



# Body Electrical System

## 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.

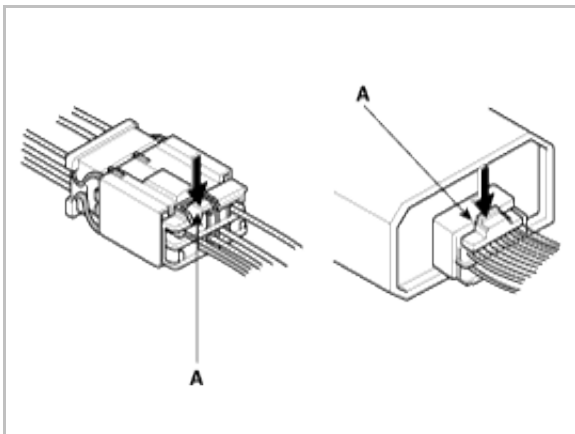
#### NOTICE

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

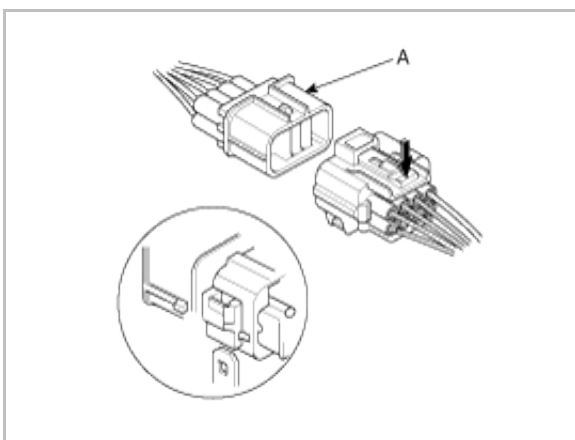
3. Check the generator belt tension.

### HANDLING CONNECTORS

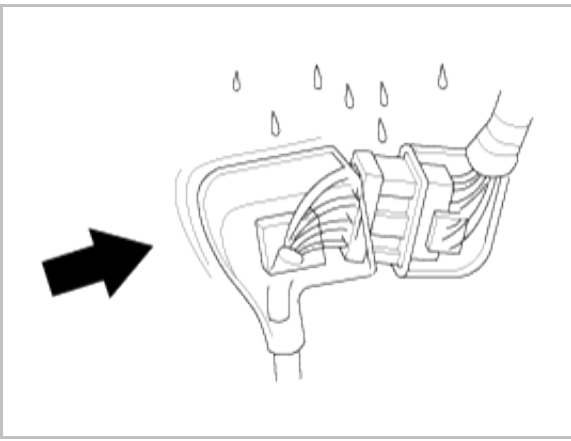
1. Make sure the connectors are clean and have no loose wire terminals.
2. Make sure multiple cavity connectors are packed with grease (except watertight connectors).
3. All connectors have push-down release type locks (A).



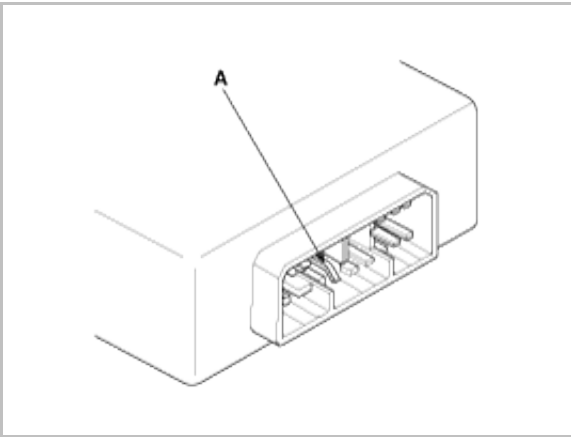
4. Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
5. Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket (A).



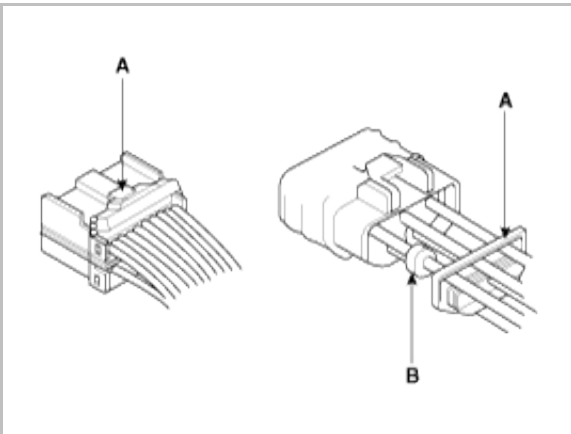
6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
7. Always reinstall plastic covers.



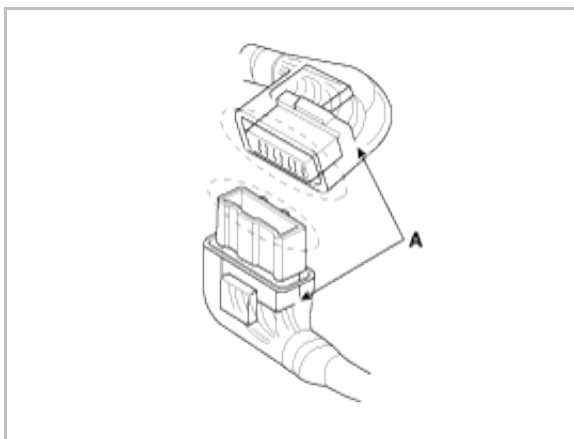
8. Before connecting connectors, make sure the terminals (A) are in place and not bent.



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

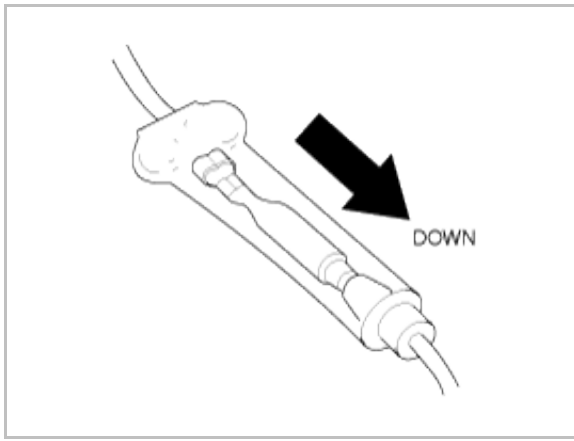


10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



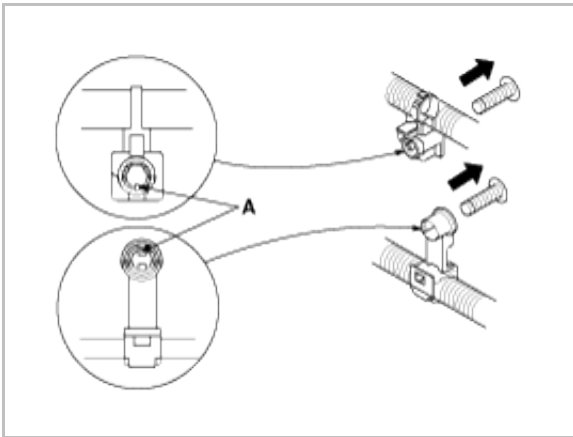
11. Insert the connector all the way and make sure it is securely locked.

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

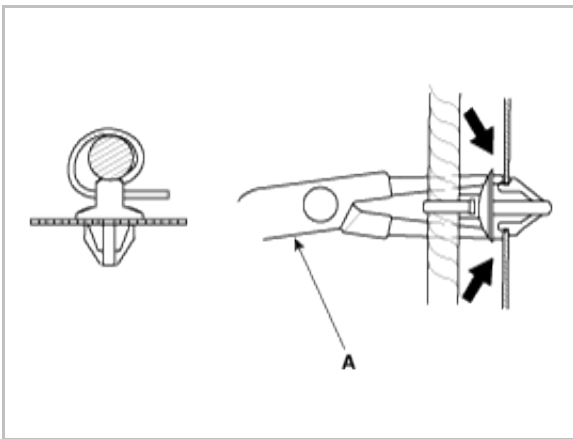


## HANDLING WIRES AND HARNESSSES

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).

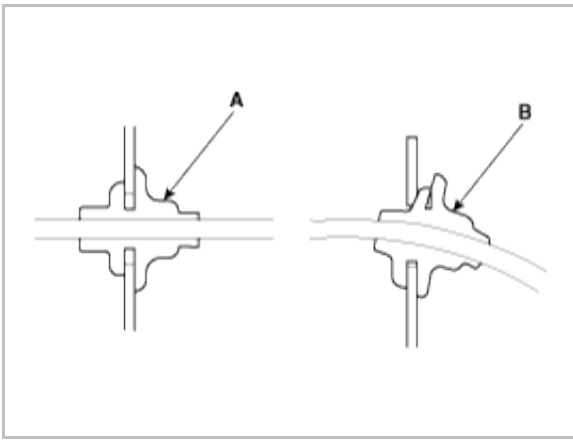


3. Slip pliers (A) under the clip base and through the hole at an angle, and then squeeze the expansion tabs to release the clip.



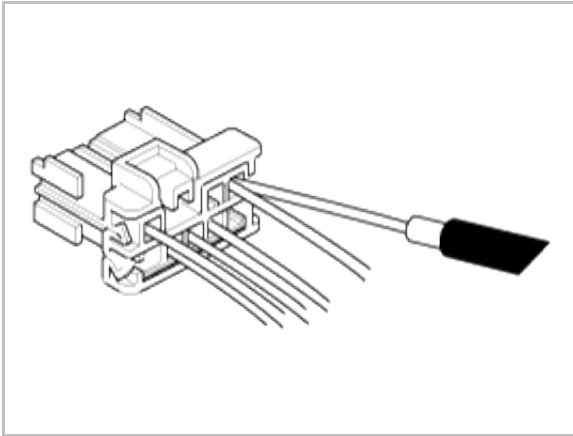
4. After installing harness clips, make sure the harness doesn't interfere with any moving parts.
5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
6. Seat grommets in their grooves properly (A). Do not leave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



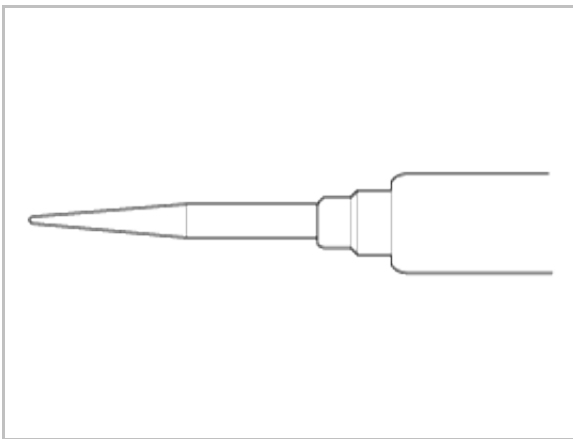


## TESTING AND REPAIRS

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 probe of the tester from the wire side (except waterproof connector).



5. Use a probe with a tapered tip.



## 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

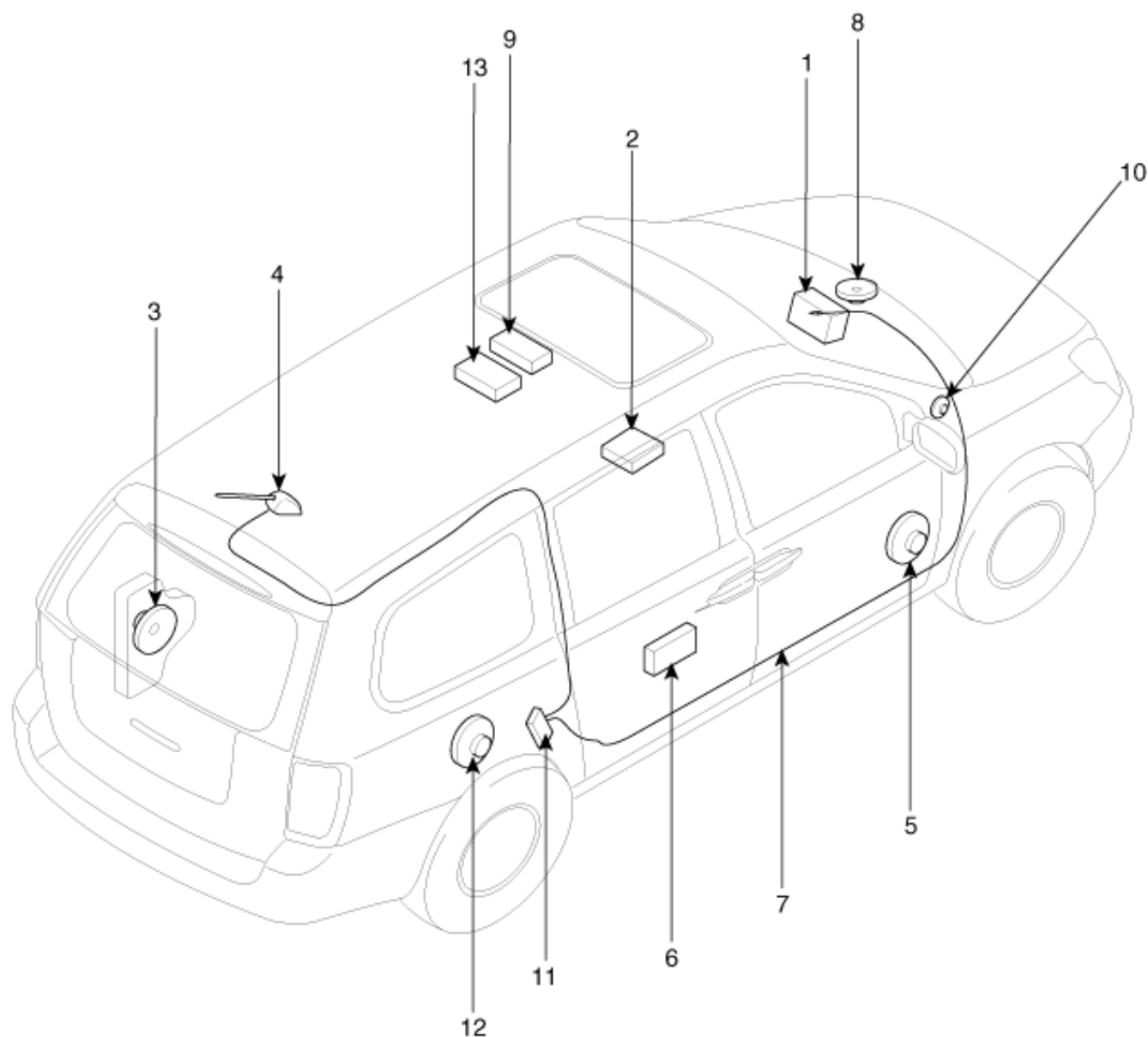


# Body Electrical System

## Audio



## Component Location



1. Audio unit
2. External amplifier
3. Woofer speaker
4. Micro antenna
5. Front door speaker
6. Sliding door speaker
7. Antenna feeder cable

8. Front center speaker
9. RSE (Rear Seat Entertainment)
10. Tweeter speaker
11. Diversity
12. Rear side speaker
13. Rear center speaker



## Specification

### Audio

| Item                            |    | Specification           |                      |
|---------------------------------|----|-------------------------|----------------------|
| Model                           |    | Radio/CD/MP3 (A200)     | Radio/CDC/MP3 (A300) |
| Power supply                    |    | DC 14.4V                |                      |
| Rated output                    |    | Max 43W x 4             | 3.2Vrms              |
| Speaker impedance               |    | 4Ω x 4                  | 10kΩ                 |
| Antenna                         |    | 80PF 75Ω                |                      |
| Tuning type                     |    | PLL synthesized type    |                      |
| Frequency range / Channel space | FM | 87.5~107.9 MHz / 200KHz |                      |
|                                 | AM | 530~1710 KHz / 10KHz    |                      |
| Other                           |    | AUX [RSE]               |                      |

※ RSE : Rear Seat Entertainment.

### Speaker

| Item                     | Specification |         |         |            |            |             |              |
|--------------------------|---------------|---------|---------|------------|------------|-------------|--------------|
| Model                    | Front         | Rear    | Tweeter | -          | -          |             |              |
| Input power              | Max 25W       | Max 25W | Max 40W | -          | -          |             |              |
| Impedance                | 4±0.6Ω        | 4±0.6Ω  | 4±0.6Ω  | -          | -          |             |              |
| Audio external amplifier | Front         | Rear    | Tweeter | Center     | Sub woofer |             |              |
| Input power              | Max 25W       | Max 25W | Max 40W | Max 32W    | Max 64W    |             |              |
| Impedance                | 2±0.4Ω        | 2±0.4Ω  | 4±0.6Ω  | 2.15±0.25Ω | 1.35±0.25Ω |             |              |
| DVD external amplifier   | Front         | Rear    | Tweeter | Center     | Sub woofer | Rear center | Sliding door |
| Input power              | Max 25W       | Max 25W | Max 40W | Max 32W    | Max 64W    | Max 32W     | Max 32W      |
| Impedance                | 4±0.6Ω        | 4±0.6Ω  | 4±0.6Ω  | 2±0.25Ω    | 1.35±0.25Ω | 2±0.25Ω     | 2±0.6Ω       |

### External Amplifier

| Item              | Audio     |
|-------------------|-----------|
| Power supply      | DC 14.4V  |
| Output power      | 45W x 7ch |
| Speaker impedance | 2 ± 0.6Ω  |



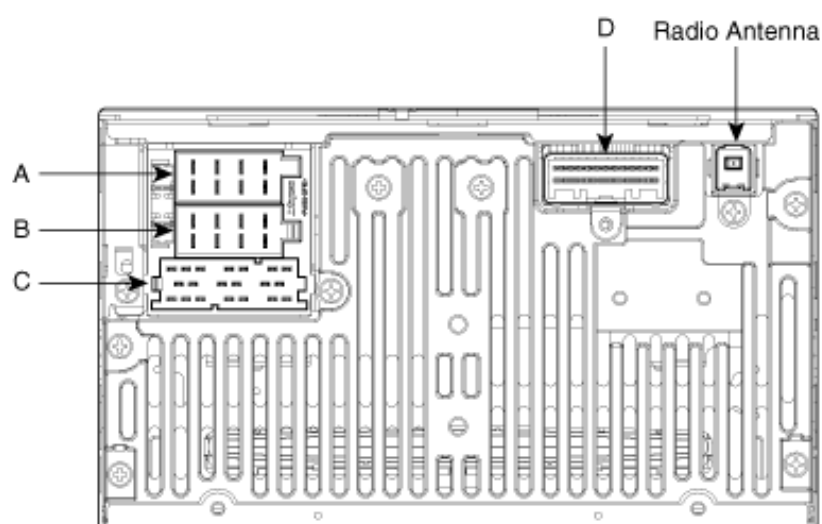
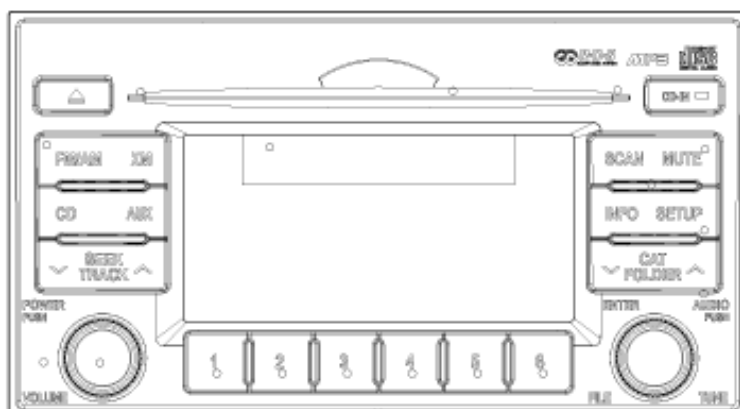
# Body Electrical System

## Audio - Audio Unit



## Component Location

### Radio/CD/MP3 (A200)

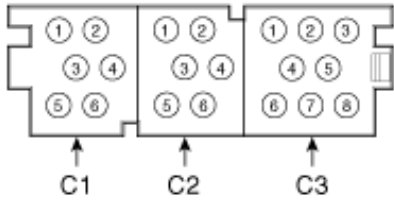


| Connector A                                                                       | Pin | Description      | Pin | Description      |
|-----------------------------------------------------------------------------------|-----|------------------|-----|------------------|
|  | 1   | Speed            | 5   | -                |
|                                                                                   | 2   | Illumination (+) | 6   | IGN +12V         |
|                                                                                   | 3   | Remote antenna   | 7   | Illumination (-) |
|                                                                                   | 4   | Battery (+)      | 8   | GND              |

| Connector B                                                                       | Pin | Description  | Pin | Description  |
|-----------------------------------------------------------------------------------|-----|--------------|-----|--------------|
|  | 1   | Speaker RR + | 5   | Speaker RR - |
|                                                                                   | 2   | Speaker FR + | 6   | Speaker FR - |
|                                                                                   | 3   | Speaker FL + | 7   | Speaker FL - |
|                                                                                   | 4   | Speaker RL + | 8   | Speaker RL - |

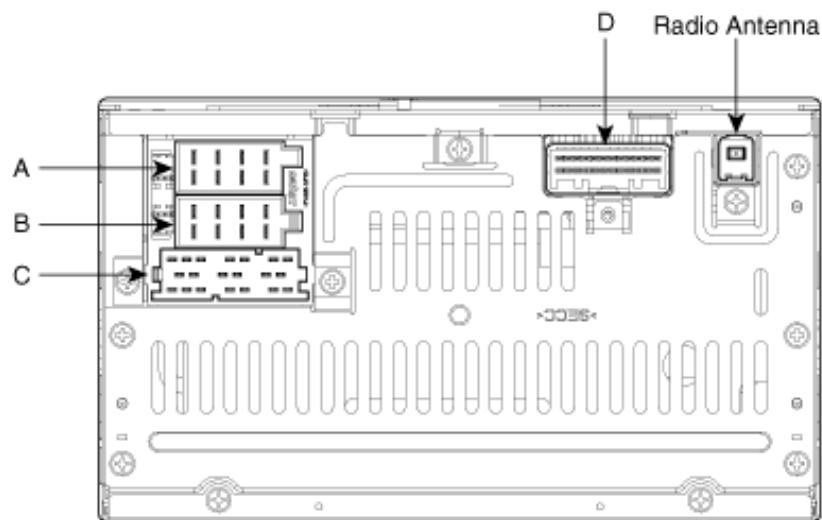
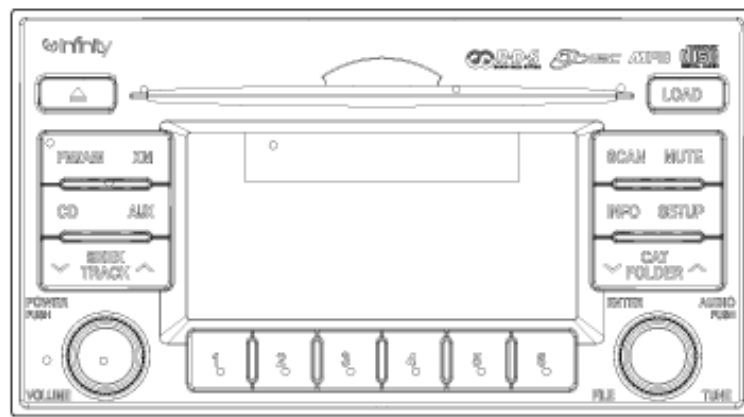
  

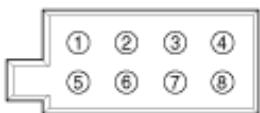
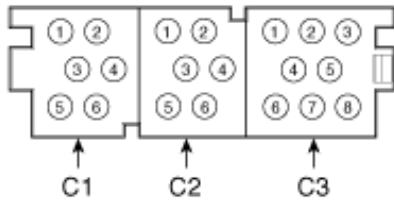
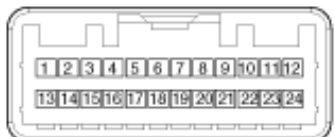
| Connector C                                                                       | Pin | Description | Pin | Description           |
|-----------------------------------------------------------------------------------|-----|-------------|-----|-----------------------|
|  | 1-1 | -           | 2-5 | Steering Wheel Remote |
|                                                                                   | 1-2 | -           | 2-6 | Remote GND            |
|                                                                                   | 1-3 | -           | 3-1 | -                     |
|                                                                                   | 1-4 | -           | 3-2 | USB D-                |
|                                                                                   | 1-5 | Mute        | 3-3 | -                     |
|                                                                                   | 1-6 | -           | 3-4 | USB D+                |
|                                                                                   | 2-1 | Aux Input R | 3-5 | USB/iPod/GND          |
|                                                                                   | 2-2 | Aux Input L | 3-6 | -                     |
|                                                                                   | 2-3 | Aux REF     | 3-7 | USB/iPod/VDO          |
|                                                                                   | 2-4 | Aux DET     | 3-8 | -                     |

| Connector D                                                                         | Pin | Description | Pin | Description       |
|-------------------------------------------------------------------------------------|-----|-------------|-----|-------------------|
|  | 7   | RSE GND     | 10  | -                 |
|                                                                                     | 8   | RSE R input | 11  | Rear remote (RSE) |
|                                                                                     | 9   | RSE L input | 12  | Surround          |





| Connector A                                                                         | Pin | Description      | Pin | Description           |
|-------------------------------------------------------------------------------------|-----|------------------|-----|-----------------------|
|    | 1   | Speed            | 5   | -                     |
|                                                                                     | 2   | Illumination (+) | 6   | IGN +12V              |
|                                                                                     | 3   | Remote antenna   | 7   | Illumination (-)      |
|                                                                                     | 4   | Battery (+)      | 8   | GND                   |
| Connector B                                                                         | Pin | Description      | Pin | Description           |
|    | 1   | Speaker RR +     | 5   | Speaker RR -          |
|                                                                                     | 2   | Speaker FR +     | 6   | Speaker FR -          |
|                                                                                     | 3   | Speaker FL +     | 7   | Speaker FL -          |
|                                                                                     | 4   | Speaker RL +     | 8   | Speaker RL -          |
| Connector C                                                                         | Pin | Description      | Pin | Description           |
|    | 1-1 | -                | 2-5 | Steering Wheel Remote |
|                                                                                     | 1-2 | -                | 2-6 | Remote GND            |
|                                                                                     | 1-3 | EQ select        | 3-1 | E. AMP mute           |
|                                                                                     | 1-4 | -                | 3-2 | USB D-                |
|                                                                                     | 1-5 | Mute             | 3-3 | -                     |
|                                                                                     | 1-6 | -                | 3-4 | USB D+                |
|                                                                                     | 2-1 | Aux Input R      | 3-5 | USB/iPod/GND          |
|                                                                                     | 2-2 | Aux Input L      | 3-6 | Remote E. AMP         |
|                                                                                     | 2-3 | Aux REF          | 3-7 | USB/iPod/VDO          |
|                                                                                     | 2-4 | Aux DET          | 3-8 | -                     |
| Connector D                                                                         | Pin | Description      | Pin | Description           |
|  | 7   | RSE GND          | 10  | -                     |
|                                                                                     | 8   | RSE R input      | 11  | Rear remote (RSE)     |
|                                                                                     | 9   | RSE L input      | 12  | Surround              |



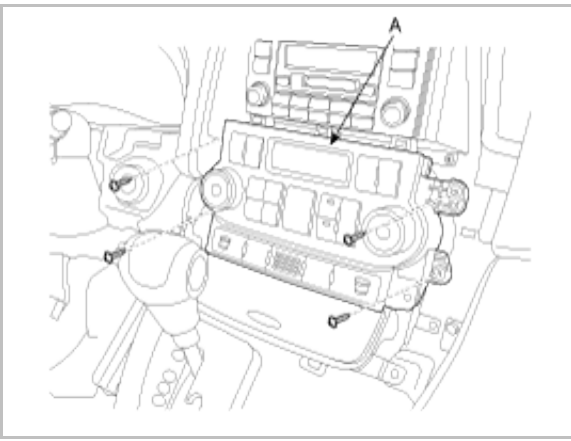
## Inspection

Troubleshooting for RSE system and audion unit

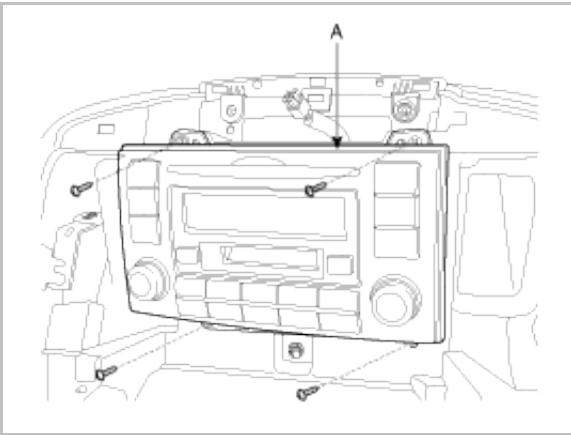
| Problem                                             | Possible causes / Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The disc becomes stuck or blocked.                  | <ol style="list-style-type: none"> <li>1. Press the Stop / Eject button to release the disc.</li> <li>2. The player will attempt to eject the disc up to three times performing the Auto-Reload function.</li> <li>3. Once the Auto-Reload function is complete, press the Stop/Eject button again to release the disc from the player.</li> <li>4. If a disc is still stuck or blocked in the RSE unit, turn the ignition off and then on again to reset the RSE unit.</li> </ol> |
| There is no audio in the headphones.                | <ol style="list-style-type: none"> <li>1. Verify that the headphone is equipped with batteries, and that the batteries are changed.</li> <li>2. Insert or replace 2 AAA batteries to resume headphone function.</li> </ol>                                                                                                                                                                                                                                                         |
| The RSE does not work.                              | <ol style="list-style-type: none"> <li>1. Press the PLAY button. If the display does not show "NO DISC", then there is no power.</li> <li>2. Check the power connection and the fuse.</li> <li>3. Turn the vehicle ignition off and back on to reset the RSE.</li> </ol>                                                                                                                                                                                                           |
| The remote control does not work.                   | <ol style="list-style-type: none"> <li>1. Make sure you are pointing the remote control at the face of the RSE at a 45° angle.</li> <li>2. Change the battery. [Device requires one(1) CR2025 battery.]</li> <li>3. Use the control buttons on the RSE display panel.</li> </ol>                                                                                                                                                                                                   |
| Continue receiving an [Θ] when a button is pressed. | Invalid button press. The function you are trying to perform is not available.                                                                                                                                                                                                                                                                                                                                                                                                     |
| RSE has no sound, display, illumination at all.     | - If ,when connected to power supplier, RSE unit works well, check the connector.                                                                                                                                                                                                                                                                                                                                                                                                  |
| Spring in the latch is missed.                      | - Re-assemble spring with latch.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Mechanism cannot read the disc.                     | <ul style="list-style-type: none"> <li>- Check if the disc has some scratches or pits.</li> <li>- In case the disc is stuck, after doing power off reset by pulling both audio fuses, wait 5 minutes an reinsert the fuses with key off. After turning on the ignition, press the eject key again.</li> </ul>                                                                                                                                                                      |
| Audio is not interfaced with RSE.                   | <ul style="list-style-type: none"> <li>- Check the connection between Audio and RSE through multimeter.</li> <li>- And measure the keydata line of the RSE and verify that 5 volts is coming out.</li> </ul>                                                                                                                                                                                                                                                                       |

## Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel, console lower cover, center air vent, switches, tray and heater control panel (A).  
(Refer to the Body group-Crash pad)



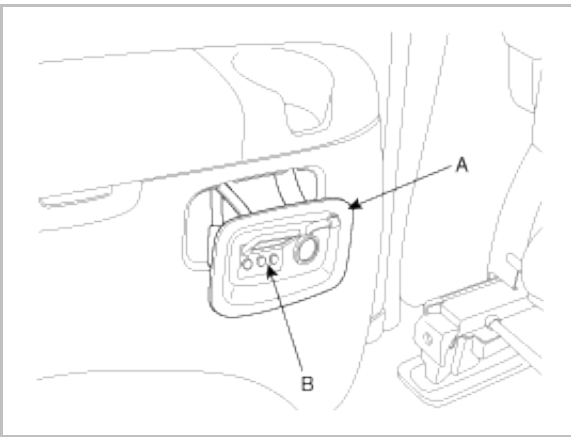
3. Remove the mounting 4 screws then remove the audio unit (A).



4. Installation is the reverse of removal.

### **Video Jack (DVD Only)**

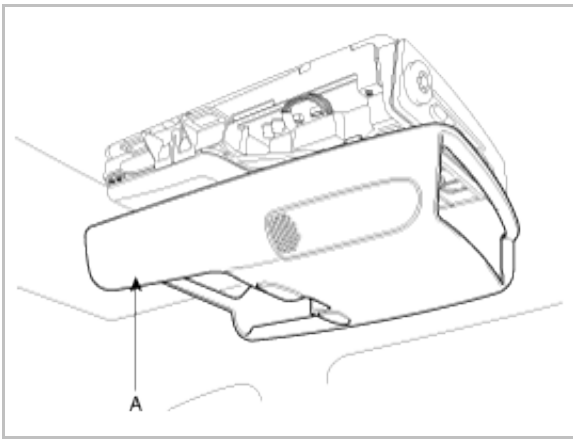
1. Disconnect the negative (-) battery terminal.
2. Remove the video jack cover (A). And then remove the video jack (B).



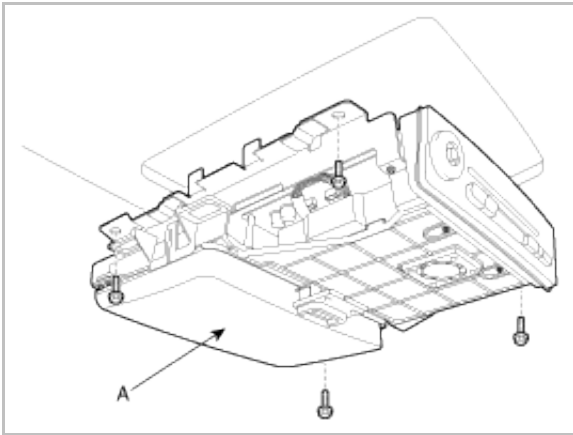
3. Installation is the reverse of removal.

### **Removal Seat Entertainment (DVD Only)**

1. Disconnect the negative (-) battery terminal.
2. Remove the DVD rear monitor cover (A) and disconnect the interior lamp connector.



3. Remove the DVD rear monitor (A) mounting bolts (4EA) and disconnect the DVD rear monitor connector.



## Installation

1. Tighten the 4 bolts.
2. Connect the lamp connector.
3. Insert the rear part of console to RSE unit.
4. Match the front part of console not to fall the rear part down.
5. Holding the front panel up, matching the ribs.
6. Push the middle part of console by too much force.



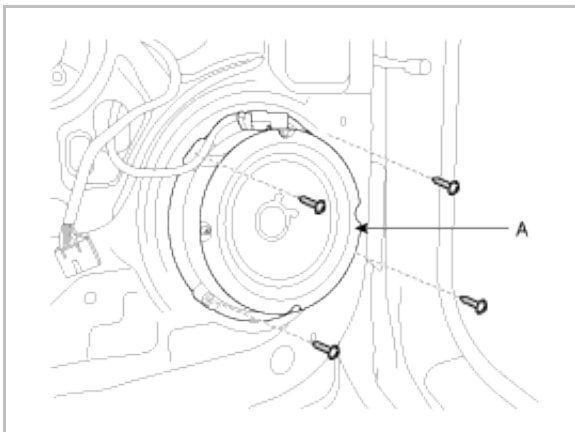
# Body Electrical System

## Audio - Speakers

## Replacement

### Front Speaker

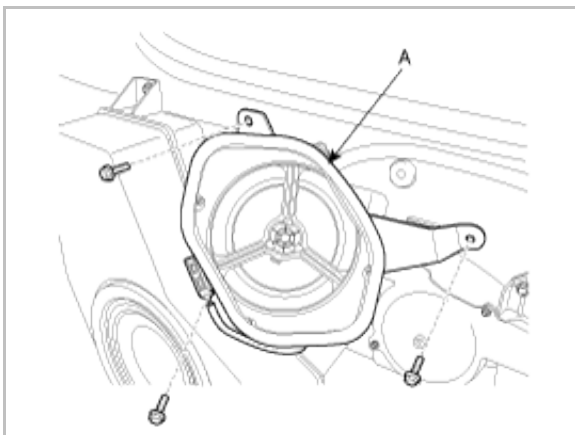
1. Remove the front door trim panel (Refer to the Body group - front door).
2. Remove the front speaker (A) after removing 4 screw.



3. Installation is the reverse of removal.

### Rear Side Speaker

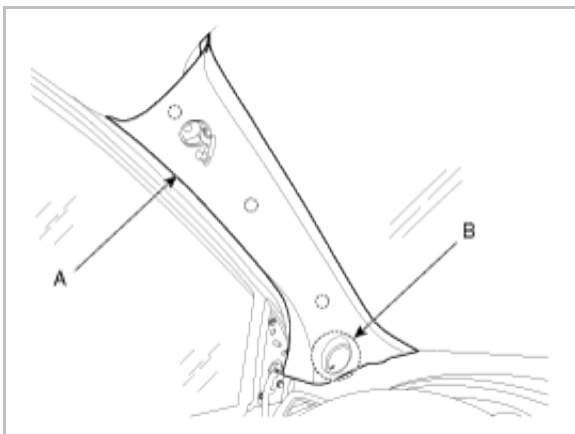
1. Remove the rear seats (Refer to the Body group - Rear seat door).
2. Remove the luggage trim after removing 4 bolts.
3. Remove the rear side speaker(A) (Refer to the Body group - Rear seat).

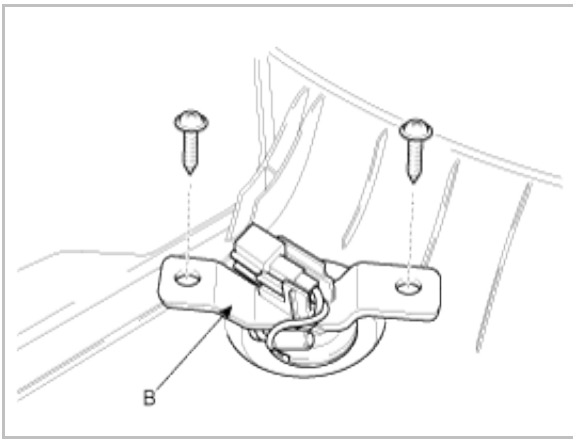


4. Installation is the reverse of removal.

### Tweeter Speaker

1. Remove the tweeter speaker (B) after removing the front filler trim(A) and disconnecting the connector.

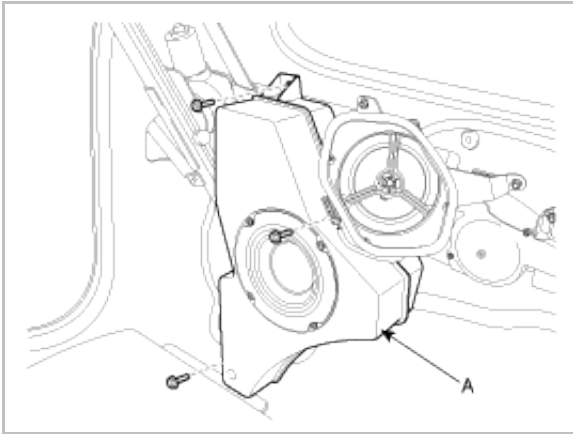




2. Installation is the reverse of removal.

## Woofer Speaker

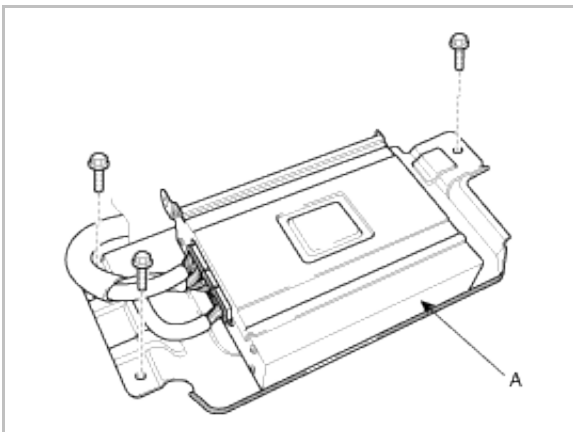
1. Remove the rear seats. (Refer to the Body group - rear seats)
2. Remove the luggage side trim (Refer to the Body group - interior trim)
3. Remove the woofer speaker (A) after removing 4 bolts.



4. Installation is the reverse of removal.

## External Amplifier

1. Remove the driver seat. (Refer to the Body group - front seats)
2. Remove the external amplifier (A) after removing 3 bolts.

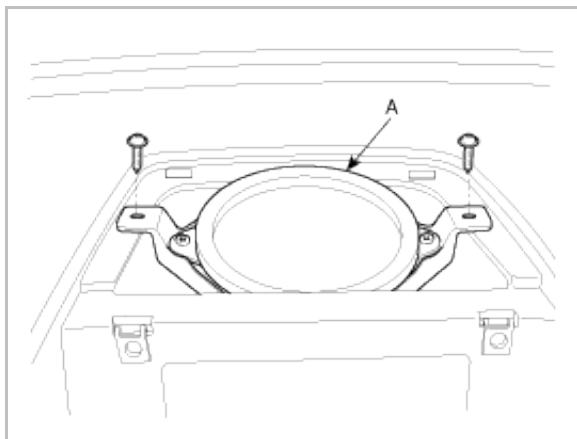


3. Installation is the reverse of removal.

## Front Center Speaker

1. Remove the center facia panel.(Refer to the Body group - crash pad)





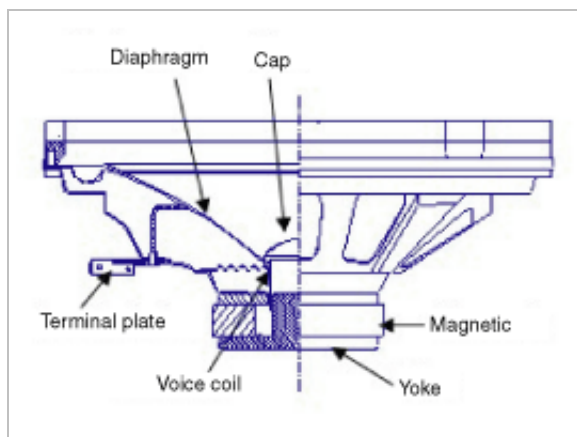
2. Installation is the reverse of removal.

## Inspection

### 1. Troubleshooting for Speaker

#### (1) Basic inspection of speaker

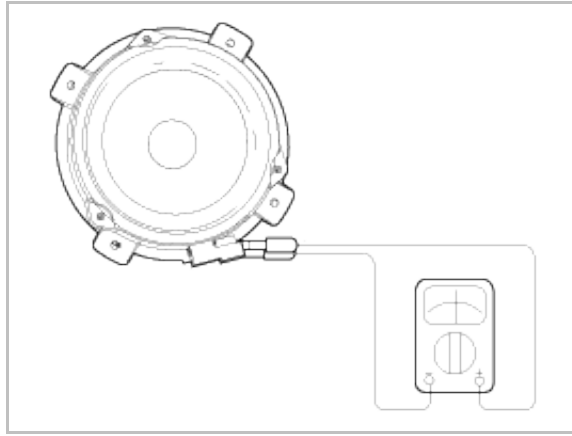
Inspect the sound from speaker after verifying that the speaker mounting screws is removed and the wiring connector is connected precisely to remove vibration transmitted from body trims and surrounding parts.



#### (2) Case Troubleshooting

| No. | Case            | Inspection/Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Trembling sound | <ol style="list-style-type: none"> <li>Before replacing the speaker, inspect that the mounting screw is installed normally.</li> <li>After re-installing the speaker, verify that no trembling sound is heard.</li> <li>When hearing a trembling sound again, replace the speaker with new one.</li> </ol>                                                                                                                                                                                                                                                              |
| 2   | Noise           | <ol style="list-style-type: none"> <li>Check if the wiring connector is connected normally. If not, reconnect the wiring connector.</li> <li>In case of radio static, check if there is a noise from cassette.</li> <li>When a noise is heard on turning radio, cassette and CD on, replace the speaker with new one.</li> </ol> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>NOTICE</b></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> |
|     |                 | <p>Inspection of the wiring connection between the battery and the speaker</p> <ol style="list-style-type: none"> <li>Before replacing the speaker, inspect the wiring connection between the battery and the speaker is normal.</li> <li>Check the supplying power to the speaker and the resistance, then inspect the sound quality.</li> </ol> <p>■ Specified impedance : 2 ~ 4Ω</p>                                                                                                                                                                                 |

3 Poor working



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

#### CAUTION

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



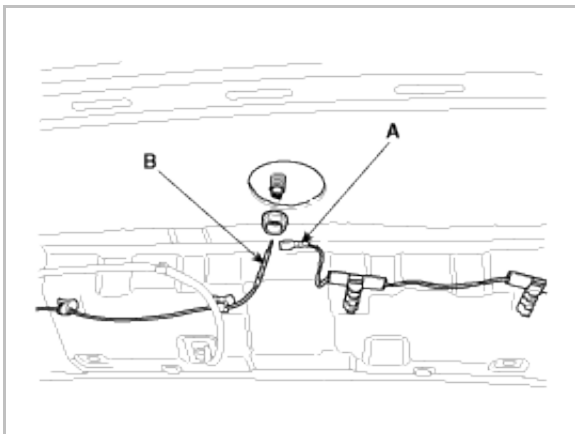
# Body Electrical System

## Audio - Antenna



## Replacement

1. Remove the rear roof trim (Refer to BD group-roof trim).
2. Disconnect the 1P connector (A) and antenna jack (B) from the roof antenna.



3. Remove the roof antenna after removing a nut.
4. Installation is the reverse of removal.

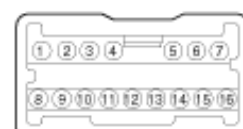
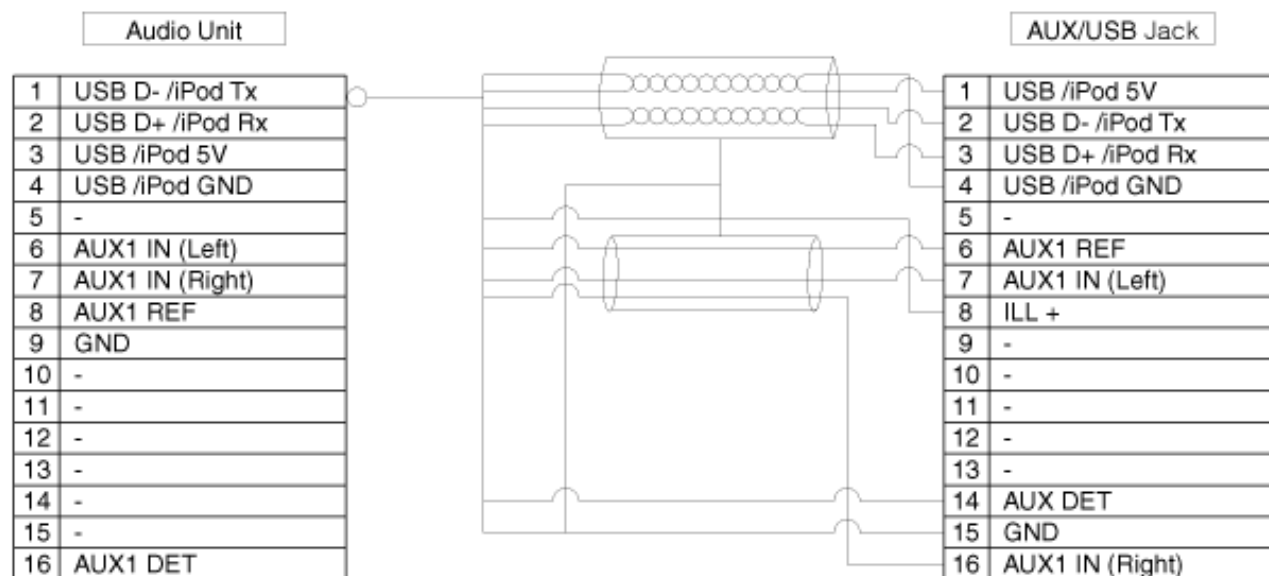


# Body Electrical System

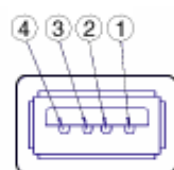
Audio - Auxiliary Jack



## Circuit Diagram



OUTPUT connector



USB INPUT

| DESCRIPTION |                     |      |
|-------------|---------------------|------|
| PIN NO.     | 2DIN<br>(USB, IPOD) | 1DIN |
| 1           | USB/IPOD_5V         | -    |
| 2           | USB D-/IPOD TX      | -    |
| 3           | USB D+/IPOD RX      | -    |
| 4           | USB/IPOD_GND        | -    |



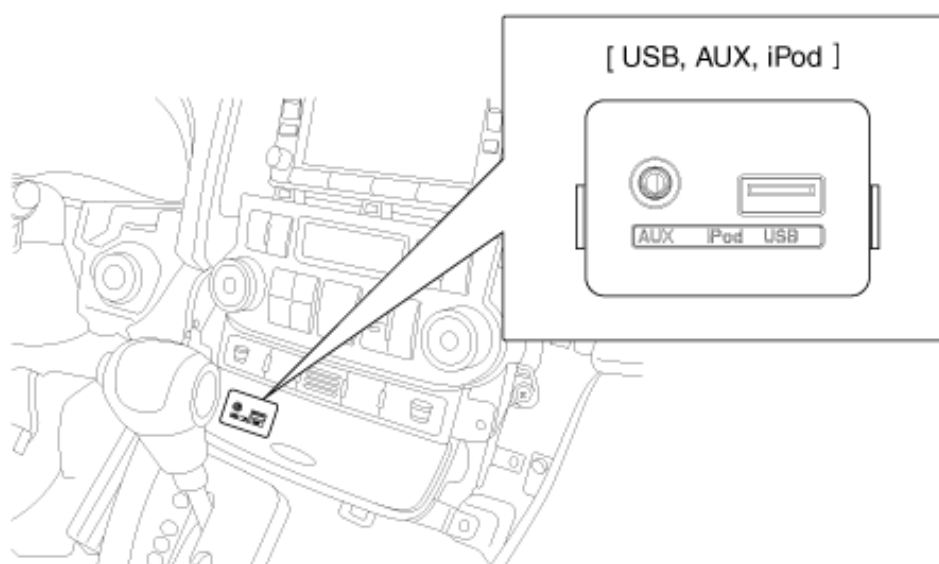
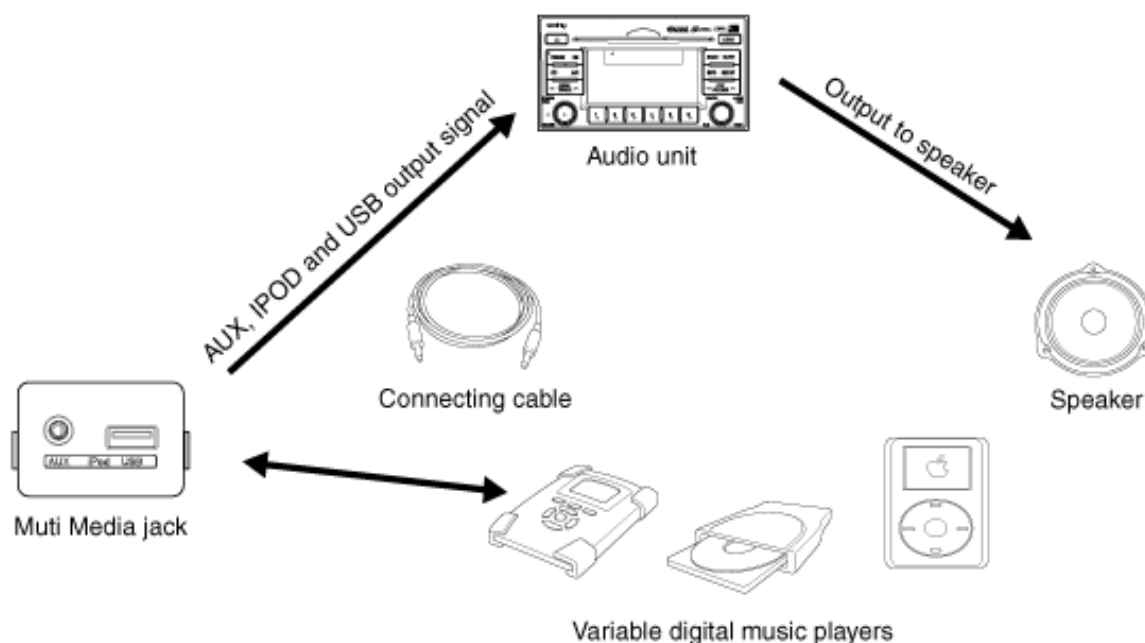
AUX INPUT

| DESCRIPTION |                     |                    |
|-------------|---------------------|--------------------|
| PIN         | 2DIN<br>(VIDEO,AUX) | 1DIN<br>(AUX ONLY) |
| 1           | AUX1_L_IN           | AUX1_L_IN          |
| 2           | AUX1_R_IN           | AUX1_R_IN          |
| 3           | VIDEO_IN            | AUX1_REF           |
| 4           | AUX1_REF            |                    |

## Description

The AUX, iPod and USB JACK on the center console is for customers who like to listen to external portable music players like the MP3, iPod, earphone, USB memory stick, CD player and etc., through the vehicle's sound system when it is linked to this jack. The customer has this added option.

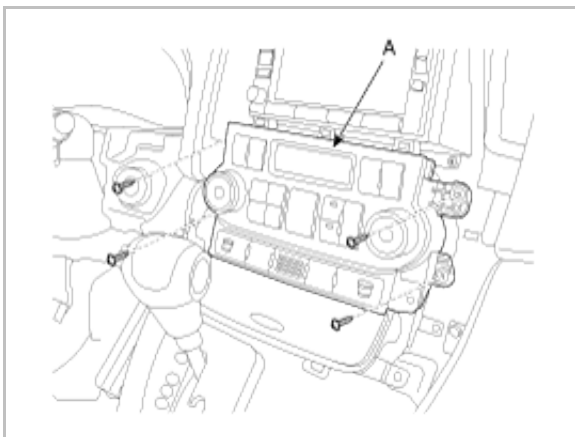
In case of distortions from media connected to the AUX source, the audio unit may not be defect but the output level of the used media does not match the specification of the AUX input.



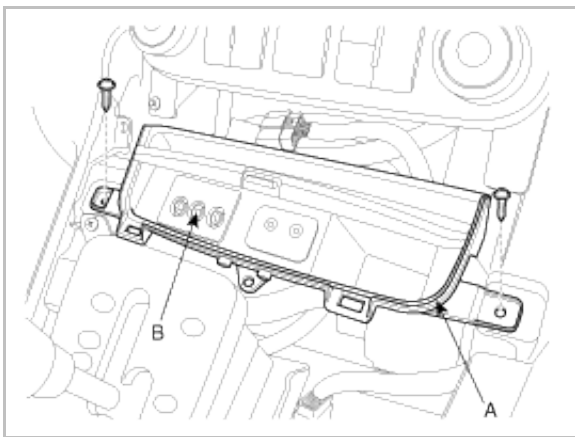


## Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel, console lower cover, center air vent, switches, tray and heater control panel (A). (Refer to the Body group-Crash pad)



3. Remove the AUX jack (B) after removing the tray(A) mounting screws.



## Installation

1. Install the AUX jack and tray.
2. Install the center facia panel, console lower cover, center air vent, switches, tray and heater control panel.
3. Connect the negative (-) battery terminal.

## Inspection

1. Disconnect the negative(-) battery terminal.
2. Disconnect the Multi Media Jack connector after from the floor console.





To inspect USB/IPOD port, check the voltage between NO.1 and 4 terminal of.

---

Standard value : 5V

---

To inspect AUX Jack, check the voltage between NO.14 terminal of Jack output connector and NO.4 terminal of USB/IPOD input port at AUX input.

---

Standard value : 5V

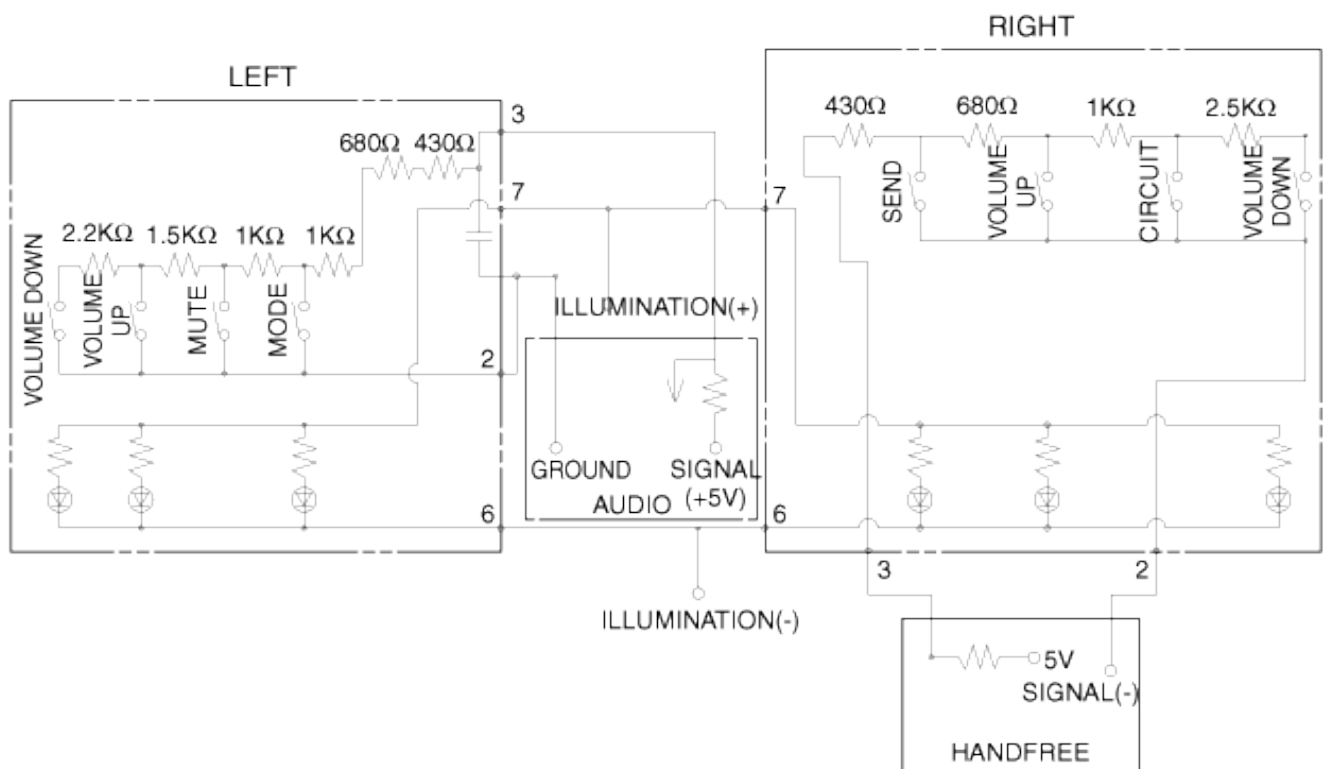
Standard value : 5V

---

# **Body Electrical System**

Audio - Audio Remote Control

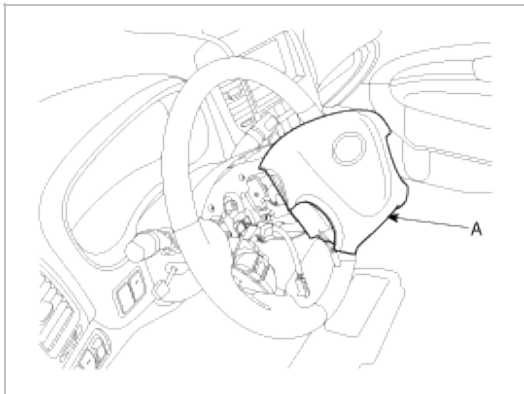
## Circuit Diagram



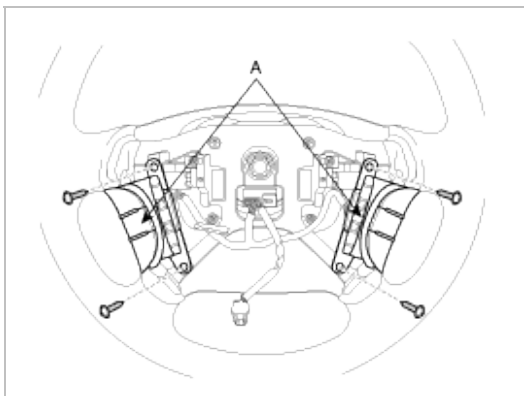


## Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the driver airbag module(A). (Refer to the airbag group).



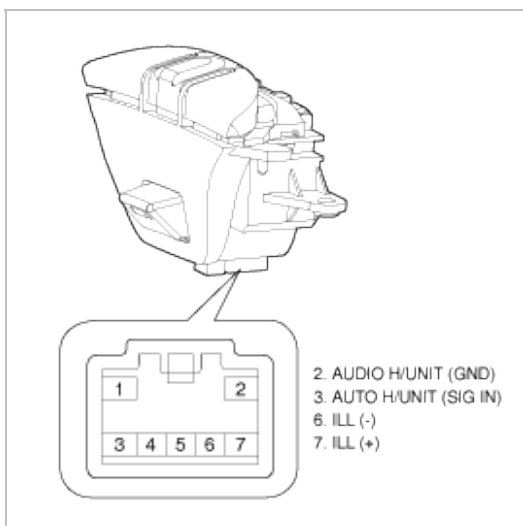
3. Remove the audio remote control switch (A) after removing the steering wheel remote control switch connector and 2 screws.



4. Installation is the reverse of removal.

## Inspection

1. Check for resistance between No.2 and No.3 terminals in each switch position.



| Function    | Resistance               | Output Voltage   |
|-------------|--------------------------|------------------|
| MODE        | 2.11 k $\Omega$ $\pm$ 5% | 1.5V $\pm$ 0.22V |
| MUTE        | 3.11 k $\Omega$ $\pm$ 5% | 2.0V $\pm$ 0.22V |
| VOLUME UP   | 4.61 k $\Omega$ $\pm$ 5% | 2.5V $\pm$ 0.22V |
| VOLUME DOWN | 5.81 k $\Omega$ $\pm$ 5% | 3.0V $\pm$ 0.22V |



## Troubleshooting

### Customer Complaint Analysis Check Sheet

|                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TROUBLE IN</b>                                                                                                                            | <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                                                                                                        |
| <b>TROUBLE OCCURS</b>                                                                                                                        | <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<br><input type="checkbox"/> Most of the time <input type="checkbox"/> Engine off                                                         |
| <b>TYPE OF TROUBLE</b>                                                                                                                       | <input type="checkbox"/> Will not play <input type="checkbox"/> Weak <input type="checkbox"/> Squealing noise <input type="checkbox"/> Eats tape<br><input type="checkbox"/> Display/illumination poor <input type="checkbox"/> CD skips & jumps <input type="checkbox"/> CD will not eject or insert<br><input type="checkbox"/> Others (Describe) : |
| <b>OTHERS</b>                                                                                                                                | <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 5 areas where a problem can occur: wiring harness, the radio, the CD player, antenna and speaker. Troubleshooting enables you to confine the problem to a particular area.

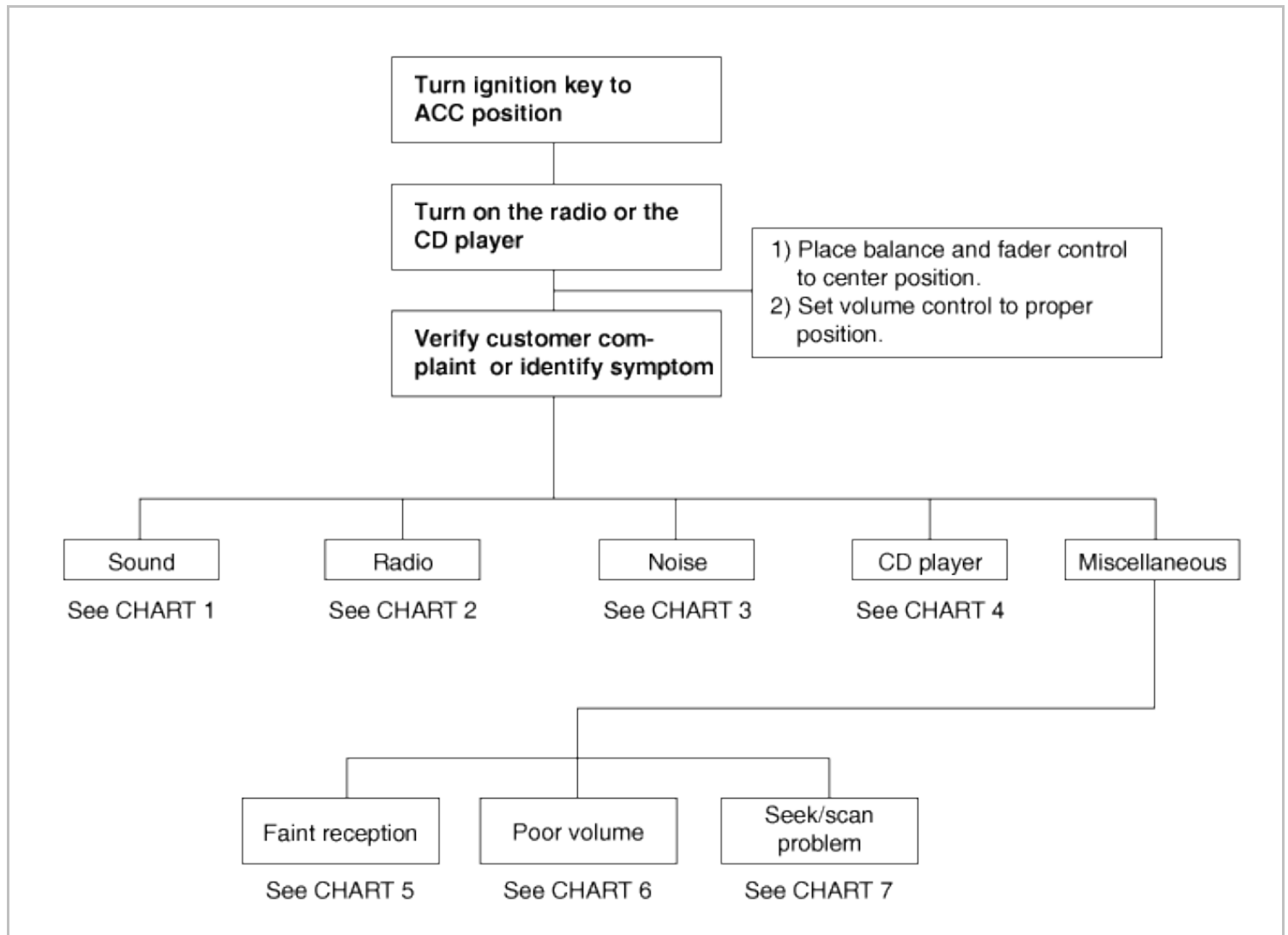


Chart 1

Sound

1. Radio and CD player have no sound at all.

All speakers

Illumination lights ?

No

Check audio fuse (10A)

O.K.

Blown

Replace fuse

Blown again

Check short circuit

Check fuse of radio unit.

Are all connectors behind radio and CD player properly connected ?

No

Connect properly

Yes

Is there voltage (12V) between terminal 11 of the audio connector and body ground ?

No

Check wire

Yes

Are radio and player properly connected ?

No

Reinstall properly

Yes

Check connection between output connector of radio and car.

O.K.

Replace radio unit

One speaker

Check speaker harness

N.G.

Repair

O.K.

Check speaker connector

N.G.

Connect correctly

O.K.

Temporarily install another speaker.

O.K.

Replace speaker

N.G.

Replace radio unit

## 2. CD player OK but no sound from radio

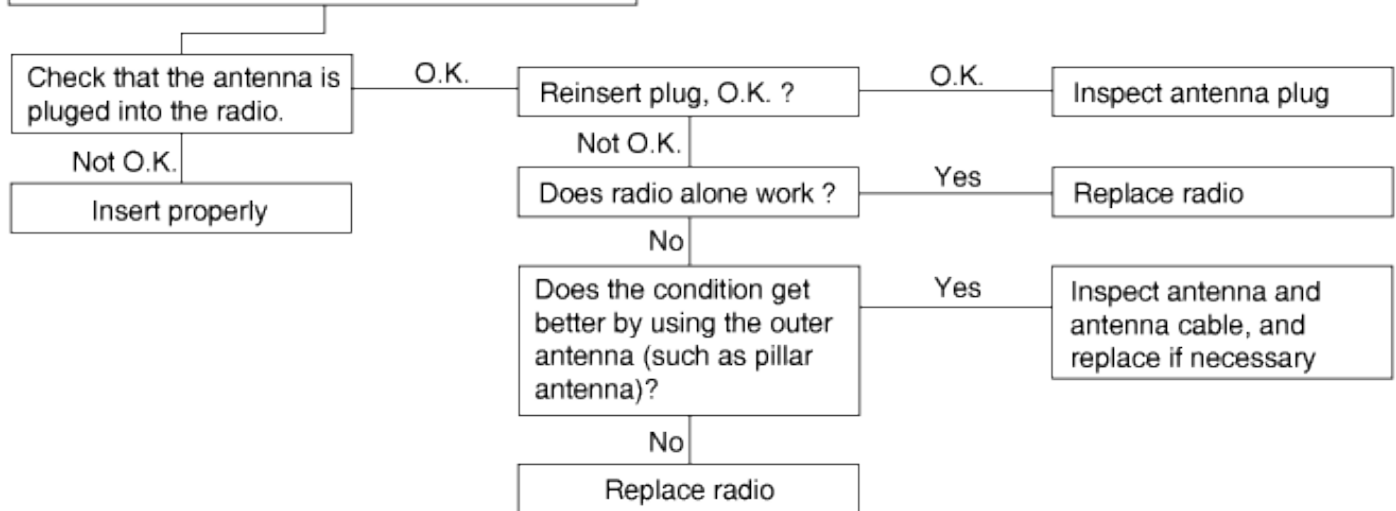


Chart 2

### Radio problem

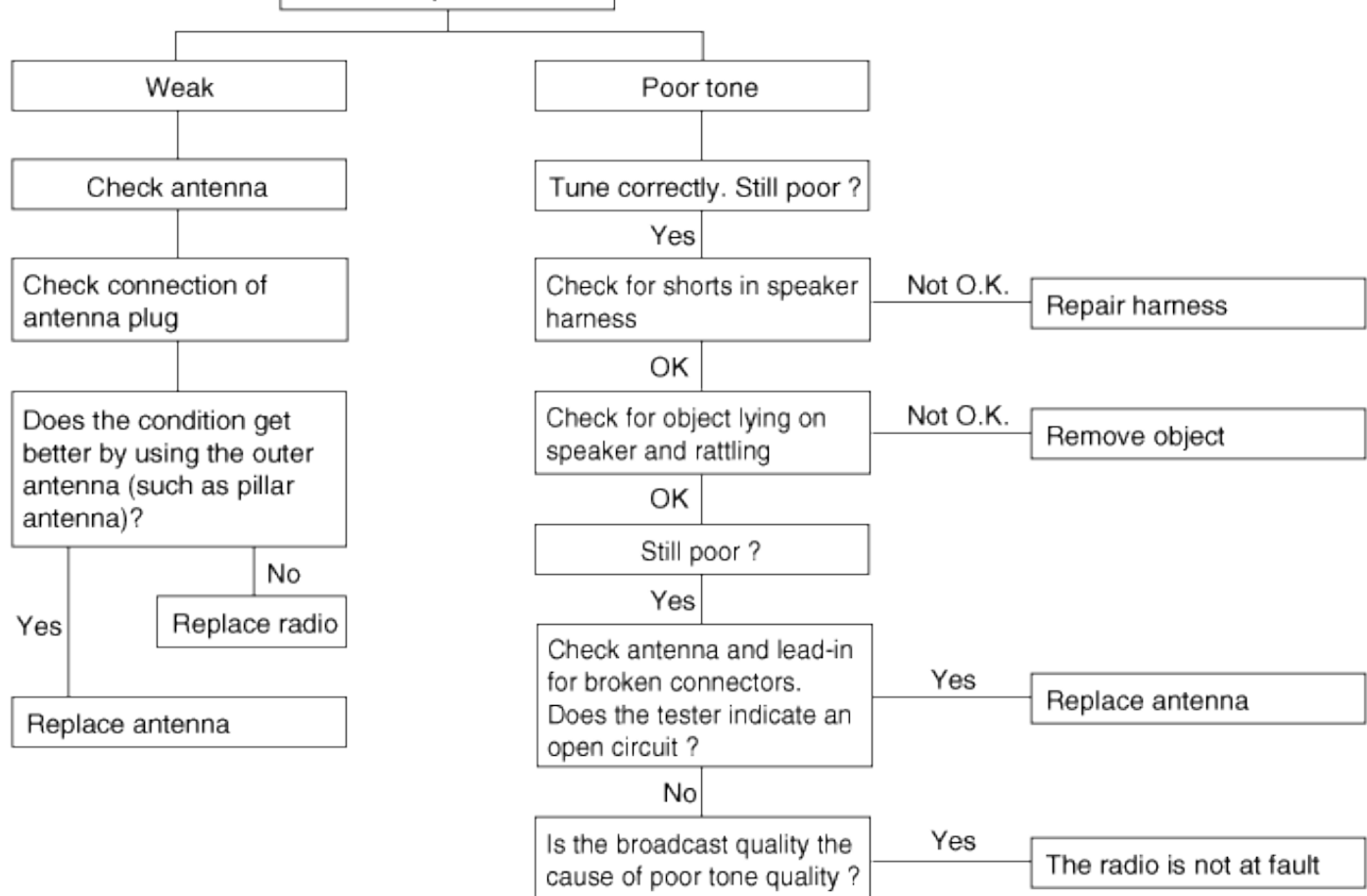


Chart 3



## 1. RADIO

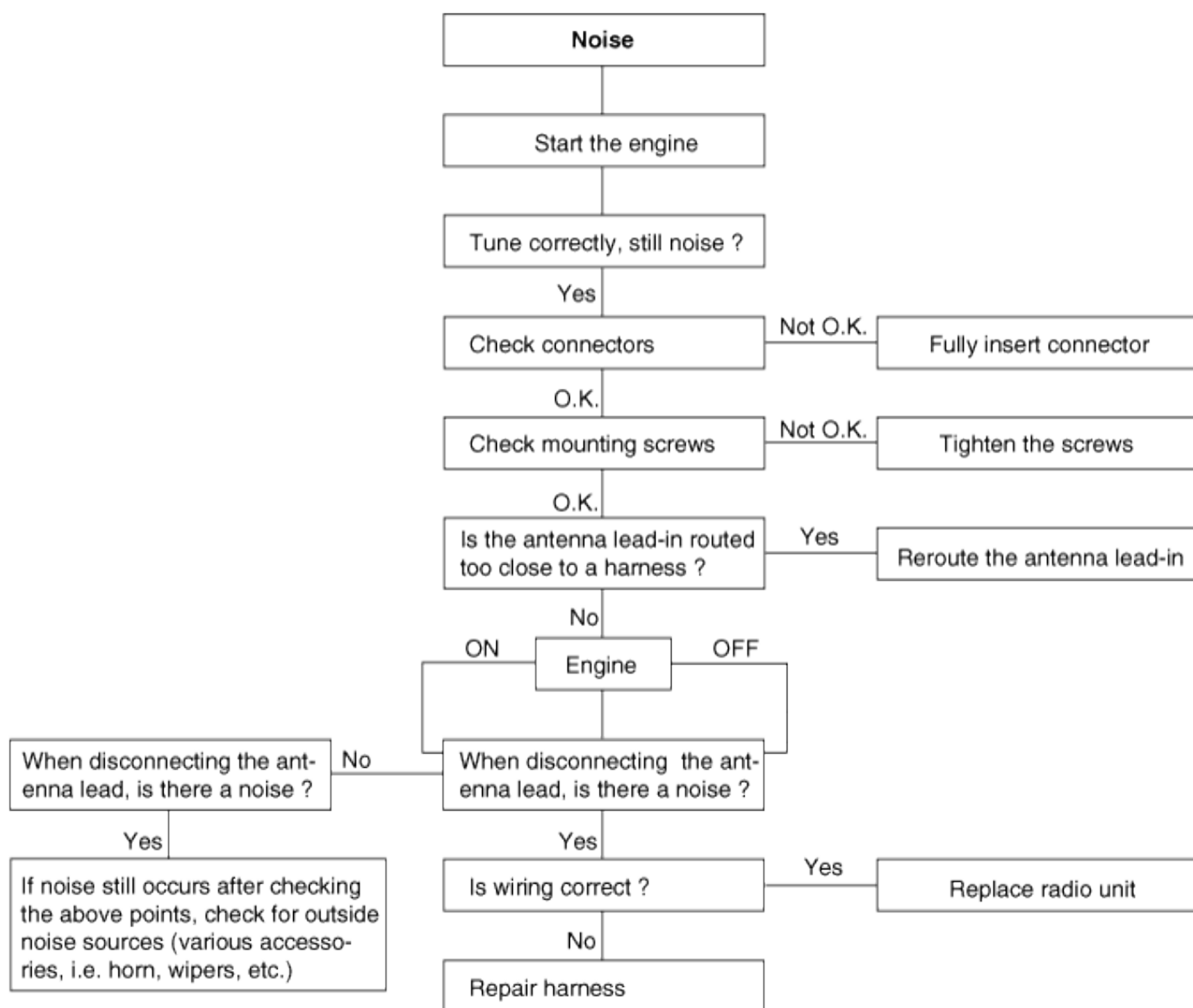
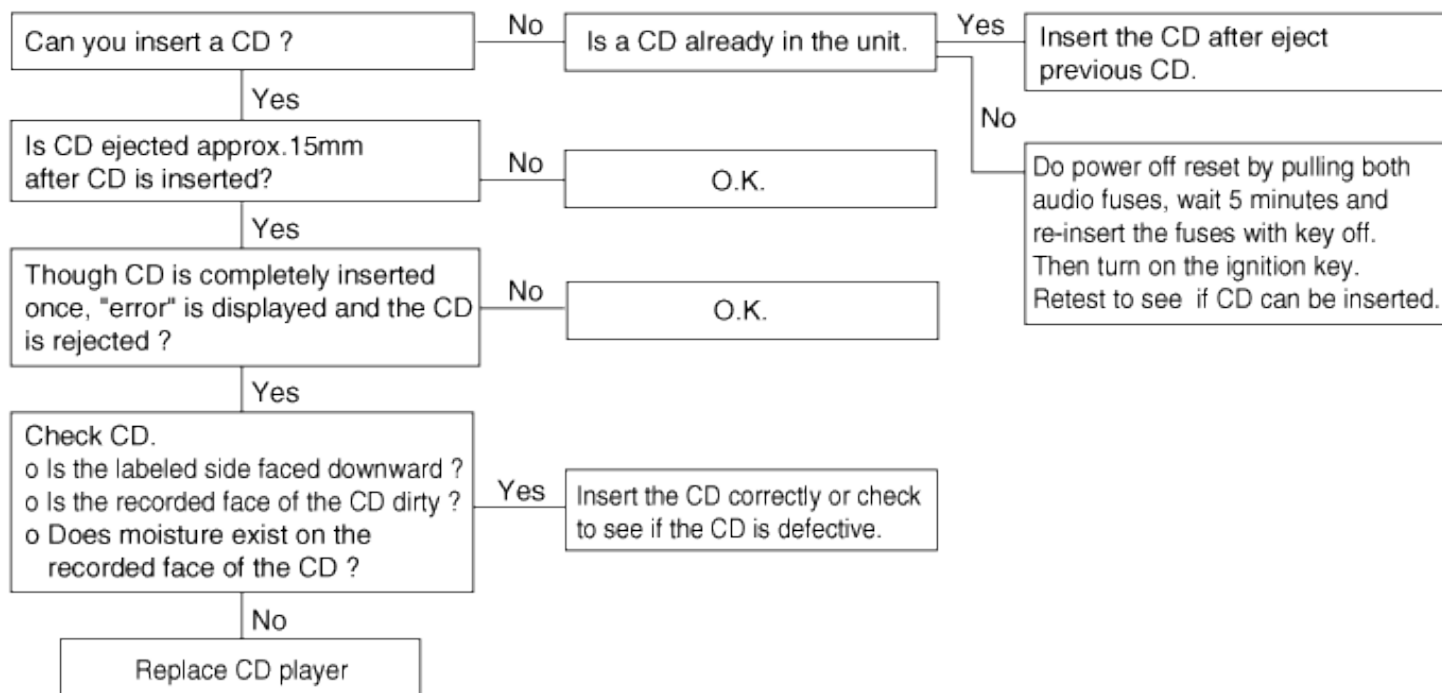
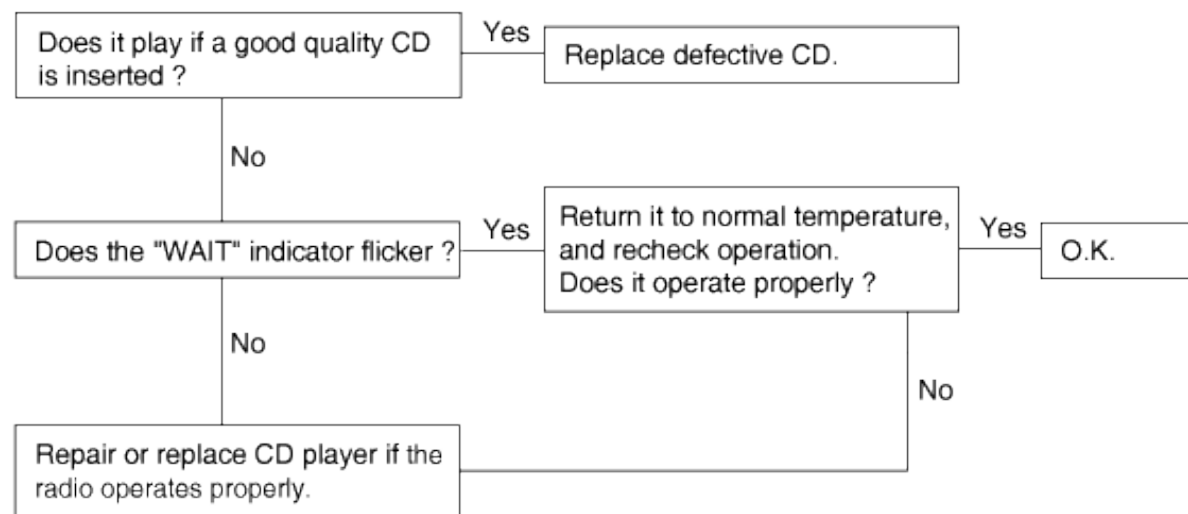


Chart 4

## 1. CD WILL NOT BE ACCEPTED

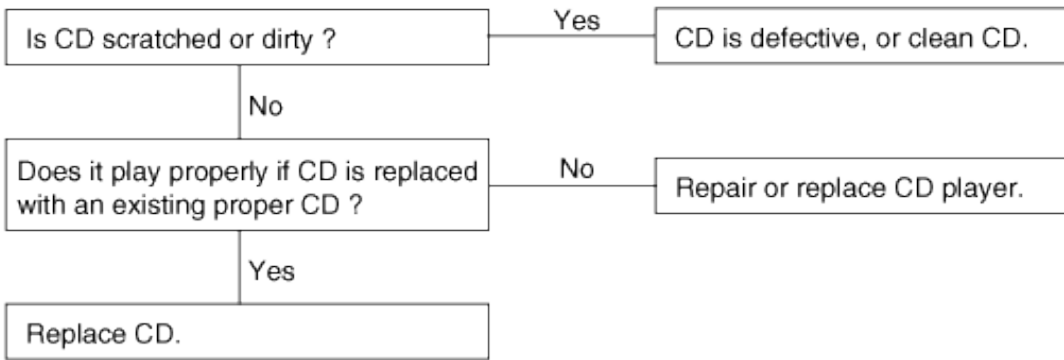


## 2. NO SOUND



### 3. CD SOUND SKIPS

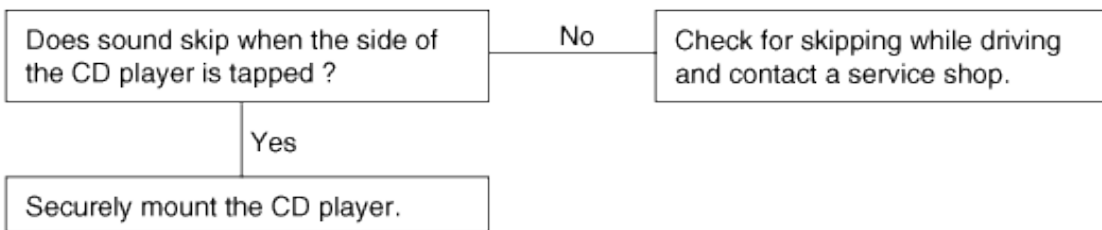
#### 1) Sound sometimes skips when parking.



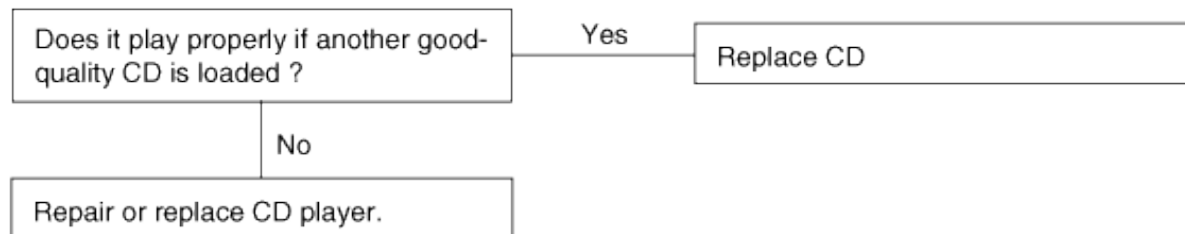
#### 2) Sound sometimes skips when driving.

(Stop vehicle, and check it.)

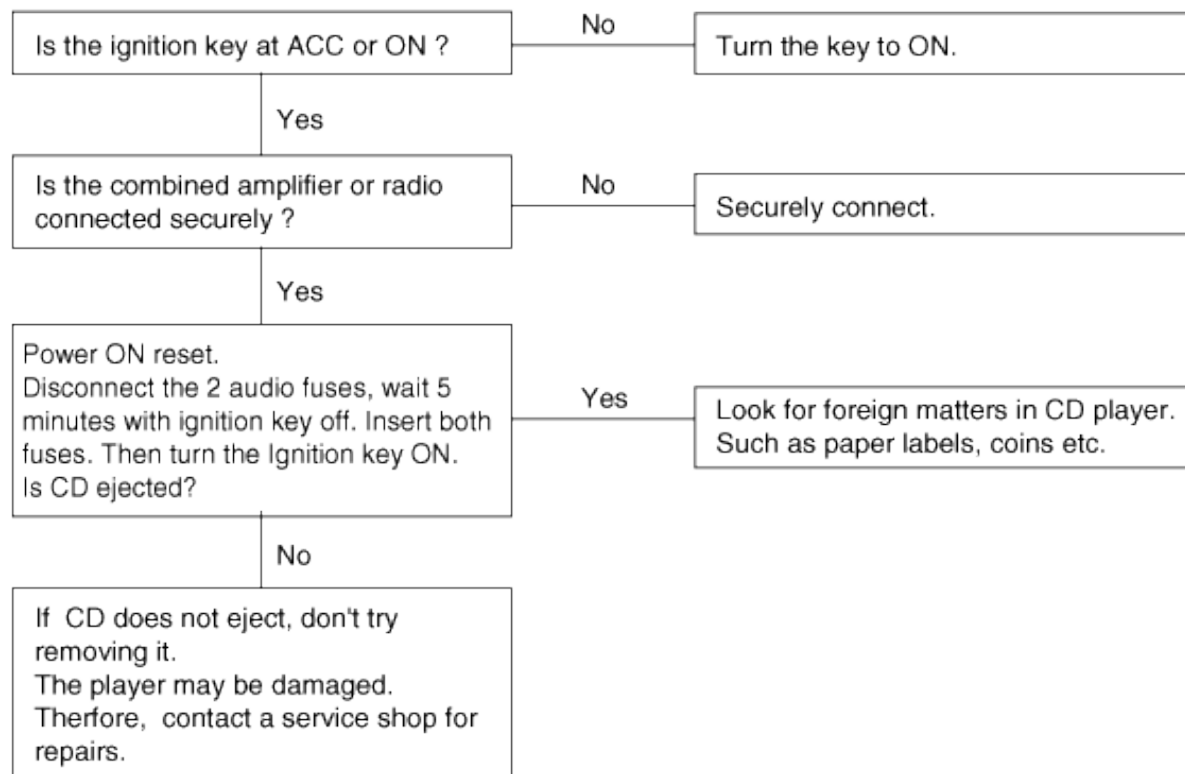
(Check by using a CD which is free of scratches, dirt or other damage.)



#### 4. SOUND QUALITY IS POOR



#### 5. CD WILL NOT EJECT



#### 6. NO SOUND FROM ONE SPEAKER

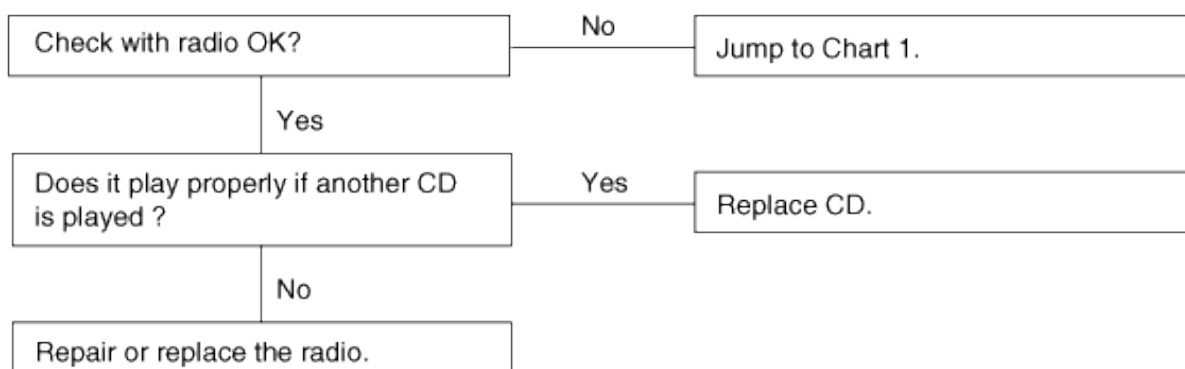


Chart 5

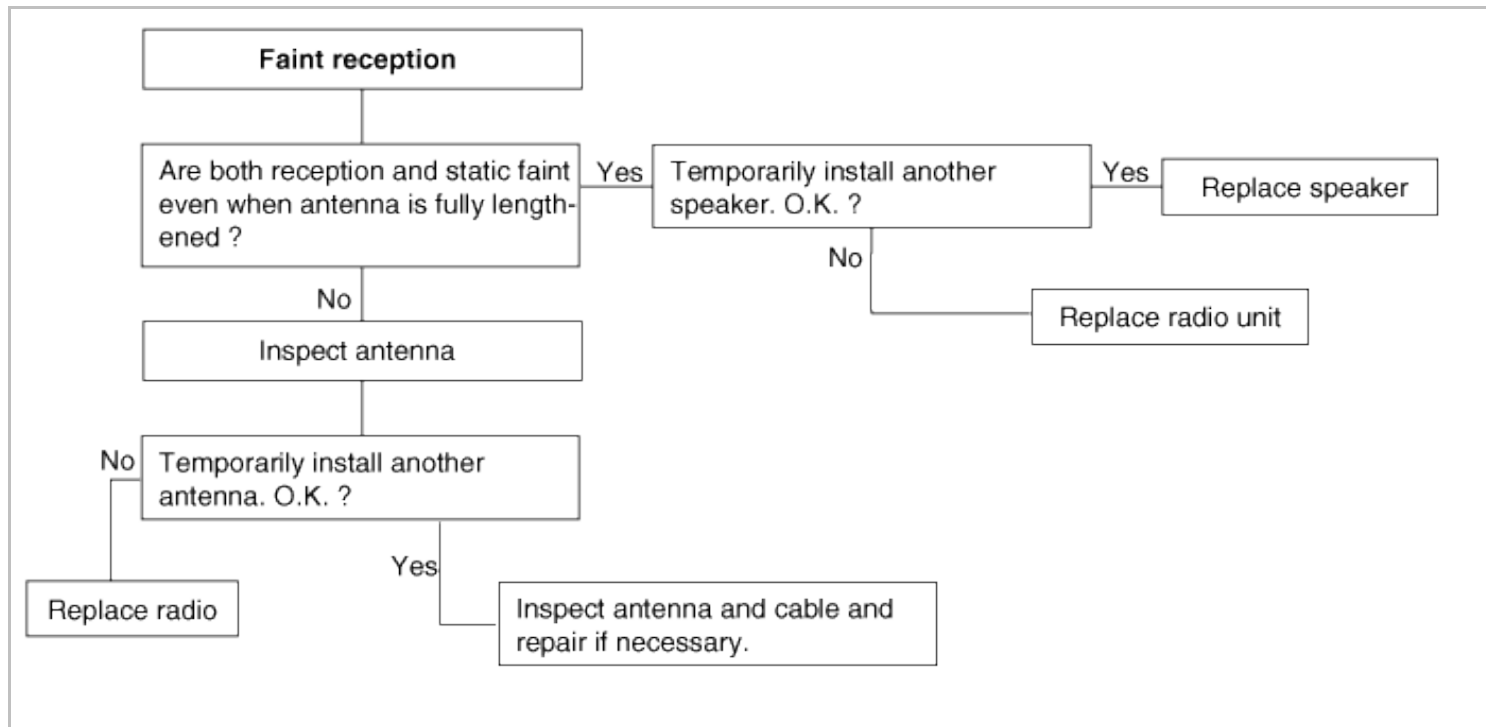


**Chart 6**

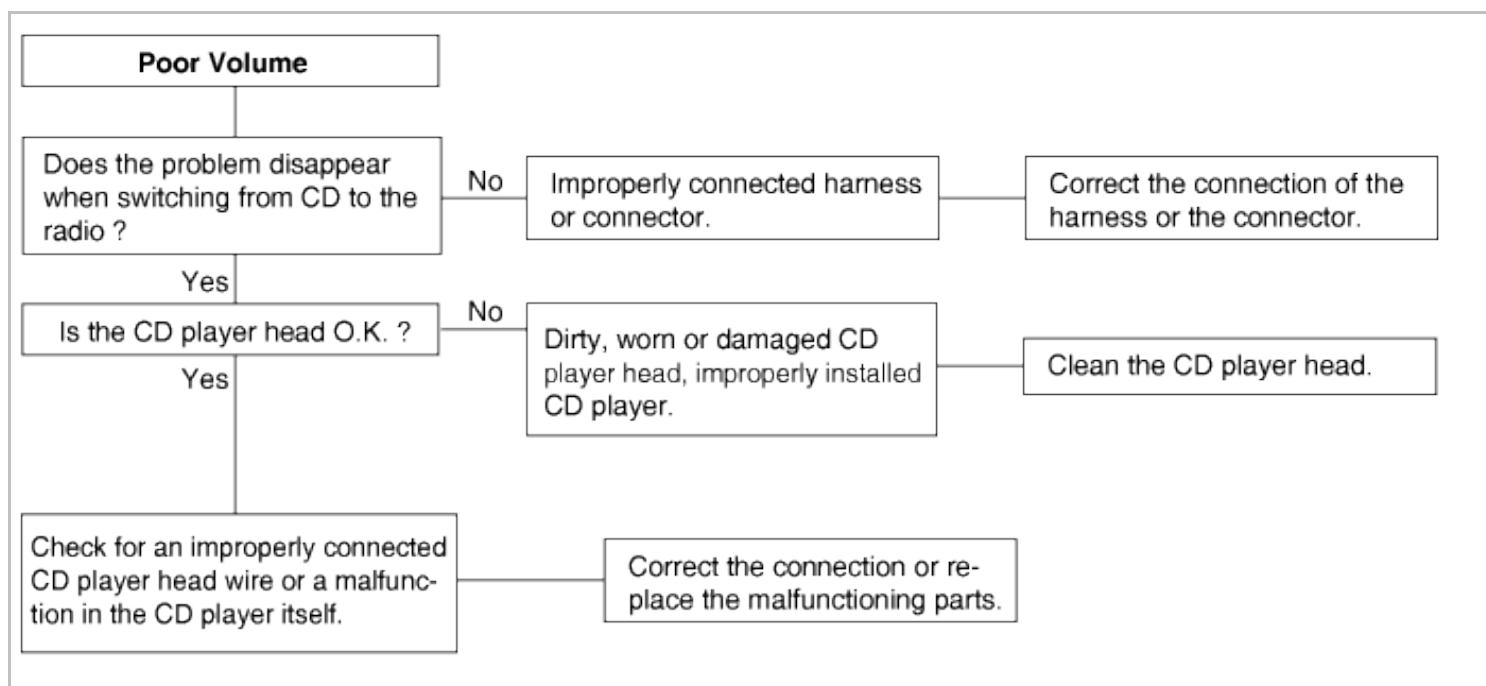


**Chart 7**

## Seek/scan problem

Is antenna lead-in properly installed ?

No

Install antenna properly

Yes

Check that the antenna is inserted completely into the antenna receptacle.

Not O.K.

Fully insert antenna

O.K.

Check antenna and lead-in for broken connectors. Tester indicates open circuit ?

Yes

Replace antenna

No

- Check antenna amplifier power ground.
- Check AM scan Vs FM scan
- Check antenna feeder cable connector in middle of cable.
- Check for clear reception.

No

Is it clear?

No

Replace radio unit.



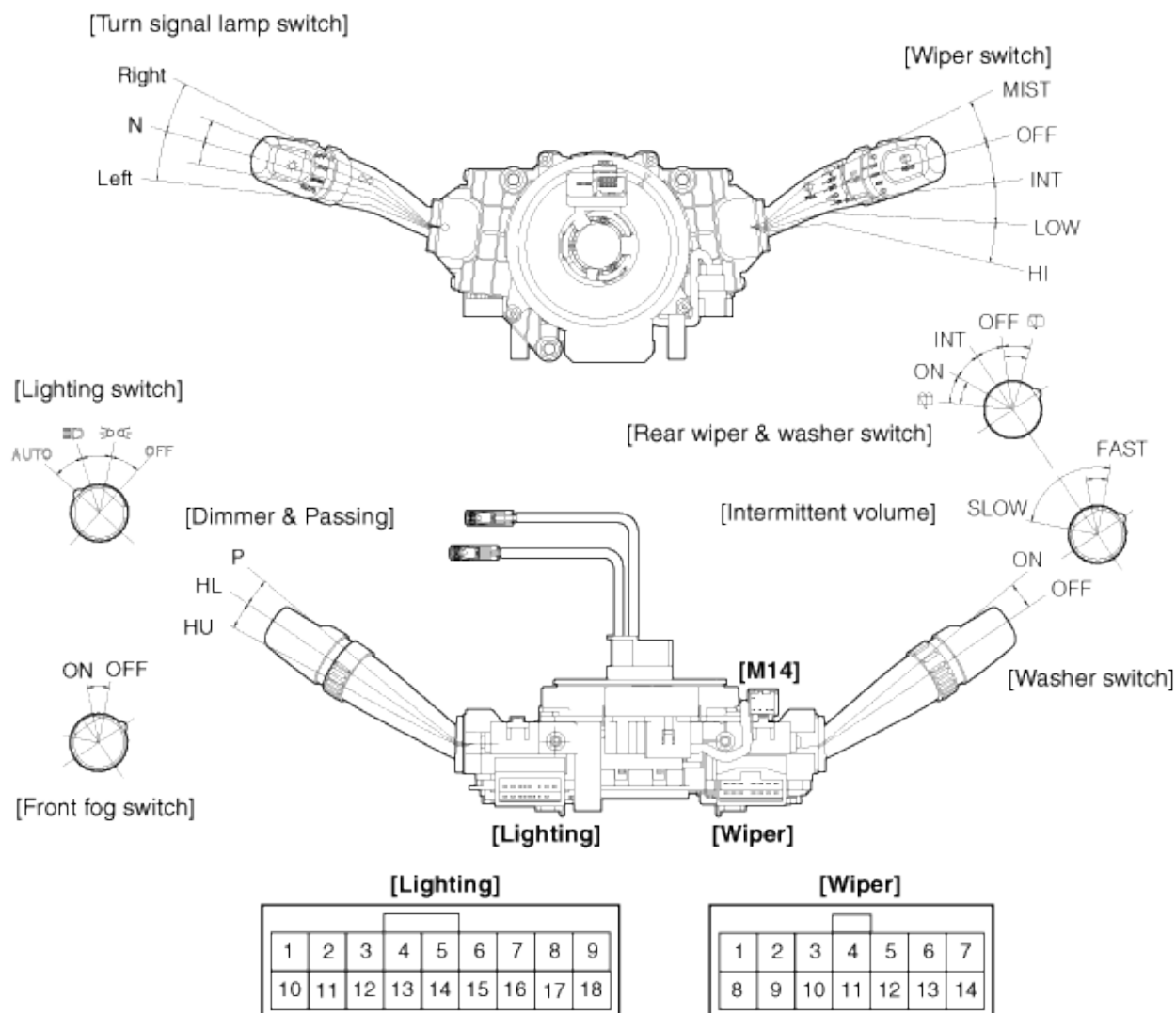
# Body Electrical System

## Multifunction switch



## COMPONENT LOCATION

[LHD]

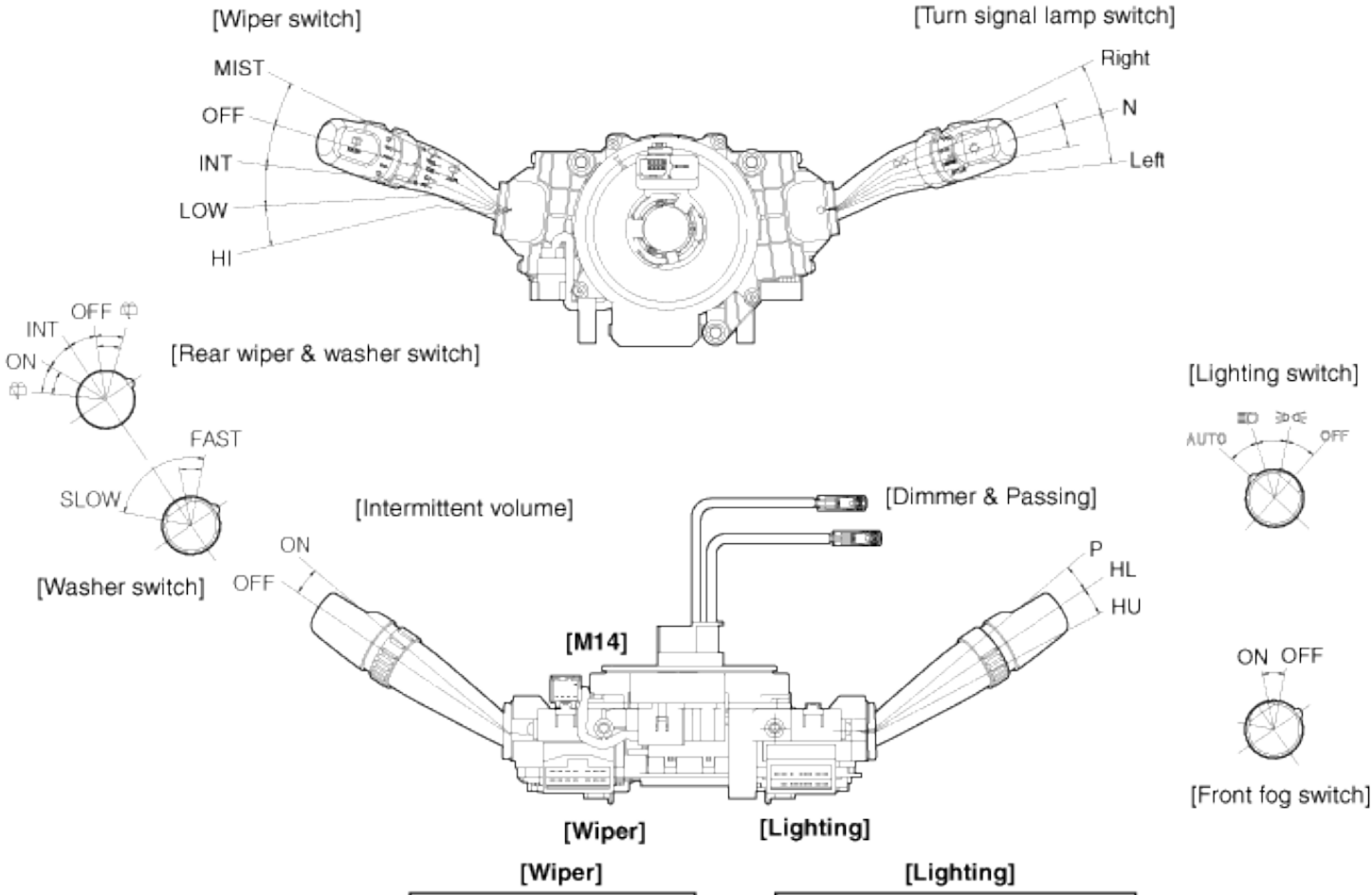


### Circuit connection

| Connector Name | Terminal No. | Description               | Connector Name | Terminal No. | Description                |
|----------------|--------------|---------------------------|----------------|--------------|----------------------------|
| Lighting       | 1            | Head lamp passing         | Wiper          | 1            | Wiper high speed           |
|                | 2            | Head lamp high beam power |                | 2            | Wiper low speed            |
|                | 7            | Turn signal lamp (RH)     |                | 3            | Wiper parking              |
|                | 8            | Flasher unit power        |                | 4            | Mist switch                |
|                | 9            | Turn signal lamp (LH)     |                | 5            | Wiper & washer power       |
|                | 10           | Head lamp low beam power  |                | 6            | Intermittent wiper         |
|                | 11           | Dimmer & passing ground   |                | 7            | Front washer switch        |
|                | 12           | Front fog switch          |                | 8            | -                          |
|                | 13           | Front fog switch ground   |                | 9            | Rear wiper & washer ground |
|                | 14           | Tail lamp switch          |                | 10           | Intermittent rear wiper    |
|                | 15           | Head lamp switch          |                | 11           | Rear wiper                 |
|                | 16           | Auto light switch         |                | 12           | Rear washer                |
|                | 17           | Lighting switch ground    |                | 13           | Intermittent wiper volume  |
|                | 18           | -                         |                | 14           | Intermittent wiper ground  |



[RHD]



| [Wiper] |   |    |    |    |    |    |
|---------|---|----|----|----|----|----|
| 1       | 2 | 3  | 4  | 5  | 6  | 7  |
| 8       | 9 | 10 | 11 | 12 | 13 | 14 |

| [Lighting] |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|
| 1          | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| 10         | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

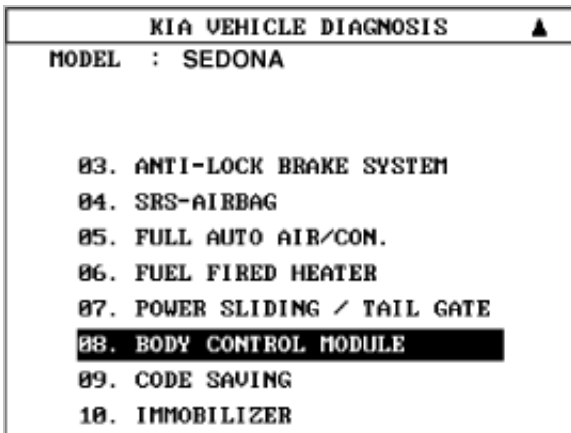
Circuit connection

| Connector Name | Terminal No. | Description                | Connector Name | Terminal No. | Description               |
|----------------|--------------|----------------------------|----------------|--------------|---------------------------|
| Wiper          | 1            | Front washer switch        | Lighting       | 1            | Turn signal lamp (RH)     |
|                | 2            | Intermittent wiper         |                | 2            | Flasher unit power        |
|                | 3            | Wiper & washer power       |                | 7            | Turn signal lamp (LH)     |
|                | 4            | Mist switch                |                | 8            | Head lamp high beam power |
|                | 5            | Wiper parking              |                | 9            | Head lamp passing         |
|                | 6            | Wiper low speed            |                | 10           | -                         |
|                | 7            | Wiper high speed           |                | 11           | Front fog switch          |
|                | 8            | -                          |                | 12           | Front fog switch ground   |
|                | 9            | Rear wiper & washer ground |                | 13           | Tail lamp switch          |
|                | 10           | Intermittent rear wiper    |                | 14           | Head lamp switch          |
|                | 11           | Rear wiper                 |                | 15           | Auto light switch         |
|                | 12           | Rear washer                |                | 16           | Lighting switch ground    |
|                | 13           | Intermittent wiper volume  |                | 17           | Dimmer & passing ground   |
|                | 14           | Intermittent wiper ground  |                | 18           | Head lamp low beam power  |

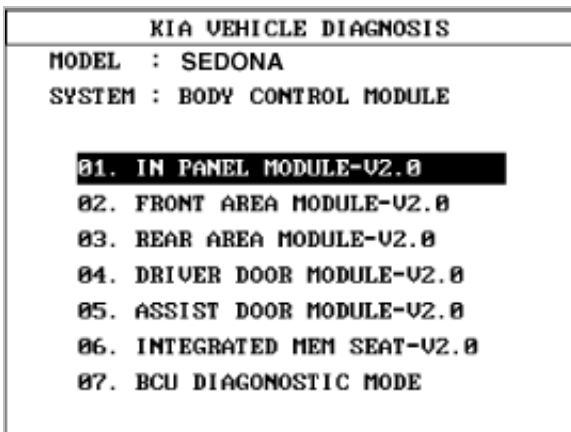


## INSPECTION

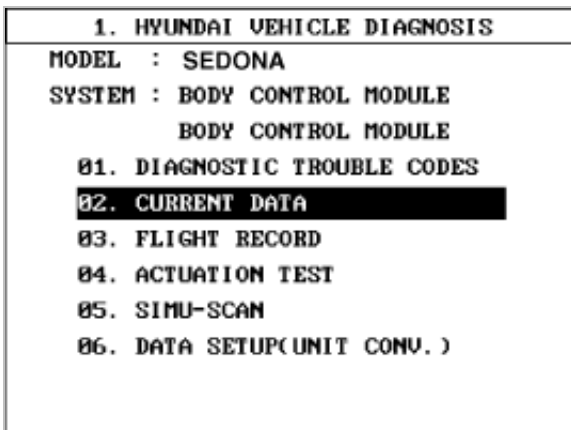
1. Multi function switch operates head lamps and wiper through LIN communication with BCM.
2. Check BCM input/output specification of multi function switch using the scan tool. If the specification is abnormal, replace the head lamp or wiper switch.
3. If diagnosis is required on the multi function switch, select "SEDONA" and "BCM".



4. Select "In panel Module".



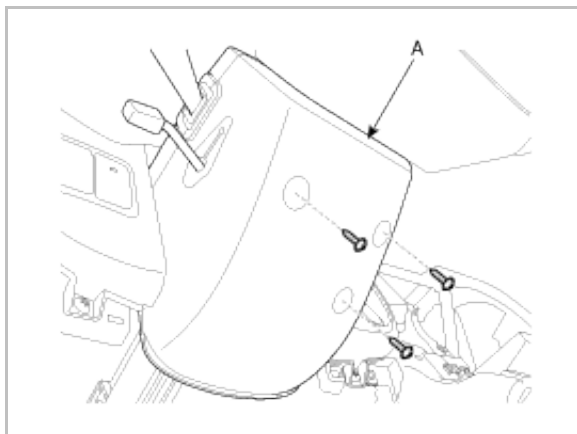
5. Select "Current data" and check the input/output condition of BCM.



| 1.2 CURRENT DATA    |       | 15/57 |
|---------------------|-------|-------|
| CLU Node STATE      | EMPTY | ▲     |
| AUTO HEAD LAMP      | OFF   | ■     |
| HEADLAMP LOW BEAM   | ON    |       |
| HEAD LAMP HIGH BEAM | OFF   |       |
| FRONT HEIGHT DN SW  | OFF   |       |
| FRONT FOG LAMP      | OFF   |       |
| BRAKE LAMP          | ON    |       |
| MAIN ROOM LAMP      | ON    | ▼     |
| FIX                 | PART  | FULL  |
| HELP                | GRPH  | BCRD  |

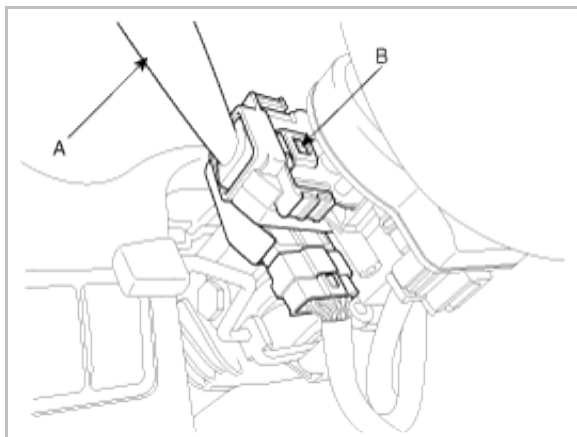
## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds (A) after removing 3 screws.

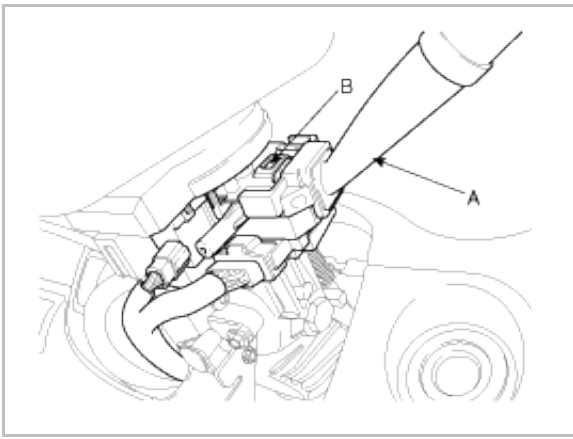


3. Disconnect the light switch(A) connector and pin(B).

### [LHD]

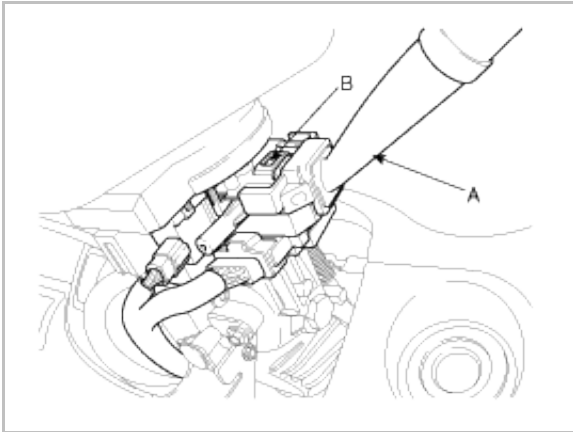


### [RHD]

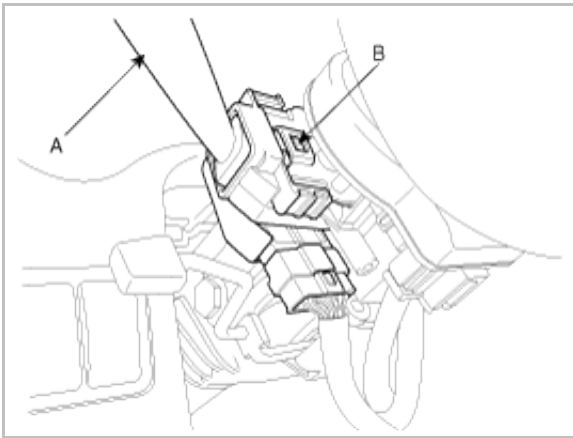


4. Remove the wiper switch (A) after disconnecting the connector and pin(B).

**[LHD]**



**[RHD]**



5. Installation is the reverse of removal.

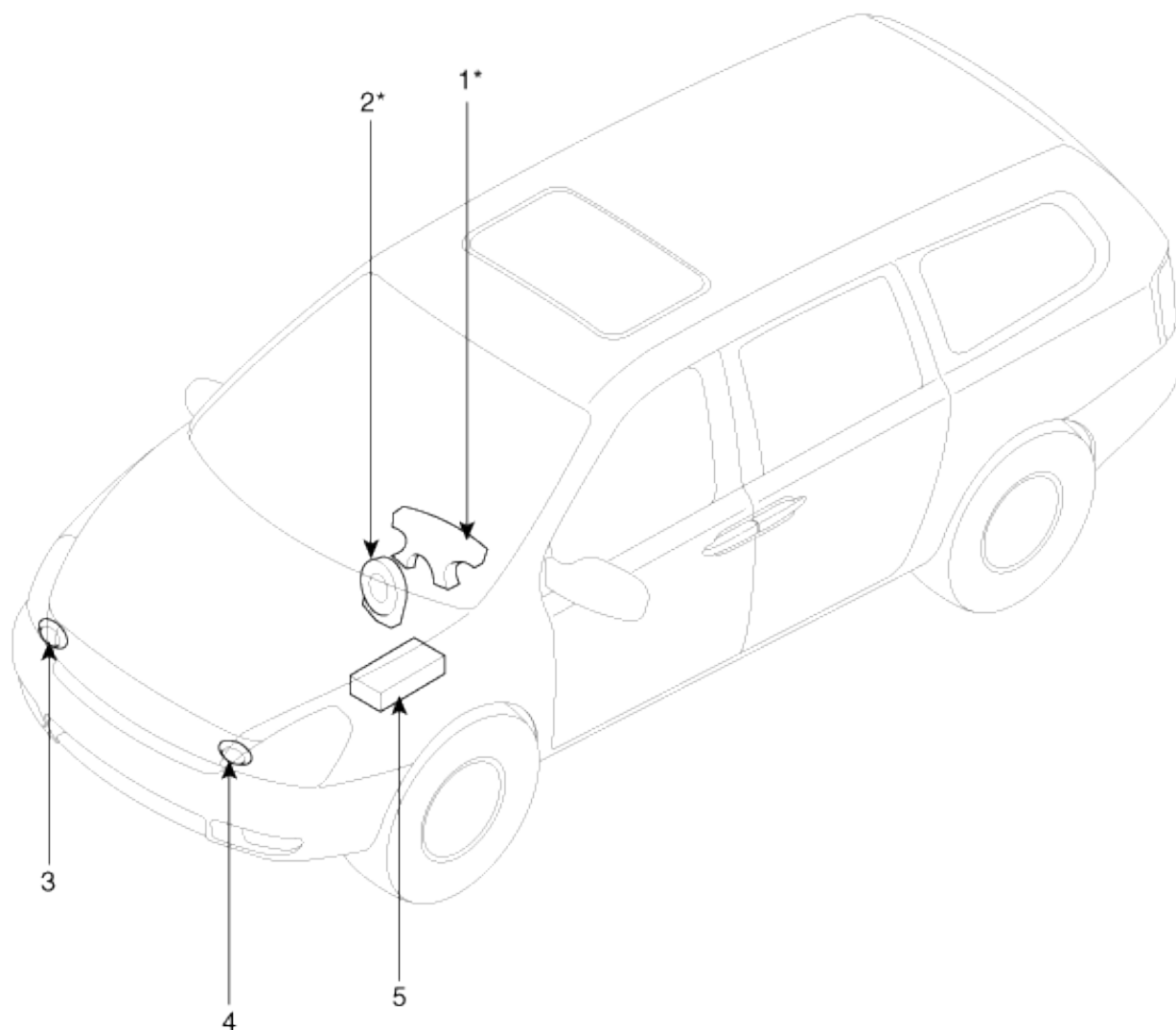


# Body Electrical System

Horn

## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



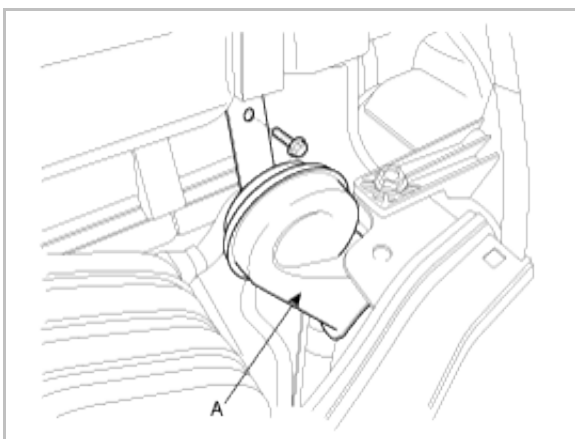
- 1. Horn switch
- 2. Clock spring
- 3. Horn (Low pitch)

- 4. Horn (High pitch)
- 5. Horn relay



## REPLACEMENT

1. Remove the bolt from the high pitch horn and the low pitch horn and disconnect the horn connector, then remove the horn.



2. Installation is the reverse of removal.

## INSPECTION

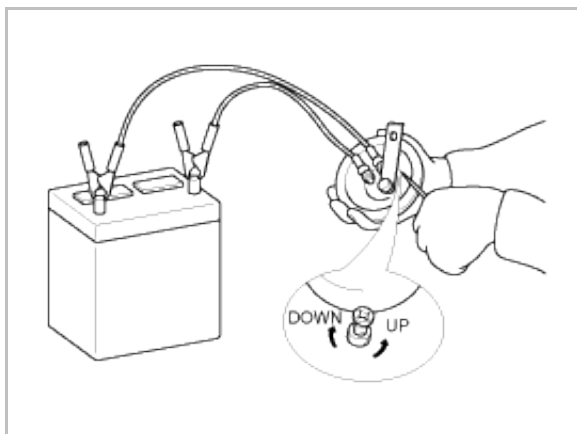
Test the horn by connecting battery voltage to the terminal 1, and ground terminal 2. The horn should make a sound. If the horn fails to make a sound, replace it.

## ADJUSTMENT

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

### NOTICE

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





# Body Electrical System

## Keyless Entry And Burglar Alarm





## DESCRIPTION

### KEYLESS ENTRY SYSTEM

The keyless entry system uses a handheld transmitter and IPM-mounted receiver to control door locks, alarm functions, Power Tail Gate (PTG) and Power Sliding Doors (PSD).

#### NOTICE

The receiver of the keyless entry system are built-in the IPM(In-Panel Module).

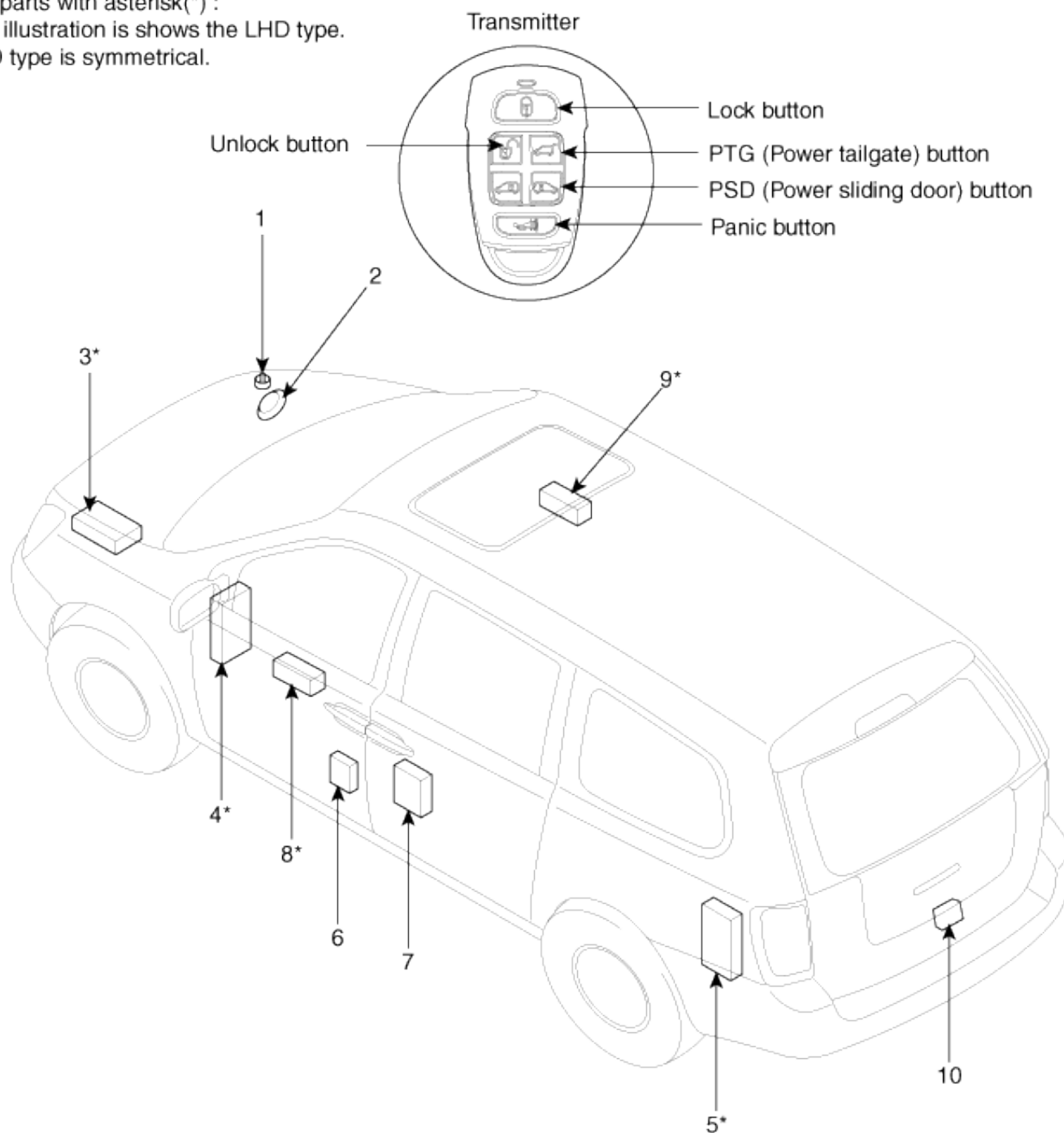


## COMPONENT LOCATION

The parts with asterisk(\*) :

This illustration is shows the LHD type.

RHD type is symmetrical.



1. Hood switch
2. Burglar horn
3. FAM (Front Area Module)
4. IPM (In-Panel Module)
5. RAM (Rear Area Module)

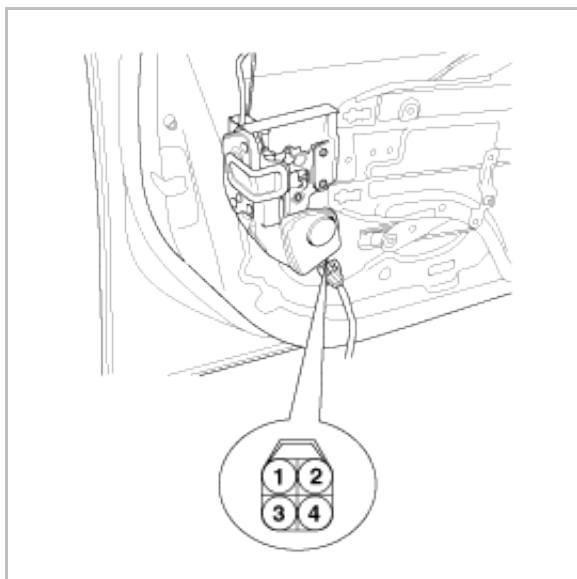
6. Front door lock actuator
7. Sliding door lock actuator
8. DDM (Driver Door Module)
9. ADM (Assistant Door Module)
10. Tailgate lock actuator



## INSPECTION

### FRONT DOOR LOCK ACTUATOR

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the 4P connector from the actuator.

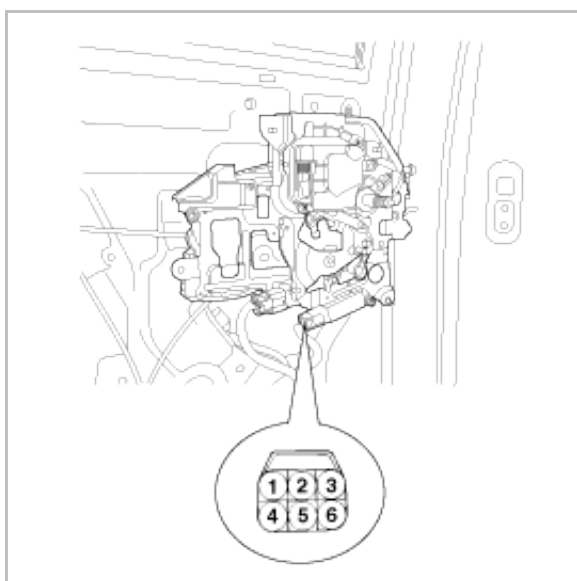


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Terminal    |        | 2 | 4 |
|-------------|--------|---|---|
| Position    | Lock   | ⊖ | ⊕ |
|             | Unlock | ⊕ | ⊖ |
| Front right | Lock   | ⊖ | ⊕ |
|             | Unlock | ⊕ | ⊖ |

### SLIDING DOOR LOCK ACTUATOR

1. Remove the sliding door trim panel. (Refer to the Body group - rear door)
2. Disconnect the 6P connector from the actuator.

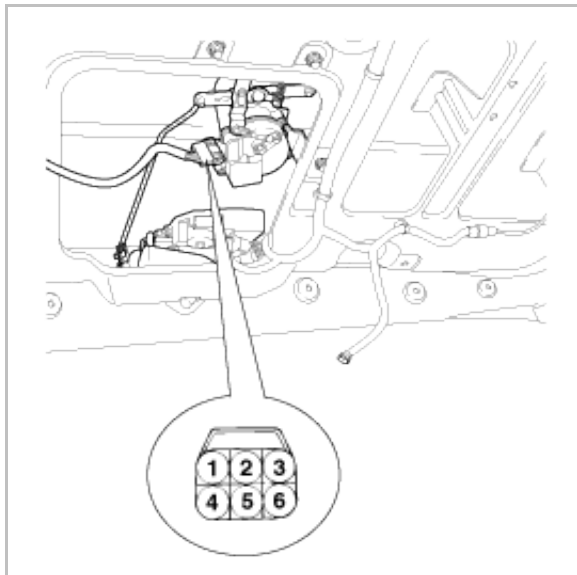


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Terminal |        | 1 | 2 | 3 |
|----------|--------|---|---|---|
| Position | Lock   |   | ⊕ | ⊖ |
|          | Unlock |   | ⊖ | ⊕ |
| Right    | Lock   | ⊕ | ⊖ |   |
|          | Unlock | ⊖ | ⊕ |   |

## TAILGATE LOCK ACTUATOR (5DOORS)

1. Remove the tailgate trim panel. (Refer to the Body group - tailgate)
2. Disconnect the 6P connector from the actuator.

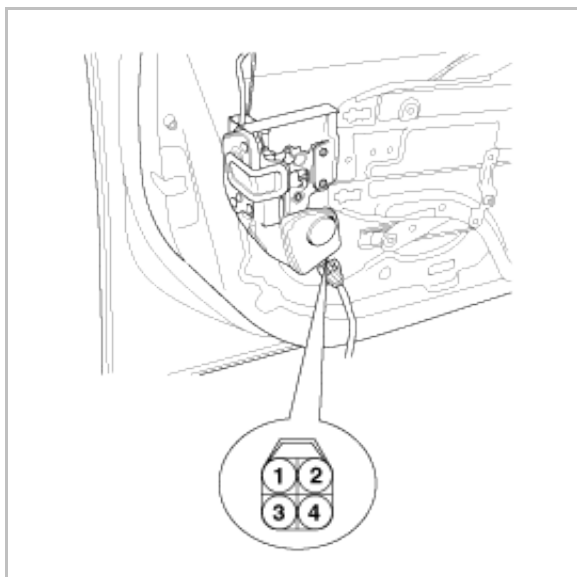


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Terminal |        | 4 | 6 |
|----------|--------|---|---|
| Position | LOCK   | ⊕ | ⊖ |
|          | UNLOCK | ⊖ | ⊕ |

## FRONT DOOR LOCK SWITCH

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the 4P connector from the actuator.

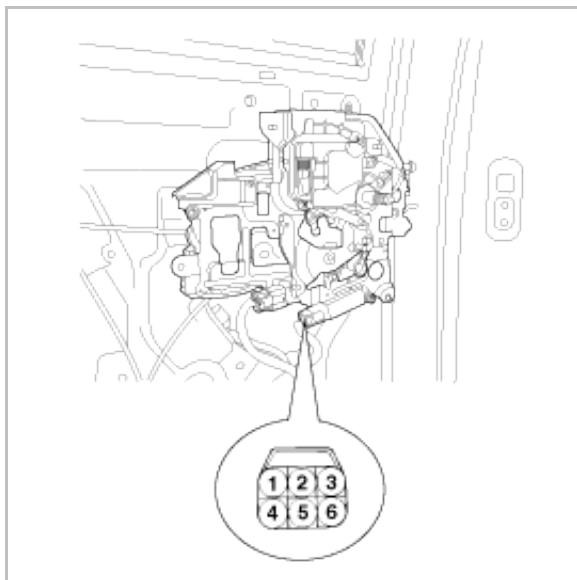


3. Check for continuity between the terminals in each switch position according to the table.

| Terminal    |        | 1 | 2 | 3 |
|-------------|--------|---|---|---|
| Position    | Lock   |   |   |   |
|             | Unlock |   |   |   |
| Front right | Lock   |   |   |   |
|             | Unlock |   |   |   |

## SLIDING DOOR LOCK SWITCH

1. Remove the sliding door trim panel. (Refer to the Body group - rear door)
2. Disconnect the 6P connector from the actuator.

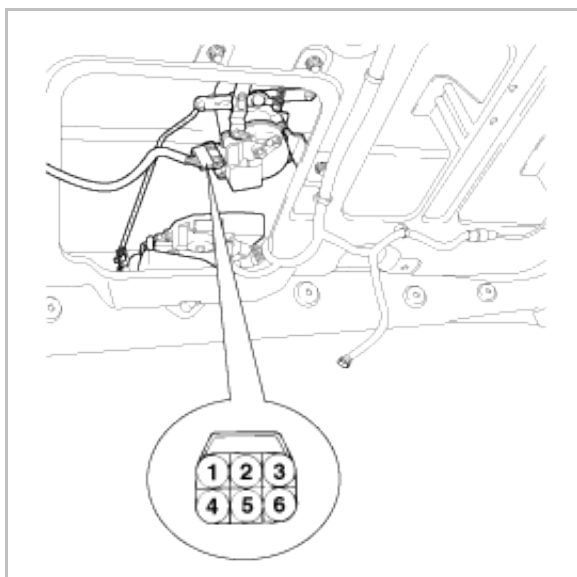


3. Check for continuity between the terminals in each switch position according to the table.

| Terminal |        | 4 | 5 | 6 |
|----------|--------|---|---|---|
| Position | Lock   |   |   |   |
|          | Unlock |   |   |   |
| Right    | Lock   |   |   |   |
|          | Unlock |   |   |   |

## TAILGATE LOCK SWITCH

1. Remove the tailgate trim panel. (Refer to the Body group - tailgate)
2. Disconnect the 6P connector from the actuator.

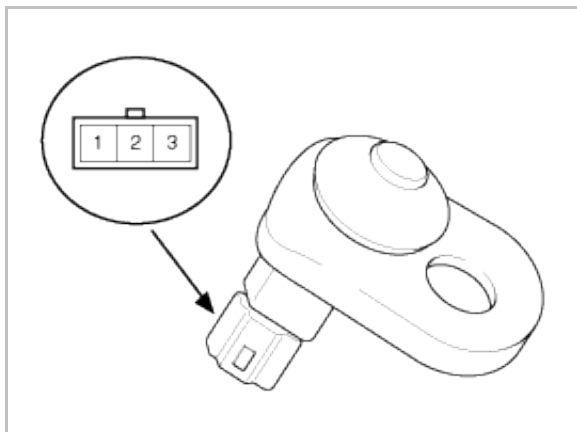


3. Check for continuity between the terminals in each switch position according to the table.

| Terminal | 1                                                                                 | 2 |
|----------|-----------------------------------------------------------------------------------|---|
| Position |                                                                                   |   |
| Unlock   |  |   |

## DOOR SWITCH

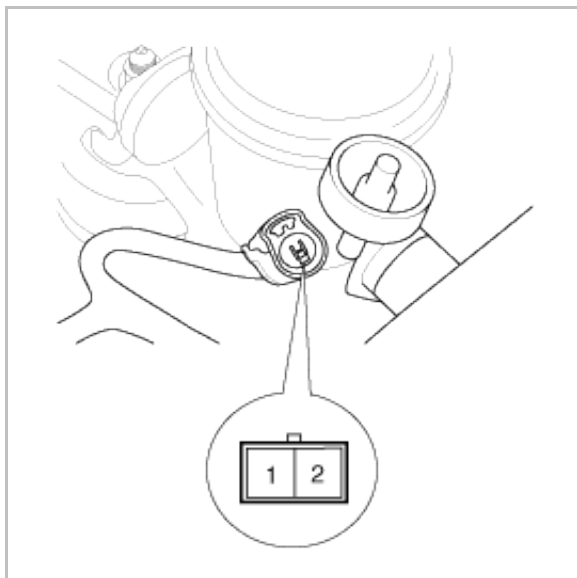
Remove the door switch and check for continuity between the terminals.



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

## HOOD SWITCH

1. Disconnect the connector from the hood switch.

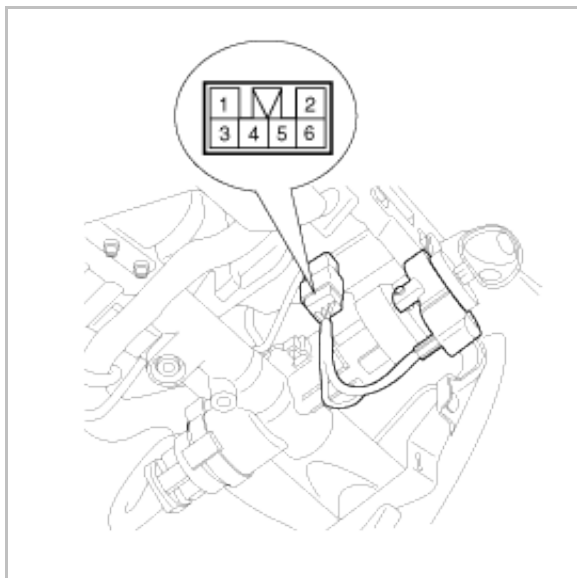


2. Check for continuity between the terminals and ground according to the table.

| Terminal          | 1                                                                                   | 2 |
|-------------------|-------------------------------------------------------------------------------------|---|
| Position          |                                                                                     |   |
| Hood open (Free)  |  |   |
| Hood close (Push) |                                                                                     |   |

## DOOR WARNING SWITCH

1. Remove driver's crash pad lower panel. (Refer to Body group - Crash pad)
2. Disconnect the 6P connector from the door warning switch.

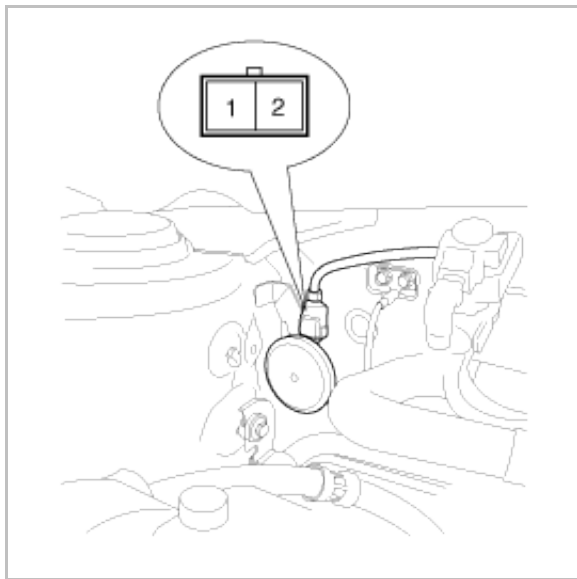


3. Check for continuity between the terminals in each position according to the table.

| Terminal<br>Key position | 5 | 6 |
|--------------------------|---|---|
| Insert                   |   |   |
| Removal                  |   |   |

### BURGLAR HORN

1. Remove the burglar horn after removing 2 bolts and disconnect the 2P connector from the burglar horn.
2. Test the burglar horn by connecting battery power to the terminal 1 and ground the terminal 2.



3. The burglar horn should make a sound. If the burglar horn fails to make a sound replace it.

**SPECIFICATION**

| Items                                     | Specifications                                                                                                                                 |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Keyless entry transmitter<br>Power source | Lithium 3V battery (1EA)                                                                                                                       |
| Transmissible distance                    | 30m or more                                                                                                                                    |
| Life of battery                           | 2 years or more (at 10 times per day)                                                                                                          |
| Button                                    | Door lock/unlock<br>PSD(Power Sliding Door) open/close (option)<br>PTG(Power Tail Gate) open/close (option)<br>Panic<br>Tailgate open (option) |
| Transmission frequency                    | 447 MHz (EUROPE, AUSTRALIA, MIDDLE EAST)<br>315.00 MHZ (GENERAL)                                                                               |





# Body Electrical System

## Keyless Entry And Burglar Alarm - Transmitter



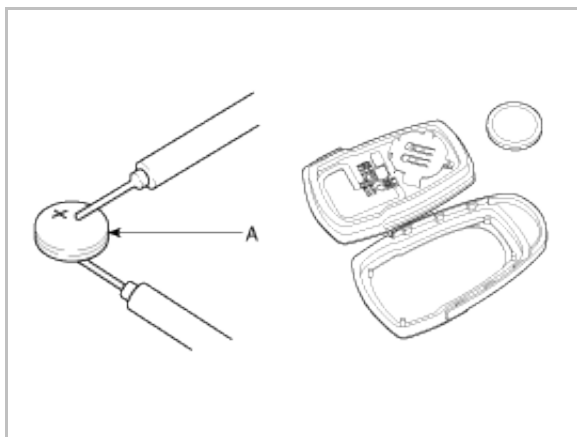
## INSPECTION

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 transmitter is failure, replace only the transmitter.

# **Body Electrical System**

BCM (Body Control Module) - Body Network  
System



## DESCRIPTION

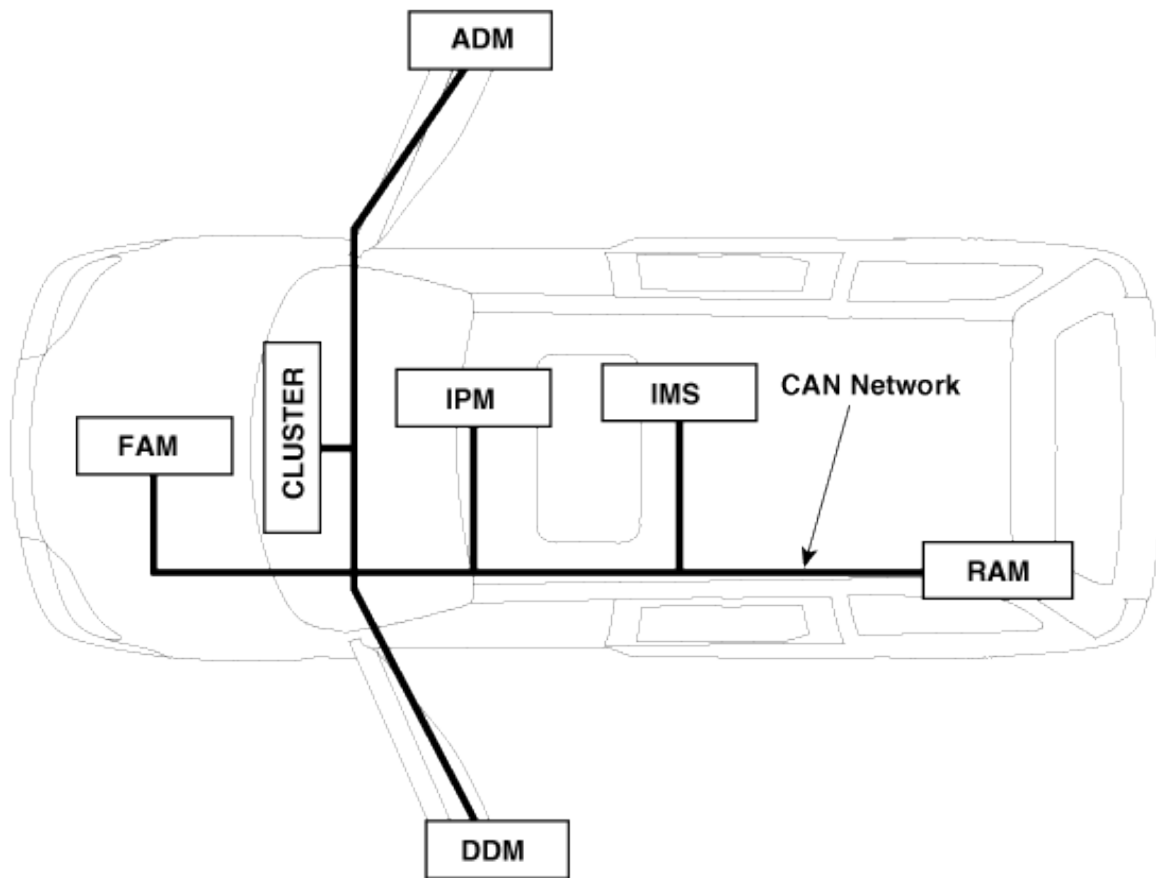
All modules are linked a low speed CAN network.

The input information for the modules is coming from both the CAN network and the hardware components (actuators and sensors).

- FAM (Front Area Module)
  - Headlamp low/high beam control (with DRL)
  - Park lamp control
  - Front fog lamp control
  - Front turn signal lamp control
  - Windshield wiper control
  - Windshield deicer
  - Diagnostics
- IPM (In-Panel Module)
  - RKE (Remote Keyless Control)
  - VAS (Voice Alarm System)
  - Ignition key hole illumination
  - Switch indicators control
  - Panel light control
  - Seat belt warning
  - Auto light/DRL control (Logic)
  - Windshield/Rear wiper control (Logic)
  - Turn and Hazard lamp control (Logic)
  - Central door lock (Logic)
  - Windshield deicer timer
  - Rear glass defog timer
  - Gateway for ISO-9141 (K-Line)
- RAM (Rear Area Module)
  - Tail lamp control
  - Turn and Hazard lamp control
  - Back up lamp control
  - Rear fog lamp control
  - Stop lamp outage detection
  - Sliding door power window/Quarter glass control
  - Room lamp control
  - Rear wiper control
  - Rear glass defog
  - Fuel filler door open solenoid control
- ADM (Assist Drive Module)
- DDM (Driver Drive Module)

## MODULE INTRODUCTION

FAM/IPM/RAM consists of a power board and an electronic board. The power board contains circuit protection devices and switching devices. The electronic board uses Intelligent Power Switching (IPS) for HS/LS load control, logic functions and CAN/K-Line communication. The power board and electronic board are connected with pin blocks for the Front Area Module (FAM) and VCD (Variable Connection Displacement) for the In-Panel Module (IPM) and the Rear Area Module (RAM).



## Functions

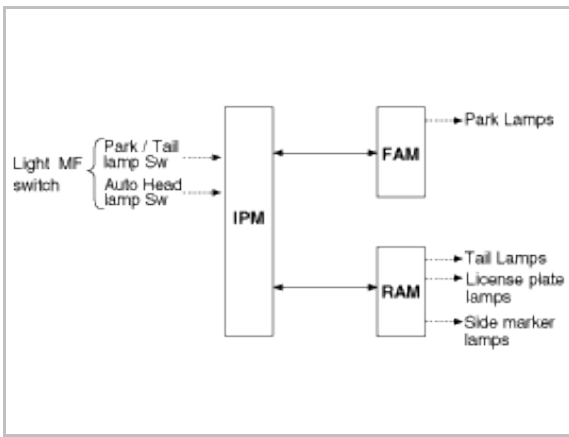
### Exterior Lighting Functions

The exterior lighting function has to provide the lighting and signalling of the vehicle; it monitors different available lights in front or at the back of the vehicle:

- Park and Tail lamps (with Side marker lamps),
- License plate lamps,
- Head lamps Low Beam,
- Head lamps High Beam,
- Front and Rear fog lamps (with the Rear fog lamp switch indicator),
- Stop lamps,
- Backup lamps,
- Turn signal and side repeater lamps.

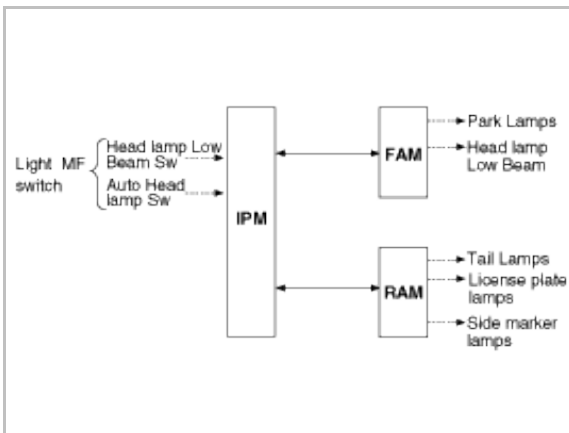
### Park/tail Lamps Function

1. Necessary conditions to switch ON :
  - A. By putting the Head lamp switch in position 'Park and Tail lamp' or 'Head lamp Low Beam' or Auto light activation or DRL activation
2. Necessary conditions to switch OFF :
  - A. If they are released by the Head lamp switch (Auto light function deactivated) and if DRL function is deactivated
  - B. If the Auto light function is active but the Auto light Sensor signal status is OFF or Battery Saver function is active.
3. Functional diagram



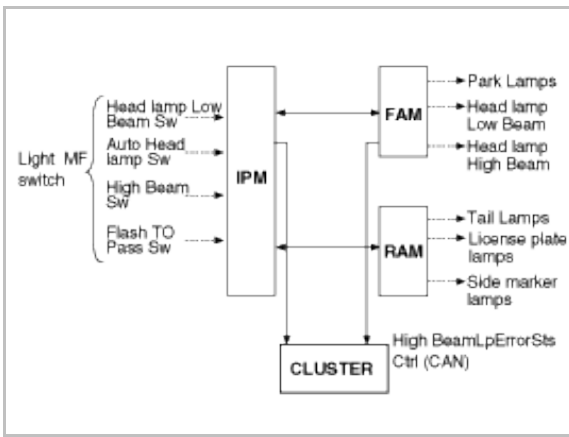
## Head Lamps Low Beam Function

1. Necessary conditions to switch ON :
  - A. By putting the Head lamp switch in position 'Head lamp Low Beam' or Auto light activation or DRL activation.
2. Necessary conditions to switch OFF :
  - A. If they are released by the Head lamp switch (Auto light function deactivated) and if the DRL function is deactivated
  - B. If the Auto light function is active but the Auto light sensor status is not 'HL ON'.
3. Functional diagram



## Head Lamps High Beam Function

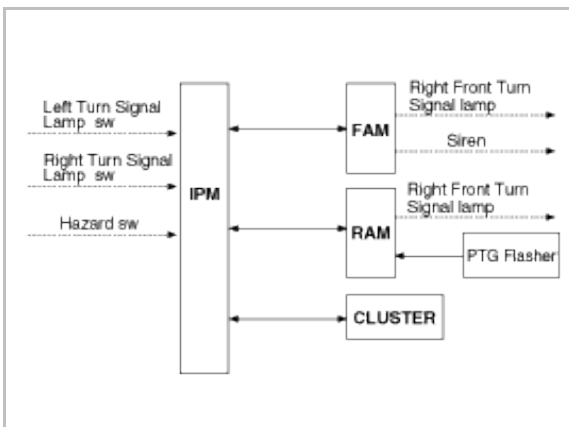
1. Necessary conditions to switch ON :
  - A. By pushing down the High Beam lever switch if
    - the Head lamp switch is in position 'Head lamp Low Beam' or the Head lamps Low Beam have been turned ON by the Auto light function.
  - B. By pulling the High Beam lever switch toward the driver (Flash to pass activation)
  - C. By the DRL function activation for Canada.
2. Necessary conditions to switch OFF :
  - A. By pulling back the High Beam lever switch (manual reset by the driver) or
  - B. If the Head lamps Low Beam are turned OFF or if the Auto light function is active but the Auto light Sensor signal status is not 'HL ON') or
  - C. By releasing the Flash To Pass activation and
  - D. If the DRL function is deactivated for Canada.
3. Functional diagram



## Turn Signal And Side Repeater Lamps Function

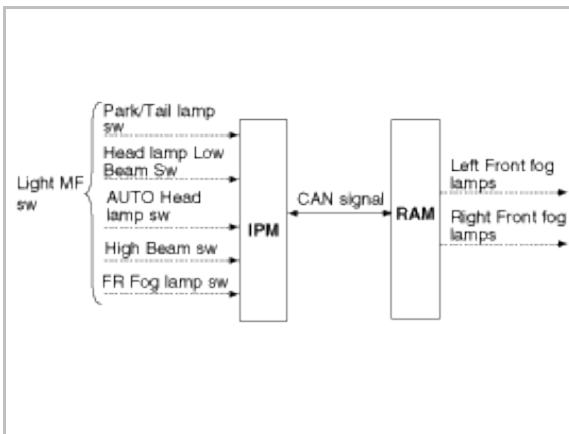
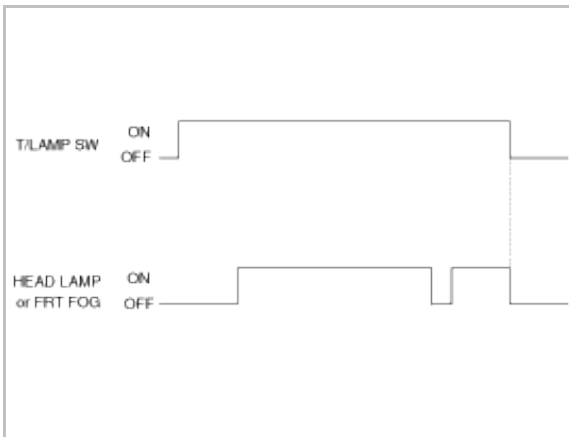
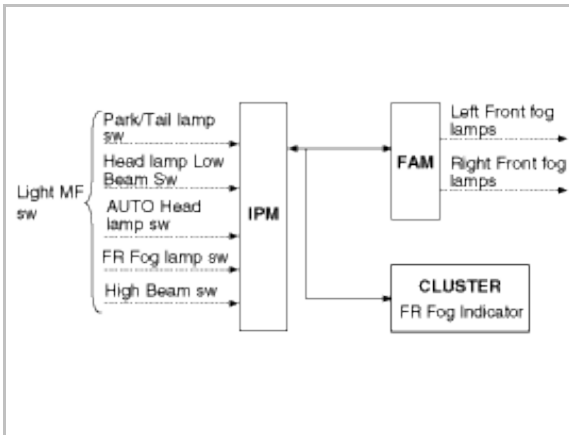
1. Necessary conditions to switch ON(if they are standard) :
  - A. By activation of Crash Unlock
  - B. During the opening / closing of the Tail gate by the PTG Flasher input
  - C. With the Remote Keyless Entry to lock / unlock the vehicle
  - D. By alarm activation
  - E. By panic activation with the Remote Keyless Entry
  - F. By activation of the Hazard Lamp by the hazard switch and ignition is position OFF, ACC or RUN
  - G. By using the turn lever switch with the ignition switch in the ON position.
2. Necessary conditions to switch OFF(if they are standard) :
  - A. Ignition switch in OFF position for deactivation of crash unlock flashing
  - B. Deactivation of the alarm or at the end of the alarm flashing sequence
  - C. Deactivation of panic sequence with pushing any button of the Remote Keyless Entry or at the end of the panic flashing sequence
  - D. Turn lever switch command in OFF position or ignition switch in OFF, ACC or START position to stop turn lever flashing.
  - E. The hazard switch in OFF position or ignition switch in position START to stop the Hazard flashing.
  - F. At the end of the Lock, Unlock and PTG flashing sequence.
3. During the start up of the vehicle (ignition key in position START) :
  - A. The Turn signal lamps activated by the turn lever switch are temporarily turned OFF. If the time duration in Start position is more than 10seconds and engine running, the Turn signal lamps are managed again as if the ignition key was in ON position,
  - B. The flashing sequence of the hazard lamps is immediately stopped if they have been activated by the hazard button. If the time duration in Start position is more than 10seconds and engine running, the flashing sequence of the hazard lamps are managed again as if the ignition key was in RUN position,
  - C. The flashing sequence of the hazard lamps is not stopped if they have been activated by a crash unlock.

## 4. Functional diagram



## Front Fog Lamps Function

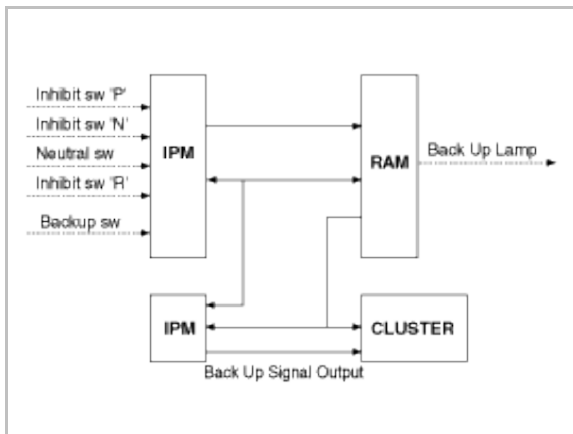
1. Necessary conditions to switch ON :
  - A. By using the stalk: Head lamp switch in position 'Head lamp Low Beam' and Front Fog lamp sw ON
  - B. When Auto light function activated and Auto light Sensor signal status is 'HL ON' and Front Fog lamp sw ON
2. Necessary conditions to switch OFF :
  - A. When Auto light function activated and Auto light Sensor signal status is not ON
  - B. When Front fog lamp sw OFF.
3. Functionnal Diagram



## Backup Lamps Function

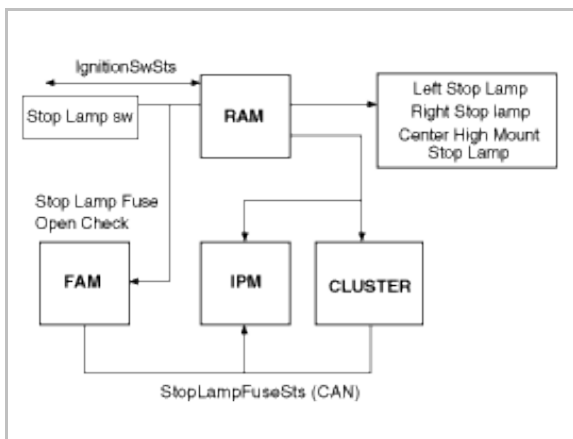
1. Necessary conditions to switch ON :
  - A. When inhibit sw 'R' read by FAM is active and transmitted to RAM by CAN signal.
2. Necessary conditions to switch OFF :
  - A. When inhibit sw 'R' read by FAM is not active and transmitted to RAM by CAN signal.
3. Functional diagram





## Stop Lamps Function

- Necessary conditions to switch ON the stop lamps:
  - Pushing on the brake pedal.
- Necessary conditions to switch OFF the stop lamps:
  - Releasing the brake pedal.
- Functional diagram



## Auto Light Function

- The Auto light function is active when the Head lamp switch is positioned to 'Auto' and the Key is in RUN position. The auto light sensor is powered on the status ACC, START and RUN of the key position. Based on the Auto light sensor values corresponding to the exterior brightness level, it controls automatically the lighting of the Park and tail lamps or / and the Head lamps Low Beam depending on the country.
- Auto light Sensor detection table

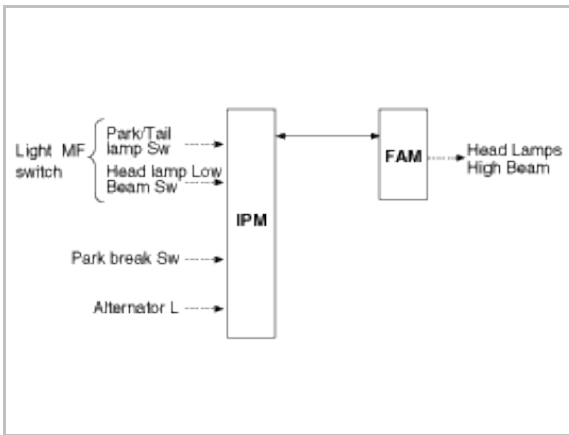
| Mode | Tail Lamps  |               | Head Lamps Low Beam |            |
|------|-------------|---------------|---------------------|------------|
|      | Lux (Lux)   | Voltage(V)    | Lux (Lux)           | Voltage(V) |
| ON   | < 24 ± 5.2  | <1.77 ± 0.08V | Same as Tail lamps  |            |
| OFF  | > 48 ± 10.5 | > 3.47 ± 0.1V | Same as Tail lamps  |            |

## Drl Function

- The Auto DRL function operates the Head lamps High Beam at 50% of full illumination. The park and tail are managed by the auto light sensor. The Auto DRL function is active if:
  - The ignition switch is on RUN position
  - The engine is running.
  - The Park brake switch is OFF.
- The DRL function is inactive when one of above conditions is released. When the DRL function is active, the Head lamps High Beam can't be turned ON, except for the Flash To Pass

activation.

### 3. Functional diagram



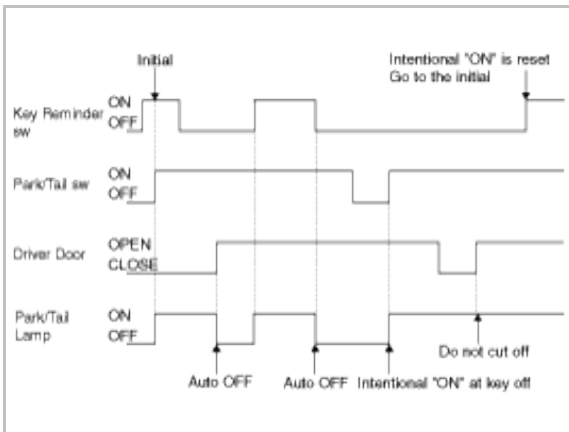
## Battery Saver Function

### 1. Necessary conditions to activate the Battery Saver function:

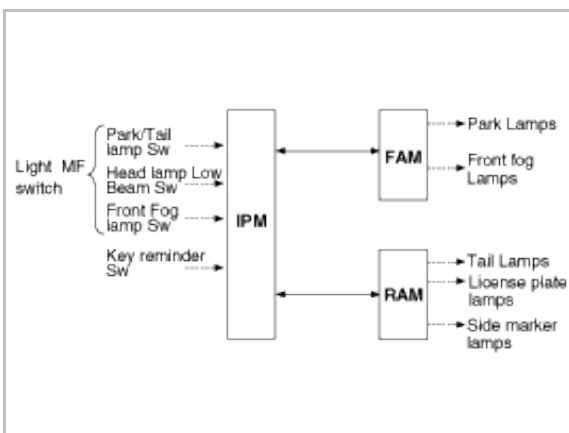
- A. Do not turn off the Park/Tail Lamp when intentionally turned on.
- B. If Key reminder switch is ON and Park/Tail Lamp switch is ON, Intentional "ON" should be reset
- C. If the driver's door is open and if the key is not in the key hole whereas the Head lamp switch is still in position 'Park and tail lamp' or 'Head lamp Low Beam', the park and tail lamps (and the Front fog lamps if turned on) are immediately turned off.

### 2. Necessary conditions to cancel the Battery Saver function:

- A. As soon as the Key is input into the IGN Key Cylinder or the Head lamp switch is put to position OFF.



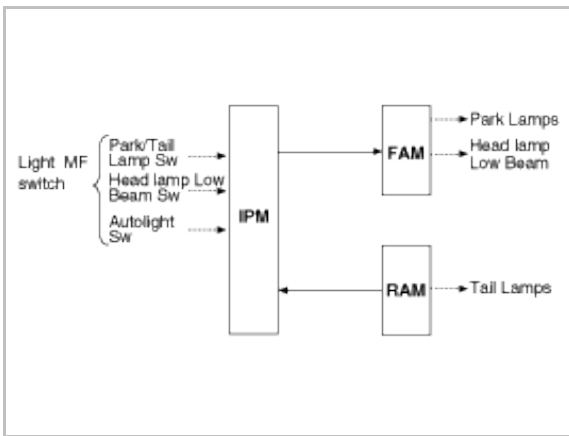
### 3. Functional diagram



## Escort Function

- 1. If the head lamps low beam are turned on by head lamps low beam switch or by auto light switch when the Ignition switch is turned from the ON to ACC or OFF positions.
- 2. The head lamps low beam are turned off:
  - A. 30s after the driver door is closed

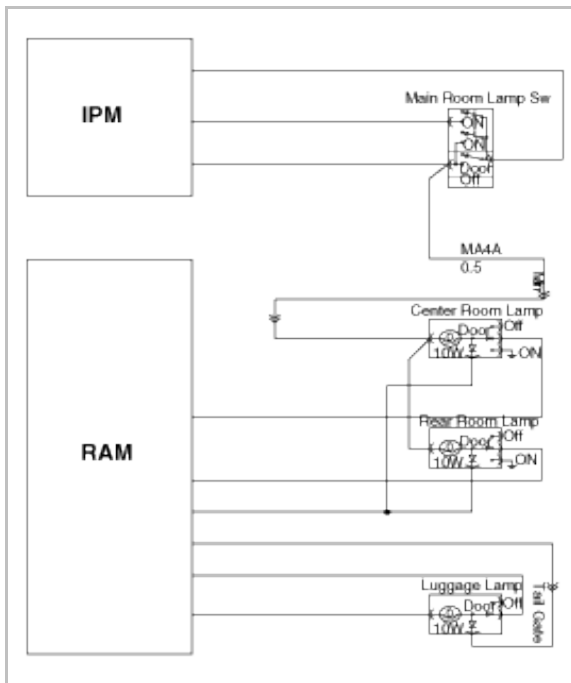
- B. When the multifunction switch is not in position headlamps turned on or autolight
  - C. 20 mn after the driver door is open
  - D. 20mn after IGN leaves the positions RUN to ACC or OFF
  - E. If IPM receives RKE "LOCK" command two times
3. Escort function enables only "Head Lamp Low Beam", so Park/Tail lamp should be turned off when driver door is opened at key out (Battery Saver function).
4. Functional Diagram



## Interior Lighting Functions

### Room Lamps

1. The room lamps can be controlled manually using the 3-state (ON, DOOR, OFF) switch or by the Rear Area Module (RAM). A main switch, located to the left of the steering wheel, is used as a master control switch. The operating logic of the lamps will vary based on the position of the main switch ON, DOOR, or OFF).
2. Working conditions
  - A. The functioning depends on the key position in the key cylinder (OFF, ACC, RUN or START)
  - B. When the key goes in RUN or START position while the room lamps are decaying, then the room lamps are turned off immediately.
  - C. When the Ignition key position is RUN or START and the last door is closed then the room lamps are OFF.
  - D. If the room lamps have been activated using the RKE UNLOCK function, and the ignition switch is turned to the RUN or START position, the room lamps will be immediately turned OFF..
  - E. If the Ignition sw status is in RUN or START and Unlock information occurs, then the room lamp status is not changed.
  - F. When the system enters to ARM WAIT mode by Remote Key or Mechanical cylinder lock switches the Room lamp should be turned off immediately.
  - G. If there is RKE Lock signal at any door open, all doors should be locked first and wait for the all door close. No action is taken while the Open Door status is OPEN and the doors are locked. Then when Open Door status changes from OPEN to CLOSE, Room lamps will be OFF immediately.
  - H. The 30sec timer does not depend on the key reminder status.
    - I. If the main switch is changed to ON from DOOR after 20minute lamp OFF, all the lamps are turned ON.
    - J. If the Open Door status changes from OPEN to CLOSE (all doors close) when ignition switch is on RUN position, room lamps and door courtesy lamps should turn off immediately (Do not decay off).
  - K. After 20minute Room Lamp OFF at door open, Room lamps are turned ON again when:
    - One of the door open switch's status changes. (Open to Close or Close to Open)
    - Ignition key is in RUN or START Position.
    - Receiving an UNLOCK event while a door is open and Main Room Lamp Switch is in the DOOR position.
  - L. For the room lamps, when the 20m timer is running and any of the side doors is opened the timer is restarted.
3. Functional Diagram



#### 4. Truth table

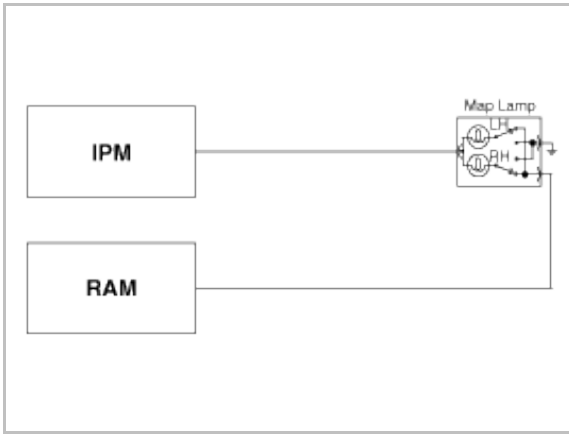
| Main Room Lamp sw | Open Door status (RAM) | Luggage interior Lamp (CAN) | Room Lamps LS (Door)               | Room Lamps LS (On) | Room Lamp Switch | Room Lamp Switch | Room Lamp Switch |
|-------------------|------------------------|-----------------------------|------------------------------------|--------------------|------------------|------------------|------------------|
|                   |                        |                             |                                    |                    | ON               | DOOR             | OFF              |
| OFF               | Don't care             | Don't care                  | OFF                                | OFF                | OFF              | OFF              | OFF              |
| ON                | Don't care             | Don't care                  | OFF                                | ON                 | ON               | ON               | ON               |
| DOOR              | OPEN                   | OFF (*)                     | ON during 20 min then directly OFF | OFF                | ON               | ON during 20 min | OFF              |
|                   | OPEN                   | →LOCK (**)                  | ON during 20 min then directly OFF | OFF                |                  | ON during 20 min |                  |
|                   | OPEN                   | →UNLOCK (***)               | ON during 20 min then directly OFF | OFF                |                  | ON during 20 min |                  |
|                   | CLOSE                  | OFF                         | OFF                                | OFF                |                  | OFF              |                  |
|                   | OPEN → CLOSE           | Don't care                  | Decayed OFF                        | OFF                |                  | Decayed OFF      |                  |
|                   | OPEN → CLOSE           | Don't care                  | ON during 20 min then directly OFF | OFF                |                  | ON during 20 min |                  |
|                   | CLOSE                  | →LOCK                       | OFF                                | OFF                |                  | OFF              |                  |
|                   | CLOSE                  | →UNLOCK                     | ON during 30 min then directly OFF | OFF                |                  | ON during 30 min |                  |

- (\*) : OFF is transmitted when there is no action from Lock/Unlock. It has no impact on the 20mn timer (no restart).  
 (\*\*) : LOCK transition is sent by IPM only when door status is CLOSE. Thus there is no action on the 20mn timer in this case.  
 (\*\*\*) : When transition to UNLOCK is received, 20mn timer is restarted.

### Map Lamp

1. The map lamps may be controlled manually or by the Rear Area Module (RAM).

## 2. Functional Diagram



## 3. Truth table

| Main Room Lamp sw | Open Door status (RAM) | Luggage interior Lamp (CAN) | Map Lamp LS                        | Map Lamp Switch | Map Lamp Switch  |
|-------------------|------------------------|-----------------------------|------------------------------------|-----------------|------------------|
|                   |                        |                             |                                    | ON              | OFF              |
| OFF               | Don't care             | Don't care                  | OFF                                | ON              | OFF              |
| ON                | Don't care             | Don't care                  | ON                                 | ON              | ON               |
| DOOR              | OPEN                   | OFF (*)                     | ON during 20 min then directly OFF | ON              | ON during 20 min |
|                   | OPEN                   | → LOCK (**)                 | ON during 20 min then directly OFF | ON              | ON during 20 min |
|                   | OPEN                   | → UNLOCK (***)              | ON during 20 min then directly OFF | ON              | ON during 20 min |
|                   | CLOSE                  | OFF                         | OFF                                | ON              | OFF              |
|                   | CLOSE                  | → LOCK                      | OFF                                | ON              | OFF              |
|                   | CLOSE                  | → UNLOCK                    | ON during 30 min then directly OFF | ON              | ON during 30 min |
|                   | OPEN → CLOSE           | Don't care                  | Off (DECAY)                        | ON              | Off (DECAY)      |
|                   | CLOSE → OPEN           | Don't care                  | ON during 20 min then directly OFF | ON              | ON during 20 min |

- (\*) : OFF is transmitted when there is no action from Lock/Unlock. It has no impact on the 20mn timer (no restart).  
 (\*\*) : LOCK transition is sent by IPM only when door status is CLOSE. Thus there is no action on the 20mn timer in this case.  
 (\*\*\*) : When transition to UNLOCK is received, 20mn timer is restarted.

## Luggage Lamp

### 1. Working Conditions

- A. The 20min timer does not depend on the key reminder status.  
 B. After 20minute Luggage Lamp OFF at tailgate open, luggage lamps are turned ON again when:
- Tailgate close and then tailgate is opened again
  - Ignition key is in RUN or START position.

### 2. Truth table

| Main Room Lamp sw | Tail Gate status (RAM) | Luggage Lamp LS | Luggage Lamp Switch | Luggage Lamp Switch |
|-------------------|------------------------|-----------------|---------------------|---------------------|
|                   |                        |                 | DOOR                | OFF                 |
| OFF               | OPEN                   | ON              | ON                  | OFF                 |
|                   | CLOSE                  | OFF             | OFF                 | OFF                 |

|      |              |                                       |                  |     |
|------|--------------|---------------------------------------|------------------|-----|
| ON   | Don't care   | OFF                                   | ON               | ON  |
| DOOR | OPEN         | ON during 20 min<br>then directly OFF | ON during 20 min | OFF |
|      | CLOSE        | OFF                                   | OFF              |     |
|      | OPEN → CLOSE | OFF                                   | OFF              |     |
|      | CLOSE → OPEN | ON during 20 min<br>then directly OFF | ON during 20 min |     |

## Door Courtesy Lamps

### Key Hole Illumination

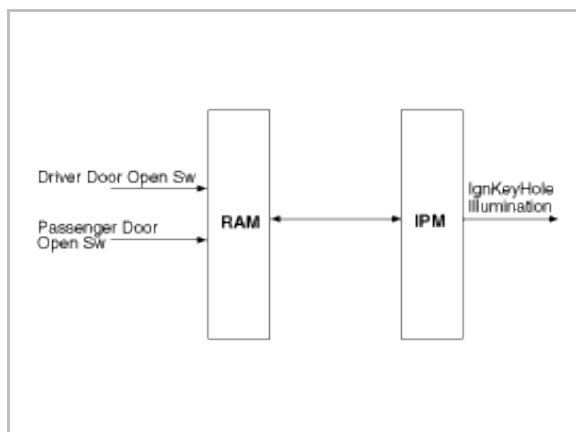
#### 1. Working Conditions

The key cylinder is illuminated when the driver and / or the assist door are open.

#### 2. Key hole extinguish conditions:

- The key cylinder is turned off 10s after the driver and assist doors are closed.
- The key cylinder is turned off immediately if the key is inserted in the hole and put to RUN or START position.
- For vehicles equipped with BurglarAlarm, the key cylinder is turned off immediately when the system goes to ARM WAIT mode during the 10s after the driver and assist doors are closed.
- For vehicles not equipped with BurglarAlarm, the key cylinder is turned off immediately when RKE lock signal is received from keyfob during the 10s after the driver and assist doors are closed (4).

#### 3. Functional Diagram

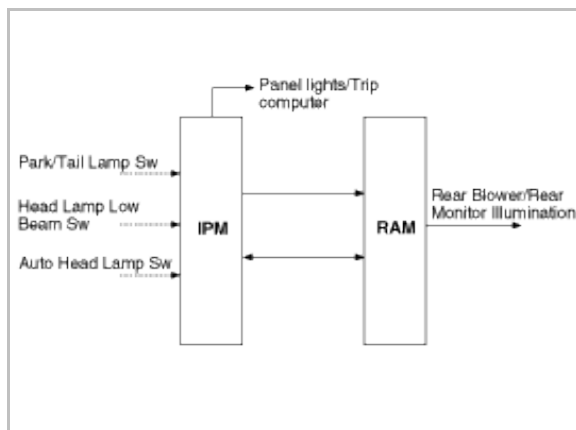


## Panel Lights, Switch Illumination

#### 1. Working Conditions

The MF "high beam" and "flash to pass" switches do not influence the management of the Panel Lights and Trip Computer illumination, Rear Blower illumination and Rear Monitor illumination.

#### 2. Functional Diagram



## Dimmable Backlighting

### 1. Working Conditions

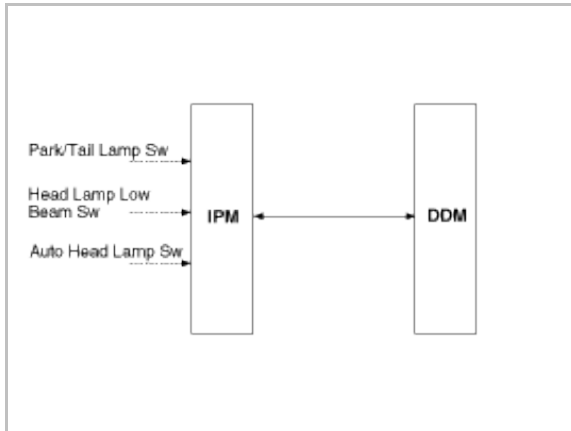
The Dimmable backlighting is directly managed by the rheostat.

## Power Seat Switch Illumination

### 1. Working Conditions

The IPM sends a CAN message to the DDM so that this module illuminate the power seat switches.

### 2. Functional Diagram



## View Enhancement Function

### Front Wiper And Washer

#### 1. Front wiper working conditions

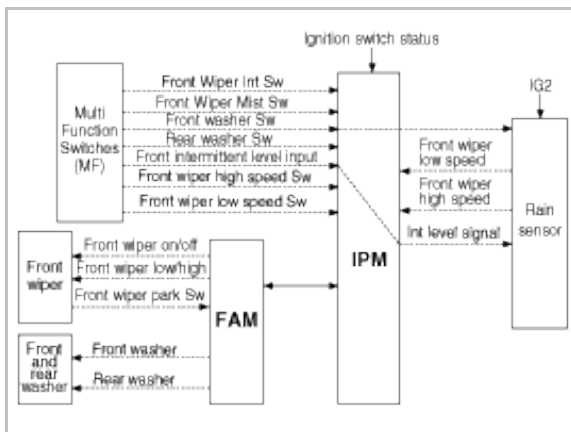
These functions are active when Ign2 switch ON

In the OFF and ACC states, the front wiper is not activated. If IGN2 turns OFF during wiper operation, the wiper stops at the current position and will move to the park position on the next IGN2 ON. In these states, the front washer is not active.

#### 2. Front washer working condition

The front washer functionality is directly available to the driver. It consists in activating the front washer pump, which is located under hood. As long as the driver activates the washer multifunction switch, the front washer is active.

#### 3. Functional diagram



### Rear Wiper And Washer

#### 1. Rear wiper working conditions

A. The rear wiper is available in RUN state.

B. In the START state, all the wiper and washer outputs are halted and then activated again.

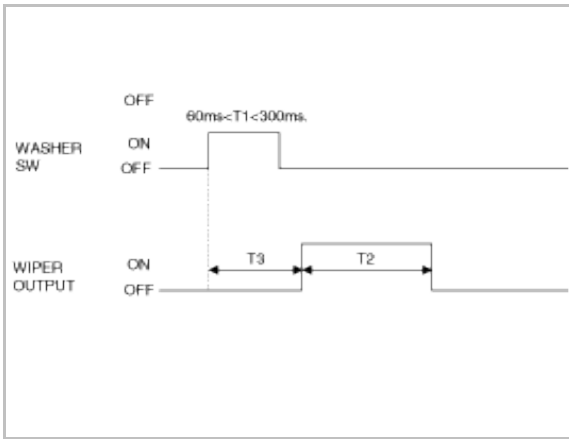
C. In the OFF and ACC states, the rear wiper stops its movement at current position. The rear wiper will move to the park position at the next IGN ON. In these states, the rear washer is not activated.

#### 2. Rear washer working condition

A. If the washer signal is active less than 60ms, the signal is neglected.

B. If the washer signal is active for T1 (between 60ms and 300ms), the rear wiper output is turned on for T2 (2.5~3.8 sec.), T3 (300ms) after the washer has been turned ON.

Rear washer activated for T1 : [60ms;300ms]

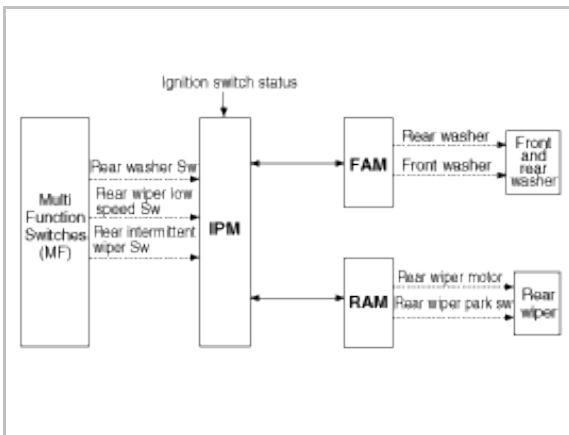


T1 : 0.06 ~ 0.3 sec.

T2 : 2.5~3.8sec.

T3 : 0.3 sec.

### 3. Functional diagram



## Defog

This function controls the heating defog grids on windshield, rear glass, and rear view mirrors.

### 1. Working Conditions

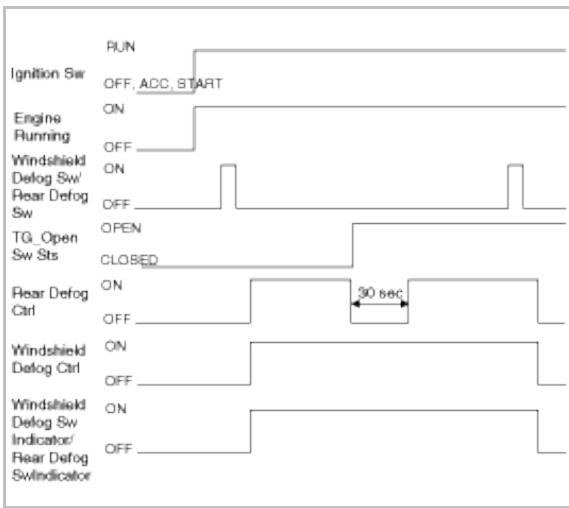
The defog function can be activated only when engine is running and ignition key is in RUN position.

- When windshield defog switch is pushed, windshield defog is activated for 20 minutes.
- While windshield defog is on, the windshield defog button is illuminated
- If the switch is pushed again while defog is already active, defog stops.
- If the engine stops while defog is on, defog stops and it is NOT automatically turned on when the engine is started again
- Rear defog works exactly in the same way as windshield defog using the rear defog switch button as input.
- When rear defog is active, rear defog switch indicator is ON.
- Rear defog ctrl output controls rear glass defog as well as rear view mirrors defog.

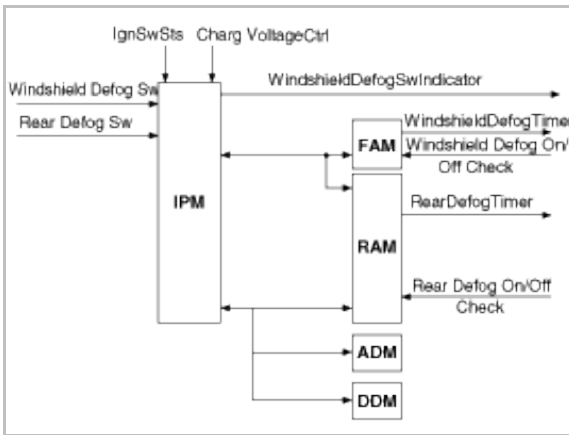
### 2. Rear defog pause

- When IPM receives Tailgate Flasher CAN message, rear defog is inhibited for 30s
- The 20min rear defog timer is frozen during this pause.
- If the user turns on rear defog function while this pause is going on, Rear defog ctrl is set to ON only at the end of the pause.
- This pause has no impact on rear defog switch illumination.
- When IPM receives Tailgate open CAN message transition to OPEN value, this 30 s rear defog pause is also started, it works the same way as described above.





### 3. Functional Diagram



## Comfort Function

### Power Windows

1. The purpose of the power window function is to manage the driver and assist power window motors. This function is entirely implemented in the DDM and ADM (door modules) and DMS role for this function is limited to providing signals through the CAN bus.

### Power Seat With Memory Interface

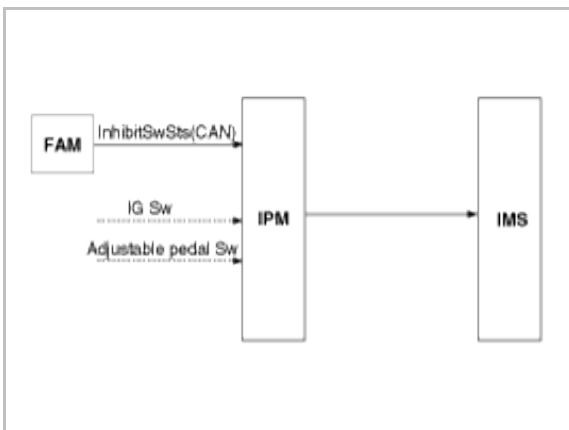
This function manages the power seat and the associated memorized positions. This function is entirely implemented in the IMS (seat module) and DMS role for this function is limited to providing signals through the CAN bus.

### Adjustable Pedal

#### Adjustable Pedal With Memory Interface(ims)

1. This function is implemented by the IMS. This function adjusts the pedal position when the pedal backward/forward switch is pressed.

### 2. Functional Diagram

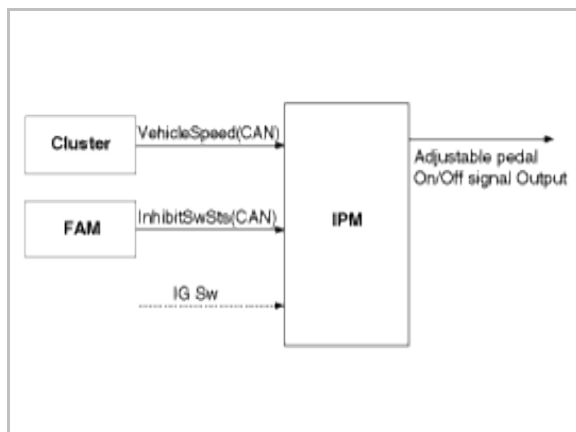


## Adjustable Pedal(non-ims)

1. Adjust Pedal allows to activate Adjustable Pedal feature for the non-IMS equipped vehicle, IPM needs to control the power source (by relay coil control) of the adjustable Pedal switch unit.

There is no Adjustable Pedal switch for Non-IMS version.

### 2. Functional Diagram



## Reverse Drive Exterior Side Mirror

This function is implemented by the DDM. This function turns the 2 external reverse mirrors down when gear box in reverse position.

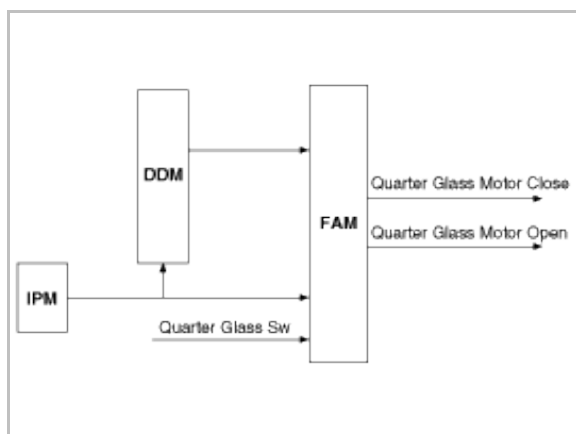
## Quarter Glass Open/close

### 1. Working Conditions

This Function is available when Ignition key is in RUN position and for 30sec after end of RUN.

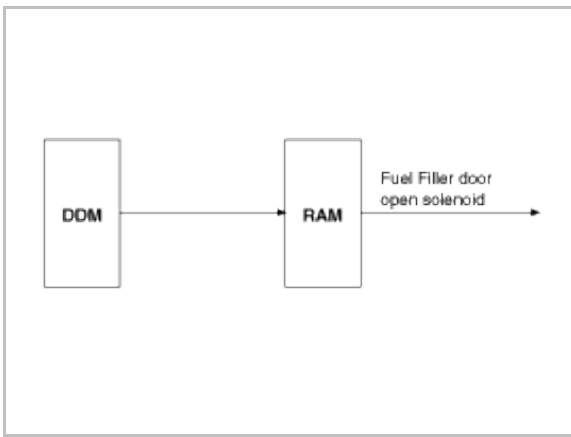
- A. Quarter glasses can be controlled by switches situated near driver or switches situated near rear passengers seat (3rd row of seats).
- B. When the switch is pressed the motor output is ON until the switch is released or after 5+/- 1sec. The switch has to be released and pressed again to command the motor output ON again.
- C. If power window lock is activated only driver window is enable by driver side switch and no switches are enable to open quarter glass.
- D. There is no interaction with the sliding doors. It is not forbidden to open the quarter glasses when the sliding door on the same side is open.
- E. No switch information (driver or rear passenger ) prevails on the other. If the main switch and the passenger side switch are pressed in opposite direction at the same time, window stops moving.

### 2. Functional Diagram



## Open Fuel Filler Door

### 1. Functional Diagram



## Sun Roof Relay Coil

This function defines the condition for switching on or off power feed to sun roof relay coil. This function is available in RUN position and during after run timer ON.

## Power Window Timer

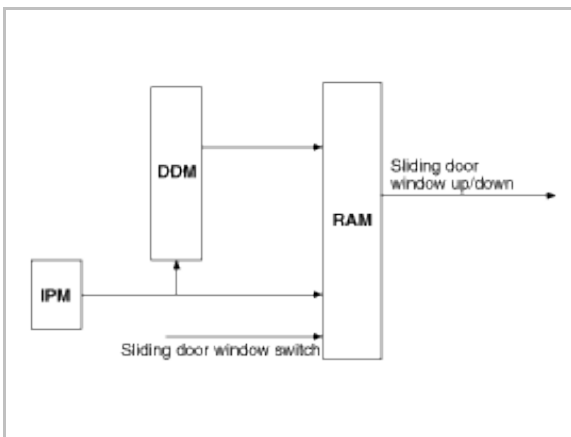
This function defines the conditions for allowing use of power windows, quarter glass, and feed to sunroof relay coil.

## Sliding Doors Power Windows

### 1. Working Conditions

This function is available when ignition key is in RUN position and for 30sec after end of RUN. Window operation will be canceled if the driver or assist door is opened during the 30sec period after the key is turned from RUN to ACC or OFF position..

### 2. Functional Diagram

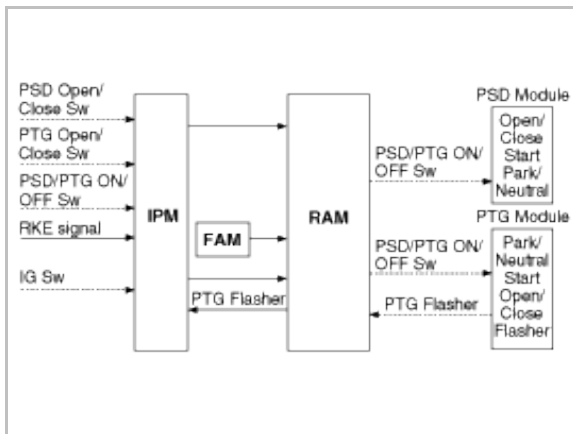


## Power Sliding Door & Power Tailgate

### 1. Description

There are two sliding doors and one tailgate in the vehicle. A switch is fitted at each B-pillar to permit Power Sliding Door activation.. For the tailgate, there is also one push button switch. These switches are used to send an signal of 200 ms minimum to the PSD module (or PTG module).

### 2. Functional Diagram

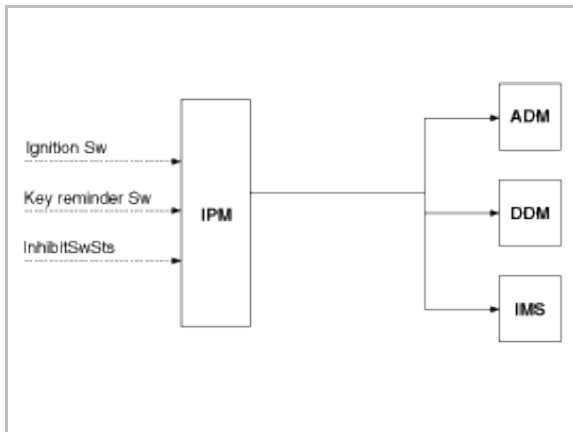


## Easy Access

### 1. Description

The easy access function permits automatic rearward movement of the driver seat when the key is removed from the cylinder. Automatic forward movement of the driver seat will take place when the key is inserted into the cylinder. This function will be enabled on IMS equipped vehicles when the AUTO button is pressed. Inhibit Switch should be in P-Position for the Easy Access operation.

### 2. Functional Diagram



## Driver Information

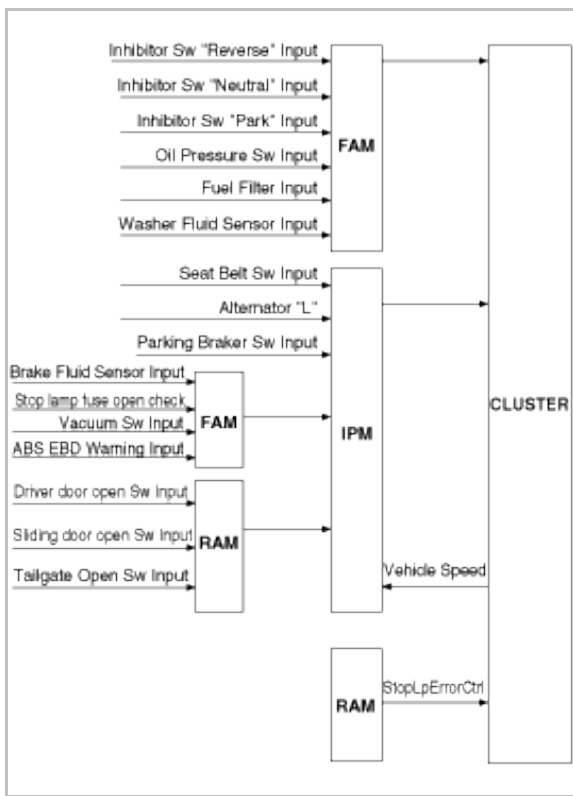
### Cluster Indicators

- The instrument cluster indicators listed below are controlled by the In-Panel Module (IPM), Front Area Module (FAM), or Rear Area Module (RAM) as applicable.

These indicators are:

- Gearbox status
- Oil pressure
- Sediment fuel filter
- Vacuum
- Brake fluid
- Washer fluid
- Seat belt
- Park brake
- Charging voltage
- Turn indicators
- High beam
- Front fog
- Doors open
- Tailgate open
- Stop lamp failure front and rear

### 2. Functional Diagram



## Gearbox Status

The status of the gearbox is sent on the CAN network when the CAN network is available.

## Oil Pressure Switch Status

The status of the oil pressure switch is sent on the CAN network when the CAN network is available.

## Fuel Filter Status

The FAM receives on digital input the status of the fuel filter (Fuel Filter Input) and sends it (Fuel filter switch) on the CAN network.

## Washer Fluid Sensor Status

The FAM receives on digital input the status of the washer fluid sensor and sends it on the CAN network.  
If Washer Fluid Low Input is LOW for more than 10 sec, FAM sends the warning message.

## Seat Belt Warning Status

The IPM receives on digital input the status of the seat belt switch and sends the seat belt warning on the CAN network.

If the Ignition switch status is in RUN or START when the Seat Belt Sw Input is FASTENED, the seat belt warning indicator is blinking for 6 seconds.

When Seat Belt switch Input is NOT FASTENED, the seat belt warning indicator is blinking for 6 seconds.

If the Seat Belt switch Input is FASTENED during the 6 seconds, the seat belt warning indicator is blinking till the end of the 6 seconds.

In North America:

the seat belt warning indicator is blinking when Ignition switch is on the status RUN or START and Seat Belt Sw Input is NOT FASTENED.

## Parking Brake Indicator

The indicator manages 3 functions: brake fluid sensor, parking brake warning and vacuum switch.

The vacuum function is available for diesel engine only

The FAM receives on digital input the status of the vacuum switch and the ABS EBD warning and sends them on the CAN network.

The status of the vacuum switch and the ABS EBD warning are sent on the CAN network when the CAN network is available.

The FAM receives on digital input the status of the brake fluid sensor and sends it on the CAN network.

The status of the brake fluid sensor is sent on the CAN network when the CAN network is available.

The IPM receives on digital input the status of the parking brake switch and by CAN network the status of the vacuum

switch, the status of the ABS EBD warning, the status of the brake fluid sensor and the speed of the vehicle.

The IPM sends the park brake indicator control on the CAN network.

The indicator is lighted if the vacuum switch or ABS EBD warning are on or brake fluid sensor is low or park brake switch is on.

If the speed of the vehicle is over 10 km/h and ignition switch is on the status RUN the park brake indicator control is blinking at 50% duty in 0.6 second if Parking Brake switch Input is active. In this case Vacuum switch, ABS EBD warning and Brake Fluid sensor are ignored.

The park brake indicator is blinking on the same time that the chime is ringing. If a CAN signal among Vacuum switch, EBD warning or Brake Fluid Sens switch is INVALID, out of range or not received this CAN signal is considered to be OFF.

If VehicleSpeed CAN signal is INVALID or not received, it is considered to be 0 kph.

## **Charging Voltage Control**

The IPM receives on analog input the voltage of generator and sends a warning.

When the voltage of generator L pass strictly above 10V, the state of the CAN variable.

## **Turn Indicators Status**

The status of the turn indicators are sent on the CAN network when the CAN network is available.

## **High Beam Status**

The status of the high beam is sent on the CAN network when the CAN network is available.

## **Front Fog Lamp Status**

The status of the front fog lamp (lightning and state of the bulbs) is sent on the CAN network when the CAN network is available.

## **Doors Open Warning**

The RAM receives on digital input the status of the driver door open switch and sends it on the CAN network.

The RAM receives on digital input the status of the passenger door open switch and sends it on the CAN network.

The RAM receives on digital input the status of the left sliding door open switch and sends it on the CAN network.

The RAM receives on digital input the status of the right sliding door open switch and sends it on the CAN network.

When vehicle speed is under 10 kph, with ignition key not inserted and any door OPEN, DoorsOpenWngCtrl stays ON for 20 min and then is turned OFF.

## **Tailgate Open Switch Status**

When vehicle speed is under 10 kph, ignition key is inserted and Tailgate open switch is OPEN, Tailgate Open warning stays ON forever (IPM can enter sleep mode).

When vehicle speed is under 10 kph, with ignition key not inserted and lgate open switch is OPEN, Tailgate Open warning stays ON for 20 min and then is turned OFF.

## **Chime Control**

1. The chime warns the driver that a problem is occurred.

These warning are:

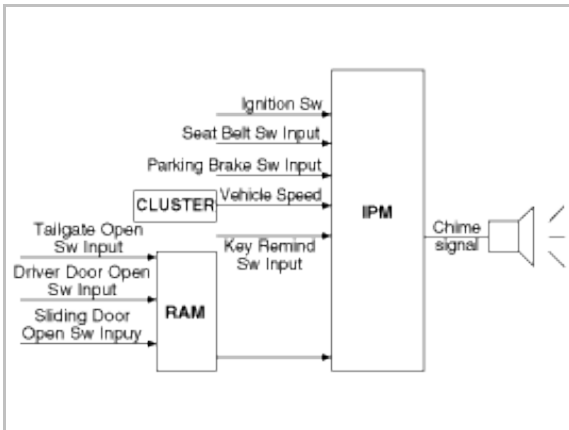
- A. Seat belt
- B. Parking on
- C. Over speed
- D. Key reminder
- E. Light Warning
- F. Doors Open
- G. Tailgate open warning

2. Chime sound priority:

- A. 1st : Seatbelt warning
- B. 2nd : Overspeed warning
- C. 3rd : Door open warning
- D. 4th : T/Gate open warning
- E. 5th : Key operated warning
- F. 6th : Parking Brake warning

- G. 7th : Light ON warning
- H. 8th : Key learning sound

3. If two different warning condition happen at the same time, chime should work only for the highest warning condition.
4. Cluster indicators should work for two warning behavior.
5. Behavior Description



## Seat Belt Warning

The IPM receives on digital input the status of the seat belt switch.

The chime is activated during 6 second when the seat belt is not fastened.

The chime will stop immediately if the seat belt is fastened during the 6 seconds of the chime.

## Park Brake Warning

The IPM receives on digital input the status of the parking brake switch.

The IPM receives the speed of the vehicle by the CAN network.

The chime is activated when the parking brake is on, ignition switch is on RUN and speed vehicle is over 10 km/h.

The park brake indicator is blinking at the same time that the chime is ringing.

## Over Speed Warning

The IPM receives the overspeed warning by the CAN network.

The chime is activated when the overspeed speed warning is on the state Overspeed.

## Key Reminder Warning

The IPM receives the status of the key on digital input.

The IPM receives the status of the driver door open switch by the CAN network.

The chime is activated when key is inserted and the driver door is open.

## Light Warning

The IPM receives the status of the driver door open switch by the CAN network.

The light chime warning is activated when the driver door is open and the park and tail lamps are turned on.

## Doors Open Warning

The RAM receives on digital input the status of the driver / passenger / left sliding / right sliding door open switch and sends it on the CAN network.

The IPM receives by CAN network the speed of the vehicle.

The doors open warning chime is activated when one or several of the 4 doors is opened and the speed of vehicle is over 10km/h.

## Tailgate Open Warning

The RAM receives on digital input the status of the tailgate open switch and sends it on the CAN network.

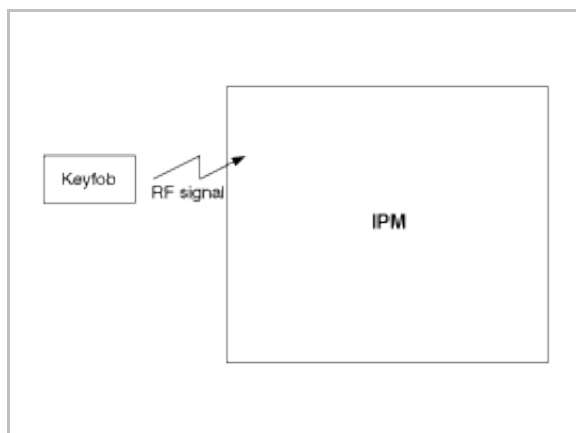
The IPM receives by CAN network the speed of the vehicle.

The tailgate open warning chime is activated when the tailgate is opened and the speed of vehicle is over 10km/h.

## Safety And Security Function

### Remote Keyless Entry

1. The aim of this function is to receive the key fob signal and decode it. There are 8 different data included in the radio frequency frame sent by the RKE to the IPM module:
  - A. Central door lock
  - B. Central door unlock
  - C. Panic function
  - D. Driver door window close (long press on RKE lock button)
  - E. Driver door window open (long press on RKE unlock button)
  - F. Left sliding door open/close
  - G. Right sliding door open/close
  - H. Power tailgate open/close
2. Each vehicle can have at most 2 associated key fobs. The key fob is physically separated from the key itself (separate device).
3. Input/Output Definition and Characteristics



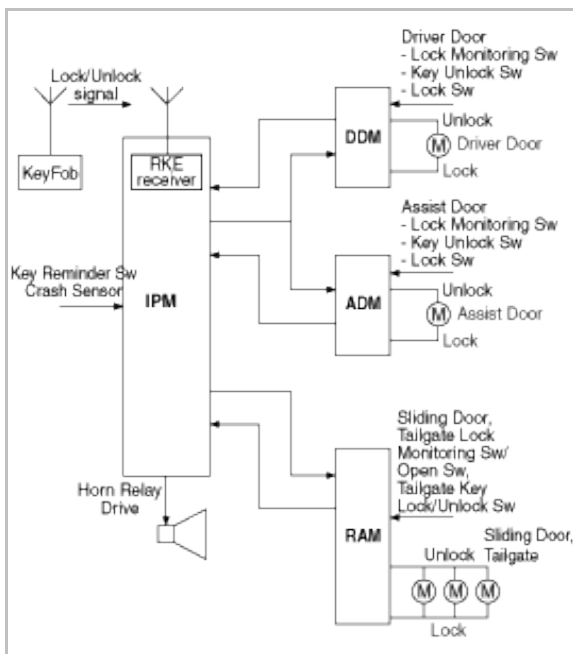
## Central Lock/unlock

1. Central locking/unlocking logic is controlled by IPM. Locking/Unlocking inputs are located in ADM, DDM (Lock/Unlock switch, door knobs, door key cylinder) and in IPM (RKE receiver).
2. Locking/Unlocking actuators are located in ADM for passenger door, DDM for driver door and RAM for sliding doors and tailgate.

There are 5 ways of operating central lock/unlock:

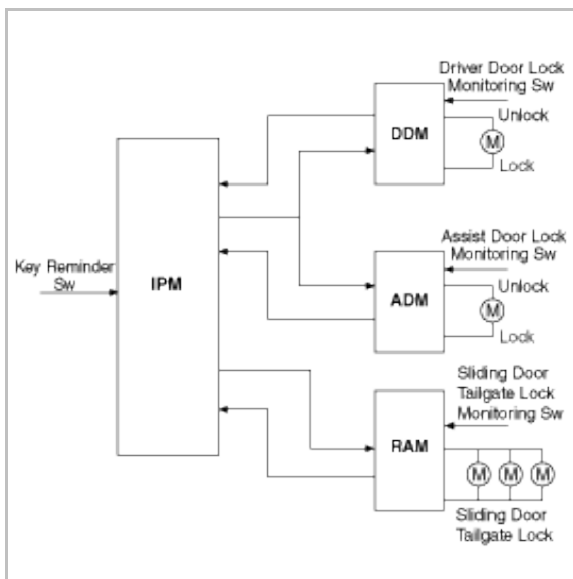
  - A. With Key RKE
  - B. With Door Lock/Unlock switches located on ADM/DDM
  - C. With Door Lock Monitoring switches located on the passenger/driver door
  - D. With Door/Tailgate Key Cylinder Lock/Unlock switches located on the tailgate or passenger/driver door.
3. Functional Diagram





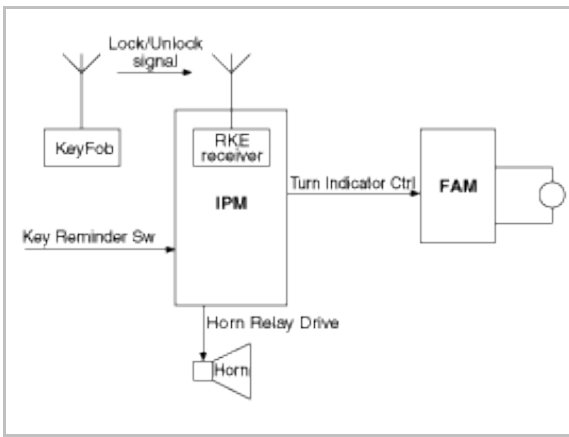
## Key Reminder Unlock

1. Key reminder door unlock does not take into account the lock/unlock commands from RKE, key cylinder or door lock switches. It only takes into account the state of the door lock monitoring switch, key reminder switch and door open status in order to proceed with the unlock sequence or not.
2. Functional Diagram



## Remote Keyless Entry Panic

1. Working Conditions  
RKE panic function is only active when the key is out of key cylinder.  
Once started, panic operation is not stopped when ignition key is inserted, ignition is ACC, RUN or START, or door is opened or closed.
2. Functional Diagram



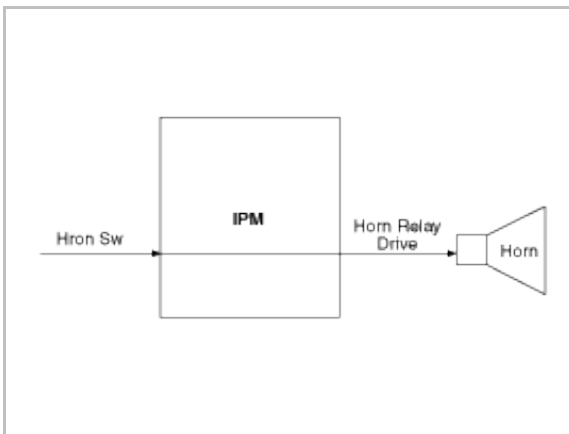
## Horn

### 1. Working Conditions

Required key positions:

- A. At any position of the key in the cylinder for the horn stalk activation,
- B. At Key out from the key cylinder for the horn lock activation or for panic activation.

### 2. Functional Diagram



## Burglar Alarm Function

### Burglar Alarm

#### 1. Basic Concept

A. The following functions are related to the RKE and burglar alarm systems..

- Door locking
- Door unlocking
- PSD open/close (both for left and right)
- PTG open/close
- Panic

B. If IGN key is inserted into the key cylinder, the RKE transmitter functions are inoperative..

C. Door locking by RKE signal:

- Whenever this signal is received, door LOCK pulse is always issued.
- Hazard lamp flashes one time for 1 second depending on the burglar alarm state.
- This signal will make the system possible to enter into the ARM state (or PREARM state depending on the vehicle condition).

D. Door unlocking by RKE signal.

- Whenever this signal is received, door UNLOCK pulse is always issued.
- Hazard lamp flashes two times whenever the key fob unlock signal is received.
- This signal will make the system possible to enter into the DISARM or 30sec DELAY state depending on Condition A is true or not.

E. LH or RH PSD open/close by RKE signal.

- Only with the information received by RKE, the burglar alarm system cannot distinguish the OPEN signal

from CLOSE signal.

- RAM will pass this signal to LH PSD and RH PSD then the burglar alarm state is decided depending on the vehicle condition.

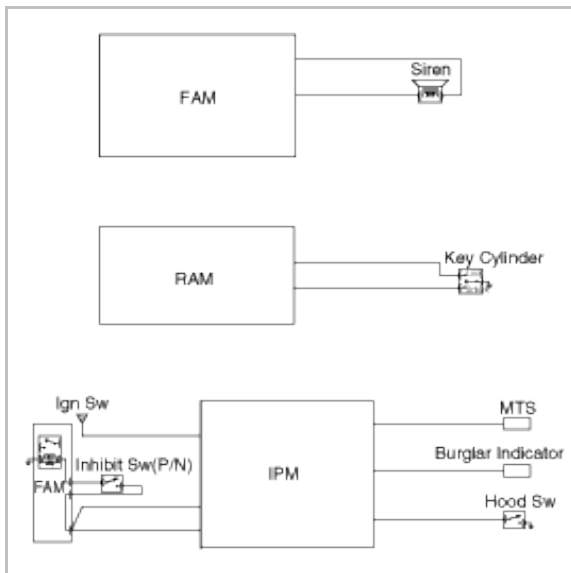
#### F. PTG open/close

- Only with the information received by RKE, the burglar alarm system cannot distinguish the OPEN signal from CLOSE signal.
- RAM will pass this signal to PTG module then the burglar alarm state is decided depending on the vehicle condition.

#### G. Panic by key fob

- Whenever this signal is received, the PANIC function is activated (unless the system is already in an ALARM state).

## 2. Functional Diagram



## Arm Mode

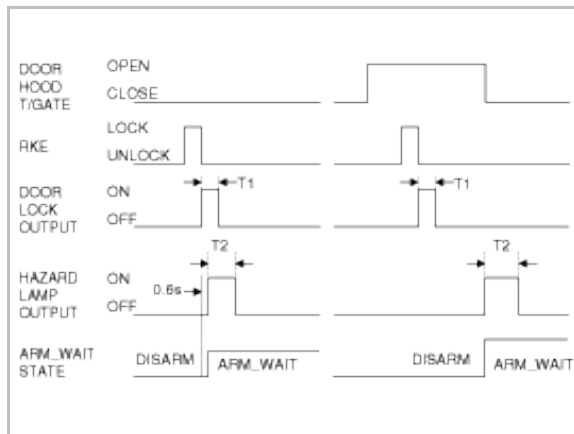
- If 30 second timer is elapsed without any changes from the ARM WAIT mode, then system goes to ARM mode.
- Whenever RKE lock signal is received in the ARM state, then the system makes a hazard flash (1 second) and sends a door lock pulse.

## Prearm Mode

- If the vehicle is locked using the RKE transmitter, and one or more doors are in an OPEN state, the system issues a LOCK pulse and enters a PREARM state." In the PREARM state, the hazard lamps do not flash".
- If all doors are closed in the PREARM state, the system enters ARM WAIT mode, and the hazard lamps will flash once.
- During PREARM state, if f key reminder switch is ON & IGN 1 & IGN 2 are turned on in this state, the system immediately goes to DISARM state

## Arm Wait Mode

- The ARM WAIT mode is active for 30 seconds. If any entrance (hood, doors, tailgate) is opened, any lock knob is moved to an UNLOCK state, or the ignition switch is turned ON, the system will immediately enter DISARM mode. The system will enter ARM state if none of the previously mention conditions occur during the 30-second ARM WAIT mode.



T1 : 0.5 sec

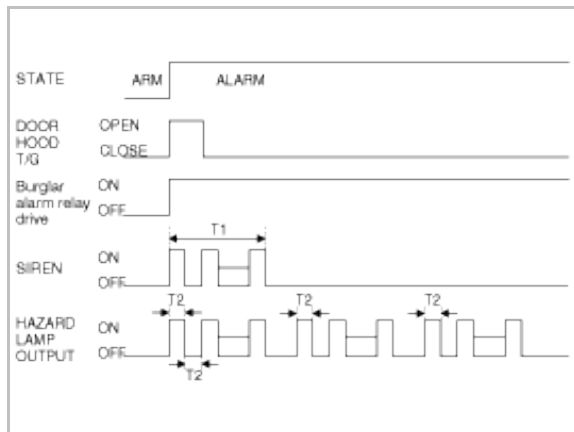
T2 : 1.0 ± 0.1 sec

## Disarm Mode

- If RKE unlock signal is received, then UNLOCK output is issued together with the flashing of hazard lamp (two times) and the system enters into the DISARM condition.
- When entering into DISARM from ALARM state, current alarm will be cancelled and burglar alarm relay drive output is turned off.
- When RKE unlock signal is received again in the DISARM state, UNLOCK output is issued again and hazard lamp is flashed also (two times).

## Alarm Mode

- If one or more of entrances are opened in the ARM or REARM state, then Burglar alarm relay drive output is turned ON in order to inhibit the start condition, and hazard lamp and siren are activated for once of 27 seconds duration.
- Siren output and hazard lamp should be synchronized to get the same output period.
- Even though all the doors are closed during alarm, alarm continues to operate it for the remaining time.
- When there is a new attack (with one of the entrance is still open) in the vehicle after completing the alarm output, alarm should not be started again.



T1 : 27 sec (-0, +3sec)

T2 : 0.5 ± 0.1 sec

## After Alarm State

- If ALARM cycle is elapsed, the system goes into AFTER ALARM state.
- During this state,
  - Burglar alarm relay drive output maintains ON.
  - Siren and hazard lamp output are stopped.
- If another entry is opened during the AFTER ALARM state, the burglar alarm relay drive output remains ON, but the siren will not be re-activated.

## Rearm State

- If all entrances are closed during AFTER ALARM state, the system goes into REARM state.

## Battery Removal

- If the battery is removed with the system in the ARM state, the system will be placed into the ARM state upon battery reconnect.
- The ALARM state will be re-activated if the battery is disconnected, then reconnected, with the system in an ALARM state.
- If the battery is disconnected and reconnected with the system in AFTER ALARM state, the alarm will be re-activated.
- The system will enter DISARM mode if the battery is disconnected during the ALARM WAIT state.

## Panic

- If RKE PANIC signal is received, Siren output and hazard lamp operate for 27 seconds and the system return to the previous state as soon as the PANIC function finishes.
- The PANIC function will be stopped if any RKE signal is received during PANIC activation..
- If Key reminder switch is ON during PANIC function is operating, PANIC is stopped immediately.
- If the system goes to ALARM mode during PANIC function is operating, PANIC is stopped immediately and then ALARM function should be activated.
- During ALARM state;  
If RKE PANIC signal is received, ALARM mode is maintained and PANIC function should be ignored. ALARM has higher priority than PANIC function.
- During AFTER\_ALARM state;  
If RKE PANIC signal is received, AFTR\_ALARM mode is maintained and PANIC function should be activated.

## Safe & Rescue Mode

The goal of those modes is to be able to cope with failures that may happen on some of the most critical functionalities (for the driver security) of the system.

### Safe Mode

The safe mode is entered in case of system problems such as:

- Incoherent inputs on monitored signals. In this case, safe mode is the debouncing time before the inputs are considered INVALID. Note that today, we have no way to detect if the rain/light sensor is in working operation or not. It means that a driver action will be required in case of failure of this sensor;
- Loss of the CAN frame containing the monitored signal:
- Loss of the CAN network: CAN goes to BUS OFF state, safe mode is the time necessary for detecting the BUS OFF state.

In all cases, the action in safe mode is to maintain the previous state of the system (for lighting and wiping). The list of monitored signals is the same as in rescue mode

### Exiting Safe Mode

The software safe mode is exited and the module goes back to the normal mode when:

- On IPM, hardware inputs return to a coherent state;
- The lost CAN signal comes back while timeout has not elapsed;
- The CAN network returns to a normal state without reaching BUS OFF state.

Software safe mode is also exited when the software rescue mode is entered (problem does not disappear).

Hardware safe mode is exited and the module goes back to normal mode if the internal problem disappears (watchdog is properly triggered again). If the problem stays, hardware safe mode is exited to enter hardware rescue mode.

## Rescue Modes

The rescue mode consists in activating some safety functions when IGN2 = ON:

- Switch on the low beams (FAM), park lamps (FAM), tail lamps (RAM) and cluster backlighting (IPM);
- Unlock of all the doors when the rescue mode is entered with IGN2 = ON
- Front wipers do not need to be turned on by software in rescue mode because wipers can be turned on by manually setting the MF switch to low speed. The FAM software must keep the same state as before entering the rescue mode.
- When IGN2 = OFF, low beams, park/tail lamps and cluster backlighting are turned off.

## Entering Rescue Modes

Rescue mode is entered when some important CAN signal or hardware input are not available. Rescue mode is entered when one of the following conditions is true:

#### IPM

- Timeout on CAN signal InhibitSwSts, to detect loss of CAN connection with FAM.
- Timeout on CAN signal StopLpErrorSts, to detect loss of CAN connection with RAM.
- MF Light Switch information is invalid: when the signals coming from MF Light Switch are not coherent for more than 2 s, CAN signal ParkTailHeadLpCtrl is sent with INVALID value and rescue mode is entered.
- Front Wiper MF Switch information is invalid: when the signals coming from Front Wiper MF Switch are not coherent for more than 2 s, CAN signal FWiperCtrl is sent with INVALID value and rescue mode is entered.
- CAN is in Bus Off state

#### RAM

- Timeout on CAN signal InhibitSwSts, to detect loss of CAN connection with FAM.
- Timeout on CAN signal ParkTailHeadLpCtrl or FWiperCtrl, to detect loss of CAN connection with IPM.
- ParkTailHeadLpCtrl = INVALID or unknown value
- FWiperCtrl = INVALID or unknown value
- CAN is in Bus Off state

#### FAM

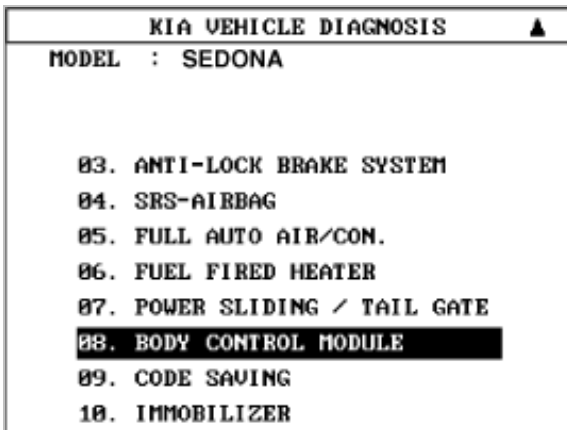
- Timeout on CAN signal StopLpErrorSts, to detect loss of CAN connection with RAM
- Timeout on CAN signal ParkTailHeadLpCtrl or FWiperCtrl, to detect loss of CAN connection with IPM
- ParkTailHeadLpCtrl = INVALID or unknown value
- FWiperCtrl = INVALID or unknown value
- CAN is in Bus Off state

For all CAN signals, timeout duration is 2.5 times signal periodicity.

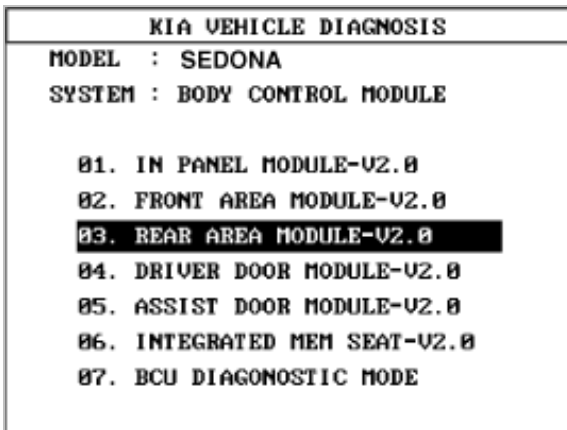


## TROUBLE DIAGNOSTICS WHEN USING DIAGNOSIS TOOL

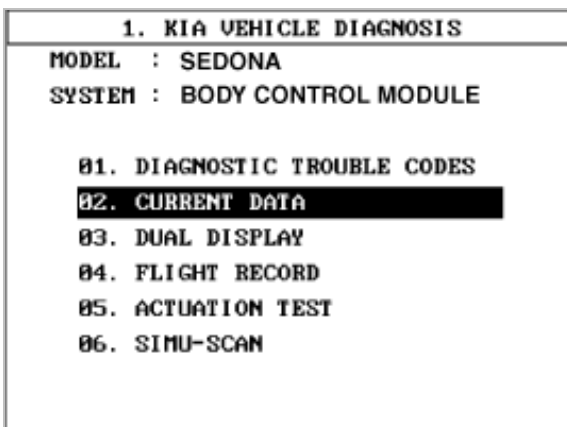
1. The diagnosis tool supports quick diagnosis of supported body electrical systems through input/output monitoring and actuation testing.
2. To diagnose the BCM function, select the menu of model and body control module.



3. Select the module menu to diagnose.



4. The CURRENT DATA function is used to monitor input/output conditions.



| 1.2 CURRENT DATA                                                                                            |            | 15/57       |
|-------------------------------------------------------------------------------------------------------------|------------|-------------|
| CLU Node STATE                                                                                              | EMPTY      | ▲<br>■<br>▼ |
| <b>AUTO HEAD LAMP</b>                                                                                       | <b>OFF</b> |             |
| HEADLAMP LOW BEAM                                                                                           | ON         |             |
| HEAD LAMP HIGH BEAM                                                                                         | OFF        |             |
| FRONT HEIGHT DN SW                                                                                          | OFF        |             |
| FRONT FOG LAMP                                                                                              | OFF        |             |
| BRAKE LAMP                                                                                                  | ON         |             |
| MAIN ROOM LAMP                                                                                              | ON         |             |
| <div> <div>FIX</div> <div>PART</div> <div>FULL</div> <div>HELP</div> <div>GRPH</div> <div>BCRD</div> </div> |            |             |

5. Use the ACTUATION TEST mode to force output devices to operate for testing purposes.

| 1. KIA VEHICLE DIAGNOSIS     |
|------------------------------|
| MODEL : SEDONA               |
| SYSTEM : BODY CONTROL MODULE |
| 01. DIAGNOSTIC TROUBLE CODES |
| 02. CURRENT DATA             |
| 03. DUAL DISPLAY             |
| 04. FLIGHT RECORD            |
| <b>05. ACTUATION TEST</b>    |
| 06. SIMU-SCAN                |

| 1.5 ACTUATION TEST                           |                         | 01/29 |
|----------------------------------------------|-------------------------|-------|
| ROOM LAMP                                    |                         |       |
| DURATION                                     | UNTIL STOP KEY          |       |
| METHOD                                       | ACTIVATION              |       |
| CONDITION                                    | IG.KEY ON<br>ENGINE OFF |       |
| PRESS [STRT], IF YOU ARE READY !             |                         |       |
| <div> <div>STRT</div> <div>STOP</div> </div> |                         |       |

6. Use the "DIAGNOSTIC TROUBLE CODES" mode.

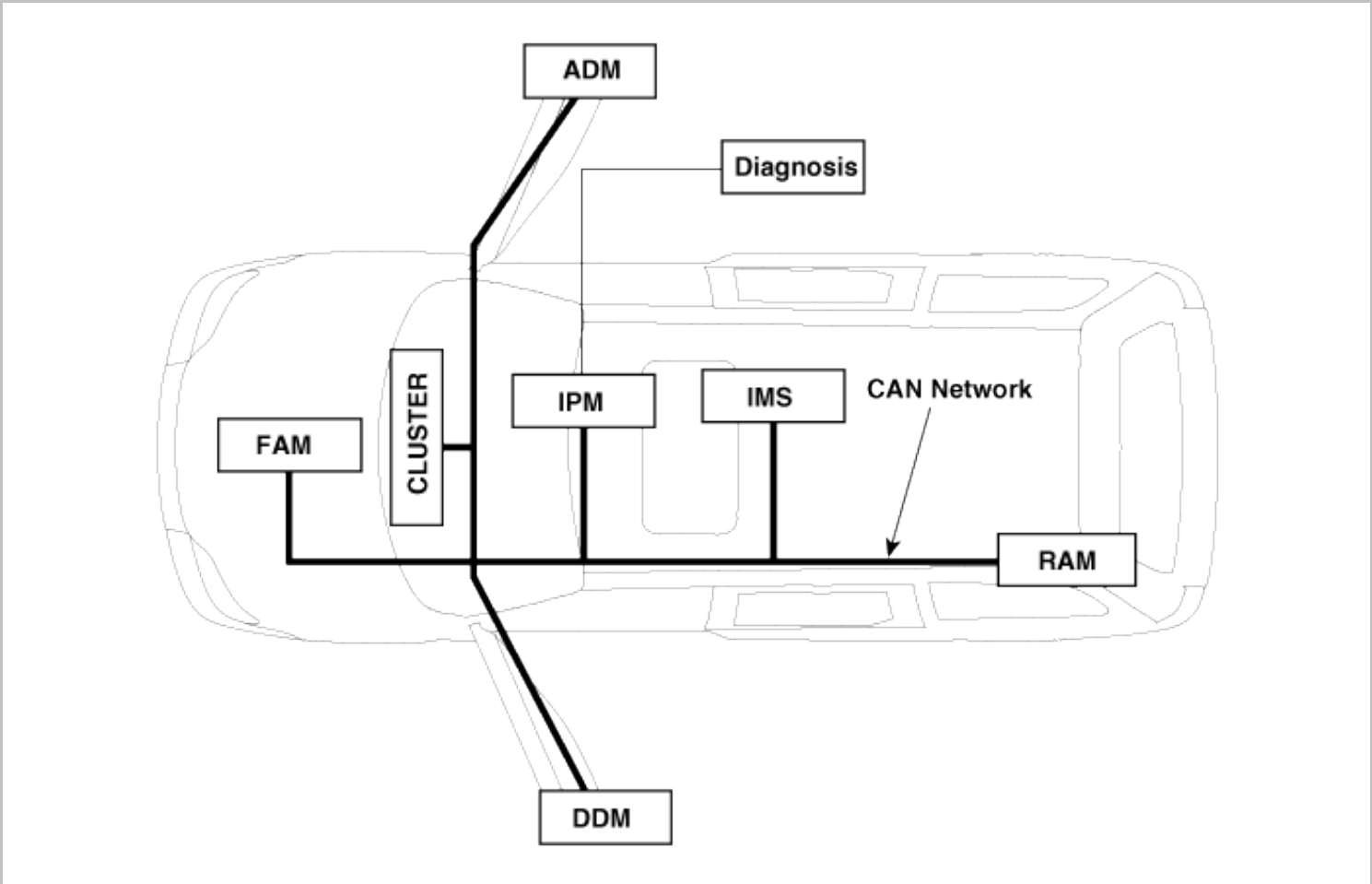
| 1. KIA VEHICLE DIAGNOSIS            |
|-------------------------------------|
| MODEL : SEDONA                      |
| SYSTEM : BODY CONTROL MODULE        |
| <b>01. DIAGNOSTIC TROUBLE CODES</b> |
| 02. CURRENT DATA                    |
| 03. DUAL DISPLAY                    |
| 04. FLIGHT RECORD                   |
| 05. ACTUATION TEST                  |
| 06. SIMU-SCAN                       |

## INSPECTION

- The body network system consists of several ECUs that communicates via a CAN bus. The diagnostic tester is not directly connected to the CAN bus, but utilises a one-wire communication line (K-line) that connects to a gateway in the IPM ECU.



2. The IPM communicates with the diagnostic tester directly. But other units operate self diagnostic, input/output monitoring and actuator operation via the IPM using the CAN communication.



INPUT MONITORING

IPM (In-Panel Module)

| No. | Input switch          | Unit                |
|-----|-----------------------|---------------------|
| 1   | IPM Node Availability | PRESENT/NOT PRESENT |
| 2   | FAM Node Availability | PRESENT/NOT PRESENT |
| 3   | RAM Node Availability | PRESENT/NOT PRESENT |
| 4   | DDM Node Availability | PRESENT/NOT PRESENT |
| 5   | ADM Node Availability | PRESENT/NOT PRESENT |
| 6   | IMS Node Availability | PRESENT/NOT PRESENT |
| 7   | CLU Node Availability | PRESENT/NOT PRESENT |
| 8   | IPM Node Failure      | FAILURE/ O.K        |
| 9   | FAM Node Failurey     | FAILURE/ O.K        |
| 10  | RAM Node Failure      | FAILURE/ O.K        |
| 11  | DDM Node Failure      | FAILURE/ O.K        |
| 12  | ADM Node Failure      | FAILURE/ O.K        |
| 13  | IMS Node Failure      | FAILURE/ O.K        |
| 14  | CLU Node Failure      | FAILURE/ O.K        |
| 15  | Auto Head lamp        | ON/OFF              |
| 16  | Headlamp low beam     | ON/OFF              |
| 17  | High beam             | ON/OFF              |

|    |                                                           |                       |
|----|-----------------------------------------------------------|-----------------------|
| 18 | Rear fog lamp                                             | ON/OFF                |
| 19 | Front fog lamp                                            | ON/OFF                |
| 20 | Park tail lamp                                            | ON/OFF                |
| 21 | Main room lamp                                            | ON/OFF                |
| 22 | Main room lamp door                                       | ON/OFF                |
| 23 | Left turn signal                                          | ON/OFF                |
| 24 | Right turn signal                                         | ON/OFF                |
| 25 | Front wiper low speed(from rain sensor)                   | ON/OFF                |
| 26 | Front wiper low speed switch(from multi function switch)  | ON/OFF                |
| 27 | Front wiper high speed(from rain sensor)                  | ON/OFF                |
| 28 | Front wiper high speed switch(from multi function switch) | ON/OFF                |
| 29 | Rear wiper low speed switch                               | ON/OFF                |
| 30 | Rear wiper intermittent switch                            | ON/OFF                |
| 31 | Front wiper intermittent switch                           | ON/OFF                |
| 32 | Front washer                                              | ON/OFF                |
| 33 | Rear washer                                               | ON/OFF                |
| 34 | Windshield defog                                          | ON/OFF                |
| 35 | Rear defog                                                | ON/OFF                |
| 36 | Parking brake                                             | ON/OFF                |
| 37 | Hazard switch                                             | ON/OFF                |
| 38 | Seat-belt                                                 | ON/OFF                |
| 39 | VAS                                                       | ON/OFF                |
| 40 | Front wiper mist switch                                   | ON/OFF                |
| 41 | Sunroof open(When operating)                              | OPEN/CLOSED           |
| 42 | PSD PTG on/off switch signal                              | ON/OFF                |
| 43 | Flash to pass                                             | ON/OFF                |
| 44 | Ignition key reminder                                     | INSERTED/NOT INSERTED |
| 45 | LH PSD open/close(Over head console)                      | ON/OFF                |
| 46 | PTG open/close(Over head console)                         | ON/OFF                |
| 47 | RH PSD open/close(Over head console)                      | ON/OFF                |
| 48 | Crash sensor input from airbag unit                       | ON/OFF                |
| 49 | Adjustable pedal backward                                 | ON/OFF                |
| 50 | Adjustable pedal forward                                  | ON/OFF                |
| 51 | IGN1                                                      | ON/OFF                |
| 52 | IGN2                                                      | ON/OFF                |
| 53 | ACC                                                       | ON/OFF                |
| 54 | MTS unlock input                                          | ON/OFF                |
| 55 | Hood Open switch                                          | OPEN/CLOSED           |

#### FAM (Front Area Module)

| No. | Input switch | Unit |
|-----|--------------|------|
|-----|--------------|------|

|    |                                  |                  |
|----|----------------------------------|------------------|
| 1  | Inhibitor Switch Neutral         | ON/OFF           |
| 2  | Inhibitor Switch Park            | ON/OFF           |
| 3  | Inhibitor Switch Reverse         | ON/OFF           |
| 4  | Brake Fluid Sensor State         | OK/LOW           |
| 5  | Washer Fluid Sensor State        | OK/LOW           |
| 6  | Fuel Filter State                | OK/NG            |
| 7  | Oil Pressure Switch State        | OK/LOW           |
| 8  | Vacuum Switch State              | OK/LOW           |
| 9  | IGN2                             | ON/OFF           |
| 10 | Front Wiper Park Switch State    | Park/Out of park |
| 11 | Stop lamp fuse check input       | OK/NG            |
| 12 | Windshield defog operation check | OK/NG            |

#### RAM (Rear Area Module)

| No. | Input switch                        | Unit             |
|-----|-------------------------------------|------------------|
| 1   | Tailgate Flasher Signal(From PTG)   | ON/OFF           |
| 2   | Stop Lamp switch                    | ON/OFF           |
| 3   | PSD PTG Door Lock Monitoring Switch | UNLOCKED/LOCKED  |
| 4   | Passenger Door Open Switch          | ON/OFF           |
| 5   | Driver Door Open Switch             | OPEN/CLOSE       |
| 6   | Tailgate Door Open Switch           | OPEN/CLOSE       |
| 7   | RSD Open Switch                     | OPEN/CLOSE       |
| 8   | LSD Open Switch                     | OPEN/CLOSE       |
| 9   | RSD Power Window Up Switch          | ON/OFF           |
| 10  | RSD Power Window Down Switch        | ON/OFF           |
| 11  | LSD Power Window Up Switch          | ON/OFF           |
| 12  | LSD Power Window Down Switch        | ON/OFF           |
| 13  | RQG Power Motor Close Switch        | ON/OFF           |
| 14  | RQG Power Motor Open Switch         | ON/OFF           |
| 15  | LQG Power Motor Close Switch        | ON/OFF           |
| 16  | LQG Power Motor Open Switch         | ON/OFF           |
| 17  | IGN2                                | ON/OFF           |
| 18  | Rear Wiper Park Switch              | Park/Out of park |
| 19  | Rear defog operation check input    | ON/NG            |
| 20  | Tailgate Key Cylinder Unlock Switch | ON/OFF           |
| 21  | Tailgate Key Cylinder Lock Switch   | ON/OFF           |

#### DDM (Driver door module)

| No. | Input switch                | Unit        |
|-----|-----------------------------|-------------|
| 1   | Door Lock Monitoring Switch | LOCK/UNLOCK |
| 2   | Door Lock Switch            | ON/OFF      |

|    |                                       |                        |
|----|---------------------------------------|------------------------|
| 3  | Door Unlock Switch                    | ON/OFF                 |
| 4  | Key Cylinder Door Lock Switch         | ON/OFF                 |
| 5  | Key Cylinder Door Unlock Switch       | ON/OFF                 |
| 6  | Fuel Filler Door Open Switch          | ON/OFF                 |
| 7  | Power Seat Slide Forward Switch       | ON/OFF                 |
| 8  | Power Seat Slide Backward Switch      | ON/OFF                 |
| 9  | Power Seat Front Height Up Switch     | ON/OFF                 |
| 10 | Power Seat Front Height Down Switch   | ON/OFF                 |
| 11 | Power Seat Rear Height Up Switch      | ON/OFF                 |
| 12 | Power Seat Rear Height Down Switch    | ON/OFF                 |
| 13 | Power Seat Recline Forward Switch     | ON/OFF                 |
| 14 | Power Seat Recline Backward Switch    | ON/OFF                 |
| 15 | IMS Auto Switch                       | ON/OFF                 |
| 16 | IMS Mode 1 Switch                     | ON/OFF                 |
| 17 | IMS Mode 2 Switch                     | ON/OFF                 |
| 18 | IMS Set Switch                        | ON/OFF                 |
| 19 | OSRVM side Select Switch              | RH/LH/OFF              |
| 20 | OSRVM direction Select Switch         | RIGHT/LEFT/DOWN/UP/OFF |
| 21 | IGN 2 Switch                          | ON/OFF                 |
| 22 | Window Lock Switch                    | ON/OFF                 |
| 23 | Front Left Window Up Switch           | ON/OFF                 |
| 24 | Front Left Window Down Switch         | ON/OFF                 |
| 25 | Front Left Window Auto Switch         | ON/OFF                 |
| 26 | Front Right Window Up Switch          | ON/OFF                 |
| 27 | Front Right Window Down Switch        | ON/OFF                 |
| 28 | Left Sliding Door Window UP Switch    | ON/OFF                 |
| 29 | Left Sliding Door Window Down Switch  | ON/OFF                 |
| 30 | Right Sliding Door Window UP Switch   | ON/OFF                 |
| 31 | Right Sliding Door Window Down Switch | ON/OFF                 |
| 32 | Left Quarter Glass Open Switch        | ON/OFF                 |
| 33 | Left Quarter Glass Close Switch       | ON/OFF                 |
| 34 | Right Quarter Glass Open Switch       | ON/OFF                 |
| 35 | Right Quarter Glass Close Switch      | ON/OFF                 |

#### ADM (Assist door module)

| No. | Input switch                    | Unit   |
|-----|---------------------------------|--------|
| 1   | Door Lock Monitoring Switch     | ON/OFF |
| 2   | Door Lock Switch                | ON/OFF |
| 3   | Door Unlock Switch              | ON/OFF |
| 4   | Key Cylinder Door Lock Switch   | ON/OFF |
| 5   | Key Cylinder Door Unlock Switch | ON/OFF |

|   |                                |        |
|---|--------------------------------|--------|
| 6 | IGN2 Switch                    | ON/OFF |
| 7 | Front Right Window Up Switch   | ON/OFF |
| 8 | Front Right Window Down Switch | ON/OFF |

## IMS Module

| No. | Input switch                | Unit   |
|-----|-----------------------------|--------|
| 1   | IGN2 Switch                 | ON/OFF |
| 2   | Slide front manual switch   | ON/OFF |
| 3   | Slide rear manual switch    | ON/OFF |
| 4   | Slide front limit switch    | ON/OFF |
| 5   | Slide rear limit switch     | ON/OFF |
| 6   | Recline front manual switch | ON/OFF |
| 7   | Recline rear manual switch  | ON/OFF |
| 8   | "P" position switch         | ON/OFF |

## Self-diagnosis

### IPM DTC List

| No. | DTC Code | DTC                          | Passiblecause                                                                        |
|-----|----------|------------------------------|--------------------------------------------------------------------------------------|
| 1   | B1102    | BATTERY VOLTAGE LOW          | Vbat < 9V                                                                            |
| 2   | B1588    | FR WIPER/WASHER MF SW        | MF switch status is not coherent for more than 2s                                    |
| 3   | B1589    | RR WIPER/WASHER MF SW        |                                                                                      |
| 4   | B1590    | LIGHT MF SW ERROR            | MF switch status is not coherent for more than 2s                                    |
| 5   | B1591    | TURN SIGNAL MF SW ERROR      |                                                                                      |
| 6   | B1602    | CAN BUS PHYSICAL BUS FAILURE | Physical error indicated by network management                                       |
| 7   | B1605    | DDM COMM. LOST& BUS FAILURE  | DDM is missing in system configuration information reported from network management. |
| 8   | B1606    | ADM COMM. LOST& BUS FAILURE  | ADM is missing in system configuration information reported from network management. |
| 9   | B1607    | IMS COMM. LOST& BUS FAILURE  | IMS is missing in system configuration information reported from network management. |
| 10  | B1611    | FAM COMM. LOST& BUS FAILURE  | FAM is missing in system configuration information reported from network management. |
| 11  | B1612    | RAM COMM. LOST& BUS FAILURE  | RAM is missing in system configuration information reported from network management. |
| 12  | B1613    | CLU COMM. LOST& BUS FAILURE  | CLU is missing in system configuration information reported from network management. |
| 13  | B1624    | EEPROM FAILURE               | Failed attempt to read or write EEPROM                                               |
| 14  | B1627    | EEPROM CORRUPTION            | Data in EEPROM is not coherent                                                       |
| 15  | B1628    | MODULE CONF. CONFLICT        | Hardware and software configuration are not coherent                                 |

|    |       |                 |                                                                                                            |
|----|-------|-----------------|------------------------------------------------------------------------------------------------------------|
| 16 | B1646 | S/W RESCUE MODE | Module enters rescue mode                                                                                  |
| 17 | B1647 | VAS ERROR       | No VAS chip transition from busy to not busy for more than 5 s after a VAS message command has been issued |

#### FAM DTC List

| No. | DTC Code | DTC                              | Passiblecause                                        |
|-----|----------|----------------------------------|------------------------------------------------------|
| 1   | B1624    | EEPROM FAILURE                   | Failed attempt to read or write EEPROM               |
| 2   | B1627    | EEPROM CORRUPTION                | Data in EEPROM is not coherent                       |
| 3   | B1646    | S/W RESCUE MODE                  | As soon as the module enters rescue mode             |
| 4   | B2119    | WINDSHIELD DEFOG RELAY FAIL      | Windshield defog relay failure                       |
| 5   | B2521    | BRAKE CIRCUIT OPEN OR FUSE FAIL  | Stop lamp fuse failure                               |
| 6   | B2535    | RIGHT T/SIGNAL LAMP SHORT TO GND | Right turn signal lamp circuit short to ground error |
| 7   | B2537    | RIGHT T/SIGNAL LAMP OPEN         | Right turn signal lamp circuit open error            |
| 8   | B2539    | LEFT T/SIGNAL LAMP SHORT TO GND  | Left turn signal lamp circuit short to ground error  |
| 9   | B2541    | LEFT T/SIGNAL LAMP OPEN          | Left turn signal lamp circuit open error             |
| 10  | B2543    | RIGHT H/LAMP HIGH SHORT TO GND   | Right headlamp high circuit short to ground error    |
| 11  | B2545    | RIGHT H/LAMP HIGH OPEN           | Right headlamp high circuit open error               |
| 12  | B2547    | LEFT H/LAMP HIGH SHORT TO GND    | Left headlamp high circuit short to ground error     |
| 13  | B2549    | LEFT H/LAMP HIGH OPEN            | Left headlamp high circuit open error                |
| 14  | B2551    | RIGHT H/LAMP LOW SHORT TO GND    | Right headlamp low circuit short to ground error     |
| 15  | B2553    | RIGHT H/LAMP LOW OPEN            | Right headlamp low circuit open error                |
| 16  | B2555    | LEFT H/LAMP LOW SHORT TO GND     | Left headlamp low circuit short to ground error      |
| 17  | B2557    | LEFT H/LAMP LOW OPEN             | Left headlamp low circuit open error                 |
| 18  | B2559    | FR FOG LAMP SHORT TO GND         | Right front fog lamp circuit short to ground error   |
| 19  | B2561    | FR FOG LAMP OPEN                 | Right front fog lamp circuit open error              |
| 20  | B2563    | FL FOG LAMP SHORT TO GND         | Left front fog lamp circuit short to ground error    |
| 21  | B2565    | FL FOG LAMP OPEN                 | Left front fog lamp circuit open error               |
| 22  | B2571    | RIGHT P/LAMP SHORT TO GND        | Right parking lamp circuit short to ground error     |
| 23  | B2573    | RIGHT P/LAMP OPEN                | Right parking lamp circuit open error                |
|     |          | LEFT P/LAMP SHORT TO             |                                                      |

|    |       |                          |                                                 |
|----|-------|--------------------------|-------------------------------------------------|
| 24 | B2575 | LEFT P/LAMP SHORT TO GND | Left parking lamp circuit short to ground error |
| 25 | B2577 | LEFT P/LAMP OPEN         | Left parking lamp circuit open error            |

#### RAM DTC List

| No. | DTC Code | DTC                              | Passiblecause                                                               |
|-----|----------|----------------------------------|-----------------------------------------------------------------------------|
| 1   | B1624    | EEPROM FAILURE                   | Failed attempt to read or write EEPROM                                      |
| 2   | B1627    | EEPROM CORRUPTION                | Data in EEPROM is not coherent                                              |
| 3   | B1646    | S/W RESCUE MODE                  | As soon as the module enters rescue mode                                    |
| 4   | B2115    | REAR DEFOG RELAY FAIL            | Command active and check entry not active                                   |
| 5   | B2441    | RR WIPER P. POS. DETECT FAIL     | Command active and park position does not change during 5s                  |
| 6   | B2524    | BRAKE LAMP OPEN                  | Stop lamps open circuit error                                               |
| 7   | B2535    | RIGHT T/SIGNAL LAMP SHORT TO GND | Right turn signal lamp circuit short to ground error                        |
| 8   | B2537    | RIGHT T/SIGNAL LAMP OPEN         | Right turn signal lamp circuit open error                                   |
| 9   | B2539    | LEFT T/SIGNAL LAMP SHORT TO GND  | Left turn signal lamp circuit short to ground error                         |
| 10  | B2541    | LEFT T/SIGNAL LAMP OPEN          | Left turn signal lamp circuit open error                                    |
| 11  | B2579    | RR TAIL MARKER LAMP SHORT TO GND | Right tail license side marker lamp circuit short to ground error           |
| 12  | B2581    | RR TAIL MARKER LAMP OPEN         | Right tail license side marker lamp circuit open error                      |
| 13  | B2583    | RL TAIL MARKER LAMP SHORT TO GND | Left tail license side marker lamp circuit short to ground error            |
| 14  | B2585    | RL TAIL MARKER LAMP OPEN         | Left tail license side marker lamp circuit open error                       |
| 15  | B2587    | BACK UP LAMP SHORT TO GND        | Back up lamps for Back Up Warning System unit circuit short to ground error |
| 16  | B2589    | BACK UP LAMP OPEN                | Back up lamps for Back Up Warning System unit circuit open error            |
| 17  | B2598    | RR BLOWER SW ILLU. CIR. OPEN     | Rear blower switch illumination circuit open                                |
| 18  | B2599    | RR BLOWER SW ILLU. SHORT TO GND  | Rear blower switch illumination short to ground                             |

#### DDM DTC List

| No. | DTC Code | DTC                                       | Passiblecause                                 |
|-----|----------|-------------------------------------------|-----------------------------------------------|
| 1   | B1910    | Left OSM horizontal motor or sensor error | Right OSM horizontal motor circuit open error |
| 2   | B1911    | Left OSM vertical motor or sensor error   | Right OSM horizontal motor circuit open error |
| 3   | B1952    | OSRVM defogger error                      | Left OSM deicer circuit open error            |
|     |          | Driver door lock actuator                 |                                               |

|   |       |                                            |                                                          |
|---|-------|--------------------------------------------|----------------------------------------------------------|
| 4 | B2330 | Driver door lock actuator error            | Assist door lock actuator circuit open error             |
| 5 | B2331 | Driver door unlock actuator error          | Assist door unlock actuator circuit open error           |
| 6 | B2429 | Folding motor power feed error             | Folding motor power feed circuit open error              |
| 7 | B2455 | Safety power window motor power feed error | Safety power window IGN2 module power circuit open error |
| 8 | B2525 | Illumination error                         | Illumination circuit open error                          |
| 9 | B2529 | Drive door courtesy lamp error             | Driver door courtesy lamp circuit open error             |

#### ADM DTC List

| No. | DTC Code | DTC                                        | Passiblecause                                  |
|-----|----------|--------------------------------------------|------------------------------------------------|
| 1   | B1912    | Right OSM horizontal motor or sensor error | Right OSM horizontal motor circuit open error  |
| 2   | B1913    | Right OSM vertical motor or sensor error   | Right OSM horizontal motor circuit open error  |
| 3   | B1952    | OSRVM defogger error                       | Right OSM deicer circuit open error            |
| 4   | B2332    | Assist door unlock actuator error          | Assist door lock actuator circuit open error   |
| 5   | B2333    | Assist door unlock actuator error          | Assist door unlock actuator circuit open error |
| 6   | B2525    | Illumination error                         | Illumination circuit open error                |
| 7   | B2533    | Assist door courtesy lamp error            | Assist door courtesy lamp circuit open error   |

#### IMS DTC List

| No. | DTC Code | DTC                                | Passiblecause                                                             |
|-----|----------|------------------------------------|---------------------------------------------------------------------------|
| 1   | B1954    | Slide motor or sensor error        | Lost Communication With Slide motor sensor output for more than 2 s       |
| 2   | B1955    | Recline motor or sensor error      | Lost Communication With Recline motor sensor output for more than 2 s     |
| 3   | B1956    | Front height motor or sensor error | Lost Communication With Front right motor sensor output for more than 1 s |
| 4   | B1957    | Rear height motor or sensor error  | Lost Communication With Rear right motor sensor output for more than 1 s  |
| 5   | B1958    | Pedal motor or sensor error        | Lost Communication With Pedal motor sensor output for more than 1 s       |
| 6   | B2456    | Seat motor sensor Vcc error        | Lost Seat motor sensor Vcc for more than 1 s                              |
| 7   | B2457    | Pedal motor sensor Vcc error       | Lost Pedal motor sensor Vcc for more than 1 s                             |

#### Driving Actuator

#### IPM ACTUATOR LIST



| No. | Description                              | Value  | Control                             |
|-----|------------------------------------------|--------|-------------------------------------|
| 1   | Windshield Defog Switch Indicator Output | ON/OFF | Continuously ON                     |
| 2   | Rear Defog Switch Indicator Output       | ON/OFF | Continuously ON                     |
| 3   | Rear Fog Lamp Switch Indicator Output    | ON/OFF | Continuously ON                     |
| 4   | VAS Switch Indicator Output              | ON/OFF | Continuously ON                     |
| 5   | Back Up Signal Output                    | ON/OFF | Continuously ON                     |
| 6   | Micro Burglar Relay Drive Output         | ON/OFF | Continuously ON                     |
| 7   | Ignition Key Hole Illumination           | ON/OFF | Continuously ON                     |
| 8   | Adjustable Pedal On Off Signal Output    | ON/OFF | Continuously ON                     |
| 9   | Power Feed To Sunroof Relay Coil         | ON/OFF | Continuously ON                     |
| 10  | Horn Relay Drive                         | ON/OFF | 0.5 sec ON then OFF                 |
| 11  | Sound Mute Signal Output                 | ON/OFF | Continuously ON                     |
| 12  | Panel Lights Trip Computer Output        | ON/OFF | Continuously ON                     |
| 13  | Micro MTS Burglar Alarm Output           | ON/OFF | Continuously ON                     |
| 14  | Auto Light Sensor 5V Ref                 | ON/OFF | Continuously ON                     |
| 15  | Burglar Alarm Indicator                  | ON/OFF | Continuously ON                     |
| 16  | AV Tail Output                           | ON/OFF | Continuously ON                     |
| 17  | VAS                                      | ON/OFF | One Issue of voice alarm message    |
| 18  | Chime                                    | ON/OFF | Continuously ON with 0.6 sec period |

#### FAM ACTUATOR LIST

| No. | Description            | Value  | Control                                                      |
|-----|------------------------|--------|--------------------------------------------------------------|
| 1   | Front Washer           | ON/OFF | 1 sec ON then OFF (once)                                     |
| 2   | Rear Washer            | ON/OFF | 2 sec ON then OFF (once)                                     |
| 3   | Right Headlamp High    | ON/OFF | Continuously ON                                              |
| 4   | Right Headlamp Low     | ON/OFF | Continuously ON                                              |
| 5   | Right Lamp Park        | ON/OFF | Continuously ON                                              |
| 6   | Right Fog Lamp         | ON/OFF | Continuously ON                                              |
| 7   | Right Turn Signal      | ON/OFF | Continuously ON with (80 +/- 5) cycles per minute, Duty: 50% |
| 8   | Left Headlamp High     | ON/OFF | Continuously ON                                              |
| 9   | Left Headlamp Low      | ON/OFF | Continuously ON                                              |
| 10  | Left Lamp Park         | ON/OFF | Continuously ON                                              |
| 11  | Left Fog Lamp          | ON/OFF | Continuously ON                                              |
| 12  | Left Turn Signal       | ON/OFF | Continuously ON with (80 +/- 5) cycles per minute, Duty: 50% |
| 13  | IGN2 Control           | ON/OFF | Continuously ON                                              |
| 14  | Windshield Defog Timer | ON/OFF | Continuously ON                                              |
| 15  | Wiper On Off           | ON/OFF | Continuously ON                                              |

|    |                    |        |                                                     |
|----|--------------------|--------|-----------------------------------------------------|
| 16 | Wiper Low speed    | ON/OFF | 3 wiping with LOW speed                             |
| 17 | Wiper High speed   | ON/OFF | 3 wiping with HIGH speed                            |
| 18 | Burglar Alarm horn | ON/OFF | Continuously ON with 60 cycles per minute, Duty:50% |

#### RAM ACTUATOR LIST

| No. | Description                              | Value  | Control                                                      |
|-----|------------------------------------------|--------|--------------------------------------------------------------|
| 1   | Room Lamp LS                             | ON/OFF | Continuously ON                                              |
| 2   | Room Lamp LS Door                        | ON/OFF | Continuously ON                                              |
| 3   | Luggage Lamp LS                          | ON/OFF | Continuously ON                                              |
| 4   | LQG Motor Close                          | ON/OFF | 3 sec ON then OFF (once)                                     |
| 5   | LQG Motor Open                           | ON/OFF | 3 sec ON then OFF (once)                                     |
| 6   | RQG Motor Close                          | ON/OFF | 3 sec ON then OFF (once)                                     |
| 7   | RQG Motor Open                           | ON/OFF | 3 sec ON then OFF (once)                                     |
| 8   | RSD Power Window Up                      | ON/OFF | 3 sec ON then OFF (once)                                     |
| 9   | RSD Power Window Down                    | ON/OFF | 3 sec ON then OFF (once)                                     |
| 10  | LSD Power Window Up                      | ON/OFF | 3 sec ON then OFF (once)                                     |
| 11  | LSD Power Window Down                    | ON/OFF | 3 sec ON then OFF (once)                                     |
| 12  | LH PSD Open Close Signal                 | ON/OFF | 0.5 sec ON then OFF (once)                                   |
| 13  | RH PSD Open Close Signal                 | ON/OFF | 0.5 sec ON then OFF (once)                                   |
| 14  | PTG Open Close Signal                    | ON/OFF | 0.5 sec ON then OFF (once)                                   |
| 15  | PSD PTG On Off Signal                    | ON/OFF | Continuously ON                                              |
| 16  | Park Signal                              | ON/OFF | Continuously ON                                              |
| 17  | Start Signal                             | ON/OFF | Continuously ON                                              |
| 18  | Rear Defog                               | ON/OFF | Continuously ON                                              |
| 19  | Rear Fog Lamps                           | ON/OFF | Continuously ON                                              |
| 20  | Right Turn Signal Lamp                   | ON/OFF | Continuously ON with (80 +/- 5) cycles per minute, Duty: 50% |
| 21  | Left Turn Signal Lamp                    | ON/OFF | Continuously ON with (80 +/- 5) cycles per minute, Duty: 50% |
| 22  | Back Up Lamp Back Up Warning System Unit | ON/OFF | Continuously ON                                              |
| 23  | Left/Right Tail Licence Side Marker      | ON/OFF | Continuously ON                                              |
| 24  | Door Lock                                | ON/OFF | 0.5 sec ON then OFF (once)                                   |
| 25  | Door Unlock                              | ON/OFF | 0.5 sec ON then OFF (once)                                   |
| 26  | Rear Wiper Motor                         | ON/OFF | 5 sec ON then OFF (once)                                     |
|     | Rear Blower Switch                       |        |                                                              |

|    |                                                               |        |                            |
|----|---------------------------------------------------------------|--------|----------------------------|
| 27 | &amp;&amp;&amp;&amp;&amp;&amp;&amp; Rear Monitor illumination | ON/OFF | Continuously ON            |
| 28 | Fuel Filler Door Solenoid                                     | ON/OFF | 0.5 sec ON then OFF (once) |
| 29 | Map Lamp LS                                                   | ON/OFF | Continuously ON            |

#### DDM ACTUATOR LIST

| No. | Description                       | Value  | Control                    |
|-----|-----------------------------------|--------|----------------------------|
| 1   | Door Courtesy Lamp                | ON/OFF | Continuously ON            |
| 2   | Door Lock Out                     | ON/OFF | 0.5 sec ON then OFF (once) |
| 3   | Door Unlock Out                   | ON/OFF | 0.5 sec ON then OFF (once) |
| 4   | OSRVM Up                          | ON/OFF | 3 sec ON then OFF (once)   |
| 5   | OSRVM Down                        | ON/OFF | 3 sec ON then OFF (once)   |
| 6   | OSRVM Left                        | ON/OFF | 3 sec ON then OFF (once)   |
| 7   | OSRVM Right                       | ON/OFF | 3 sec ON then OFF (once)   |
| 8   | OSRVM Defog                       | ON/OFF | Continuously ON            |
| 9   | Folding Motor Power Feed          | ON/OFF | Continuously ON            |
| 10  | Safety Power Window Auto Up Out   | ON/OFF | 0.2 sec ON then OFF (once) |
| 11  | Safety Power Window Up Out        | ON/OFF | 3 sec ON then OFF (once)   |
| 12  | Safety Power Window Auto Down Out | ON/OFF | 0.2 sec ON then OFF (once) |
| 13  | Safety Power Window Down Out      | ON/OFF | 3 sec ON then OFF (once)   |
| 14  | Power Window up Out               | ON/OFF | 3 sec ON then OFF (once)   |
| 15  | Power Window Down Out             | ON/OFF | 3 sec ON then OFF (once)   |
| 16  | Illumination Out                  | ON/OFF | Continuously ON            |

#### ADM ACTUATOR LIST

| No. | Description           | Value  | Control                    |
|-----|-----------------------|--------|----------------------------|
| 1   | Door Courtesy Lamp    | ON/OFF | Continuously ON            |
| 2   | Door Lock Out         | ON/OFF | 0.5 sec ON then OFF (once) |
| 3   | Door Unlock Out       | ON/OFF | 0.5 sec ON then OFF (once) |
| 4   | OSRVM Up              | ON/OFF | 3 sec ON then OFF (once)   |
| 5   | OSRVM Down            | ON/OFF | 3 sec ON then OFF (once)   |
| 6   | OSRVM Left            | ON/OFF | 3 sec ON then OFF (once)   |
| 7   | OSRVM Right           | ON/OFF | 3 sec ON then OFF (once)   |
| 8   | OSRVM Defog           | ON/OFF | Continuously ON            |
| 9   | Power Window up Out   | ON/OFF | 3 sec ON then OFF (once)   |
| 10  | Power Window Down Out | ON/OFF | 3 sec ON then OFF (once)   |
| 11  | Illumination Out      | ON/OFF | Continuously ON            |

## IMS ACTUATOR LIST

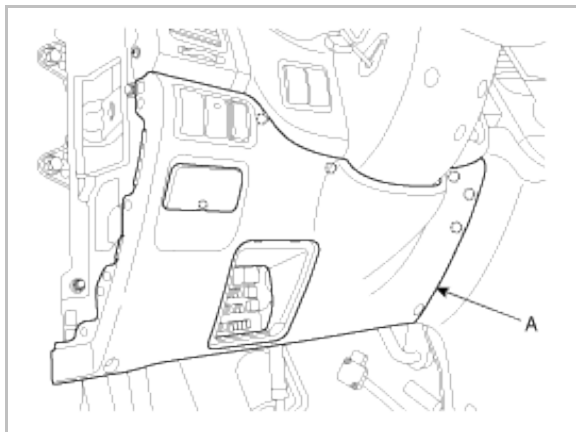
| No. | Description                       | Value  | Control         |
|-----|-----------------------------------|--------|-----------------|
| 1   | Power Seat Slide Forward Motor    | ON/OFF | Continuously ON |
| 2   | Power Seat Slide Backward Motor   | ON/OFF | Continuously ON |
| 3   | Power Seat FR Height Up Motor     | ON/OFF | Continuously ON |
| 4   | Power Seat FR Height Down Motor   | ON/OFF | Continuously ON |
| 5   | Power Seat RR Height Up Motor     | ON/OFF | Continuously ON |
| 6   | Power Seat RR Height Down Motor   | ON/OFF | Continuously ON |
| 7   | Power Seat Recline Forward Motor  | ON/OFF | Continuously ON |
| 8   | Power Seat Recline Backward Motor | ON/OFF | Continuously ON |
| 9   | Pedal Forward Motor               | ON/OFF | Continuously ON |
| 10  | Pedal Backward Motor              | ON/OFF | Continuously ON |

## REPLACEMENT

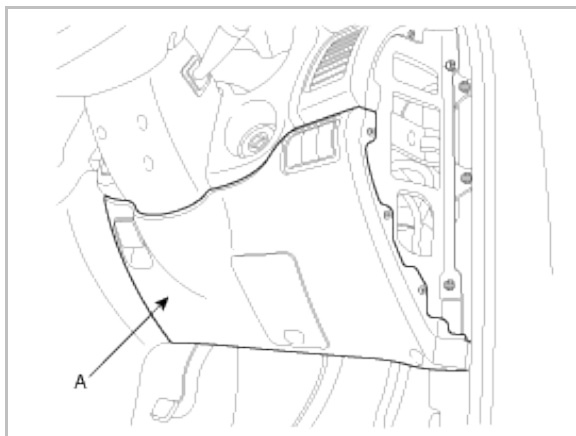
### IPM (In-Panel Module)

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

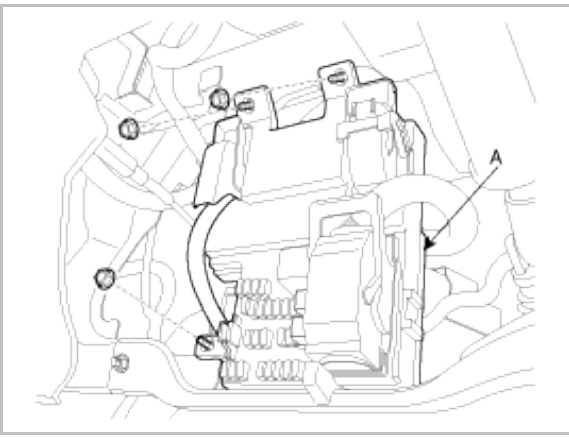
#### [LHD]



#### [RHD]



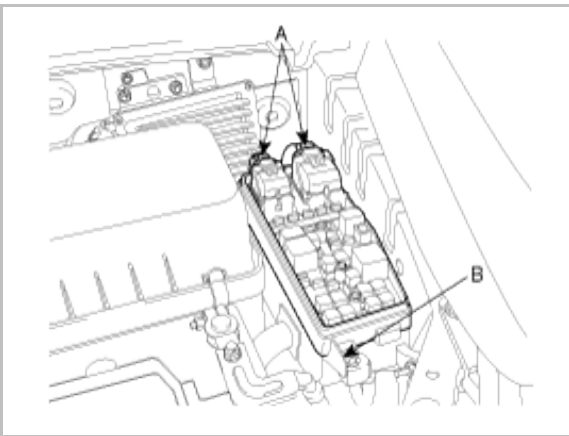
3. Remove the keyless antenna cable and IPM(Instrument Panel Module)(A) after loosening 3 nuts and disconnecting 5 connectors.



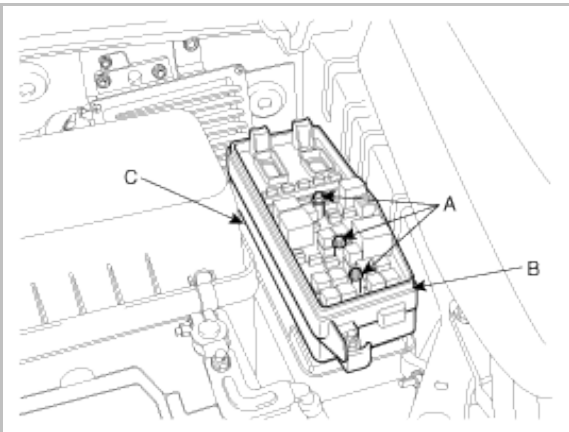
4. Installation is the reverse of removal.

## **FAM (Front Area Module)**

1. Disconnect the negative (-) battery terminal.
2. Remove the FAM cover from the engine room.
3. Remove the 2 FAM connectors(A) and battery terminal nut(B).



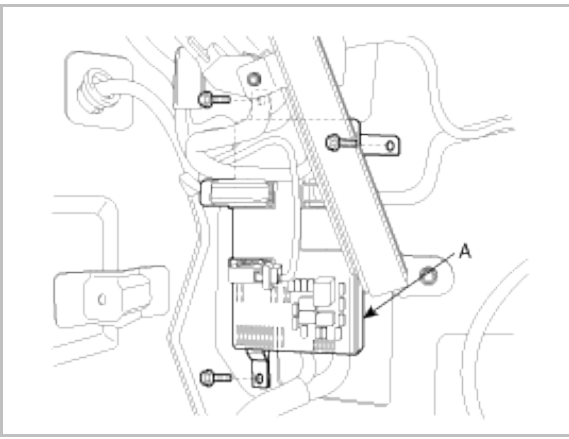
4. Remove the IPM(B) from the splash shield(C) after loosening the 3 IPM mounting bolts(A) and the IPM mounting clip.



5. Disconnect the connector from the splash shield.
6. Installation is the reverse of removal.

## **RAM (Rear Area Module)**

1. Disconnect the negative (-) battery terminal.
2. Remove the left luggage side trim  
(Refer to the Body group - interior trim)
3. Remove the RAM(A) after loosening the 7 connectors and the 3 RAM mounting bolts(A).



4. Installation is the reverse of removal.

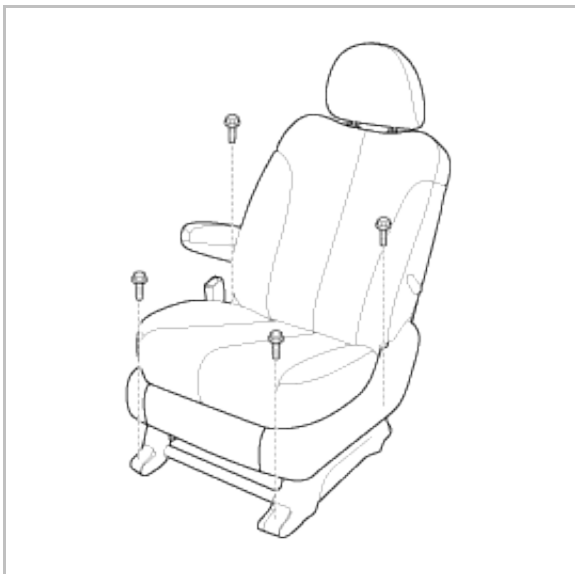
# **Body Electrical System**

IMS (Integrated Memory System) - IMS  
Module

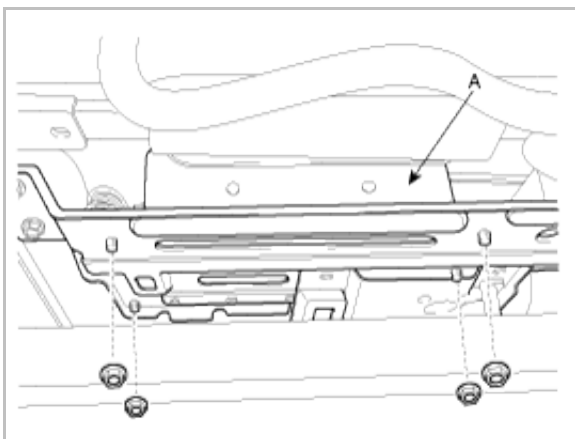


## REPLACEMENT

1. Remove the negative (-) battery terminal.
2. Remove the seats in the car. (Refer to the Body group - front seats)



3. Remove the IMS module (A) after loosening 4 nuts and 3 connectors in the bottom of seat.



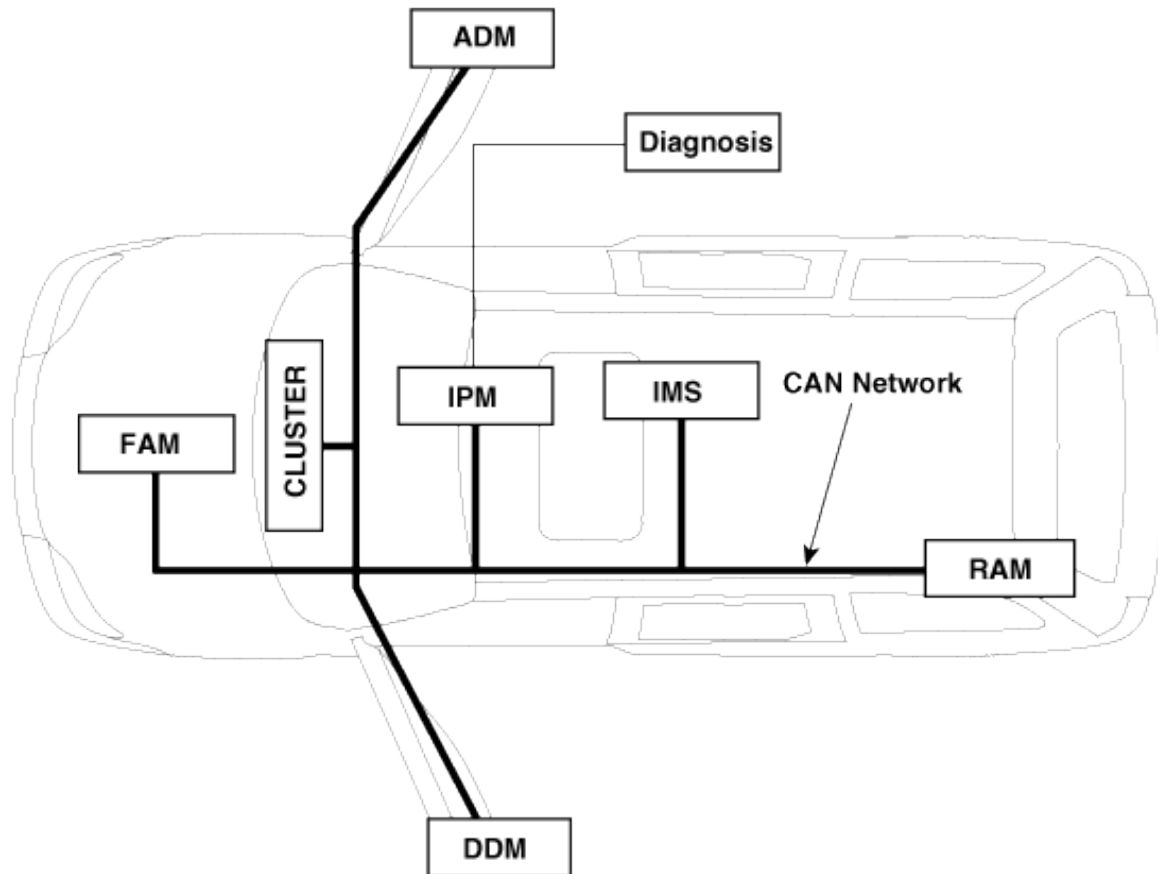
4. Installation is the reverse of removal.



# **Body Electrical System**

IMS (Integrated Memory System) - IMS  
Power Seat Control

## CIRCUIT DIAGRAM





## DESCRIPTION

An optimal seat position set by a driver can be memorized in P/seat unit by memory SW and position SW, which enables restoration of seat position set by the driver despite seat adjustments.

Furthermore, data is transmitted between P/seat and IPM, DDM, ADM, RAM, FAM, CLUSTER through CAN BUS.

Seat position presets cannot be recalled while driving. An emergency stop function is provided; additional functions are described below.

1. It conducts manual operation of seat by CAN BUS data transmitted by DDM as well as that of adjustable pedal by CAN BUS data transmitted by IPM received when operating SW manually.
2. Manual SW behavior when communication stops (back-up behavior)
  - A. Slide front/rear
  - B. Recline front/rear
  - C. Position control of slide motor is possible by manual SW even in case of congestion in CPU or removal of a fuse for P/seat unit B.
3. 2 memory locations are provided for storing seat, outside mirror, and adjustable pedal presets.
4. The driver seat can be set to slide rearward when the ignition key is removed, and forward when the key is inserted.
5. 2 additional presets for seat, mirror, and adjustable pedal position can be stored with the RKE transmitter.

## OPERATION

### MANUAL OPERATION

Manual operation of the driver seat and adjustable pedals is possible provided the transaxle is in 'P' range and the vehicle speed is 0 MPH. Operation of the manual controls overrides any automatic operation commanded via CAN.

### MEMORY OPERATION

1. Pressing the 'M' button on the control panel will place the system into memory storage mode and will result in a single pulse from the output buzzer.
2. If one of the memory location buttons is pressed and held within 5 seconds of pressing the 'M' button, the output buzzer will pulse twice to indicate successful storage of seat, mirror, and adjustable pedal positions.
3. The ignition switch must be in the RUN or START position, the vehicle speed must be 0 MPH, and the transaxle must be in 'P' range to store memory presets.
4. Pressing the 'M' button while recalling a stored preset will halt the preset recall operation.
5. Memory will be cleared if battery is removed.

### MEMORY REPLAY OPERATION

1. Pressing one of the memory location buttons will result in the driver seat, outside mirrors, and adjustable pedals being positioned based on the stored preset data.
2. The ignition switch must be in the RUN position, the transaxle must be in 'P' range, the vehicle speed must be 0 MPH, and the manual functions must not be in operation to recall stored presets.
3. Others
  - A. Play operation not recorded in the position switch will not be conducted and there will be no buzzer output.
  - B. If other data is received during preset recall operation, the most recent preset recall signal will take precedence.
  - C. If engine is started during preset recall operation, halt preset recall operation, and resume it toward target position 100ms after Ignition switch is returned to "RUN". However, if the START state lasts over 5 sec., it will not resume even after returning to RUN.
  - D. If preset recall order is received during engine start, preset recall operation is inhibited.
  - E. If input from manual switch for seat and adjust pedal occurs during preset recall operation of seat and adjust pedal, halt all their preset recall operations.
  - F. If an error occurs during manual operation of seat and adjust pedal, delete Memory.

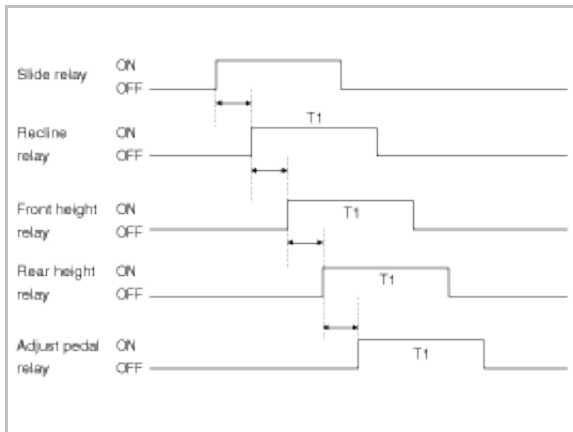
#### 4. Operation control

##### A. Prioritization of operations

Motor starting is delayed for 100ms respectively in case of auto control to prevent rush current from overlap when motors are running, and it follows the following order.

Slide > recline > front height > rear height > adjust pedal

##### B. Memory preset recall is conducted in the following order, and delay time for each motor is as follows.



T1 : Maximum 0.1 sec.

Continuous cooperation TIMER value for each motor

Slide: 15 sec., recline: 30 sec., front height: 5 sec., rear height: 8 sec., adjust pedal: 10 sec.

##### C. Control when turning to the opposite direction

When motor has to be run in a reverse direction during Easy access function or preset recall operation, stop the operation immediately, wait for 100ms and then try operation to the reverse direction.

##### D. If the difference between position and the current one is below specified value, motor will not run even though preset recall data is received.

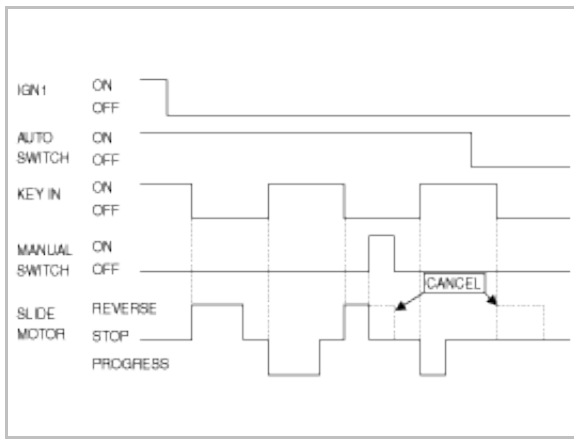
Slide, recline, front height, rear height : 6PULSE

Adjust pedal: 3LSB(about 0.06V)

##### E. Operation will stop upon reaching Motor's target point when conducting Easy access function or preset recall operation.

### EASY ACCESS FUNCTION OPERATION (SLIDE MOTOR ONLY)

1. Easy access function operation is allowed only when auto switch is on, and the operation will be halted if auto switch changes from on to off.
2. If a key is removed and CAN BUS data transmitted from IPM changes from "on" to "off", the seat slide will move 50mm backward based on the IGN off point. If a key off position is farther back than 50mm against the IGN off point, get-off gearing will not be conducted. If slide rear limit becomes off in the middle of backward operation, retreat control will be halted.
3. The following conditions will be identified and processed by IMS, and if any one of the following conditions is met, Easy access function operation will be prevented or halted.
  - A. When "P" position switch is not on.
  - B. When Vehicle Speed in CAN BUS data transmitted from cluster is "3km/h" or faster.
  - C. When seat and pedal is under manual switch operation.
  - D. When auto switch is off.
4. When control is halted in the middle of backward operation, the remaining operation will not be completed, and when returning, it will return just as much as it retreated.
5. It will move to IGN off point in case of Get-on gearing by key in despite manual switch input during or after backward operation.
6. After the key is removed, on the condition of SLEEP state, Easy access function operation will be conducted after 150ms if the key is inserted when auto switch is turned ON(OFF) from Off(ON).



## MEMORY STORAGE OPERATION BY KEYLESS

1. If "ID1" or "ID2" is received during keyless lock operation, record seat and pedal position in keyless code. (there is no buzzer output during memory storage operation by keyless)
2. Memory storage operation is allowed for a single ID after a change of IG from "on" → "off".
3. Any one of the following conditions will prevent keyless Memory storage operation.
  - A. When "P" position switch is not on.
  - B. When Vehicle Speed in CAN BUS data transmitted from CLUSTER is "3km/h" or faster.
  - C. When seat and pedal is manipulated by CAN BUS and manual switch.
  - D. When IG transmitted from IPM is other than off.

## PRESET RECALL OPERATION BY KEYLESS

1. When IG is off (CAN BUS data IG transmitted from IPM is "off") and a key is removed (CAN BUS data Key Reminder Switch transmitted from IPM is "off"), and if "ID1" or "ID2" is received during keyless unlock operation, it automatically adjusts seat and pedal positions as memorized in keyless code (there is no buzzer output during preset recall operation by keyless). However, seat slide adjustment position is determined as follows, depending on Auto switch.
  - A. When auto switch is on ("IMS Auto Switch" is "on") , the position is automatically adjusted to 50 mm farther back than target position, and if a key is inserted ("Key Reminder Switch" changes from "off" to "on"), it conducts Get-on gearing operation to a target preset recall position.
  - B. If auto switch is off ("IMS Auto Switch" is "off"), it moves to the target memory play position.
2. Any one of the following conditions will prevent preset recall operation.
  - A. When "P" position switch is not on.
  - B. When Vehicle Speed in CAN BUS data transmitted from cluster is "3km/h" or faster.
  - C. When seat and pedal is manipulated by CAN BUS and manual switch.
  - D. When IG Switch transmitted from IPM is other than off.
  - E. When a key is inserted.
3. Playing will be halted during preset recall operation if any of the following conditions is met.
  - A. When "P" position switch is not on.
  - B. When vehicle speed in CAN BUS data transmitted from cluster is "3km/h" or faster.
  - C. When seat and pedal is manipulated by CAN BUS and manual switch.

## SETTING LIMIT

1. A limit switch is installed to prevent the seat from traveling beyond the maximum forward/reward positions.
2. No limit switch is installed for the recline, height, or pedal adjustments. Arbitrary limit positions are used for these functions.

## DETECTING ERRORS FOR SEAT

Take countermeasure against error if the following conditions occur during manual switch operation.

- Error when pulse is not fed.

|  |       |         |              |             |
|--|-------|---------|--------------|-------------|
|  | Slide | Recline | Front height | Rear height |
|--|-------|---------|--------------|-------------|

|                 |                          |                          |
|-----------------|--------------------------|--------------------------|
| Error condition | Below 6 pulses in 2 sec. | Below 6 pulses in 1 sec. |
| Prerequisite    | FR/RR limit SW on        | Limit setting complete   |

- Stop the related motor(seat / pedal) if an error is detected during playing or Easy access function operation.
- Stop the corresponding motor if an error is detected during manual operation (excluding slide motor).
- If seat sensor Vcc below 1V is detected by 1s
  - Stop all seat motors running if seat sensor Vcc error is detected during playing or Easy access function operation. (no buzzer output)
- Return if seat sensor Vcc is 4V or more.

## DETECTING ERRORS FOR ADJUST PEDAL

1. If signal change is below 0.06V per sec though motor is running.
  - A. Stop the corresponding motor if error is detected during playing or Easy access function operation.
2. If adjust pedal sensor Vcc below 1V is detected by 1s
  - A. Stop pedal motor running if pedal sensor Vcc error is detected during playing or Easy access function operation. (no buzzer output)
3. Return if adjust pedal sensor Vcc is 4V or more.

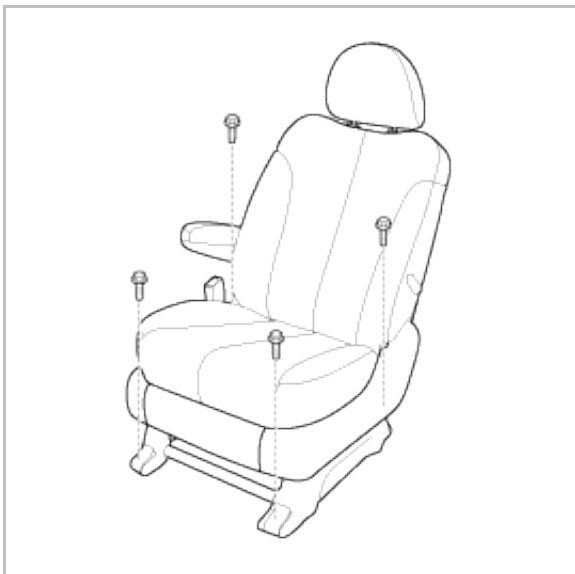
## HANDLING ERRORS

1. If errors are discovered, regard them as harness disconnection or sensor failure, and conduct the following measures.
  - A. Stop auto control (play or Easy access function operation) if it is under auto control and set off buzzer 10 times (however, have motors other than the one with an error operate normally).
  - B. Set off alarm again in case of recurrence of error after restoration of a motor with an error.
  - C. Complete alarm 10 times though it comes back to normal during error alarm.
  - D. Stop alarm if receiving memory recall or play order, and set off buzzer in the corresponding function.
  - E. Manual operation control is allowed even for a motor with errors.
  - F. Set off buzzer if memory or play order is received even during error.
  - G. The timing to lift auto control suspension is when repair for the failing motor is completed, and the criteria for the completion point are as follows:
    - Seat: if signal input is normal with over 6 pulses within a sec. from position sensor of a motor with an error caused by manual switch.
    - Adjust pedal: if there is change in input of over 3 LSB within 1 sec. from sensor by manual switch.

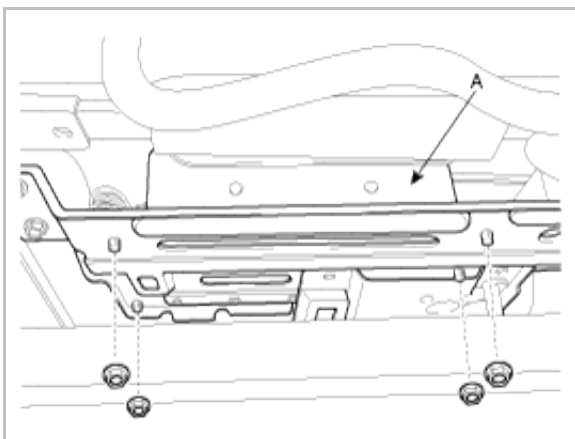


## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the seat back (Refer to Body group - front seat).



3. Remove the power seat module after removing the power seat module mounting nuts (4EA) and connector (3EA).



4. Installation is the reverse of removal.

# **Body Electrical System**

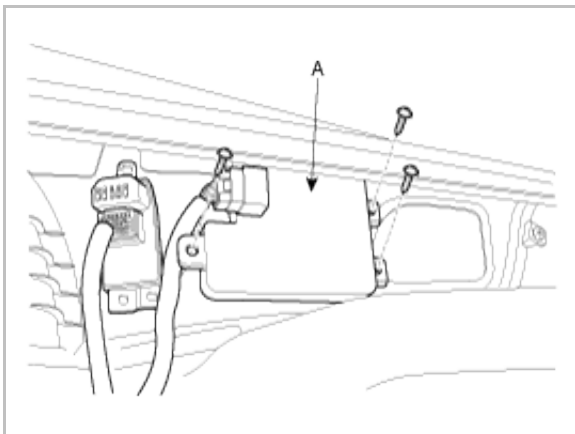
IMS (Integrated Memory System) - IMS  
Control Switch





## REPLACEMENT

1. Remove the negative (-) battery terminal.
2. Remove the front door trim panel in the car. (Refer to the Body group - front door)
3. Remove the switch (A) mounting screws (3EA) after disconnecting the 16pin switch connector.



4. Remove the connector from the front door trim panel.
5. Installation is the reverse of removal.



# Body Electrical System

## Seat Electrical

## COMPONENT LOCATION



1. Slide motor

2. Front height motor

3. Rear height motor

4. Reclining motor

# **Body Electrical System**

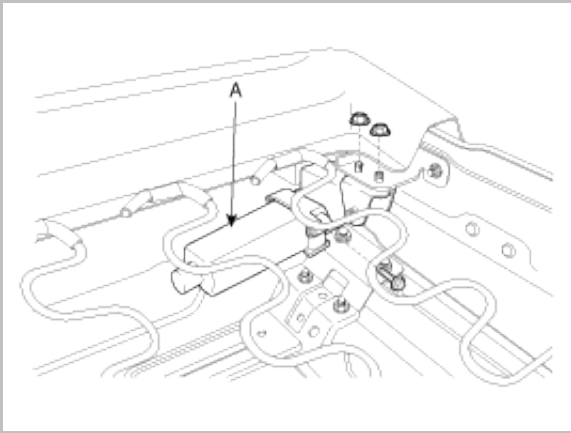
Seat Electrical - Power Seat Motor



## REPLACEMENT

### FRONT HEIGHT MOTOR

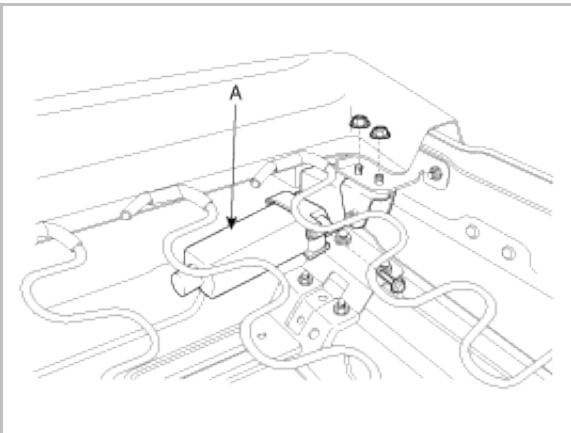
1. Disconnect the negative (-) battery terminal.
2. Remove the seat cushion (Refer to Body group - front seat).
3. Remove the front height motor (A) after loosening the mounting nuts (2EA) , bolt (1EA) and removing connector.



4. Installation is the reverse of removal.

### REAR HEIGHT MOTOR

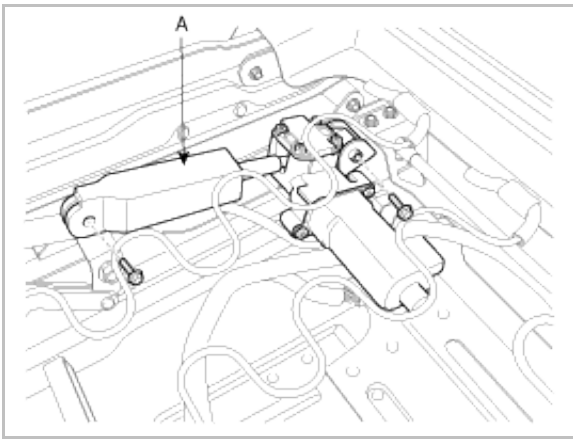
1. Disconnect the negative (-) battery terminal.
2. Remove the seat cushion (Refer to Body group - front seat).
3. Remove the rear height motor (A) after removing the mounting bolt (2EA) and connector.



4. Installation is the reverse of removal.

### SLIDE MOTOR

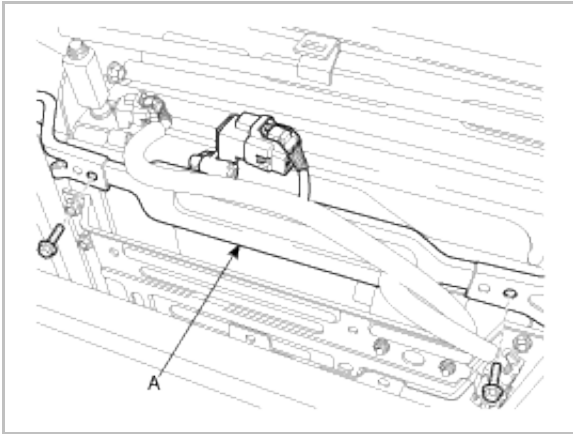
1. Disconnect the negative (-) battery terminal.
2. Remove the seat cushion (Refer to Body group - front seat).
3. Remove the slide motor (A) after removing the mounting bolt (2EA) and connector.



4. Installation is the reverse of removal.

## SLIDE MOTOR

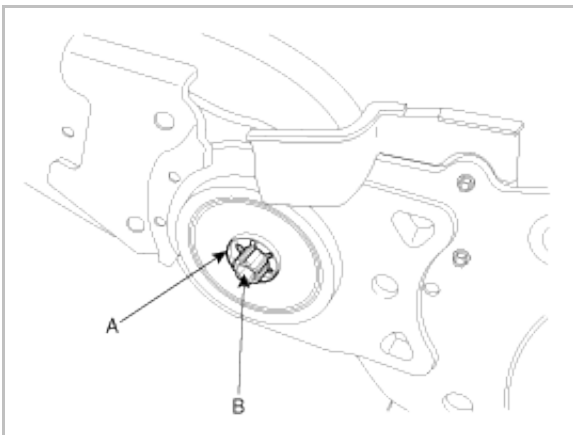
1. Disconnect the negative (-) battery terminal.
2. Remove the seat cushion (Refer to Body group - front seat).
3. Remove the slide motor (A) after removing the mounting bolts (2EA) and connector.



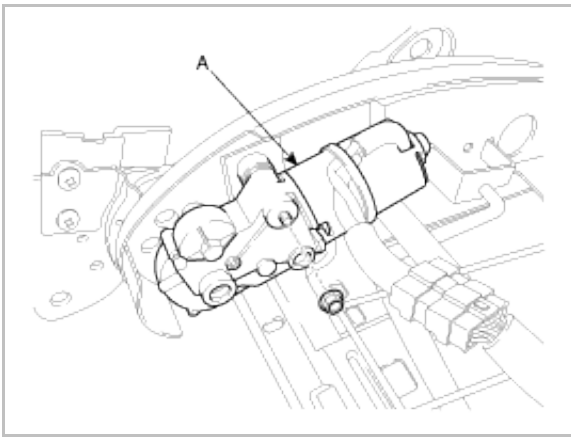
4. Installation is the reverse of removal.

## RECLINING MOTOR

1. Disconnect the negative (-) battery terminal.
2. Remove the seat back (Refer to Body group - front seat).
3. Remove the seat shaft fixing clip (A) and seat shaft (B).



4. Remove the reclining motor (A) after removing the mounting nut (1EA) and connector.

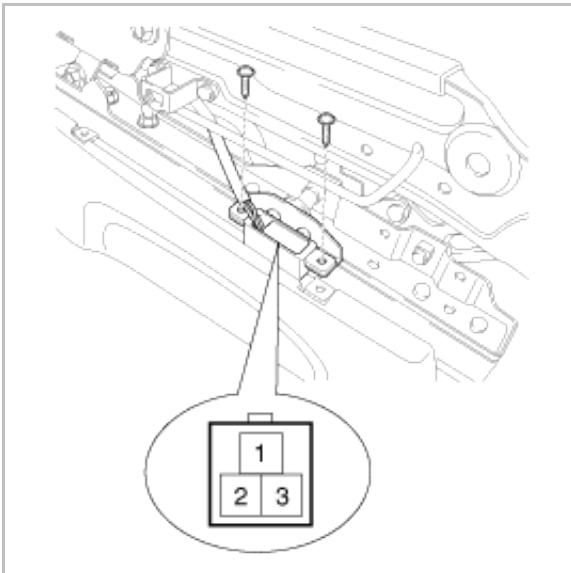


5. Installation is the reverse of removal.

## INSPECTION

### SLIDE MOTOR LIMIT SWITCH

1. Disconnect the limit switch 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 operation is not correct, replace the limit switch.



| Terminal | 1 | 2 | 3 |
|----------|---|---|---|
| Position |   |   |   |
| Front    | ○ | ○ |   |
| Rear     | ○ |   | ○ |

### POWER SEAT MOTOR

1. Disconnect the connectors 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 operation is not correct, replace the motors.

# **Body Electrical System**

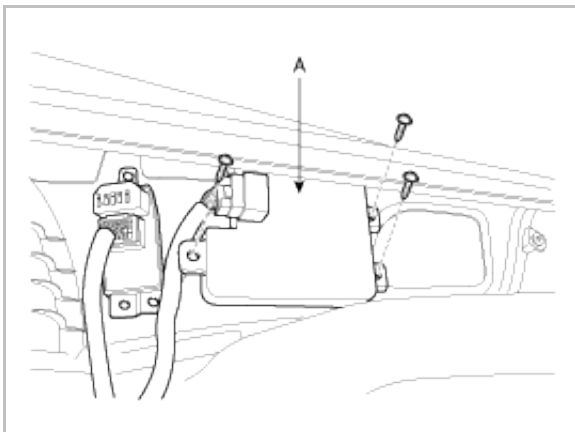
Seat Electrical - Power Seat Control Switch





## REPLACEMENT

1. Disconnect the negative(-) battery terminal.
2. Remove the door trim panel (Refer to Body group - front door).
3. Remove the switch connector (16pin) from the wiring harness, And then loosen the mounting screws (3EA).



4. Remove the switch from the front door panel.
5. Installation is the reverse of removal.



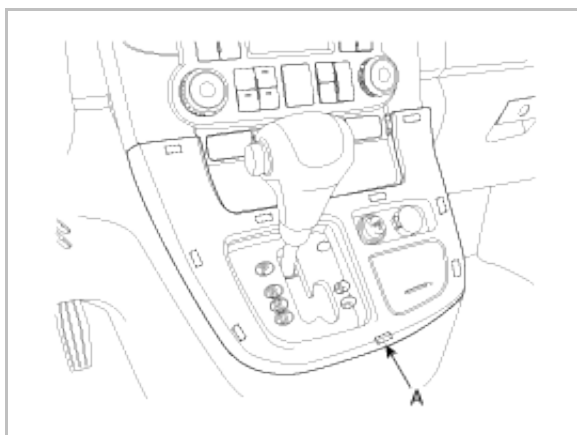
# Body Electrical System

## Seat Electrical - Seat Heater Switch



## Inspection

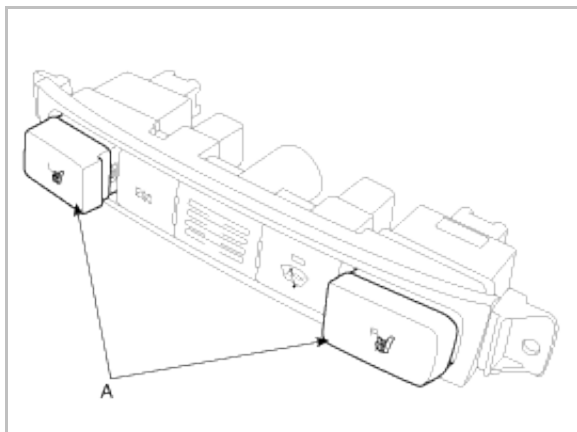
1. Disconnect the negative (-) battery terminal.
2. Remove the seat back (Refer to Body group - front seat).



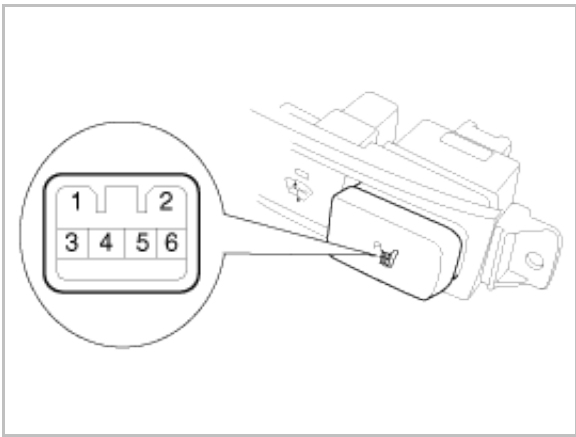
3. Remove the mounting screw, center facia panel switch and then disconnect connectors.



4. Remove the seat warmer switch (A) from center facia panel switch.



5. Check for the continuity between the terminals.



| Position<br>Terminal | ON | OFF | Remarks |
|----------------------|----|-----|---------|
| 1                    |    |     |         |
| 4                    |    |     |         |
| 3                    |    |     |         |
| 6                    |    |     | ILL(+)  |
| 2                    |    |     | ILL(-)  |

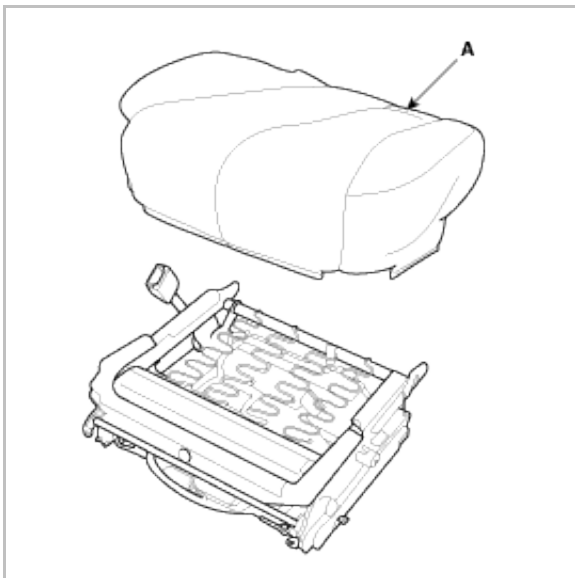
6. Installation is the reverse of removal.

# **Body Electrical System**

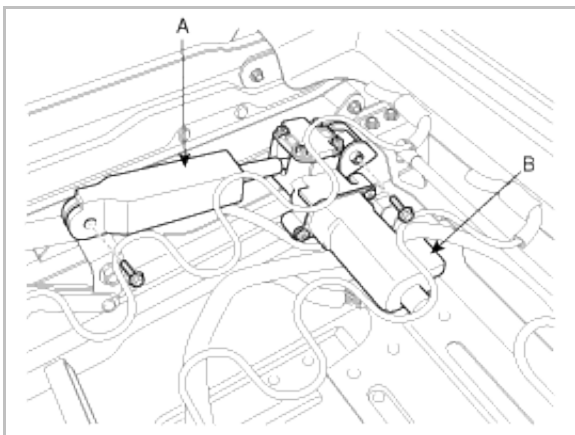
Seat Electrical - Seat Heater Module

## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the seat cushion (A) (Refer to Body group - front seat)



3. Remove the seat heater module (B) after removing seat heater module mounting screw (2EA) and connector from rear height motor (A).



4. Installation is the reverse of removal.



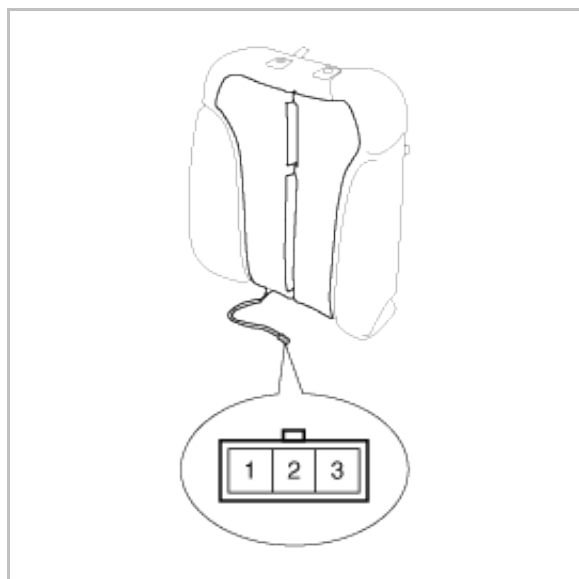
# **Body Electrical System**

Seat Electrical - Seat Heater

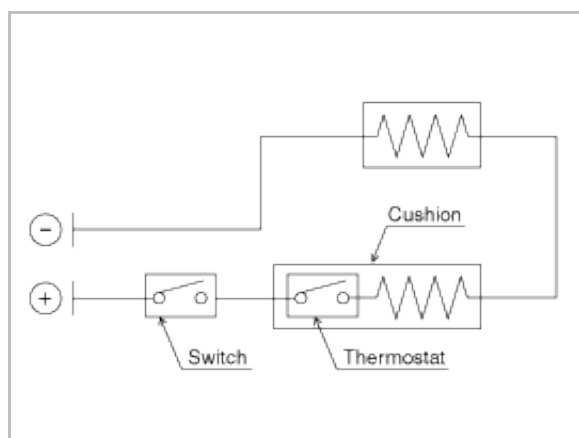


## INSPECTION

1. Replacement of new part refer to Body group - front seat.
2. Check for continuity and measure the resistance between No.1 and NO.3 terminals.



Standard value:  $2.45\Omega \pm 10\%$   
 (Cushion:  $1.2\Omega \pm 10\%$ , Back:  $1.2\Omega \pm 10\%$ )



3. Operate the seat warmer after connecting the 3P connector, and then check the thermostat by measuring the temperature of seat surface. Check for continuity between the terminals after disconnecting the 3P connector.

Standard value :  
 $28 \pm 3.5^{\circ}\text{C}$ (Continuity),  $37 \pm 3.0^{\circ}\text{C}$ (Short)



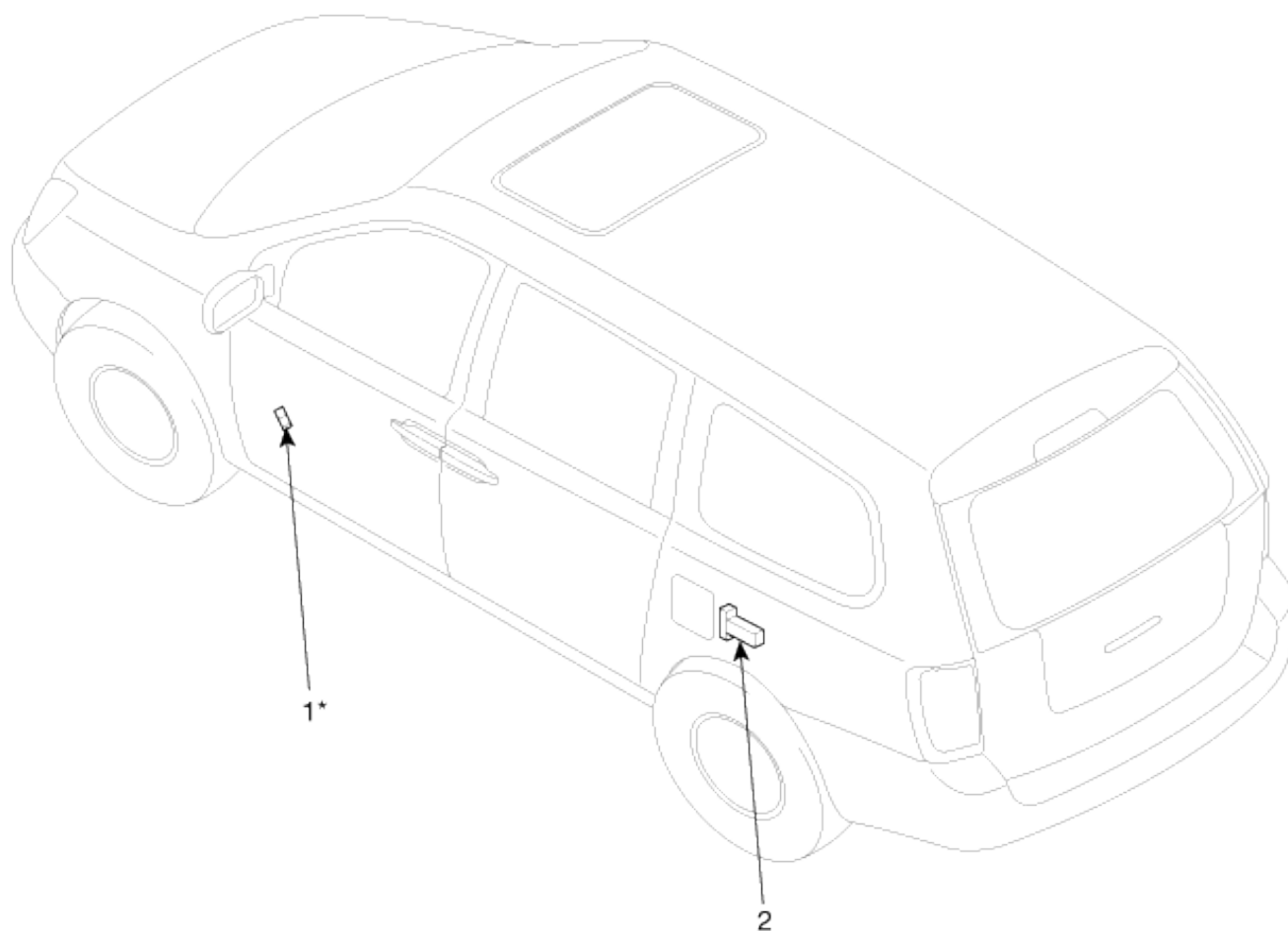


# **Body Electrical System**

Fuel Filler Door

## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



1. Fuel filler door open switch

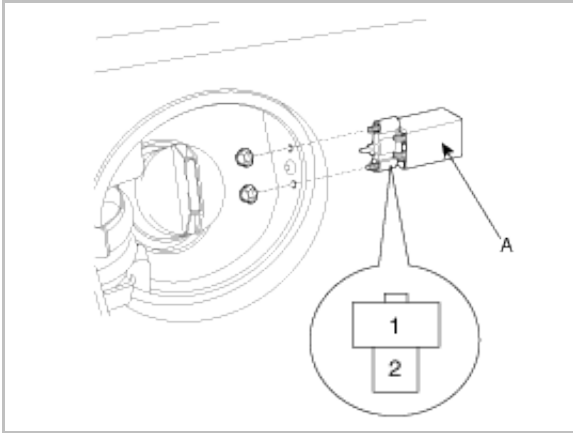
2. Fuel filler door release actuator

# **Body Electrical System**

Fuel Filler Door - Fuel Filler Door Release  
Actuator

## INSPECTION

1. Remove the rear seats. (Refer to the Body group - rear seats)
2. Remove the luggage side trim. (Refer to the Body group - interior trim)
3. Open the fuel filler door and disconnect the wiring connector after loosening 2 bolts.
4. Check for continuity between terminal No. 1 and No. 2. If there is no continuity replace the fuel filler door opener.



# **Body Electrical System**

Fuel Filler Door - Fuel Filler Door Open  
Switch

**INSPECTION**

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. To check the Input Value of fuel filler door open switch, select option "09.BODY CONTROL MODULE".

| KIA VEHICLE DIAGNOSIS ▲                                                                                                                                                                                  |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| MODEL :                                                                                                                                                                                                  | SEDONA |
| 03. ANTI-LOCK BRAKE SYSTEM<br>04. SRS-AIRBAG<br>05. FULL AUTO AIR/CON.<br>06. FUEL FIRED HEATER<br>07. POWER SLIDING / TAIL GATE<br><b>08. BODY CONTROL MODULE</b><br>09. CODE SAVING<br>10. IMMOBILIZER |        |

3. Select option "DRIVER DOOR MODULE".

| KIA VEHICLE DIAGNOSIS                                                                                                                                                                                               |                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MODEL :                                                                                                                                                                                                             | SEDONA              |
| SYSTEM :                                                                                                                                                                                                            | BODY CONTROL MODULE |
| 01. IN PANEL MODULE-V2.0<br>02. FRONT AREA MODULE-V2.0<br>03. REAR AREA MODULE-V2.0<br><b>04. DRIVER DOOR MODULE-V2.0</b><br>05. ASSIST DOOR MODULE-V2.0<br>06. INTEGRATED MEM SEAT-V2.0<br>07. BCU DIAGNOSTIC MODE |                     |

4. Select option "02. CURRENT DATA".

| 1. KIA VEHICLE DIAGNOSIS                                                                                                                |                     |
|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MODEL :                                                                                                                                 | SEDONA              |
| SYSTEM :                                                                                                                                | BODY CONTROL MODULE |
| 01. DIAGNOSTIC TROUBLE CODES<br><b>02. CURRENT DATA</b><br>03. DUAL DISPLAY<br>04. FLIGHT RECORD<br>05. ACTUATION TEST<br>06. SIMU-SCAN |                     |

| 1.2 CURRENT DATA           |           | 06/35       |      |      |      |
|----------------------------|-----------|-------------|------|------|------|
| DR LOCK MON. SW            | OFF       | ▲<br>■<br>▼ |      |      |      |
| DOOR LOCK SW               | ON        |             |      |      |      |
| DOOR UNLOCK SW             | OFF       |             |      |      |      |
| KEY CYL.DOOR LOCK SW       | OFF       |             |      |      |      |
| KEY CYL.DOOR UNLOCK SW     | OFF       |             |      |      |      |
| <b>FUEL FILLER DOOR SW</b> | <b>ON</b> |             |      |      |      |
| P/SEAT SLID FORWARD SW     | ON        |             |      |      |      |
| P/SEAT SLID BACKWA. SW     | ON        |             |      |      |      |
| FIX                        | PART      | FULL        | HELP | GRPH | BCRD |



# **Body Electrical System**

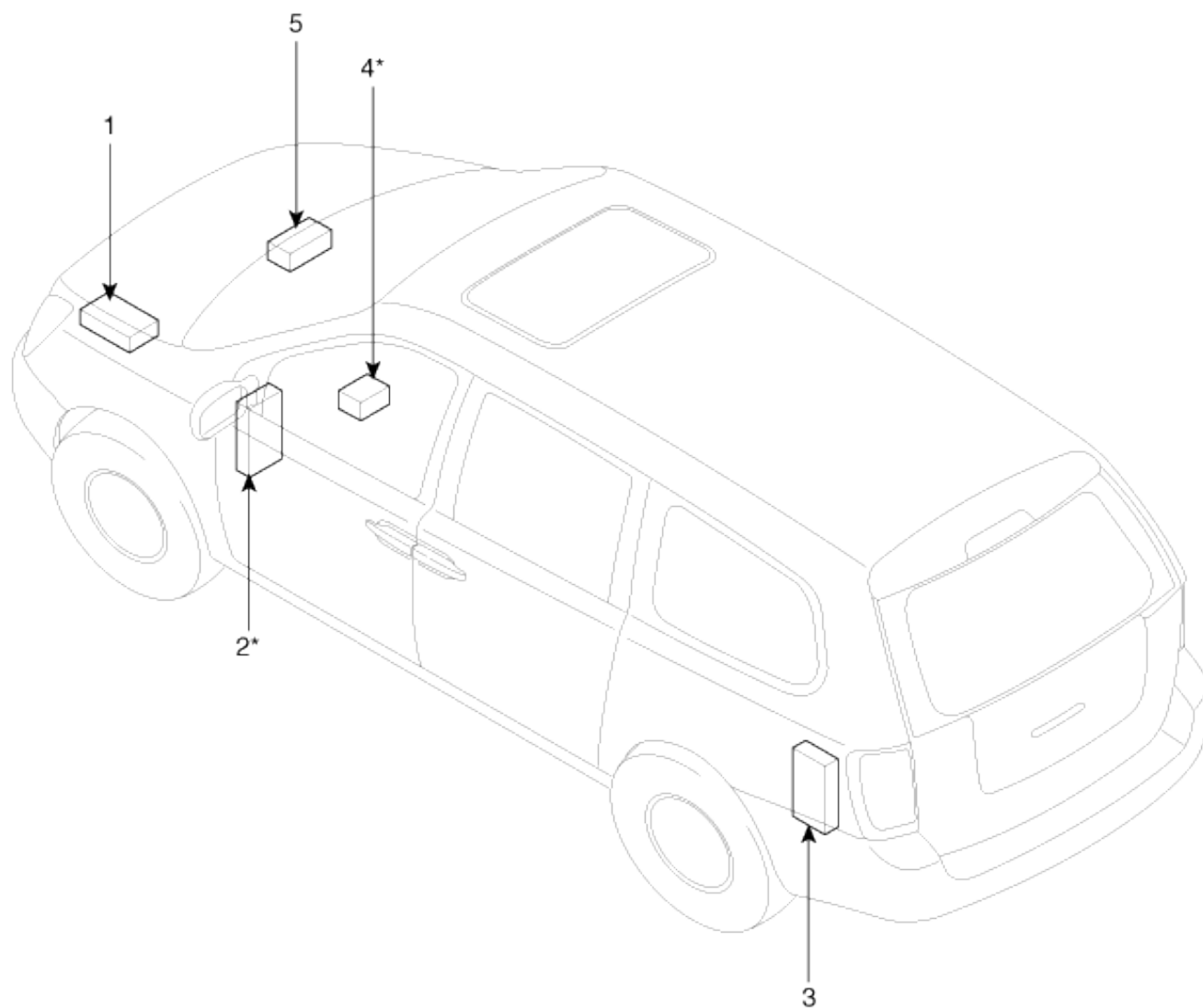
Fuses And Relays

## COMPONENT LOCATION

The parts with asterisk(\*) :

This illustration is shows the LHD type.

RHD type is symmetrical.



- 1. Front area module
- 2. In-Panel module
- 3. Rear area module

- 4. ICM relay box
- 5. Diesel box





# Body Electrical System

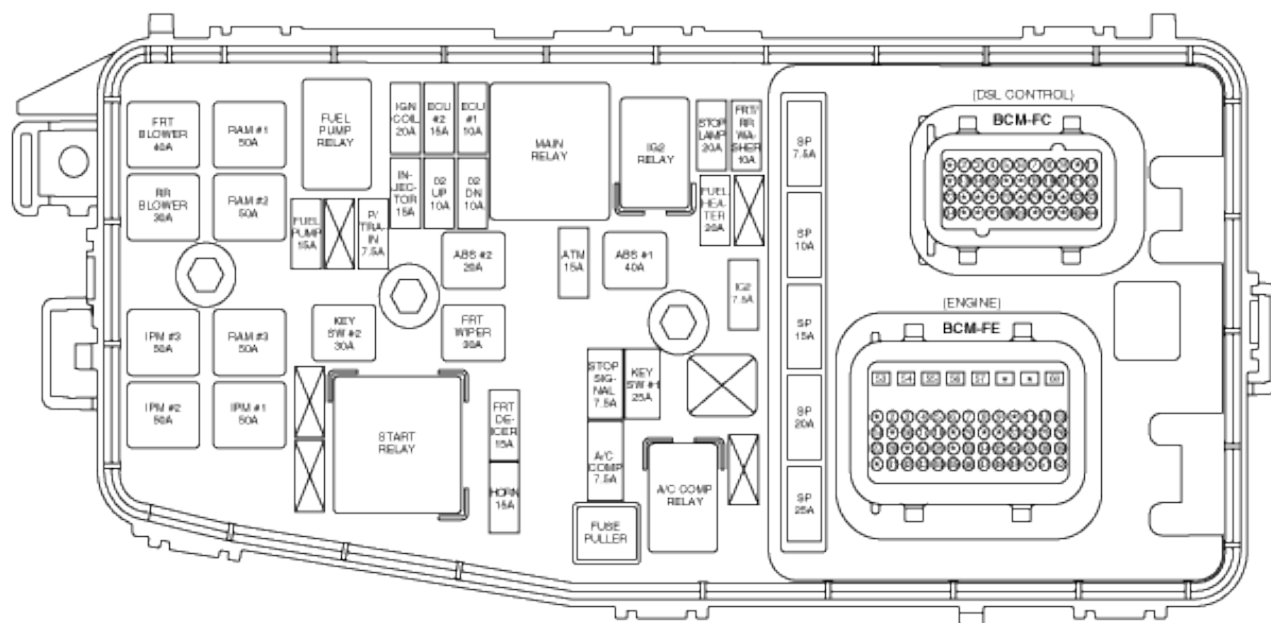
## Fuses And Relays -Relay Box (Engine Compartment)



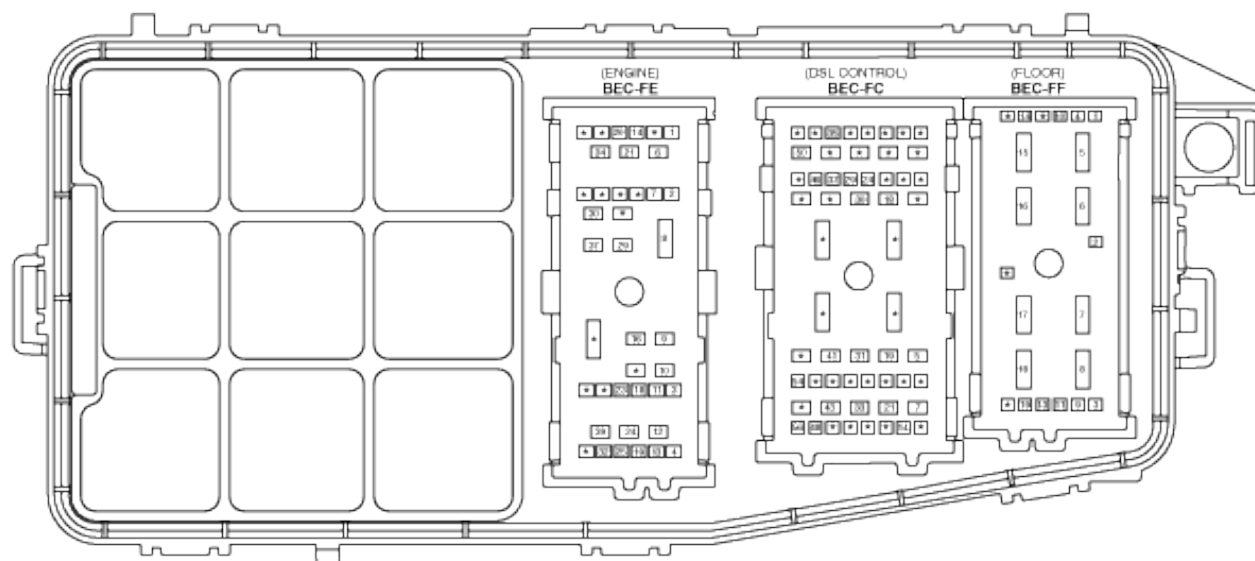
## COMPONENTS

## FAM (FRONT AREA MODULE)

&lt; FRONT &gt;



&lt; REAR &gt;



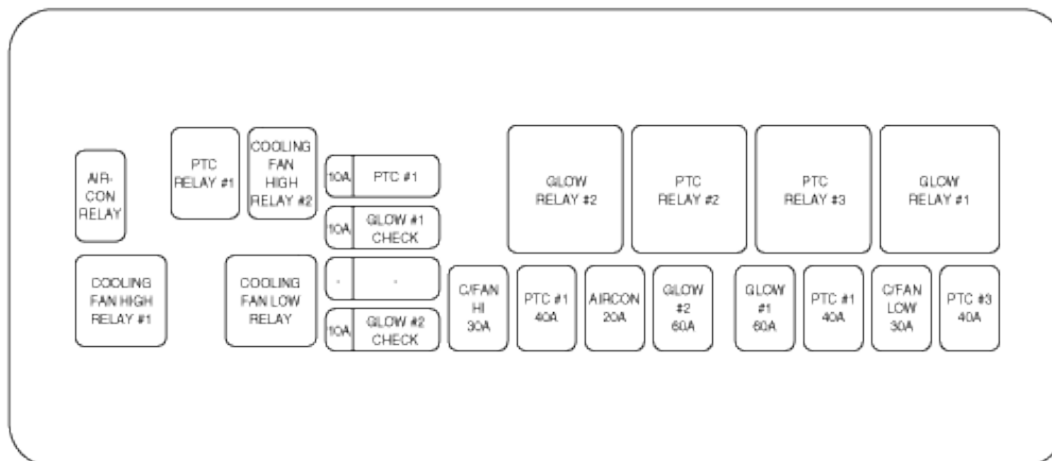
✕ USE THE DESIGNATED FUSE ONLY

## CIRCUIT

| FUSE          | (A)  | Circuit Protected                                                                                                                       |
|---------------|------|-----------------------------------------------------------------------------------------------------------------------------------------|
| FRT/RR WASHER | 10A  | FRONT WASHER MOTOR RELAY, REAR WASHER MOTOR RELAY                                                                                       |
| STOP LAMP     | 20A  | STOP LAMP SWITCH                                                                                                                        |
| KEY SW #1     | 25A  | IGNITION SWITCH                                                                                                                         |
| STOP SIGNAL   | 7.5A | ABS CONTROL MODULE, ESP CONTROL MODULE, PCM, ECM, TCM                                                                                   |
| A/C COMP      | 7.5A | A/C COMP RELAY                                                                                                                          |
| ATM           | 15A  | ATM RELAY                                                                                                                               |
| FRT DEICER    | 15A  | WINDSHIELD DEFOGGER RELAY                                                                                                               |
| HORN          | 15A  | HORN RELAY                                                                                                                              |
| ECU #1        | 10A  | A/C COMP RELAY, PCM, MASS AIR FLOW SENSOR, IMMOBILIZER MODULE, ECM, DIESEL BOX                                                          |
| O2 DN         | 10A  | OXYGEN SENSOR #3, OXYGEN SENSOR #4                                                                                                      |
| ECU #2        | 10A  | PCM, VARIABLE INTAKE MANIFOLD VALVE, COOLING FAN RELAY, PCSV, OCV, ECM                                                                  |
| O2 UP         | 10A  | OXYGEN SENSOR #1, OXYGEN SENSOR #2                                                                                                      |
| IGN COIL      | 20A  | IGNITION COIL #1 ~ #6, CONDENSER #1, #2                                                                                                 |
| INJECTOR      | 15A  | INJECTOR #1 ~ #6, PCM, INLET METERING VALVE, EGR SOLENOID VALVE), INTAKE THROTTLE SOLENOID VALVE, ECM, MASS AIR FLOW SENSOR, DIESEL BOX |
| P/TRAIN       | 7.5A | MAIN RELAY, BURGLAR HORN RELAY, PCM, TCM, GENERATOR                                                                                     |
| FUEL PUMP     | 15A  | FUEL PUMP RELAY                                                                                                                         |
| ABS #1        | 40A  | ABS CONTROL MODULE, ESP CONTROL MODULE                                                                                                  |
| ABS #2        | 20A  | ABS CONTROL MODULE, ESP CONTROL MODULE                                                                                                  |
| FRT WIPER     | 30A  | FRONT WIPER ON RELAY                                                                                                                    |
| KEY SW #2     | 30A  | START RELAY, IGNITION SWITCH                                                                                                            |
| FRT BLOWER    | 40A  | FRONT BLOWER RELAY                                                                                                                      |
| RR BLOWER     | 30A  | REAR BLOWER RELAY                                                                                                                       |
| IPM #1        | 50A  | INSTRUMENT PANEL MODULE                                                                                                                 |
| IPM #2        | 50A  | INSTRUMENT PANEL MODULE                                                                                                                 |
| IPM #3        | 50A  | INSTRUMENT PANEL MODULE                                                                                                                 |
| RAM #1        | 50A  | REAR AREA MODULE                                                                                                                        |
| RAM #2        | 50A  | REAR AREA MODULE                                                                                                                        |
| RAM #3        | 50A  | REAR AREA MODULE                                                                                                                        |
| IG 2          | 7.5A | AQS SENSOR                                                                                                                              |
| FUEL HEATER   | 20A  | FUEL FILTER HEATER                                                                                                                      |

※ USE THE DESIGNATED FUSE ONLY

### < DIESEL BOX >





## INSPECTION

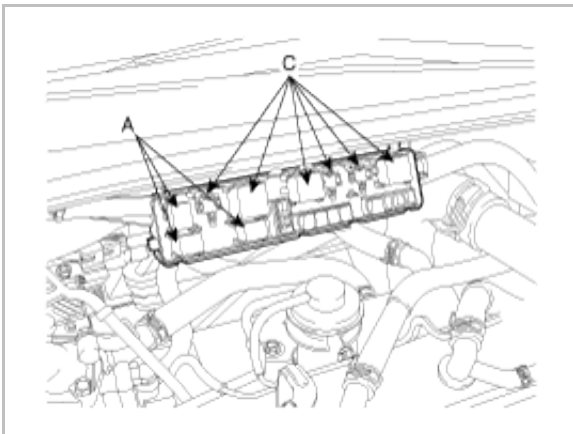
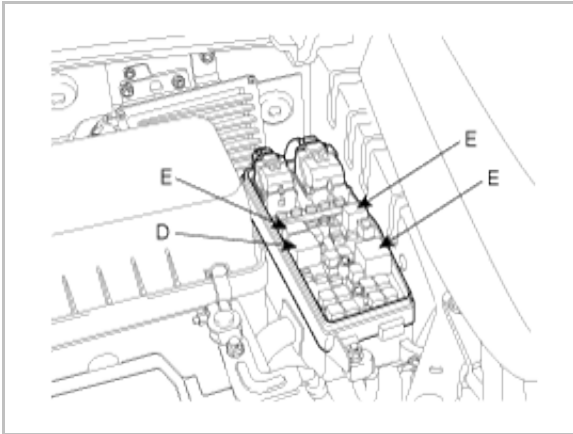
### FUSE

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

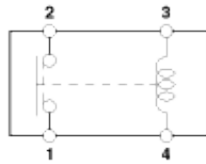
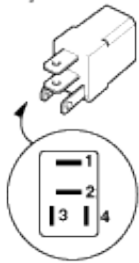
If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

### RELAY

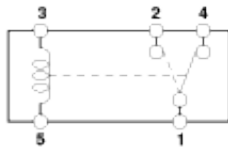
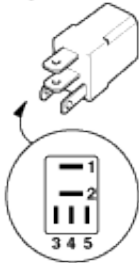
1. Be sure that the relays are held the each module securely.
2. Are the relay types for each circuit correct?



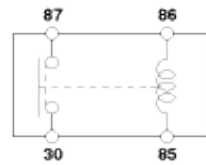
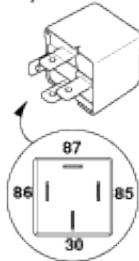
[TYPE A]



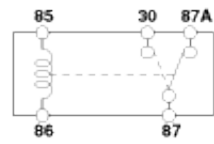
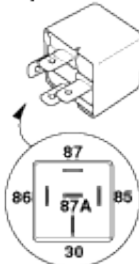
[TYPE B]



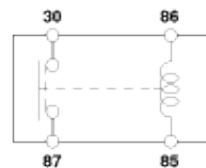
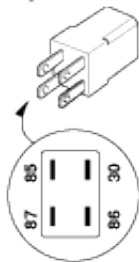
[TYPE C]



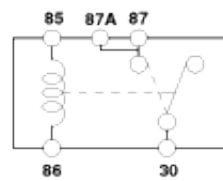
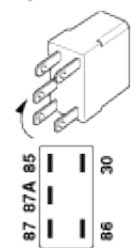
[TYPE D]

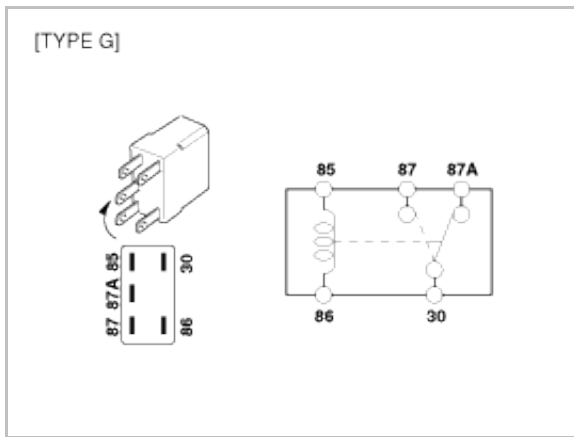


[TYPE E]



[TYPE F]



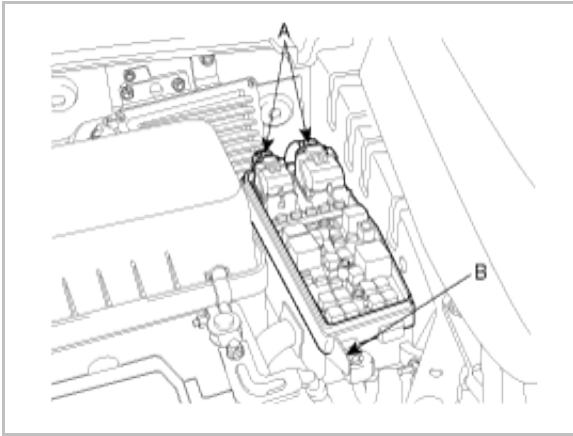


3. If system of some relay is not operate accurately, replace with a new one and check the system.

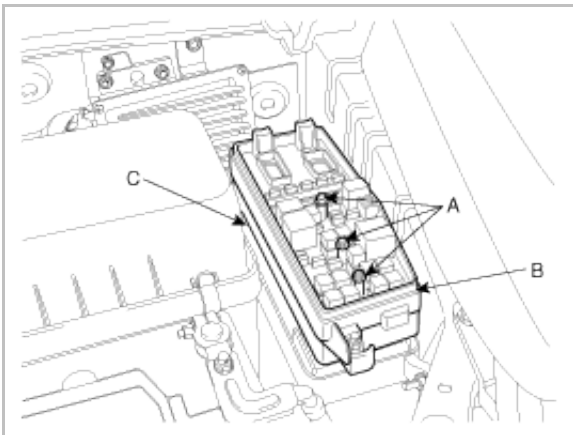
## REPLACEMENT

### FAM (FRONT AREA MODULE)

1. Disconnect the negative (-) battery terminal.
2. Remove the FAM cover of engine room.
3. Remove the FAM connectors (2EA) (A) and battery terminal nut (1EA) (B).



4. Remove FAM mounting bolts (3EA) (A) and remove the FAM (B) from splash shield (C).



5. Disconnect the connector from splash shield.
6. Installation is the reverse of removal.



# Body Electrical System

Fuses And Relays -Relay Box (Passenger  
Compartment)



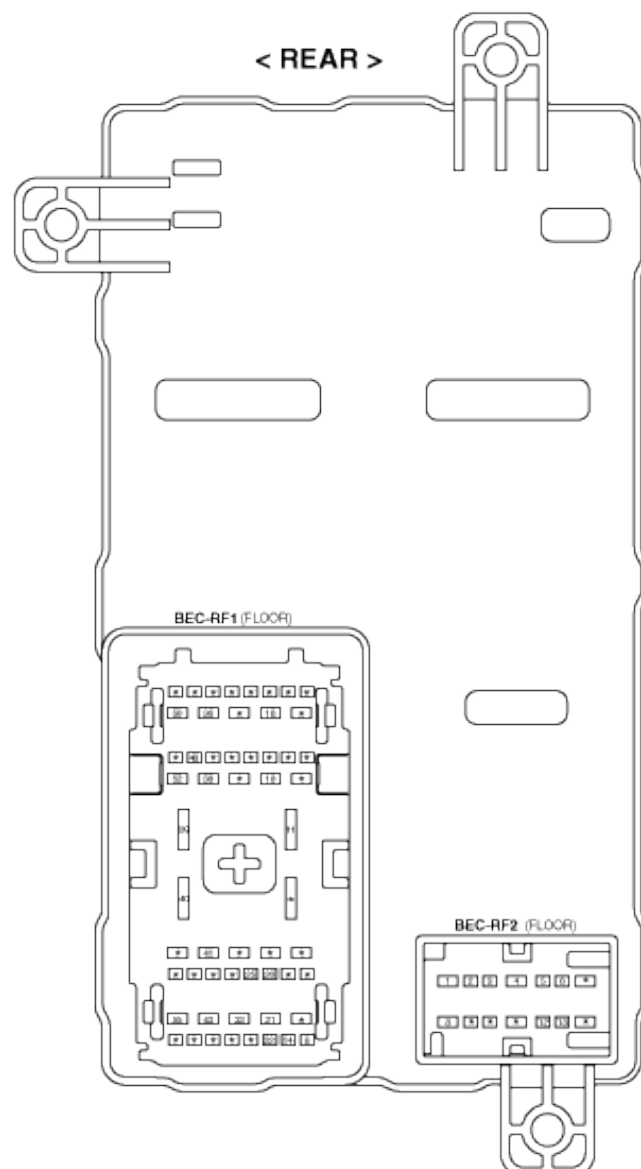
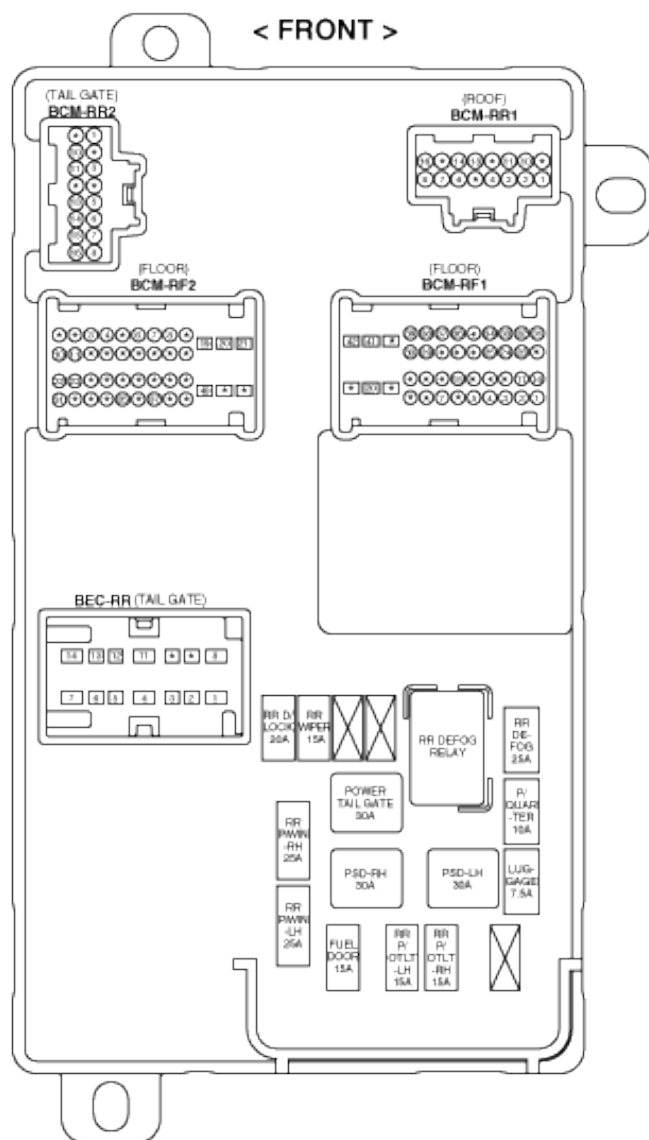


## CIRCUIT

| FUSE        | (A)  | Circuit Protected                                                                                                                                                                         |
|-------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACC         | 7.5A | POWER OUTSIDE MIRROR & MIRROR FOLDING SWITCH, AUDIO, DIGITAL CLOCK                                                                                                                        |
| P/OUTLET #2 | 15A  | CIGARETTE LIGHTER & POWER OUTLET                                                                                                                                                          |
| START       | 7.5A | BURGLAR ALARM RELAY, TRANSAXLE RANGE SWITCH, ECM                                                                                                                                          |
| AIRBAG IND  | 7.5A | INSTRUMENT CLUSTER                                                                                                                                                                        |
| ENG         | 7.5A | ATM LEVER SWITCH, STOP LAMP SWITCH, INPUT SPEED SENSOR, OUTPUT SPEED SENSOR, TRANSAXLE RANGE SWITCH, PCM, VEHICLE SPEED SENSOR, ECM, TCM, BACK-UP LAMP SWITCH, FUEL FILTER WARNING SWITCH |
| IG1         | 7.5A | TRIP COMPUTER, BACK WARNING BUZZER, RHEOSTAT, ESP SWITCH, INSTRUMENT CLUSTER, MULTIFUNCTION SWITCH, GENERATOR                                                                             |
| ABS         | 7.5A | ABS CONTROL MODULE, ESP CONTROL MODULE, YAW RATE SENSOR, STEERING ANGLE SENSOR, MULTIPURPOSE CHECK CONNECTOR                                                                              |
| AIRBAG      | 15A  | SRS CONTROL MODULE                                                                                                                                                                        |
| PEDAL       | 15A  | PEDAL ADJUST RELAY                                                                                                                                                                        |
| P/OUTLET #1 | 15A  | CIGARETTE LIGHTER & POWER OUTLET                                                                                                                                                          |
| ASS P/SEAT  | 20A  | PASSENGER POWER SEAT MODULE                                                                                                                                                               |
| DRV P/SEAT  | 30A  | LIMIT SWITCH, DRIVER POWER SEAT MODULE                                                                                                                                                    |
| OBD-II      | 7.5A | DATA LINK CONNECTOR, MULTIPURPOSE CHECK CONNECTOR                                                                                                                                         |
| ROOM        | 7.5A | VANITY LAMP LH(RH), MAP LAMP, A/C CONTROL MODULE, REAR ROOM LAMP SWITCH, OVER HEAD CONSOLE                                                                                                |
| VRS         | 10A  | VRS SWITCH, VRS MODULE                                                                                                                                                                    |
| ILLUMI      | 7.5A | INSTRUMENT PANEL MODULE                                                                                                                                                                   |
| AMP         | 25A  | AMP                                                                                                                                                                                       |
| SEAT WARMER | 20A  | SEAT WARMER RELAY                                                                                                                                                                         |
| SUNROOF     | 25A  | SUNROOF MODULE                                                                                                                                                                            |
| AUDIO       | 15A  | STEP LAMP LH(RH), AUDIO                                                                                                                                                                   |
| MEMORY      | 7.5A | A/C CONTROL MODULE, DIGITAL CLOCK, INSTRUMENT CLUSTER, TRIP COMPUTER, DOOR MODULE, FRONT AREA MODULE, DRIVER POWER SEAT MODULE, POWER TAIL GATE MODULE                                    |
| IG2 #1      | 7.5A | MULTIFUNCTION SWITCH, A/C CONTROL MODULE, ELECTRO CHROMIC MIRROR, RAIN SENSOR, RELAY BOX                                                                                                  |
| IG2 #2      | 7.5A | DOOR MODULE, REAR A/C CONTROL SWITCH, FRONT AREA MODULE, DRIVER POWER SEAT MODULE, POWER TAIL GATE MODULE                                                                                 |
| DDM         | 30A  | DRIVER DOOR MODULE, SAFETY POWER WINDOW MOTOR                                                                                                                                             |
| ADM         | 30A  | PASSENGER DOOR MODULE                                                                                                                                                                     |

※ USE THE DESIGNATED FUSE ONLY

## RAM (REAR AREA MODULE)



**※ USE THE DESIGNATED FUSE ONLY**

## CIRCUIT

| FUSE            | (A)  | Circuit Protected                                                                                                                                                        |
|-----------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PSD-LH          | 30A  | POWER SLIDING DOOR MODULE LH                                                                                                                                             |
| PSD-RH          | 30A  | POWER SLIDING DOOR MODULE RH                                                                                                                                             |
| RR DEFOG        | 25A  | RR DEFOG RELAY, REAR DEFOGGER                                                                                                                                            |
| POWER TAIL GATE | 30A  | POWER TAIL GATE MODULE                                                                                                                                                   |
| P/QUARTER       | 10A  | QUARTER GLASS OPEN RELAY LH, QUARTER GLASS CLOSE RELAY LH<br>QUARTER GLASS OPEN RELAY RH, QUARTER GLASS CLOSE RELAY RH<br>QUARTER GLASS MOTOR LH, QUARTER GLASS MOTOR RH |
| RR WIPER        | 10A  | REAR WIPER RELAY, REAR WIPER MOTOR                                                                                                                                       |
| RR D/LOCK       | 20A  | S/DOOR LOCK RELAY, S/DOOR UNLOCK RELAY<br>SLIDING DOOR LOCK ACTUATOR, TAIL GATE LOCK ACTUATOR                                                                            |
| RR P/OTLT-LH    | 15A  | REAR POWER OUTLET LH                                                                                                                                                     |
| RR P/OTLT-RH    | 15A  | REAR POWER OUTLET RH                                                                                                                                                     |
| FUEL DOOR       | 15A  | FUEL FILLER RELAY, FUEL FILLER ACTUATOR                                                                                                                                  |
| RR P/WIN-LH     | 25A  | S/DOOR WINDOW RELAY (UP) LH, S/DOOR WINDOW RELAY (DN) LH,<br>SLIDING DOOR POWER WINDOW MOTOR LH                                                                          |
| RR P/WIN-RH     | 25A  | S/DOOR WINDOW RELAY (UP) RH, S/DOOR WINDOW RELAY (DN) RH,<br>SLIDING DOOR POWER WINDOW MOTOR RH                                                                          |
| LUGGAGE         | 7.5A | LUGGAGE LAMP, POWER TAIL GATE ON/OFF SWITCH                                                                                                                              |

**※ USE THE DESIGNATED FUSE ONLY**

## INSPECTION

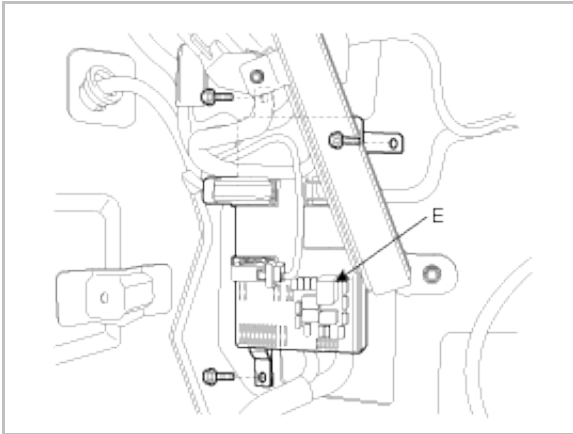
### FUSE

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

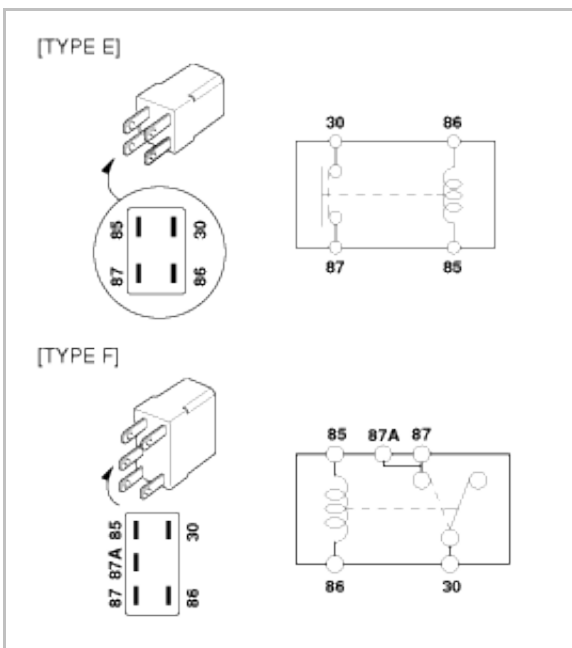
If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

### RELAY

1. Be sure that the relays are held the each module securely.
2. Are the relay types for each circuit correct?



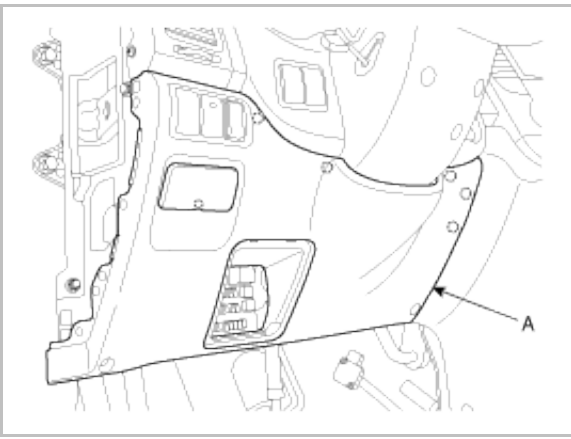
3. If system of some relay is not operate accurately, replace with a new one and check the system.



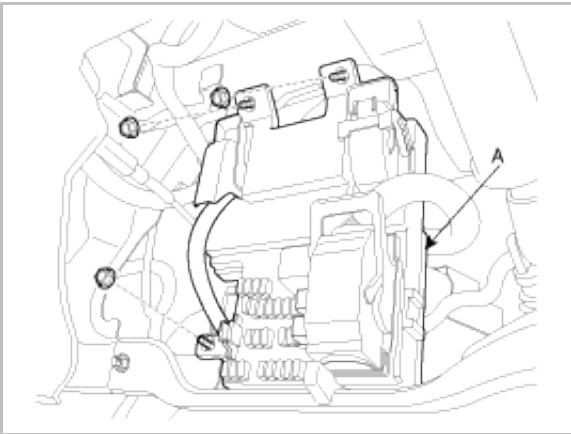
## REPLACEMENT

### IPM (INSTRUMENT PANEL MODULE)

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



3. Disconnect the receiver antenna cable and connectors (5EA). Remove IPM mounting nuts (3EA) and IPM (A).



4. Installation is the reverse of removal procedures.

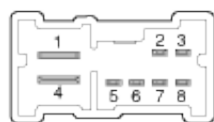
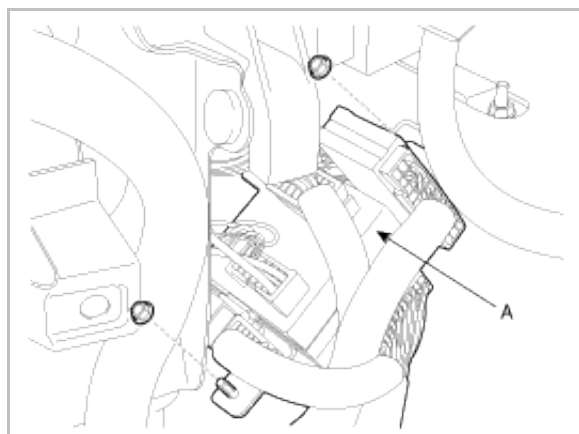
# **Body Electrical System**

Fuses And Relays - ICM (Integrated Circuit  
Module) Relay Box

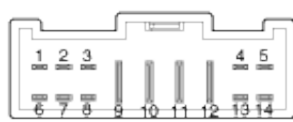


## DESCRIPTION

The ICM (Integrated circuit module) relay (A) is united with many kinds of relays and installed side of the in-panel module.



[Connector A]



[Connector B]



## INSPECTION

### FRONT BLOWER

Check for continuity between the terminals.

1. There should be continuity between the No.1 in the ICM-A and No.10 in the ICM-B terminals when power and ground are connected to the No.7 in the ICM-A and No.13 terminals in the ICM-B terminals.
2. There should be no continuity between the No.1 in the ICM-A and No.10 terminals in the ICM-B terminals when power is disconnected.

### REAR BLOWER

Check for continuity between the terminals.

1. There should be continuity between the No.4 in the ICM-A and No.12 in the ICM-B terminals when power and ground are connected to the No.2 in the ICM-A and No.14 terminals in the ICM-B terminals.
2. There should be no continuity between the No.4 in the ICM-A and No.12 in the ICM-B terminals when power is disconnected.

### SEAT HEATER RELAYS

Check for continuity between the terminals.

1. There should be continuity between the No.9 and No.6 terminals when power and ground are connected to the No.7 and No.8 terminals in the ICM-B.
2. There should be no continuity between the No.9 and No.6 terminals when power is disconnected.

### KEY INTERLOCK

Check for continuity between the terminals.

1. There should be continuity between the No.2 and No.3 terminals when power and ground are connected to the No.4 and No.5 terminals in the ICM-B.
2. There should be no continuity between the No.2 and No.3 terminals when power is disconnected.





# Body Electrical System

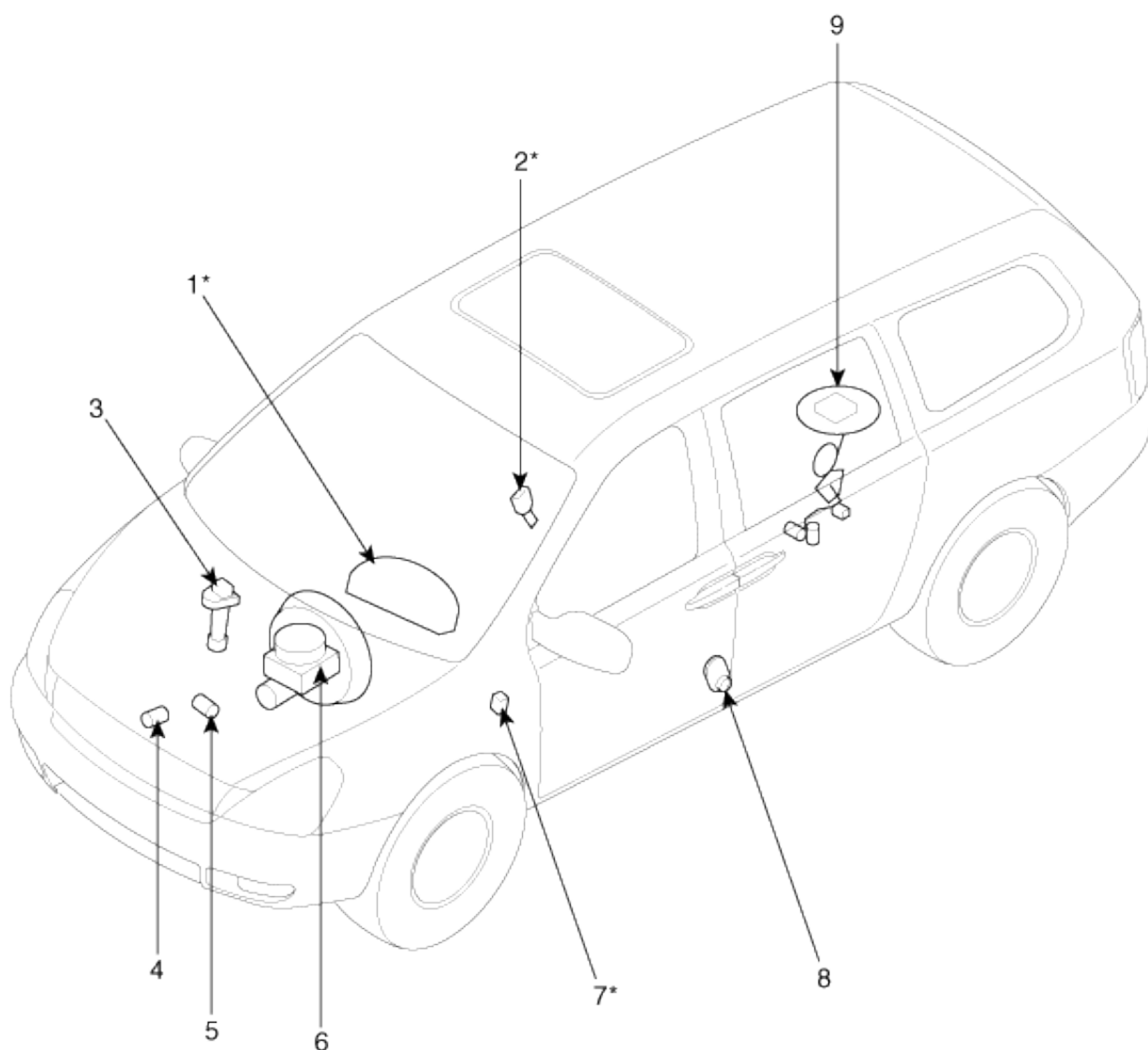
## Indicators And Gauges

## COMPONENT LOCATION

The parts with asterisk(\*) :

This illustration is shows the LHD type.

RHD type is symmetrical.



1. Cluster assembly
2. Seat belt switch
3. Vehicle speed sensor
4. Engine coolant temperature sender
5. Oil pressure switch

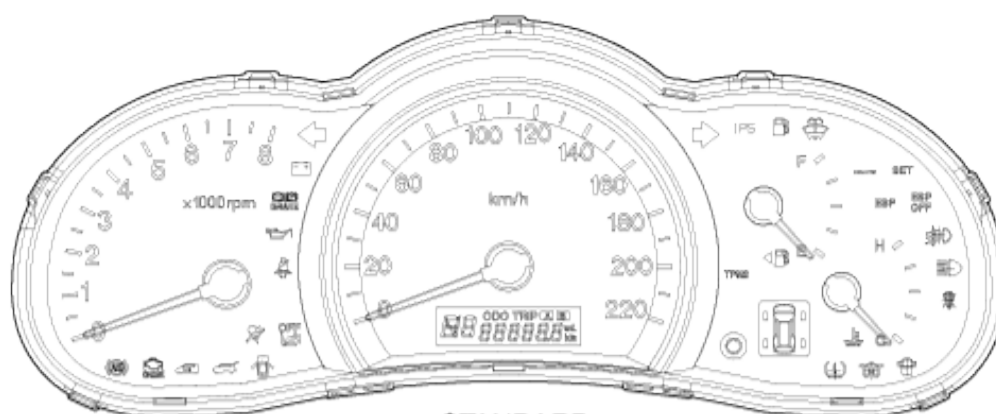
6. Brake fluid level warning switch
7. Parking brake switch
8. Door switch
9. Fuel gauge sender



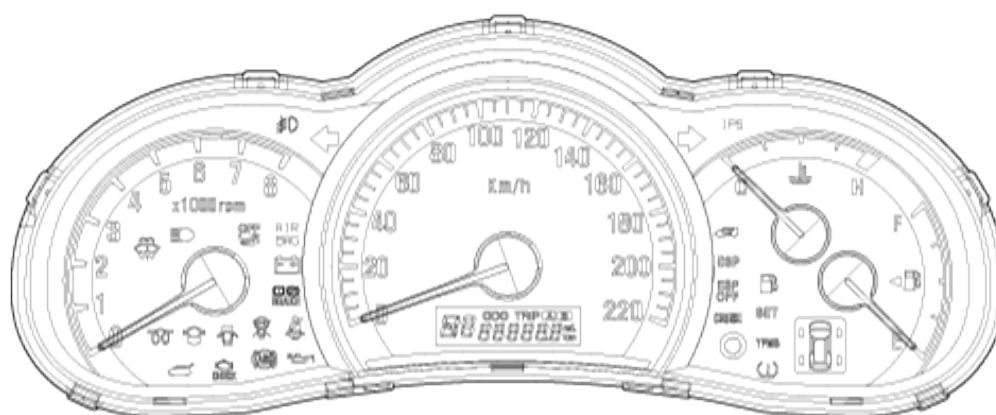
# Body Electrical System

## Indicators And Gauges - Instrument Cluster

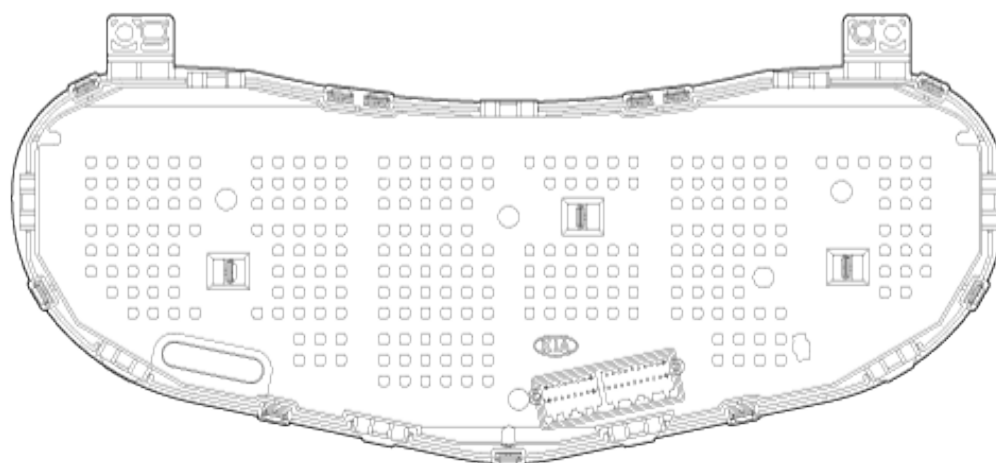
## COMPONENTS



&lt;STANDARD&gt;



&lt;SUPER VISION&gt;

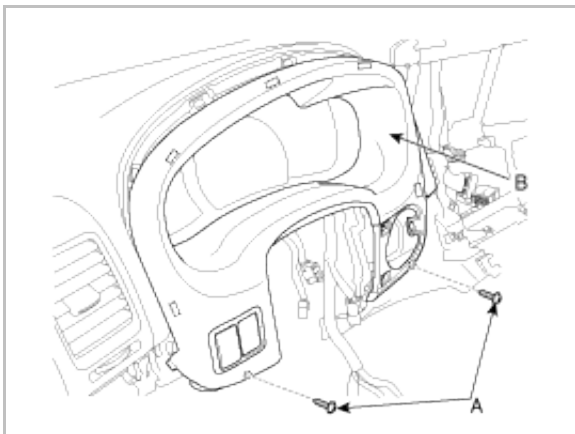


|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |

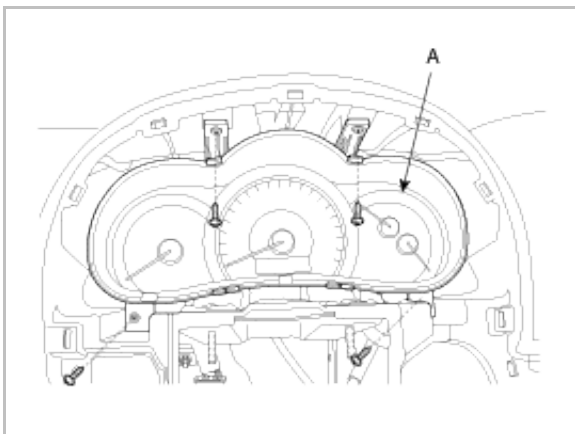


## REPLACEMENT

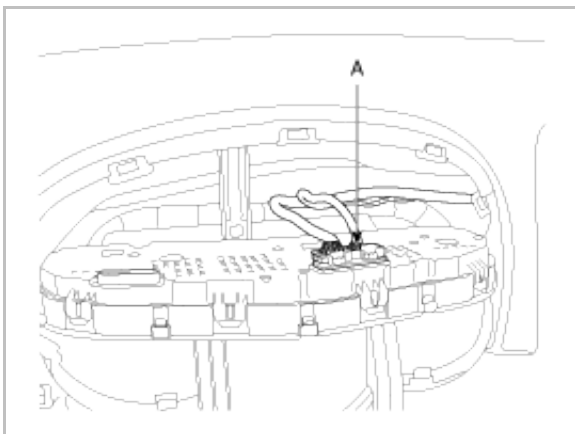
1. Disconnect the negative (-) battery terminal.
2. Remove the cluster facia panel (B) after removing 2 screws (A) and disconnecting trip switch connector.



3. Pull out the cluster (A) from the housing after removing 4 screws.



4. Disconnect the cluster connector (A) and then remove the cluster.



5. Installation is the reverse of removal.

## INSPECTION

### SPEEDOMETER

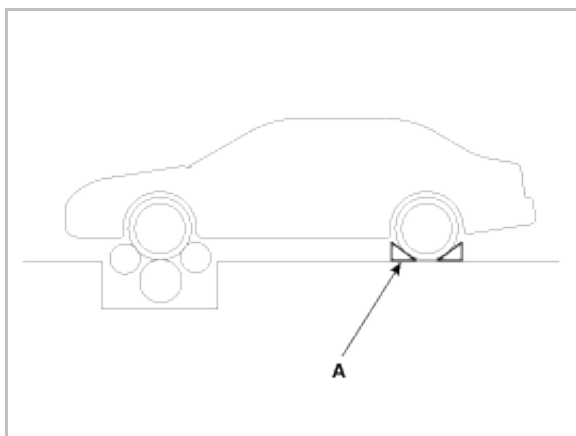
1. Adjust the pressure of the tires to the specified level.
2. Drive the vehicle onto a speedometer tester. Use wheel chocks as appropriate.
3. Check if the speedometer indicator range is within the standard values.

#### CAUTION

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

**NOTICE**

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

**[MPH]**

|                 |           |           |           |           |
|-----------------|-----------|-----------|-----------|-----------|
| Velocity (MPH)  | 10        | 20        | 40        | 60        |
| Tolerance (MPH) | +1.3<br>0 | +1.7<br>0 | +2.3<br>0 | +3.0<br>0 |
| Velocity (MPH)  | 80        | 100       | 120       | -         |
| Tolerance (MPH) | +4.0<br>0 | +5.0<br>0 | +6.0<br>0 | -         |

**[KPH]**

|                 |           |           |           |           |          |
|-----------------|-----------|-----------|-----------|-----------|----------|
| Velocity (KPH)  | 20        | 40        | 60        | 80        | 100      |
| Tolerance (KPH) | +2.6<br>0 | +2.9<br>0 | +3.5<br>0 | +4.1<br>0 | +5       |
| Velocity (KPH)  | 120       | 140       | 160       | 180       | 220      |
| Tolerance (KPH) | +6<br>0   | +7<br>0   | +8<br>0   | +9<br>0   | +11<br>0 |

**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**

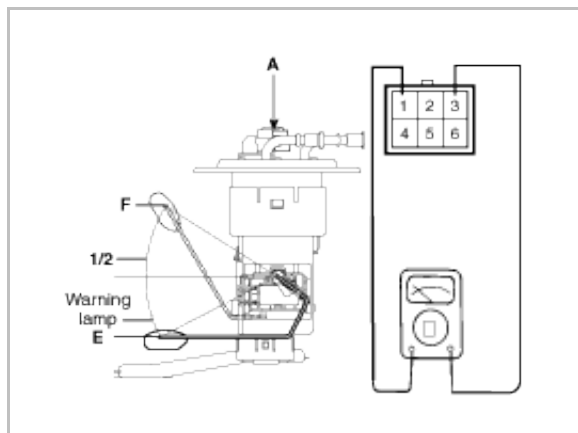
- Reversing the connections of the tachometer will damage the transistor and diodes inside.
- When removing or installing the tachometer, be careful not to drop it or subject it to severe shock.

|                  |       |       |       |       |          |
|------------------|-------|-------|-------|-------|----------|
| Revolution (rpm) | 1,000 | 2,000 | 3,000 | 4,000 | Engine   |
| Tolerance (rpm)  | ±100  | ±125  | ±150  | ±150  | Gasoline |
|                  | ±100  | ±125  | ±150  | ±150  | Diesel   |
| Tolerance        |       |       |       |       |          |

|                     |       |       |       |       |          |
|---------------------|-------|-------|-------|-------|----------|
| Tolerance<br>(rpm)  | 5,000 | 6,000 | 7,000 | 8,000 | Engine   |
| Revolution<br>(rpm) | ±150  | ±180  | ±210  | -     | Gasoline |
|                     | ±150  | ±150  | -     | -     | Diesel   |

## FUEL GAUGE SENDER

- Using an ohmmeter, measure the resistance between terminals 1 and 2 of sender connector (A) at each float level.



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

| Position     | Resistance(Ω) |
|--------------|---------------|
| Sender (E)   | 200           |
| Warning lamp | 160           |
| 1/2          | 54.5          |
| Sender (F)   | 8             |

### CAUTION

If the height resistance is not within specifications, replace the fuel sender as an assembly.  
After completing this test, wipe the sender dry and reinstall it in the fuel tank.

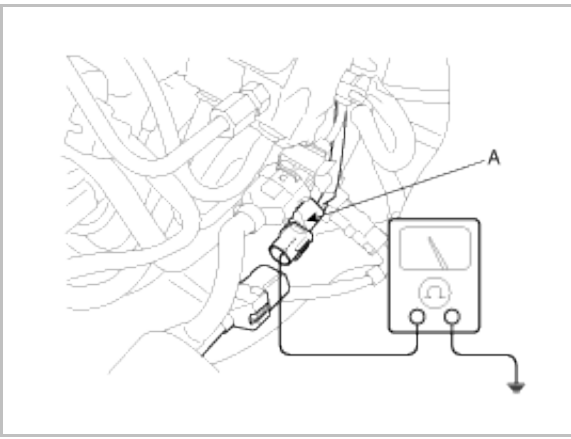
## ENGINE COOLANT TEMPERATURE SENDER

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

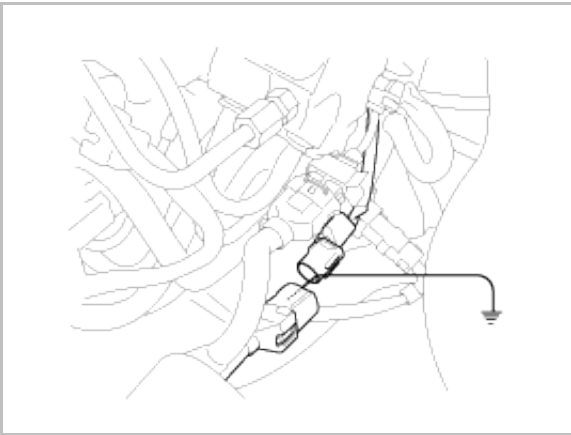
|                         |             |             |              |                |          |
|-------------------------|-------------|-------------|--------------|----------------|----------|
| Temperature<br>[°F(°C)] | 140<br>(60) | 185<br>(85) | 230<br>(110) | 257<br>(127.4) | E/G      |
| Resistance (Ω)          | 128         | 56.1        | 25.2         | 16.1           | Gasoline |
| Temperature<br>[°F(°C)] | 120<br>(49) | 160<br>(71) | 230<br>(110) | 260<br>(127.4) | E/G      |
| Resistance (Ω)          | 209.6       | 88.7        | 24.3         | 15.9           | Diesel   |

## OIL PRESSURE SWITCH

- Check that there is continuity between the oil press switch terminal and ground with the engine off.
- Check that there is no continuity between the terminal and ground with the engine running.
- If operation is not as specified, replace the switch.

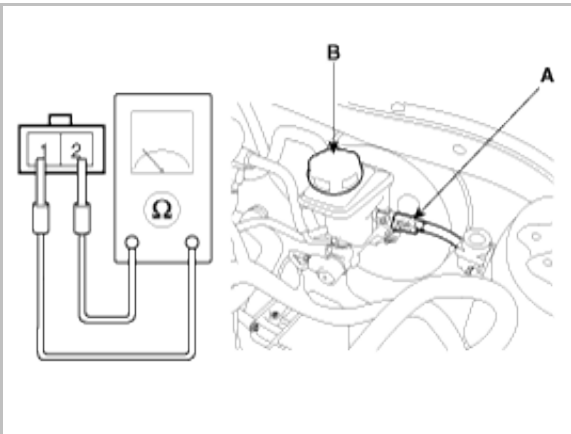


4. Connect the oil pressure switch wire harness.
5. Turn the ignition switch ON. Check that the warning lamp lights up. If the warning lamp doesn't light, test the wire harness.



## BRAKE FLUID LEVEL WARNING SWITCH

1. Remove the connector (A) from the switch located at the brake fluid reservoir (B).
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

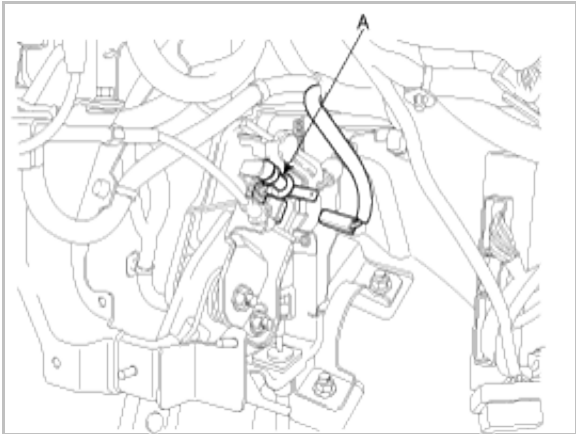
The parking brake switch is a push type. It is located at the side of the parking brake pedal.

1. Check that there is continuity between the terminal and switch body with the switch (A) ON.



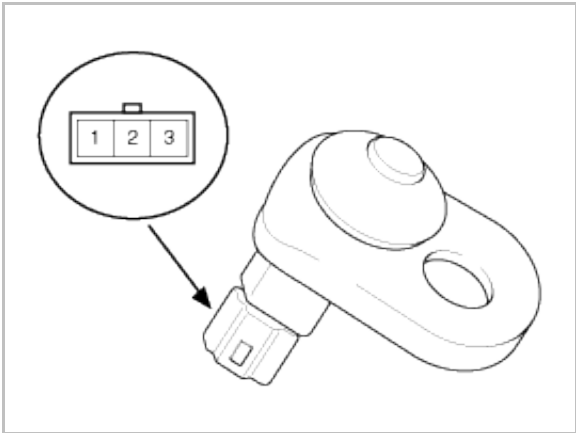
2. Check that there is no continuity between the terminal and switch body with the switch OFF.

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



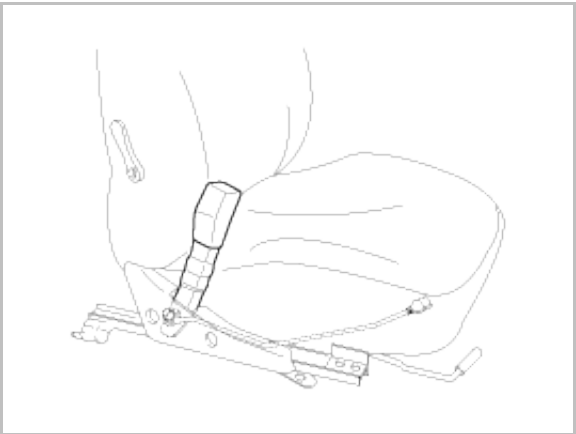
| Terminal         | 1 | 2 | Body (Ground) |
|------------------|---|---|---------------|
| Position         |   |   |               |
| Free(Door open)  | ○ | ○ | ○             |
| Push(Door close) |   |   |               |

**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 ( $0 \Omega$ )          |



**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           |



# Body Electrical System

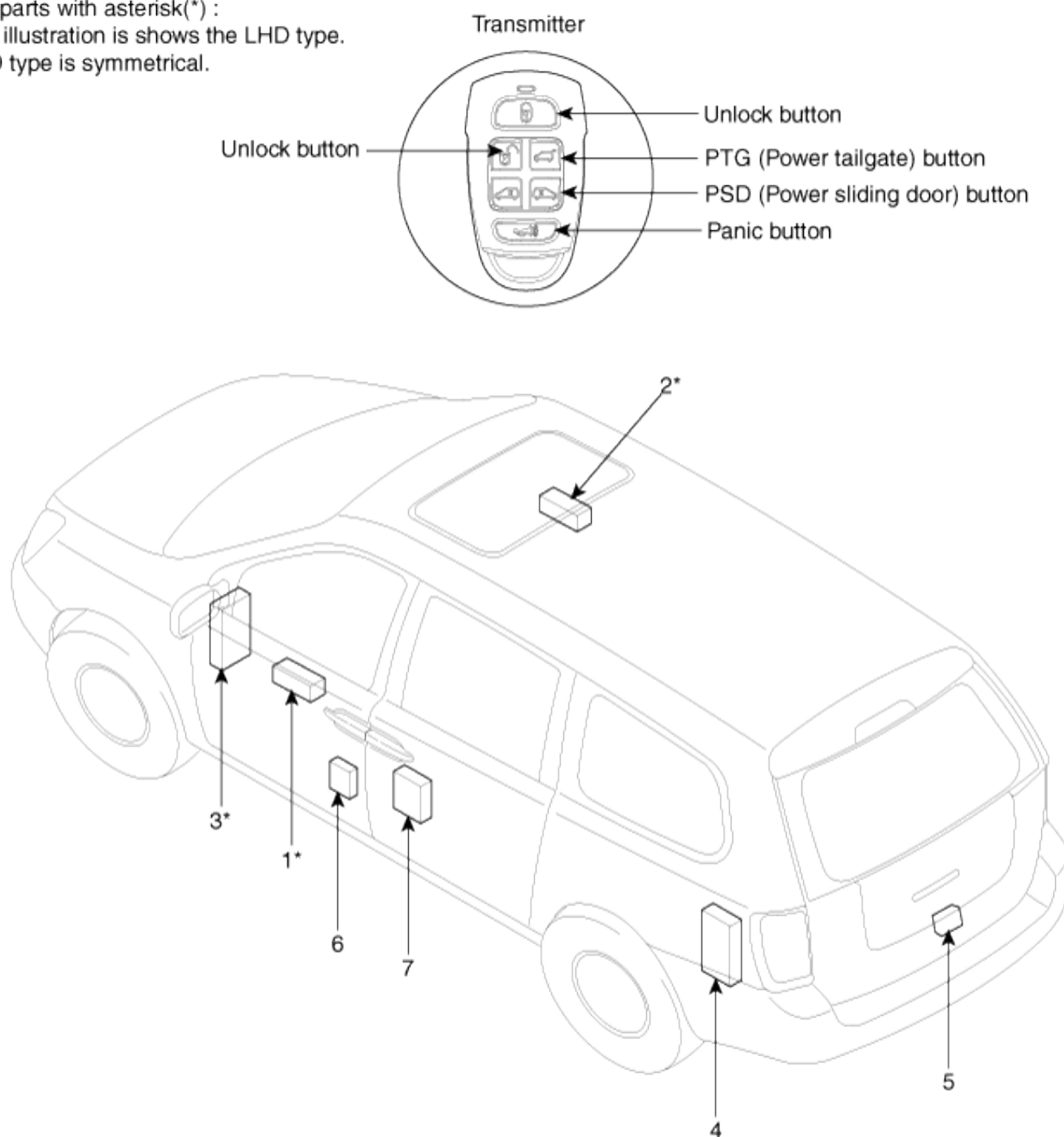
## Power Door Locks

## COMPONENT LOCATION

The parts with asterisk(\*) :

This illustration is shows the LHD type.

RHD type is symmetrical.



- 1. DDM (Driver Door Module)
- 2. ADM (Assistant Door Module)
- 3. IPM (In-Panel Module)
- 4. RAM (Rear Area Module)

- 5. Tailgate lock actuator
- 6. Front door lock actuator
- 7. Sliding door lock actuator



# Body Electrical System

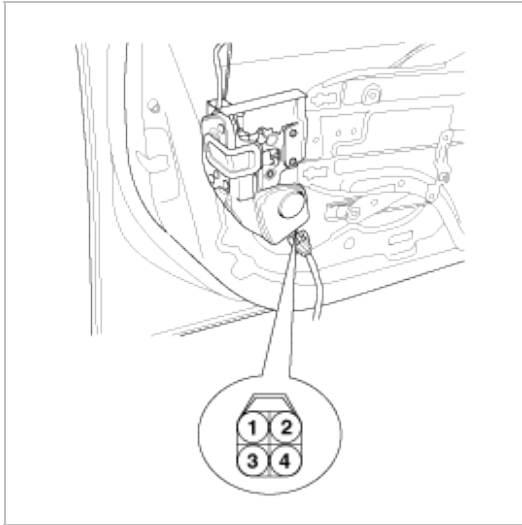
## Power Door Locks - Power Door Lock Actuators



## INSPECTION

### FRONT DOOR LOCK ACTUATOR

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the 4P connector from the actuator.

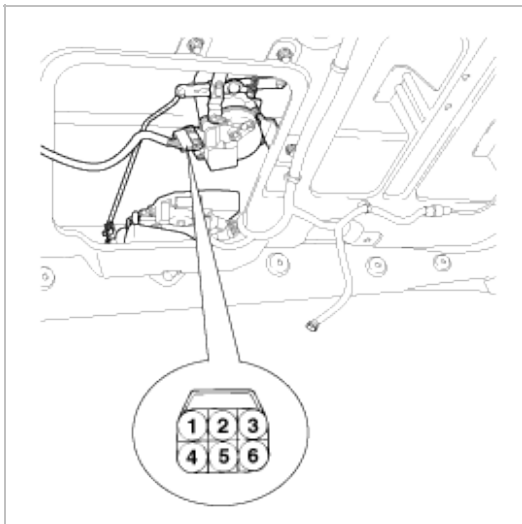


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Terminal    |        | 2 | 4 |
|-------------|--------|---|---|
| Position    | Lock   | ⊖ | ⊕ |
|             | Unlock | ⊕ | ⊖ |
| Front right | Lock   | ⊖ | ⊕ |
|             | Unlock | ⊕ | ⊖ |

### SLIDING DOOR LOCK ACTUATOR

1. Remove the sliding door trim panel. (Refer to the Body group - rear door)
2. Disconnect the 6P connector from the actuator.

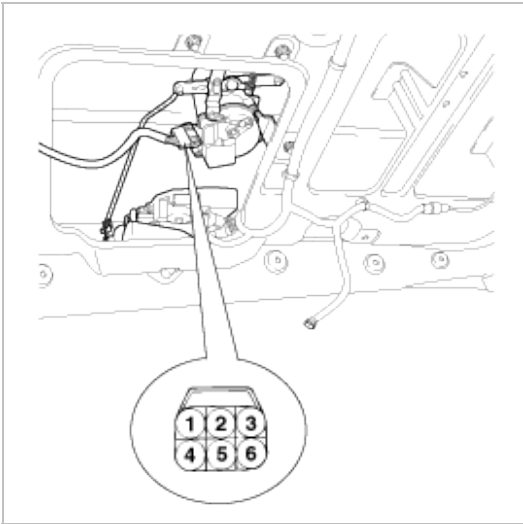


3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Terminal |        | 1 | 2 | 3 |
|----------|--------|---|---|---|
| Position | Lock   |   | ⊕ | ⊖ |
|          | Unlock |   | ⊖ | ⊕ |
| Right    | Lock   | ⊕ | ⊖ |   |
|          | Unlock | ⊖ | ⊕ |   |

TAILGATE LOCK ACTUATOR

- 1. Remove the tailgate trim panel. (Refer to the Body group - tailgate)
- 2. Disconnect the 6P connector from the actuator.

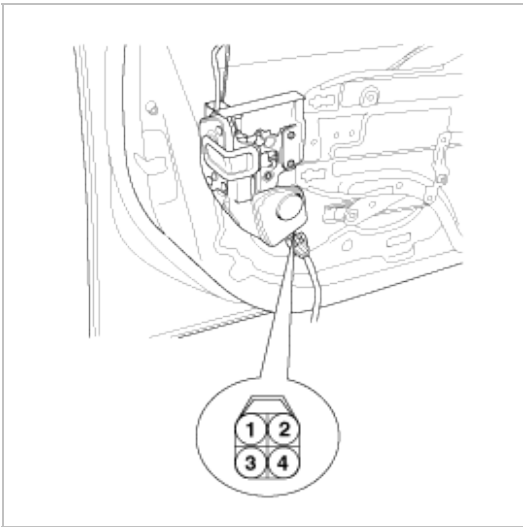


- 3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Terminal |        | 4 | 6 |
|----------|--------|---|---|
| Position |        |   |   |
|          | LOCK   | + | - |
|          | UNLOCK | - | + |

FRONT DOOR LOCK SWITCH

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

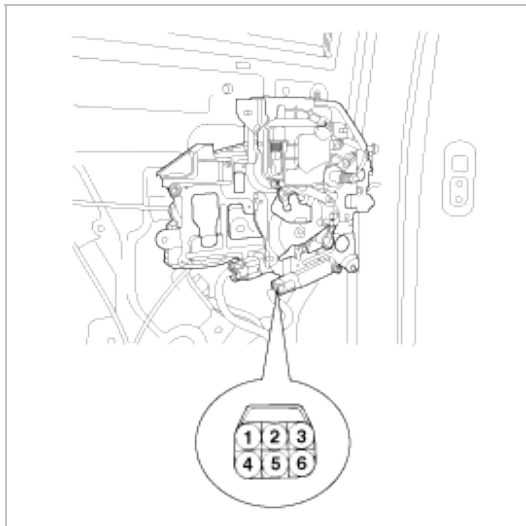


- 3. Check for continuity between the terminals in each switch position according to the table.

| Terminal    |        | 1 | 2 | 3 |
|-------------|--------|---|---|---|
| Position    |        |   |   |   |
| Front left  | Lock   |   |   |   |
|             | Unlock | ○ | — | ○ |
| Front right | Lock   |   |   |   |
|             | Unlock | ○ | — | ○ |

SLIDING DOOR LOCK SWITCH

- 1. Remove the rear door trim panel. (Refer to the Body group - Rear door)
- 2. Disconnect the 6P connector from the actuator.

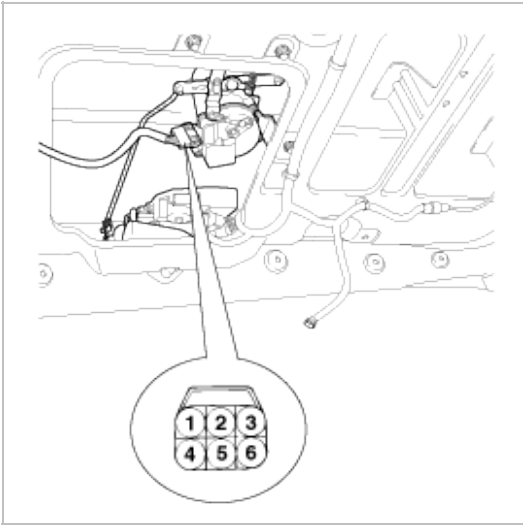


3. Check for continuity between the terminals in each switch position according to the table.

| Terminal |        | 4 | 5 | 6 |
|----------|--------|---|---|---|
| Position | Lock   |   |   |   |
|          | Unlock |   |   |   |
| Right    | Lock   |   |   |   |
|          | Unlock |   |   |   |

**TAILGATE LOCK SWITCH**

- 1. Remove the tailgate trim panel. (Refer to the Body group - tailgate)
- 2. Disconnect the 6P connector from the actuator.



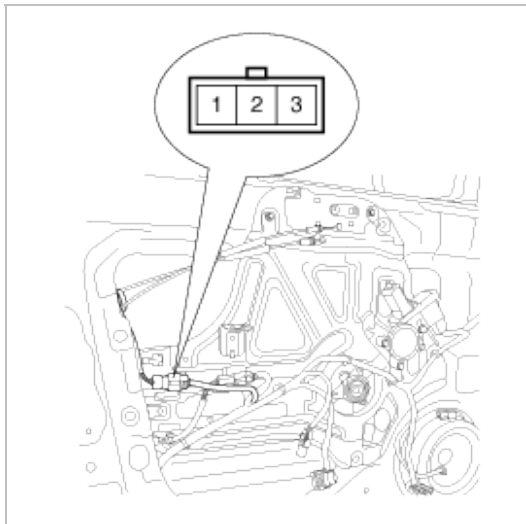
3. Check for continuity between the terminals in each switch position according to the table.

| Terminal |        | 1 | 2 |
|----------|--------|---|---|
| Position | Unlock |   |   |

**FRONT DOOR KIEY SWITCH**

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



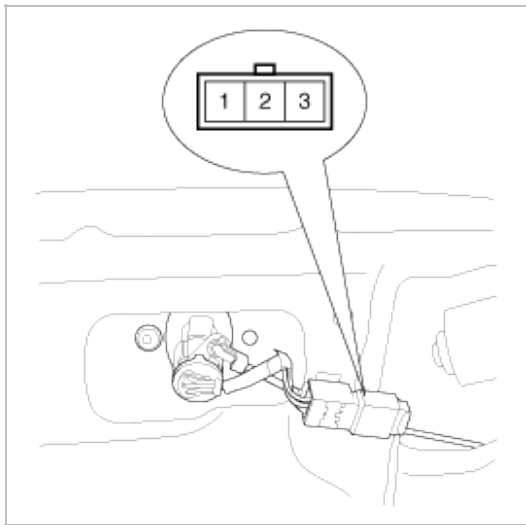


3. Check for continuity between the terminals in each switch position according to the table.

| Terminal |        | 1     | 2     | 3     |
|----------|--------|-------|-------|-------|
| Position | Left   |       | ○ — ○ |       |
|          | Unlock | ○ — ○ |       | ○ — ○ |
| Right    | Lock   | ○ — ○ |       | ○ — ○ |
|          | Unlock |       | ○ — ○ |       |

### TAILGATE KEY SWITCH

1. Remove the tailgate trim panel. (Refer to the Body group - tailgate)
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     | 2 | 3     |
|----------|--------|-------|---|-------|
| Position | LOCK   | ○ — ○ |   | ○ — ○ |
|          | UNLOCK | ○ — ○ |   |       |

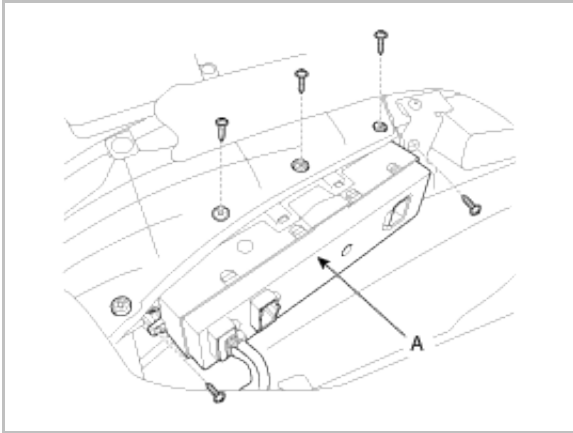
# **Body Electrical System**

Power Door Locks - Power Door Lock  
Switch

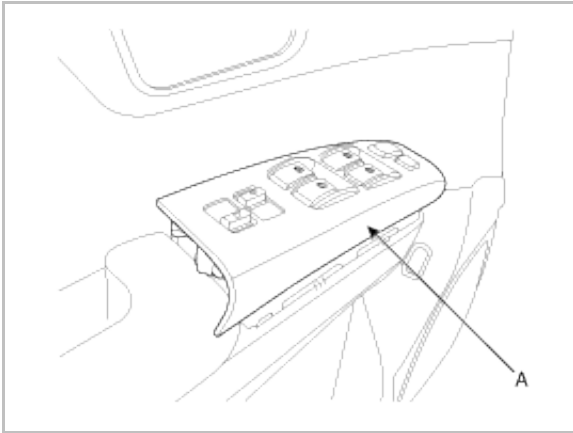
## REPLACEMENT

### DDM/ADM

1. Disconnect the negative battery terminal.
2. Remove the front door trim panel. (Refer to the Body group - Front door)
3. Remove the door module (A) mounting screws (5EA) after disconnecting the connector (3EA) from the actuator.

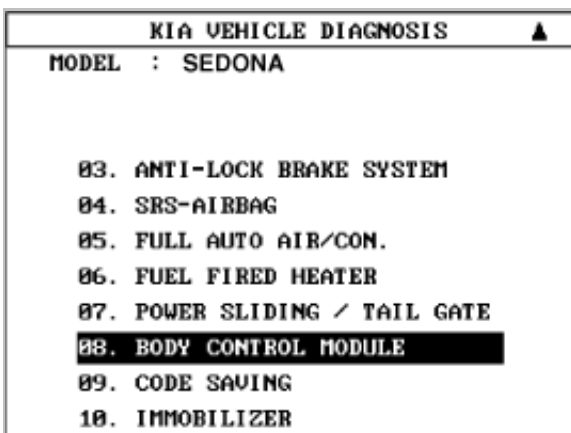


4. Remove the front door modules (DDMDM) from the front door trim panel.



## INSPECTION

1. The DDM inputs can be checked using the scan tool..
2. To check the Input Value of door lock switch, select option "09. BODY CONTROL MODULE".



3. Select option "04. DRIVER DOOR MODULE".

| KIA VEHICLE DIAGNOSIS |                          |
|-----------------------|--------------------------|
| MODEL :               | SEDONA                   |
| SYSTEM :              | BODY CONTROL MODULE      |
|                       |                          |
| 01.                   | IN PANEL MODULE-V2.0     |
| 02.                   | FRONT AREA MODULE-V2.0   |
| 03.                   | REAR AREA MODULE-V2.0    |
| 04.                   | DRIVER DOOR MODULE-V2.0  |
| 05.                   | ASSIST DOOR MODULE-V2.0  |
| 06.                   | INTEGRATED MEM SEAT-V2.0 |
| 07.                   | BCU DIAGNOSTIC MODE      |

4. Select option "02. CURRENT DATA".

| 1. KIA VEHICLE DIAGNOSIS |                          |
|--------------------------|--------------------------|
| MODEL :                  | SEDONA                   |
| SYSTEM :                 | BODY CONTROL MODULE      |
|                          |                          |
| 01.                      | DIAGNOSTIC TROUBLE CODES |
| 02.                      | CURRENT DATA             |
| 03.                      | DUAL DISPLAY             |
| 04.                      | FLIGHT RECORD            |
| 05.                      | ACTUATION TEST           |
| 06.                      | SIMU-SCAN                |

| 1.2 CURRENT DATA       |      | 02/35       |      |      |      |
|------------------------|------|-------------|------|------|------|
| DR LOCK MON. SW        | OFF  | ▲<br>■<br>▼ |      |      |      |
| DOOR LOCK SW           | ON   |             |      |      |      |
| DOOR UNLOCK SW         | OFF  |             |      |      |      |
| KEY CYL.DOOR LOCK SW   | OFF  |             |      |      |      |
| KEY CYL.DOOR UNLOCK SW | OFF  |             |      |      |      |
| FUEL FILLER DOOR SW    | ON   |             |      |      |      |
| P/SEAT SLID FORWARD SW | ON   |             |      |      |      |
| P/SEAT SLID BACKWA. SW | ON   |             |      |      |      |
| FIX                    | PART | FULL        | HELP | GRPH | RCRD |

5. To check the Input Value of door lock switch in force mode, select option "05. ACTUATION TEST".

| 1. KIA VEHICLE DIAGNOSIS |                          |
|--------------------------|--------------------------|
| MODEL :                  | SEDONA                   |
| SYSTEM :                 | BODY CONTROL MODULE      |
|                          |                          |
| 01.                      | DIAGNOSTIC TROUBLE CODES |
| 02.                      | CURRENT DATA             |
| 03.                      | DUAL DISPLAY             |
| 04.                      | FLIGHT RECORD            |
| 05.                      | ACTUATION TEST           |
| 06.                      | SIMU-SCAN                |

KIA VEHICLE DIAGNOSIS

MODEL : SEDONA

SYSTEM : BODY CONTROL MODULE

**01. IN PANEL MODULE-V2.0**

02. FRONT AREA MODULE-V2.0

03. REAR AREA MODULE-V2.0

04. DRIVER DOOR MODULE-V2.0

05. ASSIST DOOR MODULE-V2.0

06. INTEGRATED MEM SEAT-V2.0

07. BCU DIAGNOSTIC MODE



# **Body Electrical System**

Power Sliding Door System



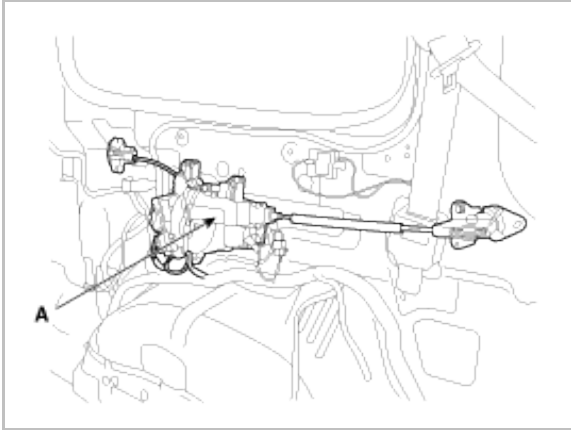
## DESCRIPTION

Power Sliding Door is an electro-mechanical system designed to provide power opening and closing of a vehicle's sliding door through the push of a button of the transmitter key or the main control buttons on the overhead console or the sub control buttons on the center pillar trim or inside/outside door handle switch.

The power sliding door will reverse direction of travel if resistance to movement is detected while the door is being closed. If resistance to movement is detected while the power sliding door is being opened, the door will stop moving.

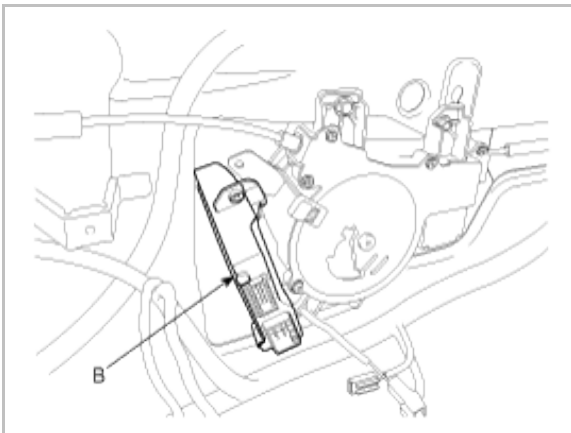
### 1. DRIVE UNIT

Drive unit (A) consists of a DC motor, optical sensor, clutch, cables and pulleys and wire harness. The clutch and motor portion of the assembly provides the power and torque required to open or close the sliding door. The clutch assembly is used to connect or disconnect the motor so that the Sliding Door may be moved manually, if desired.



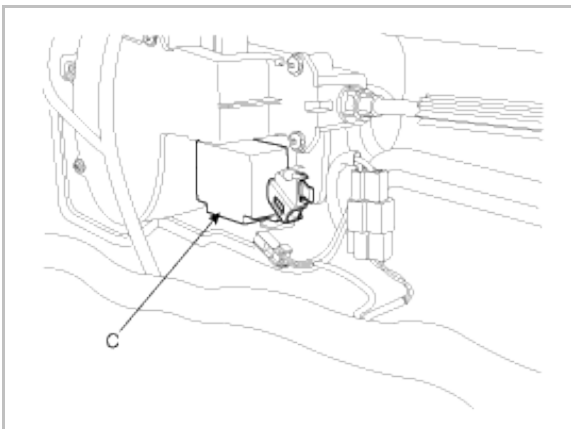
### 2. POWER SLIDING DOOR CONTROL MODULE (PSDM)

The PSD System uses a power sliding door control module (microprocessor controller) to operate the drive unit. Signals are received from the vehicle and used to start or stop power open or close operations. The PSDM cannot be adjusted or repaired and if found to be faulty, must be replaced.



### 3. SLIDING DOOR CHIME (C)

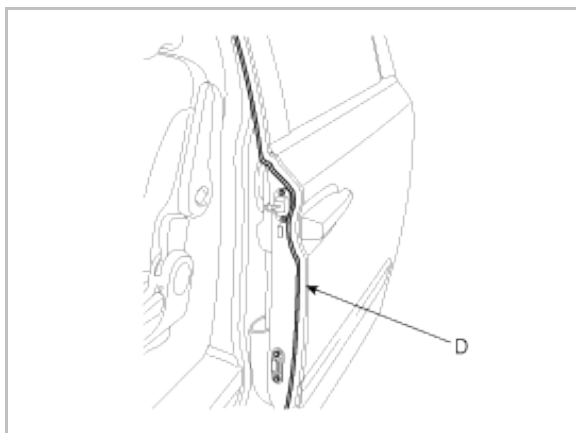
When the power sliding door detect the resistance or abnormal operation, the chime will sound.



### 4. ANTI-PINCH STRIP (D)

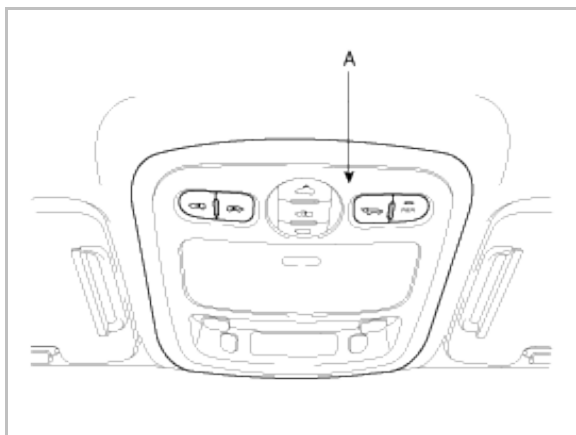
Secondary Obstacle Detection is provided by means of a contact type strip. Strip is composed of two conductive zones separated by an air gap. When strip is compressed, conductive zones make contact, activating the switch signal.

Copper wire is extruded through conductive material to prevent resistive buildup. Terminating resistor is molded into end of strip to detect failures of strip.



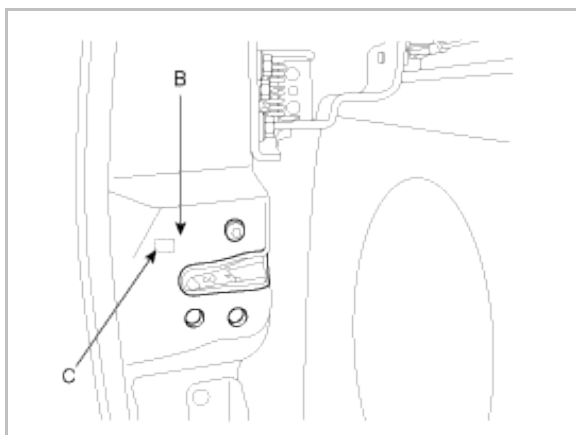
#### 5. OVERHEAD CONSOLE AND REMOTE CONTROL SWITCH (A)

The power sliding doors can be opened and closed automatically with the RKE and the main control button on the overhead console.



#### 6. DOOR LATCH (B)

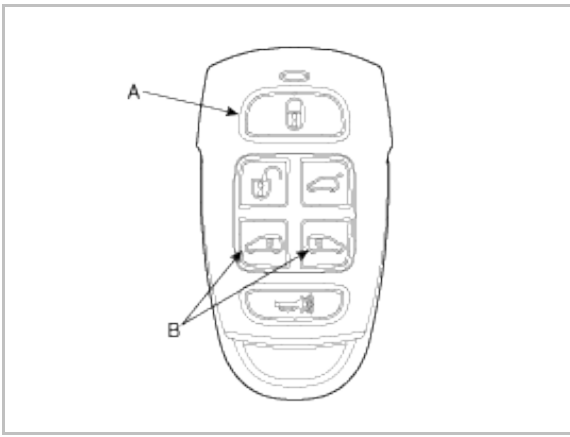
The door latch contains a detent switch [C] used to detect the latch state and report the latch state to the power sliding door module.



#### 7. KEYLESS ENTRY (A)

Power sliding doors can be opened and closed by pressing the button on the RKE more than 0.5 sec. Open operation shall be reserved when an additional open/close signal is received during power opening.

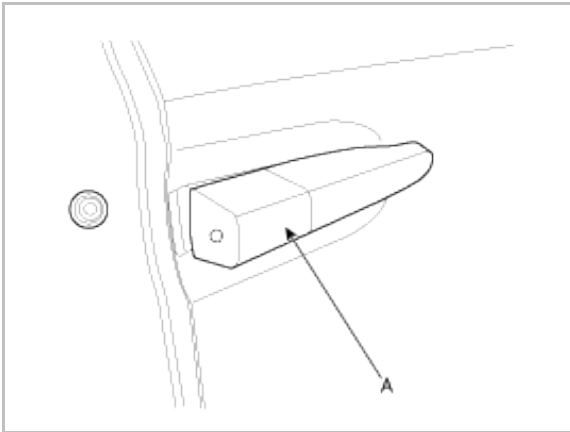




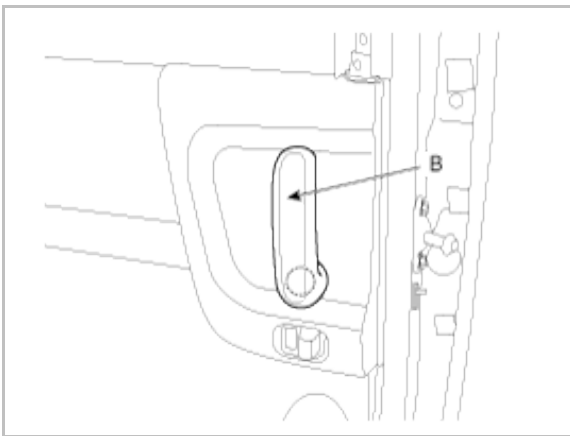
#### 8. INSIDE/OUTSIDE DOOR HANDLE SWITCH

Power sliding door can be opened and closed manually/automatically from inside or outside vehicle.

Outside door handle switch (A)



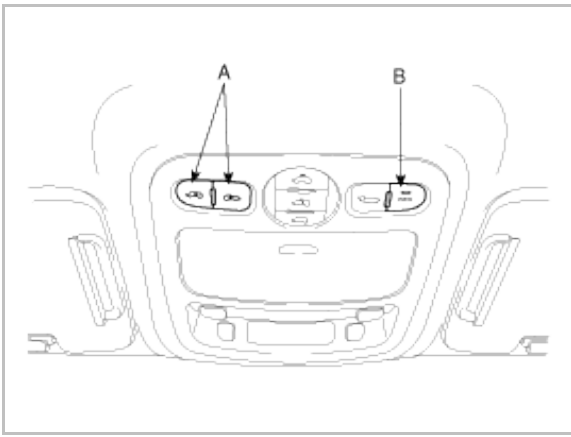
Inside door handle switch (B)



## OPERATION

### POWER SLIDING DOOR OPEN/CLOSE

1. The right/left sliding door is opened and closed automatically if the main switch (A) is pressed on the overhead console.



2. When the power ON/OFF button (PWR) (B) is ON, the power sliding door and power tailgate can be opened and closed automatically by using trim switch.
3. When the sliding door window is open (more than 3 in/80 mm), the power sliding door will not power open fully but will open to the 3/4 position and the chime will sound 3 times.
4. General rules for chime functions
  - A. Chime shall operate when a power operation cannot be performed as requested except handle pull : 1 Time (Duration 0.5 second on)
  - B. Chime shall operate when an obstacle has been detected : 3 Time (0.5 sec on, 0.5 sec off)
  - C. Chime shall operate if PSD has not reached primary latch position after a power cinch cycle : 3 Time (0.5 sec on, 0.5 sec off)

#### WARNING

Do not leave the power sliding door at half-opened position. Close the window and then open the door fully. Half-opened door is held and then released after 10 minutes. The chime sounds 3 times to indicate the door is released. If the vehicle is stopped on a downward slope, it may move and cause an injury.

## POWER SLIDING DOOR OPERATING CONDITION

1. The sliding door will not power open when vehicle is moving above 3 mph (5 km/h) or the gearshift lever is not in P (Park) for automatic transaxle.
2. The power sliding door will not open with the transmitter or the main control button when all power sliding doors are locked and closed.
3. The power sliding door will detect the resistance, then stop movement or move to the full open position to allow the object to be cleared.
4. The left sliding door cannot be opened when the fuel filler lid is open.
5. If the automatic stop and reversal feature operates continuously more than twice during one opening or closing operation, the power sliding door may stop at that position. At this time, close the doors manually and operate the door automatically again.
6. The power sliding door can be opened by pulling the outside door handle while the door is unlocked and child safety lock is engaged.

#### NOTICE

- If the fuel filler lid is opened when the left sliding door is not closed completely, the door may be opened. Close the left sliding door before refueling to prevent possible damage to the door or the fuel filler lid.
- Sudden starting or accelerating the vehicle while the door is closing could cause it to open the door and result in a serious injury or damage to cargo.
- The PSDM will go to a sleep mode and power operation will be disabled if the sliding door is left open longer than 6 hours. Manually close the sliding door to the latched position to reset the PSDM. Power operation will be restored.

### CAUTION

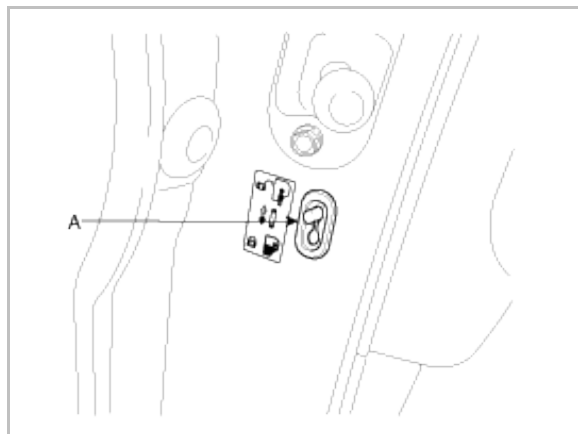
- The door could suddenly close by itself and cause a serious injury especially when stopping on a down-hill grade.
- To prevent the battery from being discharged, do not leave the power sliding door and power tailgate at open position for a long time.

### WARNING

- Let the rear passengers get on or off the vehicle after the door is open fully. Sudden closing could cause a serious injury.
- To prevent power sliding door system, don't use excessive force to open/close the door during operation.

## CHILD SAFETY LOCKS

To prevent children from opening the power sliding doors from the inside, the child safety locks (A) should be used whenever children are in the vehicle.



### WARNING

Be careful, when the child safety lock is used in an accident, that the passengers are not held in vehicle.

## POWER OPERATION

The PSD system shall not open the Sliding Door when the vehicle is moving.

The PSD system shall operate through the full range of Sliding Door travel.

The PSD system shall learn the position of each travel extreme: full open and full closed.

– : No action    ● : Close    ○ : Open    X : Stop

| Vehicle Motion | Door Position Zone | ON/OFF | Door Lock Status | Operation                           |                 |                |                    |
|----------------|--------------------|--------|------------------|-------------------------------------|-----------------|----------------|--------------------|
|                |                    |        |                  | RKE Key fob Note 2                  | PSD main switch | PSD sub switch | Door handle switch |
| Not Moving     | 1 or 2             | OFF    | Any              | ○                                   | ○               | X(Chime 1 T)   | X                  |
|                |                    | ON     | Not Locked       | ○                                   | ○               | ○              | ○                  |
|                |                    |        | Locked           | ○                                   | ○               | X(Chime 1 T)   | X                  |
|                | 3 or 4             | OFF    | Any              | ●                                   | ●               | X(Chime 1 T)   | X                  |
|                |                    | ON     | Any              | ●                                   | ●               | ●              | ●                  |
|                | Closing            | OFF    | Any              | ○                                   | ○               | X              | X                  |
|                |                    | ON     | Any              | ○                                   | ○               | ○              | ○                  |
|                | Opening 1 or 2     | ON/OFF | Any              | X                                   | X               | X              | X                  |
|                | Opening 3 or 4     | OFF    | Any              | ●                                   | ●               | X              | X                  |
|                |                    | ON     | Any              | ●                                   | ●               | ●              | ●                  |
| Moving         | 1 or 2             | ON/OFF | Any              | –                                   | X(Chime 1 T)    | X(Chime 1 T)   | X                  |
|                | 3 or 4             | OFF    | Any              | –                                   | ●               | X(Chime 1 T)   | ●                  |
|                |                    | ON     | Any              | –                                   | ●               | ●              | ●                  |
|                | Closing            | ON/OFF | Any              | –                                   | X               | X              | X                  |
|                | Opening 1 or 2     | ON/OFF | Any              | –                                   | X               | X              | X                  |
|                | Opening 3 or 4     | OFF    | Any              | –                                   | ●               | X              | X                  |
|                |                    | ON     | Any              | –                                   | ●               | ●              | ●                  |
| Any            | 1 or 2             | ON     | Any              | Manual Move in open/close direction |                 |                |                    |
|                |                    |        | Any              |                                     |                 |                |                    |
|                | 3 or 4             | ON     | Any              | Manual Move in open/close direction |                 |                |                    |
|                |                    |        | Any              |                                     |                 |                |                    |
|                | Any                | OFF    | Any              | Manual Move                         |                 |                |                    |

#### 1. Vehicle condition

##### Moving

A. (IGN=OFF and Vehicle Speed > 5 km/h) or (IGN= ON and (Vehicle Speed > 5 km/h or PIN - not P/N))

##### Not moving

A. (IGN=OFF and Vehicle Speed < 5 km/h) or (IGN= ON and (Vehicle Speed < 5 km/h and TRANS - P/N))

#### 2. DOOR TRAVEL - ZONES

The door travel is divided into four zones starting at the full closed and latched position.

Dimensions are at the rear edge of the door and are approximate.

Zone 1 - Latching - 0 to 10 mm (primary and secondary latch positions).

Zone 2 - Near latching position including curved track portion -10 to 300 mm.

Zone 3 - Straight track - 300 mm to hold open latch.

Zone 4 - Hold Open - door in hold open latch.

## POWER SLIDING DOOR OPERATION

#### 1. Vehicle condition

##### Stopping condition

A. When the ignition switch is in the OFF or ACC position, vehicle is stopped or moving below 5 km/h.

B. When the ignition switch is in the ON position, vehicle is stopped or moving below 5 km/h (the gearshift lever is in N(Neutral) for manual transaxle, P(Park) for automatic transaxle).

##### Driving condition

A. When the ignition switch is in the OFF or ACC position, vehicle is moving above 5 km/h.

B. When the ignition switch is in the ON position, vehicle is moving above 5 km/h or the gearshift lever is not in

N(Neutral) for manual transaxle, P(Park) for automatic transaxle.

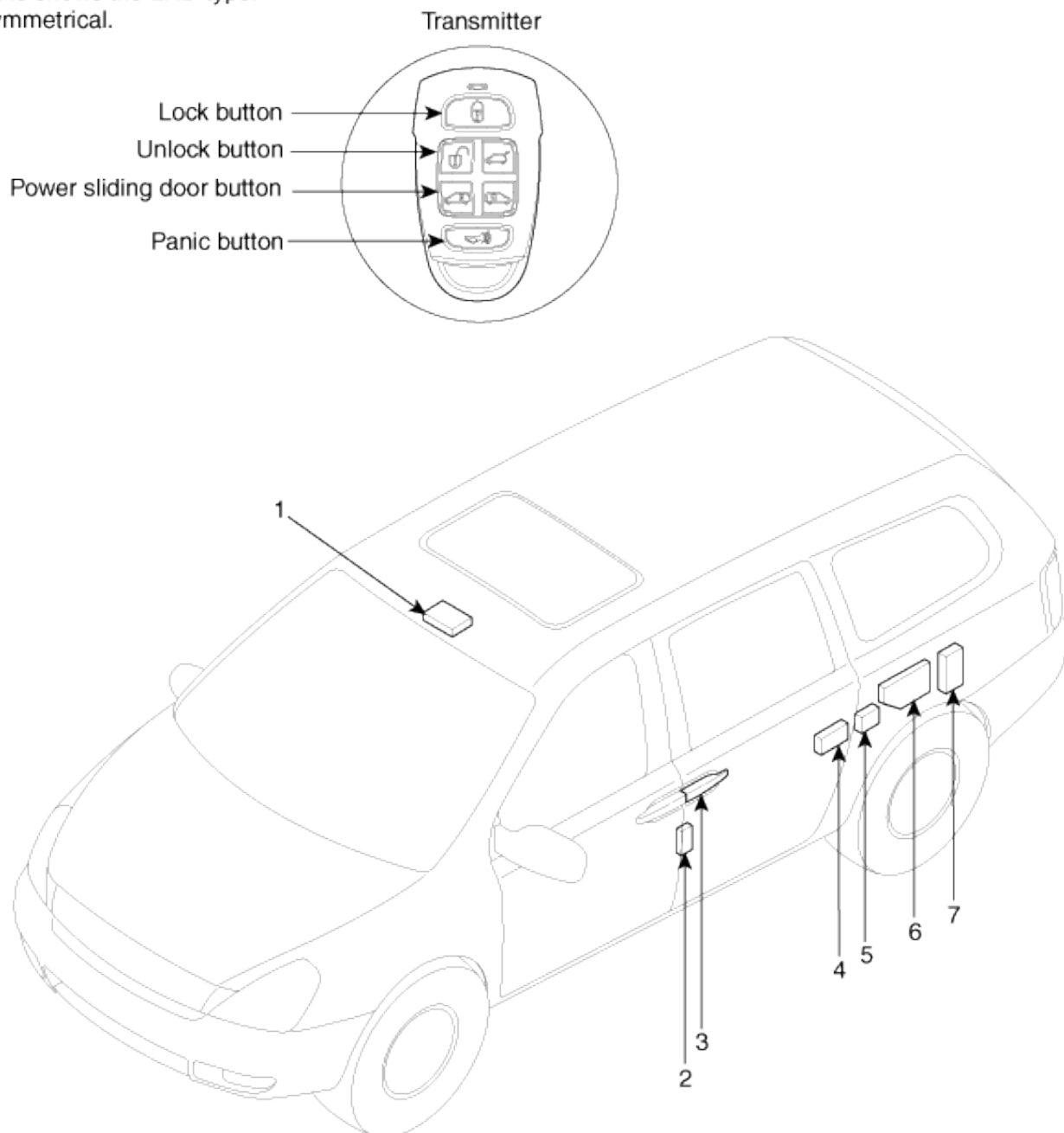
2. Door position

If the power sliding door is operated while the door is in slightly-opened position (less than 300mm), the door is automatically opened fully. If the power sliding door is operated while the door is in slightly-opened position (more than 300mm), the door is automatically closed completely.

3. If the door handle is pulled from inside or outside while the door is locked or child safety lock is engaged, the power sliding door is not opened.

## COMPONENT LOCATION

This illustration shows the LHD type.  
RHD type is symmetrical.



1. Overhead console switch
2. Power sliding door trim switch
3. In/out door handle switch
4. Latch (including detent switch)

5. Power sliding door chime
6. Power sliding door drive unit
7. Power sliding door module



## TROUBLESHOOTING

Check the following items prior to performing Power Sliding Door System service.

### 1. Manual movement

Make sure the sliding door moves manually. Place the ON/OFF switch on the overhead console in the OFF position. Move the door manually and check for proper door fit and latch effort. Check for interference with other body parts such as latch striker, trim, and weather seals.

### 2. Battery voltage

Make sure the battery is fully charged. The PSD system is an electronic device and requires a minimum battery voltage to operate. The PSDM(Power sliding door module) monitors the battery voltage present at the PSDM input battery input and will not permit operation if the battery voltage is out of range.

### 3. Fuses

Two fuses protect the battery supply to the PSDM(Power sliding door module), one for Power, and one for logic. Check that the fuses are intact

### 4. Repeat Operations

Make sure the customer has not been operating the PSD repeatedly while the vehicle is turned off. The battery will be discharged and the PSDM(Power sliding door module) will not permit operation.

### 5. Vehicle on Steep Grade

Make sure the customer has not been operating the PSD system when the vehicle is parked on a steep grade (greater than 30%). The system will operate but the force of gravity and normal flex of the vehicle body may affect proper operation.

### 6. Obstacle Detection

The obstacle detection force is not adjustable. Factors that may affect the force are vehicle grade, battery voltage, or dirt in sliding door tracks.

### 7. Outside handle response time

When the vehicle has been parked and OFF, there may be a delay before power operation starts after the outside handle is pulled. This is normal because the PSDM(Power sliding door module) must wake up and check for proper conditions before starting a power open operation.

### 8. The sliding doors are not identical. Open and close times and obstacle detection efforts may vary when comparing the two doors. This is normal and is caused by vehicle build conditions such as door fit and rolling resistance.

### 9. Scan tool Diagnostic tool

Connect Scan tool to the K-line and check status of system.

## POWER SLIDING DOOR SYSTEM DIAGNOSIS

| CONDITION                                 | POSSIBLE CAUSES                                                                             | CORRECTION                                                                                                                                                                                      |
|-------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sliding Door opens unexpectedly           | Accidental activation or failure of open/close command switch                               | Check for shorted or defective switch                                                                                                                                                           |
|                                           | Failure of latch assembly                                                                   | Check wiring connections                                                                                                                                                                        |
|                                           | Failure of Power Sliding Door or Body Control module                                        | Check for diagnostic trouble codes                                                                                                                                                              |
| Sliding Door will not power open or close | Failure of Power Sliding Door or Body Control module                                        | Disconnect then reconnect battery or fuse to reset module and function sliding door. If no function exists check for loose wire connections. See Body Diagnostic Manual for detailed procedures |
|                                           | Not in Park or false indication                                                             | Check switch status with SCAN tool                                                                                                                                                              |
|                                           | Battery voltage at PSDM is too low <9.5V to start operation and <8.0V to continue operation | Check for proper voltage at the PSDM. Charge battery                                                                                                                                            |
|                                           | Blown fuse                                                                                  | Check for blown fuse                                                                                                                                                                            |
|                                           | PSDM or sliding door control module                                                         |                                                                                                                                                                                                 |

|                                                                        |                                                                                                   |                                                                                           |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
|                                                                        | BCM or Sliding door control module critical fault codes                                           | Check for diagnostic trouble codes                                                        |
|                                                                        | Failure of latch assembly                                                                         | Check wire connections and for blown fuse                                                 |
|                                                                        |                                                                                                   | Check for foreign matter preventing the operation of latch assembly                       |
|                                                                        | Failure of motor assembly                                                                         | Test motor assembly                                                                       |
|                                                                        | Binding or sticking of components                                                                 | Establish location of binding and replace necessary components                            |
|                                                                        | Wiring problems (system or vehicle)                                                               | Troubleshoot using electrical schematics<br>Refer to wiring diagrams                      |
| Power loss during Sliding Door operation                               | Wiring problems (system or vehicle)                                                               | Troubleshoot using electrical schematics<br>Refer to wiring diagrams                      |
|                                                                        | Battery voltage at PSDM is too low<br><9.5V to start operation and<br><8.0V to continue operation | Check for proper voltage at the PSDM.<br>Charge battery                                   |
|                                                                        | Failure of Power Sliding Door or Body Control Module                                              | Check for diagnostic trouble codes                                                        |
|                                                                        | Failure of motor assembly                                                                         | Test motor assembly                                                                       |
| Sliding Door does not close to primary latch position                  | Door mis-alignment                                                                                | Check latch and striker alignment                                                         |
|                                                                        |                                                                                                   | Check rollers and track alignment                                                         |
|                                                                        | Binding or sticking of components                                                                 | Establish location of binding and adjust or replace necessary components                  |
|                                                                        | Failure of Power Sliding Door or Body Control Module                                              | Check for diagnostic trouble codes                                                        |
|                                                                        | Sliding Door seal force too high                                                                  | Inspect seals for damage, mis-assembly, foreign matter or other possible obstruction      |
|                                                                        | Failure of motor assembly                                                                         | Test motor assembly                                                                       |
| Latch will not release from primary position                           | Not in Park or false indication                                                                   | Check switch status with SCAN tool                                                        |
|                                                                        | Battery voltage at PSDM is too low                                                                | Check for proper voltage at the PSDM<br>Charge battery                                    |
|                                                                        | Blown fuse                                                                                        | Check fuse and replace if required                                                        |
|                                                                        | Failure of latch assembly                                                                         | Check switch status with scan tool                                                        |
|                                                                        |                                                                                                   | Check for foreign matter or damaged components preventing the operation of latch assembly |
|                                                                        |                                                                                                   | Troubleshoot using body diagnostic manual.<br>Replace latch assembly, if necessary        |
|                                                                        | Failure of outside or inside handle connection                                                    | Check handle connections on brainplate.                                                   |
|                                                                        | Failure of Power Sliding Door or Body Control Module                                              | Check for diagnostic trouble codes.                                                       |
|                                                                        | Binding or sticking of components                                                                 | Establish location of binding and adjust or replace necessary components                  |
| Key fob or overhead console switch does not power operate sliding door | Blown Fuse                                                                                        | Check fuse and replace                                                                    |
|                                                                        | Battery voltage at PSDM is too low                                                                | Check for proper voltage at the PSDM.<br>Charge battery                                   |
|                                                                        |                                                                                                   | Refer to wiring diagrams                                                                  |



|                                                                         |                                                                      |                                                                                           |
|-------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
|                                                                         | Wiring problems (system or vehicle)                                  | Refer to wiring diagrams<br>Check for diagnostic trouble codes.                           |
| Does Not Power Unlatch                                                  | Failure of latch assembly                                            | Check for foreign matter preventing the operation of latch assembly                       |
|                                                                         |                                                                      | Check for diagnostic trouble codes.                                                       |
|                                                                         |                                                                      | Check Detent switch.                                                                      |
|                                                                         |                                                                      | Troubleshoot using body diagnostic manual                                                 |
|                                                                         | Failure of Latch Release Actuator                                    | Check actuator and replace if necessary                                                   |
|                                                                         | Wiring problems (system or vehicle)                                  | Refer to wiring diagrams<br>Check for diagnostic trouble codes.                           |
|                                                                         | Failure of Body Control Module (BCM)                                 | Troubleshoot using body diagnostic manual                                                 |
|                                                                         |                                                                      | Replace BCM if necessary                                                                  |
|                                                                         | Failure of key fob                                                   | Reprogram key fob                                                                         |
|                                                                         |                                                                      | Replace key fob if necessary                                                              |
|                                                                         | Failure of Power Sliding Door Module                                 | Check for diagnostic trouble codes.<br>See Body Diagnostic Manual for detailed procedures |
|                                                                         | Failure of sliding door motor assembly                               | Check for foreign matter preventing the operation of motor assembly                       |
| Check wire connections                                                  |                                                                      |                                                                                           |
| Drive Unit clutch does not engage.<br>Replace Drive Unit.               |                                                                      |                                                                                           |
| Troubleshoot using Body Diagnostic Manual<br>Replace motor if necessary |                                                                      |                                                                                           |
| Sliding Door does not stay open                                         | Hold Open Latch not working                                          | Check if sliding door powers open to hold open latch                                      |
|                                                                         |                                                                      | Check if H-O-L is working                                                                 |
| High inside/outside opening effort                                      | Bound cables                                                         | Check for smooth manual operation                                                         |
|                                                                         |                                                                      | Check for broken attachments                                                              |
|                                                                         | Drive unit jammed or did not disengage                               | Troubleshoot using Body Diagnostic Manual<br>Replace components, if necessary             |
|                                                                         | Binding or sticking of components                                    | Establish location of binding and replace necessary components                            |
| Sliding Door continues to power close                                   | Failure of latch assembly                                            | Check wire connections and Detent switch                                                  |
|                                                                         |                                                                      | Check for foreign matter                                                                  |
|                                                                         |                                                                      | Troubleshoot using Body Diagnostic Manual                                                 |
|                                                                         | Control Module                                                       | Check for diagnostic trouble codes                                                        |
| Wiring problems (system or vehicle)                                     | Troubleshoot using electrical schematics<br>Refer to wiring diagrams |                                                                                           |
| Sliding Door continues to power open                                    | Failure of PSDM                                                      | Check for diagnostic trouble codes<br>See Body Diagnostic Manual for detailed procedures  |
|                                                                         | Wiring problems (system or vehicle)                                  | Troubleshoot using electrical schematics<br>Refer to Wiring Diagrams                      |
| Sliding Door opens very slowly                                          | Battery voltage at PSDM is too low                                   | Check for proper voltage at the PSDM<br>Charge battery                                    |

|                             |                                                |                                                                |
|-----------------------------|------------------------------------------------|----------------------------------------------------------------|
|                             | Bound cables                                   | Replace drive unit if necessary                                |
|                             | Binding or sticking of components              | Establish location of binding and replace necessary components |
|                             | Grade of vehicle too steep for power operation | Operate sliding door manually                                  |
|                             | Failure of sliding door motor assembly         | Replace motor assembly, if necessary                           |
| Squeaks, Noises and rattles | Foreign material in Sliding Door               | Remove foreign material                                        |
|                             | Worn or Loose components                       | Check and tighten loose components                             |

## DTC LIST

| DTC CODE | DISPLAY                                                      |
|----------|--------------------------------------------------------------|
| B1101    | Battery Voltage High                                         |
| B1102    | Battery Voltage Low                                          |
| B1105    | Reference Voltage Fault                                      |
| B1223    | VSS Fault                                                    |
| B1270    | Optical Sensor-1 Output Stuck High                           |
| B1271    | Optical Sensor-1 Output Stuck Low                            |
| B1272    | Optical Sensor-2 Output Stuck High                           |
| B1273    | Optical Sensor-2 Output Stuck Low                            |
| B1274    | Broken Cable(PSD Only)                                       |
| B1580    | Ignition Start Switch Short High                             |
| B1586    | Chime Open Or Short High                                     |
| B1621    | ECU Fault                                                    |
| B1645    | Drive Unit Fault                                             |
| B2420    | Drive Motor Open                                             |
| B2421    | Drive Motor Short High                                       |
| B2422    | Drive Motor Short Low                                        |
| B2423    | Clutch Open Or Short High                                    |
| B2424    | Clutch Short Low                                             |
| B2425    | Pinch strip(PSD) open or Stuck High                          |
| B2426    | Pinch strip(PSD) Stuck Low                                   |
| B2450    | Unlatch Motor (PSD) Short High                               |
| B2451    | Unlatch or Cinch Motor (PTG) / Unlatch Motor (PSD) Short Low |

## INPUT/OUTPUT MONITORING

|   | BCM DISPLAY                              | UNIT     |
|---|------------------------------------------|----------|
| 1 | Battery Logic Voltage                    | Voltages |
| 2 | Battery Power Voltage                    | Voltages |
| 3 | Optical Sensor Power                     | Voltages |
| 4 | Door/Gate Optical Sensor 2-Logical State | LOW/HIGH |
| 5 | Door/Gate Optical Sensor 1-Logical State | LOW/HIGH |

|    |                                       |                        |
|----|---------------------------------------|------------------------|
| 6  | Detent Switch                         | LOW/HIGH               |
| 7  | Power Battery Voltage                 | OUT OF RANGE/ IN RANGE |
| 8  | Pinch strip-pinch condition(PSD Only) | Not Pinched/Pinched    |
| 9  | Park Switch                           | Out Of Park/Park       |
| 10 | Ignition Swtich                       | LOW/HIGH               |
| 11 | Child Lock Status (PSD Only)          | Lock/Unlock            |
| 12 | Lock Status (PSD Only)                | Lock/Unlock            |
| 13 | Handle Switch (PSD Only)              | Not Pressed/Pressed    |
| 14 | Local Open/Close Switch               | Not Pressed/Pressed    |
| 15 | Master Open/Close Switch              | Not Pressed/Pressed    |
| 16 | Learn Process Complete Status         | Not Complete/Complete  |
| 17 | Vehicle Speed Slow Status             | ≥5kph / < 5kph         |
| 18 | On/Off Switch                         | ON/OFF                 |
| 19 | Start Switch                          | LOW/HIGH               |
| 20 | PSD Right Select Status               | Left/Right             |
| 21 | Fuel Filler Door switch               | LOW/HIGH               |
| 22 | Door/Gate Open Feedback               | Voltages               |
| 23 | Door/Gate Close Feedback              | Voltages               |
| 24 | Unlatch Feedback                      | Voltages               |
| 25 | Clutch Feedback                       | Voltages               |
| 26 | Door/Gate Position Count              | -                      |
| 27 | Most Recent Cinch Time                | ms                     |
| 28 | 2nd Most Recent Cinch Time            | ms                     |
| 29 | 3rd Most Recent Cinch Time            | ms                     |
| 30 | 4th Most Recent Cinch Time            | ms                     |
| 31 | Left Pinch Strip Voltage              | Voltages               |
| 32 | Right Pinch Strip Voltage             | Voltages               |



## ADJUSTMENT

### POWER SLIDING DOOR INITIALIZATION

A learn cycle must be performed whenever the power is removed, a Power Sliding Door component is removed or replaced, or a sliding door adjustment is performed. The learn cycle enables the Power Sliding Door control module (PSDM) to learn the range of full travel and effort required to power the Sliding Door which allows it to perform properly and safely.

### POWER SLIDING DOOR SYSTEM RESET

Certain conditions may require that the PSD system be reset

1. Remove the MEMORY fuse that provides power to the PSDM.
2. Wait 1 minute. Replace fuse. Initialize PSDM.

### INITIALIZATION PROCEDURE

1. Manually close and latch the sliding door.
2. Power the sliding door open using the remote control, Open/Close switch, B-pillar switch, or handle.
3. Power the door close from full open to full closed position.
4. Power the door open again to full open position.

### ALTERNATE METHOD

1. Remove the black connector (J2) from the PSDM.
2. Wait a short time. Replace connector. Initialize PSDM.

#### CAUTION

- The PSD system initialization must start from the primary or secondary latched position.
- Obstacle detection shall be active during Sliding Door initialization.
- Work on level ground.

# **Body Electrical System**

Power Sliding Door System - Power Sliding  
Door Drive Unit



## INSPECTION

### SLIDING DOOR MOTOR INSPECTION

1. It will be able to diagnose defects of PSD motor with scan tool quickly.
2. Select model and menu(BCM).

| KIA VEHICLE DIAGNOSIS ▲                                                                                                                                                                                  |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| MODEL :                                                                                                                                                                                                  | SEDONA |
| 03. ANTI-LOCK BRAKE SYSTEM<br>04. SRS-AIRBAG<br>05. FULL AUTO AIR/COM.<br>06. FUEL FIRED HEATER<br>07. POWER SLIDING / TAIL GATE<br><b>08. BODY CONTROL MODULE</b><br>09. CODE SAVING<br>10. IMMOBILIZER |        |

3. Select "rear area module(RAM)".

| KIA VEHICLE DIAGNOSIS                                                                                                                                                                                               |                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MODEL :                                                                                                                                                                                                             | SEDONA              |
| SYSTEM :                                                                                                                                                                                                            | BODY CONTROL MODULE |
| 01. IN PANEL MODULE-V2.0<br>02. FRONT AREA MODULE-V2.0<br><b>03. REAR AREA MODULE-V2.0</b><br>04. DRIVER DOOR MODULE-V2.0<br>05. ASSIST DOOR MODULE-V2.0<br>06. INTEGRATED MEM SEAT-V2.0<br>07. BCU DIAGNOSTIC MODE |                     |

4. Select the "Actuation test" and "PSD open/close" to operate tailgate motor.

| 1.5 ACTUATION TEST 01/29         |                         |
|----------------------------------|-------------------------|
| PSD - RH                         |                         |
| DURATION                         | UNTIL STOP KEY          |
| METHOD                           | ACTIVATION              |
| CONDITION                        | IG.KEY ON<br>ENGINE OFF |
| PRESS [STRT], IF YOU ARE READY ! |                         |
| STRT                             | STOP                    |

5. Replace the drive unit, if actuator operates abnormal.

### DRIVE UNIT CLUTCH INSPECTION

1. Check the power sliding door control module input/output value by using the diagnostic tool. If the operation of power sliding control module is abnormal, replace power sliding door drive unit.
2. When checking the clutch operation, select a vehicle type and "POWER SLIDING/TAILGATE" menu.

| KIA VEHICLE DIAGNOSIS ▲ |                           |
|-------------------------|---------------------------|
| MODEL :                 | SEDONA                    |
|                         |                           |
| 03.                     | ANTI-LOCK BRAKE SYSTEM    |
| 04.                     | SRS-AIRBAG                |
| 05.                     | FULL AUTO AIR/COM.        |
| 06.                     | FUEL FIRED HEATER         |
| 07.                     | POWER SLIDING / TAIL GATE |
| 08.                     | BODY CONTROL MODULE       |
| 09.                     | CODE SAVING               |
| 10.                     | IMMOBILIZER               |

3. Select the "POWER SLIDING DOOR" to check.

| KIA VEHICLE DIAGNOSIS |                           |
|-----------------------|---------------------------|
| MODEL :               | SEDONA                    |
| SYSTEM :              | POWER SLIDING / TAIL GATE |
|                       |                           |
| 01.                   | POWER SLIDING - LH(V1.5)  |
| 02.                   | POWER SLIDING - RH(V1.5)  |
| 03.                   | POWER TAIL GATE(V1.5)     |

4. Select the sensor output. And then check the clutch feedback sensor output while operating power sliding door in power mode.

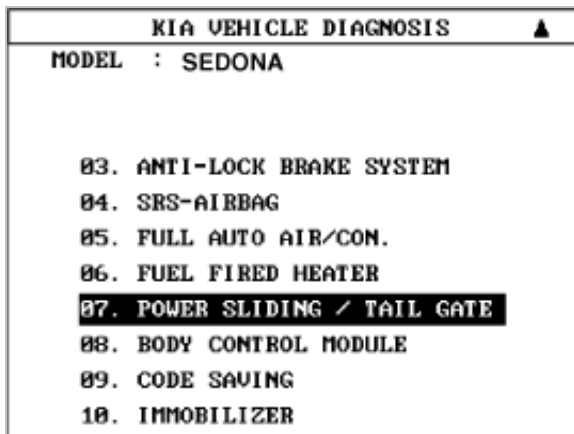
| 1.2 CURRENT DATA    |       | 24/25                           |      |      |      |
|---------------------|-------|---------------------------------|------|------|------|
| DOOR OPEN F/BACK    | 3.5 V | ▲<br><br><br><br><br><br>■<br>▼ |      |      |      |
| DOOR CLOSE F/BACK   | 3.7 V |                                 |      |      |      |
| UNLATCH F/BACK      | 3.8 V |                                 |      |      |      |
| CLUTCH F/BACK       | 3.9 V |                                 |      |      |      |
| DOOR POSITION       | 14648 |                                 |      |      |      |
| BATTERY LOGIC VOLT. | 3.5 V |                                 |      |      |      |
| BATTERY POWER VOLT. | 3.5 V |                                 |      |      |      |
| OPTICAL SNSR VOLT.  | 3.6 V |                                 |      |      |      |
| FIX                 | PART  | FULL                            | HELP | GRPH | BCRD |

※ Above voltage and numerical value may be different from the real value.

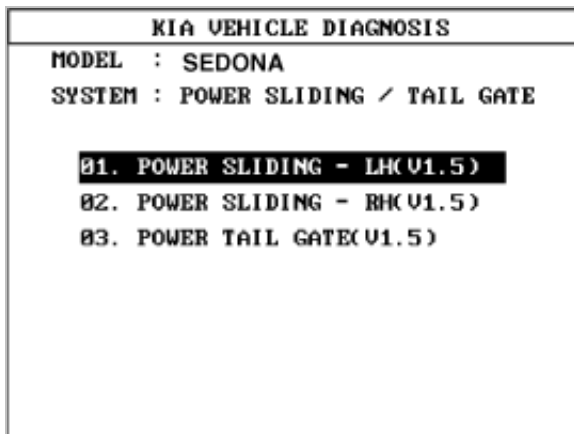
5. Change the drive unit, if there is no change during operation.

## OPTICAL SENSOR INSPECTION

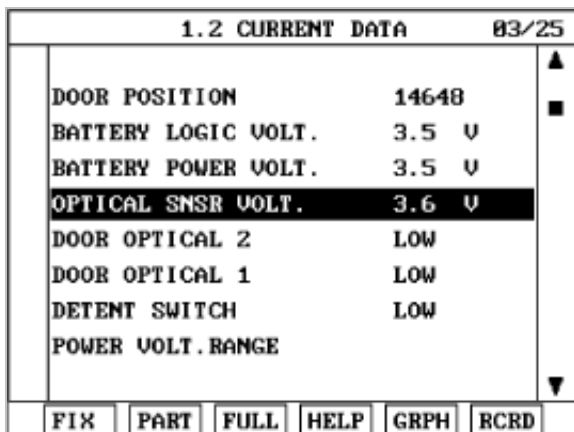
1. Check the power sliding door control module input/output value by using the diagnostic tool.
2. When checking the optical sensor, select a vehicle type and "Power sliding/tailgate" menu.



3. Select the "POWER SLIDING DOOR" to check.



4. Select the sensor output. And then check the optical sensor volt while operating power sliding door in power mode.



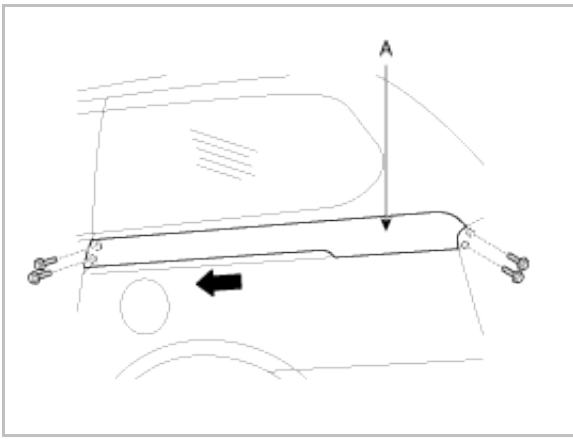
※ Above voltage and numerical value may be different from the real value.

5. Change the drive unit, if there is no change during operation.

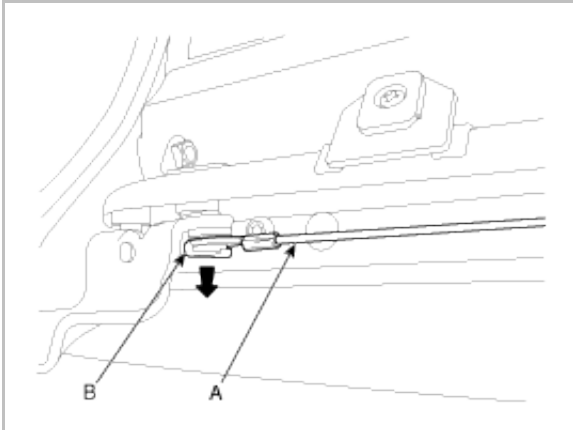
## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the rear trim panel (Refer to the Body group - interior trim)
3. Disconnect the connectors (6EA) from the power sliding door drive unit.
4. Remove the rear combination lamp (Refer to the Body group - rear bumper)
5. Remove the mounting bolts (4EA) and rail cover (A).

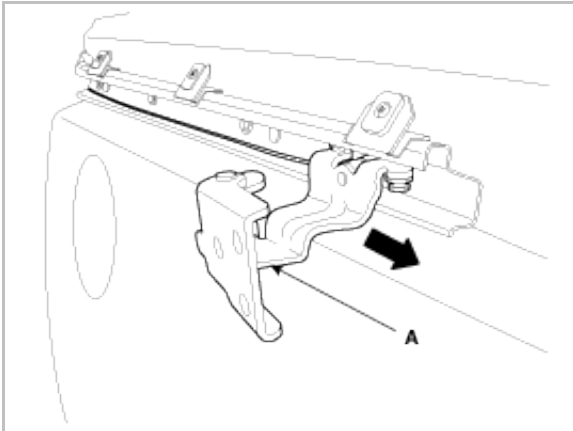




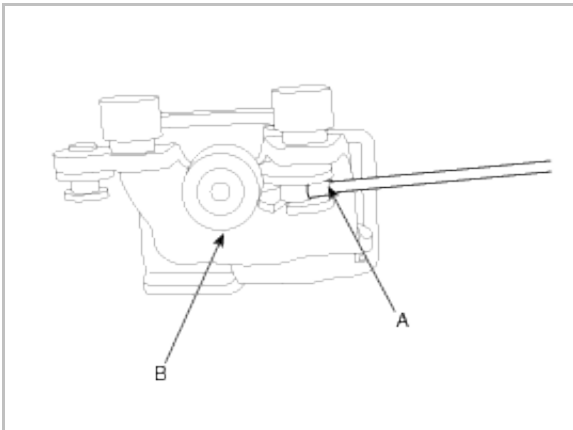
6. Pull the rear cable (A) and draw the cable clip (B) to bottom of roller hinge post and then remove the rear cable (A).



7. Remove the roller hinge bracket assembly (A) as below.



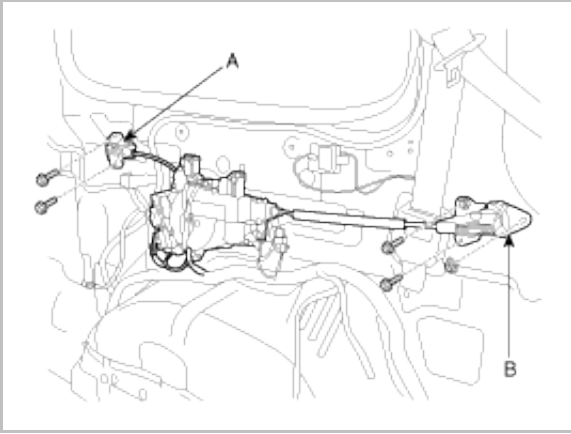
8. Remove the front cable (A) from center roller hinge (B).



9. Loosen the bolts (2EA) and remove the rear pulley bracket (A). And then remove the front pulley bracket (B) after loosening the mounting bolts (2EA) and nut (1EA).

**TORQUE : 7 - 11 N.m (0.7 - 1.1 Kg.m)**

---

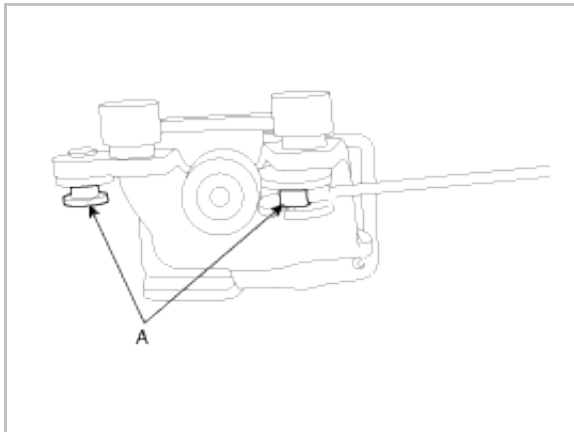


10. Loosen the mounting bolt (1EA) and nuts (2EA). And then remove the power sliding door drive unit assembly after removing the front cable.
- 

**TORQUE : 7 - 11 N.m (0.7 - 1.1 Kg.m)**

---

11. Installation is the reverse of removal.
12. When installation, check the grease on the center roller hinge barrel and club contact part (A).



**WARNING**

- A learn cycle must be performed whenever the power is removed.
- Check the normal operation whenever a power sliding door component is removed or replaced. If the chime sound is heard, check the DTC, wiring harness and cable connections.



# **Body Electrical System**

Power Sliding Door System - Power Sliding  
Door Control Module



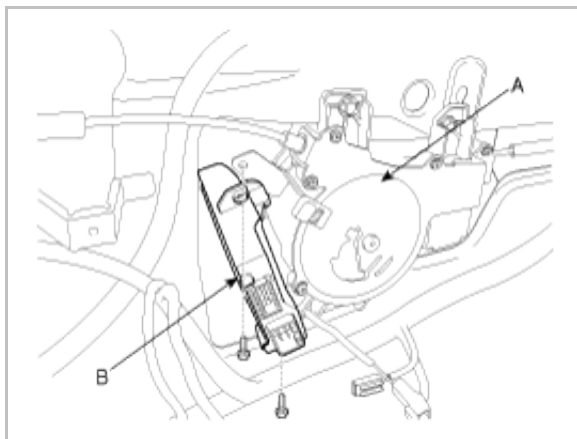
## REPLACEMENT

1. Disconnect the negative (-) battery terminal..
2. Remove the rear trim panel (Refer to the Body group - interior trim)
3. Remove the connectors and mounting bolts (2EA) from the power sliding door unit(A). And then remove the power sliding door control module (B).

---

**TORQUE** 0.25-0.35N.m(0.025-0.035Kg.m)

---



4. Installation is the reverse of removal.

### WARNING

- A learn cycle must be performed whenever the power is removed.
- Check the normal operation whenever a power sliding door component is removed or replaced. If the chime sound is heard, check the DTC, wiring harness and cable connections.

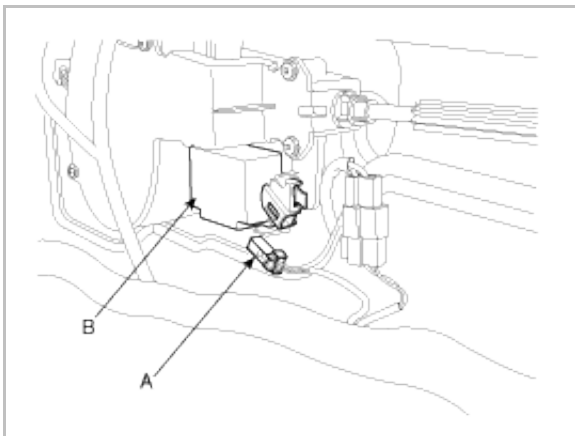
# **Body Electrical System**

Power Sliding Door System - Power Sliding  
Door Bluzzer



## REPLACEMENT

1. Remove the rear side trim (Refer to the Body group - interior trim).
2. Disconnect the sliding door chime connector (A) from chime (B).



3. Remove the chime from drive unit and replace it with a new one.

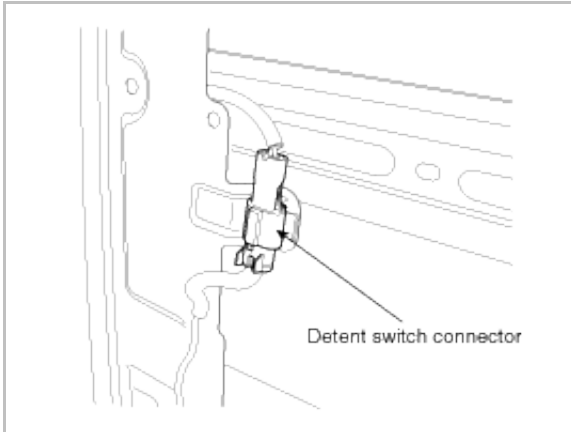
# **Body Electrical System**

Power Sliding Door System - Detent Switch

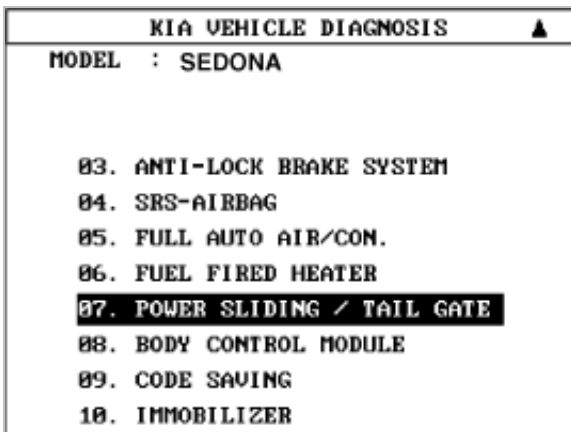


## INSPECTION

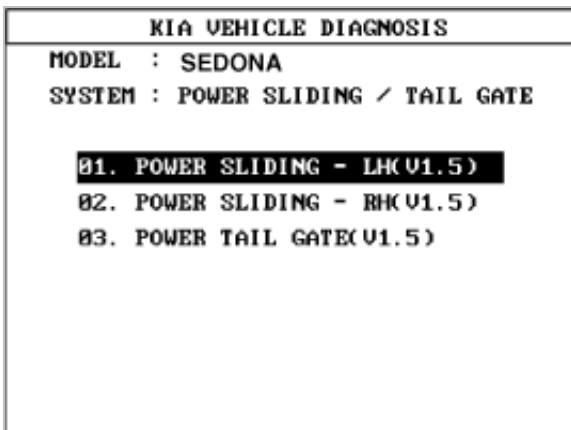
1. Detent switch detect the latch position within latch assembly.



2. Check the power sliding door control module input/output value by using the diagnostic tool.
3. When checking the detent switch, select a vehicle type and "POWER SLIDING/TAIL GATE" menu.



4. Select the "POWER SLIDING DOOR".



5. Select the detent sensor output. And then check the detent switch output with operating power sliding door.



| 1.2 CURRENT DATA      |       | 06/25 |
|-----------------------|-------|-------|
| BATTERY POWER VOLT.   | 3.5 U | ▲     |
| OPTICAL SNSR VOLT.    | 3.6 U | ■     |
| DOOR OPTICAL 2        | LOW   |       |
| DOOR OPTICAL 1        | LOW   |       |
| DETENT SWITCH         | LOW   |       |
| POWER VOLT. RANGE     |       |       |
| PINCH STRIP CONDITION |       |       |
| PARK SWITCH           |       | ▼     |
| FIX                   | PART  | FULL  |
| HELP                  | GRPH  | BCRD  |

※ Above voltage and numerical value may be different from the real value.

6. If there is no change in output, change the latch assembly.

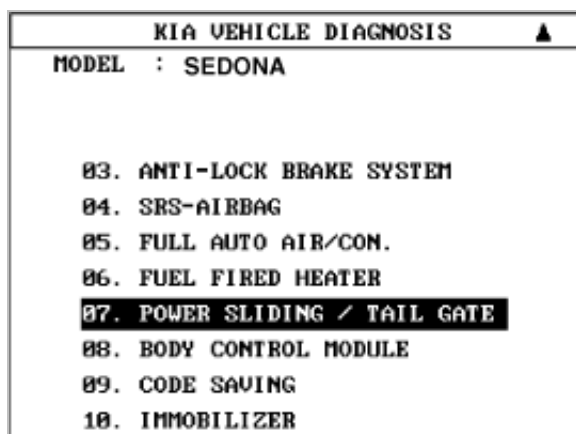
# **Body Electrical System**

Power Sliding Door System - Latch Switch

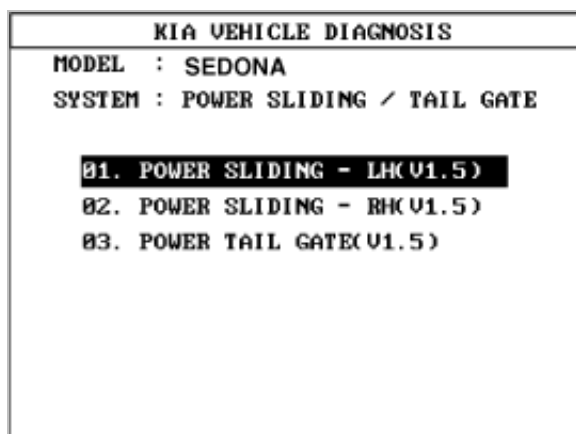


## INSPECTION

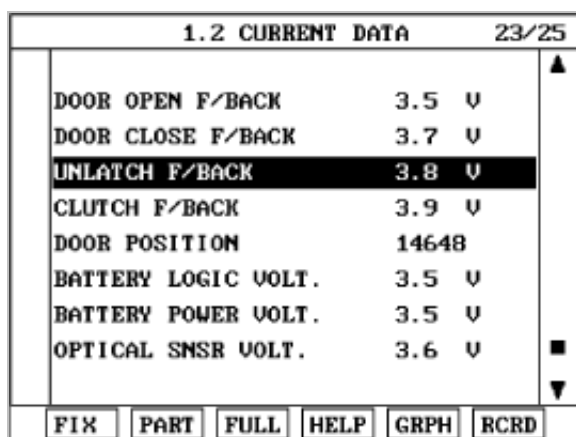
1. Check the power sliding door control module input/output value by using the diagnostic tool.
2. When checking the latch, select a vehicle type and "POWER SLIDING/TAIL GATE" menu.



3. Select the "POWER SLIDING DOOR".



4. Select the sensor output. And then check the unlatch feedback (Unlocked state) voltage while operating power sliding door in power mode.



※ Above voltage and numerical value may be different from the real value.

5. If there is no change in voltage, change the latch.

## ANTI PINCH STRIP

1. Check the power sliding door control module input/output value by using the diagnostic tool. If the operation of door control module is abnormal, replace anti pinch strip control module.
2. When checking the anti pinch strip operation, select a vehicle type and "POWER SLIDING/TAIL GATE" menu.

| KIA VEHICLE DIAGNOSIS ▲ |                           |
|-------------------------|---------------------------|
| MODEL :                 | SEDONA                    |
|                         |                           |
| 03.                     | ANTI-LOCK BRAKE SYSTEM    |
| 04.                     | SRS-AIRBAG                |
| 05.                     | FULL AUTO AIR/COM.        |
| 06.                     | FUEL FIRED HEATER         |
| 07.                     | POWER SLIDING / TAIL GATE |
| 08.                     | BODY CONTROL MODULE       |
| 09.                     | CODE SAVING               |
| 10.                     | IMMOBILIZER               |

3. Select power sliding door.

| KIA VEHICLE DIAGNOSIS |                           |
|-----------------------|---------------------------|
| MODEL :               | SEDONA                    |
| SYSTEM :              | POWER SLIDING / TAIL GATE |
|                       |                           |
| 01.                   | POWER SLIDING - LH(V1.5)  |
| 02.                   | POWER SLIDING - RH(V1.5)  |
| 03.                   | POWER TAIL GATE(V1.5)     |

4. Select the sensor output. And then check the anti pinch strip sensor output while operating power sliding door in power mode.

| 1.2 CURRENT DATA      |        | 08/25       |      |      |      |
|-----------------------|--------|-------------|------|------|------|
| DETENT SWITCH         | LOW    | ▲<br>■<br>▼ |      |      |      |
| POWER VOLT. RANGE     |        |             |      |      |      |
| PINCH STRIP CONDITION |        |             |      |      |      |
| PARK SWITCH           |        |             |      |      |      |
| IGN SWITCH            | HIGH   |             |      |      |      |
| CHILD LOCK STATUS     | UNLOCK |             |      |      |      |
| LOCK STATUS           | LOCK   |             |      |      |      |
| HANDLE SWITCH         |        |             |      |      |      |
| FIX                   | PART   | FULL        | HELP | GRPH | RCRD |

※ Above voltage and numerical value may be different from the real value.

5. Change the anti pinch strip sensor, if there is no change from OFF to ON during operation.

# **Body Electrical System**

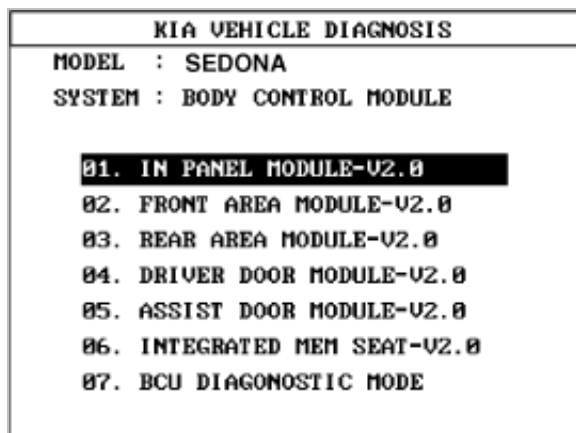
Power Sliding Door System - Power Sliding  
Door Switch



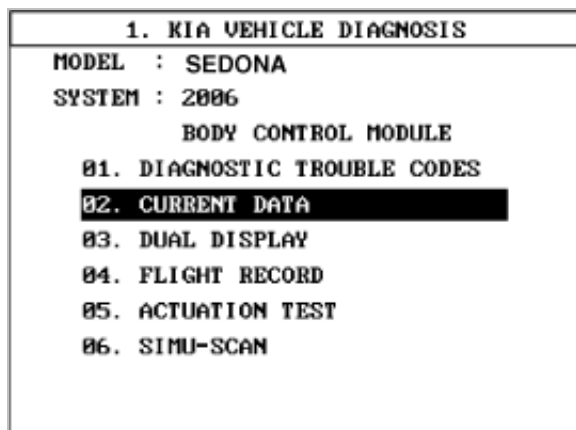
## INSPECTION

### OVERHEAD CONSOLE DOOR SWITCH INSPECTION

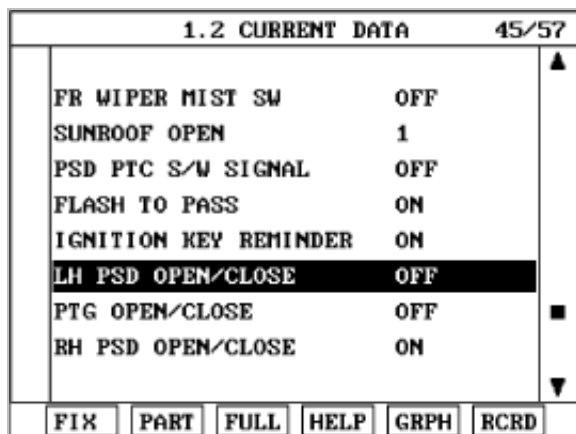
1. Check the overhead console door switch input/output value by using the diagnostic tool. If the operation of overhead console door switch is abnormal, check the IPM and replace.
2. When checking the overhead console switch operation, select a vehicle type and "IPM" menu.



3. Select a in panel module (IPM) and "CURRENT DATA".



4. Check the PSD PTG power control switch and PSD left/right switch.



5. Confirm that output is changed by the controlling ON/OFF of each switch on the overhead console.

### DOOR HANDLE SWITCH INSPECTION

1. Check the power sliding door control module input/output value by using the diagnostic tool. If the operation of door control module is abnormal, replace power sliding door control module.
2. When checking handle switch operation, select a vehicle type and "POWER SLIDING/TAIL GATE" menu.

| KIA VEHICLE DIAGNOSIS ▲ |                           |
|-------------------------|---------------------------|
| MODEL :                 | SEDONA                    |
|                         |                           |
| 03.                     | ANTI-LOCK BRAKE SYSTEM    |
| 04.                     | SRS-AIRBAG                |
| 05.                     | FULL AUTO AIR/CON.        |
| 06.                     | FUEL FIRED HEATER         |
| 07.                     | POWER SLIDING / TAIL GATE |
| 08.                     | BODY CONTROL MODULE       |
| 09.                     | CODE SAVING               |
| 10.                     | IMMOBILIZER               |

3. Select the "POWER SLIDING DOOR" menu to check.

| KIA VEHICLE DIAGNOSIS |                           |
|-----------------------|---------------------------|
| MODEL :               | SEDONA                    |
| SYSTEM :              | POWER SLIDING / TAIL GATE |
|                       |                           |
| 01.                   | POWER SLIDING - LH(V1.5)  |
| 02.                   | POWER SLIDING - RH(V1.5)  |
| 03.                   | POWER TAIL GATE(V1.5)     |

4. Select the sensor output. And then check the handle switch output value changed by the controlling PSD or PTG.

| 1.2 CURRENT DATA     |      | 13/25               |      |      |      |
|----------------------|------|---------------------|------|------|------|
| LOCK STATUS          | LOCK | ▲<br><br>■<br><br>▼ |      |      |      |
| HANDLE SWITCH        |      |                     |      |      |      |
| LOCAL OPEN/CLOSE SW  |      |                     |      |      |      |
| MASTER OPEN/CLOSE SW |      |                     |      |      |      |
| PRECESS STATUS       | 1    |                     |      |      |      |
| VEHICLE SPEED STATUS |      |                     |      |      |      |
| ON/OFF SWITCH        | ON   |                     |      |      |      |
| IGN START SW         | HIGH |                     |      |      |      |
|                      |      |                     |      |      |      |
|                      |      |                     |      |      |      |
| FIX                  | PART | FULL                | HELP | GRPH | RCRD |

5. Check that the handle switch output changed from OFF to ON during PSD or PTG operation.

## TRIM SWITCH INSPECTION

1. Check the trim switch input/output value by using the diagnostic tool. If the operation of rear area module (RAM) is abnormal, replace RAM.
2. When checking the trim switch operation, select a vehicle type and "IPM" menu.

| KIA VEHICLE DIAGNOSIS                                                                                                                                                                                                                                                                              |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MODEL :                                                                                                                                                                                                                                                                                            | SEDONA              |
| SYSTEM :                                                                                                                                                                                                                                                                                           | BODY CONTROL MODULE |
| <ul style="list-style-type: none"> <li>01. IN PANEL MODULE-V2.0</li> <li>02. FRONT AREA MODULE-V2.0</li> <li>03. REAR AREA MODULE-V2.0</li> <li>04. DRIVER DOOR MODULE-V2.0</li> <li>05. ASSIST DOOR MODULE-V2.0</li> <li>06. INTEGRATED MEM SEAT-V2.0</li> <li>07. BCU DIAGNOSTIC MODE</li> </ul> |                     |

3. Select a rear area module (RAM) and sensor output.

| KIA VEHICLE DIAGNOSIS                                                                                                                                                                                                                                                                              |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MODEL :                                                                                                                                                                                                                                                                                            | SEDONA              |
| SYSTEM :                                                                                                                                                                                                                                                                                           | BODY CONTROL MODULE |
| <ul style="list-style-type: none"> <li>01. IN PANEL MODULE-V2.0</li> <li>02. FRONT AREA MODULE-V2.0</li> <li>03. REAR AREA MODULE-V2.0</li> <li>04. DRIVER DOOR MODULE-V2.0</li> <li>05. ASSIST DOOR MODULE-V2.0</li> <li>06. INTEGRATED MEM SEAT-V2.0</li> <li>07. BCU DIAGNOSTIC MODE</li> </ul> |                     |

4. Check the value of RSD/LSD, left/right door switch.

| 1.2 CURRENT DATA                                                                                            |        | 07/21       |
|-------------------------------------------------------------------------------------------------------------|--------|-------------|
| TAILGATE FLASH SIGNAL                                                                                       | ON     | ▲<br>■<br>▼ |
| BRAKE LAMP                                                                                                  | OFF    |             |
| PSD PTG MONITER                                                                                             | UNLOCK |             |
| PSNGER DOOR SW                                                                                              | P/N/R  |             |
| DRIVER DOOR SW                                                                                              | 1      |             |
| TAILGATE DOOR SW                                                                                            | 1      |             |
| RH S/DOOR SW                                                                                                | P/N/R  |             |
| LH S/DOOR SW                                                                                                | P/N/R  |             |
| <div> <div>FIX</div> <div>PART</div> <div>FULL</div> <div>HELP</div> <div>GRPH</div> <div>RCRD</div> </div> |        |             |

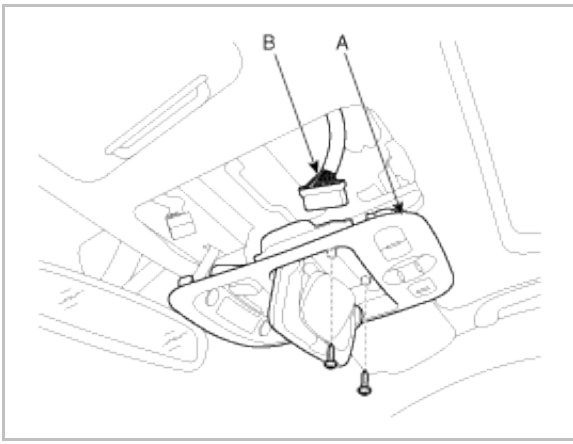
5. Confirm that the door switch output is changed by the controlling ON/OFF switch on center pillar trim.

## REPLACEMENT

### OVERHEAD CONSOLE SWITCH

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). And then disconnect the connector (B).

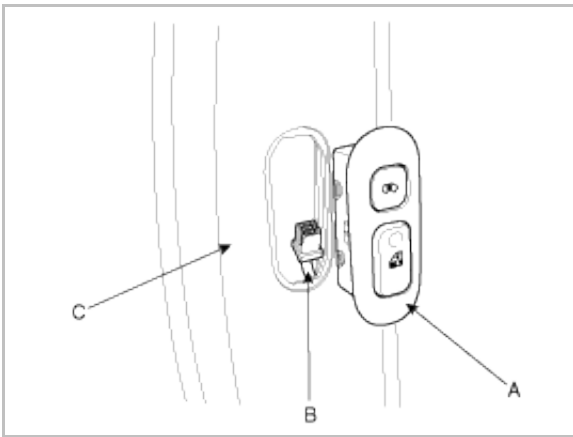




3. Installation is the reverse of removal.

## DOOR TRIM SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the connector (B) and door trim switch (A) from the center pillar (C) by using the scraper.



3. Installation is the reverse of removal.

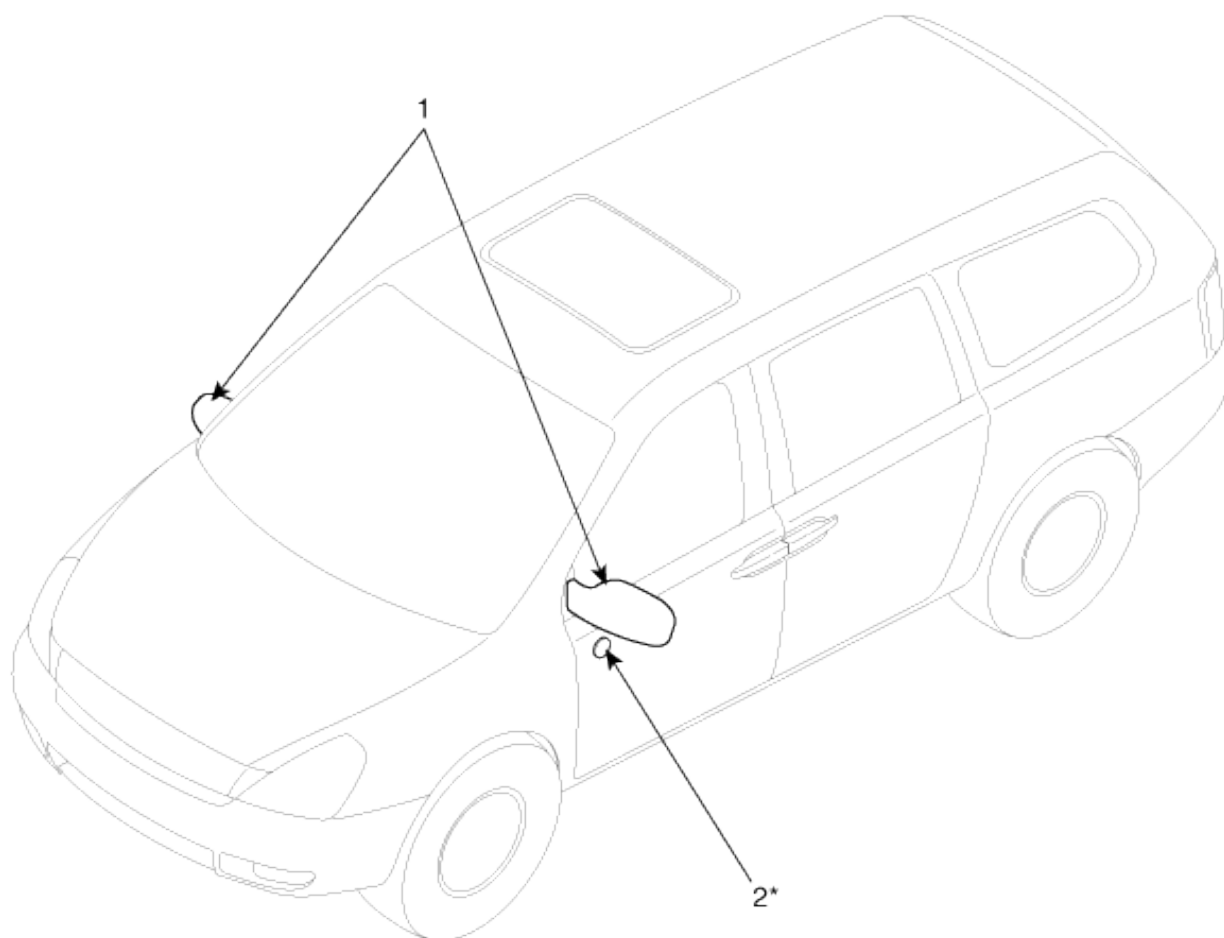


# **Body Electrical System**

Power Door Mirrors

## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



1. Power door mirror

2. Mirror folding switch & Power door mirror switch(DDM)

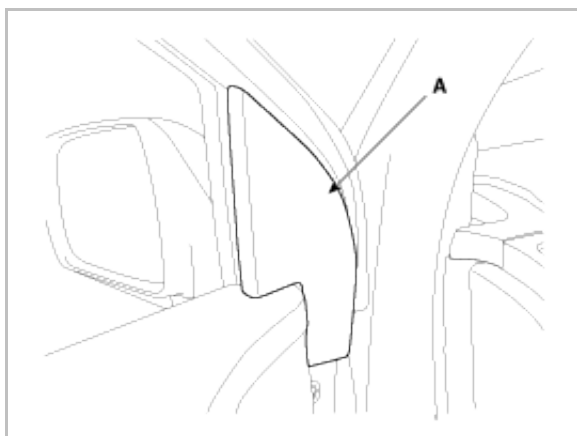
# **Body Electrical System**

Power Door Mirrors - Power Door Mirror  
Actuator

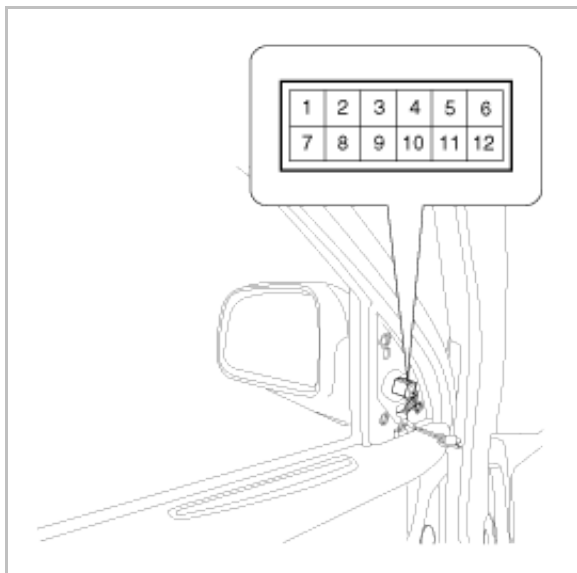


## INSPECTION

1. Remove the front door quadrant inner cover (A). Take care not to damage fixing clips. (Refer to the Body group - front door)



2. Disconnect the power door mirror connector from the harness.
3. Verify that the mirror operates properly as shown in the table.

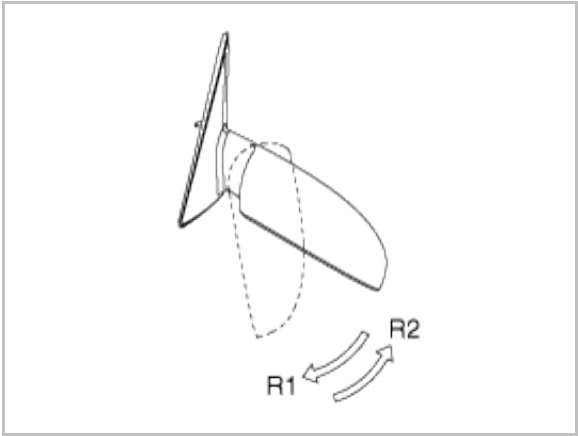


| Terminal<br>Position | 1 | 2 | 3 |
|----------------------|---|---|---|
| UP                   | ⊕ | ⊕ | ⊖ |
| DOWN                 | ⊖ | ⊖ | ⊕ |
| OFF                  | ⊕ | ⊕ |   |
| LEFT                 | ⊖ | ⊕ | ⊖ |
| RIGHT                | ⊕ | ⊖ | ⊕ |

### MIRROR HEATER

| Terminal<br>Position | 7 | 8 |
|----------------------|---|---|
| Heater               | ○ | ○ |

### MIRROR FOLDING



| Terminal  | 6                                               | 7 |
|-----------|-------------------------------------------------|---|
| Direction |                                                 |   |
| R1        | <div><div>+</div><div>M</div><div>-</div></div> |   |
| R2        | <div><div>-</div><div>M</div><div>+</div></div> |   |

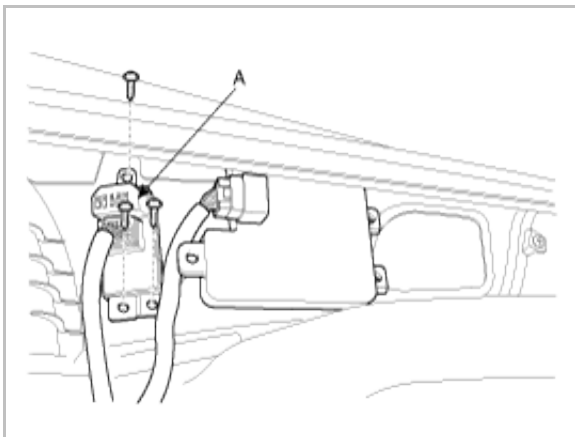
# **Body Electrical System**

Power Door Mirrors - Door Mirror Folding  
Switch



## REPLACEMENT

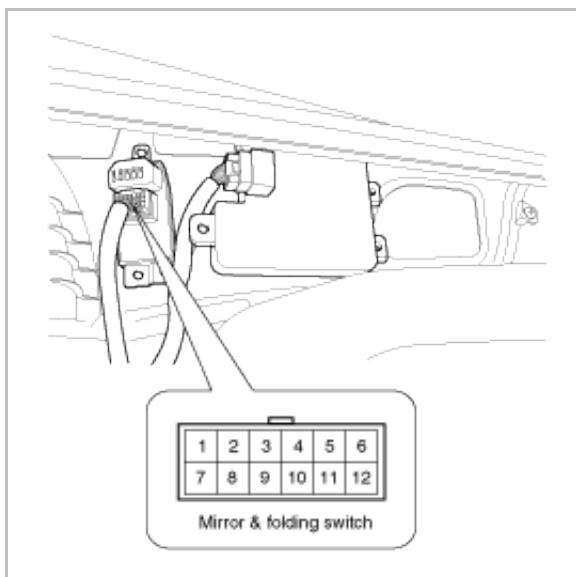
1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim panel. (Refer to the Body group-front door)
3. Remove the power window main switch mounting screws (3EA) (A) after disconnecting the switch connector (12pin) from the switch.



4. Remove the switch from the front door trim panel.
5. Installation is the reverse of removal.

## INSPECTION

1. Disconnect the 12P connector from the switch.



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



| Class   | Terminal  | 9                                                                                 | 7 | 10                                                                                | 12 | 8                                                                                 | 11 | 6                                                                                 | 2                                                                                 | 5                                                                                 | 4                                                                                 | 3 |
|---------|-----------|-----------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------|----|-----------------------------------------------------------------------------------|----|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---|
|         | Direction |                                                                                   |   |                                                                                   |    |                                                                                   |    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |   |
| LEFT    | UP        |  |   |                                                                                   |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | DOWN      |  |   |                                                                                   |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | OFF       |  |   |                                                                                   |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | LEFT      |  |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | RIGHT     |  |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
| RIGHT   | UP        |                                                                                   |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | DOWN      |                                                                                   |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | OFF       |                                                                                   |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | LEFT      |                                                                                   |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
|         | RIGHT     |                                                                                   |   |  |    |  |    |  |                                                                                   |                                                                                   |                                                                                   |   |
| Folding | Folding   |                                                                                   |   |                                                                                   |    |                                                                                   |    |                                                                                   |  |                                                                                   |  |   |
|         | Unfolding |                                                                                   |   |                                                                                   |    |                                                                                   |    |                                                                                   |  |  |  |   |

<Mirror & folding switch>



# **Body Electrical System**

Power Tail Gate System

## DESCRIPTION

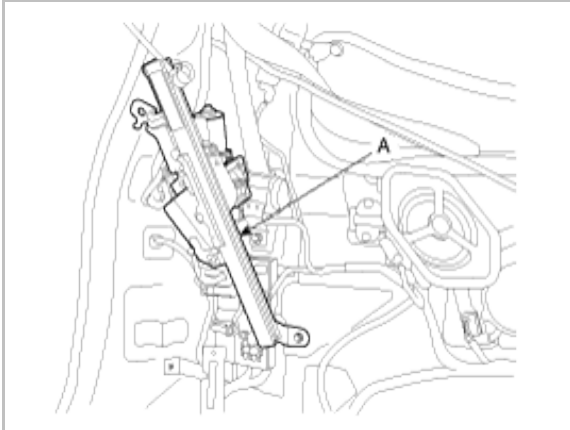
Power tail gate is an electro-mechanical system designed to provide power opening and closing of a vehicle's tail gate through the push of a button of the transmitter key or tail gate handle or the overhead console or switch of the tail gate.

The power tail gate will reverse direction of travel if resistance to movement is detected while the tail gate is being closed. If resistance to movement is detected while the power tail gate is being opened, the tail gate will stop moving.

### 1. PTG DRIVE UNIT

Power tailgate drive unit consists of a DC motor, optical sensor, clutch, push rod, rack and wire harness.

PTG drive unit is located in rear left on D-pillar panel. PTG drive unit opens and closes the tail gate connected push rod automatically.

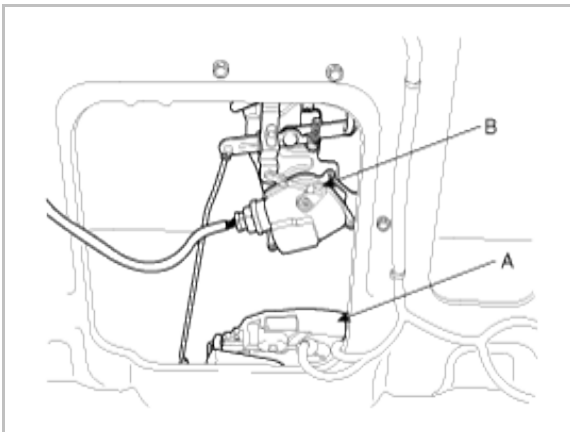


A. Optical sensor : Provides tail gate velocity and position information

B. Drive unit clutch : Transmit motor power to push rod through pinion gear.

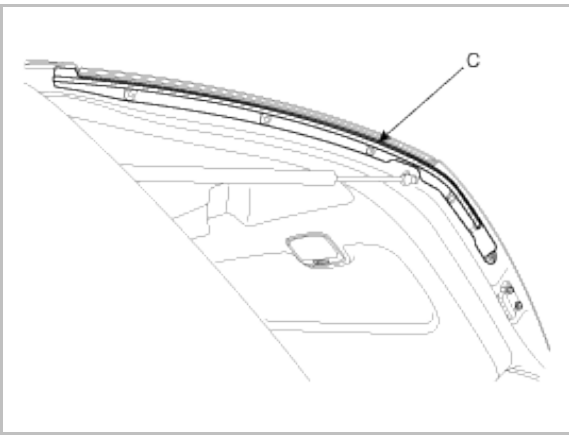
### 2. POWER LATCH

Power latch is located in the lower part of tail gate panel. When tail gate located latching position, cinching motor (A) has a cinch electrically. And unlatch motor (B) unlatch the latch electrically when receive the open signal.



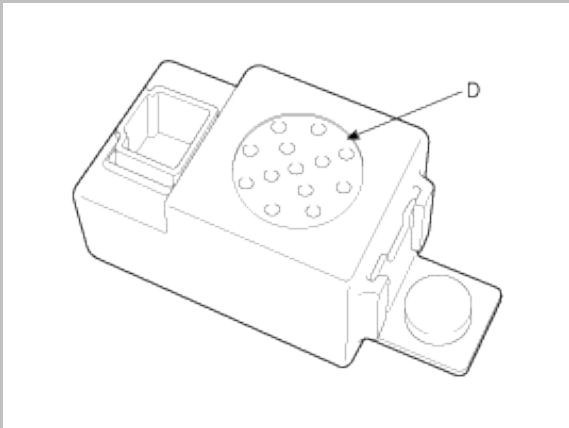
### 3. ANTI PINCH STRIP (C)

During power closing or cinching, the PTG system shall reverse to full open if an anti-pinch strip signal is received. However, the anti-pinch strips will not work when the Tailgate is idle in the full closed, full open, or stopped positions.

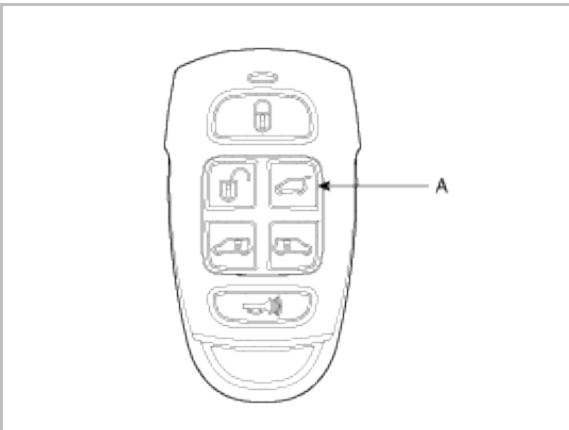


#### 4. PTG CHIME (D)

When a power operation cannot be performed as requested or an obstacle has been detected.



#### 5. REMOTE KEYLESS ENTRY (A)



Push the power tail gate (A) of the remote keyless entry more than 0.5s to open the power tail gate. Power Open operation shall be reversed when an additional Open/Close signal is received during power opening.

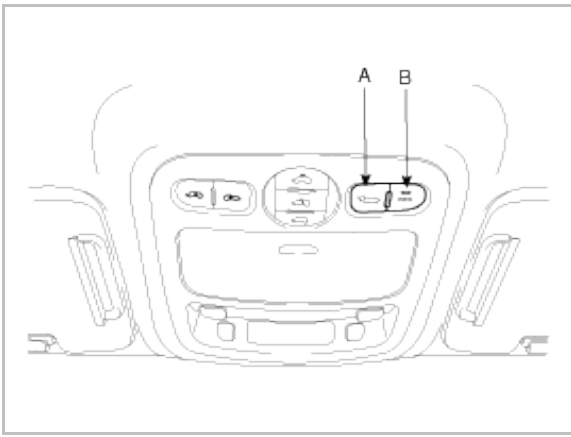
#### 6. OPERATING ORDER

Switch ON → clutch on → motor operation → pinion gear rotation → rack rectilinear motion → push rod motion → tail gate open/close

## OPERATION

### POWER TAIL GATE OPEN/CLOSE

1. The power tail gate is opened and closed automatically if the main switch (A) is pressed on the overhead console.



2. When the power ON/OFF button (PWR) (B) is ON, the power sliding door and power tailgate can be opened and closed automatically by using the switch.
3. When the power tail gate door will power open/close fully, the warning lamp and the chime will operate 3 times.
4. General rules for chime functions
  - A. Chime & tail lamp shall operate prior to and during power opening or closing the Tailgate : 3 Times (0.5 sec on, 0.5 sec off), after 1 chime start opening or closing with two chimes.
  - B. Chime shall operate when a power operation cannot be performed as requested except handle pull : 1 Time (Duration 0.5 second on)
  - C. Chime shall operate when an obstacle has been detected : 3 Times (0.5 sec on, 0.5 sec off)
  - D. Chime shall operate if PTG has not reached primary latch position after a power cinch cycle : 3 Times (0.5 sec on, 0.5 sec off)

## POWER TAIL GATE OPERATING CONDITION

1. The tail gate will not power open when vehicle is moving above 3 mph (5 km/h) or the gearshift lever is not in P (Park) for automatic transaxle.
2. The power tail gate will not open with the transmitter or the main control button when all power sliding doors are locked and closed.
3. The power tail gate will detect the resistance, then stop movement or move to the full open position to allow the object to be cleared.
4. If the automatic stop and reversal feature operates continuously more than twice during one opening or closing operation, the power tail gate may stop at that position. At this time, close the tailgate manually and operate the tailgate automatically again.
5. The PTG system is an electronic device and requires a minimum battery voltage to operate. The Electronic Control Unit (ECU) monitors the battery voltage present at the ECU input battery input and will not permit operation if the battery voltage is out of range.
6. If the PTG button is pressed during closing operation, the power tail gate may reverse direction and open fully.
7. Remove the accumulated snow or ice on the power tail gate before operating.

### NOTICE

- To prevent the battery from being discharged, do not leave the power sliding door and power tailgate at open position for a long time.
- The PTGM will go to a sleep mode and power operation will be disabled if the tail gate is left open longer than 6 hours.  
Manually close the tail gate to the latched position to reset the PTGM. Power operation will be restored.

### WARNING

- Always disconnect the negative battery cable before attempting any power tailgate system service.
- Never attempt to enter or exit the vehicle with the tailgate in motion. You could be injured or cause damage to the power tailgate system and or components.

## POWER OPERATION

The PTG system shall not open the Tailgate when the vehicle is moving.

The PTG system shall operate through the full range of Tailgate travel.

The PTG system shall learn the position of each travel extreme: full open and full closed.

| – : No action    ● : Close    ○ : Open    X : Stop |                    |        |                  |                    |                 |                |                    |
|----------------------------------------------------|--------------------|--------|------------------|--------------------|-----------------|----------------|--------------------|
| Vehicle Motion                                     | Door Position Zone | ON/OFF | Door Lock Status | Operation          |                 |                |                    |
|                                                    |                    |        |                  | RKE Key fob Note 2 | PSD main switch | PSD sub switch | Door handle switch |
| Not Moving                                         | 1                  | OFF    | Any              | ○                  | ○               | –              | X                  |
|                                                    |                    | ON     | Unlock           | ○                  | ○               | –              | ○                  |
|                                                    |                    |        | Locked           | ○                  | ○               | –              | X                  |
|                                                    | 2                  | OFF    | Any              | ○                  | ○               | X(Chime 1 T)   | X                  |
|                                                    |                    | ON     | Unlock           | ○                  | ○               | ○              | X                  |
|                                                    |                    |        | Locked           | ○                  | ○               | ○              | X                  |
|                                                    | 3 or 4             | OFF    | Any              | ●                  | ●               | X(Chime 1 T)   | X                  |
|                                                    |                    | ON     | Any              | ●                  | ●               | ●              | X                  |
|                                                    | Closing            | OFF    | Any              | ○                  | ○               | X              | X                  |
|                                                    |                    | ON     | Any              | ○                  | ○               | ○              | X                  |
|                                                    | Opening 1 or 2     | ON     | Any              | X                  | X               | X              | X                  |
|                                                    |                    | OFF    | Any              | X                  | X               | X              | X                  |
| Moving                                             | 1 or 2             | ON/OFF | Any              | X(Chime 1 T)       | X(Chime 1 T)    | X(Chime 1 T)   | X                  |
|                                                    |                    | OFF    | Any              | ●                  | ●               | X(Chime 1 T)   | X                  |
|                                                    | 3 or 4             | ON     | Any              | ●                  | ●               | ●              | X                  |
|                                                    |                    | ON     | Any              | ●                  | ●               | ●              | X                  |
|                                                    | Closing            | ON     | Any              | ●                  | ●               | ●              | X                  |
|                                                    |                    | OFF    | Any              | X                  | X               | X              | X                  |
|                                                    | Opening 1 or 2     | ON     | Any              | X                  | X               | X              | X                  |
|                                                    |                    | OFF    | Any              | ●                  | ●               | X              | X                  |
| Any                                                | Any                | ON/OFF | Any              | ●                  | ●               | ●              | X                  |
|                                                    |                    | ON/OFF | Any              | Manual Move        |                 |                |                    |

### 1. Vehicle condition

Moving

A. (IGN=OFF and Vehicle Speed > 5 km/h) or (IGN= ON and (Vehicle Speed > 5 km/h or TRANS - not P/N))

Not moving

A. (IGN=OFF and Vehicle Speed < 5 km/h) or (IGN= ON and (Vehicle Speed < 5 km/h and TRANS - P/N))

### 2. TAILGATE TRAVEL ZONES

The Tailgate travel is divided into four zones starting at the full closed and latched position. Dimensions are at the bottom edge of the Tailgate and are approximate.

Zone 1 : Power Latching - from primary to secondary latch (0 to 10 mm depending on latch travel).

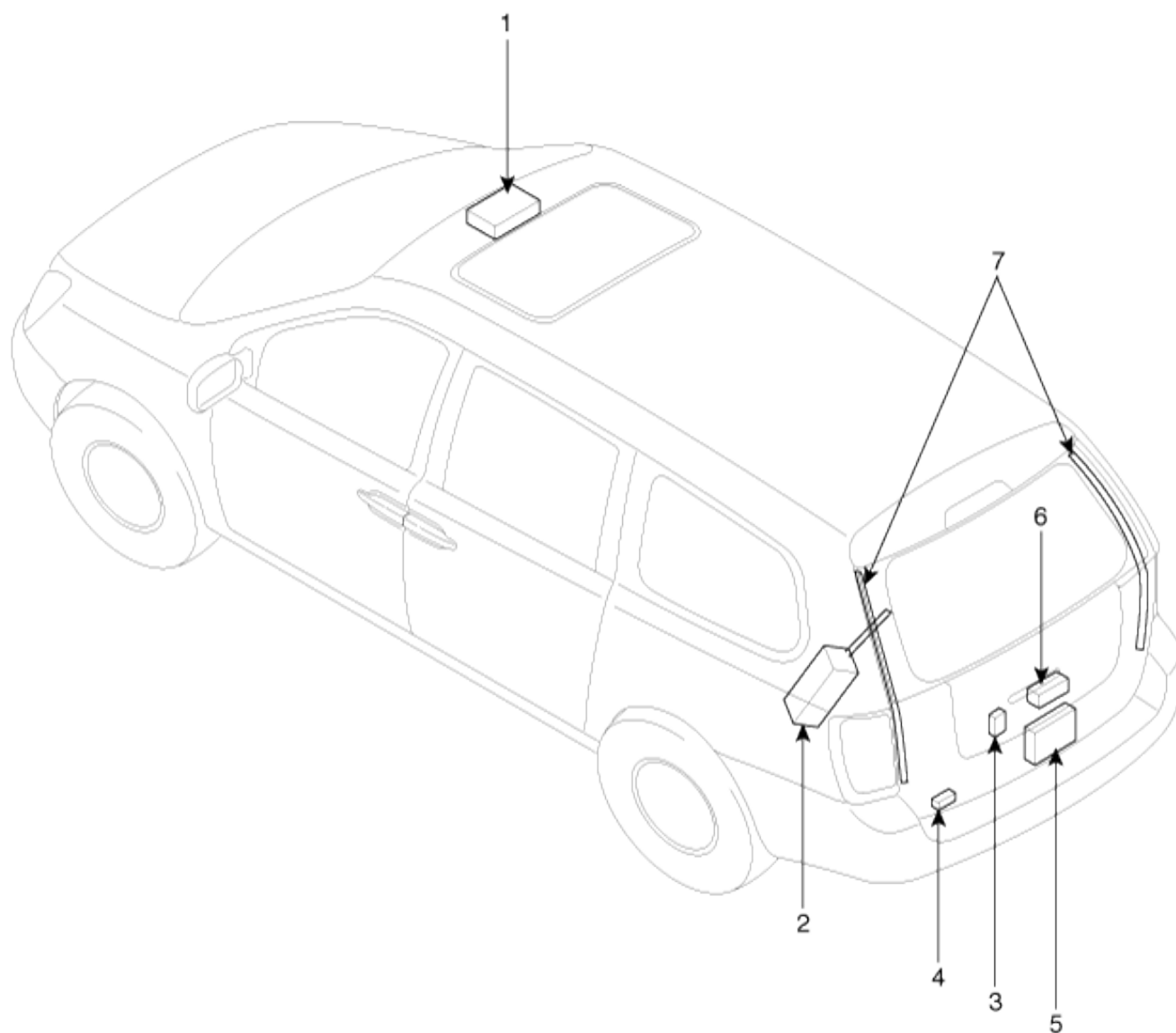
Zone 2 : Between Secondary and Crossover Point (Secondary to 20 degrees)

Zone 3 : Between Crossover Point and Power Off (20 degrees to 79 degrees)

Zone 4 : Power Off to Full Open - approximately 5° (15 counts from full open)

## COMPONENT LOCATION

This illustration shows the LHD type.  
RHD type is symmetrical.



1. Overhead console switch
2. Power tail gate drive unit  
(Including control module)
3. Power tail gate chime

4. Power tail gate switch
5. Power latch assembly
6. Power tail gate handle
7. Anti pinch strip



## DIAGNOSIS AND TESTING - POWER TAILGATE SYSTEM

The power tailgate system is a complex system containing many components. In order to perform conclusive testing, or receive outputs the power tailgate control module must be checked.

The most reliable, efficient, and accurate means to diagnose the power tailgate system requires the use of a scan tool and the proper Body Diagnostic Procedures manual. The scan tool can be used to observe current switch status recorded in the power tailgate control module to help the technician diagnose an inoperative switch.

Before any testing of the power tailgate system is attempted, the battery should be fully charged, all power tailgate system inhibitors read and understood (Refer to power tailgate system description for list).

Following are quick reference diagnostic tables to help when diagnosing and testing the power tailgate system.

| CONDITION                             | POSSIBLE CAUSES                                               | CORRECTION                                                                                                                                                                               |
|---------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tailgate opens unexpectedly           | Accidental activation or Failure of open/close command switch | Check for shorted or defective switch                                                                                                                                                    |
|                                       | Failure of latch assembly                                     | Check wiring connections                                                                                                                                                                 |
|                                       |                                                               | Check for trouble codes, replace latch if necessary                                                                                                                                      |
|                                       | Failure of Power Tailgate or Body Control module              | Disconnect then reconnect battery or fuse to reset module, function tailgate, if no function exists check for loose wire connections, see Body Diagnostic Manual for detailed procedures |
| Tailgate will not power open or close | Not in Park or false indication                               | Check switch status with SCAN tool                                                                                                                                                       |
|                                       | Battery voltage at PTGM is too low                            | Check for proper voltage at the PTGM<br>Charge battery                                                                                                                                   |
|                                       | Blown fuse                                                    | Check for blown fuse                                                                                                                                                                     |
|                                       | Gas strut failure                                             | Check condition of tailgate gas struts                                                                                                                                                   |
|                                       | BCM or tailgate control module critical fault codes           | Check code status with SCAN tool                                                                                                                                                         |
|                                       | Failure of latch assembly                                     | Check wire connections and for blown fuse                                                                                                                                                |
|                                       |                                                               | Check for foreign matter preventing the operation of latch assembly                                                                                                                      |
| Tailgate will not power open or close | Failure of motor assembly                                     | Test motor assembly                                                                                                                                                                      |
|                                       | Binding or sticking of components                             | Establish location of binding and replace necessary components                                                                                                                           |
|                                       | Wiring problems (system or vehicle)                           | Troubleshoot using electrical schematics<br>Refer to wiring diagrams                                                                                                                     |
| Power loss during Tailgate operation  | Wiring problems (system or vehicle)                           | Troubleshoot using electrical schematics.<br>Refer to wiring diagrams                                                                                                                    |
|                                       | Battery voltage at PTGM is too low                            | Check for proper voltage at the PTGM<br>Charge battery                                                                                                                                   |
|                                       | Failure of Power Tailgate or Body Control Module              | Check for diagnostic trouble codes with SCAN tool                                                                                                                                        |
|                                       | Failure of motor assembly                                     | Test motor assembly                                                                                                                                                                      |
|                                       | Failure of latch assembly                                     | Check wire connections and for blown fuse                                                                                                                                                |
|                                       |                                                               | Check for diagnostic trouble codes and cycle with SCAN tool                                                                                                                              |
|                                       |                                                               | Troubleshoot using Body Diagnostic Manual.                                                                                                                                               |



|                                                                    |                                                  |                                                                                                          |
|--------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| No power latching in primary and/or secondary positions            |                                                  | Replace latch assembly, if necessary                                                                     |
|                                                                    | Binding or sticking of components                | Establish location of binding and replace necessary components                                           |
|                                                                    | Failure of Power Tailgate or Body Control Module | Check for diagnostic trouble codes with scan tool                                                        |
|                                                                    | Tail Gate seal force too high                    | Inspect seals for damage, mis-assembly, foreign matter or other possible obstruction                     |
|                                                                    | Failure of motor assembly                        | Test motor assembly                                                                                      |
| Latch will not release from primary position                       | Not in Park or false indication                  | Check switch status with SCAN tool                                                                       |
|                                                                    | Battery voltage at PTGM is too low               | Check for proper voltage at the PTGM<br>Charge battery                                                   |
|                                                                    | Blown fuse                                       | Check fuse and replace if required                                                                       |
|                                                                    | Failure of latch assembly                        | Check switch status with scan tool                                                                       |
|                                                                    |                                                  | Check for foreign matter or damaged components preventing the operation of latch assembly                |
|                                                                    |                                                  | Troubleshoot using body diagnostic manual.<br>Replace latch assembly, if necessary                       |
|                                                                    | Failure of outside handle connection             | Check handle of brainplate.                                                                              |
|                                                                    | Failure of Power Tailgate or Body Control Module | Check for diagnostic trouble codes and cycle with scan tool                                              |
|                                                                    | Binding or sticking of components                | Establish location of binding and replace necessary components                                           |
| Key fob or overhead console switch does not power operate tailgate | Blown Fuse                                       | Check fuse and replace                                                                                   |
|                                                                    | Battery voltage at PTGM is too low               | Check for proper voltage at the PTGM<br>Charge battery                                                   |
| Does Not Power Unlatch                                             | Failure of latch assembly                        | Check for foreign matter preventing the operation of latch assembly                                      |
|                                                                    |                                                  | Check for diagnostic trouble codes and cycle with scan tool                                              |
|                                                                    |                                                  | Check pawl and/or ratchet switch with SCAN tool                                                          |
|                                                                    |                                                  | Troubleshoot using body diagnostic manual                                                                |
| Does Not Power Unlatch                                             | Failure of Power Tailgate Module                 | Troubleshoot using body diagnostic manual                                                                |
|                                                                    | Failure of Body Control Module (BCM)             | Troubleshoot using body diagnostic manual                                                                |
|                                                                    |                                                  | Replace BCM if necessary                                                                                 |
|                                                                    | Failure of RAM                                   | Replace RAM if necessary                                                                                 |
|                                                                    | Failure of key fob                               | Reprogram key fob                                                                                        |
|                                                                    |                                                  | Replace key fob if necessary                                                                             |
|                                                                    | Failure of Power Tailgate Module                 | Check for diagnostic trouble codes with scan tool, see<br>Body Diagnostic Manual for detailed procedures |
|                                                                    |                                                  | Check for foreign matter preventing the operation of motor assembly                                      |
|                                                                    |                                                  | Check wire connections                                                                                   |

|                                    |                                                |                                                                                                  |
|------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------|
|                                    | Failure of tailgate motor assembly             | Motor clutch does not engage, replace assembly                                                   |
|                                    |                                                | Full open switch inoperative, replace switch, if necessary                                       |
|                                    |                                                | Troubleshoot using Body Diagnostic Manual<br>Replace motor, if necessary                         |
| Tailgate does not stay open        | Failure of tailgate gas struts                 | Replace gas struts                                                                               |
|                                    |                                                | Check for broken attachments                                                                     |
| High inside/outside opening effort | Failure of tailgate gas struts                 | Replace gas struts                                                                               |
|                                    |                                                | Check for broken attachments                                                                     |
|                                    | Drive unit jammed or did not disengage         | Troubleshoot using Body Diagnostic Manual<br>Replace components, if necessary                    |
|                                    | Binding or sticking of components              | Establish location of binding and replace necessary components                                   |
| Tailgate continues to cinch closed | Failure of latch assembly                      | Check wire connections and for blown fuse<br>Check switches with SCAN tool                       |
| Tail gate continues to power close | Failure of latch assembly                      | Check wire connections                                                                           |
|                                    |                                                | Check for foreign matter                                                                         |
|                                    |                                                | Troubleshoot using Body Diagnostic Manual                                                        |
|                                    | Control Module                                 | Check for diagnostic trouble codes with Scan tool                                                |
|                                    | Wiring problems (system or vehicle)            | Troubleshoot using electrical schematics<br>Refer to wiring diagrams                             |
| Tailgate continues to power open   | Failure of PTGM or BCM                         | Check for diagnostic trouble codes and cycle, see Body Diagnostic Manual for detailed procedures |
|                                    | Failure of motor assembly                      | Check for continuous drive condition                                                             |
|                                    | Wiring problems (system or vehicle)            | Troubleshoot using electrical schematics<br>Refer to Wiring Diagrams                             |
| Tailgate opens very slowly         | Battery voltage at PTGM is too low             | Check for proper voltage at the PTGM<br>Charge battery                                           |
|                                    | Failure of tailgate gas struts                 | Replace gas struts, if necessary                                                                 |
|                                    | Binding or sticking of components              | Establish location of binding and replace necessary components                                   |
|                                    | Grade of vehicle too steep for power operation | Operate tailgate manually                                                                        |
|                                    | Failure of tailgate motor assembly             | Replace motor assembly, if necessary                                                             |
| Squeaks, Noises and rattles        | Foreign material in tail gate compartment      | Remove foreign material                                                                          |
|                                    | Worn/Loose components                          | Check and tighten loose components                                                               |

#### DTC LIST

| DTC CODE | DISPLAY              |
|----------|----------------------|
| B1101    | Battery Voltage High |
| B1102    | Battery Voltage Low  |

|       |                                      |
|-------|--------------------------------------|
| B1105 | Reference Voltage Fault              |
| B1223 | VSS Fault                            |
| B1270 | Optical Sensor-1 Output Stuck High   |
| B1271 | Optical Sensor-1 Output Stuck Low    |
| B1272 | Optical Sensor-2 Output Stuck High   |
| B1273 | Optical Sensor-2 Output Stuck Low    |
| B1580 | Ignition Start Switch Short High     |
| B1585 | Latch Switch Failure                 |
| B1621 | ECU Defective                        |
| B1645 | Drive Unit Failure                   |
| B2421 | Drive Motor Short High               |
| B2422 | Drive Motor Short Low                |
| B2423 | Clutch Open Or Short High            |
| B2424 | Clutch Short Low                     |
| B2425 | Left pinch strip open or Stuck High  |
| B2426 | Left pinch strip stuck Low           |
| B2427 | Right Pinch Strip Open Or Stuck High |
| B2428 | Right Pinch Strip Stuck Low          |
| B2450 | Unlatch or Cinch Motor short High    |
| B2451 | Unlatch or Cinch Motor short Low     |
| B2452 | Cinch motor open (PTG Only)          |

## INPUT/OUTPUT MONITORING

| [공백문<br>장] | BCM DISPLAY                         | UNIT                     |
|------------|-------------------------------------|--------------------------|
| 1          | Battery Logic Voltage               | Voltages                 |
| 2          | Battery Power Voltage               | Voltages                 |
| 3          | Optical Sensor Power                | Voltages                 |
| 4          | Gate Optical Sensor 2               | LOW/HIGH                 |
| 5          | Gate Optical Sensor 1               | LOW/HIGH                 |
| 6          | Detent Switch                       | LOW/HIGH                 |
| 7          | Forkbolt Primary Switch             | LOW/HIGH                 |
| 8          | Power Battery Voltage               | OUT OF RANGE/IN<br>RANGE |
| 9          | Forkbolt Secondary Switch           | LOW/HIGH                 |
| 10         | Right Pinch Strip - Pinch Condition | Not Pinched/Pinched      |
| 11         | Left Pinch Strip - Pinch Condition  | Not Pinched/Pinched      |
| 12         | Park Switch                         | Out Of Park/Park         |
| 13         | Ignition Swtich                     | LOW/HIGH                 |
| 14         | Tail Lamp Flash Feedback            | LOW/HIGH                 |
| 15         | Local Open/Close Switch             | Not Pressed/Pressed      |

|    |                               |                        |
|----|-------------------------------|------------------------|
| 16 | Master Open/Close Switch      | Not Pressed/Pressed    |
| 17 | Spare Switch                  | LOW/HIGH               |
| 18 | Learn Process Complete Status | Not<br>Comple/Complete |
| 19 | Vehicle Speed Slow Status     | ≥5kph/<5kph            |
| 20 | On/Off Switch                 | ON/OFF                 |
| 21 | Start Switch                  | LOW/HIGH               |
| 22 | Gate Open Feedback            | Voltages               |
| 23 | Cinch Feedback (PTG Only)     | Voltages               |
| 24 | Uncinch Feedback (PTG Only)   | Voltages               |
| 25 | Gate Close Feedback           | Voltages               |
| 26 | Unlatch Feedback              | Voltages               |
| 27 | Unlatch Return Feedback       | Voltages               |
| 28 | Clutch Feedback               | Voltages               |
| 29 | Gate Position Count           | -                      |
| 30 | Most Recent Cinch Time        | ms                     |
| 31 | 2nd Most Recent Cinch Time    | ms                     |
| 32 | 3rd Most Recent Cinch Time    | ms                     |
| 33 | 4th Most Recent Cinch Time    | ms                     |
| 34 | Left Pinch Strip Voltage      | Voltages               |
| 35 | Right Pinch Strip Voltage     | Voltages               |



## ADJUSTMENT

### POWER TAIL GATE INITIALIZATION

#### POWER TAILGATE SYSTEM RESET

Certain conditions may require that the PTG system be reset.

1. Remove the MEMORY fuse that provides logic power to the PTGM.
2. Wait 1 minute. Replace fuse. Initialize the PTGM.

#### INITIALIZATION PROCEDURE

The Power Tailgate system initialization must start from the full closed or latched position. The Tailgate must be powered Open once to fully initialize the system (Obstacle detection shall be active during Tailgate initialization).

1. Manually close and latch the Tailgate.
2. Power the Tailgate open using the Open/Close switch, outside handle or the remote control.

#### ALTERNATE METHOD

1. Remove the black connector (J2) from the PTGM.
2. Wait a short time. Replace connector. Initialize PTGM.

#### CAUTION

- The PTG system initialization must start from the primary or secondary latched position.
- Obstacle detection shall be active during system initialization.



# **Body Electrical System**

Power Tail Gate System - PTG Driver Unit



## INSPECTION

### POWER TAILGATE MOTOR INSPECTION

1. Check the power tailgate motor by using the diagnostic tool.
2. Select a vehicle type and "BODY CONTROL MODULE(BCM)".

| KIA VEHICLE DIAGNOSIS                                                                                                                                                                                               |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| MODEL :                                                                                                                                                                                                             | SEDONA |
| 01. ENGINE CONTROL<br>02. AUTOMATIC TRANSAXLE<br>03. ANTI-LOCK BRAKE SYSTEM<br>04. SRS-AIRBAG<br>05. FULL AUTO AIR/CON.<br>06. FUEL FIRED HEATER<br>07. POWER SLIDING / TAIL GATE<br><b>08. BODY CONTROL MODULE</b> |        |

3. Select the "REAR AREA MODULE"

| KIA VEHICLE DIAGNOSIS                                                                                                                                                                                               |                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| MODEL :                                                                                                                                                                                                             | SEDONA              |
| SYSTEM :                                                                                                                                                                                                            | BODY CONTROL MODULE |
| 01. IN PANEL MODULE-V2.0<br>02. FRONT AREA MODULE-V2.0<br><b>03. REAR AREA MODULE-V2.0</b><br>04. DRIVER DOOR MODULE-V2.0<br>05. ASSIST DOOR MODULE-V2.0<br>06. INTEGRATED MEM SEAT-V2.0<br>07. BCU DIAGNOSTIC MODE |                     |

4. Select the "ACTUATION TEST" and "PTG OPEN/CLOSE" to operate tailgate motor.

| 1.5 ACTUATION TEST                           |                         | 01/29 |
|----------------------------------------------|-------------------------|-------|
| PTG OPEN/CLOSE                               |                         |       |
| DURATION                                     | UNTIL STOP KEY          |       |
| METHOD                                       | ACTIVATION              |       |
| CONDITION                                    | IG.KEY ON<br>ENGINE OFF |       |
| PRESS [STRT], IF YOU ARE READY ?             |                         |       |
| <div> <div>STRT</div> <div>STOP</div> </div> |                         |       |

5. If there is no working in actuator, change the drive unit.

### OPTICAL SENSOR INSPECTION

1. Check the power tailgate control module input/output value by using the diagnostic tool. If the operation of tailgate control module is abnormal, replace power tailgate drive unit.
2. When checking the optical sensor, select a vehicle type and "POWER SLIDING/TAILGATE" menu.

| KIA VEHICLE DIAGNOSIS ▲ |                           |
|-------------------------|---------------------------|
| MODEL :                 | SEDONA                    |
|                         |                           |
| 03.                     | ANTI-LOCK BRAKE SYSTEM    |
| 04.                     | SRS-AIRBAG                |
| 05.                     | FULL AUTO AIR/CON.        |
| 06.                     | FUEL FIRED HEATER         |
| 07.                     | POWER SLIDING / TAIL GATE |
| 08.                     | BODY CONTROL MODULE       |
| 09.                     | CODE SAVING               |
| 10.                     | IMMOBILIZER               |

3. Select "POWER TAIL GATE".

| KIA VEHICLE DIAGNOSIS |                           |
|-----------------------|---------------------------|
| MODEL :               | SEDONA                    |
| SYSTEM :              | POWER SLIDING / TAIL GATE |
|                       |                           |
| 01.                   | POWER SLIDING - LH(U1.5)  |
| 02.                   | POWER SLIDING - RH(U1.5)  |
| 03.                   | POWER TAIL GATE(U1.5)     |

4. Select the sensor output. And then check the optical sensor volt while operating power tailgate in power mode.

| 1.2 CURRENT DATA                                                                                            |       | 03/35       |
|-------------------------------------------------------------------------------------------------------------|-------|-------------|
| BATTERY LOGIC VOLT.                                                                                         | 3.5 V | ▲<br>■<br>▼ |
| BATTERY POWER VOLT.                                                                                         | 3.5 V |             |
| OPTICAL SNSR VOLT.                                                                                          | 3.6 V |             |
| GATE OPTICAL 2                                                                                              | LOW   |             |
| GATE OPTICAL 1                                                                                              | LOW   |             |
| DETENT SWITCH                                                                                               | LOW   |             |
| FORKBOLT PRI.SW                                                                                             | HIGH  |             |
| POWER VOLT.RANGE                                                                                            |       |             |
| <div> <div>FIX</div> <div>PART</div> <div>FULL</div> <div>HELP</div> <div>GRPH</div> <div>BCRD</div> </div> |       |             |

5. Change the drive unit, if there is no change during operation.

## DRIVE UNIT CLUTCH INSPECTION

1. Check the power tailgate control module input/output value by using the diagnostic tool. If the operation of tailgate control module is abnormal, replace power tailgate drive unit.
2. To check the clutch operation, select a vehicle type and "POWER SLIDING/TAILGATE" menu.

| KIA VEHICLE DIAGNOSIS ▲ |                           |
|-------------------------|---------------------------|
| MODEL :                 | SEDONA                    |
|                         |                           |
| 03.                     | ANTI-LOCK BRAKE SYSTEM    |
| 04.                     | SRS-AIRBAG                |
| 05.                     | FULL AUTO AIR/CON.        |
| 06.                     | FUEL FIRED HEATER         |
| 07.                     | POWER SLIDING / TAIL GATE |
| 08.                     | BODY CONTROL MODULE       |
| 09.                     | CODE SAVING               |
| 10.                     | IMMOBILIZER               |

3. Select power tailgate.



| KIA VEHICLE DIAGNOSIS |                           |
|-----------------------|---------------------------|
| MODEL :               | SEDONA                    |
| SYSTEM :              | POWER SLIDING / TAIL GATE |
|                       |                           |
| 01.                   | POWER SLIDING - LH(U1.5)  |
| 02.                   | POWER SLIDING - RH(U1.5)  |
| 03.                   | POWER TAIL GATE(U1.5)     |

- Select the sensor output. And then check the clutch feedback sensor output while operating power tailgate in power mode.

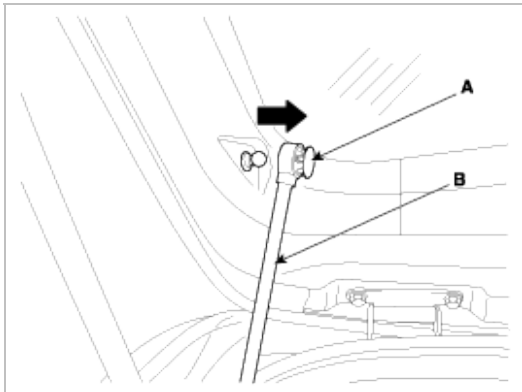
| 1.2 CURRENT DATA    |       | 28/35 |
|---------------------|-------|-------|
| GATE CLOSE F/BACK   | 3.7   | U     |
| UNLATCH F/BACK      | 3.8   | U     |
| UNLATCH RETURN F/B  | 3.8   | U     |
| CLUTCH F/BACK       | 3.9   | U     |
| GATE POSITION       | 14648 |       |
| 1ST MOST CINCH TIME | 988   | ms    |
| 2ND MOST CINCH TIME | 1000  | ms    |
| 3RD MOST CINCH TIME | 1020  | ms    |

※ Above voltage and numerical value may be different from the real value.

- Change the drive unit, if there is no change during operation.

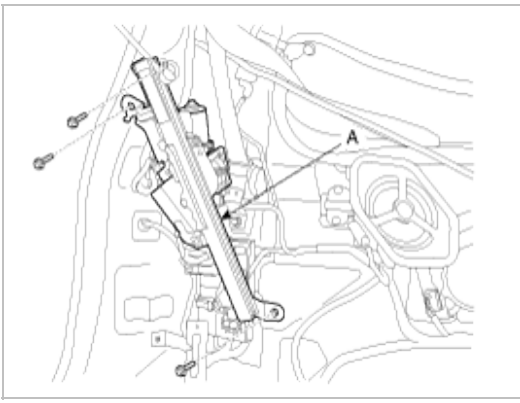
## REPLACEMENT

- Disconnect the negative (-) battery terminal.
- Remove the third, fourth seat (Refer to the Body group - seat)
- Remove the D pillar and luggage side trim (Refer to the Body group - Interior trim).
- Use a small screw driver to loosen clip (A). But do not remove power tailgate push rod (B).



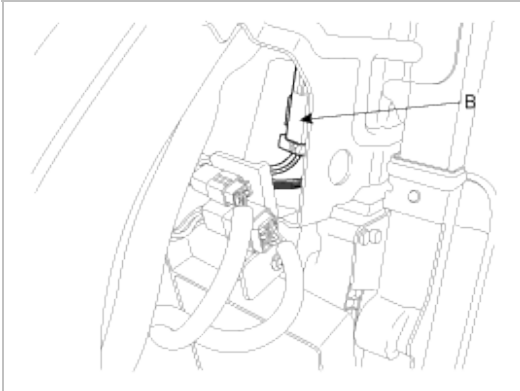
- Remove the power tail gate motor mounting bolts (3EA) and connectors (4EA). And then remove the power tail gate drive unit(A).

**TORQUE** : 22-27N.m(2.2-2.7Kg.m)



#### NOTICE

PTG drive unit bracket connector (B) does not need to be disconnected in this procedure.



6. Installation is the reverse of removal.

#### NOTICE

- Connect the connectors tightly.
- Check the power tail gate for normal operation correctly.

#### WARNING

- A lost drive unit mounting bolt in the vehicle may make a noise.
- Don't operate the power tail gate when a push rod is removed.
- A learn cycle must be performed whenever the power is removed.
- Check the normal operating whenever a power tailgate component is removed or replaced. If the chime sound is heard, check the DTC, wiring harness and cable connections.



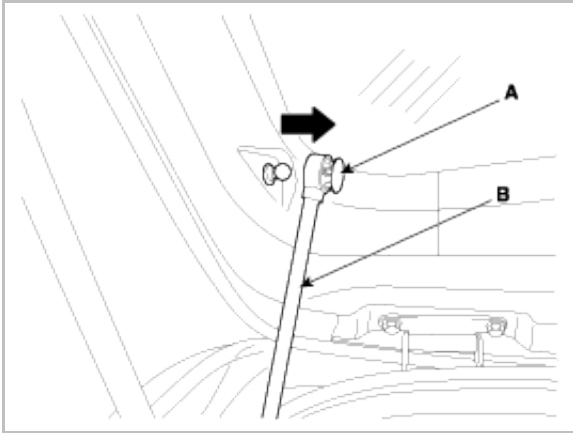
# **Body Electrical System**

Power Tail Gate System - PTG Module



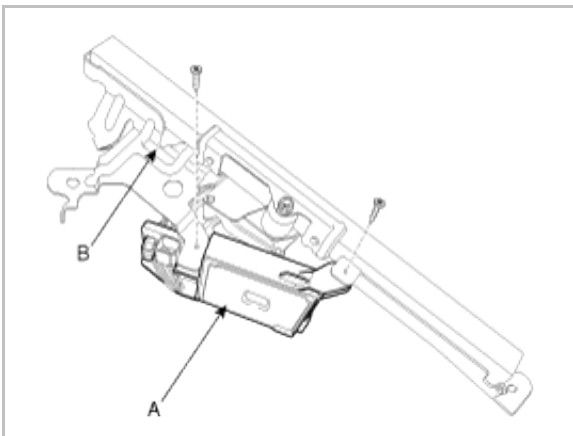
## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the third, fourth seat (Refer to the Body group - seat)
3. Remove the D pillar and luggage side trim (Refer to the Body group - Interior trim).
4. Use a small screw driver to loosen clip (A). But do not remove power tailgate push rod (B).



5. Remove the power tail gate module mounting bolts (2EA) and connectors (2EA). And then remove the power tail gate module (A).

**TORQUE** : 25-35N.m(2.5-3.5Kg.m)



6. Installation is the reverse of removal

### NOTICE

- Connect the connectors tightly.
- Check the power tail gate for normal operation correctly.

### WARNING

- A lost drive unit mounting bolt in the vehicle may make a noise.
- Don't operate the power tail gate when a push rod is removed.
- A learn cycle must be performed whenever the power is removed.
- Check the normal operating whenever a power tailgate component is removed or replaced. If the chime sound is heard, check the DTC, wiring harness and cable connections.



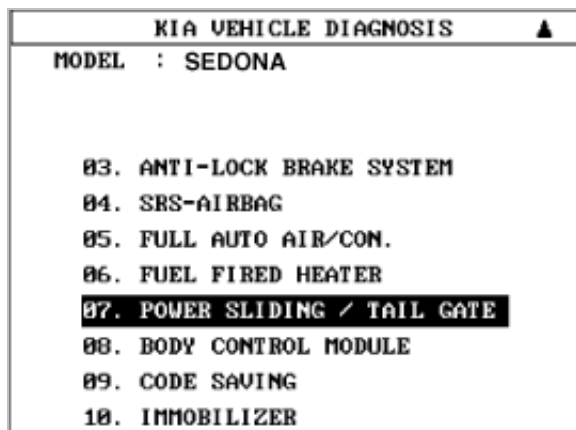
# **Body Electrical System**

Power Tail Gate System - Anti-Pinch Strip

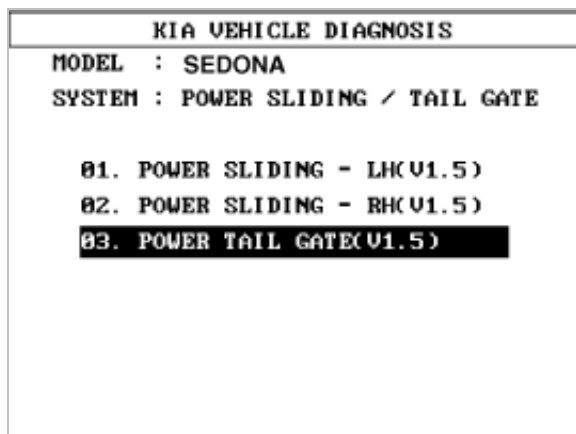


## INSPECTION

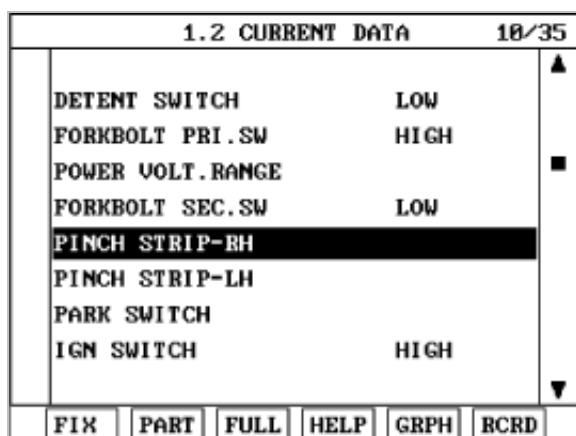
1. Check the power tail gate control module input/output value by using the diagnostic tool. If the operation of tailgate control module is abnormal, replace anti pinch strip control module.
2. When checking the anti pinch strip operation, select a vehicle type and "POWER SLIDING/TAILGATE" menu.



3. Select "POWER TAILGATE".



4. Select the sensor output. And then check the anti pinch strip sensor output while operating power tailgate in power mode.

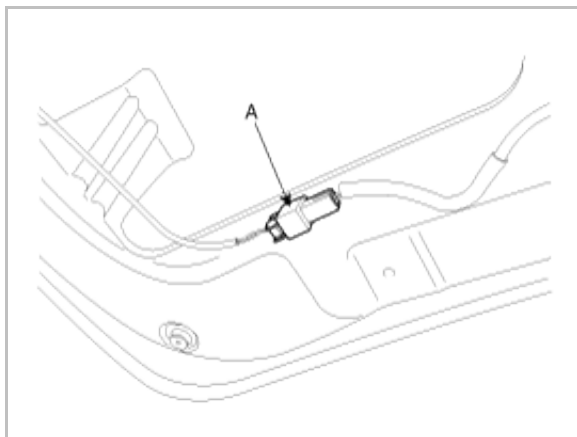


※ Above voltage and numerical value may be different from the real value.

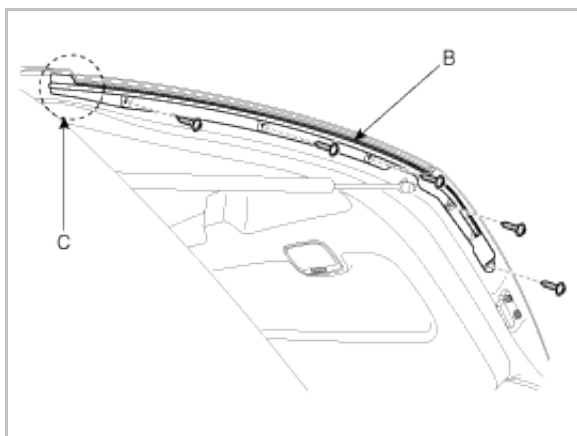
5. Change the anti pinch strip sensor, if there is no change from OFF to ON during operation.

## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the tail gate trim (Refer to the Body group - tail gate).
3. Remove the anti-pinch strip sensor connector (A).



4. Remove the left and right side anti-pinch strip sensor (B) after removing the screws (5EA).



5. Installation is the reverse of removal. Part (C) has to be assembled using the cloth.



# **Body Electrical System**

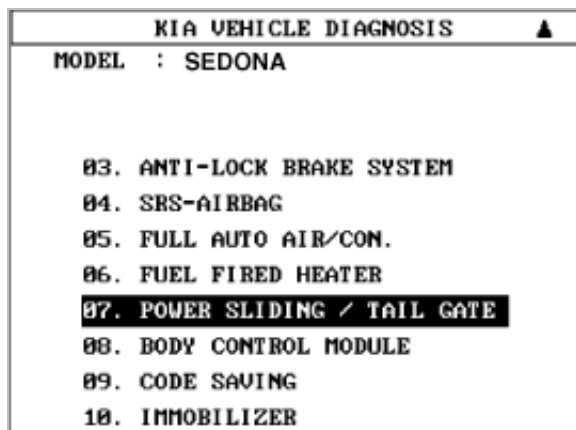
Power Tail Gate System - PTG Power Latch



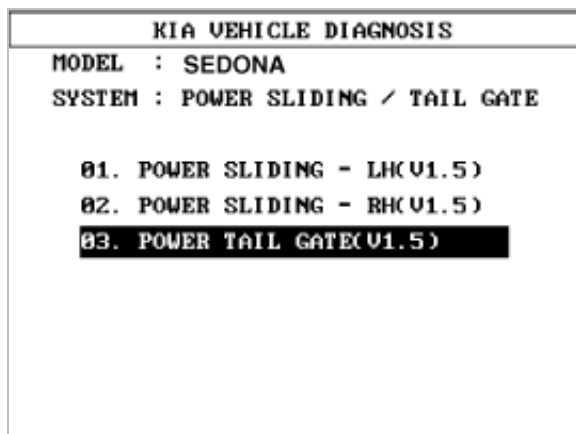


## INPECTION

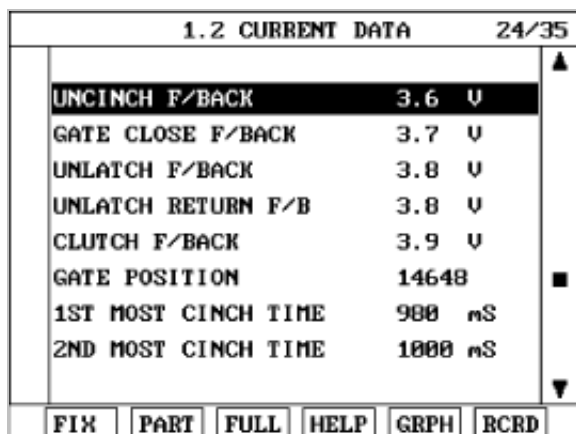
1. Check the power tail gate control module input/output value by using the diagnostic tool. If the operation of tailgate control module is abnormal, replace power latch.
2. To check the power latch operation, select a vehicle type and "POWER SLIDING/TAILGATE" menu.



3. Select "POWER TAILGATE".



4. Select the sensor output. And then check the cinch feedback and unlatch feedback output while operating power tailgate in power mode.

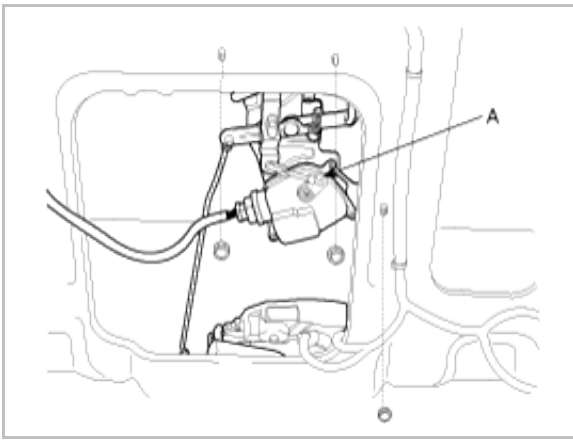


※ Above voltage and numerical value may be different from the real value.

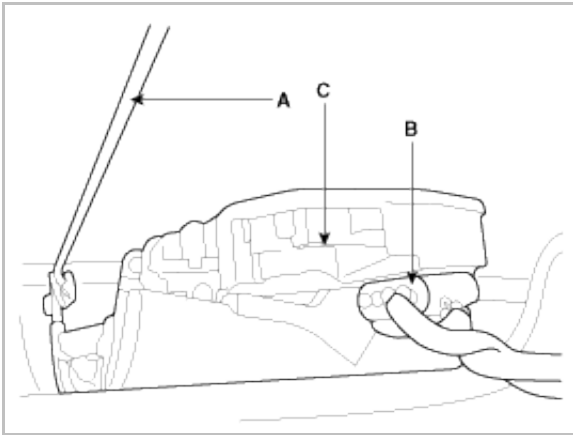
5. Change the anti pinch strip sensor, if there is no change during operation.

## REPLACEMENT

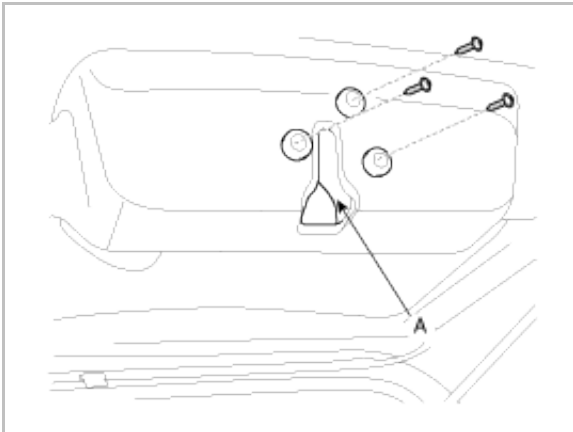
1. Disconnect the negative (-) battery terminal.
2. Remove the tail gate trim (Refer to the Body group - tail gate).
3. Remove the tail gate handle rod, actuator rod and key rod.
4. Remove the unlatch actuator assembly (A) after removing the connector and nuts (3EA).



5. Remove the tail gate handle rod (A) and connector (B) from the cinching latch assembly (C).



6. Remove the latch mounting screws (3EA) and cinching latch assembly (A) from the tail gate.



7. Installation is the reverse of removal.

#### NOTICE

- Check the power tail gate for normal operation.
- Check the normal operating whenever a power tailgate component is removed or replaced. If the chime sound is heard, check the DTC, wiring harness and cable connections.

# **Body Electrical System**

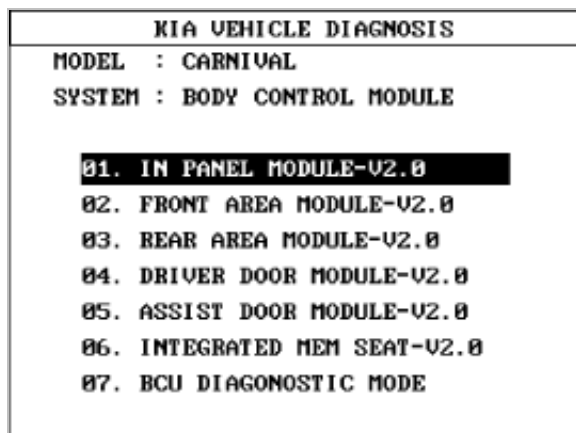
Power Tail Gate System - PTG Switch



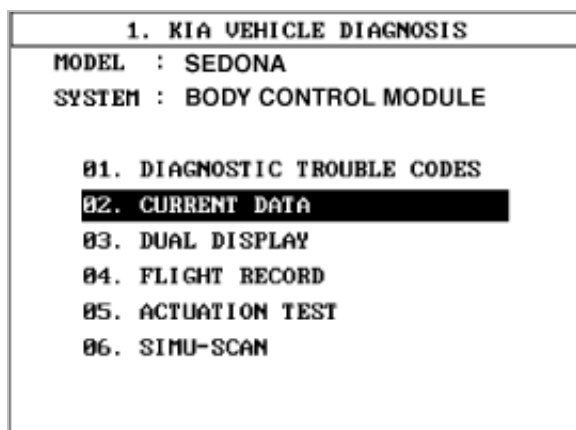
## INSPECTION

### OVERHEAD CONSOLE DOOR SWITCH INSPECTION

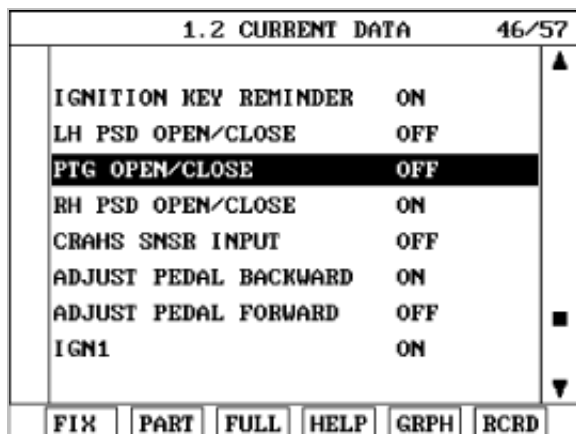
1. Check the overhead console door switch input/output value by using the diagnostic tool. If the operation of overhead console door switch is abnormal, check the IPM and replace.
2. When checking the overhead console switch operation, select a vehicle type and "IPM".



3. Select a in panel module (IPM) and "02. CURRENT DATA".



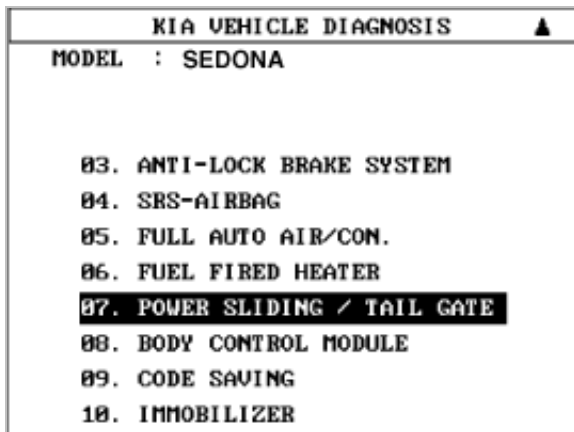
4. Check the PSD PTG power control switch and PTG switch output value.



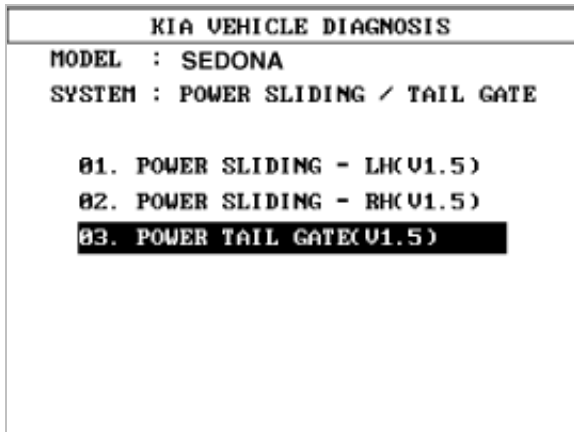
5. Confirm that output is changed by the controlling ON/OFF of each switch on the overhead console.

### TAILGATE SWITCH INSPECTION

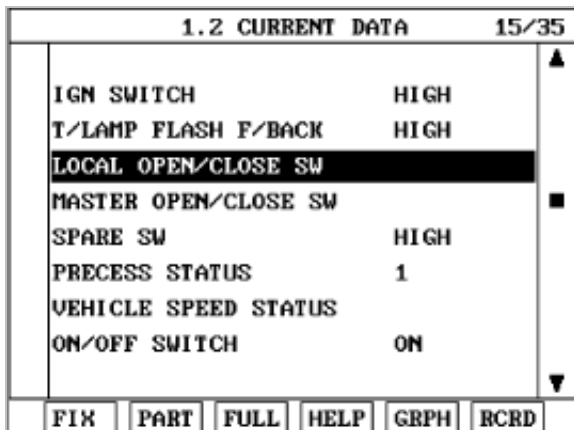
1. Check the power tailgate control module input/output value by using the diagnostic tool. If the operation of tailgate module is abnormal, replace power tailgate switch.
2. When checking tailgate switch operation, select a vehicle type and "POWER SLIDING/TAILGATE" menu.



3. Select the "POWER TAILGATE" menu to check.



4. Select the sensor output. And then check the power tailgate local switch output value changed by the controlling PTG.

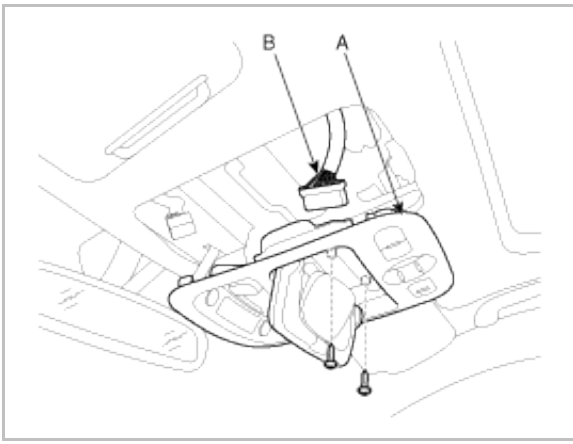


5. If there is no input/output change from OFF to ON during PTG operation, change the power tailgate switch.

## REPLACEMENT

### OVERHEAD CONSOLE SWITCH

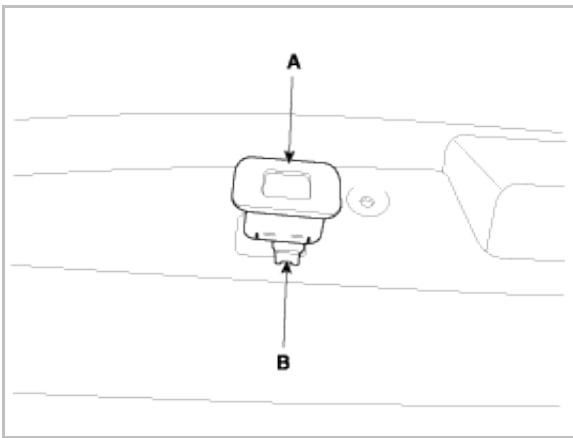
1. Disconnect the negative (-) battery terminal.
2. Open the sunglass case cover from the overhead console then remove the 2 screws holding the overhead console (A). And then disconnect the connector (B).



3. Installation is the reverse of removal.

## TAIL GATE SWITCH

1. Disconnect the negative (-) battery terminal.
2. Open the tail gate and remove the tail gate trim switch (A) using the appropriate trim tool. And then remove the connector (B).



3. Installation is the reverse of removal.

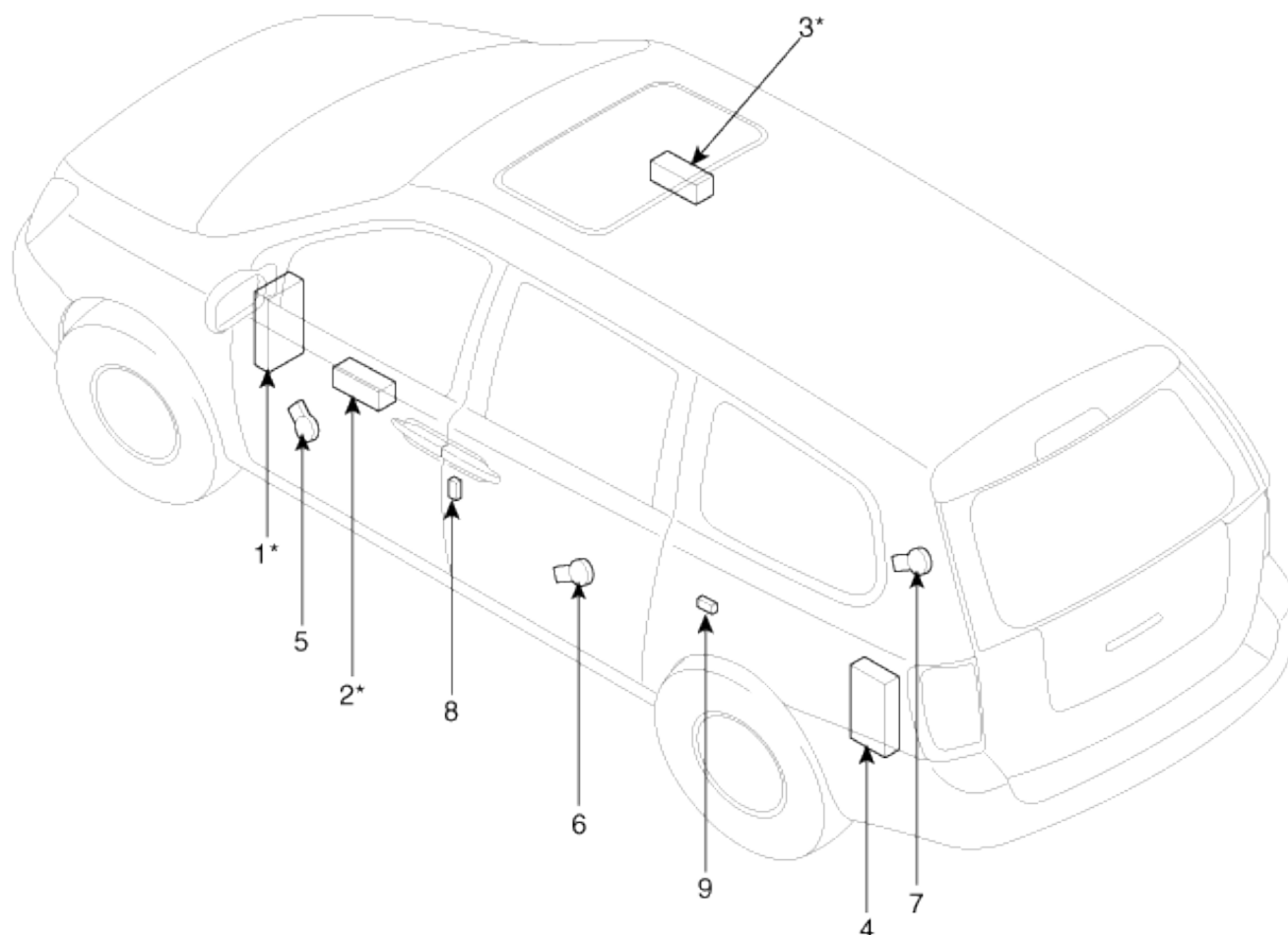


# **Body Electrical System**

Power Windows

## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



- 1. IPM (In-Panel module)
- 2. DDM (Driver door module)
- 3. ADM (Assist door module)
- 4. RAM (Rear area module)
- 5. Front window motor

- 6. Rear window motor
- 7. Quarter glass motor
- 8. Rear window switch
- 9. Quarter glass switch



# **Body Electrical System**

Power Windows - Power Window Motor

## OPERATION

### FUNCTION OF SAFETY POWER WINDOW

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

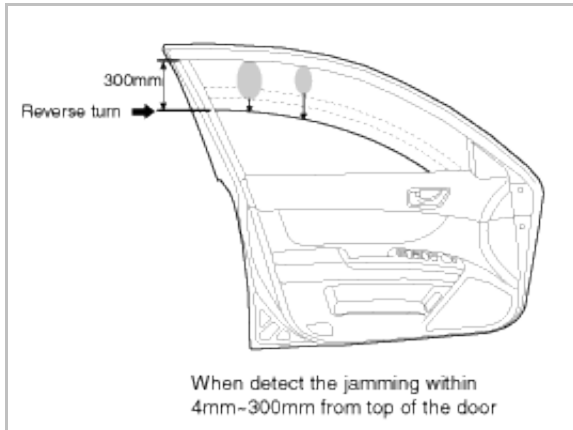
#### 1. Safety function condition

When the system detects a force of 100N during the window rising, window is reversed.

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

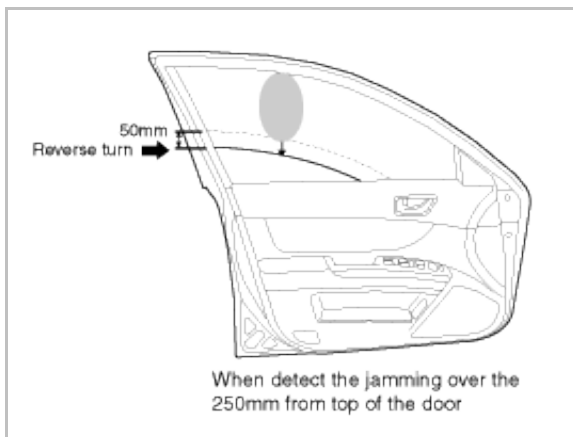
##### A. When detect the jamming within 4mm ~ 300mm from top of the door.

→ Window is reversed until 350mm from top of the door.



##### B. When detect the jamming over the 300mm from top of the door.

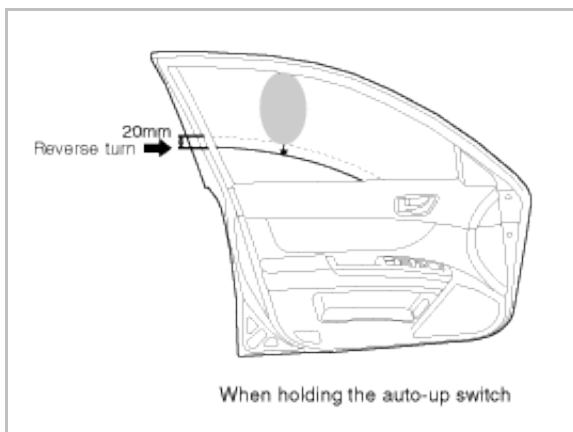
→ Window is reversed until 50mm from jamming position.



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

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

→ Window is reversed until 20mm from jamming position.



#### 4. Safety function is not available area

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

## **INITIALIZING METHOD OF THE SAFETY POWER WINDOW**

### **1. Initializing of Battery Connection**

#### **(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**

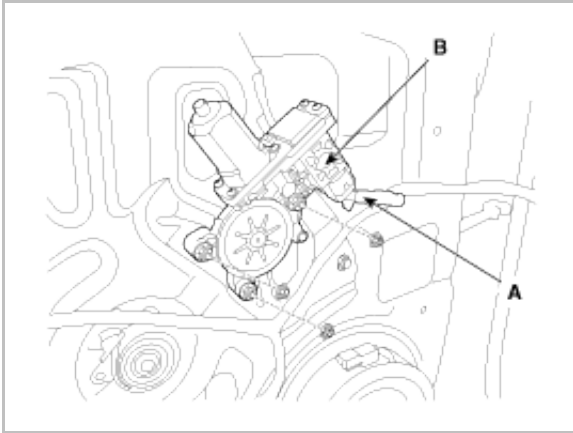
Close the window in window open position, and holding the switch in window full close position more than 1 second.



## REPLACEMENT

### FRONT POWER WINDOW MOTOR

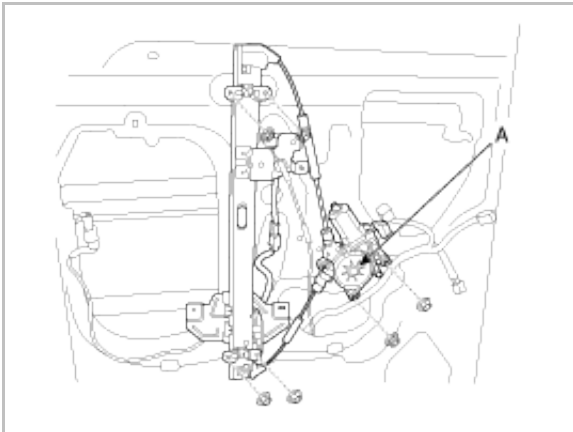
1. Remove (-) negative battery terminal.
2. Remove the front door trim panel. (Refer to the Body group-front door)
3. Remove the window motor (B) after disconnecting the motor connector (A) and mounting nuts.



4. Installation is the reverse of removal.

### SLIDING POWER WINDOW MOTOR

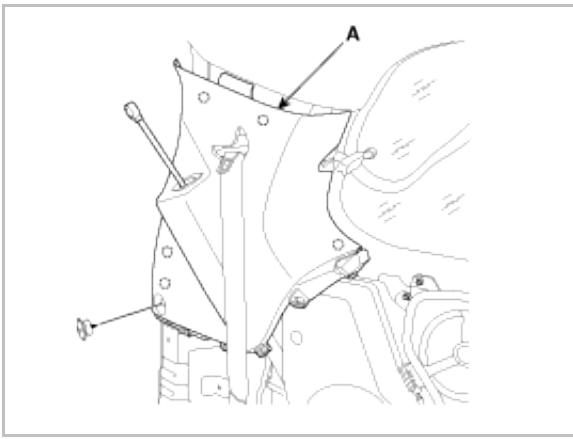
1. Remove (-) negative battery terminal.
2. Remove the sliding door trim panel. (Refer to the Body group-rear door)
3. Remove the door trim seal and glass.
4. Remove the door regulator.
5. Remove the power window motor (A) after disconnecting the motor connector and power window motor mounting nuts.



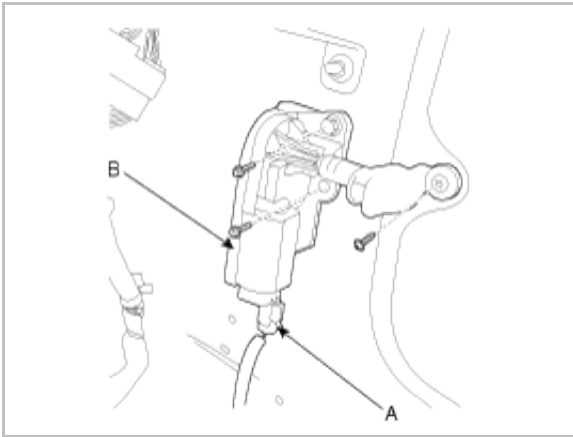
6. Installation is the reverse of removal.

### QUARTER GLASS MOTOR

1. Remove (-) negative battery terminal.
2. Remove the D pillar trim panel (A). (Refer to the Body group-interior trim)



3. Remove the quarter glass motor (B) after disconnecting the motor connector (A) and quarter glass motor mounting bolts and screws.

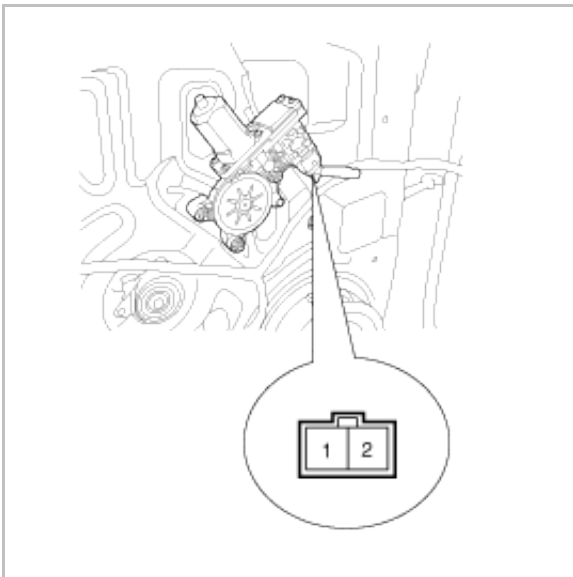


4. Installation is the reverse of removal.

## INSPECTION

### FRONT POWER WINDOW MOTOR INSPECTION

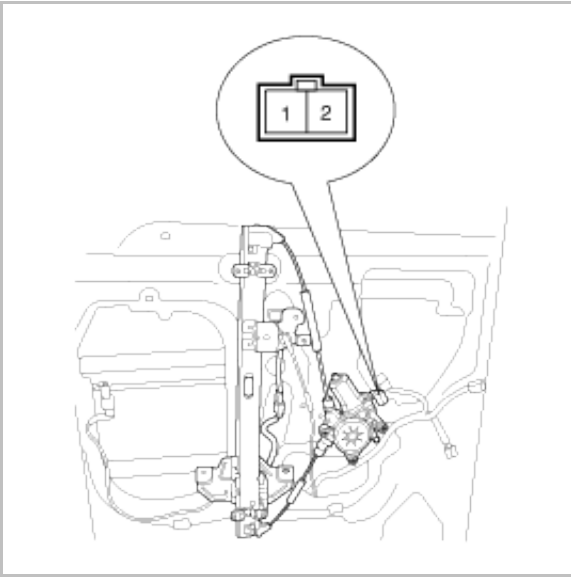
1. Remove (-) negative battery terminal.
2. Remove the rear door trim panel. (Refer to the Body group-front door)
3. Disconnect the motor connector from the motor.



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

### SLIDING POWER WINDOW MOTOR INSPECTION

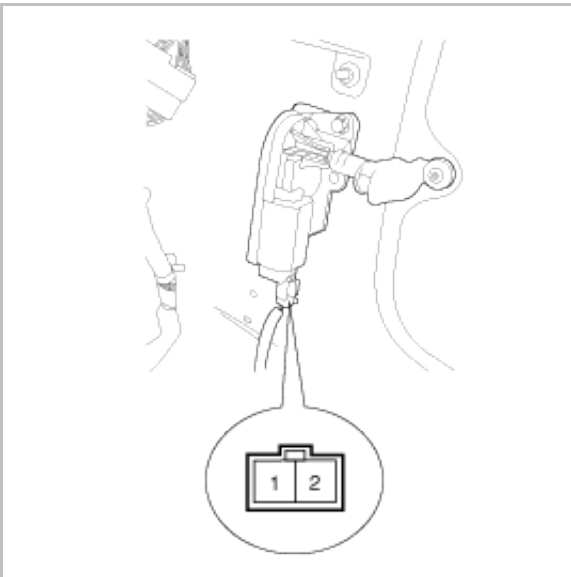
1. Remove (-) negative battery terminal.
2. Remove the sliding door trim panel. (Refer to the Body group-rear door)
3. Disconnect the motor connector from the motor.



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

## QUARTER GLASS MOTOR INSPECTION

1. Remove (-) negative battery terminal.
2. Remove the D pillar trim panel (A). (Refer to the Body group-interior trim)
3. Disconnect the motor connector from the motor.



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

# **Body Electrical System**

Power Windows - Power Window Switch



# **Body Electrical System**

Windshield Deicer





## DESCRIPTION

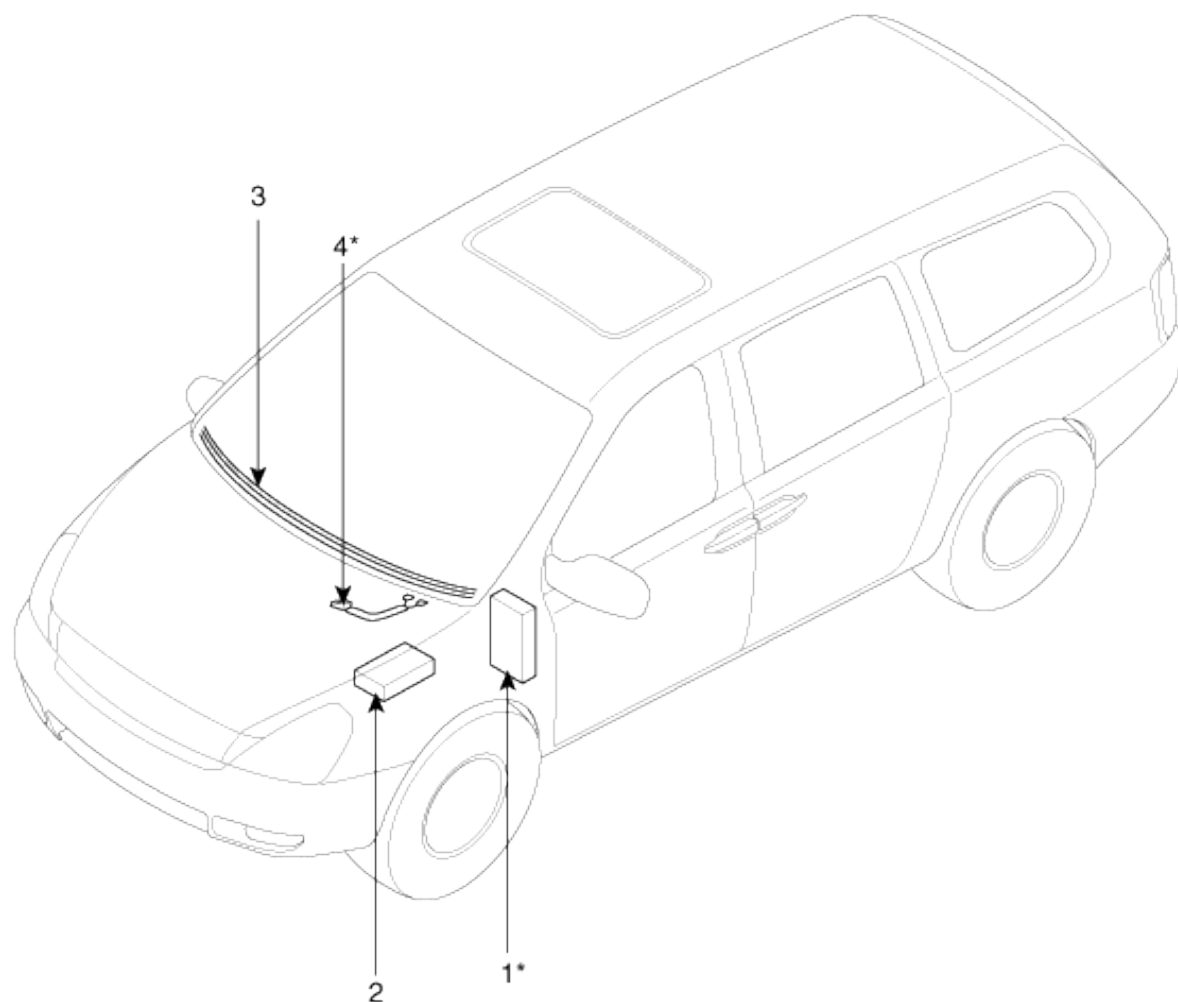
Windshield deicer system prevent windshield wiper from freezing in the winter season. It consists of deicer in the lower part of windshield, switch and relay. FAM receives an input signal from the deicer switch of IPM through CAN communication line and then controls relay. Operating condition is the same that of rear window defogger system. With the engine running and the charging system operating, if the deicer switch is ON, then deicer output is ON for 20 minutes.

## COMPONENT LOCATION

The parts with asterisk(\*) :

This illustration is shows the LHD type.

RHD type is symmetrical.



- 1. IPM (In-Panel module)
- 2. FAM (Front area module)

- 3. Windshield deicer
- 4. Deicer connector(2pin)



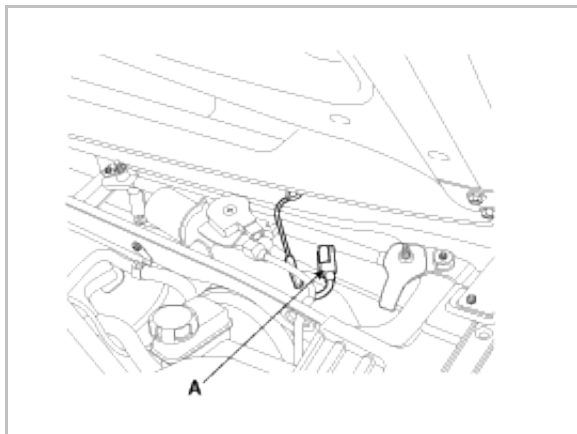
# **Body Electrical System**

Windshield Deicer - Windshield Deicer

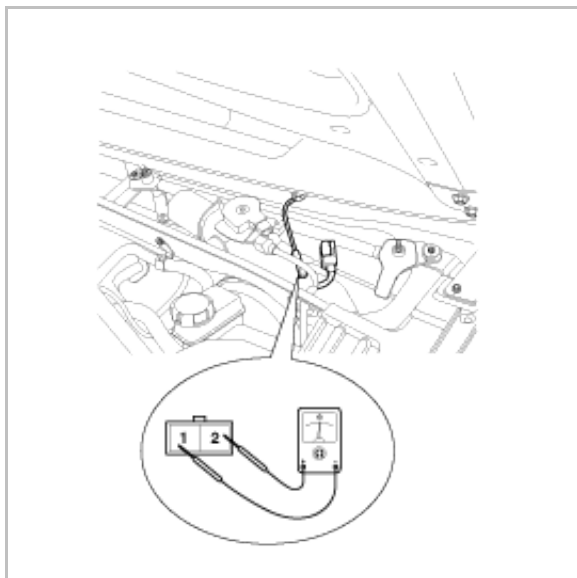


## INSPECTION

1. Remove the cowl top cover.(Refer to the wiper)
2. Disconnect the windshield deicer connector (A) from the wiper motor linkage.



3. Check for continuity between the terminals of deicer lines.

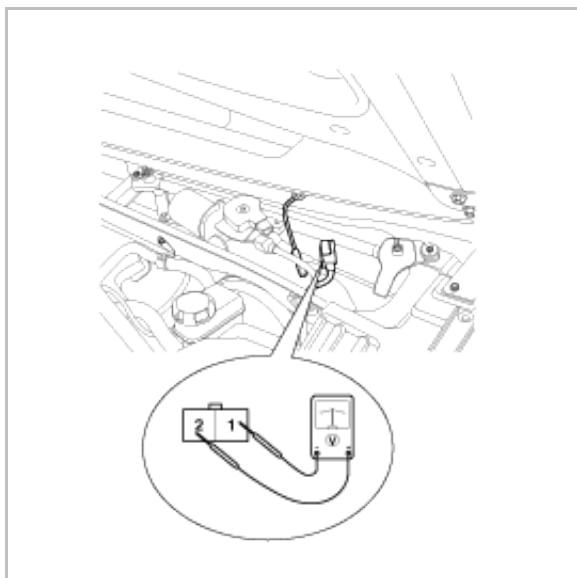


4. Turn the ignition switch ON and the windshield deicer switch ON, then measure the voltage between the terminals of harness side deicer connector.

---

O K: approx. Battery voltage (12V)

---



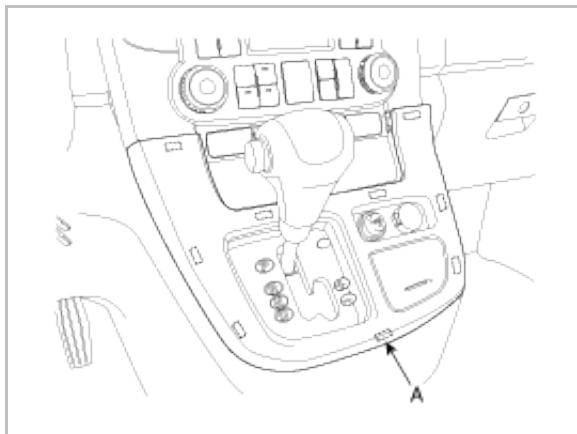
# **Body Electrical System**

Windshield Deicer - Windshield Deicer  
Switch



## Inspection

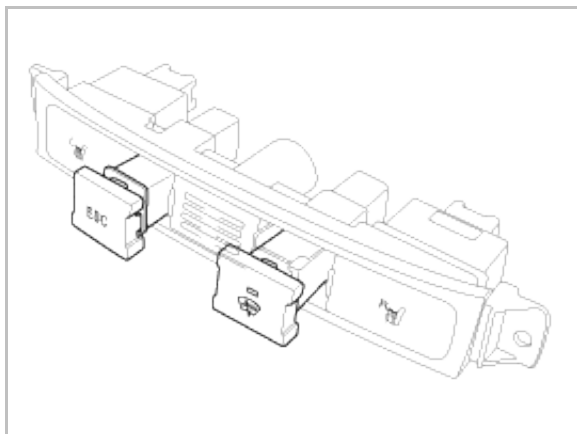
1. Disconnect the negative (-) battery terminal.
2. Remove the console lower cover (A).



3. Remove the center facia panel(A) after loosening screws. Take care not to damage fixing clips.



4. Remove the windshield deicer switch from the center facia panel switch.



5. Installation is the reverse of removal.



# **Body Electrical System**

Windshield Deicer - Windshield Deicer Timer

# **Body Electrical System**

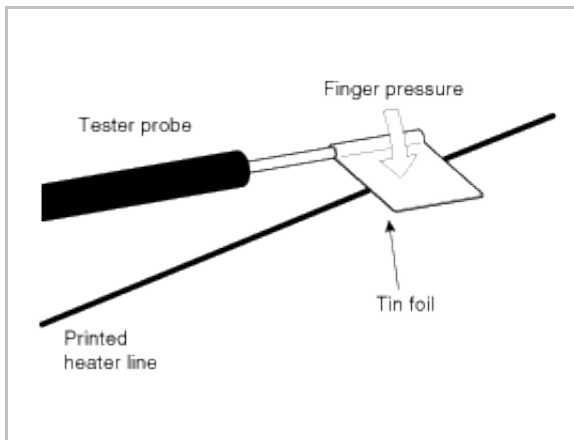
Rear Glass Defogger - Rear Glass Defogger  
Printed Heater



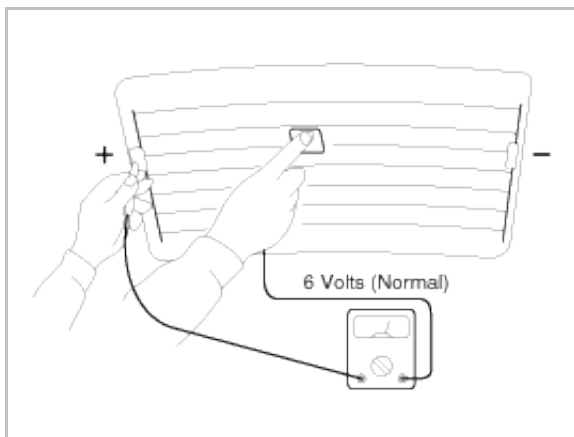
## INSPECTION

### CAUTION

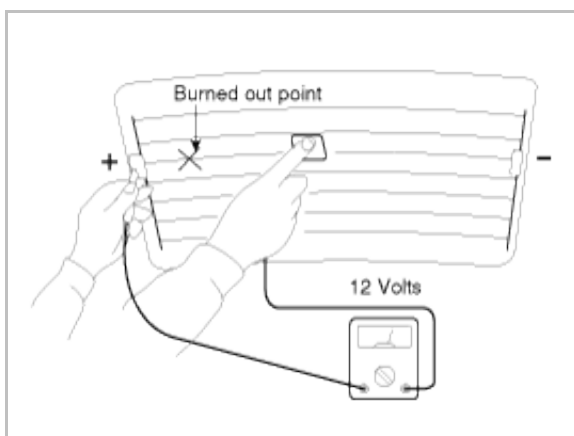
Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply finger pressure on the tin foil, moving the tin foil along the grid line to check for open circuits.



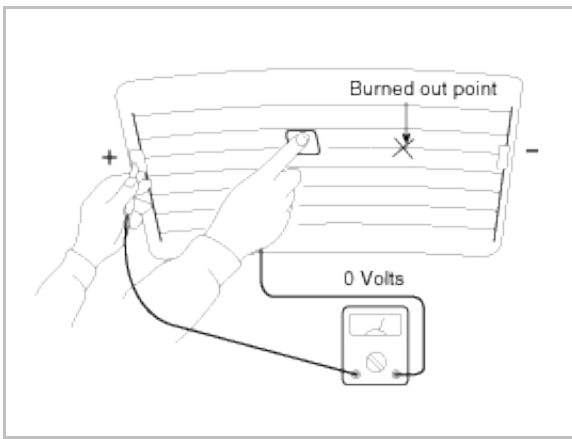
1. Turn on the defogger switch and use a voltmeter to measure the voltage of each heater line at the glass center point. If a voltage of approximately 6V is indicated by the voltmeter, the heater line of the rear window is considered satisfactory.



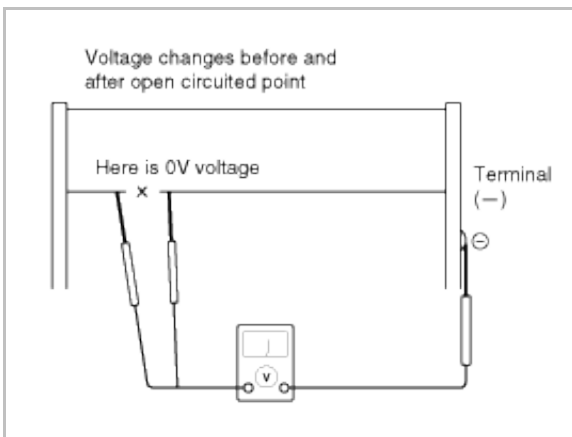
2. If a heater line is burned out between the center point and (+) terminal, the voltmeter will indicate 12V.



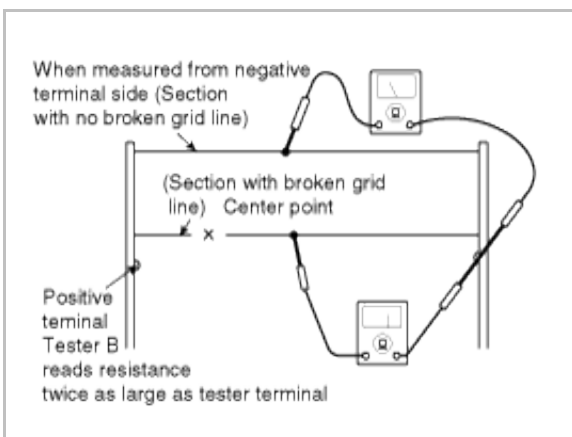
3. If a heater line is burned out between the center point and (-) terminal, the voltmeter will indicate 0V.



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.



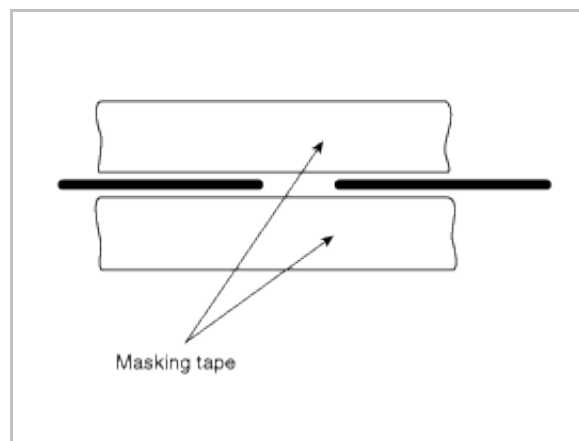
## REPAIR OF BROKEN HEATER LINE

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).



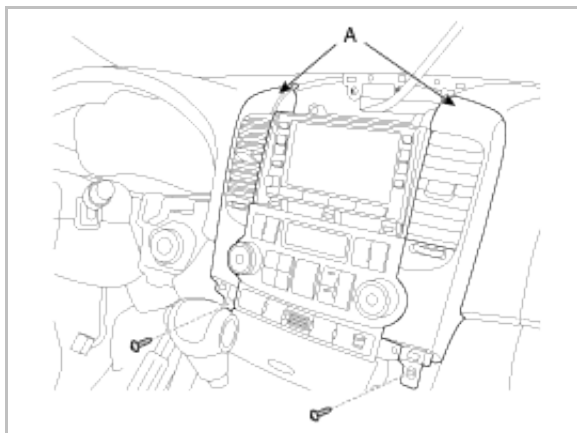
# **Body Electrical System**

Rear Glass Defogger - Rear Glass Defogger  
Switch

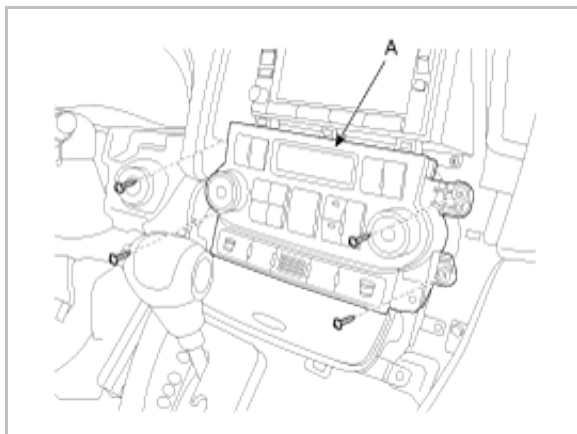


## INSPECTION

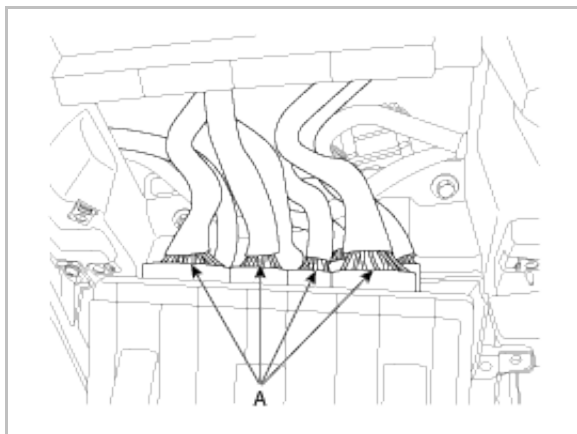
1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel, console lower cover and center air vent (A) after loosening screws. Take care not to damage fixing clips.



3. Remove the center facia panel switch and air control panel (A) after loosening screws.



4. Disconnect the air control panel connector (A).



5. Installation is the reverse of removal.

# **Body Electrical System**

Rear Glass Defogger - Rear Glass Defogger  
Timer

## INSPECTION

While operating the components, check whether the operations are normal as shown in the timing chart.

1. The defog function can be activated only when engine is running and ignition key is in RUN position.

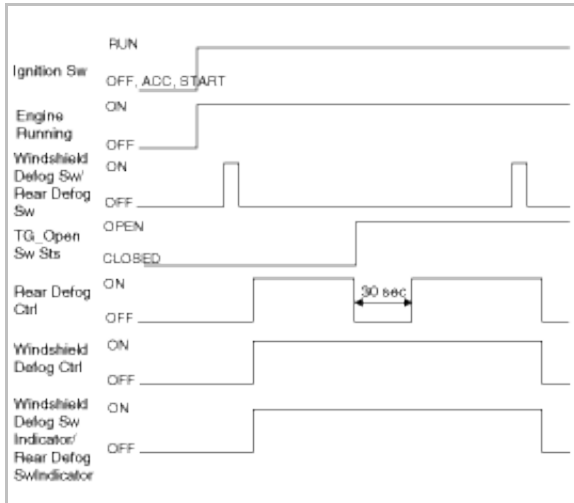
If the defogger is switched ON, the defogger will stay ON for 20 minutes duration.

While Windshield Defog is on, the windshield defog button is illuminated

If the switch is pushed again while defog is already active, defog stops.

If the engine stops while defog is on, defog stops and it is not automatically turned on when the engine is started again.

Rear defog works exactly in the same way as windshield defog using the Rear Defog Switch button as input.



2. Rear Defog Pause

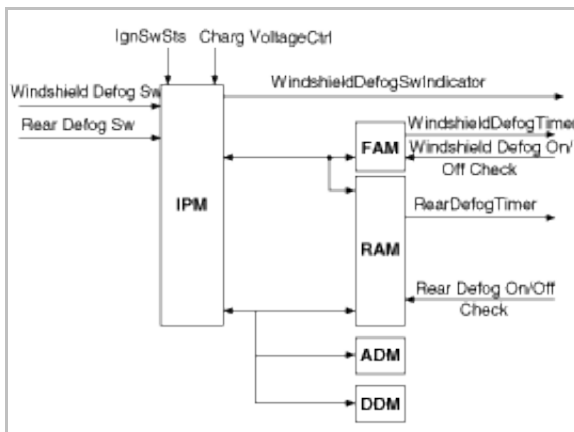
When IPM receives tailgate flasher control CAN message transition to tailgate flash value, rear defog is inhibited for 30s.

The 20 min rear defog timer is frozen during this pause.

If the user turns on rear defog function while this pause is going on, rear defog is set to ON only at the end of the pause.

This pause has no impact on Rear Defog Switch illumination.

When IPM receives tail gate open CAN message transition to OPEN value, this 30 s rear defog pause is also started, it works the same way as described above.





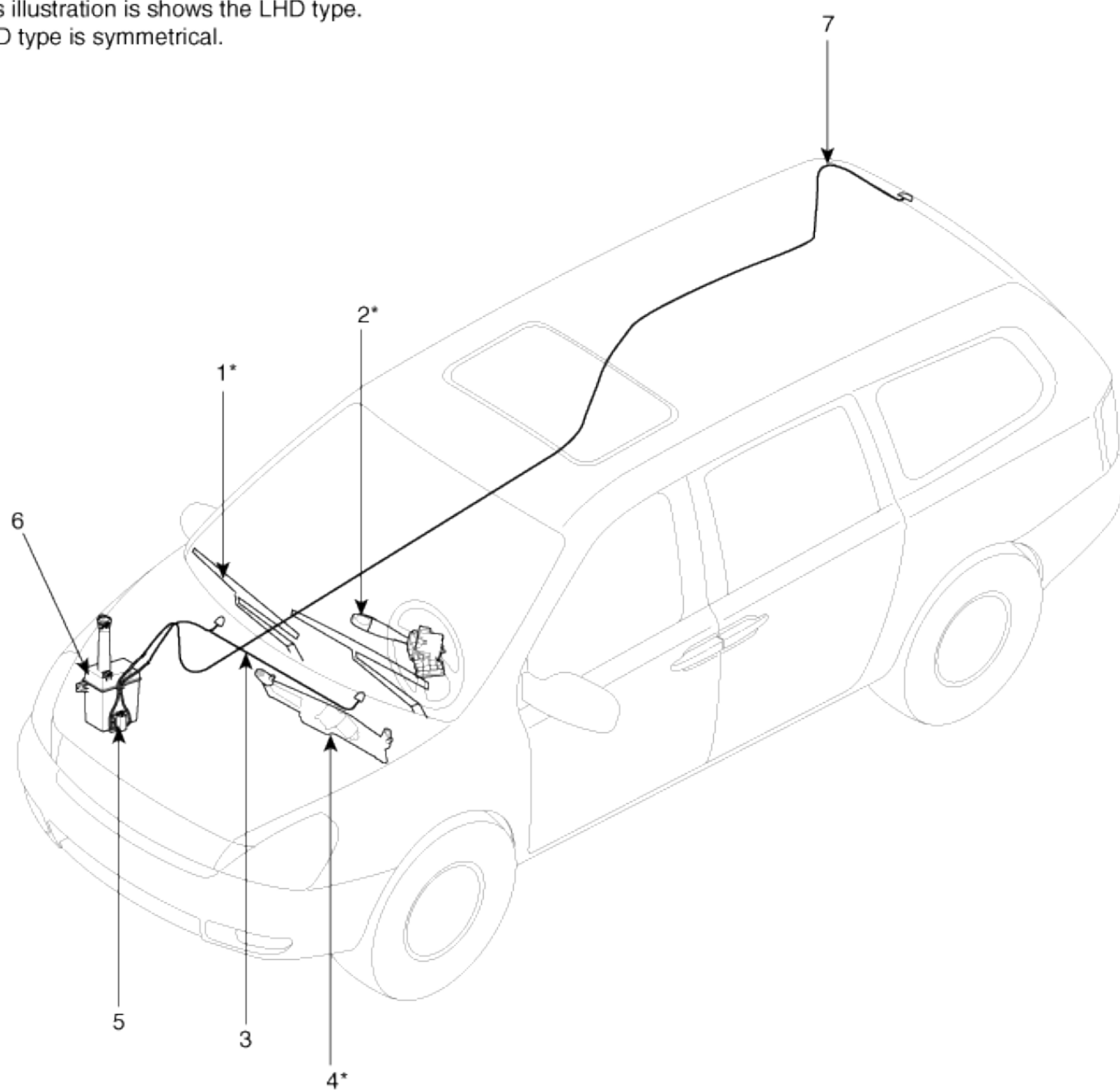
# Body Electrical System

## Windshield Wiper/Washer



## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



- 1. Windshield wiper arm & blade
- 2. Wiper & washer switch
- 3. Windshield washer hose
- 4. Windshield wiper motor & linkage

- 5. Washer motor
- 6. Washer reservoir
- 7. Rear washer hose



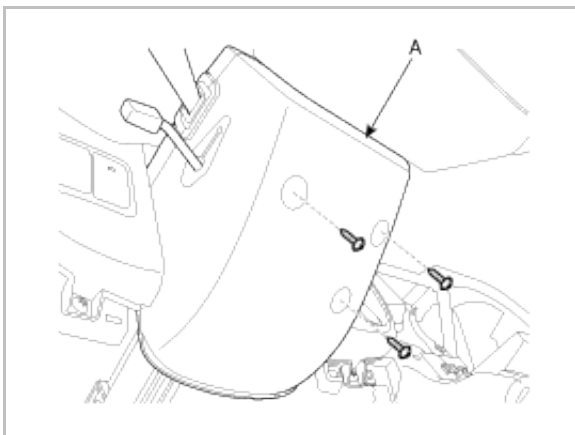
# Body Electrical System

Windshield Wiper/Washer - Windshield Wiper-Washer Switch



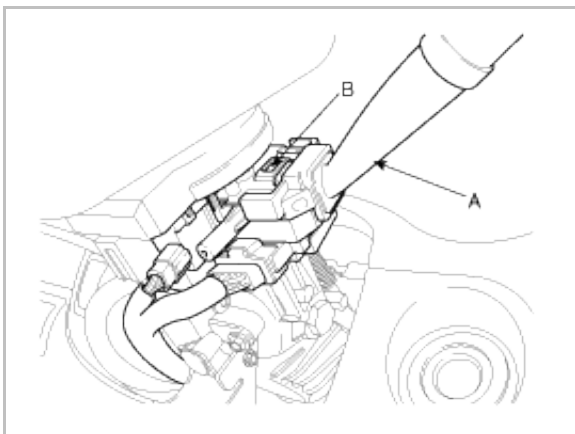
## REPLACEMENT

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

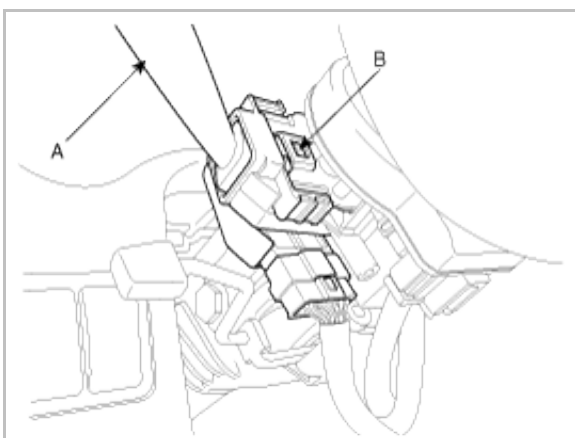


2. Remove the wiper switch (A) by pushing the lock pin (B) after disconnecting the connector.

### [LHD]



### [RHD]

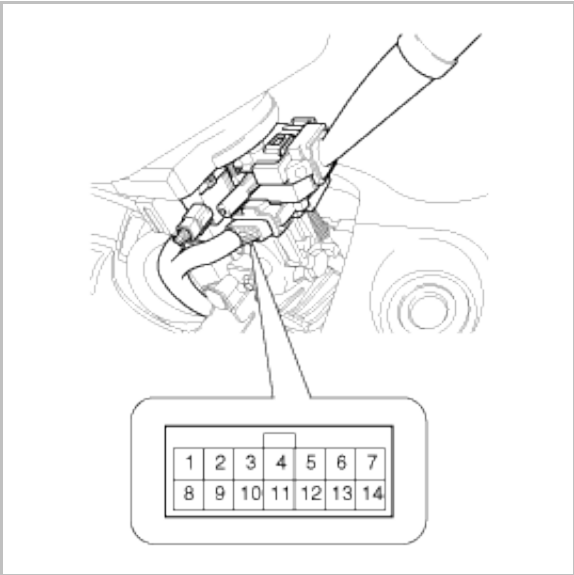


3. Installation is the reverse of removal.

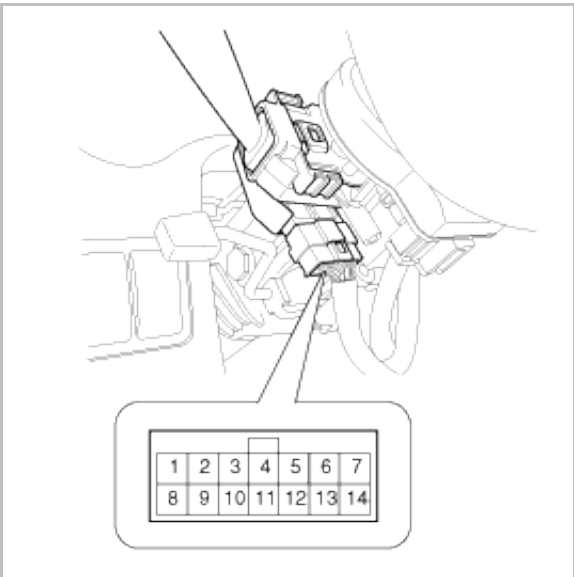
## INSPECTION

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

### [LHD]



[RHD]



WIPER SWITCH

| (RHD)                |          |          |          |          |          |          |            |            |
|----------------------|----------|----------|----------|----------|----------|----------|------------|------------|
| Terminal<br>Position | 1<br>(7) | 2<br>(6) | 3<br>(5) | 4<br>(4) | 5<br>(3) | 6<br>(2) | 13<br>(13) | 14<br>(14) |
| MIST                 |          |          |          | ○—○      |          |          |            |            |
| OFF                  |          | ○—○      |          |          |          |          |            |            |
| INT                  |          | ○—○      |          |          | ○—○      |          | ○—○        |            |
| LOW                  |          | ○—○      |          |          | ○—○      |          |            |            |
| HI                   | ○—○      |          |          |          | ○—○      |          |            |            |

WASHER SWITCH

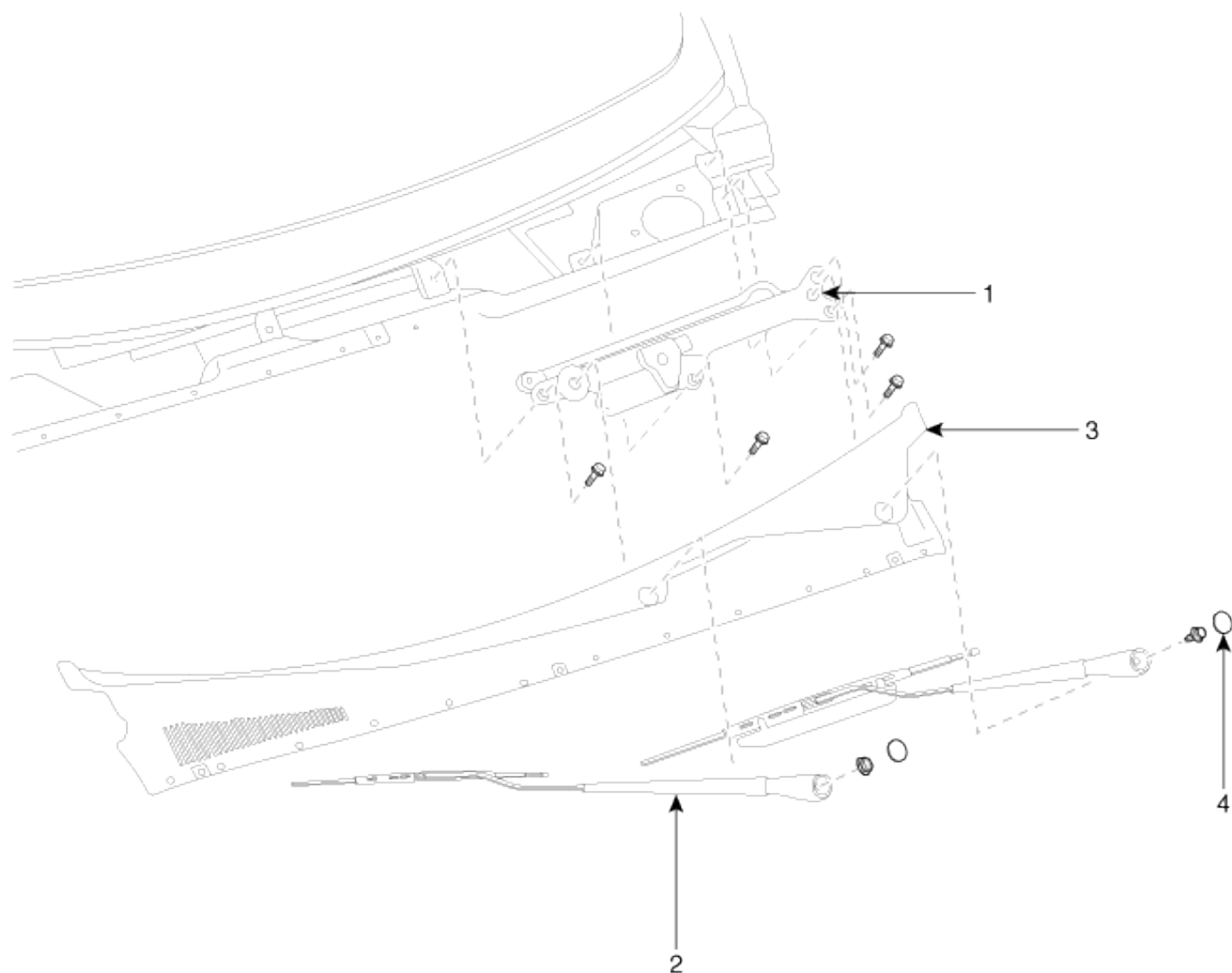
| (RHD)                |      |      |
|----------------------|------|------|
| Terminal<br>Position | 5(3) | 7(1) |
| OFF                  |      |      |
| ON                   | ○—○  | ○—○  |



# **Body Electrical System**

Windshield Wiper/Washer - Front Wiper  
Motor

## COMPONENT LOCATION



1. Wiper motor & linkage assembly  
2. Wiper arm & blade

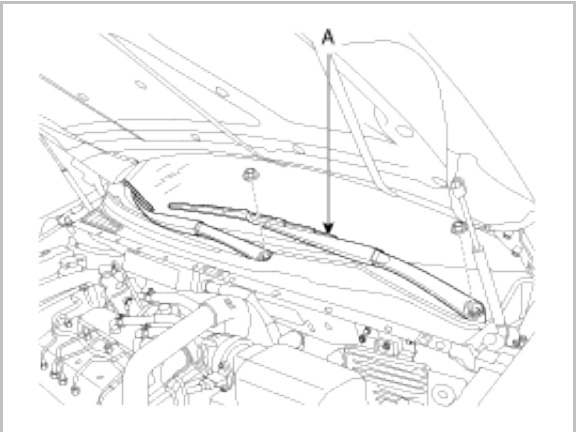
3. Cowl top cover  
4. Cap



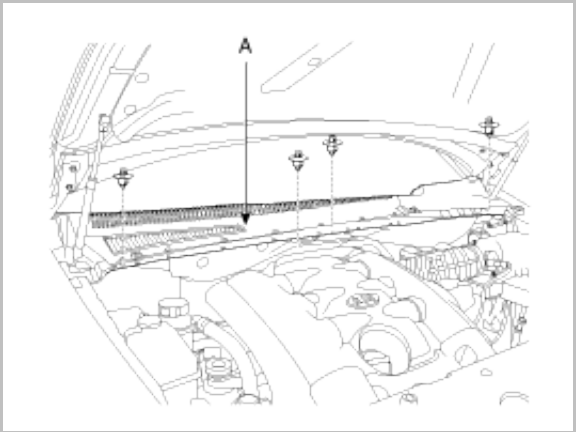
REMOVAL

1. Remove the windshield wiper arm and blade after removing the mounting nut (A).

TORQUE: 28~32 Nm (2.8~3.2 kgf.m, 20~23.1 lbf.ft)

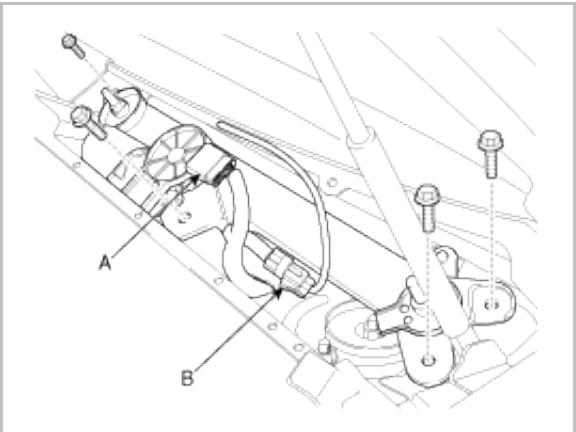


2. Remove the weather strip and the cowl top cover (A) after removing 4 fasteners.



3. Remove the windshield wiper motor and linkage assembly after removing 4 bolts. Disconnect the wiper motor connector (A) and windshield deicer connector (B) from the wiper motor & linkage assembly.

Torque: 7-11Nm (0.7-1.1, kgf.m, 5.0-7.9 lbf.ft)



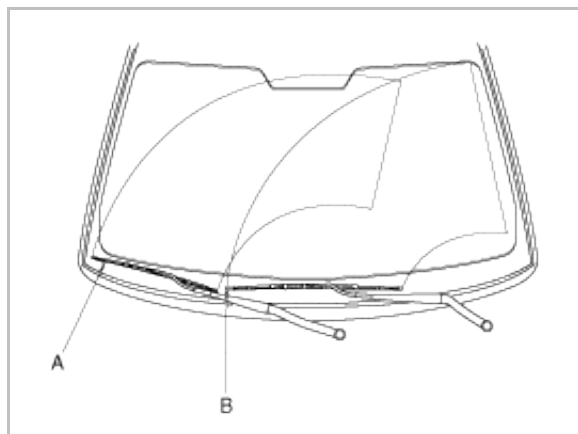
4. Installation is the reverse of removal.

INSTALLATION

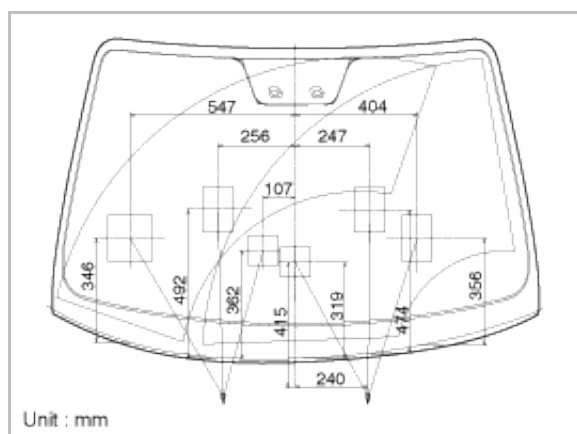
1. Install the wiper arm and blade to the specified position.

|                    |   |   |
|--------------------|---|---|
| Specified position | A | B |
|--------------------|---|---|

|                   |                         |                         |
|-------------------|-------------------------|-------------------------|
| Distance[in (mm)] | 1.57+0.19/0<br>(40+5/0) | 1.57+0.19/0<br>(40+5/0) |
|-------------------|-------------------------|-------------------------|



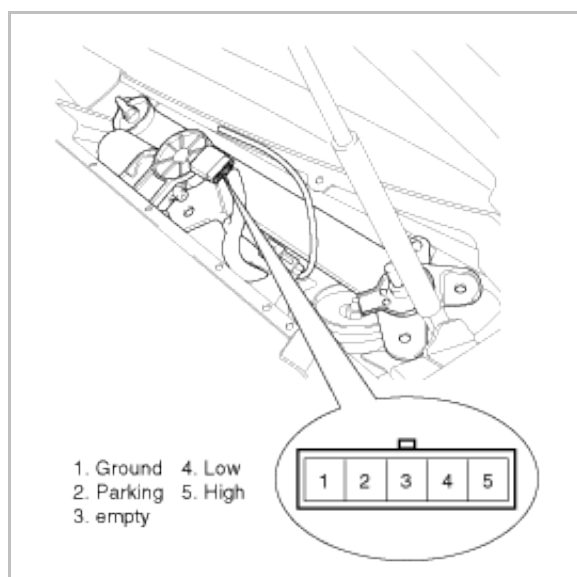
- Set the washer nozzle on the specified spray position.



## INSPECTION

### SPEED OPERATION CHECK

- Remove the connector from the wiper motor.
- Attach the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 1.
- Check that the motor operates at low speed.
- Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 1.
- Check that the motor operates at high speed.





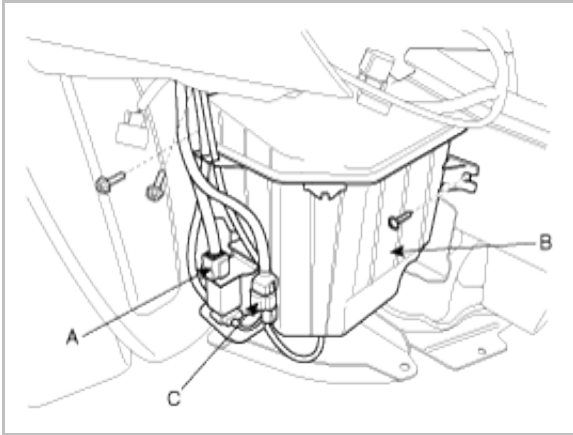
# **Body Electrical System**

Windshield Wiper/Washer - Front Washer  
Motor



## REPLACEMENT

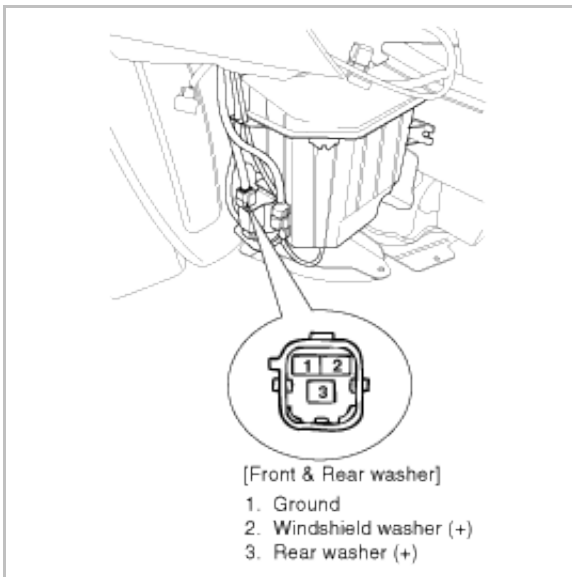
1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper cover. (Refer to Body group - Front bumper)
3. Remove the washer hose, the washer motor connector (A) and washer level sensor connector (C).
4. Remove the washer reservoir after removing 2 bolts and 1 step bolt.

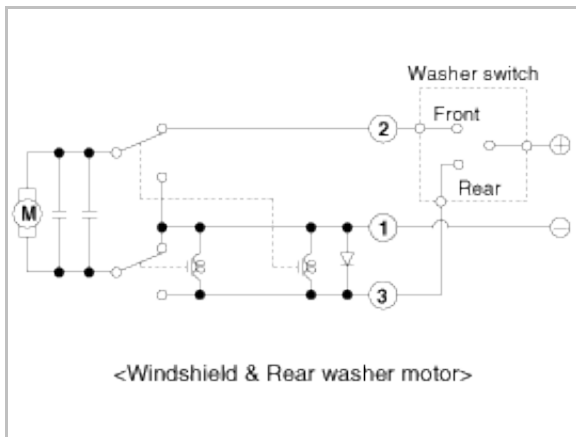


5. Installation is the reverse of removal.

## INSPECTION

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.
2. Connect positive (+) battery cables to terminal 2 and negative (-) battery cables to terminal 1 respectively.
3. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles. If they are abnormal, replace the washer motor.







# **Body Electrical System**

Windshield Wiper/Washer - Rain Sensor

# **Body Electrical System**

Rear Wiper/Washer - Rear Wiper Motor

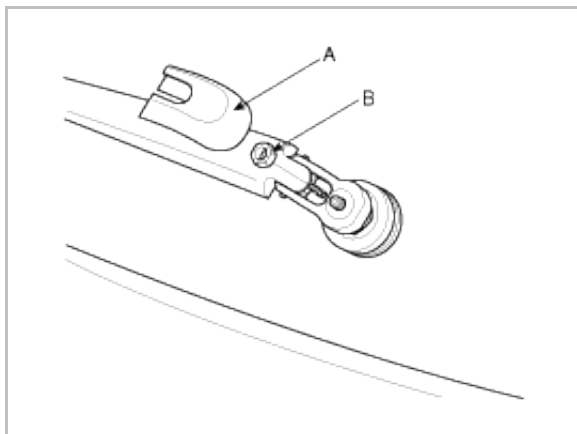


## REMOVAL

1. Remove the tail gate trim (Refer to the Body group - Tail gate).
2. Detach the wiper cap (A), and then remove the rear wiper arm after removing the mounting nut (B).

Tightening torque Nut(B) :

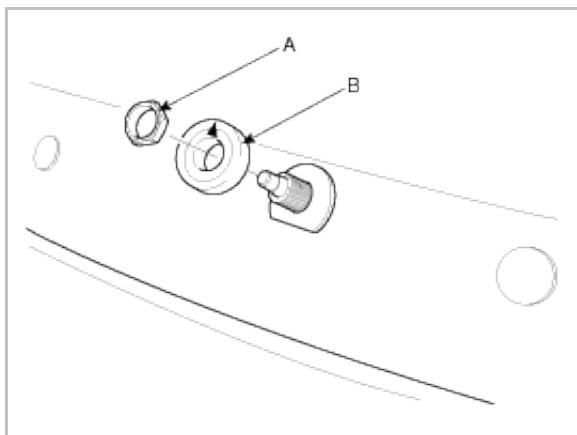
10~13 Nm (1.0~1.3 kgf.m, 7.2~9.4 lbf.ft)



3. Detach the wiper motor cover, and then remove the rear wiper cap & pad (B) after removing the mounting nut (A).

### NOTICE

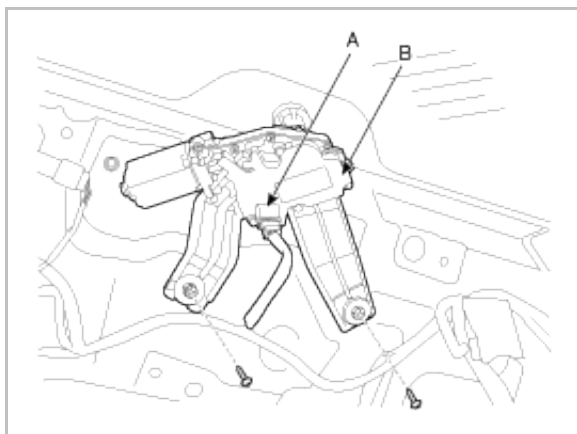
During installation, of the rear wiper cap and pad, ensure the arrow on the cap assembly is pointed upwards.



4. Disconnect the rear wiper motor connector (A) then remove the rear wiper motor (B) after removing 2 bolts.

Tightening torque Nut :

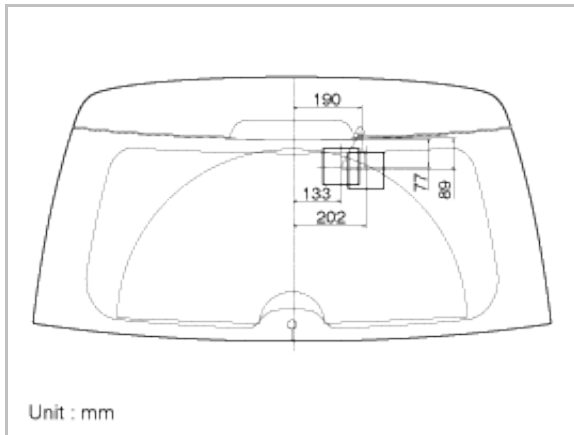
7~11 Nm (0.7~1.1 kgf.m, 5.1~8.0 lbf.ft)



5. Installation is the reverse of removal.

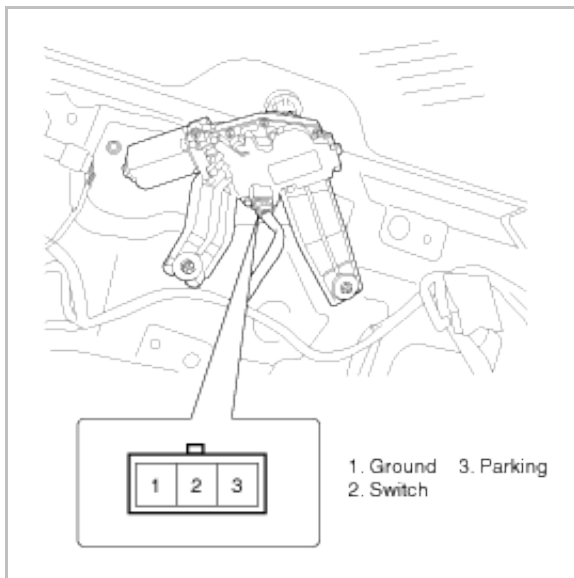
## INSTALLATION

1. Install the rear wiper arm and blade to the specified position.  
※ Specified position : The first defogger line from bottom of the rear window.
2. Set the rear washer nozzle on the specified spray position.



## INSPECTION

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



# **Body Electrical System**

Rear Wiper/Washer - Rear Washer Switch

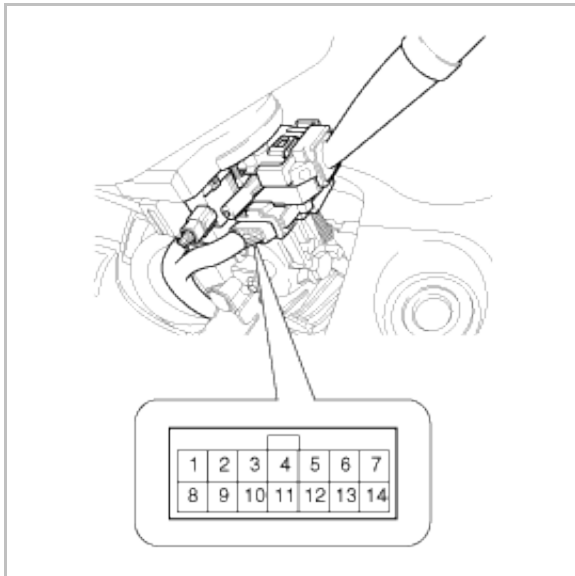




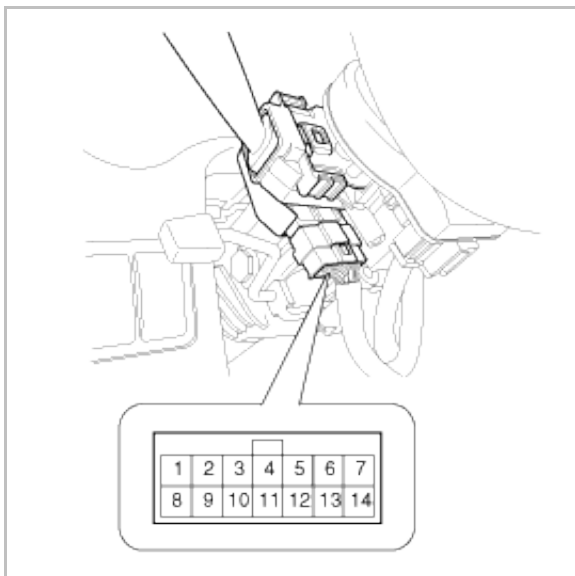
## INSPECTION

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

### [LHD]



### [RHD]



## REAR WIPER & WASHER SWITCH

| (RHD)                |      |        |        |        |
|----------------------|------|--------|--------|--------|
| Terminal<br>Position | 9(9) | 10(10) | 11(11) | 12(12) |
| Rear washer          | ○    | —      | —      | ○      |
| OFF                  |      |        |        |        |
| INT                  |      |        | ○      | ○      |
| ON                   |      | ○      | —      | ○      |
| Rear washer          | ○    | —      | —      | ○      |

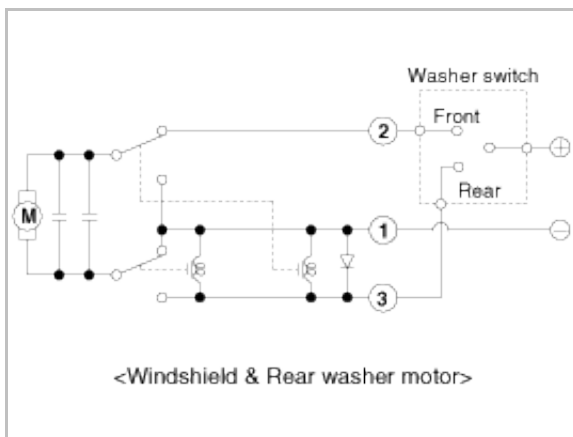
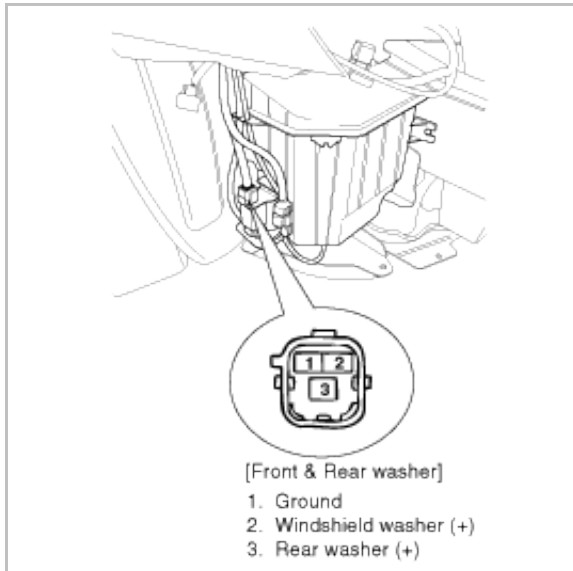
# **Body Electrical System**

Rear Wiper/Washer - Rear Washer Motor



## INSPECTION

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.
2. Remove the front bumper. (Refer to the Body group- Front bumper)
3. Connect positive (+) and negative (-) battery cables to terminals 3 and 1 respectively to see that the washer motor runs and water is pumped.
4. Check that the motor operates normally.  
Replace the motor if it operates abnormally.

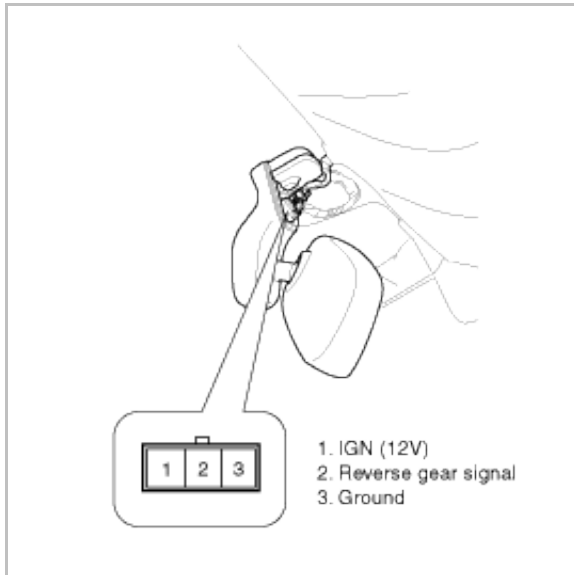


# **Body Electrical System**

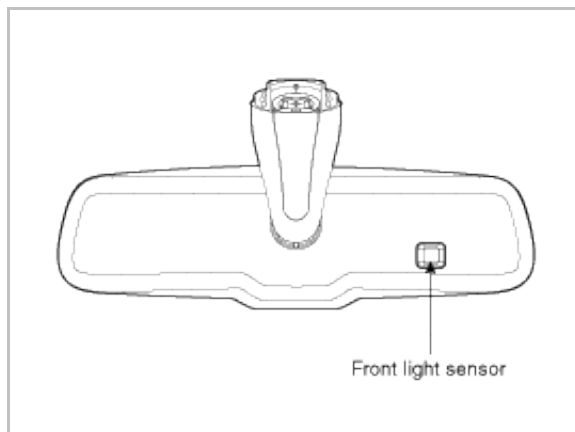
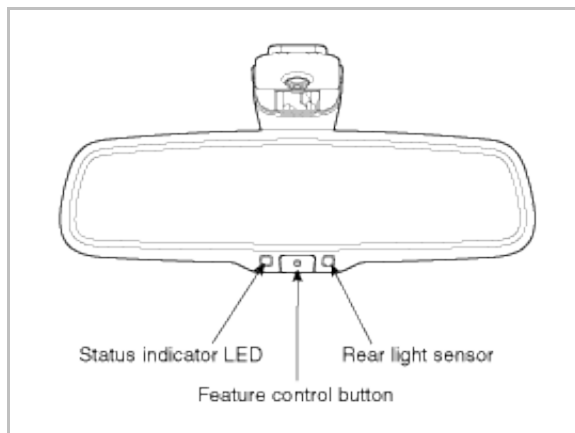
Electro Chromic Inside Rear View Mirror

## DESCRIPTION

The electrochromatic rear view mirror detects the ambient light using a built-in sensor and adjusts the reflectability of the mirror to prevent excess light (such as the light emitted by a following vehicle's headlights) from reaching the driver's eyes during night driving. To allow for maximum vision while backing up, the electrochromatic functionality of the mirror is deactivated whenever the transaxle is in 'R' range.



1. The front 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 following vehicle.
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.



## 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.

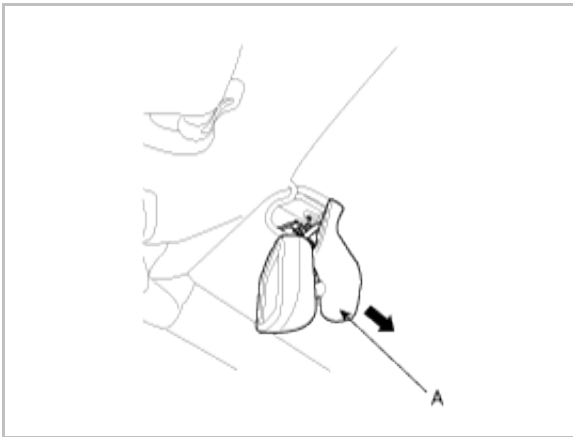
### NOTICE

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

5. When the reverse gear is engaged, the ECM should not be darkened.

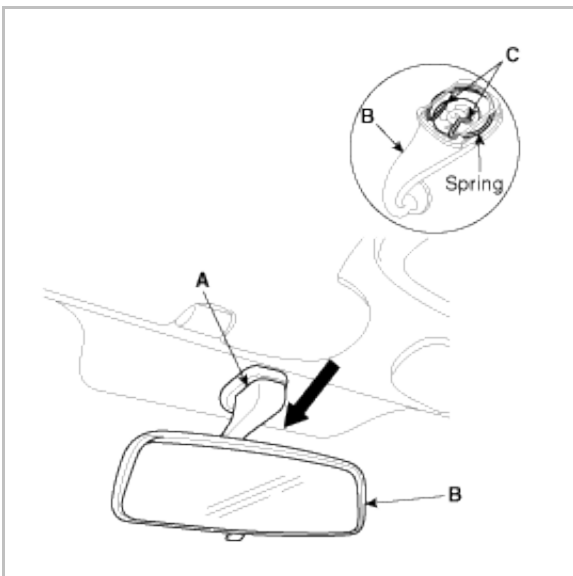
## REPLACEMENT

1. Push the inside rear view mirror base down to remove the inside rear view mirror assembly (A) after removing the mirror wire cover.



### NOTICE

Take care not to damage the mounting bracket during removal.



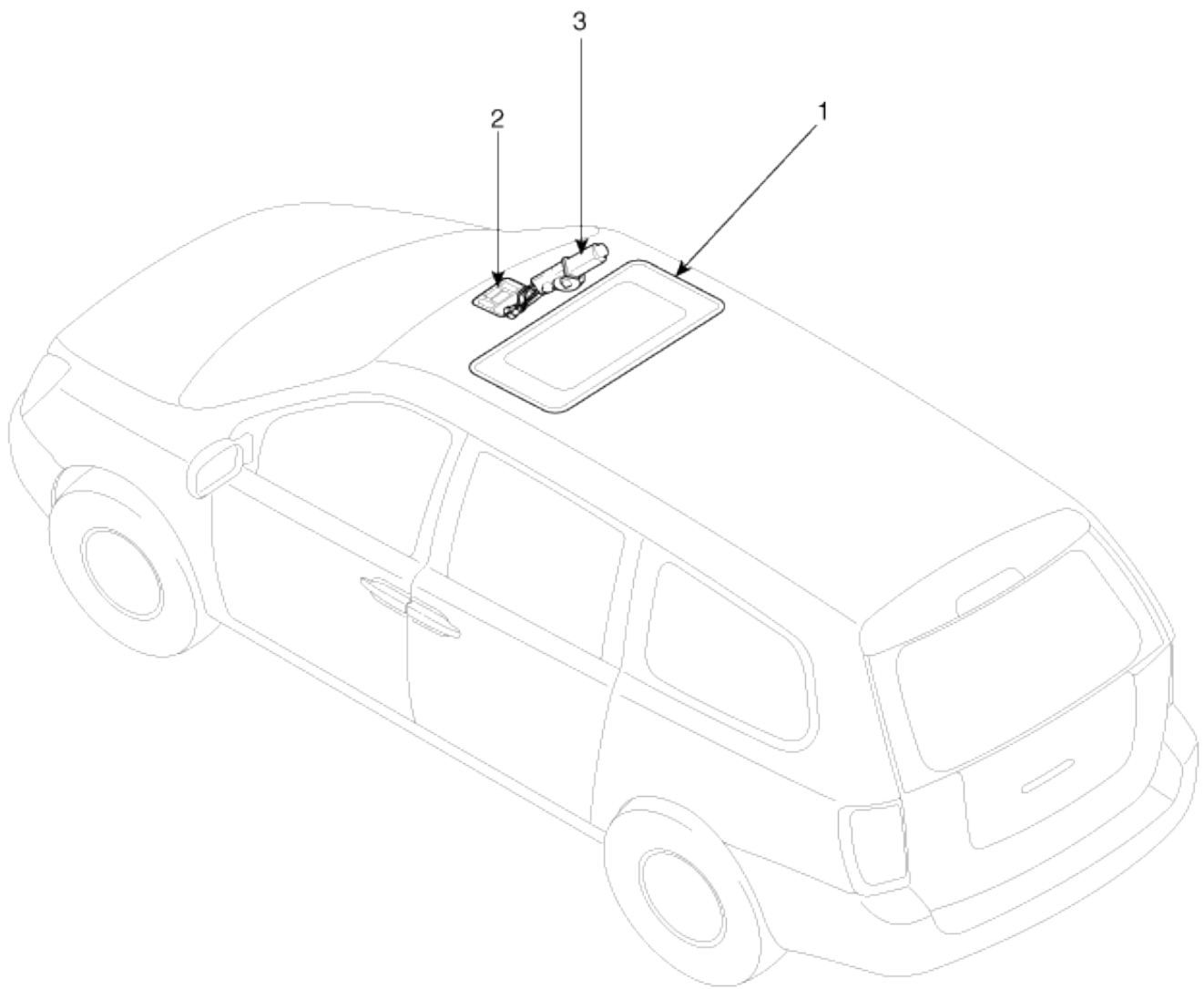
2. Installation is the reverse of removal.



# **Body Electrical System**

Sunroof

## COMPONENT LOCATION



- 1. Sunroof
- 2. Sunroof switch

- 3. Sunroof motor & controller

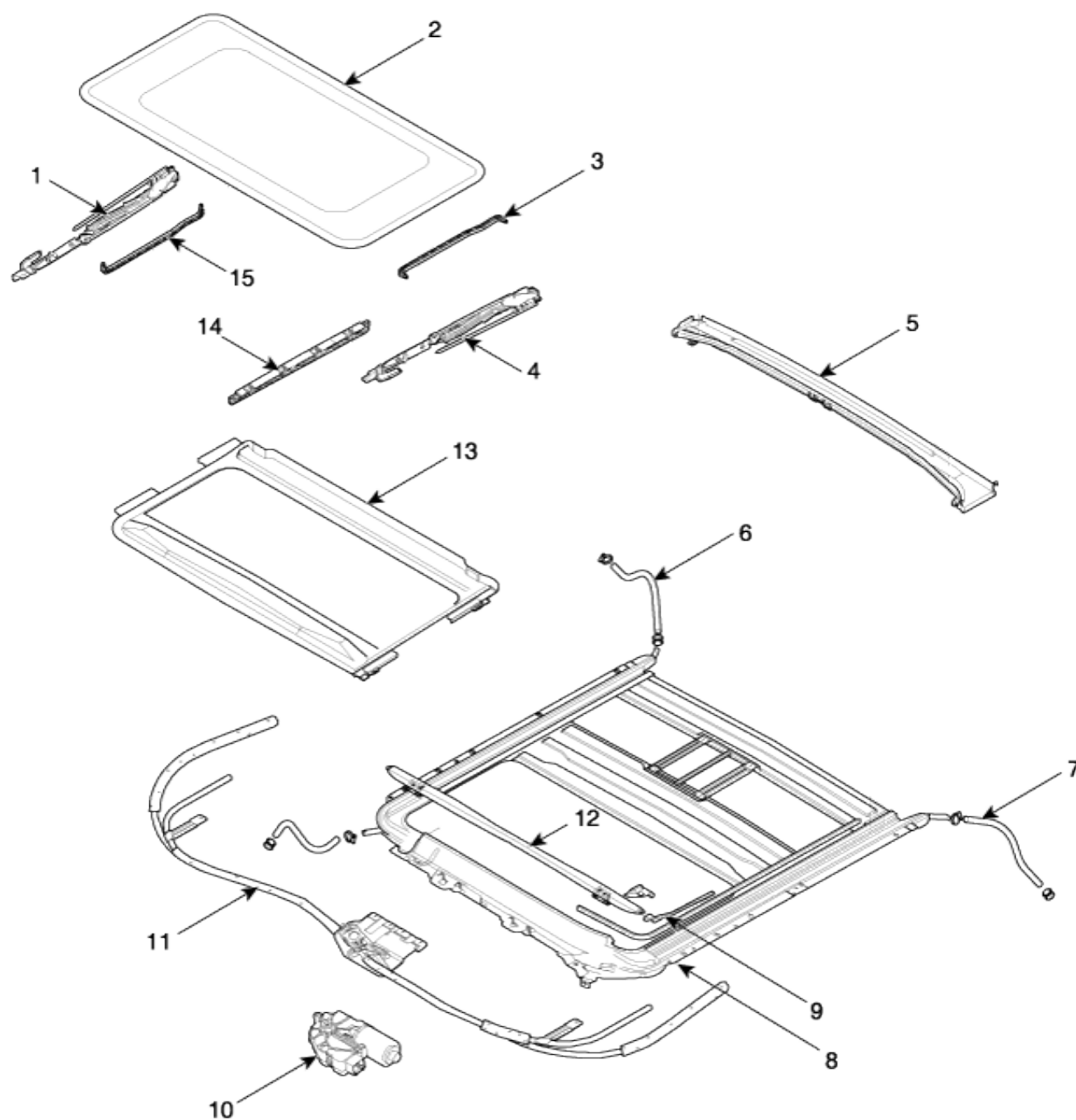




# **Body Electrical System**

Sunroof - Sunroof Assembly

## COMPONENTS



1. Guide assembly  
2. Glass  
3. Drip link  
4. Guide assembly

5. Drip rail  
6. Drain tube  
7. Drain tube  
8. Frame

9. Defector link  
10. Motor  
11. Drive unit  
12. Defector

13. Sunshade  
14. Decoration cover  
15. Drip link



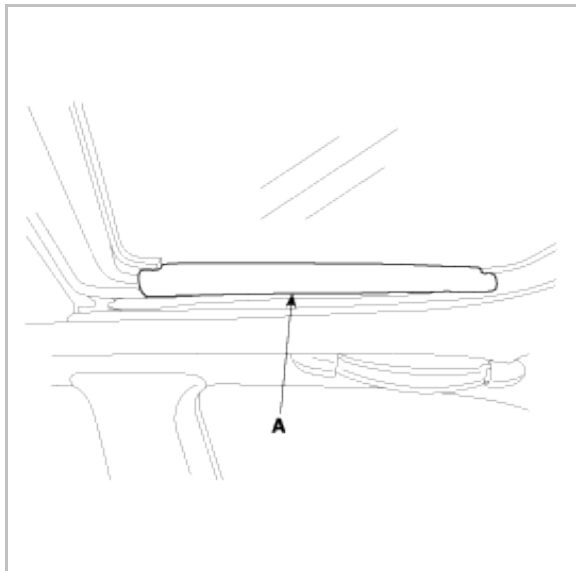
## REPLACEMENT

### GLASS REPLACEMENT

#### NOTICE

- Put on glove to protect your hands.

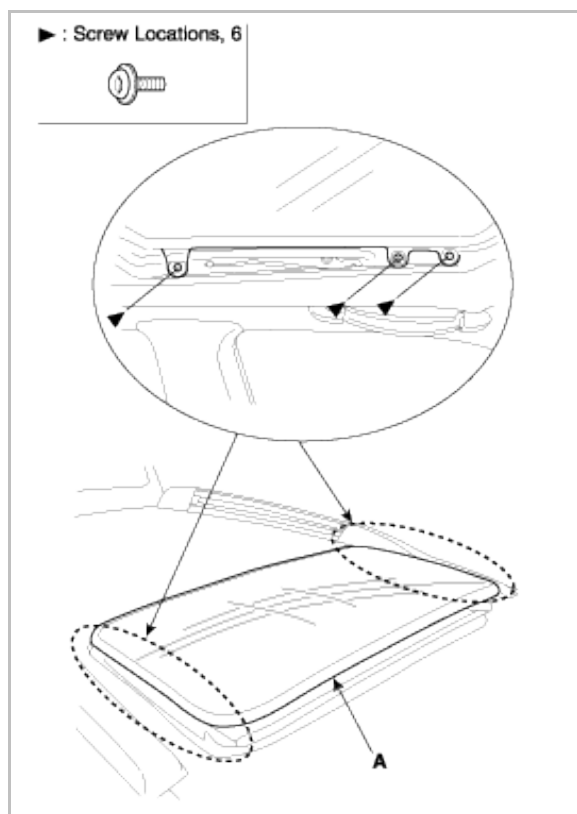
1. Remove both decoration cover (A).



2. Remove the glass (A) by lifting it up.

#### NOTICE

- Do not damage the roof panel.



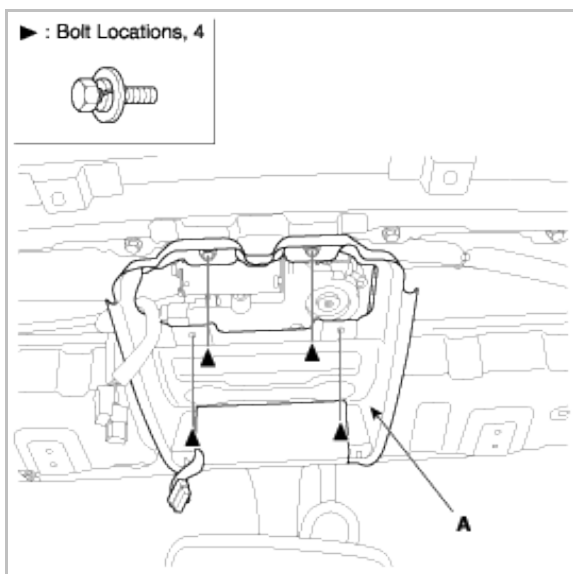
3. Installation is the reverse of removal.

### MOTOR REPLACEMENT

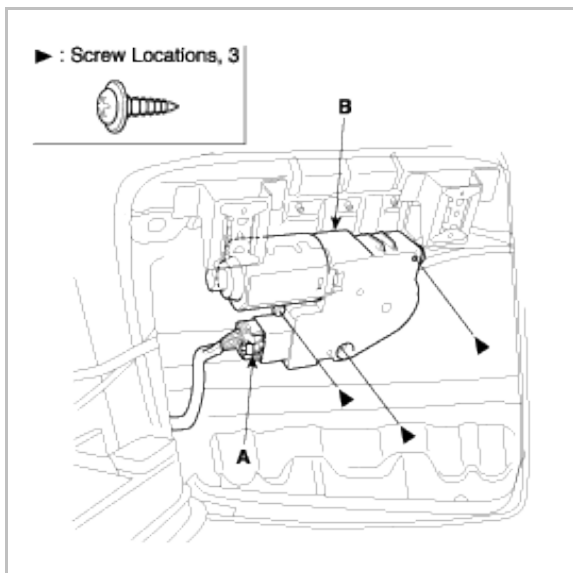
1. Remove the over head console.

#### NOTICE

- Confirm the position of guide whether it is closed or not when you remove the motor.



2. Disconnect the motor connector (A), remove the screws and then remove the motor (B).



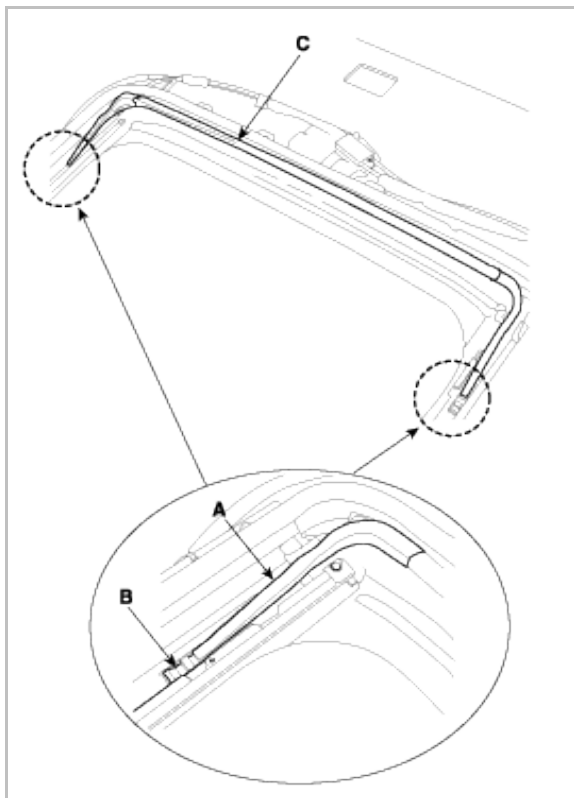
3. Installation is the reverse of removal.

#### NOTICE

- Make sure to initialize the motor.

## DEFLECTOR REPLACEMENT

1. Open the glass fully.
2. Disconnect the deflector link (A) from the frame (B) and then remove the deflector (C ).



3. Installation is the reverse of removal.

## SUNROOF ASSEMBLY REPLACEMENT

1. Remove the follows parts.
  - A. Front and rear door scuff trim.
  - B. Center upper and lower pillar trim.
  - C. Headliner.
  - D. Sunroof glass.
2. Disconnect the drain tubes (A).
3. After loosening the mounting bolts and nuts, remove the sunroof assembly (B).

### NOTICE

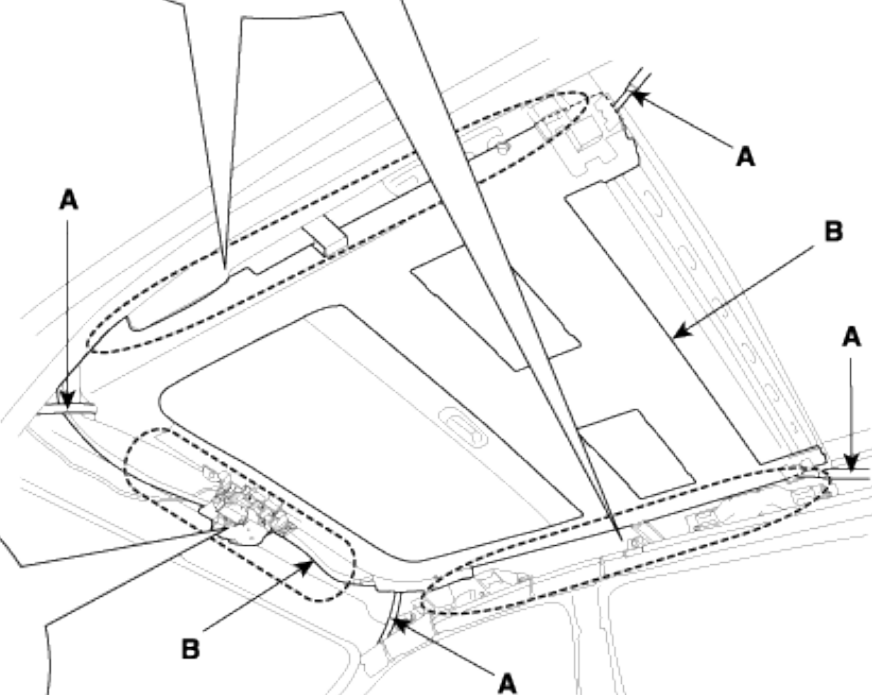
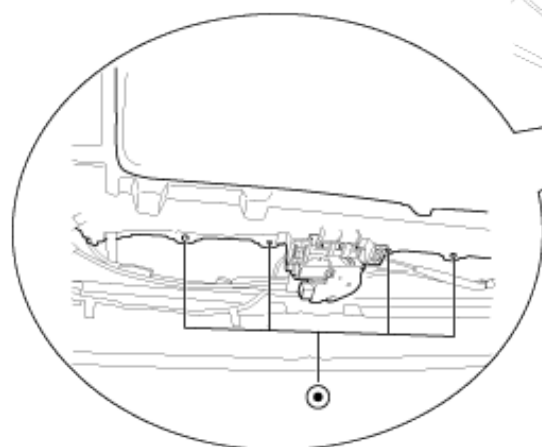
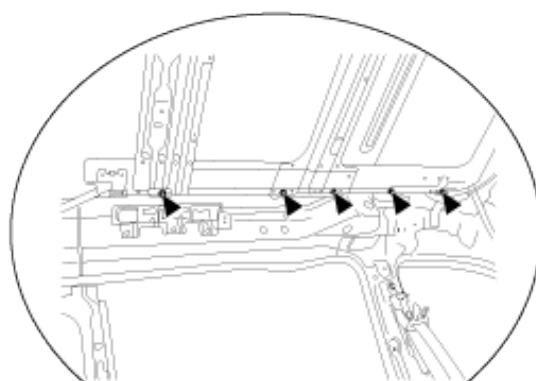
- Take care not to scratch the interior trims and other parts.

4. Installation is the reverse of removal.

## Fastener Locations

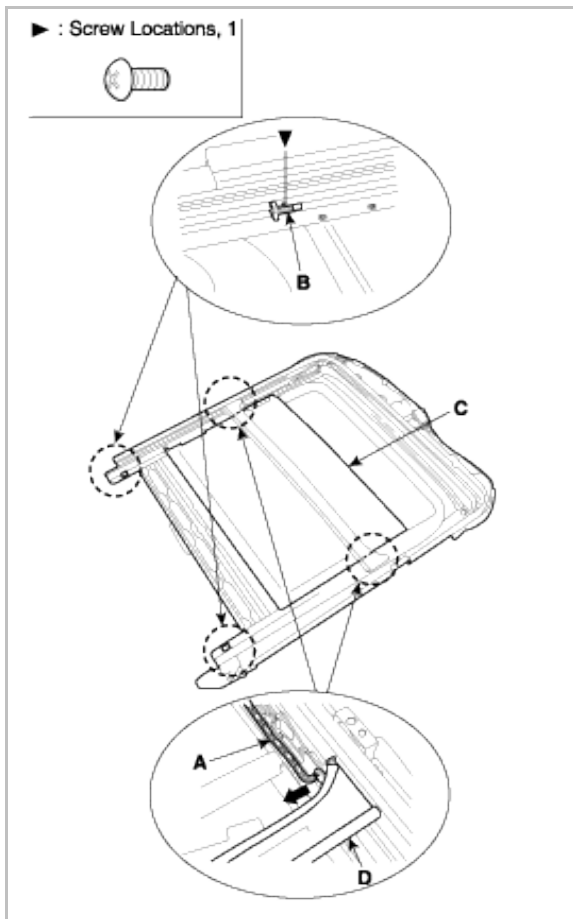
► : Bolt

● : Nut



## SUNSHADE AND DRIP RAIL REPLACEMENT

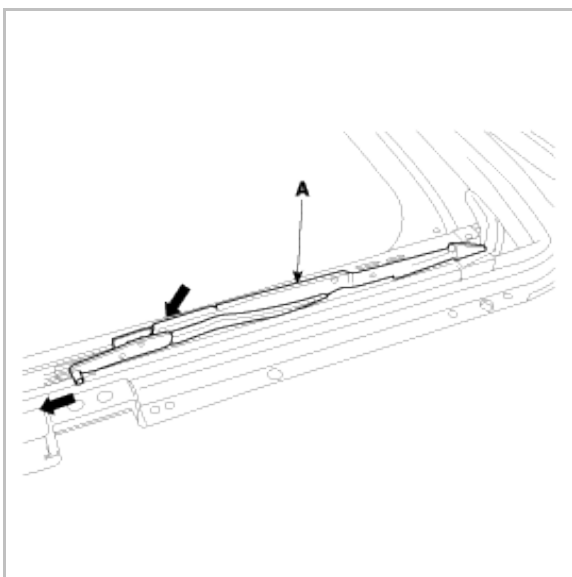
1. Remove the sunroof assembly.
2. Remove the drip link (A) and sunshade stopper (B).
3. Remove the sunshade (C) and drip rail (D).



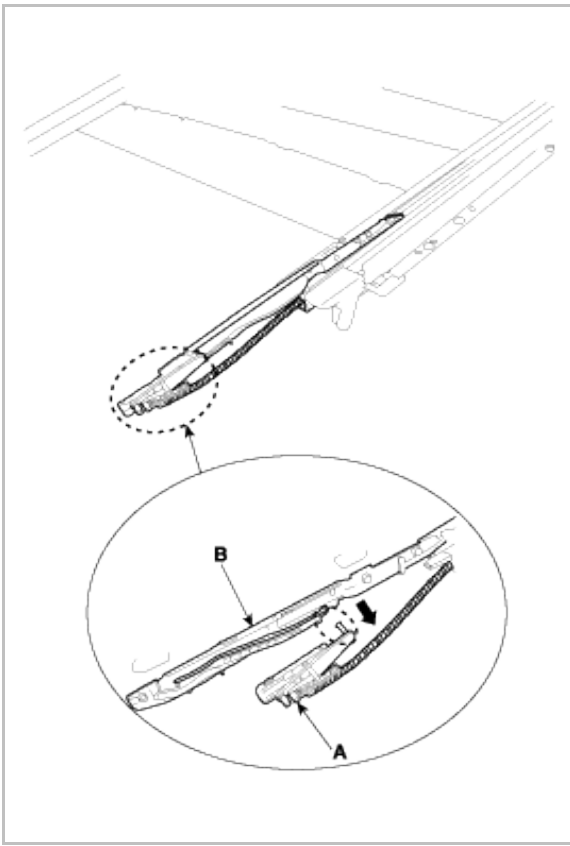
4. Installation is the reverse of removal.

## GUIDE ASSEMBLY REPLACEMENT

1. Remove the sunroof assembly.
2. Remove a guide assembly (A) after lowering a guide thoroughly by pushing a slide (B) to rear.



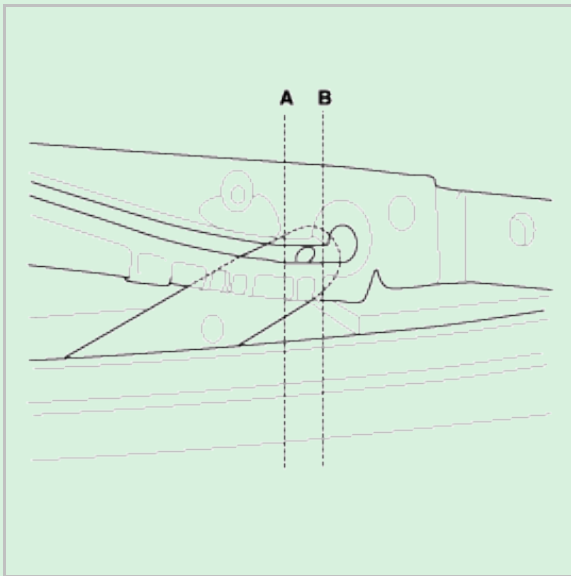
3. Remove the guide (A) and slide (B).



4. Installation is the reverse of removal.

#### NOTICE

- Make sure to align the slide with the center of "A" and "B"
- Make sure to initialize the motor.

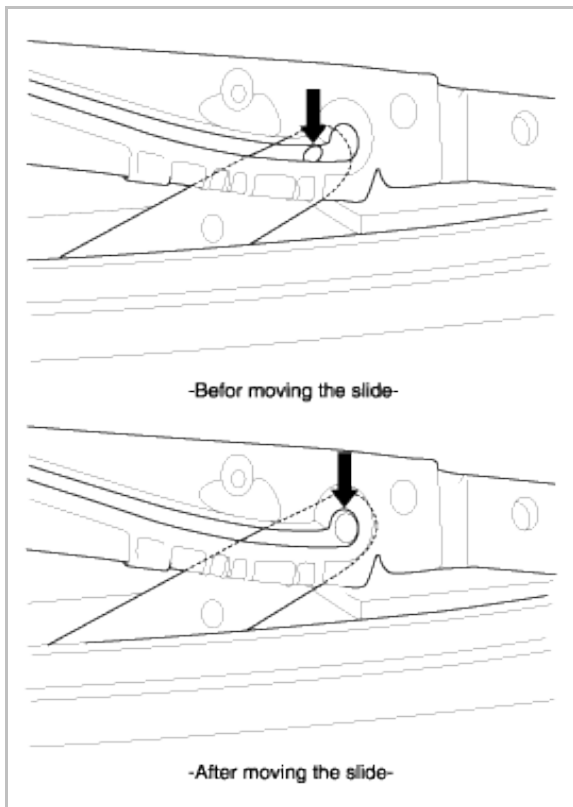


## ADJUSTMENT

### HOW TO INITIALIZE

1. Check that the glass has been installed.
  - A. Finish height adjustment.
2. Push the up switch. (Keep on pushing the switch)
  - A. The slide moved 5mm forward after 15 seconds.





3. After moving the slide 5mm forward, release the switch just momentarily.
  - A. If the operation above is normal condition, the sunroof opens and closes.
4. When the sunroof is closed completely, turn OFF the UP switch initialize the motor completely.

## WHEN TO INITIALIZE THE MOTOR

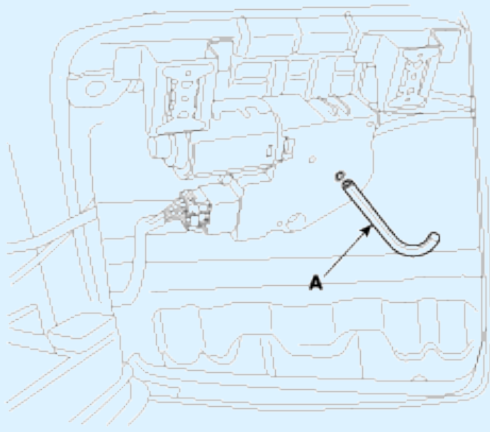
1. First operation the vehicle after manufactured it.
2. Initial value is erased or damaged because of short power electric discharge during operation
3. After using the manual handle.

## OPERATING THE SUNROOF EMERGENCY HANDLE

1. Use the sunroof emergency handle to close and open the sunroof manually for the following case only.
  - A. To close the sunroof before driving a vehicle in a rainy day or on the highway if the sunroof cannot be closed due to failure of the sunroof motor or controller.
2. Operating method
  - A. Remove the overhead console
  - B. Push the emergency handle up into the hexagonal drive (A) of the sunroof motor. You must push hard enough to disengage the motor clutch; otherwise the emergency handle will slip due to incomplete fit in the motor.
  - C. Carefully turn the emergency handle clockwise to close the sunroof.
  - D. After closing the sunroof, wiggle the handle back and forth as you remove the tool from the motor, to ensure the motor clutch reengages.
  - E. A 5mm hex socket may be used in place of the emergency handle, with a "Speeder" type handle.

### CAUTION

- Do not use power tools to operate the sunroof.
- Damage to the components may occur.





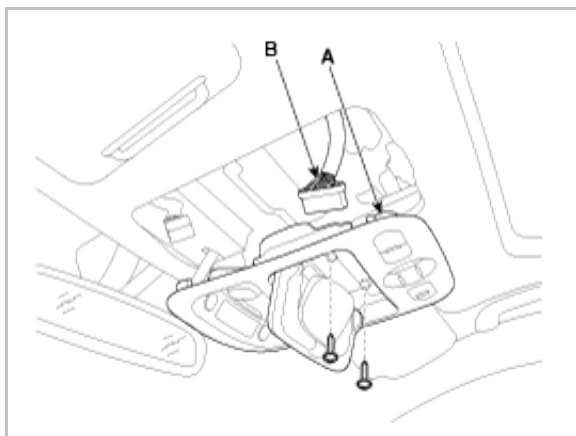
# **Body Electrical System**

Sunroof - Sunroof Switch

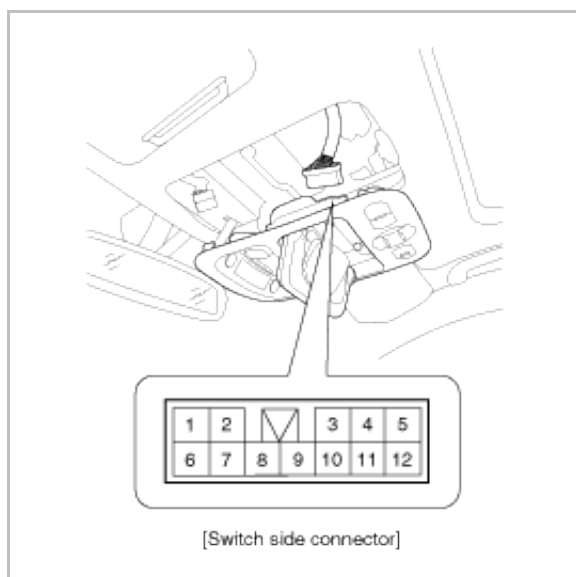


## INSPECTION

1. Disconnect the negative (-) battery terminal.
2. Remove the lens and open the sunglass case cover from the overhead console then remove the 2 screws holding the overhead console. And disconnect the connector then remove the overhead console lamp assembly from the headliner.



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



| Terminal   | 2 | 6 | 7 | 4 |
|------------|---|---|---|---|
| Position   |   |   |   |   |
| SLIDE OPEN | ○ |   |   | ○ |
| CLOSE/DOWN | ○ | ○ |   |   |
| TILT UP    | ○ |   | ○ |   |

# **Body Electrical System**

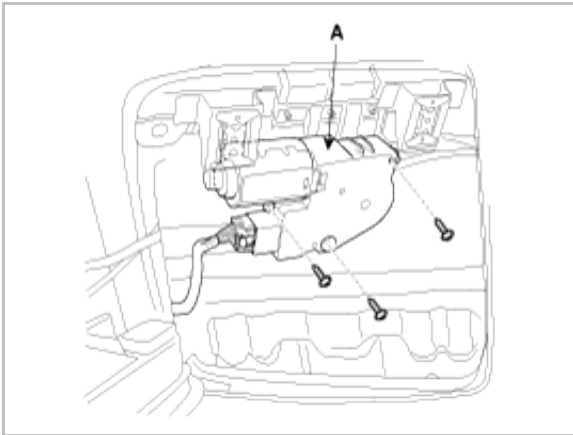
Sunroof - Sunroof Motor

## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console and loosen sunroof motor bracket (A) mounting bolts (4EA).



3. Remove sunroof motor mounting screw (3EA) and disconnect connector (10pin). And then remove the sun roof motor.



## 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 :

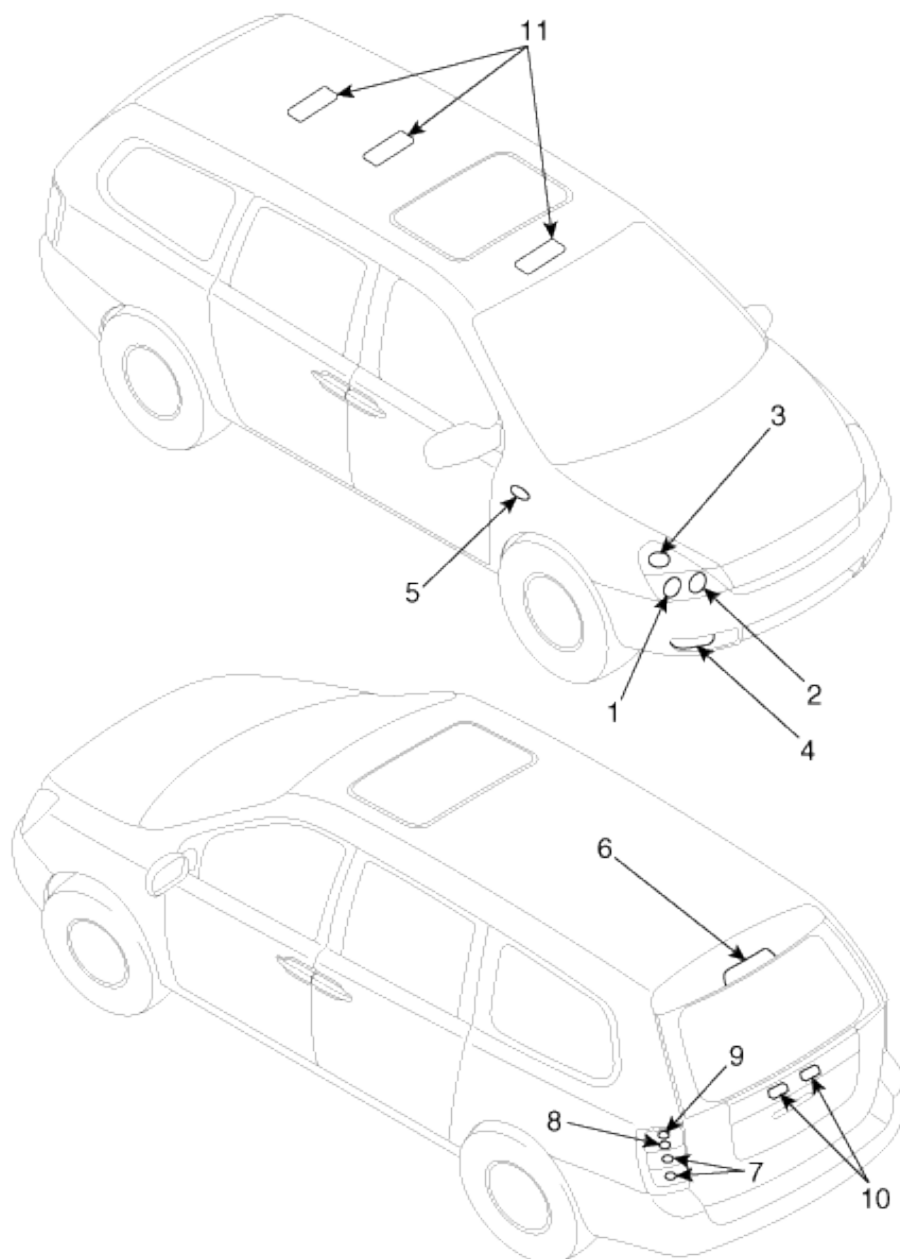
1. Turn the ignition key to the ON position. Press and hold the TILT UP button more than 15s until the sunroof has tilted upward/downward slightly.
2. When this is complete, Press and hold the TILT UP button once again until the sunroof has raised above and returned to the maximum TILT UP position.  
When this is complete, the sunroof system is reset.



# **Body Electrical System**

Lighting System

## COMPONENT LOCATION



- 1. Head lamp(Low)
- 2. Head lamp(High)
- 3. Front turn signal lamp/Position lamp
- 4. Front fog lamp
- 5. Side repeater
- 6. High mounted stop lamp

- 7. Tail/stop lamp
- 8. Rear turn signal lamp
- 9. Back up lamp
- 10. License plate lamp
- 11. Room lamp





## SPECIFICATION

| Items                  | Bulb Watt (W) |
|------------------------|---------------|
| Head lamp (High)       | 55            |
| Head lamp (Low)        | 55            |
| Front turn signal lamp | 28            |
| Front position lamp    | 8             |
| Front side marker lamp | 5             |
| Front fog lamp         | 35            |
| Rear stop/tail lamp    | 21/5          |
| Back up lamp           | 16            |
| Rear turn signal lamp  | 27            |
| Rear fog lamp          | 21            |
| License plate lamp     | 5             |
| Side repeater          | 5             |
| Room lamp              | 10            |
| Overhead console lamp  | 10 x 2        |
| High mounted stop lamp | LED           |
| Glove box lamp         | 5             |
| Luggage room lamp      | 5             |
| Door courtesy lamp     | 5             |



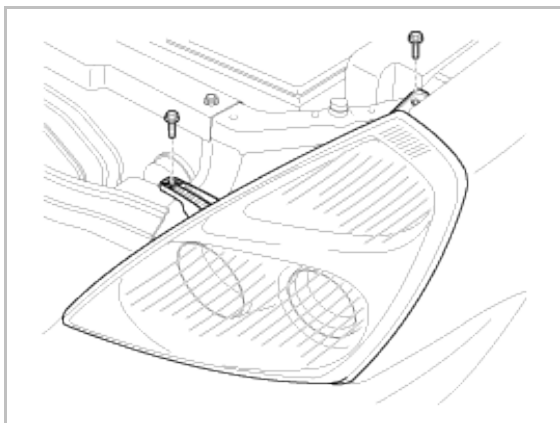
# **Body Electrical System**

Lighting System - Head Lamps



## REPLACEMENT

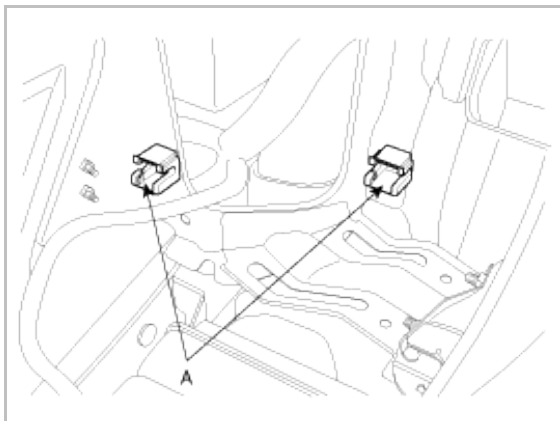
1. Disconnect the negative (-) battery terminal.
2. Loosen the mounting bolts (2EA).



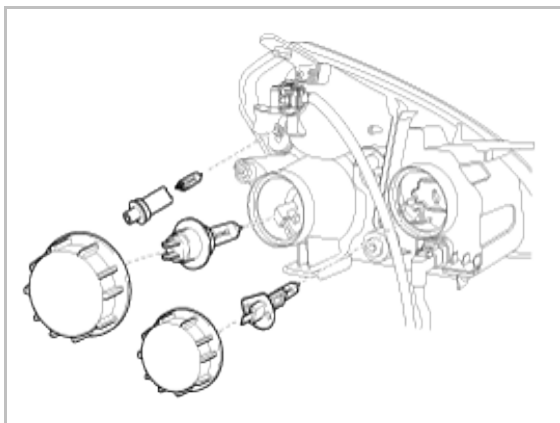
3. Remove the head lamp assembly after disconnecting the lamp connectors.

### NOTICE

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



4. Remove the head lamp rear cover and pulling up head lamp bulb fixing wire clip.



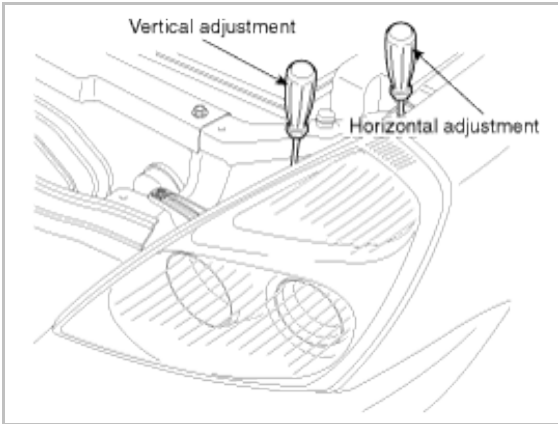
5. Replace the bulb.
6. Installation is the reverse of removal.

## HEAD LAMP AIMING INSTRUCTIONS

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

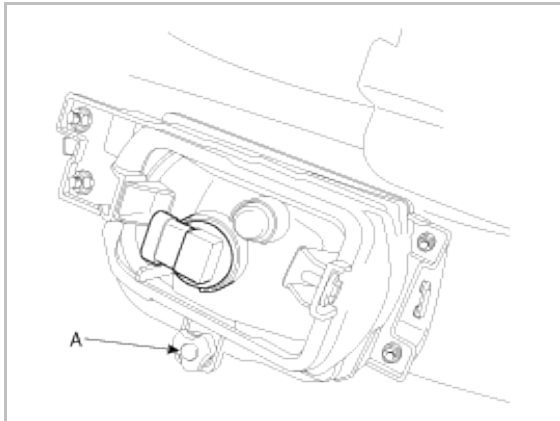
1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.

2. The vehicle should be placed on a flat floor.
  3. Check the suspension spring.
  4. 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.
  5. 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 and horizontal adjustments to the lower beam using the adjusting wheel.

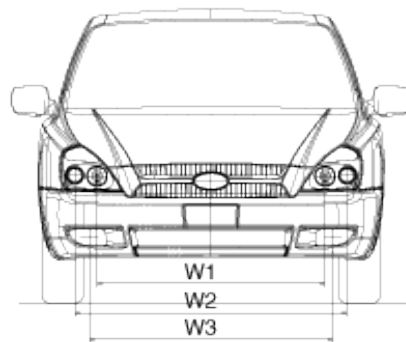
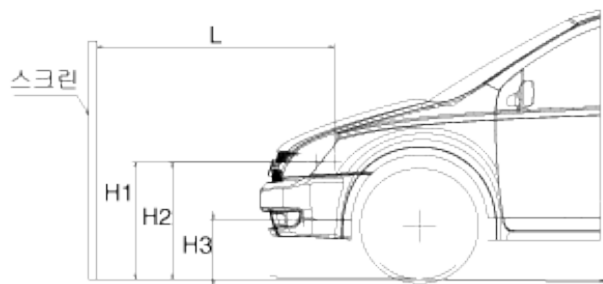


## FRONT FOG LAMP AIMING

The front fog lamps should be aimed in the same manner used to adjust the head lamps. With the front fog lamps and battery in normal condition, aim the front fog lamps by turning the adjusting gear (A).



## 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

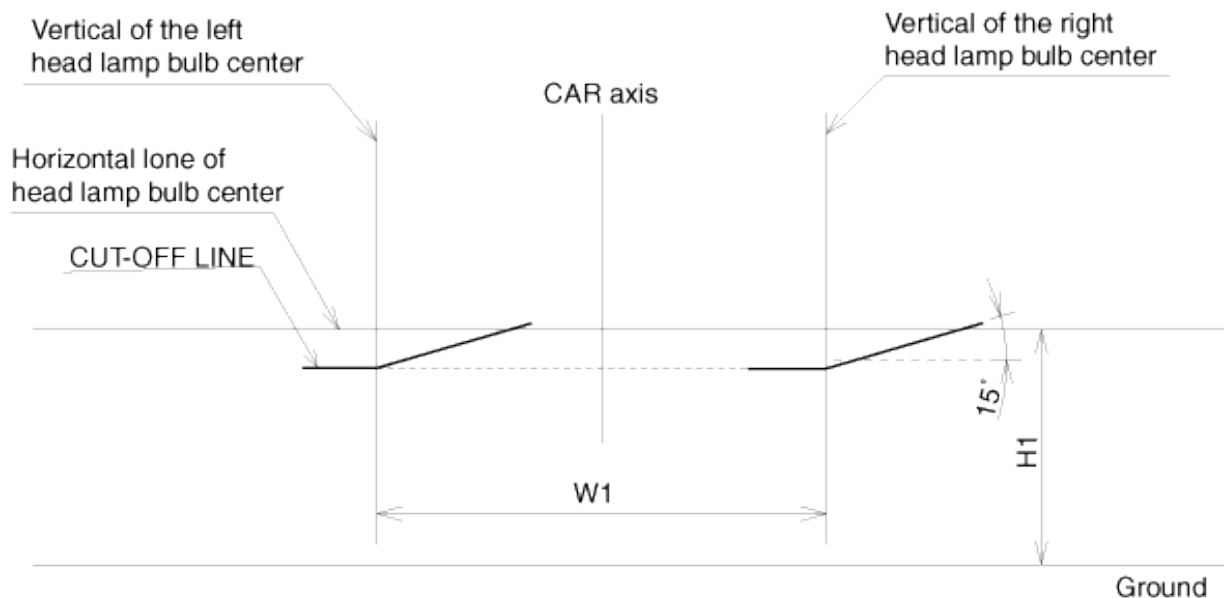
Unit : mm

| Vehicle condition | H1        | H2        | H3        | W1          | W2          | W3          | L            |
|-------------------|-----------|-----------|-----------|-------------|-------------|-------------|--------------|
| Without driver    | 28.7(730) | 28.9(735) | 14.8(376) | 50.3(1,278) | 60.0(1,526) | 52.5(1,363) | 118.1(3,000) |
| With driver       | 28.5(725) | 28.7(730) | 14.6(371) |             |             |             |              |

1. Turn the low beam on with driver.

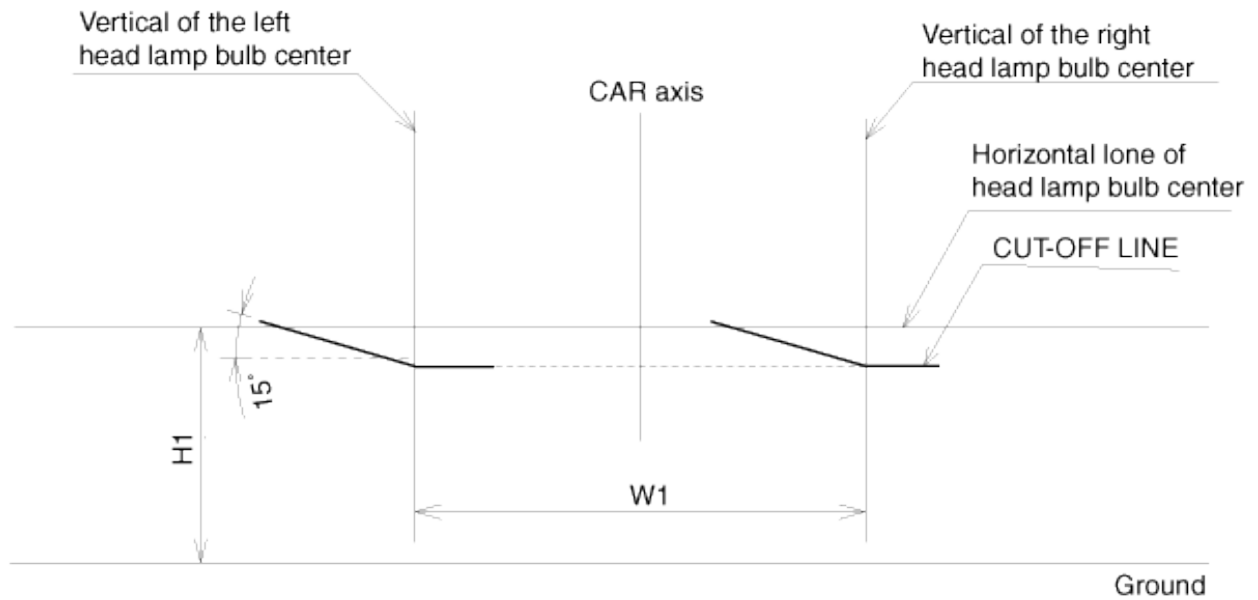
The cut-off line should be projected in the allowable range (shaded region).

[LHD]



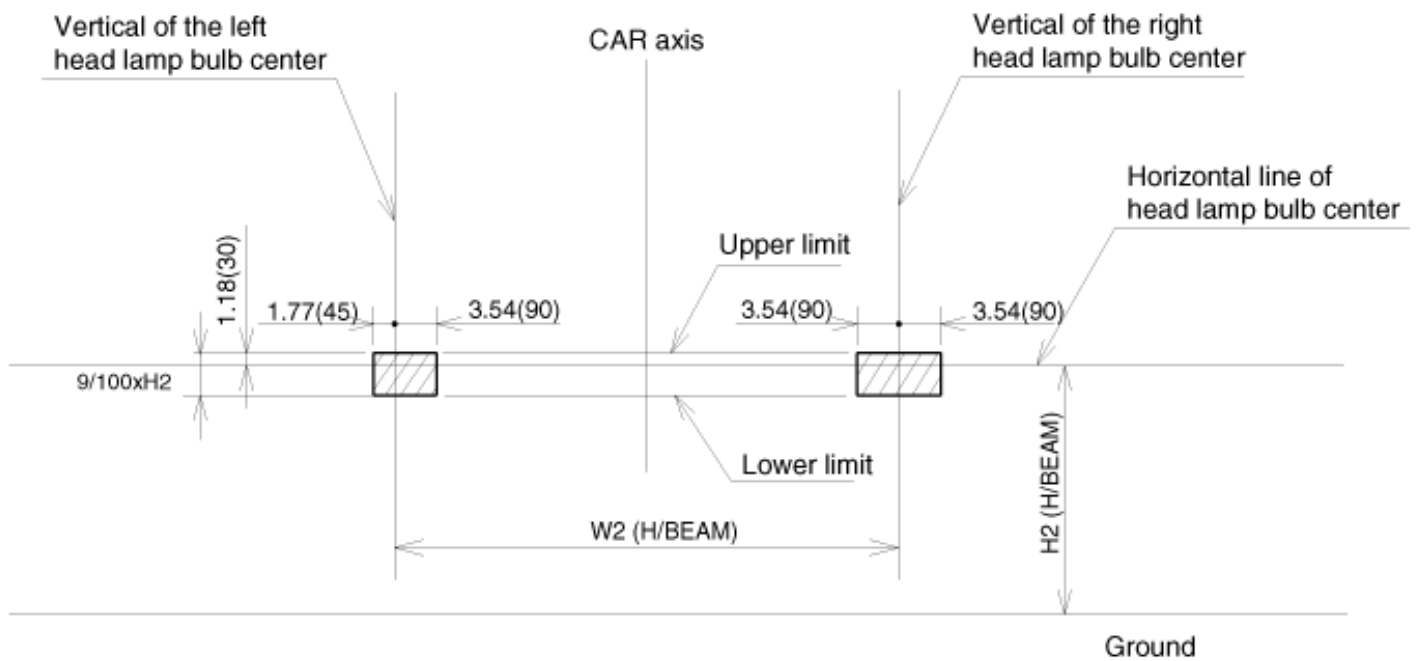
Unit : mm

[RHD]



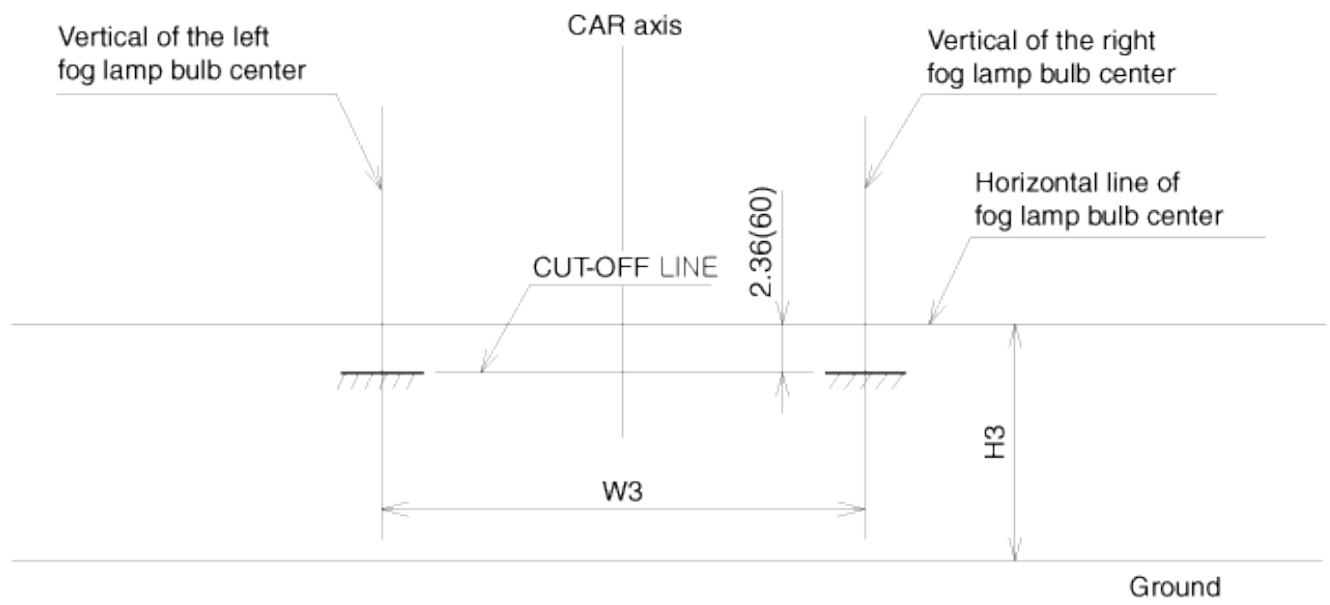
Unit : mm

2. Turn the high beam on with driver.  
The hot zone should be projected in the allowable range shown in the picture.



Unit : in.(mm)

3. Turn the front fog lamp on with driver.  
The cut-off line should be projected in the allowable range (shaded region)



Unit : in.(mm)

# **Body Electrical System**

Lighting System - Turn Signal Lamp

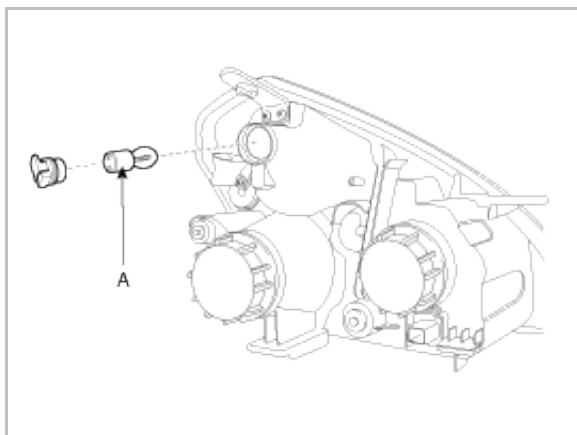




## REPLACEMENT

### FRONT TURN SIGNAL LAMP

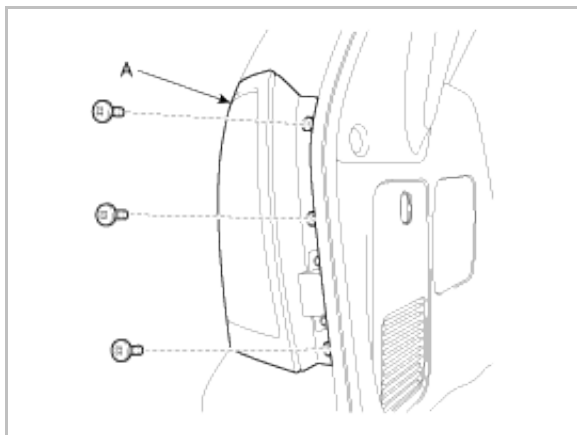
1. Disconnect the negative (-) battery terminal.
2. Remove front lamp assembly.
3. Remove the socket in a counterclockwise direction.



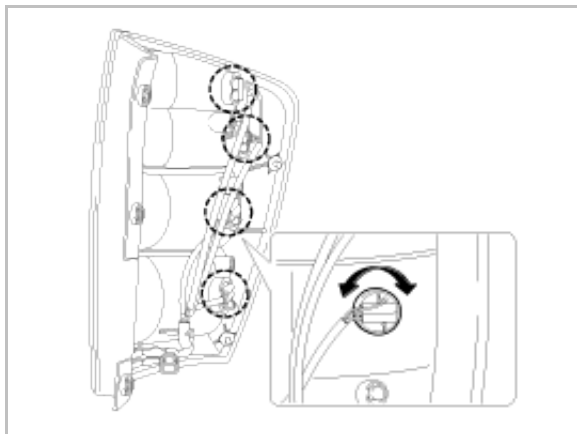
4. Replace the bulb (A).

### REAR TURN SIGNAL LAMP

1. Disconnect the negative (-) battery terminal.
2. Remove the rear lamp assembly (A) after removing the mounting screw (3EA) and connector.



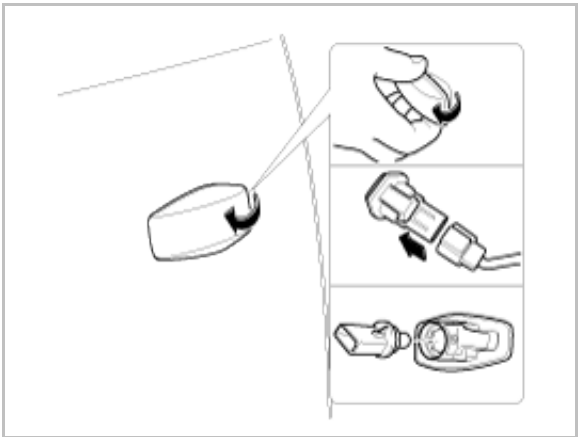
3. Remove the socket in a counterclockwise direction and replace the bulbs.



### SIDE TURN SIGNAL LAMP

1. Disconnect the negative (-) battery terminal.
2. Disconnect the connector after removing the lens.

3. Remove the socket in a counterclockwise direction.



4. Replace the bulb.

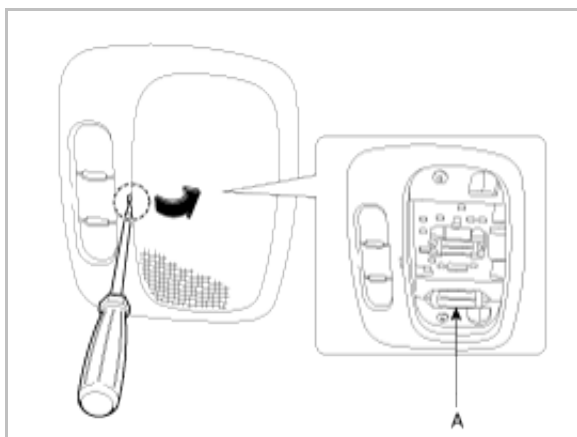
# **Body Electrical System**

Lighting System - Room Lamp



## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Detach the lamp lens from the room lamp with a flat-tip screwdriver (-) then replace the bulb.



3. Pull the bulb down and replace it with a new one.

### NOTICE

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

4. Installation is the reverse of removal.

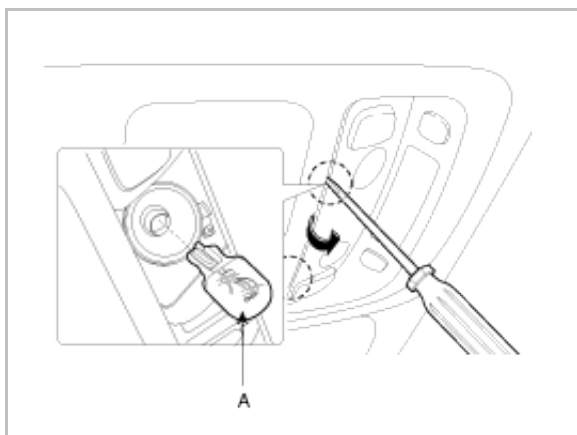
# **Body Electrical System**

Lighting System - Overhead Console Lamp



## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Replace the bulb after removing the lens with a flat-tip screwdriver.



3. Remove the bulb and replace it with a new one

### NOTICE

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

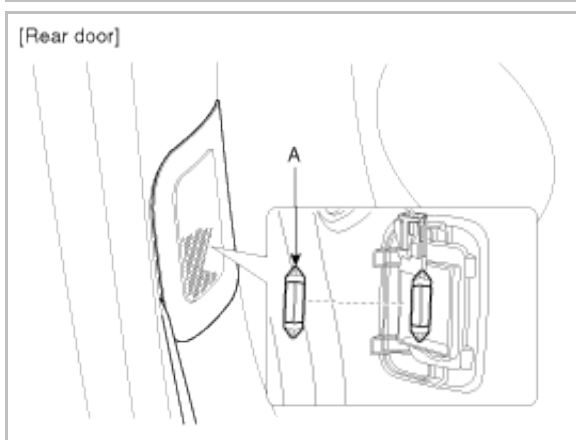
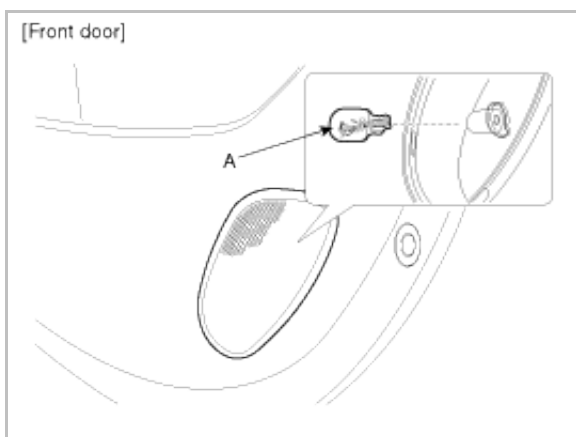


# **Body Electrical System**

Lighting System - Courtesy Lamp

## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Replace the bulb (A) after removing the lens with a flat-tip screwdriver.



3. Remove the bulb and replace it with a new one.

### NOTICE

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



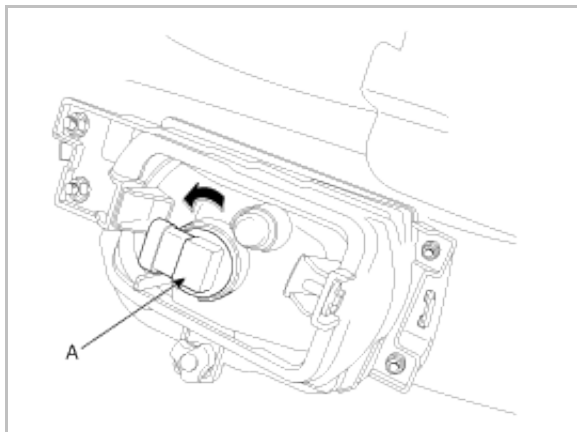
# **Body Electrical System**

Lighting System - Front Fog Lamps



## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the front lamp assembly.
3. Remove connector and the socket in a counterclockwise direction.



4. Remove the bulb (A) and replace it with a new one.

# **Body Electrical System**

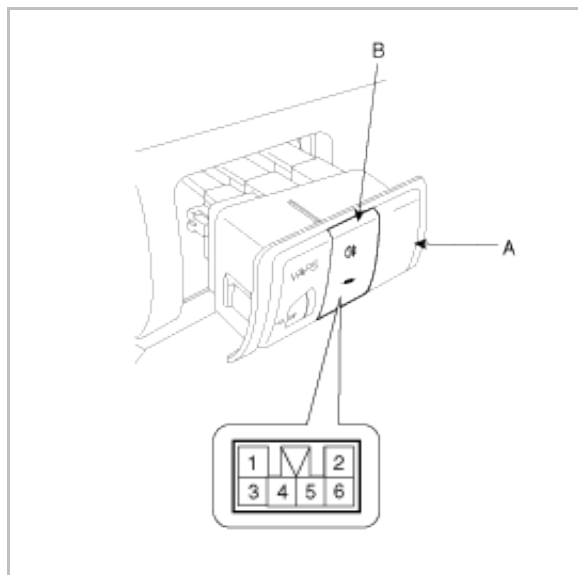
Lighting System - Rear Fog Lamps



## INSPECTION

### REAR FOG LAMP SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the lower crash pad switch (A) from the side crash pad cover by using the scraper and then disconnect the connectors.
3. Remove the rear fog lamp (B) switch from lower crash pad switch.



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

| Terminal<br>Position | 2 | 5 | 1 | 4 | 3 |
|----------------------|---|---|---|---|---|
| ON                   |   |   |   |   |   |
| OFF                  |   |   |   |   |   |



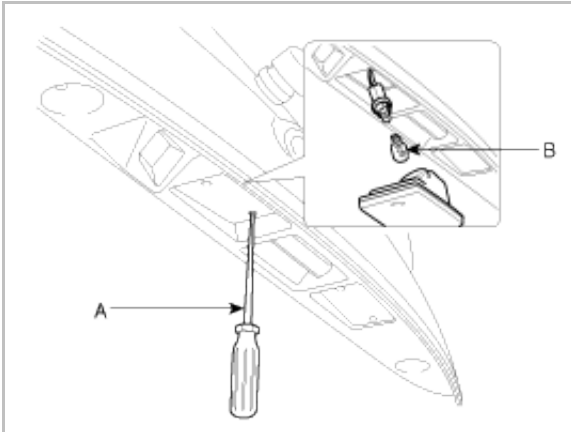
# **Body Electrical System**

Lighting System - License Lamps



## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the license plate lamp cover mounting screw with a flat-tip screwdriver.



3. Pull the bulb (B) down and replace it with a new one.

# **Body Electrical System**

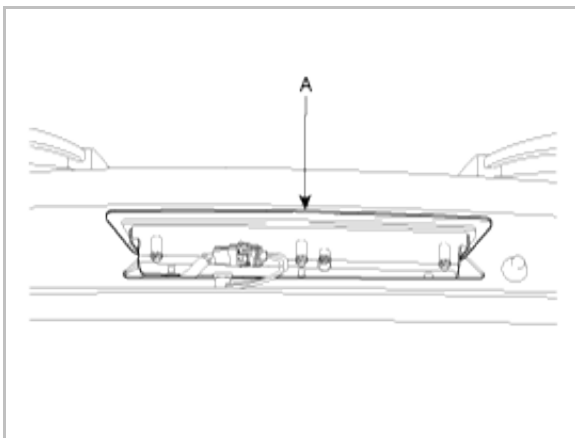
Lighting System - High Mounted Stop Lamp



## REPLACEMENT

### HIGH MOUNTED STOP LAMP

1. Disconnect the negative (-) battery terminal.
2. Open the tail gate and disconnect the high mounted stop lamp mounting bolts (3EA). And then remove the high mounted stop lamp(A).



3. Installation is the reverse of removal.





# **Body Electrical System**

Auto Lighting Control System



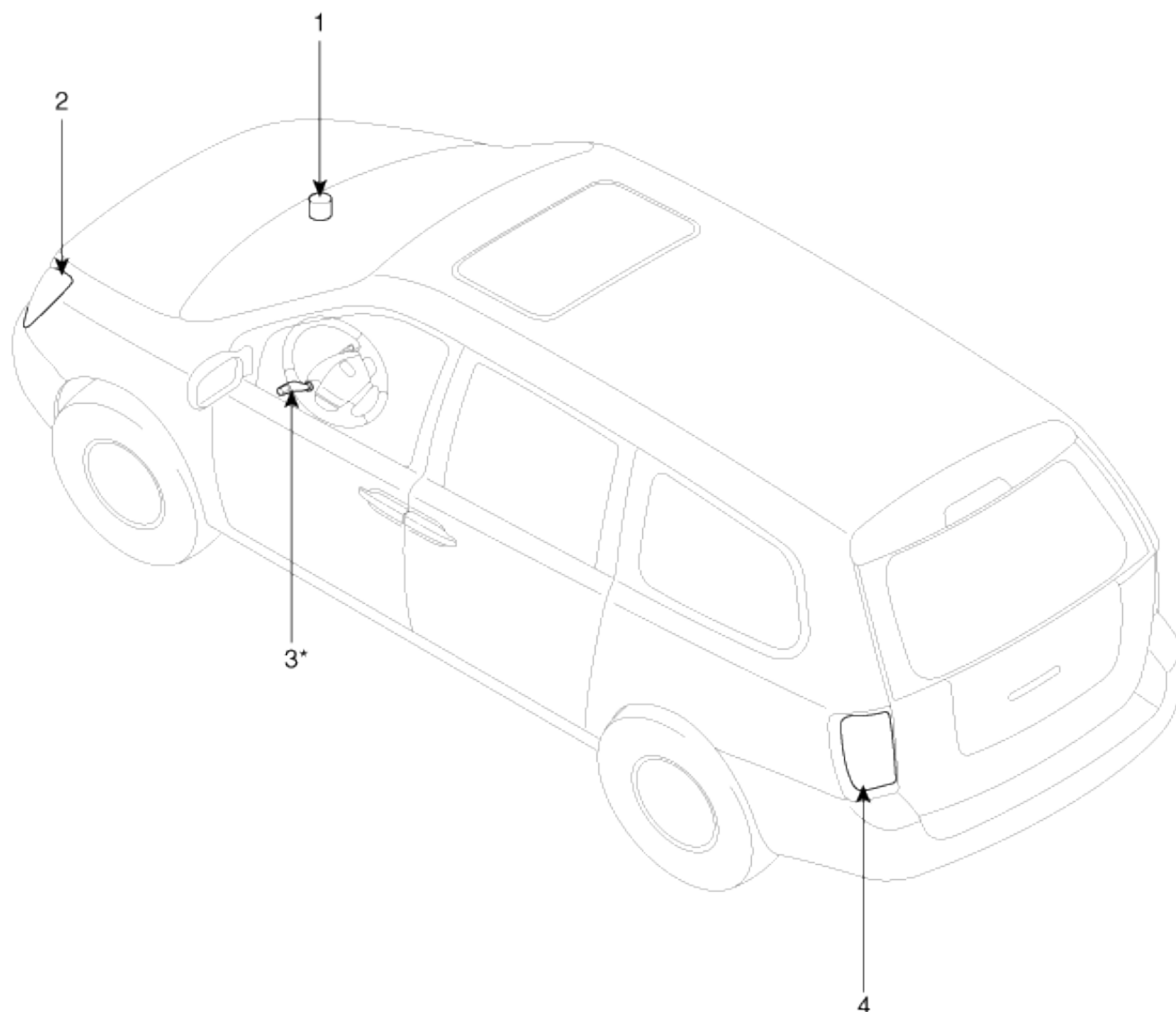
## DESCRIPTION

The auto light control system operates by using the auto light switch.

If you set the multi-function switch to "AUTO" position, the tail lamp and head lamp will be turned automatically on or off according to external illumination.

## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



1. Auto light unit  
2. Head lamps

3. Lighting switch (AUTO)  
4. Tail lamps

# **Body Electrical System**

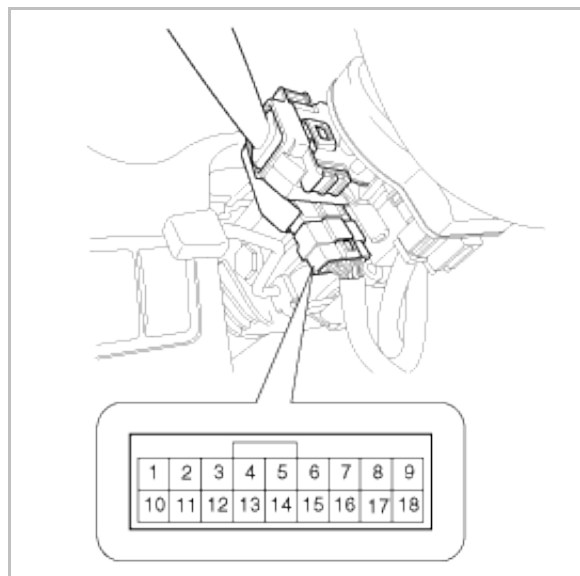
Auto Lighting Control System - Auto Light  
Switch



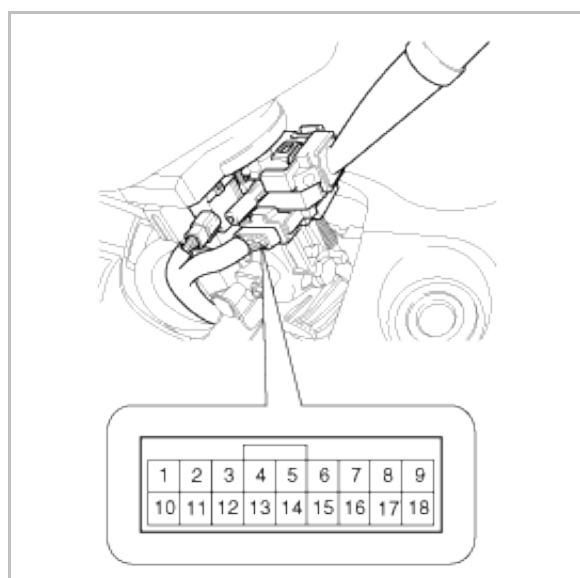
## INSPECTION

Check for continuity between terminal and terminal while operating the auto light switch.

### [LHD]



### [RHD]



(RHD)

| Terminal<br>Position | 14(13) | 15(14) | 16(15) | 17(16) |
|----------------------|--------|--------|--------|--------|
| OFF                  |        |        |        |        |
| I                    | ○      | —      | —      | ○      |
| II                   | ○      | ○      | —      | ○      |
| AUTO                 |        |        | ○      | ○      |

# **Body Electrical System**

Auto Lighting Control System - Auto Light  
Sensor

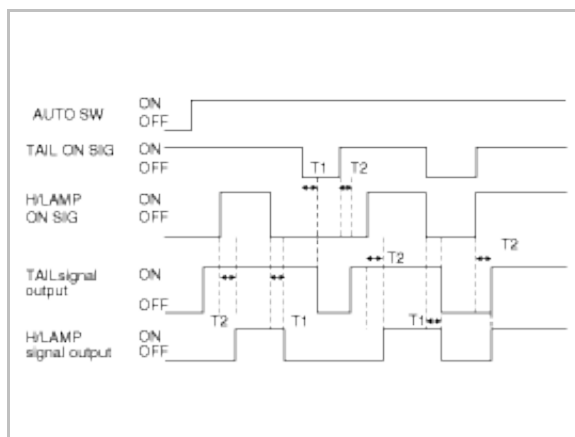


## INSPECTION

While operating the auto light switch, check if the operations are normal as shown in the timing chart.

1. Auto light sensor value is always read at IGN ON.
2. Light is turned ON after  $1\text{sec} \pm 0.1\text{sec}$  when auto light sensor value is same as light ON input value.
3. Light is turned OFF after  $2\text{sec} \pm 0.2\text{sec}$  when sensor value is same as light OFF input value.
4. Tail lamp and head lamp are turned ON when sensor value is same as tail lamp ON input value.
5. Light ON value of sensor is based on the below table.
6. Head lamp signal is output when head lamp switch is ON. After head lamp is turned OFF, head lamp signal output is immediately stopped if head lamp OFF luminance condition is met at auto light switch ON.

|     | TAIL LAMP, AV LAMP              | HEAD LAMP<br>(low beam)         |
|-----|---------------------------------|---------------------------------|
| ON  | $1.77\text{V} \pm 0.08\text{V}$ | $0.63\text{V} \pm 0.06\text{V}$ |
| OFF | $3.47\text{V} \pm 0.10\text{V}$ | $1.02\text{V} \pm 0.06\text{V}$ |



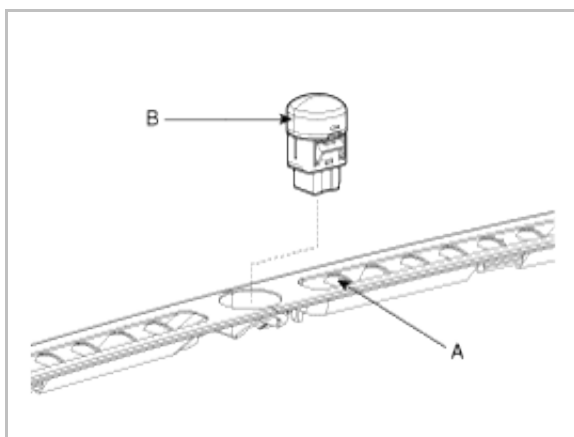
T1 :  $2 \pm 0.2 \text{ sec}$

T2 :  $2 \pm 0.2 \text{ sec.}$

## REPLACEMENT

Photo & auto light sensor inspection

1. Disconnect the crash pad (Refer to Body group - Crash pad).
2. Remove the Photo & auto light sensor (B) from crash pad.



3. Installation is the reverse of removal.

# **Body Electrical System**

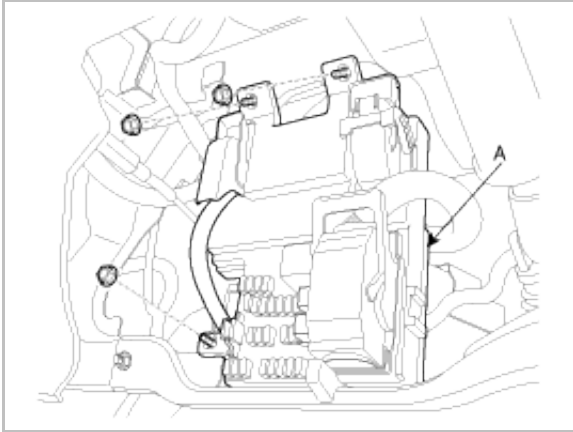
Daytime Running Lights - DRL Control  
Module



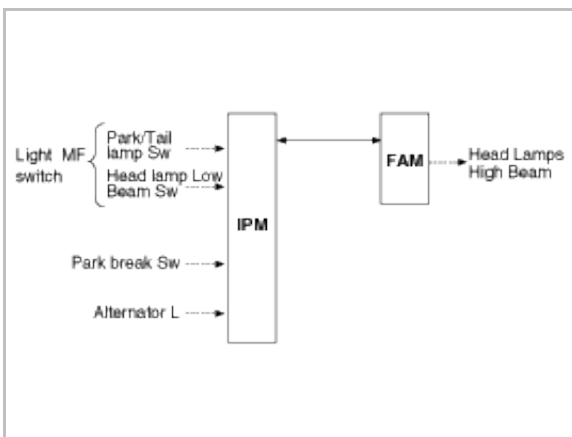


## INSPECTION

1. The daytime running unit (A) is integrated in the IPM.



2. Functional diagram.



3. The DRL function operates the Head lamps High Beam at 50% of full illumination. The DRL function is active if :
  - A. the engine is running
  - B. the Head lamp multifunction switch is in OFF position or 'Park and Tail lamp' (Auto light function deactivated)
  - C. The Park break switch is OFF.

When the DRL function is active, the Head lamps High Beam can't be turned ON, except for the Flash To Pass activation.
4. If the daytime running light is not operated 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 4.
5. Make these input tests at the connector by using ETM.  
 If any test indicates a problem, find and correct the cause, then recheck the system.  
 If all the input tests prove OK, the IPM (In-panel module) must be faulty; replace it.

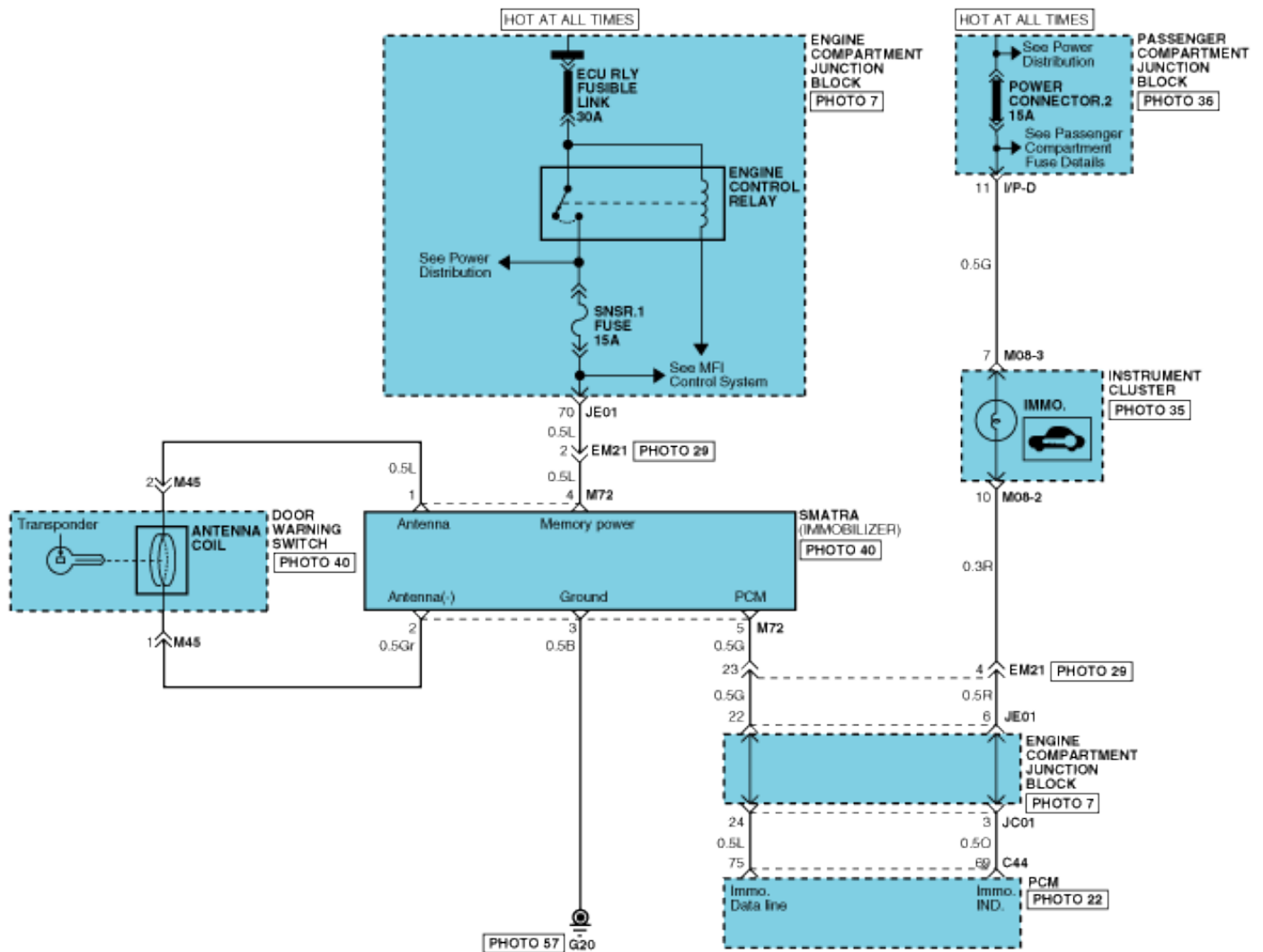


# **Body Electrical System**

Immobilizer System



## CIRCUIT DIAGRAM



C44

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |   |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|
| 94 | 93 | 92 | 91 | 90 | 89 | *  | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 6 | 5 |
| 72 | 71 | 70 | 69 | *  | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | *  | 53 | 52 | 51 | 4 | 3 |
| *  | *  | 48 | 47 | *  | *  | *  | *  | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | *  | *  | 30 | 29 |   |   |
| 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7  | 2 | 1 |

AMP\_PCU\_94F\_B

M08-2

|    |    |    |    |    |    |    |   |
|----|----|----|----|----|----|----|---|
| 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1 |
| 16 | 15 | 14 | 13 | 12 | 11 | 10 | * |

AMP\_040M2\_16F\_B

M08-3

|    |    |    |   |   |   |
|----|----|----|---|---|---|
| 6  | 5  | 4  | 3 | 2 | 1 |
| 12 | 11 | 10 | 9 | 8 | 7 |

AMP\_040M2\_12F\_B

BLANK

M45

|   |   |
|---|---|
| 1 | 2 |
| 3 | 4 |
| 5 | 6 |

KET\_0908\_06M\_W

M72

|                                                                                   |   |   |   |
|-----------------------------------------------------------------------------------|---|---|---|
|  |   |   |   |
| 5                                                                                 | 4 | 3 | 2 |

KUM\_CDR\_05F\_W

BLANK

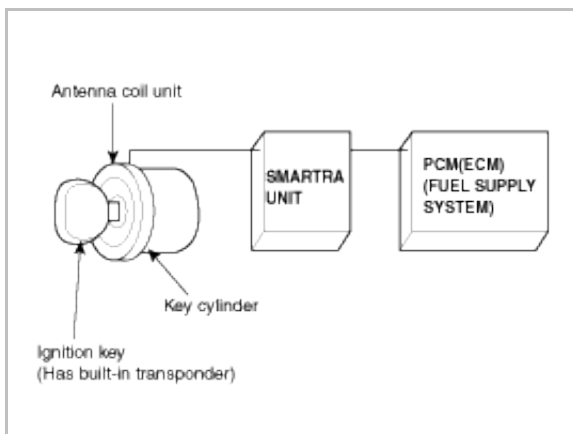
BLANK

## 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. SMARTRA type immobilizer

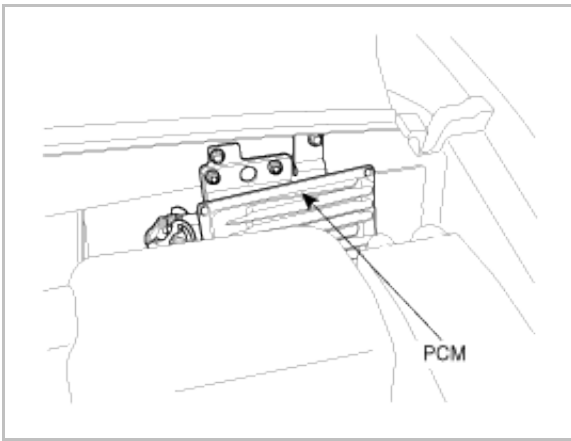
- A. The SMARTRA system consists of a transponder located in the ignition key, an antenna coil, a SMARTRA unit, an indicator light and the PCM(ECM).
- B. The SMARTRA communicates to the PCM(ECM) (Engine Control Module) via a dedicated communications line. Since the vehicle engine management system is 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 Scan tool (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 four key codes.
- H. If the customer has lost his key, and cannot start the engine, contact motor service station.



## COMPONENTS OPERATIONS

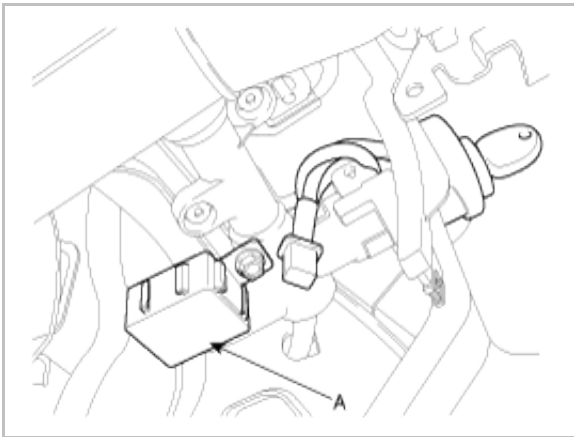
### PCM (Power Train Control Module)

1. The PCM(ECM) 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).



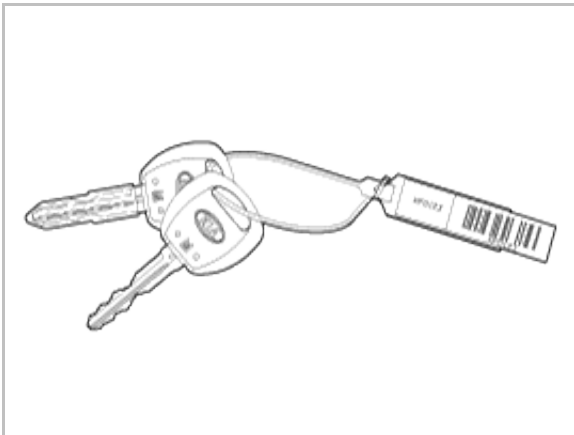
## SMARTRA unit

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 crush pad under panel close to the antenna coil for RF transmission and receiving. 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 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.

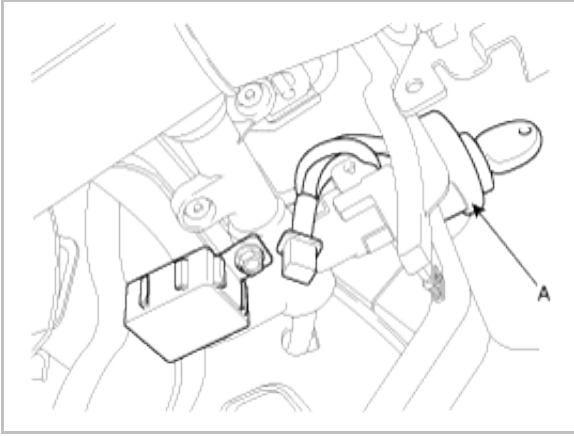


## Antenna coil

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.





## DIAGNOSIS OF IMMOBILIZER FAULTS

- Communication between the PCM(ECM) and the SMARTRA.
- Function of the SMARTRA and the transponder.
- Data (stored in the PCM(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<br>2. Transponder transport data has been changed.                                                                                                      | P1674<br>(Transponder status error)                       |
| Transponder key fault                             | 1. Transponder programming error                                                                                                                                                            | P1675<br>(Transponder programming error)                  |
| SMARTRA fault                                     | 1. Invalid message from SMARTRA to PCM(ECM)                                                                                                                                                 | P1676<br>(SMARTRA message error)                          |
| SMARTRA fault                                     | 1. No response from SMARTRA<br>2. Antenna coil error<br>3. Communication line error (Open/Short etc.)<br>4. Invalid message from SMARTRA to PCM(ECM)                                        | P1690<br>(SMARTRA no response)                            |
| Antenna coil fault                                | 1. Antenna coil open/short circuit                                                                                                                                                          | P1691<br>(Antenna coil error)                             |
| Immobilizer indicator lamp fault                  | 1. Immobilizer indicator lamp error (Cluster)                                                                                                                                               | P1692<br>(Immobilizer lamp error)                         |
| Transponder key fault                             | 1. Corrupted data from transponder<br>2. More than one transponder in the magnetic field (Antenna coil)<br>3. No transponder (Key without transponder) in the magnetic field (Antenna coil) | P1693<br>(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<br>(PCM(ECM) message error)                         |
| PCM(ECM) internal permanent memory (EEPROM) fault | 1. PCM(ECM) internal permanent memory (EEPROM) fault<br>2. Invalid write operation to permanent memory (EEPROM)                                                                             | P1695<br>(PCM(ECM) memory error)                          |
| Invalid key fault                                 | 1. Virgin transponder at PCM(ECM) status "Learnt" (Invalid) Transponder at PCM(ECM) status "Learnt" (Authentication fail)                                                                   | P1696<br>(Authentication fail)                            |
| Hi-Scan fault                                     | 1. Hi-Scan message error                                                                                                                                                                    | P1697                                                     |
| Locked by timer                                   | 1. Exceeding the maximum limit of Twice IGN ON ( $\geq 32$ times)                                                                                                                           | P1699<br>(Twice IG ON over trial)                         |

### IMMOBILIZER (SMARTRA) DTC LIST

| No. | Fault code | Monitor strategy description  | Gasoline | Diesel |
|-----|------------|-------------------------------|----------|--------|
| 1   | P1674      | Transponder status error      | O        | -      |
| 2   | P1675      | Transponder programming error | O        | O      |



|    |       |                                                  |   |   |
|----|-------|--------------------------------------------------|---|---|
| 3  | P1676 | SMARTRA message error                            | O | O |
| 4  | P1690 | SMARTRA no response                              | O | O |
| 5  | P1691 | Antenna coil error                               | O | O |
| 6  | P1692 | Immobilizer lamp error                           | O | O |
| 7  | P1693 | Transponder no response error / Invalid response | O | O |
| 8  | P1610 | Non-Immobilizer-EMS connected to an immobilizer  | - | O |
| 9  | P1694 | EMS message error                                | O | - |
| 10 | P1695 | EMS memory error                                 | O | - |
| 11 | P1696 | Authentication fail                              | O | - |
| 12 | P1697 | HI-SCAN message error                            | O | - |
| 13 | P1699 | Twice overtrial                                  | O | - |



## TEACHING PROCEDURES

### 1. Key Teaching Procedure

Key teaching must be done after replacing an inoperative 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. After reconnecting the battery, the timer starts again for one hour.

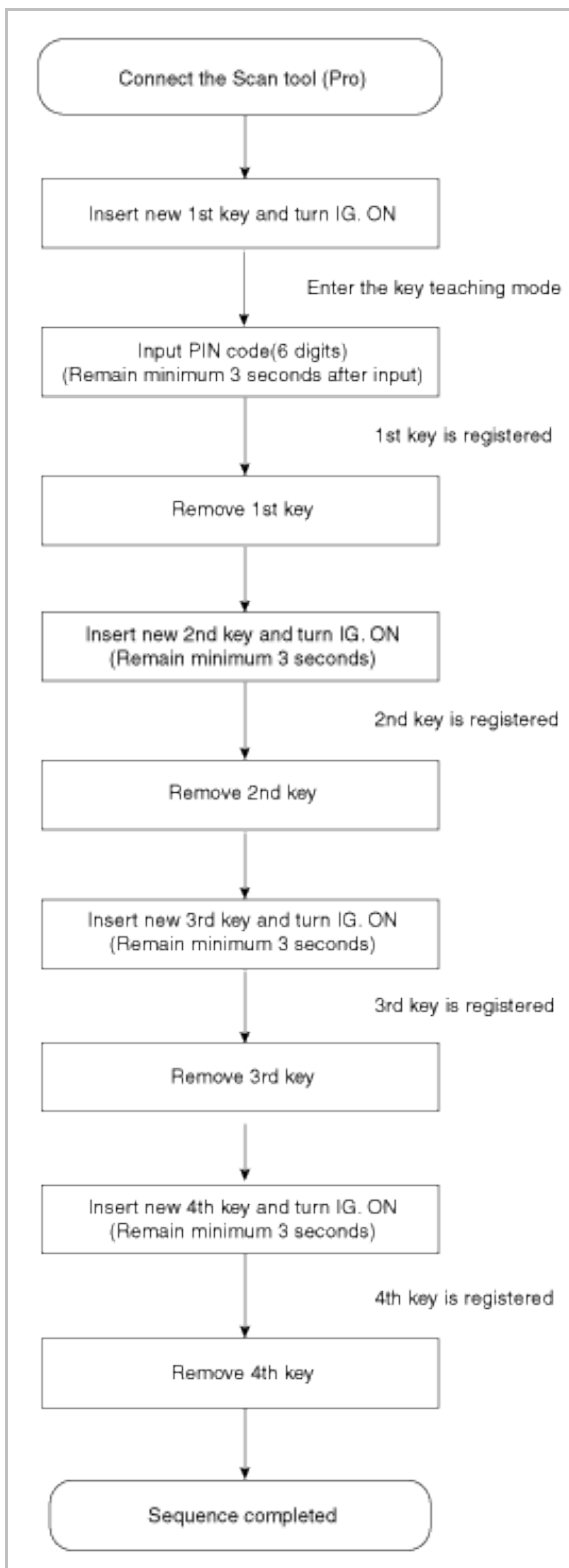
The key teaching is done by ignition on with the key and additional tester commands. The PCM(ECM) stores the relevant data in the EEPROM and in the transponder. Then the PCM(ECM) runs the authentication required for confirmation of the teaching process. The successful programming is then confirmed by 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 can be 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 4

If an error occurs during the Immobilizer Service Menu, the PCM(ECM) status remains unchanged and a specific fault 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 and a specific fault code will be stored at PCM(ECM).



(1) PCM(ECM) learnt status.

| 1. KIA VEHICLE DIAGNOSIS ▼   |
|------------------------------|
| MODEL : SEDONA               |
| 01. ENGINE                   |
| 02. AUTOMATIC TRANSAXLE      |
| 03. ANTI-LOCK BRAKE SYSTEM   |
| 04. SRS-AIRBAG               |
| 05. ELEC. CONTROL SUSPENSION |
| <b>06. IMMOBILIZER</b>       |
| 07. ELEC. POWER STEERING     |
| 08. FULL AUTO AIR/CON.       |

## 1. KIA VEHICLE DIAGNOSIS

MODEL : SEDONA

SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

### 1.3 TEACHING

MODEL : SEDONA

SYSTEM : IMMOBILIZER

STATUS : LEARNT

INPUT PIN OF SIX  
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

### 1.3 TEACHING

MODEL : SEDONA

SYSTEM : IMMOBILIZER

STATUS : LEARNT

1st KEY TEACHING  
ARE YOU SURE ? [Y/N]

CODE : 234567

### 1.3 TEACHING

MODEL : SEDONA

SYSTEM : IMMOBILIZER

STATUS : LEARNT

1st KEY TEACHING  
COMPLETED

CODE : 234567

|                                                           |
|-----------------------------------------------------------|
| 1.3 TEACHING                                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT |
| <div> 2st KEY TEACHING<br/> ARE YOU SURE ? [Y/N] </div>   |
| CODE : 234567                                             |

|                                                           |
|-----------------------------------------------------------|
| 1.3 TEACHING                                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT |
| <div> 2st KEY TEACHING<br/> COMPLETED </div>              |
| CODE : 234567                                             |

(2) PCM(ECM) virgin status.

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

|                                                                 |
|-----------------------------------------------------------------|
| 1.3 TEACHING                                                    |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : VIRGIN       |
| <div> INPUT PIN OF SIX<br/> FIGURE AND PRESS [ENTER] KEY </div> |
| CODE : 234567                                                   |

|                                                           |
|-----------------------------------------------------------|
| 1.3 TEACHING                                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : VIRGIN |
| <div> 1st KEY TEACHING<br/> ARE YOU SURE ? [Y/N] </div>   |
| CODE : 234567                                             |

|                                                           |
|-----------------------------------------------------------|
| 1.3 TEACHING                                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : VIRGIN |
| <div>1st KEY TEACHING<br/>COMPLETED</div>                 |
| CODE : 234567                                             |

|                                                           |
|-----------------------------------------------------------|
| 1.3 TEACHING                                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : VIRGIN |
| <div>2st KEY TEACHING<br/>ARE YOU SURE ? [Y/N]</div>      |
| CODE : 234567                                             |

|                                                           |
|-----------------------------------------------------------|
| 1.3 TEACHING                                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : VIRGIN |
| <div>2st KEY TEACHING<br/>COMPLETED</div>                 |
| CODE : 234567                                             |

## 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 four digits.

User password teaching is only accepted by a "learnt" PCM(ECM). Before first teaching of user password to an 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 and sending the user password by tester. After successful teaching, the status of the user password changes from "virgin" to "learnt"

The learnt user password can also be changed. This can be done if the user password status is "learnt" and the tester sends authorization of access, either the old user password or the vehicle specific data. After correct authorization, the PCM(ECM) requests the new user password. The status remains "learnt" and the new user password will be valid for the next limp home mode.

If incorrect user passwords or wrong vehicle specific data have been sent to the PCM(ECM) three times, the PCM(ECM) will reject the request to change the password for one hour. This time cannot be reduced by disconnecting the battery or any other actions. After reconnecting the battery, the timer starts again for one hour.

### (1) User password teaching

## 1. KIA VEHICLE DIAGNOSIS

MODEL : SEDONA  
SYSTEM : IMMOBILIZER

01. CURRENT DATA

**02. PASSWORD TEACHING/CHANGING**

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

### 1.2 PASSWORD TEACHING/CHANGING

MODEL : SEDONA  
SYSTEM : IMMOBILIZER  
STATUS : VIRGIN

INPUT NEW PASSWORD OF FOUR  
FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD :

### 1.2 PASSWORD TEACHING/CHANGING

MODEL : SEDONA  
SYSTEM : IMMOBILIZER  
STATUS : VIRGIN

INPUT NEW PASSWORD OF FOUR  
FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD : 2345

### 1.2 PASSWORD TEACHING/CHANGING

MODEL : SEDONA  
SYSTEM : IMMOBILIZER  
STATUS : VIRGIN

ARE YOU SURE ? [Y/N]

NEW PASSWORD : 2345

|                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------|
| 1.2 PASSWORD TEACHING/CHANGING                                                                                     |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : VIRGIN                                                          |
| <div style="border: 1px solid black; padding: 5px; text-align: center;"> COMPLETED<br/> PRESS [ESC] TO EXIT </div> |
| NEW PASSWORD : 2345                                                                                                |

※ If the wrong password is entered, wait 10 seconds, then start again from step 1.

(2) User password changing

|                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. KIA VEHICLE DIAGNOSIS                                                                                                                                          |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br><br>01. CURRENT DATA<br><b>02. PASSWORD TEACHING/CHANGING</b><br>03. TEACHING<br>04. NEUTRAL MODE<br>05. LIMP HOME MODE |

|                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1.2 PASSWORD TEACHING/CHANGING                                                                                                                |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT                                                                                     |
| <div style="border: 1px solid black; padding: 5px; text-align: center;"> INPUT OLD PASSWORD OF FOUR<br/> FIGURES AND PRESS [ENTER] KEY </div> |
| OLD PASSWORD :                                                                                                                                |

|                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1.2 PASSWORD TEACHING/CHANGING                                                                                                                |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT                                                                                     |
| <div style="border: 1px solid black; padding: 5px; text-align: center;"> INPUT OLD PASSWORD OF FOUR<br/> FIGURES AND PRESS [ENTER] KEY </div> |
| OLD PASSWORD : 2345                                                                                                                           |



|                                                             |
|-------------------------------------------------------------|
| 1.2 PASSWORD TEACHING/CHANGING                              |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT   |
| INPUT NEW PASSWORD OF FOUR<br>FIGURES AND PRESS [ENTER] KEY |
| NEW PASSWORD : 1234                                         |

|                                                           |
|-----------------------------------------------------------|
| 1.2 PASSWORD TEACHING/CHANGING                            |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT |
| ARE YOU SURE ? [Y/N]                                      |
| NEW PASSWORD : 1234                                       |

|                                                           |
|-----------------------------------------------------------|
| 1.2 PASSWORD TEACHING/CHANGING                            |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br>STATUS : LEARNT |
| COMPLETED<br>PRESS [ESC] TO EXIT                          |
| NEW PASSWORD : 1234                                       |

## 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.

|                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. KIA VEHICLE DIAGNOSIS                                                                                                                                   |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br><br>01. CURRENT DATA<br>02. PASSWORD TEACHING/CHANGING<br>03. TEACHING<br>04. NEUTRAL MODE<br>05. LIMP HOME MODE |

|                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------|
| 1.5 LIMP HOME MODE                                                                                                                  |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br><br><div>INPUT PASSWORD OF FOUR<br/>FIGURES AND PRESS [ENTER] KEY</div><br><br>PASSWORD : |

|                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1.5 LIMP HOME MODE                                                                                                                           |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br><br><div>INPUT PASSWORD OF FOUR<br/>FIGURES AND PRESS [ENTER] KEY</div><br><br>NEW PASSWORD : 2345 |

|                                                                                            |
|--------------------------------------------------------------------------------------------|
| 1.5 LIMP HOME MODE                                                                         |
| MODEL : SEDONA<br>SYSTEM : IMMOBILIZER<br><br><div>COMPLETED<br/>PRESS [ESC] TO EXIT</div> |

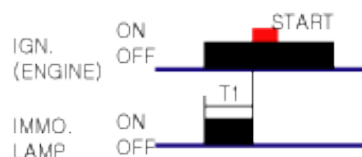
## 2. LIMP HOME BY IGNITION KEY

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.

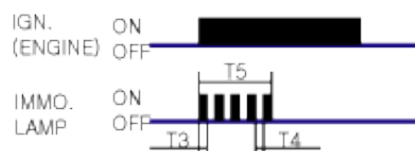
Only if the PCM(ECM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the PCM(ECM) will be unlocked for a period of time (30 sec.). The engine can be started during this time. After the time has elapsed, engine start is not possible. After a new password 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.

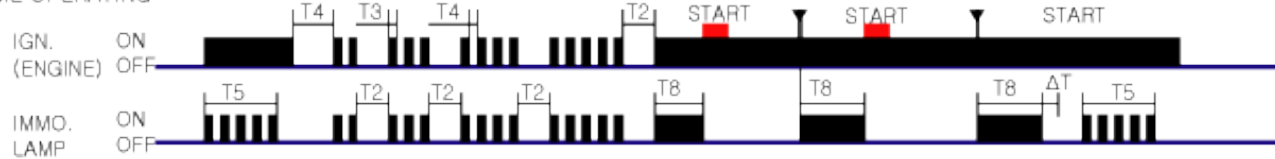
### 1. NORMAL CONDITION(NO FAILURE)



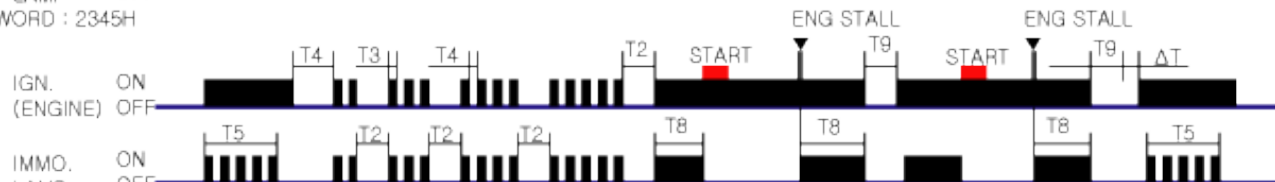
### 2. IN CASE OF FAILURE(LIMP HOME)



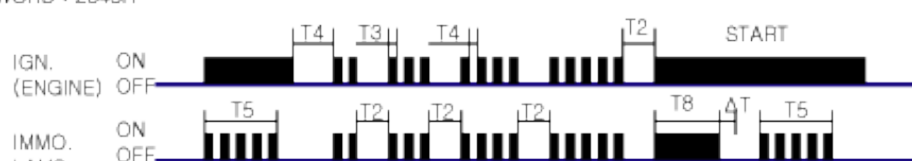
### 3. LIMP HOME OPERATING



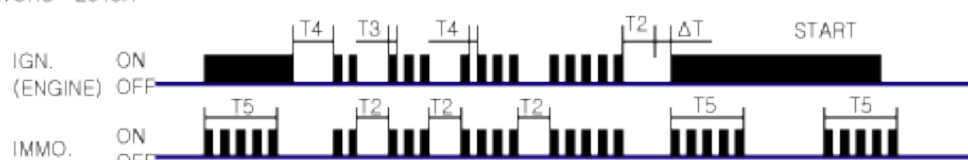
USER PASSWORD : 2345H



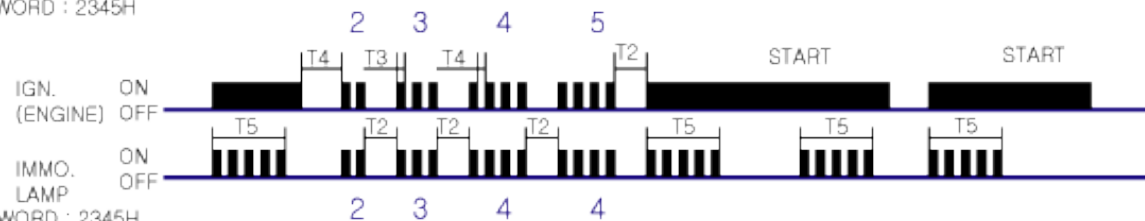
USER PASSWORD : 2345H



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

## 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                  |
| PCM(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                           | NO                  |

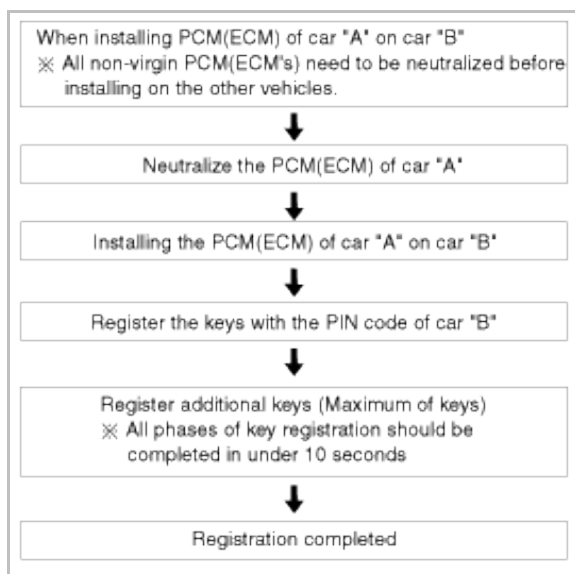
## REPLACEMENT OF PCM(ECM) AND SMARTRA

In case of an inoperative PCM(ECM), the unit has to be replaced with a "virgin" or "neutral" PCM(ECM). All keys have to be taught to the new PCM(ECM). Keys, which are not taught to the PCM(ECM), are invalid for the new PCM(ECM) (Refer to key teaching procedure). The vehicle specific data have to be left unchanged due to the unique programming of transponder.

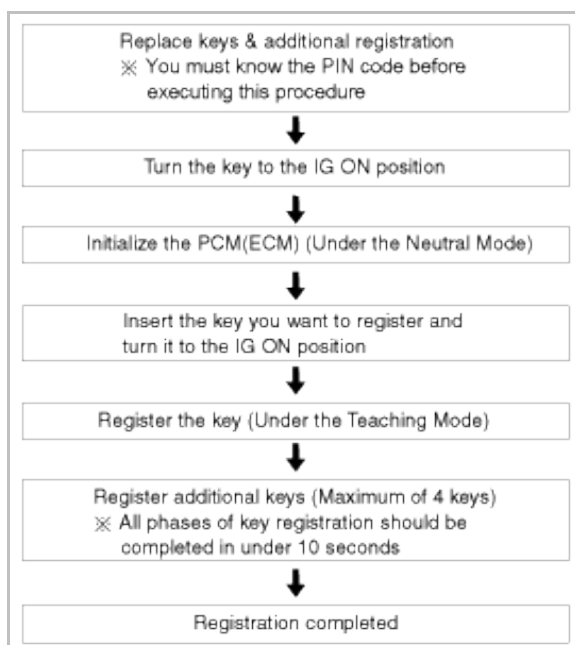
In case of an inoperative SMARTRA, there is no special procedure required. A new SMARTRA device simply replaces

the old one. There are no transponder-related data stored in this device.

#### 1. Things to remember before replacing (PCM(ECM))



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



#### NOTICE

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

### NEUTRALIING OF PCM(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 PCM(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. A valid ignition key is inserted and after ignition on is recorded, the PCM(ECM) requests the vehicle specific data from the scanner. The communication messages are described at "Neutral Mode". After successfully receiving the data, the PCM(ECM) is neutralized.

The PCM(ECM) remains locked. Neither the limp home mode nor the "twice ignition on" function is accepted by PCM(ECM).

The teaching of keys follows the procedure described for virgin PCM(ECM). The vehicle specific data have to be unchanged due to the unique programming of transponder. If data should be changed, new keys with virgin transponder are requested.

#### NOTICE

- 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 PCM(ECM) (except key teaching permission)

#### 1. KIA VEHICLE DIAGNOSIS

MODEL : SEDONA

SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

#### 1.4 NEUTRAL MODE

MODEL : SEDONA

SYSTEM : IMMOBILIZER

STATUS : LEARNT

INPUT PIN OF SIX  
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

#### 1.4 NEUTRAL MODE

MODEL : SEDONA  
SYSTEM : IMMOBILIZER  
STATUS : NEUTRAL

COMPLETED  
PRESS [ESC] TO EXIT

#### 1. KIA VEHICLE DIAGNOSIS

MODEL : SEDONA  
SYSTEM : IMMOBILIZER

- 01. CURRENT DATA
- 02. PASSWORD TEACHING/CHANGING
- 03. TEACHING
- 04. NEUTRAL MODE
- 05. LIMP HOME MODE

#### 1.1 CURRENT DATA

01. NO. OF LEARNT KEY 0

|                |           |
|----------------|-----------|
| 02. ECU STATUS | NEUTRAL   |
| 03. KEY STATUS | NOT CHECK |



FIX SCRN FULL PART GRPH HELP

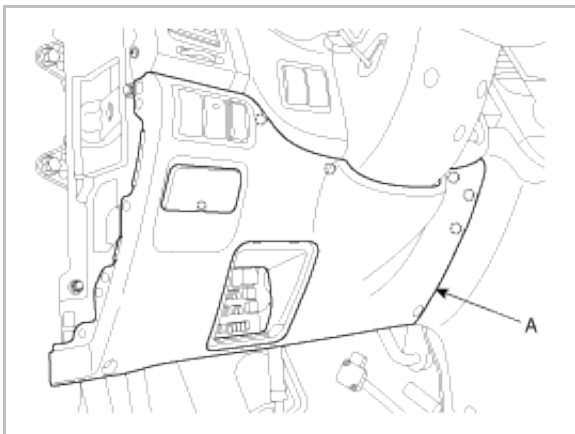
# **Body Electrical System**

Immobilizer System - Immobilizer Control  
Unit

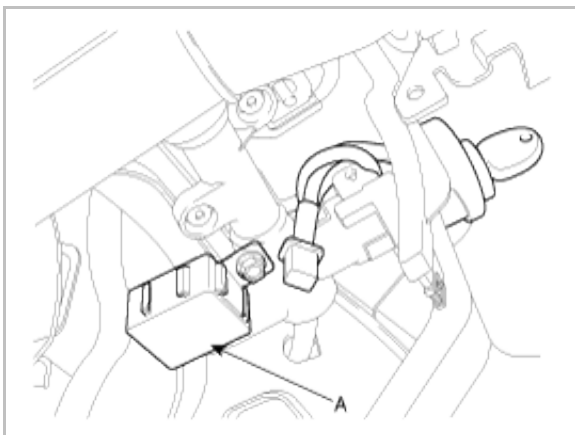


## REPLACEMENT

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 5P connector of the SMARTRA unit and then remove the SMARTRA unit (A) after loosening the screw.



5. Installation is the reverse of removal procedure.

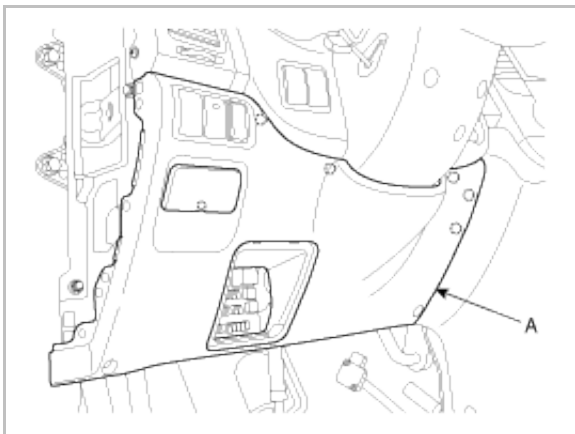


# **Body Electrical System**

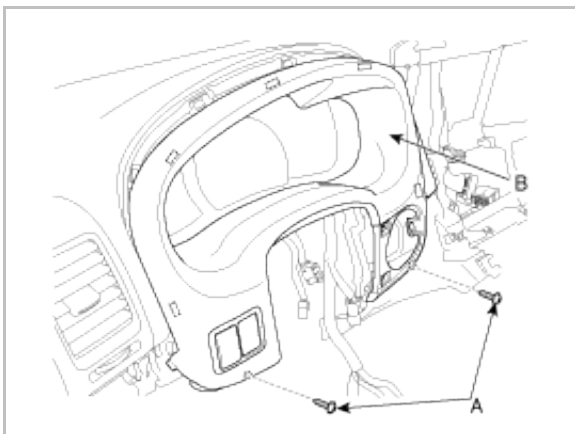
Immobilizer System - Antenna Coil

## REPLACEMENT

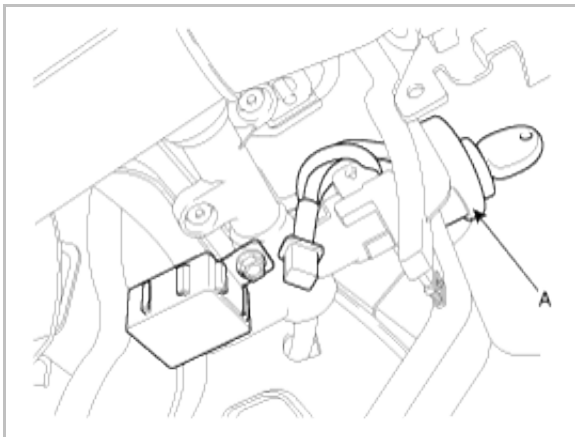
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel (A).



3. Remove the cluster facia panel (B) after removing the screws (A) (2EA) and trip switch connector.



4. Disconnect the 6P connector of the coil antenna and then remove the coil antenna (A) after loosening the screw.



5. Installation is the reverse of removal procedure.



# **Body Electrical System**

Trip Computer



## DESCRIPTION

The trip computer displays information related to driving, including compass, distance to empty, elapsed time, average fuel consumption and outside temperature on the display. To change the function as described below, push the MODE button lesser than 2 sec. Distance to empty → elapsed time → average fuel consumption → outside temperature → OFF.

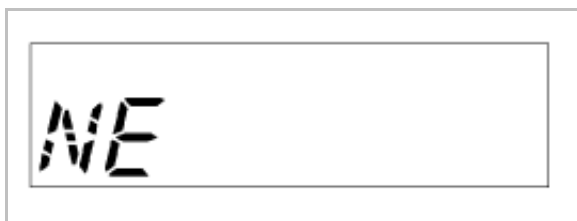
### NOTICE

Compass is always displayed except for OFF mode.

## OPERATION

### 1. COMPASS

The vehicle compass displays the direction (8 directions) where the vehicle is heading. Compass is displayed when driving.



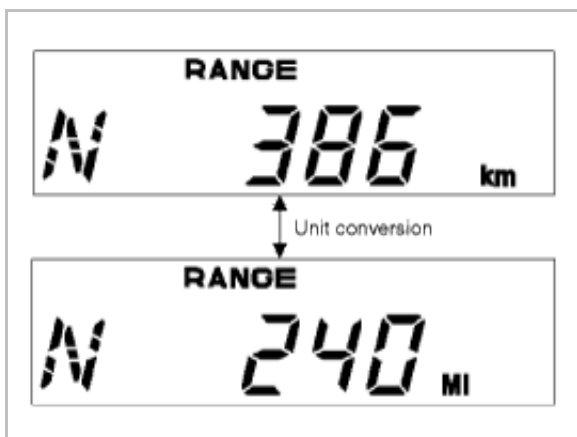
### 2. DISTANCE TO EMPTY

This mode indicates the estimated distance to empty based on the current fuel in the fuel tank and the amount of fuel delivered to the engine. The meter's working range is from 30 to 1500 miles (50 to 1500 km) by the 1km or 1mile.



When the remaining distance is below 30 miles (50km), a blinking "----" symbol will be displayed.

The unit can be changed by press the reset button for more than 4 sec. If the unit of distance to empty is changed, the unit of average fuel consumption is changed together.



### 3. ELAPSED TIME

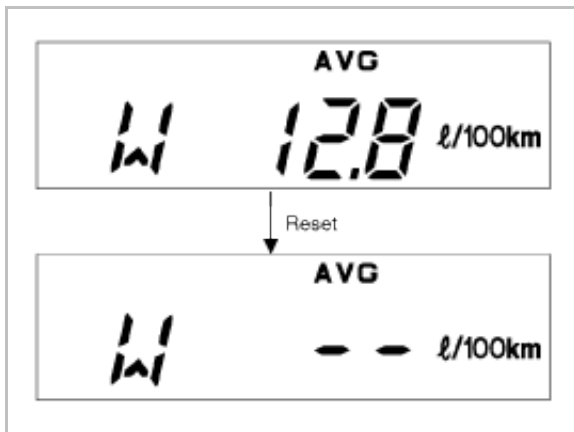
This mode indicate the total time traveled since the last driving time reset while the engine is running. Press the reset button for less than 4sec, clears the driving time to zero.



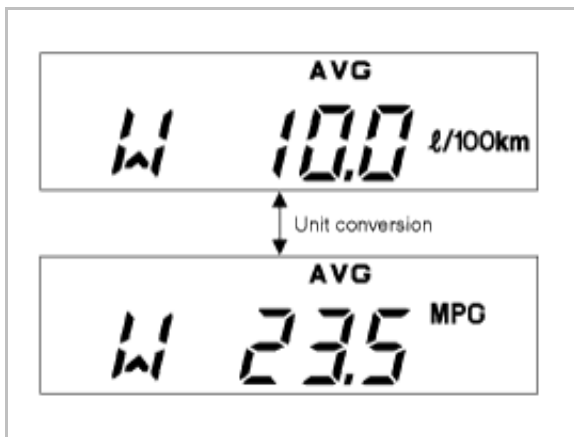
#### 4. AVERAGE FUEL CONSUMPTION

This mode calculates the average fuel consumption from the total used fuel and the distance. The meter's working range is from 0.0 to 99.9 L/100km or MPG (mile per gallon).

Press the reset button for less than 4 sec, when the average fuel consumption is being displayed, clears the average fuel consumption to "- -" until the vehicle is moved to 0.3 miles (500m).



The unit can be changed by press the reset button for more than 4 sec. If the unit of average fuel consumption is changed, the unit of distance to empty is changed together.



#### 5. OUTSIDE AMBIENT TEMPERATURE

This mode indicates the outside temperature around the vehicle from -40°C to 60°C (from -40°F to 140°F).

The unit can be changed by press the reset button for more than 4 sec.

E 25 °C

Unit conversion

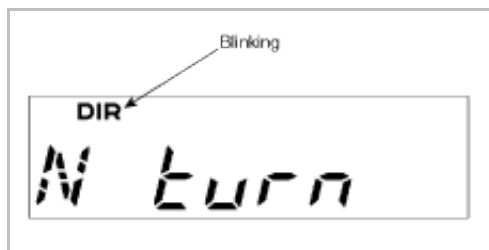
E 77 °F



## ADJUSTMENT

### CORRECTION MODE

1. The correction process is necessary for displaying correct direction of by removing the effect of magnetized car body components.
2. Push Mode button for 2 sec - 4.5 sec. And then "turn" is displayed and "DIR" is blinking with 0.5 sec intervals.



3. Automatic correction is done when the vehicle turns 720° in normal driving condition (the correction is invisible to the driver).

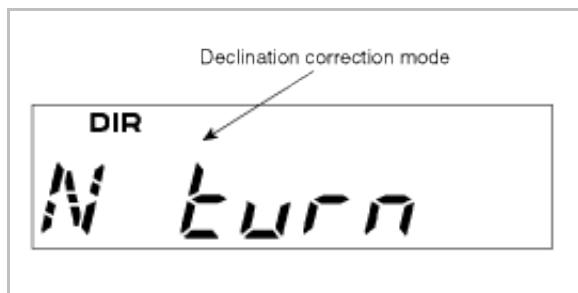
#### NOTICE

- The correction data is updated if the automatic correction data is better than the present correction data.
- Turning direction is not important.
- If the correction process is not finished after the vehicle turns 720°, turn the vehicle some more degree.

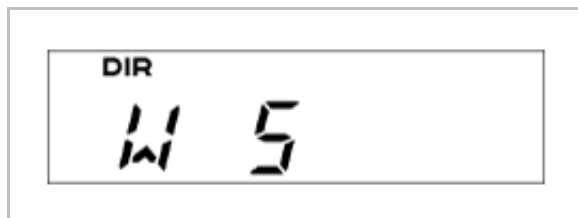
4. After finishing the correction process, the compass displays the present direction.
5. If the correction process is not finished until 5 minutes this mode is cancelled and the compass returns to normal mode with restoring the previous correction data.

### DECLINATION CORRECTION (VARIANT REGION CHANGE MODE)

1. Change the "Declination Setting Value" according to the regional declination to synchronize the true north and vehicle's north.
2. Push the mode button longer than 4.5 Sec to enter the declination correction mode. ('DIR' is on)



3. Screen after 4.5 sec.



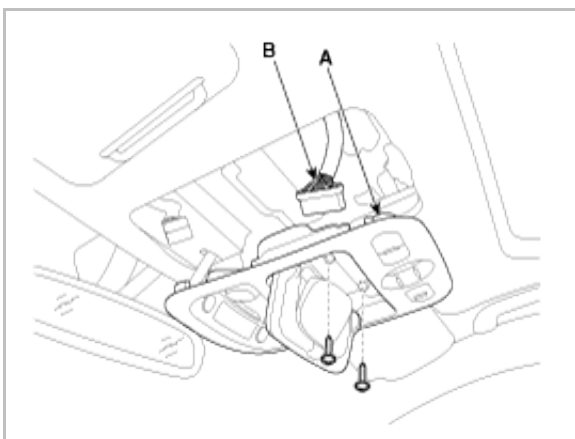
4. Push the reset button longer than 0.1 Sec to change the declination setting Value (Steps by 5° to East. After East 30, wraps to West 30)
5. Push the mode button more than 1sec, new data is stored on EEPROM and VFD displays normal direction.
6. Without any effective input for 30 seconds, the trip computer displays the previous declination angle with blinking for 2 sec and displays normal direction.

## NOTICE

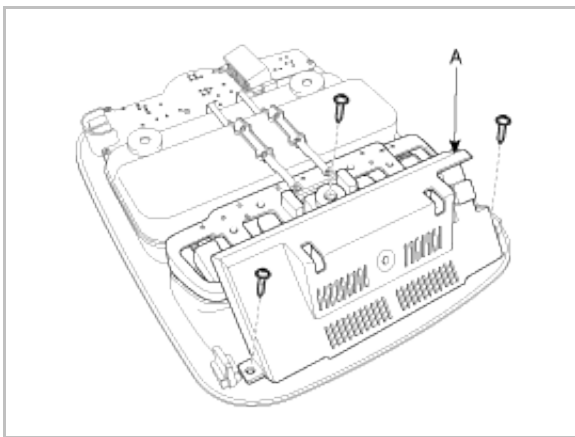
1. Do not install a ski rack, antenna, etc. that are attached to the vehicle using a magnet as anything attached to the roof of the vehicle with a magnet will effect compass operation.
2. If the compass deviates from the correct indication soon after repeated adjustment, have the compass checked at an authorized dealer.
3. The compass may not indicate the correct compass point in tunnels or while driving up or down a steep hill. (The compass returns to the correct compass point when the vehicle moves to an area where the geomagnetism is stabilized.)
  - Declination correction and correction setting value is not deleted during the B(+) OFF.

## DISPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the lens and open the sunglass case cover from the overhead console then remove the 2 screws holding the overhead console. And disconnect the connector then remove the overhead console lamp assembly from the headliner.



3. Remove the trip computer(A) mounting screws (3EA), and then disconnect from the overhead console.



4. Installation is the reverse of removal.



# **Body Electrical System**

Rear Parking Assist System - Rear Parking  
Assist System Control Unit



## DESCRIPTION

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

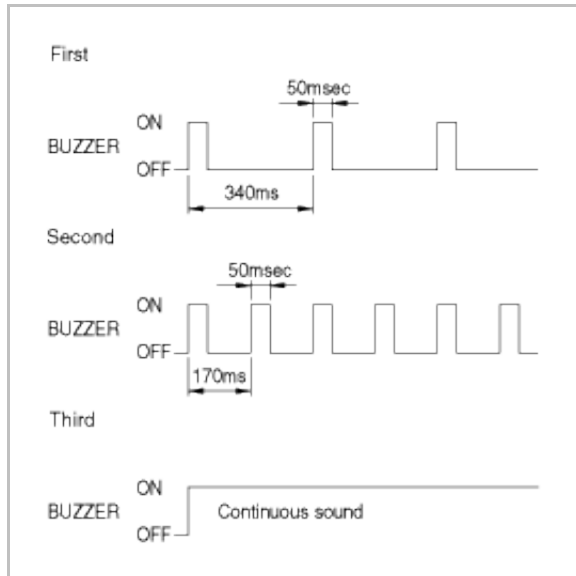
## ALARM RANGE

Upon detecting an object at each range out of 3 ranges as stated below within the operation range, it will generate alarm.

First alarm : Object comes near to the sensor located at the rear of vehicle, within 81-120cm  $\pm$  15cm

Second alarm : Object comes near to the sensor located at the rear of vehicle, within 41-80cm  $\pm$  10cm

Third alarm : Object comes near to the sensor located at the rear of vehicle, within 40cm  $\pm$  10cm

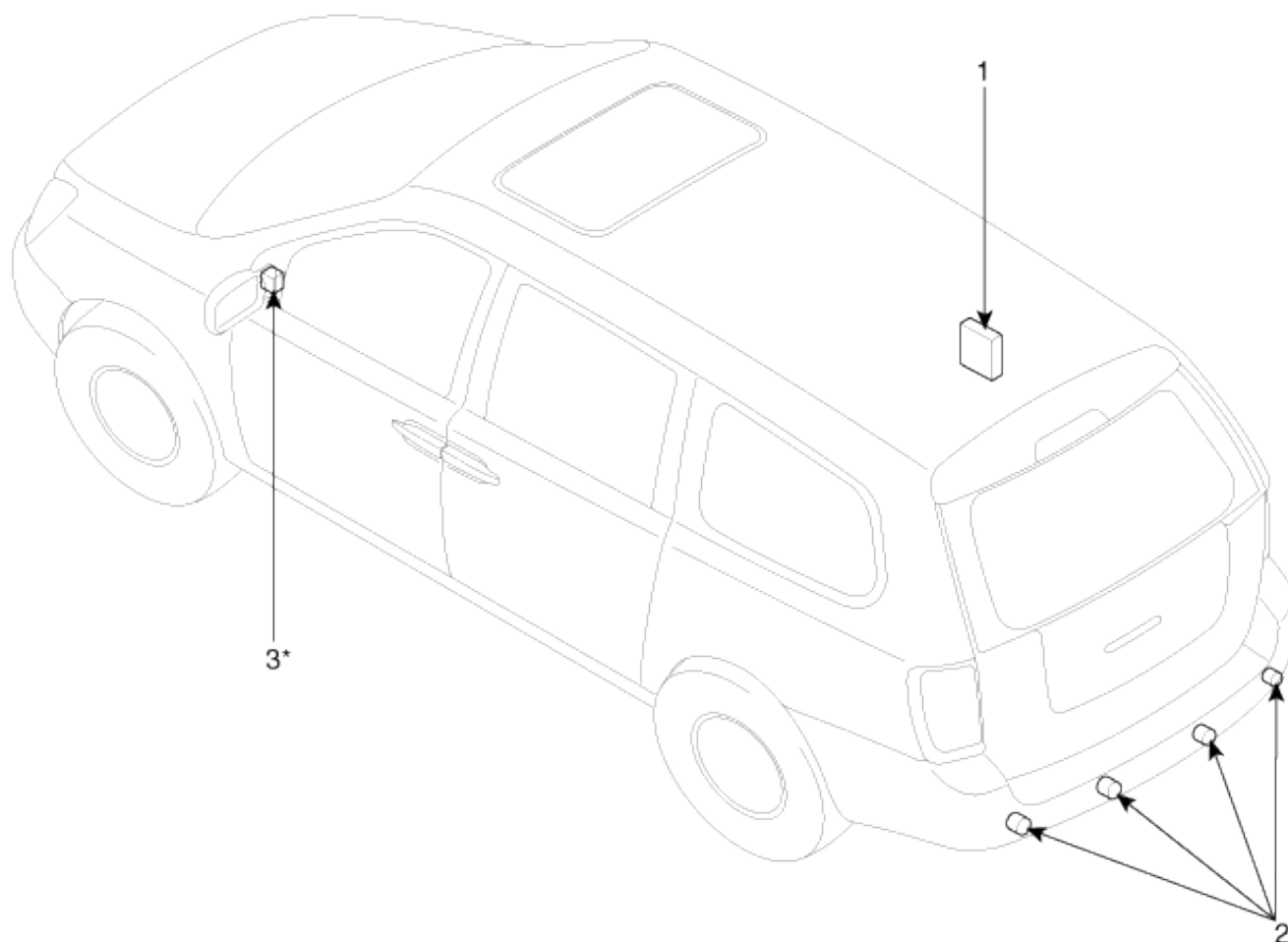


## NOTICE

1. Time tolerance of the above waveform : Time  $\pm$  10%
2. At nearer distance than 40cm, detection may not occur.
3. Alarm will be generated with vehicle reversing speed 10km/h or less.  
For moving target, maximum operation speed shall be target approach speed of 10km/h.
4. When the vehicle or the target is moving, sequential alarm generation or effective alarm may be failed.
5. False alarm, or failure of the alarm to trigger may occur in the following conditions.
  - Irregular road surface, gravel road, reversing toward grass.
  - Horn, motor cycle engine noise, large vehicle air brake, or other object generating ultrasonic wave is near.
  - When a wireless transmitter is used near to the sensor.
  - Dirt on the sensor.
  - Sequential alarm may not occur due to the reversing speed or the target shape.

## COMPONENT LOCATION

The parts with asterisk(\*) :  
This illustration is shows the LHD type.  
RHD type is symmetrical.



1. Back warning control unit  
2. Ultrasonic sensor

3. Buzzer

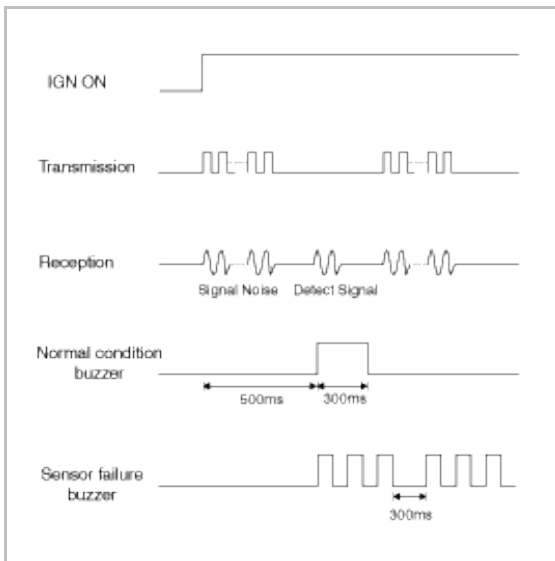


## DIAGNOSIS

### 1. DIAGNOSIS

Turn the ignition switch ON, then shift the transaxle lever to 'R'. The Back Warning System is then checked.

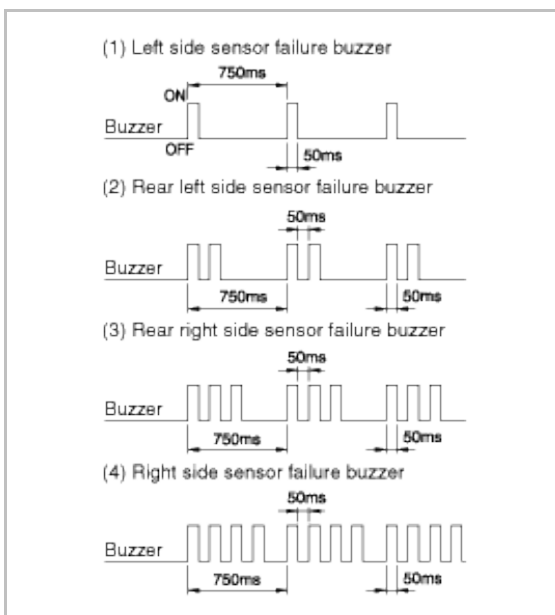
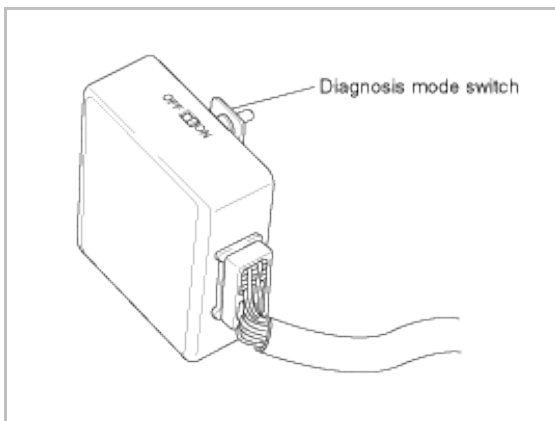
If no trouble, it generates buzzer alarm sound for 0.3 seconds after 0.5 seconds from power approval. In case of system failure, buzzer alarm is generated 3 times continuously with the interval of 0.3 seconds.



### 2. DIAGNOSIS MODE

Switch on diagnosis mode upon system failure.

In case of system failure, then it indicates the failed point as follows.

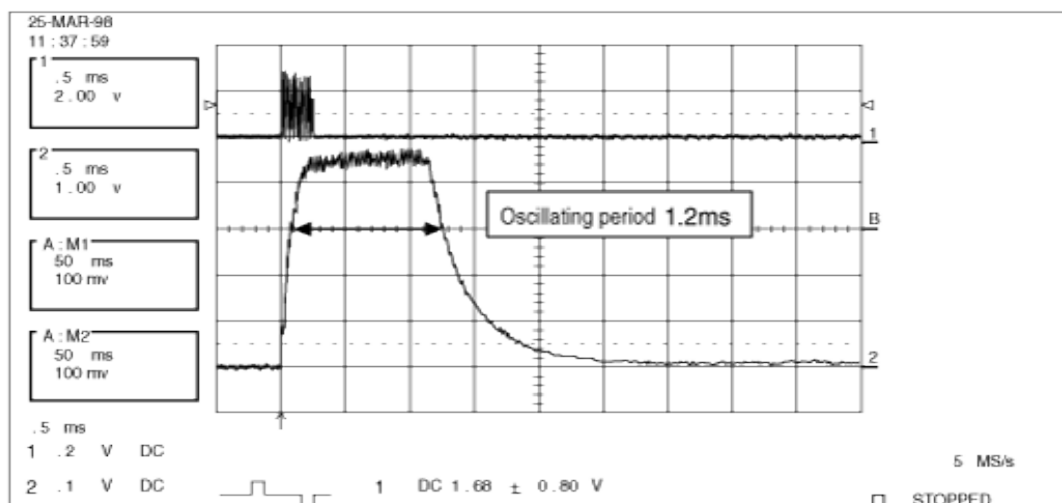


## SENSOR CONNECTION CHECKING

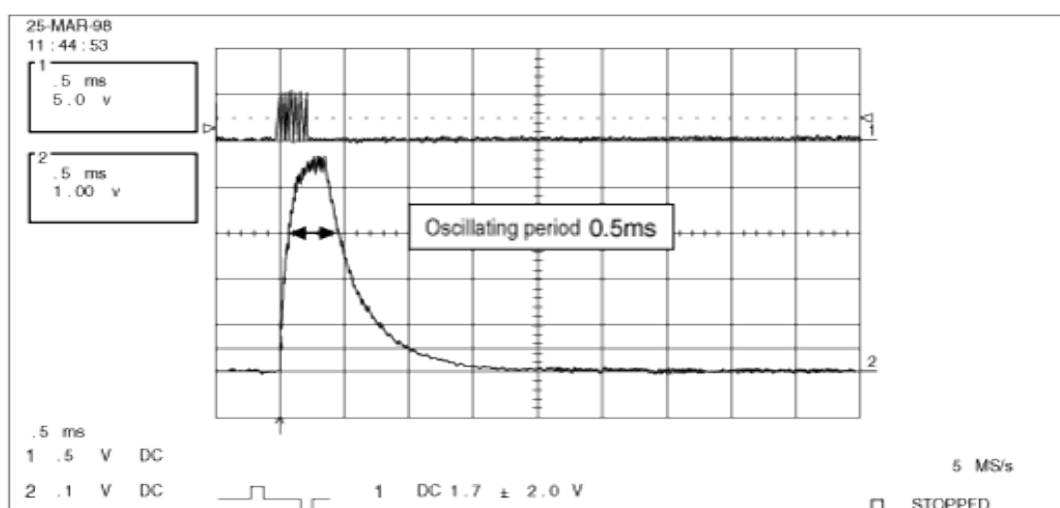
Transmit ultrasonic wave to the sensors, boost input signal, and detect wave.

Waveform will be found, oscillating for a certain period of time.

### 1. Waveform for a normal sensor connection



### 2. Waveform for a failed sensor connection



### NOTICE

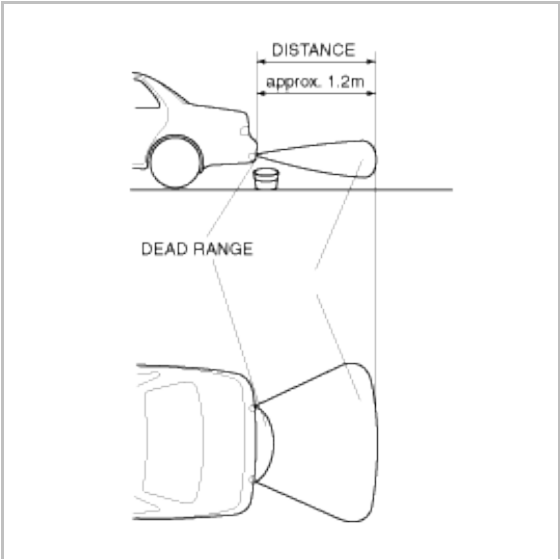
Sensor connection will be checked for oscillating period of input signal 3V. If oscillating period is more than 0.8ms, it is normal.

- A. Left sensor failure : beep-beep-beep
- B. Right sensor failure : beep beep-beep beep-beep beep
- C. Rear-right sensor failure : beep beep beep-beep beep beep-beep beep beep
- D. Right side sensor failure : beep beep beep beep-beep beep beep beep beep-beep beep beep beep

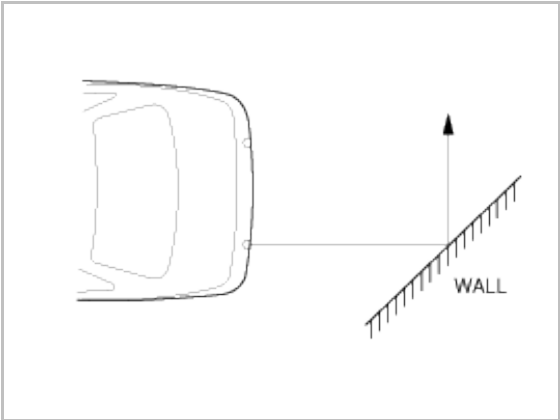
### WARNING

1. Range detected by back sensors is limited.  
Watch back before reversing
2. There is a blind spot below the bumper. Low objects (for example boundary barrier) may be detected from minimum 1.5m away unable to detect at nearer.
3. Besides there are some materials unable to be detected even in detection range as follows.  
(1) Needles, ropes, rods, or other thin objects.

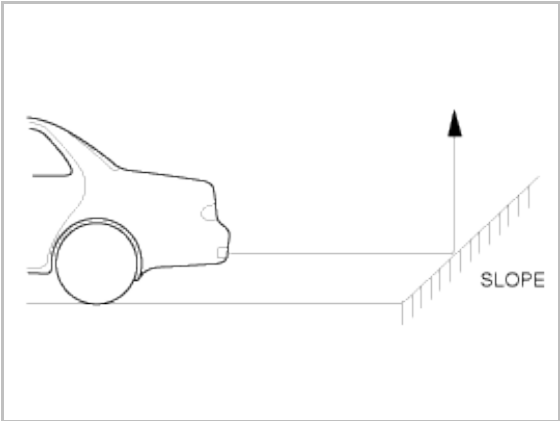
- (2) Cotton, snow and other material absorbing ultrasonic wave  
(for example, fire extinguisher device covered with snow)



4. Reversing toward the sloped walls.



5. Reversing toward the sloped terrain.



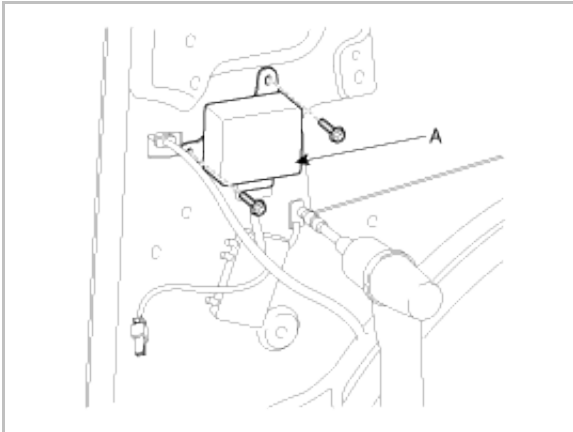
6. False alarm may operate in the following condition: irregular road surface, gravel road, sloped road and grass.  
Upon alarm generation by grass the alarm may be generated by rock behind grass. Always visually check the area behind the vehicle before backing up.  
The sensors cannot discriminate between materials.
7. Sensors may not operate correctly in the below conditions.  
Ensure sensors are clean from mud or dirt
- (1) When spraying the bumper, the sensor opening is covered with something in order not to be contaminated. If sensor opening is contaminated with mud, snow, or dirt, detection range will be reduced and alarm may not be generated under the crash condition. Dirt accumulated on the sensor opening shall be removed with water.  
Do not wipe or scrape sensor with a rod or a hard object.
  - (2) If the sensor is frozen, alarm may not operate until sensor thaws.

- (3) If a vehicle stays under extremely hot or cold environment, the detection range may be reduced. It will be restored at the normal temperature.
  - (4) When heavy cargo is loaded in rear cargo area, it changes the vehicle balance, which reduces the detection range.
  - (5) When other vehicle's horn, motor cycle engine noise, or other ultra-sonic wave sources are near.
  - (6) Under heavy rain.
  - (7) When reversing towards a vertical wall and the gap between the vehicle and the wall is 15cm. (Alarm may sound despite the absence of a barrier)
  - (8) If radio antenna is installed at the rear.
  - (9) If the vehicle rear wiring is re-routed or electrical component is added at the rear part.
  - (10) Vehicle balance is changed due to the replacement of the rear spring.
  - (11) The unit will operate normally when the vehicle speed is 5km/h or less.  
Above this speed, the unit may not operate normally
8. Check the rear bumper for installation condition and deformation. If installed improperly or the sensor orientation is deviated, it may cause malfunction.
9. Be careful not to apply shock during sensor installation on the transmission or reception unit.
10. When adding electrical devices or modifying harness at the rear body of the vehicle, ensure not to change the transmission and reception unit wiring.  
Tagging the transmission side and reception side, it may cause malfunction.
11. High power radio transmitter (above 10W) may cause malfunction. Do not install it on the vehicle.
12. Be careful that excessive heat or sharp objects shall not touch ultrasonic sensor surface.  
Do not cover the sensor opening or press the sensor.



## REPLACEMENT

1. Remove the right side trim of the trunk (Refer to the Body group - "Interior trim")
2. Loosen the mounting bolts and remove the back warning control unit (A) from the quarter panel.





# **Body Electrical System**

Rear Parking Assist System - Parking Assist  
Sensor



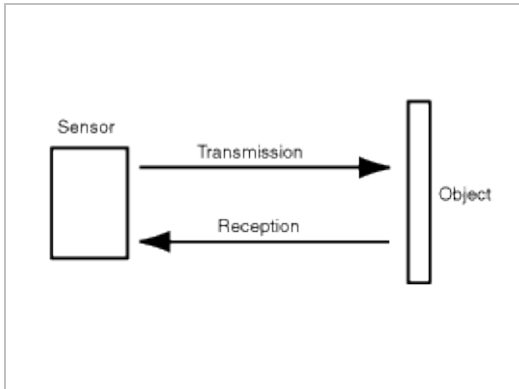
## Operation principle

The sensor emits ultrasonic wave to the objects, and it measures the time until reflected wave returns, and calculates the distance to the object.

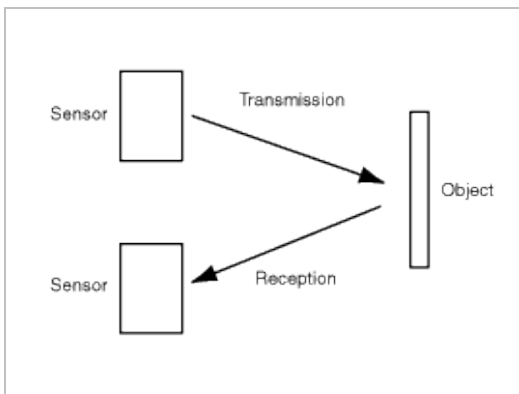
### Distance detection type

Direct detection type and indirect detection type are used together for improving effectiveness of the detection.

1. Direct detection type: One sensor transmits and receives signals to measure the distance.



2. Indirect detection type: One sensor transmits signals and the other sensor receives the signals to measure the distance.



### Measurement principle

Back warning system (BWS) is a complementary device for reversing. BWS detects objects behind vehicle and provides the driver with buzzer alarm finding objects in a certain area, using ultrasonic wave propagation speed and time.

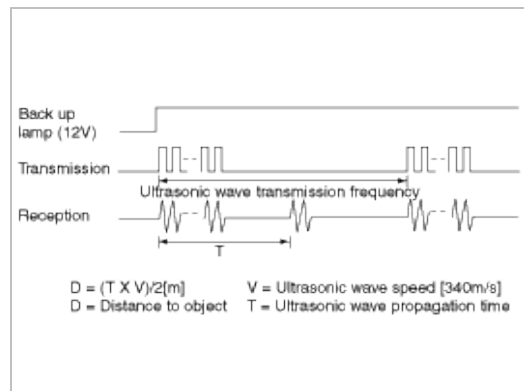
The propagation speed formula of ultrasonic wave in air is following :

$$v = 331.5 + 0.6t \text{ (m/s)}$$

$v$  = ultrasonic wave propagation speed

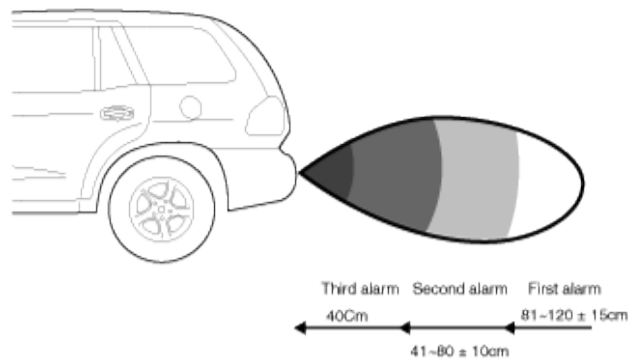
$t$  = ambient temperature

The basic principle of distance measurement using ultrasonic wave is :



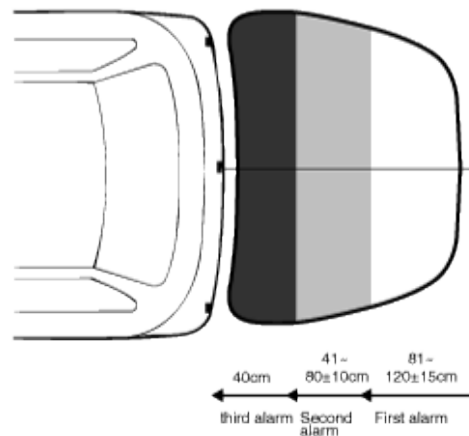
### Sensor detection range

## [Vertical range]



1. Distance tolerance(Measured at the front of sensor)
  - 81~120cm :  $\pm 15\text{cm}$
  - 41~80cm :  $\pm 10\text{cm}$
  - 40cm :  $\pm 10\text{Cm}$
2. Detection tolerance
  - At 40cm :  $45^\circ \pm 15^\circ$
  - At 80cm :  $30^\circ \pm 15^\circ$
  - At 120cm :  $20^\circ \pm 15^\circ$
3. At nearer distance than 40cm detection may occur.
4. Measurement condition : Room temperature ( $20^\circ\text{C}$ ), 90mm diameter, 3m length rod.

## [Horizontal range]



1. Distance tolerance(Measured at the front of sensor)
  - 81~120cm :  $\pm 15\text{cm}$
  - 41~80cm :  $\pm 10\text{cm}$
  - 40cm :  $\pm 10\text{cm}$
2. Detection tolerance
  - At 80cm :  $90^\circ \pm 20^\circ$
  - At 120cm :  $10^\circ \pm 20^\circ$
3. At nearer distance than 40Cm detection may occur.
4. Measurement condition : Room temperature ( $20^\circ\text{C}$ ), 90mm diameter, 3m length rod.

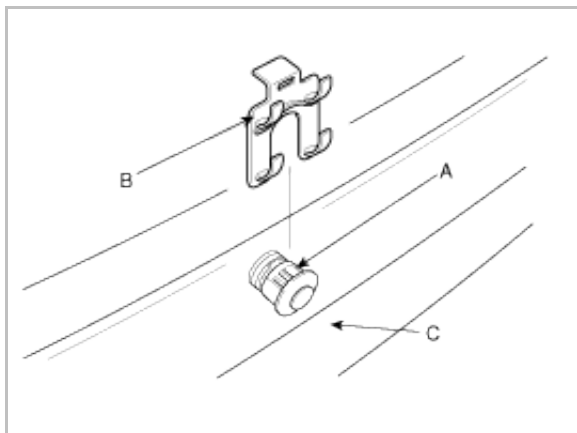
### NOTICE

1. 14cm (Diameter) plastic rod is used for the test target.
2. The test result may differ by a different target object.
3. Detection range may be reduced by dirt accumulated on sensor, and extremely hot or cold weather.
4. The following object may not be detected.
  - Sharp object or thin object like rope.
  - Cotton, sponge, snow or other materials absorbing sonic wave.
  - Smaller objects than 14cm (Diameter), 1m length.



## REPLACEMENT

1. Remove the rear bumper ( Refer to the Body group - "Rear bumper")
2. Disconnect the sensor connector at the inside of the rear bumper (C), and then remove the sensor (B) from the housing (A).



3. Installation is the reverse of removal procedure.

# **Body Electrical System**

Rear Parking Assist System - Buzzer

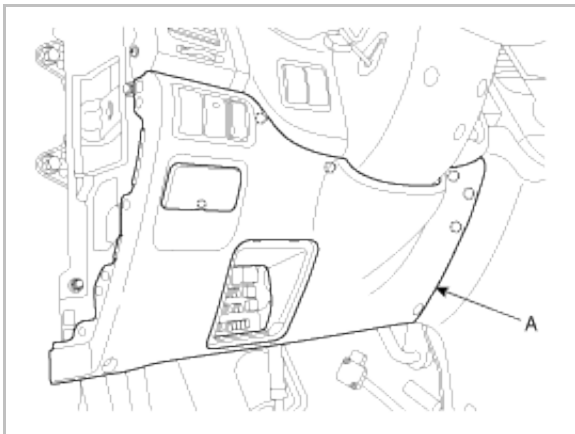


## INSPECTION

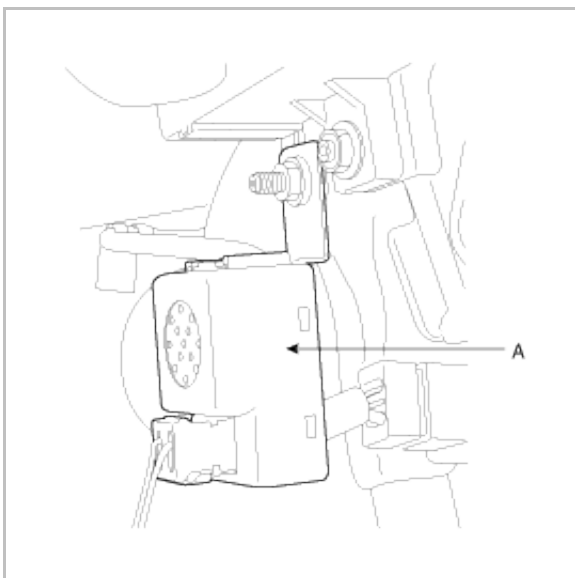
Test the buzzer by connecting battery voltage to terminal 1, and ground terminal 2. The buzzer should make a sound. If the buzzer fails to make a sound, replace it.

## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel (Refer to the Body group - crash pad).



3. Remove the buzzer (A) after loosening the bolt and disconnecting the connector from the left side of IPM.



4. Installation is the reverse of removal procedure.



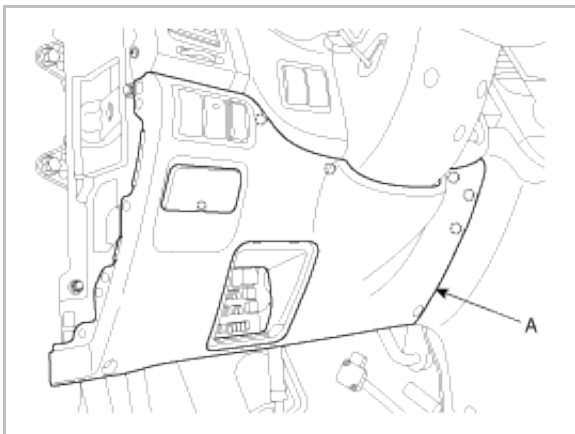
# **Body Electrical System**

Ignition Switch Assembly - Ignition Switch

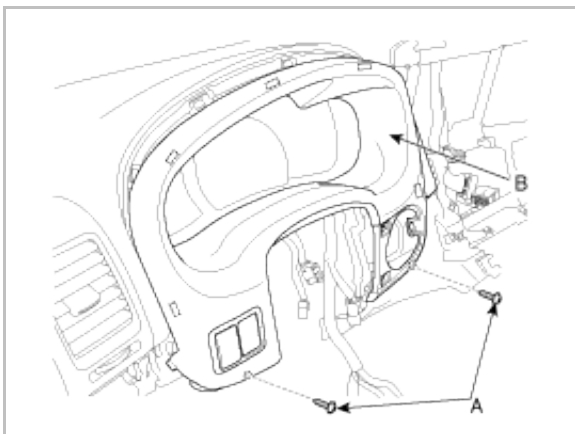


## REPLACEMENT

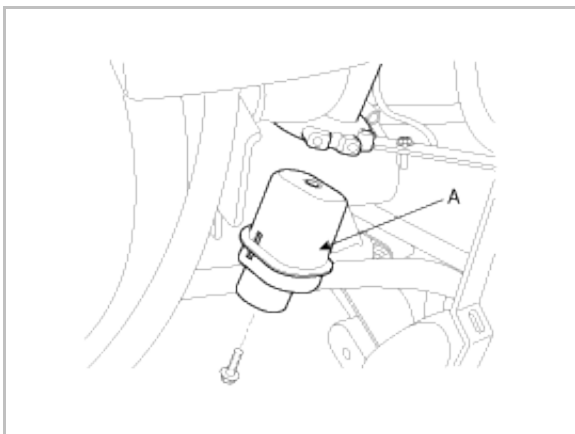
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel (Refer to the Body group - crash pad).



3. Remove the screws (2EA) and trip switch connector. Then remove the crash facia panel (B).

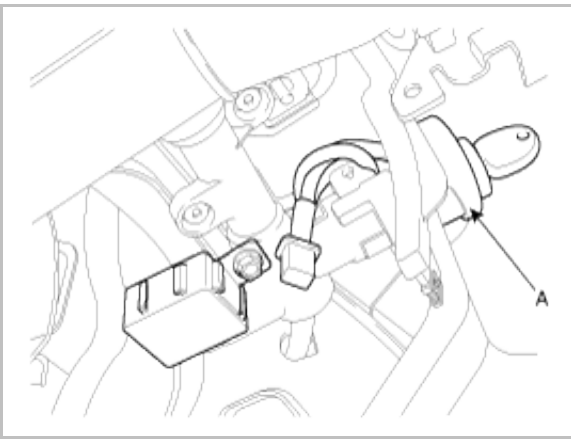


4. Remove the ignition switch (A) after loosening the screw with IG ON and disconnecting the 6P connector.

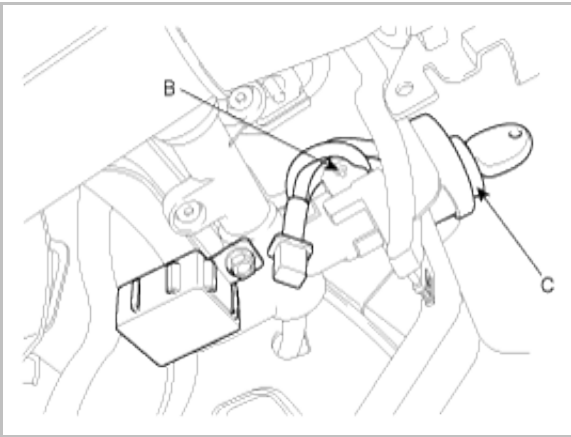


5. Remove the door warning switch and key illumination lamp (A) after loosening the screws (B) and disconnecting the 6P connector.





6. Remove the key lock cylinder (C) after pushing lock pin (B) with key ACC.



7. Installation is the reverse of removal procedure.

# **Body Electrical System**

Multiplex Communication - Driver Door  
Module (DDM)



## DESCRIPTION

The driver door module is a part of a Controller Area Network (CAN), and performs CAN communication with the BCM, FAM, IPM, RAM, ADM, and IMS. Driver controls driver side power window switch button located inside of the driver side door to operate power window, mirror, door lock and unlock.

1. Two manual operations (up and down) for four p/windows. However, on the driver's seat the auto up/down operation must be possible.
2. Opening and closing the quarter glass by the quarter glass switch.
3. Window UP/DOWN operation by RKE.
4. Manually operating the mirror position by the manual switch (Up, Down, Right, and Left)
5. Saving and replacing the mirror position by the MEMORY switch → For 2 persons
6. Saving and replacing the mirror position by RKE → For 2 persons
7. Out side mirror AUTO reverse operation
8. Out side mirror FOLD/UNFOLD power control
9. CENTRAL DOOR LOCK/UNLOCK function
10. DOOR COURTESY LAMP control
11. Out side mirror DEFOG control
12. Illumination control

## CONTROL FUNCTION

### POWER WINDOW CONTROL

1. This switch controls power window up/down, automatic up/down from driver & assist side.
  - A. Driver's power window switch sends input signal through CAN communication by the manual up/down and automatic up/down switch input. At the same time passenger side sends manual up/down and automatic up/down signals to the wires.
  - B. Each safety window ECU receives the signal and performs manual up/down and automatic up/down functions.
2. Power window lock
 

When the driver's power window lock switch is ON, each safety window ECU receives the power window lock command to prohibit the operation by the passenger side doors except the driver's door.
3. Timer function
 

Power window switch can be controlled for 30 seconds after the ignition is turned off. This function stops immediately even within 30 seconds if the front door is opened.

### KEY REMINDER

1. If door is locked by using door lock knob after opening door while IGN KEY is inserted to KEY CYLINDER, Unlock output will be for 1sec and there will be a series of three output signals every 0.5sec if door condition is "Lock".
2. If Key Reminder unlock message is "SHORT UNLOCK", DOOR UNLOCK lasts for 0.5sec.
3. If Key Reminder unlock message is "LONG UNLOCK", DOOR UNLOCK lasts for 1sec.
4. Remained action goes on though Key Reminder Unlock message changes to "OFF".

### PRIORITY OF DOOR LOCK/UNLOCK

1. Crash Unlock > Auto Door Lock > Key Reminder > Central Door Lock
2. Higher priority signals take precedence, and will override lower priority signals.
3. If the priority is the same or low, it'll be ignored.

### OUT SIDE MIRROR CONTROL BY THE SWITCH

1. If the mirror direction switch (up, down, left and right) is pressed when mirror selection switch on driver side power window switch is in outside LH(RH) under ACC ON condition, then mirror motor moves to the corresponding

direction.

## OUTSIDE MIRROR MEMORY OPERATION BY THE MEMORY SWITCH

1. If position switch (POS1 or POS2) is pressed within 5 seconds after pressing the memory switch under ignition 2 on, it registers current mirror position. (Switch module sends in LIN communication). (Memory permit status lasts for 5 seconds after memory switch ON. After 5 seconds, memory permits status terminates. In other words, current position is registered if the position switch (POS1 or POS2) is turned on, during the memory permit status). However, RH side mirror position is not registered during the LH side mirror manual switch operation.
2. Memory permit status is released if any of the following conditions is met
  - A. If 5 seconds is elapsed after the memory switch is turned on
  - B. If the ignition 2 is turned off
  - C. When saving is completed
  - D. If Ignition switch of the CAN communication data sent by the IPM is not "Run" or "Start".
  - E. If Inhibit switch of the CAN communication data sent by the FAM is not "P".
  - F. If vehicle speed of the CAN communication data sent by the cluster is "3Km/h" or more.
3. Memory is cleared if the battery is removed.

## OUTSIDE MIRROR MEMORY AND REPLAY OPERATION BY KEYLESS

1. Memory operation
  - A. Outside mirror LH position is registered in the driver side power window switch when the ignition is turned off from on.
  - B. When door is locked by the keyless, outside mirror position is registered corresponding to the keyless code.
  - C. Data related to the memory operation is received from BCM in CAN communication.
2. Replay operation
  - A. When door is unlocked by the keyless under ignition off state, it replays the position corresponding to the keyless code.
  - B. Data related to the replay operation is received from BCM in CAN communication on CAN line.
3. Replay prohibit condition
  - A. If the mirror switch on the LH side is pressed
  - B. If Ignition switch of the CAN communication data sent by the IPM is not "Run" or "Start".
  - C. If Inhibit switch of the CAN communication data sent by the FAM is not "P".
  - D. If vehicle speed of the CAN communication data sent by the CLUSTER is "3Km/h" or more.

## OUTSIDE MIRROR MEMORY AND REPLAY OPERATION BY KEYLESS

1. Memory operation
  - A. Outside mirror LH position is registered in the driver side power window switch when the ignition is turned off from on.
  - B. When door is locked by the keyless, outside mirror position is registered corresponding to the keyless code.
  - C. Data related to the memory operation is received from BCM in CAN communication.
2. Replay operation
  - A. When door is unlocked by the keyless under ignition off state, it replays the position corresponding to the keyless code.
  - B. Data related to the replay operation is received from BCM in CAN communication on CAN line.
3. Replay prohibit condition
  - A. When the inhibit "P" switch is OFF.
  - B. When RH side mirror switch is pressed.
  - C. When mirror switch is pressed after ignition on.
  - D. When the vehicle speed is over 3km/h

## AUTO REVERSE FUNCTION

| No. | Operation | Select | Shift<br>Lever | MIR Position |  | Manipulation | Result |
|-----|-----------|--------|----------------|--------------|--|--------------|--------|
|     |           |        |                |              |  |              |        |

|   | Operation                       | SW | Shift | L                       | R              | Manipulation                             | Result                                                                         |
|---|---------------------------------|----|-------|-------------------------|----------------|------------------------------------------|--------------------------------------------------------------------------------|
| 1 | Basic Operation                 | LH | P     | Position A              | Position B     | Changing the shift lever from "P" to "R" | MIR L:Auto reverse to position (A-5°)<br>MIR R:Auto reverse to position (B-5°) |
| 2 |                                 | RH | P     | Position A              | Position B     |                                          | MIR L:NO change<br>MIR R:Auto reverse to position (B-5°)                       |
| 3 |                                 | N  | P     | Position A              | Position B     |                                          | MIR L:NO change<br>MIR R:NO change                                             |
| 4 | Returning after Basic Operation | LH | R     | Result of No.1          | Result of No.2 | Changing the shift lever from "R" to "P" | MIR L:Return to position (A)<br>MIR R:Return to position (B)                   |
| 5 |                                 | RH | R     | No.1 is being performed | Result of No.2 |                                          | MIR L:NO change<br>MIR R:Return to position (B)                                |

## FAIL SAFE FUNCTION

1. If the sensor does not move more than 60mV for the input changes (5 second operation) of the position sensor although the motor is operating, automatic control will stop.
2. The mirror operation signal cannot be displayed into the same direction for more than 15 seconds. (When the mirror is replacing to the saved position or the switch is manually pressed)
3. Monitoring the replacing time
  - A. If the replacing operation does not stop within 40 seconds, the mirror motor will not outputted and the replacing operation will stop.

## IMS SWITCH

1. If it's satisfied with the followings
  - (1) Can communication Data ignition switch sent by IPM is "RUN"
  - (2) Can communication Data Inhibit switch sent by FAM is "P"
  - (3) Can communication Data vehicle speed sent by CLUSTER is under "3Km/h"
2. If SET switch is ON, IMS message is SET.
3. If POSITION switch is ON within 5sec since SET switch is ON, IMS message will be sent to MEMORY1 or MEMORY2.

## SEAT MANUAL SWITCH

If Seat switch is controlled, seat control message is sent to seat.

## COURTESY LAMP

1. If driver's door is opened, RAM changes door open Message to ON and Courtesy lamp is ON by DDM.
2. If driver's door is closed, RAM changes door open Message to Off and Courtesy lamp is OFF gradually by DDM.(5±0.5sec)
3. During dim out, If IGN changes to ON or door is closed while Ignition switch is ON, Courtesy lamp is OFF immediately.
4. If Key reminder switch is OFF and door is opened for 20min, Courtesy lamp is OFF immediately.

## FUEL FILLER DOOR OPEN

When the fuel filler door open switch is turned on, this data is uploaded to the bus through CAN communication.

## DEFOG CONTROL (O/S MIRROR HEAT LINE)

If rear defog switch is on while IGN is ON, rear defog control of IPM is ON and O/S Mirror Defog is ON by DDM,ADM.

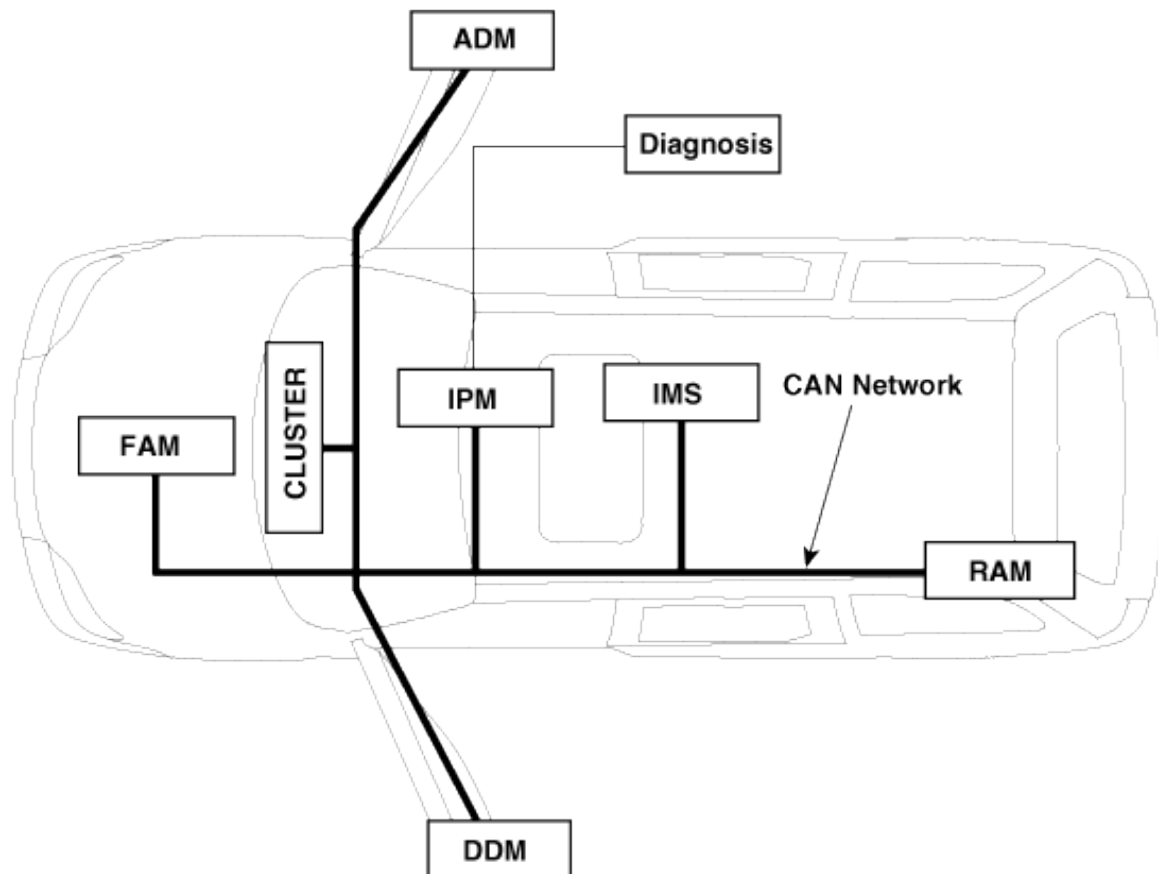
## RESCUE MODE

1. The condition to run RESCUE MODE is listed below.
  - A. Ignition switch Message is in RUN or IGN switch is ON.
  - B. Any signal received from of park tail head lamp, front wiper control message is received as INVALID or CAN line from IPM is not normal.
  - C. Drive door courtesy lamp control message is sent as INVALID or Can Line from RAM is not normal
2. If RESCUE MODE runs, operation is as follows.
  - A. Door unlock is ON for 0.5sec
  - B. OSRVM Defogger is ON for 20min.
  - C. Illumination is ON continuously.
  - D. Other functions are the same as NORMAL mode.
3. If Ignition switch Message is OFF/ACC or IGN switch is OFF or can line from IPM,FAM,RAM is normal, Rescue mode is stopped.

# **Body Electrical System**

Multiplex Communication - Assist Door  
Module (ADM)

## COMMUNICATION DIAGRAM







## DESCRIPTION

The assist door module is a part of CAN, and performs CAN communication with the BCM, FAM, IPM, RAM, DDM, and IMS. The driver can control the power window, mirror, door(lock/unlock) by using buttons of the ADM on the door of the driver's seat.

1. Operating the power window by buttons
2. Central Door LOCK/UNLOCK function
3. Manually operating the mirror position by the manual SW (Up, Down, Right, and Left)
4. Saving and replacing the mirror position by the memory switch → For 2 persons
5. Out side mirror AUTO reverse operation
6. Door courtesy lamp control
7. Out side mirror defog control
8. Illumination control

## CONTROL FUNCTION

### POWER WINDOW CONTROL

1. This switch controls power window up/down from assist side.
  - A. According to the input of assist Door module window, up/down switch, output window motor up/down.
  - B. Power window up/down control from assist side.
2. Timer function  
Power window switch can be controlled for 30 seconds after the ignition is turned off. This function stops immediately even within 30 seconds if the front door is opened.

## CRASH UNLOCK

1. Under the condition "IGN ON", if Crash Sensor message from IPM is ON, Door UNLOCK is output.(5 ± 0.5sec)

## AUTO DOOR LOCK

1. If the vehicle is under any of the following conditions and the condition lasts for 3sec, all doors is locked.  
If message from IPM is "Door Lock Control = LOCK ALL", it will be locked for 0.5sec.
  - A. IGN "RUN" or "START"
  - B. ALT L ON (Engine is running)
  - C. Speed of the vehicle is 40Km/h
  - D. If any door is on "UNLOCK"
2. After LOCK output, if any door is not locked, there will be a series of three Lock output every 0.5sec.
3. If all doors are locked during a series of three output signals, output will be stopped.
4. If any door is not locked after a series of three output signals, output will be stopped.

## KEY REMINDER

1. If door is locked by using door lock knob after opening door while IGN KEY is inserted to KEY CYLINDER, Unlock output will be for 1sec and there will be a series of three output signals every 0.5sec if door condition is "Lock".
2. If Key Reminder unlock message is "SHORT UNLOCK", DOOR UNLOCK lasts for 0.5sec.
3. If Key Reminder unlock message is "LONG UNLOCK", DOOR UNLOCK lasts for 1sec.
4. Remained action goes on though Key Reminder Unlock message changes to "OFF".

## PRIORITY OF DOOR LOCK/UNLOCK

1. Crash Unlock > Auto Door Lock > Key Reminder > Central Door Lock
2. Higher priority signals take precedence, and will override lower priority signals.
3. If the priority is the same or low, it'll be ignored.

## OUT SIDE MIRROR FOLD/UNFOLD POWER CONTROL

1. Supply folding power for 30sec after ACC ON or ACC OFF.
2. FOLD/UNFOLD operation is controlled by fold switch.

## OUT SIDE MIRROR CONTROL BY THE SWITCH

### 1. Manual control of left outside mirror

If the mirror direction switch (up, down, left and right) is pressed when mirror selection switch on driver side power window switch is in outside LH under ACC ON condition, then mirror motor moves to the corresponding direction.

### 2. Manual control of right outside mirror

If the mirror direction switch (up, down, left and right) is pressed when mirror selection switch on driver side power window switch is in outside RH under ACC ON condition, then operating signal is sent to passenger side power window switch through CAN communication.

## OUTSIDE MIRROR MEMORY OPERATION BY THE MEMORY SWITCH

### 1. IMS Message from DDM is sent to RETURN1 or RETURN2, out side mirror returns to the position stored.

### 2. Memory permit status is released if any of the following conditions is met

- A. If 5 seconds is elapsed after the memory switch is turned on
- B. If the ignition 2 is turned off
- C. When saving is completed
- D. If Ignition switch of the CAN communication data sent by the IPM is not "Run" or "Start".
- E. If Inhibit switch of the CAN communication data sent by the FAM is not "P".
- F. If vehicle speed of the CAN communication data sent by the cluster is "3Km/h" or more.

### 3. Memory is cleared if the battery is removed

## OUTSIDE MIRROR MEMORY AND REPLAY OPERATION BY THE MEMORY SWITCH

### 1. IMS message from DDM is sent to RETURN1 or RETURN2, O/S MIRROR returns to the position stored.

### 2. Replacing not stored position doesn't work.

### 3. If RETURN Message is sent during replacing, the last Message has priority.

### 4. Replacing Prohibition Conditions.

- (1) If the mirror switch on the LH side is pressed
- (2) If Ignition switch of the CAN communication data sent by the IPM is not "Run".
- (3) If Inhibit switch of the CAN communication data sent by the FAM is not "P".
- (4) If vehicle speed of the CAN communication data sent by the CLUSTER is "3Km/h".

## OUTSIDE MIRROR MEMORY AND REPLAY OPERATION BY KEYLESS

### 1. Memory operation

- A. If the ignition is turned off after being on, the position of the O/S mirror RH is saved in the switch ASSY power window main.
- B. If the door was keyless-locked, the outside mirror RH position is saved corresponding to the keyless code.

### 2. Replay operation

- A. If the door is keyless-unlocked while the IGN SW is off, replacing is made to the saved position corresponding to the keyless code.

### 3. Replay prohibit condition

- A. When the inhibit "P" switch is OFF
- B. When RH side mirror switch is pressed
- C. When mirror switch is pressed after ignition on
- D. When the vehicle speed is over 3km/h

## AUTO REVERSE FUNCTION

| No. | Operation       | Select SW | Shift Lever | MIR Position |            | Manipulation                             | Result                                                                         |
|-----|-----------------|-----------|-------------|--------------|------------|------------------------------------------|--------------------------------------------------------------------------------|
|     |                 |           |             | L            | R          |                                          |                                                                                |
| 1   | Basic Operation | LH        | P           | Position A   | Position B | Changing the shift lever from "P" to "R" | MIR L:Auto reverse to position (A-5°)<br>MIR R:Auto reverse to position (B-5°) |
| 2   |                 | RH        | P           | Position A   | Position B |                                          | MIR L:NO change<br>MIR R:Auto reverse to position (B-5°)                       |
|     |                 |           |             |              | Position   |                                          | MIR L:NO change                                                                |

|   |                                 |    |   |                         |                |                                          |                                                              |
|---|---------------------------------|----|---|-------------------------|----------------|------------------------------------------|--------------------------------------------------------------|
| 3 |                                 | N  | P | Position A              | Position B     |                                          | MIR L:NO change<br>MIR R:NO change                           |
| 4 | Returning after Basic Operation | LH | R | Result of No.1          | Result of No.2 | Changing the shift lever from "R" to "P" | MIR L:Return to position (A)<br>MIR R:Return to position (B) |
| 5 |                                 | RH | R | No.1 is being performed | Result of No.2 |                                          | MIR L:NO change<br>MIR R:Return to position (B)              |

## FAIL SAFE FUNCTION

1. If the sensor does not move more than 60mV for the input changes (5 second operation) of the position sensor although the motor is operating, it will be considered there is a harness cutting, motor breakdown, or sensor breakdown and automatic control will stop.
2. The mirror operation signal cannot be displayed into the same direction for more than 15 seconds. (When the mirror is replacing to the saved position or the switch is manually pressed)
3. Monitoring the replacing time
  - A. If the replacing operation does not stop within 40 seconds, the mirror motor will not outputted and the replacing operation will stop.

## COURTESY LAMP

1. If assist's door is opened, RAM changes door open Message to ON and Courtesy lamp is ON by ADM.
2. If assist's door is closed, RAM changes door open Message to Off and Courtesy lamp is OFF gradually by ADM.(5±0.5sec)
3. During dim out, If IGN changes to ON or door is closed while Ignition switch is ON, Courtesy lamp is OFF immediately.
4. If Key reminder switch is OFF and door is opened for 20min, Courtesy lamp is OFF immediately.

## DEFOG CONTROL (O/S MIRROR HEAT LINE)

If rear defog switch is on while IGN is ON, rear defog control of IPM is ON and O/S Mirror Defog is ON by DDM, ADM.

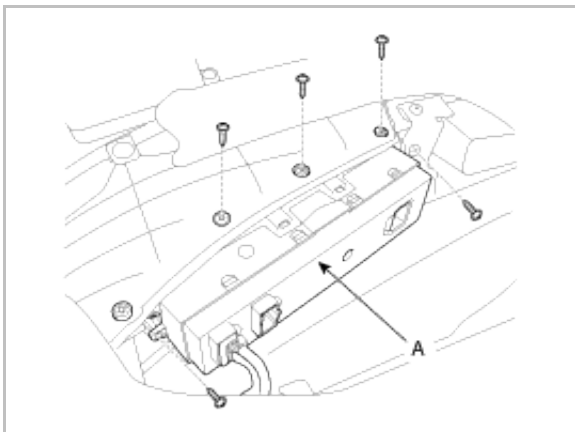
## RESCUE MODE

1. The condition to run RESCUE MODE is listed below.
  - A. Ignition switch Message is in RUN or IGN switch is ON.
  - B. Any signal received from of park tail head lamp, front wiper control message is received as INVALID or CAN line from IPM is not normal.
  - C. Drive door courtesy lamp control message is sent as INVALID or Can Line from RAM is not normal.
2. If RESCUE MODE runs, operation is as follows.
  - A. Door unlock is ON for 0.5sec
  - B. OSRVM Defogger is ON for 20min.
  - C. Illumination is ON continuously.
  - D. Other functions are the same as NORMAL mode.
3. If Ignition switch Message is OFF/ACC or IGN switch is OFF or can line from IPM,FAM, RAM is normal, Rescue mode is stopped.



## REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the front door lower panel (Refer to the Body group - front door)
3. Remove the door module (A) mounting screws (5EA) after disconnecting module connector (3EA)



4. Remove the door module (DDM/ADM) (A) from the front door trim panel.

