GENERAL TROUBLESHOOTING INFORMATION

Before Troubleshooting

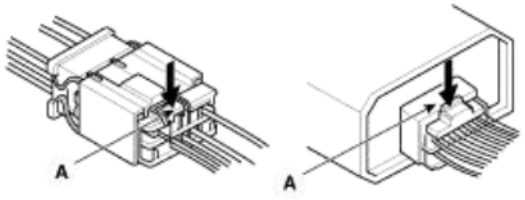
1. Check applicable fuses in the appropriate fuse/relay box.
2. Check the battery for damage, state of charge, and clean and tight connections.
   (Refer to the EE group - "Battery")

> **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.

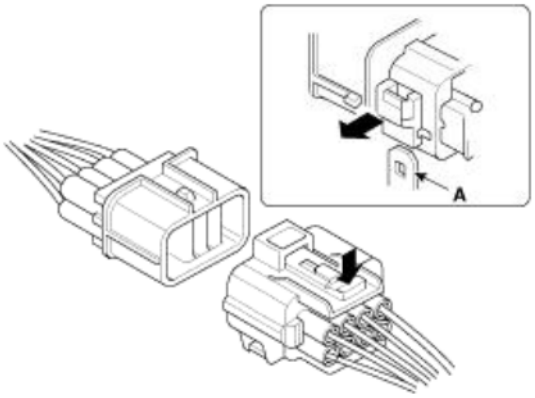
3. Check the alternator belt tension.

Handling Connectors

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).

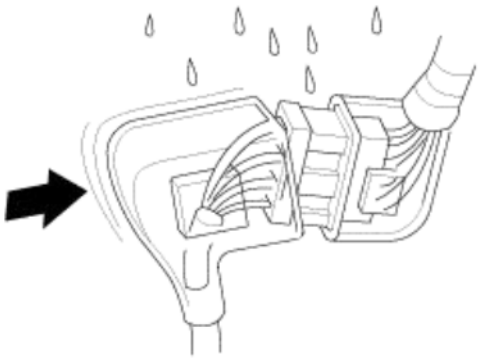


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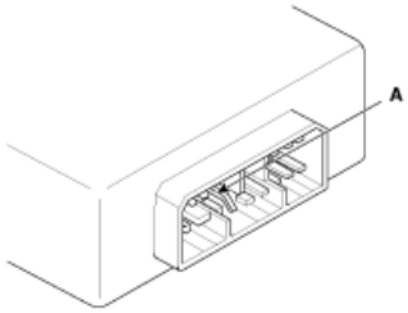
6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.

English ▼

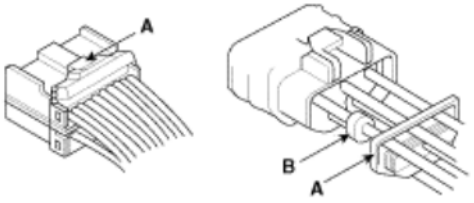
7. Always reinstall plastic covers.



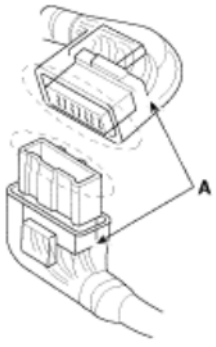
8. Before connecting connectors, make sure the terminals (A) are in place and not bent.



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



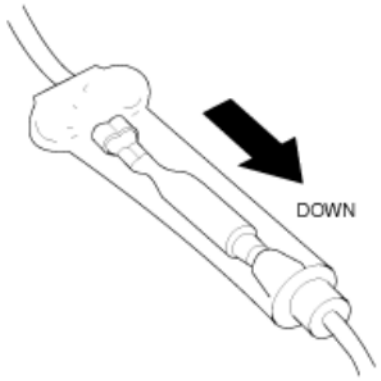
10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



11. Insert the connector all the way and make sure it is securely locked.

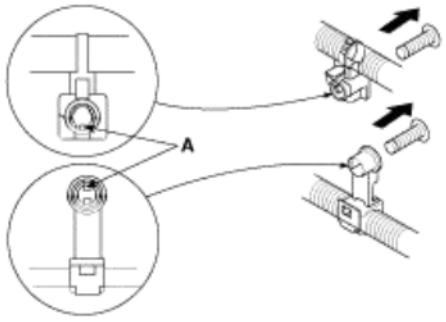
12. Position wires so that the open end of the cover faces down.

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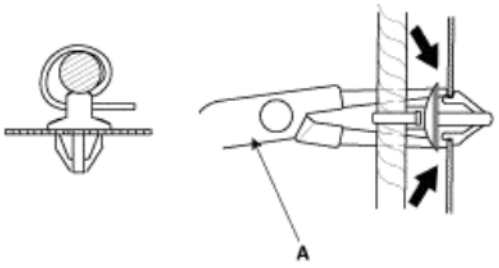


Handling Wires And Harnesses

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).

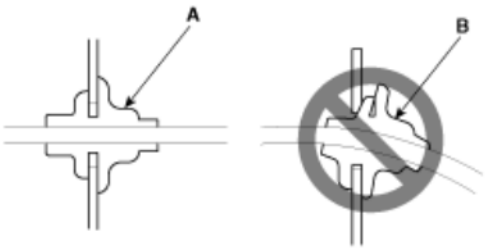


3. Slip pliers (A) under the clip base and through the hole at an angle, and then squeeze the expansion tabs to release the clip.



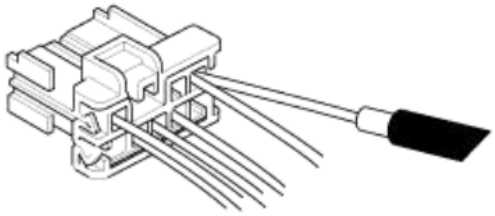
4. After installing harness clips, make sure the harness doesn't interfere with any moving parts.
5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
6. Seat grommets in their grooves properly (A). Do not leave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

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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 remover tool with a tapered tip.



Refer to the user's guide in the wiring repair kit II (Pub. No. : 0K000 003 A05)

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.

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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 in 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
Power window	Whenever the window cannot be properly closed or opened. Whenever the battery is discharged or the related fuse is replaced or reinstalled, reset the power window system according to the procedure below. 1. Turn the ignition switch to the ON position. 2. Push up the power window switch until the window glass is entirely down and then push up continuously for about 1 sec.
Sunroof	Whenever the vehicle battery is disconnected or discharged, or you use the emergency handle to operate the sunroof, you have to reset your sunroof system as follows : 1. Turn the ignition key to the ON position and then close the sunroof completely. 2. Release the sunroof control lever. 3. Press and hold the CLOSE button for more than 10 seconds until the sunroof closed and it has moved slightly. 4. Release the sunroof control lever. 5. Press and hold the CLOSE button once again within 3 seconds until the sunroof does as follows; • Tilt down → Slide Open → Slide Close Then release the lever. 6. Reset procedure of sunroof 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	When the battery is disconnected and reconnected, the clock becomes initialized. So, the clock should be reset. (Refer to the owner's manual)
Audio	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.
Heater & Air Conditioner	When the battery is disconnected and reconnected, the heater and A/Con become initialized. So, heater and A/Con should be reset.

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SPECIAL SERVICE TOOLS

Tool (Number and Name)	Illustration	Application
RKE Battery Checker (09954-2P100)		Measuring the RKE battery voltage

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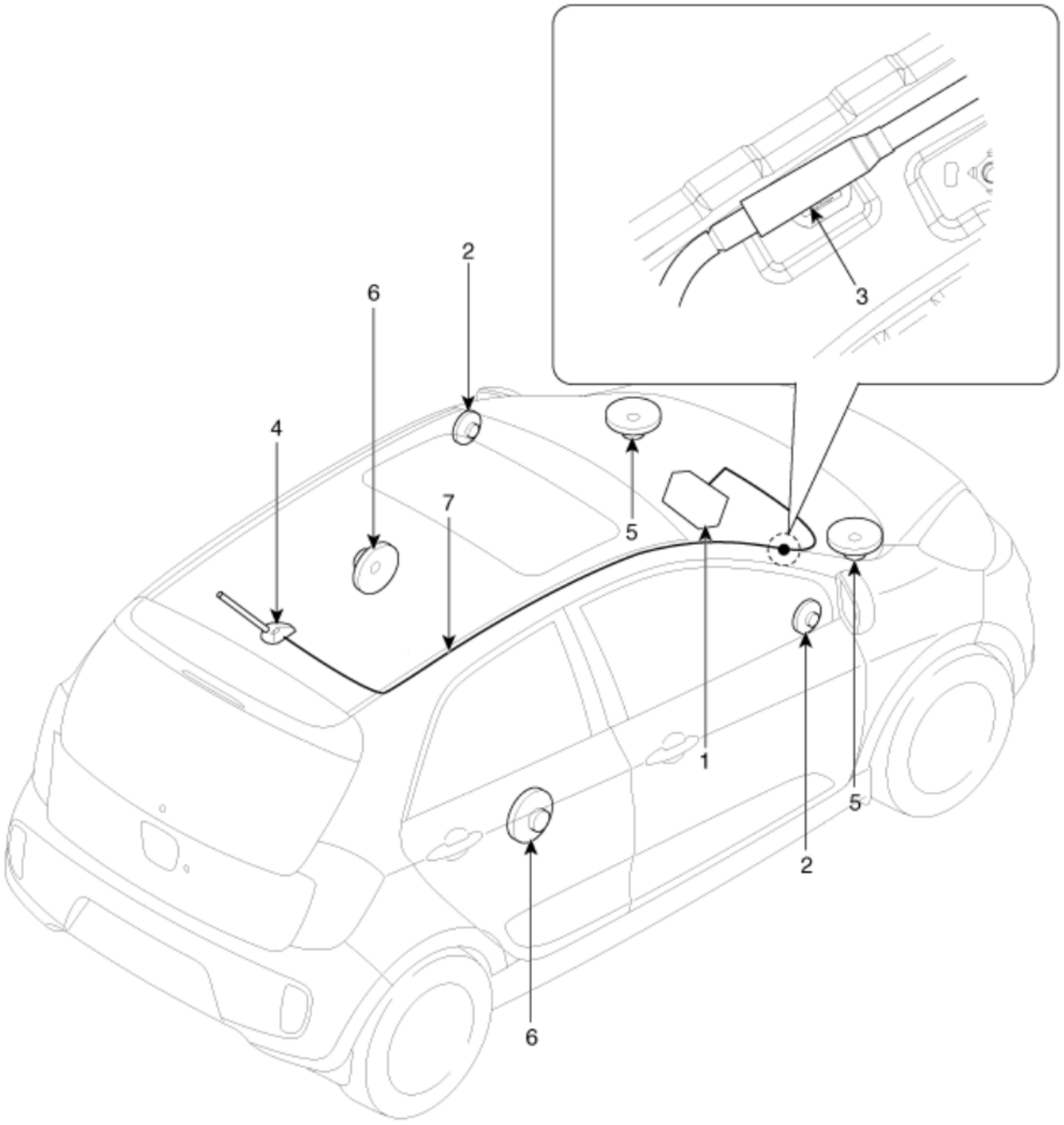
SPECIFICATION

Audio Unit

Item		Specification
Model		RADIO/CDP/MP3 (AM100)
Power supply		DC 14.4V
Power supply		Max. 43 W x 4 : 14 V
Impedance (Ω)		4Ω x 4
Tuning type		PLL synthesized type
Other		Internal amplifier
Frequency range	FM	87.5~108 MHz/ 100KHz (General), 50KHz (Middle East)
		87.5~108 MHz/ 100KHz (Aus)
		87.5~107.9 MHz/ 100KHz (Colombia)
	AM	522~1620 KHz/ 9KHz (General)
		531~1602 KHz/ 9KHz (Middle East)
		531~1602 KHz/ 9KHz (Aus)
		530~1710 KHz/ 10KHz (Colombia)

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COMPONENT LOCATION

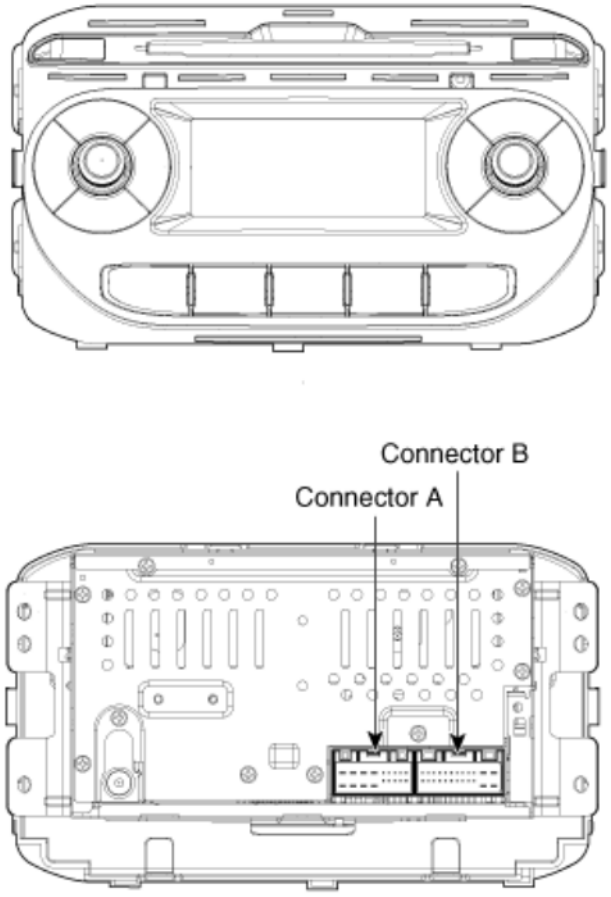


1. Audio unit 2. Tweeter speaker 3. Antenna cable connector 4. Roof antenna (Radio)	5. Front speaker 6. Rear door speaker 7. Antenna feeder cable

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COMPONENTS

[Radio/CDP/MP3(AM100)]





Connector A Connector B

NO	Connector A	Connector B
1	Speaker RL+	-
2	Speaker FL+	-
3	Speaker FR+	-
4	Speaker RR+	Steering remote

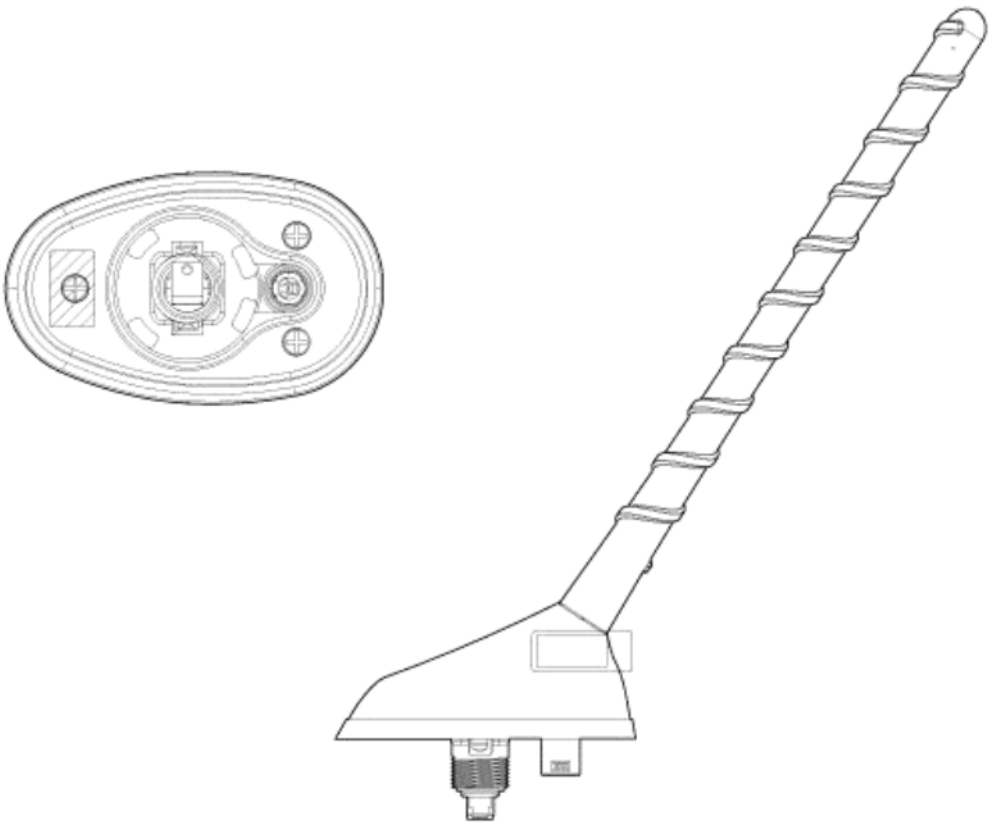
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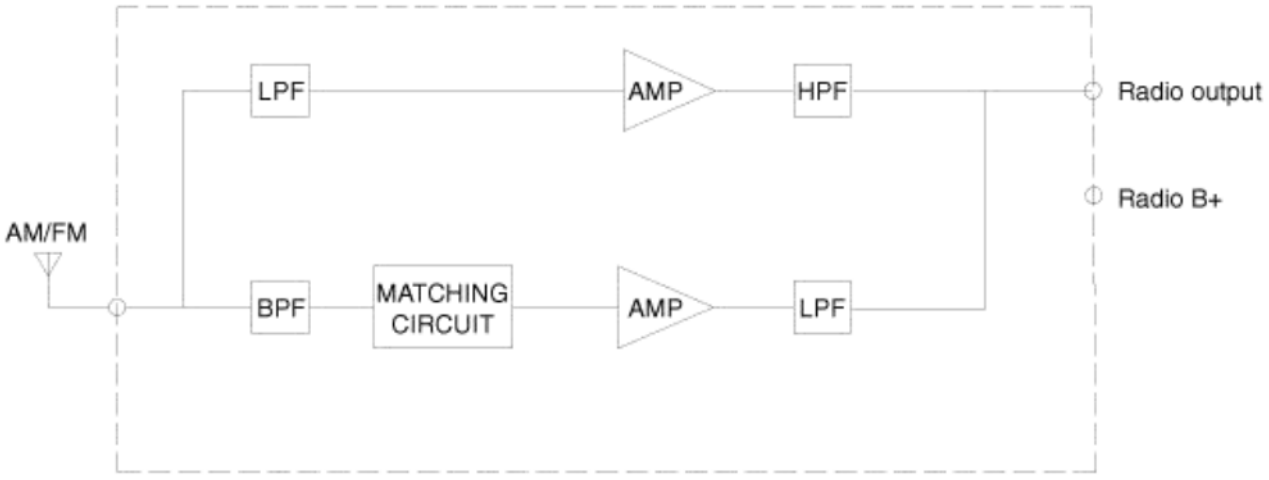
English ▼

5	-	-
6	-	USB D+
7	-	USB/iPod VDD
8	Illumination +	AUX IN R
9	-	AUX GND
10	Speaker RL-	MIC+
11	Speaker FL-	ACC
12	Speaker FR-	B+
13	Speaker RR-	-
14	-	-
15	-	-
16	-	Vehicle speed
17	Illumination -	Remote GND
18	Remote antenna	USB D-
19		USB/iPod GND
20		AUX Detect
21		AUX IN L
22		MIC-
23		-
24		GND(power)

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[Roof Antenna]





※ LNA (Low Noise Amplifier)
BPF (Band Pass Filter)

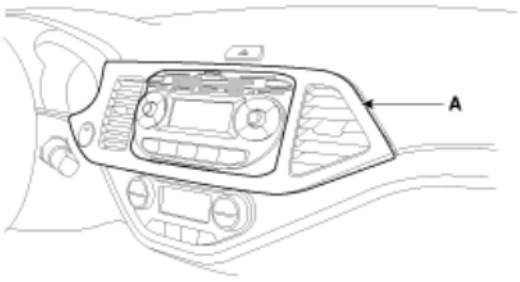
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REMOVAL

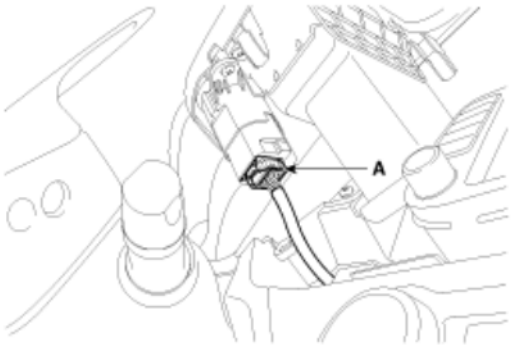
NOTICE

- Take care not to scratch the center fascia panel and related parts.
- Eject all the disc before removing the audio unit to prevent damaging the CD player's load mechanism.

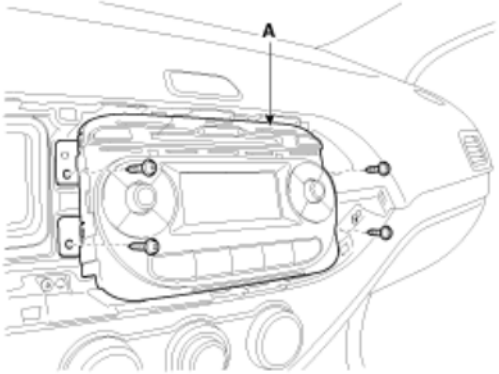
1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, remove the center fascia panel (A).
   (Refer to the BD group - "Crash pad")



3. Remove the connector (A).

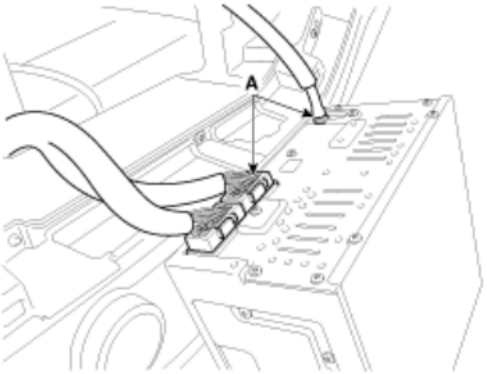


4. Remove the audio head unit (A) with loosening 4 screws.



5. Remove the audio with disconnecting audio connectors and antenna cables (A).

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NOTICE

If the CD does not eject, do not attempt to remove it because the audio unit may be damaged. Contact an authorized dealership for assistance.

INSTALLATION

1. Connect the audio unit connectors and cables.
2. Install the audio unit.
3. Install the center fascia panel.
4. Install the crash pad garnish.
5. Connect the battery (-) terminal.

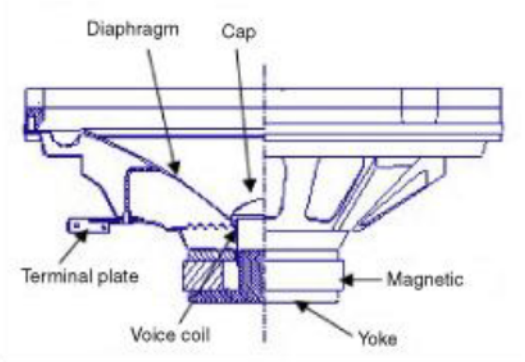
NOTICE

Make sure the audio head unit connectors are plugged in properly and the antenna cable is connected properly.

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INSPECTION

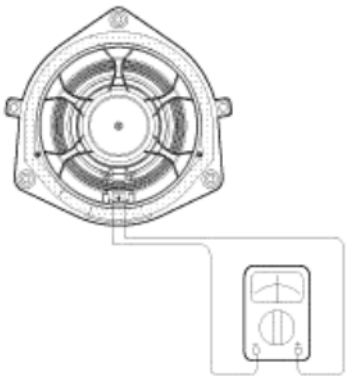
1. Troubleshooting for Speaker
   (1) Basic inspection of speaker
   Inspect the sound from speaker after verifying that the speaker mounting screws are removed and the wiring connector is connected to remove any possible vibration transmitted from body trims and surrounding parts.



   (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) In case of radio static, check if there is a noise from CD. 3) If a noise is heard with the radio and CD on, replace the speaker with new one. **NOTICE** In case there is only radio static, this may be the cause of the poor radio reception. Thus the speaker needs no repair and replacement.
3	Speaker in operative	Inspection of the wiring connection between the battery and the speaker 1) Before replacing the speaker, inspect the wiring connection between the battery and the speaker is normal. 2) Check the supply power to the speaker and the resistance, then inspect the sound quality. ■ Specified impedance : 2 ~ 4Ω

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3) If the speaker works poorly, replace it with new one.

⚠ CAUTION

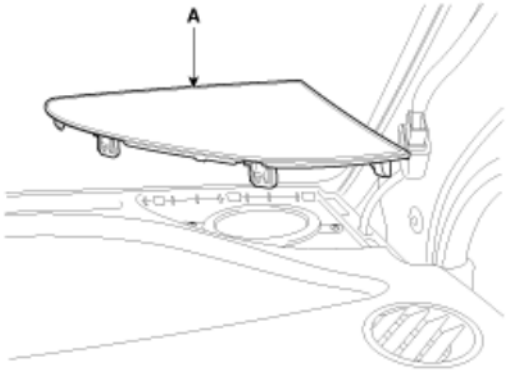
When handling the speakers:

- Do not damage the speaker with impact, like dropping or throwing it.
- Be careful not to drop water and oil on the speakers.
- Caution during handling of speaker because the material of diaphragm is paper which is easily torn by impact or external force.
- Modifying the audio system may cause damage to the speakers. If this is the case, the speakers are not covered by the manufacturer's warranty.

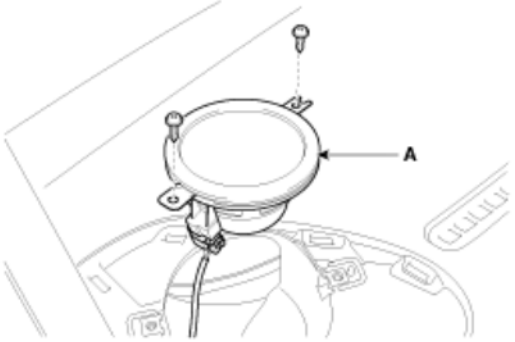
REMOVAL

Front Speaker

1. Remove the crash pad side speaker grill (A).



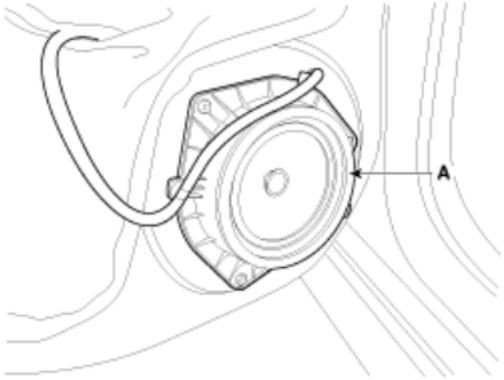
2. Remove the front speaker (A) after loosening 2 screws.



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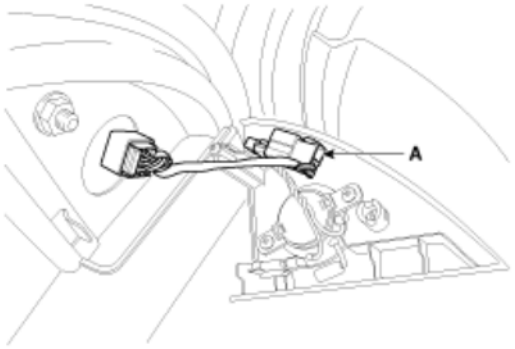
Rear Speaker

1. Remove the rear door trim panel and speaker connector.
   (Refer to the BD group - "Rear door")
2. Remove the rear speaker (A) after removing 3 rivets.

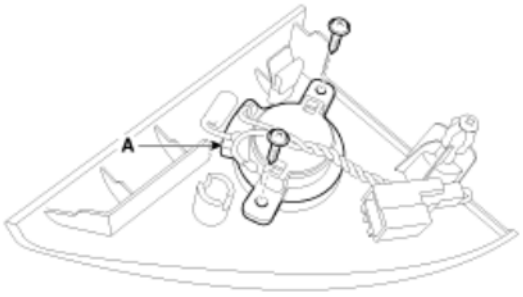


Tweeter speaker

1. Disconnect the connector (A) after removing the front door delta cover.
   (Refer to the BD group - " Front Door")



2. Remove the tweeter speaker (A) after loosening 2 screws.



INSTALLATION

Front Speaker

1. Install the front speaker.
2. Install the crash pad side speaker grill.

Rear Speaker

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

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Tweeter speaker

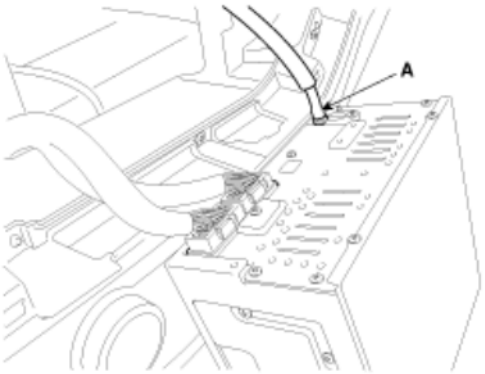
1. Connect the connector.
2. Install the tweeter speaker and front door delta cover.

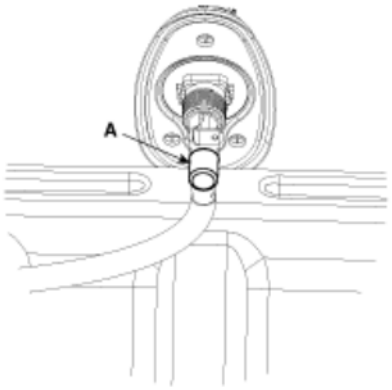
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INSPECTION

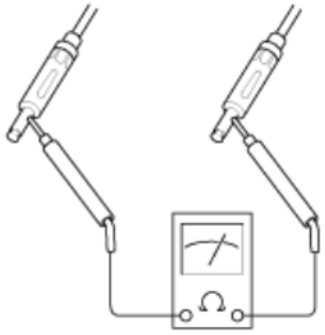
Antenna Cable

1. Remove the antenna jack (A) from the audio unit and antenna.



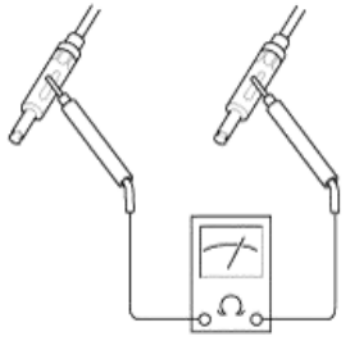


2. Check for continuity between the center poles of antenna cable.

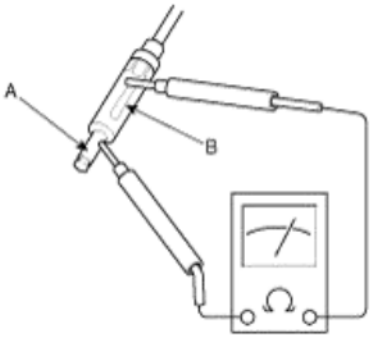


3. Check for continuity between the outer poles of antenna cable. There should be continuity.

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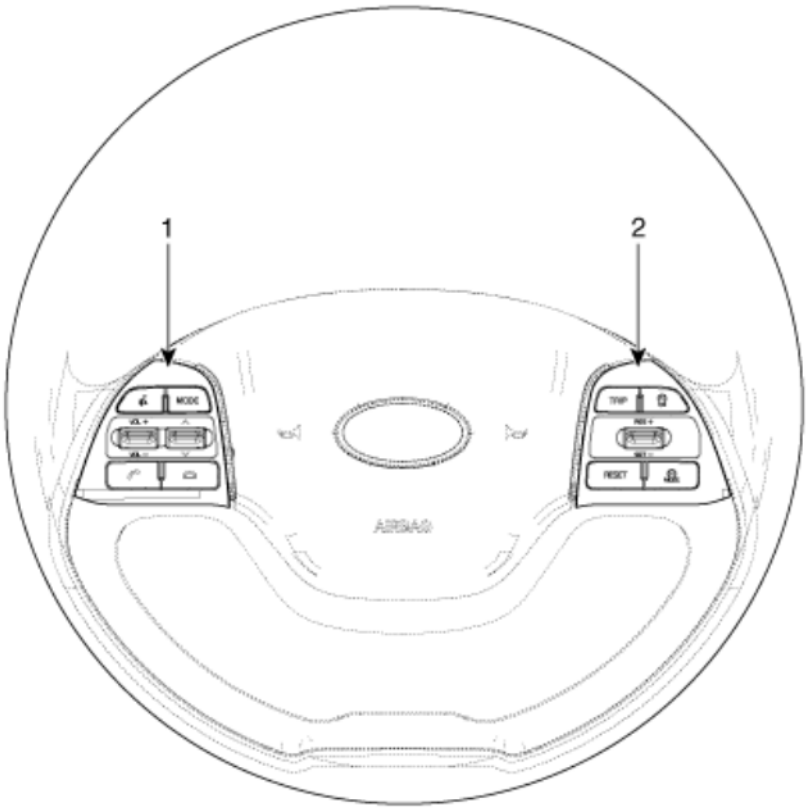
4. If there is no continuity, replace the antenna cable.
5. Check for continuity between the center pole (A) and outer pole (B) of antenna cable. There should be no continuity.



6. If there is continuity, replace the antenna cable.

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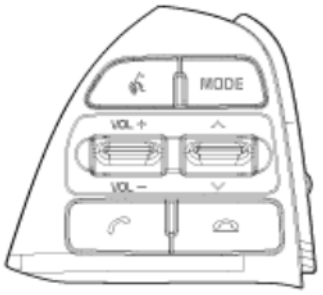
COMPONENT LOCATION



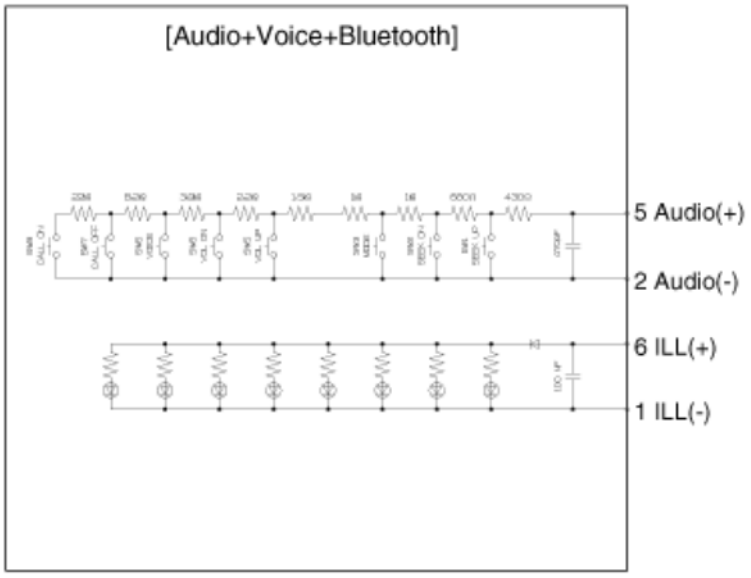
1. Remote control switch(LH)	2. Remote control switch(RH)

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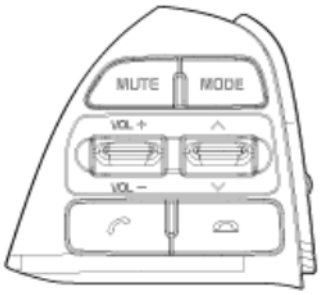
CIRCUIT DIAGRAM

[Audio+Voice+Bluetooth]	Connector
	

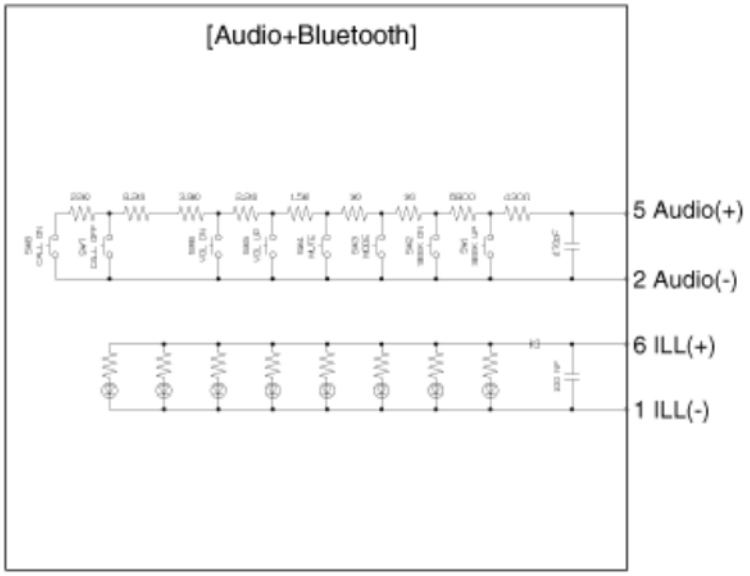
No.	Description
1	Illumination (-)
2	Audio (-)
3	-
4	-
5	Audio (+)
6	Illumination (+)



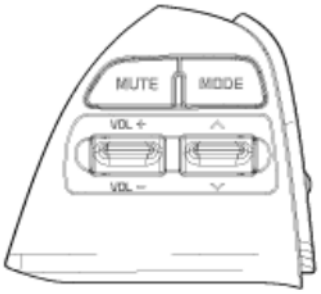
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[Audio+Bluetooth]	Connector
	

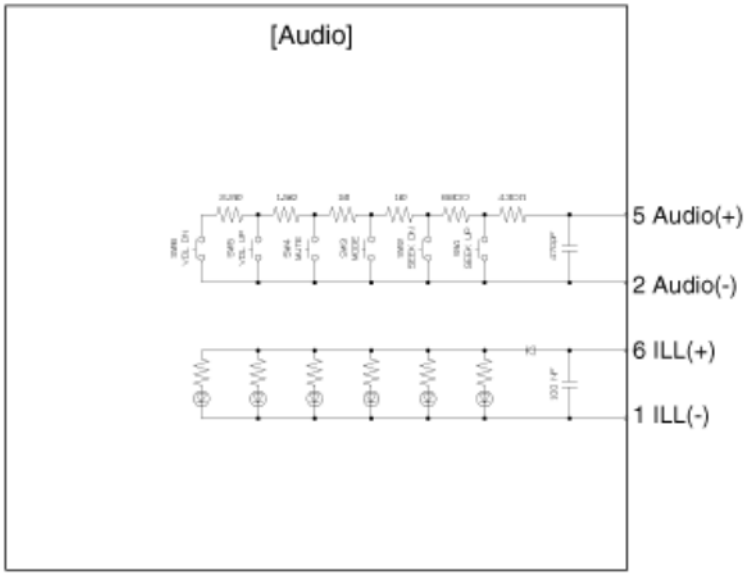
No.	Description
1	Illumination (-)
2	Audio (-)
3	-
4	-
5	Audio (+)
6	Illumination (+)



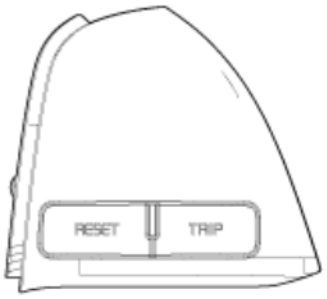
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[Audio]	Connector
	

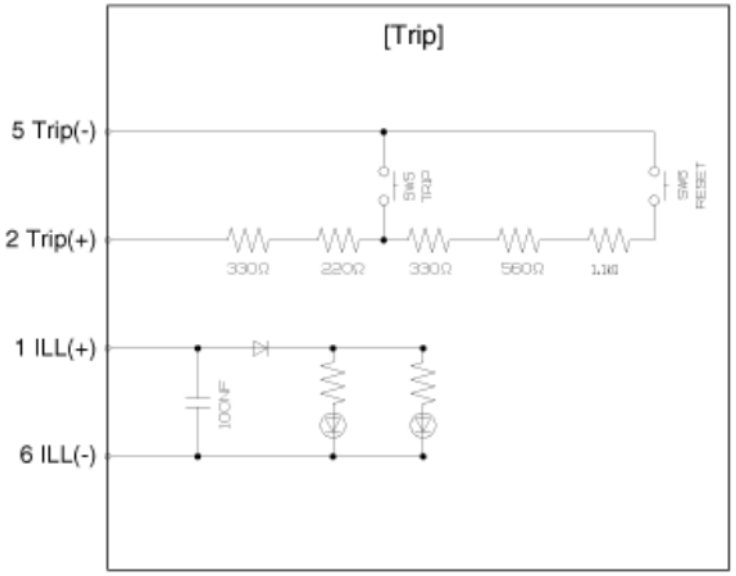
No.	Description
1	Illumination (-)
2	Audio (-)
3	-
4	-
5	Audio (+)
6	Illumination (+)



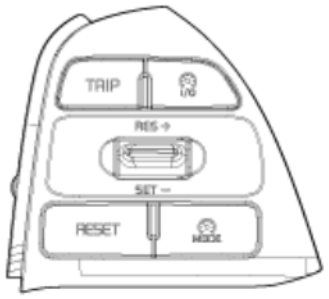
cardiagn.com

[Trip]	Connector
	

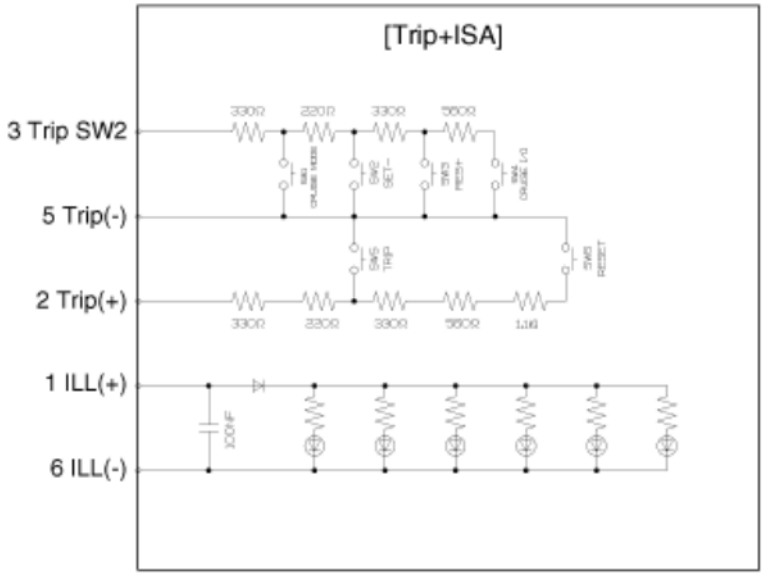
No.	Description
1	Illumination (+)
2	Trip (+)
3	-
4	-
5	Trip (-)
6	Illumination (-)



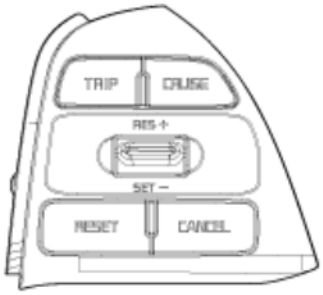
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[Trip+ISA]	Connector
	

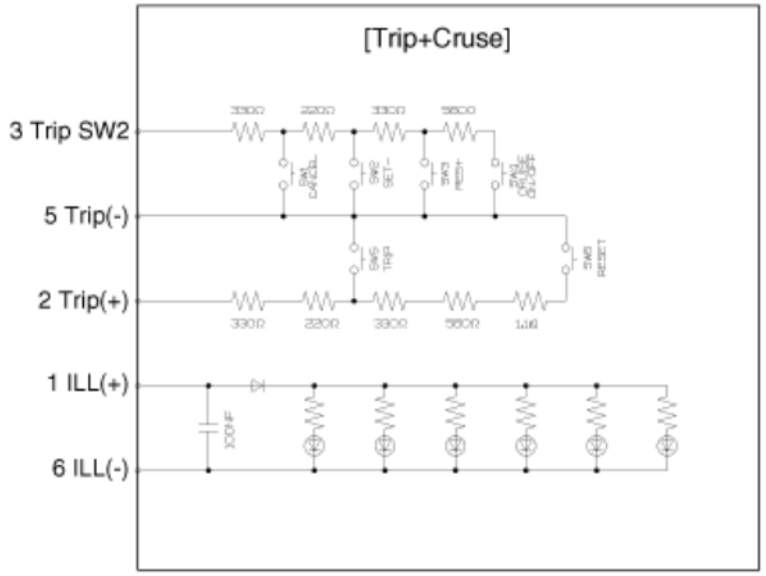
No.	Description
1	Illumination (+)
2	Trip (+)
3	Trip Switch 2
4	-
5	Trip (-)
6	Illumination (-)



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[Trip+Cruse]	Connector
	

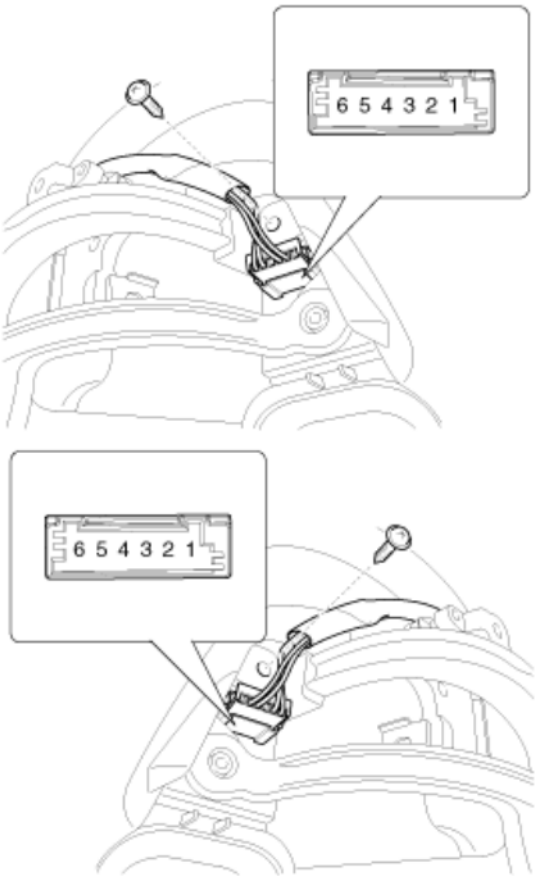
No.	Description
1	Illumination (+)
2	Trip (+)
3	Trip Switch 2
4	-
5	Trip (-)
6	Illumination (-)



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INSPECTION

1. Check the audio remote control switch for resistance between connector 4 and 5 in each switch position.



[Audio (Left)]

Switch	Connector terminal	Resistance (±5%)
MUTE	4-5	2.0 kΩ
Volume up	4-5	3.5 kΩ
Volume down	4-5	5.7 kΩ

[Audio (Right)]

Switch	Connector terminal	Resistance (±5%)
SEEK up	4-5	430 Ω
SEEK down	4-5	1.1 kΩ
Mode	4-5	2.11 kΩ

[Audio + Voice (Left)]

Switch	Connector terminal	Resistance (±5%)
Mode	4-5	1.0 kΩ

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English ▼

Volume up	4-5	3.49
Volume down	4-5	5.69 kΩ
Voice	4-5	9.59 kΩ

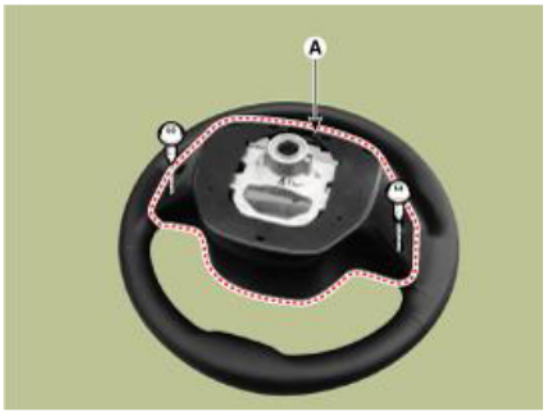
[Audio + Bluetooth (Right)]

Switch	Connector terminal	Resistance (±5%)
SEEK up	4-5	430 Ω
SEEK down	4-5	1.1 kΩ
Hang up	4-5	18.9 kΩ
Call	4-5	40.9 kΩ

REMOVAL

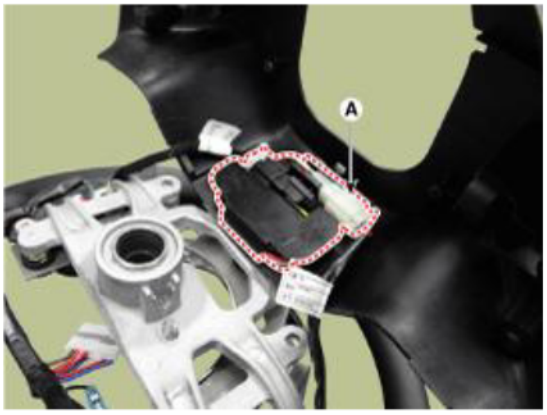
1. Disconnect the negative (-) battery terminal.
2. Remove the driver airbag module.
   (Refer to the RT group)
3. Remove the steering wheel.
   (Refer to the ST group - "Steering column & shaft")
4. Remove the steering wheel cover (A) after loosening the screws.





5. Separate the heated steering wheel connector (A) and remove the cover.

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6. Disconnect the connector (A) and remove the steering wheel remote control switch (B) after loosening the screw.

[Left]

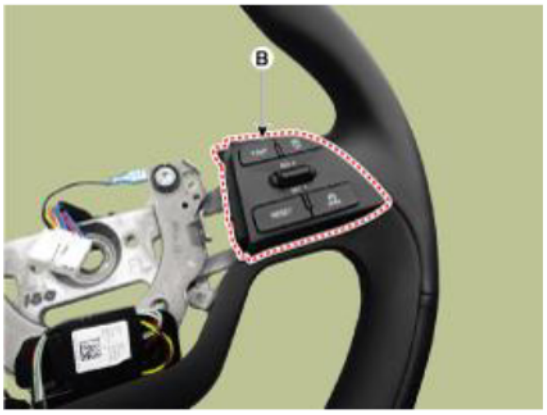




[Right]



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INSTALLATION

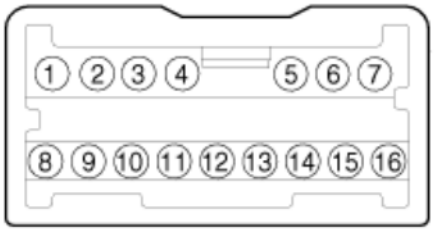
1. Install the steering wheel remote control switch after connecting the connector.
2. Connect the heated steering wheel connector.
3. Install the steering wheel cover.
4. Install the steering wheel.
5. Connect the steering remote control switch connector and airbag connector.

> **NOTICE**
>
> Make sure the audio remote control switch and the airbag module connectors are plugged in properly.

6. Install the driver airbag module.

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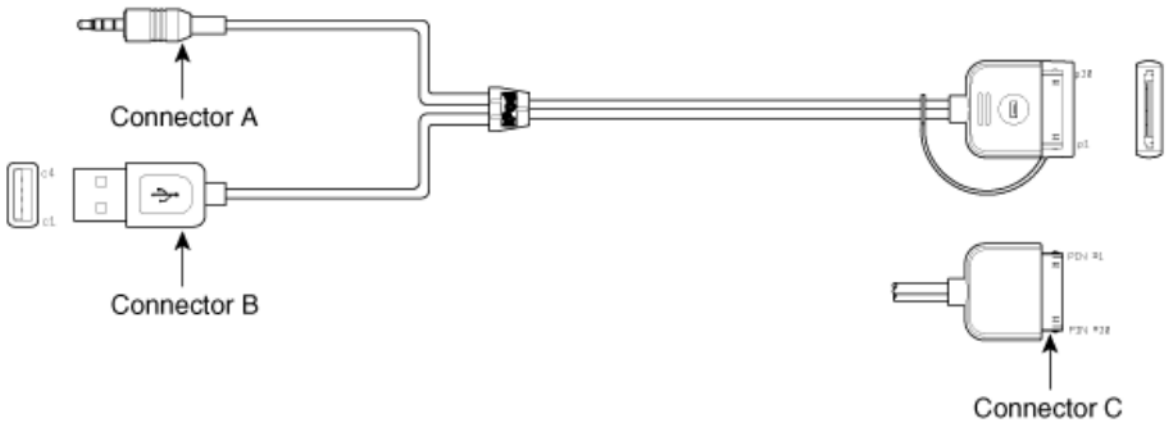
CIRCUIT DIAGRAM



No	Terminal Description	Condition	Specified Condition
1	USB /iPod power	USB/iPod device is inserted	4.9V ~ 5.1V
2	USB D-	USB device is inserted	3.2V ~ 3.45
3	USB D+	USB device is inserted	3.2V ~ 3.45
4	iPod detection line	iPod device is inserted	GND
5	-		
6	AUX Reference Ground	Always	Below 1 ohm
7	AUX Left Sound Signal	External Auxiliary device is Audio playing(At time of Aux jack use)	A waveform synchronized with sound is output
8	Rheostat from vehicle +		
9	-		
10	-		
11	Multimedia jack ground		GND
12	-		
13	-		
14	AUX Signal Input Detect	Auxiliary device is inserted	0V(Low) → 5V(High)
15	-		
16	AUX Right Sound Signal	External Auxiliary device is Audio playing(At time of Aux jack use)	A waveform synchronized with sound is output

[iPod cable]

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Connector A (4P)	
No.	Description
AUX 1	Audio L
AUX 2	Audio R
AUX 3	Video
AUX 4	Audio GND

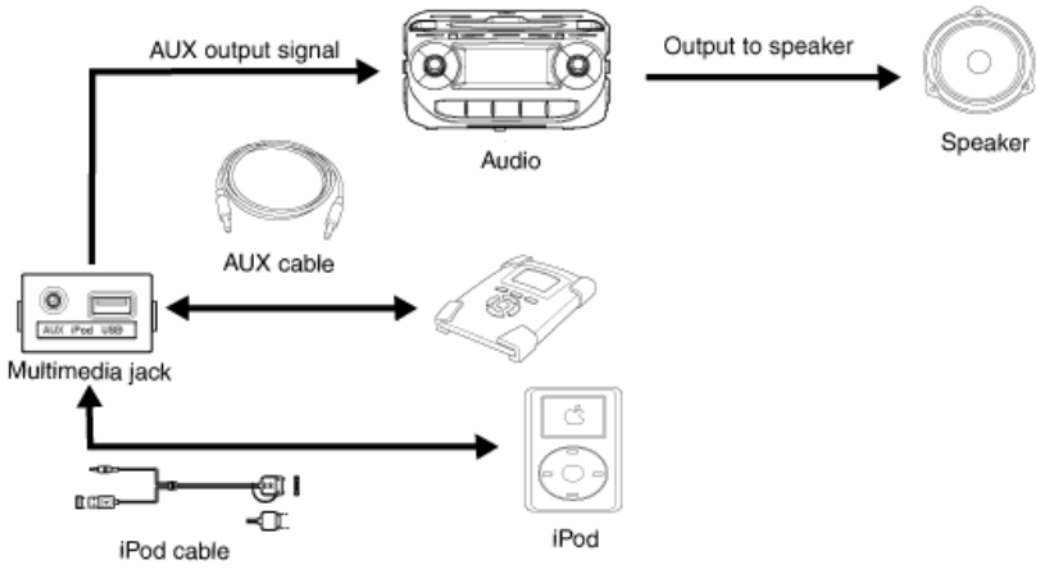
Connector B (4P)	
No.	Description
USB 1	USB/iPOD 5V
USB 2	USB D-/iPOD Rx
USB 3	USB D+/iPOD Tx
USB 4	USB/iPOD GND

Connector C (30P)			
1		16	GND
2		17	
3		18	Rx
4	D+	19	Tx
5		20	GND
6	D-	21	
7		22	
8	5V	23	Video
9		24	
10	ACC - ID	25	
11		26	
12		27	Aux - L
13		28	Aux - R
14		29	Aux - REF
15	GND	30	GND

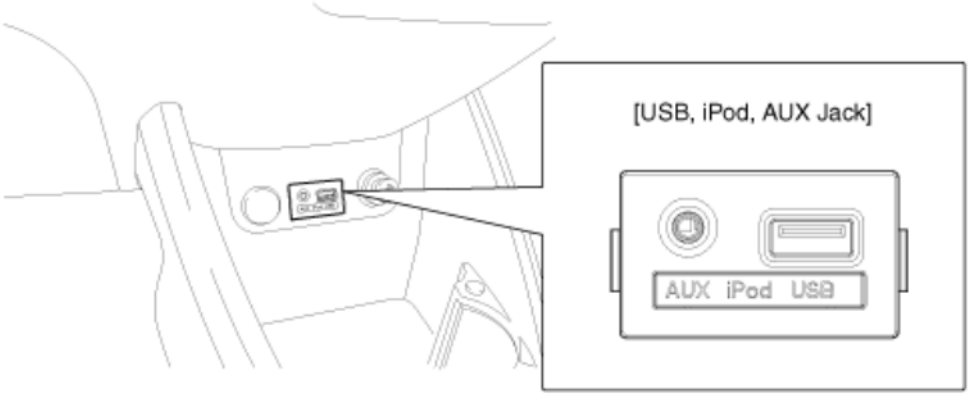
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DESCRIPTION

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.



Variable digital music players



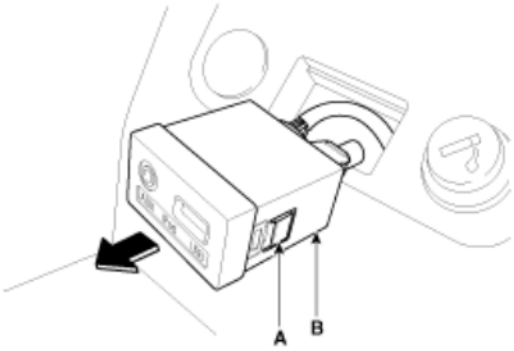
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REMOVAL

1. Remove the shift lever knob.
   (Refer to the BD group - "Console")
2. Remove the console upper cover.
   (Refer to the BD group - "Console")
3. Disconnect the connector (A) from the console upper cover.



4. Remove the multimedia jack (B) from the console under cover after releasing the fixed hooks (A).



INSTALLATION

1. Install the multimedia jack.
2. Connect the multimedia jack connector.
3. Install the console upper cover.
4. Install the shift lever knob.

NOTICE

Make sure the multimedia connector and the console upper cover connectors are plugged in properly.

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TROUBLESHOOTING

CUSTOMER COMPLAINT ANALYSIS CHECK SHEET

TROUBLE IN	☐ ALL ☐ AM ☐ FM ☐ CD ☐ MP3 ☐ CD changer ☐ AMP ☐ Others
TROUBLE OCCURS	☐ Always ☐ Engine start ☐ Engine Running ☐ Cold ☐ Warm ☐ Sometimes ☐ Most of the time ☐ Engine off
TYPE OF TROUBLE	☐ Will not play ☐ Weak ☐ Squealing noise ☐ Display/illumination poor ☐ CD skips & jumps ☐ CD will not eject or insert ☐ Others (Describe) :
OTHERS	▶ Customer complaint contents : ▶ Have you checked customer's defects :
★ Using the customer complaint analysis check sheet for reference, ask the customer for as much detail as possible about the problem.	

There are several areas where a problem can occur: wiring harness, the radio, the CD player, and speaker. Troubleshooting enables you to confine the problem to a particular area.

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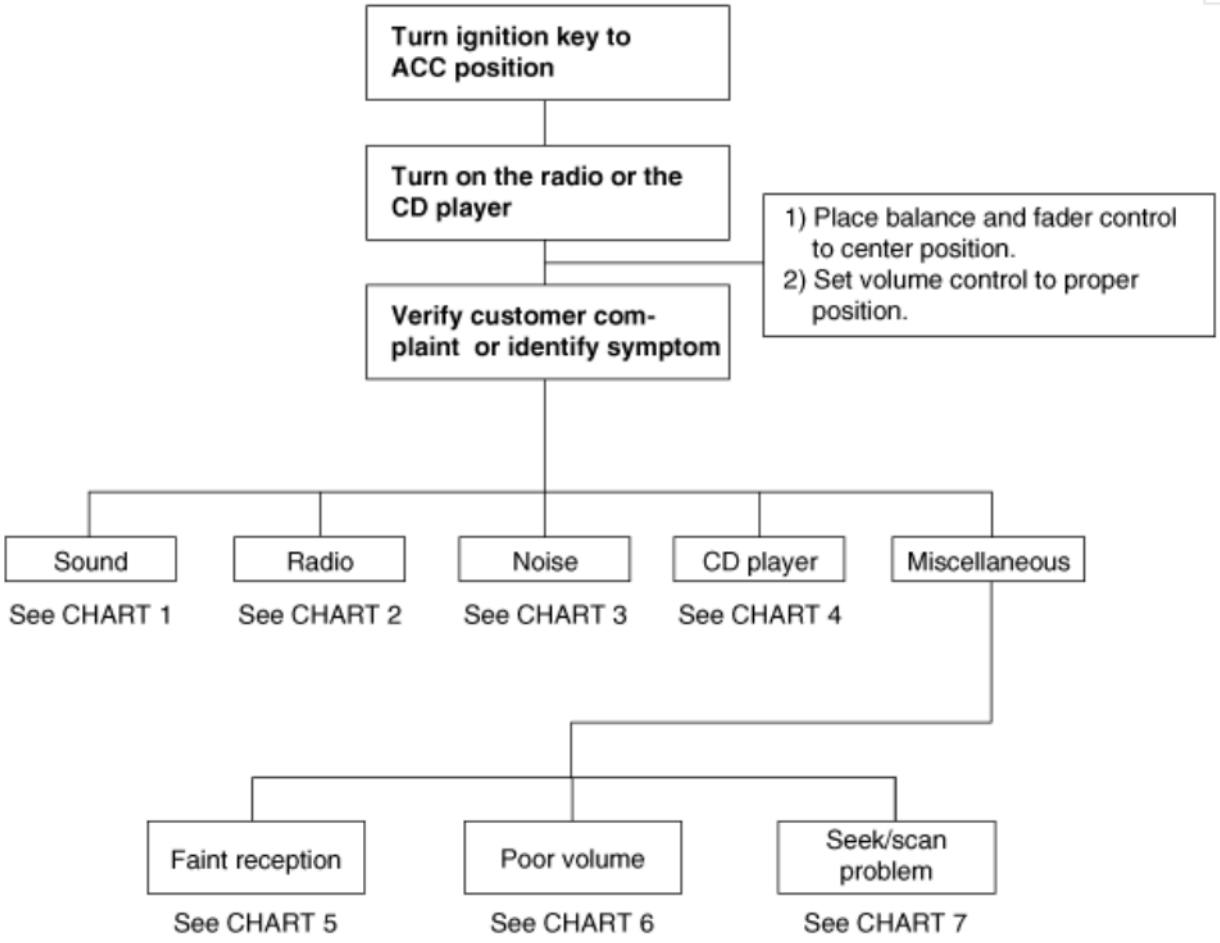
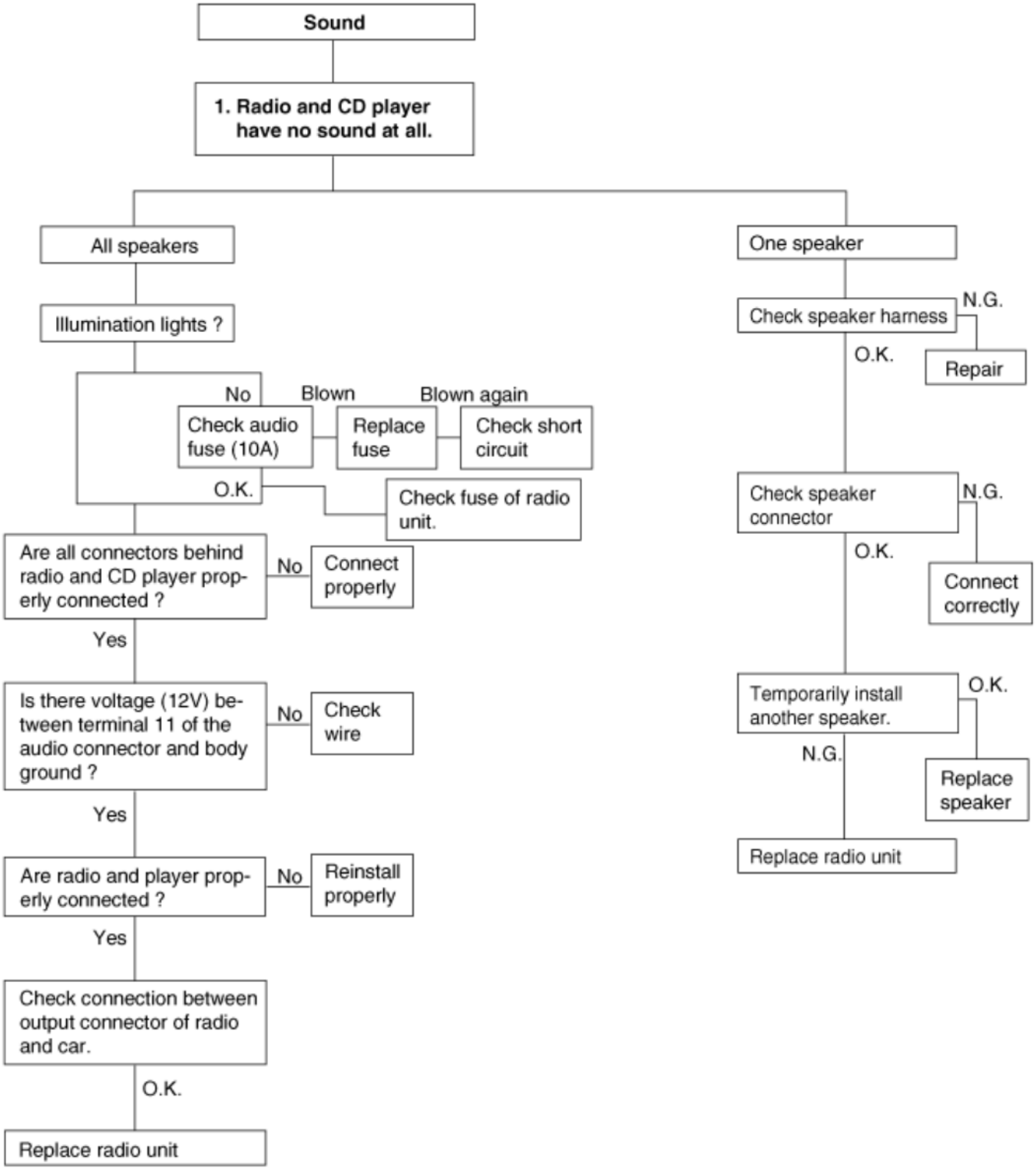


CHART 1

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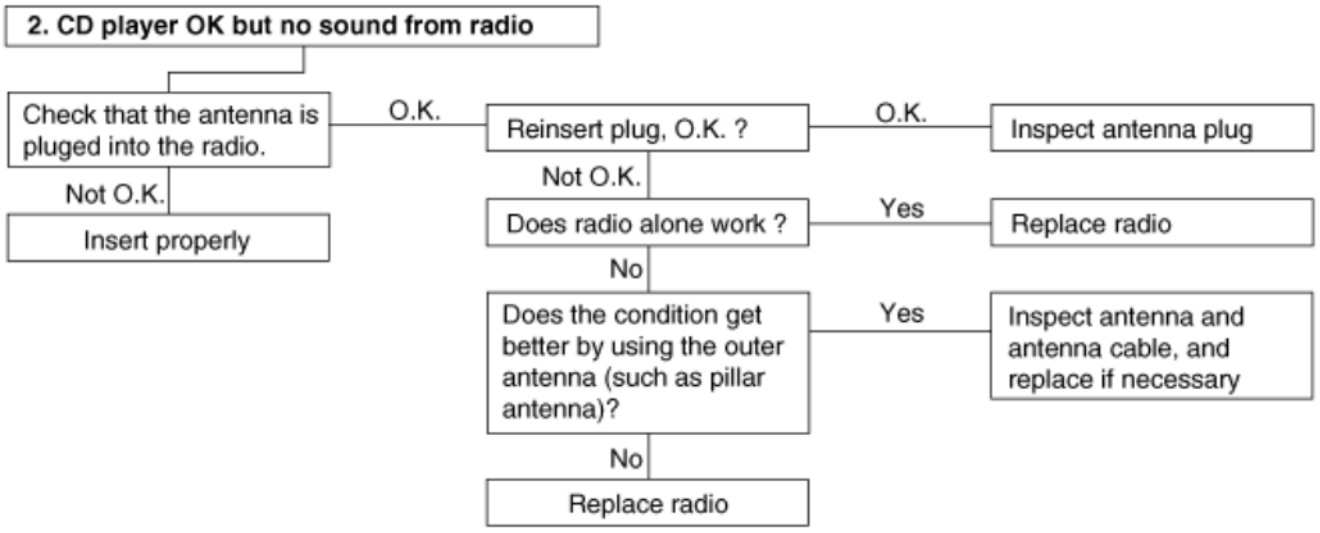


CHART 2

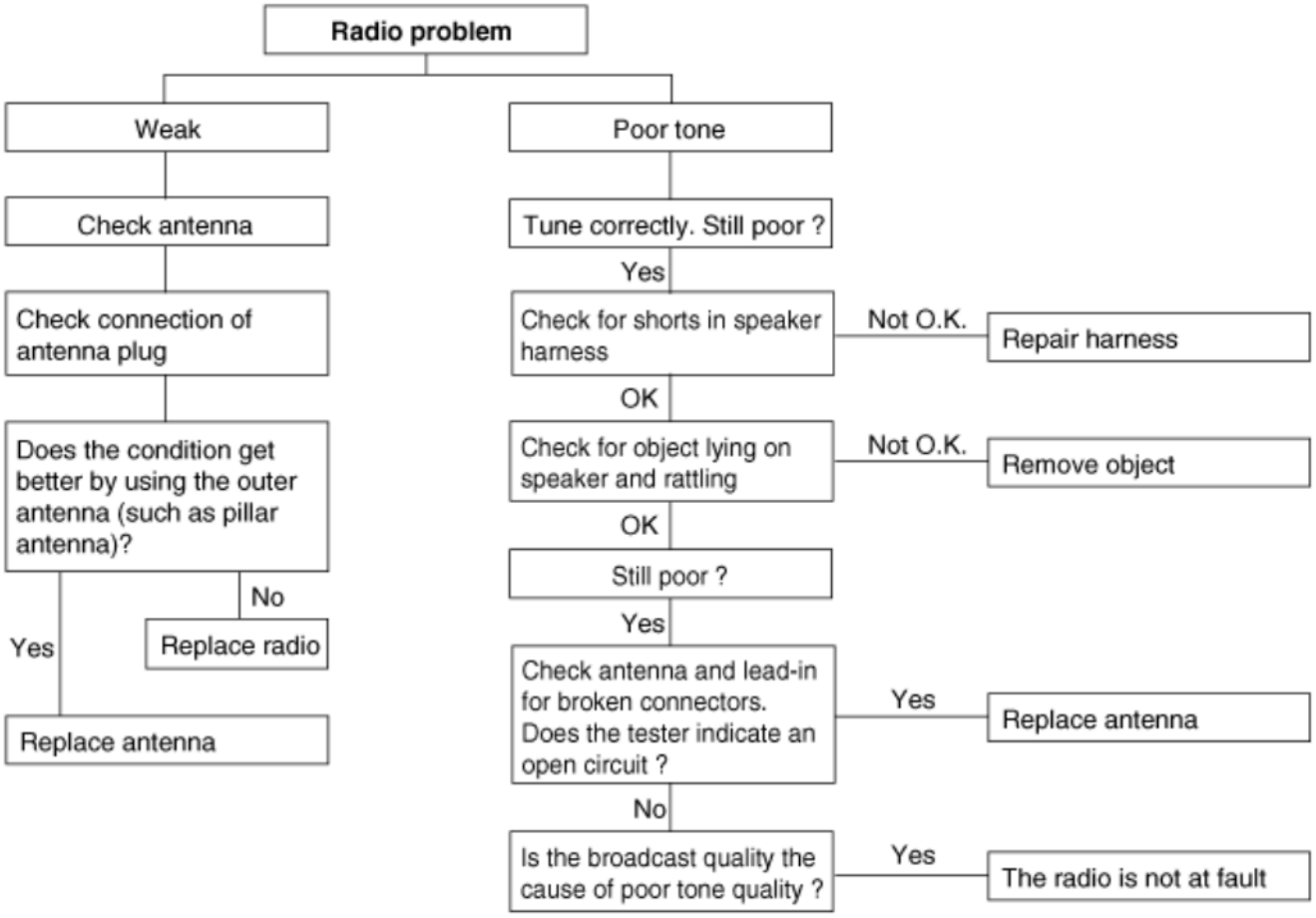


CHART 3

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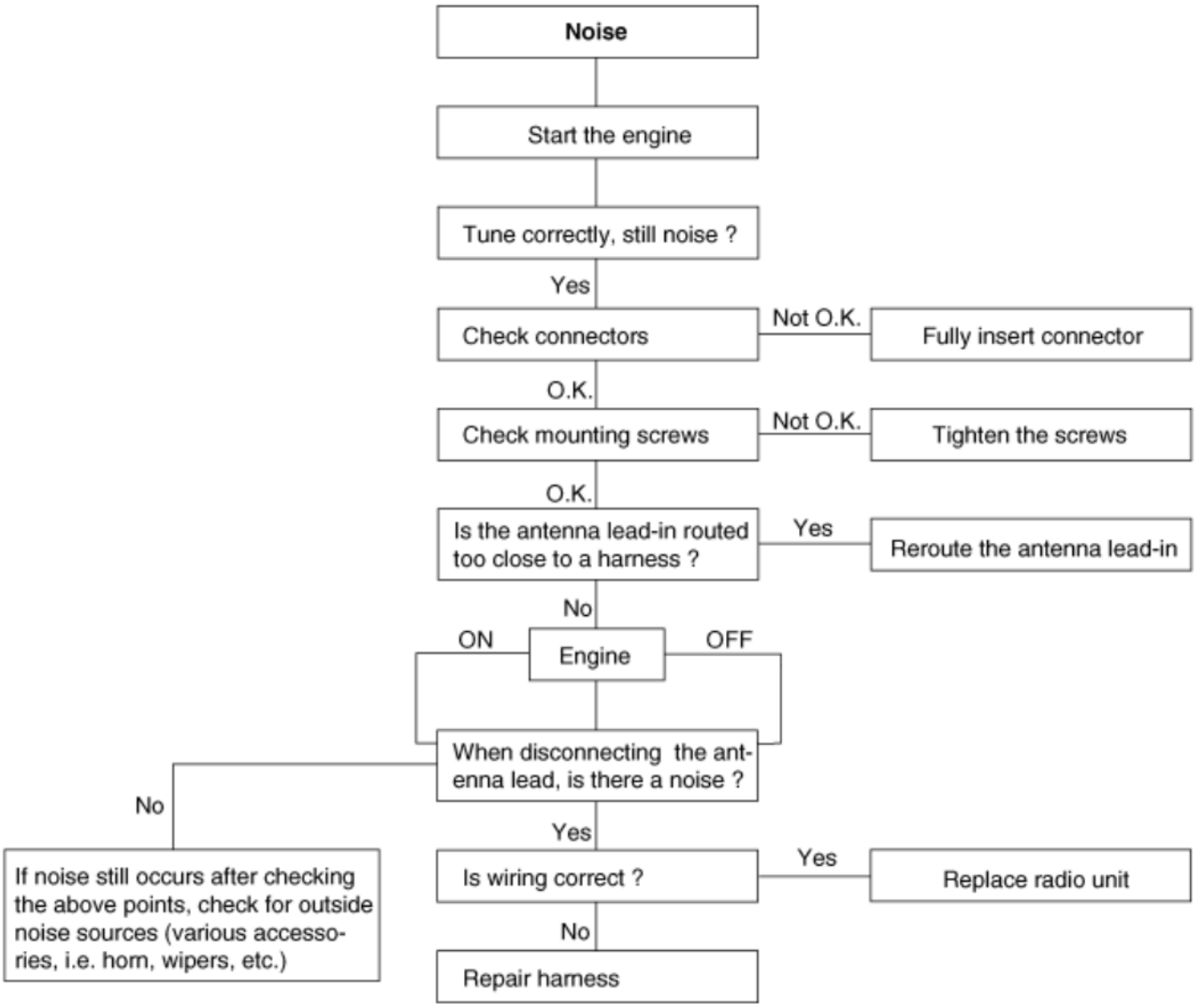
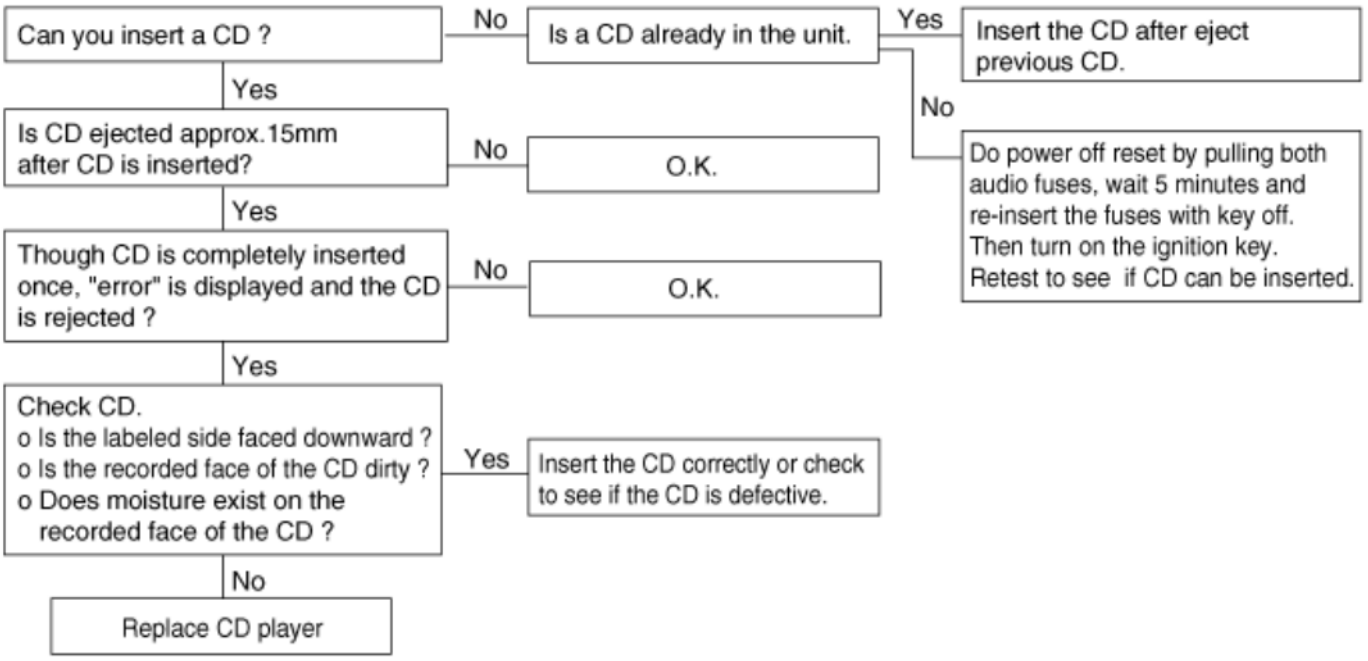


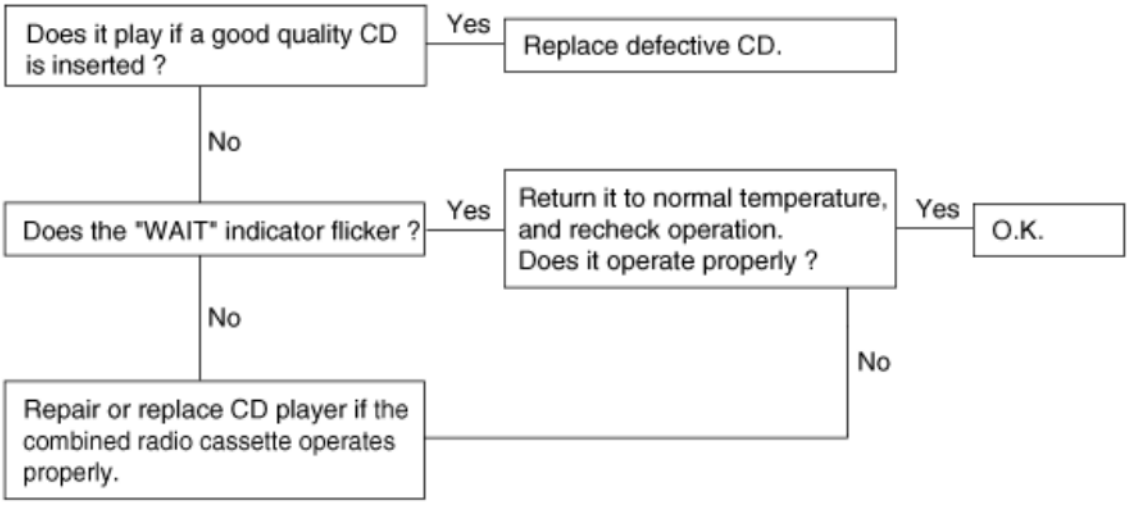
CHART 4

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1. CD WILL NOT BE ACCEPTED



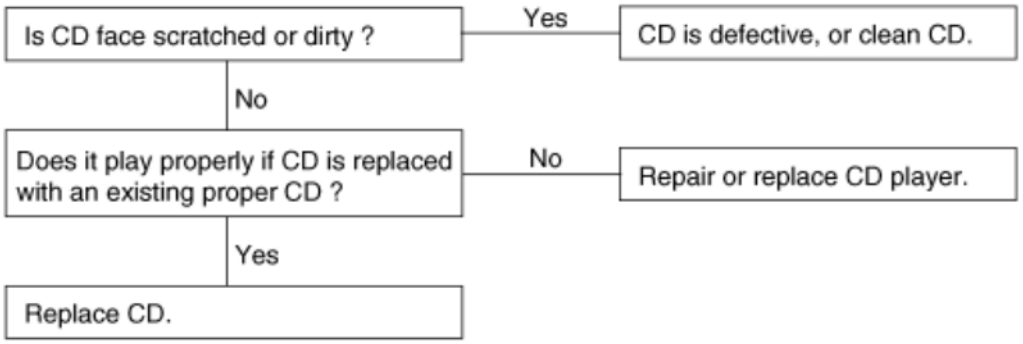
2. NO SOUND



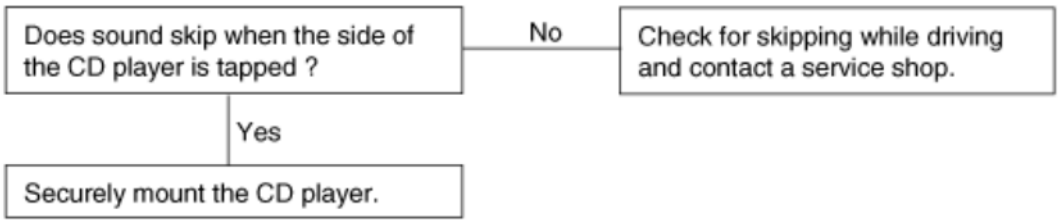
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3. CD SOUND SKIPS

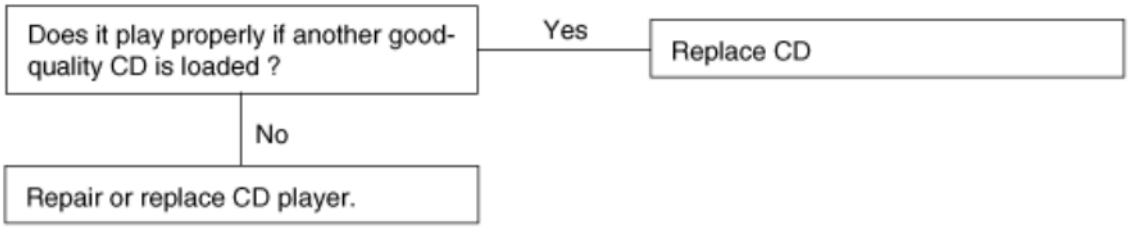
1) Sound sometimes skips when parking.



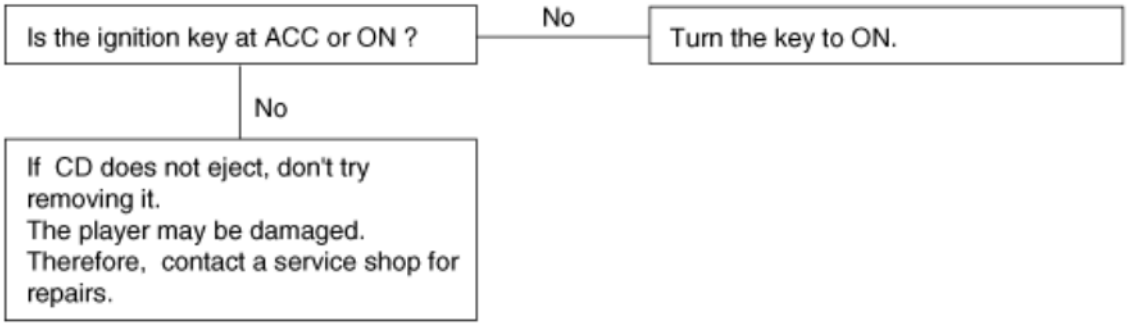
2) Sound sometimes skips when driving.
(Stop vehicle, and check it.)
(Check by using a CD which is free of scratches, dirt or other damage.)



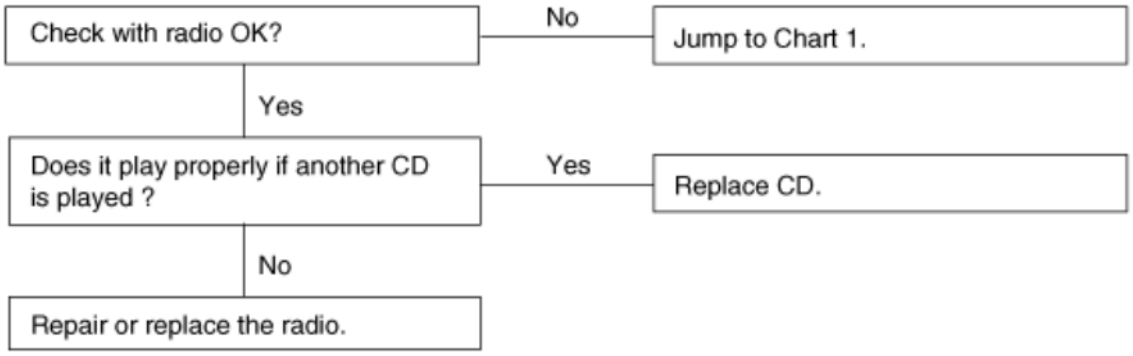
4. SOUND QUALITY IS POOR



5. CD WILL NOT EJECT



6. NO SOUND FROM ONE SPEAKER



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CHART 5

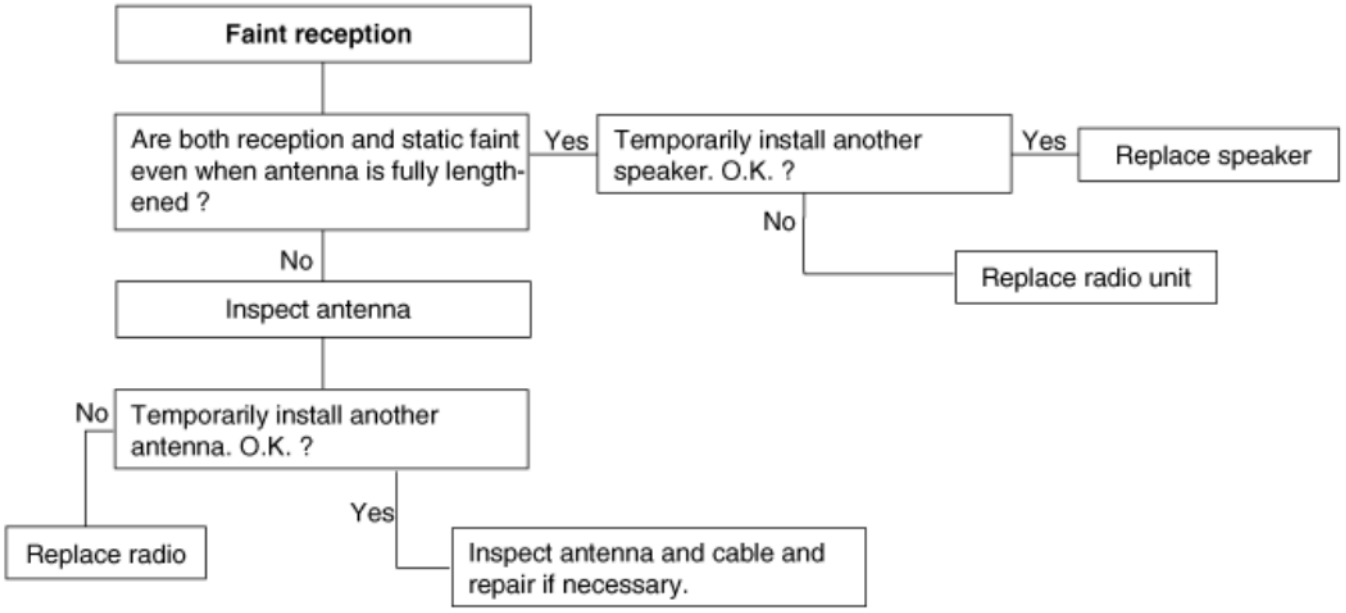


CHART 6

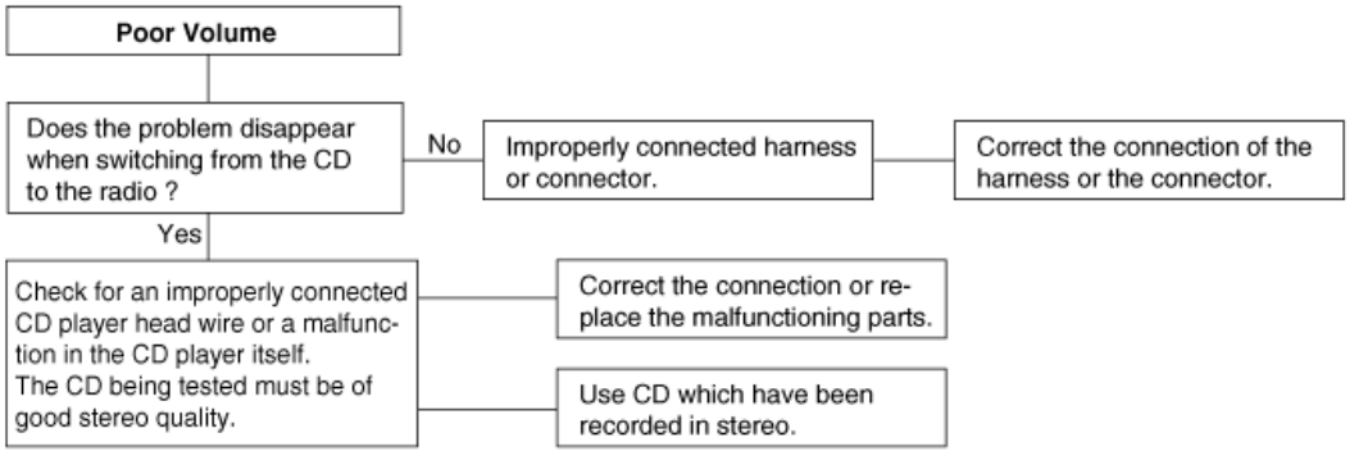
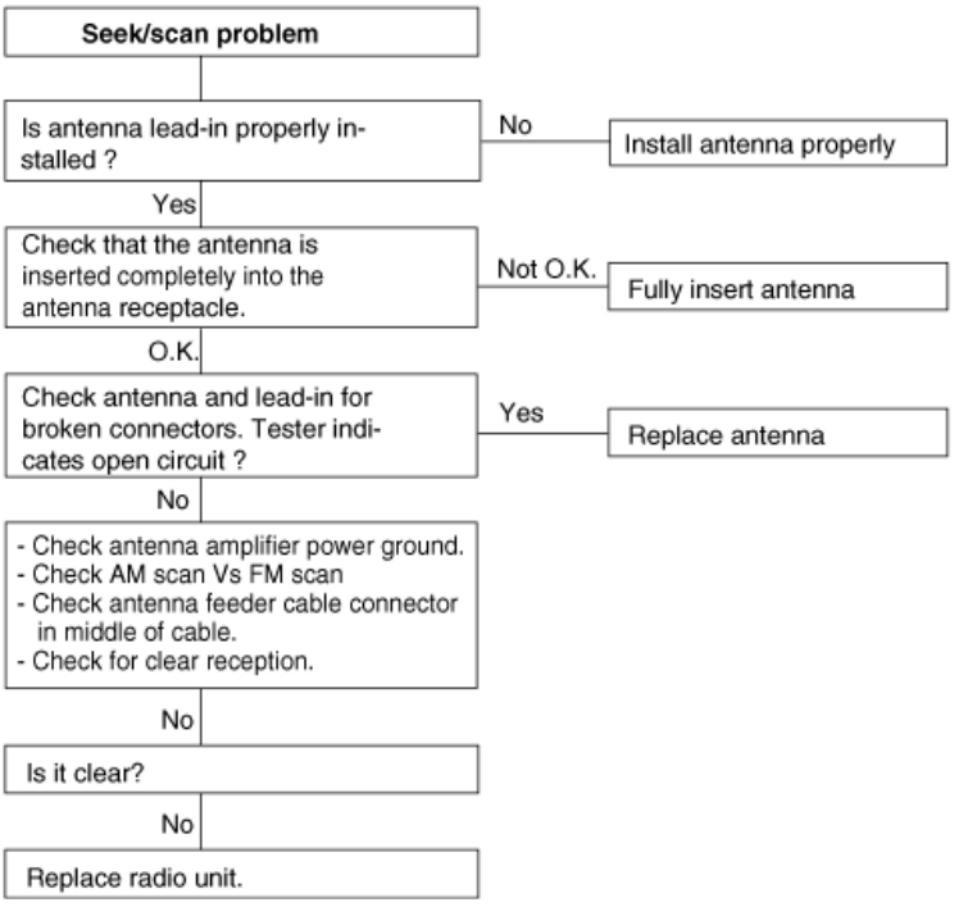


CHART 7

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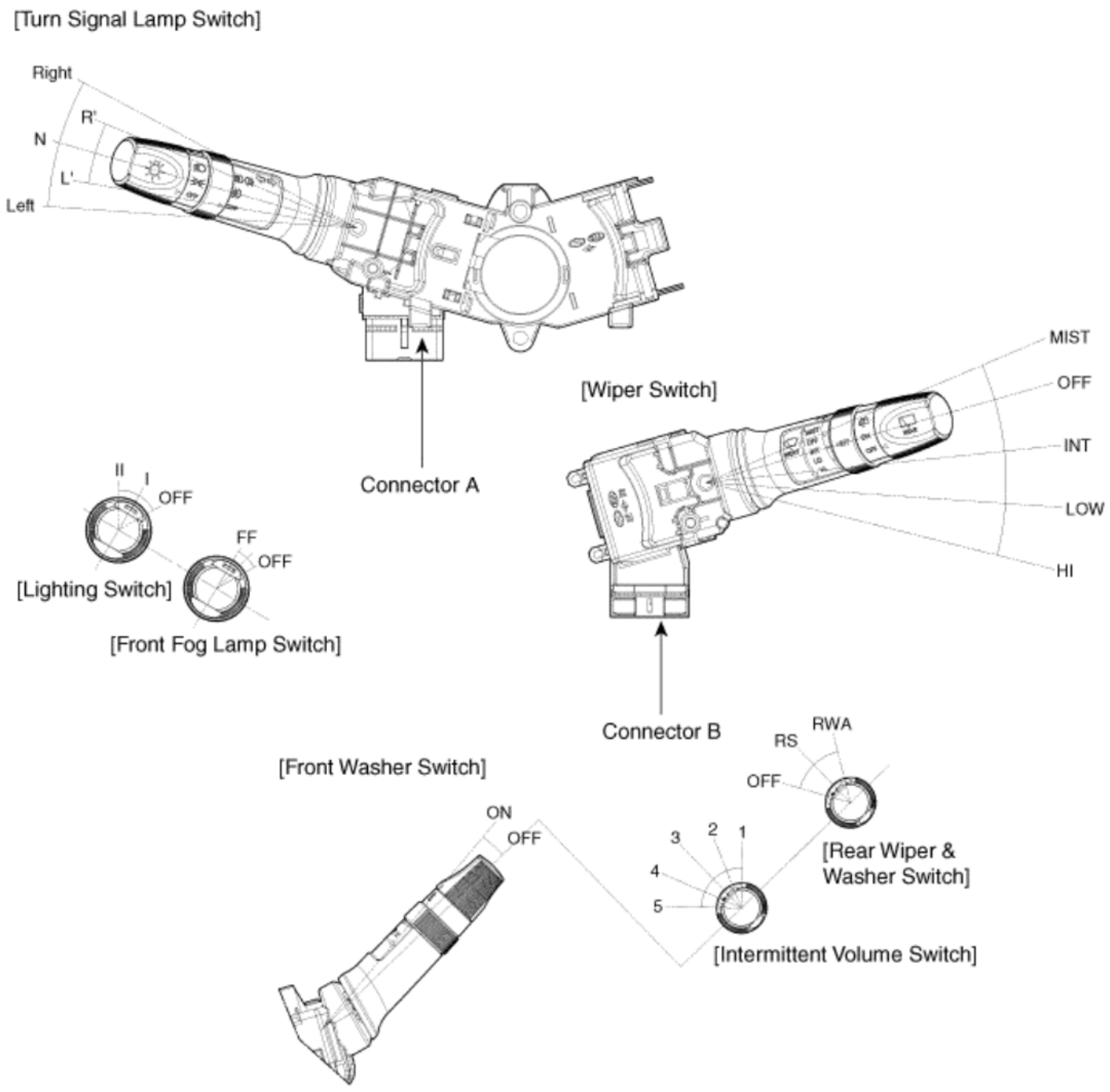
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SPECIFICATIONS

Items		Specifications
Rated voltage		DC 12V
Operating temperature range		-30°C ~ +80°C (-22 ~ +176°F)
Rated load	Dimmer & passing switch	High : 0.2A (Relay load) Low : 0.2A (Relay load) Passing : 0.2A (Relay load)
	Lighting switch	Lighting : 21W (Lamp load)
	Turn signal & lane change switch	6.6 ± 0.5A (Lamp load)
	Fog lamp switch	0.2A (Relay load)
	Wiper & mist switch	Low, High : 5.0A (Motor load) Intermittent : 0.22 ± 0.05A (Relay load) Lock : Max. 25A (Motor load) Mist : 5.0A (Motor load)
	Washer switch	5A (Motor load)

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COMPONENTS



1	2	3			4	5	6
7	8	9	10	11	12	13	14

Connector A (Lighting Switch)

1	2	3	4	5	6	7
8	9	10	11	12	13	14

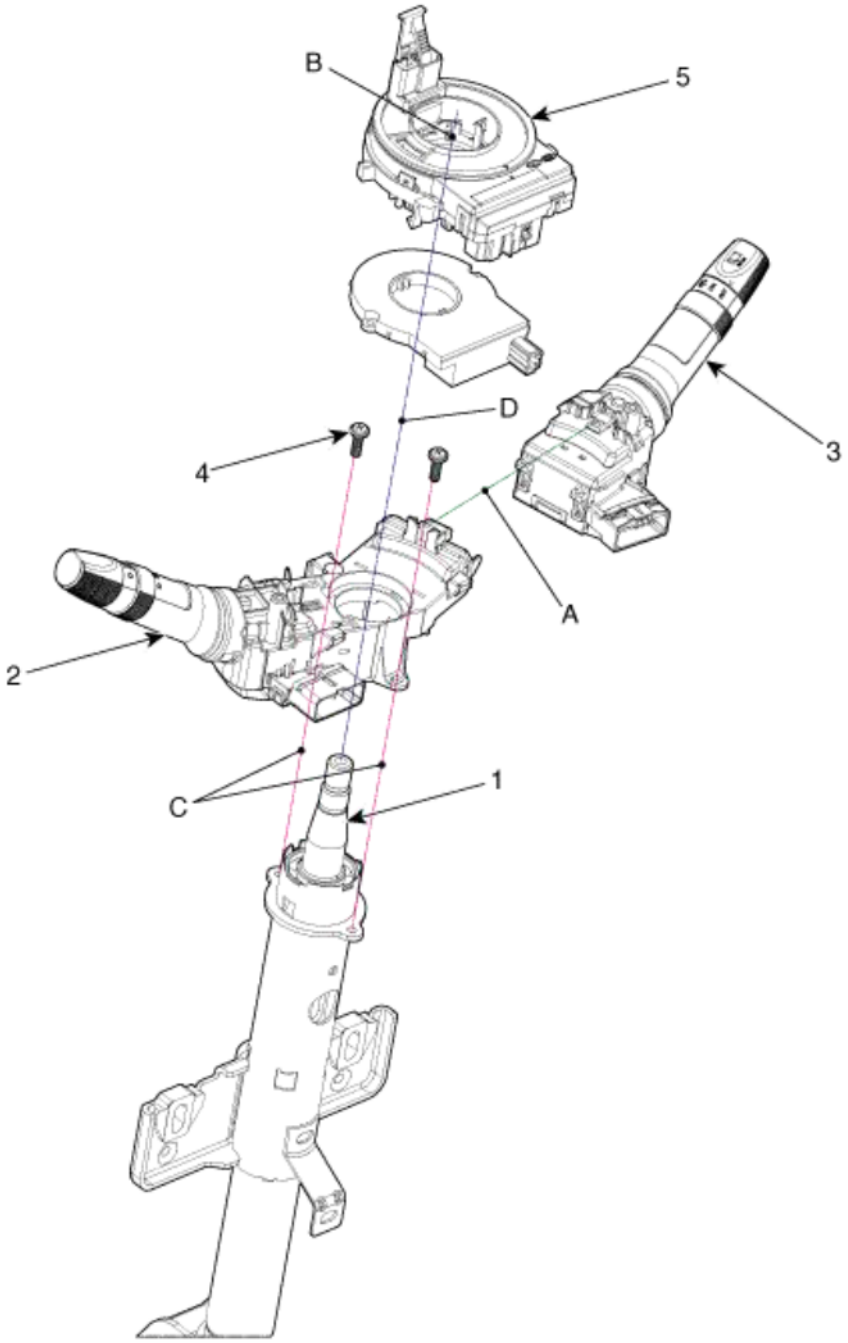
Connector B (Wiper Switch)

Connector name	NO	Description	Connector name	NO	Description
	1	Fog lamp switch GND		1	Wiper GND

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Lighting switch (14P)	2	Front fog lamp switch	Wiper & Washer switch (14P)	2	Wiper HI
	3	Rear fog lamp switch		3	Wiper & washer & MIST power
	4	Flasher unit power		4	Wiper LOW speed
	5	Turn signal lmap RH		5	Wiper parking
	6	Turn signal lmap LH		6	Front washer
	7	Head lamp switch power		7	-
	8	Tail lamp switch		8	-
	9	Head lamp switch GND		9	-
	10	-		10	-
	11	-		11	Rear parking
	12	Rear fog lamp		12	Rear washer
	13	Head lamp HI power		13	Rear wiper
	14	Head lamp LOW power		14	Rear wiper & washer power

English



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※ Installation order : A→B→C→D

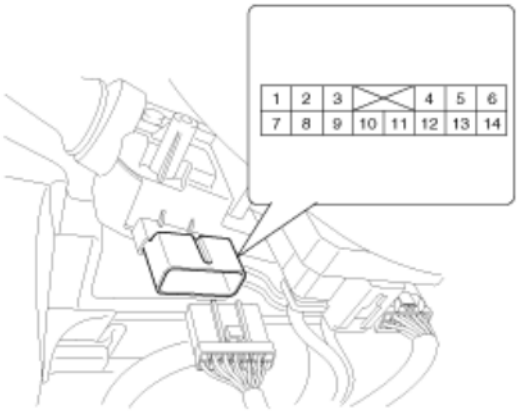
1. Steering column shatf 2. Lighting switch 3. Wiper and washer switch	4. Screw 5. Clock spring

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INSPECTION

Lighting Switch Inspection

With the multifunction 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	7	8	10	9
OFF				
Tail	○——	——○		
H/Lamp	○——	——○——	——○	
AUTO		○——	——	——○

Lighting Switch

Terminal / Position	7	8	10
OFF			
Tail	○——	——○	
H/Lamp	○——	——○——	——○

Dimmer And Passing Switch

Terminal / Position	13	11	12	8
HU	○——	——	——○	
HL	○——	——○		
P	○——	——	——○——	——○

HU : Head lamp high beam
HL : Head lamp low beam
P : Head lamp passing switch

Turn Signal Switch

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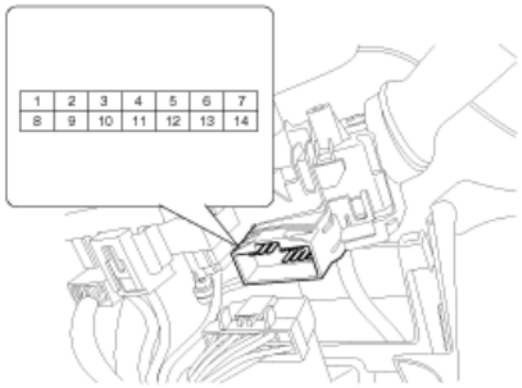
Terminal / Hazard switch / Turn signal switch		4	6	5
OFF	L	○	○	
	N			
	R	○		○

Fog Lamp Switch

Terminal / Position	1	3	2
OFF			
Rear	○	○	
Front+Rear	○	○	○

Wiper And Washer Switch Inspection

With the multifunction 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

Terminal / Position	3	2	4	5	INT1	INT2	B1
MIST	○		○				
OFF			○	○	○		○
INT			○	○	○	○	
LOW	○		○				
HI	○	○					

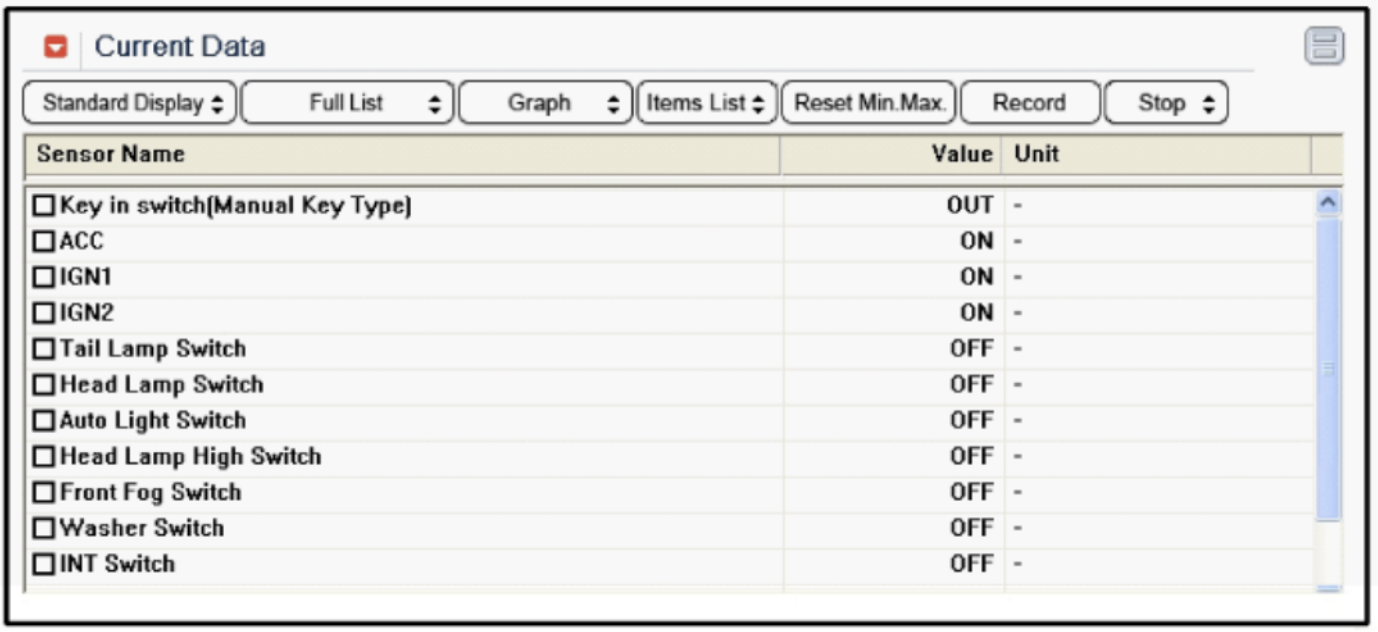
Washer Switch

Terminal / Position	3	6
OFF		
ON	○	○

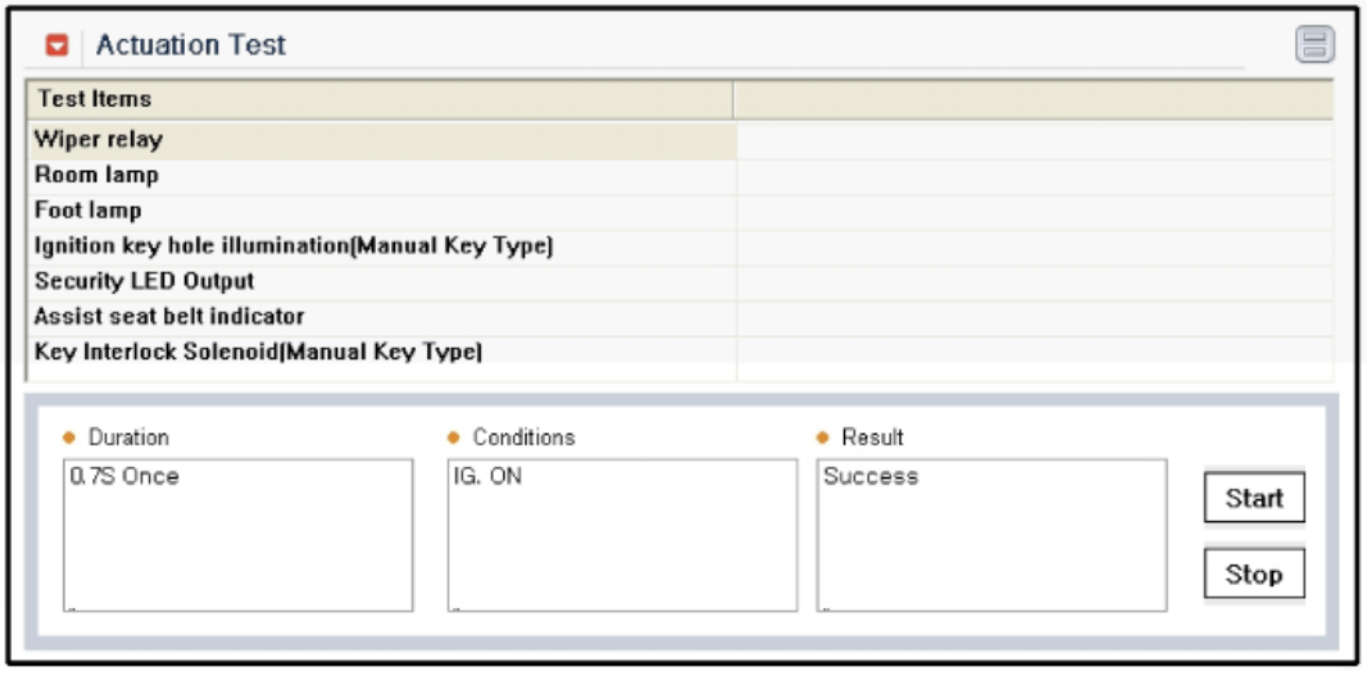
INSPECTION (WITH GDS)

1. Check BCM 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 "BCM".
3. To consult the present input/output value of BCM, "Current DATA". It provides information of BCM input/output conditions of power supply, turn signal/brake lamp, headlamp, door, locks, outside mirror, wiper, auto-light and transmitters etc.

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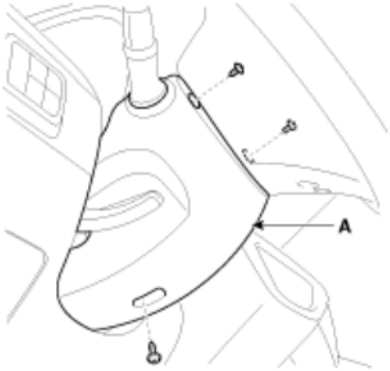
4. To perform compulsory operation on BCM input factors, select "ACTUATION TEST".



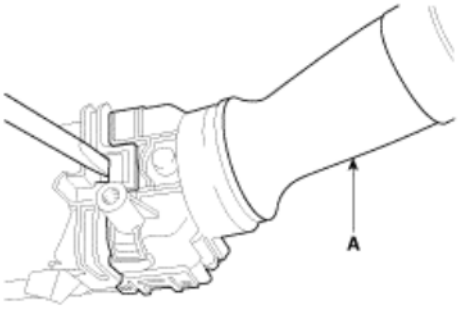
REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the steering wheel.
   (Refer to the ST group - "Steering column & shaft")
3. Remove the steering column upper and lower shrouds (A) after removing 3 screws.

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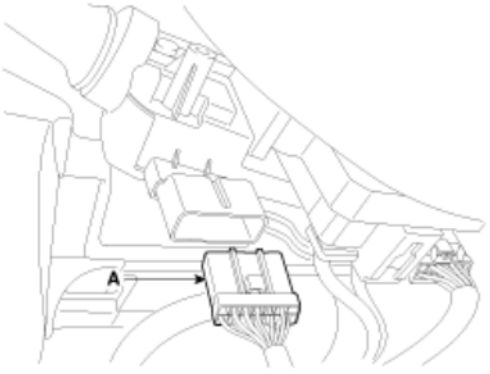


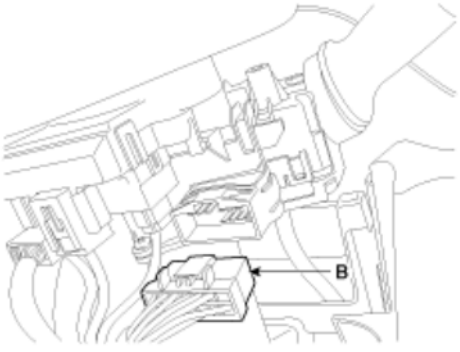
4. If it is necessary to remove. The wiper & washer switch (A) only, release the lock of wiper switch using tool without removing the steering wheel and the clock spring.



5. Remove the clock spring.
   (Refer to RT group - "Air bag module")

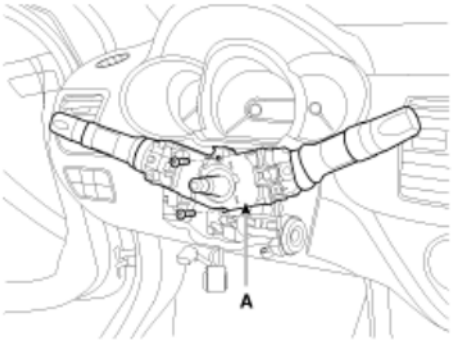
6. Disconnect the lighting switch connector (A) and wiper & washer switch connector (B).





7. Remove the multifunction switch assembly (A) with loosening 2 screws.

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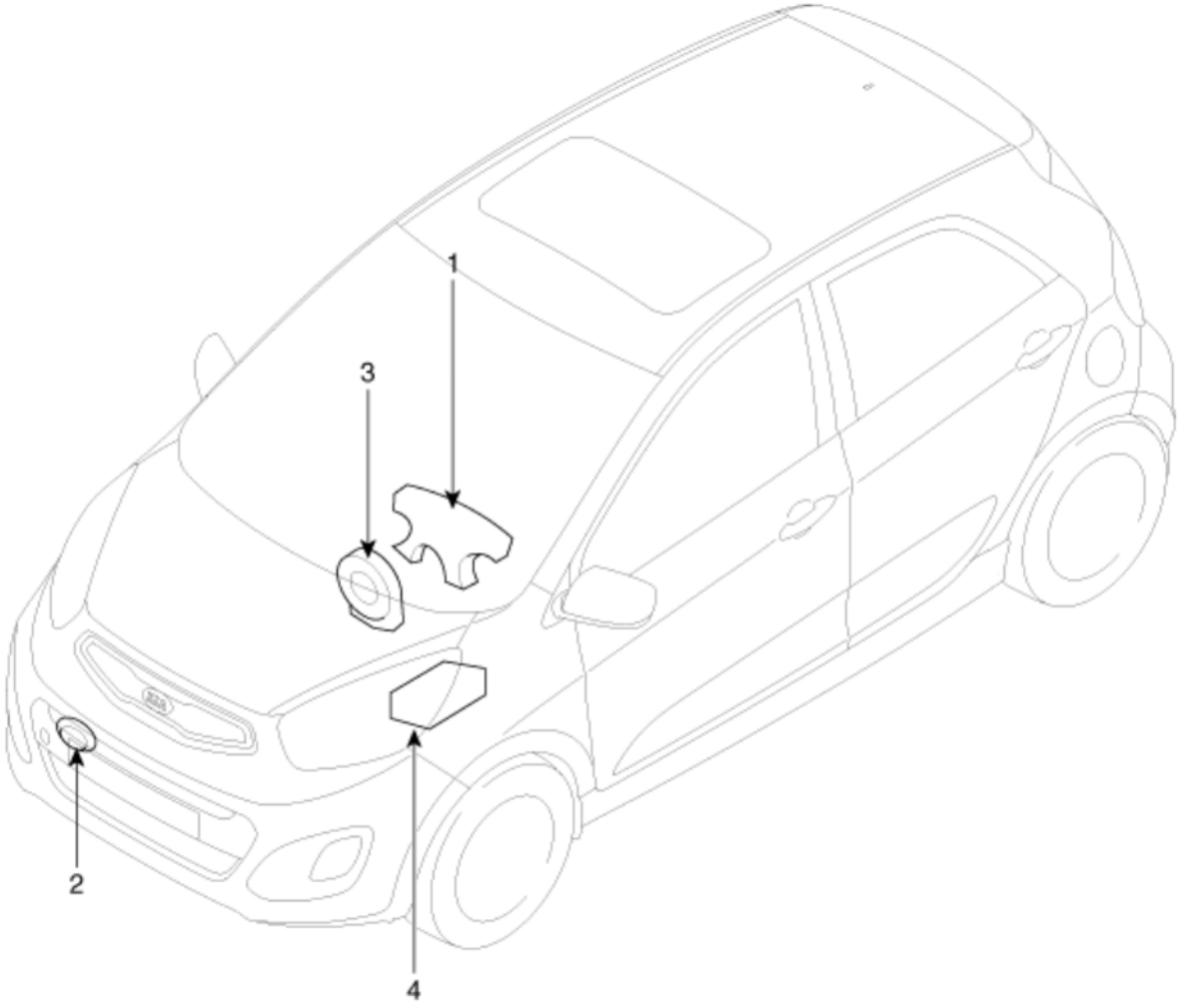
INSTALLATION

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

> **NOTICE**
>
> Make sure the multifunction switch connectors are plugged in properly.

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COMPONENT LOCATION



※ Horn relay is buit in PCB of engine room relay box.

1. Horn switch 2. Horn	3. Clock spring 4. Engine room relay box

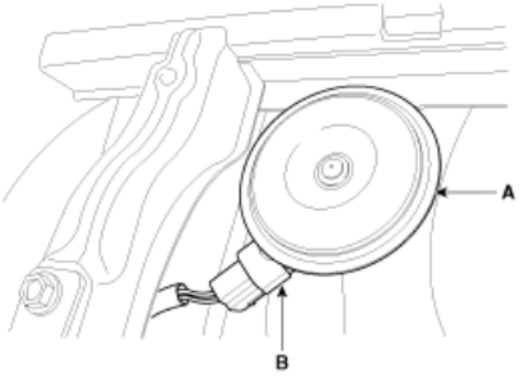
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INSPECTION

※ Horn relay is buit in PCB of engine room relay box.
(Refer to the "Fuse and relays")

REMOVAL

1. Remove the front bumper.
   (Refer to the BD group - "Front bumper")
2. Remove the mounting bolt and disconnect the horn connector (B), then remove the horn (A).



INSTALLATION

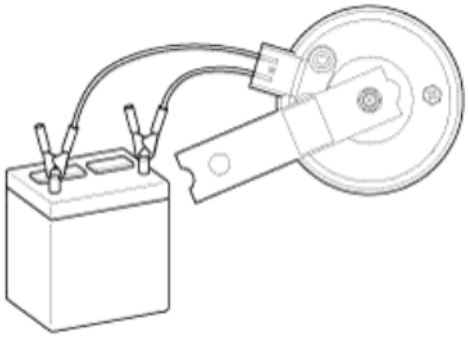
1. Connect the horn connector, then reassemble the horn.
2. Reassemble the front bumper.

ADJUSTMENT

Operate the horn, and adjust the tone to a suitable level by turning the adjusting screw.

NOTICE

After adjustment, apply a small amount of paint around the screw head to keep it from loosening.



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SPECIFICATIONS

AVN Head Unit

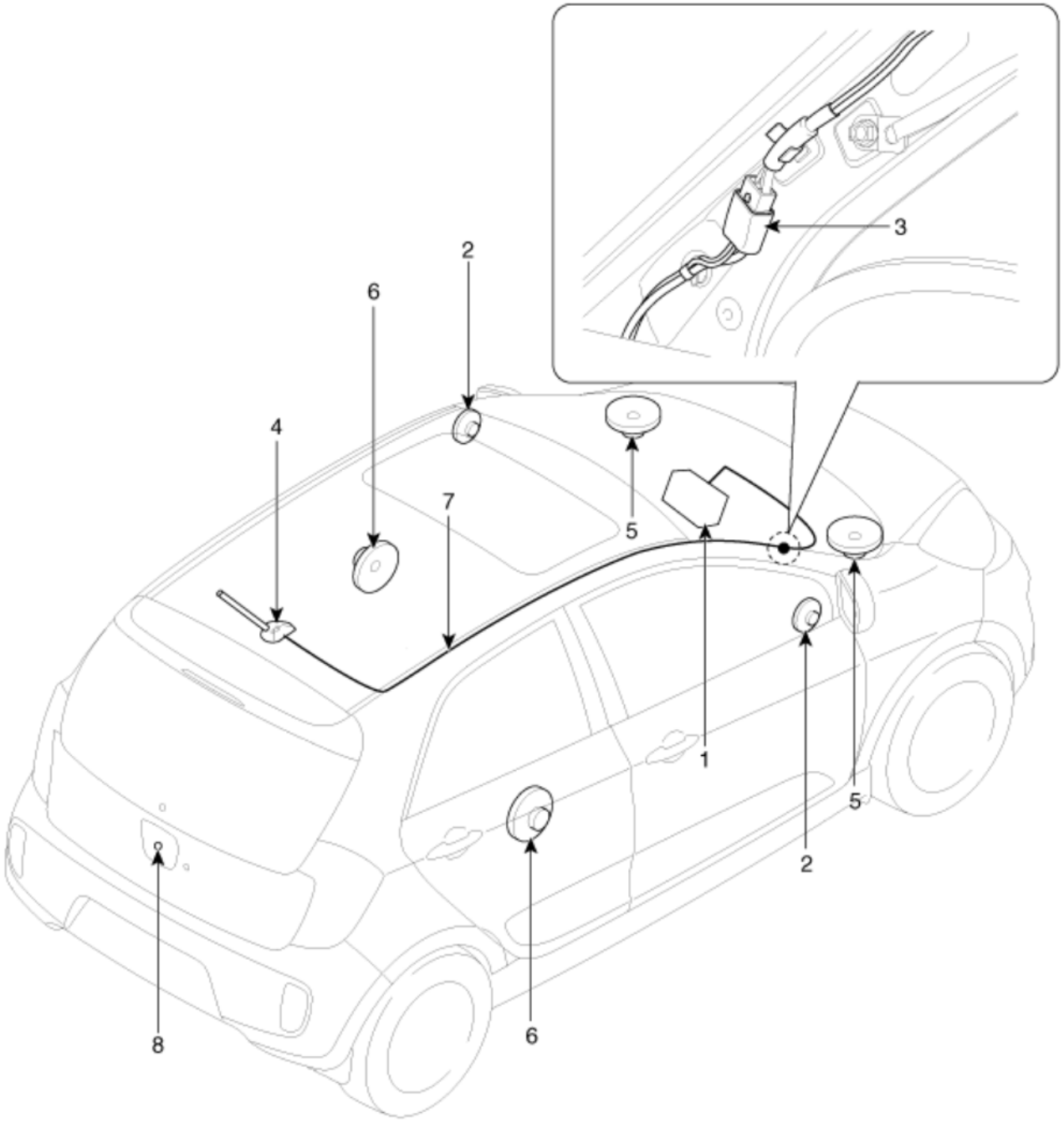
Item		Specification
Power supply		DC 14.4V negative ground
Load Impedance		4Ω × 4
Tuning type		PLL SYNTHESIZED TUNING
Antenna		80PF 75Ω
Dark current		Max. 2.0mA (Head unit only)
Frequency range / Channel space	FM	87.5~107.9 MHz / 200 kHz
	AM	530~1,710 kHz / 10 kHz
S/N	FM	Min. 50 dB
	AM	Min. 40 dB

Speaker

Item		Specification
Power supply	Front	15W (Max 25W)
	Rear	15W (Max 25W)
	Front Tweeter	15W (Max 25W)
Antenna	Front	4 ± 0.6 Ω
	Rear	4 ± 0.6 Ω
	Front Tweeter	4 ± 0.6 Ω
Speaker Number		6

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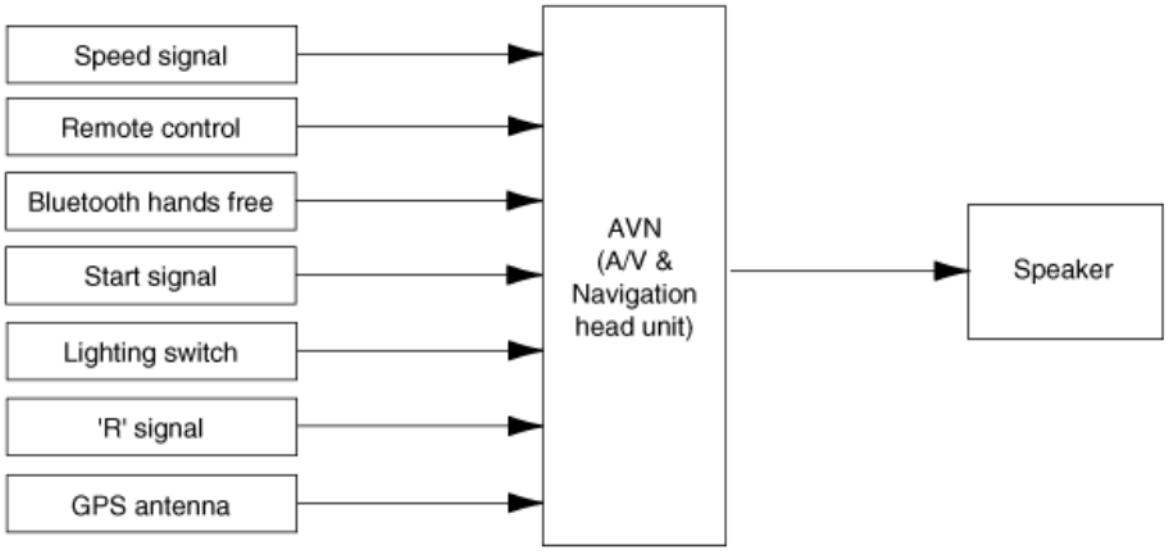
COMPONENTS LOCATION



1. AVN (A/V & Navigation head unit)	5. Front door speaker
2. Tweeter speaker	6. Rear door speaker
3. Antenna cable connector	7. Antenna feeder cable jiont
4. Roof antenna	8. Back view camera

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SYSTEM BLOCK DIAGRAM



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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).
   - When driving on a Y-shaped road with a narrow angle, the current position may be displayed in the opposite direction.
   - If the vehicle is loaded onto a car transport vehicle, the current position mark may be stalled on the last position prior to loading.
   - When driving on a spiral-shaped road.
   - When driving in mountain regions with sharp turns or sudden brakes.
   - When entering a road after having been in an underground parking structure, building parking structure, or turnable with many rotations.
   - When the tires have recently been replaced (Especially upon use of spare or studless tires)
   - If the battery terminal is removed.
   - When driving in city streets, the current position may be displayed on the opposite side or on an off-road position.
   - 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.
   - When driving in heavy traffic with frequent go · stops in traffic or intersections.
   - When driving under slippery conditions, such as heavy sand, snow, etc.
   - When driving with the tire chain in place.
   - When using a tire with an incorrect size specification.
   - When the tire pressure for the 4 tires are different.
   - When the replacement tire is a worn or used tire (Especially studless tires having passed a 2nd seasons, etc.)
   - When driving near high-rise buildings
   - If a roof carrier has been installed
   - When driving under high speeds or having calculated a long-distance route.

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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.

Route Re-calculation

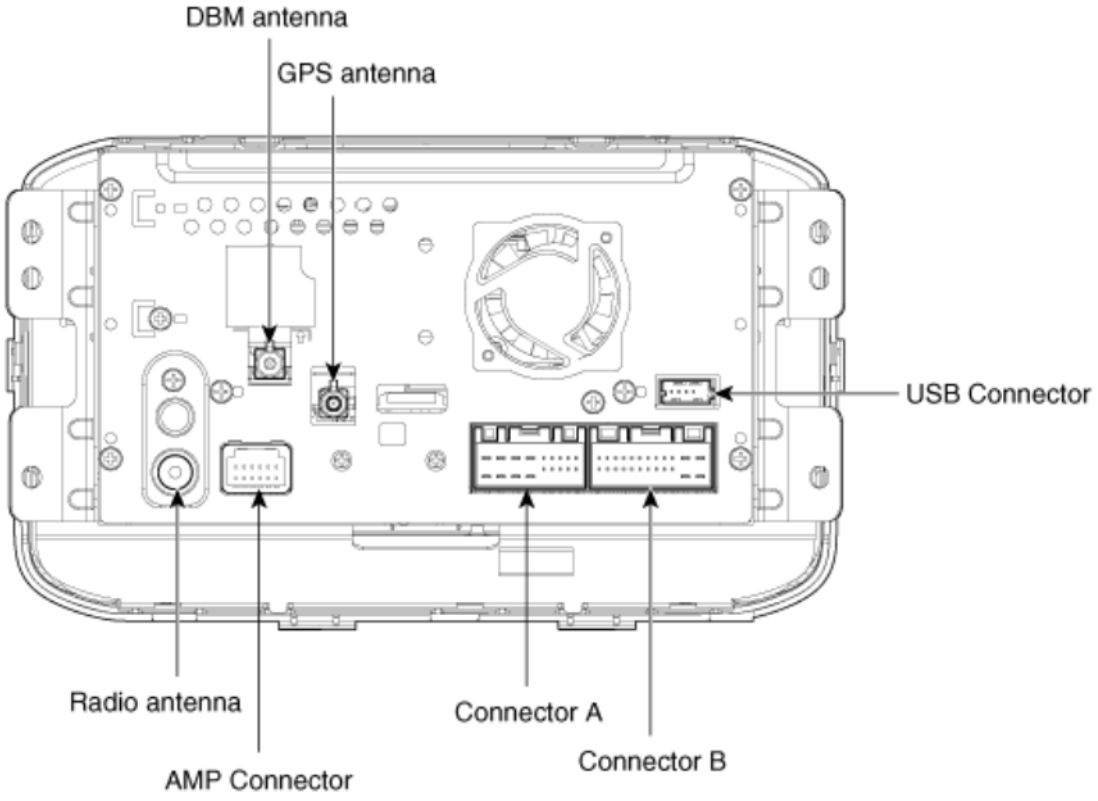
The following phenomena may occur after conducting route recalculation.

- 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)

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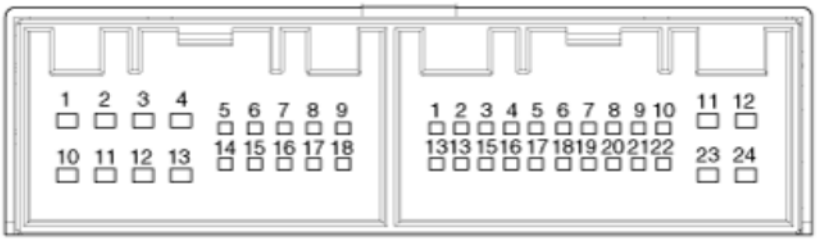
COMPONENTS





AVN Head Unit Connector (AVN)

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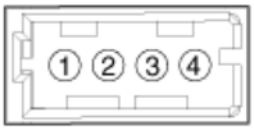
Connector A Connector B

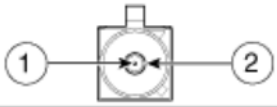
Connector Pin Information

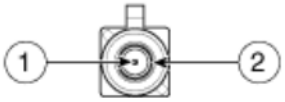
No.	Connector A	Connector B
1	Rear left speaker (+)	MM CAN high
2	Front left speaker (+)	-
3	Front right speaker (+)	Parking (M/T)
4	Rear right speaker (+)	Steering key
5	Back view ground	-
6	Back view power	-
7	ALT L	AUX / IPOD video
8	Illumination (+)	AUX R input
9	Reverse	AUX ground
10	Rear left speaker (-)	Mic (+)
11	Front left speaker (-)	ACC
12	Front right speaker (-)	Battery (+)
13	Rear right speaker (-)	MM CAN low
14	Back view video ground	Auto light
15	Back view video	P position (A/T)
16	Door unlock	Vehicle speed
17	-	Remote control ground
18	Remote antenna	-
19		AUX / IPOD video ground
20		AUX detect
21		AUX L input
22		Mic (-)
23		Ground
24		Ground

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Radio antenna	Pin	Description	Pin	Description
	1	Signal	2	Ground

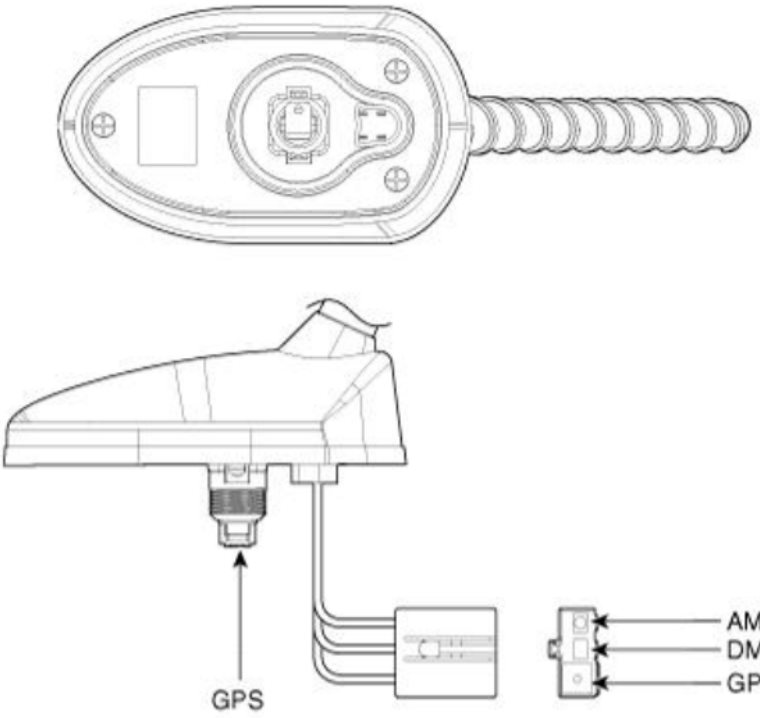
USB Connector	Pin	Description	Pin	Description
	1	USB VCC	3	USB D (+)
	2	USB D (-)	4	USB VCC

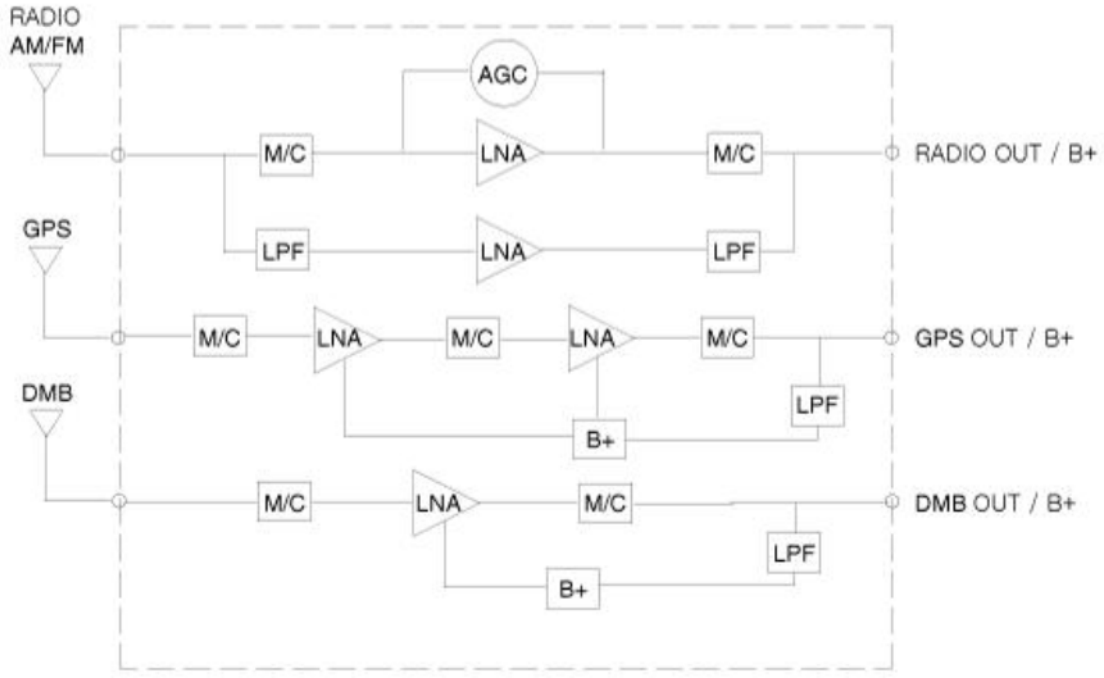
DMB antenna	Pin	Description	Pin	Description
	1	DMB Signal	2	Ground

GPS antenna	Pin	Description	Pin	Description
	1	GPS Signal	2	Ground

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[DMB + GPS + RADIO]





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REMOVAL

AVN Head Unit

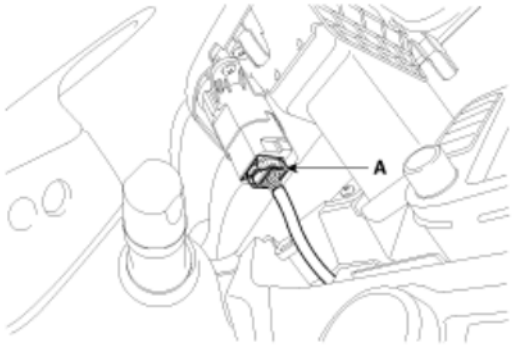
NOTICE

- Take care not to scratch the center fascia panel and related parts.
- Eject all the disc before removing the AVN head unit to prevent damaging the CD player's load mechanism.

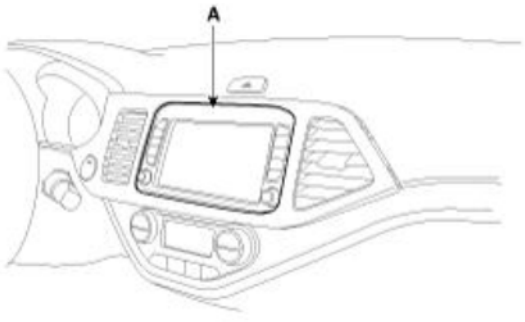
1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, remove the center fascia panel (A).
   (Refer to the BD group - "Crash pad")



3. Disconnect the connector (A).



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



5. Remove the AVN head unit with disconnecting AVN head unit connectors and antenna cables (A).

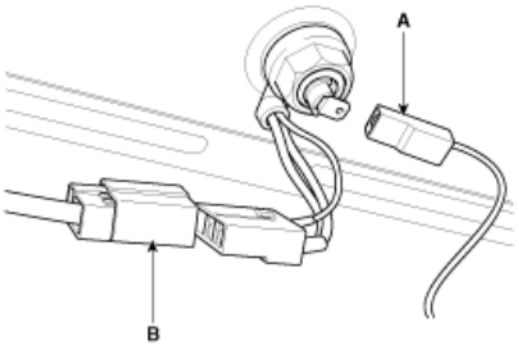
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NOTICE

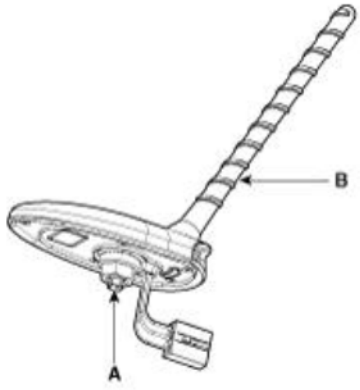
If the CD does not eject, do not attempt to remove it because the audio unit may be damaged. Contact an authorized dealership for assistance.

Roof Antenna

1. Remove the rear roof trim.
   (Refer to the BD group - "Roof Trim")
2. Disconnect antenna feeder cable (B) and antenna power cable (A).



3. Remove the roof antenna (B) after loosening the nut (A).



INSTALLATION

AVN Head Unit

1. Connect the AVN head unit connectors and cables.
2. Install the AVN head unit.
3. Install the center fascia panel.
4. Install the crash pad garnish.
5. Connect the battery (-) terminal.

NOTICE

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

Roof Antenna

1. Install the roof antenna.
2. Connect the GPS connect cable and DMB cable.

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3. Install the nut to antenna.
4. Install the roof trim.

NOTICE

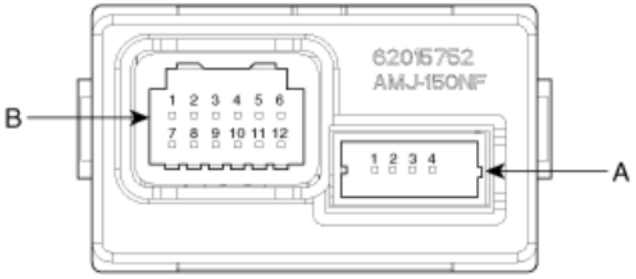
- Make sure that the cables and connectors are plugged in properly.
- Check the AVN system.

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English

CIRCUIT DIAGRAM

[AUX, USB, iPod jack (AVN type)]



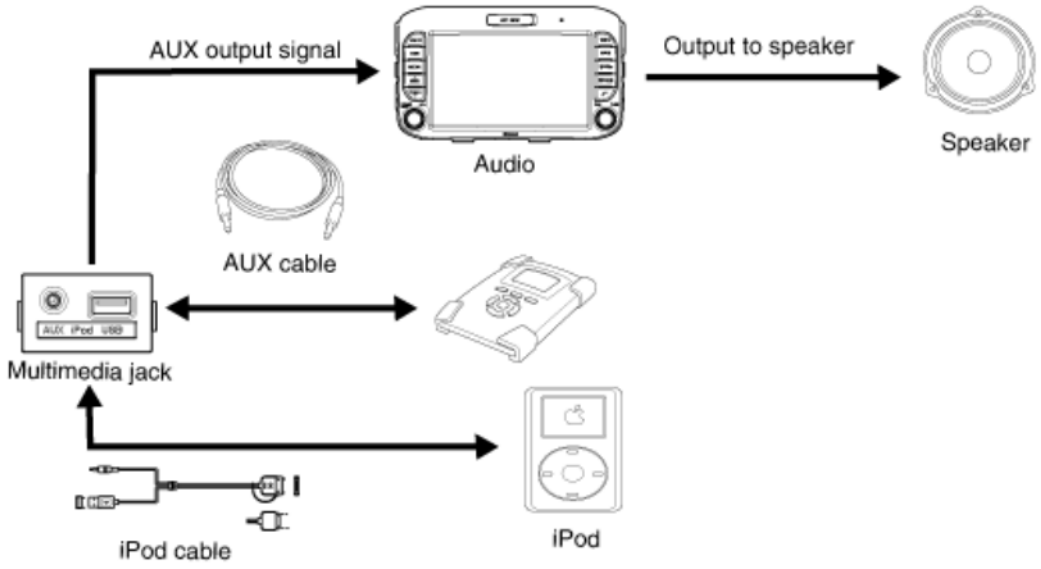
Connector A	Pin	USB Connector
1 2 3 4	1	USB/iPod VCC
	2	USB D(-)
	3	USB D(+)
	4	USB/iPod Ground

Connector B	Pin	AUX(iPod) Connector
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫	1	AUX input L
	2	AUX input R
	3	AUX DETECT
	4	AUX Video
	5	-
	6	Illumination (+)
	7	AUX REF
	8	shield ground
	9	-
	10	AUX Ground
	11	-
	12	Ground

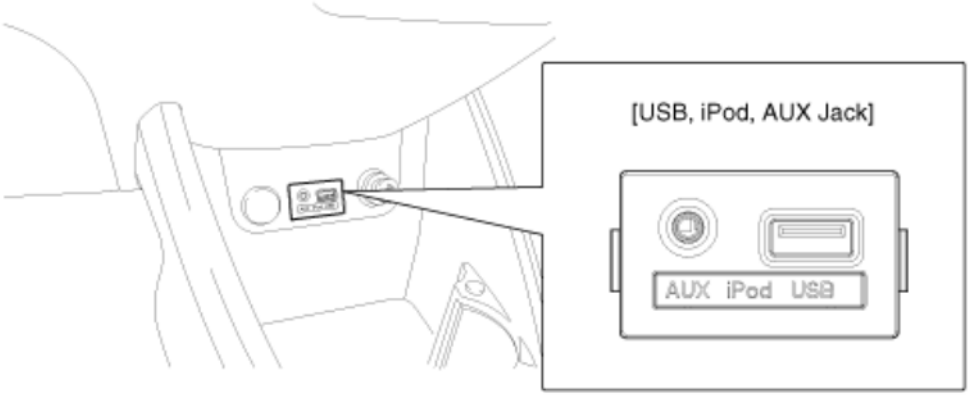
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DESCRIPTION

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.



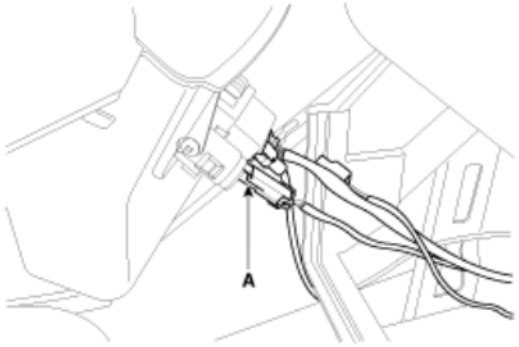
Variable digital music players



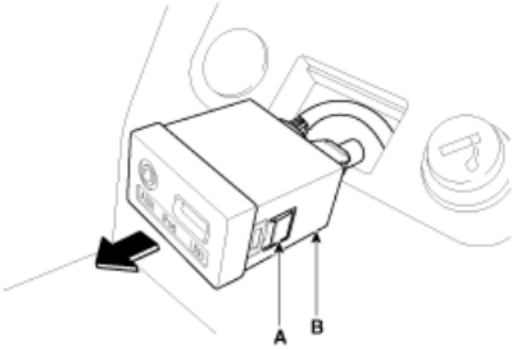
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REMOVAL

1. Remove the shift lever knob.
   (Refer to the BD group - "Console")
2. Remove the console upper cover.
   (Refer to the BD group - "Console")
3. Disconnect the connector (A) from the console upper cover.



4. Remove the multimedia jack (B) from the console under cover after releasing the fixed hooks (A).



INSTALLATION

1. Install the multimedia jack.
2. Connect the multimedia jack connector.
3. Install the console upper cover.
4. Install the shift lever knob.

NOTICE

Make sure the multimedia connector and the console upper cover connectors are plugged in properly.

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TROUBLESHOOTING GUIDE

Before Thinking The Product Has Malfunctioned

1. Errors which occur during the operation or installation of the device may be mistaken as a malfunction of the actual device.
2. If you are having problems with the divice, try the suggestions listed below.
3. If the problems persist, contact your point of purchase or the nearest service center.

Problem	Function
There are small red, blue, or green dots on the screen	Because the LCD is manufactured with technology requiring high point density, a pixel deficiency or lighting may occur within 0.01% of total pixels.
The sound or image is not working	• Has the switch for the vehicle been turned to [ACC] or [ON]? • Has the SYSTEM been turned OFF?
The video is being displayed but sound is not working	• Has the volume been set to a low level? • Has the volume been set on mute?
When the power is turned on, the corners of the screen are dark	• The display looking somewhat darker after prolonged periods of use is a normal phenomenon with LCD panels. It is not a malfunction. • If the screen is very dark, contact your point of purchase or the nearest service center.
Sound is working from only one speaker	• Is the position of FAL/BAL sound controls or volume adjusted to only one side?
Sound and video does not work in AUX mode	Is the audio and video connector jacks fully inserted into the AUX terminal?
The external device is not working	Is the external device connected with a standard connector cable?
The road is missing	Some map data may be missing or incorrect.
The road name is spoken incorrectly	The TTS(Text To Speech) engine speaks the street name based off of the phonetic spelling. This will continuously be update with the map datebase.

Troubleshooting

Problem	Possible Cause	Solution
The power does not turn on.	The fuse is disconnected.	Replace with a suitable fuse. If the fuse is disconnected again, please contact your point of purchase or service center.
	Device is not properly connected.	Check to see that the device has been properly connected.
The CD does not play.	The DISC has not been inserted or has been inserted upside down.	Insert the disc properly so that the sides are facing the correct direction.
	The DISC has been contaminated.	Wipe dirt dirt and other foreign substances from the DISC.
	The vehicle battery is low.	Charge the battery. If the problem persists, please contact your point of purchase or service center.
	A disc which is not supported by the device has been inserted.	Insert a disc which is supported for play by the device.

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The sound does not work.	• The volume level is set the lowest level. • The connector is not properly connected. • The device is currently fast-forwarding, rewinding, scanning, or playing in slow mode.	• Adjust the volume level. • Check the connection state. • The sound will not work when the device is fast-forwarding, rewinding, scanning, or playing in slow mode.
The sound or video quality is low.	• The DISC is dirty or scrached. • Vibration is occuring from the position in which the conversion switch has been installed. • The color and tone quality of the image is low.	• Wipe off water or dirt from the DISC. Do not use a disc which has been scrached. • The sound may be short-circuited and the image distorted if the device begins to vibrate. The device will return to normal operation once the vibration has stopped. • Aging of the video display and deterioration in performance may cause certain quality degradations.
The USB does not work.	• USB memory is damaged. • USB memory has been contaminated. • A separately purchased USB HUB is being used. • A USB extension cable is being used. • A USB which is not a Metal Cover Type USB Memory is being used. • A HDD type, CF, SD Memory is being used. • There are no music files which can be played.	• Please use after formatting the USB into FAT 12/16/32 format. • Remove any foreign substances on the contact surface of the USB memory and multimedia terminal. • Directly connect the USB memory with the multimedia terminal on the vehicle. • Directly connect the USB memory with the multimedia terminal on the vehicle. • Use a standard USB memory. • Use a standard USB memory. • Only MP3, WMA file formats are supported. Please use only the supported music file formats.
The iPod is not recognized even though it has been connected.	• There are no titles which can be played. • The iPod firmware version has not been properly updated. • The iPod device does not recognize downloads.	• Use iTunes to download and save MP3 files into the iPod. • Use iTunes to update the firmware version and reconnect the iPod with the device. • Reset the iPod and reconnect with the device.

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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)
Load	Max. 5mA

Smart Key FOB

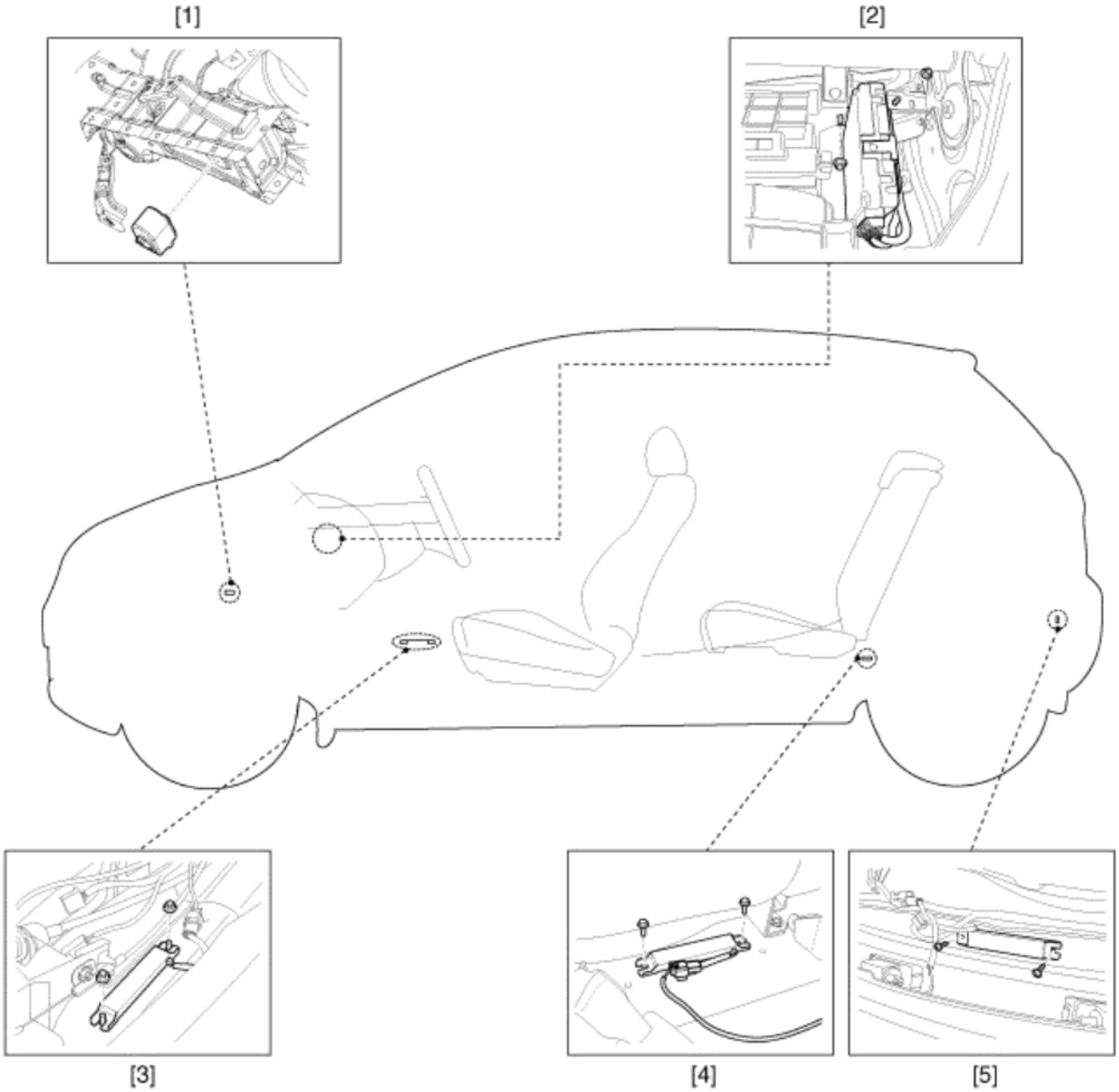
Items	Specification
Battery	Lithium battery 3V 1EA
Distance	30m from vehicle, RF : 30m, Passive(LF) : 0.7m
Battery life	More than 2years (10 times / a day) **⚠ WARNING** An inappropriately disposed battery can be harmful to the environment and human health. Dispose the battery according to your local law(s) or regulation.
Push buttons	4 (Door lock / unlock, Trunk lid / Panic)
Frequency(Rx)	125 kHz
Frequency(Tx)	433.92 MHz
Numbers	2EA

Antenna

Items	Specification
Rated voltage	DC 12V
Operating voltage	DC 9 ~ 16V
Operating temperature	-30°C ~ 75°C (-22°F ~ 167°F)
Frequency	125kHz
Numbers	Interior(2EA), Door(2EA), Bumper(1EA)

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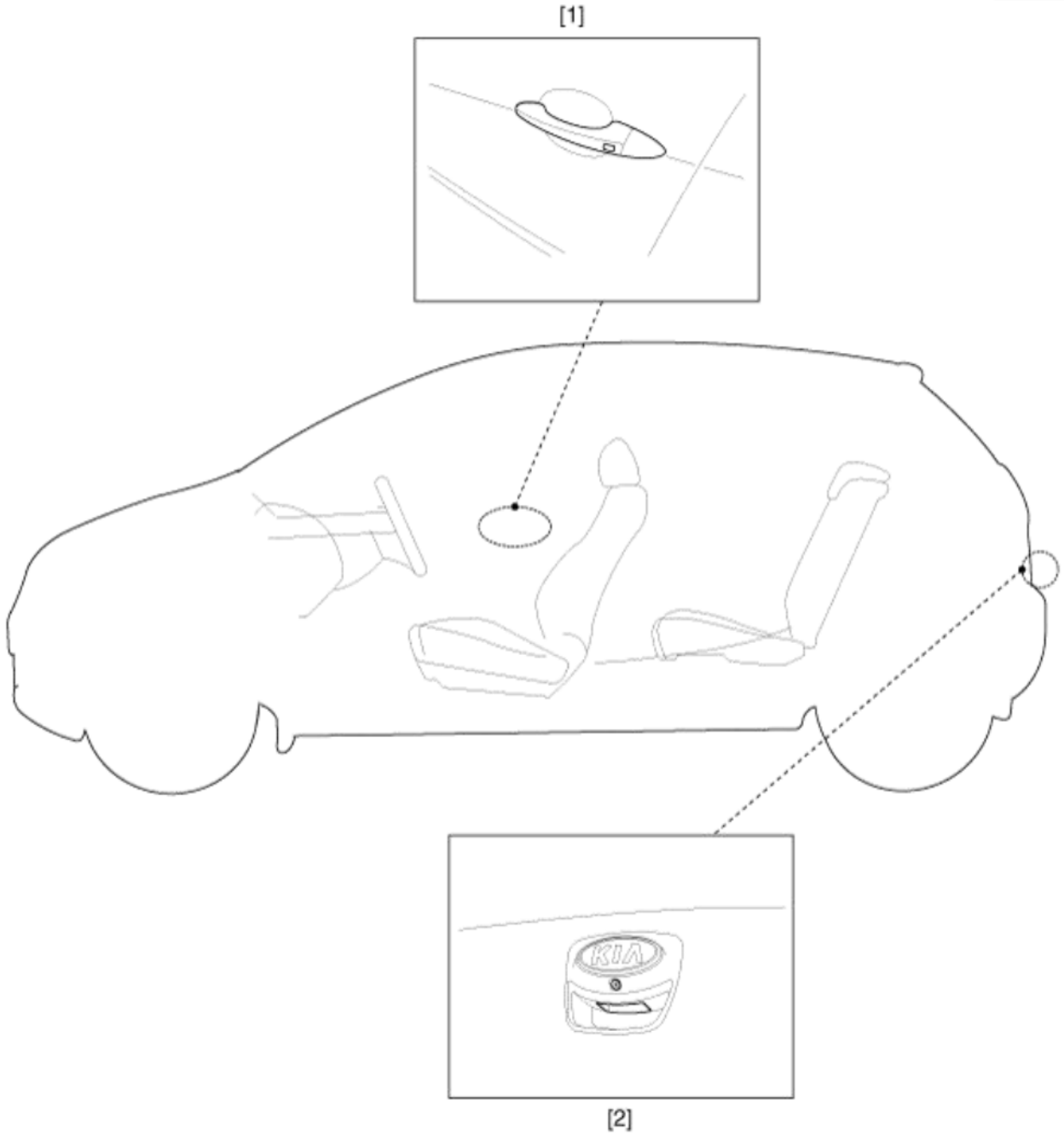
COMPONENT LOCATION (1)



1. Buzzer 2. Smart key unit 3. Interior antenna 1	4. Interior antenna 2 5. Bumper antenna

COMPONENT LOCATION (2)

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1. Door outside handle	2. Trunk lid open switch

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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
- 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 driver integrated into SSB for TP authentication (i.e. limp home mode)
- Communication with engine management system
- Communication with SRX
- 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:
   - 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/LIN (depends on the vehicle) as well as a single line interface to further devices of the car.
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 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 125 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

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- Microcontroller with FLASH Memory
- Single Line Interface to SRX
- Single Line Interface to EMS
- Input stage
- LF antenna amplifier/driver
- CAN communication with BCM
- LIN communication with other unit (depending on platform)

The LF antenna amplifier/driver generates a 125 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 6 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 125 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.
   Two antennas cover the vehicle's exterior: two antennas in the Door Handles (DS and PS) cover the area around the doors.
   Up to three antennas cover the vehicle's interior and the trunk interior: two 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 (125 - 135 kHz challenge) and receives changes in the field strength (response of Transponder).

Door Handle

The front door handles of the two doors (driver door / passenger door) are equipped with emitting LF-antennas to emit the 125 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

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min. 0.7m measured around the exterior antennas which are integrated in the door handles; refer to the below given picture. The trunk access range is also min. 0.7m measured from the antenna position.
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; refer to the below given picture

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:

- At least one door is unlocked and two_steps timer is not running or
- Two_steps timer is running and one of the push button except Front Left side is triggered

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

Passive Open Tailgate

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 outside 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.
- A blind spot in the trunk similar to any RF disturbance may lead to no trunk warning

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:
   - 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)
   - 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.
   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)

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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:
   - 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)
   - 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) :
   - (All doors are closed) & (trunk closed)

2. Event:
   - 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:
   - User presses the door handle Push button

3. SMK ECU actions:
   - 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

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1. SMK actions:
   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:
   - (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.
   - 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).
   - 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:

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– 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

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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.

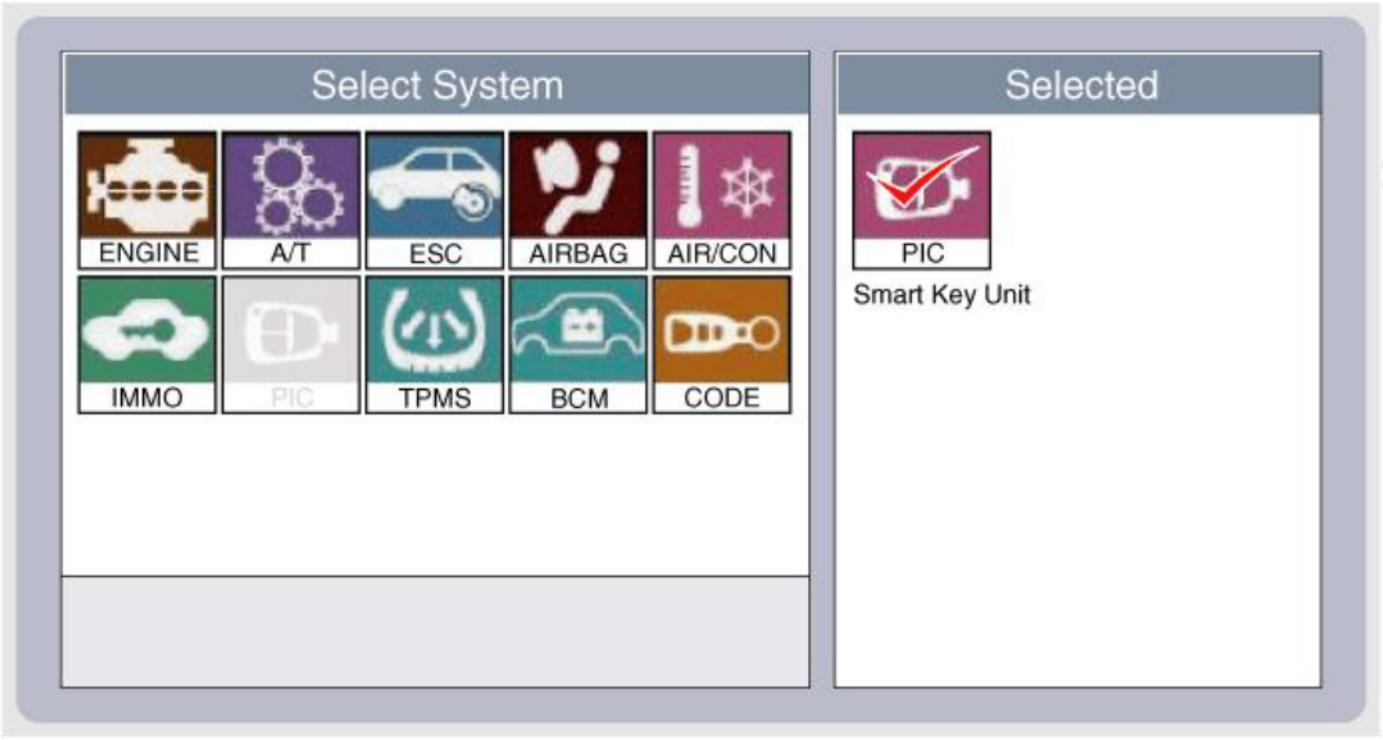
1. Problem in SMART KEY unit input.
2. Problem in SMART KEY unit.
3. Problem in SMART KEY unit output.

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

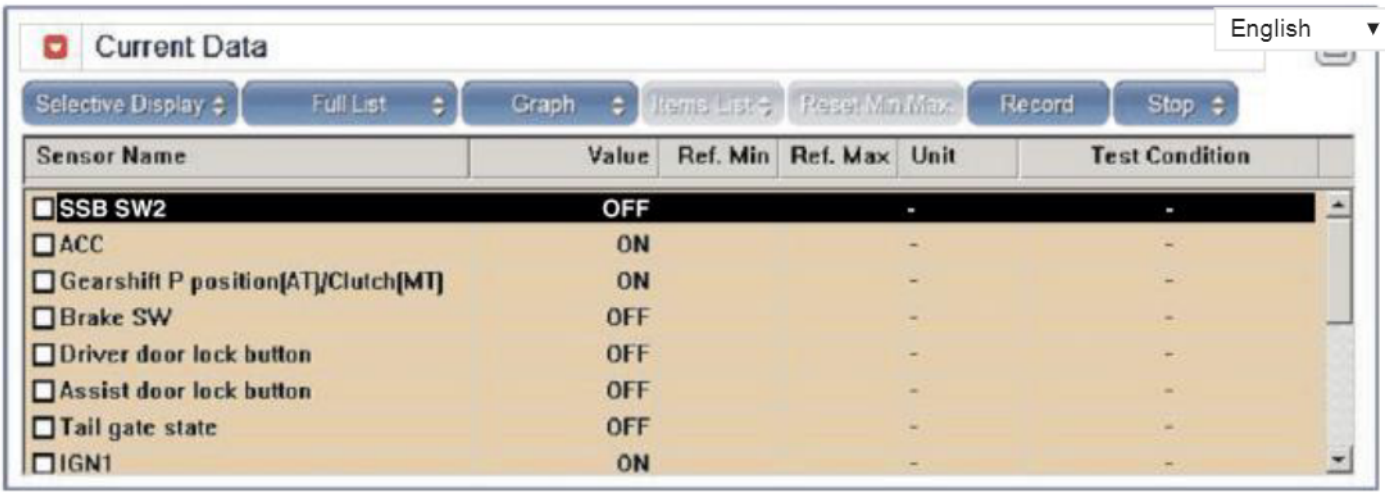
Switch Diagnosis

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.



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

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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)

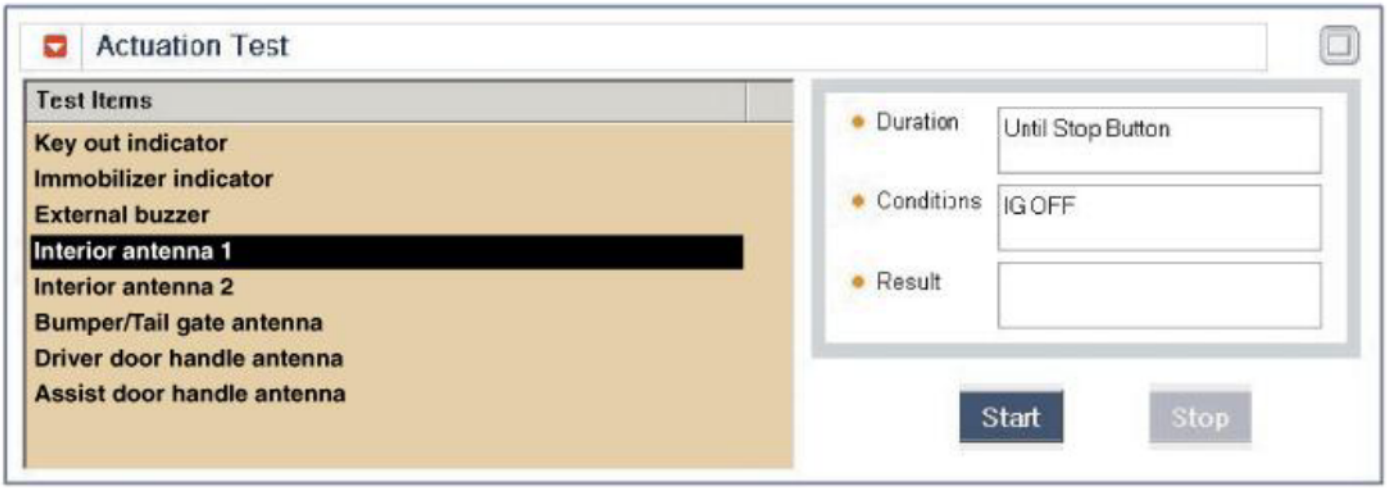
1. Communication diagnosis checks that the each linked components operates normal.
2. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
3. After IG ON, select the "DTC".



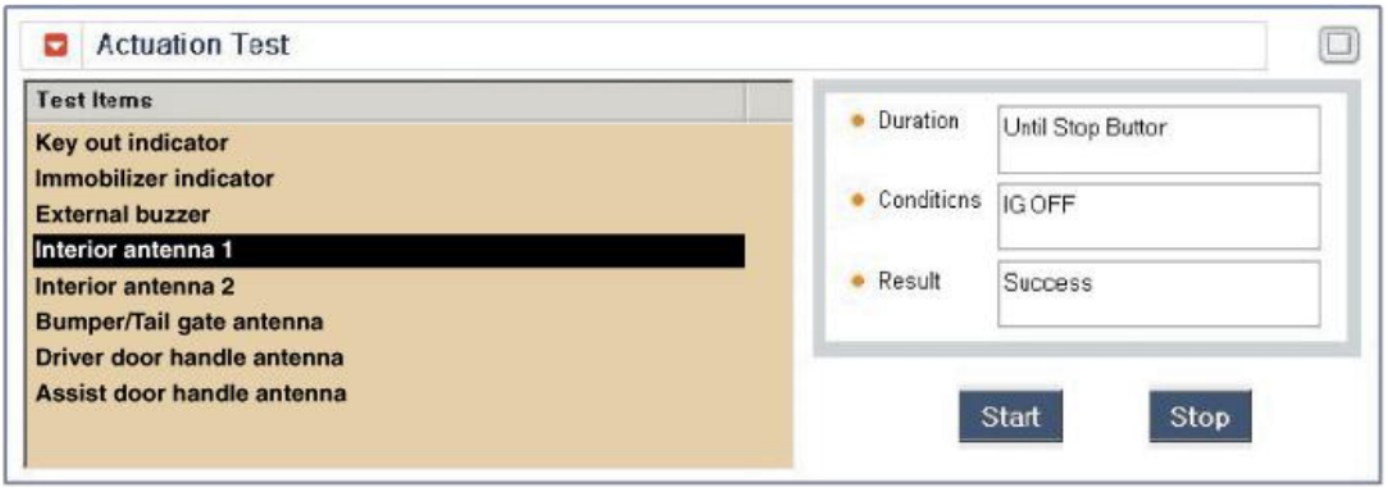
Antenna Actuation Diagnosis

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".

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

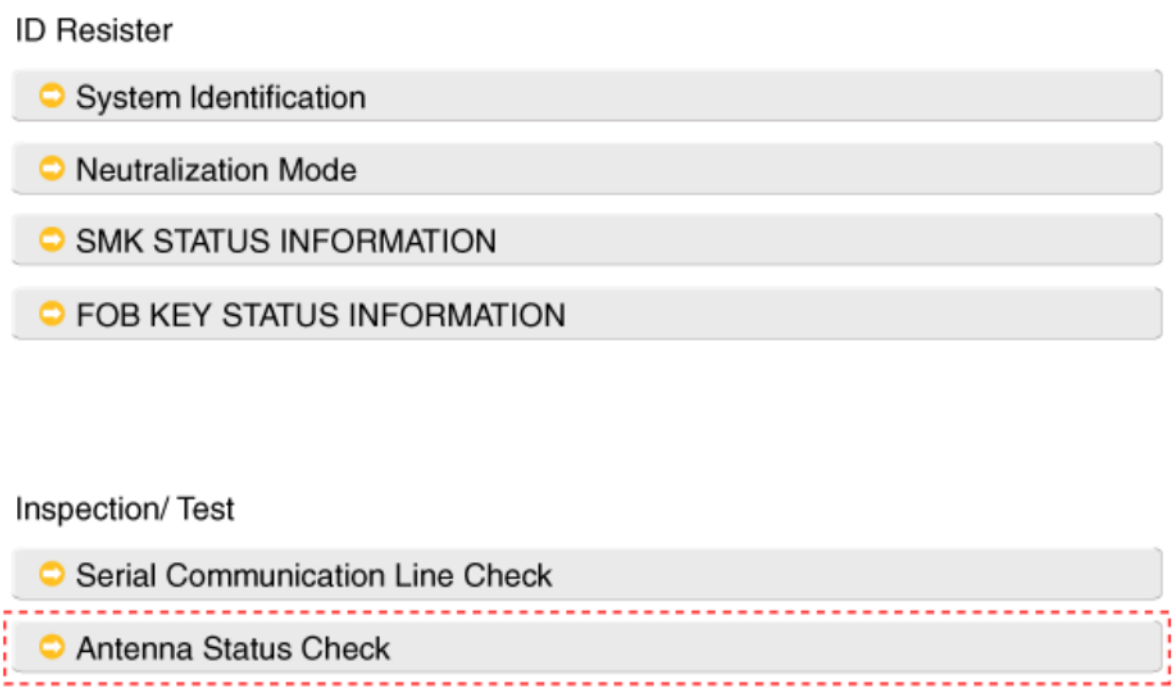


4. If the LED of smart key is blinking, the smart key is normal.
5. If the LED of smart key is not blinking, check the voltage of smart key battery.
6. Antenna actuation
   - INTERIOR Antenna 1
   - INTERIOR Antenna 2
   - Trunk antenna
   - BUMPER/Antenna
   - DRV_DR Antenna
   - AST_DR Antenna

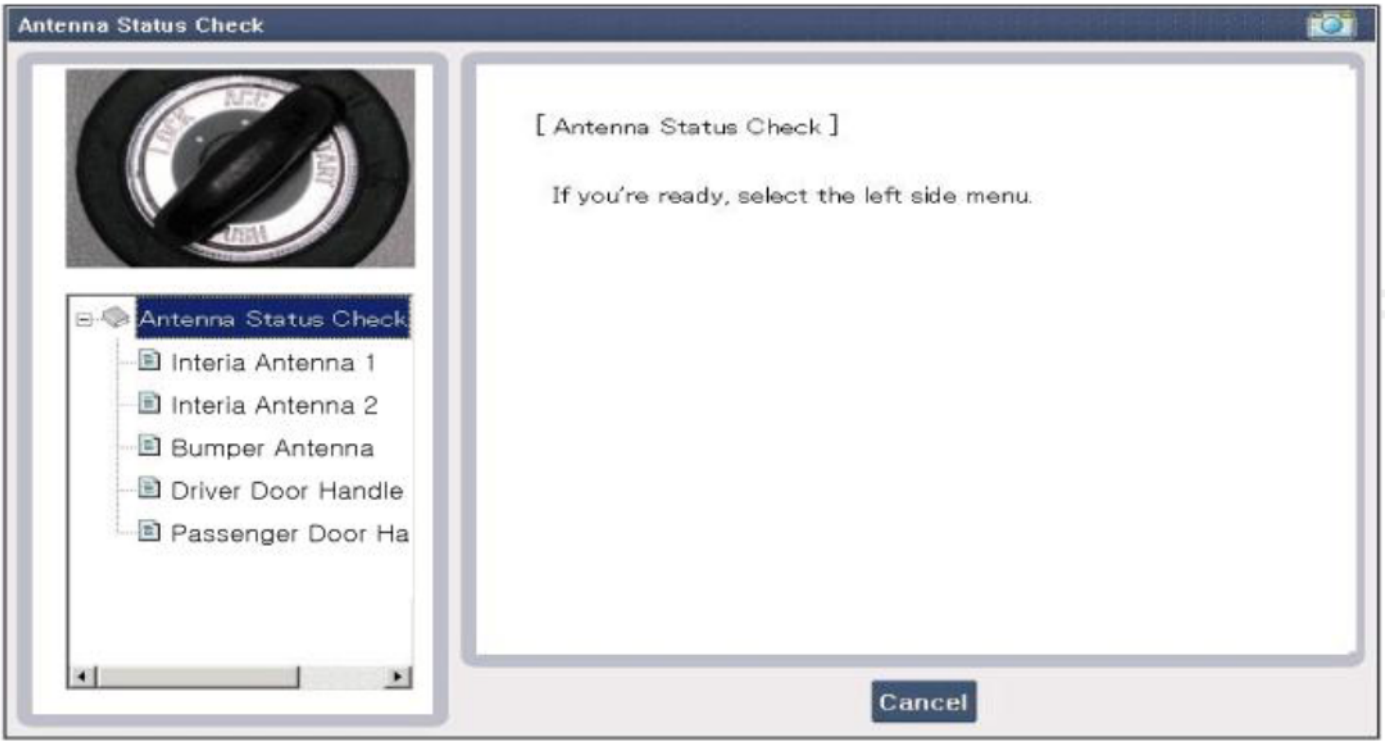
Antenna Status Check

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

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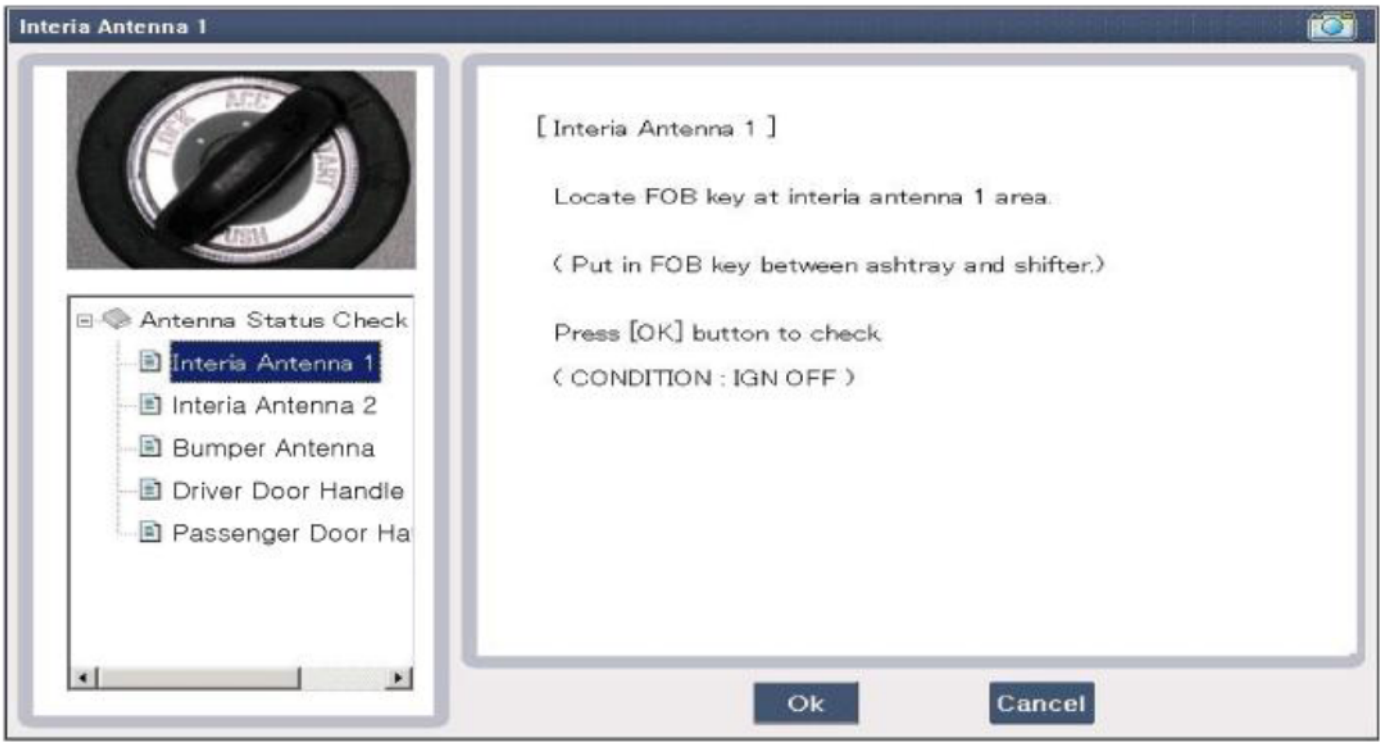


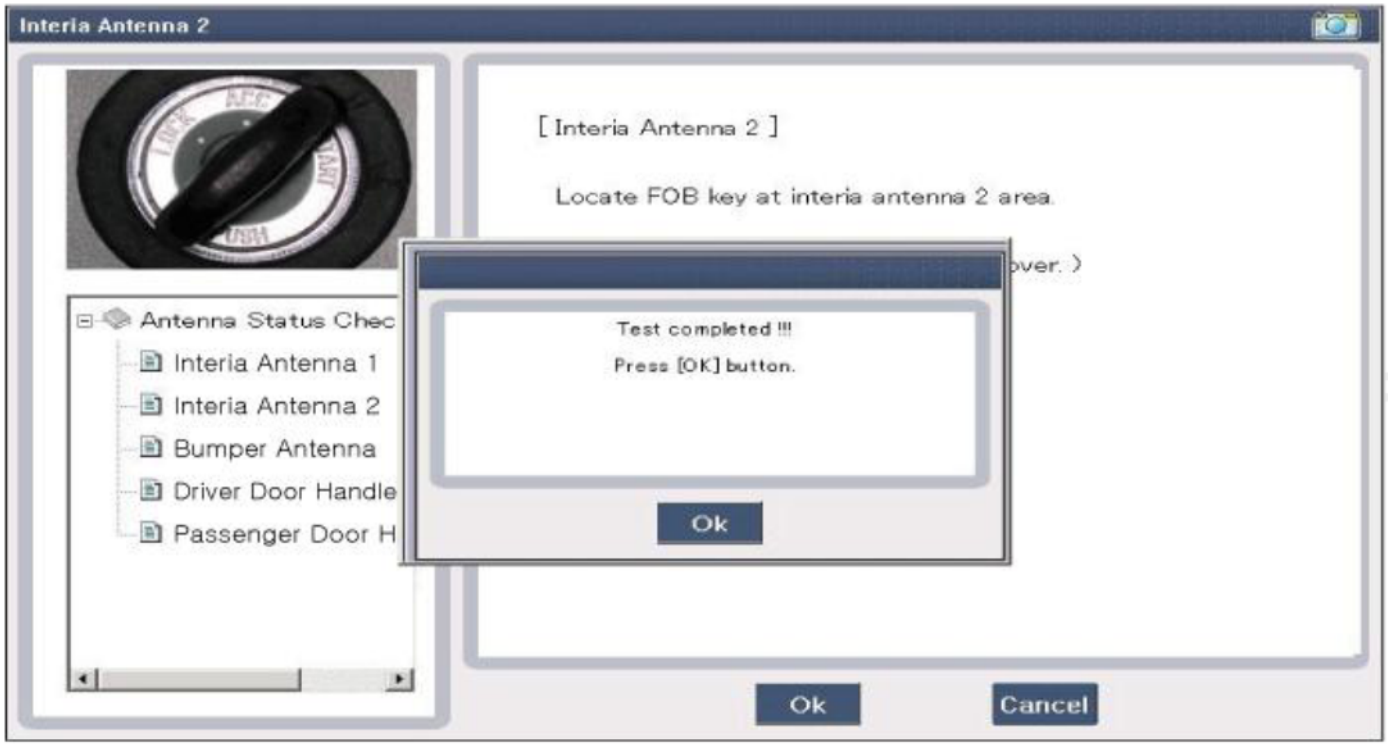
3. After IG ON, select the "Antenna Status Check".



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

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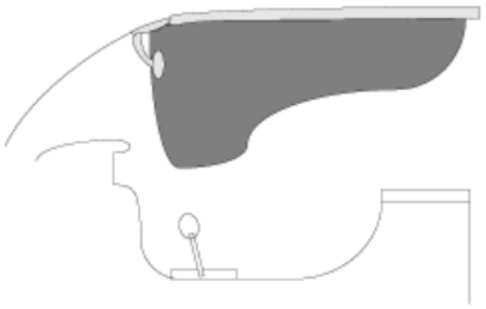


5. If the smart key runs normal , the related antenna, smart key(transmission, reception) and exterior receiver are normal.
6. Antenna status
   - INTERIOR Antenna 1
   - INTERIOR Antenna 2
   - Trunk antenna
   - BUMPER/Antenna
   - DRV_DR Antenna
   - AST_DR Antenna

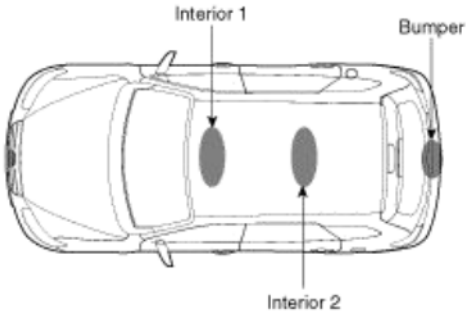
Interior Antenna Actuation Check

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

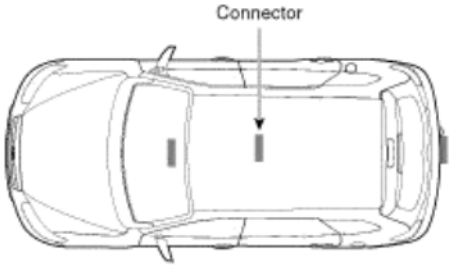
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2. If the ignition is ON, the antenna runs normal.
3. Check the interior antenna ignition mode.
4. Set the smart key in the following shade area and actuate the antenna. Check the LED of smart key is blinking.



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 IG ON, select the "FOB KEY STATUS INFO".

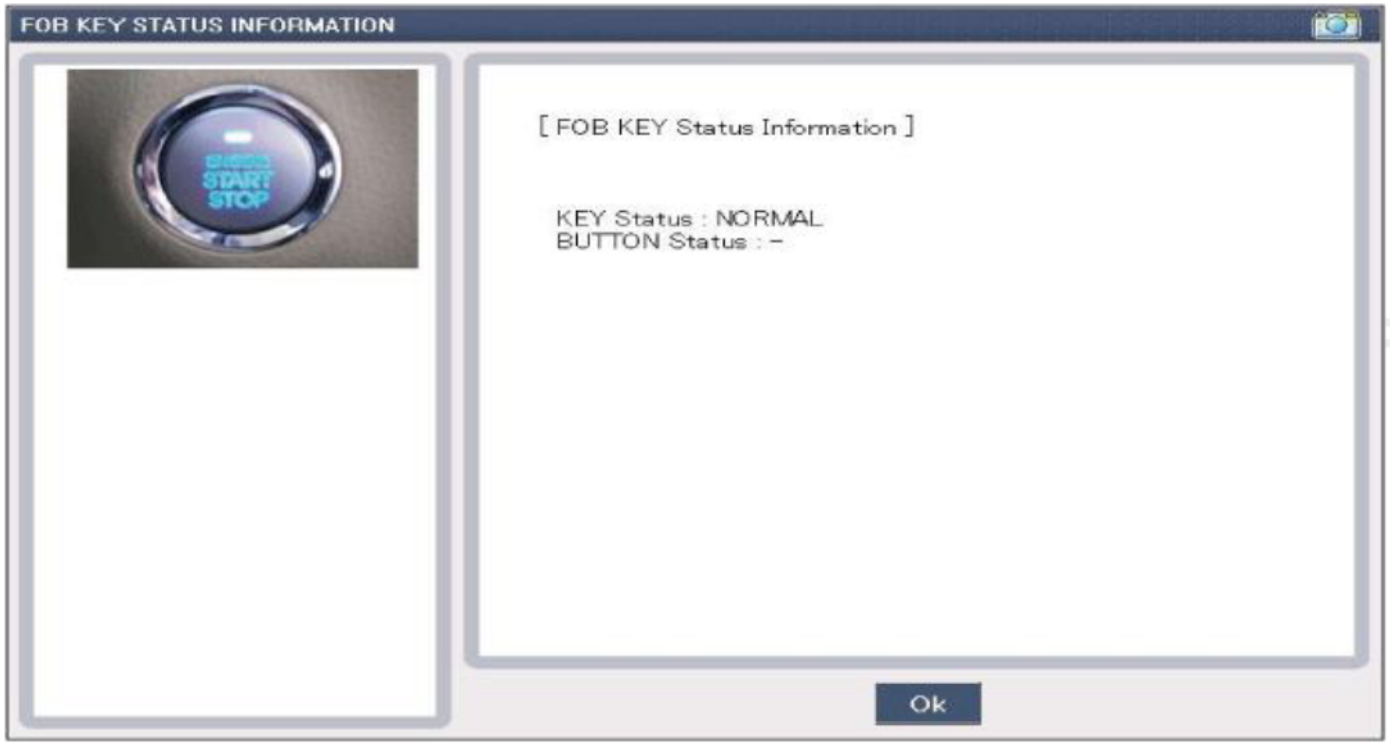
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ID Resister

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

Inspection/ Test

- Serial Communication Line Check
- Antenna Status Check



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Smart Key Status Check

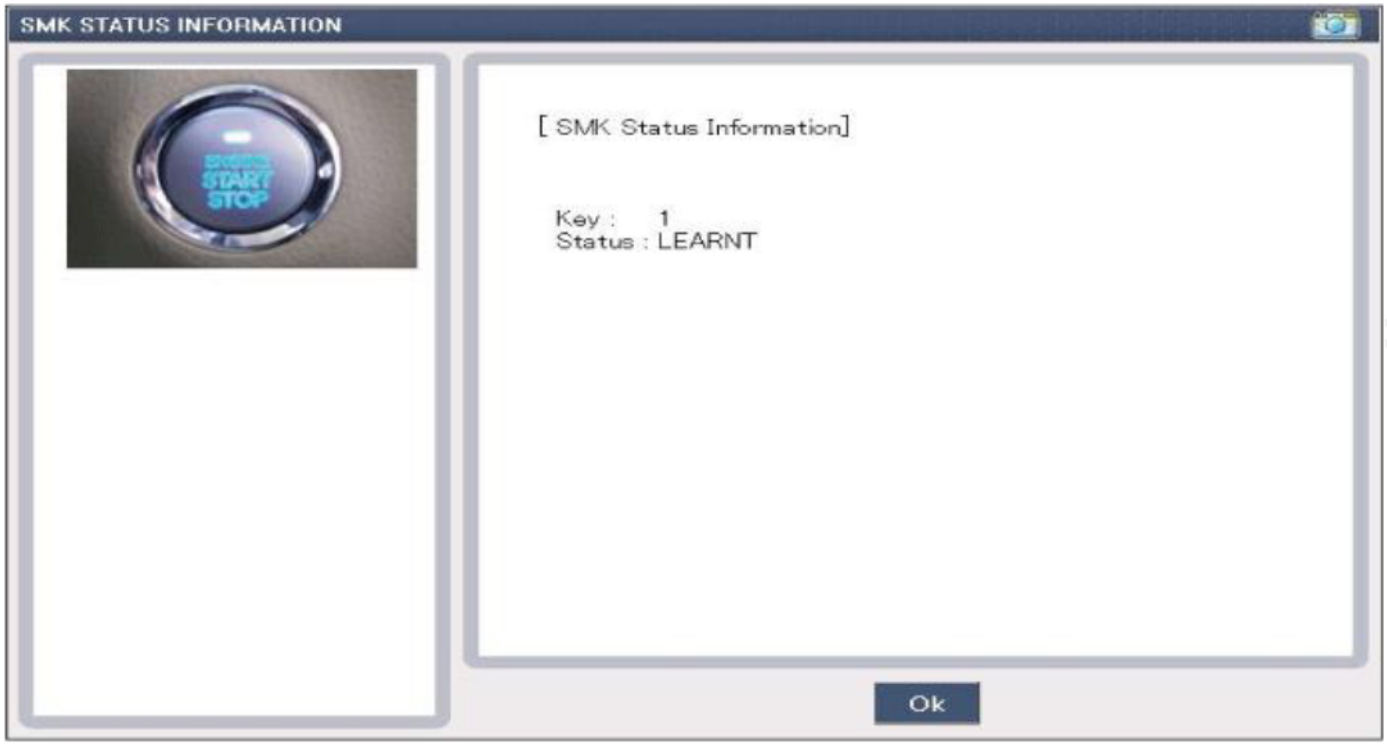
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "SMK STATUS INFO".

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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Neutralization Status Check

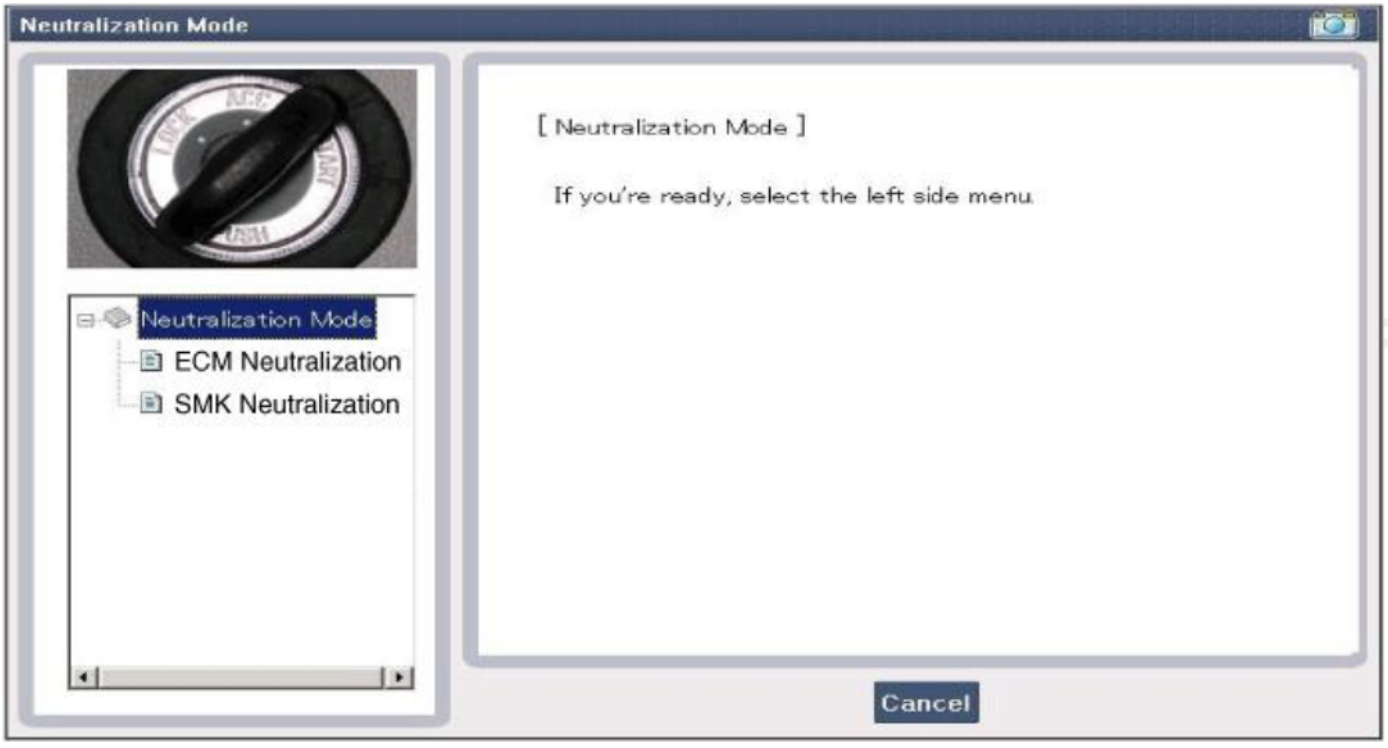
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "Neutralization mode".

ID Resister

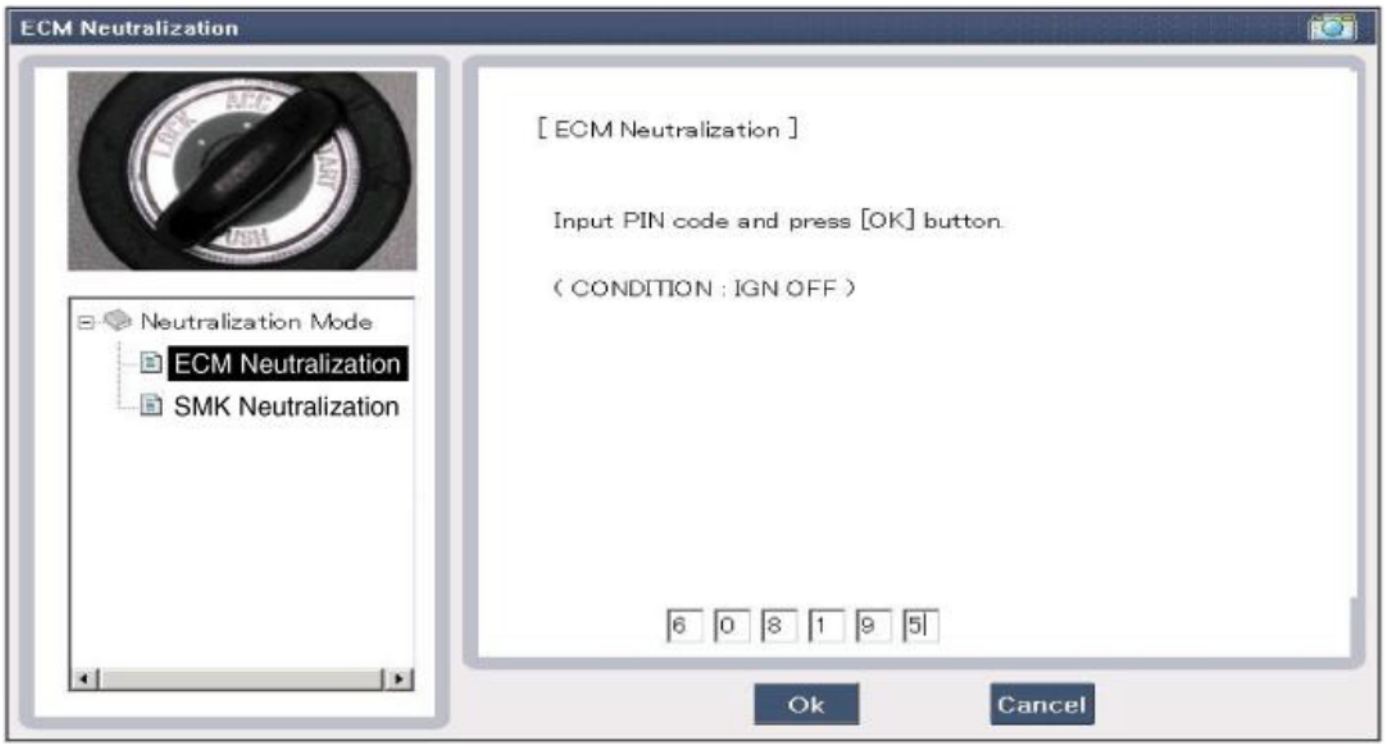
- System Identification
- Neutralization Mode
- SMK STATUS INFORMATION
- FOB KEY STATUS INFORMATION

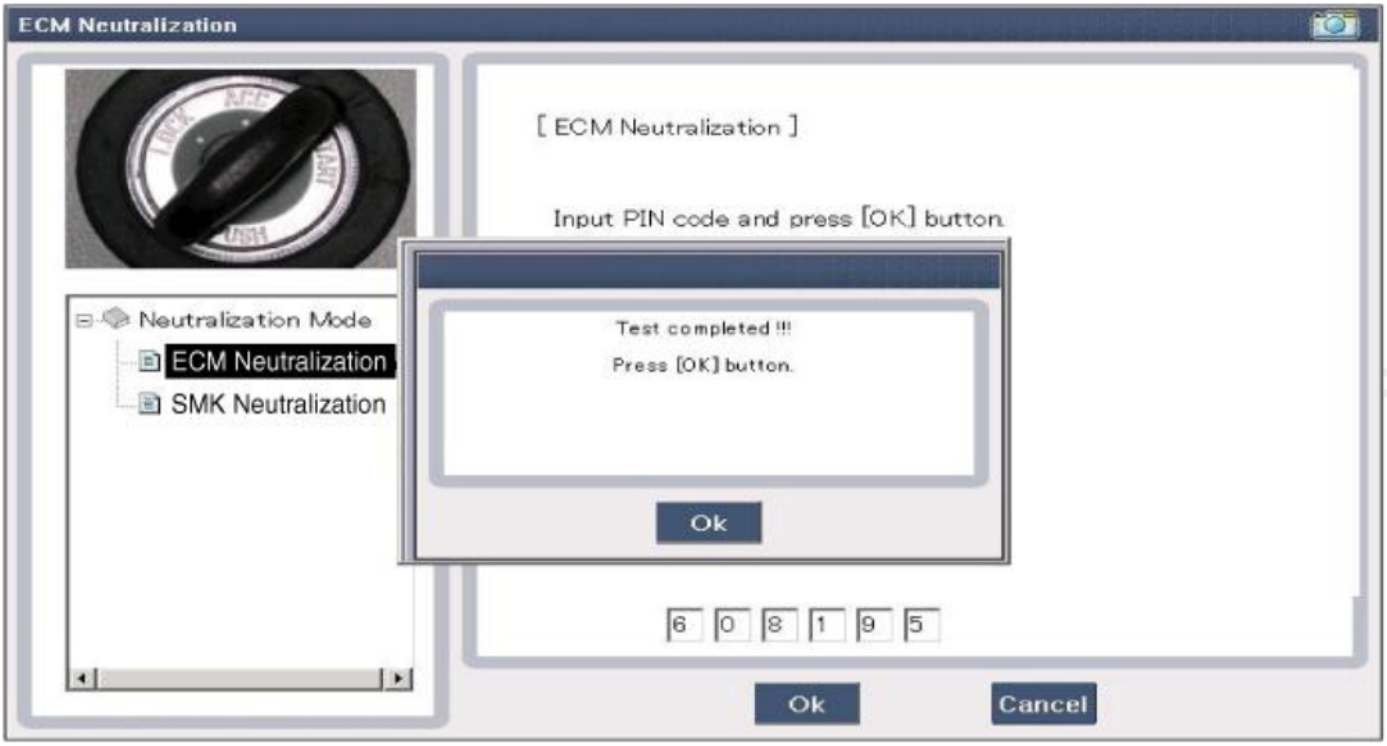
Inspection/ Test

- Serial Communication Line Check
- Antenna Status Check

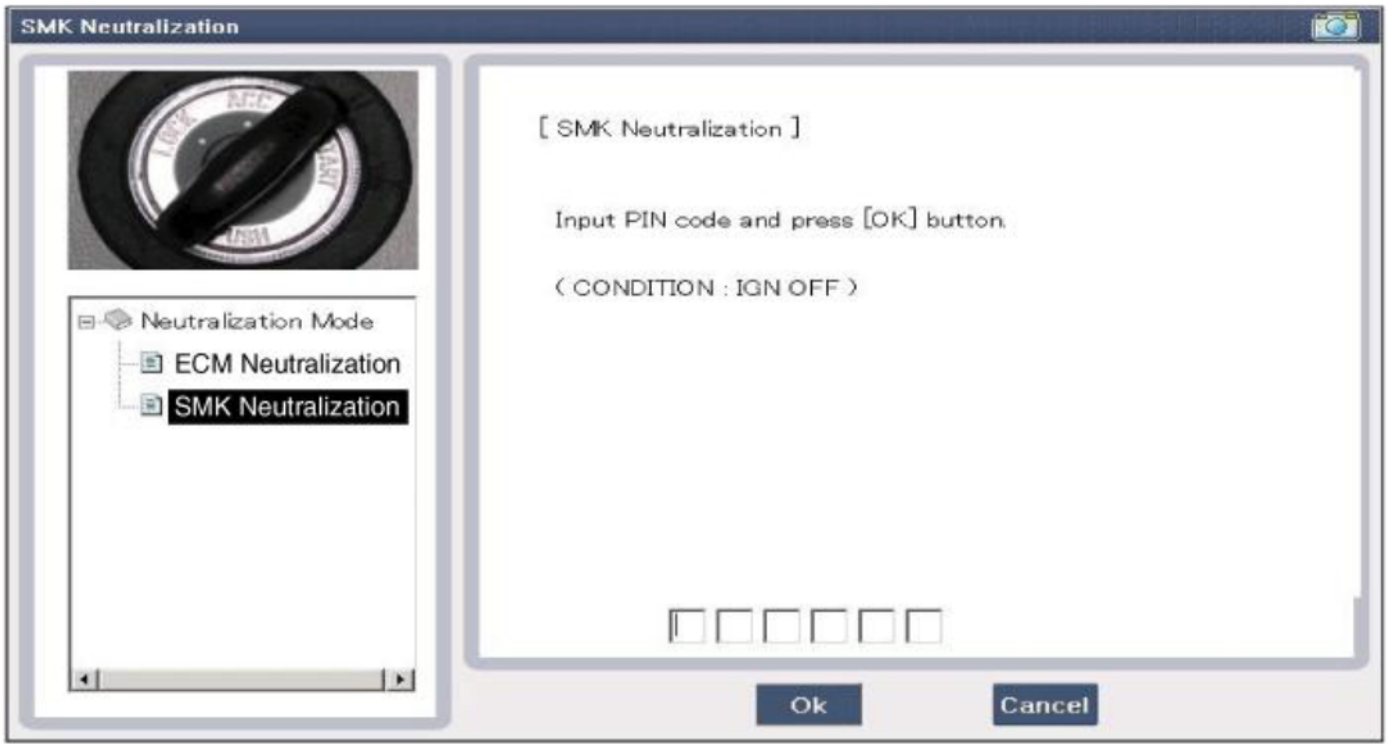


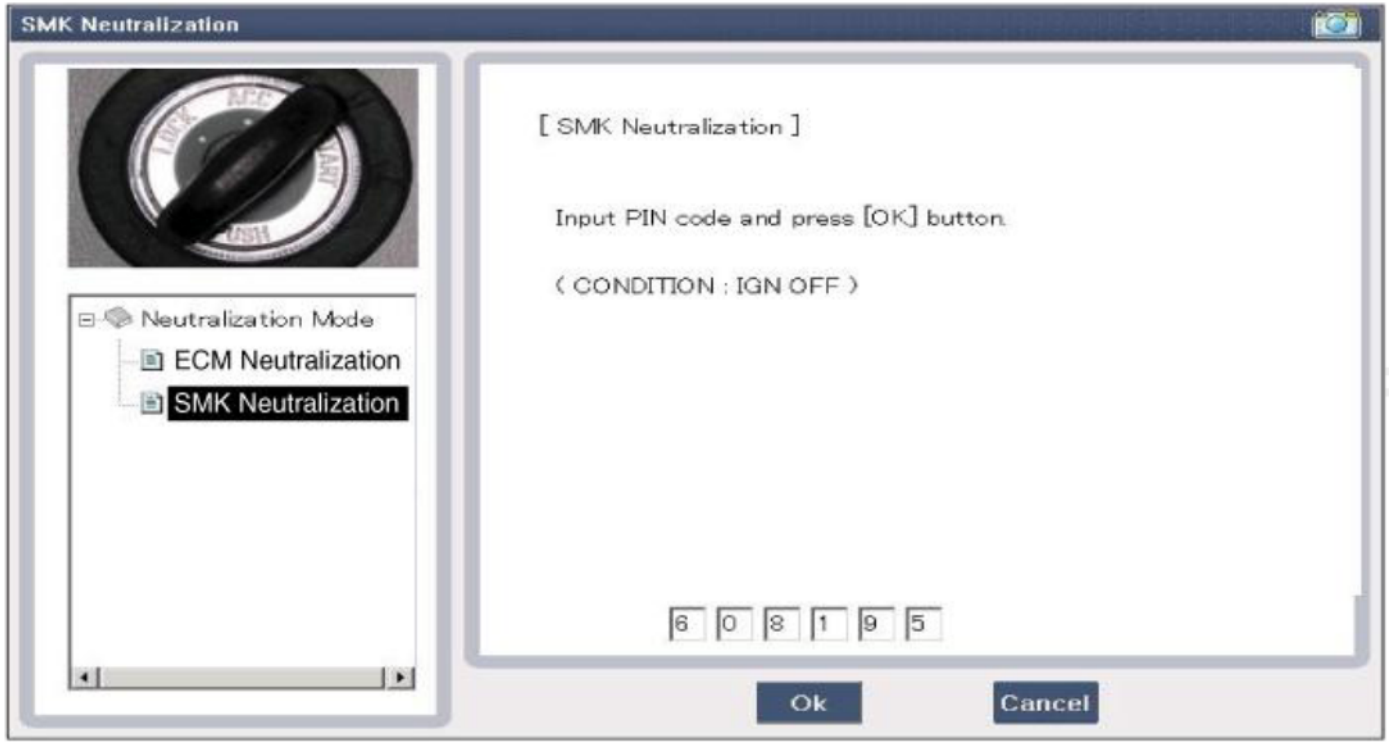
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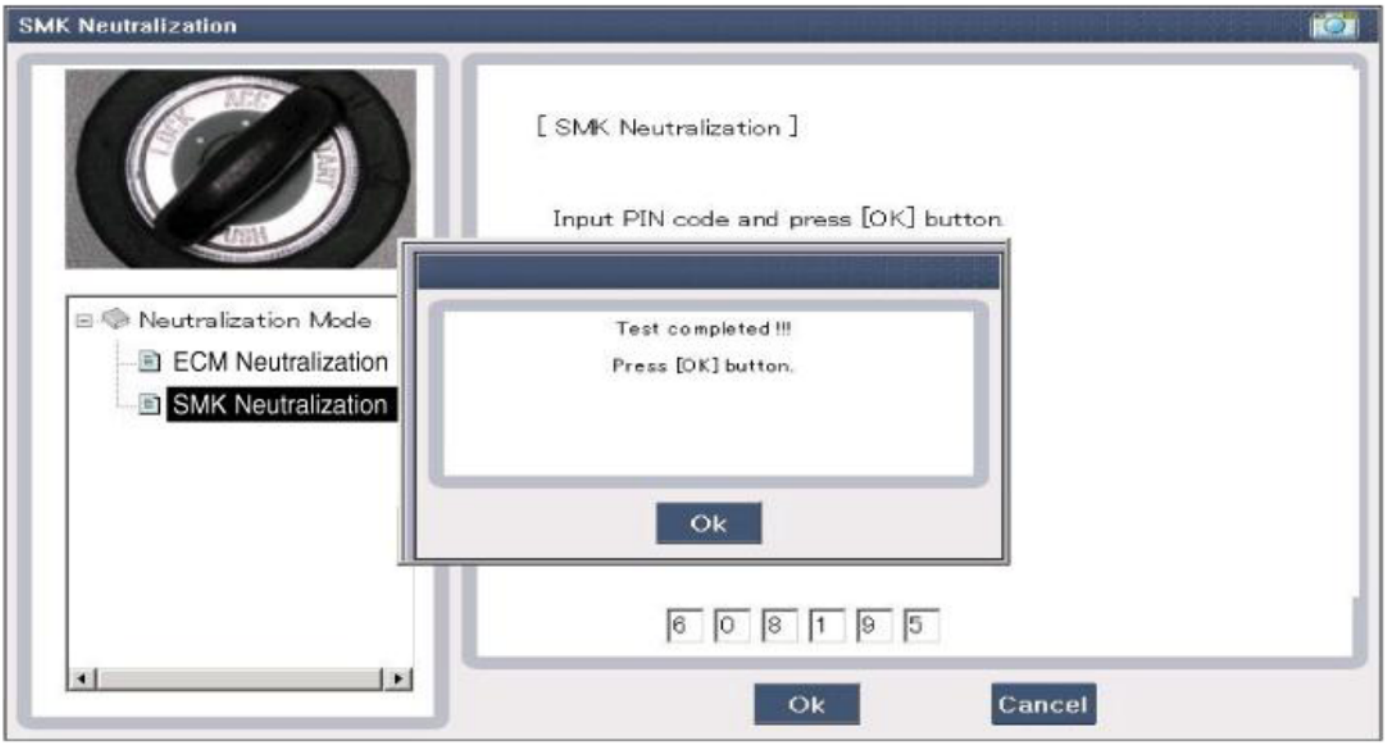


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Input Switch List

No	Item name	Unit
1	SSB switch2	-
2	ACC	-
3	IGN1	-
4	Gear 'P' Position	-
5	Brake switch	-
6	FL Door Lock Button	-
7	FR Door Lock Button	-
8	Trunk Lid switch	-
9	Battery Voltage	-
10	Alternator Voltage	-
11	KEY out Indicator Lamp	-
12	Immobilizer Lamp	-
13	External Buzzer	-

Actuator List

No.	Item name	Condition
1	Immo.indicator Lamp	Ignition switch ON Engine off
2	External Buzzer	Ignition switch ON Engine off
3	Interior Antenna 1 Active	Ignition switch ON Engine off
4	Interior Antenna 2 Active	Ignition switch ON Engine off
5	Bumper Antenna Active	Ignition switch ON Engine off

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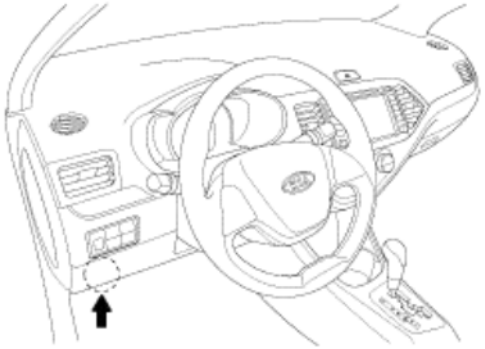
6	DRV DR Antenna Active	Ignition switch ON Engine off
7	AST DR Antenna Active	Ignition switch ON Engine off

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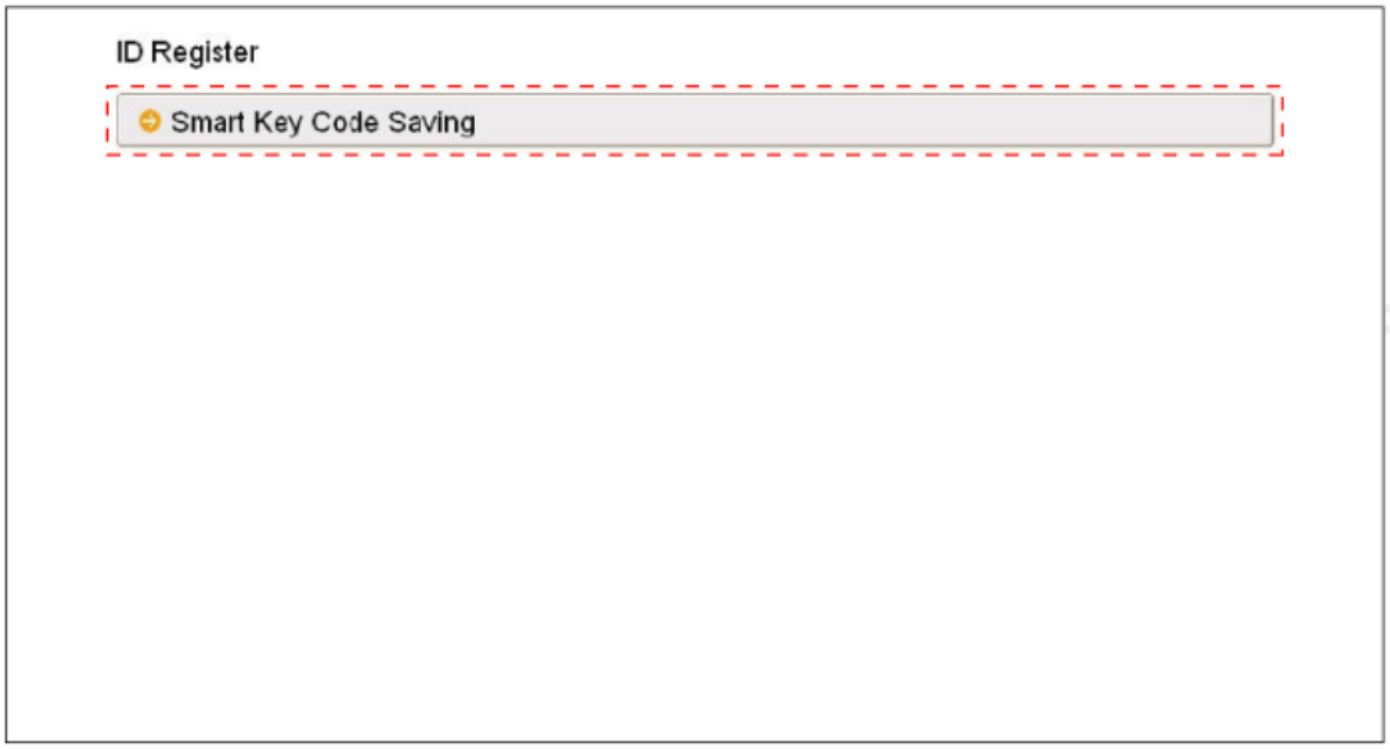
SMART KEY

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.

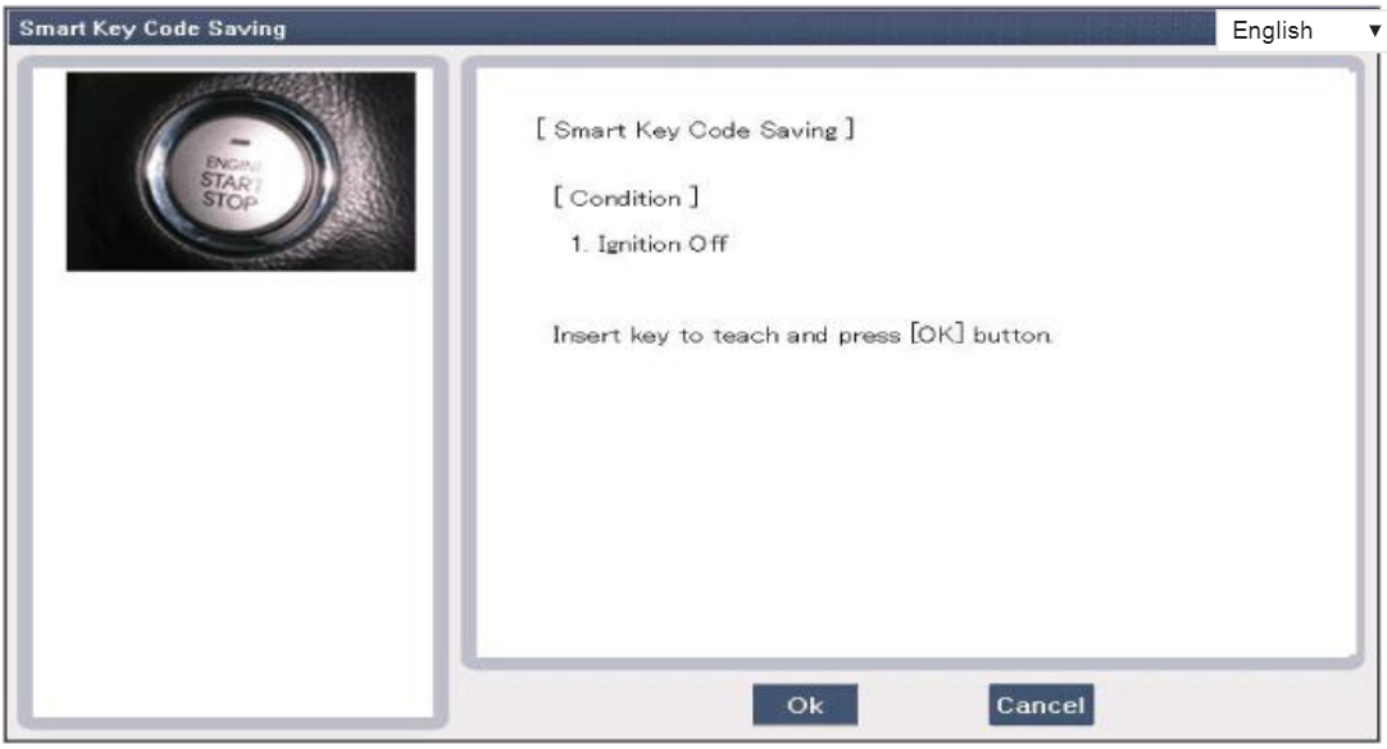


2. Select the vehicle model and then do "Smart key code saving".

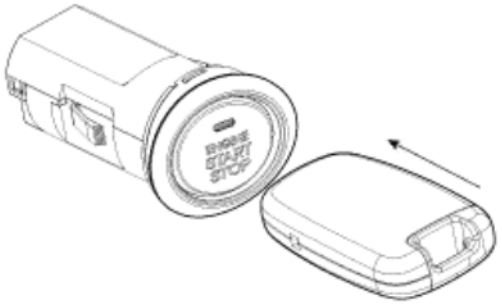


3. After selecting "Smart key teaching" menu, push "Enter" key, then the screen will be shown as below.

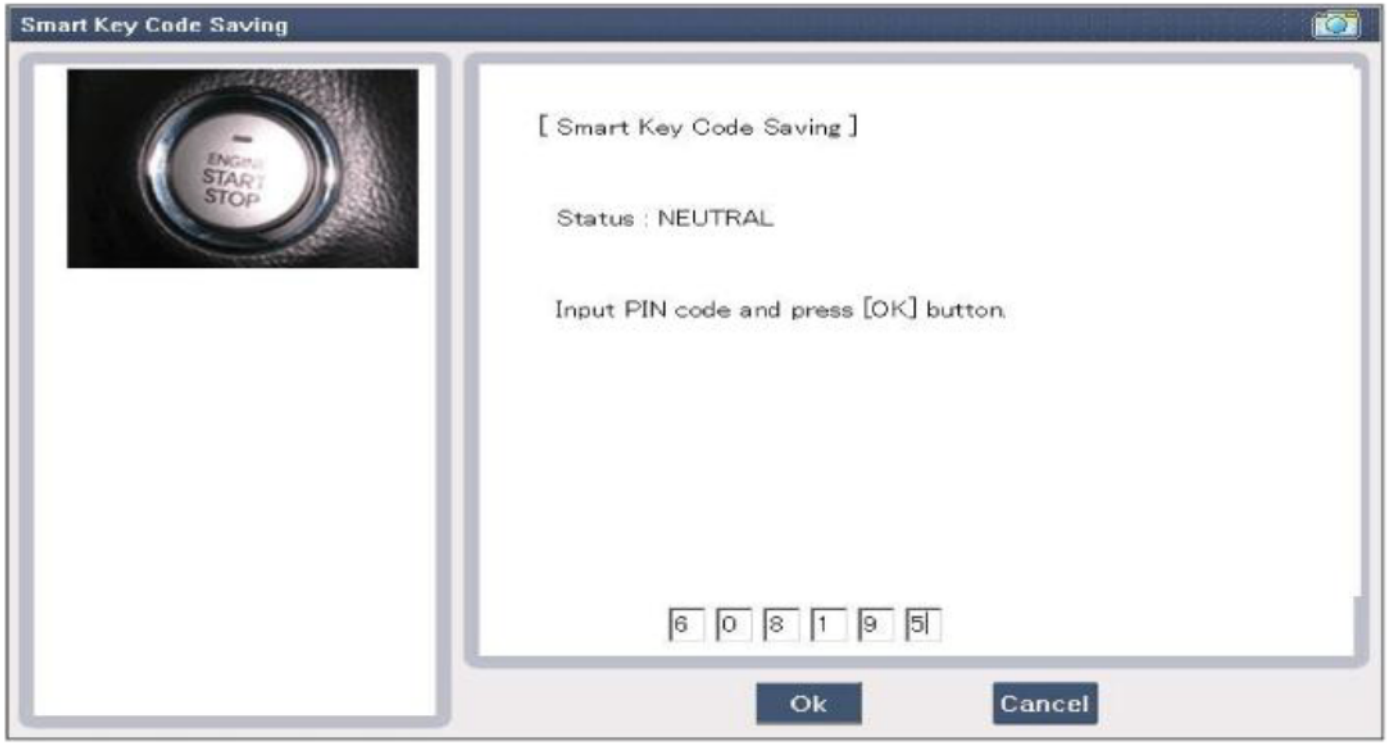
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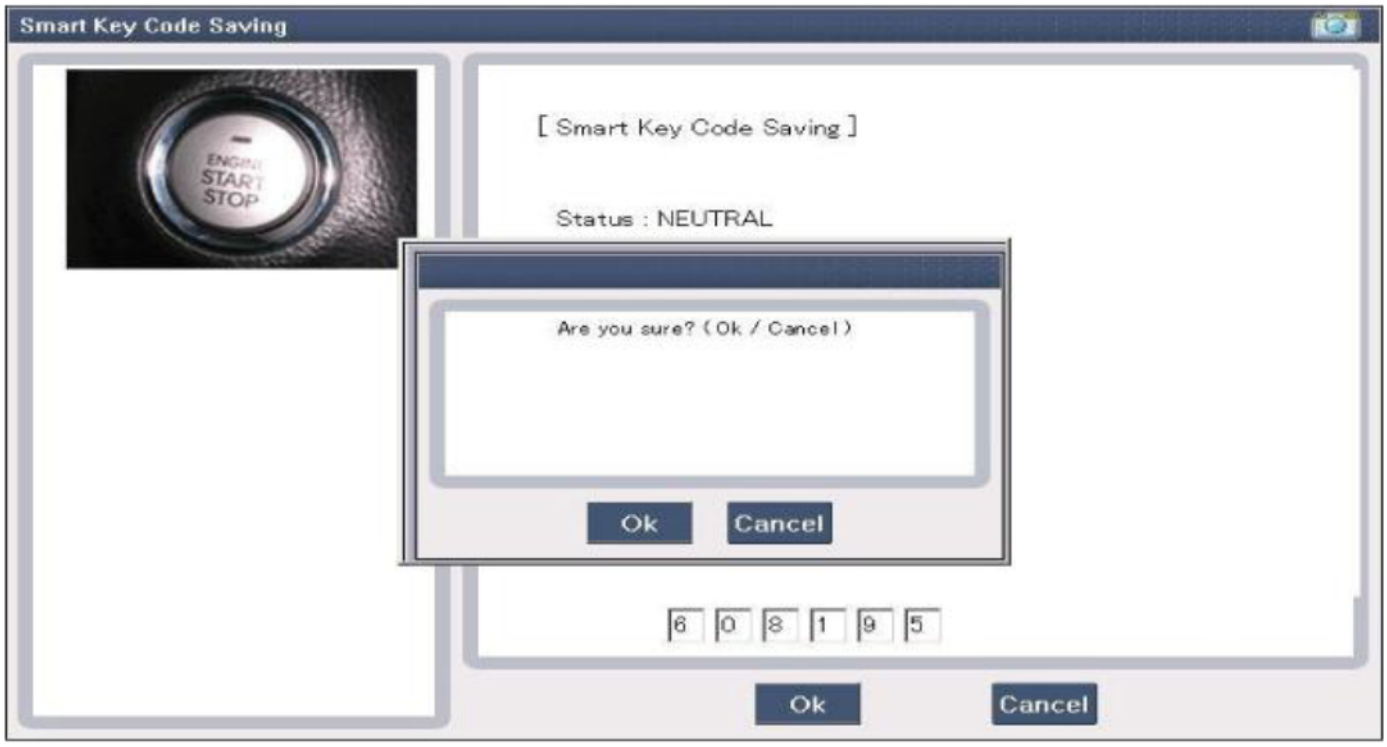
4. After pushing the teaching key, push "ENTER" key.



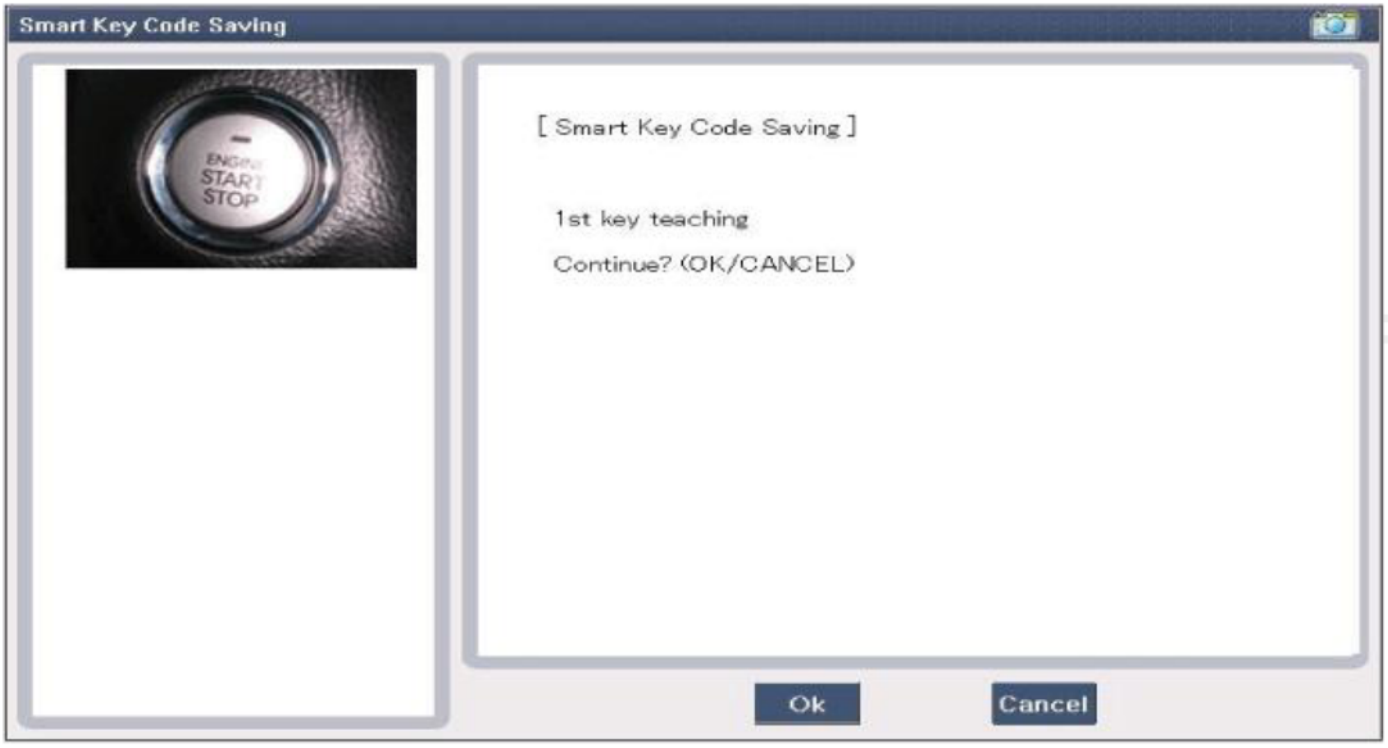
5. Input the "Pin code" for first key teaching.



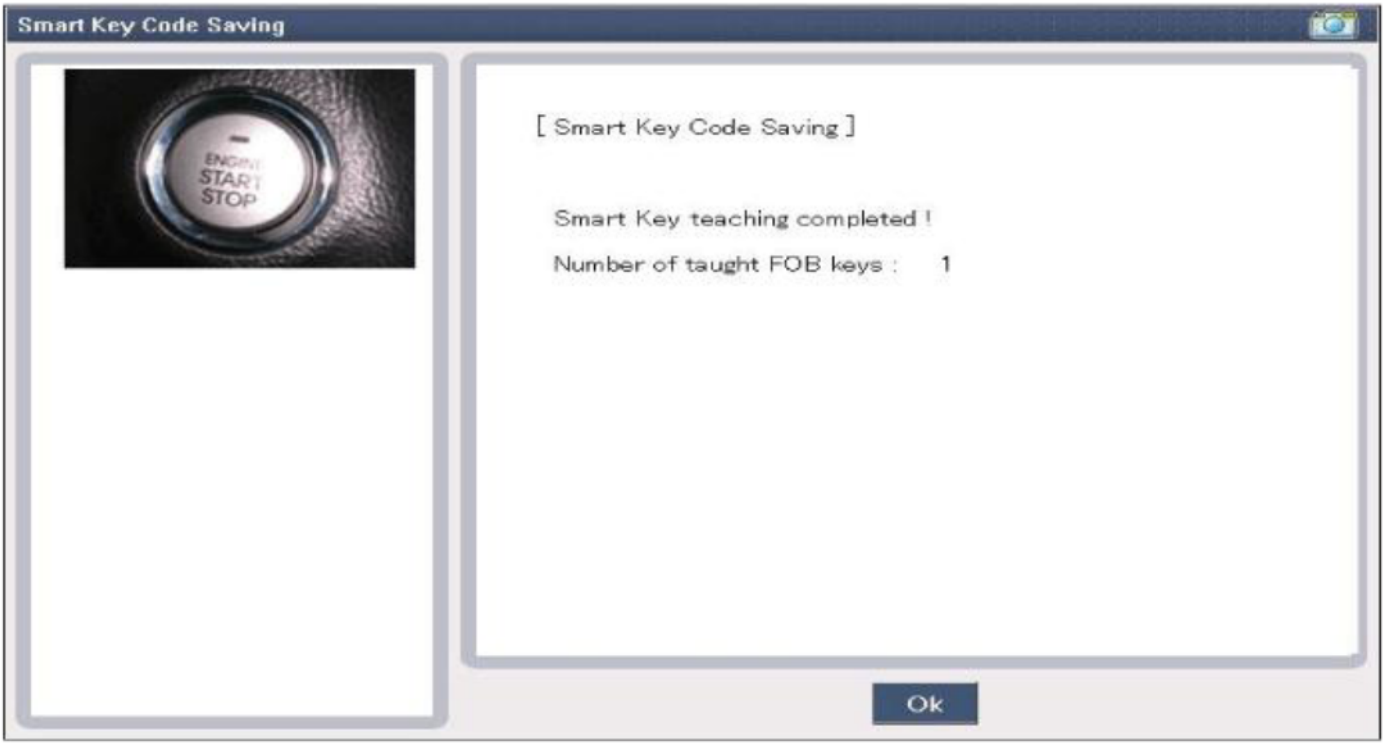
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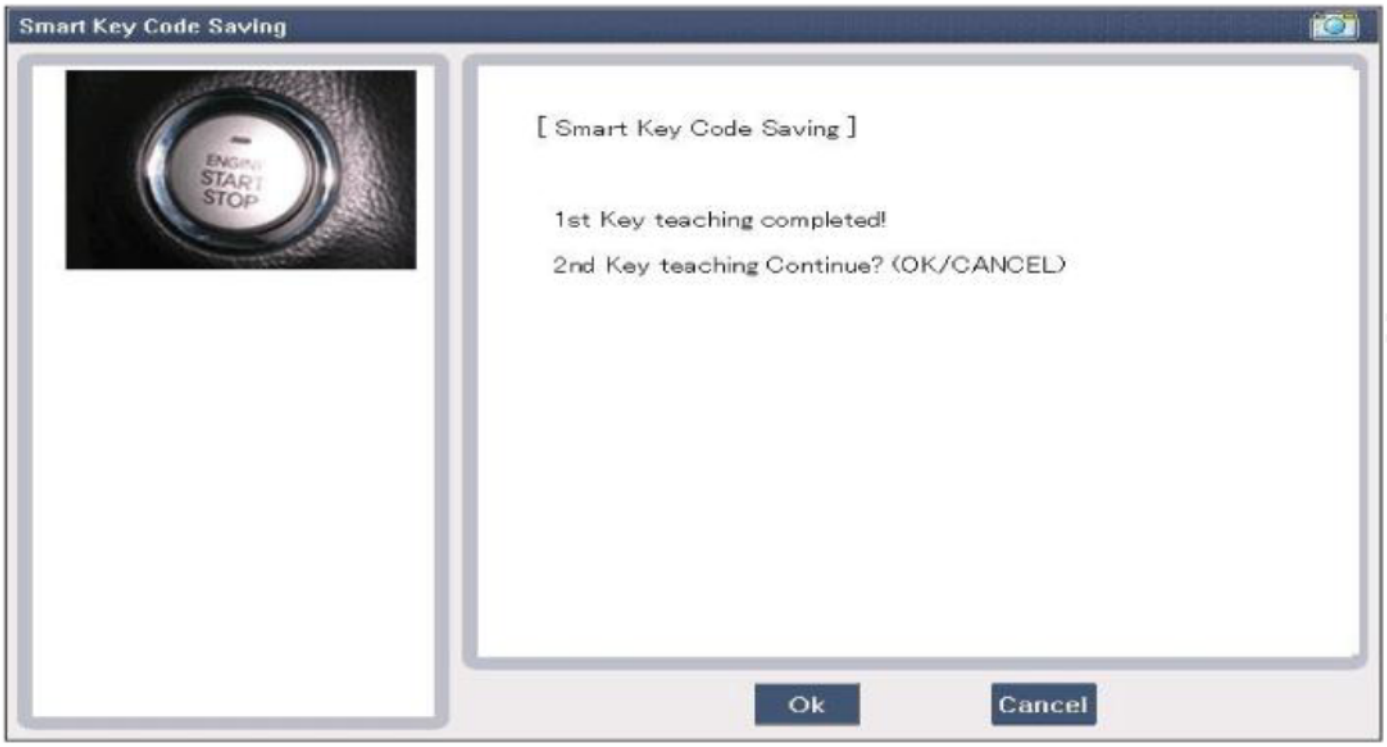
6. Confirm the message "First key teaching completed".



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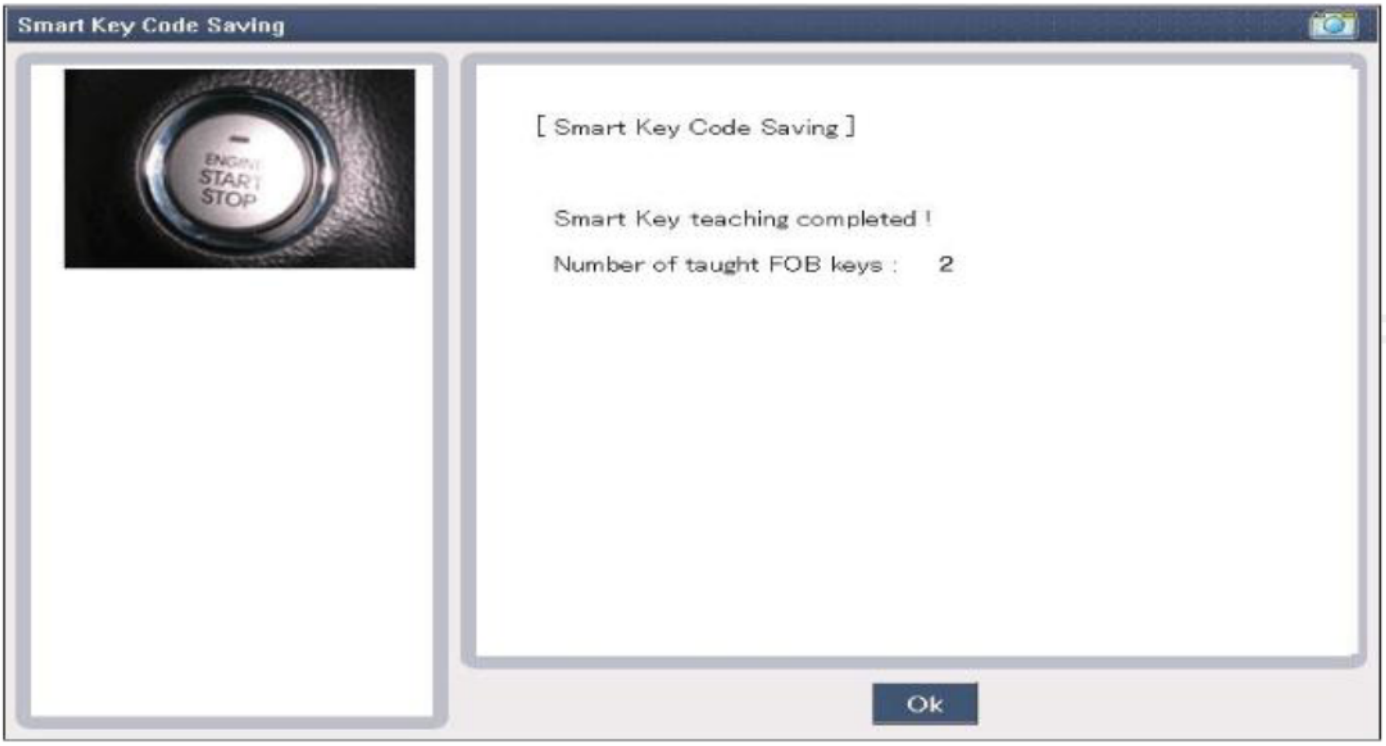
7. Input the "Pin code" for second key teaching.



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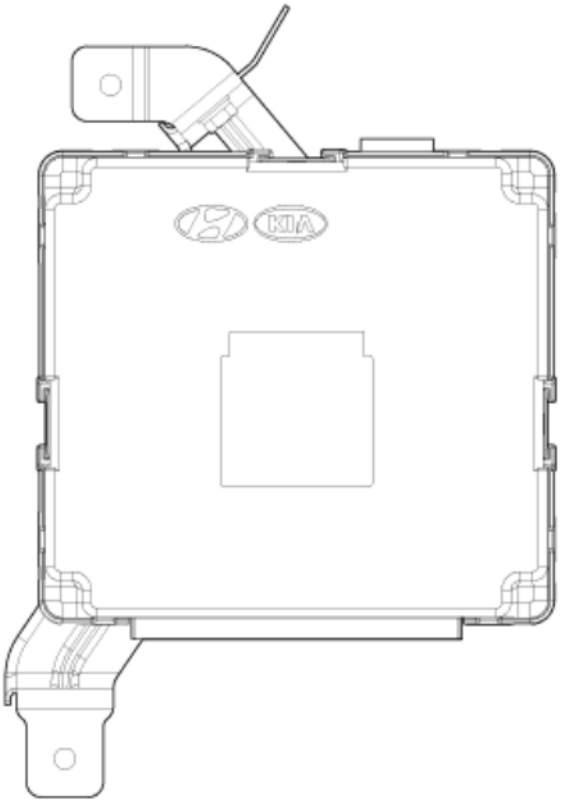
8. Confirm the message "Second key teaching completed".

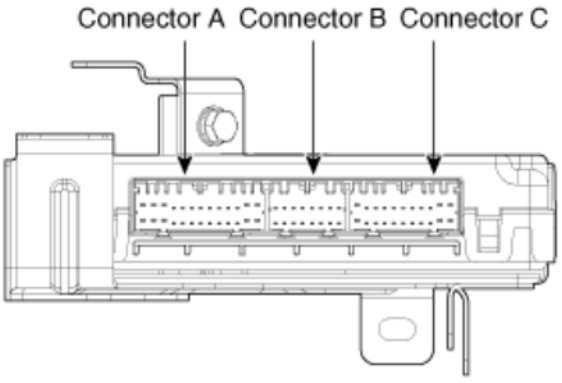


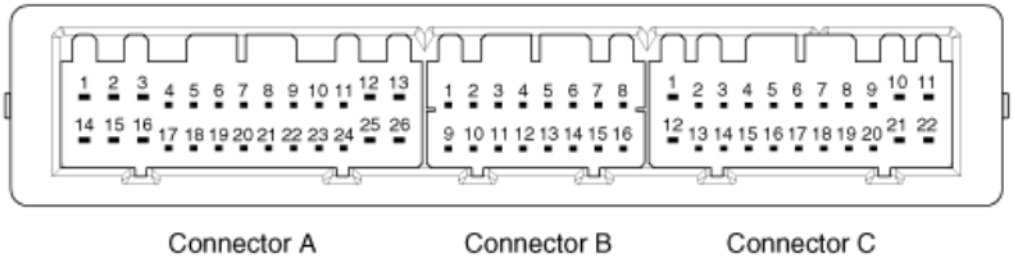
9. Then the screen will be shown as below when key teaching process is completed.

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COMPONENT (1)







Connector A Connector B Connector C

Connector Pin Information

No.	Connector A(26 pins)	No.	Connector B(16 pins)	No.	Connector C(22 pins)
1	Battery power load	1	CAN L	1	Start/Stop button switch ILL
2	-	2	CAN H	2	Start/Stop button lamp

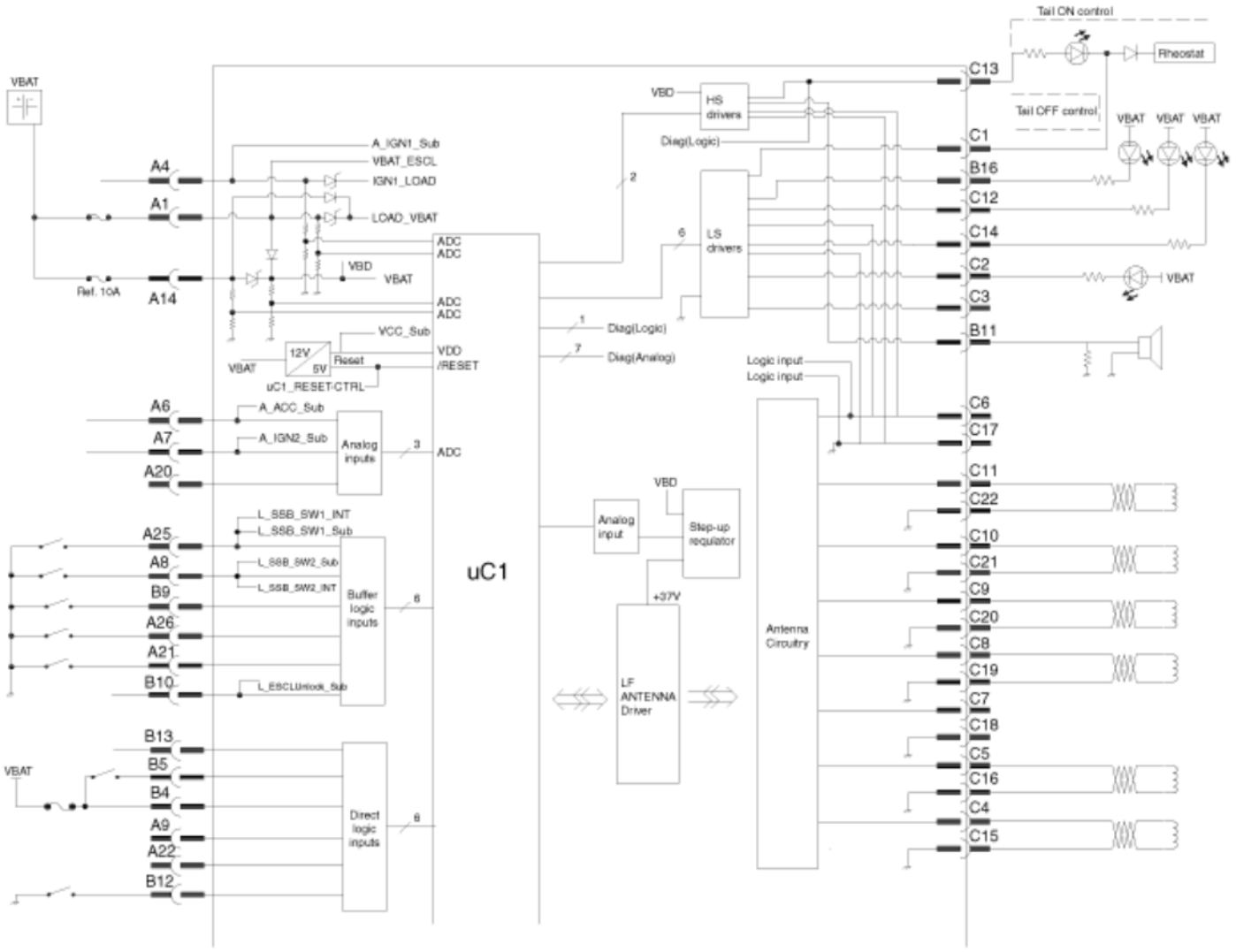
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3	Power ground 1	3	-	3	-
4	IGN 1	4	Stop lamp fuse	4	Internal antenna #2 power
5	IGN 1 relay	5	Brake switch	5	Internal antenna #1 power
6	ACC	6	Immobilizer antenna power	6	-
7	IGN 2	7	-	7	-
8	Start/Stop button switch 2	8	Wheel speed	8	-
9	-	9	Driver toggle button	9	Bumper antenna power
10	-	10	-	10	Assistant antenna power
11	-	11	External buzzer	11	Driver antenna power
12	CAN H	12	P position / Clutch switch	12	SSB LED Blue / GN
13	CAN L	13	Start feedback	13	SSB illumination power
14	Battery voltage CPU	14	Immobilizer antenna ground	14	-
15	-	15	Diagnostic - K	15	Internal antenna #2 ground
16	Power ground 2	16	Start/Stop button switch LED	16	Internal antenna #1 ground
17	Starter relay			17	-
18	IGN 2 relay			18	-
19	ACC relay			19	-
20	-			20	Bumper antenna ground
21	Trunk lid switch			21	Assistant antenna ground
22	-			22	Driver antenna ground
23	RPM				
24	EMS COM				
25	Start/Stop button switch 1				
26	Assistant toggle button				

English ▼

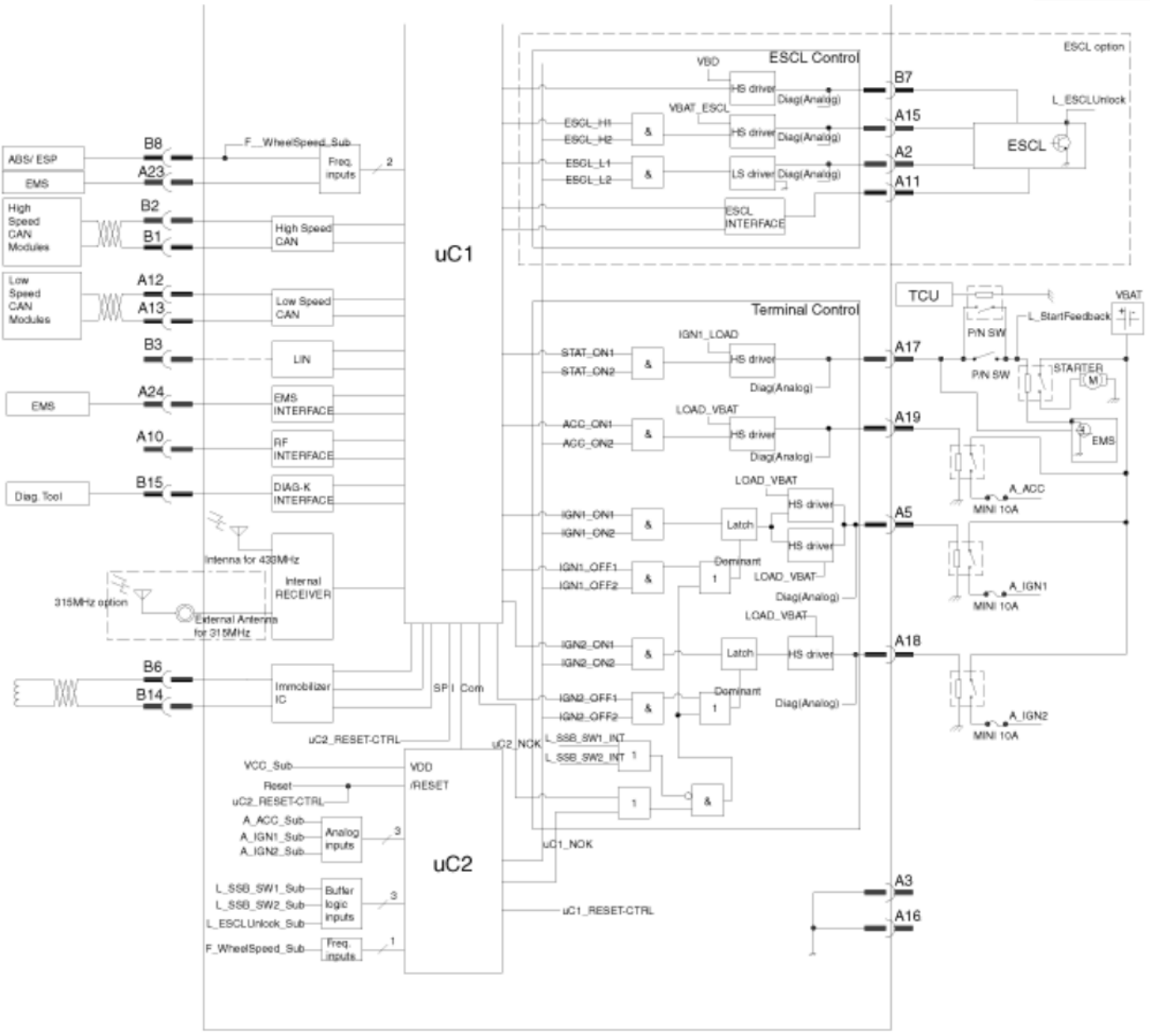
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CIRCUIT DIAGRAM



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English

INSPECTION

Smart Key Unit

– Refer to the BE group - inspection / self diagnosis with GDS.

Smart Key Switch

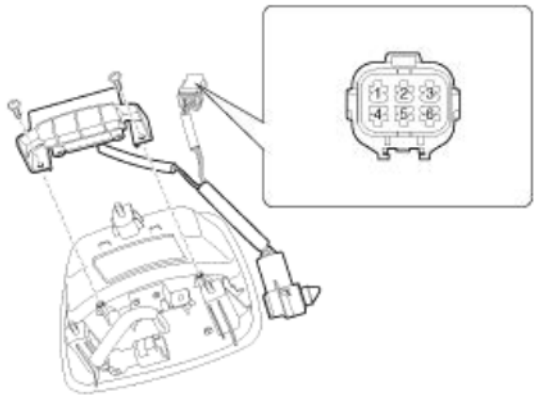
– Refer to the BE group - inspection / self diagnosis with GDS.

Antenna

– Refer to the BE group - inspection / self diagnosis with GDS.

Trunk Lid Open Switch

1. Check for continuity between the Trunk lid open switch terminals.



2. If continuity is not specified, inspect the switch

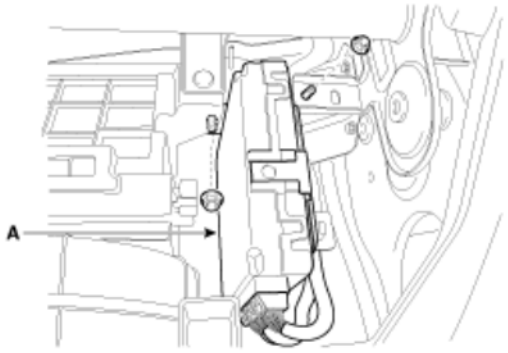
Terminal / Position	1	2
OFF		
ON	○	○

REMOVAL

Smart key unit

1. Disconnect the negative(-) battery terminal.
2. Remove the glove box housing.
   (Refer to the BD group - "Crash pad")
3. Remove the smart key unit (A) with loosening bolt and nut, then disconnect the connector.

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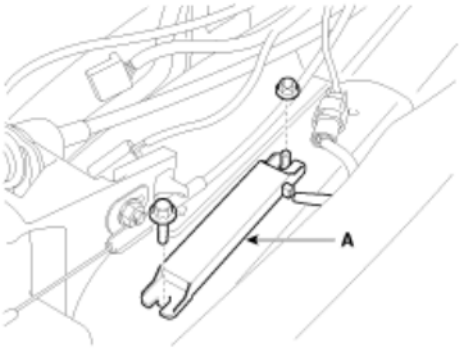


Interior #1 antenna

NOTICE

Take care not to scratch the crash pad and related parts.

1. Disconnect the negative(-) battery terminal.
2. Remove the console upper cover.
   (Refer to the BD group - "Console")
3. Disconnect the connector ,then remove the interior #1 antenna (A) with loosening 2 nuts.

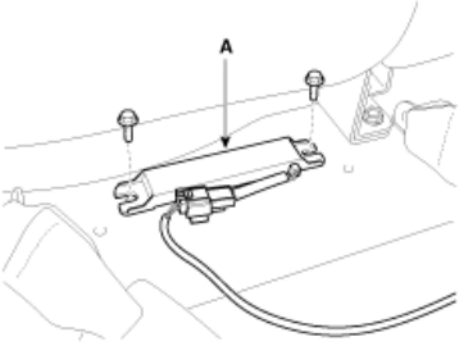


Interior #2 antenna

NOTICE

Take care not to scratch the crash pad and related parts.

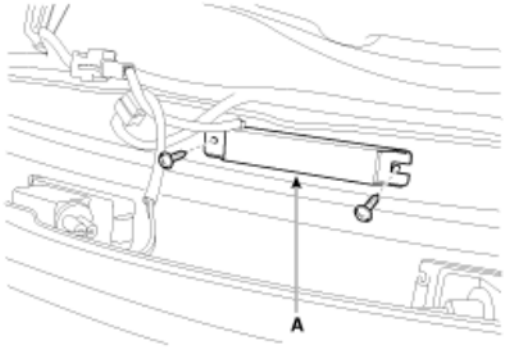
1. Disconnect the negative(-) battery terminal.
2. Fold the rear seat and open the carpet.
3. Disconnect the connector ,then remove the interior #2 antenna (A) with loosening 2 bolts.



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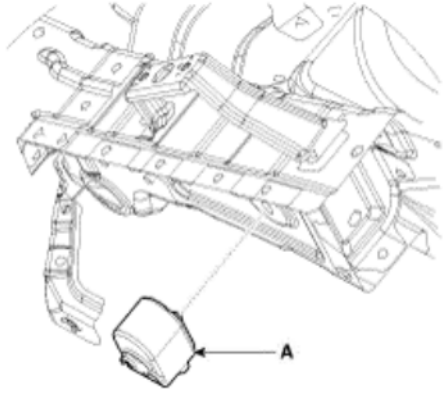
Exterior Bumper Antenna

1. Disconnect the negative(-) battery terminal.
2. Remove the rear bumper.
   (Refer to the BD group - "Rear bumper")
3. Disconnect the connector ,then remove the rear bumper antenna (A) with loosening 2 screws.



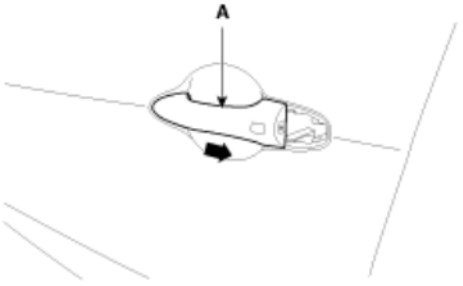
Buzzer

1. Disconnect the negative(-) battery terminal.
2. Remove the left tire wheel guard.
   (Refer to the BD group - "Front bumper")
3. Remove the buzzer (A) after disconnecting the connector.



Door outside handle

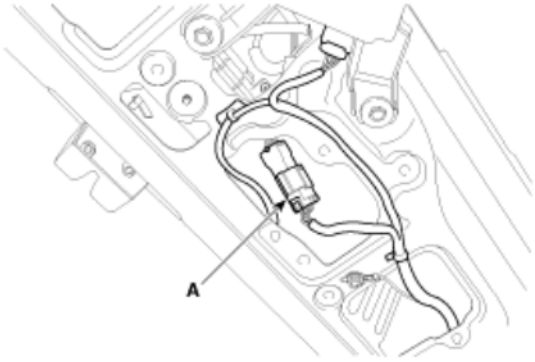
1. Disconnect the negative(-) battery terminal.
2. Remove the front door module.
   (Refer to the BD group - "Front door")
3. Remove the outside handle (A) by sliding it reward.



Tail gate lid open switch

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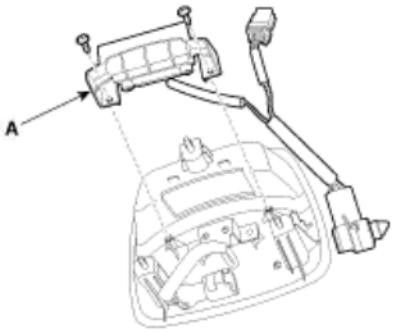
1. Disconnect the negative(-) battery terminal.
2. Remove the Tail gate door trim.
   (Refer to the BD group - "Tail gate")
3. Disconnect the Tail gate lid open switch connector (A).



4. Remove the Tail gate outside handle assembly (A) after loosening the nuts.



5. Remove the tail gate outside handle (A) after loosening the screws.



INSTALLATION

Smart Key Unit

1. Install the smart key unit.
2. Connect the connector and install the smart key unit.
3. Install the glove box.
4. Install the negative (-) battery terminal and check the smart key system.

Interior #1 Antenna

1. Install the interior #1 antenna.

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2. Install the console.
3. Install the negative (-) battery terminal and check the smart key system.

Interior #2 Antenna

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

Buzzer

1. Install the buzzer.
2. Install the tire 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 trip.
3. Install the negative (-) battery terminal and check the smart key system.

Tail gate open switch

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

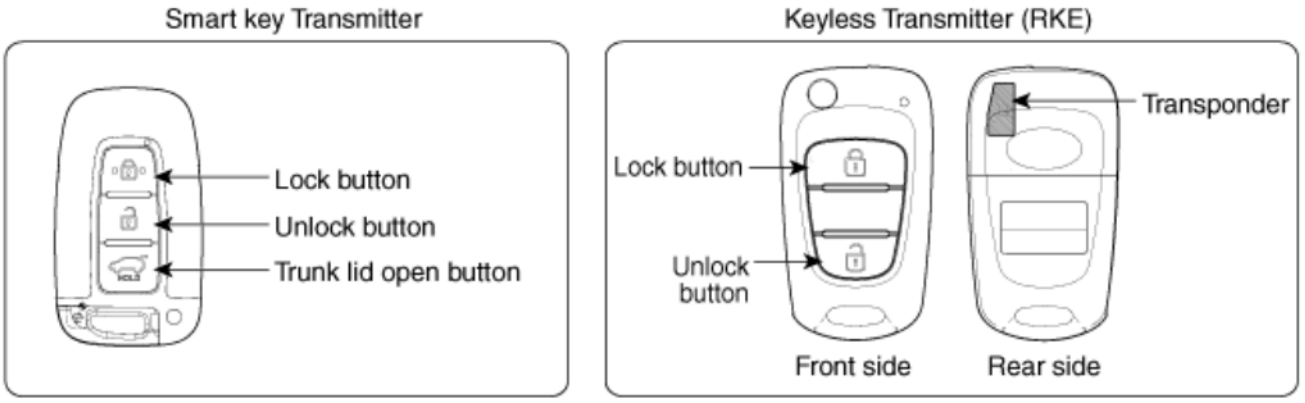
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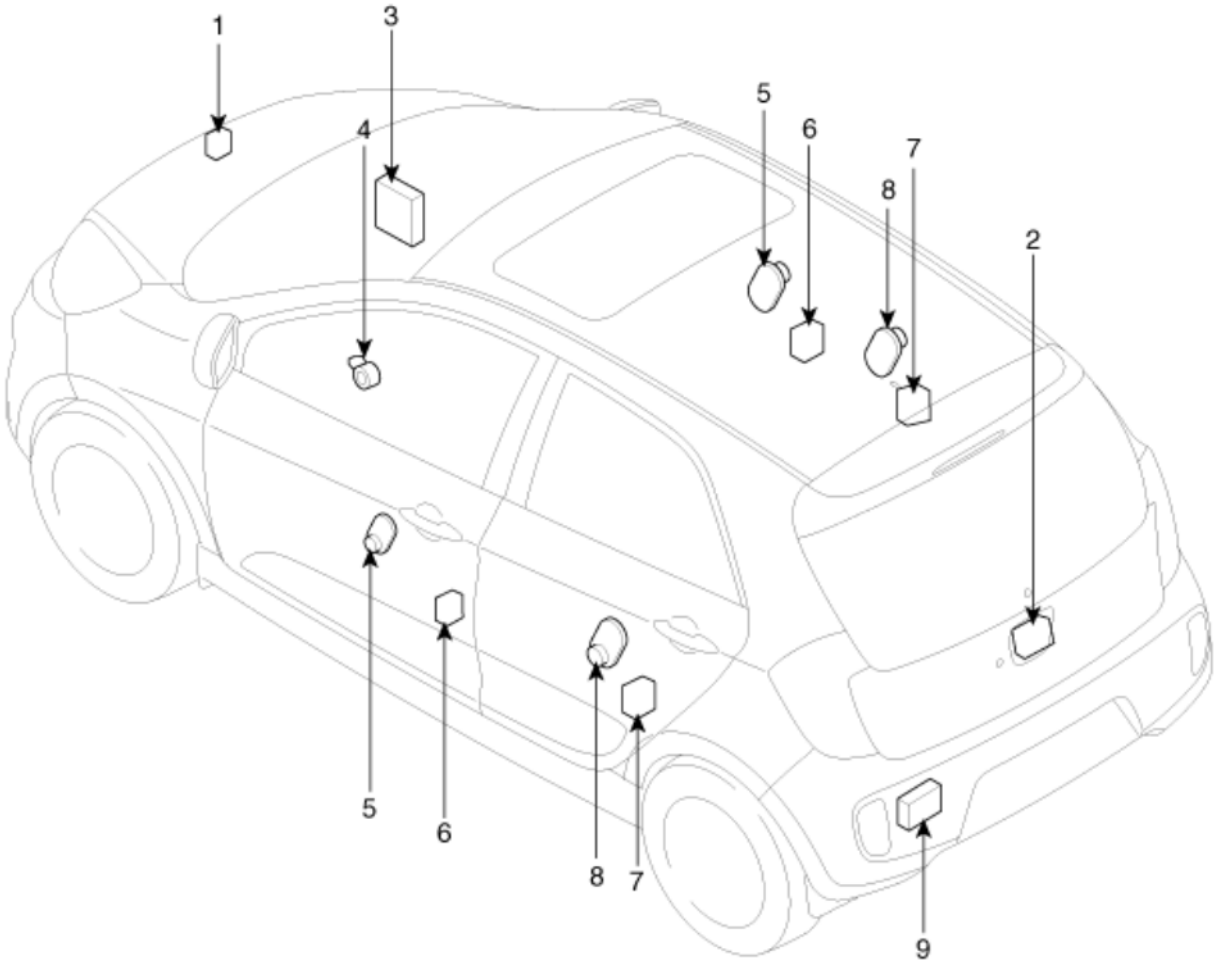
SPECIFICATION

Item	Description
Power source	3V
Operating temperature	-20°C ~ +60°C
RF Modulation	FSK
LF Modulation	ASK
RF frequency	433.92MHz
Battery	CR2032
Transmissible distance	10m or more
Life of battery	2years or more(at 20 times per day) **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.
Button number	2
Function	Door lock
	Door unlock

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COMPONENT LOCATION





1. Hood switch 2. Trunk lid open switch 3. BCM and RF antenna 4. Key warning switch 5. Front door switch	6. Front door lock actuator & switch 7. Rear door lock actuator & switch 8. Rear door switch 9. Burglar horn

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DESCRIPTION

Burglar Alarm System

The burglar alarm system is armed automatically after the doors, hood, and trunk lid are closed and locked.
The system is set off when any of these things occur:

- A door is forced open.
- A door is unlocked without using the transmitter & key.
- The trunk lid is opened without using the key.
- The hood is opened.
- The engine starter circuit and battery circuit are bypassed by breaking the ignition switch.

When the system is set off, the alarm (horn) sounds and the hazard lamp flash for about two minutes or until the system is disarmed by unlocking the transmitter.
For the system to arm, the ignition switch must be off and the key removed. Then, the body control module must receive signals that the doors, hood, and trunk lid are closed and locked. When everything is closed and locked, none of the control unit inputs are grounded.
The door switches, hood switch and trunk lid switch are all close and lock the doors with the remote transmitter and then the system arms after 30 second.
If anything is opened or improperly unlocked after the system is armed, the body control module gets a ground signal from that switch, and the system is set off.
If one of the switches is misadjusted or there is a short in the system, the system will not arm. As long as the body control module continues to get a ground signal, it thinks the vehicle is not closed and locked and will not arm.
The receiver is integrated in the body control module.

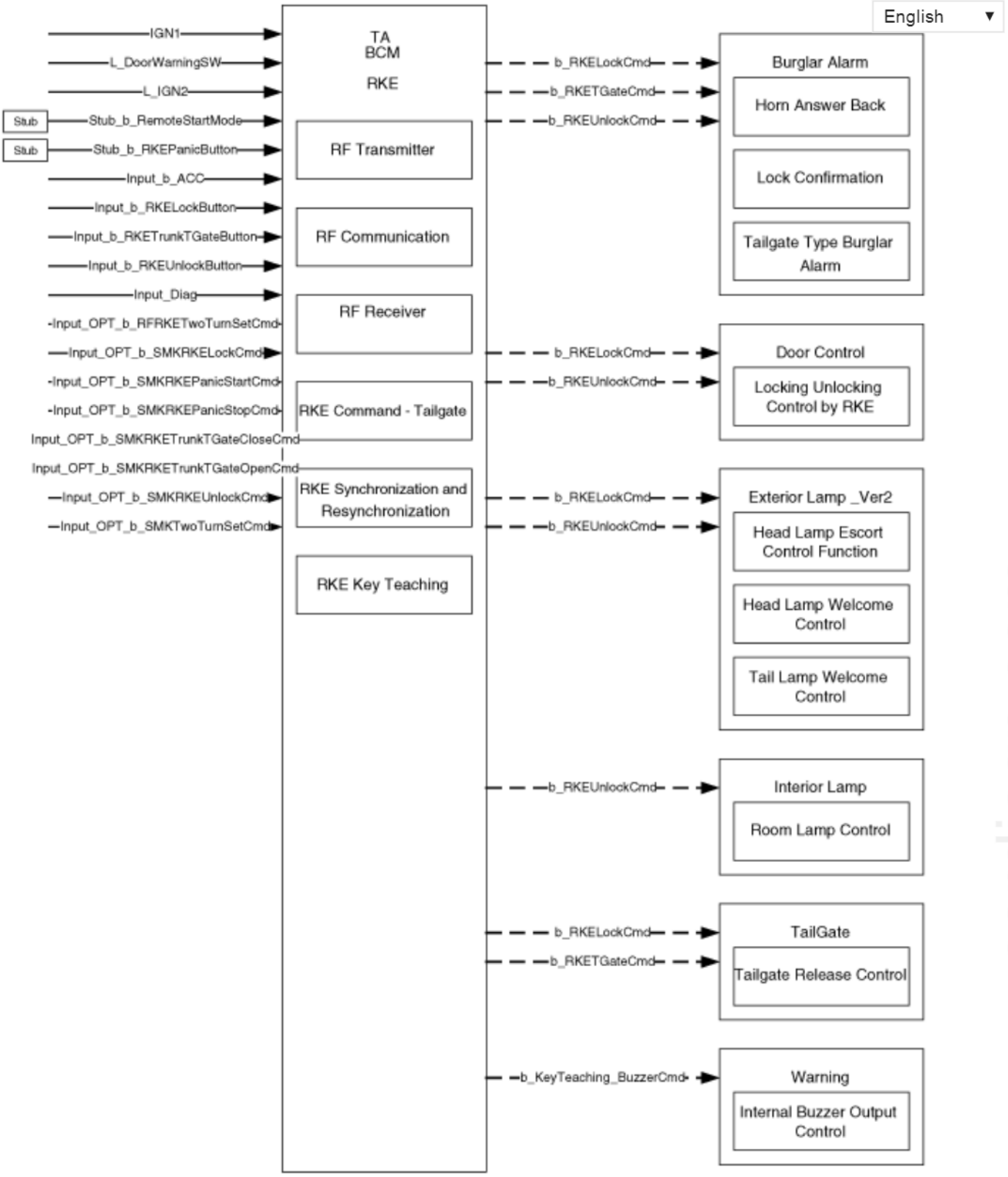
Keyless Entry System

The burglar alarm system is integrated with the keyless entry system. The keyless entry system allows you to lock and unlock the vehicle with the remote transmitter. When you push the lock button, all doors lock. When you push the unlock button all doors unlock.
The room lamp, if its switch is in the center position, will come on when you press the unlock button. If you do not open a door, the light will go off in about 30 seconds, the doors will automatically relock, and the burglar alarm system will rearm. If you relock the doors with the remote transmitter within 30 seconds, the light will go off immediately.
You cannot lock or unlock the doors with the remote transmitter if the key is in the ignition switch.
The system will signal you when the doors lock and unlock by flashing the hazard lamp once when they lock, and twice when they unlock.

Data Flow

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Overview Description

1. According to various input signals there are a variety of changing conditions that perform many functions.
   - ARM
   - ARM WAIT
   - AUTO lock TIMER1
   - AUTO lock TIMER2
   - ARM HOLD
   - REARM
   - ALARM

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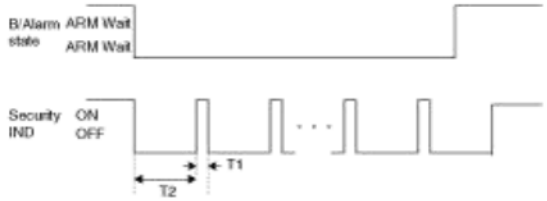
– PREARM

– DISARM

Condition 1 : At least one entrance opened
(4Door Not Close=ON) or (Trunk Open Switch=ON) or (Hood Switch=ON)
Condition 2 : All doors closed, but HOOD or TRUNK open
(4Door Not Close=OFF) & (Trunk Open Switch=ON) or (Hood Switch=ON)
Condition 3 : Close the 4DOOR with DOOR lock
(4Doors Locked) & (4Door Not Close ON→OFF)
Condition 2 & 3 : Close the 4DOOR with lock with HOOD or TRUNK OPEN
(4Doors Locked) & (4Door Not Close ON→OFF) & (Trunk Open Switch=ON) or (Hood Switch=ON)
All entrances closed : 4DOOR Switch & HOOD Switch & TRUNK OPEN Switch is CLOSE
LOCK : Lock command by Tx
UNLOCK : Unlock command by Tx
LOCK : Driver key lock switch is ON
UNLOCK : Driver key unlock switch is ON
TRUNK : TRUNK OPEN signal or TRUNK or RKE TRUNK command by Tx
IGN KEY ON : KEY IN Switch = ON & IGN1 = ON & IGN2 =ON
IGN KEY OUT : KEY IN Switch = OFF & IGN1 = OFF & IGN2 =OFF
KEY IN : KEY IN Switch = ON
KEY IN 1 : KEY IN Switch = ON or IGN1 = ON or IGN2 = ON
H1 : Hazard Time is one-time(lock) 1sec on
H2 : Hazard Time is two-time(unlock) 0.5sec/on, 0.5sec/off
AUTO LOCK TIMER1 : 30sec
AUTO LOCK TIMER2 : 30sec
ARM WAIT TIMER : 30sec
TRUNK TIMER : 30sec
TRUNK MARK : Default value is clear
LOCK CONFIRM CHECK : 0.2 ~ 5sec

Security Ind Control

1. Key In switch ON or ACC ON1 ON or IGN1 ON or IGN2 ON or FOB IN is LED OFF.
2. IGN KEY OUT entry in the ARM WAIT mode, the Infinite On control of the ARM WAIT mode, the other will control the BLINKING.
3. BLINKING cycle is 2.3s.(ON during 0.3s / OFF during 2.0s)



T1 : 0.3sec, T2 : 2sec

FUNCTIONS

DISARM

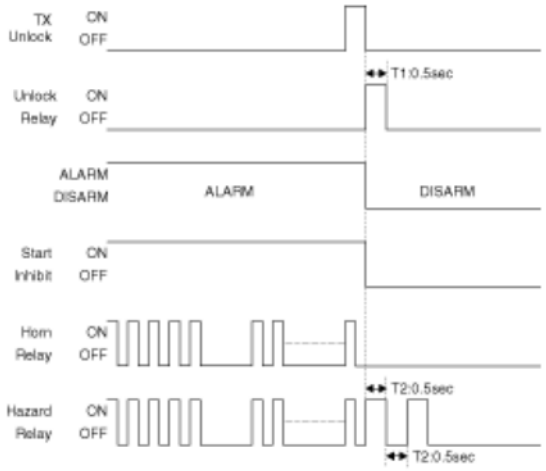
Condition 1

State	Description
Initial Condition	**ALARM**
	– IGN KEY ON during 30sec or ALT "L" on
	NON SMK SPEC : – Any door open & TX unlock – TX Trunk

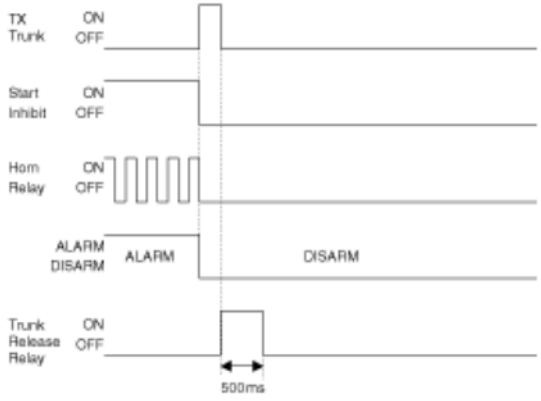
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Event	– TX Lock & Lock confirm Failed
	SMK SPEC : – Any door open & RKE CMD Unlock / Passive Access Unlock 1 – RKE trunk 1 – TP AUTH 1/ PIC AUTH 1 – RKE CMD Lock / Passive Access Lock 1 & Lock confirm Failed
	Mechanical Key Option Enable : – Unlock – lock & Lock confirm Failed
Action	The state goes to **DISARM** state – Horn Relay, Hazard Relay, Start inhibit OFF – TX Unlock, RKE CMD Unlock, Passive Access Unlock 1 -> Unlock relay on for 0.5sec -> Hazard relay on (TWICE)

Lock failure : Lock attempts within 5 seconds after the Unlock door maintain at least one if
RKE CMD = Unlock : RKE CMD = Unlock & Fob1 or Unlock & Fob2
RKE CMD = Lock : RKE CMD = Lock & Fob1 or Lock & Fob2



T1 : 0.5s, T2 : 0.5s +-0.1s



Condition 2

State	Description
Initial Condition	**DISARM** state & (IGN KEY OUT) & Any Door open
Event	NON SMK spec : – Any door open & TX UNLOCK
	SMK spec : – Any door open & RKE CMD=2 / Passive Access Unlock 1 / SMKRKECMD=3

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	– C_Authstate=2
Action	No state change – TX UNLOCK, RKE CMD UNLOCK, Passive Access Unlock 1 -> Hazard relay for 0.5s ON/OFF(twice)

Condition 3

State	Description
Initial Condition	**ARM WAIT** state
Event	– Any door open or Hood switch OPEN or Trunk switch OPEN – Any door is unlocked – Key In switch ON
	SMK spec : C_Authstate=2
	Mechanical Key OPTION Enable : UNLOCK
Action	The state goes to **DISARM** state

Condition 4

State	Description
Initial Condition	**AUTOLOCK TIMER1** STATE
Event	– Any door open or Hood switch OPEN or Trunk switch OPEN – Key In switch ON – AUTO LOCK & Lock confirmation failure
	NON SMK spec : – AUTO LOCK & Lock confirmation failure
	SMK spec : – RKE CMD LOCK / Passive Access Lock 1& Lock confirmation failure – C_Authstate=2
	Mechanical Key option Enable : – LOCK & Lock confirmation failure
Action	The state goes to **DISARM** state

Condition 5

State	Description
Initial Condition	**AUTOLOCK TIMER2** STATE
	– Any door open – Key In switch ON – AUTO LOCK & Lock confirmation failure – Hood switch Open and Memory Hood was Close – Trunk switch Open and Memory Trunk was Close

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Event	NON SMK spec : – TX LOCK& Lock confirmation failure
	SMK spec : – RKE CMD=LOCK/ Passive Access Lock 1& Lock confirmation failure – C_Authstate=2
	Mechanical Key option Enable : LOCK & Lock confirmation failure
Action	The state goes to **DISARM** state

Condition 6

State	Description
Initial Condition	**ARM** STATE
Event	– IGN KEY ON
	SMK spec : – C_Authstate=2
	Mechanical Key option Enable : – UNLOCK
Action	The state goes to **DISARM** state

Condition 7

State	Description
Initial Condition	**REARM** state
Event	– IGN KEY ON during 30sec or ALT"L" on
	NON SMK spec : – TX LOCK& Lock confirmation failure – TX TRUNK
	SMK spec : – C_Authstate=2 – RKE CMD LOCK / Passive Access Lock 1 & Lock confirmation failure – SMKRKECMD=3
	Mechanical Key option Enable : – UNLOCK – LOCK & Lock confirmation failure
Action	The state goes to **DISARM** state Start inhibit OFF

Condition 8

State	Description
Initial Condition	**PREARM** state
	– Key In switch ON – All entrance closed & Any Door is unlocked – Any Door open & Tx Unlock

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Event	NON SMK : – Any door open & TX UNLOCK
	SMK : – C_Authstate=2 – Any door open & RKE CMD UNLOCK/ Passive Access Unlock 1
	Mechanical Key option Enable : – UNLOCK
Action	The state goes to **DISARM** state – TX UNLOCK, RKE CMD UNLOCK, Passive Access Unlock 1 -> Hazard relay for 0.5s ON/OFF(twice)

Condition 9

State	Description
Initial Condition	**ARMHOLD**
Event	– IGN KEY ON
	SMK : – C_Authstate=2
	Mechanical Key option Enable : – UNLOCK
Action	The state goes to **DISARM** state

ARM

Condition 1

State	Description
Initial Condition	**ARM** state
Event	NON SMK : – TX LOCK
	NON SMK : – RKE CMD LOCK / Passive Access Lock 1
Action	No state change Hazard relay 1Time on(1sec)

Condition 2

State	Description
Initial Condition	**ARM WAIT** state
Event	– After ARM WAIT TIMER finished
Action	The state goes to **ARM** state

Condition 3

State	Description
Initial Condition	**ARMHOLD** state

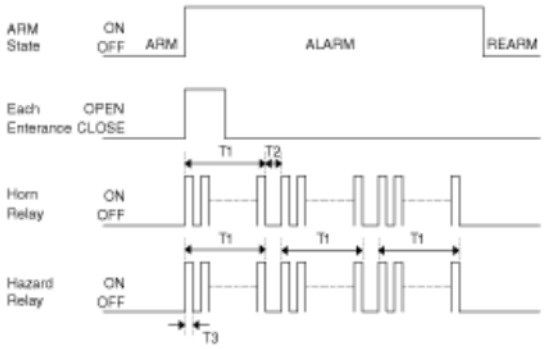
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Event	Trunk close for at least Trunk Release Time Out(default 30sec) in ARMWAIT state
Action	The state goes to **ARM** state

ALARM

Condition 1

State	Description
Initial Condition	**ARM** state
Event	Any door open or Hood switch open or Trunk switch open
Action	The state goes to **ALARM** state – Engine Start Inhibit is ON – The horn is ON one time for 27sec(±2sec) and OFF two times for 10sec(±1sec) – The hazard is driven also (During Horn driving)



T1 : 27s(±2sec), T2 : 10s(±2sec), T3 : 0.5s ± 0.1sec

Note : Horn Output : Period : 1sec(Can be calibrated Horn Period), 50% Duty

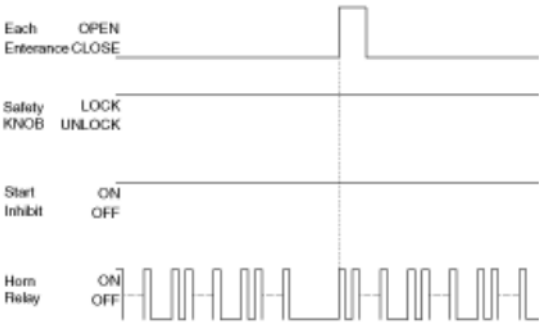
Condition 2

State	Description
Initial Condition	**REARM** state
Event	Any door open or Hood switch OPEN or Trunk switch OPEN
Action	The state goes to **ALARM** state The horn is ON one time for 27sec(±2sec) and OFF two times for 10sec(±1sec) The hazard is driven also (During Horn driving)

Condition 3

State	Description
Initial Condition	**ARMHOLD** state
Event	Any door open or Hood switch OPEN
Action	The state goes to **ALARM** state The horn is ON one time for 27sec(±2sec) and OFF two times for 10sec(±1sec) The hazard is driven also (During Horn driving).

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ARM WAIT MODE

Condition 1

State	Description
Initial Condition	ARMWAIT state
Event	NON SMK : – TX LOCK
	NON SMK : – RKE CMD LOCK / Passive Access Lock 1
Action	No state change Hazard relay 1Time on(1sec)

Condition 2

State	Description
Initial Condition	**DISARM** state & IGN KEY OUT & All entrances closed(DOORS, HOOD and TRUNK)
Event	NON SMK : – Tx Lock & locked confirmed
	SMK spec : – RKE CMD LOCK / Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : – LOCK & locked confirmed – DOOR LOCK state : Any door open → All door closed
Action	– The state goes to **ARMWAIT** State – Start ARM WAIT TIMER – Hazard relay 1Time on(1sec)

Condition 3

State	Description
Initial Condition	**ALARM** state & All entrances closed(DOORS, HOOD and TRUNK)
Event	NON SMK : – Tx Lock & locked confirmed
	SMK spec : – RKE CMD LOCK / Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : – LOCK & locked confirmed
	– The state goes to **ARMWAIT** State

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Action	– Horn relay, Start inhibit relay OFF – Hazard relay 1Time on(1sec) (LOCK : Except) – Start ARMWAIT TIMER

Condition 4

State	Description
Initial Condition	**AUTOLOCK TIMER1** state
Event	AUTOLOCK & locked confirmed
	NON SMK : – Tx Lock & locked confirmed
	SMK : – RKE CMD LOCK / Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : LOCK & locked confirmed
Action	– The state goes to **ARMWAIT** State – Hazard relay 1Time on(1sec) – Start ARMWAIT TIMER

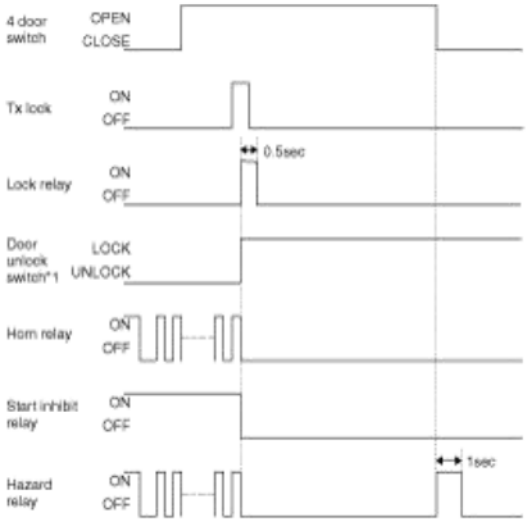
Condition 5

State	Description
Initial Condition	**PREARM** state
Event	All door closed and (Trunk switch CLOSE & TRUNK MARK CLEAR) & Hood switch CLOSE & DOOR LOCK
Action	– The state goes to **ARMWAIT** State – Hazard relay 1Time on(1sec) – Start ARMWAIT TIMER

Condition 6

State	Description
Initial Condition	**REARM** state
Event	NON SMK : – TX LOCK & locked confirmed
	SMK : – RKE CMD LOCK/ Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : – LOCK & locked confirmed
Action	– The state goes to **ARMWAIT** State – Hazard relay 1Time on(1sec) (LOCK : Except) – Start Inhibit relay OFF – Start ARMWAIT TIMER

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*1 : Lock : Driver Door Unlock Switch or Assist Door Unlock Switch or Rear Right Driver Unlock Switch = LOCK
Unlock : Driver Door Unlock Switch or Assist Door Unlock Switch or Rear Right Driver Unlock Switch = UNLOCK

REARM MODE

Condition 1

State	Description
Initial Condition	**ALARM** state
Event	All door closed and trunk switch close, hood switch close state, and ALARM PATTERN finished
Action	The state goes to **REARM** state

AUTO LOCK TIMER1 MODE

Condition 1

State	Description
Initial Condition	**ARM** state
Event	NON SMK : – TX UNLOCK
	SMK : – RKE CMD UNLOCK / Passive Access Unlock 1
Action	– The state goes to **AUTO LOCK TIMER1** state – Start AUTO LOCK TIMER1 – Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 2

State	Description
Initial Condition	**AUTO-LOCK TIMER1** state
Event	AUTOLOCK TIMER1 finished
	NON SMK : – TX UNLOCK
	SMK : – RKE CMD UNLOCK / Passive Access Unlock 1
	No change state

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Action	CASE1: AUTO LOCK TIMER1 Finished AUTOLOCK
	CASE2: TX UNLOCK, RKE CMD UNLOCK, Passive Access Unlock 1 Hazard relay Twice on(0.5s ON/0.5s OFF) Restart AUTO LOCK TIMER1

Condition 3

State	Description
Initial Condition	**ARM WAIT** state
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK / Passive Access Unlock 1
Action	– The state goes to AUTO LOCK TIMER1 state – Start AUTO LOCK TIMER1 – Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 4

State	Description
Initial Condition	**DISARM** state & All entrances closed(DOORS, Hood SW & Trunk SW) & IGN KEY OUT
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK/ Passive Access Unlock 1
Action	– The state goes to **AUTO LOCK TIMER1** state – Start AUTO LOCK TIMER1 – Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 5

State	Description
Initial Condition	**ALARM** state & All door closed and Trunk switch CLOSE, Hood switch CLOSE
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK / Passive Access Unlock 1
Action	– The state goes to AUTO LOCK TIMER1 state – Start AUTO LOCK TIMER1 – Hazard relay Twice on(0.5s ON/0.5s OFF) – Start inhibit relay off /Horn relay off

Condition 6

State	Description
Initial Condition	**REARM** state
	NON SMK :

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Event	TX UNLOCK
	SMK : RKE CMD UNLOCK/ Passive Access Unlock 1
Action	The state goes to **AUTO LOCK TIMER1** state – Start AUTO LOCK TIMER1 – Hazard relay Twice on(0.5s ON/0.5s OFF) – Start inhibit relay off

AUTO LOCK TIMER2 MODE

Condition 1

State	Description
Initial Condition	**AUTO-LOCK TIMER2** state
Event	Finished AUTO LOCK TIMER2
	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK/ Passive Access Unlock 1
Action	No change state
	CASE1: AUTO LOCK TIMER2 finished AUTOLOCK
	CASE2: TX UNLOCK, RKE CMD UNLOCK, Passive Access Unlock 1 – Start AUTOL OCK TIMER2 – Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 2

State	Description
Initial Condition	**DISARM** state & IGN KEY OUT & (Trunk switch OPEN or Hood switch OPEN) state
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK/ Passive Access Unlock 1
Action	– The state goes to AUTOLOCKTIMER2 state – Start AUTOLOCKTIMER2 – Hazard relay Twice on(0.5s ON/0.5s OFF) – Memo Hood/Trunk state

Condition 3

State	Description
Initial Condition	**ALARM** state & All door closed & (Trunk switch OPEN or Hood switch OPEN) state
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK / Passive Access Unlock 1
	– The state goes to AUTO LOCK TIMER2 state

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Action	– Horn relay, Start inhibit relay OFF – Start AUTO LOCK TIMER2 – Hazard relay Twice on(0.5s ON/0.5s OFF) – Memo Hood/Trunk state

Condition 4

State	Description
Initial Condition	**PREARM** state & All door closed & (Trunk switch OPEN or Hood switch OPEN)state
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK / Passive Access Unlock 1
Action	– The state goes to AUTO LOCK TIMER2 state – Start AUTO LOCK TIMER2 – Hazard relay Twice on(0.5s ON/0.5s OFF) – Memo Hood/Trunk state

Condition 5

State	Description
Initial Condition	**ARMHOLD** state
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD UNLOCK / Passive Access Unlock 1
Action	– The state goes to **AUTO LOCK TIMER2** state – Start AUTO LOCK TIMER2 – Hazard relay Twice on(0.5s ON/0.5s OFF) – Memo Hood/Trunk state

PREARM MODE

Condition 1

State	Description
Initial Condition	**AUTO-LOCK TIMER2** state
Event	AUTO LOCK & locked confirmed
	NON SMK : TX LOCK& locked confirmed
	SMK : RKE CMD LOCK/ Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : LOCK & locked confirmed
Action	The state goes to **PREARM** state

Condition 2

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State	Description
Initial Condition	**DISARM** state & IGN KEY OUT
Event	NON SMK : – Any door open or Hood SW OPEN or Trunk SW OPEN state & locked confirmed
	SMK : – Any door open or Hood SW OPEN or Trunk SW OPEN state RKE CMD LOCK / Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : LOCK & locked confirmed ALL DOOR LOCK state (Any door open → All doors closed) and (Trunk switch OPEN or Hood switch OPEN)
Action	The state goes to **PREARM** state

Condition 3

State	Description
Initial Condition	ALARM state & IGN KEY OUT and(Any door open or Hood SW OPEN or Trunk SW OPEN)
Event	NON SMK : TX LOCK& locked confirmed
	SMK : RKE CMD LOCK/ Passive Access Lock 1 & locked confirmed
	Mechanical Key option Enable : LOCK & locked confirmed
Action	The state goes to PREARM state Horn relay, Hazard relay, Start INH relay => OFF

Condition 4

State	Description
Initial Condition	**ARMHOLD** state
Event	NON SMK : TX LOCK & locked confirmed
	SMK : RKE CMD LOCK/ Passive Access Lock 1& locked confirmed
	Mechanical Key option Enable : LOCK locked confirmed
Action	The state goes to **PREARM** state

Condition 5

State	Description
Initial Condition	**ARMWAIT** state
Event	NON SMK : TX TRUNK
	SMK : RKE TRUNK 1
Action	The state goes to **PREARM** state Start TRUNK TIMER TRUNK MARK Set

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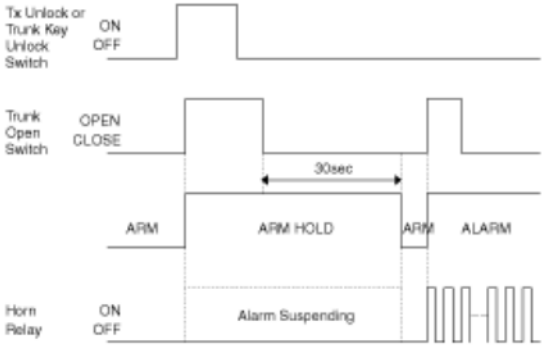
Condition 6

State	Description
Initial Condition	**PREARM** state
Event	Trunk switch OPEN Trunk TimeR expired(Trunk Release Time Out: 30s)
Action	No state change CASE Trunk switch OPEN : Stop to Trunk Timer. TRUNK MARK Clear CASE TRUNK TIMER expired : TRUNK MARK Clear

ARMHOLD MODE

Condition 1

State	Description
Initial Condition	**ARM** state
Event	NON SMK : TX Trunk
	SMK : RKE Trunk 1
Action	The state goes to **ARMHOLD** state



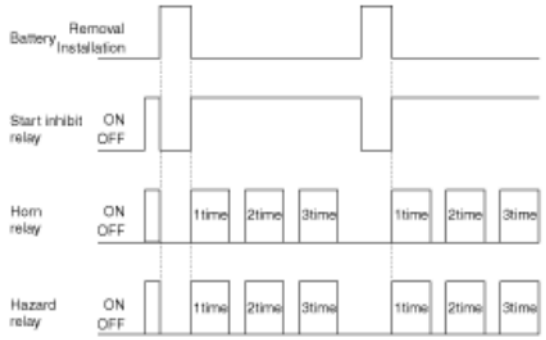
RESET

1. In case of taking the BATTERY out during the ALARM state

Condition

State	Description
Initial Condition	**ALARM, REARM** state
Event	Taking the battery out
Action	Start INH relay ON and Horn relay twice The state goes to **ALARM** mode

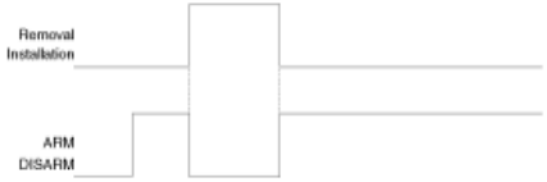
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2. In case of taking the BATTERY out during ARM

Condition

State	Description
Initial Condition	ARM state
Event	Taking the battery out
Action	The state goes to ARM mode



3. In case of taking the BATTERY out during the ARMHOLD state

Condition

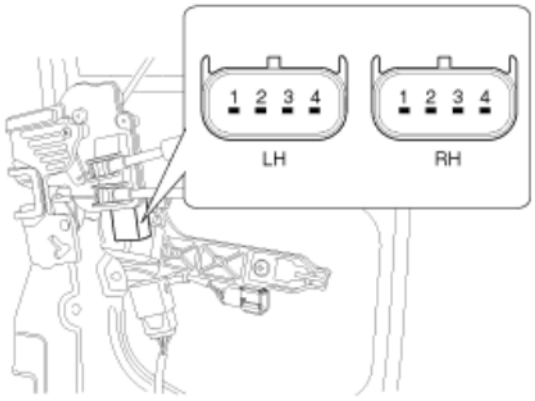
State	Description
Initial Condition	**Except ARM, ALARM, REARM,ARMHOLD** state
Event	Taking the battery out
Action	The state goes to **DISARM** mode

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INSPECTION

Front Door Lock Actuator Inspection

1. Remove the front door trim.
   (Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the connector from the actuator.

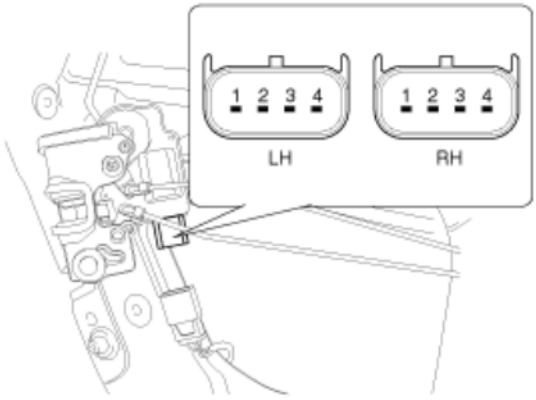


4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal		1	2
Front left	Lock	⊕	⊖
	Unlock	⊖	⊕
Position \ Terminal		3	4
Front right	Lock	⊕	⊖
	Unlock	⊖	⊕

Rear Door Lock Actuator Inspection

1. Remove the rear door trim.
   (Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the connector from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator,

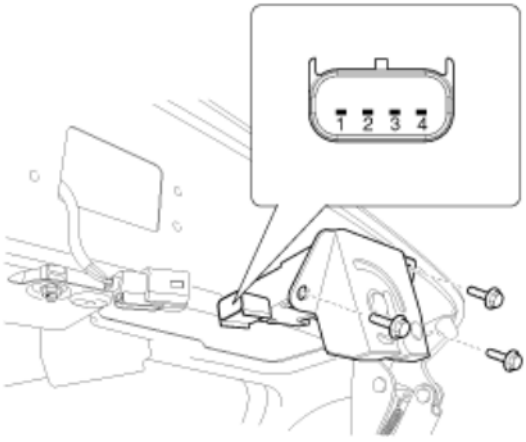
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apply battery voltage only momentarily.

Position \ Terminal		1	2
Rear left	Lock	⊕	⊖
	Unlock	⊖	⊕
Position \ Terminal		3	4
Rear right	Lock	⊕	⊖
	Unlock	⊖	⊕

Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.
   (Refer to the BD group - "Trunk lid")
2. Disconnect the connector from the actuator.

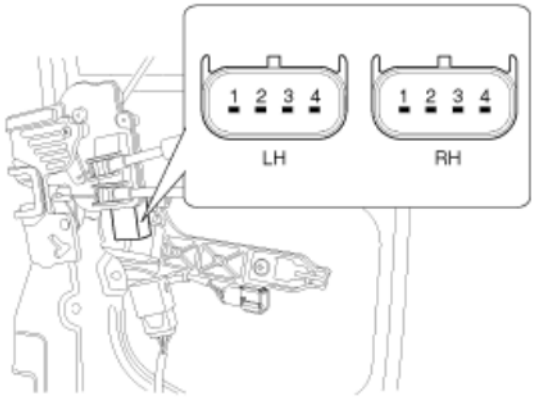


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	2	1
Lock release(Open)	⊕	⊖

Front Door Lock Switch Inspection

1. Remove the front door trim panel.
   (Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the connector from the actuator.



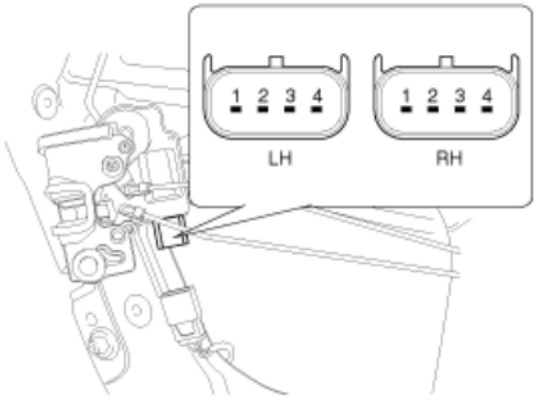
4. Check for continuity between the terminals in each switch position when inserting the key into the door according to the table.

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Position \ Terminal		3	4
Front Left	Unlock	○	○
Position \ Terminal		1	2
Front Right	Unlock	○	○

Rear Door Lock Switch Inspection

1. Remove the rear door trim panel.
   (Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the connector from the actuator.

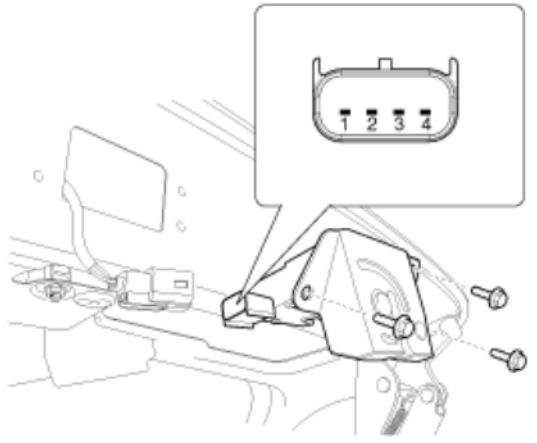


4. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal		3	4
Rear Left	Unlock	○	○
Position \ Terminal		1	2
Rear Right	Unlock	○	○

Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim.
   (Refer to the BD group - "Trunk lid")
2. Disconnect the connector from the actuator.



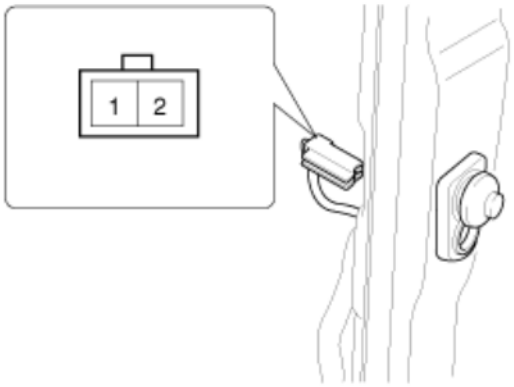
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	3	4
Lock release(Open)	○	○

Door Switch Inspection

Remove the door switch and check for continuity between the terminals.

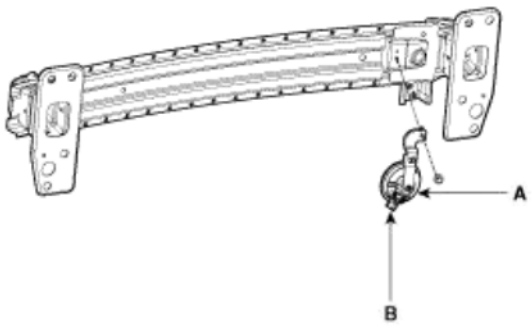
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Terminal / Position	1	2	Body (Ground)
Free(Door open)	○	○	○
Push(Door close)			

Burglar Horn Inspection

1. Remove the burglar horn (A) after removing 1 bolt and disconnect the 2P connector from the burglar horn.



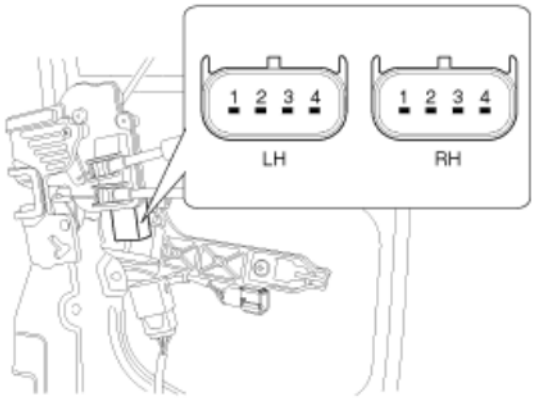
2. Test the burglar horn by connecting battery power to the terminal 1 and ground the terminal 2.
3. The burglar horn should make a sound. If the burglar horn fails to make a sound replace it.

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INSPECTION

Front Door Lock Actuator Inspection

1. Remove the front door trim.
   (Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the connector from the actuator.

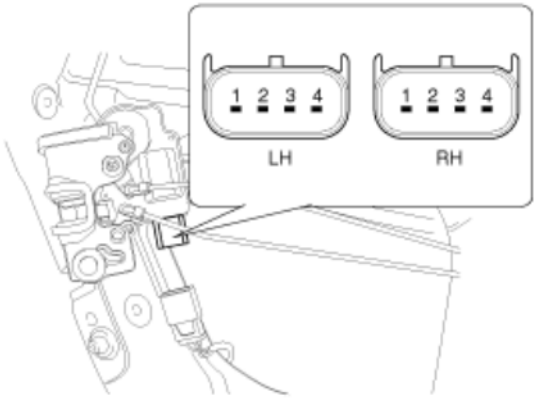


4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Terminal / Position		1	2
Front left	Lock	⊕	⊖
	Unlock	⊖	⊕
Terminal / Position		3	4
Front right	Lock	⊕	⊖
	Unlock	⊖	⊕

Rear Door Lock Actuator Inspection

1. Remove the rear door trim.
   (Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the connector from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator,

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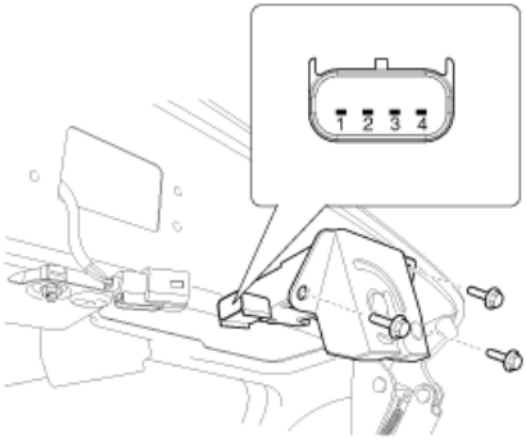
English ▼

apply battery voltage only momentarily.

Position \ Terminal		1	2
Rear left	Lock	⊕	⊖
	Unlock	⊖	⊕
Position \ Terminal		3	4
Rear right	Lock	⊕	⊖
	Unlock	⊖	⊕

Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.
   (Refer to the BD group - "Trunk lid")
2. Disconnect the connector from the actuator.

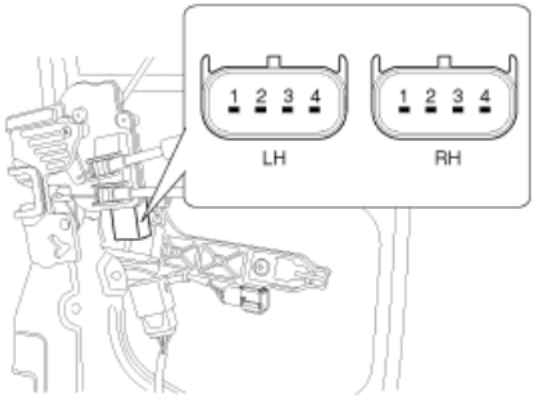


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	2	1
Lock release(Open)	⊕	⊖

Front Door Lock Switch Inspection

1. Remove the front door trim panel.
   (Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the connector from the actuator.



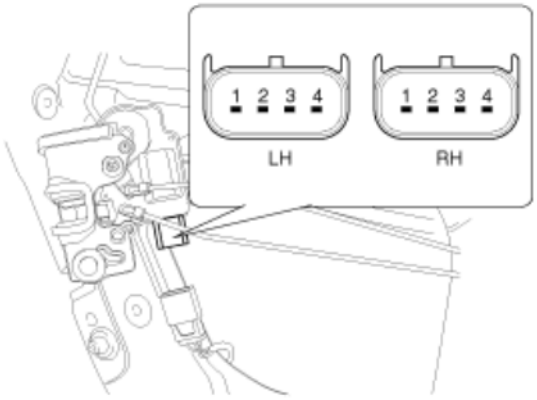
4. Check for continuity between the terminals in each switch position when inserting the key into the door according to the table.

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Position \ Terminal		3	4
Front Left	Unlock	○	○
Position \ Terminal		1	2
Front Right	Unlock	○	○

Rear Door Lock Switch Inspection

1. Remove the rear door trim panel.
   (Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the connector from the actuator.

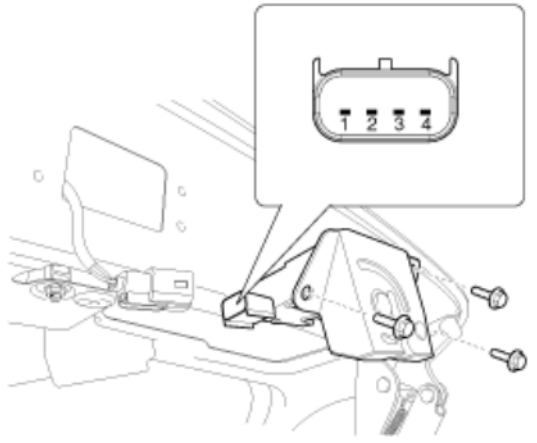


4. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal		3	4
Rear Left	Unlock	○	○
Position \ Terminal		1	2
Rear Right	Unlock	○	○

Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim.
   (Refer to the BD group - "Trunk lid")
2. Disconnect the connector from the actuator.



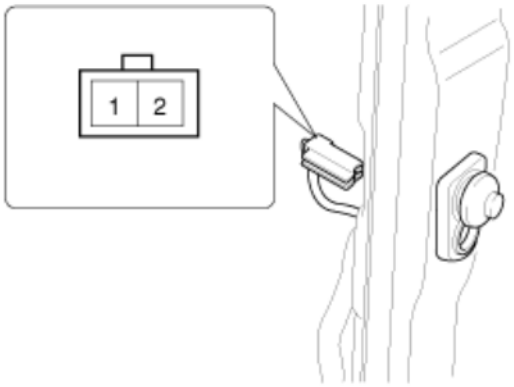
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	3	4
Lock release(Open)	○	○

Door Switch Inspection

Remove the door switch and check for continuity between the terminals.

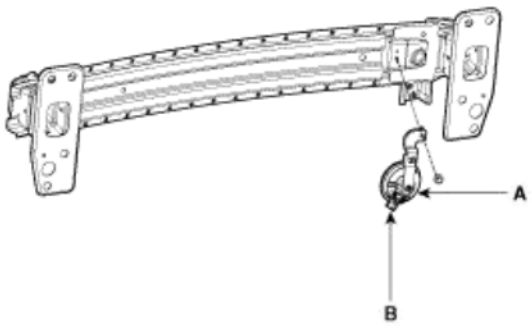
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Terminal / Position	1	2	Body (Ground)
Free(Door open)	○	○	○
Push(Door close)			

Burglar Horn Inspection

1. Remove the burglar horn (A) after removing 1 bolt and disconnect the 2P connector from the burglar horn.

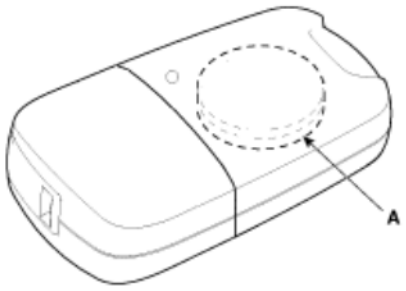


2. Test the burglar horn by connecting battery power to the terminal 1 and ground the terminal 2.
3. The burglar horn should make a sound. If the burglar horn fails to make a sound replace it.

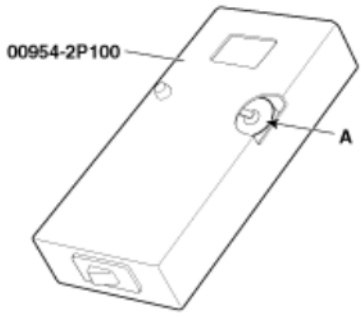
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INSPECTION

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

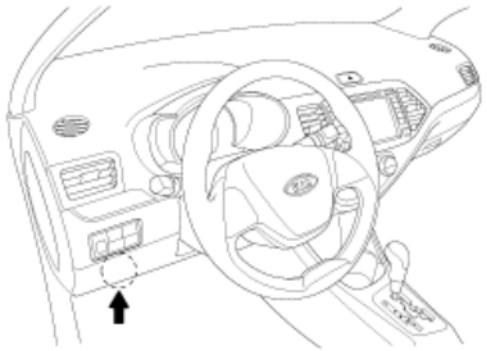
An inappropriately disposed battery can be harmful to the environment and human health.
Dispose the battery according to your local law(s) or regulation.

TRANSMITTER CODE REGISTRATION (USING GDS)

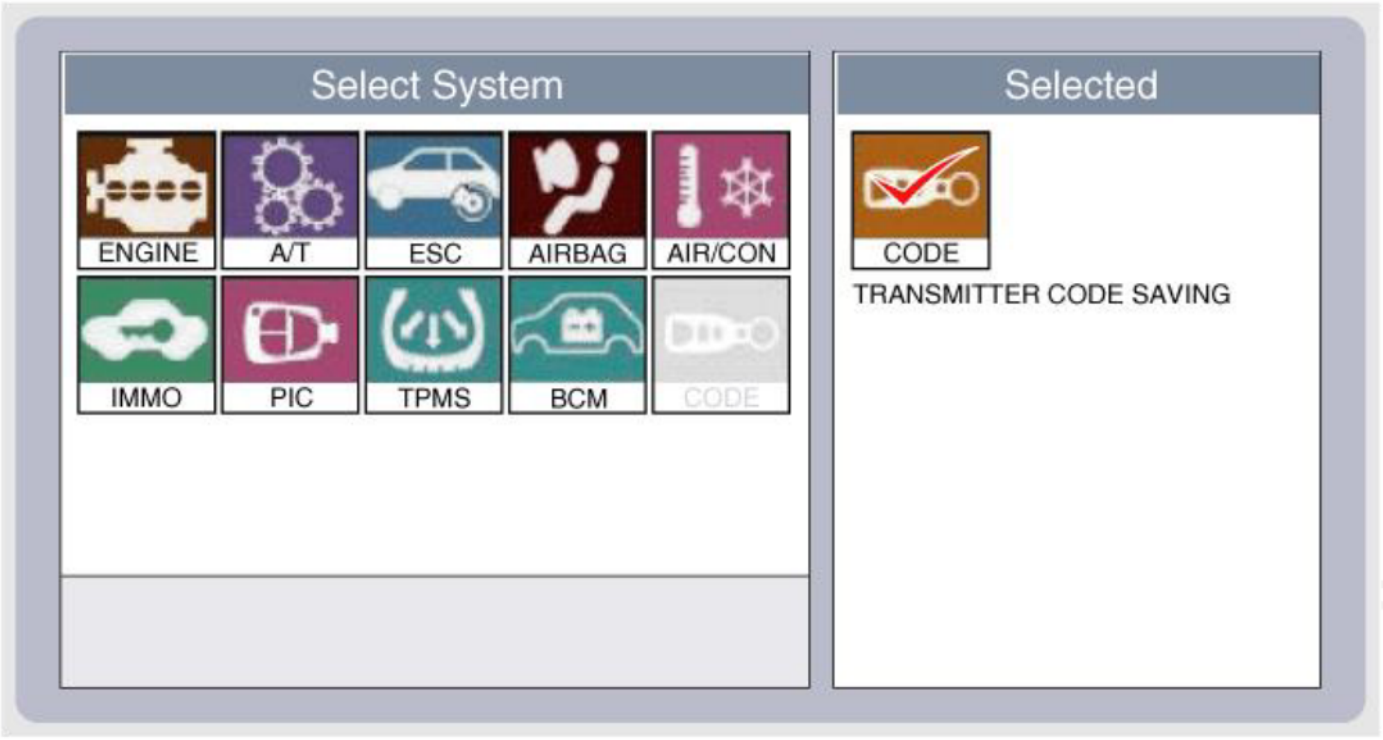
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1. Connect the DLC cable of GDS to the data link connector (16 pins) in driver side crash pad lower panel, tu
   on GDS.

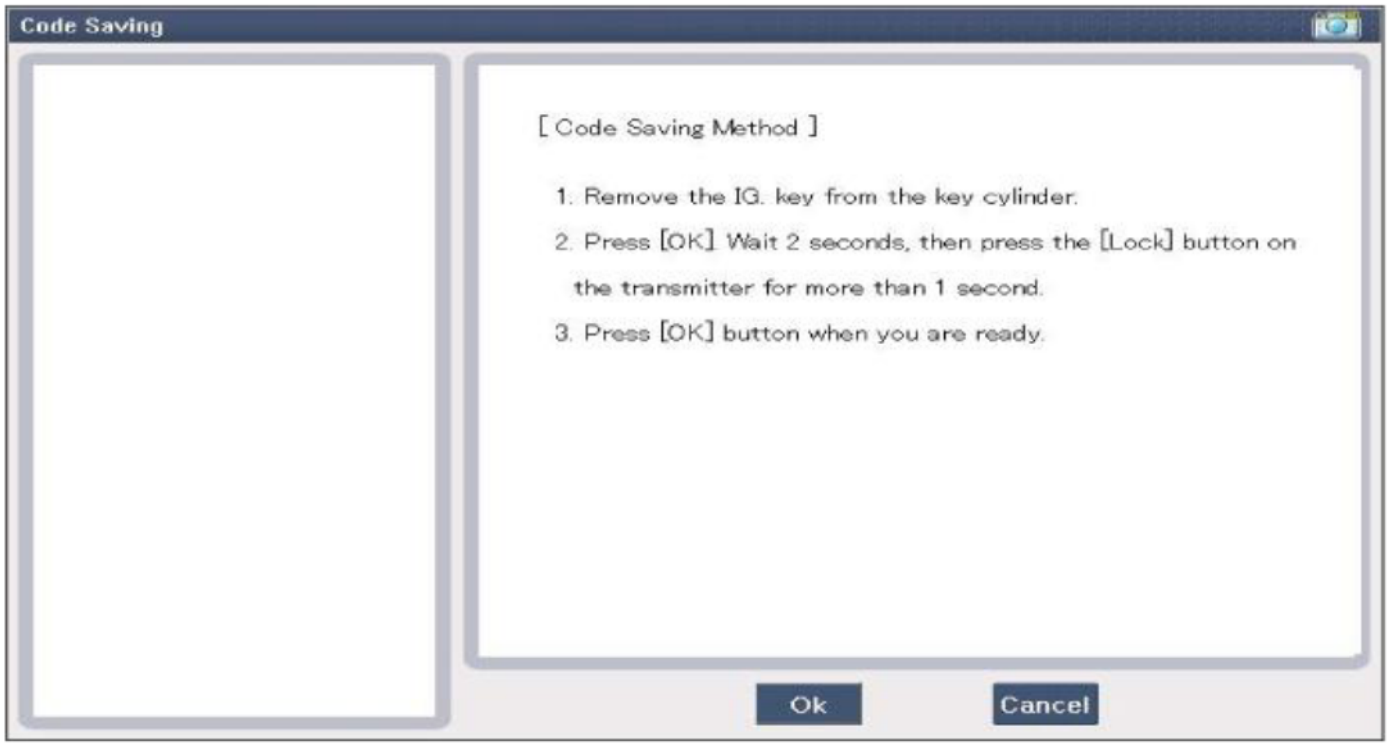


2. Select the vehicle model and then do "CODE SAVING"

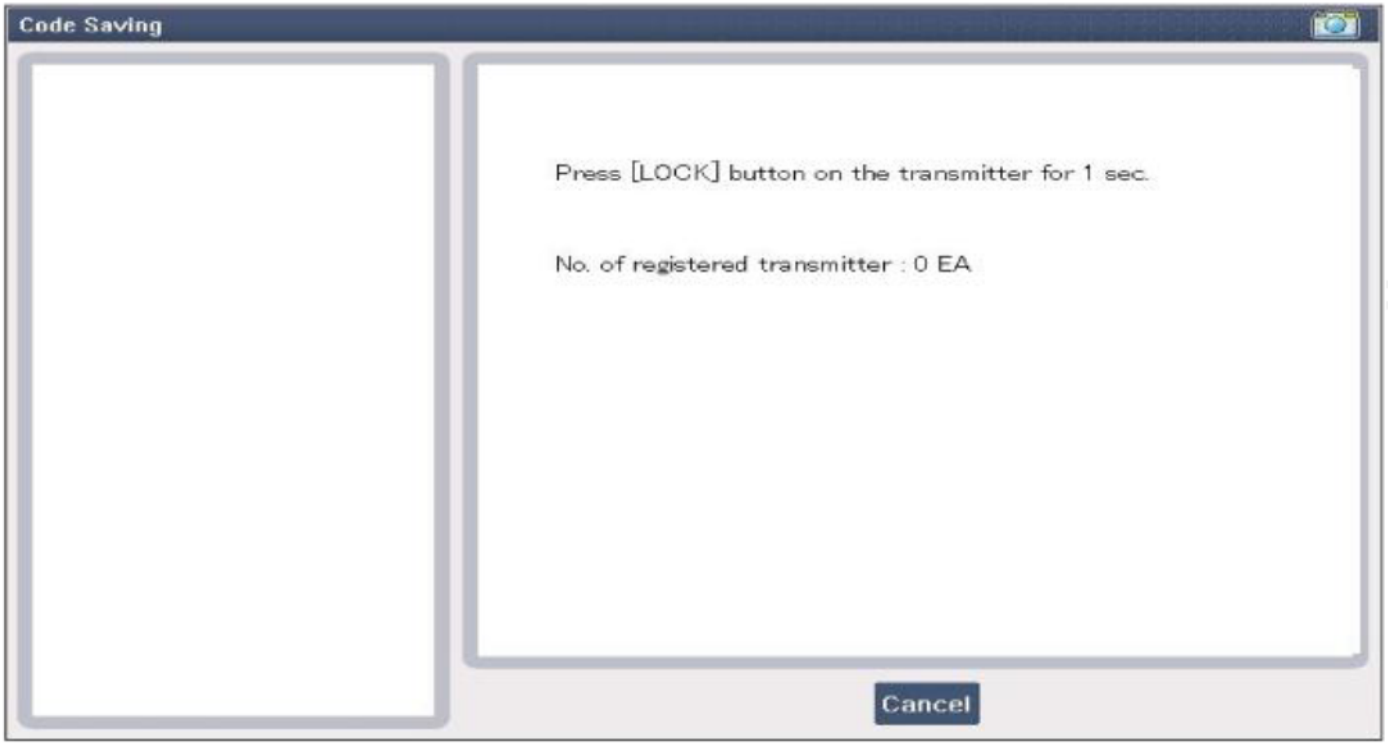


3. After selecting "CODE SAVING" menu, button "ENTER" key, then the screen will be shown as below.

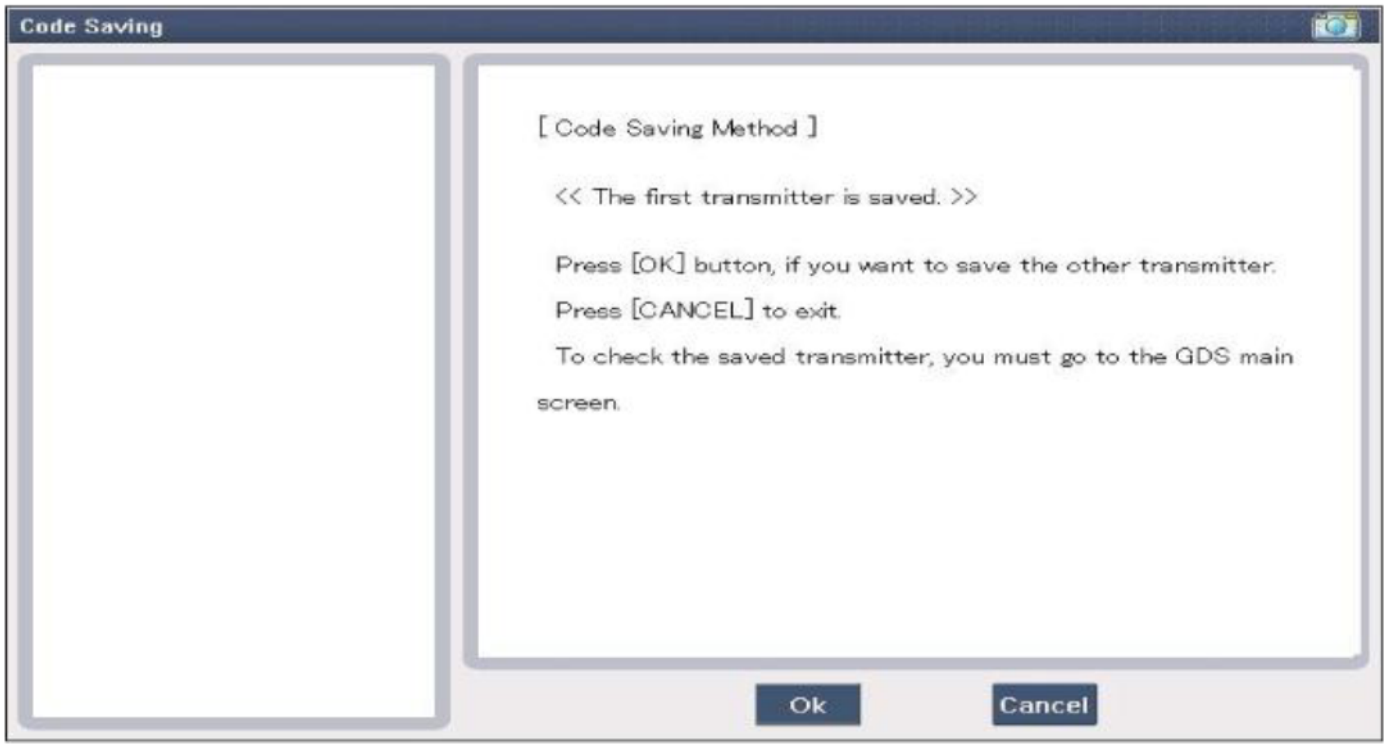
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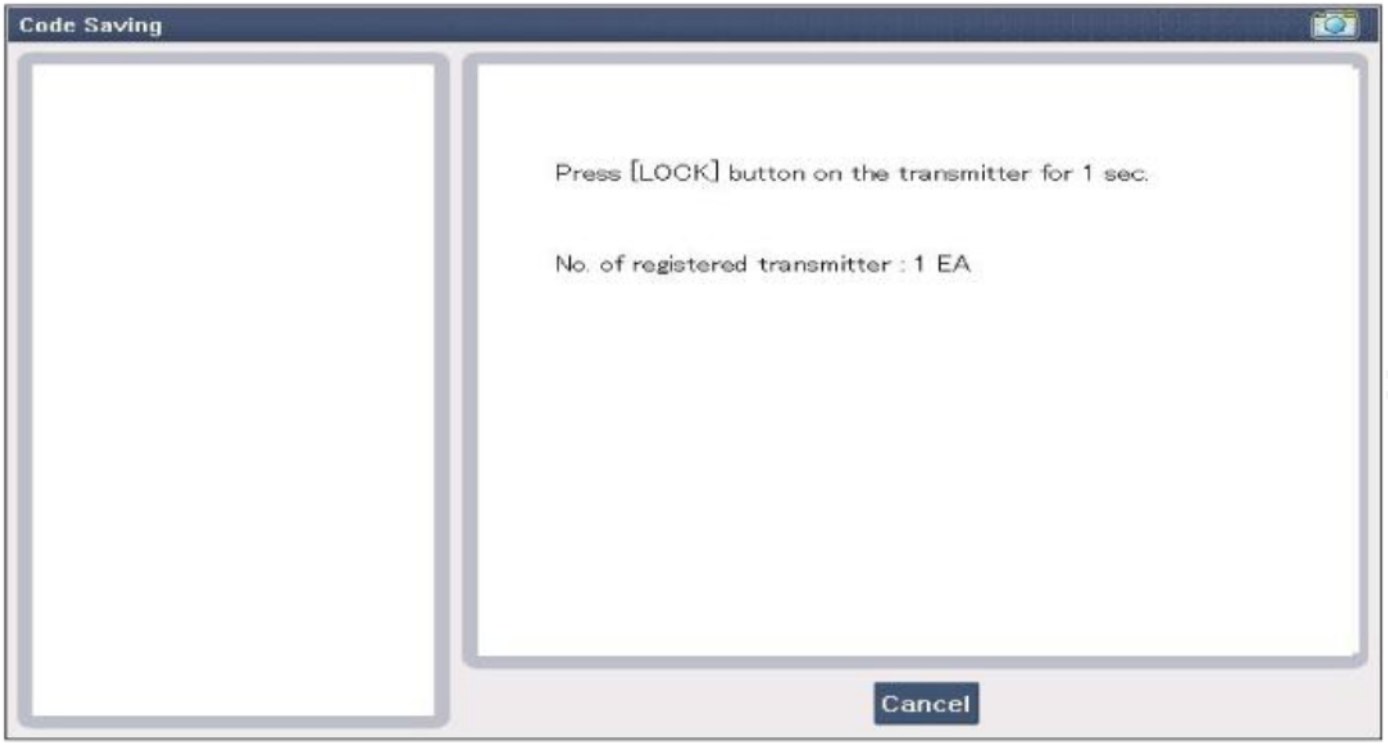


4. After removing the ignition key from key cylinder, push "ENTER" key to proceed to the next mode for code saving. Follow steps 1 to 4 and then code saving is completed.

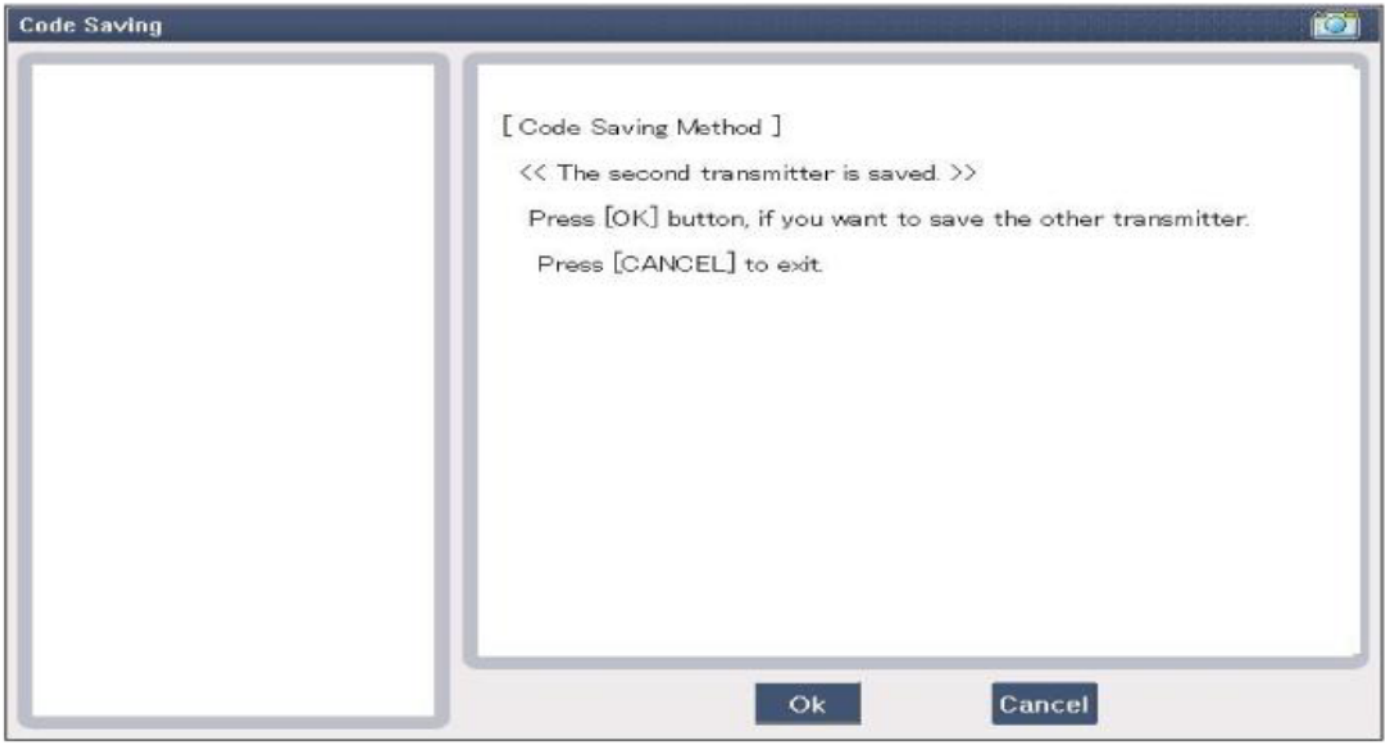


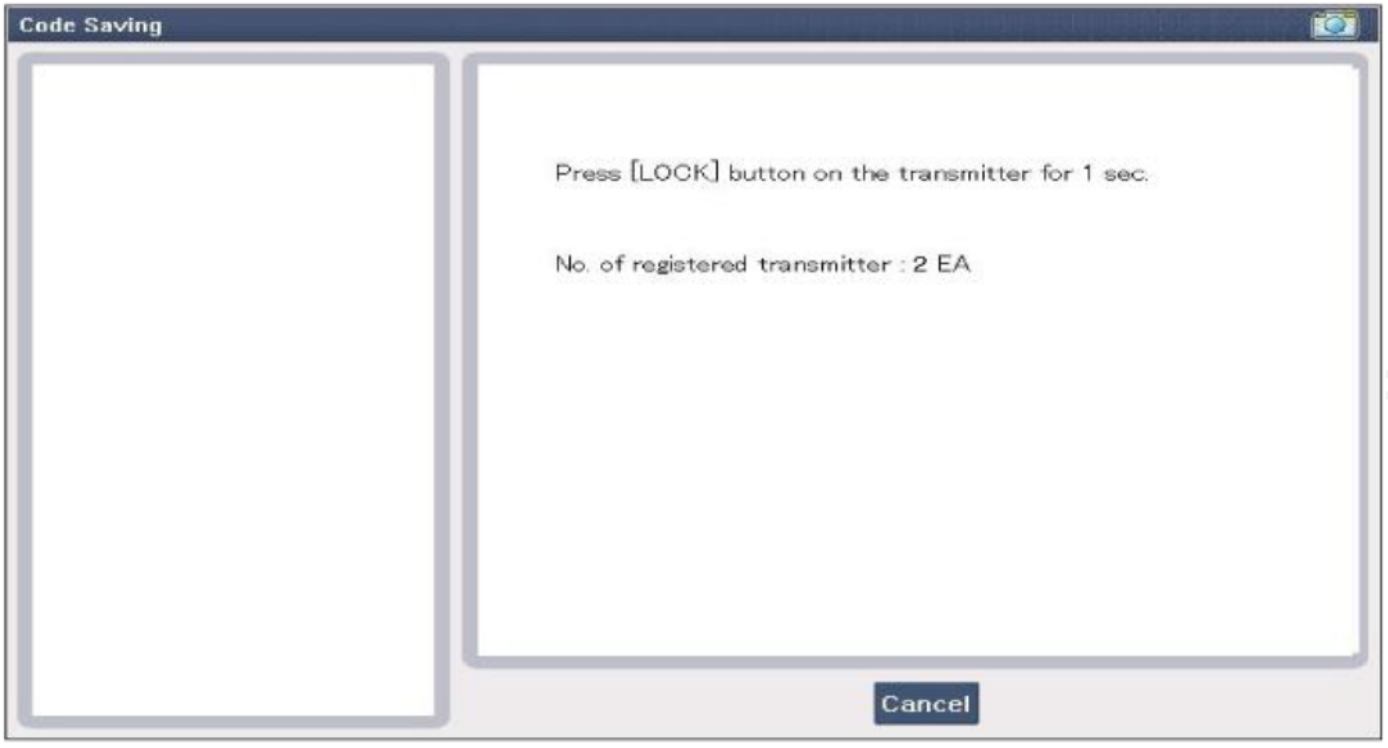
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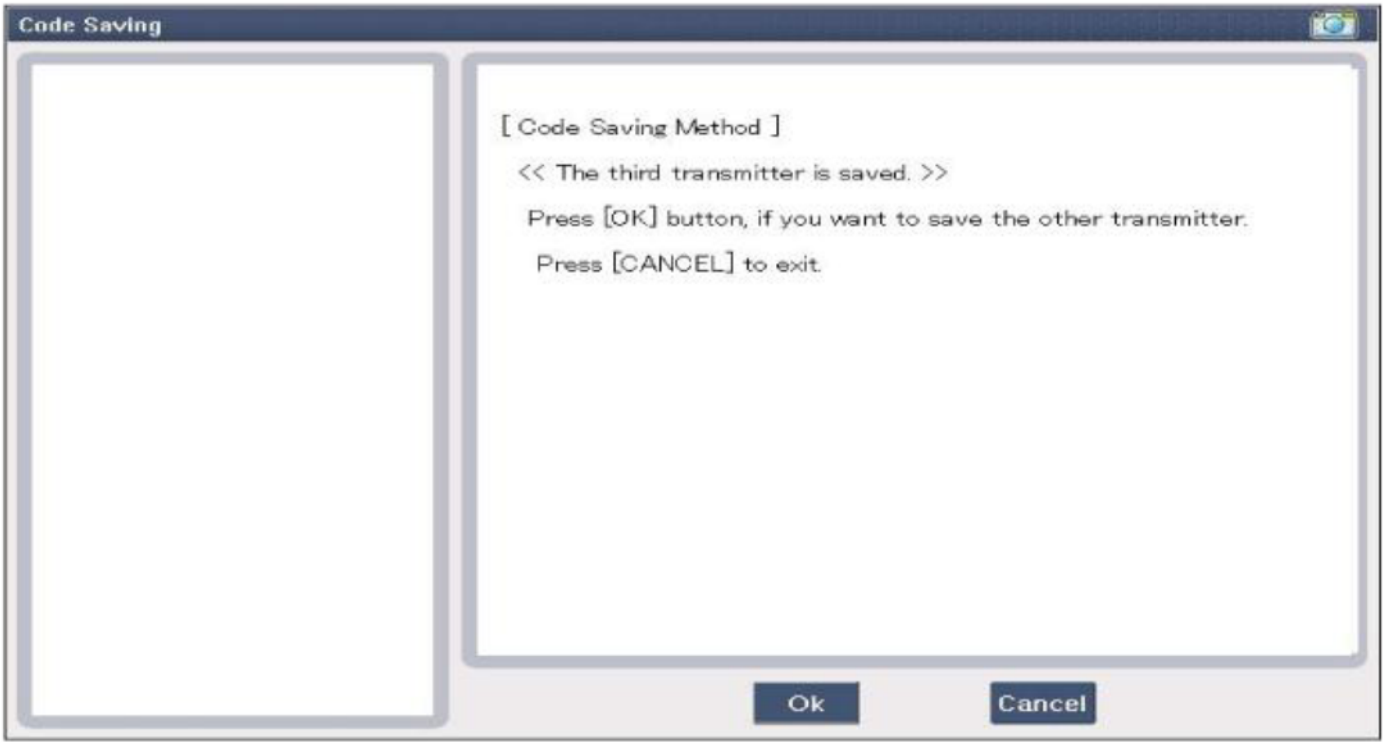


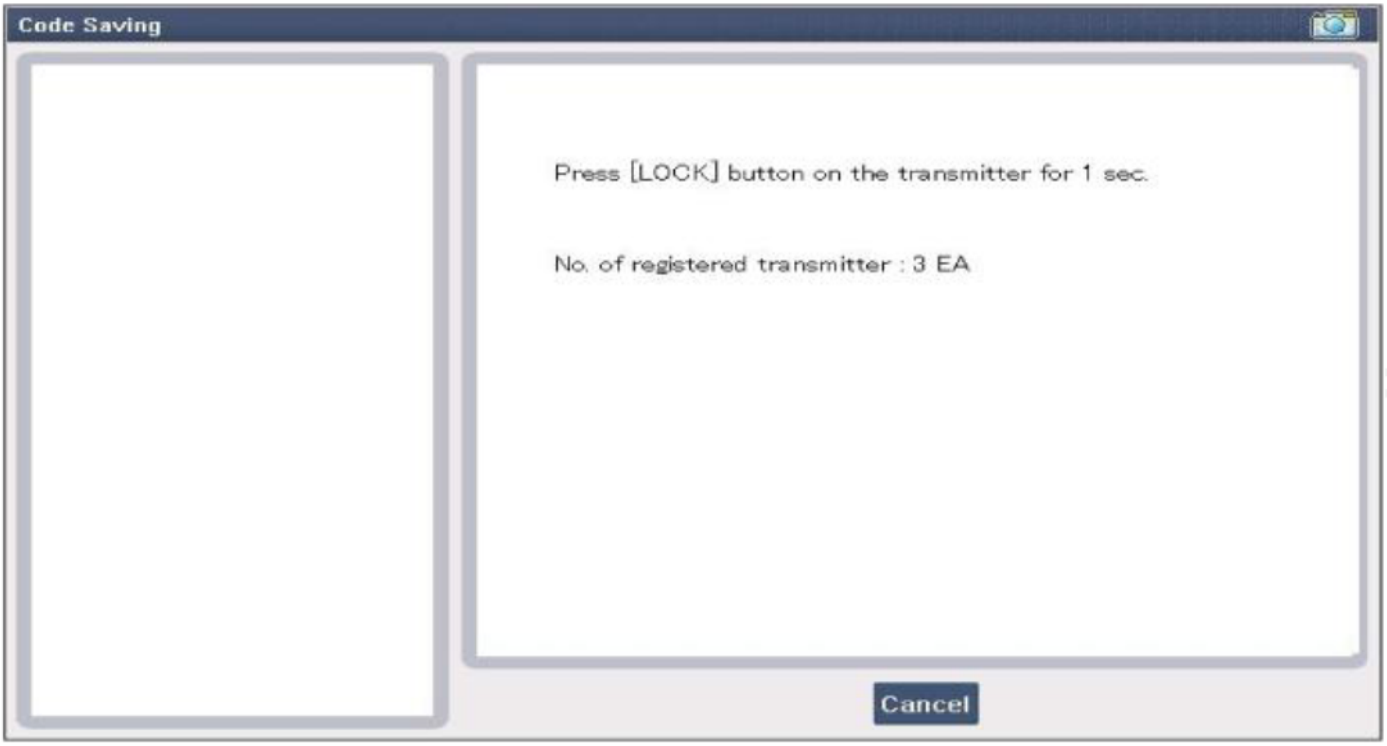
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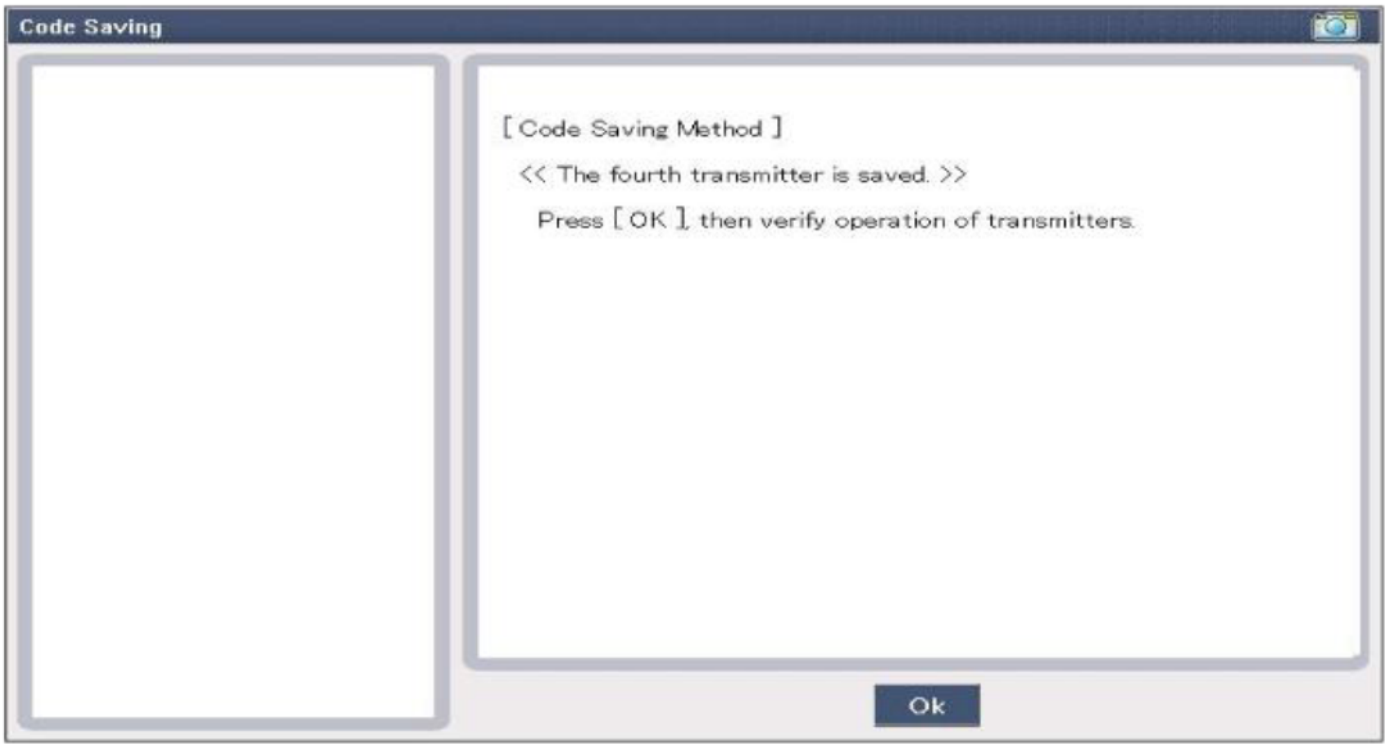


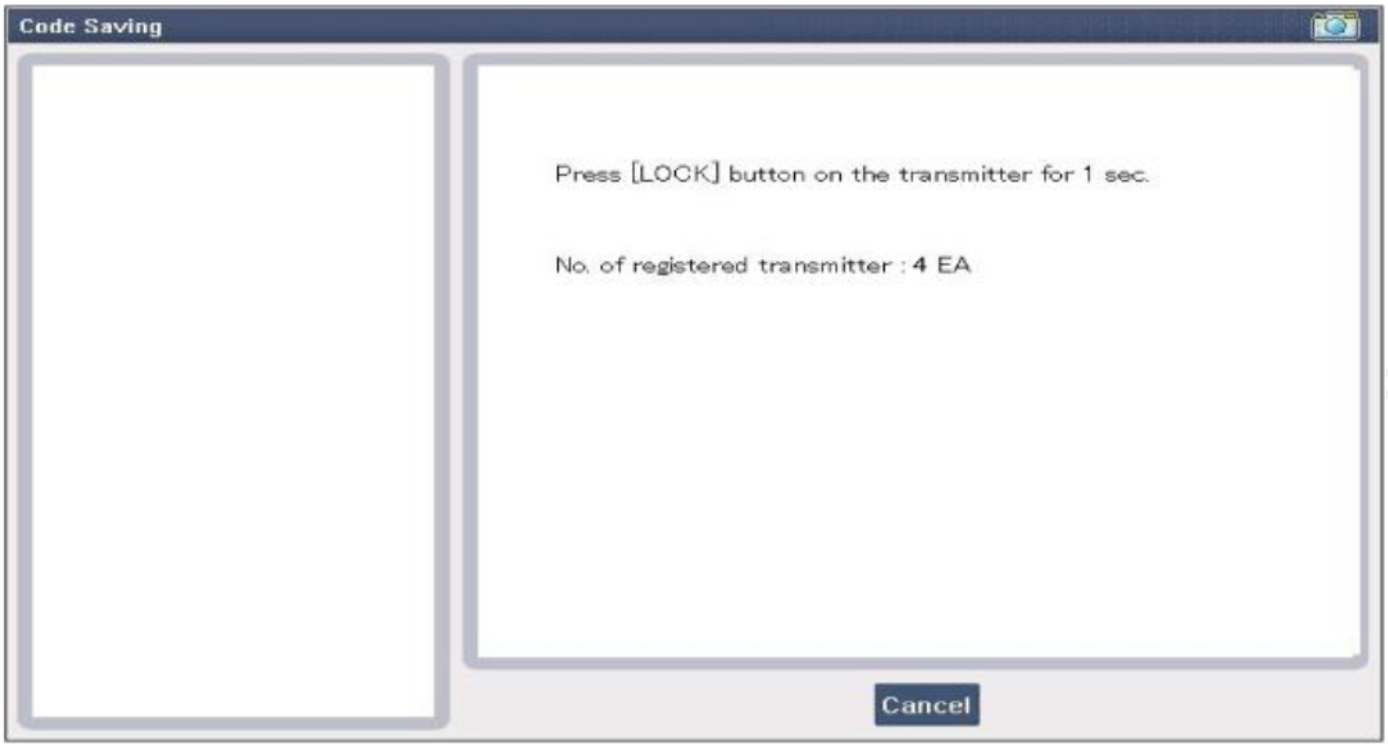
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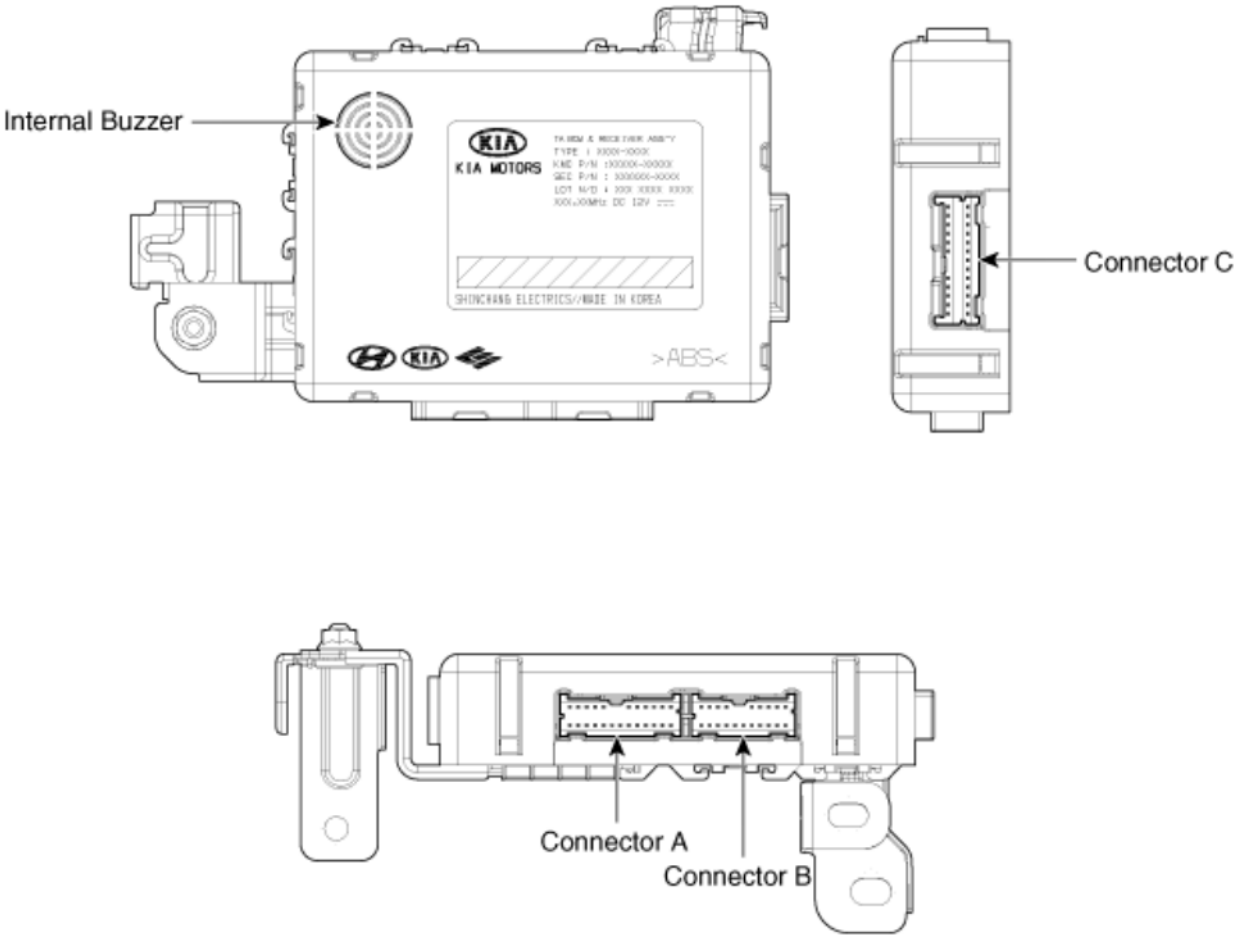
SPECIFICATIONS

Items	Specifications
Rated voltage	DC 12V
Operating voltage	DC 9 ~ 16V
Operating temperature	-22°F~176°F(-30°C~ 80°C)
Dark current	BCM : 3mA or less

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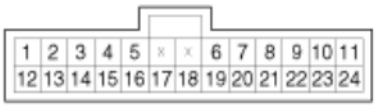
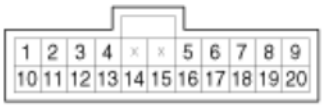
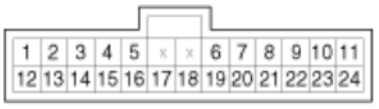
COMPONENTS



※ Internal Buzzer : Rear parking assist system buzzer

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NO.	Connector A	Connector B	Connector C
			
1	Battery +	Head lamp high control	DRL lamp
2	IGN1	Assist seat belt switch	-
3	IGN2	Rear seat belt switch	Rear seat belt IND
4	Driver door open switch	Rear center seat belt switch	Hazard relay
5	Hood switch	CAN_high	Front fog relay
6	Driver door unlock switch	CAN_low	Lock relay
7	Assist door unlock switch	Autolight power	Unlock relay
8	Rear & tailgate unlock switch	Autolight sensor	Driver seat belt IND
9	Power window lock switch	Battery+ (for DRL)	MTS Tx
10	Power window unlock switch	Tail lamp switch	AV tail
11	Driver seat belt switch	Rear left seat belt switch	Security IND
12	ACC	Rear fog switch	Rear center seat belt IND
13	R position	Autolight GND	GND(signal)
14	ALT L	Diagnosis	Rear left seat belt IND
15	Rear left door open switch	LIN RPAS	Room lamp relay
16	Assist door open switch	Crash sensor	Tailgate unlock
17	Tailgate door switch	Door warning switch	Horn relay
18	Autolight switch	Rear door open switch	-
19	Head lamp low switch	Room lamp	B/Alarm relay
20	Head lamp high switch	Mood lamp	Assist seat belt IND
21	Tailgate release switch		Rear fog relay
22	GND(power)		Tail lamp relay
23	Front fog switch		Head lamp relay
24	Speed sensor switch		Power window relay

BCM Input Signal Specification

Signal Name	Description	Input Characteristics(determinant condition of connector base)	Power Source(Pull Up)	Input acquisition VBAT Threshold Voltage
V_B+	Supply power to BCM	Pull down (Analog)	-	-
L_IGN1	Ignition1 voltage signal input	Pull down(B+ Backup Line) (ON:VB,OFF:Open)	-	Min:7V Max17.5V
L_IGN2	Ignition2 voltage signal input	Pull down(ON:VB,OFF:Open)	-	Min:7V Max17.5V
L_RLDoorOpenSW	REAR LEFT Door Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_HoodSW	Hood Open Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_DRDoorUnlockSW	Driver Door Knob Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V

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L_ASTDoorUnklockSW	Assist Door Knob Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_Rear&TailgateUnlockSW	Rear Door Knob Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_P/WindowLockSW	Power Window Lock Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_P/WindowUnlockSW	Power Window Unlock Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_DR_SeatBeltSW	Driver Seatbelt Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_ACC	Accessory voltage signal input	Pull down(ON:VB,OFF:Open)	-	Min:7.8V Max17.5V
L_'R'position	P-position signal input	Pull down(ON:VB,OFF:Open)	-	Min:7V Max17.5V
L_Alt'L'	Alternator voltage signal input	Pull down(ON:VB,OFF:Open)	-	Min:8V Max17.5V
L_DRDoorOpenSW	Driver Door Open Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_ASTDoorOpenSW	Assist Door Open Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_TailgateDoorSW	Tail Gate Door Open Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_AutolightSW	Auto light switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_HeadlampLowSW	Head Lamp Low switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_HeadlampHighSW	Head Lamp High(Passing/Dimmer) switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_T/GATE RELEASE SW	Tail Gate Release switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_FrontFogSW	Front Fog switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_SpeedSensorSW	Speed Sensor signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_AssistSeatBeltSW	Assist Seatbelt Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_RR_SeatBeltSW	Rear Right Seatbelt Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
L_RC_SeatBeltSW	Rear Center Seatbelt Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
V_AutolightPWR	Auto light power output	Pull down(ON:VB,OFF:Open)	-	Min:4v Max:5V
L_AutolightSnsr	Auto light sensor signal input	Pull down(ON:VB,OFF:Open)	-	Min:0v Max:5V
L_TailLampSW	Tail Lamp Low switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_RL_SeatBeltSW	Rear Left Seatbelt Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+(only wake up)	Min:7V Max17.5V
	Rear Fog Lamp switch		B+(only wake	Min:7V

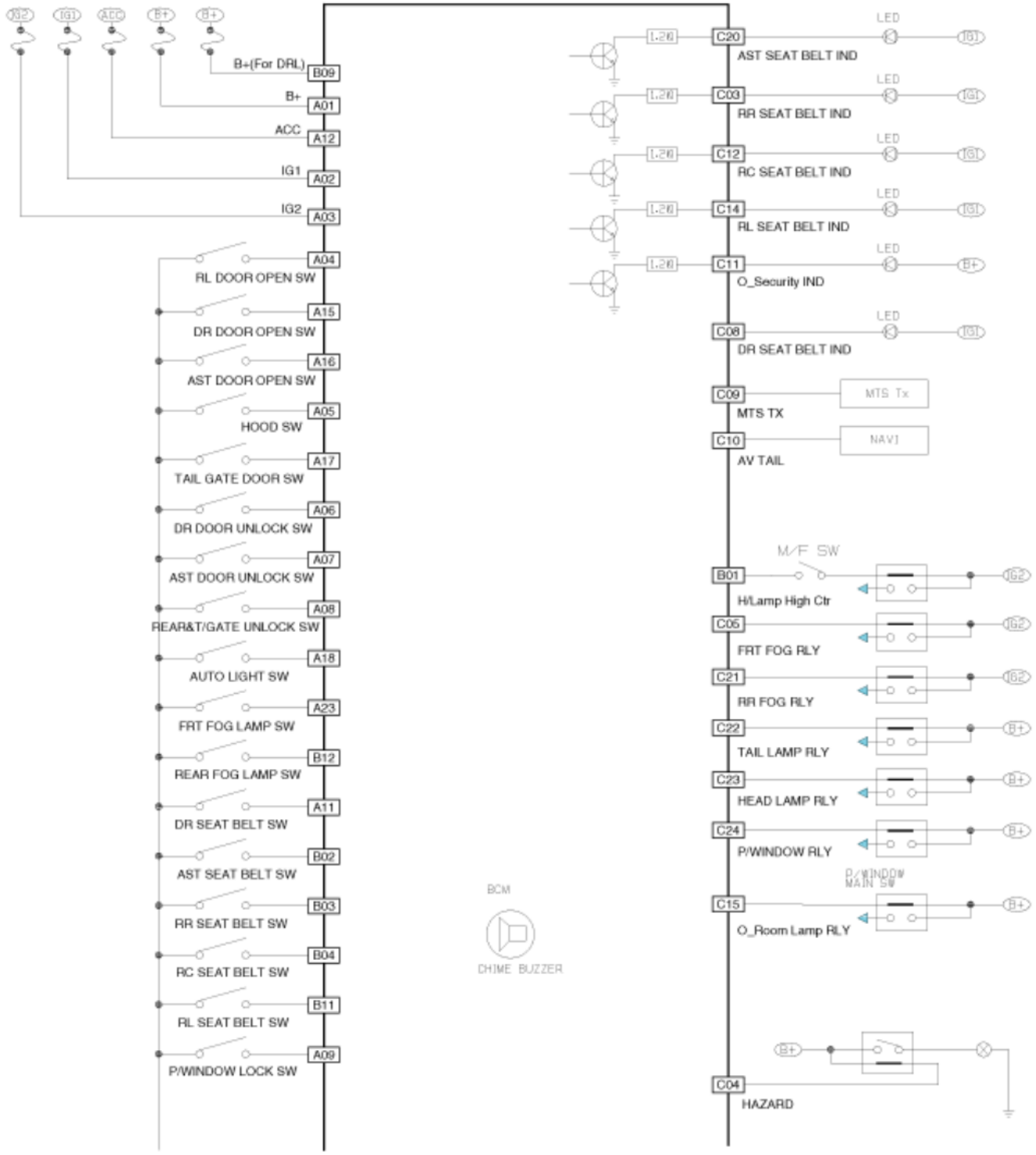
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L_RearFogSW	signal input	Pull up(ON:Gnd,OFF:Open)	up)	Max17.5V
P_CrashSensor(ESPS)	Crash Sensor signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_DoorWarningSW	Key insertion signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V
L_RRDoorOpenSW	Rear Right Door Open Status Switch signal input	Pull up(ON:Gnd,OFF:Open)	B+	Min:7V Max17.5V

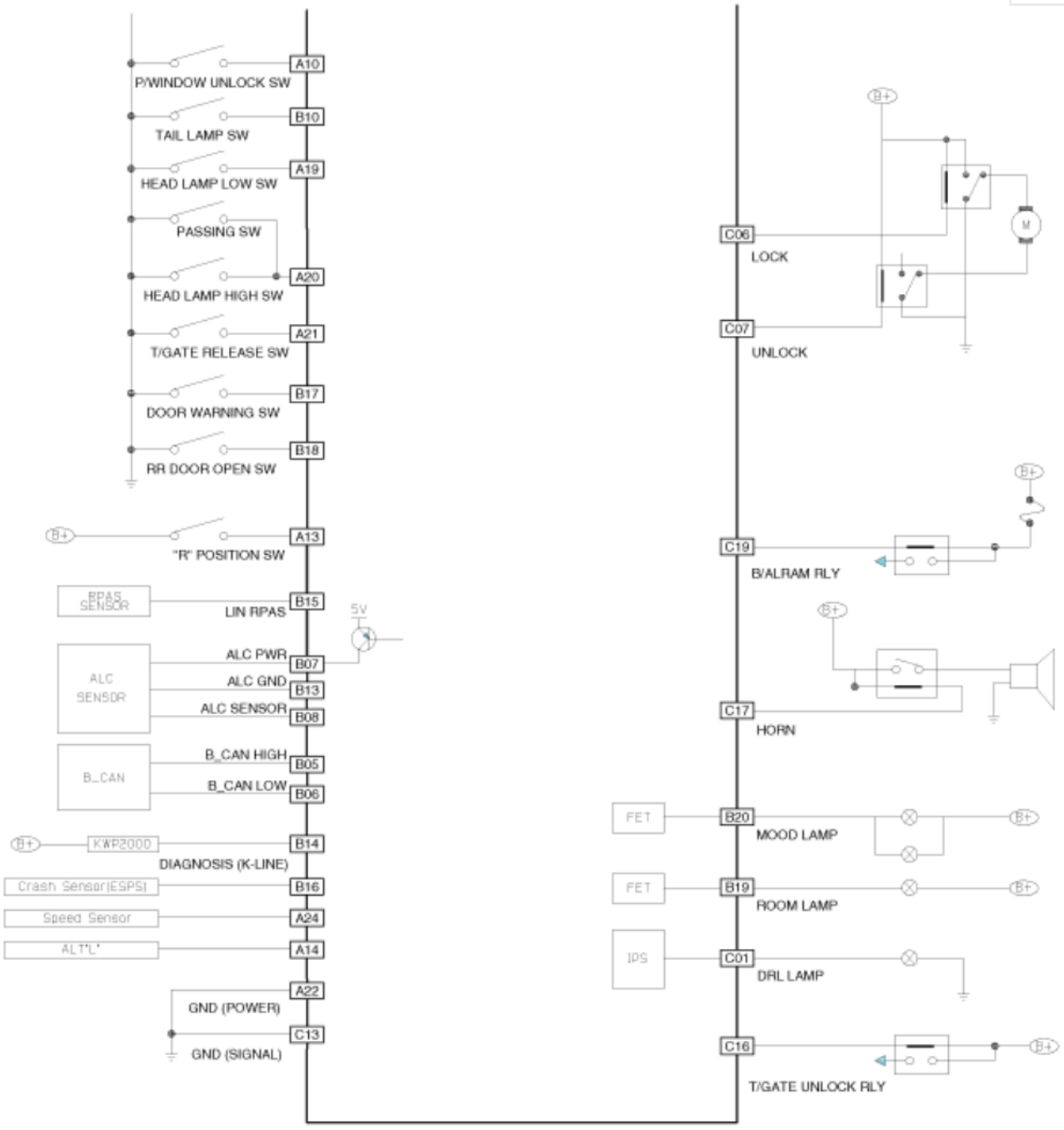
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CIRCUIT DIAGRAM



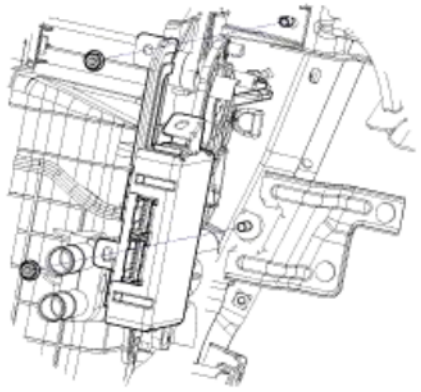
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DESCRIPTION

Body control module receives various input switch signals controlling time and Warning(Buzzer and indicator), Fade In/Out Room Lamp and Mood Lamp Control, Lamp control(Tail, AV Tail,Head Lamp Low, Front fog, Rear Fog lamp Control, DRL, Room Lamp Auto Cut), GND Control(Head Lamp Feedback Control), Power Window Timer Control, Door Lock/Unlock Control, Trunk Open Control, Burglar Alarm Control, Horn Answer Back Control, Navi Wake Up Signal Control and RPAS.

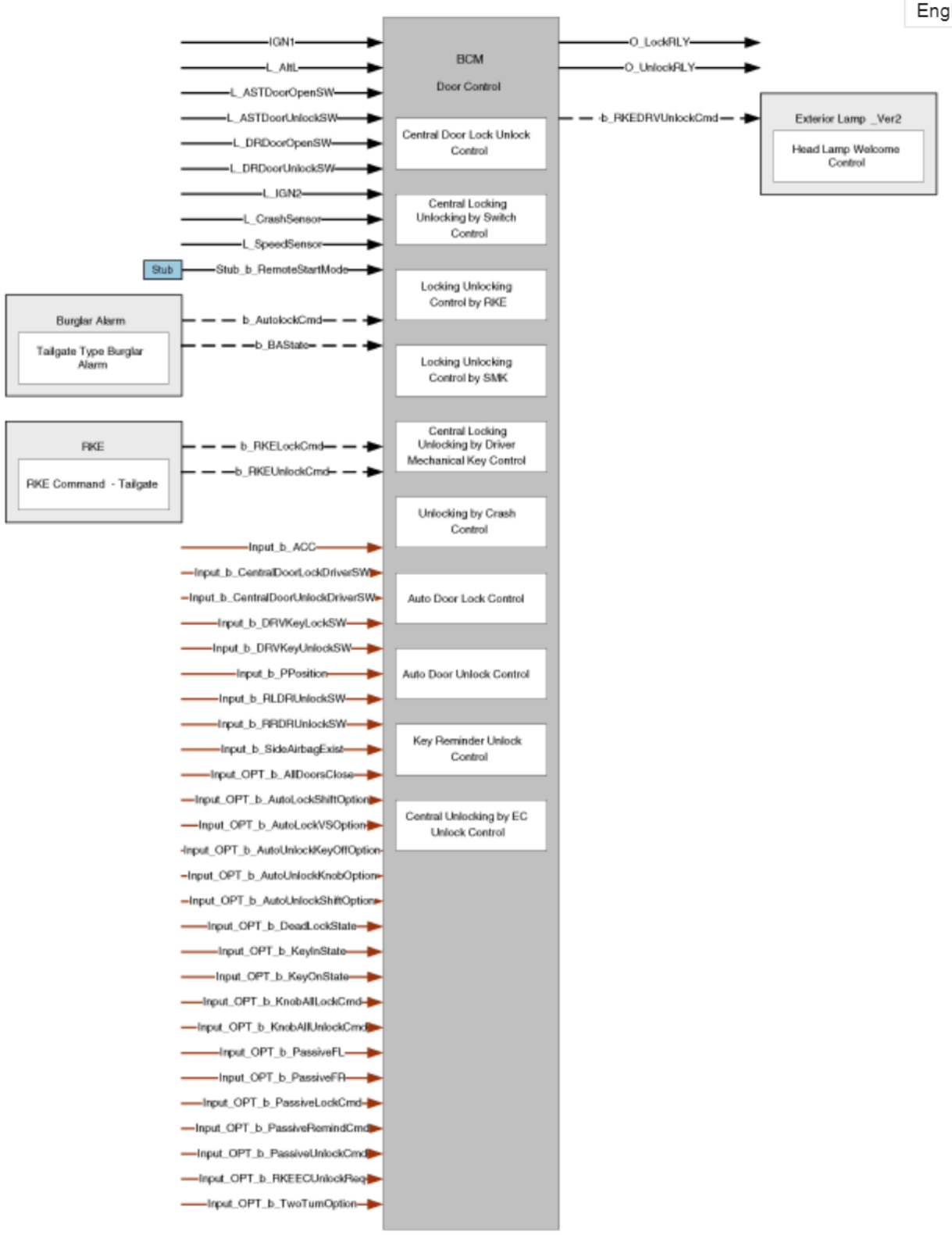


FUNCTION

Door Control

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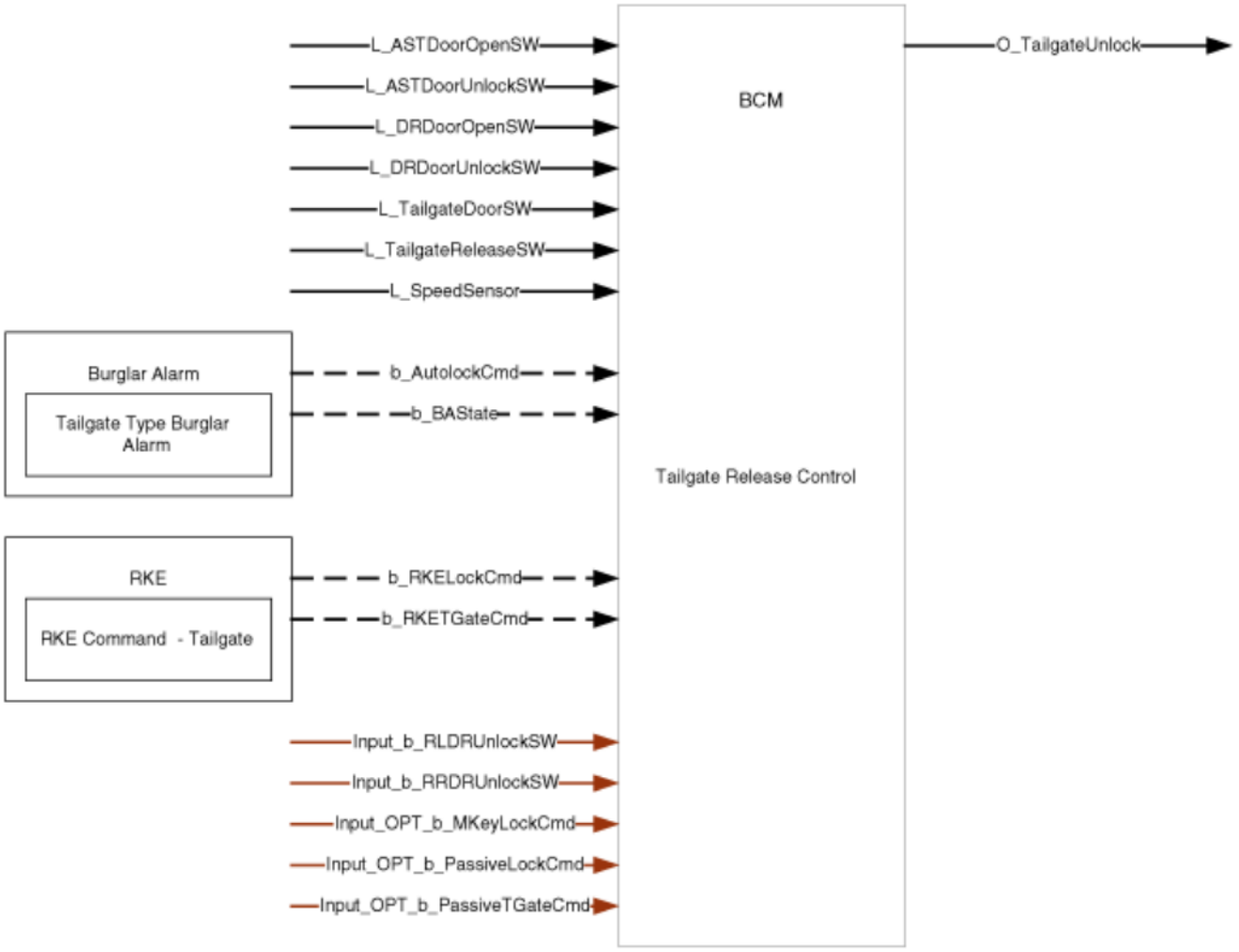
Function	Characteristics	Name	
		Signal Label	Description
	Logic	L_AltL	Alternator Input
		L_ASTDoorOpenSW	Assist door open switch
		L_ASTDoorUnlockSW	Assist door unlock switch
		L_DRDoorOpenSW	Driver door open switch
		L_DRDoorUnlockSW	Driver door unlock switch
		L_IGN2	IGN2
	PWM	L_CrashSensor	Crash sensor

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Input		L_SpeedSensor	Speed sensor
	Stub	Stub_b_RemoteStartMode	Flag for Remote Start Mode
	Internal	b_AutolockCmd	Lock Request by Burglar Alarm Control
		b_BAState	Burglar Alarm State is in ARM type state
		b_RKELockCmd	RKE Lock command
		b_RKEUnlockCmd	RKE Unlock command
		Input_b_ACC	Accessory Input
		Input_b_CentralDoorLockDriverSW	Central Door Lock Switch Driver Side
		Input_b_CentralDoorUnlockDriverSW	Central Door Unlock Switch Driver Side
		Input_b_DRVKeyLockSW	Driver Mechanical Key Lock signal
		Input_b_DRVKeyUnlockSW	Driver Mechanical Key Unlock signal
		Input_b_PPosition	Gear Shift Lever P Position Input
		Input_b_RLDRUnlockSW	Rear left door unlock status
		Input_b_RRDRUnlockSW	Rear right door unlock status
		Input_b_SideAirbagExist	Side airbag existence
		Input_OPT_b_AllDoorsClose	All Doors Open/Close State
		Input_OPT_b_AutoLockShiftOption	Auto Door Lock by Shift Lever Function Option State
		Input_OPT_b_AutoLockVSOption	Auto Door Lock by Vehicle Speed Function Option State
		Input_OPT_b_AutoUnlockKeyOffOption	Auto Door Unlock by Key Off Function Option State
		Input_OPT_b_AutoUnlockKnobOption	Auto Door Unlock byDriver Safety knob Function Option State
		Input_OPT_b_AutoUnlockShiftOption	Auto Door Unlock by Shift Lever Function Option State
		Input_OPT_b_DeadLockState	Dead Lock State
		Input_OPT_b_KeyInState	Key In or Fob In state
		Input_OPT_b_KeyOnState	Key In or Fob In or Terminal On state Input
		Input_OPT_b_KnobAllLockCmd	All Lock Command by Knob
		Input_OPT_b_KnobAllUnlockCmd	All Unlock Command by Knob
		Input_OPT_b_PassiveFL	SMK Passive Command from Front Left
		Input_OPT_b_PassiveFR	SMK Passive Command from Front Right
		Input_OPT_b_PassiveLockCmd	Passive Lock Command
		Input_OPT_b_PassiveRemindCmd	SMK Passive Key Reminder Unlock Command
		Input_OPT_b_PassiveUnlockCmd	SMK Passive Unlock command
		Input_OPT_b_RKEECUnlockReq	EC Unlock Request by RKE
Output	Internal	b_RKEDRVUnlockCmd	RKE Driver Door Unlock command

Tailgate Release Control

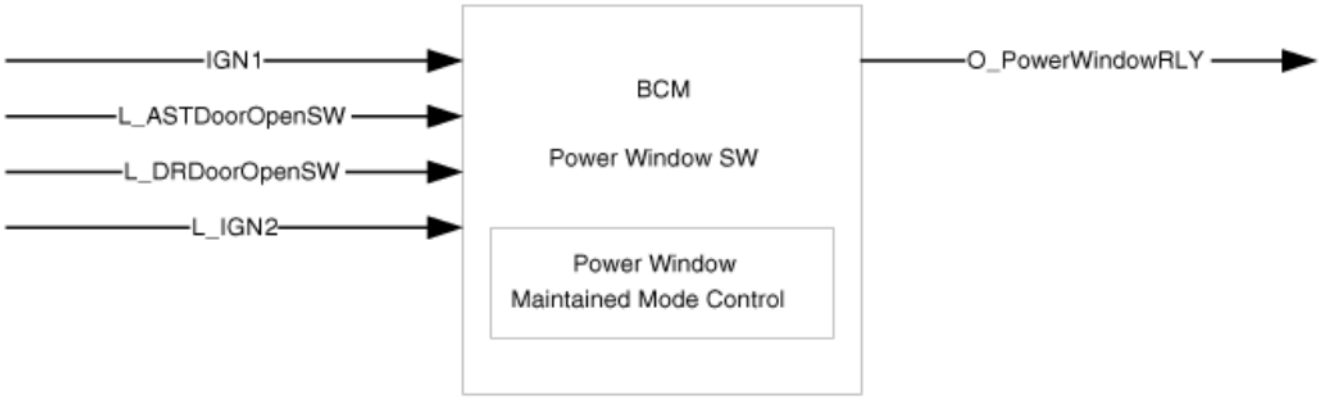
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Function	Characteristics	Name	
		Signal Label	Description
Input	Logic	L_ASTDoorOpenSW	Assist door open switch
		L_ASTDoorUnlockSW	Assist door unlock switch
		L_DRDoorOpenSW	Driver door open switch
		L_DRDoorUnlockSW	Driver door unlock switch
		L_TailgateDoorSW	Tailgate door switch
		L_TailgateReleaseSW	Tailgate release switch
	PWM	L_SpeedSensor	Speed sensor
	Internal	b_AutolockCmd	Lock Request by Burglar Alarm Control
		b_BAState	Burglar Alarm State is in ARM type state
		b_RKELockCmd	RKE Lock command
		b_RKETGateCmd	RKE Tailgate Command
		Input_b_RLDRUnlockSW	Rear left door unlock status
		Input_b_RRDRUnlockSW	Rear right door unlock status
		Input_OPT_b_MKeyLockCmd	Mechanical Key Lock Command
		Input_OPT_b_PassiveLockCmd	Passive Lock Command
		Input_OPT_b_PassiveTGateCmd	SMK Passive Tailgate Command

Tailgate Release Control

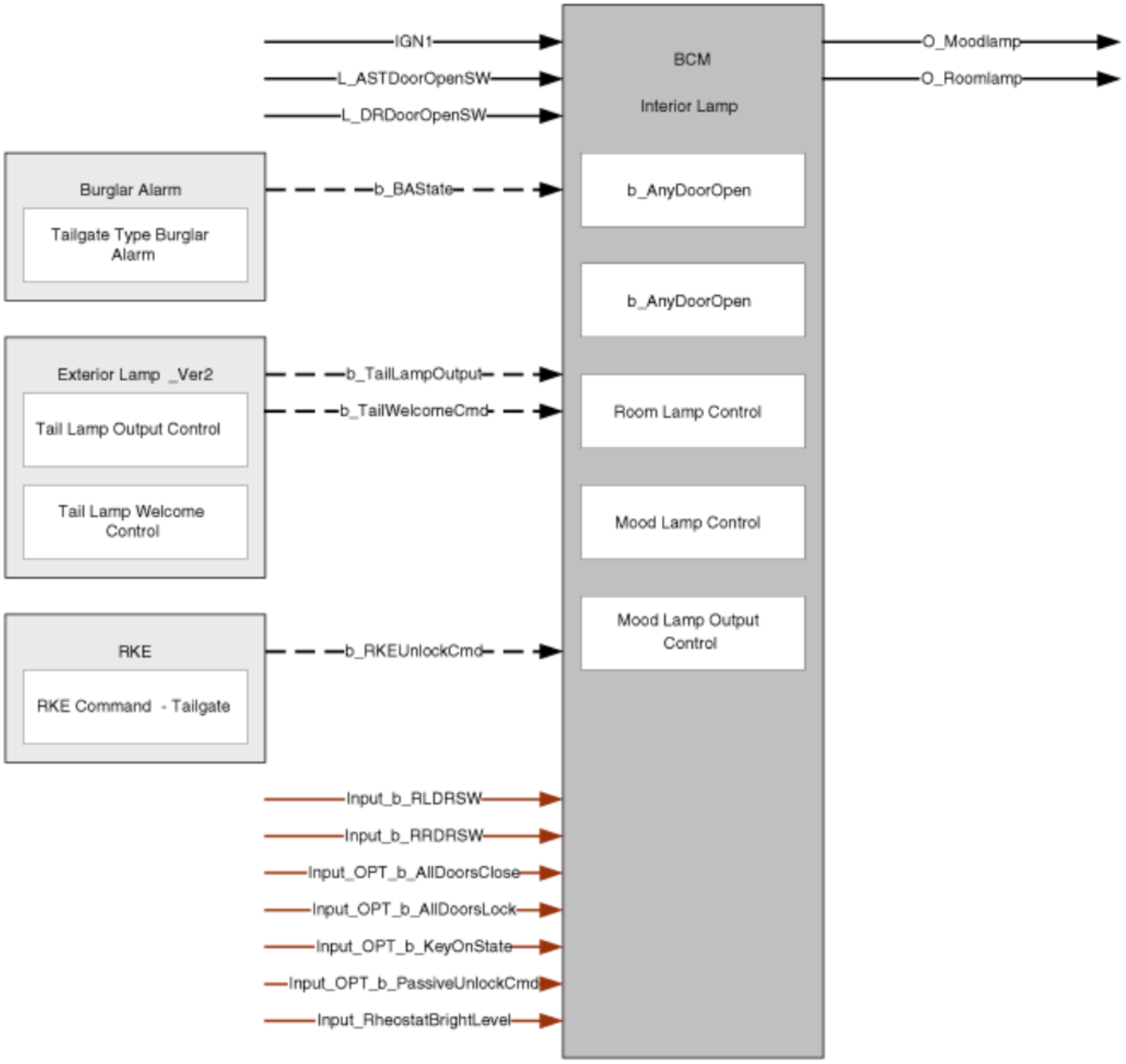
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Function	Characteristics	Name	
		Signal Label	Description
Input	Logic	L_ASTDoorOpenSW	Asssist door open switch
		L_DRDoorOpenSW	Driver door open switch
		L_IGN2	IGN2

Interior Lamp Control

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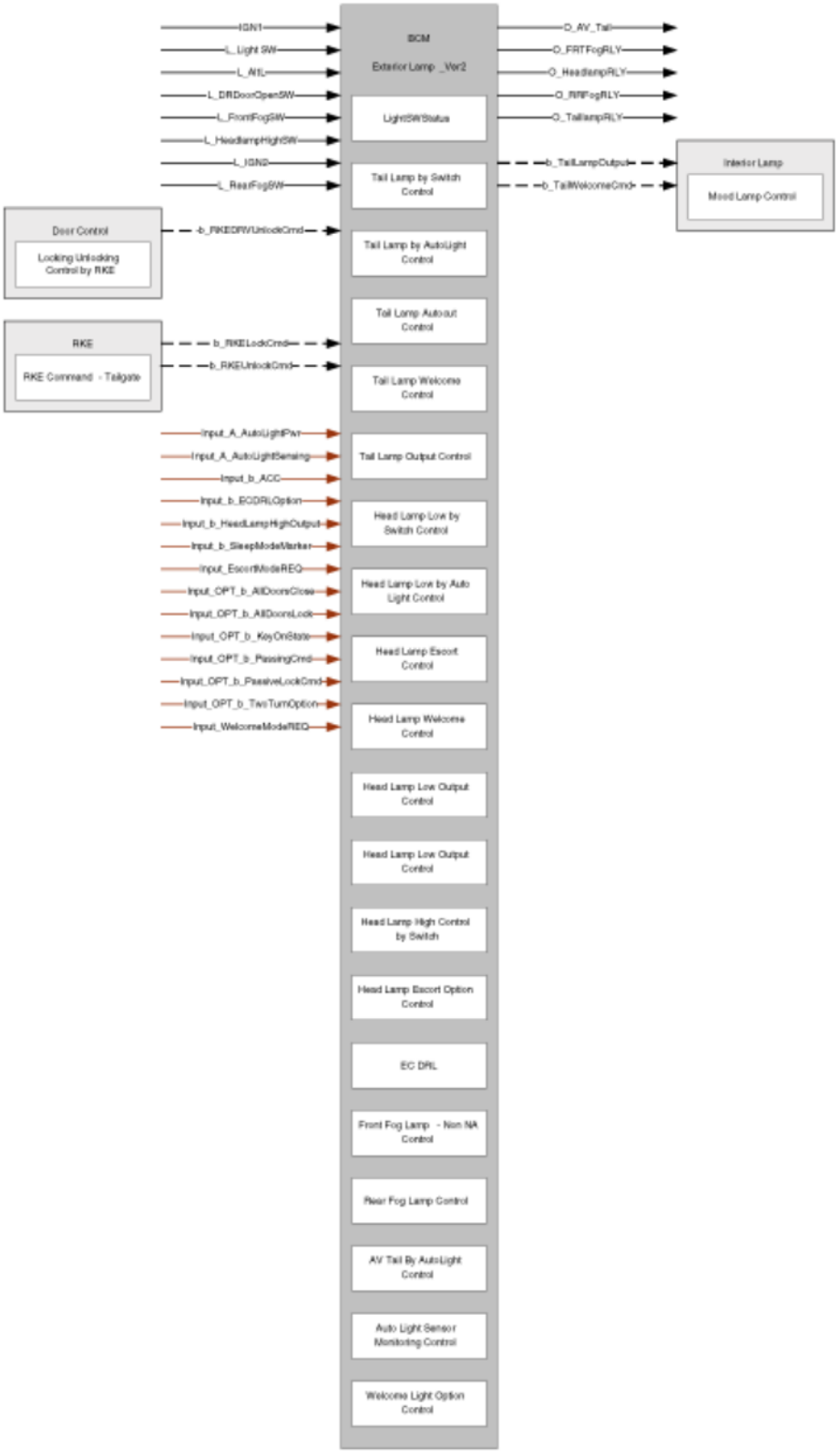


Function	Characteristics	Name	
		Signal Label	Description
Input	Logic	L_ASTDoorOpenSW	Assist door open switch
		L_DRDoorOpenSW	Driver door open switch
	Internal	b_BAState	Burglar Alarm State is in ARM type state
		b_RKEUnlockCmd	RKE Unlock command
		b_TailLampOutput	Tail Lamp Output
		b_TailWelcomeCmd	Tail Lamp Welcome Output Command
		Input_b_RLDRSW	Rear Left Door Open/Close State
		Input_b_RRDRSW	Rear Right Door Open/Close State
		Input_OPT_b_AllDoorsClose	All Doors Open/Close State
		Input_OPT_b_AllDoorsLock	All Doors Lock/Unlock State
		Input_OPT_b_KeyOnState	Key In or Fob In or Terminal On state Input
		Input_OPT_b_PassiveUnlockCmd	SMK Passive Unlock command

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		Input_RheostatBrightLevel	Rheostat Mood Lamp Bright Level

Exterior Lamp Control

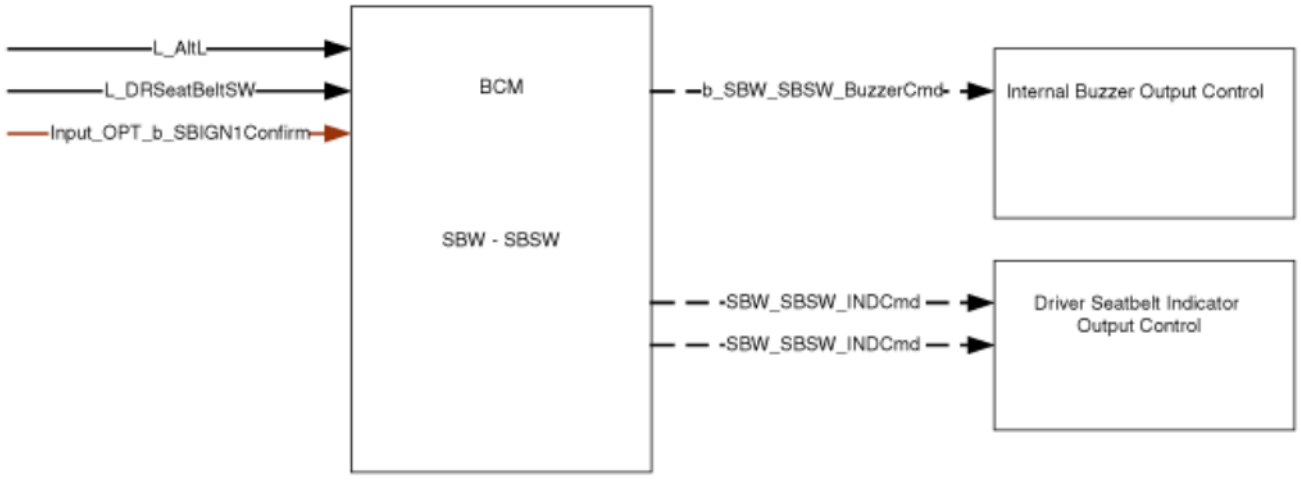


Function	Characteristics	Name	
		Signal Label	Description
	Logic	L_AltL	Alternator Input
		L_DRDoorOpenSW	Driver door open switch
		L_FrontFogSW	Front Fog Lamp switch
		L_HeadlampHighSW	Head lamp high switch

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Input		L_IGN2	IGN2
		L_RearFogSW	Rear fog lamp switch
	Internal	b_RKEDRVUnlockCmd	RKE Unlock command for Drive Door
		b_RKELockCmd	RKE Lock command
		b_RKEUnlockCmd	RKE Unlock command
		Input_A_AutoLightPwr	Auto Light Sensor Power raw Input Value
		Input_A_AutoLightSensing	Auto Light Sensor raw Input Value
		Input_b_ACC	Accessory Input
		Input_b_ECDRLOption	EC DRL Function Enable/Disable Option
		Input_b_HeadLampHighOutput	Head Lamp High Output
		Input_b_SleepModeMarker	Sleep Mode Marker
		Input_EscortModeREQ	Request to set Head Lamp Escort Option
		Input_OPT_b_AllDoorsClose	All Doors Open/Close State
		Input_OPT_b_AllDoorsLock	All Doors Lock/Unlock State
		Input_OPT_b_KeyOnState	Key In or Fob In or Terminal On state Input
		Input_OPT_b_PassingCmd	Passing Output Command by Passing Switch
		Input_OPT_b_PassiveLockCmd	Passive Lock Command
		Input_WelcomeModeREQ	Request to set Welcome Light Option
Output	Internal	b_TailLampOutput	Tail Lamp Output
		b_TailWelcomeCmd	Tail Lamp Welcome Output Command

Seat Belt Warning Control



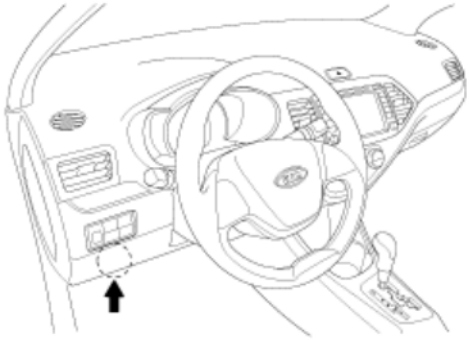
Function	Characteristics	Name	
		Signal Label	Description
Input	Logic	L_AltL	Alternator Input
		L_DRSeatBeltSW	Driver seat belt switch
	Internal	Input_OPT_b_SBIGN1Confirm	IGN1 On Confirmation State
Output	Internal	b_SBW_SBSW_BuzzerCmd	Seat belt Warning Sound Command for SBW - SBSW Function
			Seat Belt Indicator Output for SBW -

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		SBW_SBSW_INDCmd	SBSW Function

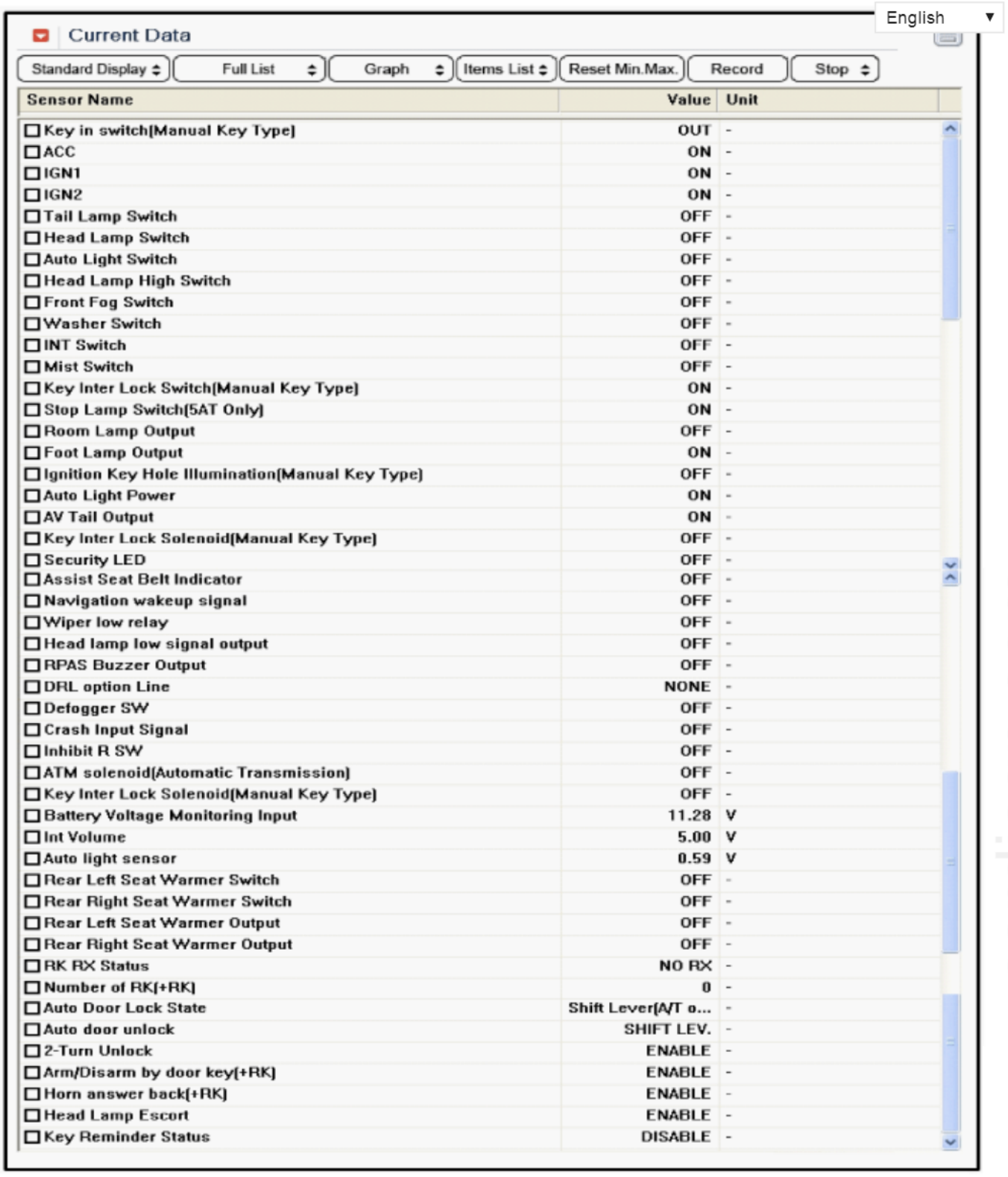
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TROUBLE DIAGNOSTICS WHEN USING GDS



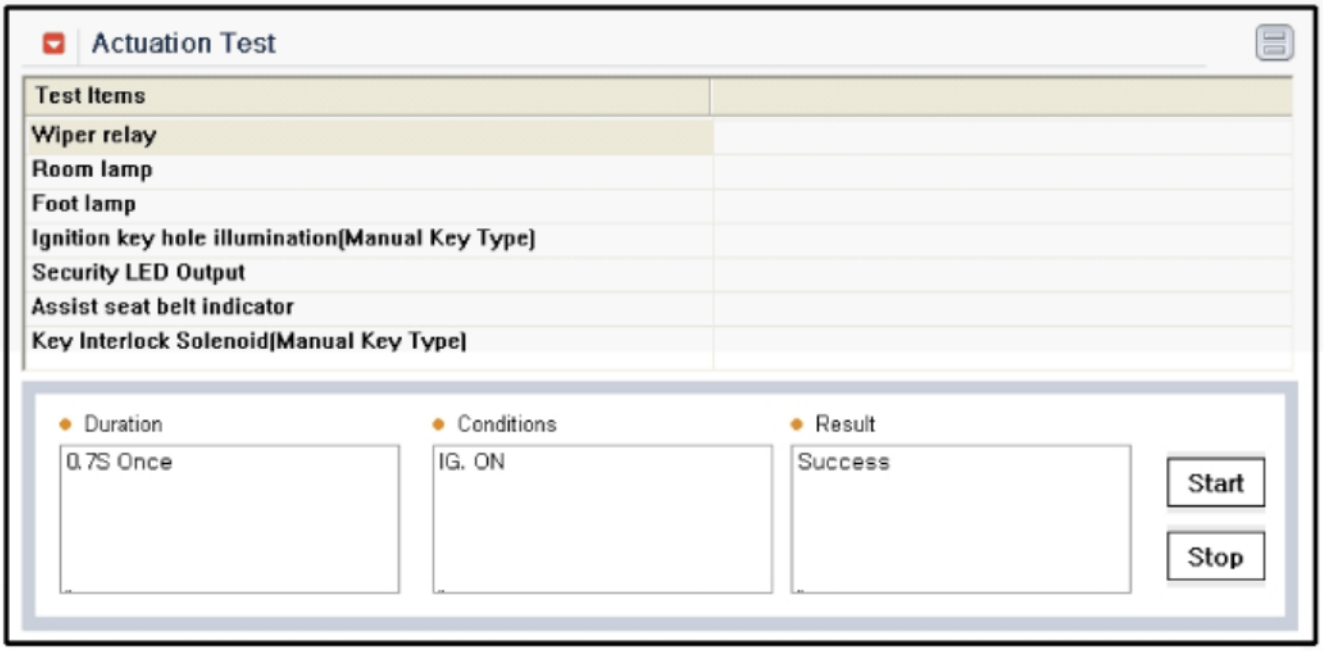
1. The body control module can diagnose by using the GDS more quickly.
   The BCM communicates with the GDS and then reads the input/output value and drives the actuator.
2. To diagnose the BCM function, select the menu of model and body control module.
3. To consult the present input/output value of BCM, "Current DATA". It provides information of BCM input/output conditions of power supply, turn signal/brake lamp, headlamp, door, locks, auto-light and transmitters etc.
   - BCM Service data

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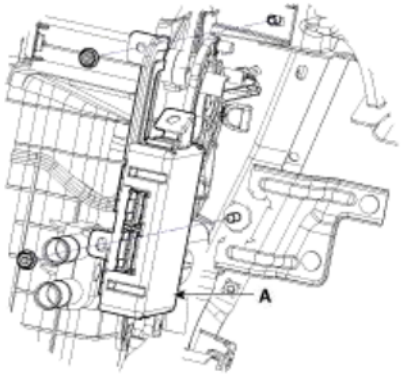
4. To perform compulsory operation on BCM input factors, select "ACTUATION TEST".

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REMOVAL

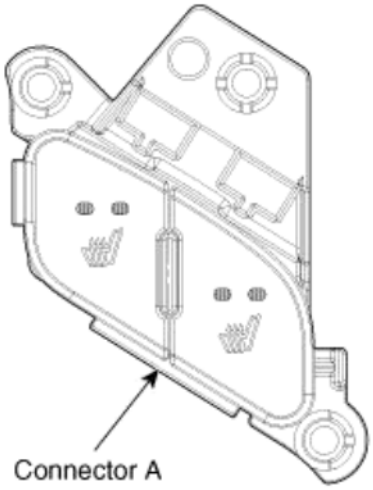
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to the BD group - "Crash pad")
3. Remove the BCM unit(A) after disconnecting a connector and loosening 2 nuts.

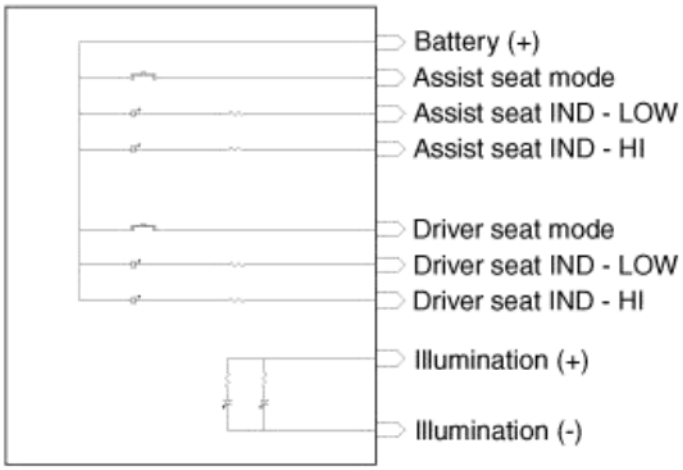


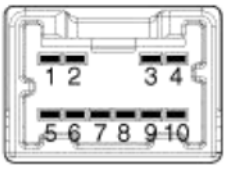
4. The installation is the reverse order of removal.

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CIRCUIT DIAGRAM





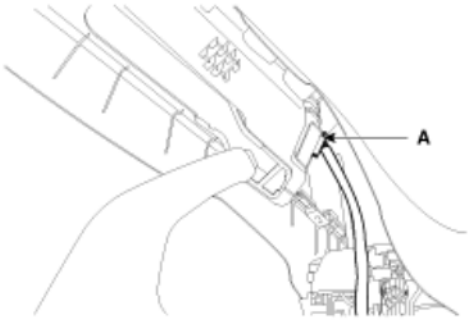


No.	Description
1	Battery (+)
2	Illumination (-)
3	Driver seat IND - HI
4	Driver seat IND - LOW
5	-
6	Illumination (+)
7	Assist seat mode
8	Assist seat IND - LOW
9	Assist seat IND - HI
10	Driver seat mode

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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console.
   (Refer to the BD group - "console")
3. Remove the seat heater switch (A) after loosening 2 screws.



INSTALLATION

1. Install the seat heater switch and connector.
2. Install the floor console.
3. Connect the battery (-) terminal.

INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Turn seat heater switch ON and check that continuity exists between the terminals.

Position \ Terminal		9	8	7	1
Driver	OFF			○—○	
	Once		○—	—○	
	Twice	○—	—	—○	

Position \ Terminal		3	4	10	1
Passenger	OFF			○—○	
	Once		○—	—○	
	Twice	○—	—	—○	

3. If there is no continuity, replace the seat heater switch.

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COMPONENT LOCATION

[Driver/Passenger]

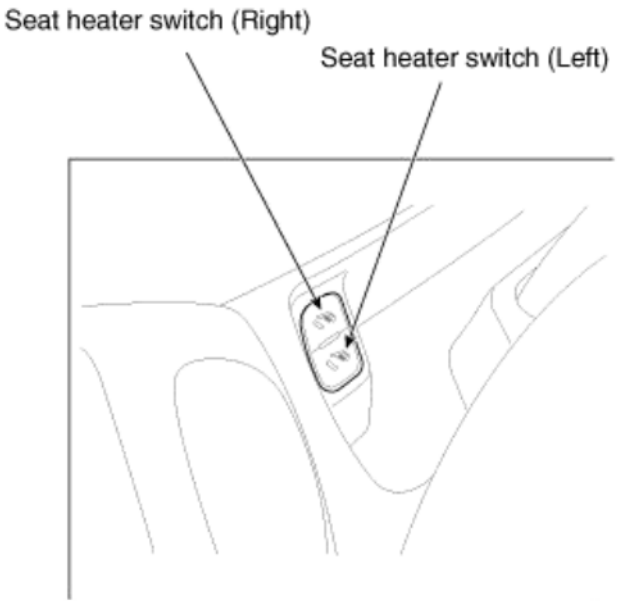




[Seat back]



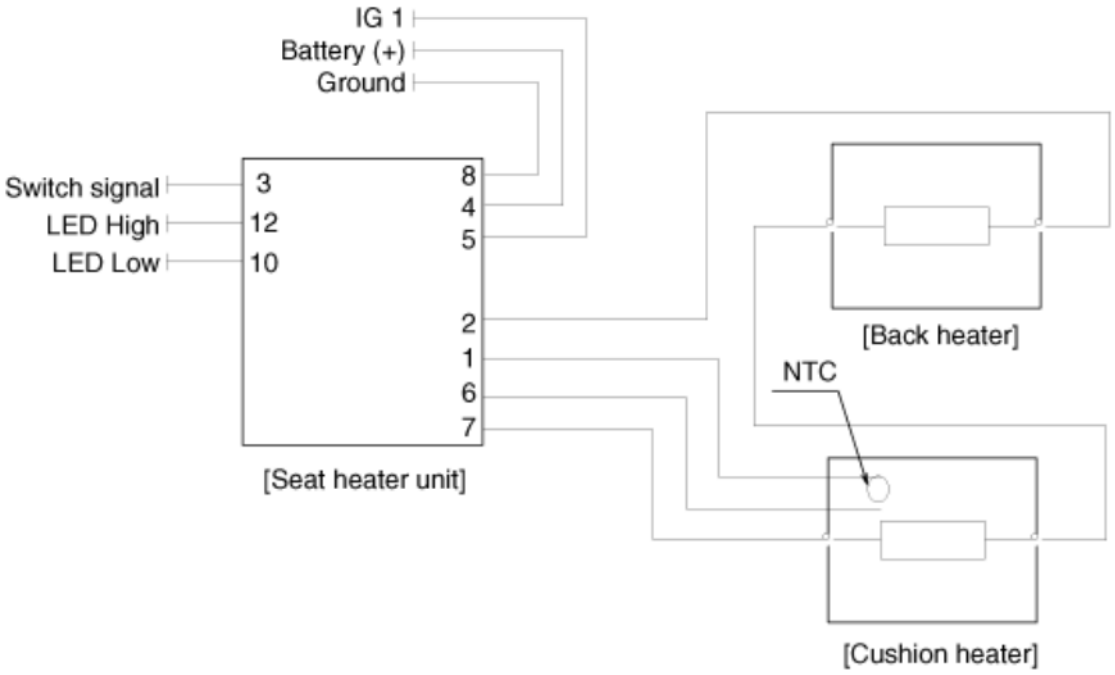
[Seat cushion]



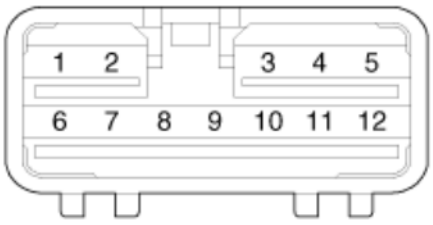
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CIRCUIT DIAGRAM

[Front seat cushion/back]

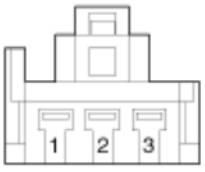


[Unit connector]



No.	Description	No.	Description
1	NTC (+)	7	Seat heater (-)
2	Seat heater (+)	8	Ground
3	Switch signal	9	-
4	Battery (+)	10	LED Low
5	IGN1	11	-
6	NTC (-)	12	LED High

[Cushion heater]



No.	Description
1	High
2	Low
3	Back

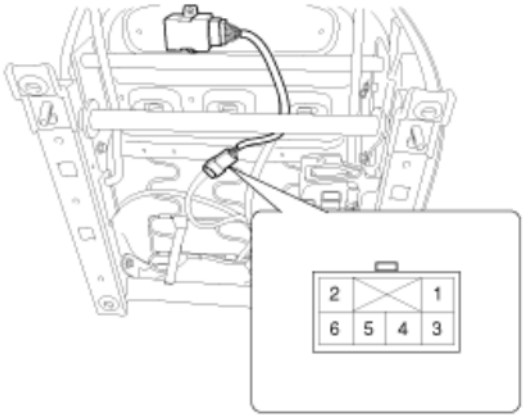
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INSPECTION

Front Seat Heater

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

[Cushion]



No.	Description	No.	Description
1	-	4	NTC-
2	-	5	NTC+
3	Heater(-)	6	Heater(+)

Standard value (Fabric / Leather)
Cushion : 1.18 Ω ± 10%
Back: 1.13 Ω ± 10%
Set : 2.47 Ω ± 10%

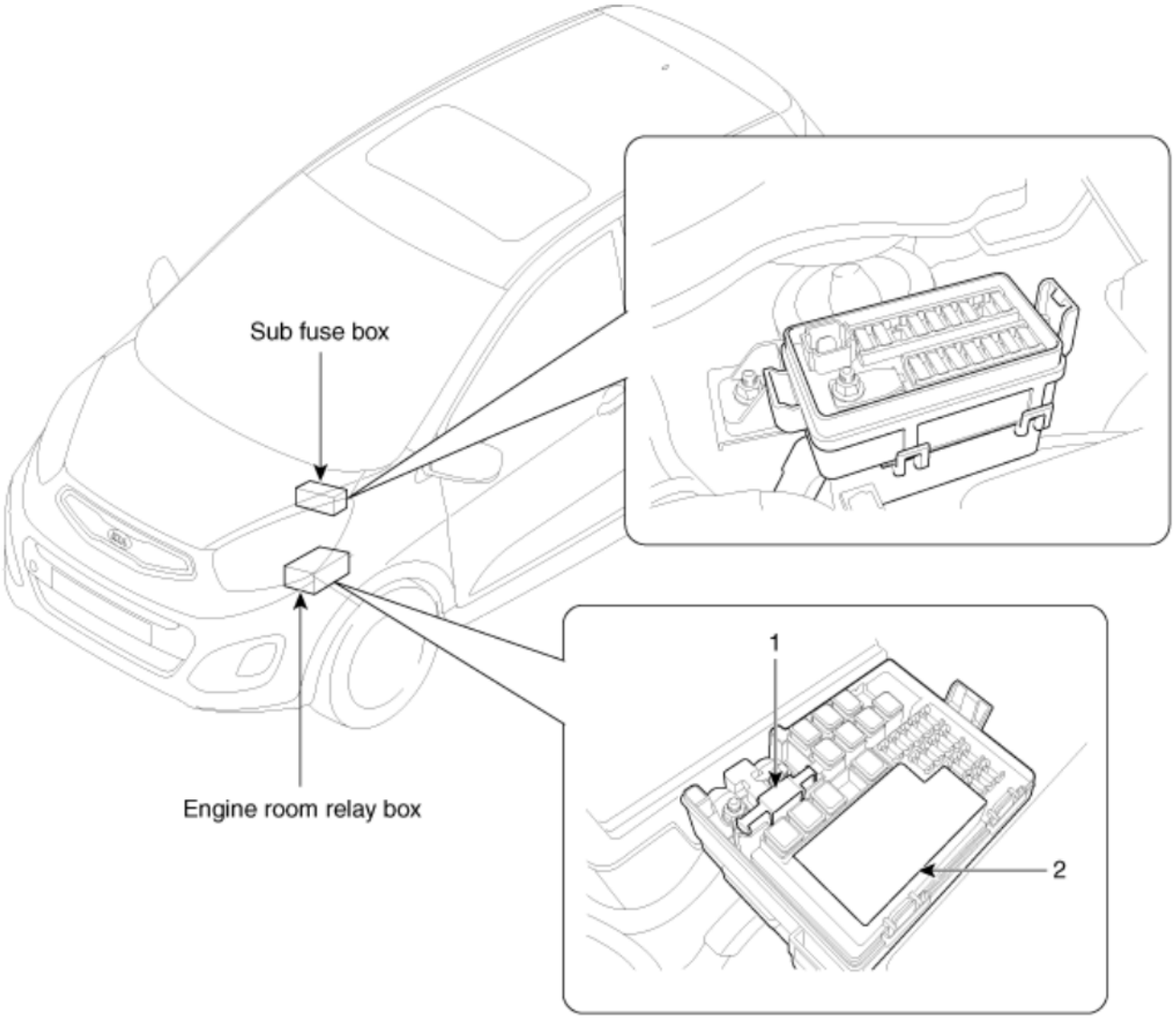
2. Operate the seat heater after connecting the connector, and then check the thermostat by measuring the temperature of seat surface.

Standard value (Fabric / Leather)
Cushion :
High : 42 ± 2°C(107.6 ± 35.6°F) / LOW : 39 ± 2°C(102.2 ± 35.6°F)
Back :
High : 52 ± 2°C(125.6 ± 35.6°F) / LOW : 46 ± 2°C(114.8 ± 35.6°F)

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COMPONENT LOCATION

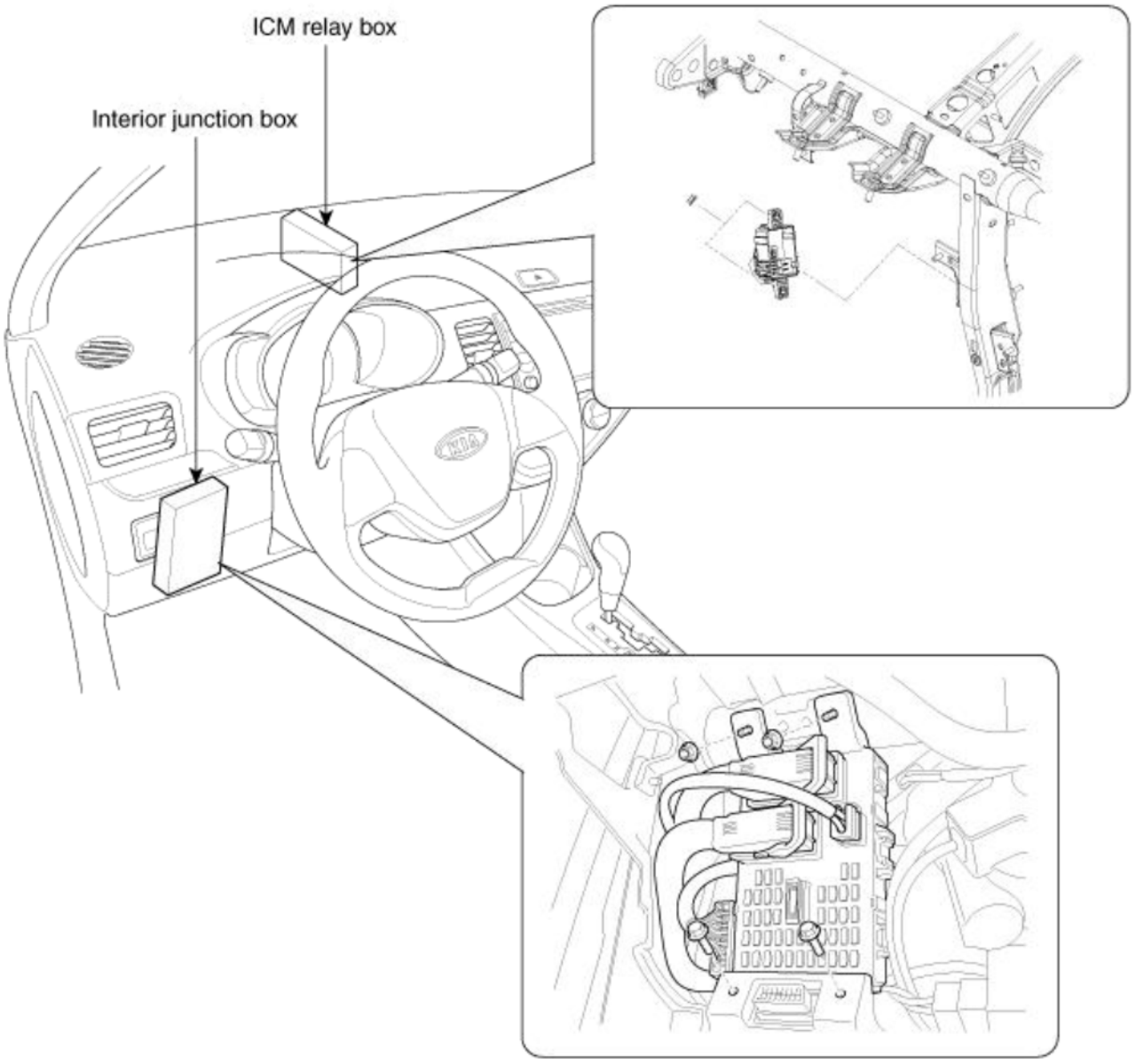
[Engine room relay box]



1. Multi fuse box (Power steering, Generator relay)
2. PCB fuse & relay box assembly (Blower, C/FAN, Start, Main, F/PUMP, Horn, B/Alarm horn, ESS, HAC, F/PUMP2, A/CON, Head lamp low/hi relay)

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[Interior Junction Box]

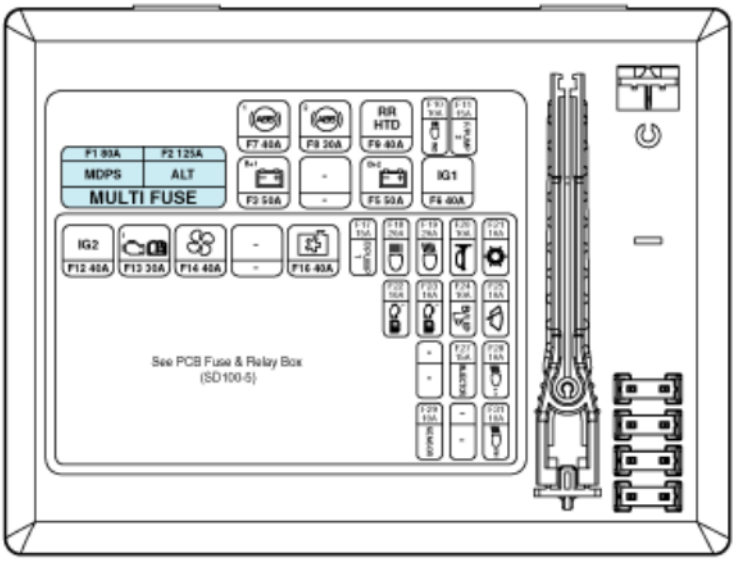


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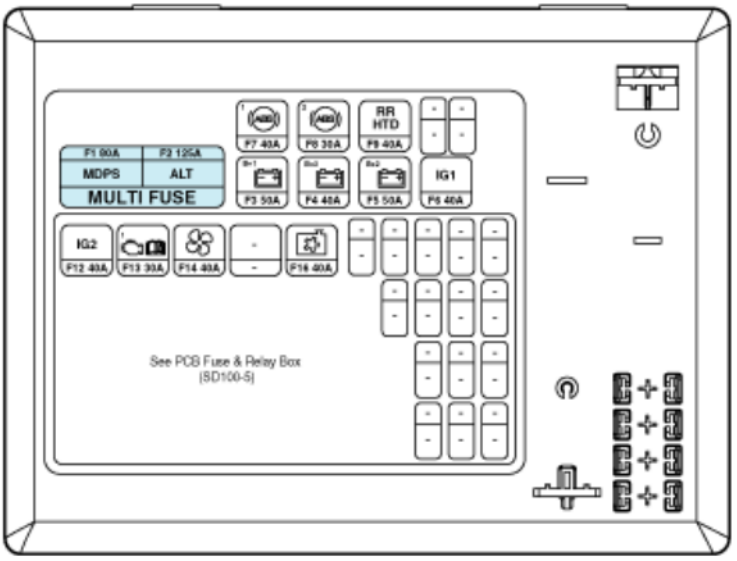
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COMPONENTS

GENERAL TYPE



PROJECTION TYPE



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Circuit

English ▼

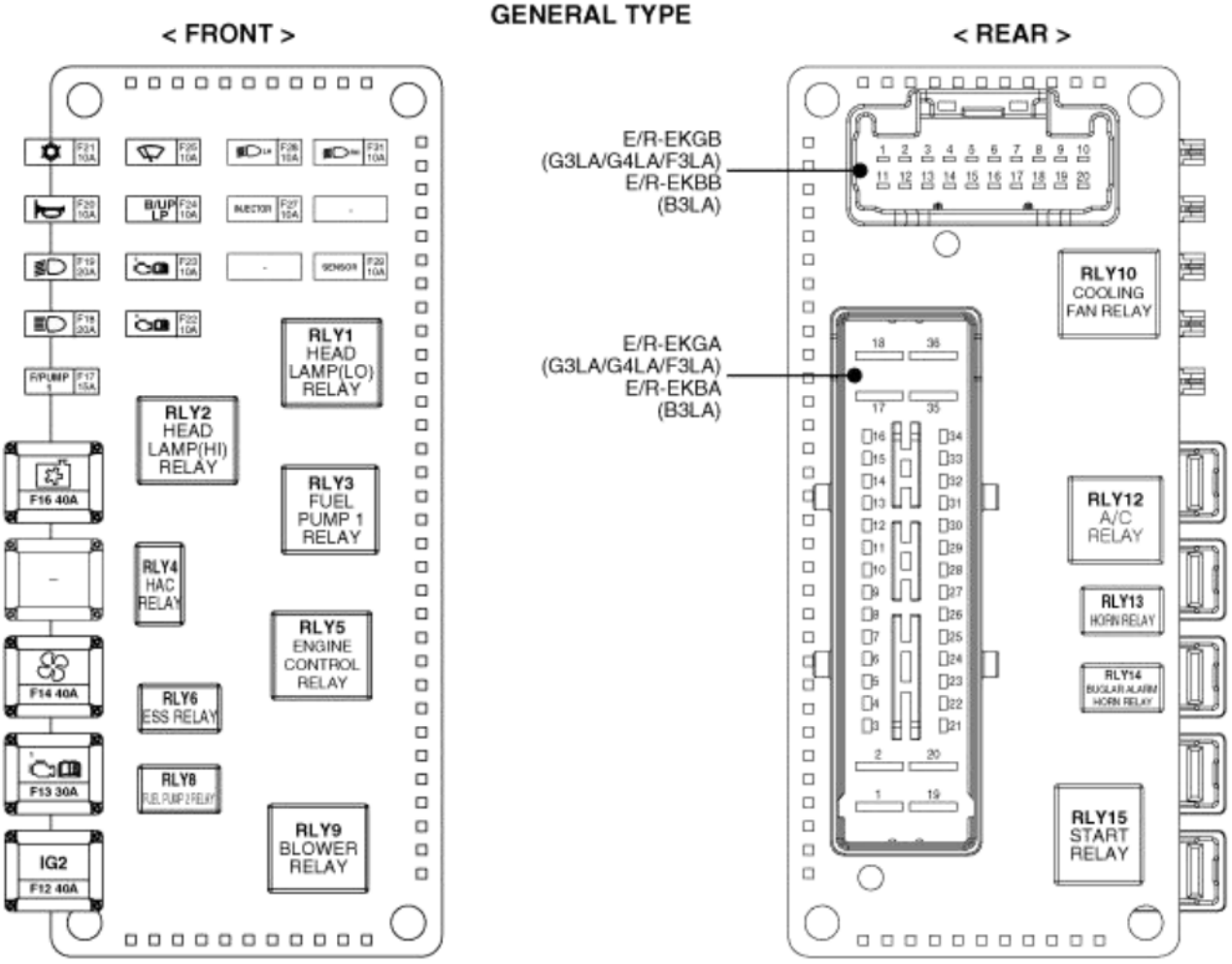
Fuse No.		(A)	Symbol	Circuit Protected
MULTI FUSE	F1	80A	MDPS	EPS Control Module
	F2	125A	ALT	Alternator, PCB Fuse & Relay Box
FUSE	F3	50A		I/P Junction Box (Power Connector Fuse : F1 10A / F2 20A, Fuse : F24 10A / F25 10A / F26 10A / F27 15A, Tail Lamp Relay)
	F4	40A		Projection Type : E/R Sub Fuse Box (Fuse : F1 10A / F2 20A / F4 15A / F5 10A / F7 10A)
	F5	50A		I/P Junction Box (Fuse : F8 20A / F9 25A / F10 15A / F16 15A / F17 25A / F18 15A / F19 10A / F35 10A, Power Window Relay)
	F6	40A	IG1	E/R Junction Box (Fuse : F11 15A), Ignition Switch, PDM Relay Box (ESCL Relay)
	F7	40A		ABS Control Relay, ESP Control Relay
	F8	30A		ABS Control Relay, ESP Control Relay
	F9	40A	RR HTD	Rear Defogger Relay
	F10	10A	IND	Instrument Cluster, Head Lamp RH, PCB Fuse & Relay Box (Head Lamp (HI) Relay)
	F11	15A	F/PUMP2	PCB Fuse & Relay Box (Fuel Pump #2 Relay)

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PCB FUSE & RELAY BOX

GENERAL TYPE



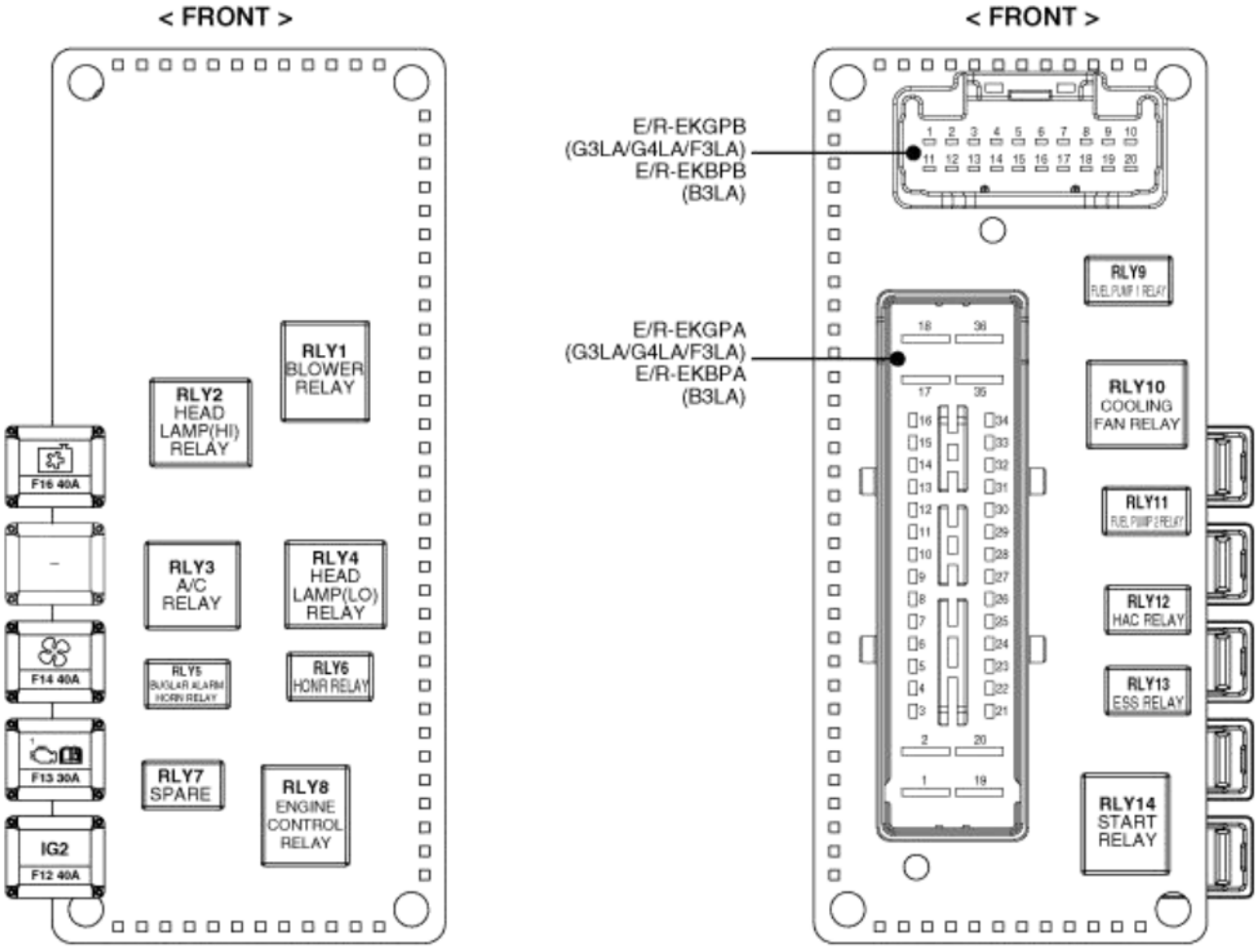
NO.	RELAY NAME	TYPE
1	HEAD LAMP (LO) RELAY	PCB MICRO
2	HEAD LAMP (HI) RELAY	PCB MICRO
3	FUEL PUMP 1 RELAY	PCB MICRO
4	HAC RELAY	PCB MINI
5	ENGINE CONTROL RELAY	PCB MICRO
6	ESS RELAY	PCB MINI
7	-	-
8	FUEL PUMP 2 RELAY	PCB MINI
9	BLOWER RELAY	PCB MICRO
10	COOLING FAN RELAY	PCB MICRO
11	-	-
12	A/C RELAY	PCB MICRO
13	HORN RELAY	PCB MINI
14	BUGLAR ALARM HORN RELAY	PCB MINI
15	START RELAY	PCB MICRO

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PCB FUSE & RELAY BOX

PROJECTION TYPE



NO.	RELAY NAME	TYPE
1	BLOWER RELAY	PCB MICRO
2	HEAD LAMP (HI) RELAY	PCB MICRO
3	A/C RELAY	PCB MICRO
4	HEAD LAMP (LO) RELAY	PCB MICRO
5	BUGLAR ALARM HORN RELAY	PCB MINI
6	HORN RELAY	PCB MINI
7	SPARE	PCB MINI
8	ENGINE CONTROL RELAY	PCB MICRO
9	FUEL PUMP 1 RELAY	PCB MICRO
10	COOLING FAN RELAY	PCB MINI
11	FUEL PUMP 2 RELAY	PCB MICRO
12	HAC RELAY	PCB MINI
13	ESS RELAY	PCB MINI
14	START RELAY	PCB MICRO

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PCB FUSE & RELAY BOX

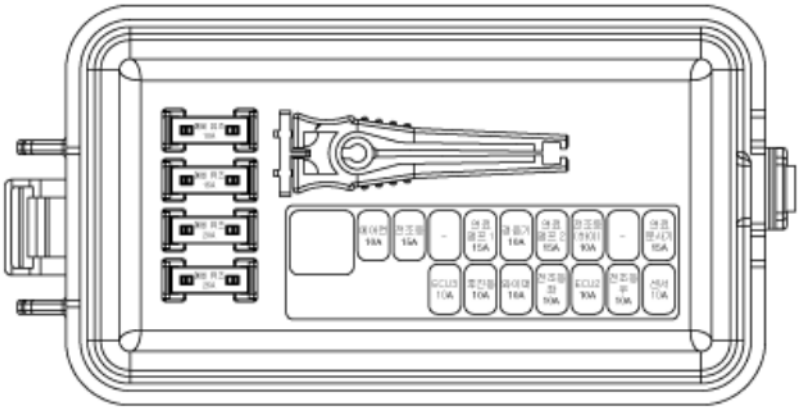
Fuse No.		(A)	Symbol	Circuit Protected
GENERAL / PROJECTION TYPE	F12	40A	IG2	PCB Fuse & Relay Box (Start Relay), Ignition Switch, PDM Relay Box (ESCL Relay)
	F13	30A		PCB Fuse & Relay Box (Engine Control Relay, Fuse : F23 10A)
	F14	40A		PCB Fuse & Relay Box (Blower Relay)
	F16	30A		PCB Fuse & Relay Box (Cooling Fan Relay)
GENERAL TYPE	F17	10A	F/PUMP1	PCB Fuse & Relay Box (Fuel Pump #1 Relay)
	F18	20A		PCB Fuse & Relay Box (Head Lamp (HI) Relay)
	F19	20A		PCB Fuse & Relay Box (Head Lamp (LO) Relay)
	F20	10A		PCB Fuse & Relay Box (Horn Relay, Burglar Alarm Horn Relay)
	F21	15A		PCB Fuse & Relay Box (A/C Relay)
	F22	10A		PCM(B3LA)
	F23	10A		TCM(F3LA/F4LA/F3LA), PCM(B3LA)
	F24	10A	B/UP LP	Transaxle Range Switch, TCM/PCM, ESP Control Module, Rear Bumper Lamp, Instrument Cluster, BCM Back-Up Lamp LH/RH, Back-Up Lamp Switch
	F25	10A		ECM/PCM, Front Wiper Motor, Multifunction Switch
	F27	15A	INJECTOR	TCM/PCM, Injector #1/#2/#3, Injector #4(G4LA), Jumper Wire 1, Crash Pad Switch(B4LA), Fuel Pump #2 Relay(B3LA)
	F28	15A	LH	Head Lamp LH
	F29	15A	SENSOR	G3LA/G4LA/F3LA : TCM/ECM, Camshaft Position Sensor #1/#2, Oxygen Sensor (UP)/(DOWN), Canister Purge Solenoid Valve, Oil Control Valve #1/#2, PCB Fuse & Relay Box (A/C Relay, Cooling Fan Relay, Start Relay) B3LA : PCM, Camshaft Position Sensor #1/#2, PCB Fuse & Relay Box (A/C Relay, Cooling Fan Relay), Oxygen Sensor (UP)/(DOWN), Canister Purge Solenoid Valve, Oil Control Valve #1/#2, Variable Intake Solenoid Valve
	F31	10A	RH	Head Lamp RH

※ PROJECTION TYPE : SEE E/R SUB FUSE BOX (SD100-8)

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E/R SUB FUSE BOX
PROJECTION TYPE



FUSE NAME	(A)	Symbol	Circuit Protected
F1	10A		PCB Fuse & Relay Box (A/C Relay)
F2	20A		PCB Fuse & Relay Box (Head Lamp (LO) Relay)
F4	15A	F/PUMP1	PCB Fuse & Relay Box (Fuel Pump #1 Relay)
F5	10A		PCB Fuse & Relay Box (Horn Relay, Burglar Alarm Horn Relay)
F6	15A	F/PUMP2	B3LA : PCB Fuse & Relay Box (Fuel Pump #2 Relay)
F7	10A		PCB Fuse & Relay Box (Head Lamp (HI) Relay)
F9	15A	INJECTOR	PCB Fuse & Relay Box (Engine Control Relay, Fuel Pump #1 Relay, Fuel Pump #2 Relay(F3LA)), Injector #1/#2/#3(B3LA), PCM
F10	10A		B3LA : PCM, PCB Fuse & Relay Box (Engine Control Relay)
F11	10A	B/UP LP	TCM, Transaxle Range Switch, Rear Bumper Lamp, Instrument Cluster, BCM, Back-Up Lamp LH/RH, Back-Up Lamp Switch
F12	10A		ECM, Front Wiper Motor, Multifunction Switch
F13	10A		Projection Lamp LH
F14	10A		ECM/TCM/PCM, PCB Fuse & Relay Box (Engine Control Relay)
F15	10A		Projection Lamp RH
F16	10A	SENSOR	PCB Fuse & Relay Box (Engine Control Relay, A/C Relay, A/C Relay, Cooling Fan Relay, Start Relay), ECM/PCM Canister Purge Control Valve, Oil Control Valve #1, Oil Control Valve #2(W/O F3LA), Camshaft Position Sensor #1 Camshaft Position Sensor #2(W/O F3LA), Variable Intake Solenoid Valve(B3LA)

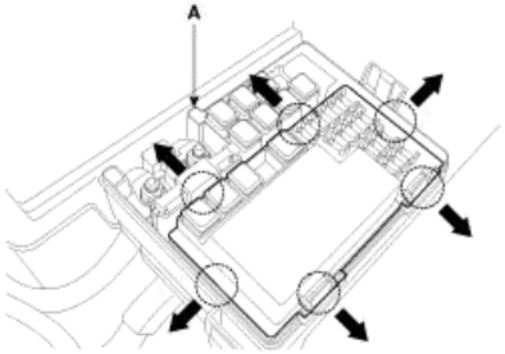
※ USE THE DESIGNATED FUSE & RELAY ONLY

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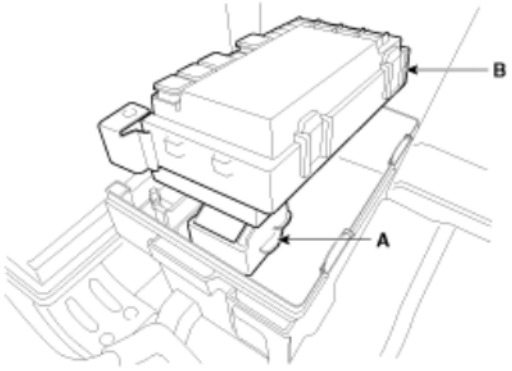
INSPECTION

Replacement of EMS box

1. Disconnect the negative (-) battery terminal.
2. Push hooks in the engine room relay box out to the arrow direction and put up the EMS box assembly (A).



3. Disconnect the connector (A) and remove the EMS box assembly (B).



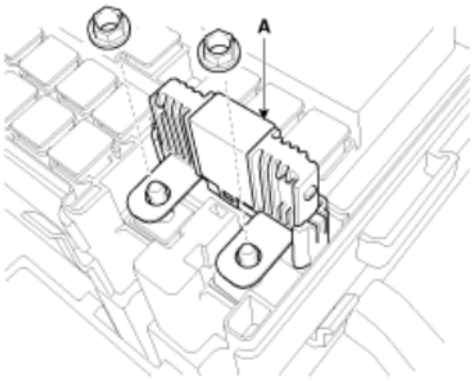
Fuse Inspection

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.

Multi Fuse

Multi Fuse is for optimizing the engine room package.

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NOTICE

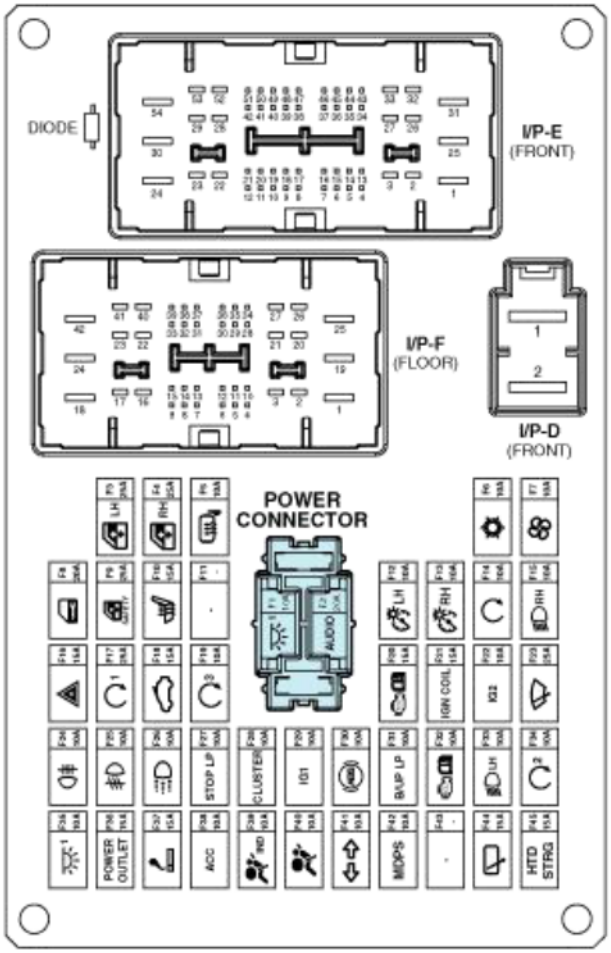
- Multi fuse (A) is needed to replace entirely when there is damage to only one fuse.
- When replace the multi fuse, refer to the "Engine compartment - component location" diagram exactly.
- Use the multi fuse capacities for each circuit correctly.

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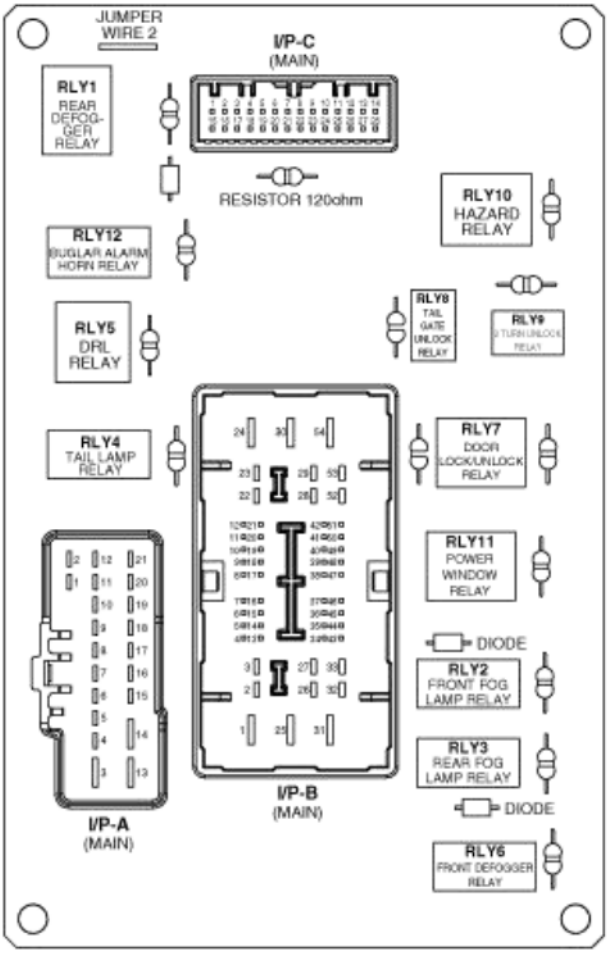
English

COMPONENTS

< FRONT >



< REAR >



NO.	NAME	TYPE
1	REAR DEFOGGER RELAY	PCB MINI
2	FRONT FOG LAMP RELAY	PCB MICRO
3	FRONT FOG LAMP RELAY	-
4	TAIL LAMP RELAY	PCB MICRO
5	DRL RELAY	-
6	FRONT DEFOGGER RELAY	-
7	DOOR LOCK/ UNLOCK RELAY	TWIN PCB MICRO
8	TAILGATE UNLOCK RELAY	PCB MICRO
9	2 TURN UNLOCK RELAY	-
10	HAZARD RELAY	PCB MICRO
11	POWER WINDOW RELAY	PCB MINI
12	BUGLAR ALARM HORN RELAY	-

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I/P JUNCTION BOX

No.	(A)	Symbol	Fuse Name	Circuit Protected
F1	10A		ROOM1	Luggage Lamp, A/C Control Module, BCM/TACM Auto Light & Photo Sensor, Cup Holder ILL, Instrument Cluster, Ignition Key ILL & Door Warning Switch, Driver Vanity Lamp, Overhead Console Lamp (With Sunroof), Room Lamp(W/O Sunroof)
F2	20A	AUDIO	AUDIO	Audio (W/O ISG), Low DC-DC Convertor (With ISG)
F3	25A	LH	P WDW LH	Rear Power Window Switch LH, Power Window Main Switch, Driver Safety Power Window Module, Passenger Power Window Switch
F4	25A	RH	P WDW RH	Rear Power Window Switch RH, Power Window Main Switch, Passenger Power Window Switch
F5	10A		HTD MIRR	Diver/Passenger Power Outside Mirror, ECM/PCM A/C Control Module
F6	10A		A/CON	A/C Control Module
F7	10A		BLOWER	ECM/PCM, Blower Switch, Blower Resistor
F8	20A		DOOR LOCK	Door Lock/Unlock Relay, Tailgate Unlock Relay
F9	25A		SAFETY P/WDW	Driver Safety Power Window Module
F10	15A		S/HTD	Driver/Passenger Seat Heater
F11	-	-	-	-
F12	10A	LH	TAIL LH	Instrument Cluster, Rear Combination Lamp LH License Lamp, Rear Bumper Lamp, Projection Lamp LH Head Lamp LH
F13	10A	RH	TAIL RH	Rear Combination Lamp LH, License Lamp, ILL.(+) Rear Bumper Lamp, Projection Lamp LH, Head Lamp LH
F14	10A		START	Ignition Lock Switch, ECM/PCM, PCB fuse & Relay Box (Start Relay)
F15	10A	RH	H/LP RH	Instrument Cluster, Head Lamp RH
F16	15A		HAZARD	Hazard Relay, Flasher Unit, Hazard Switch
F17	25A	1	PDM1	Smart Key Control Module
F18	15A		S/ROOF	Sunroof Motor
F19	10A	3	PDM3	Smart Key Control Module, Immobilizer Module Start/Stop Button Switch
F20	15A		TCU	Pulse Generator 'A'/'B', Vehicle Speed Sensor Transaxle Range Switch
F21	15A	IGN COIL	IGN COIL	Ignition Coil, Condenser

No.	(A)	Symbol	Fuse Name	Circuit Protected
F22	10A	IG2	IGN2	BCM/TACM, A/C Control Module, Sunroof Motor Rear Defogger Timer, Dual Pressure Switch Head Lamp Leveling Device Actuator LH/RH I/P Junction Box (Power Window Relay)
F23	25A		F/WPR	Front Wiper Motor, Multifunction Switch
F24	10A		R/FOG	Rear Fog Lamp Relay
F25	10A		F/FOG	Front Fog Lamp Relay
F26	10A		DRL	BCM/TACM
F27	10A	STOP LP	STOP LAMP	Stop Lamp Relay, PCB Fuse & Relay Box (HAC Relay) Stop Lamp Switch, Data Link Connector, Smart Key Control Module, Power Window Relay
F28	10A	CLUSTER	CLUSTER	BCM, TACM, Seat Belt Timer A/C Control Module, Instrument Cluster
F29	10A	IG1	IGN1	Stop Lamp Switch, Alternator(G3LA/G4LA), Rear Parking Assist Sensor RH/LH, Rear Parking Assist Sensor (Center) RH/LH, Seat Heater Switch, Driver/Passenger Seat Heater, Crash Pad Switch , Low DC-DC Convertor Electro Chromic Mirror
F30	10A		ABS	Yaw Rate Sensor, Check Connector, ESP Control Module ABS Control Module, PCB Fuse & Relay Box (HAC Relay, ESS Relay), Steering Angle Sensor,, Multipurpose
F31	10A	B/UP LP	B/UP LAMP	Back-Up Lamp Switch
F32	10A		PCU	Smart Key Control Module,Immobilizer Module, ECM/PCM
F33	10A	LH	H/LP LH	Head Lamp LH
F34	10A	2	PDM2	Smart Key Control Module
F35	10A	2	ROOM2	Room Lamp Relay
F36	15A	POWER OUTLET	P/OUTLET	Power Outlet
F37	15A		C/LIGHT	Cigarette Lighter
F38	10A	ACC	ACC	BCM, Audio, Low DC-DC Convertor, Smart Key Control Module, Power Outside Mirror Switch
F39	10A	IND	A/BAG IND	Instrument Cluster
F40	10A		A/BAG	A/C Control Module, SRS Control Module
F41	10A		T/SIG	Multifunction Switch (Europe) Hazard Switch (Except Europe)
F42	10A	MDPS	MDPS	EPS Control Module
F43	-	-	-	-
F44	15A		R/WPR	Multifunction Switch, Rear Wiper Motor
F45	15A	HTD STRG	HTD STRG	Steering Wheel Heater

: POWER CONNECTOR

※ USE THE DESIGNATED FUSE & RELAY ONLY

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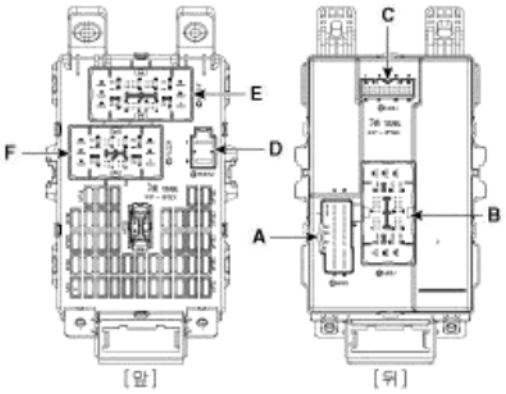
English

INSPECTION

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.

Passenger Compartment Relay



Power Window

Check for continuity between the terminals.

1. There should be continuity between the No.1 terminal in the I/P-D and the No.24 or 42 terminal in the I/P-F when power and ground are connected to the No.37 terminal in the I/P-B and the No.38 terminal in the I/P-B.
2. There should be no continuity between the No.1 terminal in the I/P-D and the No.24 or 42 terminal in the I/P-F when power and ground are connected to the No.37 terminal in the I/P-B and the No.38 terminal in the I/P-B.

Tail Lamp

Check for continuity between the terminals.

1. There should be continuity between the No.2 terminal in the I/P-D and the No.35 or No.34 terminal in the I/P-F when power and ground are connected to the No.2 terminal in the I/P-D and the No.8 terminal in the I/P-B.
2. There should be no continuity between the No.2 terminal in the I/P-D and the No.8 terminal in the I/P-F when power and ground are connected to the No.2 terminal in the I/P-D and the No.8 terminal in the I/P-B.

Tail Gate

Check for continuity between the terminals.

1. There should be continuity between the No.1 terminal in the I/P-D and the No.27 terminal in the I/P-F when power and ground are connected to the No.1 terminal in the I/P-D and the No.50 terminal in the I/P-B.
2. There should be no continuity between the No.1 terminal in the I/P-D and the No.27 terminal in the I/P-F when power and ground are connected to the No.1 terminal in the I/P-D and the No.50 terminal in the I/P-B.

Hazard Lamp

Check for continuity between the terminals.

1. There should be continuity between the No.1 terminal in the I/P-D and the No.40 terminal in the I/P-E or the No.41 in the I/P-E when power and ground are connected to the No.1 terminal in the I/P-D and the No.40 terminal in the I/P-E.

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2. There should be no continuity between the No.1 terminal in the I/P-D and the No.40 terminal in the I/P-E connector No.1 in the I/P-E when power and ground are connected to the No.1 terminal in the I/P-D and the No.40 terminal in the I/P-E.

Rear Glass Heater

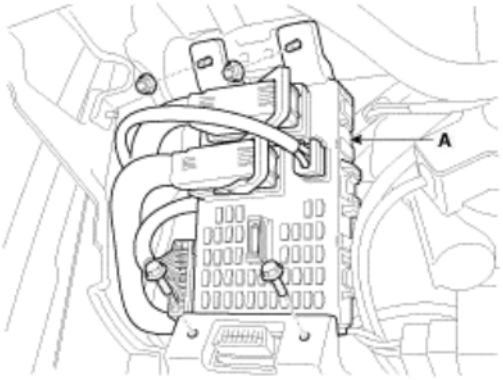
Check for continuity between the terminals.

1. There should be continuity between the No.31 terminal in the I/P-E and the No.19 terminal in the I/P-F or the No.19 in the I/P-F when power and ground are connected to the No.1 terminal in the I/P-B and the No.16 terminal in the I/P-C.
2. There should be no continuity between the No.31 terminal in the I/P-E and the No.19 terminal in the I/P-F or the No.19 in the I/P-F when power and ground are connected to the No.1 terminal in the I/P-B and the No.16 terminal in the I/P-C.

REMOVAL

Passenger Compartment Junction Box

1. Disconnect the negative(-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to the BD group - "Crash pad")
3. Disconnect the connectors from the fuse side of the interior junction box.
4. Remove the interior junction box after loosening the mounting nuts (2EA) and bolt.



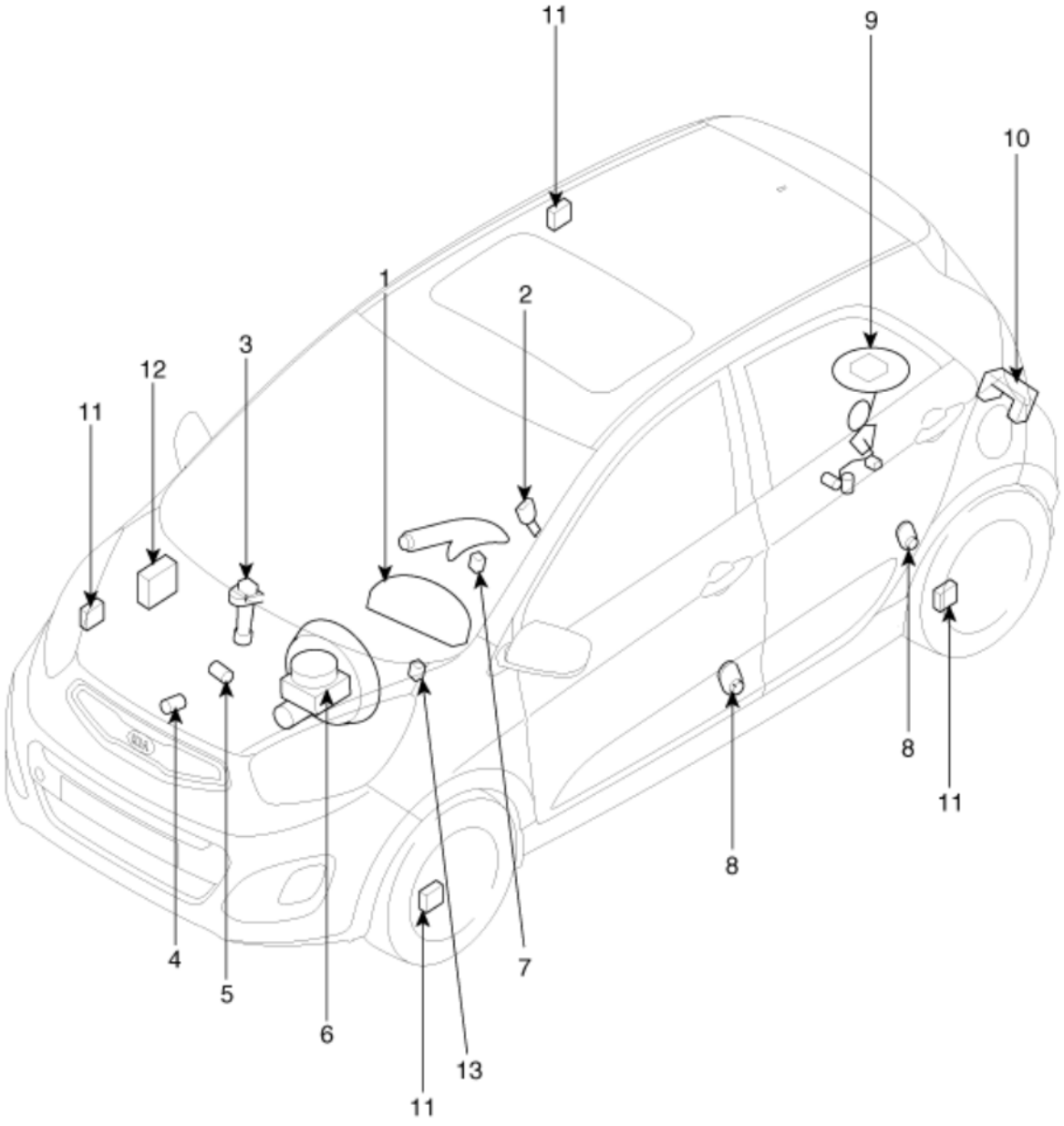
5. Disconnect the connectors from the back side of the interior junction box.

INSTALLATION

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

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COMPONENT LOCATION



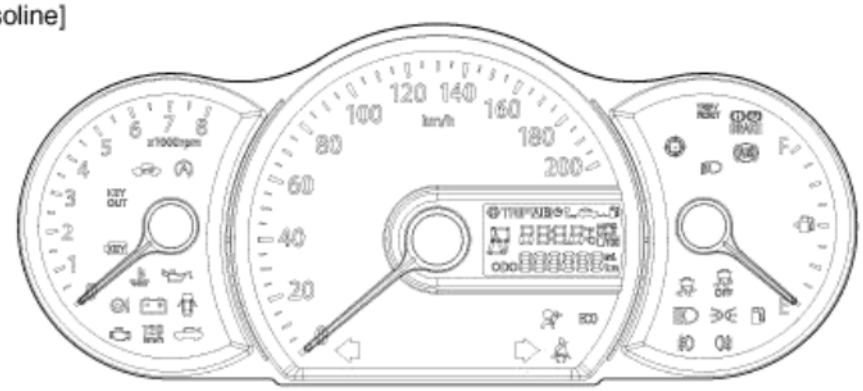
1. Instrument cluster assembly	7. Parking brake switch
2. Seat belt switch	8. Door switch
3. Vehicle speed sensor	9. Fuel gauge sender
4. Engine coolant temperature sender	10. Tail gate open switch
5. Oil pressure switch	11. Wheel speed sensor
6. Brake fluid level warning switch	12. ABS ECU

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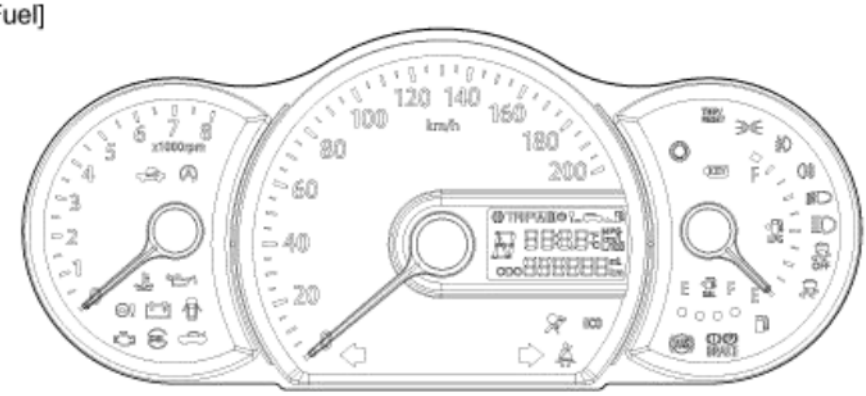
COMPONENTS

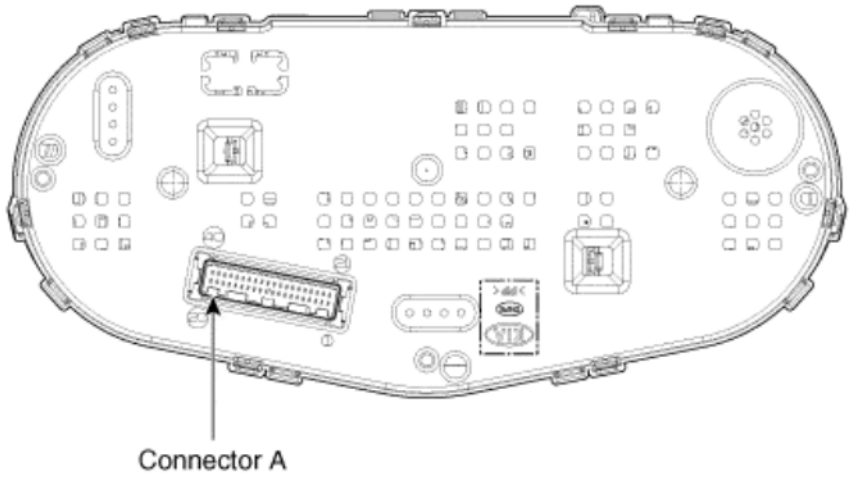
[General]

[Gasoline]



[BI Fuel]

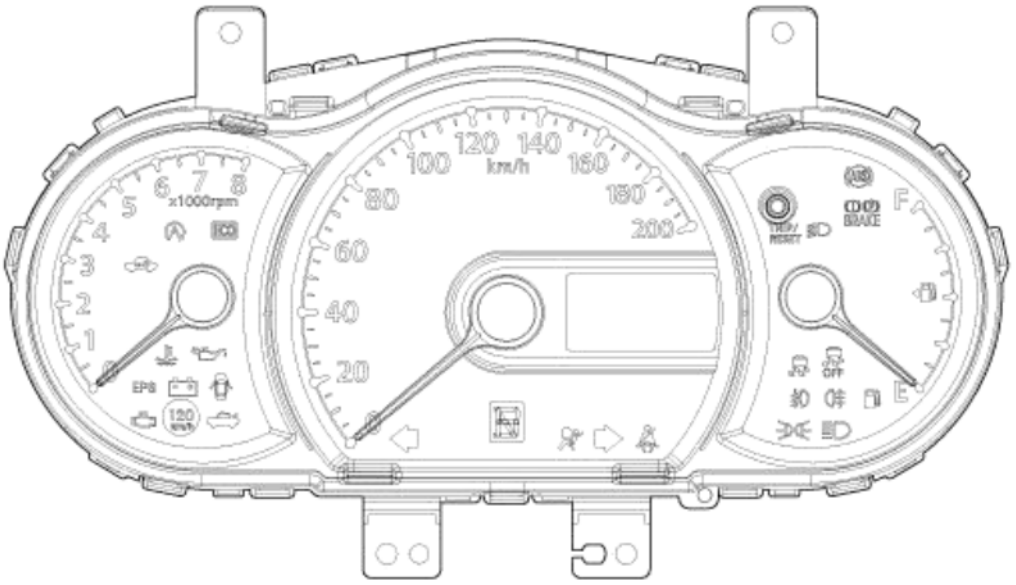




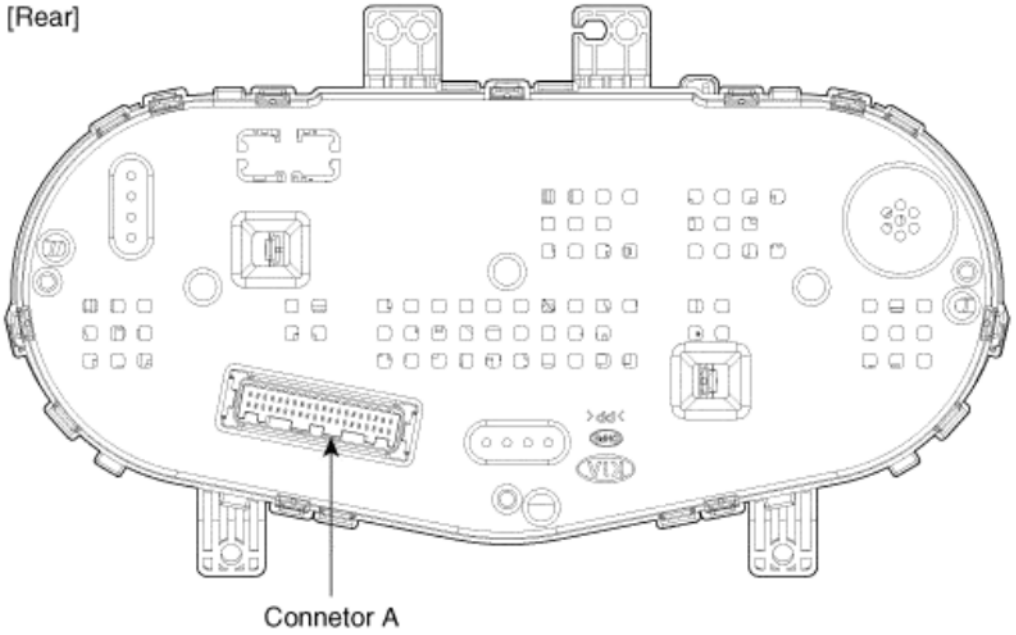
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English ▼

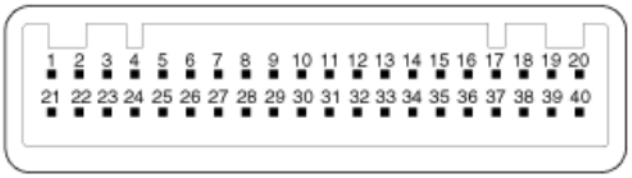
[Front]



[Rear]



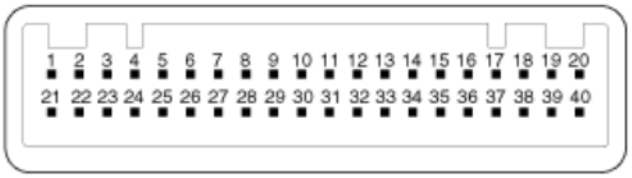
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Connector A

Pin No.	Description	Pin No.	Description
1	Parking brake	21	Head lamp input
2	Immobilizer	22	Hood open
3	Key out	23	Driver door open
4	Seat belt	24	Oil pressure
5	Door open	25	Charge
6	Illumination -	26	Speed input
7	Tail gate open	27	Signal GND
8	Head lamp hi GND	28	C CAN HI
9	Head lamp low GND	29	C CAN LOW
10	Power GND	30	-
11	Head lamp low (+)	31	-
12	Rear fog lamp	32	Fob battery
13	Front fog lamp	33	Fuel GND
14	Tail lamp	34	Gasoline fuel input
15	Head lamp hi (+)	35	LPG fuel input
16	Turn signal right	36	R gear input
17	Air bag (+)	37	Rear fog switch
18	Turn signal left	38	Illumination (+)
19	ALT L	39	IGN (+)
20	DC converter	40	Battery (+)

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Connector A

Pin No.	Description	Pin No.	Description
1	Parking brake	21	-
2	Immobilizer	22	-
3	-	23	Oil pressure
4	Seat belt	24	Charge
5	-	25	Speed input
6	-	26	Signal GND
7	-	27	C CAN HI
8	Head lamp hi GND	28	C CAN LOW
9	-	29	B CAN HI
10	Power GND	30	B CAN LOW
11	-	31	-
12	-	32	Fuel GND
13	Front fog lamp	33	Gasoline fuel input
14	Tail lamp	34	-
15	Head lamp hi (+)	35	R gear input
16	Turn signal right	36	-
17	Air bag (+)	37	Illumination (+)
18	Turn signal left	38	IGN (+)
19	-	39	Battery (+)
20	-	40	

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DESCRIPTION

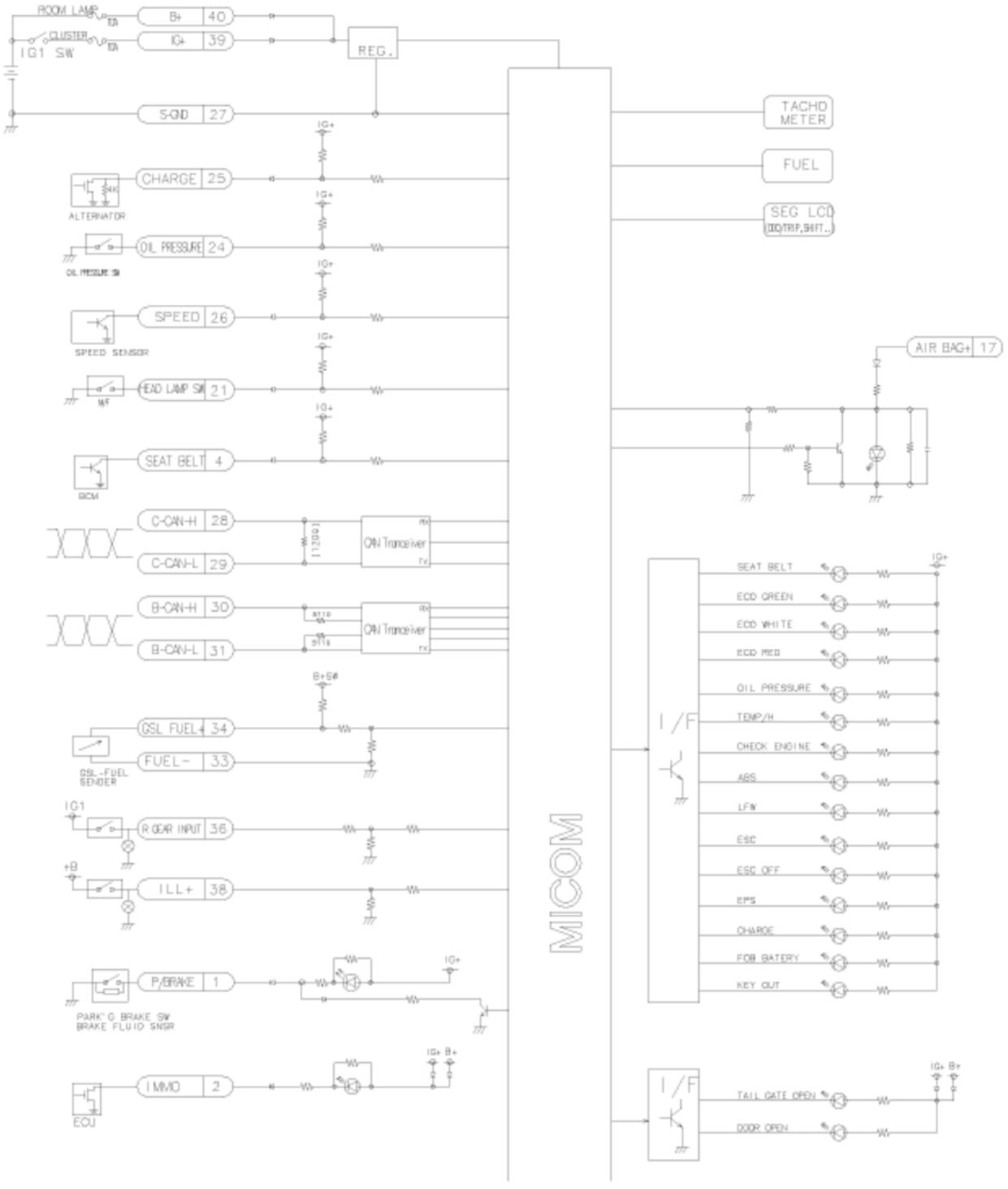
ECO driving system

This system is designed to encourage eco-driving by providing real-time feedback to the driver.
The ECO indicator light assists you to drive in the most economical way.
The green indicator comes on when you drive with high fuel efficiency.
The fuel efficiency depends on driver's driving habit and road condition.
The system stops operation when the transaxle is in the P,R,N position or sports mode, or instantaneous fuel consumption mode is selected.

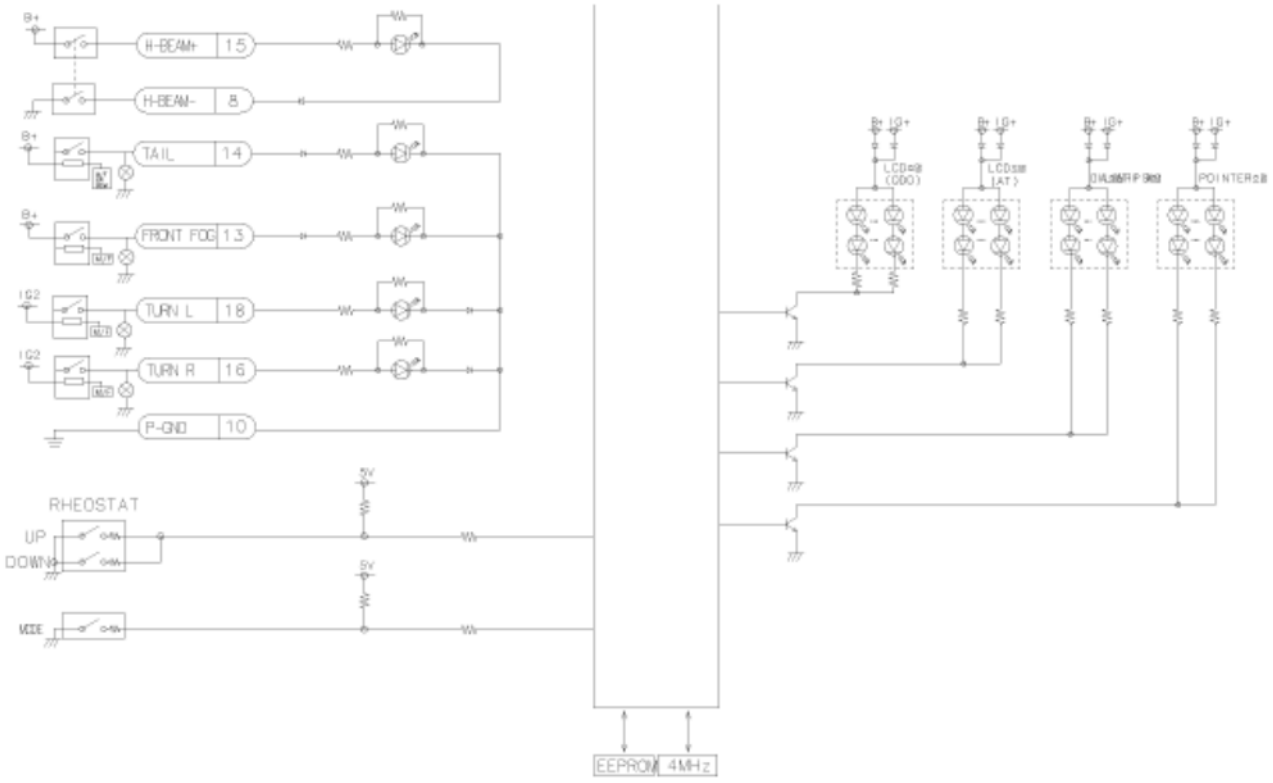
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CIRCUIT DIAGRAM

[Super vision]

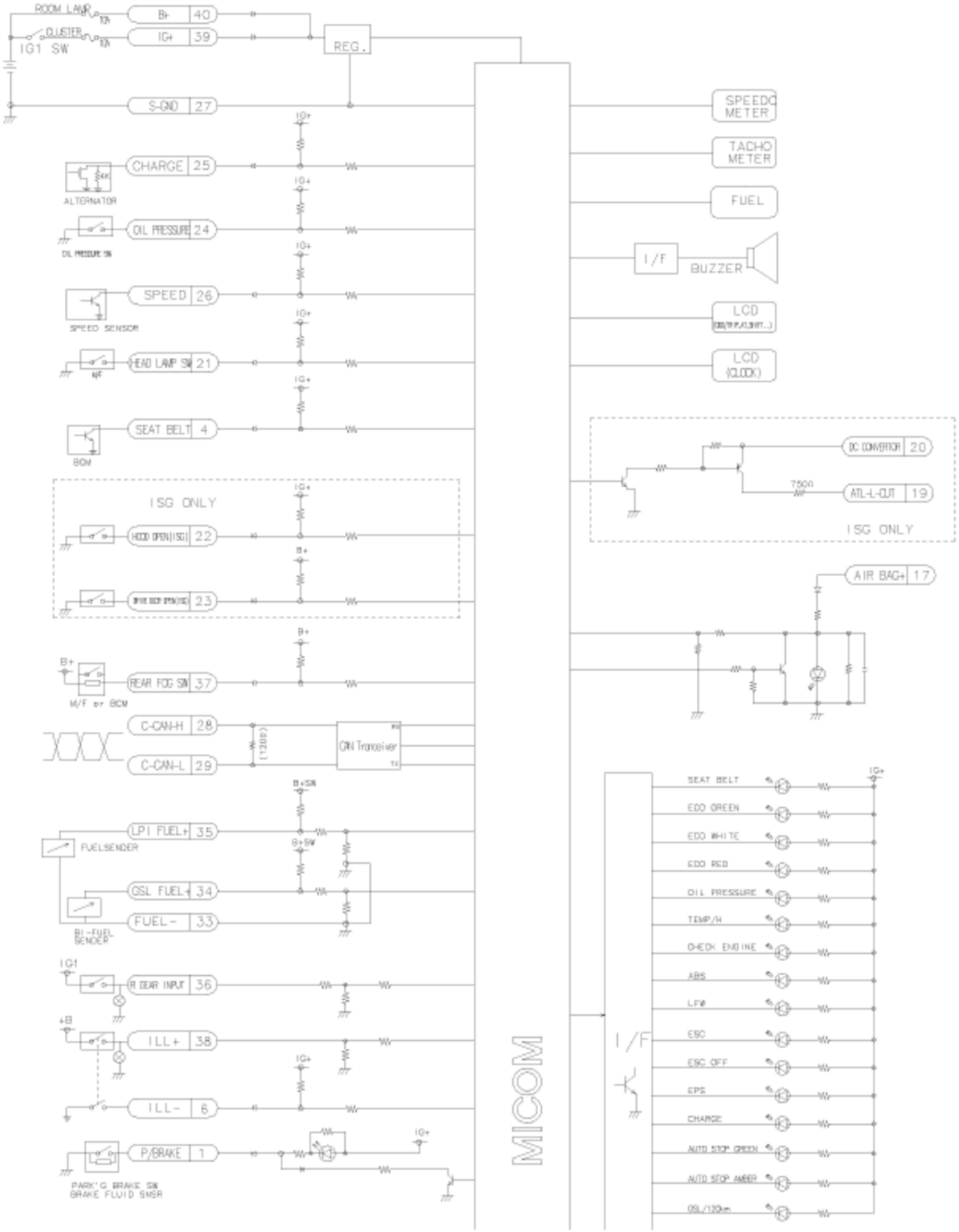


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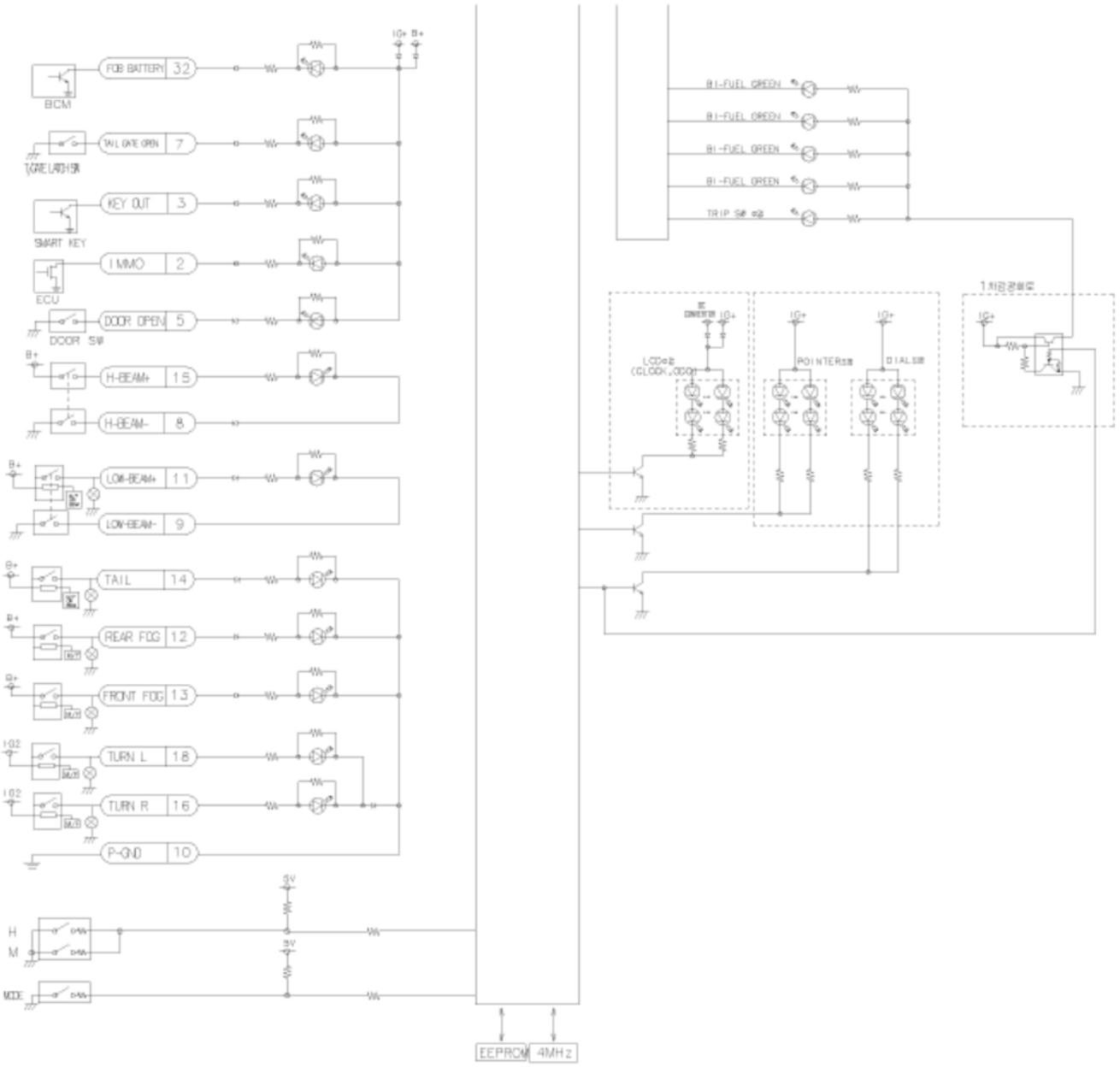


[General]

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INSPECTION

Speedometer

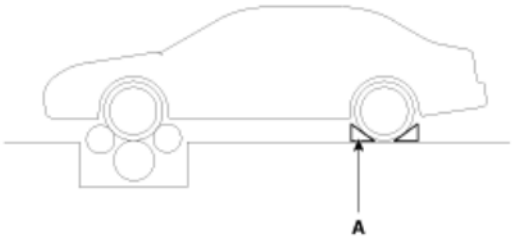
1. Adjust the pressure of the tires to the specified level.
2. Drive the vehicle onto a speedometer tester. Use wheel chocks (A) as appropriate.
3. Check if the speedometer indicator range is within the standard values.

CAUTION

Do not operate the clutch suddenly or increase/ decrease speed rapidly while testing.

NOTICE

Tire wear and tire over or under inflation will increase the indication error.



[km/h]

Velocity (km/h)	Tolerance (km/h)
20	+3.4 +0.9
40	+5.7 +3.2
60	+6.5 +4.0
80	+7.5 +4.5
100	+8.3 +5.3
120	+9.0 +6.0
140	+9.9 +6.4
160	+10.6 +7.1
180	+11.3 +7.8
200	+12 +8.5

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[MPH]

Velocity(mph)	Tolerance(mph)
10	+1.8 +0.8
20	+3.5 +1.5
40	+4.3 +2.3
60	+5.0 +3.0
80	+6.0 +3.5
100	+7.1 +4.1
120	+7.9 +4.9
130	-

Tachometer

1. Connect the GDS to the diagnostic link connector or install a tachometer.
2. With the engine started, compare the readings of the tester with that of the tachometer. Replace the tachometer if the tolerance is exceeded.

⚠ CAUTION

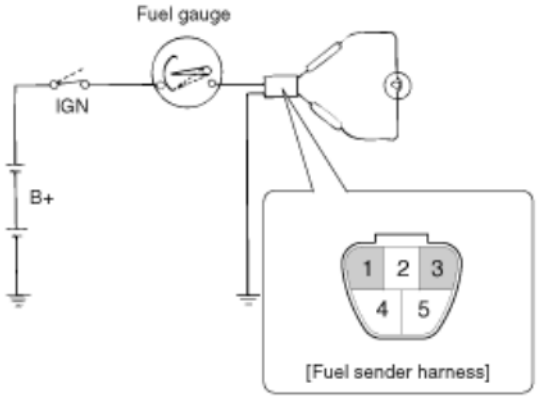
1) Reversing the connections of the tachometer will damage the transistor and diodes inside.
2) When removing or installing the tachometer, be careful not to drop it or subject it to severe shock.

Revolution (rpm)	Tolerance (rpm) Max 8000rpm
	Gasoline
1,000	±100
2,000	±100
3,000	±100
4,000	±100
5,000	±100
6,000	±100
7,000	±100
8,000	-

Fuel Gauge

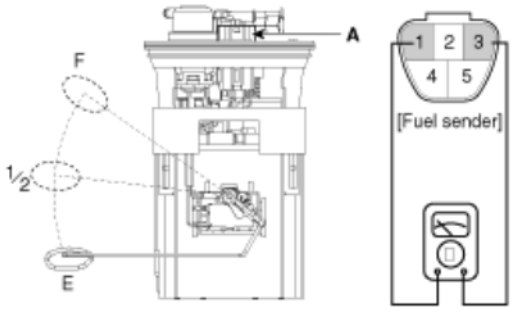
1. Disconnect the fuel sender connector from the fuel sender.
2. Connect a 3.4 watt, 12V test bulb to terminals 1 and 3 on the wire harness side connector.
3. Turn the ignition switch to the ON, and then check that the bulb lights up and the fuel gauge needle moves to full.

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Main Fuel Gauge Sender

1. Using an ohmmeter, measure the resistance between terminals 1 and 3 of sender connector (A) at each float level.



NO	Description	NO	Description
1	Gauge signal GND	4	Fuel pump (+)
2	-	5	Fuel pump GND
3	Gauge signal (+)	-	-

2. Also check that the resistance changes smoothly when the float is moved from "E" to "F"

[Gasoline]

Position	Angle (°)	Resistance (Ω)	Liter (ℓ)
Sender (E)	-44.5	200	4.5
Warning lamp	-36	178.1	6.7
1/2	0	99	19.1
Sender (F)	43	8	34

[Bi Fuel - LPI]

Position	Angle (°)	Resistance (Ω)	Liter (ℓ)
Sender (E)	-49.5	200	4.7
Warning lamp	-41	170	7.7
1/2	0	74	19.2
Sender (F)	49.5	19	34.6
Red zone	54~60	15	36.8

[Bi Fuel - Gasoline]

Position	LED	Resistance (Ω)	Liter (ℓ)

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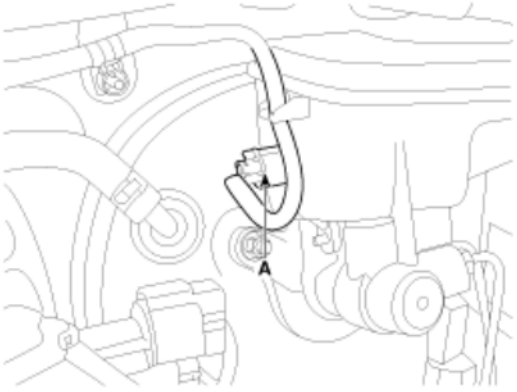
Gauge (E)	1 seg	200	2.0
1/2	3 seg	104	6.0
Gauge (F)	4 seg	8	9.6

3. If the height resistance is unsatisfied, replace the fuel sender as an assembly.

> **⚠ CAUTION**
>
> After completing this test, wipe the sender dry and reinstall it in the fuel tank.

Brake Fluid Level Warning Switch

1. Remove the connector (A) from the switch located at the brake fluid reservoir.
2. Verify that continuity exists between switch terminals 1 and 2 while pressing the switch (float) down with a rod.



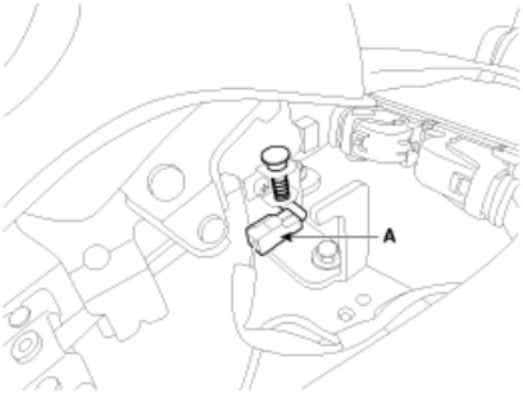
Brake Fluid Level Warning Lamp

1. Ignition "ON"
2. Release the parking brake.
3. Remove the connector from the brake fluid level warning switch.
4. Ground the connector at the harness side.
5. Verify that the warning lamp lights.

Parking Brake Switch

The parking brake switch (A) is a pulling type. It is located under the parking brake lever. To adjust, move the switch mount up and down with the parking brake lever released all the way.

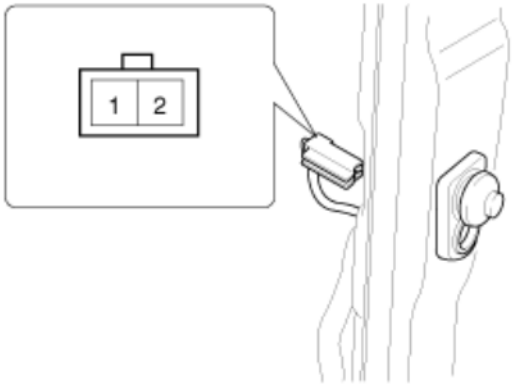
1. Check that there is continuity between the terminal and switch body with the switch ON (Lever is pulled).
2. Check that there is no continuity between the terminal and switch body with the switch OFF (Lever is released).
   If continuity is not as specified, replace the switch or inspect its ground connection.



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Door Switch

Remove the door switch and check for continuity between the terminals.

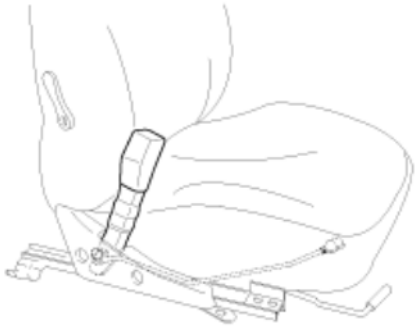


Terminal / Position	1	2	Body (Ground)
Free(Door open)	○	○	○
Push(Door close)			

Seat Belt Switch

1. Remove the connector from the switch.
2. Check for continuity between terminals.

Seat belt condition	Continuity
Fastened	Non-conductive (∞Ω)
Not fastened	Conductive (Ω)



Seat Belt Warning Lamp

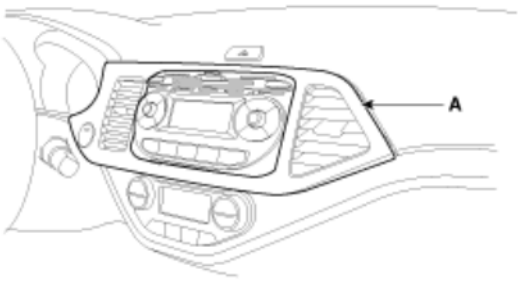
With the ignition switch turned ON, verify that the lamp glows.

Seat belt condition	Warning lamp
Fastened	OFF
Not fastened	ON

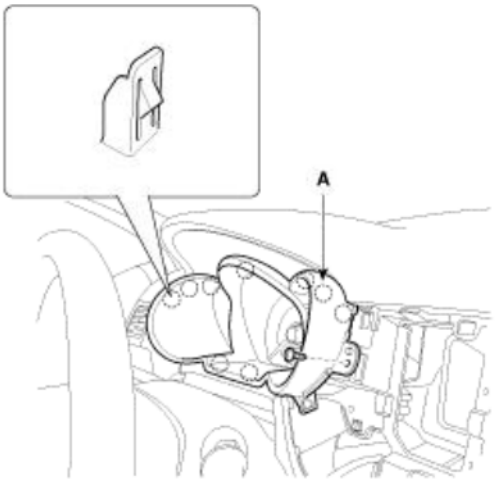
REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia panel (A).
   (Refer to the BD group - "Crash pad")

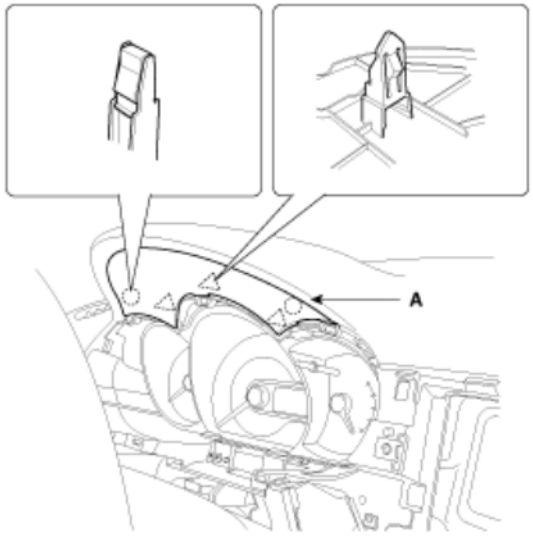
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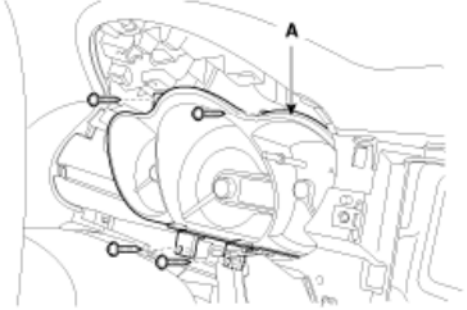
3. Remove the cluster fascia lower panel (A) after loosening the screws.



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



5. Remove the cluster (A) after loosening 4 screws and disconnecting a connector (B).



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INSTALLATION

1. Install the cluster to the crash pad.
2. Install the cluster fascia upper & lower panel.
3. Install the center fascia pannel.

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TROUBLESHOOTING

Symptom	Possible cause	Remedy
Tachometer does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	CAN line faulty	Check the ECM
	Tachometer faulty	Check tachometer
	Wiring or ground faulty	Repair if necessary
Fuel gauge does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Fuel gauge faulty	Check gauge
	Fuel sender faulty	Check fuel sender
	Wiring or ground faulty	Repair if necessary
Low fuel warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Fuel sender faulty	Check fuel sender
	Wiring or ground faulty	Repair if necessary
Water temperature lamp does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Water temperature lamp faulty	Check lamp
	Water temperature sender faulty	Check sender
	CAN line faulty	Check the ECM
	Wiring or ground faulty	Repair if necessary
Oil pressure warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Oil pressure switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Parking brake warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Brake fluid level warning switch faulty	Check switch
	Parking brake switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
	CAN line faulty	Check the ESP/ABS
Open door warning lamp and trunk warning lamp do not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	CAN line faulty	Check the BCM
	Door switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Speedometer does not operate	CAN line faulty (ABS/ESP)	Check the ABS/ESP
	CAN line faulty (Non ABS/ESP)	Check the ECM
	CAN line faulty	Check the EMS (A/T)
Seat belt warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb

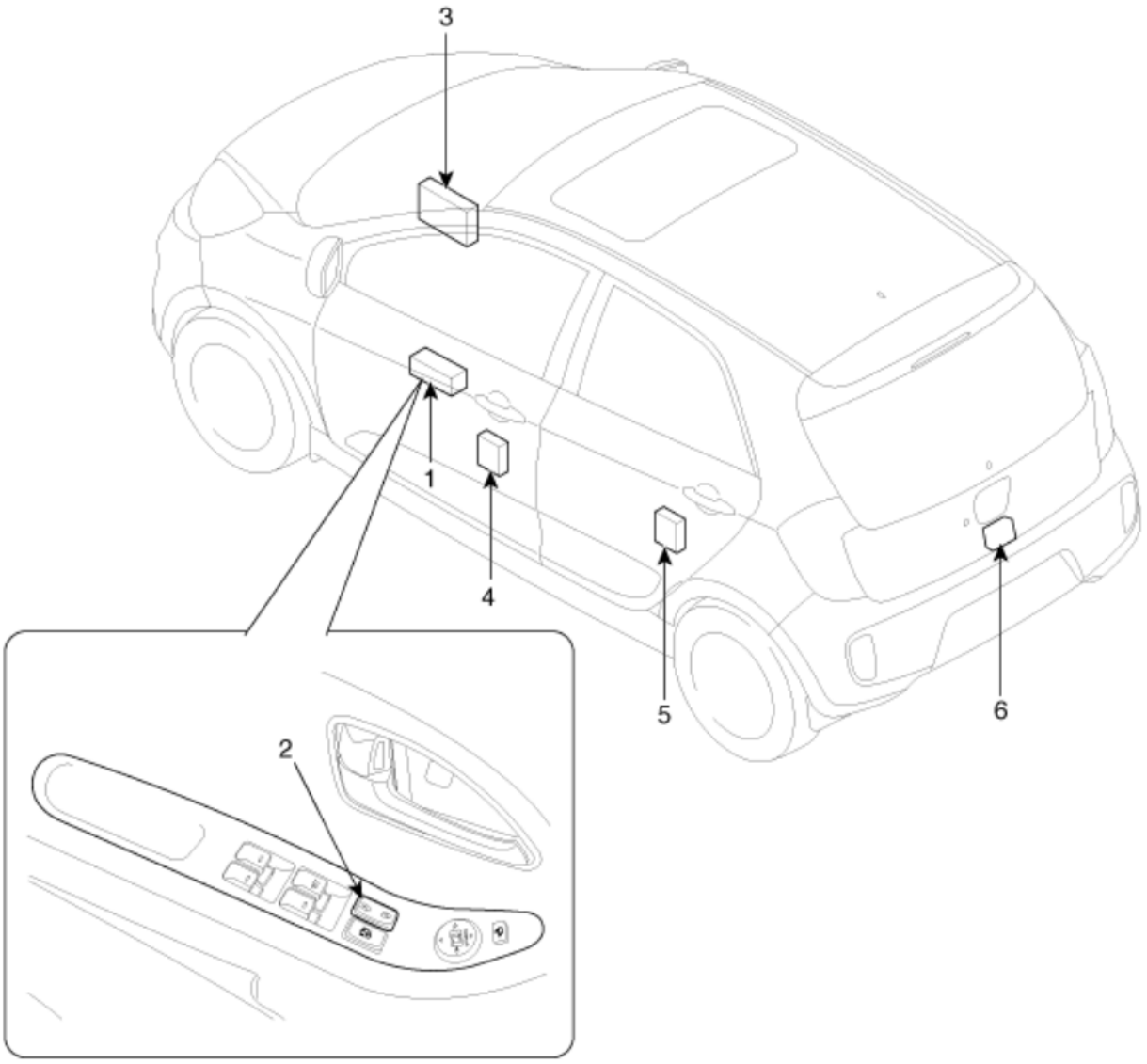
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	CAN line faulty	Check the BCM
	Seat belt switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

English ▼

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COMPONENT LOCATION



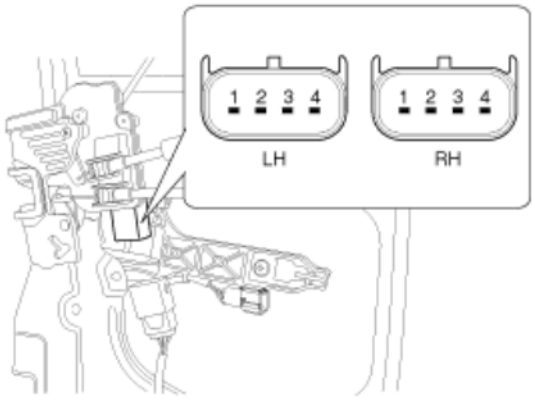
1. Driver power window switch	4. Front door lock actuator
2. Door lock switch	5. Rear door lock actuator
3. BCM (Body Control Module)	6. Trunk lid open actuator

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INSPECTION

Front Door Lock Actuator Inspection

1. Remove the front door trim.
   (Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the connector from the actuator.

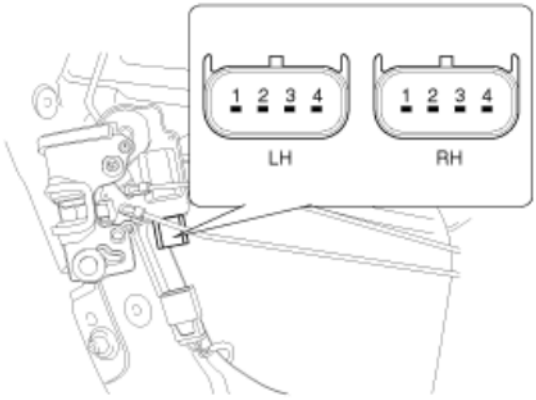


4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal		1	2
Front left	Lock	⊕	⊖
	Unlock	⊖	⊕
Position \ Terminal		3	4
Front right	Lock	⊕	⊖
	Unlock	⊖	⊕

Rear Door Lock Actuator Inspection

1. Remove the rear door trim.
   (Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the connector from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator,

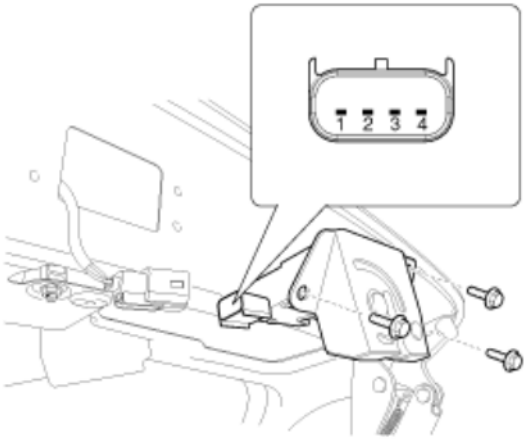
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apply battery voltage only momentarily.

Position \ Terminal		1	2
Rear left	Lock	⊕	⊖
	Unlock	⊖	⊕
Position \ Terminal		3	4
Rear right	Lock	⊕	⊖
	Unlock	⊖	⊕

Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.
   (Refer to the BD group - "Trunk lid")
2. Disconnect the connector from the actuator.

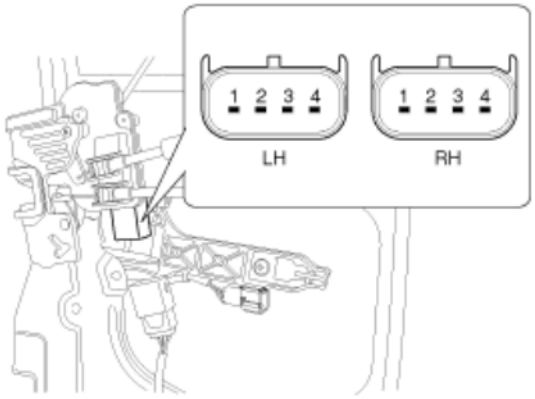


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	2	1
Lock release(Open)	⊕	⊖

Front Door Lock Switch Inspection

1. Remove the front door trim panel.
   (Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the connector from the actuator.



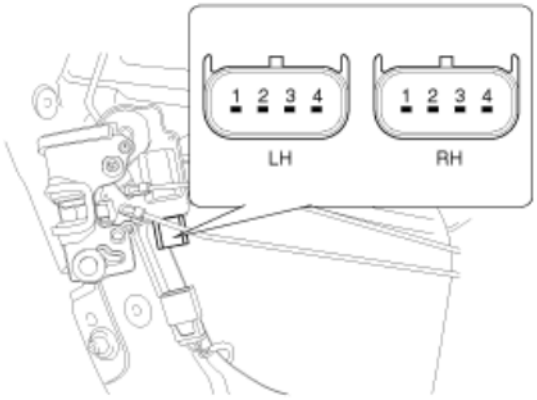
4. Check for continuity between the terminals in each switch position when inserting the key into the door according to the table.

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Position \ Terminal		3	4
Front Left	Unlock	○	○
Position \ Terminal		1	2
Front Right	Unlock	○	○

Rear Door Lock Switch Inspection

1. Remove the rear door trim panel.
   (Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the connector from the actuator.

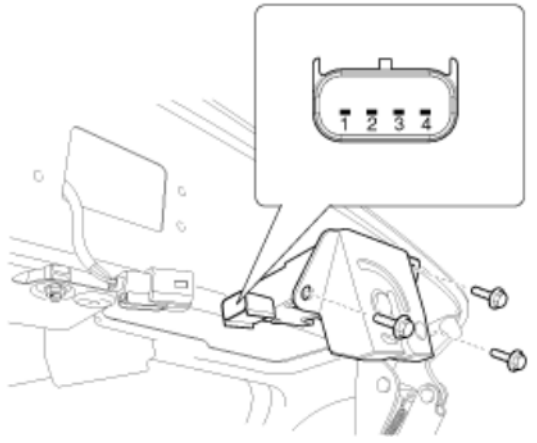


4. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal		3	4
Rear Left	Unlock	○	○
Position \ Terminal		1	2
Rear Right	Unlock	○	○

Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim.
   (Refer to the BD group - "Trunk lid")
2. Disconnect the connector from the actuator.



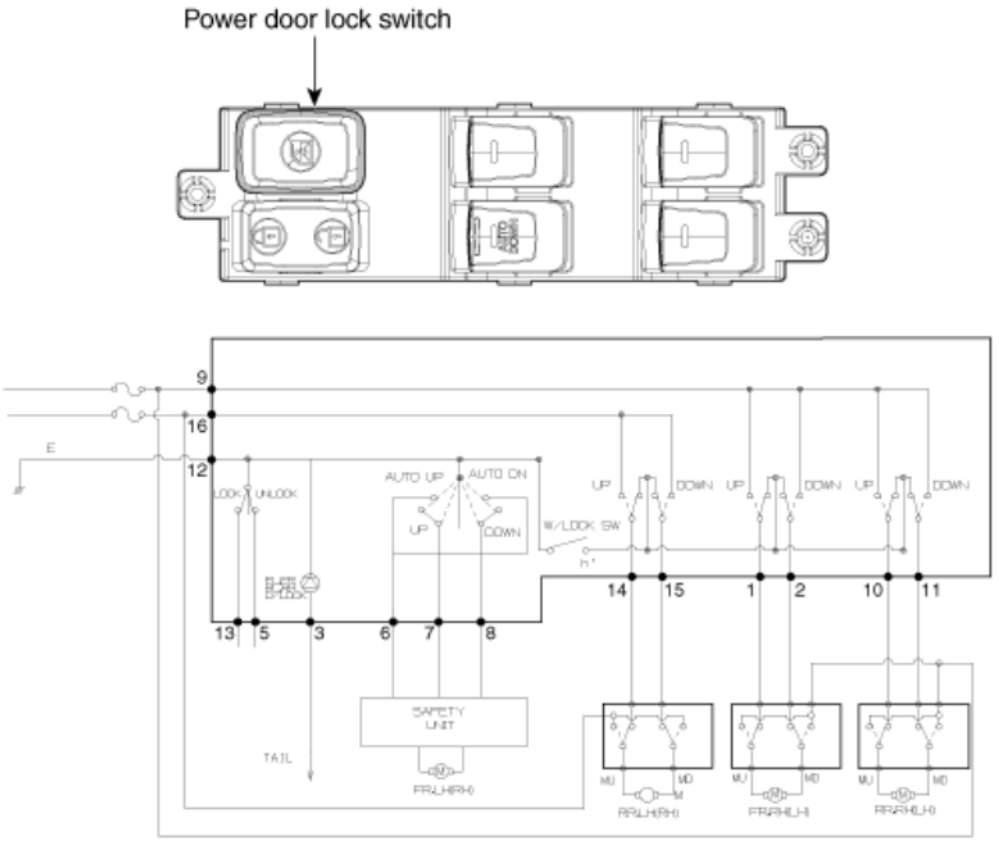
3. Check for continuity between the terminals in each switch position according to the table.

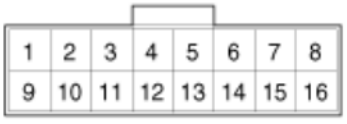
Position \ Terminal	3	4
Lock release(Open)	○	○

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COMPONENTS

[Driver-Auto up & auto down]

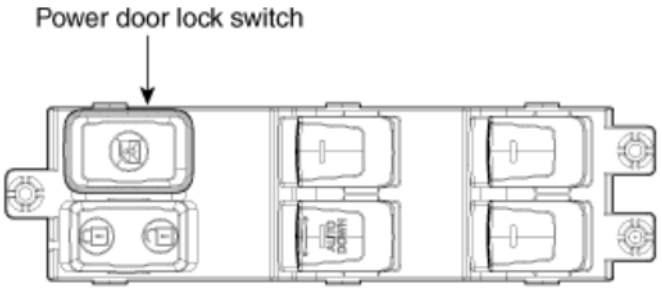


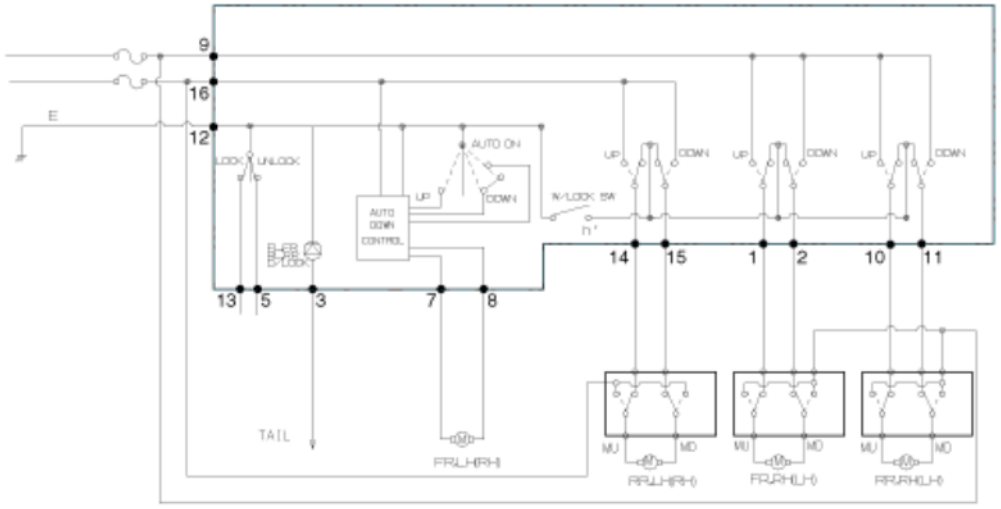


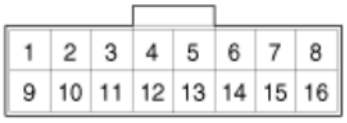
Connector

Pin No.	Description	Pin No.	Description
1	Up (Assist)	9	Battery R (+)
2	Down (Assist)	10	Up (Rear right)
3	Tail lamp	11	Down (Rear right)
4	GND (switch)	12	GND
5	Door unlock	13	Door lock
6	Safety auto	14	Up (Rear left)
7	Auto up (Driver)	15	Down (Rear left)
8	Auto down (Driver)	16	Battery L (+)

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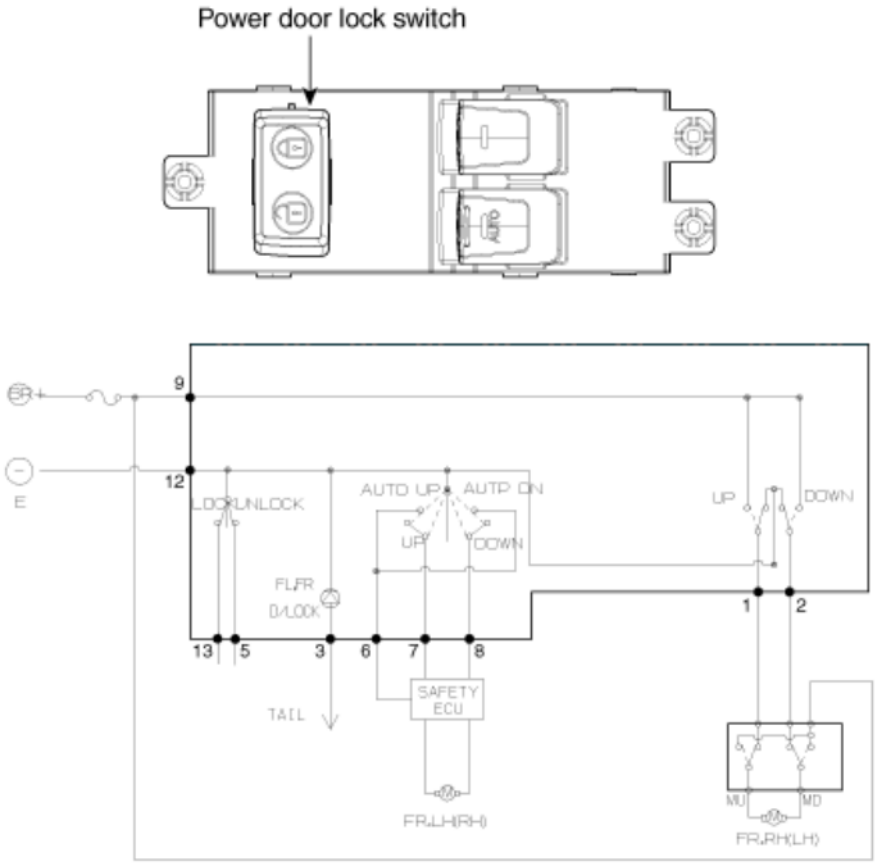


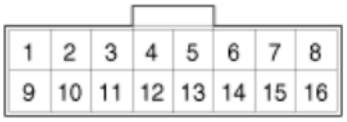
Connector

Pin No.	Description	Pin No.	Description
1	Up (Assist)	9	Battery R (+)
2	Down (Assist)	10	Up (Rear right)
3	Tail lamp	11	Down (Rear right)
4	GND (switch)	12	GND
5	Door unlock	13	Door lock
6	-	14	Up (Rear left)
7	Up (Driver)	15	Down (Rear left)
8	Auto down (Driver)	16	Battery L (+)

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[Driver-Auto up & auto down (3DR)]

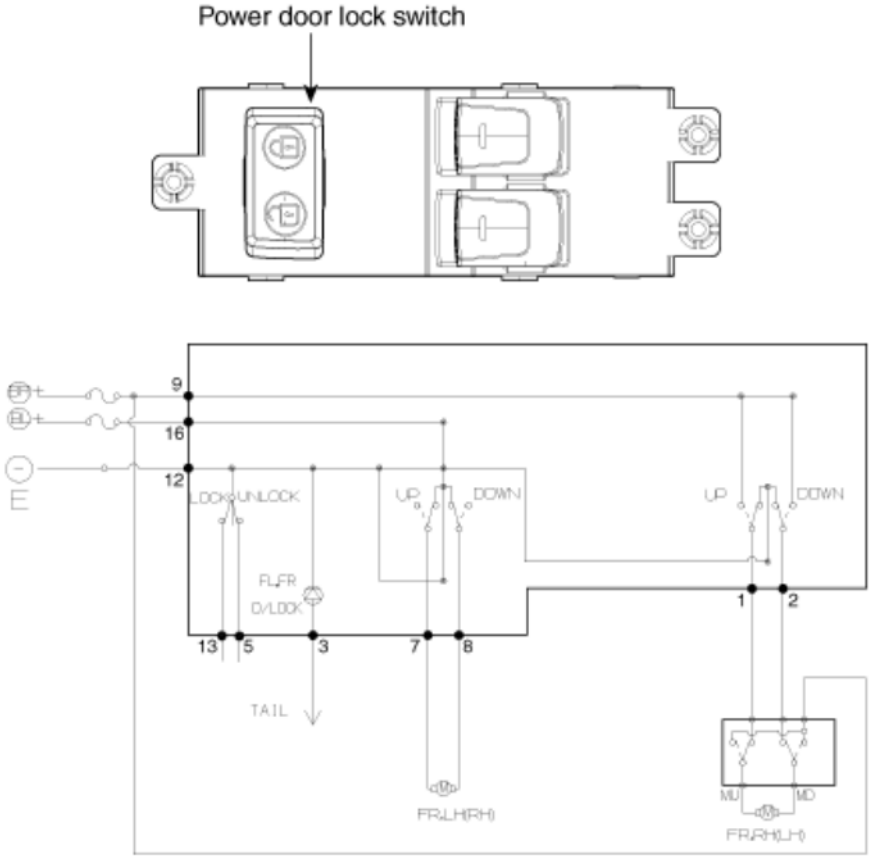


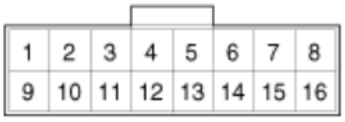


Connector

Pin No.	Description	Pin No.	Description
1	Up (Assist)	9	Battery R (+)
2	Down (Assist)	10	-
3	Tail lamp	11	-
4	GND (switch)	12	GND
5	Door unlock	13	Door lock
6	Auto	14	-
7	Up (Driver)	15	-
8	Down (Driver)	16	Battery L (+)

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Connector

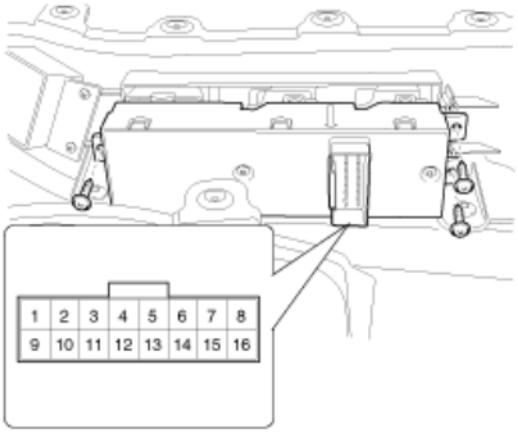
Pin No.	Description	Pin No.	
1	Up (Assist)	9	Battery R (+)
2	Down (Assist)	10	-
3	Tail lamp	11	-
4	GND (switch)	12	GND
5	Door unlock	13	Door lock
6	-	14	-
7	Up (Driver)	15	-
8	Down (Driver)	16	Battery L (+)

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INSPECTION

Driver Door Lock Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim panel.
   (Refer to the BD group - "Front door")
3. Disconnect the connector from the power window switch module.



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

[Auto up & auto down]

Position \ Terminal	5	12	13
Lock		○	○
Unlock	○	○	

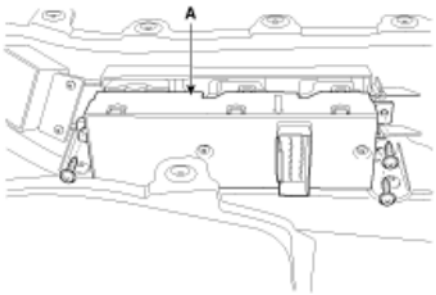
[Manual - 3DR]

Position \ Terminal	5	4	13
Lock		○	○
Unlock	○	○	

REMOVAL

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

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NOTICE

Be careful not to damage door trim panel and door module mounting hooks.

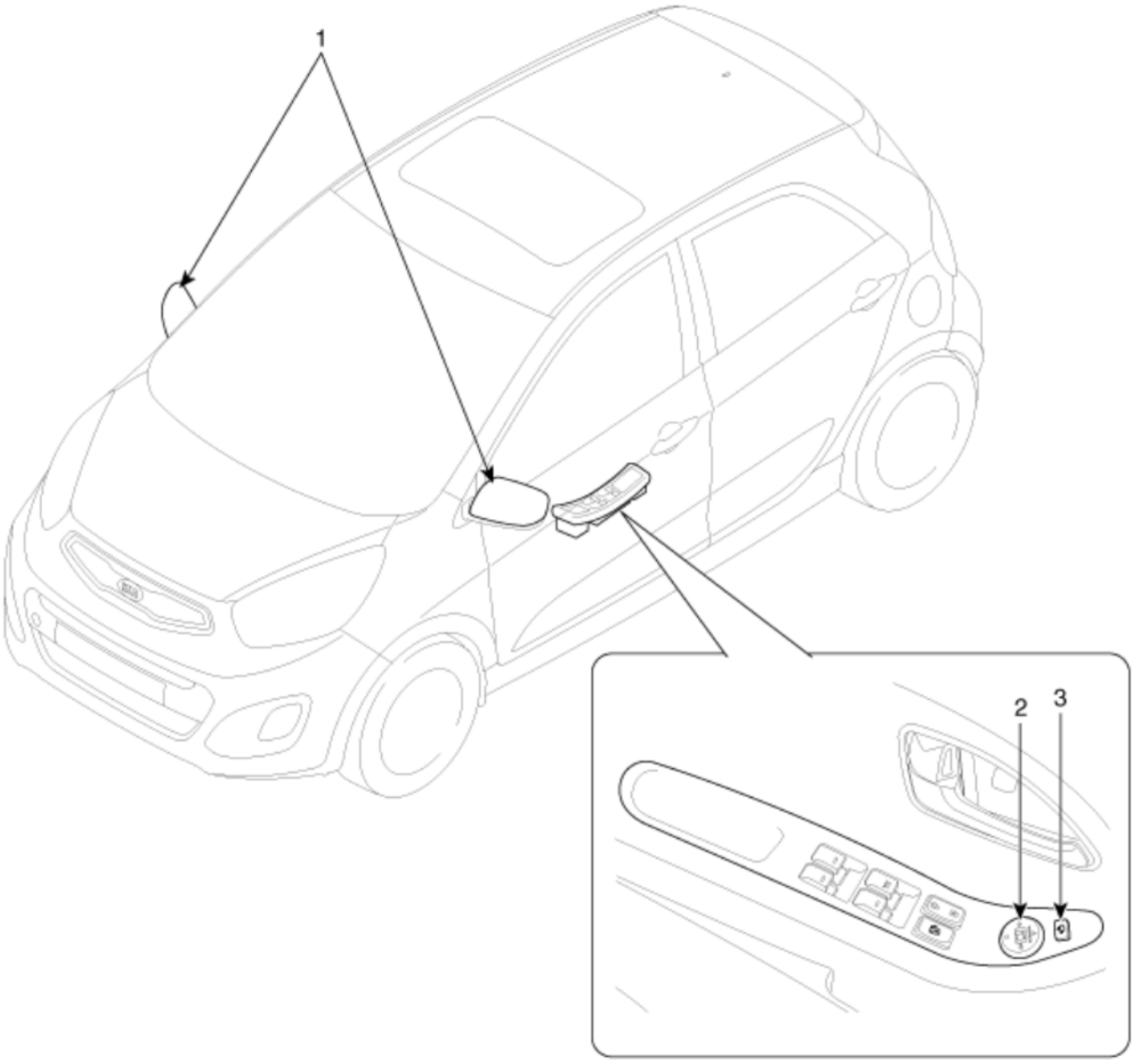
INSTALLATION

1. Install the power window switch.
2. Connect the connector and install the front door trim panel.

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English ▼

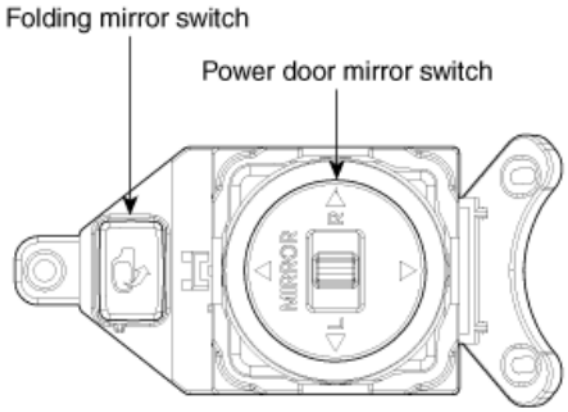
COMPONENTS

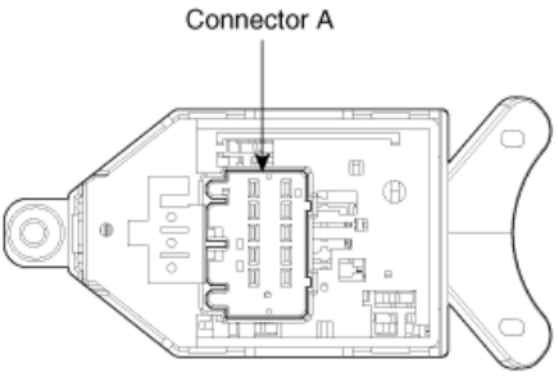


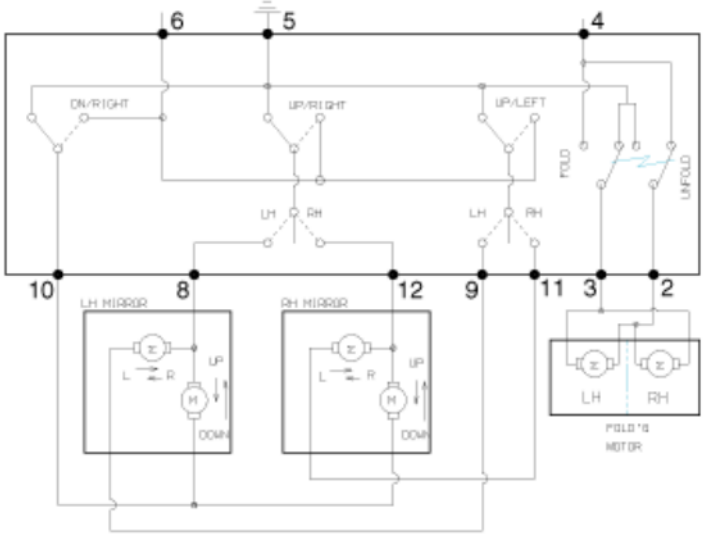
1. Power door mirror 2. Power door mirror switch	3. Folding mirror switch

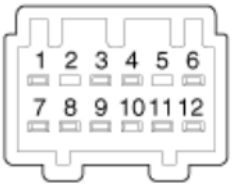
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CIRCUIT CONFIGURATION







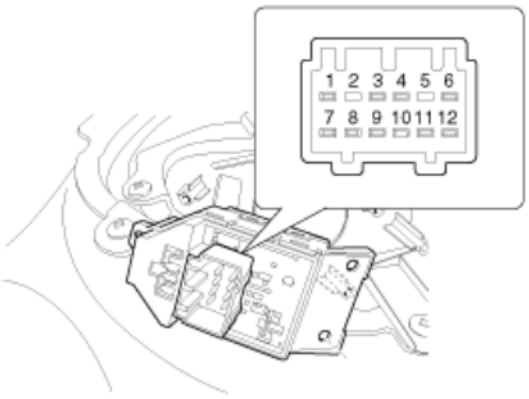


Pin No.	Connector A
1	-
2	Unfolding motor
3	Folding motor
4	Battery +
5	GND
6	ACC (Mirror)
7	-
8	Driver mirror motor vertical
9	Driver mirror motor horizontal
10	Center
11	Assist mirror motor vertical
12	Assist mirror motor horizontal

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INSPECTION

1. Disconnect the power door mirror switch module connector from front door trip panel.



2. Check for the continuity between terminals of power door mirror switch according to the table.

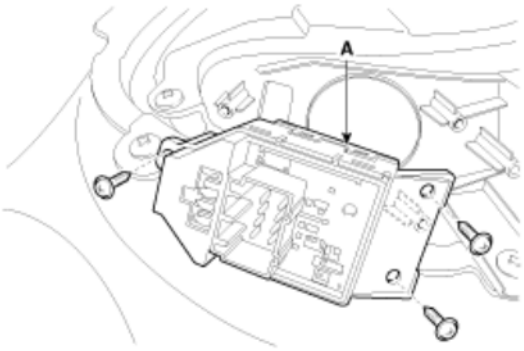
Item	Terminal / Direction	6	5	8	9	10	11	12
Left	UP		○		○	○		
	DOWN	○	○		○			
	OFF		○	○	○	○		
	LEFT	○		○		○		
	RIGHT	○			○			
Right	UP		○			○	○	○
	DOWN	○	○				○	○
	OFF		○			○	○	○
	LEFT	○					○	
	RIGHT	○	○			○		○

Terminal / Direction	4 (B+)	5 (E)	3 (M2)	2 (M1)
Unfolding	○		○	
Folding	○	○		○

REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to the BD group - "Front door")
3. Remove the power door mirror switch (A) after loosening screws.

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NOTICE

Be careful not to damage the hook when removing the switch module.

INSTALLATION

1. Install the driver power mirror switch and connectors.
2. Install the front door trim.

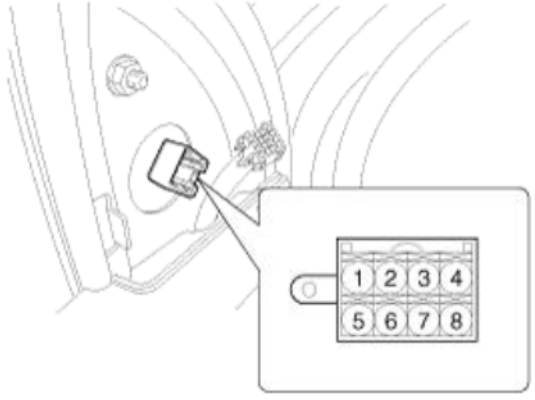
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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the delta cover (A).



3. Disconnect the connector from the mirror.
4. Verify that the mirror operates properly as shown in the table.



Terminal / Position	1	2	3	B+	E
UP	○		○	○	○
DOWN	○	○	○	○	○
OFF	○	○		○	
RIGHT	○		○	○	○
LEFT	○	○	○	○	○

Mirror Heater Inspection

Terminal / Position	7	8
Heater	⊕	⊖

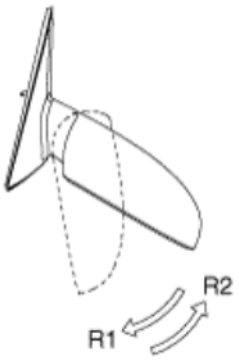
Turn signal lamp inspection

Terminal / Position	4	8
Turn signal	⊕	⊖

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Mirror Folding

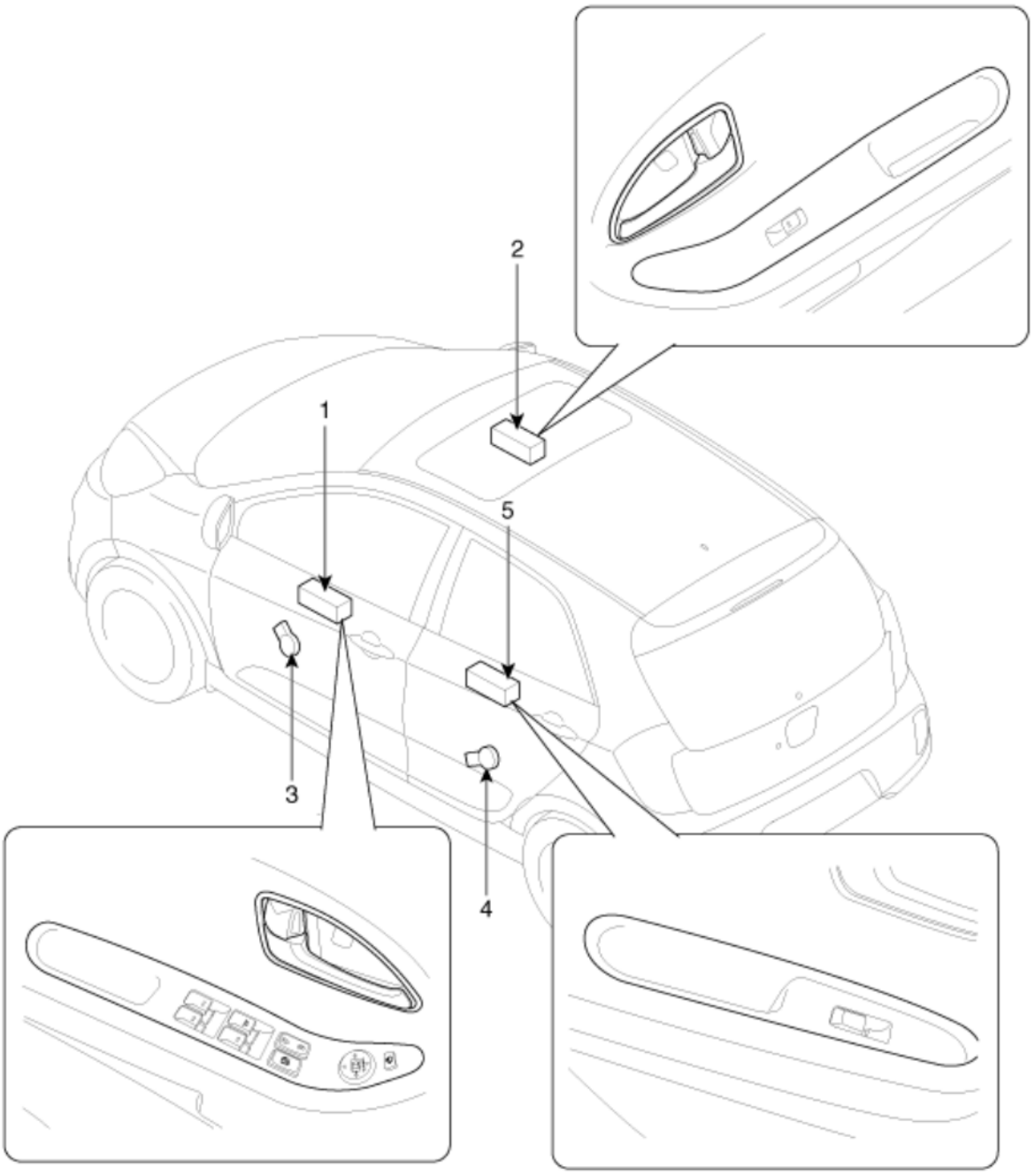
English ▼



Terminal / Direction	B+	E	6	5
Folding R1	○	○	○	○
Unfolding R2	○	○	○	○

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COMPONENT LOCATION



1. Driver power window main switch 2. Passenger power window switch 3. Front window motor	4. Rear window motor 5. Rear window switch

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OPERATION

Function Of Safety Power Window

When all door (Front, Rear) power window auto-up switch is operated, safety function is activated.

1. Safety function condition
   When detect the force of 100N during the window rising, window is reversed.

2. Length of window reversing (except holding the auto-up switch)
   - When detect the jamming during the 4mm ~ 250mm from top of the door.
     → Window is reversed until 300mm from top of the door.



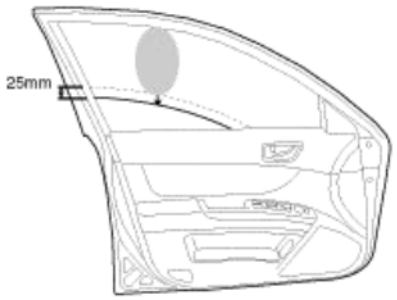
   - When detect the jamming over the 250mm from top of the door.
     → Window is reversed until 50mm from jamming position.
     → Window is reversed 50mm or bottom position in case of 50mm reversing distance.



   - When detect the jamming over 300mm from top of the door.
     → Window stops at reverse point.

3. Length of window reversing (holding the auto-up switch)
   - When detect the jamming during holding the auto-up switch.
     → Window is reversed until 25mm from jamming position.
   - 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.)
   - When detect the jamming during holding the auto-up switch again.
     → Window is reversed until 25mm from jamming position.
   - When holding the auto-up switch after 5 seconds from above condition.
     → Window is reverse until 25mm from jamming position.

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

Normalization (Teaching)

After power on reset or error detection, the motor has to be normalized at the fully closed position.
How to be normalized:

- Move the window upwards into the fully closed position. As the window reaches the fully closed position, hold the power window switch in auto for T≥2 seconds.
  If the block is reconized, the system state turns to normalized.

Recall And Storing The Normalization (teaching) Information

ECU records the normalization information into the specified location in Flash ROM. (as long as Flash ROM page is valid)

- Stroing conditions : Entering to sleep mode after valid switch input. Entering to low voltage(7.5V) after valid switch input.
- Recall conditions : Engine=ON or Power ON reset

Denormalization (Memory reset)

Under conditions below, ECU turns to denormalized status. After demormalization, auto up and safety function shall not be operated. In order to make these function active again, ECU should go through the normalization process.

- Denormalization conditions :

1. Continuous 15 times reverses
2. Power off during motor operation
3. Driver side door opened and window glass is at the bottom (hard stop position) with IGN on, IGN off → within 2 sec, IGN on → Press Manual Down switch 3 times within 5 sec → De-normalization

Door and Glass status	IGN status	Input time	IGN status	Switch input status			Switch input times	Normalization status
				Re-input time	IGN status	Switch input		
Driver side door opened, Window glass is bottom with IGN on (Hard stop)	IGN Off	T≤2 sec	IGN On	T≤5 sec	IGN On	Press and release Manual down switch	3 times	De-normalization

Window Position Control

To detect the window position and direction of motor rotation, hall sensors are employed. ECU recognizes the fully closed position of the window and sets this relative window position value as "0". When the window goes downwards, based on the information from the hall sensor, the relative position value increments. On the contrary, when the window goes upwards, it decrements.

Thermal Protection

Thermal protection by software module is implemented to prevent from destruction of motor during overload condition. Motor temperature is estimated by integrating squared motor current as an estimate for heating power integral. When estimated motor temperature exceeds EEPROM programmable upper limit, motor is deactivated for fixed delay time (default value = 30 sec.)

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Thermal shutdown during a window operation will not interrupt the operation due to safety reasons.

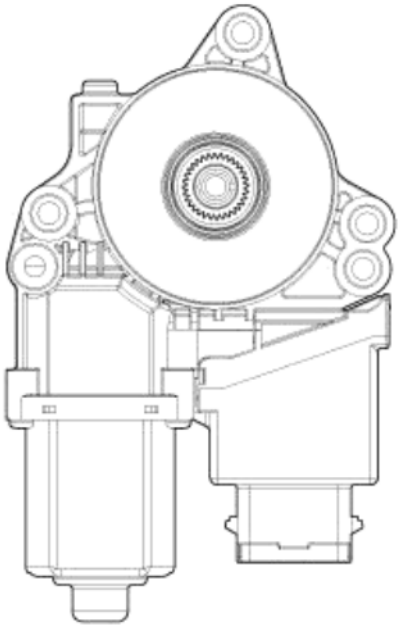
Operation Time Limiter

Maximal operation time of power window motor is limited to 15 sec (EEPROM programmable).

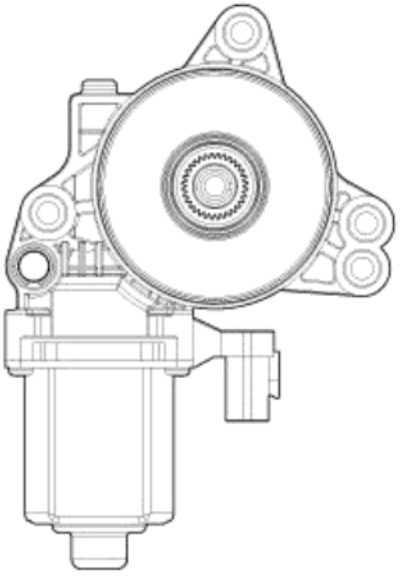
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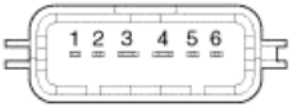
CIRCUIT DIAGRAM

[Auto up & auto down window]



[General window]

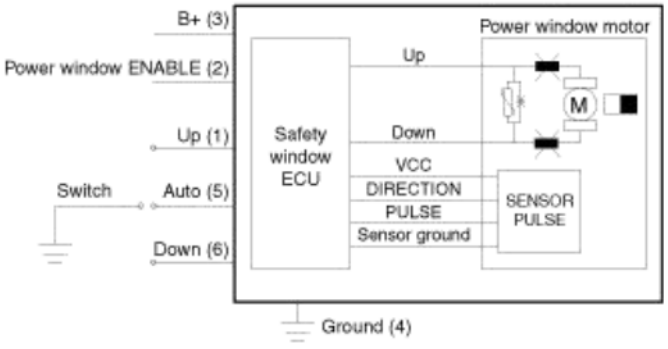


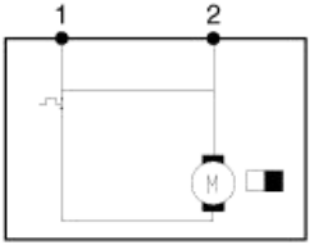


NO.	Description	NO.	Description
1	Up	4	Ground
2	Power window	5	Auto
3	B+	6	Down



NO.	Description
1	⊕
2	⊖





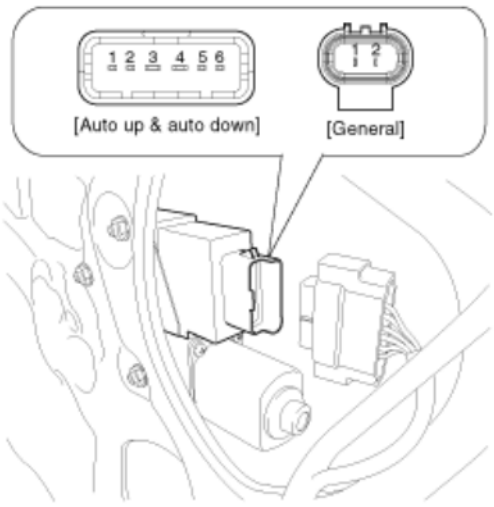
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INSPECTION

Front Power Window Motor Inspection

1. Remove the front door trim panel.
   (Refer to the BD group - "Front door")

2. Disconnect the connector from the motor.



3. Connect the motor terminals No.2 and No.3 directly to battery voltage (12V) and check that the motor operates smoothly.
   If the operation is abnormal, replace the motor.

[Auto up & auto down Window]

Position \ Terminal		1	4	6
LH	UP	○	○	
	DOWN		○	○
RH	DOWN	○	○	
	UP		○	○

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.

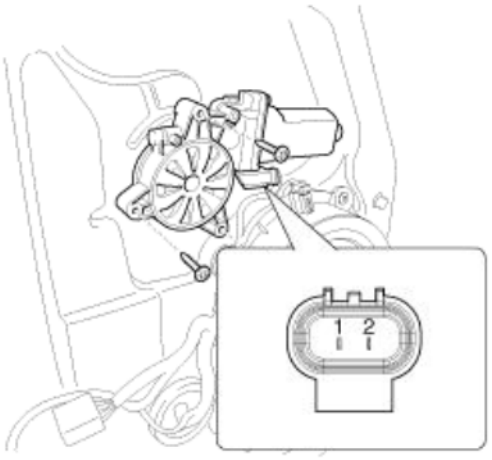
Position \ Terminal			1	2
LH	UP	Clockwise	⊕	⊖
	DOWN	Counter-clockwise	⊖	⊕
RH	UP	Counter-clockwise	⊕	⊖
	DOWN	Clockwise	⊖	⊕

Rear Power Window Motor Inspection

1. Remove the rear door trim panel.
   (Refer to the BD group - "Rear door")

2. Disconnect the 2P connector from the motor.

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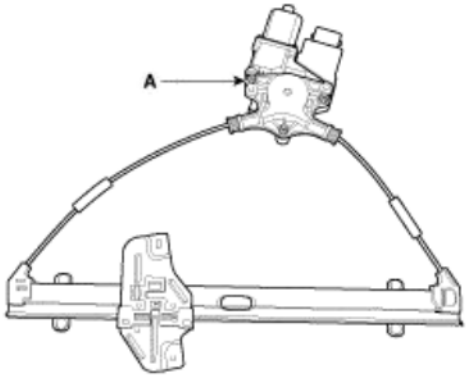
3. Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

Position		Terminal	1	2
LH	UP	Clockwise	⊕	⊖
	DOWN	Counter-clockwise	⊖	⊕
RH	UP	Clockwise	⊕	⊖
	DOWN	Counter-clockwise	⊖	⊕

REMOVE

1. Remove the power window regulator assembly.
   (Refer to the BD group - "Front door")

2. Remove the power window motor (A) after loosening the screws.

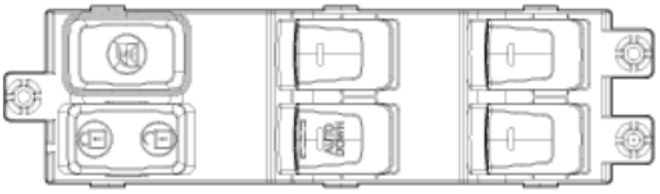


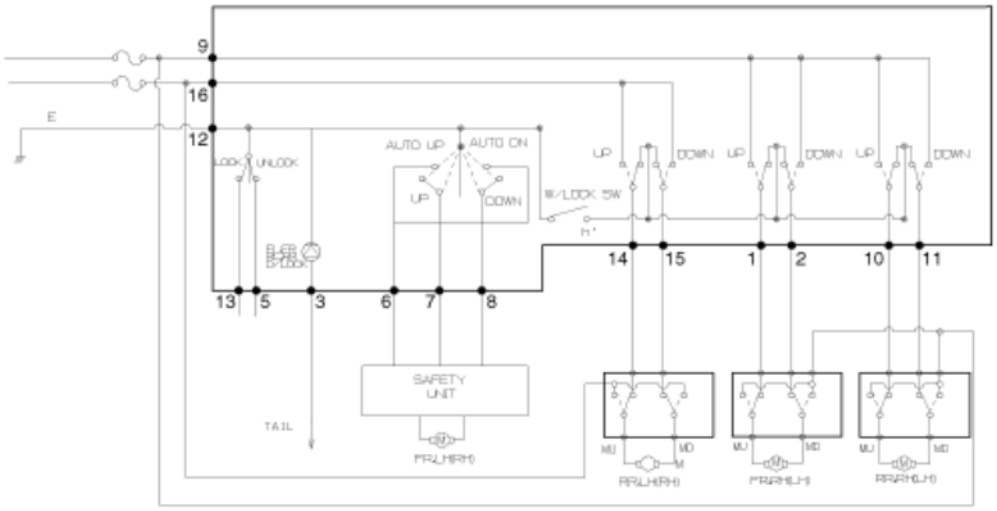
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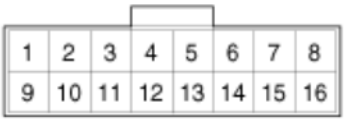
English

CIRCUIT DIAGRAM

[DRIVER - AUTO UP & AUTO DOWN]





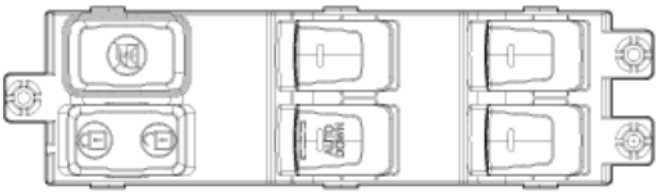


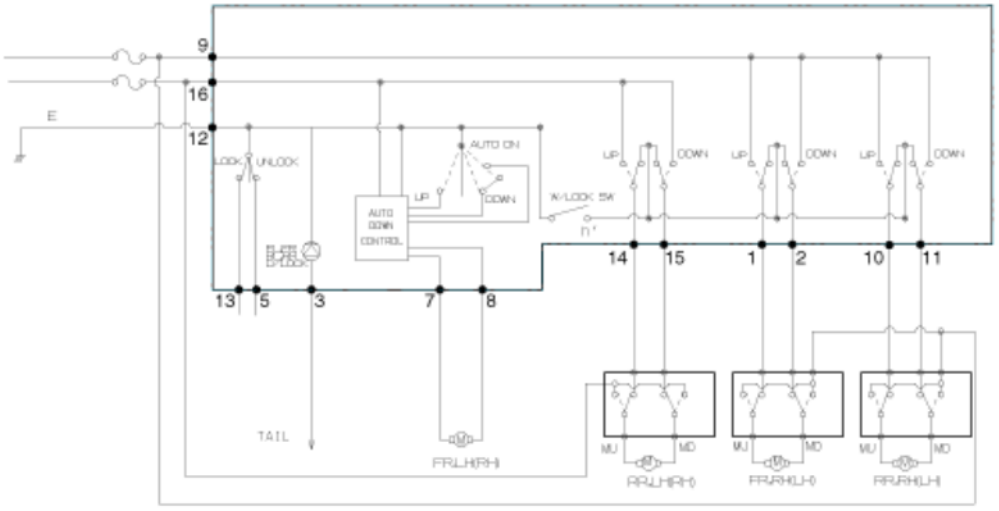
Connector A

Pin No.	Description	Pin No.	Description
1	Passenger window up switch	9	B+ (Right)
2	Passenger window down switch	10	Rear right window up switch
3	Tail lamp	11	Rear right window down switch
4	Ground (switch)	12	Ground
5	Door unlock	13	Door lock
6	Auto switch	14	Rear left window up switch
7	Driver window up switch	15	Rear left window down switch
8	Driver window down switch	16	B+ (Left)

[DRIVER - AUTO DOWN]

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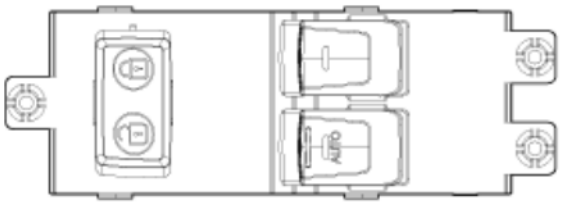
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

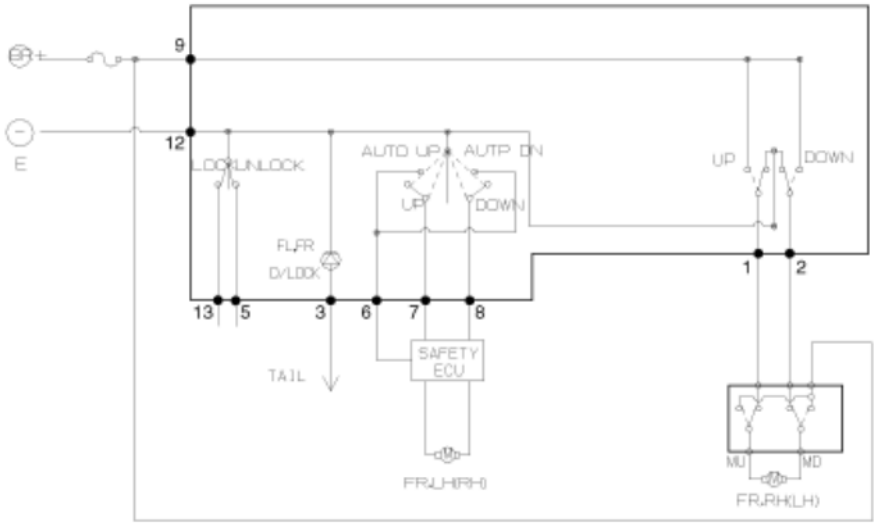
Connector A

Pin No.	Description	Pin No.	Description
1	Passenger window up switch	9	B+ (Right)
2	Passenger window down switch	10	Rear right window up switch
3	Tail lamp	11	Rear right window down switch
4	Ground (switch)	12	Ground
5	Door unlock	13	Door lock
6	Auto switch	14	Rear left window up switch
7	Driver window up switch	15	Rear left window down switch
8	Driver window down switch	16	B+ (Left)

[DRIVER - AUTO UP & AUTO DOWN (3DR)]

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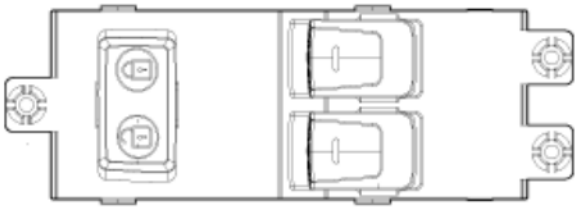


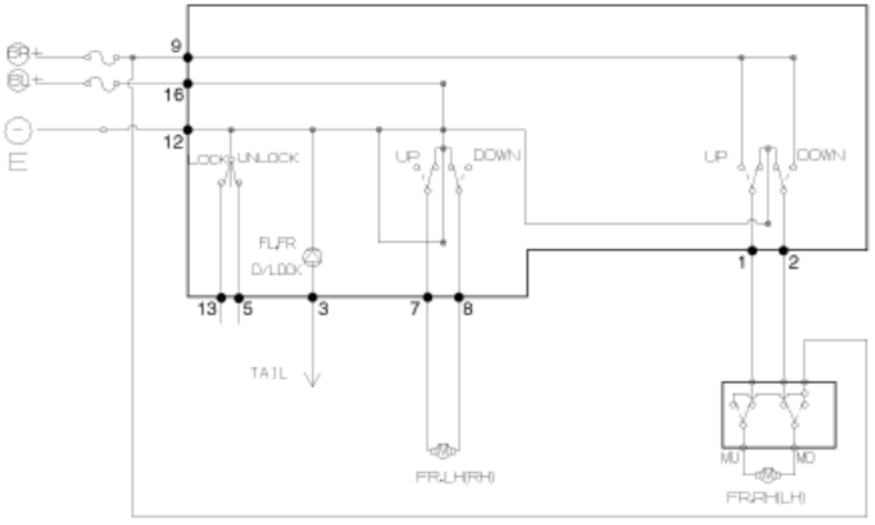
Connector A

Pin No.	Description	Pin No.	Description
1	Passenger window up switch	9	B+ (Right)
2	Passenger window down switch	10	Rear right window up switch
3	Tail lamp	11	Rear right window down switch
4	Ground (switch)	12	Ground
5	Door unlock	13	Door lock
6	Auto switch	14	Rear left window up switch
7	Driver window up switch	15	Rear left window down switch
8	Driver window down switch	16	B+ (Left)

[DRIVER - MANUAL (3DR)]

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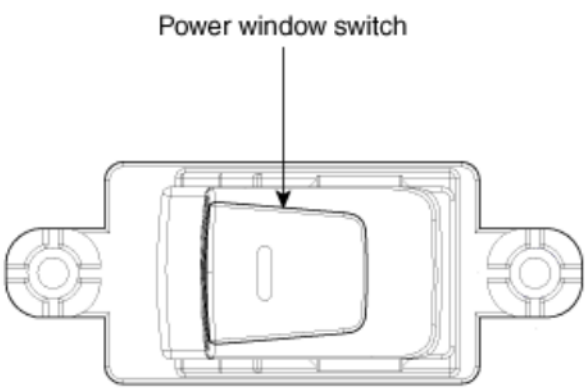
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

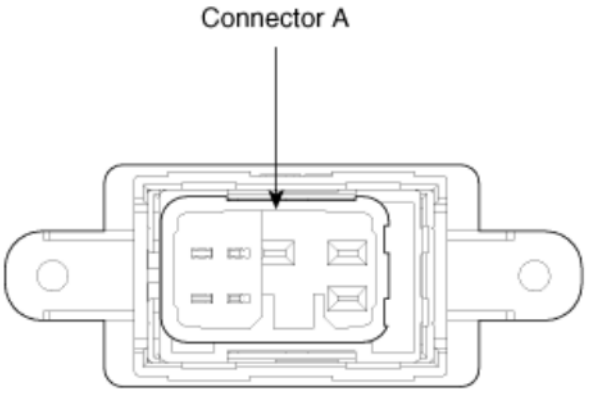
Connector A

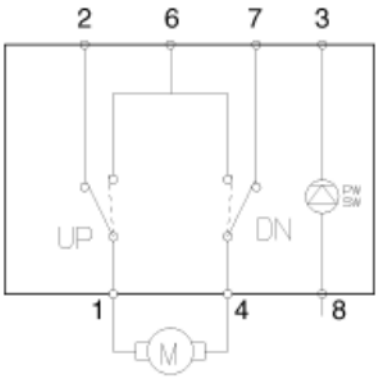
Pin No.	Description	Pin No.	Description
1	Passenger window up switch	9	B+ (Right)
2	Passenger window down switch	10	Rear right window up switch
3	Tail lamp	11	Rear right window down switch
4	Ground (switch)	12	Ground
5	Door unlock	13	Door lock
6	Auto switch	14	Rear left window up switch
7	Driver window up switch	15	Rear left window down switch
8	Driver window down switch	16	B+ (Left)

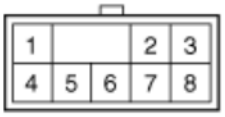
[PASSENGER / REAR POWER WINDOW SWITCH]

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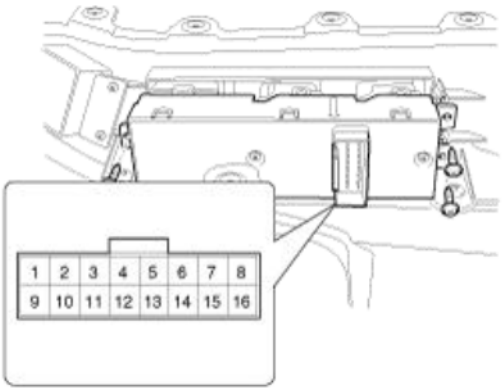
NO.	Connector A
1	Motor up
2	Up switch
3	GND
4	Motor down
5	-
6	Battery(+)
7	Down switch
8	Tail lamp

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INSPECTION

Power Window Main Switch Inspection

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



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.

[Auto up & auto down]

Terminal / Position	Front left				Front right			
	12	7	8	6	9	1	2	12
UP	○—○				○—○		○—○	
AUTO UP	○—○			○—○				
OFF						○—○	○—○	
DOWN	○—○		○—○		○—○		○—○	
AUTO DOWN	○—○		○—○	○—○				
Terminal / Position	Rear left				Rear right			
	16	14	15	12	9	10	11	12
UP	○—○		○—○		○—○		○—○	
OFF		○—○	○—○			○—○	○—○	
DOWN	○—○	○—○			○—○	○—○		

[Auto down]

Terminal / Position	Front left				Front right			
	12	7	8	6	9	1	2	12
UP	○—○				○—○		○—○	
OFF						○—○	○—○	
DOWN	○—○		○—○		○—○		○—○	
AUTO DOWN	○—○		○—○	○—○				
Terminal / Position	Rear left				Rear right			
	16	14	15	12	9	10	11	12
UP	○—○		○—○		○—○		○—○	
OFF		○—○	○—○			○—○	○—○	
DOWN	○—○	○—○			○—○	○—○		

[Auto up & auto down (3DR)]

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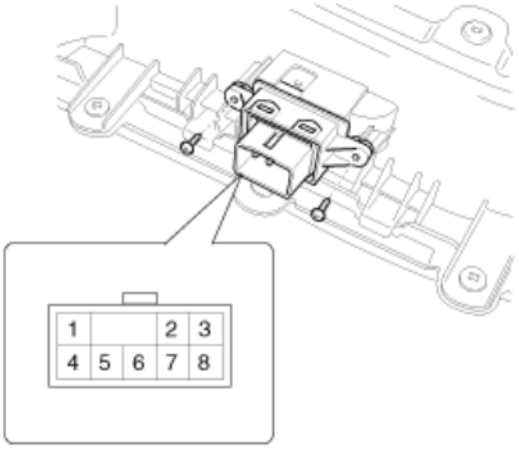
Terminal / Position	Front left				Front right			
	12	7	8	6	9	1	2	12
UP	○—○				○—○		○—○	
AUTO UP	○—○	○	○	○				
OFF						○	○—○	○
DOWN	○	○	○—○		○—○	○		○
AUTO DOWN	○	○	○—○	○				

[Manual (3DR)]

Terminal / Position	Rear left				Rear right			
	16	7	8	12	9	1	2	12
UP	○—○		○—○		○—○		○—○	
OFF		○	○	○		○	○	○
DOWN	○	○		○	○—○	○		○

Passenger & Rear Power Window Switch Inspection

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

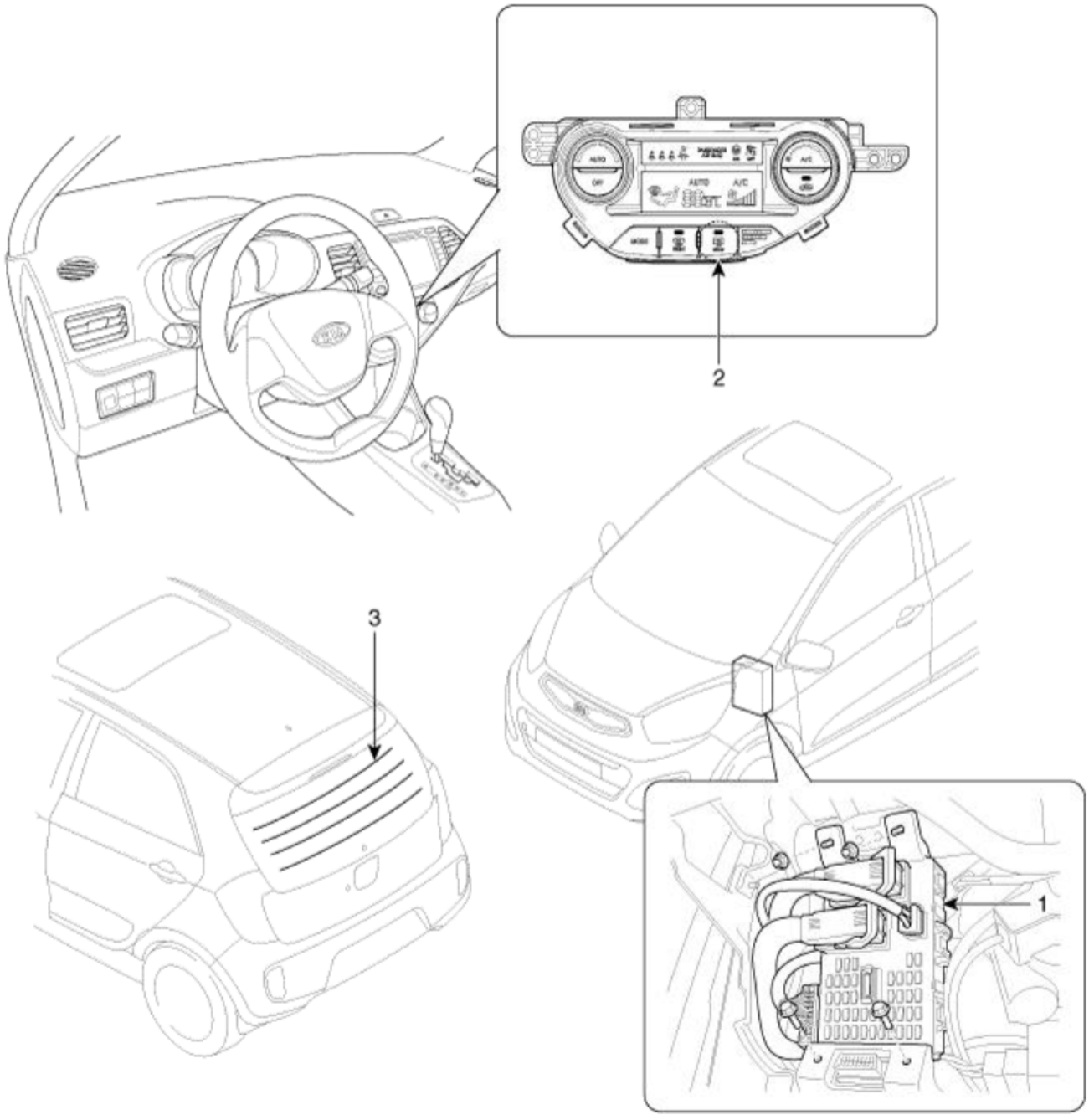


4. Check for continuity between the terminals in each switch position according to the table. If the continuity condition is not normal, replace the switch.

Terminal / Position	6	7	2	4	1
UP	○	○		○	○
OFF		○	○	○	○
DOWN	○		○	○	○

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COMPONENT LOCATION



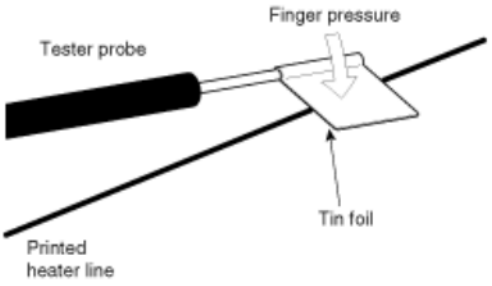
1. Passenger compartment junction box (Rear glass defogger relay)
2. Rear glass defogger switch (A/C controller)
3. Rear glass defogger

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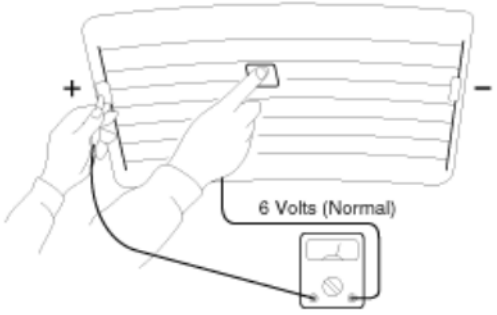
INSPECTION

CAUTION

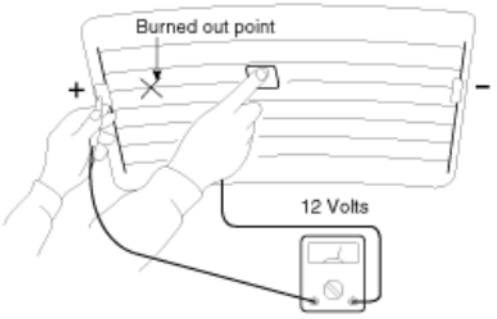
Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply finger pressure on the tin foil, moving the tin foil along the grid line to check for open circuits.



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.

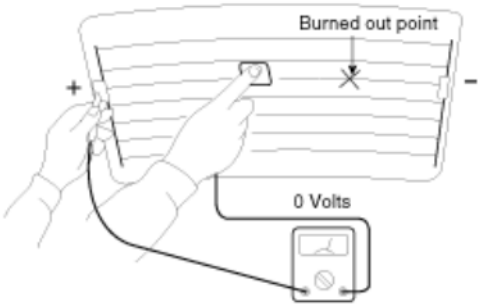


2. If a heater line is burned out between the center point and (+) terminal, the voltmeter will indicate 12V.

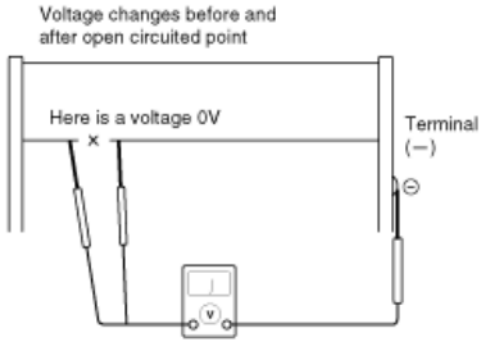


3. If a heater line is burned out between the center point and (-) terminal, the voltmeter will indicate 0V.

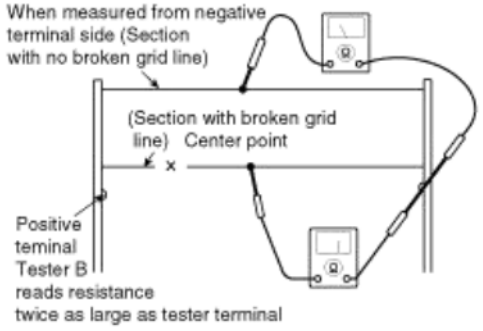
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4. To check for open circuits, slowly move the test lead in the direction that the open circuit seems to exist. Try to find a point where a voltage is generated or changes to 0V. The point where the voltage has changed is the open-circuit point.



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 as that in other sections. In the affected section, move the test lead to a position where the resistance sharply changes.

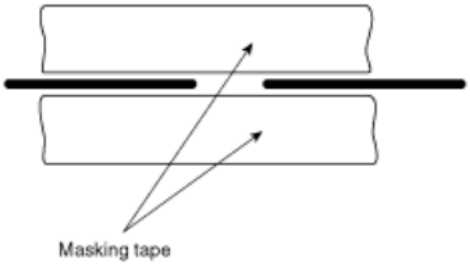


Repair Of Broken Heater Line

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).

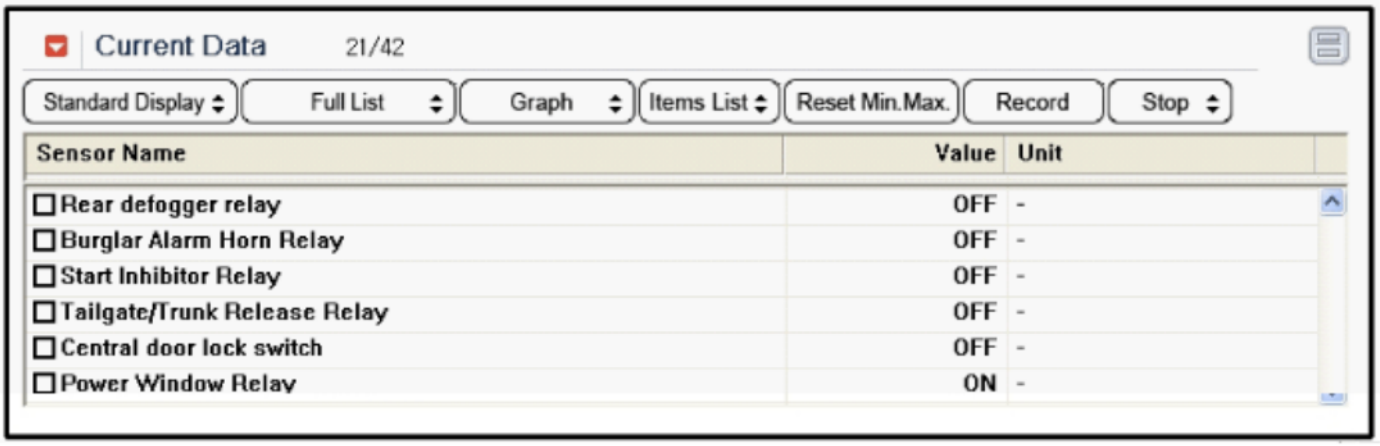
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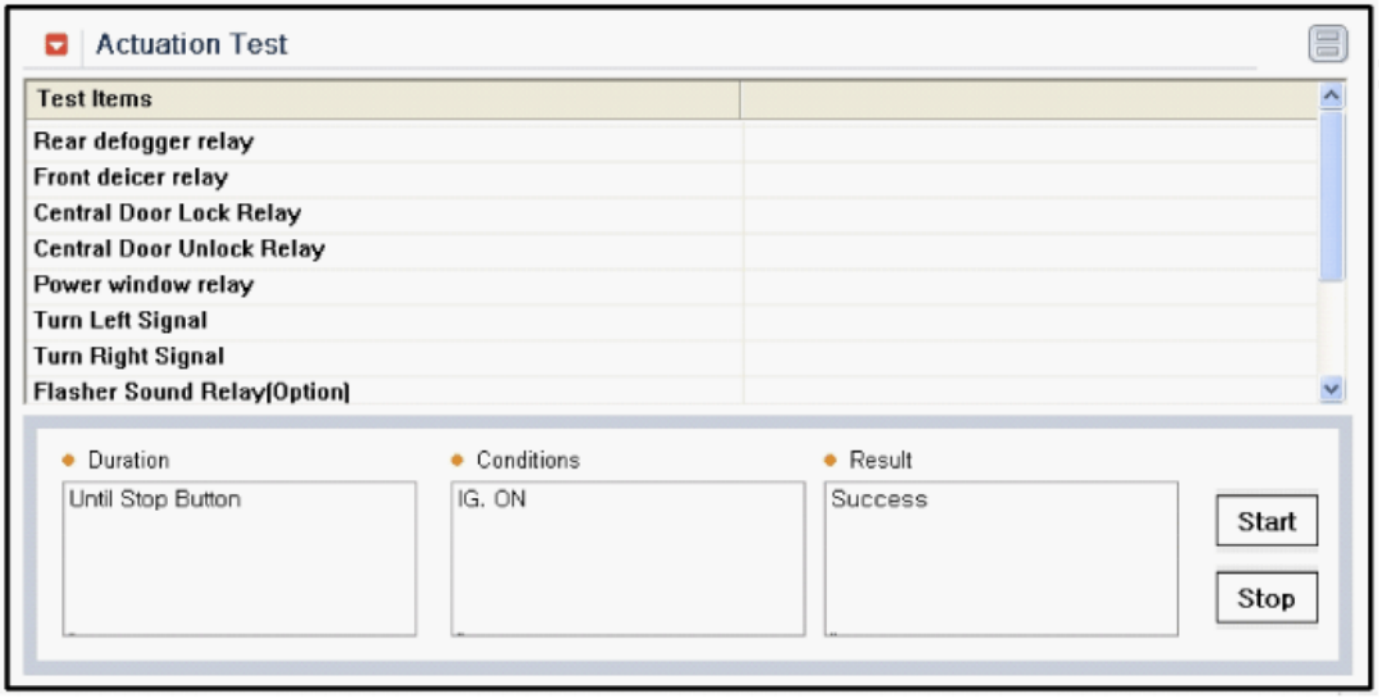
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INSPECTION

1. The rear glass defogger switch inputs can be checked using the GDS.
2. To check the input value of rear glass defogger switch, select option "Body Control Module".
3. To consult the present input/output value of BCM, "Current DATA". It provides information of BCM input/output conditions of smart junction box.



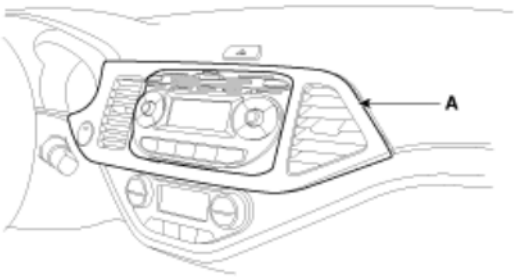
4. To check the input value of rear glass defogger switch in force mode, select option "Actuation Test of smart junction box".



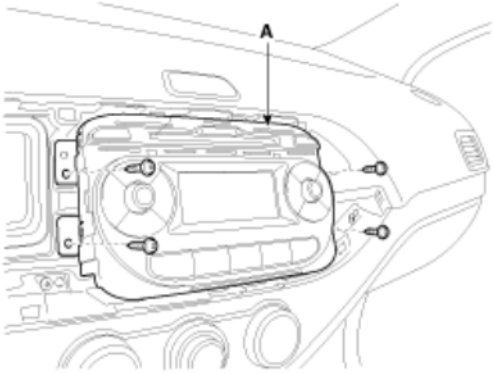
REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia panel (A).
(Refer to the BD group - "Crash pad")

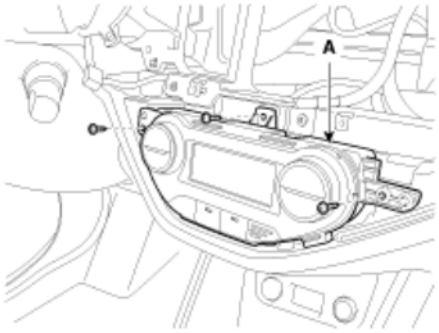
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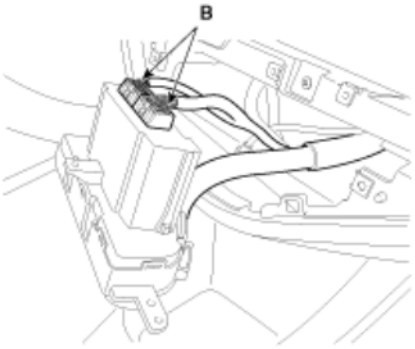


3. Remove the audio head unit (A).
   (Refer to the "Audio")



4. Remove the heater and air conditioner controller (A) with 4 screws and connectors (B).





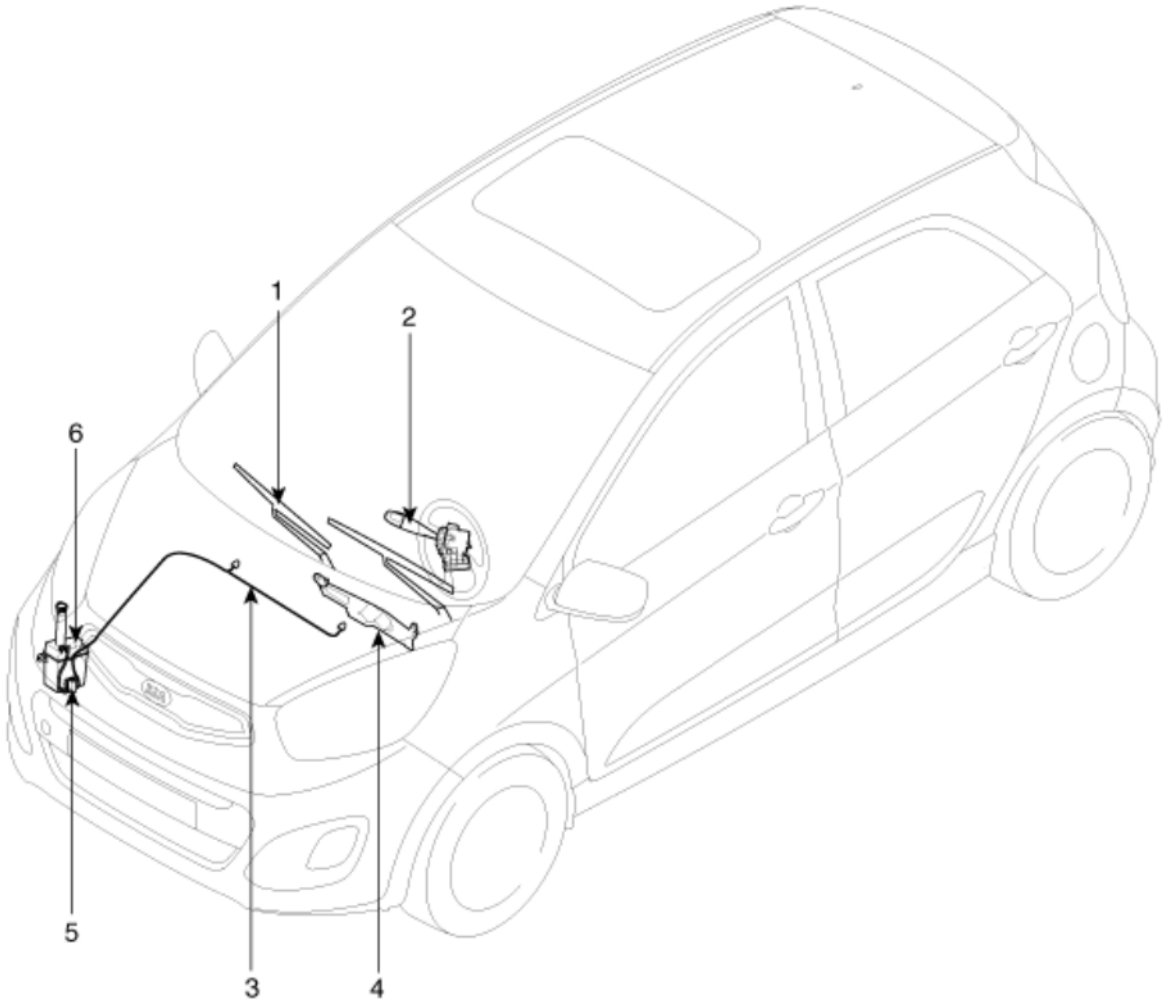
INSTALLATION

1. Install the heater and air conditioner controller to the center fascia panel.
2. Install the audio head unit.
3. Install the center fascia panel.

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COMPONENT LOCATION

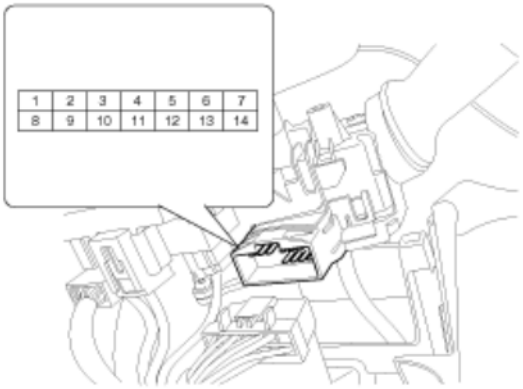


1. Windshield wiper arm & blade	4. Windshield wiper motor & linkage
2. Wiper & washer switch	5. Washer motor
3. Windshield washer hose	6. Washer reservoir

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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.



WIPER SWITCH

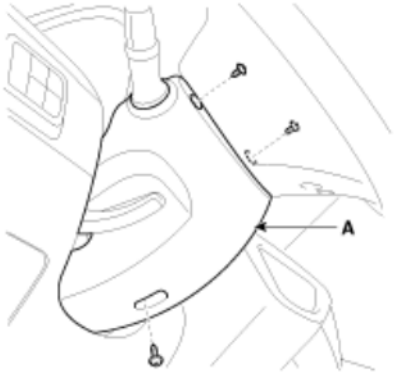
Position \ Terminal	3	2	4	5	INT1	INT2	B1
MIST	○	—	○				
OFF			○	○	○	—	○
INT			○	○	○	○	
LOW	○	—	○				
HI	○	○					

WASHER SWITCH

Position \ Terminal	3	6
OFF		
ON	○	○

REMOVAL

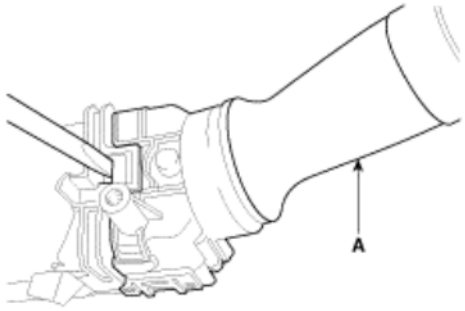
1. Remove the steering column upper and lower shrouds (A) after removing 3 screws.



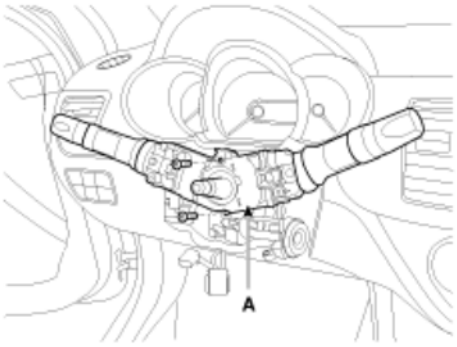
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English ▼

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



3. Remove the steering wheel.
   (Refer to the ST group - "Steering column and shaft")
4. Remove the clock spring.
   (Refer to the RT group - "Airbag module")
5. Remove the multifunction switch assembly (A) with 2 screws.

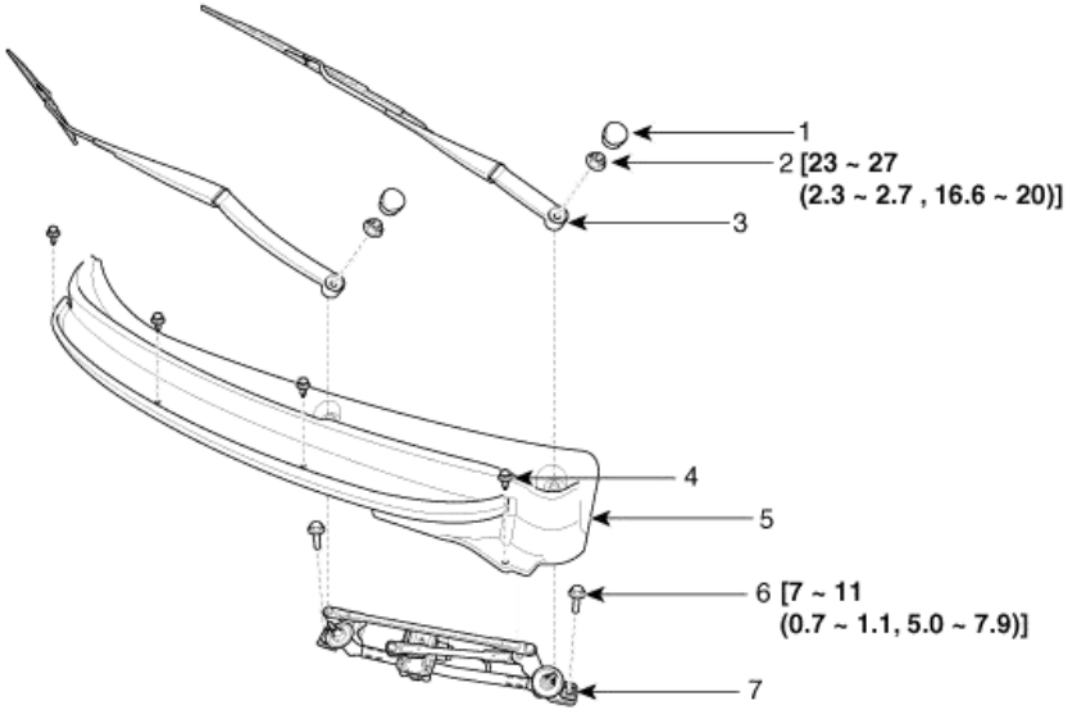


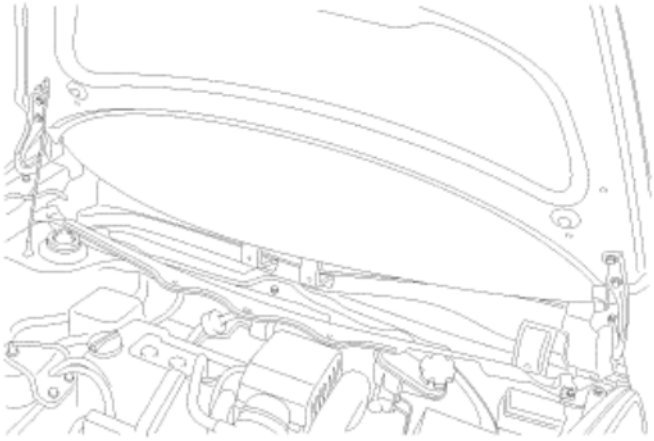
INSTALLATION

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.

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COMPONENT LOCATION





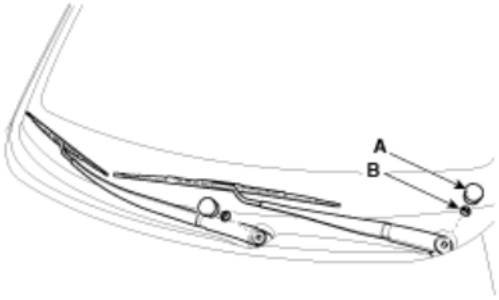
Torque : Nm (kgf.m, lb-ft)

1. Cap 2. Nut 3. Wiper arm & blade 4. Rivet	5. Cowl top cover 6. Bolt 7. Wiper motor & linkage assembly

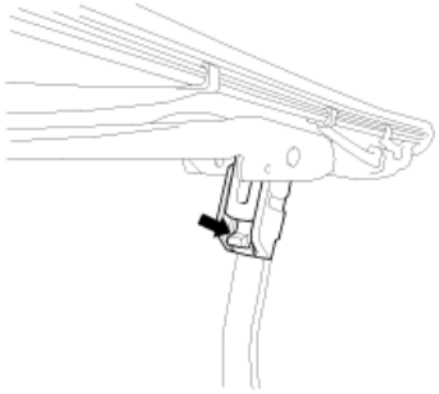
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REMOVAL

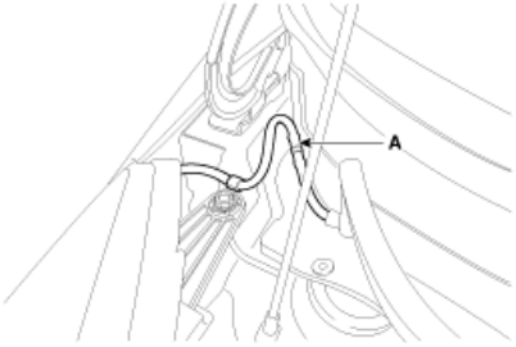
1. Loosen the windshield wiper arm nut (B) after removing a wiper cap (A).



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.

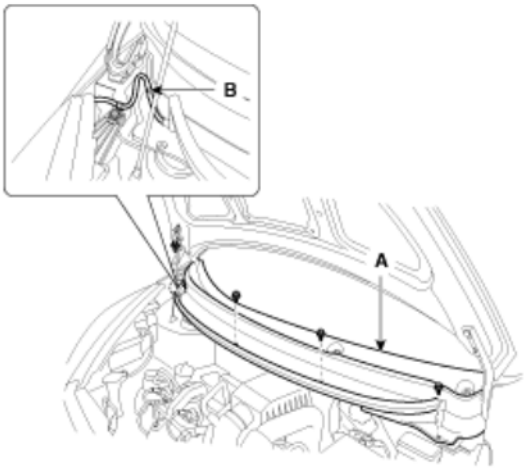


4. Disconnect the washer hose (A) connected to cowl top cover.



5. Remove the weather strip and the cowl top cover (A) after removing 4 rivets.

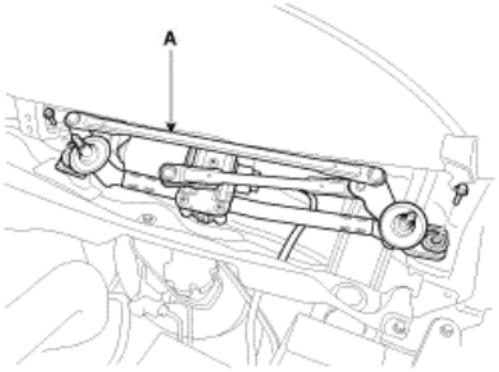
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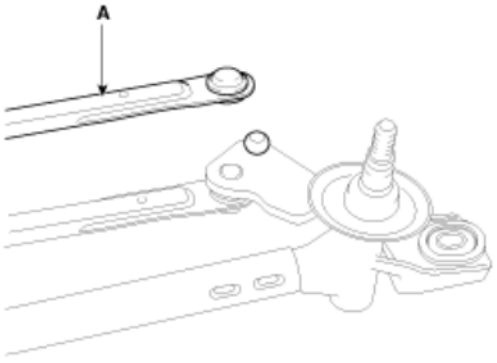
NOTICE

To prevent the damage of washer hose (B), install the fixing clip to the mounting hole certainly.

6. Disconnect the wiper motor connector from the wiper motor & linkage assembly.
7. Remove the windshield wiper motor and linkage assembly (A) after removing 2 bolts.

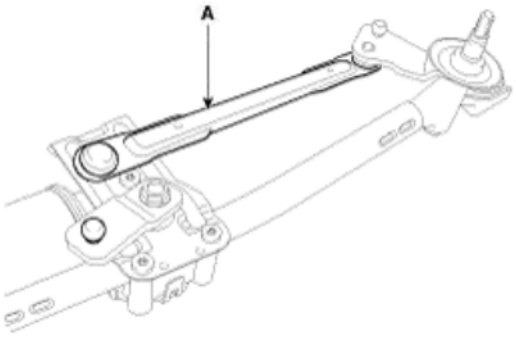


8. Hold the wiper motor crank arm and remove the upper linkage (A) from the wiper motor crank arm.



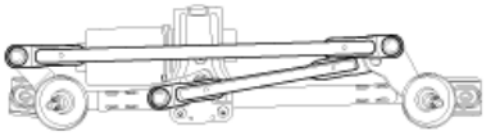
9. Remove the lower linkage (A).

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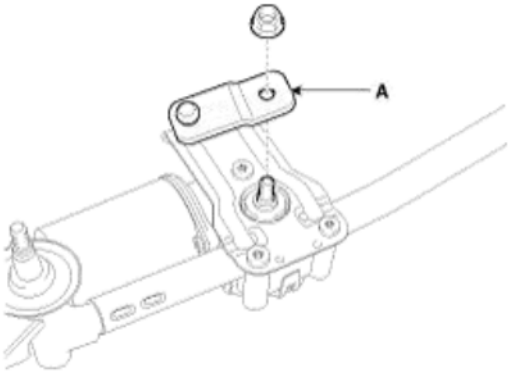
⚠ CAUTION

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.

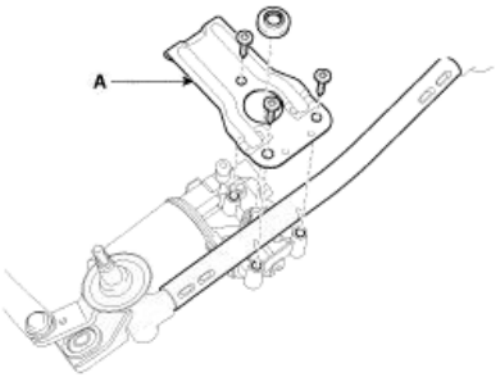


Be careful not to bend the linkage.

10. Remove the crank arm (A) after removing the nut.



11. Remove the wiper motor bracket (A) with 3 bolts.



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INSTALLATION

1. Install the wiper motor.
2. Install the crank arm.

   Tightening torque:
   24.5 ~ 26.4Nm (2.5 ~ 2.7kgf.m, 18.1 ~ 21.7lb-ft)

   ⚠ 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:
   7 ~ 11Nm (0.7 ~ 1.1, kgf.m, 5.0 ~ 7.9 lb-ft)

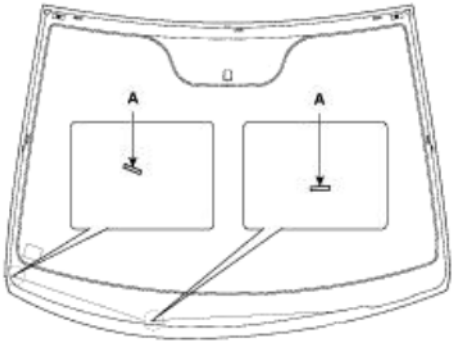
5. Install the cowl top cover.
6. Install the windshield wiper arm and blade.

   Tightening torque:
   22.5 ~ 26.4 Nm (2.3 ~ 2.7 kgf.m, 16.6 ~ 21.7 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)

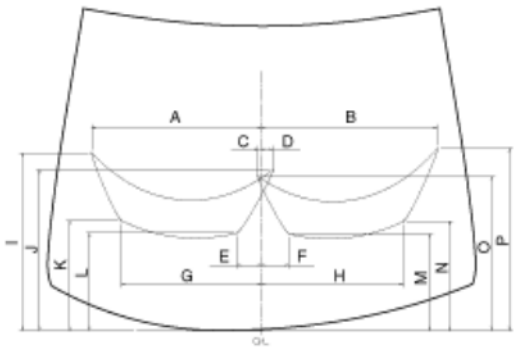


8. Set the cowl top cover on the specified spray position.

   NOTICE

   – When you turn on the washer, confirm 50% or more of washer fluid lands within the spray area.
   – If the spray area is not within the standard positions, adjust the nozzle(s).

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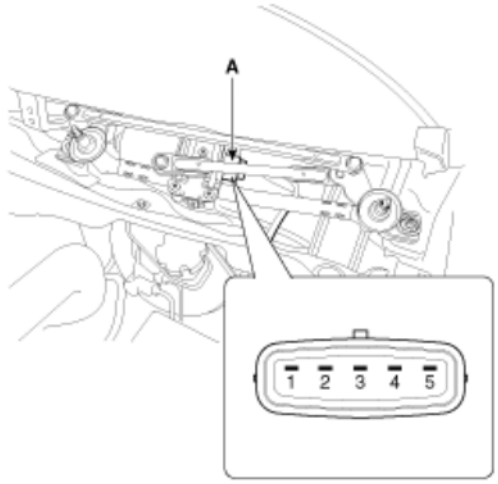


Specified position	Distance (in)	Distance (mm)
A	1.61.6	570
B	20.68	525.3
C	1.33	33.9
D	0.41	10.3
E	2.87	72.9
F	3.26	82.7
G	16.45	417.9
H	16.69	424
I	20.84	529.4
J	18.88	479.5
K	12.87	326.9
L	11.45	290.8
M	11.31	287.2
N	12.81	325.3
O	18.07	459.1
P	21.39	543.3

INSPECTION

Speed Operation Check

1. Remove the connector (A) from the wiper motor.



No.	Description	No.	Description

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1	GND	4	Low
2	Parking	5	High
3	Battery (+)		

2. Attach the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 5.
3. Check that the motor operates at low or high speed as below table.

Terminal / Position	2	3	5	4
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.

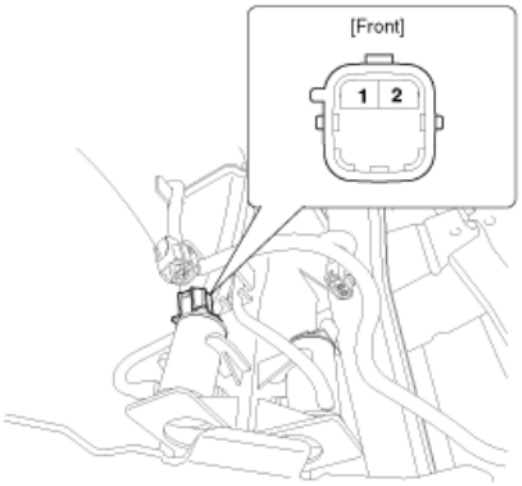
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INSPECTION

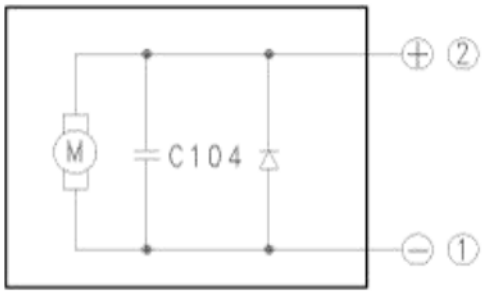
1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.

> **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 2 and negative (-) battery cables to terminal 1 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.



NO	Description	NO	Description
1	GND	2	Washer (+)



[Front washer motor]

REMOVAL

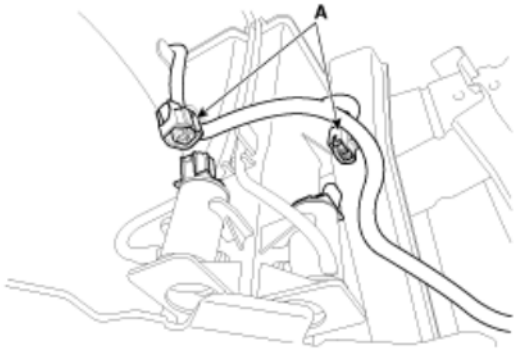
> **CAUTION**
>
> – When servicing the washer pump, be careful not to damage the washer pump seal.

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– Do not operate the washer pump before filling the washer reservoir.
Failure to do so could result in premature pump failure.

English ▼

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper.
(Refer to the BD group - "Front bumper")
3. Remove the washer hose and disconnect the washer motor connector (A).



4. Remove the washer reservoir (A) after removing 2 bolts.



INSTALLATION

1. Install the washer reservoir.

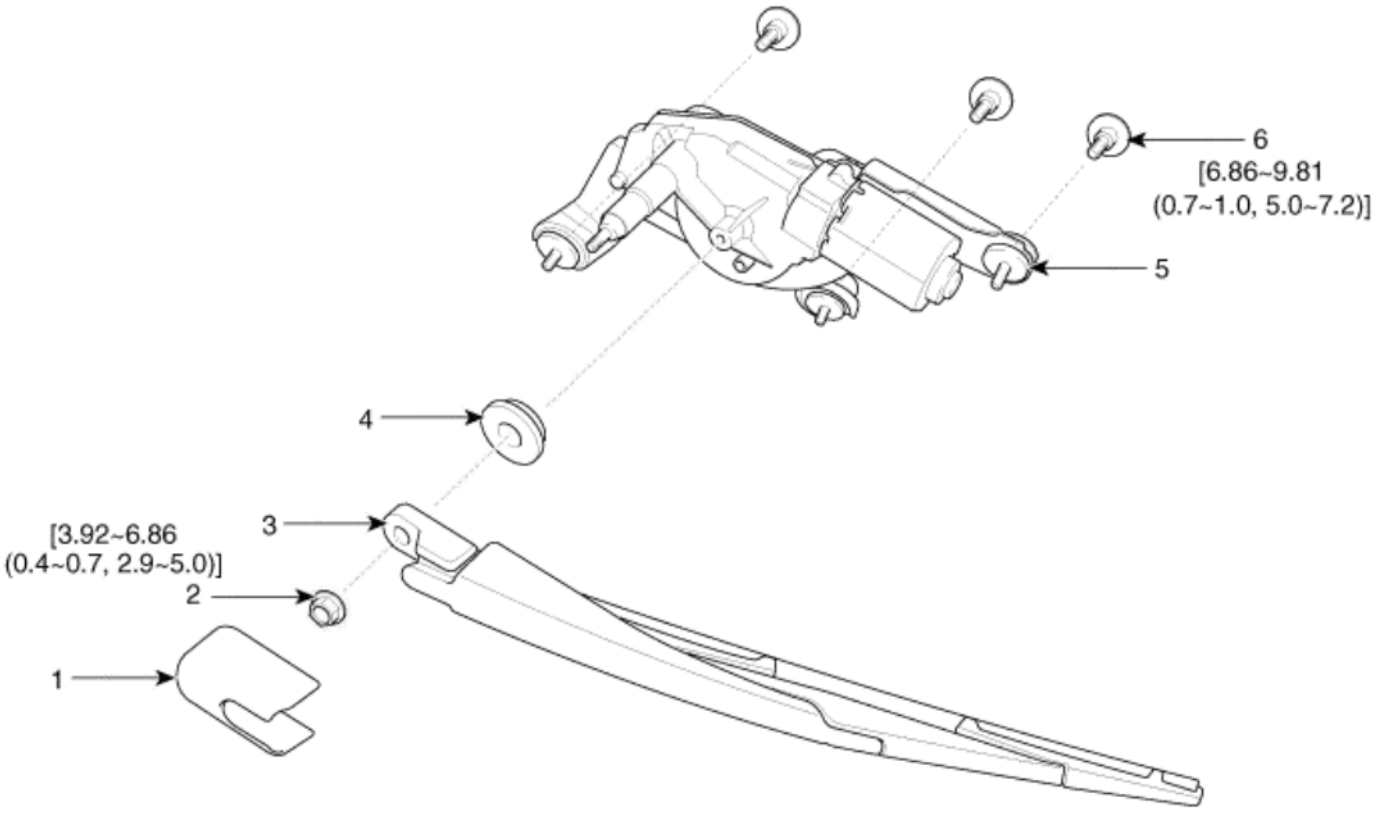
NOTICE

Before installing the pump motor, check the filter for foreign material or contamination. if necessary, clean the filter into the pump motor.

2. Install the washer motor.
3. Install the washer hose.
4. Connect the washer motor connector.
5. Install the front bumper.
6. Check the washer motor operation.

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COMPONENT LOCATION



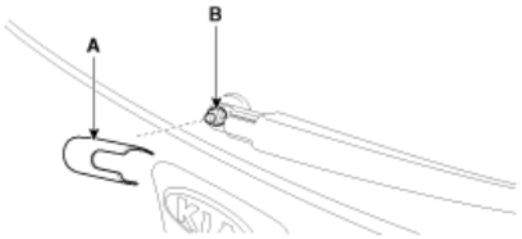
Torque : N.m (kg.m, lb.ft)

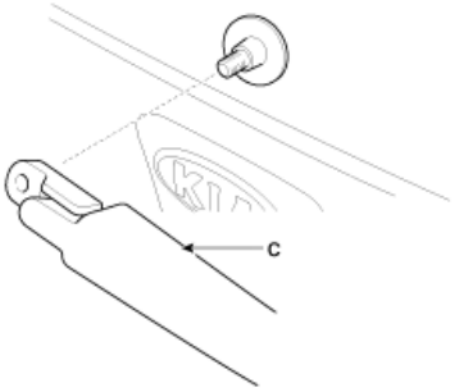
1. Head cap 2. Nut 3. Rear wiper arm & Blade	4. Packing (rubber) 5. Rear wiper motor assembly 6. Bolt

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REMOVAL

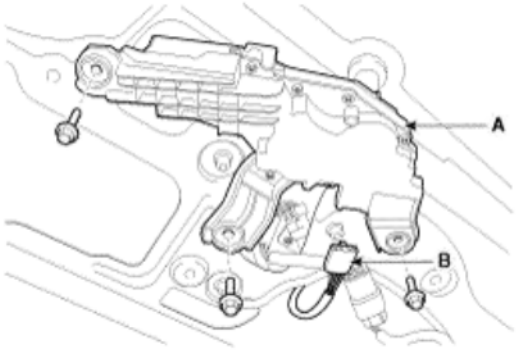
1. Detach the wiper cap (A), then remove the rear wiper arm (C) after removing a nut (B).





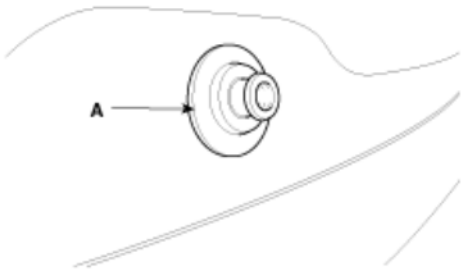
2. Open the tailgate then remove the tailgate trim.
   (Refer to the BD group - "Tail gate")

3. Disconnect the rear wiper motor connector (B) then remove the rear wiper motor (A) after removing 3 bolts.



4. Remove the rubber packing (A).

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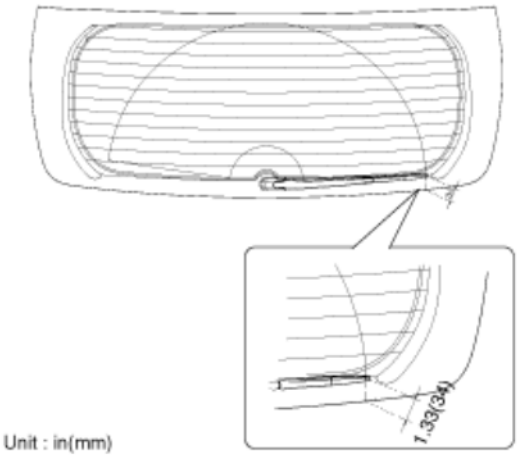


INSTALLATION

1. Install the rubber packing.
2. Install the rear wiper motor assembly.
   Tightening torque :
   6.86 ~ 9.81N.m (0.7 ~ 1.0kgf.m, 5.0 ~ 7.2lb-ft)
3. Intall the tailgate trim.
4. Install the rear wiper arm and rear wiper arm cap.
   Tightening torque :
   3.92 ~ 6.86N.m (0.4 ~ 0.7kgf.m, 2.9 ~ 5.0lb-ft)

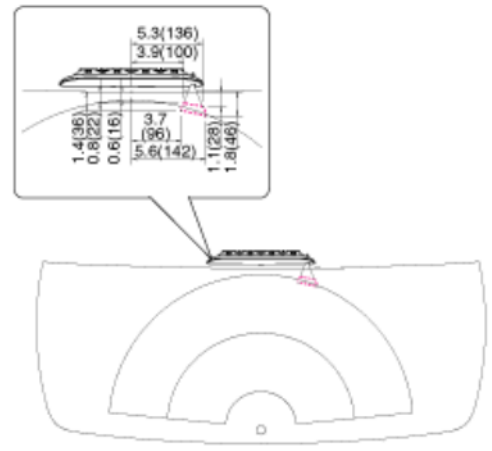
> **NOTICE**
>
> Before installation, be sure that the rear wiper motor is in the park position.
> Turn the wiper switch ON and OFF to allow the rear wiper motor to cycle and stop in the park position.

5. Set the rear wiper blade and to the lowest defogger heat line and tailgate glass.
6. Set the rear washer nozzle on the specified spray position.



Unit : in(mm)

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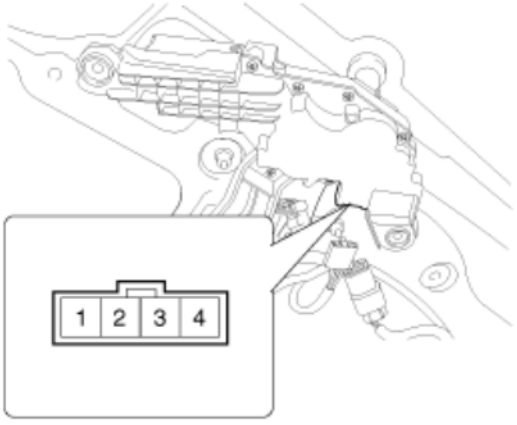


Unit : in(mm)

INSPECTION

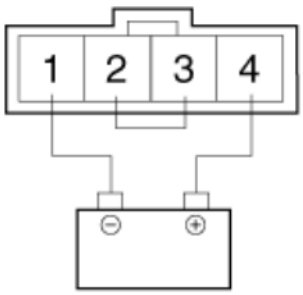
Rear Wiper Motor

1. Remove the 4P connector from the rear wiper motor.
2. Connect battery positive (+) and negative (-) cables to terminals 4 and 1 respectively.
3. Check that the motor operates normally. Replace the motor if it operates abnormally.
   (1. GND, 2. Switch, 3. Parking , 4. B+)



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 terminals 2 and 3.
4. Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 1.
5. Check that the motor stops running at the off position.

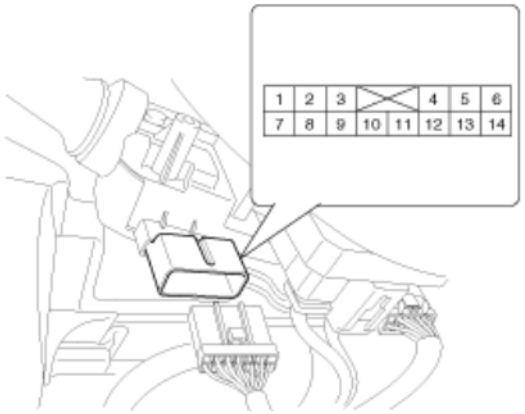


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INSPECTION

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



Rear Wiper Switch

Position \ Terminal	13	11	14
OFF	○——	——○	
ON	○——	——	——○

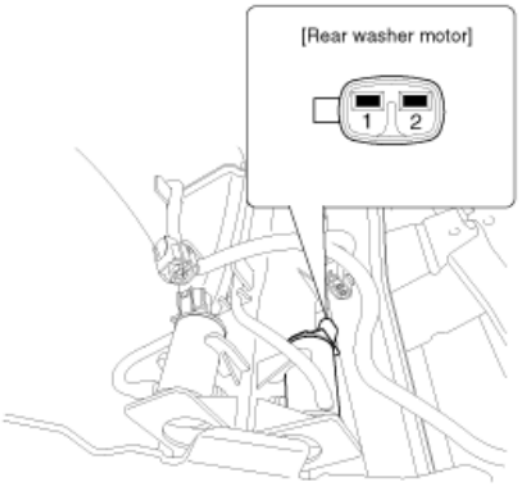
Rear Washer Switch

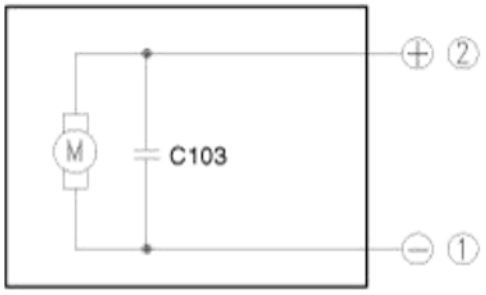
Position \ Terminal	13	11	14	12
OFF	○——	——○		
ON	○——	——	——○	——○

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INSPECTION

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.
2. Remove the front bumper cover. (Refer to the Body group- Front bumper)
3. Connect positive (+) and negative (-) battery cables to terminals 3 and 1 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.
   1. Ground, 2. Rear washer (+)

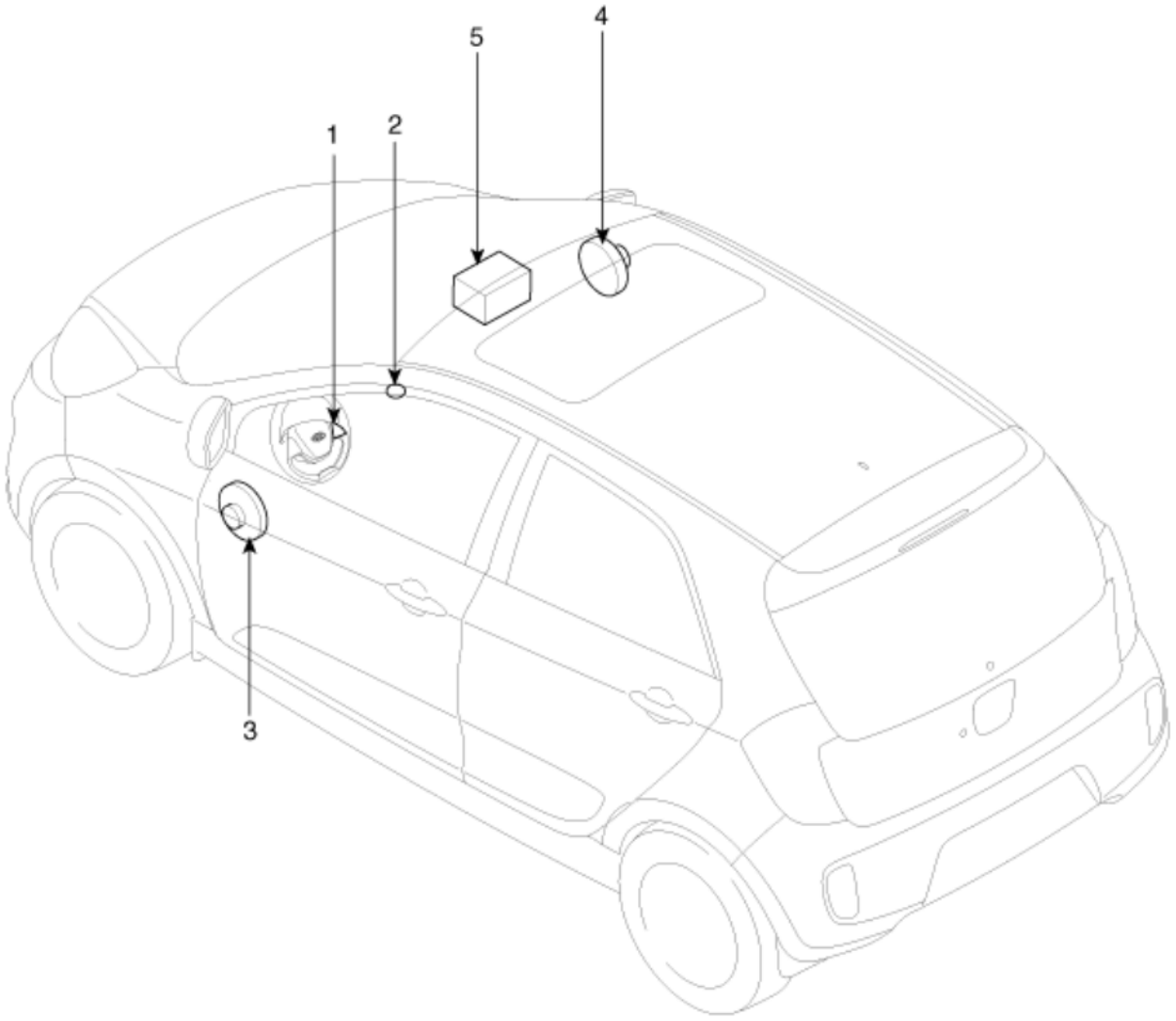




[Rear washer motor]

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COMPONENTS

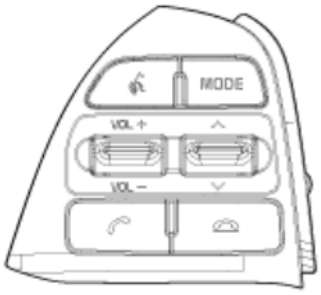


1. Hands free call switch 2. Mic 3. Front left speaker	4. Front right speaker 5. Audio head unit (hands free control)

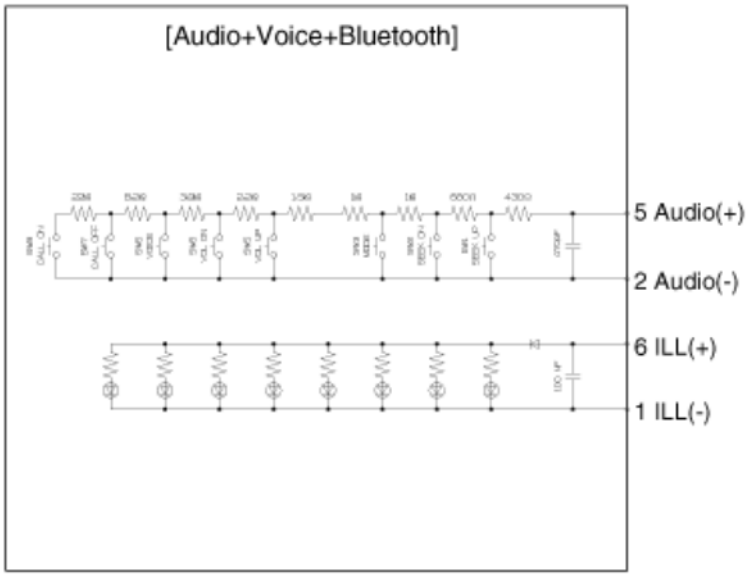
※ There is no hands free jack. This system supports Bluetooth(wireless system).

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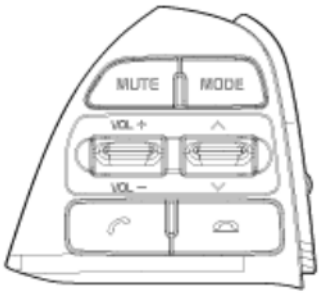
CIRCUIT DIAGRAM

[Audio+Voice+Bluetooth]	Connector
	

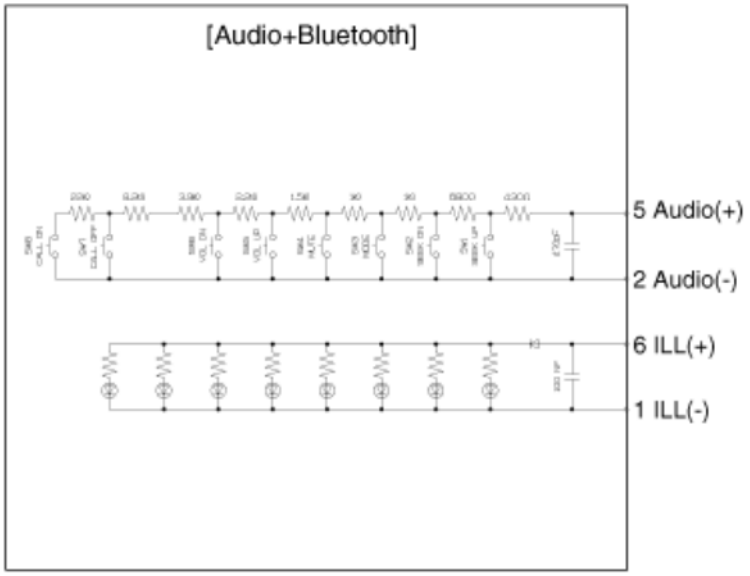
No.	Description
1	Illumination (-)
2	Audio (-)
3	-
4	-
5	Audio (+)
6	Illumination (+)



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[Audio+Bluetooth]	Connector
	

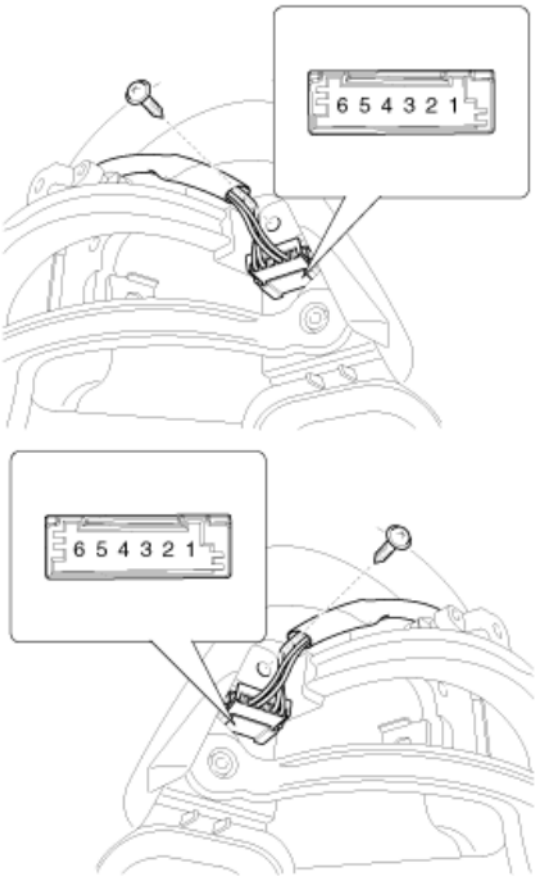
No.	Description
1	Illumination (-)
2	Audio (-)
3	-
4	-
5	Audio (+)
6	Illumination (+)



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INSPECTION

1. Check the hands free remote control switch for resistance between terminals in each switch position.



[Audio + Voice (Left)]

Switch	Connector terminal	Resistance (±5%)
Mode	4-5	1.0 kΩ
Volume up	4-5	3.49 kΩ
Volume down	4-5	5.69 kΩ
Voice	4-5	9.59 kΩ

[Audio + Bluetooth (Right)]

Switch	Connector terminal	Resistance (±5%)
SEEK up	4-5	430 Ω
SEEK down	4-5	1.1 kΩ
Hang up	4-5	18.9 kΩ
Call	4-5	40.9 kΩ

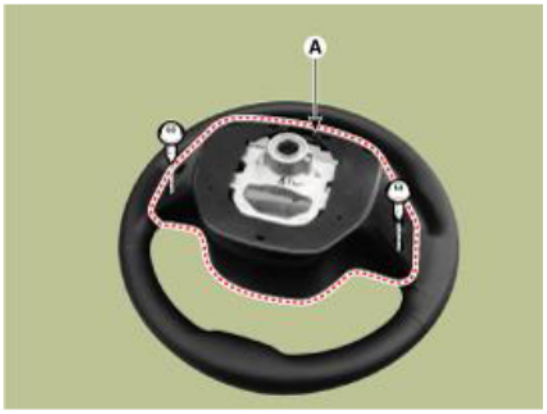
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REMOVAL

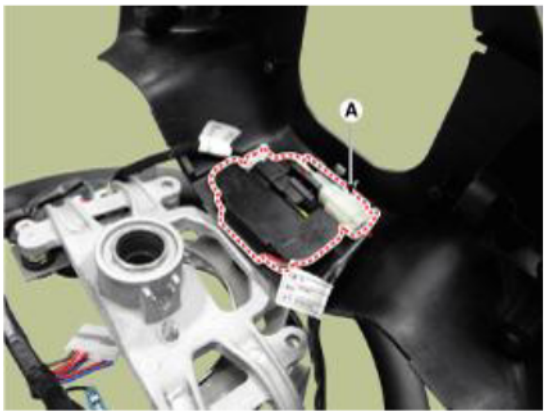
English

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. Remove the steering wheel cover (A) after loosening the screws.





5. Separate the heated steering wheel connector (A) and remove the cover.



6. Disconnect the connector (A) and remove the steering wheel remote control switch (B) after loosening the screw.

[Left]

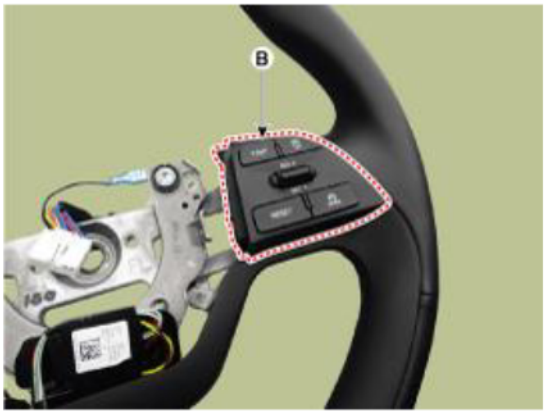
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[Right]





INSTALLATION

1. Install the steering wheel remote control switch after connecting the connector.
2. Connect the heated steering wheel connector.
3. Install the steering wheel cover.
4. Install the steering wheel.

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5. Connect the steering remote control switch connector and airbag connector.

NOTICE

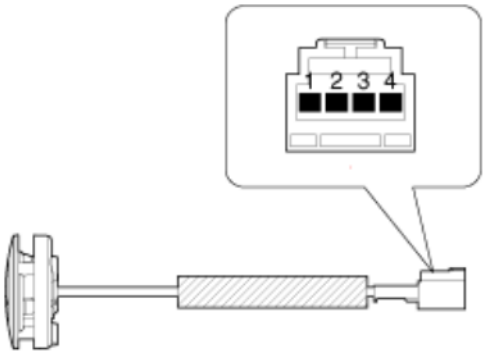
Make sure the audio remote control switch and the airbag module connectors are plugged in properly.

6. Install the driver airbag module.

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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the roof trim.
   (Refer to the BD group - "Roof trim")
3. Remove the handsfree mic (A) after disconnect the connector from roof top.



CAUTION

Be careful not to damage the roof trim when removing the hands free mic.

4. Check the continuity of Mic between terminals.



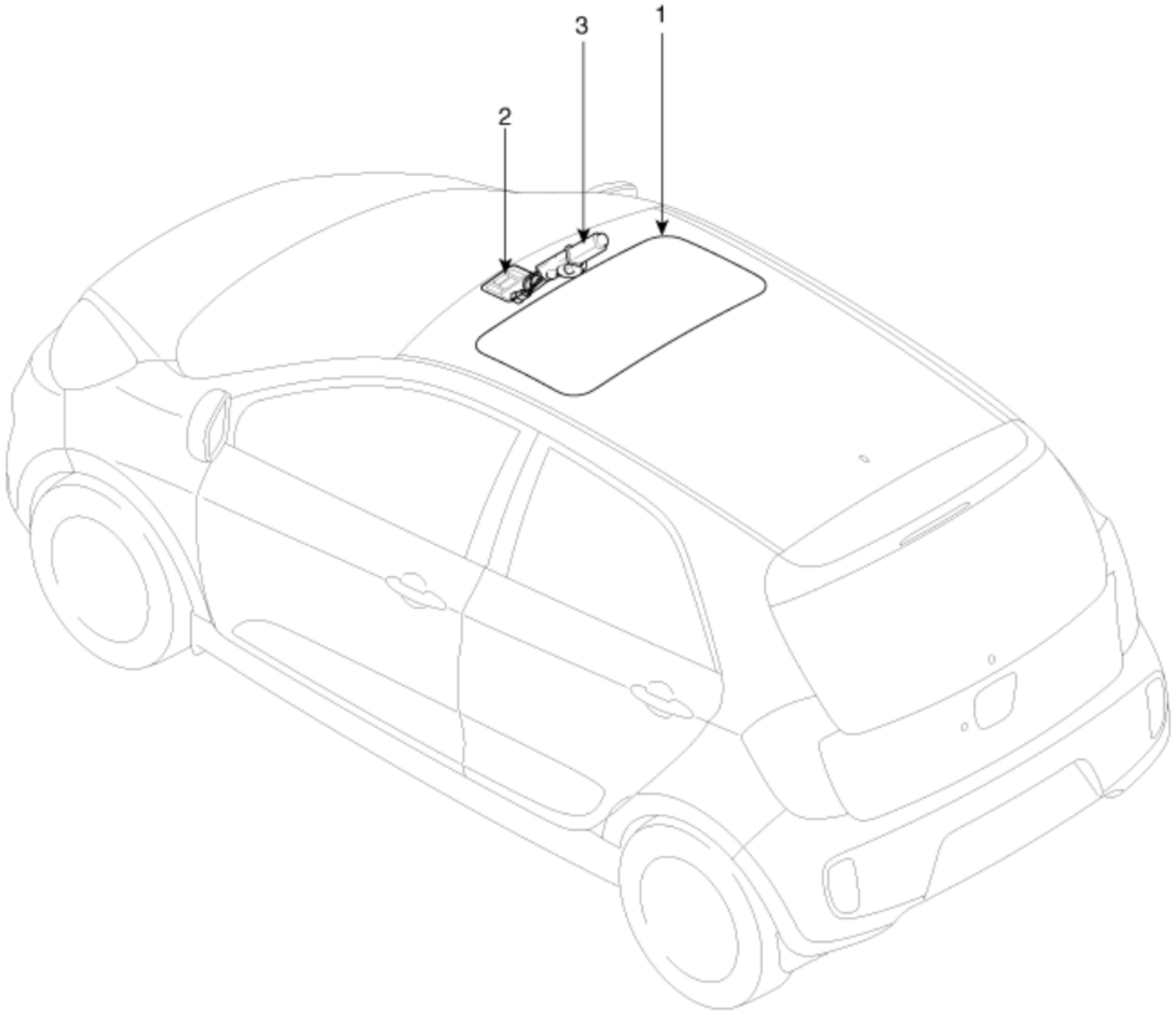
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TROUBLESHOOTING

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	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 dose 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

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COMPONENT LOCATION

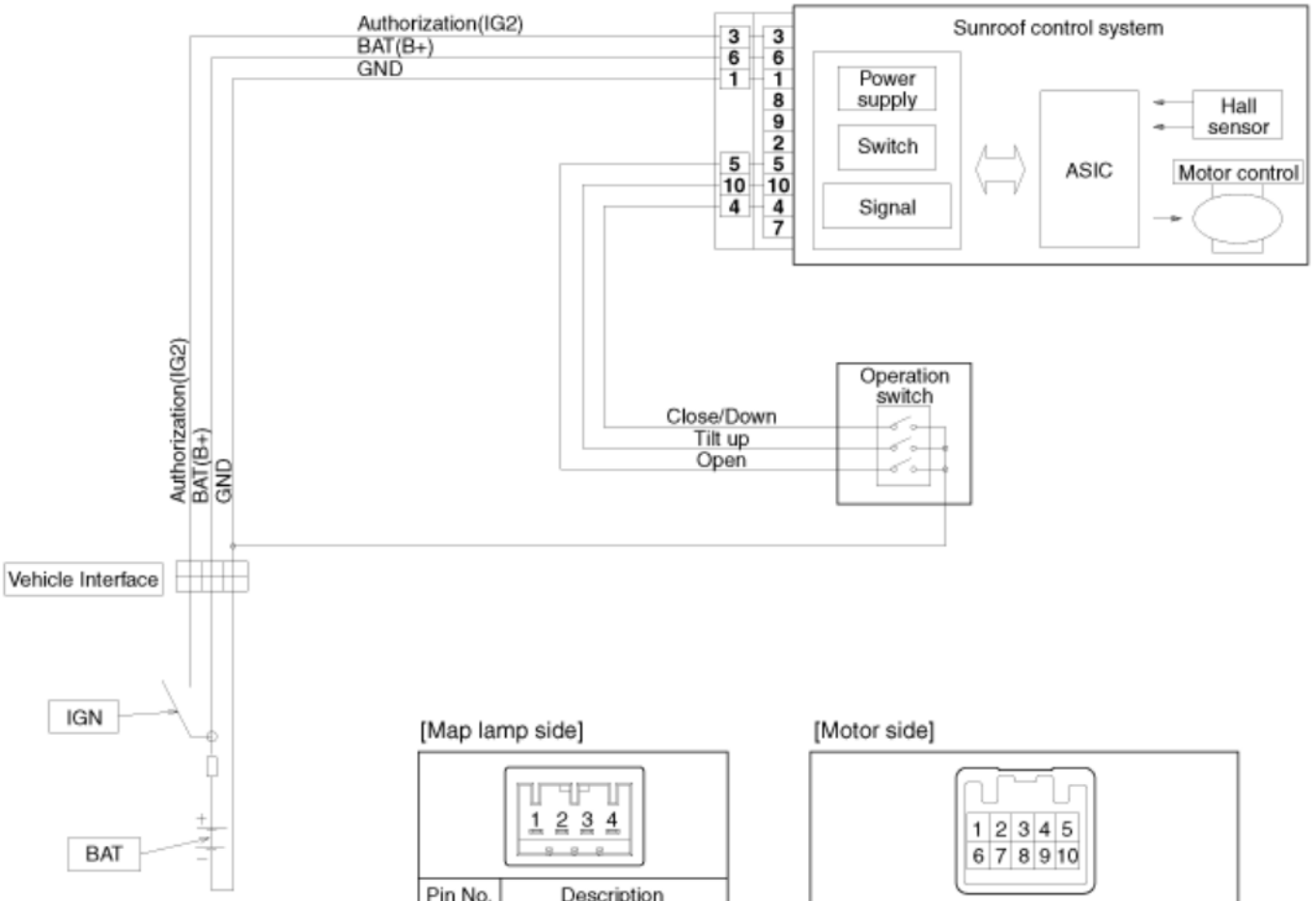


1. Sunroof 2. Sunroof switch	3. Sunroof motor & controller

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English

CIRCUIT DIAGRAM



[Map lamp side]

Pin No.	Description
1	Tilt up
2	GND
3	Slide open
4	Close/Down

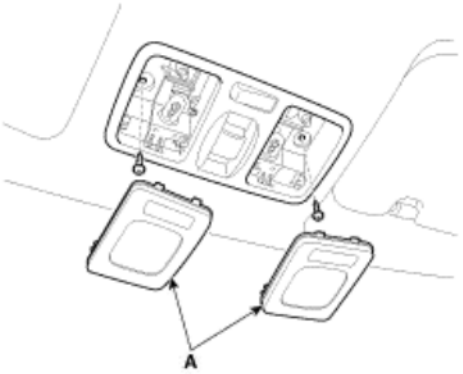
[Motor side]

Pin No.	Description	Pin No.	Description
1	GND	6	B+
2	-	7	-
3	IG2	8	-
4	Close/Down	9	-
5	Open	10	Tilt up

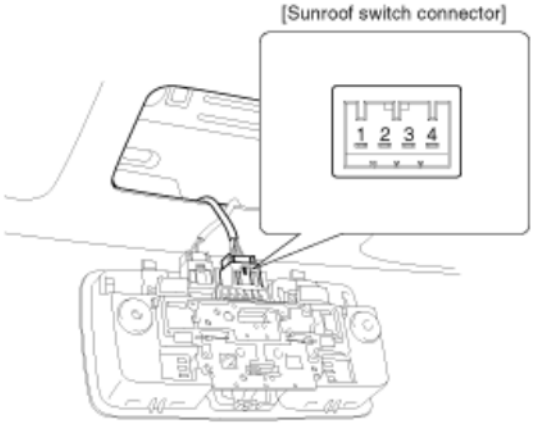
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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console lamp assembly after removing the lens (A) and screws..
   (Refer to the BD group - "Roof trim")



3. Check for continuity between the terminals.

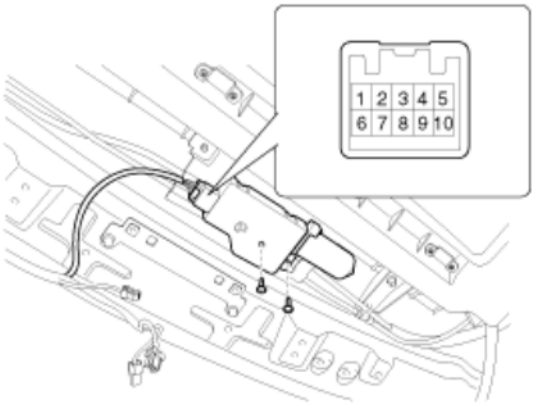


Position \ Terminal	1	2	3	4
Open		○	○	
Tilt up	○	○		
Close/Down		○		○

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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the roof trim.
   (Refer to the BD group - "Roof trim")
3. Disconnect the sunroof motor (A) connector.



4. Ground the terminals as below table, and check that the sunroof unit operates.

NOTICE

– When inspecting the sunroof motor operation, sunroof motor and roller blind motor always should be connected.

Position \ Terminal	3	4	5	10
Manual close	⊕			⊖
Tilt up	⊕	⊖		
Manual open	⊕		⊖	

5. Make these input tests at the connector. If any test indicates a problem, find and correct the cause, then recheck the system. If all the input tests prove OK, the sunroof motor must be faulty; replace it.

Terminal	Test condition	Test: Desired result
3	IG2 ON	Check for voltage to ground: There should be battery voltage.
1	Under all conditions	Check for continuity to ground: There should be continuity.
6	Under all conditions	Check for voltage to ground: There should be battery voltage.

RESETTING THE SUNROOF

Whenever the vehicle battery is disconnected or discharged, or you use the emergency handle to operate the sunroof, you have to reset your sunroof system as follows :

1. Turn the ignition key to the ON position and then close the sunroof completely.

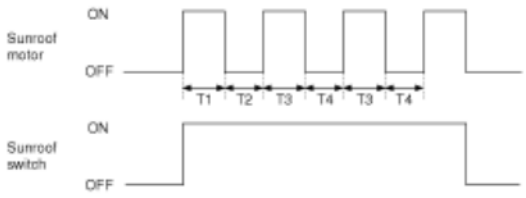
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2. Release the sunroof control lever.
3. Press and hold the CLOSE button for more than 10 seconds until the sunroof closed and it has moved slightly.
4. Release the sunroof control lever.
5. Press and hold the CLOSE button once again within 5 seconds until the sunroof do as follows;
   - Tilt → Slide Open → Slide Close
     Then release the lever.
6. Reset procedure of panorama system is finished.

Protecting Motor From Overheating

In order to protect the sunroof motor from overheating from continuous motor operation, the sunroof ECU controls the Run-time and Cool-time of the motor as follows:

1. The sunroof ECU detects the Run- time of motor
2. Motor can be operated continuously for the 1st run-time(120 ± 10sec.).
3. The continuous operation of motor stops after the 1st Run-time(120 ± 10sec.).
4. Then Motor is not operated for the 1st Cool-time(18 ± 2sec.).
5. Motor is operated for the 2nd Run-time(10 ± 2sec.) at the continued motor operation after 1st Cool-time(18 ± 2sec.)
6. The continuous operation of motor stops operating after the 2nd Run-time(10 ± 2sec.)
7. Motor is not operated for the 2nd Cool-time(18 ± 2sec.).
8. Motor repeats the 2nd run-time and 2nd cool-time at the continued motor operation.
   - In case that motor is not operated continuously, the run-time is increased.
   - The Run-Time of motor is initialized to "0" if the battery or fuse is reconnected after being disconnected, discharged or blown.



T1 : 120 ± 10 sec., T2 : 18 ± 2 sec.,
T3 : 10 ± 2 sec., T4 : 18 ± 2 sec.

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SPECIFICATION

[General type]

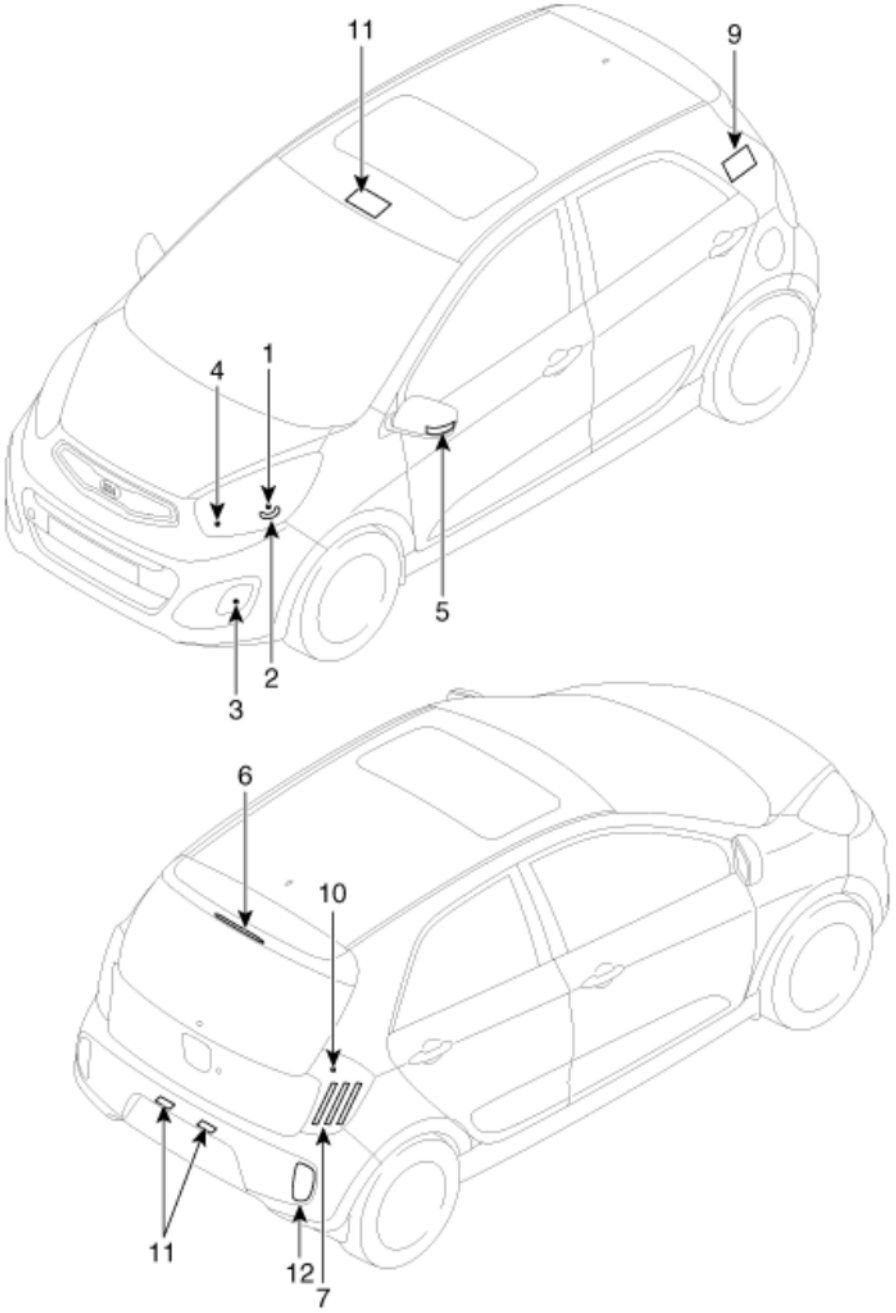
Light Bulb	Wattage	Bulb type
Headlamps (Low/High)	55/60	H4 L/L
Front turn signal lamps	21	PY21W
Front Position lamps (bulb type)	5	W5W
Side repeater lamps	5	WY5W
Front fog lamps	27	GE881
D.R.L (BULB type)	21	P21W
Stop and tail lamp	21/5	P21/5W
Rear turn signal lamps	21	P21W
Back-up lamps	16	W16W
Rear Fog lamp	21	P21W
High mounted stop lamp	5	W5W
License plate lamps	5	W5W
Map lamps	10	W10W
Room lamp	8	FESTOON 8W
Luggage lamp	5	FESTOON 5W

[Projection type]

Light Bulb	Wattage	Bulb type
Headlamps (Low/High)	55	H7 L/L
Front turn signal lamps	21	PY21W
Front Position lamps (LED type)	LED	LED
Side repeater lamps (LED type)	LED	LED
Front fog lamps	27	GE881
D.R.L (LED type)	LED	LED
Stop and tail lamp (LED type)	LED	LED
Rear turn signal lamps	21	P21W
Back-up lamps	16	W16W
High mounted stop lamp (LED type)	LED	LED
License plate lamps	5	W5W
Map lamps	10	W10W
Room lamp	8	FESTOON 8W
Luggage lamp	5	FESTOON 5W

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COMPONENT LOCATION

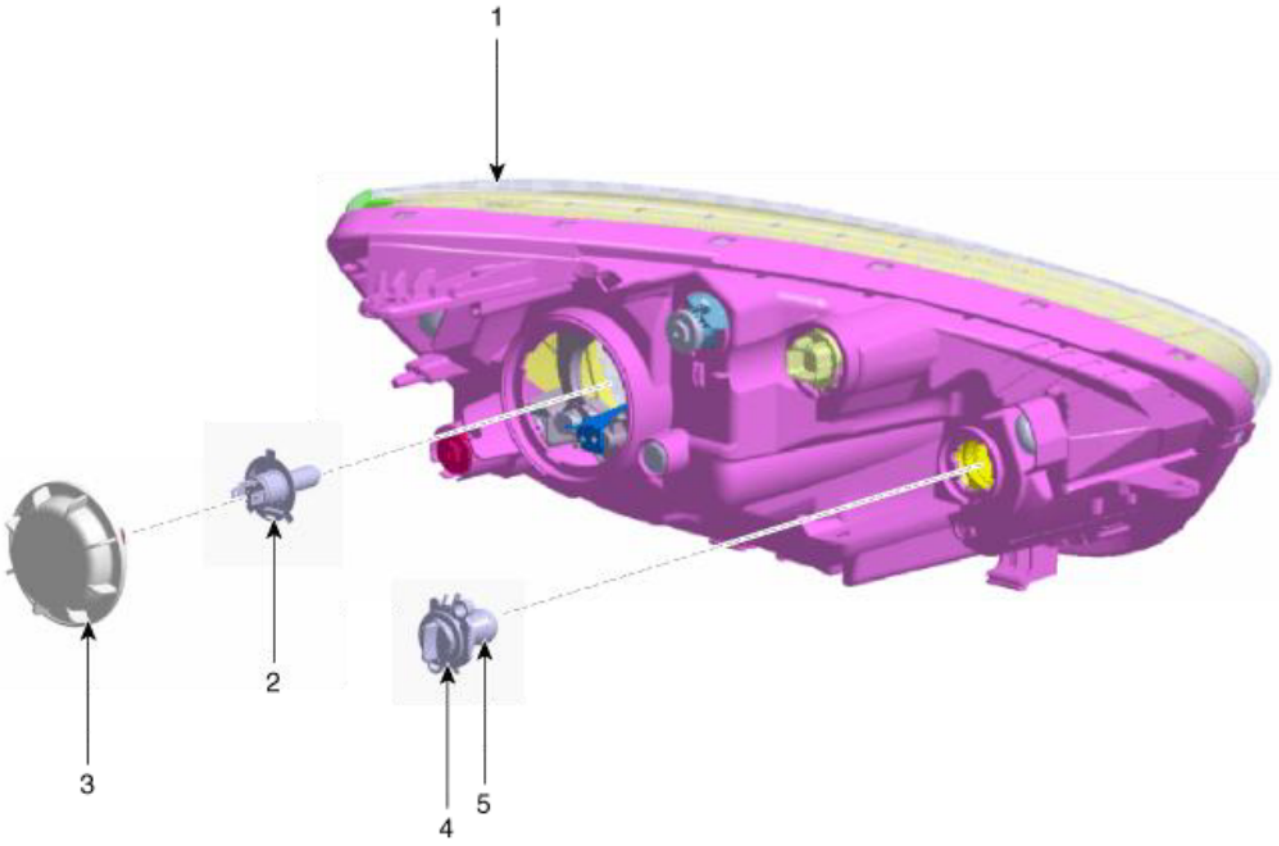


1. Head lamp (Low/High)	8. License lamp
2. Position lamp (LED)	9. Luggage lamp
3. Fog lamp (Fog+DRL)	10. Turn signal lamp
4. Turn signal lamp	11. Overhead lamp
5. Turn signal lamp (Door mirror)	12. Back up lamp
6. High mounted stop lamp	13. Room lamp
7. Tail/stop lamp	

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COMPONENT

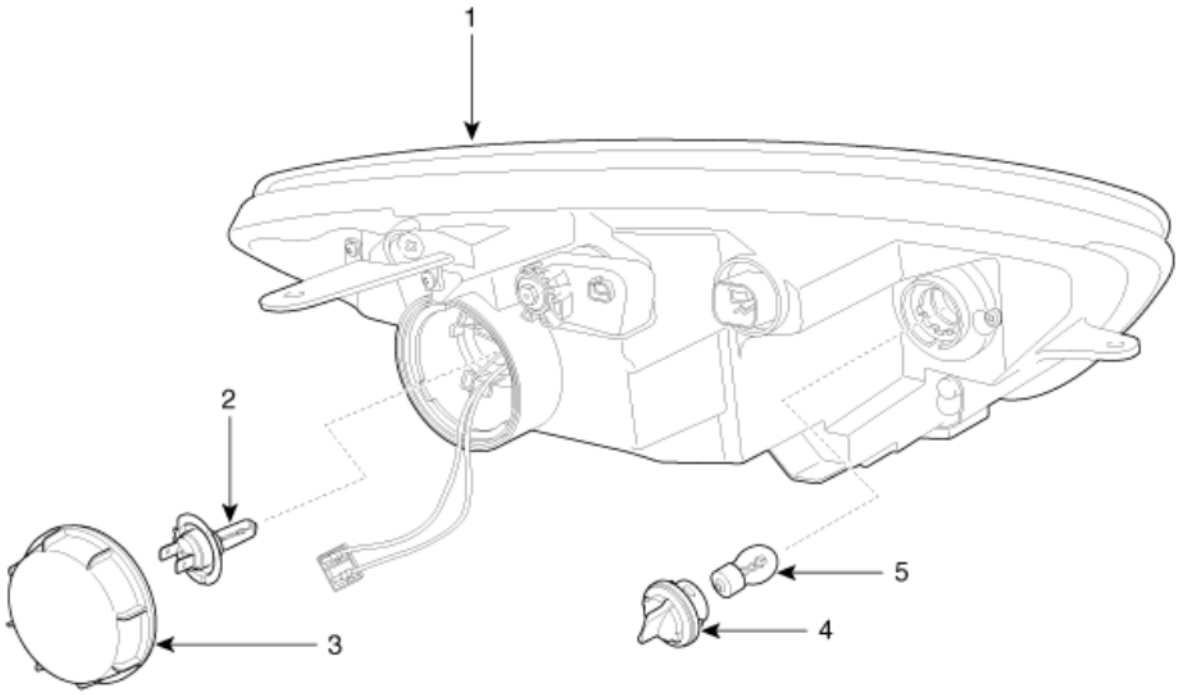
[General]



1. Head lamp assembly lens & housing 2. Head lamp (High/Low) lamp 3. Dust cap	4. Socket 5. Turn signal lamp

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English ▼



1. Head lamp assembly lens & housing 2. Head lamp (High/Low) lamp 3. Dust cap	4. Socket 5. Turn signal lamp

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English

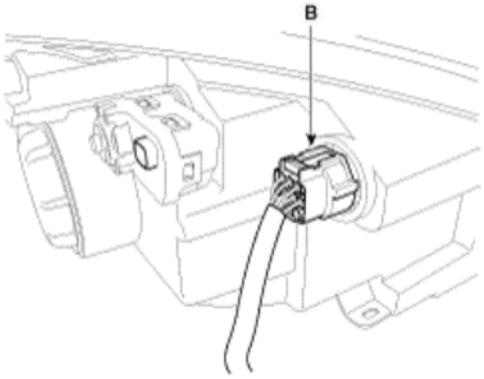
REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Loosening the head lamp mounting bolts (2EA) and disconnect the head lamp connector (B). Then, remove the head lamp assembly (A).

NOTICE

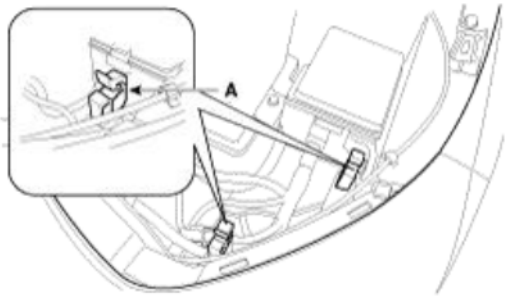
– Take care not to scratch the head lamp lens or fender.





NOTICE

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

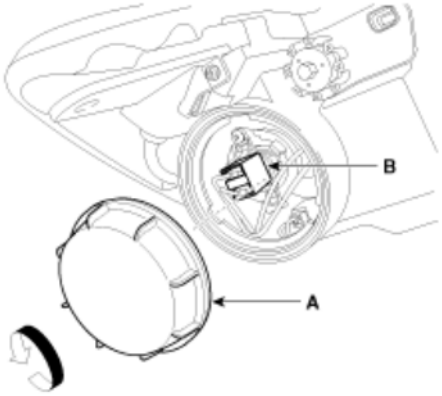


3. Remove the dust caps from the head lamp assembly after turning in the counter clock-wise direction.

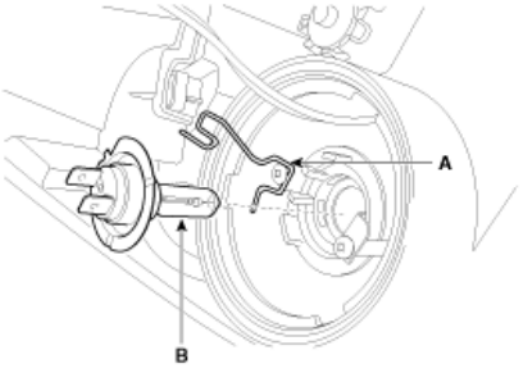
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Headlamp(Low/High) bulb

1. Turn off the lamp power.
2. Disconnect the connector.
3. Open the dust cap (A) and disconnect the connector (B).

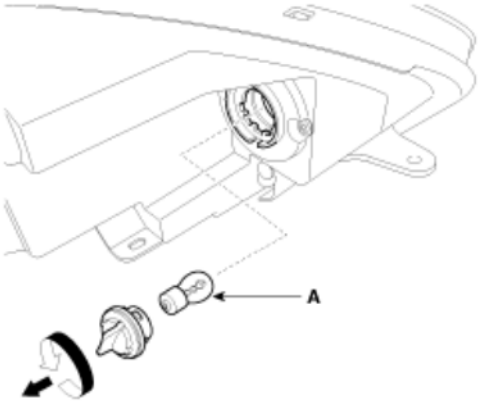


4. Remove the bulb (B) and fixing clip (A).



Turn signal lamp

1. Turn off the lamp power.
2. Remove the socket and bulb (A) of turn signal lamp.



INSTALLATION

1. Install the head lamp bulbs.
2. Connect the connectors.
3. Install the head lamp bolts (3EA).
4. Connect the negative (-) battery terminal.

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HEAD LAMP AIMING INSTRUCTIONS

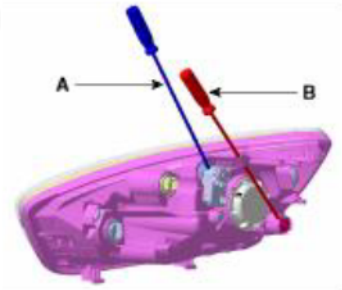
The head lamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer's instructions.

> **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.

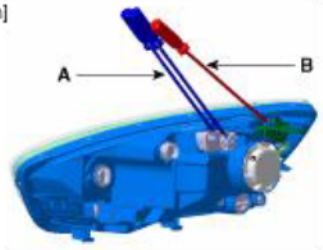
Alternately turn the adjusting gear to adjust the head lamp aiming. If beam-setting equipment is not available, proceed as follows:

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 : Vertical (Low, High)
   B : Horizontal (Low, High)

[General]



[Projection]



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 (A) with a driver.

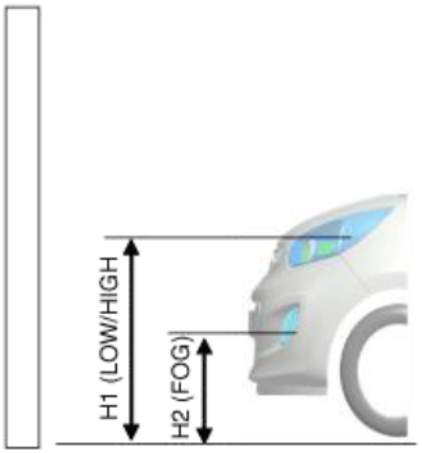


Head Lamp And Fog Lamp Aiming Point

[General]

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< Ground Height >



< Distance between lamps >



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

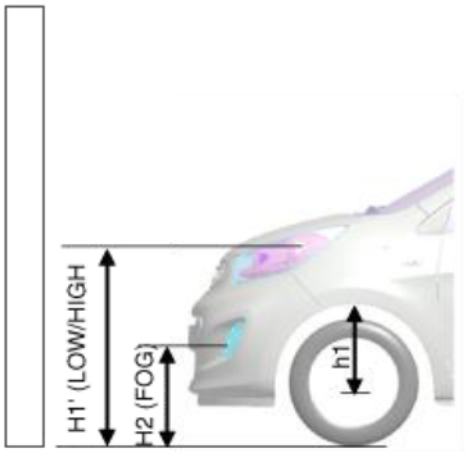
[General]

Unit : in(mm)

Vehicle condition	H1	H2	W1	W2	L
Without driver	31.7(807)	17.4(442)	47.0(1196)	51.1(1300)	Refer to aiming condition
With driver	31.4(798)	170.0(433)			

[Projection (LED)]

< Ground Height >



< Distance between lamps >



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

[Projection (LED)]

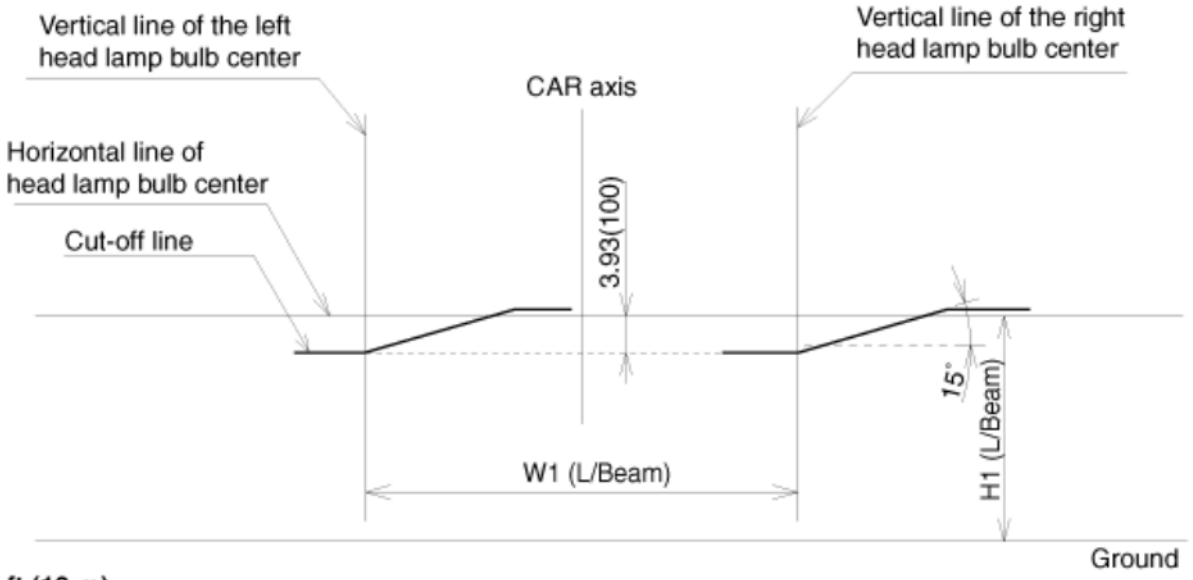
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Unit : in(mm)

Vehicle condition	H1	H2	W1	W2	H3	W3	L
Without driver	32.1(817)	17.4(442)	47.9(1219)	51.1(1300)	14.2(362)	50.0(1270)	Refer to aiming condition
With driver	31.8(808)	170.0(433)			13.9(353)		

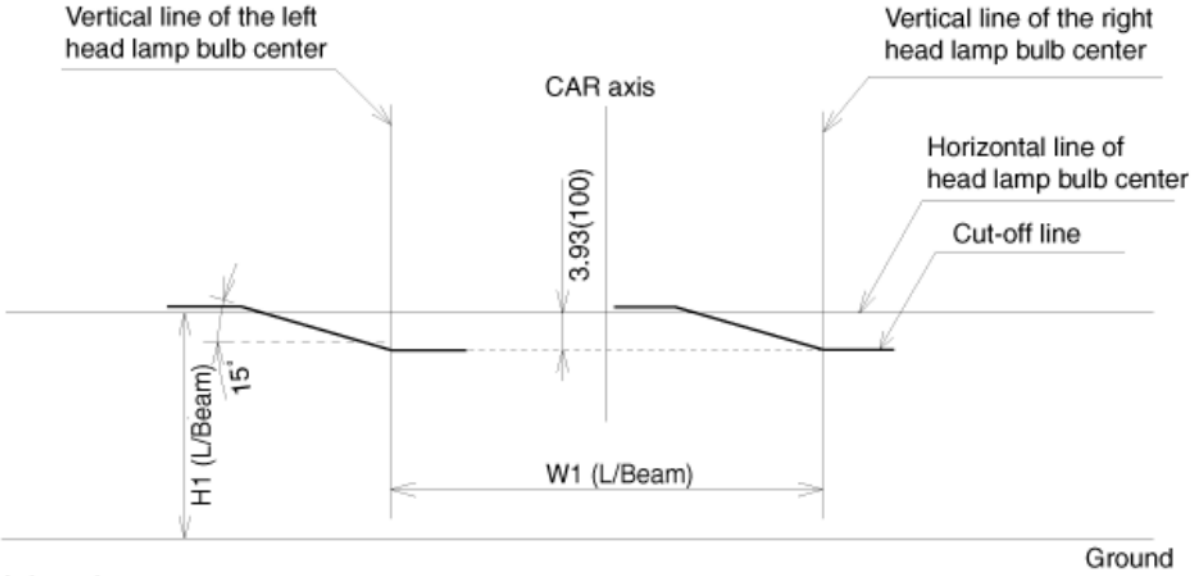
1. Head Lamp (Low beam)
   - Turn the low beam on without driver aboard.
   - The cut-off line should be projected in the cut-off line shown in the picture.
   - If head lamp leveling device is equipped, adjust the head lamp leveling device switch with 0 positions.

[LHD]



L : 32.8 ft (10 m)
Unit : in.(mm)

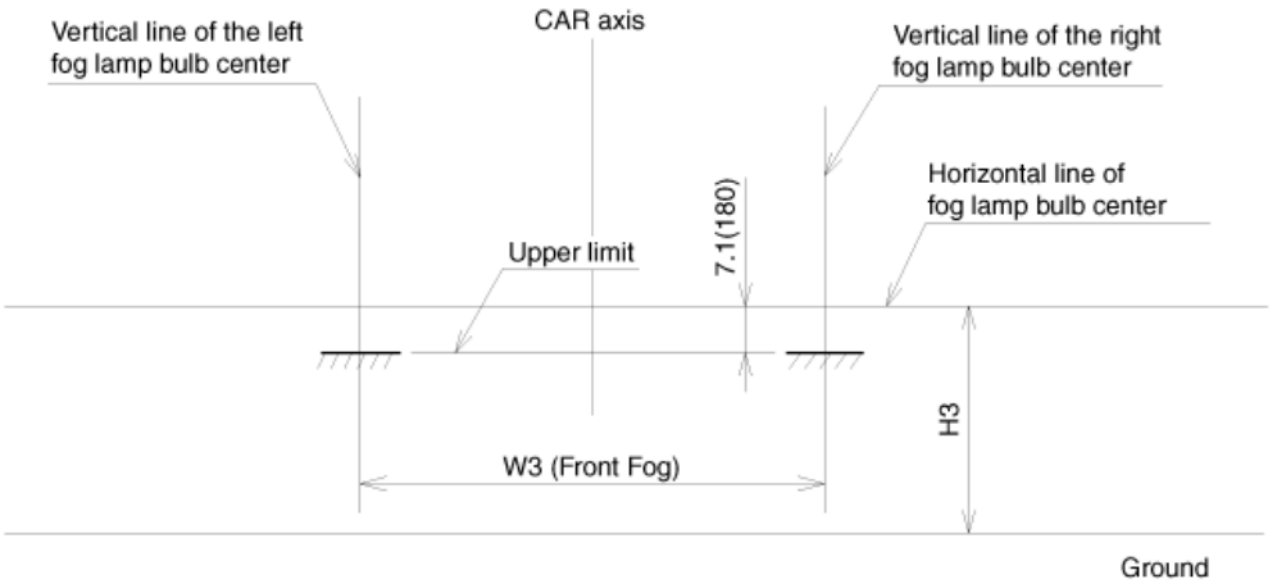
[RHD]



L : 32.8 ft (10 m)
Unit : in.(mm)

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

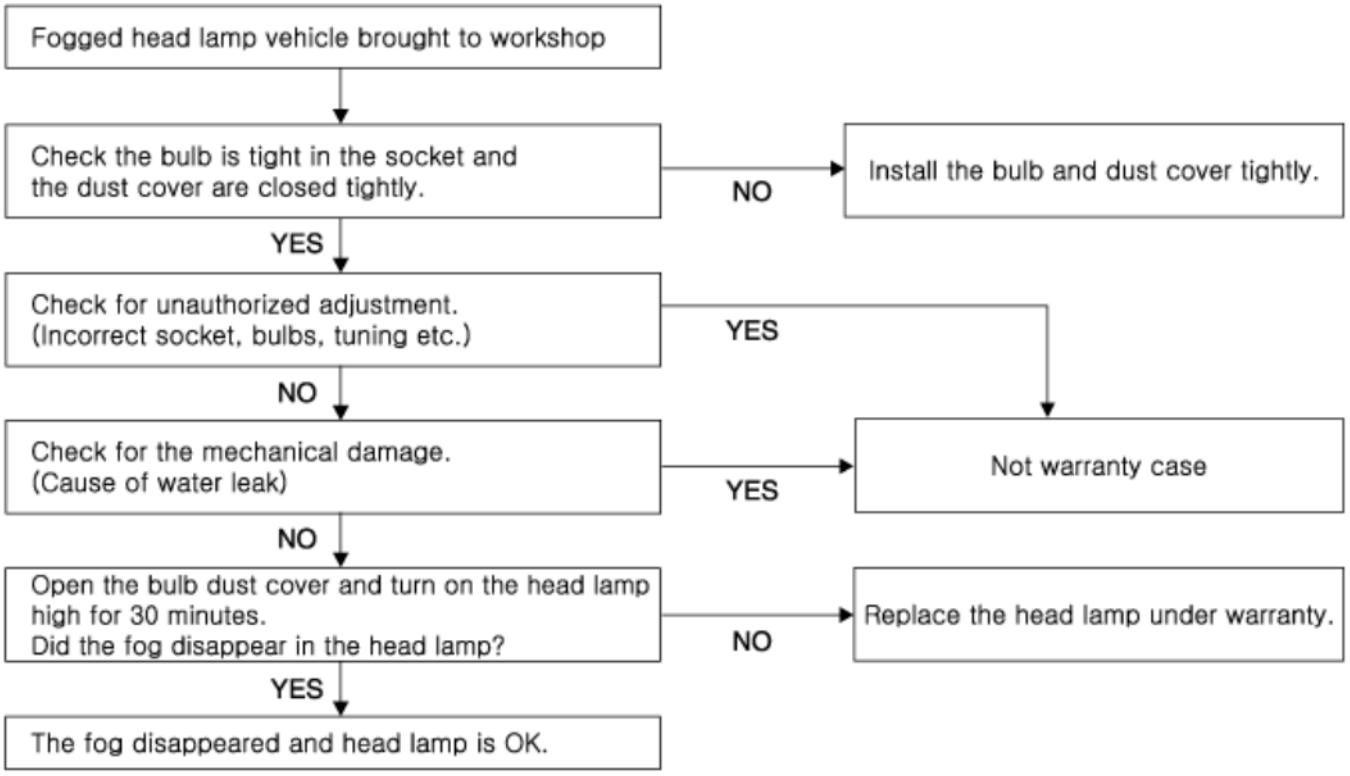
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L : 32.8 ft (10 m)
Unit : in.(mm)

Head lamp fogging

Check the below instruction procedure when the head lamp is fogged.



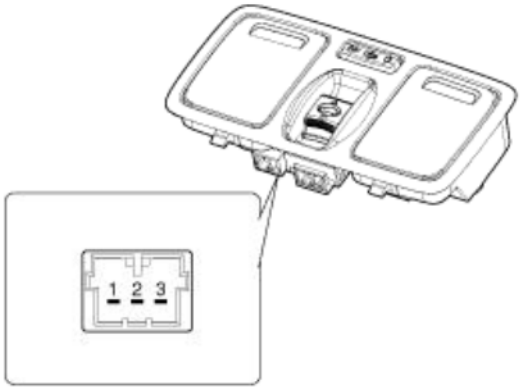
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INSPECTION

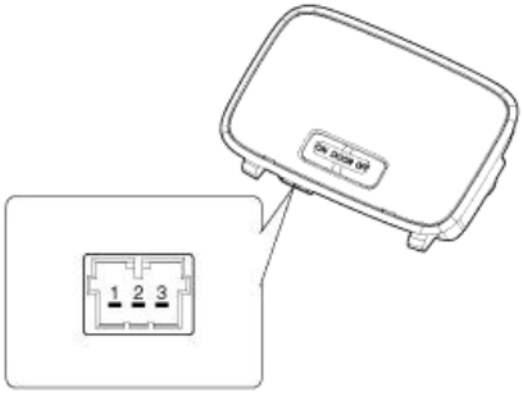
Room Lamp

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

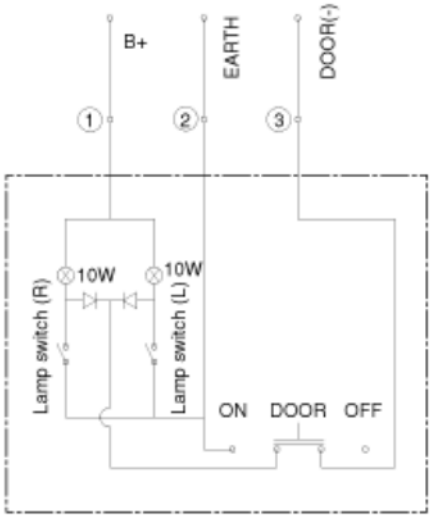
[Sunroof]



[General]



NO	Description	NO	Description
1	BAT(+)	3	Door(-)
2	GND		



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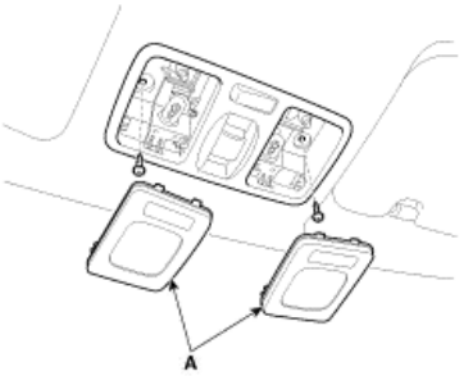
Terminal / Position	1	2	3
ON	○	⊗	○
OFF			
DOOR	○	⊗	○

English ▼

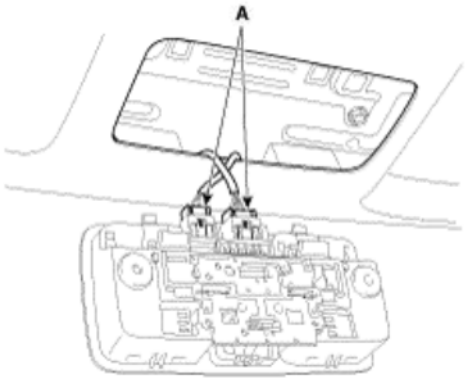
REMOVAL

Room Lamp

1. Disconnect the negative (-) battery terminal.
2. Carefully remove the lamp lens (A) from the room lamp with a flat-tip screwdriver.



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



INSTALLATION

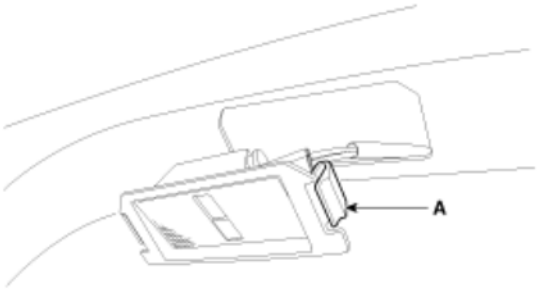
Room Lamp

1. Reconnect the connector.
2. Install the room lamp assembly.
3. Install the lens.

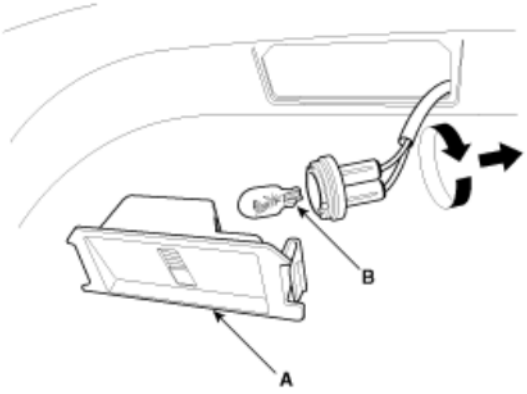
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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the license lamp lens by pushing the clip (A).



3. Replace the lamp bulbs (B) after turning the socket in the counter clock-wise direction from lens (A).



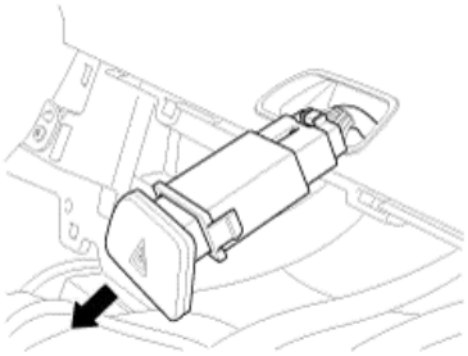
INSTALLATION

1. Install the bulb.
2. Install the lens and license lamp.

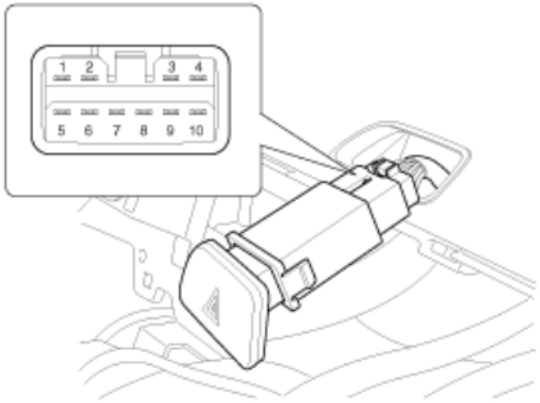
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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the hazard lamp switch assembly in the crash pad center facia panel. (Refer to the Body group - "Crash pad")



3. Disconnect the hazard lamp switch (A).



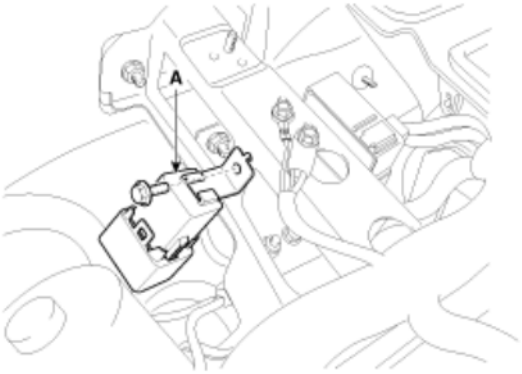
4. Operate the switch and check for continuity between terminals with an ohmmeter.

Terminal / Position	OFF	ON	Remark
8	○		IGN
9		○	Battery
7	○	○	F BATT
10		○	Signal
1		○	F Lamp
4		○	Right
3		○	Left
6	○		Illumination -
5	○		Illumination +

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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the upper main crash pad
   (Refer to the BD group - "Crash pad")
3. Remove the flasher unit(A) after loosening bolt.



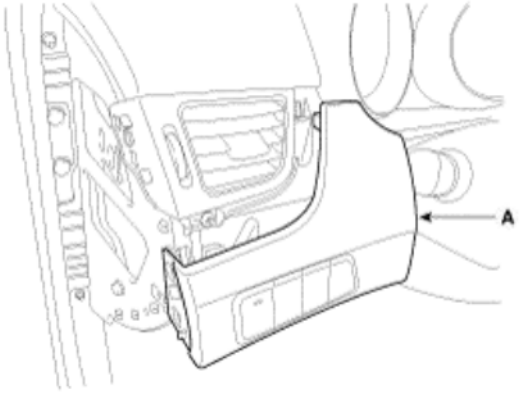
INSTALLATION

1. Install the flasher unit and connector.
2. Install the upper main crash pad.

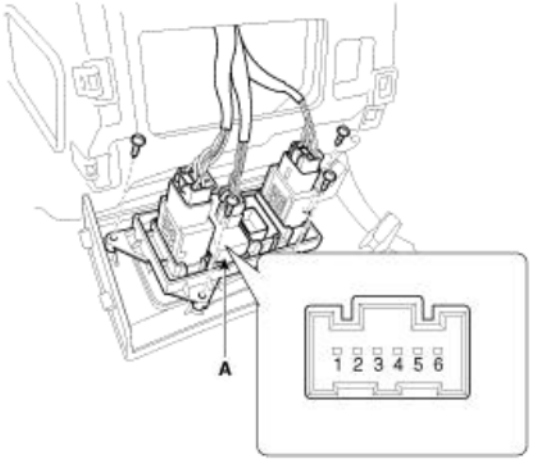
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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower switch (A).



3. Remove the rheostat switch connector (A).



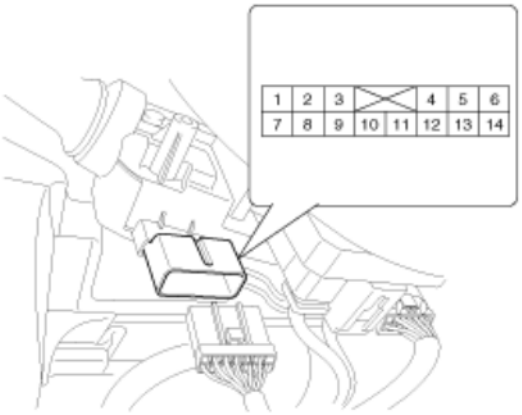
4. Operate the rheostat switch and check for continuity between terminals.

Position / Terminal	UP	DOWN	Remarks
5	○	○	Ground
6		○	DOWN
2	○		UP
4	○		Illumination(-)
3	○		Illumination(+)

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INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the lighting switch of the multi-function switch. (Refer to the multi-function switch)
3. With the front fog lamp switch, make sure that continuity exists between the terminals below.
   If continuity is not as specified, replace the multi-function switch.

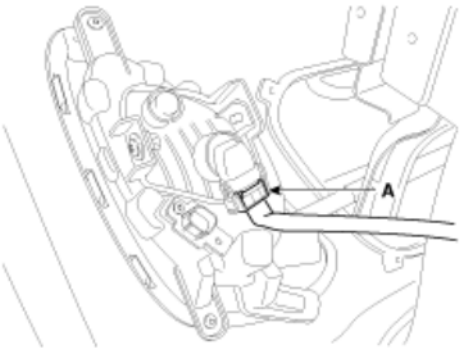


Fog lamp switch

Terminal / Position	1	3	2
OFF			
Rear	○	○	
Front+Rear	○	○	○

REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the front wheel guard.
   (Refer to the BD group - "Front bumper")
3. Remove the front fog lamp connector (A) from the front bumper.

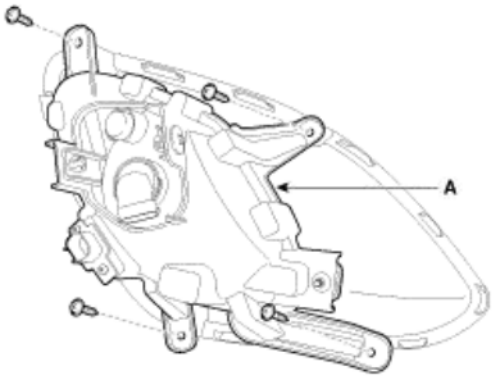


4. Remove the front fog bulb (A) turning it in the counterclockwise direction.

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5. Remove the front fog lamp assembly (A).



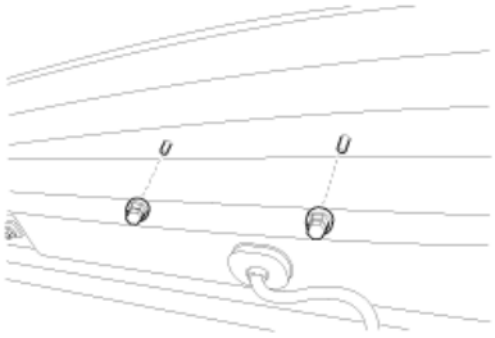
INSTALLATION

1. Install the front fog bulb.
2. Reconnect the lamp connector.
3. Install the front wheel guard.

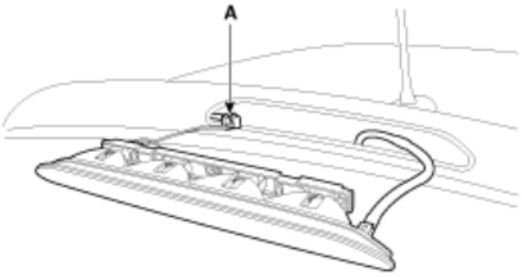
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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Open the tail gate and remove the nuts.



3. Remove the connector (A) from high mounted stop lamp.

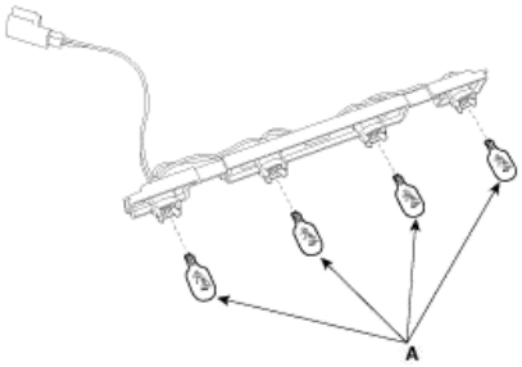


4. Remove the bulb assembly (A) after loosening the fixing clip (Bulb type only).



5. Replace the bulbs (A). (Bulb type only)

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INSTALLATION

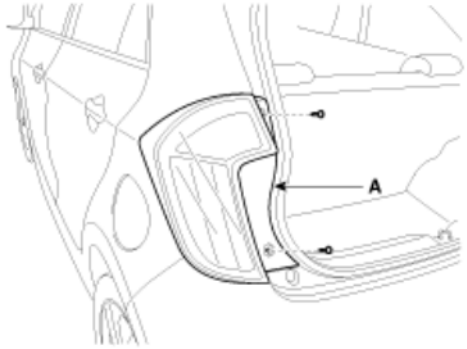
1. Install the bulb assembly and high mounted stop lamp
2. Connect the connector.
3. Connect the negative (-) battery terminal.

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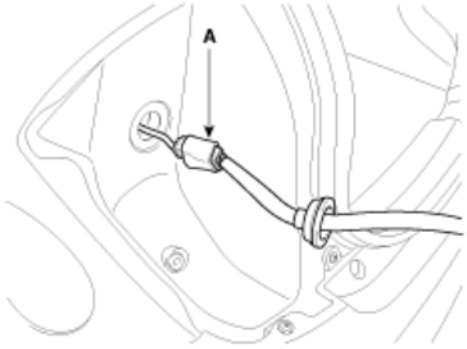
REMOVAL

Rear Combination lamp

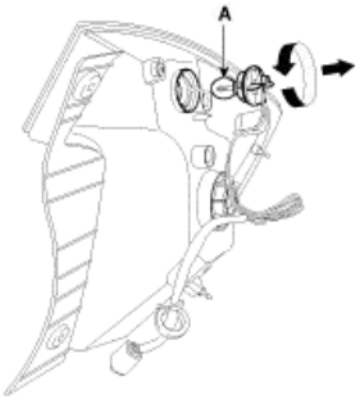
1. Disconnect the negative (-) battery terminal.
2. Remove the rear combination lamp (A) after loosening screws.



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



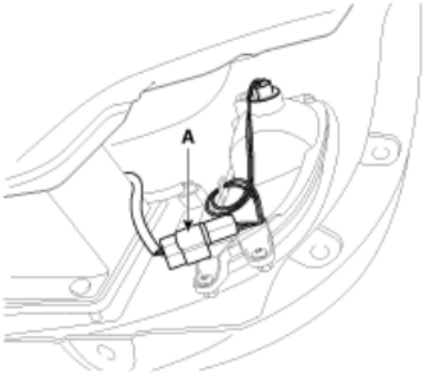
4. Replace the lamp bulbs after turning in the counter clock-wise direction.



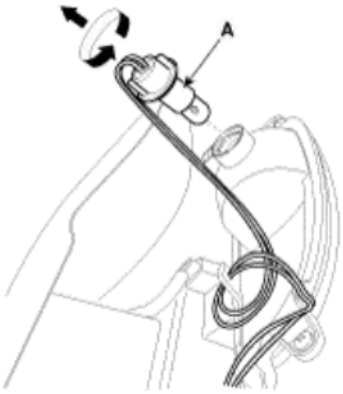
Back up lamp

1. Disconnect the negative (-) battery terminal.
2. Lift the vehicle up and remove the rear tire wheel cover.
   (Refer to the BD group - "Rear bumper")
3. Remove the back up lamp connector (A).

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4. Replace the lamp bulbs (A) after turning in the counter clock-wise direction.



INSTALLATION

Rear combianation lamp

1. Install the bulbs and connect the connector.
2. Install the rear combianation lamp.

Back up lamp

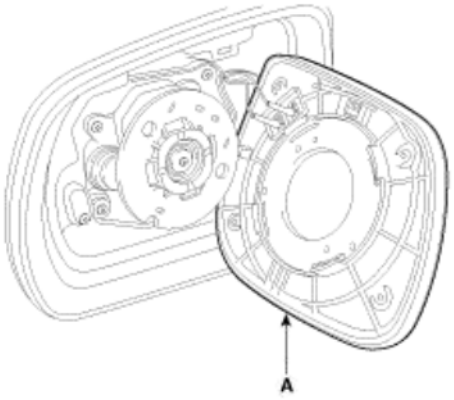
1. Install the lamp bulbs and connector.
2. Install the rear tire wheel cover.
3. Connect the negative (-) battery terminal.

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REMOVAL

Door Mirror Turn Signal Lamp

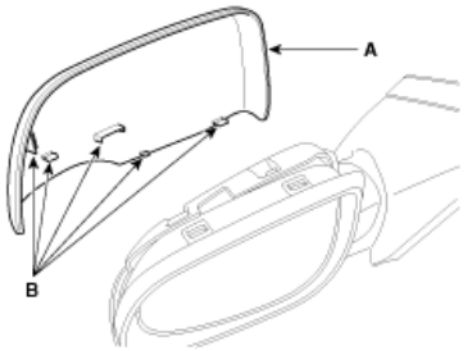
1. Disconnect the negative (-) battery terminal.
2. Remove the mirror (A) from the mirror holder.



NOTICE

Take care not to damage the mirror cover fixing clip.

3. Loosen the fixing clip and remove the door mirror cover (A).

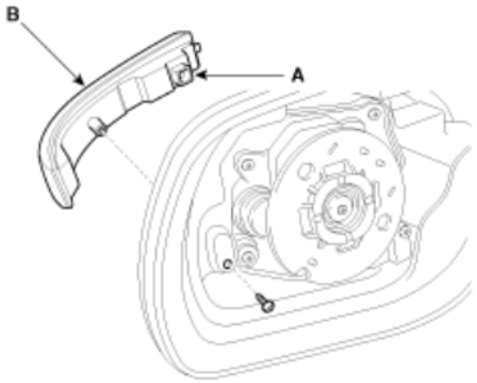


NOTICE

Take care not to damage the mirror cover fixing clip (B).

4. Loosen a screw and disconnect a connector (A). Remove the door mirror turn signal lamp (B).

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INSTALLATION

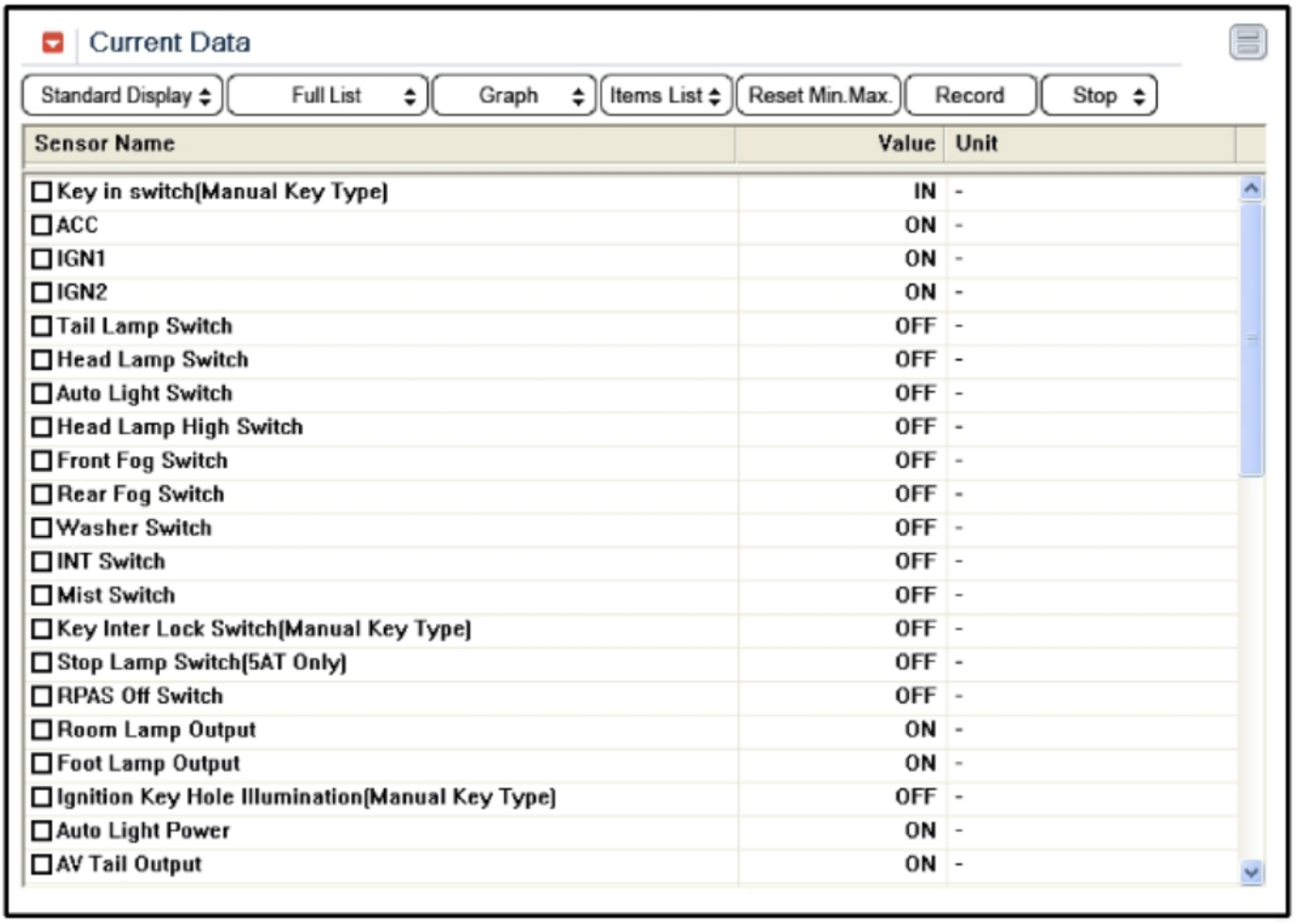
Door Mirror Turn Signal Lamp

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

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TROUBLESHOOTING

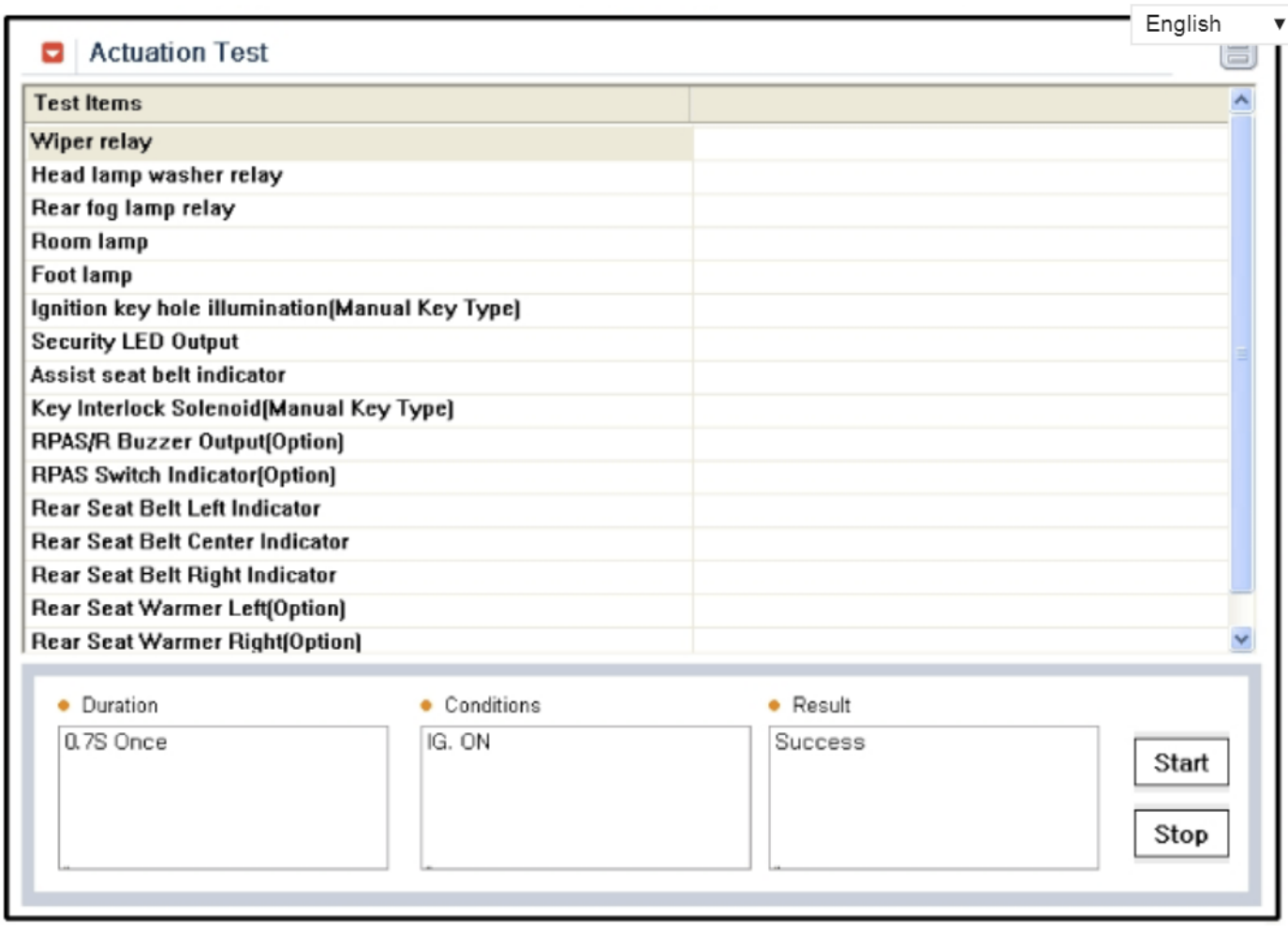
1. The lamp switch inputs can be checked using the GDS.
2. To check the input value of lamp switch, select option "Body Control Module".
3. To consult the present input/output value of BCM, "Current DATA". It provides information of BCM input/output conditions of power supply, turn signal/brake lamp, headlamp, door, locks, outside mirror, wiper, auto-light and transmitters etc.



Sensor Name	Value	Unit
Key in switch(Manual Key Type)	IN	-
ACC	ON	-
IGN1	ON	-
IGN2	ON	-
Tail Lamp Switch	OFF	-
Head Lamp Switch	OFF	-
Auto Light Switch	OFF	-
Head Lamp High Switch	OFF	-
Front Fog Switch	OFF	-
Rear Fog Switch	OFF	-
Washer Switch	OFF	-
INT Switch	OFF	-
Mist Switch	OFF	-
Key Inter Lock Switch(Manual Key Type)	OFF	-
Stop Lamp Switch(5AT Only)	OFF	-
RPAS Off Switch	OFF	-
Room Lamp Output	ON	-
Foot Lamp Output	ON	-
Ignition Key Hole Illumination(Manual Key Type)	OFF	-
Auto Light Power	ON	-
AV Tail Output	ON	-

4. To check the input value of lamp switch in force mode, select option "Actuation Test".

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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
	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

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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
Rear fog lamps do not light	Rear fog lamp fuse (15A) blown	Check for short and replace fuse
	Rear fog lamp fuse (15A) blown	Check for short and replace fuse
	Rear fog lamp switch faulty	Check switch
	Rear fog lamp relay faulty	Check relay
	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

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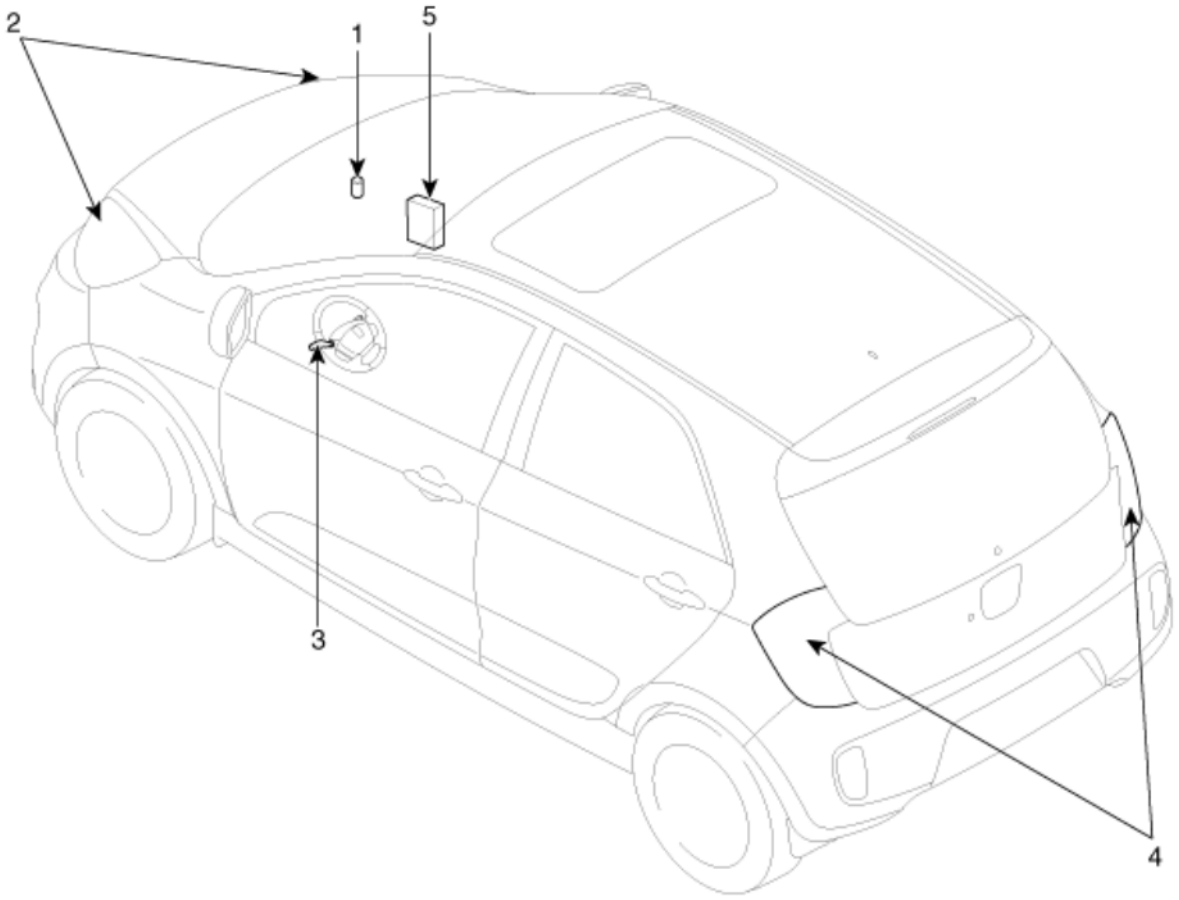
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SPECIFICATIONS

Items		Specifications
Rated voltage		5V
Load		Max. 1mA (When head lamp lighting)
Illuminations (LUX)	50	1.42 ± 0.31V
	100	2.63 ± 0.58V
	150	3.84 ± 0.84V

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COMPONENT LOCATION

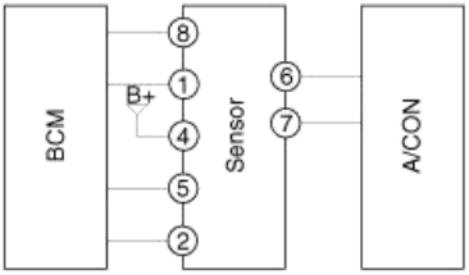


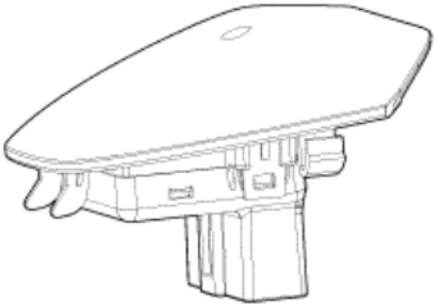
1. Auto light sensor 2. Head lamps 3. Lighting switch (Auto)	4. Tail lamps 5. Body control module (BCM)

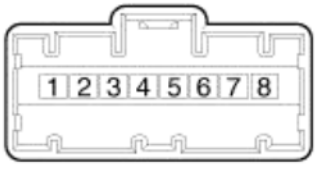
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English

CIRCUIT DIAGRAM







[Auto Light Connector]

No.	Description
1	Auto light signal
2	Auto light GND
3	-
4	LED power (B+)
5	LED GND (To BCM)
6	Photo signal (LH)
7	Photo power (SW)
8	Auto light power (5V)

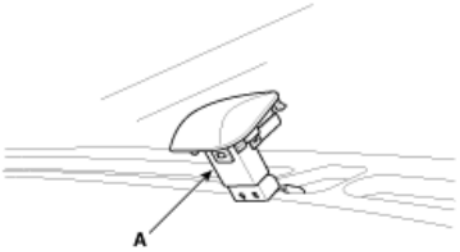
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INSPECTION

In the state of IGN1 ON, when multifunction 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.
The auto light control doesn't work if the pin sunlight supply (5V regulated power from Ignition 1 power to sunlight sensor) is in short circuit with the ground.
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 auto light sensor (A) from crash pad upper side by using screw (-) driver.



NOTICE

Apply the protective tapes to auto light sensor and its related parts.

3. Remove the auto light connector.

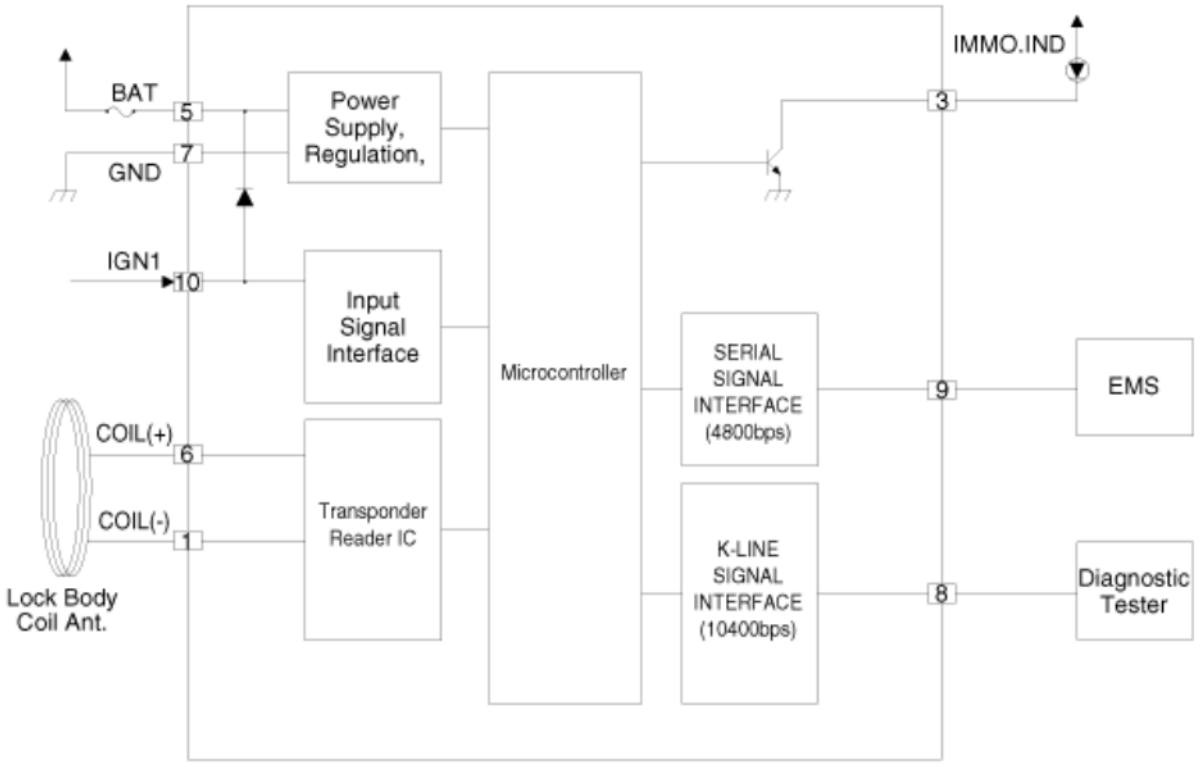
INSTALLATION

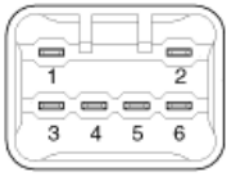
1. Reconnect the auto light connector.
2. Install the auto light sensor.

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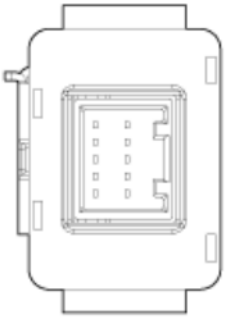
English

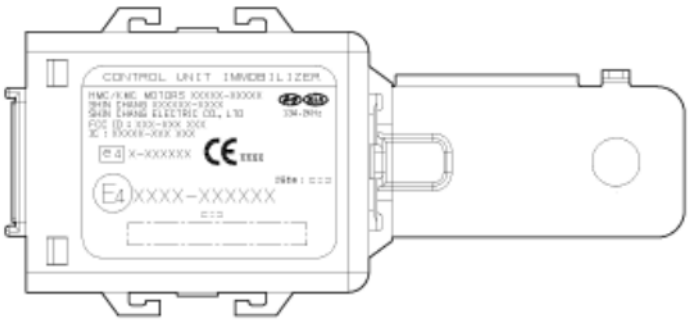
CIRCUIT DIAGRAM





Coil antenna connector



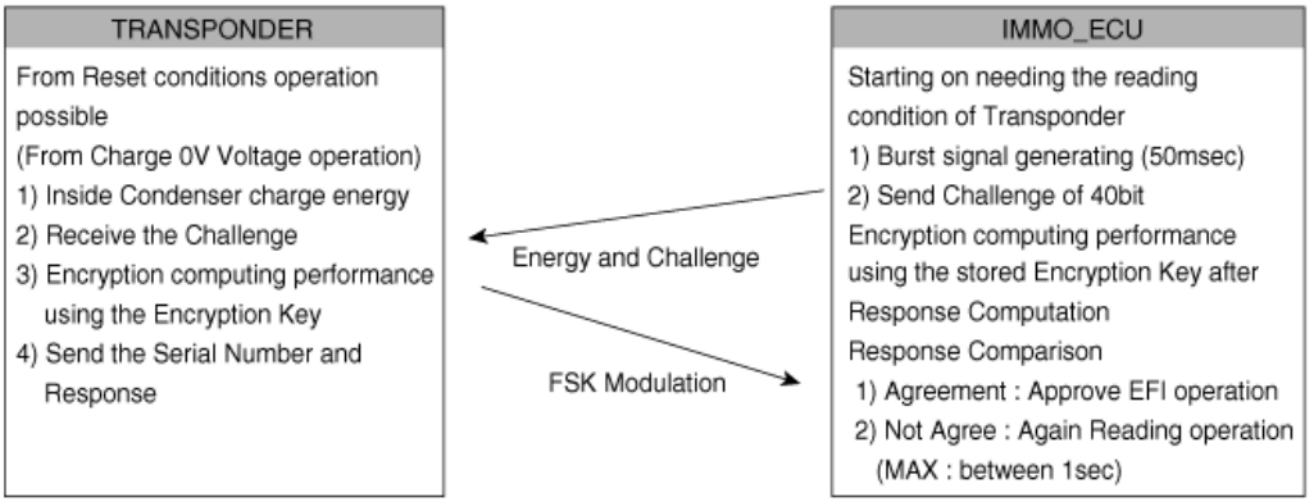


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DESCRIPTION

The immobilizer system will disable the vehicle unless the proper ignition key is used, in addition to the currently available anti-theft systems such as car alarms, the immobilizer system aims to drastically reduce the rate of auto theft.

1. Transponder (TP) – IMMO ECU Communication



TP Read Protocol

(1) IMMO_ECU after IGN on(or CPU Reset cancellation) is sent Challenge to TP and confirmed Serial Number and Signature.

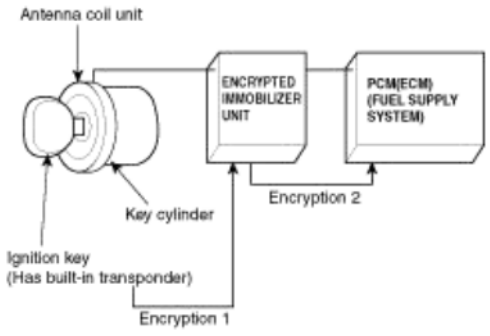
(2) When response of input transponder is not correct, input is retry.

(3) When response of input transponder is correct, The data that calculate Encryption operation in the EEPROM program compared with received data from TP.
When Codes is same, input is finished.
If the codes are not same, input are continued until when codes are same.

(4) If IMMO_ECU EEPROM code is not programming, when correct transponder is inputted (CRC Check OK), input is finished.

(5) After IGN1 on(CPU Reset cancellation), IMMO_ECU is reading the maximum 5times Transponder Code

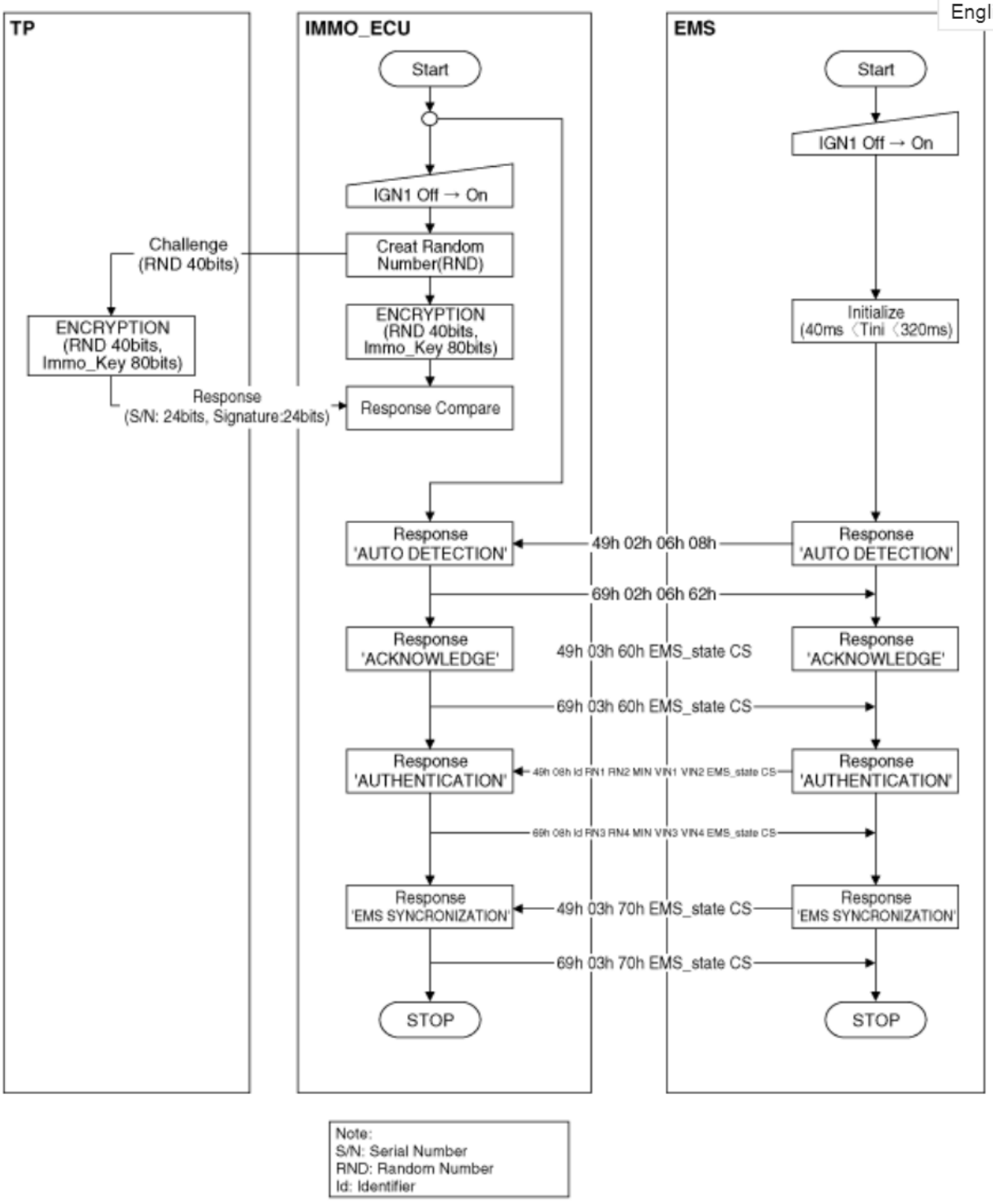
(6) In the IGN1 ON&EMS_state=Lock state, when received ANKNOWLEDGE, TP is re-authenticated



2. TP / IMMO ECU / EMS Authentication Flowchart

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English ▼

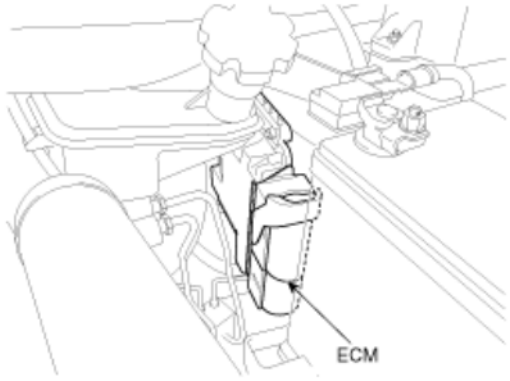


COMPONENTS OPERATIONS

ECM (Engine Control Module)

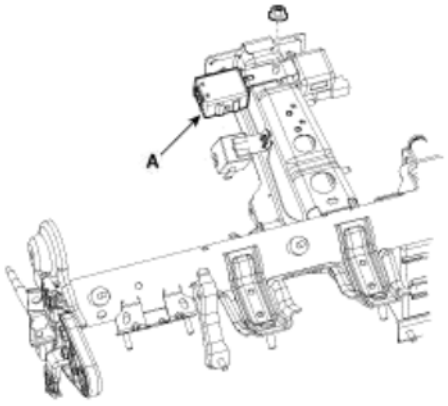
1. The ECM(PCM) (A) carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the ECM simultaneously. Only if the results are equal, the engine can be started. The data of all transponders, which are valid for the vehicle, are stored in the ECM.
   ERN (Encrypted Randorn Number) value between EMS and encrypted Immobilizer unit is checked and the validity of coded key is decided by EMS.

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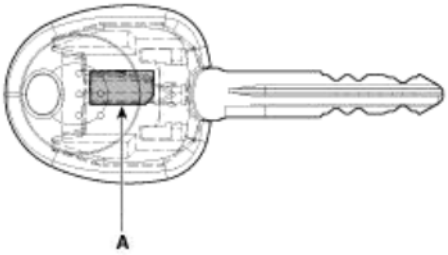
ENCRYPTED Immobilizer unit (A)

The Immobilizer carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The Immobilizer is mounted behind of the crash pad close to center cross bar.
The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the Immobilizer device. And, the received messages from the PCM (ECM) are converted into an RF signal, which is transmitted to the transponder by the antenna.
The Immobilizer does not carry out the validity check of the transponder or the calculation of encryption algorithm. This device is only an advanced interface, which converts the RF data flow of the transponder into serial communication to the ECM and vice versa.



TRANSPONDER (Built-in keys)

The transponder (A) has an advanced encryption algorithm. During the key teaching procedure, the transponder will be programmed with vehicle specific data. The vehicle specific data are written into the transponder memory. The write procedure is once only; therefore, the contents of the transponder can never be modified or changed.

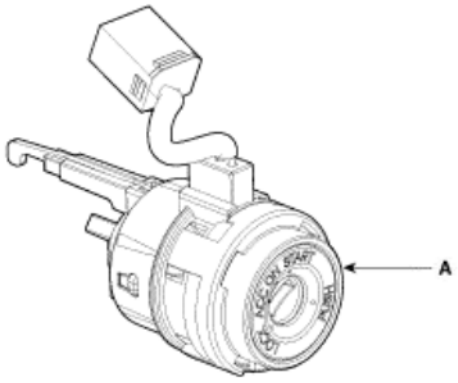


Antenna coil

The antenna coil (A) has the following functions.

- The antenna coil supplies energy to the transponder.
- The antenna coil receives signal from the transponder.
- The antenna coil sends transponder signal to the Immobilizer.
  It is located directly on the shroud.

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REPLACEMENT

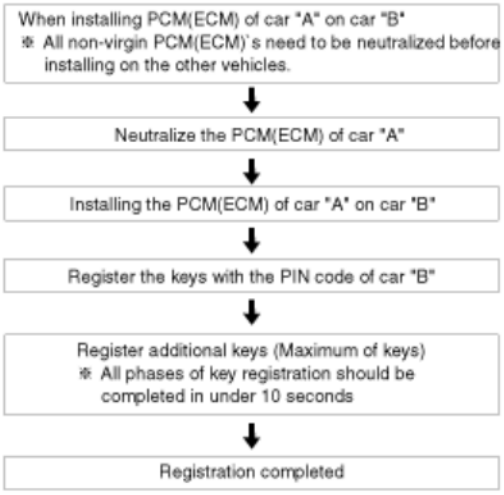
Problems And Replacement Parts:

Problem	Part set	Scan tool required?
All keys have been lost	Blank key (4)	YES
Antenna coil unit does not work	Antenna coil unit	NO
ECM does not work	ECM	YES
Ignition switch does not work	Ignition switch with Antenna coil unit	YES
Unidentified vehicle specific data occurs	Key, ECM	YES
Immobilizer unit does not work	Immobilizer unit	YES

Replacement Of Ecm And Immobilizer

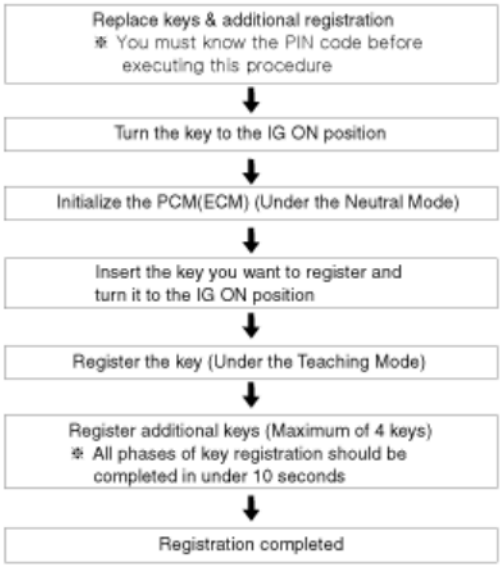
In case of a defective ECM, the unit has to be replaced with a "virgin" or "neutral" ECM. All keys have to be taught to the new ECM. Keys, which are not taught to the ECM, are invalid for the new ECM (Refer to key teaching procedure). The vehicle specific data have to be left unchanged due to the unique programming of transponder.
In case of a defective Immobilizer, it needs teaching the Immobilizer. A new Immobilizer device replaces the old one and Immobilizer need teaching.

1. Things to remember before a replacement (ECM)



2. Things to remember before a replacement (Keys & Additional registration)

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NOTICE

1) When there is only one key registered and you wish to register another key, you need to re-register the key which was already registered.
2) When the key #1 is registered and master key #2 is not registered, Put the key #1 in the IG/ON or the start position and remove it. The engine can be started with the unregistered key #2.
(Note that key #2 must be used within 10 seconds of removing key #1)
3) When the key #1 is registered and key #2 is not registered, put the unregistered master key #2 in the IG/ON or the start position.
The engine cannot be started even with the registered key #1.
4) When you inspect the immobilizer system, refer to the above paragraphs 1, 2 and 3.
Always remember the 10 seconds zone.
5) If the pin code & password are entered incorrectly on three consecutive inputs, the system will be locked for one hour.
6) Be cautious not to overlap the transponder areas.
7) Problems can occur at key registration or vehicle starting if the transponders should overlap.

Neutralizing Of ECM

The ECM can be set to the "neutral" status by a tester.
A valid ignition key is inserted and after ignition on is recorded, the ECM requests the vehicle specific data from the tester. The communication messages are described at "Neutral Mode" After successfully receiving the data, the ECM is neutralized.
The ECM remains locked. Neither the limp home mode nor the "twice ignition on" function, is accepted by the ECM.
The teaching of keys follows the procedure described for the virgin ECM. The vehicle specific data have to be unchanged due to the unique programming of the transponder. If data should be changed, new keys with a virgin transponder are requested.
This function is for neutralizing the ECM and Key. Ex) when lost key, Neutralize the ECM then teach keys.
(Refer to the Things to do when Key & PIN Code the ECM can be set to the "neutral" status by a scanner. If wrong vehicle specific data have been sent to immobilizer three times continuously or intermittently, the immobilizer will reject the request to enter neutral mode for one hour. Disconnecting the battery or other manipulation cannot reduce this time. After connecting the battery the timer starts again for one hour.

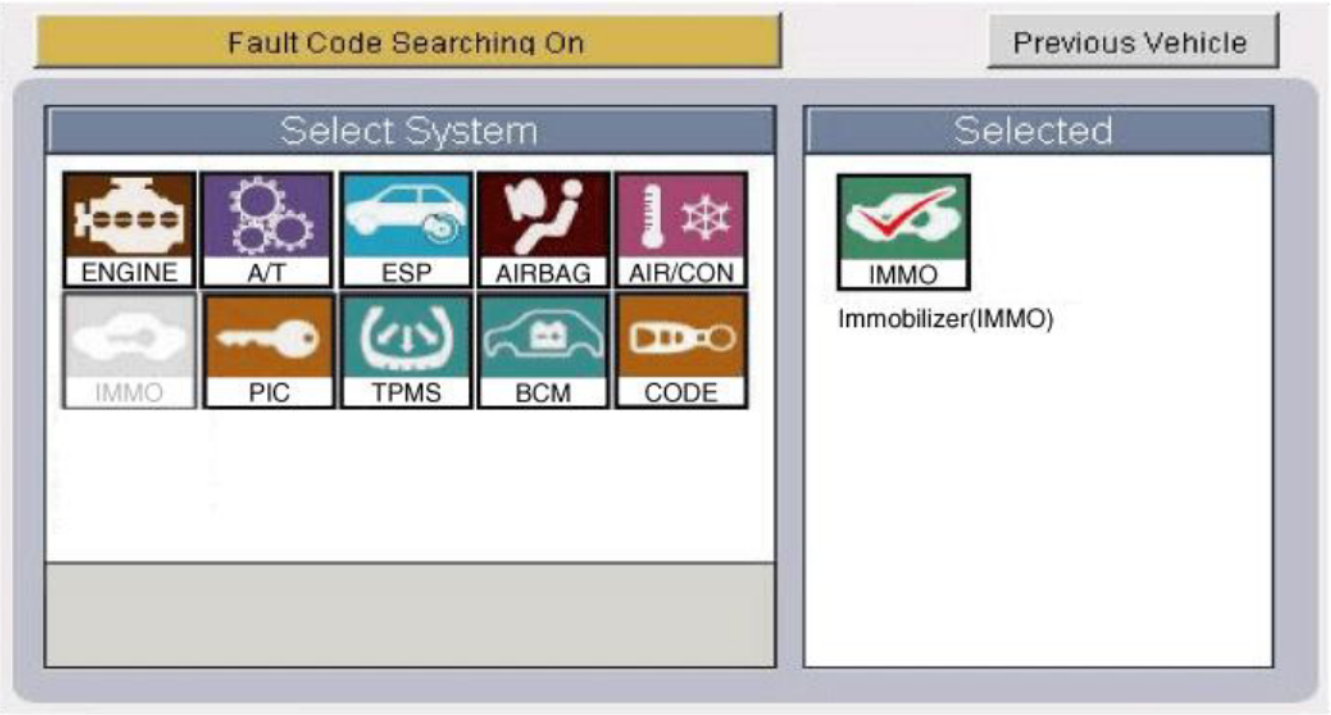
NOTICE

- Neutralizing setting condition
  - In case of ECM status "Learnt" regardless of user password "Virgin or Learnt"
  - Input correct PIN code by scanner.
  - Neutralizing meaning .
    : PIN code (6) & user password (4) deletion.
    : Locking of ECM (except key teaching permission)

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- Neutralizing meaning:
  - PIN Code(6) & User P/Word(4) deletion
  - Locking of EMS(except Key Learning permission)

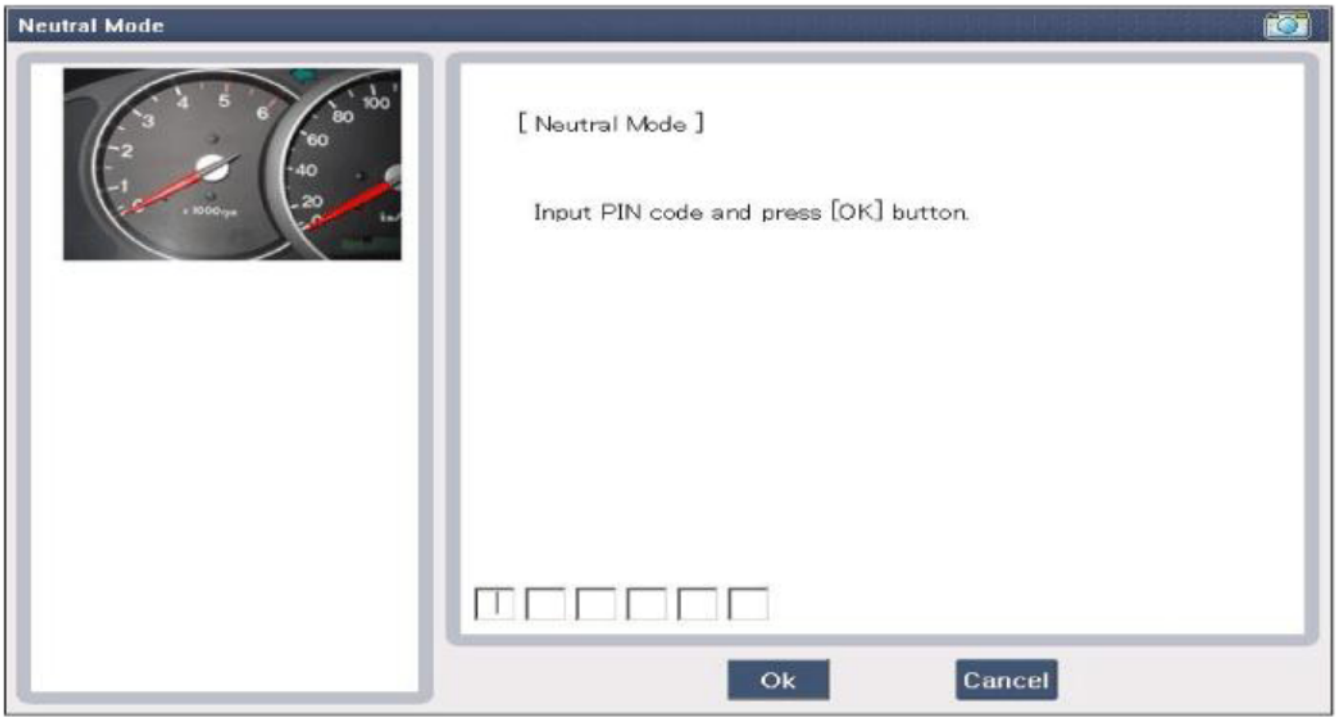
Function / EMS	Engine Running			Learning	
	Learnt Key	Limp home	Twice Ignition	Key	User Password
Neutral	No	No	No	Yes	No

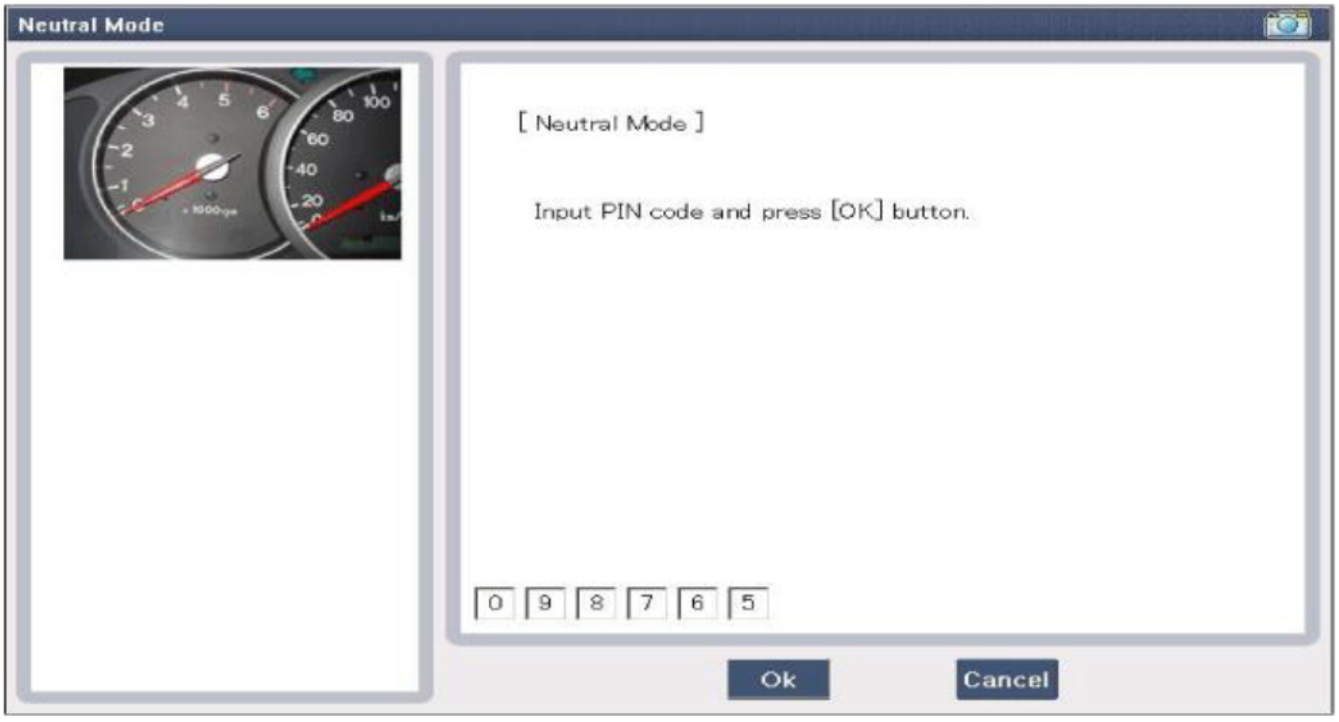


ID Register

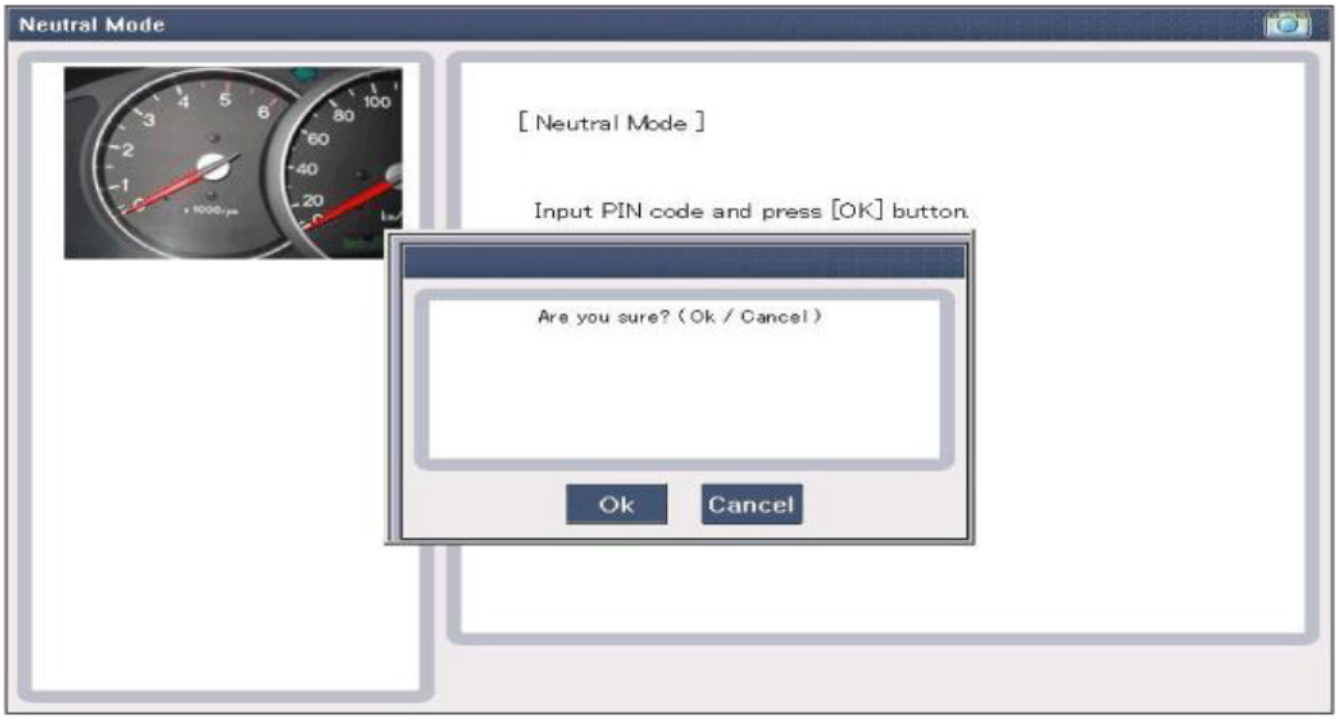
- Password Teaching/Changing
- Neutral Mode
- Limp Home Mode
- Teaching

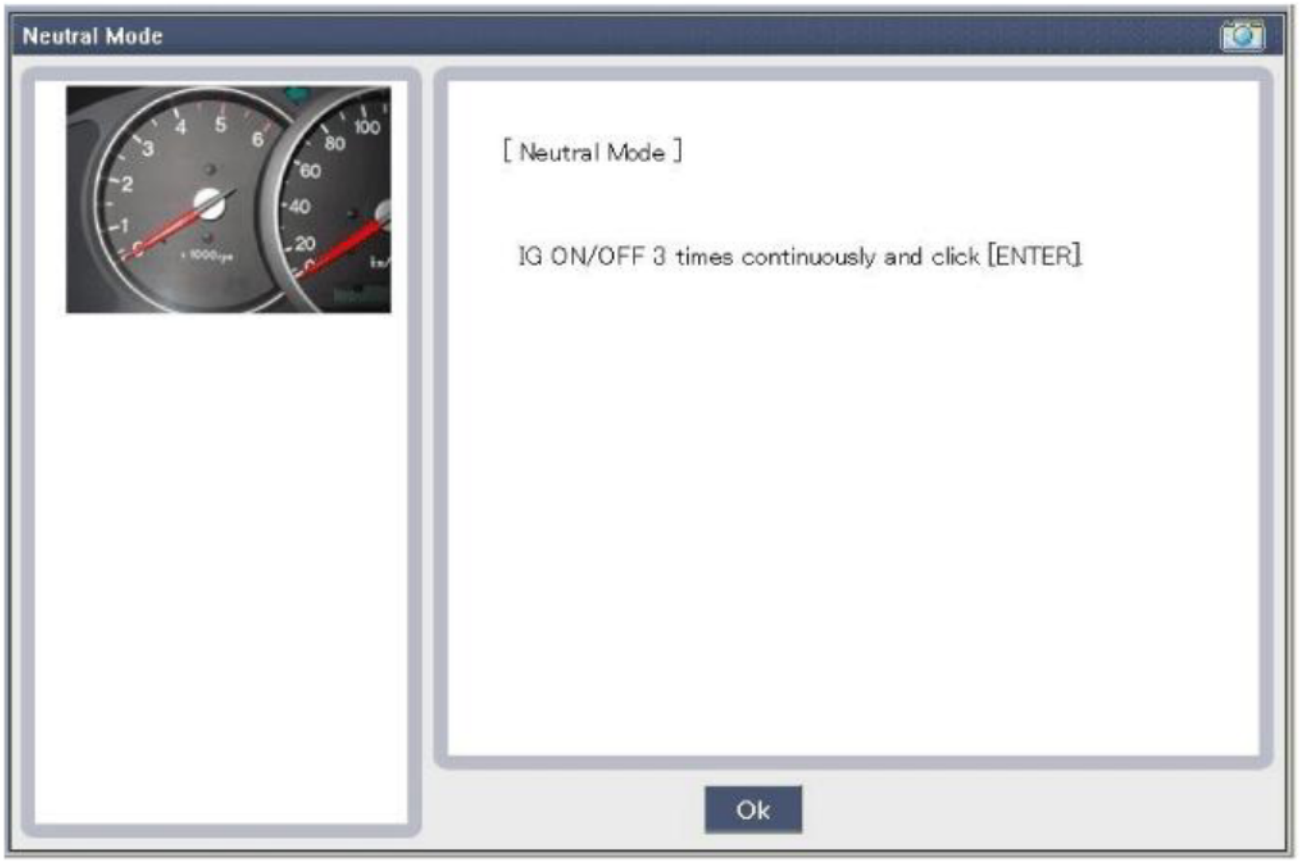
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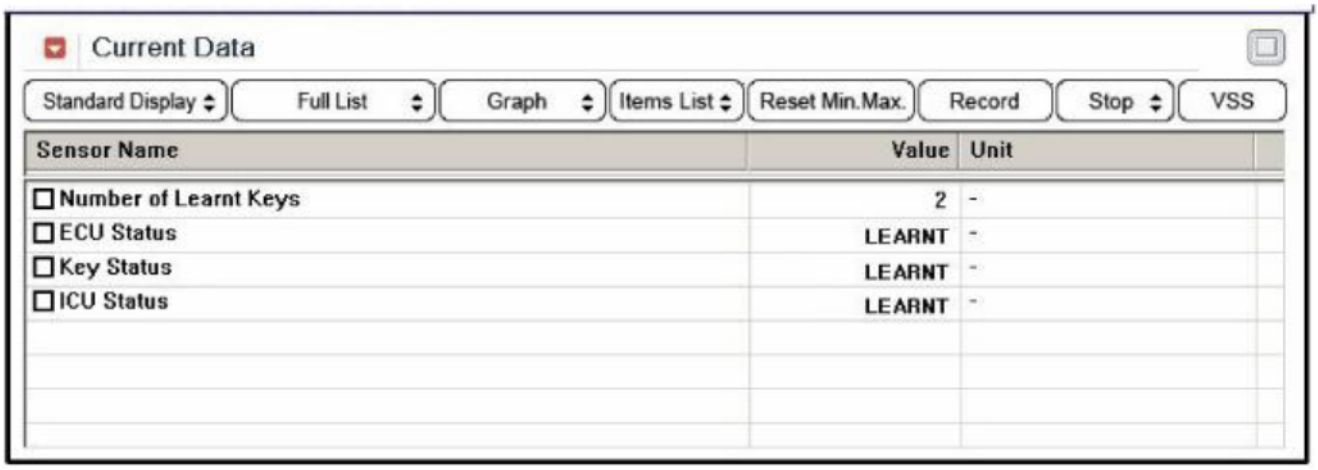
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TEACHING PROCEDURES

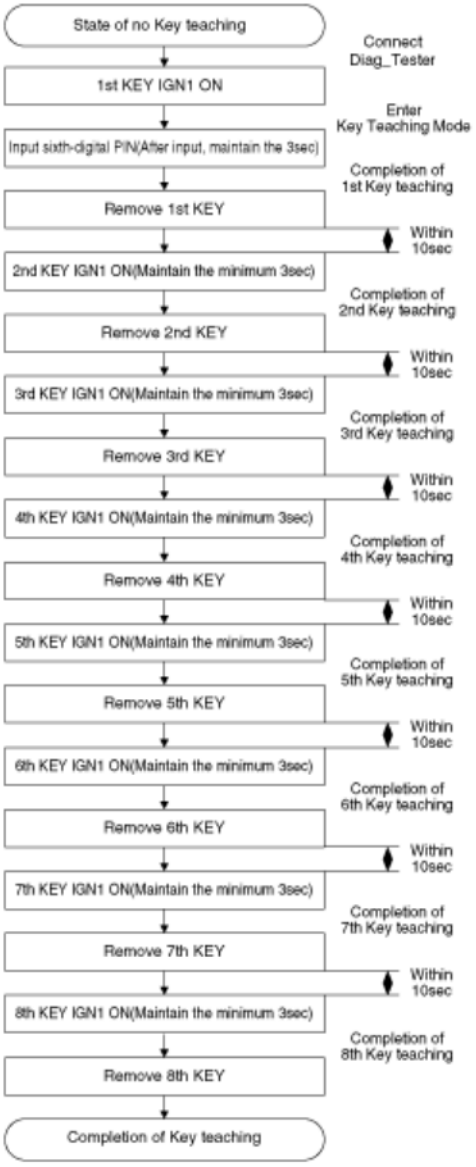
1. Key Teaching Procedure
   Key teaching must be done after replacing a defective ECM or when providing additional keys to the vehicle owner.
   The procedure starts with an ECM request for vehicle specific data (PIN code: 6digits) from the tester. The "virgin" ECM stores the vehicle specific data and the key teaching can be started. The "learnt" ECM compares the vehicle specific data from the tester with the stored data. If the data are correct, the teaching can proceed.
   If incorrect vehicle specific data have been sent to the ECM three times, the ECM will reject the request of key teaching for one hour. This time cannot be reduced by disconnecting the battery or any other manipulation. After reconnecting the battery, the timer starts again for one hour.
   The key teaching is done by ignition on with the key and additional tester commands. The ECM stores the relevant data in the EEPROM and in the transponder. Then the ECM runs the authentication required for confirmation of the teaching process. The successful programming is then confirmed by a message to the tester.
   If the key is already known to the ECM from a previous teaching, the authentication will be accepted and the EEPROM data are updated. There is no changed transponder content (this is impossible for a learnt transponder).
   The attempt to repeatedly teach a key, which has been taught already during the same teaching cycle, is recognized by the ECM. This rejects the key and a message is sent to the tester.
   The ECM rejects invalid keys, which are presented for teaching. A message is sent to the tester. The key can be invalid due to faults in the transponder or other reasons, which result from unsuccessful programming of data. If the ECM detects different authenticators of a transponder and an ECM, the key is considered to be invalid.
   The maximum number of taught keys is 8

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If an error occurs during the Immobilizer Service Menu, the ECM status remains unchanged and a specific fault code is stored.
If the ECM status and the key status do not match for teaching of keys, the tester procedure will be stopped and a specific fault code will be stored at ECM.

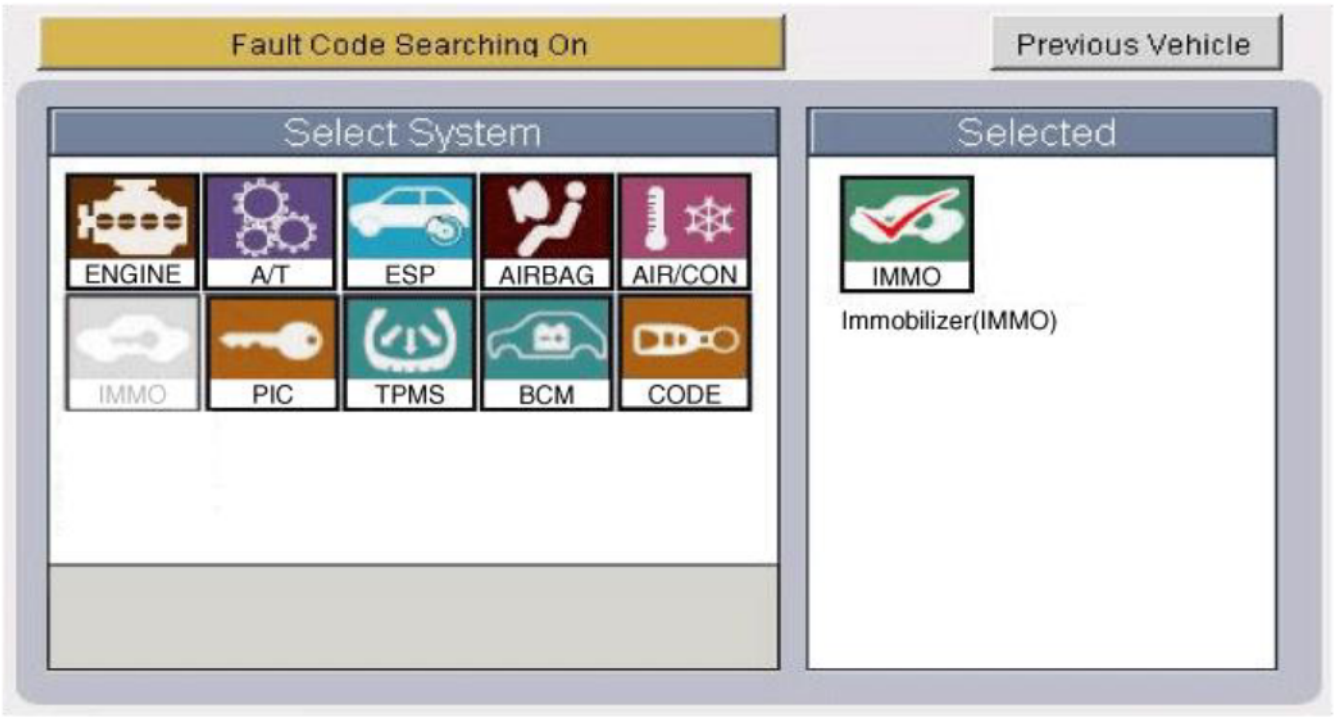
NOTICE

When teaching the 1st key, Immobilizer regists at the same time.



(1) ECM learnt status.

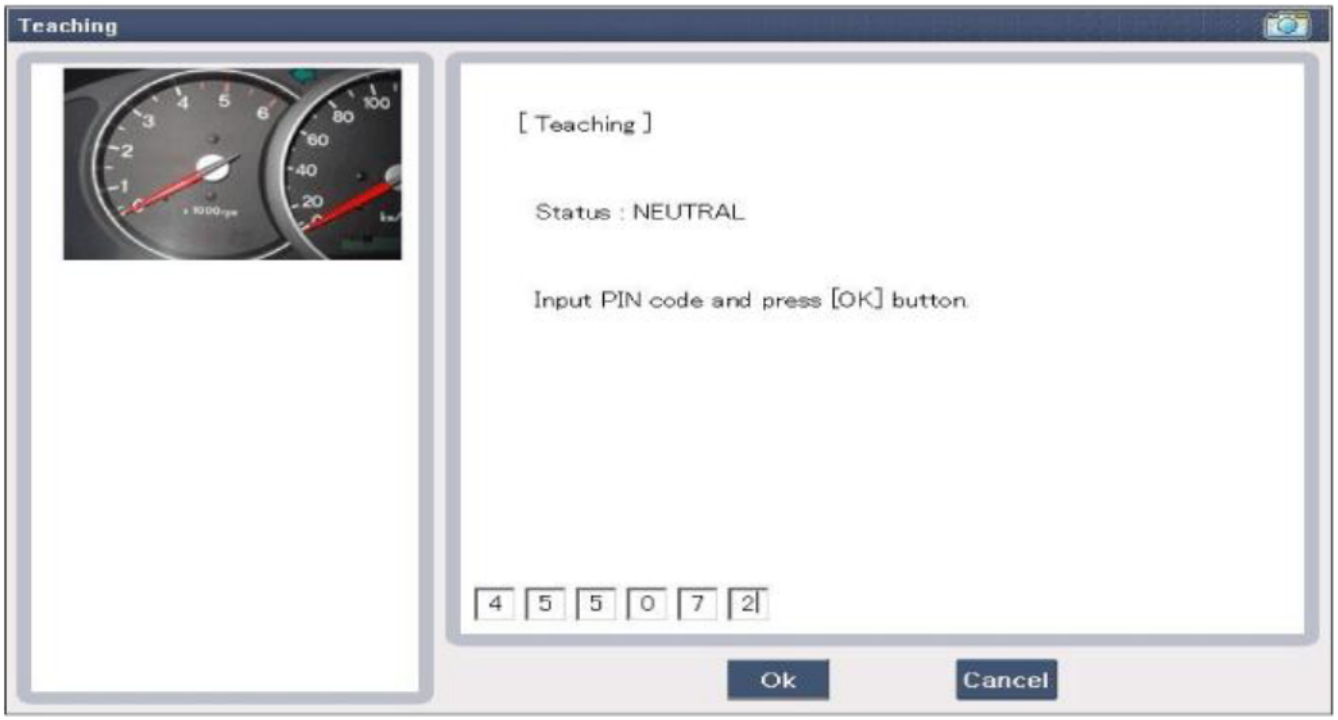
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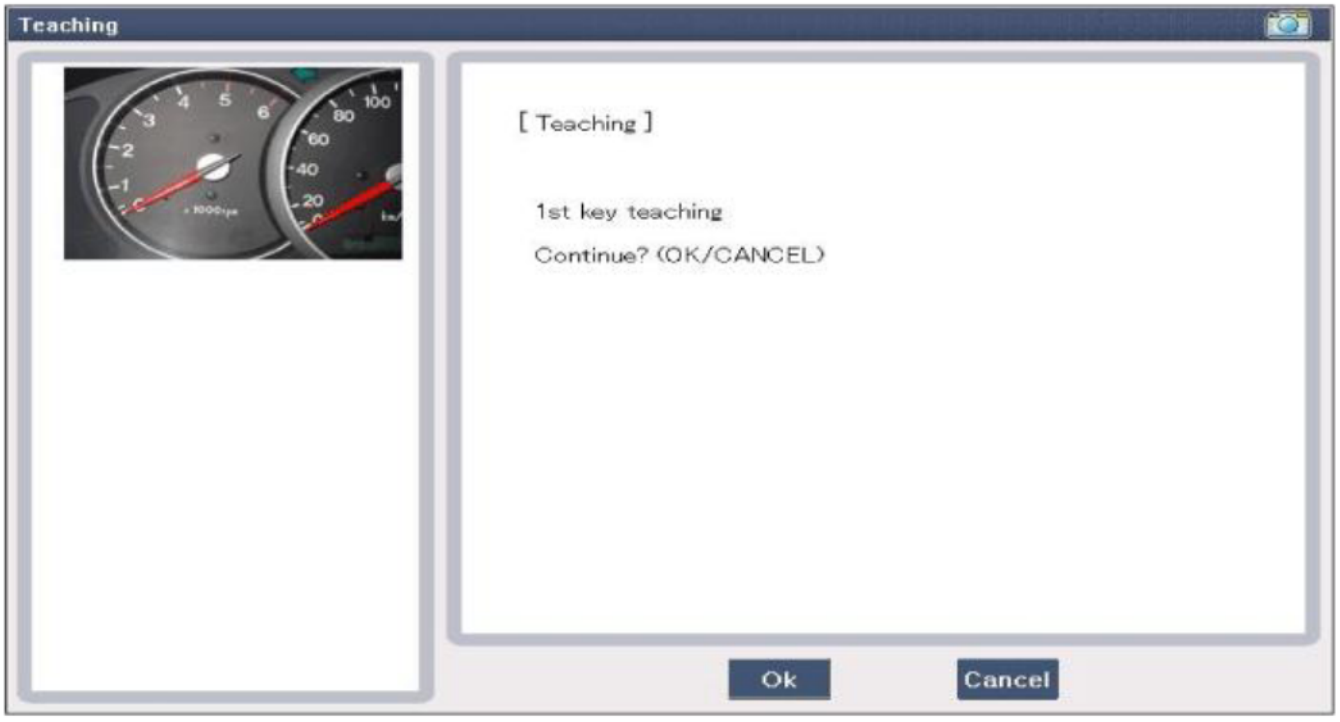


ID Register

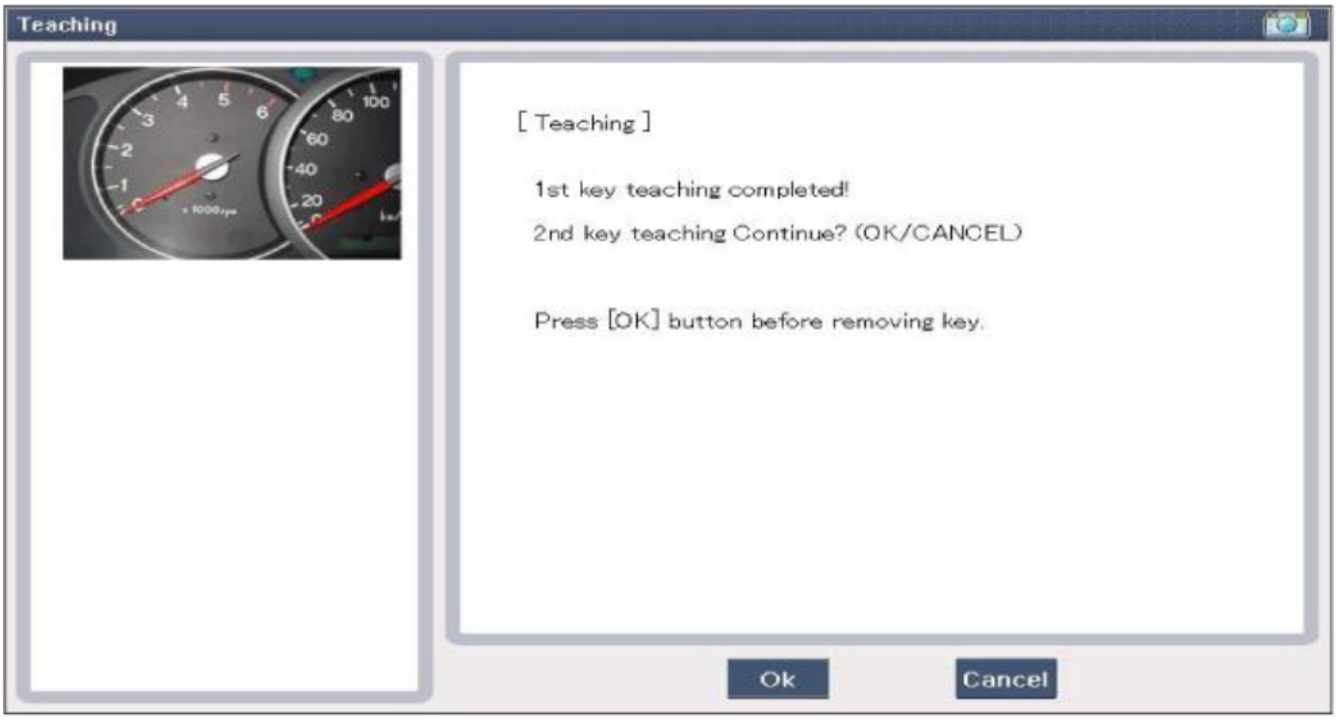
- Password Teaching/Changing
- Neutral Mode
- Limp Home Mode
- Teaching

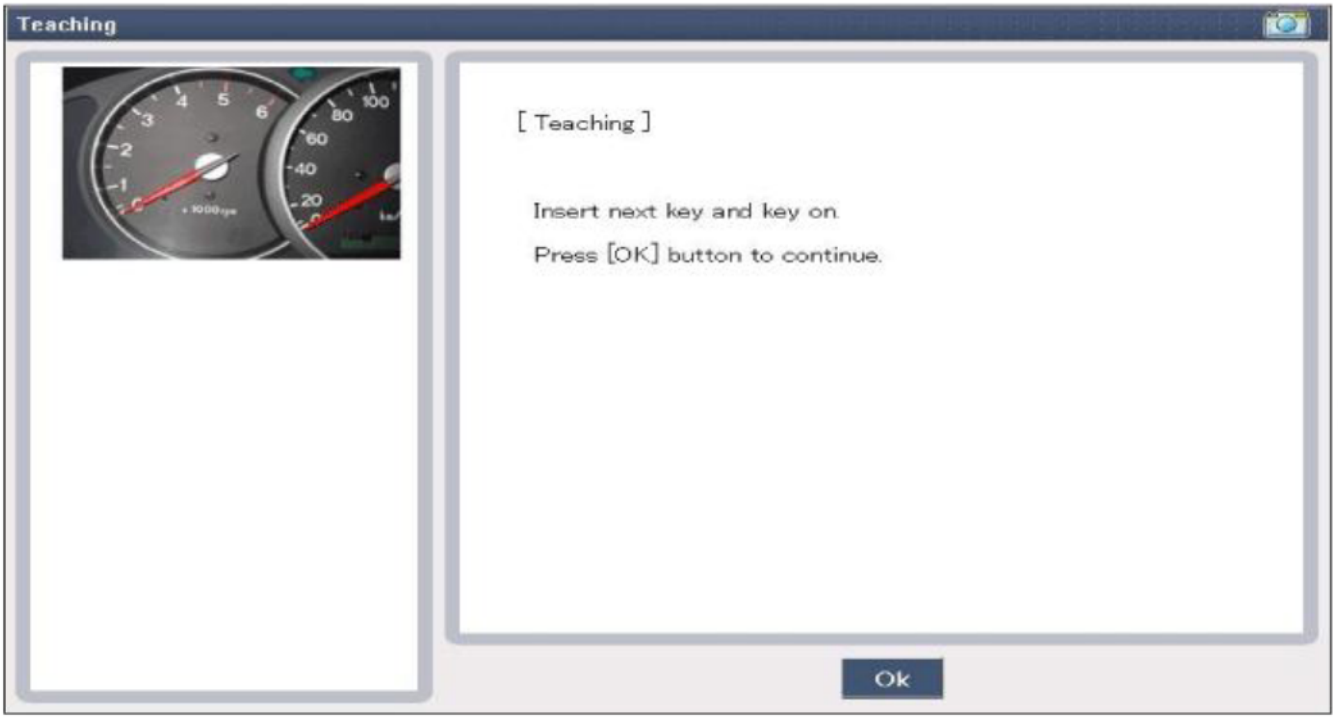
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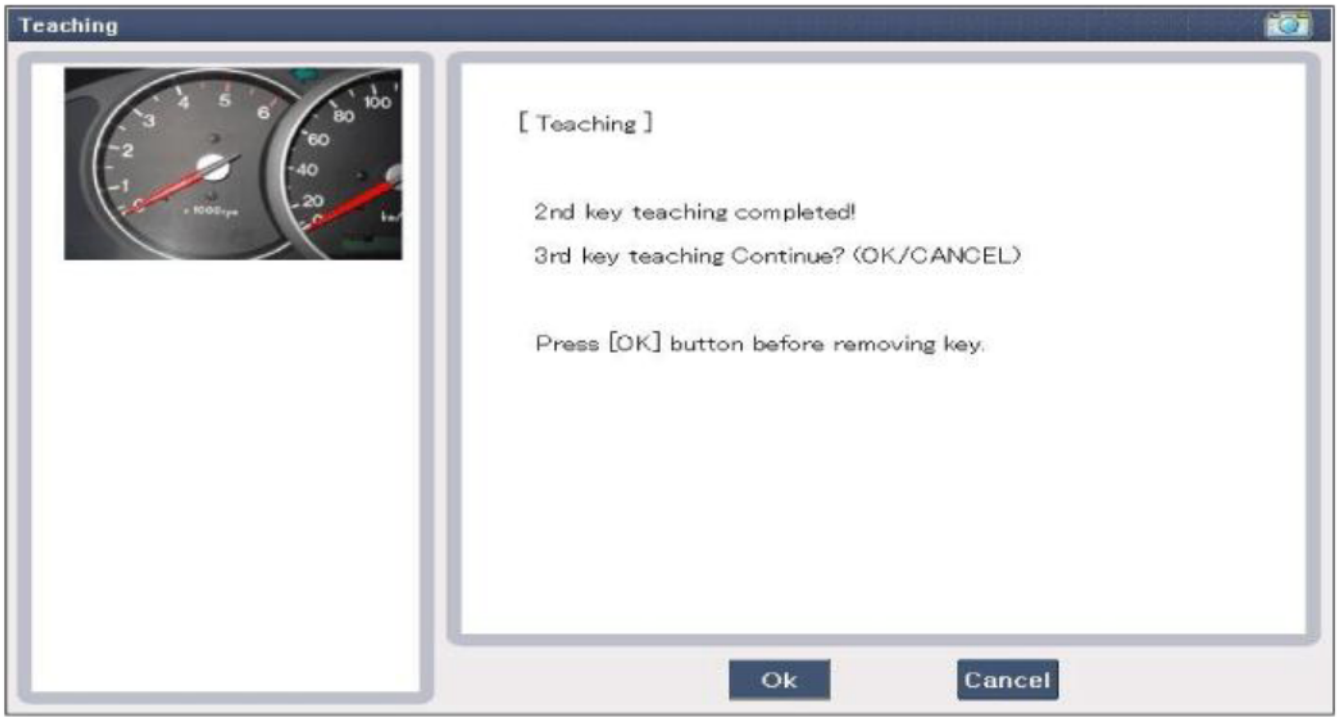


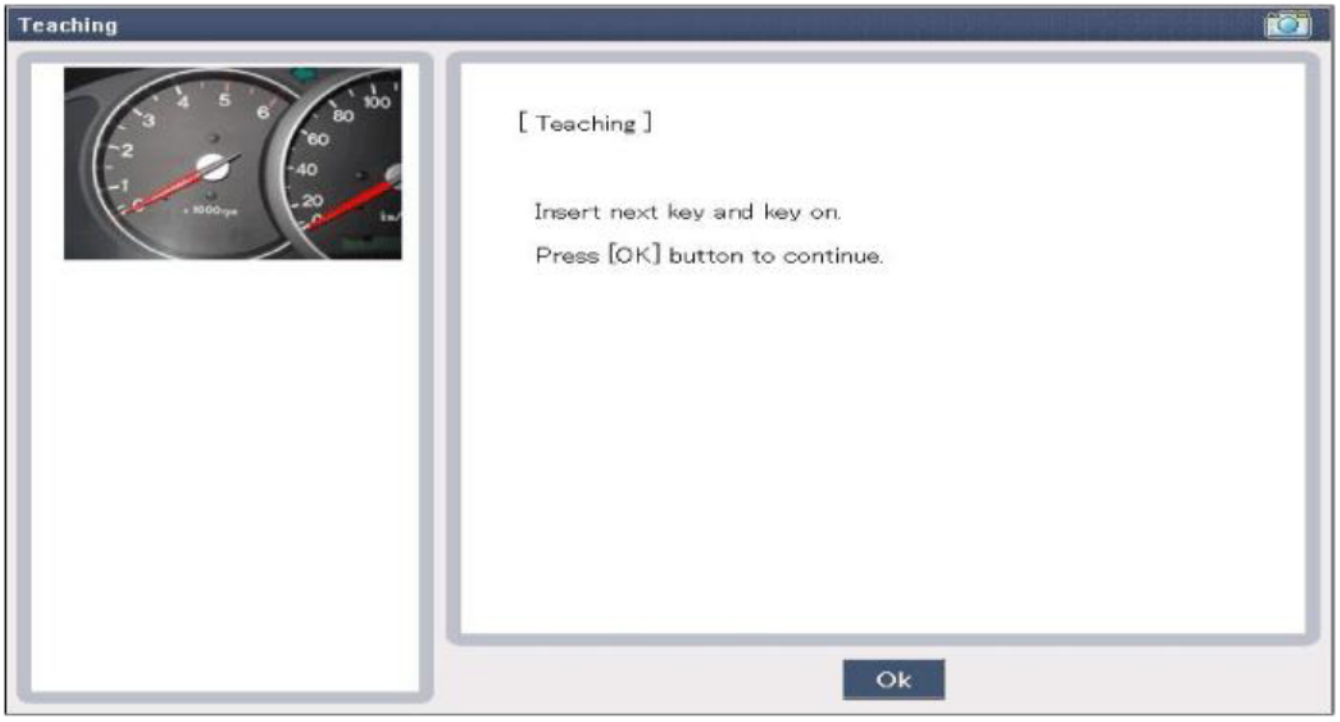
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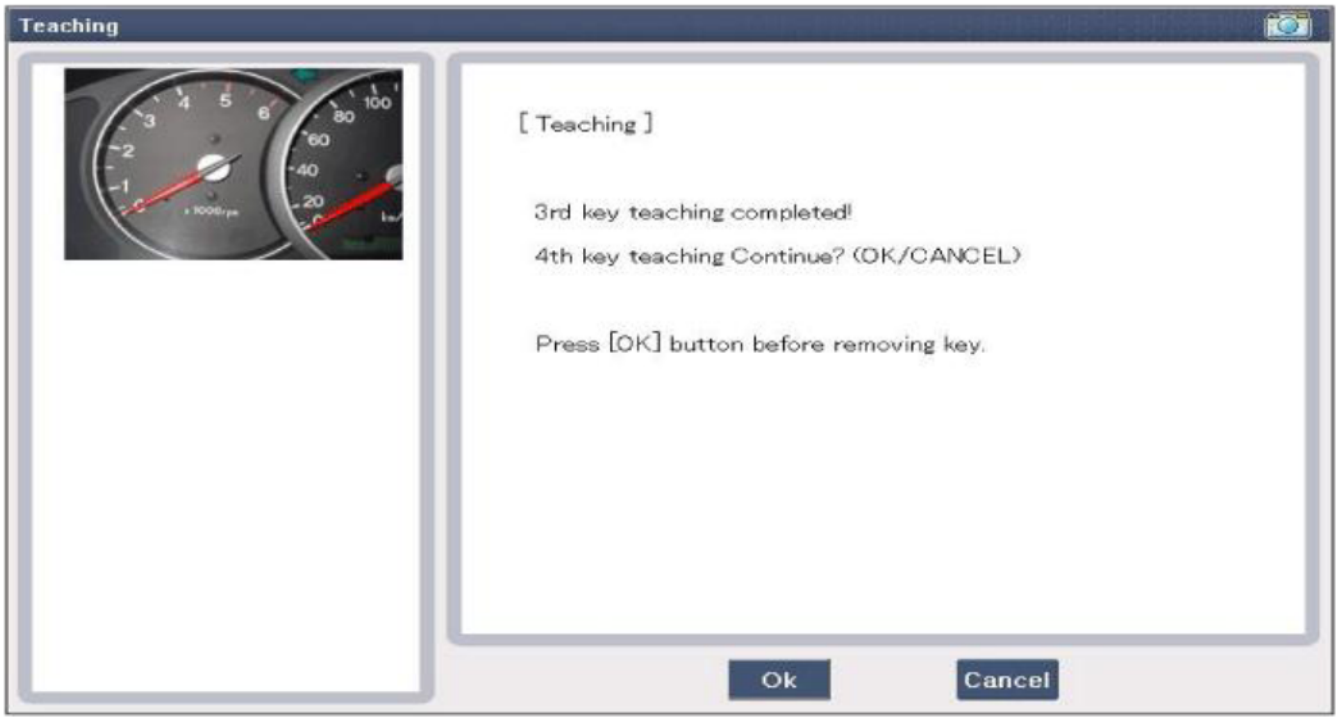


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(2) ECM virgin status.
After replacing new "ECM" scan tool displays that ECM is virgin status in Key Teaching mode.
"VIRGIN" status means that ECM has not matched any PIN code before.

Password Teaching/changing

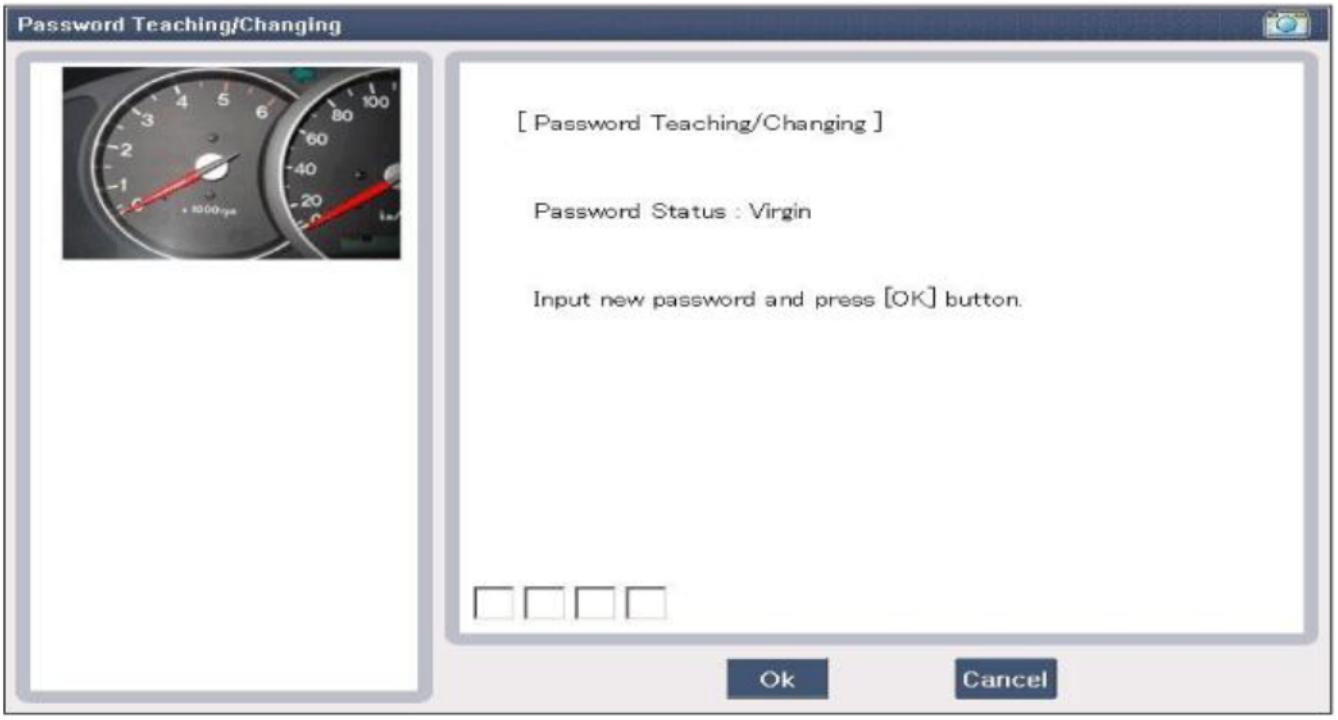
1. User Password Teaching Procedure
The user password for limp home is taught at the service station. The owner of the vehicle can select a number with four digits.
The user password teaching is only accepted by a "learnt" ECM. Before first teaching of user password to an ECM, the status of the password is "virgin" No limp home function is possible.
The teaching is started by ignition on, with a valid key(learnt key) and sending the user password by tester. After successful teaching, the status of the user password changes from "virgin" to "learnt"
The learnt user password can also be changed. This can be done if the user password status is "learnt" and the tester sends authorization of access, either the old user password or the vehicle specific data. After correct authorization, the ECM requests the new user password. The status remains "learnt" and the new user password will be valid for the next limp home mode.
If wrong user passwords or wrong vehicle specific data have been sent to the ECM three times continuously or intermittently, the ECM will reject the request to change the password for one hour. This time cannot be reduced by disconnecting the battery or any other actions. After reconnecting the battery, the timer starts again for one hour.

2. User password teaching

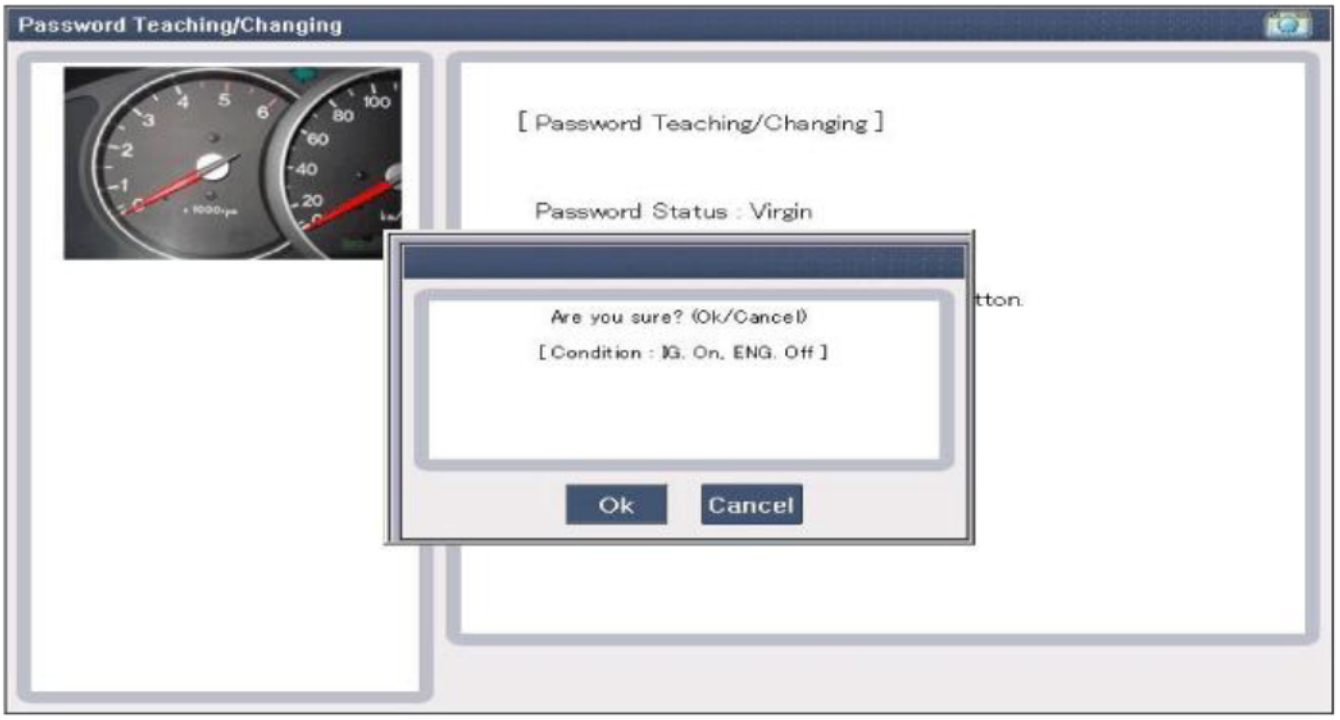
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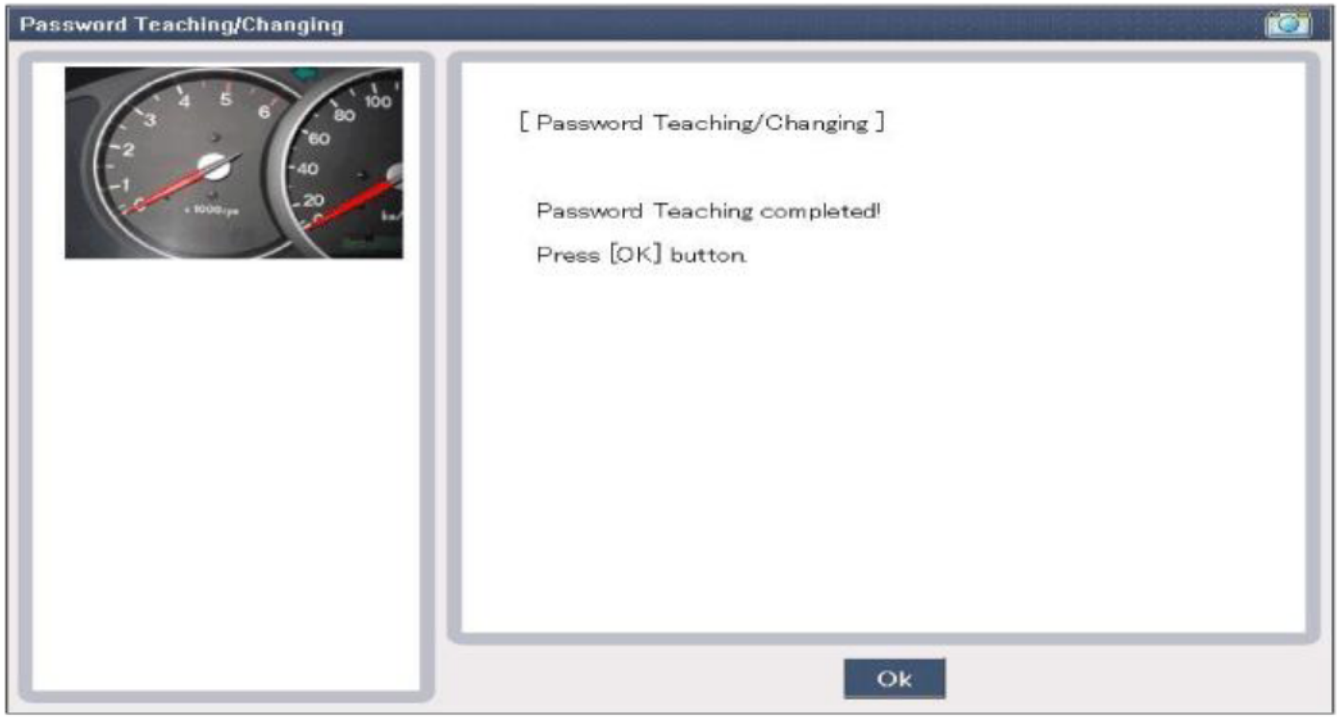
ID Register

- Password Teaching/Changing
- Neutral Mode
- Limp Home Mode
- Teaching



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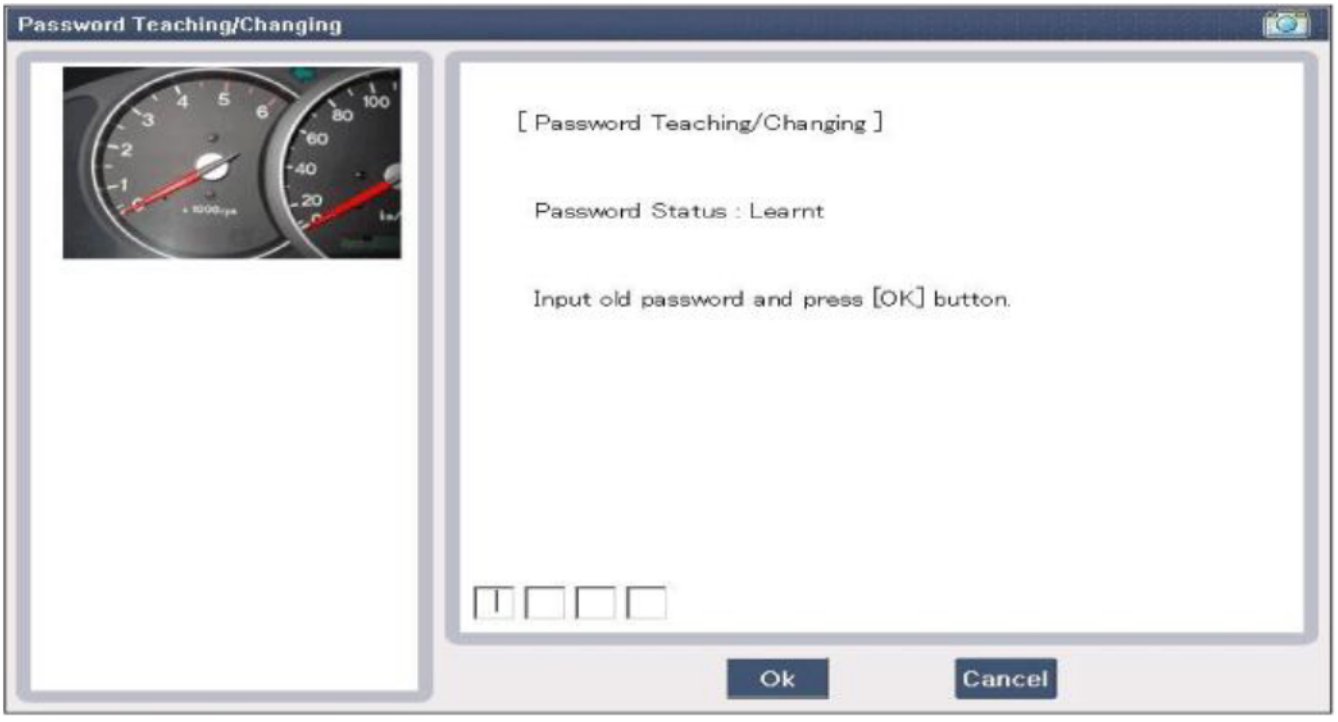
※ In case of putting wrong password, retry from first step after 10 seconds.

3. User password changing

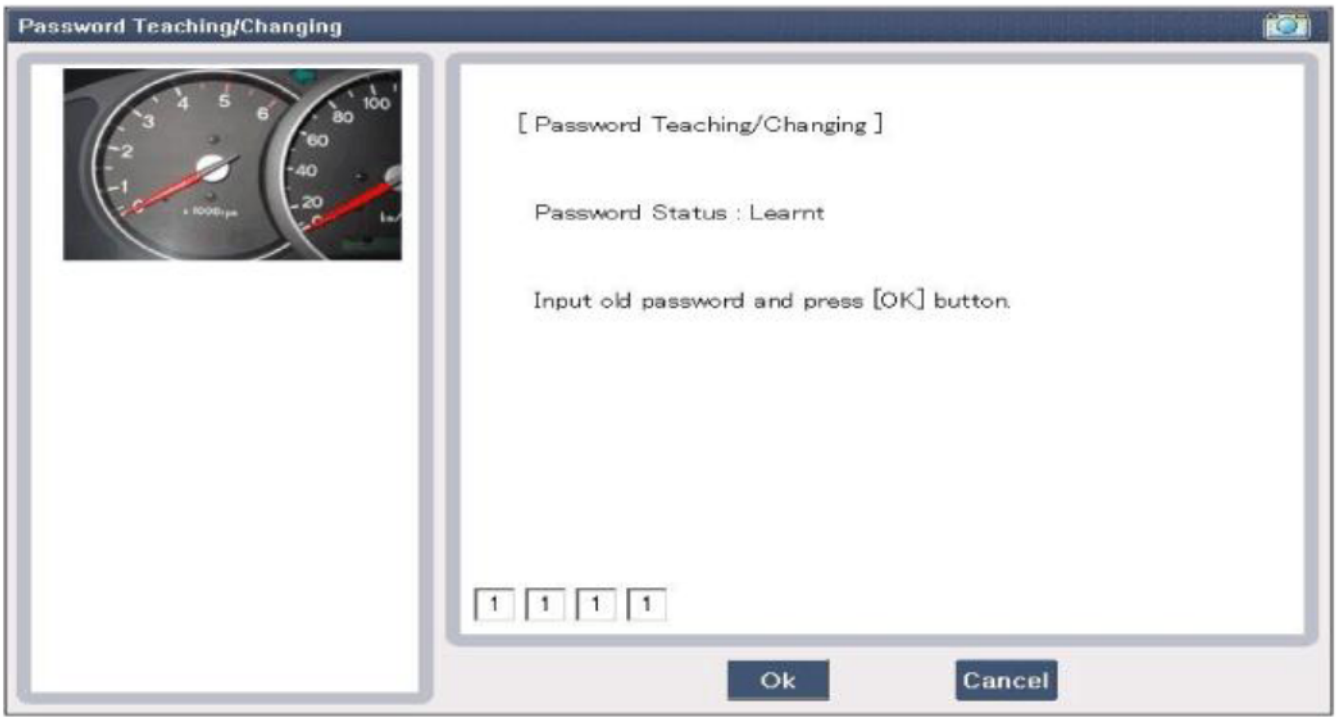
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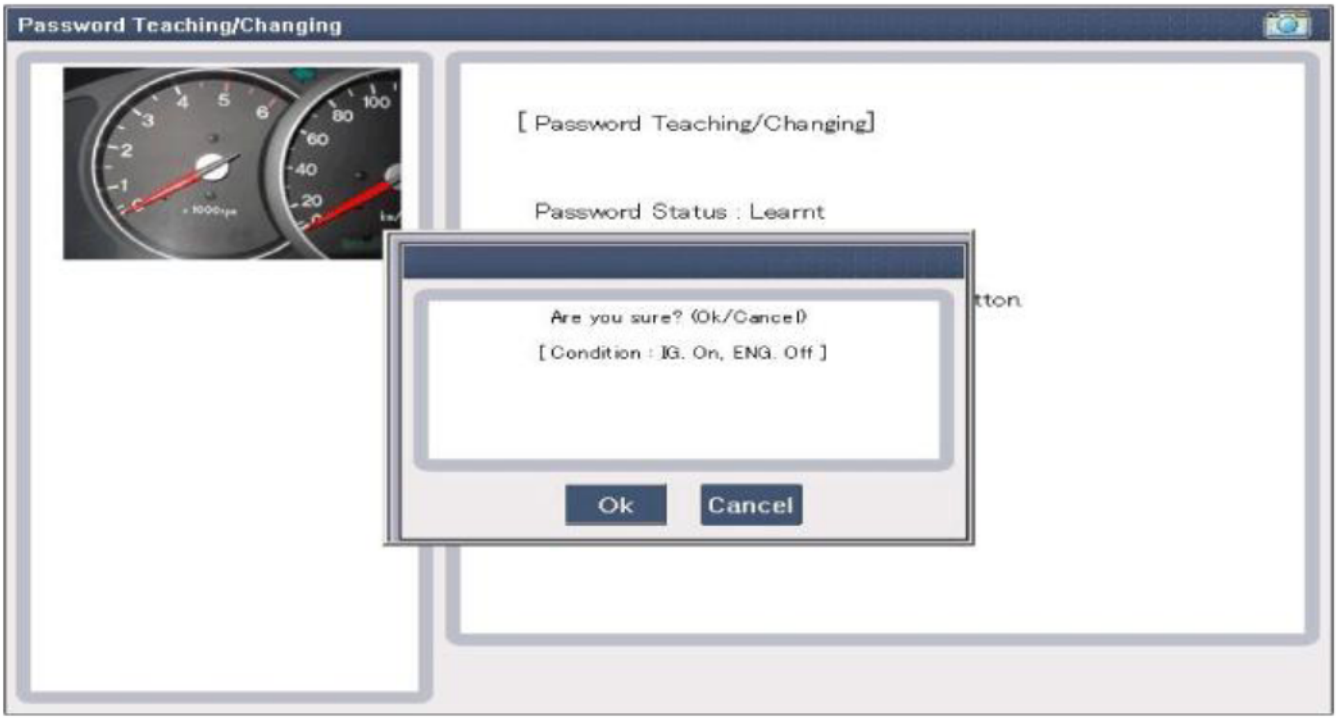
ID Register

- Password Teaching/Changing
- Neutral Mode
- Limp Home Mode
- Teaching

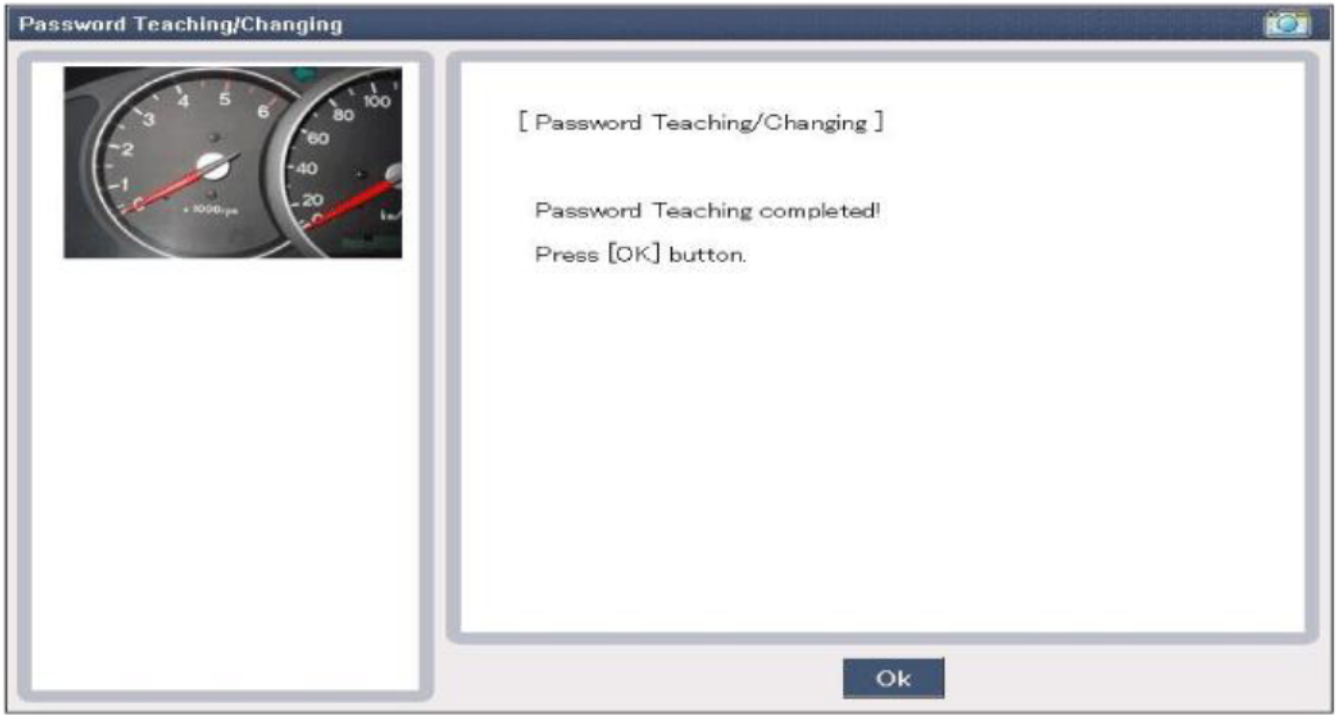


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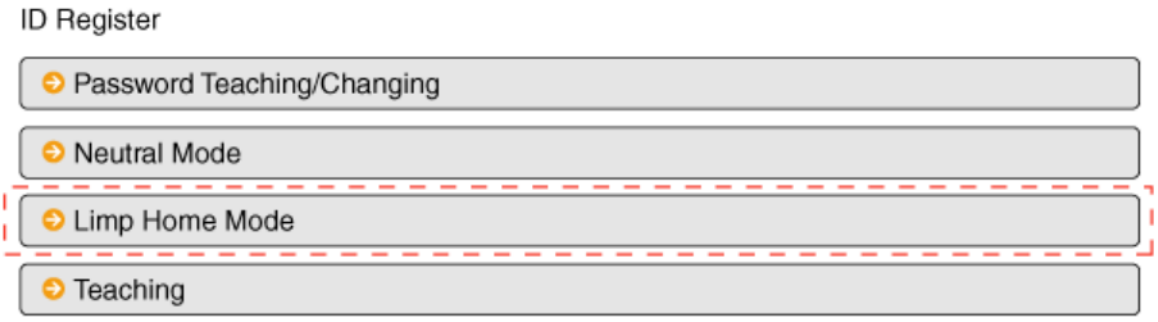


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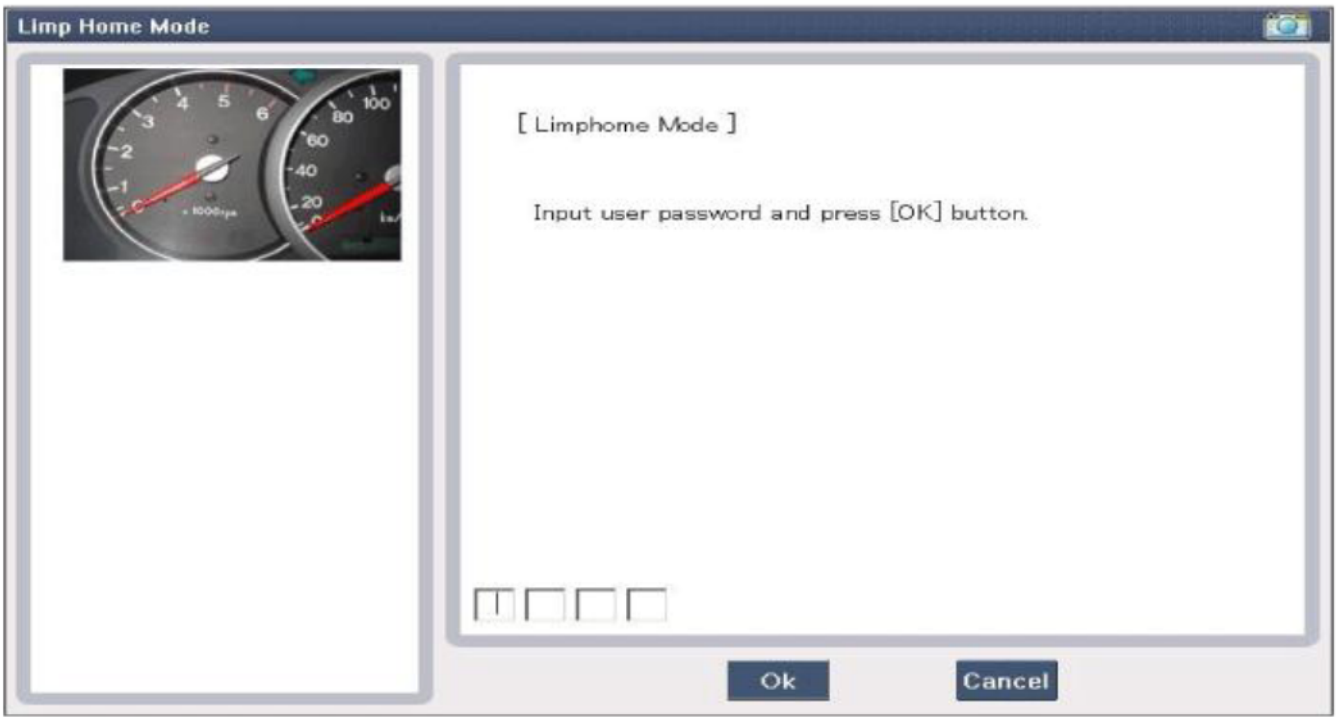


LIMP HOME FUNCTION

1. Limp Home By Tester
   If the ECM detects the fault of the Immobilizer or transponder, the ECM will allow limp home function of the immobilizer. Limp home is only possible if the user password (4 digits) has been given to the ECM before. This password can be selected by the vehicle owner and is programmed at the service station.
   The user password can be sent to the ECM via the special tester menu.
   Only if the ECM is in status "learnt" and the user password status is "learnt" and the user password is correct, the ECM will be unlocked for a period of time (30 sec.). The engine can only be started during this time. After the time has elapsed, engine start is not possible.
   If the wrong user password is sent, the ECM will reject the request of limp home for one hour. Disconnecting the battery or any other action cannot reduce this time. After connecting the battery to the ECM, the timer starts again for one hour.

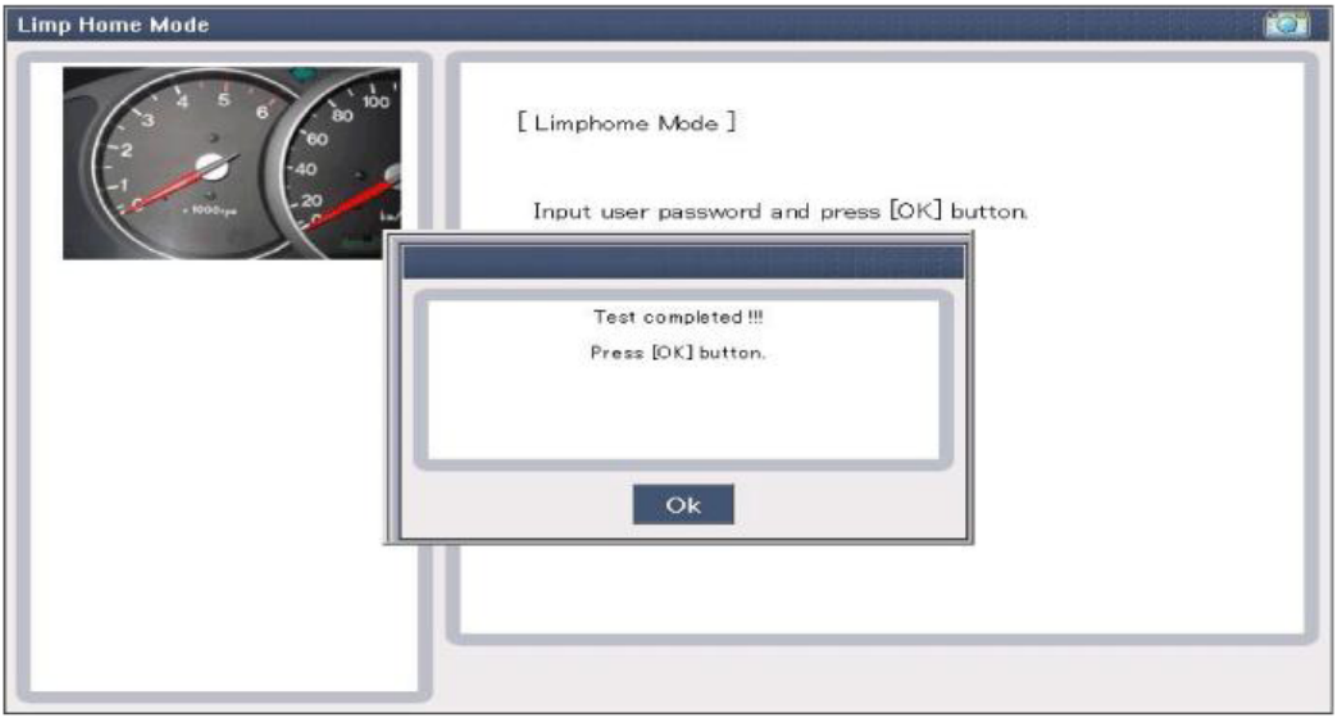


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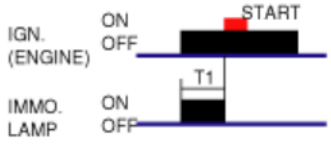
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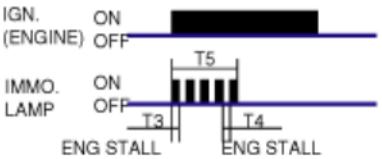
2. Limp Home By Ignition Key
   The limp home can be activated also by the ignition key. The user password can be input to the ECM by a special sequence of ignition on/off.
   Only if the ECM is in status "learnt" and the user password status is "learnt" and the user password is correct, the ECM will be unlocked for a period of time (30 sec.).
   The engine can be started during this time. After the time has elapsed, engine start is not possible. After a new password has been input, the timer (30 sec.) will start again.
   After ignition off, the ECM is locked if the timer has elapsed 8 seconds. For the next start, the input of the user password is requested again.

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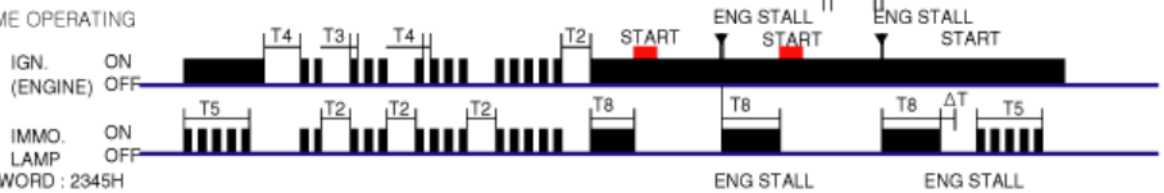
1. NORMAL CONDITION(NO FAILURE)



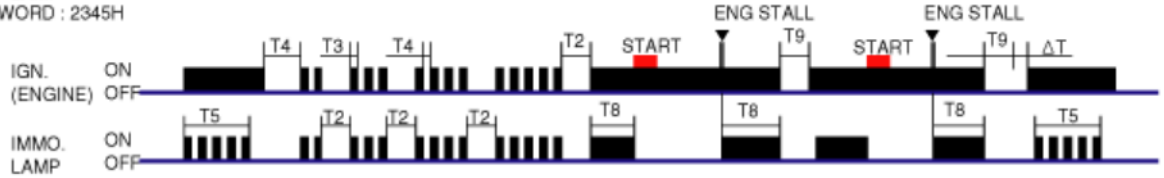
2. IN CASE OF FAILRE(LIMP HOME)



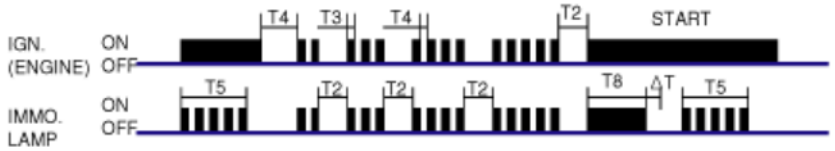
3. LIMP HOME OPERATING



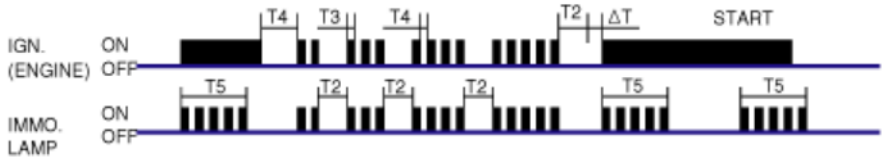
USER PASSWORD : 2345H



USER PASSWORD : 2345H



USER PASSWORD : 2345H

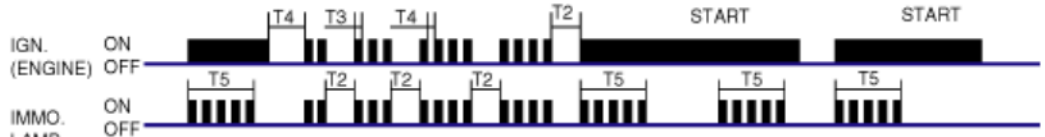


USER PASSWORD : 2345H

NOTE :

T1 > 5sec
3sec < T2 < 10sec
0.2sec < T3 < 5 sec
0.2sec < T4 < 3sec
T5 = 5sec
T6 < 30sec
T9 = 8sec
T8 = 30sec
CODE "0" = IG.ON 10 TIMES

2 3 4 5



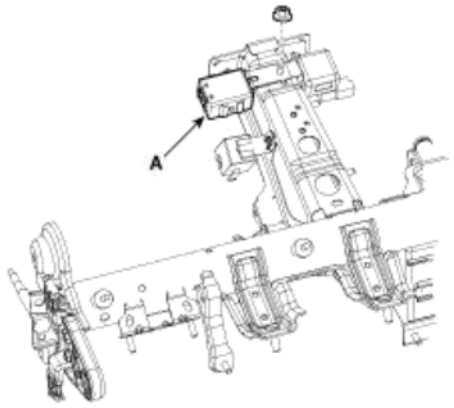
USER PASSWORD : 2345H

2 3 4 4

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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the upper main crash pad.
   (Refer to the "Crash pad")
3. Disconnect the 10P connector of the immobilizer unit and then remove the immobilizer unit (A) after loosening a bolt.



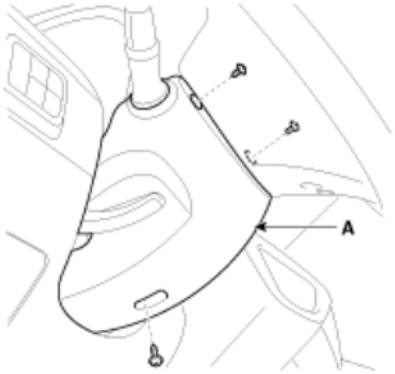
INSTALLATION

1. Install the immobilizer control unit after connecting the unit connector.
2. Install the upper main crash pad.

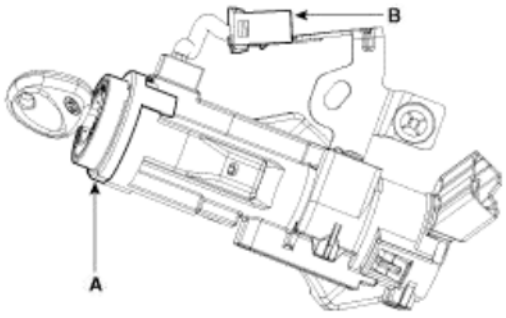
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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds (A).
   (Refer to the BD group - "Crash pad")



3. Disconnect the 6P connector (B) of the coil antenna and then remove the coil antenna (A).



INSTALLATION

1. Install the coil antenna and connect the 6P connector.
2. Install the steering column upper and lower shrouds.

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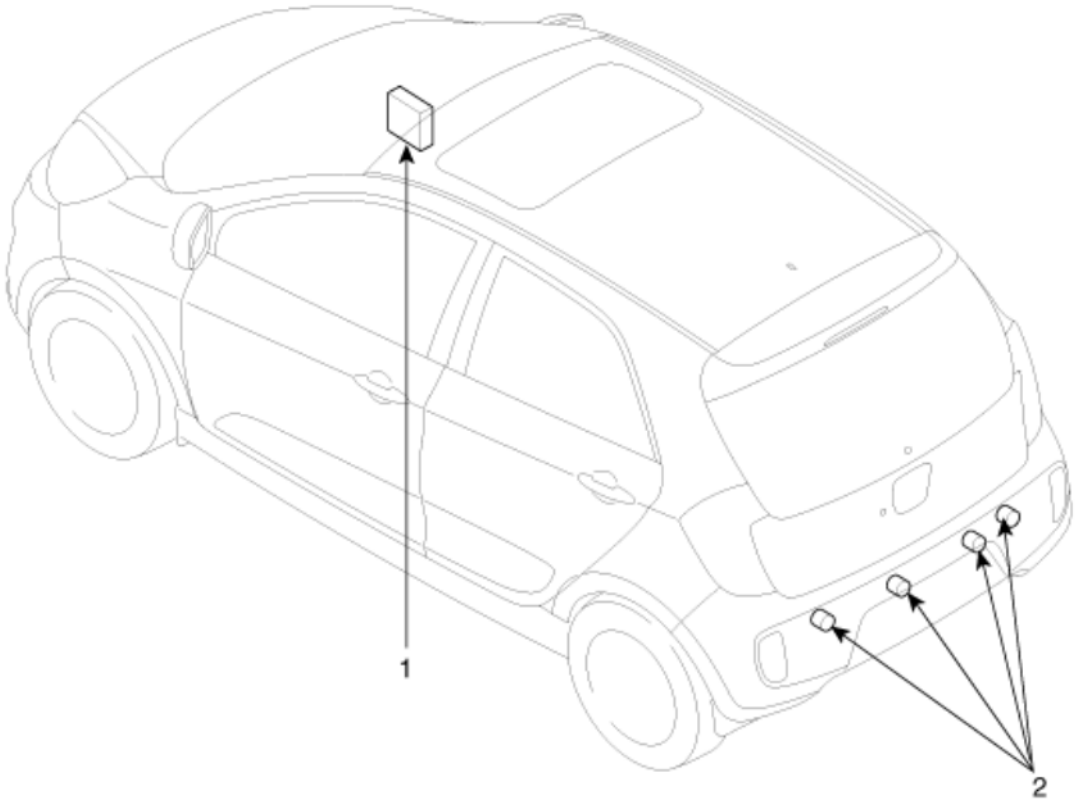
SPECIFICATIONS

Description		Specification
Ultrasonic sensor	Detecting range	11.8~47.2 in (300 ~ 1,200 mm)
	Operating voltage	DC 8~10 V
	Rated current	MAX. 20 mA
	Operating temperature	-22°F~+176°F(-30°C ~ +80°C)
	Preservation temperature	-40°F~+185°F(-40°C ~ +85°C)
	Frequency	48 ± 5 KHZ
	Number of sensors	4 EA (Right, Center-right, Center-left, Left)
Piezo buzzer	Rated voltage	DC 12 V
	Operating voltage	DC 9~16 V
	Operating temperature	-22°F~+176°F(-30°C ~ +80°C)
	Preservation temperature	-40°F~+185°F(-40°C ~ +85°C)
	Rated current	MAX. 60 mA
	Sound, tone	Oscillation frequency : 2.0 ± 0.5 KHz
		Sound level : MIN 65 dB (DC 13 V/m)

※ The BCM contains the rear parking assist system function.
※ Buzzer is built-in the BCM.

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COMPONENT LOCATION

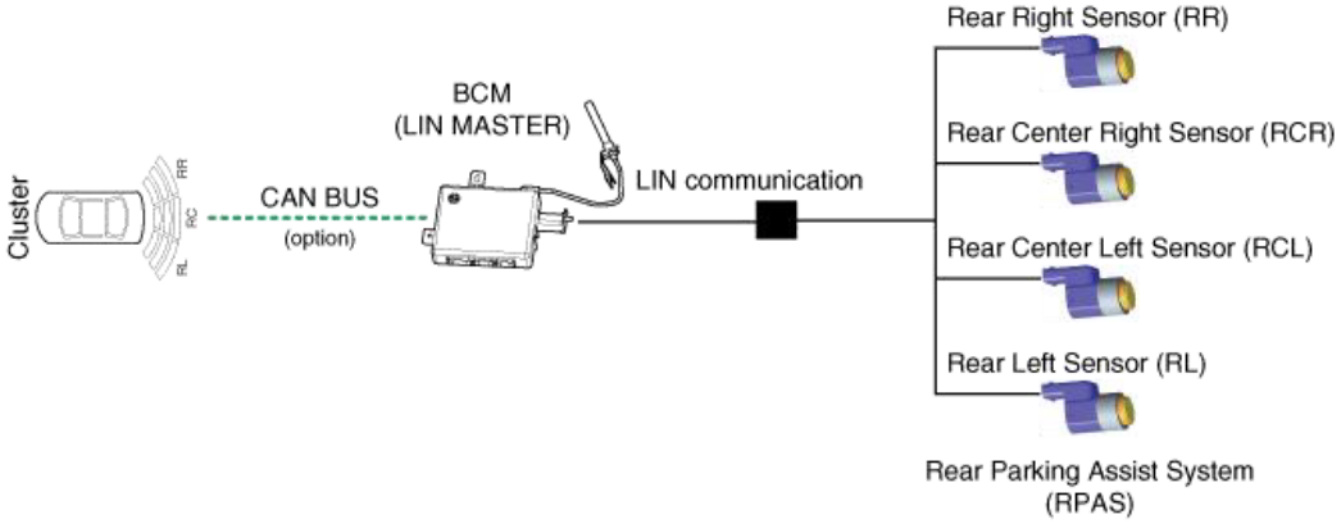


1. BCM
2. Rear parking assist sensor

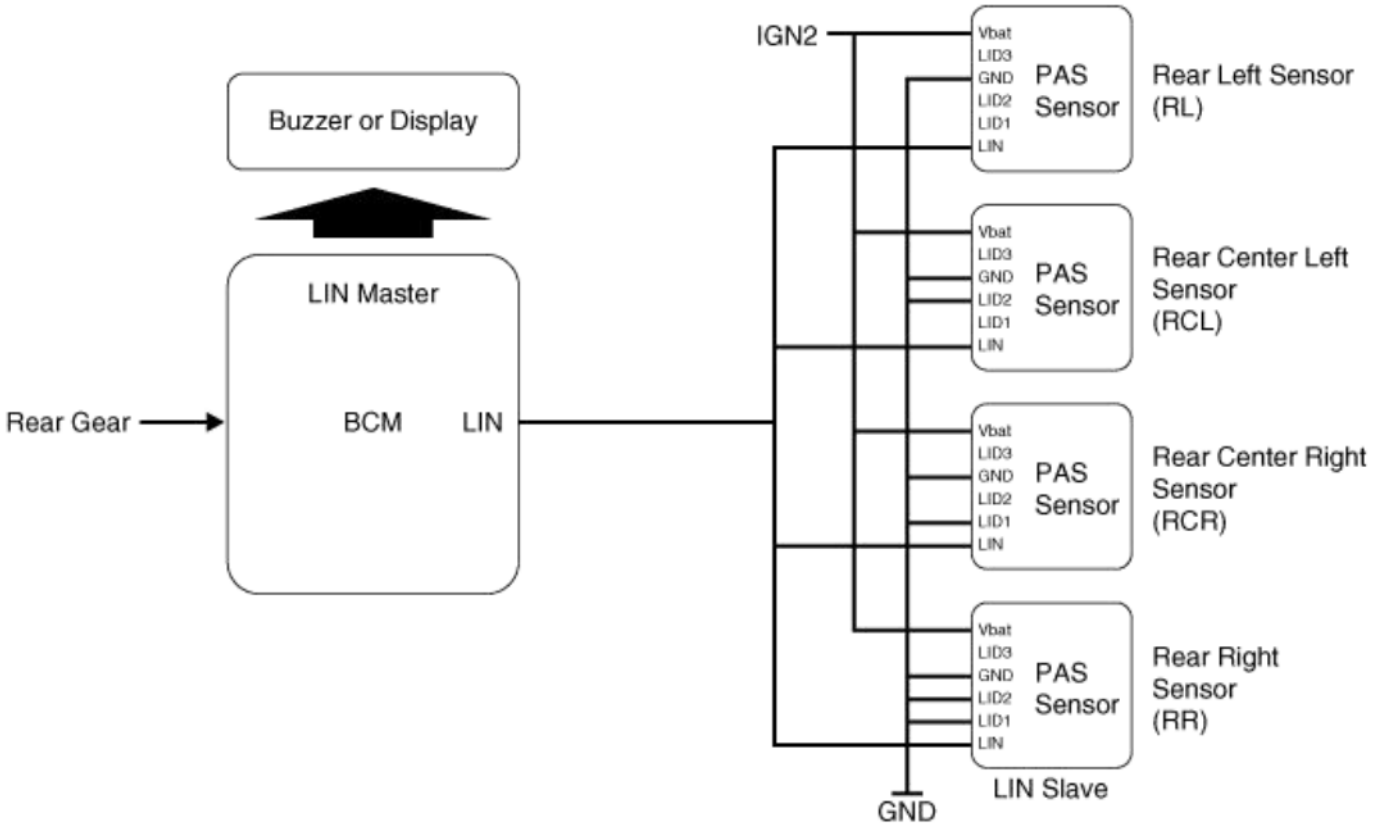
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DESCRIPTION

When reversing, the driver is not easy to find objects in the blind spots and to determine the distance from the object. In order to provide the driver safety and convenience, back warning system will operate upon shifting to "R" Ultrasonic sensor will emit ultrasonic wave rearward and detect the reflected wave.
Control unit (BCM) will calculate distance to the object using the sensor signal input and output buzzer alarm in three steps (first, second and third alarm).



Block Diagram

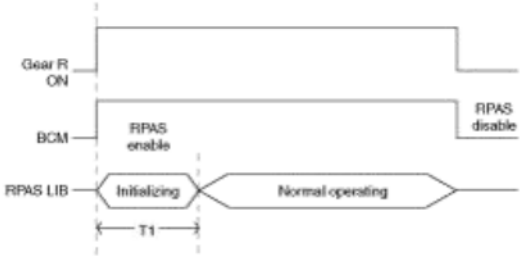


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System Operation

Initial Mode

1. RPAS checks the ID and Reference (shaping table) during the initialization using LIN communication.
2. If sensor ID or sensor parameter is same with expected value, RPAS system is initialized within 500ms after turning IGN1 and shifting R gear.
3. If Sensor ID or sensor parameter is different with expected value, initial mode can take about 1.2 second after turning IGN1 and shifting R gear because of teaching sensor ID or sensor parameter.
4. RPAS executes the diagnosis of each sensor during the initialization.



T1 : RPAS initializing time

(1) In case of sensor teaching, T1 : within 1.2 second

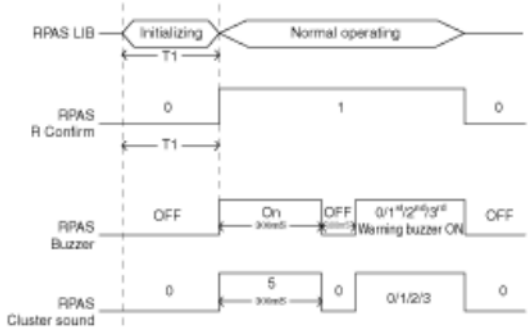
(2) In case of normal condition, T1 : 500ms ± 10%

Normal Mode

Normal mode of RPAS can divide as two steps.
First step is a mode to inform the driver of the RPAS system ON and diagnosis results which is executed during the initialization.
Second step is the obstacle detection mode to give driver warning when detecting the obstacle.

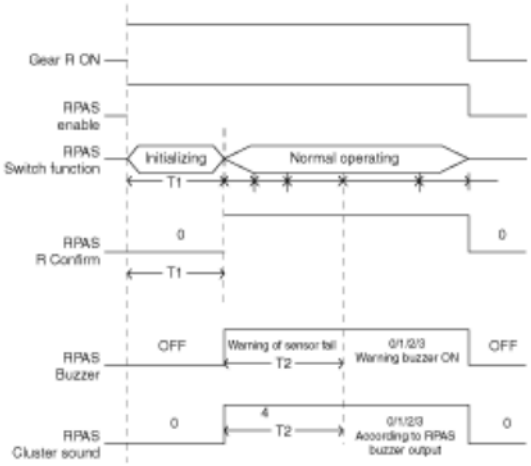
1. Driver info mode for RPAS ON

(1) If there aren't any diagnosis messages from sensors, the normal RPAS ON sound with ON-period 300ms warn after initializing time since R gear is shifted. The obstacle detection warning starts after the delay of 100ms since finishing the normal RPAS ON warning sound.



(2) If there are any failure sensor, "Warning of sensor fail" sound is driven during the fixed period and if there is any display unit, it displays the diagnosis.
Refer to the Diagnosis buzzer sound for more detail Information.

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T1 : RPAS initializing time

(1) In case of sensor teaching, T1 : within 1.2 second

(2) In case of normal condition, T1 : 500ms ± 10%

T2 : Refer to the spec for warning of fail

(3) “Diagnosis-buzzer” is driven only one time but the display unit continue to display the diagnosis according each failure sensor’s location.

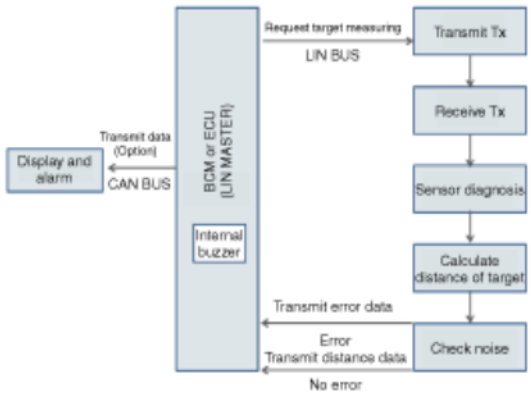
2. Obstacle detection mode

(1) There are 3 kinds of warning sound for detecting the obstacle, the 1st warning and the 2nd warning are the intermittent sound and the 3rd warning is the continuous sound.

(2) The vehicle speed for the operation of RPAS is below 10Km/h .

(3) There are 2 kinds of detection mode. One is for normal operating mode using normal 4 sensors. Even if any sensor is on failure condition, the RPAS system will be entered to degrade mode excepting a failure sensor.

(4) Operating procedure



Detection Area

1. Test condition – PVC pole(Diameter 75mm, Length 1m) & At the room temperature

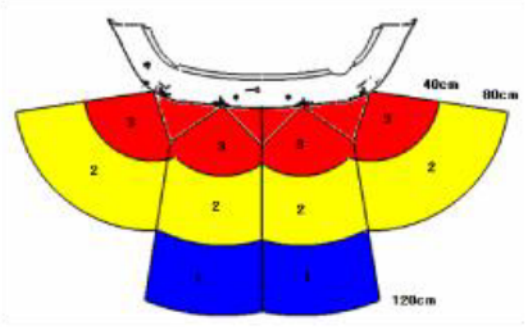
2. Distance tolerance (measured at the front of sensor)
   81 cm ~ 120 cm : ± 15 cm
   41 cm ~ 80 cm : ± 10 cm
   Below 40 cm : ± 10 cm

3. Below 30 cm may not be detected.

4. Sensing zone specification
   Sound pulse has a fixed duration.
   Pause between pulses is related to the distance from the obstacle and is not variable.
   Although the position of the obstacle is not moving during sometime, the buzzer (BCM) should keep warning. And although an obstacle that is currently warned is getting far, the buzzer should keep warning according to obstacle

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distance.
The warning sound is generated by the algorithm of ECU which measures the distance of the obstacle from the sensor. The distance is divided into three detection ranges. Obstacles below 30cm from the sensor may not be detected.

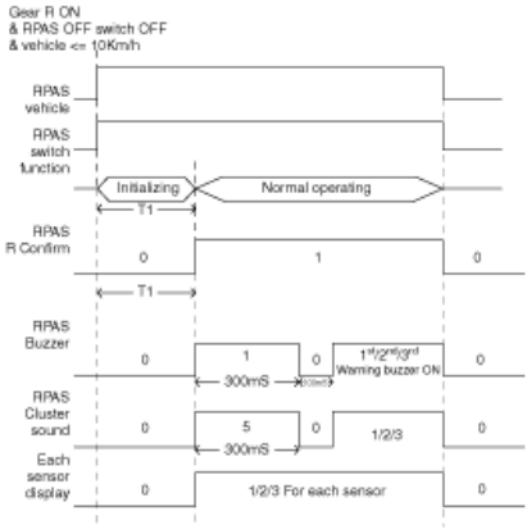


Each Warning Zone Hysteresis Function for buzzer and display.

Condition	1st Warning (120cm)	2nd Warning (80cm)	3rd Warning (40cm)
the distance between vehicle and obstacle is getting close	Immediately warning		
the distance between vehicle and obstacle is getting far	2sec warning delay	2sec warning delay	1sec warning delay

Warning method of RPAS

If RPAS sensor detects the obstacle, the acoustic device makes warning sound (BCM) and the display module (Cluster) indicates each warning level as like followings.
RPAS sensor sends the distance data to BCM through LIN communication and BCM received the distance data from each sensor.
BCM has the responsibility of the acoustic function.
BCM has the responsibility of the gateway function that BCM sends the warning data to Cluster as like below timing diagram.

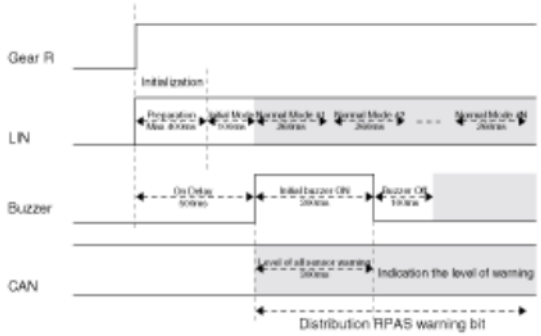


When change from a warning area to the different zone, after finishing one cycle of warning output, the next warning sound has to start for different zone necessarily.

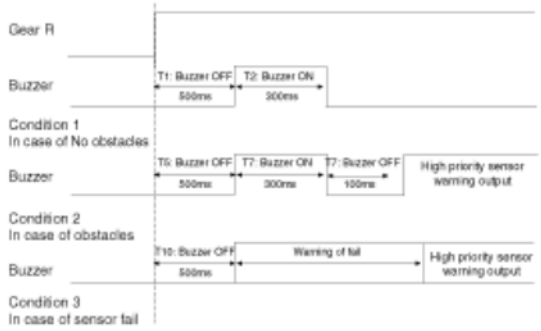
Timing Chart for RPAS Warning Sound

If Power is supplied to the system (turning IGN1 and shifting R gear), BCM checks the channel of each sensor and if no problems, the buzzer sound with turn-on period 300ms is generated after 500ms, but even if one sensor has a problem, the buzzer sound not for “Start-buzzer of RPAS” but for “Diagnosis-buzzer of RPAS”, The next action for Normal mode is like followings.

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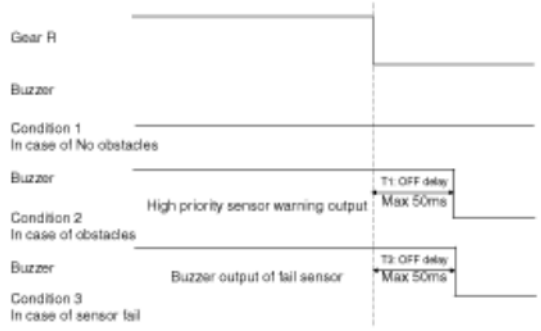


After R gear is armed, the system operation is like followings.



Time tolerance: ±10%

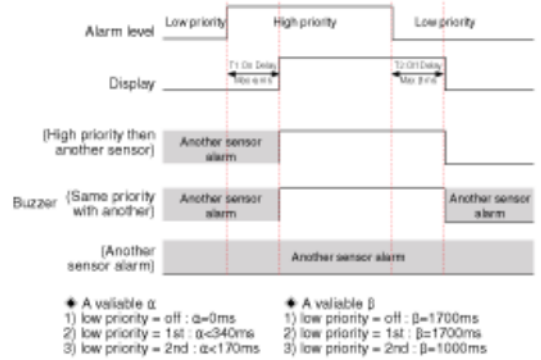
After R gear is disarmed, the system operation is like followings.



Time tolerance: ±10%

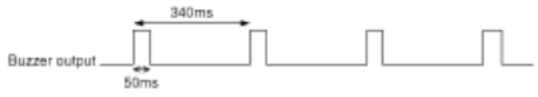
Sensor interval distance dividing alarm output specification

The condition logic is as below according to phase logic in priority. (In same sensor)



RPAS operation ranges according to distance are as below.

1. First alarm (81 cm ~ 120 cm)



2. Secondary alarm (41 cm ~ 80 cm)

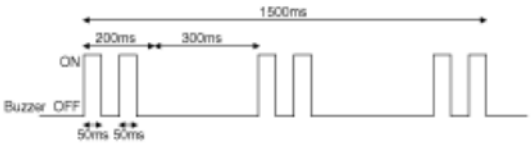
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3. Third alarm (40 cm or less)



4. Failure alarm cycle
   When the system starts and sensor has errors, the warning sound as the sensor position is like following.
   (1) Fault Warning with Display



NOTICE

1) Time tolerance of the above waveform : Time ± 10%
2) At nearer distance than 30cm, detection may not occur.
3) Alarm will be generated with vehicle reversing speed 10km/h or less.
4) For moving target, maximum operation speed shall be target approach speed of 10km/h.
5) When the vehicle or the target is moving, sequential alarm generation or effective alarm may be failed.
6) False alarm, or failure of the alarm to trigger may occur in the following conditions.

– Irregular road surface, gravel road, reversing toward grass.
– Horn, motor cycle engine noise, large vehicle air brake, or other object generating ultrasonic wave is near.
– When a wireless transmitter is used near to the sensor.
– Dirt on the sensor.
– Sequential alarm may not occur due to the reversing speed or the target shape.

Method of error handling

■ LIN BUS Off error

Division	Condition for error	Condition for the disarmed
Initial routine	Detecting LIN BUS OFF one time	Disarmed (if LIN BUS ON is detected 4 consecutive times in general routine)
Normal routine	Detecting LIN BUS OFF 4 consecutive times	Disarmed (if LIN BUS ON is detected 4 consecutive times)

※ Remarks

1. LIN BUS OFF means no response from sensors when BCM send request to sensors.
2. In the case that error happens to the initial routine, diagnosis warning sound + display for error
3. In the case that error happens to the Normal routine, the only display for error
4. If error happens to the direct condition of each sensor, after that, error is transmitted at the indirect condition (sensor side).

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■ In the case of sensor error

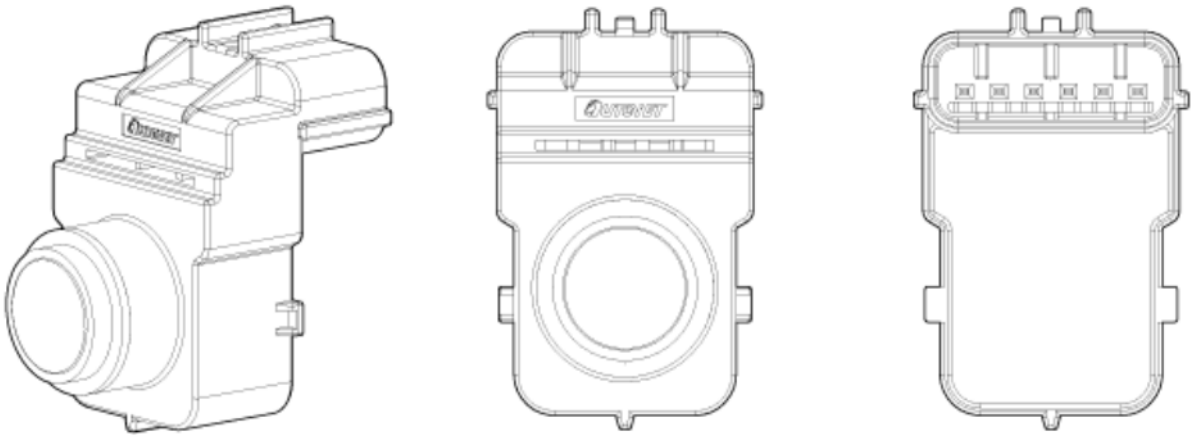
Division	Condition for error	Condition for the disarmed
Initial routine	Detecting the message of sensor error	Disarmed(if the message which sensor is normal is detected 4 consecutive times , but it is impossible to be disarmed in the initial routine)
General routine	Detecting the message of sensor error 4 consecutive times	Disarmed(if the message which sensor is normal is detected 4 consecutive times)

※ Remarks

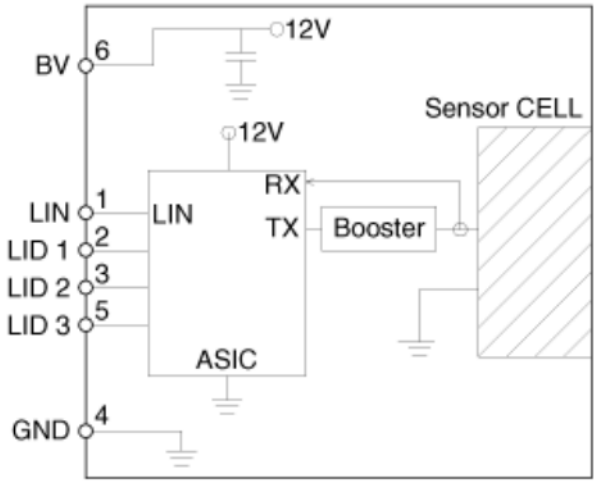
1. In the case of fault counting output message or signal with last valid should be transmitted.
2. In the case that error happens to the initial routine, diagnosis warning sound + display for error
3. In the case that error happens to the general routine, the only display for error

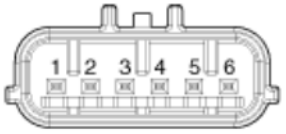
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COMPONENTS LOCATION



[Circuit diagram]



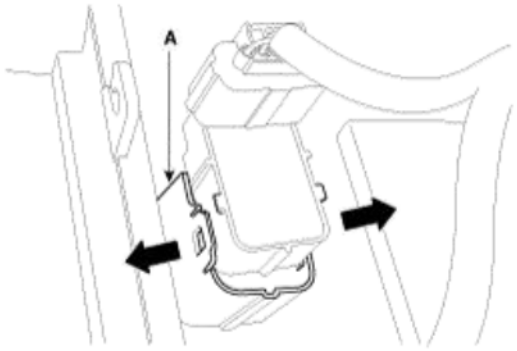


NO	Description
1	LIN
2	LID 1
3	LID 2
4	GND
5	LID 3
6	B+

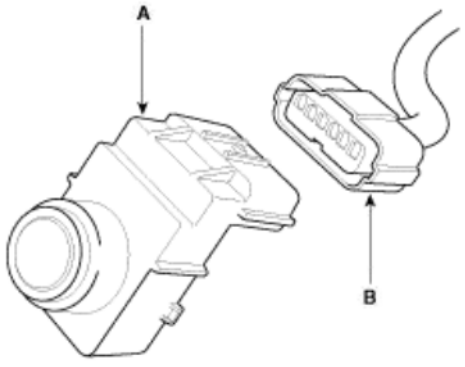
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REMOVAL

1. Remove the rear bumper.
   (Refer to the BD group - "Rear bumper")
2. Pull out the sensor (A) by opening the sensor holder out.



3. Disconnect the sensor connector (B) from sensor(A).

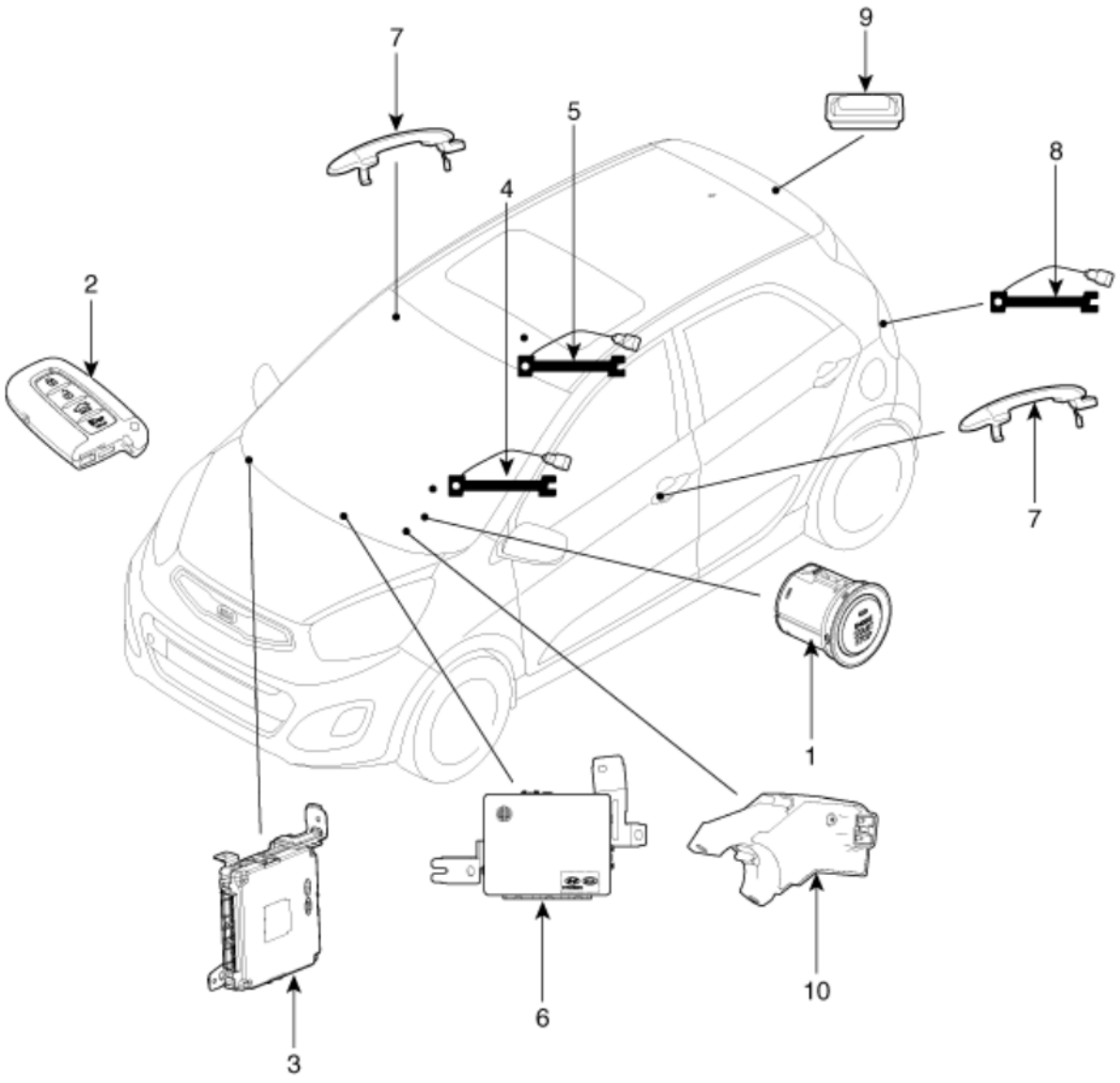


INSTALLATION

1. Connect the connector, and then reassemble the sensor.
2. Install rear bumper.

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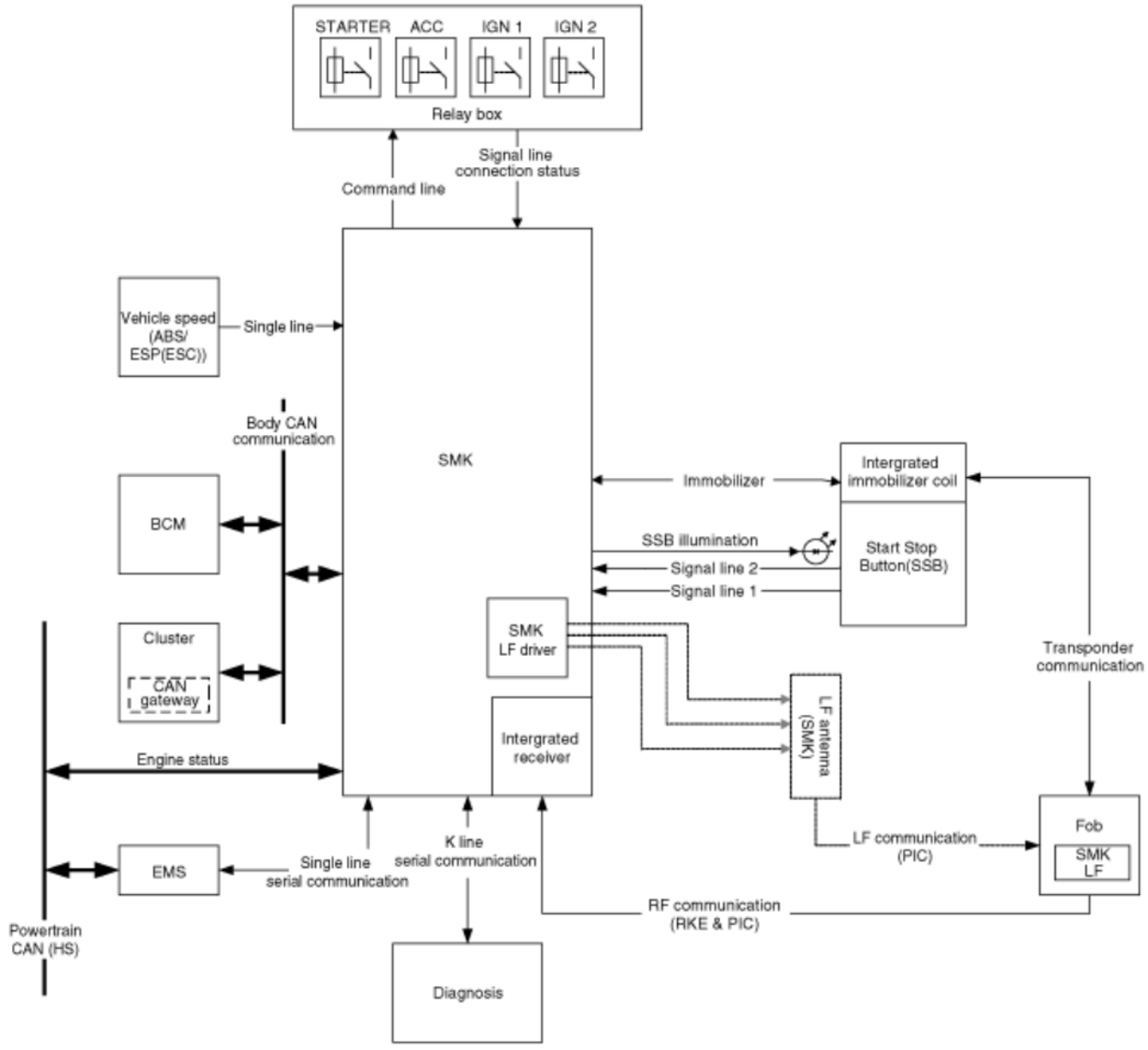
COMPONENT LOCATION



1. Start Stop Button (SSB)	6. Body control module
2. FOB key	7. Door handle & door antenna
3. Smart key unit	8. Bumper antenna
4. Interior antenna 1	9. Trunk lid open switch
5. Interior antenna 2	10. ESCL (Electrical Steering Column Lock)

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BLOCK DIAGRAM



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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.
- Steering column locking with an ESCL device; Monitoring of the vehicle status to insure safe activation of the ESCL.
- Indication of vehicle status through LED or explicit messages on display.
- Immobilizer function by LF transponder communication between fob and SSB.
- 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.

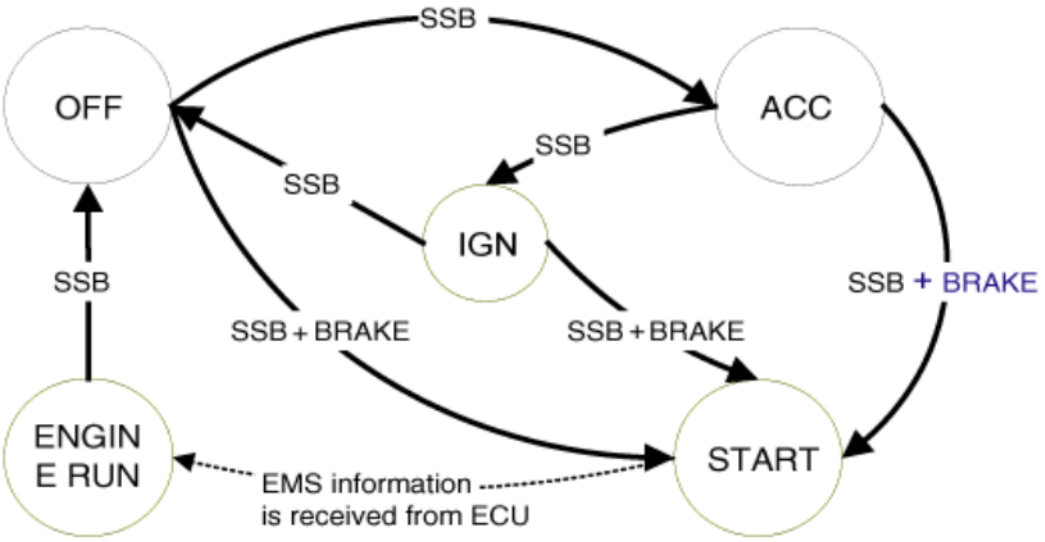
System Main Function

- Steering column locking/unlocking with ESCL.
- Switching of ACC / IGN1 / IGN2 terminals.
- 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. It also manages the locking and the unlocking of the steering column (called as ESCL)without any specific actions by the driver.
If the driver press the SSB while prerequisites on brakes, fob authentication and transmission status are satisfied, the BES System will proceed with the locking/unlocking of the steering column, the control of the terminal, and the cranking of the engine.
The driver can release the SSB as soon as this sequence initiated. After positive response from immobilizer interrogation, the system will activate the starter motor and communicate with the EMS to check the engine running status for starter release.
The driver will be able to stop the engine by a short push on the SSB if the vehicle is already in standstill. Emergency engine stop will be possible by a long press of the SSB or 3 consecutive presses in case the vehicle is in ENGINE RUNNING.
If the conditions for engine cranking are not satisfied while a push on 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 start the engine.
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 fob to the SSB.

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

Indicator ON/OFF Condition At Ignition Key Off Condition

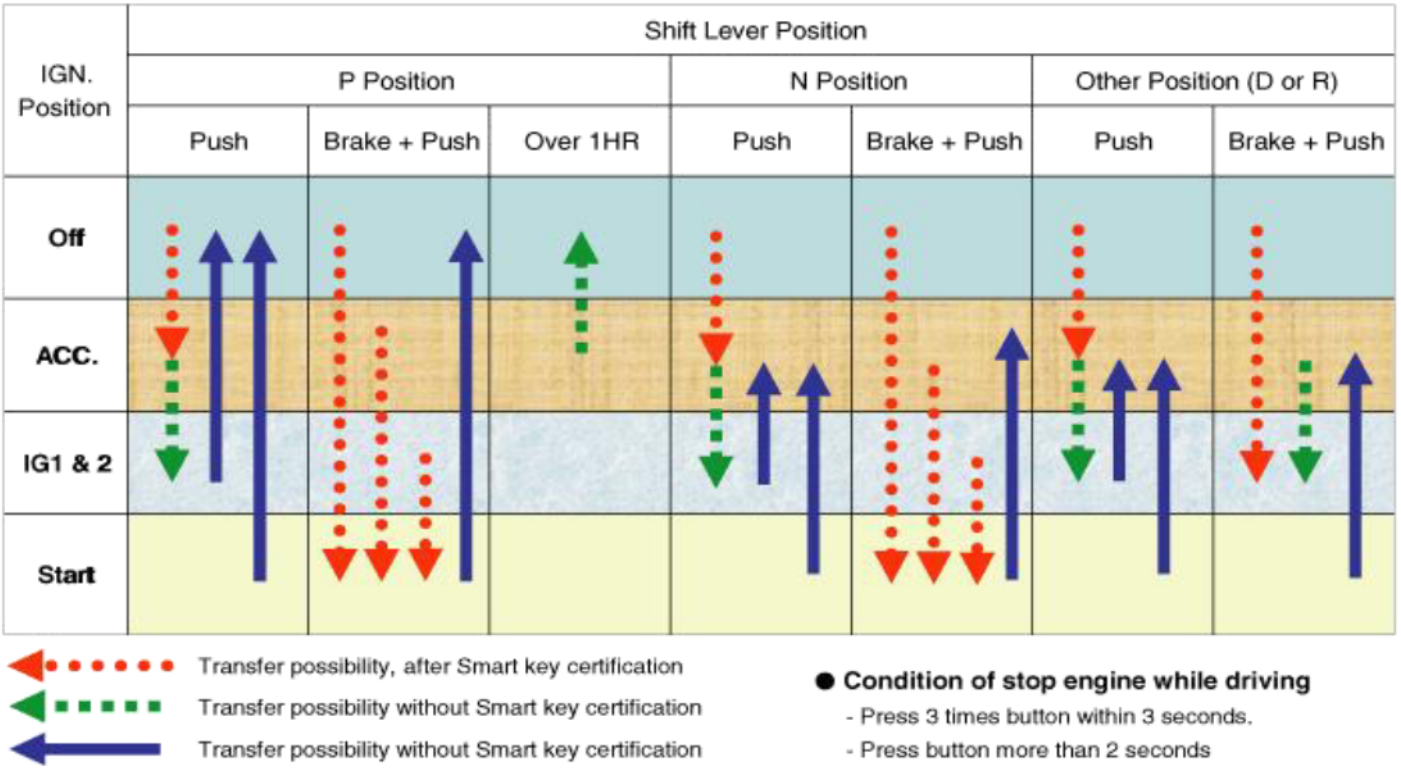
No.	Character lamp	Conditions
1	Indicator Lamp ON	Door open, Tail lamp ON, ACC, IG ON
2	Indicator Lamp 30sec ON → Lamp OFF	Door close, Tail lamp OFF, IG OFF
3	Indicator Lamp OFF	Remote LOCK, Passive LOCK
4	Rheostat at tail lamp ON (Illumination lamp)	

Indicator ON/OFF Condition According To Ignition Key's Position

No.	Ignition conditions	Start Button LED status
1	IG OFF	LED OFF
2	IG ACC	Amber color LED ON
3	IG ON (Engine OFF)	Blue 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

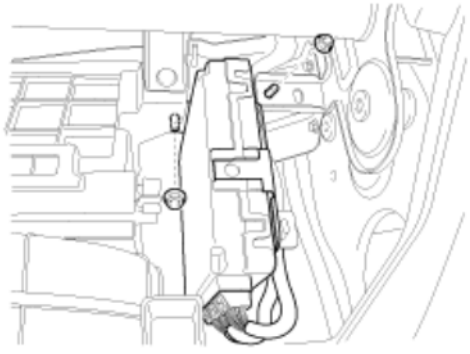
Electromagnetic waves are used to exchange information between the vehicle and the FOB. Two types of RKE Key can supplement the BES system:

– 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.

SMK unit



The SMK manages all functions related to “SMK Start”.
The SMK unit reads the inputs (e.g. Start Stop Button, Fob inserted,…), controls the outputs (e.g. exterior and interior antennas), and communicates via the CAN network as well as a single line interface to further devices of the car.
The main functional blocks of the SMK are:

- 2 Microcontrollers with Flash Memory (1 Master uC + 1 Slave uC)
- Low Speed CAN communication interface
- High Speed CAN Communication interface
- Single Line Interface to EMS for Immobilizer status

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- Input/Output stages
- LF antenna amplifier/driver

The LF antenna amplifier/driver generates a 125 kHz sinusoidal carrier signal which is distributed to the different antennas.
The signal is 100%-ASK modulated by switching on and off the carrier (the data is Manchester encoded). The power of the carrier shall be adjustable by software so that there is the possibility to adjust power level for each transmitted LF-telegram (it is recommended to have the power setting stored in EEPROM in such a way that it can be adjusted without software change).
The LF antenna driver consists of a number of outputs with different switching features, for SMK Start is used:

- switch on/off Left door handle antennas
- switch on/off Right door handle antennas
- switch on/off interior antennas
- switch on/off hat shelf antennas

The SMK comprises:

- the electronics described above
- a plastic housing

SMK Fob

The system supports up to 3 SMART FOBs to be used per vehicle.
The main functions of the SMART FOB are:

- SMK functionality: receives LF-challenge and sends automatically RF response.
- RKE function by action on four push buttons (LOCK/UNLOCK/TRUNK/PANIC/TAILGATE)
- Additional Mechanical key blade in case of low fob battery or disturbed wireless communication.
- LED for operation feedback and battery monitoring.

The main functional blocks of the SMART FOB are:

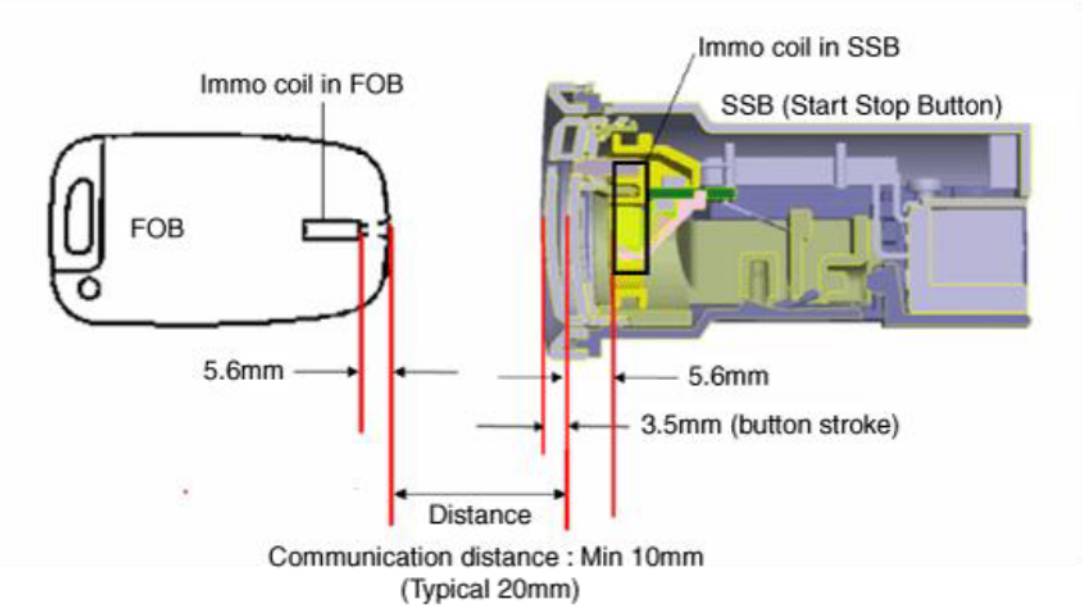
- 3 LF-antennas for 3-dimensional reception
- ASIC including Microcontroller core and transponder emulation
- RF transmitter
- 1 RF antenna for transmission
- Push buttons

The SMART FOB comprises:

- the electronics described above
- plastic housing (SMK FOB design) with push buttons
- a mechanical key blade

Transponder

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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 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.
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:
The main functions of the Start-Stop-Button are:

- Starting/Stopping the engine
- Visualization of the clamp status
- Illumination of the Start-Stop-Button to locate easily the SSB
- Authentication by Transponder of the Fob Key (Limp-Home authentication)

The main functional blocks of the Start-Stop-Button are:

- Redundancy of the SSB signal
- LED Illumination: Blue/Amber
- SSB text illumination
- Integrated coil to communicate with the transponder by a base station and using wireless communication: LF 125kHz

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.



Electronic Steering Column Lock (ESCL)

The main functions of the ESCL are:

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- Unlocking/Locking of the Electric Steering Column Lock

The main functional blocks of the ESCL are:

- ESCL Controller
- micro switch for detection of the unlocked status of the stroke bolt
- two hall sensors to detect the position of the stroke-bolt
- serial data communication using the ESCL COM Line



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, ESCL and Engine status :

System State	Terminal Status	ESCL Status	Engine status
1. OFF - Locked	OFF	Locked	Stopped
2. OFF - Unlocked	OFF	Unlocked	Stopped
3. ACC	ACC	Unlocked	Stopped
4. IGN	IGN1, IGN2, ACC	Unlocked	Stopped
5. Start	IGN1, Start	Unlocked	Cranking
6. IGN - Engine	IGN1, IGN2, ACC	Unlocked	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

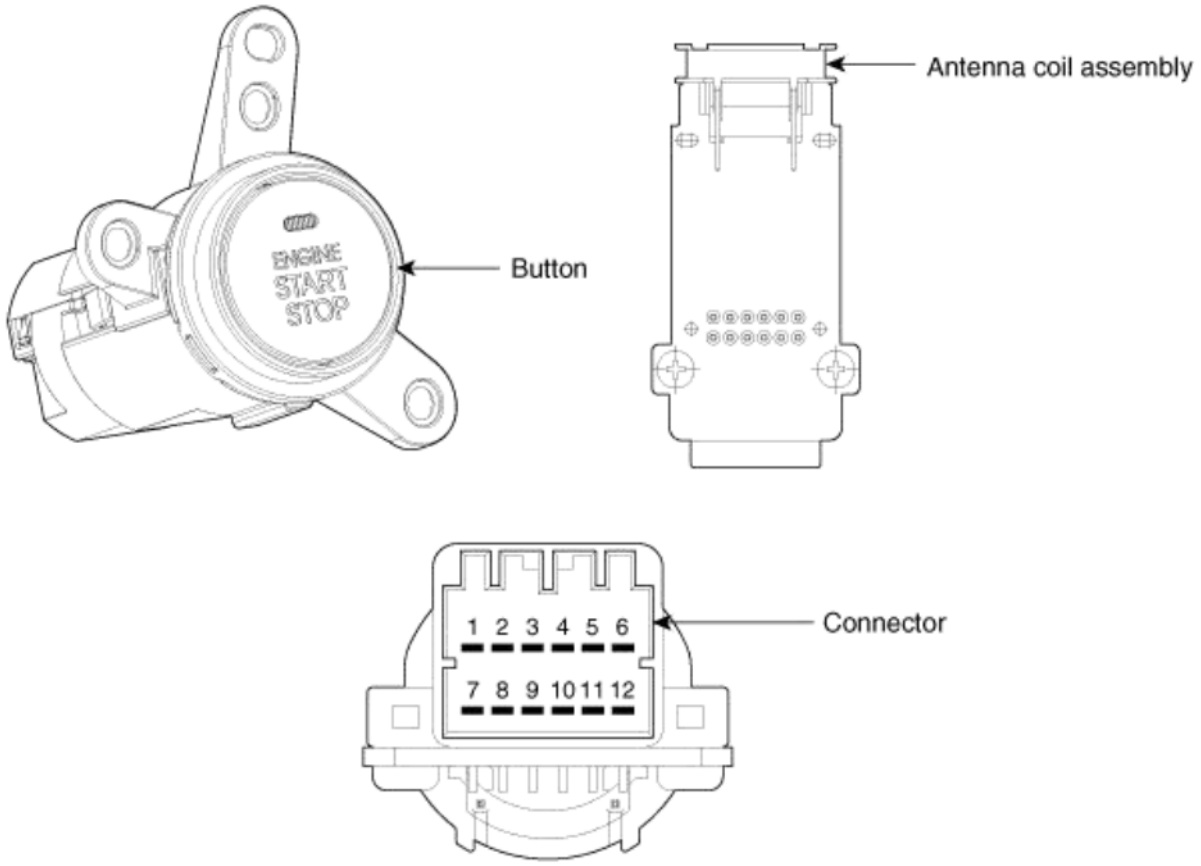
The BES System can be set in 5 different states (OFF LOCKED is not available in virgin mode), depending on the status of the terminals, ESCL and Engine status :

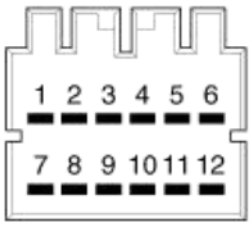
System State	Terminal Status	ESCL Status	Engine status
1. OFF - UNLOCKED	OFF	Unlocked	Stopped
2. ACC	ACC	Unlocked	Stopped
3. IGN	IGN1, IGN2, ACC	Unlocked	Stopped
4. Start	IGN1, START with special pattern of activation see Chap 6.2.1 for details	Unlocked	Cranking
5. IGN - Engine	IGN1, IGN2, ACC	Unlocked	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.

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COMPONENT

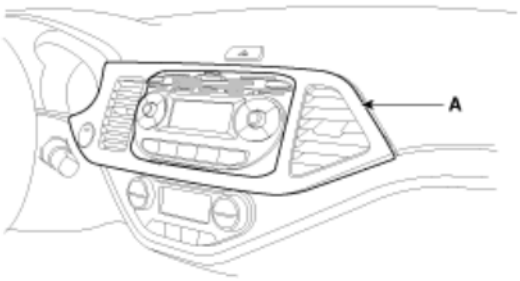


Connector (12 Pins)			
Pin No.	Description	Pin No.	Description
1	Start/Stop button switch 1	7	Ground
2	LED illumination power	8	Start/Stop button switch 2
3	Amber LED	9	Green LED
4	Button illumination(letter) GND	10	Rheostat
5	Button illumination(letter) Power	11	-
6	Immobilizer power	12	Immobilizer GND

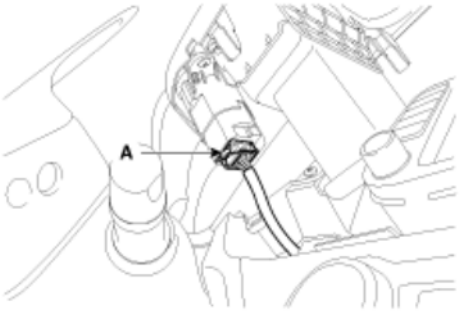
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REMOVAL

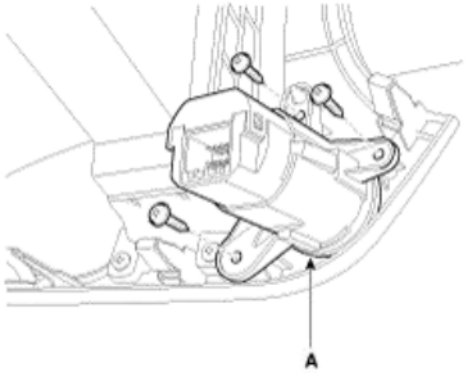
1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia panel (A).
   (Refer to the BD group - "Crash pad")



3. Disconnect the start/stop button connector (A).



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



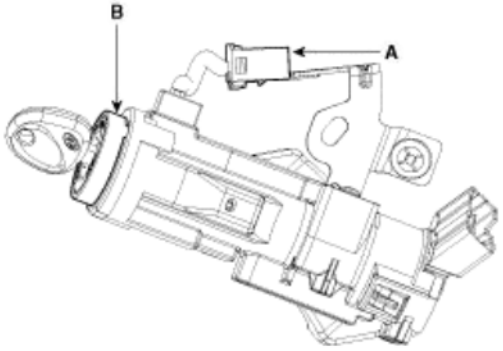
INSTALLATION

1. Install the start/stop button.
2. Install the center fascia panel.

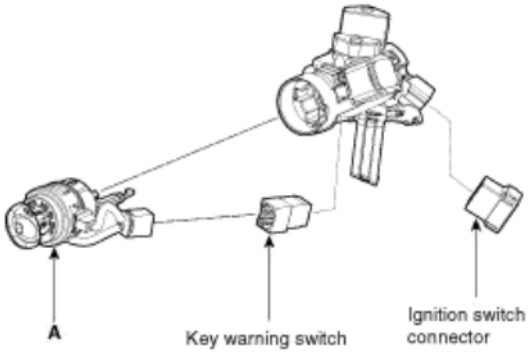
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REMOVAL

1. Disconnect the negative (-) battery terminal.
2. Remove the driver crash pad lower panel.
   (Refer to the BD group - "Crash pad")
3. Remove the steering column upper and lower shrouds.
   (Refer to the BD group - "Crash pad")
4. Remove the wiper switch.
   (Refer to the BE group - "Multifunction switch")
5. Remove the ignition switch after disconnecting the ignition switch 6P connector.
6. Remove the key warning/immobilizer connector (A).



7. After loosening the screw, remove the key warning switch (B).
8. Pushing lock pin with key ACC.
9. Remove the key lock cylinder (A).



INSTALLATION

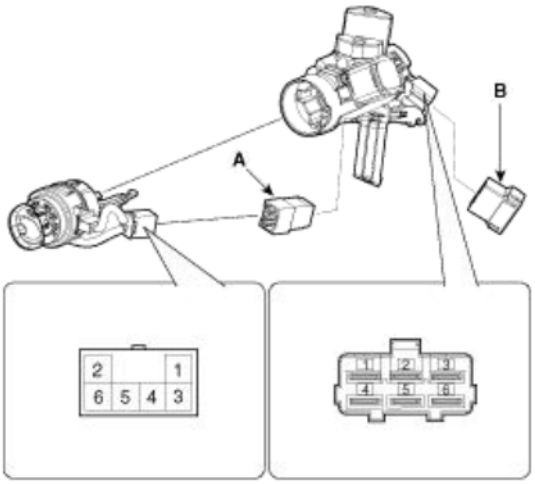
1. Install the key lock cylinder.
2. Install the key warning switch.
3. Install the key warning/immobilizer connector.
4. Connect the ignition switch connector after Install the ignition switch.

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5. Install the wiper switch.
6. Install the steering column shrouds.
7. Install the driver crash pad lower panel.

INSPECTION

1. Disconnect the ignition switch connector (B) and key warning switch connector (A) from the steering column.



2. Check for continuity between the terminals.
3. If continuity is not specified, replace the switch.

Terminal / Position	Key	Ignition switch (B) 5	6	4	1	2	3	Key warning switch (A) Immobilizer antenna 1	2	Key warning switch 3	4
LOCK	Key out (Off) removal										
LOCK	Key in (On) insert										
ACC	Key in (On) insert	○	○								
ON	Key in (On) insert	○	○	○	○	○		⊖	⊕	○	○
START	Key in (On) insert	○		○	○		○				

English ▼

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