

GENESIS COUPE(BK) > 2013 > G 3.8 GDI > Body Electrical System

Body Electrical System > General Information > General Information

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 Engine Electrical System - Battery)

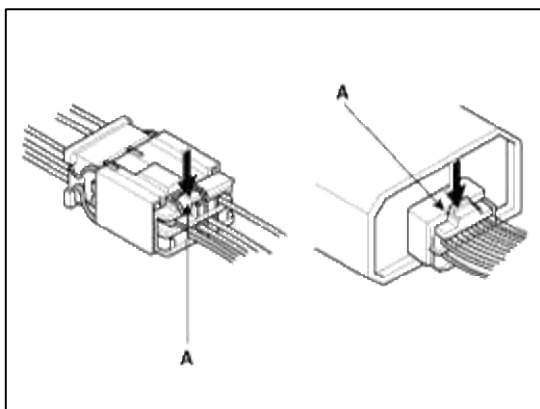
NOTE

- 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.

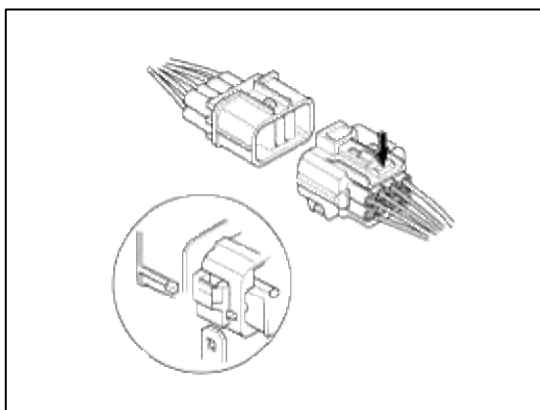
3. Check the alternator belt tension.

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).

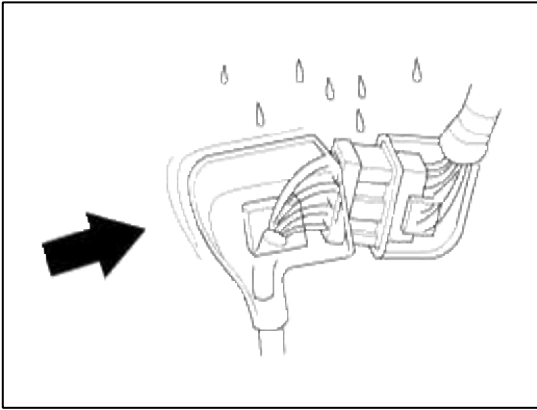


4. Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
5. Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket (A).

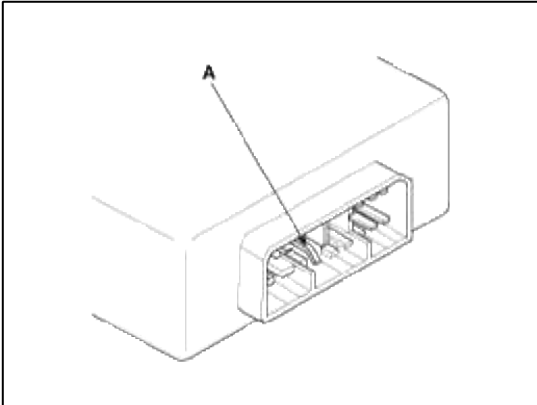


6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.

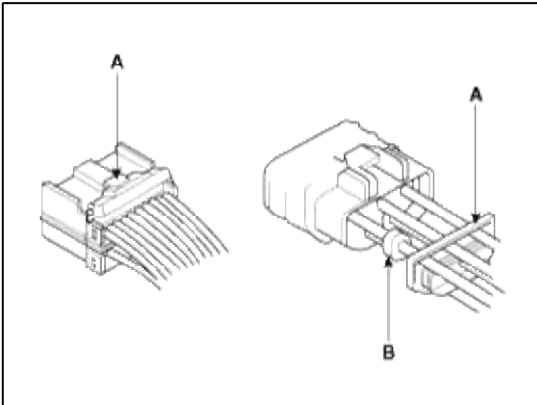
7. Always reinstall plastic covers.



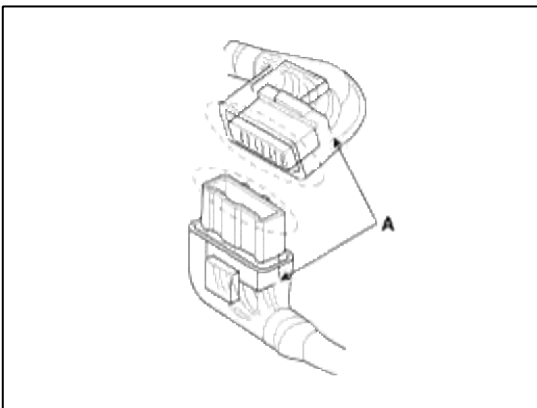
8. Before connecting connectors, make sure the terminals (A) are in place and not bent.



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

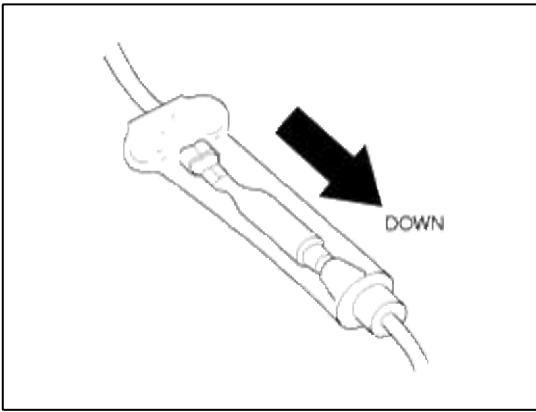


10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



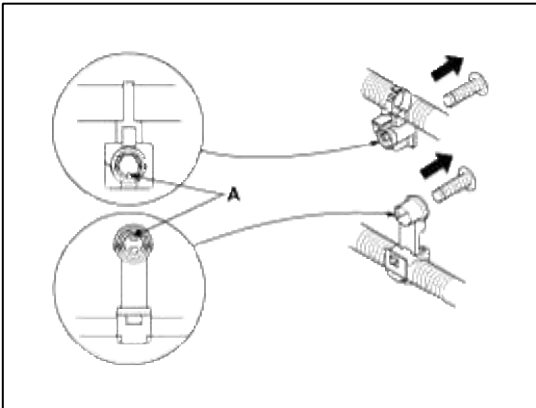
11. Insert the connector all the way and make sure it is securely locked.

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

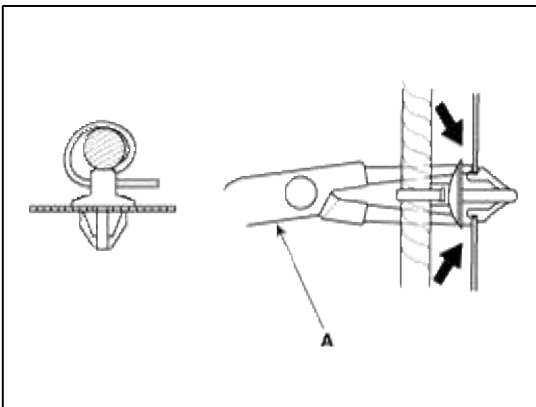


Handling Wires And Harnesses

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

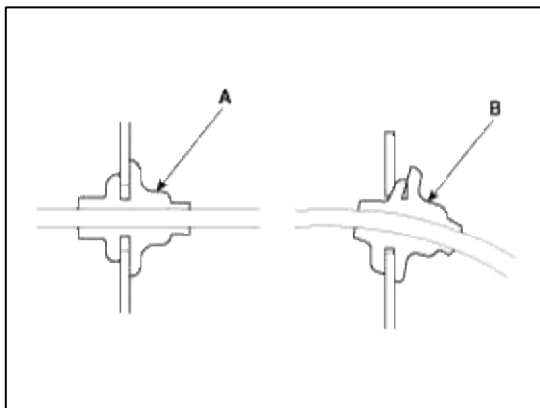


3. Slip pliers (A) under the clip base and through the hole at an angle, and then squeeze the expansion tabs to release the clip.



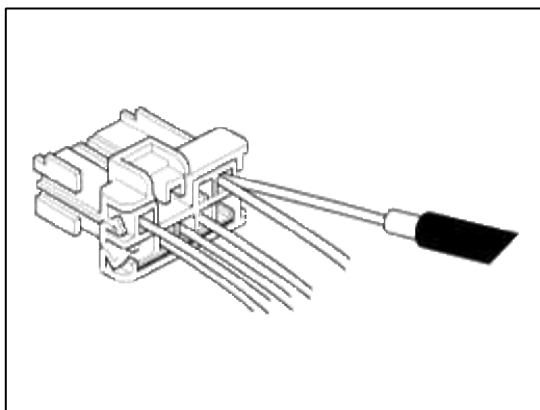
4. After installing harness clips, make sure the harness doesn't interfere with any moving parts.
5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.

6. Seat grommets in their grooves properly (A). Do not leave grommets distorted (B).

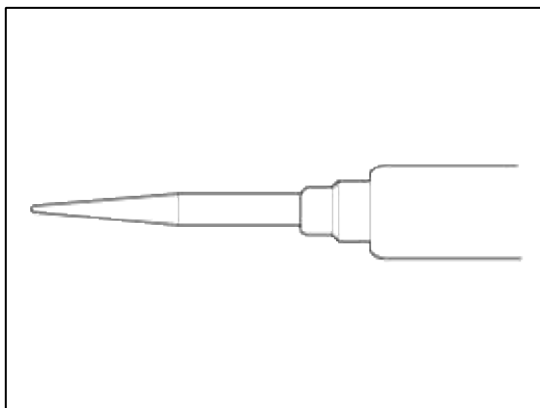


Testing And Repairs

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



5. Use a 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.

3. Isolate the problem by testing the circuit.

Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting.

Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

4. Fix the problem

Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.

5. Make sure the circuit works

Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on the fuse. Make sure no new problems turn up and the original problem does not recur.

Battery Reset

Description

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

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

SYSTEM	RESETTING
Auto up/down window	Whenever the battery is disconnected, discharged or the related fuse is replaced or reinstalled, reset the Auto up/down window system according to the procedure below. 1) Turn the ignition switch to the ON position. 2) Pull up the power window switch in order that the window can close completely, and then keep pulling up the power switch for about 1 second.
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 5 seconds until the sunroof do as follows; A. Tilt → Slide Open → Slide Close Then release the lever. 6. Reset procedure of panorama system is finished.
Trip computer	When the battery is disconnected and reconnected, the set functions of the trip computer become initialized. So, you need to explain this information to the customer.
Clock	When the battery is disconnected and reconnected, the clock becomes initialized. So, the clock should be reset.
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.

Body Electrical System > Audio > Specifications

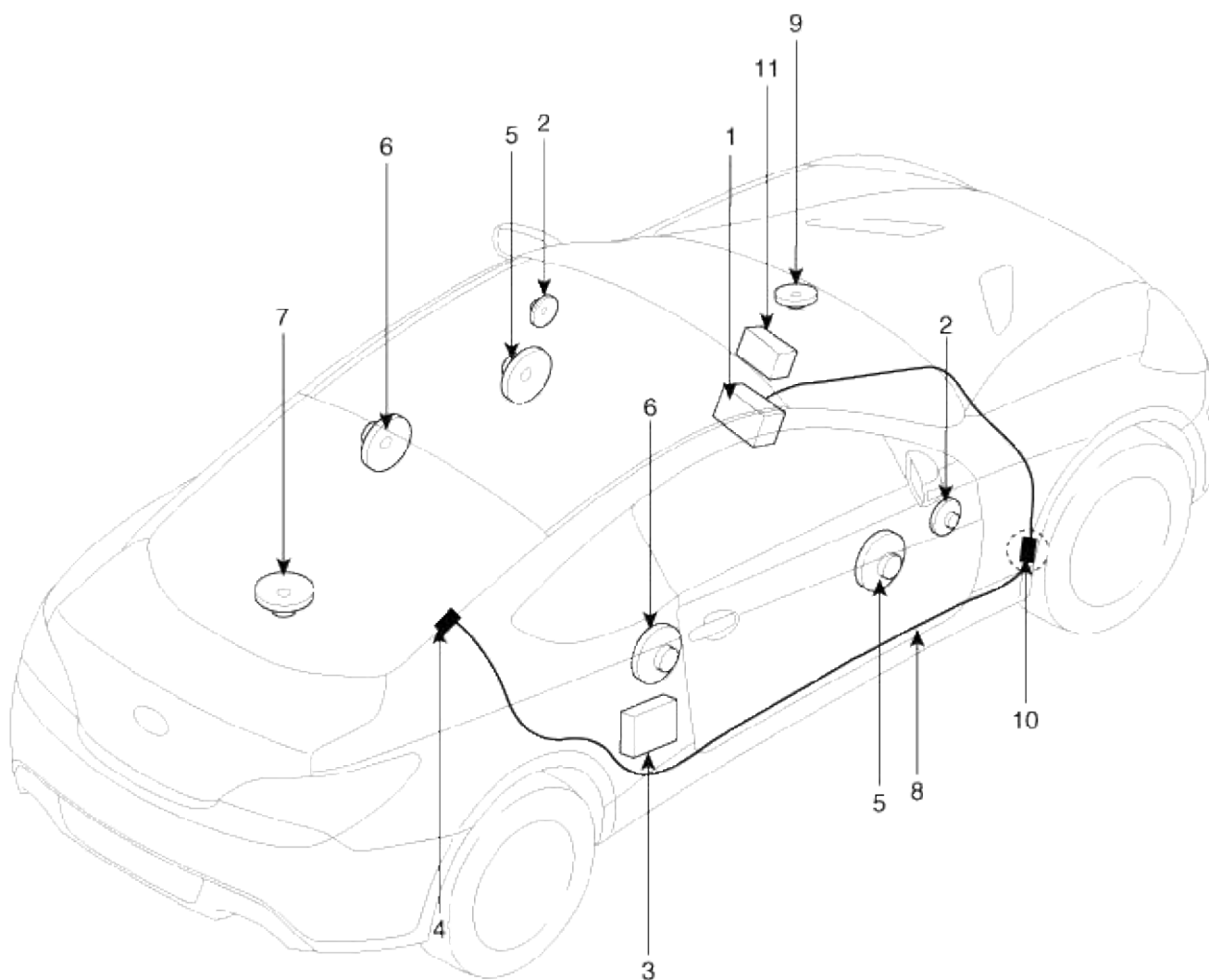
Specification

Audio

Item		Specification	
Model		RADIO/CD/MP3/XM	RADIO/CDC/MP3/XM
Power supply		DC 14.4 V	DC 14.4 V
Rated output		Max. 43 W x 4	Max. 3.2 Vrms
Antenna		80 PF 75 Ω	
Tuning type		PLL synthesized tuning	
Other		Internal Amplifier	External Amplifier
Frequency range / Channel space	FM	87.5 ~ 107.9 MHz/200 KHz	
	AM	NAS, CAN : 530 ~ 1710 KHz/9 KHz, GUAM : 531~1701 KHz/9 KHz	

Body Electrical System > Audio > Components and Components Location

Component Location

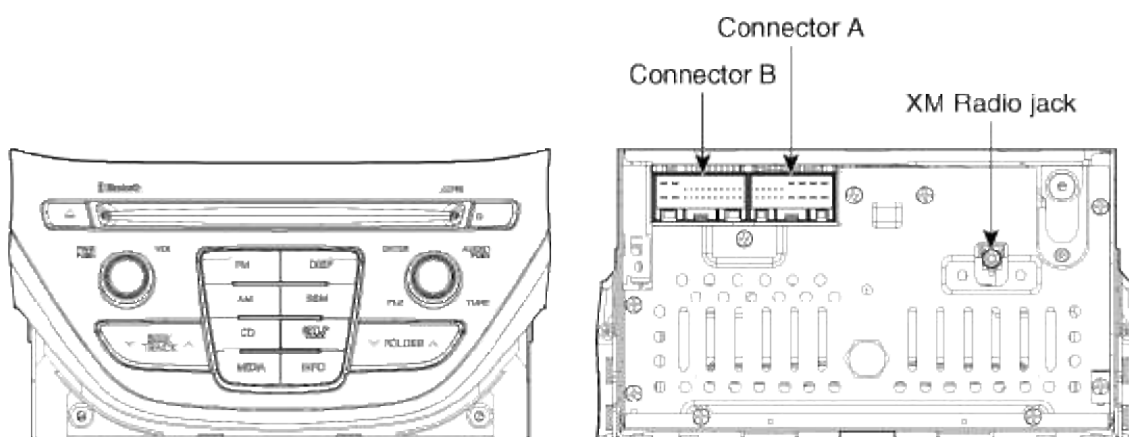


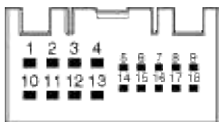
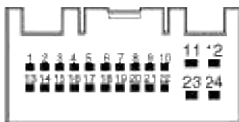
- | | |
|-----------------------|----------------------------------|
| 1. Audio unit | 7. Woofer speaker |
| 2. Tweeter speaker | 8. Antenna feeder cable |
| 3. External amp | 9. Crash pad center speaker |
| 4. Glass antenna | 10. Feeder cable joint connector |
| 5. Front door speaker | 11. Audio monitor |
| 6. Rear speaker | 12. Aux jack |

Body Electrical System > Audio > Audio Unit > Components and Components Location

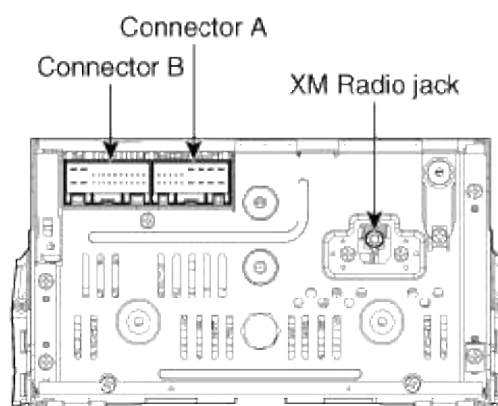
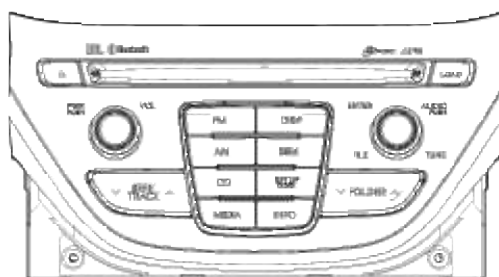
Components


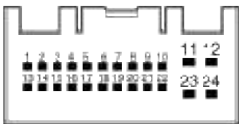
[RADIO/CD/MP3 - Internal AMP]



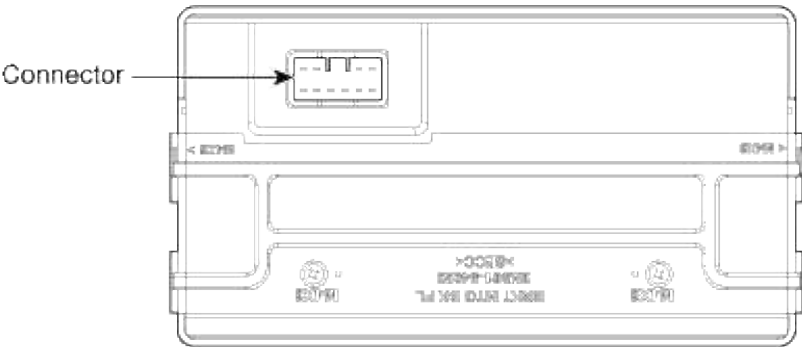
		
Pin No.	Connector A	Connector B
1	Speaker RL (+)	CAN High
2	Speaker FL (+)	-
3	Speaker FR (+)	Temp
4	Speaker RR (+)	Steering remote
5	-	-
6	-	USB D (+)
7	-	USB/iPod VDD
8	Illumination (+)	AUX R Input
9	-	AUX GND
10	Speaker RL (-)	MIC (+) (Bluetooth)
11	Speaker FL (-)	ACC
12	Speaker FR (-)	B (+)
13	Speaker RR (-)	CAN Low
14	-	-
15	-	-
16	External keyboard	Vehicle speed
17	Illumination (-)	Steering remote GND
18	Remote antenna	USB D (-)
19		USB / iPod GND
20		AUX detect
21		AUX L Input
22		MIC (-) (Bluetooth)
23		-
24		Power GND


[RADIO/CD/MP3 - External AMP]



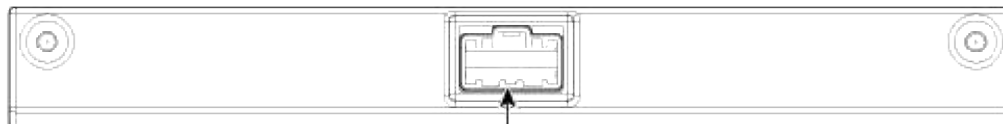
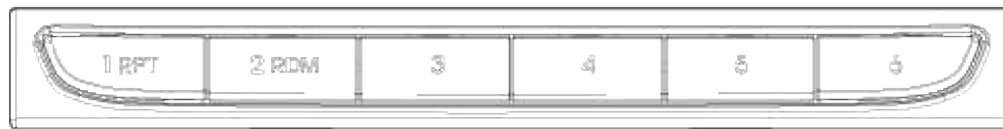
		
Pin No.	Connector A	Connector B
1	-	CAN High
2	-	-
3	-	Temp
4	-	Steering remote
5	SPDIF GND	-
6	SPDIF DN	USB D (+)
7	-	USB / iPod VDD
8	Illumination (+)	AUX R Input
9	-	AUX GND
10	-	MIC + (Bluetooth)
11	-	ACC
12	-	B+
13	-	CAN Low
14	-	-
15	SPDIF DP	-
16	External keyboard	Vehicle speed
17	Illumination (-)	Steering remote GND
18	Remote antenna	USB D (-)
19		USB / iPod GND
20		AUX DETECT
21		AUX L Input
22		MIC - (Bluetooth)
23		-
24		Power GND

[Audio Monitor]

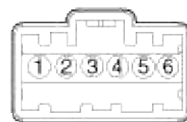


Connector	No.	Name	No.	Name
	1	ILL (-)	6	-
	2	-	7	CAN -
	3	-	8	CAN +
	4	Power ground	9	ACC
	5	IL_ (+)	10	Battery

[External Keyboard]



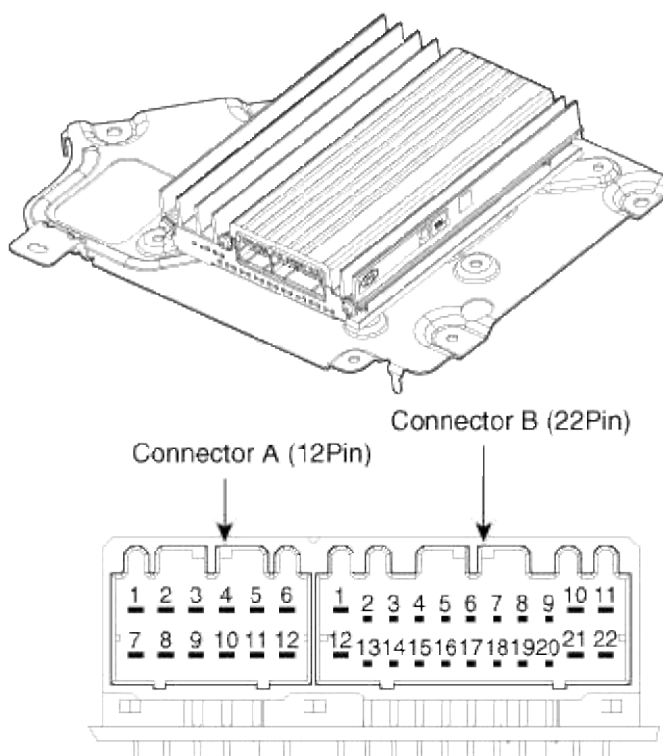
Connector



Connector

Pin No.	Description
1	Power GND
2	External keyboard
3	-
4	-
5	Illumination (+)
6	Illumination (-)

[External Amplifier]



No.	Connector A	Connector B
1	Front left door(+)	Front center(+)
2	Front Right door(+)	-
3	Rear left door(+)	-
4	Rear Right door(+)	-
5	Subwoofer 2(+)	NAVI(+)
6	Subwoofer 1(+)	ACC
7	Front left door(-)	CAN (-)
8	Front Right door(-)	CAN (+)
9	Rear left door(-)	-
10	Rear Right door(-)	Battery
11	Subwoofer 2(-)	Battery
12	Subwoofer 1(-)	Front center(-)
13		-
14		-
15		-
16		NAVI(-)
17		SPDIF Signal
18		SPDIF (-)
19		SPDIF (+)
20		-
21		GND
22		GND

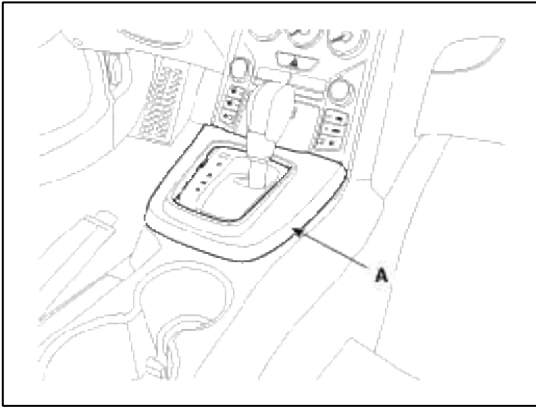
Body Electrical System > Audio > Audio Unit > Repair procedures

Removal

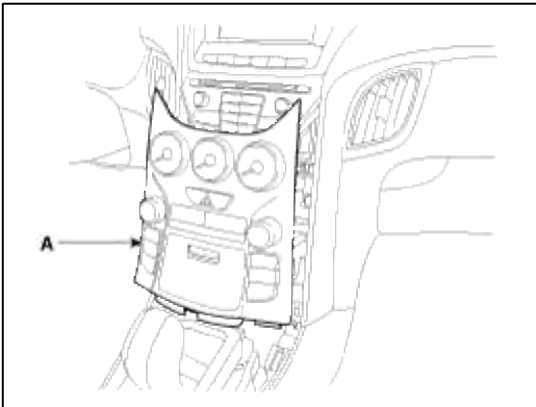
Audio Head Unit

1. Disconnect the negative (-) battery terminal.

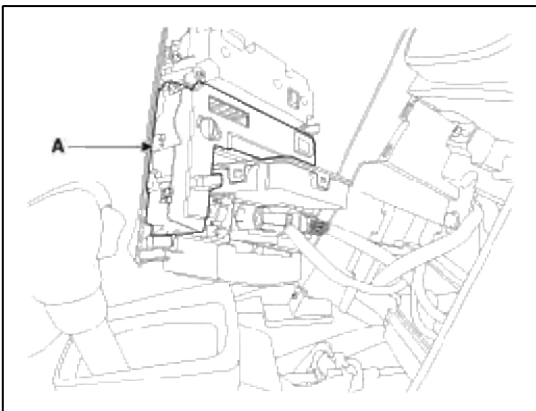
2. Remove the console upper cover(A).



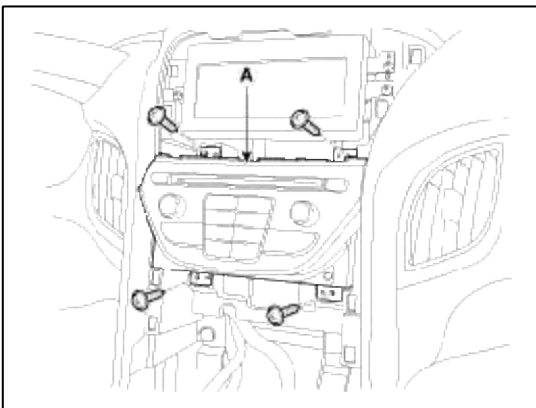
3. Remove the center fascia lower panel(A).
(Refer to the BD group - "Crash pad")



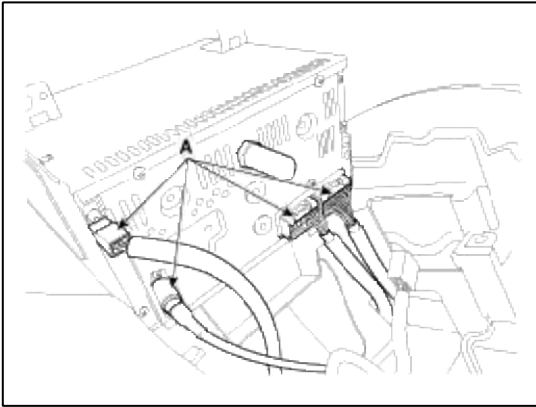
4. Remove the connectors and cables (A).



5. Remove the mounting screws then remove the audio head unit(A).

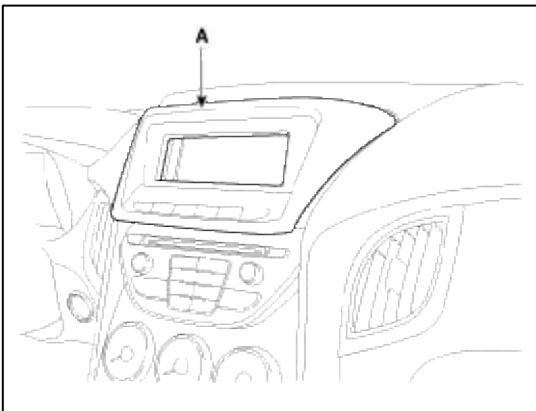


6. Remove the connectors and cable(A).

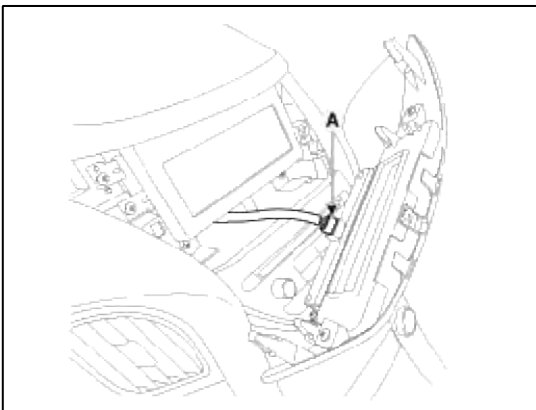


Audio Monitor

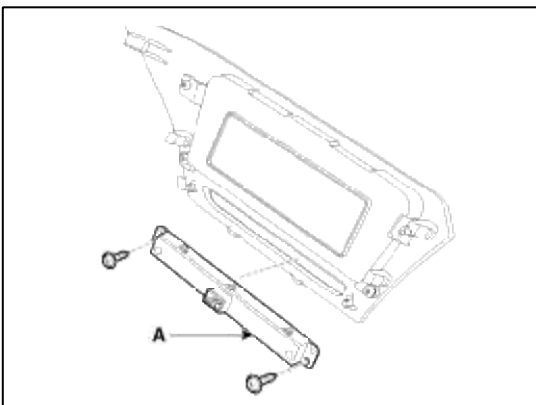
1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia upper panel (A).
(Refer to the BD group - "Crash pad")



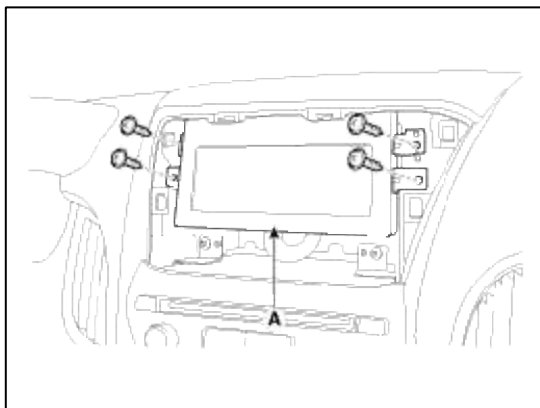
3. Disconnect the connector (A) from external keyboard.



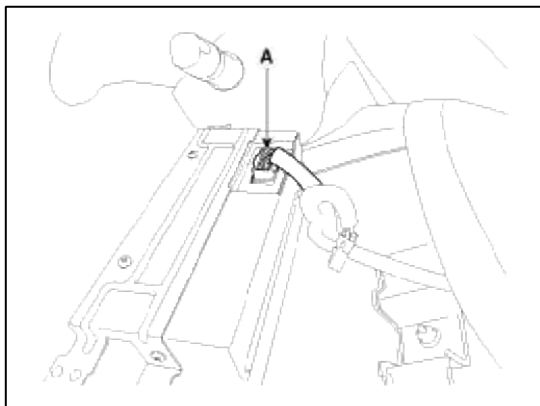
4. Remove the external keyboard (A) after loosening the mounting screws.



5. Remove the audio monitor (A) after loosening the mounting screws.

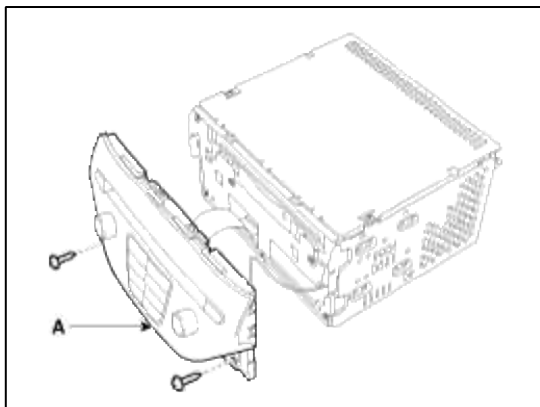


6. Disconnect the connector (A) from audio monitor.

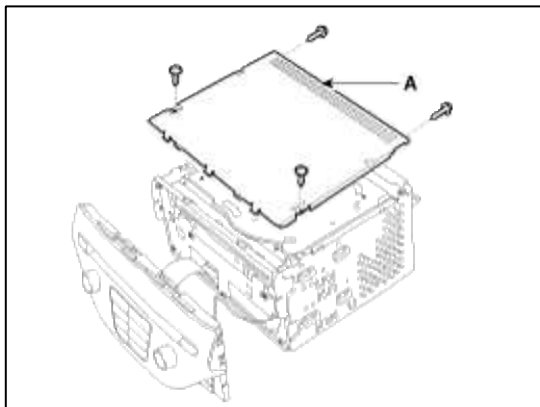


Disassembly

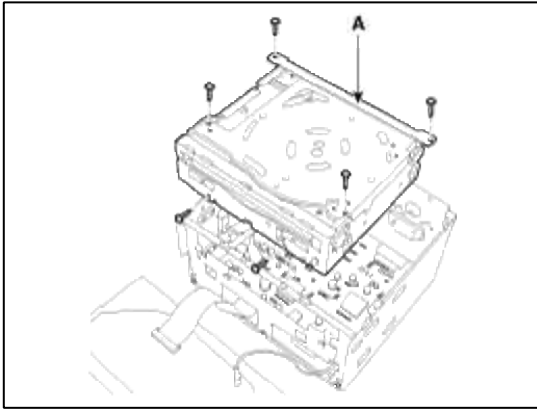
1. Remove the front panel (A) after loosening the mounting screws.



2. Remove the upper cover (A) after loosening the mounting screws.



3. Remove the CD deck (A) after loosening the mounting screws.



Reassembly

1. Reassemble the deck to the audio unit.
2. Reassemble the upper cover.
3. Reassemble the front panel.
4. Reassemble the audio brackets.

NOTE

Make sure the film connector and cable jack are plugged in properly.

Installation

Audio Head Unit

1. Connect the audio unit connectors and cables.
2. Install the audio unit.
3. Install the center fascia lower panel.
4. Install the console upper cover.
5. Check the audio system.

NOTE

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

Audio Monitor

1. Install the audio monitor.
2. Install the upper cover and connect the external keyboard connector.
3. Install the center fascia upper panel.

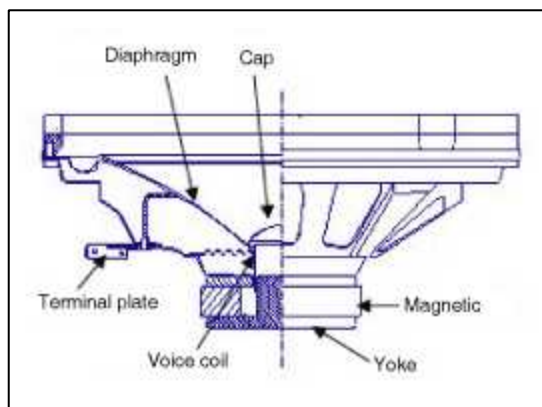
Body Electrical System > Audio > Speakers > Repair procedures

Inspection

1. Troubleshooting for Speaker

(1) Basic inspection of speaker

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



(2) Case Troubleshooting

No.	Case	Inspection/Remedy
1	Trembling sound	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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. When a noise is heard on turning radio and CD on, replace the speaker with new one. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE</p> <p>In case there is only radio static, this causes from poor radio reception. Thus the speaker needs no repair and replacement.</p> </div>
3	Poor working	<p>Inspection of the wiring connection between the battery and the speaker</p> <ol style="list-style-type: none"> 1. Before replacing the speaker, inspect the wiring connection between the battery and the speaker is normal. 2. Check the supplying power to the speaker and the resistance, then inspect the sound quality. <ul style="list-style-type: none"> ■ Specified impedance : 2 ~ 4Ω <div style="text-align: center; margin: 10px 0;"> </div> <ol style="list-style-type: none"> 3. If the speaker works poorly, replace it with new one.

CAUTION

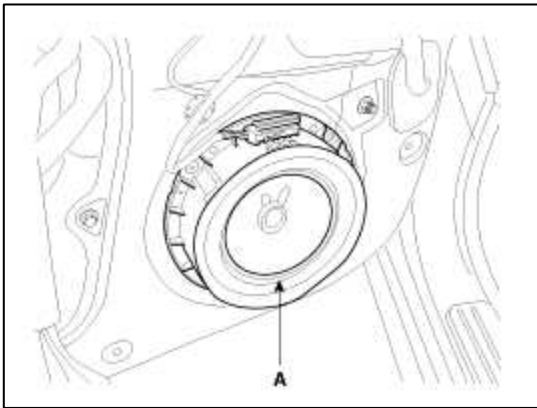
During handling of speaker

- During dealing of speaker
- Do not damage the speaker with impact as like a drop and a throw.
- Be careful not to spill water and oil over the speaker.
- Caution during handling of speaker because the material of diaphragm is paper which is easy to be torn by impact and external force.
- Modifying audio system can damage the speakers.
- And, in this case the speakers are not covered by the manufacturer's warranty.

Removal

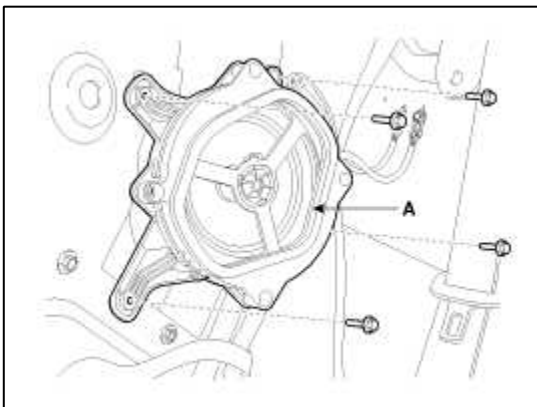
Front Speaker

1. Remove the front door trim panel.
(Refer to the Body group - "Front door")
2. Remove the front speaker (A) after loosening 4 rivets.



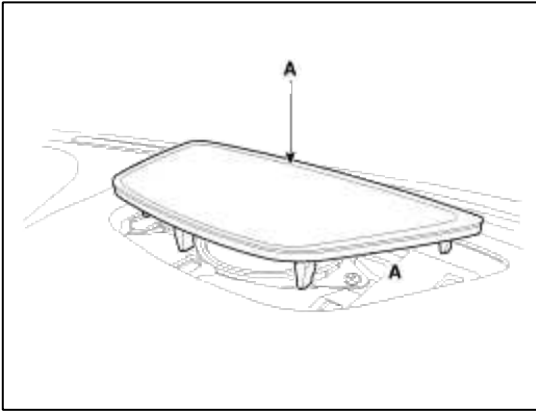
Rear Speaker

1. Remove the rear seat.
(Refer to the Body group - "Rear seat")
2. Remove the rear side trim and then remove the rear speaker (A) after removing 4 bolts.

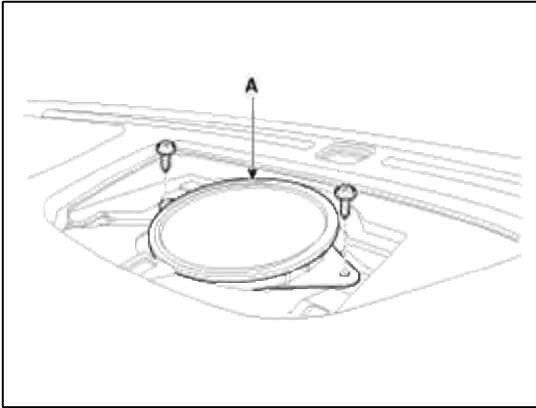


Crash pad center speaker

1. Remove the center speaker cover(A).

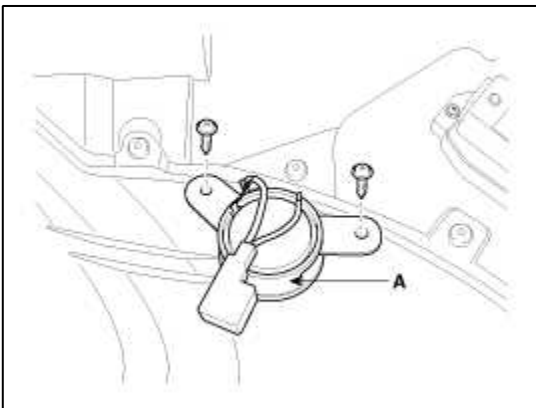


2. Remove the center speaker(A) after loosening the mounting screws.



Tweeter Speaker

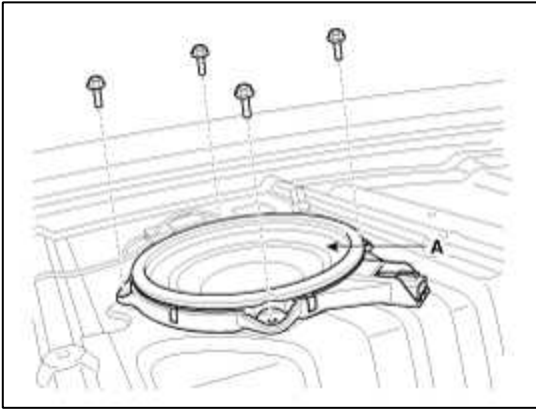
1. Remove the front door trim(A).
(Refer to the Body group - "Front door")
2. Remove the tweeter speaker(A) from the front door trim after disconnecting the connector.



Woofer Speaker

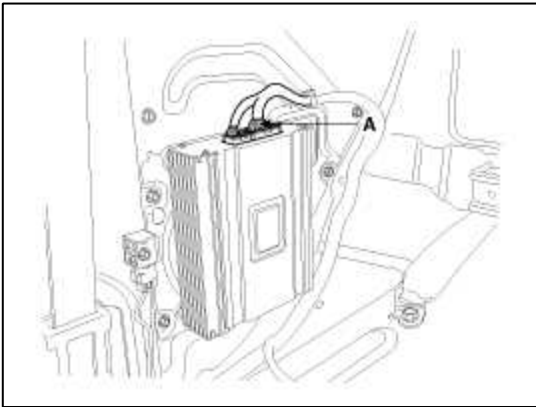
1. Fold the rear seat forward.
(Refer to the Body group - "Rear seat")
2. Remove the rear package tray.
(Refer to the Body group - "Interior trim")

3. Remove the woofer speaker (A) after removing 4 bolts.

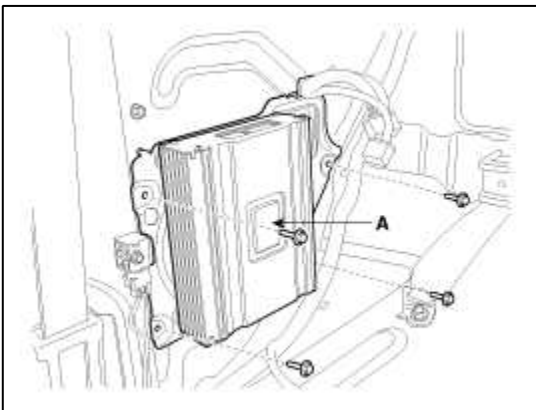


External Amp

1. Remove the rear seat.
(Refer to BD group - "Rear seat")
2. Remove the rear right side trim.
3. Remove the external amplifier connector(A) from the rear right quarter panel.



4. Remove the external amplifier(A) after loosening the mounting bolts.



Installation

Front Speaker

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

Rear Speaker

1. Install the rear speaker.
2. Install the rear side trim.
3. Install the rear seat.

Crash pad center speaker

1. Install the center speaker.
2. Install the center speaker cover.

Tweeter Speaker

1. Install the tweeter speaker after connecting the tweeter speaker connector.
2. Install the front door trim.

Woofer Speaker

1. Install the woofer speaker after connecting the connector.
2. Install the rear package tray and rear seat assembly.

External Amp

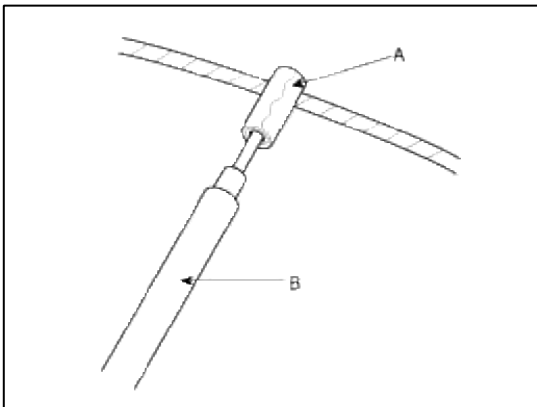
1. Install the external amplifier after connecting the connector.
2. Install the rear right side trim.

Body Electrical System > Audio > Antenna > Repair procedures

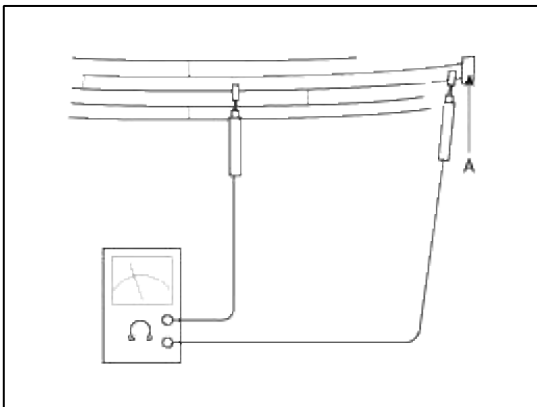
Inspection

Glass Antenna Test

1. Wrap aluminum foil (A) around the tip of the tester probe (B) as shown.



2. Touch one tester probe to the glass antenna terminal (A) and move the other tester probe along the antenna wires to check that continuity exists.

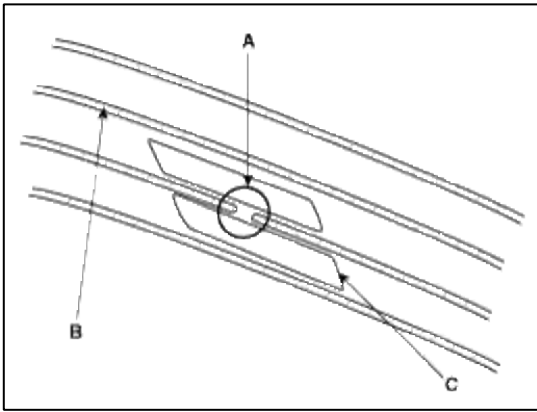


Glass Antenna Repair

NOTE

To make an effective repair, the broken section must be no longer than one inch.

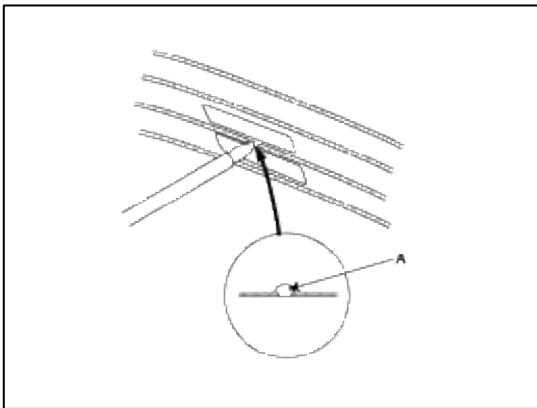
1. Lightly rub the area around the broken section (A) with fine steel wool, and then clean it with alcohol.



2. Carefully mask above and below the broken portion of the glass antenna wire (B) with cellophane tape (C).
3. Using a small brush, apply a heavy coat of silver conductive paint (A) extending about 1/8" on both sides of the break. Allow 30 minutes to dry.

NOTE

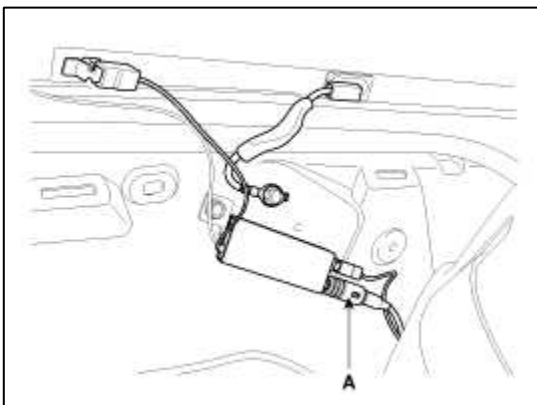
Thoroughly mix the paint before use.



4. Check for continuity in the repaired wire.
5. Apply a second coat of paint in the same way. Let it dry three hours before removing the tape.

Glass Antenna Circuit Inspection

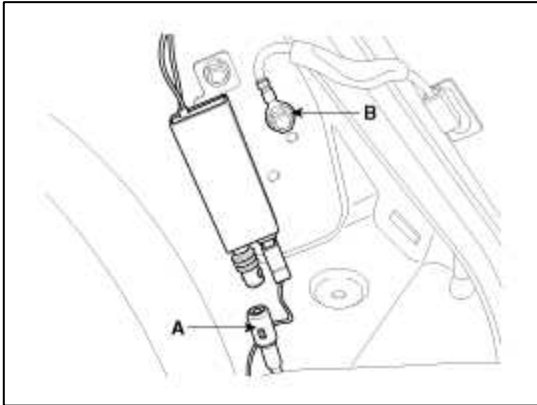
1. Remove the right side rear quarter trim.
Then disconnect the antenna feeder cable(A) from the glass antenna amp.



2. Turn the radio ON.

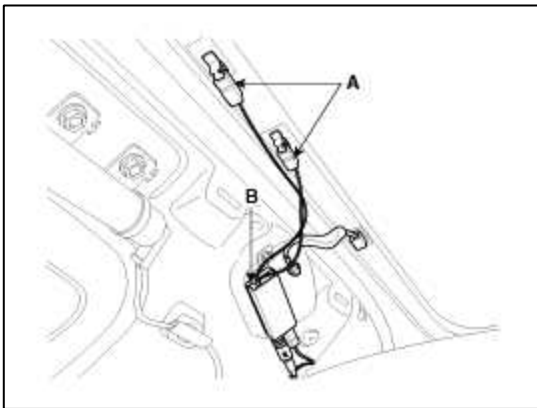
Measure the voltage between terminal 2 of the harness side feeder cable(A) and body ground(B).

OK : approximately 12V (ACC+)



3. Disconnect the 2P connector of radio wiring from the glass antenna amp.

4. Check for continuity between terminals of harness side connector(B) and antenna grid terminals(A).



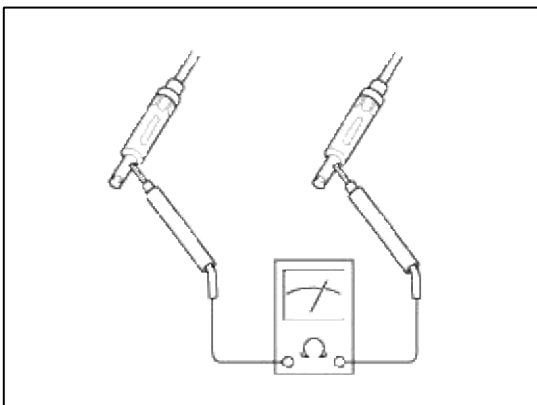
5. Check the grid lines for continuity.

6. When a poor radio reception is not repaired through the above inspection methods, replace the amp.

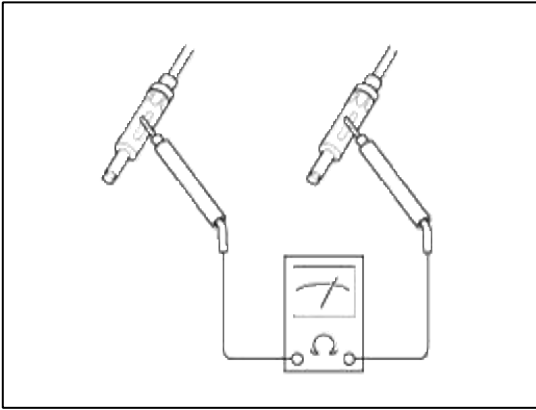
If the radio reception is still poor, check the radio cable for short and radio head unit for failure.

Antenna Cable

1. Remove the antenna jack from the audio unit and antenna.
2. Check for continuity between the center poles of antenna cable.

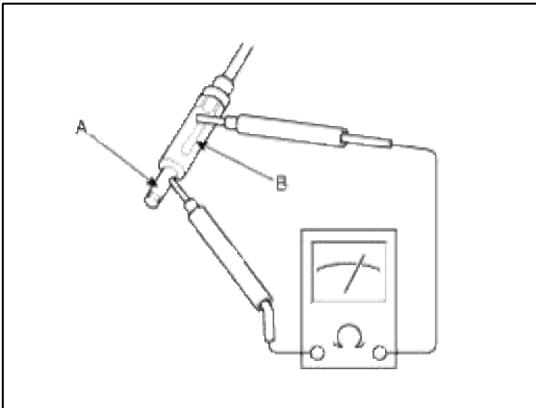


3. Check for continuity between the outer poles of antenna cable. There should be continuity.



4. If there is no continuity, replace the antenna cable.

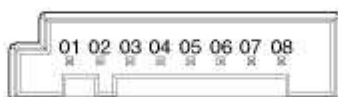
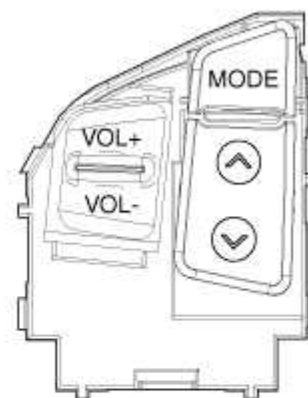
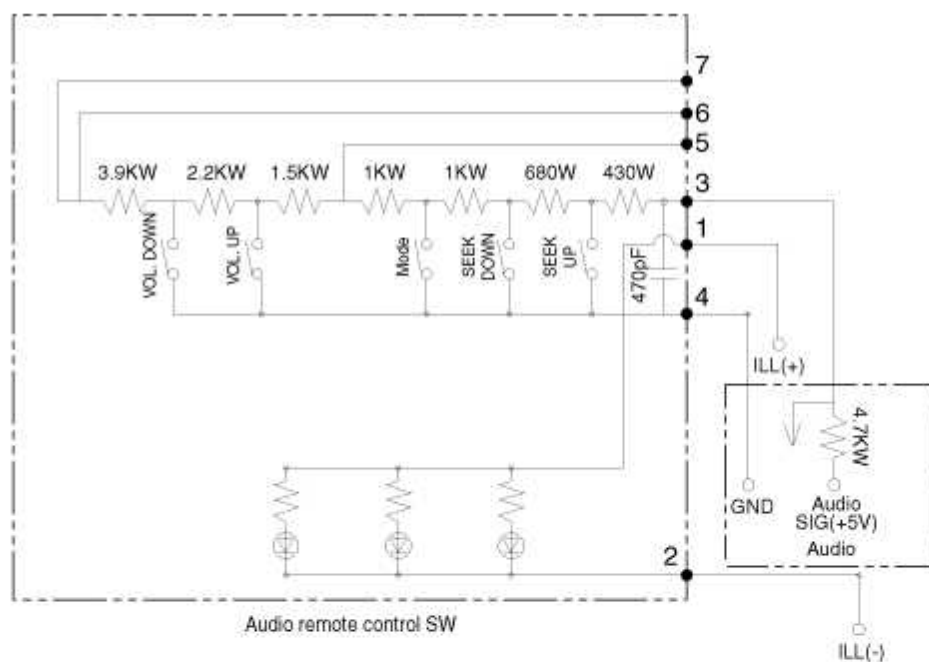
5. Check for continuity between the center pole (A) and outer pole (B) of antenna cable. There should be no continuity.



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

Body Electrical System > Audio > Audio Remote Control > Schematic Diagrams

Circuit Diagram

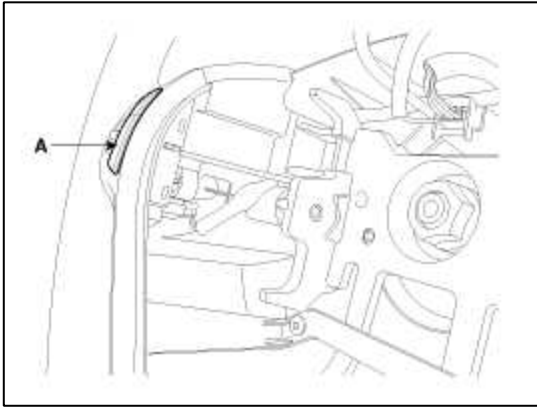


Pin No.	Name
1	ILL (+)
2	ILL (-)
3	Audio (+)
4	Audio (-)
5	Mute Out
6	-
7	-
8	-

Body Electrical System > Audio > Audio Remote Control > Repair procedures

Inspection

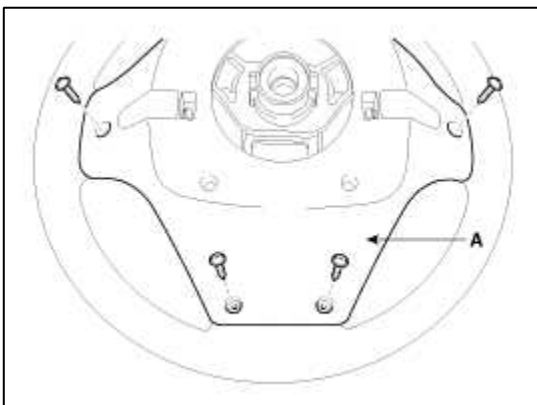
1. Check the audio remote control switch(A) for resistance between No.3 and No.4 terminals in each switch position.



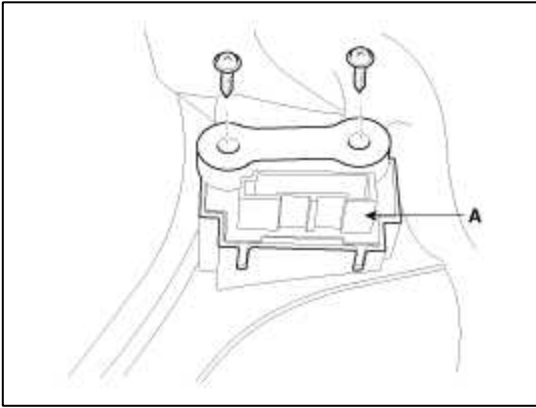
Switch	Connector terminal	Resistance (±5%)
Volume Down	3 - 4	6.81 kΩ
Volume Up	3 - 4	4.61 kΩ
Seek Up	3 - 4	430 Ω
Seek Down	3 - 4	1.11 kΩ
Mode	3 - 4	2.11 kΩ

Removal

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



5. Remove the audio remote control switch (A) after removing the steering wheel remote control switch connector and 2 screws.



Installation

1. Reassemble the steering wheel remote control switch after connecting the connector.
2. Reassemble the steering wheel.
3. Reassemble the driver airbag module.

NOTE

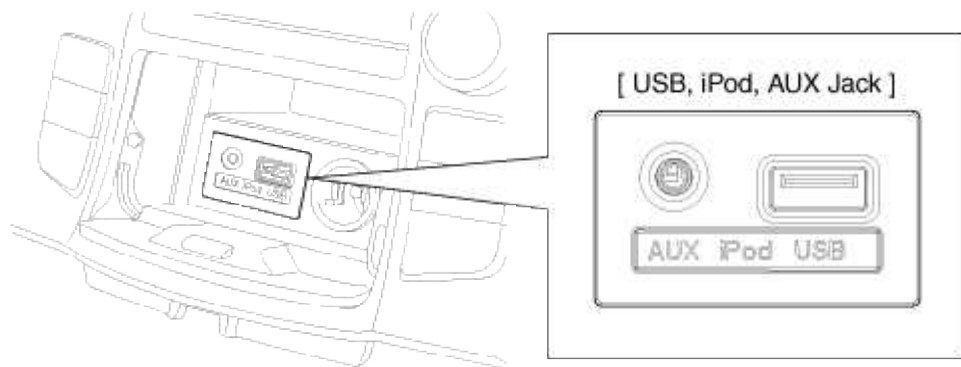
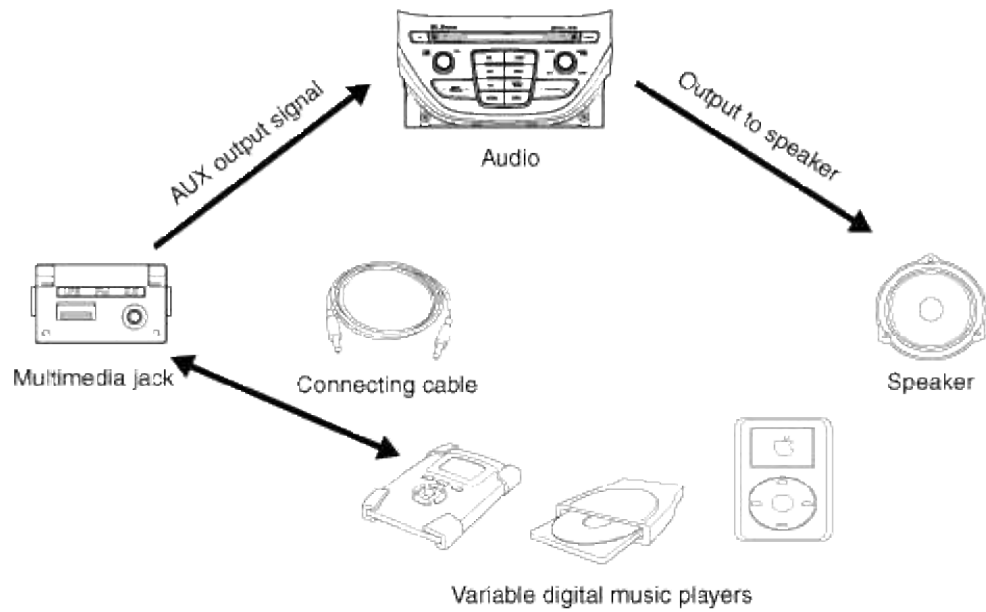
Make sure the audio remote control switch and the airbag module connectors are plugged in properly.

Body Electrical System > Audio > AUX(Auxiliary) Jack > Description and Operation

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.

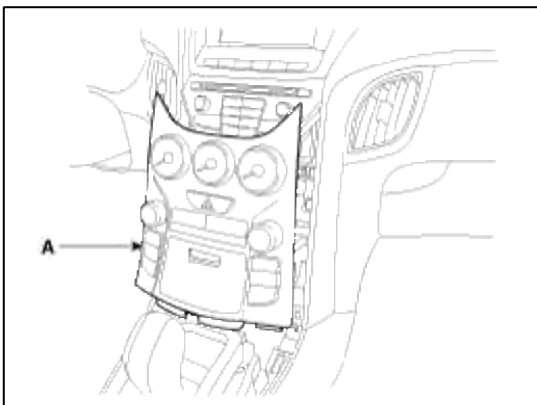
In case of distortions from media connected to the AUX source, the audio unit may not be defect but the output level of the used media does not match the specification of the AUX input.



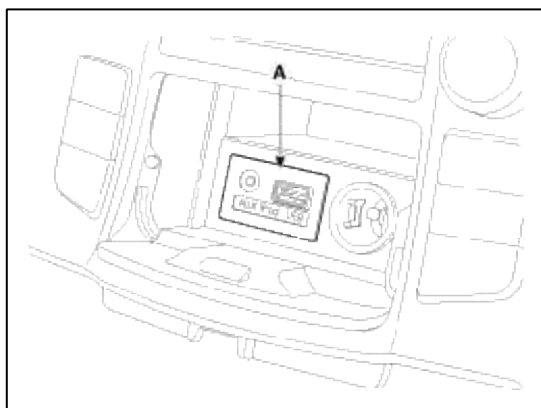
Body Electrical System > Audio > AUX(Auxiliary) Jack > Repair procedures

Removal

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



3. Remove the multimedia jack(A) from the center fascia lower pannel after disconnecting the connertor.



Installation

1. Install the multimedia jack.
2. Connect the AUX jack connector.
3. Install the center fascia lower pannel.

NOTE

Make sure the Aux connector and the console connectors are plugged in properly.

Body Electrical System > Audio > Troubleshooting

Troubleshooting

Customer Complaint Analysis Check Sheet

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

There are four 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.

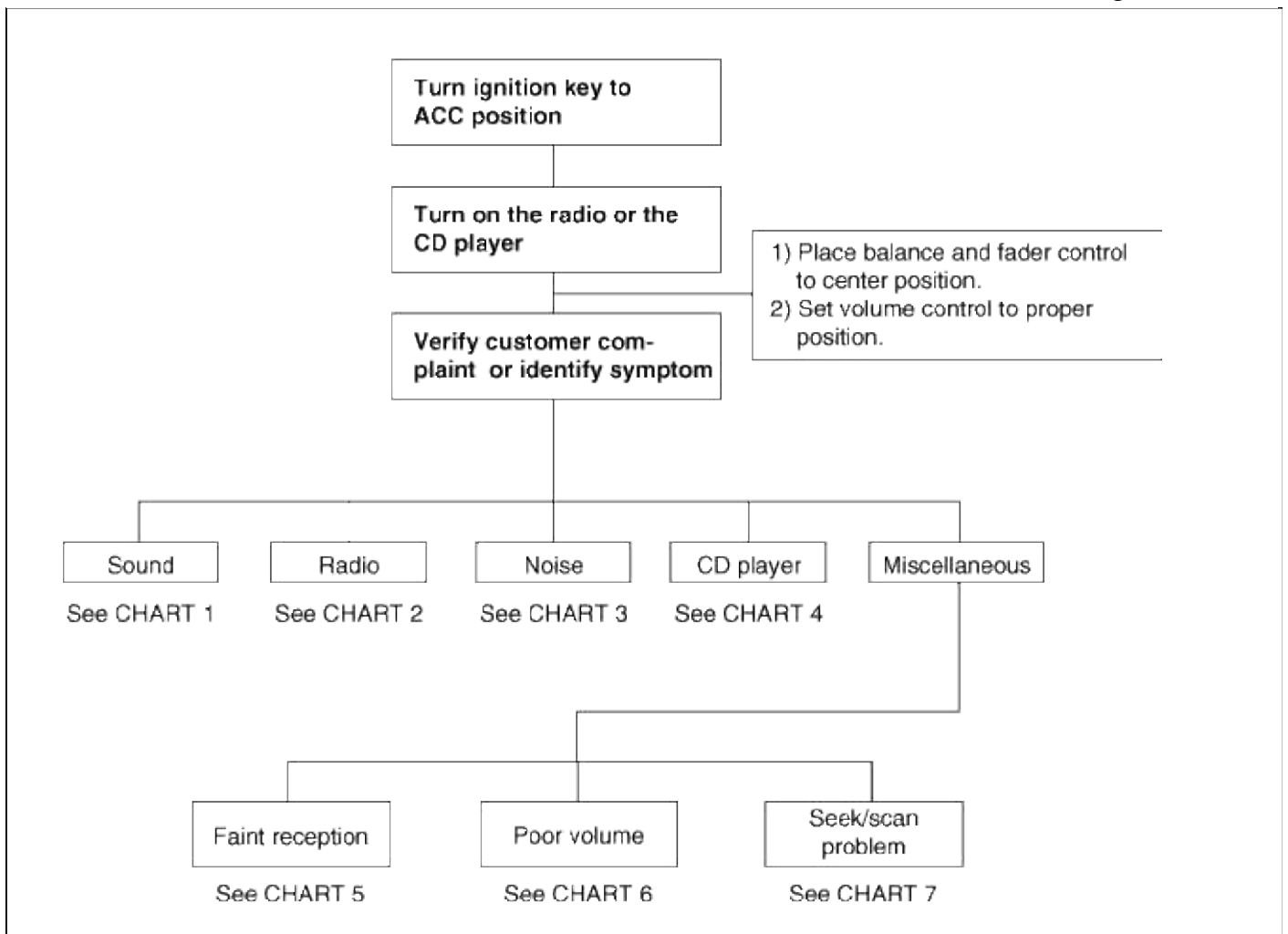
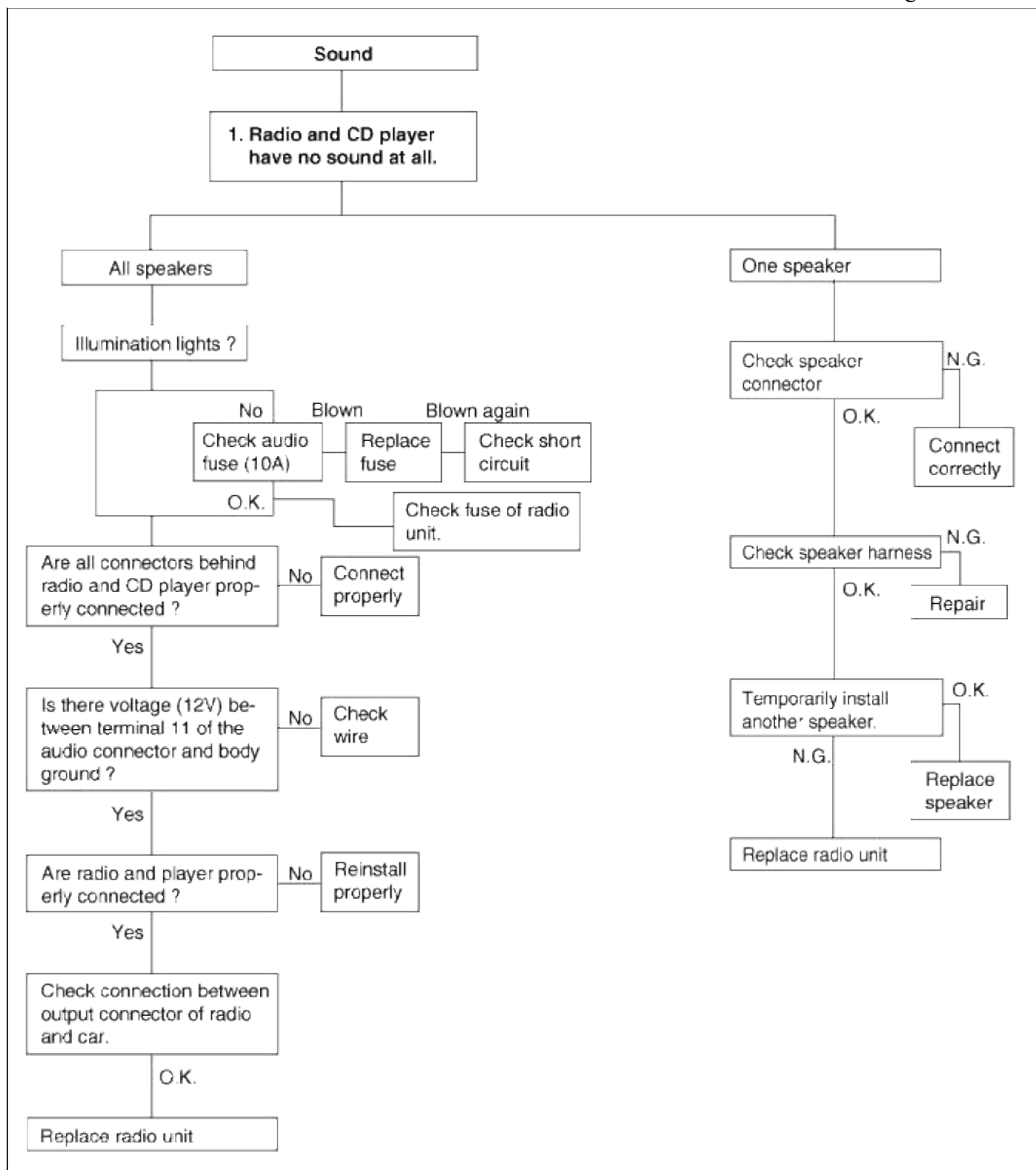


Chart 1



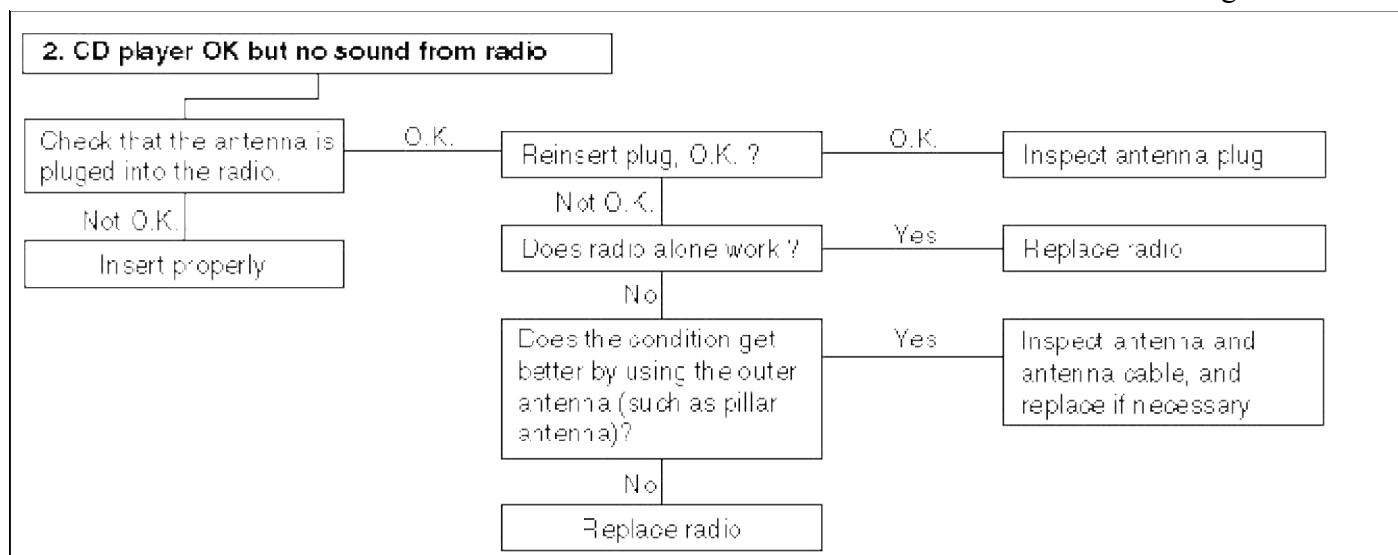


Chart 2

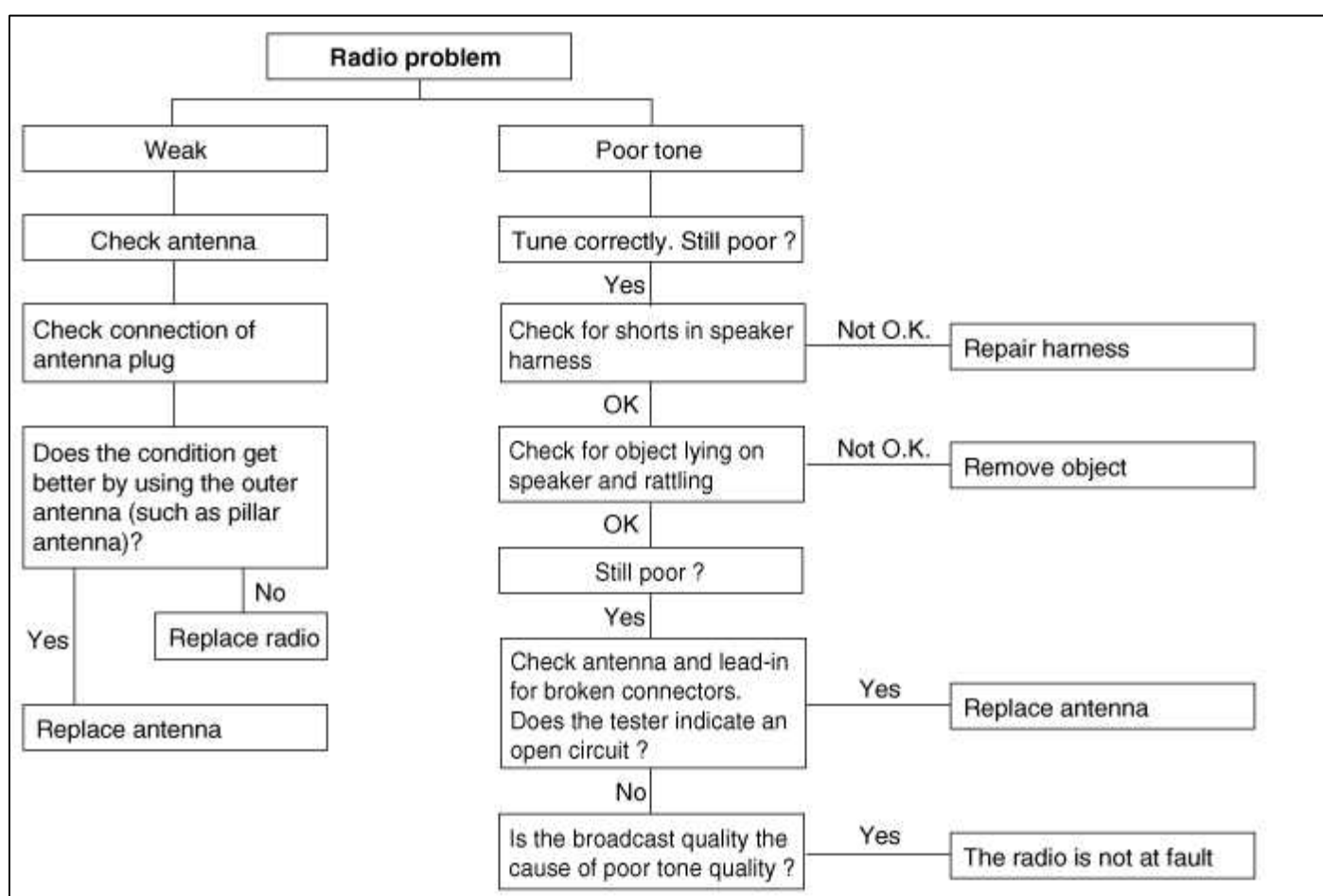


Chart 3

1. RADIO

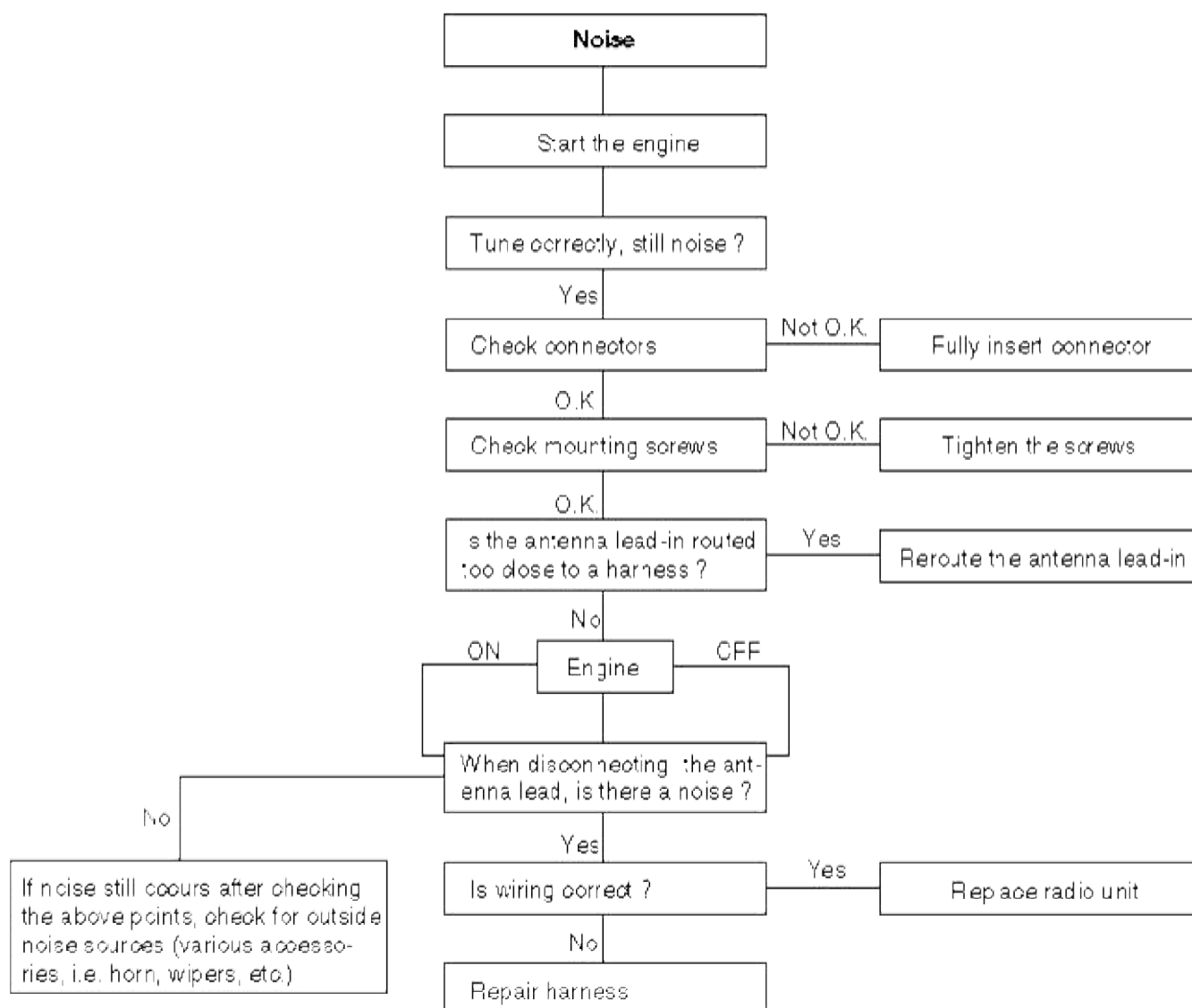
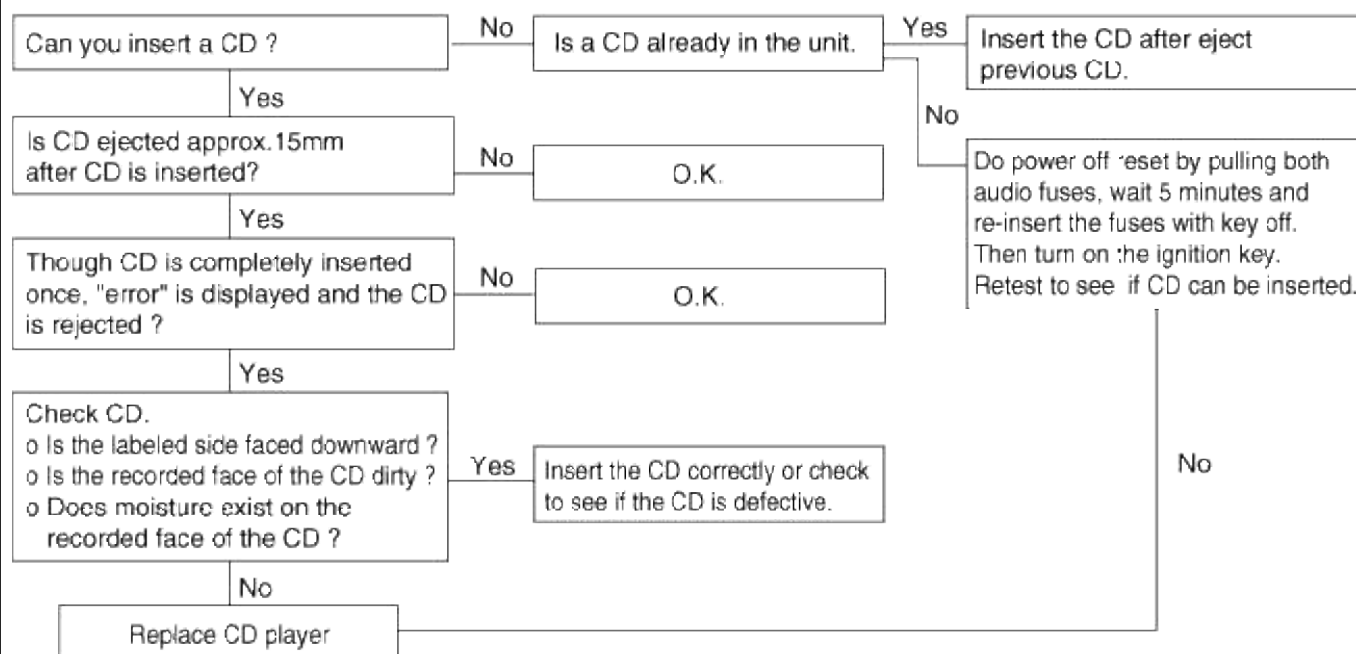
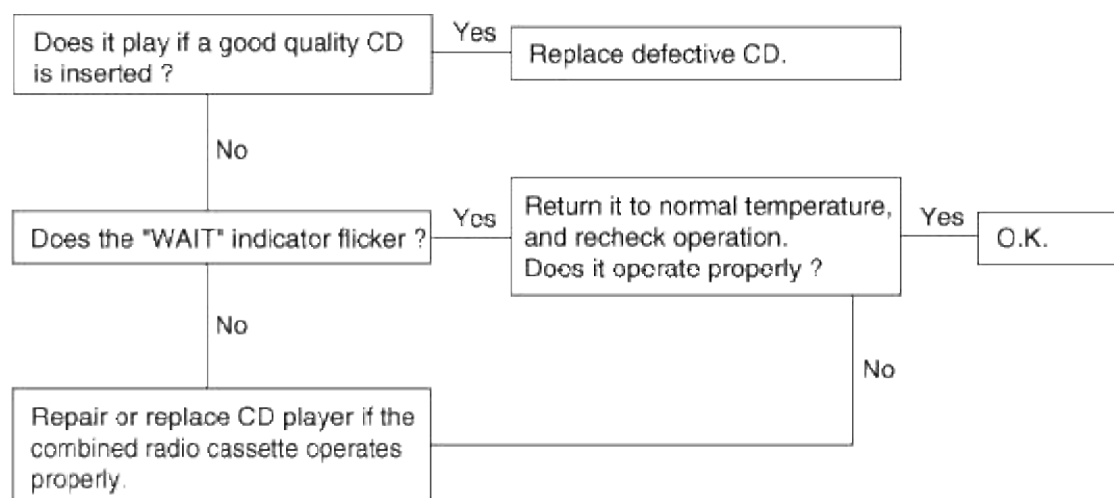


Chart 4

1. CD WILL NOT BE ACCEPTED

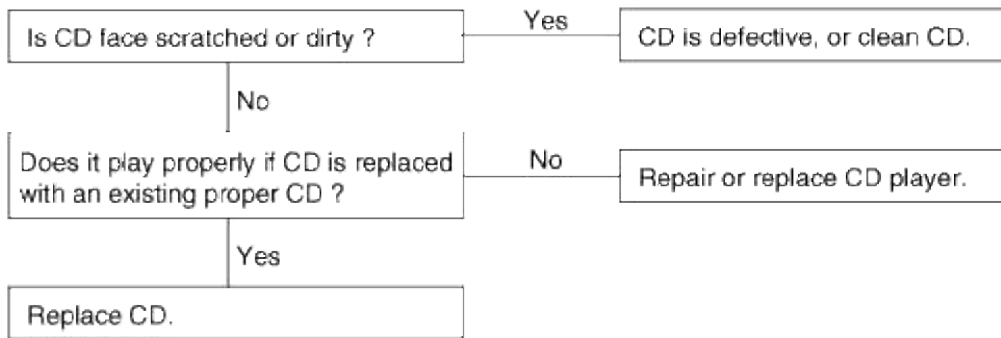


2. NO SOUND



3. CD SOUND SKIPS

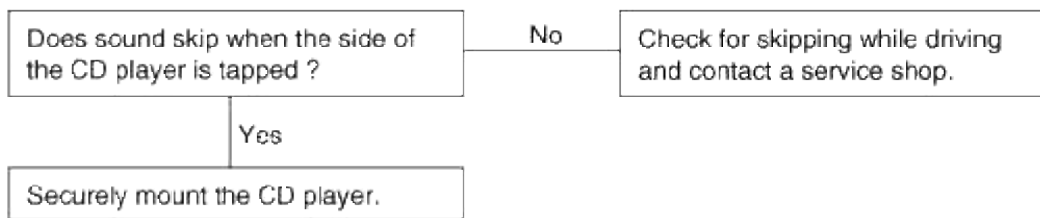
1) Sound sometimes skips when parking.



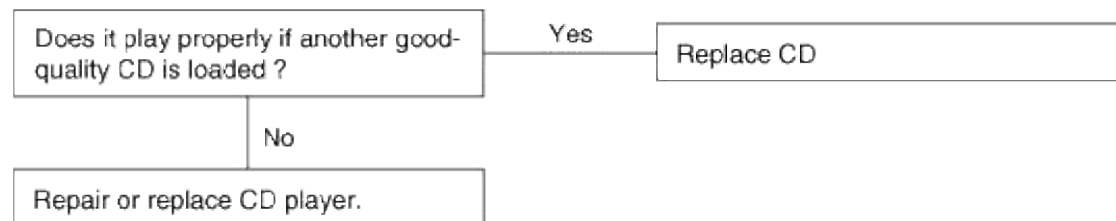
2) Sound sometimes skips when driving.

(Stop vehicle, and check it.)

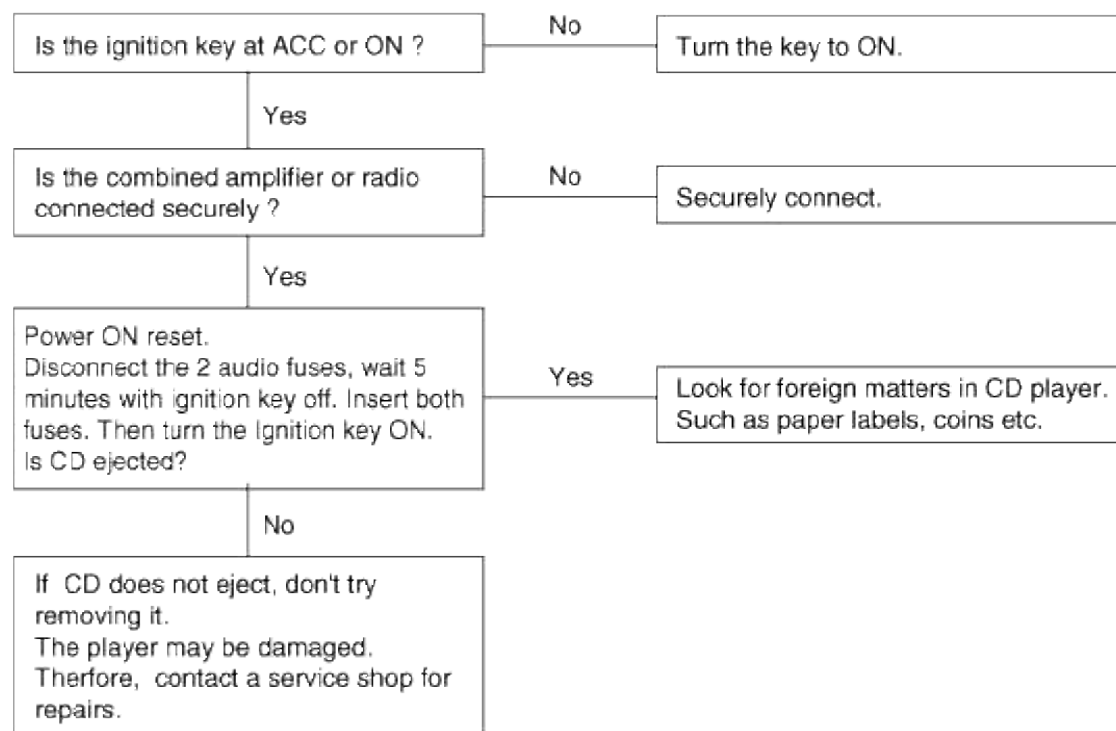
(Check by using a CD which is free of scratches, dirt or other damage.)



4. SOUND QUALITY IS POOR



5. CD WILL NOT EJECT



6. NO SOUND FROM ONE SPEAKER

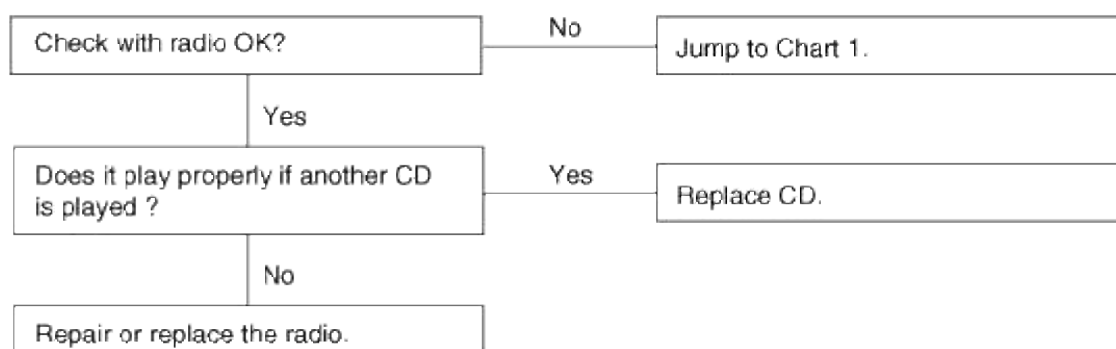


Chart 5

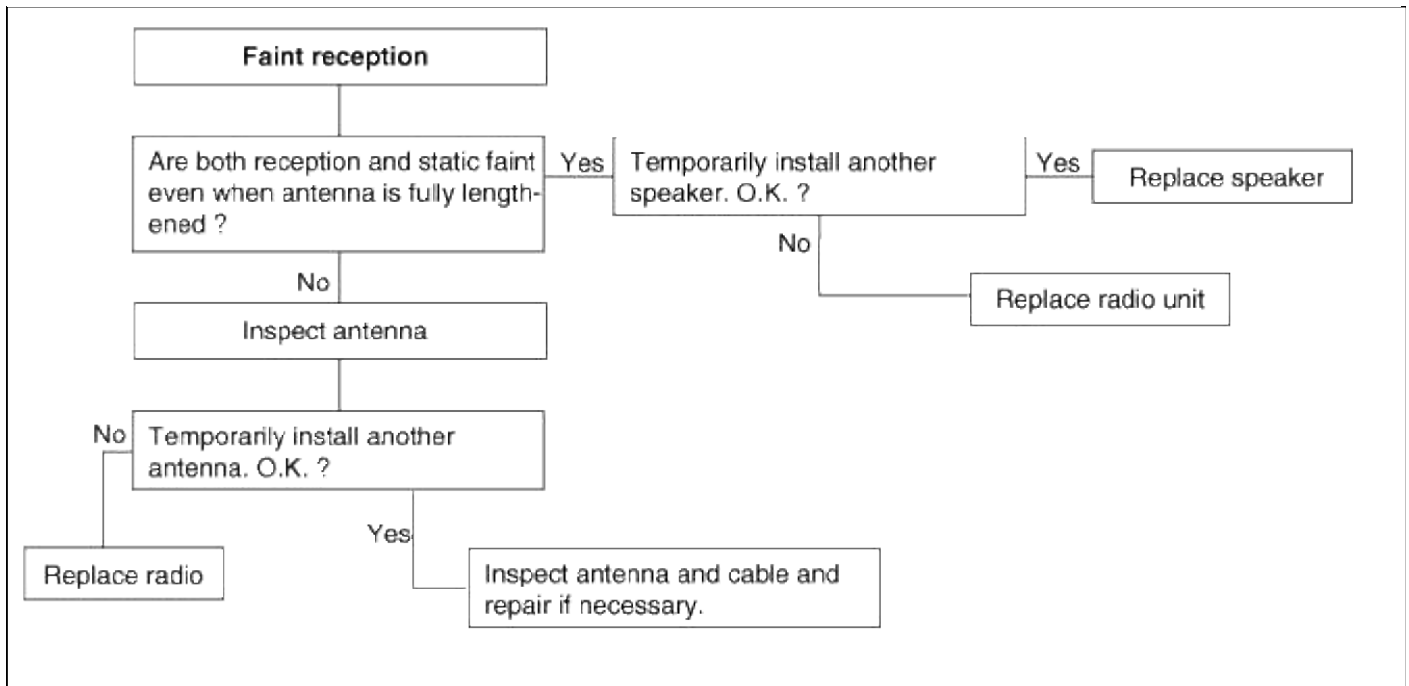


Chart 6

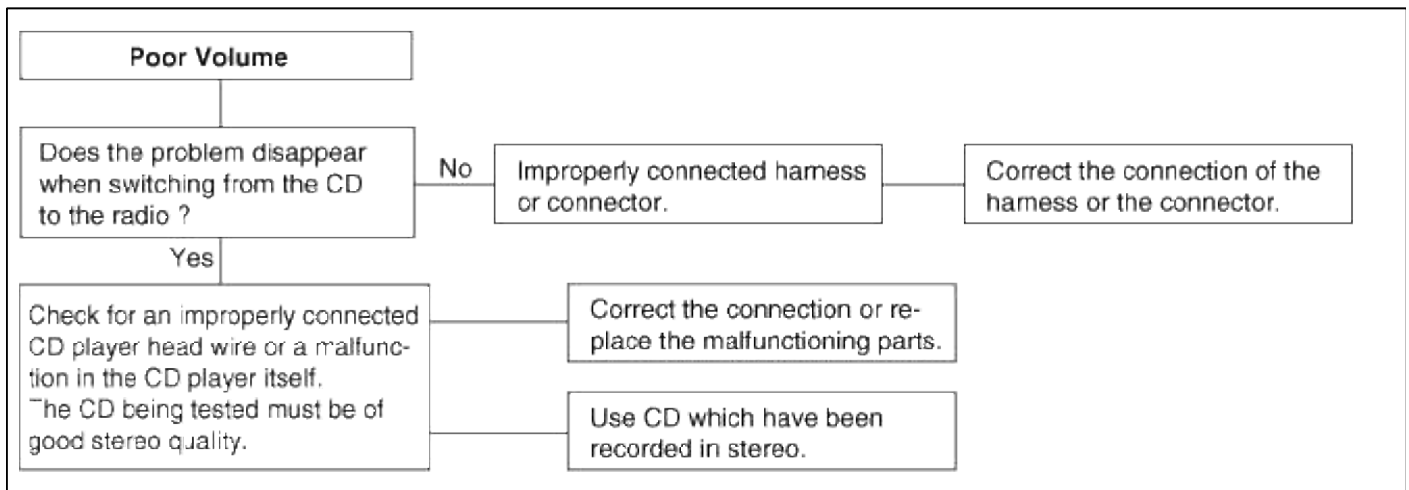
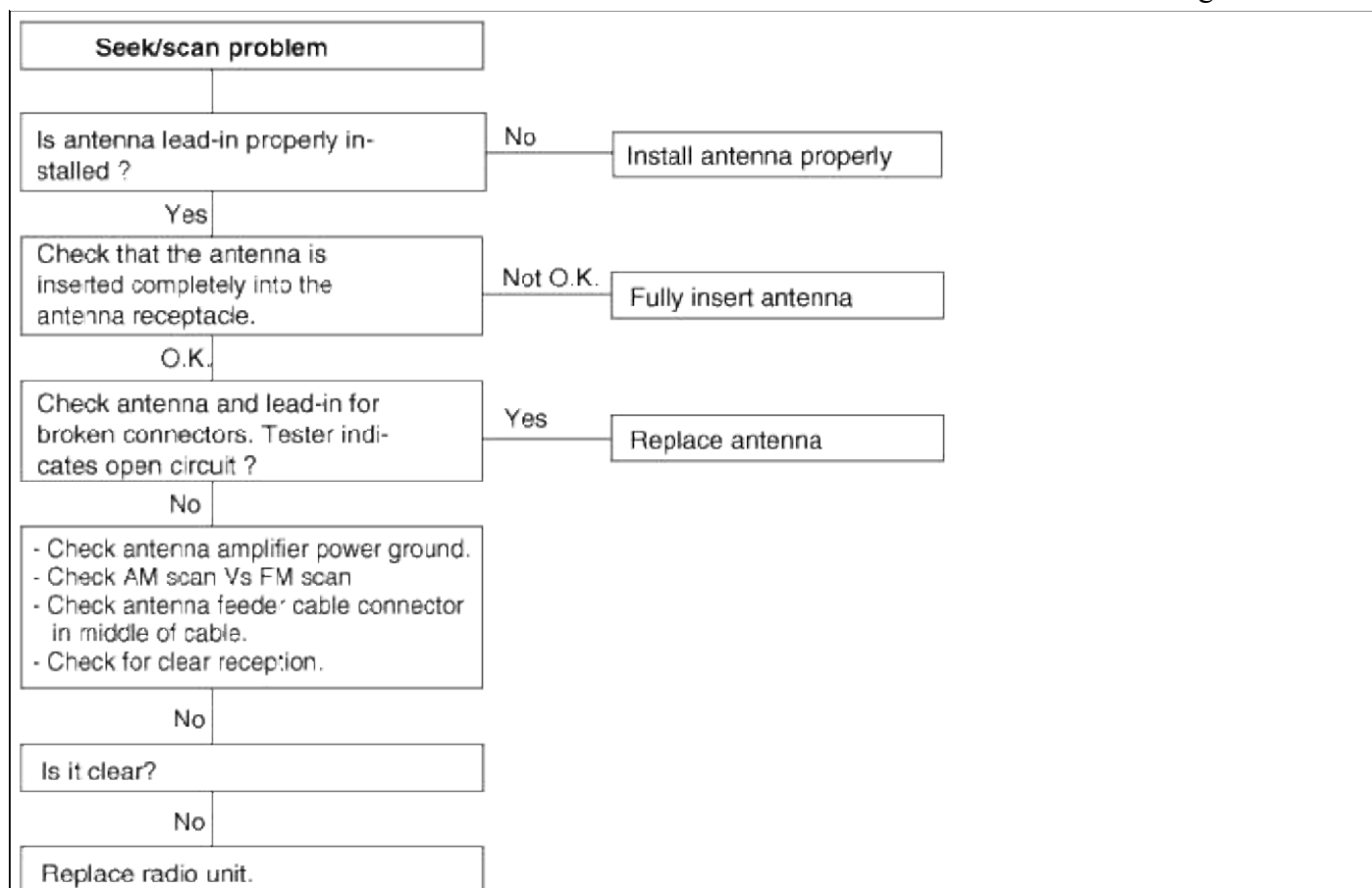


Chart 7



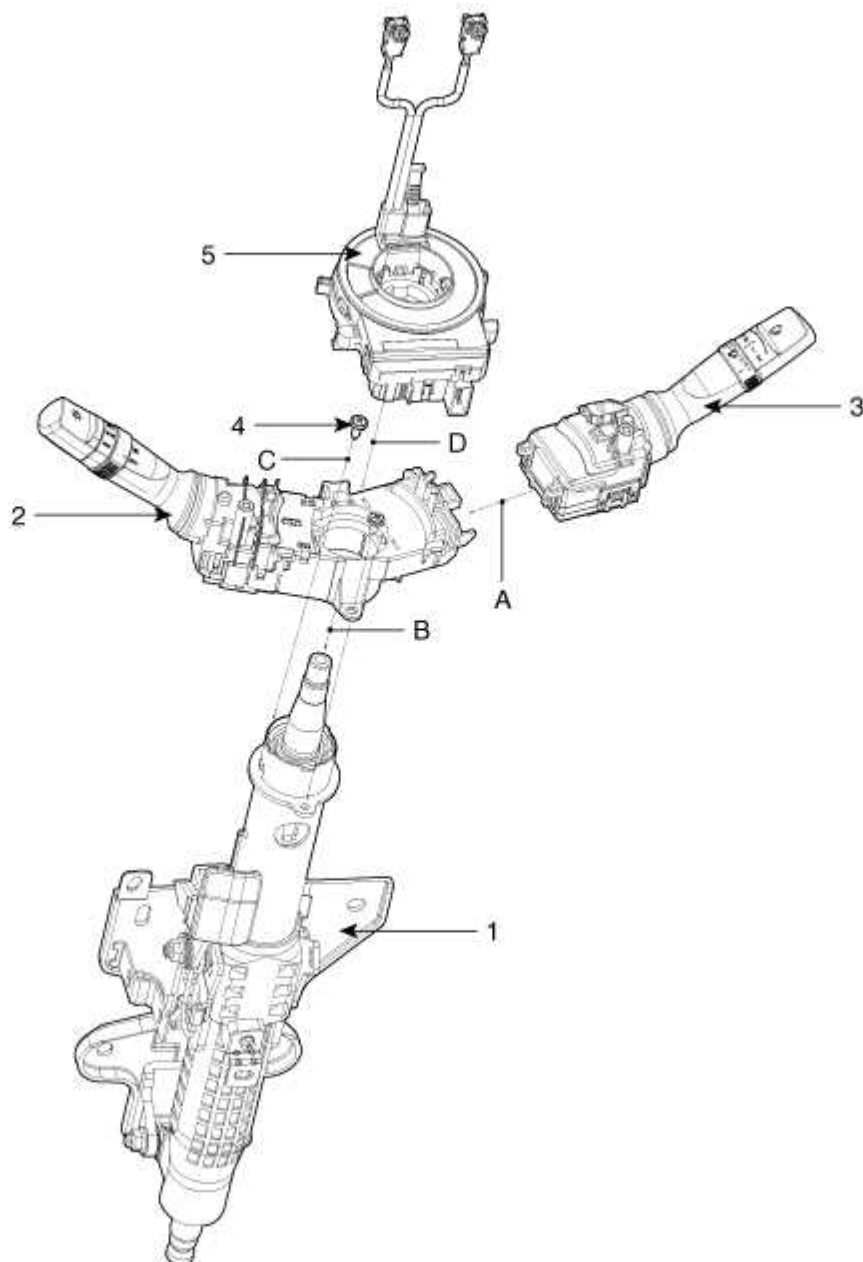
Body Electrical System > Multifunction switch > Specifications

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 : 0.2A (Relay load)
	Turn signal & lane change switch	6.6 ± 0.5A (Lamp load)
	Front & rear fog lamp switch	0.2A (Relay load)
	Wiper & mist switch	Low, High : 4.5A (Motor load) Intermittent : 0.22 ± 0.5A (Relay load) Lock : Max. 28A (Motor load)
	Washer switch	4A (Motor load)
	Variable intermittent volume switch	Max. 25mA

Body Electrical System > Multifunction switch > Components and Components Location

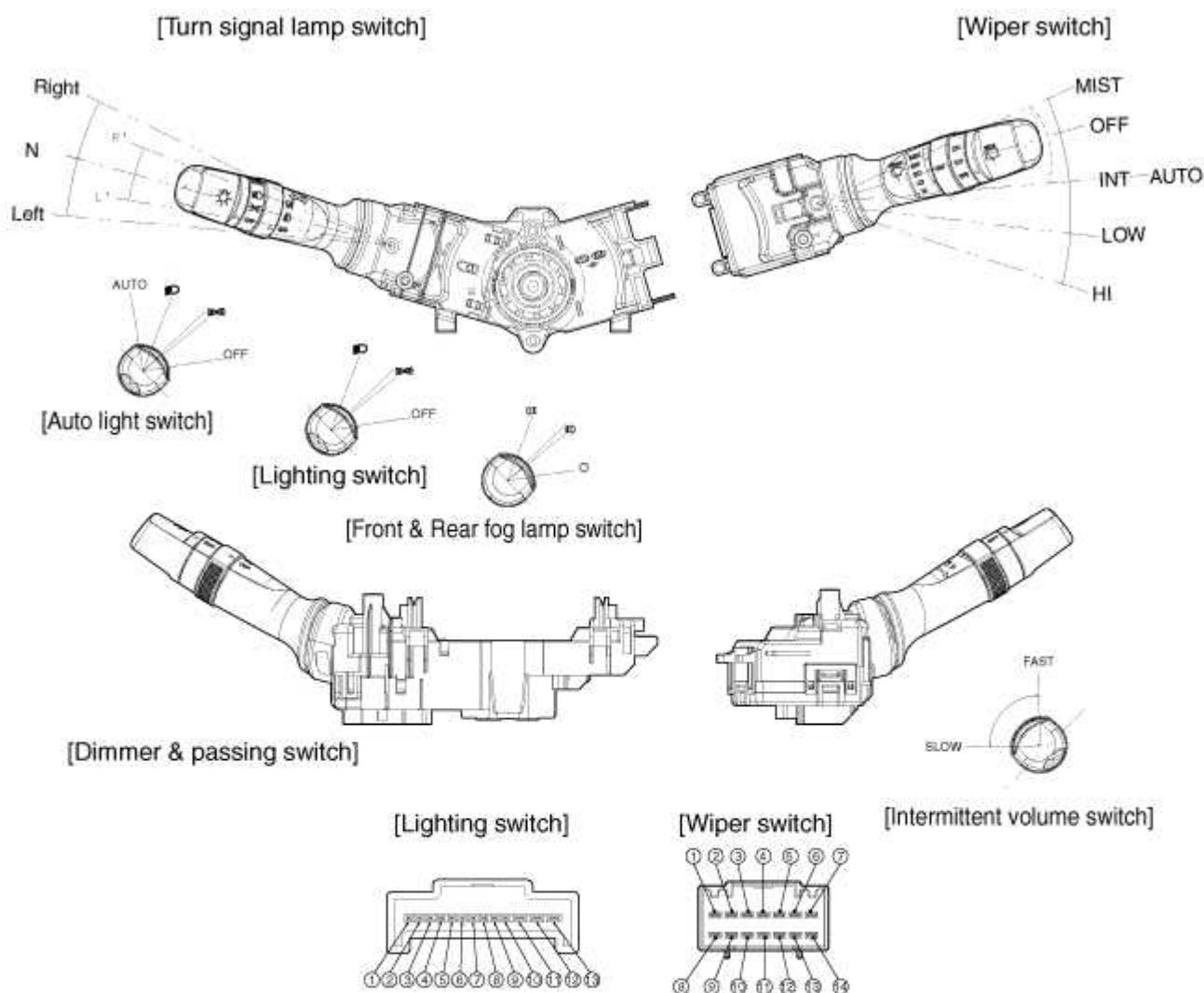
Component (1)



* Installation order : A→B→C→D

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

Component (2)



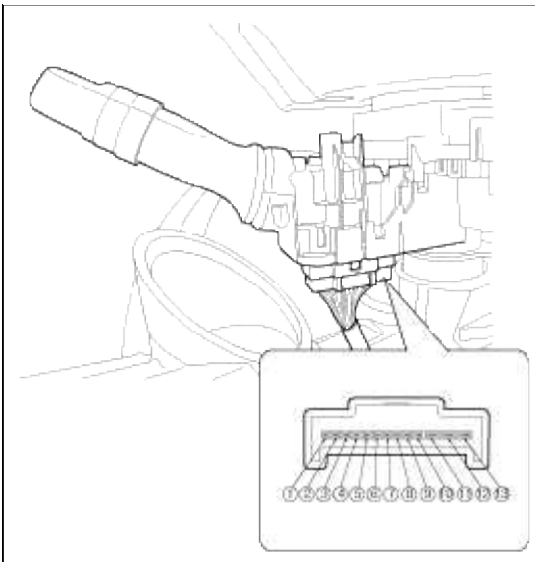
Connector	Pin NO.	Name	Connector	Pin NO.	Name
Lighting SW (13pin)	1	Tail lamp sw	Wiper & washer SW (14pin)	1	Mist sw
	2	Lighting sw ground		2	Wiper parking
	3	Auto light sw		3	Wiper low speed
	4	H/lamp sw		4	Intermittent volume base
	5	Fog sw base		5	Intermittent time base
	6	Front fog sw		6	-
	7	Rear fog sw		7	-
	8	Head lamp low beam		8	Intermittent wiper sw
	9	Head lamp high beam		9	Wiper high speed
	10	Dimmer sw base		10	IGN(2)- Front washer & wiper
	11	Turn signal lamp - left		11	Front washer
	12	Turn signal base		12	-
	13	Turn signal lamp - right		13	-
				14	-

Body Electrical System > Multifunction switch > Repair procedures

Inspection

Lighting Switch Inspection

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



Lighting Switch (Auto Light)

Terminal Position	1	4	3	2
OFF				
I	○	—	—	○
II	○	○	—	○
AUTO			○	○

Lighting Switch

Terminal Position	1	4	2
OFF			
I	○	—	○
II	○	○	○

Dimmer And Passing Switch

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

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

Turn Signal Switch

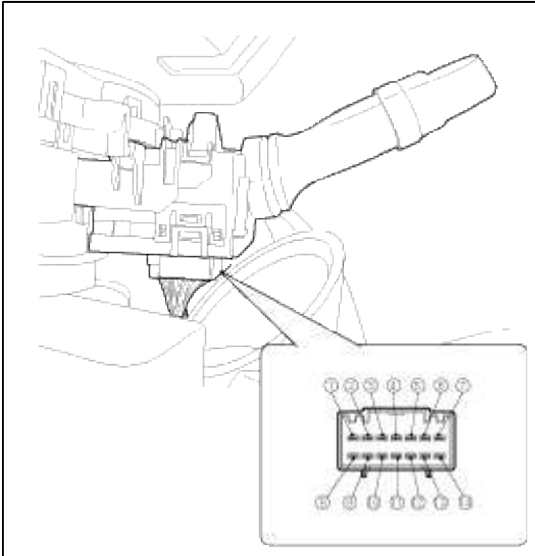
Hazard switch	Turn signal switch	13	12	11
OFF	L		○	○
	N			
	R	○	○	

Front & Rear Fog Lamp Switch

Terminal Position	5	6	9
OFF			
Front	○	○	
Rear	○	○	○

Wiper And Washer Switch Inspection

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



Wiper Switch

Terminal Position	9	3	2	1	10	8	4	5
MIST		○	○	○	○			
OFF		○	○					
INT		○	○		○	○	○	○
LOW		○	○	○	○			
HI	○	○	○	○	○			

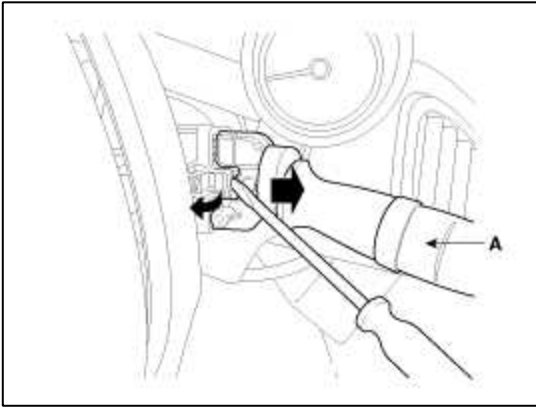
Washer Switch

Terminal Position	11	10
OFF		
ON	○	○

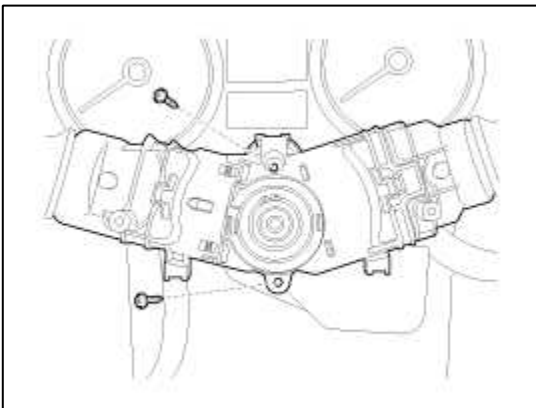
Removal

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

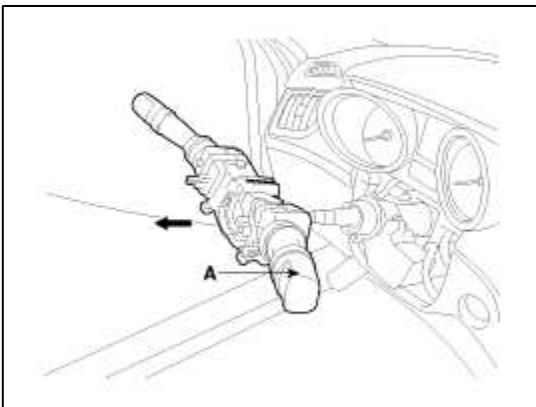
4. If necessary of removing the wiper & washer switch, release the lock of wiper switch using tool without removing the steering wheel.



5. Remove the clock spring.
(Refer to RT group - "Airbag Module")
6. Loosen the screws from the multifunction switch assembly.



7. Remove the multifunction switch assembly(A) after loosening the connectors.



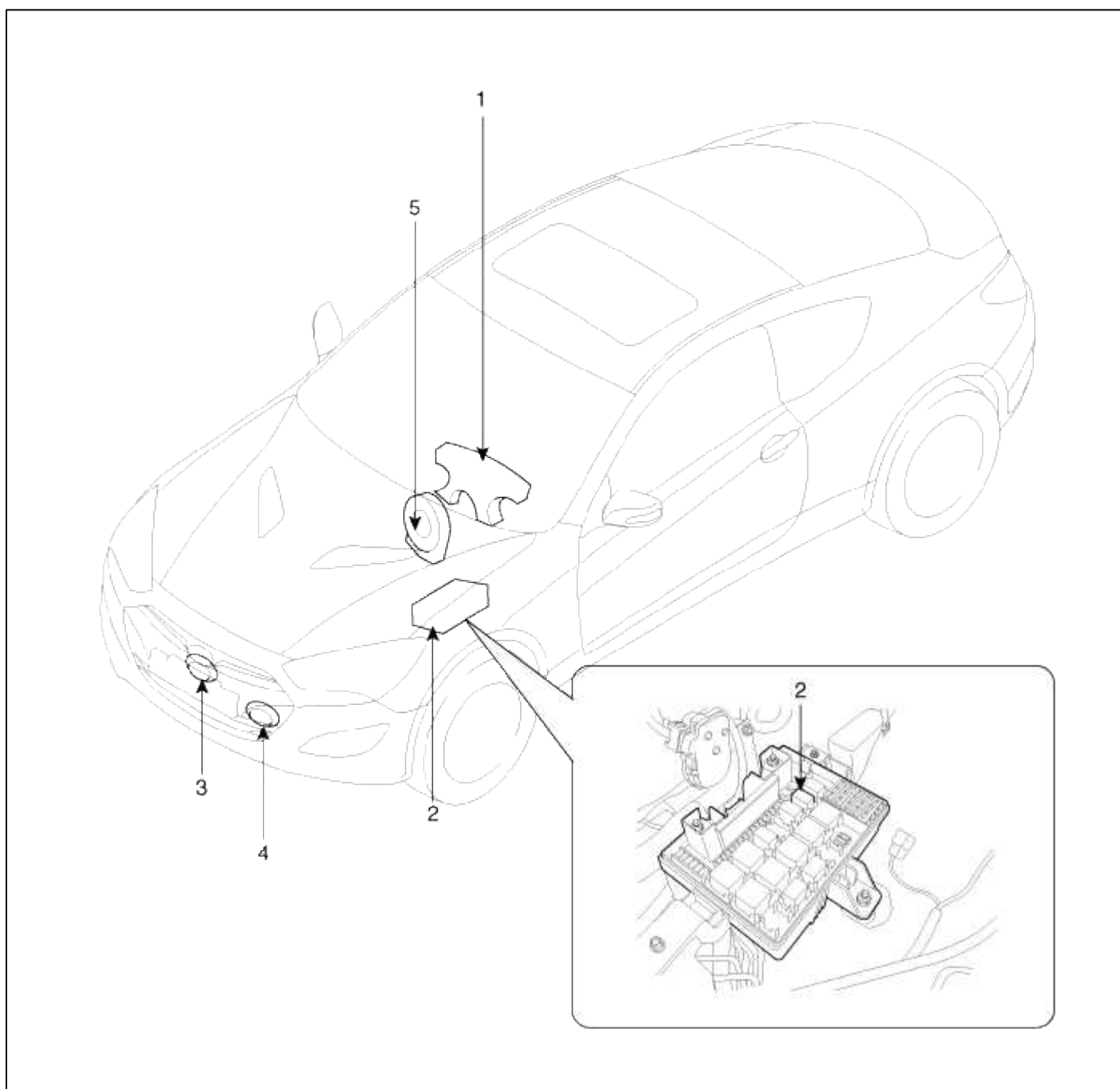
Installation

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

NOTE

Make sure the multifunction switch connectors are plugged in properly.

Component Location



- | | |
|---|----------------------|
| 1. Horn switch | 4. Horn (High pitch) |
| 2. Horn relay (Engine room compartment) | 5. Clock spring |
| 3. Horn (Low pitch) | |

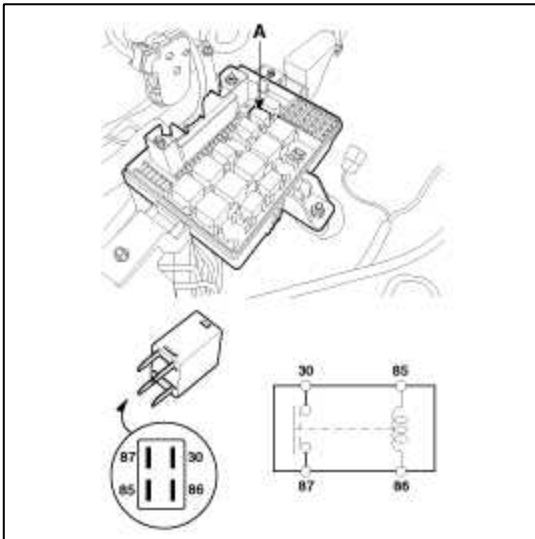
Body Electrical System > Horn > Repair procedures
Inspection

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

Horn Relay Inspection

1. Remove the horn relay (A) from the engine room relay box.

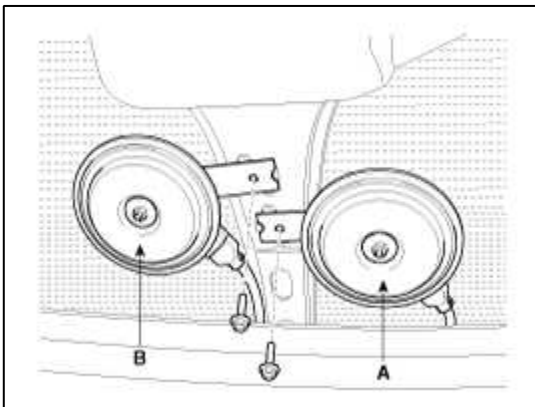
2. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
3. There should be no continuity between the No.30 and No.87 terminals when power is disconnected.



Terminal Position	30	87	85	86
Disconnected			○	○
Connected	○	○	○	+

Removal

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



Installation

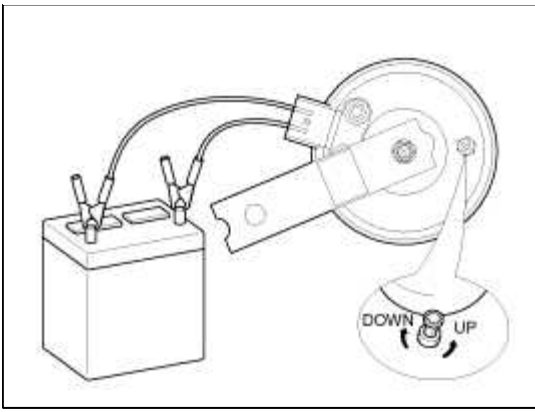
1. Connect the horn connector, then reassemble the high pitch horn and low pitch horn.
2. Reassemble the front bumper.

Adjustment

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

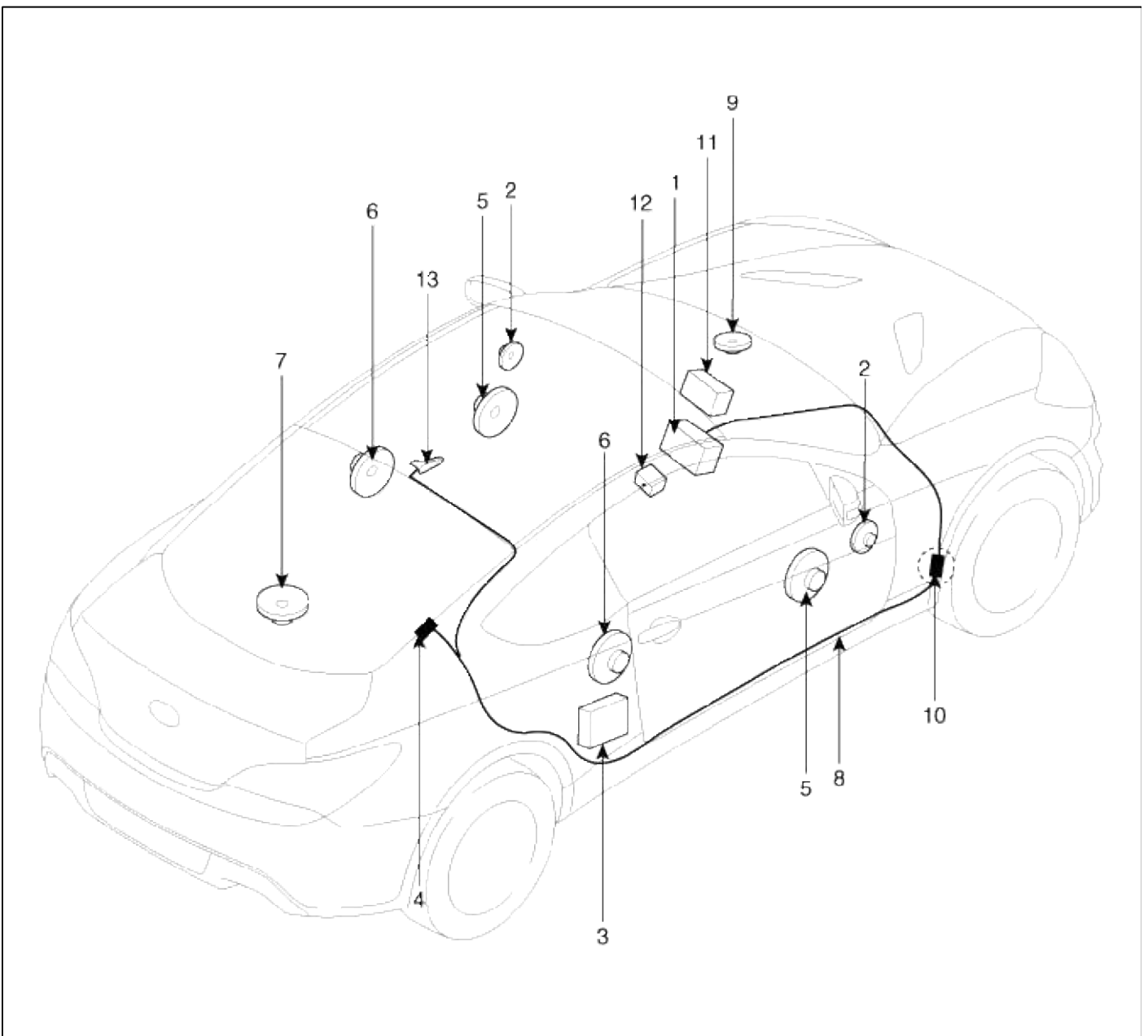
NOTE

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



Body Electrical System > AVN System > Components and Components Location

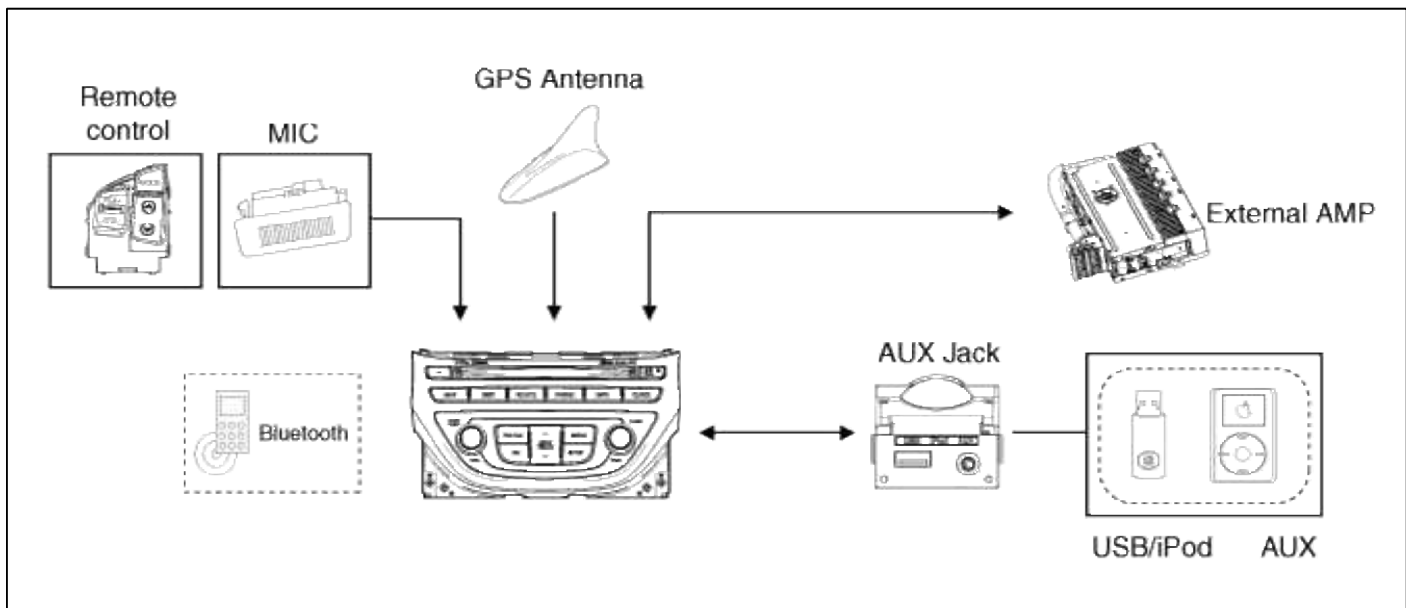
Component Location



- | | |
|-------------------------------------|----------------------------------|
| 1. AVN (A/V & Navigation) head unit | 8. Antenna feeder cable |
| 2. Tweeter speaker | 9. Crash pad center speaker |
| 3. External Amplifier | 10. Feeder cable joint connector |
| 4. Glass antenna (Radio) | 11. Multi display |
| 5. Front door speaker | 12. Aux jack |
| 6. Rear door speaker | 13. Roof antenna (GPS) |
| 7. Woofer speaker | |

Body Electrical System > AVN System > Schematic Diagrams

System Block Diagram



Body Electrical System > AVN System > Description and Operation

Limitations Of The Navigation system

GPS Signal Reception State

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

- Tunnels



- Basement parking structures



- Underneath an overpass



- Roads within forested areas



- Areas near high rise buildings



- Roads within canyons



Vehicle Position Display

1. If multipass errors occur due to reflections from buildings or related causes, the current position mark on the navigation may differ from the actual position of the vehicle.

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

Route Guidance

Unsuitable route guidance situation may caused by the following 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.

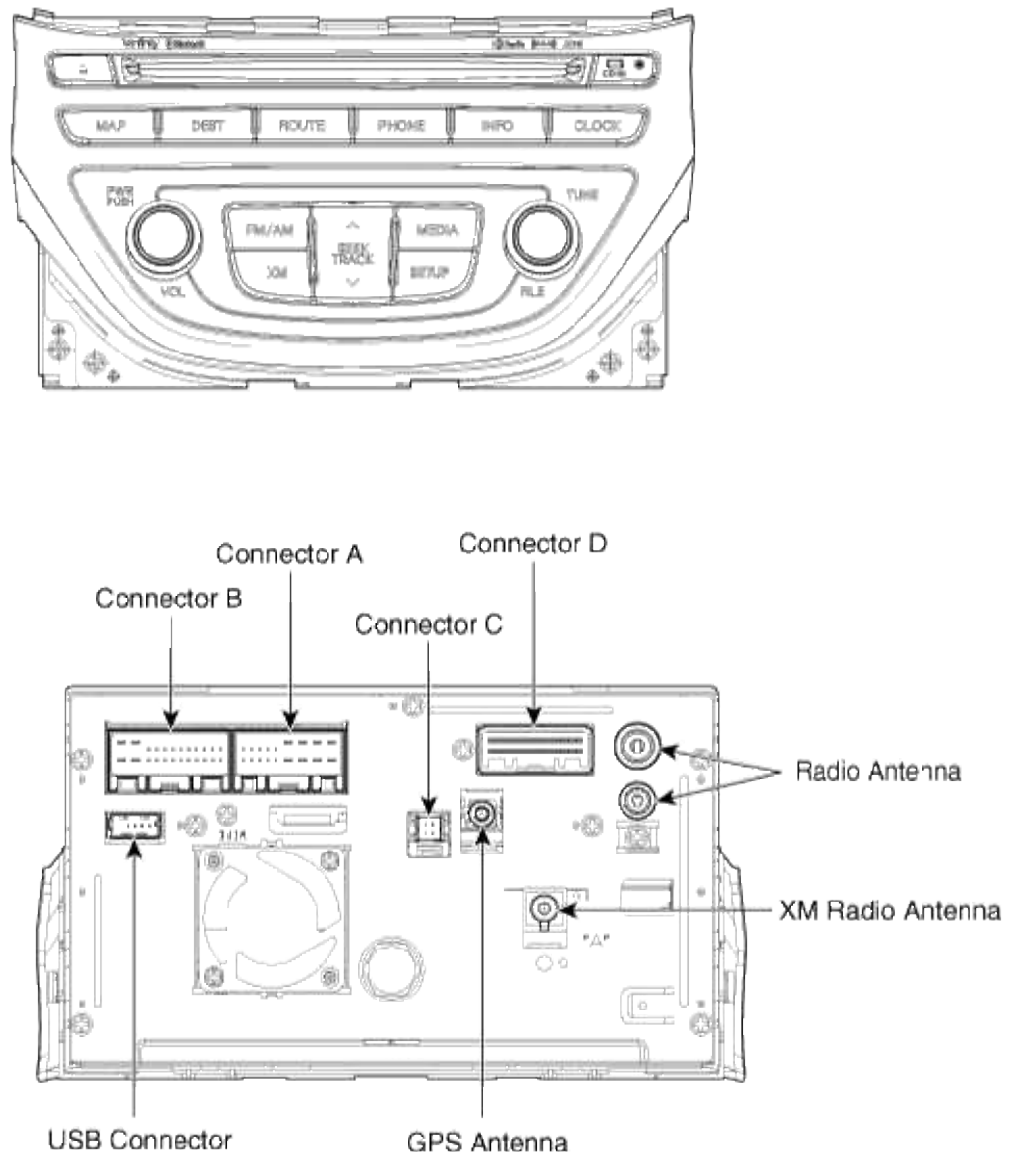
- Guidance may be given to a position differing from the current position when turning at an intersection.
- Route recalculation may take a longer period of time when driving under high speeds.
- A route guidance signaling for a U-Turn in a No U-Turn location may occur.
- A route guidance signaling entrance 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)

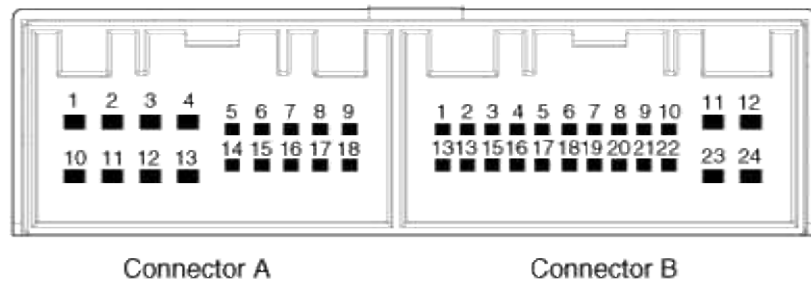
Body Electrical System > AVN System > AVN Head Unit > Components and Components Location

Components

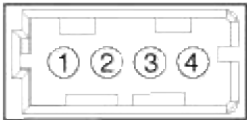
AVN (A/V & Navigation) Head Unit

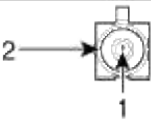
[AVN Head Unit]

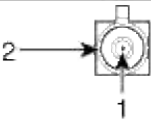


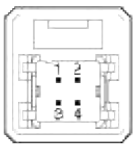


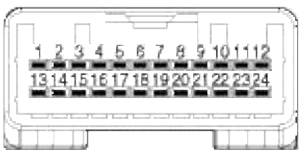
Pin No.	Connector A	Connector B
1	-	MM CAN High
2	-	-
3	-	-
4	-	Steering remote
5	SPDIF GND	-
6	SPDIF (+)	-
7	ALT L	AUX Video
8	Illumination (+)	AUX R IN
9	R Position	AUX GND
10	-	MIC+ (Bluetooth)
11	-	ACC+
12	NAVI Voice (-)	B+
13	NAVI Voice (+)	MM CAN Low
14	-	Auto Light
15	SPDIF (-)	P Position
16	Door key unlock	Vehicle speed
17	Illumination (-)	Remote GND
18	Remote antenna ON	-
19		AUX Video GND
20		AUX DETECT
21		AUX L IN
22		MIC- (Bluetooth)
23		Power GND
24		Power GND

USB Connector	NO	Description	NO	Description
	1	USB GND	3	USB D (-)
	2	USB D (+)	4	USB VCC

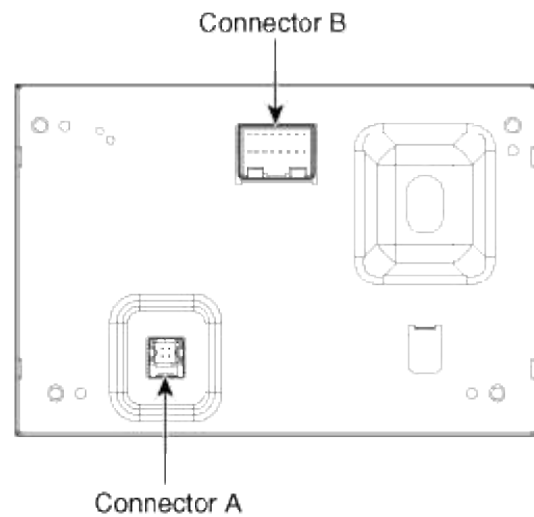
XM Antenna	NO	Description	NO	Description
	1	XM Signal	2	GND

GPS Antenna	NO	Description	NO	Description
	1	GPS Signal	2	GND

Connector C	NO	Description	NO	Description
	1	LVDS (-)	3	GND
	2	GND	4	LVDS (+)

Connector D	NO	Description	NO	Description
	1	-	13	LVDS LOCK
	2	-	14	BL ON
	3	-	15	RS485 RX(+)
	4	-	16	RS485 RX(-)
	5	-	17	GND
	6	-	18	RS485 TX(+)
	7	-	19	RS485 TX(-)
	8	-	20	-
	9	LVDS _ PDN	21	-
	10	-	22	-
	11	-	23	-
	12	-	24	-

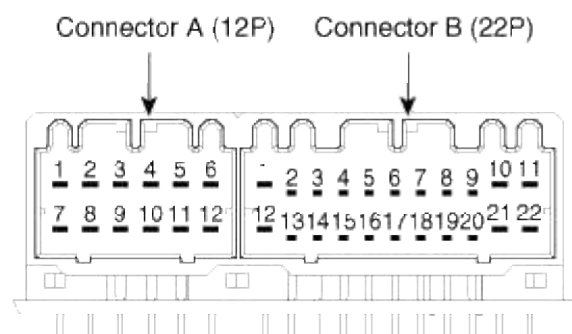
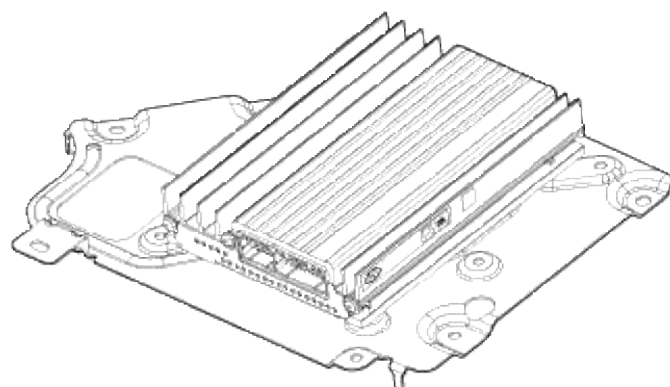
[AVN Monitor]



Connector A	
Pin No.	Description
1	GND
2	LVDS(-)
3	LVDS(+)
4	GND

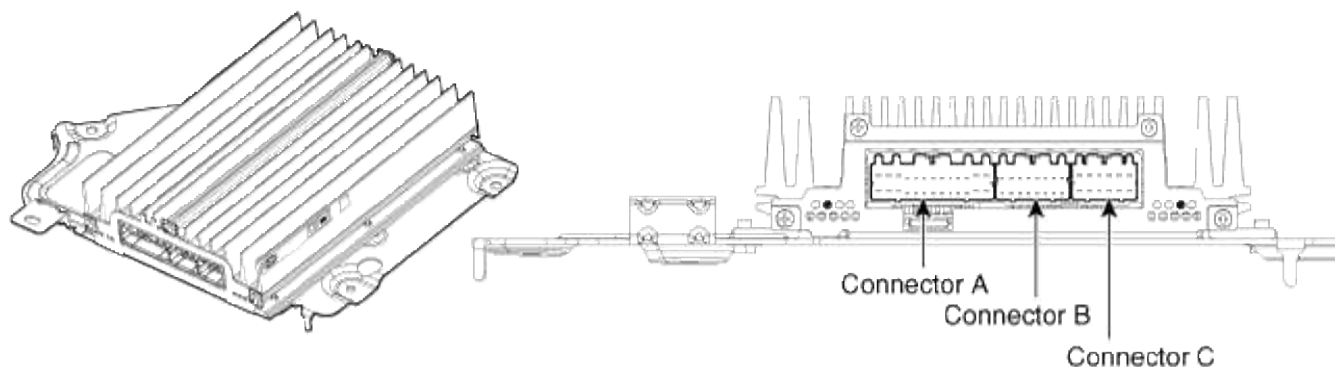
Connector B			
Pin No.	Description	Pin No.	Description
1	Battery(+)	9	GND
2	Illumination(+)	10	BI ON/OFF
3	Illumination(-)	11	LVDS PDN
4	GND	12	LVDS LOCK
5	ACC	13	RS485 RX(+)
6	-	14	RS485 RX(-)
7	-	15	RS485 TX(+)
8	-	16	RS485 TX(-)

[External AMP]



No.	Connector A (12P)	Connector B (22P)
1	Front left door (+)	Center speaker (+)
2	Front right door (+)	-
3	Rear left door (+)	-
4	Rear right door (+)	-
5	SubWoofer 2 (+)	NAVI (+)
6	SubWoofer 1 (+)	ACC
7	Front left door (-)	CAN (-)
8	Front right door (-)	CAN (+)
9	Rear left door (-)	-
10	Rear right door (-)	Battery (+)
11	SubWoofer 2 (-)	Battery (+)
12	SubWoofer 1 (-)	Center speaker (-)
13		-
14		-
15		-
16		NAVI (-)
17		SPDIF Signal
18		SPDIF (-)
19		SPDIF (+)
20		-
21		GND
22		GND

[External AMP]



No.	Connector A (26P)	Connector B (16P)	Connector C (12P)
1	B (+)	-	SubWoofers 2 (+)
2	B (+)	-	SubWoofers 1 (+)
3	-	-	Rear right door (+)
4	-	-	Rear left door (+)
5	CAN (+)	-	Front right door (+)
6	CAN (-)	-	Front left door (+)
7	ACC	Center speaker (+)	SubWoofers 2 (-)
8	-	-	SubWoofers 1 (-)
9	-	-	Rear right door (-)
10	-	-	Rear left door (-)
11	NAVI (+)	-	Front right door (-)
12	-	-	Front left door (-)
13	-	-	
14	GND	-	
15	GND	Center speaker (-)	
16	-	-	
17	-		
18	SPDIF (+)		
19	SPDIF (-)		
20	SPDIF Signal		
21	-		
22	-		
23	-		
24	NAVI (-)		
25	-		
26	-		

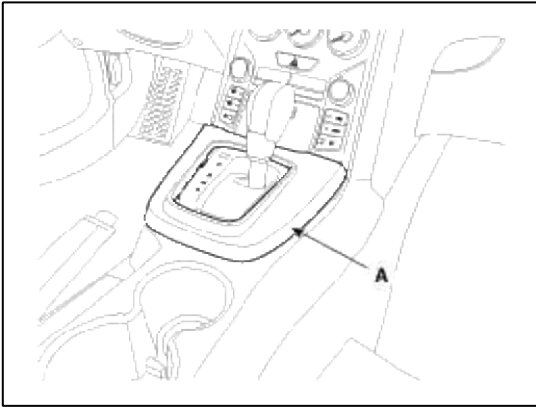
Body Electrical System > AVN System > AVN Head Unit > Repair procedures

Removal

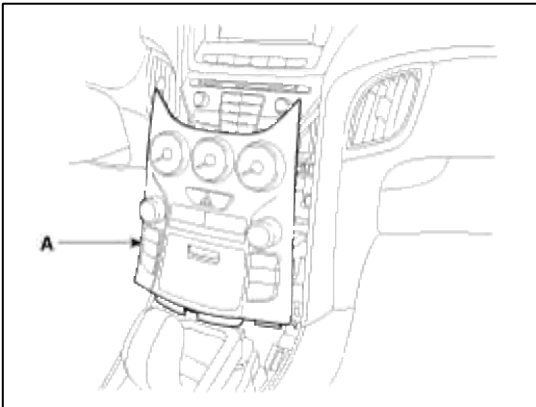
AVN Head Unit

1. Disconnect the negative (-) battery terminal.

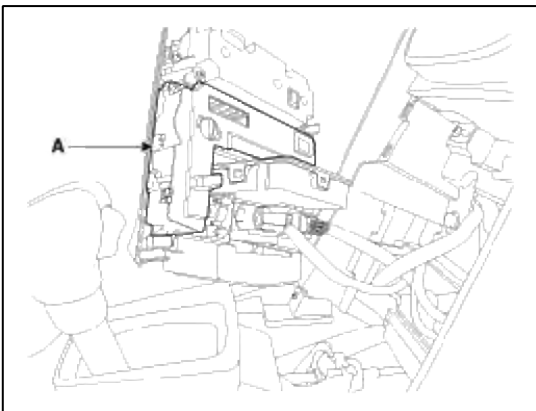
2. Remove the console upper cover(A).



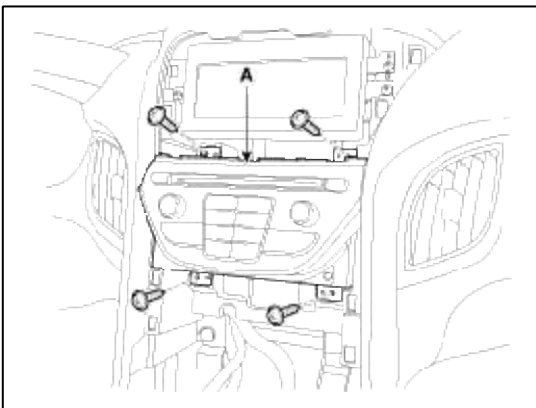
3. Remove the center fascia lower panel(A).
(Refer to the BD group - "Crash pad")



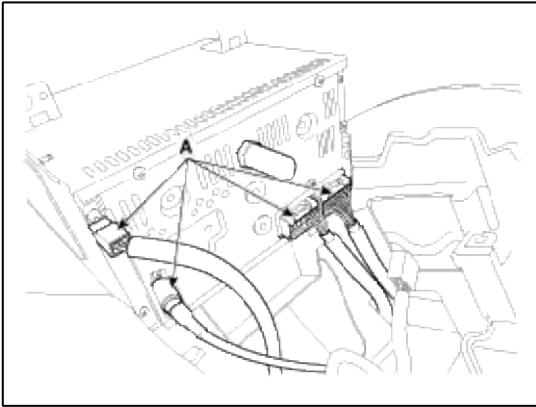
4. Remove the connectors and cables from center fascia lower panel(A).



5. Remove the mounting screws then remove the AVN head unit(A).

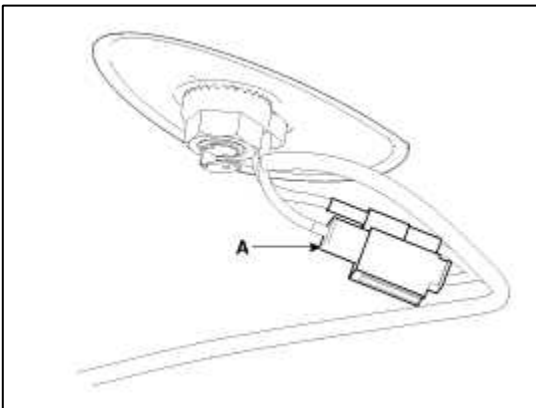


6. Remove the connectors and cable(A).

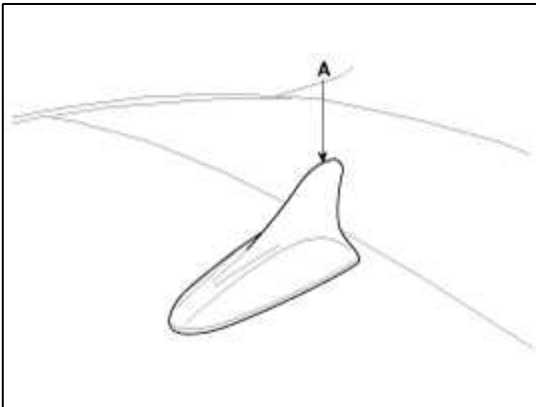


Roof Antenna

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



3. Remove the roof antenna after loosening the nut.



Installation

AVN Head Unit

1. Connect the AVN unit connectors and cables.
2. Install the AVN unit.
3. Install the center fascia lower panel.
4. Install the console upper cover.
5. Check the AVN system.

NOTE

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

Roof Antenna

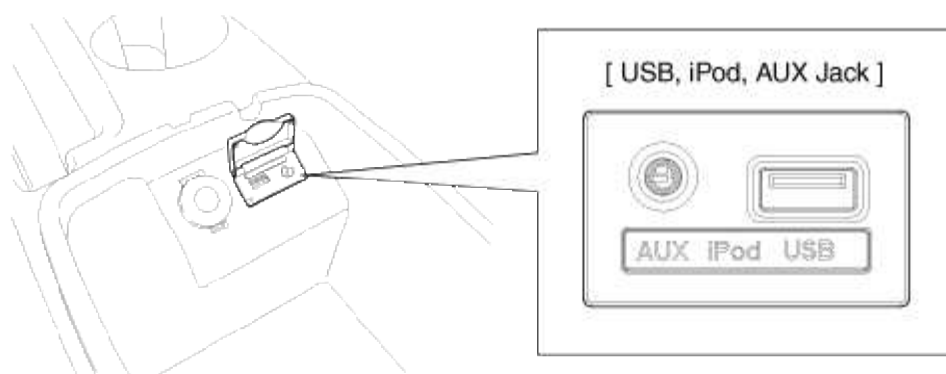
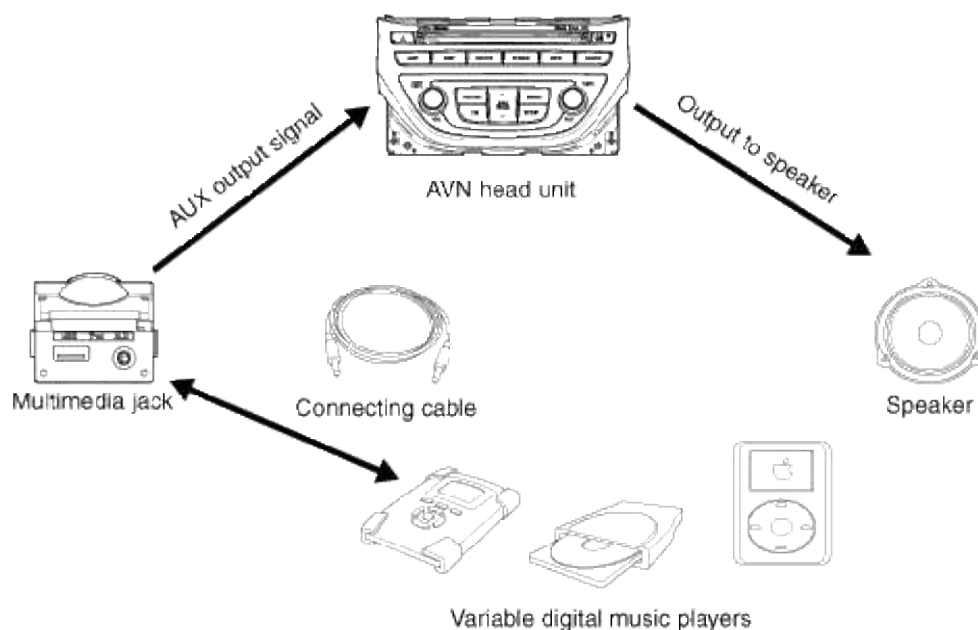
1. Install the roof antenna and connect the cable and connector.
2. Install the rear roof trim.

Body Electrical System > AVN System > AUX(Auxiliary) Jack > Description and Operation

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.

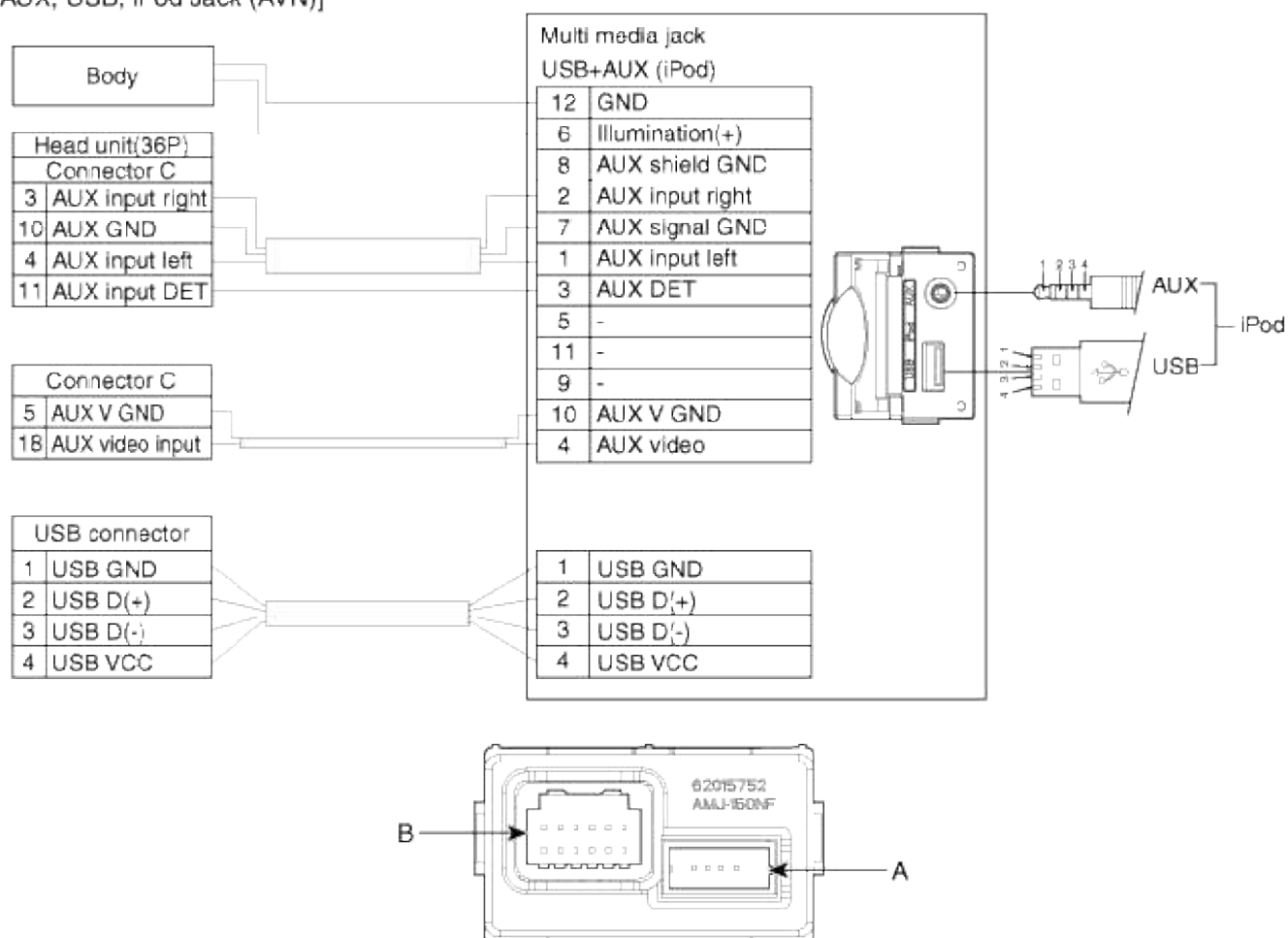
In case of distortions from media connected to the AUX source, the audio unit may not be defect but the output level of the used media does not match the specification of the AUX input.




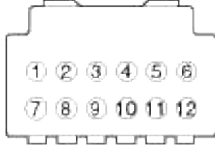
Body Electrical System > AVN System > AUX(Auxiliary) Jack > Schematic Diagrams

Circuit Diagram

[AUX, USB, iPod Jack (AVN)]



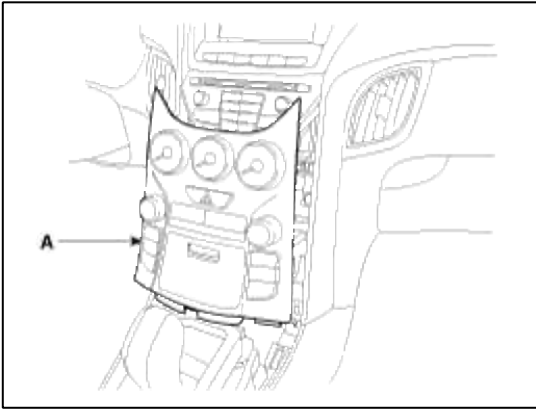
Connector A	No.	USB Connector
	1	USB GND
	2	USB D (+)
	3	USB D (-)
	4	USB VCC

Connector B	No.	AUX(iPod) Connector
	1	AUX input left
	2	AUX input right
	3	AUX DET
	4	AUX video
	5	-
	6	Illumination(+)
	7	AUX signal GND
	8	AUX shield GND
	9	-
	10	AUX V GND
	11	-
	12	GND

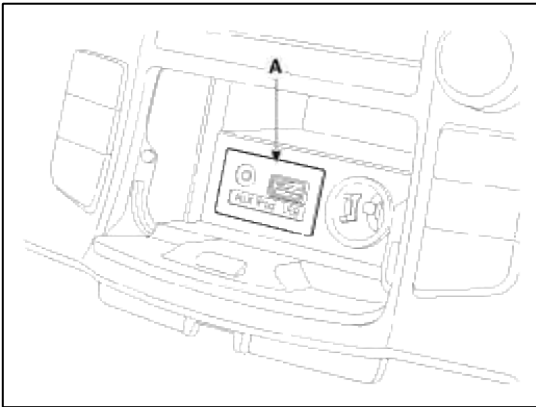
Body Electrical System > AVN System > AUX(Auxiliary) Jack > Repair procedures
Removal

1. Disconnect the negative (-) battery terminal.

2. Remove the center fascia lower panner (A).
(Refer to BD group - "Crash pad")



3. Remove the multimedia jack(A) from the center fascia lower pannel after disconnecting the connertor.



Installation

1. Install the multimedia jack.
2. Connect the AUX jack connector.
3. Install the center fascia lower pannel.

NOTE

Make sure the Aux connector and the console connectors are plugged in properly.

Body Electrical System > AVN System > Troubleshooting

Troubleshooting Guide

Before Thinking The Product Has Malfunctioned

Try the suggestions listed below.

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<p>The TTS(Text To Speech) engine speaks the street name based off of the phonetic spelling.</p> <p>This will continuously be update with the map database.</p>

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.
XM only goes through one category	The XM mode is in category.	Press the mode button to change to channel mode.
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 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.
The sound does not	<ul style="list-style-type: none"> • The volume level is set the 	<ul style="list-style-type: none"> • Adjust the volume level.

work.	<p>lowest level.</p> <ul style="list-style-type: none"> • The connector is not properly connected. • The device is currently fast-forwarding, rewinding, scanning, or playing in slow mode. 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • The DISC is dirty or scratched. • Vibration is occurring from the position in which the conversion switch has been installed. • The color and tone quality of the image is low. 	<ul style="list-style-type: none"> • Wipe off water or dirt from the DISC. Do not use a disc which has been scratched. • 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.	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • There are no titles which can be played. • The iPod firmware version has not been properly updated. • The iPod device does not recognize downloads. 	<ul style="list-style-type: none"> • 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.

Body Electrical System > Smart key System > Specifications

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. 2mA

RF Receiver

Items	Specification
Frequency	315 MHz
Antenna type	FSK (Frequency Shift Keying)

Smart Key FOB

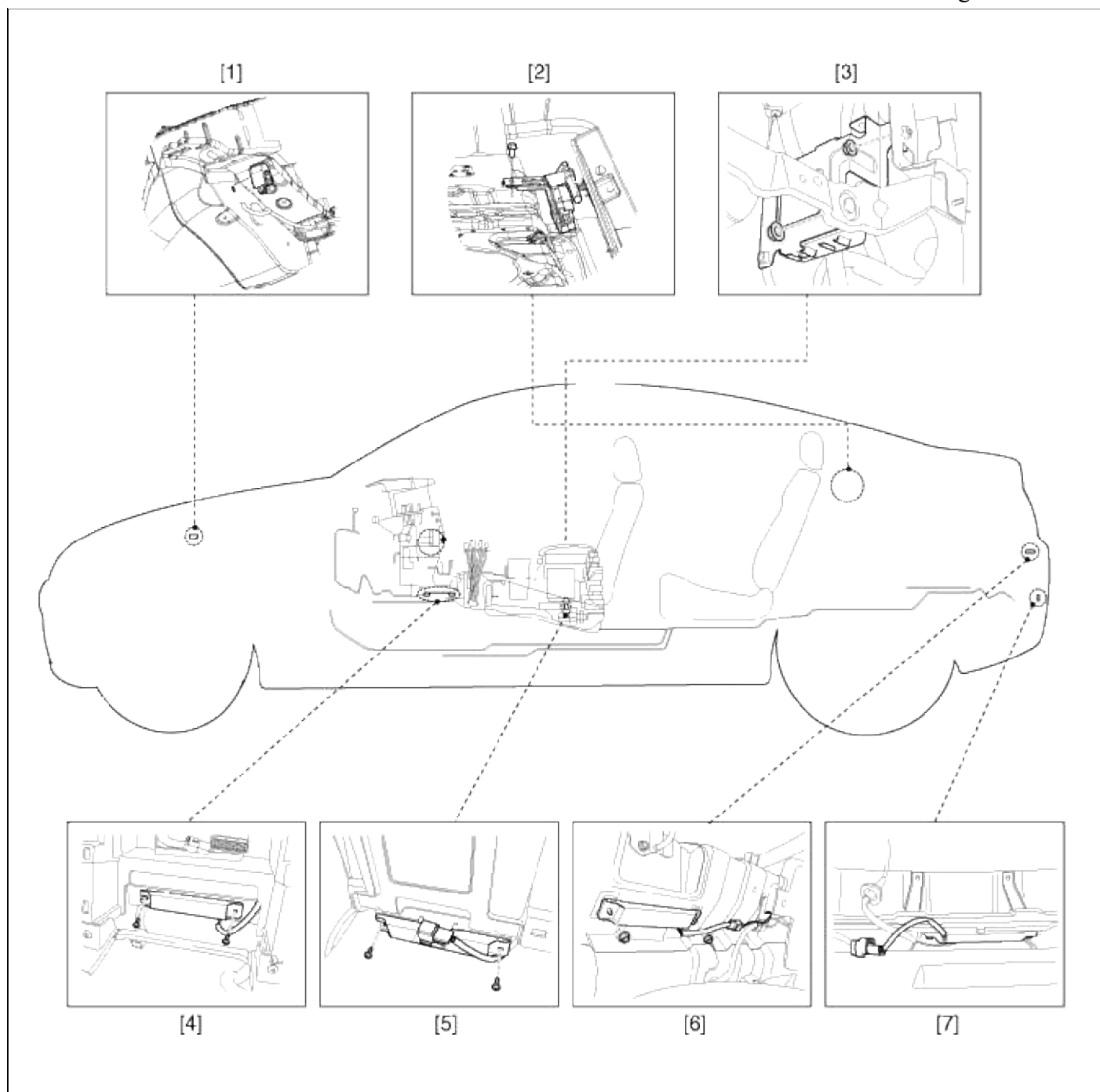
Items	Specification
Battery	Lithium battery 3V 1EA
Distance	30m
Battery life	More than 2years (10 times / a day)
Push buttons	Door lock / unlock, Trunk lid / Panic
Frequency(Rx)	125 kHz
Frequency(Tx)	315 MHz
Numbers	2EA

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(3EA), Door(2EA), Bumper(1EA)

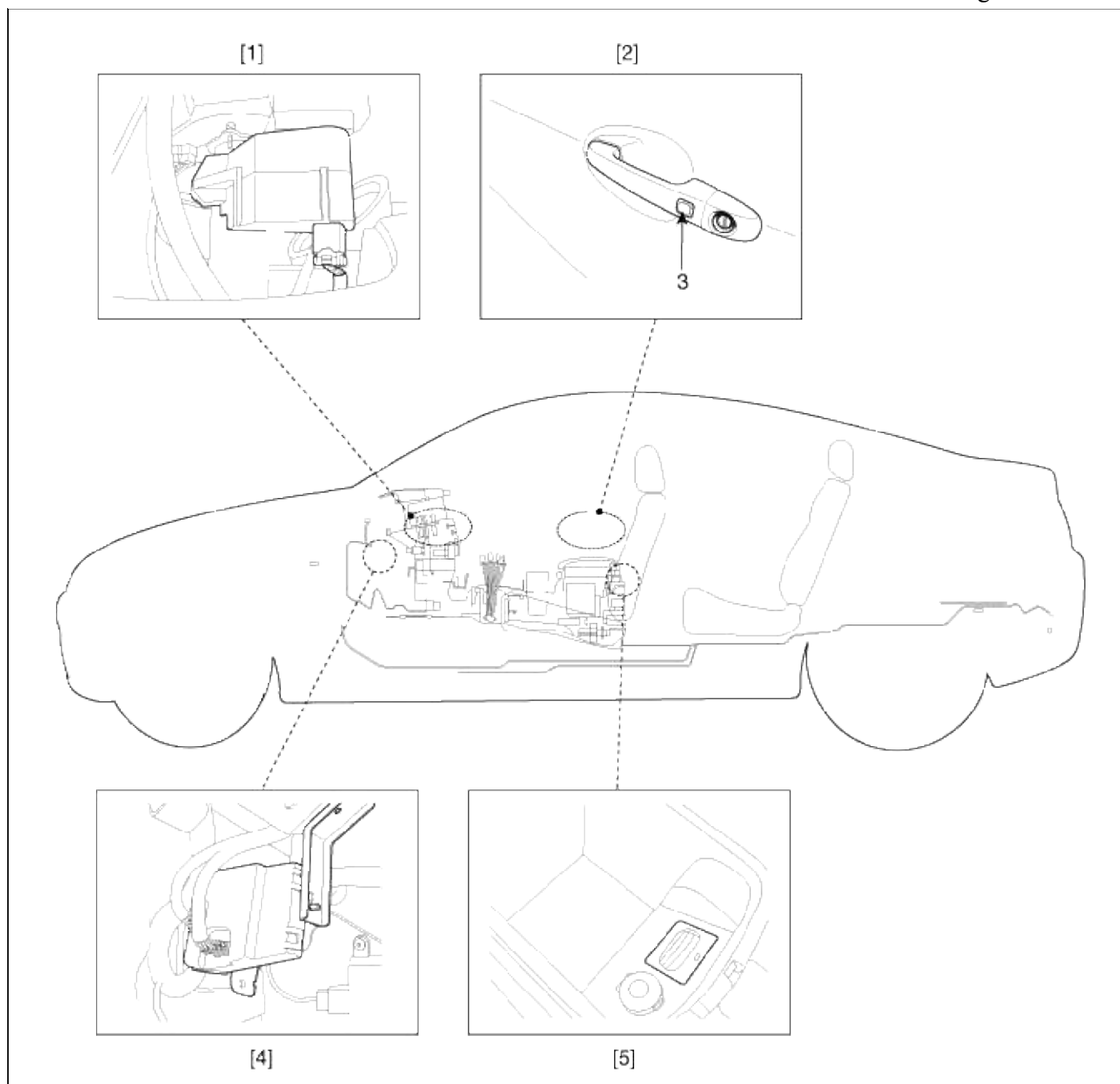
Body Electrical System > Smart key System > Components and Components Location

Component Location (1)



1. Buzzer	5. Interior antenna 2
2. RF receiver	6. Trunk antenna
3. SMART KEY unit	7. Bumper antenna
4. Interior antenna 1	

Component Location (2)



1. Electronic Steering
Column Lock (ESCL)
2. Door outside handle
3. Door outside handle
button

4. PDM
5. FOB holder

Body Electrical System > Smart key System > Description and Operation

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.

In a similar manner the vehicle's Electrical Steering Column Lock (ESCL) is released. 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 FOB-HOLDER 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:

A. Pressing Push button in door handle

2. Passive locking

The system allows the user to lock the vehicle by pushing a button on door handle with the SMART KEY FOB.

3. Button start

The system allows the user to release ESCL and 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 inserting the key into the FOB HOLDER.

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
- 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.

NOTE

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.

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).

3. External Receiver

The SMART KEY FOB's response is received via the external RF receiver, which is connected to the SMK ECU via a serial communication Line.

The SMK ECU provides a connector pin for the serial communication Line.

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 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.

NOTE

- 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:

A. IF NO FOB-IN ACTIVE

SMK performs a search for the fobs in the interior of the vehicle. The same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication)

B. IF FOB-IN ACTIVE

SMK sends request toward PDM to search 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)

2. Vehicle action:

Closing last door or trunk with knobs locked state, or with a locking in progress

3. SMK actions:

Before elapsing 500ms after the closing if all doors are locked then:

A. IF NO FOB-IN ACTIVE

SMK performs a search for the fobs in the interior of the vehicle.

The same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication)

B. IF FOB-IN ACTIVE

SMK sends request toward PDM to search valid TP

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

If any valid fob or valid TP has been found, SMK sends unlock command via CAN and activates ext. buzzer warning.

If any valid fob has been found, SMK sends unlock command via CAN/LIN and activates ext. buzzer warning.

Smart Key Door Lock Warning

Door Lock Warning 1

1. Preconditions:

While (at least one door knob is unlocked) & (ACC ON or IGN ON) & (No FOB-IN) :

A. (All doors are closed) & (trunk closed)

2. Event:

A. User presses the push button in door handle or trunk

3. SMK actions:

SMK performs a search for the fobs outside of the vehicle; the same LF-strategy has to be used as it is defined for "Scenario Access with I/O Distinction".

Door Lock Warning 2

1. Preconditions:

Same as passive locking precondition but with at least one door open.

2. Event:

User presses the door handle Push button .

3. SMK actions:

SMK performs a search for the fobs outside of the vehicle; the same LF-strategy has to be used as it is defined for "Scenario Access with I/O Distinction".

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

If the preconditions are no longer valid during buzzer active time (3 seconds), the SMK ECU stops the buzzer immediately.

Door Lock Warning 3

1. Preconditions:

Same as passive locking precondition

2. User action:

A. User presses the door handle Push button

3. SMK ECU actions:

A. If ATWS(Anti Theft Warning System) is in DISARM status, SMK ECU performs a search for the fob inside of the vehicle (use "Door Lock Warning 3" scenario)

If no fob has been found, the passive locking is performed.

If any valid fob has been found, SMK ECU activates the external buzzer.

If the activity timer elapsed or ACC ON or IGN1 ON or NOT All door closed or FOB-IN, the SMK ECU stops the buzzer immediately.

After searching of inside fob, SMK ECU also performs a search for fobs outside of the vehicle.

Smart Key Lamp Warning

1. SMK actions:

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

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

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

Failsafe Functions (Backup For Limp Home)

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

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

User Information Functions

ID OUT Warning

1. Preconditions:

A. (ACC or IGN1) & (any door open or trunk open)

2. Event:

The last opened door is closed

3. SMK action:

SMK searches for a SMART KEY FOB in the interior.

A. If no valid SMART KEY FOB is found, the SMK activates external buzzer and also sends ID OUT WNG via CAN (exterior buzzer warning and internal buzzer warning).

B. If a door is opened and closed again during terminals on and inside valid fob, SMK re-enables the authentication and stops the warning. If the terminal is in ACC, SMK shall turn on immobilizer lamp.

NOTE

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, PDM, ESCL and FOBs is described.

For the learning of the SMK, PDM, ESCL and 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

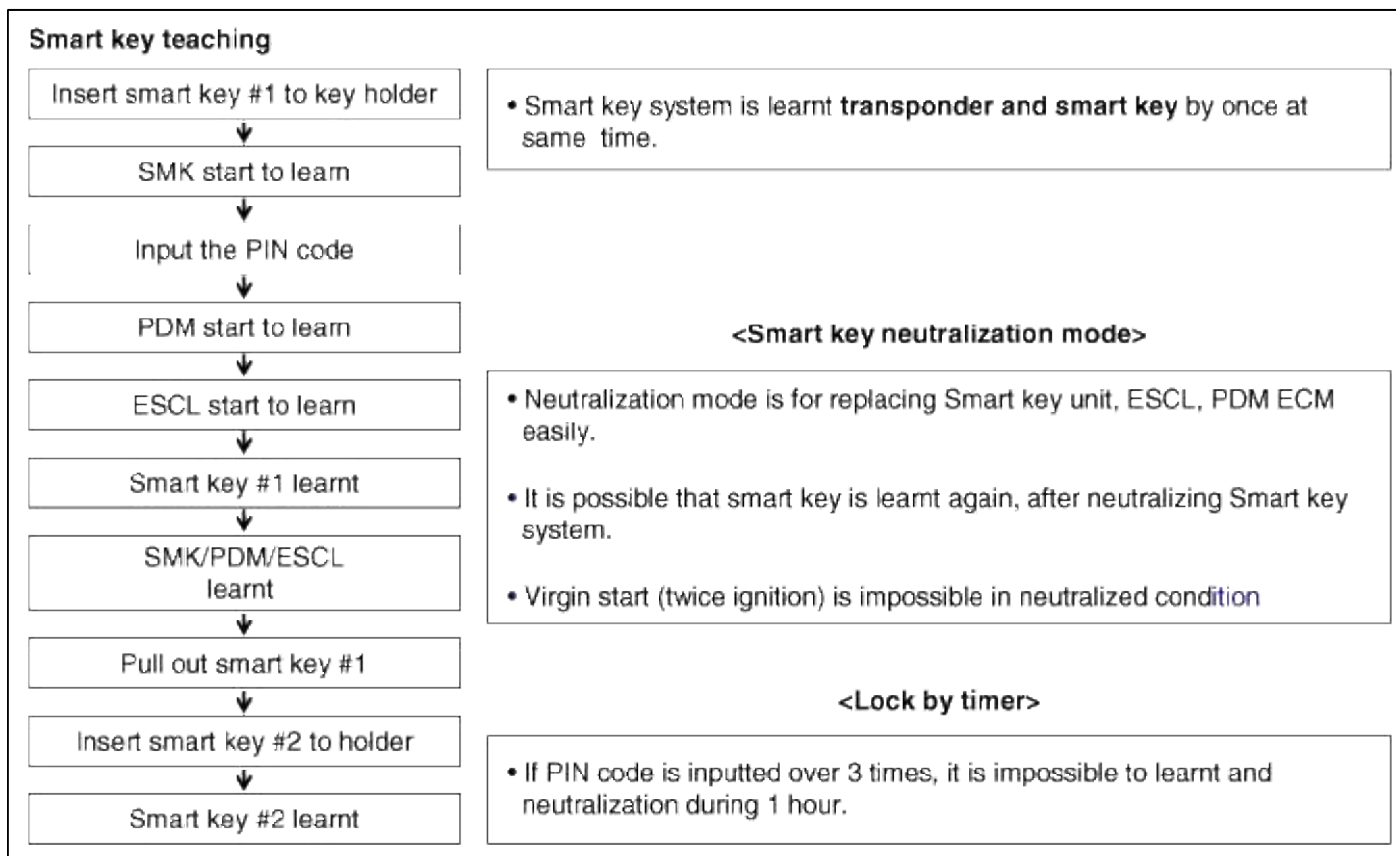
This mode is used by the dealers in order to replace SMK and/or PDM and/or ESCL and/or the set of keys, or to register additional keys for an existing system. That means the system already has been learnt with certain PIN Code. The PIN Code is fixed for the life time of the vehicle, therefore the same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

Teaching MODE Procedure Description (Step By Step)

Objective: Key teaching procedure at service station

Initial state:

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



Starting After Replacing (Virgin Start)

Starting is possible by following process after replacing new smart key unit , PDM, FOB key or ESCL.

- It is for starting at virgin condition
- All related parts are virgin condition (Smart key, IPM, PDM, ESCL ECM)
- ESCL is always unlock at virgin
- When virgin smart key is inserted in smart key holder, possible to start, IG ON and ACC position
- Press brake pedal in P or N range
- After inserting virgin smart key to holder, push start button once.



Body Electrical System > Smart key System > Repair procedures

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.

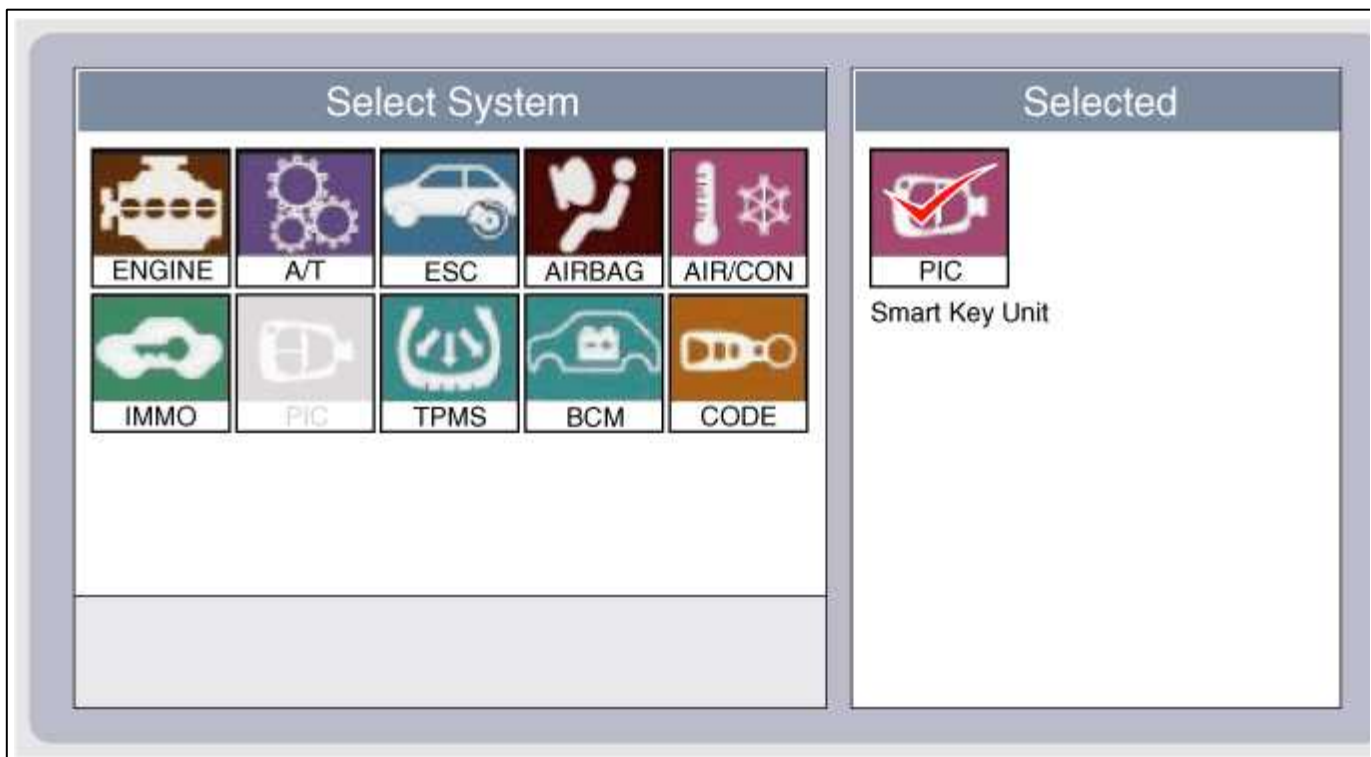
1. Problem in SMART KEY unit input.
2. Problem in SMART KEY unit.
3. Problem in SMART KEY unit output.

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

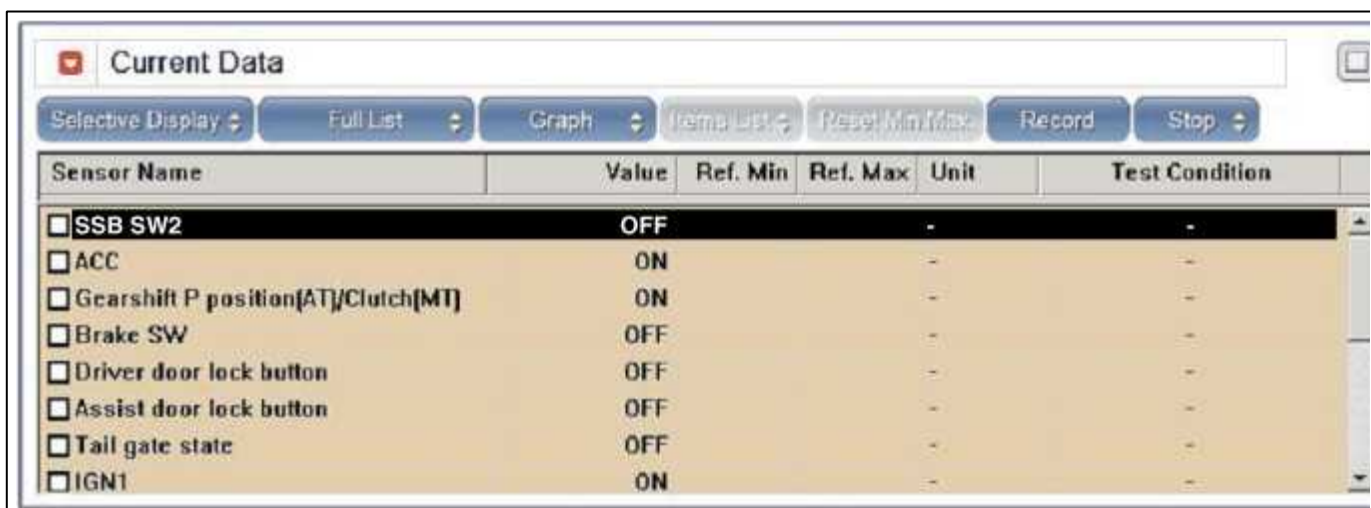
1. SMART KEY unit Input problem : switch diagnosis
2. SMART KEY unit problem : communication diagnosis
3. SMART KEY unit Output problem : antenna and switch output diagnosis

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".



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.

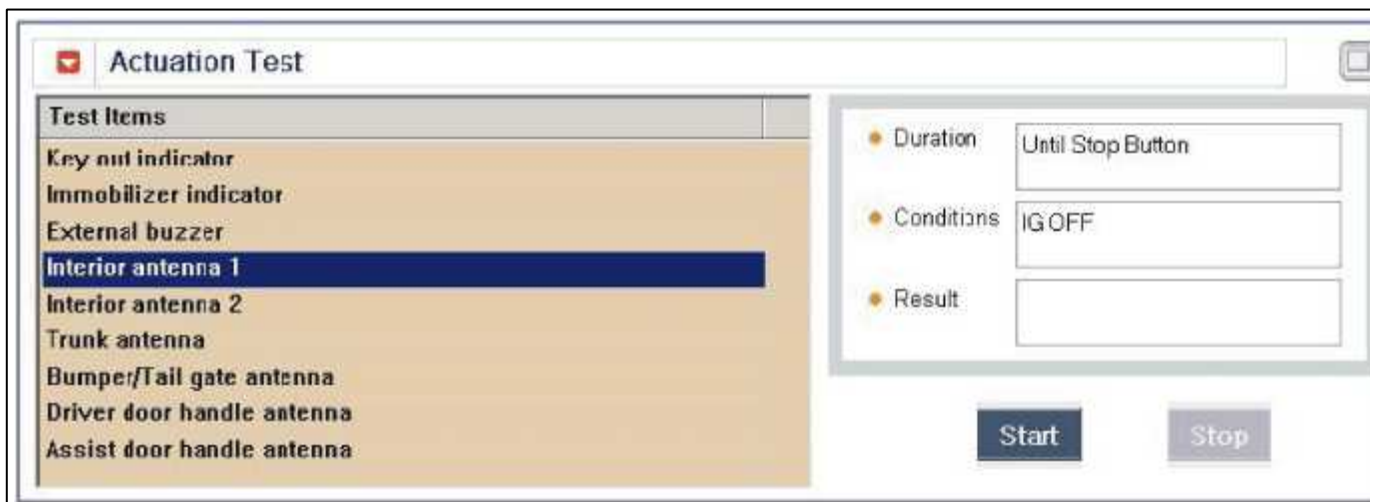
Communication Diagnosis With GDS (Self Diagnosis)

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".

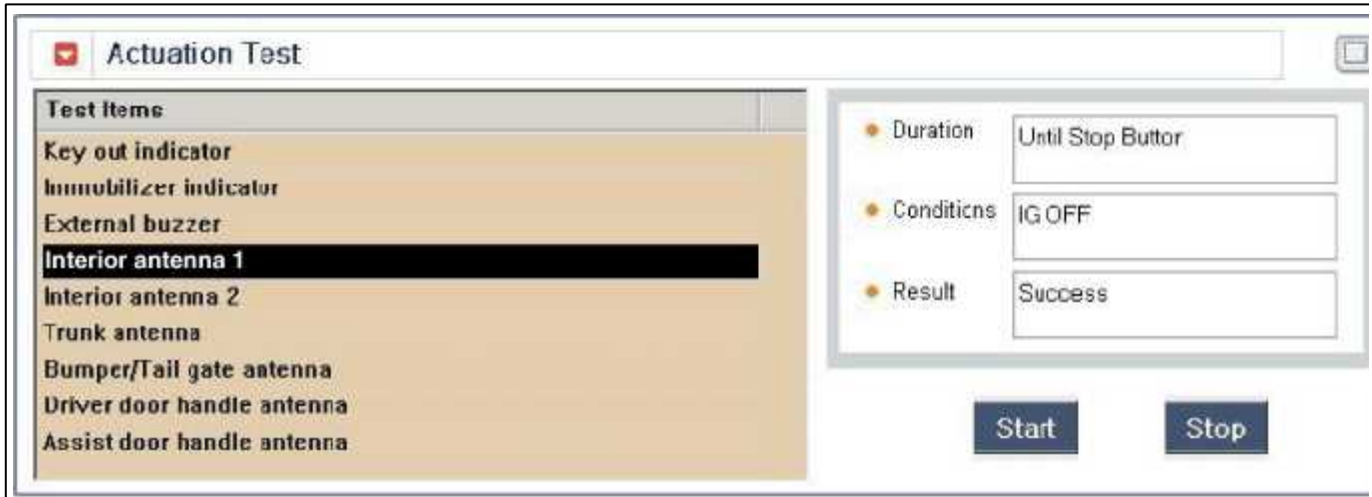


Antenna Actuation Diagnosis

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".



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



4. If the LED of smart key is blinking, the smart key is normal.

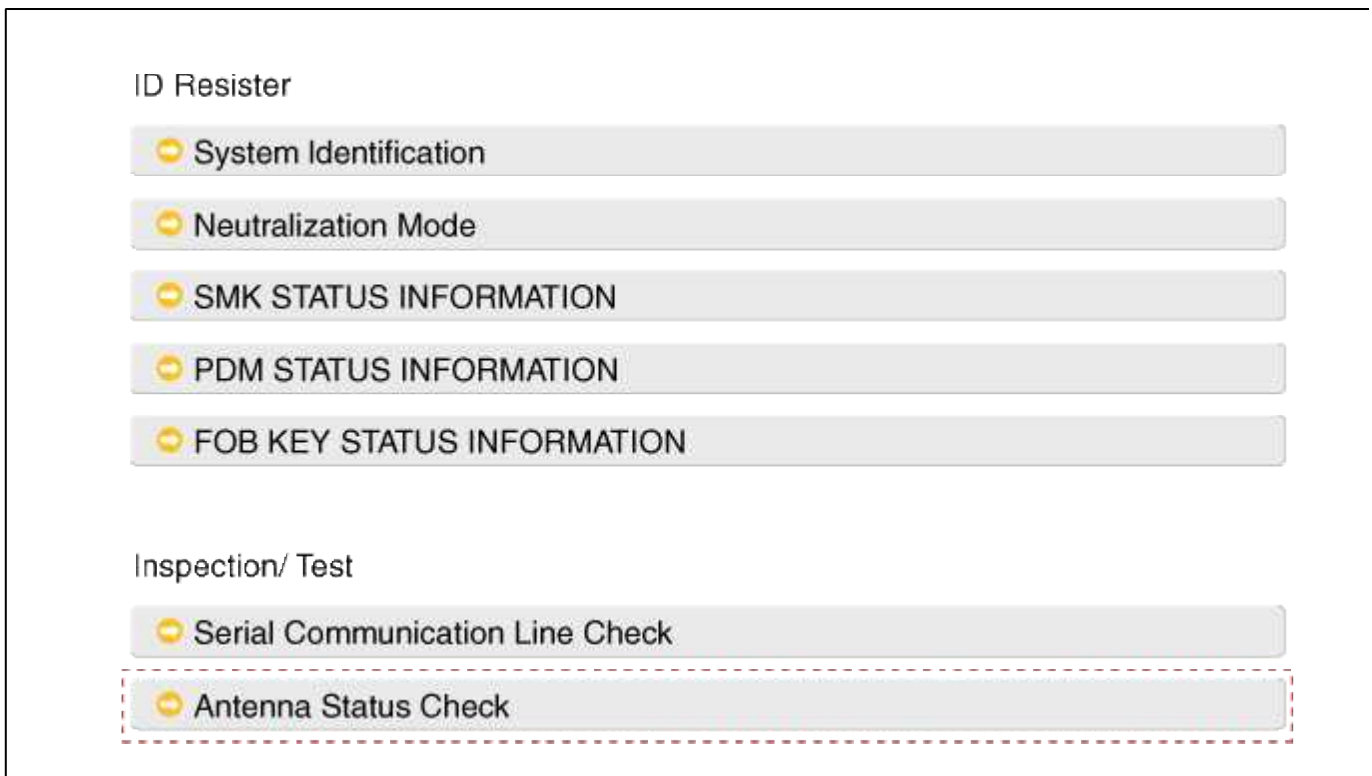
5. If the LED of smart key is not blinking, check the voltage of smart key battery.

6. Antenna actuation

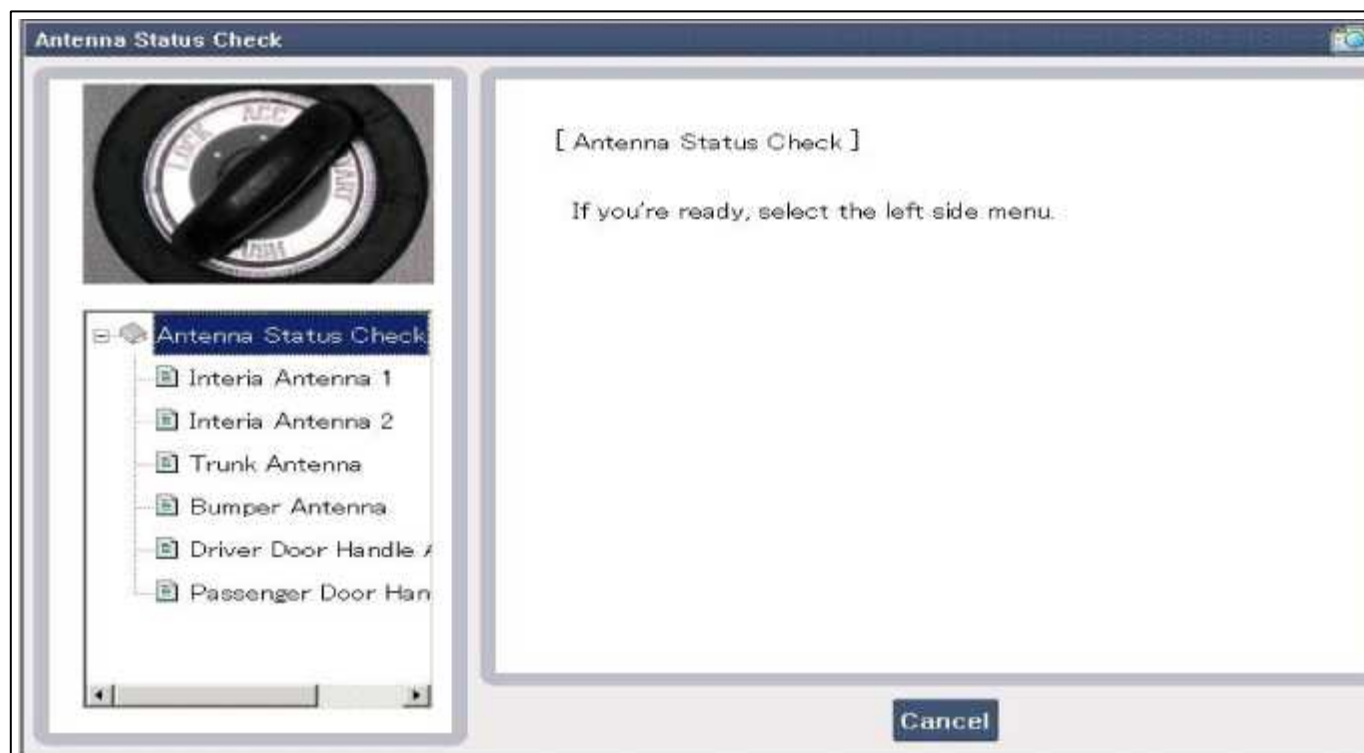
- A. INTERIOR Antenna 1
- B. INTERIOR Antenna 2
- C. Trunk antenna
- D. BUMPER/Antenna
- E. DRV_DR Antenna
- F. AST_DR Antenna

Antenna Status Check

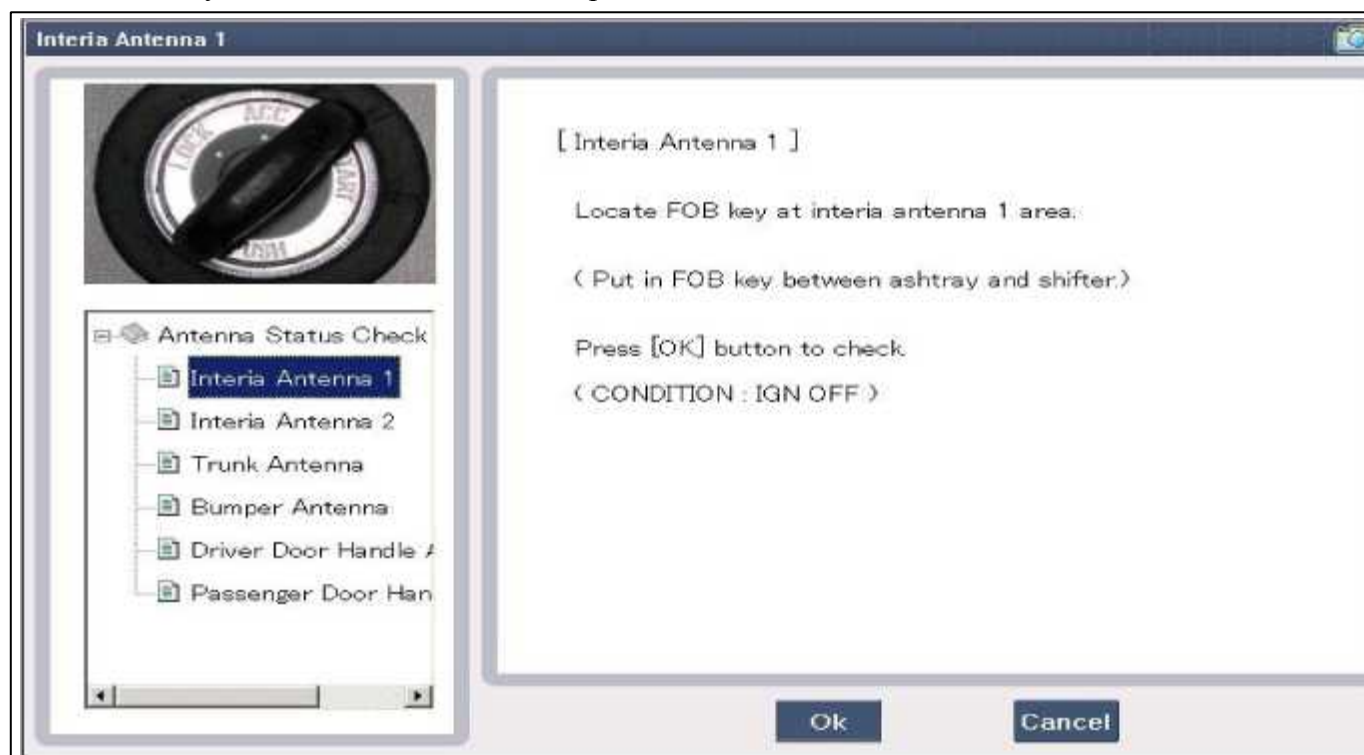
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. Select the "Antenna Status Check".

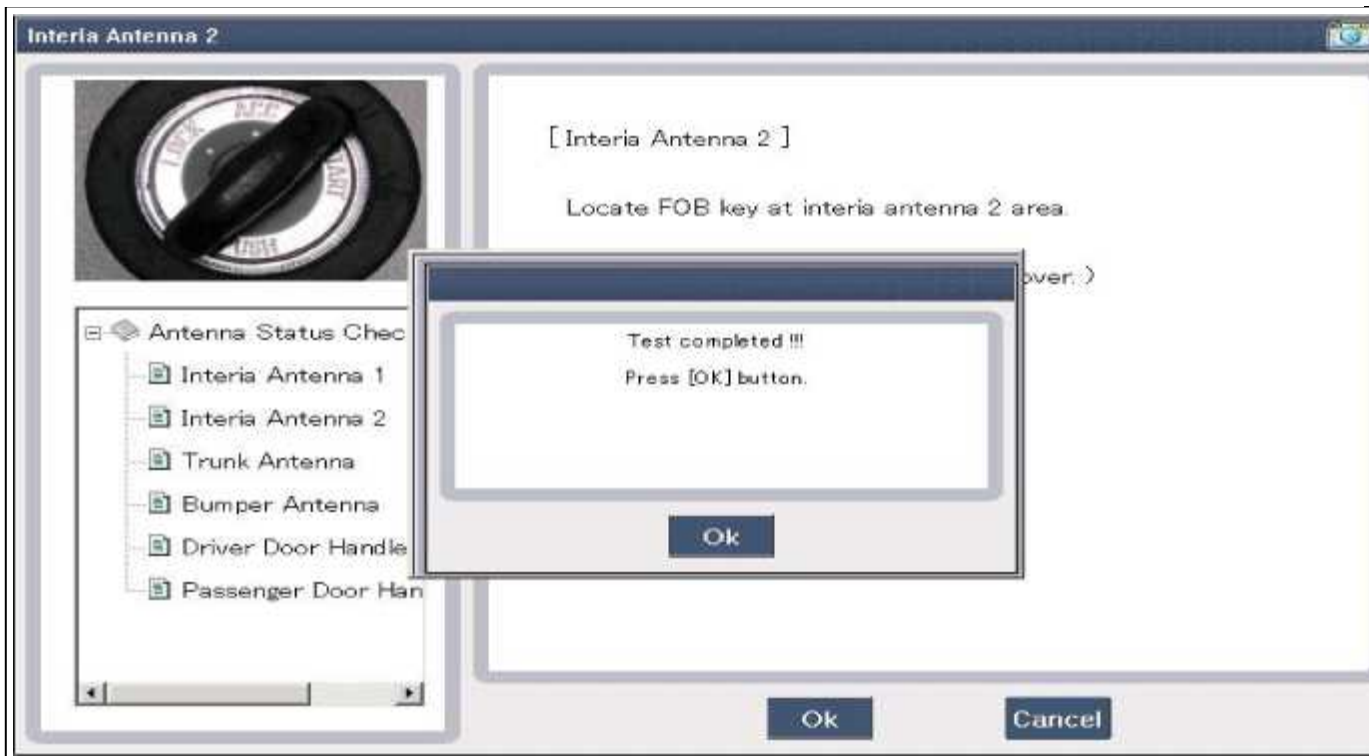


3. After IG ON, select the "Antenna Status Check".



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





5. If the smart key runs normal , the related antenna, smart key(transmission, reception) and exterior receiver are normal.

6. Antenna status

- A. INTERIOR Antenna 1
- B. INTERIOR Antenna 2
- C. Trunk antenna
- D. BUMPER/Antenna
- E. DRV_DR Antenna
- F. AST_DR Antenna

Serial Communication Status Check

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

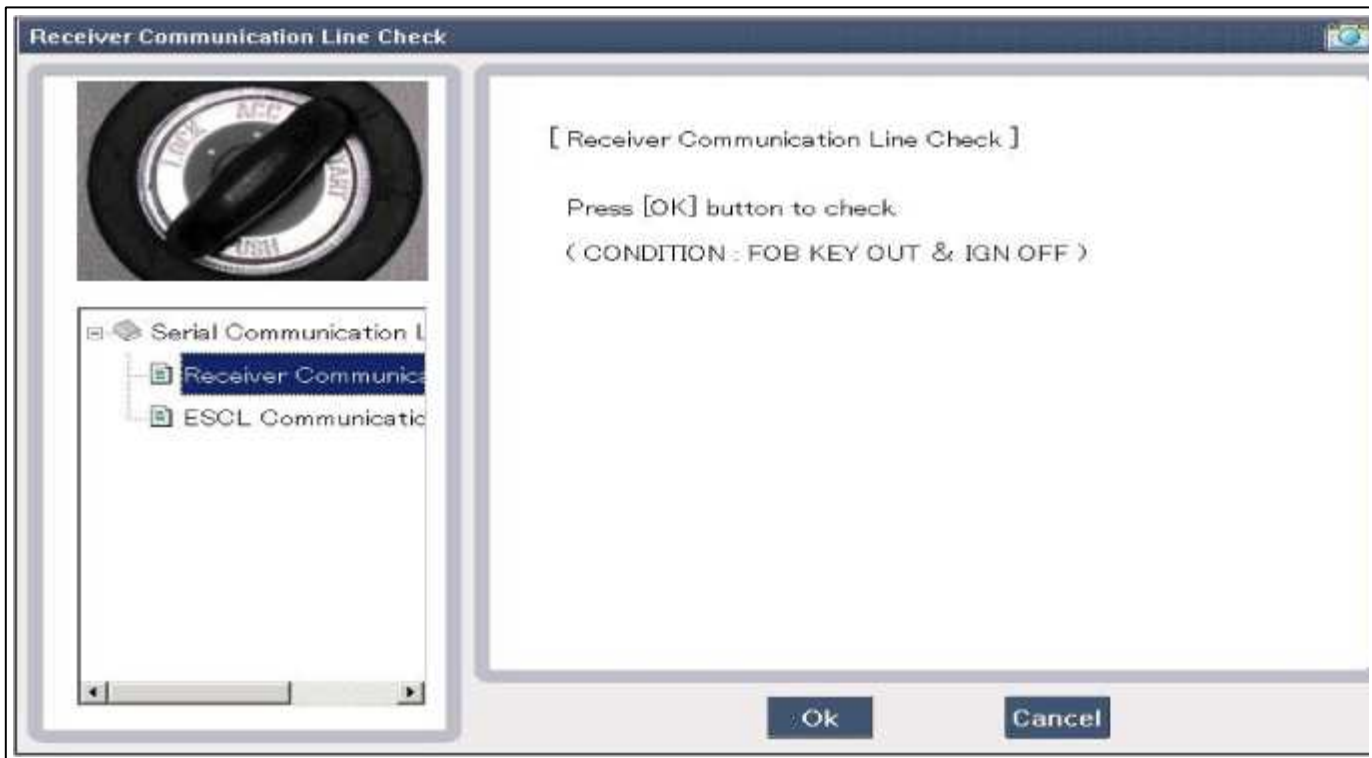
ID Resister

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

Inspection/ Test

- ☐ Serial Communication Line Check
- ☐ Antenna Status Check

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



4. Check the serial communication line with a GDS.

5. If the smart key runs normal, the communication of smart key unit, exterior receiver are normal.

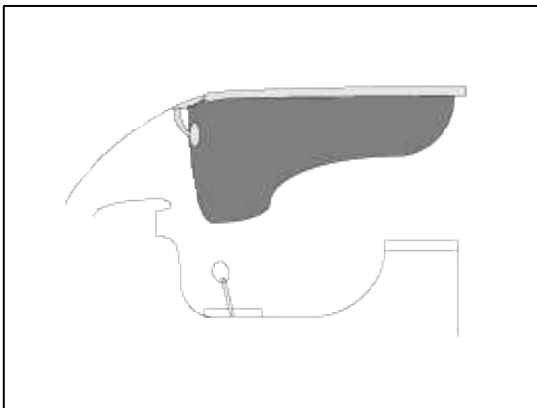
6. If the smart key runs abnormal, check the following items.

A. Disconnection or no response of the exterior receiver communication line.

B. The exterior receiver communication line disconnection and ground connection.

Interior Antenna Actuation Check

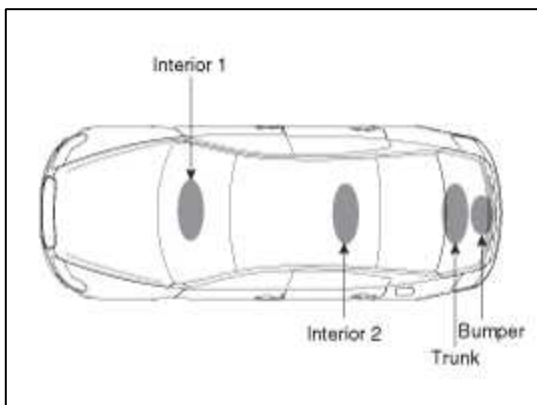
1. Set the smart key in the following shade area and check the IG ON.



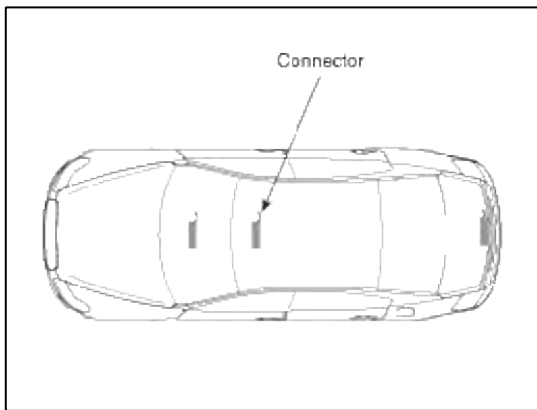
2. If the ignition is ON, the antenna runs normal.

3. Check the interior antenna ignition mode.

4. Set the smart key in the following shade area and actuate the antenna. Check the LED of smart key is blinking.



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



FOB Status Check

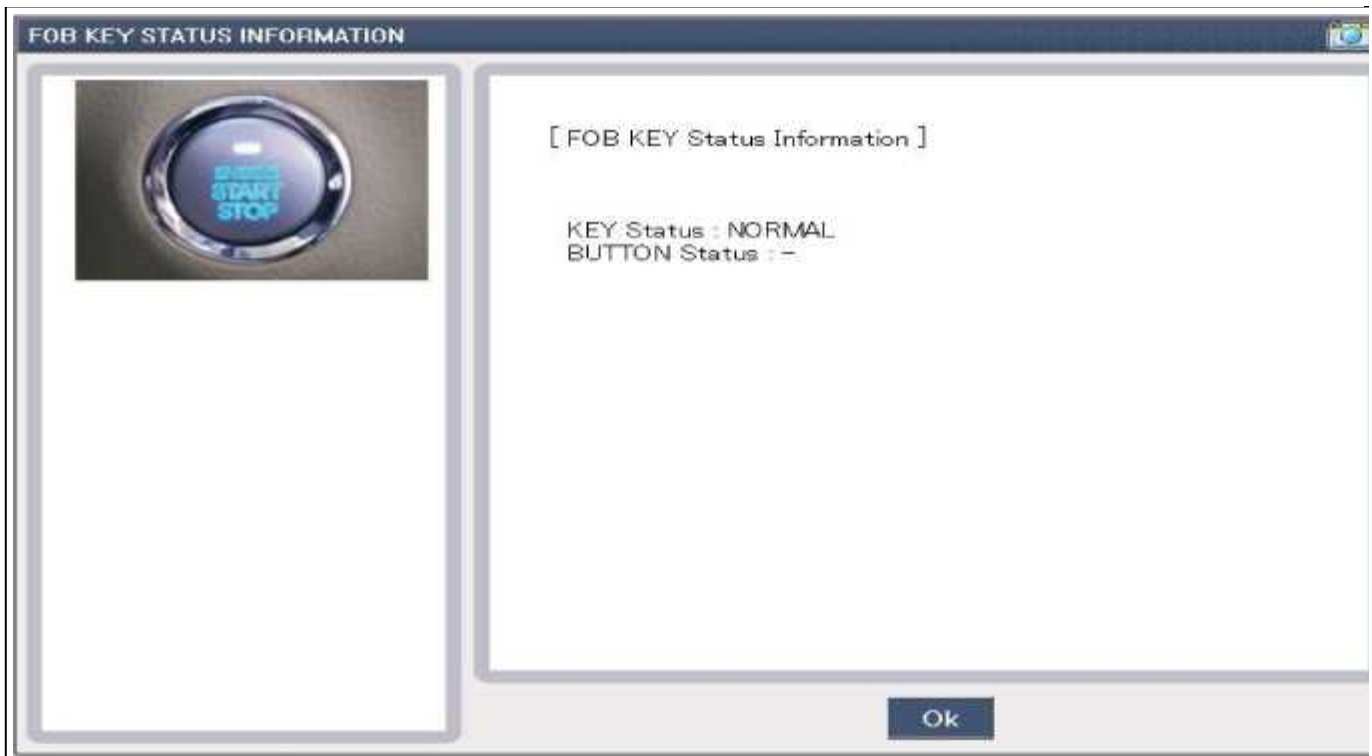
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "FOB KEY STATUS INFO".

ID Resister

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

Inspection/ Test

- Serial Communication Line Check
- Antenna Status Check



Smart Key Status Check

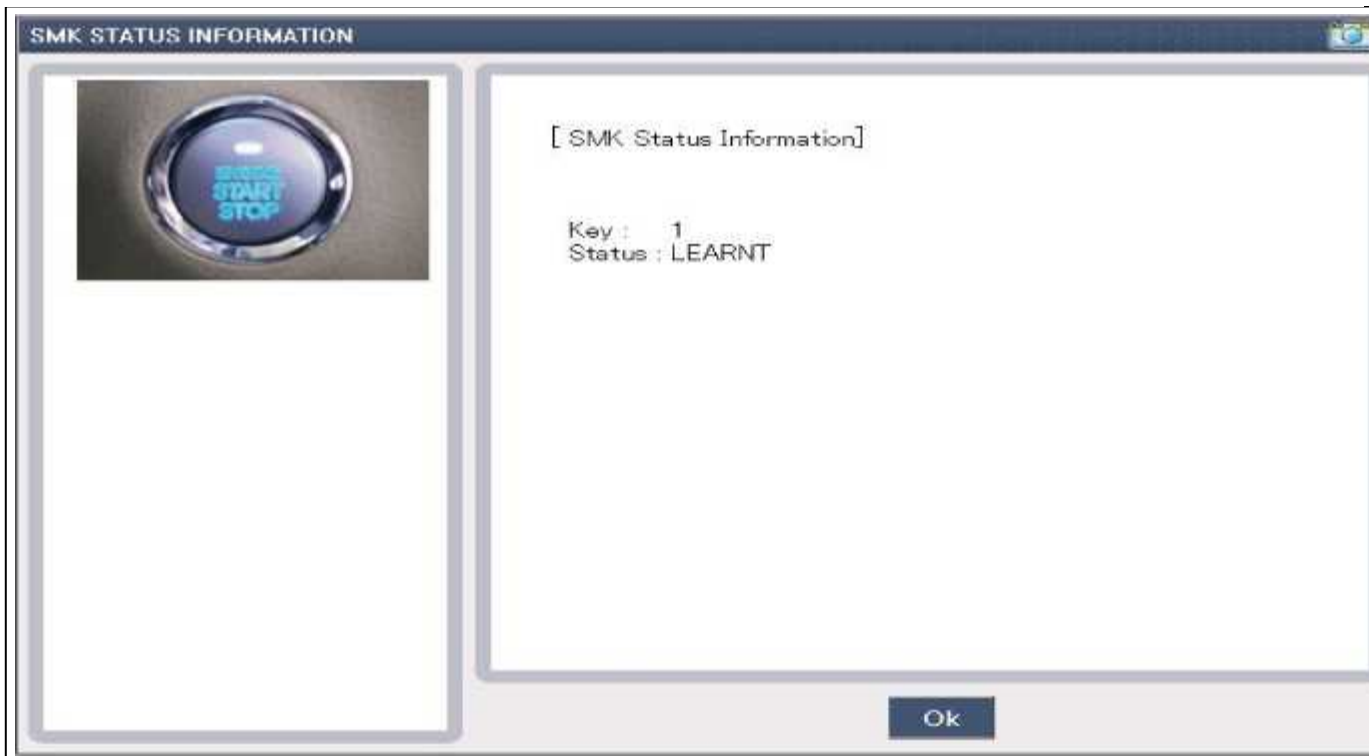
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "SMK STATUS INFO".

ID Resister

- ☐ System Identification
- ☐ Neutralization Mode
- ☒ SMK STATUS INFORMATION
- ☐ PDM STATUS INFORMATION
- ☐ FOB KEY STATUS INFORMATION

Inspection/ Test

- ☐ Serial Communication Line Check
- ☐ Antenna Status Check



PDM Status Check

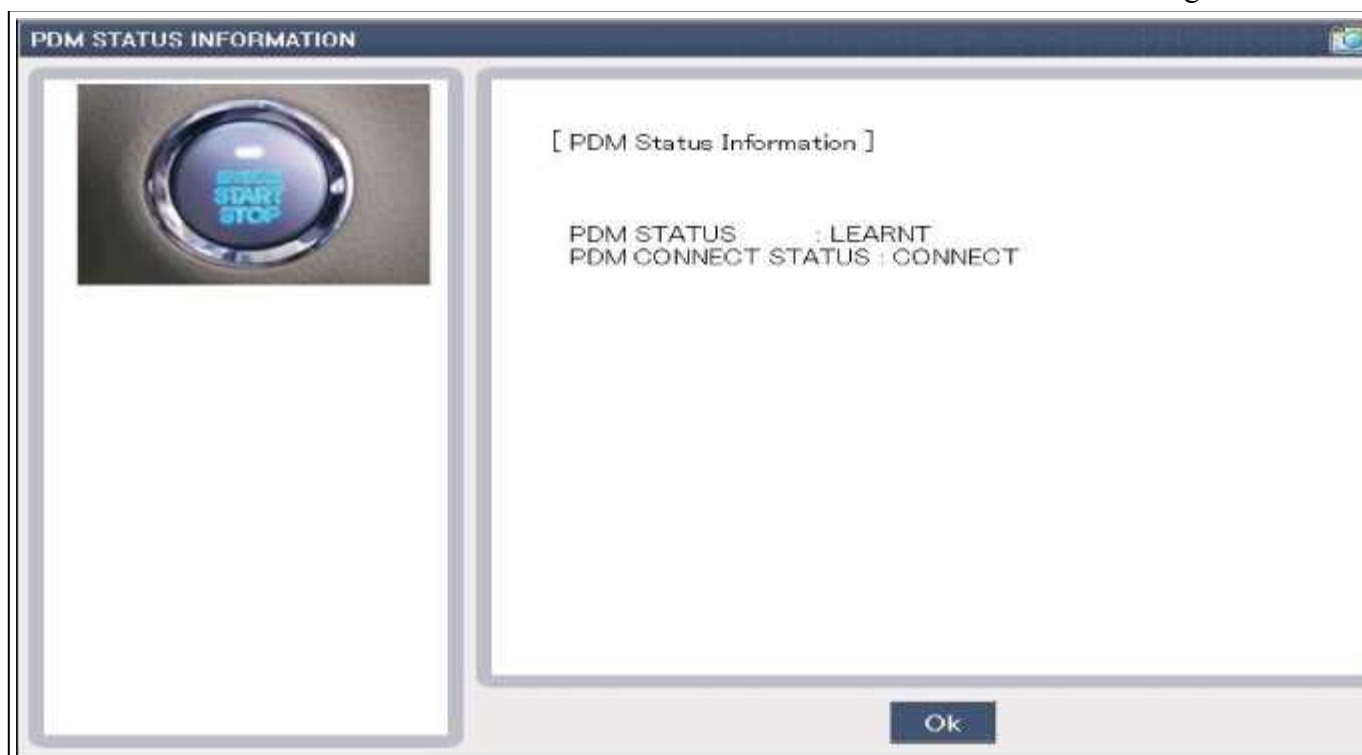
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "PDM STATUS INFO".

ID Resister

- ☐ System Identification
- ☐ Neutralization Mode
- ☐ SMK STATUS INFORMATION
- ☒ PDM STATUS INFORMATION
- ☐ FOB KEY STATUS INFORMATION

Inspection/ Test

- ☐ Serial Communication Line Check
- ☐ Antenna Status Check



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

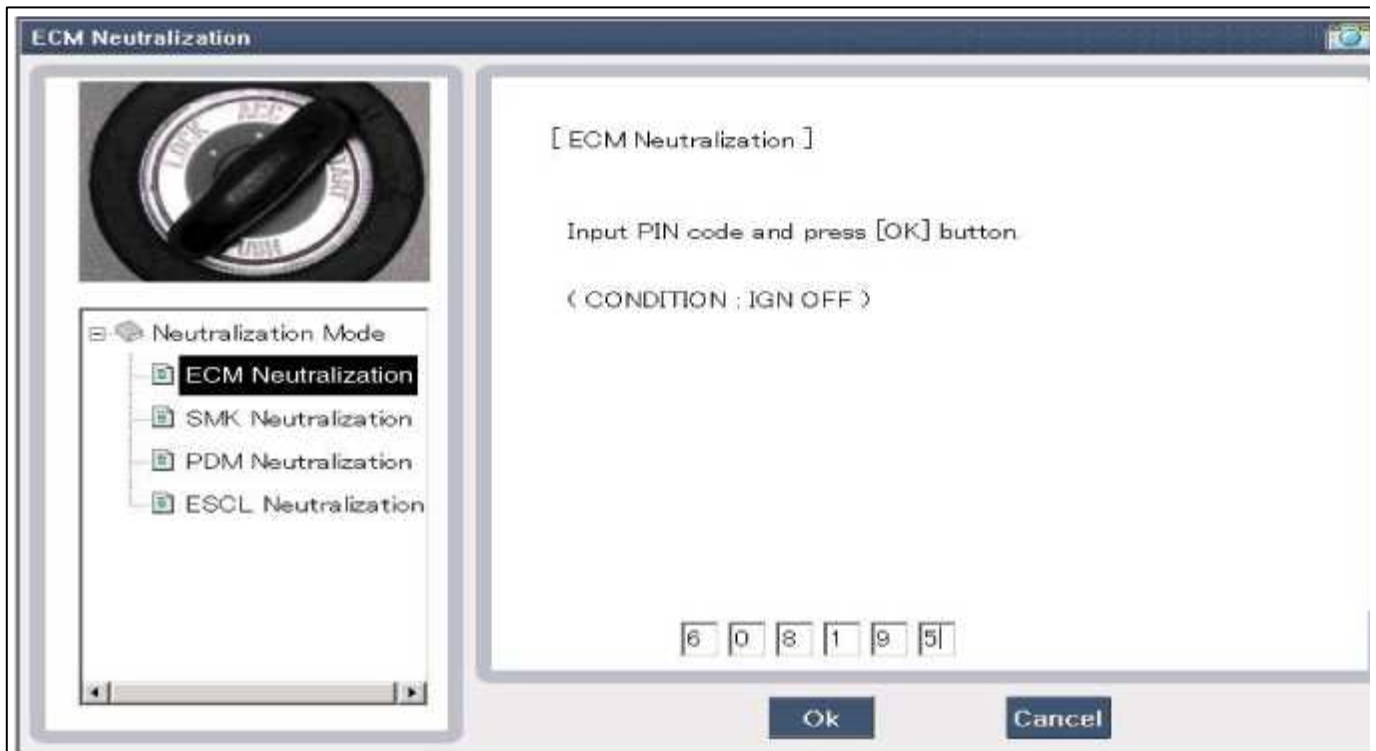
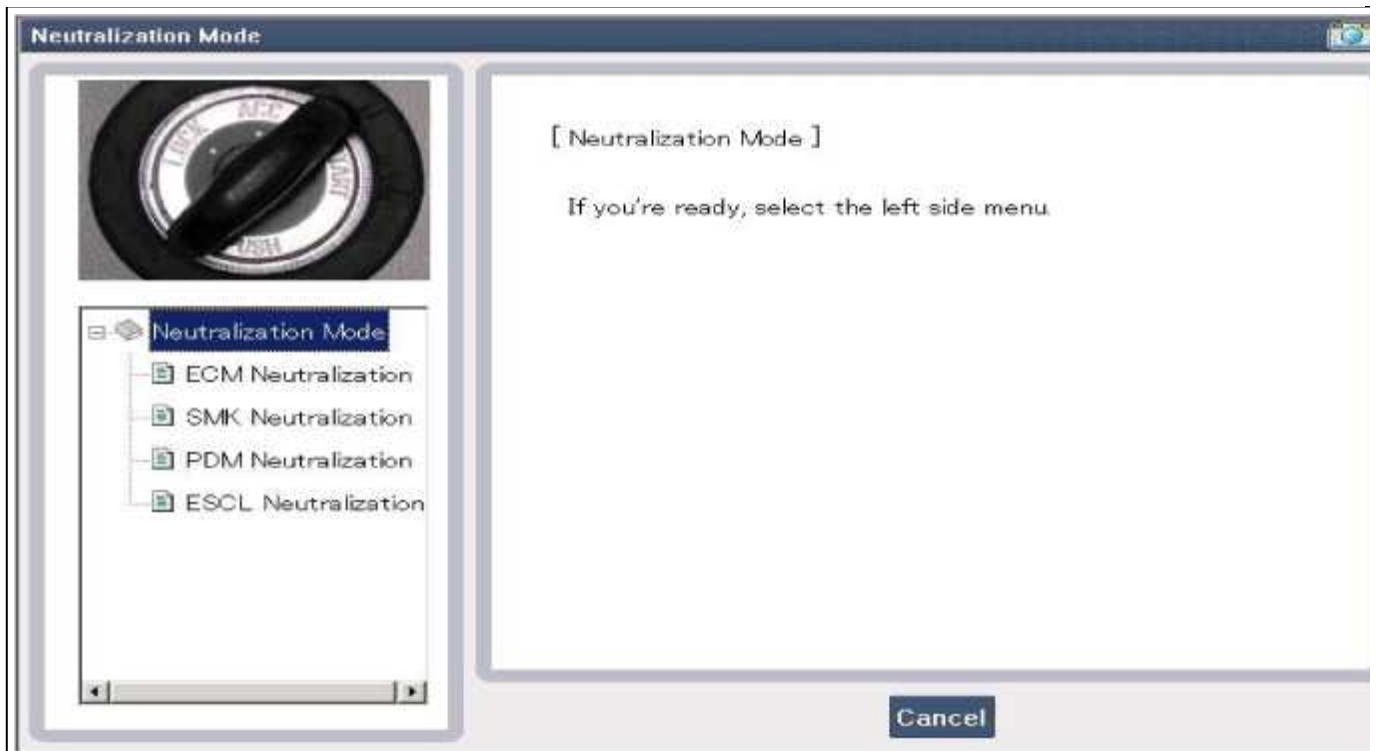
☐ PDM STATUS INFORMATION

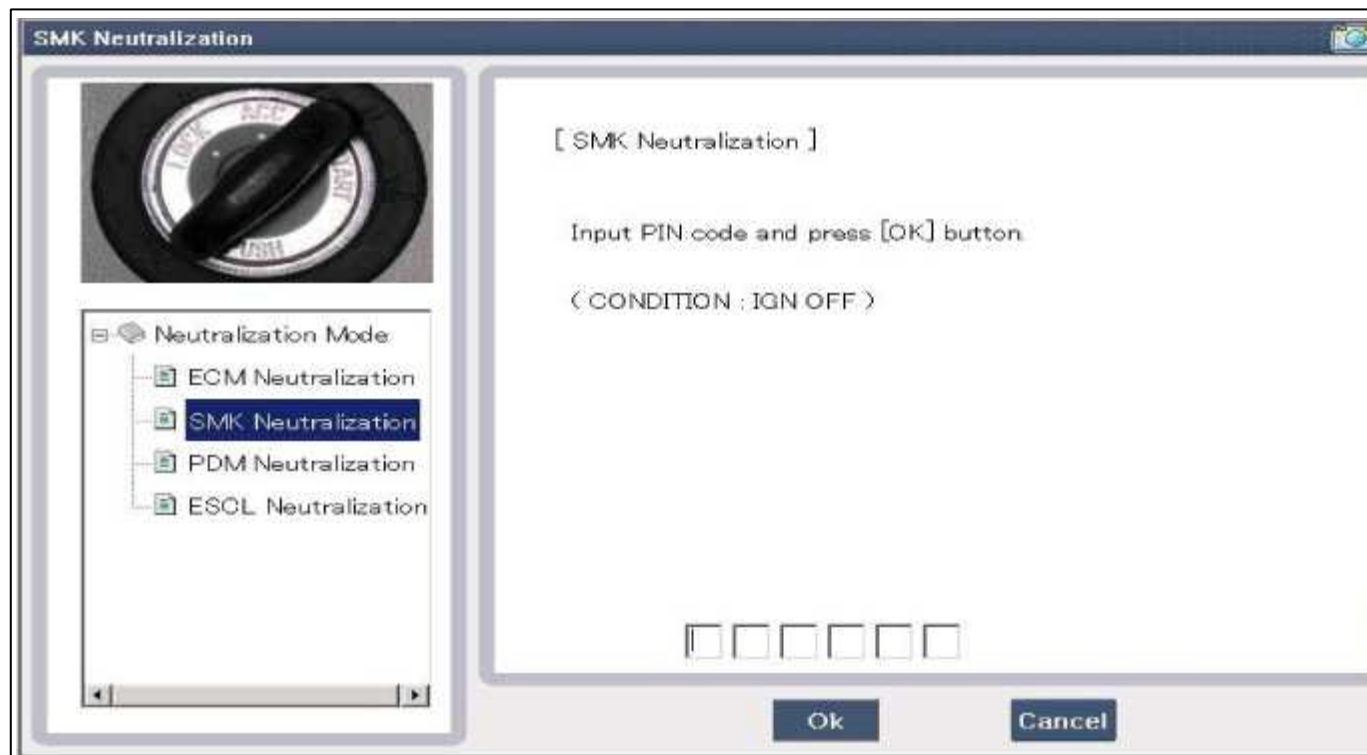
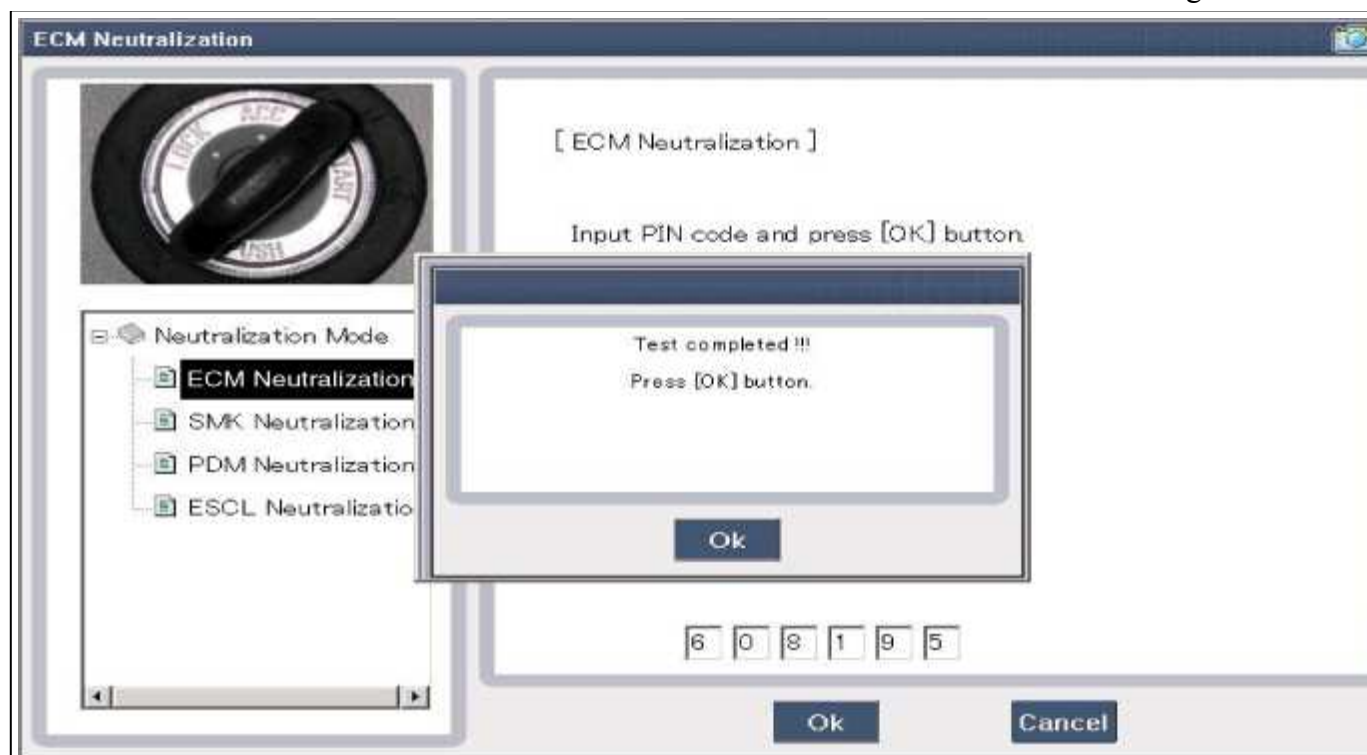
☐ FOB KEY STATUS INFORMATION

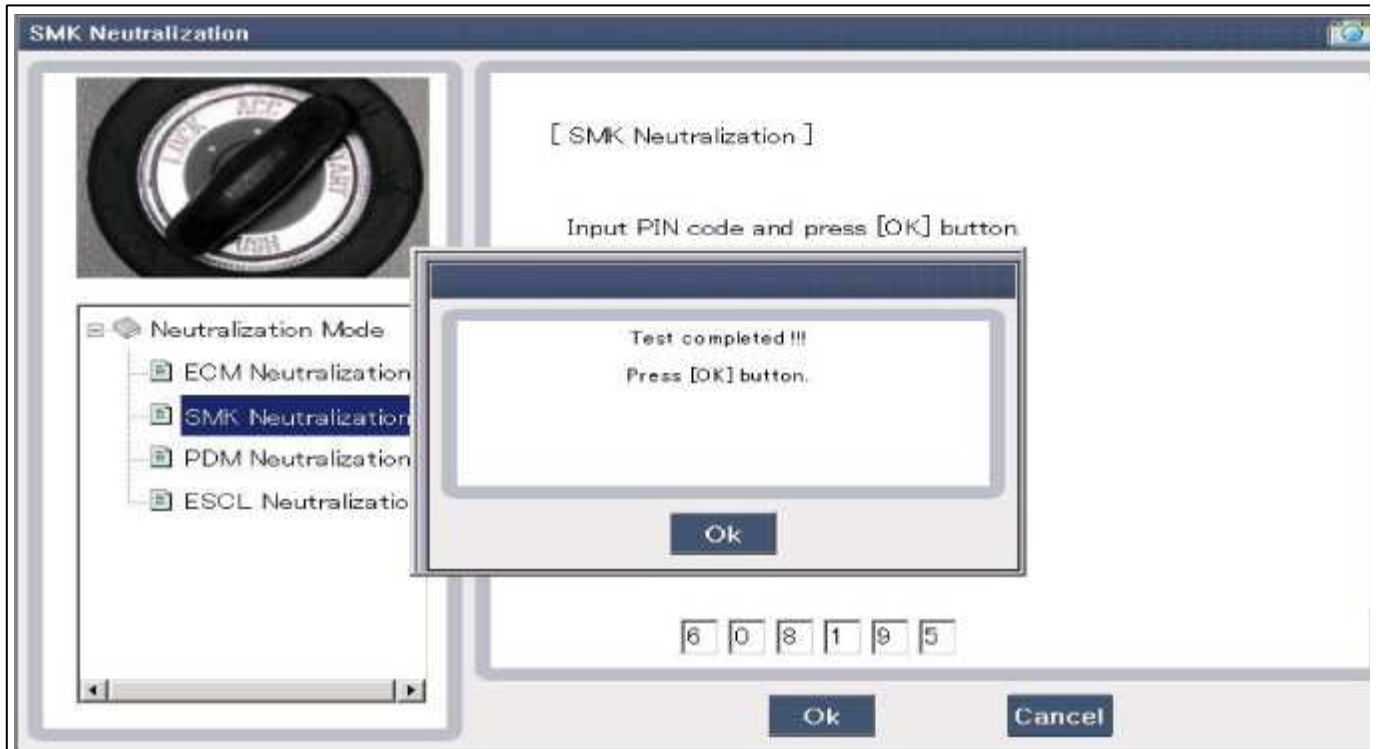
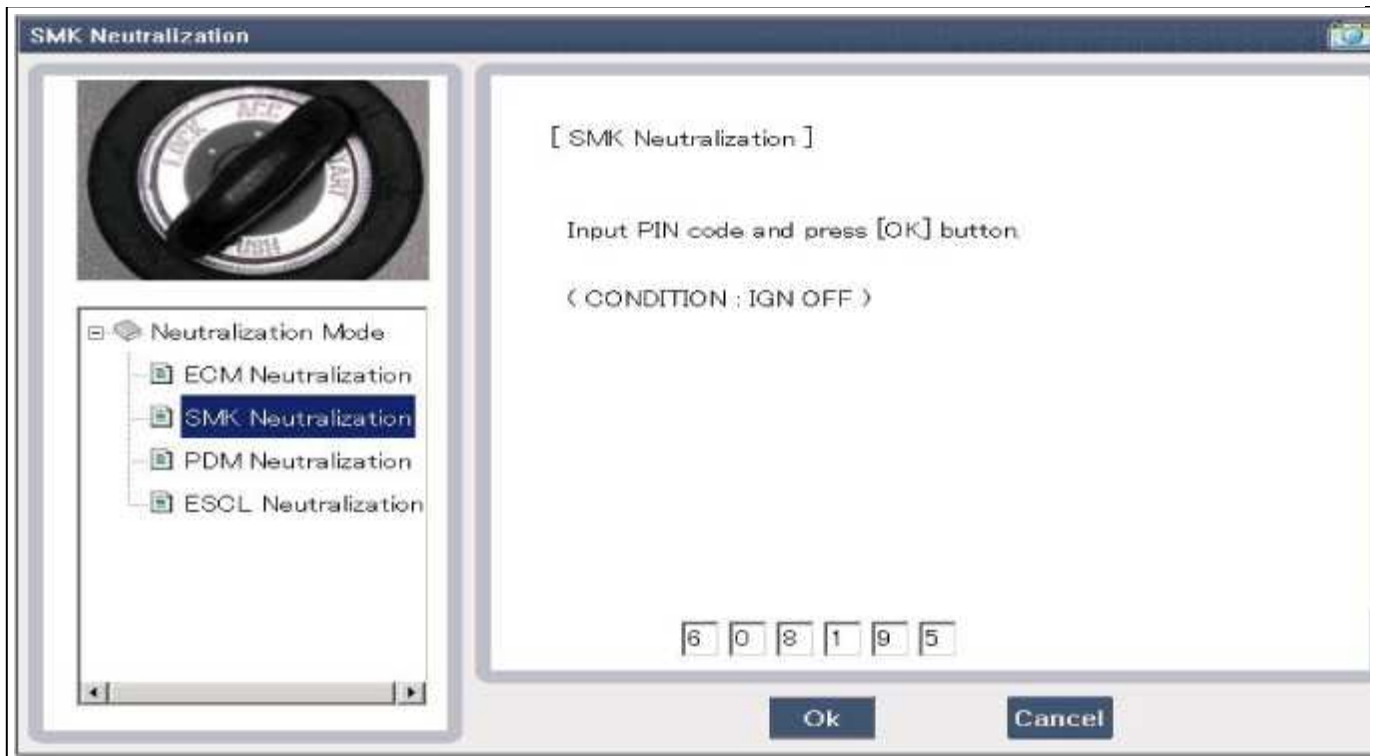
Inspection/ Test

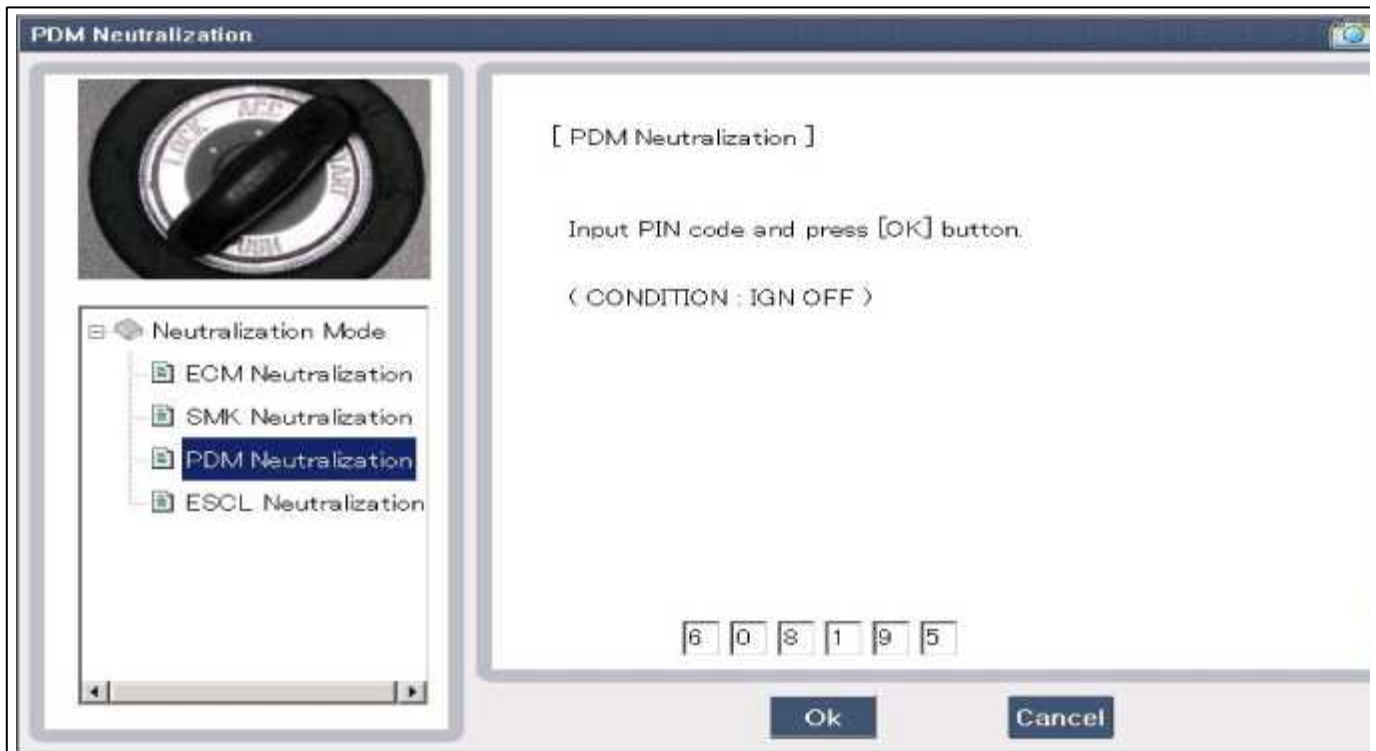
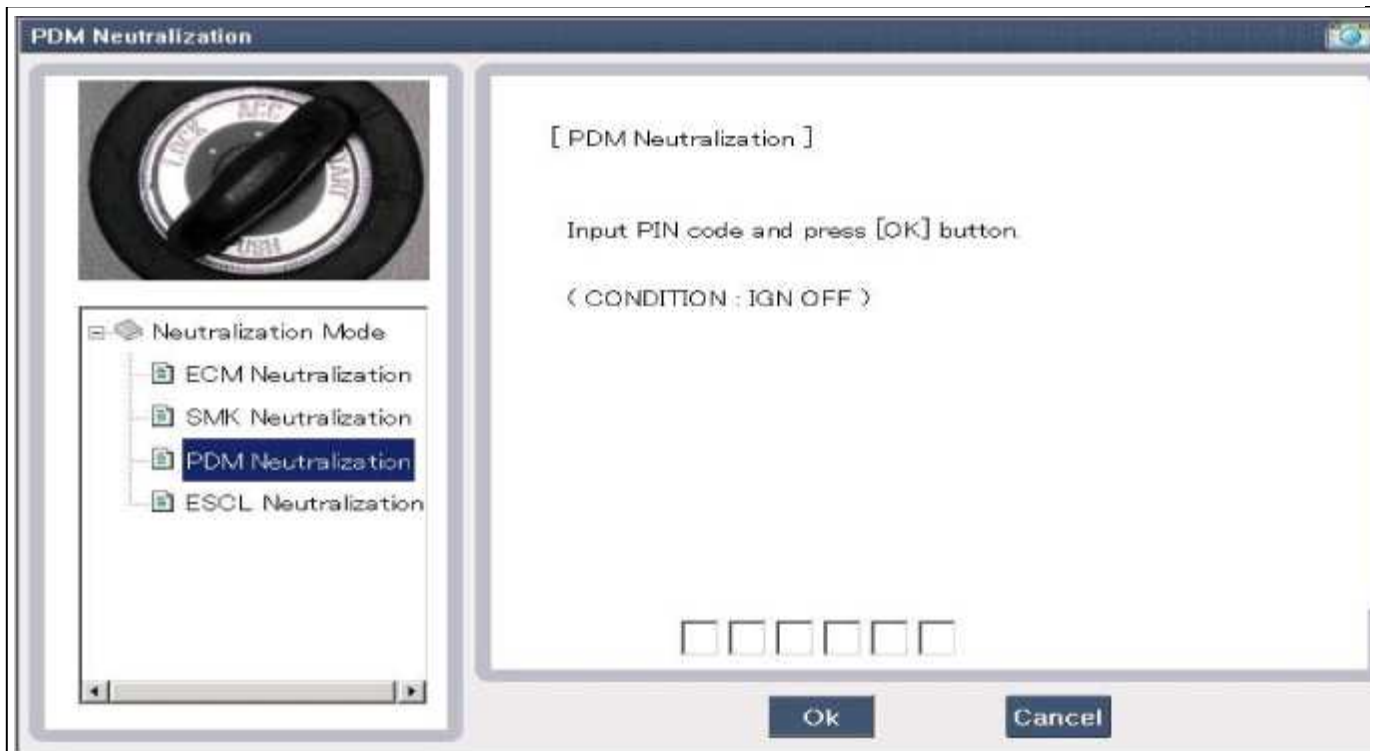
☐ Serial Communication Line Check

☐ Antenna Status Check











Input Switch List

No	Item name	Unit
1	SSB SW2	-
2	ACC	-
3	IGN1	-
4	Gear 'P' Position	-
5	Brake SW	-
6	FL Door Lock Button	-
7	FR Door Lock Button	-
8	Trunk Lid SW	-
9	Battery Voltage	-
10	Alternator Voltage	-
11	KEY out Indicator Lamp	-
12	Immobilizer Lamp	-
13	External Buzzer	-
14	ESCL Enable	-

Actuator List

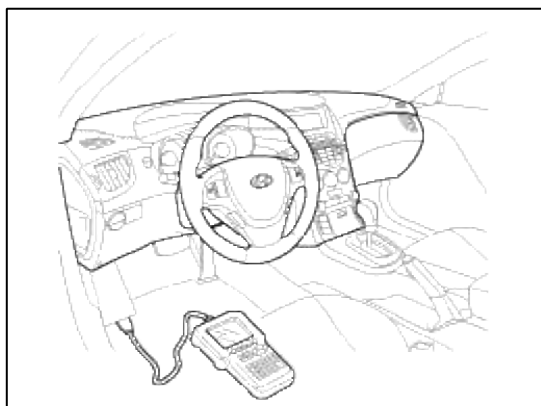
No.	Item name	Condition
1	KEY out Indicator Lamp	Ignition switch ON Engine off
2	Immo.indicator Lamp	Ignition switch ON Engine off
3	External Buzzer	Ignition switch ON Engine off
4	Interior Antenna 1 Active	Ignition switch ON Engine off
5	Interior Antenna 2 Active	Ignition switch ON Engine off
6	Interior Antenna 3 Active	Ignition switch ON Engine off
7	Bumper/trunk Antenna Active	Ignition switch ON Engine off
8	DRV_DR Antenna Active	Ignition switch ON Engine off
9	AST_DR Antenna Active	Ignition switch ON Engine off

Body Electrical System > Smart key System > Smart key > Repair procedures

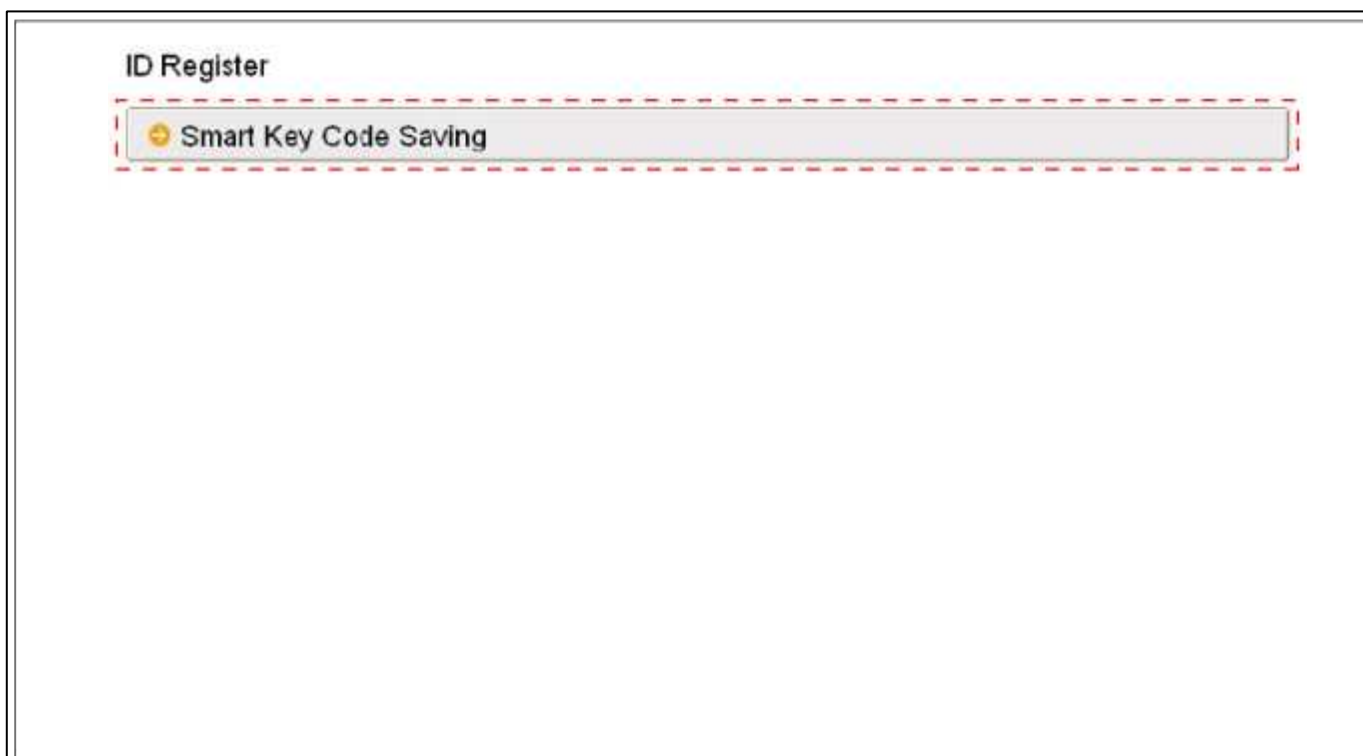
Smart Key

Smart Key Code Saving

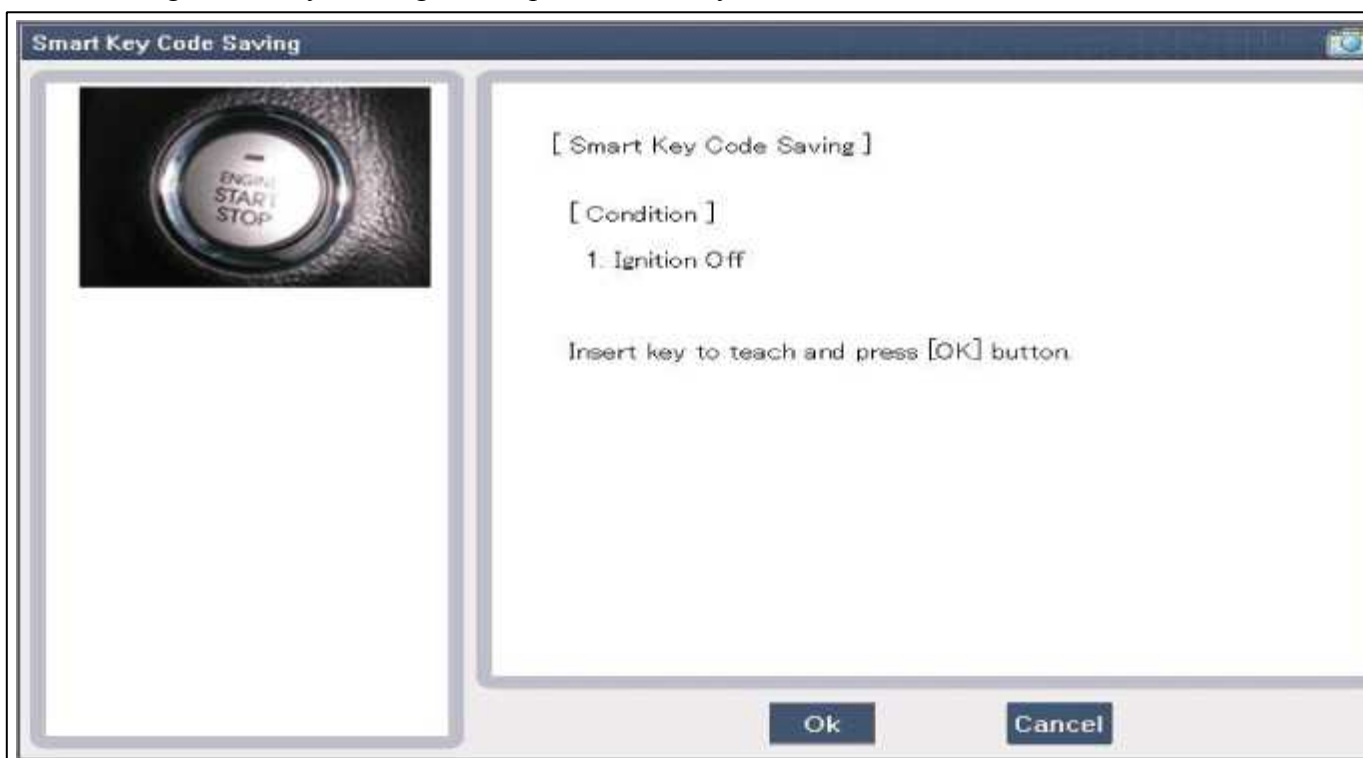
1. Connect the DLC cable of scan tool to the data link connector (16 pins) in driver side crash pad lower panel, turn the power on scan tool.



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

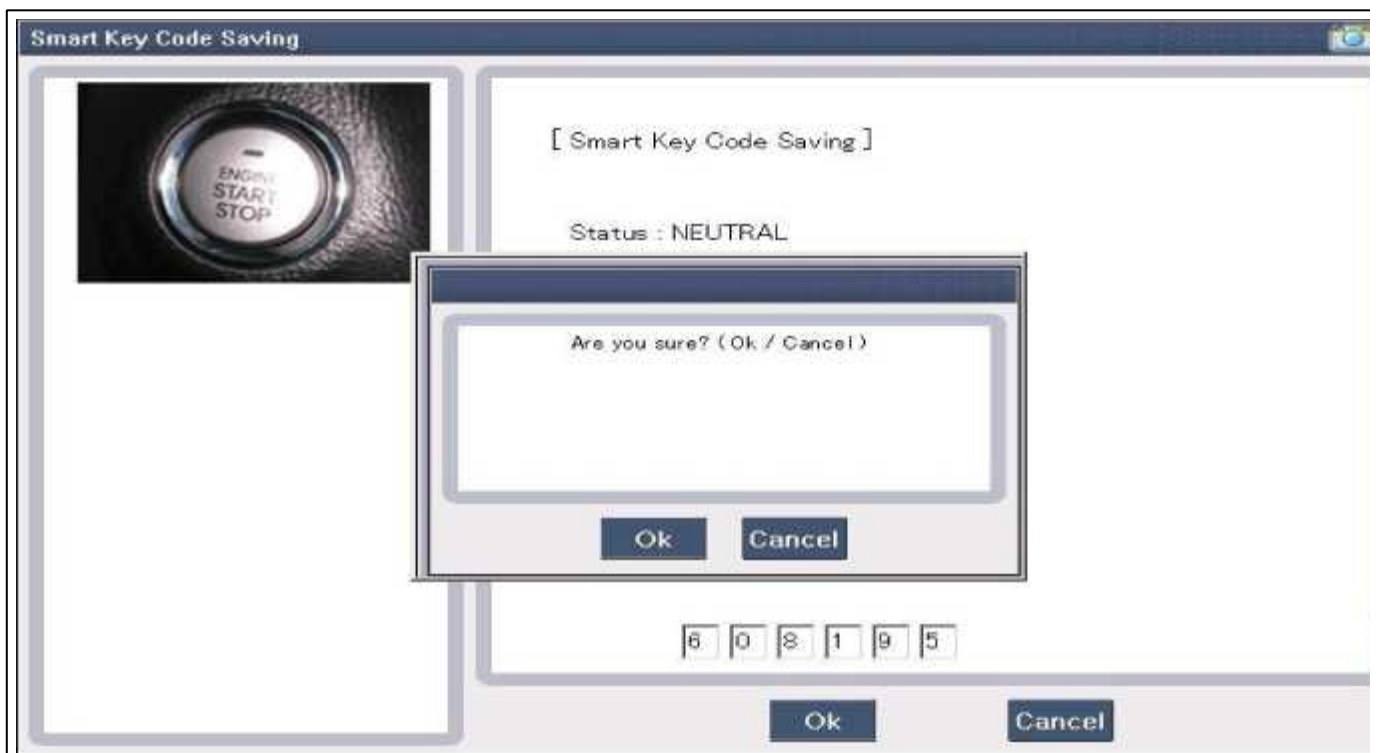
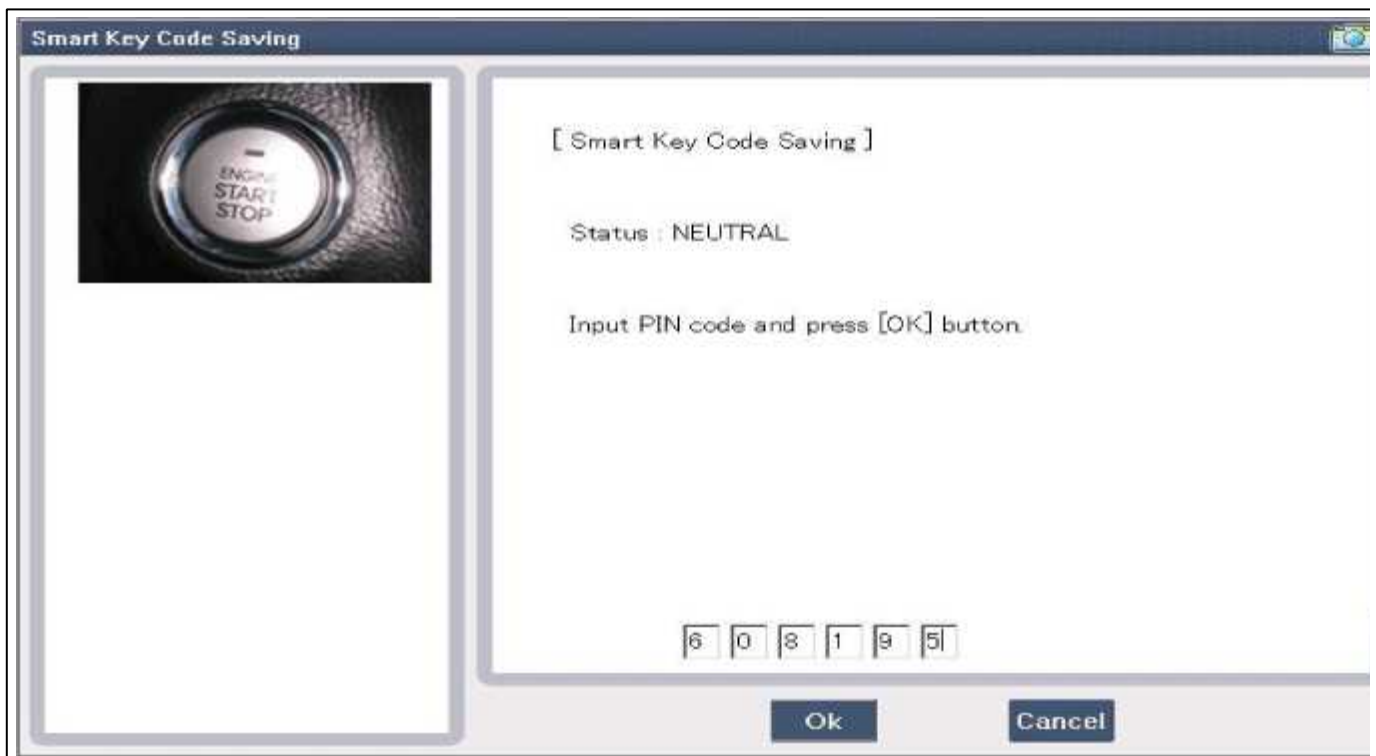


3. After selecting "Smart key teaching" menu, push "Enter" key, then the screen will be shown as below.

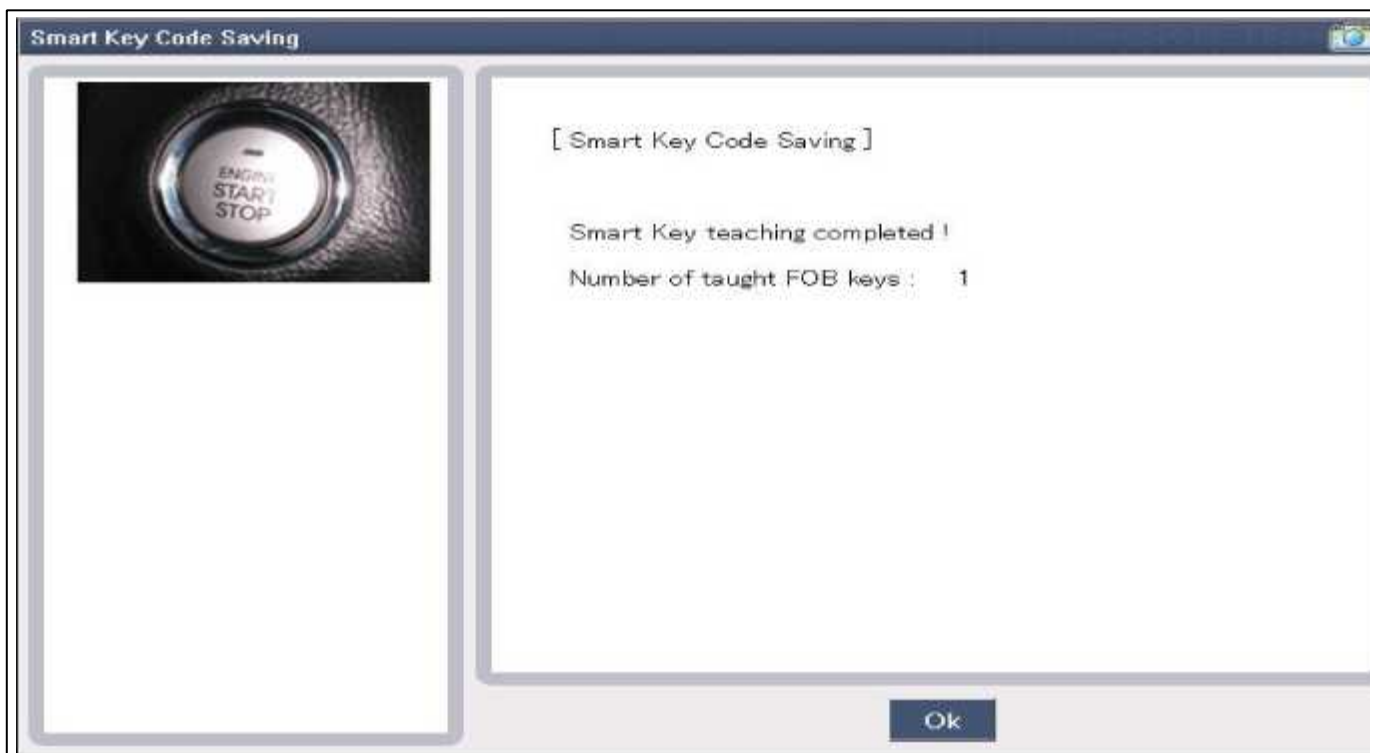
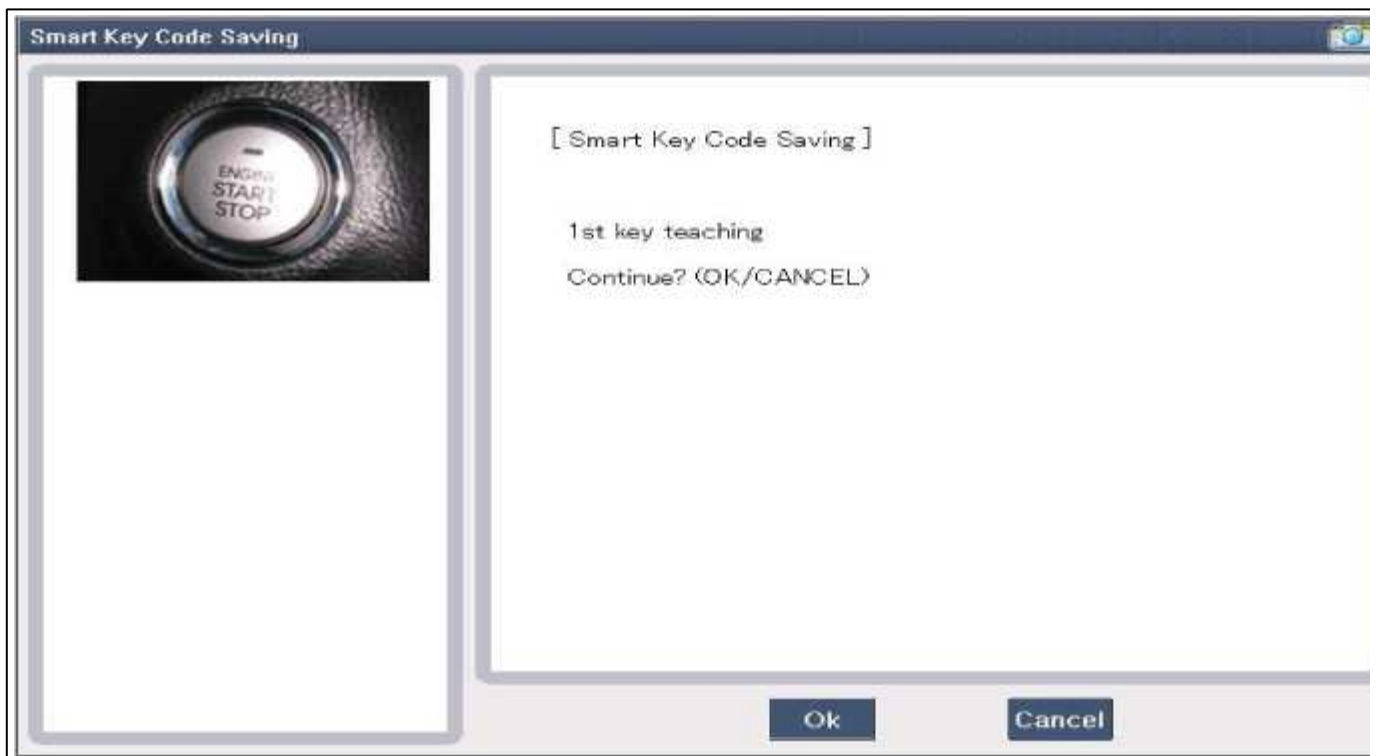


4. After inserting the teaching key, push "ENTER" key.

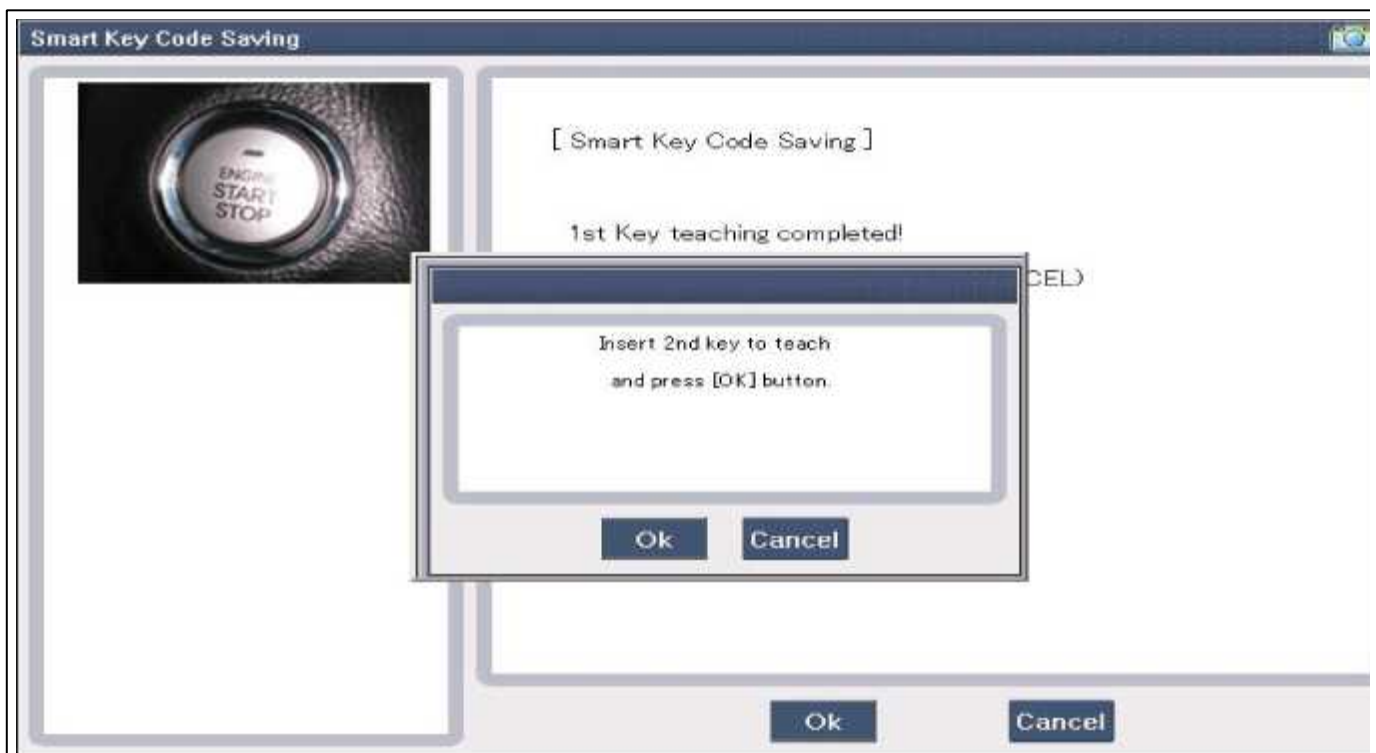
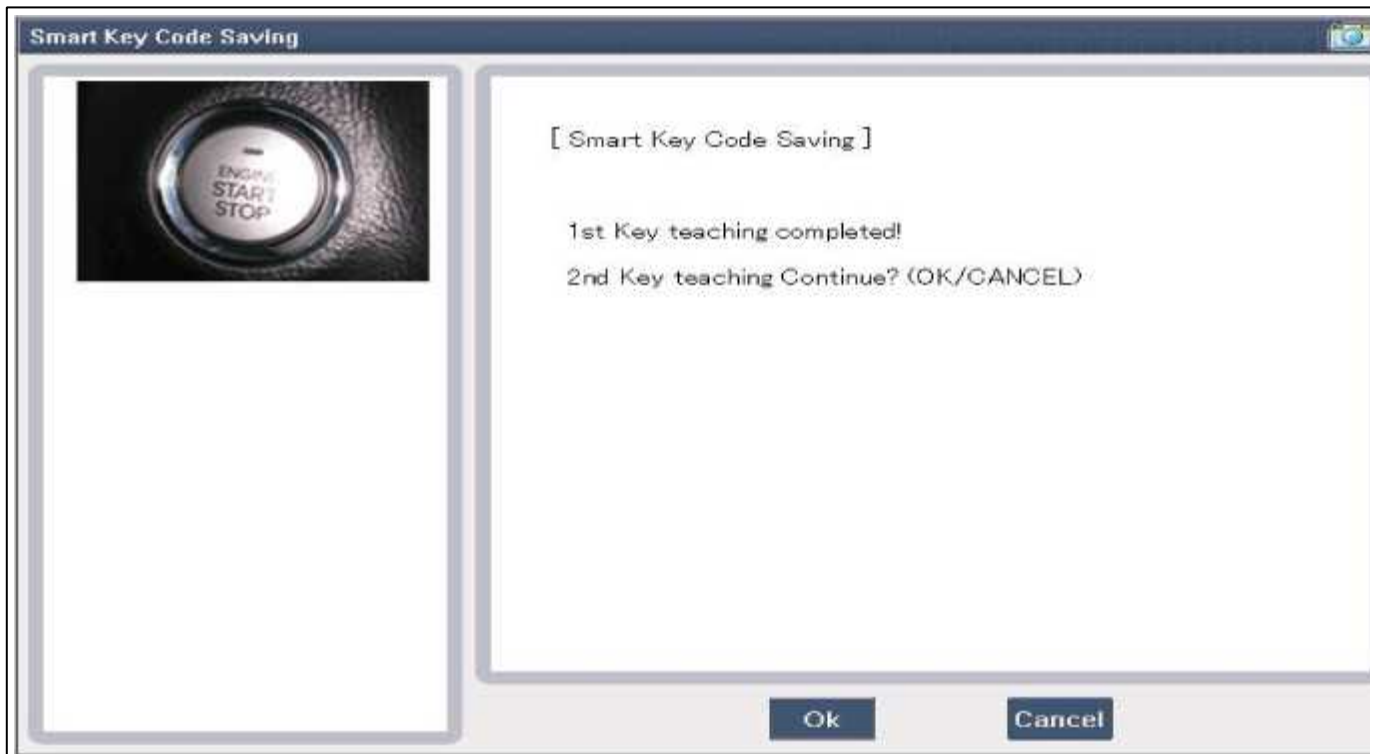
5. Input the "Pin code" for first key teaching.



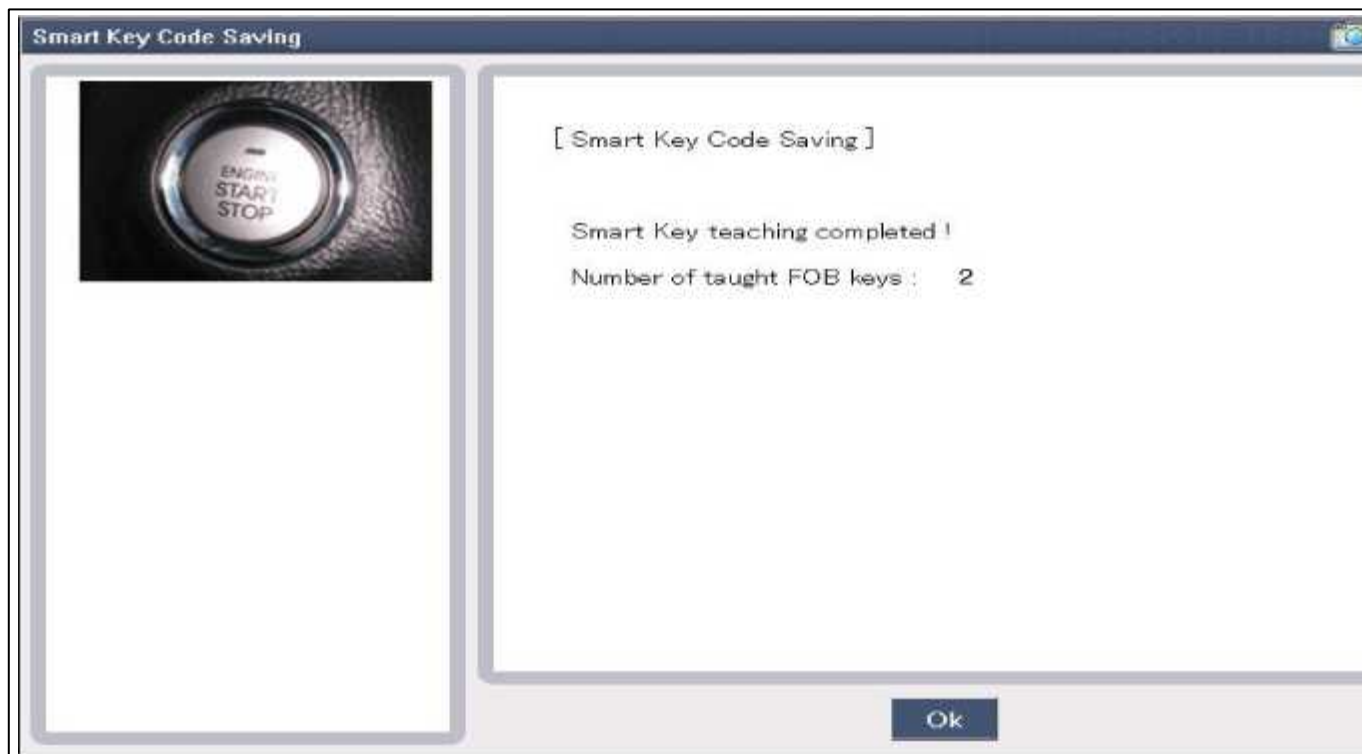
6. Confirm the message "First key teaching completed".



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



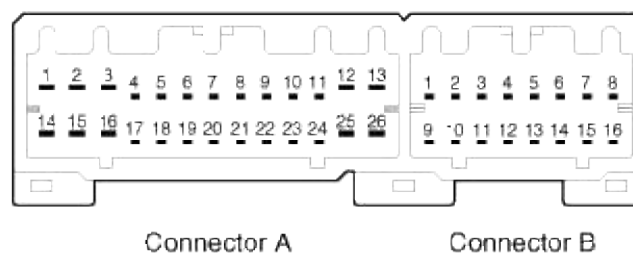
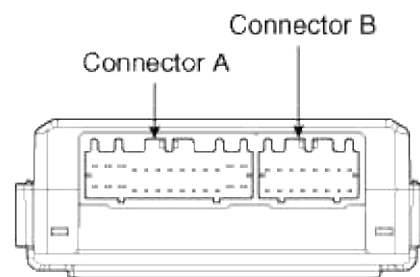
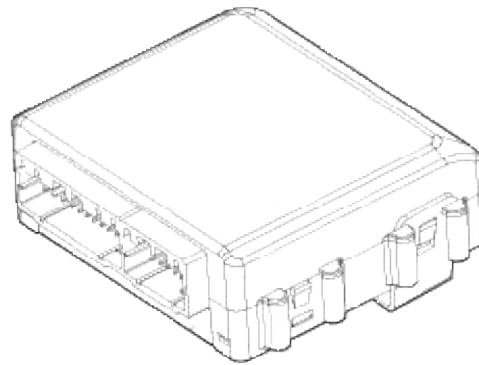
8. Confirm the message "Second key teaching completed".



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

Body Electrical System > Smart key System > Smart key unit > Components and Components Location

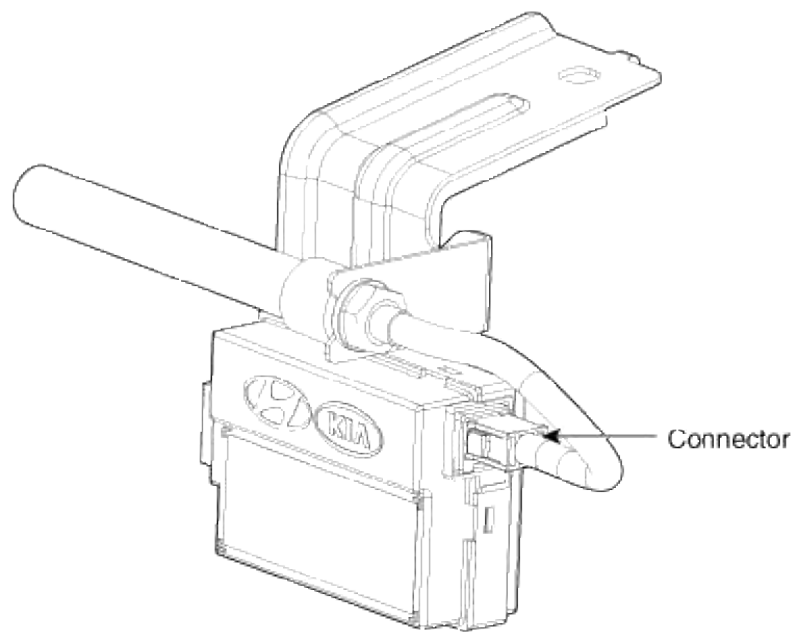
Component (1)

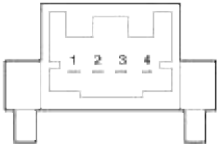


Connector Pin Information

Pin	Connector A	Pin	Connector B
1	Battery	1	Interior 2 antenna 2
2	Immobilizer Indicator	2	Interior 1 antenna 2
3	GND 1	3	-
4	-	4	-
5	Trunk lid	5	Trunk antenna 1
6	Front left door lock / unlock	6	Bumper antenna 1
7	External buzzer	7	Front right side antenna 1
8	-	8	Front left side antenna 1
9	ACC	9	Interior 2 antenna 1
10	CAN high	10	Interior 1 antenna 1
11	CAN low	11	-
12	ESCL Communication	12	-
13	RF Communication	13	Trunk antenna 2
14	IGN 1	14	Bumper antenna 2
15	P position	15	Front right side antenna 2
16	GND 2	16	Front left side antenna 2
17	-		
18	ESCL Enable		
19	-		
20	Front right door lock / unlock		
21	-		
22	Diagnosis		
23	SSB switch		
24	Brake		
25	EMS COM		
26	-		

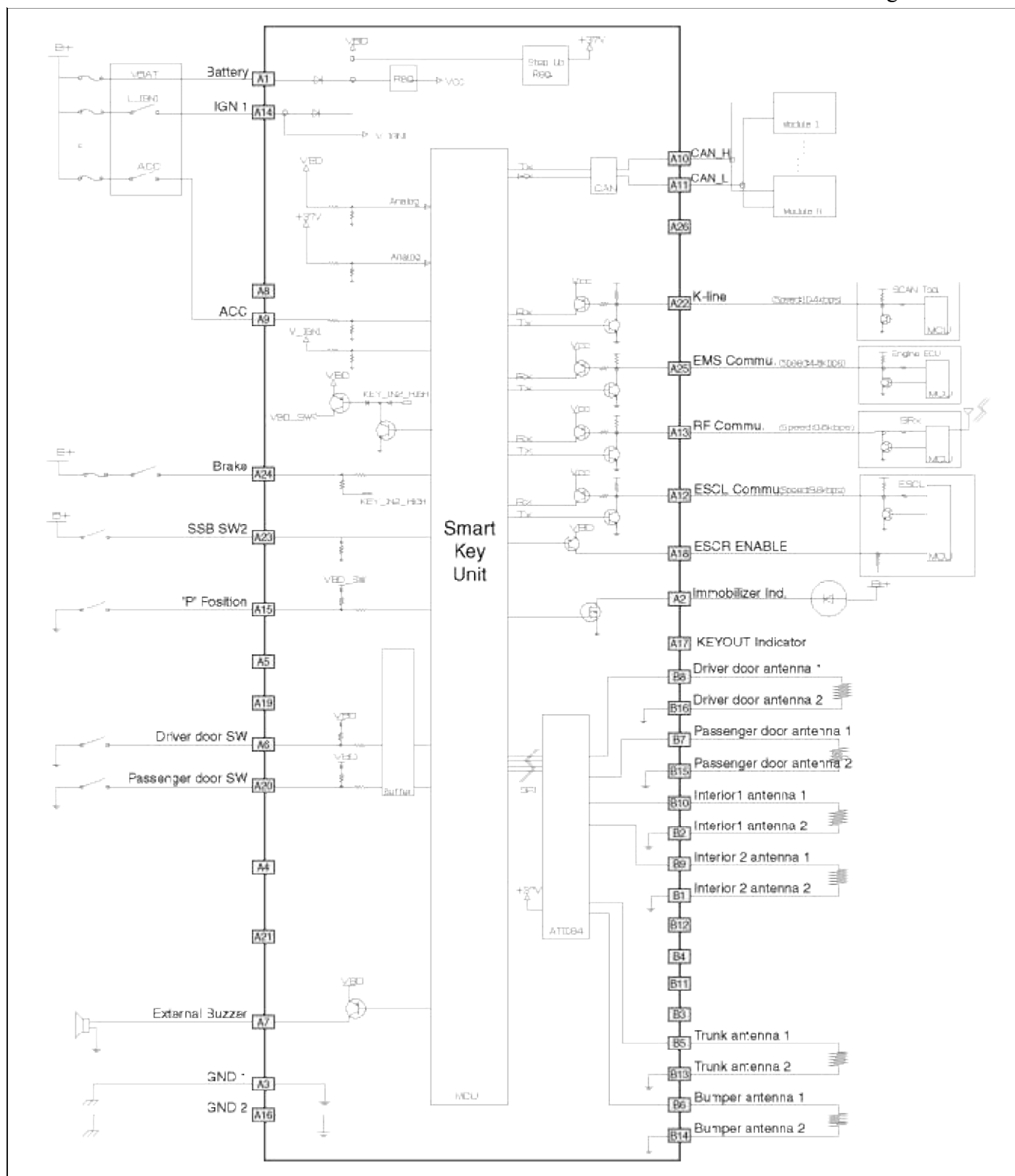
Component (2)



	No.	Name
	1	Data
	2	-
	3	Power
	4	Ground

Body Electrical System > Smart key System > Smart key unit > Schematic Diagrams

Circuit Diagram



Body Electrical System > Smart key System > Smart key unit > Repair procedures

Inspection

Smart Key Unit

- Refer to the BE group - inspection / self diagnosis with scan tool.

Smart Key Switch

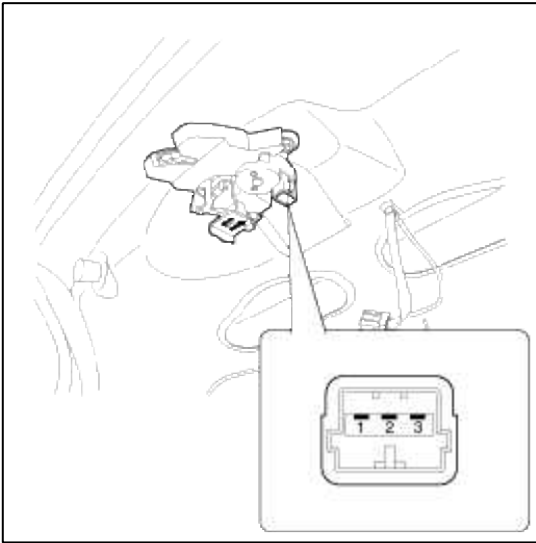
- Refer to the BE group - inspection / self diagnosis with scan tool.

Antenna

- Refer to the BE group - inspection / self diagnosis with scan tool.

Trunk Lid Open Switch

1. Remove the trunk trim.
(Refer to BD group - "Trunk trim")
2. Check for continuity between the Trunk actuator terminals.



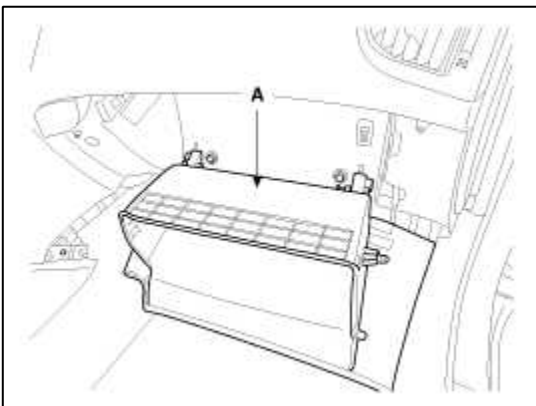
3. If continuity is not specified, inspect the switch

Terminal Position	1	3
Unlock		
Lock	○	○

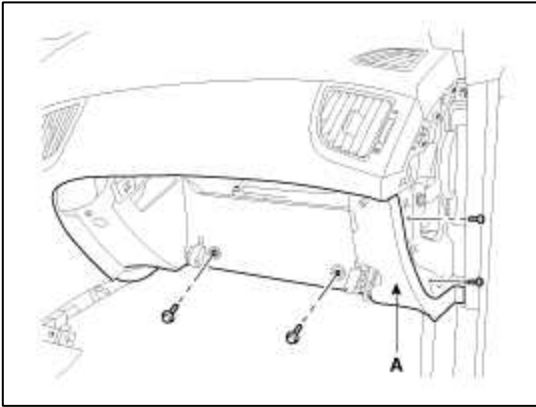
Removal

Smart key unit

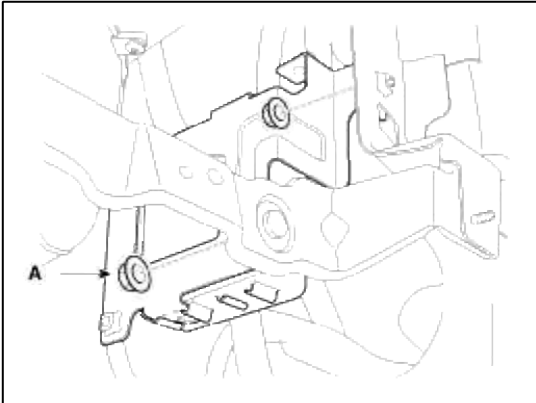
1. Disconnect the negative(-) battery terminal.
2. Remove the glove box (A).
(Refer to BD group - "Crash pad")



3. Remove the glove box housing (A) after loosening the mounting screws.

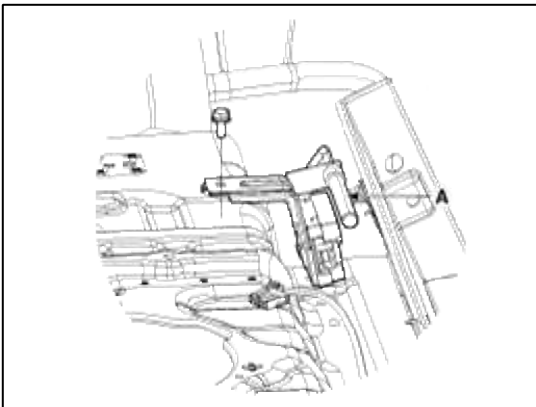


4. Loosen the nuts (2EA) from the smart key unit (A) after disconnecting the connector.



RF Receiver

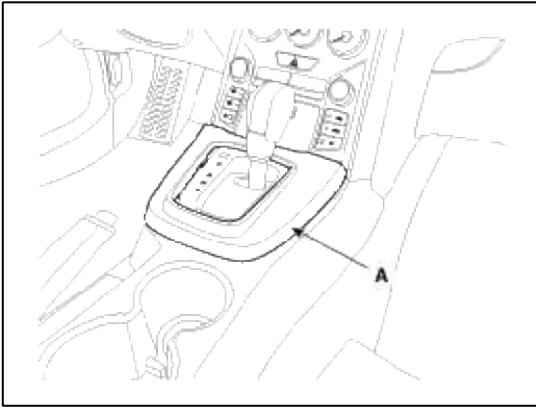
1. Disconnect the negative(-) battery terminal.
2. Remove the rear seat.
(Refer to BD group - "Rear Seat")
3. Remove the package tray trim.
(Refer to BD group - "Rear Seat")
4. Disconnect the connector after loosening the RF receiver (A) bolt (1EA).



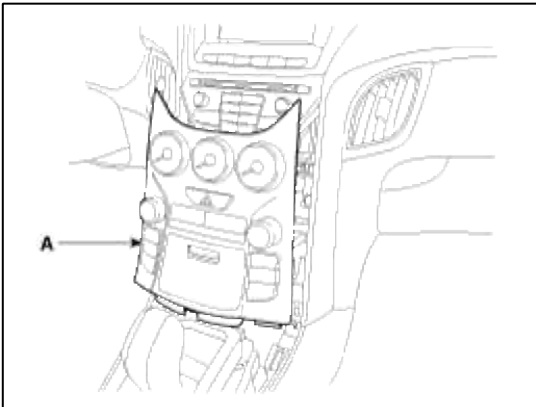
Interior 1 Antenna

1. Disconnect the negative(-) battery terminal.

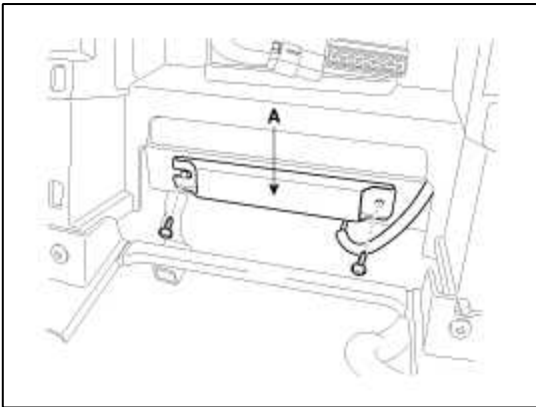
2. Remove the console upper cover (A).
(Refer to BD group - "Console")



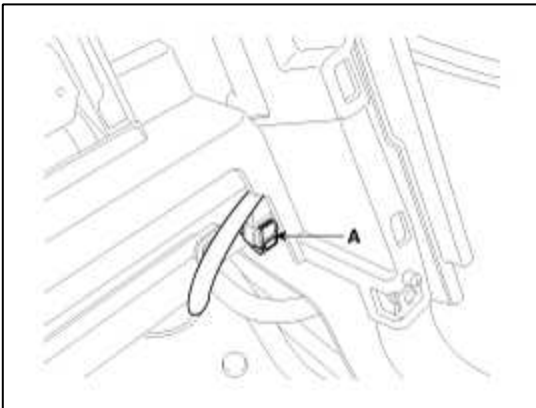
3. Remove the center fascia lower panel (A).
(Refer to BD group - "Crash pad")



4. Loosen the interior 1 antenna (A) screws (2EA) located in front of the console.



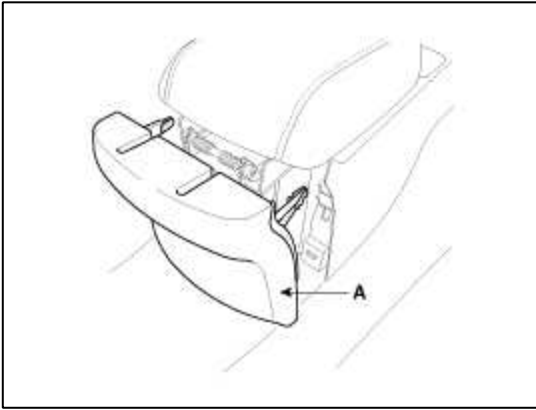
5. Remove the interior 1 antenna (A) after disconnect the connector.



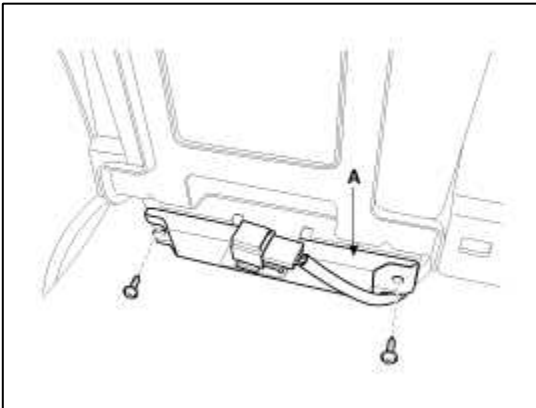
Interior 2 Antenna

1. Disconnect the negative(-) battery terminal.

2. Remove the console rear cover (A).
(Refer to BD group - "Console")

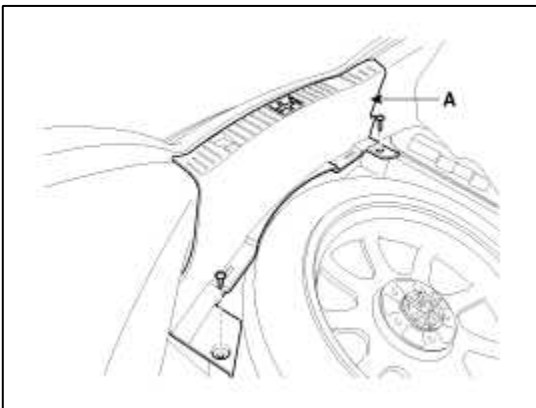


3. Disconnect the interior 2 antenna connector located at the console rear side, then remove the interior 2 antenna (A) after loosening screws (2EA).

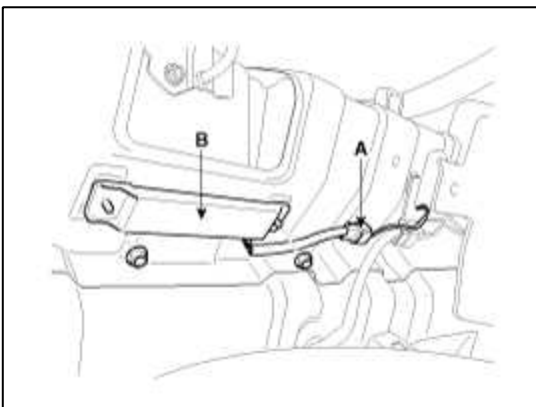


Interior 3 Antenna

1. Disconnect the negative(-) battery terminal.
2. Remove the trunk panel (A) after loosening the mounting screws.

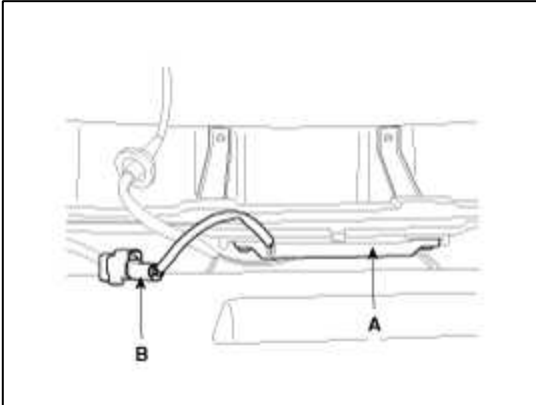


3. Disconnect the interior 2 antenna connector (A) and remove the interior 3 antenna (B) after loosening nut (2EA).



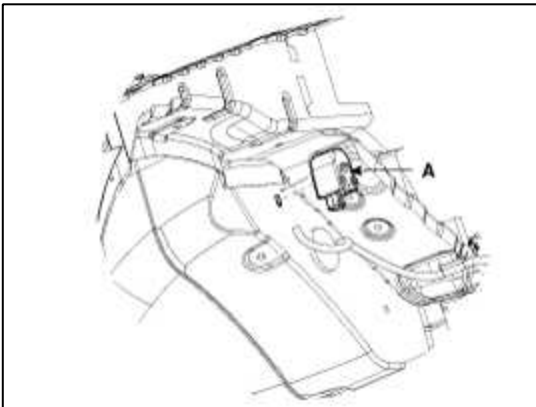
Exterior Bumper Antenna

1. Disconnect the negative(-) battery terminal.
2. Remove the rear bumper.
(Refer to BD group - "Rear bumper")
3. Disconnect the antenna connector (B) and remove the exterior bumper antenna (A) after loosening the nuts (2EA).



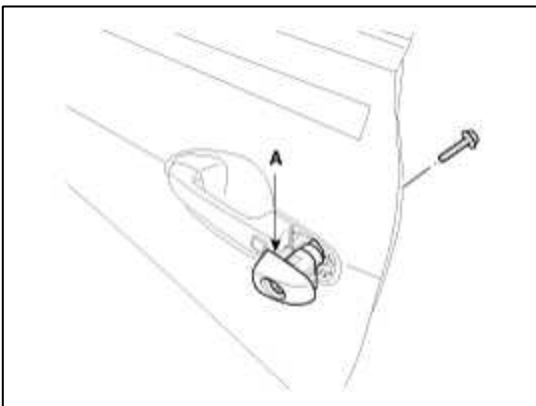
Buzzer

1. Disconnect the negative(-) battery terminal.
2. Remove the left side fender.
(Refer to BD group - "Fender")
3. Remove the external buzzer (A).

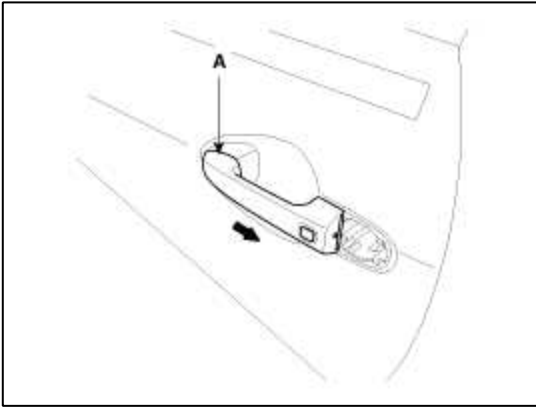


Door Outside Handle

1. Disconnect the negative (-) battery terminal.
2. Disconnect the connector after removing the door trim.
(Refer to the Body group - "Front door")
3. After loosening the mounting bolt, then remove the key holder (A).



4. Remove the outside handle (A) by sliding it rearward.



Installation

Smart Key Unit

1. Install the smart key unit.
2. Install the smart key unit mounting nut and connector.
3. Install the glove box housing.
4. Install the glove box.
5. Install the negative (-) battery terminal and check the smart key system.

RF Receiver

1. Install the RF receiver.
2. Install the glove box housing.
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.
2. Install the center fascia lower panel.
3. Install the console upper cover.
4. Install the negative (-) battery terminal and check the smart key system.

Interior 2 Antenna

1. Install the interior 2 antenna.
2. Install the console rear cover after connecting the connector.
3. Install the negative (-) battery terminal and check the smart key system.

Interior 3 Antenna

1. Install the interior 3 antenna.
2. Install the trunk panel.
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

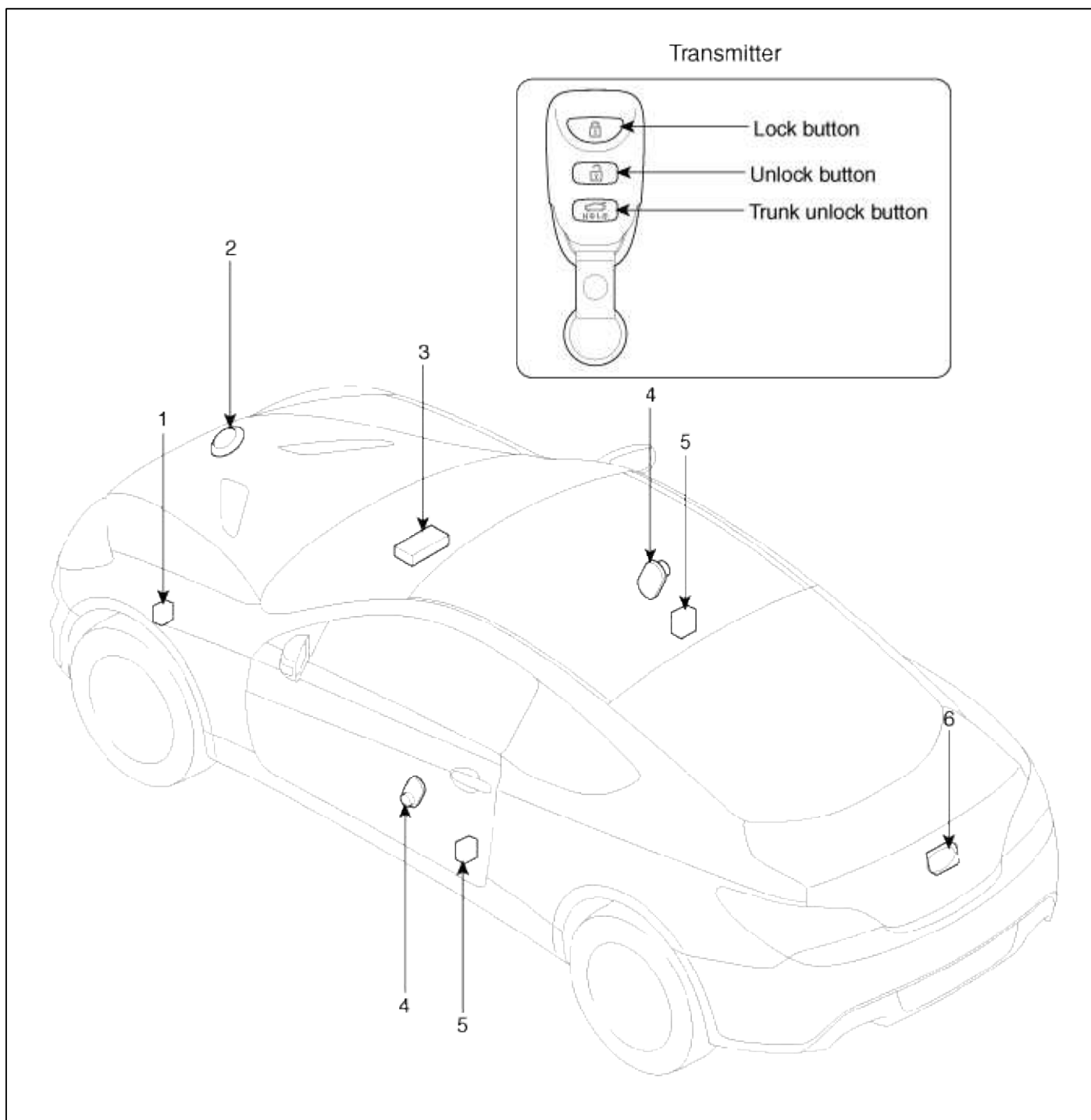
1. Install the buzzer.
2. Install the left side fender.
3. Install the negative (-) battery terminal and check the smart key system.

Door Outside Handle

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

Body Electrical System > Keyless Entry And Burglar Alarm > Components and Components Location

Component Location



- | | |
|------------------------------|--------------------------------------|
| 1. Hood switch | 4. Front door switch |
| 2. Horn | 5. Front door lock actuator & switch |
| 3. Body Control Module (BCM) | 6. Trunk lid lock actuator |

Body Electrical System > Keyless Entry And Burglar Alarm > Description and Operation

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 the following things below occurs:

- A door is forced open.
- A door is unlocked without using the transmitter.
- 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 immediately.

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

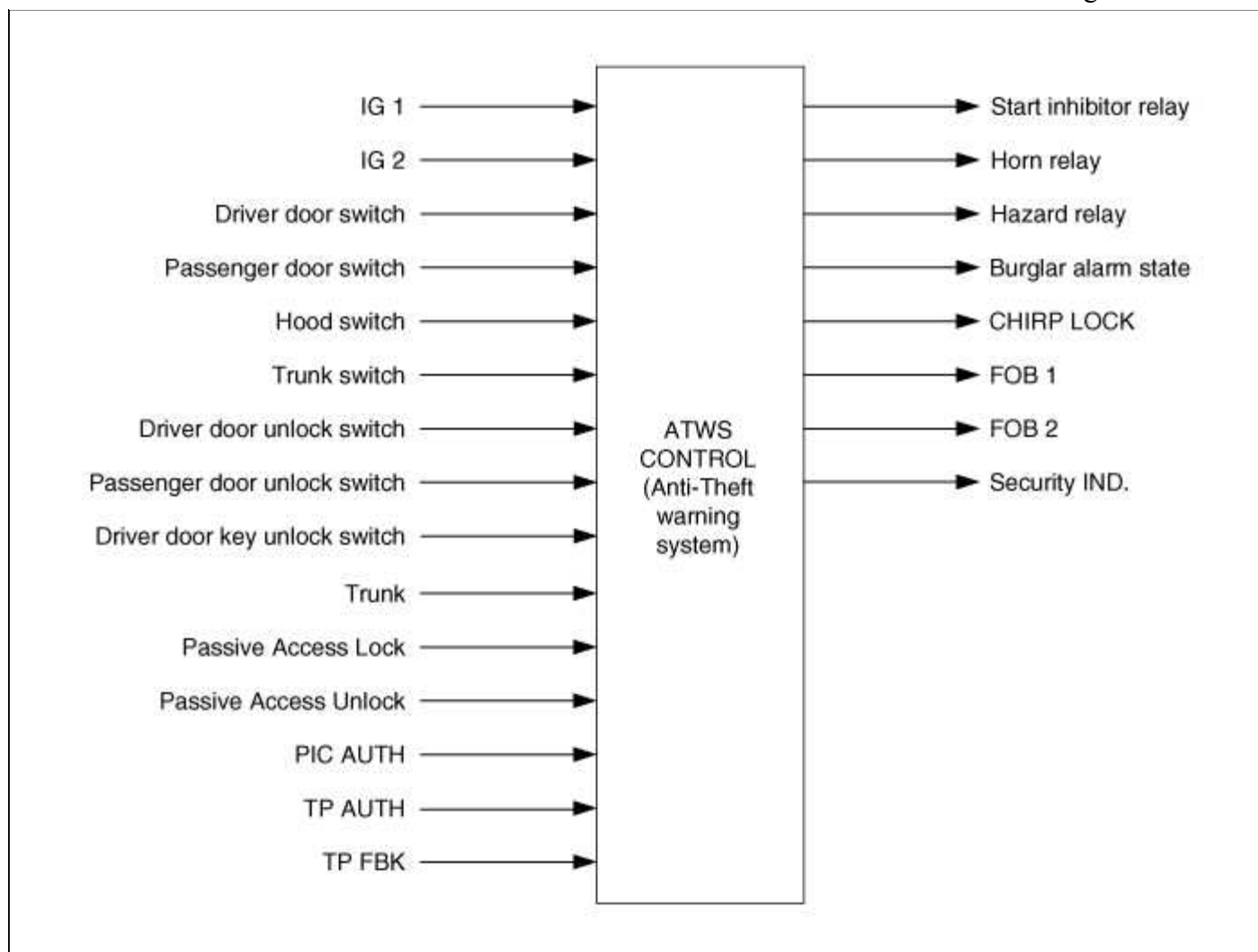
The burglar alarm system is integrated with the keyless entry system. The keyless entry system allows you to lock and unlock the vehicle with the remote transmitter. When you push the LOCK button, all doors lock. When you push the UNLOCK button all doors unlock.

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



Transmitter(TX) Spec

1. Transmission Distance : 30m or more from outside of the car
2. Registration procedure of the transmitter
 - (1) In registration mode, it shall be possible to register up to Max 4EA.
 - (2) At re-registration, data are registered newly after deleting the previous TX DATA

No.	Saved CODE	CODE to change	Changed CODE
1	A	C	C (A is deleted)
2	A, B, C, D	E	E (A, B, C, D is deleted)
3	A, B	C, D, E	C, D
4	A, B	C, C, D	C

- (3) For the registration procedures by using GDS, refer to "TRANSMITTER CODE REGISTRATION".

3. Transmitter signal & Receiver Spec

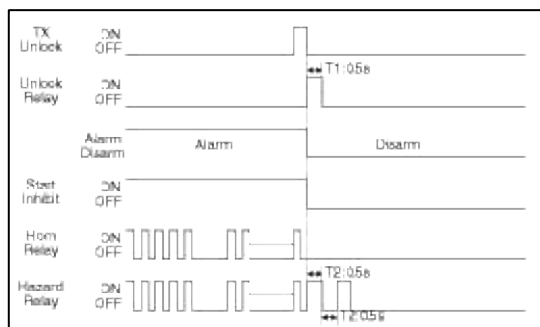
- (1) Transmission signal
 - A. Transmit relevant transmission DATA (Transmission frame) twice by pushing TX SW.
 - B. Only LOCK signal is output when pushing TX LOCK SW and UNLOCK SW at the same time.

Functions

1. Disarm

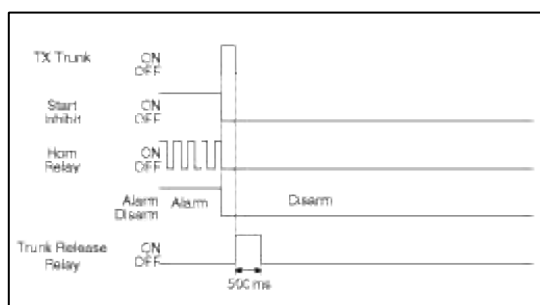
Condition 1

State	Description
Initial Condition	ALARM
Event	- IGN KEY ON during 30sec or ALT”L”=on during 3 sec.
	NON SMK(Smart key) - Any door open&TX UNLOCK - TX TRUNK-TX Lock & Lock confirm Failed
	SMK : - Any door open & RKE CMD=UNLOCK/Passive Access Unlock=1 - RKE_TRUNK=1-TP(Transponder)AUTH=1 / PIC AUTH=1 / TP FBK=X2 (X:Don't care) - RKE CMD=LOCK/Passive Access Lock=1 & Lock confirm Failed
	Mechanical Key OPTION Enable: - Mechanical UNLOCK - Mechanical LOCK&Lock confirm Failed
Action	The state goes to DISARM state - Horn Relay, Hazard Relay, Start Inhibit Relay OFF - TX Unlock →Unlock Relay on for 0.5 sec →Hazard Relay on (twice)



T1 : 0.5s

T2 : 0.5s +/-0.1s

**Condition 2**

State	Description
Initial Condition	DISARMstate & (IGN KEY OUT) & Any Door open
Event	NON SMK : - Any door open & TX UNLOCK
	SMK : - Any door open & RKE CMD=UNLOCK / Passive Access Unlock=1 / RKE TRUNK=1 / Trunk reopen=1 - TP AUTH=1 / PIC AUTH=1 / TP FBK=X2 (X:Don't care)
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 : TP AUTH=1 / PIC AUTH=1 / TP FBK=X2
	Mechanical Key OPTION Enable: M UNLOCK
Action	The state goes to DISARM state - M-unlock →Hazard relay for 0.5 sec. ON/OFF(twice)

Condition 4

State	Description
Initial Condition	AUTOLOCK TIMER1 STATE
Event	- Any door open or Hood Switche 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 - TP AUTH=1 / PIC AUTH=1 / TP FBK=X2
	Mechanical Key option Enable: - Mechanical LOCK & Lock confirmation failure
Action	The state goes to DISARM state

Condition 5

State	Description
Initial Condition	AUTOLOCK TIMER2 STATE
Event	<ul style="list-style-type: none"> - 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
	NON SMK : <ul style="list-style-type: none"> - TX LOCK& Lock confirmation failure
	SMK : <ul style="list-style-type: none"> - RKE CMD=LOCK/ Passive Access Lock=1& Lock confirmation failure - TP AUTH=1/ PIC AUTH=1 / TP FBK=X2
	Mechanical Key option Enable: Mechanical LOCK & Lock confirmation failure
Action	The state goes to DISARM state

Condition 6

State	Description
Initial Condition	ARMSTATE
Event	EXCEPT CHINA SPEC: <ul style="list-style-type: none"> - IGN KEY ON
	SMK : <ul style="list-style-type: none"> - TP AUTH=1 / PIC AUTH=1 / TP FBK=X2
	Mechanical Key option Enable: <ul style="list-style-type: none"> - Mechanical UNLOCK
Action	The state goes to DISARM state <ul style="list-style-type: none"> - M-unlock →Hazard relay for 0.5 sec. ON/OFF(twice)

Condition 7

State	Description
Initial Condition	REARM state
Event	Execpt china spec: - IGN KEY ON during 30sec or ALT "L"=on during 3 sec.
	NON SMK : - TX LOCK & Lock confirmation failure - TX TRUNK
	SMK : - TP AUTH=1 / PIC AUTH=1 / TP FBK=X2 - RKE CMD=LOCK / PassiveAccess Lock=1 & Lock confirmation failure - RKE TRUNK=1 / Trunk reopen=1
	Mechanical Key option Enable: - Mechanical UNLOCK - Hazard relay for 0.5 sec. ON/OFF(twice) - Mechanical LOCK & Lock confirmation failure
Action	The state goes to DISARM state Start Inhibit Relay 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
	NON SMK: - Any door open & TX UNLOCK
	SMK : - TP AUTH=1 / PIC AUTH=1 / TP FBK=X2 - Any door open & C RKE CMD=UNLOCK/ Passive Access Unlock=1
	Mechanical Key option Enable : - MECHANICAL UNLOCK
Action	The state goes to DISARMECHANICAL state - Hazard Relay for 0.5s ON/OFF(twice)

Condition 9

State	Description
Initial Condition	ARMHOLD
	- IGN KEY ON
	SMK : - TP AUTH=1 / PIC AUTH=1 / TP FBK=X2
	Mechanical Key option Enable: - MECHANICAL UNLOCK
Action	The state goes to DISAR state - M-unlock →Hazard relay for 0.5 sec. ON/OFF(twice)

2. Arm

Condition 1

State	Description
Initial Condition	ARM state
Event	NON SMK : - TX LOCK
	SMK: - RKE CMD=LOCK / Passive Access Lock=1
Action	No state change HazardRly 1Time on(1sec)

Condition 2

State	Description
Initial Condition	ARM WAIT state
Event	- Afte ARM WAIT TIMER finished
Action	The state goes to ARM state

Condition 3

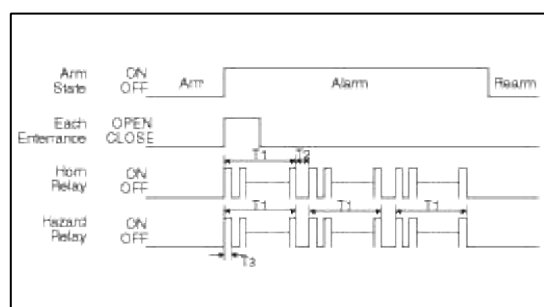
State	Description
Initial Condition	ARMHOLD state
Event	Trunk close for at least Trunk Release Time Out(default 30sec) in ARMWAIT state
Action	The state goes to ARM state

3. Alarm

Condition 1

State	Description
Initial Condition	ARM state
Event	Any door open or Hood Switch open or Trunk Switch open China spec ; Key In Switch ON or IG1 ON or IG2 ON Fob in (SMK Spec.)
Action	The state goes to ALARM state - Engine Start Inhibit is ON - GEN, M/E, CHINA AREA : The horn is ON one time for 27sec(± 2 sec) - The hazard is driven also (During Horn driving)

Non-middle East Area

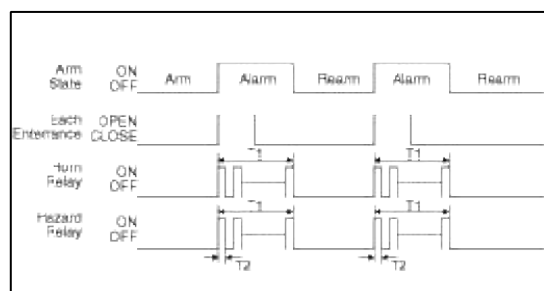


T1 : 27s(± 2 sec),

T2 : 10s(± 2 sec),

T3 : 0.5s ± 0.1 sec

Middle East, GEN/EC, CHINA-Area



T1 : 27s ± 2 sec

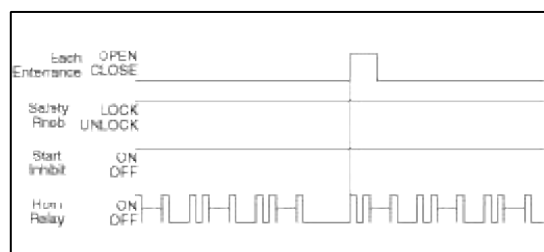
T2 : 0.5s ± 0.1 sec

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 GEN, M/E, CHINA AREA : The horn is ON one time for 27sec(± 2 sec) 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 GEN, M/E, CHINA AREA : The horn is ON one time for 27sec(± 2 sec) The hazard is driven also (During Horn driving).



4. Arm Wait Mode

Condition 1

State	Description
Initial Condition	ARMWAIT state
Event	NON SMK : - TX LOCK 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: - RKE CMD=LOCK / Passive Access Lock=1 & locked confirmed Mechanical Key option Enable: - MECHANICAL LOCK & locked confirmed - DOOR LOCK state : Any door open → All door closed
Action	- The state goes to ARMWAIT State - Start ARMWAITTIMER - 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 : - RKE CMD=LOCK / Passive Access Lock=1 & locked confirmed
	Mechanical Key option Enable: - MECHANICAL LOCK & locked confirmed
Action	<ul style="list-style-type: none"> - The state goes to ARMWAIT State - Horn Relay, Start Inhibit Relay = OFF - Hazard Relay 1Time on(1sec) (MECHANICAL LOCK : Except) - Start ARMWAIT TIMER

Condition 4

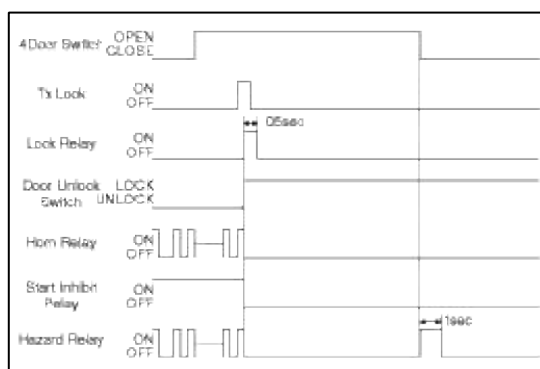
State	Description
Initial Condition	AUTOLOCK TIMER1 state
Event	AUTOLOCK & locked confirmed
	NON SMK: - Tx Lock & locked confirmed
	SMK: - RKE CMD=LOCK / Passive Access Lock=1 & locked confirmed
	Mechanical Key option Enable: MECHANICAL LOCK & locked confirmed
Action	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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: - MECHANICAL LOCK & locked confirmed
Action	<ul style="list-style-type: none"> - The state goes to ARMWAIT State - Hazard Relay 1Time on(1sec) (MECHANICAL LOCK : Except) - Start Inhibit Relay OFF - Start ARMWAIT TIMER



5. Rearm Mode

Condition 1

State	Description
Initial Condition	ALARM state
Event	All entrance is closed & ALARM Patten finished
Action	The state goes to REARM state

6. Autolocktimer1 Mode

Condition 1

State	Description
Initial Condition	ARM state
Event	NON SMK : TX UNLOCK
	SMK : RKE CMD=UNLOCK / Passive Access Unlock=1
Action	<ul style="list-style-type: none"> - 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
Action	No change state
	CASE1: AUTOLOCK TIMER1 Finished AUTOLOCK
	CASE2: TX UNLOCK, RKE CMD=UNLOCK, Passive Access Unlock=1 Hazard Relay Twice on(0.5s ON/0.5s OFF) Restart AUTOLOCK TIMER1

Condition 3

State	Description
Initial Condition	ARM WAIT state
Event	NON SMK :
	TX UNLOCK
	SMK: RKE CMD=UNLOCK / Passive Access Unlock=1
Action	<ul style="list-style-type: none"> - 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 & TRUNK) & IGN KEY OUT
Event	NON SMK:
	TX UNLOCK
	SMK: RKE CMD=UNLOCK/ Passive Access Unlock=1
Action	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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
Event	NON SMK: TX UNLOCK
	SMK: RKE CMD=UNLOCK/ Passive Access Unlock=1
Action	The state goes to AUTO LOCK TIMER1 state <ul style="list-style-type: none"> - Start AUTO LOCK TIMER1 - Hazard Relay Twice on(0.5s ON/0.5s OFF). - Start Inhibit Relay off

7. Autolocktimer2 Mode**Condition 1**

State	Description
Initial Condition	AUTO-LOCK TIMER2 state
Event	Finished AUTOLOCK TIMER2
	NON SMK: TX UNLOCK
	SMK: RKE CMD=UNLOCK/ Passive Access Unlock=1
Action	No change state
	CASE1: AUTOLOCK TIMER2 finished AUTOLOCK
	CASE2: TX UNLOCK, RKE CMD=UNLOCK, Passive Access Unlock=1 <ul style="list-style-type: none"> - Start AUTO LOCK TIMER2 - Hazard Relay Twice on(0.5s ON/0.5s OFF).

Condition 2

State	Description
Initial Condition	DISARM state & IGN KEY OUT & (Trunk or Hood Switch OPEN) state
Event	NON SMK : TX UNLOCK
	SMK: RKE CMD=UNLOCK/ Passive Access Unlock=1
Action	<ul style="list-style-type: none"> - 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 3

State	Description
Initial Condition	ALARM state & All door closed & (Trunk or Hood Switch OPEN) state
Event	NON SMK: TX UNLOCK
	SMK: RKE CMD=UNLOCK / Passive Access Unlock=1
Action	<ul style="list-style-type: none"> - The state goes to AUTO LOCK TIMER2 state - 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 or Hood OPEN)state
Event	NON SMK: TX UNLOCK
	SMK: RKE CMD=UNLOCK / Passive Access Unlock=1
Action	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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

8. 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: MECHANICAL LOCK & locked confirmed
Action	The state goes to PREARM state

Condition 2

State	Description
Initial Condition	DISARM state & IGN KEY OUT
Event	NON SMK: - Any door open or Hood Switch OPEN or Trunk Switch OPEN state & locked confirmed
	SMK : - Any door open or Hood Switch OPEN or Trunk Switch OPEN state RKE CMD=LOCK / Passive Access Lock=1 & locked confirmed
	Mechanical Key option Enable: MECHANICAL 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 Switch OPEN or TrunkSwitch OPEN)
Event	NON SMK : TX LOCK & locked confirmed
	SMK : RKE CMD=LOCK/ Passive Access Lock=1 & locked confirmed
	Mechanical Key option Enable: MECHANICAL LOCK & locked confirmed
Action	The state goes to PREARM state Horn Relay, Hazard Relay, Start Inhibit 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: MECHANICAL 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 / Trunk reopen=1
Action	The state goes to PREARM state Start TRUNKTIMER TRUNK MARK = Set

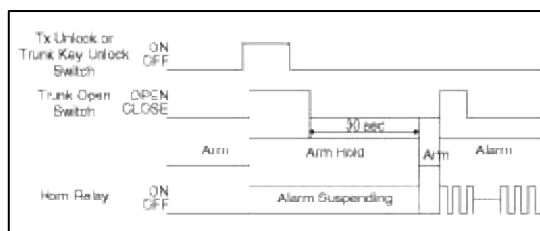
Condition 6

State	Description
Initial Condition	PREARM state
Event	Trunk Switch OPEN TRUNKTIMER expired (Trunk Release Time Out: 30s)
Action	No state change CASE Trunk Switch OPEN : <ul style="list-style-type: none"> • Stop to TRUNKTIMER. • TRUNK MARK = Clear CASE TRUNKTIMER expired <ul style="list-style-type: none"> • TRUNK MARK = Clear

9. Armhold Mode

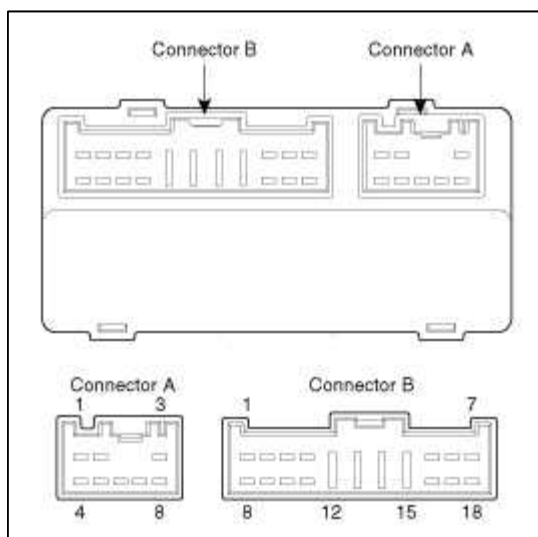
Condition 1

State	Description
Initial Condition	ARM state
Event	NON SMK: TX TRUNK SMK: RKE TRUNK=1 / Trunk reopen=1
Action	The state goes to ARMHOLD state



Body Electrical System > Keyless Entry And Burglar Alarm > Repair procedures

Inspection



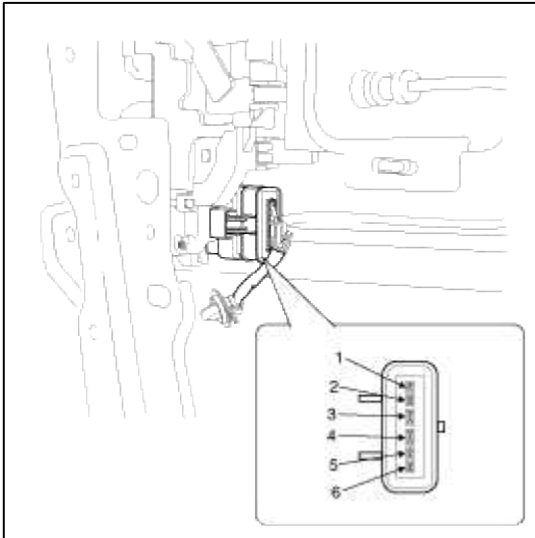
Burglar Alarm

Check for continuity between the terminals.

1. There should be no continuity between the No.11 and No.10 terminals when power and ground are connected to the No.11 and No.4 in the ICM relay B terminals.
2. There should be continuity between the No.11 and No.10 terminals when power is disconnected.

Front Door Lock Actuator Inspection

1. Remove the front door trim.
(Refer to the Body group - "Front door")
2. Remove the front door module.
3. Disconnect the 6P connector from the actuator.

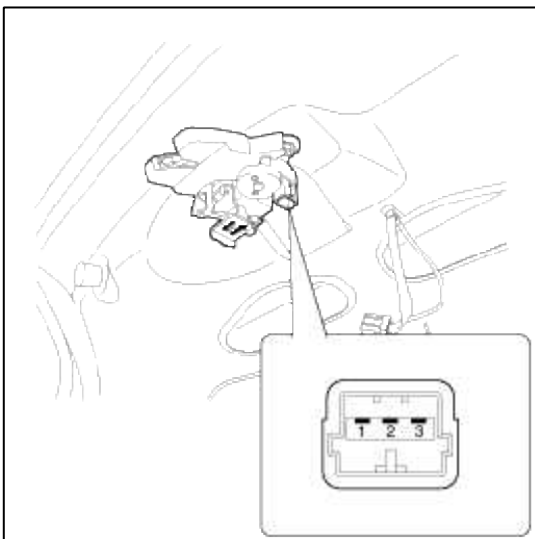


4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Terminal		4	3
Position	Lock	⊕	⊖
	Unlock	⊖	⊕
Front right	Lock	⊖	⊕
	Unlock	⊕	⊖

Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.
(Refer to the Body group - "Trunk lid")
2. Disconnect the 3P connector from the actuator.

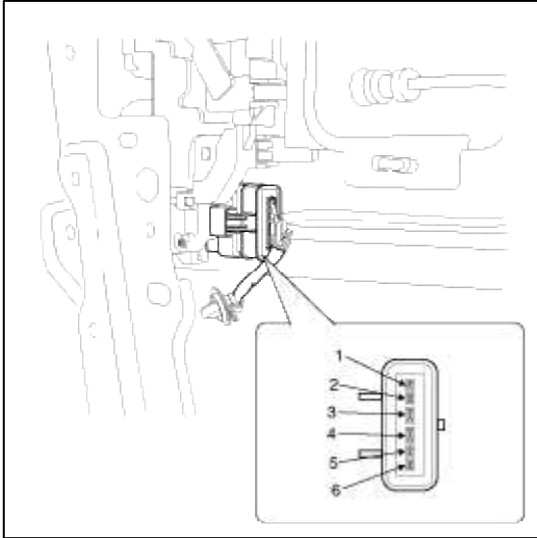


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Terminal	1	2
Position		
Lock release(Open)	⊖	⊕

Front Door Lock Switch Inspection

1. Remove the front door trim panel.
(Refer to the Body group - "Front door")
2. Remove the front door module.
3. Disconnect the 6P connector from the actuator.

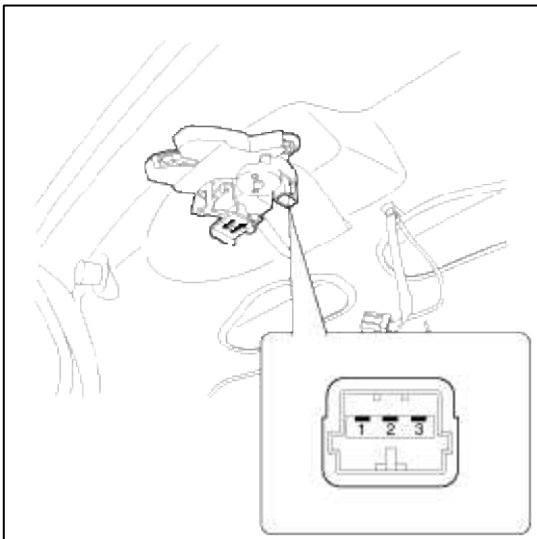


4. Check for continuity between the terminals in each switch position according to the table.

Position	Terminal	5	6	1	2
Front left	Lock				
	Unlock	○	○		
Front right	Lock				
	Unlock			○	○

Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim.
(Refer to the Body group - "Trunk lid")
2. Disconnect the 3P connector from the actuator.

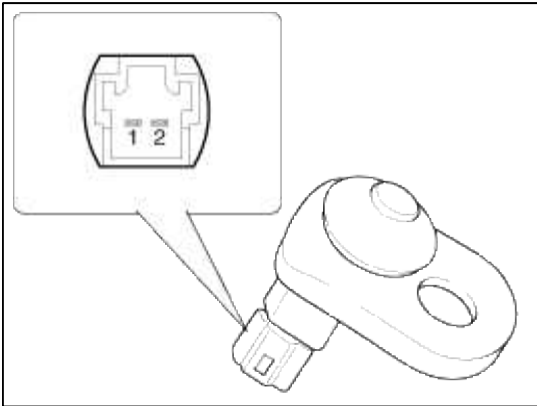


3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	1	3
Lock release(Open)		

Door Switch Inspection

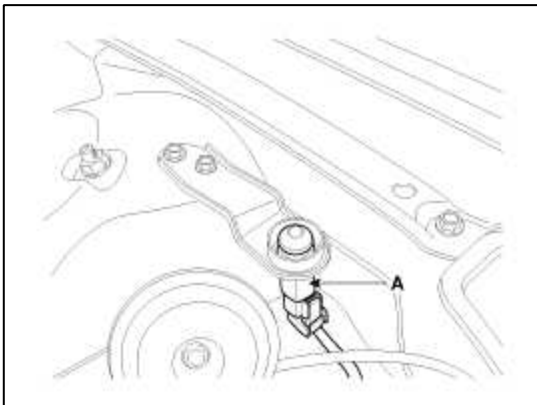
Remove the door switch and check for continuity between the terminals.



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

Hood Switch Inspection

1. Disconnect the 1P connector from the hood switch(A).



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

Position \ Terminal	2	1
Hood open (Free)		
Hood close (Push)		

Body Electrical System > Keyless Entry And Burglar Alarm > Transmitter > Specifications

Specifications

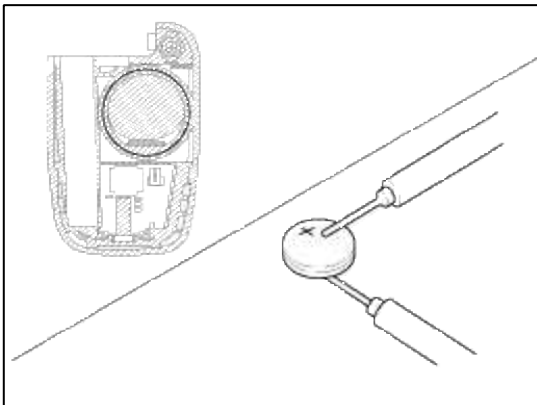
Items	Specifications
Keyless entry transmitter Power source	Lithium 3V battery (1EA, CR2032)
Transmissible distance	10m or more
Life of battery	2 years or more (at 20 times per day)
Button	Door lock Door unlock Trunk lid open Panic
Transmission frequency	315 MHz

Body Electrical System > Keyless Entry And Burglar Alarm > Transmitter > Repair procedures

Inspection

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

Standard voltage : 3V



3. Replace the transmitter battery with a new one, if voltage is below 3V then try to lock and unlock the doors with the transmitter by pressing the lock or unlock button five or six times.
4. 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.
5. If the doors lock and unlock, the transmitter is O.K, but if the doors don't lock and unlock, replace the transmitter.

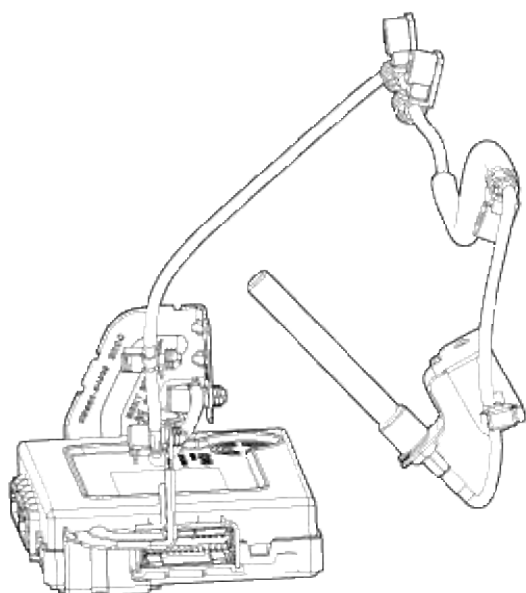
Body Electrical System > BCM (Body Control Module) > Body Control Module (BCM) > Specifications

Specifications

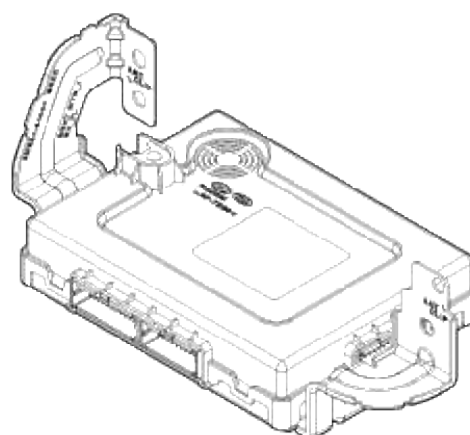
Items	Specifications
Rated voltage	DC 12V
Operating voltage	DC 9 ~ 16V
Operating temperature	-22°F~167°F(-30°C~75°C)
Insulation resistance	100MΩ or more
Dark current	Less than 3mA (SMK : 5.5mA)

Body Electrical System > BCM (Body Control Module) > Body Control Module (BCM) > Components and Components Location

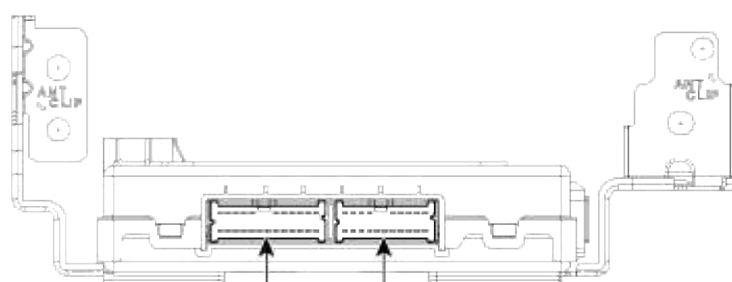
Component



[RKE]

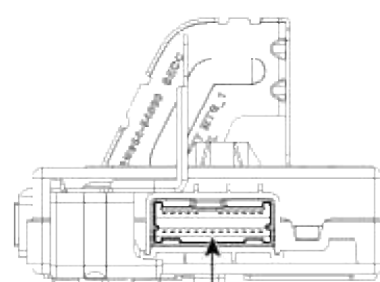


[SMK]

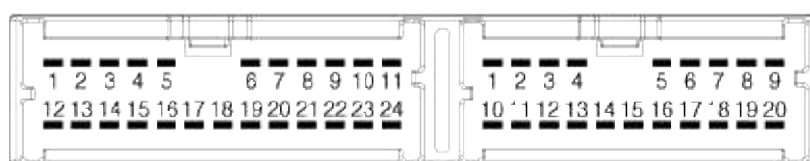


Connector A

Connector B

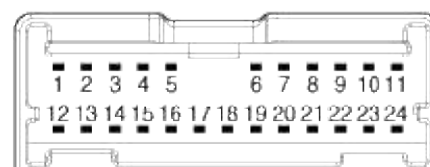


Connector C



Connector A

Connector B



Connector C

Body Electrical System > BCM (Body Control Module) > Body Control Module (BCM) > Schematic Diagrams

BCM Connector Terminals

Function	Input/Output	Connector No	Description	Active	ON/OFF vlotage level
	B+	A1	Supply power to BCM	Power	Operating Voltage 9V ~

			DCM1		16V
Power	POWER_GND	A24	Ground	GND	
	SIGNAL_GND	A11	Ground	GND	
	V_AutoLightPWR	B8	Auto light sensor power	Power	
	AutoLight_GND	B20	Auto light sensor ground	GND	
Analog Input	A_IGN1	A12	Ignition1 voltage signal input	High	7V above/4V below
	A_IGN2	A2	Ignition2 voltage signal input	High	7V above/4V below
	A_ACC	A13	Accessory voltage signal input	High	7.8V above/7.1V below
	A_WiperIntVolume	B16	Wiper intermittent volume input	AD	
	A_AutoLightSnsr	B9	Auto light sensor signal input	AD	
Logic	L_BreakSW	A14	Break switch signal input	High	7V above/4V below
	L_WasherSW	A4	Front Washer switch signal input	High	7V above/4V below
	L_MistSW	A15	Mist switch signal input	High	7V above/4V below
	L_WiperIntSW	A5	Front Intermittent switch signal input	High	7V above/4V below
	L_KeyInSW	A18	Key In switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_PASSW	A6	PAS ON/OFF switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_PASOpt	A7	PAS Option switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_HeadLampLowSW	A9	Head Lamp Low switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_SideABGOpt	A17	Side Air Bag Option switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_TailSW	A19	Tail Lamp switch signal input	Low	2V below/OPEN (Reference:6V above)

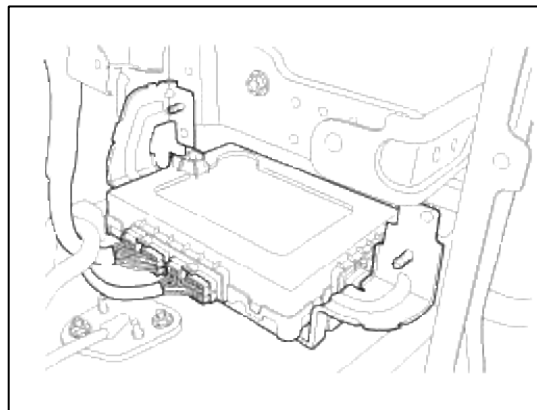
Logic Input	L_HazardSW	A20	Hazard switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_AutoLightSW	A21	Auto Light switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_HeadLampHISW	A22	Head Lamp High Lamp switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_RearFogSW	B1	Rear Fog Lamp switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_TurnSigRHSW	B2	Turn Signal Right switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_DefoggerSW	B3	Defogger switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_KeyInterLockSW	B4	Key Interlock switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_FrontFogSW	B10	Front Fog Lamp switch signal input	Low	2V below/OPEN (Reference:6V above)
	L_TurnSigLHSW	B11	Turn Signal Left switch signal input	Low	2V below/OPEN (Reference:6V above)
PWM Input	P_CrashInput	A8	Crash Input signal	PWM	
	P_MTSRx	B17	MTX Rx Input signal	PWM	
Communication	S_DiagK	A10	Diagnostic Communication line K for Tester	Data	
	CAN_H	B5	Can network communication line (high)	Data	
	CAN_L	B6	Can network communication line (low)	Data	
	LIN_PASData	B7	LIN network communication line	Data	
	O_SafetyPWECU	C5	Safety Power Window ECU output	Low	
	O_HeadLampLowSig	C6	Head Lamp Low signal output	Low	

Output	O_AV_TAIL	C7	Navi wakeup signal output	Low	
	O_KeyHoleILL	C8	Key Hole Illumination output	Low	
	O_ATMSOL	C10	ATM Solenoid Relay output	Low	
	O_KeySol	C11	Key Interlock Solenoid Relay output	Low	
	O_WiperRly	C16	Wiper Relay output	Low	
	O_HeadLampWasher	C17	Head Lamp Washer Relay output	Low	
	O_RearFogRly	C19	Rear Fog Relay output	Low	
	O_MTS_Tx(O_NaviWakeUp)	C21	MTS signal output (Navi Wake UO Signal Output)	Low	
	O_SecurityIND	C22	Security Indicator Relay output	Low	
	O_RoomLamp	C23	Room Lamp output		
	O_TURNSIGFRLH	C1	Turn signal front left signal output	High	
	O_TURNSIGFRRH	C2	Turn signal front right signal output	High	
	O_TURNSIGRRLH	C3	Turn signal rear left signal output	High	
	O_TURNSIGRRRH	C4	Turn signal rear right signal output	High	
	O_PASIND	C9	Turn signal front left signal output	High	
Power	V_Turn	C12	Turn signal IPS power		
		C13			

Body Electrical System > BCM (Body Control Module) > Body Control Module (BCM) > Description and Operation

Description

Body control module (A) receives various input switch signals controlling time and alarm functions for the intermittent wiper timer, washer timer, rear defogger timer, seat belts warning, central door lock, ignition key reminder, power window, door warning, tail lamp, crash door unlock, ignition key hole illumination, rear fog lamp control and keyless entry & burglar alarm.



Function

1. Wiper & Washer Control

(1) Front Washer Interlocking Wiper Control

If washer switch (WasherSW) is ON at the status of IGN2 ON, Wiper turn ON. If washer switch is OFF, wiper turn ON for 2.5~3.8 seconds and then turn OFF.

(2) Front Wiper Intermittent Control

If front wiper INT switch is ON at the status of IGN2 ON, wiper turn ON according to INT volume.

(3) Front Wiper MIST Control

If front wiper MIST switch is ON at the status of IGN2 ON, wiper turn ON continually.

(4) Rear Washer Interlocking Rear Wiper Control

If rear washer switch is ON at the status of IGN2 ON, Wiper turn ON. If rear washer switch is OFF, rear wiper turn ON for 2.5~3.8 seconds and then turn OFF.

(5) Rear Wiper Control

If rear wiper switch is ON at the status of IGN2 ON, rear wiper turn ON continually.

(6) Rear Wiper Intermittent Control

If rear wiper INT switch is ON at the status of IGN2 ON, rear wiper turn ON according to INT volume.

2. Warning

(1) Seat Belt Reminder (Front)

IGN1 ON → Indicator ON for 6 sec → Indicator turn ON continually if the seat belt switch is OFF

IGN1 ON → Indicator ON for 7 sec → Indicator turn OFF if the seat belt switch is ON

If the vehicle speed is over 20km/h and seat belt switch is OFF, the warning sound ON and Indicator blink.

If the vehicle speed is over 20km/h and warning sound ON, the warning sound OFF after seat belt switch ON.

If the seat belt switch is ON, the warning sound OFF and Indicator turn OFF.

(2) Seat Belt Reminder (Rear)

IGN1 ON → Indicator turn ON when the seat belt switch is OFF

IGN1 ON → Indicator turn ON when the seat belt switch is OFF → ALT'L ON → Indicator turn OFF after 35 sec

In above situation, if the vehicle speed is over 9 km/h, indicator turn ON again for 35 sec

If the vehicle speed is over 25 km/h and rear seat belt is OFF, indicator warning ON.

(3) Parking Brake Start Warning

If the vehicle speed is over 10 km/h & parking brake switch ON & IGN ON, the parking brake warning sound is ON.

3. Rear defogger

- (1) If rear defogger switch turns ON after Alt L is ON while IGN1 is ON, turn the defogger relay output ON for 20min.
- (2) If rear defogger switch turns ON again while defogger relay output is ON, turn the defogger relay output OFF.
- (3) Also turn defogger output OFF in case of Alt L OFF or IGN1 OFF while the defogger relay output is ON.

4. Power Window Timer

- (1) Turn the safety and power window ECU output ON when turning IGN1 ON.
- (2) Turn safety power window ECU output OFF after keeping safety power window ECU output for 30sec when IGN1 is OFF.
- (3) Turn safety power window ECU OFF immediately when opening the driver door or assist door within the condition (2) above.

5. Exterior Lamp Control

(1) Tail Lamp Auto Cut

If the key out and driver door is opened while the key or ACC or IGN ON and tail lamp switch ON, turn the tail lamp relay OFF automatically.

When turning tail lamp switch ON again from OFF after the automatic blackout, the tail lamp relay will be turned ON and Tail Lamp Auto Cut function will be cancelled.

(2) Auto Light Control

If the value of Auto Light Signal is input value of LIGHT ON at the status of IGN1 ON and the auto light switch ON, turn the light ON in $2.5\text{sec} \pm 100\text{msec}$.

If the value of Auto Light Signal is LIGHT OFF and the auto light switch ON, turn the light OFF after 5sec.

(3) Front Fog Lamp control

Turn the front fog lamp ON when pressing the front fog lamp switch when IGN2 ON and Tail Lamp Relay turn ON.

(4) Head lamp low control

Turn the head lamp relay ON when turning the head lamp switch ON while IGN1 is ON.

(5) Escort

Turn the head lamp relay ON for 20 sec when turning the key OFF while the head lamp is ON.

The head lamp relay ON for 30 sec when opening the driver door while the head lamp is ON for 20 sec.

The head lamp relay OFF immediately when pressing the door lock button twice with RKE(or FOB) while the head lamp is ON.

(6) Static Bending Light

When the driver turn the steering wheel and IGN1 ON and head lamp ON, the static bending light turn ON.

The opposite side lamp is ON when the prohibit R is ON.

The static bending light turn ON for 2 min at least.

The static bending light turn ON according to the vehicle speed and steering wheel angle.

(7) Head Lamp Welcome Function

The head lamp low and tail lamp ON for 15 sec when pressing the door lock button twice with RKE(or FOB) while all doors are closed, locked, the key out and the head lamp switch (or auto light switch) is ON.

If the lock/unlock with RKE(or FOB) or IGN1 & head lamp switch (or auto light switch) OFF while head lamp low and tail lamp ON, the head lamp is OFF.

(8) Turn Signal Lamp Control

Turn the turn signal lamp ON when turning the turn signal lamp switch ON and IGN2 ON.

Triple turn signal operates when the turn signal switch OFF before signal lamp operating 3 times.

(9) Hazard Lamp Control

Turn the hazard lamp ON when turning the hazard lamp switch ON.

6. Interior Lamp Control

(1) Room Lamp Control

If 4 doors are closed & RKE(or FOB) unlocked or 4 doors are closed & KEY ON → OFF, turn the room lamp ON for 30 sec.

If IGN key OFF and door is opened, turn the room lamp ON for 20 min.

If IGN ON while the room lamp ON for 20 min, keep the room lamp ON.

If the door is closed while the room lamp ON for 20 min, keep the room lamp ON for 30 sec.

If the door is locked while the room lamp ON for 30 sec, the room lamp is decaying.

(2) Room Lamp Auto Cut

Room lamp turn ON when the ACC and IGN ON.

If ACC OFF, turn the room lamp ON for 20 min.

If vehicle enter the ARMWAIT, the room lamp ON for 3 sec and OFF.

7. Door Lock/unlock Control

(1) Central Reminder

Turn the central door unlock ON when the lock inputted while the key OUT and door is opened.

(2) IGN Key Reminder

Turn the door unlock relay output ON when the knob is locked while the key IN and driver (or assist) door is opened.

(3) Passive Reminder

Turn the central door unlock ON when receiving the passive unlock signal.

(4) Crash Door Unlock

Keep the central unlock output for 5 sec when receiving the crash signal while the key IN or ACC ON or IGN ON.

Crash door unlock function has priority to LOCK/UNLOCK control by other functions

(5) Auto Door Lock By Vehicle Speed Change

All door lock signal is output if vehicle speed is 15km/h when the IGN1 ON and Alt L ON.

(6) Auto Door Lock By Shift Lever Change

All door lock signal is output if shift lever is changed from P to R/N/D position while the IGN1 ON and all doors are closed.

(7) Auto Door Unlock By Key In Condition

All door unlock signal is output if the IGN KEY IN→OUT while the door knob is locked.

(8) Auto Door Unlock By Shift Lever Change

All door unlock signal is output if shift lever is changed from R/N/D to P position while the IGN1 ON and all doors are closed.

(9) AVN Wakeup Function

AVN wakeup signal is output if door unlock signal is inputted by RKE(or FOB) while the KEY OFF.

(10) Tailgate Release

Tailgate release relay is ON if tailgate open switch is ON while all door unlocked.

8. Anti-theft

(1) If all door is locked with RKE(or FOB) and knob is locked while all door lock and key out, the vehicle enter the ARMWAIT for 30 sec.

(2) The vehicle enter the ARM after 30 sec from ARMWAIT mode.

(3) If the door or hood or tailgate is opened in ARM mode, the alarm is ON for 27sec.

9. Head Lamp Washer Function

- (1) If the front wiper and washer switch ON, the head lamp washer operates.
- (2) Head lamp washer operates for 1.5 sec and it need the 15 min for next operation.

10. One Touch Triple Turn Signal

Triple turn signal operates when the turn signal switch OFF before signal lamp operating 3 times.

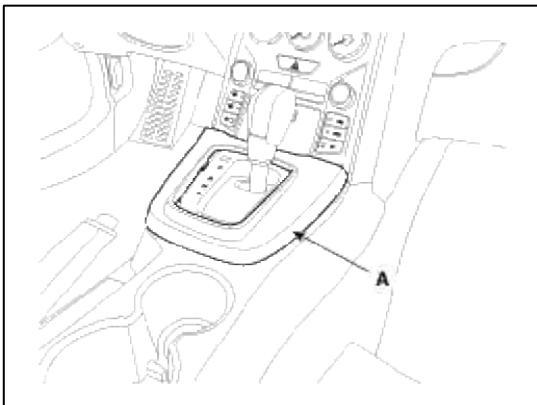
11. ATM Shift Lock Control

Shift lever can be changed to the another position when IGN1 ON and brake pedal is pressed.

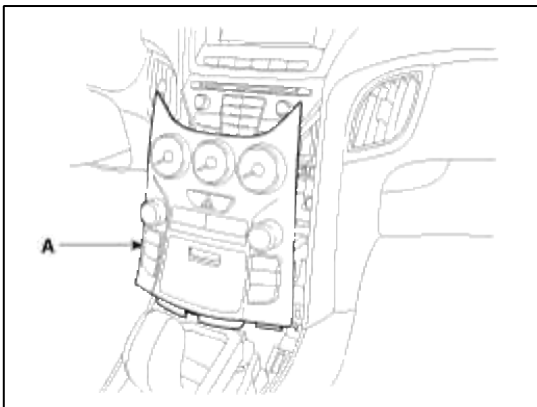
Body Electrical System > BCM (Body Control Module) > Body Control Module (BCM) > Repair procedures

Removal

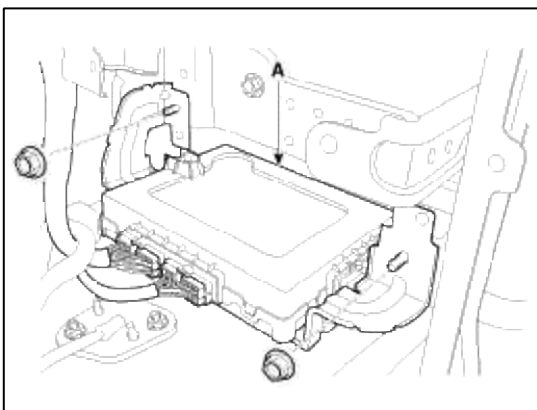
1. Disconnect the negative (-) battery terminal.
2. Remove the console upper cover(A).



3. Remove the center fascia lower panel(A).



4. Remove the body control module(A) after loosening 2 nuts and disconnecting the connectors.

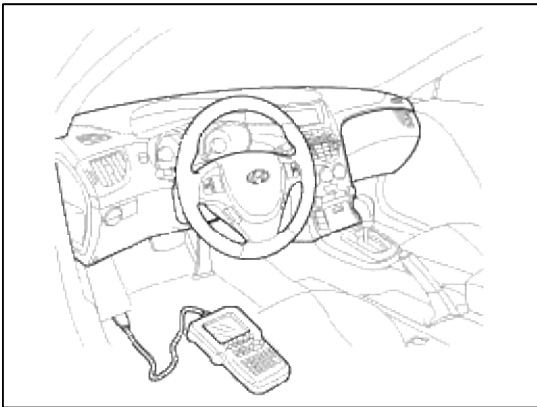


Installation

1. Install the body control module.

2. Install the center fascia lower panel.
3. Install the console upper cover.

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, outside mirror, wiper, auto-light and transmitters etc.
- A. BCM Service data

Current Data		
Standard Display	Full List	Graph
Items List	Reset Min.Max.	Record
Stop		
Sensor Name	Value	Unit
<input type="checkbox"/> Key in switch[Manual Key Type]	IN	-
<input type="checkbox"/> ACC	ON	-
<input type="checkbox"/> IGN1	ON	-
<input type="checkbox"/> IGN2	ON	-
<input type="checkbox"/> Tail Lamp Switch	OFF	-
<input type="checkbox"/> Head Lamp Switch	OFF	-
<input type="checkbox"/> Auto Light Switch	OFF	-
<input type="checkbox"/> Head Lamp High Switch	OFF	-
<input type="checkbox"/> Front Fog Switch	OFF	-
<input type="checkbox"/> Washer Switch	OFF	-
<input type="checkbox"/> INT Switch	OFF	-
<input type="checkbox"/> Mist Switch	OFF	-
<input type="checkbox"/> Key Inter Lock Switch[Manual Key Type]	ON	-
<input type="checkbox"/> Room Lamp Output	ON	-
<input type="checkbox"/> Foot Lamp Output	ON	-
<input type="checkbox"/> Ignition Key Hole Illumination[Manual Key Type]	OFF	-
<input type="checkbox"/> Auto Light Power	ON	-
<input type="checkbox"/> AV Tail Output	ON	-
<input type="checkbox"/> Key Inter Lock Solenoid[Manual Key Type]	OFF	-
<input type="checkbox"/> Security LED	OFF	-
<input type="checkbox"/> Navigation wakeup signal	OFF	-

Current Data		
Standard Display	Full List	Graph
Items List	Reset Min.Max.	Record
Stop		
Sensor Name	Value	Unit
<input type="checkbox"/> Security LED	OFF	-
<input type="checkbox"/> Navigation wakeup signal	OFF	-
<input type="checkbox"/> Wiper low relay	OFF	-
<input type="checkbox"/> Head lamp low signal output	OFF	-
<input type="checkbox"/> Parking brake switch	PARK	-
<input type="checkbox"/> Defogger SW	OFF	-
<input type="checkbox"/> Glove Box Sw	OFF	-
<input type="checkbox"/> Inhibit R SW	OFF	-
<input type="checkbox"/> Glove Box Lamp Output	OFF	-
<input type="checkbox"/> ATM solenoid(Automatic Transmission)	OFF	-
<input type="checkbox"/> Battery voltage monitoring input	13.20	V
<input type="checkbox"/> Int Volume	2.47	V
<input type="checkbox"/> Auto light sensor	0.00	V
<input type="checkbox"/> RK RX Status	NO RX	-
<input type="checkbox"/> Number of RK(+RK)	1	-
<input type="checkbox"/> Auto Door Lock Status	DISABLE	-
<input type="checkbox"/> Auto door unlock	DR DOOR UNLO...	-
<input type="checkbox"/> 2-Turn Unlock	ENABLE	-
<input type="checkbox"/> Arm/Disarm by door key(+RK)	ENABLE	-
<input type="checkbox"/> Horn answer back(+RK)	DISABLE	-
<input type="checkbox"/> Auto Light Control	ENABLE	-

B. CLU(Cluster) Service data

Current Data		
Standard Display	Full List	Graph
Items List	Reset Min.Max.	Record
Stop		
Sensor Name	Value	Unit
<input type="checkbox"/> Ignition 1	ON	-
<input type="checkbox"/> Ignition 2	ON	-
<input type="checkbox"/> Cruise Main Indicator	OFF	-
<input type="checkbox"/> Front fog Indicator	OFF	-
<input type="checkbox"/> High Beam Indicator	OFF	-
<input type="checkbox"/> Door open Indicator	ON	-
<input type="checkbox"/> P Inhibit output	ON	-
<input type="checkbox"/> R Inhibit output	OFF	-
<input type="checkbox"/> Seat belt indicator	OFF	-
<input type="checkbox"/> N Inhibit output	OFF	-
<input type="checkbox"/> D Inhibit output	OFF	-
<input type="checkbox"/> FUEL_INPUT	5.0	L
<input type="checkbox"/> Battery Voltage on CLU	14.4	V

C. SJB(Smart junction box) Service data

Current Data		
Standard Display	Full List	Graph
Items List	Reset Min.Max.	Record
Stop		
Sensor Name	Value	Unit
<input type="checkbox"/> Rear Left Door Open Switch	CLOSE	-
<input type="checkbox"/> Rear Left Door Actuator Position Switch	LOCK	-
<input type="checkbox"/> Rear Right Door Open Switch	CLOSE	-
<input type="checkbox"/> Rear Right Door Actuator Position Switch	LOCK	-
<input type="checkbox"/> Assist Door Open Switch	CLOSE	-
<input type="checkbox"/> Driver Door Open Switch	OPEN	-
<input type="checkbox"/> Tailgate/Trunk Open Switch	CLOSE	-
<input type="checkbox"/> Hood Switch	CLOSE	-
<input type="checkbox"/> Driver Seat Belt Switch	UNBUCKLED	-
<input type="checkbox"/> Tail Gate Release Switch	OFF	-
<input type="checkbox"/> Ignition 2	ON	-
<input type="checkbox"/> Canada DRL Output	OFF	-
<input type="checkbox"/> Front fog lamp relay	OFF	-
<input type="checkbox"/> AV Tail Output	ON	-
<input type="checkbox"/> Tail Lamp Relay	ON	-
<input type="checkbox"/> Head Lamp High Output	OFF	-
<input type="checkbox"/> Head Lamp Low Output	OFF	-
<input type="checkbox"/> Canada DRL Status	NONE	-
<input type="checkbox"/> Front Deicer Relay	OFF	-
<input type="checkbox"/> Rear defogger relay	OFF	-
<input type="checkbox"/> Burglar Alarm Horn Relay	OFF	-

Current Data		
Standard Display	Full List	Graph
Items List	Reset Min.Max.	Record
Stop		
Sensor Name	Value	Unit
<input type="checkbox"/> Canada DRL Status	NONE	-
<input type="checkbox"/> Front Deicer Relay	OFF	-
<input type="checkbox"/> Rear defogger relay	OFF	-
<input type="checkbox"/> Burglar Alarm Horn Relay	OFF	-
<input type="checkbox"/> Start Inhibitor Relay	OFF	-
<input type="checkbox"/> Tailgate/Trunk Release Relay	OFF	-
<input type="checkbox"/> Central door lock switch	OFF	-
<input type="checkbox"/> Power Window Relay	ON	-
<input type="checkbox"/> Assist Door Actuator Position Switch	UNLOCK	-
<input type="checkbox"/> Driver Door Actuator Position Switch	UNLOCK	-
<input type="checkbox"/> Assist Door Key Unlock Switch	OFF	-
<input type="checkbox"/> Driver Door Key Lock Switch	OFF	-
<input type="checkbox"/> Driver Door Key Unlock Switch	OFF	-
<input type="checkbox"/> Turn Left Switch	OFF	-
<input type="checkbox"/> Turn Right Switch	OFF	-
<input type="checkbox"/> Hazard Switch	OFF	-
<input type="checkbox"/> Central door unlock switch	OFF	-
<input type="checkbox"/> Driver door unlock relay	OFF	-
<input type="checkbox"/> Door unlock relay	OFF	-
<input type="checkbox"/> Door lock relay	OFF	-
<input type="checkbox"/> HID Option	OFF	-

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

Actuation Test	
Test Items	<ul style="list-style-type: none"> Duration: 0.5S On 0.5 Off Repeat Conditions: BATTERY ON Result: Success
<ul style="list-style-type: none"> Rear defogger relay Front deicer relay Central Door Lock Relay Central Door Unlock Relay Driver Door Unlock Relay Power window relay Turn Left Signal Turn Right Signal Flasher Sound Relay 	<div>Start</div> <div>Stop</div>

Body Electrical System > Seat Electrical > Components and Components Location

Component Location



1. Slide motor
2. Front height motor

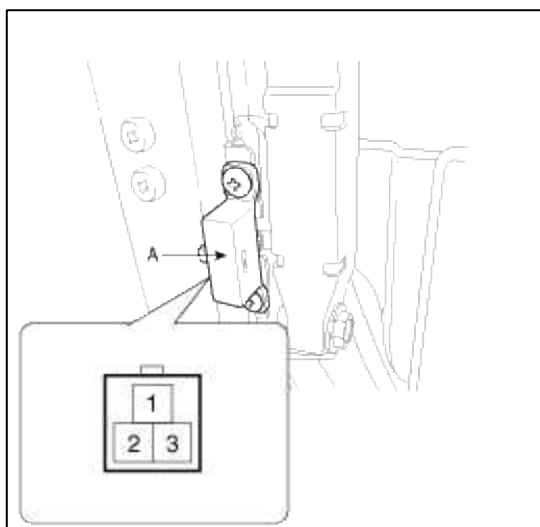
3. Rear height motor
4. Power seat switch

Body Electrical System > Seat Electrical > Power Seat Motor > Repair procedures

Inspection

Slide Motor Limit Switch

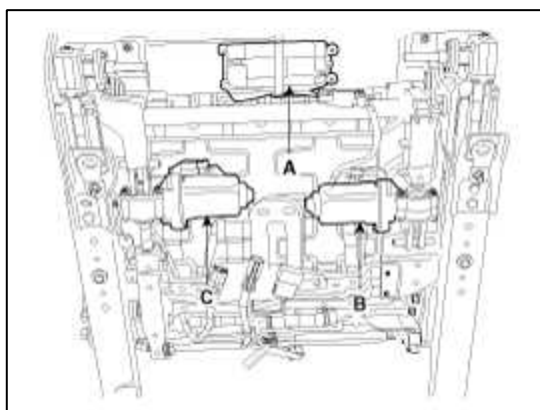
1. Disconnect the limit switch (A) and operate the limit switch.
2. Check for continuity between the terminals.
3. Make sure that the seat operation is normal in the reverse after the maximum operation.
4. If there is an abnormality, replace the limit switch.



Terminal NO.	1	2	3
Position			
Frontward	○	—	○
Backward	○	○	

Power Seat Motor

1. Disconnect the connectors(A) for each motor.

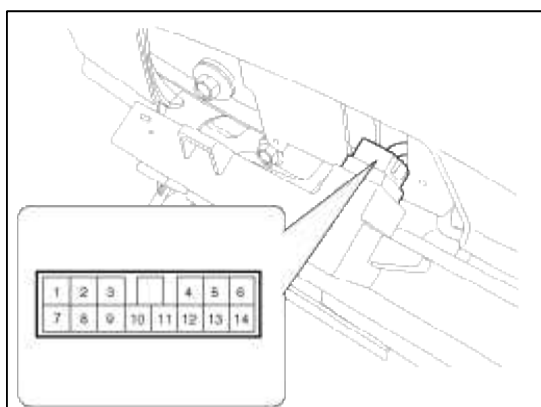


2. With the battery connected directly to the motor terminals, check if the motors run smoothly.
3. Reverse the connections and check that the motor turns in reverse.
4. If there is an abnormality, replace the motors.

Terminal NO.		1	2
Position			
Slide motor A	Forward	⊕	⊖
	Backward	⊖	⊕
Front Height Motor B	Up	⊖	⊕
	Down	⊕	⊖
Rear Height Motor C	Up	⊕	⊖
	Down	⊖	⊕

Inspection

With the power seat switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the power seat switch.

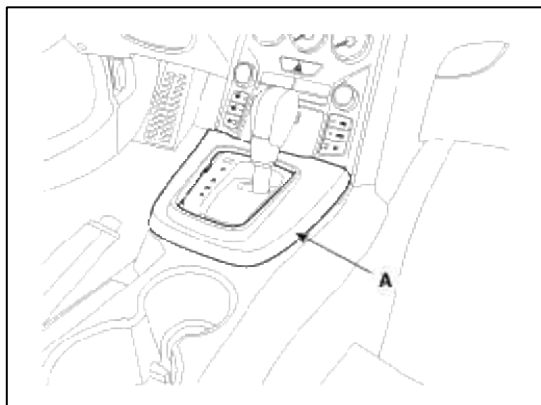


	Front height switch			Slide switch			Rear height switch			Name
	Up	N	Down	Forward	N	Backward	Up	N	Down	
11	○		○	○		○	○		○	B+
12	○		○	○	○	○	○		○	Backward slide motor
14	○		○	○	○		○		○	Forward slide motor
4	○		○		○		○		○	Backward slide limit
13	○		○		○		○		○	Forward slide limit
8	○	○	○				○		○	Front height motor (Up)
9		○	○				○		○	Front height motor (Down)
3		○	○				○		○	Front height limit (Up)
10		○	○				○		○	Front height limit (Down)
2							○	○	○	Rear height motor (Up)
5								○	○	Rear height motor (Down)
1								○	○	Rear height limit (Up)
6								○	○	Rear height limit (Down)

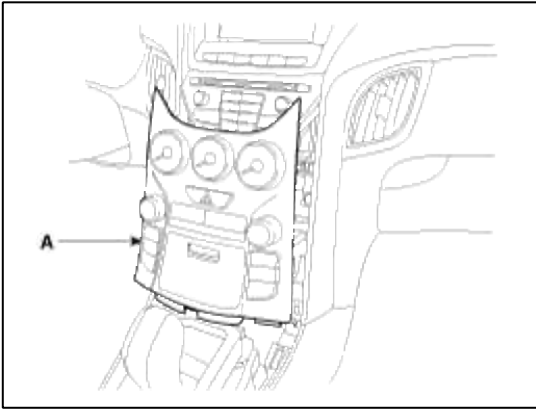
Body Electrical System > Seat Electrical > Seat Heater Switch > Repair procedures

Removal

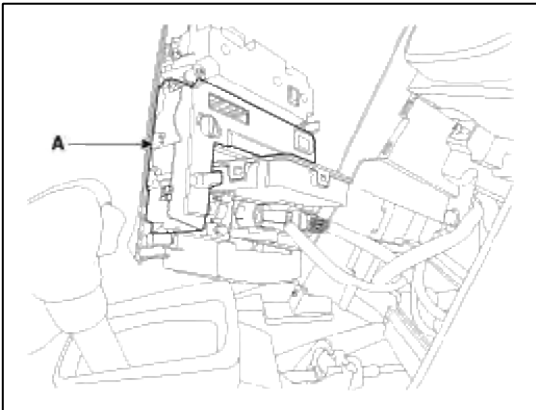
1. Disconnect the negative(-) battery terminal.
2. Remove the console upper cover (A).
(Refer to the BD group - "Console")



3. Remove the center fascia lower panel (A).
(Refer to the BD group - "Crash pad")



4. Remove the heater control unit (A) after disconnecting the connectors and cables.

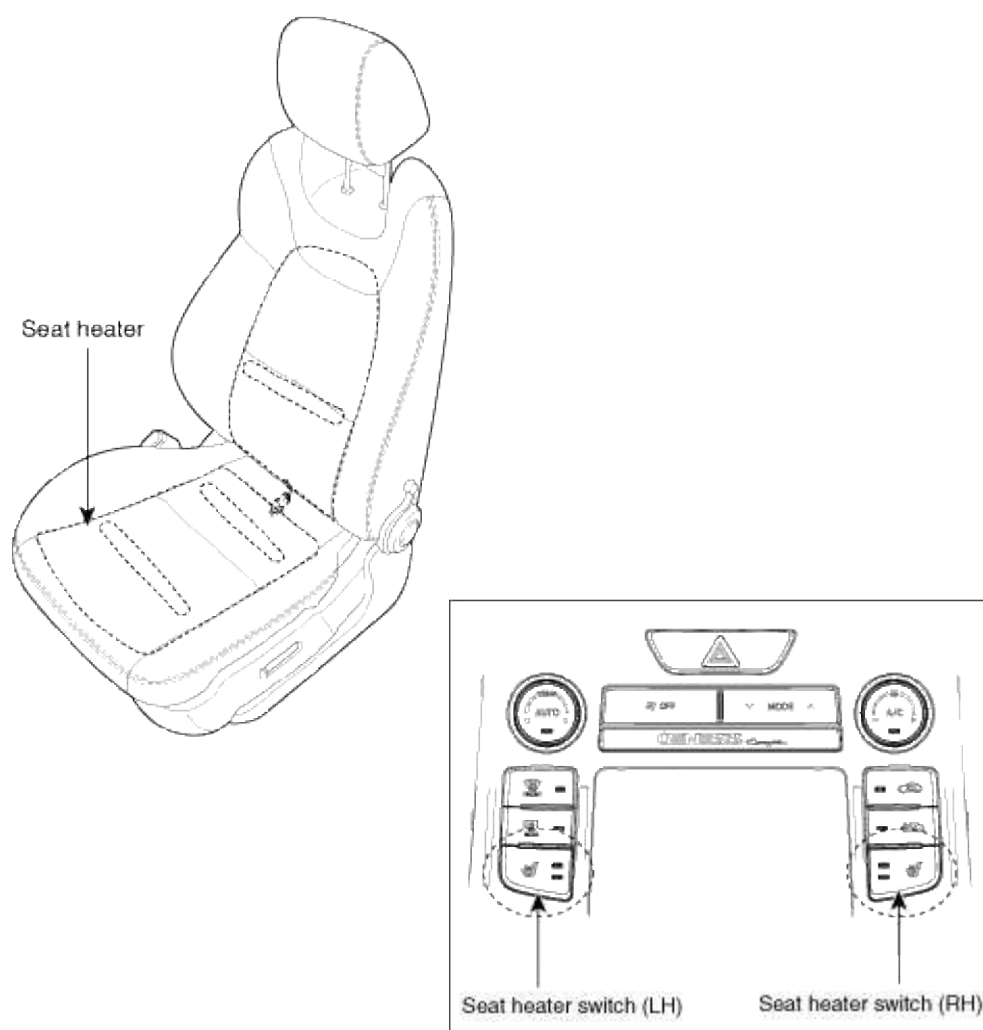


Installation

1. Install the heater control unit.
2. Install the center fascia lower panel and console upper cover.

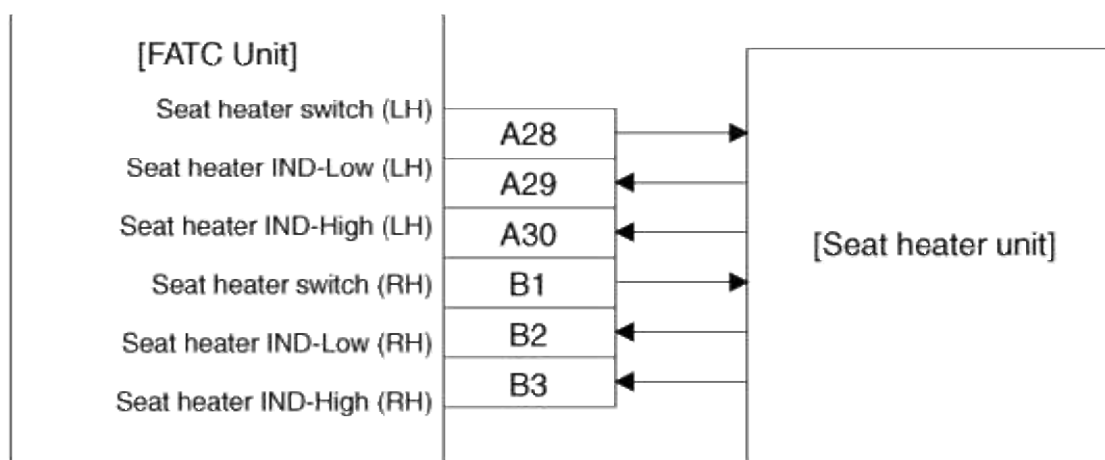
Body Electrical System > Seat Electrical > Seat Heater > Components and Components Location

Component Location



Body Electrical System > Seat Electrical > Seat Heater > Schematic Diagrams

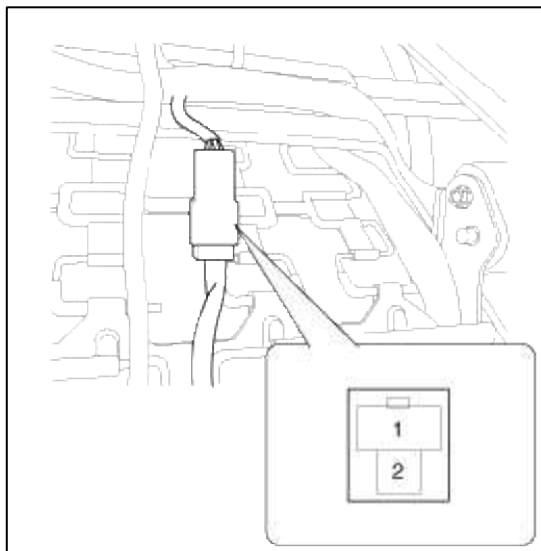
Circuit Diagram



Body Electrical System > Seat Electrical > Seat Heater > Repair procedures

Inspection

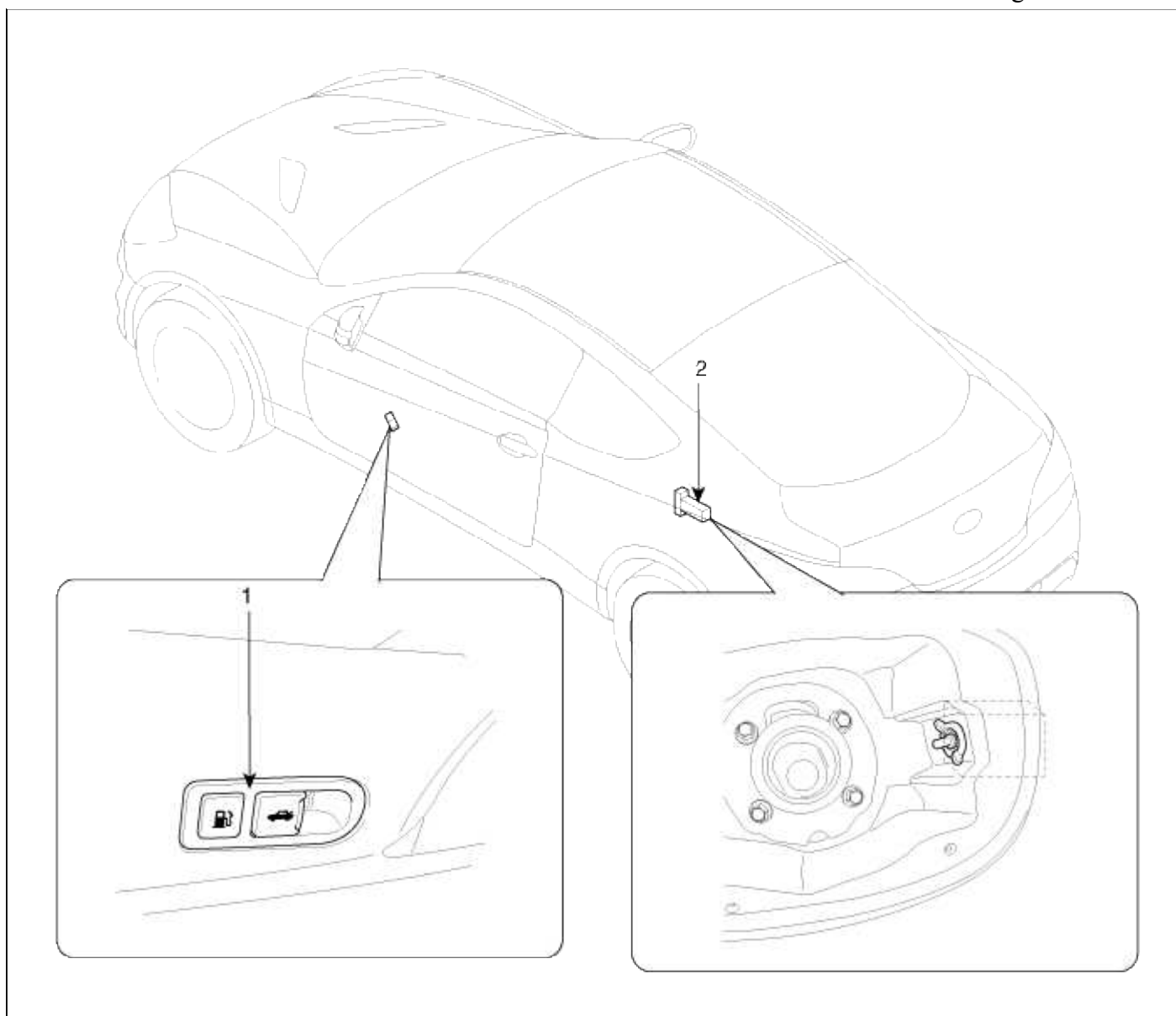
1. Check for continuity and measure the resistance between No.1 and NO.2 terminals.



Standard value: $2.43\Omega \pm 10\%$ / SET
(Cushion: $1.22\Omega \pm 10\%$, Back: $1.21\Omega \pm 10\%$)

Body Electrical System > Fuel Filler Door > Components and Components Location

Component Location

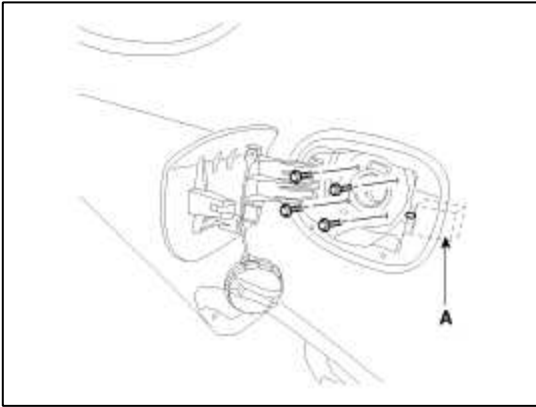


- | | |
|---------------------------------|--------------------------------------|
| 1. Fuel filler door open switch | 2. Fuel filler door release actuator |
|---------------------------------|--------------------------------------|

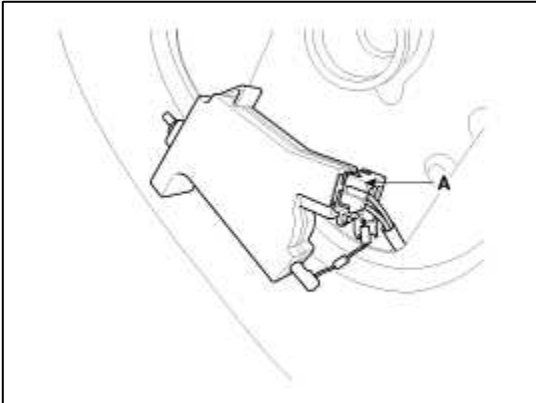
Body Electrical System > Fuel Filler Door > Fuel Filler Door Release Actuator > Repair procedures**Inspection**

1. Remove the fuel filler door housing.
(Refer to BD group - "Interior trim")

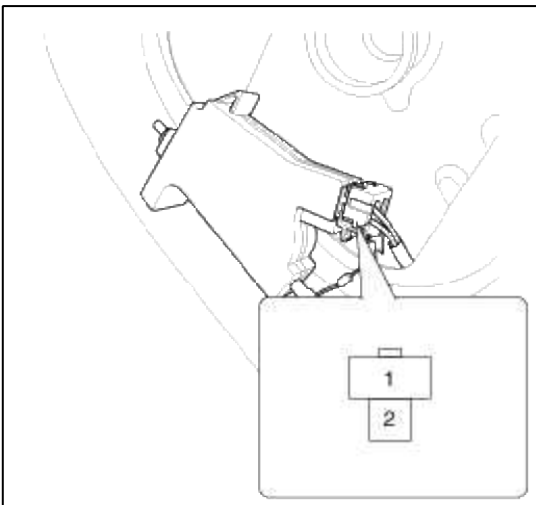
2. Loosen the mounting bolts and remove the fuel filler door release actuator(A).



3. Disconnect the fuel filler door connector(A).



4. Check for continuity between terminal No. 1 and No. 2. If there is no continuity replace the fuel filler door release actuator(A).

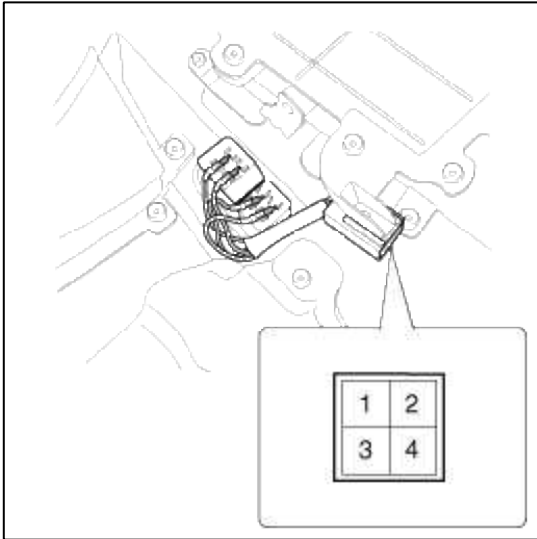


Body Electrical System > Fuel Filler Door > Fuel Filler Door Open Switch > Repair procedures

Inspection

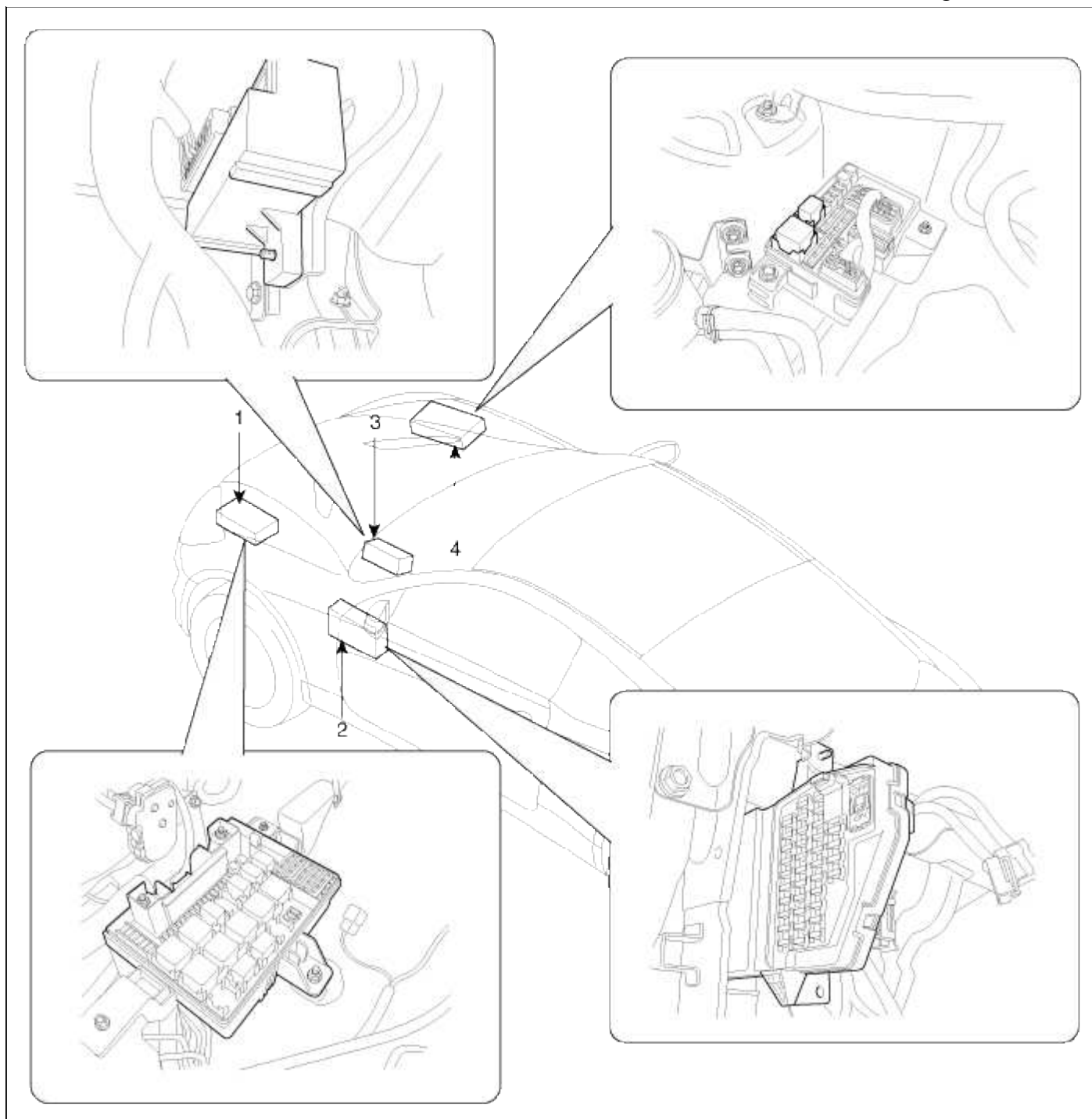
1. Remove the front door trim panel.
(Refer to the Body group - "Front door")
2. Disconnect the switch connector.
3. Check the switch for continuity between the No. 1 and No. 2 terminals.

4. If the continuity is not as specified, replace the switch.



Body Electrical System > Fuses And Relays > Components and Components Location

Component Location

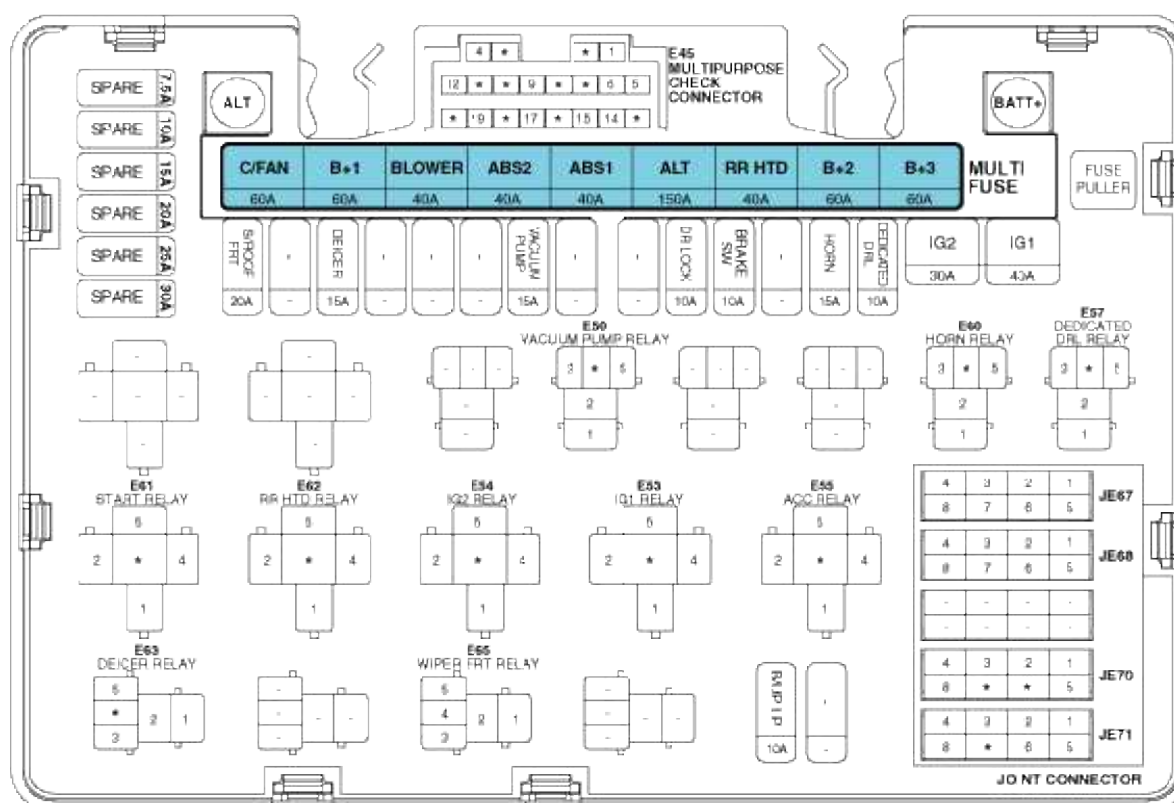


1. Engine room relay box
2. Passenger compartment
junction box

3. ICM relay box
4. Engine room sub-box

Body Electrical System > Fuses And Relays > Relay Box (Engine Compartment) > Components and Components Location

Components



Relay Type

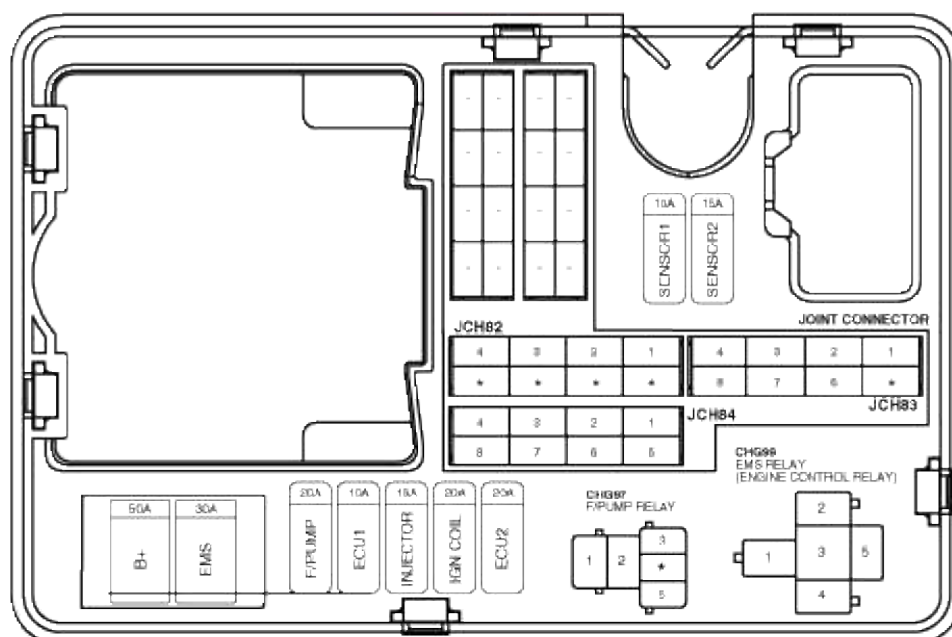
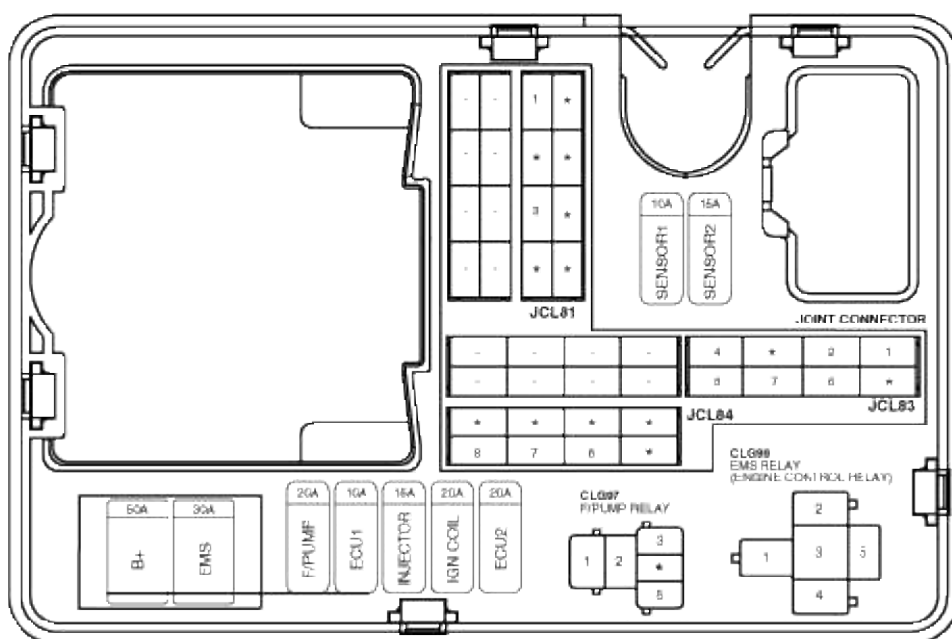
NO.	Name	Type
E50	Vacuum Pump Relay	Plug Micro
E53	IG1 Relay	Plug Mini
E54	IG2 Relay	Plug Mini
E55	ACC Relay	Plug Mini
E57	Dedicated	Plug Micro
E60	DRL Relay, Horn Relay	Plug Micro
E61	Start Relay	Plug Mini
E62	RR HTD Relay	Plug Mini
E63	Deicer Relay	Plug Micro
E66	Wiper FRT Relay	Plug Micro

✖ USE THE DESIGNATED FUSE AND RELAY ONLY

Circuit (E/R Junction Box LH)

Description		(A)	Circuit Protected
MULTI FUSE	C/FAN	60A	Cooling Fan (High) Relay, Cooling Fan (Low) Relay
	B+1	60A	Smart Junction Box ((Fuse : S/HEATER, AMP, SAFETY POWER WINDOW LH/R-H), IPS 2, IPS Control Module)
	BLOWER	40A	Smart Junction Box (Blower Relay)
	ABS2	40A	Multipurpose Check Connector, ESC Module
	ABS1	40A	Multipurpose Check Connector, ESC Module
	ALT	150A	Alternator, Multi Fuse (ABS1, ABS2, BLOWER, B+1, C/FAN), Fuse (S/ROOF FRT, DEICER, VACUUM PUMP)
	RR HTD	40A	RR HTD Relay
	D+2	60A	Smart Junction Box ((Fuse : HAZARD, PDM1, MODULE5, STOP LP, TRUNK, PDM2), IPS 1, ARISU 2, IPS Control Module)
FUSE	B+3	60A	Smart Junction Box ((Fuse : AUDIO, DRV P/SEAT, ROOM LP, MEMORY1, MEMORY2), ARISU 1, IPS Control Module, Leak Current Autocut Device Switch, Leak Current Autocut Device Relay)
	IG2	30A	Start Relay, IG2 Relay, Ignition Switch
	IG1	40A	IG1 Relay, ACC Relay, Ignition Switch
	S/ROOF FRT	20A	Sunroof Control Module
	DEICER	15A	Deicer Relay
	VACUUM PUMP	15A	Vacuum Pump Relay (G4KF A/T)
	DOOR LOCK	10A	Smart Junction Box (Door Lock Relay, Door Unlock Relay), ICM Relay Box (Two Turn Unlock Relay)
	BRAKE SW	10A	Stop Lamp Switch
	HORN	15A	Horn Relay
	DEDICATED DRL	10A	Dedicated DRL Relay
	B/UP LP	10A	M/T - Back-Up Lamp Switch A/T - Rear Combination Lamp LH/RH, Electro Chromic Mirror, A/V & Navigation Head Unit

※ USE THE DESIGNATED FUSE AND RELAY ONLY

G4KF : THETA 2.0L TCI**G6DJ : LAMBDA II 3.8L GDI**

※ USE THE DESIGNATED FUSE AND RELAY ONLY

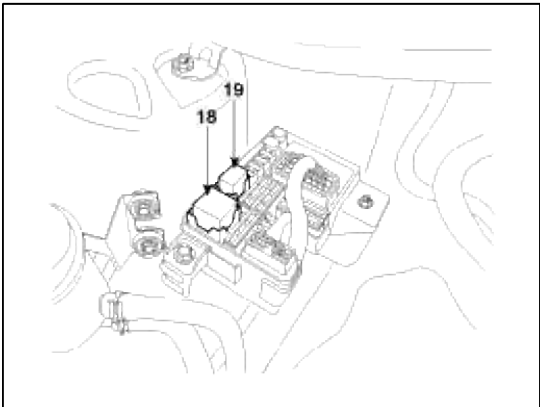
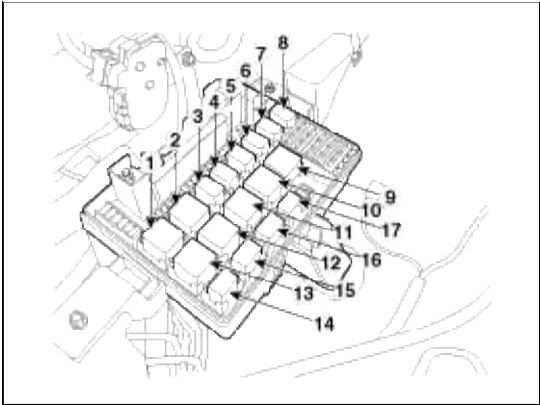
Circuit (E/R Junction Box RH)

Fuse Name	(A)	Circuit Protected
3+	50A	Fuse (EMS 30A, ECU1 10A, F/PUMP 20A)
EMS	30A	Engine Control Relay
F/PUMP	20A	F/Pump Relay
ECU 1	10A	G4KF ECM, TCM
		G6DJ ECM, TCM, Injector Drive Box
INJECTOR	15A	G4KF F/Pump Relay, Injector #1/#2/#3/#4
		G6DJ F/Pump Relay, Fuel Pump Relay (Low), ECM
IGN COIL	20A	G4KF Ignition Coil #1/#2/#3/#4, Condenser
		G6DJ Ignition Coil #1/#2/#3/#4/#5/#6, Condenser #1/#2
ECU 2	20A	G4KF ECM
		G6DJ Injector Drive Box
SENSOR 1	10A	G4KF Cooling Fan (High)/(Low) Relay, Oxygen Sensor (Up)/(Down)
		G6DJ Cooling Fan (High)/(Low) Relay, ECM, Oxygen Sensor #1/#2/#3/#4
SENSOR 2	15A	G4KF Camshaft Position Sensor #1/#2, RCV Control Solenoid Valve, Immobilizer Module, Canister Close Valve Purge Control Solenoid Valve, Crankshaft Position Sensor, Oil Control Valve #1/#2
		G6DJ ECM, Oil Control Valve #1/#2/#3/#4, Purge Control Solenoid Valve, Immobilizer Module, Canister Close Valve

※USE THE DESIGNATED FUSE AND RELAY ONLY

Body Electrical System > Fuses And Relays > Relay Box (Engine Compartment) > Repair procedures
Inspection

1: -	11: IG2 relay
2: -	12: Rear heater relay
3: -	13: Start relay
4: Vacuum pump relay	14: Front deicer relay
5: -	15: Head lamp washer relay
6: -	16: Front wiper relay
7: Horn relay	17: -
8: Dedicated DRL relay	18: EMS relay
9: ACC relay	19: Fuel pump relay
10: IG1 relay	

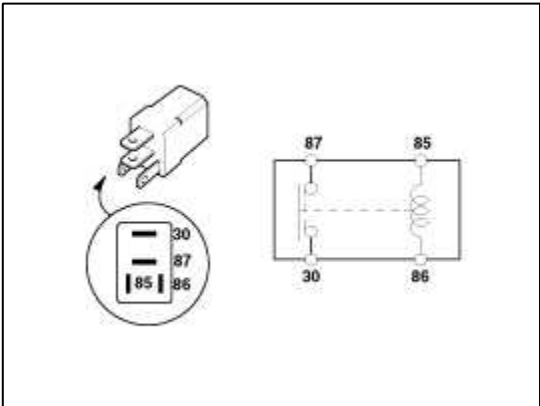


Power Relay Test (Type A)

Check for continuity between the terminals.

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

[A] Type:	
4: Vacumm pump relay	14: Front deicer relay
7: Horn relay	15: Head lamp washer relay
8: Dedicated DRL relay	19: Fuel pump relay



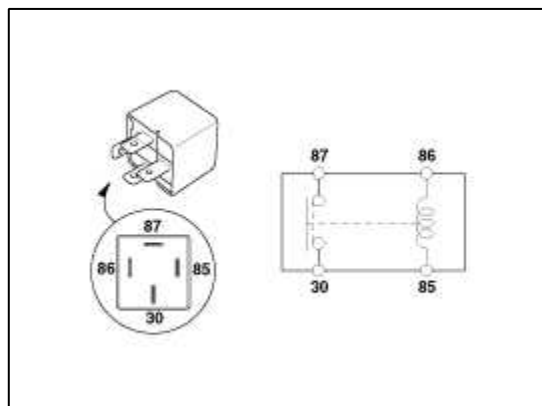
Terminal	85	86	87	30
Power				
Disconnected	○	○		
Connected	⊖	⊕	○	○

Power Relay Test (Type B)

Check for continuity between the terminals.

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

[B] Type:	12: Rear heater relay
9: ACC relay	13: Start relay
10: IG1 relay	
11: IG2 relay	



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

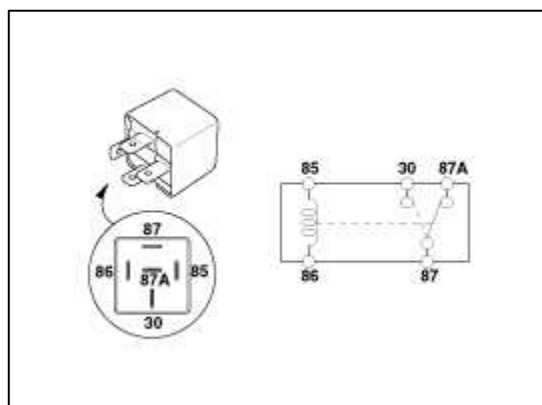
Power Relay Test (Type C)

Check for continuity between the terminals.

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

[C] Type :

18: EMS relay



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

Power Relay Test (Type D)

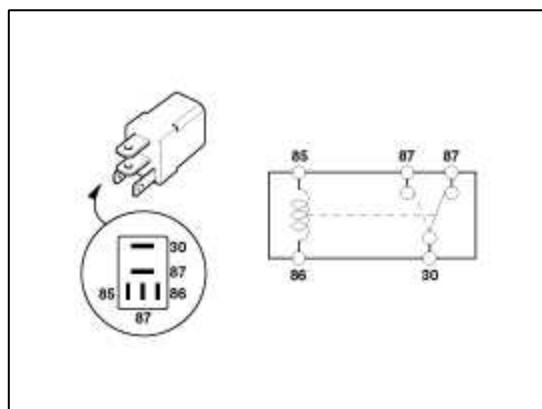
Check for continuity between the terminals.

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

2. There should be continuity between the No.30 and No.87 terminals when power is disconnected.

[D] Type:

16. Front wiper relay



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

Fuse Inspection

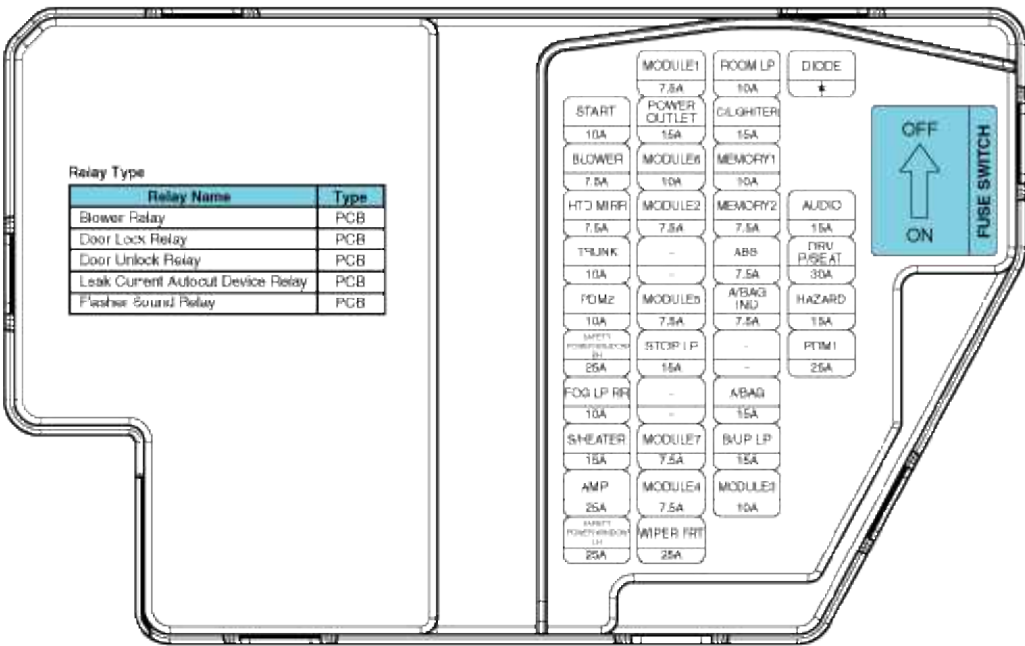
1. Be sure there is no play in the fuse holders, and that the fuses are held securely.
2. Are the fuse capacities for each circuit correct?
3. Are there any blown fuses?

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.

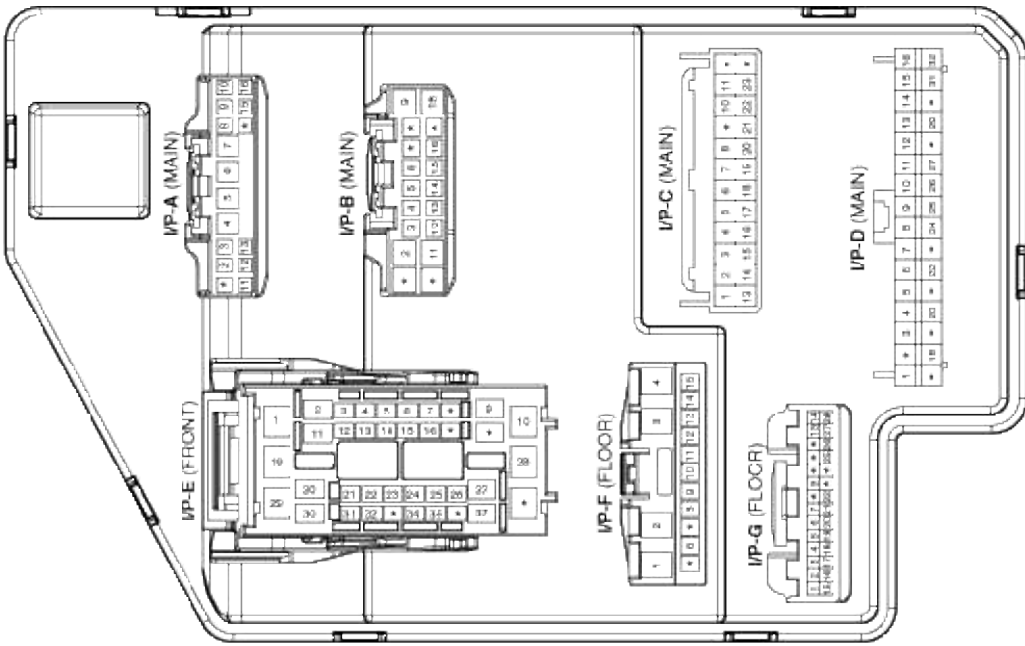
Body Electrical System > Fuses And Relays > Relay Box (Passenger Compartment) > Components and Components Location

Components

< FRONT >



< REAR >



※ USE THE DESIGNATED FUSE AND RELAY ONLY

Circuit (Smart Junction Box)

Fuse Name	(A)	Circuit Protected
AUDIO	15A	Audio, A/V & Navigation Head Unit, Multi Gauge, Multi Monitor, Front Monitor, MTS Module
DRV P/SEAT	30A	Driver Seat Manual Switch, Driver Lumbar Support Switch
HAZARD	15A	BCM, Flasher Sound Relay
PDM1	25A	PDM
ROOM LP	10A	Driver/Passenger Door Lamp, Trunk Room Lamp, Driver/Passenger Door Scoff Lamp, Vanity Lamp L/R/RH, Map Lamp
CAUGHTER	15A	Front Power Outlet
MEMORY1	10A	BCM, Data Link Connector, Auto Light & Photo Sensor, Ignition Key ILL. & Door Warning Switch, Electro Chromic Mirror, Instrument Cluster (IND, MICOM), A/C Control Module, Tire Pressure Monitoring Module
MEMORY2	7.5A	RF Receiver
ABS	7.5A	E/R Junction Box LH (Multipurpose Check Connector), ESC Module, ESC & PAS Switch, Steering Angle Sensor
A/BAG IND	7.5A	Instrument Cluster (Air Bag IND.)
A/BAG	15A	SRS Control Module, A/C Control Module, PDCS Module
BU/LP	15A	Back-Up Lamp Switch, TCM, Transaxle Range Switch
MODULE3	10A	ECM, PDM, Smart Key Control Module, Injector Drive Box (G60J)
MODULE1	7.5A	AMP, Audio, A/V & Navigation Head Unit, Multi Monitor, MTS Module, Front Monitor, Map Lamp, Power Outside Mirror Switch
POWER OUTLET	15A	Console Power Outlet
MODULE5	10A	BCM, PDM, Smart Key Control Module

Fuse Name	(A)	Circuit Protected
MODULE F2	7.5A	IPS Control Module, Instrument Cluster (IND, MICOM), BCM, ATM Shift Lever IND., Multifunction Switch (Remote Control), Multi Gauge, Cruise Clutch Pedal Position Switch, A/C Control Module, Auto Head Lamp Levelling Device Unit, Stop Lamp Switch, Driver/Passenger Seat Warmer Module, Electro Chromic Mirror, MTS Module, Tire Pressure Monitoring Module, Head Lamp Levelling Device Actuator L/R/RH, Front Parking Assist Sensor L/R/RH, Rear Parking Assist Sensor Side L/R/RH, Rear Parking Assist Sensor Center L/R/RH
MODULE5	7.5A	Sport Mode Switch (A/T), Key Solenoid
STOP LP	15A	Stop Signal Relay
MODULE7	7.5A	Blower Relay, Sunroof Control Module, A/C Control Module, Cluster Ionizer (Auto A/C)
MODULE4	7.5A	BCM, PDM, IPS Control Module, Vacuum Switch, E/R Junction Box LH (Vacuum Pump Relay)
WIPER FRT	25A	Multifunction Switch (Wiper), Front Wiper Motor, E/R Junction Box LH (Wiper FRT Relay)
START	10A	E/R Junction Box LH (Start Relay), Ignition Lock Switch, PDM, Transaxle Range Switch, ECM (G60J), B/Alarm Relay
BLOWER	7.5A	A/C Control Module
HTD MIRR	7.5A	A/C Control Module, Driver/Passenger Power Outside Mirror
TRUNK	10A	Trunk Lid & Fuel Filler Door Switch, ICM Relay Box (Trunk Lid Relay)
PDM2	10A	PDM, Smart Key Control Module, Start Stop Button Switch, FOB Holder
SAFETY POWER WINDOW RH	25A	Passenger Safety Power Window Module
FOG LP R/R	10A	(Not Used)
SEATER	15A	Driver/Passenger Seat Warmer Module
AMP	25A	AMP (HACDUEL)
SAFETY POWER WINDOW LH	25A	Driver Safety Power Window Module

※ 지정된 퓨즈 및 릴레이를 사용하십시오

Body Electrical System > Fuses And Relays > Relay Box (Passenger Compartment) > Repair procedures

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?

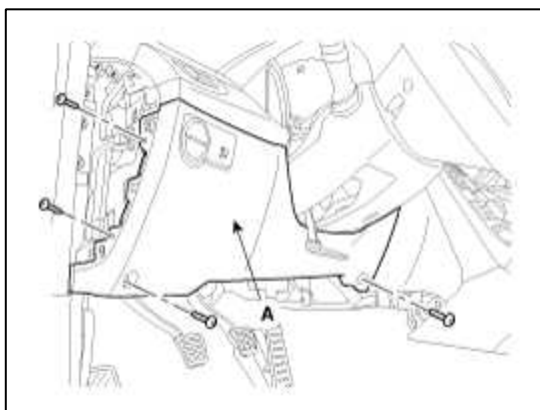
If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

Replacement

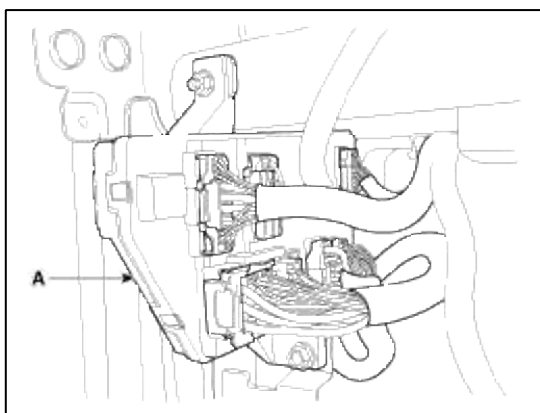
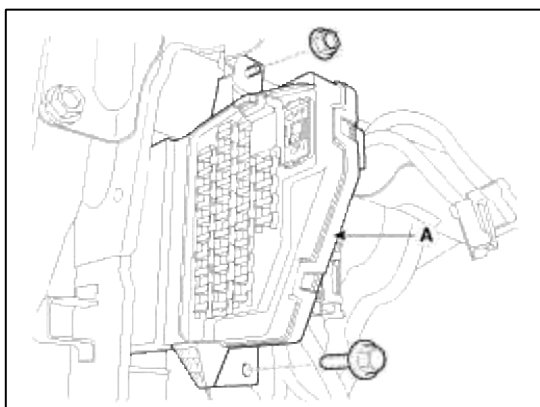
Passenger Compartment Junction Box

1. Disconnect the negative(-) battery terminal.

2. Remove the crash pad lower panel (A).
(Refer to BD group - "Crash pad")



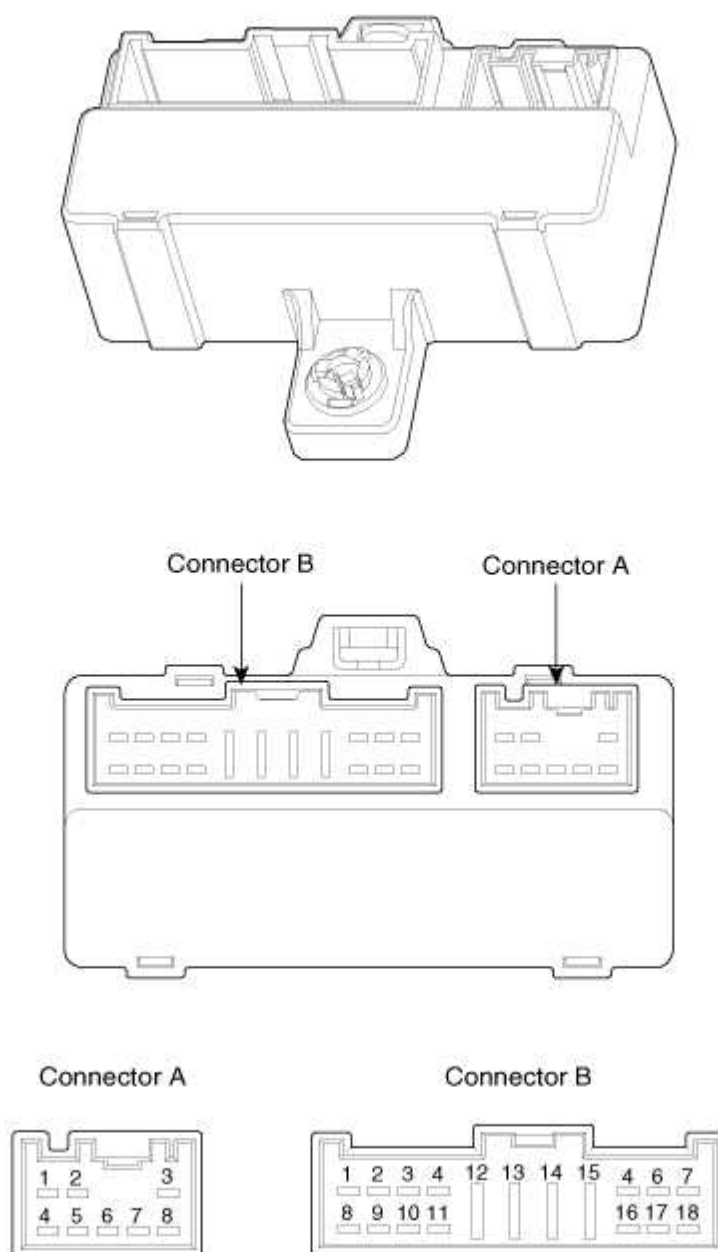
3. Remove the passenger compartment junction box (A) after loosening the mounting nut and bolt and disconnecting the connectors.



4. Installation is the reverse of removal.

Body Electrical System > Fuses And Relays > ICM (Integrated Circuit Module) Relay Box > Components and Components Location

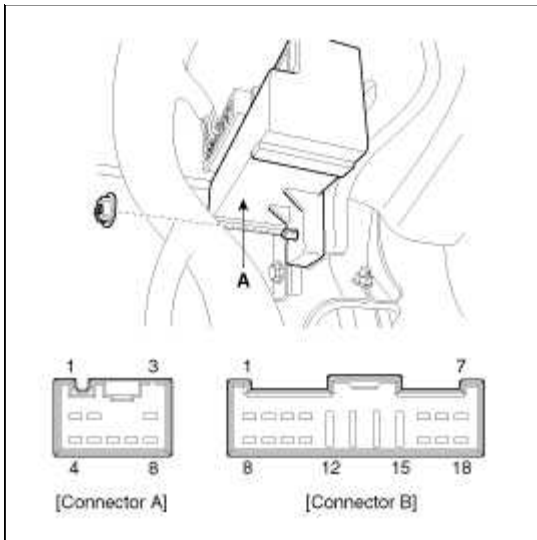
Component



Body Electrical System > Fuses And Relays > ICM (Integrated Circuit Module) Relay Box > Description and Operation

Description

The ICM is united with many kinds of relay and installed inside the driver crash pad lower panel.



Body Electrical System > Fuses And Relays > ICM (Integrated Circuit Module) Relay Box > Repair procedures

Inspection

Trunk Lid Relay

Check for continuity between the terminals.

1. There should be continuity between the No.13 and No.12 terminals when power and ground are connected to the No.13 and No.3 in the ICM relay B terminals.
2. There should be no continuity between the No.13 and No.12 terminals when power is disconnected.

Burglar Alarm Horn

Check for continuity between the terminals.

1. There should be continuity between the No.8 and No.9 terminals when power and ground are connected to the No.8 and No.1 in the ICM relay B terminals.
2. There should be no continuity between the No.8 and No.9 terminals when power is disconnected.

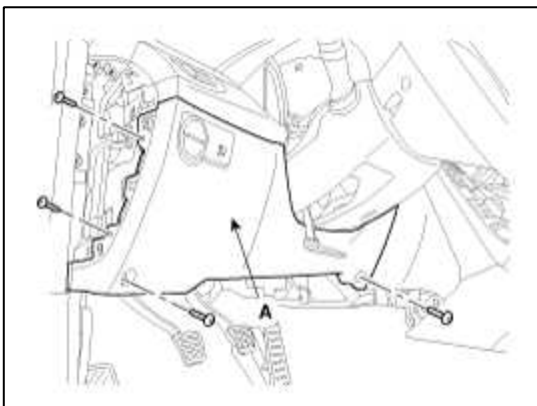
Burglar Alarm

Check for continuity between the terminals.

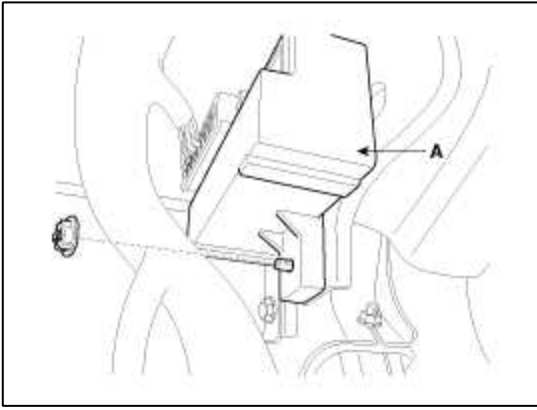
1. There should be no continuity between the No.11 and No.10 terminals when power and ground are connected to the No.11 and No.4 in the ICM relay B terminals.
2. There should be continuity between the No.11 and No.10 terminals when power is disconnected.

Removal

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



3. Remove the ICM relay box(A) after disconnecting the connector and removing the mounting nut.

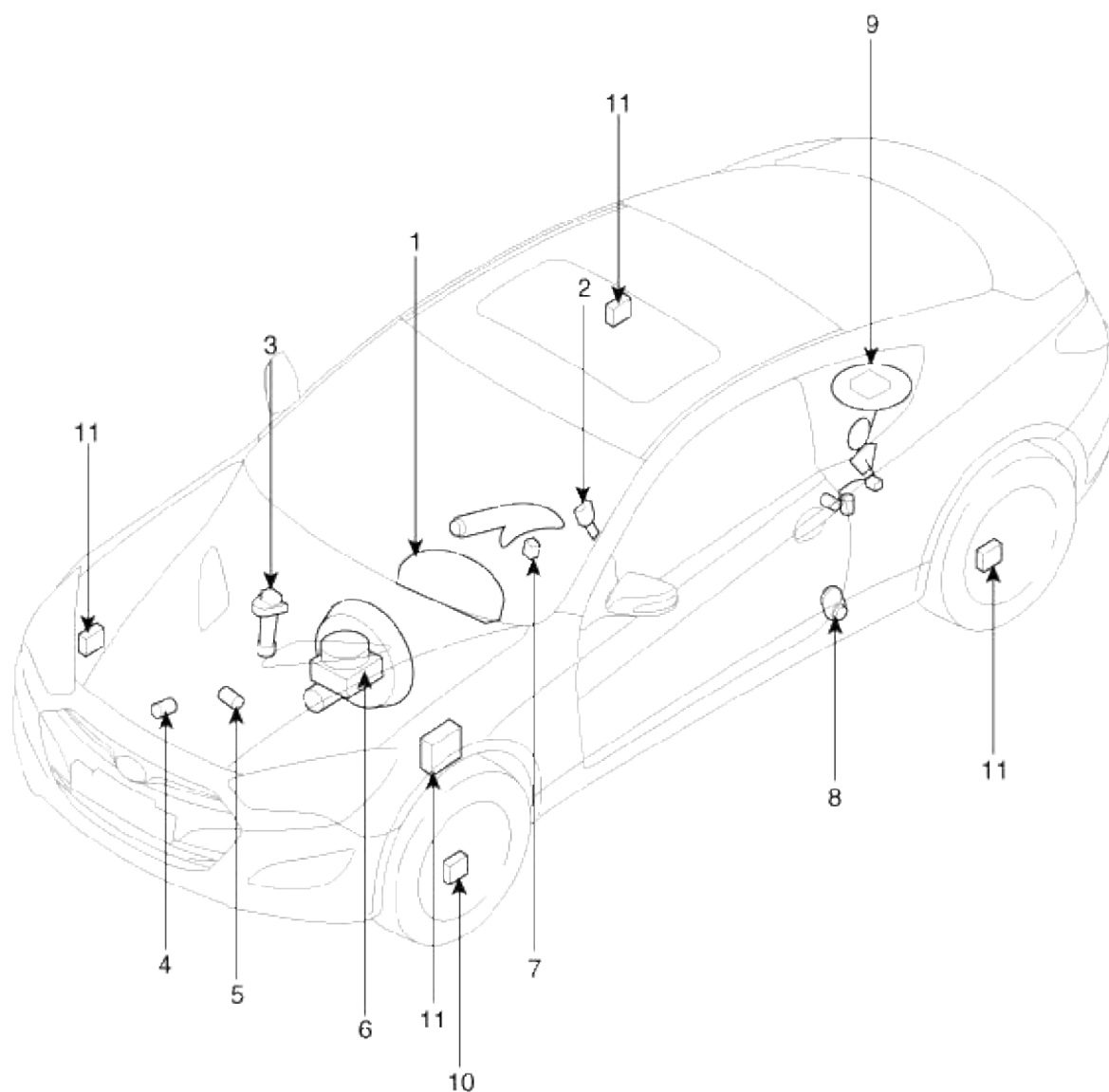


Installation

1. Install the ICM relay box.
2. Install the crash pad lower panel.

Body Electrical System > Indicators And Gauges > Components and Components Location

Component Location



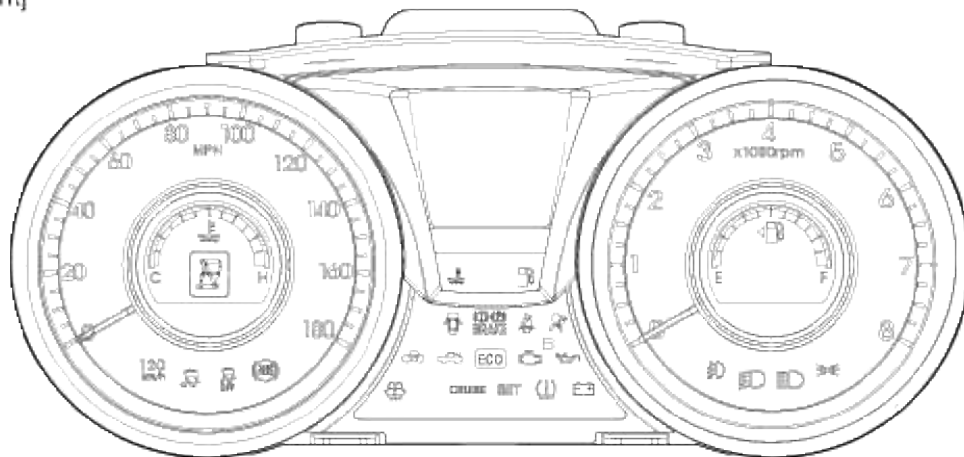
- | | |
|--------------------------------------|-------------------------|
| 1. Cluster assembly | 7. Parking brake switch |
| 2. Seat belt switch | 8. Door switch |
| 3. Vehicle speed sensor | 9. Fuel gauge sender |
| 4. Engine coolant temperature sender | 10. Wheel speed sensor |
| 5. Oil pressure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

Body Electrical System > Indicators And Gauges > Instrument Cluster > Components and Components Location

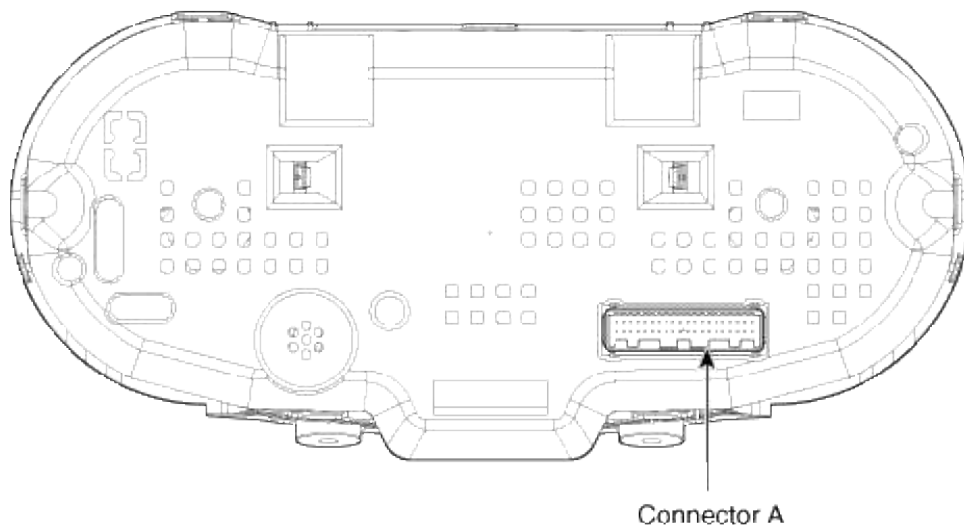
Components

[Supervision]

[Front]

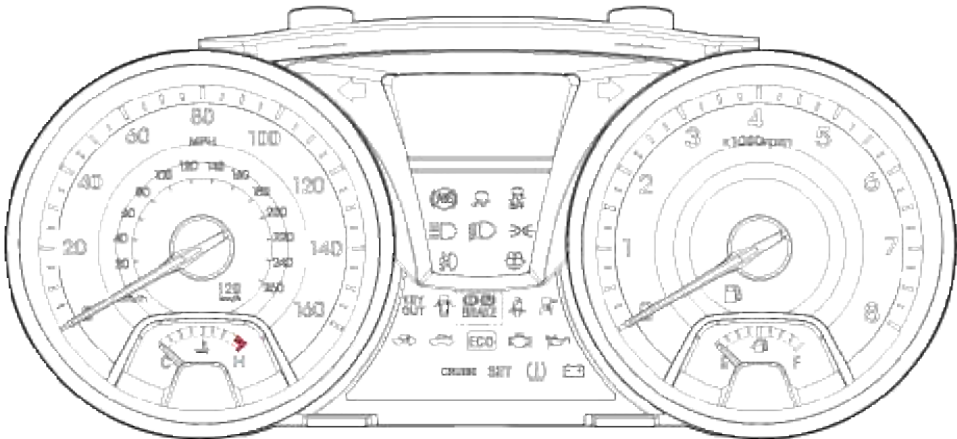


[Rear]

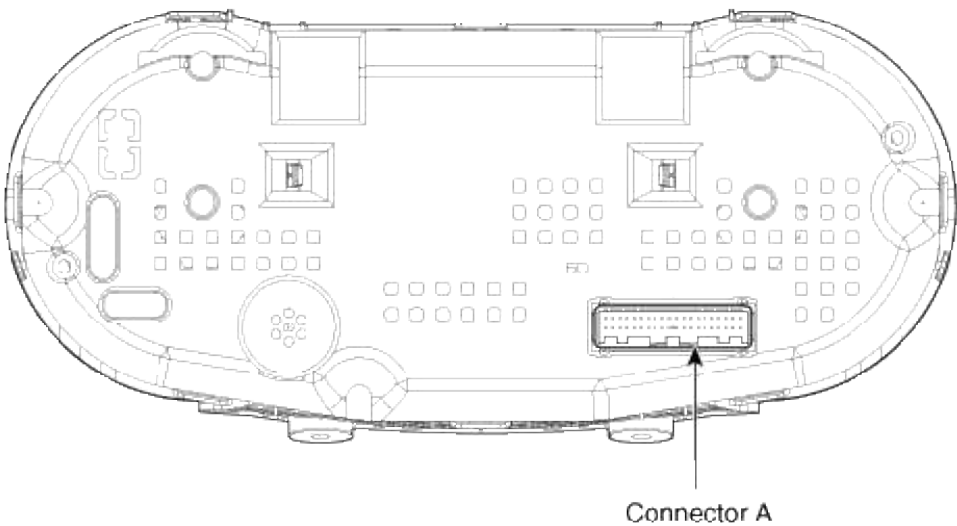


[General]

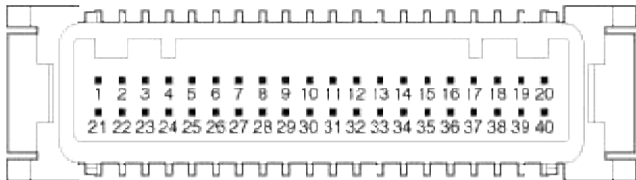
[Front]



[Rear]



Connector A

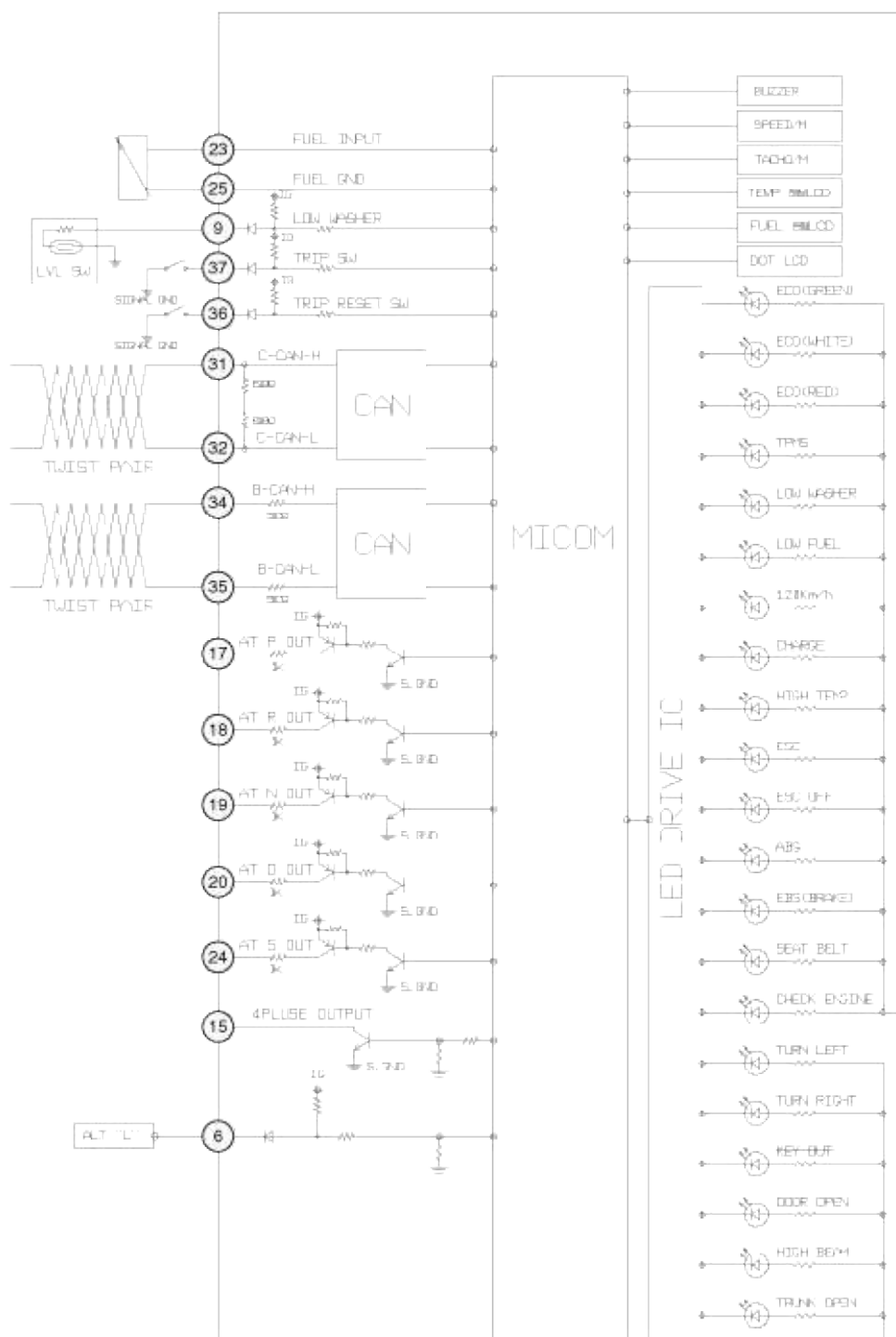


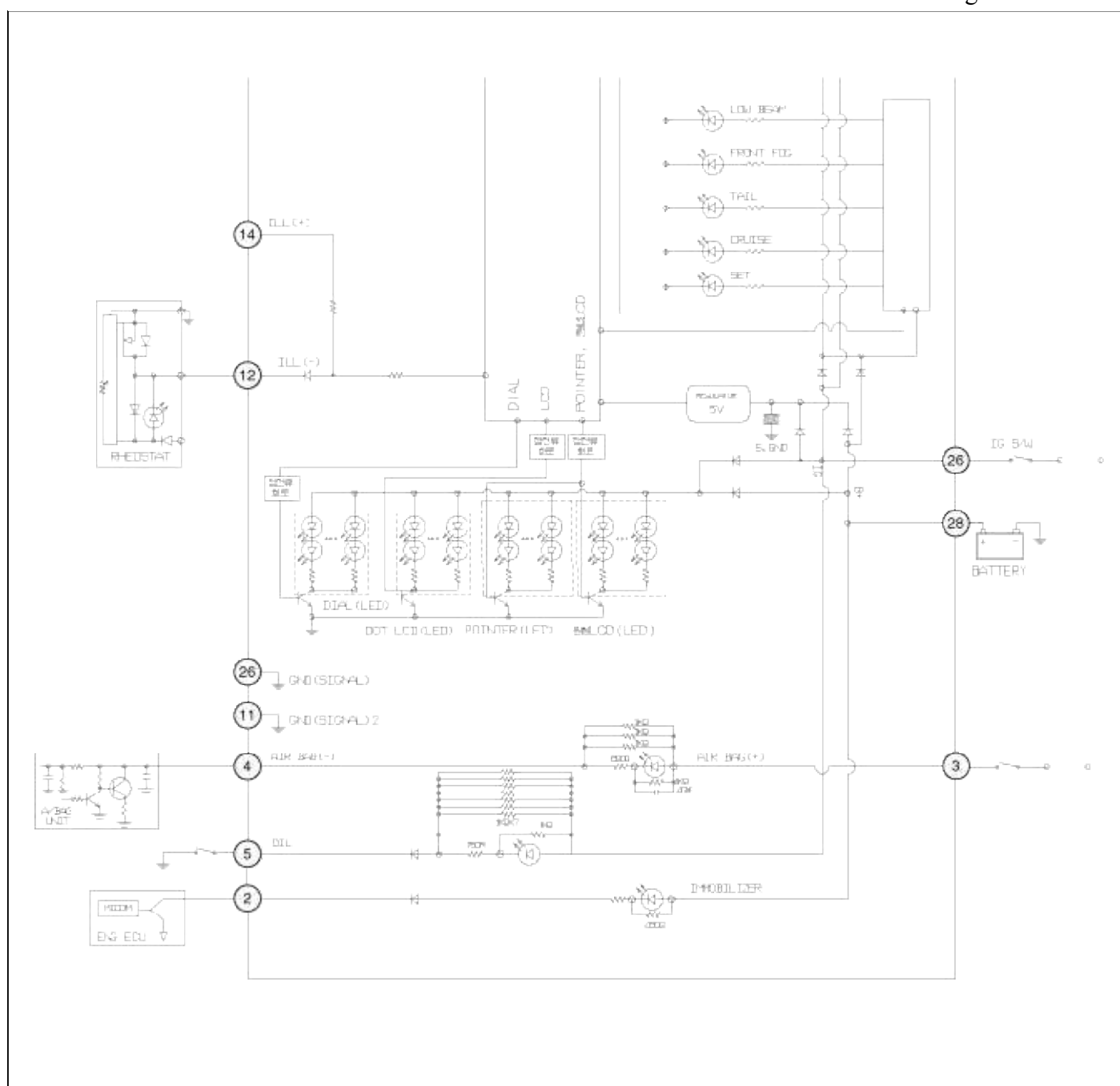
Connector A

No	Description	Remarks	No	Description	Remarks
1	-		21	-	
2	Immobilizer	Input	22	-	
3	Airbag +	Input	23	Fuel +	Input
4	Airbag -	Input	24	AT position S	Output
5	Oil pressure	Input	25	Fuel -	Input
6	Battery charge	Input	26	Signal GND	Input
7	-		27	-	
8	-		28	Battery +	Input
9	Washer fluid	Input	29	Ignition +	Input
10	-		30	-	
11	Signal GND2	Input	31	C CAN High	Input/Output
12	Illumination -	Input	32	C CAN Low	Input/Output
13	-		33	-	
14	Illumination +	Input	34	B CAN High	Input/Output
15	4P Out	Output	35	B CAN Low	Input/Output
16	-		36		Input
17	AT position P	Output	37		Input
18	AT position R	Output	38	-	
19	AT position N	Output	39	-	
20	AT position D	Output	40	-	

Body Electrical System > Indicators And Gauges > Instrument Cluster > Schematic Diagrams

Circuit Diagram





Body Electrical System > Indicators And Gauges > Instrument Cluster > Repair procedures

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.

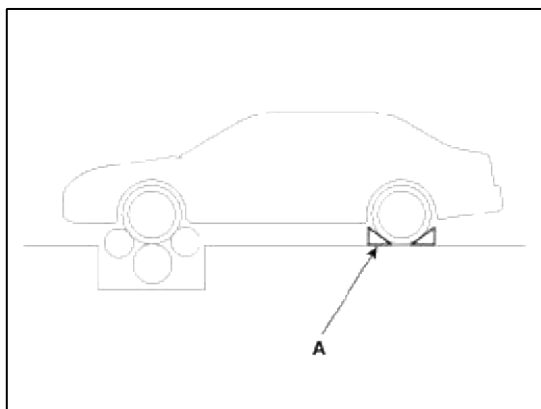
3. Check if the speedometer indicator range is within the standard values.

CAUTION

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

NOTE

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



[km/h-CANADA]

Velocity (km/h)	20	40	60	80	100	120	140
Tolerance (km/h)	+3.0 0	+3.3 0	+3.4 0	+3.8 0	+4.1 0	+4.9 0	+5.2 0
Velocity (km/h)	160	180	200	220	240	260	280
Tolerance (km/h)	+5.7 0	+6.2 0	+6.5 0	+6.7 0	+6.9 0	+7.1 0	- -

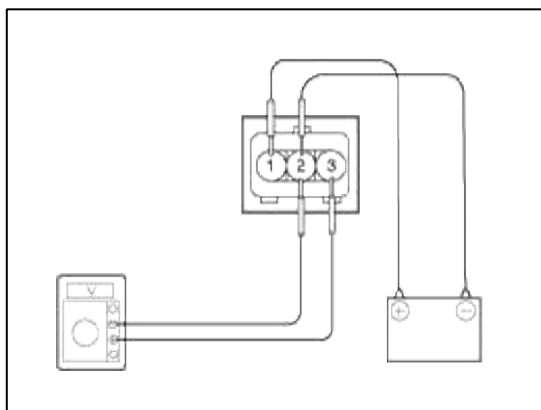
[MPH-USA]

Velocity (MPH)	10	20	40	60	80
Tolerance (MPH)	+2.3 0	+2.4 0	+2.5 0	+2.6 0	+2.7 0
Velocity (MPH)	100	120	140	160	
Tolerance (MPH)	+2.8 0	+2.9 0	+3.0 0	+3.3 0	

Vehicle Speed Sensor

1. Connect the positive (+) lead from battery to terminal 1 and negative (-) lead to terminal 2.
2. Connect the positive (+) lead from tester to terminal 3 and the negative (-) lead to terminal 2.
3. Rotate the shaft.
4. Check that there is voltage change from approx. 0V to 11V or more between terminals 3 and 2.

5. The voltage change should be 4 times for every revolution of the speed sensor shaft.
If operation is not as specified, replace the sensor.



Tachometer

1. Connect the scan tool 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.

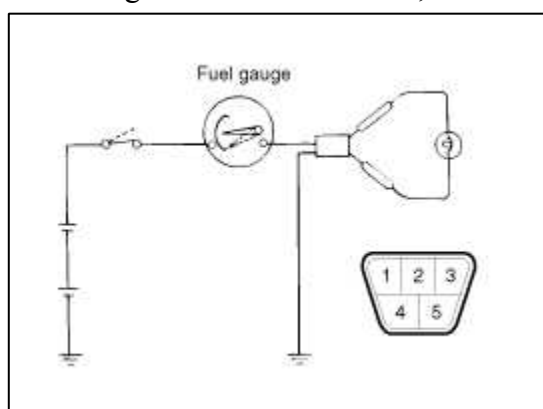
CAUTION

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

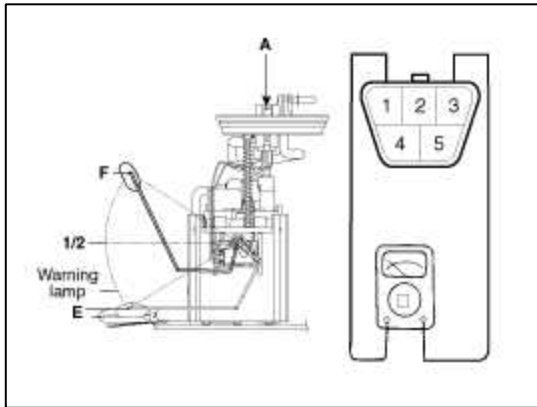
Fuel Gauge

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.



Main Fuel Gauge Sender

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



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

Position	Resistance(Ω)
SEG 1	193.4 ± 2
Warning lamp	186.8 ± 2
SEG 6	112.1 ± 2
SEG 12	13.5 ± 2

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

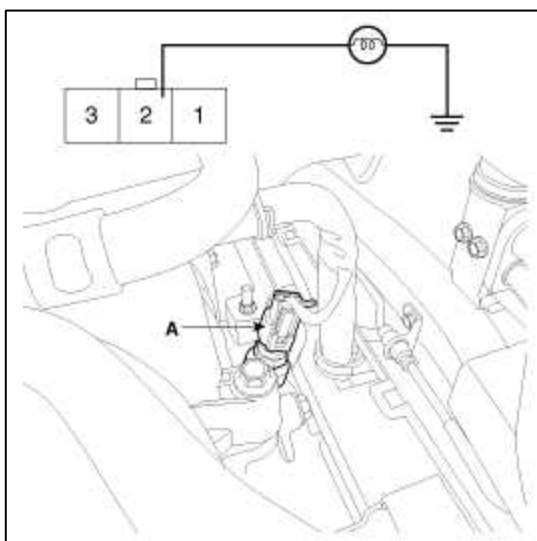
CAUTION

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

Engine Coolant Temperature Gauge

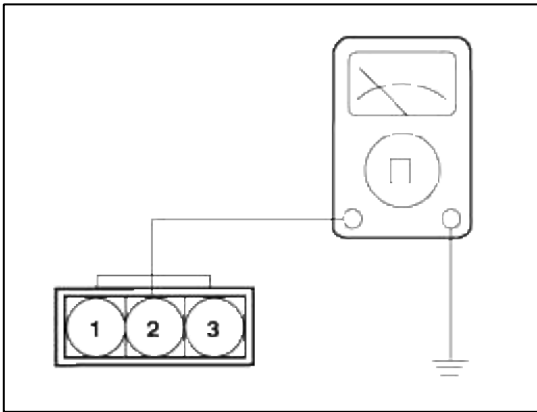
1. Disconnect the wiring connector (A) from the engine coolant temperature sender in the engine compartment.
2. Turn the ignition switch ON. Check that the gauge needle indicates cool. Turn the ignition switch OFF.
3. Connect a 12V, 3.4 watt test bulb between the harness side connector and ground.
4. Turn the ignition switch ON.
5. Verify that the test bulb flashes and that the indicator moves to HOT.

If operation is not as specified, replace the engine coolant temperature gauge. Then recheck the system.



Engine Coolant Temperature Sender

1. Using an ohmmeter, measure the resistance between the terminal 2 and ground.

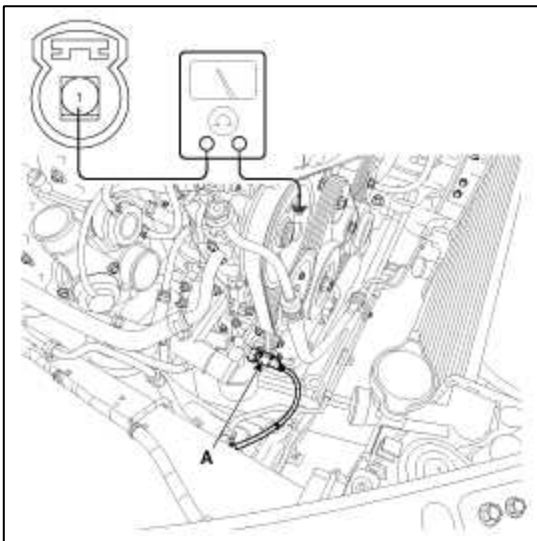


2. If the resistance value is not as shown in the table, replace the temperature sender.

Temperature [°F(°C)]	131(55)	160(71) ~ 230(110)	257(125)
Gauge angle (°)	-45	-70 ± 25	+35

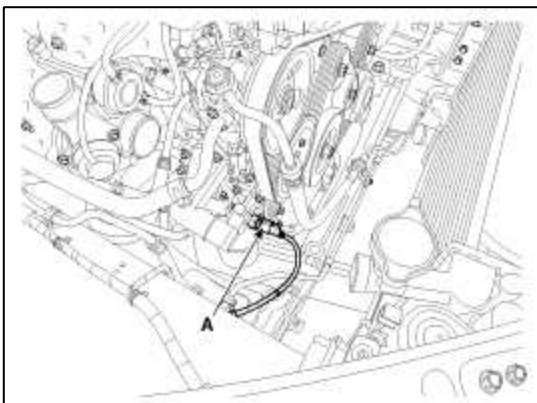
Oil Pressure Switch

1. Check that there is continuity between the oil press switch terminal (A) and ground with the engine off.
2. Check that there is no continuity between the terminal and ground with the engine running.
3. If operation is not as specified, replace the switch.



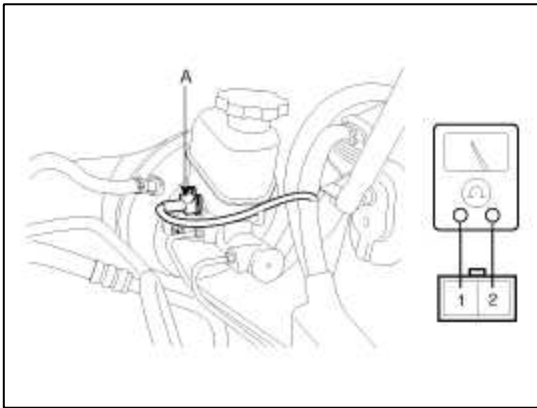
Oil Pressure Warning Lamp

1. Disconnect the connector (A) from the warning switch and ground the terminal on the wire harness side connector.
2. Turn the ignition switch ON. Check that the warning lamp lights up. If the warning lamp doesn't light, test the bulb or inspect the wire harness.



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.



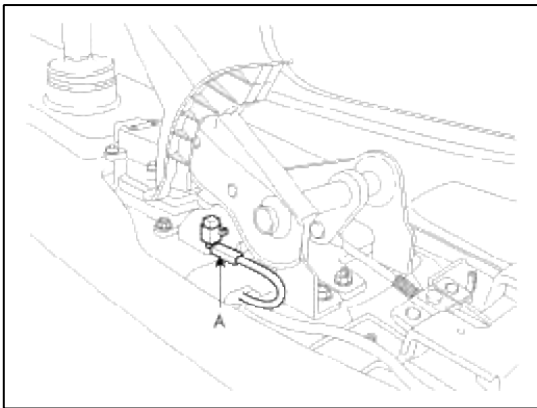
Brake Fluid Level Warning Lamp

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

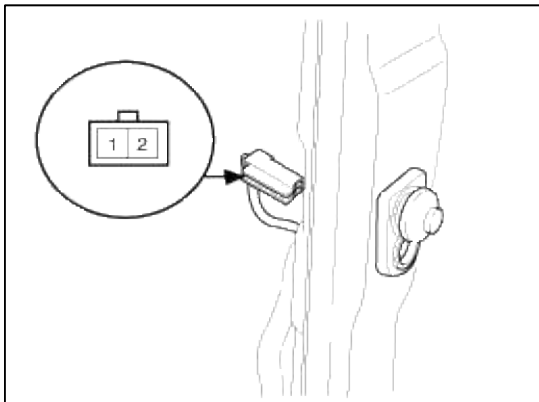
The parking brake switch (A) is a pulling type. It is located under the parking brake lever. To adjust, move the switch mount up and down with the parking brake lever released all the way.

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.



Door Switch

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



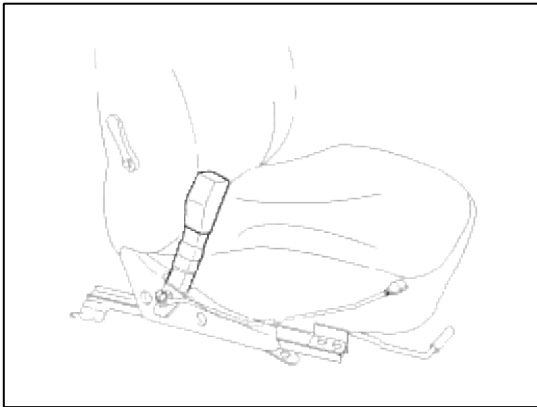
[Front Door Switch]

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 ($\infty\Omega$)
Not fastened	Conductive (Ω)



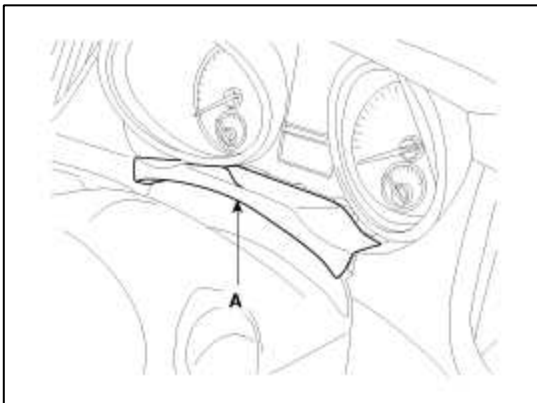
Seat Belt Warning Lamp

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

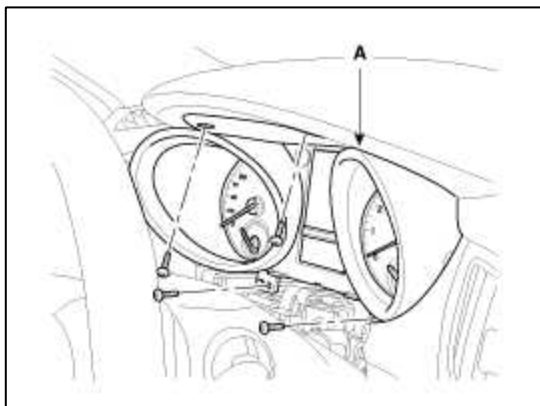
Seat belt condition	Warning lamp
Fastened	OFF
Not fastened	ON

Removal

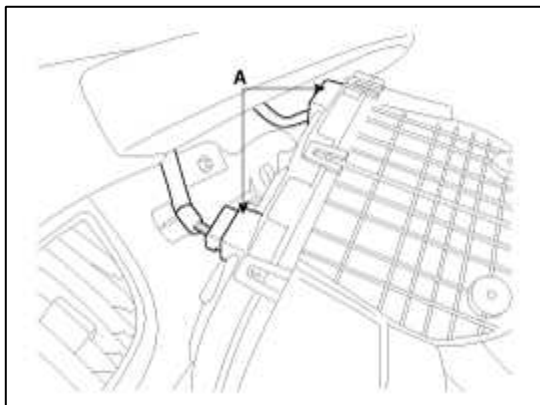
1. Disconnect the negative (-) battery terminal.
2. Tilt the steering column down.
3. Remove the cluster fascia lower panel(A).



4. Remove the cluster(A) after loosening the screws.



5. Disconnect the cluster connector (A), then remove the cluster.



Installation

1. Install the cluster to the cluster housing.
2. Install the cluster fascia lower panel.

Body Electrical System > Indicators And Gauges > Troubleshooting

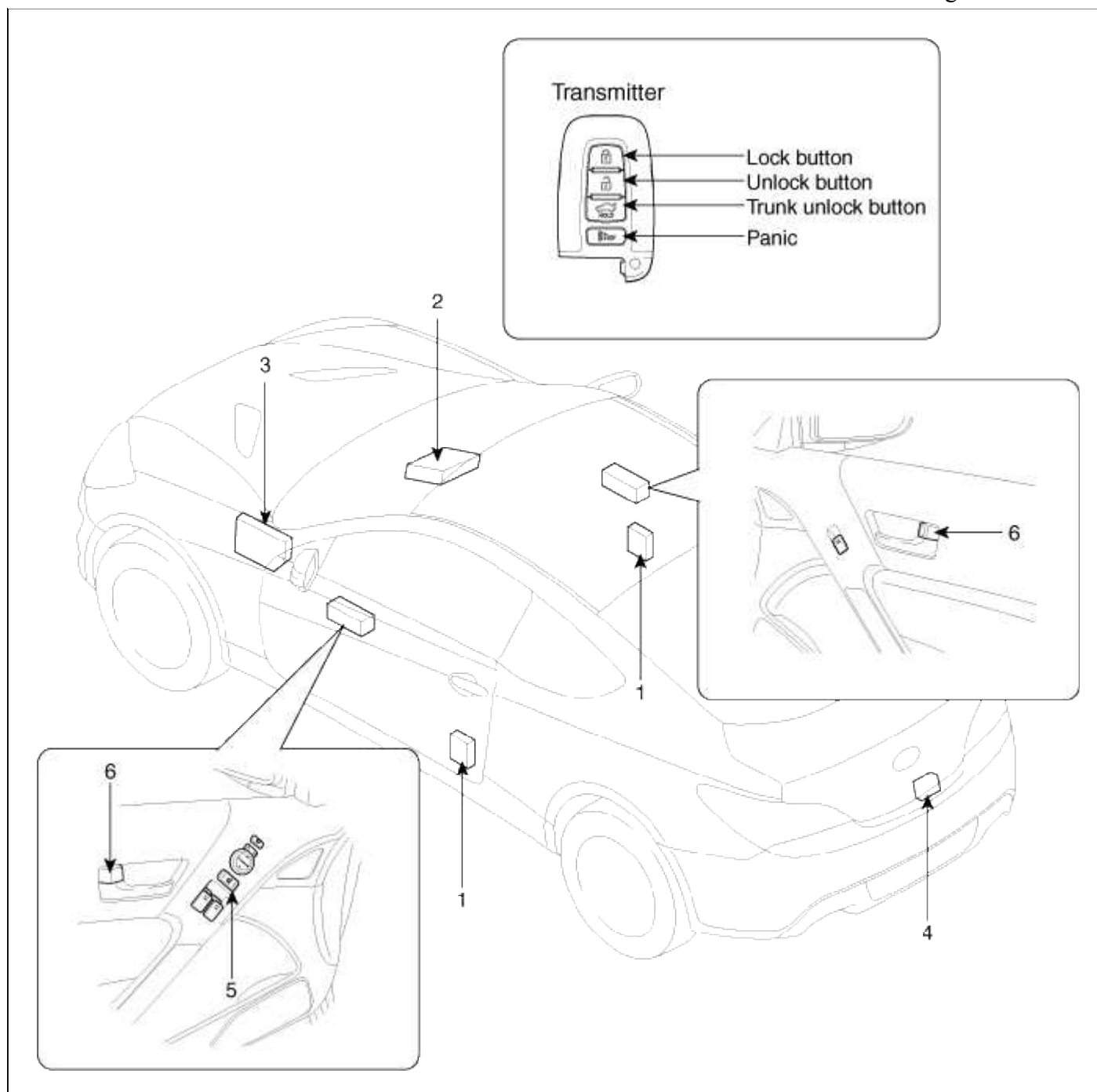
Troubleshooting

Symptom	Possible cause	Remedy
Speedometer does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Speedometer faulty	Check speedometer
	Vehicle speed sensor faulty	Check vehicle speed sensor
	Wiring or ground faulty	Repair if necessary
Tachometer does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	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 gauge does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Water temperature gauge faulty	Check gauge
	Water temperature sender faulty	Check sender
	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
	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
	Brake fluid level warning switch faulty	Check switch
	Parking brake switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Open door warning lamp and trunk lid warning lamp do not light up	Memory fuse (15A) blown	Check for short and replace fuse
	Door switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Seat belt warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Seat belt switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

Body Electrical System > Power Door Locks > Components and Components Location

Component Location



- | | |
|--|-------------------------------|
| 1. Front door lock actuator & switch | 4. Trunk lid release actuator |
| 2. Body control module | 5. Door lock switch |
| 3. Junction box (Door lock/unlock relay) | 6. Door lock knob |

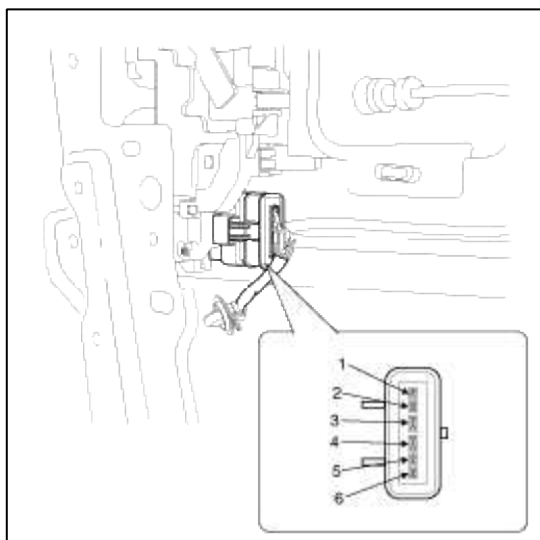
Body Electrical System > Power Door Locks > Power Door Lock Actuators > Repair procedures

Inspection

Front Door Lock Actuator Inspection

1. Remove the front door trim.
(Refer to the Body group - front door)
2. Remove the front door module.

3. Disconnect the 6P connector from the actuator.

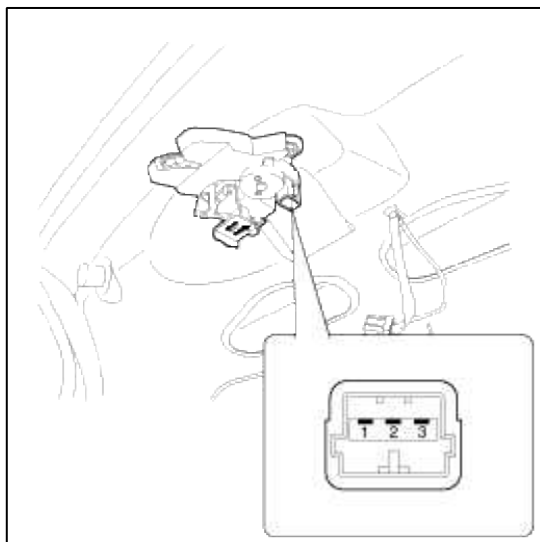


4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Terminal		3	4
Position			
Front left	Lock	⊖	⊕
	Unlock	⊕	⊖
Front right	Lock	⊕	⊖
	Unlock	⊖	⊕

Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.
(Refer to the Body group - trunk lid)
2. Disconnect the 3P connector from the actuator.



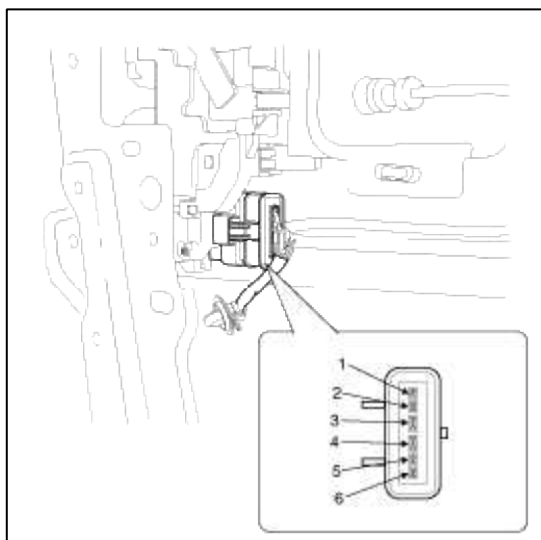
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Terminal		1	2
Position			
Lock release(Open)		⊖	⊕

Front Door Lock Switch Inspection

1. Remove the front door trim panel.
(Refer to the Body group - front door)
2. Remove the front door module.

3. Disconnect the 6P connector from the actuator.

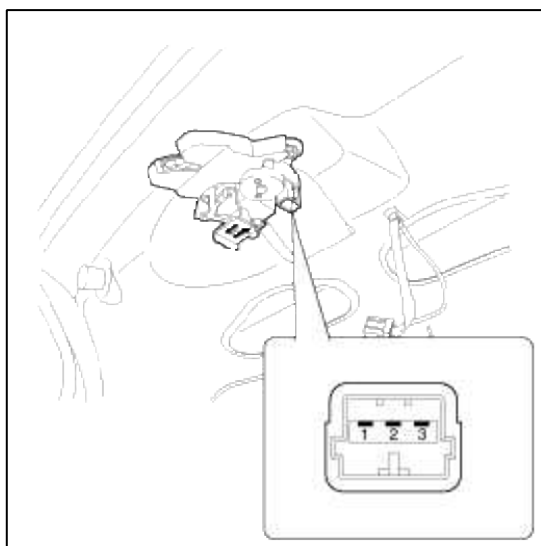


4. Check for continuity between the terminals in each switch position according to the table.

Terminal		5	6	1	2
Position	Lock				
	Unlock	○	○		
Front right	Lock				
	Unlock			○	○

Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim panel. (Refer to the Body group - trunk lid)
2. Disconnect the 3P connector from the actuator.



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

Terminal		1	3
Position	Lock		
	Lock release(Open)	○	○

Body Electrical System > Power Door Locks > Power Door Lock Relay > Repair procedures

Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the junction box.
3. Check for continuity between the terminals.

Door Lock

1. There should be continuity between the No.2 terminal in the I/P-F and No.2 terminal in the I/P-E when power and ground are connected to the No.14 terminal in the I/P-E and No.1 terminal in the I/P-K.
2. There should be no continuity between the No.2 terminal in the I/P-F and No.2 terminal in the I/P-E when power is disconnected.



Terminal	I/P-F (2 or 8)	I/P-E (2)	I/P-E (14)	I/P-K (1)
Power				
Disconnected			○ — ○	
Connected	○ — ○		○ — ○	

Door Unlock

1. There should be continuity between the No.3 terminal in the I/P-F and No.2 terminal in the I/P-E when power and ground are connected to the No.3 terminal in the I/P-E and No.1 terminal in the I/P-E.
2. There should be no continuity between the No.3 terminal in the I/P-F and No.2 terminal in the I/P-E when power is disconnected.



Terminal	I/P-F (3 or 9)	I/P-E (2)	I/P-E (3)	I/P-K (1)
Power				
Disconnected			○ — ○	
Connected	○ — ○		○ — ○	

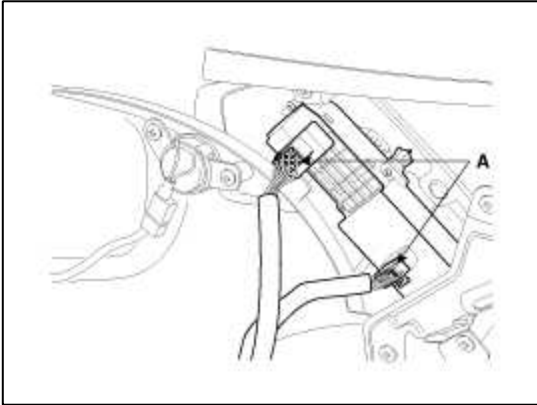
Body Electrical System > Power Door Locks > Power Door Lock Switch > Repair procedures

Replacement

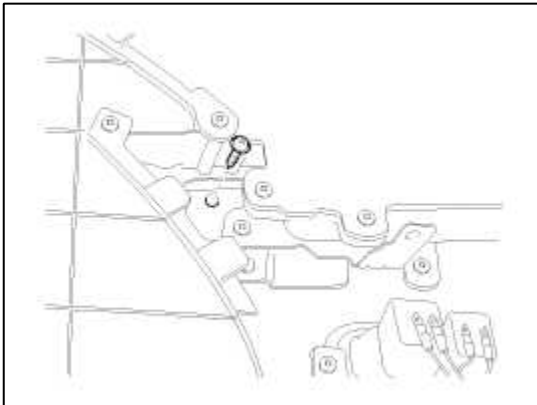
Front Door Lock Switch

1. Disconnect the negative(-) battery terminal.

2. Remove the front door trim panel.
(Refer to Body group - "Front door")
3. Disconnect the module connector(A) from the wiring harness.

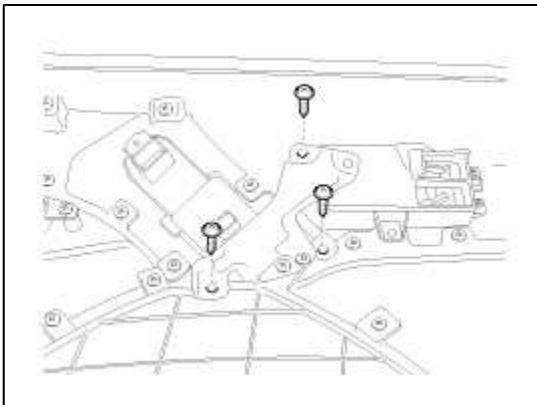


A. Loosen the screw(1EA).



B. Remove the grip handle cover then loosen the upper screw.

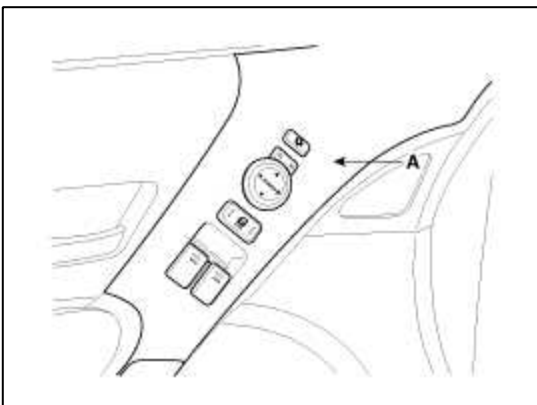
C. Loosen the screws(3EA).



D. Remove the power window switch bracket.

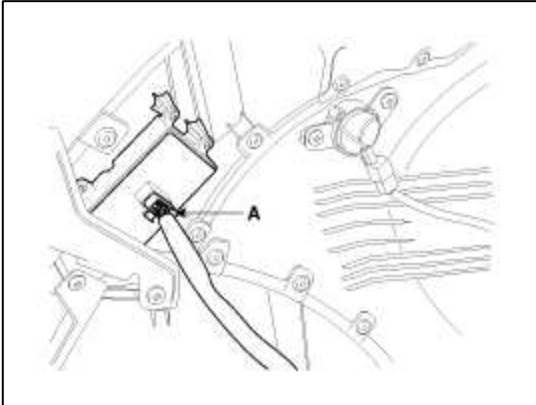
E. Loosen the screws from the bracket.

4. Remove the power window switch module(A) from the front door trim panel.

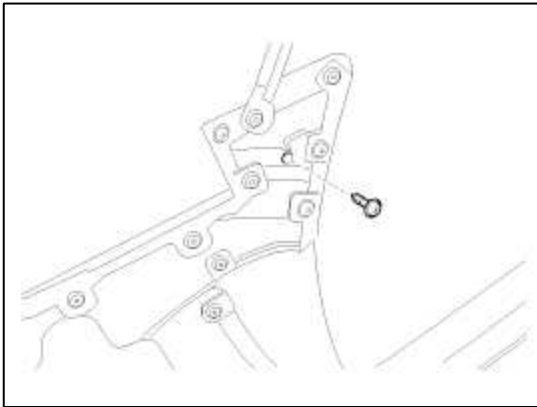


Passenger Door Lock Switch

1. Disconnect the negative(-) battery terminal.
2. Remove the door trim panel.
(Refer to Body group - "Front door")
3. Disconnect the module connector(A).

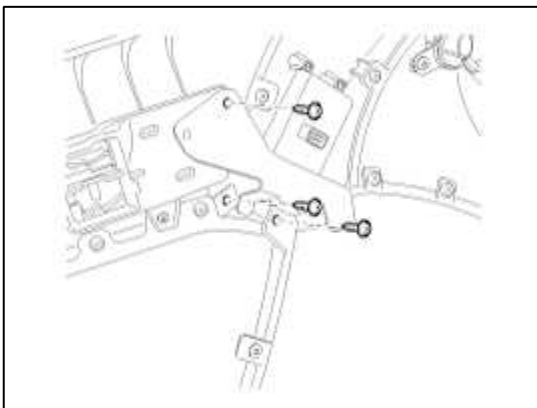


- A. Loosen the screw(1EA).



- B. Remove the grip handle cover then loosen the upper screw.

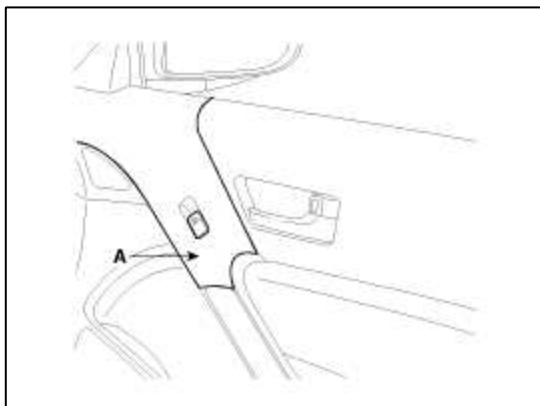
- C. Loosen the screws(3EA).



- D. Remove the power window switch bracket.

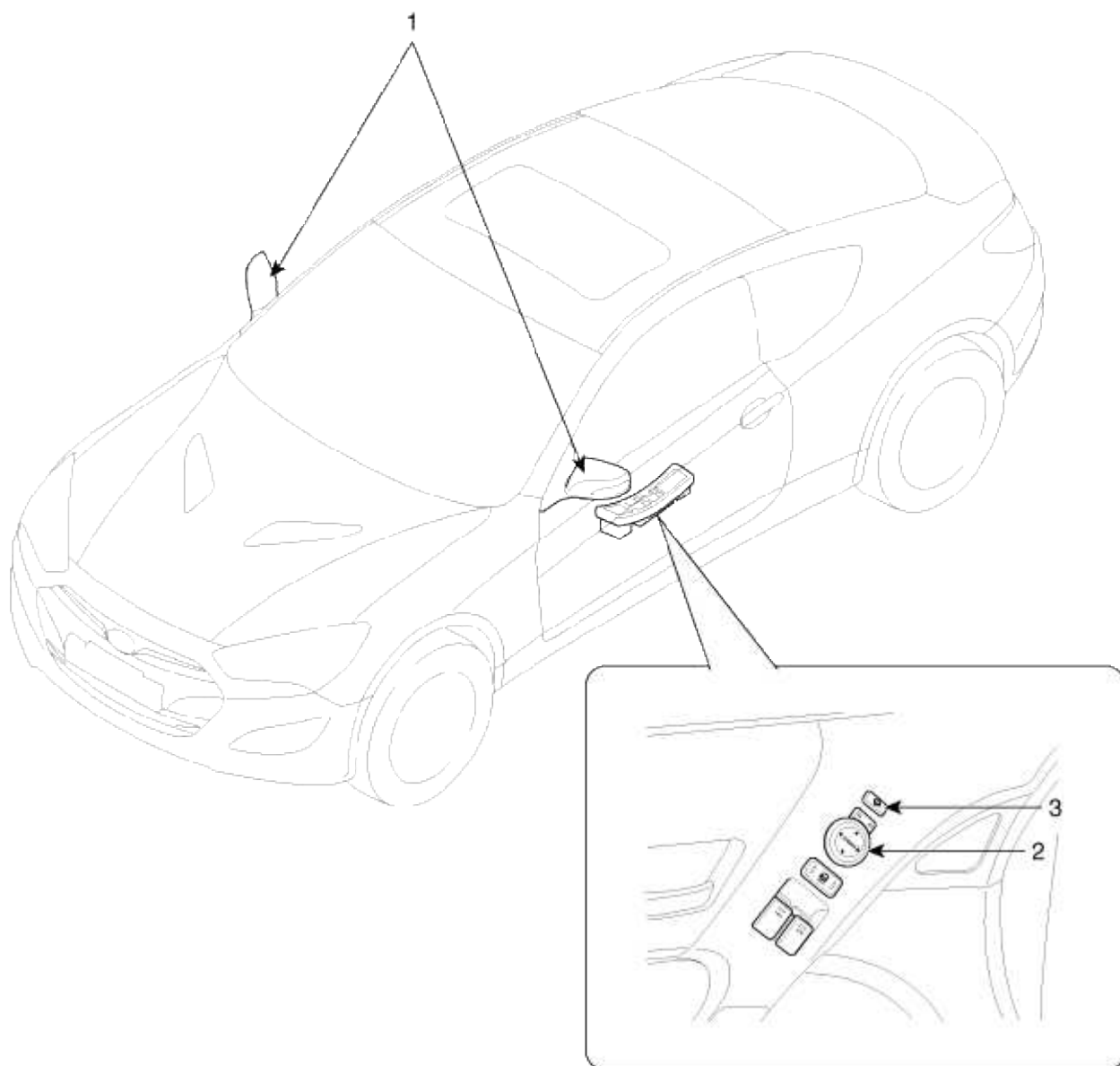
- E. Loosen the screws from the bracket.

4. Remove the power window switch module(A) from the front door trim panel.



Body Electrical System > Power Door Mirrors > Components and Components Location

Component Location

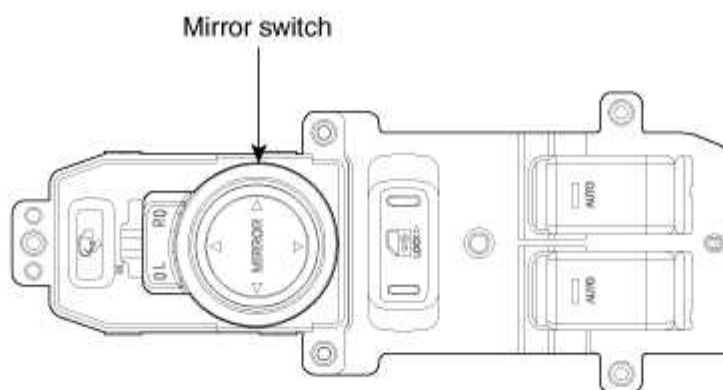


1. Power door mirror

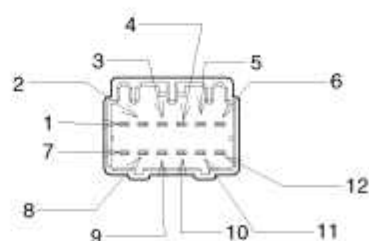
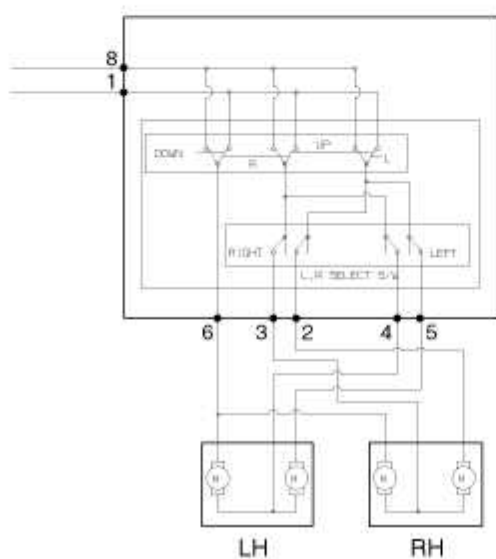
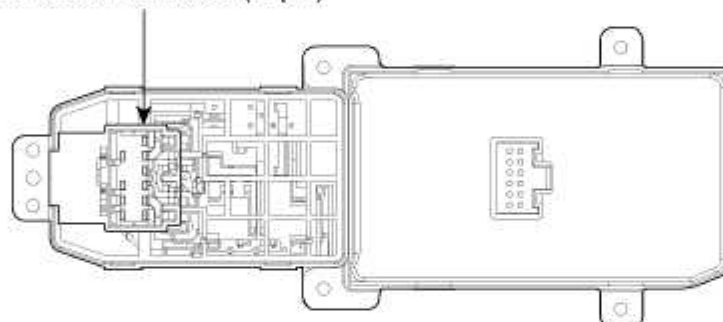
2. Power door mirror
switch

Body Electrical System > Power Door Mirrors > Power Out Side Mirror Switch > Components and Components Location

Component

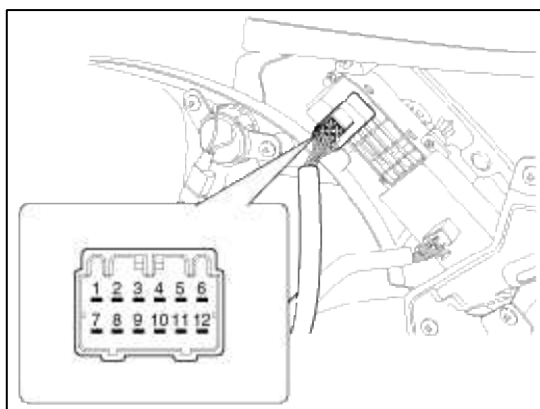


Mirror switch connector (12pin)



Body Electrical System > Power Door Mirrors > Power Out Side Mirror Switch > Repair procedures
Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim panel.
(Refer to the Body group - "Front door")
3. Disconnect the 12P connector from the switch.



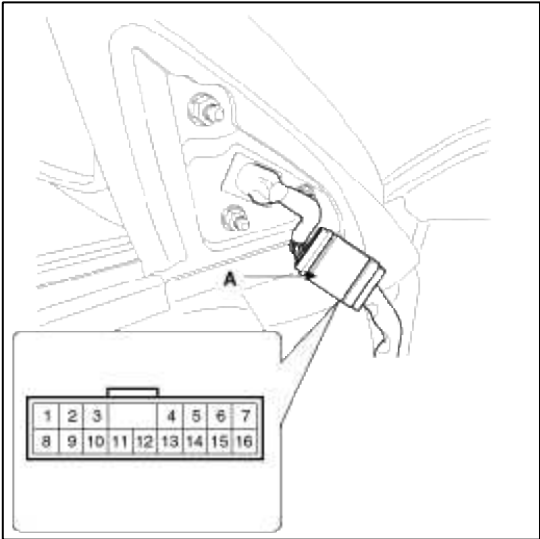
4. Check for continuity between the terminals in each switch position according to the table.

Item	Terminal Position	4	5	3	2	6	1	7	9
Left	UP	○	○			○	○	○	
	DOWN	○	○				○	○	
	OFF	○	○			○	○	○	
	LEFT	○				○	○	○	
	RIGHT	○				○	○	○	
Right	UP			○	○	○	○	○	
	DOWN			○	○		○	○	
	OFF			○	○	○	○	○	
	LEFT			○		○	○	○	
	RIGHT			○		○	○	○	

Body Electrical System > Power Door Mirrors > Power Door Mirror Actuator > Repair procedures
Inspection

1. Remove the front door quadrant delta cover.
(Refer to the Body group - "Front door")

2. Disconnect the power door mirror connector from the harness.



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

Terminal Position	7	16	6	B+	GND
UP	○	○	○	○	○
DOWN	○	○	○	○	○
OFF	○	○	○	○	
RIGHT	○	○	○	○	○
LEFT	○	○	○	○	○

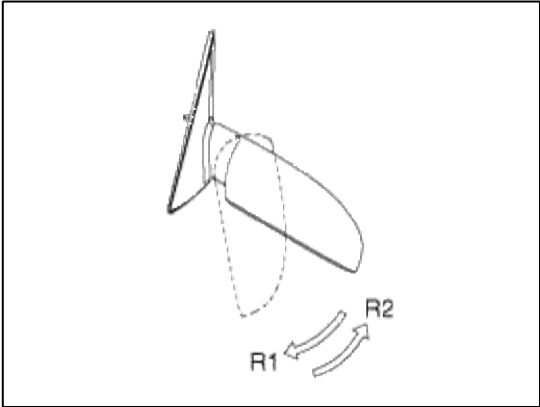
Mirror Heater Inspection

Terminal Position	4	13
Heater	○	○

Side Repeater Lamp

Terminal Position	12	11
Lamp	B	E

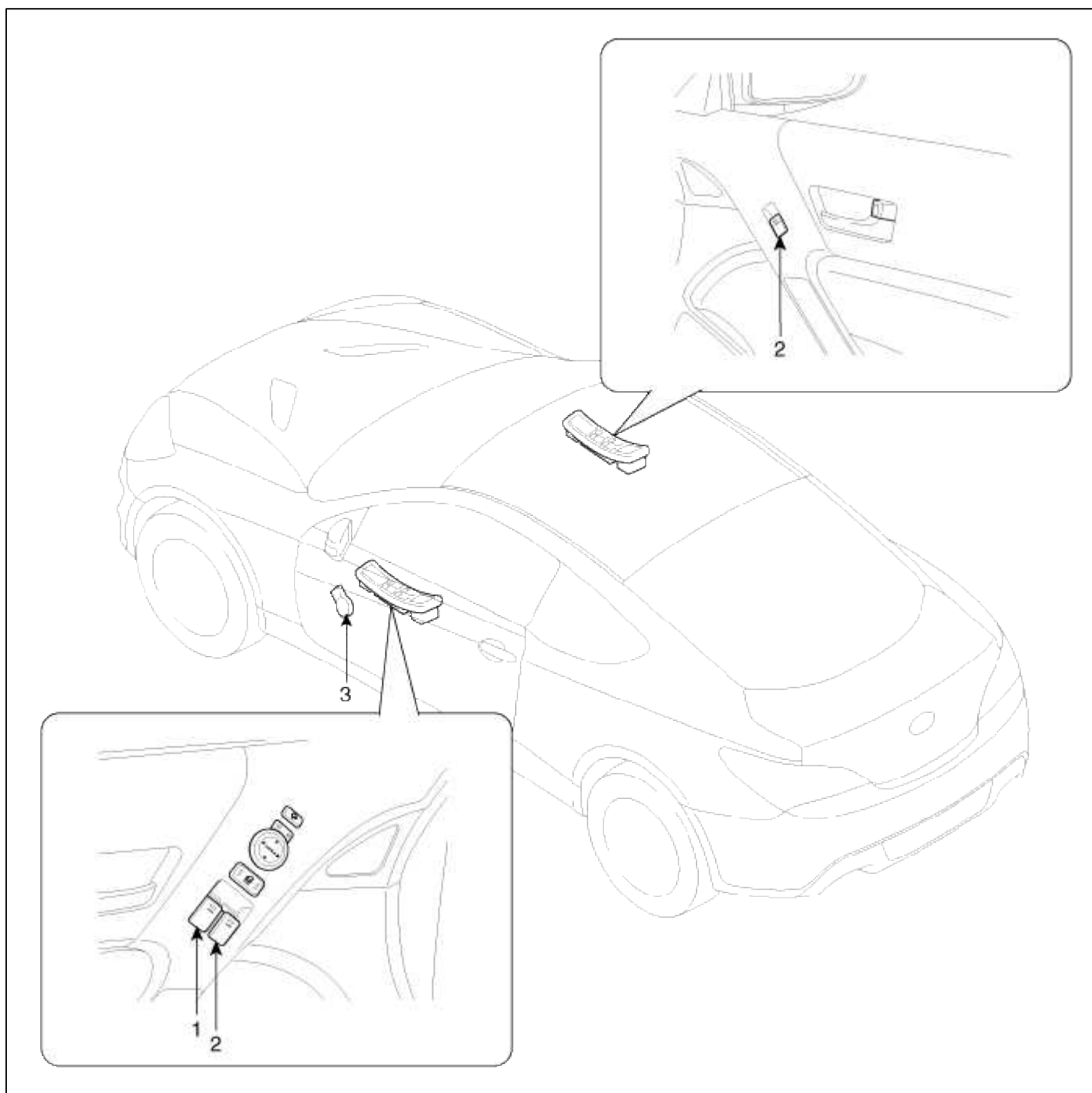
Folding Mirror



Terminal Position	B(+)	GND(-)	14	5
Folding (R1)	○	○	○	○
Unfolding (R2)	○	○	○	○

Body Electrical System > Power Windows > Components and Components Location

Component Location



1. Driver power window main switch
2. Passenger power window switch

3. Front window motor (Safety window)

Body Electrical System > Power Windows > Description and Operation

Function Of Safety Power Window

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

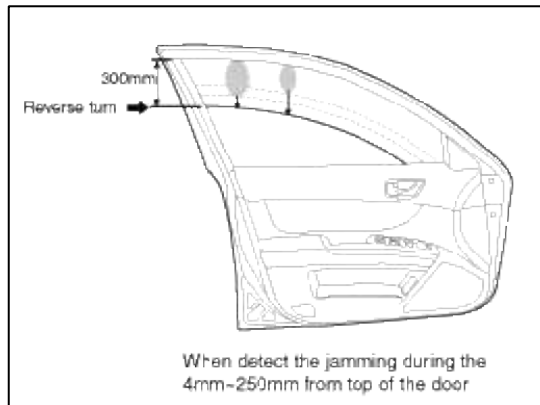
1. Safety function condition

When detect the force of 100N (using the 10N/mm spring) during the window rising, window is reversed.

2. Length of window reversing (except holding the auto-up switch)

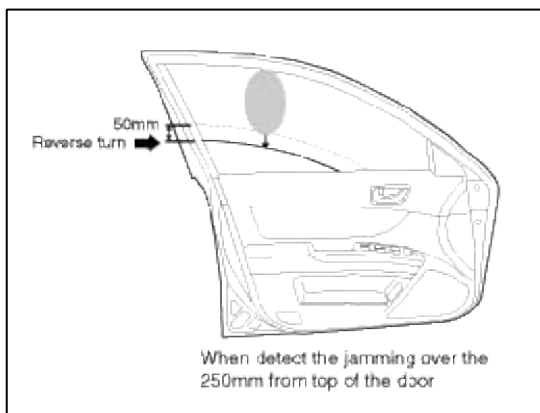
A. When detect the jamming during the 4mm ~ 250mm from top of the door.

→ Window is reversed until 300mm from top of the door.



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

→ Window is reversed until 20mm from jamming position.



3. Length of window reversing (holding the auto-up switch)

A. When detect the jamming during holding the auto-up switch.

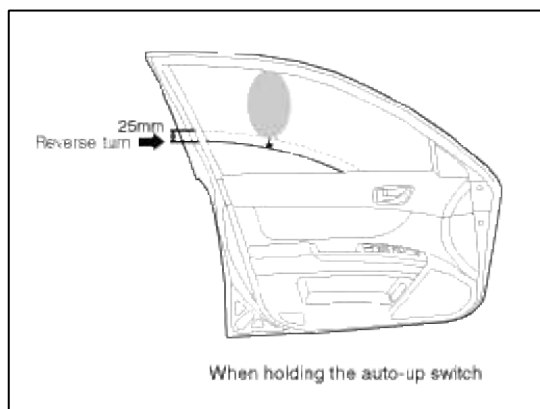
→ Window is reverse until 25mm from jamming position.

B. Auto-up function is not available during the 5 seconds from above condition.

→ When holding the auto-up switch, window is operated as a manual-up function. (Safety function is not activated.)

C. When holding the auto-up switch after 5 seconds from above condition.

→ Window is reverse until 25mm from jamming position.



4. Safety function is not available area

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

Initializing Method Of The Safety Power Window

1. Initializing of Battery Connection

When the battery is not connected the vehicle over the 5 minutes, safety power window switch need the initializing.

(1) Power window operation before initializing

A. Manual-Up/Down function is available

B. Auto-Up function is not available

(When holding the auto-up/down switch, window is operated as a manual-up/down.)

(2) Initializing method

Close the window in window open position, and holding the switch in window full close position over the 0.2 second.

(If start the closing the window in window full close position, initializing could be failed.)

(3) If initialize the safety power window in jamming status, could occur below conditions.

A. Safety function is not available

2. Initializing of fail safe mode

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

(2) Power window operation in fail mode

A. Auto/Manual-Down function is available

B. Auto/Manual-Up function is not available

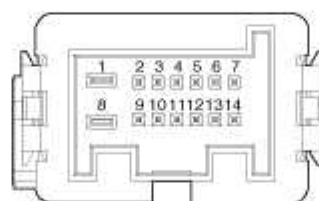
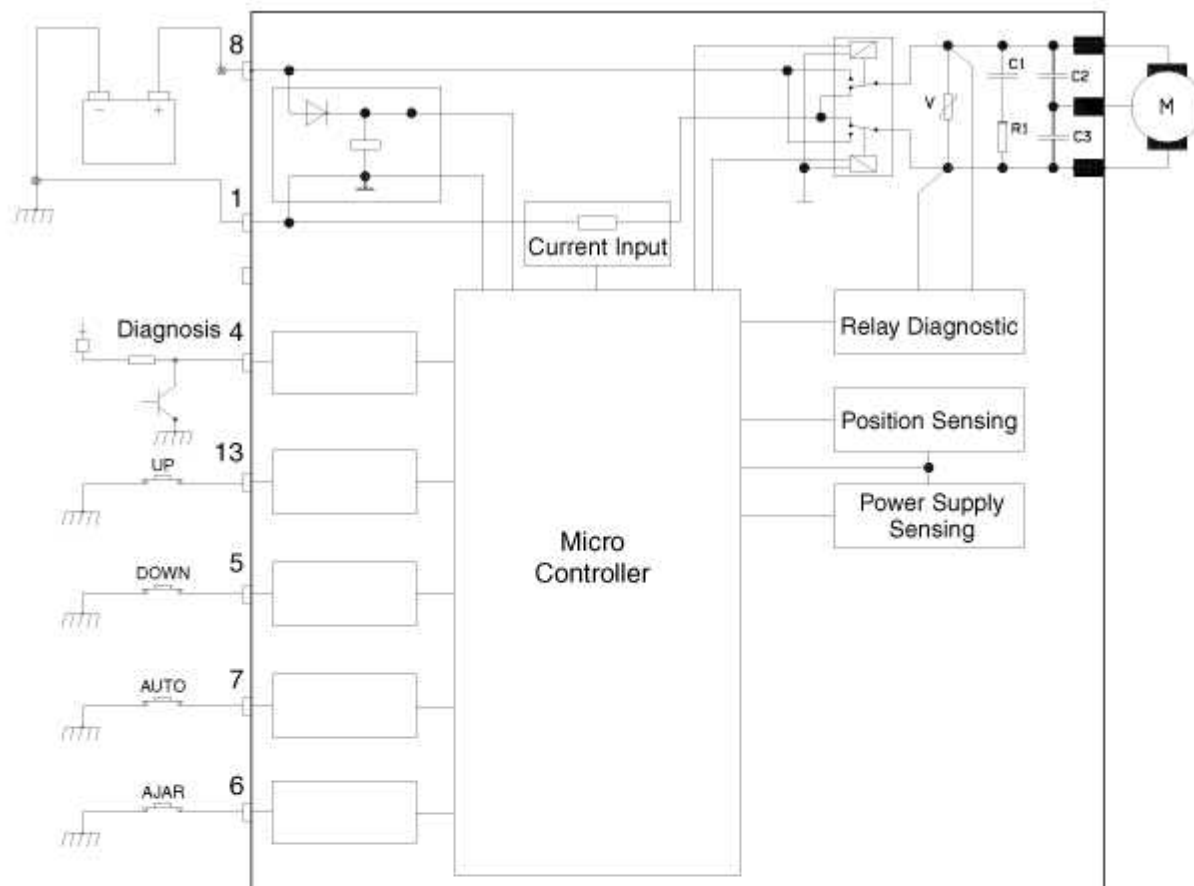
(When auto/manual-up is operated, window is rising 20mm and is stopped the moving.)

Short Drop

The short drop (SD) functionality is linked to the door ajar signal. In case of door opened, the door ajar signal (low level) will be received by the ECU. As a result the upper stop position will be changed from upper mechanical block position to the short drop position (EEPROM parameter). Short drop commandos will be executed independent of multi function line state.

Window lifter behavior due to door ajar signal:

Window	Event	Action
Closed	Door opened → Short drop active	Glass moves down to SD position
Over SD position	Door opened → Short drop active	Glass moves down to SD position
Below SD position	Door opened → Short drop active	Glass will not move, but upper stop position will be changed to SD position
SD position	Door opened → Short drop active	Glass will not move, but upper stop position will be changed to SD position
SD position	Door closed → Short drop inactive	Glass will move to upper block position, upper stop position is equal to mechanical stop SD position
Below SD position	Door closed → Short drop inactive	Glass will not move, but upper stop position will change to mechanical stop position



Pin No.	Name
1	Battery GND
4	Diagnostic Line
5	Down Switch
6	AJAR Switch
7	Auto Switch
8	Battery
13	Up Switch

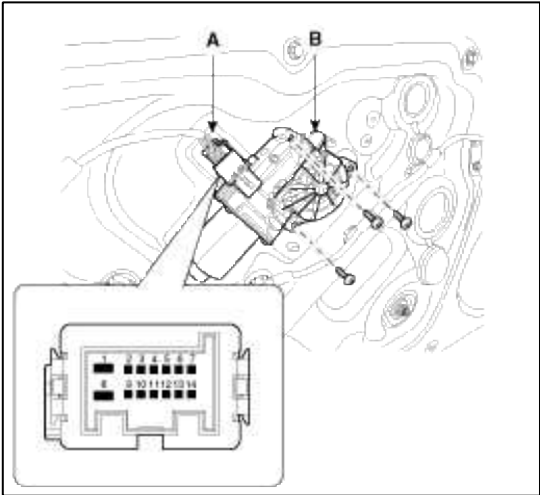
Body Electrical System > Power Windows > Power Window Motor > Repair procedures

Inspection

Front Power Window Motor

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

2. Disconnect the connector from the motor.



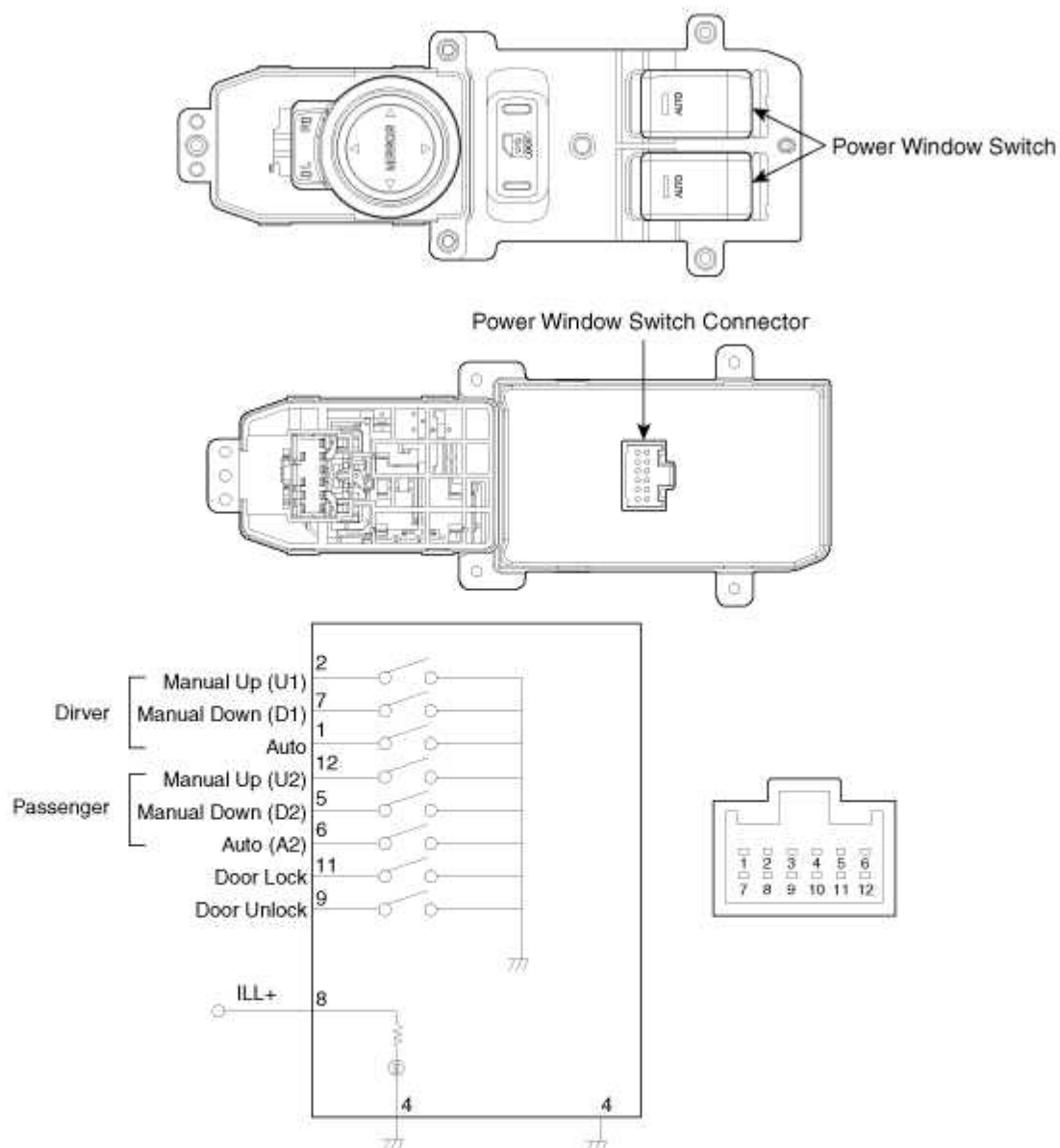
3. Connect the terminal No.4 directly to battery voltage (12V) and check that the motor operates smoothly. If the operation is abnormal, replace the motor.

Terminal Position		13	1(GND)	5
LH	UP	○ — ○		
	DOWN		○ — ○	
RH	UP	○ — ○		
	DOWN		○ — ○	

Body Electrical System > Power Windows > Power Window Switch > Schematic Diagrams

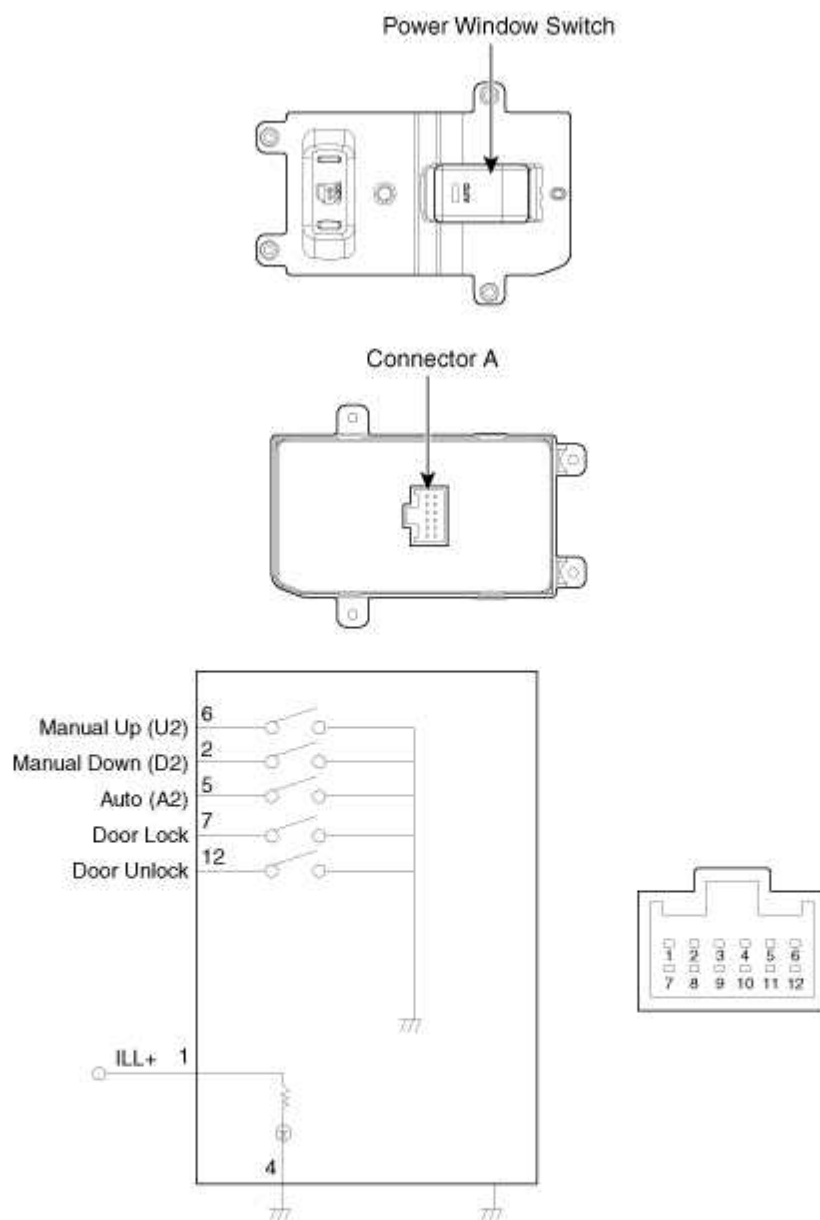
Circuit Diagram

Driver Power Window Switch



Pin No.	Name	Pin No.	Name
1	Auto (Driver)	7	Manual Down (Driver)
2	Manual Up (Driver)	8	ILL (+)
3	-	9	Door Unlock
4	GND	10	-
5	Manual Down (Passenger)	11	Door Lock
6	Auto Down (Passenger)	12	Manual Up (Passenger)

Assist Power Window Switch



Pin No.	Name	Pin No.	Name
1	ILL (+)	7	Door Lock
2	Manual Down	8	-
3	-	9	-
4	GND	10	-
5	Auto	11	-
6	Manual Up	12	Door Unlock

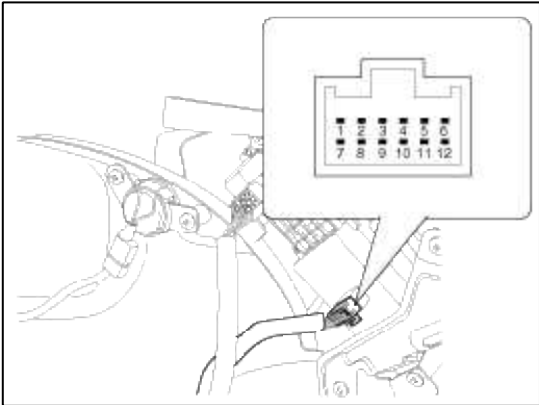
Body Electrical System > Power Windows > Power Window Switch > Repair procedures

Inspection

Power Window Main Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim panel.
(Refer to the Body group - front door)

3. Disconnect the 12P connector from the switch.

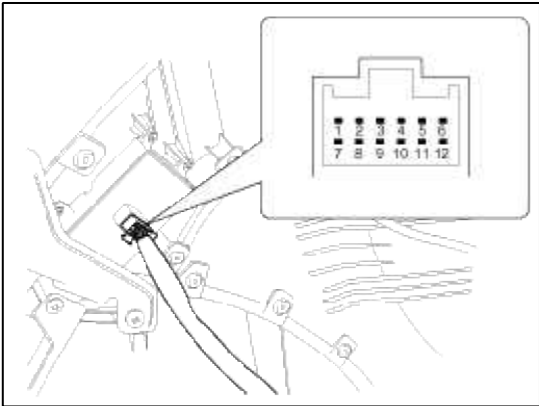


4. Check for continuity between the terminals in each switch position according to the table. If the continuity condition is not normal, replace the switch.

Terminal		1	2	4	5	6	7	12
Position								
Driver	Manual Up		○	○				
	Manual Down			○	○	○	○	
	Auto	○	○					
Passenger	Manual Up			○	○	○	○	
	Manual Down			○	○			
	Auto			○	○			

Assist Power Window Switch Inspection

- 1. Disconnect the negative (-) battery terminal.
- 2. Remove the front door trim panel.
(Refer to the Body group - front door)
- 3. Disconnect the 12P connector from the switch.

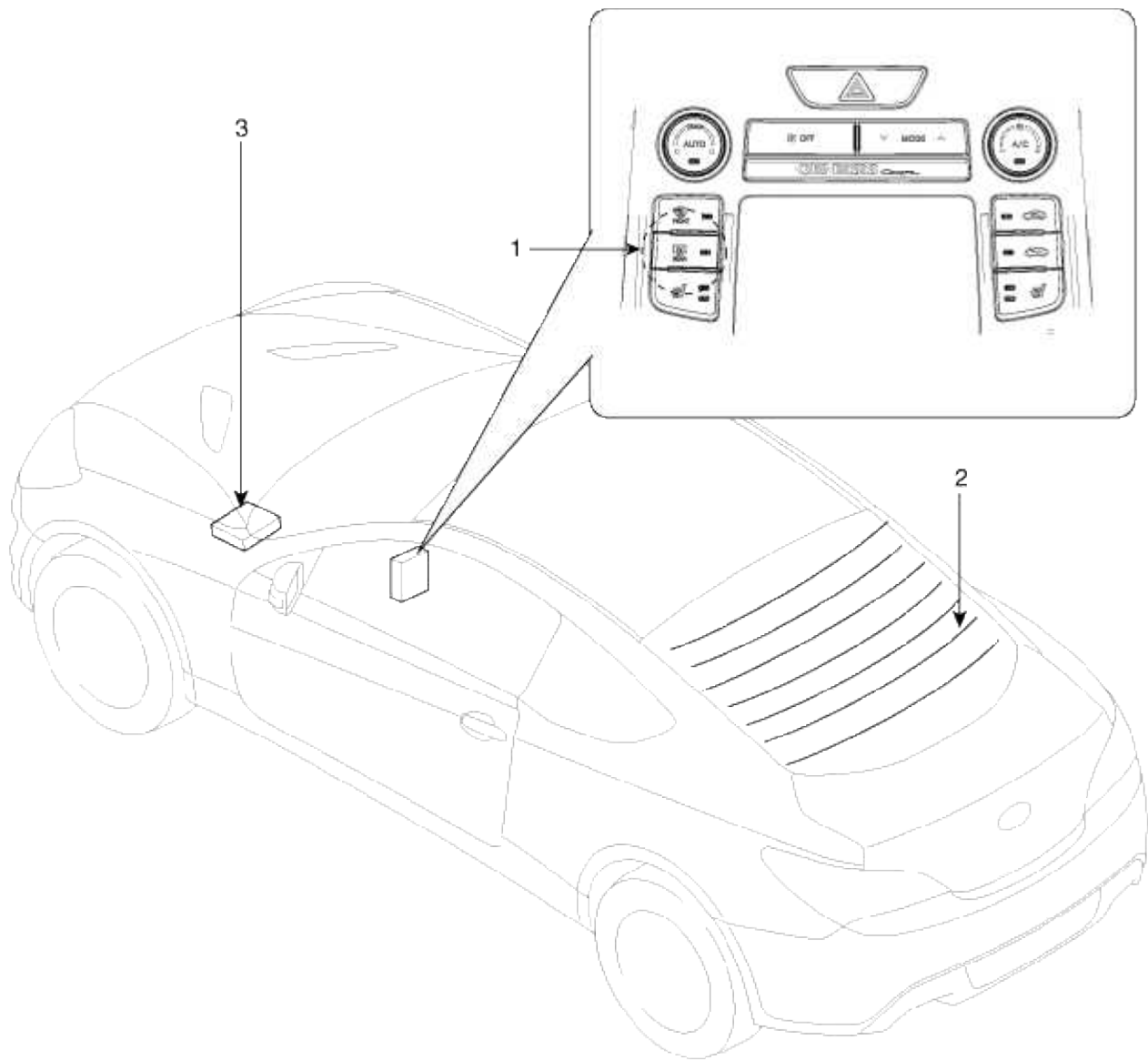


4. Check for continuity between the terminals in each switch position according to the table. If the continuity condition is not normal, replace the switch.

Terminal	2	4	5	6
Position		(GND)		
Manual Up		○	○	○
Manual Down	○	○		
Auto		○	○	

Body Electrical System > Rear Glass Defogger > Components and Components Location

Component Location



1. Rear window defogger switch (A/C controller)
2. Rear window defogger

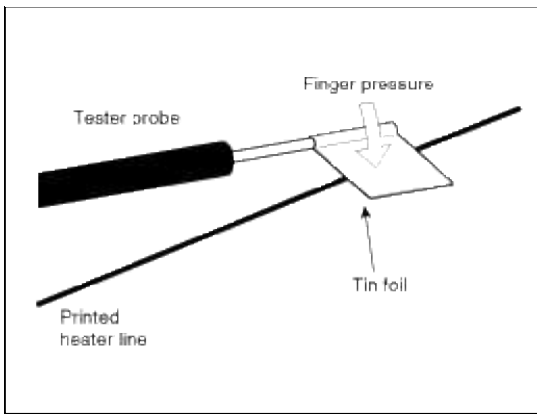
3. Body control module (Rear window defogger relay)

Body Electrical System > Rear Glass Defogger > Rear Glass Defogger Printed Heater > Repair procedures

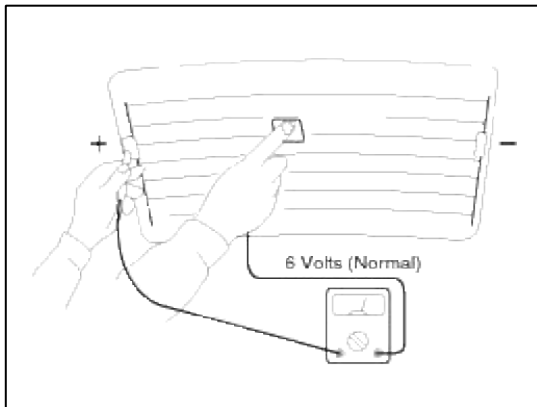
Inspection

CAUTION

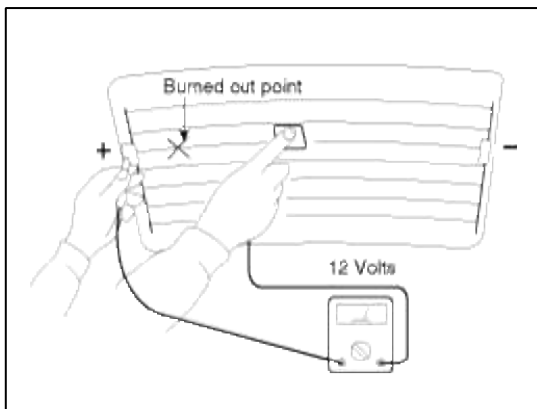
Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply finger pressure on the tin foil, moving the tin foil along the grid line to check for open circuits.



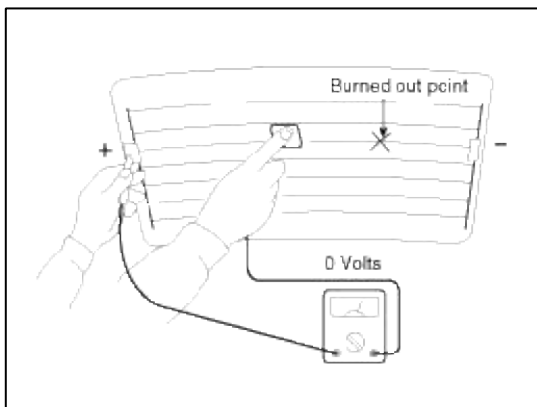
1. Turn on the defogger switch and use a voltmeter to measure the voltage of each heater line at the glass center point. If a voltage of approximately 6V is indicated by the voltmeter, the heater line of the rear window is considered satisfactory.



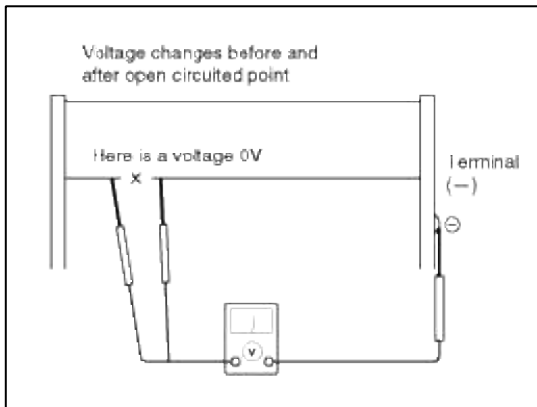
2. If a heater line is burned out between the center point and (+) terminal, the voltmeter will indicate 12V.



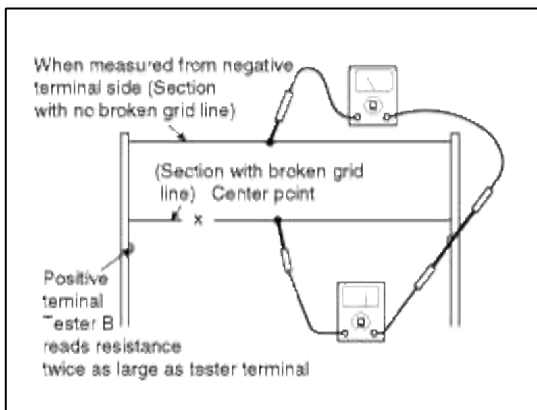
3. If a heater line is burned out between the center point and (-) terminal, the voltmeter will indicate 0V.



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.

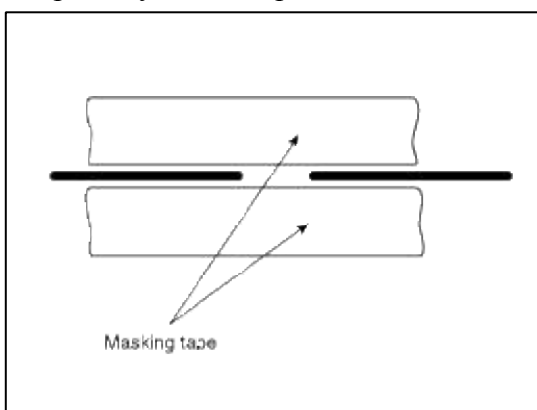


Repair Of Broken Heater Line

Prepare the following items:

1. Conductive paint.
2. Paint thinner.
3. Masking tape.
4. Silicone remover.
5. Using a thin brush:

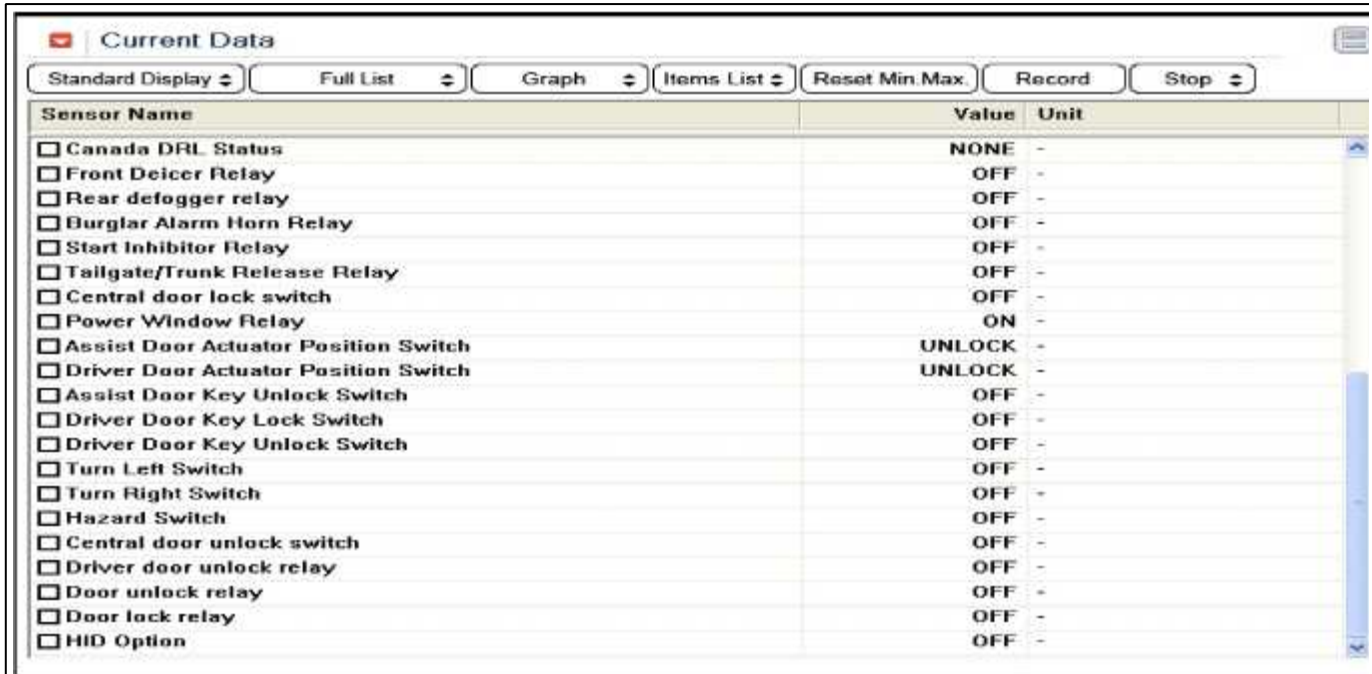
Wipe the glass adjacent to the broken heater line, clean with silicone remover and attach the masking tape as shown. Shake the conductive paint container well, and apply three coats with a brush at intervals of about 15 minutes apart. Remove the tape and allow sufficient time for drying before applying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



Body Electrical System > Rear Glass Defogger > Rear Glass Defogger Switch > Repair procedures

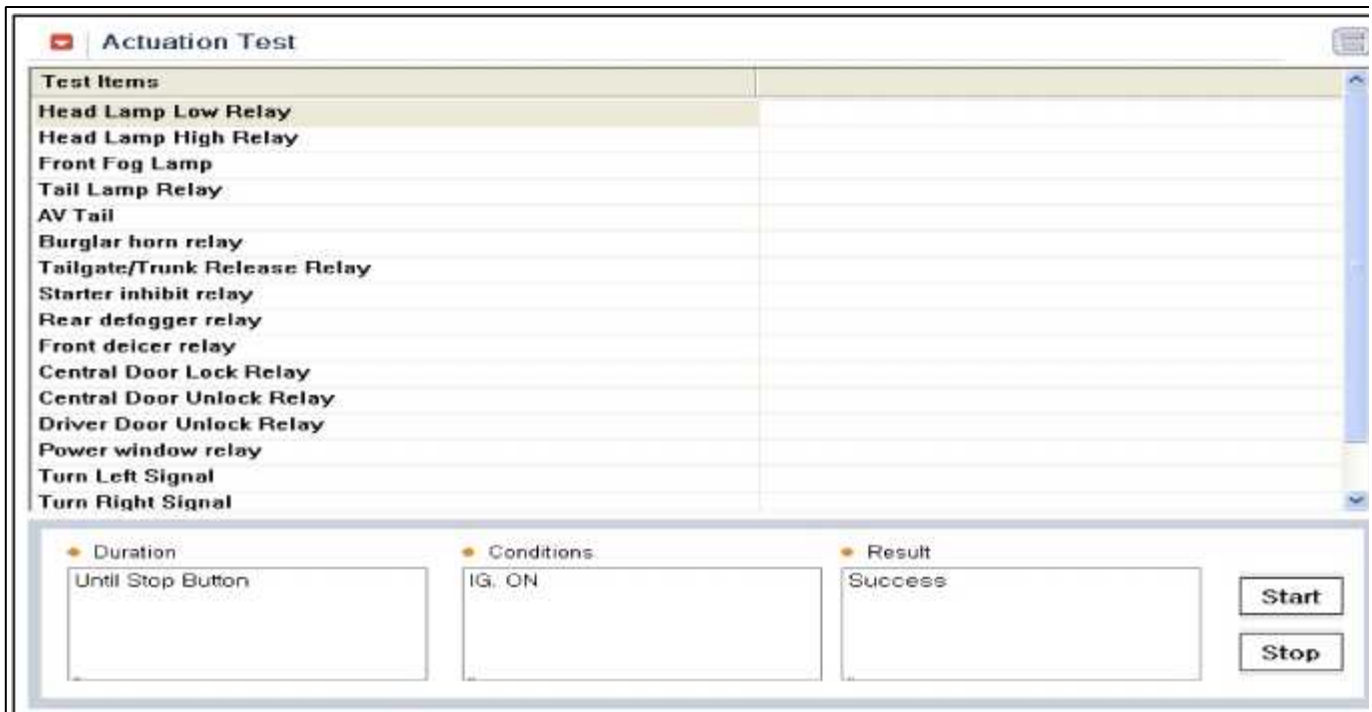
Inspection

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 rear defogger relay.



Sensor Name	Value	Unit
<input type="checkbox"/> Canada DRL Status	NONE	-
<input type="checkbox"/> Front Deicer Relay	OFF	-
<input type="checkbox"/> Rear defogger relay	OFF	-
<input type="checkbox"/> Burglar Alarm Horn Relay	OFF	-
<input type="checkbox"/> Start Inhibitor Relay	OFF	-
<input type="checkbox"/> Tailgate/Trunk Release Relay	OFF	-
<input type="checkbox"/> Central door lock switch	OFF	-
<input type="checkbox"/> Power Window Relay	ON	-
<input type="checkbox"/> Assist Door Actuator Position Switch	UNLOCK	-
<input type="checkbox"/> Driver Door Actuator Position Switch	UNLOCK	-
<input type="checkbox"/> Assist Door Key Unlock Switch	OFF	-
<input type="checkbox"/> Driver Door Key Lock Switch	OFF	-
<input type="checkbox"/> Driver Door Key Unlock Switch	OFF	-
<input type="checkbox"/> Turn Left Switch	OFF	-
<input type="checkbox"/> Turn Right Switch	OFF	-
<input type="checkbox"/> Hazard Switch	OFF	-
<input type="checkbox"/> Central door unlock switch	OFF	-
<input type="checkbox"/> Driver door unlock relay	OFF	-
<input type="checkbox"/> Door unlock relay	OFF	-
<input type="checkbox"/> Door lock relay	OFF	-
<input type="checkbox"/> HID Option	OFF	-

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



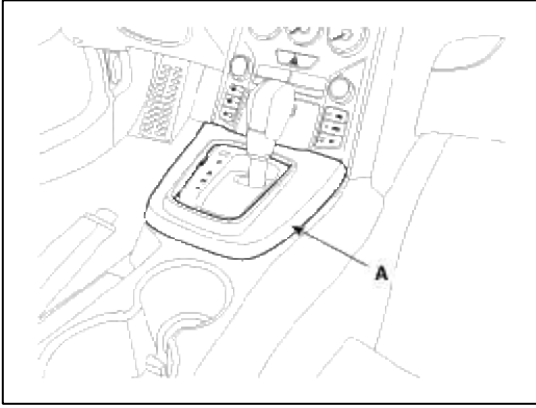
Test Items
Head Lamp Low Relay
Head Lamp High Relay
Front Fog Lamp
Tail Lamp Relay
AV Tail
Burglar horn relay
Tailgate/Trunk Release Relay
Starter inhibit relay
Rear defogger relay
Front deicer relay
Central Door Lock Relay
Central Door Unlock Relay
Driver Door Unlock Relay
Power window relay
Turn Left Signal
Turn Right Signal

<p>● Duration</p> <p>Until Stop Button</p>	<p>● Conditions</p> <p>IG. ON</p>	<p>● Result</p> <p>Success</p>	<p>Start</p> <p>Stop</p>
--	-----------------------------------	--------------------------------	--------------------------

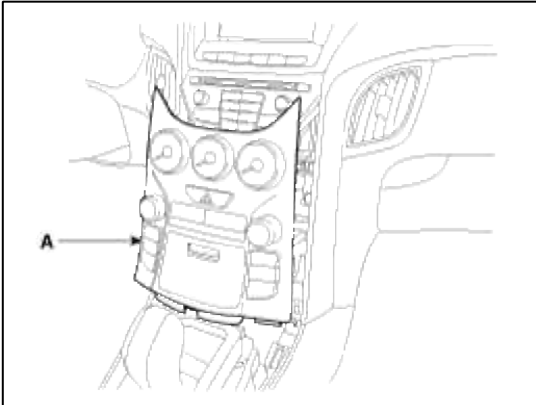
Removal

1. Disconnect the negative(-) battery terminal.

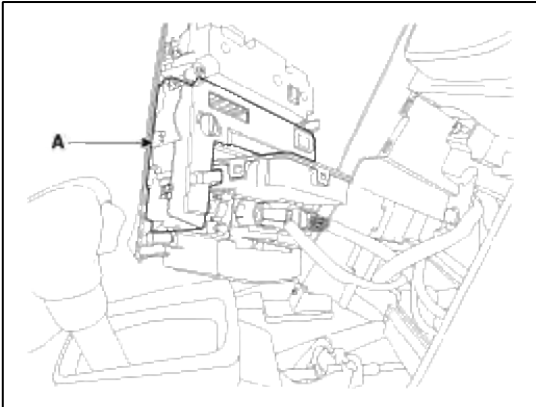
2. Remove the console upper cover (A).
(Refer to the BD group - "Console")



3. Remove the center fascia lower panel (A).
(Refer to the BD group - "Crash pad")



4. Disconnect the heater control unit (A) connectors and cables.



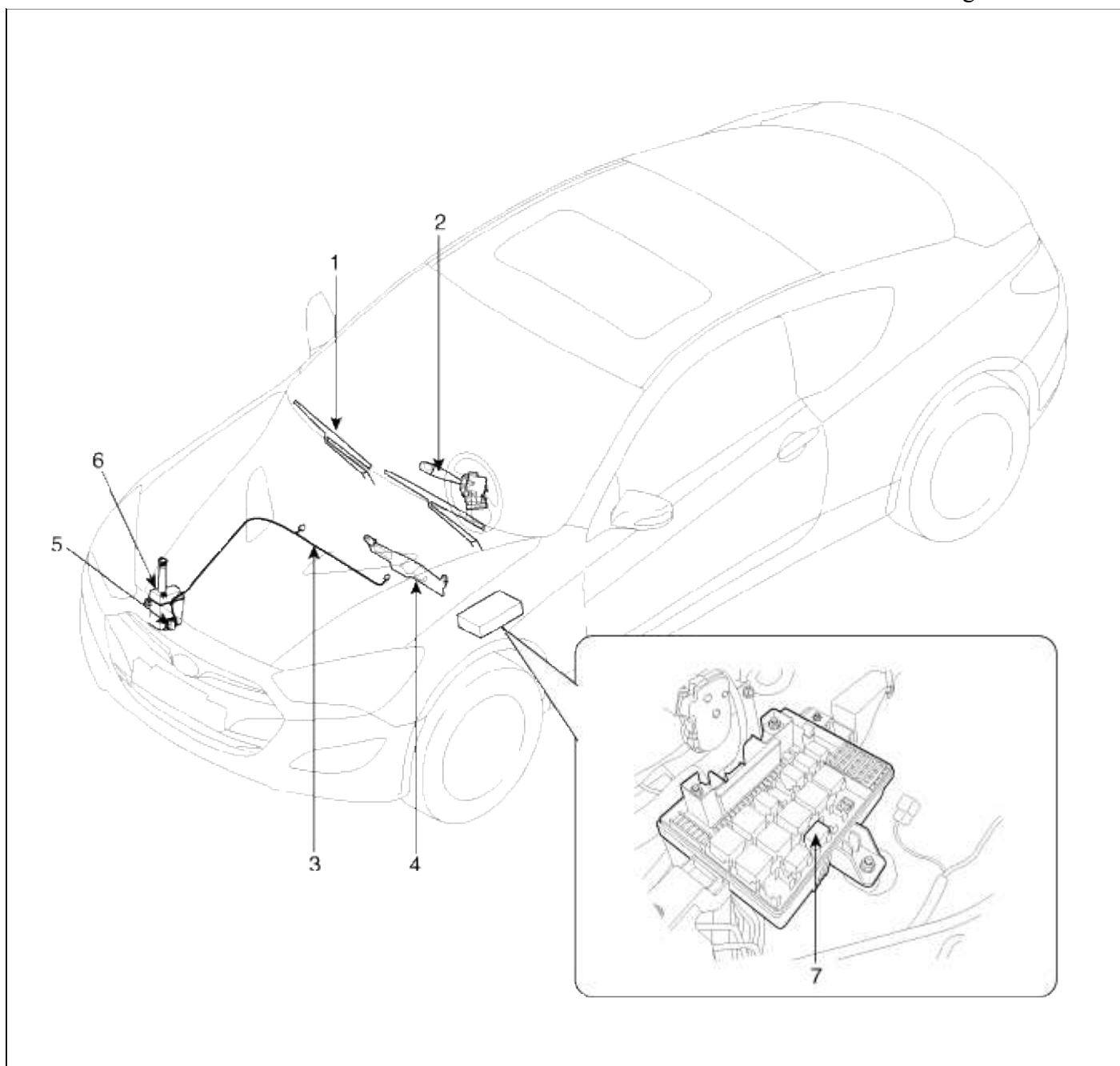
5. Remove the heater control unit contained the rear window defogger switch from the center fascia panel.

Installation

1. Install the heater control unit.
2. Install the center fascia lower panel.
3. Install the console upper cover.

Body Electrical System > Windshield Wiper/Washer > Components and Components Location

Component Location

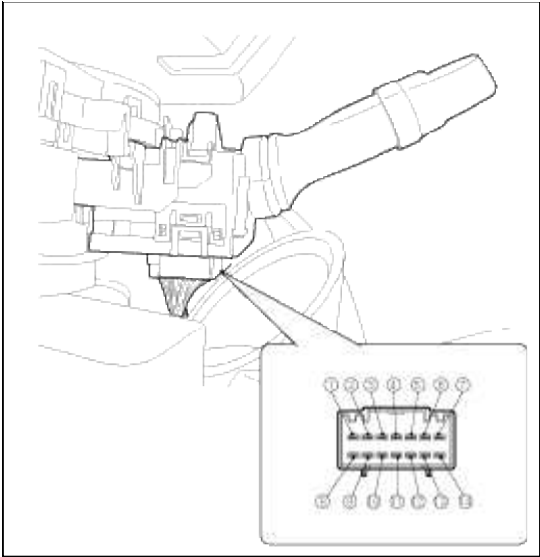


- | | |
|-------------------------------------|--|
| 1. Windshield wiper arm & blade | 5. Washer motor |
| 2. Wiper & washer switch | 6. Washer reservoir |
| 3. Windshield washer hose | 7. Wiper relay (Engine room relay box) |
| 4. Windshield wiper motor & linkage | |

Body Electrical System > Windshield Wiper/Washer > Windshield Wiper-Washer Switch > Repair procedures

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

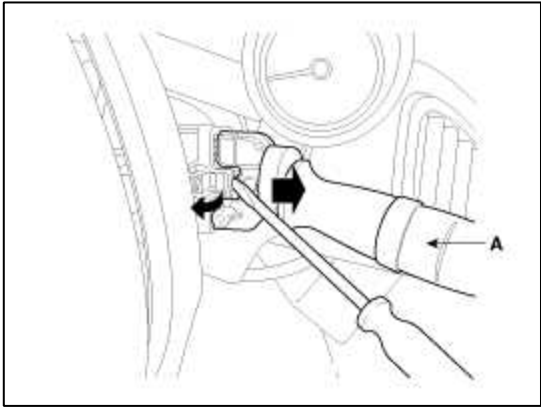
Terminal Position	3	9	2	8	10	1	4	5
MIST								
OFF								
INT								
LOW								
HI								

Washer Switch

Terminal Position	10	11
OFF		
ON		

Removal

- 1. Remove the steering column upper and lower shrouds after removing 3 screws.
- 2. Remove the wiper switch(A) by releasing the part.

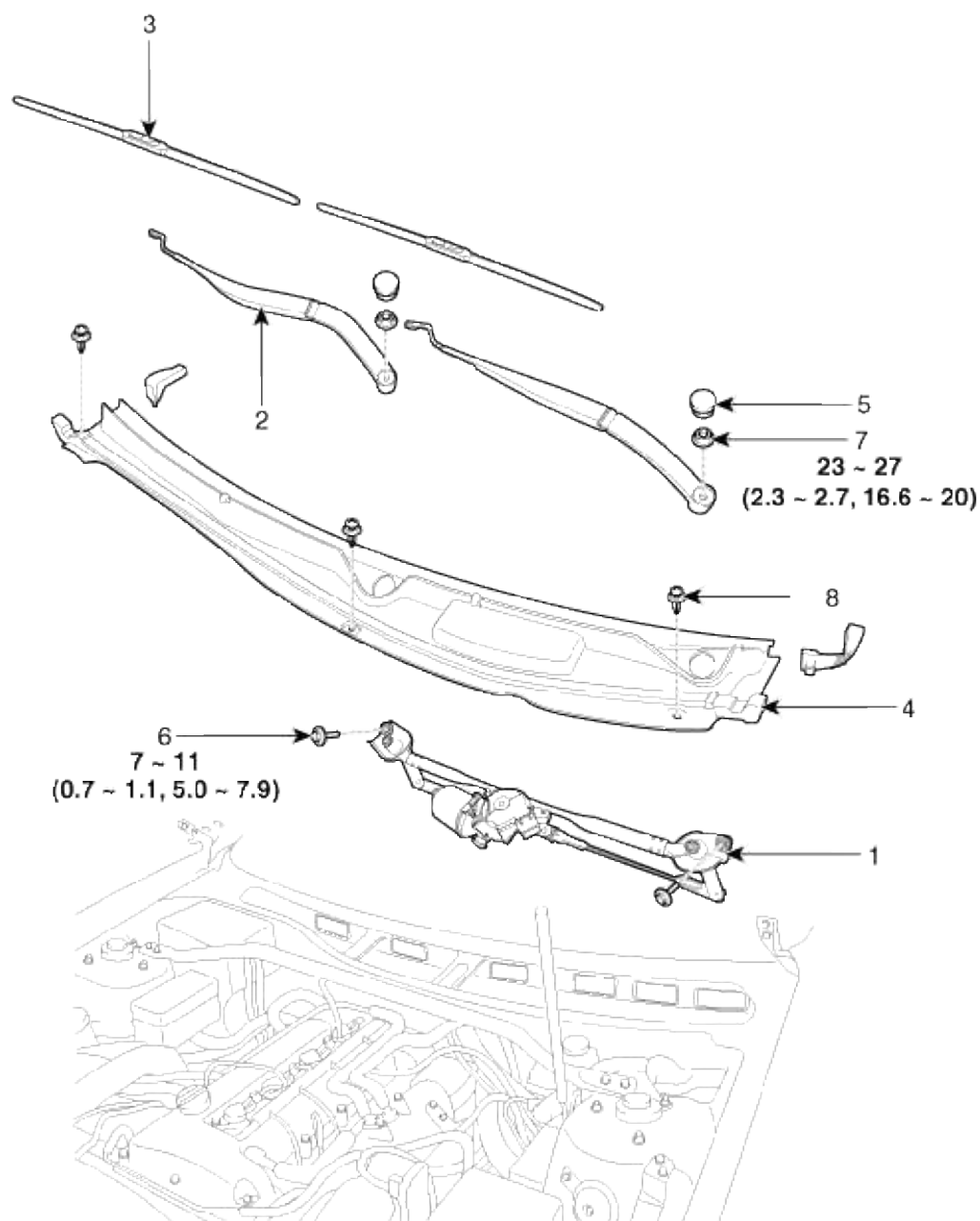


Installation

- 1. Install the wiper switch.
- 2. Install the steering column upper and lower shrouds.

Body Electrical System > Windshield Wiper/Washer > Front Wiper Motor > Components and Components Location

Component Location



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

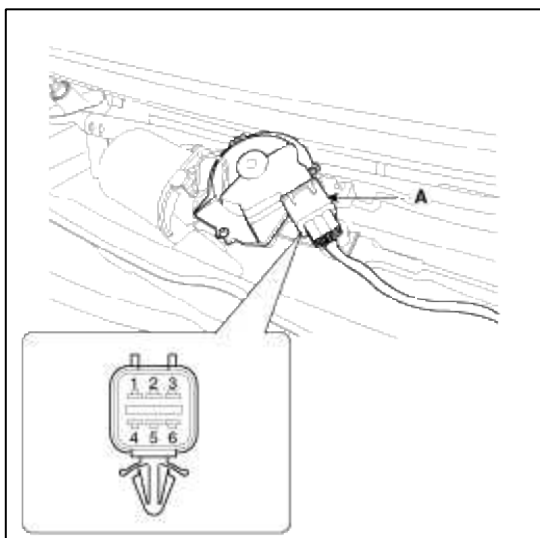
1. Wiper motor & linkage assembly	5. Cap
2. Wiper arm	6. Bolt
3. Wiper blade	7. Nut
4. Cowl top cover	8. Rivet

Body Electrical System > Windshield Wiper/Washer > Front Wiper Motor > Repair procedures

Inspection

Speed Operation Check

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

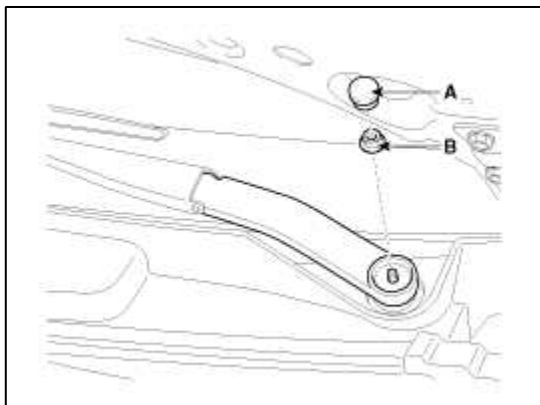


2. Attach the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 2.
3. Check that the motor operates properly.

Terminal Position	4	5	3	1
OFF	○	○	○	○
LOW		○	○	○
HIGH		○	○	

Removal

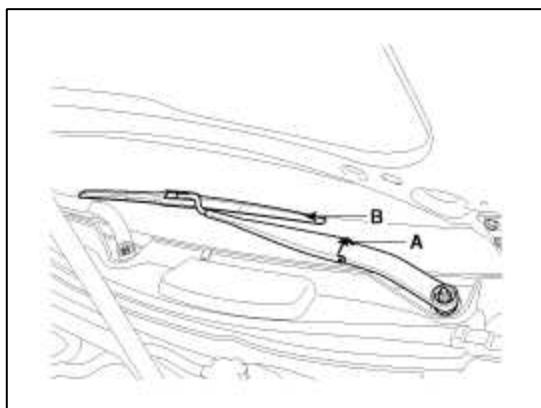
1. Remove the wiper arm mounting nut (B) after removing the wiper cap (A).



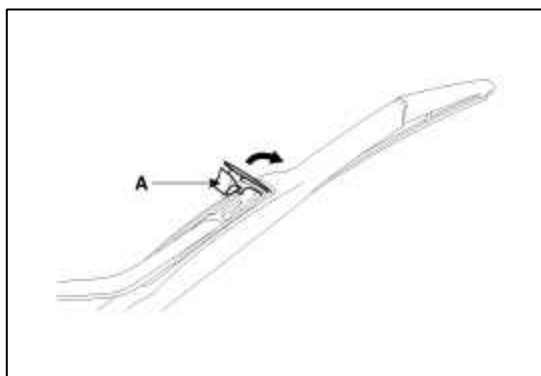
2. Remove the windshield wiper arm (A) and blade (B).

Tightening torque :

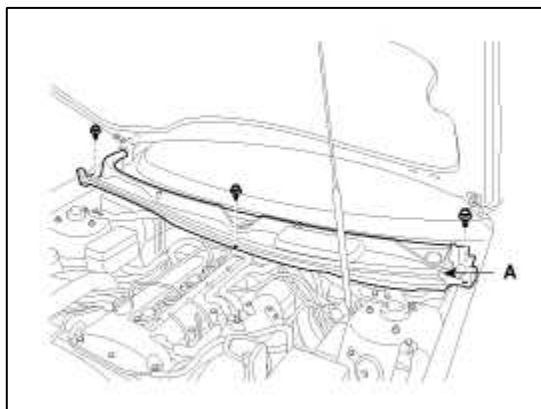
23~27 Nm (2.3~2.7 kgf.m, 16.6~20 lbf.ft)



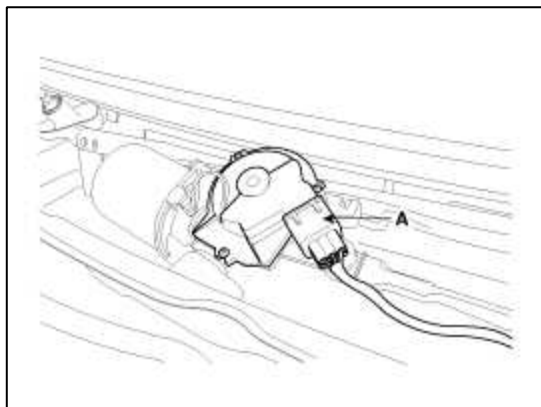
3. If necessary of removing the wiper blade, push in the bottom of the wiper blade clip (A) and remove the wiper blade from the inside radius of the wiper arm.



4. Remove the weather strip then remove the cowl top cover (A) after removing 3 rivets.



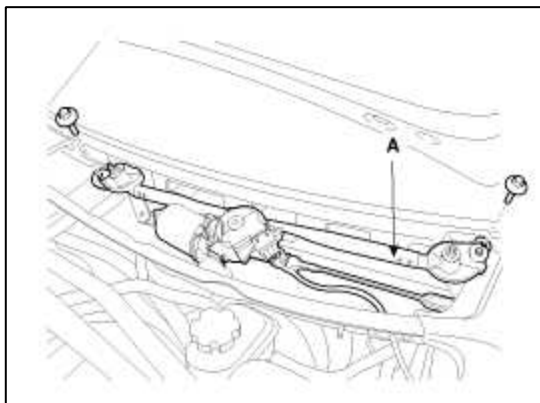
5. Disconnect the wiper motor connector (A).



6. Remove the windshield wiper motor and linkage assembly (A) after removing 2 bolts.

Tightening torque :

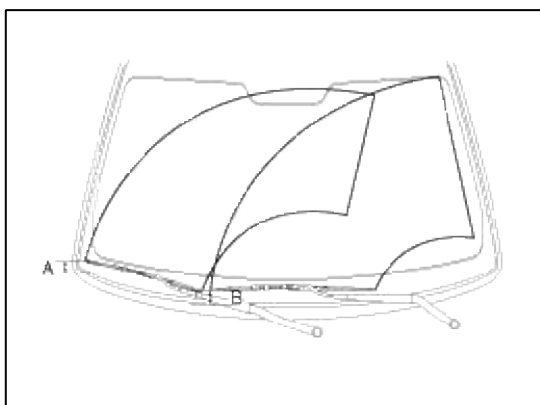
7~11Nm (0.7~1.1, kgf.m, 5.0~7.9 lbf.ft)



Installation

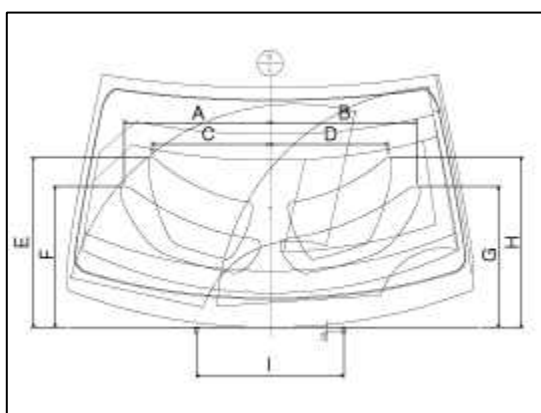
1. Install the wiper arm and blade to the specified position.

Specified position	A	B
Distance [in (mm)]	1.49 ± 0.2 (38 ± 5)	1.97 ± 0.2 (50.1 ± 5)



2. Set the washer nozzle on the specified spray position.

Specified position	Distance [in (mm)]
A	21.1 (535)
B	21.1 (535)
C	17.0 (432)
D	17.0 (432)
E	24.4 (620)
F	20.3 (515)
G	20.3 (515)
H	24.4 (620)
I	21.3 (540)



Body Electrical System > Windshield Wiper/Washer > Front Washer Motor > Repair procedures

Inspection

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

NOTE

Before filling the reservoir tank with water, check the filter for foreign material or contamination. if necessary, clean the filter.

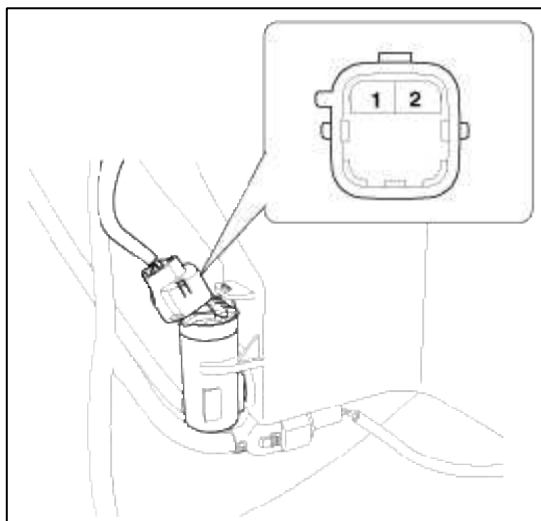
2. Connect positive (+) battery cables to terminal 1 and negative (-) battery cables to terminal 2 respectively.

3. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles.

4. If they are abnormal, replace the washer motor.

Connector No.1 : Windshield washer(+),

2 : Ground



Washer Fluid Level Sensor Switch

1. Disconnect the negative(-) battery terminal.

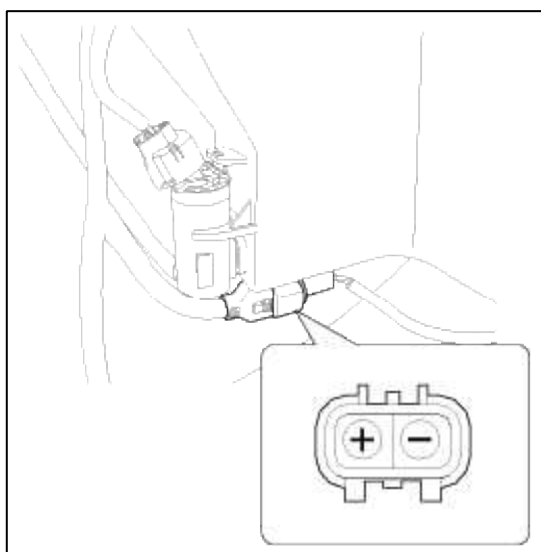
2. Drain the washer fluid less than 650 cc.

3. Check for continuity between the No. 1 and No.2 terminal in each float position.

There should be continuity when the float is down.

There should be no continuity when the float is up.

4. If the continuity is not as specified, replace the washer fluid level switch



Terminal Position	1	2
Over 650cc		
Under 650cc	○	○

(Tolerance : -50cc ~ +100cc)

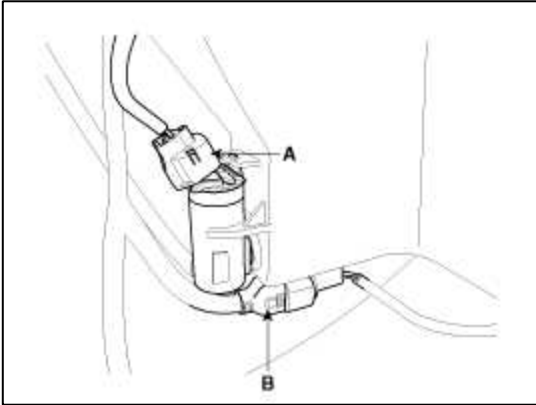
Removal

CAUTION

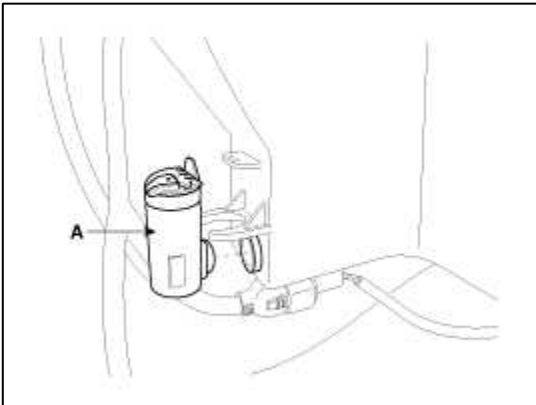
- When servicing the washer pump, be careful not to damage the washer pump seal.
- Do not operate the washer pump before filling the washer reservoir.
Failure to do so could result in premature pump failure.

1. Disconnect the negative (-) battery terminal.

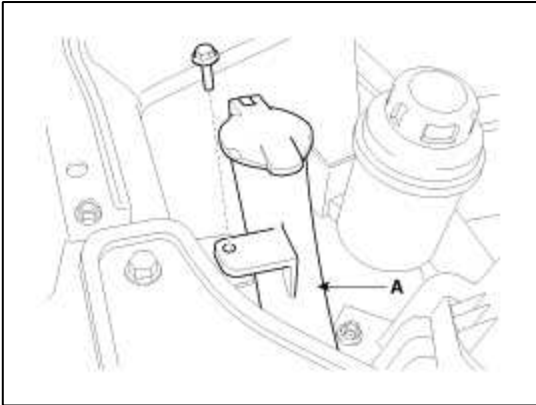
2. Remove the front bumper.
(Refer to BD group - "Front bumper")
3. Remove the washer hose and disconnect the washer motor connector(A) and level sensor connector(B).



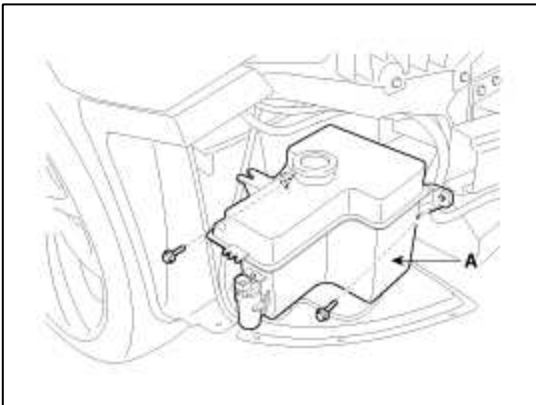
4. Remove the washer motor(A).



5. Remove the funnel part(A) of reservoir after loosening the mounting bolt(1EA).



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



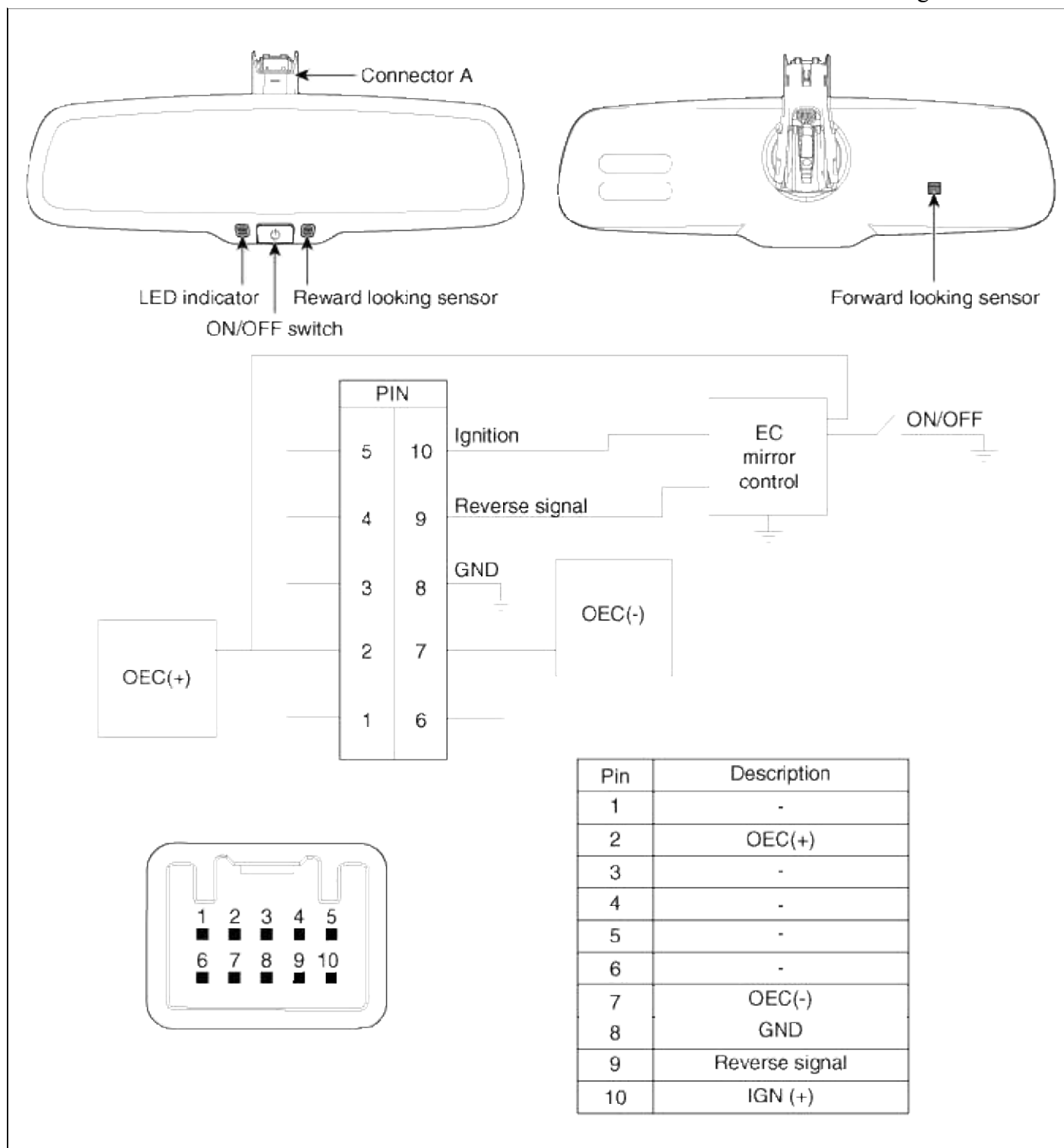
1. Install the washer reservoir.

NOTE

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 funnel.
3. Install the washer motor.
4. Install the washer hose.
5. Connect the washer motor connector and level sensor connector.
6. Install the front bumper.

Body Electrical System > Electro chromic Inside Rear View Mirror > Components and Components Location**Components**



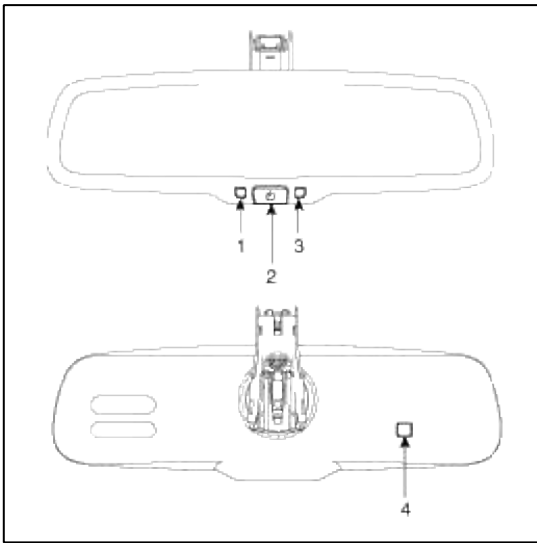
Body Electrical System > Electro chromic Inside Rear View Mirror > Description and Operation

Description

The ECM (Electro Chromatic inside rear view Mirror) is for dimming the reflecting light from a vehicle behind at night, in order the user not to be dazzled by the light. The forward facing sensor detects brightness of the surroundings, while the rearward looking sensor detects the strength of the reflecting light so that adjusts the reflexivity of the mirror in the range of 7~85%. But, when the reverse gear is engaged, it stops functioning.

1. The forward facing sensor sees if the brightness of the surroundings is low enough for the mirror to operate its function.
2. The rearward looking sensor detects glaring of the reflecting light from a vehicle behind.

3. The ECM is darkened to the level as determined by the rearward looking sensor. When the glaring is no longer detected, the mirror stops functioning.
 1. LED indicator
 2. ON/OFF Switch
 3. Rearward looking sensor
 4. Forward facing sensor



Body Electrical System > Electro chromic Inside Rear View Mirror > Repair procedures

Inspection

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

1. Turn the ignition key to the "ON" position.
2. Cover the front sensor to stop functioning.
3. Shine a light at the rear sensor.
4. The ECM should be darkened as soon as the rear sensor detects the light.

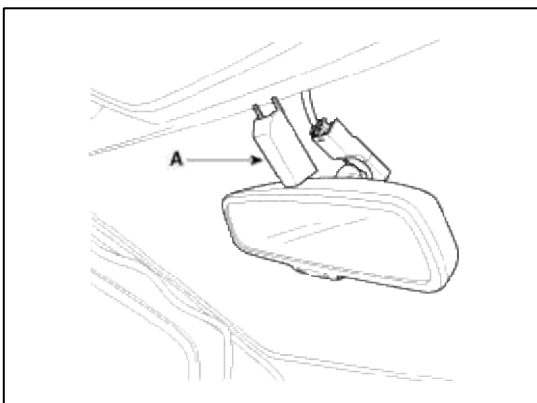
NOTE

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

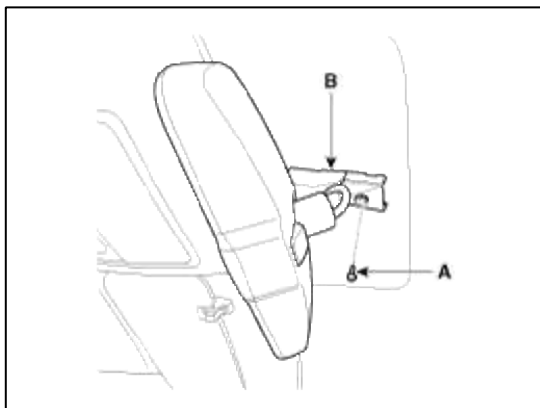
5. When the reverse gear is engaged, the ECM should not be darkened.
6. When heading lights to both the front and rear sensors, the ECM should not be darkened.

Removal

1. Remove the mirror wiring cover (A).



2. Remove the screw (A) and disconnect the mirror connector (B).



NOTE

Take care not to damage the mounting bracket during removal.

Installation

1. Install the mirror assembly.
2. Install the mirror wiring cover and connector.

Body Electrical System > Electro chromic Inside Rear View Mirror > Compass Mirror > Description and Operation

Description

The compass feature is designed to be integrated into an electro chromic interior rearview mirror.

The mirror assembly shall display a compass heading.

The compass mirror then take the sensor information to determine static field strengths and rotating field information to determine an accurate compass heading.

Specification

Item	Standard value
Rate voltage	DC 12V
Operating voltage range	DC9 ~ 16V
Operating temperature range	-30 ~ +65°C
Direction display	8
Renewal time	2 sec.

Switch Point Accuracy

The compass module shall, while compensating for the vehicle magnetic fields, until the Earth's varying magnetic fields to determine direction.

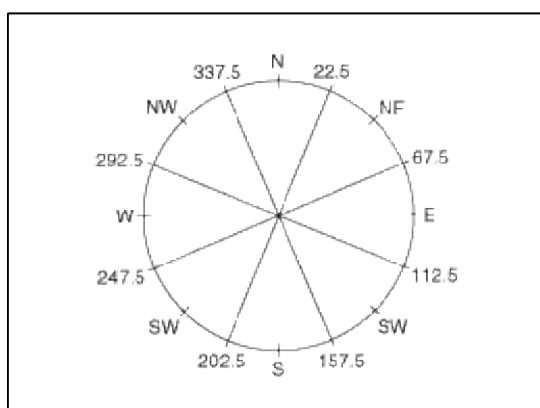
[Switch points]

Switch point	Heading $\pm 10^\circ$
N - NE	22.5
NE - E	67.5
E - SE	112.5
SE - S	157.5
S - SW	202.5
SW - W	247.5
W - NW	292.5
NW - N	337.5

NOTE

There should be hysteresis at each switch point.

Switch points between the 8 cardinal directions, these switch points are $\pm 10^\circ$

**Compass display interval**

Compass display should be updated at every two seconds.

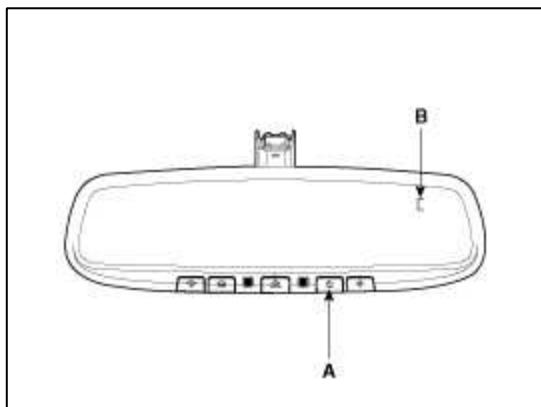
Function

The compass can be turned ON and OFF and will remember the last state when the ignition is cycled. To turn the display feature ON/OFF :

1. Press and release the feature control button (A) to turn the display feature OFF.

2. Press and release the feature control button (A) again to turn the display back ON.

Additional options can be set with press and hold sequences of the feature control button (A) and are detailed below.



There is a difference between magnetic north and true north. The compass in the mirror can compensate for this difference when it knows the magnetic zone in which it is operating. This is set either by the dealer or by the user.

Body Electrical System > Electro chromic Inside Rear View Mirror > Compass Mirror > Repair procedures

Adjustment

Calibration procedure

If the display read "C", calibrate the compass.

1. Driving the vehicle in a circle at less than 8km/h 3 times or until the compass heading appears.
2. Driving in a circle in right-handed direction and opposite direction are possible, and if the calibration is completed, the compass heading will appear.
3. Keep driving in a circle until a compass heading appears.

To adjust the Zone setting :

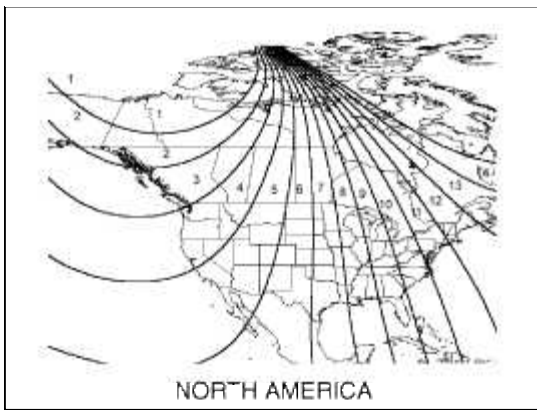
1. Determine the desired zone number based upon your current location on the zone maps.
2. Press and hold the Feature Control button for more than 6 but less than 9 seconds, the current zone number will appear on the display (B).
3. Pressing and holding the feature control button (A) again will cause the numbers to increment (Note: they will repeat ...13, 14, 15, 1, 2,...). Releasing the button when the desired zone number appears on the display will set the new zone.
4. Within about 5 seconds the compass will start displaying a compass heading again.

To re-calibrate the compass :

There are some conditions that can cause changes to the vehicle magnets. Items such as installing a ski rack or a antenna or even some body repair work on the vehicle can cause changes to the vehicle's magnetic field. In these situations, the compass will need to be re-calibrated to quickly correct for these changes.

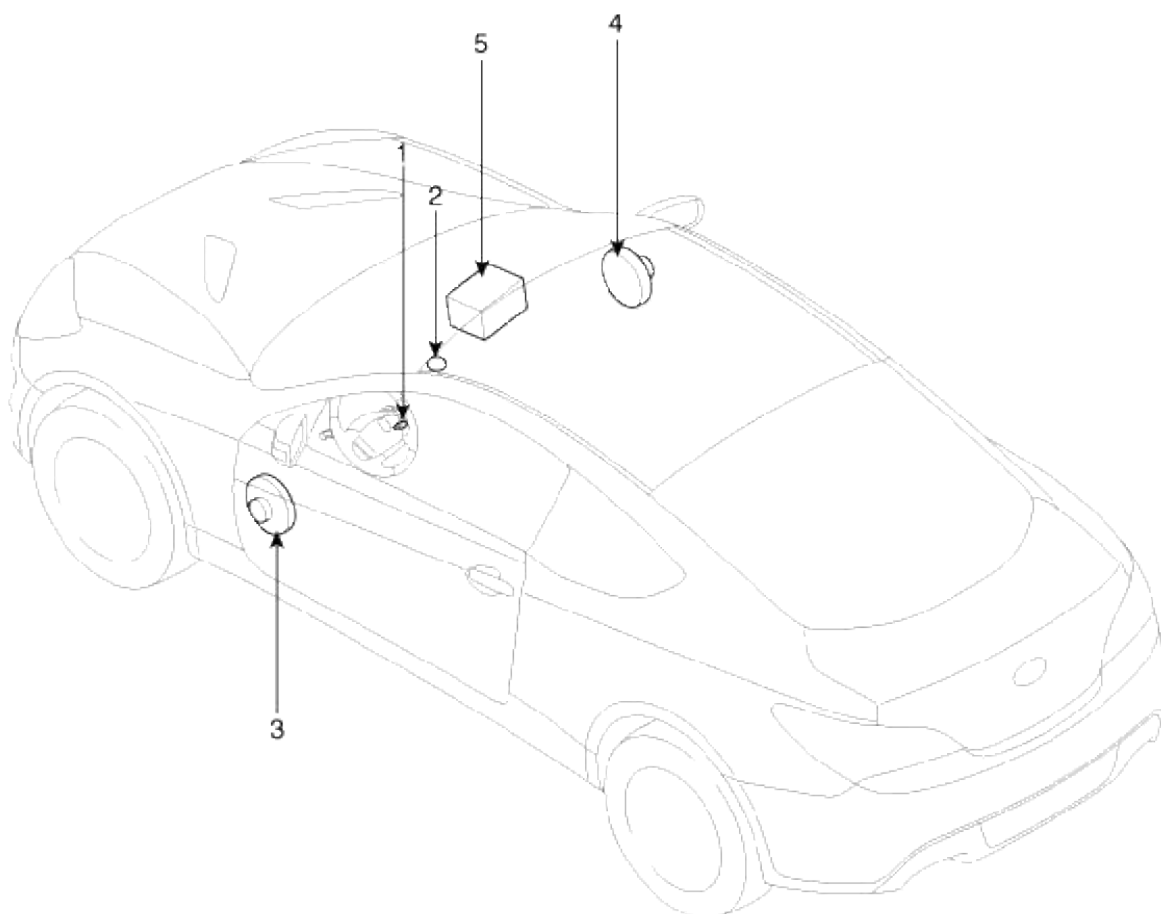
1. Press and hold the feature control button (A) for more than 9 seconds. When the compass memory is cleared, a "C" will appear in the display (B).
2. To calibrate the compass, drive the vehicle in 2 complete circles at less than 8 KPH (5 MPH).

Zone Map



Body Electrical System > Hands Free System > Components and Components Location

Components



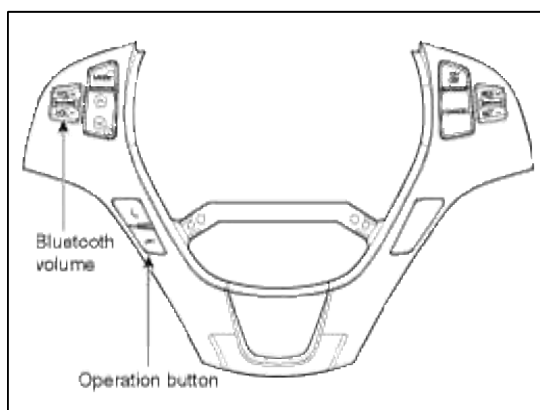
- | | |
|---------------------------|---|
| 1. Hands free call switch | 4. Front right speaker |
| 2. Mic | 5. Audio head unit (hands free control) |
| 3. Front left speaker | |

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

Body Electrical System > Hands Free System > Description and Operation

Function

Bluetooth Phone Operation



General Features

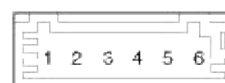
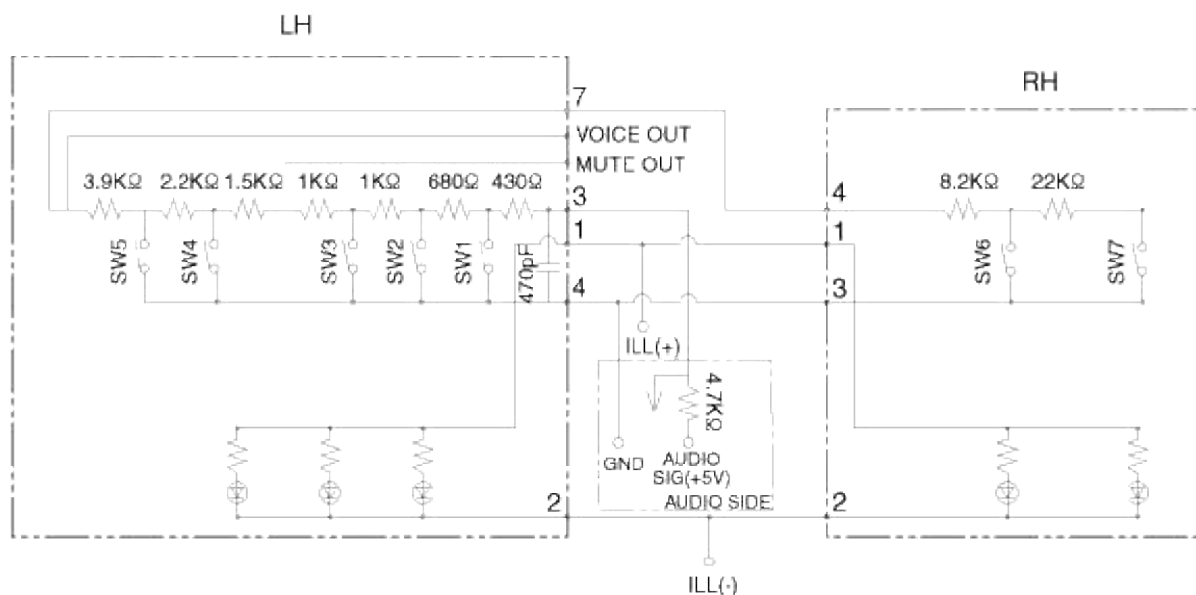
- This audio system supports Bluetooth hands-free and stereo headset features.
- HANDS-FREE feature: Making or receiving calls wirelessly.
- STEREO-HEADSET feature: Playing music from cellular phones (that supports A2DP feature) wirelessly.

NOTE

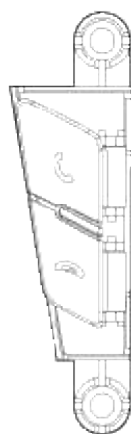
1. The phone must be paired to the system before using Bluetooth features.
2. Only one selected (connected) cellular phone can be used with the system at a time.
3. Some phones are not fully compatible with this system.

Body Electrical System > Hands Free System > Hands Free Switch > Schematic Diagrams

Circuit Diagram



Pin NO.	Connector
1	-
2	-
3	Bluetooth in
4	Audio(-)
5	ILL(-)
6	ILL(+)



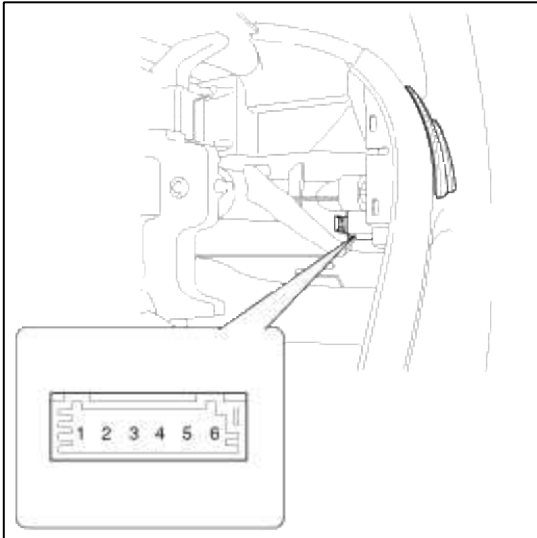
[LH]

[LH]

Body Electrical System > Hands Free System > Hands Free Switch > Repair procedures

Inspection

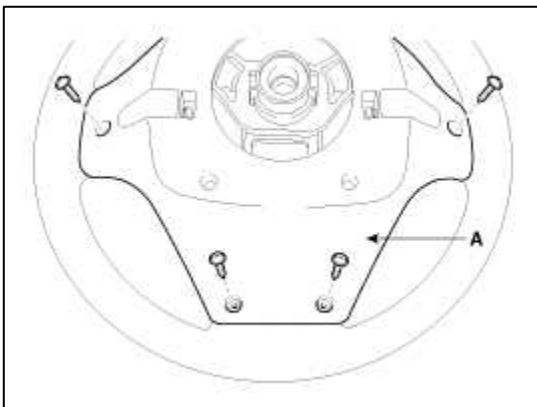
1. Check the hands free remote control switch for resistance between No.3 and No.4 terminals in each switch position.



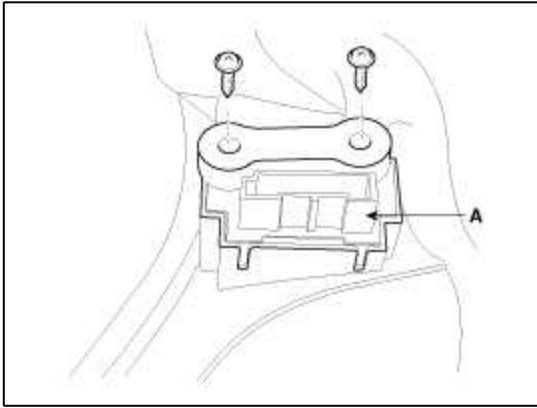
Switch	Connector terminal	Resistance ($\pm 5\%$)
END	3 - 4 (LH)	18.91 k Ω
CALL	3 - 4 (LH)	40.91 k Ω

Removal

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



5. Remove the hands free remote control switch (A) after removing the steering wheel remote control switch connector and 2 screws.



Installation

1. Reassemble the steering wheel remote control switch after connecting the connector.
2. Reassemble the steering wheel.
3. Reassemble the driver airbag module.

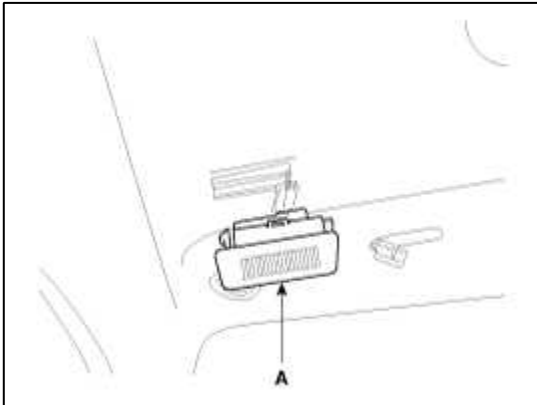
NOTE

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

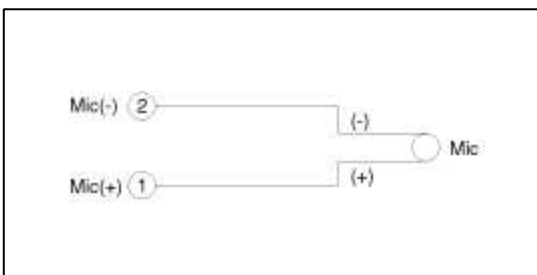
Body Electrical System > Hands Free System > Hands Free Mic > Repair procedures

Inspection

1. Disconnect the negative(-) battery terminal.
2. Remove the hands free mic (A) after loosening the connector from loof top.

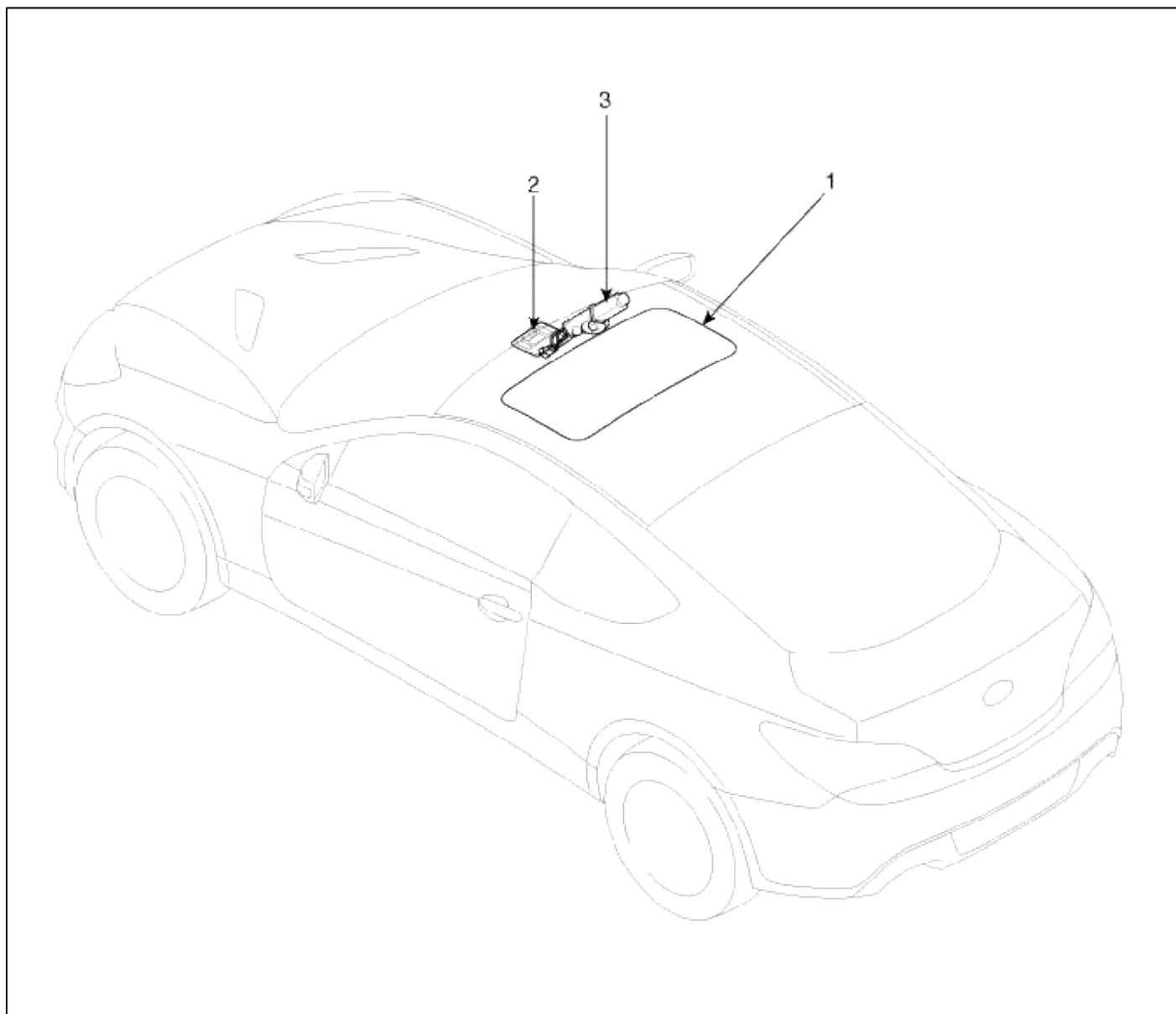


3. Check the continuity of Mic between terminals.



Body Electrical System > Sun Roof > Components and Components Location

Component Location



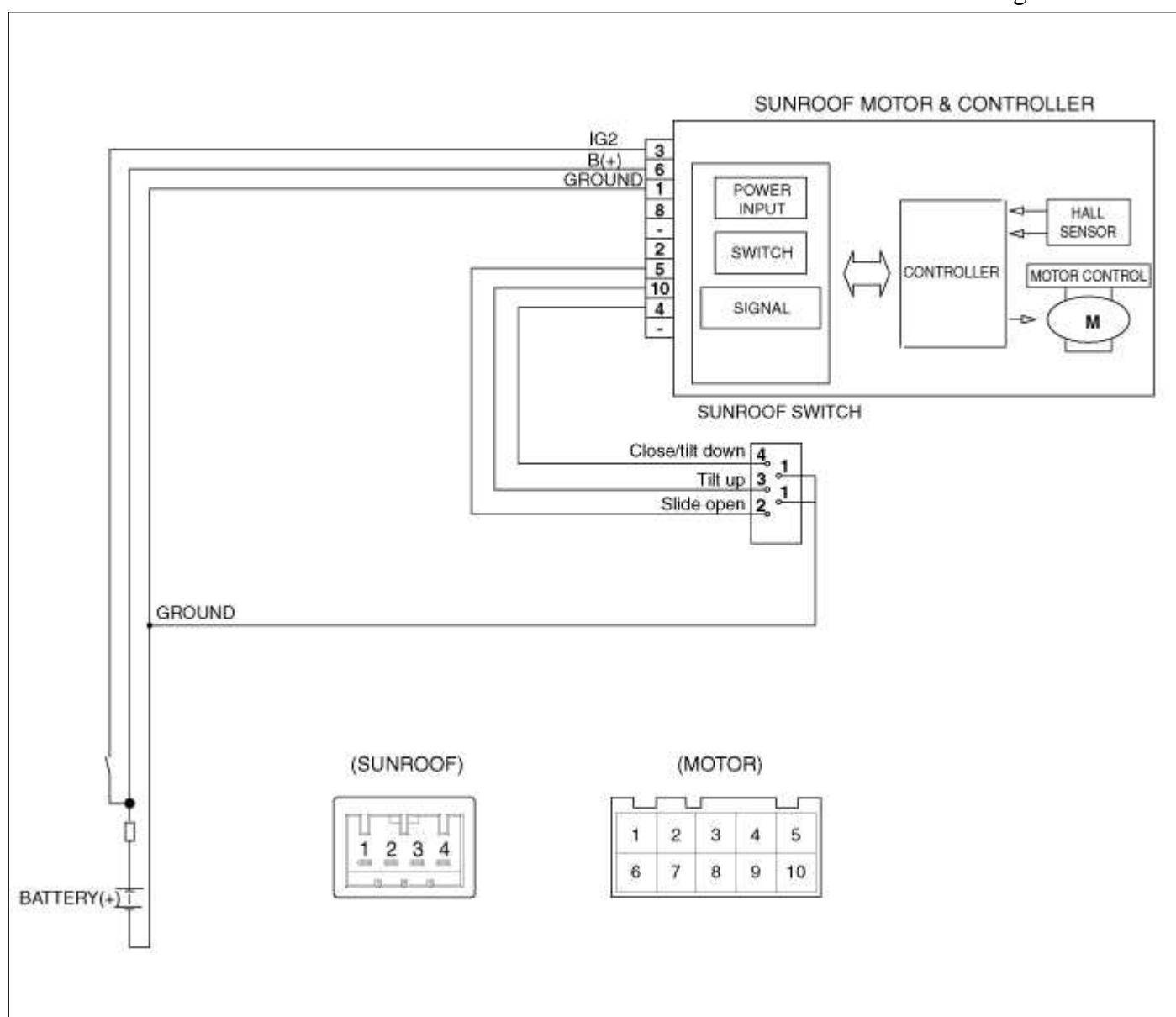
1. Sunroof

2. Sunroof switch

3. Sunroof motor &
controller

Body Electrical System > Sun Roof > Schematic Diagrams

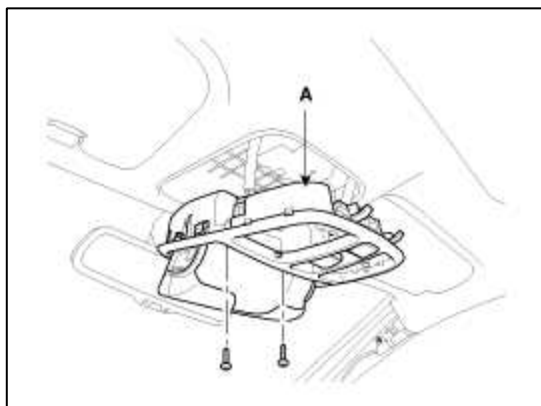
Circuit Diagram



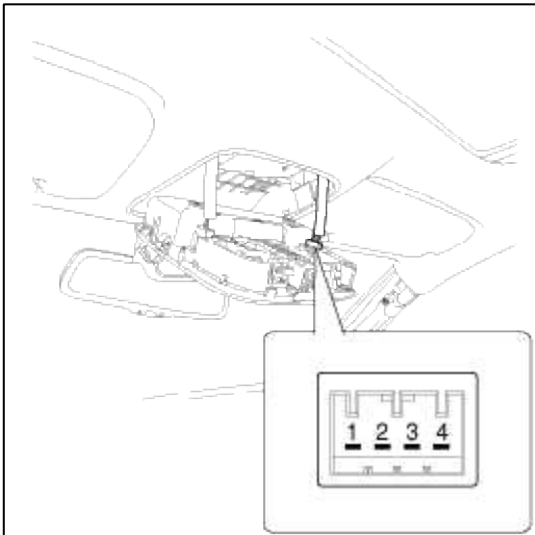
Body Electrical System > Sun Roof > Sunroof Switch > Repair procedures

Inspection

1. Disconnect the negative (-) battery terminal.
2. Open the sunglass case cover from the overhead console then remove the 2 screws holding the overhead console (A).



3. Disconnect the connector. Check for continuity between the terminals. If the continuity is not as specified, replace the sunroof switch.

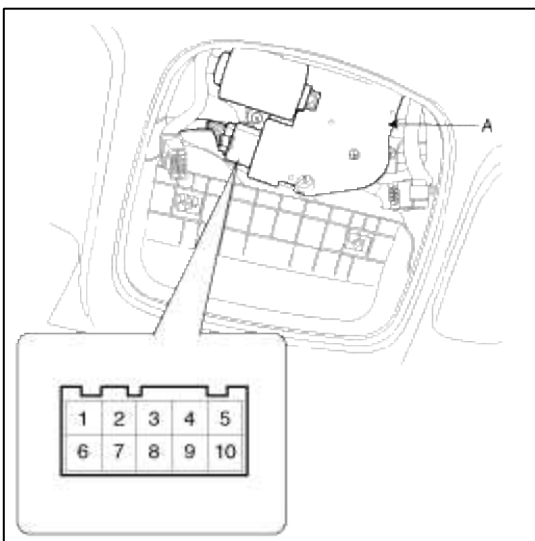


Terminal Position	1	2	3	4
Manual open	○	○		
Auto open	○	○	○	
Manual close Tilt down	○			○
Auto close	○		○	○
Manual tilt up	○		○	
Manual tilt down	○			○

Body Electrical System > Sun Roof > Sunroof Motor > Repair procedures

Inspection

1. Disconnect the negative (-) battery terminal.
2. Open the sunglass case cover from the overhead console then remove the 2 screws holding the overhead console. Disconnect the connector then remove the overhead console lamp assembly from the headliner.
3. Disconnect the sunroof motor(A) connector.



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

Terminal Position	3	4	5	10
Manual open	⊕		⊖	
Auto open	⊕		⊖	⊖
Manual close Manual tilt down	⊕	⊖		⊖
Auto close	⊕	⊖		⊖
Manual tilt up	⊕			⊖
Manual tilt down	⊕	⊖	⊖	

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.

Replacement

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.
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;
 - A. Tilt → Slide Open → Slide Close
 Then release the lever.
6. Reset procedure of panorama system is finished.

Protecting Motor From Overheating

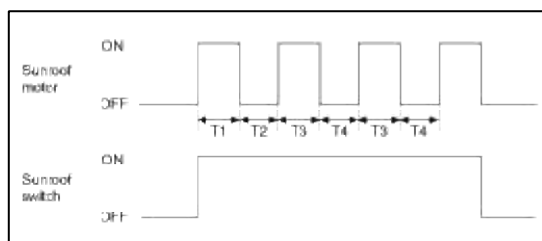
In order to protect the sunroof motor from overheating from continuous motor operation, the sunroof ECU controls the Run-time and Cool-time of the motor as follows:

1. The Sunroof ECU detects the Run- time of motor
2. Motor can be operated continuously for the 1st run-time($120 \pm 10\text{sec.}$).
3. The continuous operation of motor stops after the 1st Run-time($120 \pm 10\text{sec.}$).
4. Then Motor is not operated for the 1st Cool-time($18 \pm 2\text{sec.}$).
5. Motor is operated for the 2nd Run-time($10 \pm 2\text{sec.}$) at the continued motor operation after 1st Cool-time($18 \pm 2\text{sec.}$)
6. The continuous operation of motor stops operating after the 2nd Run-time($10 \pm 2\text{sec.}$)
7. Motor is not operated for the 2nd Cool-time($18 \pm 2\text{sec.}$).

8. Motor repeats the 2nd run-time and 2nd cool-time at the continued motor operation.

A. In case that motor is not operated continuously, the run-time is increased.

B. 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.

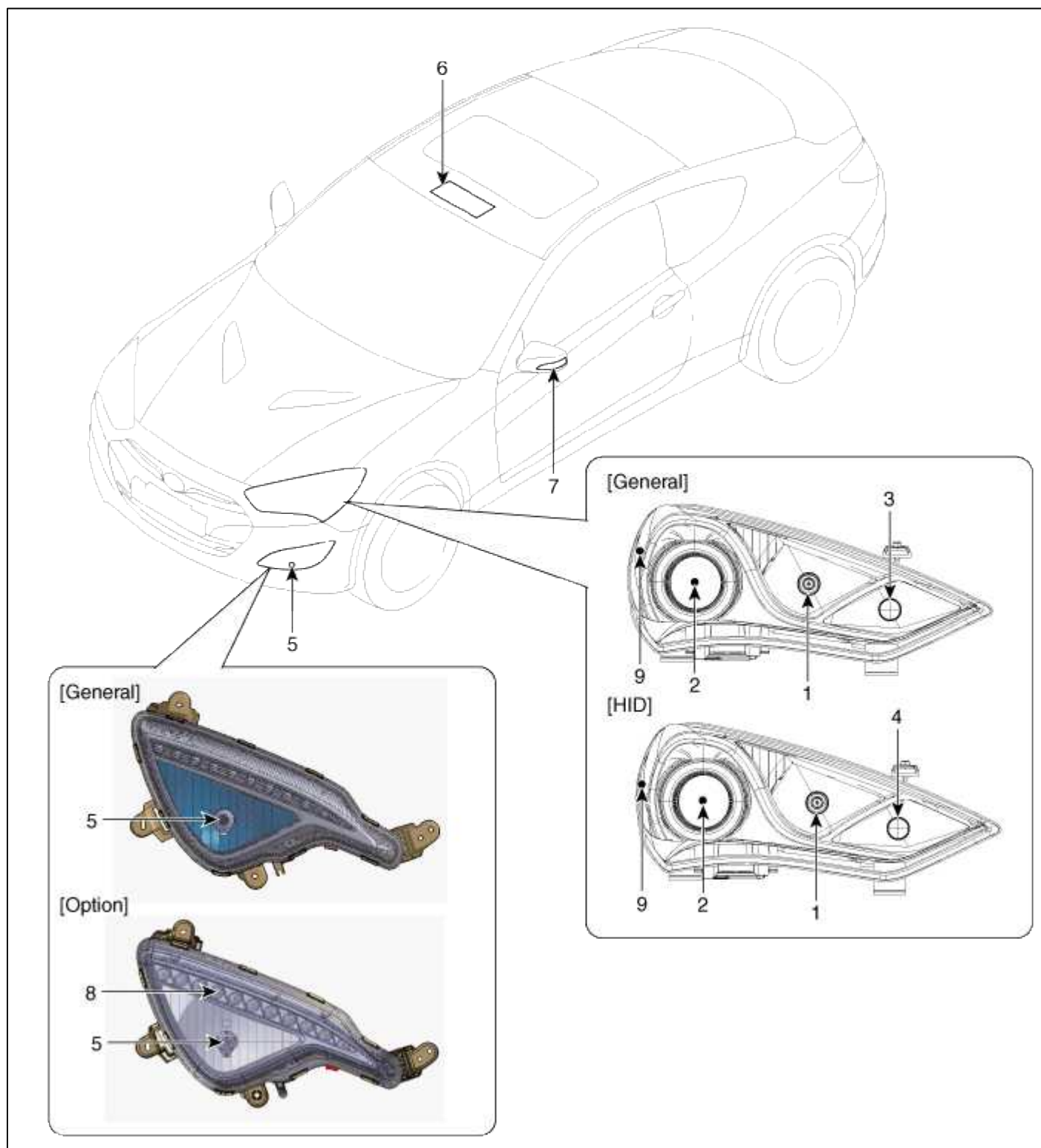
Body Electrical System > Lighting System > Specifications

Specification

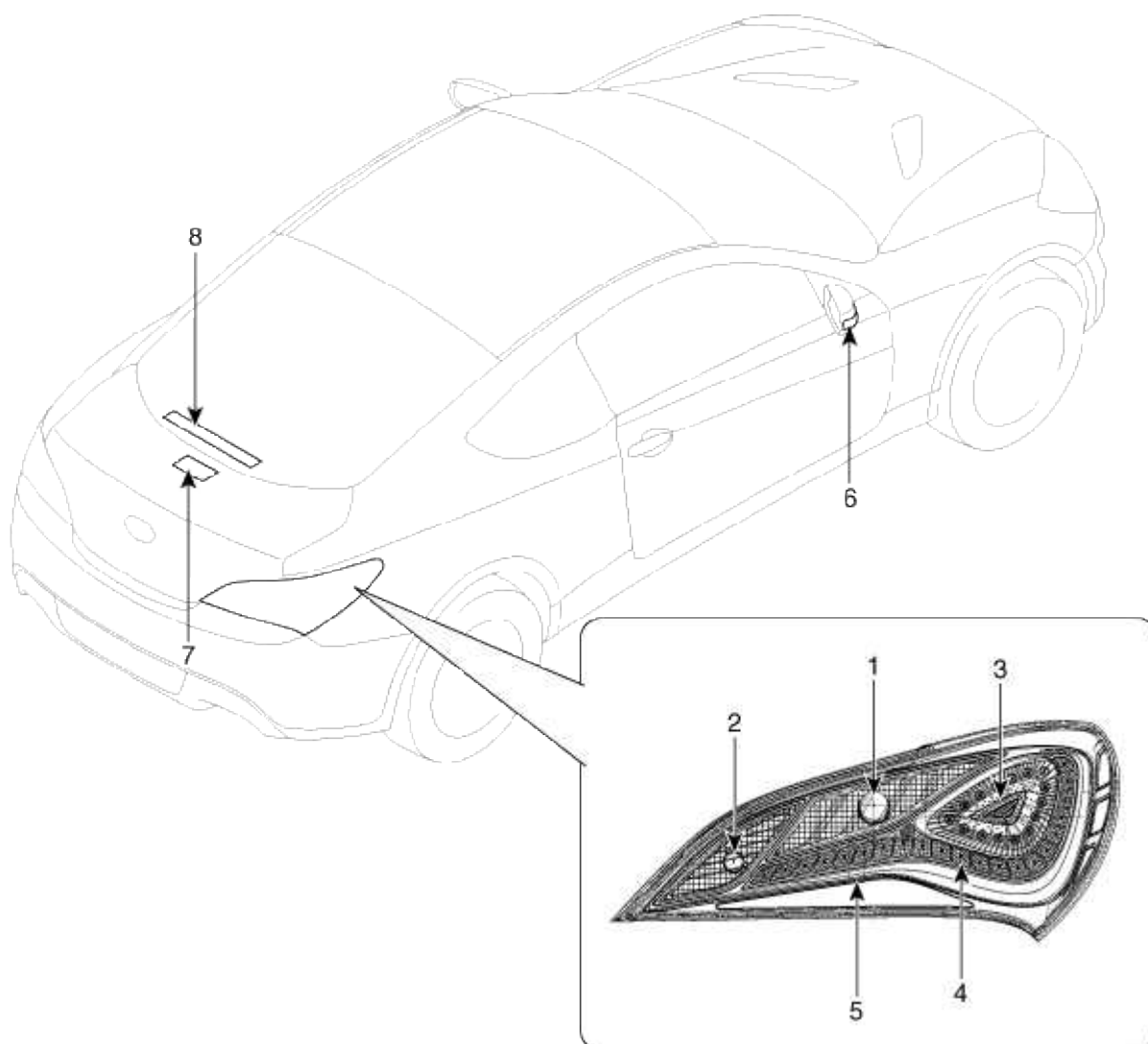
Items			Bulb watt (W)	Bulb type
Front	Head lamp (High)		55	H7
	Head lamp (Low)	General	55	H7
		HID	35	D1S
	Turn signal / Position lamp		28/8	PY28/8WLL
	Front fog lamp		35	H8
	Daytime running light		LED	-
	Side marker		5	W5WLL
Rear	Stop / Tail lamp		LED	-
	Back up lamp		16	W16W
	Turn signal lamp		27	PY27WL
	Tail lamp		LED	-
	Side marker		LED	-
	License plate lamp		5 x 2	W5W
Others	Overhead console lamp		10 x 2	W10W
	Luggage lamp		5	Festoon
	Vanity lamp		5	Festoon
	Glove box lamp		5	Festoon
	High mounted stop lamp		LED	-

Body Electrical System > Lighting System > Components and Components Location

Component Location



- | | | |
|---------------------------|---------------------------|------------------------------|
| 1. Head lamp (High) | 4. Front turn signal lamp | 7. Trun signal lamp (Mirror) |
| 2. Head lamp (Low) | 5. Front fog lamp | 8. DRL |
| 3. Turn signal / Position | 6. Map lamp | 9. Side marker |

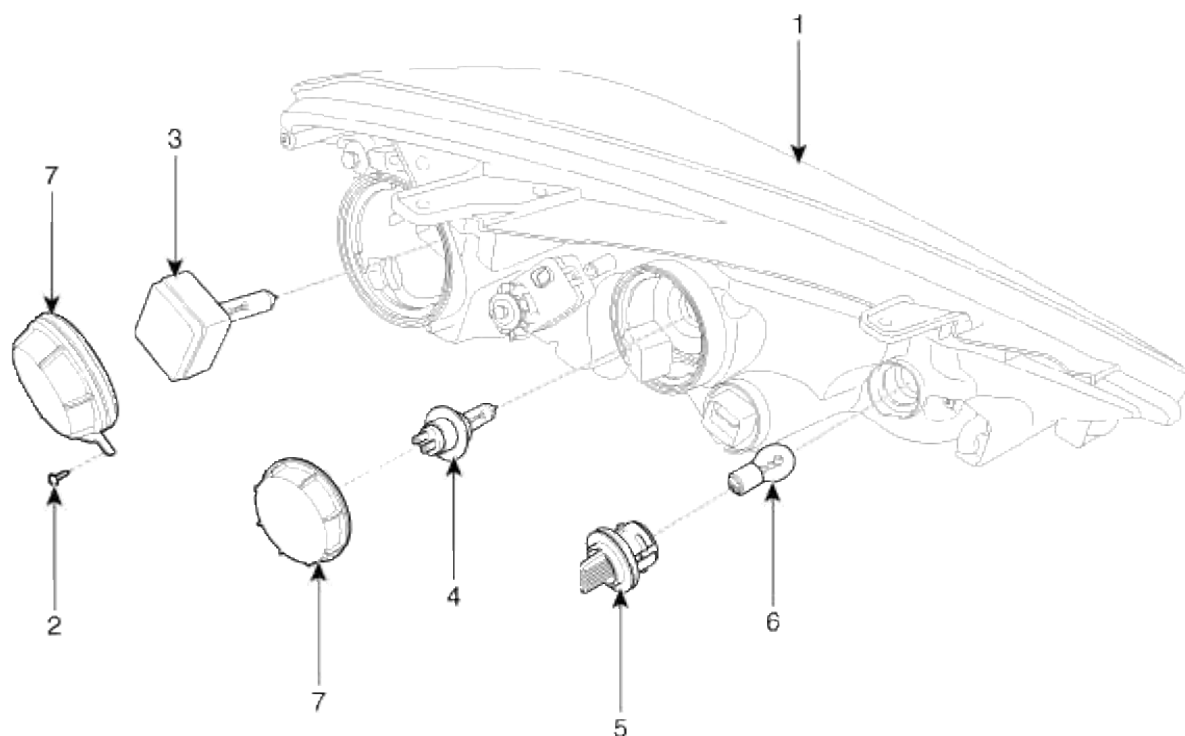


- | | |
|---------------------|------------------------------|
| 1. Turn signal lamp | 5. Rear fog lamp |
| 2. Back up lamp | 6. Turn signal lamp (Mirror) |
| 3. Tail / Stop lamp | 7. Luggage lamp |
| 4. Tail / Stop lamp | 8. High mounted stop lamp |

Body Electrical System > Lighting System > Head Lamps > Components and Components Location

Component

[HID]



1. Head lamp assembly housing
 2. Screw
 3. Head lamp (Low) lamp
 4. Headlamp (High) lamp

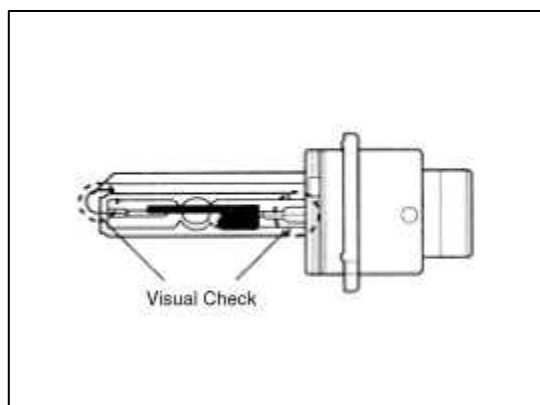
5. Socket
 6. Turn signal/Tail lamp
 7. Dust cover

Body Electrical System > Lighting System > Head Lamps > Repair procedures

Inspection

1. Check-points upon head lamp failure (HID)

- (1) Check the battery voltage. (Low beam will be on when the battery voltage above 9V.)
- (2) Check the fuse and relay.
- (3) Check the polarity of ballast. (If the polarity are changed, low beam doesn't lighten)
- (4) Check the bulb connector securely.
- (5) Visually bulb checking (no filament): damaged glass, damaged for upper parts and lower parts of glass tube.
- (6) After (1)~(5), replace the ballast and the ignitor. (ballast assembly).



2. Service procedure and warning (HID)

No.	Item	Service procedures	Warning	Remarks
1	Replacement of lamp assembly	<ol style="list-style-type: none"> 1. Disconnect the power connector from the lamp. 2. Remove and replace the lamp assembly. 3. Connect the power connector. 	<ul style="list-style-type: none"> • Disconnect the head lamp power connector to avoid high voltage. 	<ul style="list-style-type: none"> • Other description is the same as the halogen bulbs.
2	Replacement of the Bulb	<ol style="list-style-type: none"> 1. Disconnect the power connector from the lamp. (head lamp, turn signal, head lamp leveling device) 2. Remove the lamp assembly. 3. Remove the ballast and dust cover. 4. Remove the bulb socket and replace the bulb. 5. Installation is the reverse of removal. 	<ul style="list-style-type: none"> • Disconnect the head lamp power connector to avoid high voltage. • Be careful not to damage the bulb and use genuine bulbs only. • Do not apply excessive force and fit it correctly. 	
		<ol style="list-style-type: none"> 1. Disconnect the power connector from the lamp. 		

3	Replacement of the Ballast (with built-in ignitor)	<ol style="list-style-type: none"> 2. Remove the lamp and then the ballast and the dust cover. 3. Remove the head lamp leveling device and then the bulb socket. 4. Connect the bulb socket on the replacement ballast and install the leveling device. 5. Installation is the reverse of removal. 	<ul style="list-style-type: none"> • Disconnect the head lamp power connector to avoid high voltage. 	<ul style="list-style-type: none"> • Replace the ballast only and install the used lamp. • Replace the sub assembly except the ballast.
4	Others	<ol style="list-style-type: none"> 1. Power supply should be according to the rated capacity. 2. Use the rated fuse and wire. 3. Bulb socket shall be free from moisture or dirt. 4. Do not apply the ballast severe shock, water, or extreme 	<ul style="list-style-type: none"> • All parts should be serviced only at specified service centers. 	<ul style="list-style-type: none"> • HID lamp should not be installed on other cars (Dangerous, fire may occur.)

CAUTION

HID lamp shall not be used on other cars.(Fire may occur.)

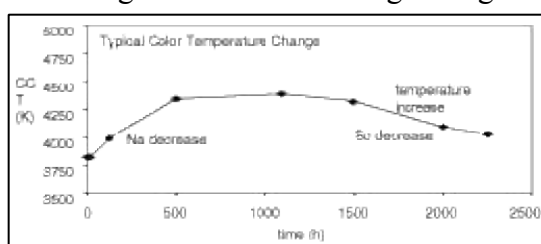
Fire may occur when HID lamp initially lights due to the fact that arc-discharge generates high voltage (max. 30,000V) and high current (12-13A), and are different from the halogen lamp specification.

3. Understanding of color change by replacement of HID bulb.

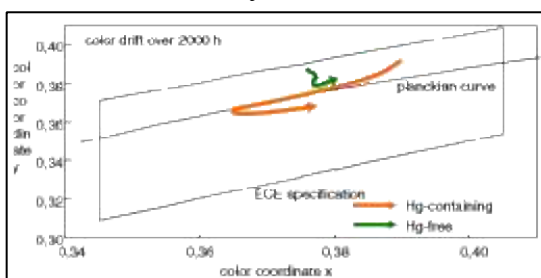
(1) The cause of HID color change.

(Change of color is HID feature)

A. The change of color occur during mixing three Elements in the HID bulb.



B. Color Coordinates by Lifetime



C. Chemical compounds in an arc tube :

1. Xenon gas(an inert gas , protection of arc tube)
2. Mercury(increase voltage, protection of arc tube, blue in the first 3 second)
3. Metal halide

- Natrium(Yellow) : 0.12mg
- Scandium(Blue) : 0.06mg
- Iodine(Halogen) : 0.02mg

(2) Change of Color by Lighting Up Time

A. It needs 4 seconds at least for stabilization.

At first, you can see the blue for 3 seconds because of Mercury.

B. After stabilization, change of color occur by metal halide.

- 0 Hour : Yellow(Na is more than Sc.)
- 10 Hour : Bright Blue (Na and Sc are similar ratio.)
- 1000Hour more : Blue (Sc is more than Na.)

C. The end of lifetime : When HID used up Natrium and Scandium, a beam of light will be dark suddenly.
so you can see the red, purple and turn on and off.

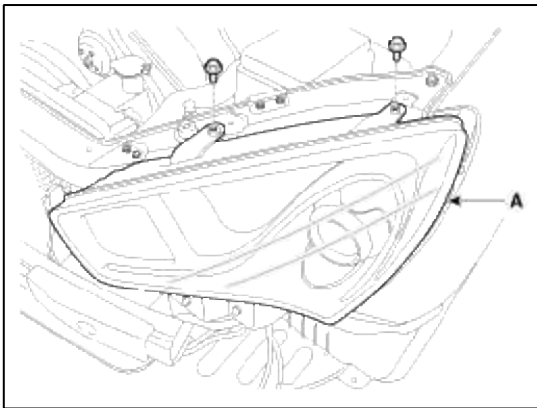
Characteristic

1. Durable for vibration as there is no filament.
2. HID lamp had a more long life than halogen lamp.
3. Does not operate if polarity is changed.
4. Operating input voltage : 9-16V

Removal

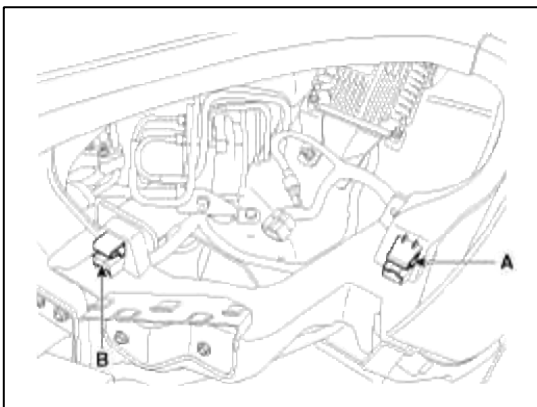
Head Lamp Assembly

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper.
(Refer to BD group - "Front bumper")
3. Remove the head lamp assembly(A) after loosening the mounting bolt(2EA).

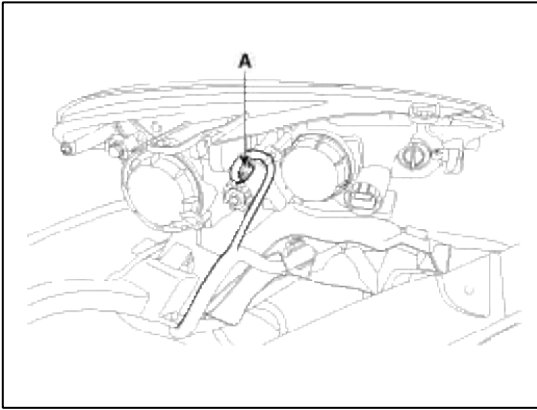


NOTE

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



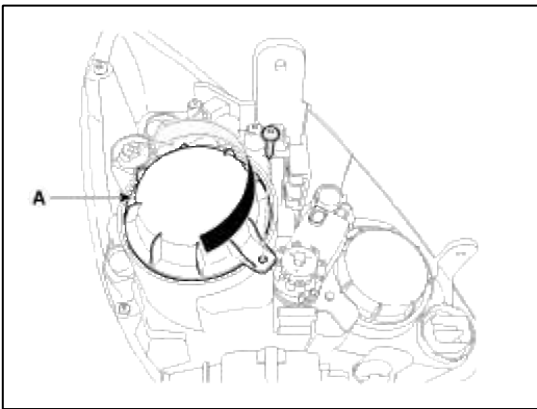
4. Disconnect the head lamp connectors(A) (HID only).



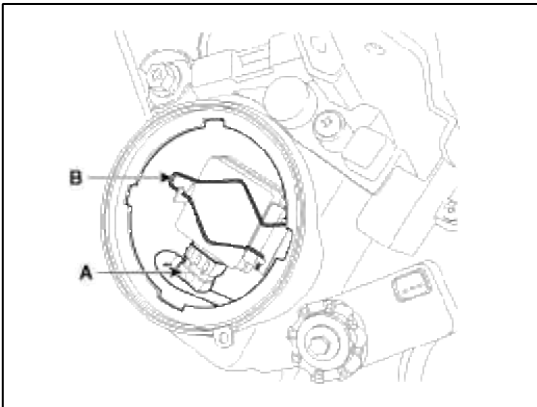
5. Remove the bulb caps from the head lamp assembly after turning in the counter clock-wise direction.

Head Lamp Bulb (Low)

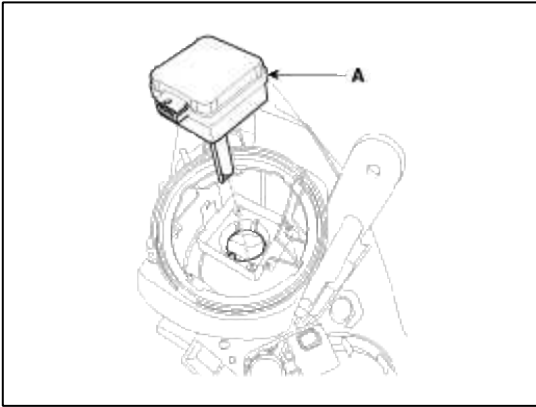
1. Disconnect the head lamp connector.
2. Remove the dust cover (A) after loosening the screw (HID only).



3. Remove the bulb connector (A) and Ignitor fixing clip (B) (HID only).



4. Remove the Ignitor & bulb (A) (HID only).



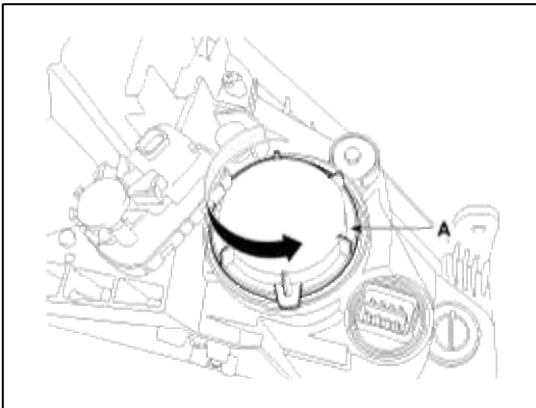
CAUTION

Turn the head lamp switch off to avoid high voltage
Be careful not to damage the bulb and use genuine bulbs only

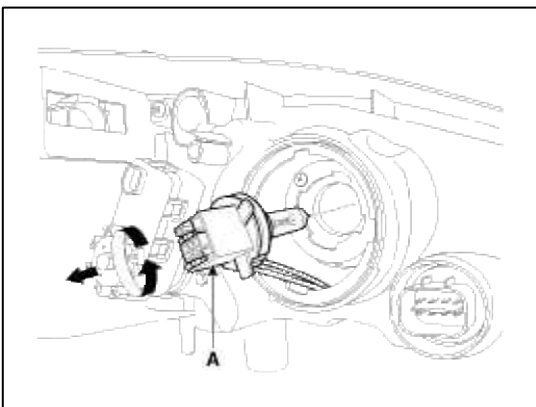
- Do not apply excessive force and fit it correctly.
- Confirm the bulb locking

Head Lamp Bulb (High)

1. Disconnect the head lamp connector.
2. Turn the dust cover (A) counterclockwise and remove it.



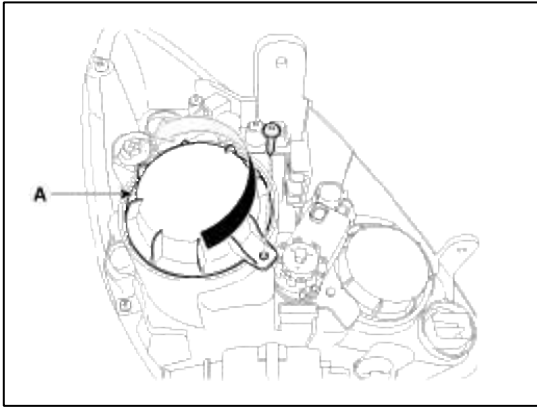
3. Turn the bulb socket (A) counterclockwise and remove it.



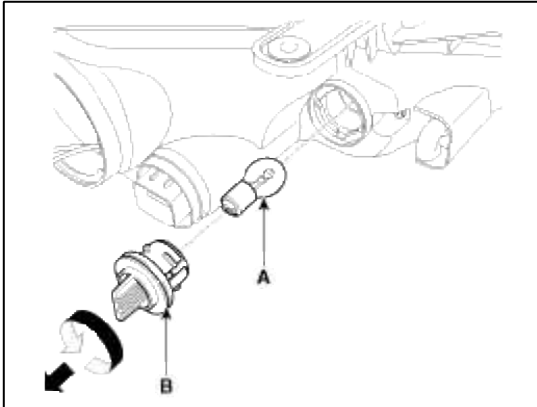
Head Lamp Bulb (Turn signal)

1. Disconnect the head lamp connector.

2. Remove the dust cover (A) after loosening the screw (HID only).

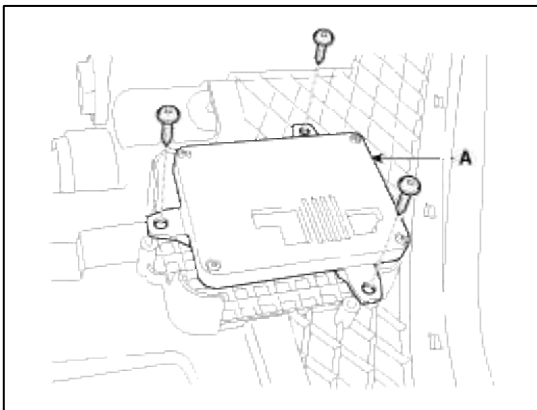


3. Turn the bulb socket (B) counterclockwise and remove the turn signal bulb (A).



Ballast

1. Turn the head lamp switch off.
2. Remove the head lamp assembly.
3. Disconnect the head lamp connector.
4. Remove the ballast (A) after loosening the screws (3EA).



CAUTION

- HID lamp shall not be used on other cars.(Fire may occur.)
- Fire may occur when HID lamp initially lights due to the fact that arc-discharge generates high voltage (max. 20,000V) and high current (12-13A), and are different from the halogen lamp specification.
- Install the dust cover after confirming the locking state between bulb and bulb holder.
- When testing the HID head lamp, turn the power on or off with switch between power supply and lamp because of high voltage.
- Do not operate the head lamp switch with the bulb not installed, because it generates spark momentarily.

Head Lamp Assembly

1. Install the head lamp assembly after connecting the connector.
2. Install the radiator under cover.
3. Connect the negative (-) battery terminal.

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.

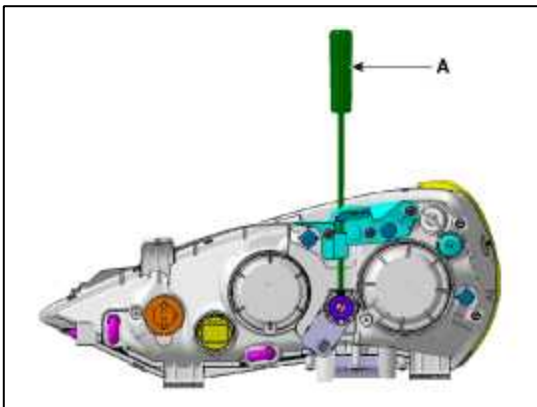
NOTE

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) and a horizontal line (Horizontal line passing through center of head lamps) on the screen.
4. With the head lamp and battery in normal condition, aim the head lamps so the brightest portion falls on the horizontal and vertical lines.

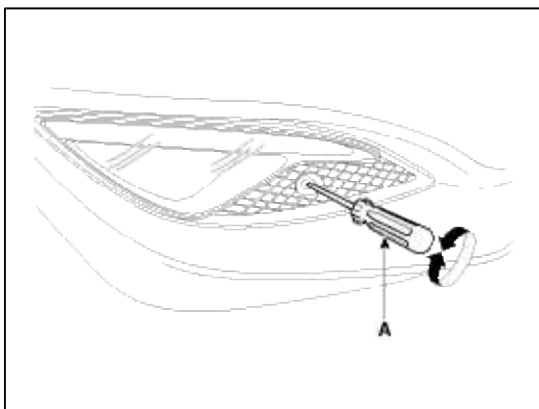
Make vertical(A) adjustments to the lower beam using the adjusting wheel.



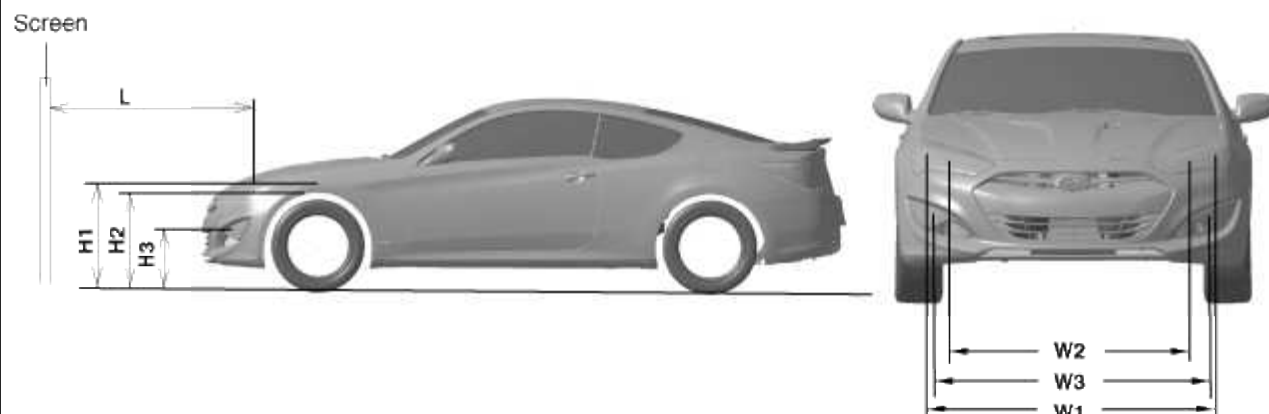
Front Fog Lamp Aiming

The front fog lamps should be aimed in the same manner of the head lamps aiming.

With the front fog lamps and battery in normal condition, aim the front fog lamps by turning the adjusting screw(A) with a driver.



Head Lamp And Fog Lamp Aiming Point



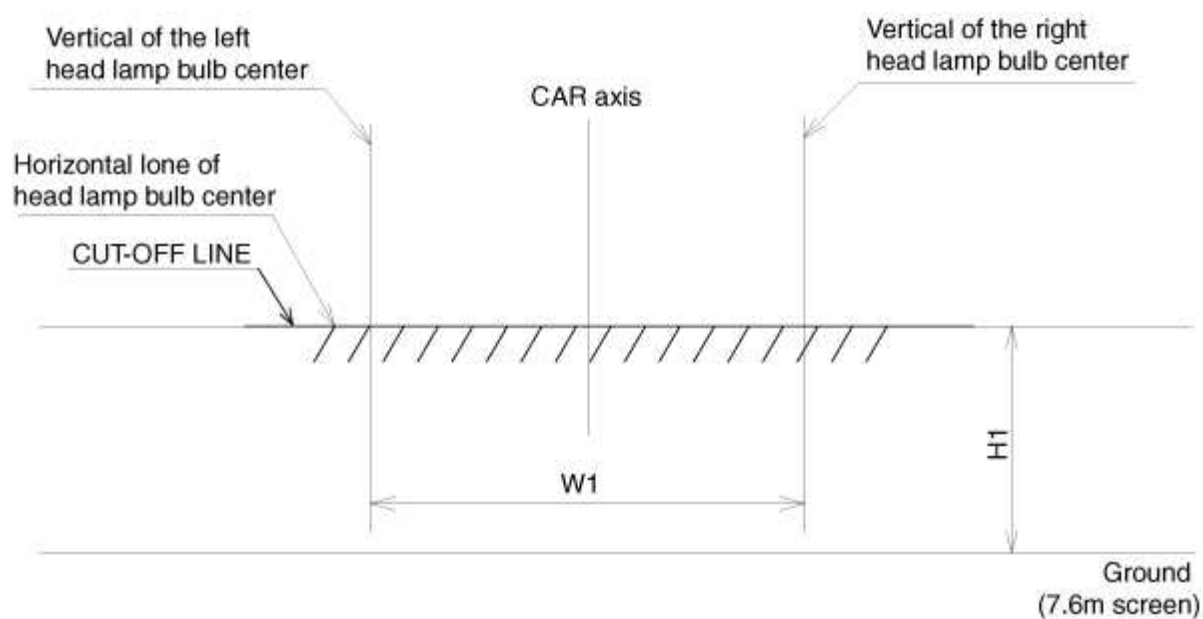
H1 : Height between the head lamp bulb center and ground (Low beam)
 H2 : Height between the head lamp bulb center and ground (High beam)
 H3 : Height between the fog lamp bulb center and ground
 W1 : Distance between the two head lamp bulbs centers (Low beam)
 W2 : Distance between the two head lamp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

Unit : in.(mm)

Vehicle condition	H1	H2	H3	W1	W2	W3	L
Without driver	27.7(704)	27.6(701)	15.5(394)	59.84 (1,519)	48.7 (1,238)	59.8 (1,519)	Refer to aiming condition
With driver	27.4(696)	27.3(693)	15.2(386)				

1. General Type (VOR)

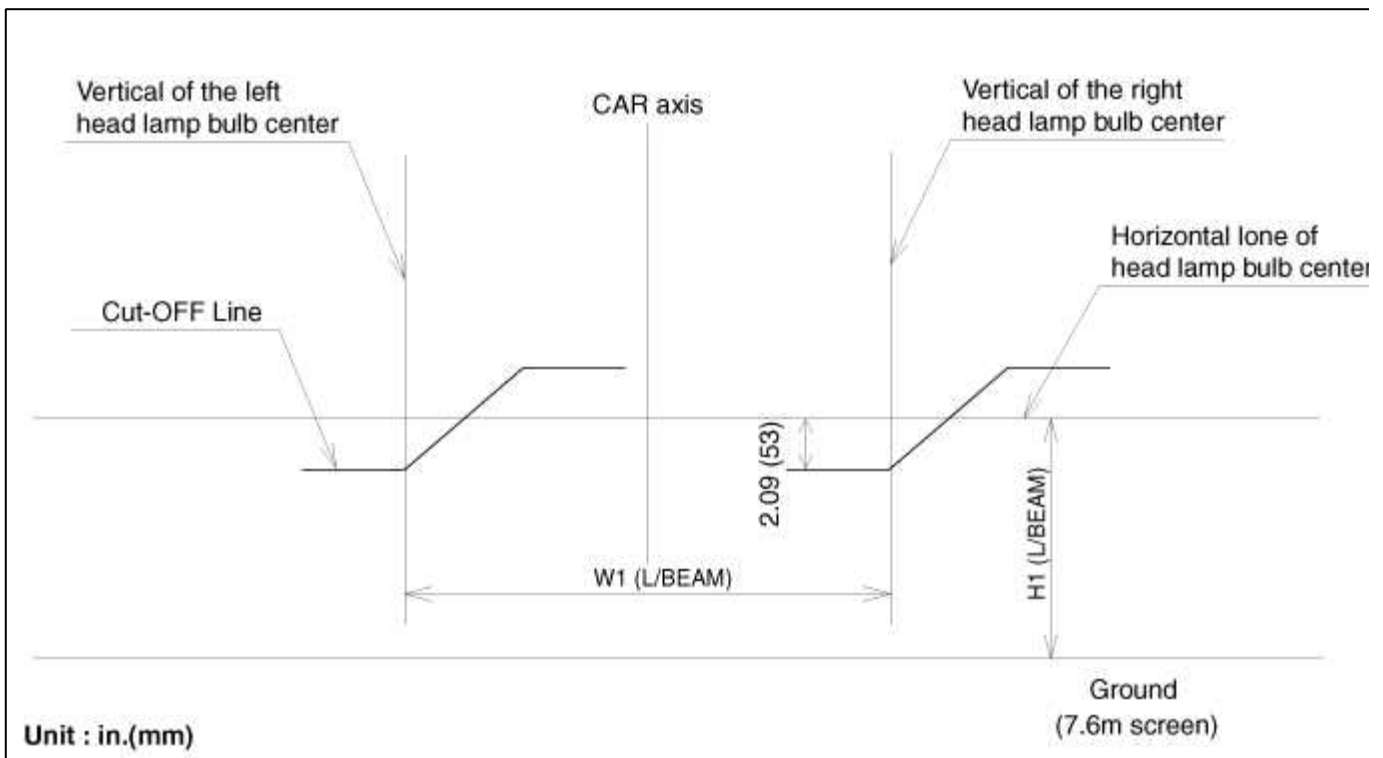
- Turn the low beam on without driver aboard.
- The cut-off line should be projected in the allowable range (shaded region) shown in the picture.
- If head lamp leveling device is equipped, adjust the head lamp leveling device switch with 0 positions.



Unit : in.(mm)

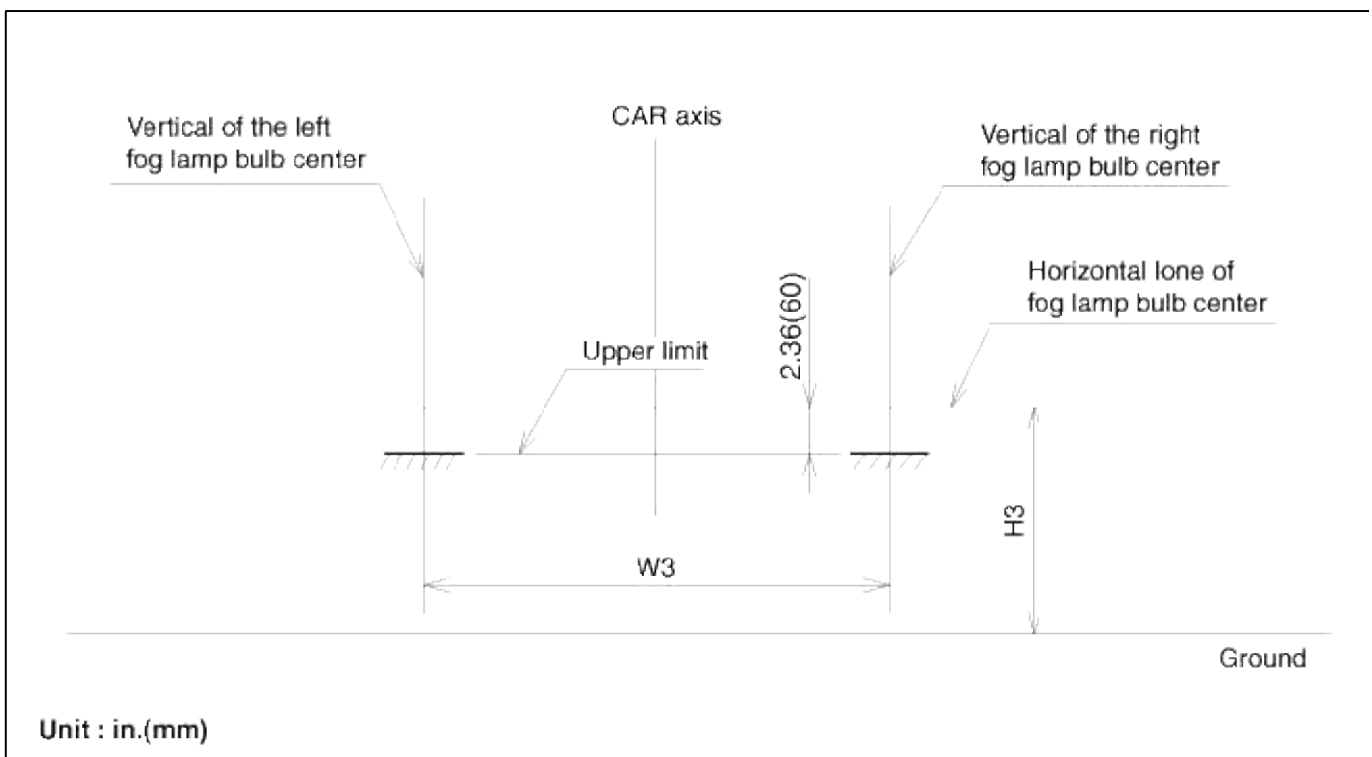
2. HID Type (VOL)

- 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.



3. Turn the front fog lamp on without the driver aboard.

The cut-off line should be projected in the allowable range (shaded region)

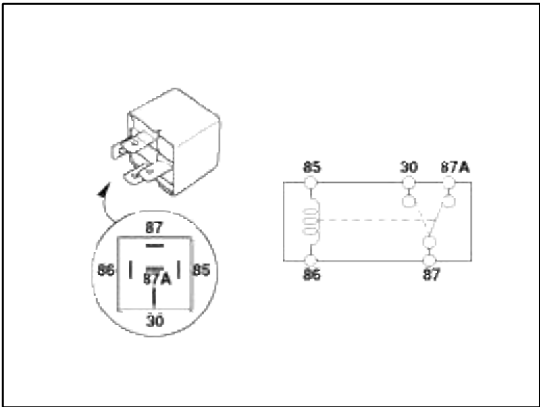
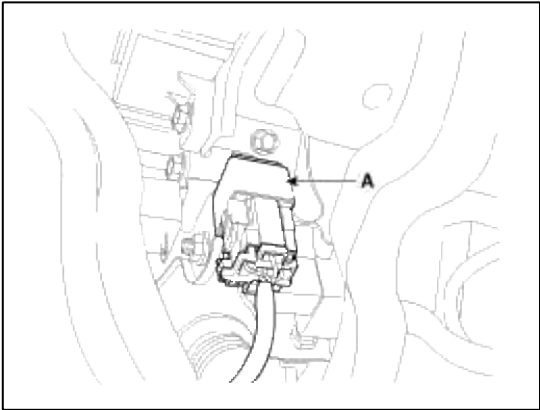


Body Electrical System > Lighting System > Rear combination lamp > Repair procedures

Inspection

Stop Lamp Relay

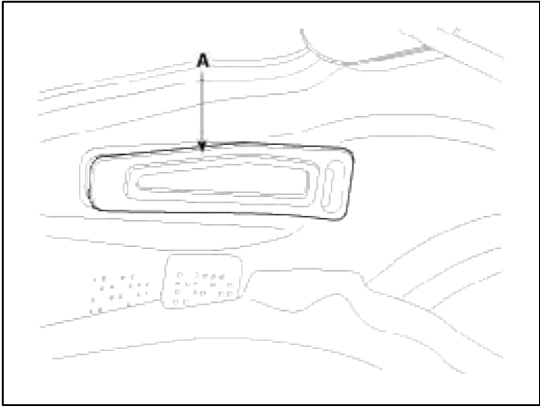
1. Check for continuity between the terminals.



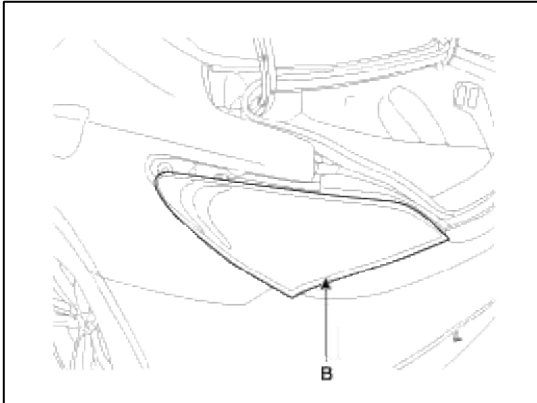
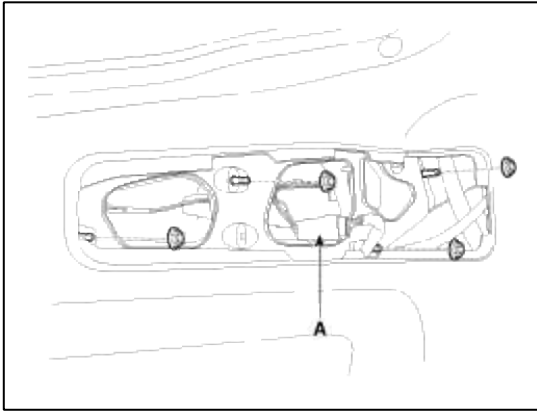
Terminal	86	85	87	87a	30
Power					
Disconnected	○	○			
Connected	○	○	○	○	○

Removal

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

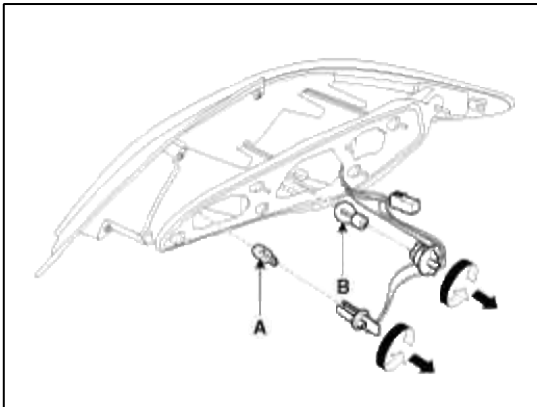


3. Loosen the rear combination lamp mounting nuts (4EA) and disconnect the connector (A) then remove the rear combination lamp assembly (B).



4. If necessary to replace the bulb, replace the bulb turning the cap in the counter clock-wise direction without removal of rear combination lamp assembly.

A : Back up lamp, B : Turn signal lamp



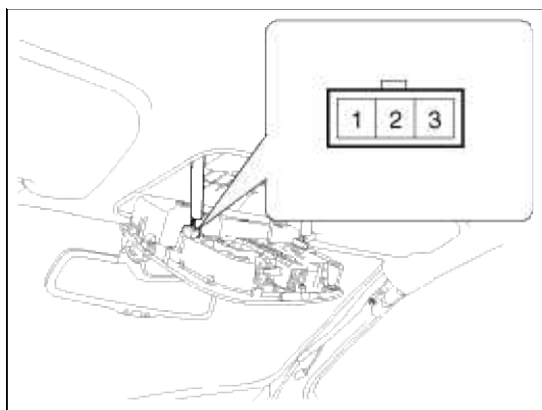
Installation

1. Install the rear combination lamp assembly after replacing the bulbs.

Body Electrical System > Lighting System > Overhead Console Lamp > Repair procedures

Inspection

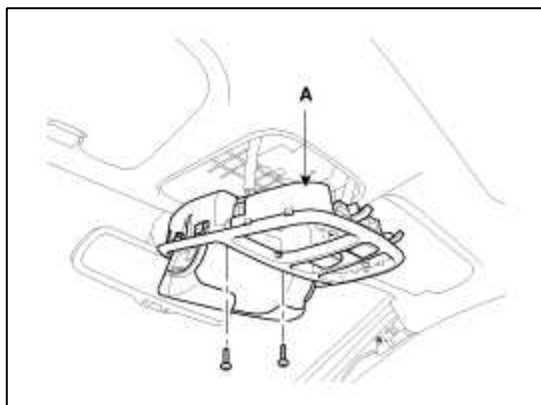
Remove the overhead console lamp assembly then check for continuity between terminals. If the continuity is not as specified, replace the map lamp switch.



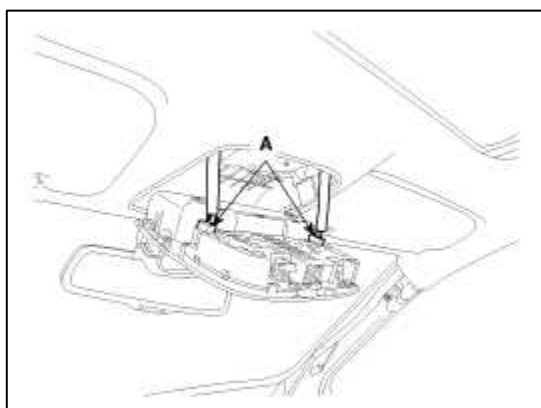
Terminal Position	1	3	2
ON	○	○	○
DOOR		○	○
OFF			

Removal

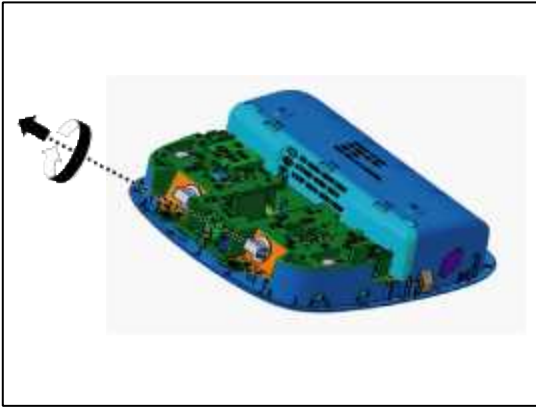
1. Disconnect the negative (-) battery terminal.
2. Loosen 2 screws holding the overhead console(A).



3. Disconnect the connectors(A) of sunroof switch then remove the overhead console lamp assembly.



4. Replace the bulb after turning the socket in the conunterclockwise direction.



5. If necessary to replace the bulb(A) only, replace the bulb after opening the overhead console lens.



Installation

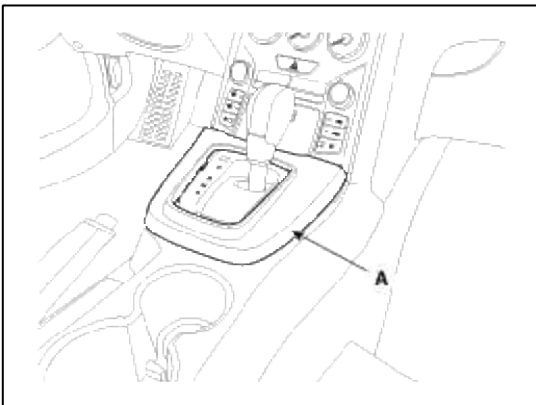
1. Install the overhead console lamp after connecting the sunroof switch connector and lamp connector.
2. Install the lens.(If lens is removed.)
3. Tighten the screws.

Body Electrical System > Lighting System > Hazard Lamp Switch > Repair procedures

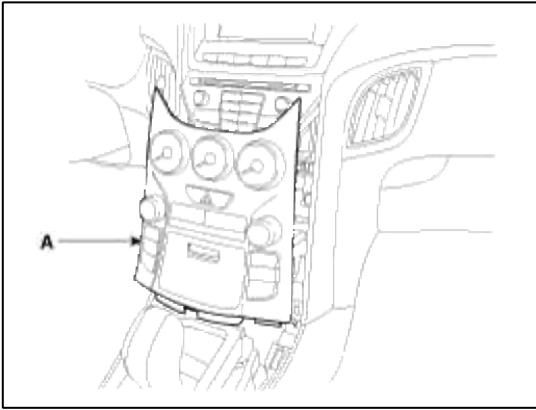
Removal

Hazard Lamp Switch

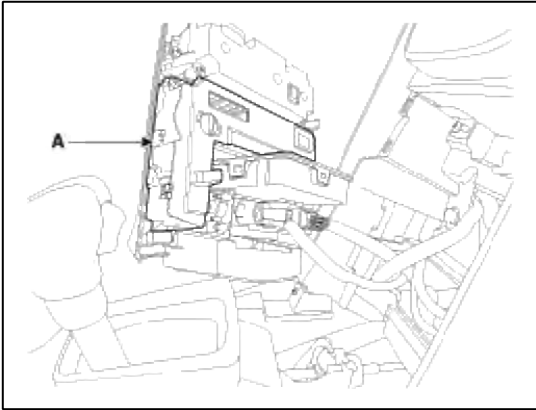
1. Disconnect the negative (-) battery terminal.
2. Remove the console upper cover(A).
(Refer to Body group - "Console")



3. Remove the center fascia lower panel(A).



4. Disconnect the heater control unit connectors and cables.



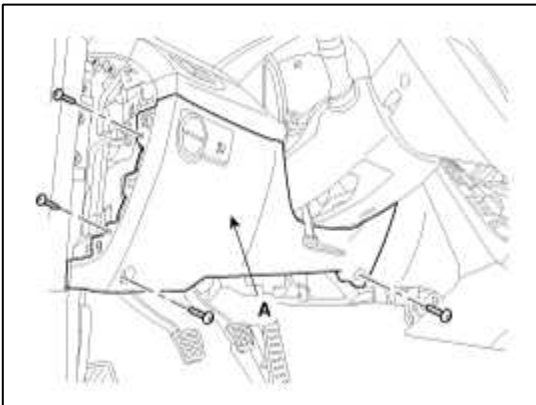
Installation

1. Install the heater control unit.
2. Install the center fascia lower panel and console upper cover.

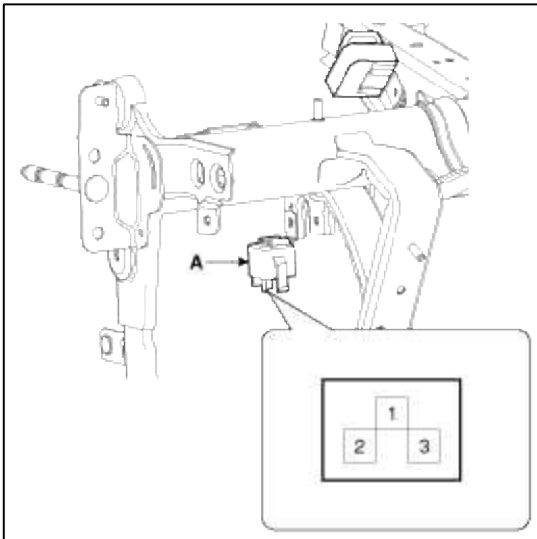
Body Electrical System > Lighting System > Flasher Unit > Repair procedures

Inspection

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



3. Remove the flasher unit (A) after loosening the bolt and disconnecting the connector.



4. Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3.
5. Connect the two turn signal lamps in parallel to terminals 1 and 3. Check that the bulbs turn on and off.

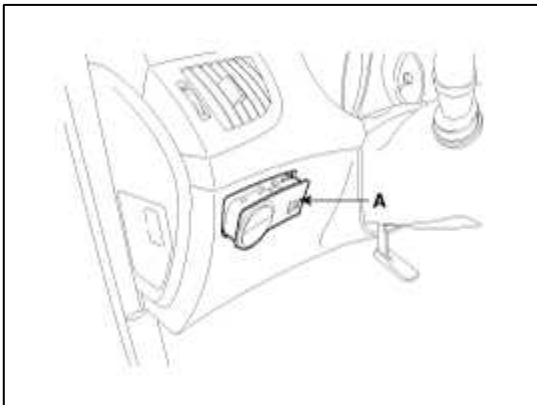
NOTE

The turn signal lamps should flash 60 to 120 times per minute. If one of the front or rear turn signal lamps has an open circuit, the number of flashes will be more than 120 per minute. If operation is not as specified, replace the flash unit.

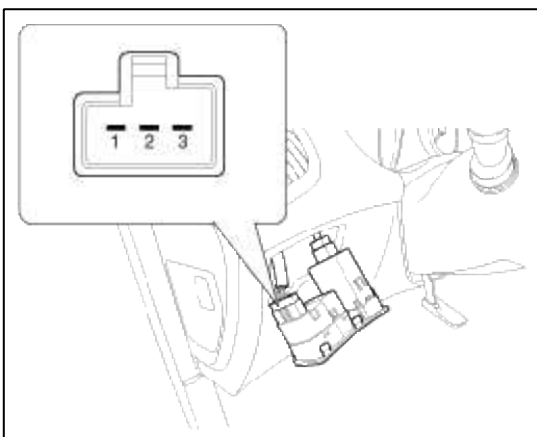
Body Electrical System > Lighting System > Rheostat > Repair procedures

Inspection

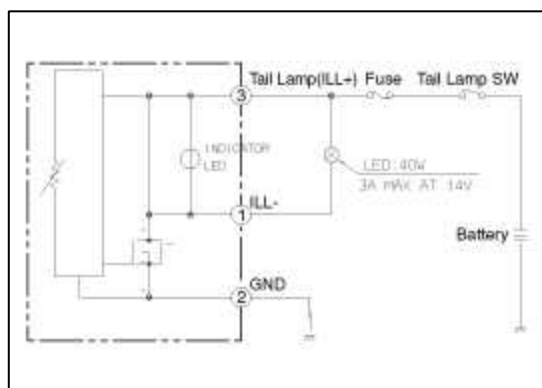
1. Disconnect the negative (-) battery terminal.
2. Remove the lower crash pad switch (A) from the side crash pad cover by using the scraper.



3. Disconnect the rheostat connector from lower crash pad switch.



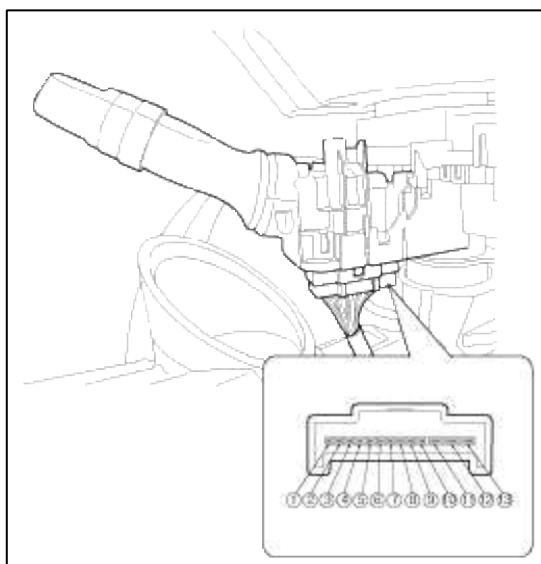
4. Check for intensity. If the light intensity of the lamps changes smoothly without any flickering when the rheostat is turned, it can be assumed that the rheostat is normal.



Body Electrical System > Lighting System > Front Fog Lamps > Repair procedures

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.



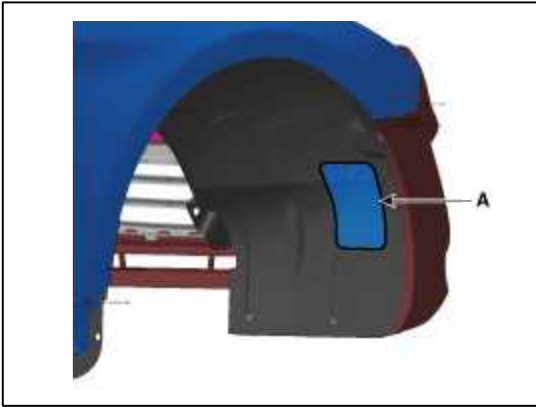
Front Fog Lamp

Terminal Position	5	6
OFF		
ON	○	○

Removal

1. Disconnect the negative (-) battery terminal.

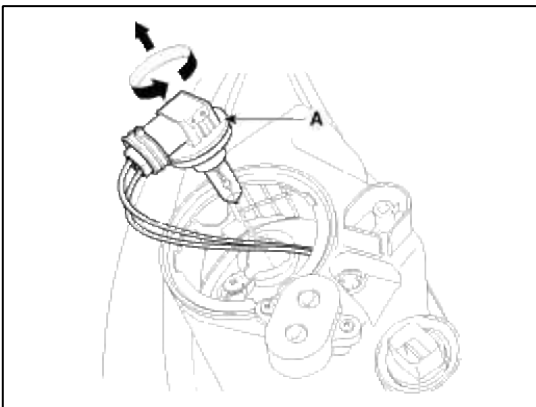
2. Open the front wheel guard service cover (A).



3. Remove the dust cover (A) in the service cover.

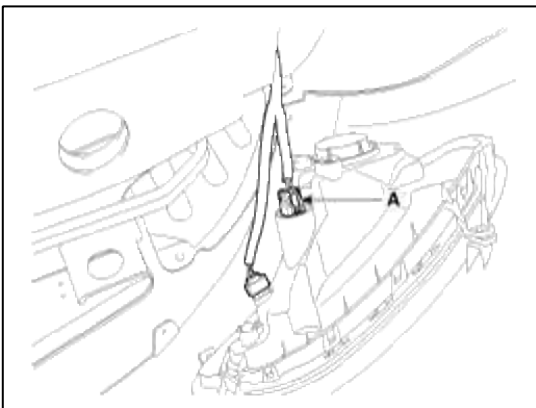


4. Replace the front fog bulb turning it in the counterclockwise direction.

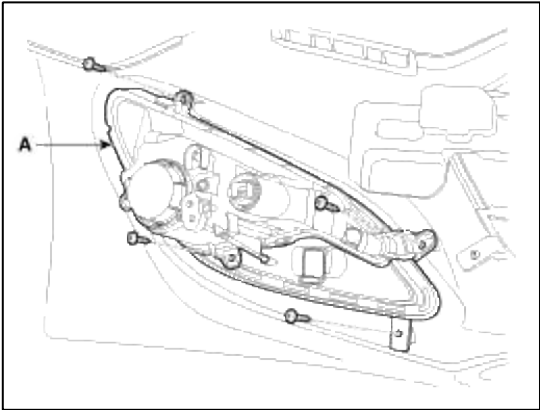


5. Remove the front bumper when it need to remove the front fog lamp assembly.
(Refer to BD group - "Front Bumper")

6. Disconnect the front fog lamp connector (A).



7. Remove the front fog lamp assembly (A) after loosening the screws.



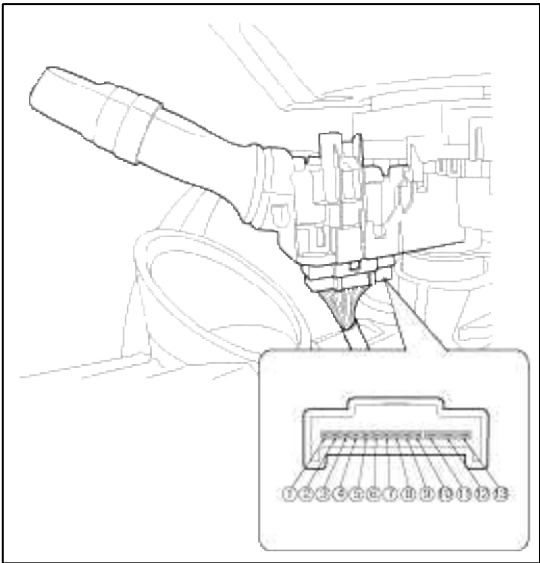
Installation

- 1. Install the front fog bulb and dust cover.
- 2. Reconnect the lamp connector.
- 3. Install the front bumper.

Body Electrical System > Lighting System > Rear Fog Lamps > Repair procedures

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 rear fog lamp switch, make sure that continuity exists between the terminals below.
- If continuity is not as specified, replace the multi-function switch.



Rear Fog Lamp

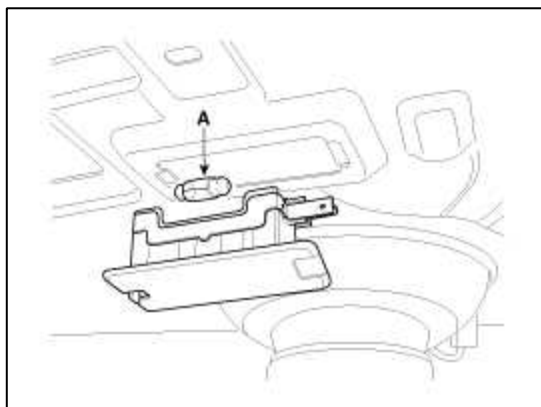
Terminal Position	5	6	9
OFF			
Front	○	○	
Rear	○	○	○

For the removal and installation of rear fog lamp, please refer to the rear combination lamp.

Body Electrical System > Lighting System > Luggage Room Lamps > Repair procedures

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the luggage room lamp with a flat-tip screwdriver and disconnect the 2P connector.
3. Remove the bulb (A).



Installation

1. Install the bulb.
2. Install the luggage lamp.

Body Electrical System > Lighting System > Troubleshooting

Troubleshooting

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

Stop lamps do not turn off	Stop lamp switch faulty	Repair or replace switch
Instrument lamps do not light (Tail lamps light)	Rheostat faulty	Check rheostat
	Wiring or ground faulty	Repair if necessary
Turn signal lamp does not flash on one side	Bulb burned out	Replace bulb
	Turn signal switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Turn signal lamps do not light	Bulb burned out	Replace bulb
	Turn signal lamp fuse (10A) blown	Check for short and replace fuse
	Flasher unit faulty	Check flasher unit
	Turn signal switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Hazard warning lamps do not light	Bulb burned out	Replace bulb
	Hazard warning lamp fuse (15A) blown	Check for short and replace fuse
	Flasher unit faulty	Check flasher unit
	Hazard switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
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
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
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
Luggage room lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (10A) blown	Check for short and replace fuse

	Luggage room lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

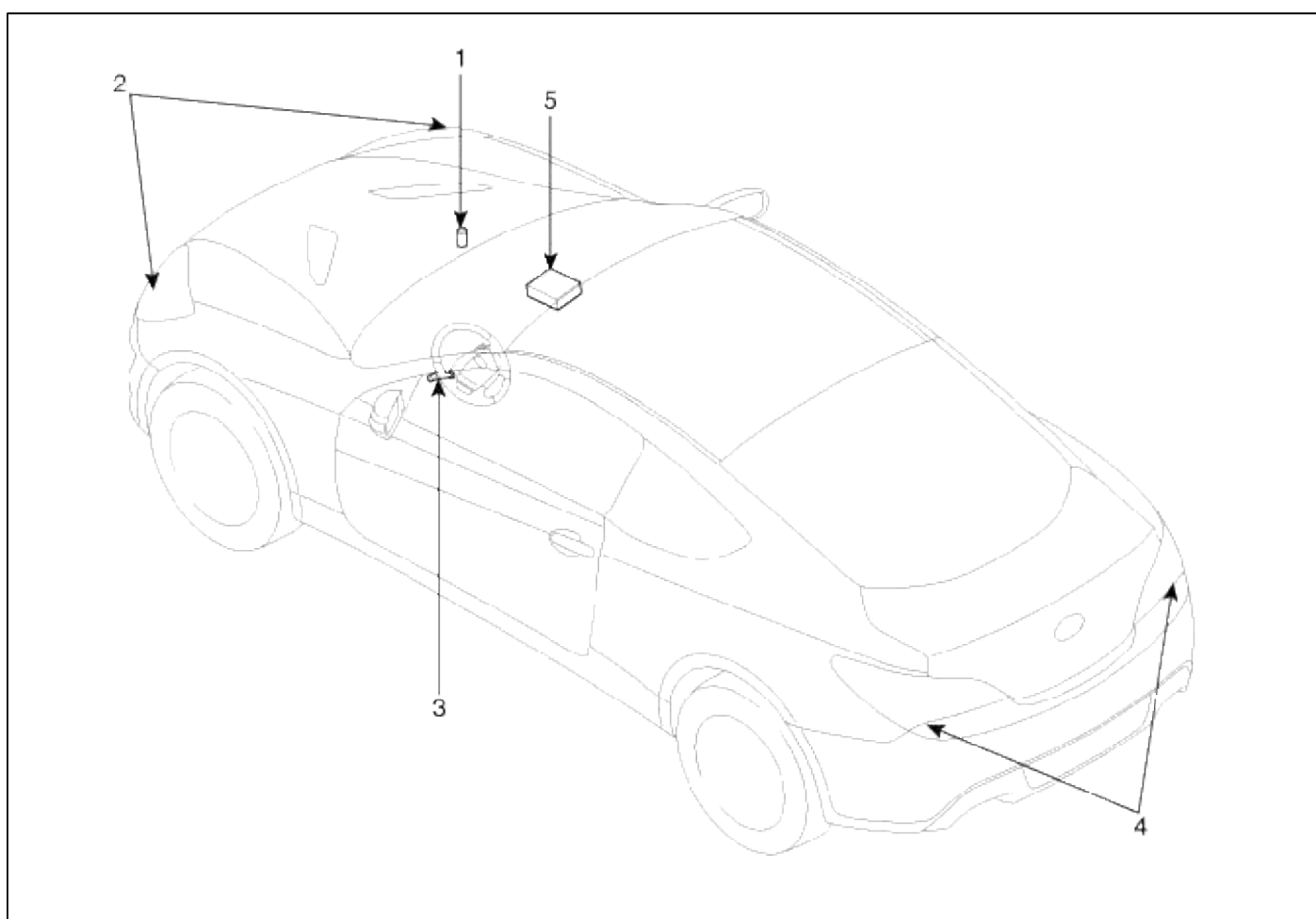
Body Electrical System > Auto Lighting Control System > Specifications

Specifications

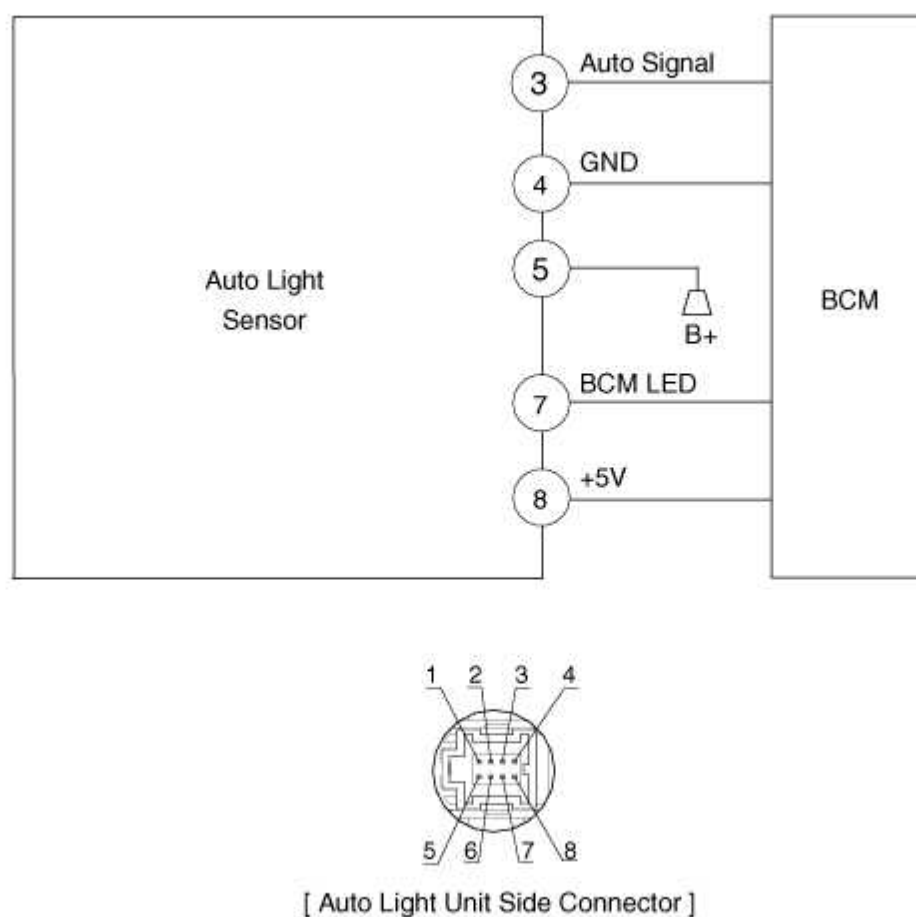
Items		Specifications
Rated voltage		5V
Load		Max. 1mA
Detection illuminations	Tail lamp	ON : $0.82 \pm 0.05V$ OFF : $1.65 \pm 0.05V$
	Head lamp	ON : $0.48 \pm 0.05V$ OFF : $0.92 \pm 0.05V$

Body Electrical System > Auto Lighting Control System > Components and Components Location

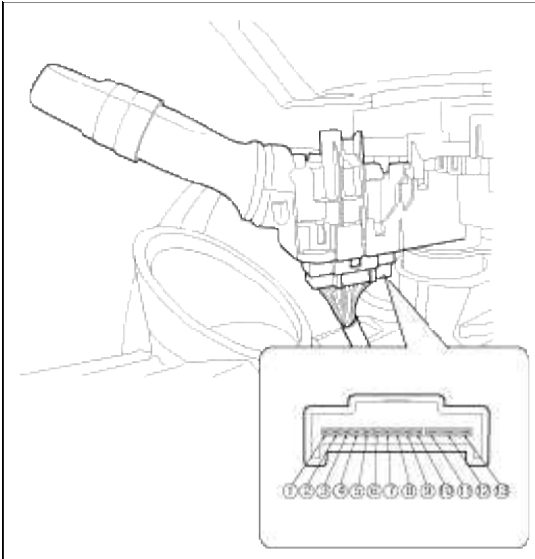
Component Location



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

Body Electrical System > Auto Lighting Control System > Schematic Diagrams
Circuit Diagram

Body Electrical System > Auto Lighting Control System > Auto Light Switch > Repair procedures
Inspection

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



Terminal Position	1	4	3	2
OFF				
I	○	—————	○	
II	○	○	—————	○
AUTO			○	○

Body Electrical System > Auto Lighting Control System > Auto Light Sensor > Repair procedures

Inspection

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

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.

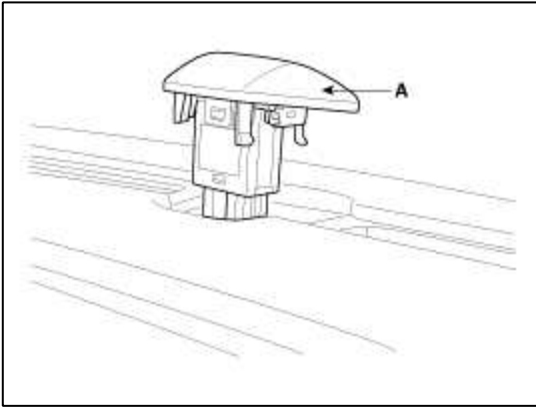
This is designed to prevent any head lamp cut off when the failure occurs during the night.

	Tail lamp	Head lamp
ON	$0.82 \pm 0.05V$	$0.48 \pm 0.05V$
OFF	$1.65 \pm 0.05V$	$0.92 \pm 0.05V$

Removal

1. Disconnect the negative (-) battery terminal.

2. Remove the photo & auto light sensor(A) from crash pad upper side by using screw (-) driver.



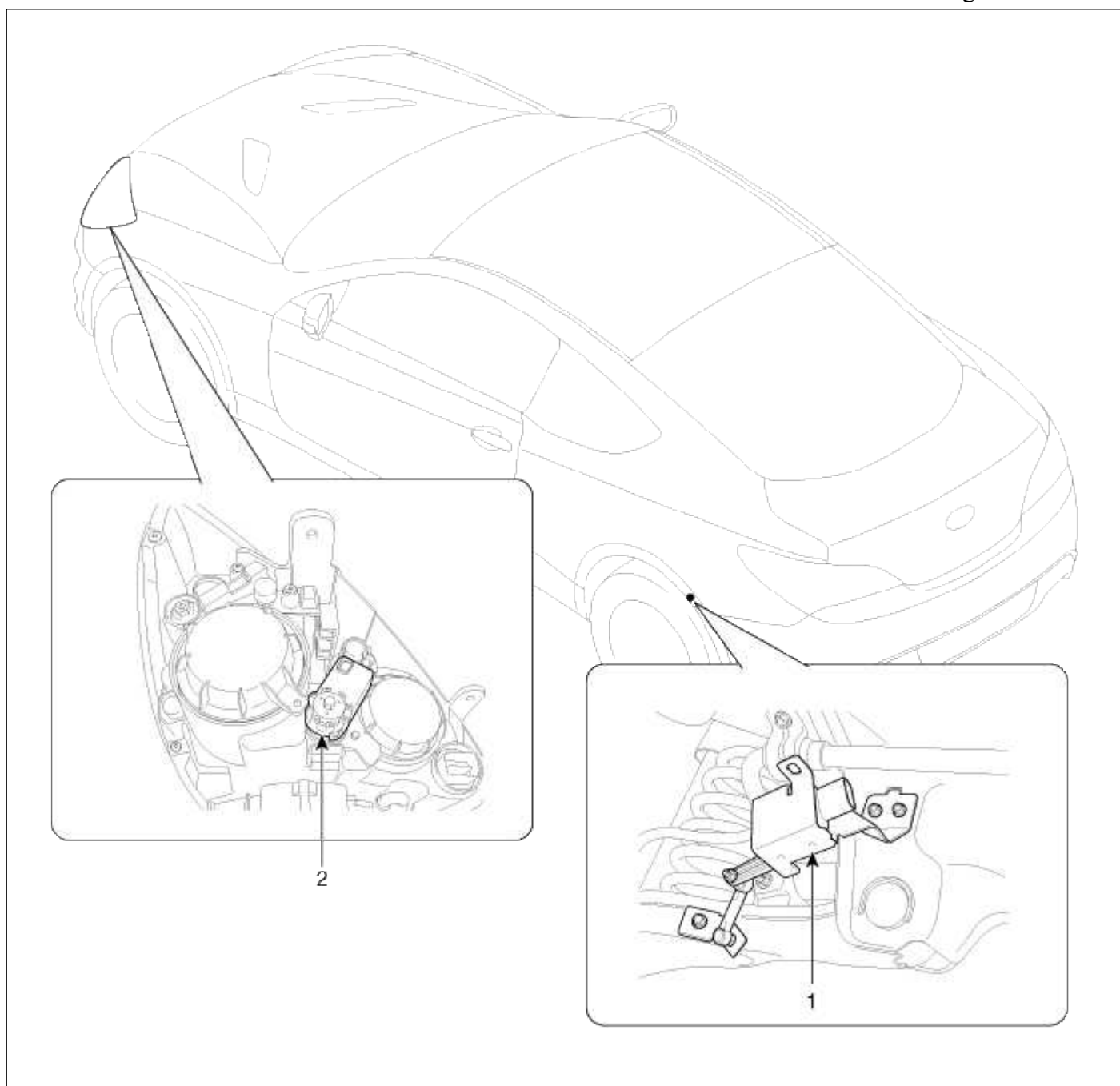
3. Remove the auto light connector.

Installation

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

Body Electrical System > Auto Head Lamp Leveling Device > Components and Components Location

Component Location

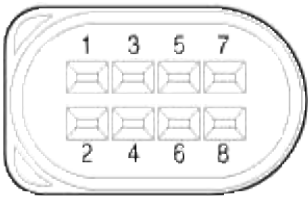
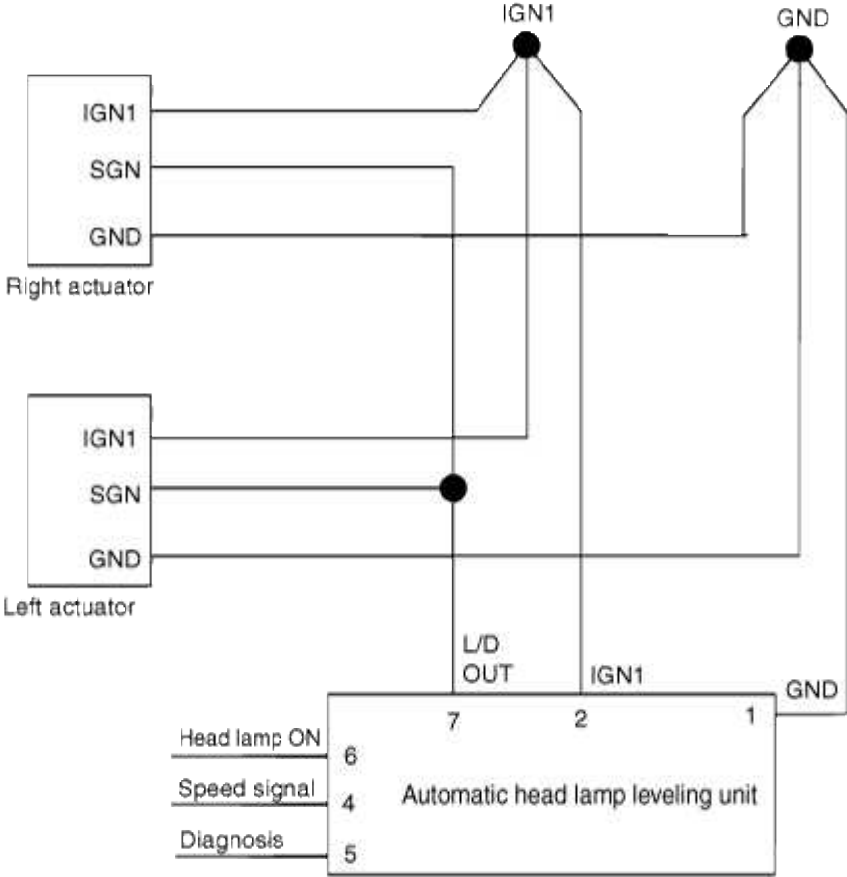


1. Head lamp leveling unit

2. Head lamp leveling
actuator

Body Electrical System > Auto Head Lamp Leveling Device > Auto Head lamp leveling Unit > Schematic Diagrams

Circuit Diagram



PIN CONNECTION

Terminal	Description
1	Ground
2	IGN1
3	-
4	Speed signal
5	Diagnosis
6	Head lamp ON
7	Leveling actuator
8	-

Body Electrical System > Auto Head Lamp Leveling Device > Auto Head lamp leveling Unit > Description and Operation

Description

According to driving environment and loading state of vehicle, head lamp lighting direction is changed to keep the driver's visibility range and to protect the driver's vision from glare, aiming at safety driving.

Sensor integrated ECU mounting on the rear center arm drives the actuator mounting on the head lamp since sensing the input signal following the vehicle's statically changes.

Head lamp beam is automatically operated by chassis tilt.

Operation

Operating Procedure

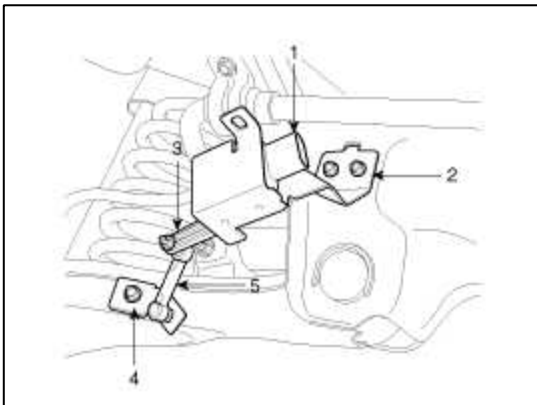
1. Suspension angle change resulted from vehicle's load change.
2. Sensor angle change.
3. Microprocessor calculates necessary head lamp angle change amount.
4. Sending a proper signal to head lamp leveling device and driving actuator.

Operating Condition

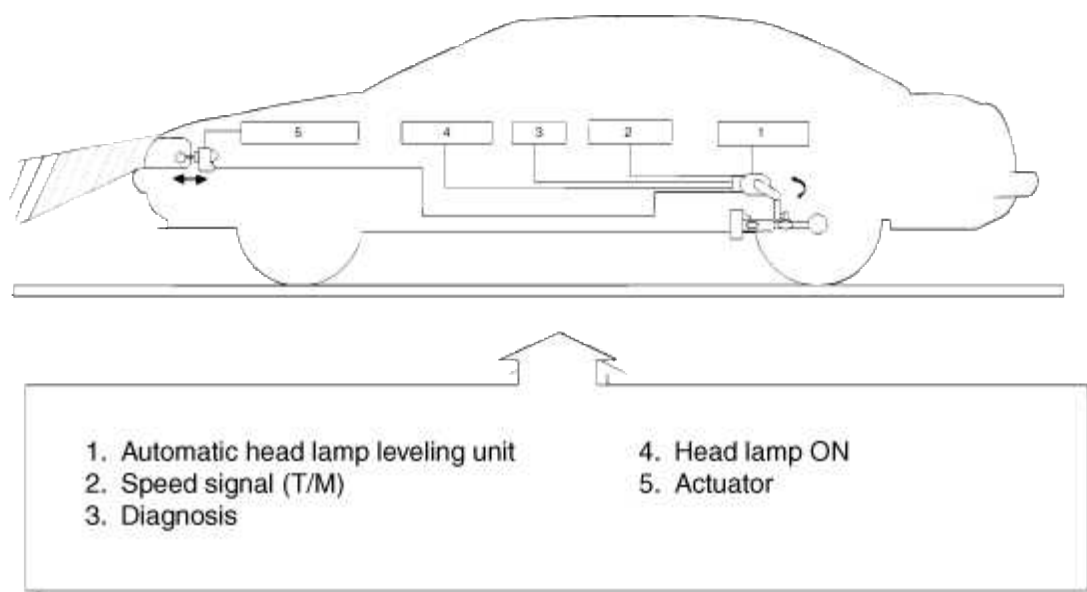
1. Ignition on
2. Low beam on
3. On stop : If sensor lever change is 2° and above, head lamp is operated after max. 1.5 sec.
4. On driving : If vehicle velocity is over 4km/h(2.48mile/h), velocity change is not over 0.8-1.6km/h(0.5 ~ 1.0mile/h) per second, and loading condition is changed, then head lamp is operated.

Components

1. Auto head lamp leveling unit
 1. Leveling unit & sensor
 2. Sensor mounting bracket
 3. Sensor linkage
 4. Linkage bracket
 5. Assist arm



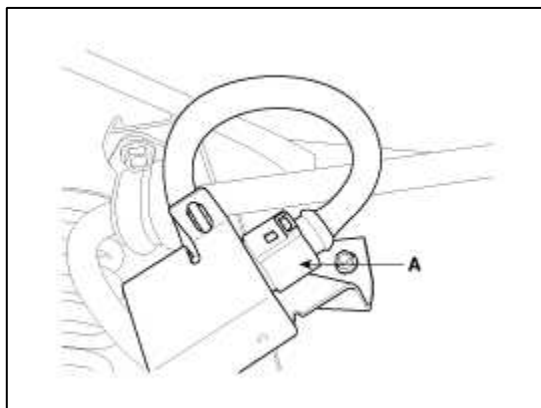
- A. Using a Micro-processor, percept the operation lever's mechanical angle change or speed signal.
 - B. As an actuator control device of inner control program, mounting on the rear center arm.
2. Actuator
 - A. Change the head lamp lighting direction up or down since automatic head lamp leveling unit sensing the input signal following the vehicle's statically changes.



Body Electrical System > Auto Head Lamp Leveling Device > Auto Head lamp leveling Unit > Repair procedures

Removal

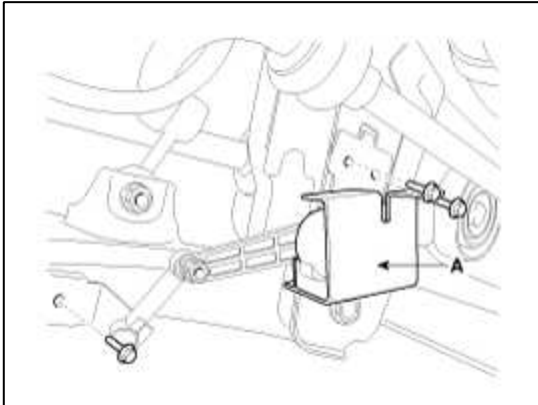
1. Remove the head lamp leveling unit connector(A).



2. Loosen the mounting bolts (3EA) of automatic head lamp leveling unit assembly.

Tightening torque :

3 ~ 5 Nm (30 ~ 50 kg.cm, 2.21 ~ 3.68 lbf.ft)



3. Remove the head lamp leveling unit assembly.

Installation

1. Install the head lamp leveling unit.
2. Reconnect the head lamp leveling unit connector.

Inspection

1. Ignition "ON".
2. Turn on the head lamp switch.
3. Check for operation. If the aim of the head lamps changes smoothly when the head lamp leveling switch is turned.
4. If the operation does not work well, inspect the connector and terminals to be sure they are all making good contact.

If the terminals are bent, loose or corroded, repair them as necessary, and recheck the system.

If the terminals look OK, go to step 5.

5. Substitute with a known-good head lamp assembly and check for proper operation.

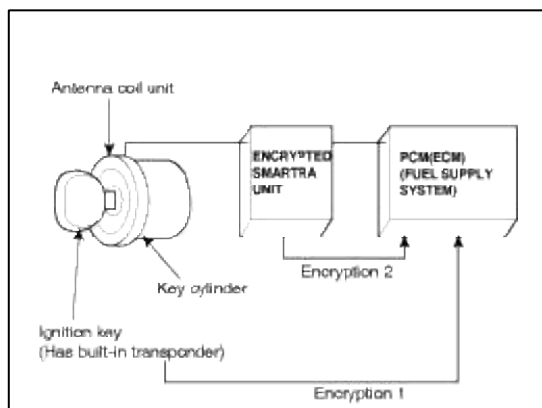
Body Electrical System > Immobilizer System > Description and Operation

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. Encrypted SMARTRA type immobilizer

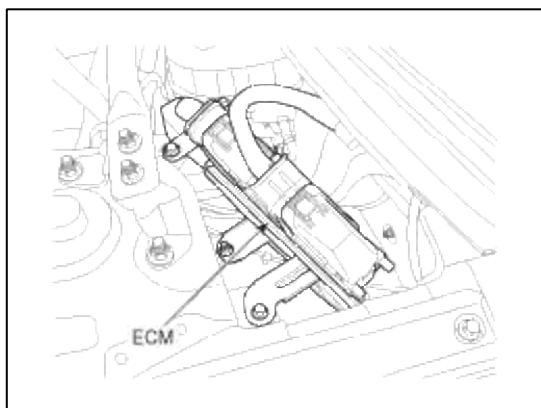
- A. The SMARTRA system consists of a passive challenge - response (mutual authentication) transponder located in the ignition key, an antenna coil, an encoded SMARTRA unit, an indicator light and the PCM(ECM).
- B. The SMARTRA communicates to the PCM(ECM) (Engine Control Module) via a dedicated communications line. Since the vehicle engine management system is able to control engine mobilization, it is the most suitable unit to control the SMARTRA.
- C. When the key is inserted in the ignition and turned to the ON position, the antenna coil sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the SMARTRA unit to the PCM(ECM).
- D. If the proper key has been used, the PCM(ECM) will energize the fuel supply system. The immobilizer indicator light in the cluster will simultaneously come on for more than five seconds, indicating that the SMARTRA unit has recognized the code sent by the transponder.
- E. If the wrong key has been used and the code was not received or recognized by the PCM(ECM) the indicator light will continue blinking for about five seconds until the ignition switch is turned OFF.
- F. If it is necessary to rewrite the PCM(ECM) to learn a new key, the dealer needs the customer's vehicle, all its keys and the Hi-scan (pro) equipped with an immobilizer program card. Any key that is not learned during rewriting will no longer start the engine.
- G. The immobilizer system can store up to eight key codes.
- H. If the customer has lost his key, and cannot start the engine, contact Hyundai motor service station.



Components Operations

PCM (Power Train Control Module)

1. The PCM(ECM) (A) carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the PCM(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 PCM(ECM). ERN (Encrypted Random Number) value between EMS and encrypted smartra unit is checked and the validity of coded key is decided by EMS.



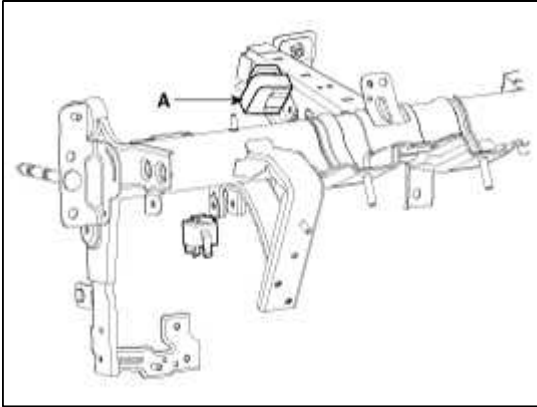
ENCRYPTED SMARTRA unit (A)

The SMARTRA carries out communication with the built-in transponder in the ignition key. This wireless

communication runs on RF (Radio frequency of 125 kHz). The SMARTRA is mounted behind of the crash pad close to center cross bar.

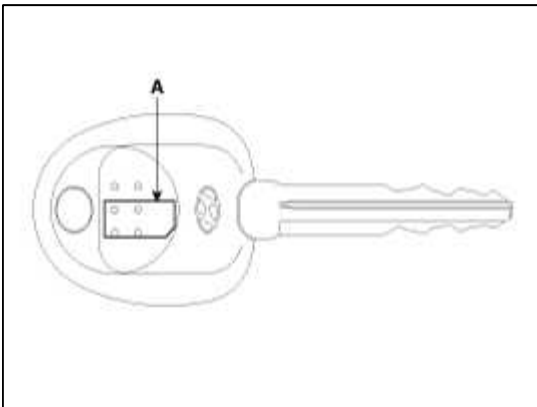
The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the SMARTRA device. And, the received messages from the PCM(ECM) are converted into an RF signal, which is transmitted to the transponder by the antenna.

The SMARTRA 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 PCM(ECM) and vice versa.



TRANSPONDER (Built-in keys)

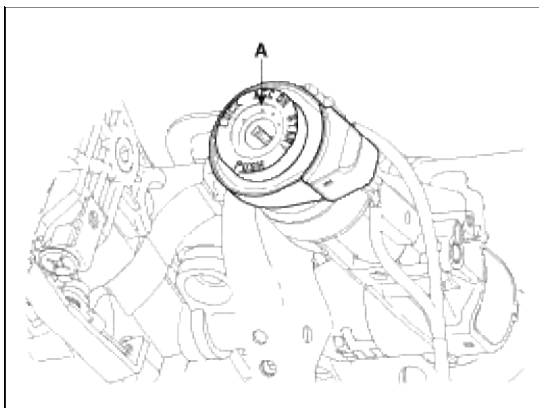
The transponder (A) has an advanced encryption algorithm. During the key teaching procedure, the transponder will be programmed with vehicle specific data. The vehicle specific data are written into the transponder memory. The write procedure is once only; therefore, the contents of the transponder can 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 SMARTRA.
- It is located directly in front of the steering handle lock.



Body Electrical System > Immobilizer System > Repair procedures

Replacement

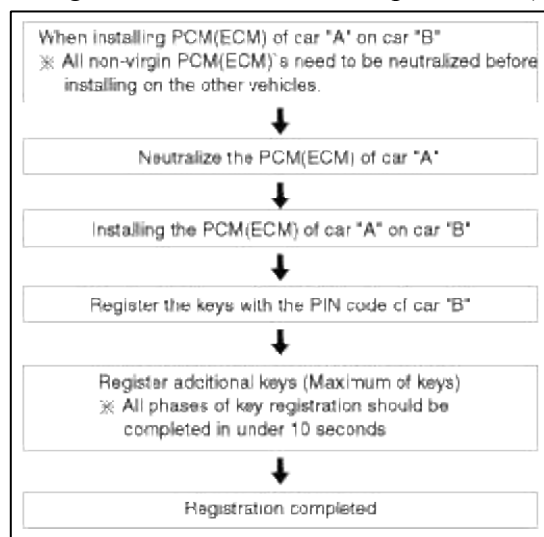
Problems And Replacement Parts:

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	PCM(ECM)	YES
Ignition switch does not work	Ignition switch with Antenna coil unit	YES
Unidentified vehicle specific data occurs	Key, PCM(ECM)	YES
SMARTRA unit does not work	SMARTRA unit	YES

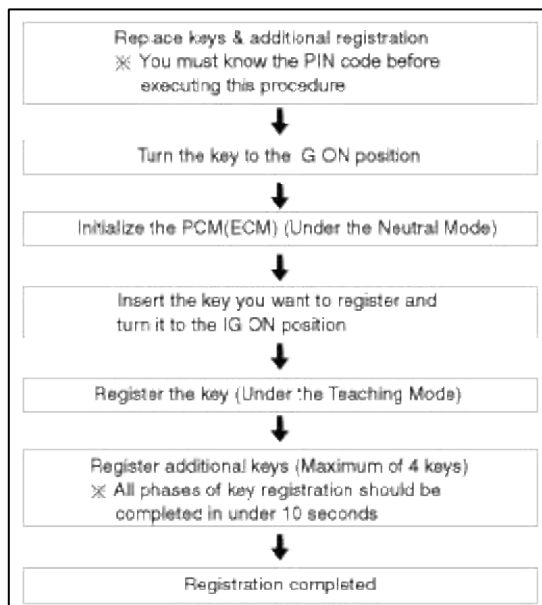
Replacement Of Ecm And Smartra

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 SMARTRA, it needs teaching the smartra. A new SMARTRA device replaces the old one and smartra need teaching.

1. Things to remember before a replacement (PCM(ECM))



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



NOTE

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 PCM(ECM) can be set to the "neutral" status by a tester.

A valid ignition key is inserted and after ignition on is recorded, the PCM(ECM) requests the vehicle specific data from the tester. The communication messages are described at "Neutral Mode" After successfully receiving the data, the PCM(ECM) is neutralized.

The ECM remains locked. Neither the limp home mode nor the "twice ignition on" function, is accepted by the PCM(ECM).

The teaching of keys follows the procedure described for the virgin PCM(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.

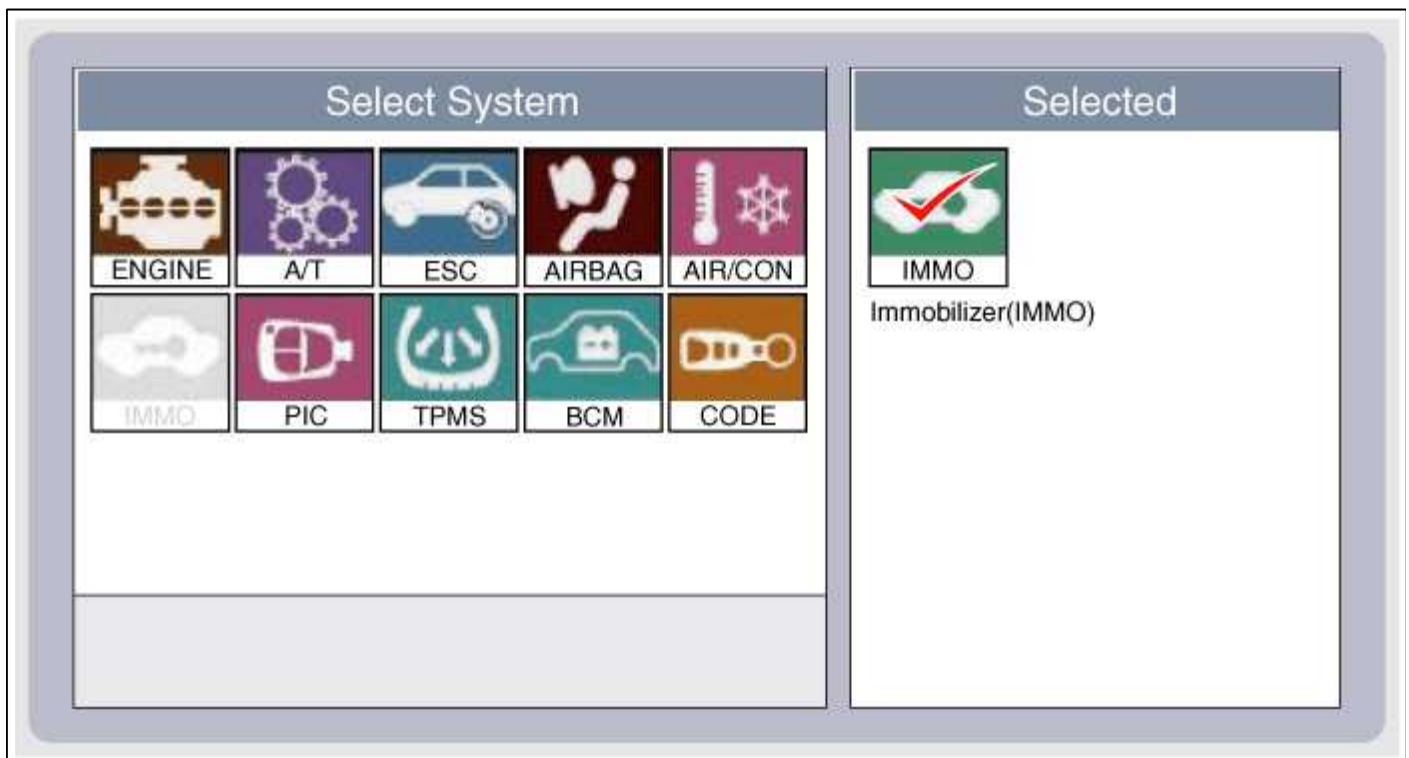
This function is for neutralizing the PCM(ECM) and Key. Ex) when lost key, Neutralize the PCM(ECM) then teach keys.

(Refer to the Things to do when Key & PIN Code the PCM(ECM) can be set to the "neutral" status by a scanner. If wrong vehicle specific data have been sent to SMATRA three times continuously or intermittently, the SMATRA 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.




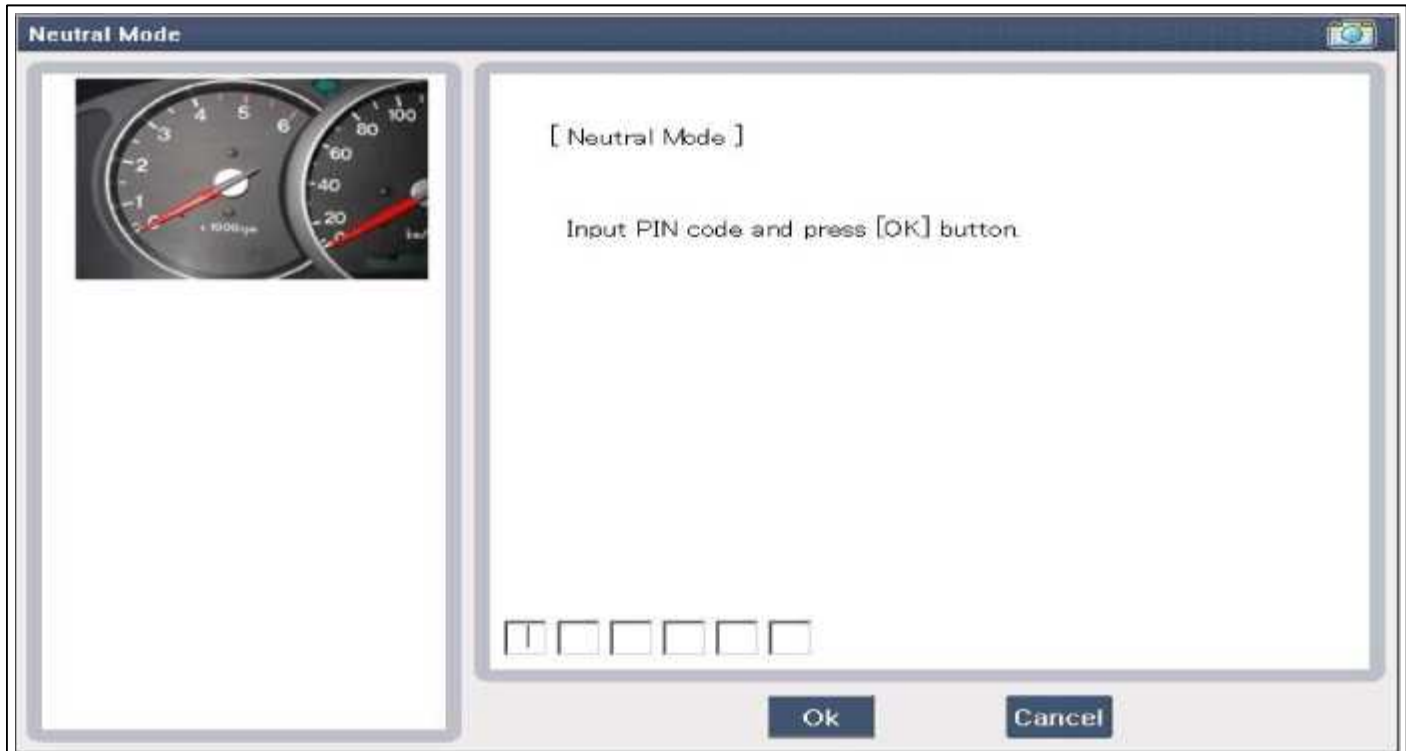
NOTE

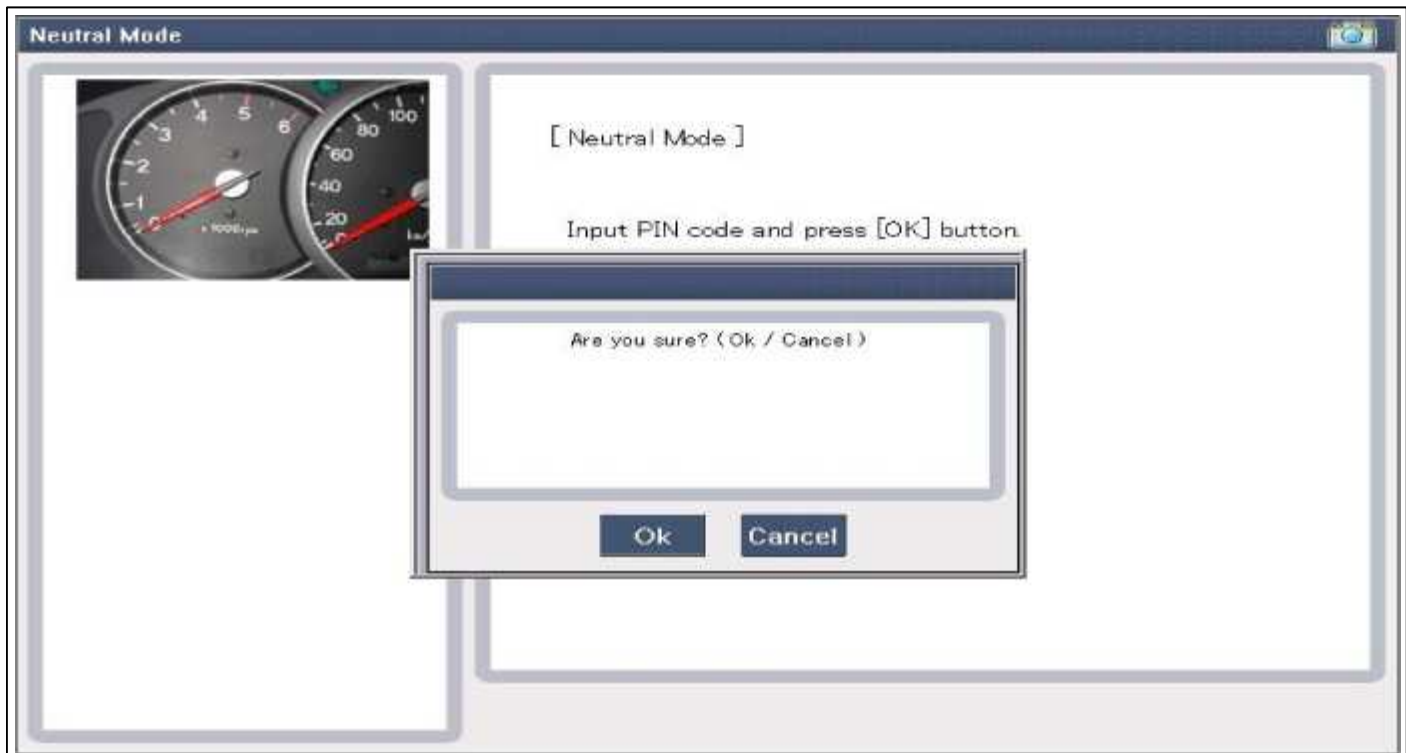
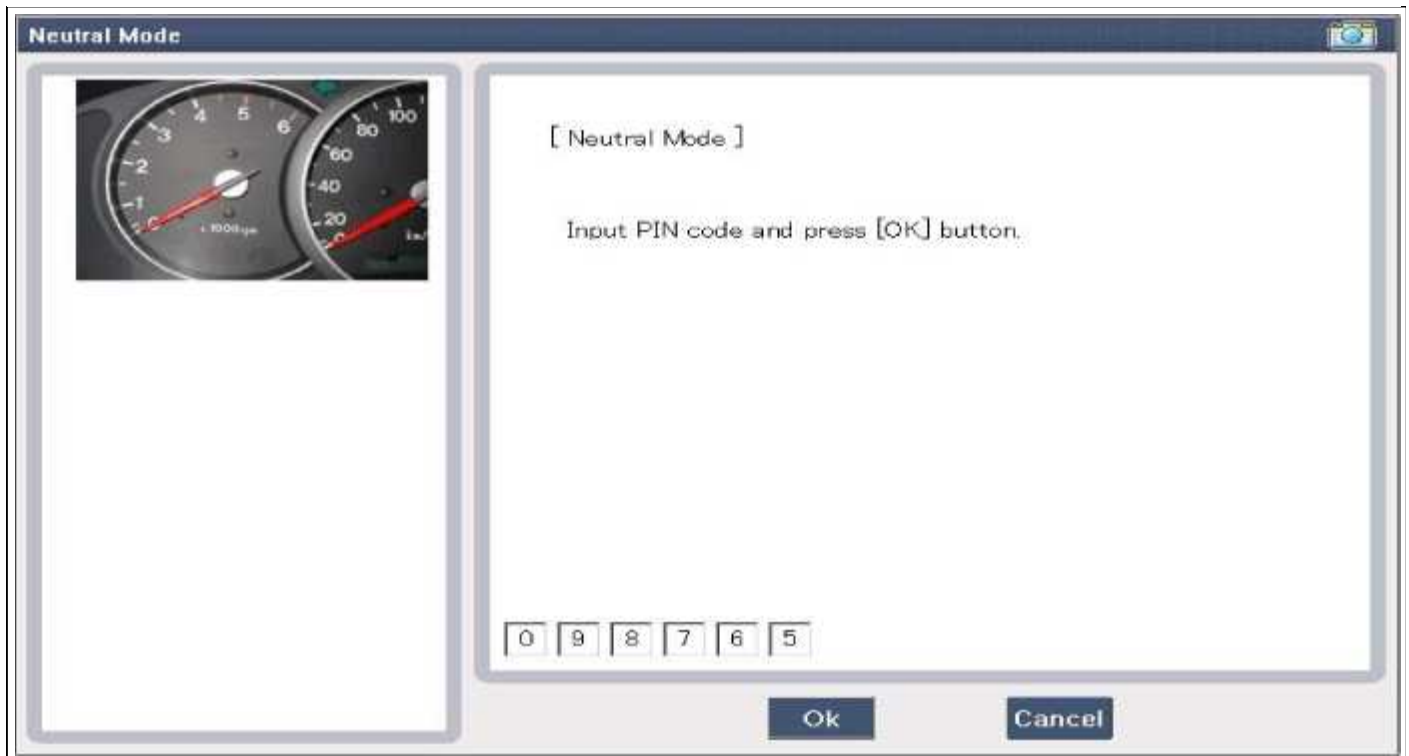
- Neutralizing setting condition
 - In case of PCM(ECM) status "Learnt" regardless of user password "Virgin or Learnt"
 - Input correct PIN code by scanner.
 - Neutralizing meaning .
 - : PIN code (6) & user password (4) deletion.
 - : Locking of ECM (except key teaching permission)
- Neutralizing meaning: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

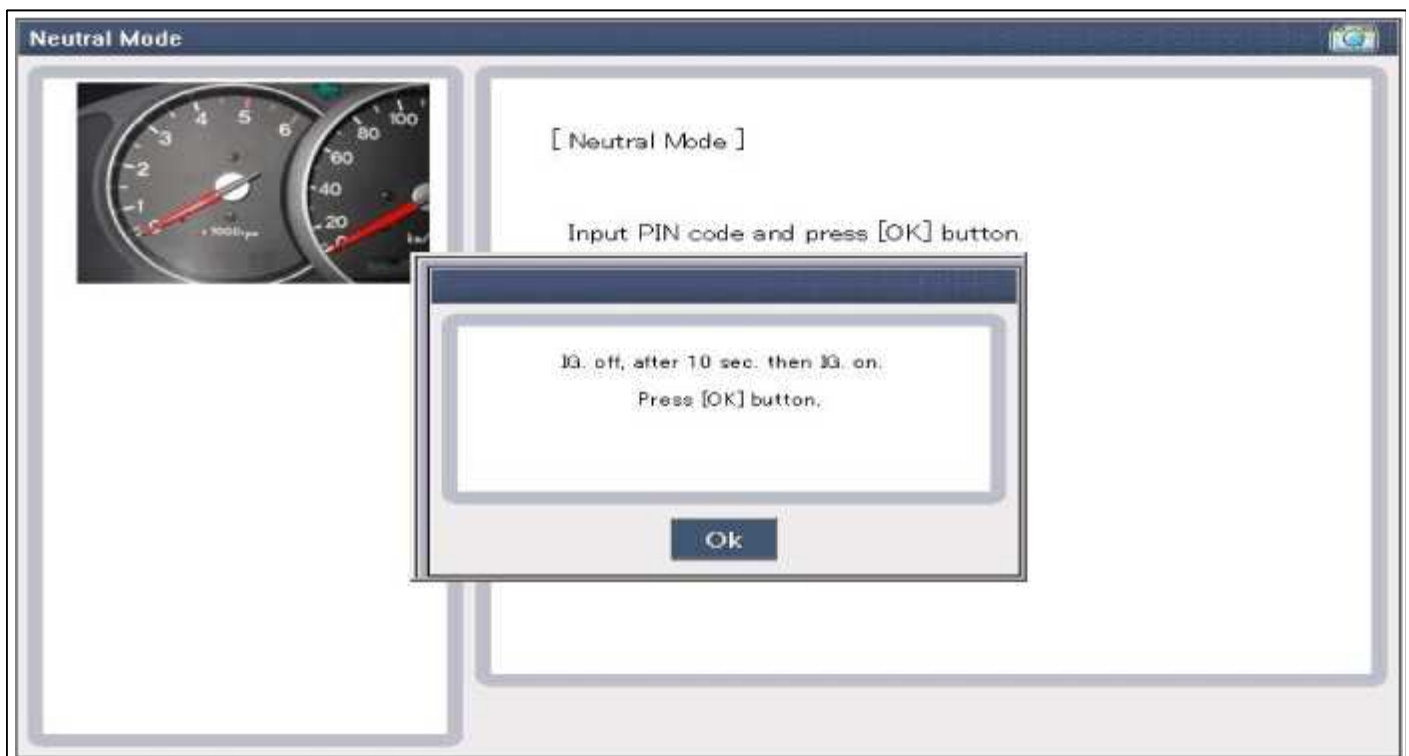
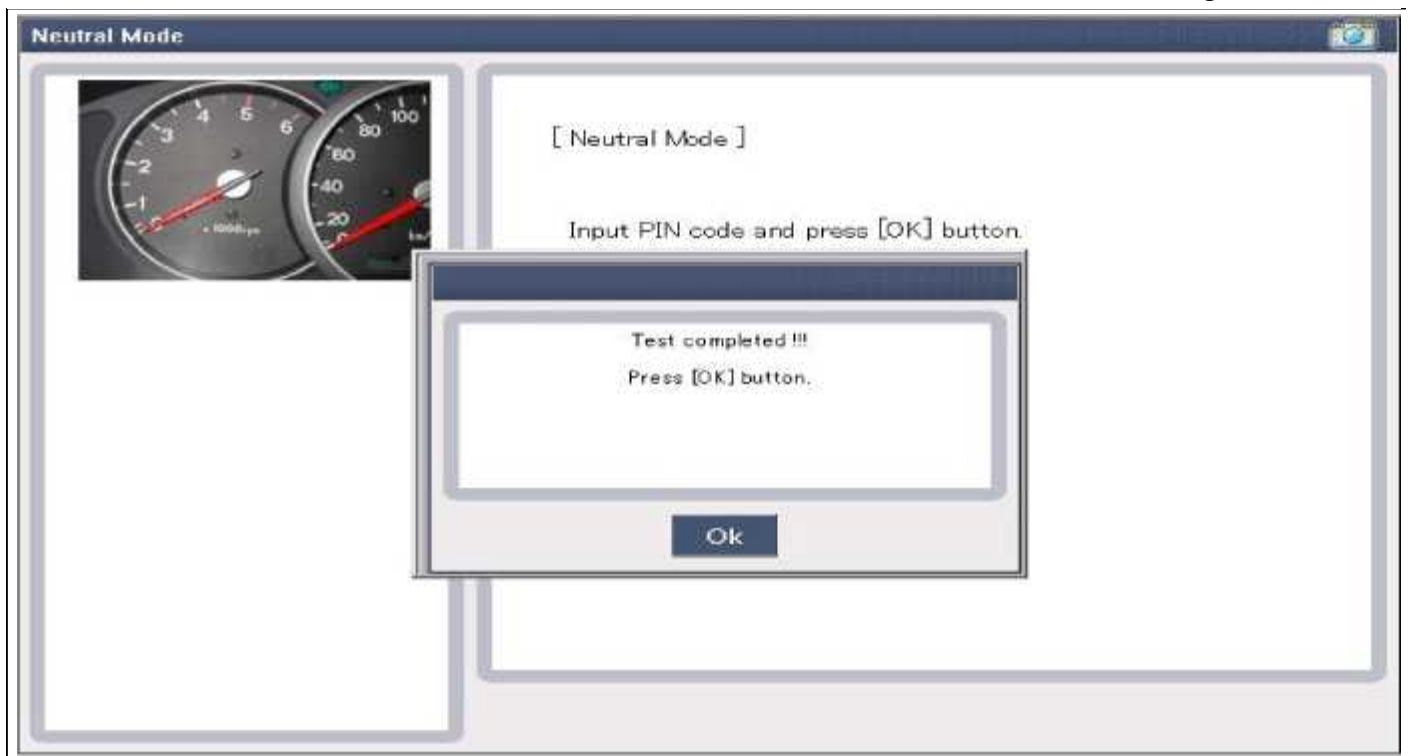
Function	Engine Running			Learning	
	Learnt Key	Limp home	Twice Ignition	Key	User Password
EMS					
Neutral	No	No	No	Yes	No

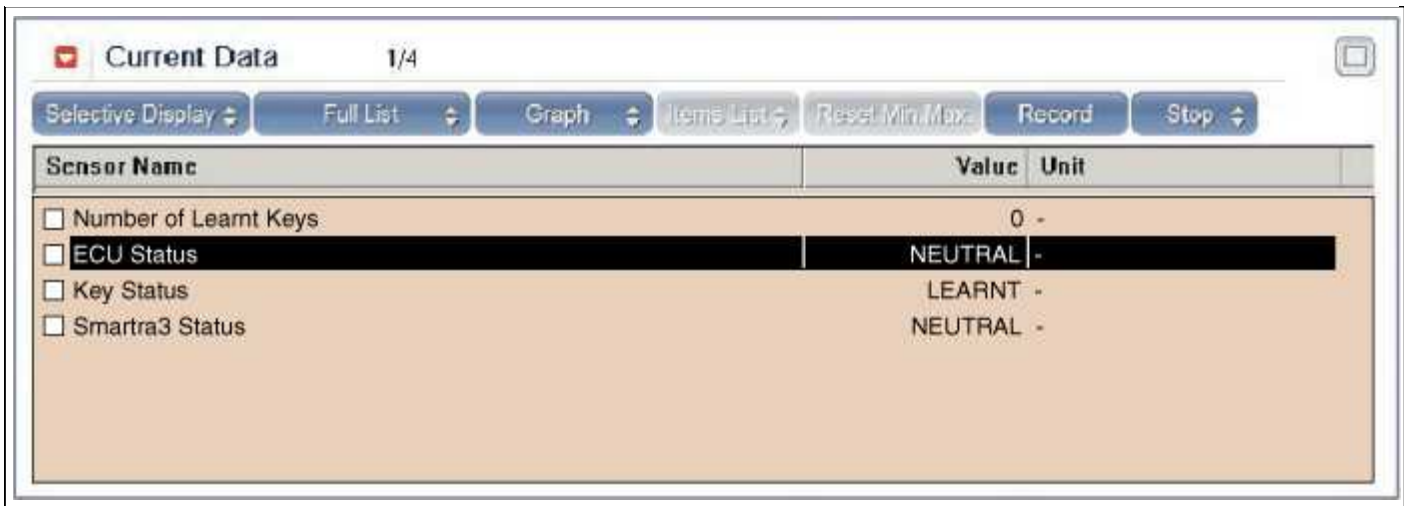


ID Register

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







Neutralizing Of SMARTRA

The EMS can be set to the status "neutral" by tester

Ignition key (regardless of key status) is inserted and after IGN ON. If receiving the correct vehicle password from GST, SMARTRA can be neutralized. The neutralization of SMARTRA is possible if DPN is same as the value inputted by GST.

In case that the SMARTRA status is neutral, the EMS keeps the lock state. And the start is not possible by "twice ignition".

In case of changing the vehicle password, new virgin transponder must be only used. And in case of virgin key, after Learning the key of vehicle password, it can be used.





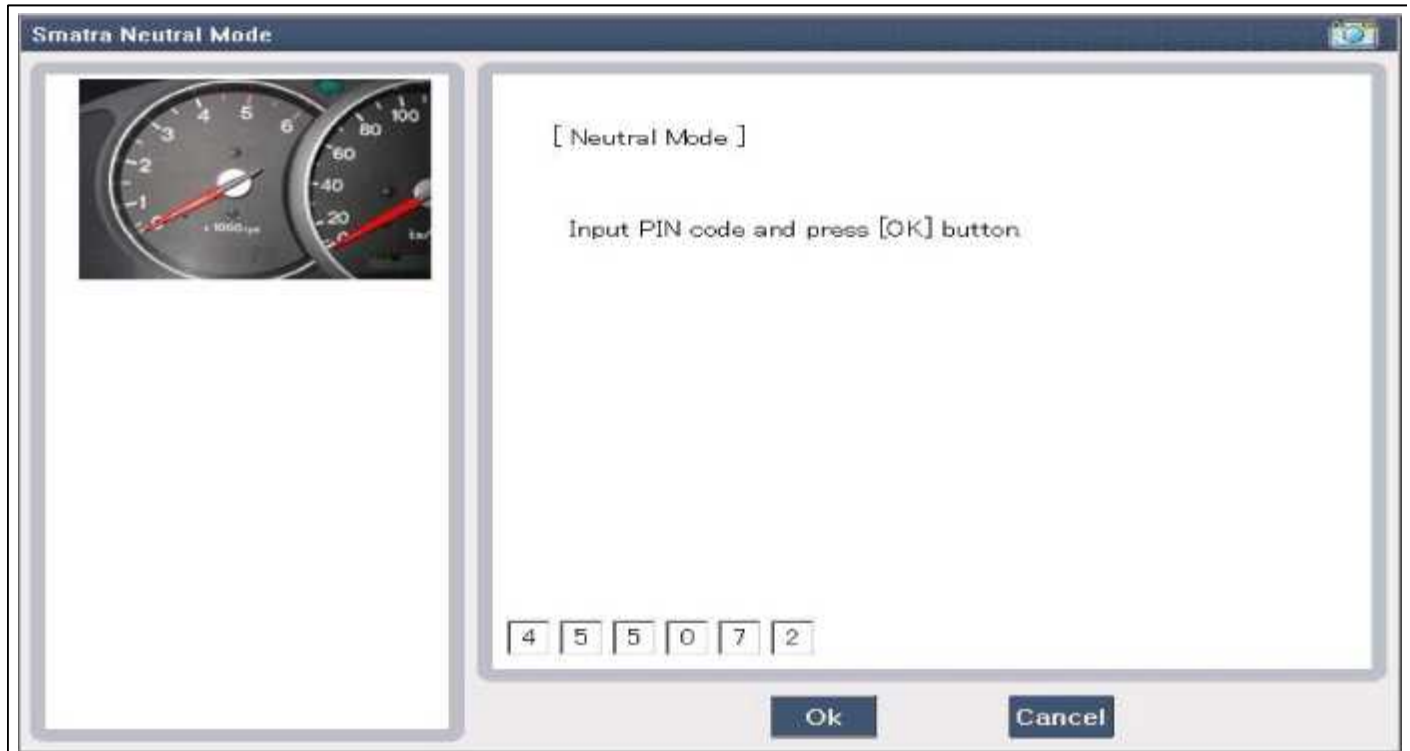
If wrong vehicle specific data have been sent to SMARTRA three times continuously or intermittently, the SMARTRA will reject the request to enter neutral mode for one hour. Disconnecting the battery or other manipulation cannot reduce this time. After connecting the battery the timer starts again for one hour.

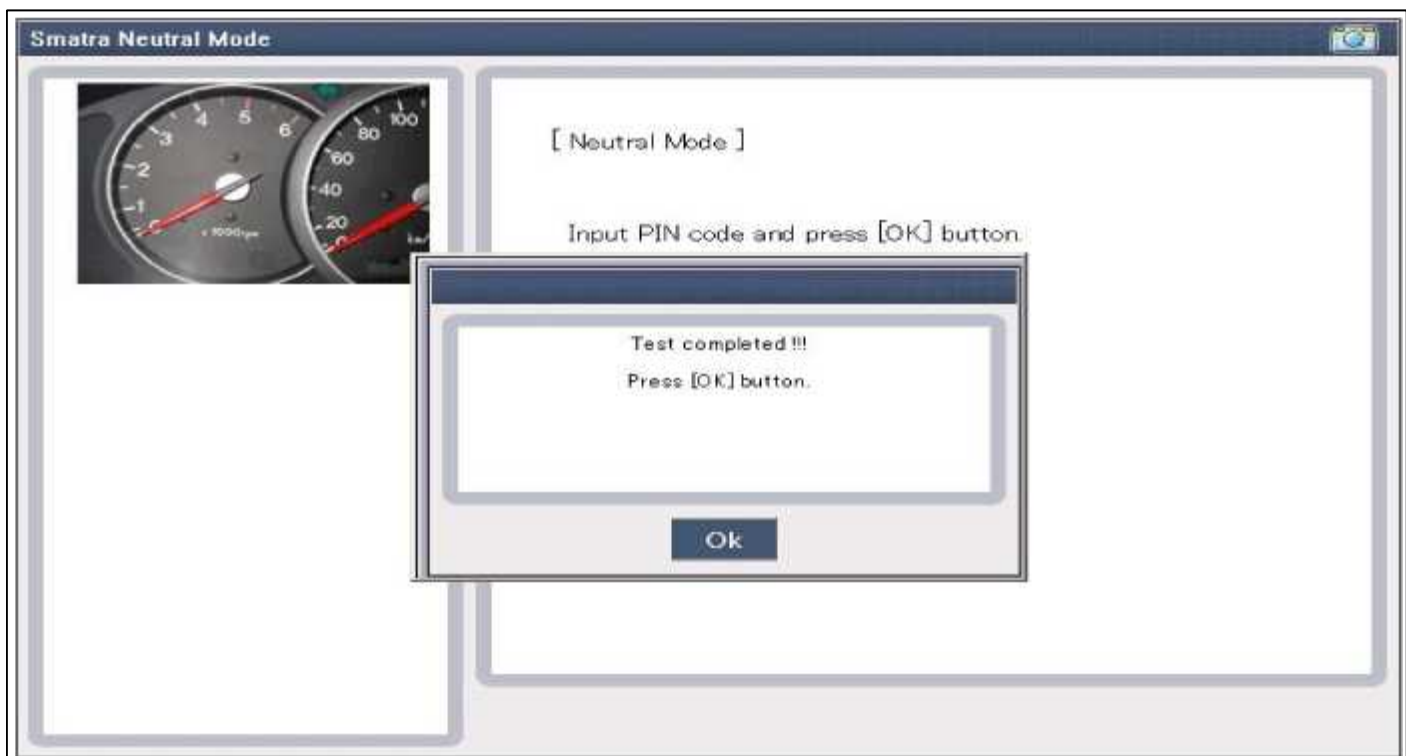
NOTE

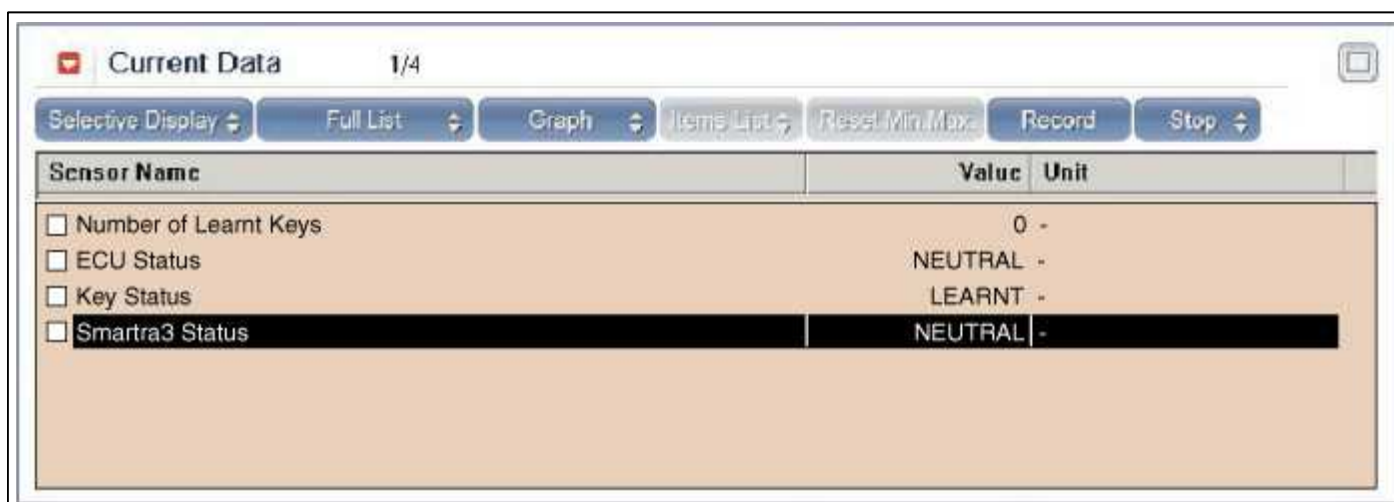
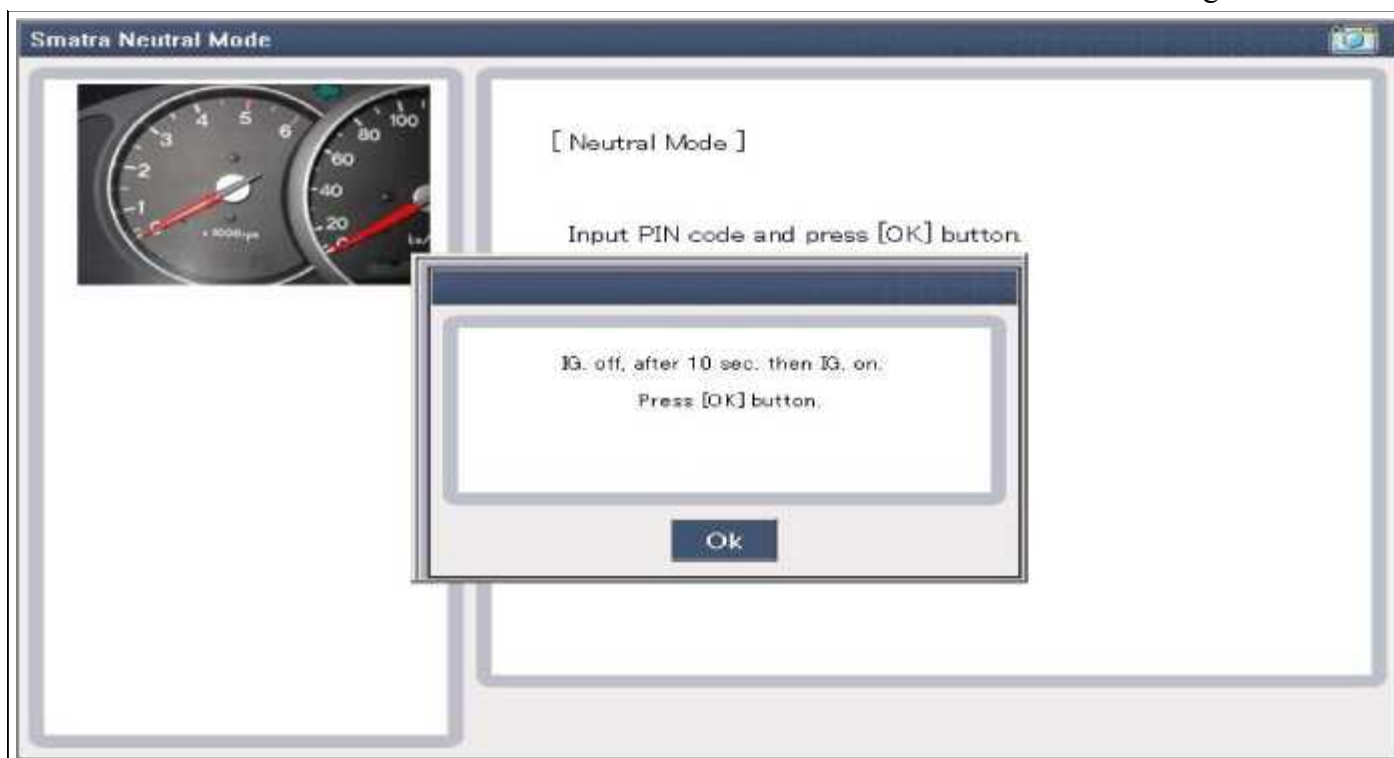
- Neutralizing Setting condition :
 - In case of "SMARTRA status", "Learnt"
 - Input correct Pin code by tester
- Neutralizing meaning :
 - Vehicle password(DPN Code) & SEK Code deletion.
 - Permission of New DPN Learning.

Function	Engine Running			Learning	
	Learnt Key	Limp home	Twice Ignition	Key	User Password
SMARTRA					
Neutral	No	Yes (EMS learnt)	No	Yes	No

ID Register

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





Teaching Procedures

1. Key Teaching Procedure

Key teaching must be done after replacing a defective PCM(ECM) or when providing additional keys to the vehicle owner.

The procedure starts with an PCM(ECM) request for vehicle specific data (PIN code: 6digits) from the tester. The "virgin" PCM(ECM) stores the vehicle specific data and the key teaching can be started. The "learnt" PCM(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 PCM(ECM) three times, the PCM(ECM) will reject the request of key teaching for one hour. This time cannot be reduced by disconnecting the battery or any other manipulation. 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 PCM(ECM) stores the relevant data in the EEPROM and in the transponder. Then the PCM(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 PCM(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 PCM(ECM). This rejects the key and a message is sent to the tester.

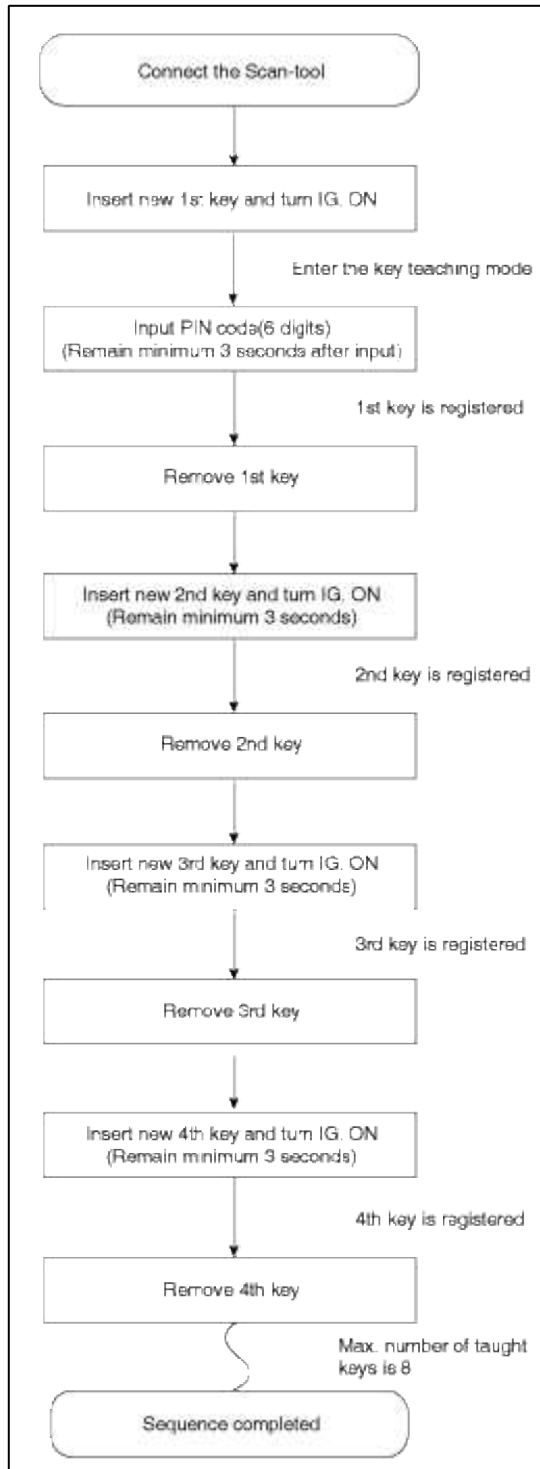
The PCM(ECM) rejects invalid keys, which are presented for teaching. A message is sent to the tester. The key is considered invalid due to faults in the transponder or other reasons, which result from unsuccessful programming of data. If the PCM(ECM) detects different authenticators of a transponder and an PCM(ECM), the key is considered to be invalid. The maximum number of taught keys is 8.

If an error occurs during the Immobilizer Service Menu, the PCM(ECM) status remains unchanged and a specific code is stored.

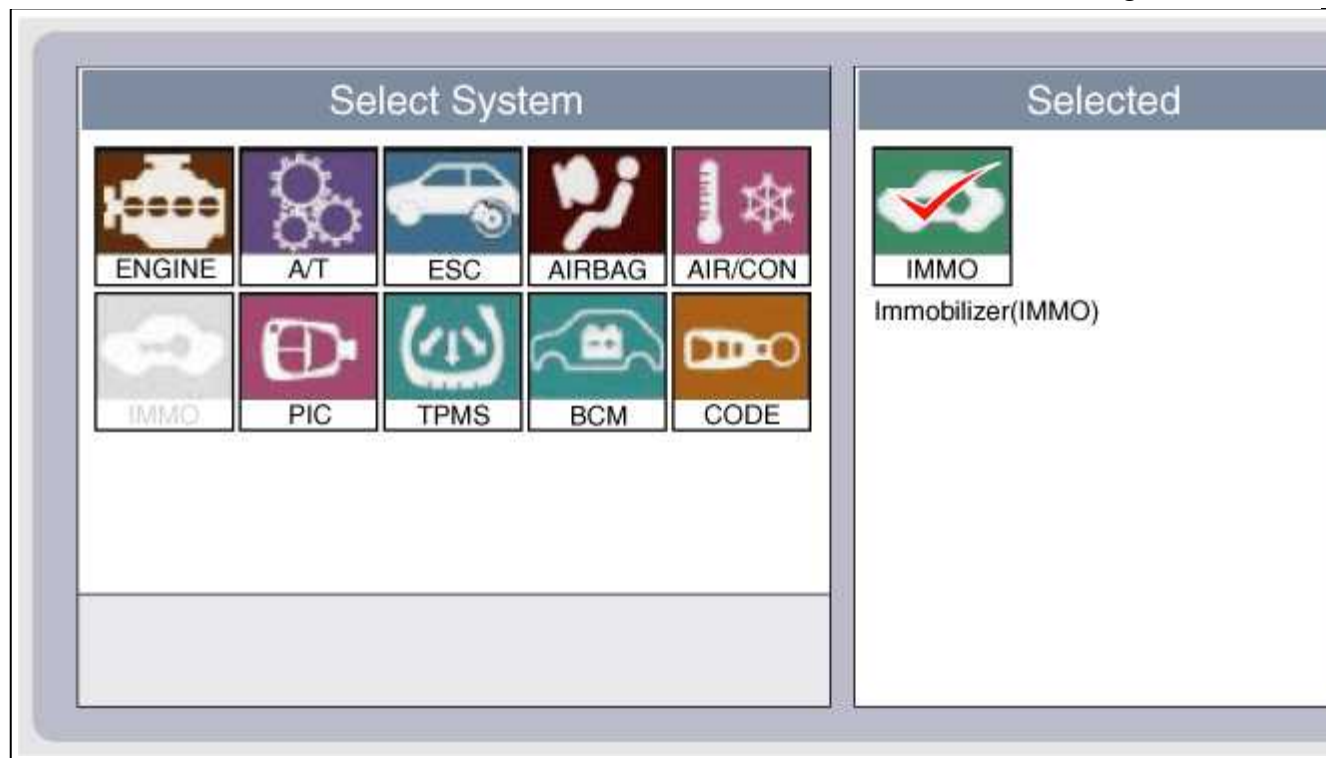
If the PCM(ECM) status and the key status do not match for teaching of keys, the tester procedure will be stopped. A specific fault code will be stored at PCM(ECM).

NOTE

When teaching the 1st key, Smartra registers at the same time.



(1) PCM(ECM) learnt status.



ID Register

➡ Password Teaching/Changing


➡ Neutral Mode

➡ Limp Home Mode

➡ Smatra Neutral Mode

➡ Teaching

Teaching



[Teaching]


Status : NEUTRAL

Input PIN code and press [OK] button

4 5 5 0 7 2

Ok Cancel

Teaching

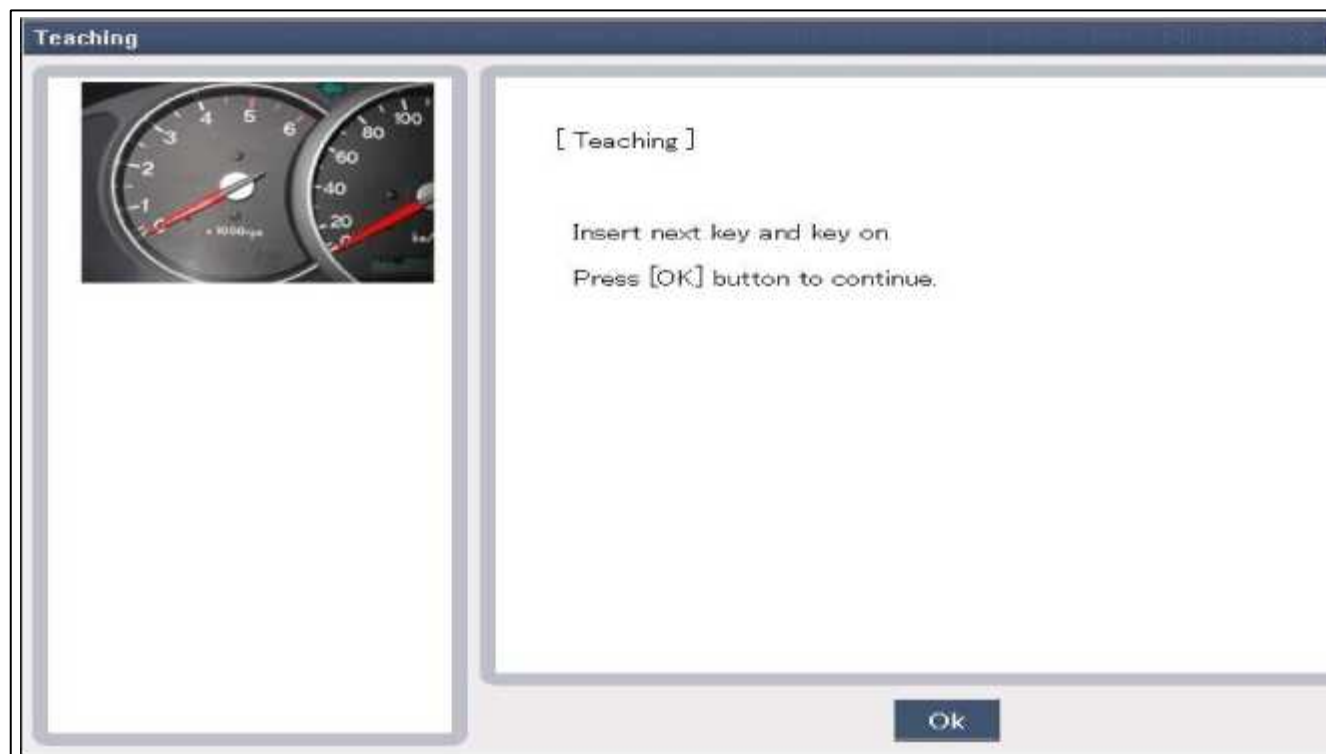
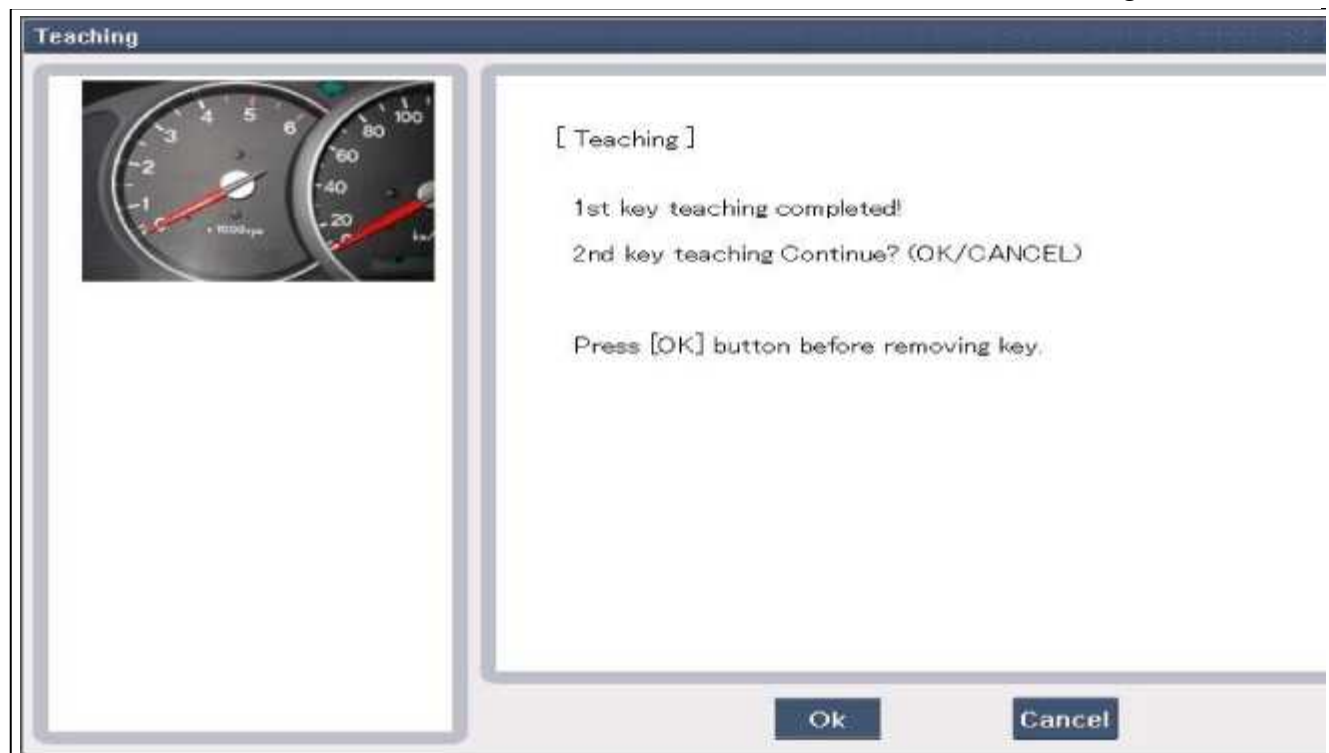


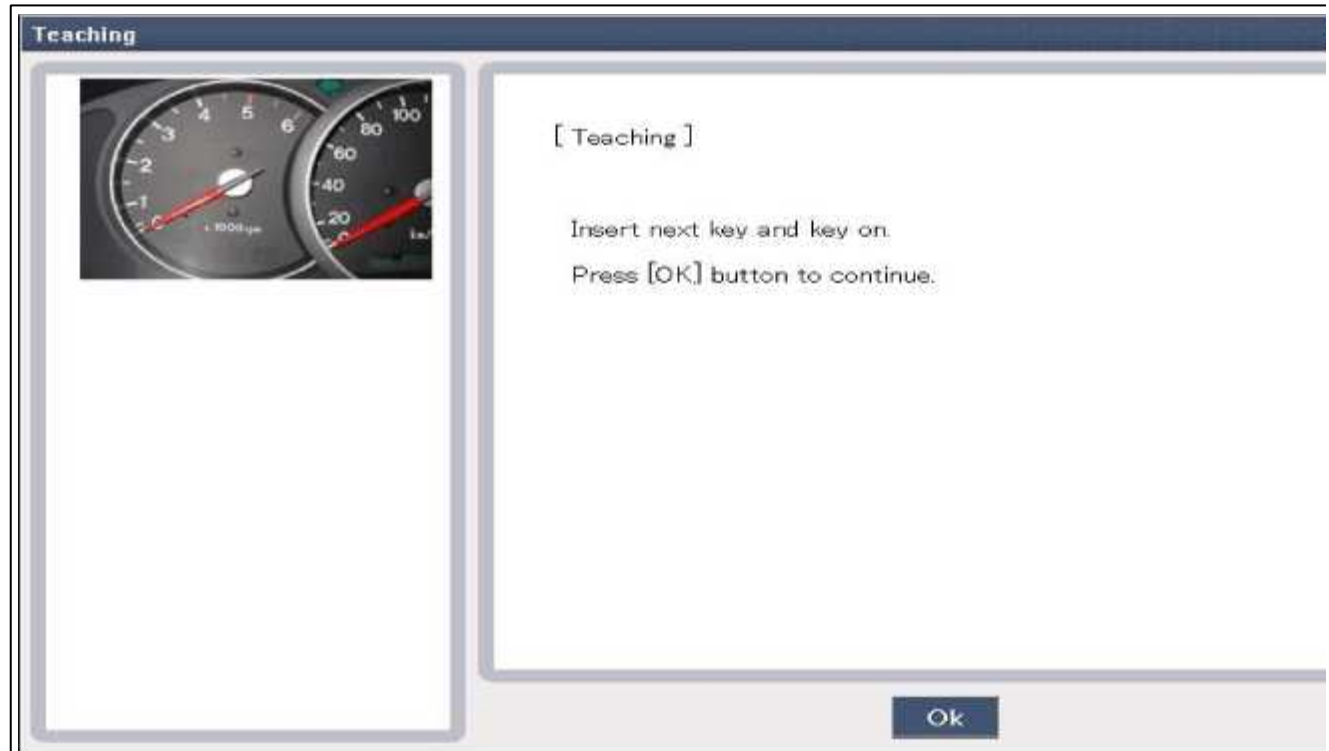
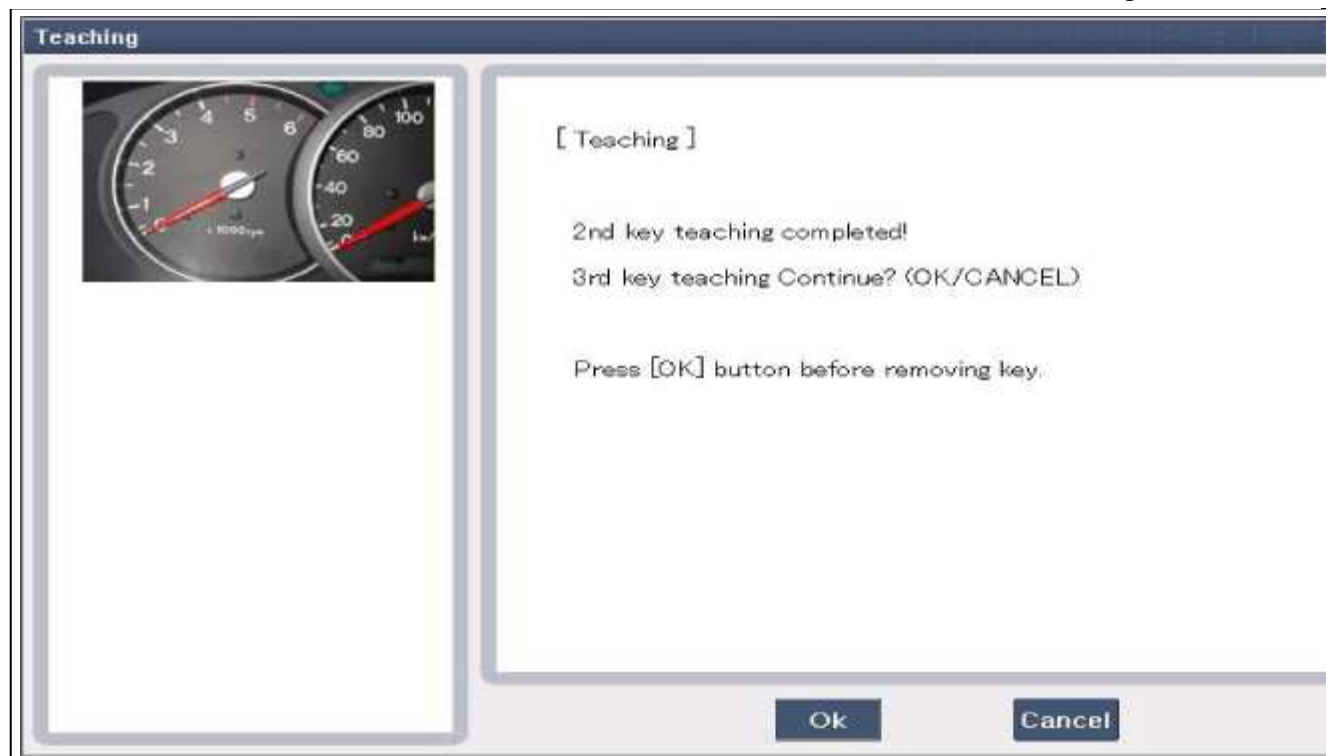
[Teaching]

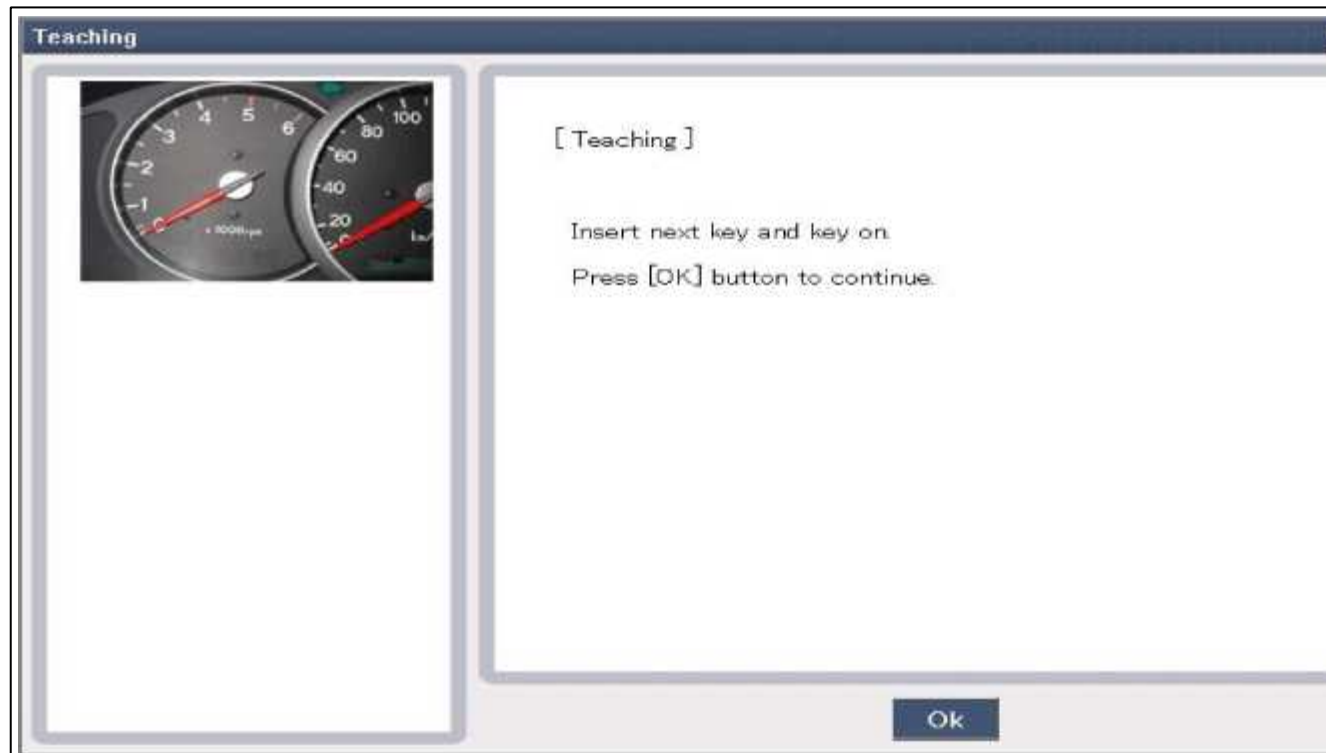
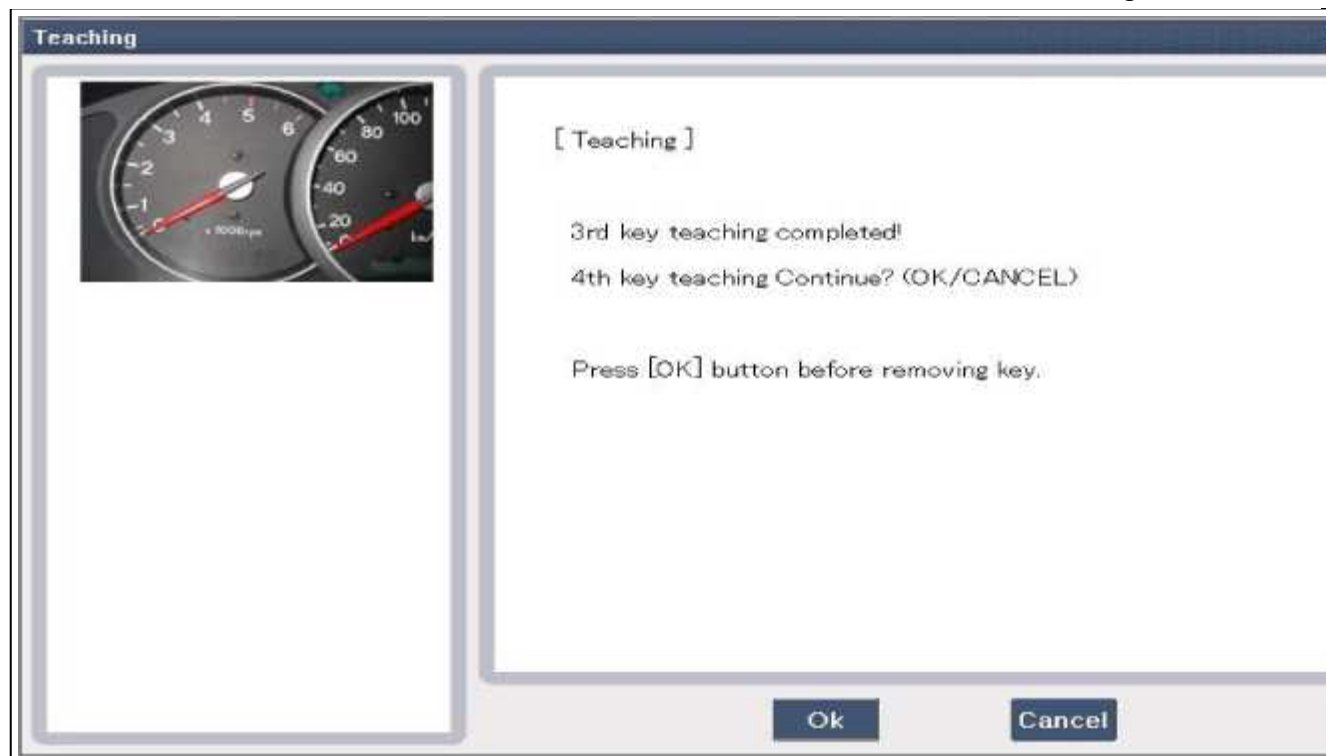
1st key teaching

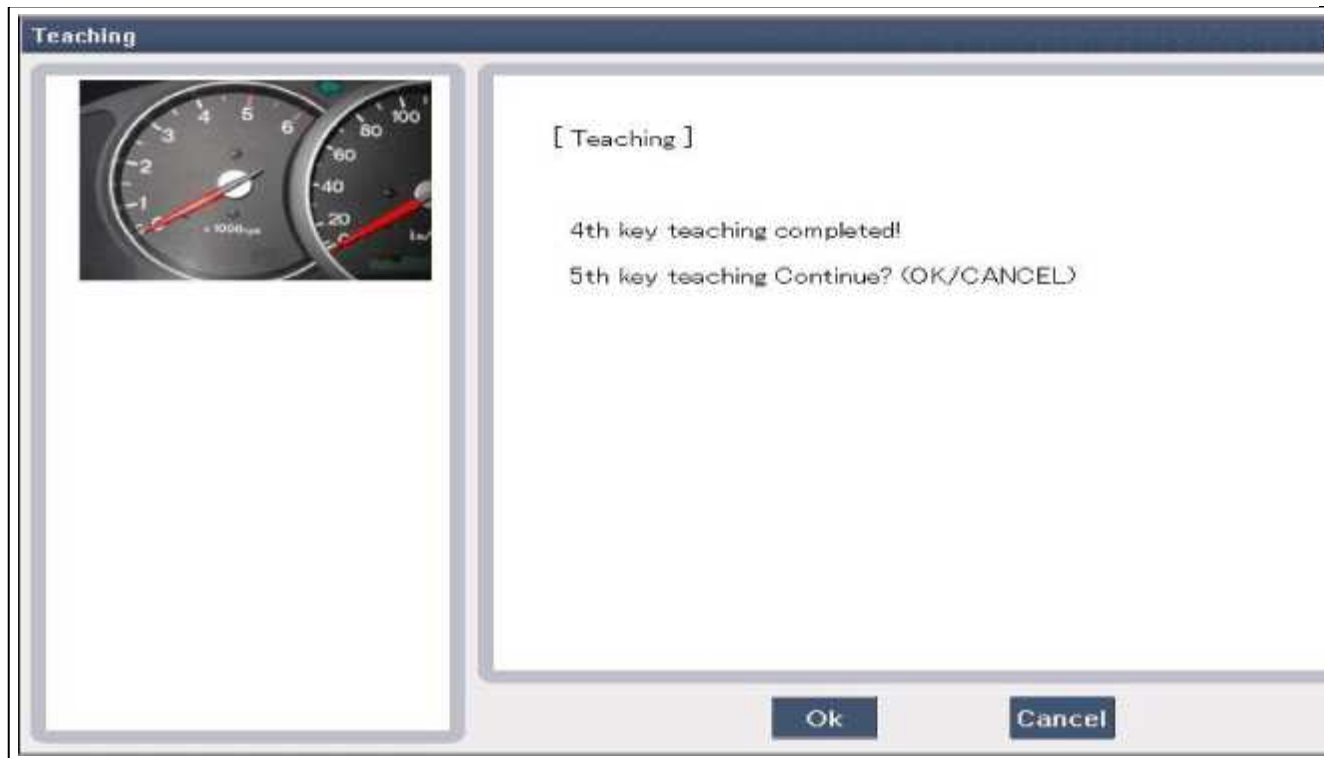
Continue? (OK/CANCEL)

Ok Cancel









(2) PCM(ECM) virgin status.

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

2. 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 digits.

The user password teaching is only accepted by a "learnt" PCM(ECM). Before first teaching of user password to PCM(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, PCM(ECM) requests the new user password. The status remains "learnt" and the new user password will be valid the next limp home mode.

If wrong user passwords or wrong vehicle specific data have been sent to the PCM(ECM) three times continuously, the PCM(ECM) will reject the request to change the password for one hour. This time cannot be reset by disconnecting the battery or any other actions. After reconnecting the battery, the timer starts again for one hour.

(1) User password teaching

ID Register

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

Password Teaching/Changing



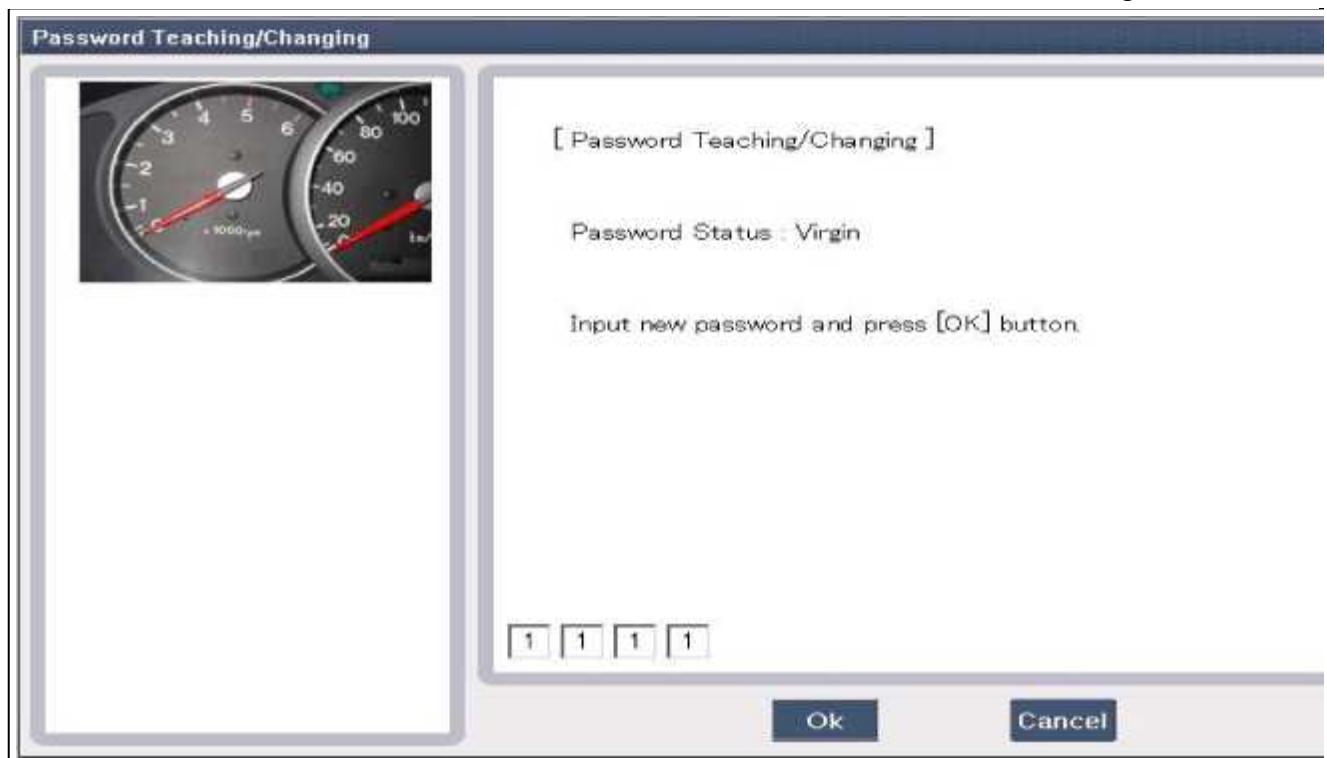
[Password Teaching/Changing]

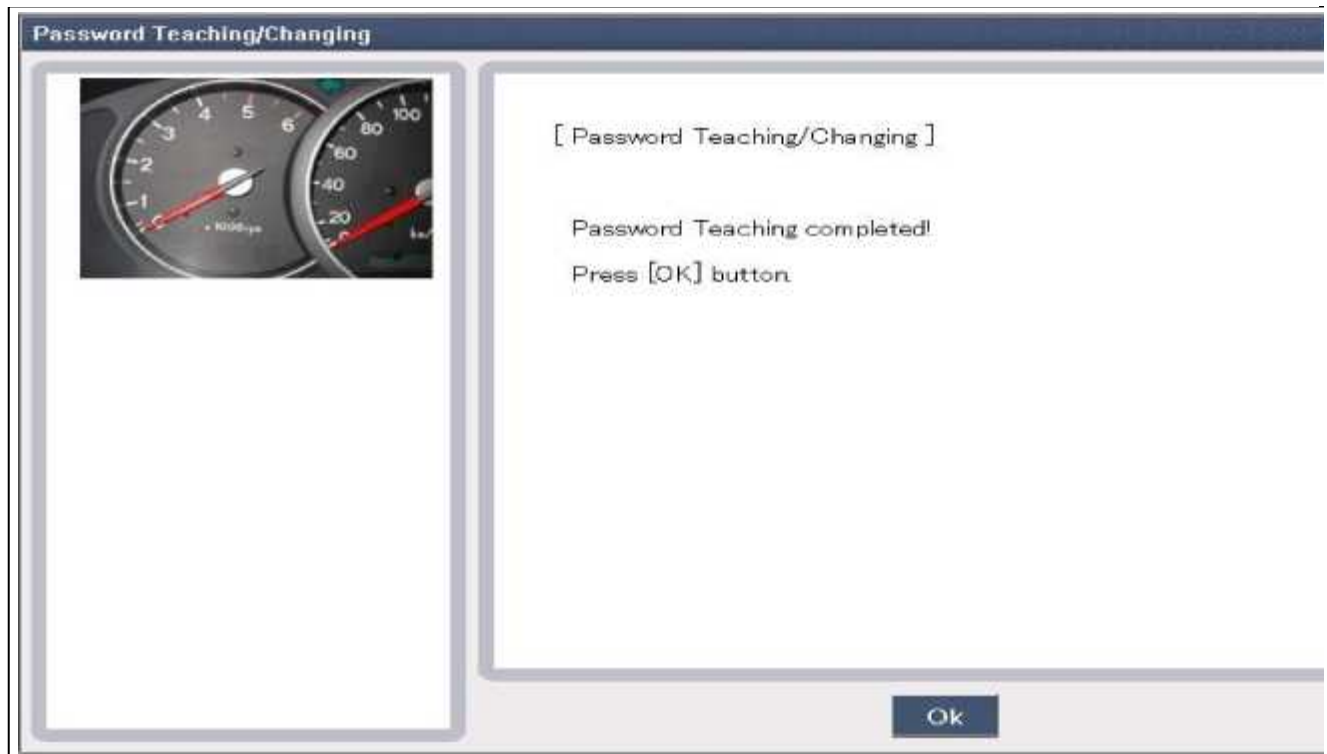
Password Status : Virgin

Input new password and press [OK] button.

Ok

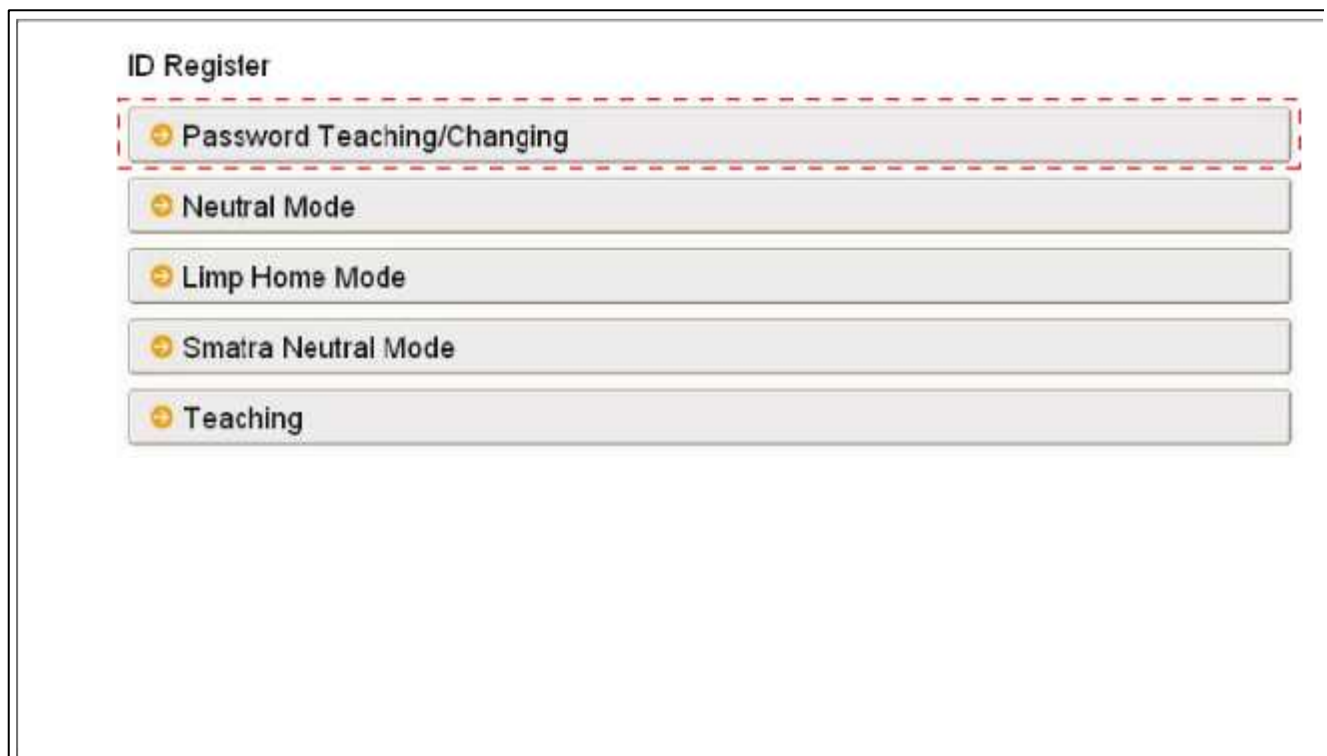
Cancel






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

(2) User password changing



Password Teaching/Changing




[Password Teaching/Changing]

Password Status : Learnt

Input old password and press [OK] button.

Ok Cancel

Password Teaching/Changing

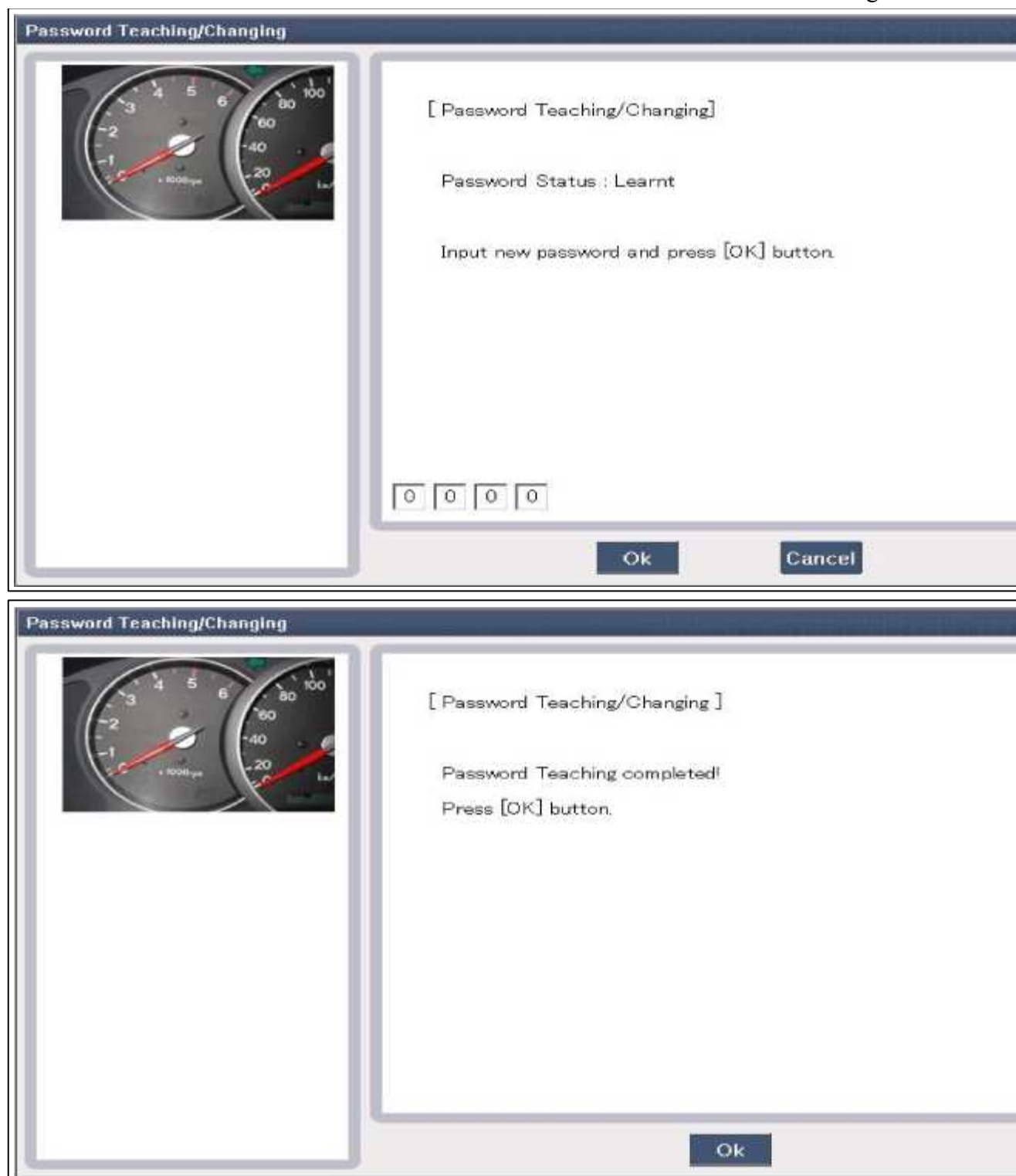


[Password Teaching/Changing]

Password Status : Learnt

Input old password and press [OK] button.

Ok Cancel



Limp Home Function

1. Limp Home By Tester

If the PCM(ECM) detects the fault of the SMARTRA or transponder, the PCM(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 PCM(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 PCM(ECM) via the special tester menu.

Only if the PCM(ECM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the PCM(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 PCM(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 PCM(ECM), the timer

starts again for one hour.

ID Register

➔ Password Teaching/Changing

➔ Neutral Mode

➔ Limp Home Mode

➔ Smatra Neutral Mode

➔ Teaching

Limp Home Mode



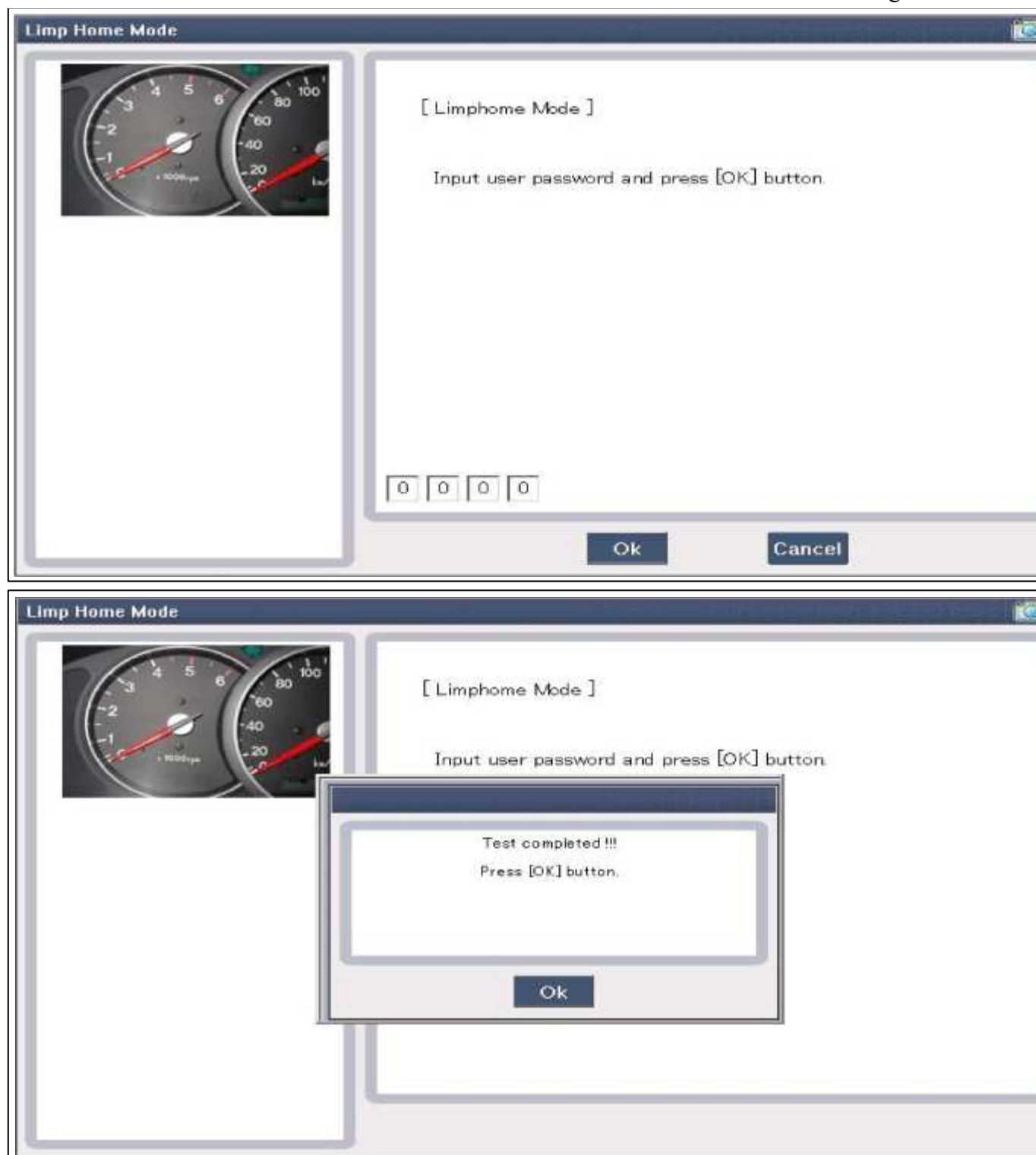
[Limphome Mode]

Input user password and press [OK] button.



Ok

Cancel



2. Limp Home By Ignition Key

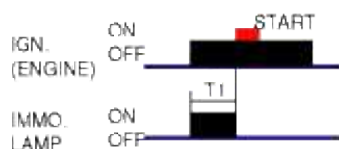
The limp home can be activated also by the ignition key. The user password can be input to the PCM(ECM) by a special sequence of ignition on/off.

Only if the PCM(ECM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the PCM(ECM) will be unlocked for a period of time (30 sec.).

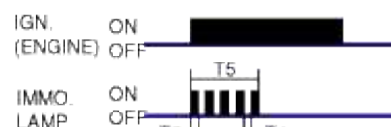
The engine can be started during this time. After the time has elapsed, engine start is not possible. After a new password has been input, the timer (30 sec.) will start again.

After ignition off, the PCM(ECM) is locked if the timer has elapsed 8 seconds. For the next start, the input of the user password is requested again.

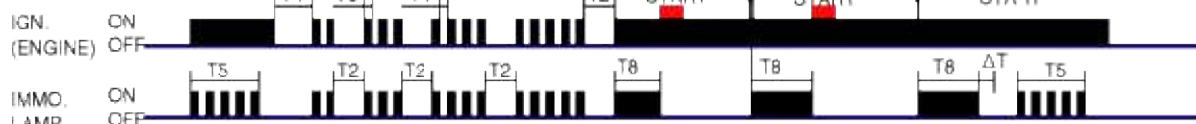
1. NORMAL CONDITION(NO FAILURE)



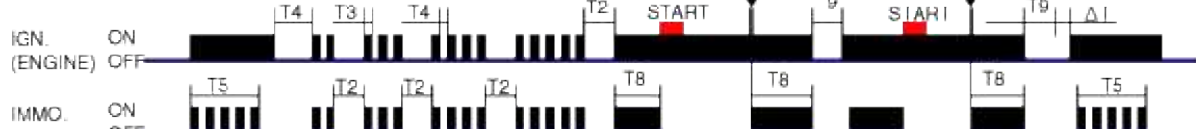
2. IN CASE OF FAILURE(LIMP HOME)



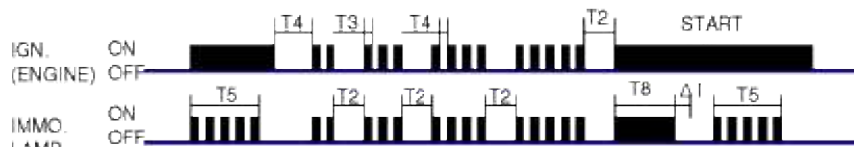
3. LIMP HOME OPERATING



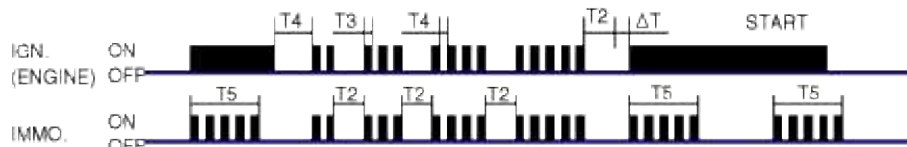
USER PASSWORD : 2345H



USER PASSWORD : 2345H



USER PASSWORD : 2345H



USER PASSWORD : 2345H



USER PASSWORD : 2345H

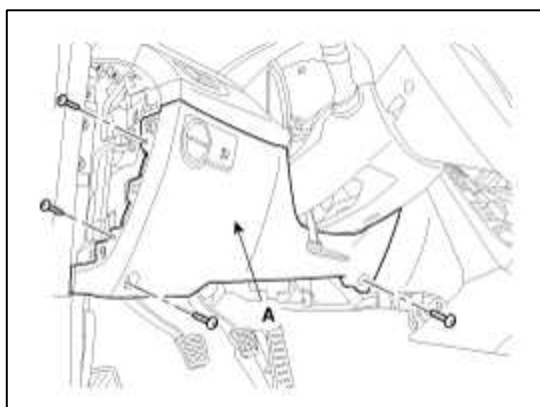
NOTE :

- 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

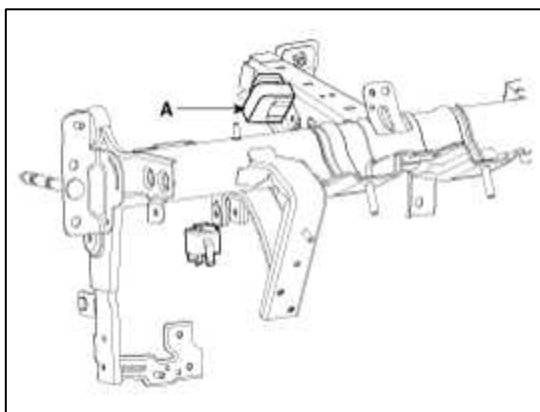
Body Electrical System > Immobilizer System > Immobilizer Control Unit > Repair procedures

Replacement

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



3. Disconnect the 5P connector of the SMARTRA unit and then remove the SMARTRA unit (A) after loosening the screw.

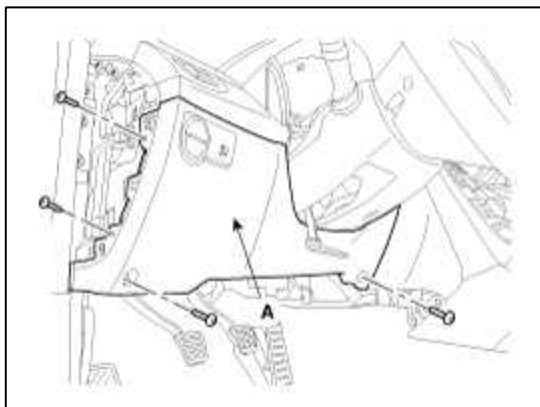


4. Installation is the reverse of removal procedure.

Body Electrical System > Immobilizer System > Antenna Coil > Repair procedures

Replacement

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



3. Remove the steering column shaft (Refer to the ST group).
4. Disconnect the 6P connector of the coil antenna and then remove the coil antenna after loosening the screw.
5. Installation is the reverse of removal procedure.

Body Electrical System > Immobilizer System > Troubleshooting

Diagnosis Of Immobilizer Faults

- Communication between the ECM and the SMARTRA.
- Function of the SMARTRA and the transponder.
- Data (stored in the ECM related to the immobilizer function).

The following table shows the assignment of immobilizer related faults to each type:

Immobilizer Related Faults	Fault types	Diagnostic codes
PCM(ECM) fault	1. Non-Immobilizer-EMS connected to an Immobilizer	P1610
Transponder key fault	1. Transponder not in password mode 2. Transponder transport data has been changed.	P1674 (Transponder status error)
Transponder key fault	1. Transponder programming error	P1675 (Transponder programming error)
SMARTRA fault	1. Invalid message from SMARTRA to PCM(ECM)	P1676 (SMARTRA message error)
SMARTRA fault	1. Virgin SMARTRA at learnt EMS 2. Neutral SMARTRA at learnt EMS 3. Incorrect the Authentication of EMS and SMARTRA 4. Locking of SMARTRA	P169A (SMARTRA Authentication fail)
SMARTRA fault	1. No response from SMARTRA 2. Antenna coil error 3. Communication line error (Open/Short etc.) 4. Invalid message from SMARTRA to PCM(ECM)	P1690 (SMARTRA no response)
Antenna coil fault	1. Antenna coil open/short circuit	P1691 (Antenna coil error)
Immobilizer indicator lamp fault	1. Immobilizer indicator lamp error (Cluster)	P1692 (Immobilizer lamp error)
Transponder key fault	1. Corrupted data from transponder 2. More than one transponder in the magnetic field (Antenna coil) 3. No transponder (Key without transponder) in the magnetic field (Antenna coil)	P1693 (Transponder no response error/invalid response)
PCM(ECM) fault	1. Request from PCM(ECM) is invalid (Protocol layer violation- Invalid request, check sum error etc.)	P1694 (PCM(ECM) message error)
PCM(ECM) internal permanent memory (EEPROM) fault	1. PCM(ECM) internal permanent memory (EEPROM) fault 2. Invalid write operation to permanent memory (EEPROM)	P1695 (PCM(ECM) memory error)
Invalid key fault	1. Virgin transponder at PCM(ECM) status "Learnt" Learnt (Invalid) Transponder at PCM(ECM) status "Learnt"(Authentication fail)	P1696 (Authentication fail)
Hi-Scan fault	1. Hi-Scan message error	P1697
Locked by timer	1. Exceeding the maximum limit of Twice IGN ON (32 times)	P1699 (Twice IG ON over trial)

Body Electrical System > Front/Rear Parking Assist System > Specifications

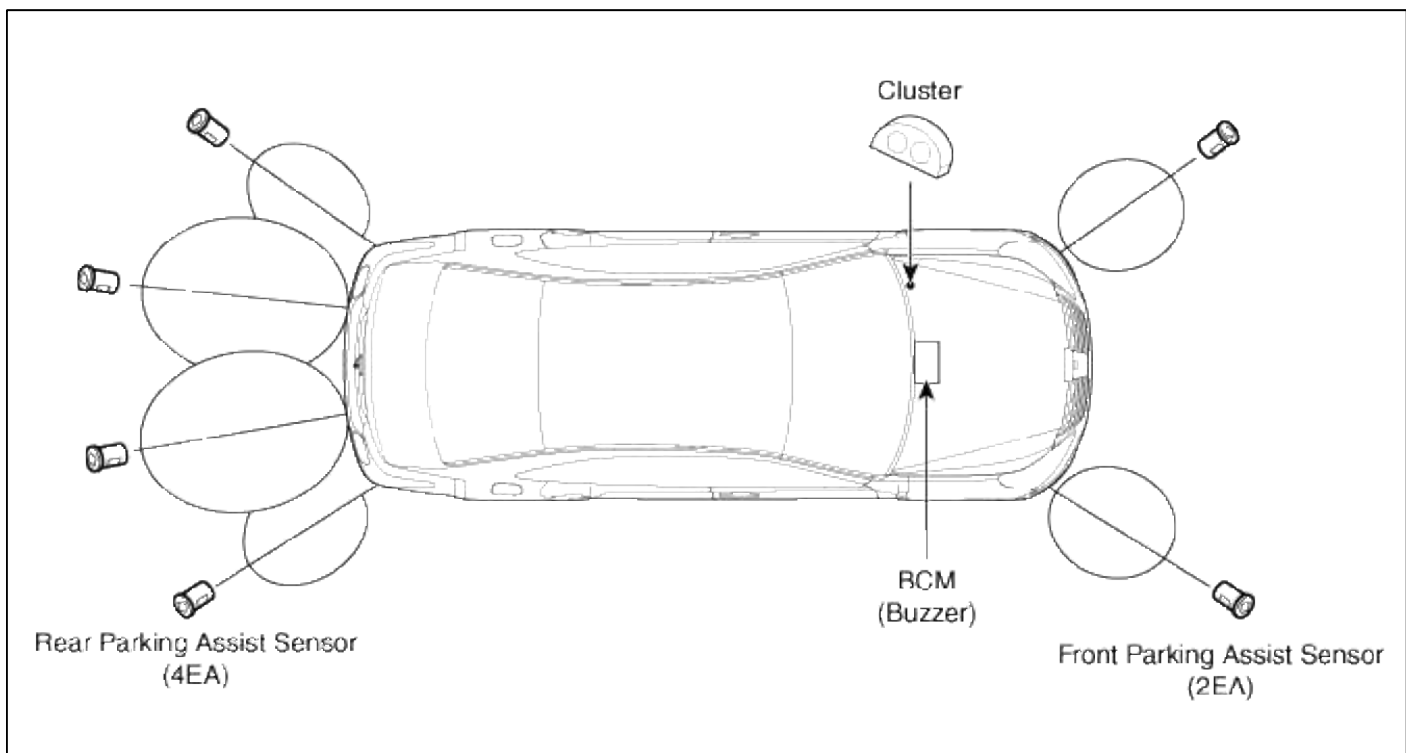
Specification

Item		Specification
Ultrasonic sensor	Voltage rating	DC 12 V
	Detecting range	30 cm ~ 120 cm
	Operation voltage	DC 9 ~ 16 V
	Operation current	MAX 300 mA
	Operation temperature	-30°C ~ +80°C (-22°C ~ +176°C)
	Operation frequency	8 ± 5 KHz
	Number of sensors	
	Front	2
	Rear	4

Rear parking assist control unit function is built in BCM (body control unit).

Body Electrical System > Front/Rear Parking Assist System > Components and Components Location

Component Location



Rear parking assist control unit function is built in BCM (body control unit).

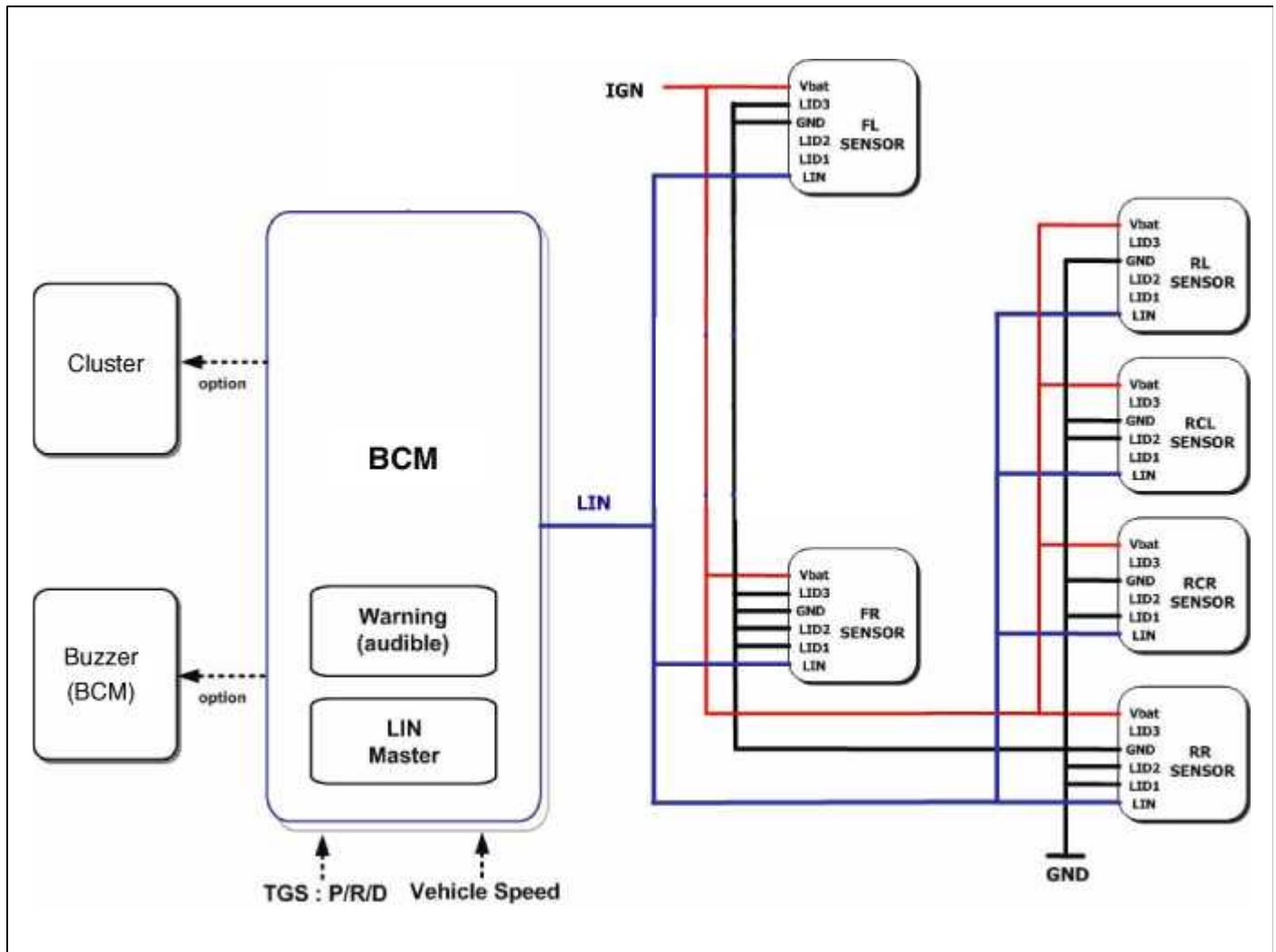
Body Electrical System > Front/Rear Parking Assist System > Description and Operation

System Overview

RPAS(Rear Parking Assist System) is an electronic driving aid device warning driver to be cautious when they park

or speed low after detecting an object on side and behind of vehicle by using the feature of ultrasonic waves. PAS consists of Six(Front:2, Rear:4) PAS sensors which are detecting the obstacles and transmit the result separated into three warning levels, the first, second and third to BCM by Lin communication. BCM decides the alarm level by the transmitted communication message from the slave sensors, then operate the buzzer or transmits the data for display.

System Block Diagram



System Operation Specification.

1. INIT mode

- (1) System initializing time is 500ms after IGN1+ R Gear.
- (2) RPAS recognizes LID and sets the sensor ID up during initialization.
- (3) RPAS activates each sensor and then executes the diagnosis after finishing initialization of BCM
- (4) R-PAS Starting buzzer" is normally worked, when sensor does not send an error message and after finishing error diagnosis.
- (5) If any failure is received from the any sensors, R-PAS Starting Buzzer" does not work but the failure alarm is operated for a moment.
If you have display option, warning sign is also shown on it.
- (6) Buzzer for sensor failure is operated once, but display is shown continuously until it is repaired completely.

2. NORMAL Mode

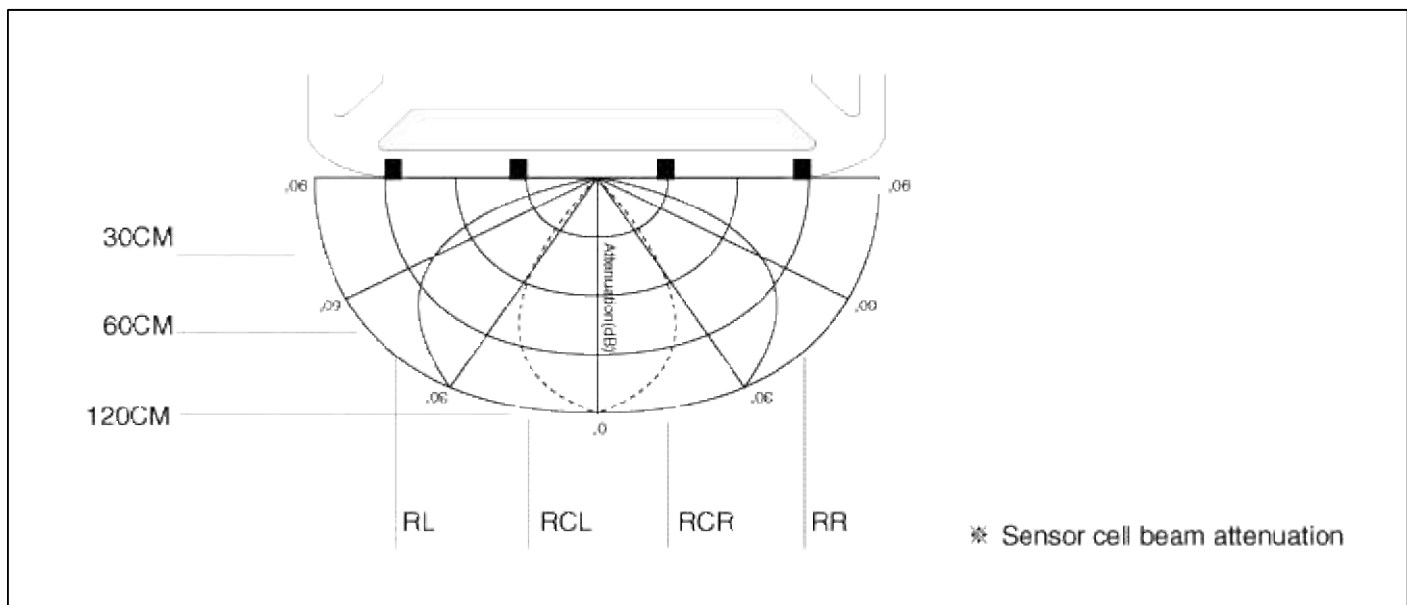
- (1) LIN communication starts and keeps the routine after IGN1 ON+R gear
- (2) BCM send a message once to each sensor for operating request to check the initial status of the system and four sensors response at a time. At this time, if there is no problem, the alarm starts after 500ms of R gear shifting at 300ms intervals.
- (3) After initialization, normal mode starts 100ms later after finishing alarm output.
- (4) Alarm for obstacles is divided into 3 levels.
The first and second are intermittent sound, and the third alarms continuously (Front sensor have second and third alarms.)
- (5) The efficient vehicle speed of RPAS operation is under 10Km/h.
- (6) Refer to 'Digital PAS Project LIN communication' for the more detailed communication specification.

Sensing Area

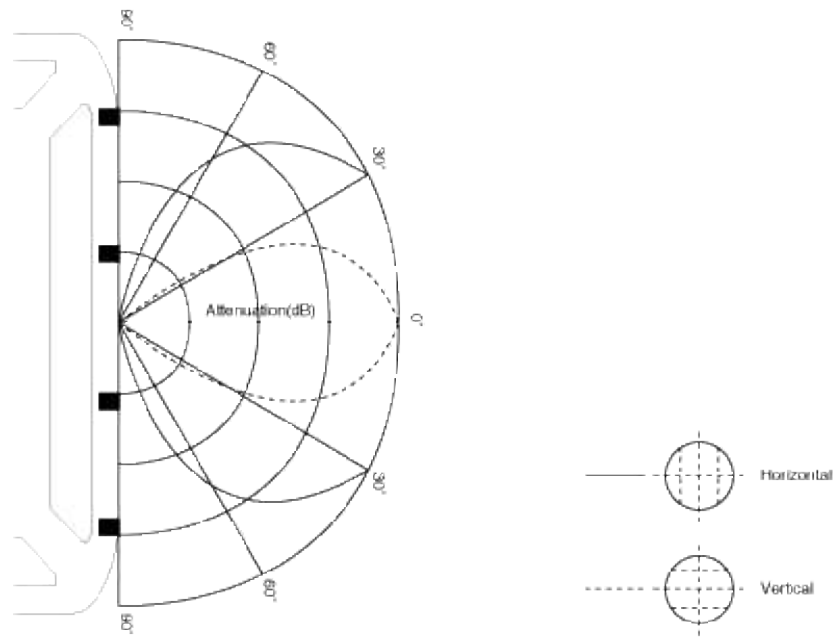
1. Measurement condition – PVC pole (diameter 75mm, length 3m), normal temperature
2. Distance range detected objects (Measured directly in front of sensor)

Position	Level	Distance range	
		cm	inch
Front	2nd	31 ~ 60 (± 15)	12.2 ~ 23.6 (± 5.9)
	3rd	0 ~ 30 (± 10)	Less than 11.8 (± 3.9)
Rear	1st	61 ~ 120 (± 15)	24.0 ~ 47.2 (± 5.9)
	2nd	31 ~ 60 (± 15)	12.2 ~ 23.6 (± 5.9)
	3rd	Less than 30 (± 10)	Less than 11.8 (± 3.9)

Horizontal Sensing Area



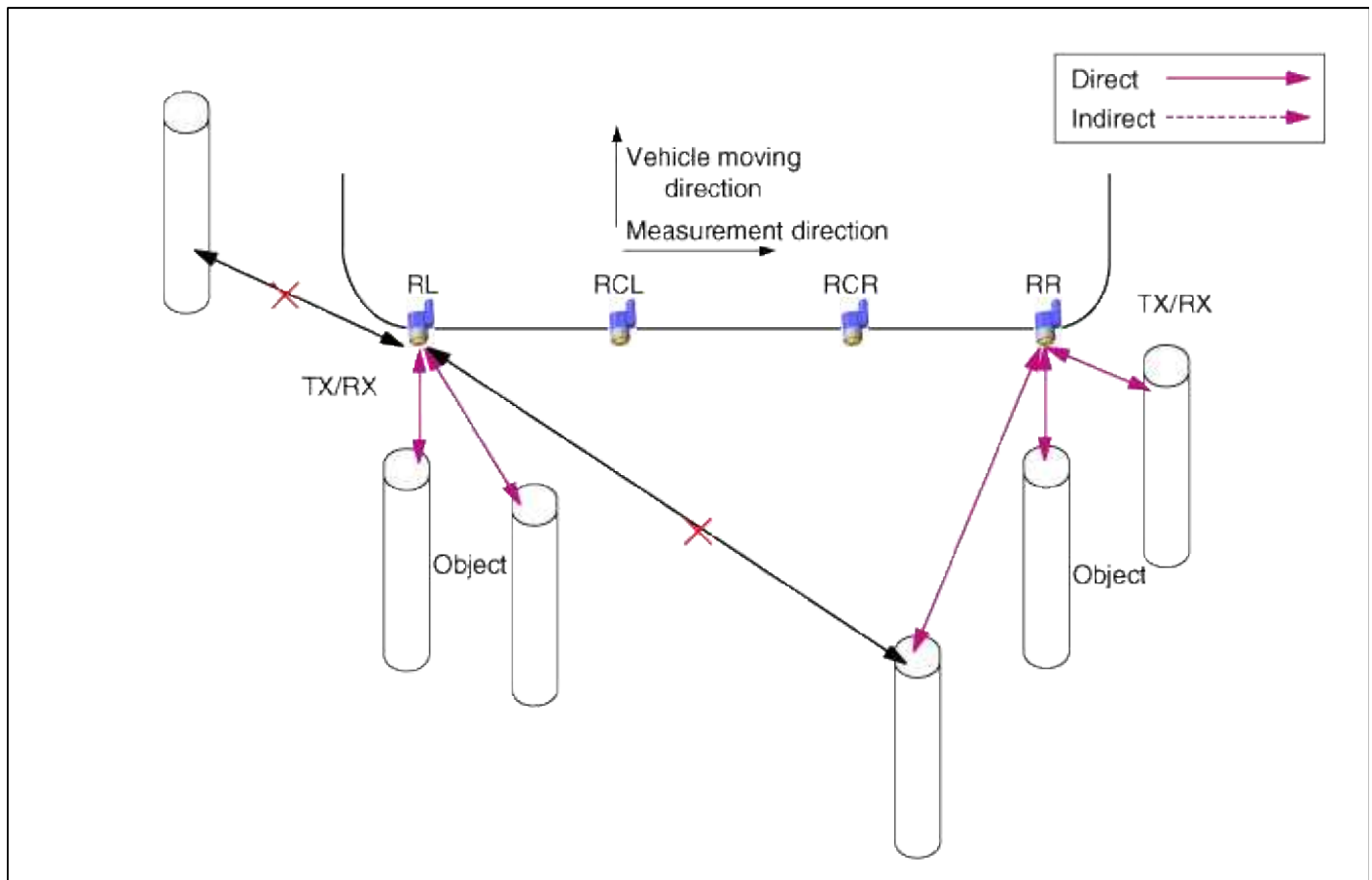
Vertical Sensing Area



Distance Measurement

Direct Measurement

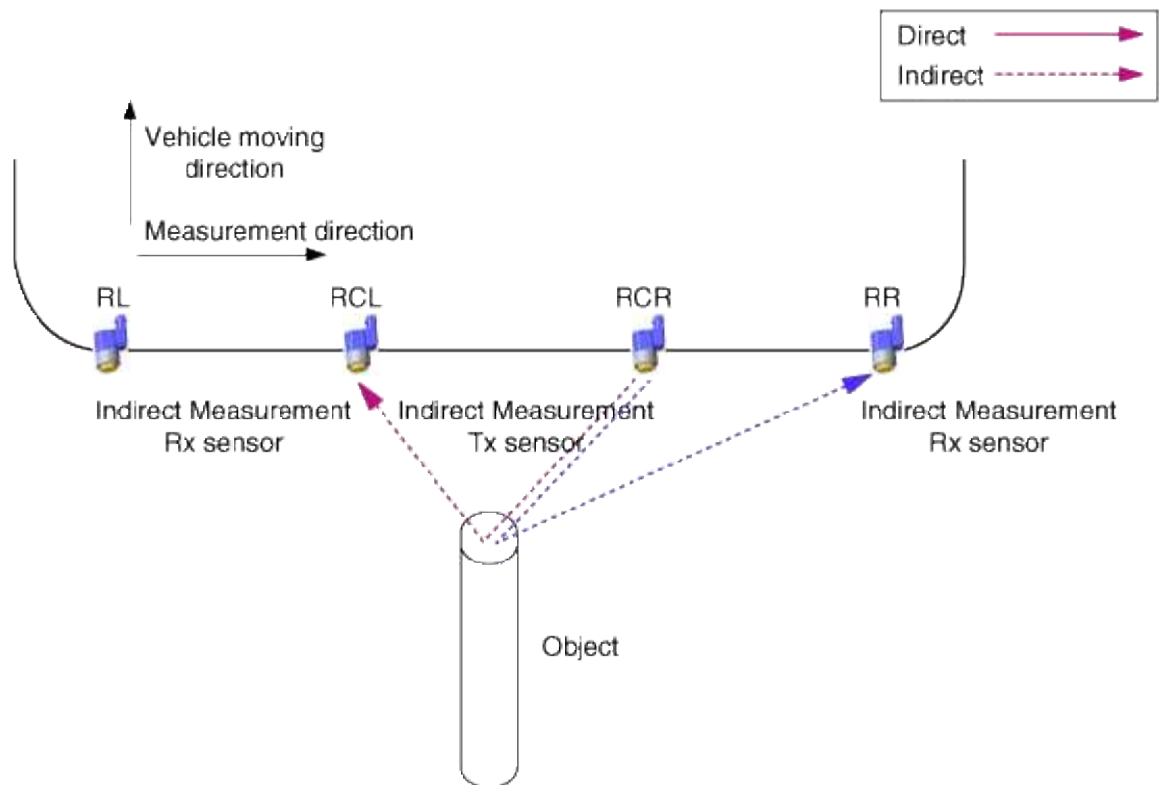
Transmission and Reception are executed with one sensor
(RL, RCL, RCR, RR each sensor execution)



Indirect Measurement

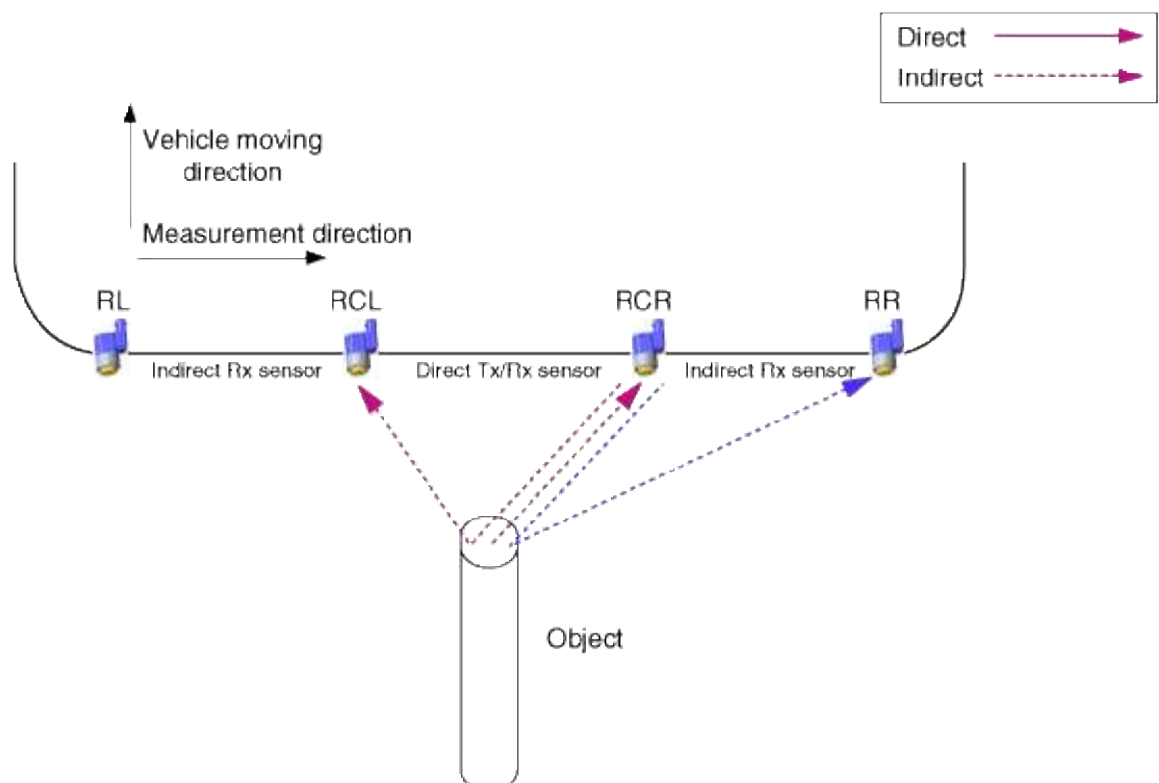
(RCL → RL, RCL → RCR, RCR → RCL, RCR → RR Execution in order)

With two or three sensors, one of them sends the transmission and the others get the reception.



Direct and Indirect Measurement at once

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



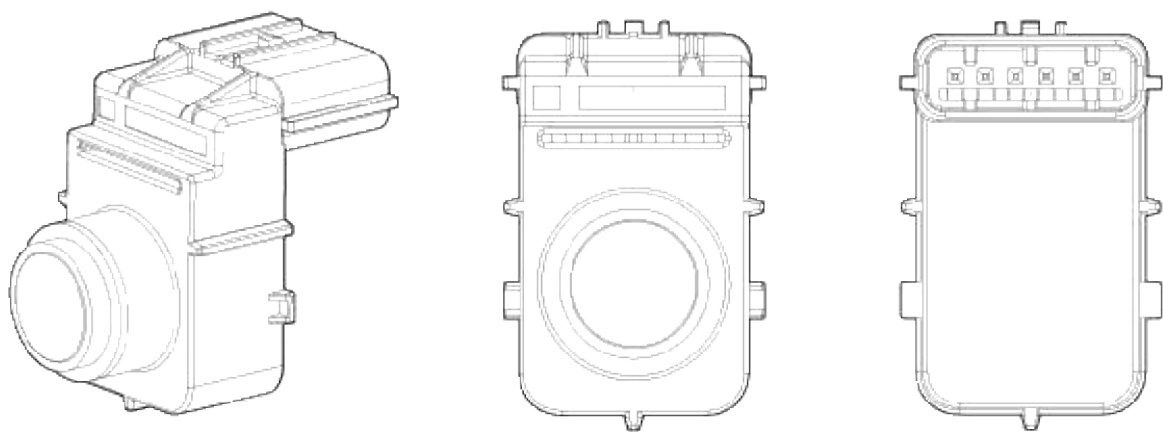
RPAS alarm system

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

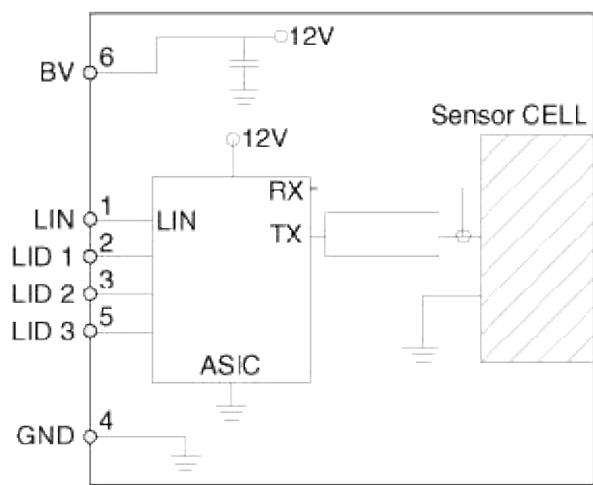
- Sensor buzzer/display information processing method of BCM In case of RL/RR sensor information, the BCM handles each sensor information directly about Display and buzzer output function. Buzzer output of CL/CR sensor, BCM handles center combination information by priority both sensor.

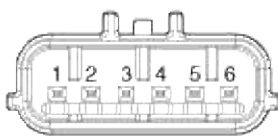
Body Electrical System > Front/Rear Parking Assist System > Parking Assist Sensor > Components and Components Location

Component



Circuit Diagram



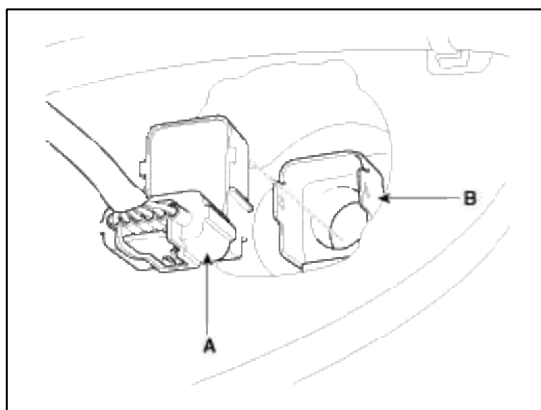
	NO	Name
	1	LIN
	2	LID 1
	3	LID 2
	4	GND
	5	LID 3
	6	B+

Body Electrical System > Front/Rear Parking Assist System > Parking Assist Sensor > Repair procedures

Removal

- 1. Remove the rear bumper.
(Refer to the Body group - "Rear bumper")
- 2. Disconnect the connector from the rear bumper.

3. Pull out the sensor (A) by opening the sensor holder (B) out.

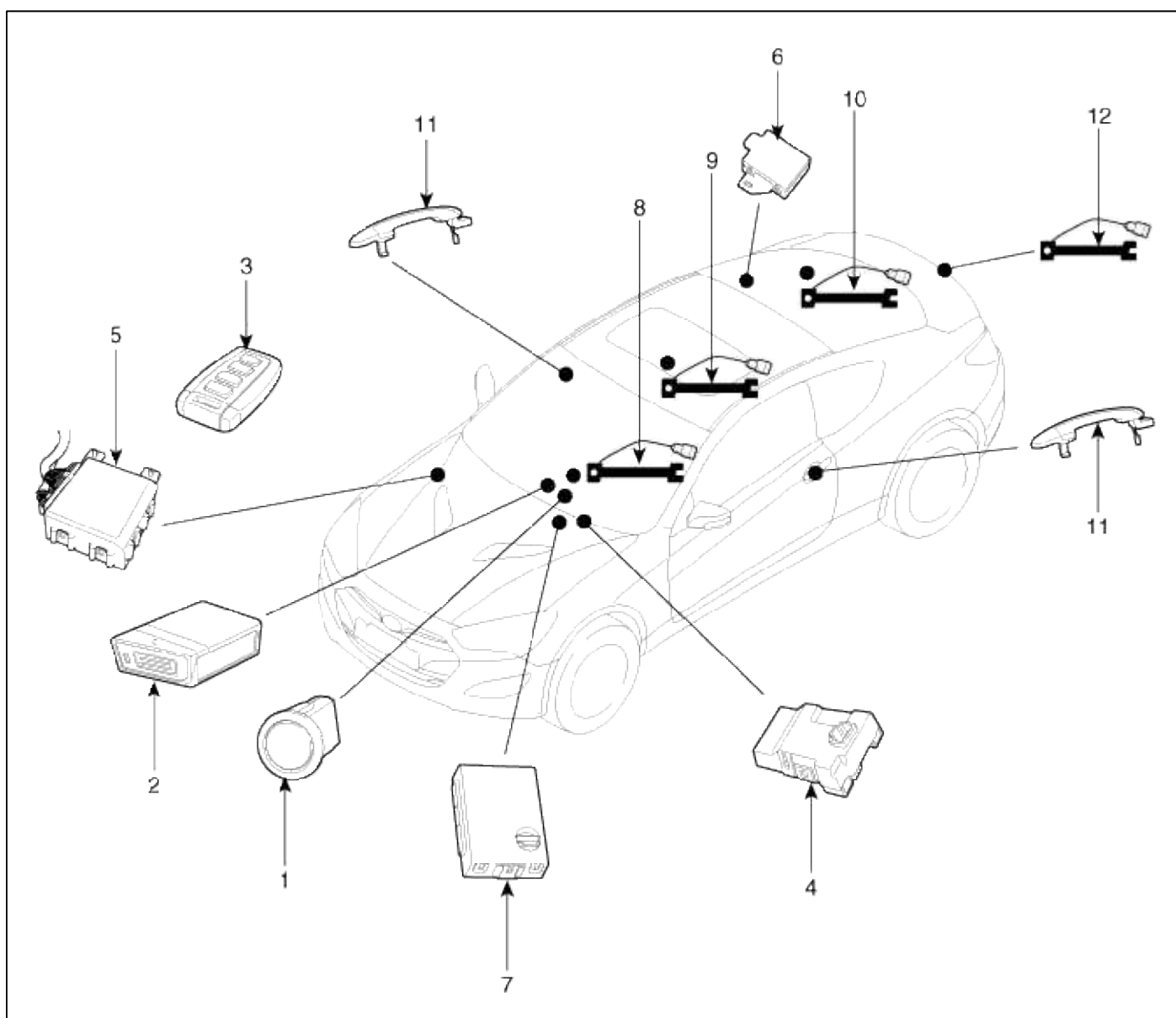


Installation

1. Install the rear ultra sensor after connecting the connector.
2. Install the rear bumper.

Body Electrical System > Button Engine Start System > Components and Components Location

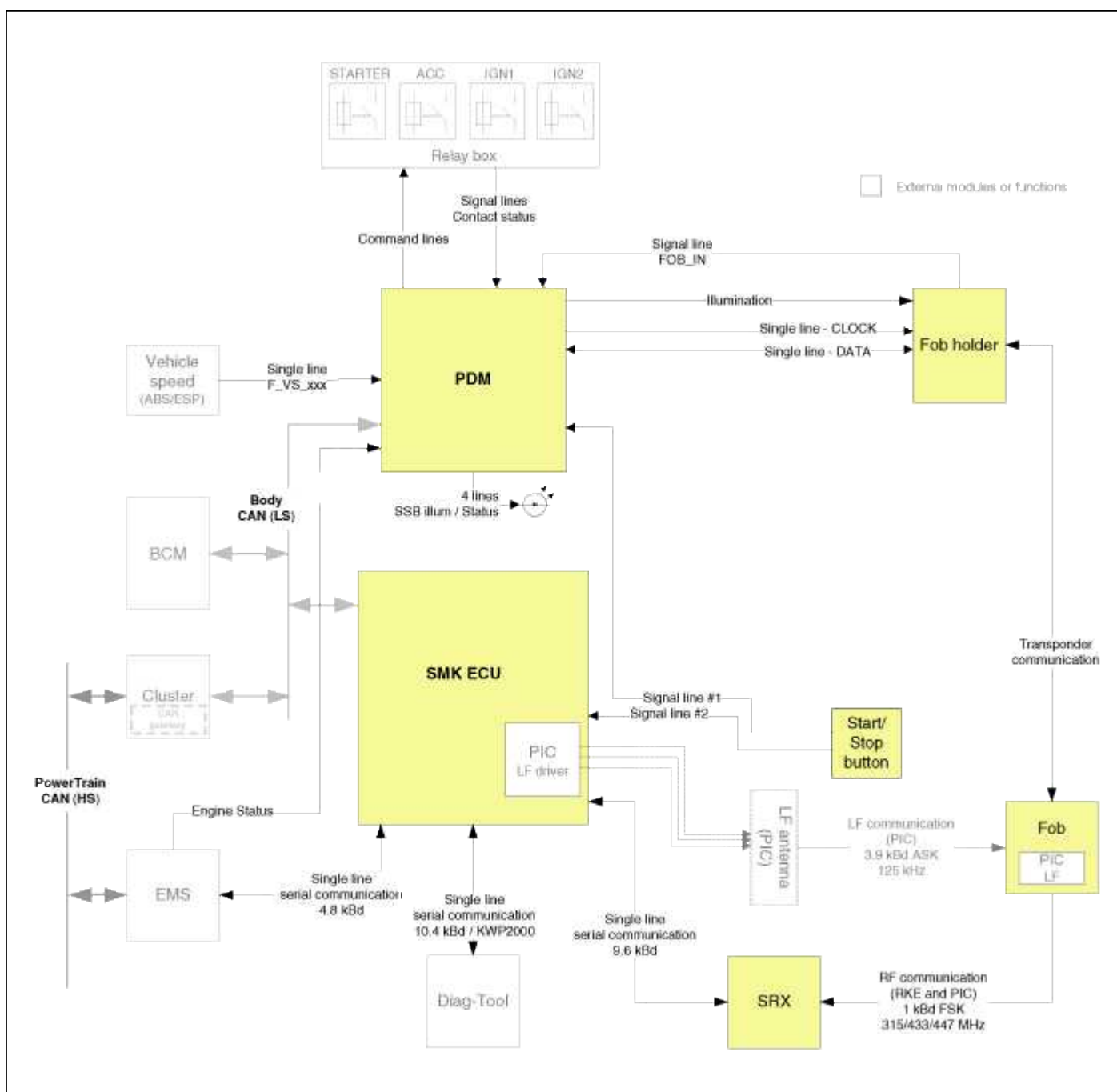
Component Location



- | | |
|-----------------------------------|--------------------------------|
| 1. Start Stop Button(SSB) | 7. Body control module |
| 2. FOB key holder | 8. Interior antenna 1 |
| 3. FOB key | 9. Interior antenna 2 |
| 4. PDM(Power Distribution Module) | 10. Interior antenna 3 |
| 5. Smart key unit | 11. Door handle & door antenna |
| 6. RF receiver | 12. Bumper antenna |

Body Electrical System > Button Engine Start System > Schematic Diagrams

Circuit Diagram



Body Electrical System > Button Engine Start System > Description and Operation

Description

System Overview

The System offers the following features:

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

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

System Main Function

- Switching of ACC / IGN1 / IGN2 terminals.
- 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.

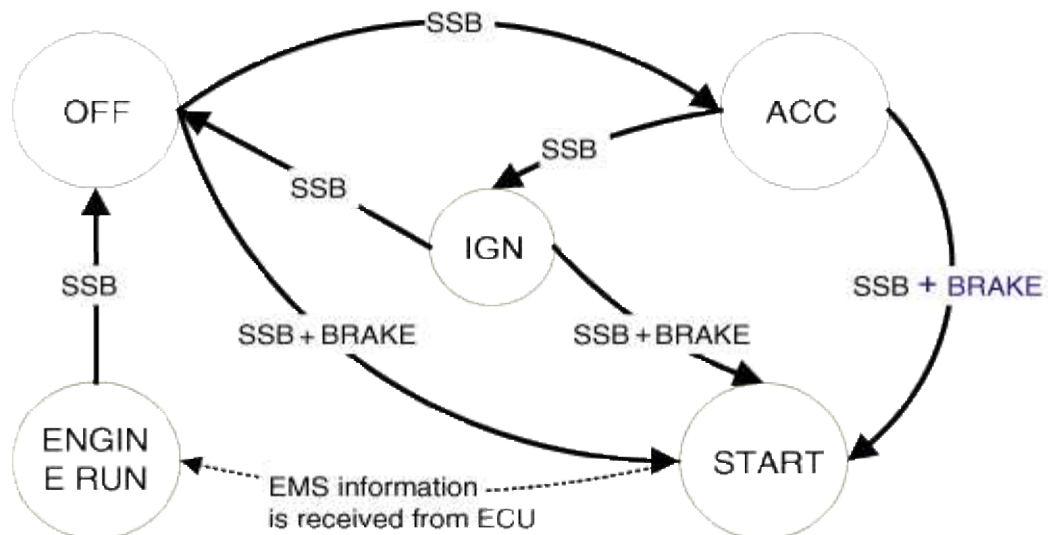
If the driver press the SSB while prerequisites on brakes, fob authentication and transmission status are satisfied, the BES System will proceed with the locking/unlocking of the steering column, the control of the terminal, and the cranking of the engine.

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 insert the fob into the fob holder.



- Control Ignition and engine ON/OFF by Sending signal to IPM and PDM.
- 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

The shift of Ignition Position

IGN. Position	Shift Lever Position						
	P Position			N Position		Other Position (D or R)	
	Push	Brake + Push	Over 1HR	Push	Brake + Push	Push	Brake + Push
Off							
ACC.							
IG1 & 2							
Start							

Transfer possibility, after Smart key certification
 Transfer possibility without Smart key certification
 Transfer possibility without Smart key certification

● **Condition of stop engine while driving**

- Press 3 times button within 3 seconds.
- Press button more than 2 seconds

Wireless Communication

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

- Non-smart key RKE
- SMART KEY FOB

Currently the BES system comprises with SMART KEY FOB always.

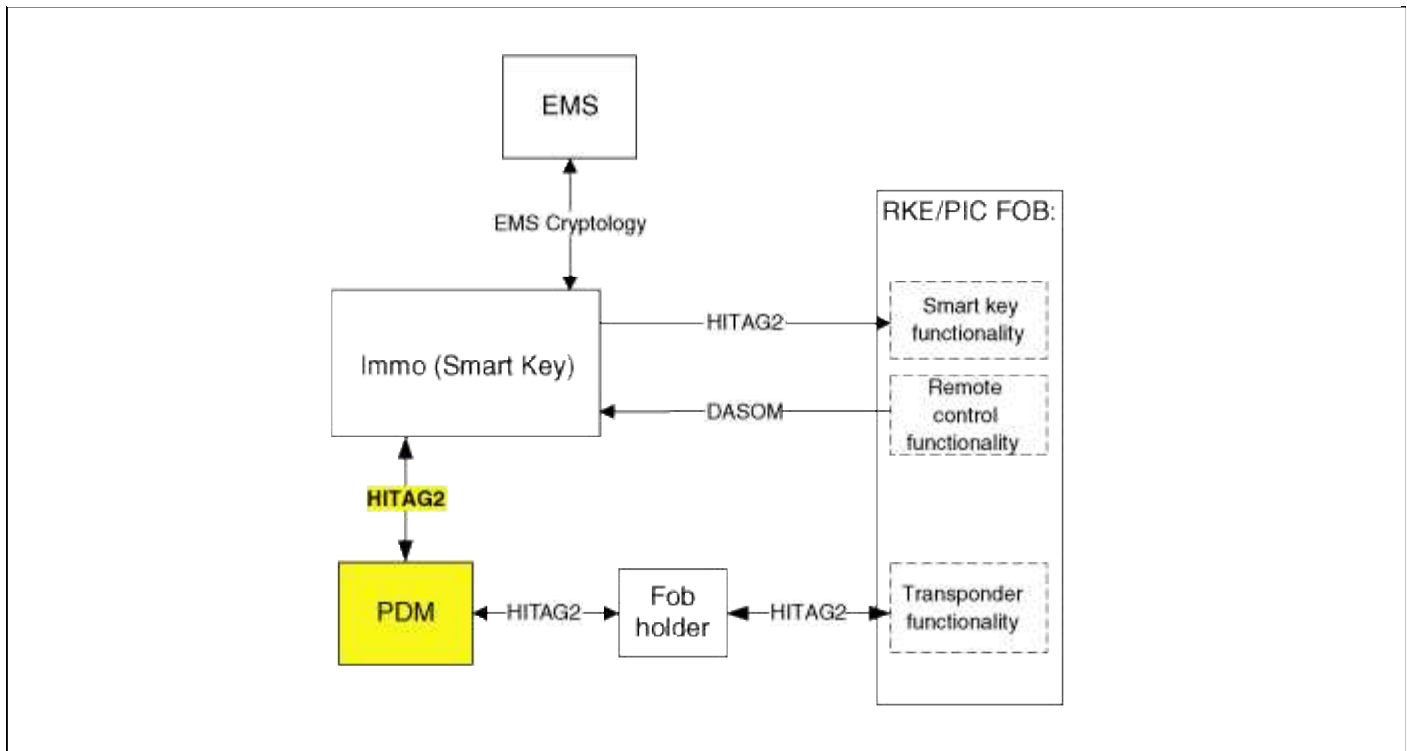
The transmitter, receiver and antennas required for the communication between the fob and the vehicle will differ depending on functionalities and regional areas.

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

Smart Key

The SMK manages all function related to:

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



The unit behaves as Master role in the whole system.

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

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

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

PDM

The PDM manages the functions related to the "terminal control" by activating external relays for ACC, IGN1 and IGN2. This unit is also responsible for the control of the STARTER relay.

The PDM is also controlling the illumination of the SSB as well as the "system status indicator", which consists of 2 LEDs of different color. The illumination of the fob holder is also managed by the PDM.

The PDM reads the inputs (Engine fob_in, vehicle speed, relays contact status), controls the outputs (Engine relay output drivers), and communicates with others devices via the CAN.

The internal architecture of the PDM is defined in a way that the control of the terminal is secured even in case of failure of one of the two microcontrollers, system inconsistency or interruption of communication on the CAN network.

In case, failure of one of the two controllers, the remaining controller shall disable the starter relay. The IGN1 and IGN2 terminals relays shall be maintained in the state memorized before the failure and the driver shall be able to switch those IGN terminals off by pressing the SSB with EMERGENCY_STOP pressing sequence. However, engine restart will not be allowed. The state of the ACC relay will depend on the type of failure.

The PDM is diagnosed through the SMK MUT service, using the CAN network.

The main functions of the PDM are:

- Control of Terminal relays
- Monitoring of the Vehicle speed received from sensor or ABS/ESP ECU.
- Control of SSB LEDs (illumination, clamp state) and FOB HOLDER illumination.
- Control of the base station located in fob holder through direct serial interface.
- System consistency monitoring to diagnose SMK failure and to switch to relevant limp home mode.
- Providing vehicle speed information

Fob Holder

This unit is used for transponder authentication. In case of a vehicle equipped with Smart key, this transponder

authentication is necessary in case of failure of the passive fob authentication (Engine loss of RF or LF link with the fob).

The Fob holder module integrates a slot where to insert the fob. The fob is maintained in position with a push-push mechanical locking (not electrically driven) and a signal (FOB_IN) is sent back to the PDM as soon as its insertion is detected.

The power supply of the fob holder is active only if a communication is initiated by the PDM.

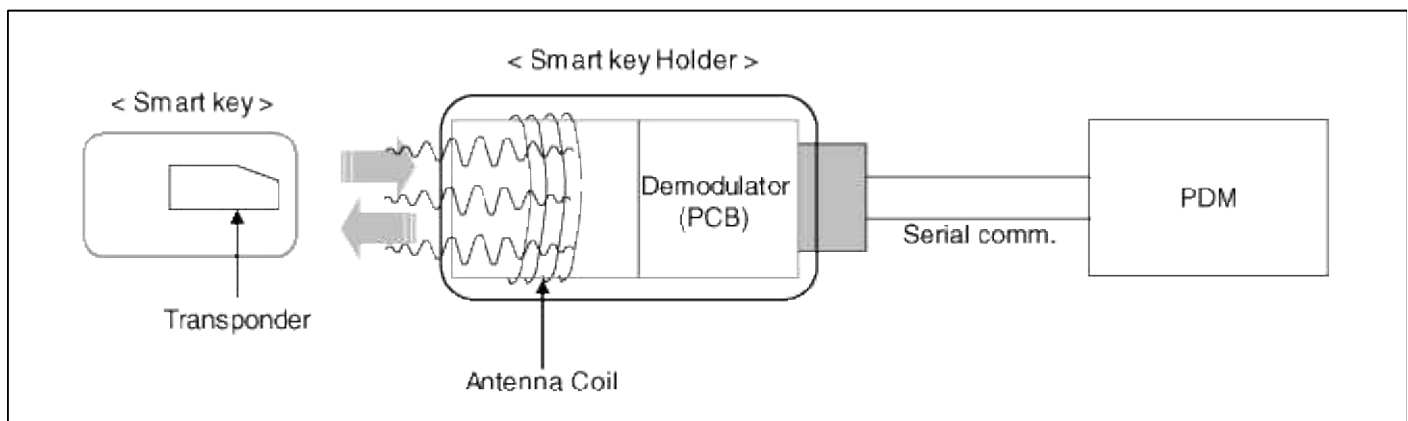
The insertion of the fob into the holder and the communication with the transponder should be possible regardless of the insertion direction of fob to the holder (buttons facing up or bottom).

A lighting device is also integrated for illumination of the Fob Holder and it is driven directly by the PDM,

The main functions of the Fob holder are:

- Transponder base station
- Fob mechanical lock
- Illumination

Transponder



External Receiver(SRX)

The data transmitted by the RKE or Smart key Fob is received by an external RF receiver called as SRX. This receiver will be same as that one for the SMK applications, with respect to electronics, housing, connector and software.

This receiver is connected to the SMK via a serial communication line.

Terminal And Starter Relays

Relays will be used to switch the terminals ACC / IGN1 / IGN2. Those normally-open relays will be driven by the PDM 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 PDM.

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

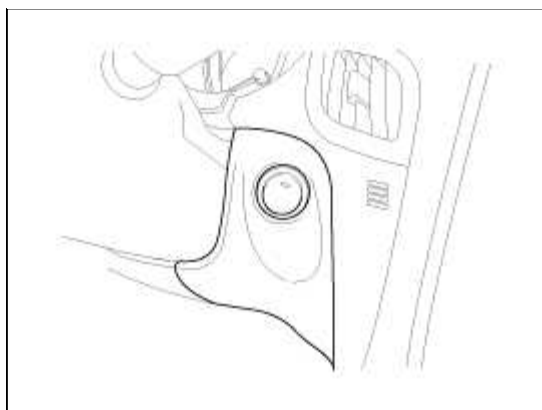
Start/Stop Button(SSB)

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

- To activate the power modes 'Off', 'Accessory', 'Ignition' and 'Start' by switching the corresponding terminals
- To start the engine
- To stop the engine

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.



BES System State Chart

System STATES in LEARNT MODE

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

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

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

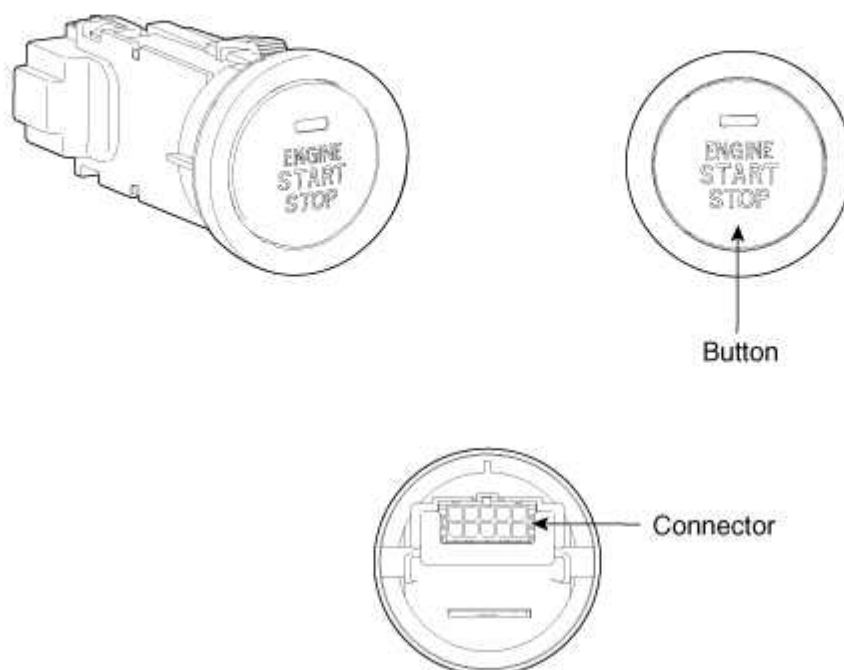
The BES System can be set in 5 different states (OFF LOCKED is not available in virgin mode), depending on the status of the terminals and Engine status:

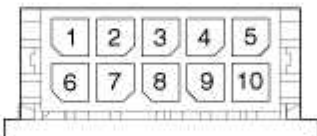
System State	Terminal Status	Engine status
1. OFF - UNLOCKED	OFF	Stopped
2. ACC	ACC	Stopped
3. IGN	IGN1, IGN2, ACC	Stopped
4. Start	IGN1, START with special pattern of activation see Chap 6.2.1 for details	Cranking
5. IGN - Engine	IGN1, IGN2, ACC	Running (means "self-running")

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

Body Electrical System > Button Engine Start System > Start/Stop Button > Components and Components Location

Component



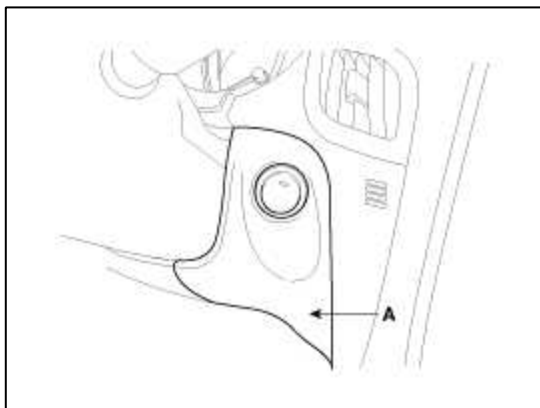
Connector (10 pins)				
Pin No.	Description	Pin No.	Description	
1	Start/Stop button switch1(PDM)	6	Battery	
2	Battery illumination	7	Start/Stop button switch2(IPM)	
3	Start/Stop button LED Amber(PDM)	8	Start/Stop button LED Blue(PDM)	
4	Start/Stop button illum. GND(PDM)	9	Rheostat	
5	Start/Stop button illum. power	10	-	

Body Electrical System > Button Engine Start System > Start/Stop Button > Repair procedures

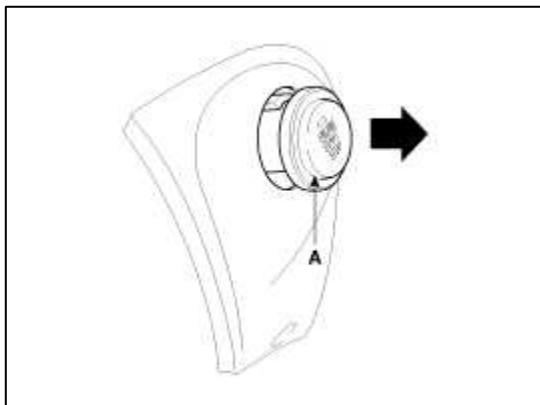
Removal

1. Disconnect the negative(-) battery terminal.

2. Remove the start/stop button cover(A).



3. Remove the start/stop button (A).

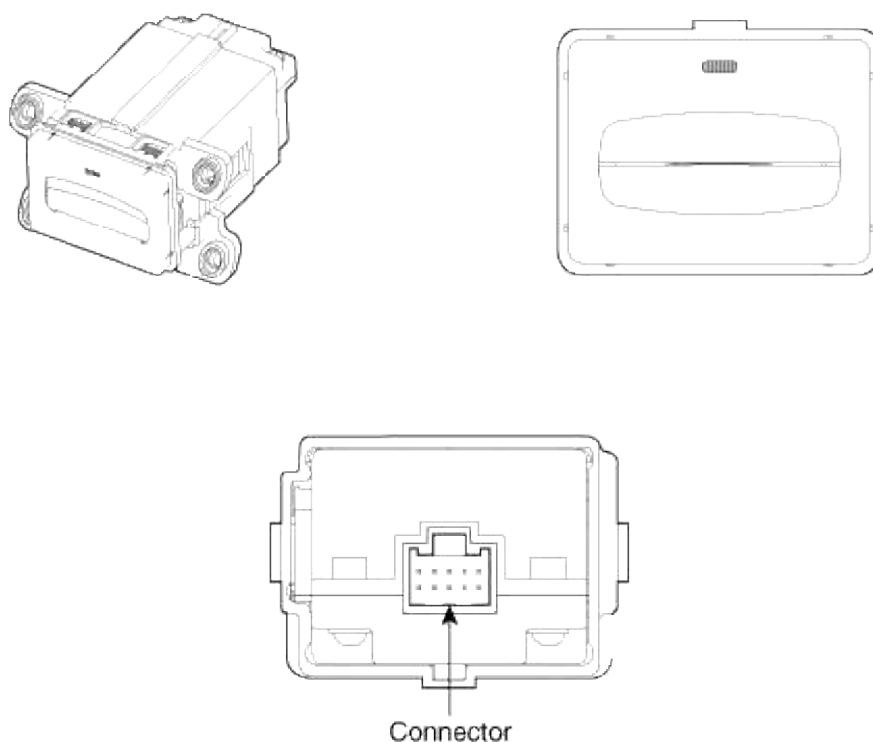


Installation

1. Install the start/stop button.
2. Install the start/stop button cover.

Body Electrical System > Button Engine Start System > Fob Holder > Components and Components Location

Component



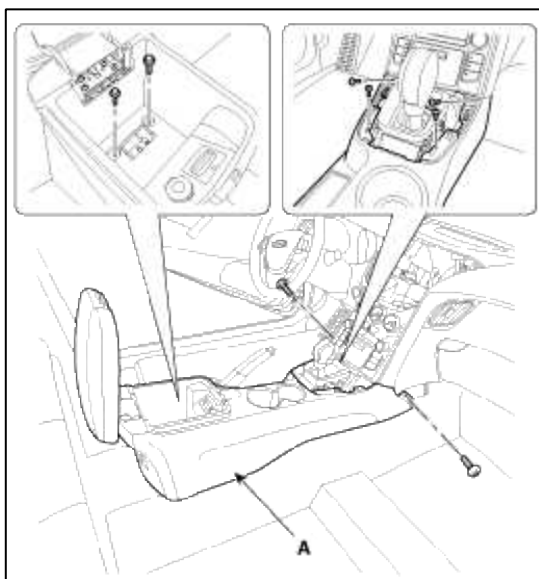
<div>Connector (10 pins)</div>			
Pin No.	Description	Pin No.	Description
1	-	6	Battery
2	Immobilizer clock	7	Immobilizer data
3	Holder illumination(PDM)	8	Illumination battery
4	-	9	Fob in (PDM)
5	GND	10	-

Body Electrical System > Button Engine Start System > Fob Holder > Repair procedures

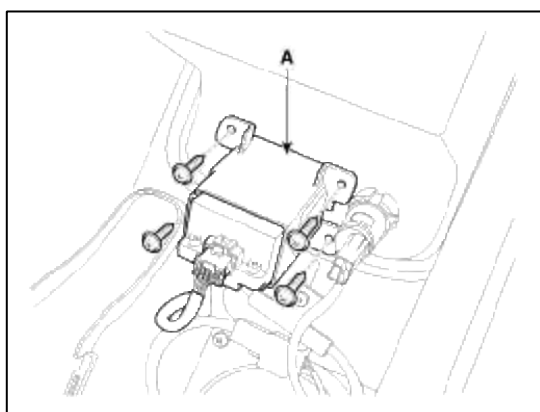
Removal

1. Disconnect the negative(-) battery terminal.

2. Remove the console assembly (A).
(Refer to BD group - "Console")



3. Disconnect the connector and remove the fob holder(A) after loosening the mounting screws.

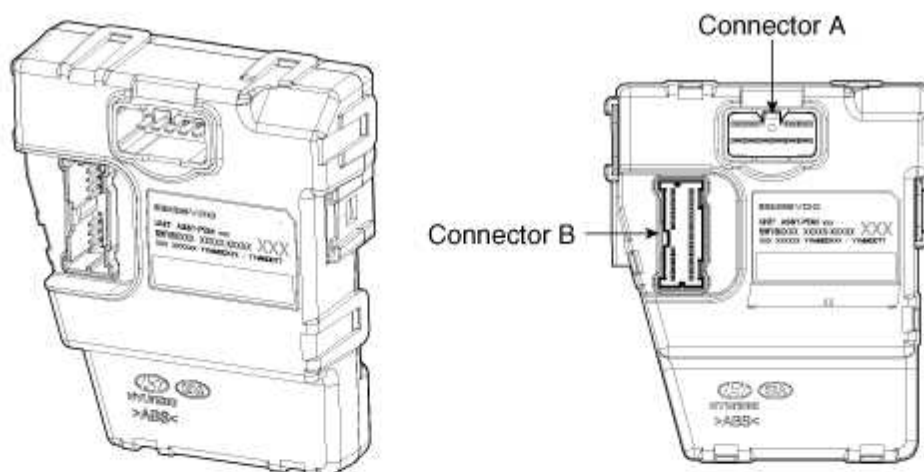


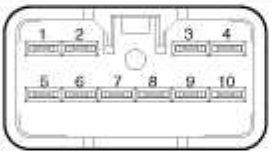
Installation

1. Install the fob holder assembly.
2. Install the console assembly.

Body Electrical System > Button Engine Start System > PDM(Power Distribution Module) > Components and Components Location

Component

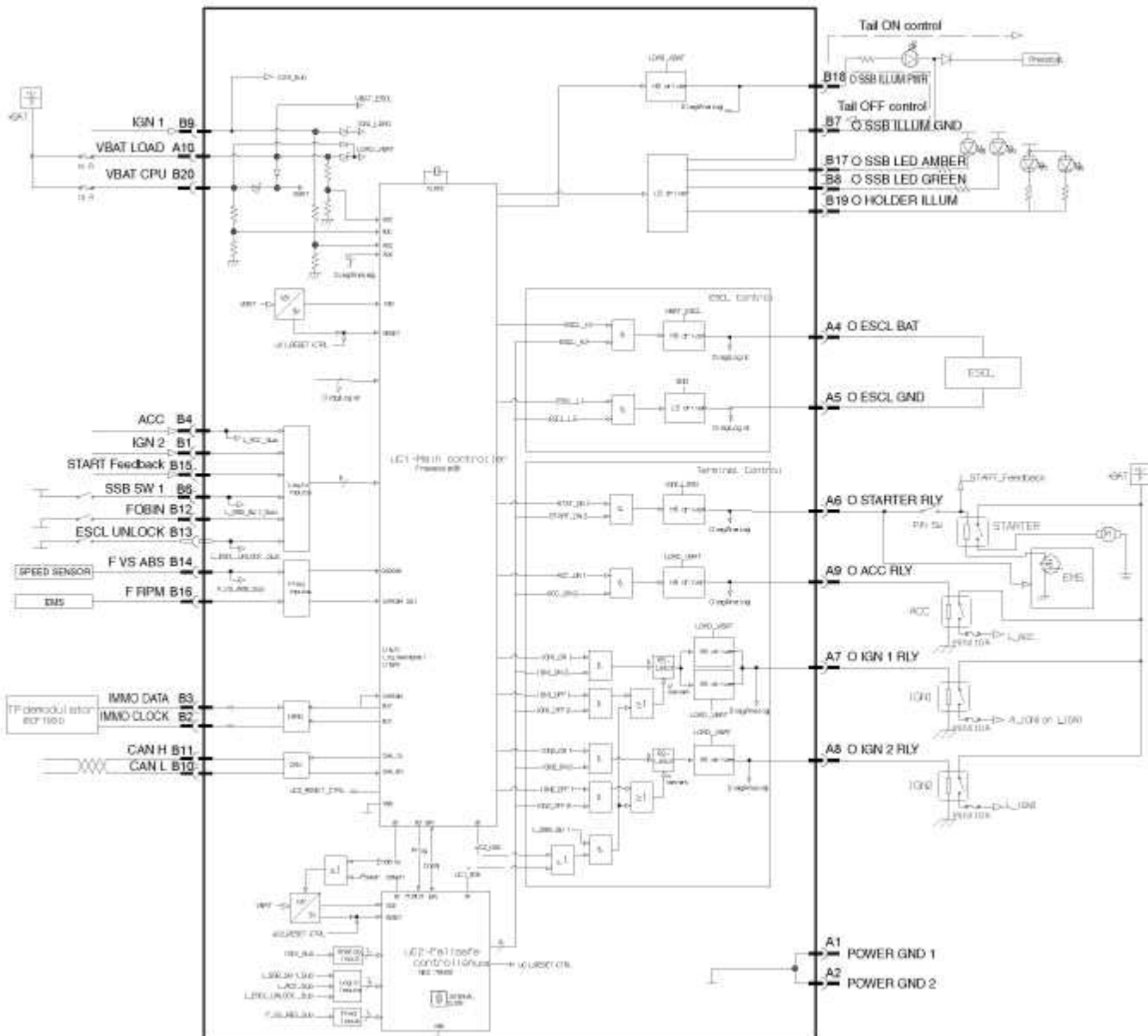


			
Pin No.	Connector A (10 pin)	Connector B (20 pin)	
1	Power ground 1	IGN2	
2	Power ground 2	Immobilizer clock	
3	-	Immobilizer data	
4	ESCL battery	ACC	
5	ESCL ground	-	
6	Starter relay	SSB switch1	
7	IGN1 relay	SSB illumination ground	
8	IGN2 relay	SSB LED green	
9	ACC relay	IGN1	
10	Battery load	CAN L	
11		CAN H	
12		Fob in	
13		ESCL unlock	
14		Vehicle speed	
15		Start Feed back	
16		RPM data (EMS)	
17		SSB LED amber	
18		SSB illumination power	
19		Holder illumination	
20		CPU battery	

Body Electrical System > Button Engine Start System > PDM(Power Distribution Module) > Schematic Diagrams

System Circuit Diagram

[PDM]



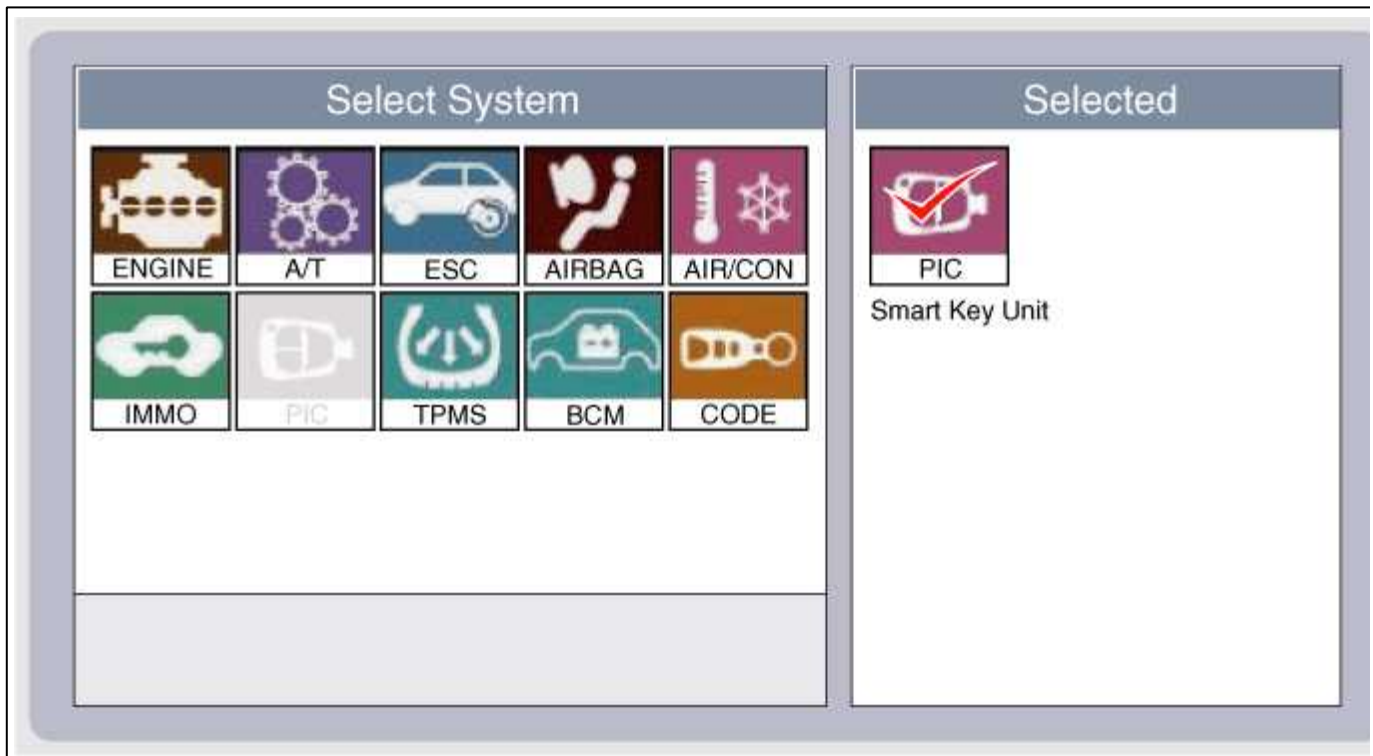
Body Electrical System > Button Engine Start System > PDM(Power Distribution Module) > Repair procedures

Inspection

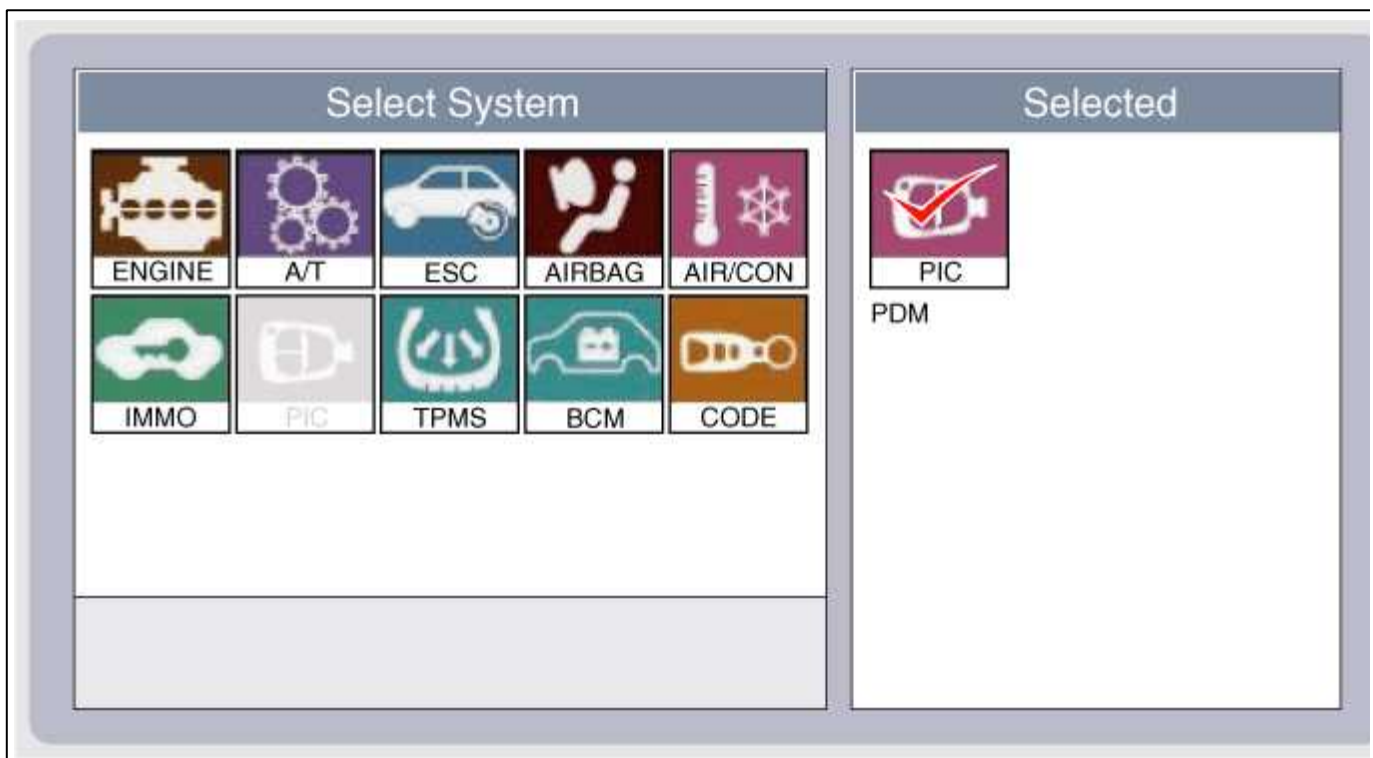
PDM Diagnosis With GDS

1. It will be able to diagnose defects of Smart key with GDS quickly.
GDS can operate actuator forcefully, input/output value monitoring and self diagnosis.

2. Select model and "Smart key system (Button start)" menu if you want to check PDM.



3. Select "PDM" in the manu.



4. Select "Current Data", if you want to check current data of PDM.
It provides the input/output status of each module.

Current Data 5/35					
Selective Display			Standard List		
Graph			Items List		
Reset Min/Max			Record		
Stop					
Sensor Name	Value	Unit	Sensor Name	Value	Unit
Load battery voltage	12.2	V	ABS speed sensor (Main)	0	MPH
ABS speed sensor(SUB)	0	MPH	FOB In switch	ON	-
IGN2 input	ON	-	ESCL unlock input	OFF	-
IGN1 input	OFF	-	ACC relay L terminal	OFF	-
Start stop switch	OFF	-	SSB illumination	OFF	-
FOB holder illumination out...	OFF	-	SSB blue LED output	OFF	-
SSB amber LED output	OFF	-	ESCL ground output	OFF	-
ESCL battery output	OFF	-	Starter relay output	OFF	-
IGN2 relay output	OFF	-	IGN1 relay output	OFF	-
ACC relay output	OFF	-	CPU battery voltage	12.2	V
Start relay short circuit batt...	OK	-	IGN2 relay short circuit batt...	NG	-
IGN1 relay short circuit batt...	OK	-	ACC output short circuit batt...	OK	-
IGN2 relay open	OK	-	IGN1 relay open	OK	-
ACC relay open	OK	-	Start output short circuit batt...	OK	-
IGN2 output short circuit bat...	OK	-	IGN1 output short circuit bat...	OK	-
ACC output short circuit batt...	OK	-	Start output short circuit gro...	OK	-
IGN2 output short circuit gro...	OK	-	IGN1 output short circuit gro...	OK	-
ACC output short circuit gro...	OK	-			

5. If you want to check PDM data operation forcefully, select "Actuation test".

Actuation Test	
Test Items SSB LED amber SSB LED blue FOB holder illumination SSB illumination ACC relay IGN1 relay IGN2 relay START relay	• Duration: 5 Sec • Conditions: IG OFF • Result: Success
	Start Stop

Input/output Current Data


NO	Description	Unit
1	Load Battery Voltage	V
2	Abs Speed Sensor(main)	Km/h
3	Start Stop Button SW	OFF/ON
4	ACC input	OFF/ON
5	IGN1 Input	OFF/ON
6	IGN2 Input	OFF/ON
7	Fob In Switch	RELEASE/INSERT
8	Start Relay Monitoring Input	
9	SSB Ember LED Output	OFF/ON
10	SSB Blue LED Output	OFF/ON
11	Fob Holder Illumination Output	OFF/ON
12	SSB Illumination Output	OFF/ON
13	ACC Relay Output	OFF/ON
14	IGN1 Relay Output	OFF/ON
15	IGN2 Relay Output	OFF/ON
16	Start Relay S1 Output	OFF/ON
17	-	-
18	-	-
19	CPU Battery Voltage	V
20	Engine Speed	DATA*1.0
21	ACC Relay SCB	OFF/ON
22	IGN1 Relay SCB	OFF/ON
23	IGN2 Relay SCB	OFF/ON
24	Start Relay SCB	OFF/ON
25	SCC Relay Open	OFF/ON
26	IGN1 Relay Open	OFF/ON
27	IGN2 Relay Open	OFF/ON
28	ACC Output SCB	OFF/ON
29	IGN1 Output SCB	OFF/ON
30	IGN2 Output SCB	OFF/ON
31	Start Output SCB	OFF/ON
32	ACC Output SCG	OFF/ON
33	IGN1 Output SCG	OFF/ON
34	IGN2 Output SCG	OFF/ON
35	Start Output SCG	OFF/ON

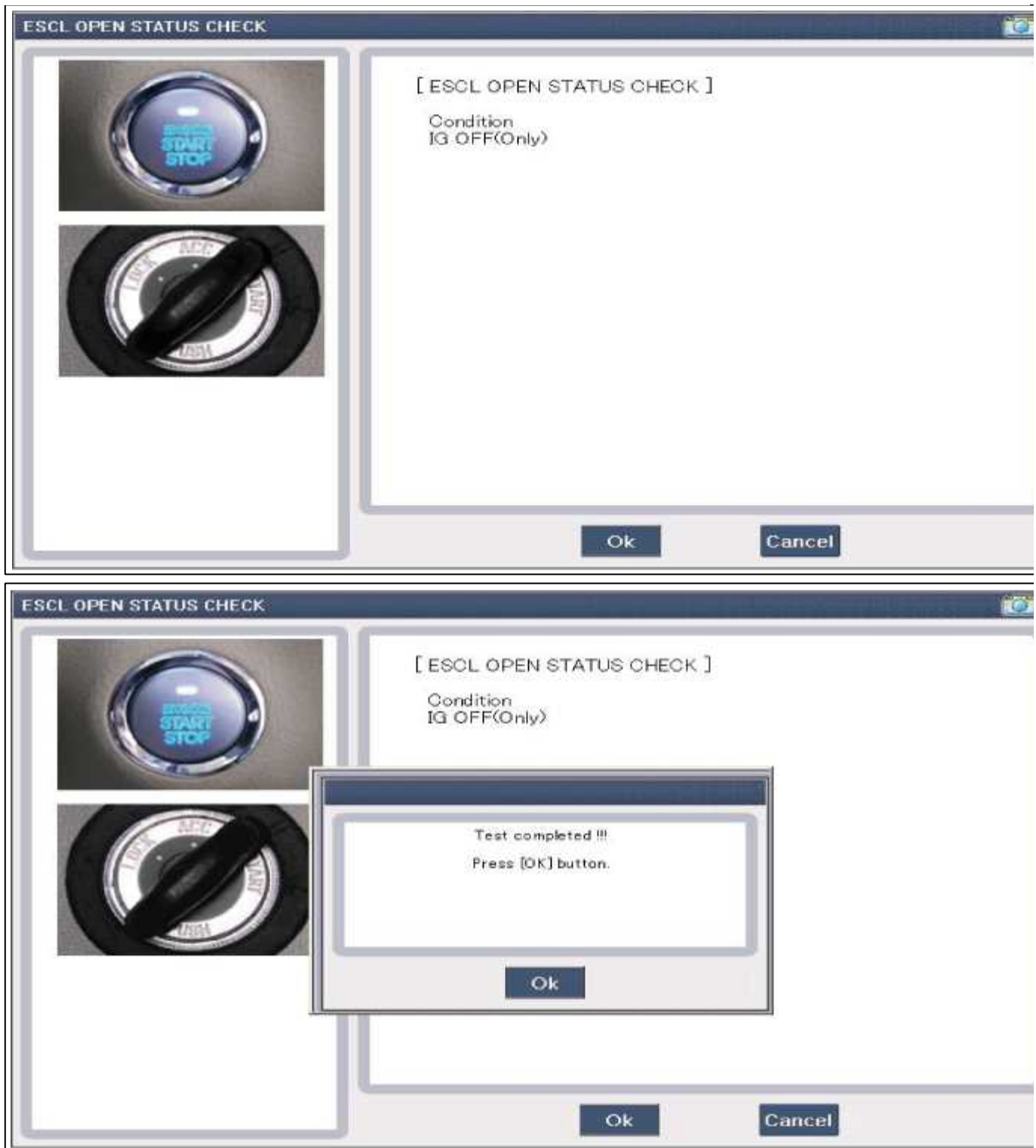
Actuation Test

No.	Description
1	SSB Ember LED
2	SSB Blue LED
3	Fob Holder Illumination
4	SSB Illumination
5	ACC Output
6	ING1 Output
7	ING2 Output
8	Start Output
9	-

ESCL OPEN STATUS CHECK

1. Select the "ESCL open status check" menu if you want to check ESCL open.

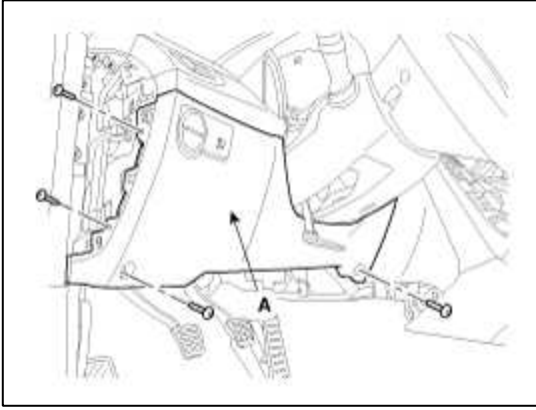
ID Register
 System Identification
Inspection / Test
 **ESCL OPEN STATUS CHECK**



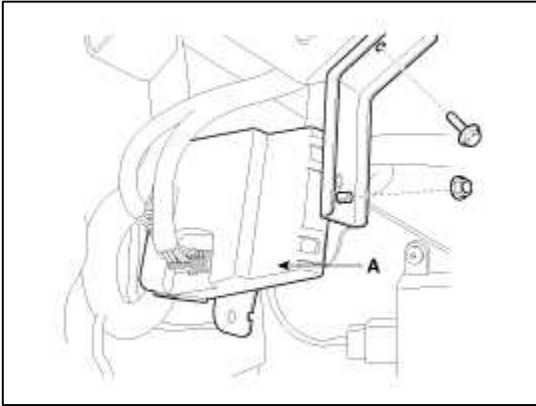
Removal

1. Disconnect the negative(-) battery terminal.

2. Remove the crash pad lower panel(A).
(Refer to Body group-"Crash pad")



3. Disconnect the power distribution module(PDM) connector.
4. Remove the power distribution module(A) after loosening nut and bolt.



Installation

1. Install the power distribution module.
2. Install the crash pad lower panel.