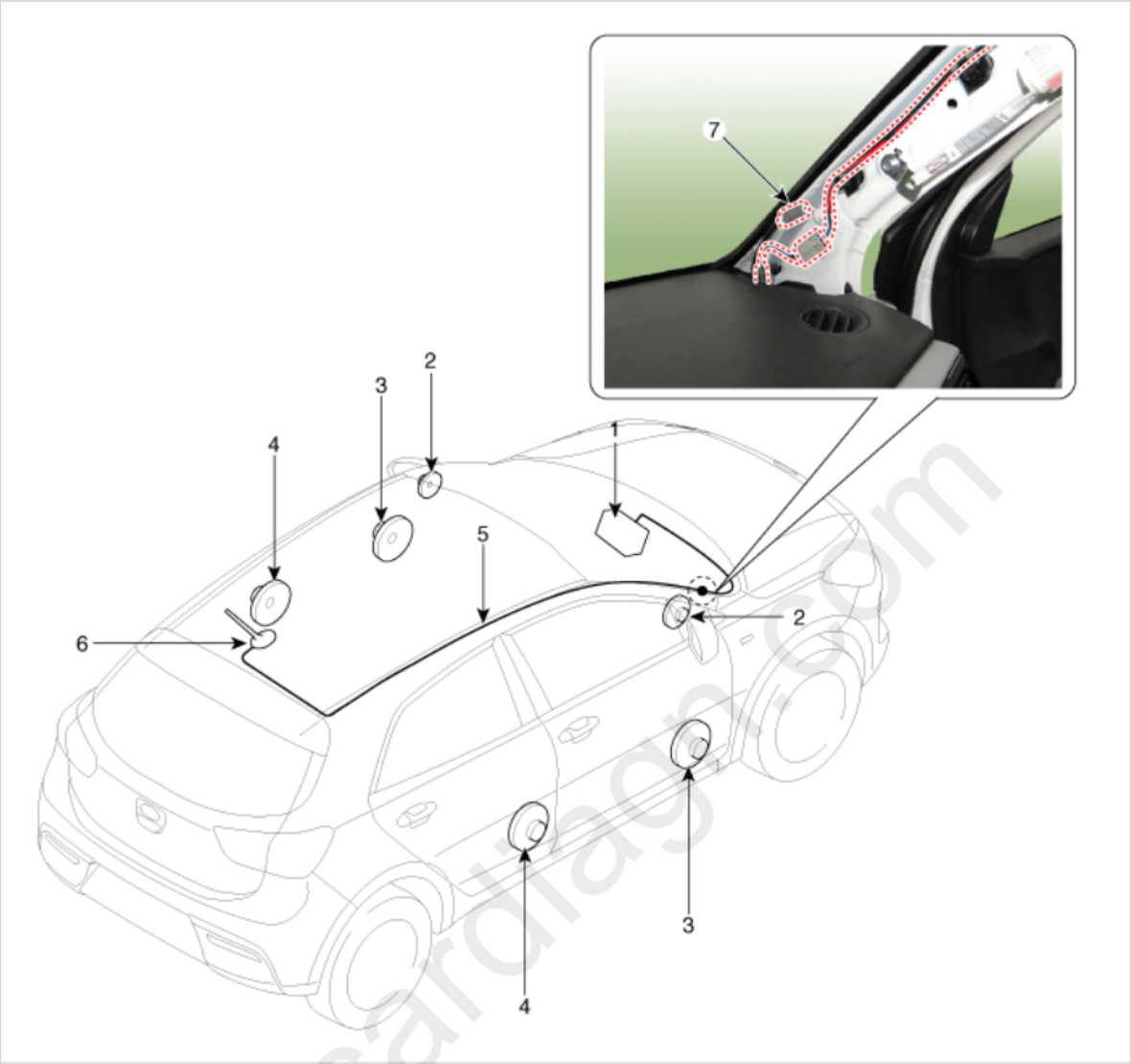
Specifications

Items	Specifications
Model	1) Radio/MP3/Bluetooth (A Type) 2) Radio/MP3/Bluetooth (B Type)
Power supply	DC 14.4 V
Parasitic current	Max. 1mA (Head unit only)
Antenna	80PF 75Ω
Tuning type	PLL SYNTHESIZED TUNING

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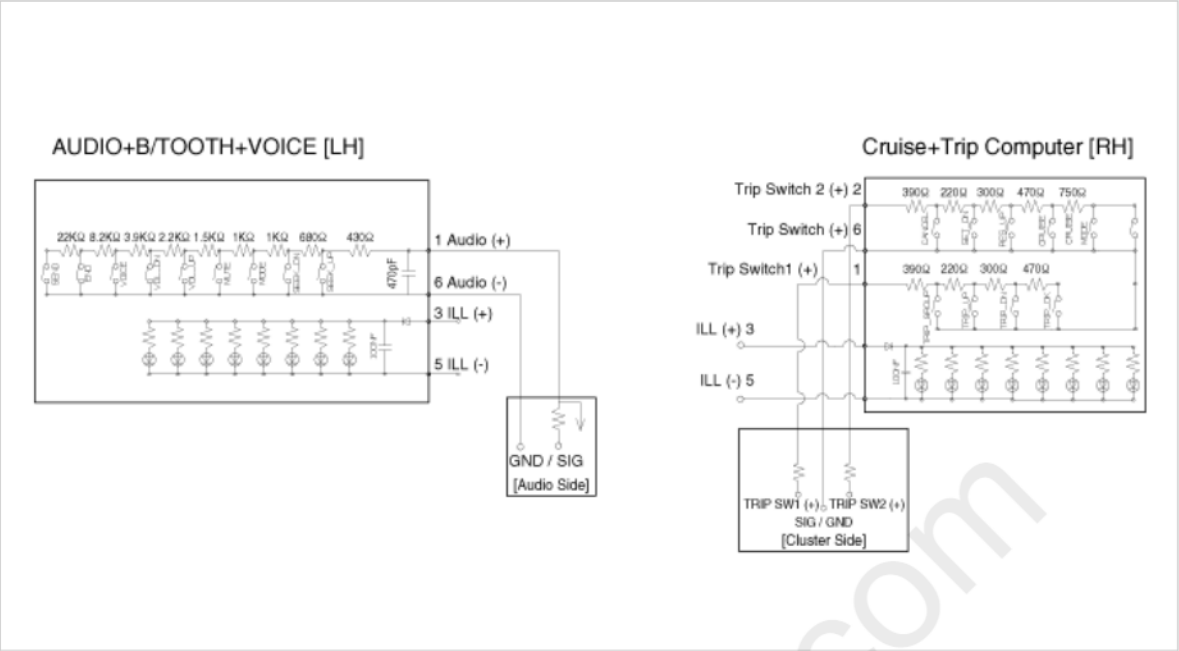
Component Location



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

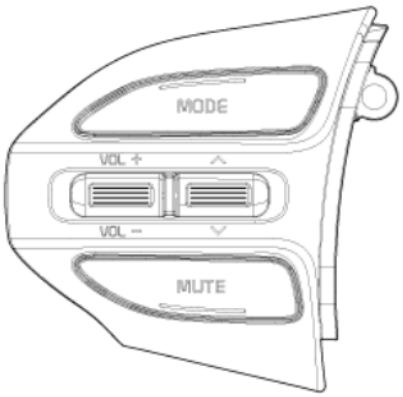
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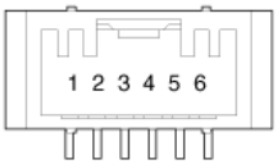
Circuit Diagram

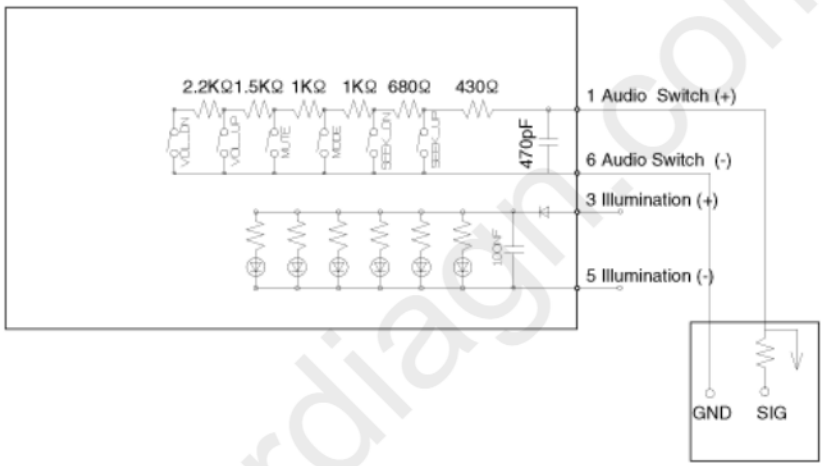


[Audio]

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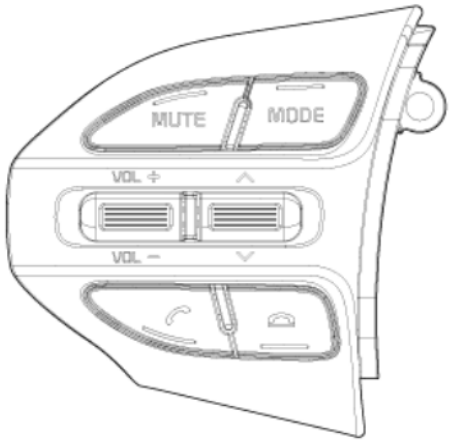


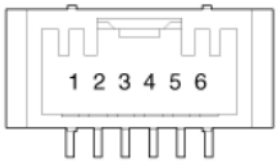
Connector	
	
No.	**Description**
1	Audio switch (+)
2	-
3	Illumination (+)
4	-
5	Illumination (-)
6	Audio switch (-)

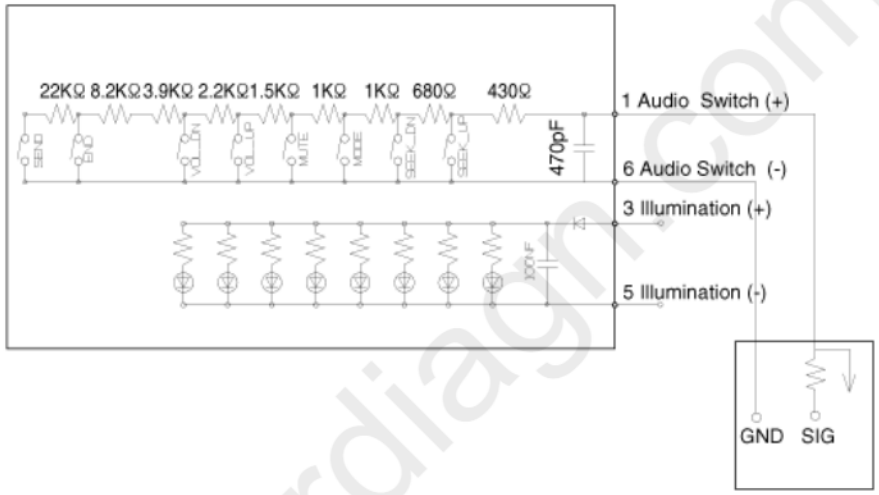


[Audio + Bluetooth]

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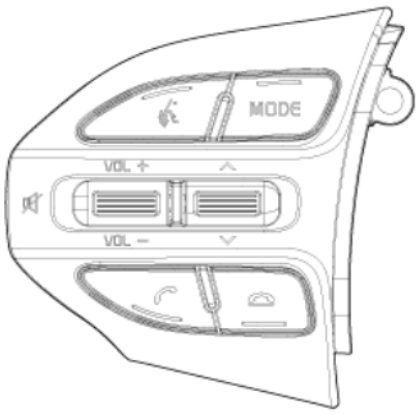


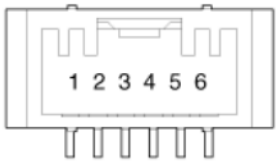
Connector	
	
No.	**Description**
1	Audio switch (+)
2	-
3	Illumination (+)
4	-
5	Illumination (-)
6	Audio switch (-)

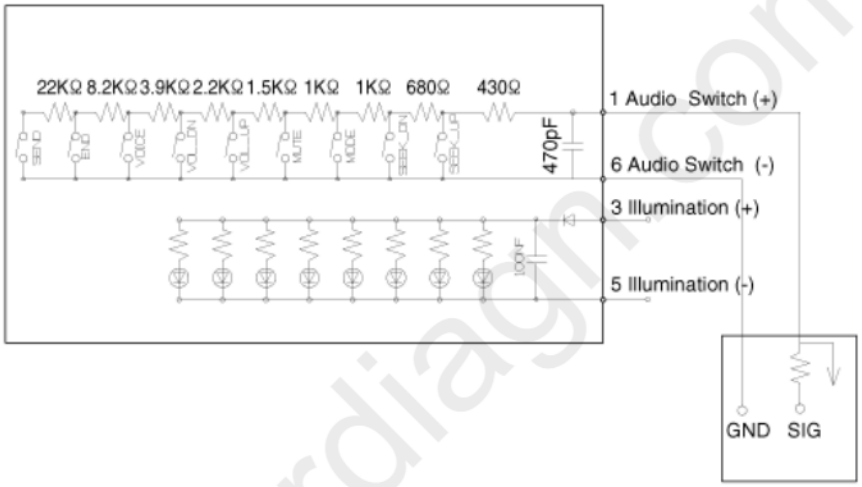


[Audio + Bluetooth + Voice]

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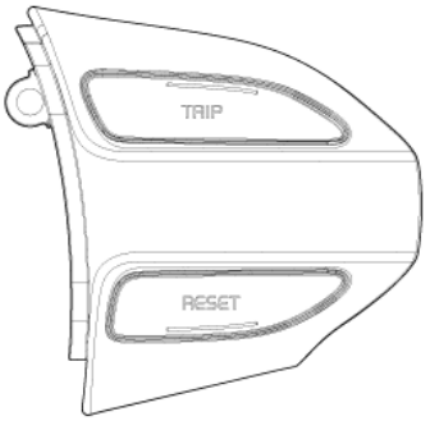


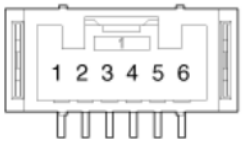
Connector	
	
No.	**Description**
1	Audio switch (+)
2	-
3	Illumination (+)
4	-
5	Illumination (-)
6	Audio switch (-)

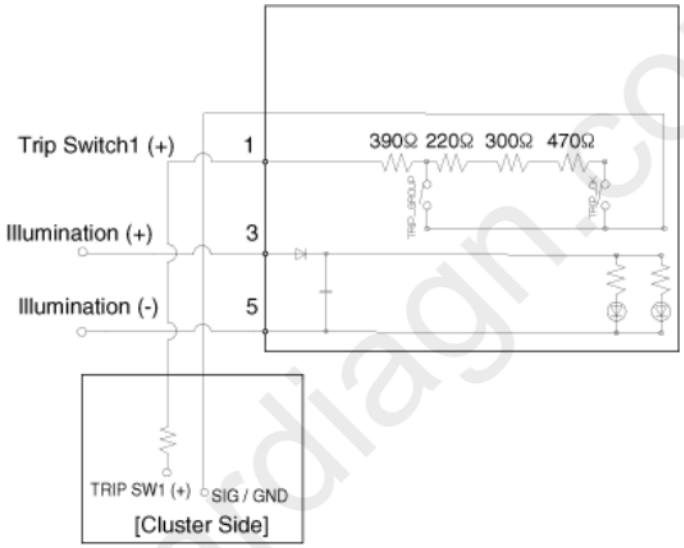


[Trip]

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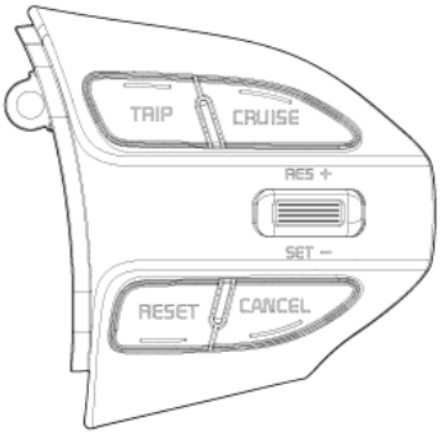


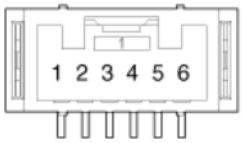
Connector	
	
No.	**Description**
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



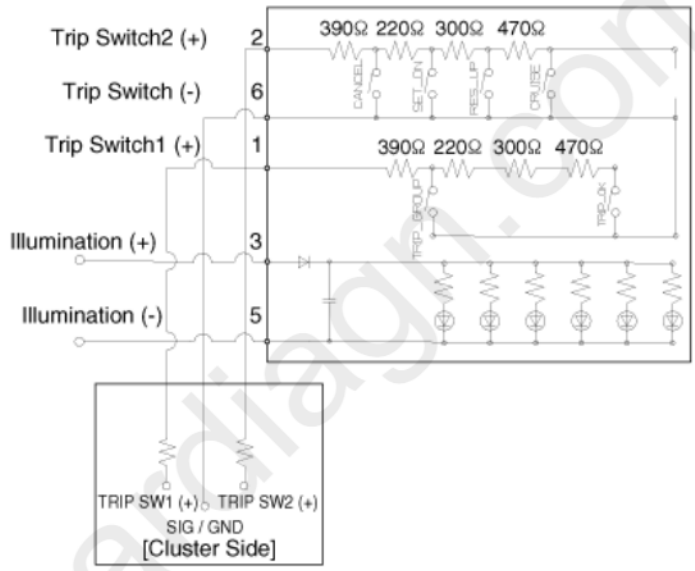
[Trip + ACC (2 Button)]

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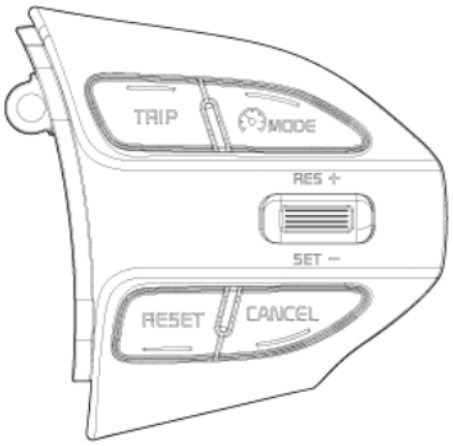
Connector


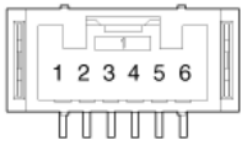
No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



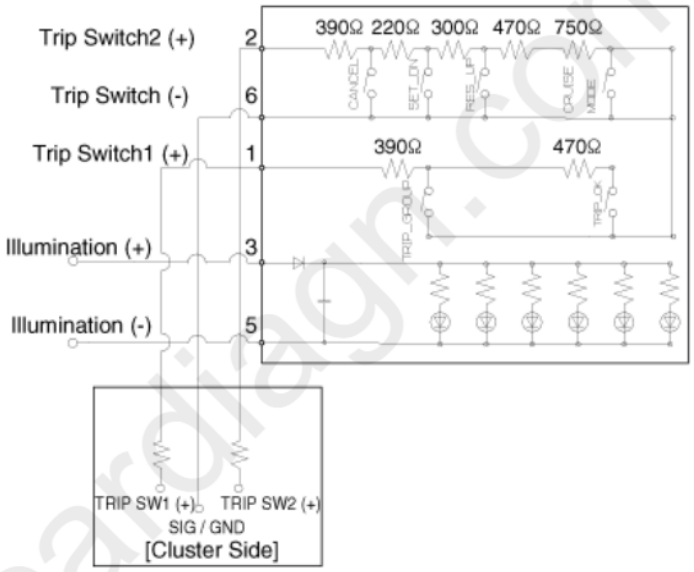
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[Trip + ACC + SLD (2 Button)]



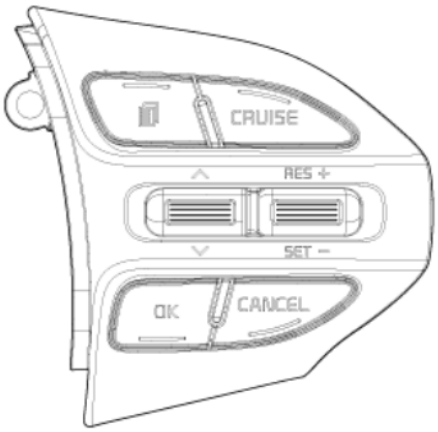
Connector


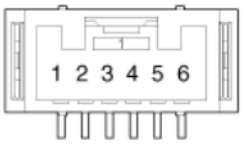
No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



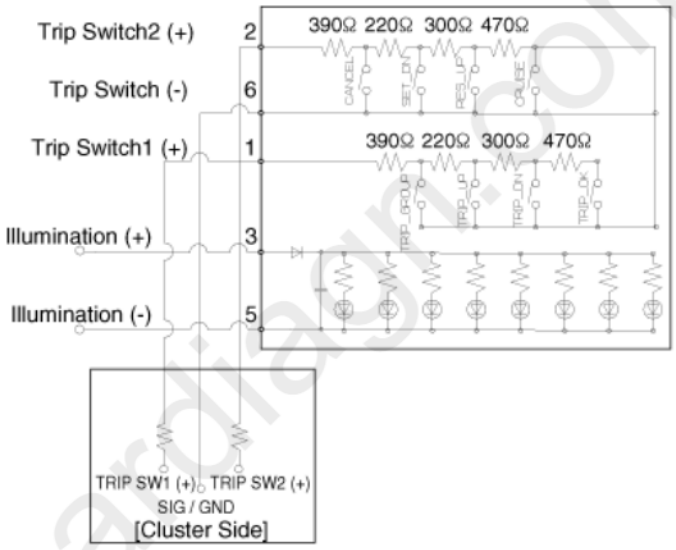
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[Trip + ACC (4 Button)]



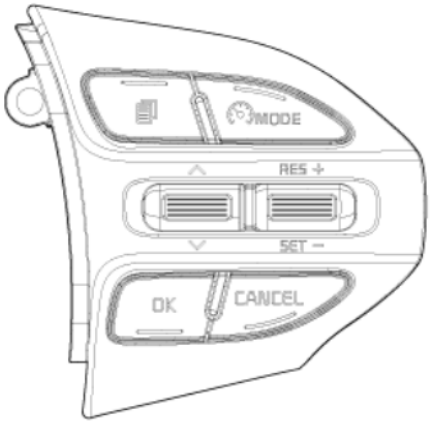
Connector


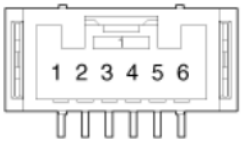
No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



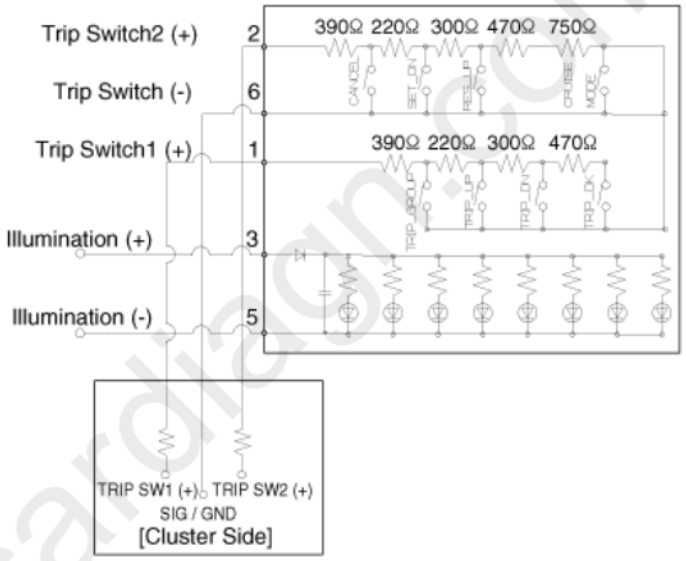
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[Trip + ACC + SLD (4 Button)]



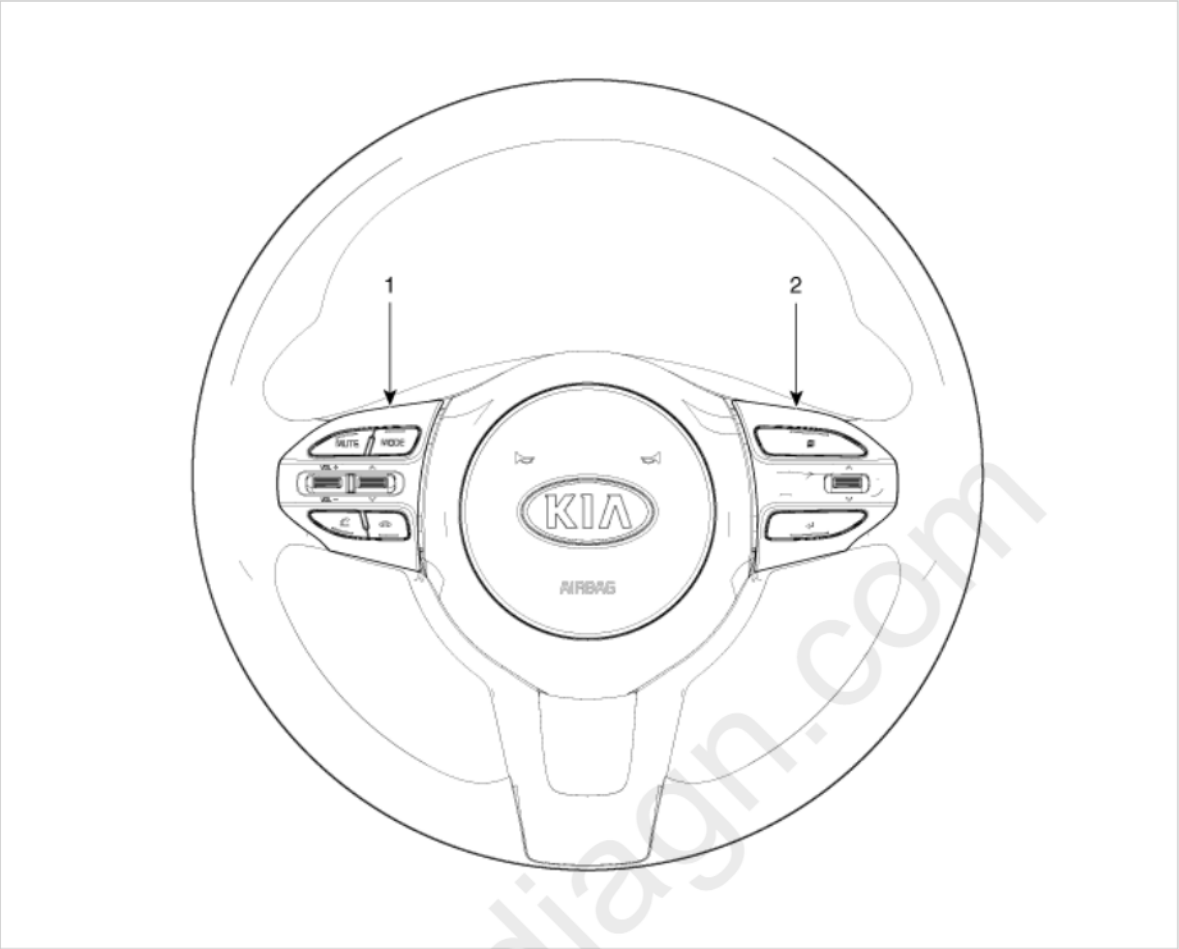
Connector


No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



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Components



1. Left Remote Control Switch (Audio + Hands free + Voice)
2. Right Remote Control Switch (Cruise+Trip Computer)

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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the steering wheel assembly.
   (Refer to Steering System - "Steering Wheel")
3. Remove the steering wheel remote control (A) after loosening the mounting screws.

[LH]





[RH]



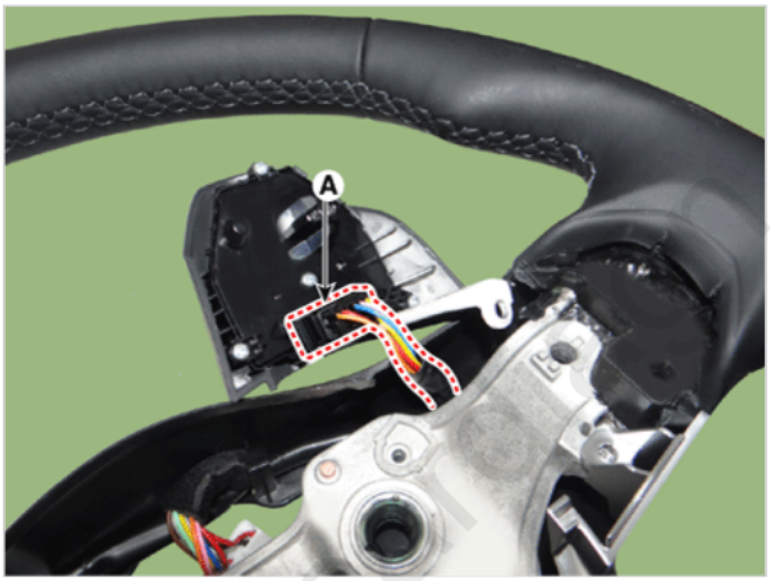
4. Disconnect the steering wheel remote control connector (A).

[LH]

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[RH]

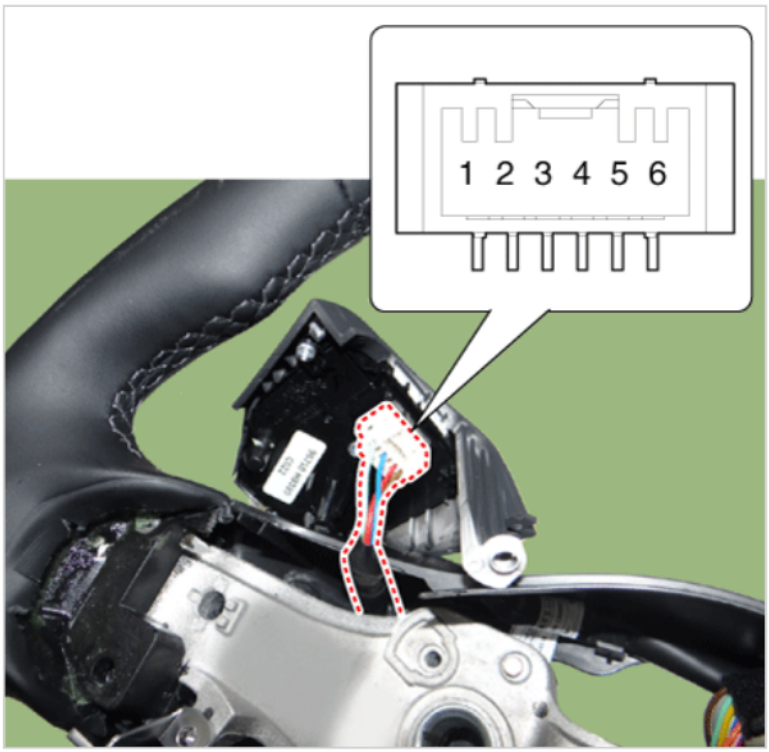


Installation

1. Connect the steering wheel remote control connector.
2. Install the steering wheel remote control.
3. Install the steering wheel and driver airbag module.
4. Connect the negative (-) battery terminal.

Inspection

1. Check the resistance between terminals in each switch position (LH).

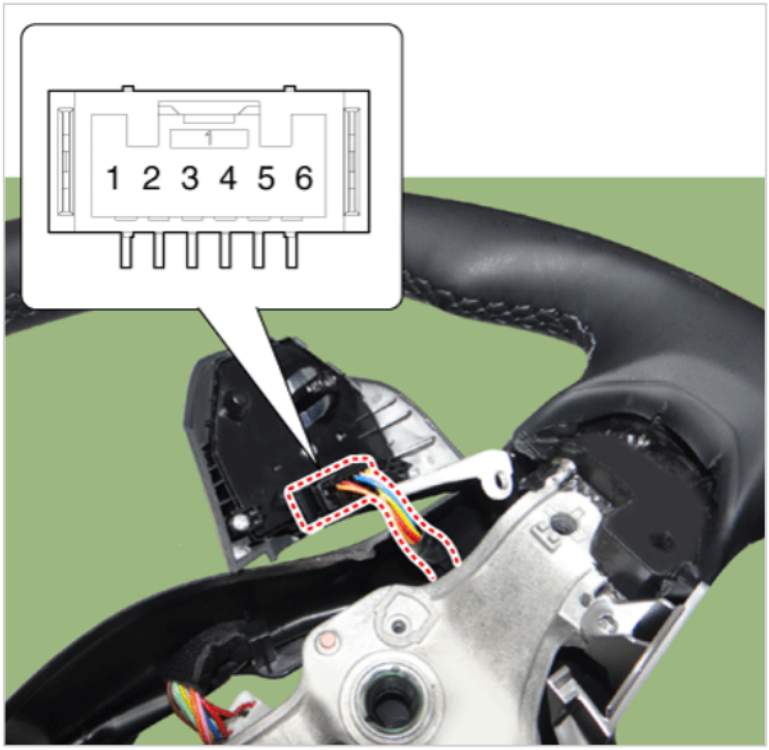


[LH : Audio + Hands free + Voice]

Switch	Connector terminal	Resistance (±3%)
SEEK Up	1-6	430 Ω
SEEK Down		1.11 kΩ
MODE		2.11 kΩ
MUTE		3.11 kΩ
Volume (+)		4.61 kΩ
Volume (-)		6.81 kΩ
Voice		10.71 kΩ
END		18.91 kΩ
SEND		40.91 kΩ

2. Check for resistance between terminals in each switch position (RH).

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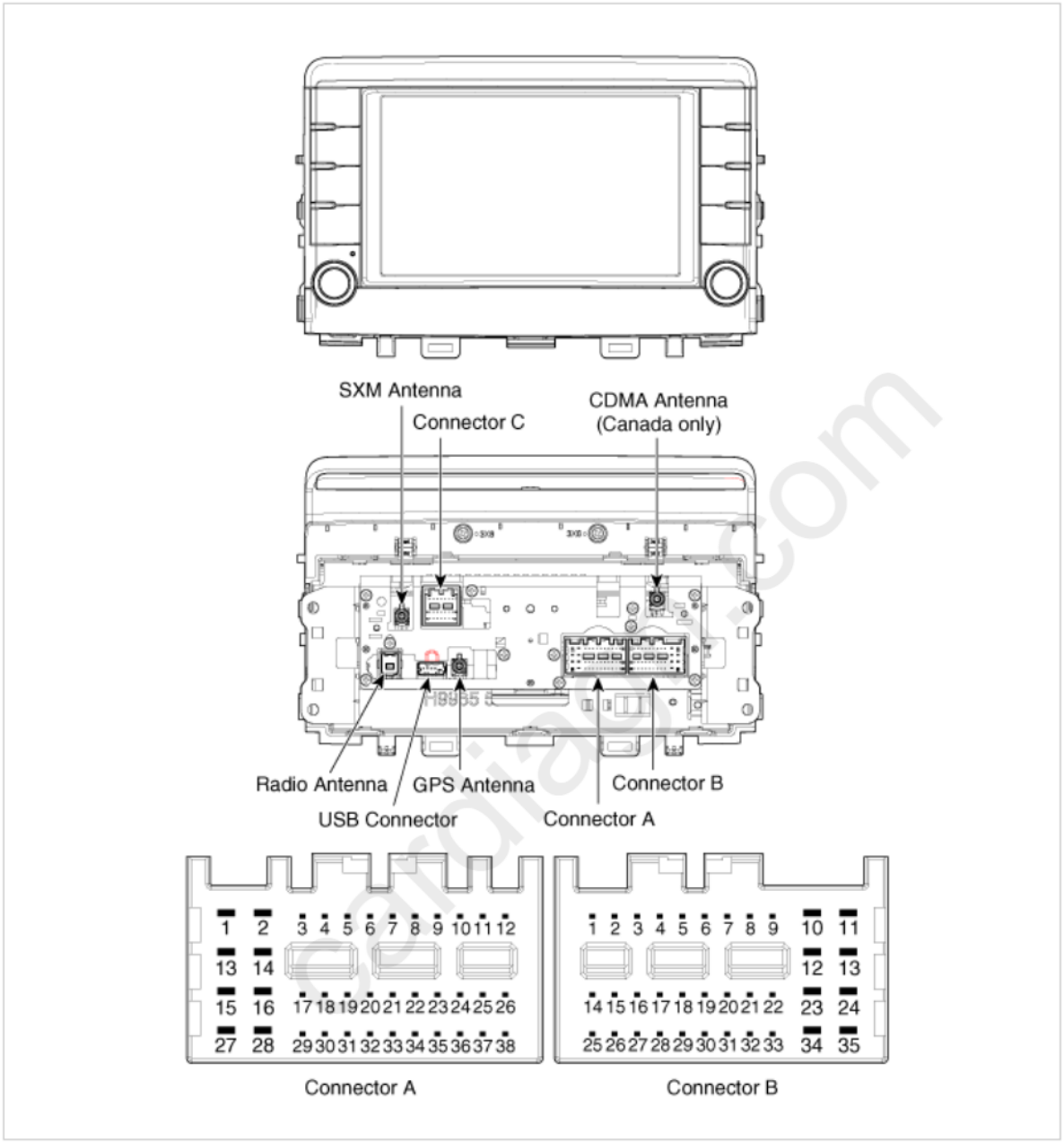
[RH : Cruise + Trip]

Switch	Connector terminal	Resistance (±3%)
Cancel	2-6	390 Ω
SET -		610 Ω
RES +		910 Ω
Cruise ON/OFF		1.38 kΩ
Cruise & Speed Limit ON/OFF Cruise Mode		2.13 kΩ
Group	1-6	390 Ω
Trip Up		610 Ω
Trip Down		910 Ω
OK / Reset		1.38 kΩ

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Components

[Radio/MP3/Bluetooth (A Type)]



Connector Pin Information

No.	Connector A	Connector B
1	Rear door left speaker (+)	-
2	Rear door left speaker (-)	MIC (+)
3	-	-
4	-	-
5	-	Remote antenna
6	Camera Power	Illumination (+)
7	Camera VIN	Multimedia-CAN (High)
8	-	-

9	-	ALT Left_output (-)
10	AUX Right input	Battery (+)
11	AUX Detect	Battery (+)
12	Steering wheel remote controller	Ground
13	Front door left speaker (+)	Ground
14	Front door left speaker (-)	MIC (Ground)
15	Front door right speaker (-)	MIC (-)
16	Front door right speaker (+)	-
17	-	"N" Position
18	-	-
19	-	Illumination (-)
20	Camera Ground	Multimedia-CAN (Low)
21	Camera VIN Ground	-
22	-	ACC
23	-	-
24	AUX Left input	-
25	AUX Ground	Reverse
26	Steering wheel remote controller (Ground)	Door open
27	Rear door right speaker (-)	Door unlock
28	Rear door right speaker (+)	Parking brake
29	-	"P" Position
30	-	Auto light
31	-	Transmission_Detect
32	-	-
33	Camera VIN Shield	IGN1
34	-	-
35	-	-
36	-	
37	-	
38	Vehicle Speed	

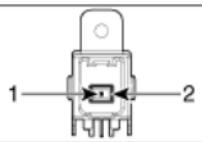
Connector C

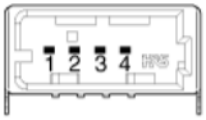


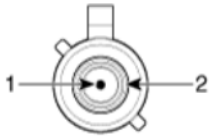
No.	Description	No.	Description
1	Body-CAN (+) (Canada only)	12	-

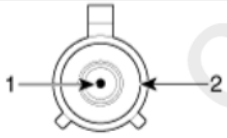
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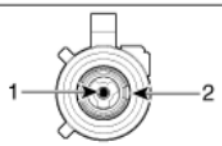
2	Chassis-CAN (+)	13	- (CD_RS422_TX -)
3	- (OBC_Wake up)	14	- (CD_RS422_RX -)
4	-	15	- (Air bag)
5	-	16	MTS Key_Input (Canada only)
6	- (CD_RS422_TX +)	17	-
7	- (CD_RS422_RX +)	18	- (CD_SPDIF_GND)
8	Body-CAN (-) (Canada only)	19	- (CD_SPDIF +)
9	Chassis-CAN (-)	20	- (CD_SPDIF -)
10	-	21	- (CD_RS422_GND)
11	-		

Radio Antenna	No.	Description	No.	Description
	1	AM/FM Signal	2	Ground

USB Connector	No.	Description	No.	Description
	1	USB VOD	3	USB D (+)
	2	USB D (-)	4	USB Ground

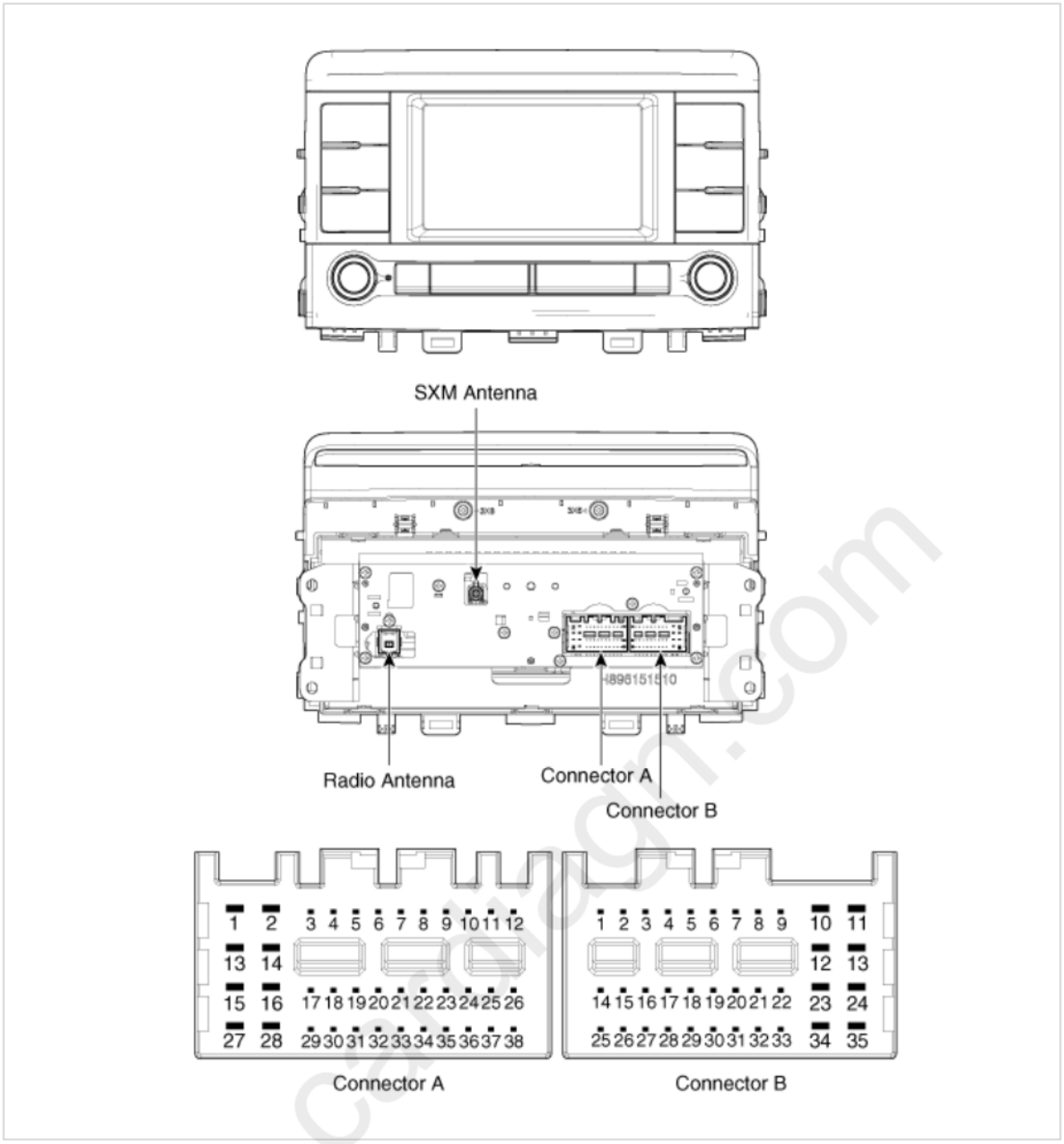
GPS Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

SXM Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

CDMA Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

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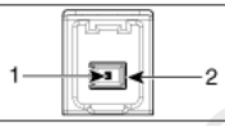
[Radio/MP3/Bluetooth (B Type)]

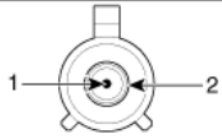


Connector Pin Information

No.	Connector A	Connector B
1	Rear door left speaker (+)	-
2	Rear door left speaker (-)	MIC (+)
3	USB Ground	-
4	USB D (+)	-
5	USB D (-)	Remote antenna
6	USB Power	Illumination (+)
7	Camera VIN	-
8	-	-
9	-	-
10	AUX Right input	Battery (+)
11	AUX Detect	Battery (+)
12	Steering wheel remote controller	Ground

13	Front door left speaker (+)	Ground
14	Front door left speaker (-)	-
15	Front door right speaker (-)	MIC (-)
16	Front door right speaker (+)	-
17	-	-
18	-	Vehicle speed
19	-	Illumination (-)
20	Camera Power	-
21	Camera VIN Ground	-
22	-	ACC
23	-	-
24	AUX Left input	-
25	AUX Ground	Reverse
26	Steering wheel remote controller (Ground)	Door open
27	Rear door right speaker (-)	-
28	Rear door right speaker (+)	Parking brake
29	-	"P" Position
30	-	Auto light
31	-	-
32	Camera Ground	IGN1
33	Camera VIN Shield	-
34	-	-
35	-	-
36	Camera Detect	
37	Transmission Detect	
38	-	

Radio Antenna	No.	Description	No.	Description
	1	AM/FM Signal	2	Ground

SXM Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

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Removal

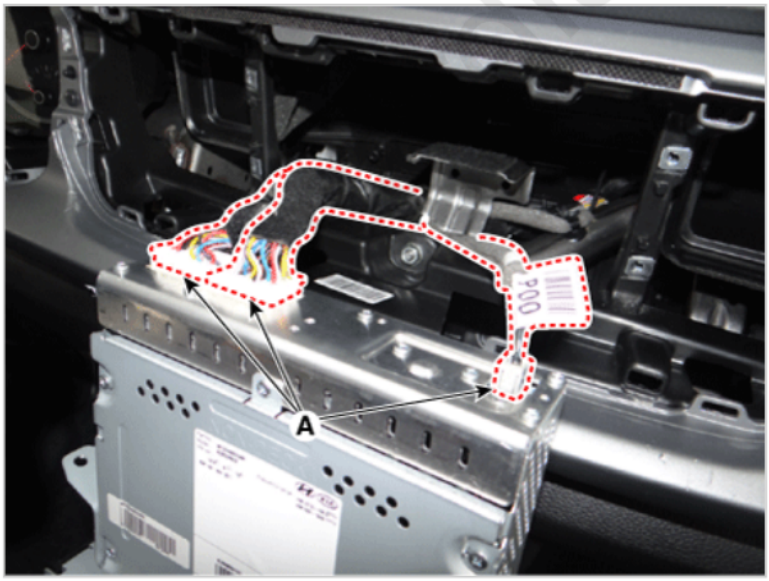
CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the crash pad when removing/installing because lubricant and oil can leave a stain on the trim.

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia duct assembly.
   (Refer to Body - "Center Fascia Panel")
3. Remove the audio head unit (A) after loosening the mounting screws.



4. Remove the audio head unit after disconnecting the connectors and antenna cable (A).



Installation

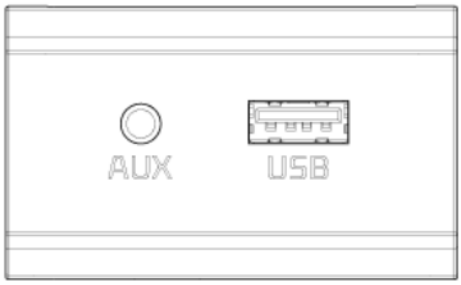
1. Connect the audio head unit connectors and antenna cable.
2. Install the audio head unit.
3. Install the center fascia duct assembly.
4. Connect the negative (-) battery terminal.

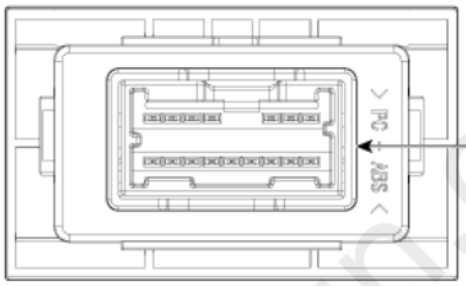
NOTICE

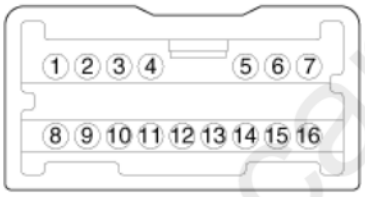
- Make sure the connector are connected in properly.
- Check the audio system.

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Circuit Diagram





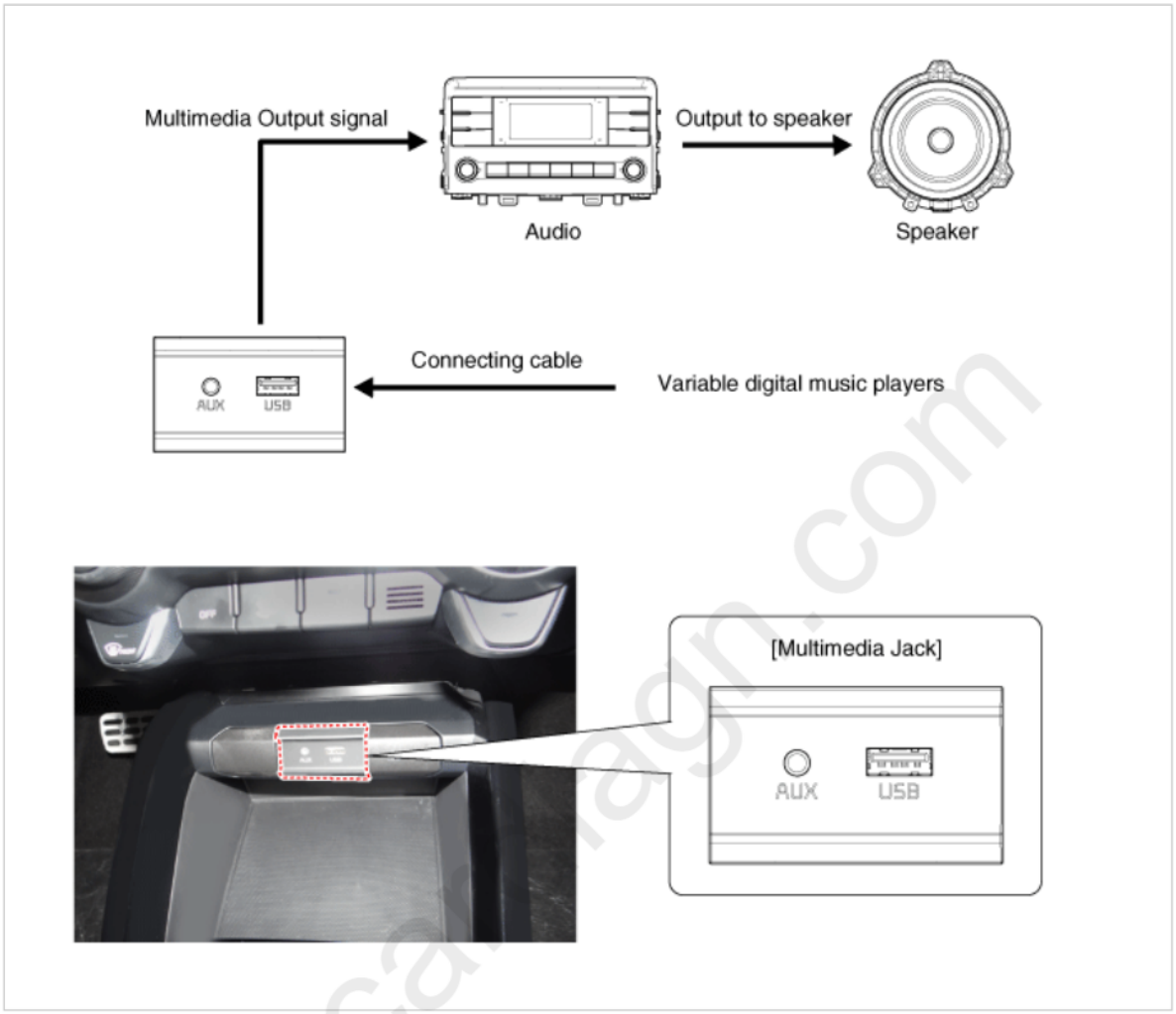
Connector A	No.	Description	No.	Description
	1	AUX_Ground	9	-
	2	AUX_Detect	10	Illumination (-)
	3	AUX Input (Left)	11	-
	4	AUX input (Right)	12	Multimedia_Ground
	5	USB Power 5V	13	-
	6	USB D (-)	14	-
	7	USB D (+)	15	-
	8	Illumination (+)	16	USB Ground

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Description

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

In case of distorted sound coming from the AUX-linked external music players, the audio unit may not be defective but the output level of the player does not match the specification of the AUX.



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Removal

Multimedia Jack

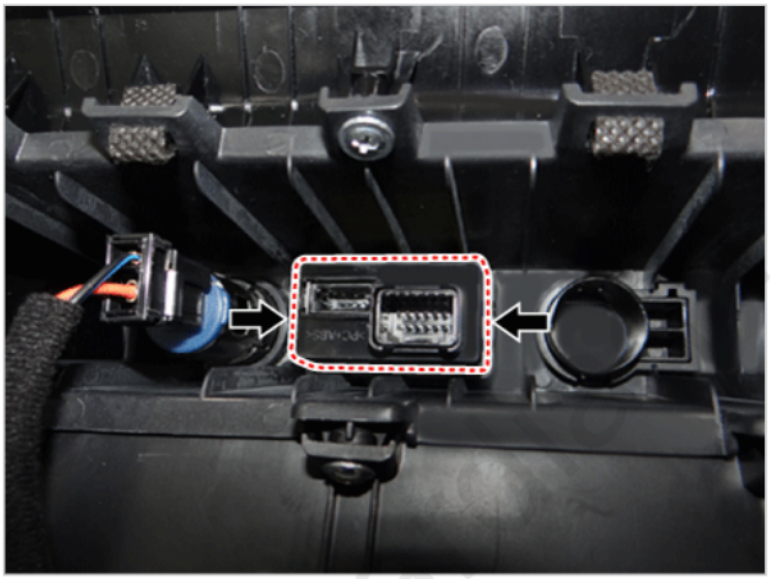
⚠ CAUTION

Put on gloves to protect your hands.

NOTICE

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

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





USB Charger

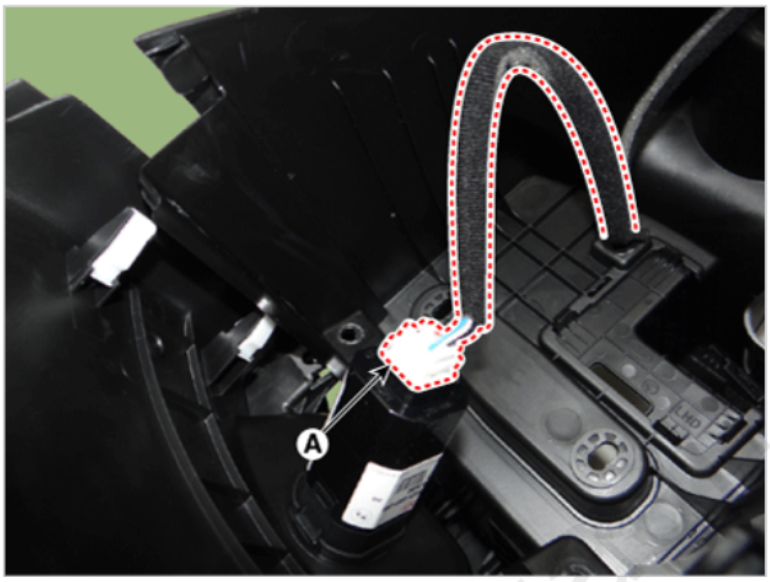
⚠ CAUTION

Put on gloves to protect your hands.

NOTICE

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

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console assembly.
   (Refer to Body - "Floor Console Assembly")
3. Disconnect the USB charger connector (A).



4. Remove the USB charger (A) after releasing the fixed hooks.



Installation

Multimedia Jack

1. Install the multimedia jack.
2. Install the front console upper cover.

3. Connect the negative (-) battery terminal.

NOTICE

- Make sure the multimedia connector and the console front tray connectors are plugged in properly.
- Check the audio system for normal operation.

USB Charger

1. Install the USB charger.
2. Connect the USB charger connector.
3. Install the floor console assembly.
4. Connect the negative (-) battery terminal.

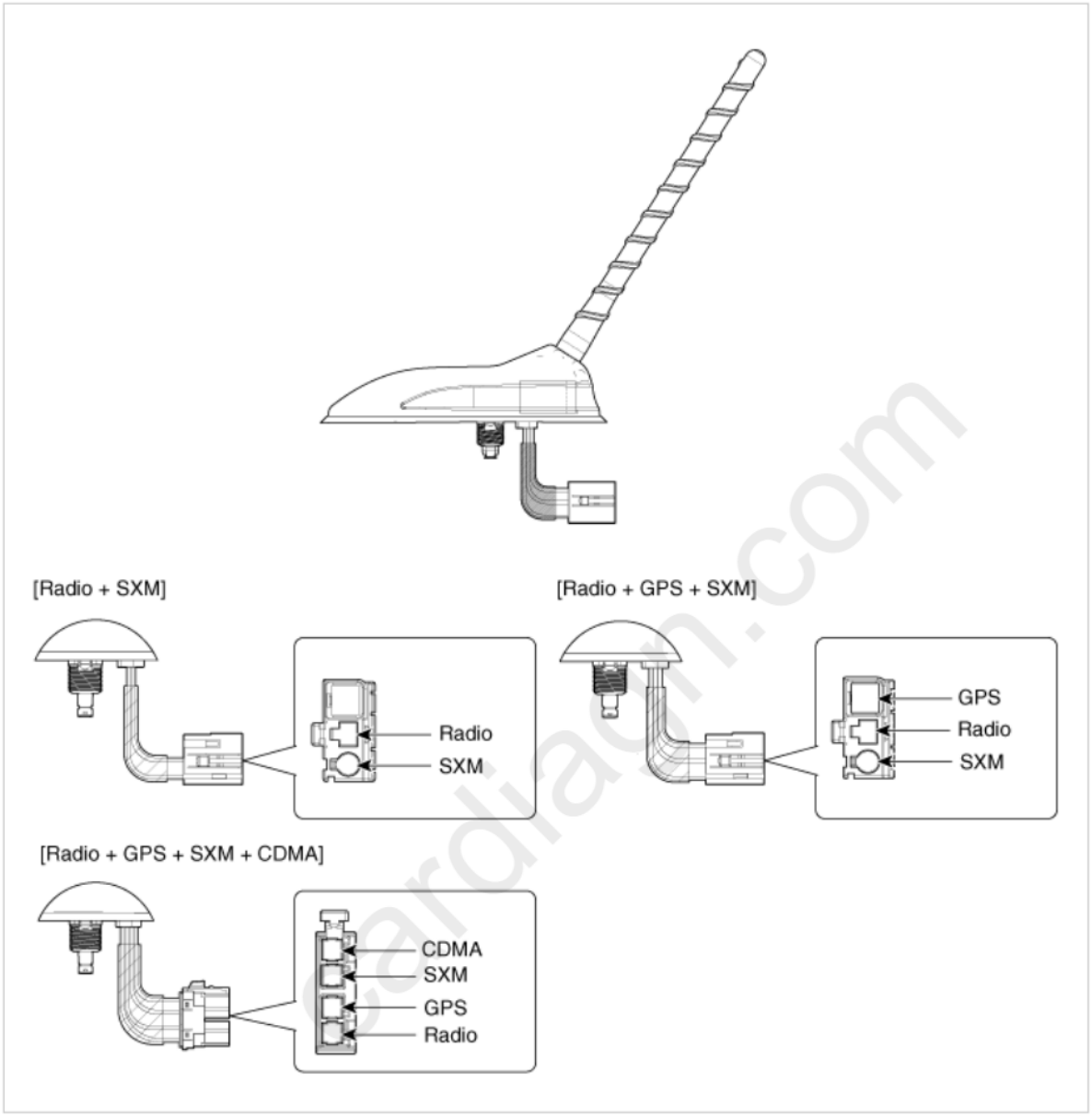
NOTICE

Make sure that the cables and connectors are plugged in properly.

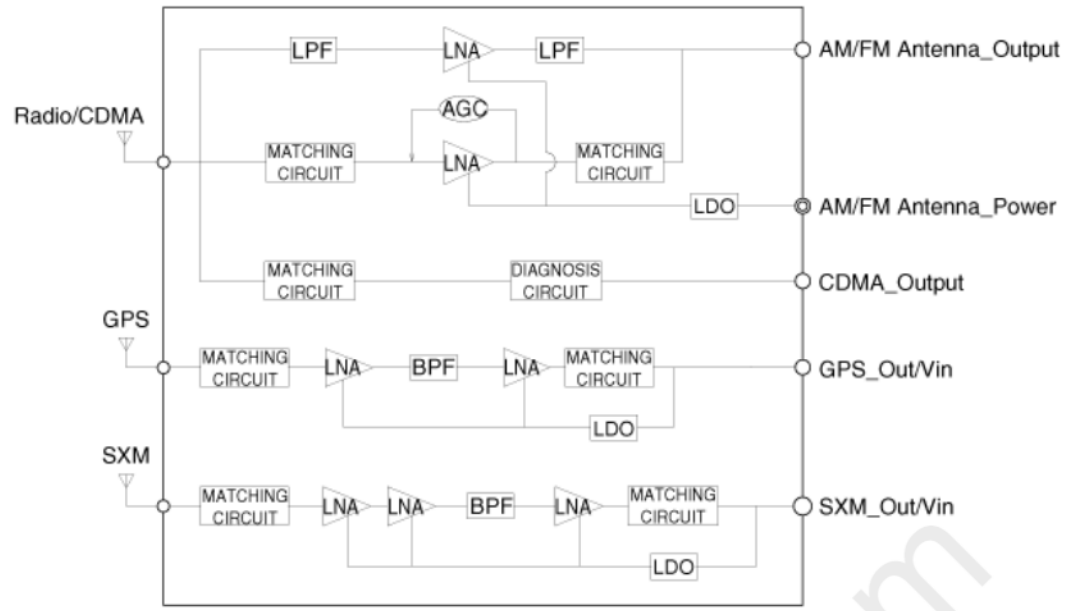
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Components

[Roof Antenna (Radio + GPS + SXM + CDMA)]



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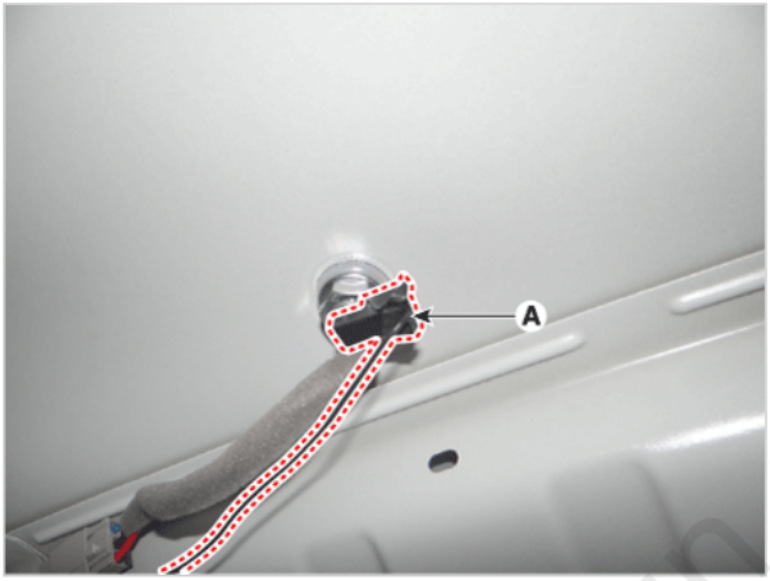
※ LNA (Low Noise Amplifier)
BPF (Band Pass Filter)
RFC (Radio Frequency Choke)

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Removal

Roof antenna

1. Disconnect the negative (-) battery terminal.
2. Remove the roof trim assembly.
   (Refer to Body - "Roof Trim Assembly")
3. Disconnect the roof antenna power connector (A).



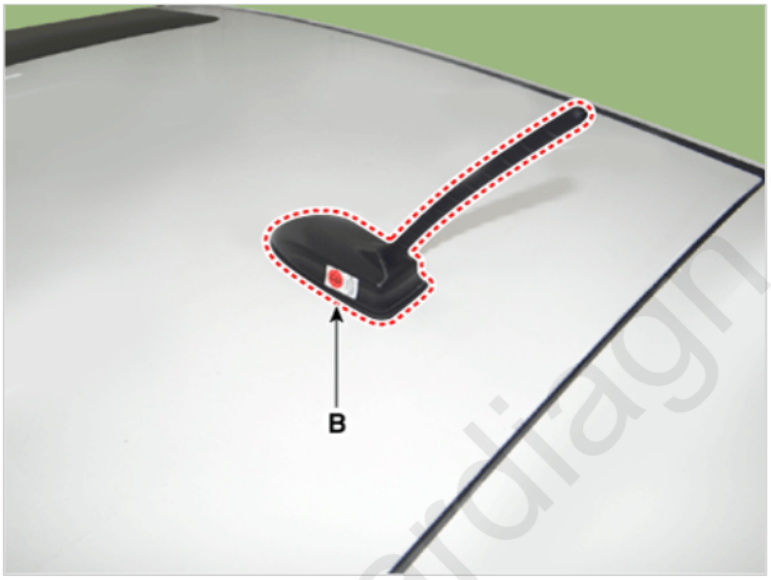
4. Disconnect the radio antenna connector (A).



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

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Installation

Roof antenna

1. Install the roof antenna.
2. Connect the roof antenna power connector and radio antenna connectors.
3. Install the roof trim assembly.
4. Connect the negative (-) battery terminal.

NOTICE

- Make sure that the cables and connectors are plugged in properly.
- Check the audio system for normal operation.

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Inspection

Troubleshooting of the speakers

⚠ CAUTION

When handling the speakers :

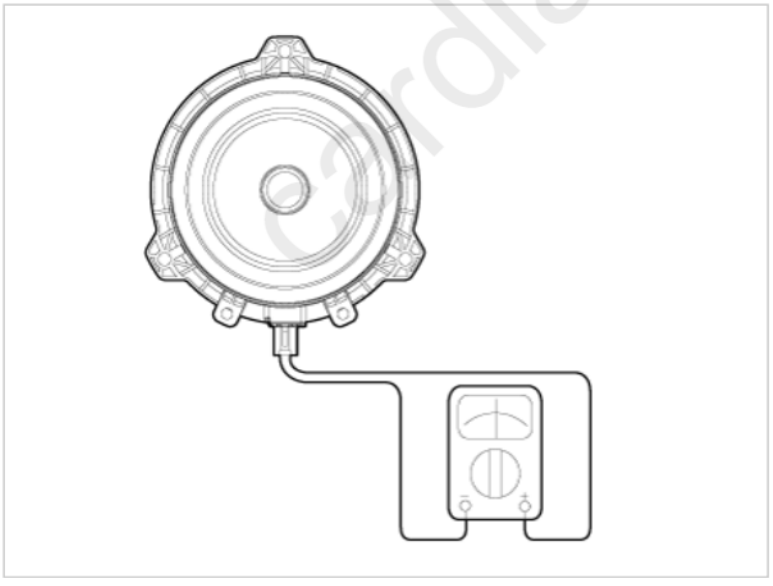
- Do not cause shock to the speakers by dropping or throwing them.
- Be careful not to drop water and oil on the speakers.
- Use caution to handle the speaker because diaphragm made of paper is easily torn by impact or external force.
- Audio system tuning may cause damage to the speakers. The modified speakers are not covered by the manufacturer's warranty.

1. Basic inspection
   Loosen the screws to rule out the interference from the body trims and surrounding parts and then remove the speaker.
   After removing the speaker, check the sound quality of the speaker with the connector plugged in.
2. Inspection for each cause
   (1) Abnormal vibration
   – Make sure the mounting screws are properly tightened before replacing the speaker.
   – Reinstall the speaker and check that the symptom is resolved.
   – If the symptom does not disappear, replace the speaker with a new one.

   (2) Noise
   – Check that the speaker connector is properly connected and reinstall the connector if necessary.
   – If noises occur in the radio mode, turn to the CD player mode.
   – If noises occur in both modes, replace the speaker with a new one.

   NOTICE
   If noises occur only in the radio mode, the poor radio reception is the cause so do not replace the speaker.

   (3) Poor working
   – Check the plus (+) and negative (-) speaker terminals using an ohmmeter.
   – If resistance is measured at the specified value shown below, the speaker operation is normal.
   – If the measured resistance is different from the specified value, replace the speaker.



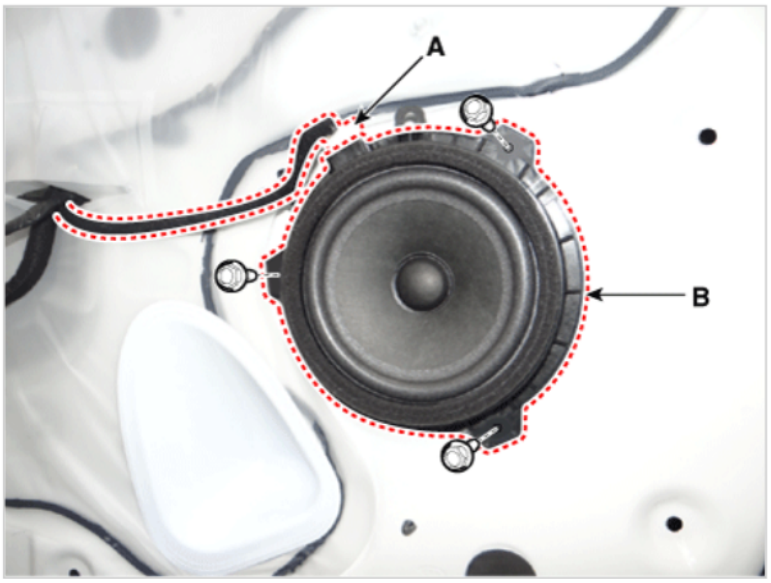
Removal

Front Door Speaker

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")

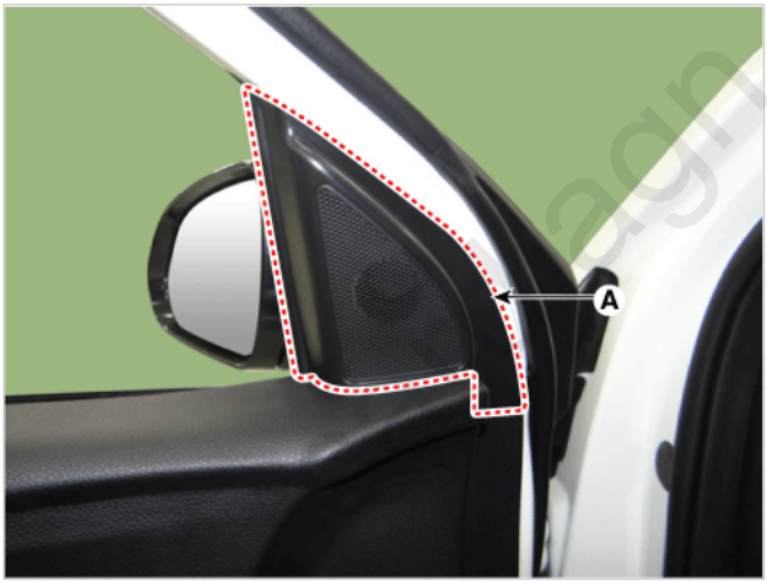
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3. Remove the front door speaker (B) after disconnecting the connector (A) and loosening the bolts.



Tweeter Speaker

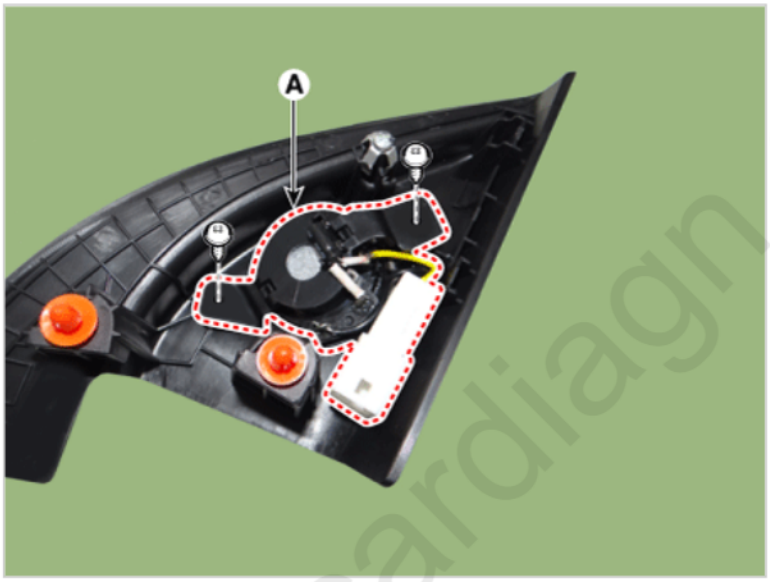
1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, remove the front door quadrant inner cover (A).



3. Disconnect the tweeter speaker connector (A).



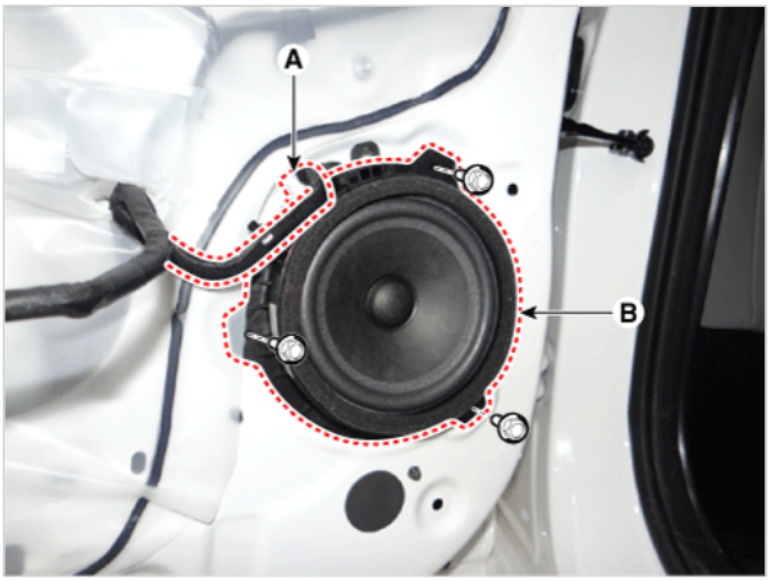
4. Remove the tweeter speaker (A) after loosening the mounting screws.



Rear Door Speaker

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
3. Remove the rear door speaker (B) after disconnecting the connector (A) and loosening the bolts.

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Installation

Front Door Speaker

1. Install the front door speaker.
2. Install the front door trim.
3. Connect the negative (-) battery terminal.

Tweeter Speaker

1. Install the tweeter speaker.
2. Install the front door quadrant inner cover.
3. Connect the negative (-) battery terminal.

Rear Door Speaker

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

NOTICE

- Make sure that the speaker connectors are plugged in properly.
- Check the audio system for normal operation.

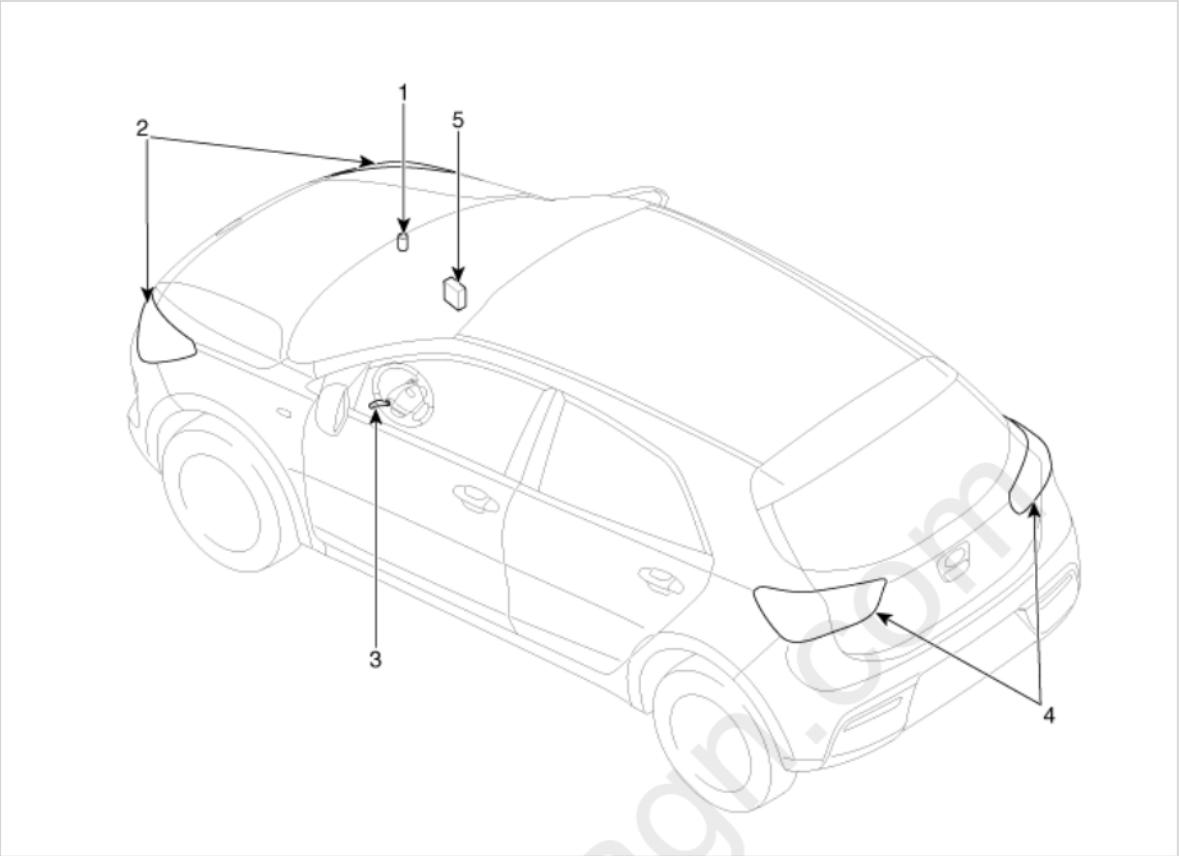
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Specifications

Items		Specifications
Rated voltage		5V
Load		Max. 1mA (Relay load)
Illuminations (LUX)	50	1.22 ± 0.27 V
	150	3.23 ± 0.71 V

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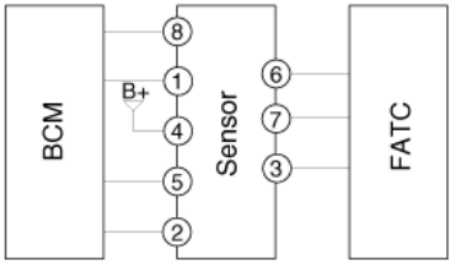
Component Location



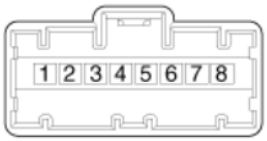
1. Auto light sensor
2. Headlamps
3. Lighting switch (Auto)
4. Tail lamps
5. BCM (Body Control Module)

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Circuit Diagram







[Photo sensor & Auto light sensor Connector]

No.	Description
1	Auto light sensor signal
2	Auto light sensor ground
3	Passenger side photo sensor
4	LED (Power)
5	LED (Signal)
6	Driver side photo sensor
7	Photo sensor power
8	Auto light sensor power

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Description

It"s a system that uses illumination sensor to automatically turn ON the tail lamp and head lamp based on the change in surrounding environment"s illumination condition. It activates when the vehicle enters/exits tunnel, or when the illumination condition in surrounding environment changes due to rain, snow, or fog. Precautions corresponding to the use of this system are as follows.

1. Do not add another device on top of this device.
2. Be sure to switch to manual during poor visibility climate, such as fog, heavy rain, or cloudy weather.
3. Illumination intensity in an actual vehicle is not always constant, and lamp ON/OFF time may very depending on the climate, season, and surrounding environment.
4. Use this system only during sunrise and sunset period, and manually control lamp ON/OFF for general conditions.
5. Error may occur if light block coating that may change interior illumination is applied.

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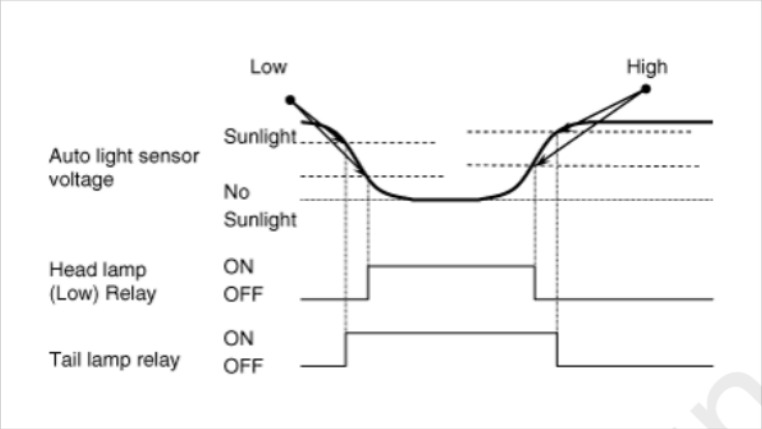
Inspection

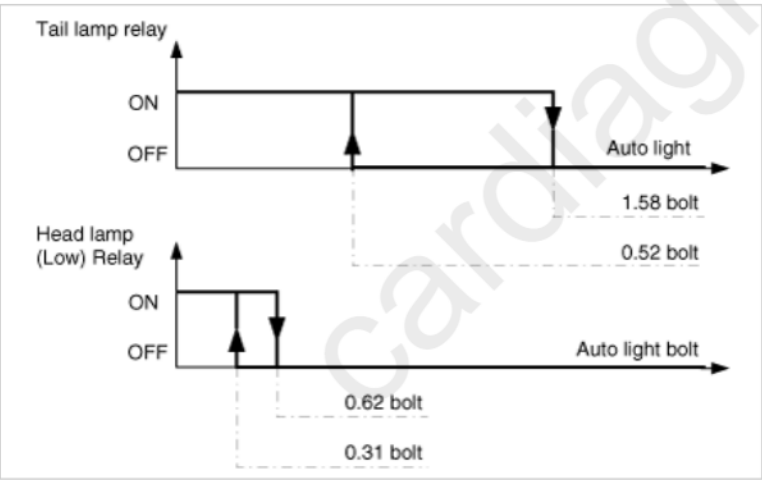
Check if the auto light control operates like a timing chart shown below. Tail lamp output and head lamp (Low) output is controlled based on the auto light sensor"s input (illumination intensity) when the Auto Light Switch in Multi-Function Switch is turned ON, and the vehicle is in IGN1 or IGN2 ON Mode. If IGN1 = ON, BCM detects this voltage, and if the voltage exceeds rated voltage, then auto light failure occurs. (below 4V or above 6V)

NOTICE

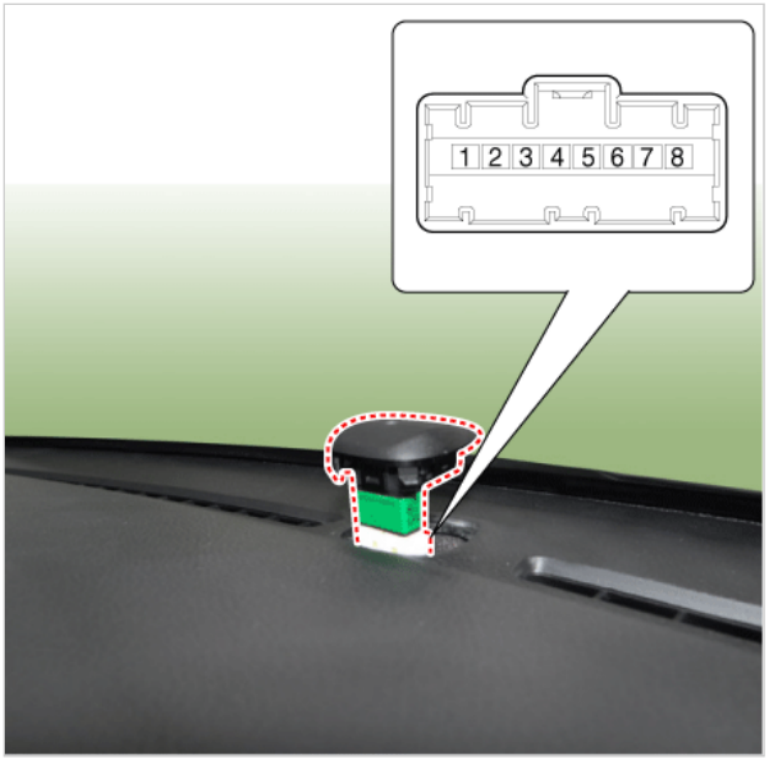
Failure Occurrence: If auto light failure occurs, the head lamp must be turned ON regardless of sun light level. This is to prevent the head lamp from being turned OFF in case of auto light failure during night time.

In the state of IGN1 ON, when multi function switch module detects auto light switch on, tail lamp relay output and head lamp low relay output are controlled according to auto light sensor"s input.The auto light control doesn"t work if the pin sunlight supply (5V regulated power from Ignition 1 power to sunlight sensor) is in short circuit with the ground.If IGN1 ON, The BCM monitors the range of this supply and raises up a failure as soon as the supply's voltage is out of range. Then this failure occurs and as long as this is present, the head lamp must be turned on without taking care about the sunlight level provided by the sensor.This is designed to prevent any head lamp cut off when the failure occurs during the night.



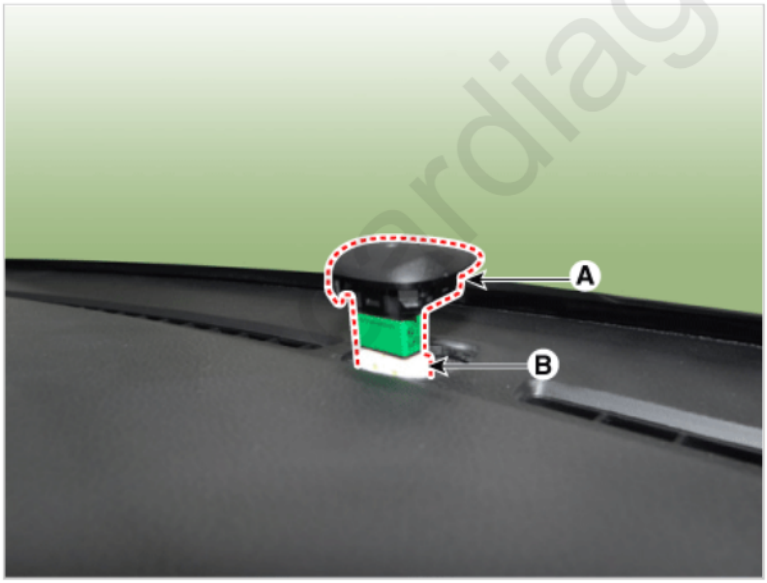


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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the auto light sensor (A).
3. Disconnect the auto light sensor connector (B).

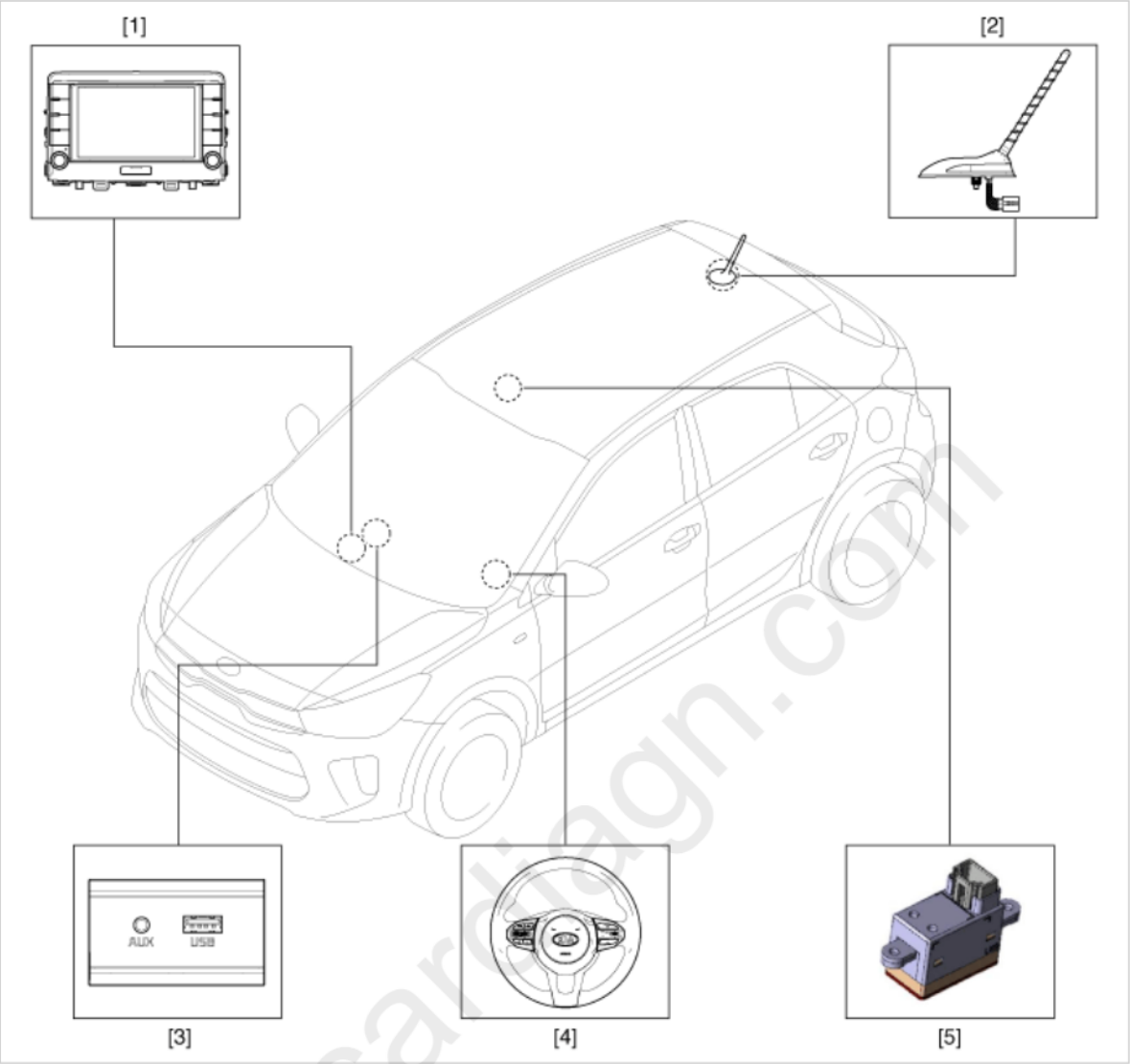


Installation

1. Connect the auto light sensor connector.
2. Install the auto light sensor.
3. Connect the negative (-) battery terminal.

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Component Location



1 . AVN head unit
2. Roof antenna (Radio+GPS+DAB)
3 . Multimedia jack
4 . Steering wheel remote control (SWRC)
5 . Hands-free mic (Built-in overhead console)

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Description

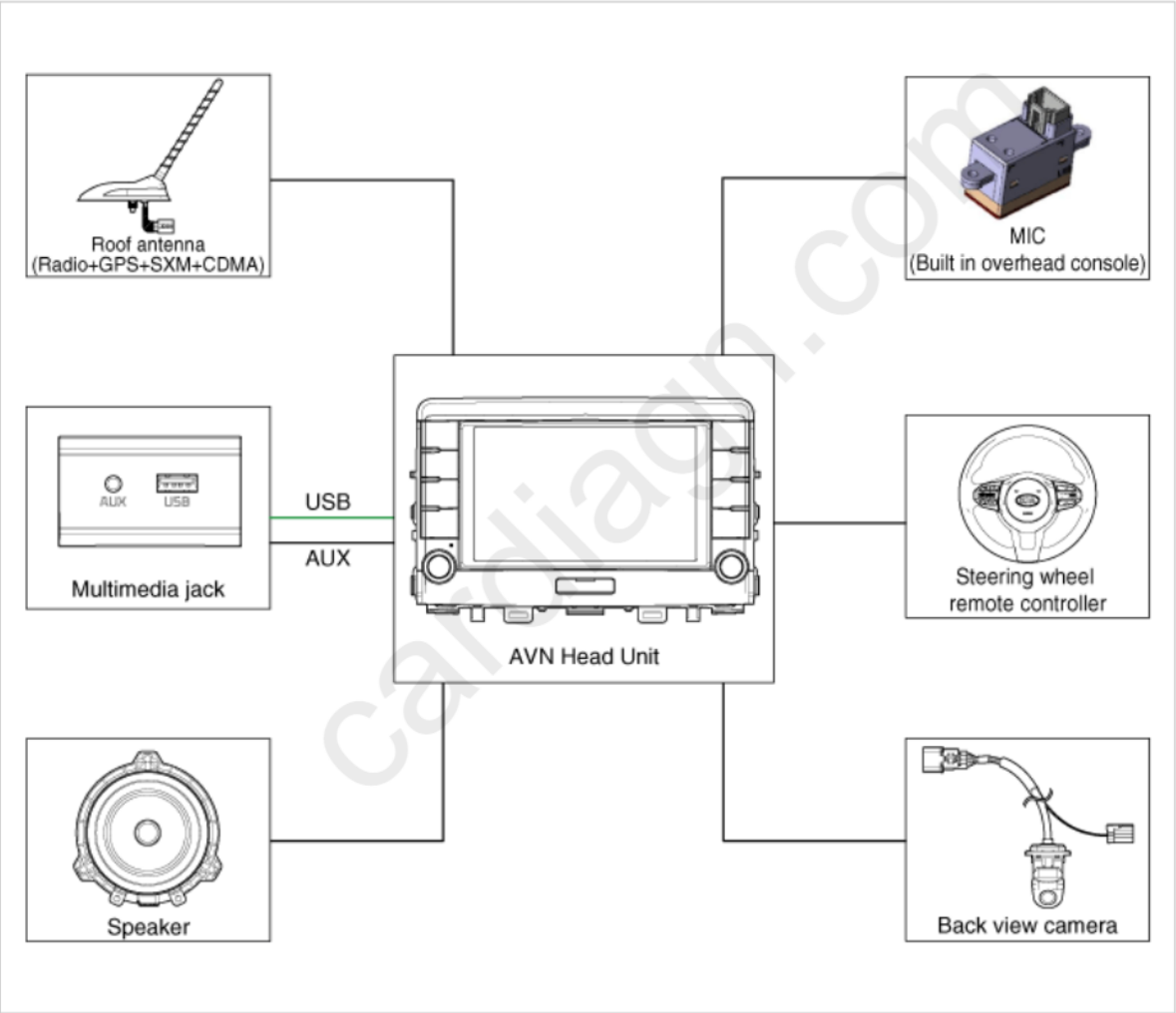
AVN system

The AVN system simplifies system manipulation and by unifying the vehicle information and user information displays, improves information search and operation experience.

The system is basically composed of a keyboard for the operation of combined function, LCD monitor, a head unit with Bluetooth handsfree calling, voice recognition and navigation, music amplifier and the media unit that connects with other external devices.

1. Simplification of user interface : the multimedia and car information are displayed on the monitor.
2. Up-to-date technologies integrated :
   - Bluetooth hands-free calling : This is compliant with the international wireless communication standards and uses bluetooth technology adopted in most currently launched mobile phones. Once connected, the driver is automatically connected every time he/she gets in the car.
   - USB connectivity : External music player devices such as USB memory stick or MP3 can be connected and played by the car speakers.

System Block Diagram



Limitations Of The Navigation system

GPS Signal Reception State

As the GPS satellite frequency is received/transmitted in straight lines, reception may not work if an object is placed on or near the GPS antenna or when travelling in the following environment:

- Tunnels
- Basement parking structures
- Underneath an overpass
- Roads within forested areas

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- Areas near high rise buildings
- Roads within canyons

Vehicle Position Display

1. If multipass errors occur due to reflections from buildings or related causes, the current position mark on the navigation may differ from the actual position of the vehicle.
2. The position of the vehicle on the navigation may be different from the actual position if the vehicle is in the following location or driving condition. In this case, drive for a short period of time to automatically correct vehicle location according to map matching or GPS information. (It may take several minutes in certain cases.)
   - When driving on a sharp Y-shaped road, the current position may be displayed in the opposite direction.
   - If the vehicle is loaded onto a car transport vehicle, the current position mark may be stalled on the last position prior to loading.
   - When driving on a spiral-shaped road.
   - When driving in mountainous regions with sharp turns or sudden brakes.
   - When entering a road after exiting from an underground parking structure, building parking structure, or turntable with multiple rotations.
   - When the tires have recently been replaced (Especially upon use of spare or studless tires)
   - If the battery terminal is removed.
   - When driving in city streets, the current position may be displayed on the opposite side or on an off-road position.
   - When changing the zoom level from the maximum zoom in level to a different zoom level, the current position mark may be displayed on a different road.
   - When driving in heavy traffic with frequent stops or intersections.
   - When driving under slippery conditions, such as heavy sand, snow, etc.
   - When driving with tire chains installed.
   - When using a tire with an incorrect size specification.
   - When the tire pressures of all 4 tires are different from each other.
   - When the replacement tire is a worn or used tire (especially studless tire that has passed 2nd season, etc.).
   - When driving near high-rise buildings
   - If a roof carrier has been installed
   - When driving in high speeds or after having calculated a long distance route.

Route Guidance

Suitable route guidance may not occur due to search conditions or driving position.

- Guidance to go straight may be given while driving on a straight road.
- Guidance may not be given after turning at an intersection.
- Proper guidance may not be given at certain intersections.
- A route guidance signaling entrance into a no entry zone may occur (No entry zone, road under construction, etc.).
- Guidance may be given to a location near the actual destination if roads to the actual destination do not exist or are too narrow.
- Wrong voice guidance may be given if the vehicle deviates from the designated route (e.g. If it turned at an intersection wherein the navigation guided to go straight.).
- The route guidance may not be provided in case of missing or incorrect map data.

Route Re-calculation

The following phenomena may occur after conducting route recalculation.

- Guidance may be given to a different position from the current position if the vehicle was turning at an intersection.
- Route recalculation may take longer when driving under high speeds.
- A route guidance signaling for a U-Turn in a No U-Turn zone may occur.
- In some cases, a route guidance may signal the driver to enter a no entry zone (No entry zone, road under construction, etc.).
- Guidance may be given to a location near the actual destination if roads to the actual destination do not exist or are too narrow.
- Wrong voice guidance may be given if the vehicle deviates from the designated route (e.g. If it turns at an intersection wherein the navigation guided to go straight.).

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Inspection

Troubleshooting of the speakers

⚠ CAUTION

When handling the speakers :

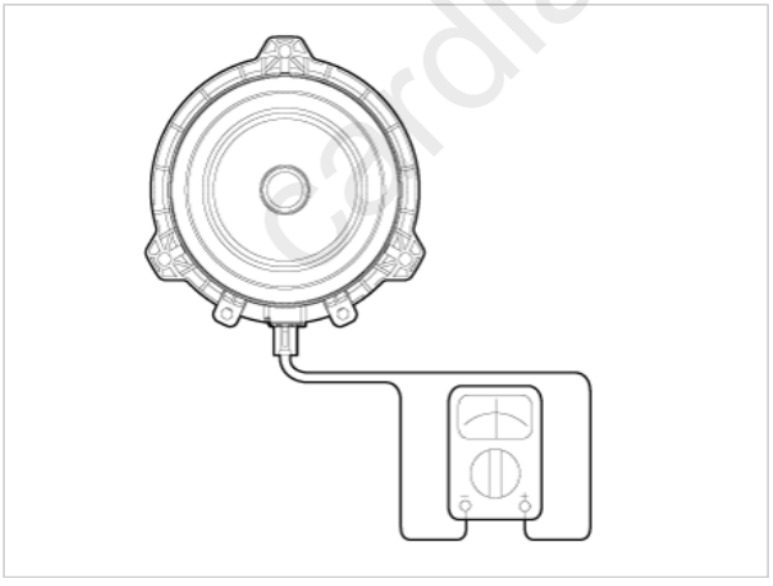
- Do not cause shock to the speakers by dropping or throwing them.
- Be careful not to drop water and oil on the speakers.
- Use caution to handle the speaker because diaphragm made of paper is easily torn by impact or external force.
- Audio system tuning may cause damage to the speakers. The modified speakers are not covered by the manufacturer's warranty.

1. Basic inspection
   Loosen the screws to rule out the interference from the body trims and surrounding parts and then remove the speaker.
   After removing the speaker, check the sound quality of the speaker with the connector plugged in.
2. Inspection for each cause
   (1) Abnormal vibration
   – Make sure the mounting screws are properly tightened before replacing the speaker.
   – Reinstall the speaker and check that the symptom is resolved.
   – If the symptom does not disappear, replace the speaker with a new one.

   (2) Noise
   – Check that the speaker connector is properly connected and reinstall the connector if necessary.
   – If noises occur in the radio mode, turn to the CD player mode.
   – If noises occur in both modes, replace the speaker with a new one.

   NOTICE
   If noises occur only in the radio mode, the poor radio reception is the cause so do not replace the speaker.

   (3) Poor working
   – Check the plus (+) and negative (-) speaker terminals using an ohmmeter.
   – If resistance is measured at the specified value shown below, the speaker operation is normal.
   – If the measured resistance is different from the specified value, replace the speaker.



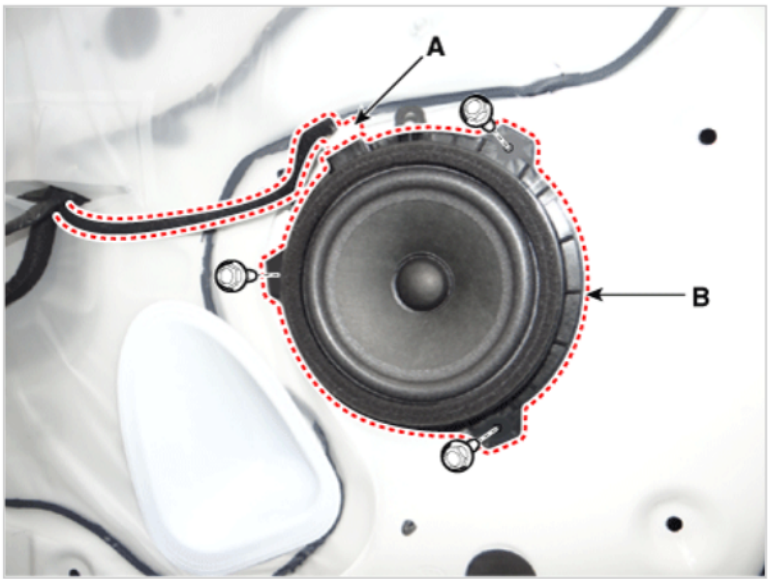
Removal

Front Door Speaker

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")

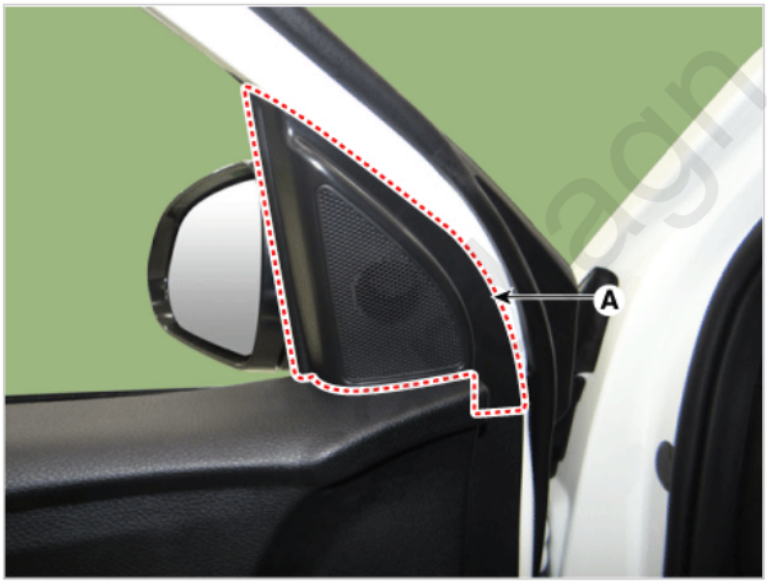
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3. Remove the front door speaker (B) after disconnecting the connector (A) and loosening the bolts.

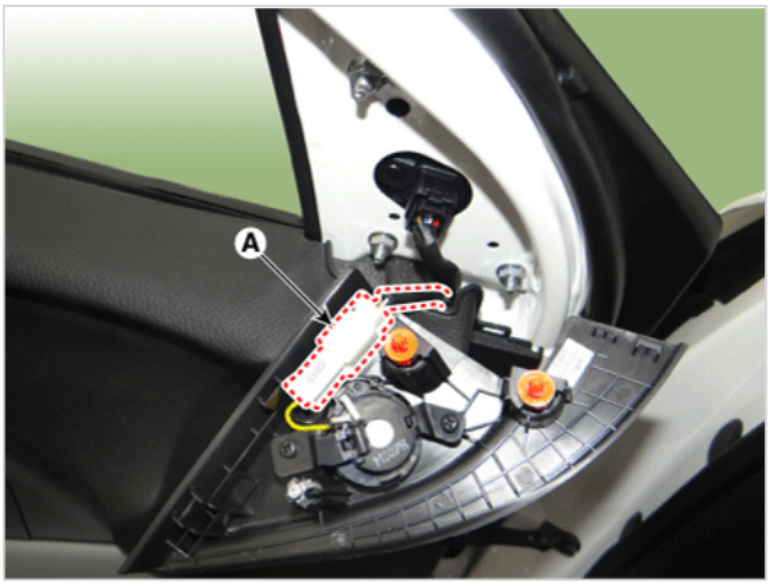


Tweeter Speaker

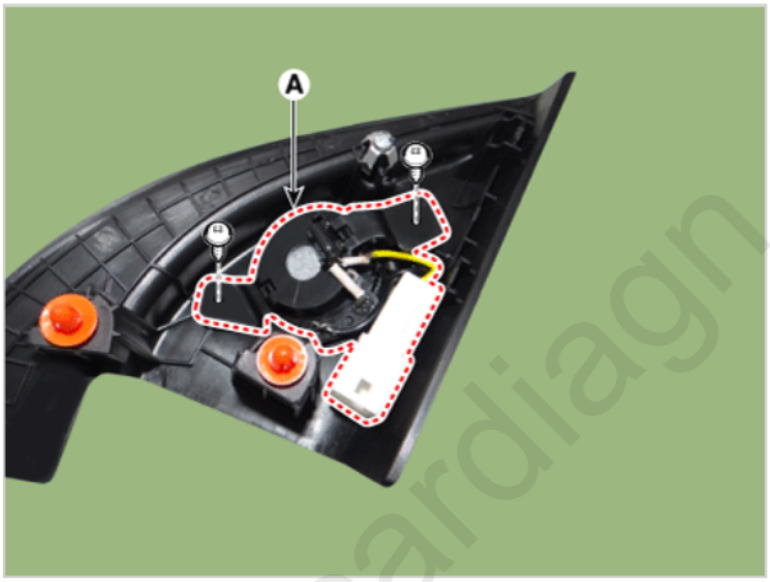
1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, remove the front door quadrant inner cover (A).



3. Disconnect the tweeter speaker connector (A).



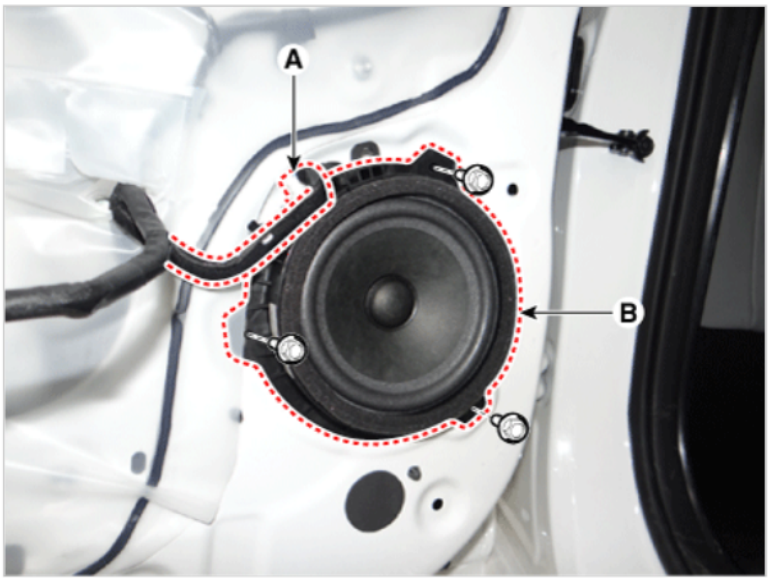
4. Remove the tweeter speaker (A) after loosening the mounting screws.



Rear Door Speaker

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
3. Remove the rear door speaker (B) after disconnecting the connector (A) and loosening the bolts.

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Installation

Front Door Speaker

1. Install the front door speaker.
2. Install the front door trim.
3. Connect the negative (-) battery terminal.

Tweeter Speaker

1. Install the tweeter speaker.
2. Install the front door quadrant inner cover.
3. Connect the negative (-) battery terminal.

Rear Door Speaker

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

NOTICE

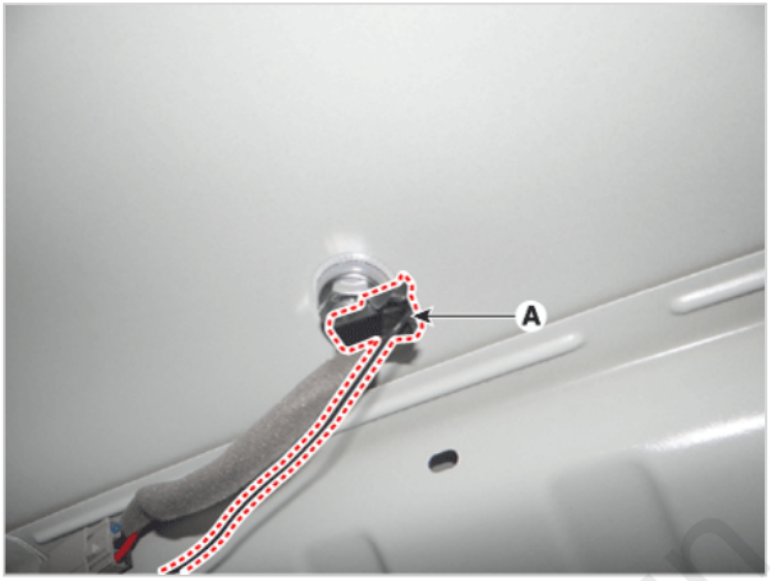
- Make sure that the speaker connectors are plugged in properly.
- Check the AVN system for normal operation.

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Removal

Roof antenna

1. Disconnect the negative (-) battery terminal.
2. Remove the roof trim assembly.
   (Refer to Body - "Roof Trim Assembly")
3. Disconnect the roof antenna power connector (A).



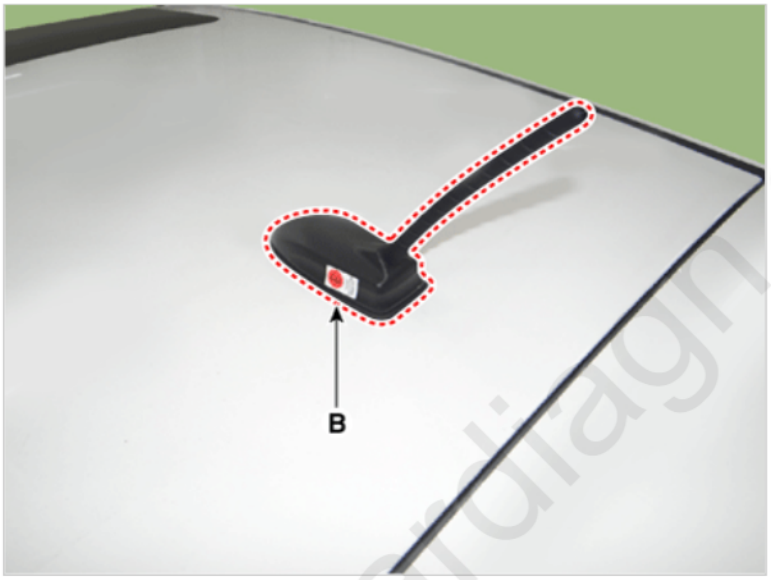
4. Disconnect the radio antenna connector (A).



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

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Installation

Roof anenna

1. Install the roof antenna.
2. Connect the roof antenna power connector and radio antenna connectors.
3. Install the roof trim assembly.
4. Connect the negative (-) battery terminal.

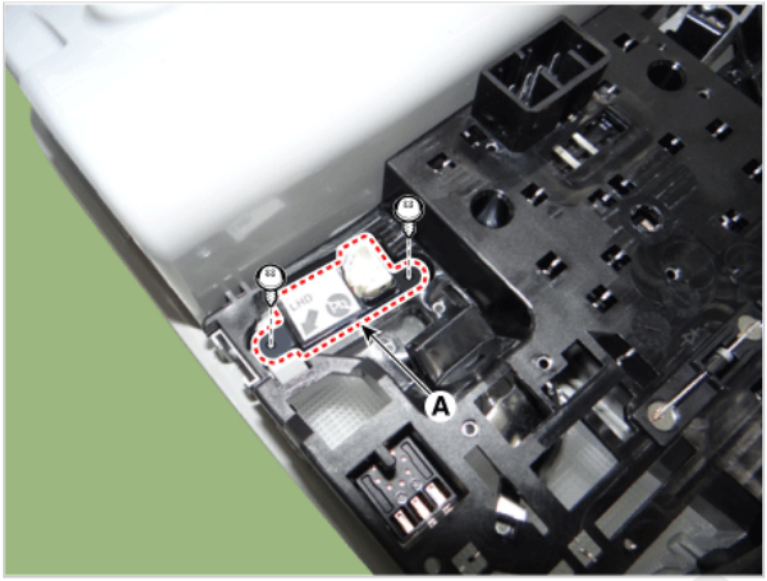
NOTICE

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

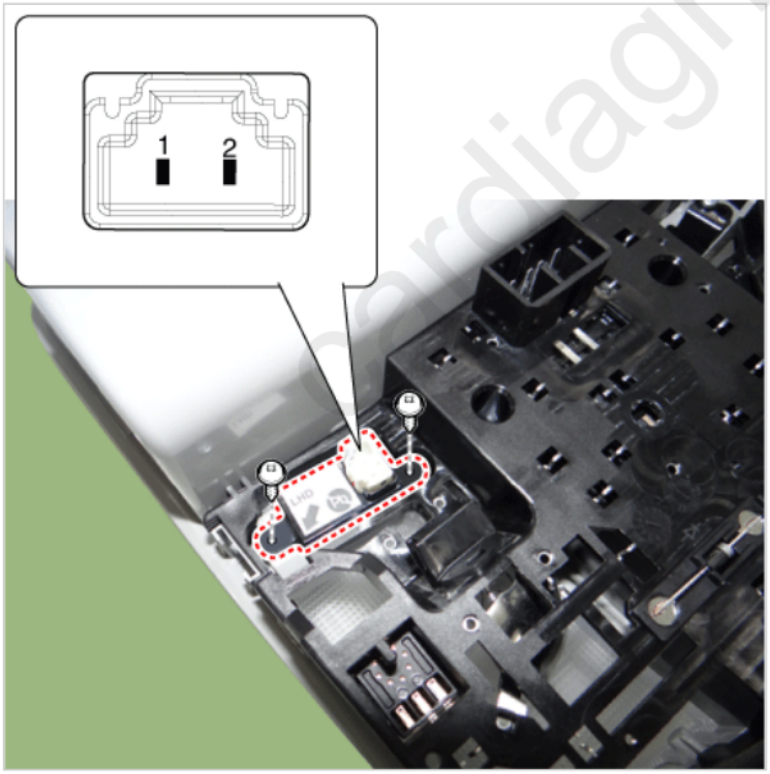
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Inspection

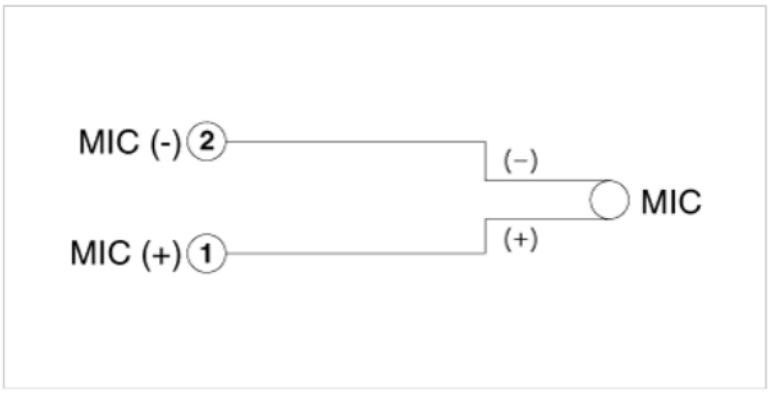
1. Disconnector the negative (-) battery terminal.
2. Remove the overhead console lamp.
   (Refer to Lighting System - "Overhead Console Lamp")
3. Remove the hands free mic (A) after loosening the mounting screws.



4. Check the continuity between terminals.

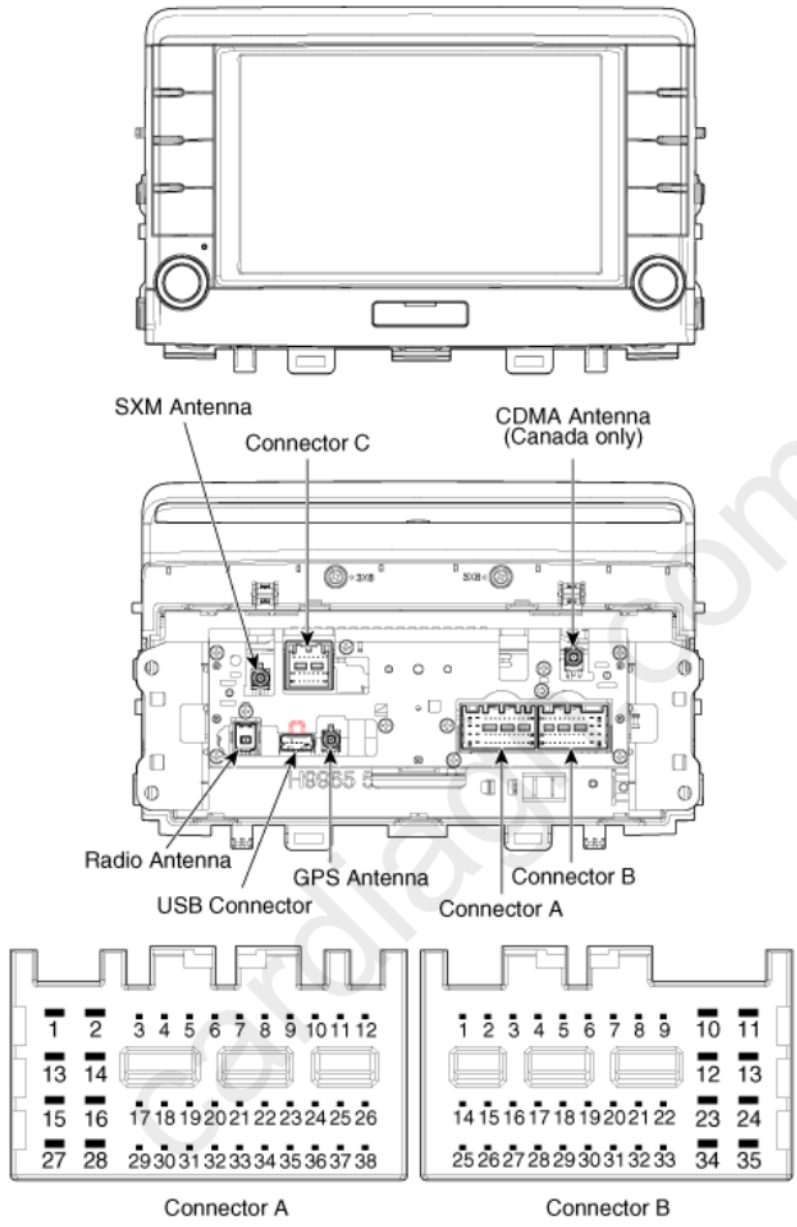


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Components



Connector Pin Information

No.	Connector A	Connector B
1	Rear door left speaker (+)	-
2	Rear door left speaker (-)	MIC (+)
3	-	-
4	-	-
5	-	Remote antenna
6	Camera Power	Illumination (+)
7	Camera VIN	Multimedia-CAN (High)
8	-	-
9	-	ALT Left_output (-)

10	AUX Right input	Battery (+)
11	AUX Detect	Battery (+)
12	Steering wheel remote controller	Ground
13	Front door left speaker (+)	Ground
14	Front door left speaker (-)	MIC (Ground)
15	Front door right speaker (-)	MIC (-)
16	Front door right speaker (+)	-
17	-	"N" Position
18	-	-
19	-	Illumination (-)
20	Camera Ground	Multimedia-CAN (Low)
21	Camera VIN Ground	-
22	-	ACC
23	-	-
24	AUX Left input	-
25	AUX Ground	Reverse
26	Steering wheel remote controller (Ground)	Door open
27	Rear door right speaker (-)	Door unlock
28	Rear door right speaker (+)	Parking brake
29	-	"P" Position
30	-	Auto light
31	-	Transmission_Detect
32	-	-
33	Camera VIN Shield	IGN1
34	-	-
35	-	-
36	-	
37	-	
38	Vehicle Speed	

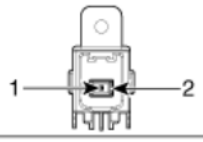
Connector C

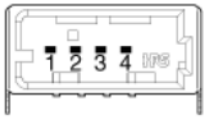


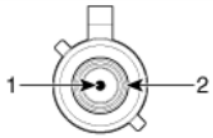
No.	Description	No.	Description
1	Body-CAN (+) (Canada only)	12	-
2	Chassis-CAN (+)	13	- (CD_RS422_TX -)

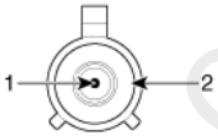
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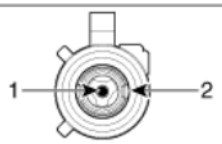
3	- (OBC_Wake up)	14	- (CD_RS422_RX -)
4	-	15	- (Air bag)
5	-	16	MTS Key_Input (Canada only)
6	- (CD_RS422_TX +)	17	-
7	- (CD_RS422_RX +)	18	- (CD_SPDIF_GND)
8	Body-CAN (-) (Canada only)	19	- (CD_SPDIF +)
9	Chassis-CAN (-)	20	- (CD_SPDIF -)
10	-	21	- (CD_RS422_GND)
11	-		

Radio Antenna	No.	Description	No.	Description
	1	AM/FM Signal	2	Ground

USB Connector	No.	Description	No.	Description
	1	USB VOD	3	USB D (+)
	2	USB D (-)	4	USB Ground

GPS Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

SXM Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

CDMA Antenna	No.	Description	No.	Description
	1	Signal	2	Ground

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Removal

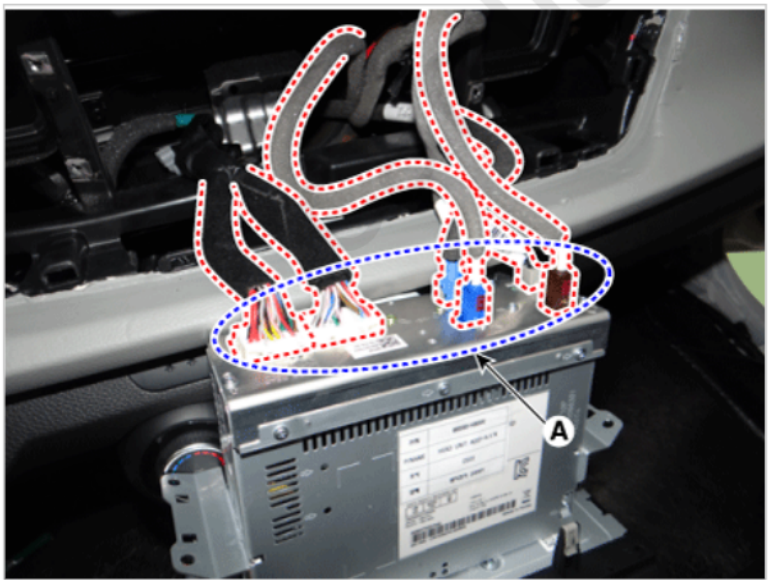
CAUTION

- Be careful not to scratch the center fascia upper panel and related parts.
- Wrap the protective tape on the tool to disassemble with the screwdriver or remover.
- Take caution when keeping and handling during disassembly/assembly as it is easily contaminated by lubricant and oil.

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia duct assembly.
   (Refer to Body - "Center Fascia Panel")
3. Remove the AVN head unit (A) after loosening the mounting screws.



4. Remove the AVN head unit after disconnecting the connectors and antenna cable (A).



Installation

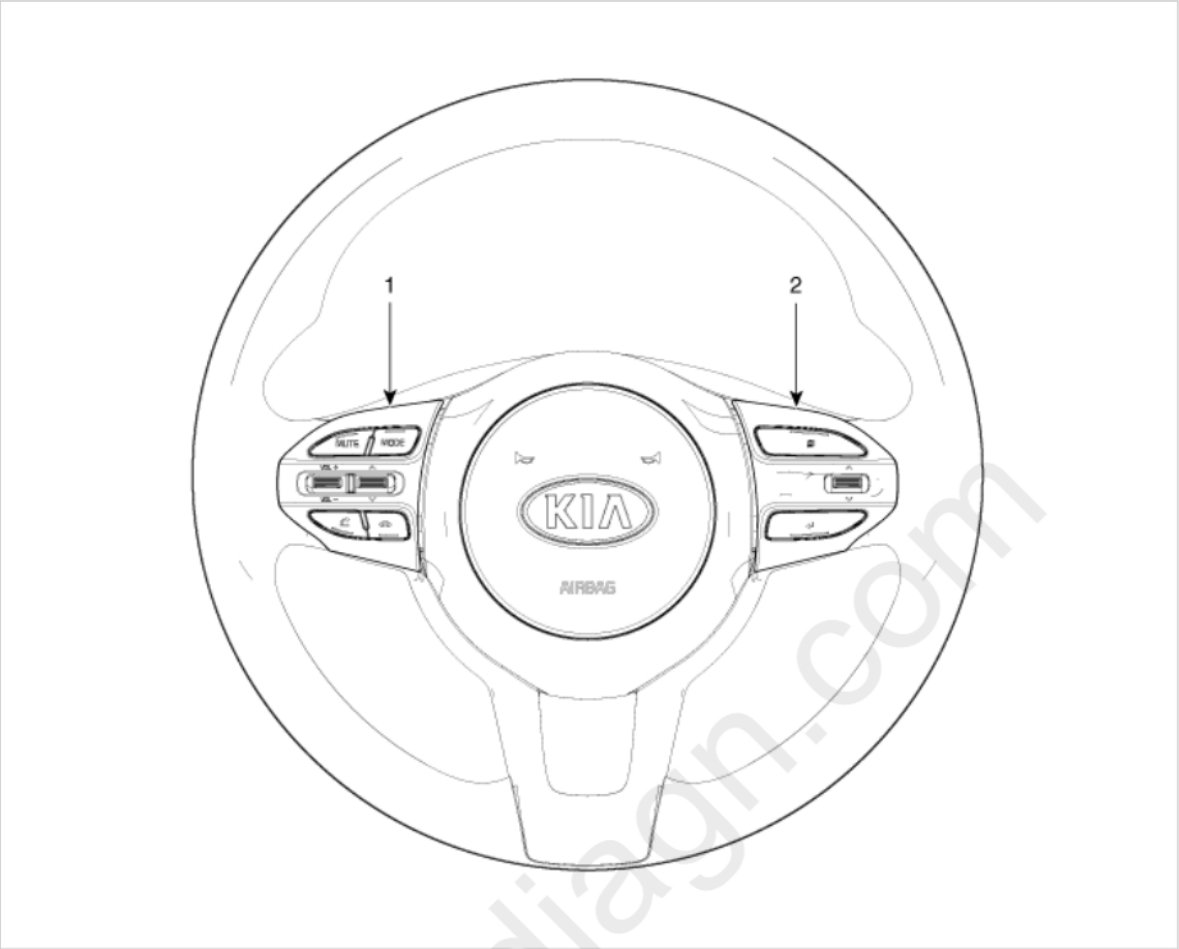
1. Connect the AVN head unit connectors and antenna cable.
2. Install the AVN head unit.
3. Install the center fascia duct assembly.
4. Connect the negative (-) battery terminal.

NOTICE

- Make sure the connector are connected in properly.
- Check the AVN system for normal operation.

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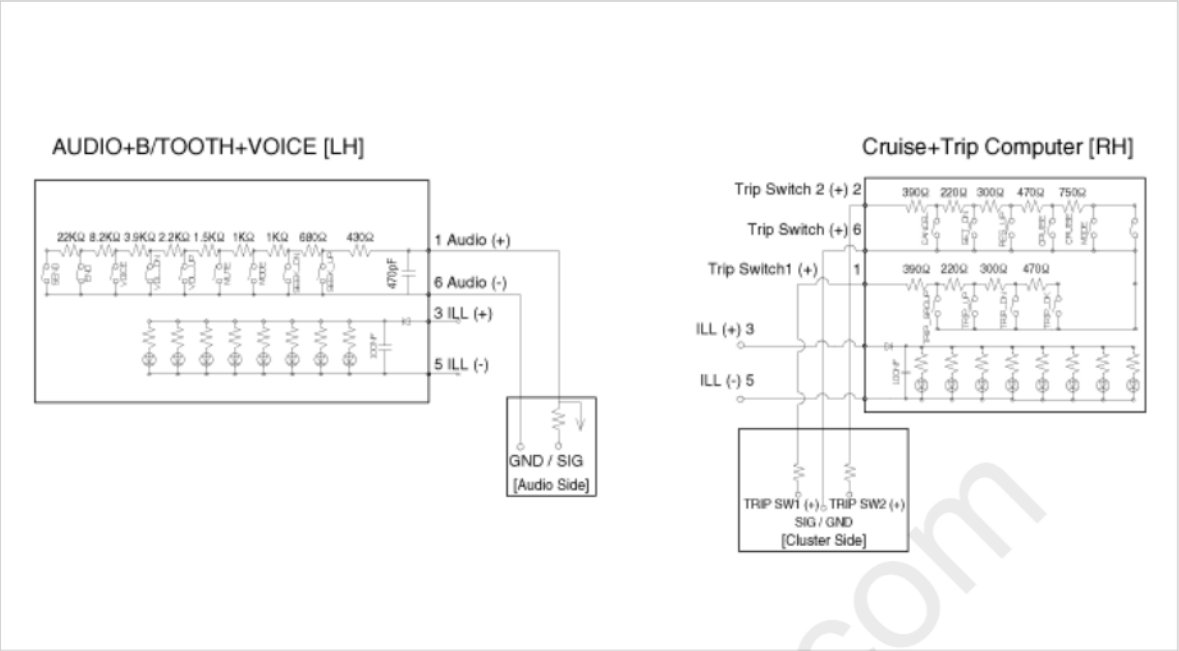
Components



1. Left Remote Control Switch (Audio + Hands free + Voice)
2. Right Remote Control Switch (Cruise+Trip Computer)

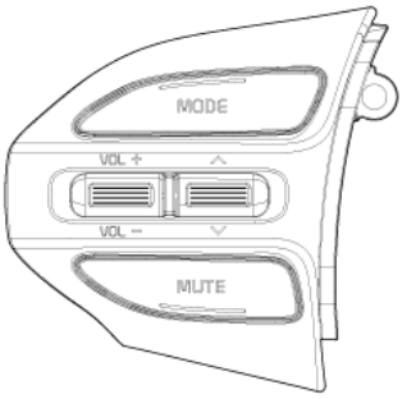
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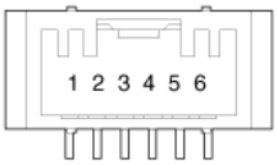
Circuit Diagram

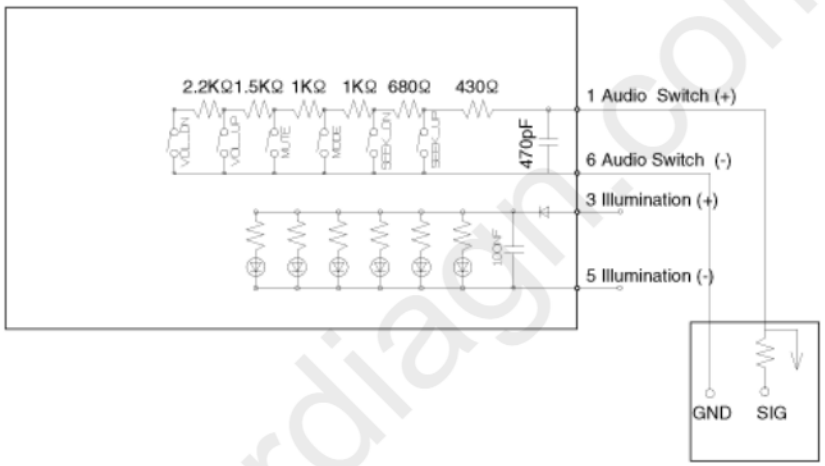


[Audio]

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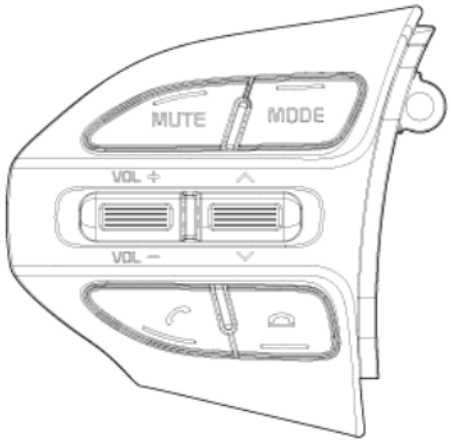


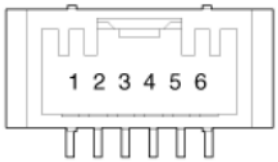
Connector	
	
No.	**Description**
1	Audio switch (+)
2	-
3	Illumination (+)
4	-
5	Illumination (-)
6	Audio switch (-)

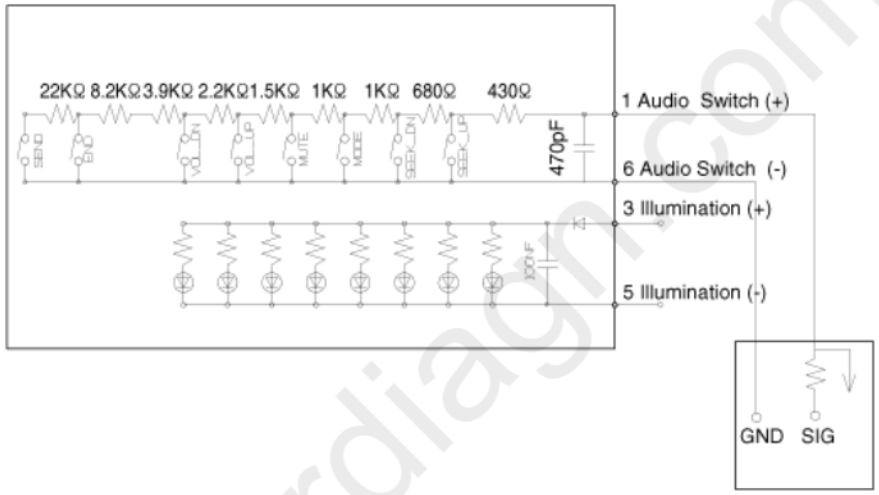


[Audio + Bluetooth]

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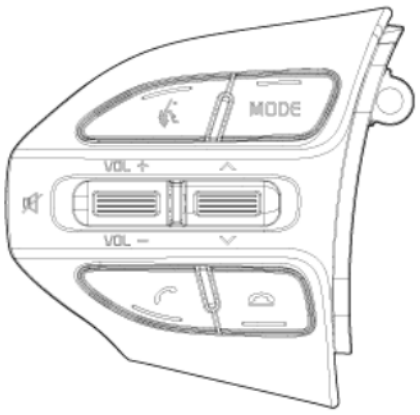


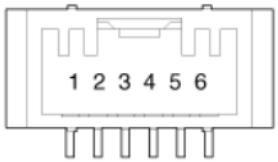
Connector	
	
No.	**Description**
1	Audio switch (+)
2	-
3	Illumination (+)
4	-
5	Illumination (-)
6	Audio switch (-)

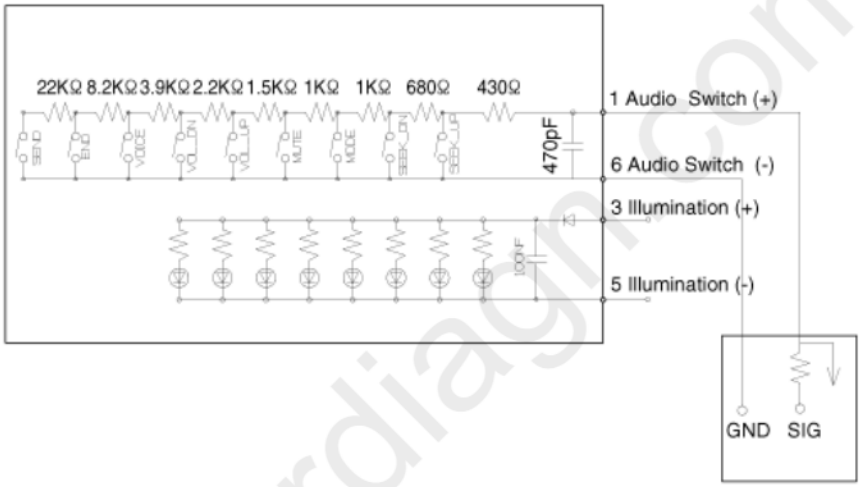


[Audio + Bluetooth + Voice]

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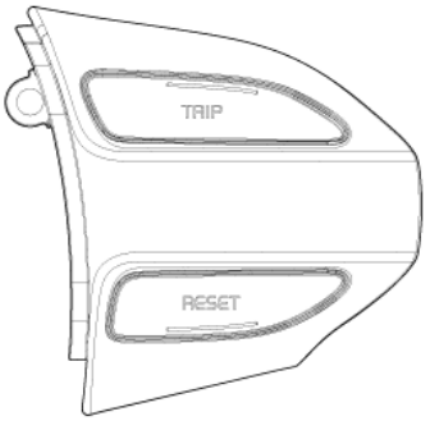


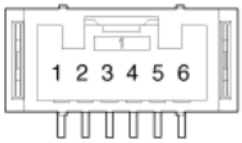
Connector	
	
No.	**Description**
1	Audio switch (+)
2	-
3	Illumination (+)
4	-
5	Illumination (-)
6	Audio switch (-)

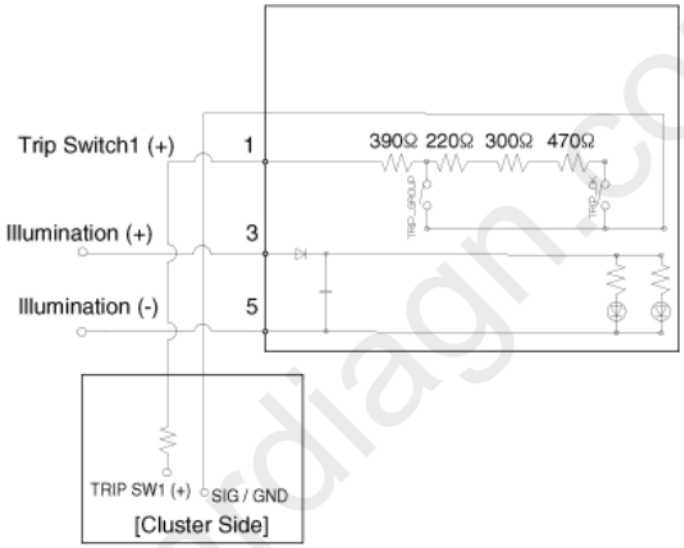


[Trip]

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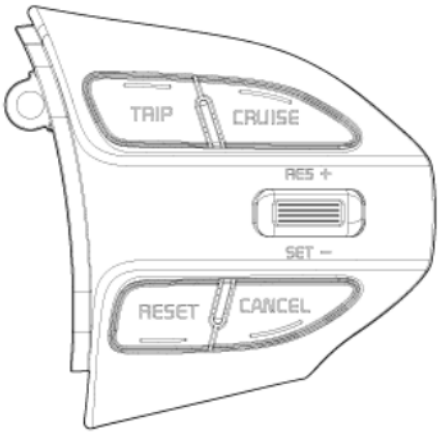


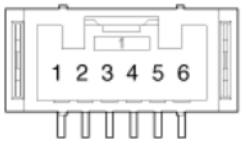
Connector	
	
No.	**Description**
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



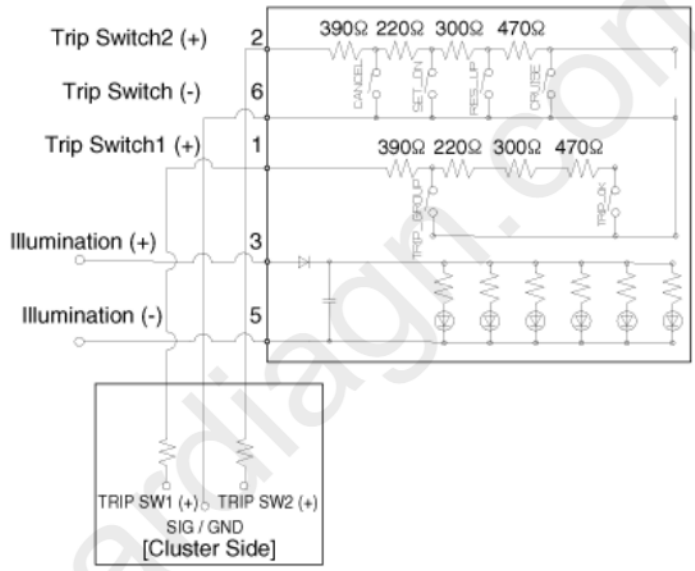
[Trip + ACC (2 Button)]

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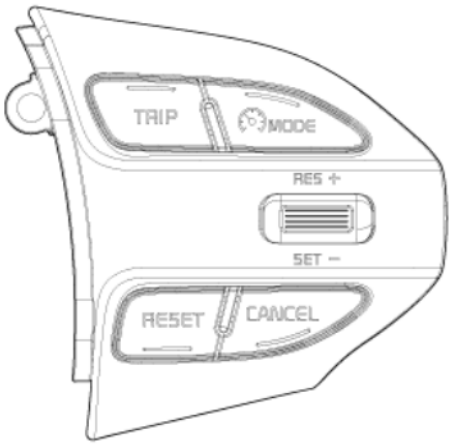
Connector


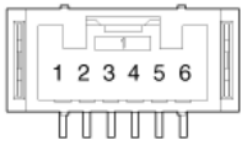
No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



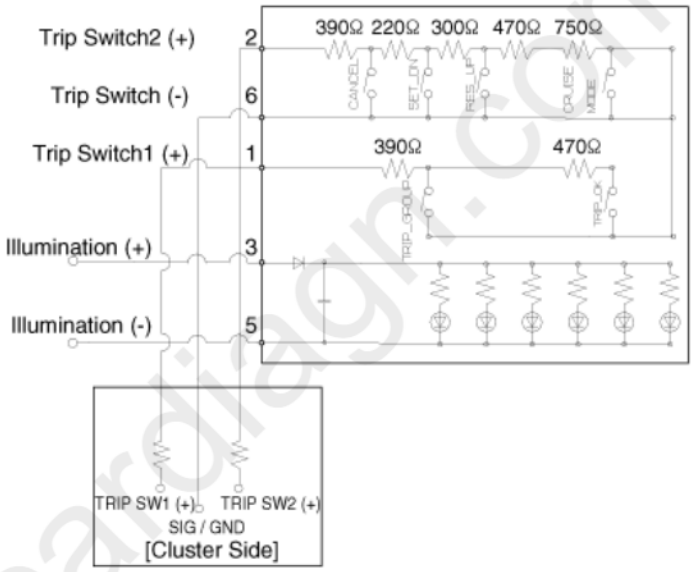
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[Trip + ACC + SLD (2 Button)]



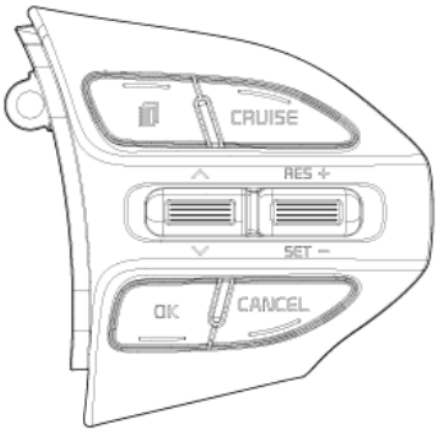
Connector


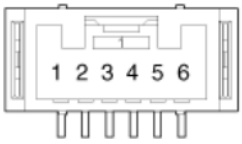
No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



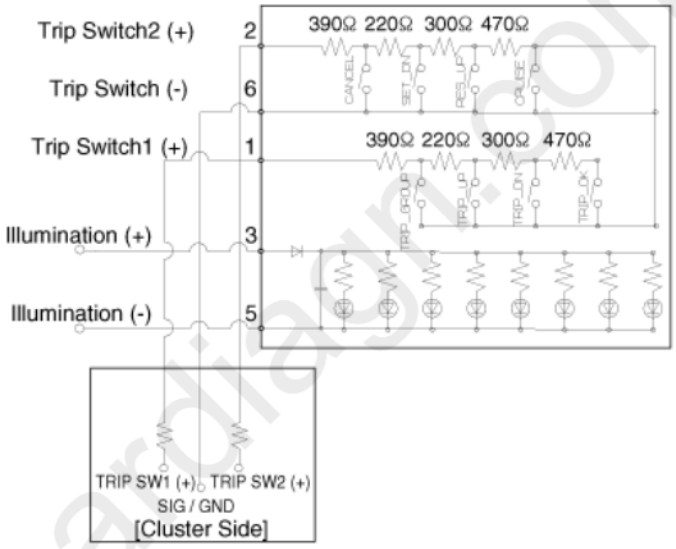
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[Trip + ACC (4 Button)]



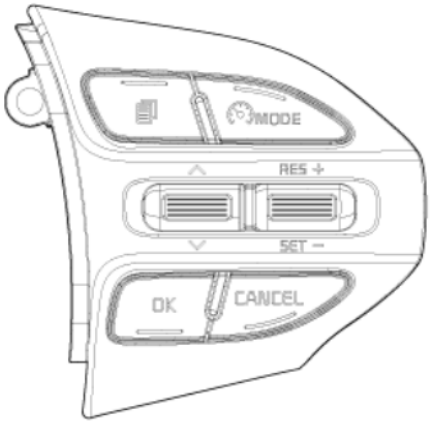
Connector


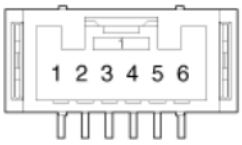
No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



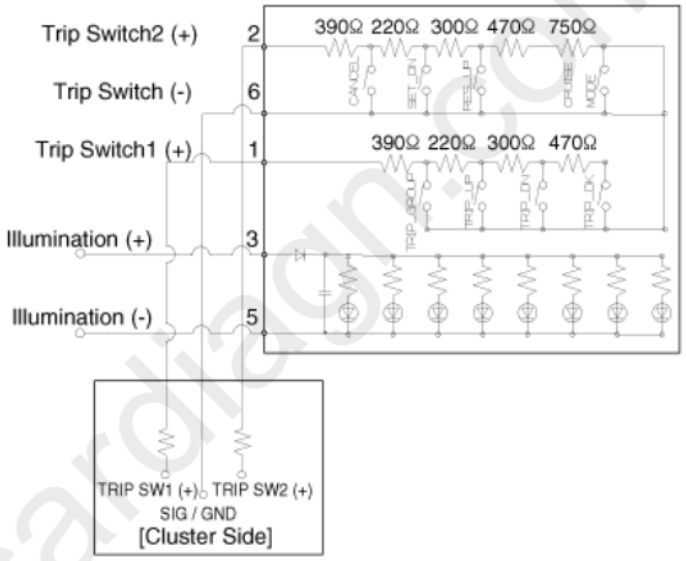
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[Trip + ACC + SLD (4 Button)]



Connector


No.	Description
1	Trip switch1 (+)
2	Trip switch2 (+)
3	Illumination (+)
4	-
5	Illumination (-)
6	Trip switch (-)



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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the steering wheel assembly.
   (Refer to Steering System - "Steering Wheel")
3. Remove the steering wheel remote control (A) after loosening the mounting screws.

[LH]





[RH]



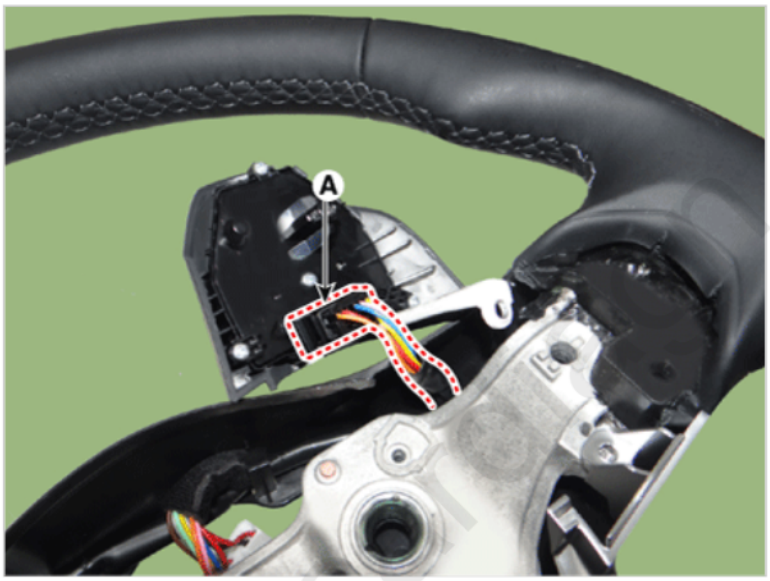
4. Disconnect the steering wheel remote control connector (A).

[LH]

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[RH]

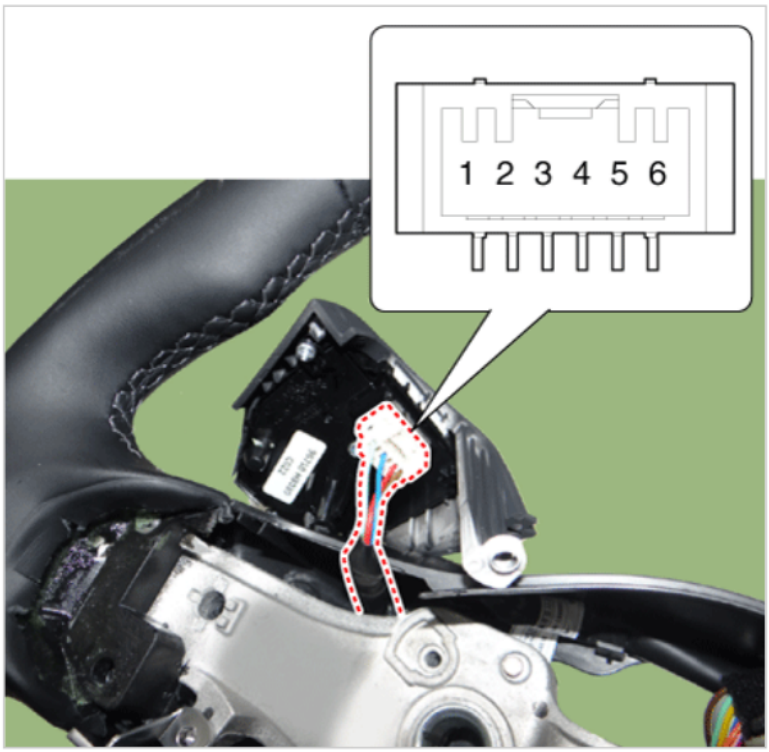


Installation

1. Connect the steering wheel remote control connector.
2. Install the steering wheel remote control.
3. Install the steering wheel and driver airbag module.
4. Connect the negative (-) battery terminal.

Inspection

1. Check the resistance between terminals in each switch position (LH).

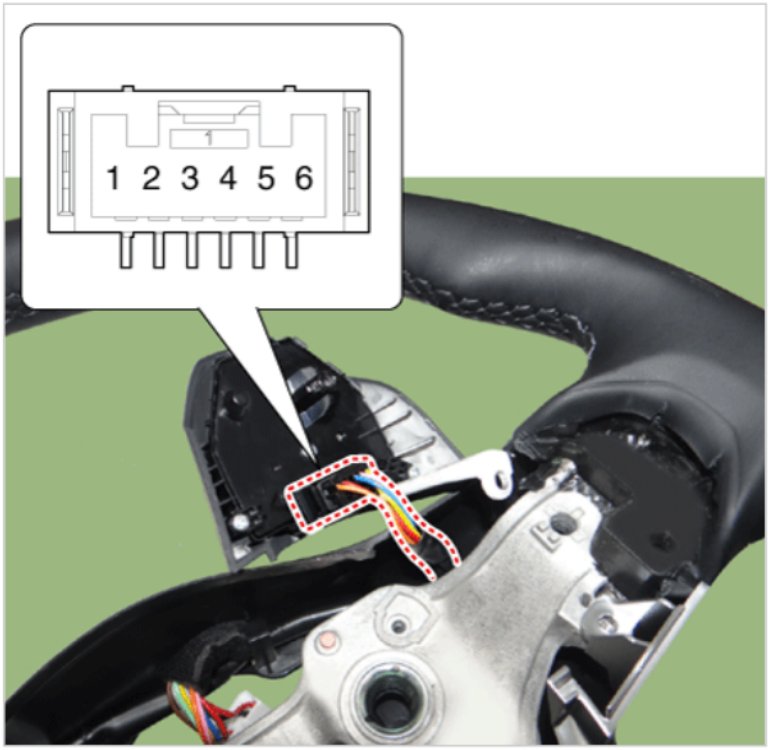


[LH : Audio + Hands free + Voice]

Switch	Connector terminal	Resistance (±3%)
SEEK Up	1-6	430 Ω
SEEK Down		1.11 kΩ
MODE		2.11 kΩ
MUTE		3.11 kΩ
Volume (+)		4.61 kΩ
Volume (-)		6.81 kΩ
Voice		10.71 kΩ
END		18.91 kΩ
SEND		40.91 kΩ

2. Check for resistance between terminals in each switch position (RH).

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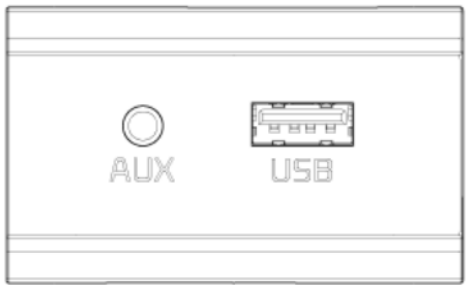


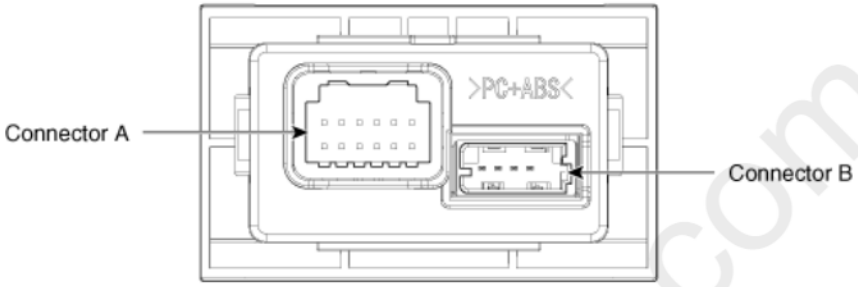
[RH : Cruise + Trip]

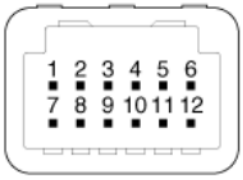
Switch	Connector terminal	Resistance (±3%)
Cancel	2-6	390 Ω
SET -		610 Ω
RES +		910 Ω
Cruise ON/OFF		1.38 kΩ
Cruise & Speed Limit ON/OFF Cruise Mode		2.13 kΩ
Group	1-6	390 Ω
Trip Up		610 Ω
Trip Down		910 Ω
OK / Reset		1.38 kΩ

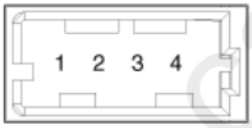
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Circuit Diagram





Connector A	No.	Description	No.	Description
	1	AUX Audio (Left)	7	AUX Audio_Ground
	2	AUX Audio (Right)	8	-
	3	AUX Detect	9	- (AUX_V_GND)
	4	Illumination (+)	10	- (AUX_Video)
	5	-	11	Ground
	6	Illumination (-)	12	-

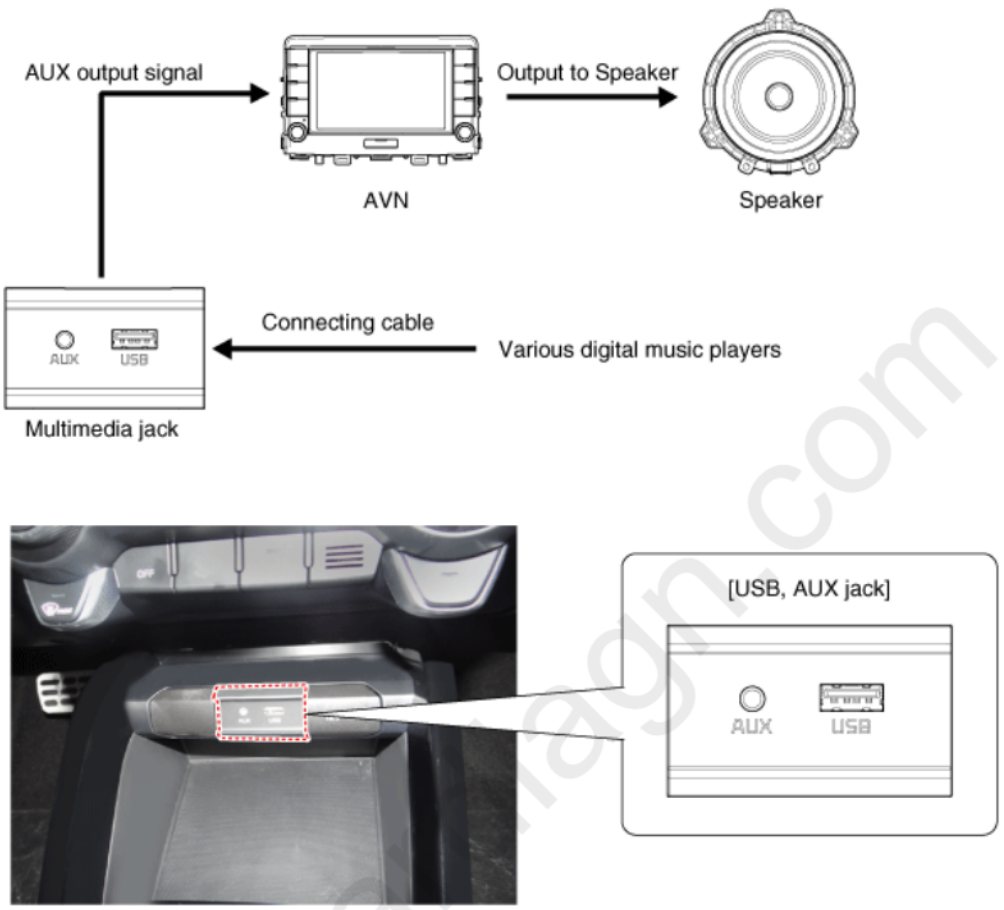
Connector B	No.	Description	No.	Description
	1	USB_VOD (5V)	3	USB D (+)
	2	USB D (-)	4	USB Ground

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Description

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

In case of distorted sound coming from the AUX-linked external music players, the audio unit may not be defective but the output level of the player does not match the specification of the AUX.



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Removal

Multimedia Jack

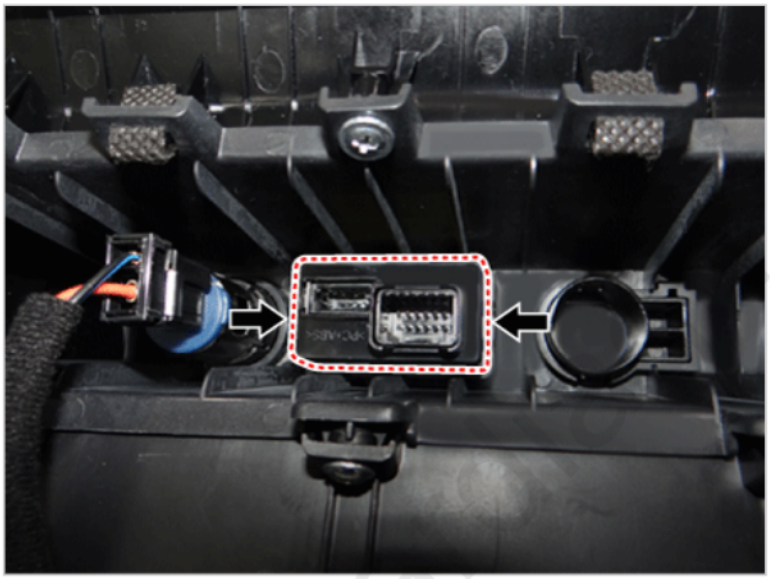
⚠ CAUTION

Put on gloves to protect your hands.

NOTICE

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

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





USB Charger

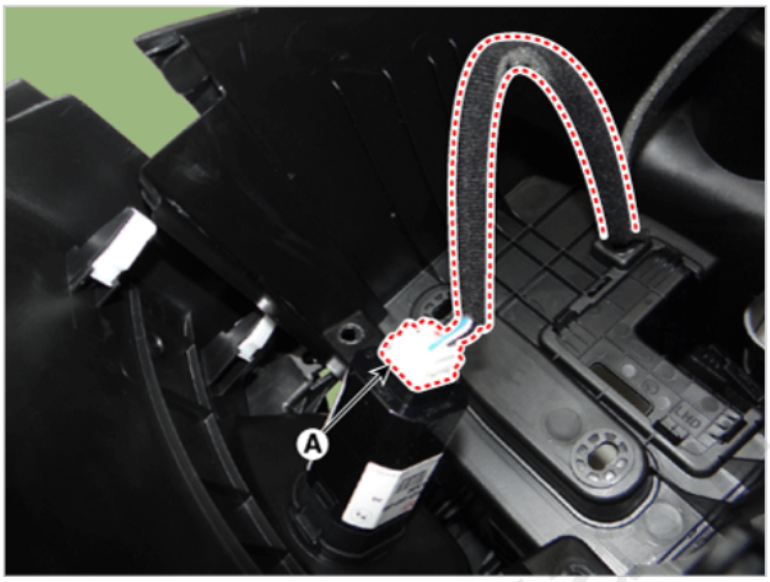
⚠ CAUTION

Put on gloves to protect your hands.

NOTICE

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

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console assembly.
   (Refer to Body - "Floor Console Assembly")
3. Disconnect the USB charger connector (A).



4. Remove the USB charger (A) after releasing the fixed hooks.



Installation

Multimedia Jack

1. Install the multimedia jack.
2. Install the front console upper cover.

3. Connect the negative (-) battery terminal.

NOTICE

- Make sure the multimedia connector and the console front tray connectors are plugged in properly.
- Check the AVN system for normal operation.

USB Charger

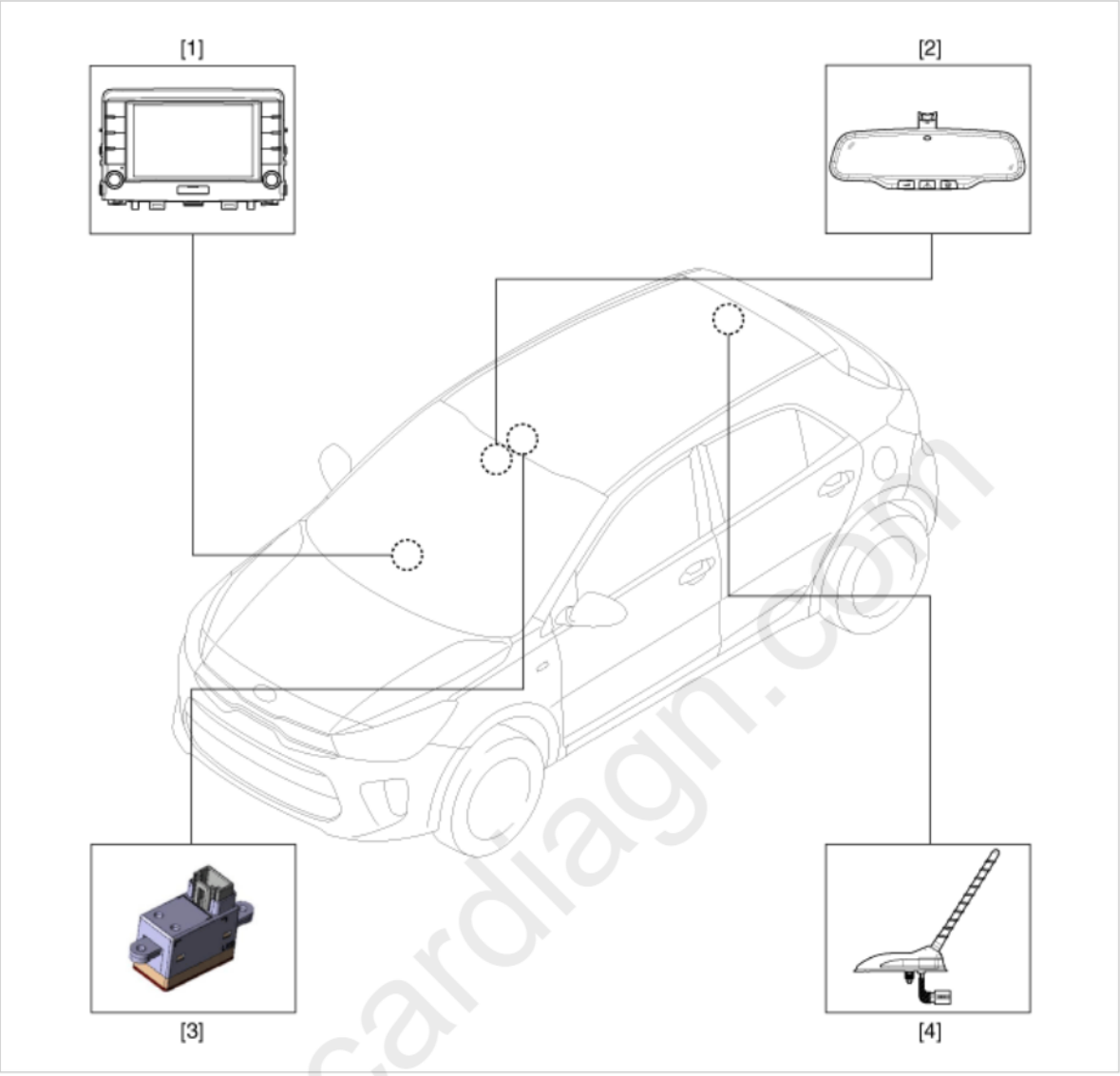
1. Install the USB charger.
2. Connect the USB charger connector.
3. Install the floor console assembly.
4. Connect the negative (-) battery terminal.

NOTICE

Make sure that the cables and connectors are plugged in properly.

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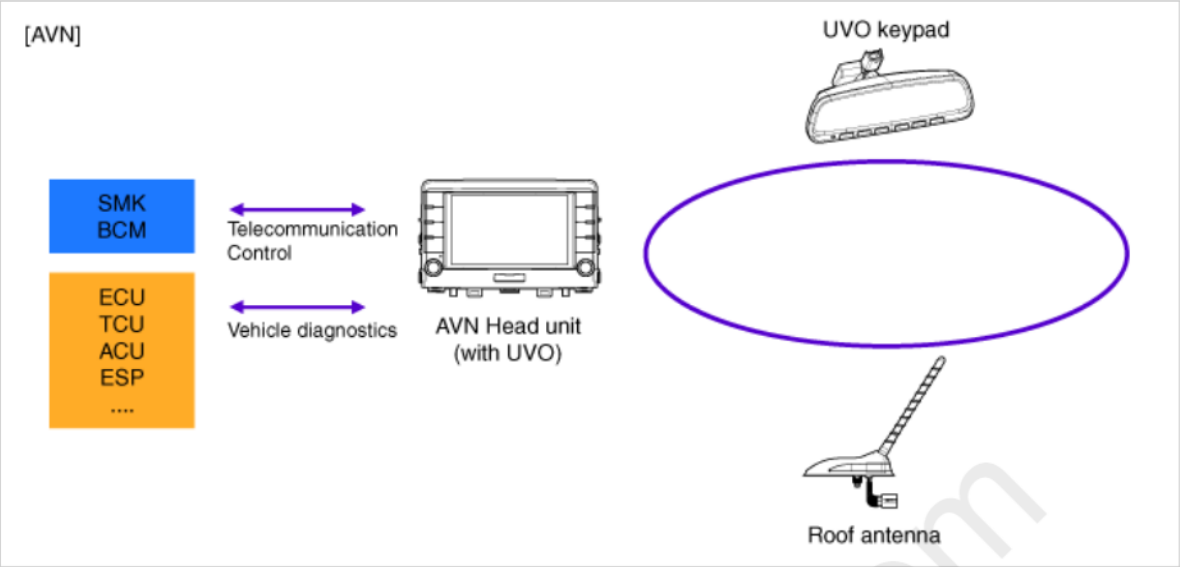
Components



1. Head unit (AVN)
2. UVO keypad
3. MIC (Installed in the overhead console)
4. Roof antenna

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System Block Diagram



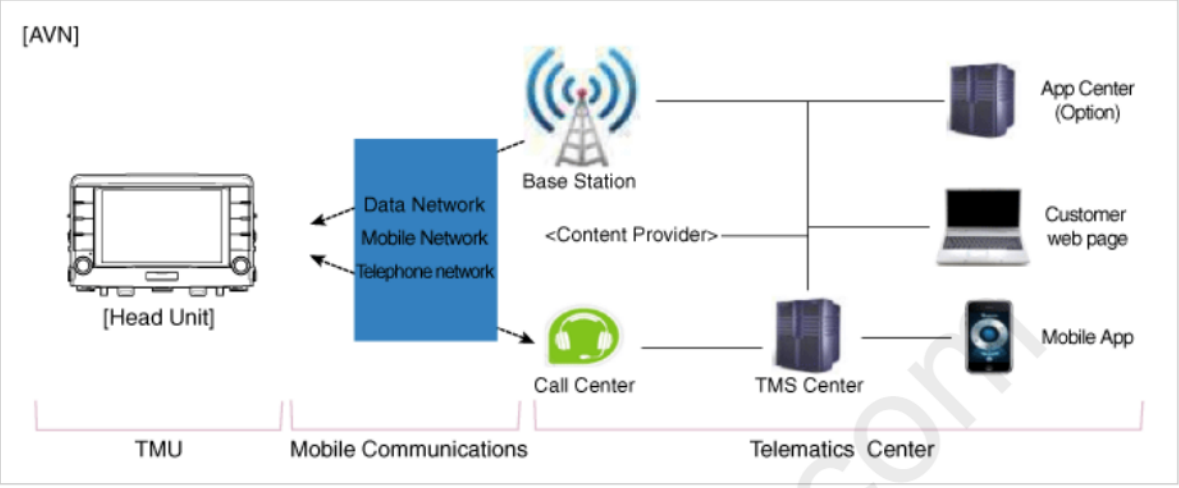
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Description

Vehicle information systems (UVO) based on state-of-the-art IT systems, safety and security

Information

The term "Telematics" is a combination of telecommunication and informatics. The Telematics system uses an assortment of communication devices mounted on the vehicle to analyze various vehicle and driving conditions and keep driving safe and convenient.



Service List for UVO

1. Safety and Security

Service Name	Service Trigger
- Auto Crash Notification	When an accident occurred and airbag deployed, ACN notification will be triggered automatically.
- SOS – Emergency Assistance	It will be triggered by manually pressing the SOS button on the inside mirror. It will connect you to emergency assistance helper.
- Alarm/Panic Notification	when the vehicle alarm system is activated, it will be automatically triggered and inform to owner. If the customer push the panic button of key FOB near the vehicle, it will be triggered and notify that driver or vehicle occupant may be in danger
- Enhanced roadside	Push the Interactive Voice Recognition (IVR) button on the inside mirror and ask to operator about the help.
- Remote Door Control – Lock	Customer can ask Remote Door Lock service by using the Smart Phone application or on the web(CWP).
- Remote Door Control – Unlock	Customer can ask Remote Door Unlock service by using the Smart Phone application or on the web(CWP).
- Remote Horn and Lights	Customer can ask Horn&Light or Light Only services by using the Smart Phone application or on the web(CWP).
- Stolen Vehicle Recovery	This service can be triggered on request by police only
- Vehicle Immobilization/Slowdown	This service can be triggered on request by police only
- Vehicle Remote Start (w/ Climate and Windshield Defrost Control)	The customer can ask remote start service by using the Smart Phone application or on the web (CWP). (Automatic transmission only) The customer can also set the temperature and control windshield defrost.
- Find My Car	The customer can check vehicle parking locaition by using the Smart Phone application.

2. Voice Recognition Module (VRM)

Service Name	Service Trigger
- Maintenance Alert Notification	Refer the telematics web service manual for detail information about setup mile triggered diagnostic service
- Automated DTC notification	If the vehicle found any problem on the vehicle itself, this information will be sent for server automatically.
- On-demand Diagnostics	The customer can check the status of vehicle. Customer can also check the diagnostics result on the Smart Phone application/SMS/Email/web(CWP) or asking to operator by IVR call.
- Scheduled Diagnostics	

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	There are two kinds of scheduled diagnostic options. Please see telematics web service manual for more information.
- Driving Information	The customer can check driving history information(e.g. mileage, driving time, etc)

3. Geographic Information System (GIS)

Service Name	Service Trigger
- Geo-Fence	The customer can setup valid boundary of vehicle driving. It can be used for Varlet geo-fence or normal geofence. Both can be setup by web or by asking operator using IVR call.
- Send2Car	POI download can be requested via Google Maps, CWP and smartphone application.
- Google Local Search	The customer can search destination via using Google Local Search.
- Google Voice Local Search	The customer can search destination by voice via using Google Voice Local Search.

4. Operator Service & ETC

Service Name	Service Trigger
- IVR - Service Link	The Customenr can schedule service appointment at preferred or nearest Kia dealer. Please ask operator on the IVR call.
- IVR - Roadside Assistance	The Customer can request roadside assistance service. Please ask operator on the IVR call.
- IVR - UVO Account Assistance	The Customer can ask UVO account information. Please ask operator on the IVR call.

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Removal

AVN Head Unit

1. Disconnect the negative (-) battery terminal.
2. Remove the AVN head unit.
   (Refer to AVN System - "AVN(Audio Video Navigation) head unit")

Roof Antenna

1. Disconnect the negative (-) battery terminal.
2. Remove the Roof Antenna.
   (Refer to AVN System - "AVN Antenna")

UVO keypad

1. Disconnect the negative (-) battery terminal.
2. Remove the electro chromic inside rear view mirror.
   (Refer to "Electro Chromic Inside Rear View Mirror")

Installation

AVN Head Unit

1. Install the AVN head unit.
2. Connect the negative (-) battery terminal.

Roof Antenna

1. Install the Roof Antenna.
2. Connect the negative (-) battery terminal.

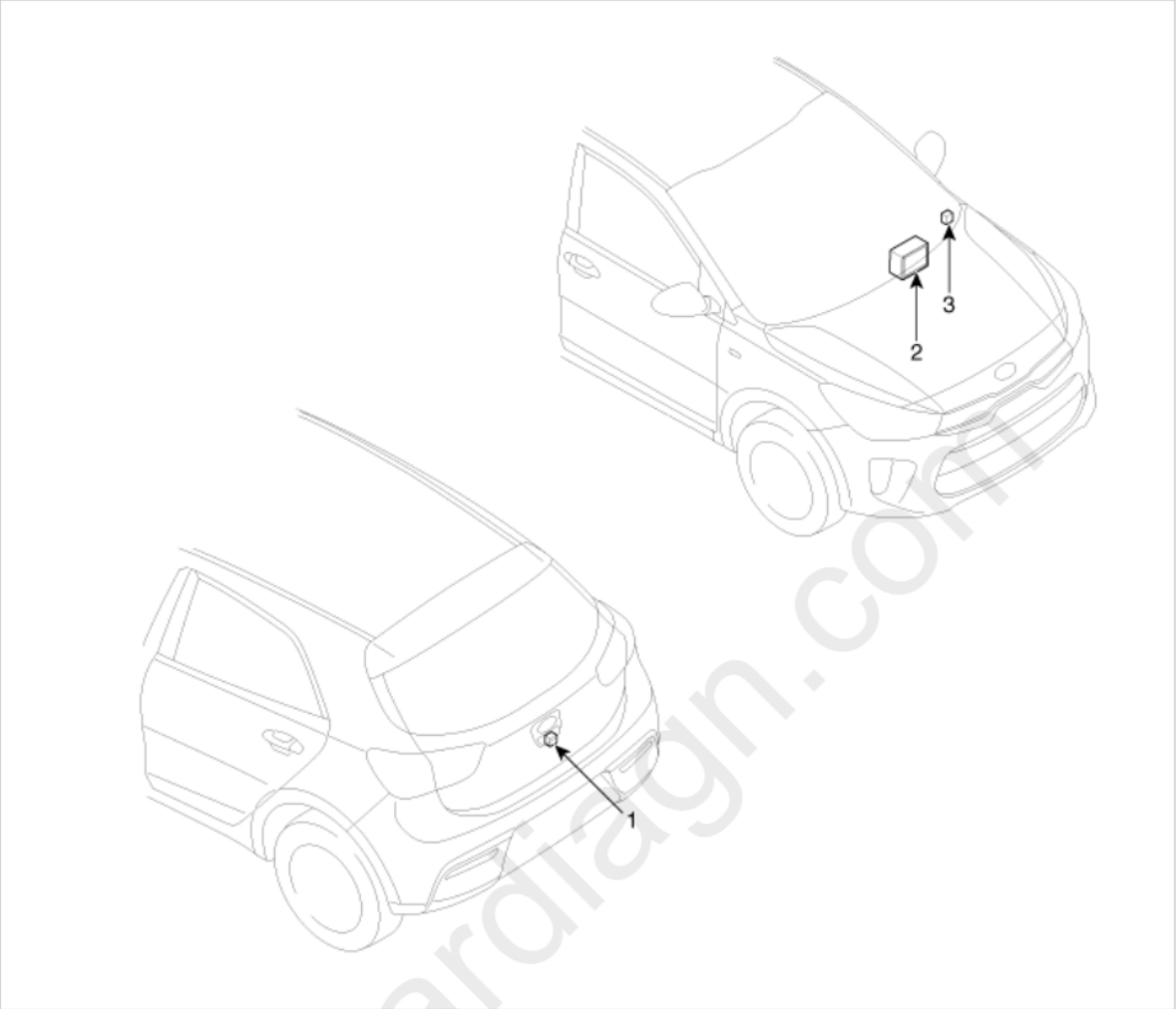
UVO keypad

1. Install the electro chromic inside rear view mirror.
2. Connect the negative (-) battery terminal.

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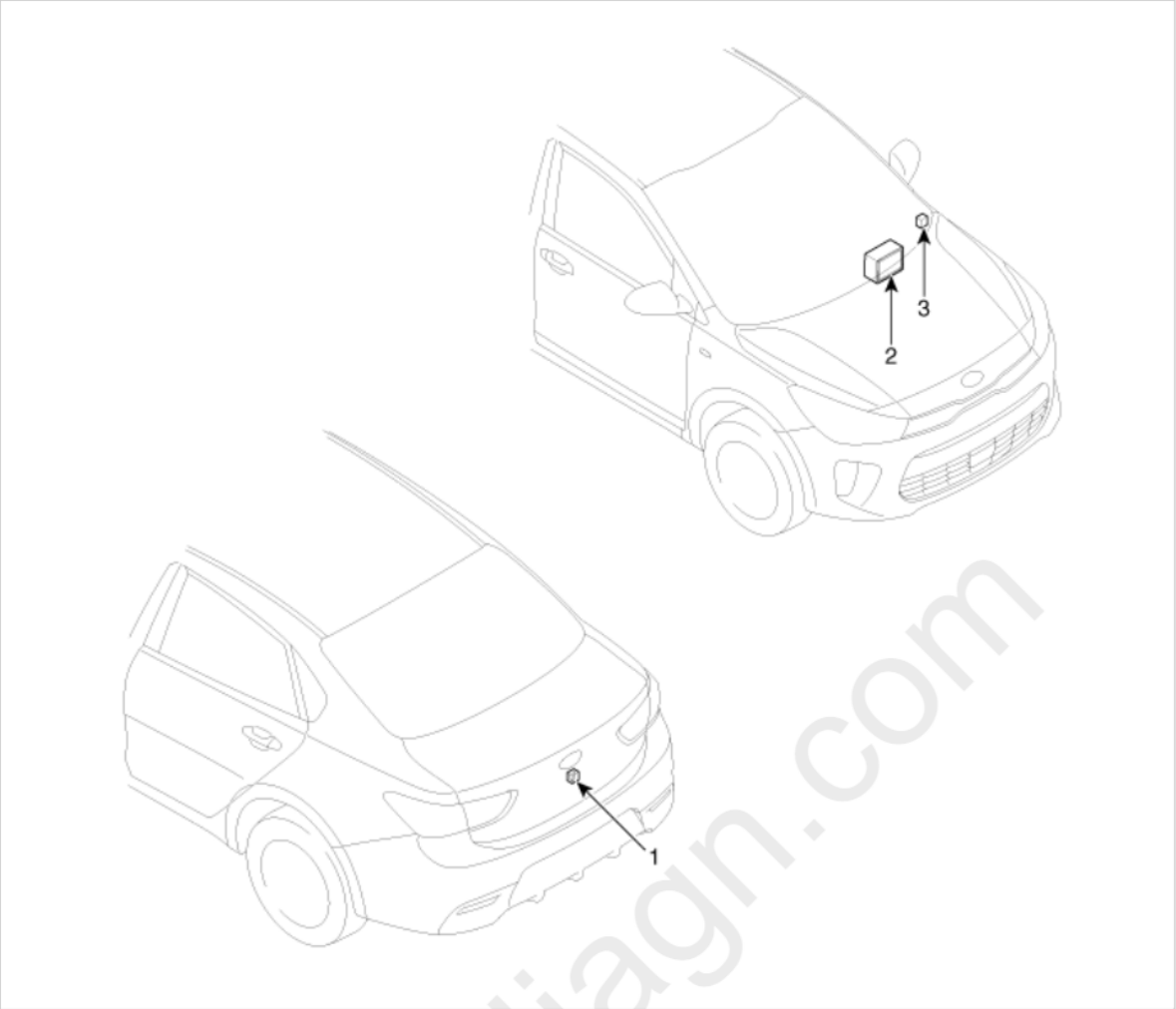
Component Location

[5 Door]



[4 Door]

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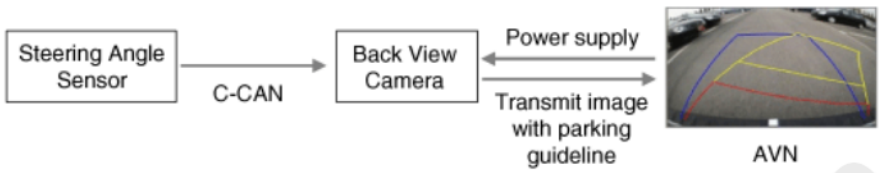
1. Back view camera
2. AVN head unit
3. Steering angle sensor

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Description

1. To display back of the vehicle to assist the driver, it receives vehicle rearside image signal from the rearview camera and displays it on AVN head unit monitor or LHS of inside rearview mirror.
2. Back view camera is a supplementary device that displays dead zone on monitor screen that automatically operates when the gear stays in "R" for over 3 seconds.
3. It displays the estimated trajectory with parking guideline in accordance with the operating angle of steering wheel. (There is no separate unit.)

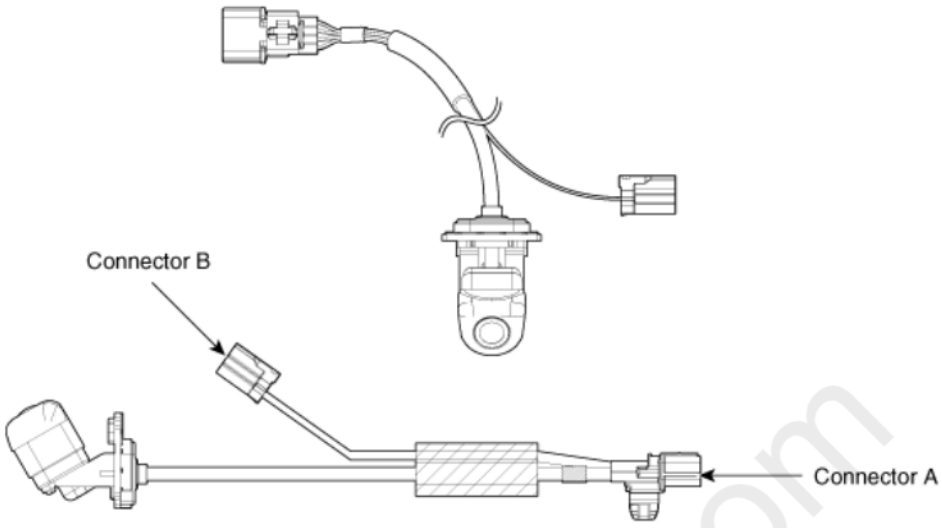
System Structure (Back view camera operated by steering)

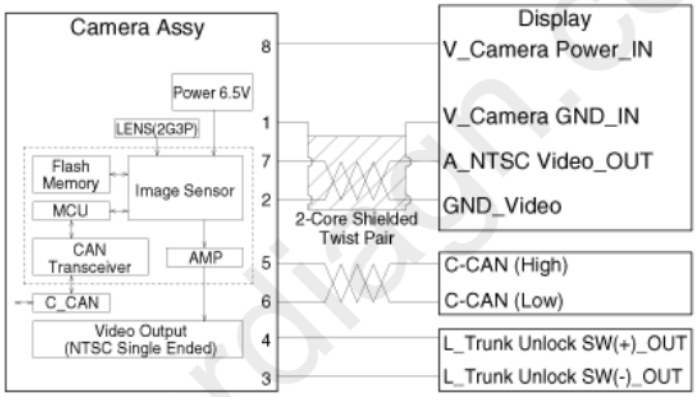


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Circuit Diagram

[5 Door]

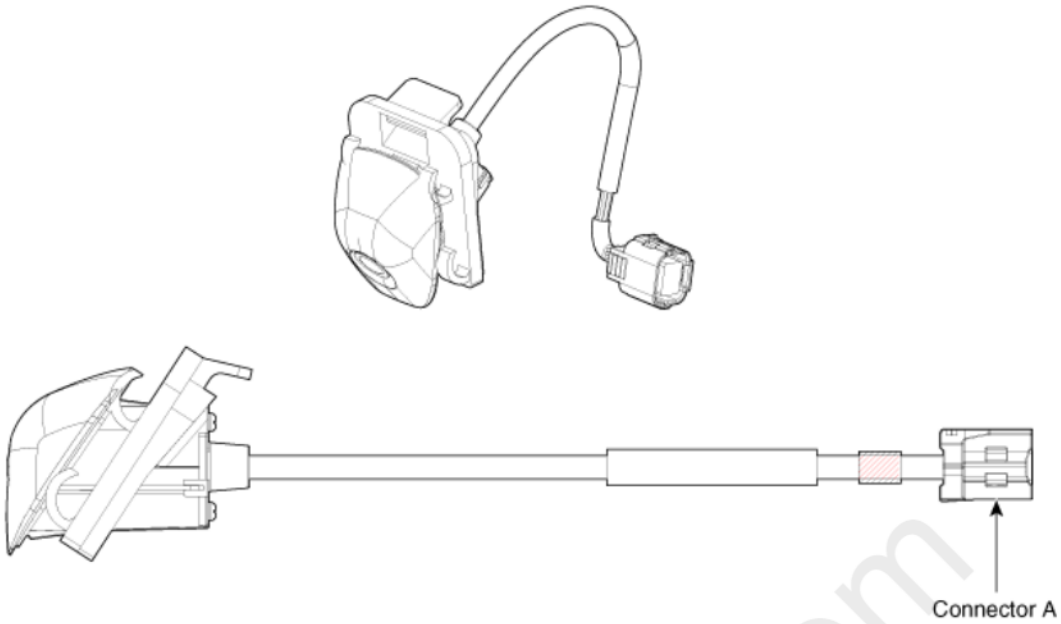


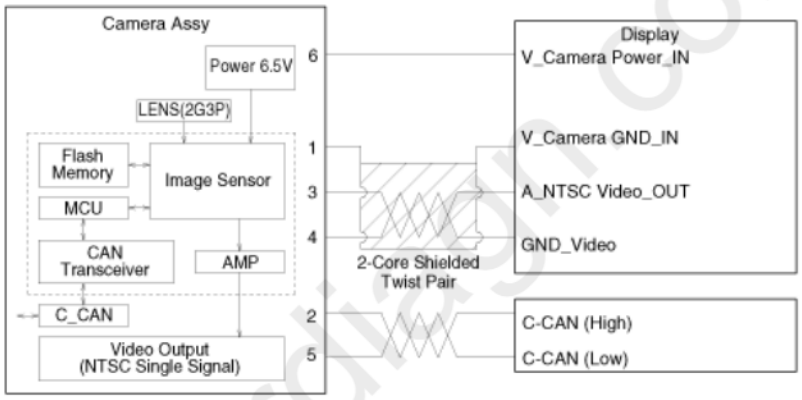


Connector A	No.	Description	No.	Description
	1	Camera ground	5	C-CAN (High)
	2	Video ground	6	C-CAN (Low)
	3	Trunk unlock switch (-)	7	NTSC Video
	4	Trunk unlock switch (+)	8	Camera power

Connector B	No.	Description
	1	Trunk unlock switch (+)
	2	Trunk unlock switch (-)

[4 Door]





Connector A	No.	Description	No.	Description
	1	Camera groud	4	Groud_Video
	2	C-CAN (High)	5	C-CAN (Low)
	3	NTSC Video	6	Camera power

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Removal

Information

In case of bad quality or poor focus, be sure to check the camera lense surface condition and foreign materials.

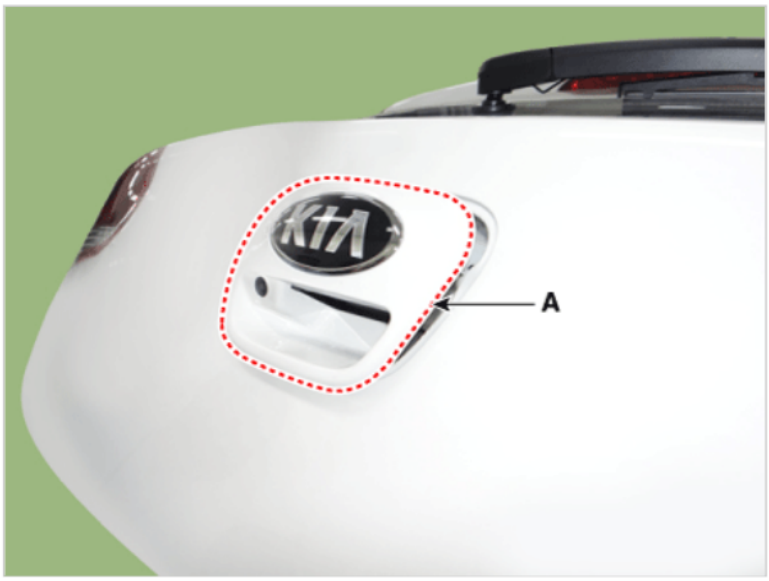
[5 Door]

1. Disconnect the negative (-) battery terminal.
2. Remove the tailgate trim.
   (Refer to Body - "Tailgate Trim")
3. Disconnect the tailgate outside handle assembly connector (A).

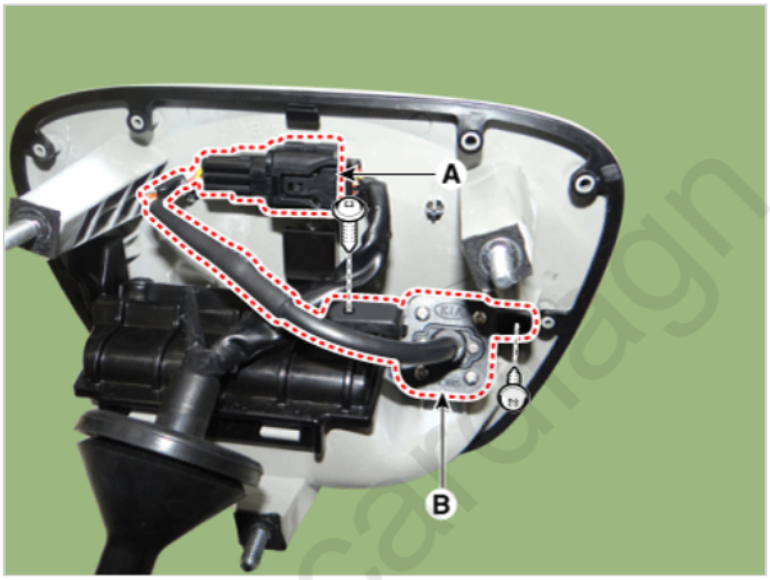


4. Remove the tailgate outside handle assembly (A) after loosening the mounting nuts.





5. Disconnect the back view camera assembly connector (A).
6. Remove the back view camera assembly (B) after loosening the mounting screws.



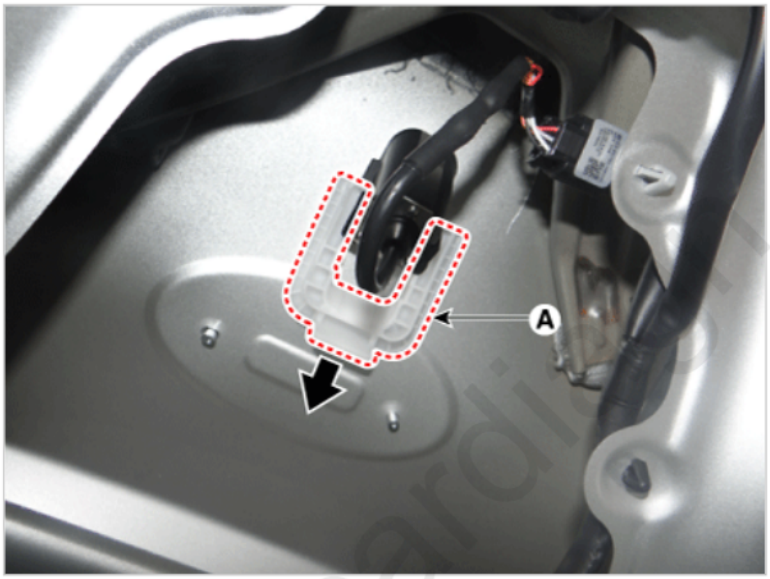
[4 Door]

1. Disconnect the negative(-) battery terminal.
2. Open the trunk and remove the trunk lid trim.
   (Refer to Body - "Trunk Lid Trim")
3. Disconnect the back view camera connector (A).

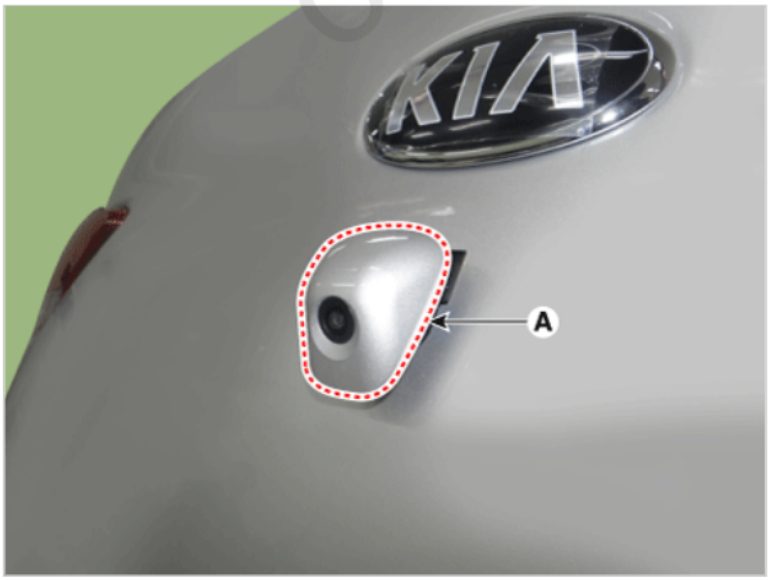
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4. Pull down and remove the back view camera holder (A).



5. Remove the back view camera assembly (A).



Installation

[5 Door]

1. Connect the back view camera assembly connector.
2. Install the back view camera assembly.
3. Install the tailgate outside handle assembly.
4. Connect the tailgate outside handle assembly connector.
5. Install the tailgate trim.
6. Connect the negative (-) battery terminal.

[4 Door]

1. Fix the back view camera with the back view camera holder.
2. Connect the back view camera connector.
3. Install the trunk lid trim.
4. Connect the negative (-) battery terminal.

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Specifications

[BCM Type]

Items	Specifications
Rated voltage	DC 12 V
Operating voltage	DC 9 - 16 V
Operating temperature	-31 - 167°F (-35 - 75°C)
Dark current	SMK : 3mA / Keyless : 3.5mA

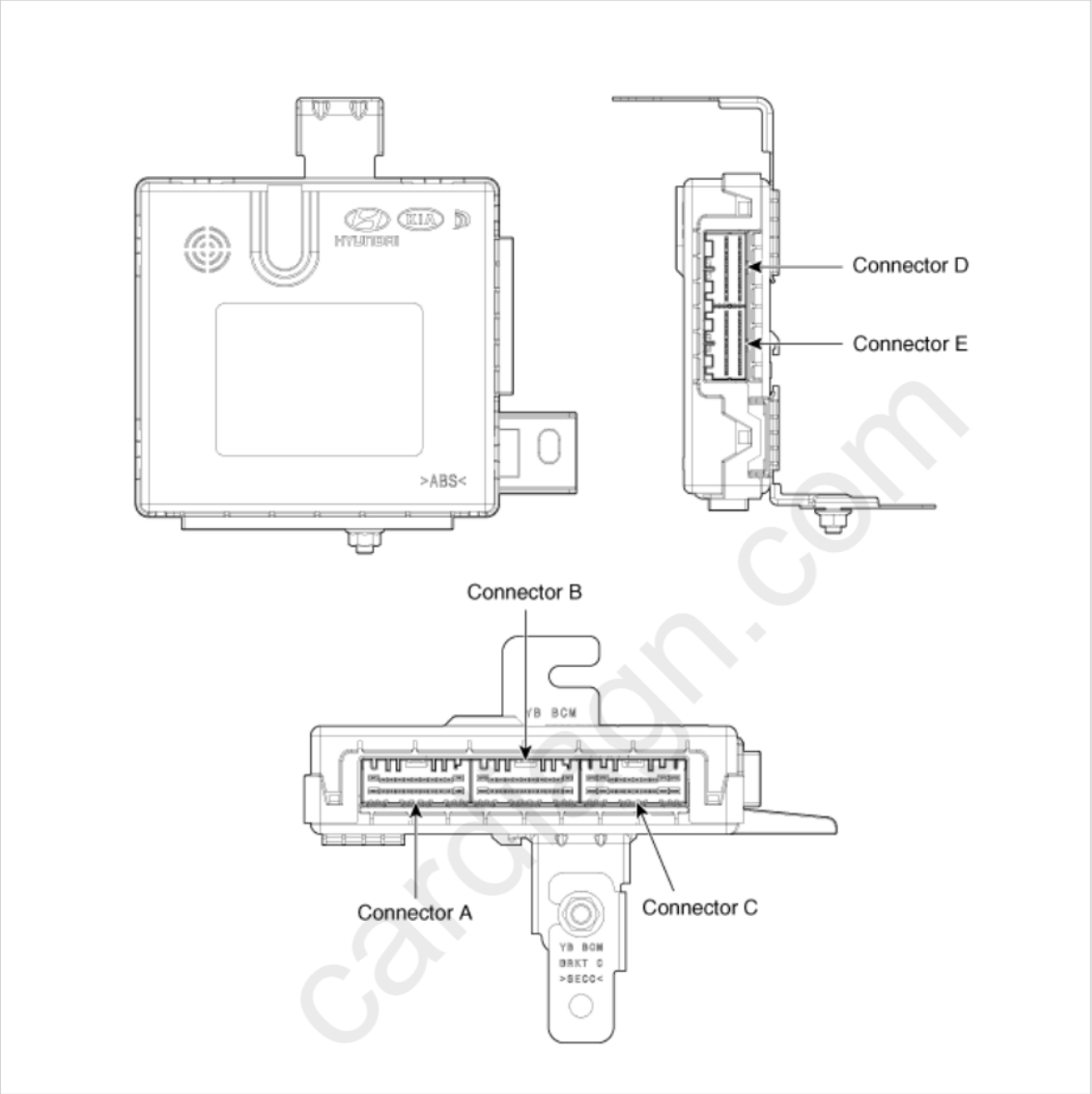
[Non-BCM Type (Seat Belt Remind & Lighting Unit)]

Items	Specifications
Rated voltage	DC 12 V
Operating voltage	DC 9 - 16 V
Operating temperature	-22 -167°F (-30 - 75°C)
Dark current	2.5mA

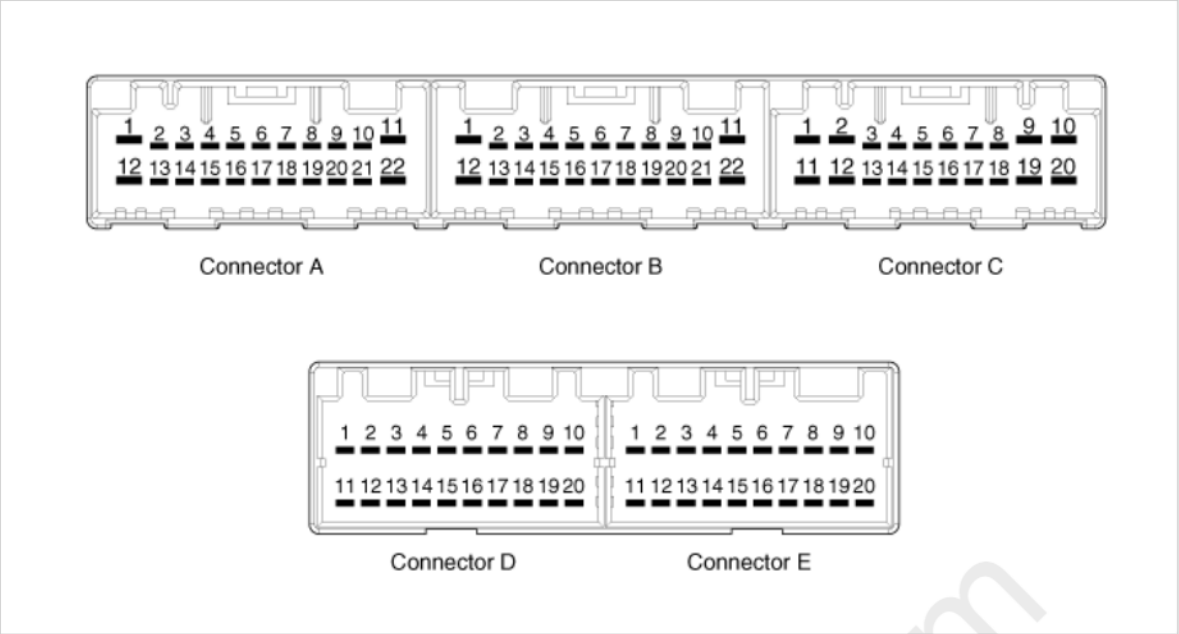
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Components

[BCM Type]



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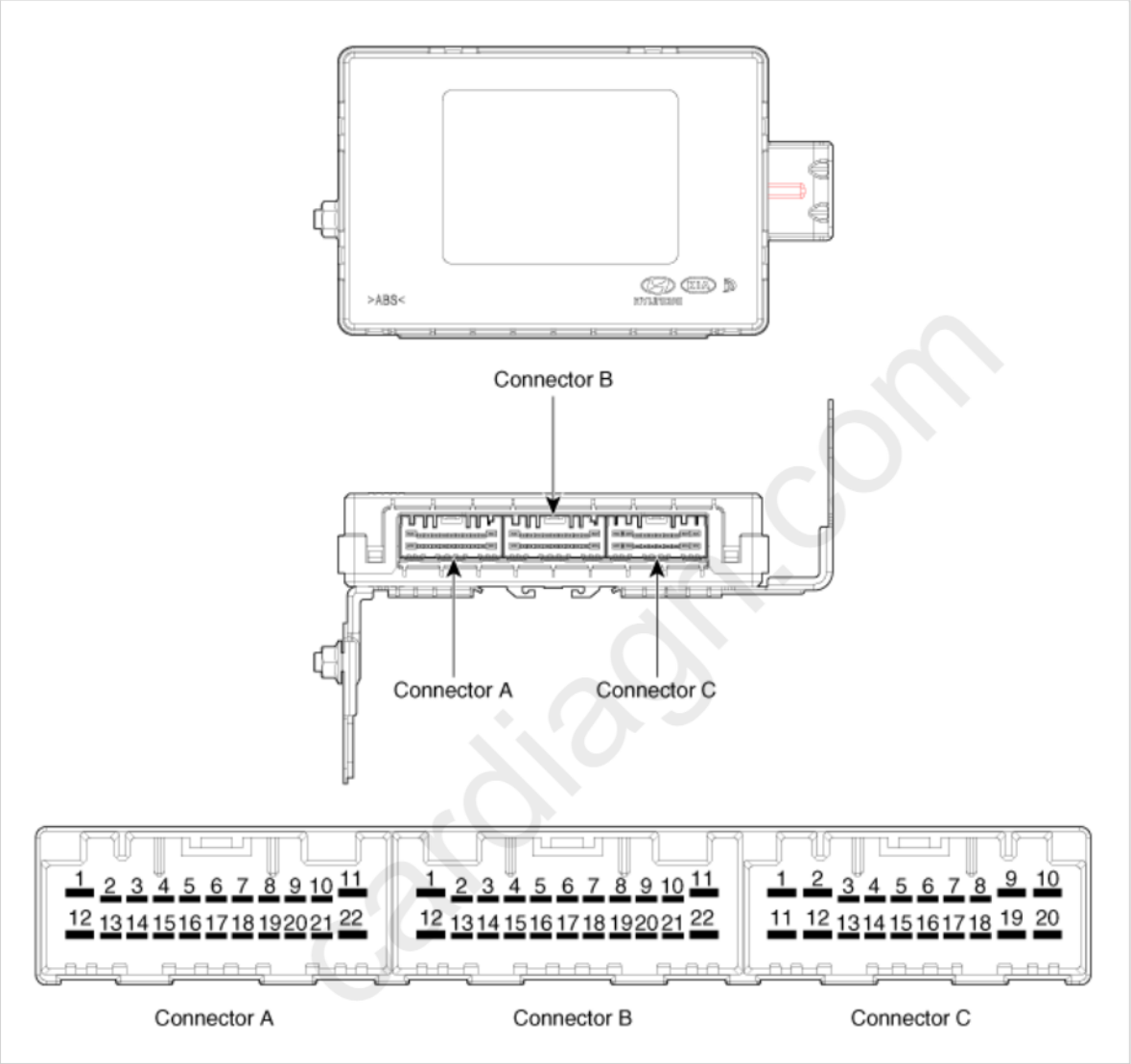
Connector Pin Information

No.	Connector A	Connector B	Connector C	Connector D	Connector E
1	Battery (+)	Front wiper low back up switch	Static bending (Left)	-	DRL Dedicated
2	RPAS Power	Rear washer switch	-	Key inter lock switch	Tail lamp relay
3	IGN1	Rear wiper switch	B-CAN (High)	-	Power window relay
4	Key in switch	Front wiper switch	B-CAN (Low)	-	Front fog lamp relay
5	-	Front wiper INT volume switch	Auto light power	-	Rear fog lamp relay
6	Power window lock switch	Multifunction light switch	Interior lamp auto cut_Ground	Security indicator	Right headlamp (High) / Right dedicated DRL
7	Sunroof open switch	PAS (LIN)	Room lamp	Key solenoid	Left headlamp (High)/ Left dedicated DRL
8	Rear right door unlock switch	-	Rear right turn signal	Headlamp low relay	Heaadlamp high_Power1 Dedicated DRL_Power1
9	Front right door unlock switch	-	Rear left turn signal	Rear wiper relay	Heaadlamp high_Power2 Dedicated DRL_Power2
10	Front left key unlock switch	-	Front left turn signal	Navi wake up	-
11	Wiper washer switch	Static bending (Power)	Trunk / Tailgate release switch	Wiper parking state	Driver door unlock relay
12	PAS Power	Crash signal	Front right door open switch	-	Door unlock relay
13	-	-	Rear right door open switch	AV Tail	Door lock relay
14	ACC	Headlamp high switch	Front left door open switch	Start inhibit relay	-
15	IGN2	Fog lamp switch	Rear left door open switch	-	Trunk unlock relay Tailgate unlock relay
16	-	Turn signal switch	Auto light sensor	-	-
17	Hazard switch	Headlamp low back up switch	Auto light ground	-	Front wiper high relay
18	Power window unlock switch	Rain sensor (LIN)	-	Headlamp high relay	Front wiper low relay
19	Rear left door unlock switch	Trunk / Tailgate open switch	Turn signal power	Alarm horn relay	Safety power window enable

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20	Front left door unlock switch	-	Front right turn signal	-	-
21	Frotn left key lock switch	Ground (Multifunction switch)			
22	Ground_Power	Static bending (Right)			

[Non-BCM Type (Seat Belt Remind & Lighting Unit)]



Connector Pin Information

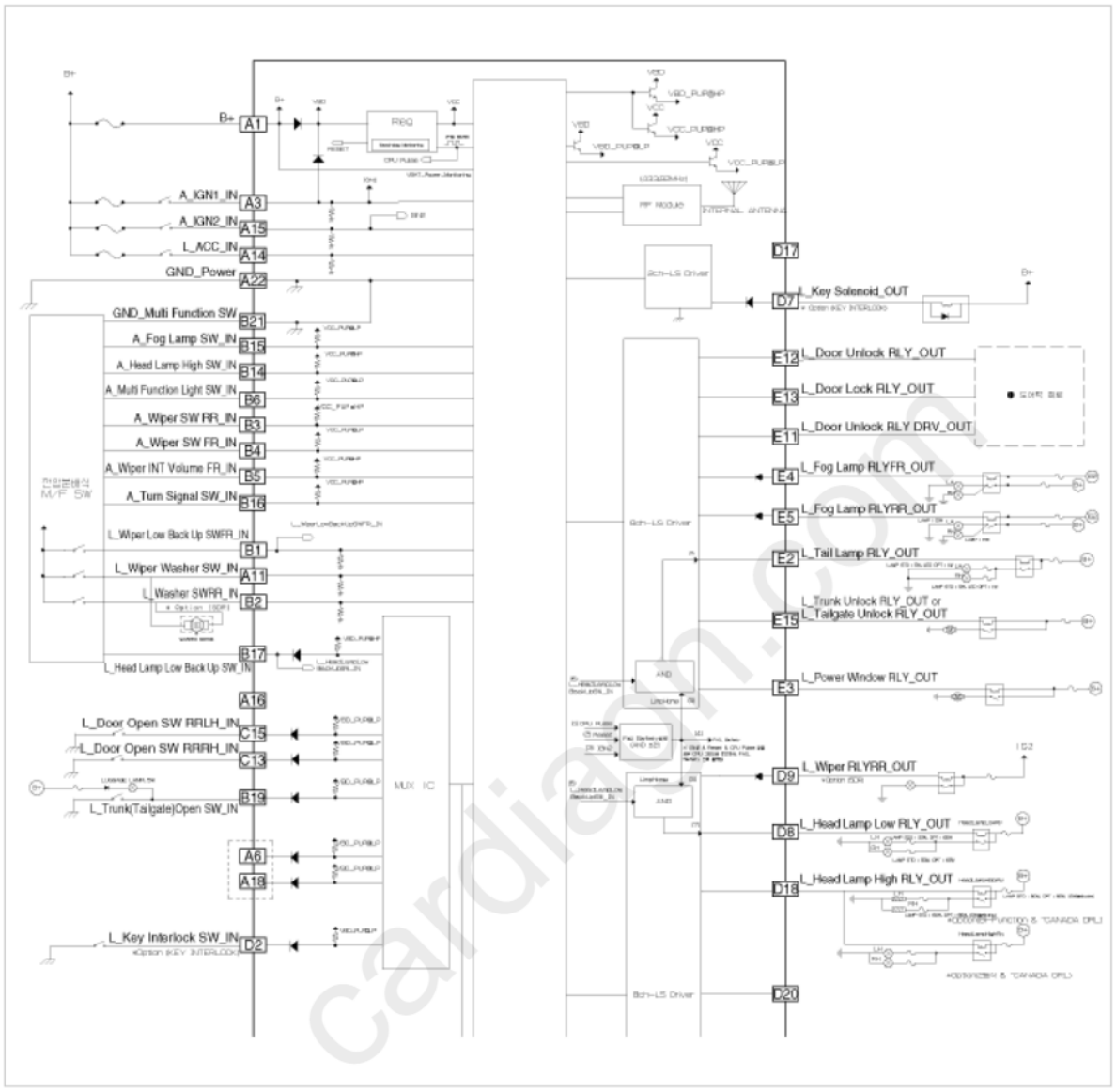
No.	Connector A	Connector B	Connector C
1	Battery (+)	Turn signal power	B-CAN (High)
2	IGN2	Front left turn signal	B-CAN (Low)
3	Driver door unlock switch	Tail lamp switch	Rear center seat belt indicator
4	Rear left door unlock switch	Front fog lamp switch	Rear left seat belt indicator
5	Driver door open switch	Hazard switch	Tailgate (Trunk) unlock relay
6	Rear left door unlock switch	Left turn signal switch	Front fog lamp relay
7	Driver key lock switch	Auto light switch	DRL Dedicated
8	Power window lock switch	Rear right SBR switch	Headlamp low relay
9	Door lock relay	Right turn signal switch	-
10	Door lock indicator	Rear fog lamp switch	-

11	Front right turn signal	Auto light ground	AV Tail
12	IGN1	Rear left turn signal	Auto light power
13	ACC	Rear right turn signal	Auto light sensor
14	Assist door unlock switch	Key IN switch	Rear right seat belt indicator
15	Rear right door unlock switch	Tailgate (Trunk) release switch	Rear fog lamp relay
16	Assist door open switch	Tailgate (Trunk) open switch	-
17	Rear right door open switch	Headlamp high switch	Headlamp high relay
18	Driver key unlock switch	Rear left SBR switch	Tail lamp relay
19	-	Rear center SBR switch	-
20	Door unlock relay	Passing switch	-
21	-	Headlamp low switch	
22	Ground	Ground	

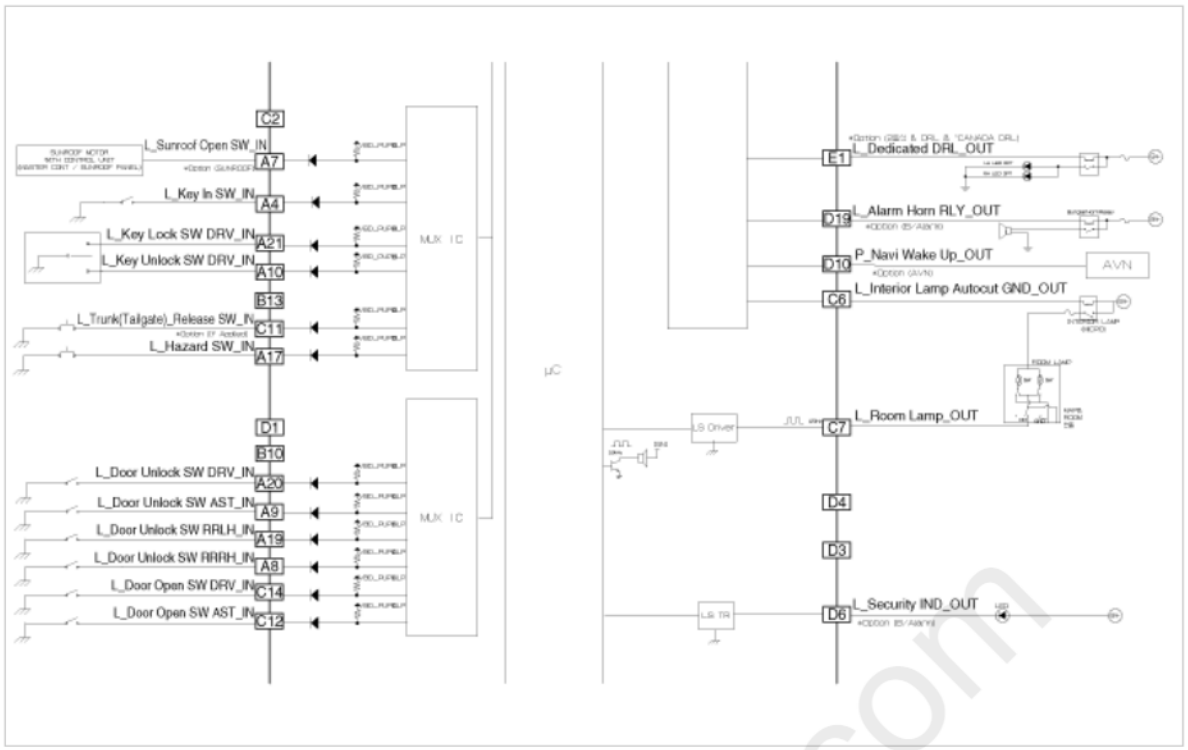
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Circuit Diagram

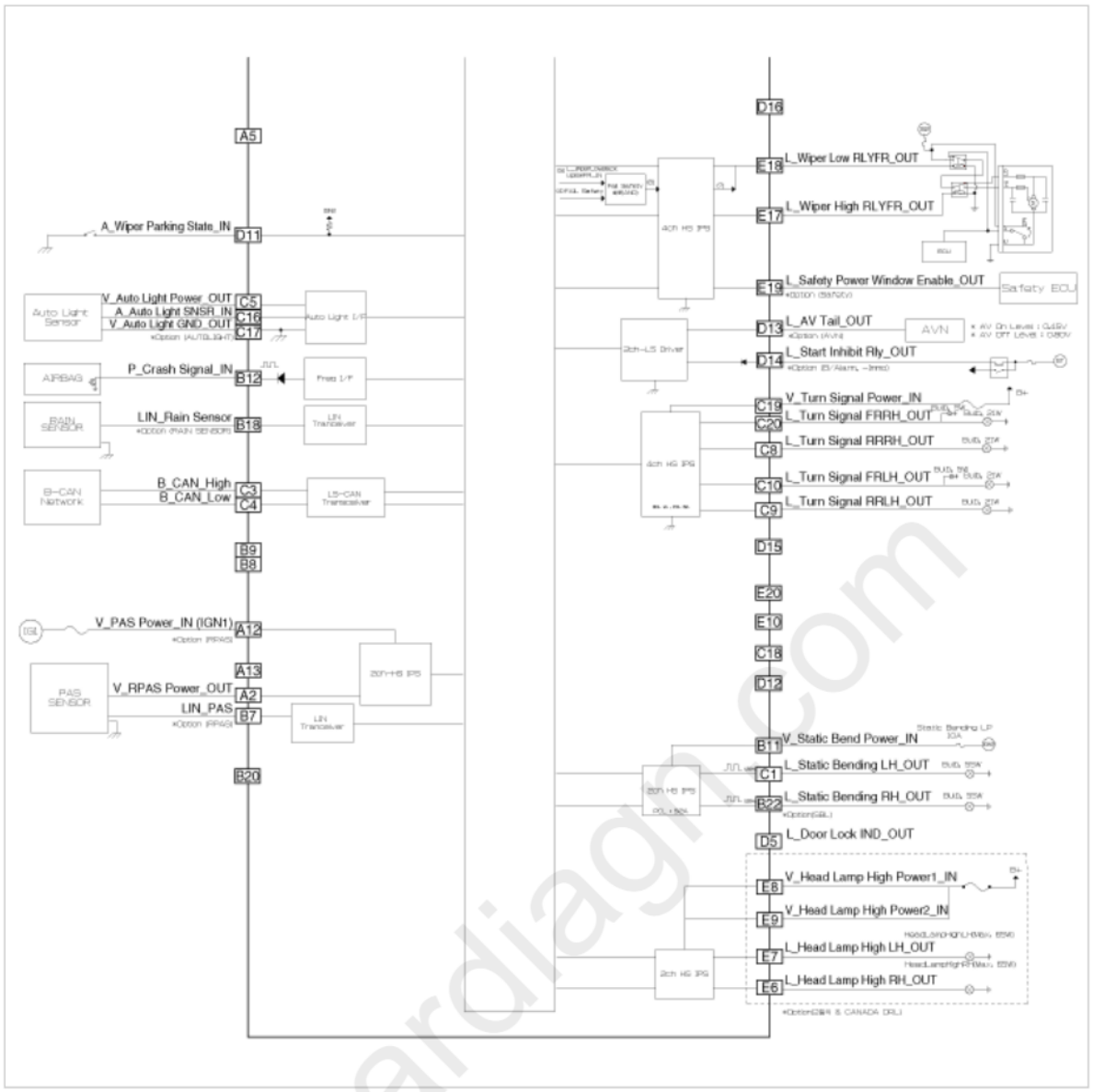
[BCM Type]



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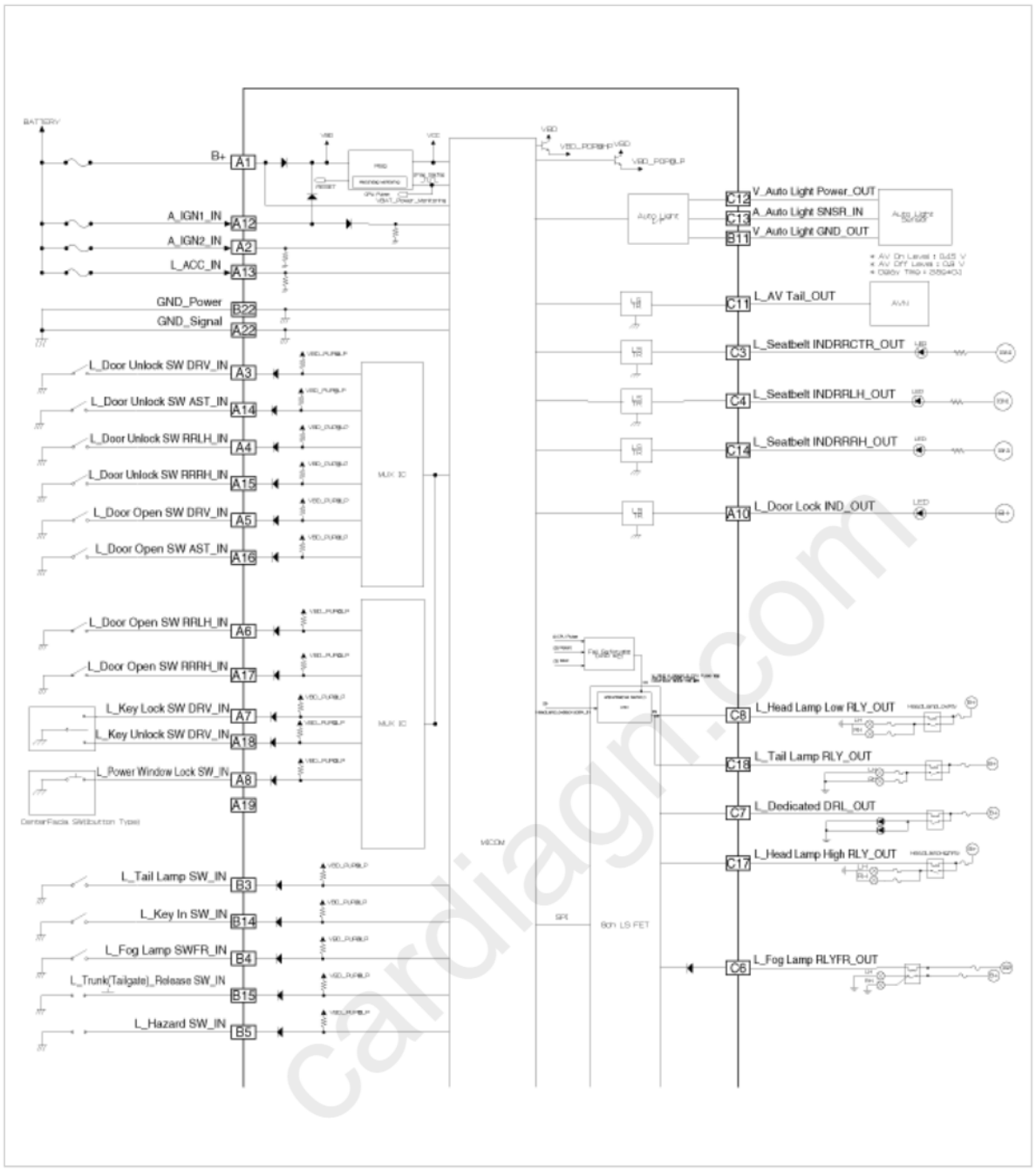


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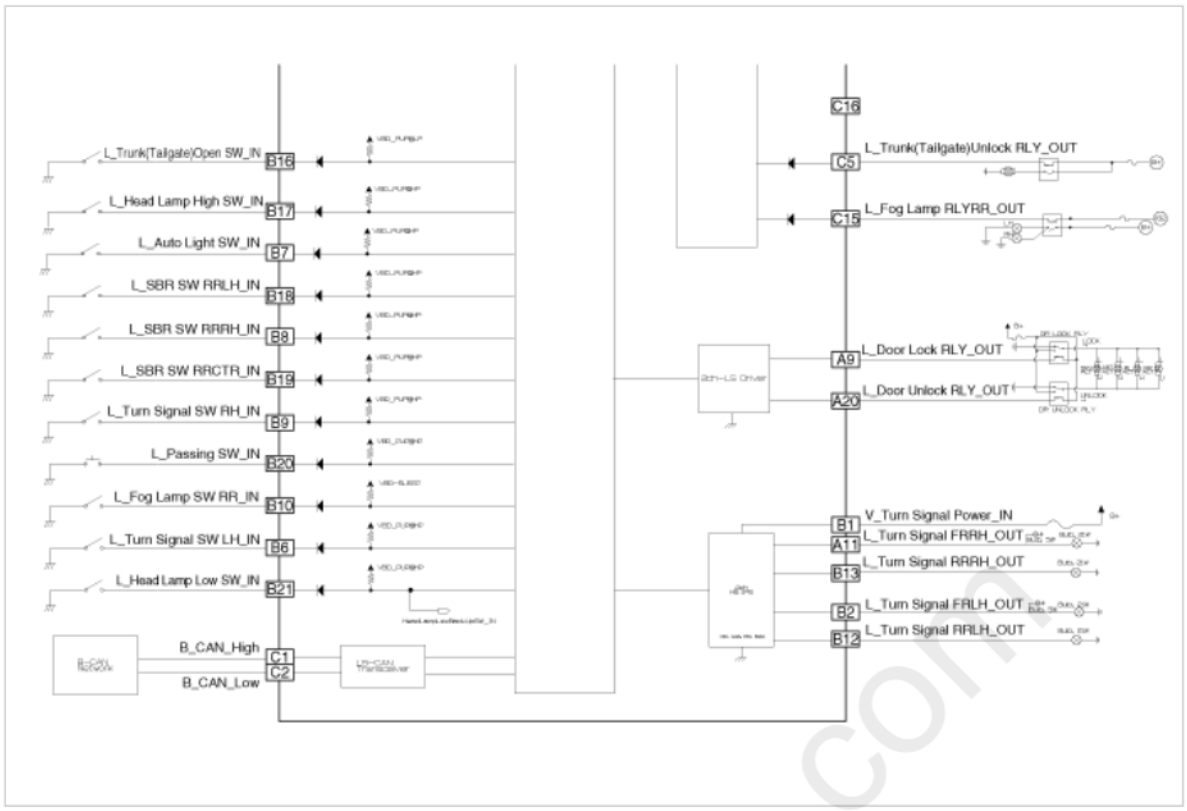


[Non-BCM Type (Seat Belt Remind & Lighting Unit)]

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Description

Body Control Module (BCM) function

No	Item	Description
1	Washer Linked Wiper	– If the washer switch is pressed ON for 0.06-0.2 second with the vehicle mode in IGN2, the wiper relay is turned ON 0.3±0.1 second after washer switch ON, and then the wiper relay is turned OFF 0.7±0.1 second later. – If the washer switch is pressed ON for over 0.2 second with the vehicle mode in IGN2, the wiper relay is turned ON 0.3±0.1 second after washer switch ON, and then the wiper relay is turned OFF 2.5-3.8 seconds (wiper activates 2-3 times) after washer switch OFF.
2	MIST Linked Wiper	– If the wiper mist switch is pressed ON for 0.7 second with the vehicle mode in IGN2, the wiper relay is turned ON, and then OFF 0.7 second later. – If the wiper mist switch is pressed ON for over 0.7 second with the vehicle mode in IGN2, the wiper relay is turned ON, and then turned OFF 0.7 second after wiper mist switch OFF.
3	Variable INT Wiper	– If the INT wiper switch is turned ON with the vehicle mode in IGN2, INT wiper operates intermittently (10 -2.2 sec.) based on the INT volume setting.
4	Wiper linked with rear washer	– If you turn on the rear washer switch while the IGN2 switch is turned on, the wiper power is turned on 0.3 seconds later. If the switch input lasts between 0.2 and 0.6 seconds, the wiper power is turned off 0.7 seconds later.
5	Rear wiper	– If you turn on the rear wiper switch while the IGN2 switch is turned on, the rear wiper relay operates continuously.
6	Rear Defogger Deicer Timer	– If the defogger switch is turned ON with the vehicle mode in alternator ON, defogger relay is turned ON for 20 minutes. – If the defogger switch is pressed one more time or if alternator mode is turned OFF while the defogger is ON, then the defogger relay is turned OFF.
7	KEY Inter Lock	– If the KEY INTER LOCK switch is turned OFF with the vehicle mode in IGN1 ON or ACC ON, the key solenoidenoid output is turned ON and prevents the key from being removed.
8	ATM Shift Lock	– If brake switch is turned ON with the vehicle mode in IGN1 ON and the shift lever in P position, ATM solenoid is turned ON to unlock the shift lever.
9	Tailgate Release	– Tailgate release relay is turned ON for 0.2±0.02 second if TX tailgate signal is received. – If tailgate release switch is turned ON with all doors unlocked, tailgate releaserelay is turned ON for 0.2±0.02 second. (However, Tailgate release switch is ignored when in ARMWAIT, ARM, REARM, or ALARM mode.) – If Interior tailgete release switch is turned ON, tailgate release relay is turned ON for 0.2±0.02 second. (However, Tailgate release relay is NOT turned ON of the vehicle speed is over 5km/h(3.1mi/h), or if the vehicle is in ARMWAIT, ARM, REARM, or ALARM mode.)
10	Power Window Timer	– Power wIndicatorow relay is turned ON when the vehicle mode is switched to IGN ON. – When the vehicle mode is switched IGN ON → OFF, power window relay is turned ON for 30 seconds. – If a door is opened during the 30 second power window relay ON period, the power window relay is immediately turned OFF. – If a door is opened and the vehicle mode is switched IGN ON → OFF, power window relay is immediately turned OFF.
11	Seat Belt Reminder (Driver Side)	– If Seat belt is not fastened, Indicator is turned ON at the first IGN ON, then turned OFF when the seat belt is fastened. – If the vehicle speed is over 20Km/h with Seat belt unfastened, Indicator blinks and chime buzzer is activated for 100 seconds. – While the vehicle speed is over 20Km/h with the seat belt fastened, then the seat belt is unfastened, Indicator blinks and chime buzzer is activated for 100 seconds. (Remider) – If the Seat belt is fastened or the vehicle mode is switched to IGN OFF while 100 sec. buzzer is activating, the Indicator blinking and the buzzer is turned OFF. – If the vehicle mode is switched to IGN ON with Seat belt unfastened, and vehicle speed exceeds 20Km/h with Indicator ON, Indicator blinks and chime buzzer is activated for 100 seconds.
12	Seat Belt Reminder (Passenger Side)	– If there is no one in the passenger seat, then the system operates as if seat belt is fastened. – If Seat belt is not fastened, Indicator is turned ON at the first IGN ON, then turned OFF when the seat belt is fastened. – If the vehicle speed is over 20Km/h with seat belt unfastened, Indicator blinks and chime buzzer is activated for 100 seconds. – While the vehicle speed is over 20Km/h with the Seat belt fastened, then the seat belt is unfastened, Indicator blinks and chime buzzer is activated for 100 seconds. (Remider) – If the seat belt is fastened or the vehicle mode is switched to IGN OFF while 100 sec. buzzer is activating, the Indicator blinking and the buzzer is turned OFF.

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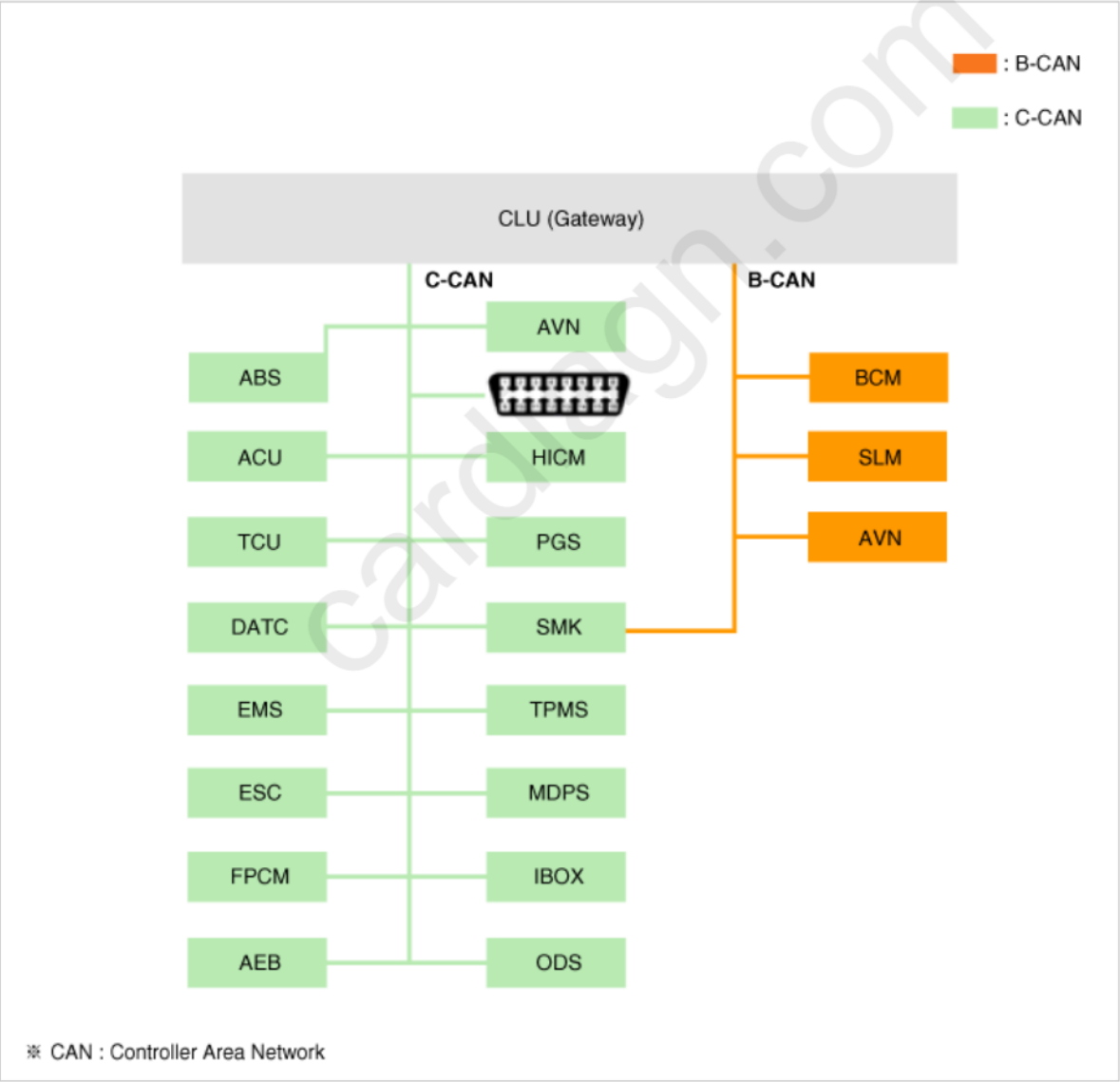
		– If the vehicle mode is switched to IGN ON with Seat belt unfastened, and vehicle speed exceeds 20Km/h with Indicator ON, Indicator blinks and chime buzzer is activated for 100 seconds.
13	Seat Belt Reminder (Rear)	– If Seat belt is not fastened, Indicator is turned ON for 35 seconds at the first IGN ON, then turned OFF when the seat belt is fastened. – If the vehicle speed is over 20Km/h with seat belt unfastened, Indicator blinks and chime buzzer is activated for 35 seconds. – If the vehicle speed is over 20Km/h with the seat belt fastened, then the seat belt is unfastened, Indicator blinks and chime buzzer is activated for 35 seconds. (Remider) – If the seat belt is fastened or the vehicle mode is switched to IGN OFF while 35 sec. buzzer is activating, the Indicator blinking and the buzzer is turned OFF. – If the vehicle mode is switched to IGN ON with seat belt unfastened, and vehicle speed exceeds 20Km/h with Indicator ON, Indicator blinks and chime buzzer is activated for 35 seconds.
14	KEY Operated Warning	– If the driver door is opened with the KEY IN, buzzer is continuously activated at 1 second interval. – The buzzer is turned OFF if KEY OUT or the door is closed while the chime buzzer is activated.
15	Parking Brake Warning	– If the vehicle speed exceeds 5Km/h(3.1mi/h) while the vehicle mode is in IGN1 and the parking brake is engaged, buzzer is sounded until the parking brake is released. (Buzzer activates at 0.6 second ON and 0.4 second OFF at 1 second interval until the parking brake is released.)
16	Decayed Room Lamp	– If a door is opened with the vehicle mode in IGN OFF, the room lamp is turned ON. If the door is closed, the room lamp is remained ON for 30 seconds then turned OFF. (dimmer 2±0.2 sec.) – If the door is remained opened, the room lamp is remained ON for 20 minutes, then turned OFF. (dimmer 2±0.2 sec.)
17	KEY Hole Illumination	– Key illumination Lamp is turned ON if a door is opened while the vehicle mode in IGN1 switch OFF, and the Key illumination Lamp is turned OFF 30 seconds after the door is closed. – If the vehicle mode is switched to IGN1 ON while Key illumination lamp is ON, then the lamp is immediately turned OFF. – If the vehicle mode is switched to ARMWAIT while Key illumination lamp is ON, then the lamp is immediately turned OFF.
18	Tail Lamp Auto Cut	– If Tail switch is switched OFF→ ON, the tail relay is turned ON. – If Tail switch is turned OFF, then the tail relay is turned OFF. – If KEY IN switch OFF & Tail switch ON & Driver Door OPEN while in KEY IN switch ON & Tail switch ON, the tail relay is turned OFF. (Auto OFF) – If KEY IN switch is turned ON after Auto OFF, then the tail relay is turned ON. Tail relay does not turn back ON even if the driver side door is opened → closed.
19	Head Lamp Escort	– If the vehicle mode is switched from IGN1 to IGN1 OFF, and the haed lamp is turned ON by haed lamp switch or autolight, then the haed lamp is remained ON. – Haed lamp is turned OFF in case of any of the following conditions. ① 15 seconds after driver side door is opened → closed. ② Haed lamp or Autolight is not turned ON. ③ If driver side door is remained opened for over 5 minutes. ④ 20 minutes after the vehicle mode switching from IGN1 ON to IGN OFF. ⑤ If TX lock signal is received 2 times while H/Lamp is ON.
20	Head Lamp LOW / HIGH	– If Haed lamp low is turned ON with head lamp low switch ON or autolight function, and head lamp high switch is ON (Self return), then the head lamp high is turned ON. – Head lamp high can only be turned OFF with the passing switch.
21	Head Lamp PASSING	– Head lamp high activates only when the passing switch is turned ON and the vehicle mode is in IGN2 ON. – The switch is used to turn OFF when the head lamp high is ON.
22	Front Fog Lamp	– If the front fog is turned ON while tail lamp is ON, then the front fog lamp is turned ON. – If the front fog is turned OFF while the front fog lamp is ON, then the lamp is turned OFF. – If the head lamp low is turned ON while front fog is ON, then the front fog lamp is turned ON. – If the front fog is turned OFF while the front fog lamp is ON, then the lamp is turned OFF.
23	Rear Fog Lamp	– Rear Fog Lamp is turned on if the Rear Fog Lamp Switch is pressed when the vehicle is in IGN1 ON Mode and the Front Fog Lamp Switch is turned ON. – The Rear Fog Lamp is turned OFF if the Rear Fog Lamp Switch is pressed while the lamp is ON. – The Rear Fog Lamp is turned OFF if the IGN1 or the Tail Lamp Relay is turned OFF while the lamp is ON. – Rear Fog Lamp is turned OFF if both of the Head Lamp Low Relay and the Front Fog Lamp Switch are turned OFF while the lamp is ON.
24	Auto Light Control	– If Auto light sensor is detects light ON condition, then the light is turned ON 2.5 seconds later. – If the sensor detects light OFF condition, then the light is turned OFF 2.5 seconds later. – If the sensor detects tail light ON condition, then only the tail lamp is turned ON. If the sensor detects head lamp ON condition, then both the tail lamp and the head lamp are turned ON. –

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		In case of head lamp ON condition, both the tail lamp and head lamp are turned ON regardless of tail switch ON/OFF status.
25	Tail Welcome	– If the vehicle mode is switched to KEY OFF, all doors are closed and locked while the tail lamp is turned ON (Head lamp switch or AUTO switch + night time), then RKE unlock is activated, the tail lamp is turned ON for 15 seconds.
26	Static Bending Lamp (SBL)	– The left/right Static Bending Lamp (SBL) is turned ON corresponding to the steering wheel angle while the head lamp is ON. – If the shift lever is in R position, then the lamp opposite of the wheel angle is turned ON. – In case of domestic models, the lamp is not turned ON if the vehicle speed is below 3Km/h or when the shift lever is in R position.
27	Daytime Running Light (DRL)	– DRL Lamp is turned ON when the engine is started. – DRL Lamp is turned OFF if head lamp low or front fog lamp is turned ON.
28	Turn Signal LAMP(HAZARD)	– Inputting the left turn signal lamp switch signal turns on the left turn lamp when the vehicle mode is in IGN2 ON. – Hazard lamp is turned ON when the hazard switch ON.
29	RPAS	– If the shift lever is switched to R position while the vehicle mode is in IGN1 ON, then buzzer is activated 0.5 second later. – Warning level is displayed in the cluster and buzzer is activated corresponding to the warning condition.
30	Normal/ARMWAIT/Relock Mode	– If TX lock signal is received with KEY IN switch removed from the cylIndicatorer and all doors are closed, then all doors lock signal is outputted, and when all door lock switch is locked, then hazard lamp is turned ON 1 time, and the vehicle enters ARM mode after expiration of ARMWAIT time (30 sec.). – If TX lock signal is received while any one of the doors, hood, or trunk is opened, then only the lock signal is outputted. Hazard lamp is not turned ON and the vehicle does not enter the ARM mode. – If any of the doors is not opened or KEY IN is not detected within 30 seconds after receiving TX unlock signal, then the vehicle returns to ARM mode.
31	Alarm Condition	– If Alarm activation condition is detected, then start inhibit is turned ON to prevent engine start and the alarm is activated.
32	DISARM/Alarm Deactivation Condition	– If TX UNLOCK/LOCK switch signal is received, unlock/lock signal is outputted for 0.5 second, and START INHIBIT is turned OFF. – If KEY IN switch ON & IGN1 switch ON & IGN2 switch ON & alternator ON is maintained for 30 seconds, then start inhibit is turned OFF and the vehicle mode is switched to DISARM.
33	RESET	– If the battery is disconnected while the alarm is activating, and then reconnected, then the alarm also reactivates. – If the battery is disconnected while the vehicle is in ARM mode, and then reconnected, the vehicle maintains ARM mode.
34	Central Door Lock/Unlock	– If Driver/Passenger side door KEY lock/unlock switch is turned ON within 3 seconds, then all door lock/unlock signal is outputted for 0.5 second. – If TX lock/unlock signal is received, then all door lock/unlock signal is outputted for 0.5 second. – If Driver door lock switch (Power window) is Lock/Unlock, then all door lock/unlock signal is outputted for 0.5 second.
35	Auto Door Lock (SAB option only)	– If the vehicle mode is in IGN1 ON & alternator ON, and the vehicle speed is over15km/h(9.3mi/h), all doors are locked within 1.5 seconds. (However, if all doors are already locked or in case all door fail condition, then all door lock function is not executed.) – If any one of the doors is unlocked after locking via above condition, then lock command is executed 3 times. (at 1 sec. interval). Unlocked door that is locked during the 3 attempts is ignored. – Auto door lock function is not engaged in case of crash unlock condition.
36	Auto Door Unlock	– If KEY OFF after KEY IN, then all door unlock is executed. (However, if all doors are already unlocked, then the unlock command is not executed.)
37	IGN KEY Reminder	This function does not activate if the vehicle speed is over 3Km/h(1.86mi/h). – If IGN KEY ON, Driver door switch open & Driver door unlock state becomes locked, all door unlock is executed for 1 second after 0.5 second delay. – IGN KEY ON, Assist door switch open & Assist door unlock state becomes locked, all door unlock is executed for 1 second after 0.5 second delay. – If Driver door switch is closed within 0.5 second from driver door unlock state switchitching UNLOCK → LOCK when the vehicle is in IGN KEY ON mode, all door unlock is executed only 1 time for 1 second. – If unlock condition is satisfied, then unlock is executed even if the condition is not maintained for 0.5 second.
38	Passive KEY Reminder	– This function does not activate if the vehicle speed is over 3Km/h(1.86mi/h). – If KEY Reminder signal is received from SMK, then all door unlock command is outputted for 1 second. –

		If the door remains locked even if unlock command is outputted for 1 second as stated above, then unlock is attempted for up to 3 times (excluding the 1st output) (1 sec. interval: 0.5 sec. ON/OFF)
39	Crash Door Unlock	– Unlock is executed every time ACU signal is inputted when IGN switch is turned ON. Unlock output continues for the set duration even if the vehicle mode is switched from IGN KEY ON to OFF. – If the Driver/Assist/Rear door lock switch is switched from unlock to lock after executing unlock, then unlock command is executed again for 5 seconds. – Auto Door Lock function is not engaged in case of crash unlock condition.
40	FOLD / UNFOLD	– Fold/Unfold is engaged when Fold/Unfold switch is activated. – If Auto switch is activated, then Fold/Unfold is engaged automatically in case of any of below conditions. 1) If RKE Lock/Unlock. 2) If Passive Lock/Unlock. 3) If Smart Key approach/away signal is detected.
41	AV Tail Lamp	– If the Auto Light Sensor value is below Tail Lamp ON (0.4V) condition while in ACC ON Mode, the AV Tail Lamp Output is turned ON after 1 second. – If the Auto Light Sensor value is above Tail Lamp OFF (0.85V) condition while the AV Tail Lamp is ON, the AV Tail Lamp Output is turned OFF after 1 second.

Communication Network Diagram



※ CAN : Controller Area Network

Abbreviation	Explanation
ACU	Airbag Control Unit

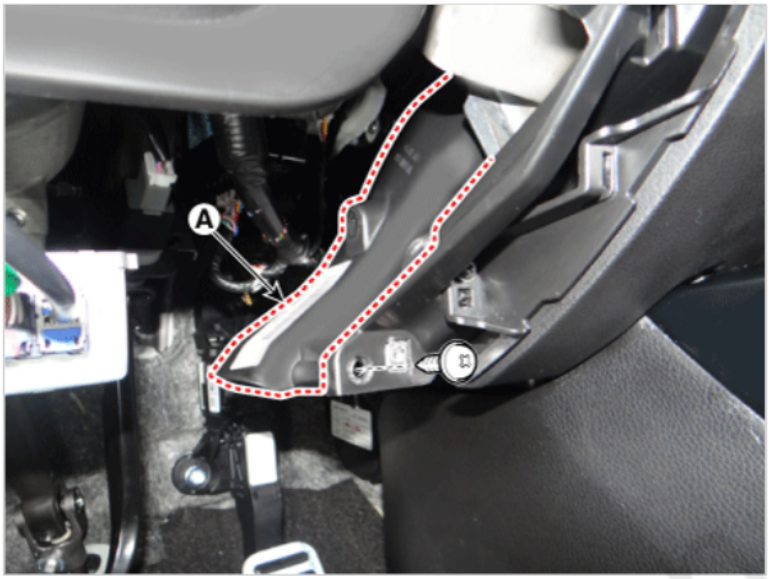
AVN	Head Unit (Audio / AVN)
B_CAN	Body Controller Area Network
BCM	Body Control Module
BSD	Blind Spot Detection
C_CAN	Chassis Controller Area Network
CLU	Cluster Module
ESC	Electronic Stability Program
EMS	Engine Management System
FPCM	Fuel Pump Control Module
LDWS	Lane Departure Warning System
M_CAN	Multimedia Controller Area Network
MDPS	Motor Driven Power Steering
MFS	Multi-Function Switch
P_CAN	Powertrain Controller Area Network
PGS	Parking Guide System
SAS	Steering Angle Sensor
SMK	Smart Key Unit
TCU	Transmission Control Unit
TPMS	Tire Pressure Monitoring System
VDC	Vehicle Dynamic Control
ABS	Anti-lock Brake System

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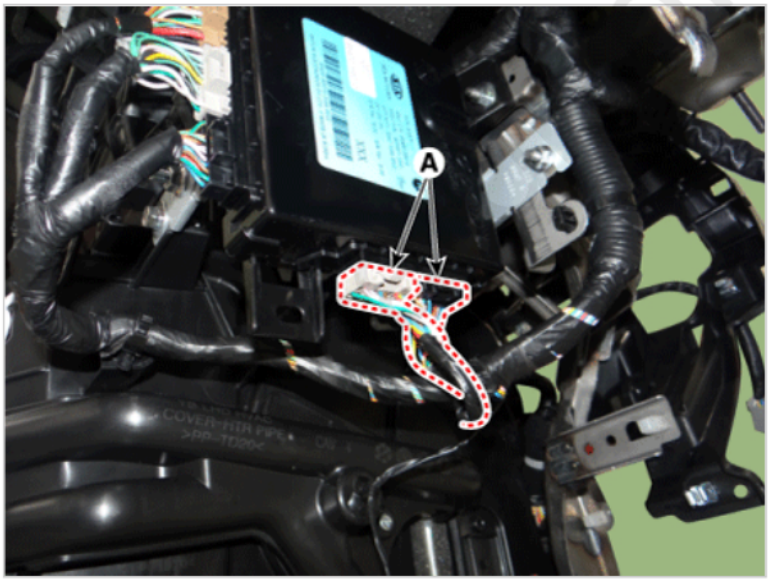
Removal

[BCM Type]

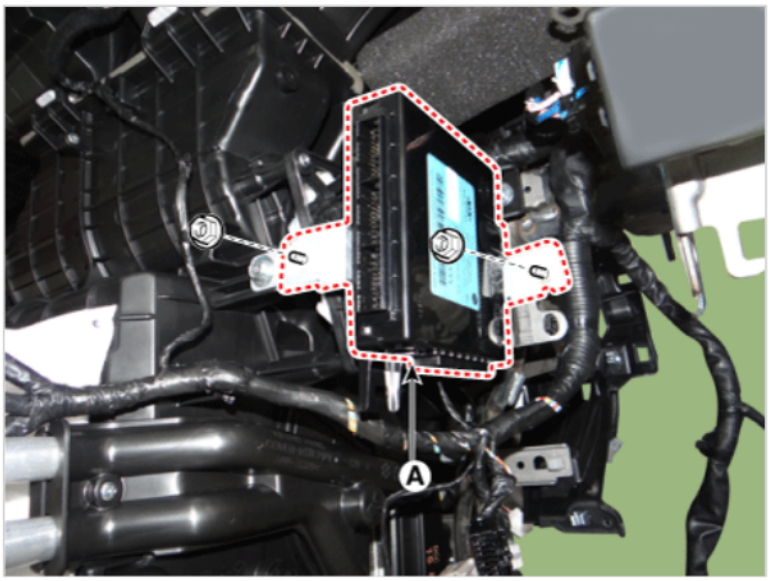
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the driver"s side shower duct (A) after loosening the screw.



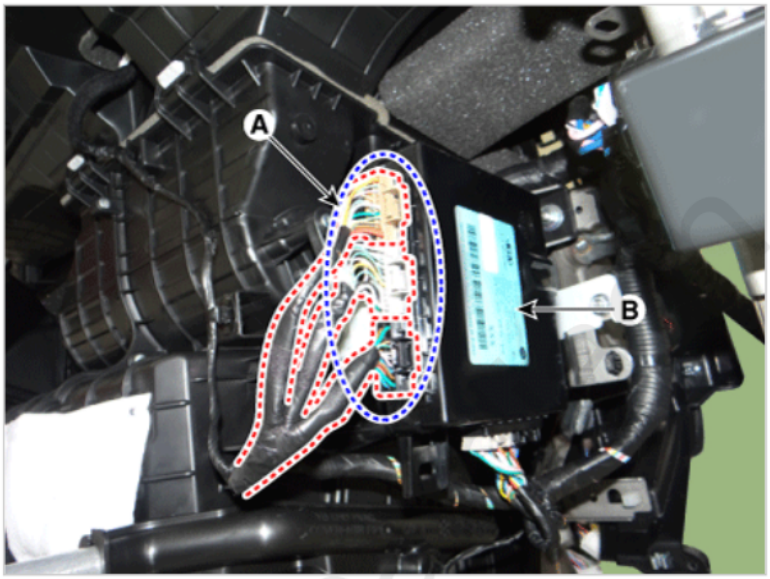
4. Disconnect the body control module connectors (A).



5. Remove the body control module (A) after loosening the mounting nuts.



6. Remove the body control module (B) after disconnecting the connectors (A).

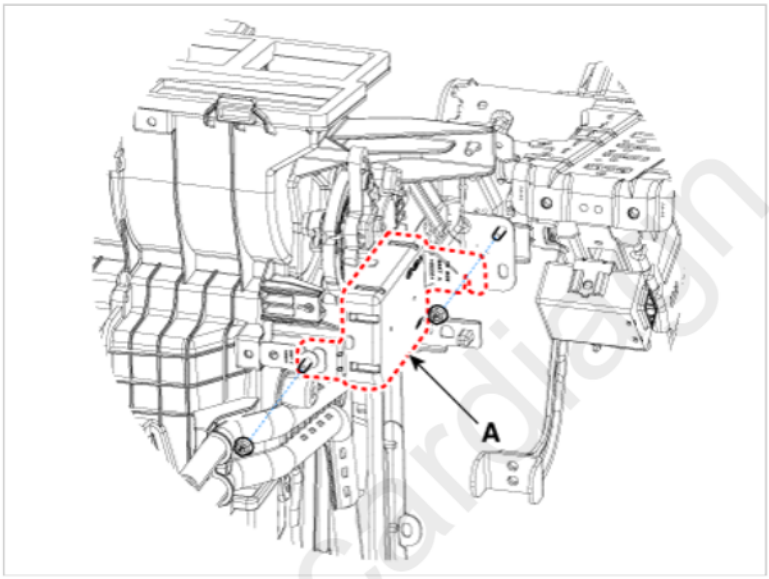


[Non-BCM Type (Seat Belt Remind & Lighting Unit)]

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the driver"s side shower duct (A) after loosening the screw.



4. Disconnect the seat belt remind & lighting unit connectors.
5. Remove the seat belt remind & lighting unit (A) after loosening the mounting nuts.



Installation

[BCM Type]

1. Connect the body control module connectors.
2. Install the body control module (BCM).
3. Install the driver"s side shower duct.
4. Install the crash pad lower panel.
5. Connect the negative (-) battery terminal.

[Non-BCM Type (Seat Belt Remind & Lighting Unit)]

1. Connect the seat belt remind & lighting unit connectors.
2. Install the seat belt remind & lighting unit.
3. Install the driver"s side shower duct.
4. Install the crash pad lower panel.
5. Connect the negative (-) battery terminal.

BCM Diagnosis With KDS

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[BCM Type Only]

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system (KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. If you want to change user option, select "user option".



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S/W Management

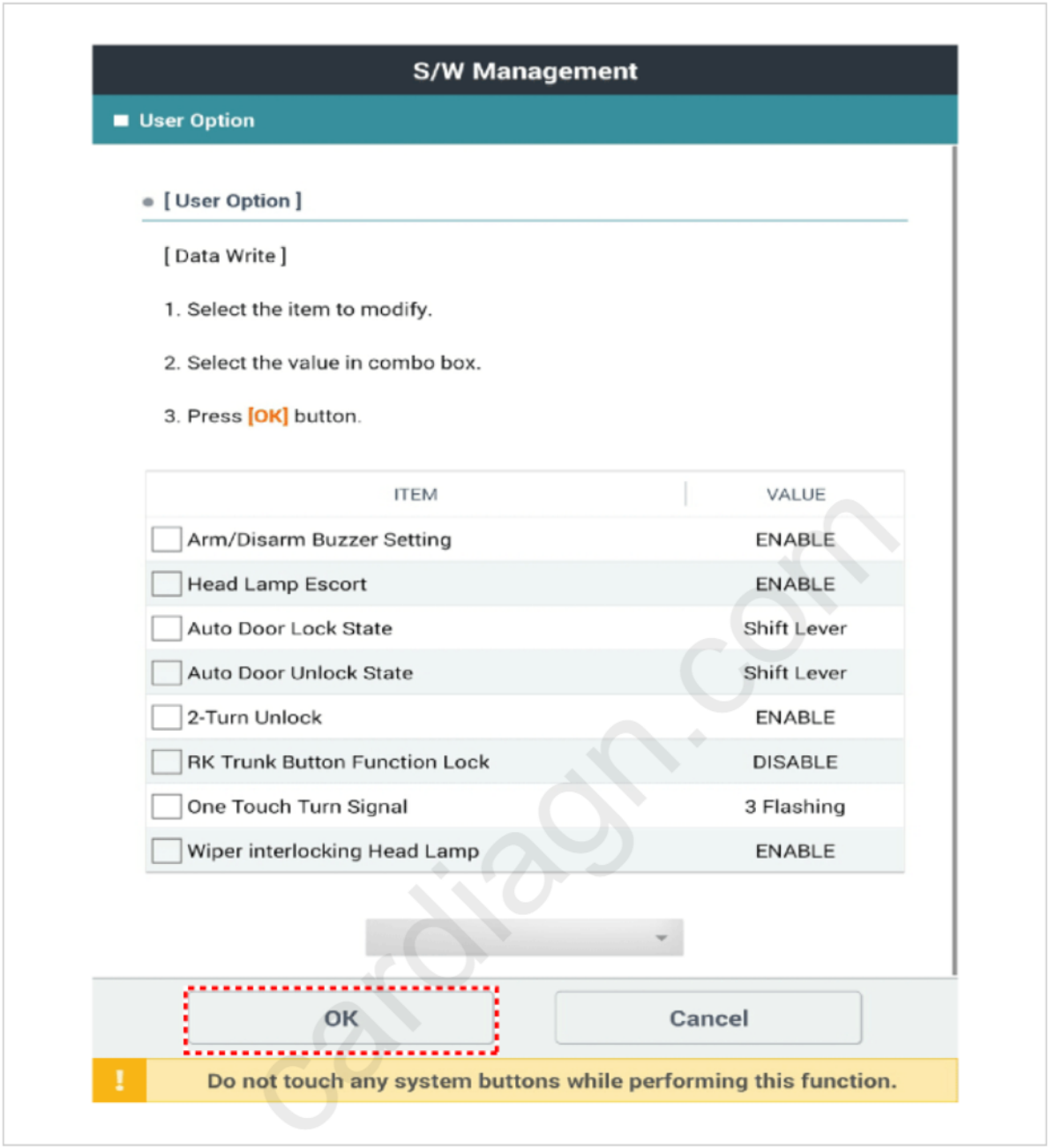
• User Option

Purpose	To check and allow users to configure the system.
Enable Condition	1.Engine Off 2.Ignition Switch On
Concerned Component	Body Electronic Control Modules (BCM, PSM, SCM, DDM, SJB, PSD)
Concerned DTC	-
Fail Safe	-
Etc	User can set the supported convenience function of vehicle.

OK

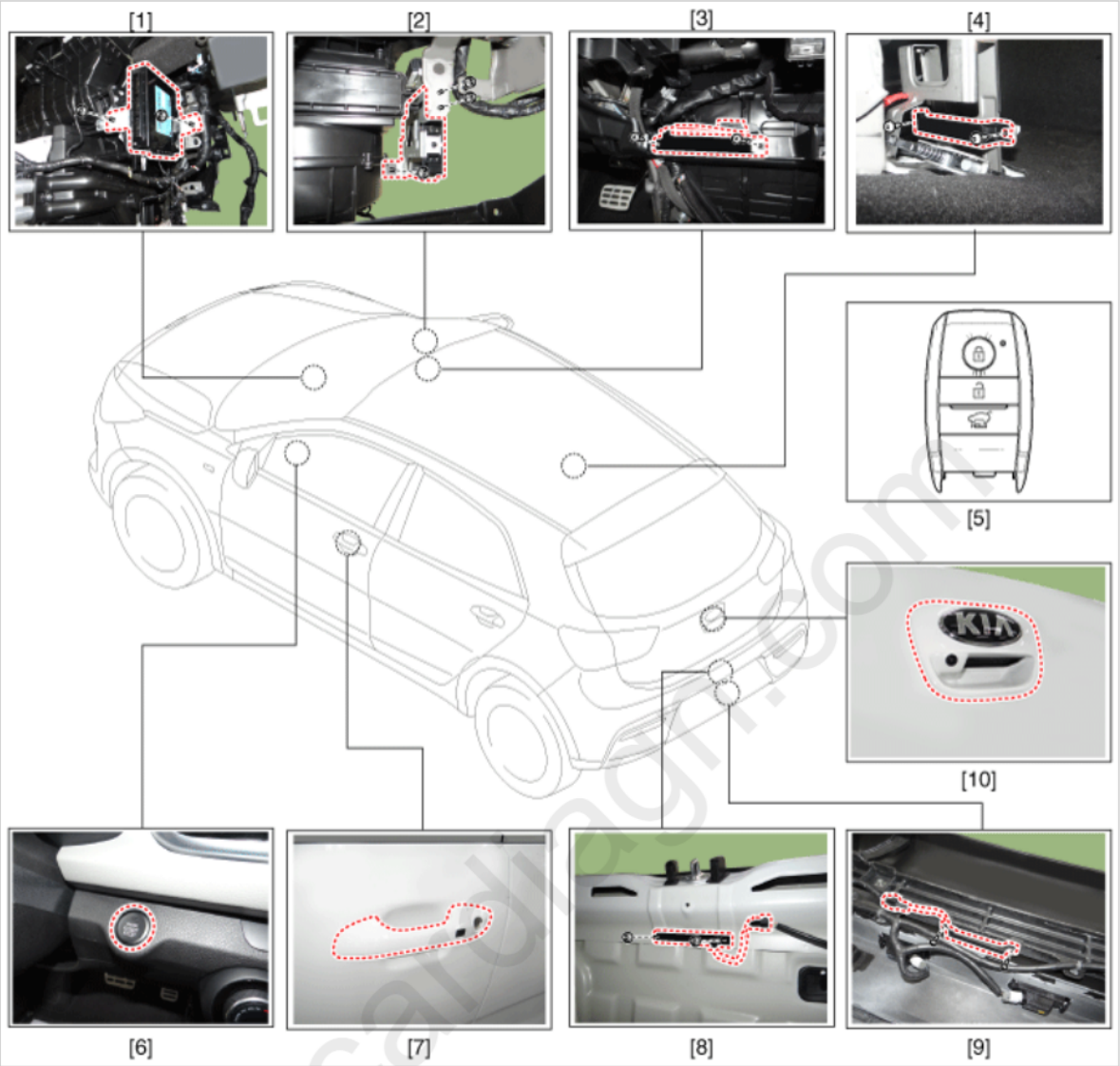
! Do not touch any system buttons while performing this function.

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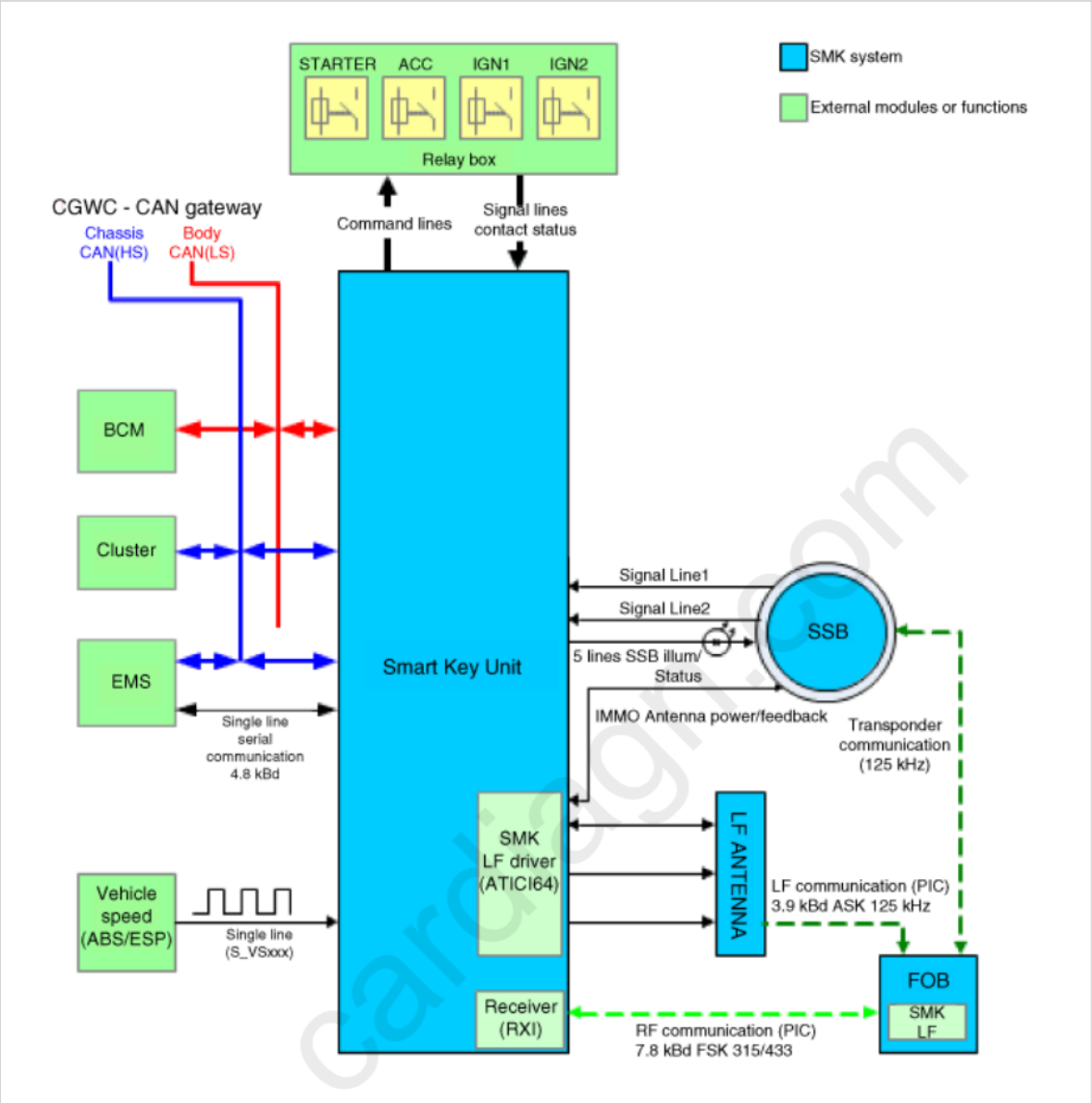
Component Location



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

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Circuit Diagram



Description

System Overview

The System offers the following features:

- Changing the state of engine ignition and power by using the start button.
- Controlling external relays for ACC / IGN1 / IGN2 terminal switching and STARTER, without use of mechanical ignition switch.
- Indicating the vehicle status on display by using LED or explicit messages.
- Immobilizer function by LF transponder communication between fob and fob holder.
- Redundant architecture for high system dependability .
- Interface with Low Speed CAN vehicle communication network.
- Interface with LIN vehicle communication network depending on platform .

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

System Main Function

- Switching of ACC / IGN1 / IGN2 terminals.
- Control of the STARTER relay BAT line (high side) based on communication with EMS ECU.
- Management of the Immobilizer function.
- Management of BES warning function.

Button Engine Start System

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

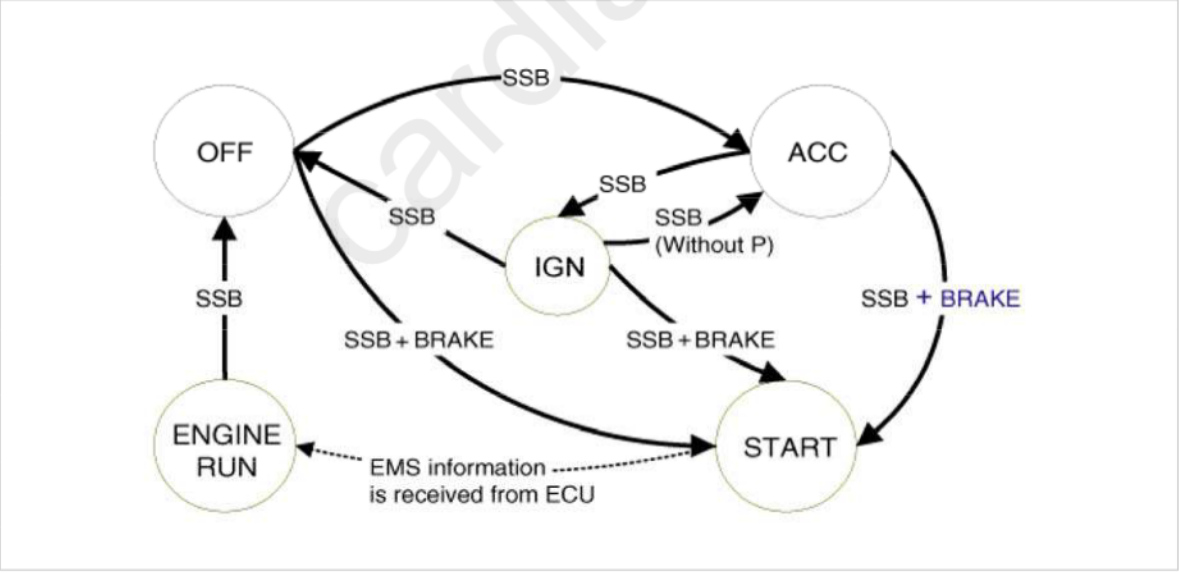
If the driver presses the SSB while prerequisites on brakes, fob authentication and transmission status are satisfied, the BES System will proceed with the locking/unlocking of the steering column, the control of the terminal, and the cranking of the engine.

The driver can release the SSB as soon as this sequence is initiated. After positive response from immobilizer interrogation, the system will activate the starter motor and communicate with the EMS to check the engine running status for starter release.

The driver will be able to stop the engine by a short push on the SSB if the vehicle is already in standstill. Emergency engine stop will be possible by a long press of the SSB or 3 consecutive presses in case the vehicle is in ENGINE RUNNING.

If the conditions for engine cranking are not satisfied while a push on the SSB is detected and a valid fob authenticated, the system will unlock the steering column and switch the terminals to IGN. Another push on the SSB will be necessary to start the engine.

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



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

Indicator ON/OFF Condition At Ignition Key Off Condition

No	Character lamp	Conditions
1	Indicator Lamp ON	Door open, Tail lamp ON, ACC, IG ON
2	Indicator Lamp 30sec ON → Lamp OFF	Door close, Tail lamp OFF, IG OFF

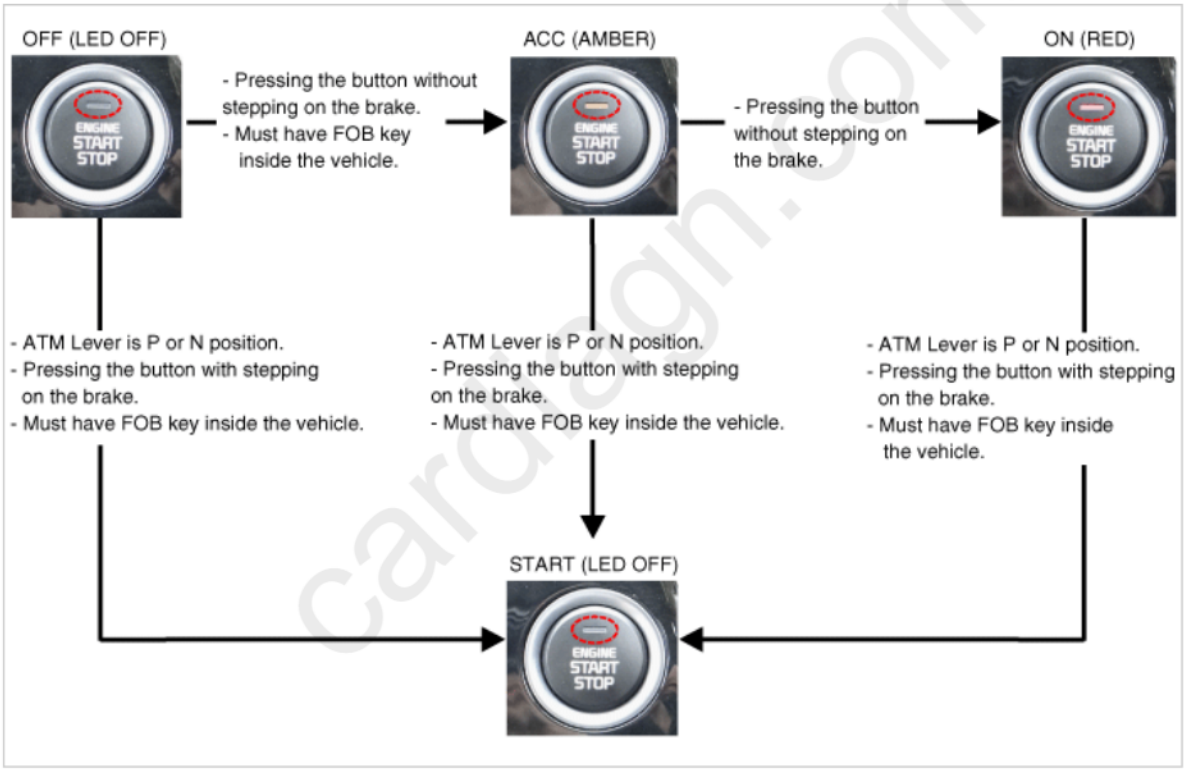
3	Indicator Lamp OFF	Remote LOCK, Passive LOCK
4	Rheostat at tail lamp ON (Illumination lamp)	

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

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

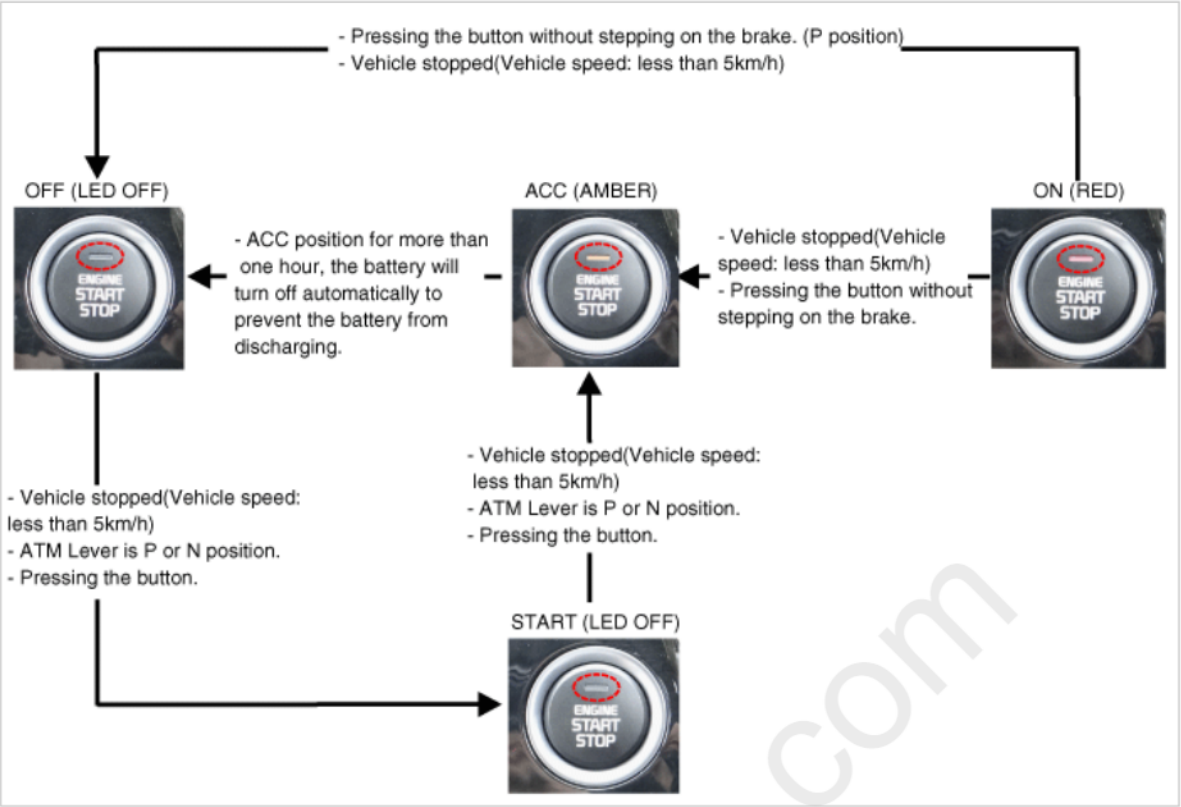
Operation for each function of button starting

1. Electric power ON / Ignition ON
   - The electric power state changes within the range of OFF →ACC→IGN→OFF by pressing the button without stepping on the brake (Or with stepping on the brake) inside the car with FOB key (However, When the gear is not in P, the power repeatedly changes between ACC and IGN. Converting to OFF is impossible.)
   - The ignition is on when the button is pressed with stepping on the brake at P/N position with FOB key.

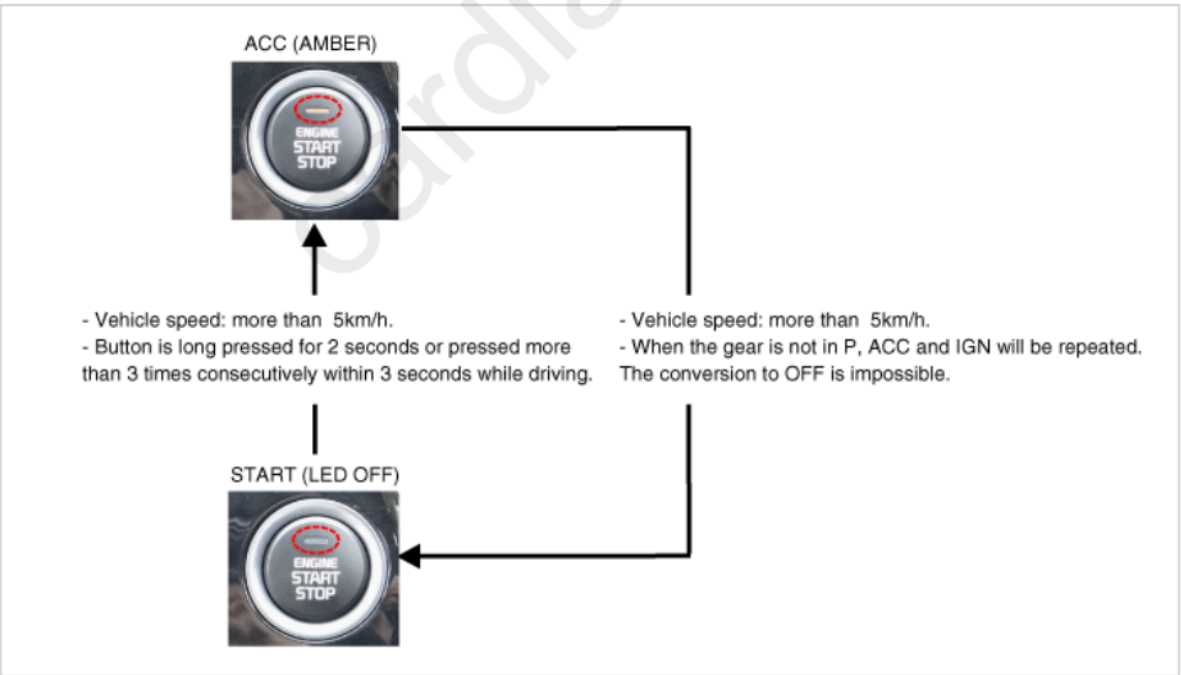


2. Electric power OFF/ Ignition OFF
   - The ignition OFF is possible in the state of vehicle stop. (The ignition OFF state is possible regardless of the ATM lever position.)
   - The lever shall be shifted for parking in gear N by pressing the ATM lever release button after electric power off in P.

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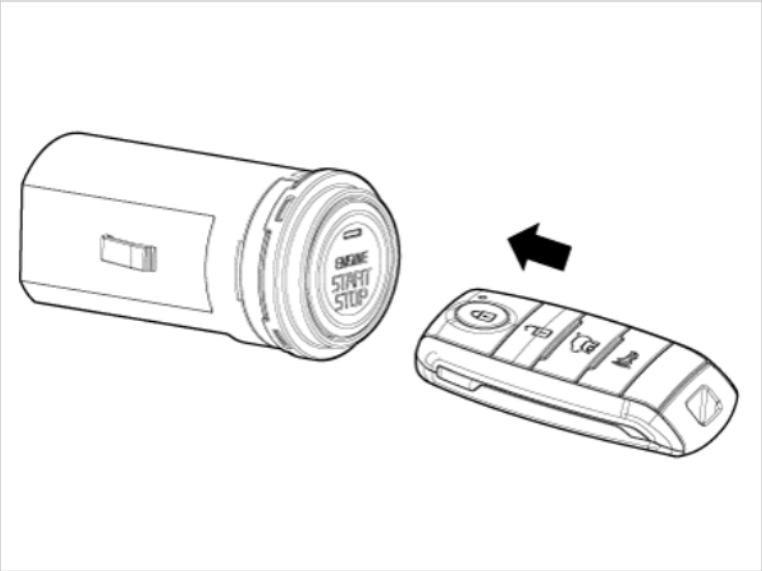
3. How to off the ignition forcibly and to restart during driving
   - It is a method of forcibly turning off ignition in case of fuel leakage when the vehicle is overturned or of emergency (e.g. failure in accelerator pedal return)
   - The engine is off and returned to the ACC state when the button is pressed for 2 seconds and more than 3 times successively within 3 seconds during driving. The restarting is available for next 30 seconds regardless of FOB key and the electric power is changed through OFF → ACC→IGN→OFF by pressing the button without stepping on the brake (or with stepping on the brake) inside the car with FOB key. (However, when it is not in P position, ACC↔IGN is repeated. The conversion to OFF is impossible.)



4. Function of 0.5 second delay for brake switch input.
   The starting is available when the brake pedal is stepped on within 0.5 second after pressing the start button in engine OFF state.
5. State of start button indicator (LED) ON depending on the electric power state.
   - Electric power OFF : LED OFF

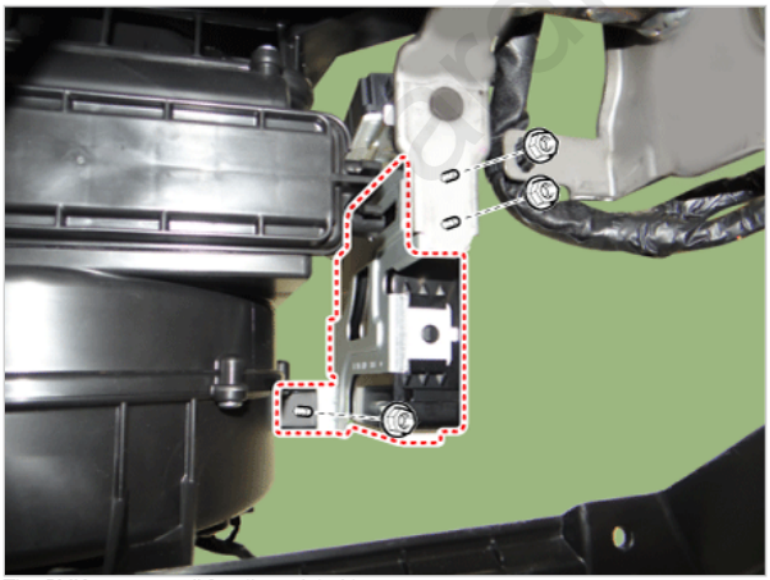
– Electric power ACC state : Yellow LED ON
– Electric power ON : Blue LED ON
– During cranking : Maintaining the previous LED ON state before cranking
– Starting ON state : LED OFF

Limp home mode



– In case of no input signal for the brake (AT specification), the ACC mode shall move to “START” by pressing SSM for more than 10 seconds.
– In case of problems with communication between EMS and CAN (the EMS state).
the “START” state moved to the “ENGINE RUN” based on RPM input.
– In case that one out of two SSM input lines is disconnected,
The electric power cycling is available when SSB is pressed twice within 10 seconds (SSB LIMP HOME PRESS)
The buzzer rings when the button is pressed in the first time.
The electric power cycling is available and buzzer stops when the button is pressed twice within 10 seconds.

Smart Key Unit



The SMK manages all function related to:

- "Start Stop Button (SSB) monitoring",
- "Immobilizer communication" (with Engine Management System unit for immobilizer release),
- "Authentication server" (Validity of Transponder and in case of Smart Key option Passive Fob authentication),
- "System consistency monitoring",
- "System diagnosis",

- Control of display message / warning buzzer .

The smart key unit masters the entire button engine start system.

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

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

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

The SMK manages the functions related to the "terminal control" by activating external relays for ACC, IGN1 and IGN2. This unit is also responsible for the control of the STARTER relay.

The SMK is also controlling the illumination of the SSB as well as the "system status indicator", which consists of 2 LEDs of different color. The illumination of the fob holder is also managed by the SMK.

The SMK reads the inputs (Engine fob in, vehicle speed, relays contact status), controls the outputs (Engine relay output drive), and communicates with others devices via the CAN.

The internal architecture of the SMK is defined in a way that the control of the terminal is secured even in case of failure of one of the two microcontrollers, system inconsistency or interruption of communication on the CAN network.

In case of failure of one of the two controllers, the remaining controller shall disable the starter relay. The IGN1 and IGN2 terminals relays shall be maintained in the state previously memorized before the failure and the driver shall be able to switch those IGN terminals off by pressing the SSB with EMERGENCY_STOP pressing sequence. However, engine restart will not be allowed. The state of the ACC relay will depend on the type of failure.

The main functions of the SMK are:

- Control of Terminal relays
- Monitoring of the Vehicle speed received from sensor or ABS/ESP ECU.
- Control of SSB LEDs (illumination, clamp state).
- Control of the base station located in SSB through direct serial interface.
- System consistency monitoring to diagnose SMK failure and to switch to relevant limp home mode.
- Providing vehicle speed information
- Start Stop Button (SSB) monitoring
- Starter power control

Start/Stop Button (SSB)

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

- To activate the power modes ‘Off’, ’Accessory’, ‘Ignition’ and "Start" by switching the corresponding terminals
- To start the engine
- To stop the engine

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

Three (3) LED colors are located in the outside ring of the switch assy. They display the status of the system.

They are OFF(White) / ACC(Amber) / ON(Green).



BES(Button Engine Start) System State Chart

System STATES in LEARNING MODE

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

System State	Terminal Status	Engine status

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

Referring to the terminals, the system states described in the table above are the same as those found in a system based on a mechanical ignition switch.

One of the features distinctive from the Mechanical Ignition Switch-based system is that the BES system allows specific transition from [OFF] to [START] without going through [ACC] and [IGN] states.

System STATES IN VIRGIN MODE

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

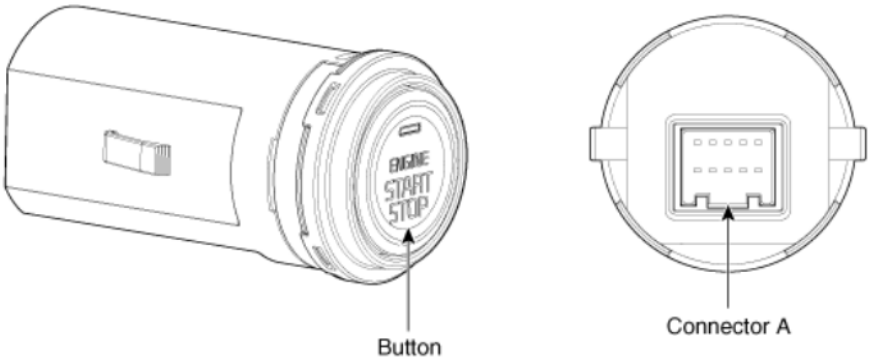
System State	Terminal Status	Engine status
1. OFF - UNLOCKED	OFF	Stopped
2. ACC	ACC	Stopped
3. IGN	IGN1, IGN2, ACC	Stopped
4. Start	IGN1, START with special pattern of activation	Cranking
5. IGN - Engine	IGN1, IGN2, ACC	Running (means "self-running")

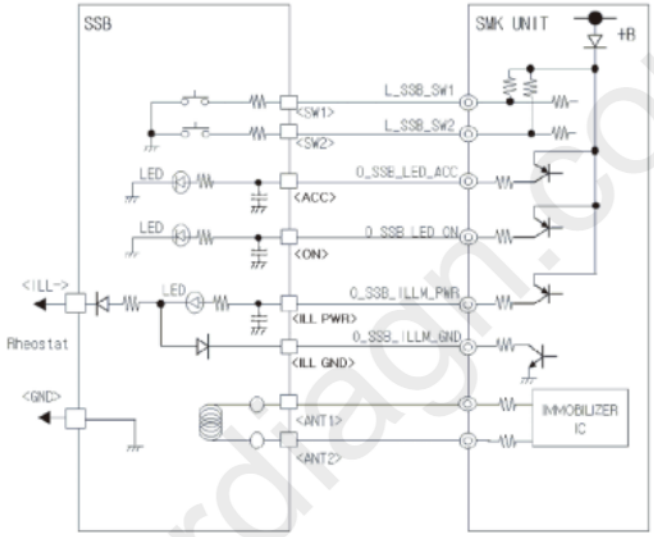
Referring to the terminals, the system states described in the table above are the same as those found in a system based on a mechanical ignition switch.

One of the features distinctive from the Mechanical Ignition Switch-based system is that the BES system allows specific transition from [OFF] to [START] without going through [ACC] and [IGN] states.

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Component



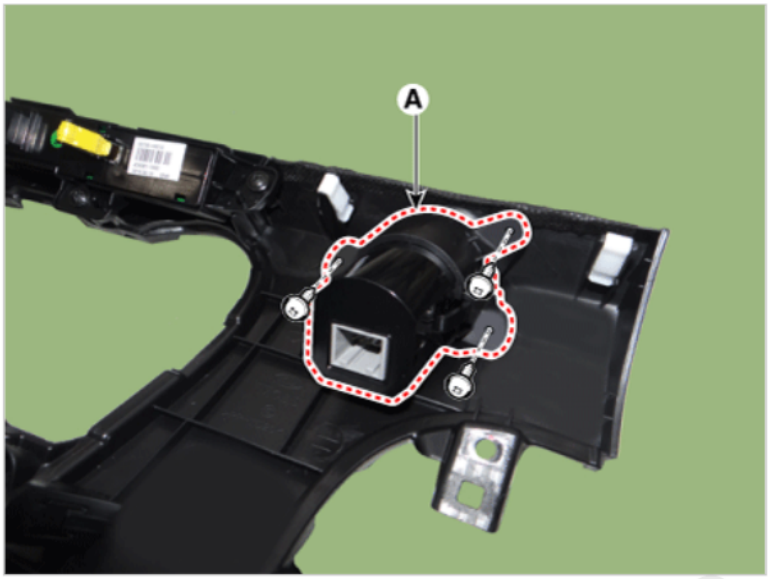


Connector A	No.	Description	No.	Description
	1	SSB Switch 1	6	Immobilizer antenna ground
	2	SSB Switch 2	7	Immobilizer antenna power
	3	SSB Illumination (-)	8	Ground
	4	Rheostat	9	SSB Button LED Indicator (ON)
	5	SSB Illumination (+)	10	SSB Button LED Indicator (ACC)

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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center lower panel.
   (Refer to Body - "Crash Pad Center Panel")
3. Remove the start/stop button (A) after loosening the mounting screws.



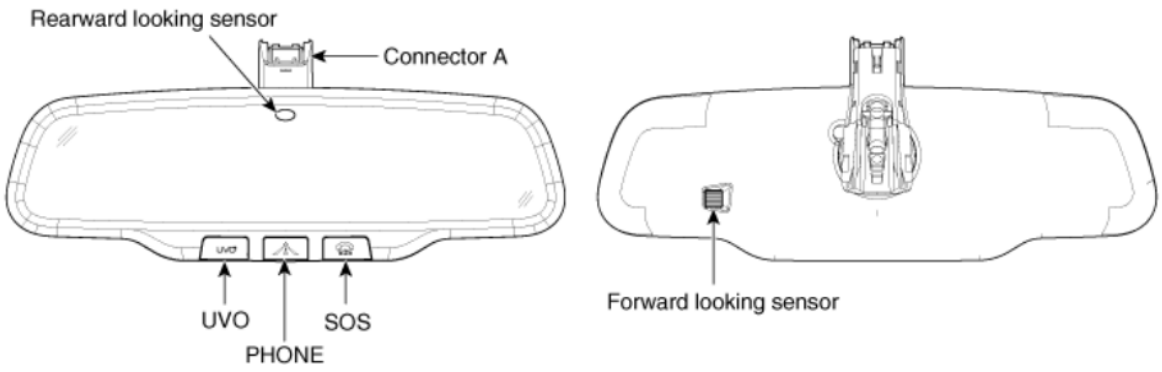
Installation

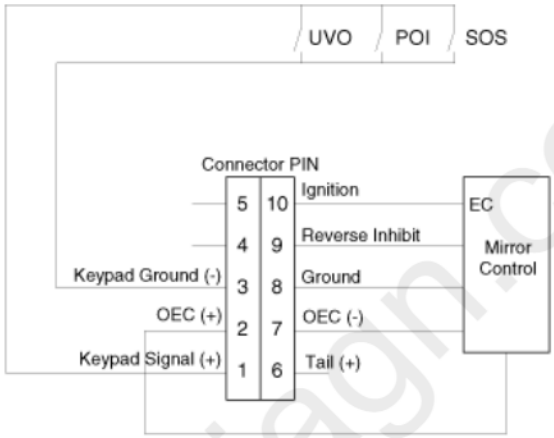
1. Install the start/stop button.
2. Install the crash pad center lower panel.
3. Connect the negative (-) battery terminal.

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Components

[ECM + UVO]





Connector A	No.	Description
	1	Keypad signal
	2	OEC feed(+)
	3	Keypad ground
	4	-
	5	-
	6	Tail (+)
	7	OEC return (-)
	8	Ground
	9	Reverse
	10	IGN

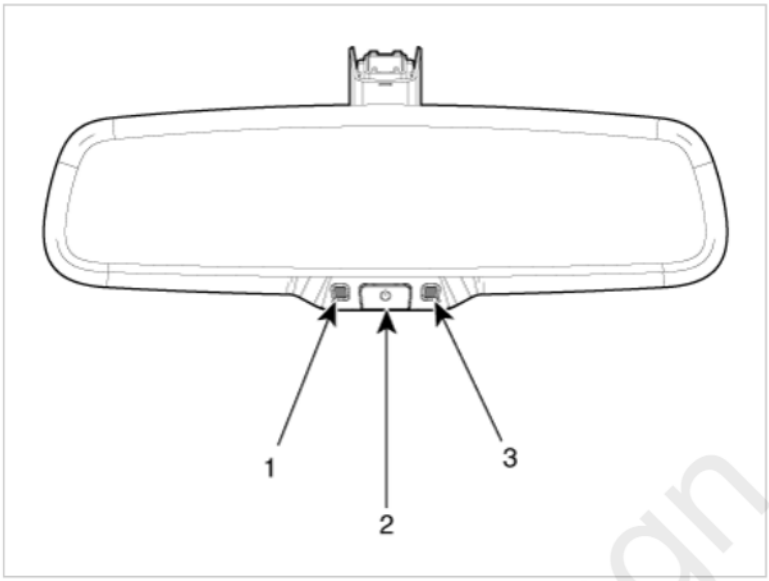
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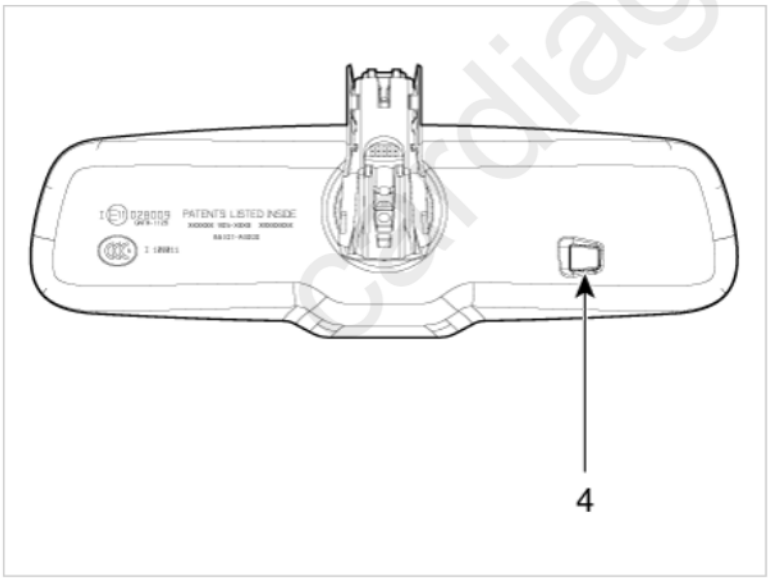
Description

The ECM (Electro Chromatic inside rear view Mirror) is one that automatically dims to protect the driver's eyes when it senses light reflecting from the car behind. The sensor in the mirror detects the brightness and if the headlight from the car behind is reflected on the mirror, the chemical layer inside the mirror reacts to glare and adjusts the reflectivity from 10 to 70%. When switching to the reverse gear, the mirror becomes bright regardless of the surrounding. The ECM receives voltage, ground and reverse gear signals, and uses two sensors to measure the intensity of glaring.

1. The forward facing sensor determines whether the surrounding space is dark enough to activate the function.
2. The rearward facing sensor detects the glare on the mirror. If the glare is detected, the sensor transmits the signal for the mirror to dim
3. The ECM is darkened to the level as determined by the rearward looking sensor. When the glaring is no longer detected, the mirror stops functioning.

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





Automatic-dimming Function

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

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

NOTICE

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

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Inspection

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

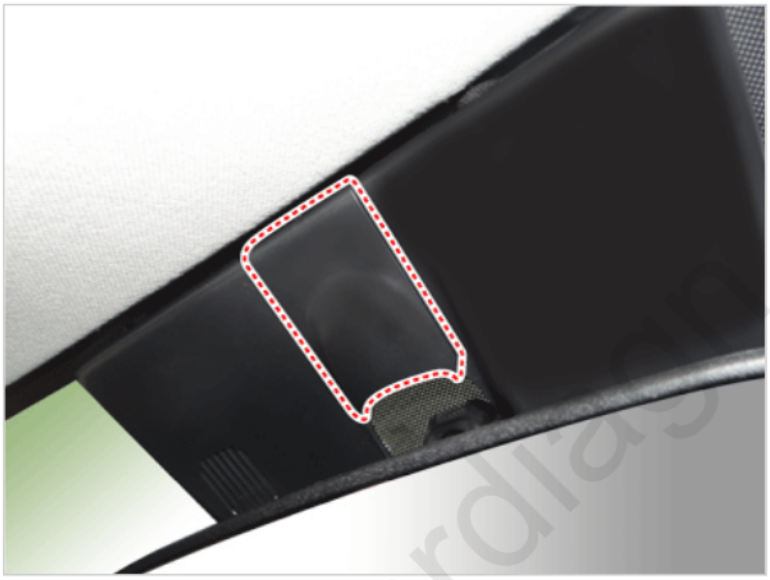
1. Turn the ignition key to the "ON" position.
2. Cover the forward facing sensor.
3. Head a light to the rearward-facing sensor.
4. The ECM shall dim as soon as the rearward-facing sensor detects a certain level of brightness.

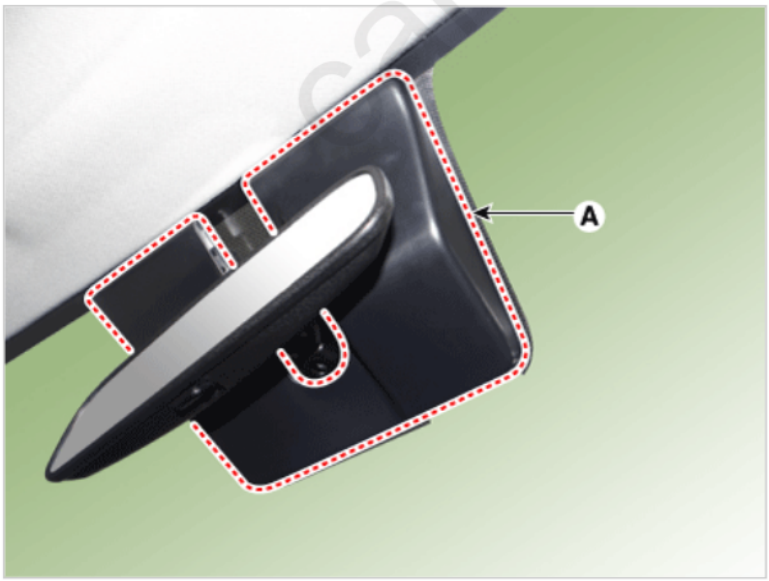
> **NOTICE**
> If this test is performed in daytime, the ECM may be darkened as soon as the forward facing sensor is covered.

5. In the reverse gear, the ECM shall not dim.
   When directing light to both the forward-facing and rearward-facing sensors, the ECM shall not dim.

Removal

1. Remove the mirror wiring cover (A).





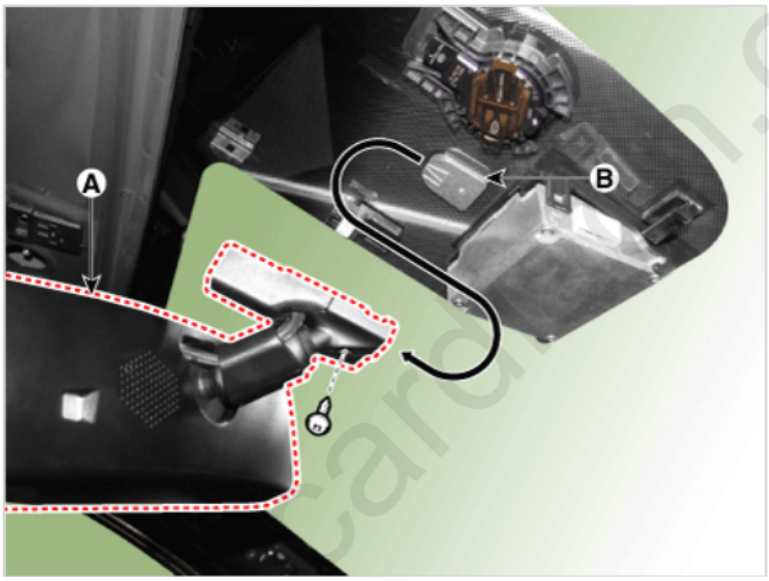
2. Remove the mirror connector (A).



3. Remove the mirror (A) by pulling up the mirror in the arrow direction below.

NOTICE

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

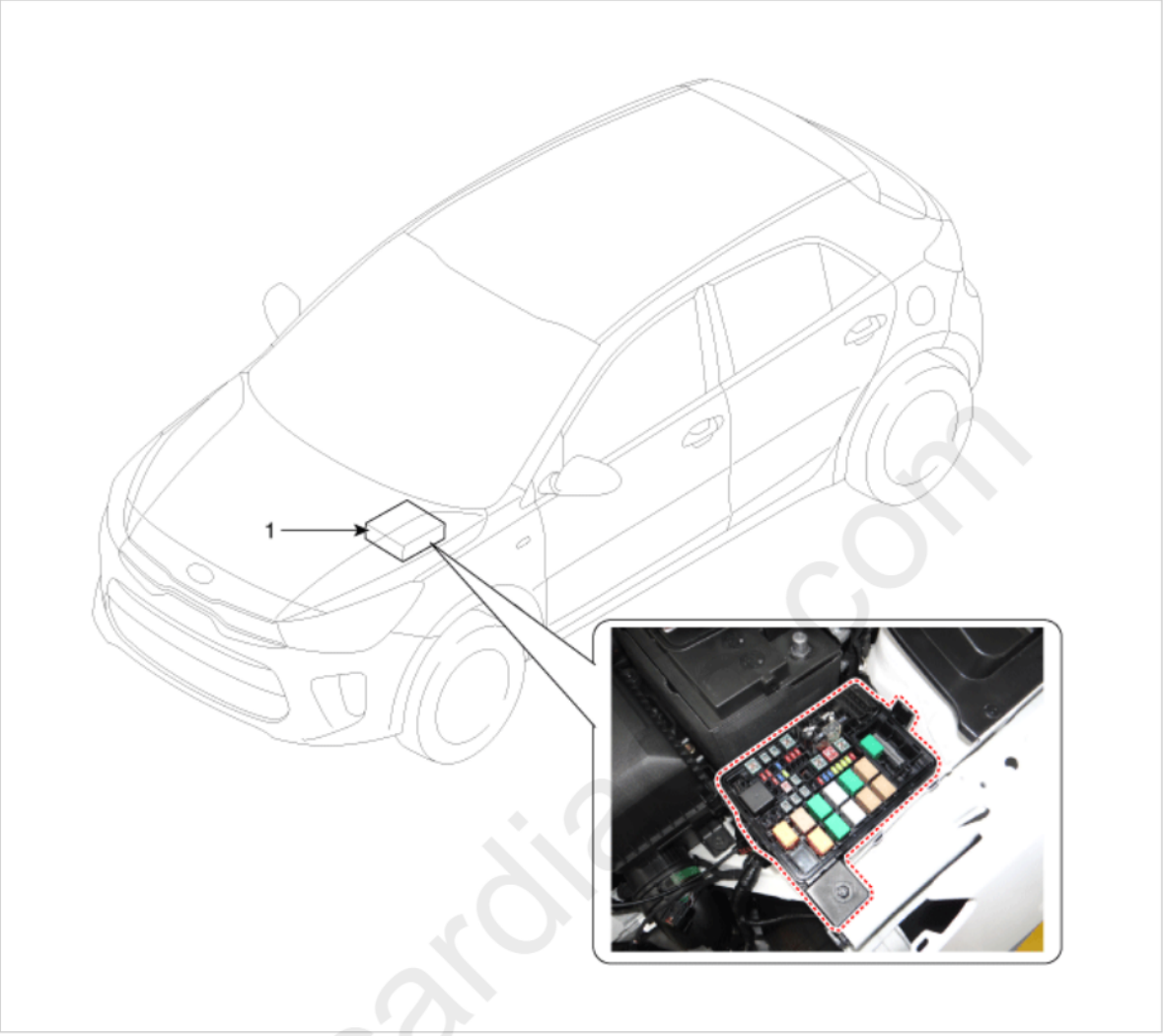


Installation

1. When installing the mirror, be careful not to damage the mounting bracket.
2. Install the mirror wiring cover and rain sensor cover after reconnecting the connector and tightening the screw.

Component Location

[Engine Room]



1. Engine room relay block

[Interior Relay]

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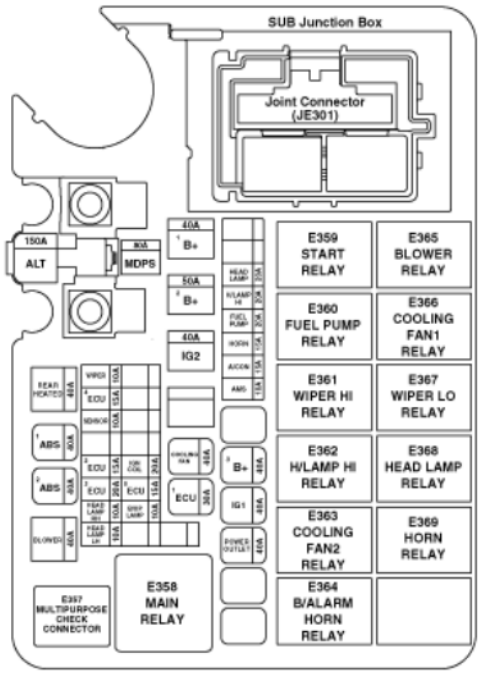


1. Interior junction block (IJB)

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Component Location

E/R Junction Block



Relay NO.	Relay Name	Type
E358	Main Relay	MINI
E359	Start Relay	MICRO
E360	Fuel Pump Relay	MICRO
E361	Wiper HI Relay	MICRO
E362	H/Lamp HI Relay	MICRO
E363	Cooling Fan2 Relay	MICRO
E364	B/Alarm Horn Relay	MICRO
E365	Blower Relay	MICRO
E366	Cooling Fan1 Relay	MICRO
E367	Wiper LO Relay	MICRO
E368	Head Lamp Relay	MICRO
E369	Horn Relay	MICRO

※USE THE DESIGNATED FUSE AND RELAY ONLY

Circuit (E/R Junction Block)

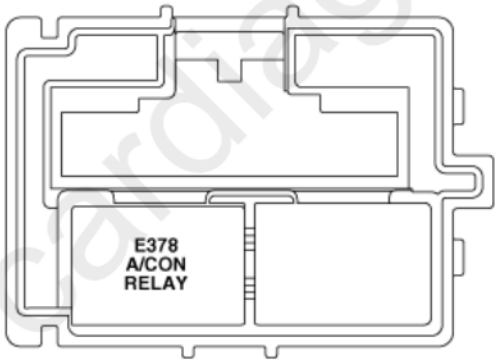
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Name	(A)	Circuit Protected
MDPS	80A	MDPS Unit
ALT	150A	E/R Junction Block (Fuse - ABS1, BAS2, BLOWER, REAR HEATED)
REAR HEATED	40A	I/P Junction Block (Rear Defogger Relay)
ABS1	40A	ESC Module, Multipurpose Check Connector
ABS2	40A	ESC Module
BLOWER	40A	E/R Junction Block (Blower Relay)
WIPER	10A	Front Wiper Motor, Multifunction Switch, E/R Junction Block (Wiper LO Relay)
ECU4	15A	ECM/PCM
SENSOR	10A	Oil Control Valve #1/#2, E/R Junction Block (Cooling Fan1/2 Relay), Oxygen Sensor (Up), Oxygen Sensor (Down), Variable Intake Solenoid Valve, Sub Relay Block (A/Con Relay) Purge Control Solenoid Valve, Canister Close Valve
-	-	-
ECU2	15A	ECM/PCM
ECU3	20A	ECM/PCM
HEAD LAMP RH	10A	Head Lamp RH
HEAD LAMP LH	10A	Head Lamp LH
-	-	-
-	-	-
-	-	-
-	-	-
IGN COIL	20A	Ignition Coil #1~#4, Condenser
ECU5	15A	ECM/PCM, E/R Junction Block (Fuel Pump Relay)

Name	(A)	Circuit Protected
B/UP LAMP	10A	Back-Up Lamp Switch
-	-	-
B+1	40A	I/P Junction Block (Fuse - DRL2, FOGLAMP FRONT, STOP LAMP, MODULE6, Power Connector (AUDIO, ROOM LAMP))
B+2	50A	I/P Junction Block (Fuse - IMMO, SMART KEY, BRAKE SWITCH, SAFETY P/WINDOW, S/HEATER, SUNROOF, Power Window Relay)
IG2	40A	Ignition Switch, PDM Relay Box (IG2 Relay), E/R Junction Block (Start Relay)
-	-	-
COOLING FAN	40A	E/R Junction Block (Cooling Fan1/2 Relay)
ECU1	30A	E/R Junction Block (Fuse - ECU3, ECU4, Main Relay)
-	-	-
-	-	-
-	-	-
HEAD LAMP	20A	E/R Junction Block (Head Lamp Relay)
H/LAMP HI	20A	With BCM : E/R Junction Block (H/Lamp HI Relay) W/O BCM : SLM
FUEL PUMP	20A	E/R Junction Block (Fuel Pump Relay)
HORN	15A	E/R Junction Block (Horn Relay/ B/Alarm Horn Relay)
A/CON	10A	Sub Relay Block (A/Con Relay)
AMS	10A	Battery Sensor
-	-	-
B+3	40A	I/P Junction Block (Fuse - T/SIGNAL LAMP, DOOR LOCK, Tail Lamp Relay)
IG1	40A	Ignition Switch, PDM Relay Box (IG1 Relay, ACC Relay)
POWER OUTLET	40A	I/P Junction Block (Power Outlet Relay)

※USE THE DESIGNATED FUSE AND RELAY ONLY

SUB Relay Block Layout



Relay Type

Relay NO.	Relay Name	Type
E378	A/Con Relay	MICRO

※USE THE DESIGNATED FUSE AND RELAY ONLY

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Inspection

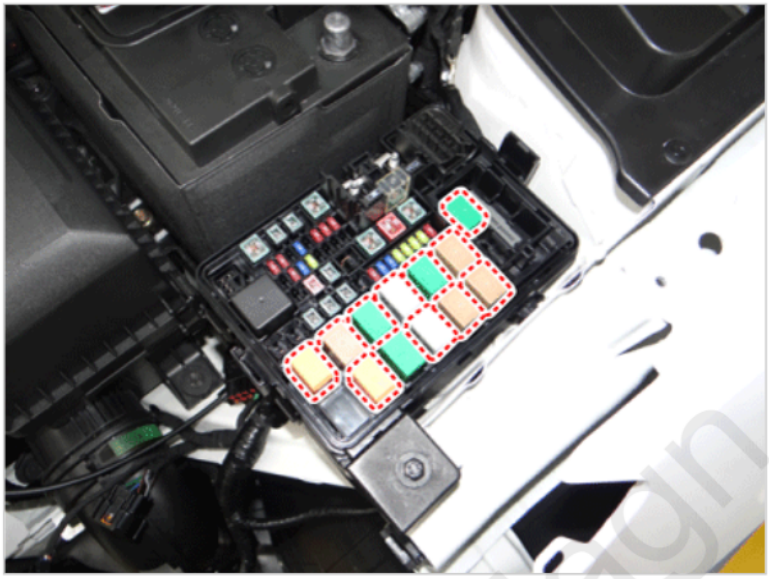
1. Disconnect the negative (-) battery terminal.
2. Pull out the relay from the engine compartment relay block.

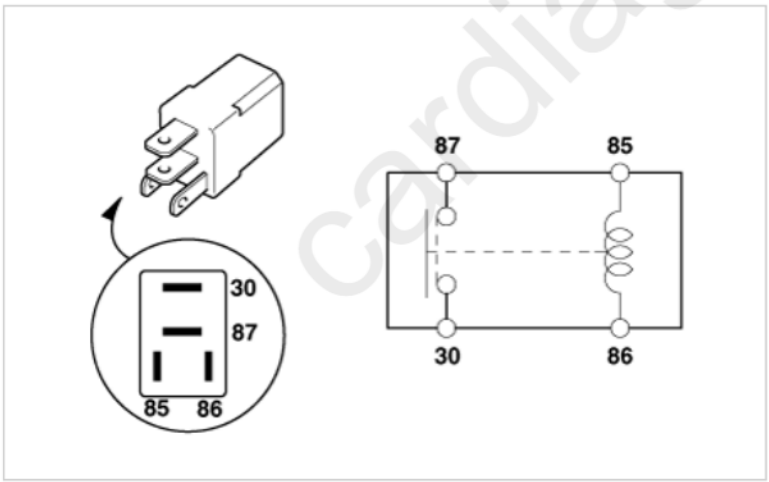
Power Relay (Type A)

Check for continuity between the terminals.

1. After supplying power to between No. 85 and 86 power relay terminals, check that there is continuity between No. 30 and 87 terminals.
2. After disconnecting power between No. 85 and 86 power relay terminals, check that there is no continuity between No. 30 and 87 terminals.

Engine Room Relay Block





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

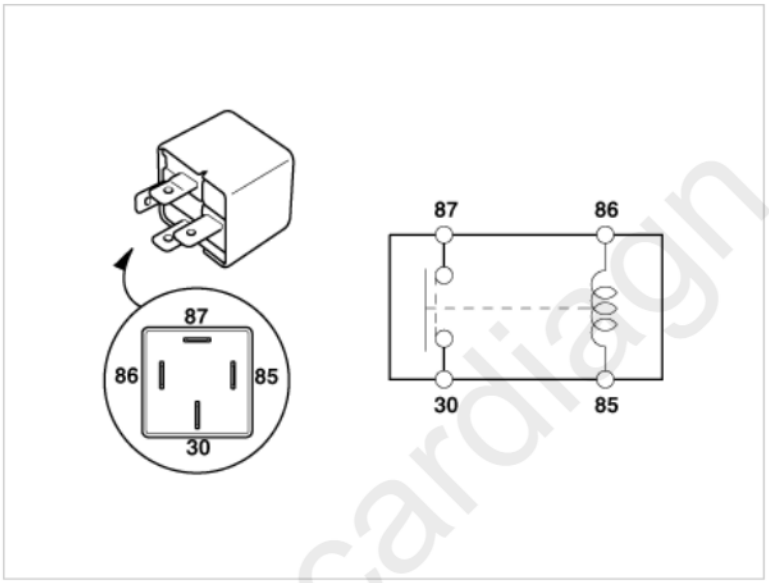
Power Relay (Type B)

Check for continuity between the terminals.

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1. After supplying power to between No. 85 and 86 power relay terminals, check that there is continuity between No. 30 and 87 terminals.
2. After disconnecting power between No. 85 and 86 power relay terminals, check that there is no continuity between No. 30 and 87 terminals.





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

Fuse

1. Check that the fuse holders are loosely held and that the fuses are securely fixed by the holders.
2. Check that each fuse circuit has the exact fuse capacity.
3. Check the fuses for any damage.

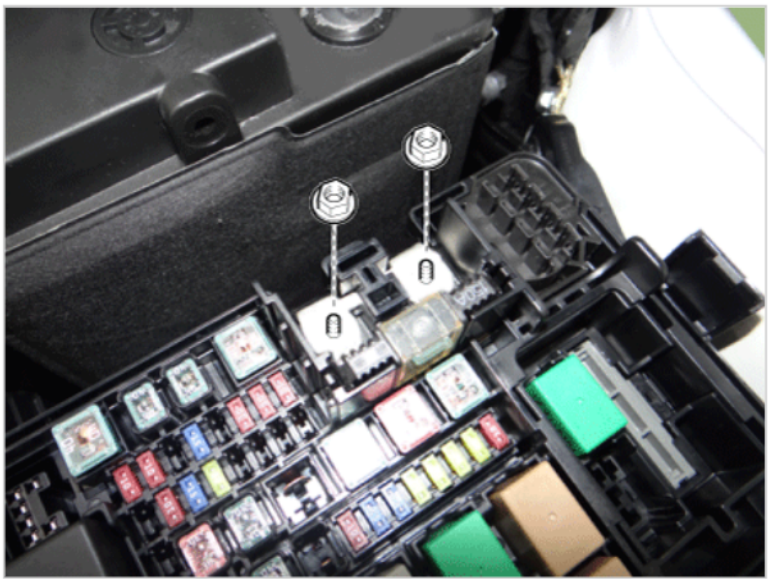
NOTICE

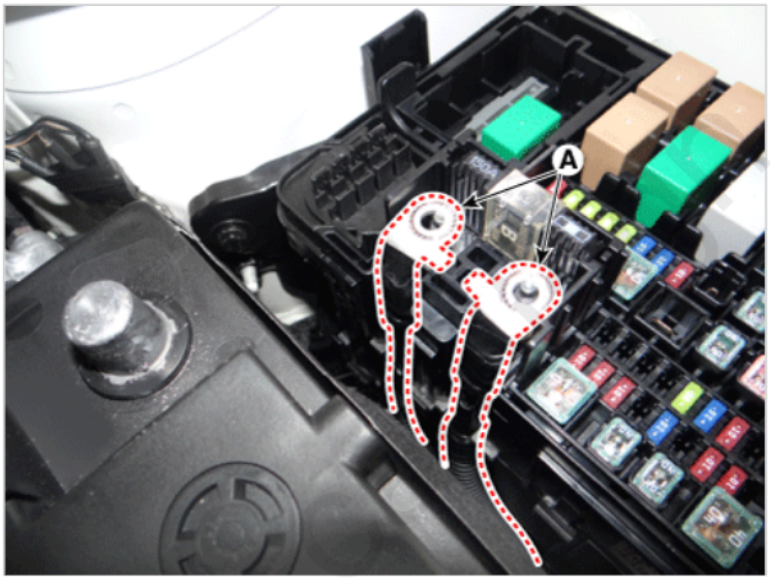
- If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always identify the cause of the blown fuse and completely eliminate the problem before installing a new fuse.

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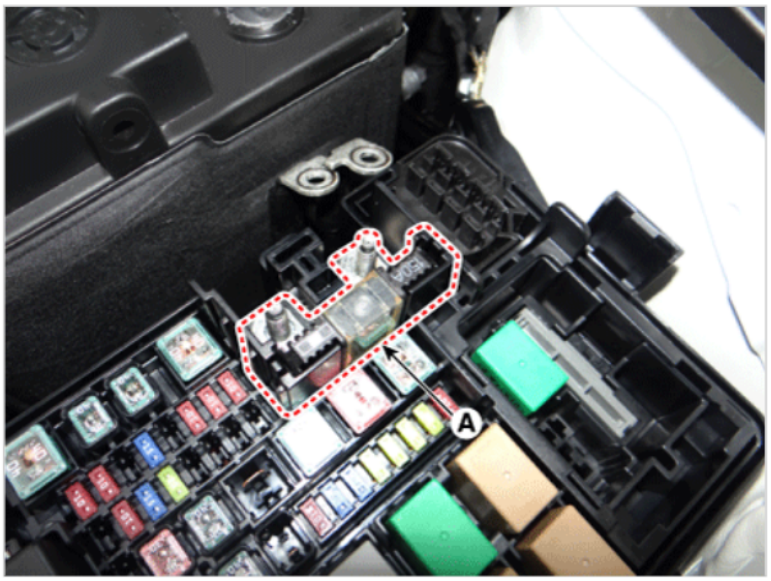
Multi Fuse

1. Disconnect the negative (-) battery terminal.
2. Remove the power cable terminals (A) after loosening the nuts from the engine room fuse & relay box.





3. Remove the multi fuse (A) after pushing the hook.



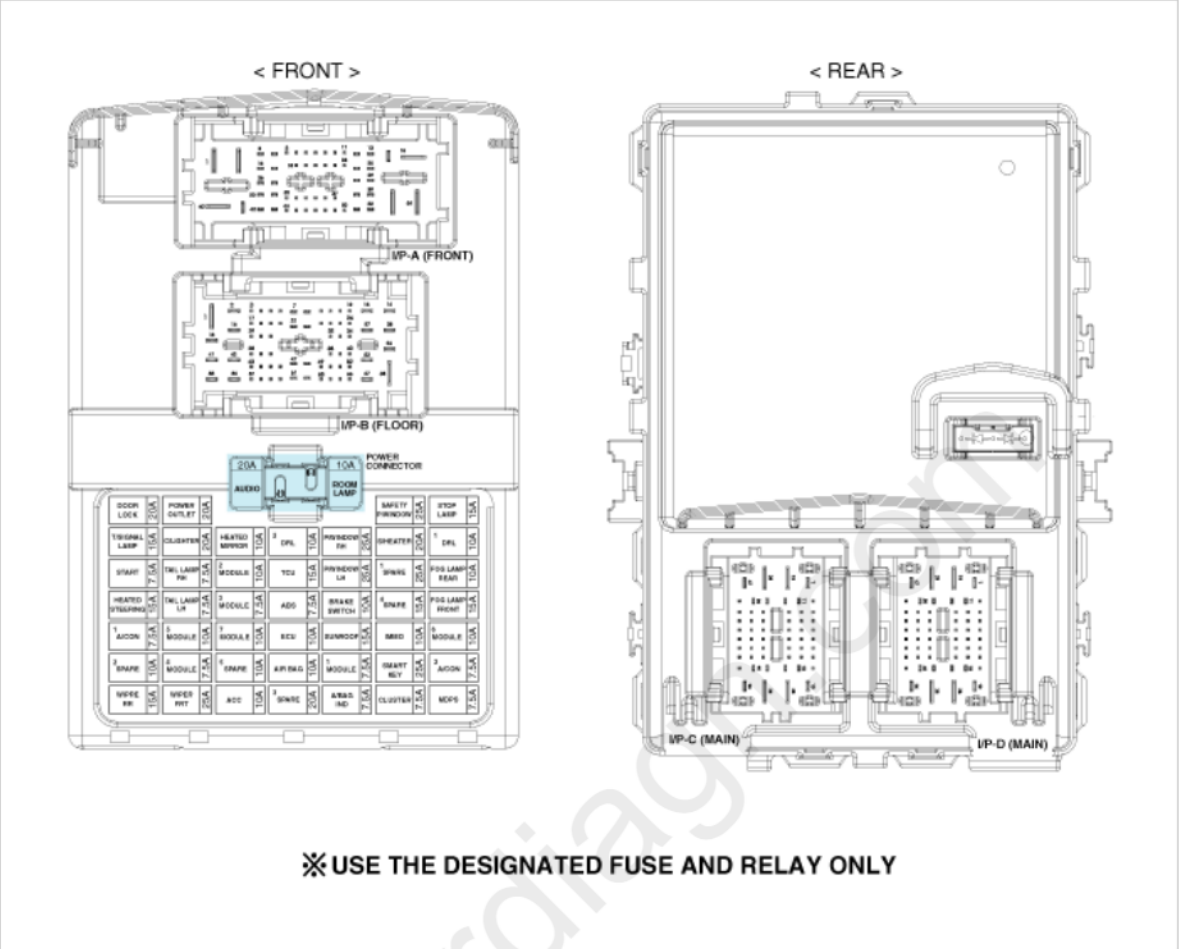
Information

- The entire multi fuse (A) has to be replaced even if only one fuse is damaged.
- When replacing it, refer to “the Engine compartment- component location” diagram to check fuse capacities and circuit arrangement.
- Use the multi fuse of the exact fuse capacity for each circuit.

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Component Location

I/P Junction Block



Circuit (I/P Junction Block)

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: Power Connector

Fuse Name	(A)	Circuit Protected
DOOR LOCK	20A	I/P Junction Block
		(Tail Gate Unlock Relay, Door Lock/Unlock Relay, Two Turn Unlock Relay)
POWER OUTLET	20A	Power Outlet
SAFETY P/WINDOW	25A	Driver Safety Power Window Module
STOP LAMP	15A	I/P Junction Block(Stop Signal Electronic Module)
T/SIGNAL LAMP	15A	BCM, SLM
C/LIGHTER	20A	Cigarette Lighter
HEATED MIRROR	10A	Driver Power Outside Mirror, Passenger Power Outside Mirror,
		A/C Control Module, ECM/PCM
DRL2	10A	BCM
P/WINDOW RH	25A	Power Window Main Switch, Passenger Power Window Switch
SHEATER	20A	Front Seat Warmer Control Module
DRL1	10A	-
START	7.5A	With IMMO. : ECM/PCM, E/R Junction Block(Start Relay), Smart Key Control Module
		W/O IMMO. : Burglar Alarm Relay
TAIL LAMP RH	7.5A	Head Lamp RH, Rear Combination Lamp (OUT) RH, License Lamp RH,
		Rear Combination Lamp (IN) RH, ILL (+)
MODULE2	10A	AEB Unit, Crash Pad Switch
TCU	15A	E/R Junction Block(Fuse - B/UP LAMP), A/T Shift Lever, Transaxle Range Switch,
		Stop Lamp Switch
P/WINDOW LH	25A	Power Window Main Switch
SPARE1	25A	Spare
FOG LAMP REAR	10A	-
HEATED STEERING	15A	Clock Spring
TAIL LAMP LH	7.5A	Head Lamp LH, License Lamp LH, Rear Combination Lamp (OUT) LH
		Rear Combination Lamp (IN) LH, Glove Box Lamp
MODULE3	7.5A	Front Seat Warmer Control Module, Audio, Electro Chromic Mirror, A/C Control Module
		A/V & Navigation Head Unit, Clock Spring, A/T Shift Lever Indicator
ABS	7.5A	E/R Junction Block(Multipurpose Check Connector), ESC Module
BRAKE SWITCH	10A	Smart Key Control Module, Stop Lamp Switch

Fuse Name	(A)	Circuit Protected
SPARE4	15A	Spare
FOG LAMP FRONT	15A	I/P Junction Block(Front Fog Lamp Relay)
A/CON1	7.5A	E/R Junction Block(Blower Relay), A/C Control Module
MODULE5	10A	E/R Junction Block(Head Lamp Relay, H/Lamp Hi Relay), Rain Sensor, Sunroof Motor,
		Front Seat Warmer Control Module, Driver Safety Power Window Module
MODULE7	10A	TPMS Unit
ECU	10A	ECM/PCM, Immovilizer Module, Smart Key Control Module
SUNROOF	15A	Sunroof Motor
IMMO.	10A	Immobilizer Module
MODULE6	10A	Key Solenoid, Center Facia Switch
SPARE2	10A	Spare
MODULE4	7.5A	SLM, BCM, Smart Key Control Module
SPARE5	10A	Spare
AIR BAG	10A	SRS Control Module, Passenger Occupant Detection Sensor
MODULE1	7.5A	BCM, SLM, Key Interlock
SMART KEY	25A	Smart Key Control Module
A/CON2	7.5A	-
WIPER RR	15A	Multifunction Switch, Rear Wiper Motor, Rear Wiper Relay
WIPER FRT	25A	Multifunction Switch, Front Wiper Motor, E/R Junction Block(Wiper Lo Relay)
ACC	10A	I/P Junction Block(Power Outlet Relay), BCM, SLM, Audio, Key Interlock
		A/V & Navigation Head Unit, USB Charging Connector,
		Power Outside Mirror Switch, Smart Key Control Module
SPARE3	20A	Spare
A/BAG IND	7.5A	Instrument Cluster
CLUSTER	7.5A	Instrument Cluster
MDPS	7.5A	MDPS Unit
AUDIO	20A	Audio, A/V & Navigation Head Unit
ROOM LP	10A	I/P Junction Block(Room Lamp Relay), Glove Box Lamp,
		A/C Control Module, SLM, BCM, Auto Light & Photo Sensor, TPMS Unit
		Instrument Cluster, Data Link Connector, Room Lamp, Trunk Room Lamp

※USE THE DESIGNATED FUSE AND RELAY ONLY

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Fuse Inspection

1. Check that the fuse holders are loosely held and that the fuses are securely fixed by the holders.
2. Check that each fuse circuit has the exact fuse capacity.
3. Check the fuses for any damage.

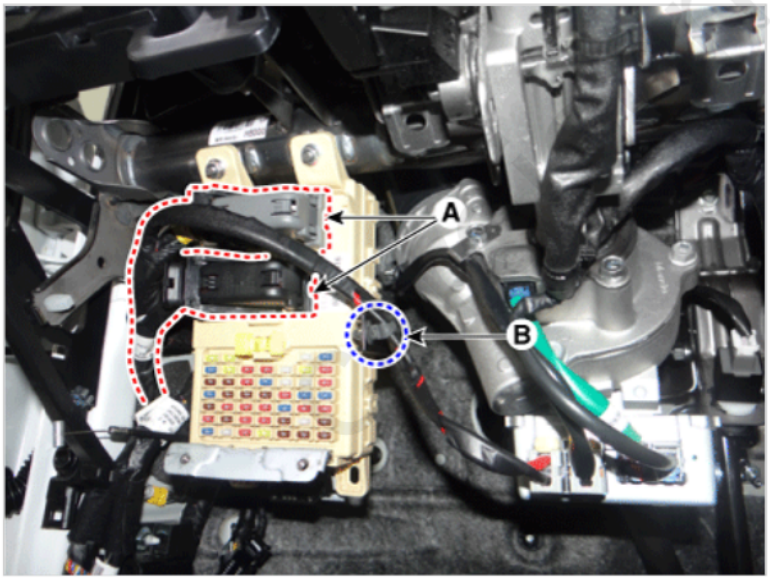
> **NOTICE**
> If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always identify the cause of the blown fuse and completely eliminate the problem before installing a new fuse.

Diagnosis with KDS

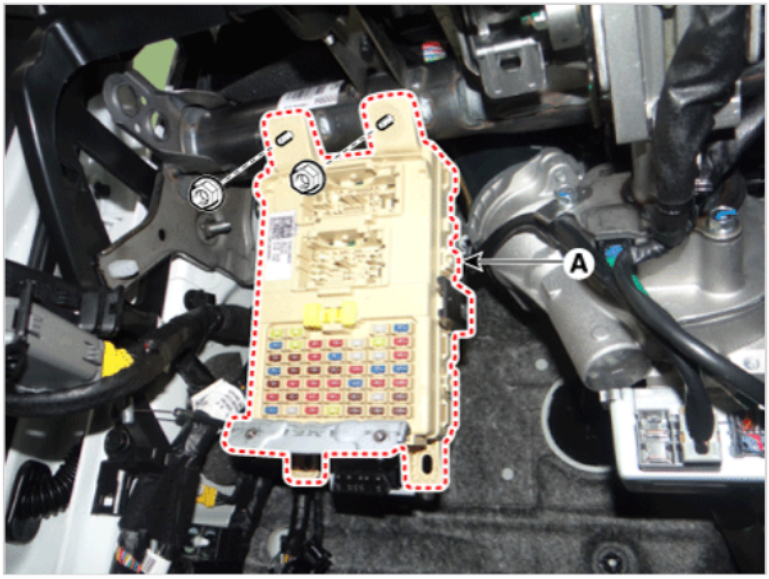
1. The Interior Junction Block can be diagnosed by using the KDS. The Interior Junction Block communicates with the KDS which then displays inputs and outputs along with codes.
2. To diagnose the Interior Junction Block function, select the vehicle model, Interior.
3. To consult the present input/out value of Interior Junction Block, "Current DATA". It provides information of Interior Junction Block input/output conditions.
4. To perform functional test on Interior Junction Block outputs, select "Actuation Test"

Removal

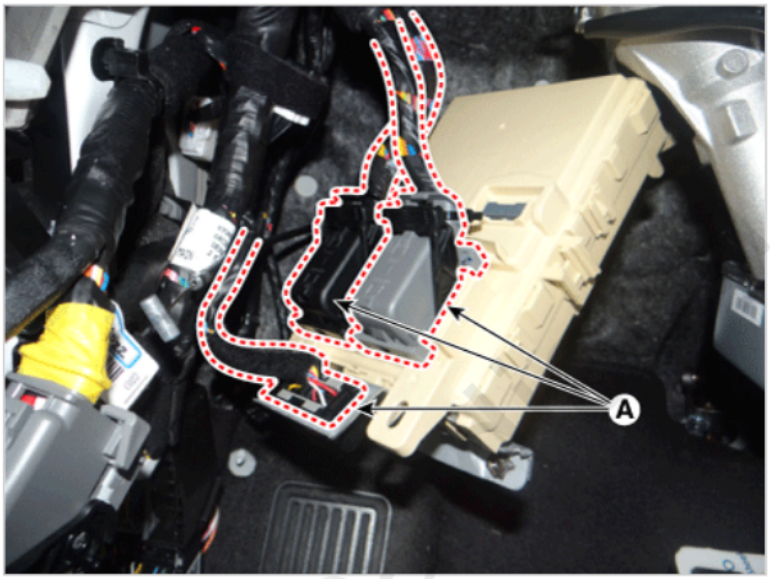
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Disconnect the connectors (A) from the fuse side of the interior junction block.
4. Remove the interior junction block wiring mounting clip (B).



5. Remove the interior junction block (A) after loosening the mounting nuts.



6. Disconnect the connectors (A) from the back of the interior junction block.



Installation

1. Install the interior junction block.
2. Connect the interior junction block connectors.
3. Install the crash pad lower panel.
4. Connect the negative (-) battery terminal.
5. Check that all systems operate properly.

General Troubleshooting Information

Before Troubleshooting

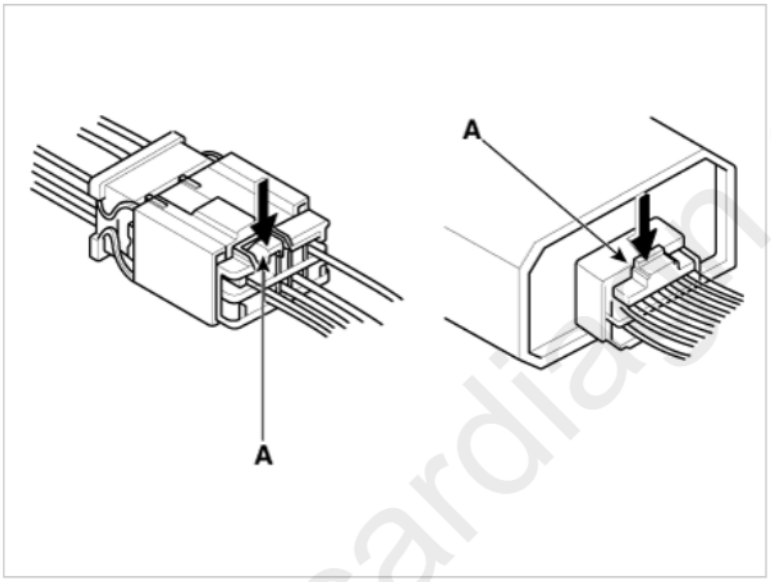
1. Check applicable fuses in the appropriate fuse/relay box.
2. Check the battery for damage, state of charge, cleanliness and tight connections.
   G 1.6 GDI (Refer to Engine Electrical System - "Charging System")

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

3. Check the alternator belt tension (D).

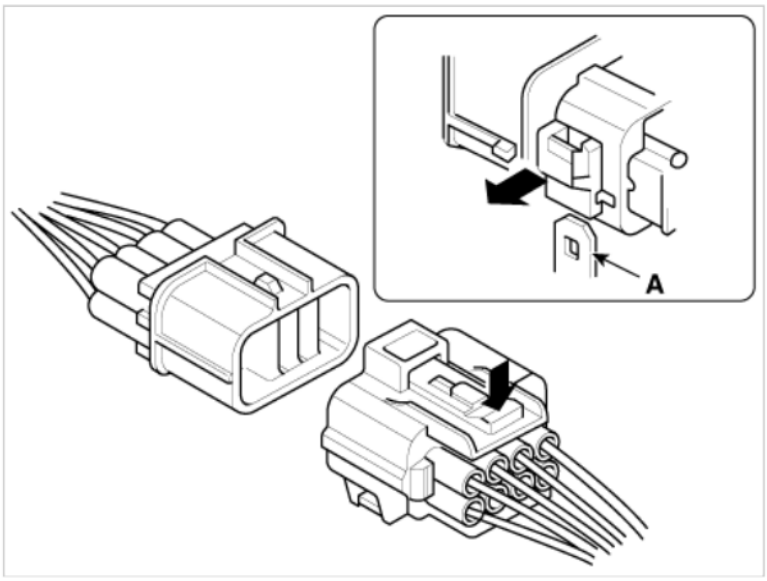
Handling Connectors

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).

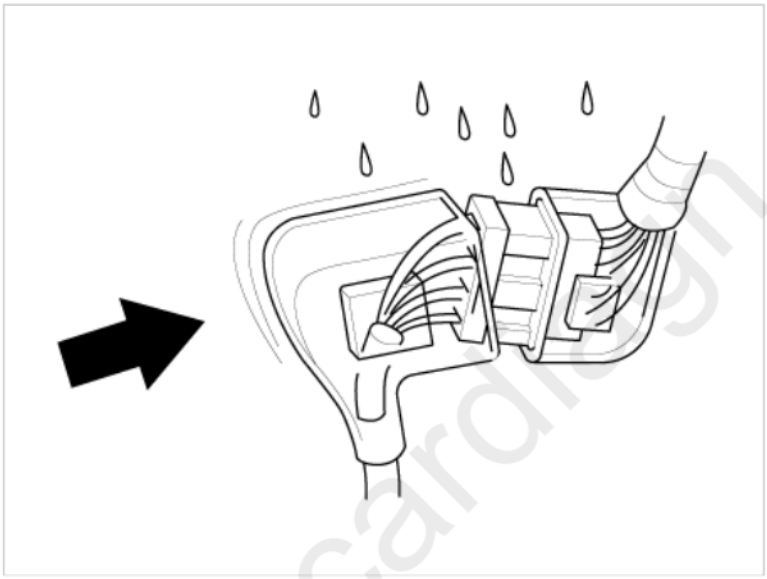


4. Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
5. Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mounting bracket (A).

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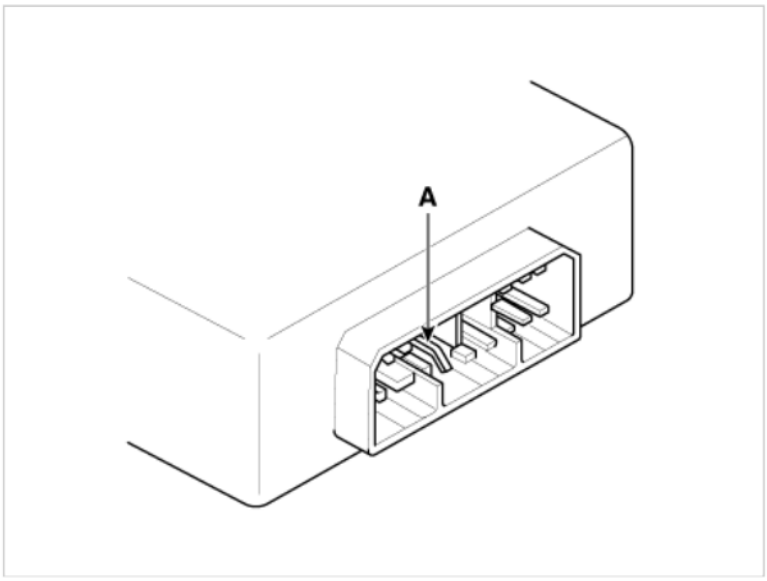


6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
7. Always reinstall plastic covers.

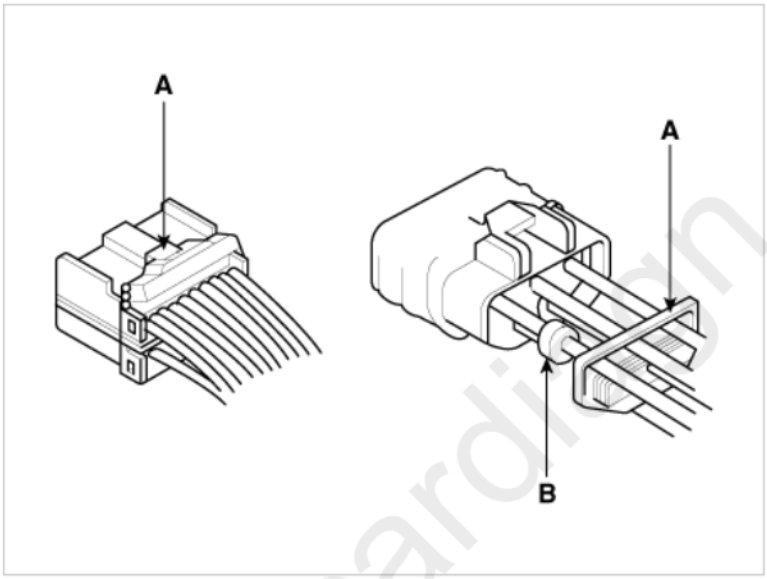


8. Before connecting connectors, make sure the terminals (A) are in place and not bent.

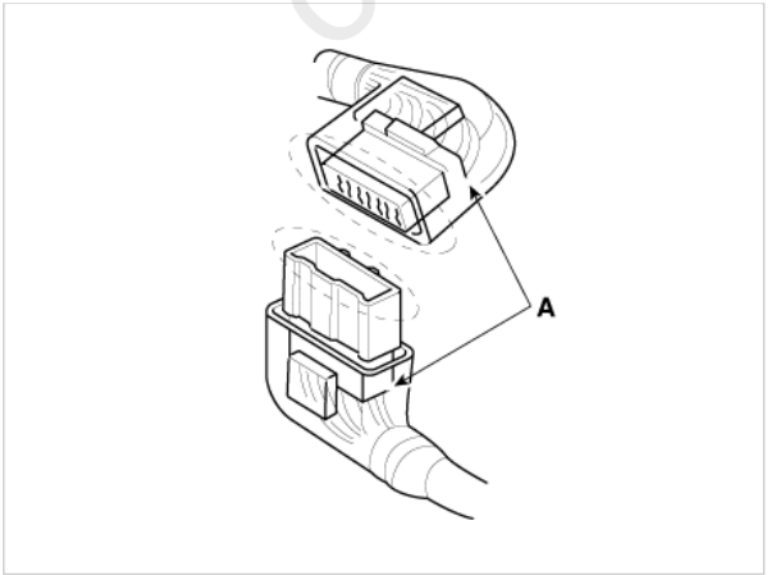
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9. Check for loose retainer (A) and rubber seals (B).

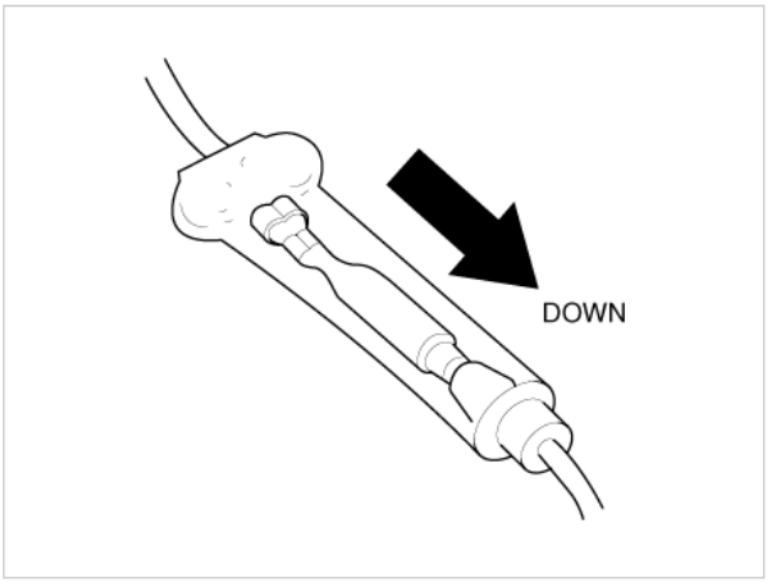


10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



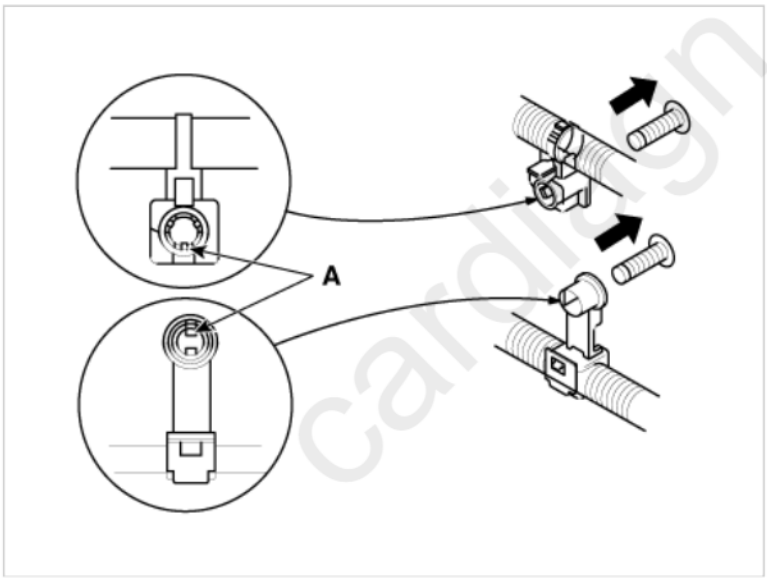
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11. Insert the connector all the way and make sure it is securely locked.
12. Position wires so that the open end of the cover faces down.



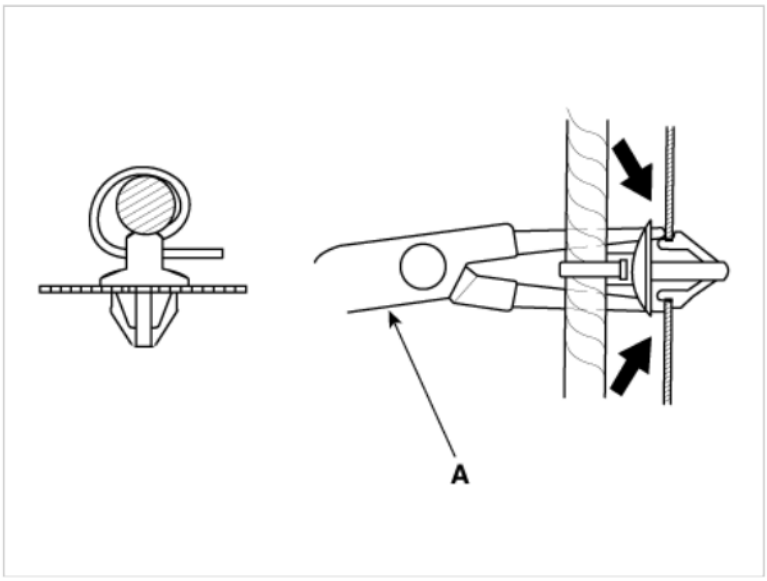
Handling Wires And Harnesses

1. Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
2. Remove clips carefully; don"t damage their locks (A).

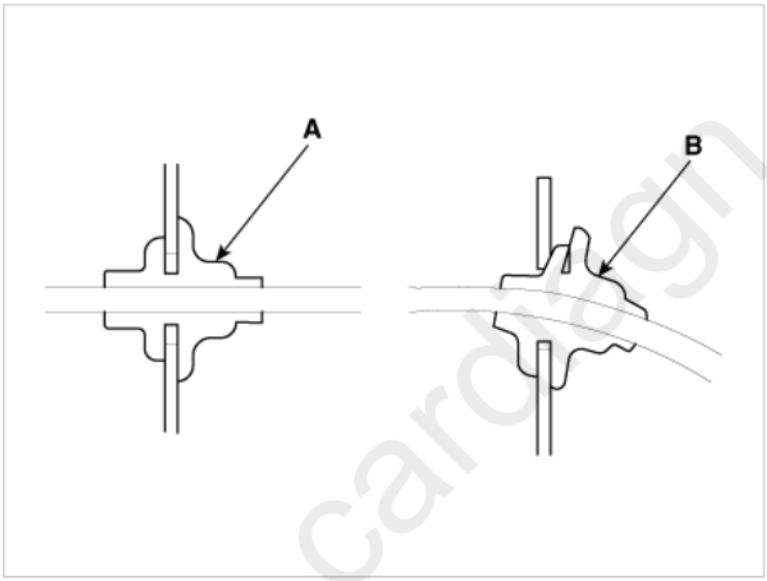


3. Slip pliers (A) under the clip base and through the hole at an angle, and then squeeze the expansion tabs to release the clip.

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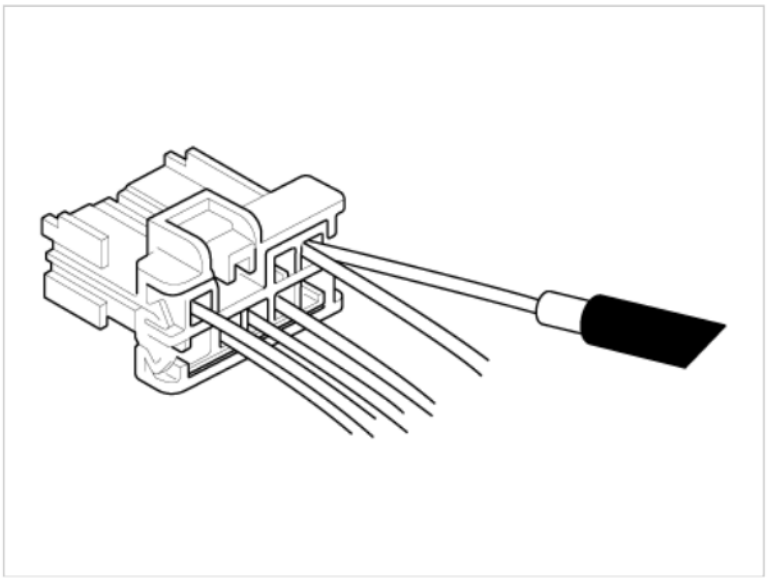
4. After installing harness clips, make sure the harness doesn"t interfere with any moving parts.
5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
6. Seat grommets in their grooves properly (A). Do not leave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



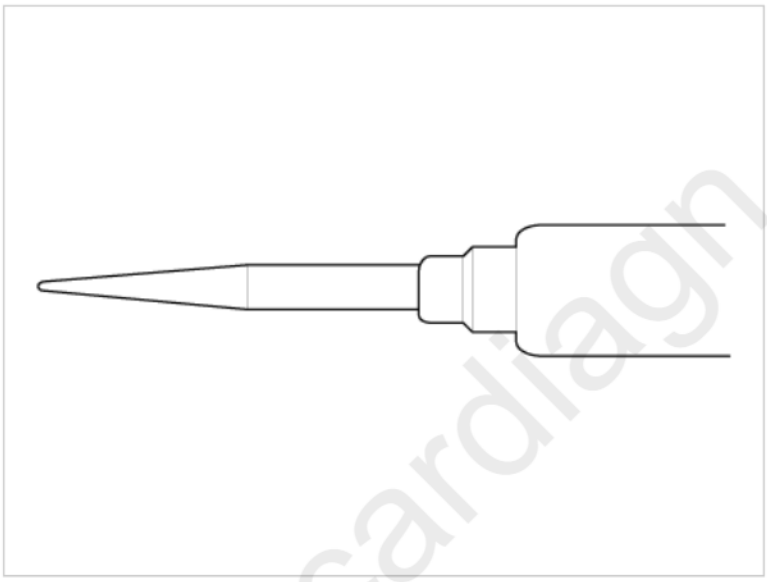
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Testing and Repairing

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



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



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Five-step Troubleshooting

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

Battery Reset

Description

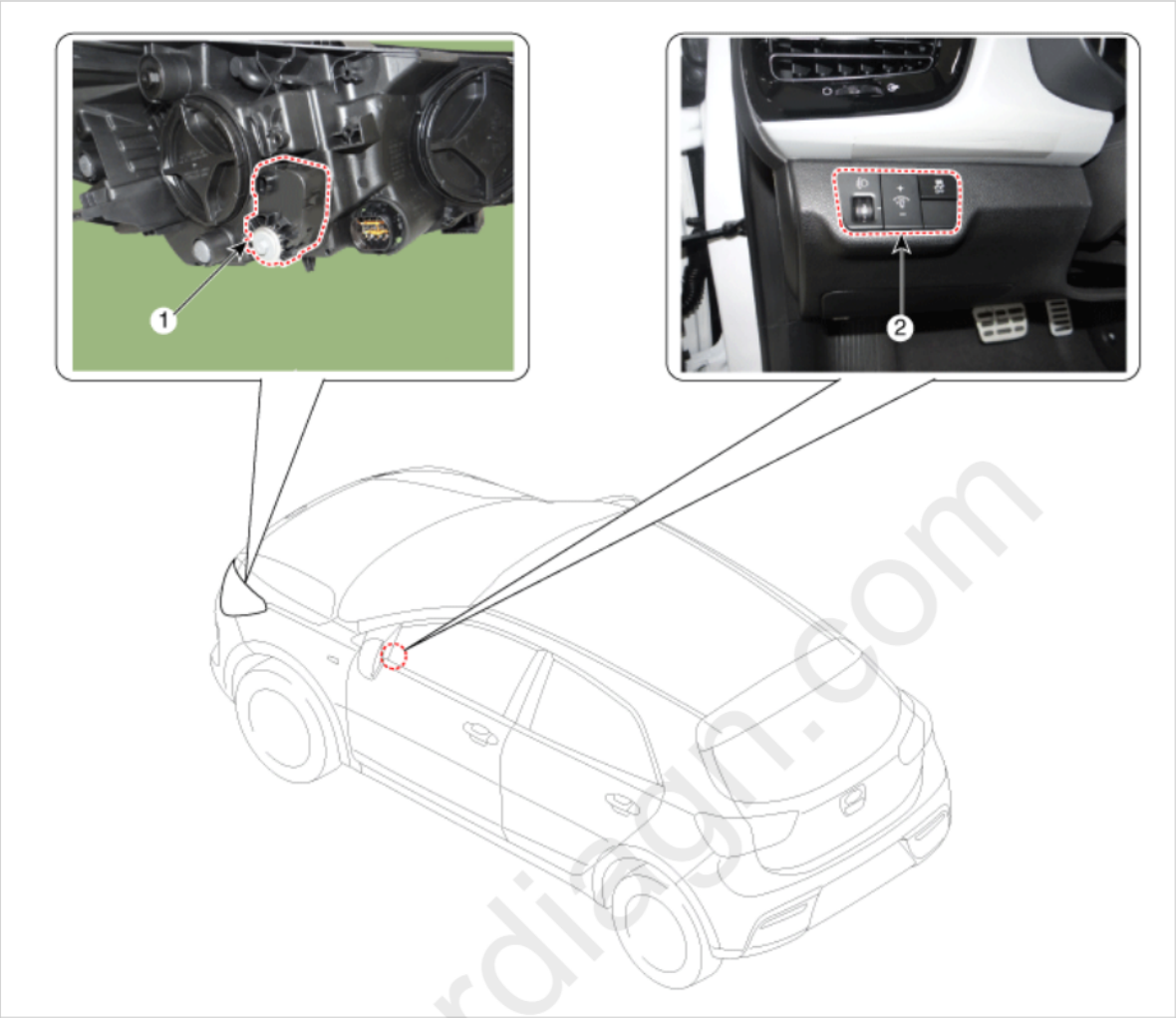
When reconnecting the battery cable after disconnecting, recharging battery after discharged or installing the memory fuse located on the driver"s side panel after removing, be sure to reset systems mentioned in the below table.

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

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

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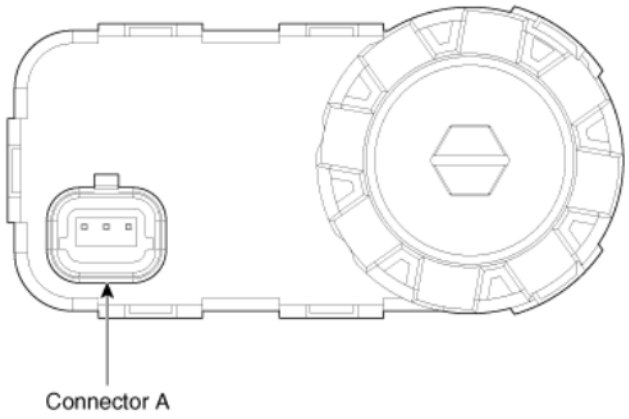
Component Location



1. Headlamp assembly (Built in leveling actuator)
2. Headlamp leveling switch

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Components



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

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Removal

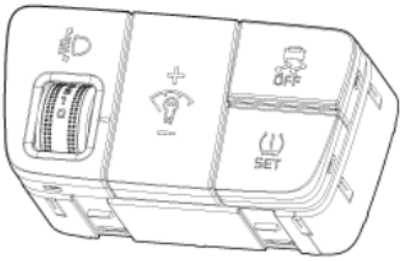
1. Disconnect the negative (-) battery terminal.
2. Remove the headlamp assembly.
   (Refer to Lighting System - "Headlamps")

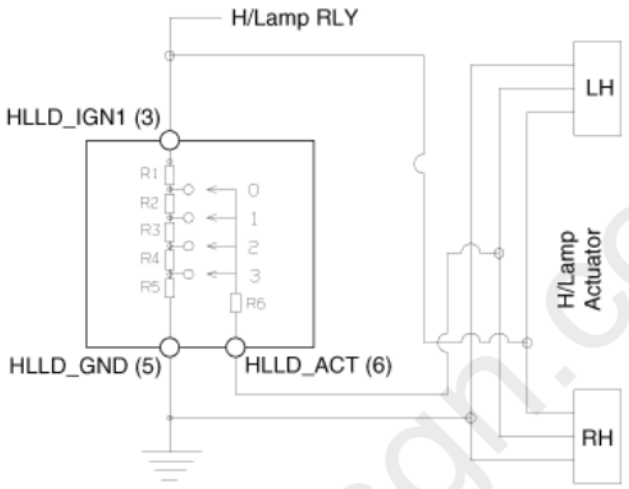
Installation

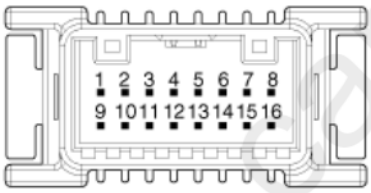
1. Install the headlamp assembly.
2. Connect the negative (-) battery terminal.
3. Adjust the headlamp in accordance with the headlamp aiming instructions.

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Components



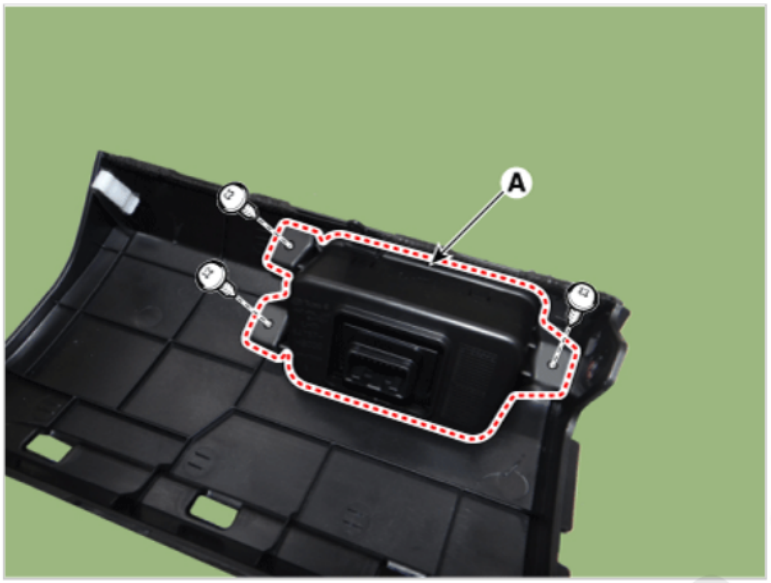


Connector A	No.	Description	No.	Description
	1	Ground	13	-
	2	-	14	ESC OFF
	3	HLLD (IGN1)	15	Rheostat (Up)
	4	-	16	IGN1
	5	HLLD (Ground)	17	-
	6	HLLD Actuator	18	Rheostat (Down)
	7	Illumination (-)	19	TPMS Mode
	8	-	20	Illumination (+)

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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the crash pad side switch (A) after loosening the mounting screws.



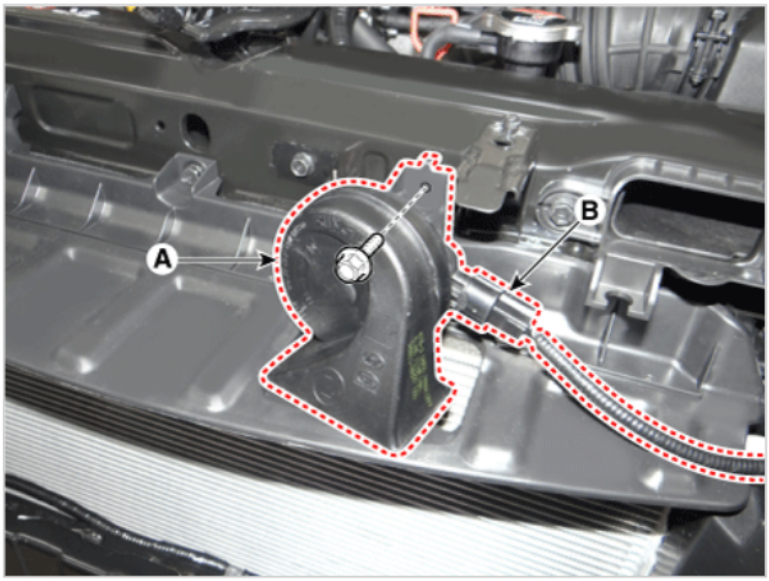
Installation

1. Install the crash pad side switch.
2. Install the crash pad lower panel.
3. Connect the negative (-) battery terminal.

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Removal

1. Remove the front bumper assembly.
   (Refer to Body - "Front Bumper Assembly")
2. Remove the horn (A) after disconnecting the horn connector (B) and loosening the mounting the bolt.



Installation

1. Install the horn after connecting the horn connector.
2. Install the front bumper assembly.

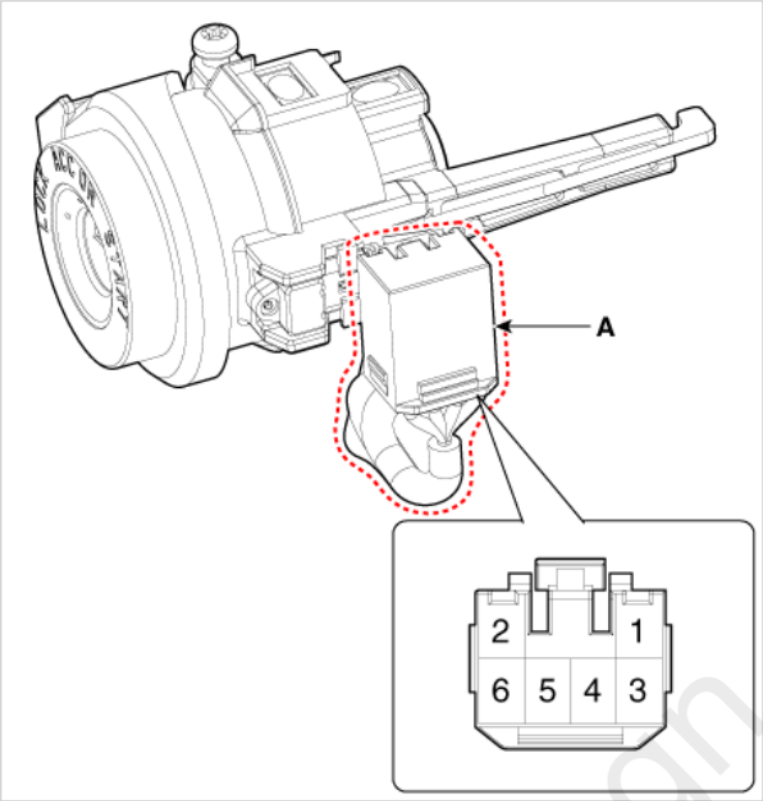
Inspection

1. The relay on the horn of this vehicle is built into the engine room relay block.

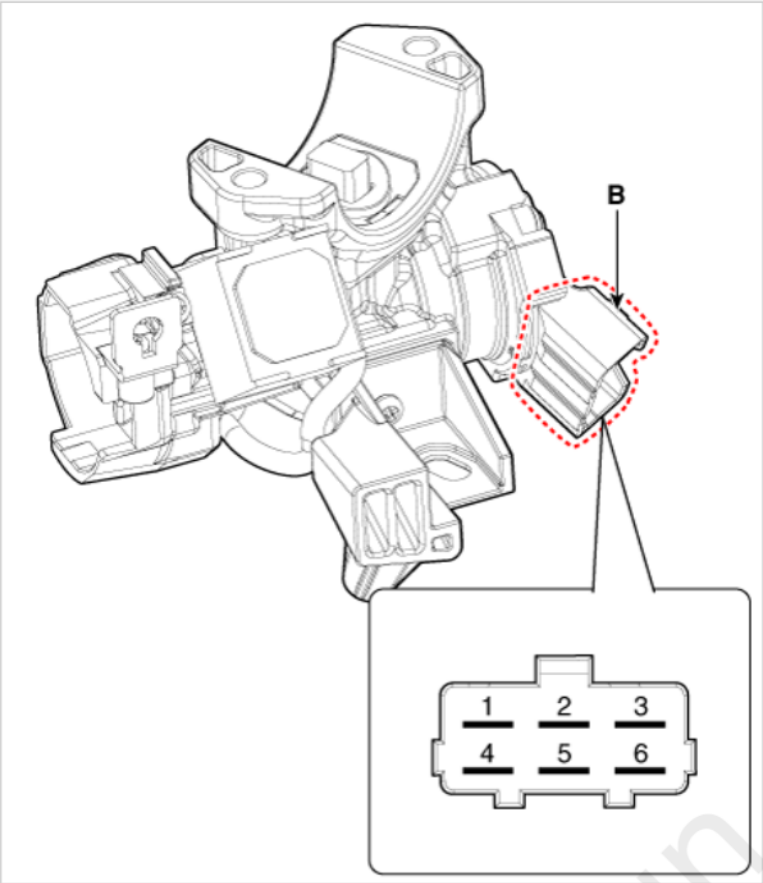
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Inspection

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



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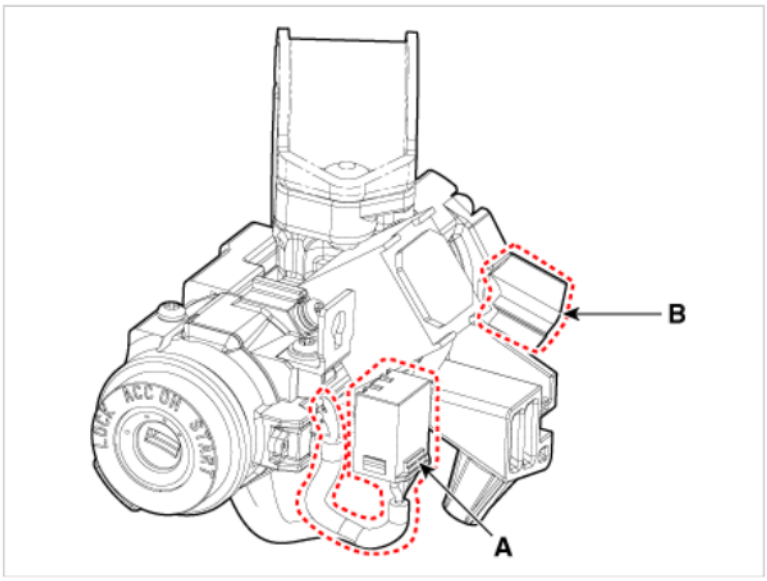
2. Check for continuity between the terminals.
3. If continuity is not specified, replace the switch.

Position \ Terminal / Key		Ignition switch (B)						Key warning switch (A)		Key hole illumination (A)	
		5 (B1)	6 (ACC)	4 (IGN1)	1 (B2)	2 (IGN2)	3 (ST)	3	4	5	6
LOCK	Removal										
	Insert										
ACC		○	○								
ON		○	○	○	○	○					
START		○		○	○		○				

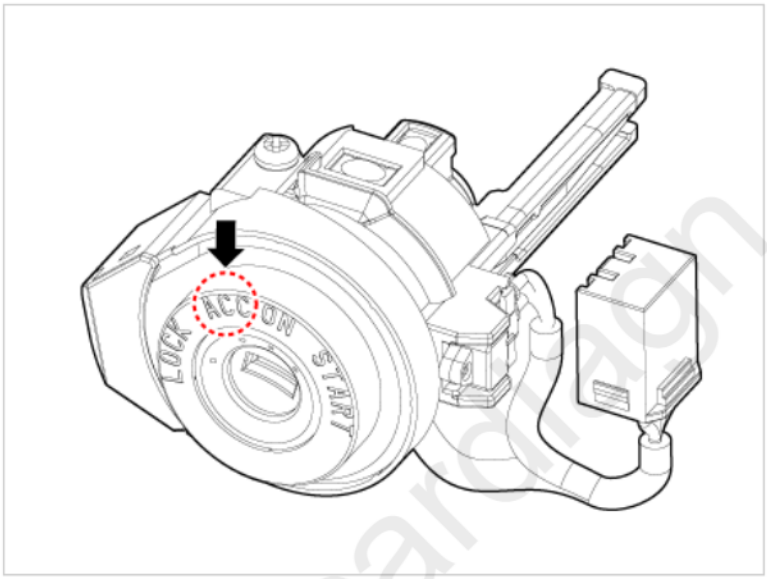
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the steering column upper and lowershrouds after loosening the screws.
   (Refer to Body - "Steering Column Shroud Panel")
4. Remove the multifunction switch.
   (Refer to Body Electrical System - "Multifunction Switch")
5. Remove the ignition switch connector (A) and key warning / immobilizer connector (B).

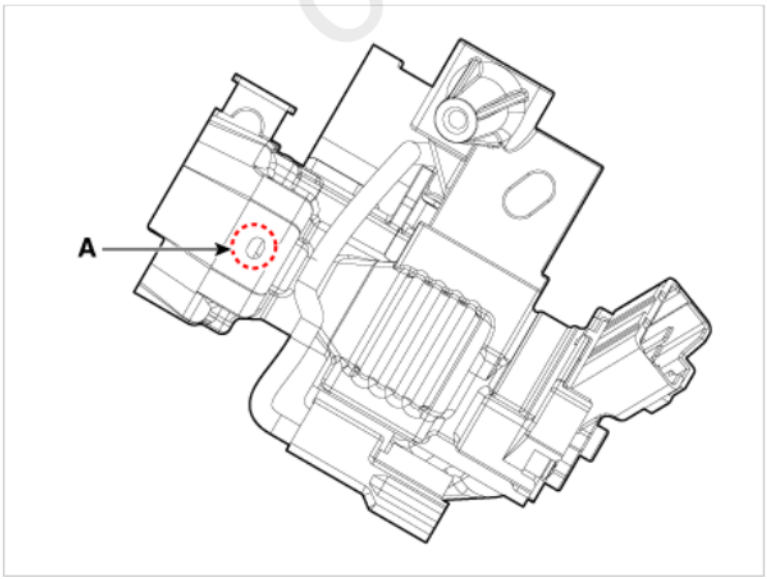
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6. Insert key and turn it to ACC position.



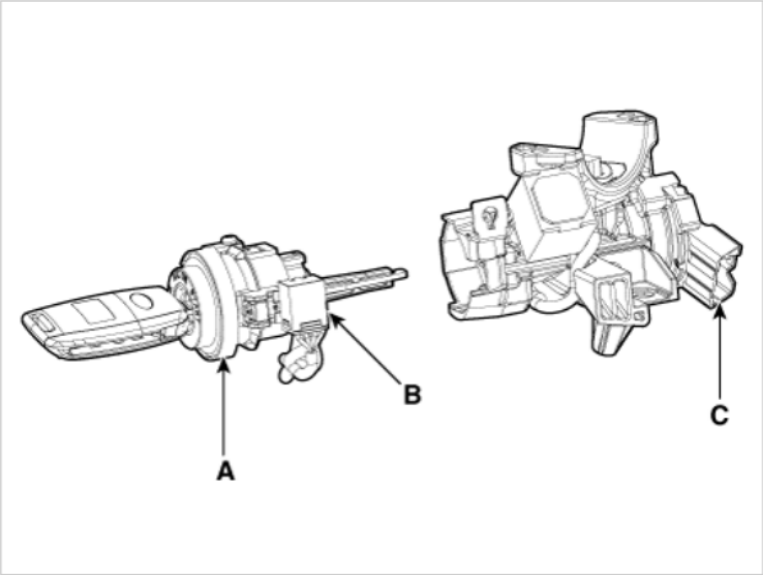
7. Push the lock pin (A) with a punch.



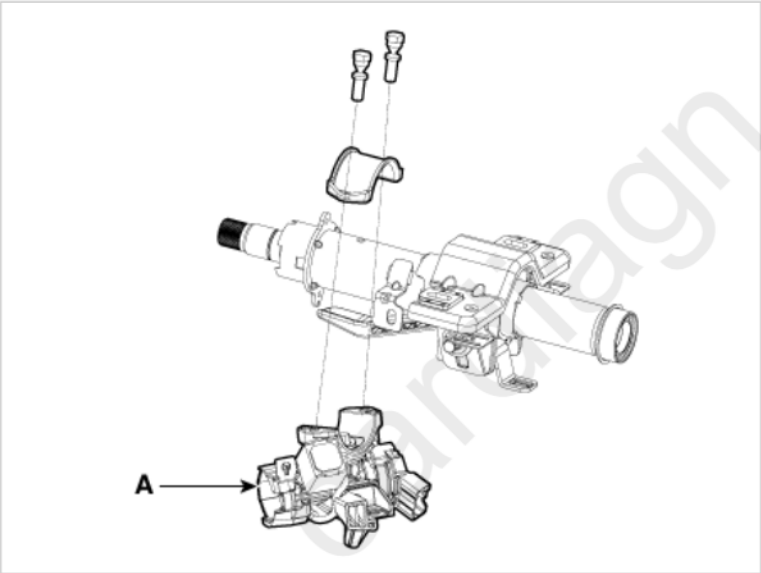
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8. Remove the key lock cylinder (A).

B : Key warning switch
C : Ignition switch connector



9. Remove the ignition switch (A) after loosening the mounting bolts.



Installation

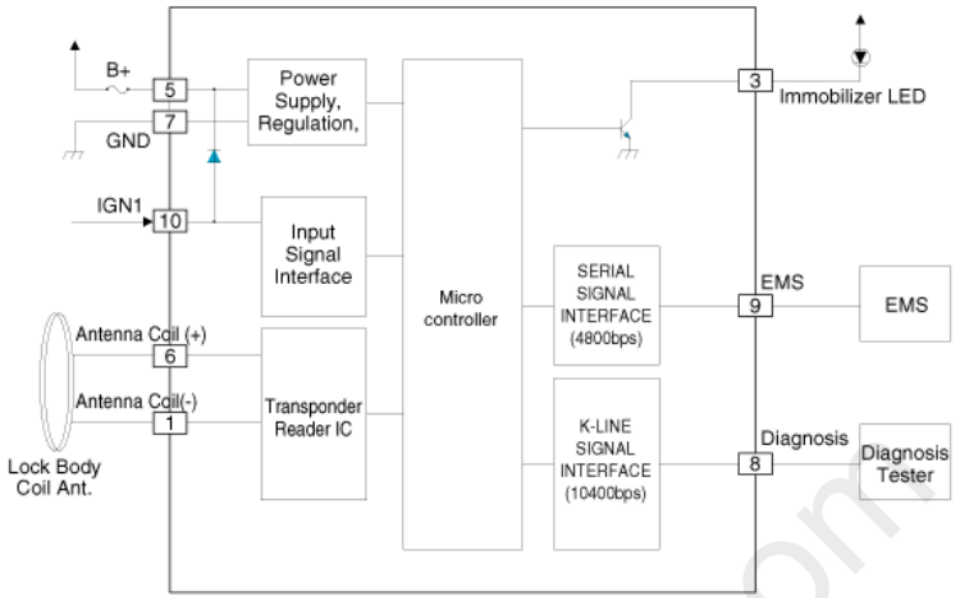
⚠ CAUTION

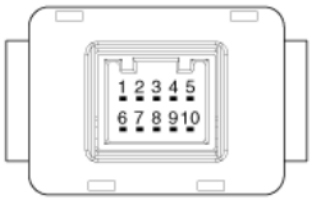
- Do not reuse the shear bolts.
- When installing the new shear bolts to the ignition switch assembly, tighten the shear bolts until its head is cut off.

1. Install the ignition switch.
2. Install the key lock cylinder.
3. Connect the ignition switch connector and key warning / immobilizer connector.
4. Install the multifunction switch.
5. Install the steering column upper and lower shroud panel.
6. Install the crash pad lower panel.
7. Connect the negative (-) battery terminal.

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Circuit Diaram







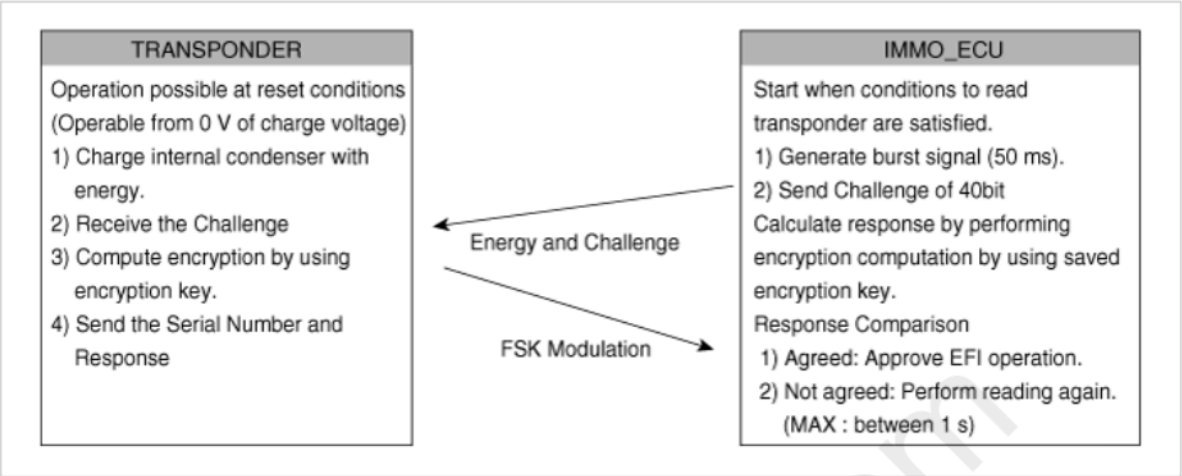
No.	Description
1	Coil (-)
2	-
3	Immobilizer_LED
4	-
5	Battery
6	Coil (+)
7	GND
8	Diagnostic taster
9	EMS
10	IGN1

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Description

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

1. Transponder (TP) – IMMO ECU Communication



TP Read Protocol

(1) Immobilizer ECU sends signal after ignition "ON" (or CPU reset cancellation) to test TP and confirms Serial Number and response.

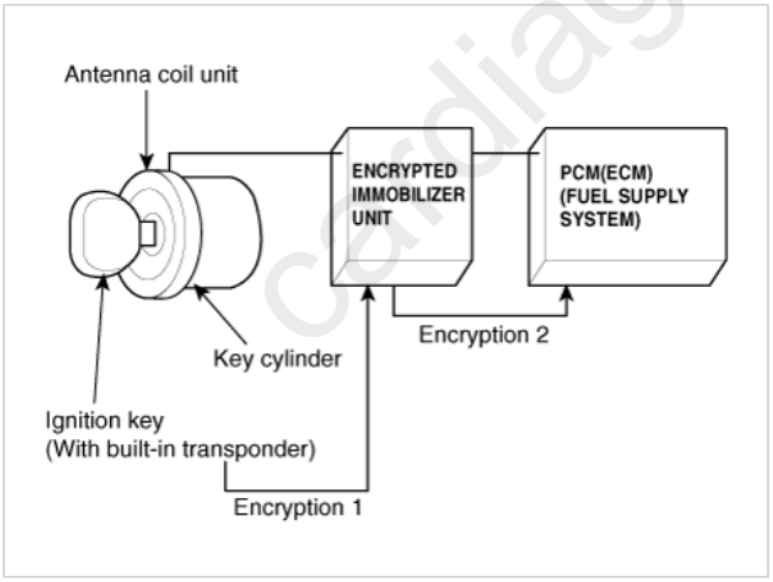
(2) When TP input response is not correct, the TP input signal is sent again.

(3) When the TP input response is correct, the data that calculates encryption operation in the EEPROM program is compared with received data from TP. When Codes is same, input is finished. If the codes are not same, input is continuously sent until codes are same.

(4) If the Immobilizer ECU EEPROM code does not program, when correct transponder code is inputted (CRC Check OK), program is complete.

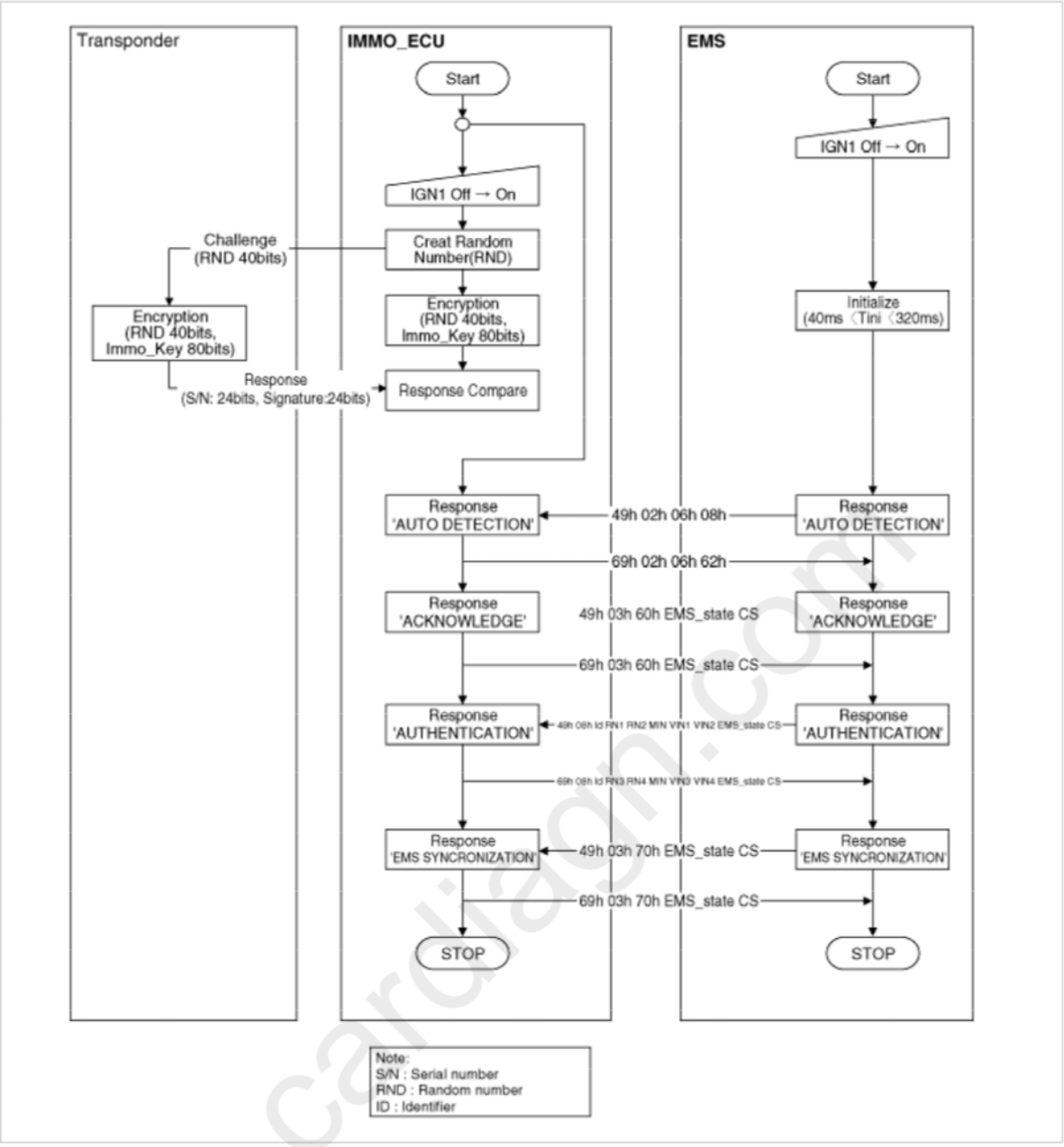
(5) After ignition "ON" (CPU Reset cancellation), Immobilizer ECU reads Transponder Code a maximum of 5 times.

(6) With ignition "ON" & EMS state "Lock"; when an ANKNOWLEDGE is received, TP is re-authenticated.



2. Transponder / IMMO ECU / EMS authentication

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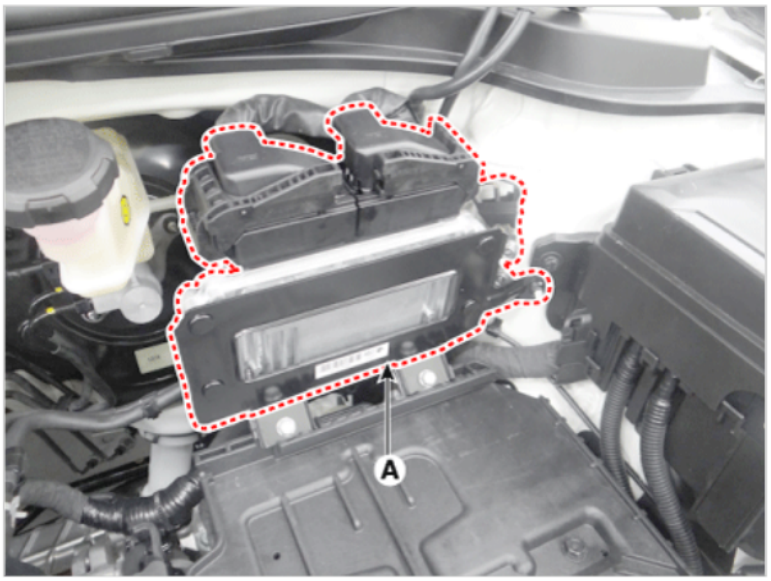


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Components Operations

PCM (Power Train Control Module)

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

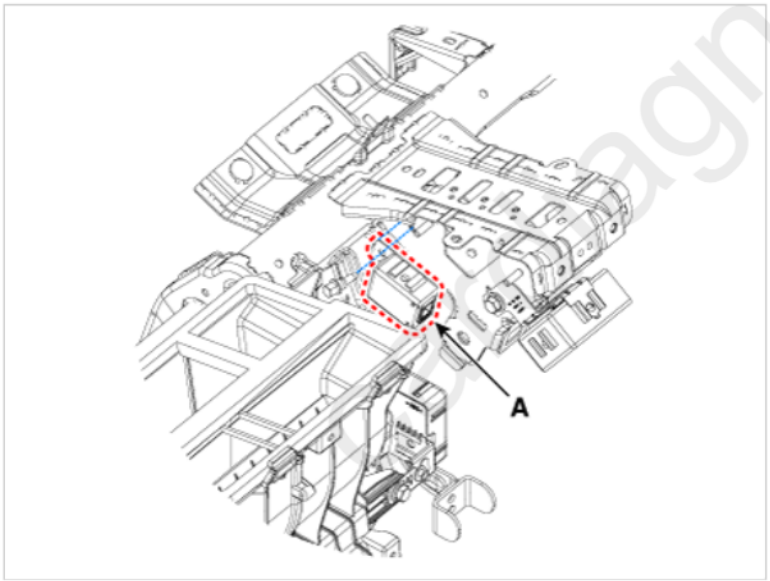


ENCRYPTED IMMOBILIZER unit (A)

The IMMOBILIZER carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The IMMOBILIZER is mounted behind of the crash pad close to center cross bar.

The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the IMMOBILIZER device. And, the received messages from the PCM(ECM) are converted into an RF signal, which is transmitted to the transponder by the antenna.

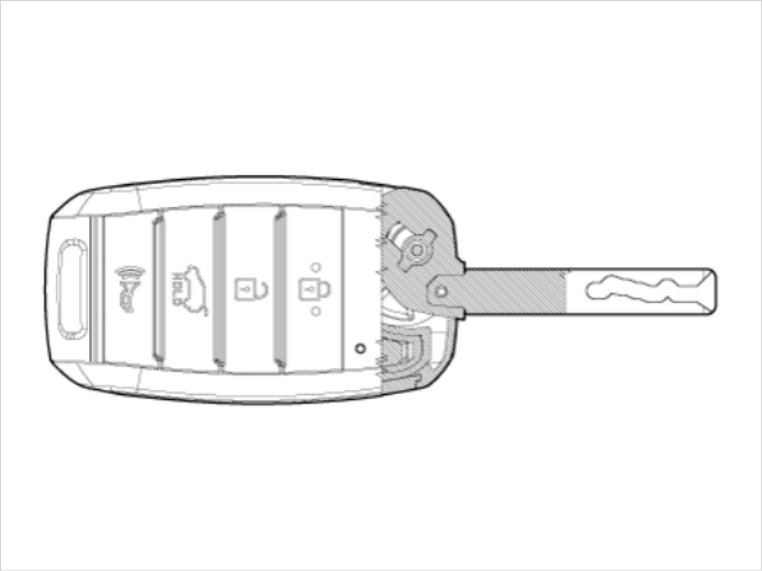
The IMMOBILIZER does not carry out the validity check of the transponder or the calculation of encryption algorithm. This device is only an advanced interface, which converts the RF data flow of the transponder into serial communication to the PCM(ECM) and vice versa.



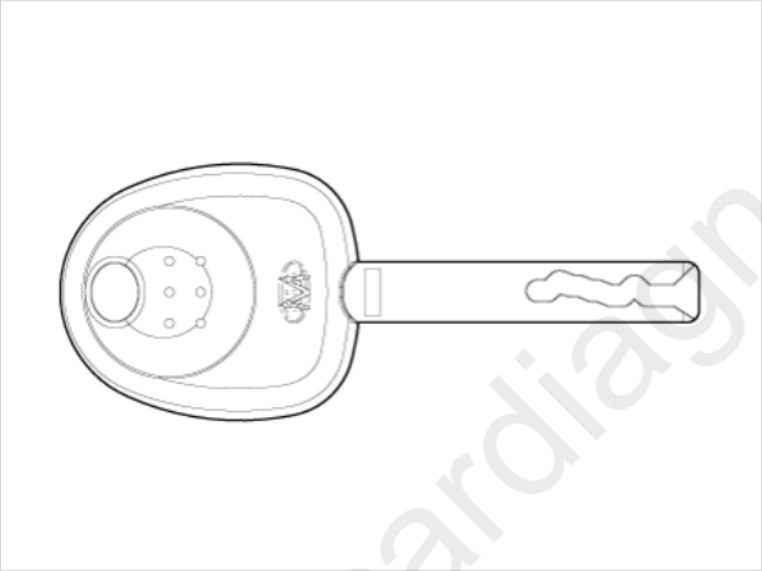
TRANSPONDER (Built-in keys)

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.

[Master Folding Key]



[Spare Master Key]

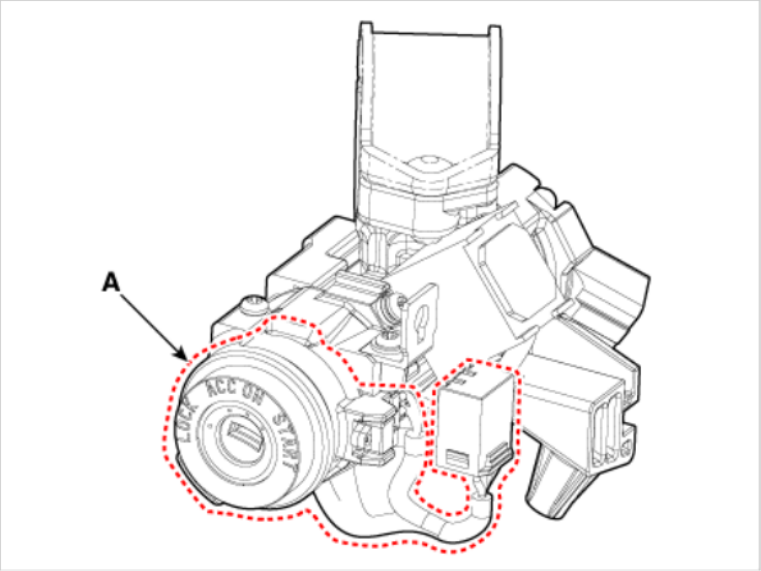


Antenna Coil

The antenna coil (A) has the following functions.

- The antenna coil supplies energy to the transponder.
- The antenna coil receives signal from the transponder.
- The antenna coil sends transponder signal to the IMMOBILIZER.
  It is located directly in front of the steering handle lock.

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Teaching Procedures

1. Key Teaching Procedure

Key teaching must be done after replacing a defective PCM(ECM) or when providing additional keys to the vehicle owner.

The procedure starts with an PCM(ECM) request for vehicle specific data (PIN code: 6digits) from the tester. The "virgin" PCM(ECM) stores the vehicle specific data and the key teaching can be started. The "learnt" PCM(ECM) compares the vehicle specific data from the tester with the stored data. If the data are correct, the teaching can proceed.

If incorrect vehicle specific data have been sent to the PCM(ECM) three times, the PCM(ECM) will reject the request of key teaching for one hour. This time cannot be reduced by disconnecting the battery or any other manipulation. 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.

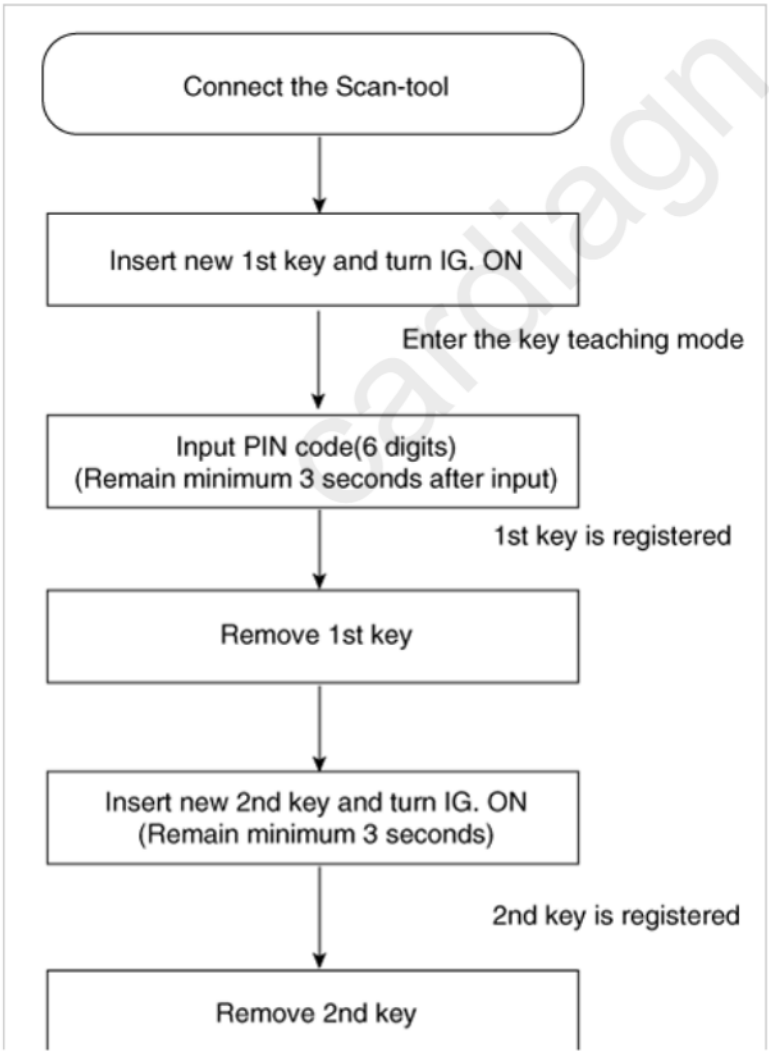
The maximum number of taught keys is 4.

If an error occurs during the Immobilizer Service Menu, the PCM(ECM) status remains unchanged and a specific fault code is stored.

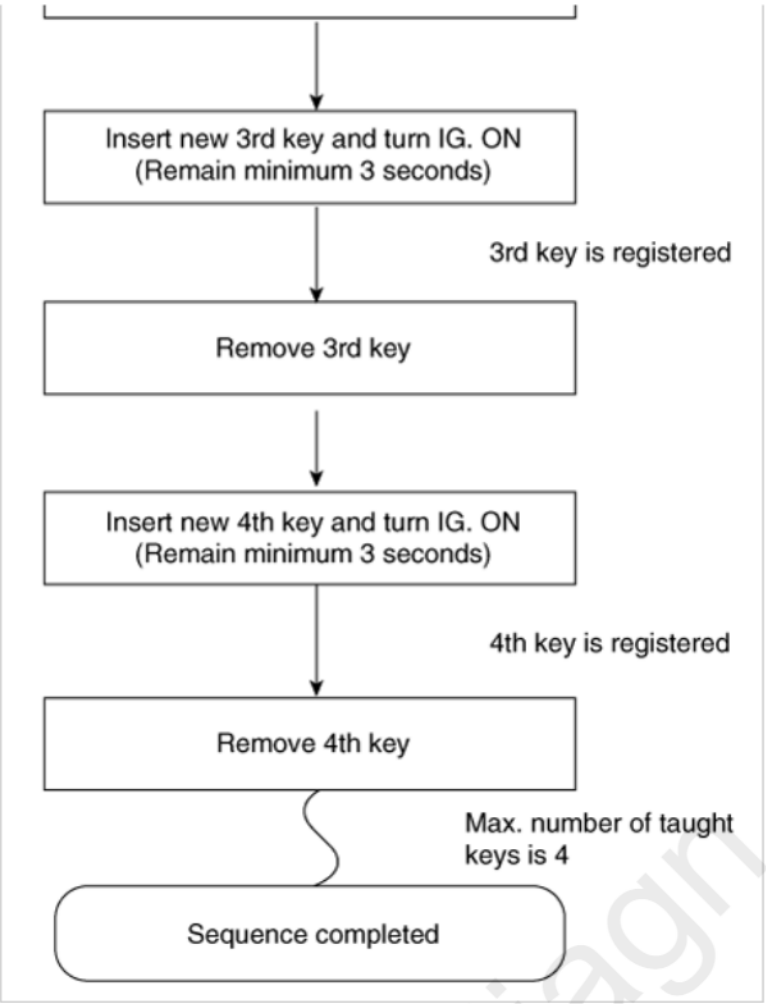
If the PCM(ECM) status and the key status do not match for teaching of keys, the tester procedure will be stopped and a specific fault code will be stored at PCM(ECM).

NOTICE

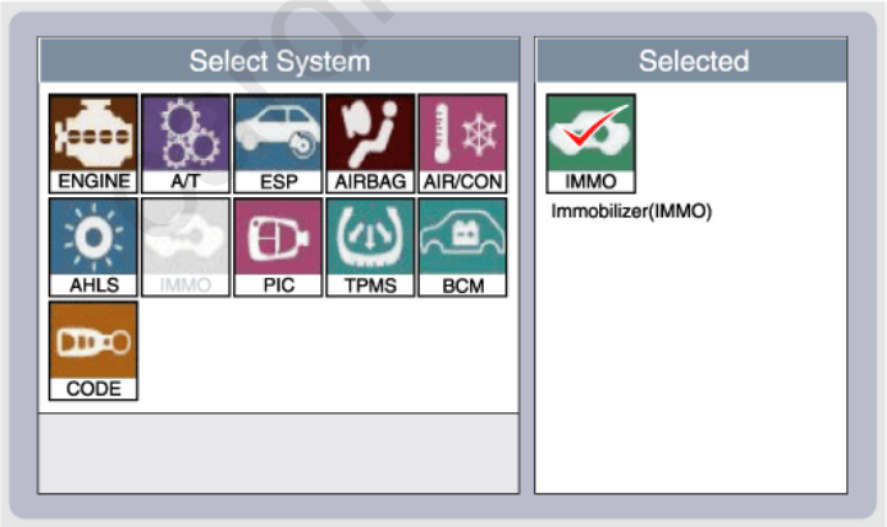
When teaching the 1st key, Smartra registers at the same time.

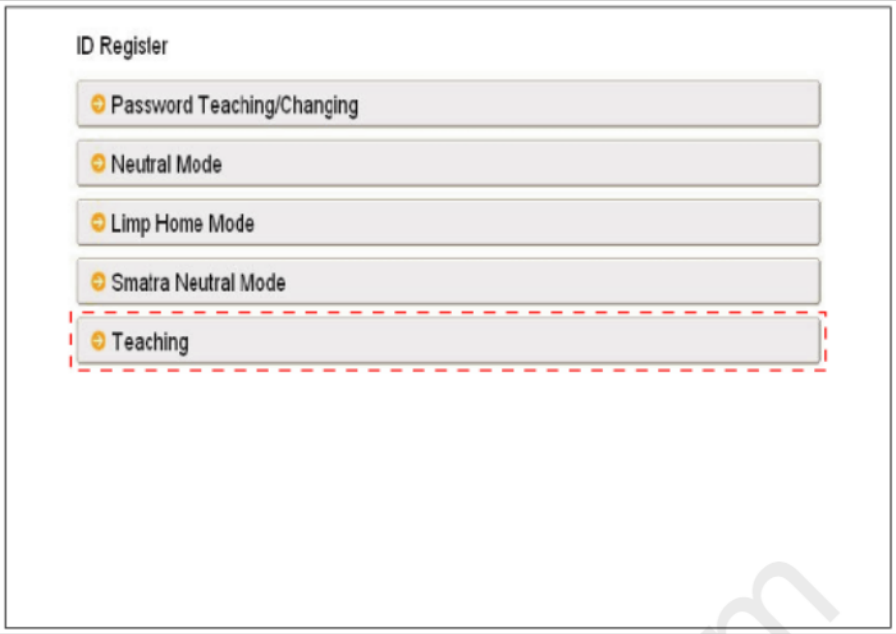


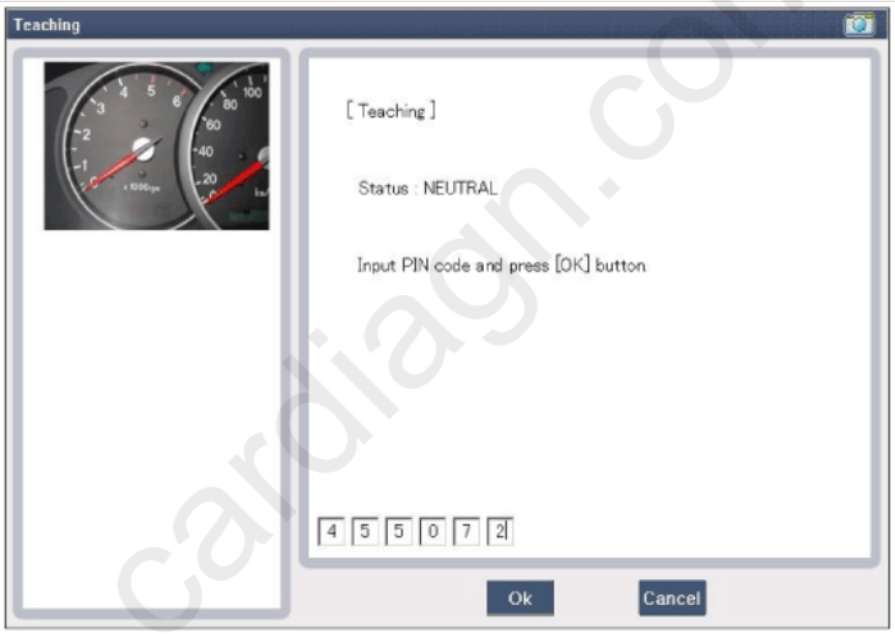
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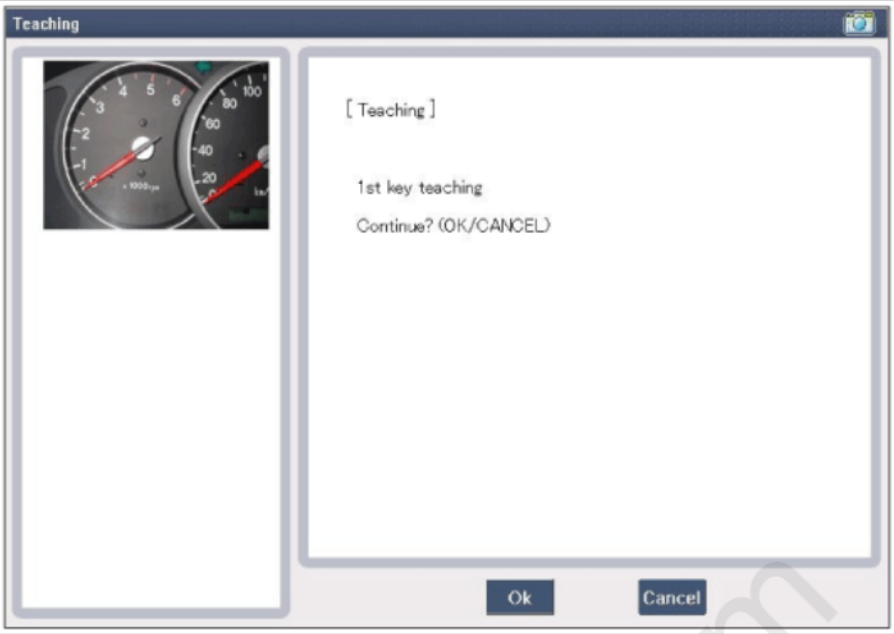
(1) PCM(ECM) learnt status.

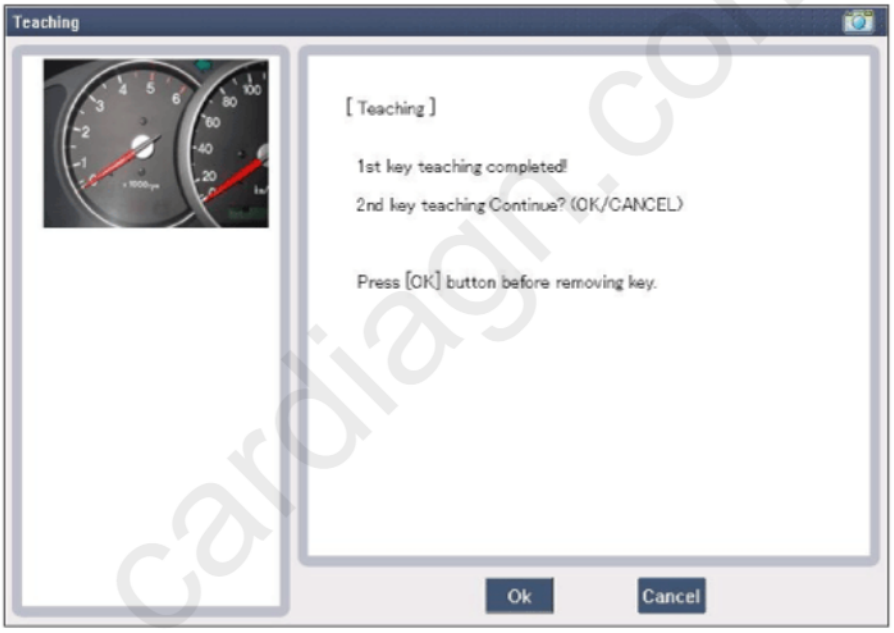




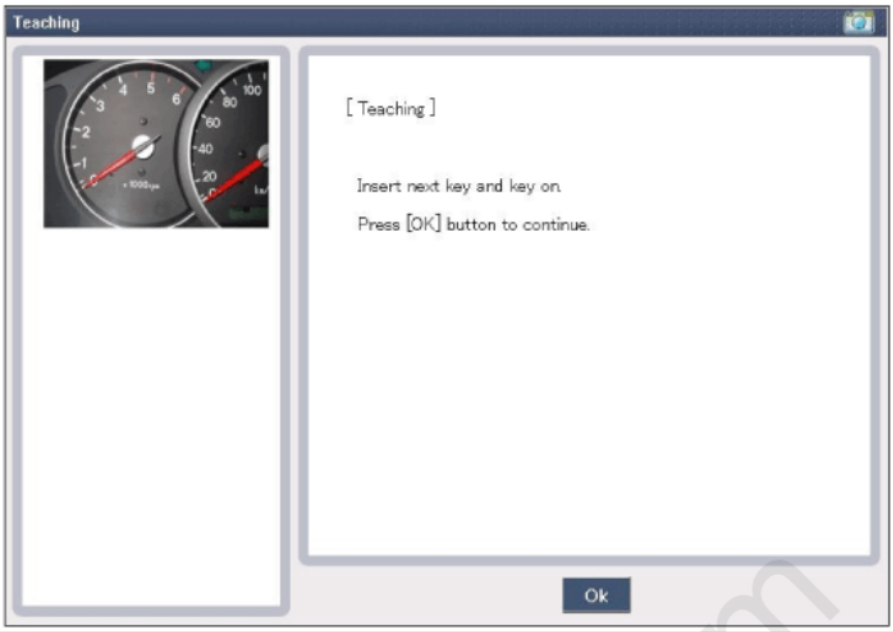


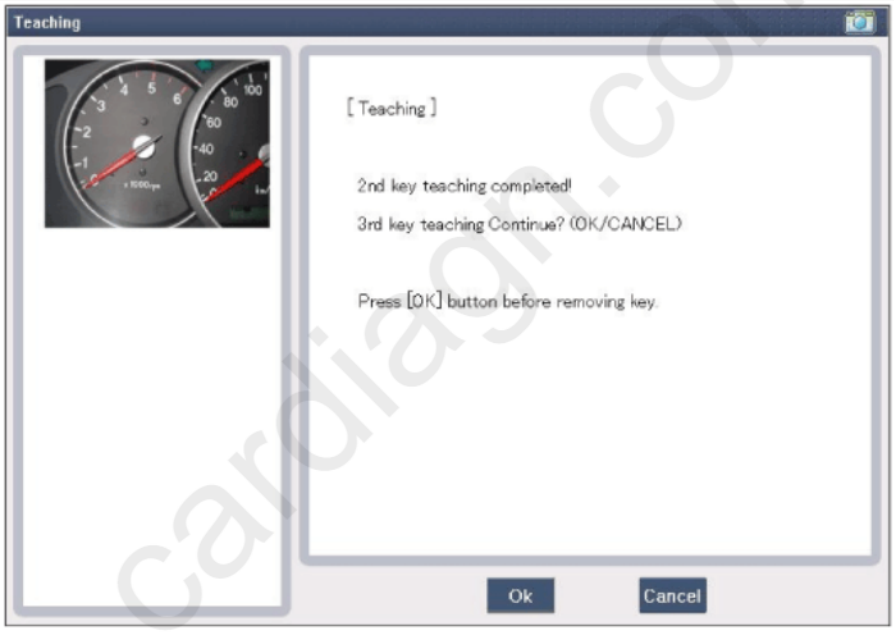
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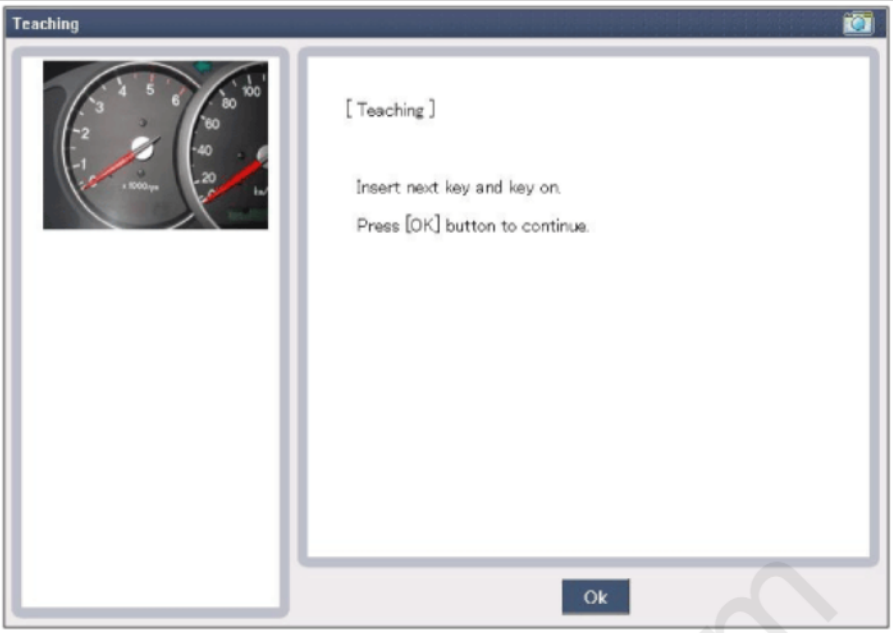


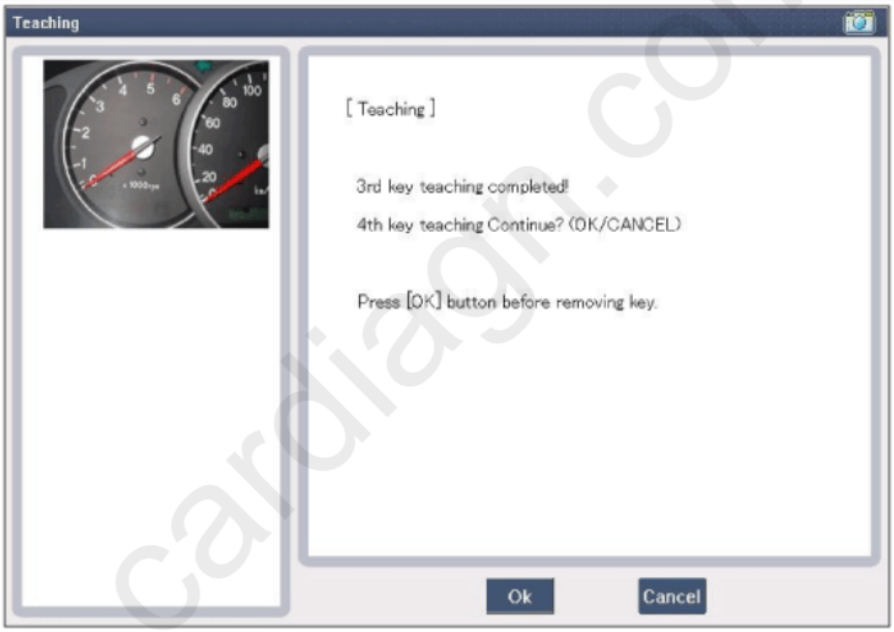
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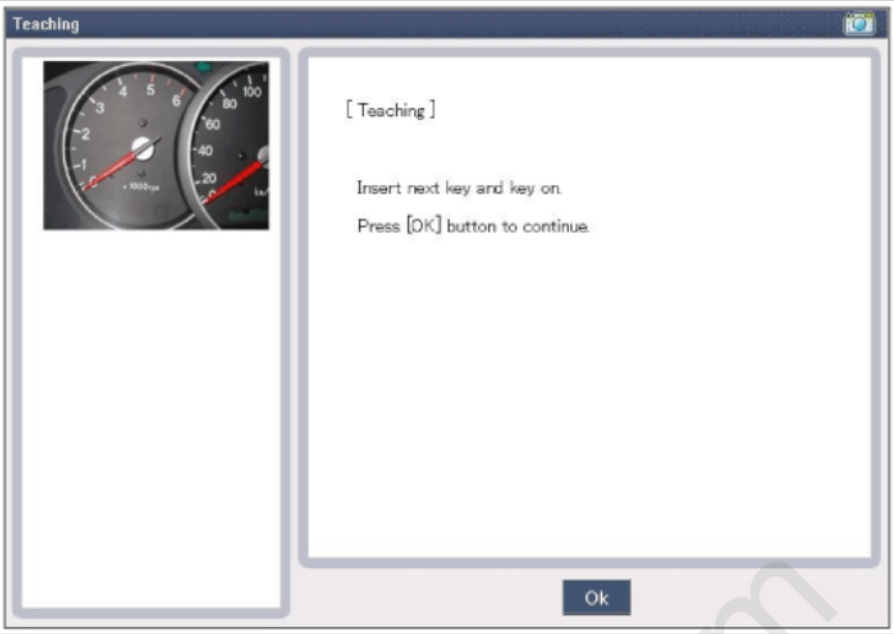


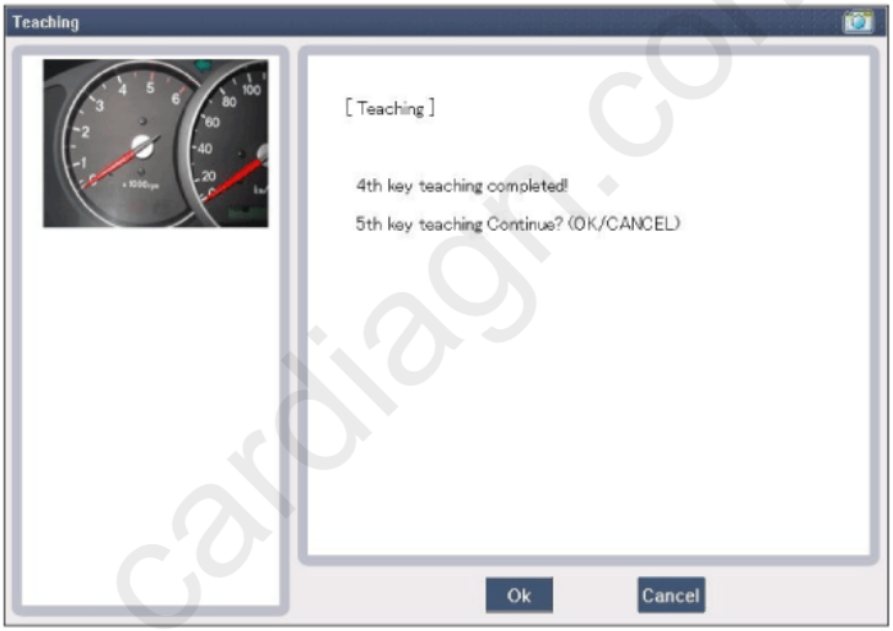
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(2) PCM(ECM) virgin status.

After replacing new "PCM(ECM)" KDS displays that PCM(ECM) is virgin status in Key Teaching mode.

"VIRGIN" status means that PCM(ECM) has not matched any PIN code before.

2. User Password Teaching Procedure

The user password for limp home is taught at the service station. The owner of the vehicle can select a number with four digits.

The 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.

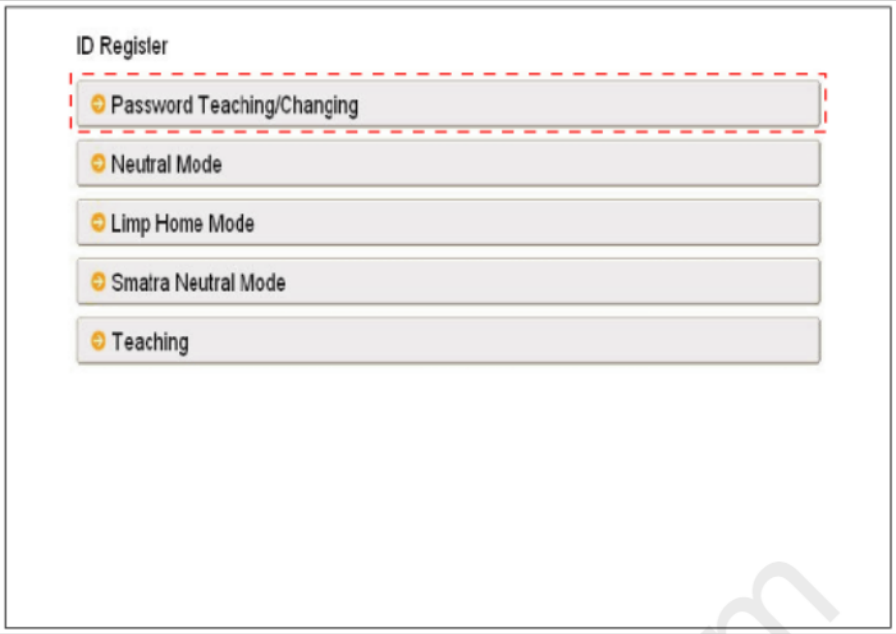
The teaching is started by ignition on, with a valid key(learnt key) and sending the user password by tester. After successful teaching, the status of the user password changes from "virgin" to "learnt"

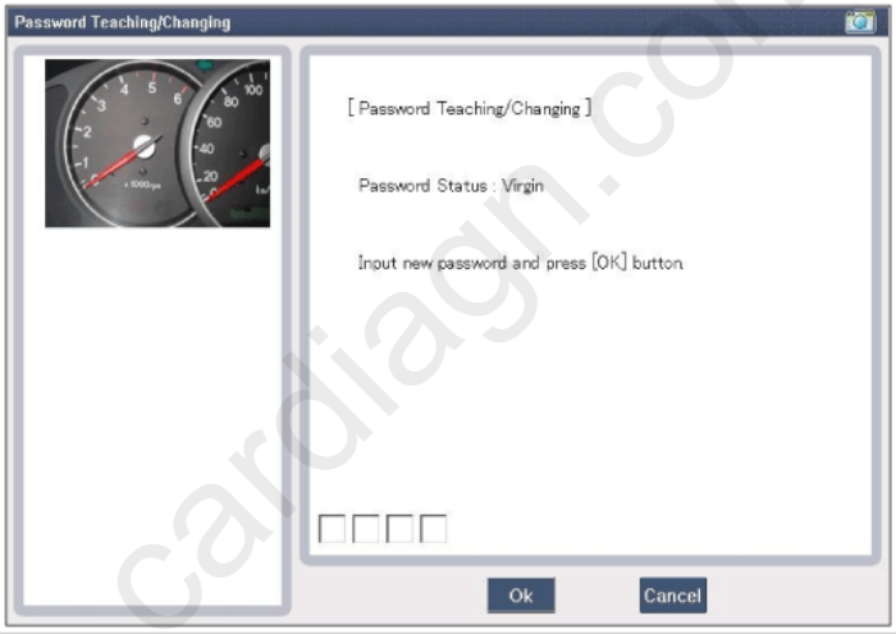
The learnt user password can also be changed. This can be done if the user password status is "learnt" and the tester sends authorization of access, either the old user password or the vehicle specific data. After correct authorization, the PCM(ECM) requests the new user password. The status remains "learnt" and the new user password will be valid for the next limp home mode.

If wrong user passwords or wrong vehicle specific data have been sent to the PCM(ECM) three times continuously or intermittently, 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.

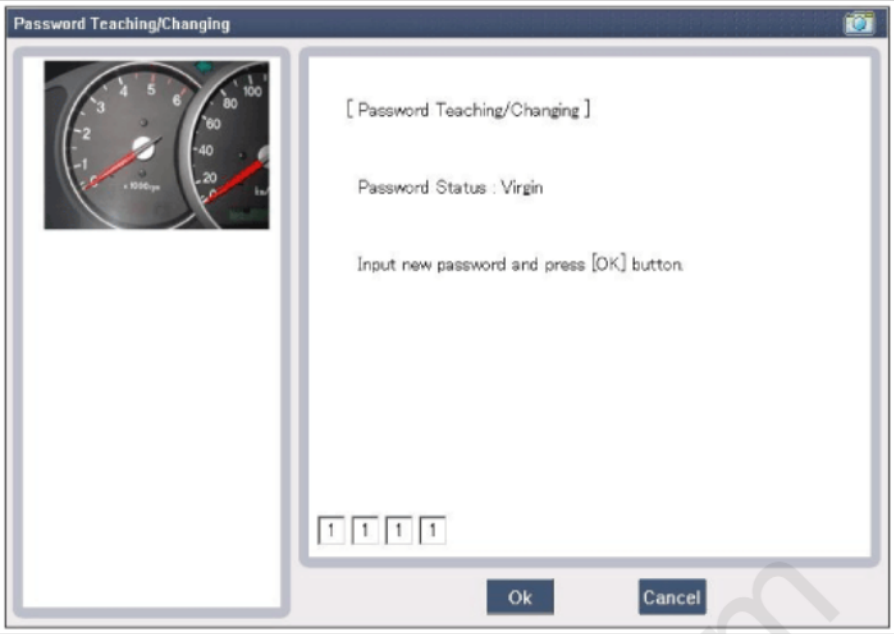
(1) User password teaching

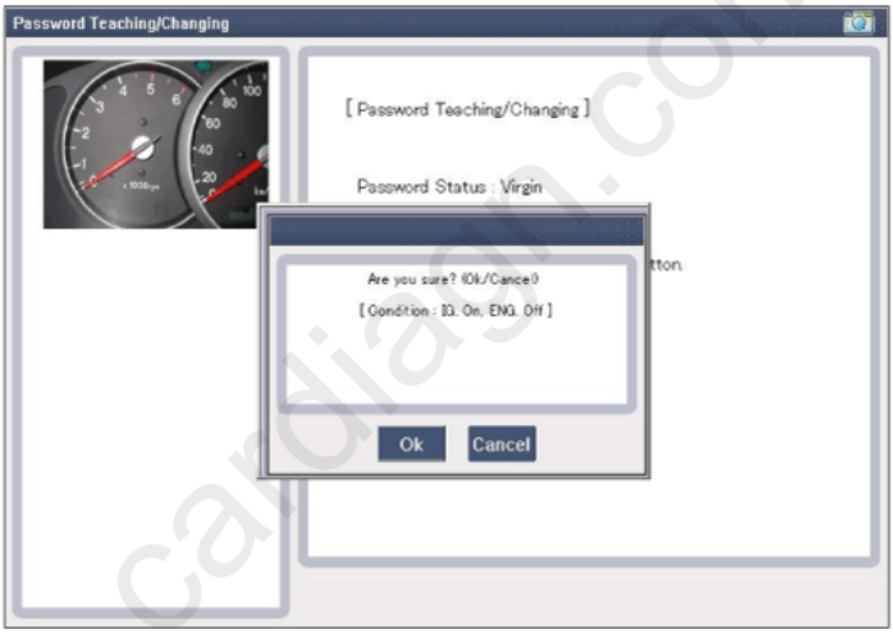
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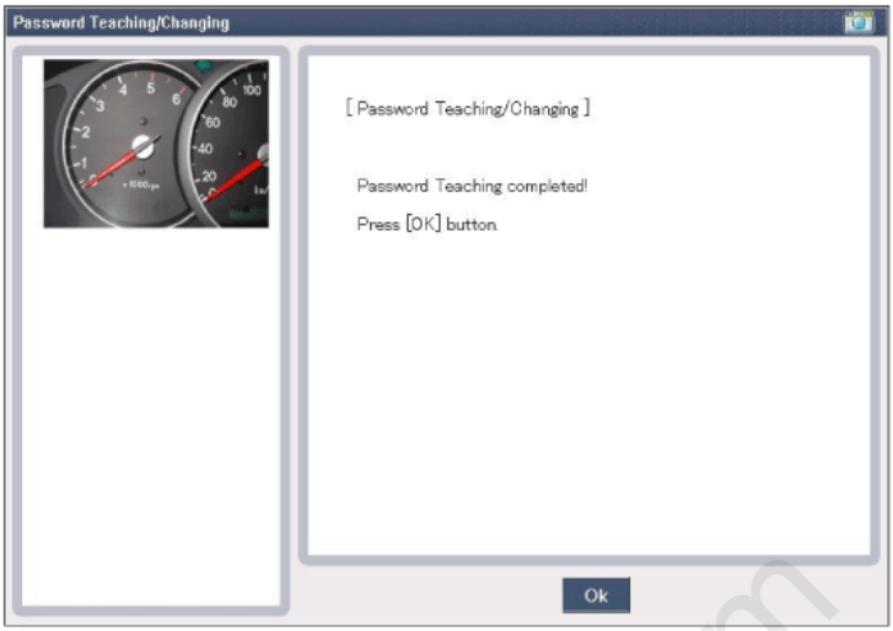


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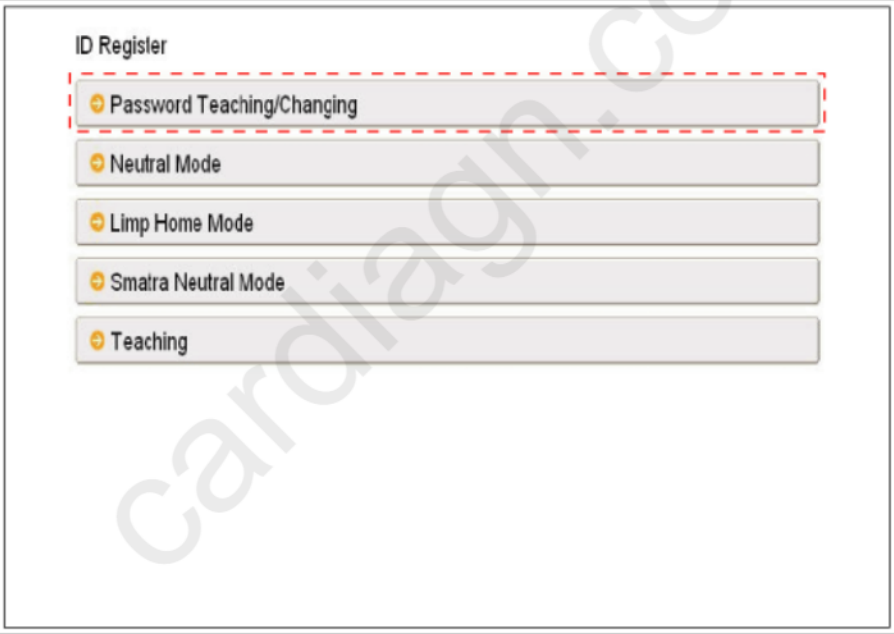


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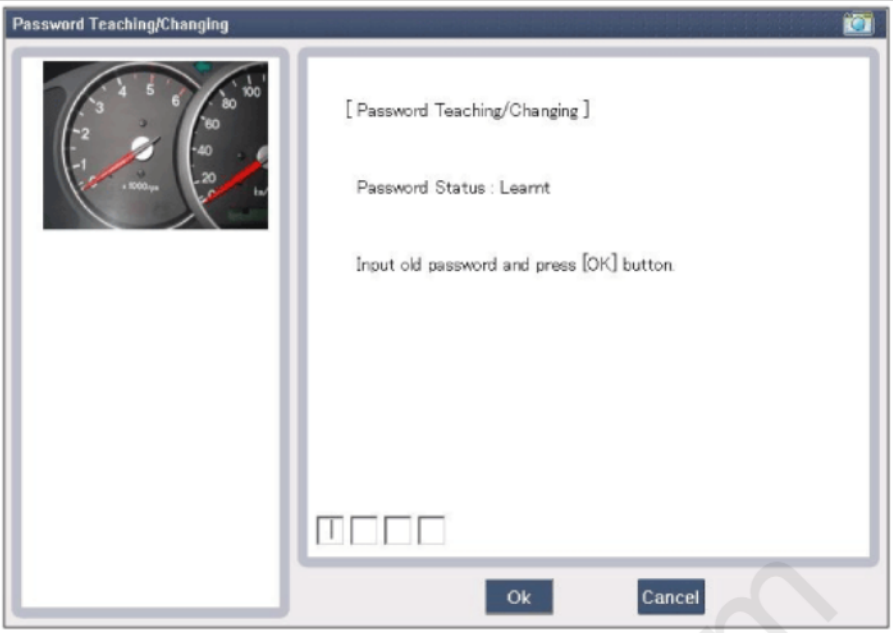


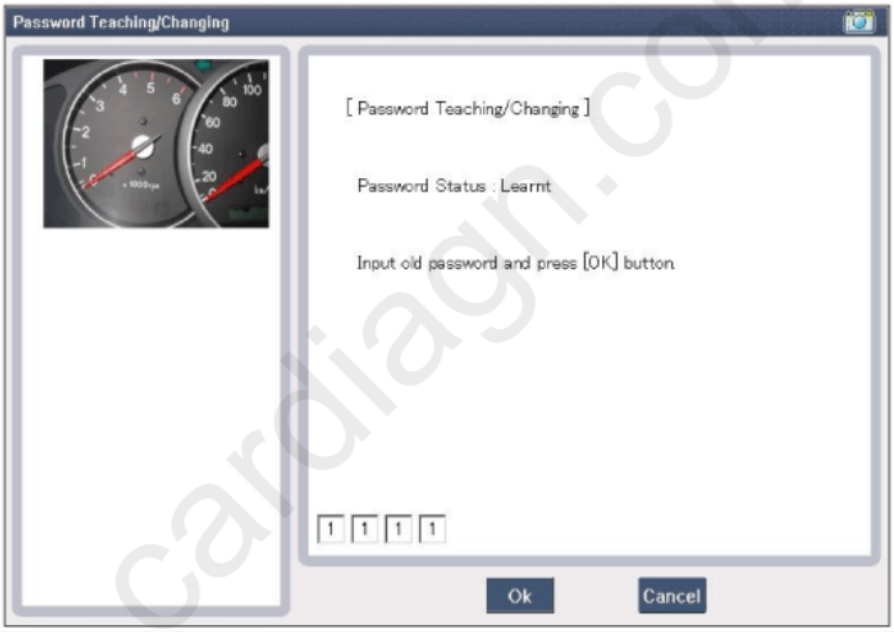
※ In case of putting wrong password, retry from first step after 10 seconds.

(2) User password changing

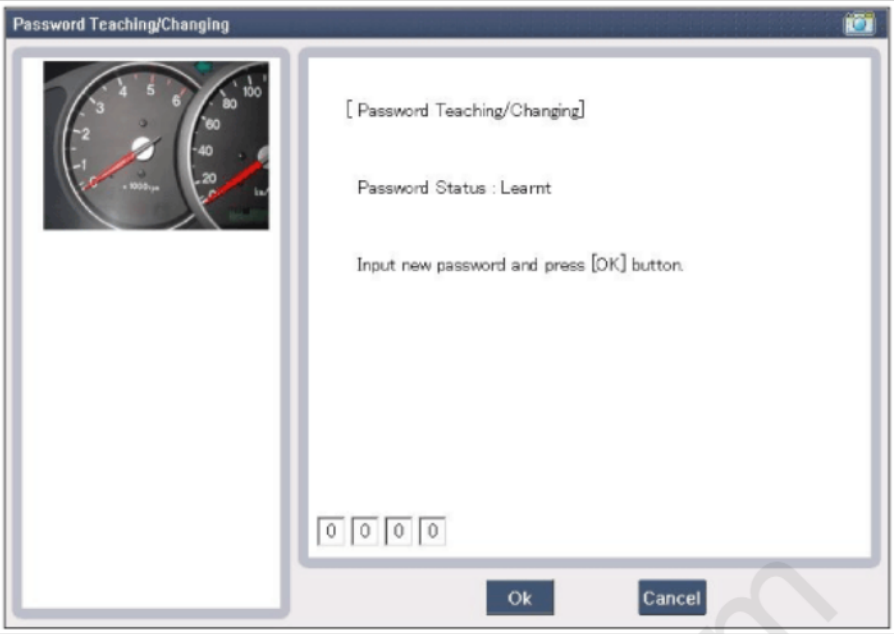


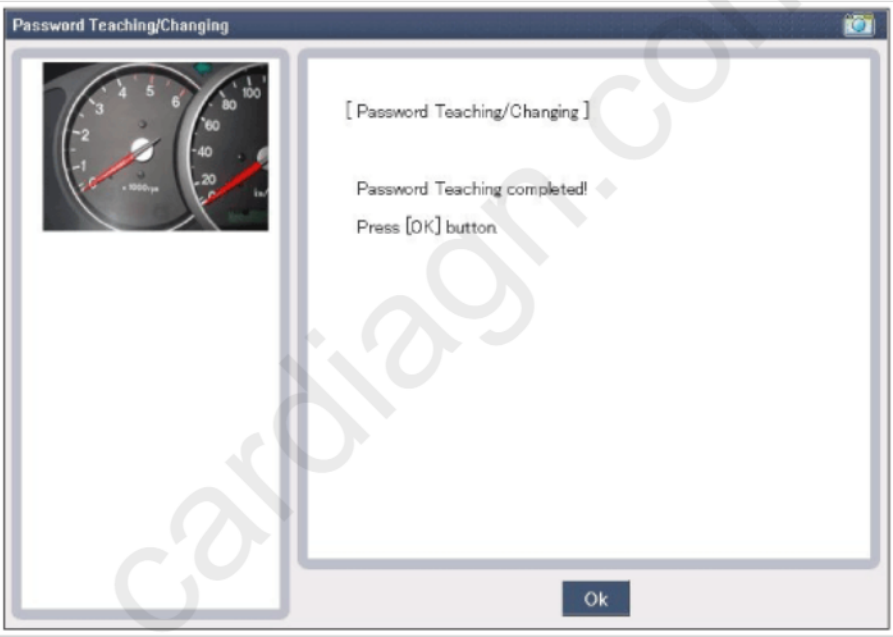
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Limp Home Function

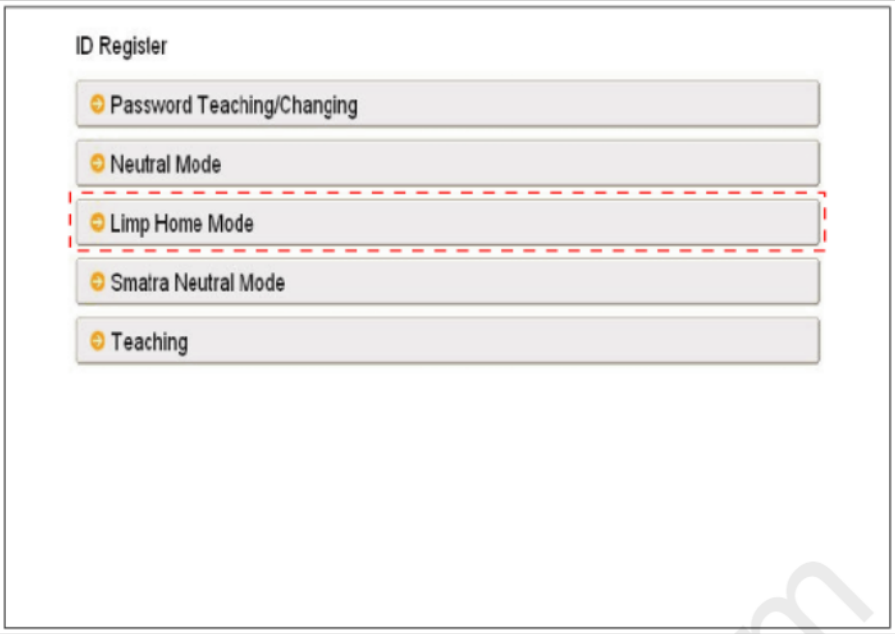
1. Limp Home By Tester

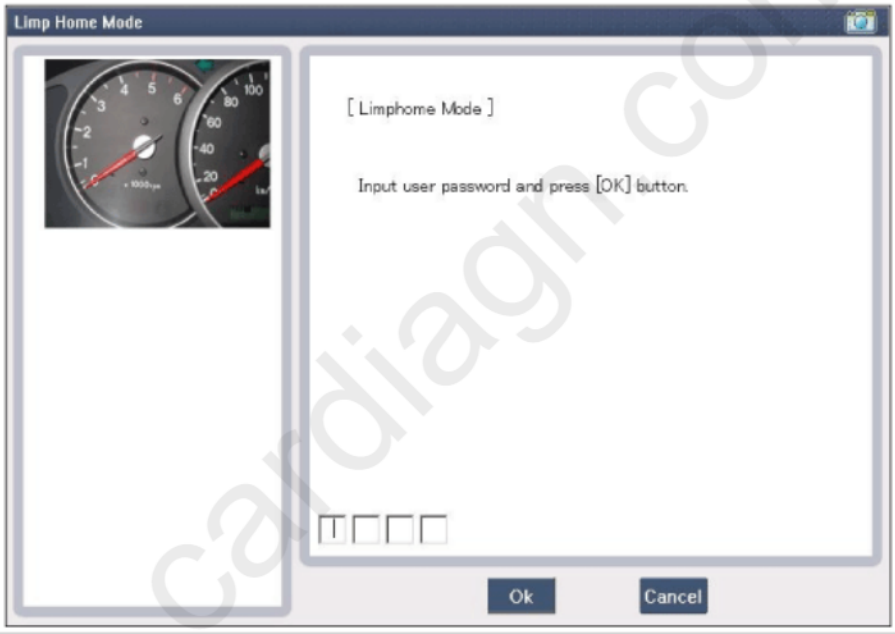
   If the PCM(ECM) detects the fault of the SMARTRA or transponder, the PCM(ECM) will allow limp home function of the immobilizer. Limp home is only possible if the user password (4 digits) has been given to the PCM(ECM) before. This password can be selected by the vehicle owner and is programmed at the service station.

   The user password can be sent to the PCM(ECM) via the special tester menu.

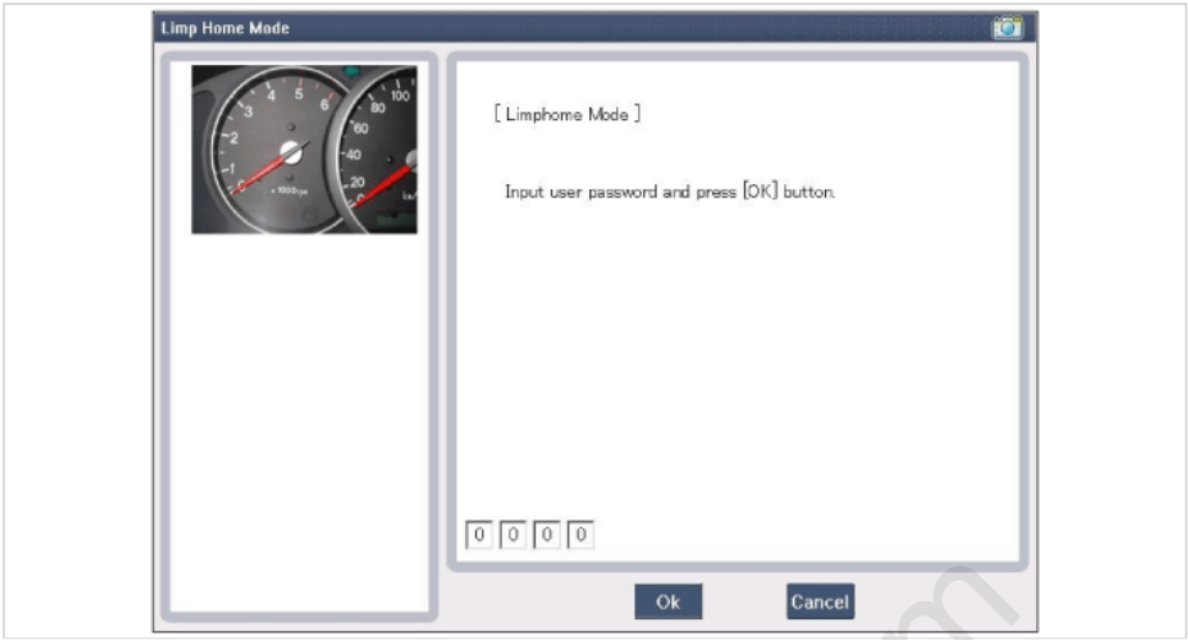
   Only if the PCM(ECM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the PCM(ECM) will be unlocked for a period of time (30 sec.). The engine can only be started during this time. After the time has elapsed, engine start is not possible.

   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.





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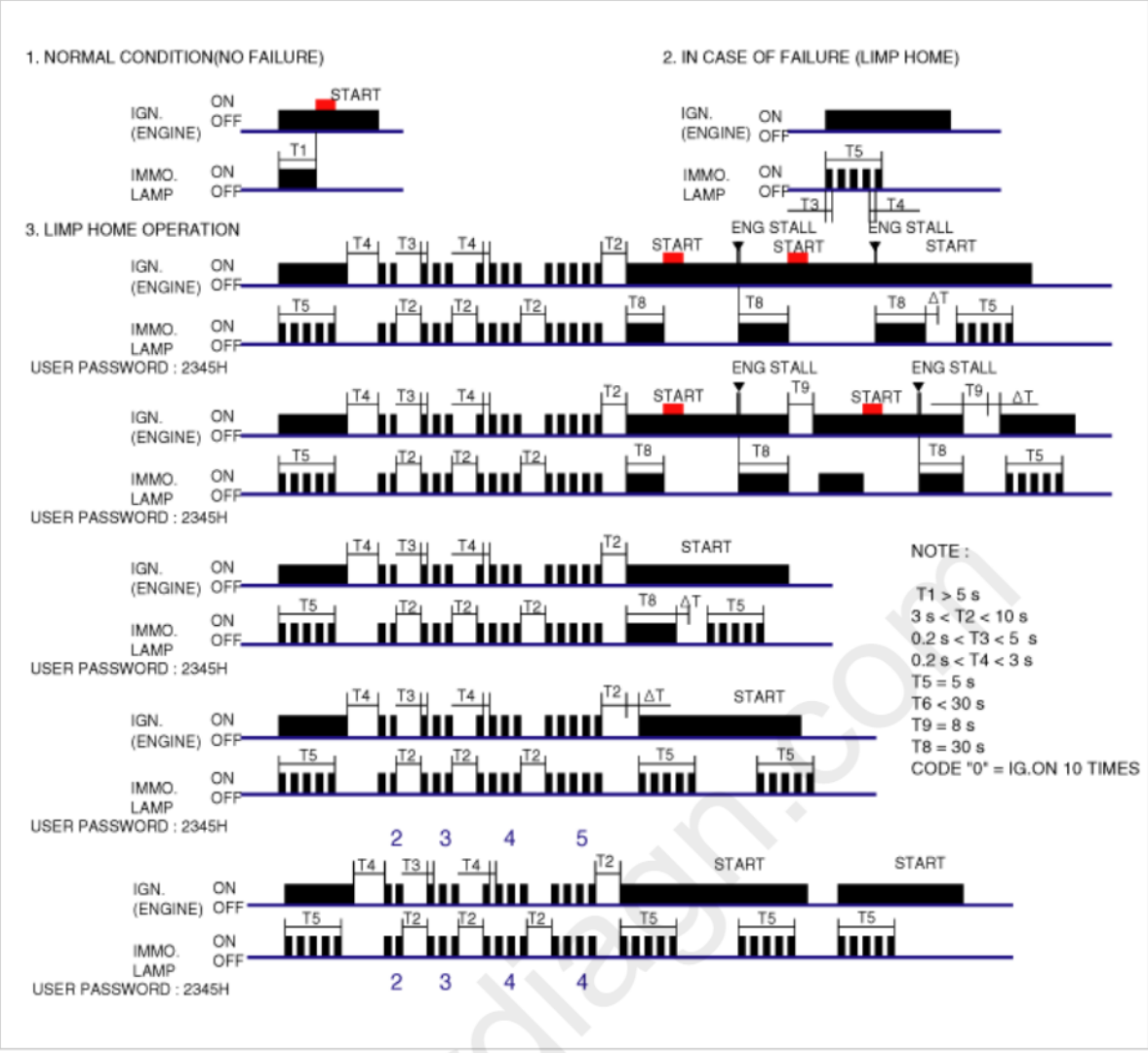
2. Limp Home By Ignition Key

   The limp home can be activated also by the ignition key. The user password can be input to the 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.



Replacement

Problems And Replacement Parts:

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

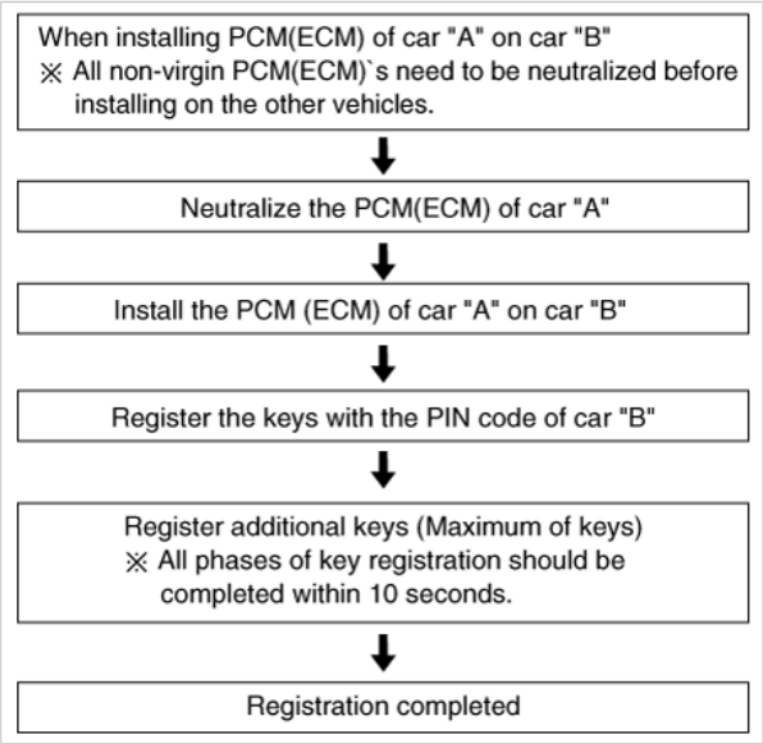
Replacement Of ECM And Smartra

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

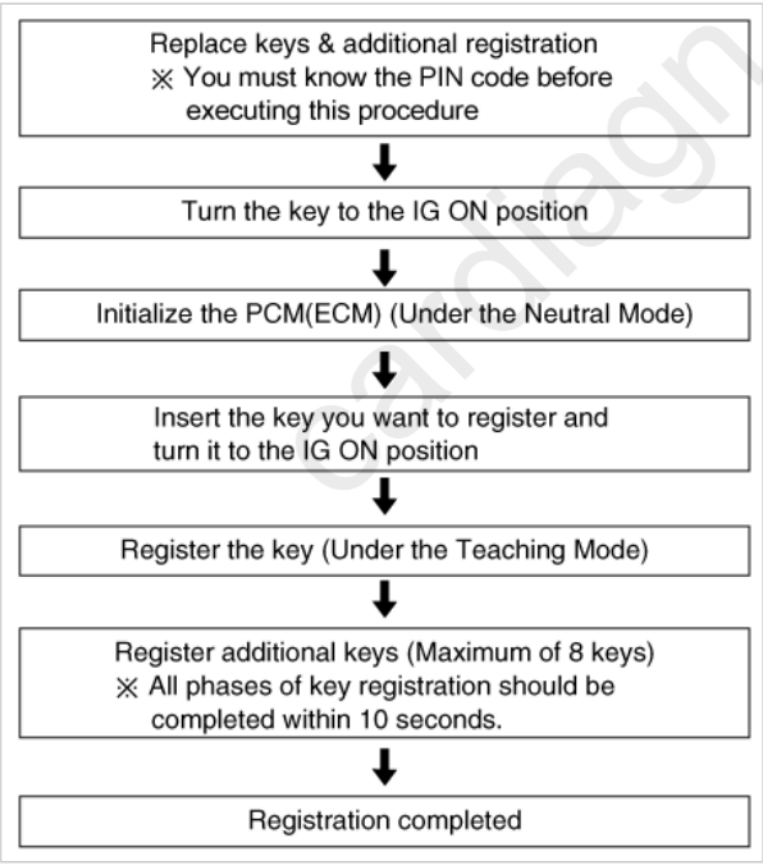
In case of a defective SMARTRA, it needs teaching the smartra. A new SMARTRA device replaces the old one and smartra need teaching.

1. Things to remember before a replacement (PCM(ECM))

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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.

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(Note that key #2 must be used within 10 seconds of removing key #1)

3) When the key #1 is registered and key #2 is not registered, put the unregistered master key #2 in the IG/ON or the start position. The engine cannot be started even with the registered key #1.
4) When you inspect the immobilizer system, refer to the above paragraphs 1, 2 and 3. Always remember the 10 seconds zone.
5) If the pin code & password are entered incorrectly on three consecutive inputs, the system will be locked for one hour.
6) Be cautious not to overlap the transponder areas.
7) Problems can occur at key registration or vehicle starting if the transponders should overlap.

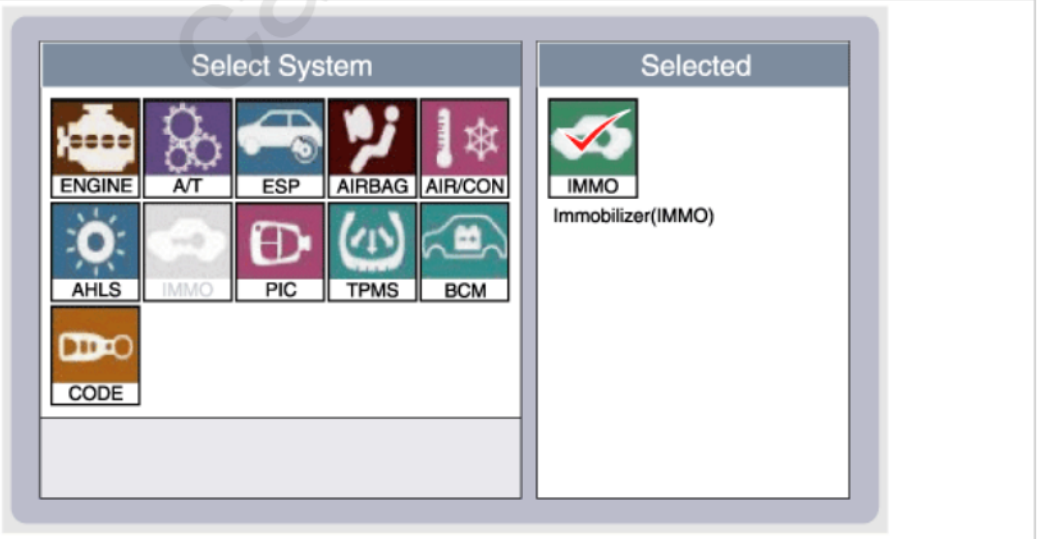
Neutralizing Of ECM

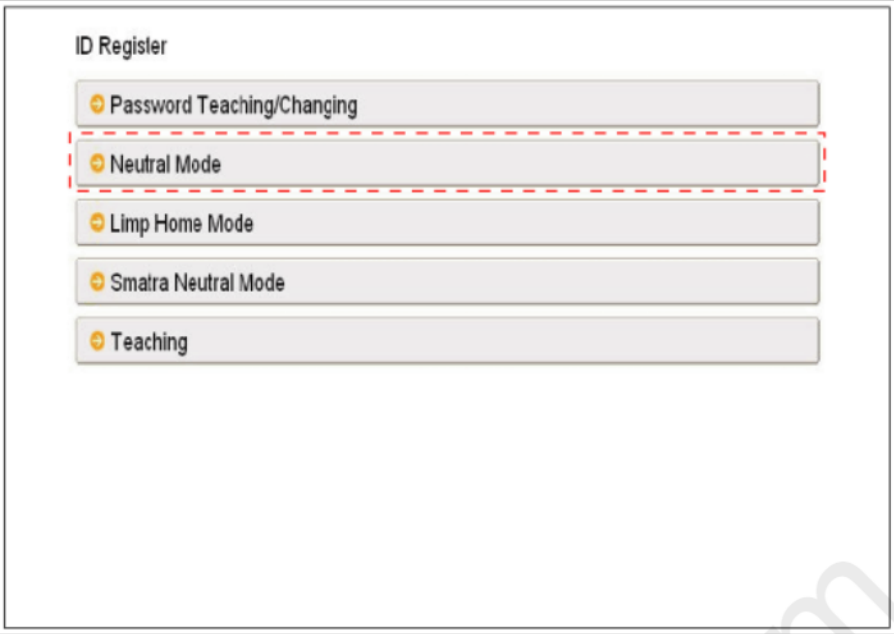
The PCM(ECM) can be set to the "neutral" status by a tester.
A valid ignition key is inserted and after ignition on is recorded, the PCM(ECM) requests the vehicle specific data from the tester. The communication messages are described at "Neutral Mode" After successfully receiving the data, the PCM(ECM)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

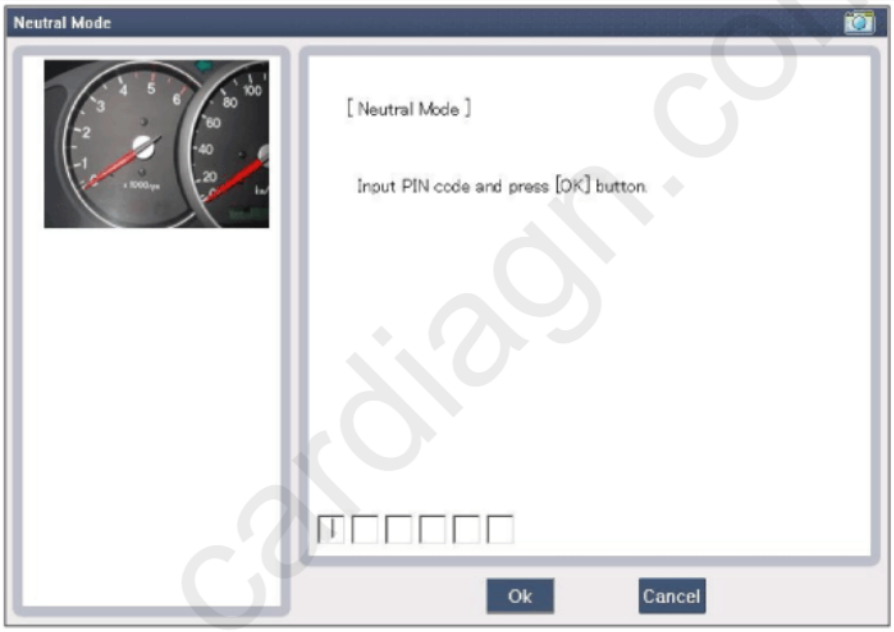
NOTICE

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

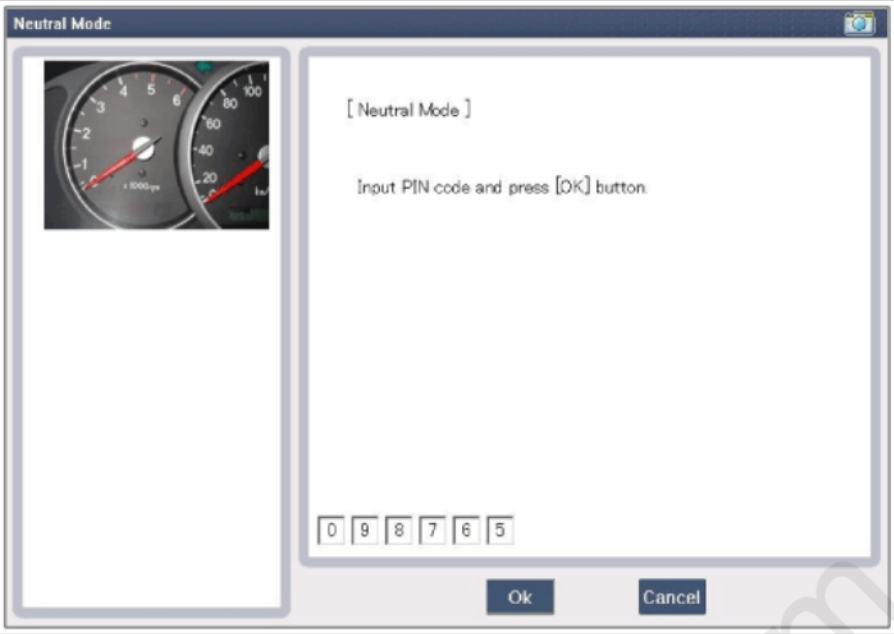
Function / EMS	Engine Running			Learning	
	Learnt Key	Limp home	Twice Ignition	Key	User Password
Neutral	No	No	No	Yes	No





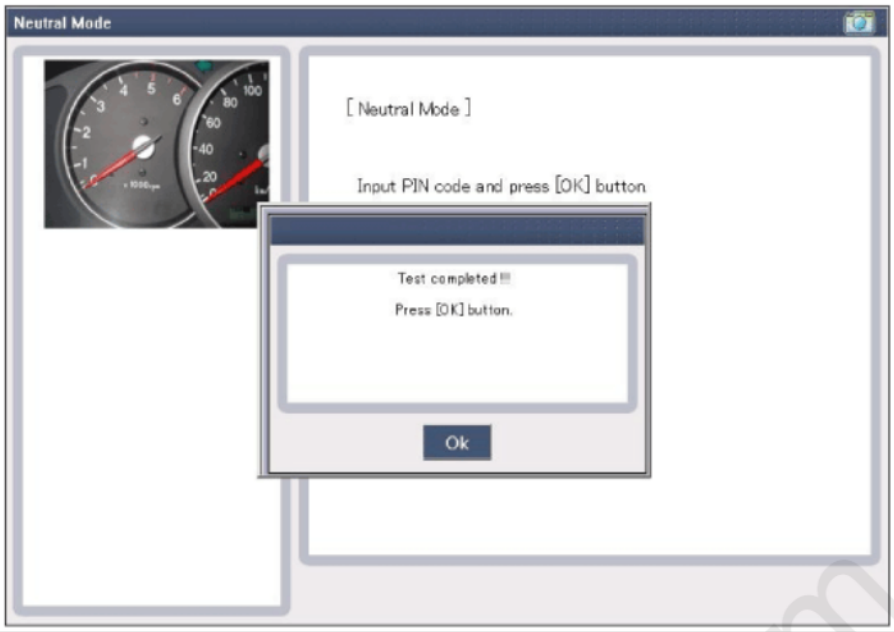


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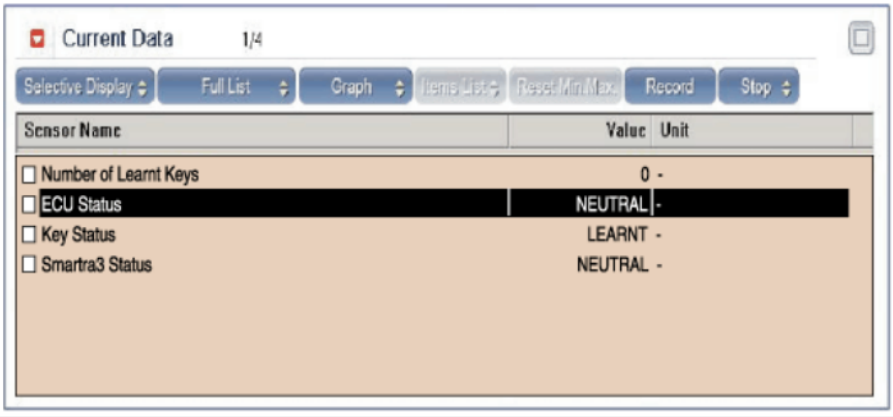




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Neutralizing Of SMARTRA

The EMS can be set to the status "neutral" by tester

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Ignition key (regardless of key status) is inserted and after IGN ON. If receiving the correct vehicle password from GST, SMARTRA can be neutralized. The neutralization of SMARTRA is possible if DPN is same as the value inputted by GST.

In case that the SMARTRA status is neutral, the EMS keeps the lock state. And the start is not possible by "twice ignition".

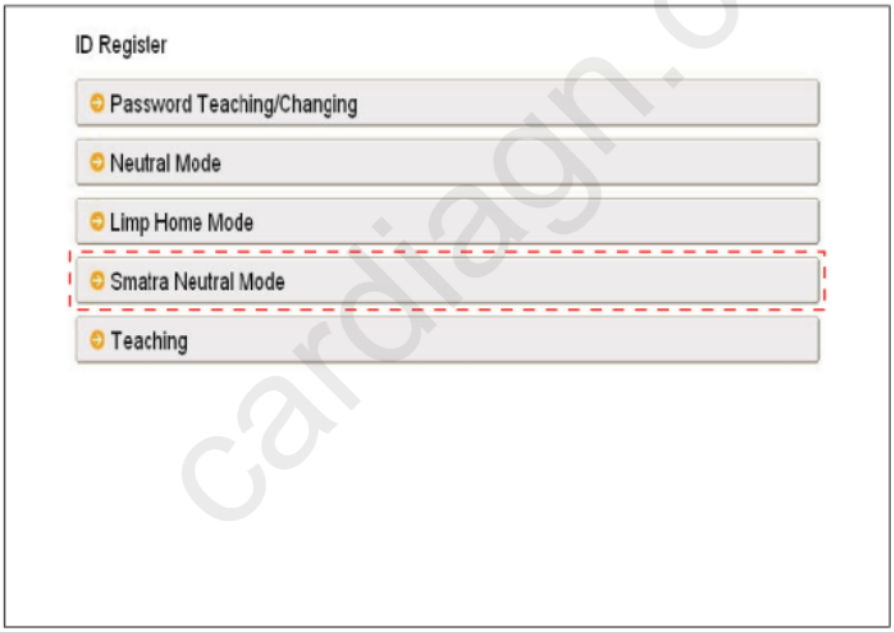
In case of changing the vehicle password, new virgin transponder must be only used. And in case of virgin key, after Learning the key of vehicle password, it can be used.

If wrong vehicle specific data have been sent to SMATRA three times continuously or intermittently, the SMATRA will reject the request to enter neutral mode for one hour. Disconnecting the battery or other manipulation cannot reduce this time. After connecting the battery the timer starts again for one hour.

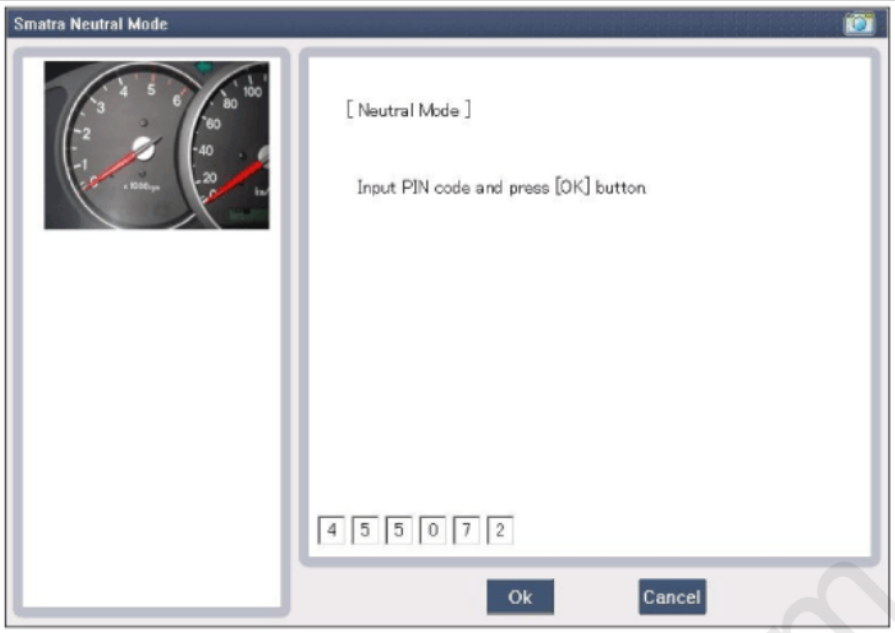
NOTICE

- Neutralizing Setting condition :
  - In case of "SMARTRA status", "Learned"
  - Input correct Pin code by tester
- Neutralizing meaning :
  - Vehicle password(DPN Code) & SEK Code deletion.
  - Permission of New DPN Learning.

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

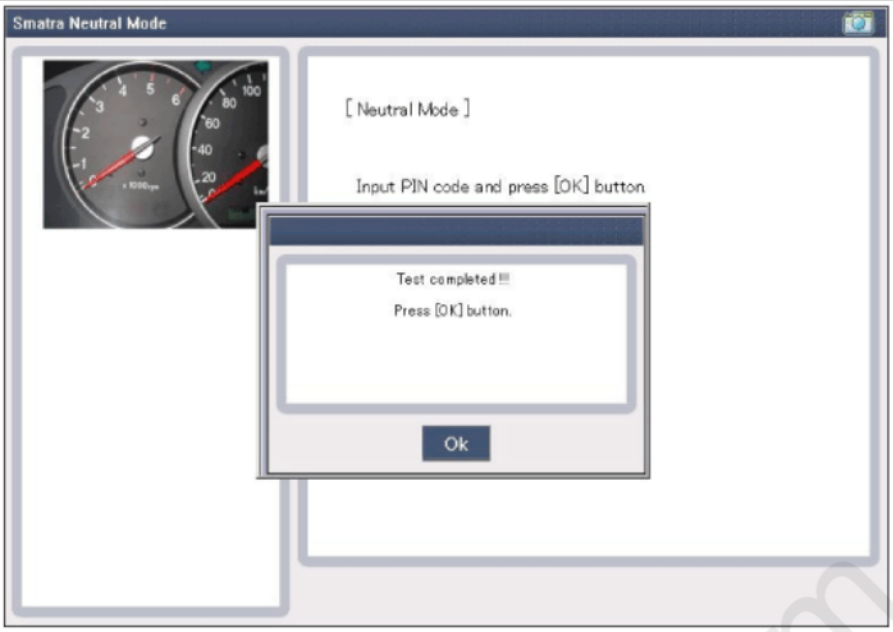


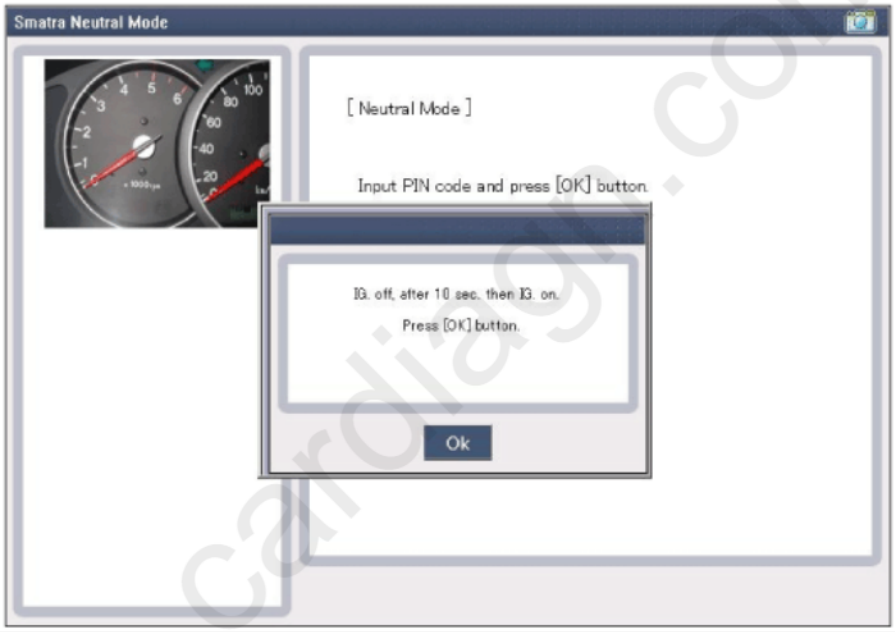
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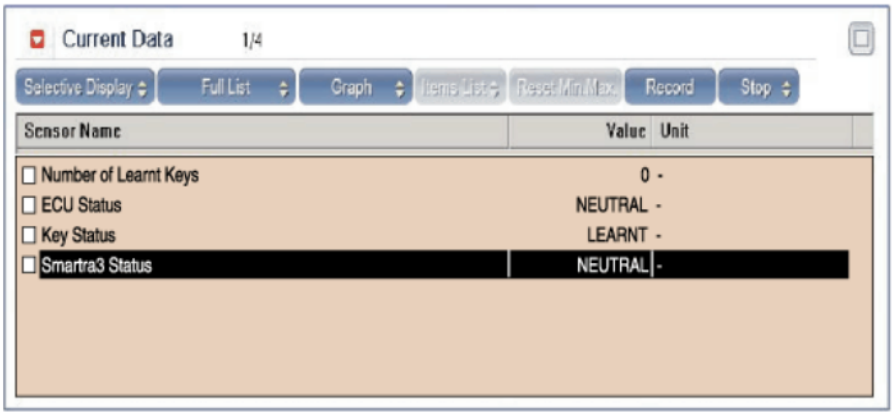




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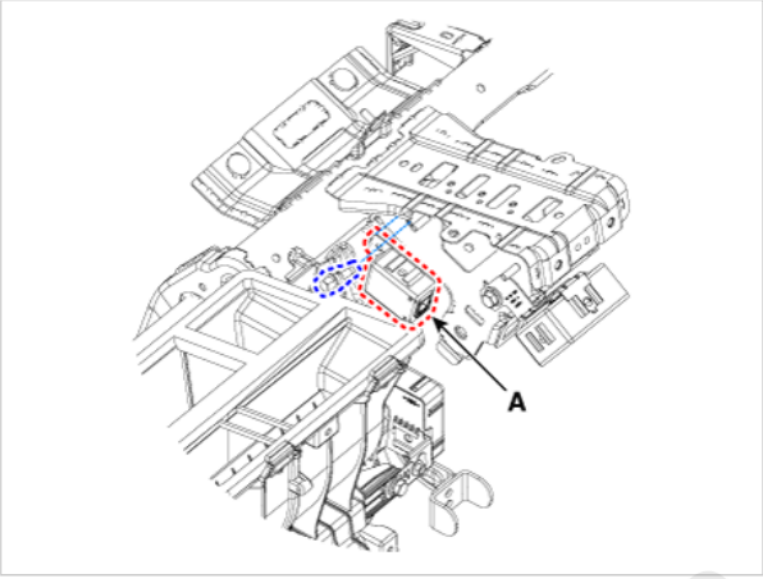




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Removal

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



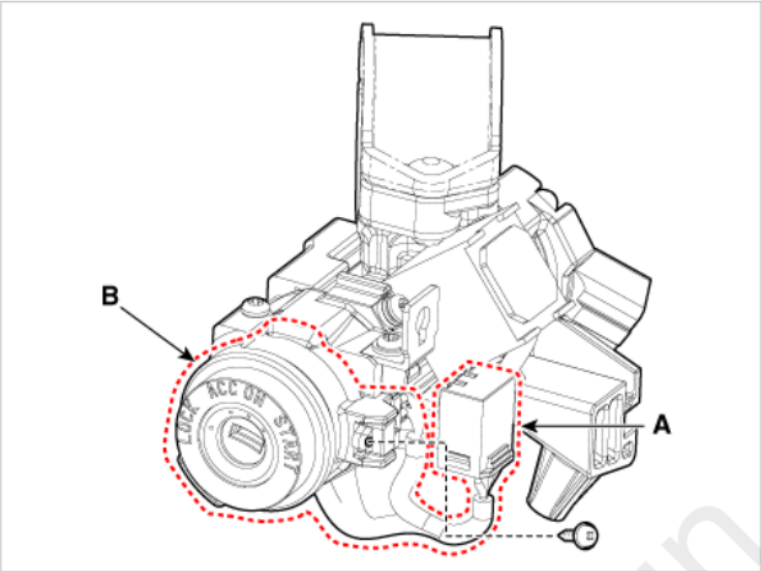
Installation

1. Install the immobilizer control unit after connecting the unit connector.
2. Install the main crash pad assembly.
3. Connect the negative (-) battery terminal.

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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the steering column upper and lower shroud panel.
   (Refer to Body - "Steering Column Shroud Panel")
4. Disconnect the 6P connector (A) of the coil antenna and then remove the antenna coil (B) after loosening a screw.



Installation

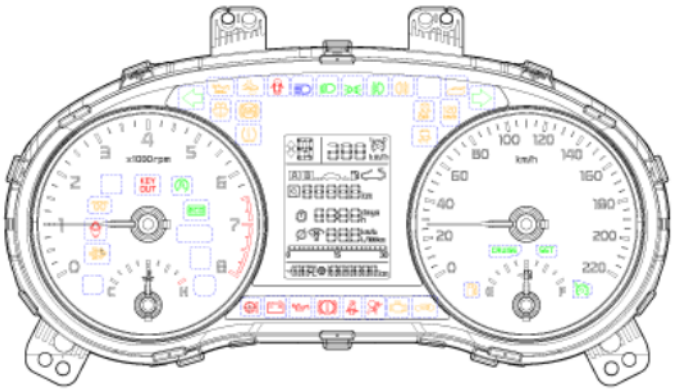
1. Install the coil antenna and connect the 6P connector.
2. Install the steering column upper and lower shroud panel.
3. Install the crash pad lower panel.
4. Connect the negative (-) battery terminal.

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Components

[Standard Type ("3.5")]

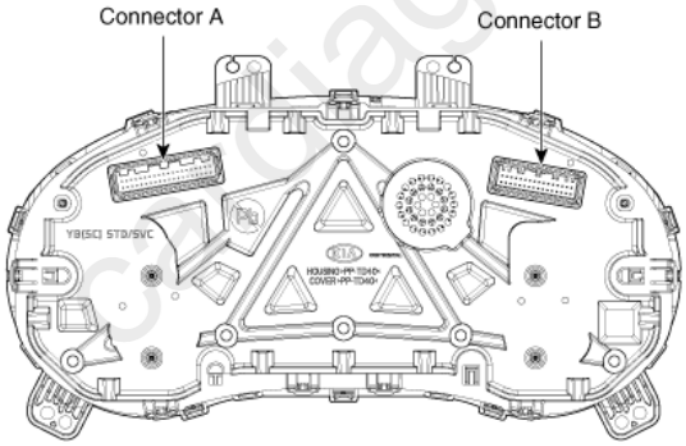
[Front]





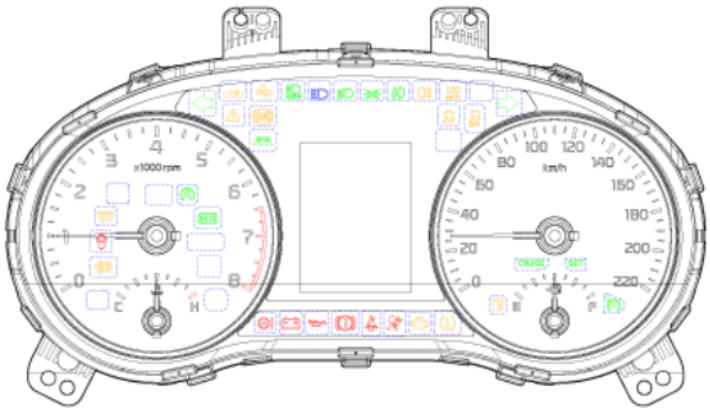
Speedo Meter (MPH)

[Rear]



[Supervision Type ("3.5")]

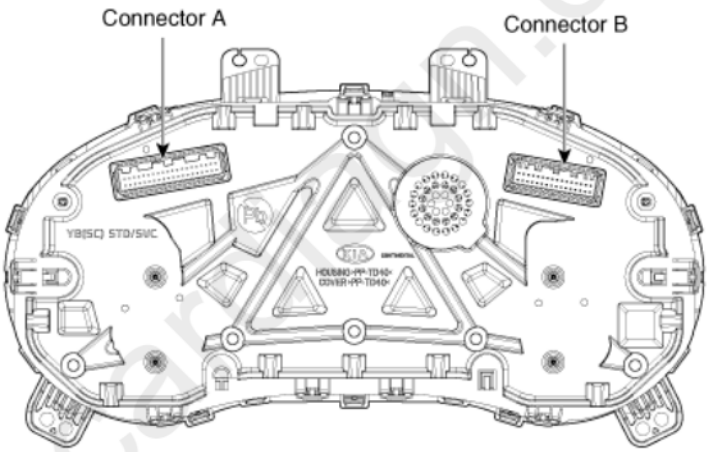
[Front]





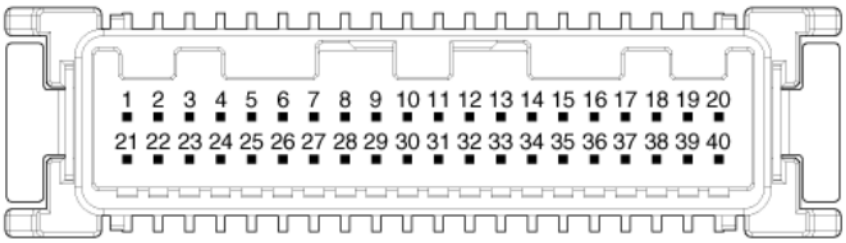
Speedo Meter (MPH)

[Rear]



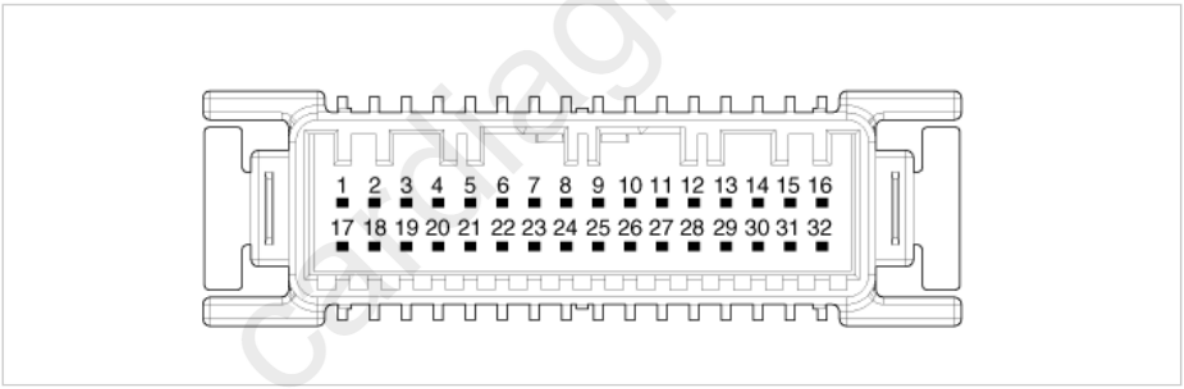
Connector Pin Information

Connector A



No.	Description	No.	Description
1	Ground	21	Trip switch (-)
2	Illumination (-)	22	Trip switch 1 (+)
3	Rheostat switch (Down)_Input	23	Trip switch 2 (+)
4	Rheostat switch (Up)_Input	24	Active ECO switch_Input
5	Dentent	25	Drive mode switch_Input
6	AT ("P" Position)	26	MT ("R" Position)
7	AT ("R" Position)	27	-
8	AT ("N" Position)	28	Washer level low_Input
9	AT ("D" Position)	29	Body-CAN (Low)
10	AT ("S" Position)	30	Body-CAN (High)
11	Immobilizer_Input	31	Alternator_Output
12	Vehicle speed_Output	32	Chassis-CAN (High)
13	Alternator_Input	33	Chassis-CAN (Low)
14	Fuel sender (+)_Input	34	Outside temp_Input
15	Vehicle speed_Input	35	FFV 5V (+)_Output LPI Fuel_Input
16	Fuel sender (-)_Input	36	Heated wheel indicator_Input
17	Water seperator (+)_Input	37	Ground
18	Air bag (+)_Input	38	LDC Battery (+)_Input
19	Oil press switch_Input	39	IGN1
20	Tail lamp_Input	40	Battery (+)

Connector B



No.	Description	No.	Description
1	Turn signal lamp (Right)_Input	17	Parking brake switch (-)_Input
2	Turn signal lamp (Left)_Input	18	Front deicer switch (-)_Input / Heated glass switch (-)_Input
3	Headlamp (High) (+)_Input	19	Driver seat belt switch (-)_Input
4	Headlamp (Low) (+)_Input	20	Assist seat belt switch (-)_Input
5	Front fog lamp (+)_Input	21	Assist seat mat switch (-)_Input
6	Rear fog lamp (+)_Input	22	Sunroof open switch (-)_Input
7	Rear fog switch (-)_Input	23	Ground
8	Door open switch (-)_Input	24	Heated washer nozzle (-)_Output
9	Driver side door open switch (-)_Input	25	Rear defogger relay (-)_Output
10	Trunk open switch (-)_Input	26	Front delcer relay (-)_Output / Heated glass relay (-)_Output
11	Hood open switch (-)_Input	27	Assist seat belt indicator (-)_Output

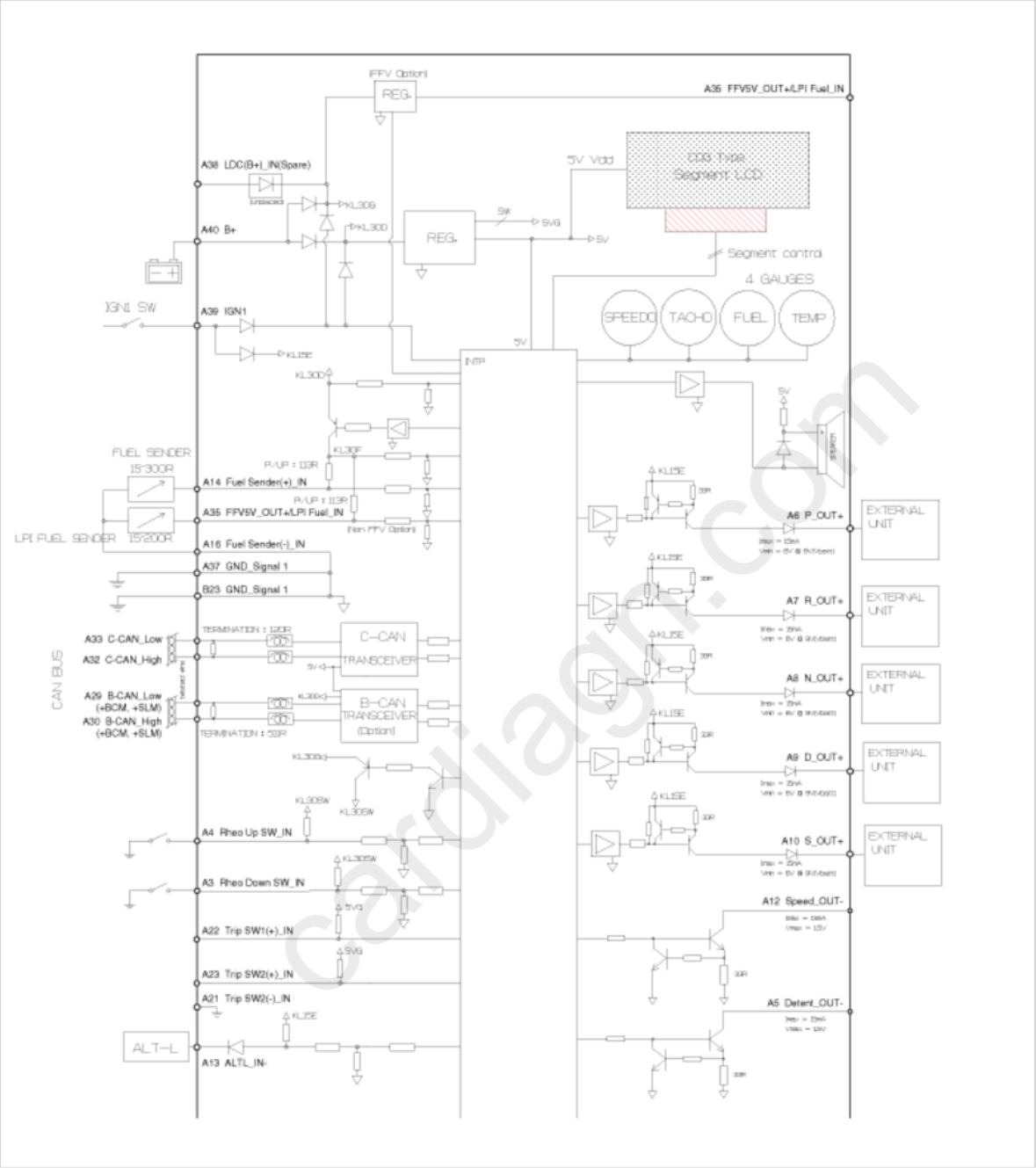
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12	Key in switch (-)_Input	28	Tail lamp relay (-)_Output
13	Tail lamp switch (-)_Input	29	Rear SBR Indicator SYNC(-)_Output
14	Rear defogger switch (-)_Input	30	-
15	Rear SBR buzzer (-)_Input	31	-
16	Brake oil switch (-)_Input	32	-

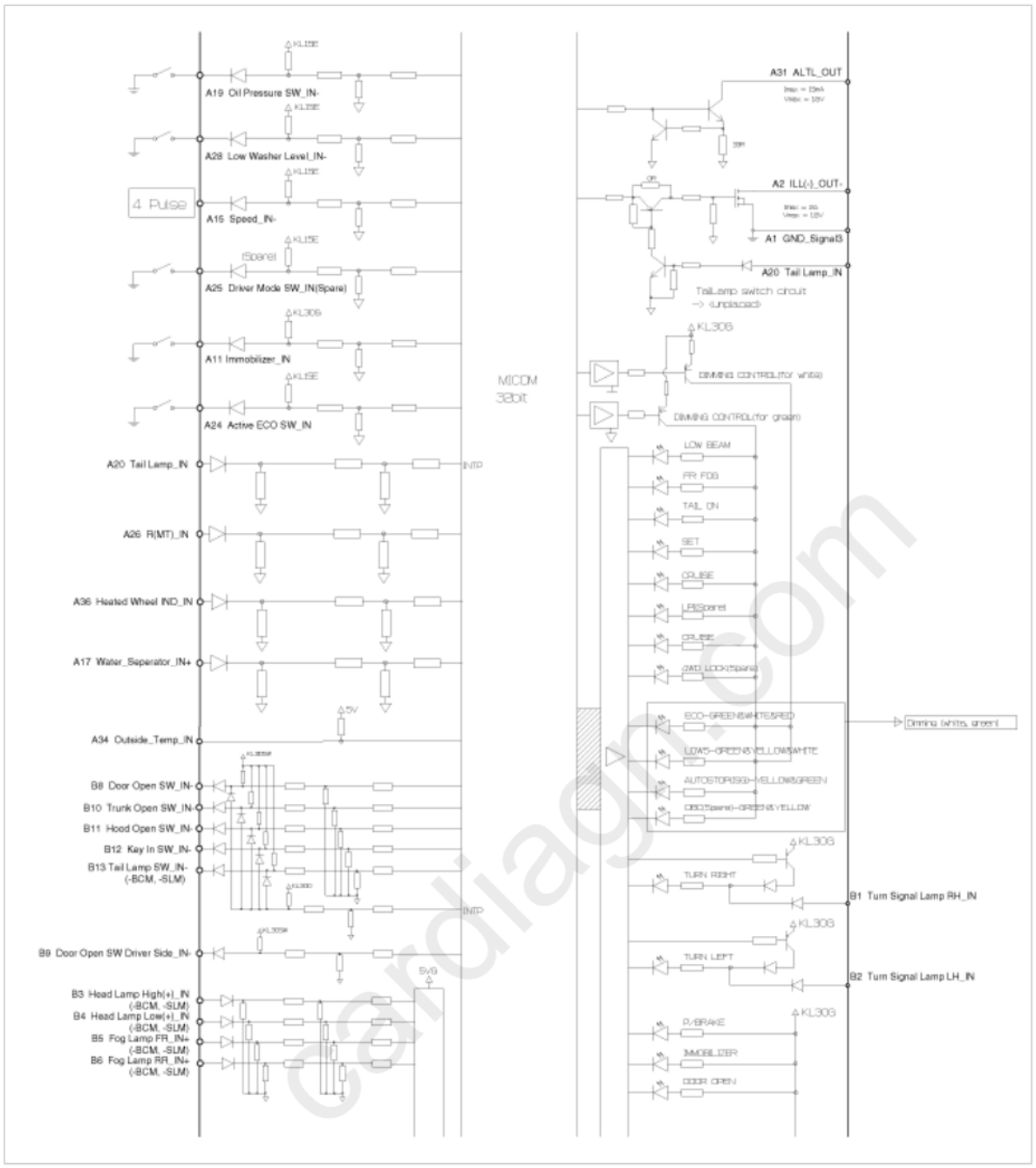
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Circuit Diagram

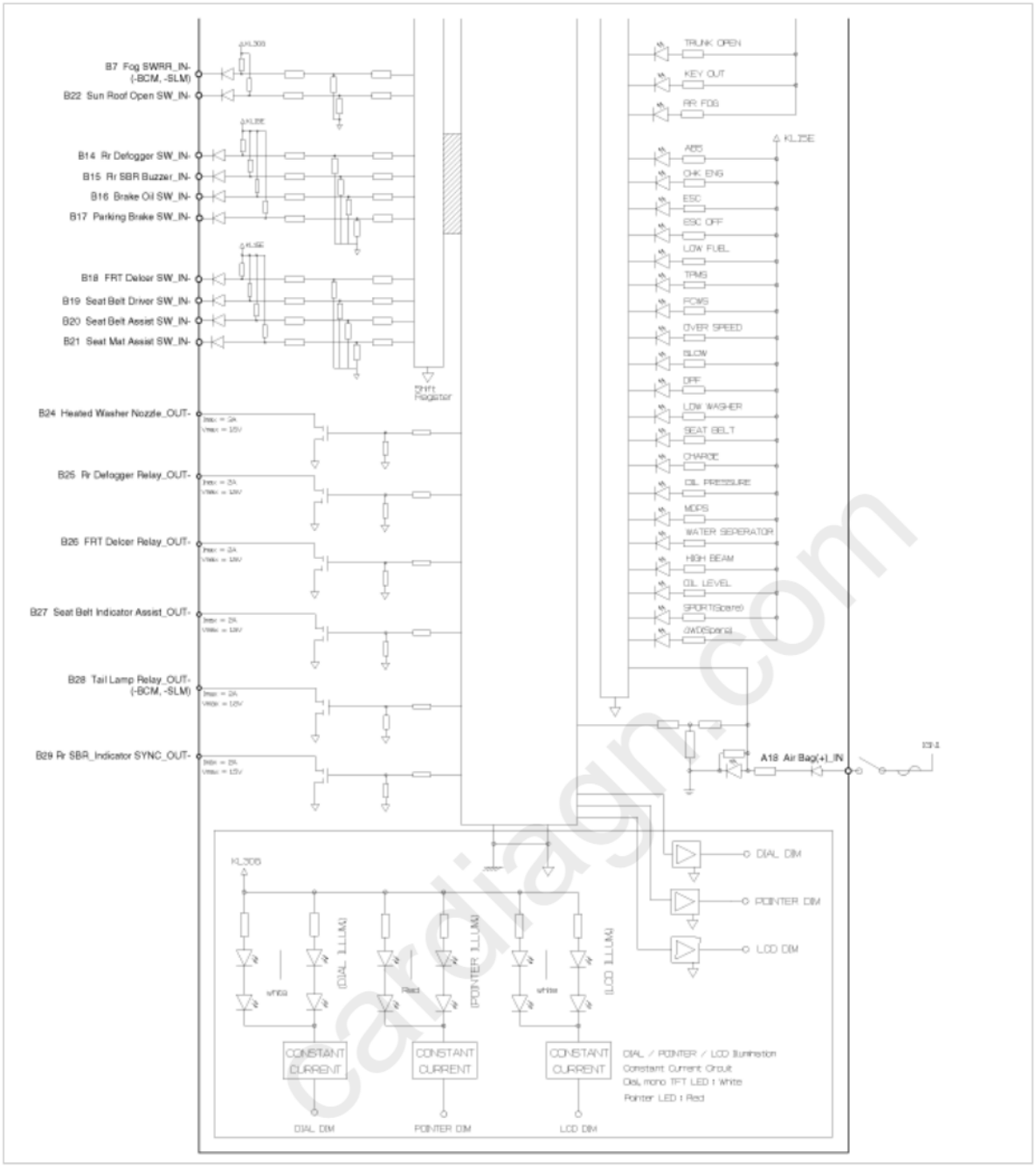
[General Standard]



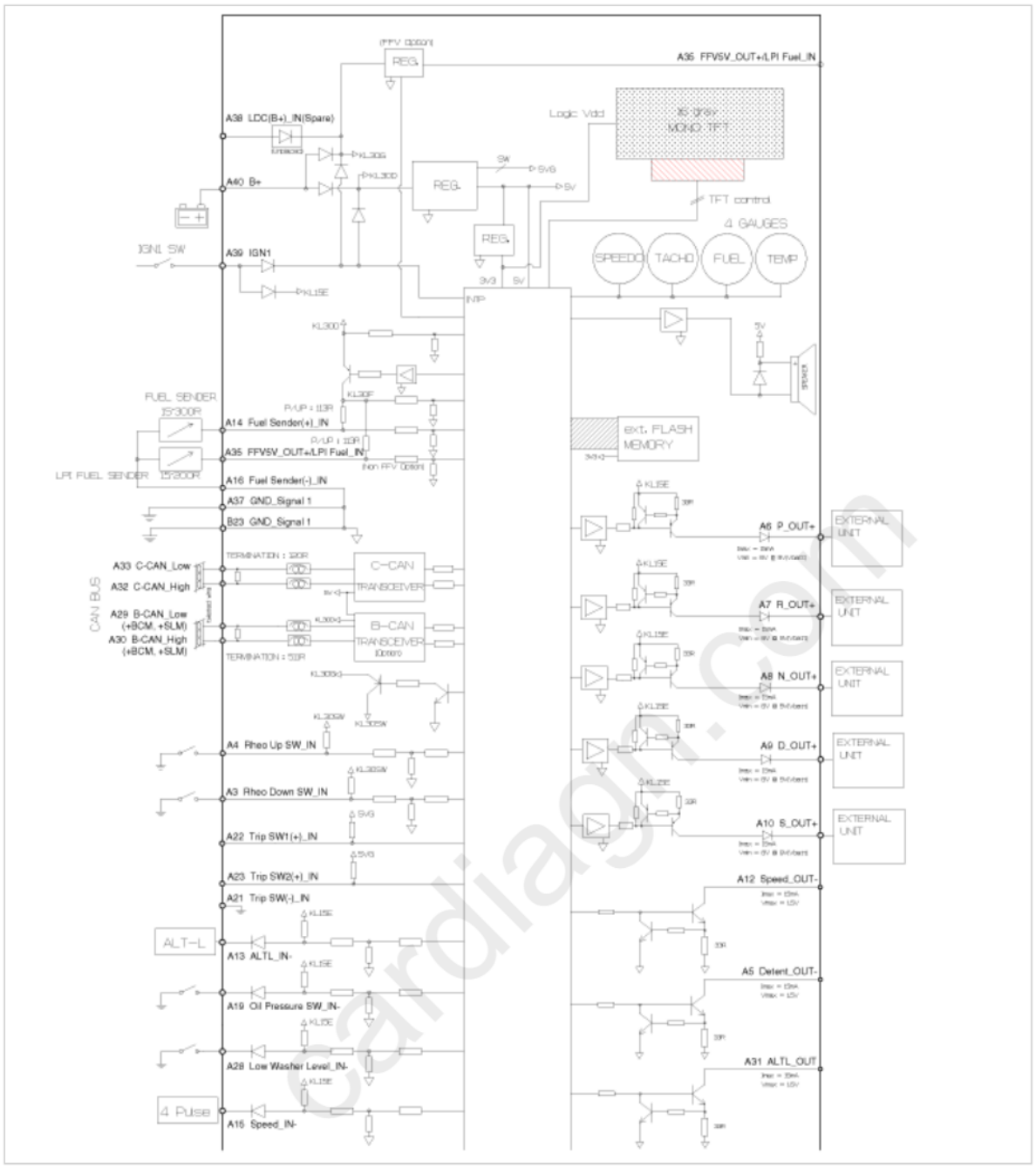
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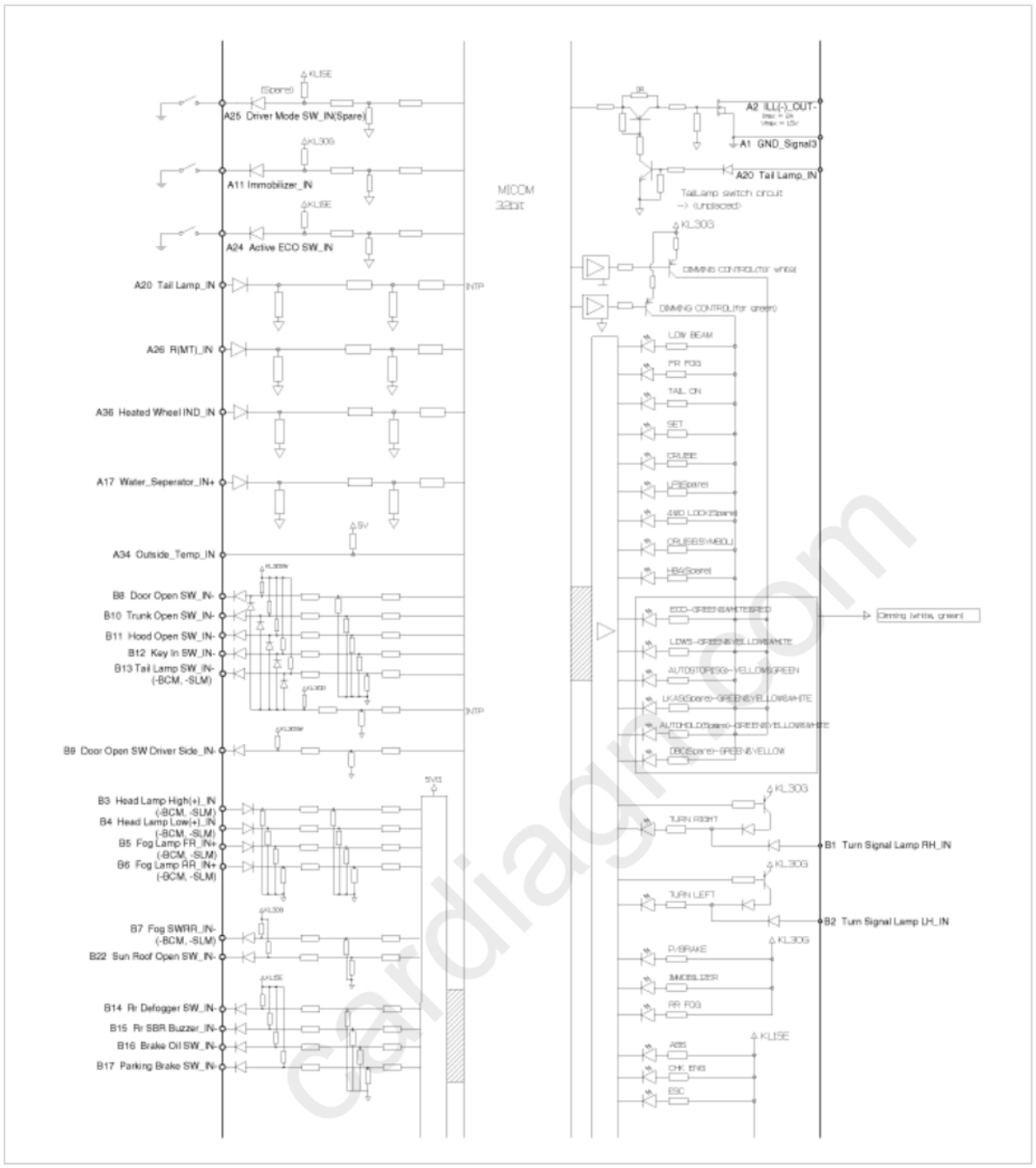
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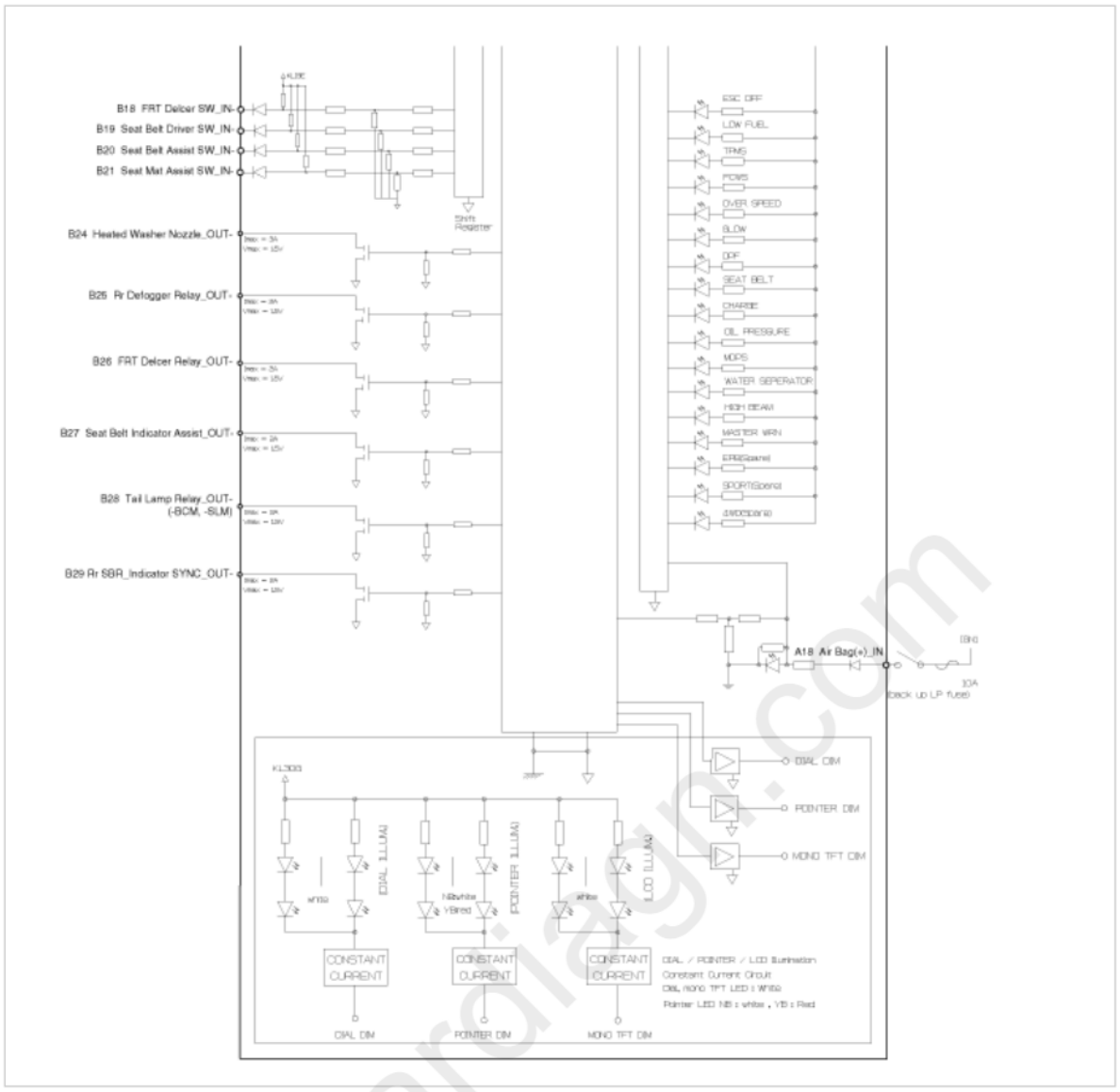
[General Supervision]



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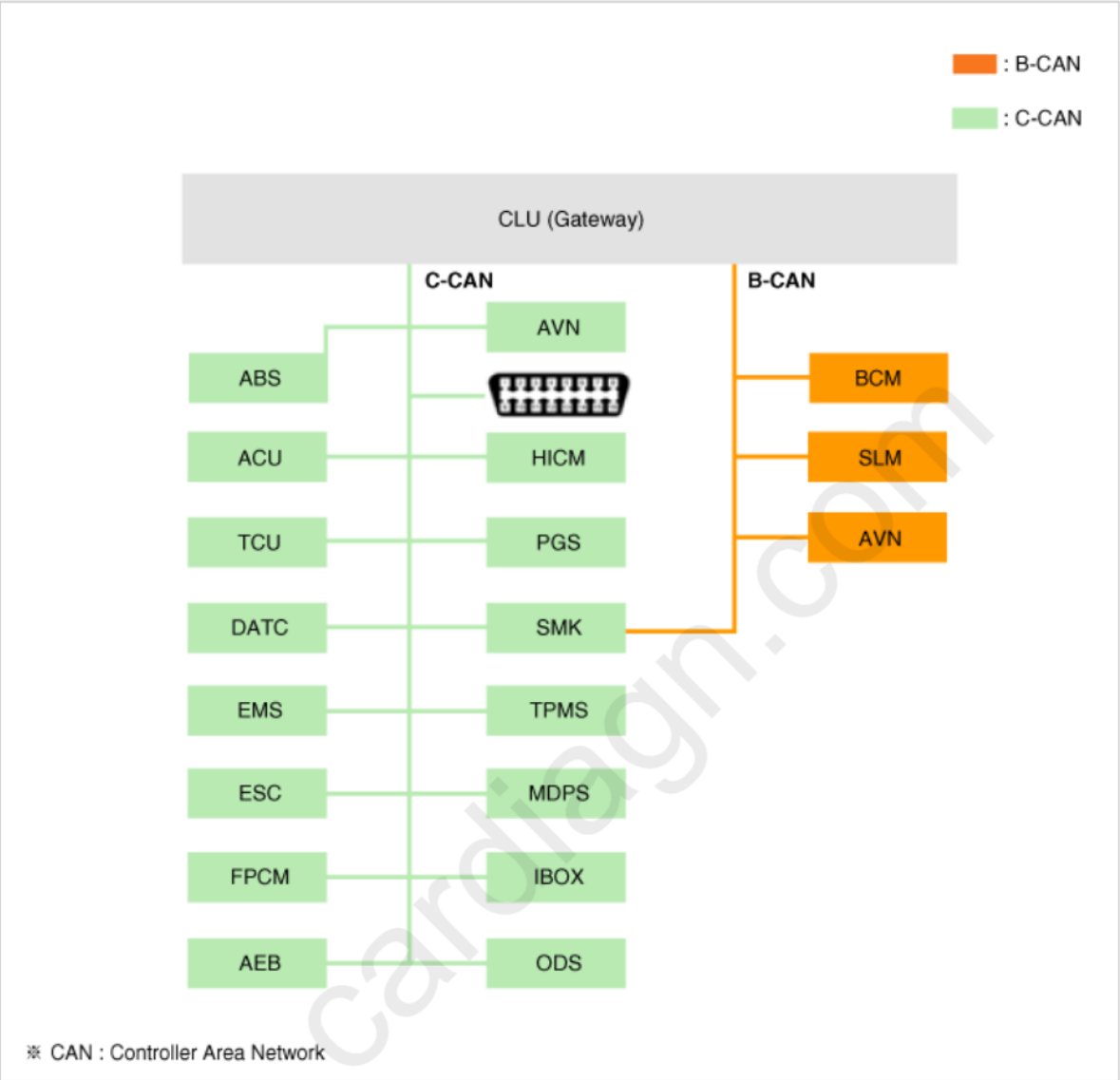
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Description

Communication Network Diagram



※ CAN : Controller Area Network

Abbreviation	Explanation
ACU	Airbag Control Unit
AVN	Head Unit (Audio / AVN)
B_CAN	Body Controller Area Network
BCM	Body Control Module
BSD	Blind Spot Detection
C_CAN	Chassis Controller Area Network
CLU	Cluster Module
ESC	Electronic Stability Program
EMS	Engine Management System
FPCM	Fuel Pump Control Module
LDWS	Lane Departure Warning System
M_CAN	Multimedia Controller Area Network
MDPS	Motor Driven Power Steering

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MFS	Multi-Function Switch
P_CAN	Powertrain Controller Area Network
PGS	Parking Guide System
SAS	Steering Angle Sensor
SMK	Smart Key Unit
TCU	Transmission Control Unit
TPMS	Tire Pressure Monitoring System
VDC	Vehicle Dynamic Control
ABS	Anti-lock Brake System

Cluster Variant Coding

As we have more options (ESC, MDPS etc.) in the car, the dashboard now has more information to display depending on the chosen options.
For this reason, we need to learn which options the vehicle has when replacing the dashboard.
To address this issue, a course of learning based on the option required for the vehicle when replacing the dashboard should be carried out.
This is called Variant Coding.

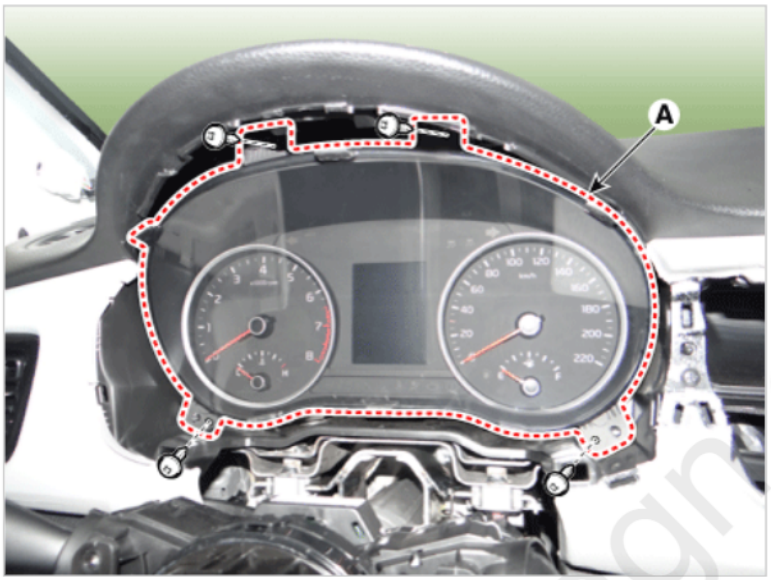
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Removal

⚠ CAUTION

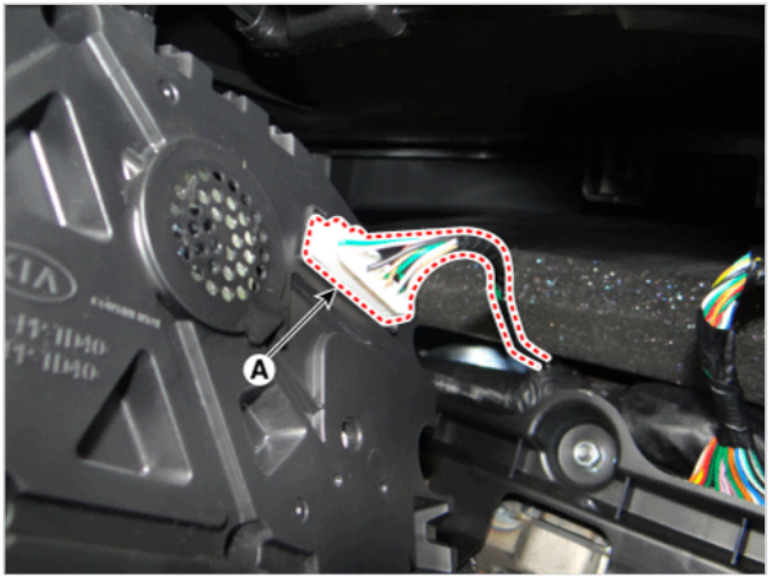
- Put on gloves to protect your hands.
- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.

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



4. Remover the instrument cluster after disconnecting the cluster connectors (A).





Installation

1. Install the cluster after connect the cluster connectors.
2. Install the cluster fascia panel.
3. Connect the negative (-) battery terminal.

Information
Perform variant coding after exchanging the instrument cluster.

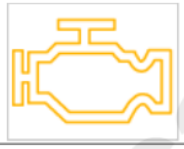
Inspection

1. Check point (Warning indicator)

NOTICE
• Fault conditions and normal operating conditions, refer to the owner"s manual.

NO	Ref Symbol	Name	Color	Signal Input	Signal Control	Check Point
1		Turnsignal (Left)	Green	CAN	BCM (Gateway)	1) Multifunction Switch 2) BCM 3) CAN Failure
2		Turnsignal (Right)	Green	CAN	BCM (Gateway)	1) Multifunction Switch 2) BCM 3) CAN Failure
3		Tail Lamp	Green	CAN	BCM (Gateway)	1) Multifunction Switch 2) BCM 3) CAN Failure
4		Front Fog Lamp	Green	CAN	BCM (Gateway)	1) Multifunction Switch 2) BCM 3) CAN Failure
5		Low Beam	Green	CAN	BCM (Gateway)	1) Multifunction Switch 2) BCM 3) CAN Failure

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6		High Beam	Blue	CAN	BCM (Gateway)	1) Multifunction Switch 2) BCM 3) CAN Failure
7		Master Symbol	Yellow	CAN	BSD	1) BSD System 2) CAN Failure
					TPMS	1) TPMS System 2) CAN Failure
					BCM	1) External lamps 2) BCM 3) CAN Failure
					Fuel Sender	1) Fuel Sender Failure 2) Wiring Failure
				Hard-wired	Low Washer	1) Whasher fluid lever sensor 2) Wiring Failure
					Digital Input	Reminders when service checks
8		Battery Charge	Red	CAN	ECM	1) Charging System 2) CAN Failure
9		Oil Pressure	Red	Hard-wired	ECM	1) ECM System 2) Hard-wired 3) CAN Failure
10		Check Engine	Yellow	CAN	ECM	1) ECM System 2) CAN Failure
11		Immobilizer	Yellow	CAN	BCM (Gateway)	1) SMK System 2) BCM 3) CAN Failure 4) Hard-wired
12		Parking Brake Brake Fluid EBD EPB	Red	CAN	BCM (Gateway) EBD EPB ABS TCS	1) BCM 2) ABS System 3) EPB System 4) CAN Failure 5) Parking Brake Switch 6) Brake Oil Lever Sensor
13		ABS	Yellow	CAN	ABS	1) ABS System 2) CAN Failure
14		ESC	Yellow	CAN	TCS	1) ABS System 2) CAN Failure

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15		ESC Off	Yellow	CAN	TCS	1) ABS System 2) CAN Failure
16		Auto Hold	White Yellow Green	CAN	TCS	1) TCS System 2) CAN Failure
17		Seat Belt	Red	CAN	BCM (Gateway)	1) BCM 2) CAN Failure
18		Airbag	Red	CAN	SRSCM	1) SRSCM System 2) CAN Failure
19		EPS (MDPS)	Red	CAN	MDPS	1) MDPS Unit System 2) MDPS Motor 3) CAN Failure
20		TPMS	Yellow	CAN	TPMS	1) TPMS System 2) TPMS Sensor 3) CAN Failure
21		Fuel Warning	Yellow	Direct (Micom)	Fuel Segment	1) Fuel Sender Failure 2) Wiring Failure
22		Door Open	Red	CAN	BCM (Gateway)	1) BCM 2) CAN Failure 3) Door Sensor/switch
23		ECO	Green	Hard-wired	ECO mode	1) ECM System 2) CAN Failure
24		SPORT	Yellow	Hard-wired	SPORT mode	1) ECM System 2) CAN Failure
25		CRUISE	Green	CAN	ECM	1) ECM System 2) CAN Failure

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26		SET	Green	CAN	ECM	1) ECM System 2) CAN Failure
27		Cooling water temperature	Red	CAN	EMS	1. EMS System 2. CAN Failure
28	 	AUTO STOP	Green Yellow	CAN	ECM	1) ECM 2) CAN Failure

2. Check point (Gauge)

NO	Name	Signal Input	Signal Control (Unit/Sensor)	Check Point
1	Speedometer	C-CAN	ABS/ESC	1. ABS System 2. CAN Line failure
2	Tachometer	C-CAN	ECM	1. ECM 2. CAN Line failure
3	Cooling water temperature	C-CAN	ECM	1. ECM 2. CAN Line failure
4	Fuel	Hardwire	Fuel Sender	1. Fuel sender failure 2. Wiring failure

Diagnosis with KDS

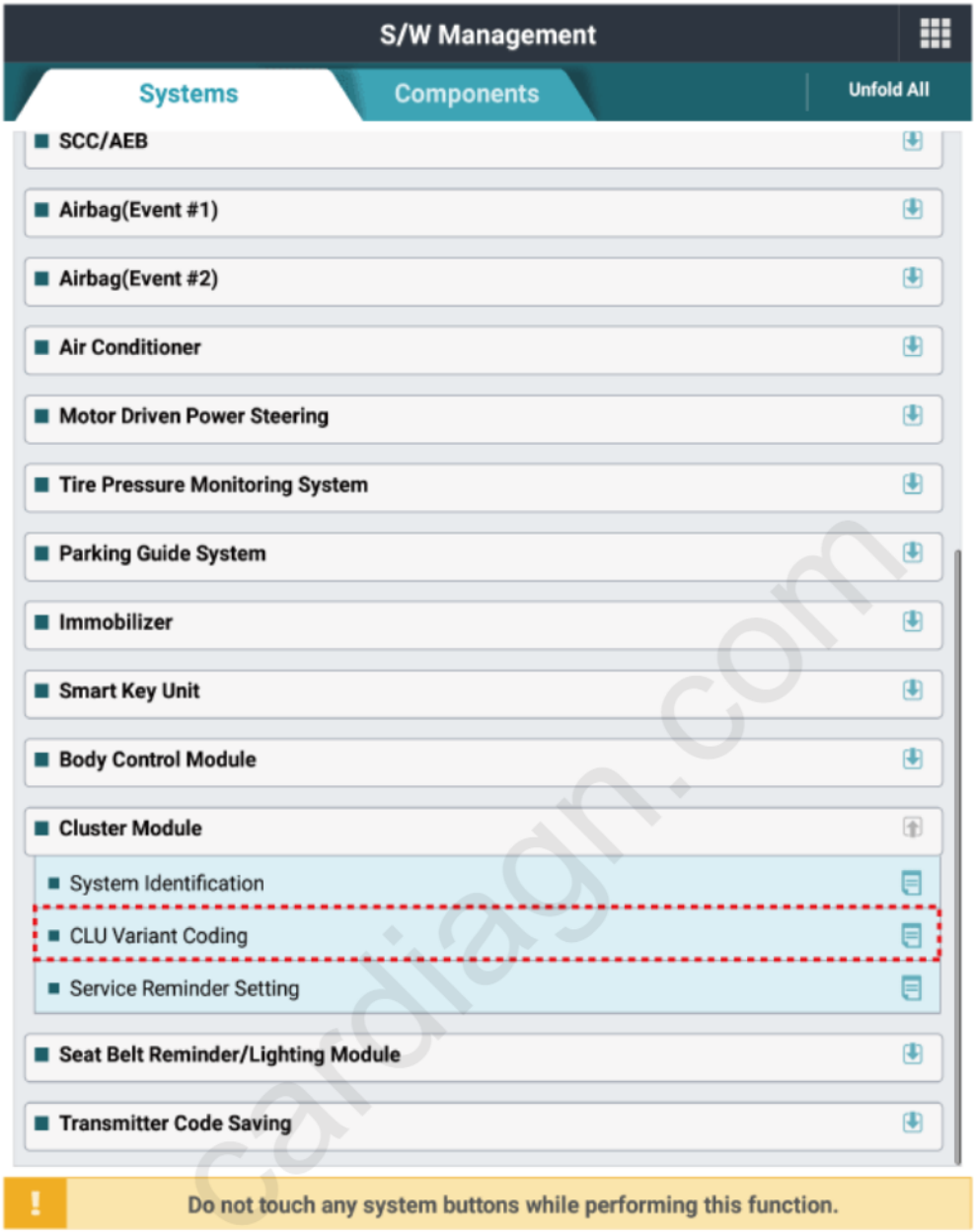
1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS). The diagnostic system (KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Cluster Module (CLU)" to be checked in order to check the vehicle with the tester
3. Select the "Current Data" menu to search the current state of the input/output data.
4. To forcibly actuate the input value of the module to be checked, select option "Actuation Test"

CLU Variant Coding

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

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

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S/W Management

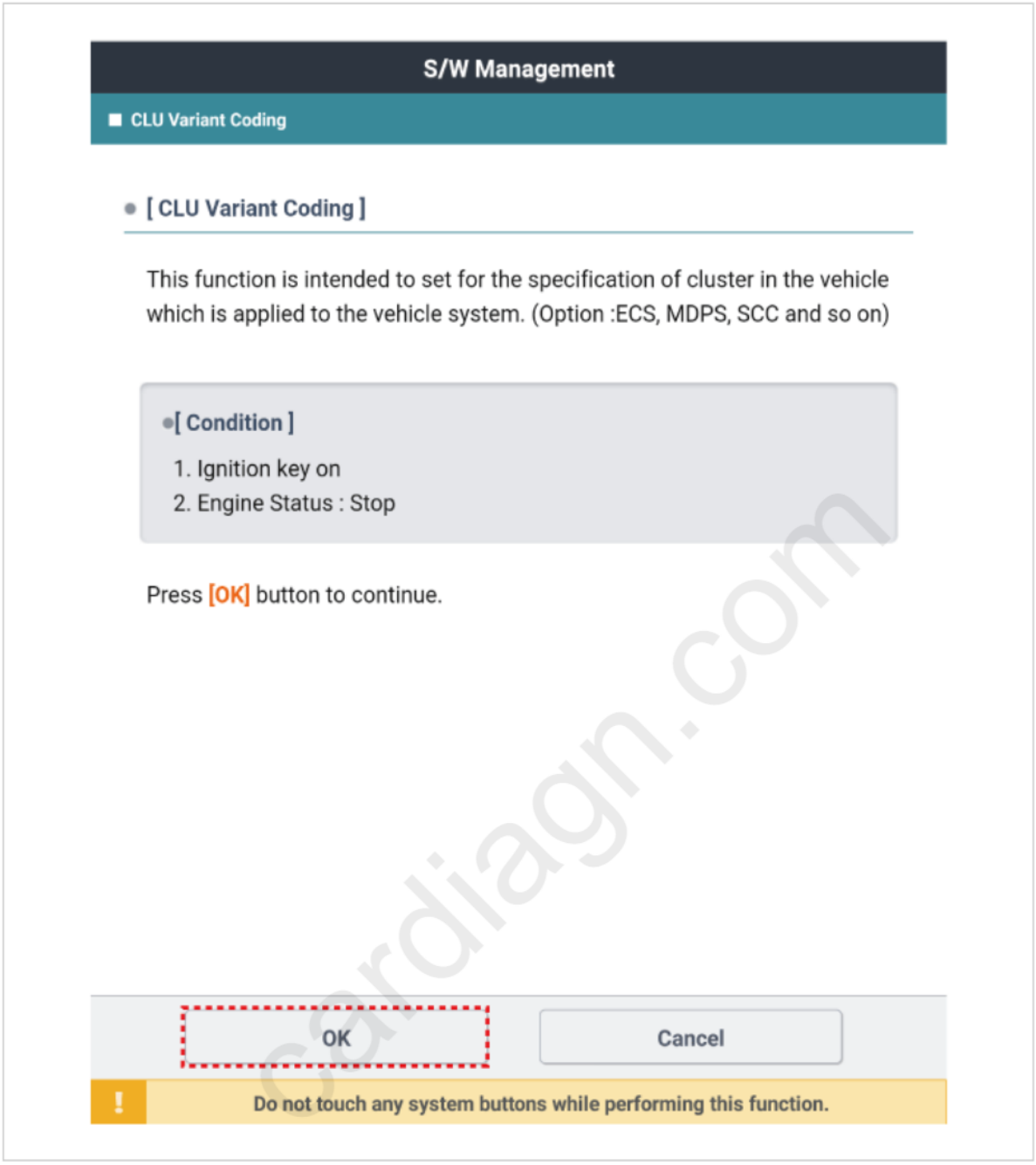
• **CLU Variant Coding**

Purpose	To set the specification of cluster in the vehicle which is applied to the vehicle CAN communication controller(ESP, MDPS, TPMS, EPB, SCC and so on).
Enable Condition	1.Engine Off 2.Ignition Switch On
Concerned Component	Cluster
Concerned DTC	B100051, B100155, B100255, B100455, B100855, B101055, B102055, B104055, B108055
Fail Safe	Set DTC, Warning message is displayed on instrument cluster
Etc	Input CLU coding code from web site.

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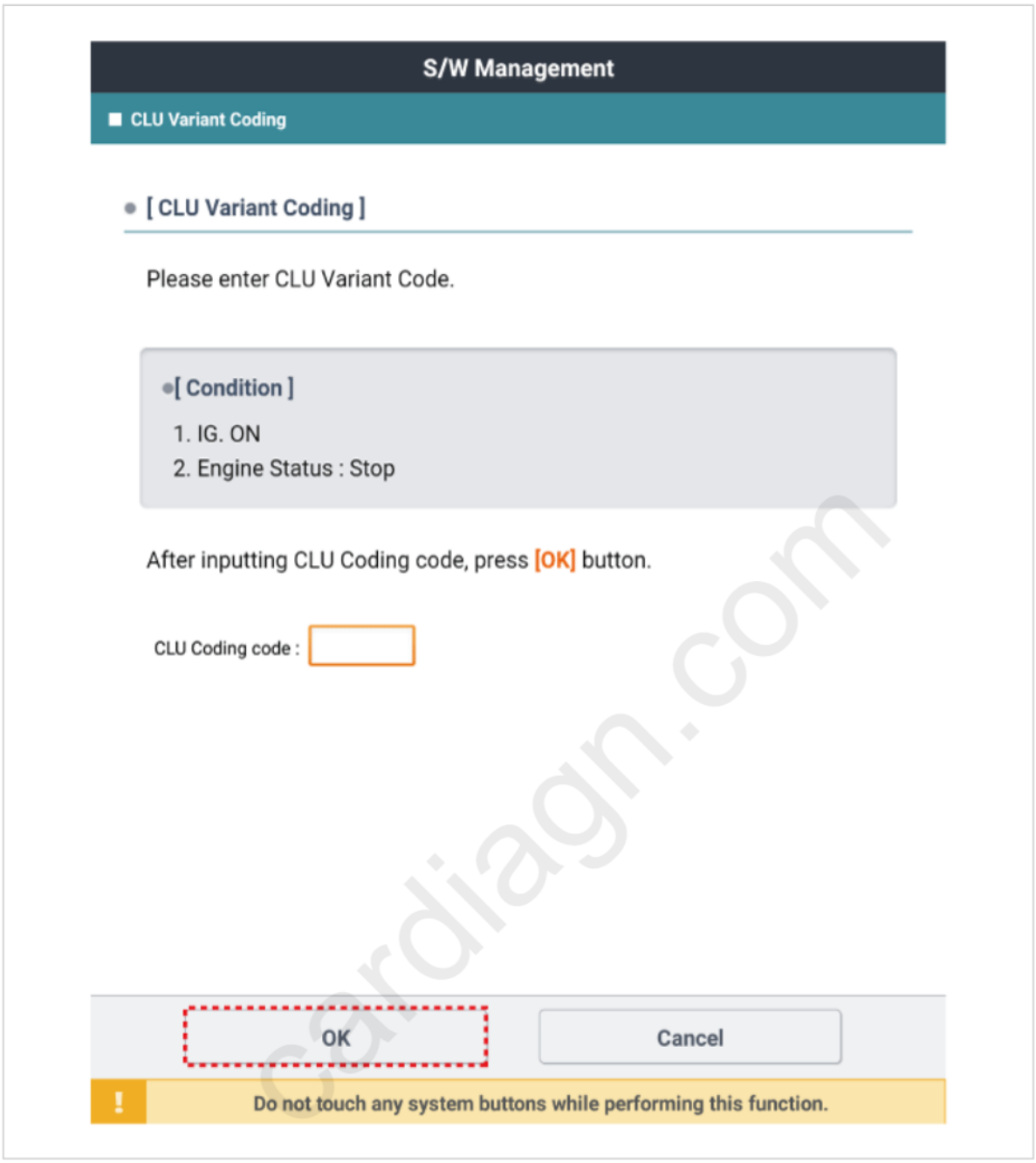
OK

! Do not touch any system buttons while performing this function.

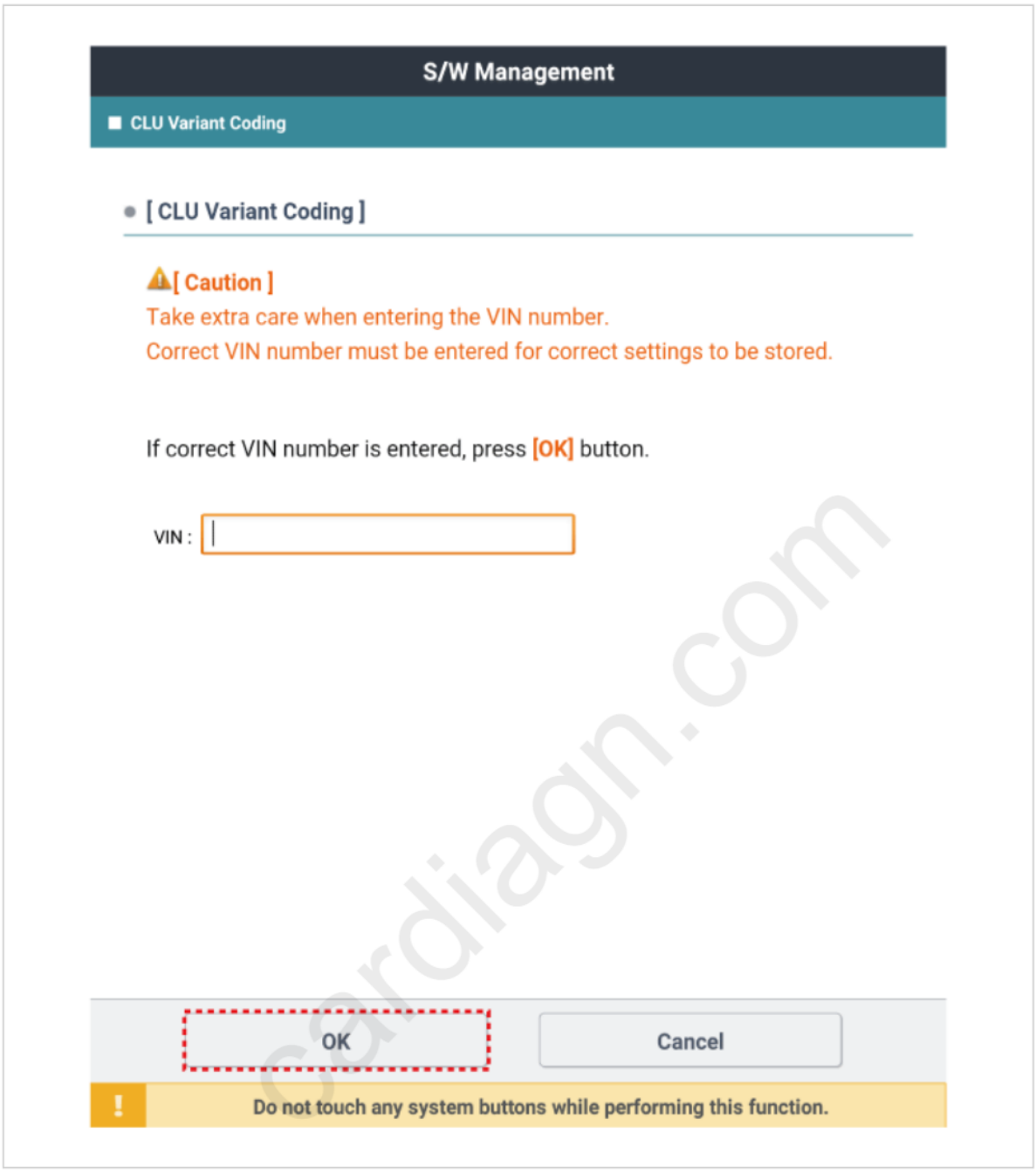


4. If the trouble codes occurred when performing variant coding, try the CLU variant coding again after checking the installation status of CLU system.

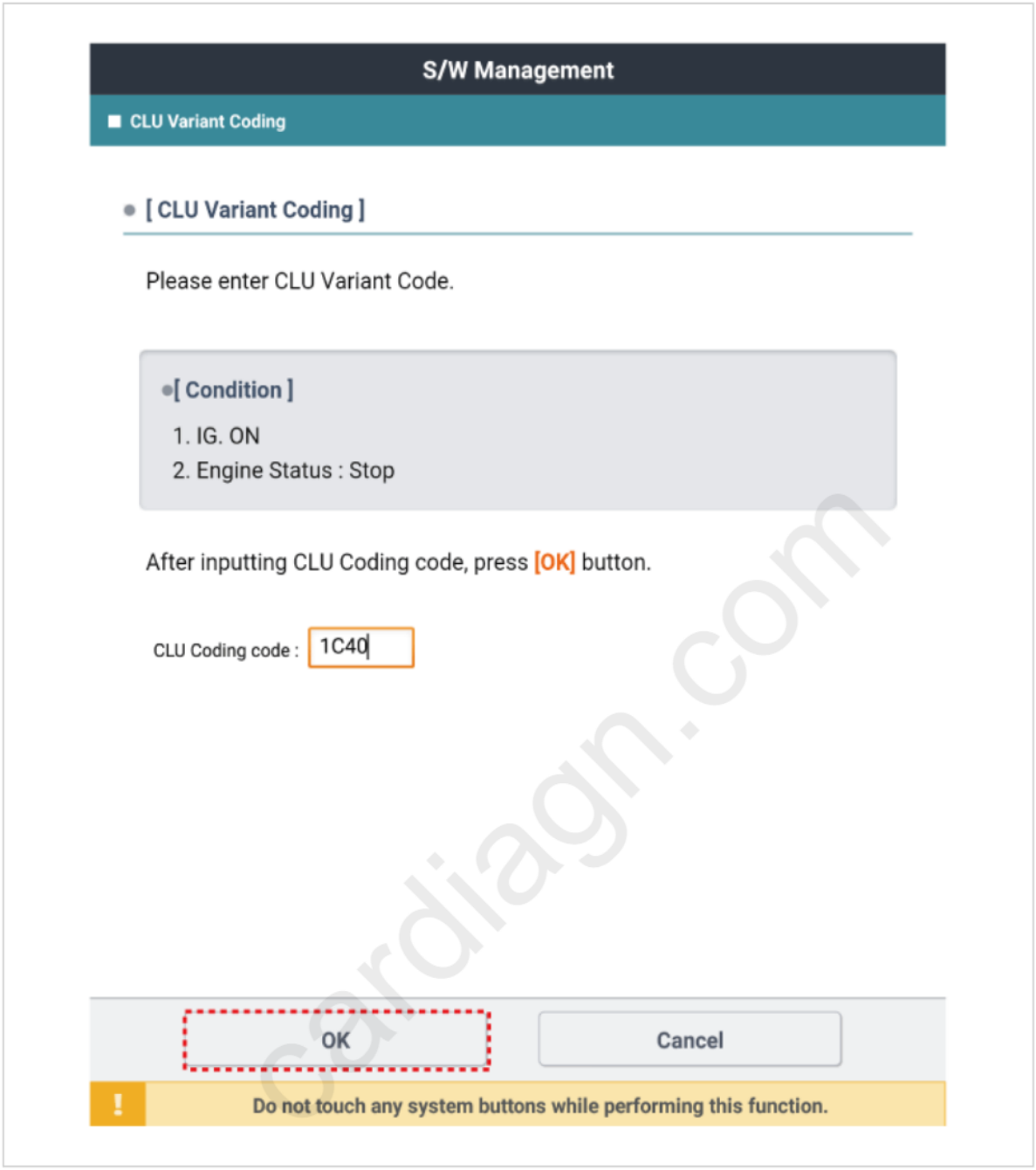
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Troubleshooting

Error Item	Failure symptom	Inspection items	Detailed inspections	Relevant Parts/ Components
Screen display	LCD screen does not turn on	1) Connector attachments 2) Components	1) Check the connector attachments 2) Check B+, IGN and GND wiring 3) Check the components	Connectors, wiring, fuses, dashboard
Warning light	Airbag warning lamp malfunction	1) Connector attachments 2) C-CAN 3) Components	1) Check airbag + signal (connectors) 2) Check C-CAN (ACU4) signal 3) Check the FPC attachment inside the dashboard	ACU Connectors, wiring, fuses, dashboard
Mode conversion	Integrated driving mode malfunction	1) Connector attachments 2) Switch 3) Components	1) Check the switch input (connector) 2) Check the switch signal input (disconnection or shorting) 3) Check conversion with dashboard component	Switch connector, wiring dashboard
Illumination	Interior light brightness cannot be controlled.	1) Connector attachments 2) Switch 3) Components	1) Check if the light switch"s input signal reaches the connector 2) Check ILL- and DETENT signals 3) Check the TAIL+ signal input	Switch connector, wiring dashboard
Warning Sound	No dashboard alarm	1) Connector attachments 2) Car speakers 3) Components	1) Check the speaker output connector 2) Check the car speakers	Speaker connectors, wiring dashboard
Fuel indicator	Faulty fuel gauge indication	1) Connector attachments 2) Fuel sender 3) Components	1) Check fuel input and GND connectors (open, short or input resistance values) 2) Check fuel sender	Fuel sender connector, wiring dashboard

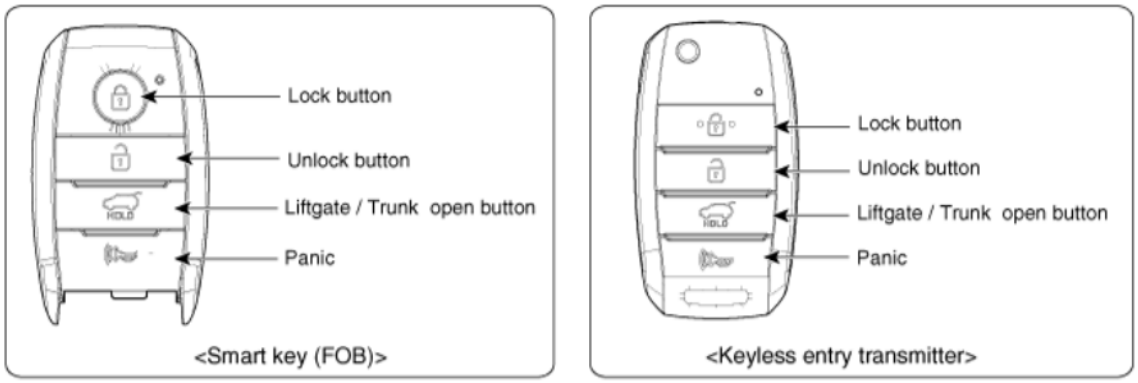
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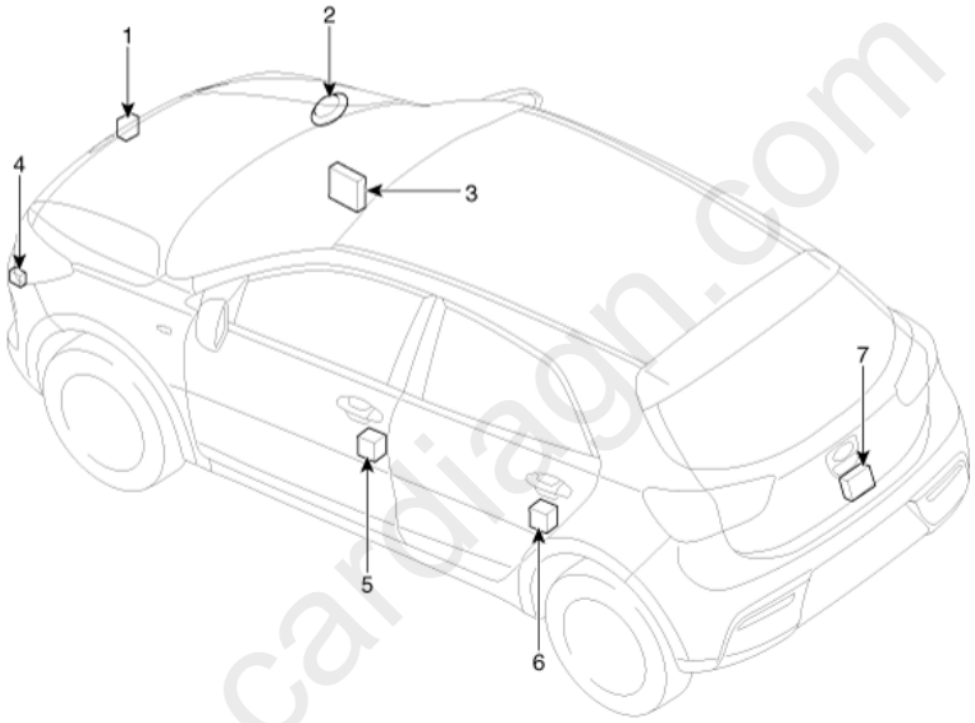
Specification

Item	Specification
Power source	3 V
Operating temperature	-22 - 176°F (-30 - 80°C)
RF Modulation	FSK
LF Modulation	ASK
RF frequency	433.92 MHz
Button number	4
Function	Door lock
	Door unlock
	Liftgate / Trunk unlock
	Panic

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Component Location





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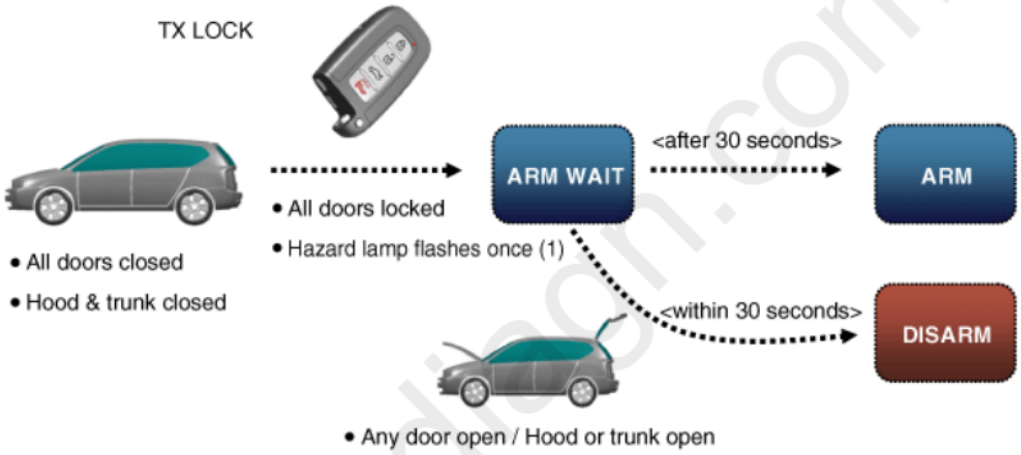
1. Hood switch
2. Burglar horn
3. Body control module (BCM)
4. Door lock / unlock buzzer
5. Front door actuator & switch
6. Rear door actuator & switch
7. Liftgate / Trunk actuator & switch

Description

Burglar Alarm State [B/A State]

B/A State	Description
DISARM	1) This is the state when "ARM" mode is off. 2) If all doors or hood or tailgate are opened, there is no alarm sound. 3) Security indicator keeps blinking in IGN OFF while it lights out in ACC ON.
ARMWAIT	1) If the BCM receives locking signals from remote control or Passive lock (specification of Smart Key) or driver's seat door key lock with the conditions for "ARM WAIT" satisfied, the BCM waits for 30 seconds after outputting "All Door Lock" signal before entering "ARM WAIT" mode. 2) For 30 seconds of "ARM WAIT" mode, there is no alarm sound and "ARM" mode turns off even if a burglary occurs. 3) Under any conditions, it is impossible to directly enter "ARM" mode without passing through "ARM WAIT" mode. 4) Security indicator remains on for 30 seconds of "ARM WAIT" mode.

[ARM WAIT Procedure]

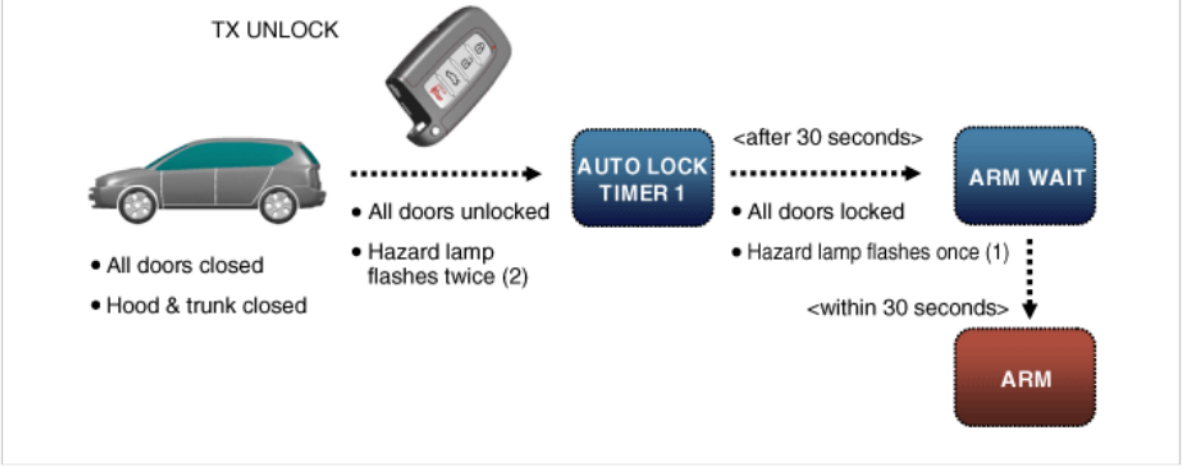


※ Remark: For a vehicle equipped with Smart Key system, the same process is applied to Passive door lock function.

B/A State	Description
AUTO LOCK TIMER 1	1) This is a similar function to RELOCK (automatic locking system after 30 seconds). 2) If UNLOCK button in remote control is pressed with "ARM WAIT" conditions satisfied, or in "ARM" mode, all doors are unlocked and then timer set for 30 seconds starts running. 3) After the 30 seconds the BCM automatically outputs all door lock signal and enters "ARM WAIT" mode. 4) After AUTO LOCK TIMER 1 (30 seconds) runs out, the BCM automatically enters "ARM" mode via "ARM WAIT" mode (30 seconds). 5) In case that the driver presses UNLOCK button by mistake, this safety function lets the vehicle enter "ARM" mode after 60 seconds. 6) Security indicator keeps blinking throughout AUTO LOCK TIMER1 process.

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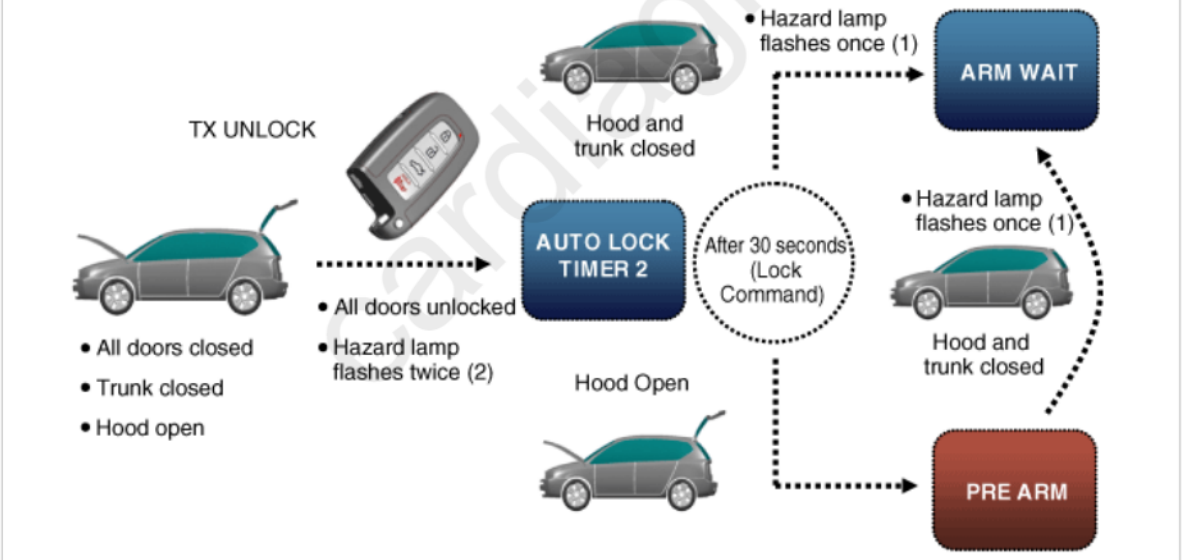
[AUTO LOCK TIMER 1 Procedure]



※ Remark: For a vehicle equipped with Smart Key system, the same process is applied to Passive door lock function.

B/A State	Description
AUTO LOCK TIMER 2	1) This shares the same purpose with AUTO LOCK TIMER 1 but operation conditions are different. 2) This function operates if UNLOCK button in the remote control is pressed when all doors are closed except hood or tailgate. After 30 seconds, the vehicle automatically enters door lock mode. 3) But after the 30 seconds, it is impossible to move to "ARM WAIT" mode because hood or tailgate is open ("PRE ARM" mode is maintained). 4) As soon as hood or tailgate is closed, the vehicle automatically moves to "ARM" mode via "ARM WAIT". 5) During AUTO LOCK TIMER 2, security indicator keeps blinking.

[AUTO LOCK TIMER 2 Procedure]

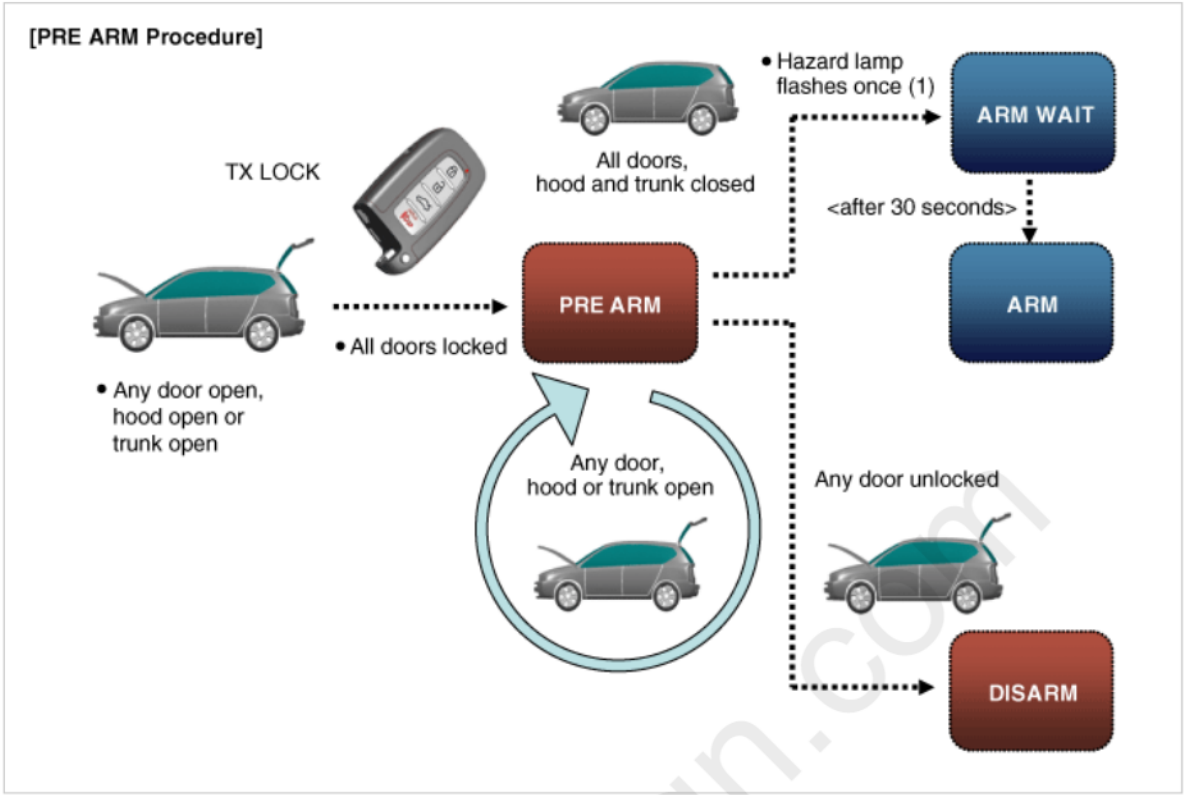


※ Remark: For a vehicle equipped with Smart Key system, the same process is applied to Passive door lock function.

B/A State	Description
PRE ARM	1-1. This is the state right before entering "ARM" mode after AUTO LOCK Timer 2 is completed and all doors are closed. 1-2. If the driver closes hood or tailgate, hazard lamp blinks one time and then the vehicle automatically enters "ARM" mode via "ARM WAIT" mode. 2-1. If LOCK button is pressed while at least one of all doors, hood and tailgate is open, "PRE ARM" mode turns on. 2-2. Because all doors locking signal is issued but the conditions for "ARM WAIT" are not satisfied, the vehicle remains in standby mode and enters ARM mode via ARM WAIT mode as soon as the door being open is closed.

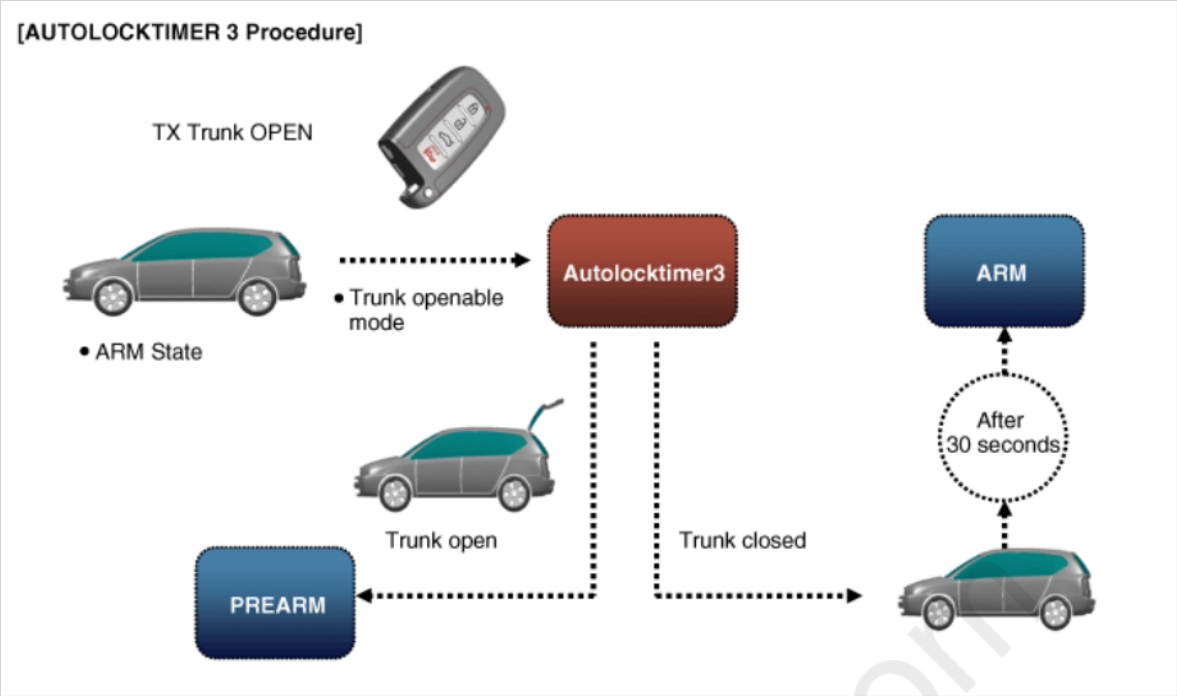
	2-3. In case intrusion is detected in PRE ARM mode, the vehicle turns into DISARM mode. 2-4. Security indicator keeps blinking in PRE ARM mode.

[PRE ARM Procedure]



B/A State	Description
RE ARM	1) In "REARM" state, if the vehicle intrusion is detected, flashing and alarm sound are activated again and the state changes to ALARM mode. 2) Burglar Alarm state moves to RE ARM mode after the timer of 27 seconds is completed. 3) Security Indicator keeps blinking.

B/A State	Description
AUTOLOCK TIMER3	1) B/A state changes to "AUTOLockTIMER3", when TX-Tailgate command operated. 2) B/A state changes "AUTOLOCKTIMER3" to "ARMWAIT", when the "30sec." timer expires with all doors lock and closed. 3) B/A state changes "AUTOLOCKTIMER3" to "DISARM", when any door open. 4) In "AUTOLOCKTIMER3" state, timer "30sec." timer is running. If this timer expired, state transits to "PREARM" state with Tailgate Open. 5) In this state, Security indicator keeps blinking



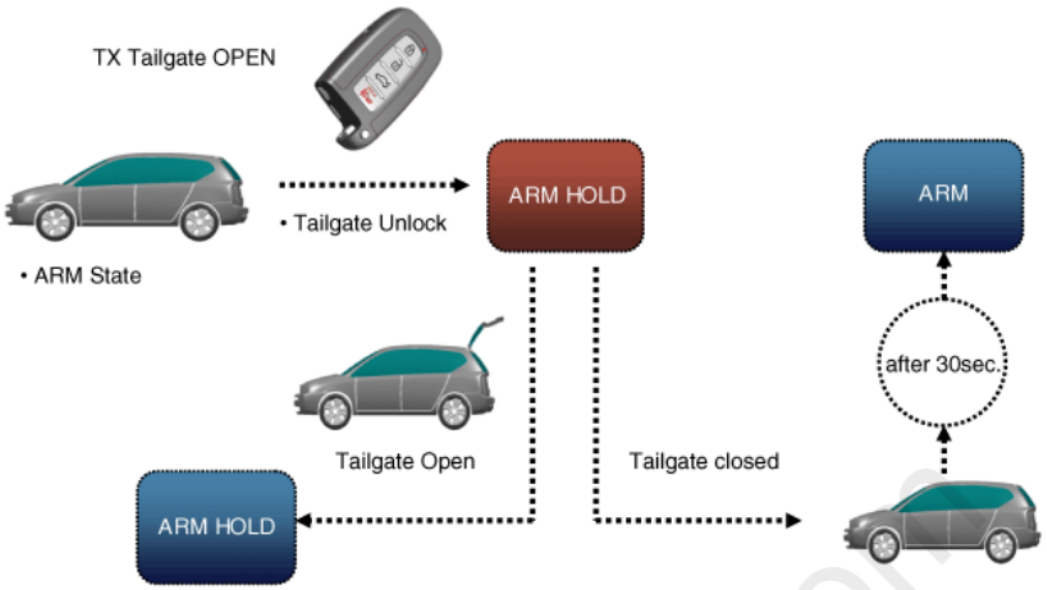
B/A State	Description
ARM HOLD (Alarm hold : Tailgate) ※Non-PTL option	1) "ARM HOLD" mode is similar to the existing tailgate alarm hold mode. 2) If tailgate is opened by a remote control (including smart key) in ARM mode, the vehicle enters ARM HOLD mode which holds off the burglar alarm only for the open tailgate. 3) As long as tailgate is closed, ARM HOLD mode keeps on without break. 4) When the opened tailgate is shut down, timer set for 30 seconds starts running. For the 30 seconds of ARM HOLD mode, burglar alarm does not go off if tailgate is opened. 5) When 30 seconds pass after tailgate is closed, the vehicle immediately enters ARM mode. 6) During ARM HOLD more, ARM mode is maintained for doors and hood so if intrusion through any door or hood is detected, burglar alarm normally goes off. 7) Security indicator keeps blinking during ARM HOLD mode.

Note 1: ARM HOLD is a mode that defers activation of ARM mode only for tailgate. During ARM HOLD mode, ARM mode is applied to doors and hood.

Note 2: When using the ignition key to open the tailgate, the ARM HOLD function works in the same way, provided that the "Door Key Burglar Alarm" function should be enabled. if this is disabled, the key-based ARM HOLD is off and using the key to opening the tailgate is determined as a theft and the alarm is issued.

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[ARM HOLD Procedure]



B/A State	Description
RE ARM (ARM mode is on again)	1) If the door, hood and tailgate are all closed after the termination of ALARM mode, it means that the ARM mode is on again. 2) At this time the actuator state (door lock/unlock) is neglected and ARM mode is kept until the remote control signal is received (normal ARM mode). 3) The security indicator keeps flickering during this mode.
RESET	1) When the battery is removed in ALARM or RE ARM mode, RESET mode is on. 2) When the battery is installed after RESET, the theft alarm operation resumes.(instead of remained output, the cycle of 27 seconds ON/10 seconds OFF repeats three times)

B/A State	Description
KEY ON 30 second deactivation (Non-Smart Key option)	1) For a vehicle without smart key option, if it waits for 30 seconds with the ignition key on during ALARM mode, the vehicle enters DISARM mode. 2) Even before 3O seconds pass, if the engine starts (Alternator "L" terminal voltage is HI: sent from the cluster module to CAN data), the theft alarm is instantly deactivated. (No ignition inhibition: The immobilizer system is applied as a basic function so the ignition system is normally operated by the registered immobilizer key during alarming) ※ For a smart key-based vehicle, the alarm is deactivated instantly after the smart key authentication.
When ARM mode is on, the tailgate OPEN and central door unlock are not allowed.	1) From the moment that a vehicle enters ARM WAIT mode by activating all door lock using the remote control or smart key, the central door unlock switch of the indoor tailgate unlock switch or DDM & ADM (power window switch of driver and passenger seat) is disabled. (theft prevention) ※ The function is equally applied to ARM WAIT/ARM/ALARM/RE ARM modes.

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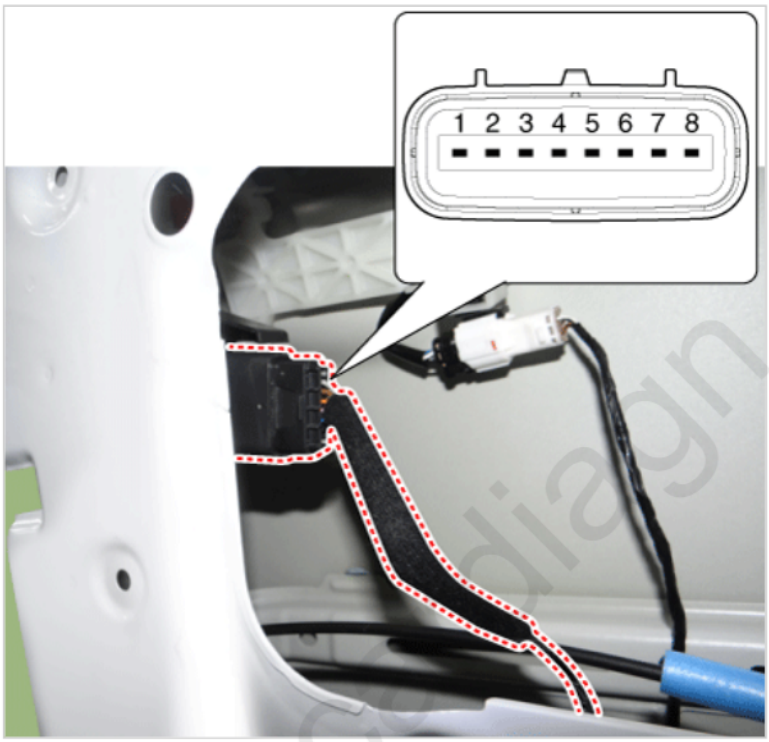
Inspection

CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the trim when removing/installing because lubricant and oil can leave a stain on the trim.

Front Door Lock Module Inspection

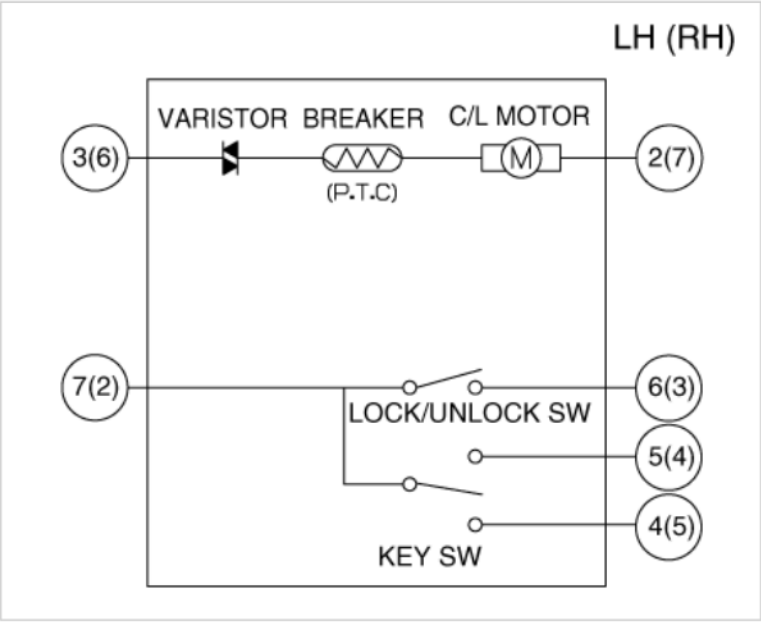
1. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the front door trim seal.
   (Refer to Body - "Front Door Window Glass")
3. Disconnect the connector from the actuator.



No.	Pin Information	
	LH	RH
1	-	-
2	Motor 2	COM
3	Motor 3	Lock / Unlock switch
4	Key unlock switch	Key lock switch
5	Key lock switch	Key unlock switch
6	Lock / Unlock switch	Motor 3
7	COM	Motor 2
8	-	-

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

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(LH)

Operation / Terminal	Central Lock	Central Unlock
2	+	-
3	-	+
6 & 7	ON → OFF	OFF → ON
5 & 7	Key Rotate CW (LH) / CCW (RH) : ON Key Return : OFF	
4 & 7	Key Rotate CCW (LH) / CW (RH) : ON Key Return : OFF	

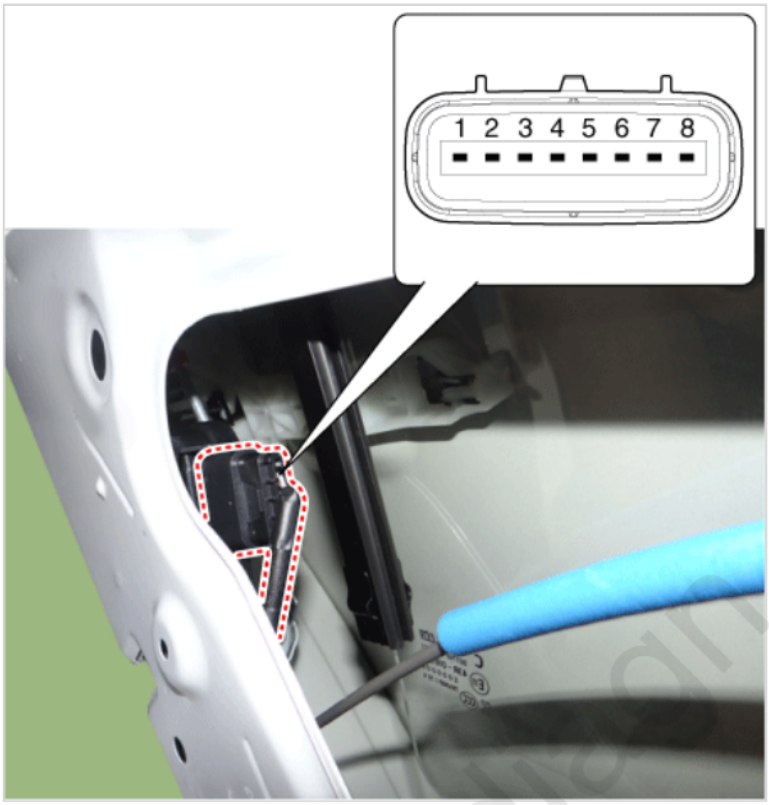
(RH)

Operation / Terminal	Central Lock	Central Unlock
7	-	+
6	+	-
2 & 3	ON → OFF	OFF → ON
2 & 4	Key Rotate CW (LH) / CCW (RH) : ON Key Return : OFF	
2 & 5	Key Rotate CCW (LH) / CW (RH) : ON Key Return : OFF	

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Rear Door Lock Module Inspection

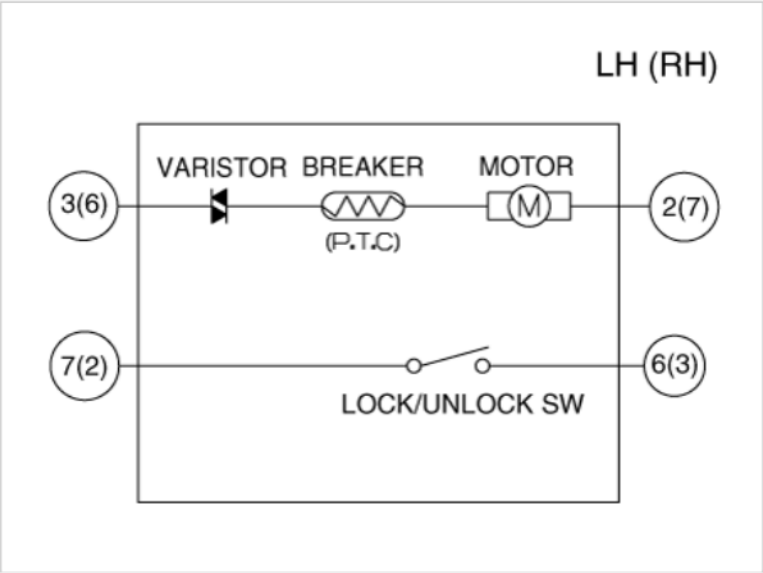
1. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
2. Remove the rear door trim seal.
   (Refer to Body - "Rear Door Window Glass")
3. Disconnect the connector from the actuator.



No.	Pin Information	
	LH	RH
1	-	-
2	Motor 2	COM
3	Motor 3	Lock / Unlock switch
4	-	-
5	-	-
6	Lock / Unlock switch	Motor 3
7	COM	Motor 2
8	-	-

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

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(LH)

Operation / Terminal	Central Lock	Central Unlock
2	+	-
3	-	+
6 & 7	ON → OFF	OFF → ON

(RH)

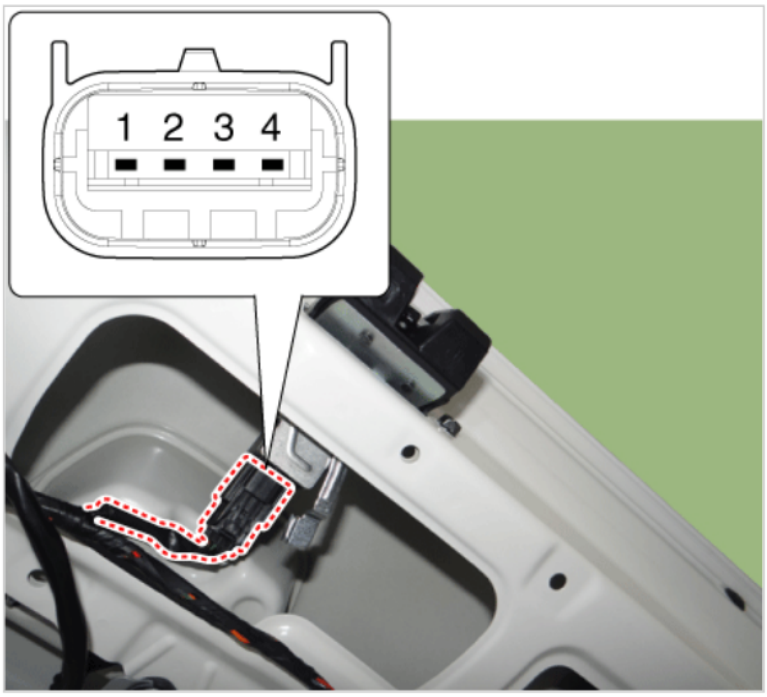
Operation / Terminal	Central Lock	Central Unlock
7	-	+
6	+	-
2 & 3	ON → OFF	OFF → ON

Liftgate / Trunk Lock Module Inspection

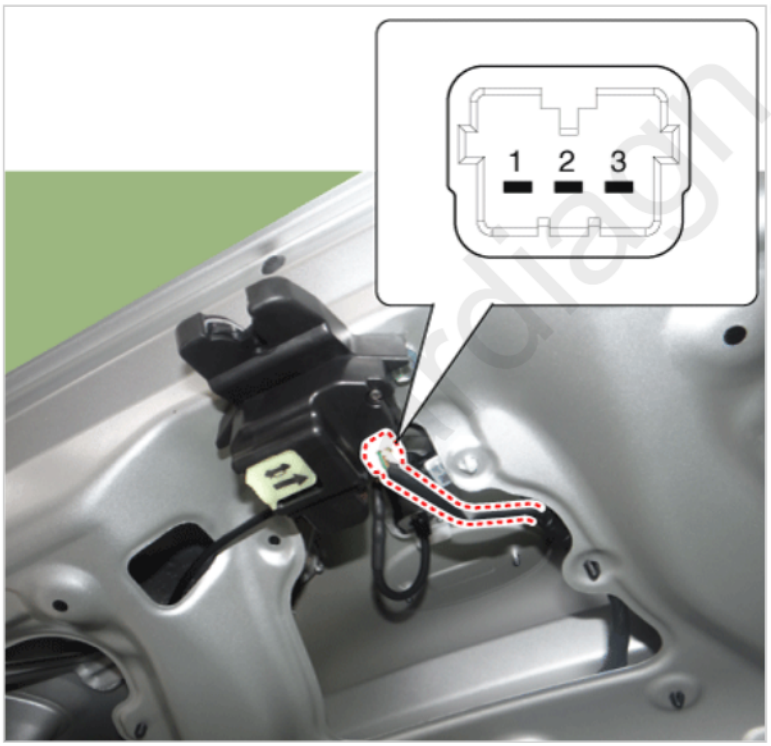
1. Remove the liftgate trim or trunk lid trim.
   (Refer to Body - "Liftgate Trim")
   (Refer to Body - "Trunk Lid Trim)
2. Disconnect the connectors from the actuator.

[5 Door]

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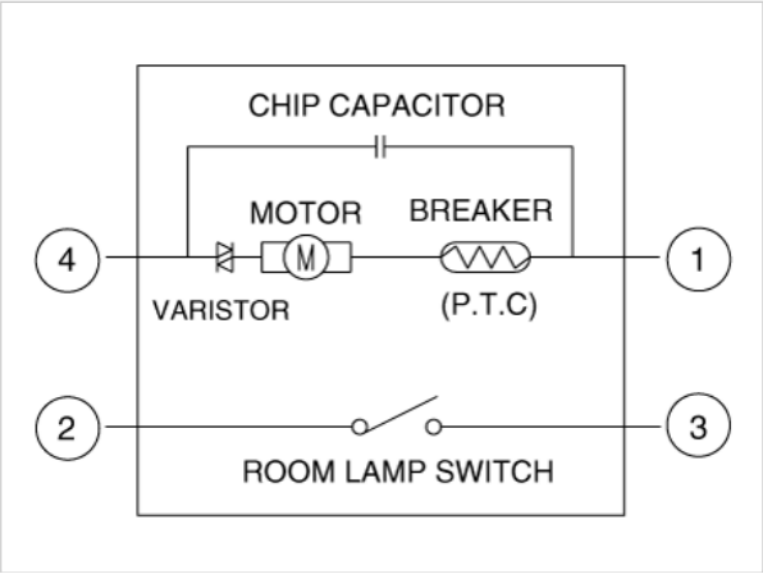


[4 Door]



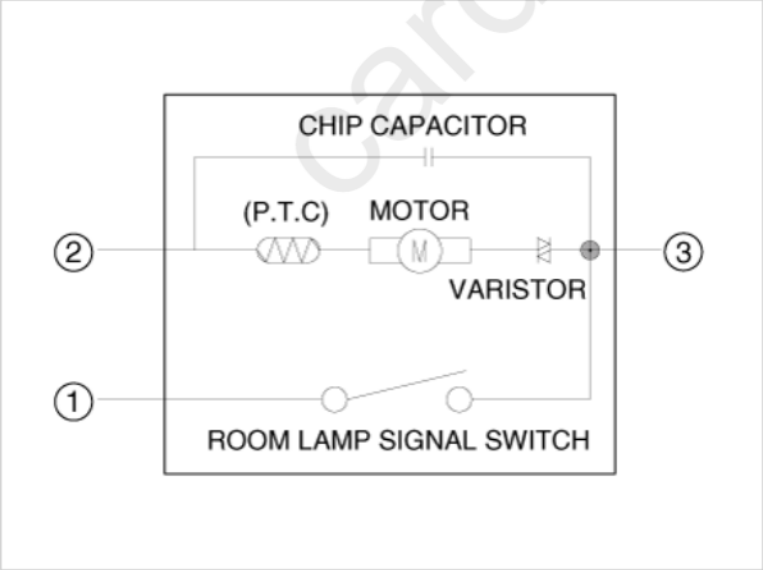
3. Check actuator operation by connecting power and ground as shown below. To prevent damage to the actuator, apply battery voltage only momentarily.

[5 Door]



Operation / Terminal	Lock → Unlock	Unlock → Lock
④	-	X
①	+	X
②	OFF → ON	ON → OFF
③		

[4 Door]



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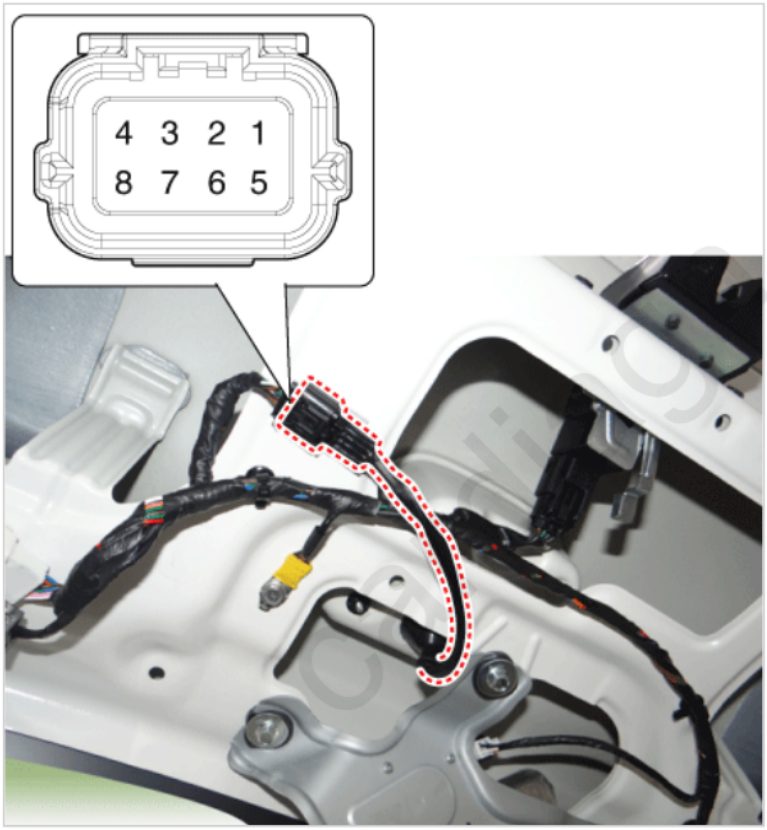
Terminal / Position	2	3
Unlock	⊕	⊖
Lock	–	–

4. Checking the liftgate of the vehicle power option power refers to the liftgate module.

Liftgate Open Switch Inspection

[5 Door only]

1. Disconnect the negative (-) battery terminals.
2. Remove the liftgate trim
   (Refer to Body - "Liftgate Trim")
3. Disconnect the liftgate open switch assembly connector.

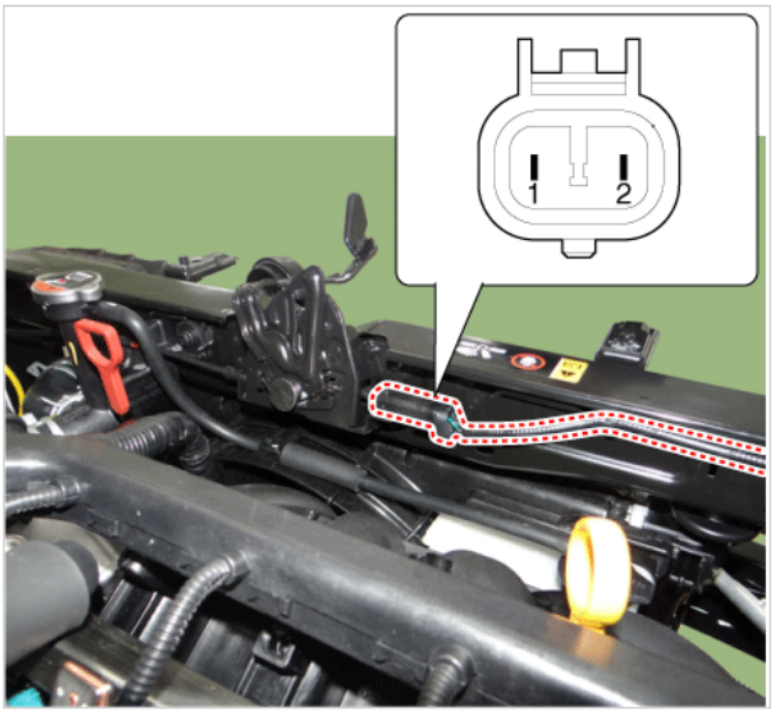


4. Check for continuity between terminals in half latching condition as shown below.

Operation / Terminal	OFF	ON(PUSH)
3		○
4		○

Hood Switch Inspection

1. Disconnect the hood switch connector (A).

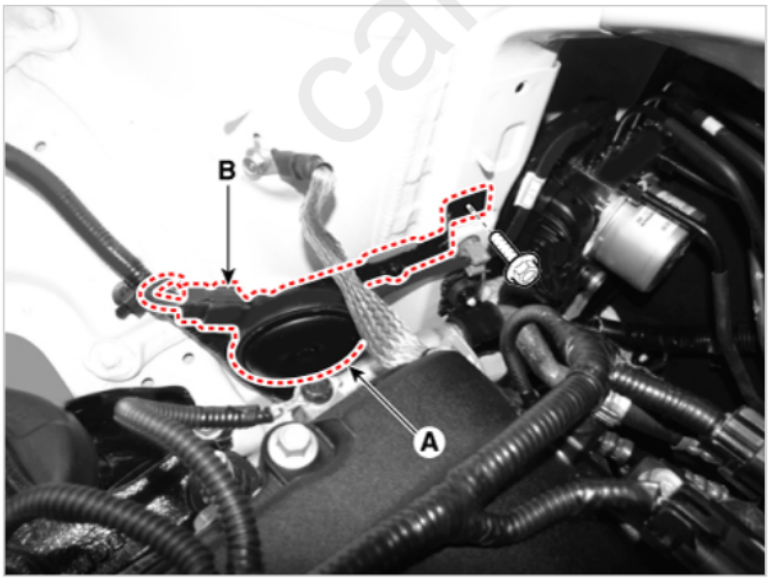


2. Check for continuity between the terminals and ground as shown below.
(Refer to Body - "Hood Latch Assembly")

Terminal / Position	1	2
Open hood(Free)	○	○
Close hood(Push)		

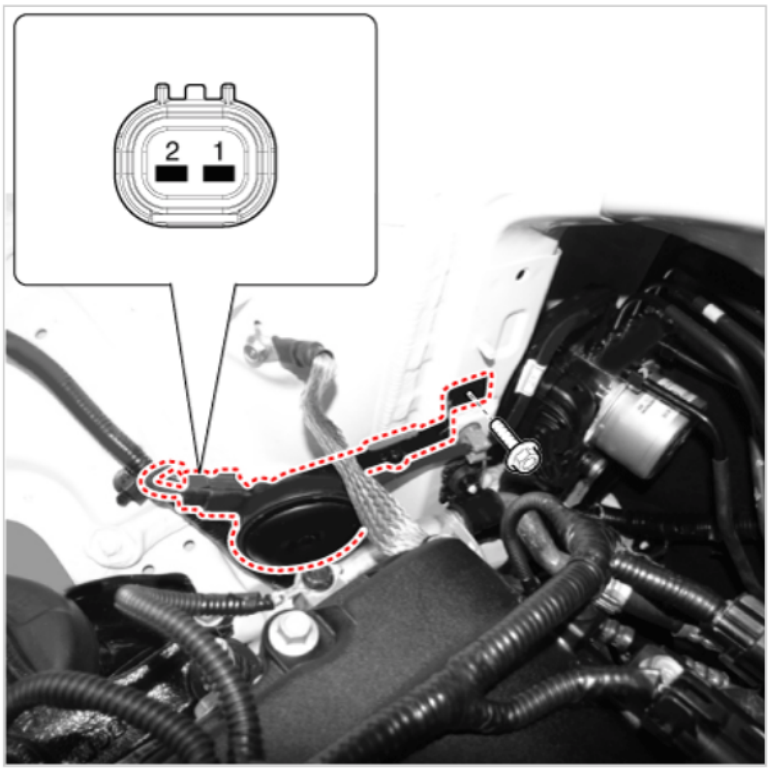
Burglar Horn Inspection

1. Remove the burglar horn (A) after loosening the mounting bolt and disconnecting the connector (B).



2. Test the burglar horn by connecting battery power to the terminal 2 and ground the terminal 1.

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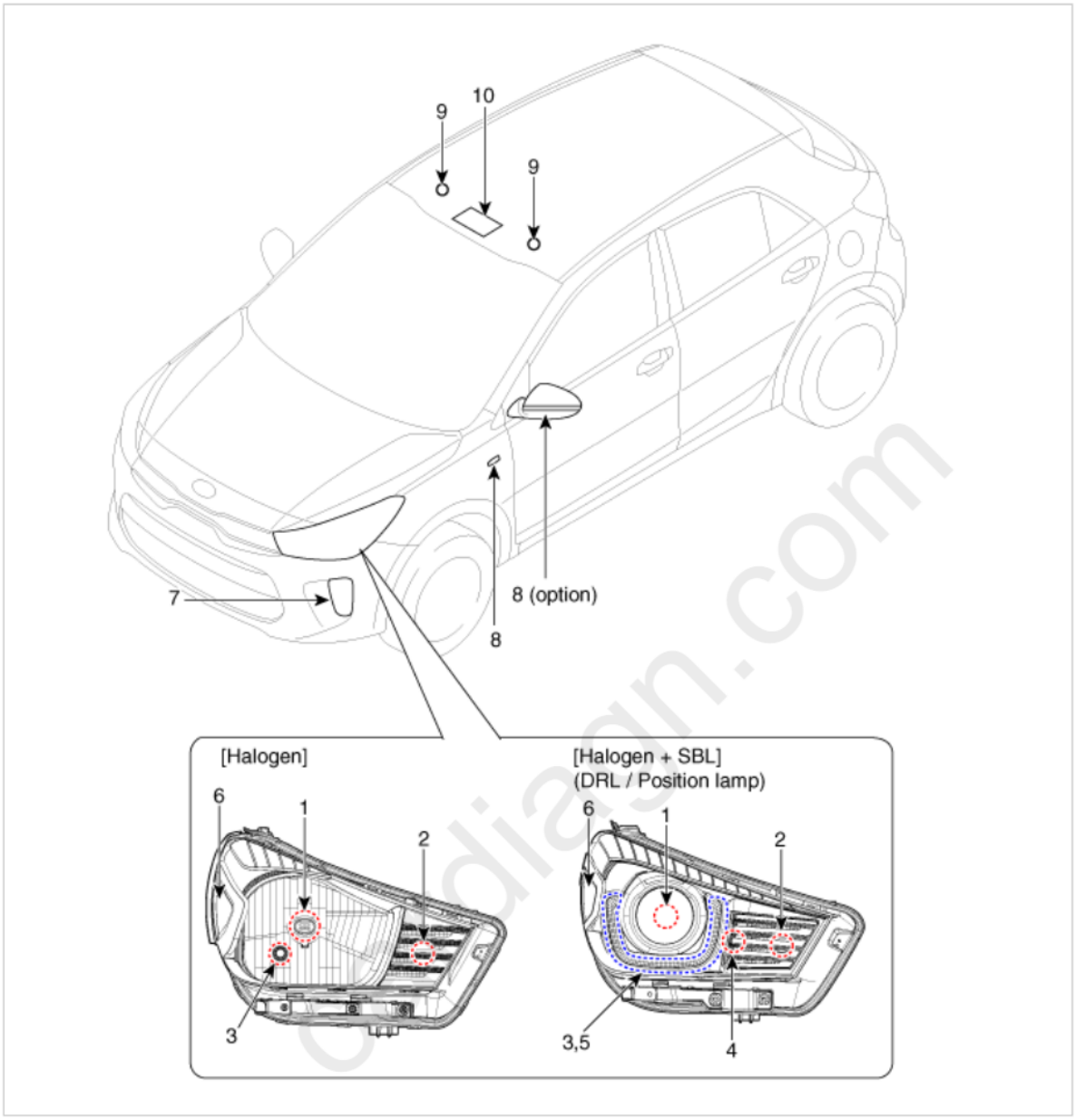
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Specification

Item				Type	Bulb Watt (W)
Front	Headlamp	Halogen	Low/High	H4 LL	55/60
			Turn signal lamp	PY21W	21
			Position lamp	W5W	5
			Side Marker lamp	W5W LL	5
		Halogen + SBL (DRL / Position lamp)	Low/High	9005 HL+	60
			Turn signal lamp	PY21W	21
			Position lamp	LED	LED
			Side Marker lamp	LED	LED
	Daytime Running Light (DRL)			LED	LED
	Static bending light (SBL)			H7 LL	55
	Front fog lamp			HB4	51
	Turn signal lamp (Side)			WY5W	5
	Door mirror turn signal lamp			LED	LED
Rear	Rear combination lamp	Bulb Type	Tail lamp	W5W LL	5
			Tail / Stop lamp	P21/5W LL	5
			Turn signal lamp	PY21W LL	21
			Back up lamp	W16W	16
			Side Marker lamp	W5W LL	5
		LED Type	Tail / Stop lamp	LED	LED
			Turn signal lamp	PY21W	21
			Back up lamp	W16W	16
			Side Marker lamp	LED	LED
	High mounted stop lamp	Bulb type		W5W	5
		LED type		LED	LED
	License plate lamp			W5W	5
Interior	Map lamp			W10W	10
	Room lamp			FESTOON	10
	Luggage lamp			FESTOON	10
	Vanity lamp			FESTOON	5

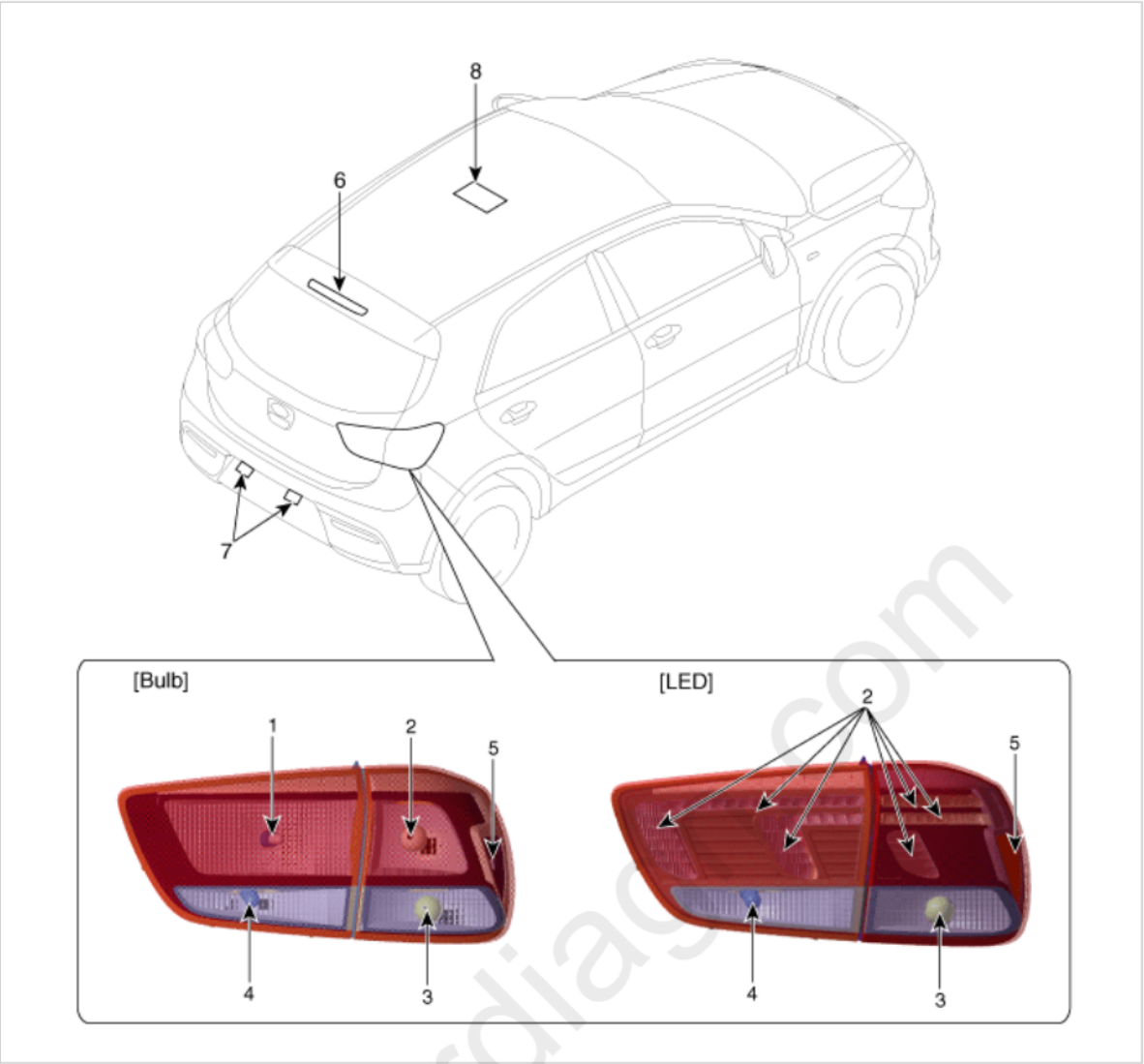
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Component Location



1. Headlamp (Low/High Bi-function)
2. Turn signal lamp
3. Position lamp
4. Static bending light (SBL)
5. Daytime running light (DRL)
6. Side marker lamp
7. Fog lamp
8. Turn signal lamp (Door mirror / Side)
9. Vanity lamp
10. Map lamp

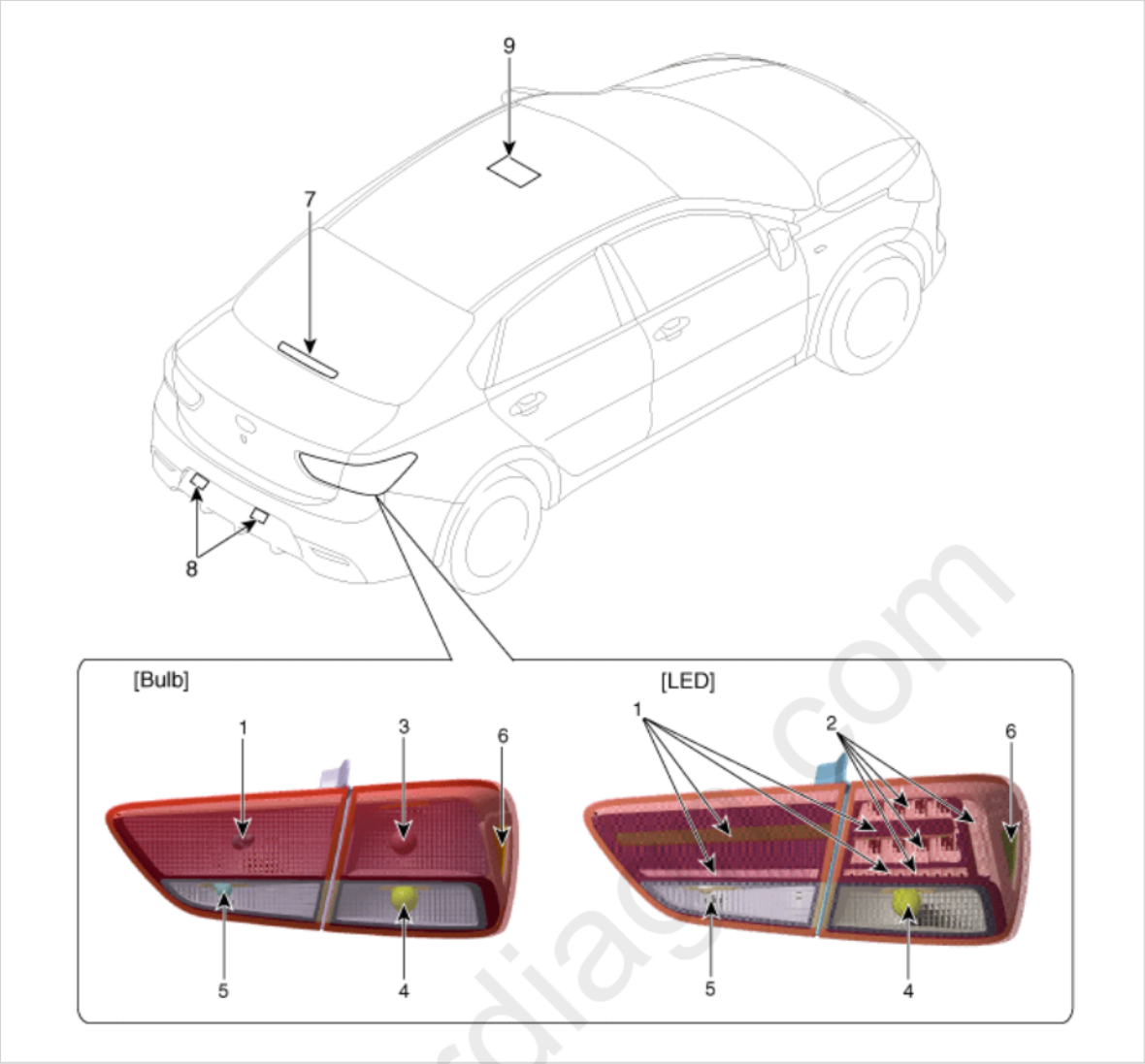
[5 Door]



1. Tail lamp
2. Stop / Tail lamp
3. Turn signal lamp
4. Back up lamp
5. Side marker lamp
6. High mounted stop lamp
7. License lamp
8. Room lamp

[4 Door]

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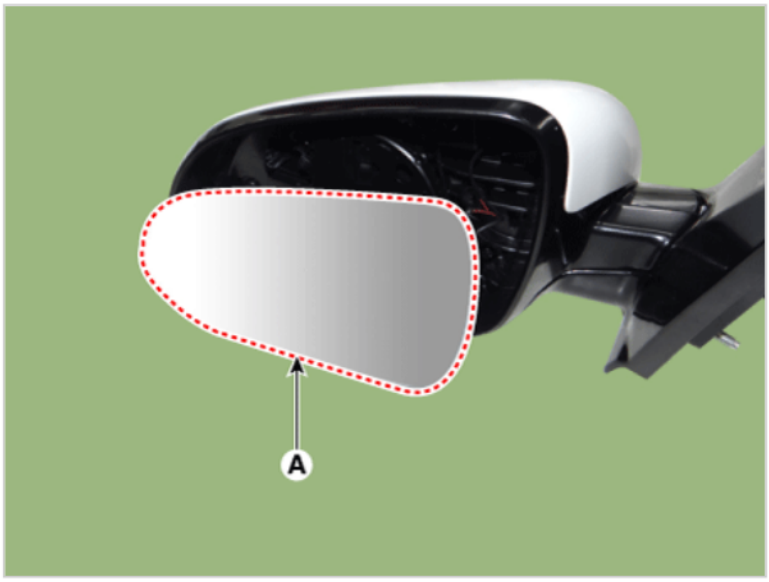
1. Tail lamp
2. Stop lamp
3. Stop / Tail lamp
4. Turn signal lamp
5. Back up lamp
6. Side marker lamp
7. High mounted stop lamp
8. License lamp
9. Room lamp

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Removal

Door Mirror Turn Signal Lamp

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



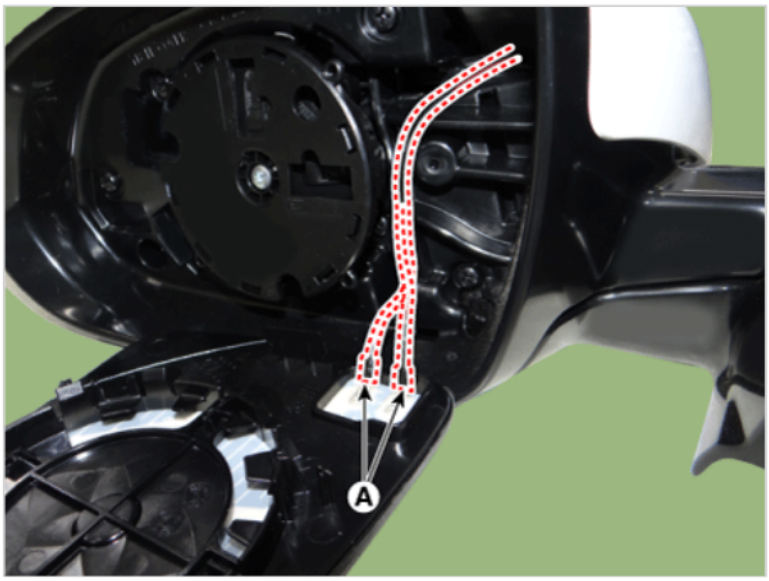
NOTICE

Be careful not to damage the fixing clips (A).

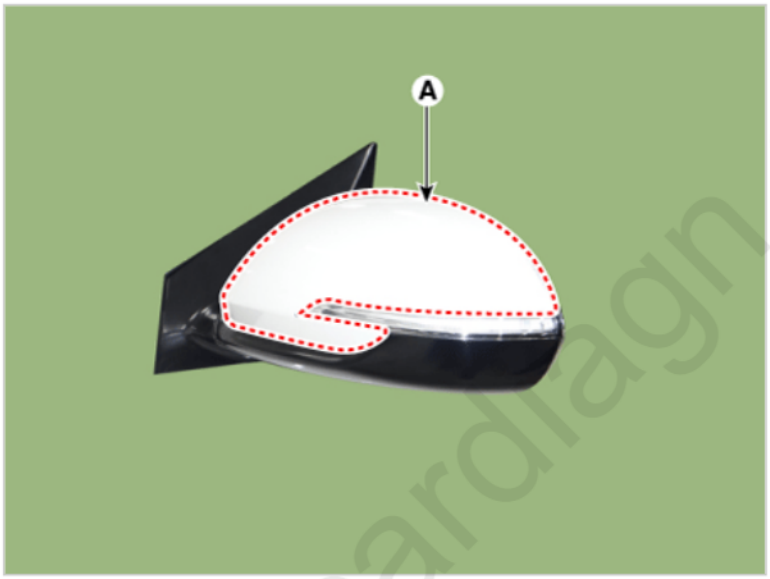


3. Disconnect the heating connectors (A) from the mirror.

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4. Remove the door mirror cover (A) after separating the mounting clips.



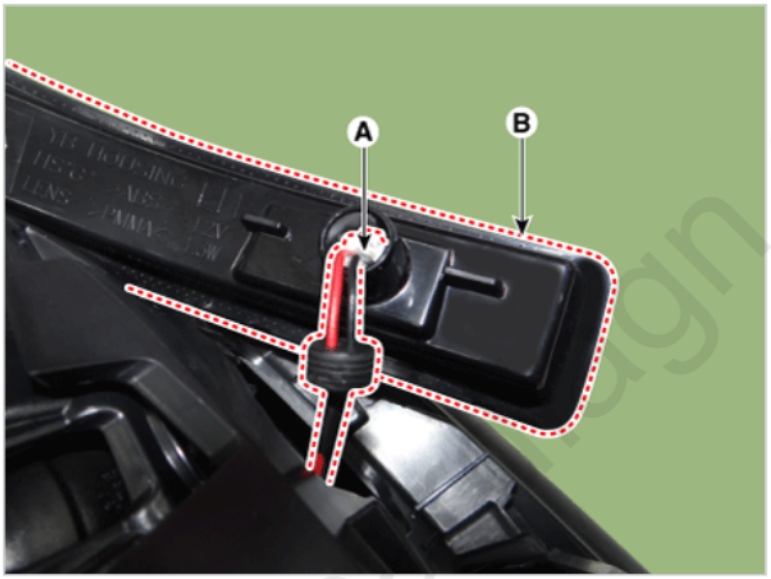
5. Remove the door mirror turn signal lamp (A) after loosening the screw.



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6. Disconnect the connector (A) from the door mirror turn signal lamp (B).



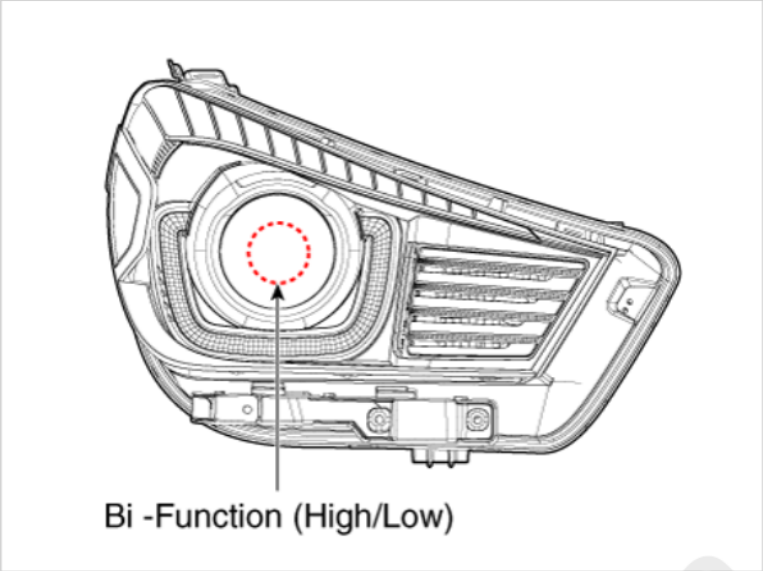
Installation

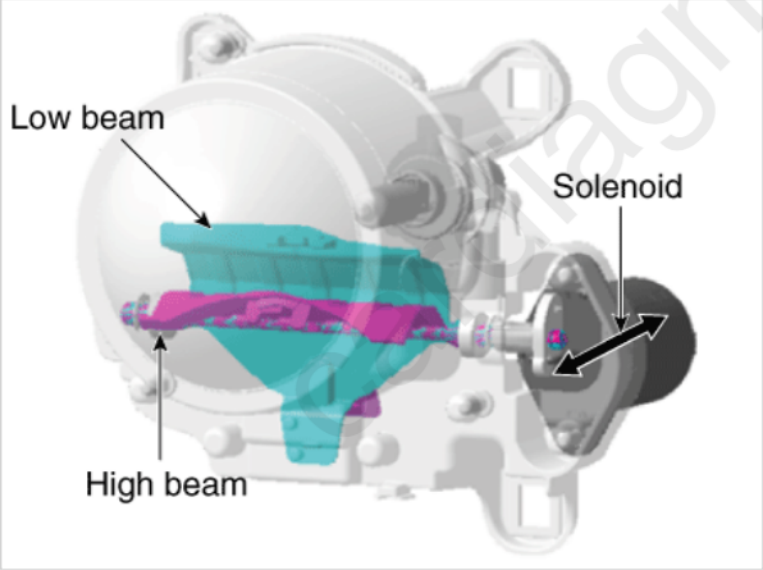
1. Install the door mirror turn signal lamp.
2. Install the door mirror cover.
3. Install the door mirror.
4. Connect the negative (-) battery terminal.

Description

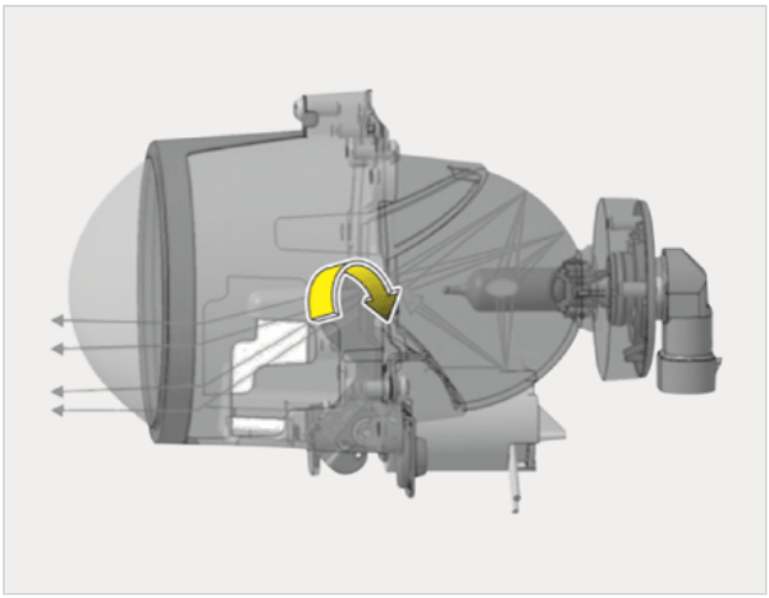
BI-FUNCTION

1. Definition
   – A headlamp with integrated functions of high and low beam
   – The light is controlled by rotating the shield inserted to the lens. (A solenoid is adopted.)

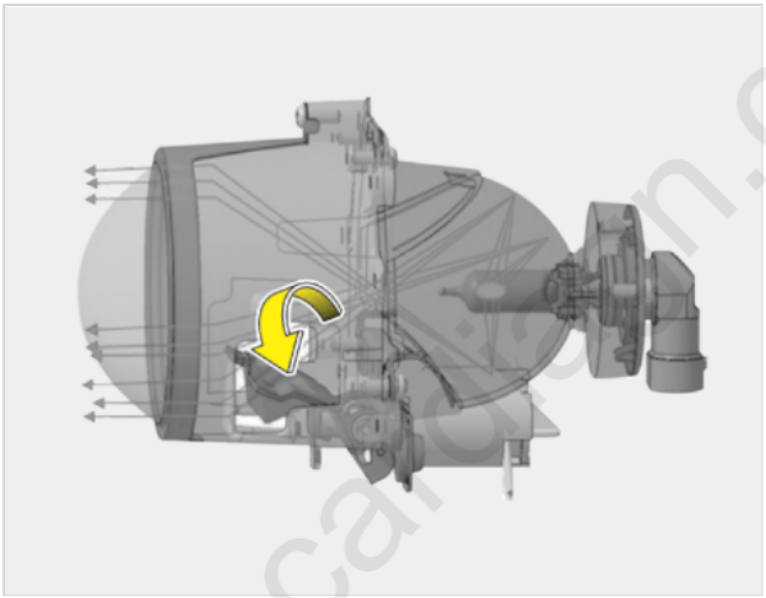




2. Structure and mechanism
   – When working as a low beam
   : The light illuminates to the restricted area of low beam by blocking the light with the stopped shield.



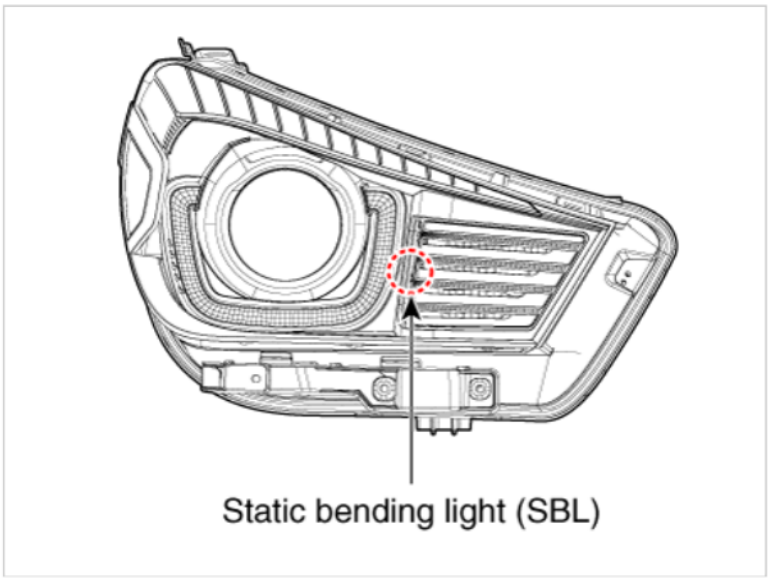
– When working as a high beam
: The light is not blocked by the open shield and the light illuminates to the area of high beam.



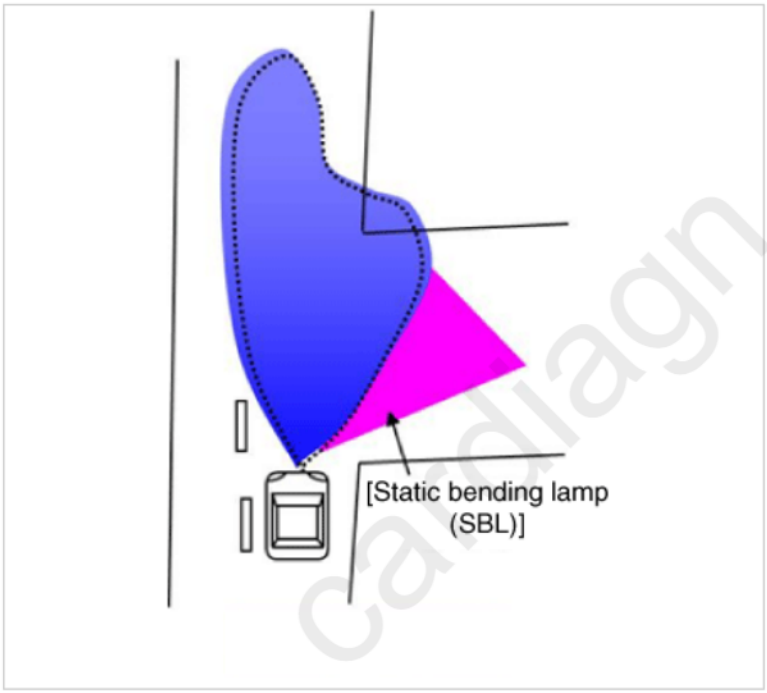
Static Bending Light (SBL)

1. Definition
   – Secures visibility in corner when turning at night.
   – L/R Static Bending Lamp is turned ON/OFF based on the vehicle speed and steering wheel angle.

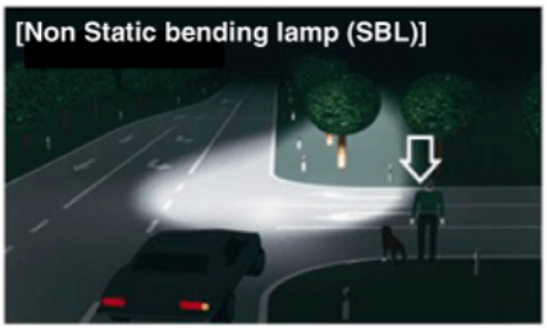
carmanuals.com



2. Vehicle Input Factors : Vehicle speed, steering wheel angle



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Headlamp Aiming Instructions

[Mechanical aiming]

The headlamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer"s instructions.

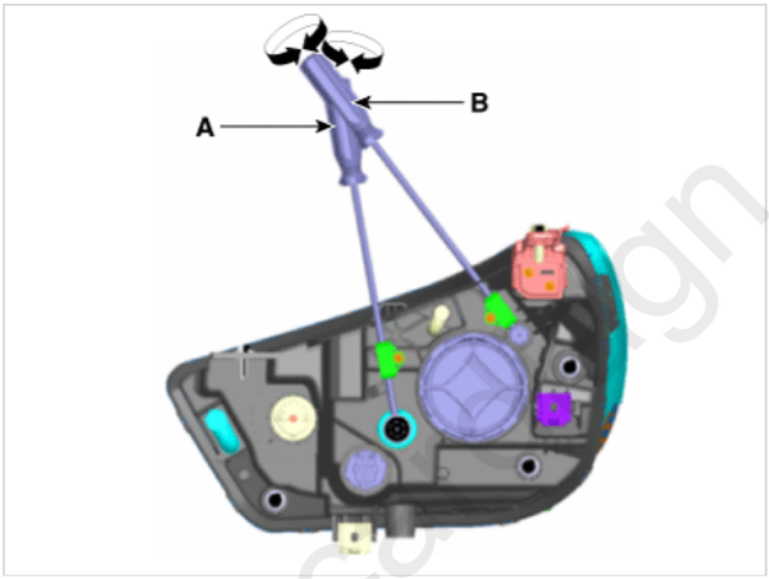
> **NOTICE**
> If there are any regulations pertinent to the aiming of headlamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

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

1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.
2. The vehicle should be placed on a flat floor.
3. Draw vertical lines (passing through respective headlamp centers) and a horizontal line (passing through center of headlamps) on the screen.
4. With the headlamps and battery in normal condition, aim the headlamps so the brightest portion falls on the horizontal and vertical lines.
   A : Vertical
   B : Horizontal

[Standard Type]

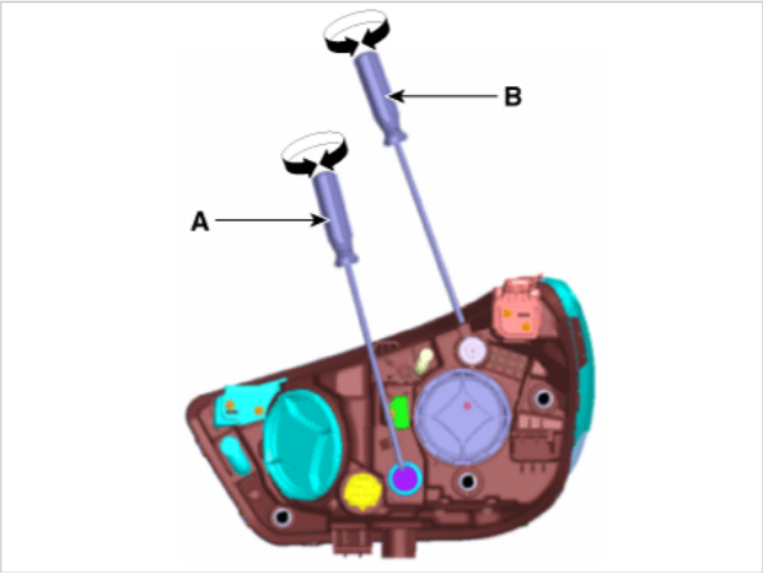
(Multl focus reflector (MFR))



[Projection Type]

(Bi-function)

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Front Fog Lamp Aiming

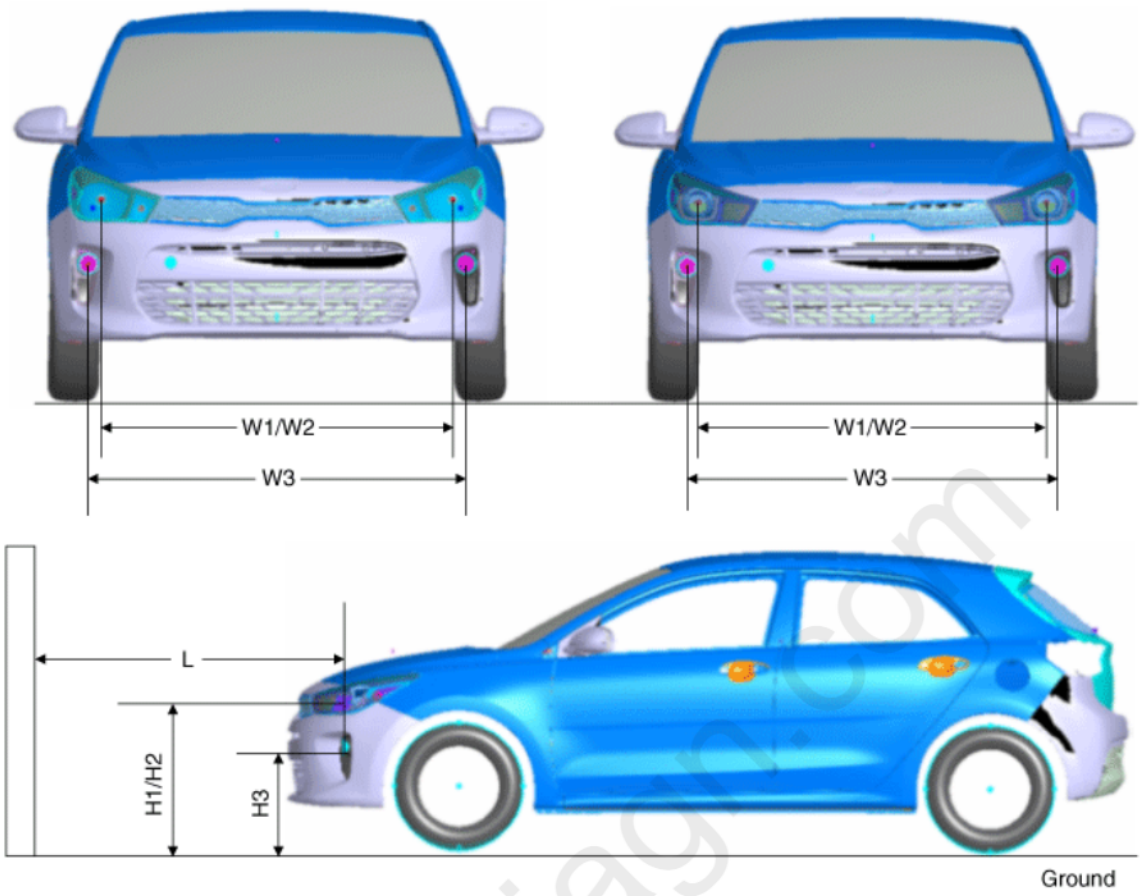
The front fog lamps should be aimed in the same manner as the headlamp aiming.
With the front fog lamps and battery normal condition, aim the front fog lamps by turning the adjusting screw (A) with a driver.



Headlamp and Fog Lamp Aiming Point

[Standard Type]
(Multl focus reflector (MFR))

[Projection Type]
(Bi-function)



H1 : Height Between the Head Lamp Low Beam Bulb Center and the Ground
H2 : Height Between the Head Lamp High Beam Bulb Center and the Ground
H3 : Height Between the Fr Fog Lamp Bulb Center and the Ground
W1 : Distance Between the Head Lamp Low Beam Bulb Center
W2 : Distance Between the Head Lamp High Beam Bulb Center
W3 : Distance Between the Fr Fog Lamp Bulb Center
L : Distance Between the head lamp bulb center and screen

Unit : in.(mm)

Type	Vehicle condition	H1	H2	W1	W2	L
[Standard] (Multl focus reflector)	Without driver	(30.4) 722		(51.9) 1,320		Refer to aiming condition
	With driver	(28.5) 725		(52.4) 1,333		
[Projection] (Bi-function)	Without driver	(28.0) 713	(28.1) 715	(51.9) 1,320		
	With driver	(28.1) 716	(28.2) 718	(52.4) 1,333		

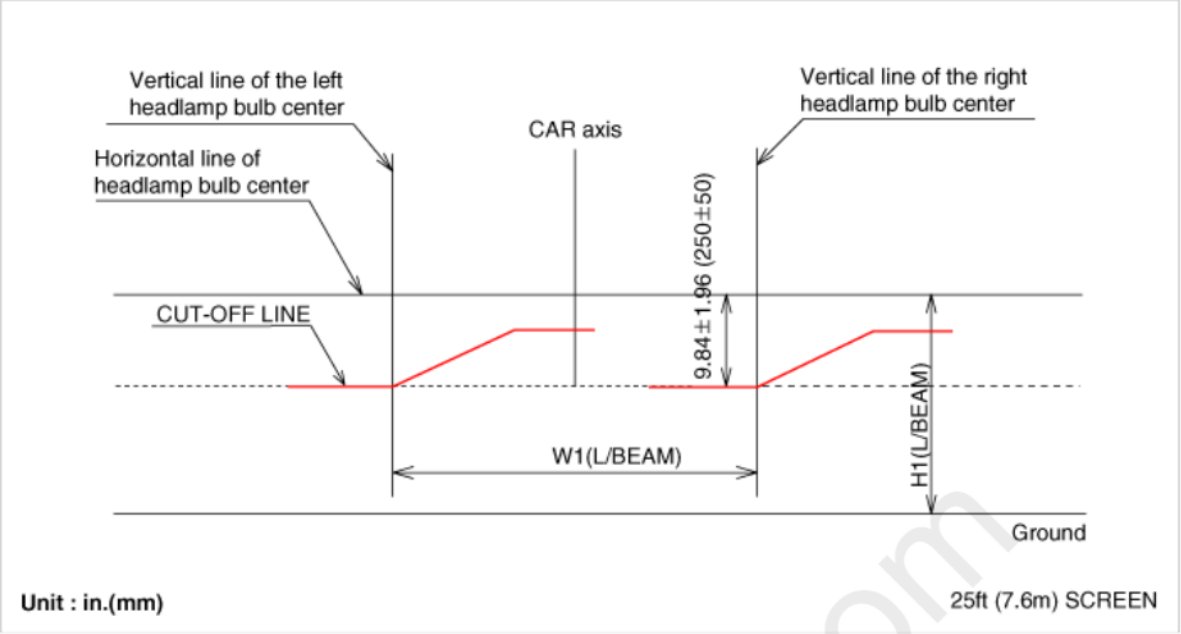
Fog lamp

Unit : in.(mm)

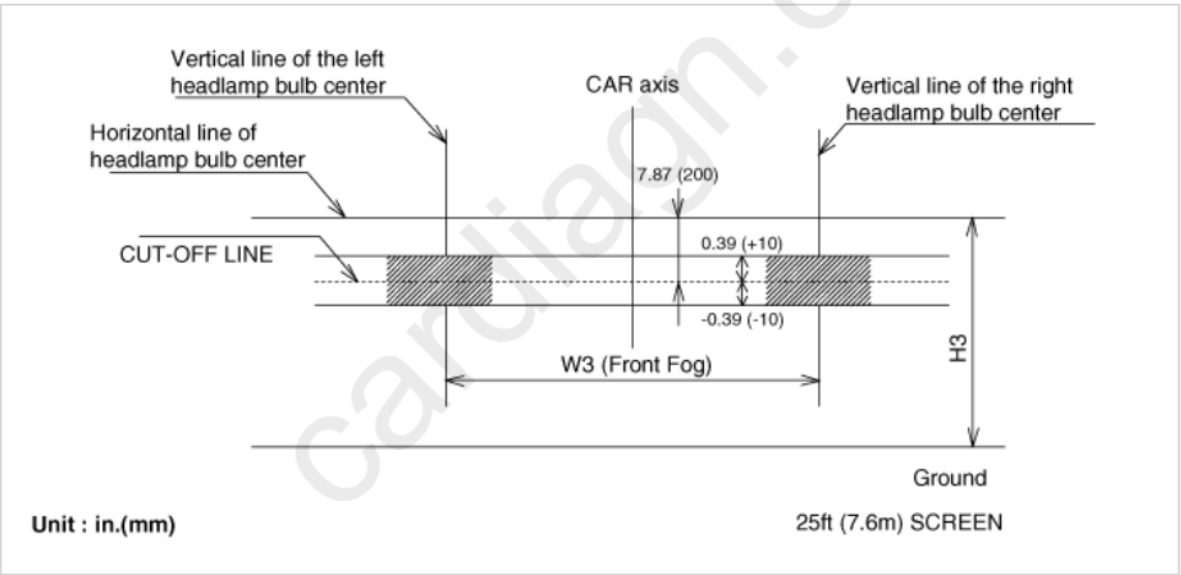
Vehicle condition	H3	W3	L
Without driver	18.9 (482)	55.7 (1,417)	Refer to aiming condition
With driver	18.6 (473)		

1. Headlamp (Low beam)
   – Turn the low beam on without driver aboard.

– The cut-off line should be projected in the cut-off line shown in the picture.
– If headlamp leveling device is equipped, adjust the headlamp leveling device switch with 0 positions.



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



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Removal

⚠ CAUTION
Headlamps become very hot during use; do not touch them or attach any hardware immediately after turning them off.

NOTICE
- The headlamp bulb should not be removed from the headlamp assembly until just before installing a new bulb.
- Leaving the headlamp bulb removed for an extended period of time may degrade the headlamp bulb performance.
- Contaminants may enter the headlamp assembly where they can settle on the lens and reflector.
- Never turn on the headlamps with the bulb removed from the headlamp assembly.

Headlamp

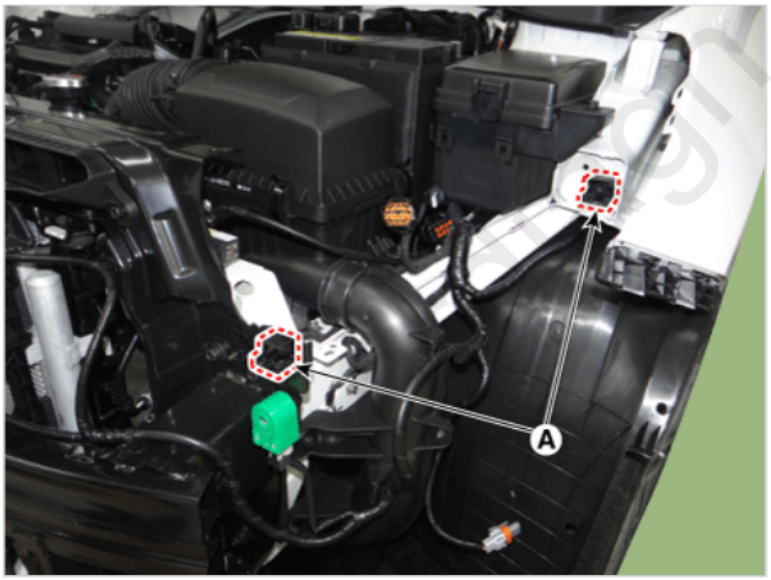
1. Disconnect the negative (-) battery terminal.

2. Remove the front bumper assembly.
   (Refer to Body - "Front Bumper Assembly")
3. Remove the headlamp (A) after loosening the bolts.

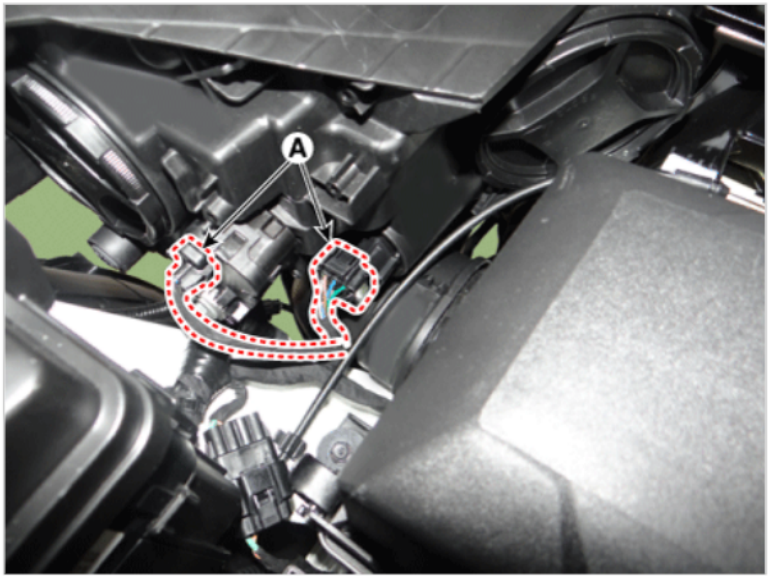


NOTICE

Be careful not to damage the retaining clips (A).



4. Disconnect the headlamp connectors (A).



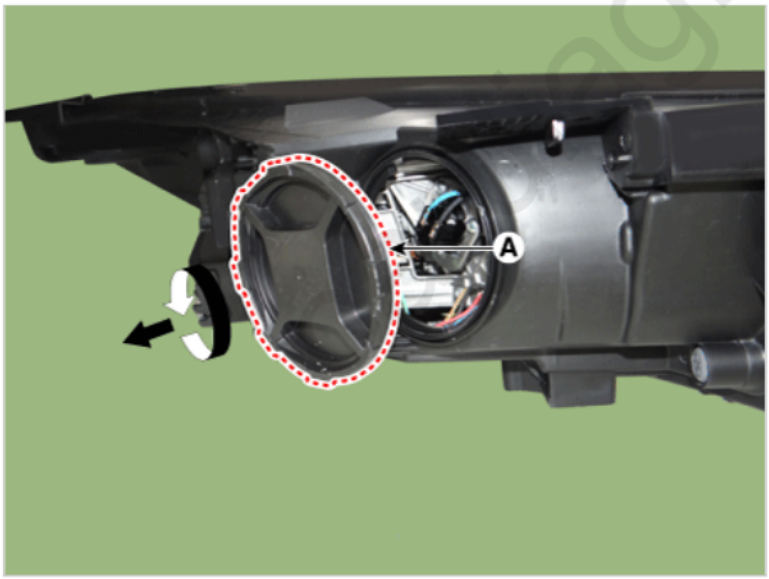
Installation

1. Install the headlamp assembly.
2. Install the front bumper assembly.
3. Connect the negative (-) battery terminal.

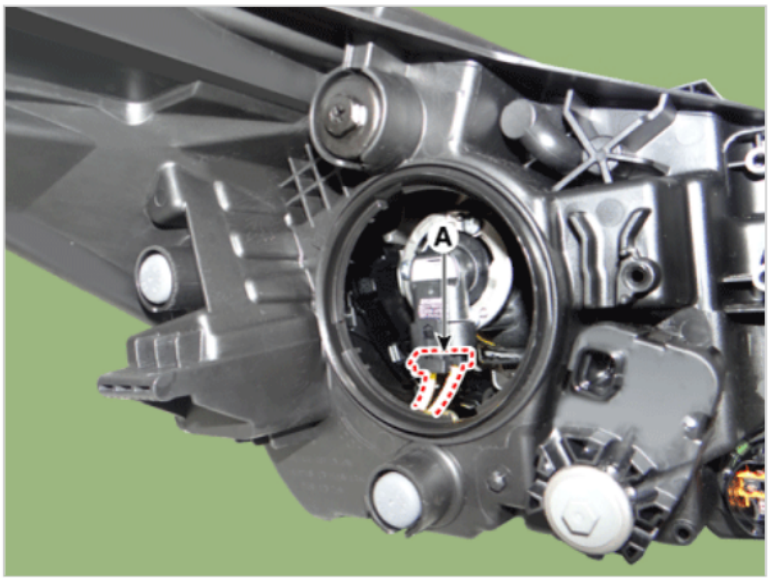
Replacement

Bulb (high/low)

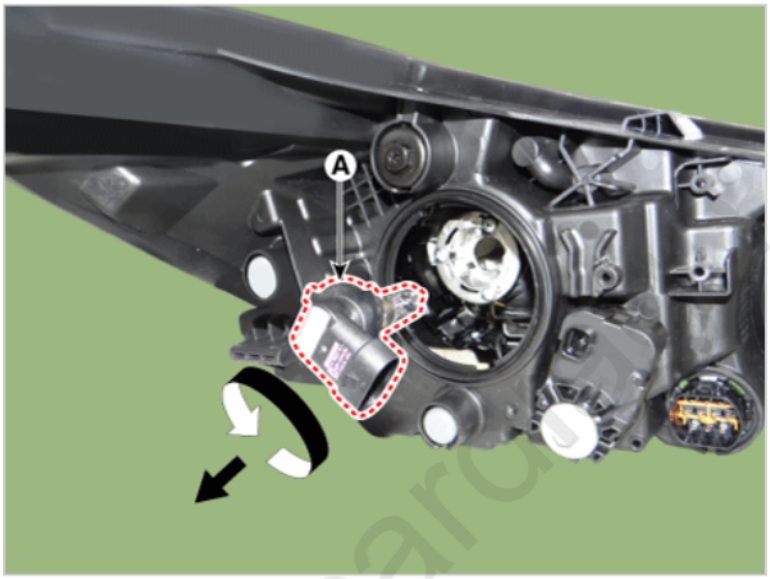
1. Remove the dust caps (A) from the headlamp assembly after turning in the counterclockwise direction.



2. Disconnect the headlamp high/low beam bulb connector (A).



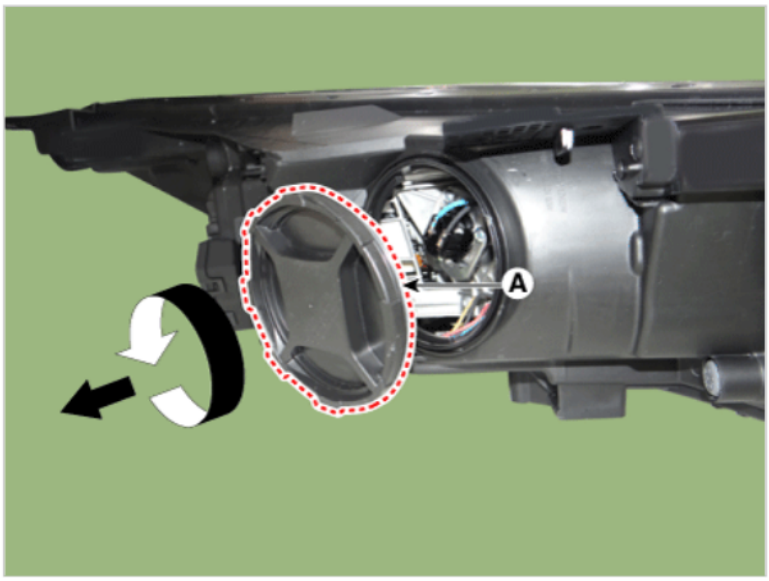
3. Remove the headlamp high/low beam bulb (A) from the headlamp assembly after turning in the counterclockwise direction.



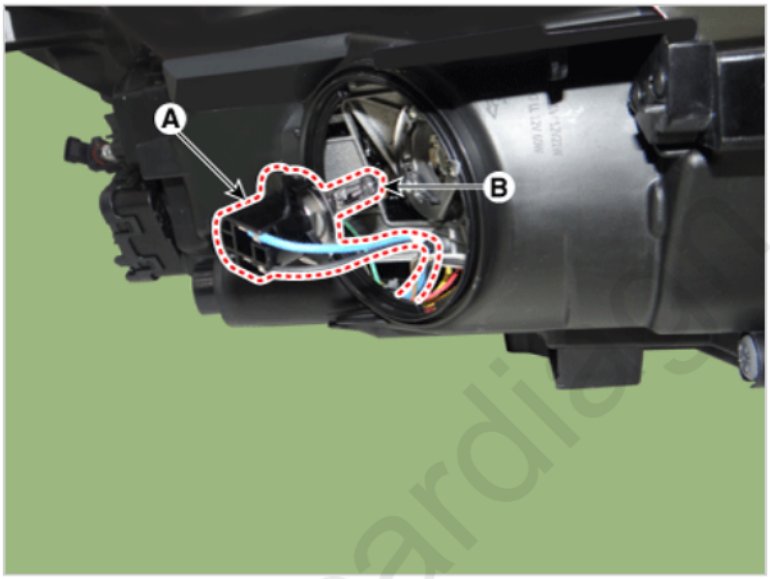
4. Install in the reverse order of removal.

Static Bending Light (SBL)

1. Turn off the head lamp switch.
2. Remove the dust caps (A) from the head lamp assembly after turning in the counterclockwise direction.



3. Remove the static bending light bulb (B) after removing the socket (A).

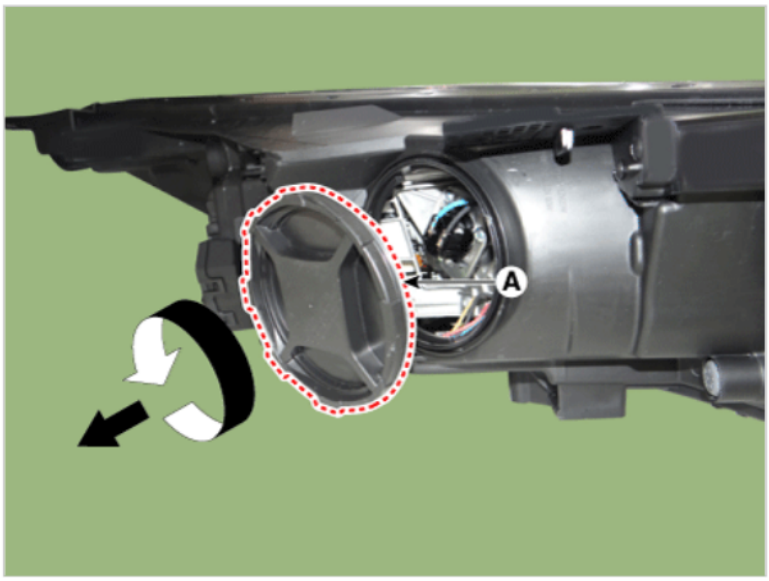


4. Install in the reverse order of removal.

Turn Signal Lamp

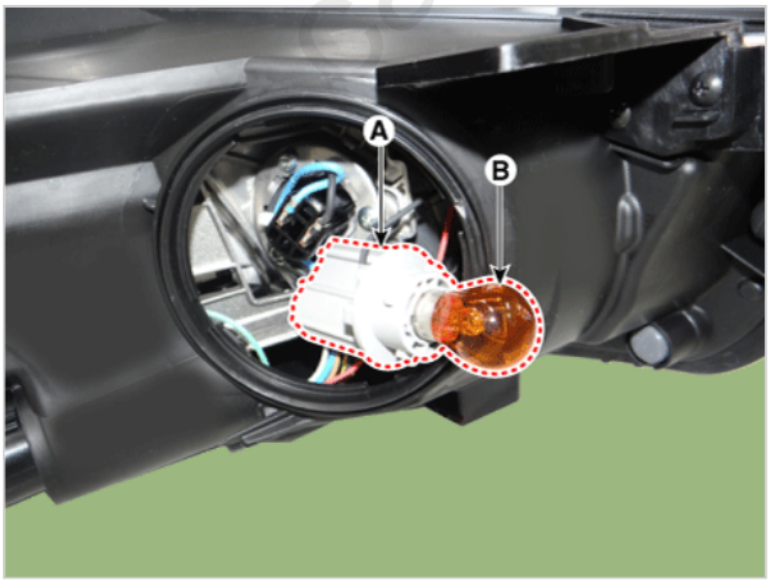
1. Turn the headlamp switch off.
2. Remove the dust caps (A) from the head lamp assembly after turning in the counterclockwise direction.

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3. Remove the bulb socket (A) and bulb (B) from the headlamp assembly.



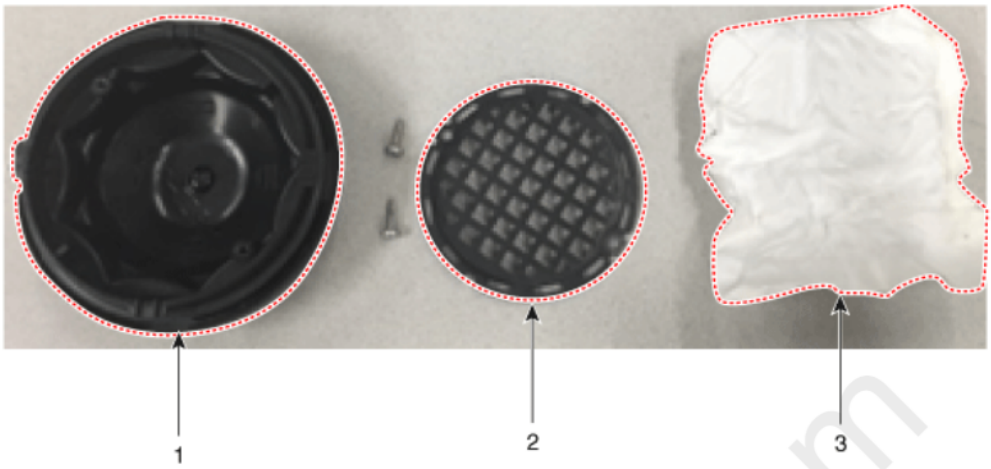


4. Install in the reverse order of removal.

Moisture absorbent

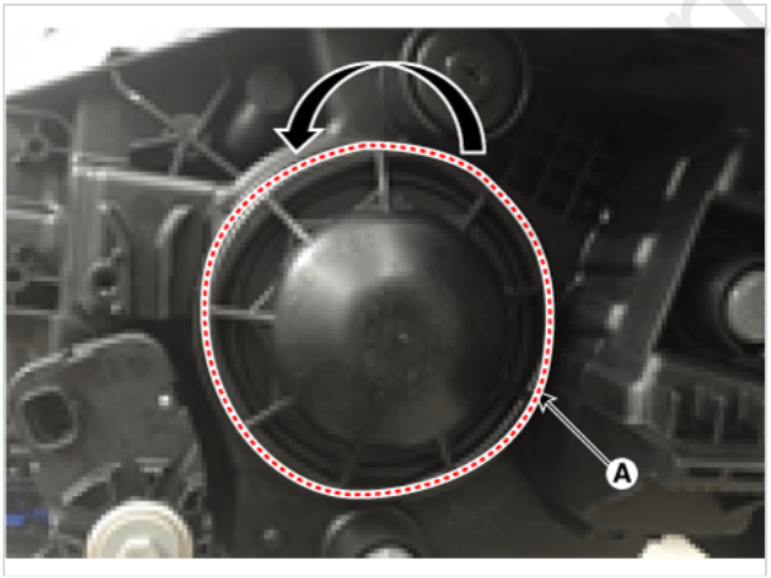
Information

Components

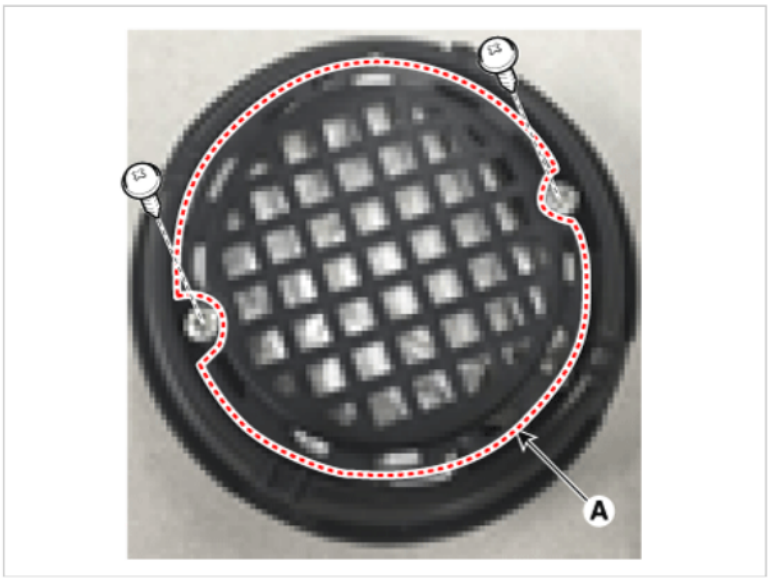


1 . Dust cap
2. Moisture absorbent bracket
3. Moisture absorbent

1. Remove the dust cap (A).



2. Remove the moisture absorbent bracket (A) from the dust cover after loosening the mounting screws. And then replace the moisture absorbent.

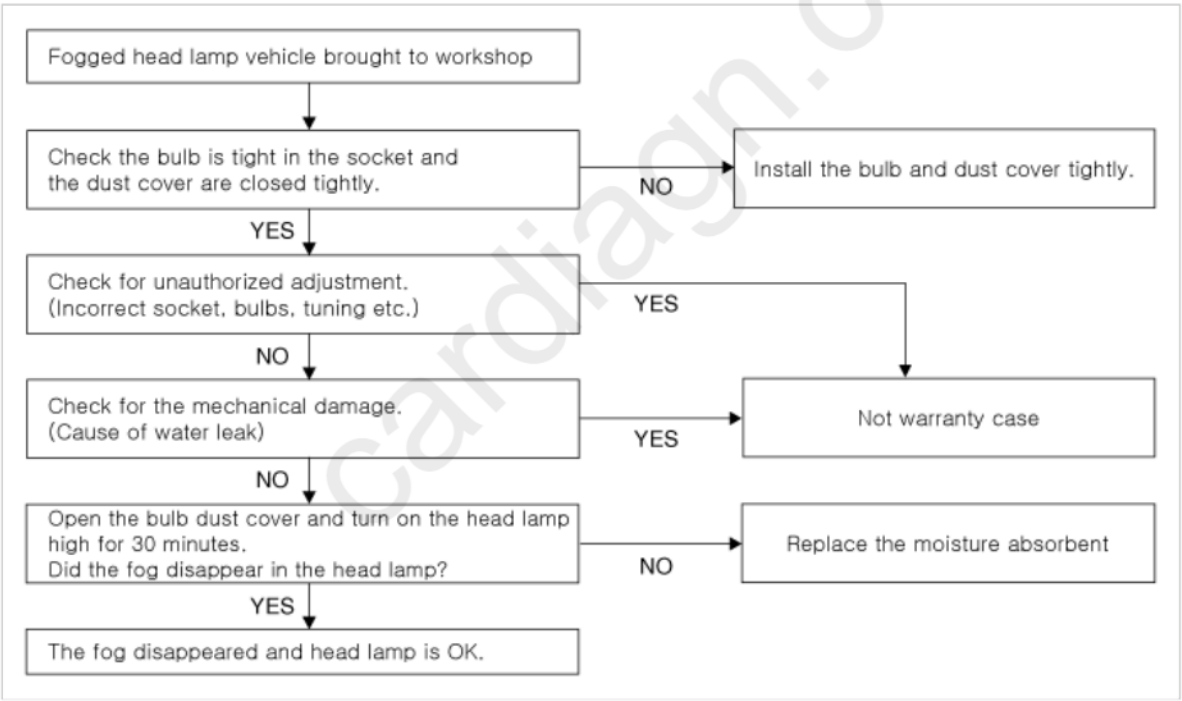


3. Install in the reverse order of removal.

Inspection

Head lamp fogging

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



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Removal

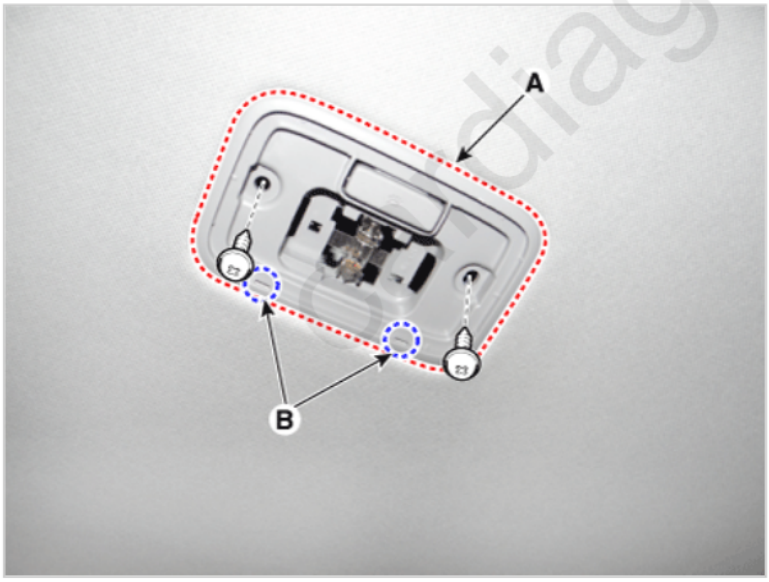
CAUTION

- Put on gloves to prevent hand injuries.
- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.

1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, separate the room lamp lens (A) from the room lamp.



3. Remove the room lamp (A) after loosening the screws.

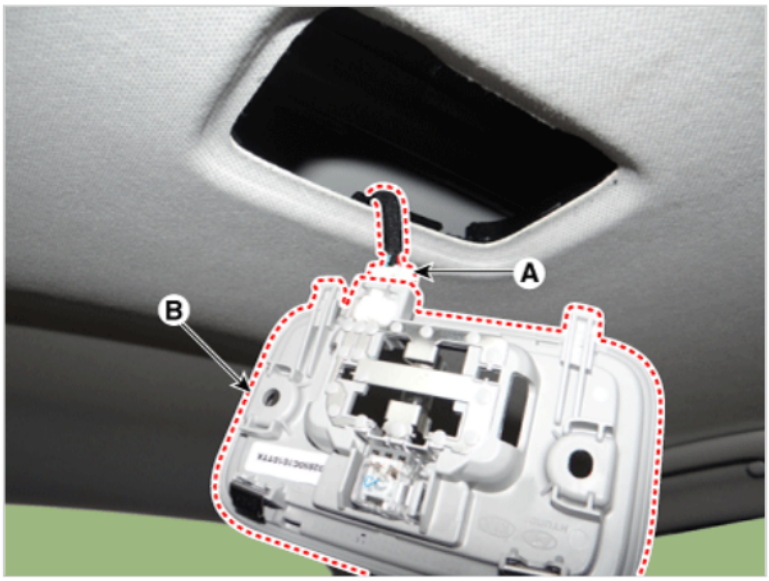


NOTICE

- When removing the room lamp, be careful of the direction in which the tool is inserted (B).
- When inserting the tool in the opposite direction, take caution as the room lamp may be damaged.

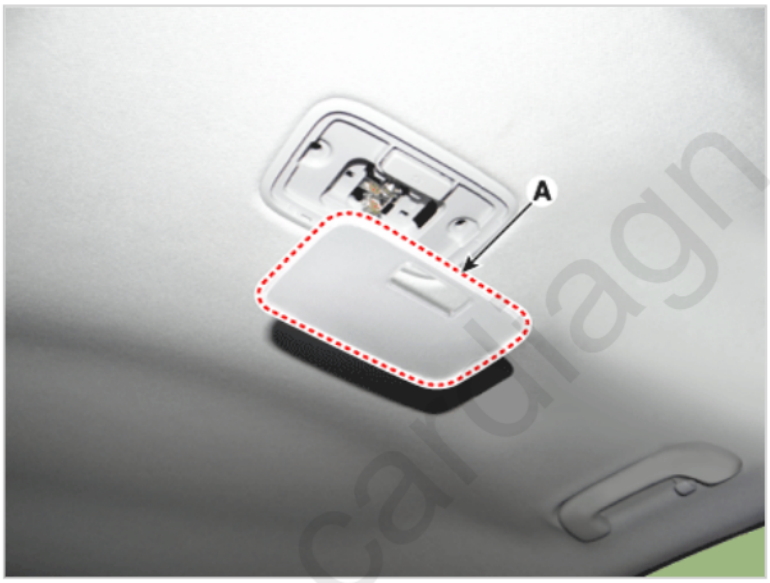
4. Remove the room lamp assembly (B) after disconnecting the room lamp connector (A).

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Bulb Replacement

1. Using a screwdriver or remover, separate the room lamp lens (A) from the room lamp.



2. Disconnect the room lamp bulb (A).

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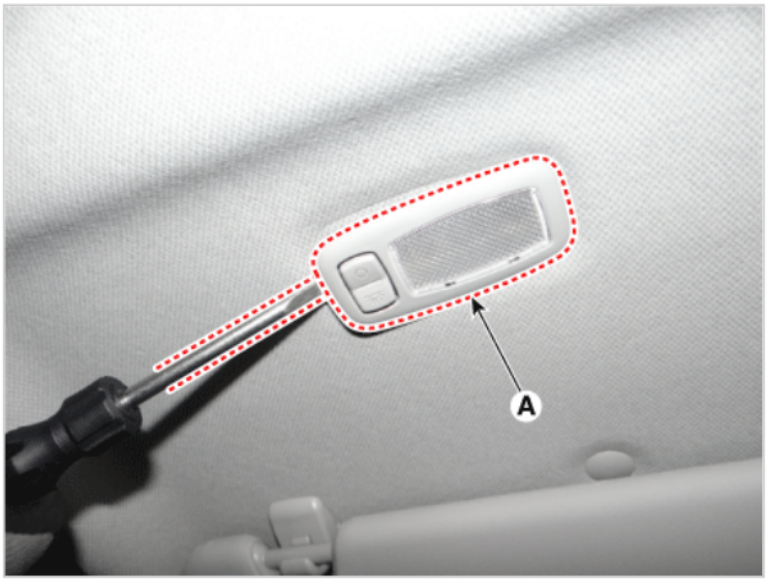
Installation

1. Connect the room lamp connector.
2. Install the room lamp.
3. Install the room lamp lens.
4. Connect the negative (-) battery terminal.

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Removal

1. Disconnect the negative (-) battery terminal.
2. Detach the vanity lamp (A) using a flat-tip screwdriver.

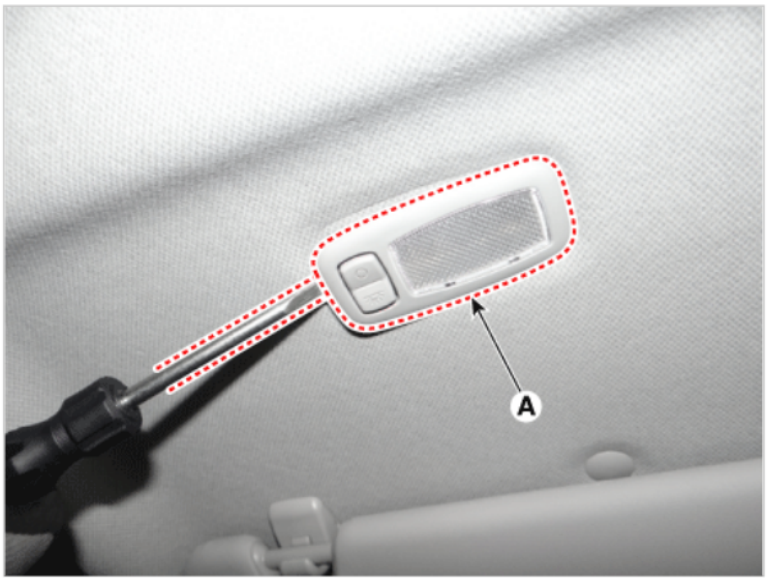


3. Disconnect the vanity lamp connector (A).



Bulb Replacement

1. Detach the vanity lamp (A) using a flat-tip screwdriver.



2. Remove the vanity lamp bulb (A).



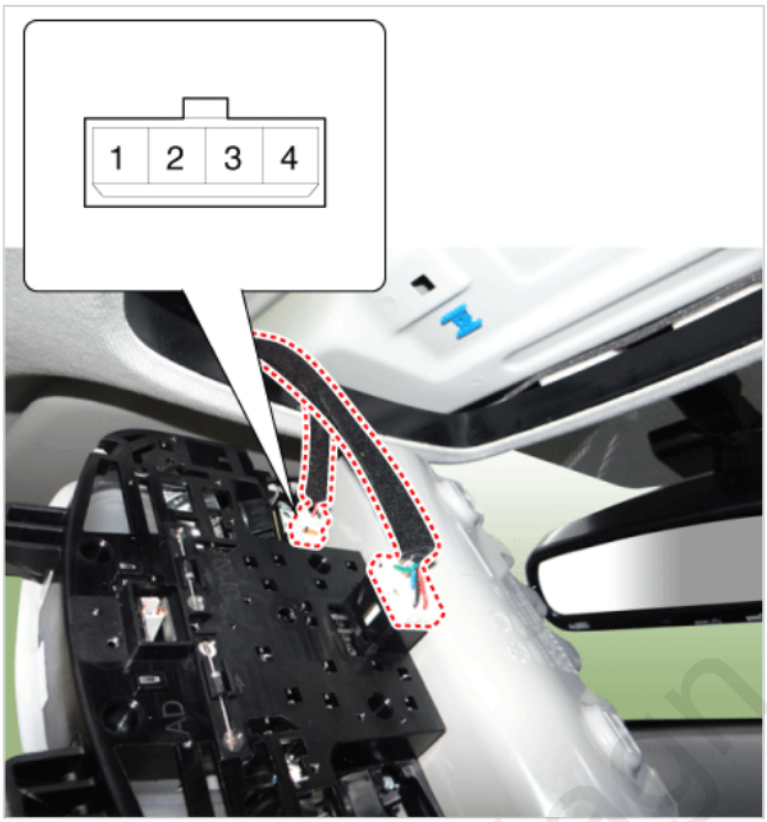
Installation

1. Connect the vanity lamp connector.
2. Install the vanity lamp.
3. Connect the negative (-) battery terminal.

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Inspection

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



Item / Position / Terminal	Map lamp switch			
	Left		Right	
	ON	OFF	ON	OFF
1	●		●	
2	●		●	

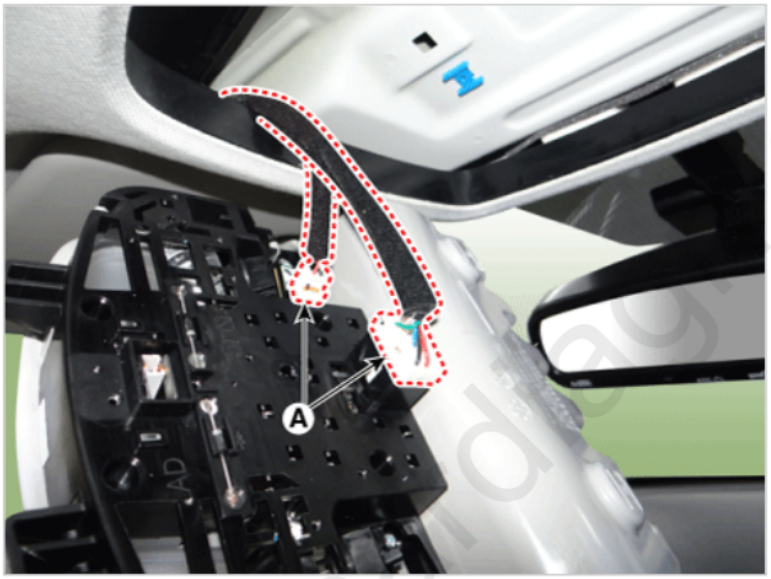
Removal

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

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



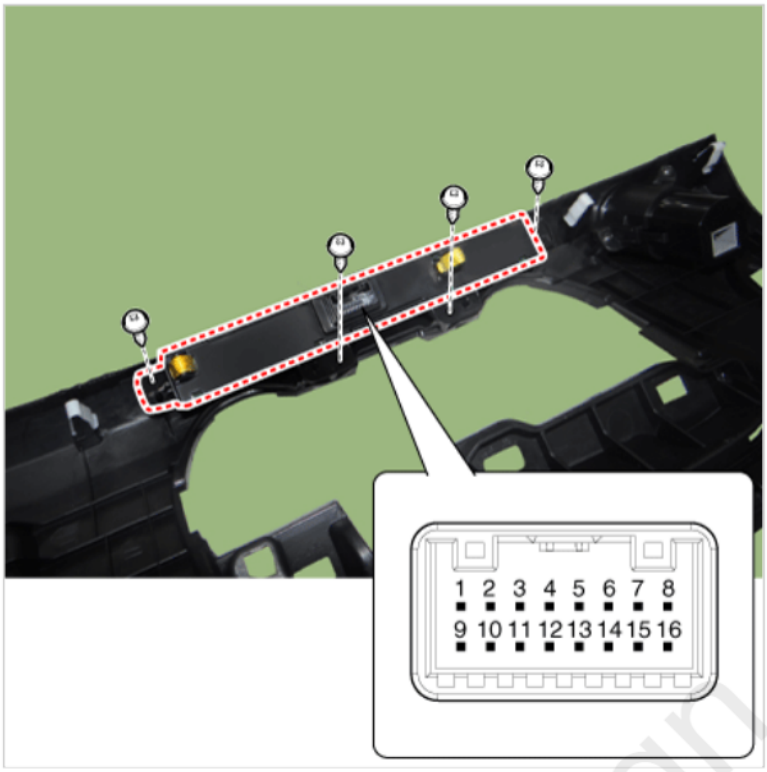
Installation

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

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Inspection

1. Check for continuity between terminals. If the continuity is not as specified, replace the hazard lamp switch.



No.	Description	No.	Description
1	Battery (+)	9	Illumination (+)
2	IGN1	10	-
3	PAB ON	11	PAB OFF
4	Rear center seat belt	12	Rear right seat belt
5	Passenger air bag	13	Rear left seat belt
6	Hazard mode	14	Door lock switch
7	-	15	Door lock indicator
8	Ground	16	Illumination (-)

Terminal / Position	6	8
OFF		
ON	○———	———○

Removal

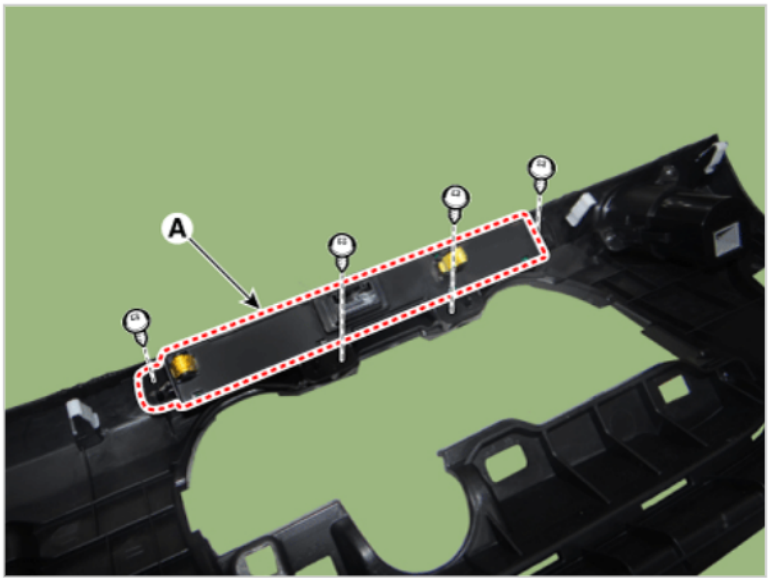
⚠ CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the crash pad when removing/installing because lubricant and oil can leave a stain on the trim.

1. Disconnect the negative (-) battery terminal.

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2. Remove the crash pad center lower panel.
   (Refer to Body - "Crash Pad Center Panel")
3. Remove the hazard warning lamp switch (A) after loosening the mounting screws.

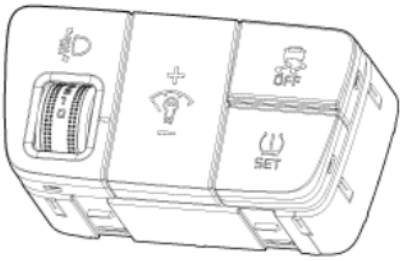


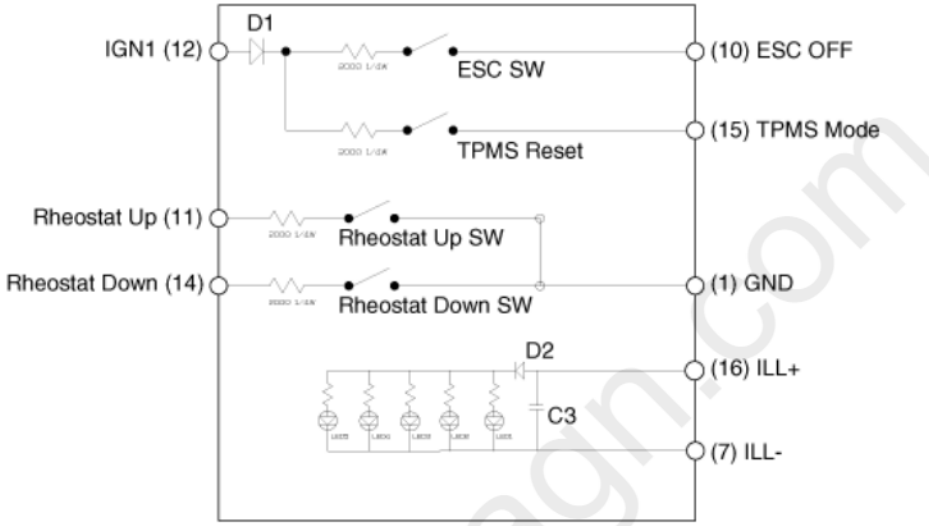
Installation

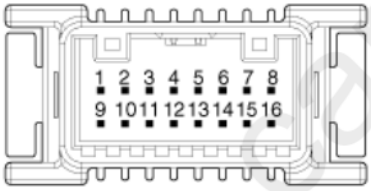
1. Install the hazard warning lamp switch.
2. Install the crash pad center lower panel.
3. Connect the negative (-) battery terminal.

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Components



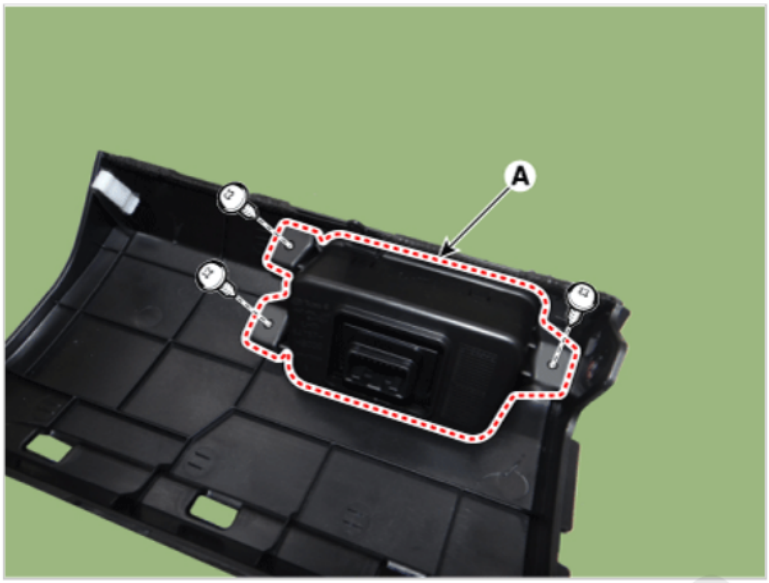


Connector A	No.	Description	No.	Description
	1	Ground	13	-
	2	-	14	ESC OFF
	3	HLLD (IGN1)	15	Rheostat (Up)
	4	-	16	IGN1
	5	HLLD (Ground)	17	-
	6	HLLD Actuator	18	Rheostat (Down)
	7	Illumination (-)	19	TPMS Mode
	8	-	20	Illumination (+)

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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the crash pad side switch (A) after loosening the mounting screws.



Installation

1. Install the crash pad side switch.
2. Install the crash pad lower panel.
3. Connect the negative (-) battery terminal.

Inspection

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

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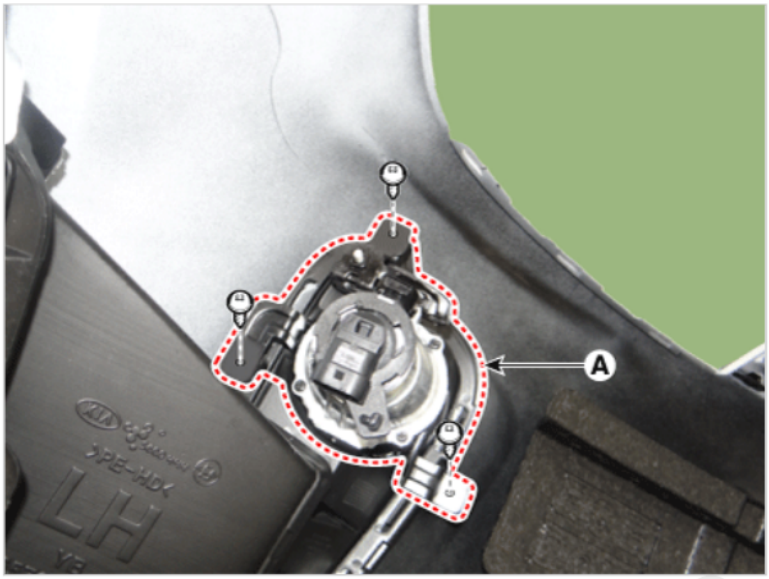


Position / Terminal	UP (+)	DOWN (-)	Description
14		○	Down
1	○	○	GND
11	○		Up
7	○	○	Illumination (-)
16	○	○	Illumination (+)

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Removal

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



Installation

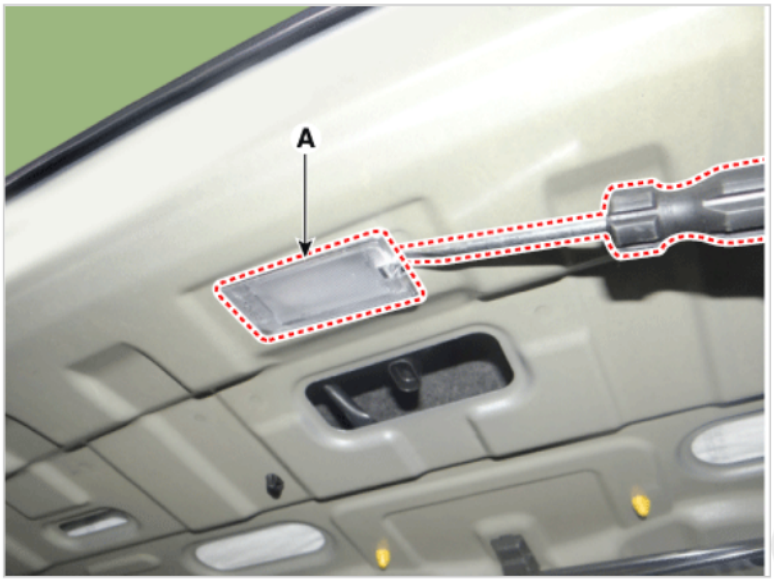
1. Install the front fog lamp assembly.
2. Install the front bumper assembly.
3. Connect the negative (-) battery terminal.

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Removal

[4 Door Only]

1. Disconnect the negative (-) battery terminal.
2. Remove the trunk room lamp (A) after pushing the locking hook.

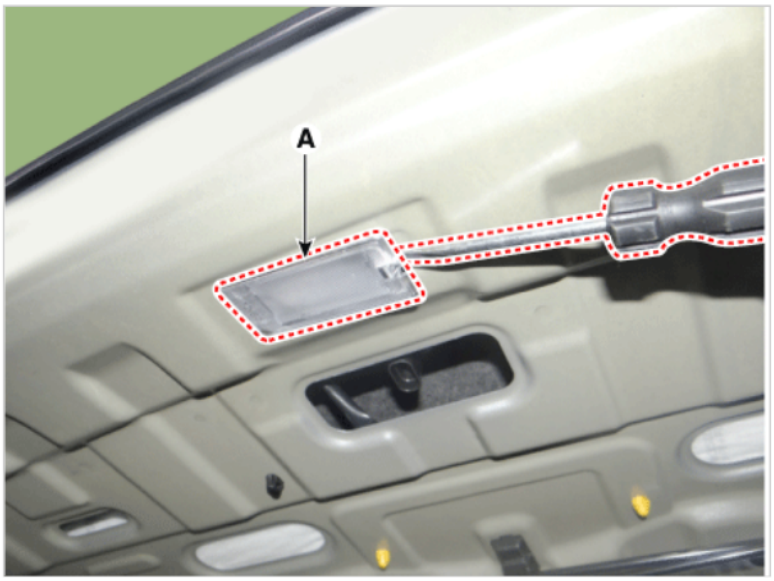


3. Disconnect the trunk room lamp connector (A).



Bulb Replacement

1. Open the trunk lid.
2. Remove the trunk room lamp (A) after pushing the locking hook.



3. Remove the trunk room lamp bulb (A) from the trunk room lamp.



Installation

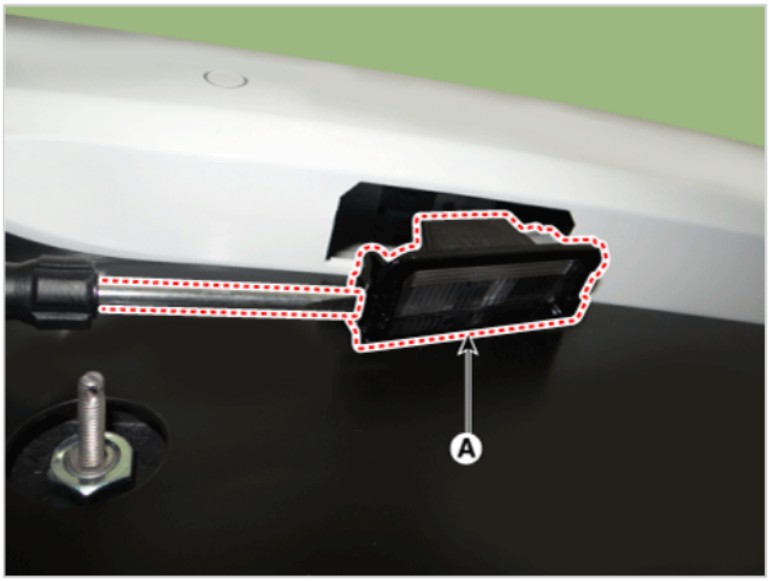
[4 Door Only]

1. Connect the trunk room lamp connector.
2. Install the trunk room lamp.
3. Connect the negative (-) battery terminal.

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Removal

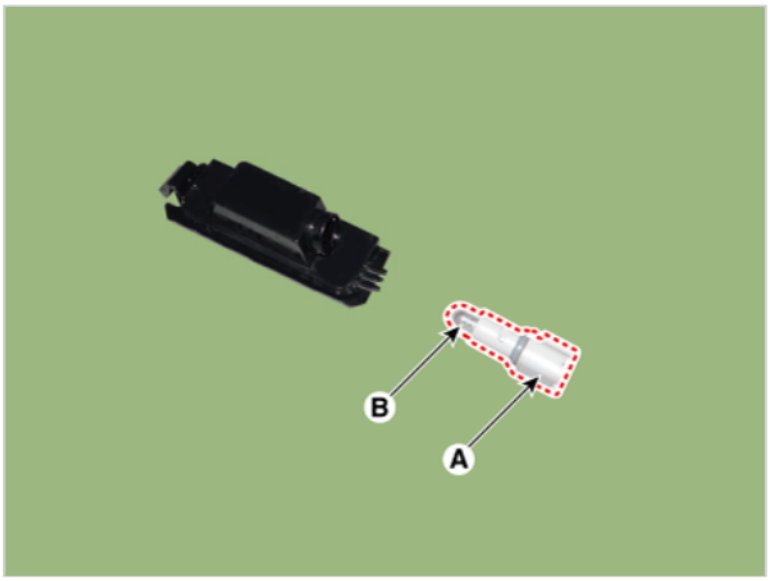
1. Disconnect the negative (-) battery terminal.
2. Remove the license lamp assembly (A) after pressing the locking pin.



3. Disconnect the license lamp connector (A).



4. Remove the license lamp bulb (B) after removing the license lamp socket (A).



Installation

1. Install the license lamp bulb.
2. Connect the license lamp connector.
3. Install the license lamp assembly.
4. Connect the negative (-) battery terminal.

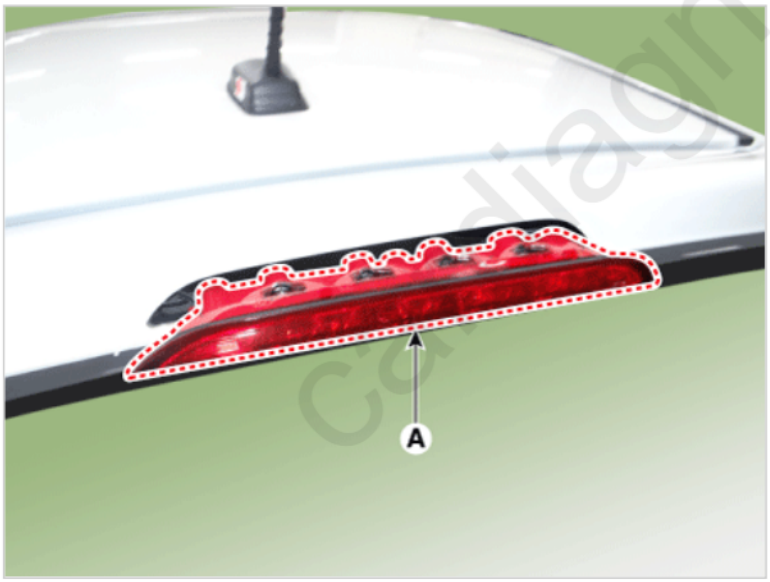
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Removal

[5 Door]

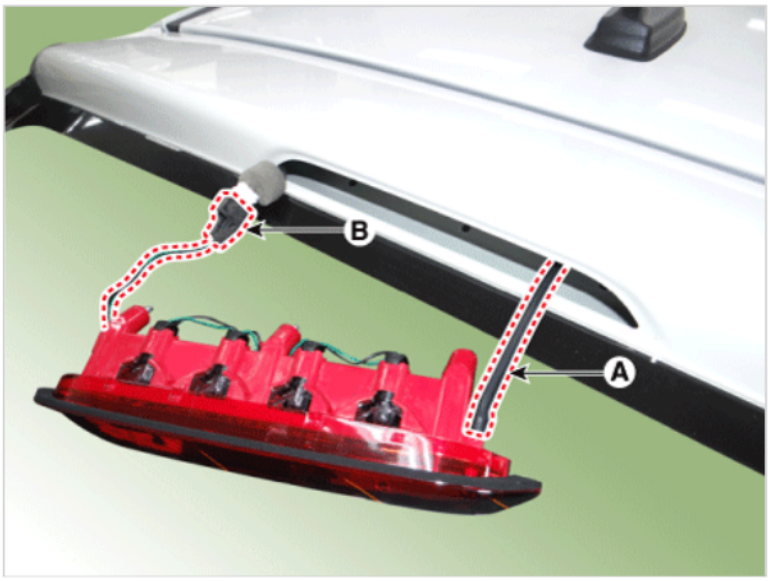
1. Disconnect the negative (-) battery terminal.
2. Open the tailgate.
3. Remove the high mounted stop lamp (A) after loosening the mounting nuts.





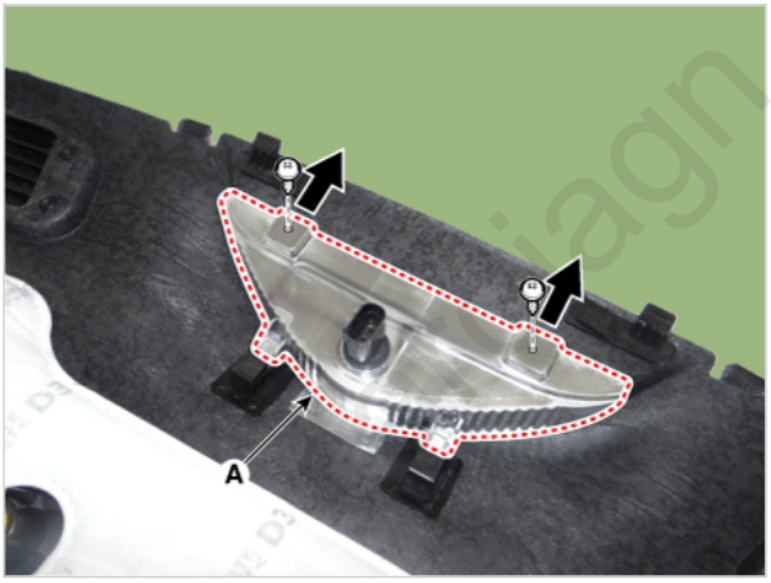
4. Disconnect the washer nozzle (A) and high mounted stop lamp connector (B).

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[4 Door]

1. Disconnect the negative (-) battery terminal.
2. Remove the rear package tray trim.
   (Refer to Body - "Rear Package Tray Trim")
3. Remove the high mounted stop lamp (A) after loosening the mounting screws.

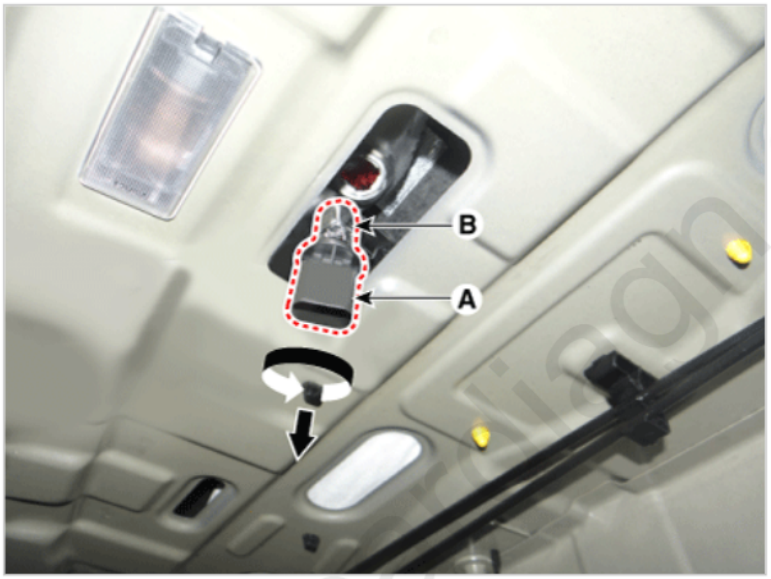


Bulb Replacement

1. Open the trunk lid.
2. Disconnect the high mounted stop lamp connector (A).



3. Remove the high mounted stop lamp bulb (B) after removing the high mounted stop lamp socket (A).



Installation

[5 Door]

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

[4 Door]

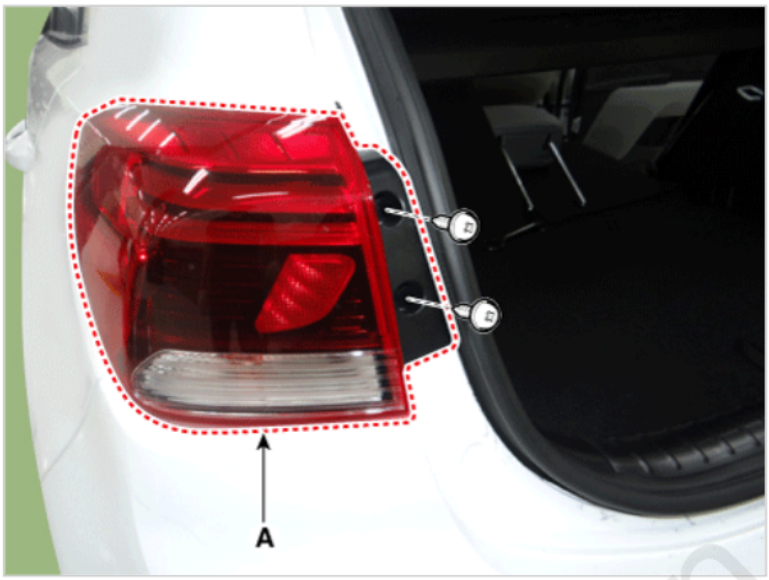
1. Install the high mounted stop lamp.
2. Install the rear package tray trim.
3. Connect the negative (-) battery terminal.

Removal

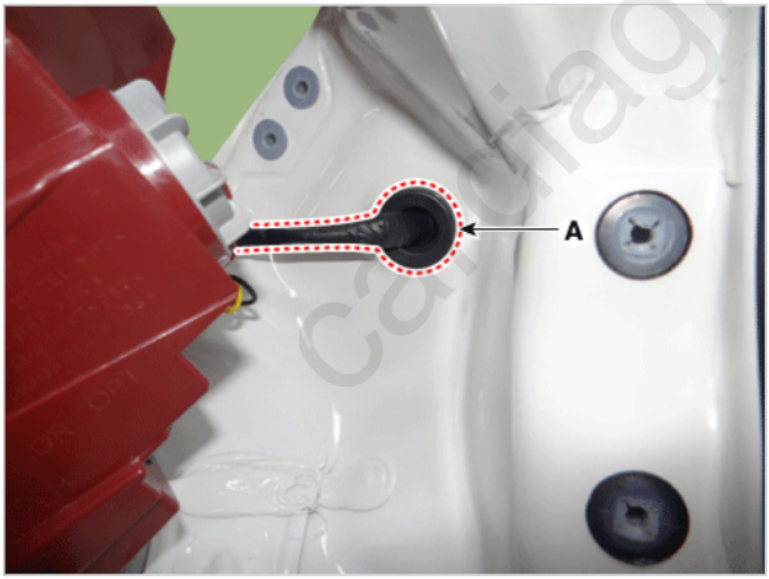
Rear Combination Lamp (Outside)

[5 Door]

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

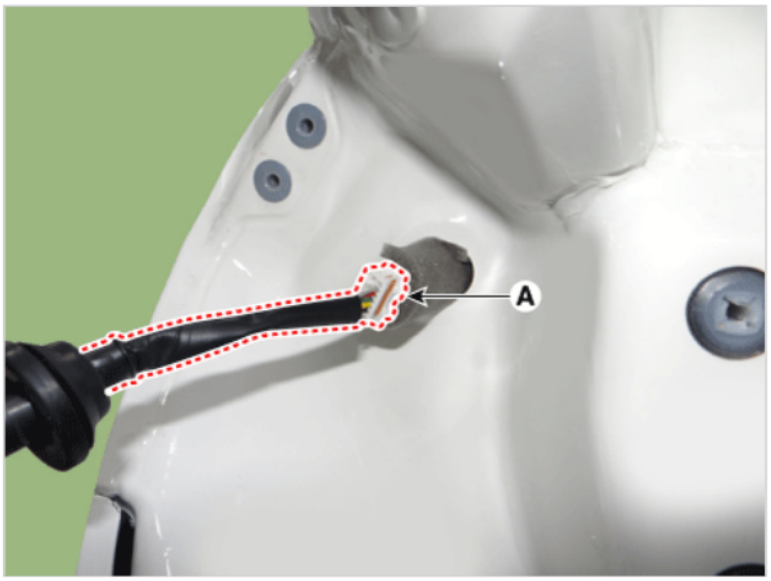


3. Remove the rear combination lamp packing (A).



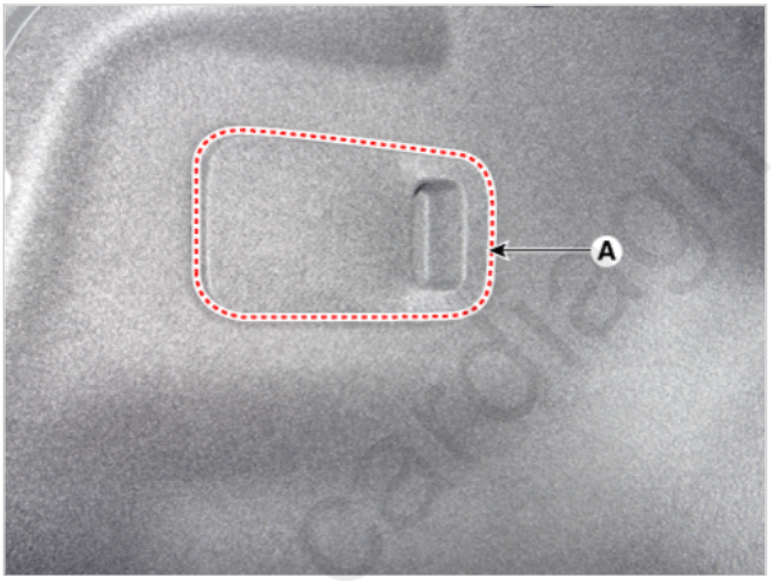
4. Disconnect the rear combination lamp connector (A).

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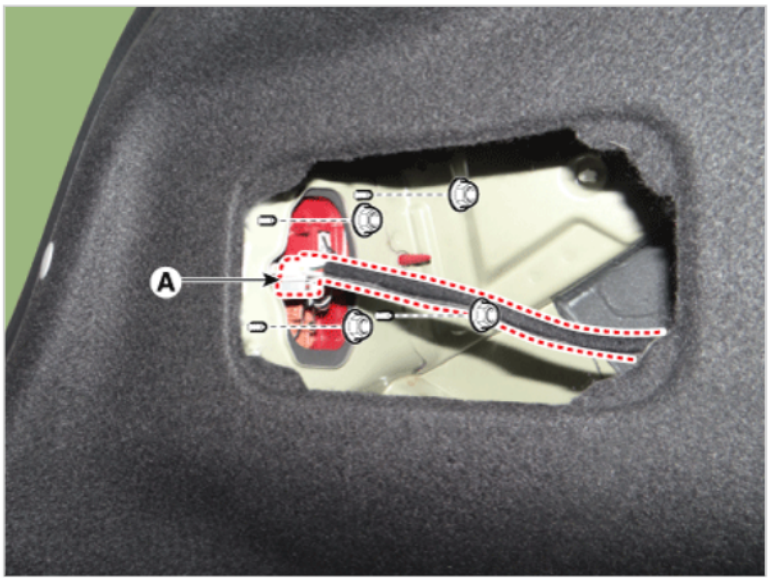


[4 Door]

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



3. Disconnect the rear combination lamp connector (A) after loosening the mounting nuts.



4. Remove the rear combination lamp (A).

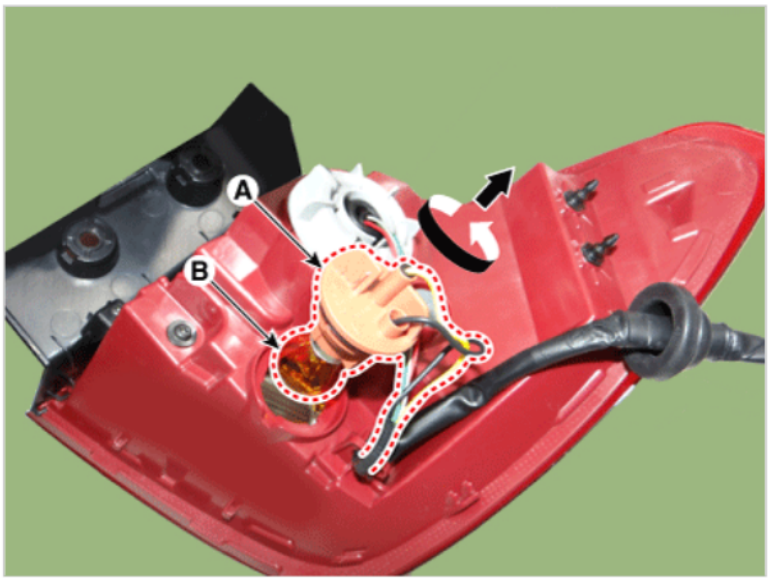


Bulb Replacement

Turn Signal Lamp

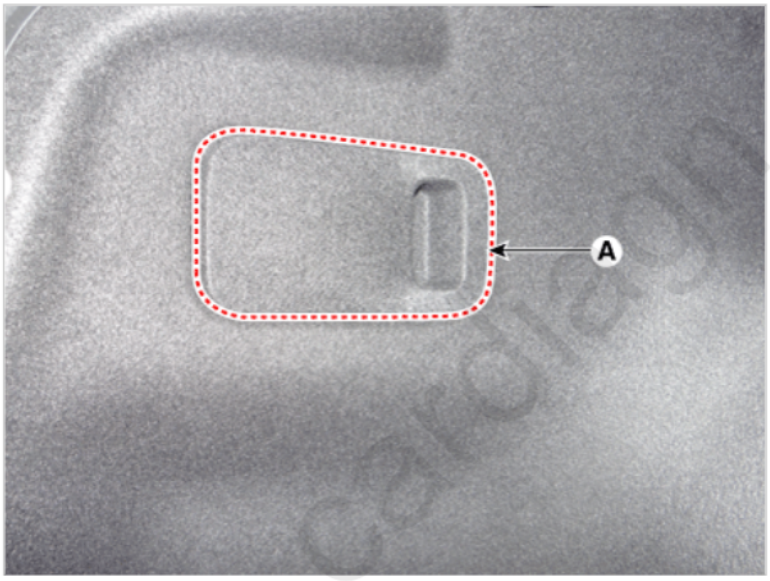
[5 Door]

1. Turn the headlamp switch off.
2. Remove the rear combination lamp (outside).
3. Remove the turn signal lamp bulb (B) by turning the socket (A) counterclockwise.

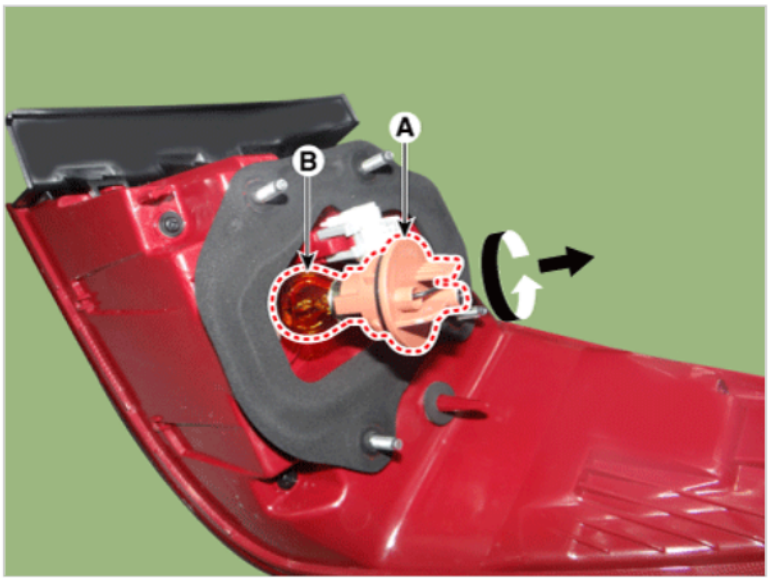


[4 Door]

1. Open the trunk lid.
2. Remove the rear combination lamp cover (A).



3. Remove the turn signal lamp bulb (B) by turning the socket (A) counterclockwise.



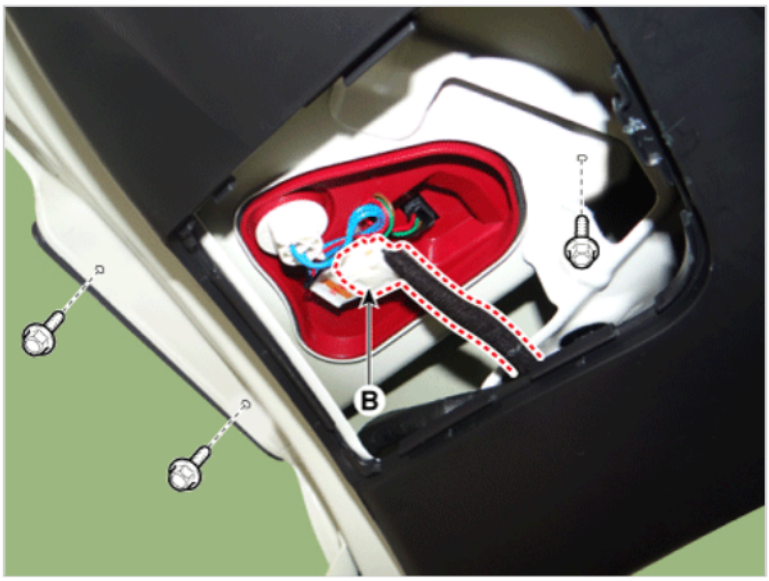
Rear Combination Lamp (Inside)

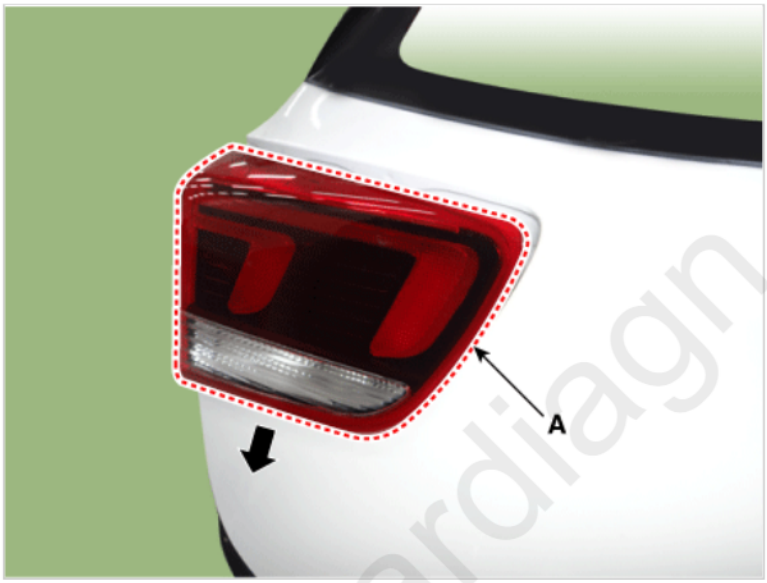
[5 Door]

1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, remove the rear combination lamp cover (A).



3. Disconnect the connector (B) and then remove the rear combination lamp (A) after loosening the nuts.

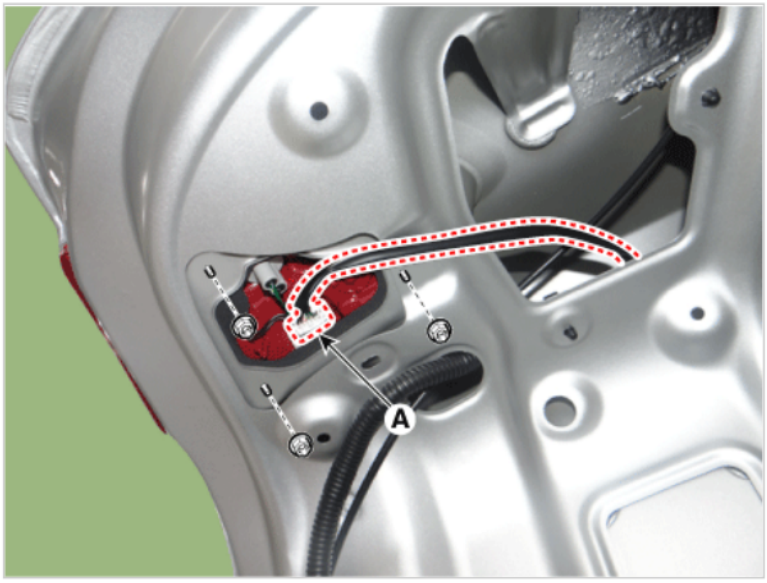




[4 Door]

1. Disconnect the negative (-) battery terminal.
2. Remove the trunk lid trim.
   (Refer to Body - "Trunk Lid Trim")
3. Disconnect the rear combination lamp connector (A) after loosening the mounting nuts.

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4. Remove the rear combination lamp (A).



Bulb Replacement

Back up lamp

[5 Door]

1. Using a screwdriver or remover, remove the rear combination lamp cover (A).

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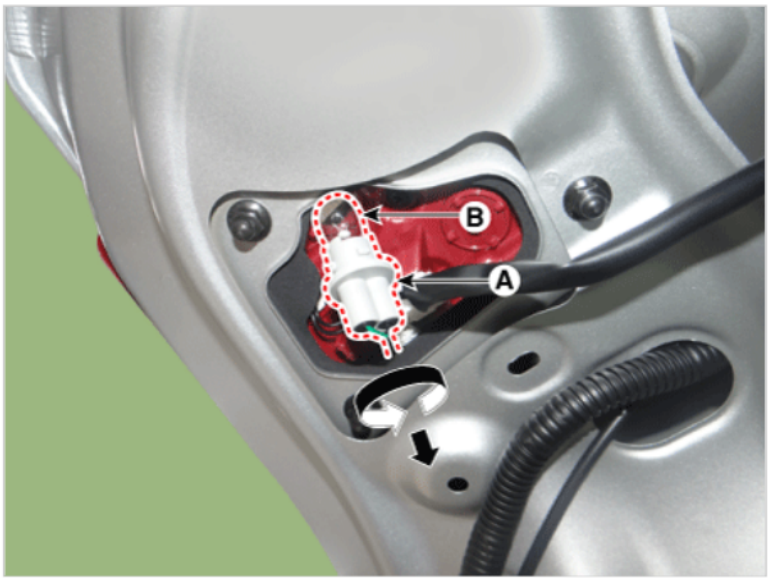


2. Remove the back up lamp bulb (B) by turning the socket (A) counterclockwise.



[4 Door]

1. Remove the trunk lid trim.
2. Remove the back up lamp bulb (B) by turning the socket (A) counterclockwise.



Installation

Rear Combination Lamp (Outside)

[5 Door]

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

[4 Door]

1. Install the rear combination lamp.
2. Connect the rear combination lamp connector.
3. Install the rear combination lamp cover.
4. Connect the negative (-) battery terminal.

Rear Combination Lamp (Inside)

[5 Door]

1. Install the rear combination lamp.
2. Connect the rear combination lamp connector.
3. Install the rear combination lamp cover.
4. Connect the negative (-) battery terminal.

[4 Door]

1. Install the rear combination lamp.
2. Connect the rear combination lamp connector.
3. Install the trunk lid trim.
4. Connect the negative (-) battery terminal.

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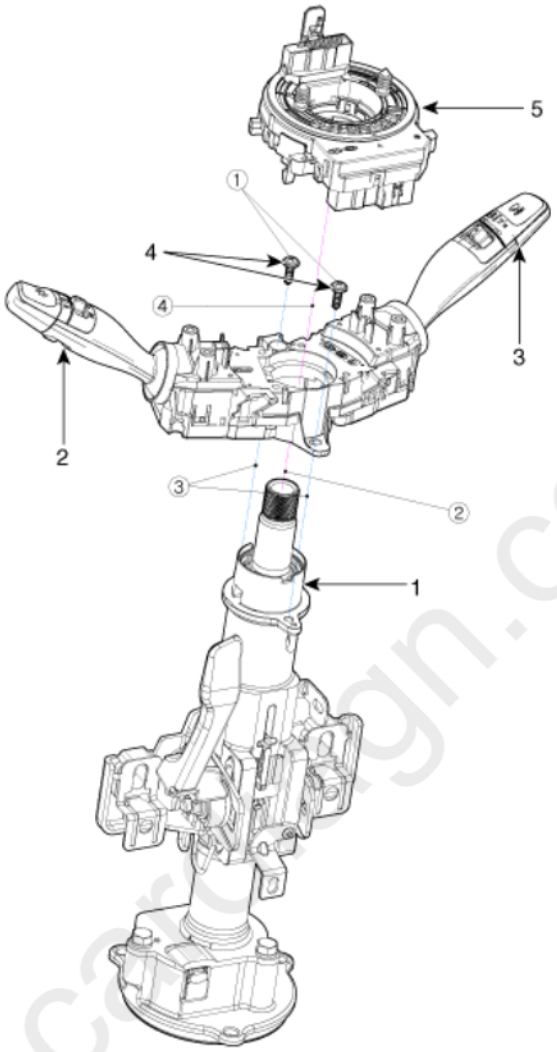
Specifications

Items		Specifications
Rated voltage		DC 12 V
Operating temperature range		-22 - 176°F (-30 - 80°C)
Rated load	Washer	Washer : 6A (Motor load)

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Components

[BCM Type]

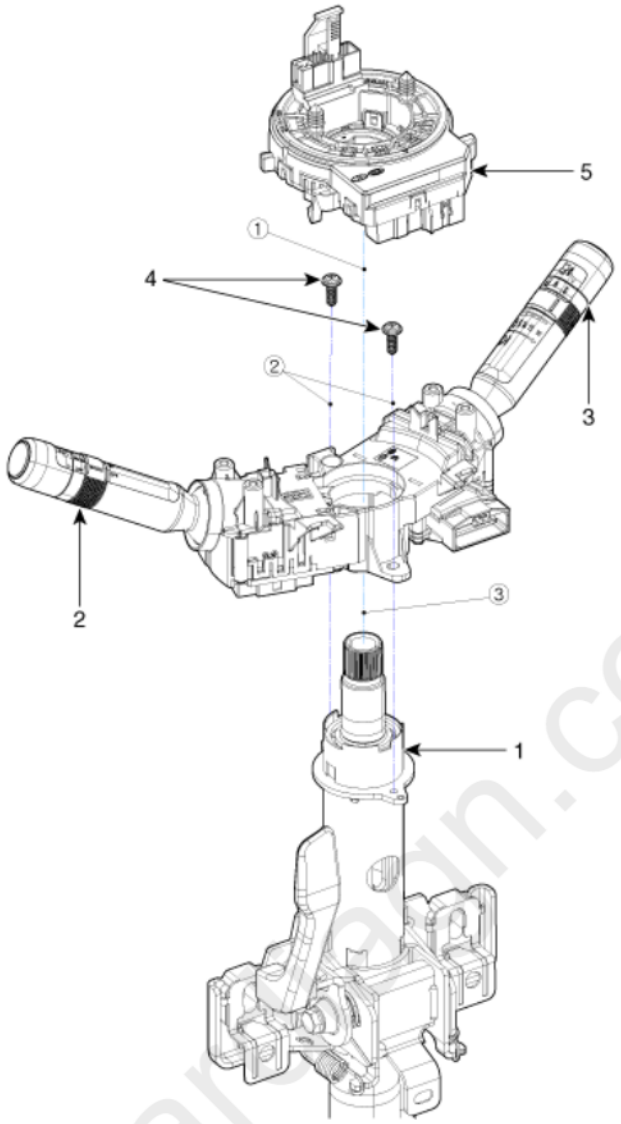


* Assembly sequence :
① → ② → ③ → ④ →Wiring connector

1 . Steering column shaft
2 . Lighting switch
3 . Wiper/Washer switch
4 . Screws
5 . Clock spring

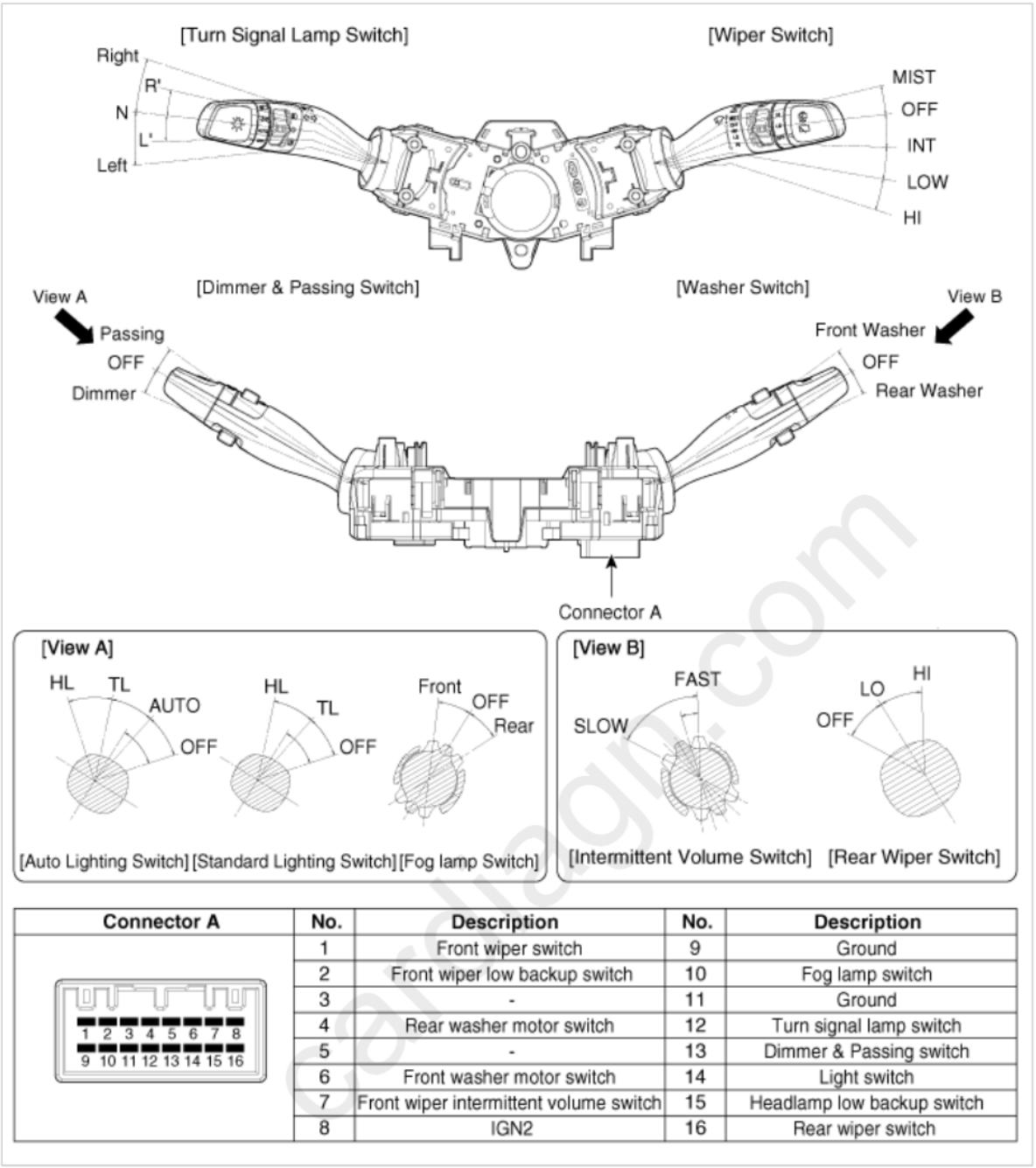
[Non -BCM Type]

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1 . Steering column shaft
2 . Lighting switch
3 . Wiper/Washer switch
4 . Screws
5 . Clock spring

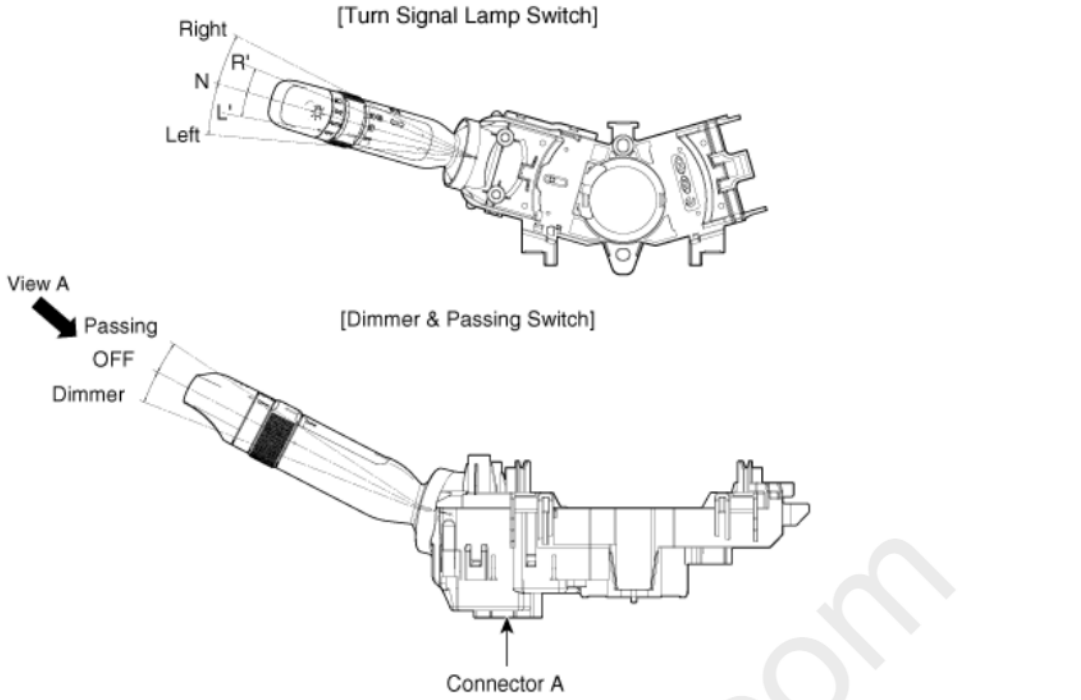
[BCM Type]

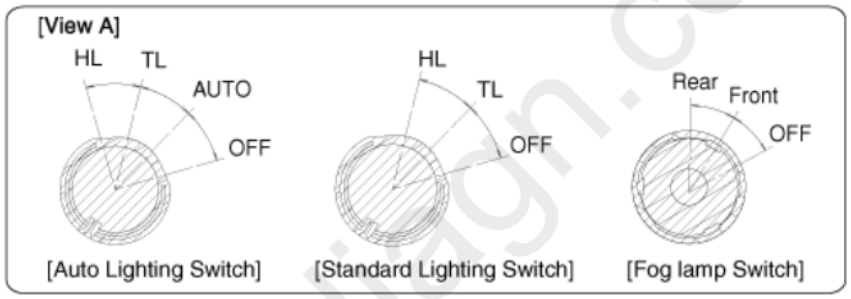


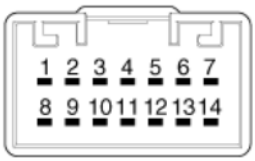
Connector A	No.	Description	No.	Description
	1	Front wiper switch	9	Ground
	2	Front wiper low backup switch	10	Fog lamp switch
	3	-	11	Ground
	4	Rear washer motor switch	12	Turn signal lamp switch
	5	-	13	Dimmer & Passing switch
	6	Front washer motor switch	14	Light switch
	7	Front wiper intermittent volume switch	15	Headlamp low backup switch
	8	IGN2	16	Rear wiper switch

[Non -BCM Type]

(Turn Signal Lamp Switch / Dimmer & Passing Switch)

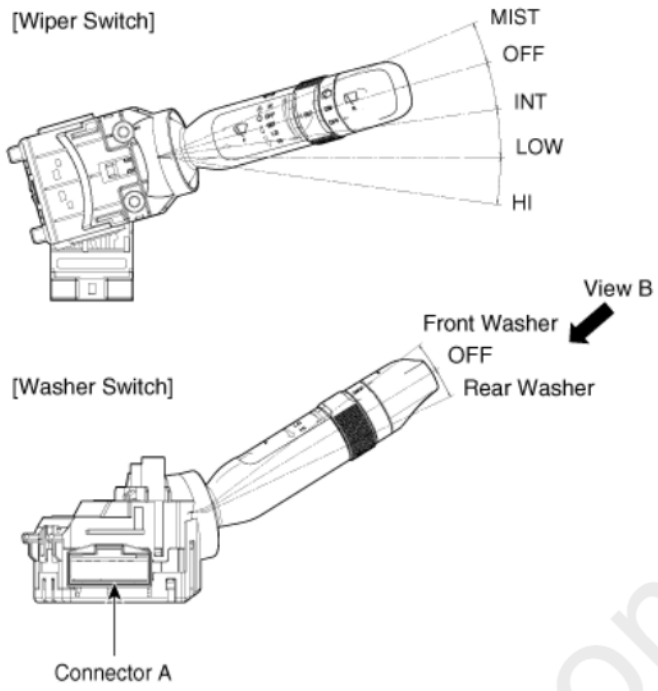


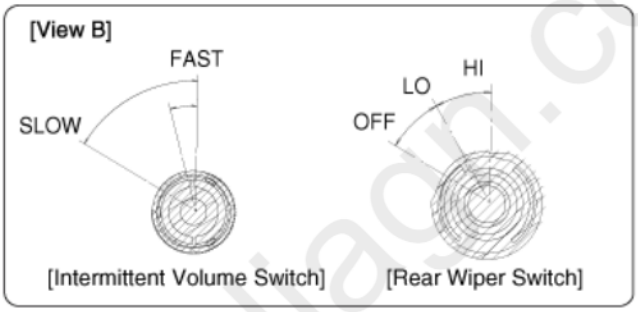


Connector A	No.	Description	No.	Description
	1	Headlamp base switch	8	Headlamp switch base
	2	Front fog switch	9	Auto light switch
	3	Rear fog switch	10	Dimmer switch base
	4	Fog lamp switch base	11	Headlamp high switch
	5	Right turn signal lamp switch	12	Headlamp low switch
	6	Turn signal lamp switch base	13	Headlamp passing beam switch
	7	Left turn signal lamp switch	14	Ground (Lamp switch)

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(Wiper Switch / Washer Switch)





Connector A	No.	Description	No.	Description
1 2 3 4 5 6 7 8 9 10 11 12 13 14	1	Wiper earth	8	-
	2	Front wiper high speed switch	9	-
	3	Front wiper & washer & mist power	10	-
	4	Front wiper low speed switch	11	Rear wiper parking
	5	Front wiper parking	12	Rear washer motor switch
	6	Front washer motor switch	13	Rear wiper switch
	7	-	14	Rear wiper & washer power

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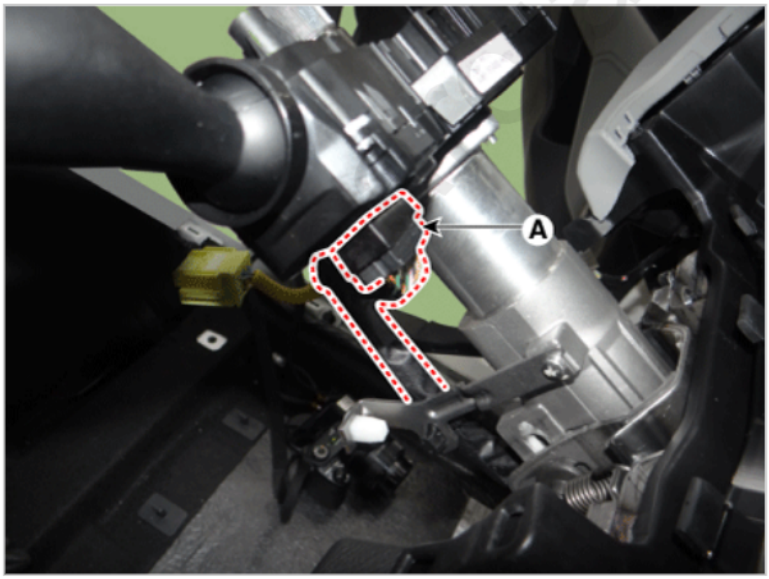
Removal

[BCM Type]

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



5. Disconnect the multifunction switch connector (A).



6. Remove the multifunction switch assembly (A) after loosening the screws.



[Non -BCM Type]

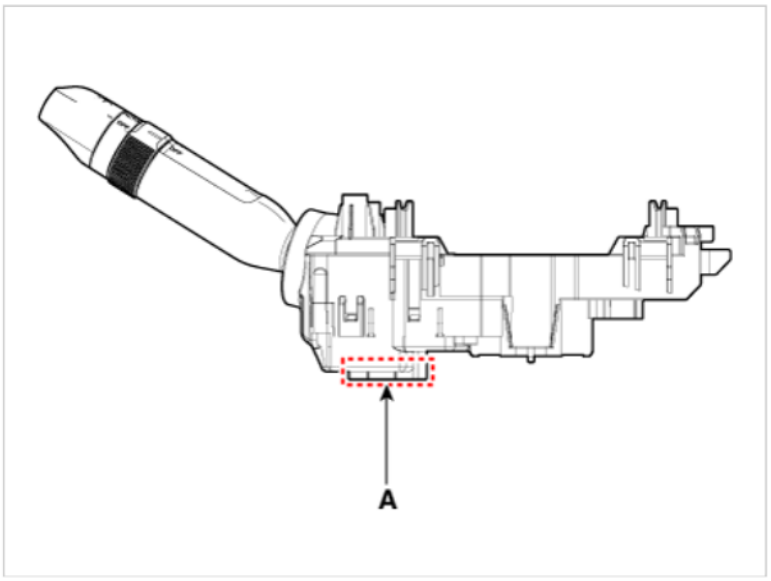
(LH)

(Turn Signal Lamp Switch / Dimmer & Passing Switch)

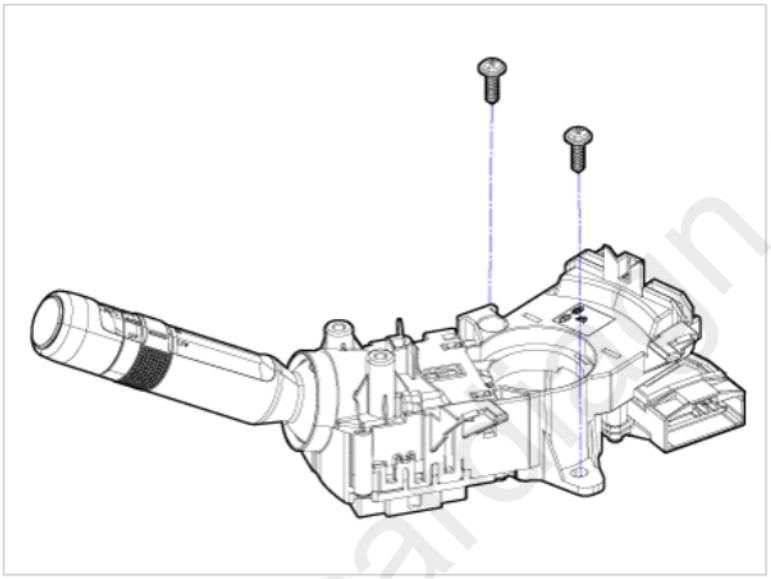
1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds after loosening the screws.
   (Refer to Body - "Steering Column Shroud Panel")
3. Remove the wiper switch / washer switch.
   (Refer to Body Electrical System - "Multifunction Switch")
4. Remove the steering wheel.
   (Refer to Steering System - "Steering Wheel")
5. Remove the clock spring.
   (Refer to Restraint - "Driver Airbag (DAB) Module and Clock Spring")



6. Disconnect the turn signal lamp switch / dimmer & passing switch connector (A).



7. Remove the turn signal lamp switch / dimmer & passing switch (A) after loosening the mounting screws.

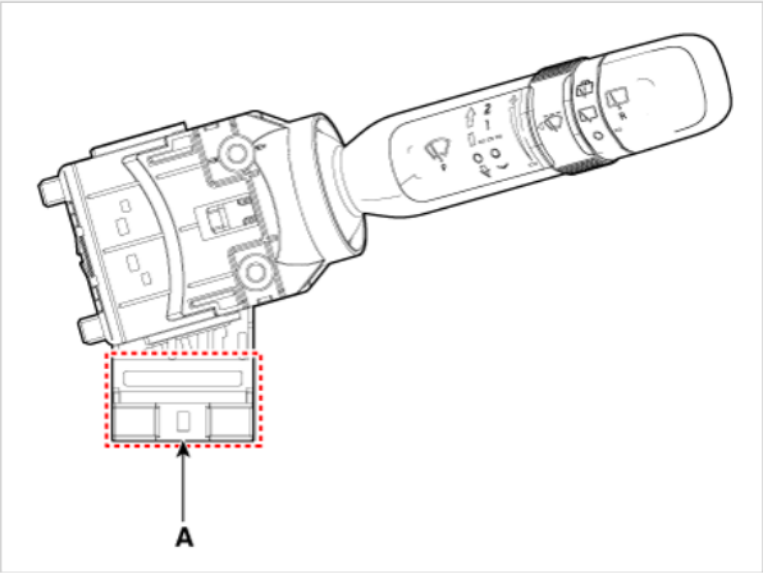


(RH)

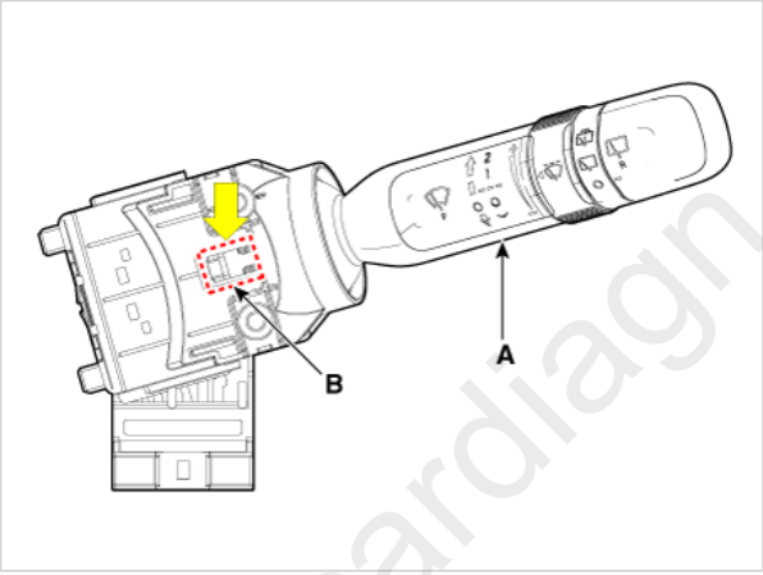
(Wiper Switch / Washer Switch)

1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds after loosening the screws.
   (Refer to Body - "Steering Column Shroud Panal")
3. Disconnect the wiper switch / washer switch connector (A).

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4. Remove the wiper switch / washer switch (A) by pushing the lock pin (B).



Installation

[BCM Type]

1. Install the multifunction switch.
2. Install the clock spring.
3. Install the steering column upper and lower shrouds.
4. Install the steering wheel.
5. Connect the negative (-) battery terminal.

[Non-BCM Type]

(LH)

(Turn Signal Lamp Switch / Dimmer & Passing Switch)

1. Install the turn signal lamp switch / dimmer & passing switch.
2. Connect the turn signal lamp switch / dimmer & passing switch connector.
3. Install the clock spring.
4. Install the steering wheel.

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5. Install the wiper switch / washer switch.
6. Install the steering column upper and lower shrouds.
7. Connect the negative (-) battery terminal.

(RH)

(Wiper Switch / Washer Switch)

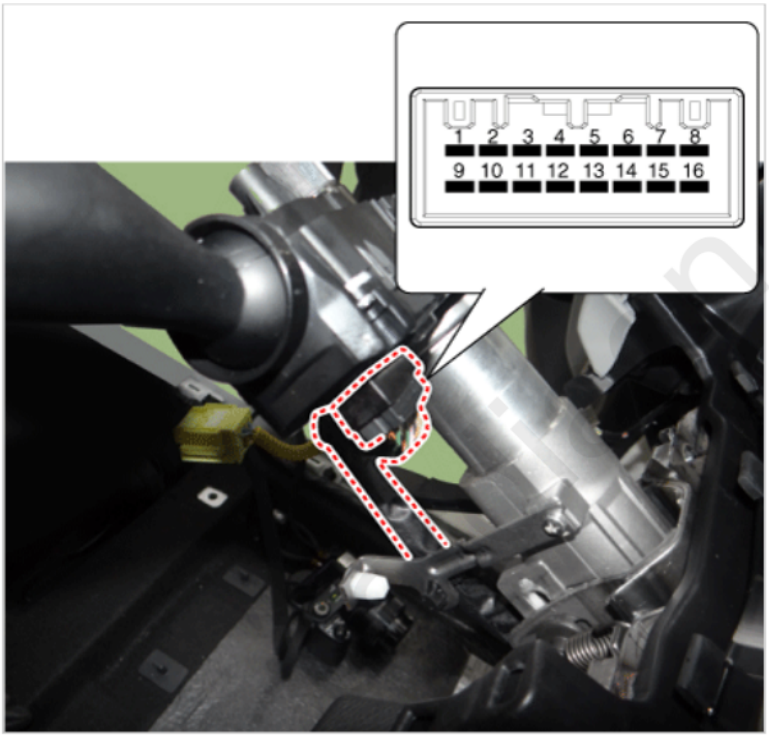
1. Install the wiper switch / washer switch.
2. Connect the wiper switch / washer switch connector.
3. Install the steering column upper and lower shrouds.
4. Connect the negative (-) battery terminal.

Inspection

Multifunction Switch Inspection

[BCM Type]

1. Check for continuity between the terminals in each switch position as shown below.



Switch	Switch position	Switch terminal	Resistance (Ω, ±3.5%)
Front wiper switch	MIST	1-9	330
	OFF		∞
	Intermittent (AUTO)		800
	LOW		1,800
	HIGH		5,700
Rear wiper switch	OFF	9-16	∞
	LOW		910
	HIGH		2,910
Wiper intermittent volume	Volume 1	7-9	330
	Volume 2		690
	Volume 3		1,310
	Volume 4		2,610

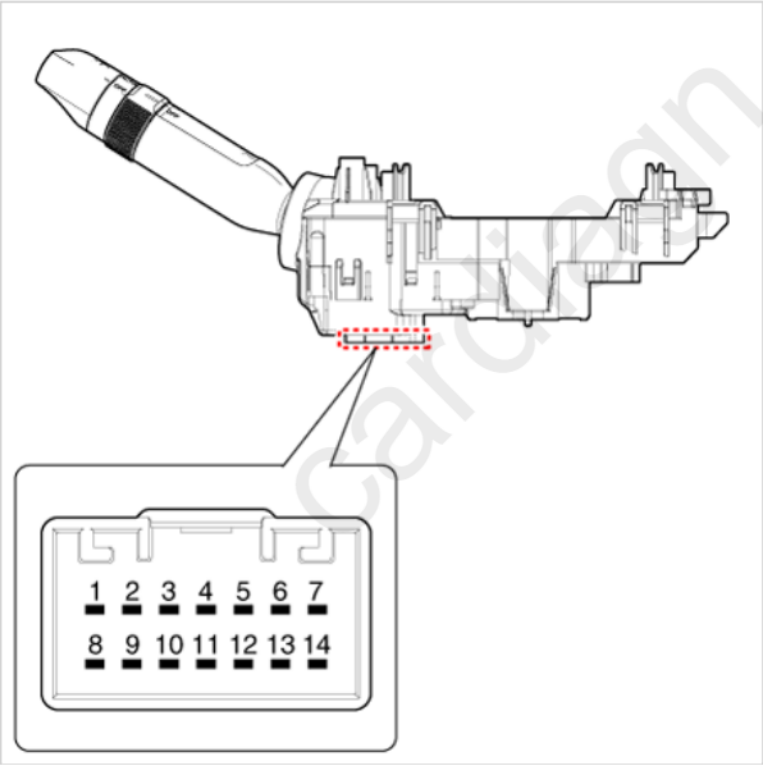
	Volume 5		7,310
Fog lamp switch	OFF	9-10	∞
	Front fog lamp		910
	Rear fog lamp		2,910
Turn signal switch	OFF	9-12	∞
	Left		910
	Right		2,910
Dimmer & Passing switch	OFF	9-13	∞
	Passing		910
	Dimmer		2,910
Light switgh	OFF	9-14	∞
	AUTO		680
	Tail lamp		1,680
	Low beam		5,580

[Non -BCM Type]

(LH)

(Turn Signal Lamp Switch / Dimmer & Passing Switch)

1. Check for continuity between the terminals in each switch position as shown below.



Lighting switch (Auto light)

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Terminal / Position	14	9	8	1
OFF				
Auto	○——	——○		
↕	○——	——○	——○	
Tail	○——	——	——○	
↕	○——	——	——○	
Headlamp	○——	——	——○	——○

Lighting Switch (Standard)

Terminal / Position	14	9	8	1
OFF				
Tail	○——	——	——○	
↕	○——	——	——○	
Headlamp	○——	——	——○	——○

Dimmer And Passing Switch

Terminal / Position	10	12	11	14	13
High	○——	——	——○		
↕	○——	——○	——○		
Low	○——	——○			
↕	○——	——○		——○	——○
Passing				○——	——○

Turn Signal Switch

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Terminal / Position	6	7	5
Left	○	○	
N			
Right	○		○

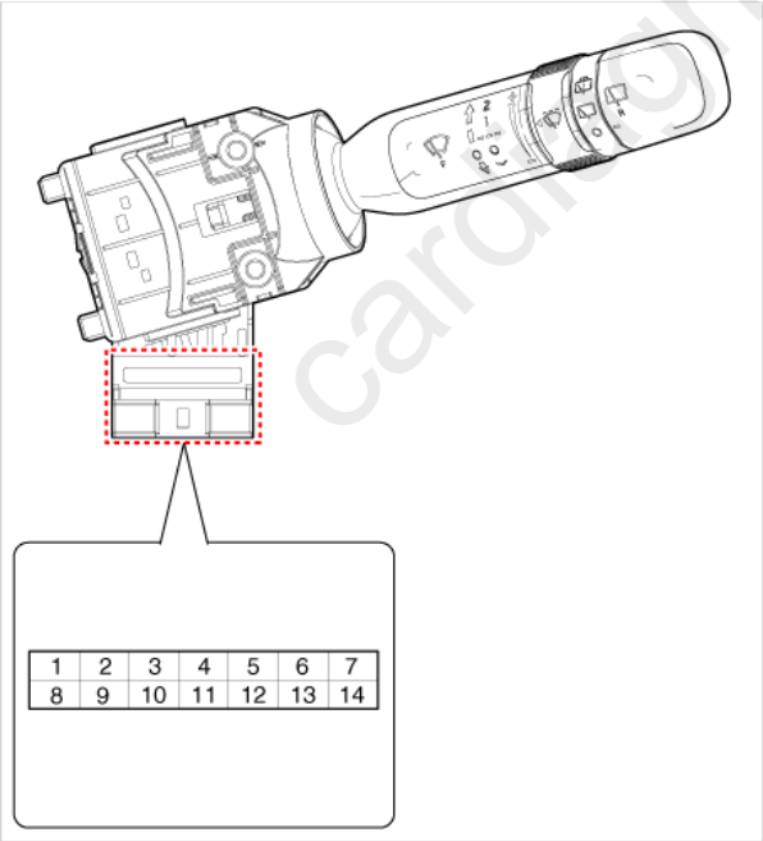
Front/Rear Fog Lamp

Terminal / Position	4	2	3
OFF			
Front fog	○	○	
Rear fog	○	○	○

(RH)

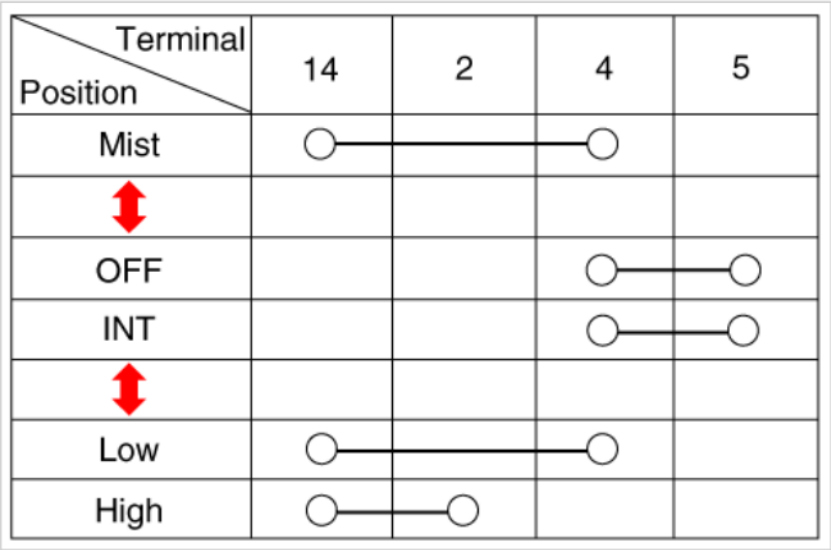
(Wiper Switch / Washer Switch)

1. Check for continuity between the terminals in each switch position as shown below.

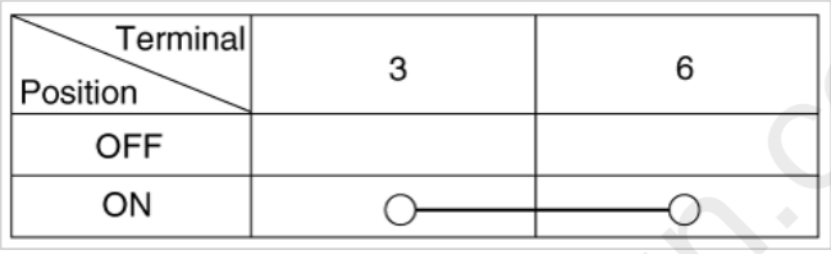


Front Wiper & Washer Switch

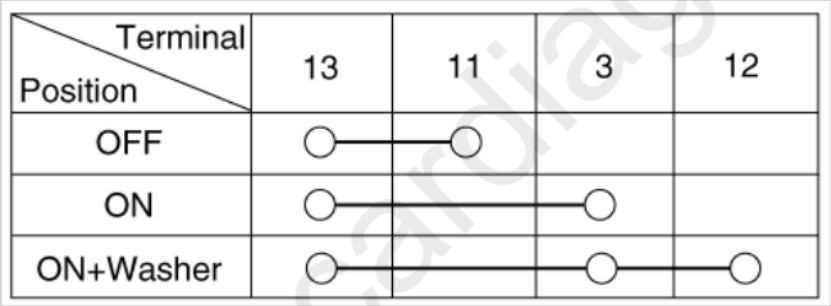
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Front Washer Switch



Rear Wiper & Washer Switch



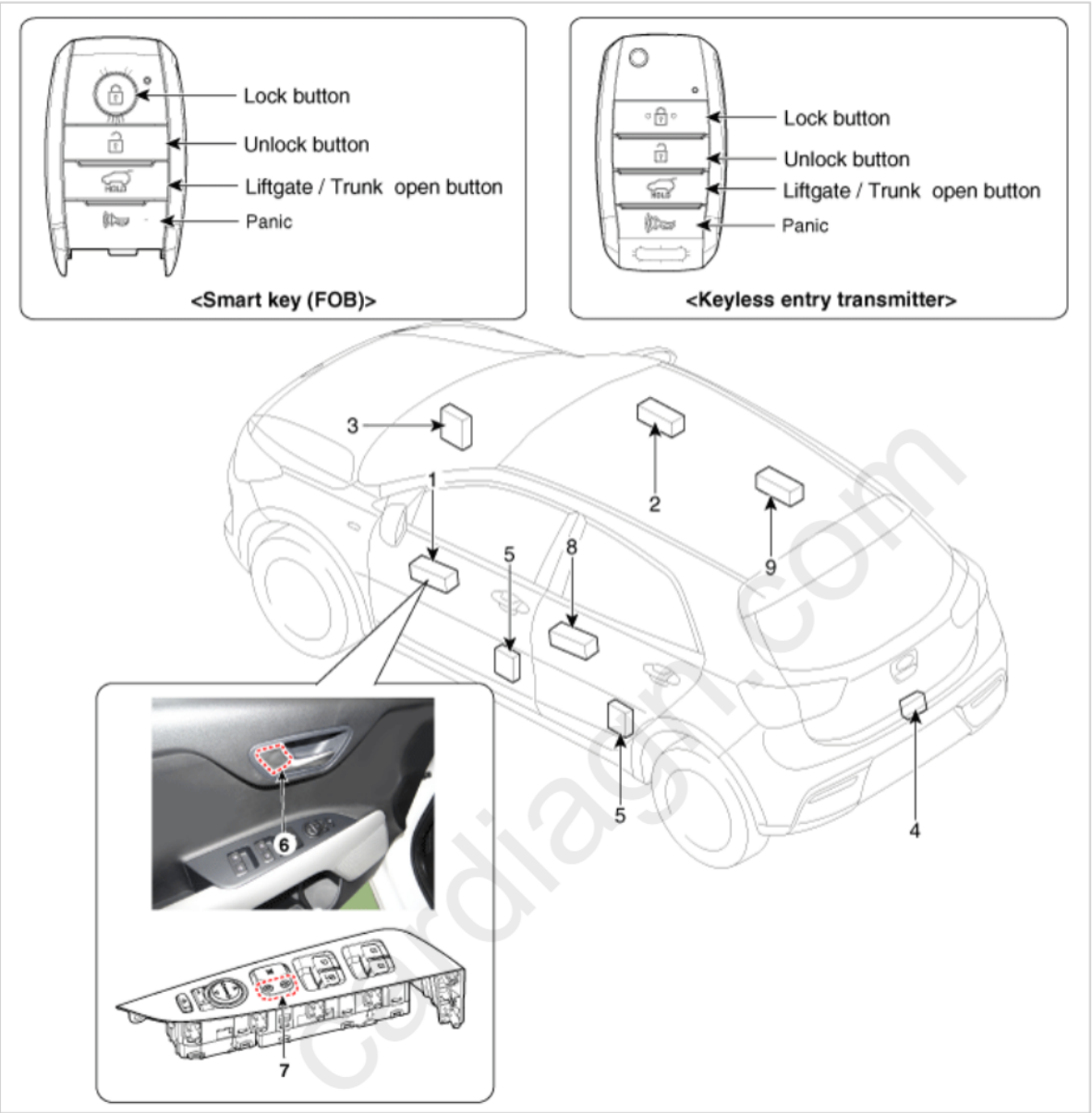
Inspection (With KDS)

[BCM Type Only]

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system(KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. Select the "Current Data" menu to search the current state of the input/output data.

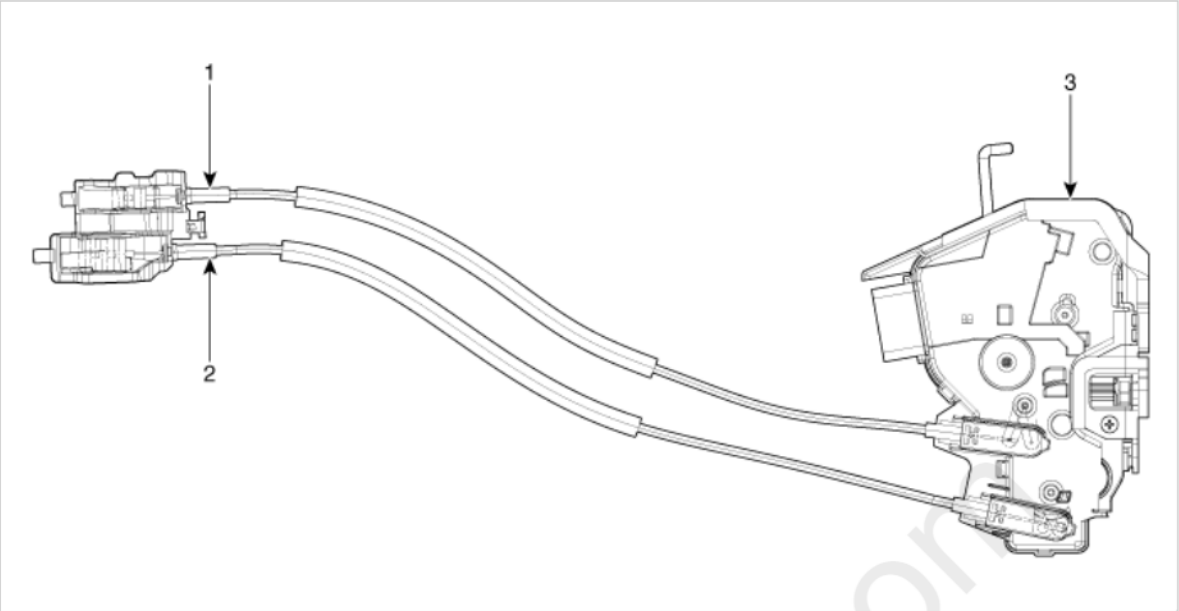
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Component Location



1. Driver power window switch
2. Assist power window switch
3 . Body Control Module (BCM)
4 . Liftgate / Trunk actuator
5 . Door latch lock actuator
6. Door lock knob
7. Door lock switch
8 . Rear left power window switch
9 . Rear right power window switch

Components



1. Door lock/unlock knob cable
2 . Door inside handle cable
3. Door latch assembly

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Inspection

CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the trim when removing/installing because lubricant and oil can leave a stain on the trim.

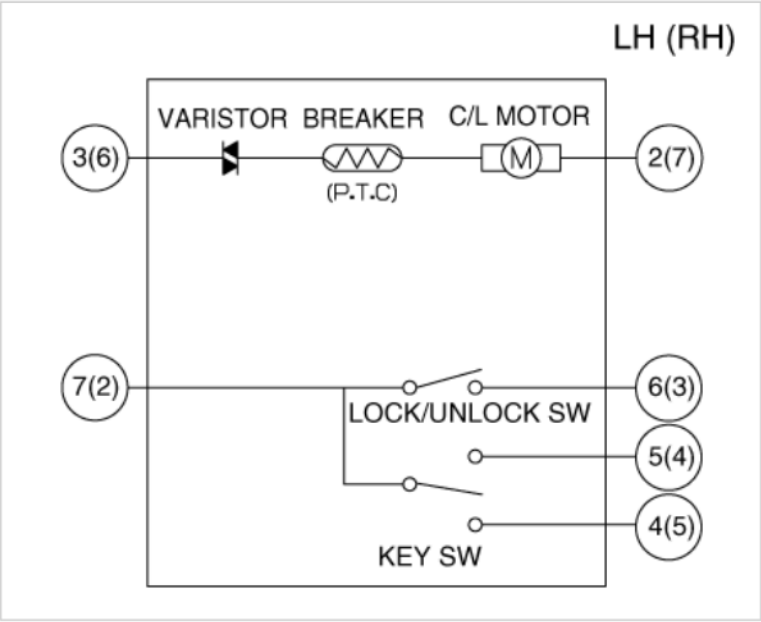
Front Door Lock Module Inspection

1. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the front door trim seal.
   (Refer to Body - "Front Door Window Glass")
3. Disconnect the connector from the actuator.



No.	Pin Information	
	LH	RH
1	-	-
2	Motor 2	COM
3	Motor 3	Lock / Unlock switch
4	Key unlock switch	Key lock switch
5	Key lock switch	Key unlock switch
6	Lock / Unlock switch	Motor 3
7	COM	Motor 2
8	-	-

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



(LH)

Operation / Terminal	Central Lock	Central Unlock
2	+	-
3	-	+
6 & 7	ON → OFF	OFF → ON
5 & 7	Key Rotate CW (LH) / CCW (RH) : ON Key Return : OFF	
4 & 7	Key Rotate CCW (LH) / CW (RH) : ON Key Return : OFF	

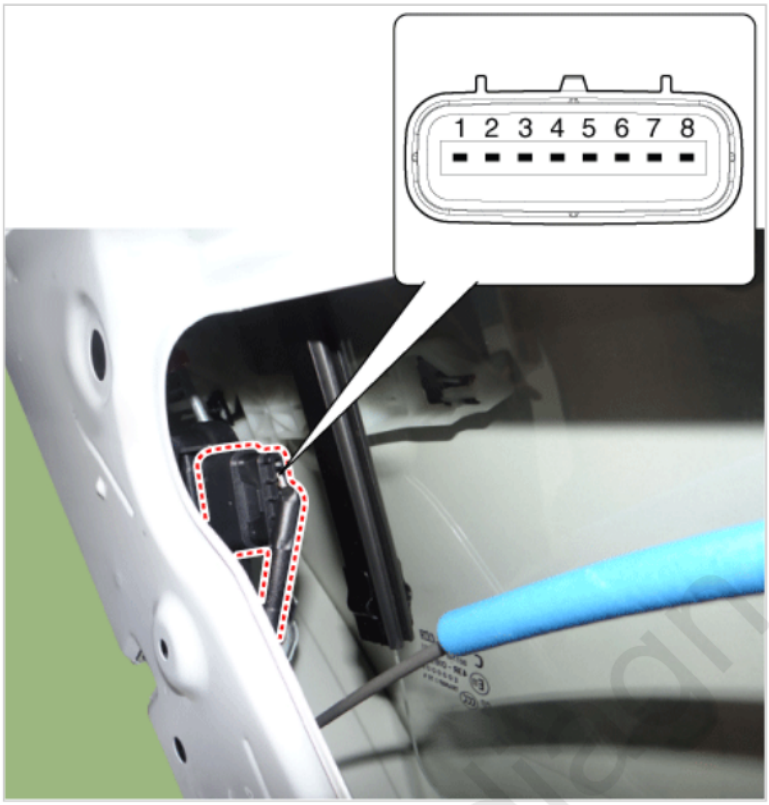
(RH)

Operation / Terminal	Central Lock	Central Unlock
7	-	+
6	+	-
2 & 3	ON → OFF	OFF → ON
2 & 4	Key Rotate CW (LH) / CCW (RH) : ON Key Return : OFF	
2 & 5	Key Rotate CCW (LH) / CW (RH) : ON Key Return : OFF	

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Rear Door Lock Module Inspection

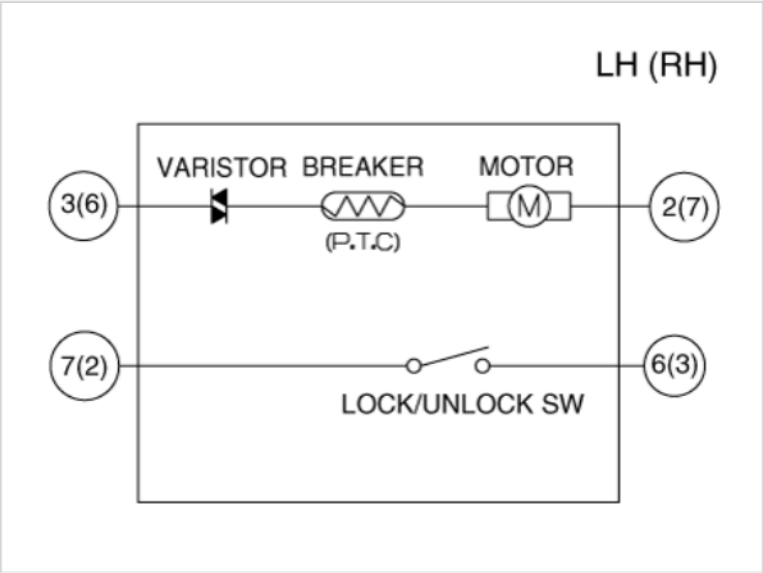
1. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
2. Remove the rear door trim seal.
   (Refer to Body - "Rear Door Window Glass")
3. Disconnect the connector from the actuator.



No.	Pin Information	
	LH	RH
1	-	-
2	Motor 2	COM
3	Motor 3	Lock / Unlock switch
4	-	-
5	-	-
6	Lock / Unlock switch	Motor 3
7	COM	Motor 2
8	-	-

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

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(LH)

Operation / Terminal	Central Lock	Central Unlock
2	+	-
3	-	+
6 & 7	ON → OFF	OFF → ON

(RH)

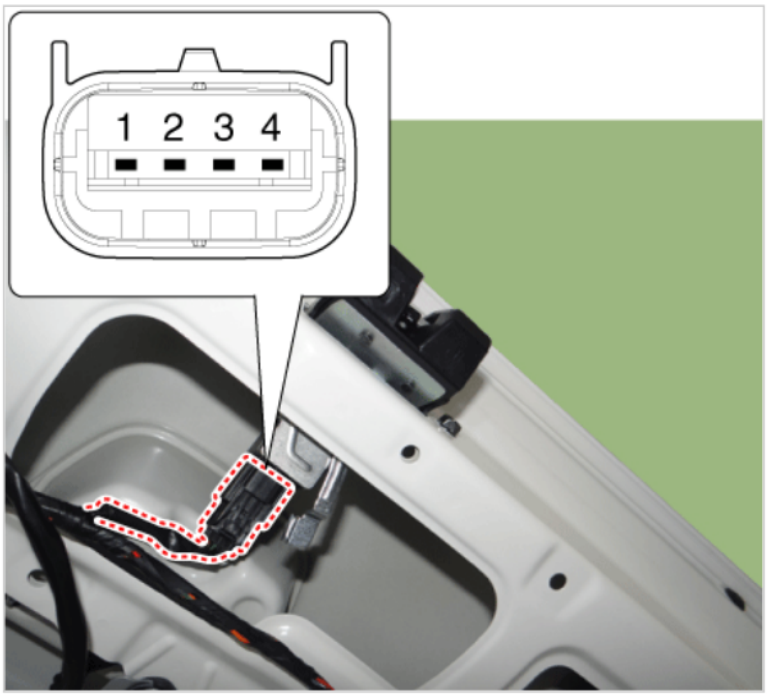
Operation / Terminal	Central Lock	Central Unlock
7	-	+
6	+	-
2 & 3	ON → OFF	OFF → ON

Liftgate / Trunk Lock Module Inspection

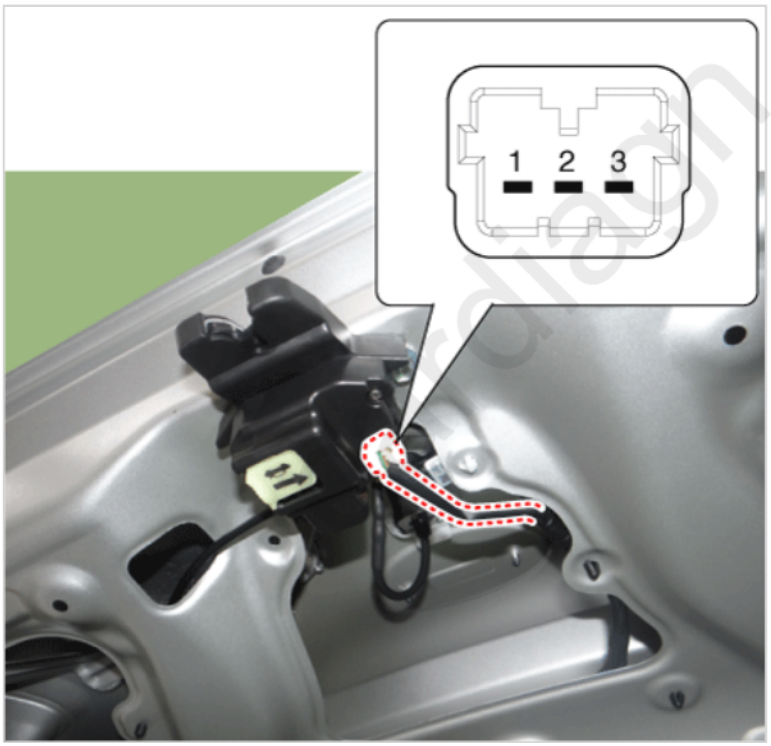
1. Remove the liftgate trim or trunk lid trim.
   (Refer to Body - "Liftgate Trim")
   (Refer to Body - "Trunk Lid Trim")
2. Disconnect the connectors from the actuator.

[5 Door]

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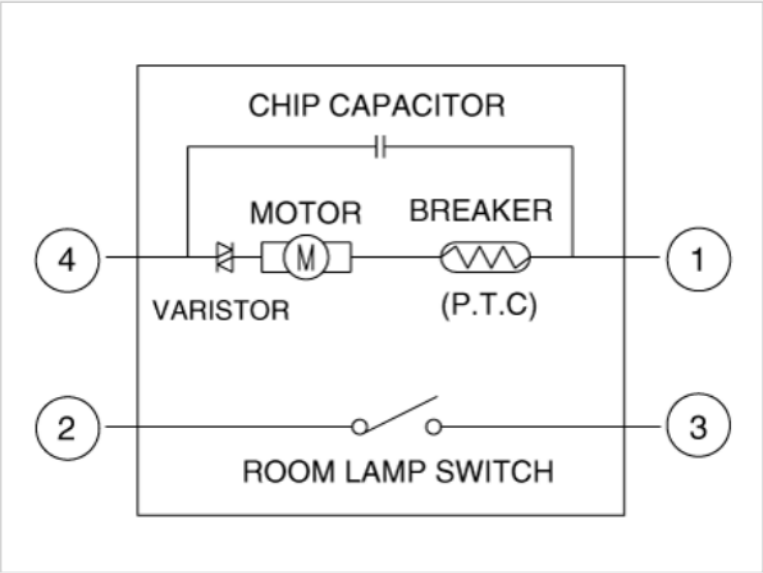


[4 Door]



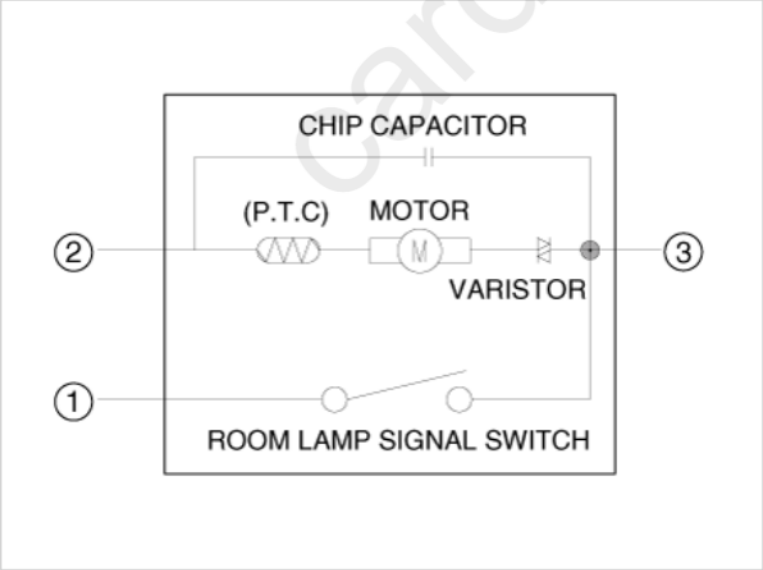
3. Check actuator operation by connecting power and ground as shown below. To prevent damage to the actuator, apply battery voltage only momentarily.

[5 Door]



Operation / Terminal	Lock → Unlock	Unlock → Lock
④	-	X
①	+	X
②	OFF → ON	ON → OFF
③		

[4 Door]



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Terminal / Position	2	3
Unlock	⊕	⊖
Lock	–	–

4. Checking the liftgate of the vehicle power option power refers to the liftgate module.

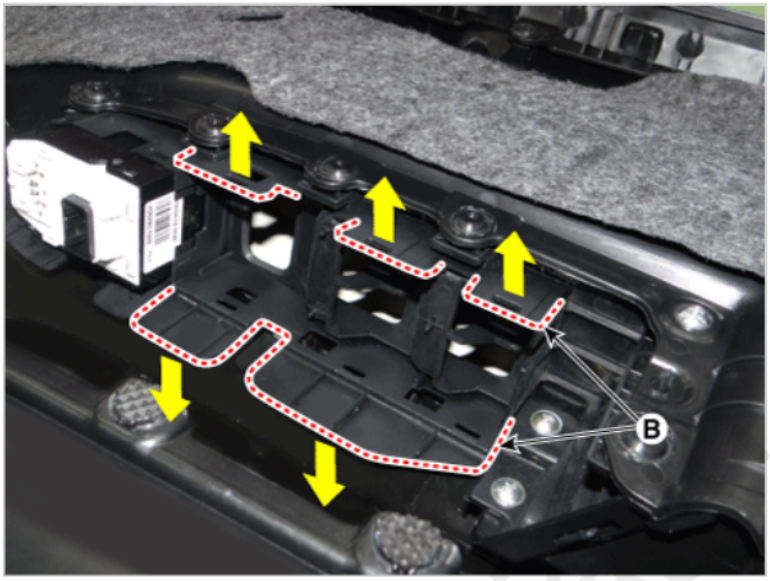
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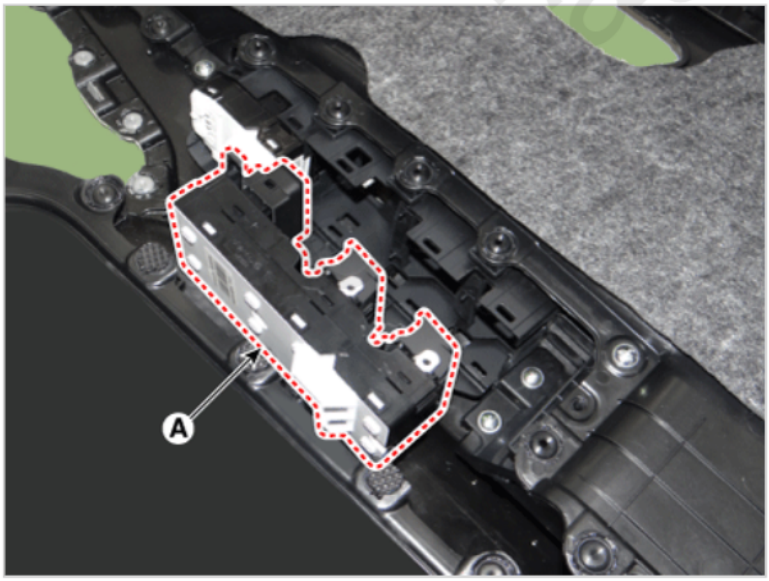
Removal

CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the crash pad when removing/installing because lubricant and oil can leave a stain on the trim.

1. Disconnect the negative (-) battery terminal.
2. Remove the front left door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power window switch assembly (A) by pulling out both ends of the switch holders (B).



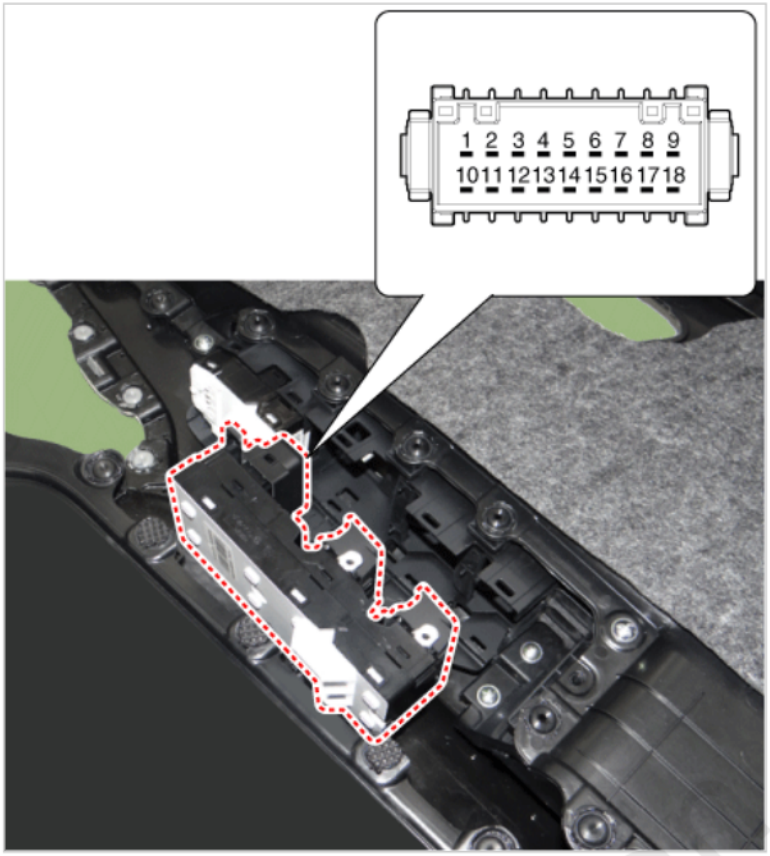


Installation

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

Inspection

1. Check for continuity between the terminals. If there is an abnormality, replace the switch.

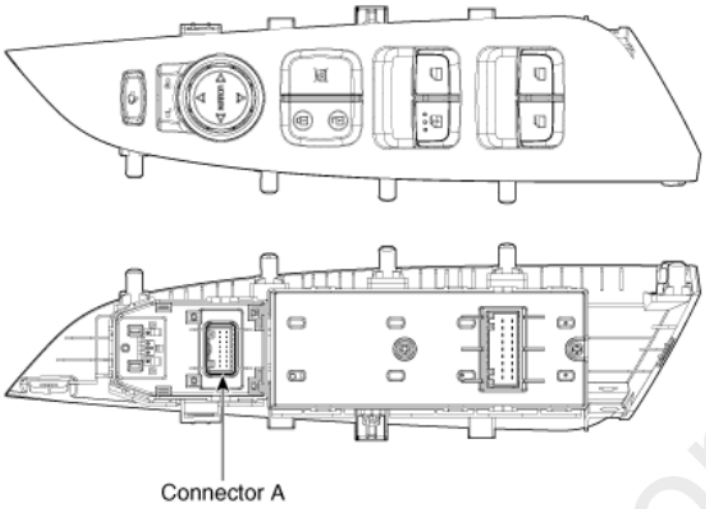


Terminal / Position	6	8	4
Door Lock		○	○
Door Unlock	○	○	

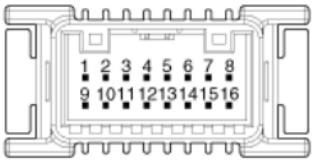
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Component

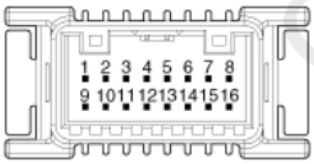
Driver Power Window Switch



[Non-Folding Mirror Type]

Connector A	No.	Description	No.	Description
	1	Battery (+)	9	-
	2	-	10	Left mirror common
	3	-	11	Left mirror horizontal
	4	-	12	Mirror vertical
	5	Ground	13	Right mirror horizontal
	6	-	14	Right mirror common
	7	Mirror unfolding switch	15	-
	8	Mirror folding switch	16	ACC

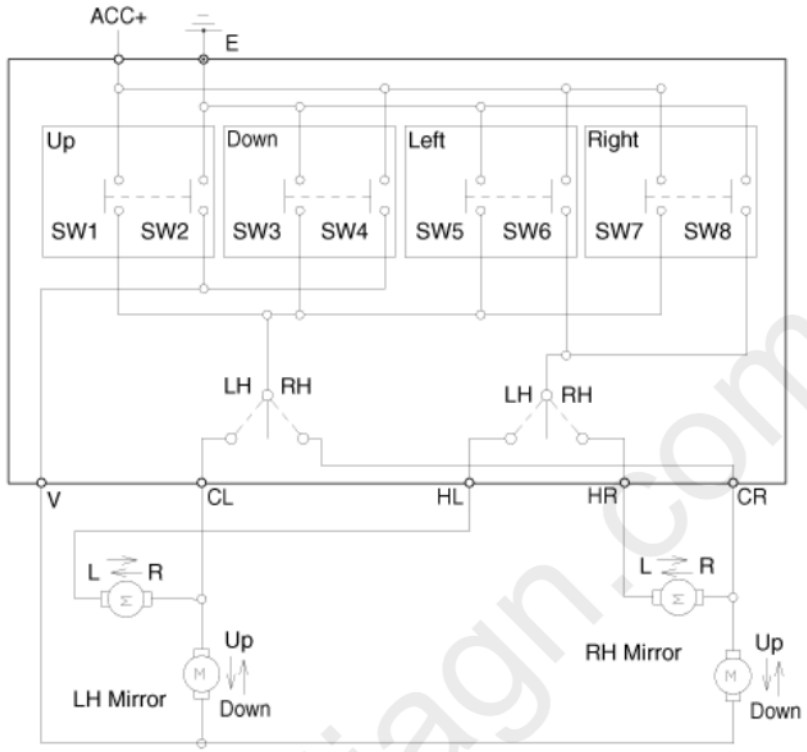
[Folding Mirror Type]

Connector A	No.	Description	No.	Description
	1	Battery (+)	9	-
	2	-	10	Left mirror common
	3	-	11	Left mirror horizontal
	4	-	12	Mirror vertical
	5	Ground	13	Right mirror horizontal
	6	-	14	Right mirror common
	7	-	15	-
	8	-	16	ACC

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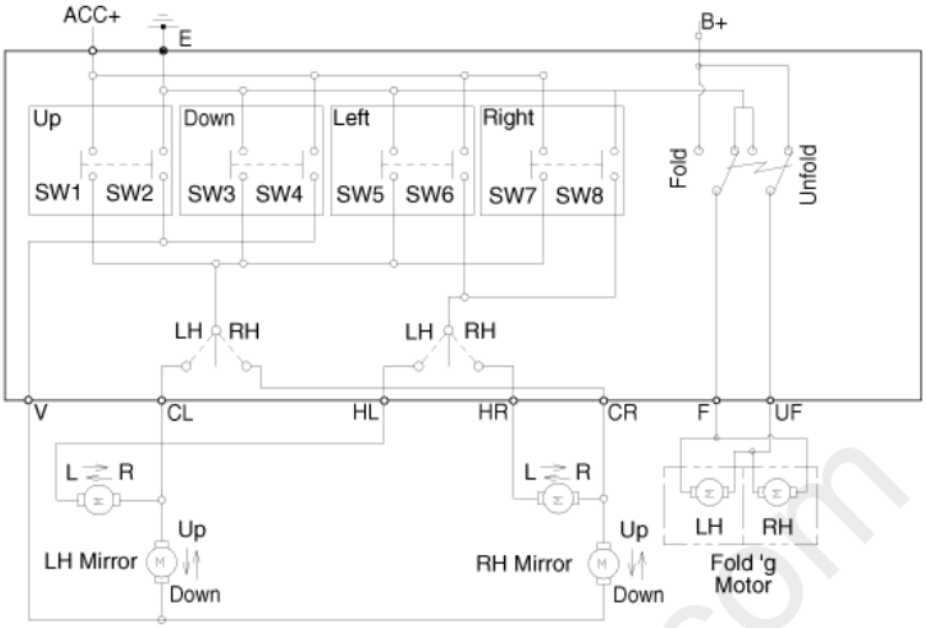
Circuit Diagram

[Non-Folding Mirror Type]



[Folding Mirror Type]

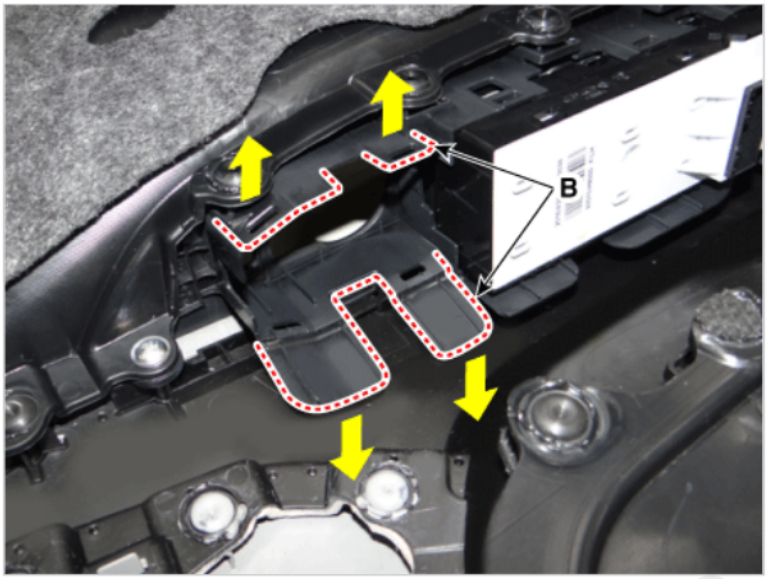
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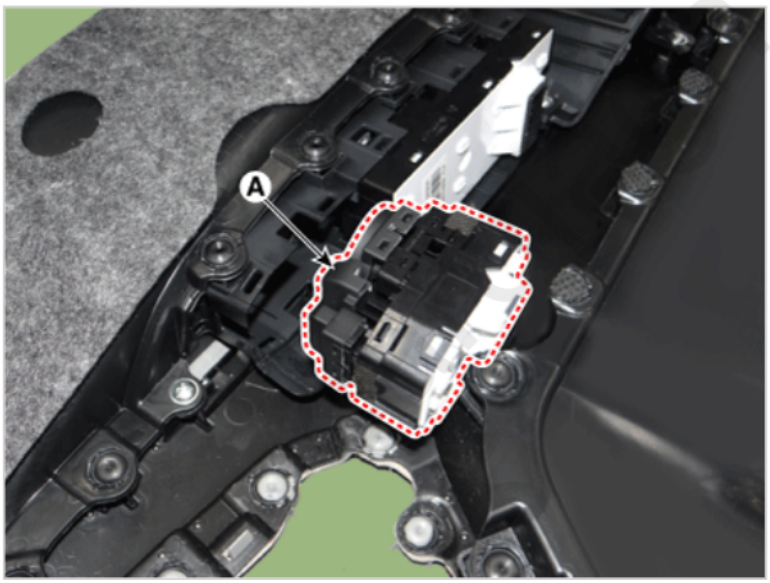


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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front left door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power mirror switch assembly (A) by pulling out both ends of the switch holders (B).



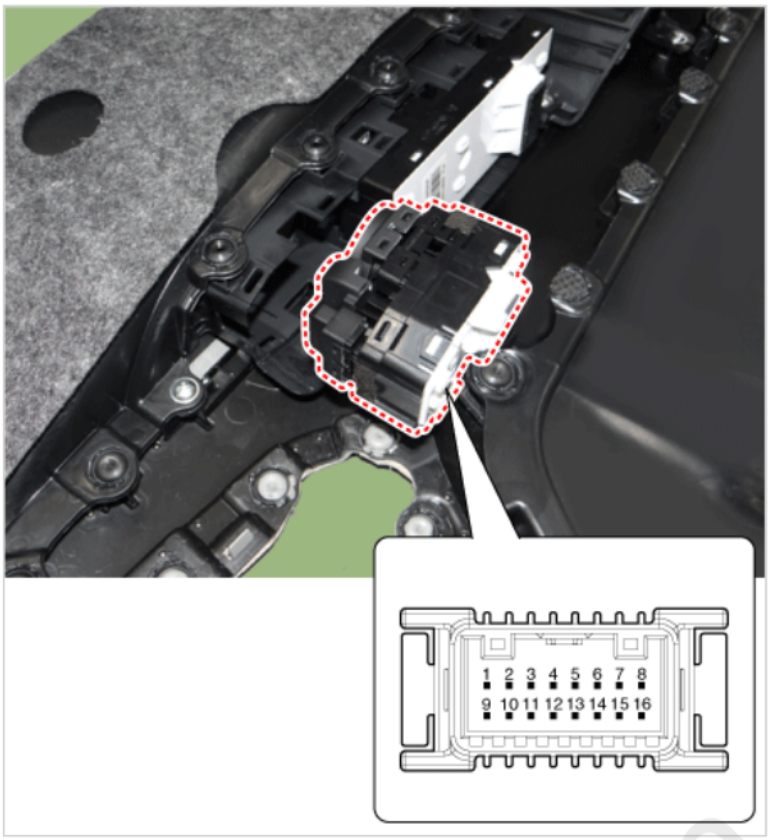


Installation

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

Inspection

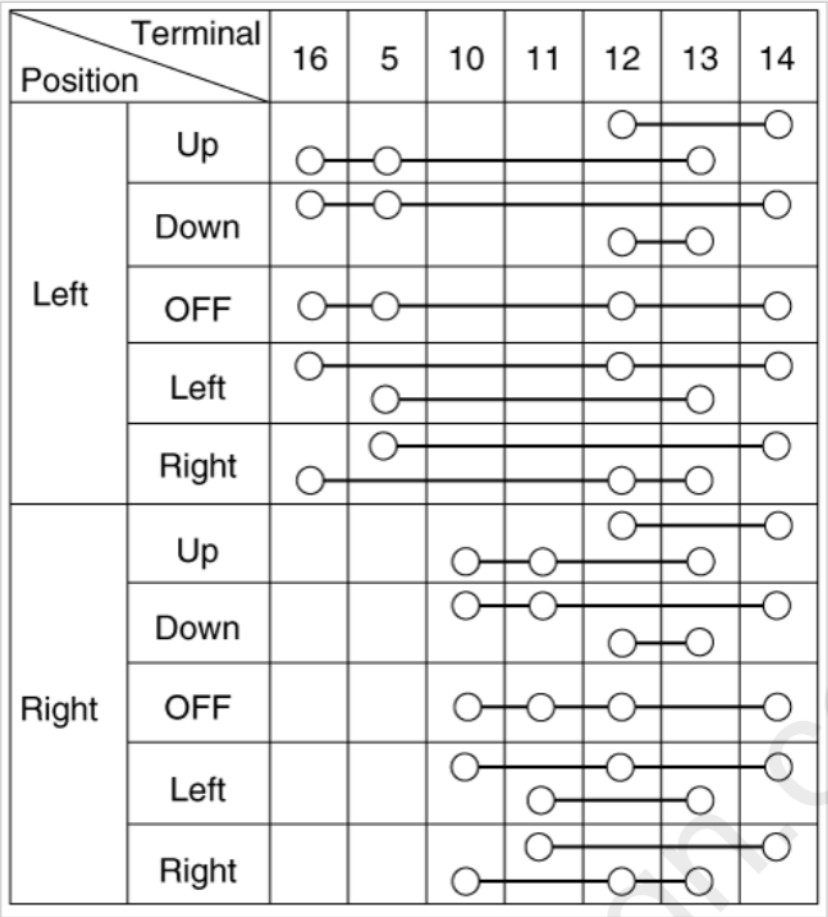
1. Remove the front left door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the power mirror switch (A) from the door trim.



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

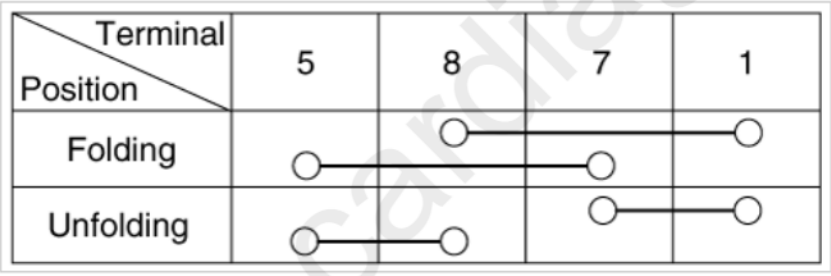
[Power Mirror Switch]

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Position \ Terminal		16	5	10	11	12	13	14
Left	Up	○	○			○	○	○
	Down	○	○				○	○
	OFF	○	○			○		○
	Left	○				○	○	○
	Right		○			○	○	○
Right	Up			○	○	○	○	
	Down			○	○		○	○
	OFF			○	○	○		○
	Left			○		○	○	○
	Right			○	○	○	○	

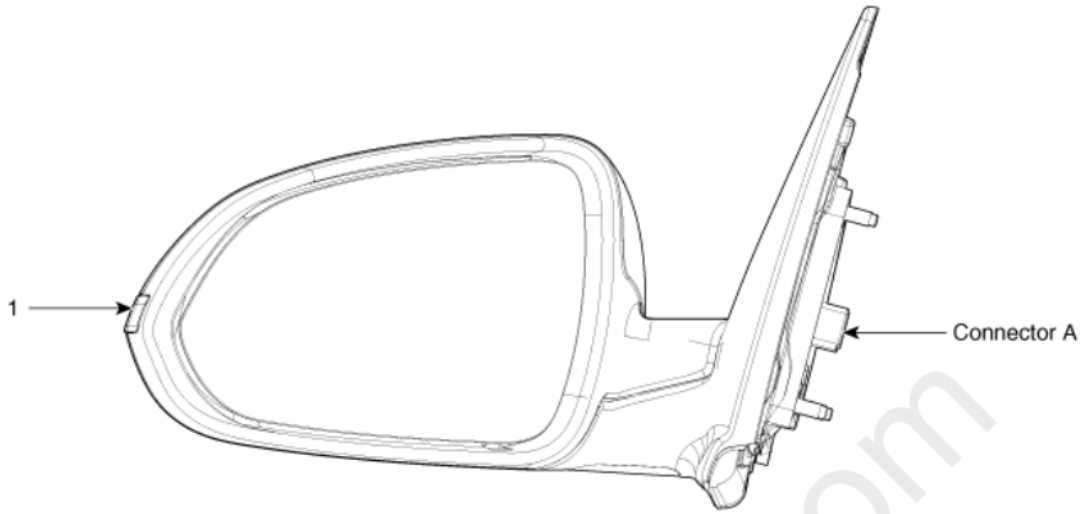
[Power Folding Mirror Switch]

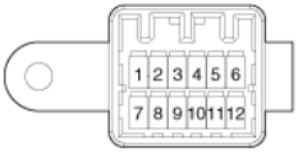


Position \ Terminal	5	8	7	1
Folding	○	○	○	○
Unfolding	○	○	○	○

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Components



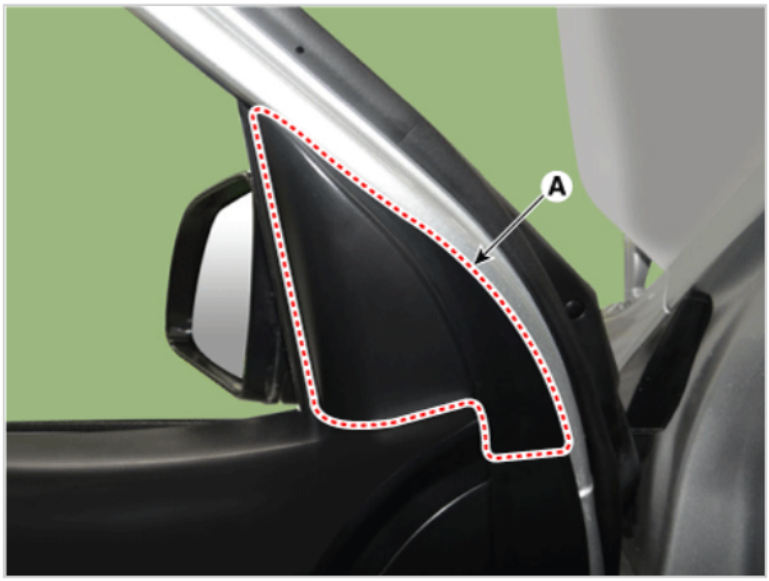
Connector A	No.	Description	No.	Description
	1	Mirror vertical motor	7	Mirror unfolding
	2	Mirror motor common	8	Side repeater lamp (+)
	3	Mirror horizontal motor	9	-
	4	Mirror heater (+)	10	BSD Indicator (-)
	5	Mirror heater (-) & Side repeater lamp (-)	11	BSD Indicator (+)
	6	Mirror folding	12	-

1. Side repeater lamp

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Inspection

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



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



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

[Mirror Control (LH/RT)]

Terminal / Position	1	2	3
Up	⊖	⊕	⊕
Down	⊕	⊖	⊖
Left	⊖	⊖	⊕
Right	⊕	⊕	⊖

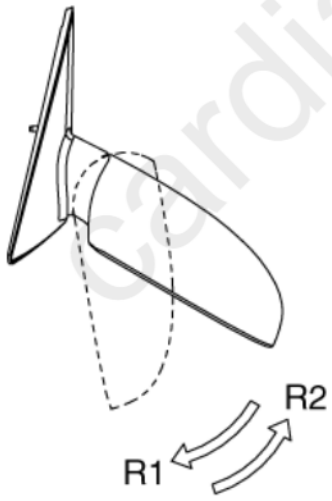
[Mirror Heater]

Terminal / Position	4	5
ON	⊕	⊖

[Side Repeater Lamp]

Terminal / Position	8	5
ON	⊕	⊖

[Folding Mirror]



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

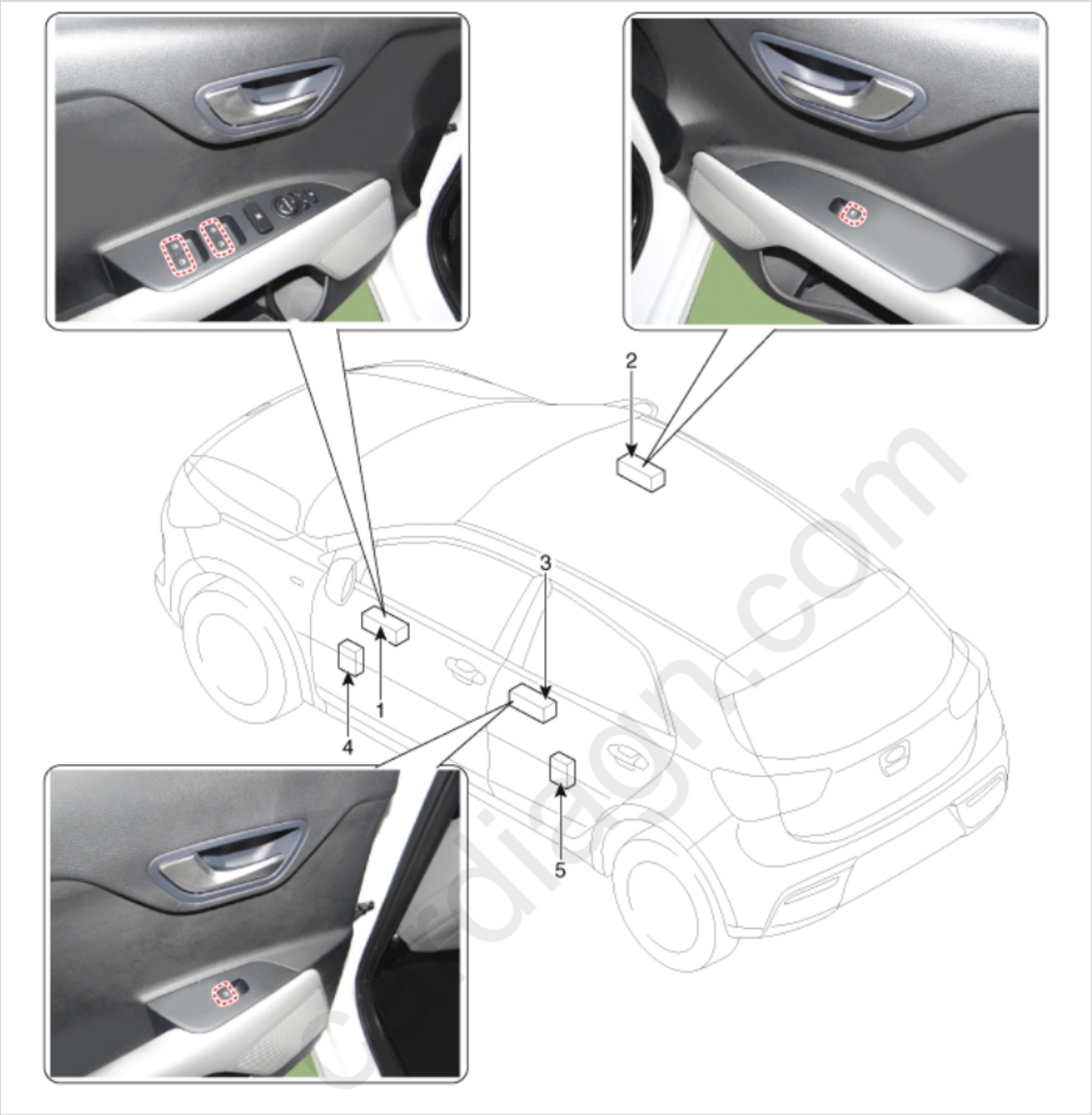
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[BSD Indicator]

Terminal / Position	11	10
ON	⊕	⊖

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Component Location

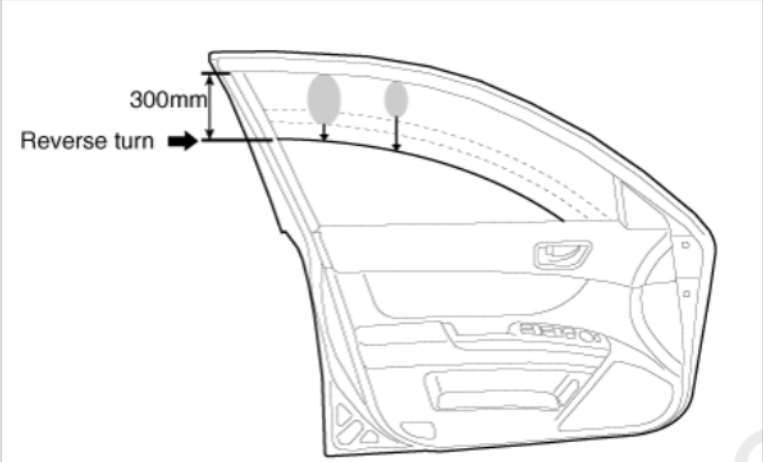


1. Driver power window switch
2. Assist power window switch
3. Rear power window switch
4. Front window motor
5. Rear window motor

Safety Function of Power Window

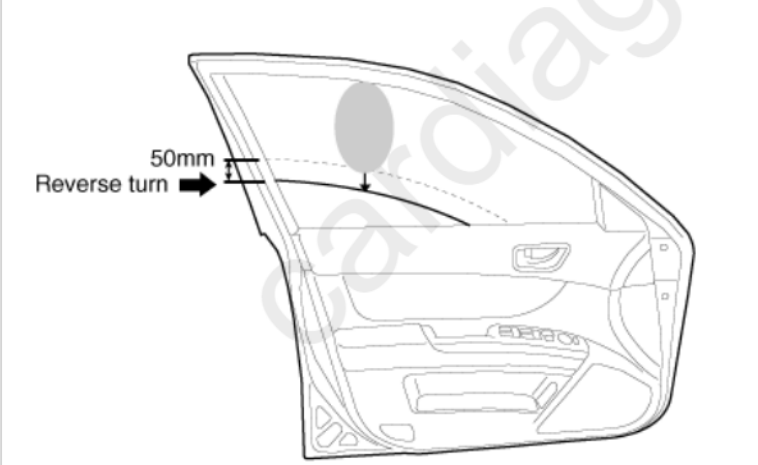
When driver door power window auto-up switch is operated, safety function is activated.

1. Safety function condition
   When the force of 100N (using the 10N/mm spring) is detected while the window is rising, the window is pulled down.
2. Length of window reversing (except holding the auto-up switch)
   – When jamming is detected within the range between 4mm and 250mm from the top of the B pillar
   → the window is pulled down to 300mm from the top of the B pillar.



When a jamming object is detected between 4 mm - 250 mm from top of the B pillar

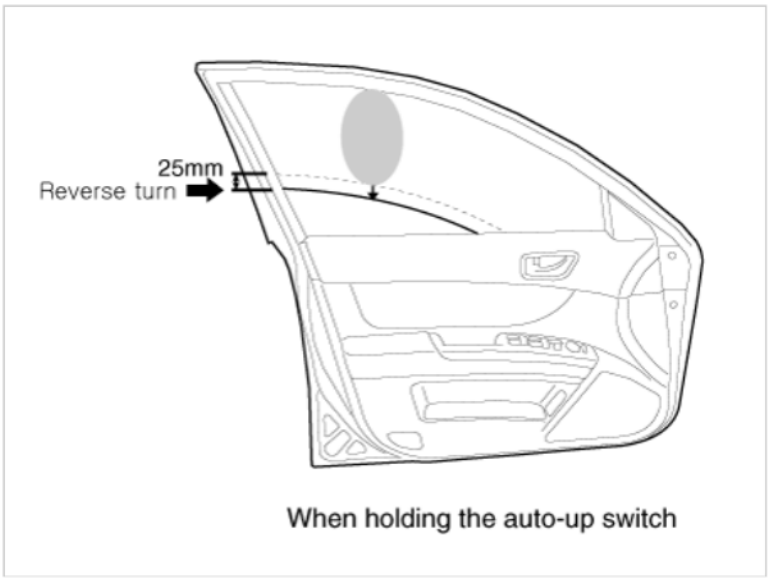
   – When jamming is detected within the range of over 250mm from the top of the B pillar.
   → the window is pulled down to the lowest position if the total length of jammed object plus 50mm is below the window's lowest position.



When a jamming object is detected over 250 mm from top of the B pillar

3. The length of window moving downward (holding the auto-up switch)
   – When jamming is detected while pulling the auto-up switch.
   → Window moves downward by 25mm from jamming position
   – Auto-up function is not available for 5 seconds after the above operation.
   → When pulling the auto-up switch, the manual-up function is activated (no safety function).

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When holding the auto-up switch

4. The area with the safety function not applied
   Safety function is not available within the 4mm range from the top of the window frame.

How to initialize the safety power window

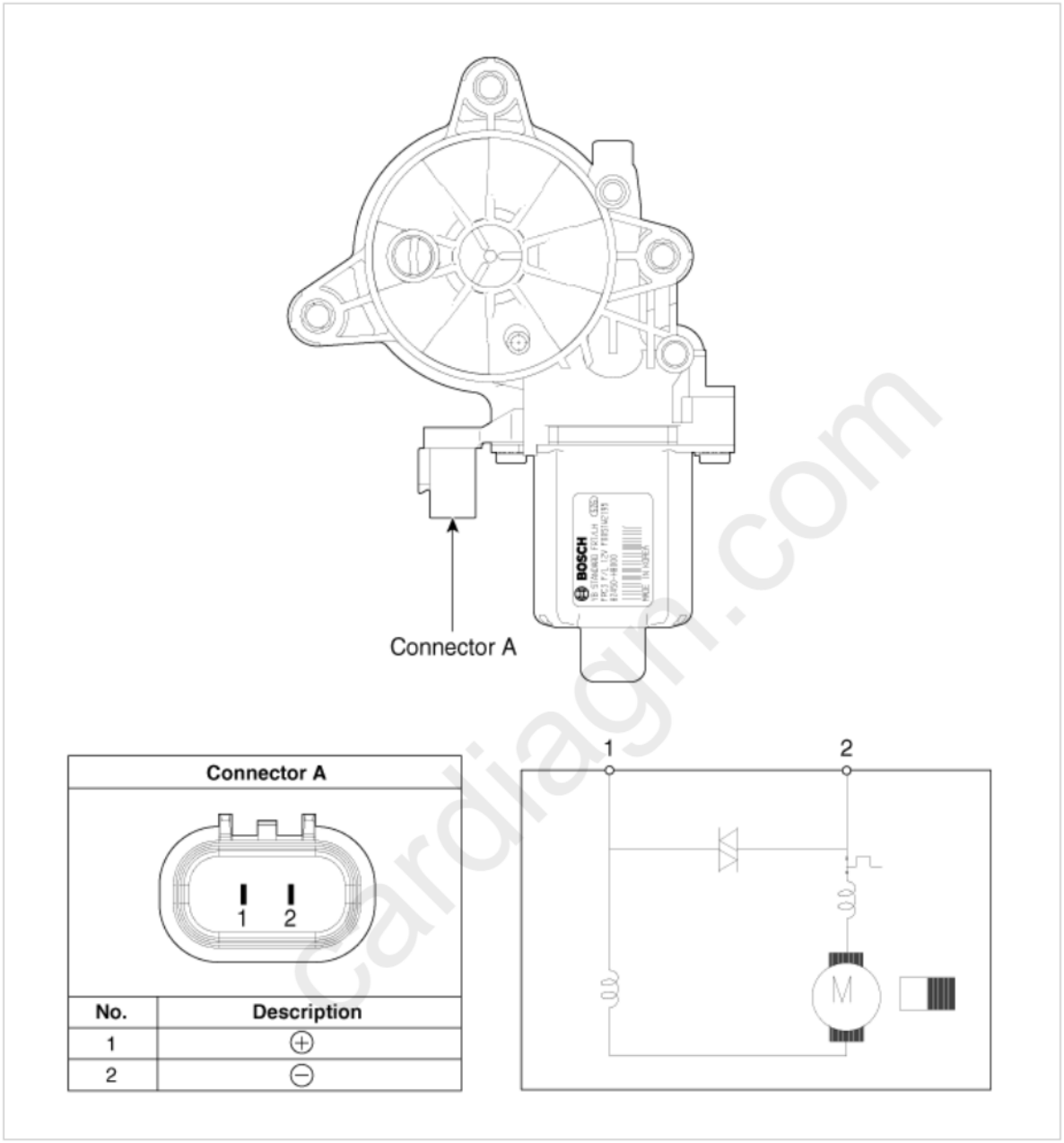
1. Initializing of Battery Connection
   When the battery power is removed for over 5 minutes, safety power window switch needs the initializing.
   (1) Power window operation before initializing
   – Manual-Up/Down function is available
   – Auto-Up/Down function is not available
   (If the Auto-up/down switch is being pushed, the manual up/down function is operated.)
   (2) Initialization
   Close the window in window open position, and holding the switch in window full close position over the 0.2 second.
   (If start the closing the window in window full close position, initializing could be failed.)
   (3) If initialize the safety power window in jamming status, could occur below conditions.
   – Safety function is not available
   (4) Window position memorizing hall sensor is used to identify the window position and motor operation direction. ECU detects the uppermost position of the window and sets the position as '0'
   (5) Deinitialization
   ECU is deinitialized if the following conditions are met. After deinitialization process, Auto-up and safety function are not activated.
   Deinitialization conditions
   a. Repeating window downward movement 15 times in a row.
   b. Power supply is suspended while the motor is in operation.
   c. Driver seat door opens, IGN Off with the window glass positioned in Hard Stop -> IGN On within 2 seconds -> within 5 seconds with IGN On, entering manual down switch signal 3 times -> Deinitialization completed (if power is not on in 2 seconds, or the operation to be performed in 5 seconds, the deinitialization process shall be repeated from the beginning.)

2. Initializing of fail safe mode
   Prevention of overheated motorSoftware overheating prevention function is used to prevent the motor from overheating (but, EEPROM data shall be saved in ECU).
   (1) If the window moved by compulsion and motor have a problem, power window switch could be entering the fail safe mode for user's safety.
   (2) Power window operation in fail mode
   – Auto/Manual-Down function is available
   – Auto/Manual-Up function is not available
   (When Auto/Manual-up is operated, window is rising by 20mm and stops moving.)

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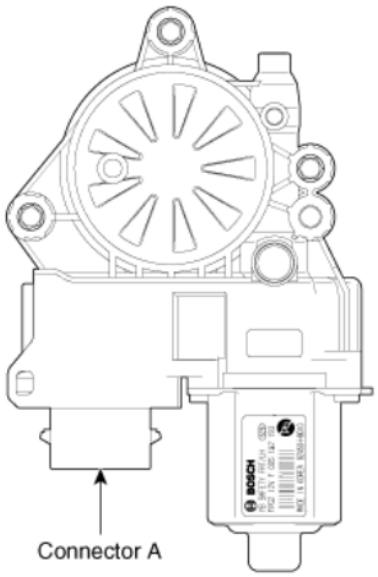
Components

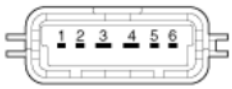
[Standard window motor]

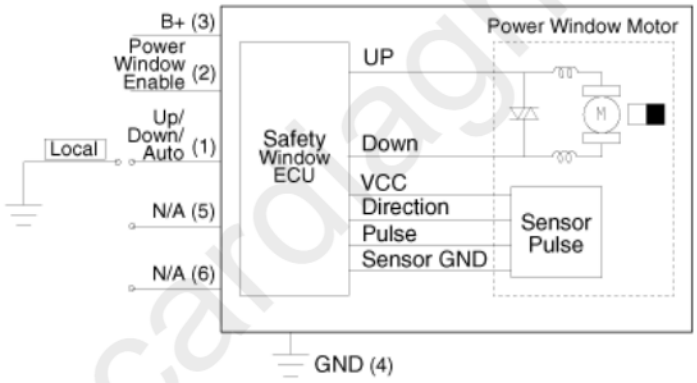


[Safety window motor]

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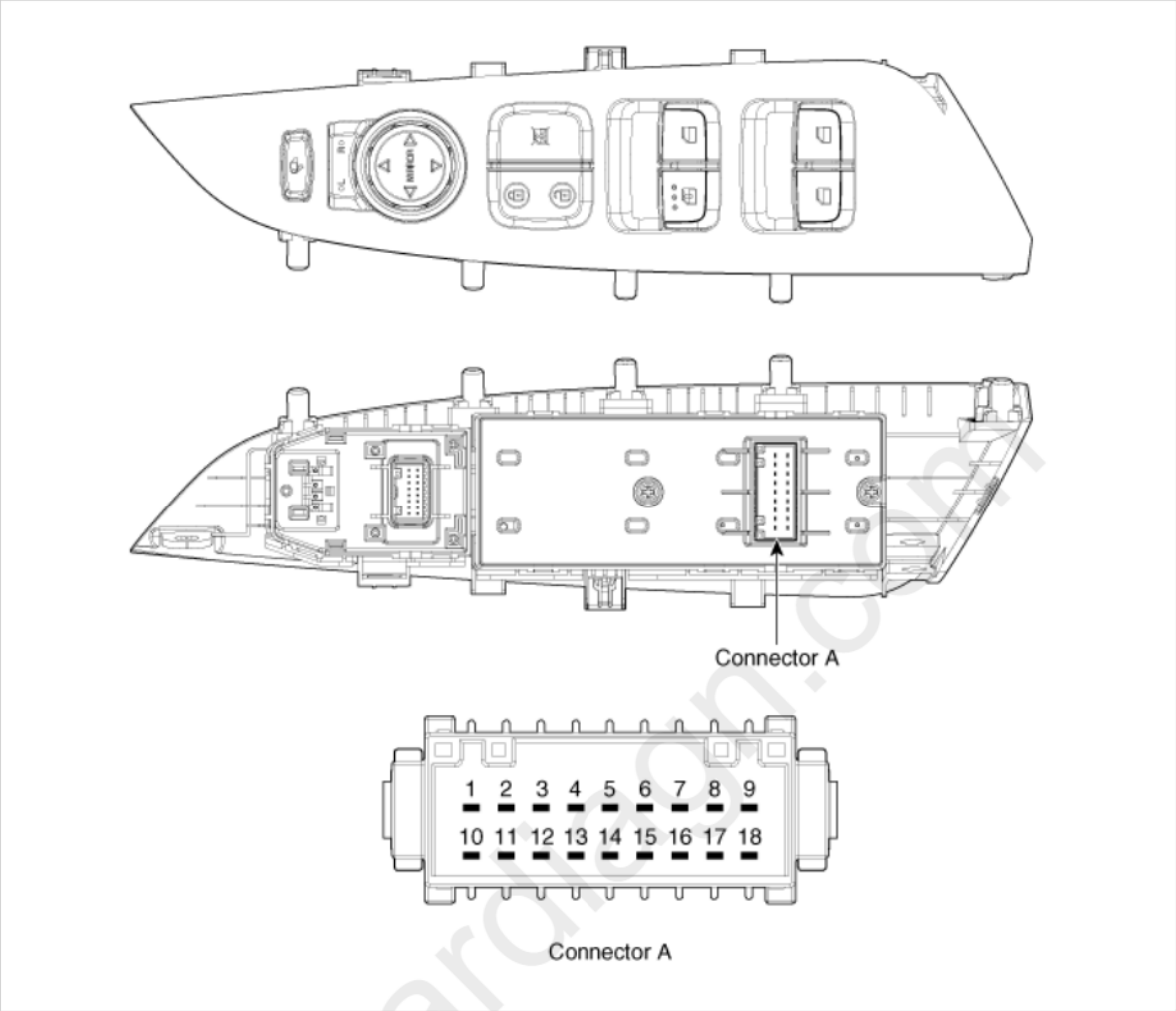
Connector A	No.	Description	No.	Description
	1	Up / Down / Auto	4	Ground
	2	Enable	5	-
	3	Battery (+)	6	-



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Components

Driver Power Window Switch



Connector Pin Information

[Front / Rear Driver Safety - Auto Up/Down]

No.	Description	No.	Description
1	Front right power window (Up)	10	Rear right power window (Up)
2	-	11	Rear right power window (Down)
3	Front right power window (Down)	12	Battery (+)_RH
4	Door lock switch	13	Tail lamp
5	Left window lock switch	14	Right window lock switch
6	Door unlock switch	15	Rear left power window (Up)
7	Driver main power window (Up/Down)	16	Rear left power window (Down)
8	Ground	17	-
9	-	18	Battery (+)_LH

[Front Driver Safety - Auto Up/Down]

No.	Description	No.	Description
1	Front right power window (Up)	10	-

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2	-	11	-
3	Front right power window (Down)	12	Battery (+)_RH
4	-	13	Tail lamp
5	-	14	-
6	Driver main power window (Up/Down)	15	-
7	-	16	-
8	Ground	17	-
9	-	18	-

[Front / Rear Auto Down]

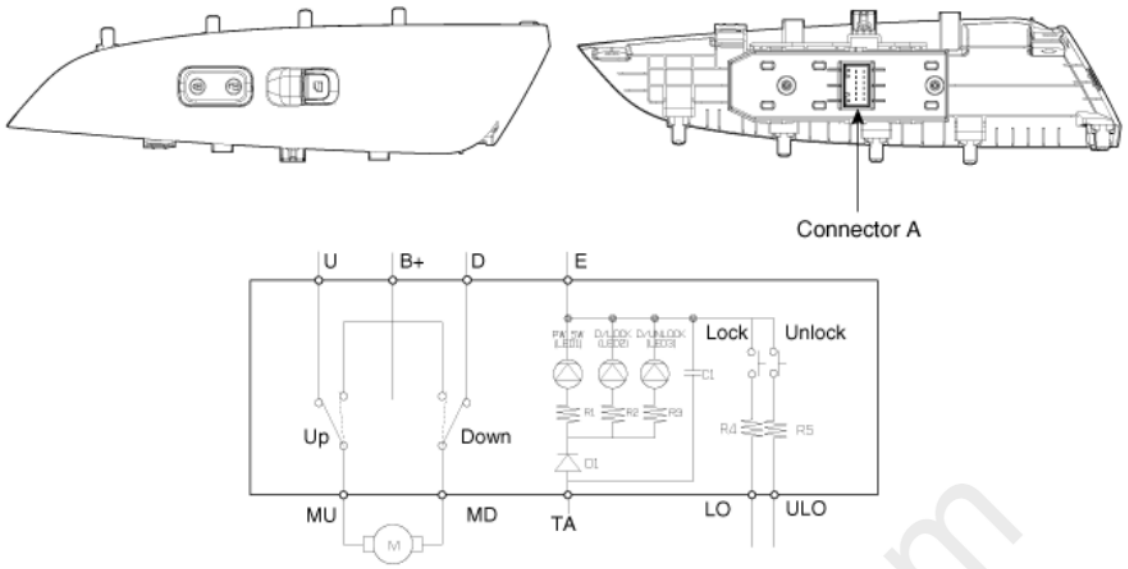
No.	Description	No.	Description
1	Front right power window (Up)	10	Rear right power window (Up)
2	-	11	Rear right power window (Down)
3	Front right power window (Down)	12	Battery (+)_RH
4	Door lock switch	13	Tail lamp
5	Left window lock switch	14	Right window lock switch
6	Door unlock switch	15	Rear left power window (Up)
7	Front left power window (Up)	16	Rear left power window (Down)
8	Ground	17	-
9	Front left power window (Down)	18	Battery (+)_LH

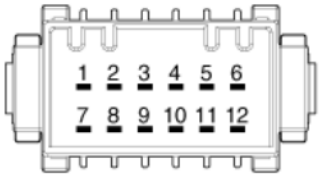
[Front Auto Down]

No.	Description	No.	Description
1	Front right power window (Up)	10	-
2	-	11	-
3	Front right power window (Down)	12	Battery (+)_RH
4	-	13	Tail lamp
5	-	14	-
6	-	15	-
7	Front left power window (Up)	16	-
8	Ground	17	-
9	Front left power window (Down)	18	Battery (+)_LH

Assist Power Window Switch

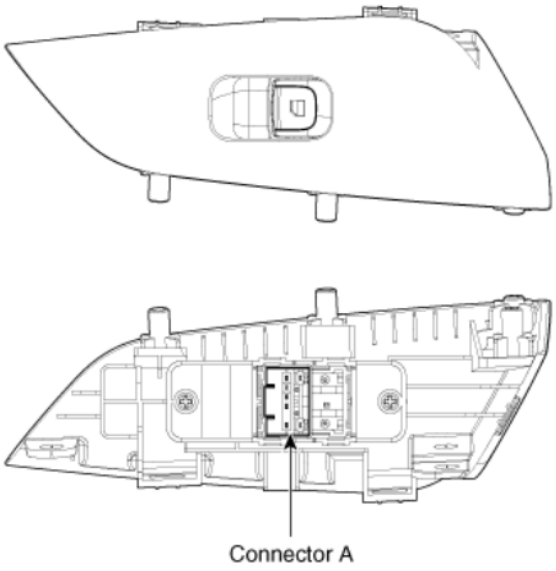
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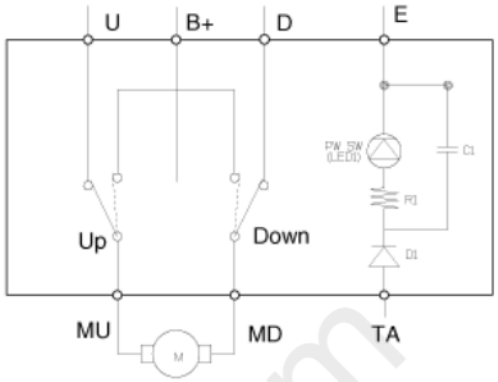


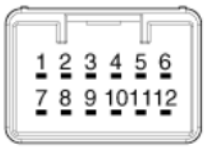
Connector A	No.	Description	No.	Description
	1	Power window (Up)	7	-
	2	Tail lamp	8	Window up signal (from main)
	3	Door lock switch	9	-
	4	Ground	10	Ground
	5	Door unlock switch	11	Window down signal (from main)
	6	Power window (Down)	12	Battery (+)

Rear Power Window Switch

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Connector A	No.	Description	No.	Description
	1	Ground	7	Power window (Up)
	2	-	8	-
	3	Window up signal (from main)	9	-
	4	Window down signal (from main)	10	-
	5	Battery (+)	11	-
	6	Tail lamp	12	Power window (Down)

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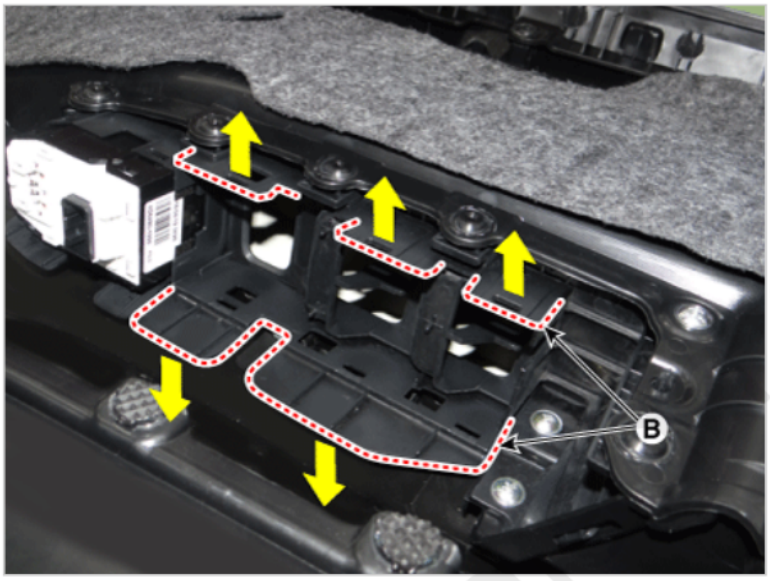
Removal

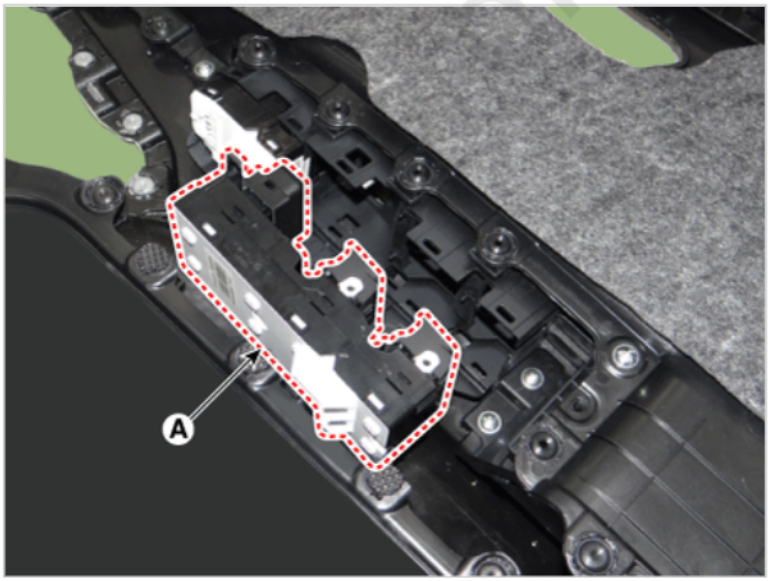
CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the trim when removing/installing because lubricant and oil can leave a stain on the trim.

Driver Power Window Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the front left door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power window switch assembly (A) by pulling out both ends of the switch holders (B).

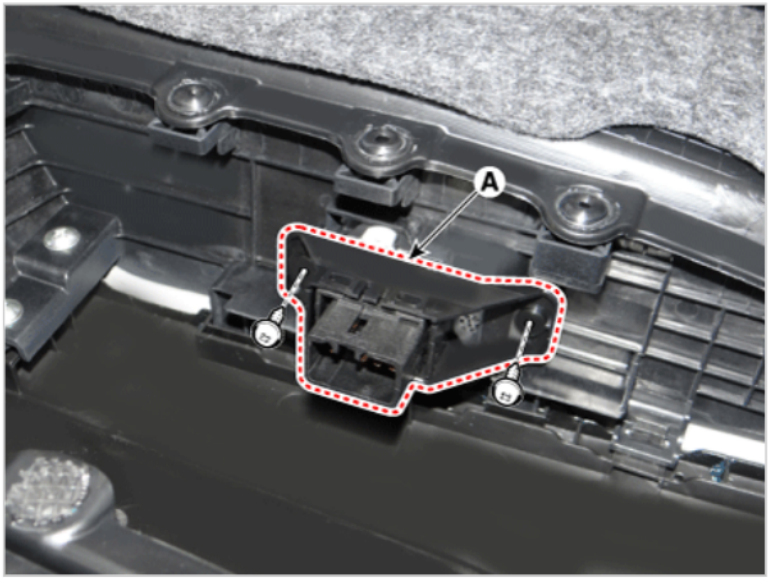




Assist Power Window Switch

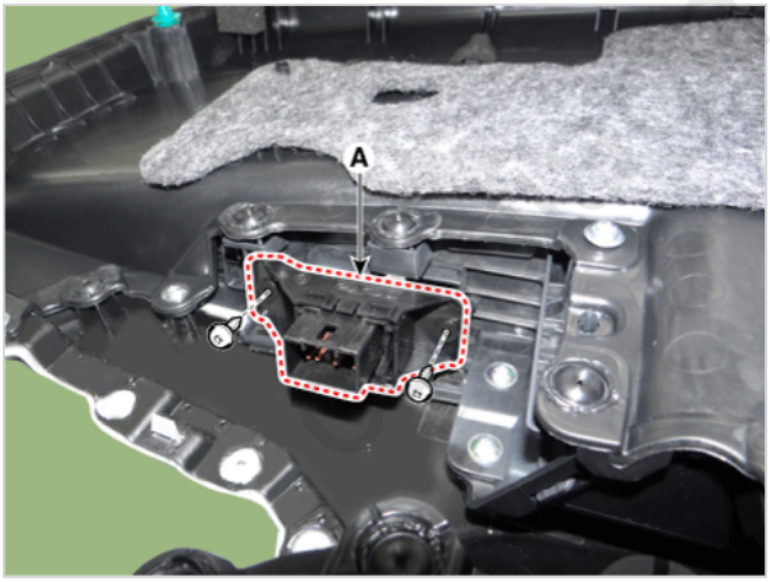
1. Disconnect the negative (-) battery terminal.
2. Remove the front right door trim.
   (Refer to Body - "Front Door Trim")

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



Rear Power Window Switch

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



Installation

Driver Power Window Switch

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

Assist Power Window Switch

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

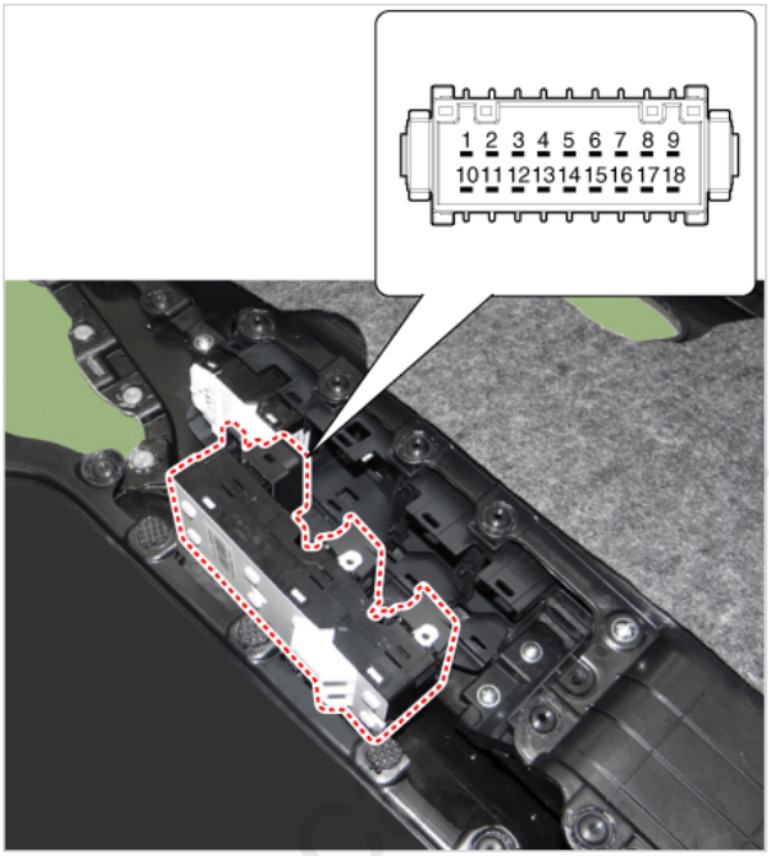
Rear Power Window Switch

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

Inspection

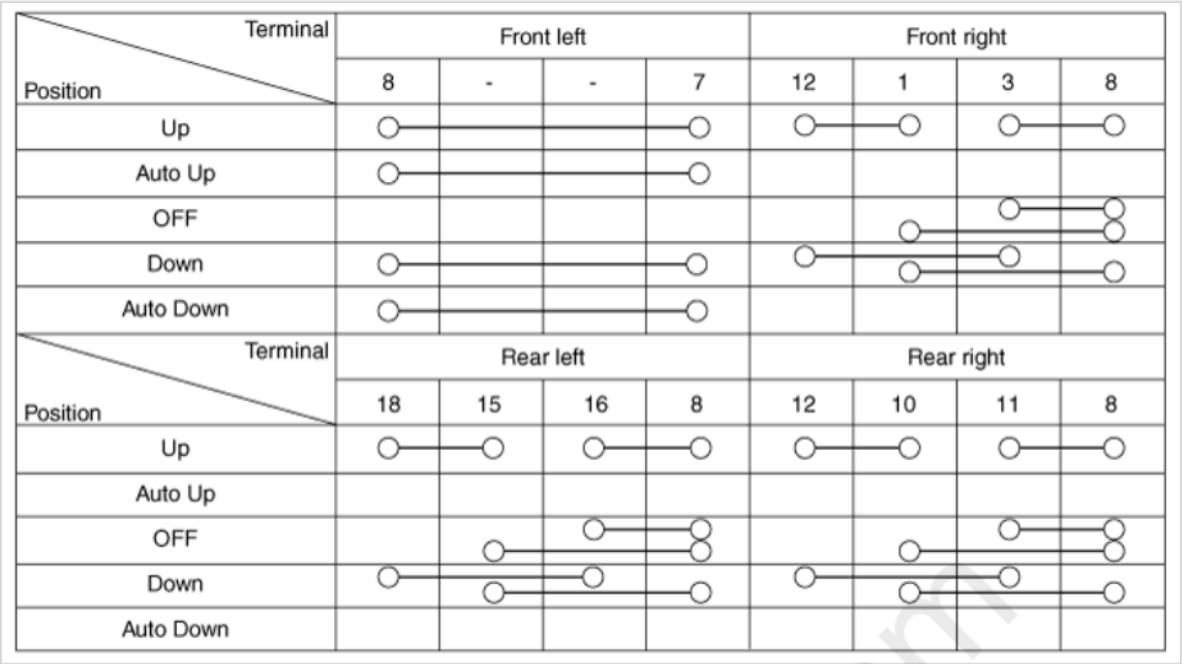
Driver Power Window Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the front left door trim.
3. Disconnect the power window switch connector from the door trim.



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

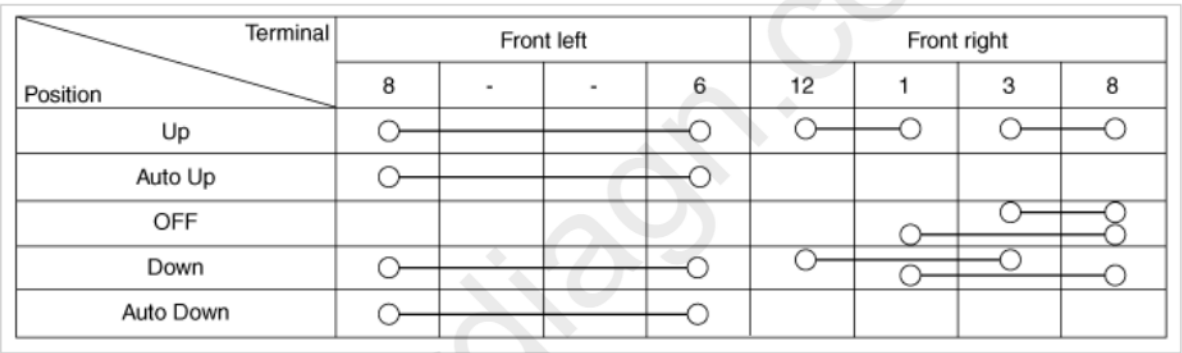
[Front / Rear Driver Safety - Auto Up/Down]



Terminal / Position	Front left				Front right			
	8	-	-	7	12	1	3	8
Up	○	○	○	○	○	○	○	○
Auto Up	○	○	○	○				
OFF						○	○	○
Down	○	○	○	○	○	○	○	○
Auto Down	○	○	○	○				

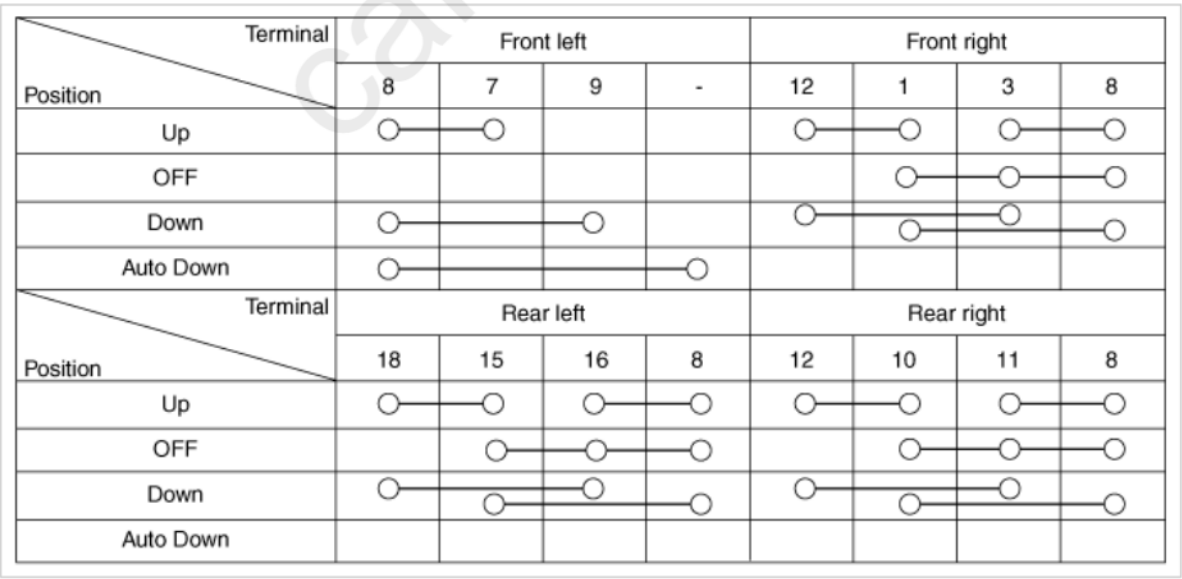
Terminal / Position	Rear left				Rear right			
	18	15	16	8	12	10	11	8
Up	○	○	○	○	○	○	○	○
Auto Up								
OFF		○	○	○		○	○	○
Down	○	○	○	○	○	○	○	○
Auto Down								

[Front Driver Safety - Auto Up/Down]



Terminal / Position	Front left				Front right			
	8	-	-	6	12	1	3	8
Up	○	○	○	○	○	○	○	○
Auto Up	○	○	○	○				
OFF						○	○	○
Down	○	○	○	○	○	○	○	○
Auto Down	○	○	○	○				

[Front / Rear Auto Down]



Terminal / Position	Front left				Front right			
	8	7	9	-	12	1	3	8
Up	○	○			○	○	○	○
OFF						○	○	○
Down	○	○	○		○	○	○	○
Auto Down	○	○	○	○				

Terminal / Position	Rear left				Rear right			
	18	15	16	8	12	10	11	8
Up	○	○	○	○	○	○	○	○
OFF		○	○	○		○	○	○
Down	○	○	○	○	○	○	○	○
Auto Down								

[Front Auto Down]

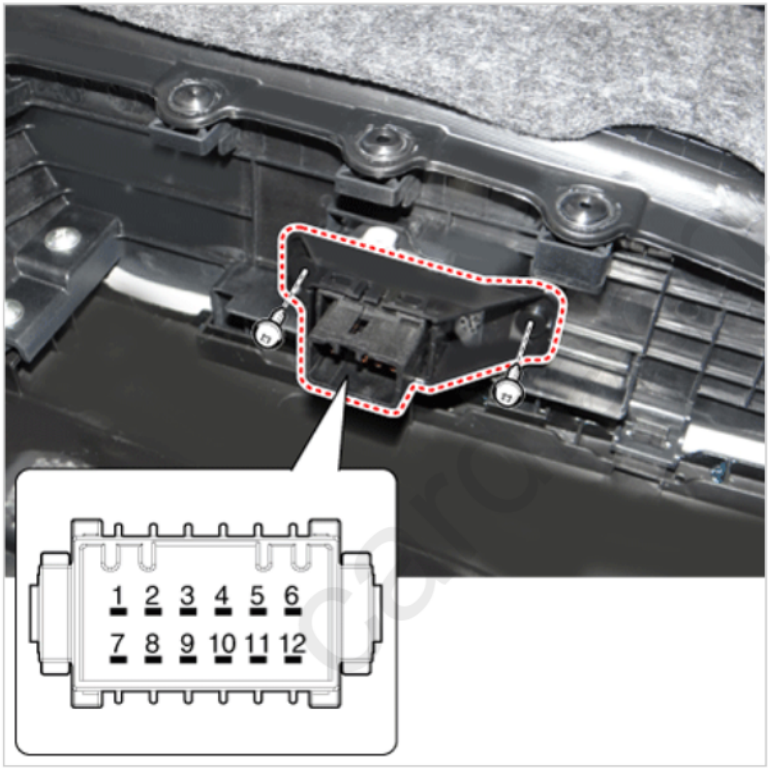
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Terminal / Position	Front left				Front right			
	8	7	9	-	12	1	3	8
Up	○	○			○	○	○	○
OFF						○	○	○
Down	○		○		○		○	○
Auto Down	○			○				

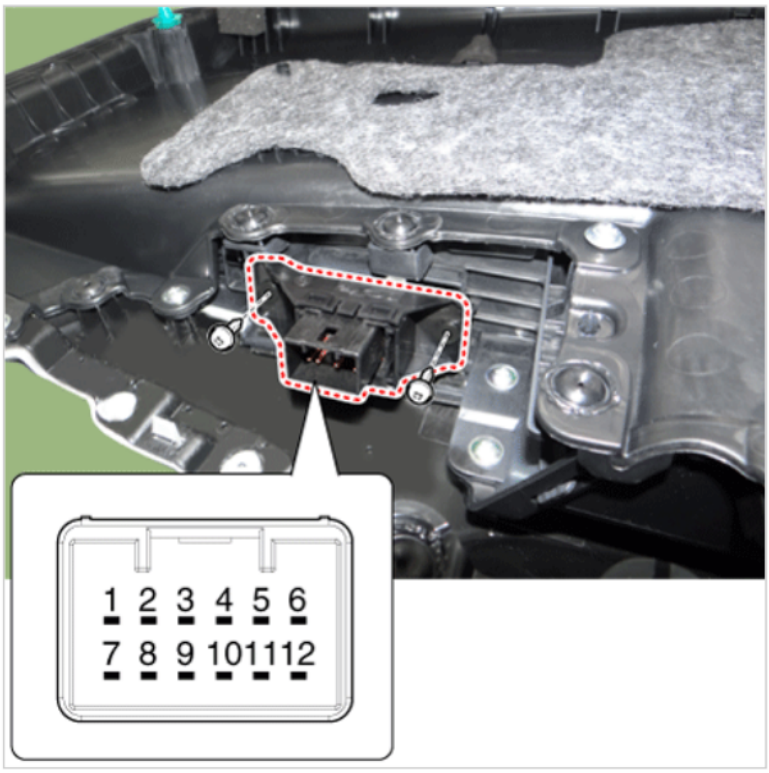
Assist / Rear Power Window Switch

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

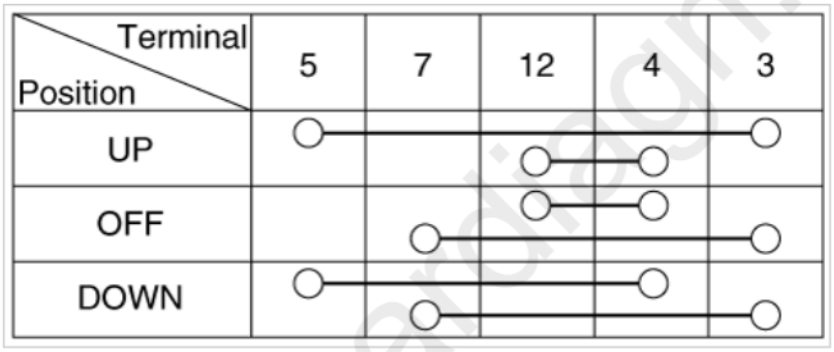
[Assist power window switch]



[Rear Power Window Switch]



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



Diagnosis With KDS

1. The body electrical system can be quickly diagnosed for failed parts by using vehicle diagnostic system (KDS).
   The diagnostic system (KDS) provides the following information.
   (1) Self diagnosis : Checks and displays the failure code (DTC)
   (2) Current data : Checks the system input/output data state
   (3) Actuation test : Checks the system operating condition
   (4) Additional function : Other controls such as the system option and zero point
2. Select the "Car model" and the system to be checked in order to check the vehicle with the tester.
3. Select the "Body Control Module (BCM)" to check the Body Control Module (BCM).
4. Select the "Current Data" menu to search the current state of the input/output data.
   The input/output data for the sensors corresponding to the door lock switch can be checked.
5. If you will check the power door lock operation forcefully, select "Actuation test" of BCM.

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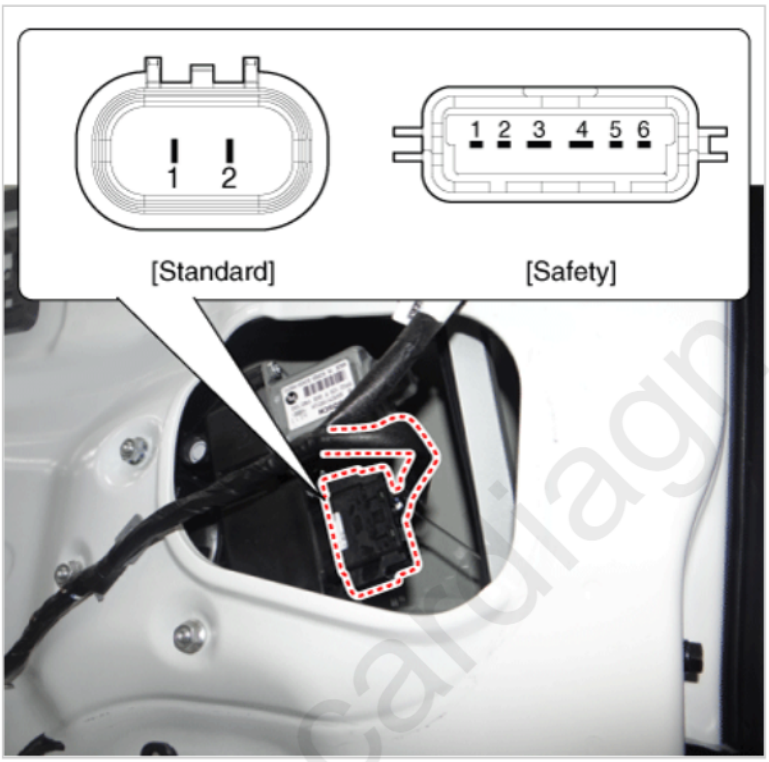
Inspection

CAUTION

- When removing with a flat-tip screwdriver or remover, wrap protective tape around the tools to prevent damage to components.
- When removing the interior trim pieces, use a plastic panel removal tool not to damage the surface.
- Be careful to store and handle the trim when removing/installing because lubricant and oil can leave a stain on the trim.

Front Power Window Motor

1. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the front door trim seal.
   (Refer to Body - "Front Door Window Glass")
3. Disconnect the connector (A) 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.

[Standard window motor]

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

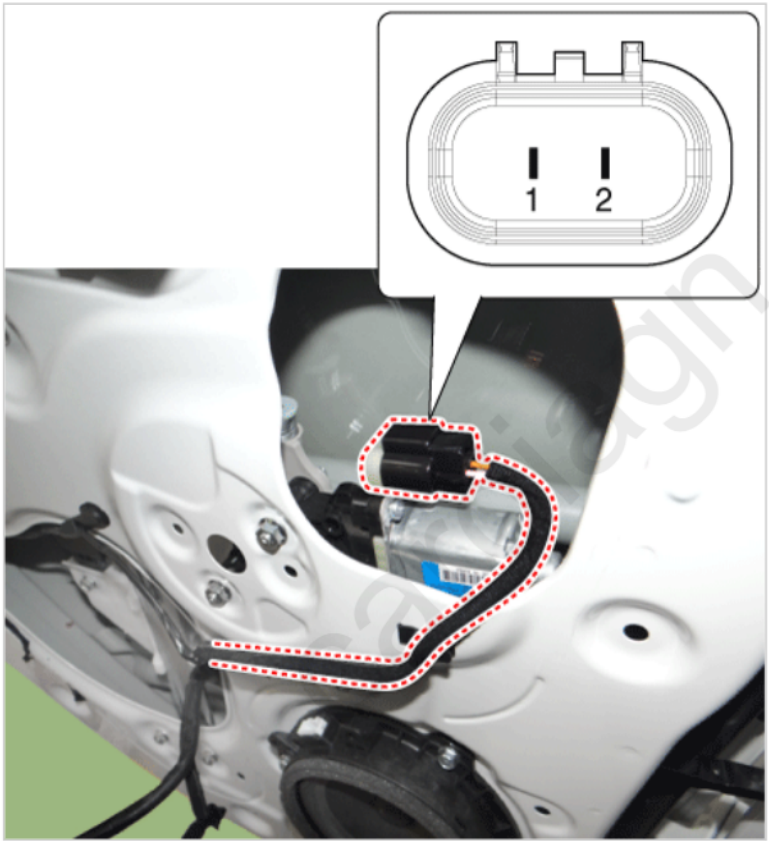
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[Safety window motor]

Position \ Terminal			1	4(GND)
Left	Up	Clockwise	○———	———○
	Down	Counter-clockwise	○———	———○

Rear Power Window Motor

1. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
2. Remove the rear door trim seal.
   (Refer to Body - "Rear Door Window Glass")
3. Disconnect the connector (A) 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.

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

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Component Location



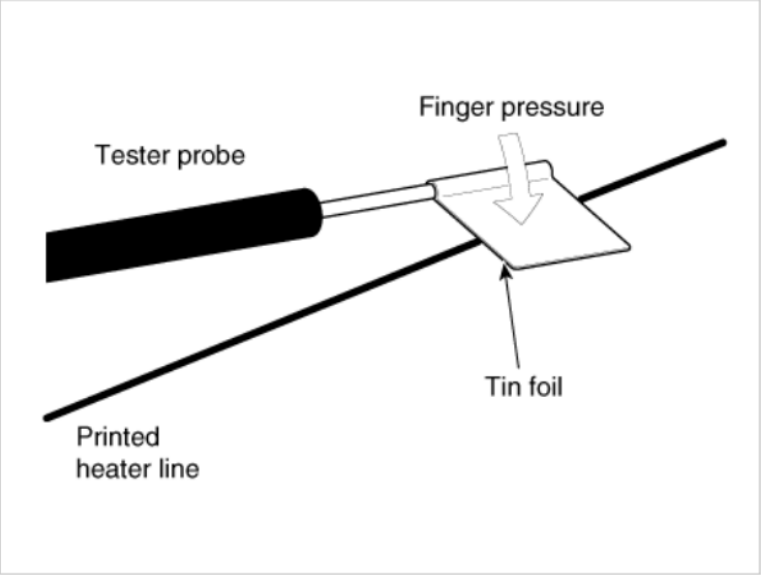
1. Rear glass defogger relay
2. Rear glass defogger switch (Manual Type)
3. Rear glass defogger switch (FATC Type)
4. Rear glass defogger

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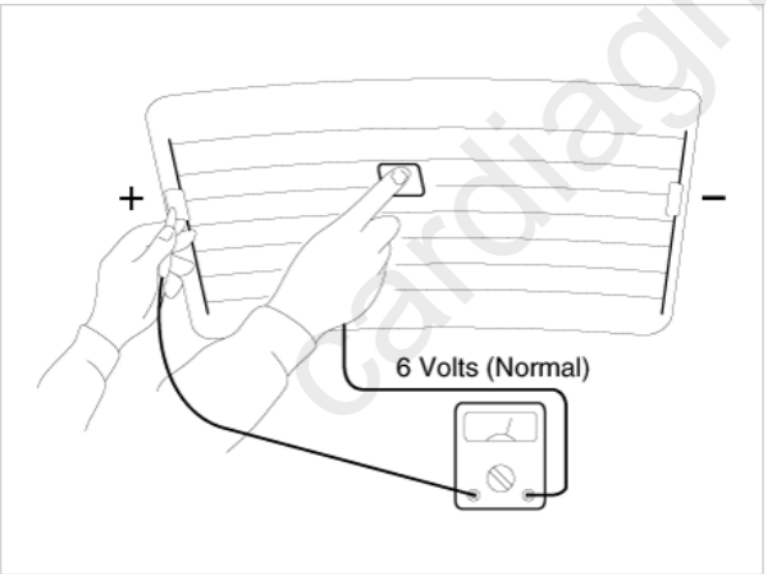
Inspection

⚠ CAUTION

- Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply pressure on the tin foil with hand and move the tin foil along the grid line to check for open circuits.

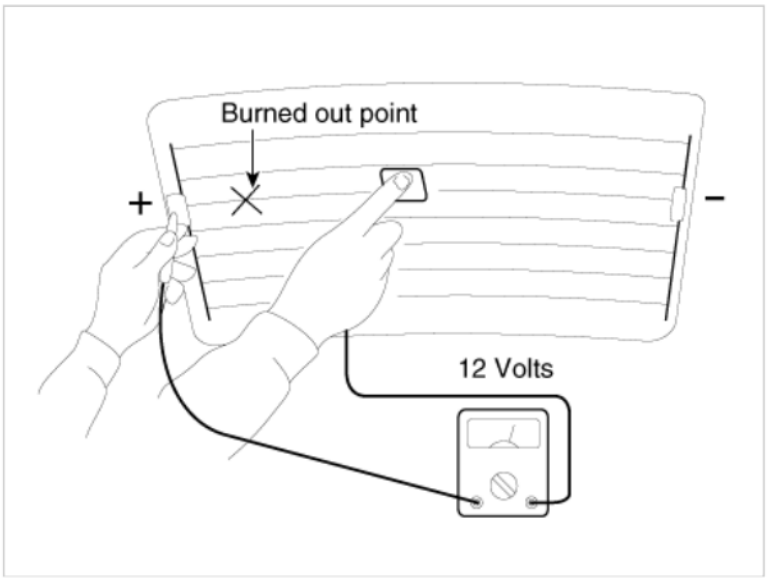


1. Turn on the defogger switch and use a voltmeter to measure the voltage of each heater line in the central part of the glass. If the voltmeter indicates 6V for a conductive line, the line of the rear window is considered to be in good condition.

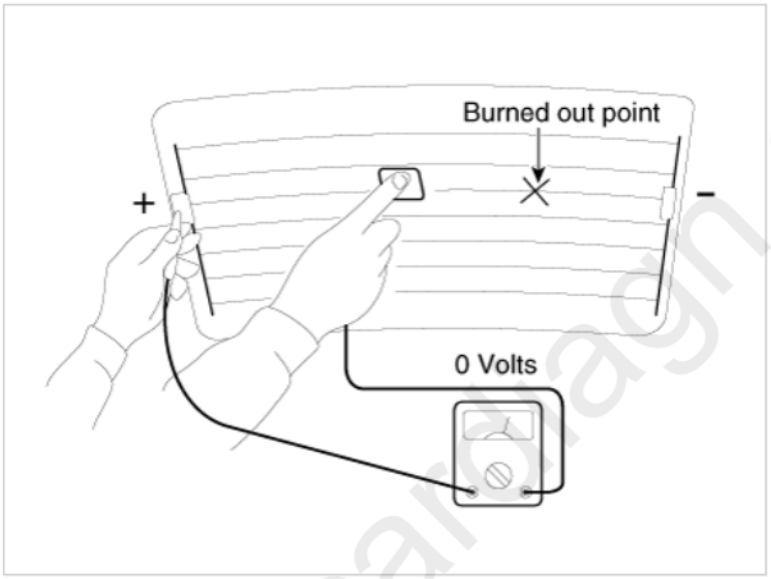


2. If a conductive line is burned out within the area between the central part and (+) terminal, the voltmeter will indicate12V.

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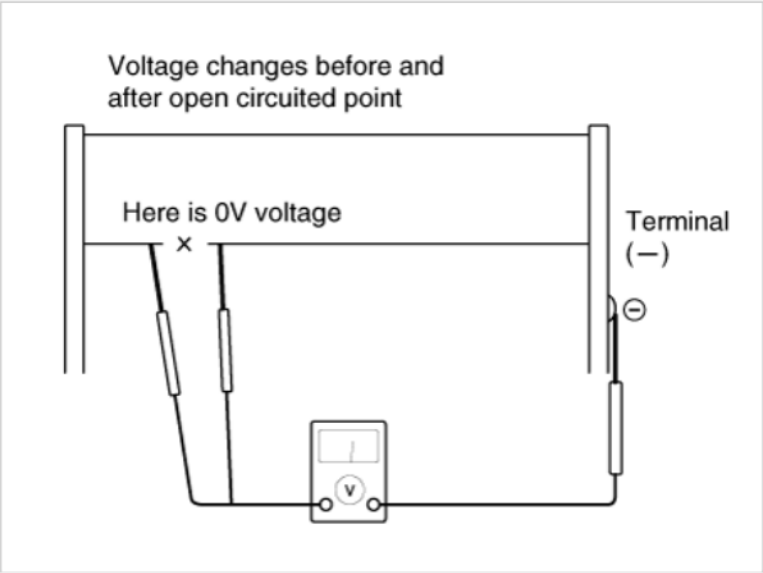


3. If a conductive line is burned out within the area between the central part and (-) terminal, the voltmeter will indicate 0V.

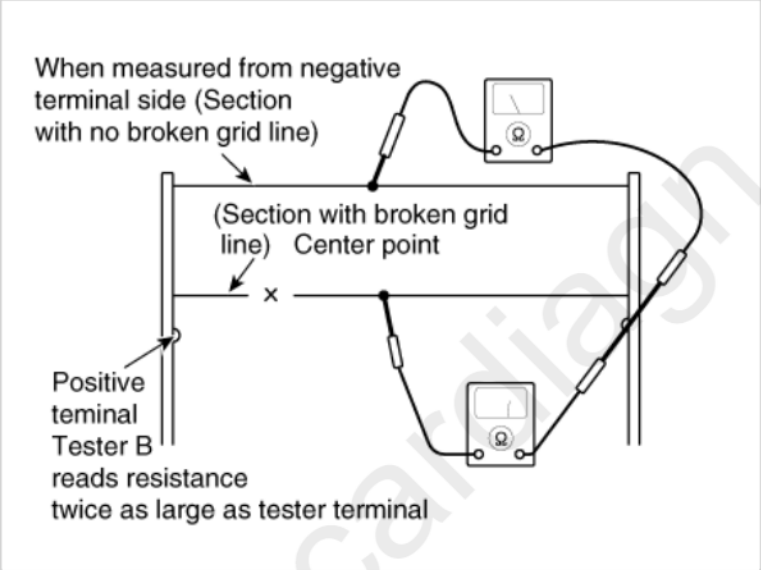


4. To check for open circuits, Slowly move the test lead toward the section where open circuits seem to exist. Try to find a point where the voltage turns to 0V. The point where the voltage has changed is the open-circuit point.

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

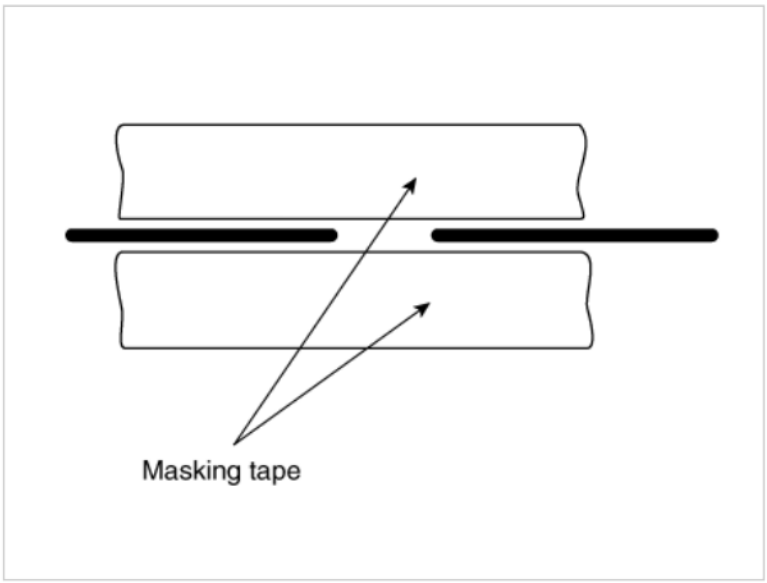


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Repair Of Broken Heater Line

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 paint with a knife after the paint has completely dried. (Allow 24 hours).



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Inspection

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system (KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. Select the "Current Data" menu to search the current state of the input/output data.
4. To forcibly actuate the input value of the module to be checked, select option "Actuation Test"

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the heater and A/C controll unit.
   (Refer to Heating, Ventilation, Air conditioning - "Heater & A/C Control Unit (MANUAL)")
   (Refer to Heating, Ventilation, Air conditioning - "Heater & A/C Control Unit (FATC)")

Installation

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

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Specification

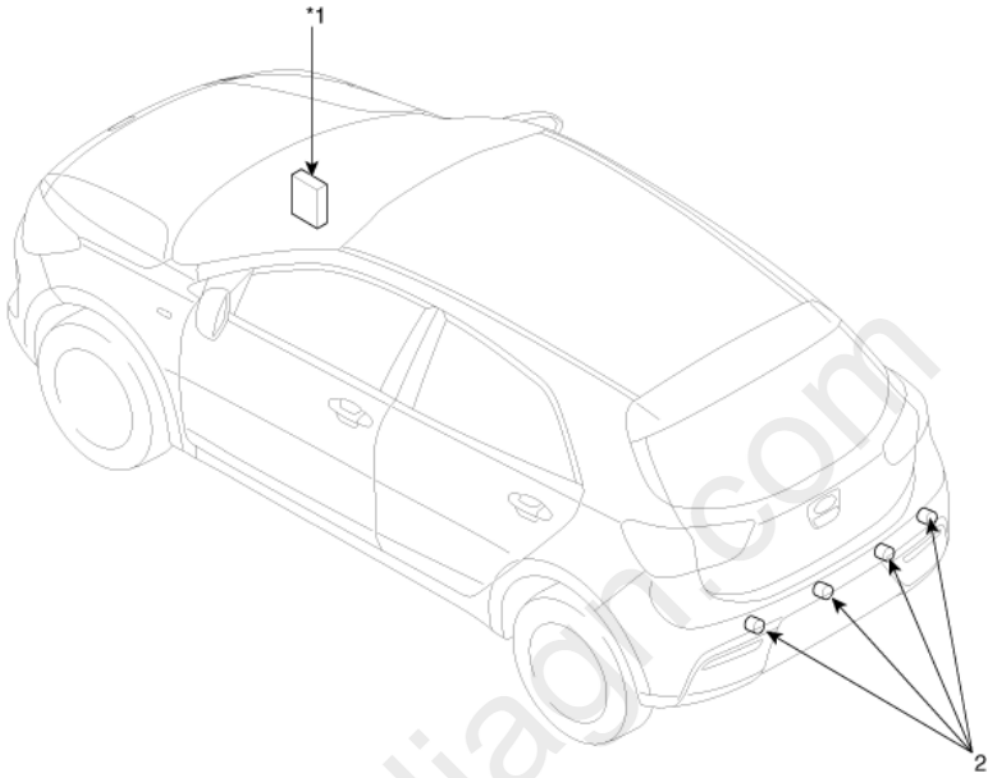
Item		Specification
Ultrasonic sensor	Voltage rating	DC 12V
	Detecting range	11.8 - 47.2 in (30 - 120 cm)
	Operation voltage	DC 9 - 16 V
	Operation current	MAX 350 mA
	Operating temperature	-22 - 176°F (-30 - 80°C)
	Operating frequency	48 ± 5 kHz
	Number of sensors	4 EA

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Component Location

[RHD]

*** This shows the LHD type.**
Refer to the mirror image for RHD type.



1. Body Control Module (BCM)
2. Ultrasonic sensor

Information

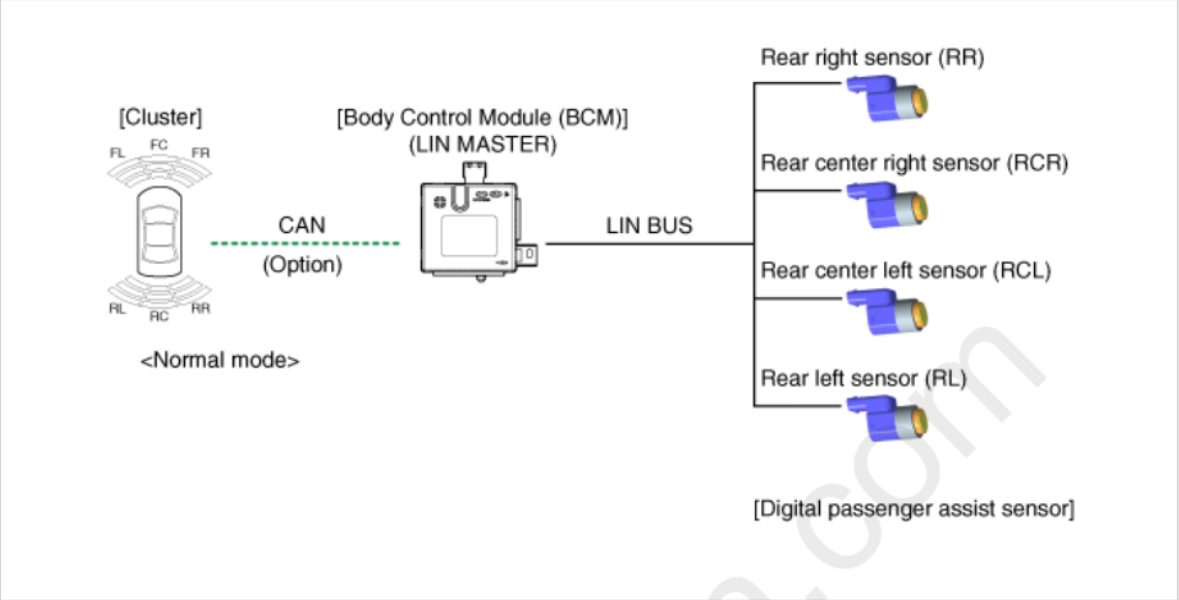
Rear parking assist control unit function is built in BCM (Body Control Module).

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System Overview

RPAS (Rear Parking Assist System) is an electronic driving aid that warns the driver to be cautious while parking or driving at low speed. The sensor uses ultrasonic waves to detect objects within proximity of the vehicle.

RPAS consists of four RPAS sensors which are detecting the obstacles and transmit the result separated into three warning levels, the first, second and third to BCM by Lin communication. BCM decides the alarm level by the transmitted communication message from the slave sensors, and then operates the buzzer or transmits the data for display.



System Operation Specification.

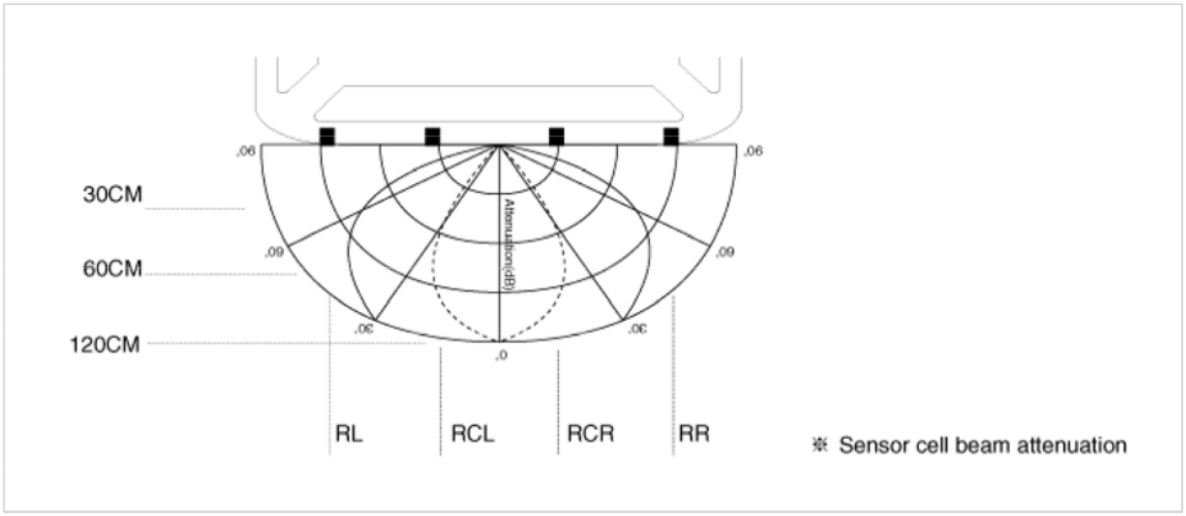
1. INIT mode
   (1) System initializing time is 500ms after IGN1+ R Gear.
   (2) RPAS recognizes LID and sets the sensor ID up during initialization.
   (3) RPAS activates each sensor and then executes the diagnosis after finishing initialization of BCM
   (4) If the diagnosis is completed and sensor does not send an error message, “RPAS Startling Buzzer” is normally worked.
   (5) If failure is received from any sensors, R-PAS Starting Buzzer” does not work but the failure alarm is operated for a moment.
   If you have display option, warning sign is also shown on it.
   (6) Buzzer for sensor failure is operated once, but the sensor failure state is shown in display until the failure is repaired.
2. NORMAL Mode
   (1) Lin communication starts and keeps the routine after IGN1 ON+R gear
   (2) BCM sends a message once to each sensor for operating request to check the initial status of the system and four sensors response all at once. At this time, if there is no problem, the alarm starts after 500 ms of R gear shifting at 300 ms intervals.
   (3) After initialization, normal mode starts 100ms later after finishing alarm output.
   (4) Alarm for obstacles is divided into 3 levels.
   The first and second are intermittent sound, and the third alarms continuously
   (5) The efficient vehicle speed of RPAS operation is below 10Km/h.
   (6) Refer to ‘Digital PAS Project LIN communication’ for the more detailed communication specification.

Sensing Area

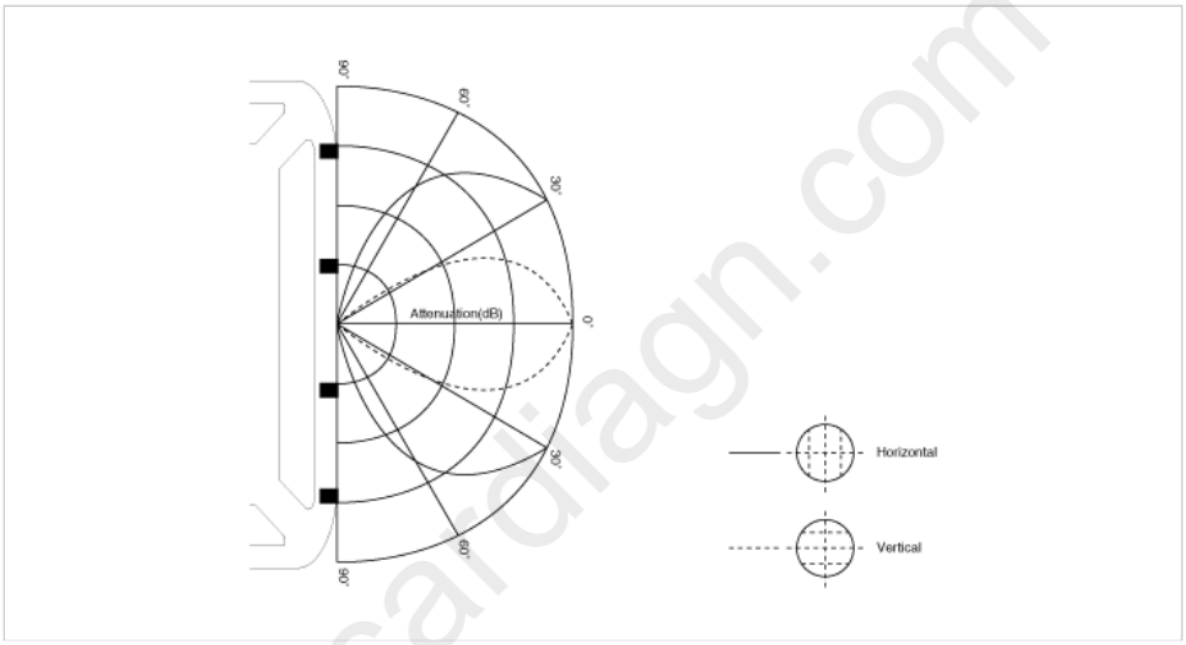
1. Measurement condition – PVC pole (diameter 75mm, length 1m), normal temperature
2. Distance range detected objects (Measured directly in front of sensor)
   61cm(24.0in) - 120cm(47.2in) : ± 15cm(5.9in)
   31cm(12.2in) - 60cm(23.6in): ± 15cm(5.9in)
   Less than 30cm(11.8in) : ± 10cm(3.9in)

Horizontal Sensing Area

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Vertical Sensing Area

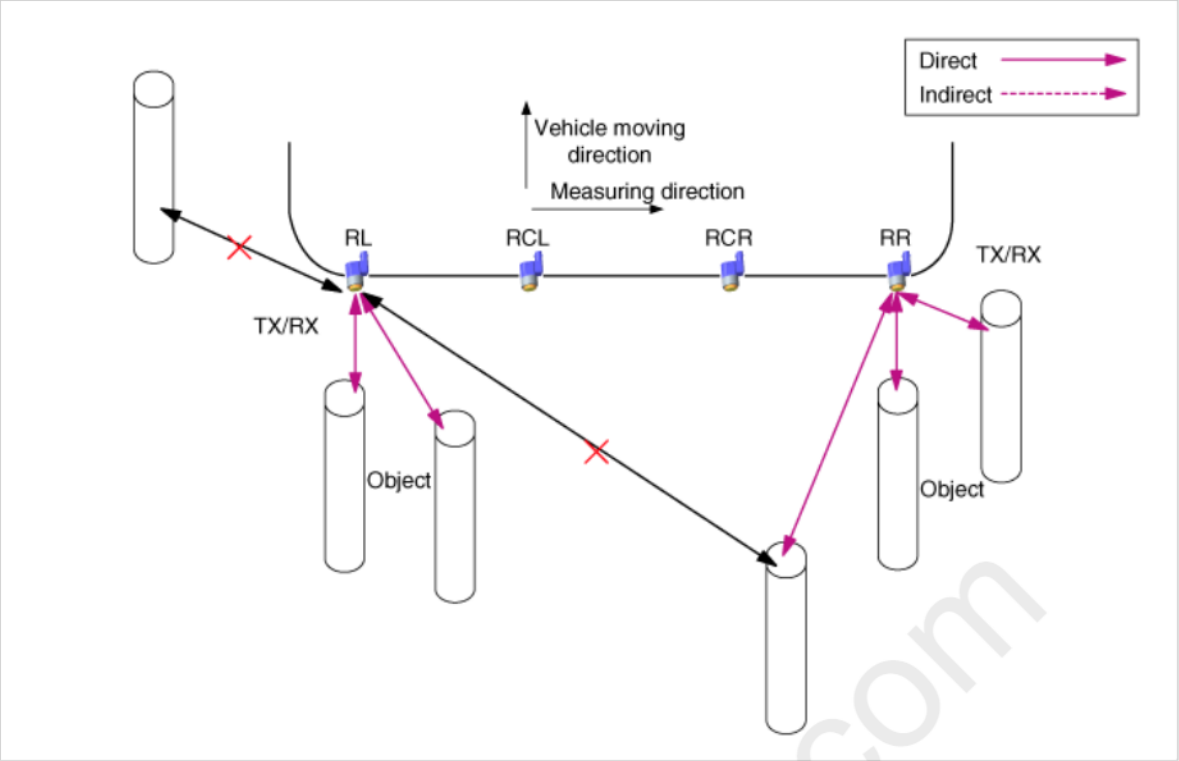


Distance Measurement

Direct Measurement

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

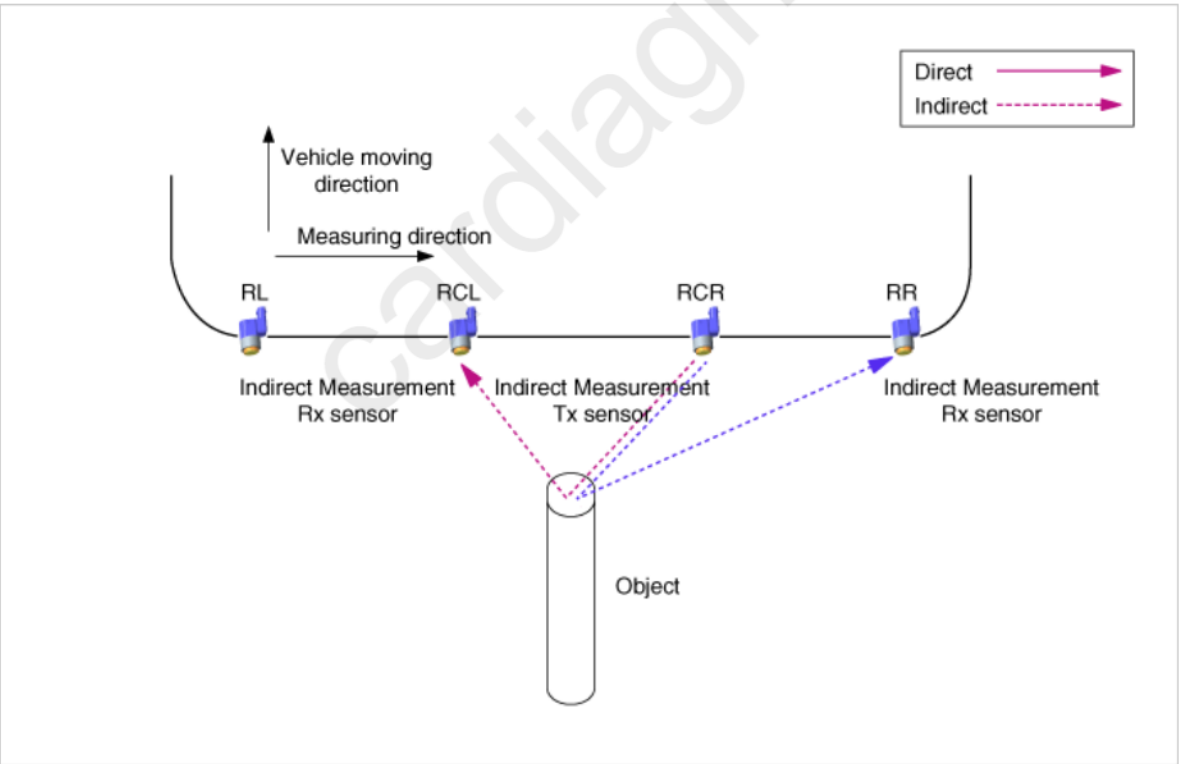
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Indirect Measurement

(RCL → RL, RCL → RCR, RCR → RCL, RCR → RR Execution in order)

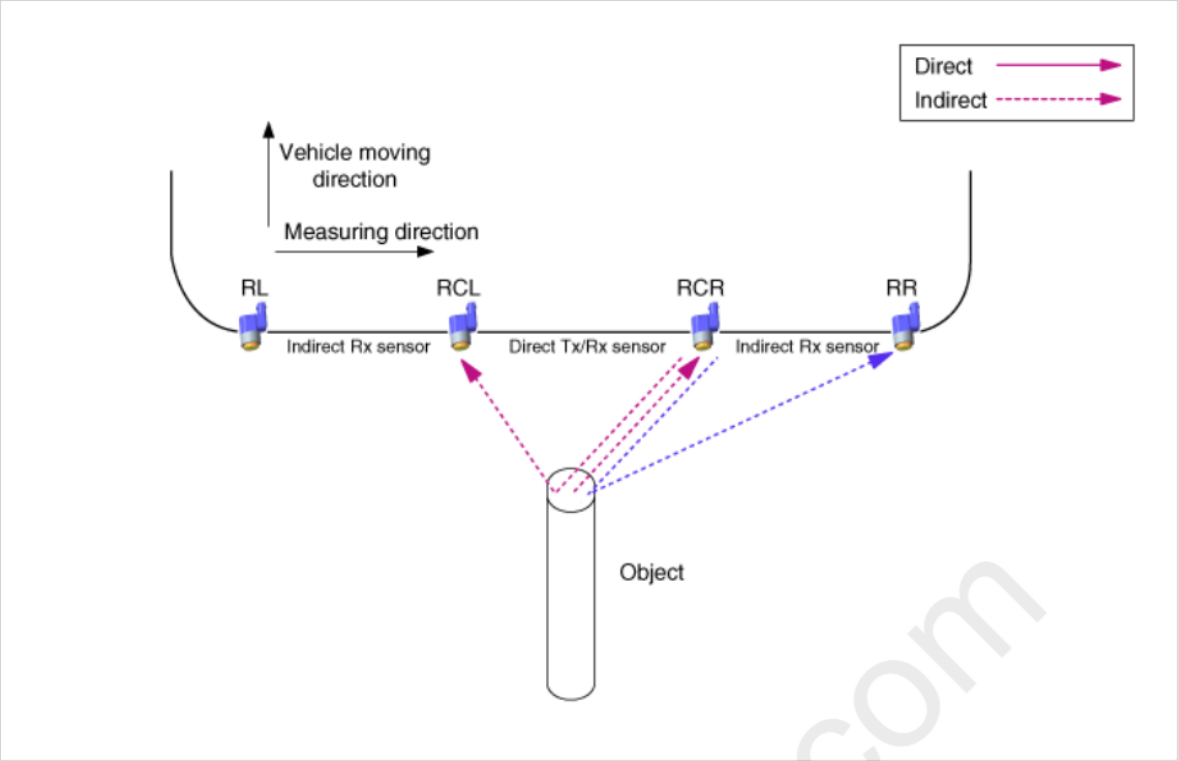
With two or three sensors, one of them sends the transmission and the others get the reception.



Direct and Indirect Measurement at once

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

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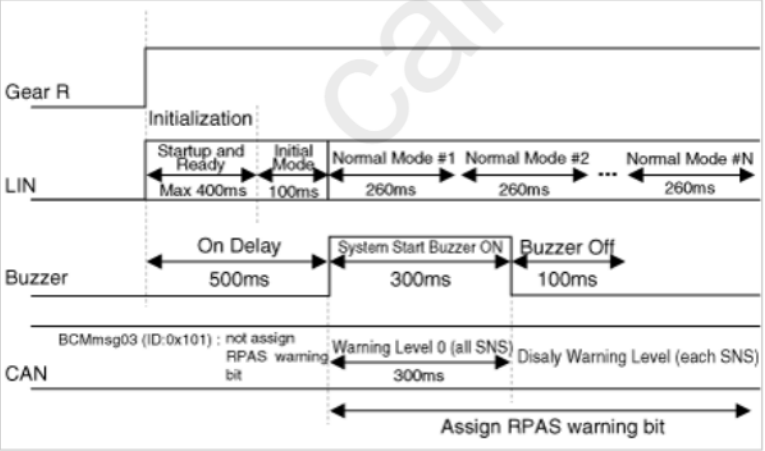
RPAS alarm system

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

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

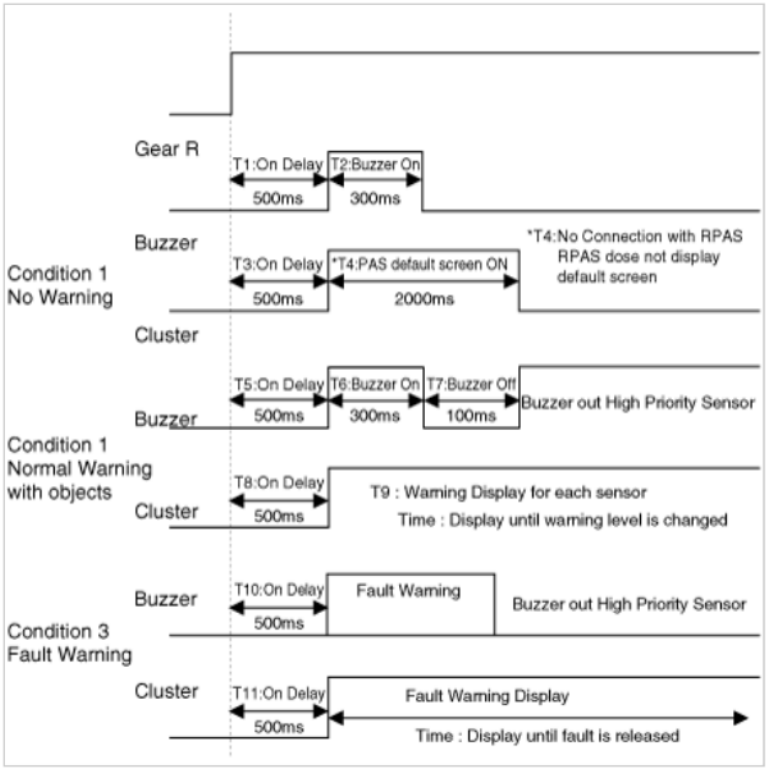
System Operation Spec

When the system has the power (after IGN ON and R gear), MICOM checks every sensor channel. In case it finds any error, it gives off the buzzer for 300ms after 500ms.If an error is found even in a sensor, it gives off the buzzer corresponding to the faulty sensor, instead of initial starting alarm. The operation to enter the normal mode is as follows.

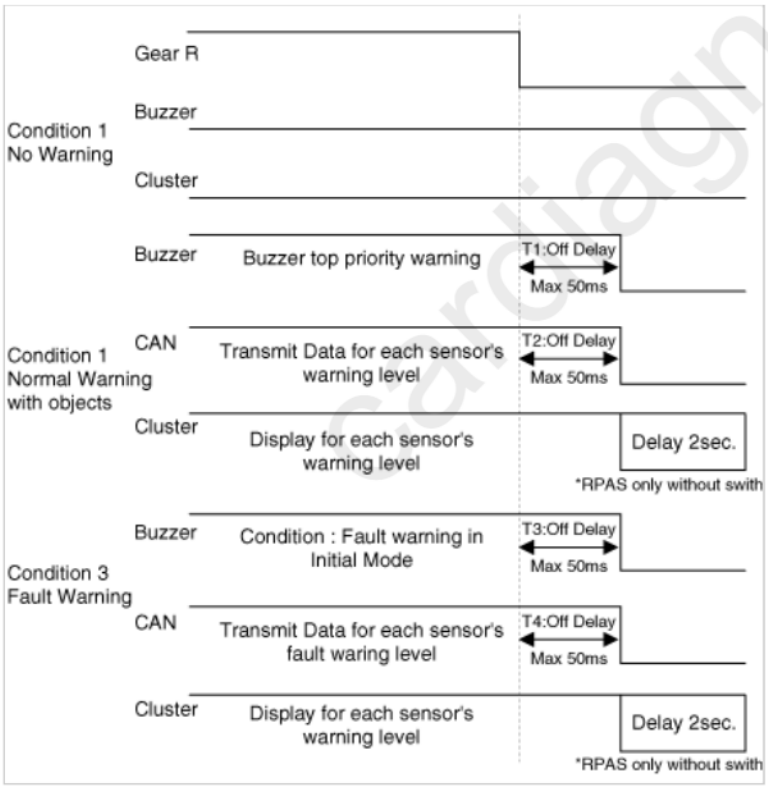


With the R gear put in the car, the system is operated as follows.

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With the R gear released, the system is operated as follows.

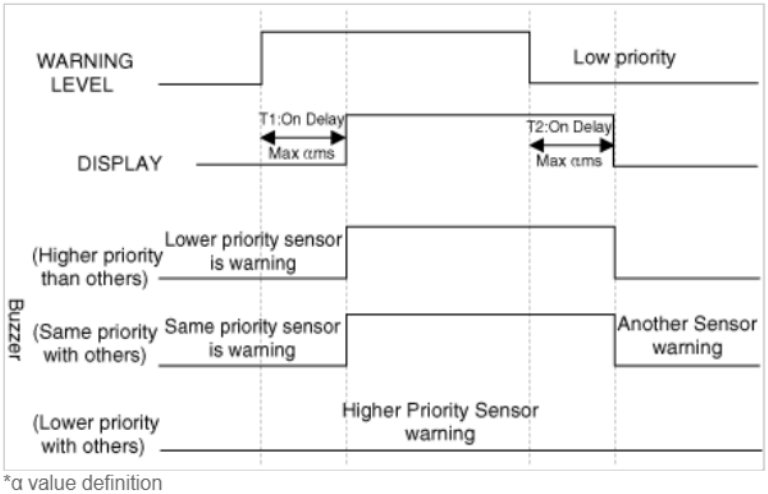


※ The acceptable error range on waveform is ±10%.

Alarm Output Specification classified by distance between sensors

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

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*α value definition

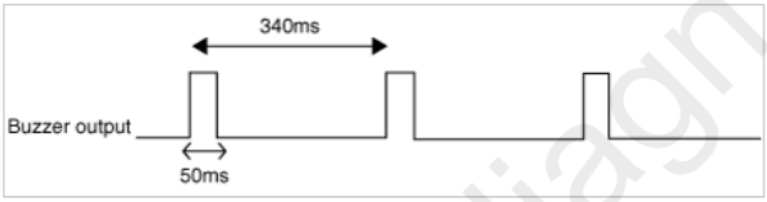
1. low priority sensor off : α = 0ms
2. low priority sensor is 1st warning level : α < 340ms
3. low priority sensor is 2nd warning level : α < 170ms

*β value definition

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

Alarm control by sensing distance is as follows.

1. First warning area (31.9 in (81 cm) - 47.2 in (120 cm))



2. Second warning area (16.1 in (41 cm) - 31.5 in (80 cm))



3. Third warning area (less than 15.7 in (40 cm))



Visible Alarm Indicator Specification

When the gear shifts to R, the cluster controls the indicator as the following picture.
When the system detects an object, it immediately turns on the indicator. If an object disappears while the RPAS detecting operation, the indicator remains on for 2 sec. before being turned off.
(But when it turns third step alarm to No alarm status, it lights third step alarm for two second and turns out.)

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Shift lever	Warning level	Rear inside	Rear outside	Beeping sound	Display
R	1st : 23.6 ~ 47.2 in (60 ~ 120 cm) beep~beep~beep~~	Beeping sound : ON Display : ON	Beeping sound : OFF Display : OFF		
	2nd : 11.8 ~ 23.6 in (30 ~ 60 cm) beep~beep~beep~	Beeping sound : ON Display : ON			
	3rd : 11.8 in (30 cm) beepbeepbeep	Beeping sound : ON Display : ON			

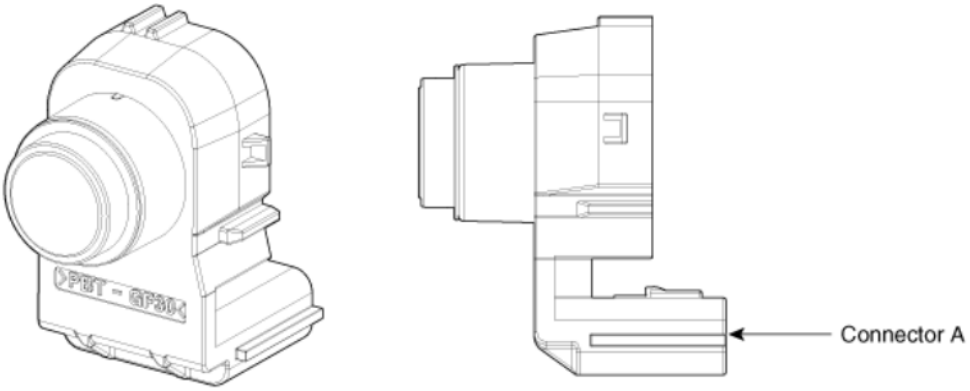
– It shows only the detecting position of obstacles.
– In third level alarm, indicator flickers at intervals of a second.
– In normal alarm mode, integrated display of RCR/RCL

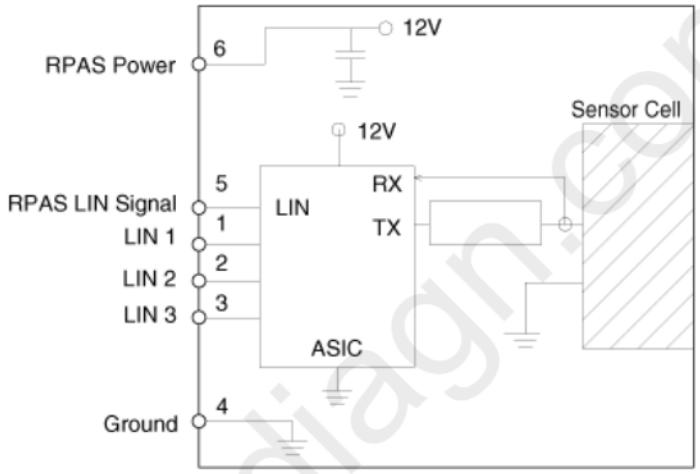
Communication Standard

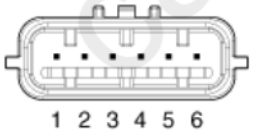
This section defines the communication between RPAS and BCM.
RPAS send a detecting result of object and sensor diagnosis result to BCM according to this document, and BCM takes a role to issue an alarm.
Indicator shows the transmitted position and alarm data, in the alarm mode, it finds the nearest DATA and alarms the nearest DATA first.
(Ex. In case, RL isthe first-step alarm and RR is the third step, RR alarm has priority.)

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Components





Connector A	No.	Description
	1	LIN 1
	2	LIN 2
	3	LIN 3
	4	Ground
	5	RPAS LIN Signal
	6	RPAS Power

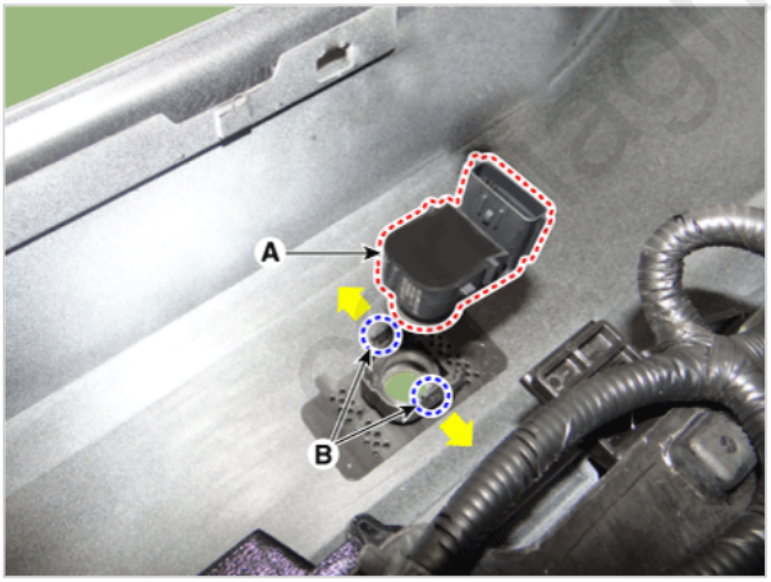
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Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the rear bumper assembly.
   (Refer to Body - "Rear Bumper Assembly")
3. Disconnect the connector (A) from the ultrasonic sensor.



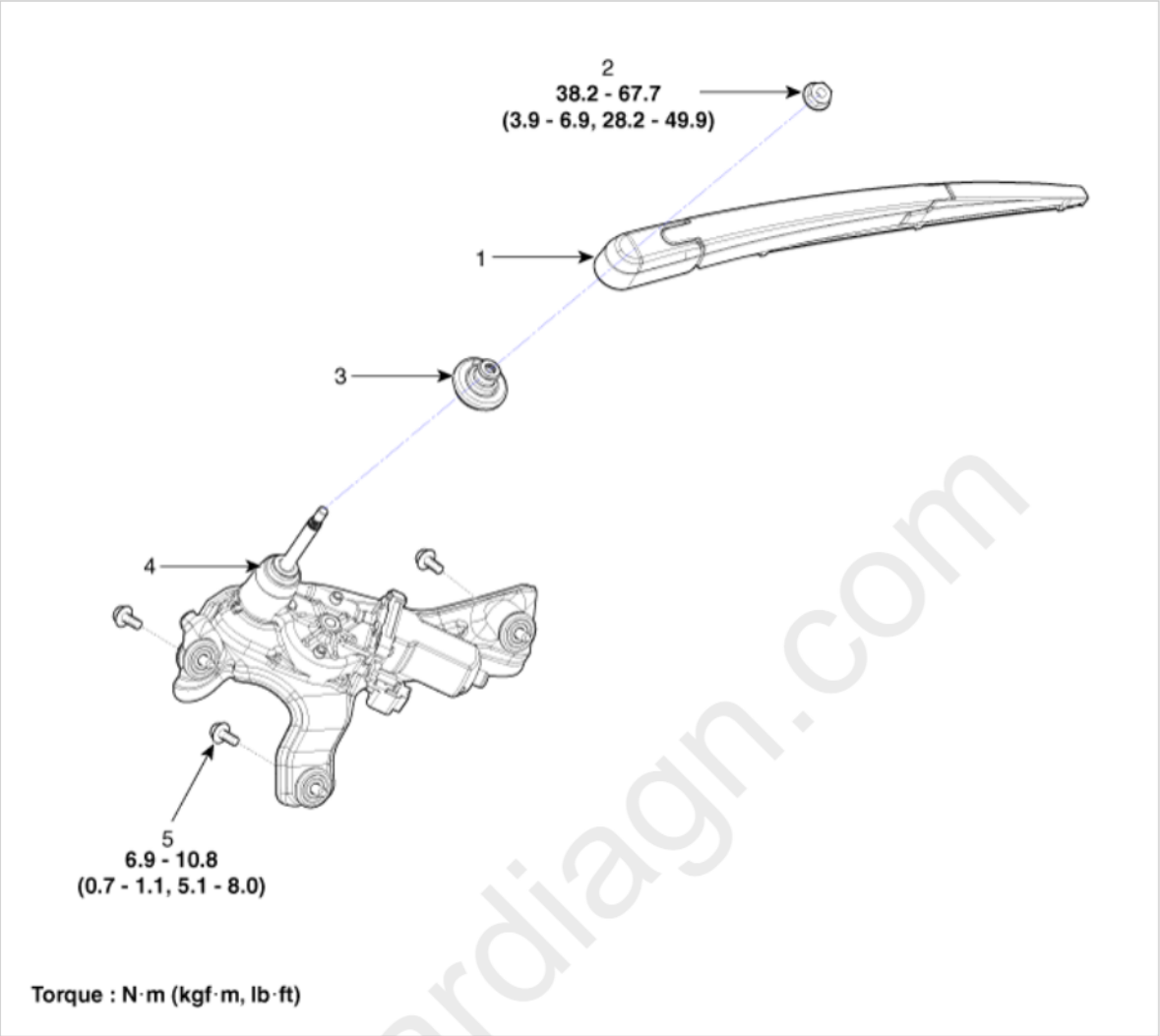
4. Pull out ths ultrasonic sensor (A) by opening the sensor holder (B) out.



Installation

1. Install the ultrasonic sensor and connector.
2. Install the rear bumper assembly.
3. Connect the negative (-) battery terminal.

Component Location



1 . Rear wiper arm & blade
2 . Rear wiper arm nut
3 . Rear wiper grommet
4 . Rear wiper motor assembly
5 . Rear wiper motor bolt

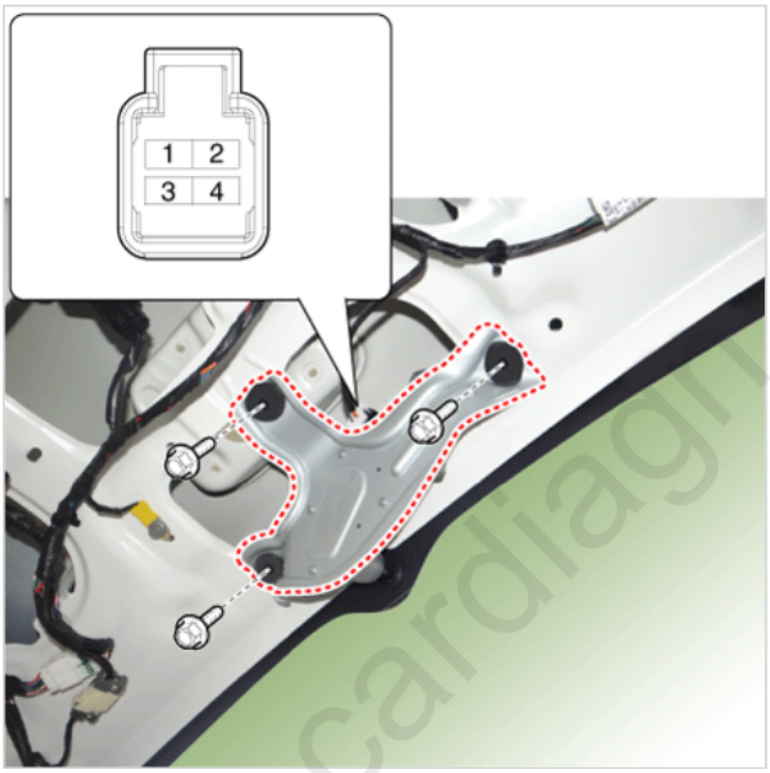
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Inspection

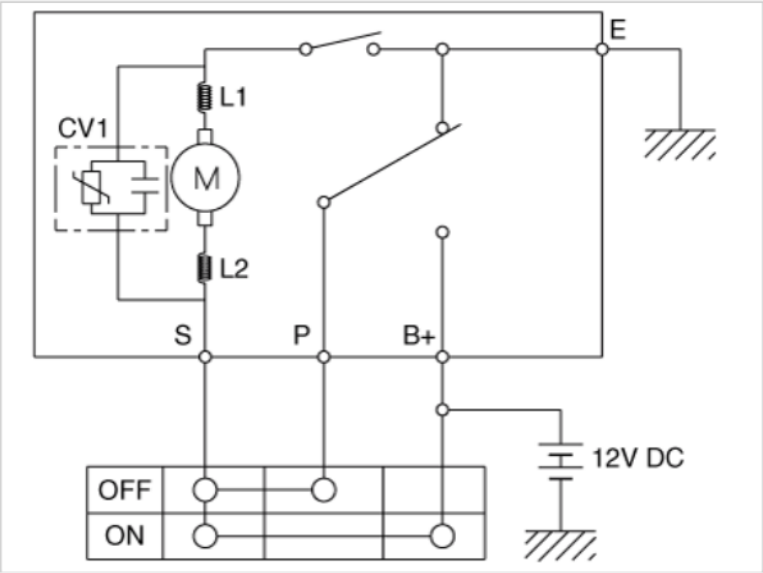
Rear Wiper Motor

1. Remove the connector from the rear wiper motor.
2. Connect positive (+) battery cables to terminal 4 and negative (-) battery cables to terminal 3 respectively.
3. Check that the motor operates normally. If they are abnormal, replace the washer motor.

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

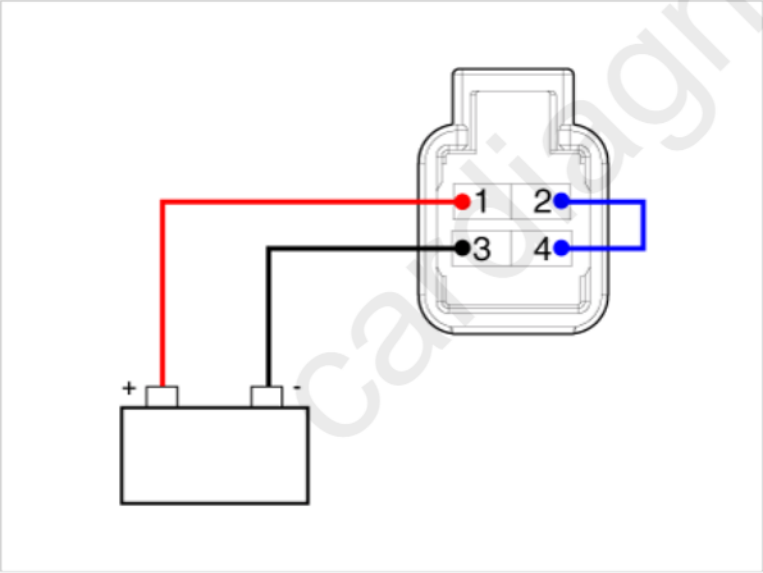


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Automatic Stop Operation Check

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



Inspection (With KDS)

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system(KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. Select the "Current Data" menu to search the current state of the input/output data.

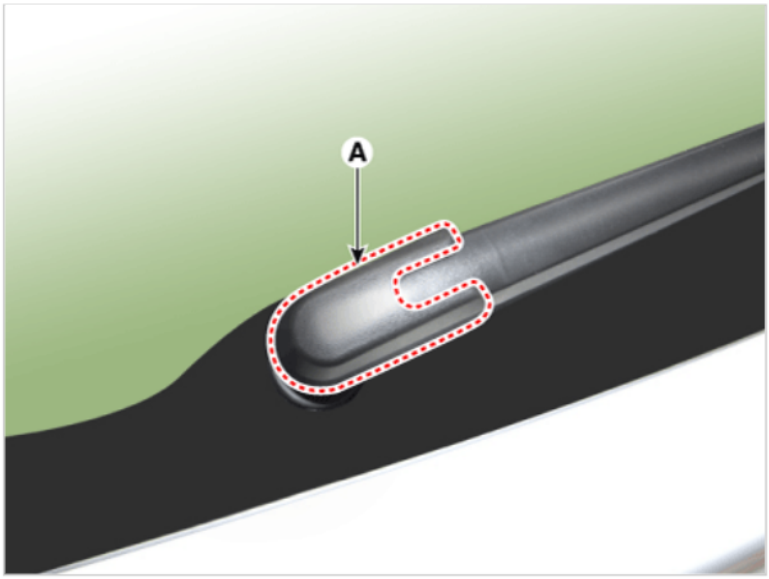
Removal

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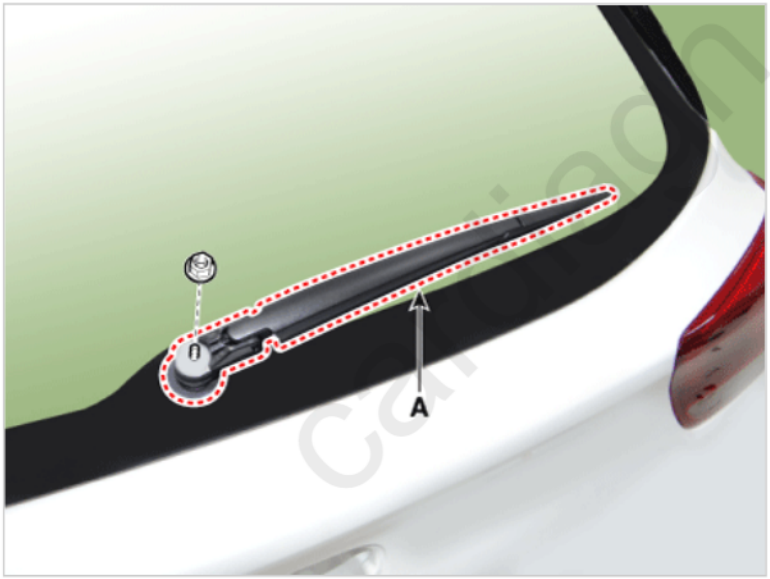
Information

Set up to automatically operate wipers of rear window glass when reverse gear shift is engaged while the wipers of windshield glass are in operation in "Instrument Panel - User Setting Menu (USM).

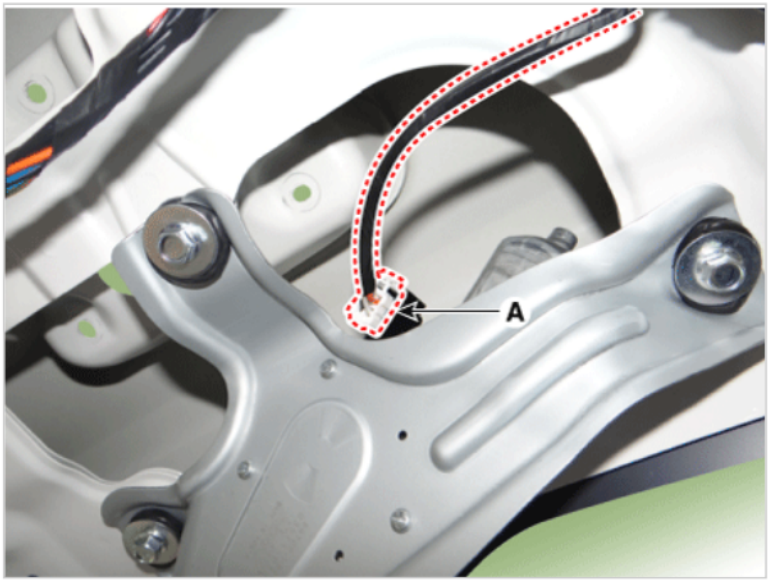
1. Remove the rear wiper cap (A).



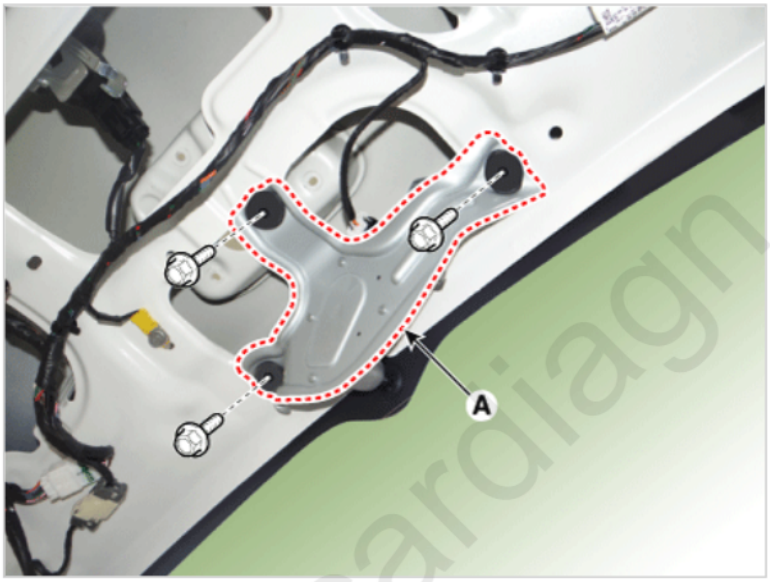
2. Remove the rear wiper arm & blade (A) after loosening the mounting nut.



3. Remove the tailgate trim after opening the tailgate.
   (Refer to Body - "Tailgate Trim)
4. Disconnect the rear wiper motor connector (A).



5. Remove the rear wiper motor assembly (A) after loosening the mounting bolts.



Installation

1. Install the rear wiper motor assembly.

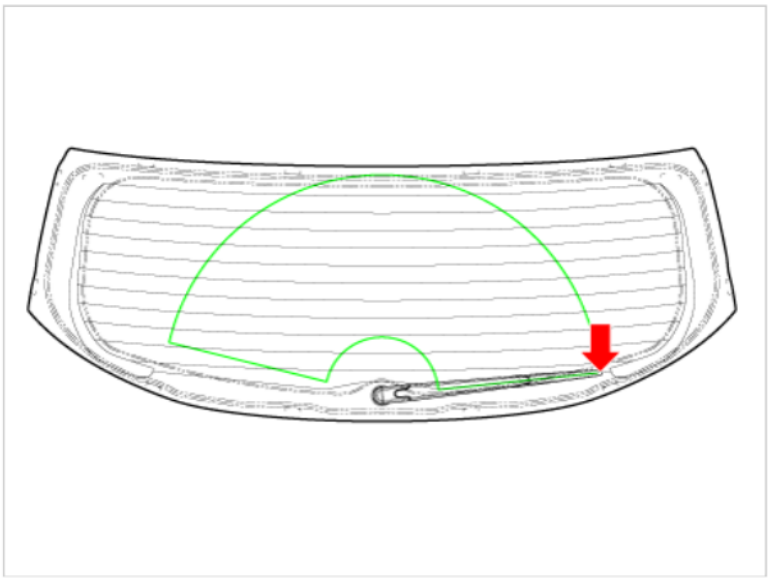
Tightening torque Nut :
6.9 - 10.8 N·m (0.7 - 1.1 kgf·m, 5.1 - 8.0 lb·ft)

2. Install the tailgate trim.
3. Install the rear wiper arm and rear wiper cap.

Tightening torque Nut :
38.2 - 67.7 N·m (3.9 - 6.9 kgf·m, 28.2 - 49.9 lb·ft)

4. Set the rear wiper blade and to the lowest defogger heat line and tailgate glass.

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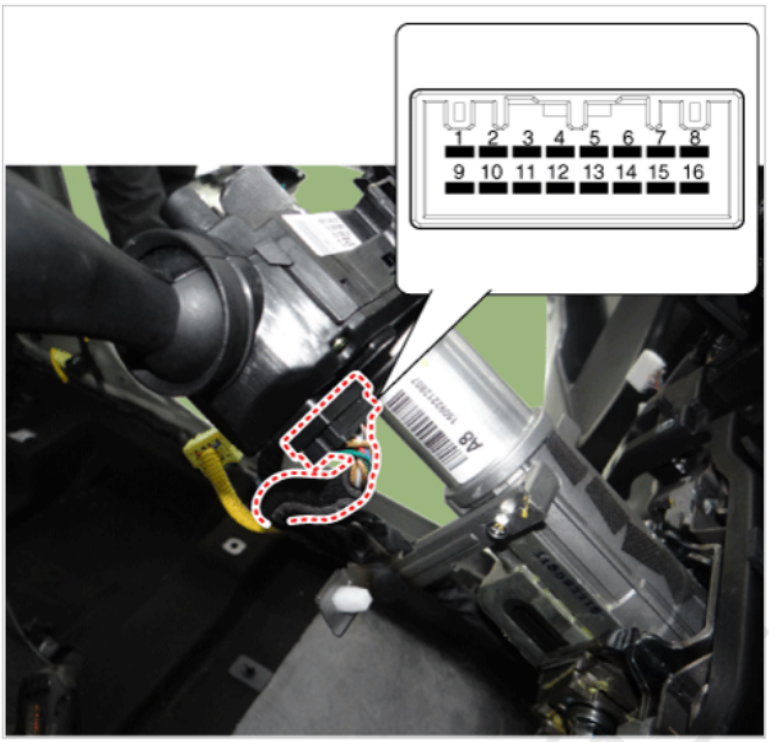
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Inspection

Multifunction Switch Inspection

[BCM Type]

1. Check for continuity between the terminals in each switch position as shown below.



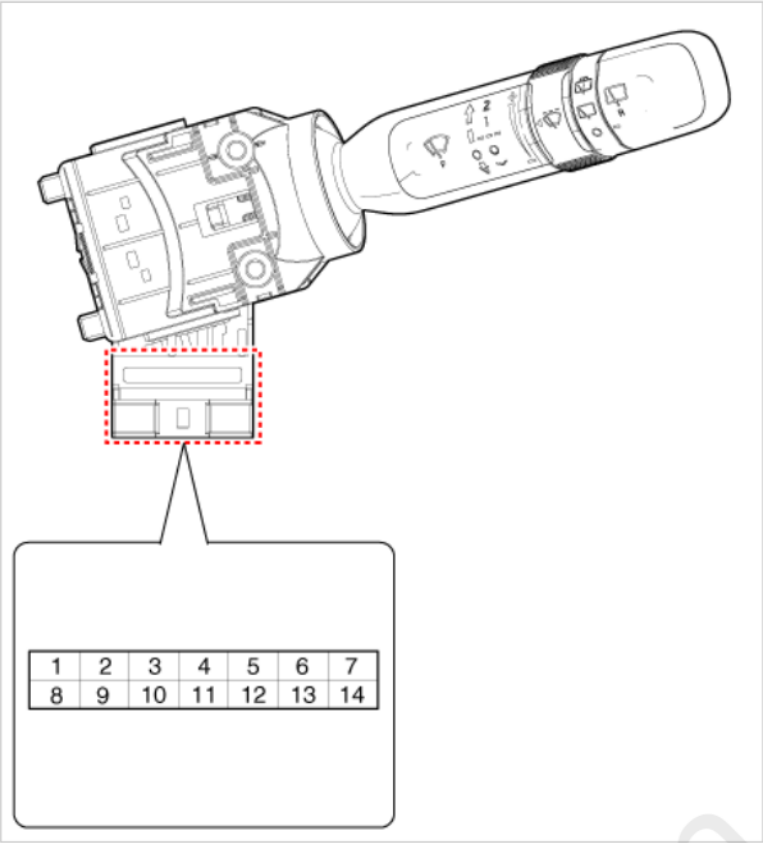
Switch	Switch position	Switch terminal	Resistance (Ω, ±3.5%)
Front wiper switch	MIST	1-9	330
	OFF		∞
	Intermittent (AUTO)		800
	LOW		1,800
	HIGH		5,700
Rear wiper switch	OFF	9-16	∞
	LOW		910
	HIGH		2,910

Inspection (With KDS)

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system(KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. Select the "Current Data" menu to search the current state of the input/output data.

[Non-BCM Type]

1. Check for continuity between the terminals in each switch position as shown below.



Rear Wiper & Washer Switch

Terminal / Position	13	11	3	12
OFF	○	○		
ON	○		○	
ON+Washer	○		○	○

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Inspection

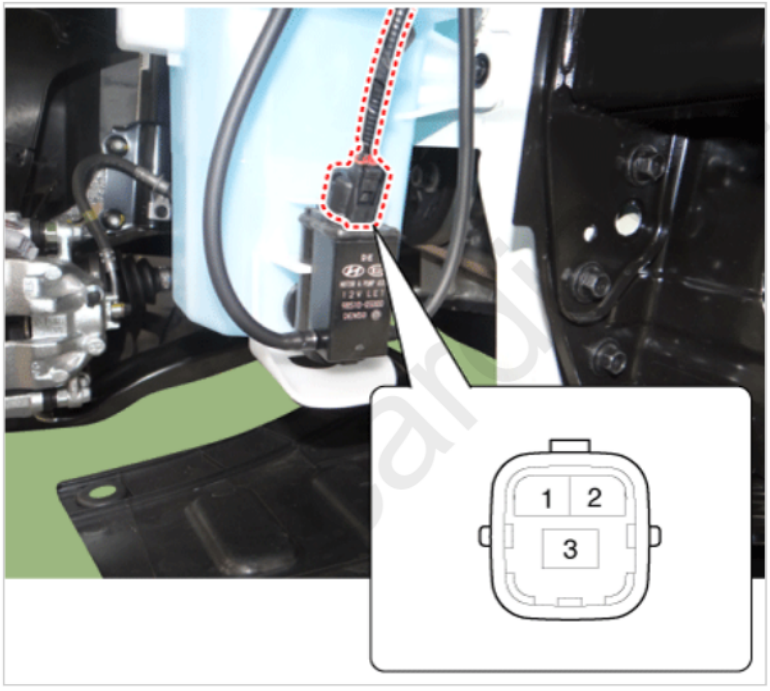
1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.

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

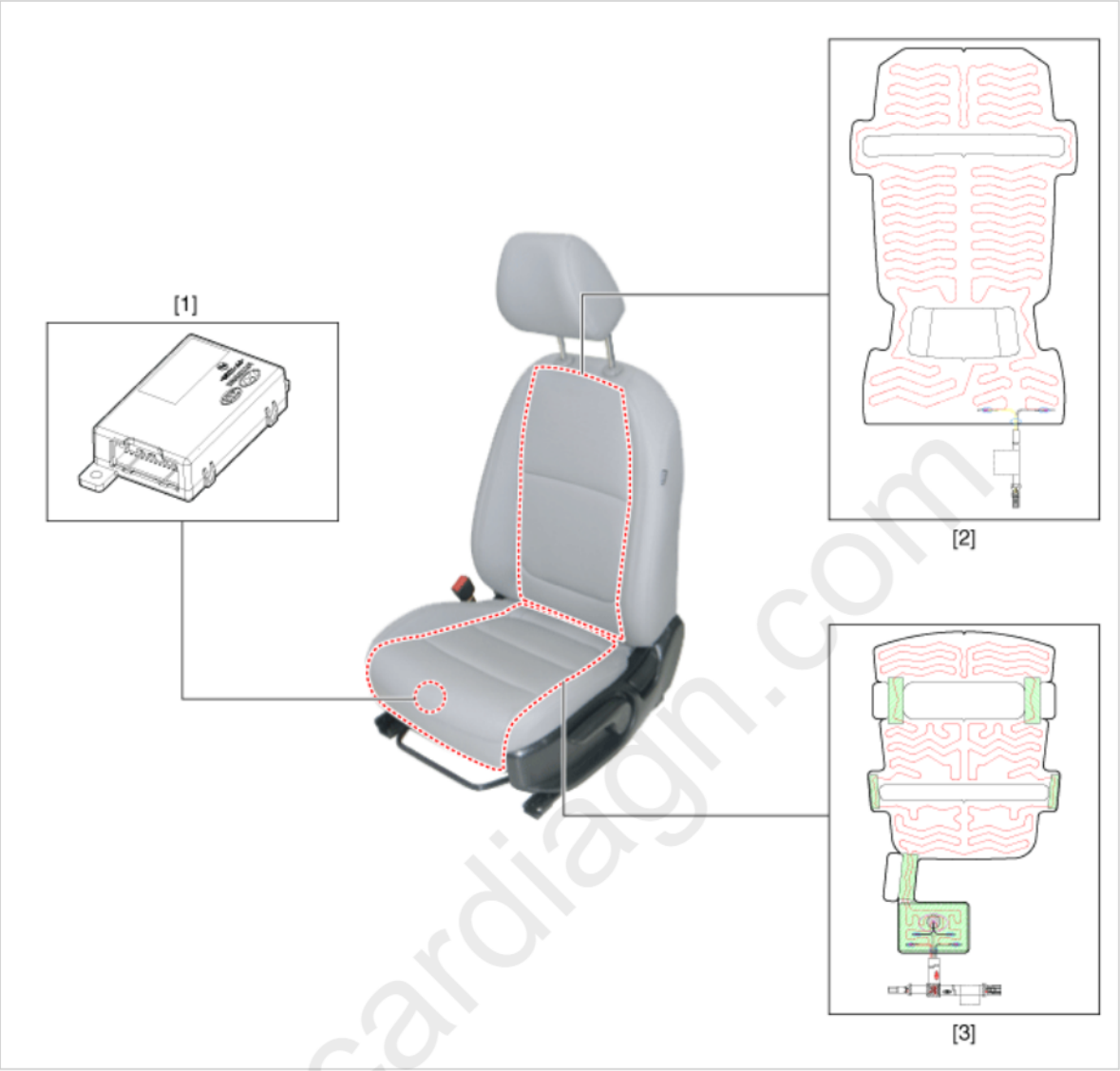
2. Remove the engine room under cover.
   G 1.6 GDI (Refer to Engine Mechanical System - "Engine Room Under Cover")
3. Remove the front wheel guard [RH].
   (Refer to Body - "Front Wheel Guard")
4. Connect positive (+) battery cables to terminal 3 and negative (-) battery cables to terminal 2 respectively.
5. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles.
6. If they are abnormal, replace the washer motor.

[Front & Rear washer]

No.	Description
1	Front windshield washer (+)
2	Ground
3	Rear washer (+)



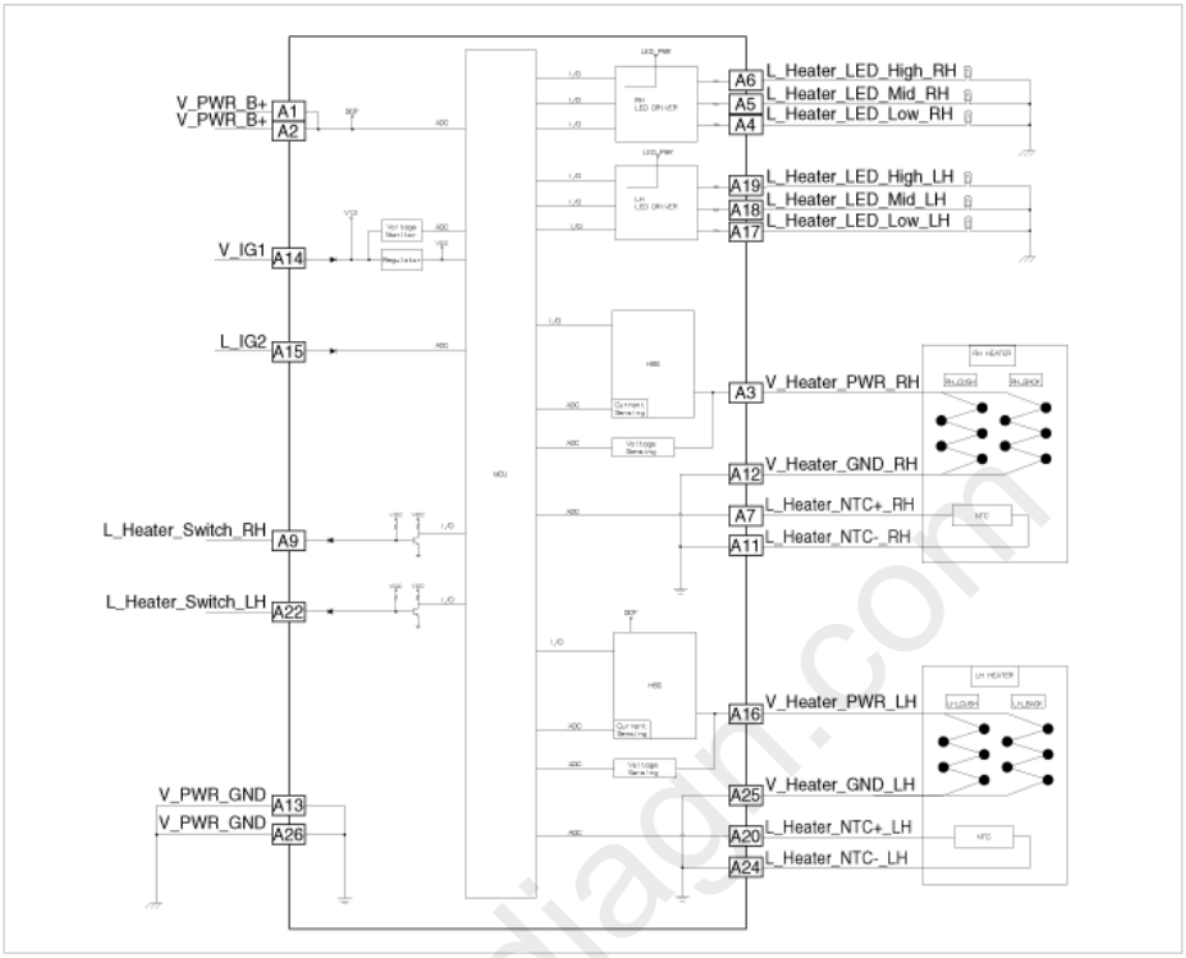
Component Location



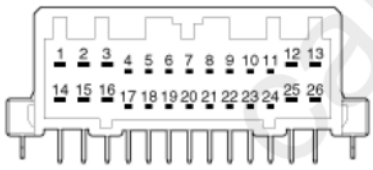
1. Seat heater unit (Passenger seat only)
2. Front seat back heater
3. Front seat cushion heater

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Circuit Diagram

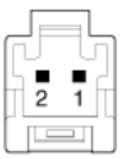


Seat Heater Unit (A)



No.	Description	No.	Description
1	Power (Battery +)	14	ECU (IGN1)
2	Power (Battery +)	15	ECU (IGN2)
3	RH Heater power	16	LH Heater power
4	RH Heater LED (Low)	17	LH Heater LED (Low)
5	RH Heater LED (Mid)	18	LH Heater LED (Mid)
6	RH Heater LED (High)	19	LH Heater LED (High)
7	RH Heater NTC (+)	20	LH Heater NTC (+)
8	-	21	-
9	RH Heater switch	22	LH Heater switch
10	-	23	-
11	RH Heater NTC (-)	24	LH Heater NTC (-)
12	RH Heater (Ground)	25	LH Heater (Ground)
13	Power (Ground)	26	Power (Ground)

Heater Pad Connector (Back) (B)



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

Heater Pad Connector (Cushion) (C)

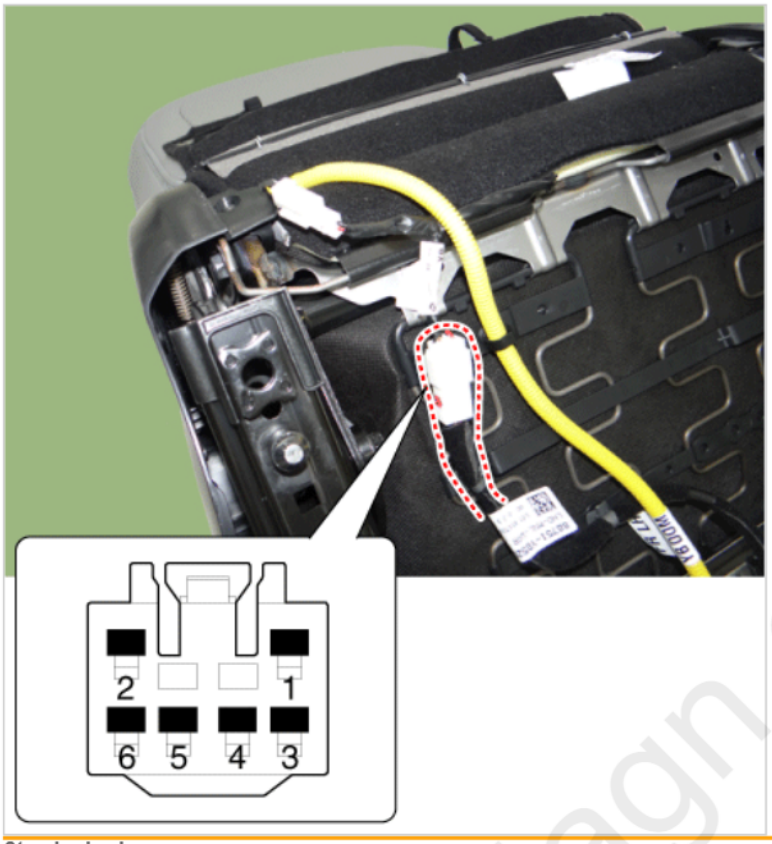


No.	Description
1	NTC (+)
2	NTC (-)
3	Heater (+)
4	-
5	-
6	Heater (-)

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Inspection

1. Check for continuity and measure the resistance between terminals No 3 and No 6.



Standard value

Driver / Assists (cushion + back)
Heater seat : 1.54Ω±10%/23°C
Ventilated seat : 1.93Ω±10%/23°C

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

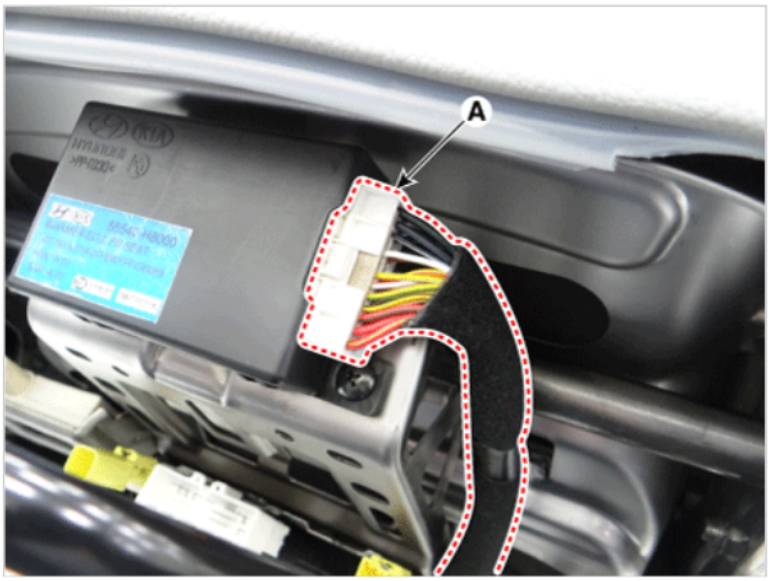
Standard value

1st : cushion : 36±2°C, back : 40±2°C
2st : cushion : 39±2°C, back : 45±2°C
3st : cushion : 42±2°C, back : 50±2°C

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front seat assembly.
   (Refer to Body - "Front Seat Assembly")
3. Disconnect the seat heater unit connector (A).

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4. Remove the seat heater unit (A) after loosening the mounting screws.



Installation

1. Install the seat heater unit and connecting the connector.
2. Install the front seat assembly.
3. Connect the negative (-) battery terminal.

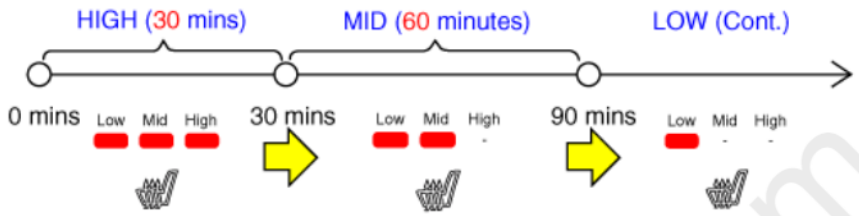
Description

Seat Heater Smart Control Technology

- To prevent low temperature burn, seat heater temperature will automatically be lowered after a certain period of time.
  (Low temperature burn condition: Over 30 minutes at 50°C)

Seat Heater Smart Control Operation

- Change to "MID" after 30 minutes in "HIGH", then "LOW" after 60 minutes in "MID"
- Change to "LOW" after 60 minutes in "MID"

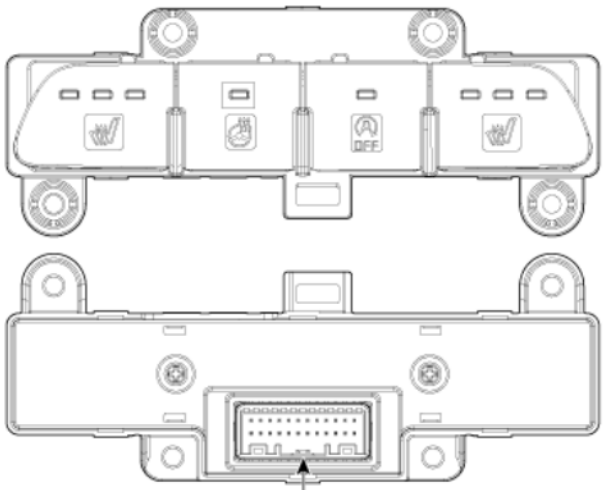


Information

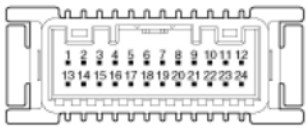
- If temperature is raised manually within certain period of time after the temperature was lowered automatically, it will be lowered again soon to prevent overheating or low temperature burn.
- This is normal operating condition as a safety device.

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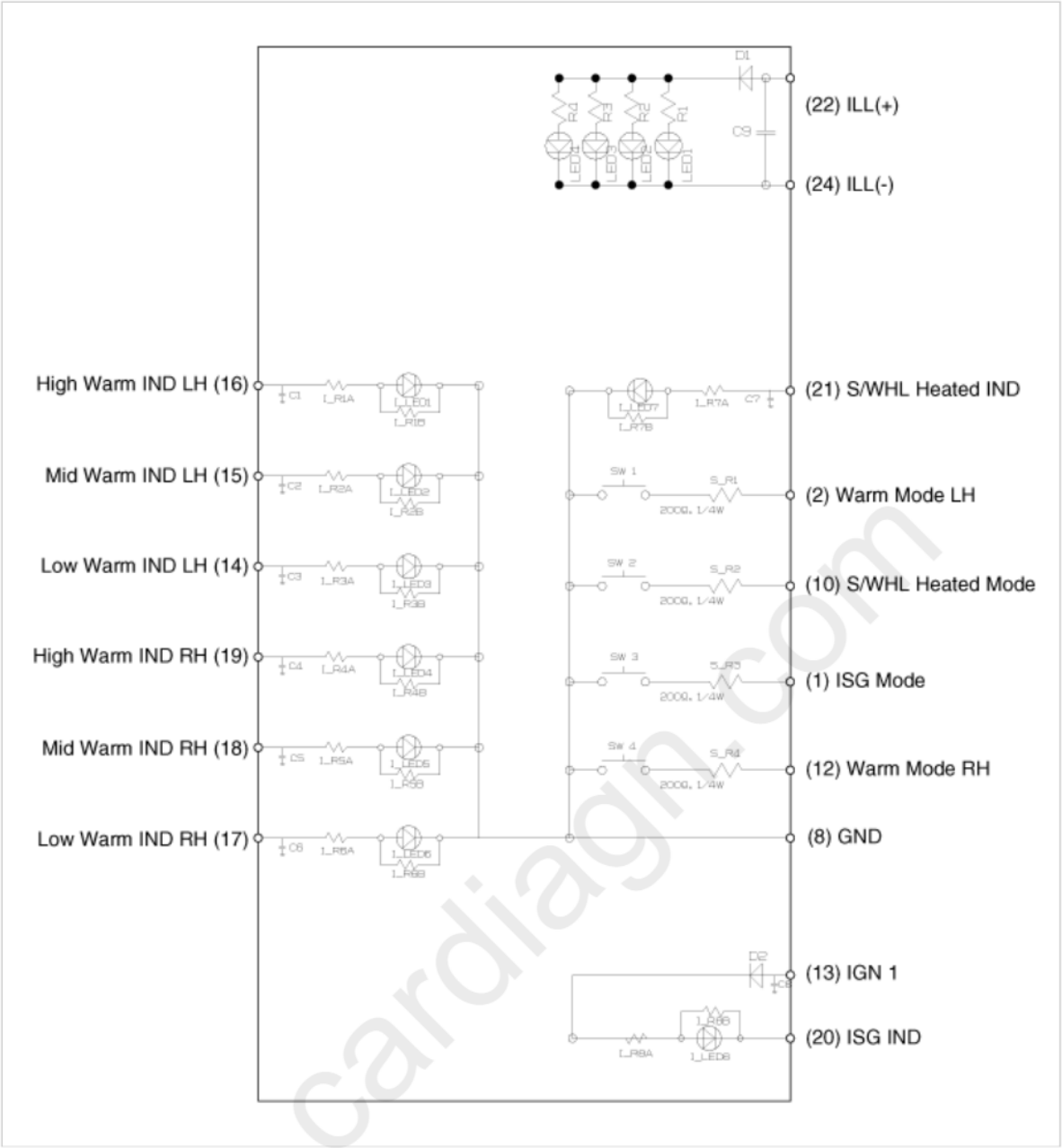
Circuit Diagram



Connector A

Connector A	No.	Description	No.	Description
	1	ISG Mode switch	13	IGN1
	2	Left seat warmer mode switch	14	Left seat warmer indicator (Low)
	3	-	15	Left seat warmer indicator (Mid)
	4	-	16	Left seat warmer indicator (High)
	5	-	17	Right seat warmer indicator (Low)
	6	-	18	Right seat warmer indicator (Mid)
	7	-	19	Right seat warmer indicator (High)
	8	Ground	20	ISG Indicator
	9	-	21	Steering heated indicator
	10	Steering heated mode switch	22	Illumination (+)
	11	-	23	-
	12	Right seat warmer mode switch	24	Illumination (-)

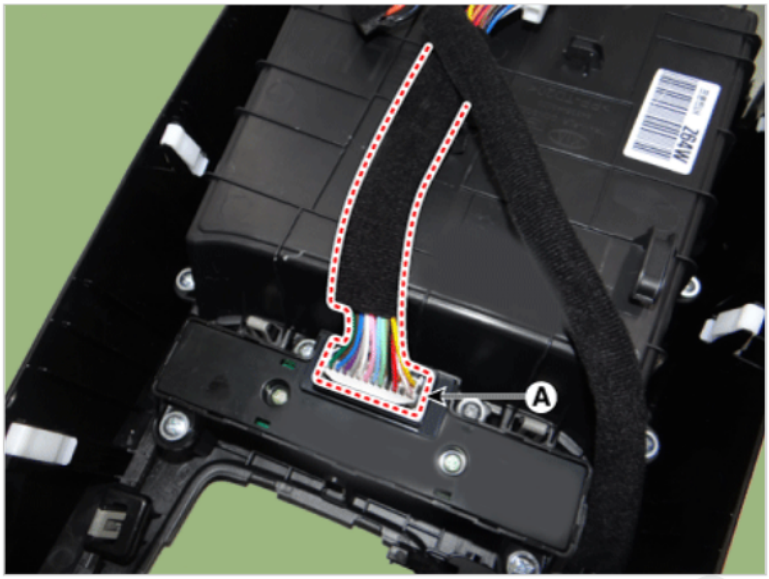
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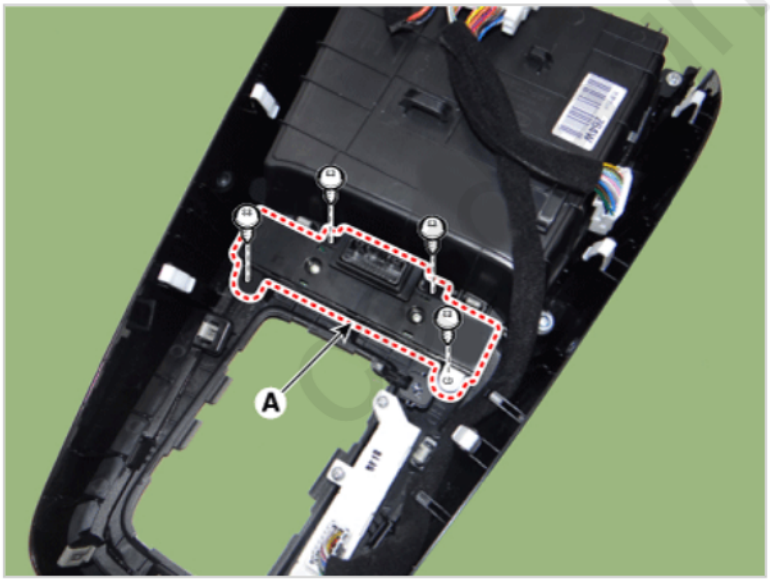
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Removal

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



4. Remove the front console upper cover switch (A) after loosening the mounting screws.



Installation

1. Install the front console upper cover switch.
2. Connect the front console upper cover switch connector.
3. Install the front console upper cover.
4. Connect the negative (-) battery terminal.

Specifications

Smart Key Unit

Items	Specification
Rated voltage	DC 12 V
Operating voltage	DC 9 - 16 V
Operating temperature	-31 - 167°F (-35 - 75°C)
Load	Max. 4mA (When welcome light function "OFF")

RF Receiver

Items	Specification
Frequency	433.92 Mhz
Antenna type	FSK (Frequency Shift Keying)

Smart Key Fob

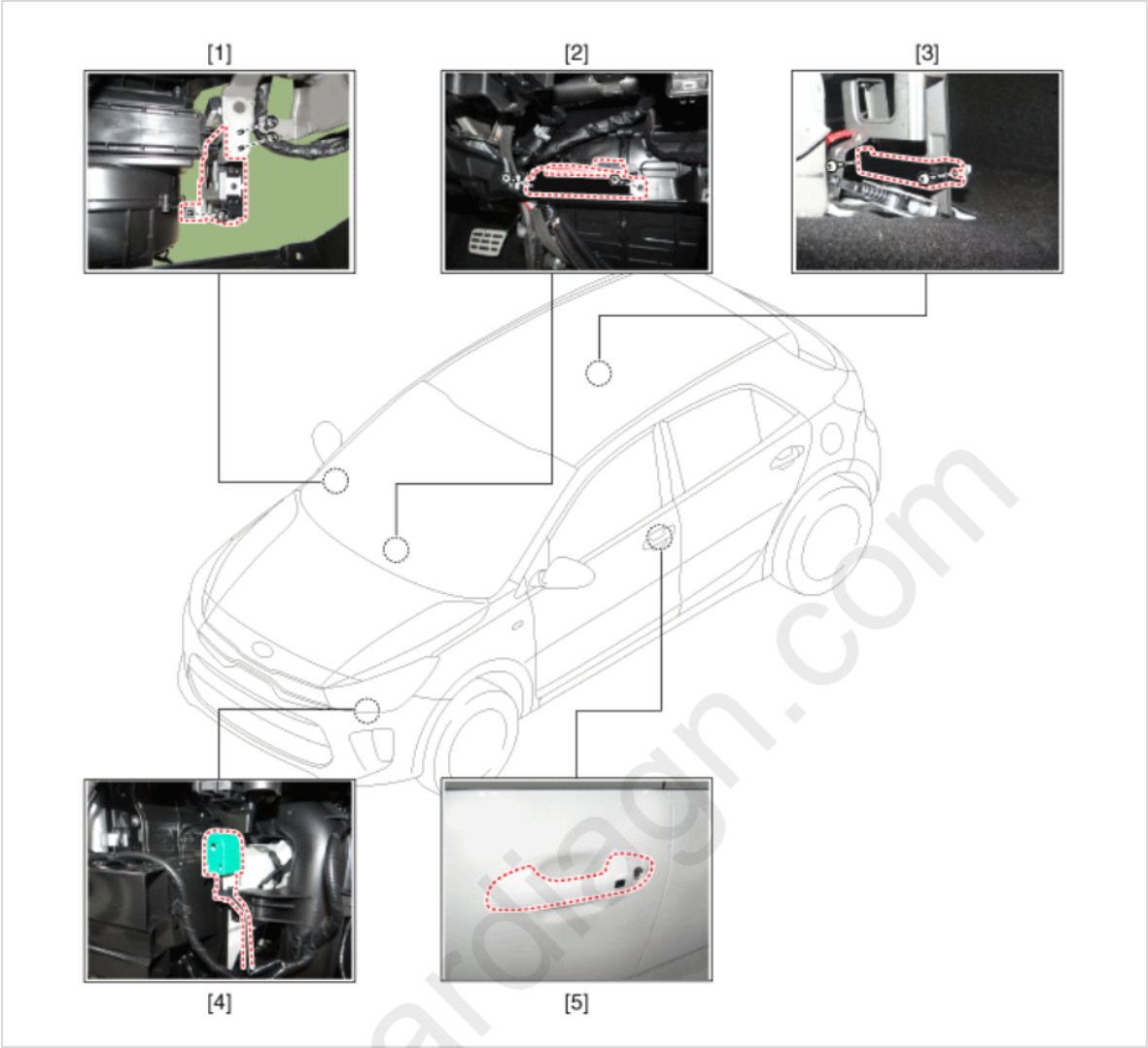
Items	Specification
Battery	Lithium battery 3V 1EA
Distance	- The distance over which RF(Radio Frequency) Receiver can receive a FOB transmission signal : 30m - The distance over which LF(Low Frequency) antenna(Outer Handle/ Trunk/ Tailgate) can detect FOB : 0.7m
Battery life	More than 2 years (10 times / a day) **WARNING** • An inappropriately disposed battery can be harmful to the environment and human health. • Dispose the battery according to your local law(s) or regulation.
Push buttons	3 (Door lock / unlock, Tailgate)
Frequency(Rx)	125 kHz
Frequency(Tx)	433.92 MHz
Numbers	2EA

Antenna

Items	Specification
Rated voltage	DC 12 V
Operating voltage	DC 9 - 16 V
Operating temperature	-22 - 167°F (-30 - 75°C)
Frequency	125kHz
Numbers	Interior (3EA), Door (2EA), Bumper (1EA)

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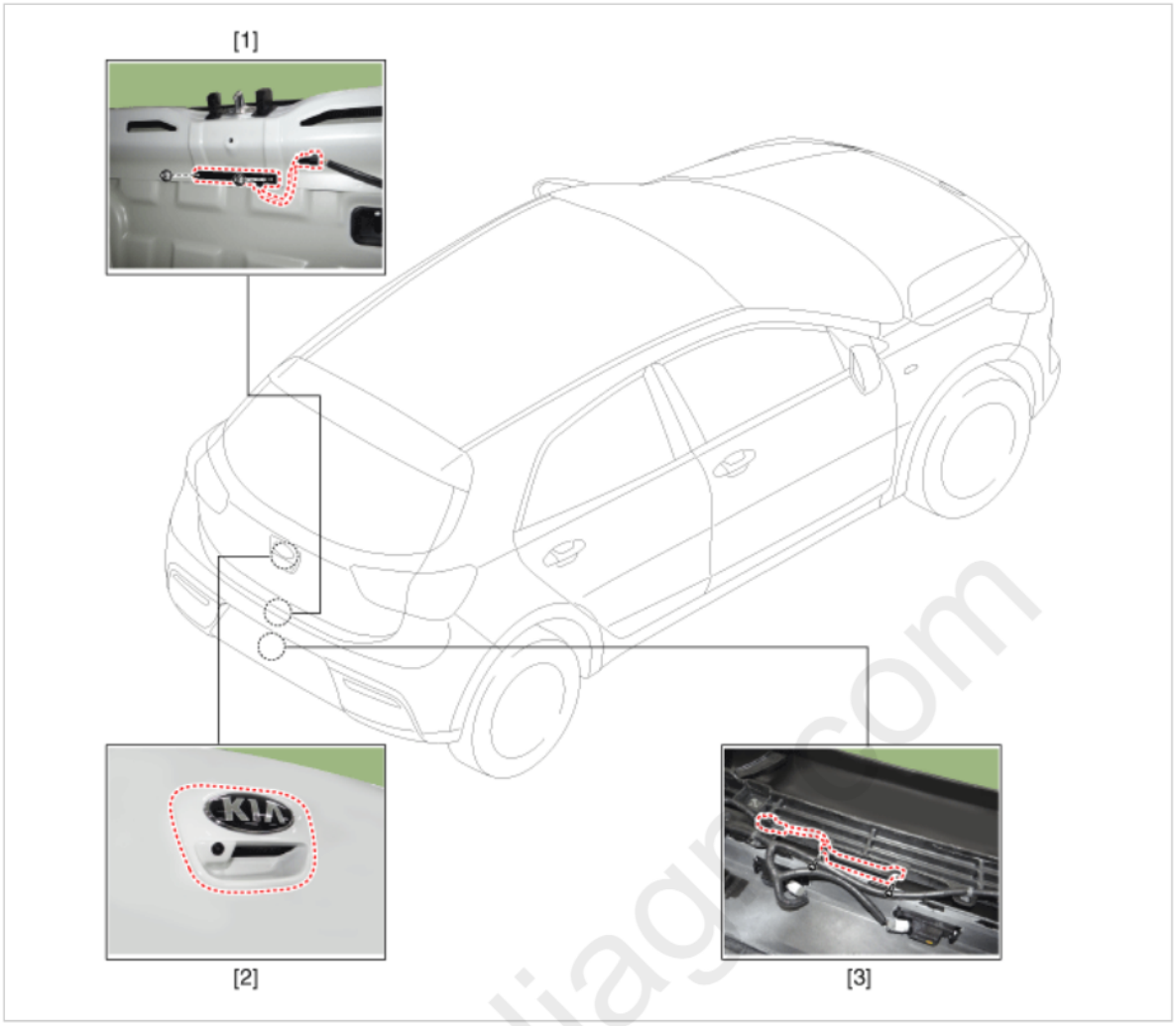
Component Location (1)



1. Smart key unit (SMK)
2. Interior antenna 1
3. Interior antenna 2
4. Buzzer
5. Door outside handle / Door antenna

Component Location (2)

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1. Tailgate antenna
2. Tailgate open switch
3. Bumper antenna

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Description

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

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

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

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

The System offers the following features :

- Passive unlock via 4 doors
- Passive locking via4 doors
- Passive start
- Passive access tailgate via the tailgate lid switch at the tailgate
- Max. 2 fobs can be handled by the system
- Immobilizer backup antenna driver integrated into SSB for TP authentication (i.e. limp home mode)
- Communication with engine management system
- Communication with SRX
- LF-RF communication

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

Smart Key ECU (SMK ECU)

The SMK ECU manages all functions related to "Passive Unlock", "Passive Lock" and "Passive Authorization for Engine Start Operation".

It reads the inputs (Push button in door handle, Start Stop Button (SSB), PARK position Switch), controls the outputs (e.g. exterior and interior antennas), and communicates via the CAN as well as a single line interface to further devices of the car.

For communication with the SMART KEY FOB, SMK ECU generates a request (challenge) as an encoded and modulated 125kHz signal at the inductive antenna outputs and receives the SMART KEY FOB's response via the external RF receiver.

The main functional blocks of the SMK ECU are :

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

The LF antenna amplifier/driver generates a 125kHz sinusoidal carrier signal which is distributed to the different antennas.

Smart Key FOB

The system supports up to 2 SMART KEY FOBs.

The main functions of the SMART KEY FOB are :

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

Antennas

1. Emitting LF Antennas :
   Inductive antennas in and at the vehicle are used to transform the current, driven by the SMK ECU antenna driver, into a 125 (or 134.2) kHz magnetic field, which is the carrier for the SMART KEY challenge.
   Three antennas cover the vehicle's exterior: two antennas in the Door Handles (DS and PS) cover the area around the doors; one antenna in the rear bumper assemblys the area around the trunk or tailgate.

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Up to three antennas cover the vehicle's interior and the trunk or tailgate interior: two in the passenger compartment and one in the trunk room or trunk.

2. Bidirectional Immobilizer Antenna (for Limp Home):
   The Immobilizer Backup Antenna is used for sending and receiving data: it emits a magnetic field (125 - 135 kHz challenge) and receives changes in the field strength (response of Transponder).
3. Receiver
   The SMART KEY FOB's response is received via the RF receiver.

Door Handle

The front door handles of the two doors (driver door / passenger door) are equipped with emitting LF-antennas to emit the 125kHz signals. The front door handles are also equipped with a push button.

Push Button

The push button in door handle serves as a trigger to indicate the user's intent to unlock or lock the vehicle.
The push buttons are installed at front doors, integrated into the door handles.
Another button is installed at the trunk or tailgate lid.

Operation

Passive Functions

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

Operating Range

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

Passive Access (Passive Entry)

Push the door handle button when all doors locked indicates the operator's intent to access the vehicle and thus triggers the system for unlock

Passive Locking (Exit)

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

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

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

Passive tailgate Warning (Sedan only)

Whenever the tailgate is closed, SMK ECU uses a suitable search strategy to avoid tailgate buzzer warning by a fob outside the vehicle. Then SMK searches for a SMART KEY FOB in the interior of the tailgate. If a valid SMART KEY FOB is found in the tailgate, the SMK ECU activates SMK external buzzer (TBD) to inform the user that the tailgate has been closed with a fob inside the tailgate.
SMK will send the tailgate open command to BCM for tailgate reopening if tailgate reopening bit is set(BK)For this functionality, a "valid" SMART KEY FOB means any SMART KEY FOB that belongs to the vehicle, even if it's DEACTIVATED.

NOTICE

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

Smart Key Reminder 1

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

IF FOB-IN ACTIVE
SMK search valid TP

If no fob or no TP has been found, no action is required.
If any valid fob or valid TP has been found, SMK unlocks the vehicle by sending a CAN Key Reminder unlock message with the fob number.
If any valid fob has been found, SMK unlocks the vehicle by sending a CAN/LIN Key Reminder unlock message with the fob number.

Smart Key Reminder 2

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

   If no fob has been found, no action is required.
   If any valid fob or valid TP has been found, SMK sends unlock command via CAN and activates ext. buzzer warning.
   If any valid fob has been found, SMK sends unlock command via CAN/LIN and activates ext. buzzer warning.

Smart Key Door Lock Warning

Door Lock Warning 1

1. If terminal state is ACC or IGN and all doors are closed and that user triggers a SMK lock, a search is started at the exterior of the vehicle from the side of the trigger.
2. If no valid Fob is found no action is required, but if a valid Fob is found then a Buzzer warning shall be started.
3. If "tailgate Option == On" and "tailgate LockUnlockOption == On" are fullfilled, Lock warning is including tailgate as a door and tailgate lockunlock knob as a door unlock switch.

Door Lock Warning 2

1. If terminal state is OFF and not all doors are closed and that user triggers a SMK lock, a search is started at the exterior of the vehicle from the side of the trigger.
2. If no valid Fob is found no action is required, but if a valid Fob is found then a Buzzer warning shall be started.
3. If "tailgate Option == On" and "tailgate LockUnlockOption == On" are fullfilled, Lock warning is including tailgate as a door and tailgate lockunlock knob as a door unlock switch.

Door Lock Warning 3

1. If terminal state is OFF and ATWS is considered as Disarmed and all doors are closed and that user triggers a SMK lock, a search is started at the Interior of the vehicle;
2. if no valid Fob is found the search for SMK locking will be started, but if a valid Fob is found then a Buzzer warning shall be started.
3. If "tailgate Option == On" and "tailgate LockUnlockOption == On" are fullfilled, Lock warning is including tailgate as a door and tailgate lockunlock knob as a door unlock switch.

Smartkey Lamp Warning

1. If terminal state is ACC or IGN and vehicle speed is less than 3km/h, a periodic search (every 3s) is done at the interior of the vehicle to check that the valid fob is still in the in the vehicle.
2. If no valid Fob is found a Warning is started, but if a valid Fob is found then no action is started.

Failsafe Functions (Backup For Limp Home)

In case of a discharged battery of the SMART KEY FOB or disturbed transmission, the following functions are available:
- Unlocking / locking of doors or trunk (or tailgate depending of the vehicle configuration): use of mechanical key

User Information Functions

ID OUT Warning

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

NOTICE

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

Fob Battery Low Voltage Detection

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

Learning Description

In this chapter, the learning procedure for SMK and FOBs is described.
For the learning of the SMK and FOBs, it"s necessary to have a connection to the diagnostic tool.

Learning MODE

Whatever the mode, the learning procedures are managed by the SMK.
Prior to start learning service, Fob-In signal must be active and the vehicle secret code (called as PIN code) should be known.

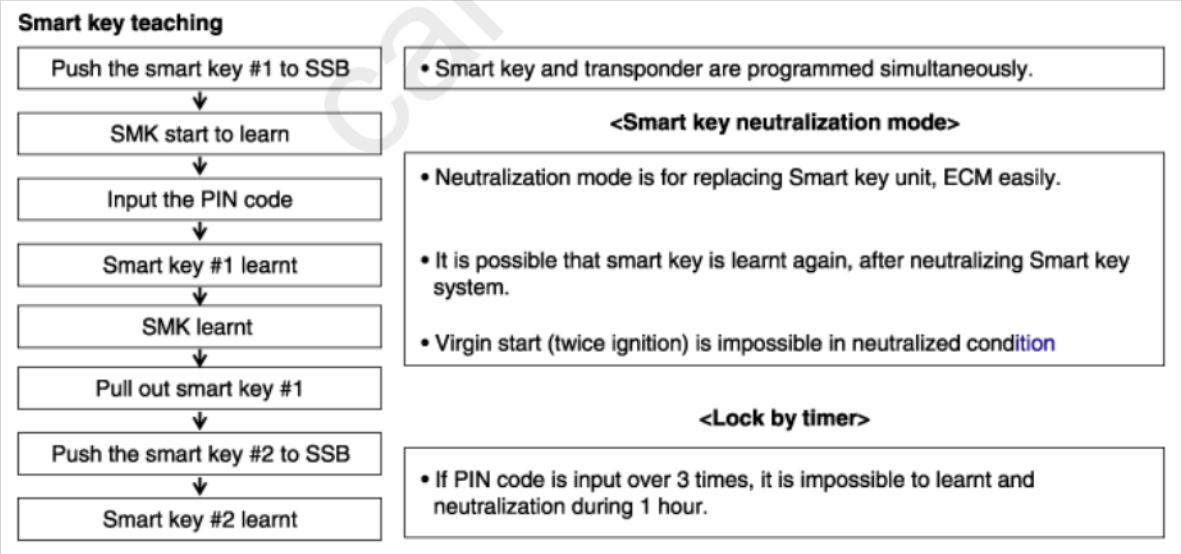
Teaching MODE

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

Teaching MODE Procedure Description (Step By Step)

Objective : Key teaching procedure at service station
Initial state :

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



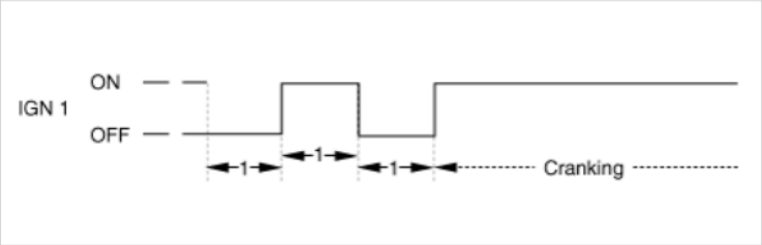
Starting After Replacing (Virgin Start)

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

- It is for starting at virgin condition

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- All related parts are virgin condition (Smart key, ECM)
- Press brake pedal in P or N range
- Push the start button once with virgin smart key.

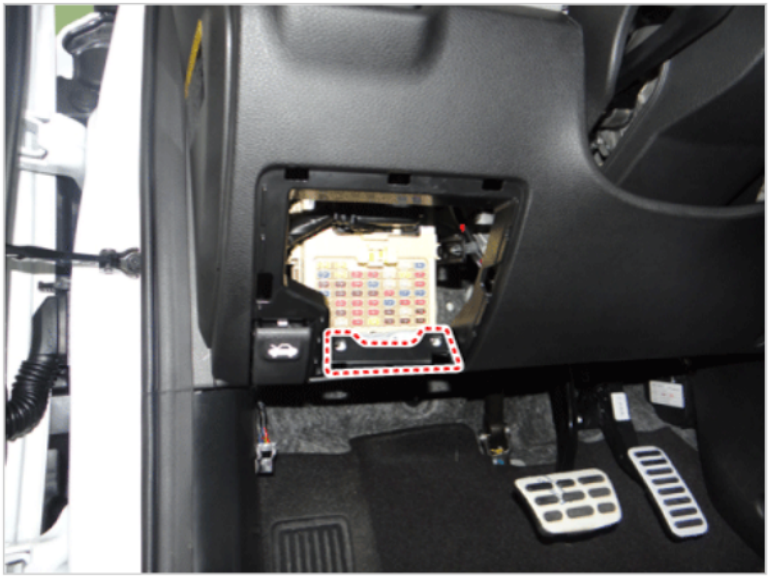


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Smart Key

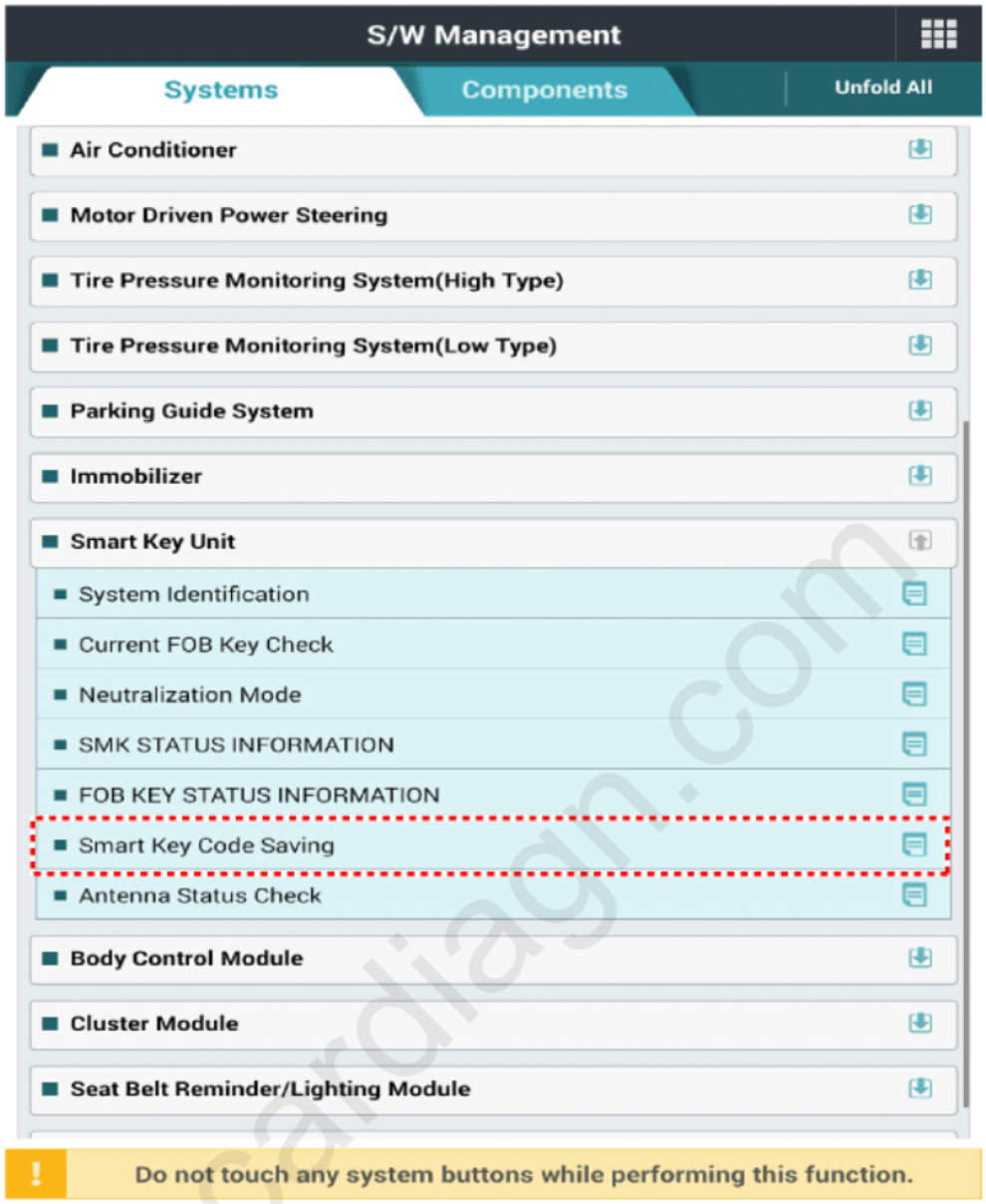
Smart Key Code Saving

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

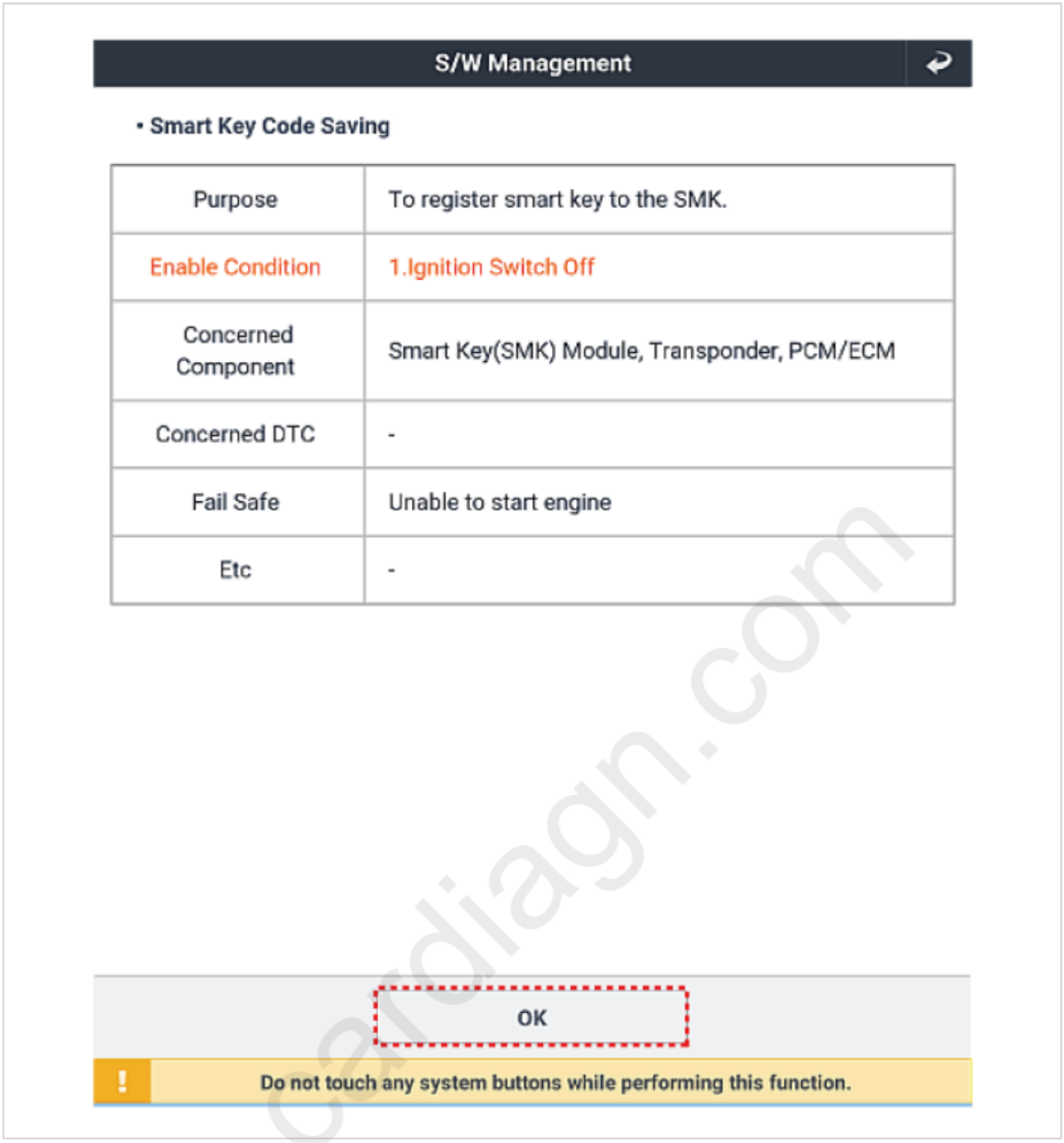


2. Select the vehicle model and then do "Smart key code saving".

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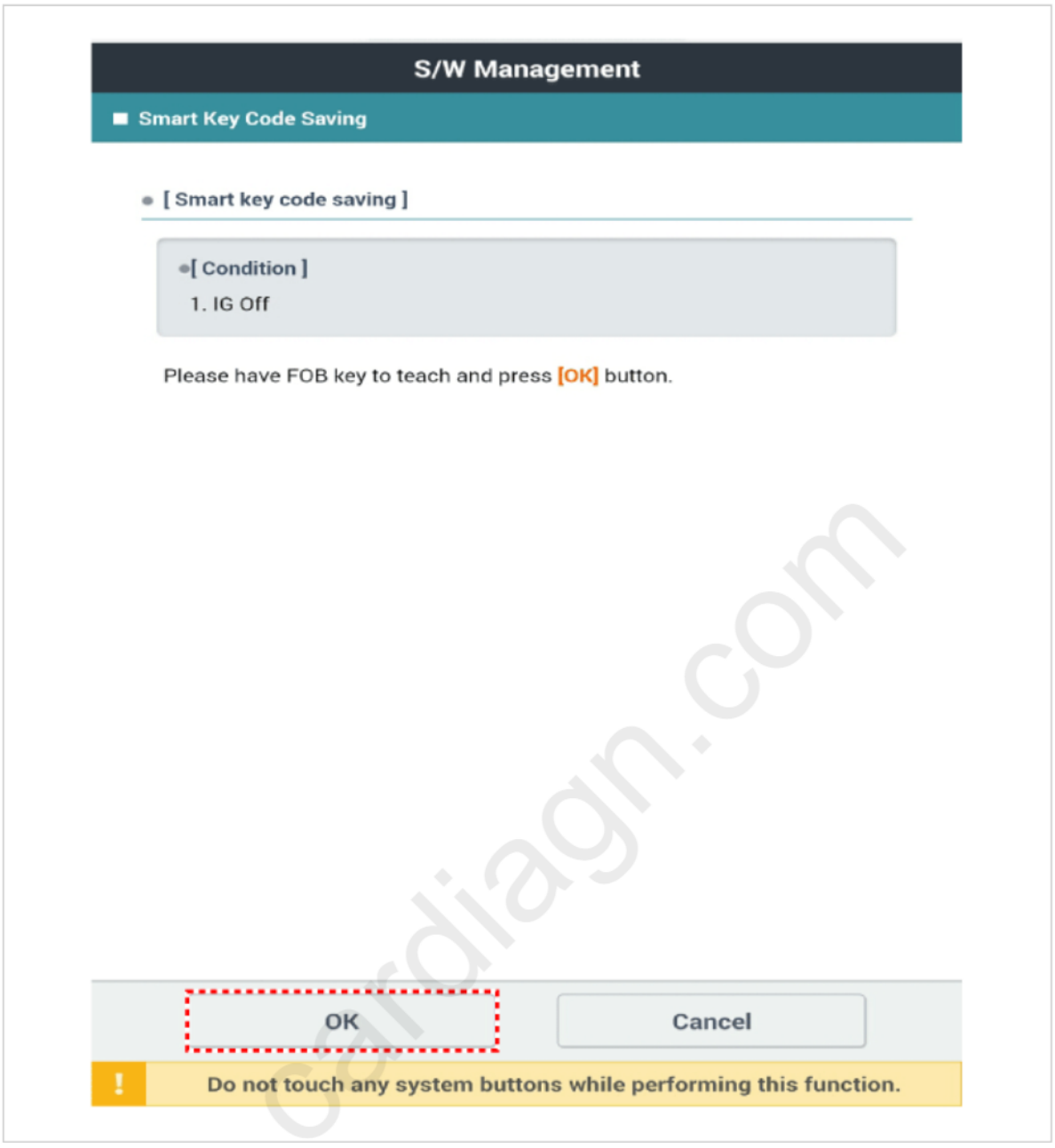


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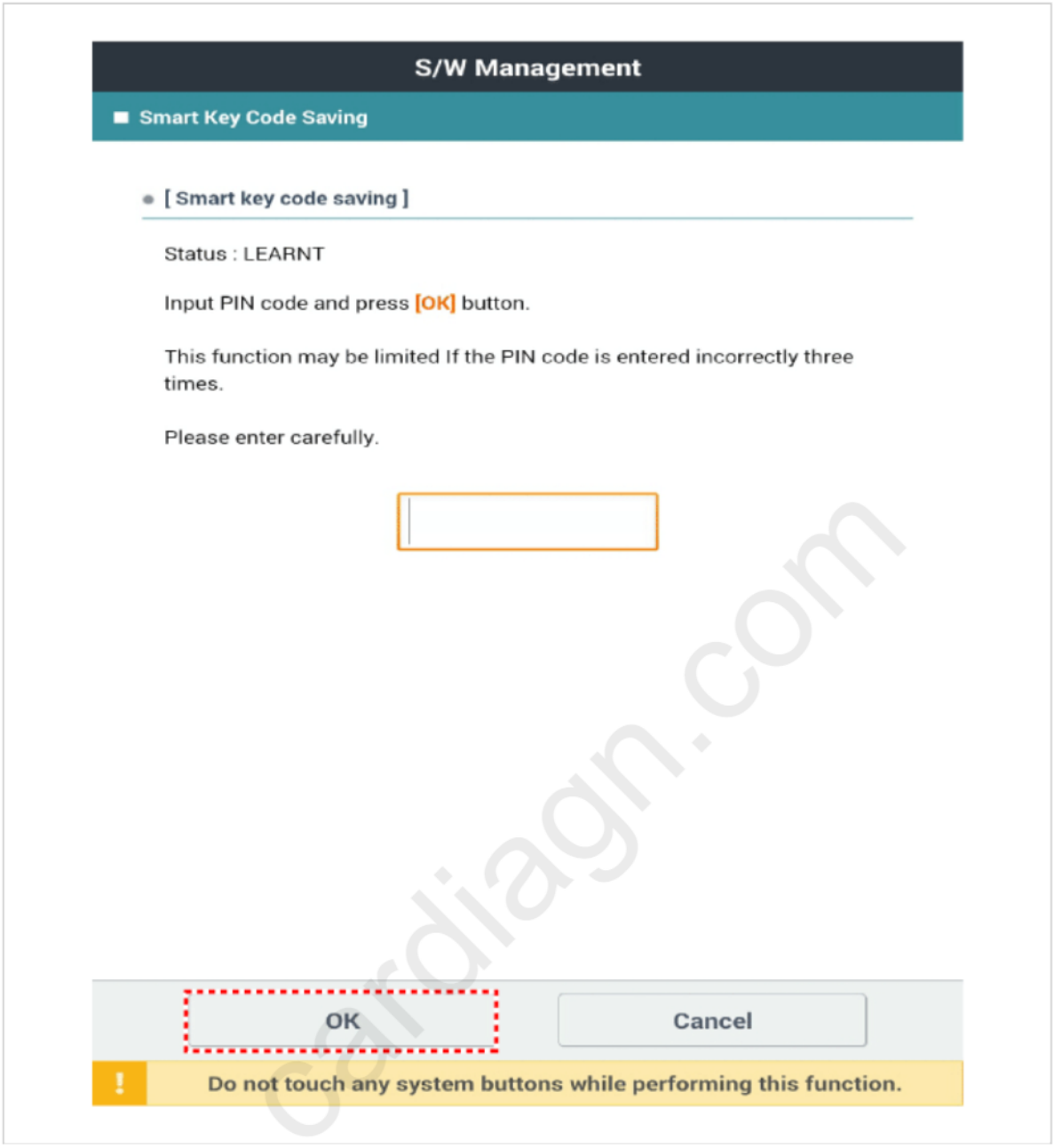
3. After selecting "Smart key teaching" menu, push "Enter" key, then the screen will be shown as below.

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4. After having the teaching smart key, push "ENTER" key.
5. Input the "Pin code" for first key teaching.

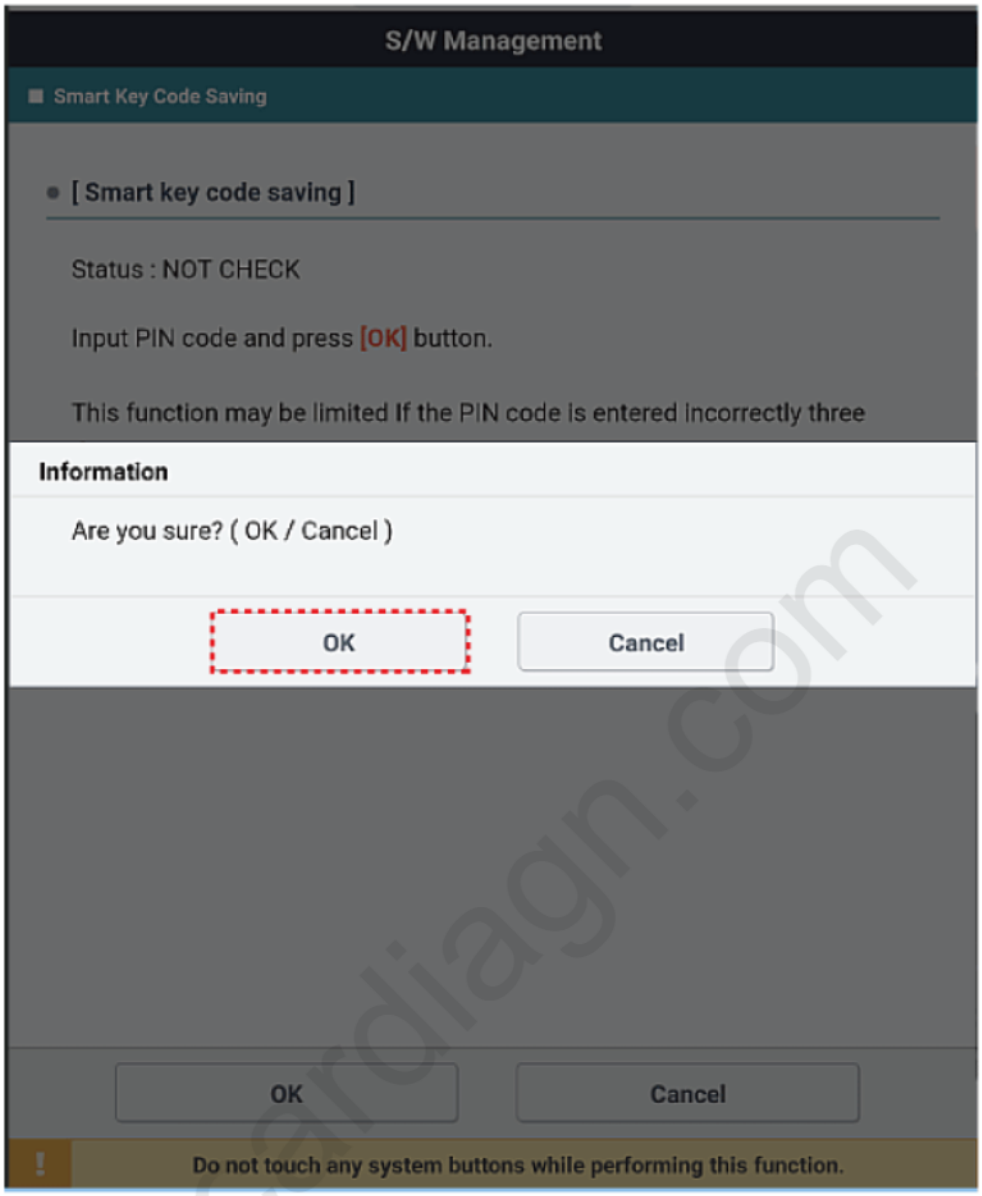
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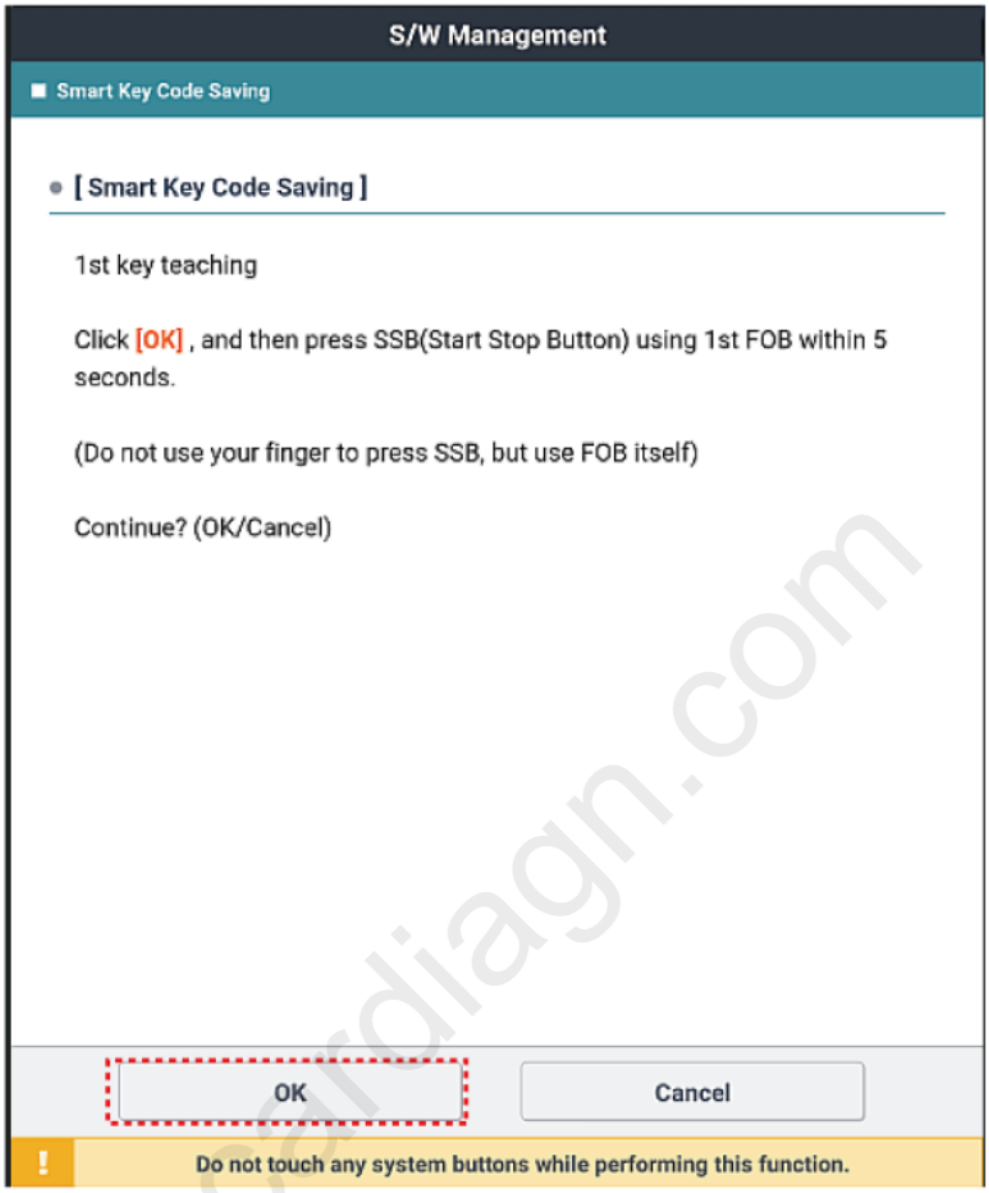


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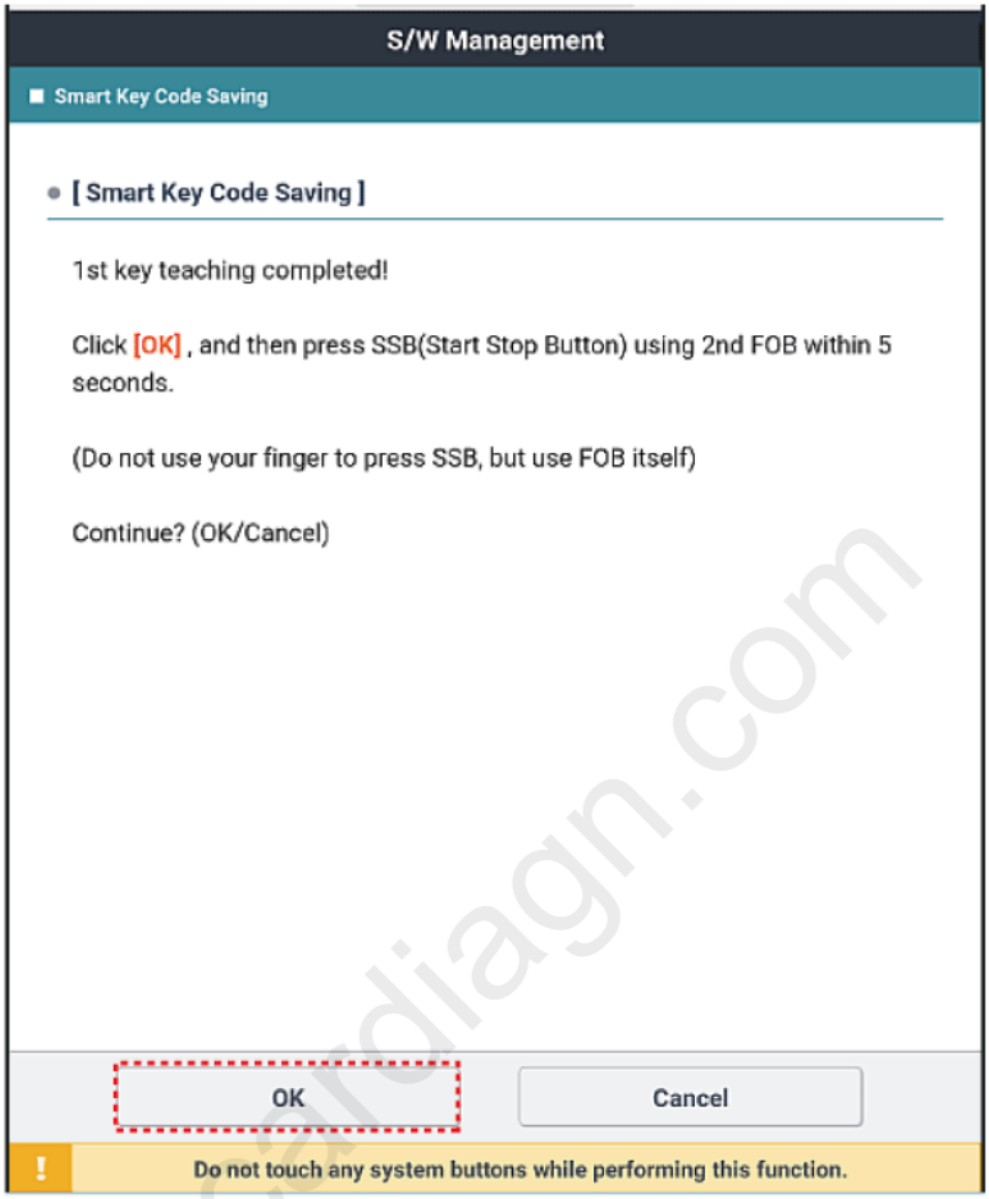


6. Confirm the message "First key teaching completed".

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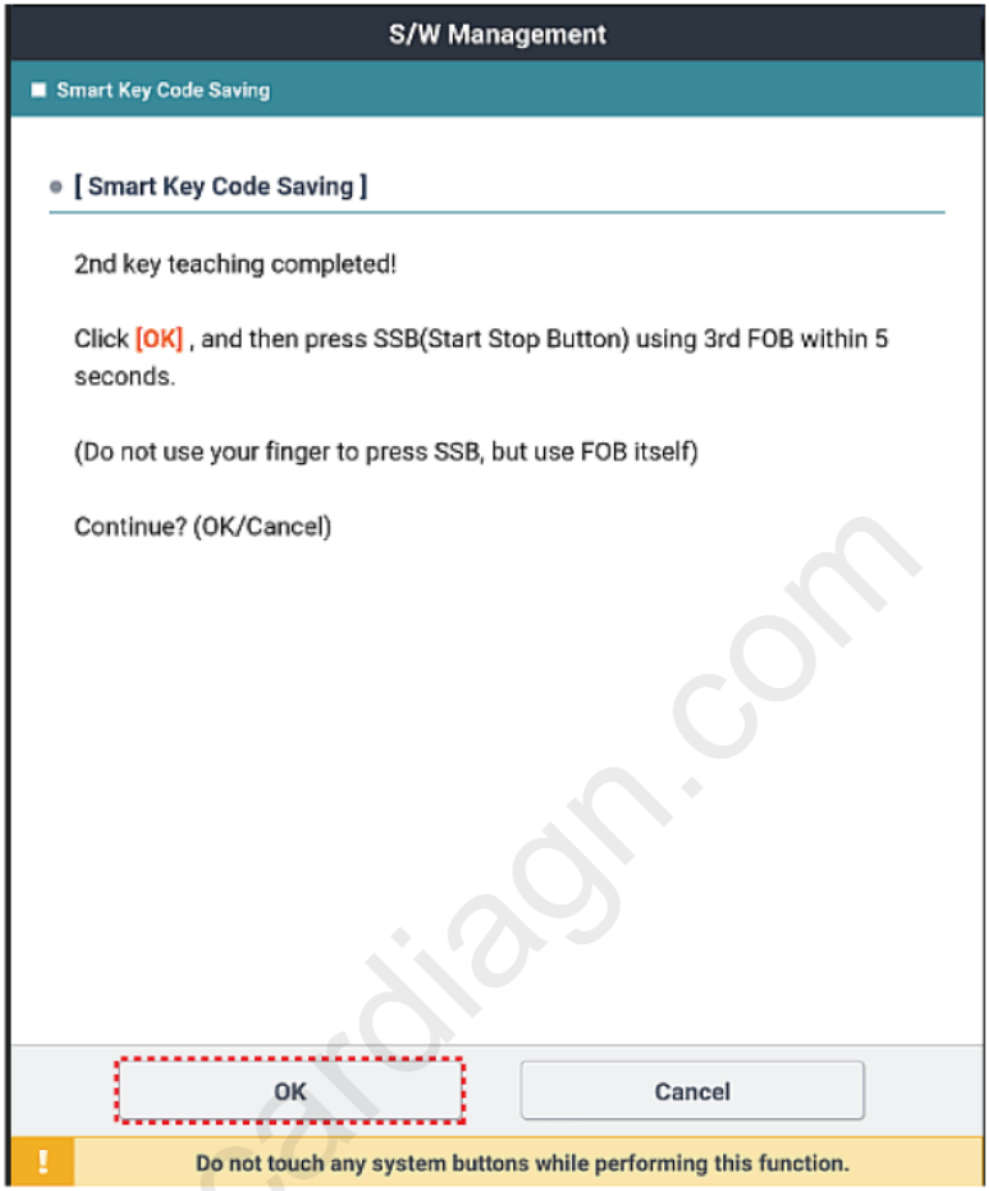


7. Press the SSB with smart key within 5 sec after pressing "OK".

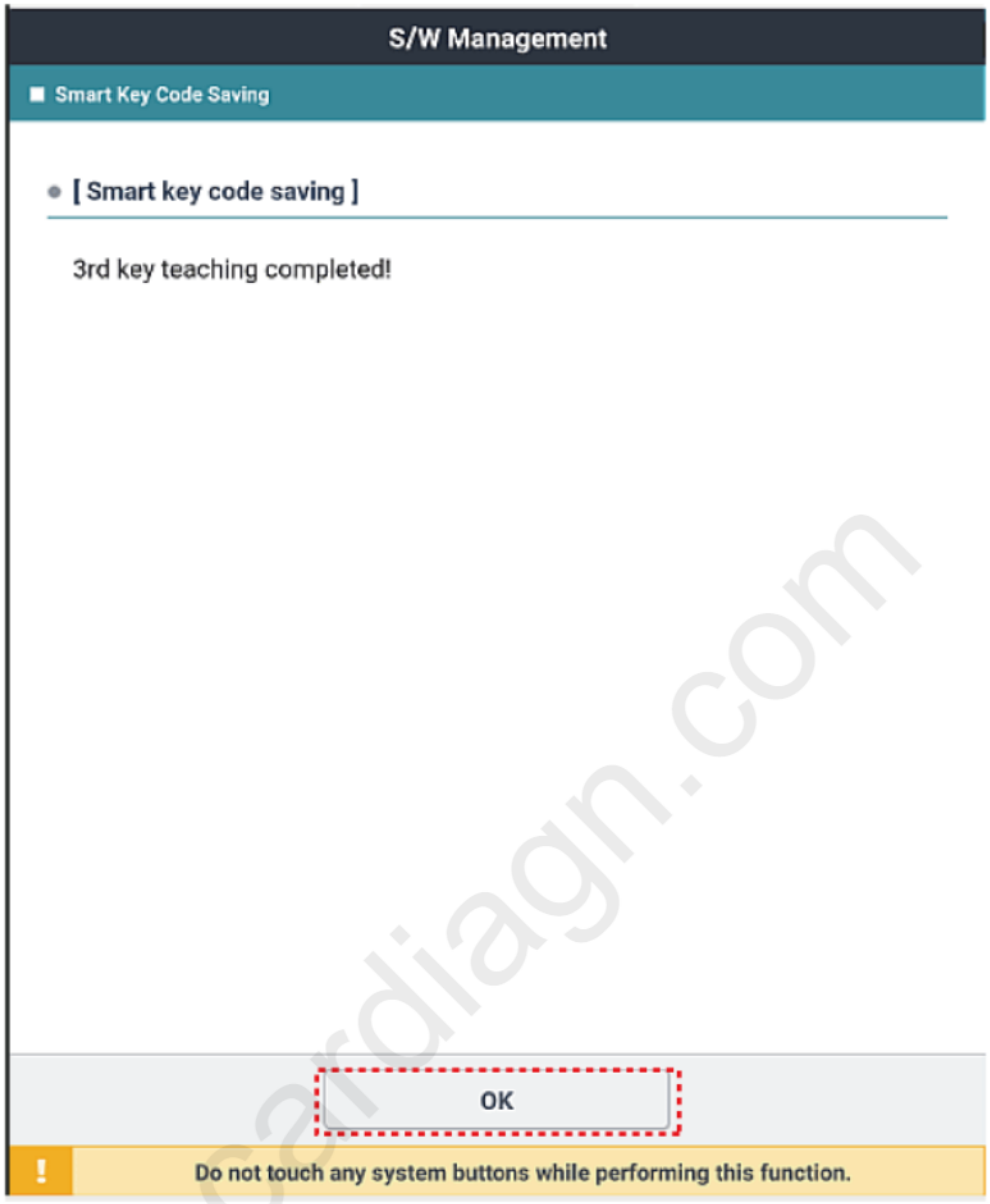


8. Confirm the message "Second key teaching completed".

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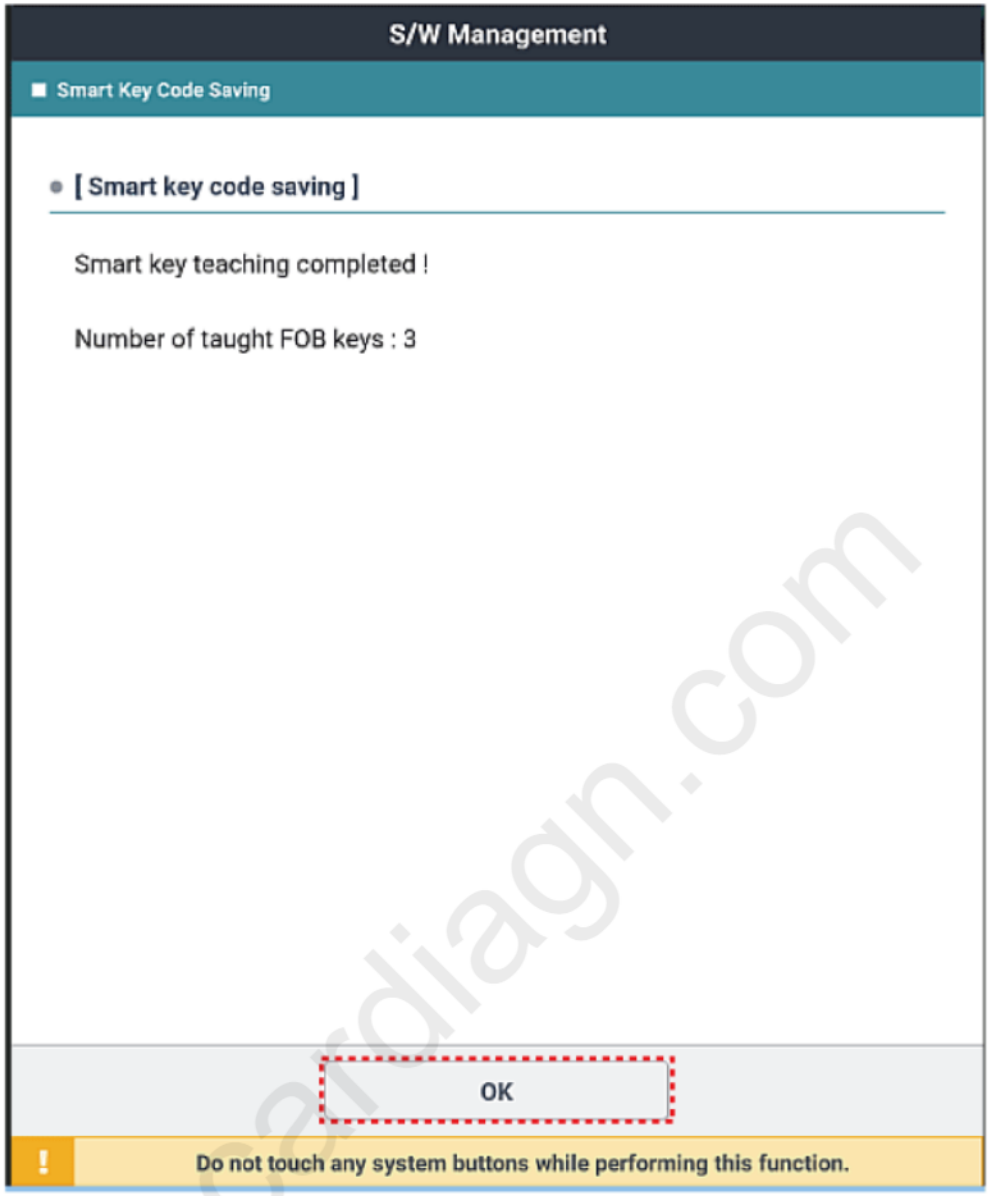


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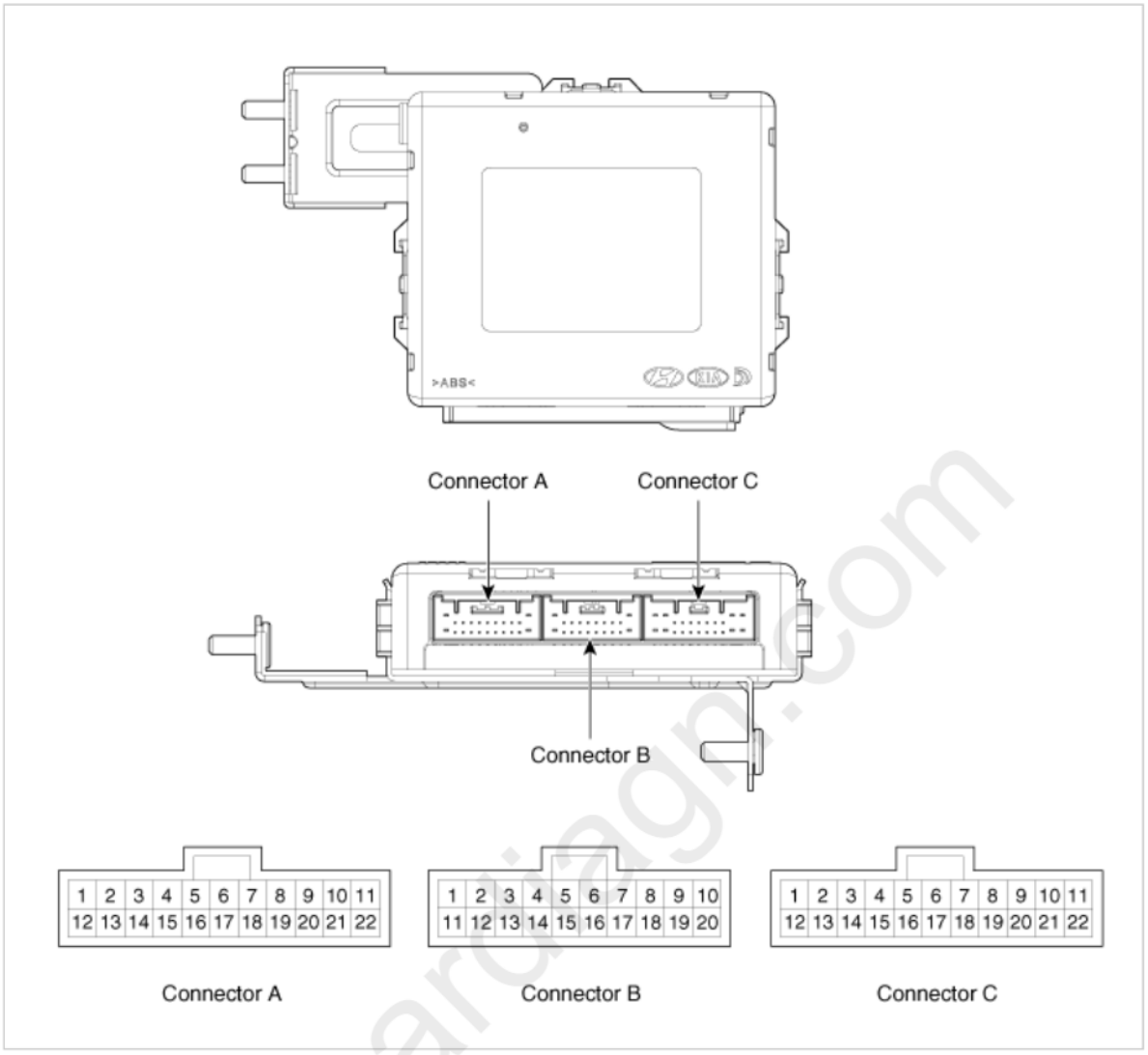
9. Then the screen will be shown as below when key teaching process is completed.

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Components



Connector Pin Information

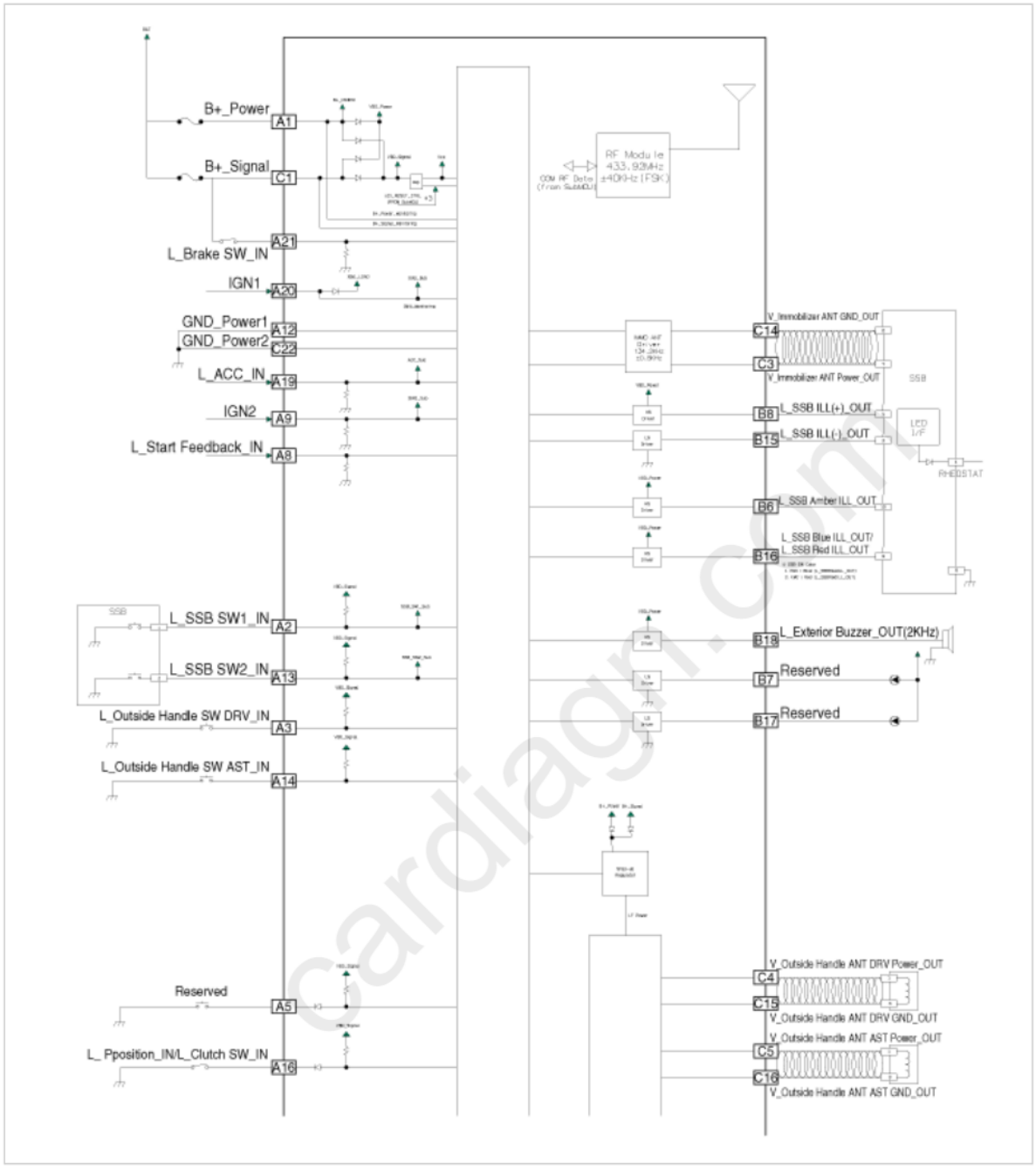
No.	Connector A	Connector B	Connector C
1	-	IGN2 Relay_output	Battery (+)_Signal
2	SSB Switch1 signal_input	P-CAN (Low)	-
3	Driver door outside handle switch_input	P-CAN (High)	Immobilizer antenna (Power)_output
4	-	C-CAN (High)	Driver outside handle antenna (Power)_output
5	-	C-CAN (Low)	Passenger outside handle antenna (Power) _output
6	-	SSB Amber illumination_output	Bumper antenna (Power)_output
7	RPM Signal_input	-	Interior antenna 1 (Power)_output
8	Start signal feedback_input	SSB Illumination (+)_output	Interior antenna 2 (Power)_output
9	IGN2	ESCL Enable_output	Interior antenna 3 (Power)_output
10	-	Battery (+)_Power	-
11	Starter relay_output	IGN1 Relay_output	-
12	Ground_Power1	ESCL (COM)	-
13	SSB Switch2 signal_input	EMS (COM)	ESCL_Ground (-)_output

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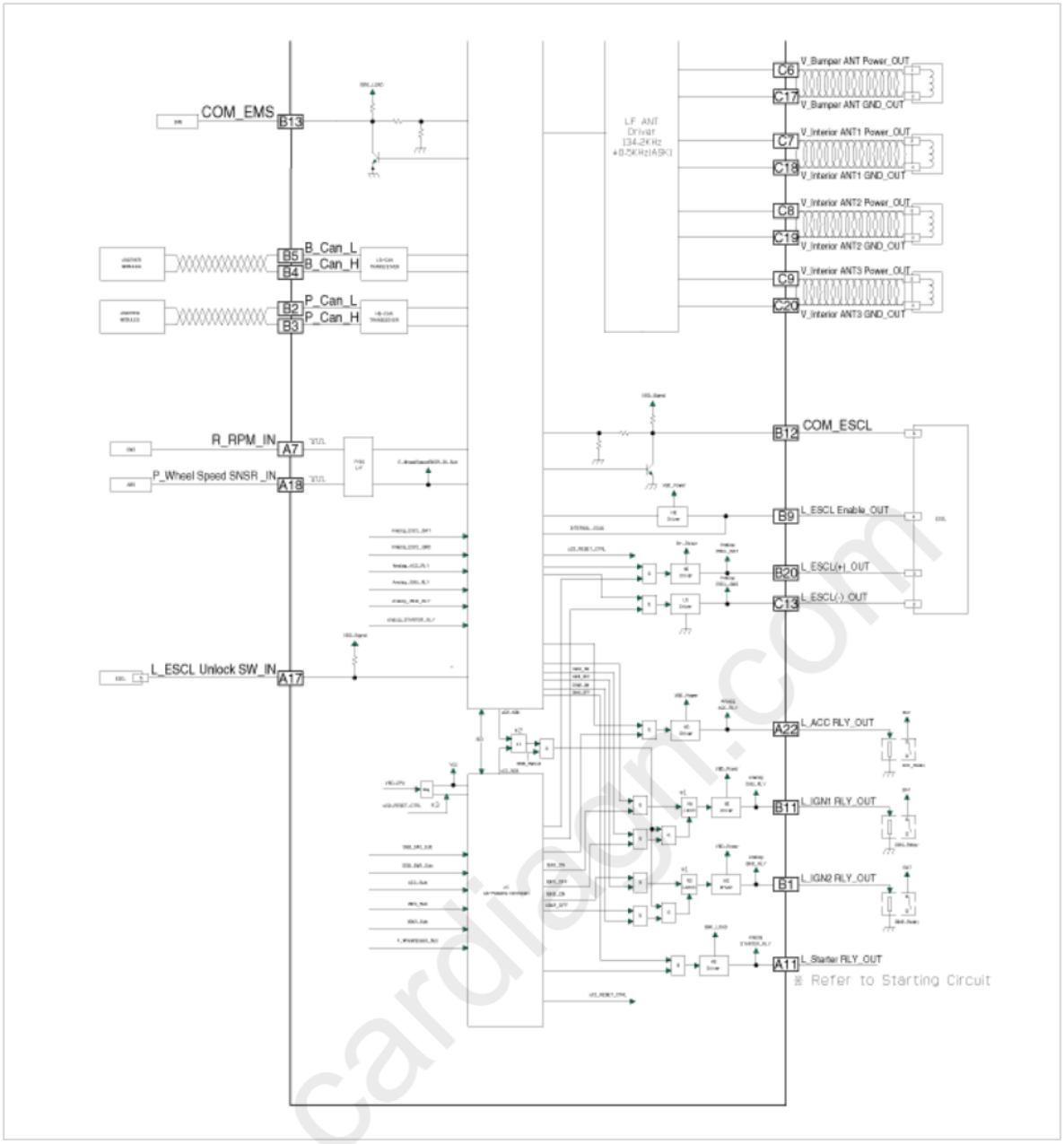
14	Assist door outside handle switch_input	-	Immobilizer antenna (Ground)_output
15	-	SSB Illumination (-)_output	Driver outside handle antenna (Ground) _output
16	AT : "P" Positon_input MT : Clutch switch_input	SSB Illumination (Blue)_output SSB Illumination (Red)_output	Passenger outside handle antenna (Ground) _output
17	ESCL Unlock switch_input	-	Bumper antenna (Ground)_output
18	Wheel speed sensor_input	Exterior buzzer_output	Interior antenna 1 (Ground)_output
19	ACC Signal_input	-	Interior antenna 2 (Ground)_output
20	IGN1	ESCL (+)_output	Interior antenna 3 (Ground)_output
21	Brake switch_input		-
22	ACC Relay_output		Ground_Power2

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Circuit Diagram



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Removal

CAUTION

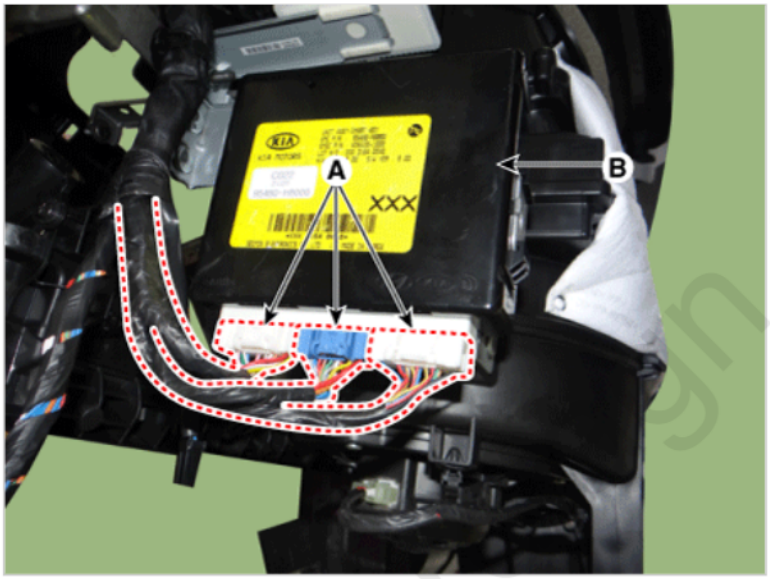
Put on gloves to prevent hand injuries.

Information

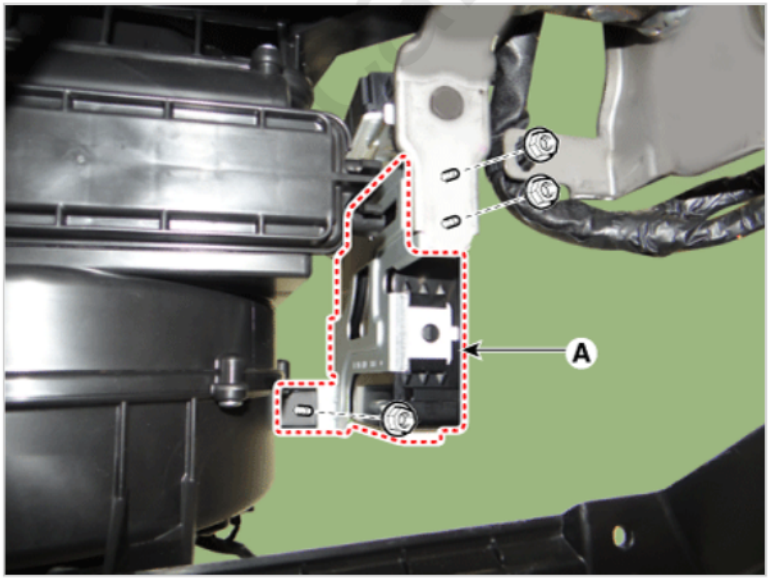
- Use a plastic panel removal tool to remove interior trim pieces without marring the surface.
- Take care not to bend or scratch the trim and panels.

Smart Key Unit

1. Disconnect the negative (-) battery terminal.
2. Remove the glove box.
   (Refer to Body - "Glove Box")
3. Remove the smart key unit (B) after disconnecting the connectors (A).

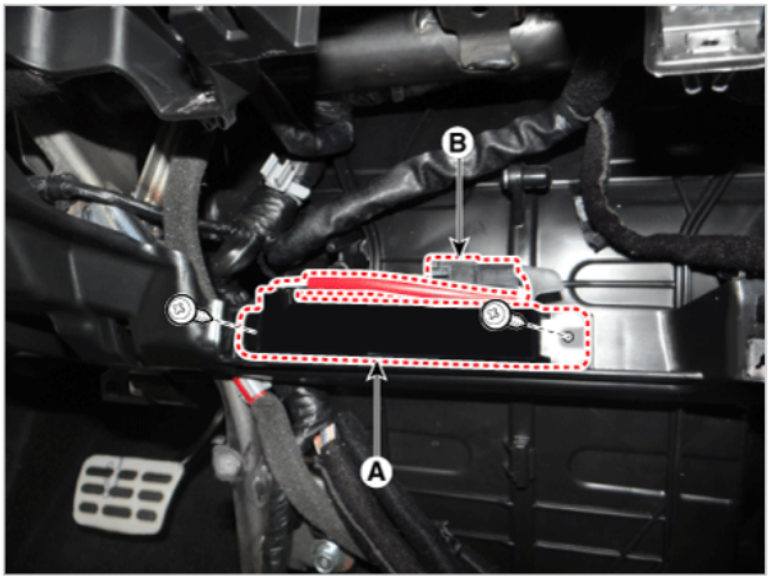


4. Remove the smart key unit (A) after loosening the mounting nuts.



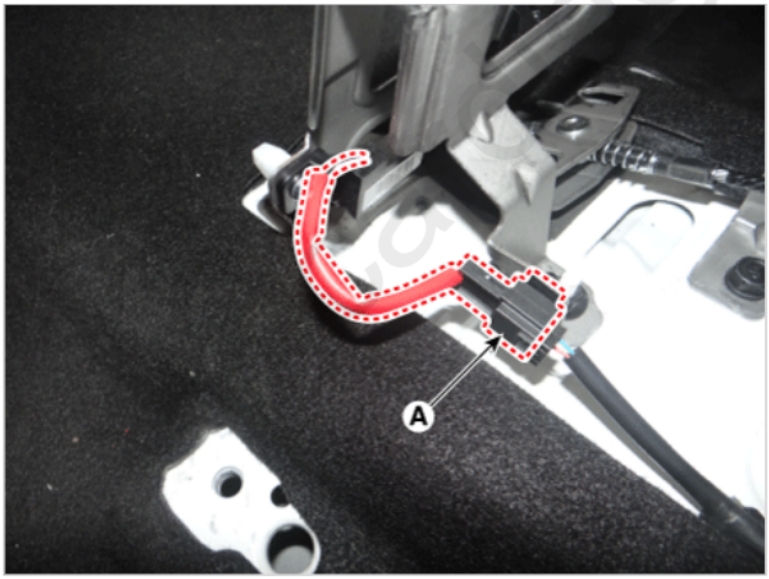
Interior 1 Antenna

1. Disconnect the negative (-) battery terminal.
2. Remove the heater and A/C controll unit.
   (Refer to Heating,Ventilation, Air Conditioning - "Heater & A/C Control Unit (Manual)")
   (Refer to Heating, Ventilation, Air conditioning - "Heater & A/C Control Unit (FATC)")
3. Remove the interior 1 antenna (A) after loosening the mounting screws and disconnecting the connector (B).

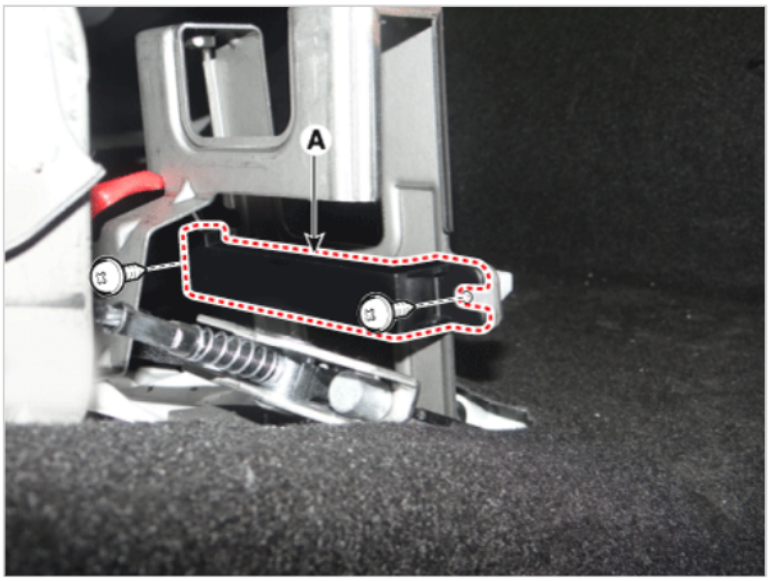


Interior 2 Antenna

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console assembly.
   (Reger to Body - "Floor Console Assembly")
3. Disconnect the interior 2 antenna connector (A).

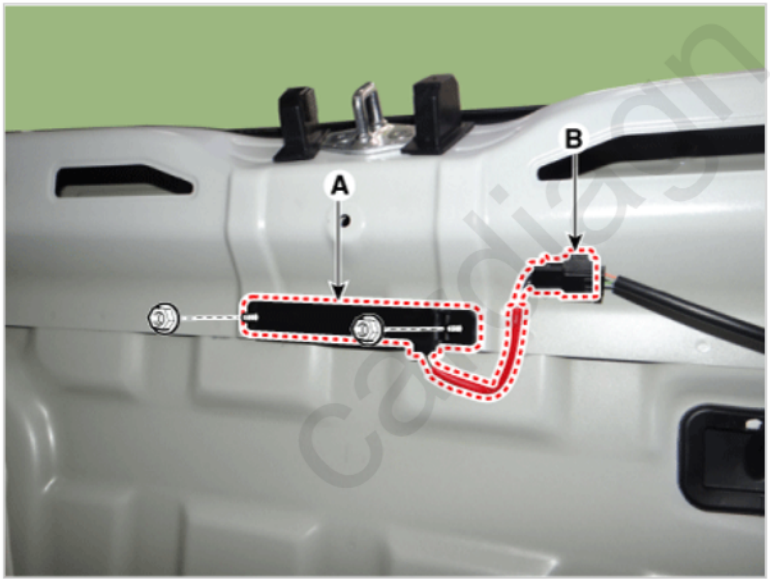


4. Remove the interior 2 antenna (A) after loosening the mounting screws.



Tailgate Antenna

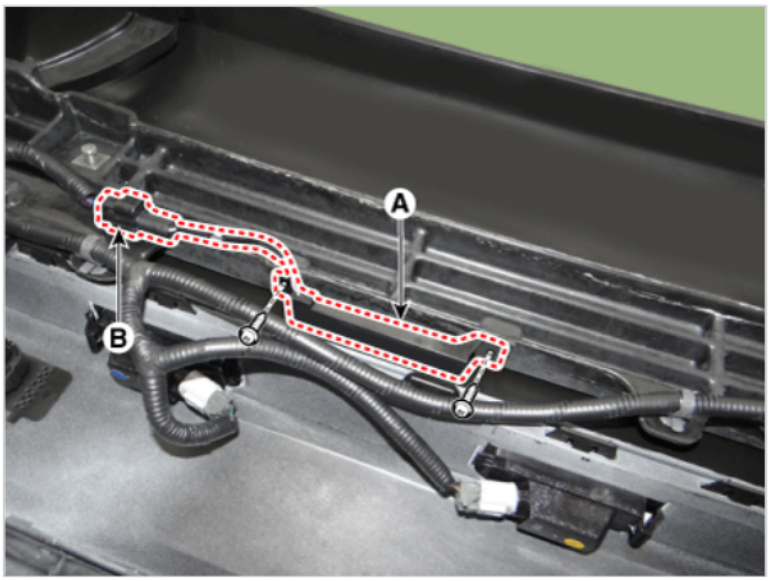
1. Disconnect the negative (-) battery terminal.
2. Remove the rear transverse trim.
   (Reger to Body - " Rear Transverse Trim")
3. Remove the tailgate antenna (A) after loosening the mounting nuts and disconnecting the connector (B).



Rear Bumper Antenna

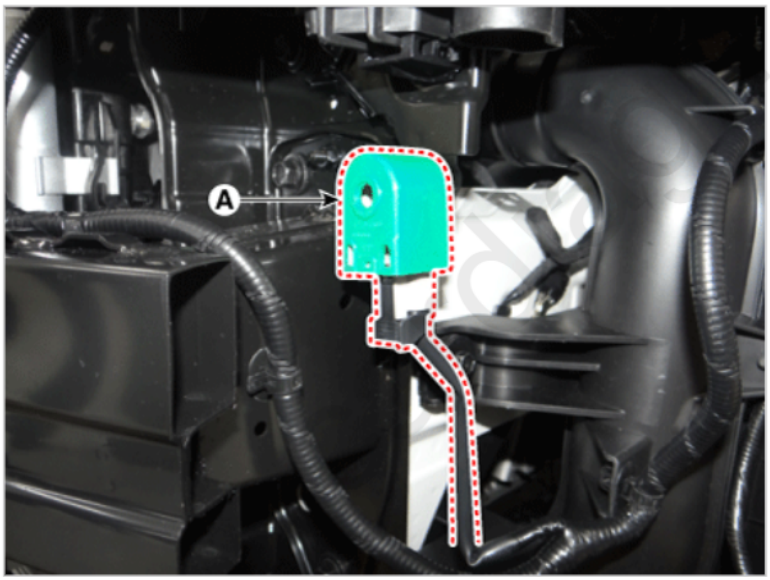
1. Disconnect the negative (-) battery terminal.
2. Remove the rear bumper assembly.
   (Refer to Body - "Rear Bumper Assembly")
3. Remove the rear bumper antenna (A) after loosening the mounting screws and disconnecting the connector (B).

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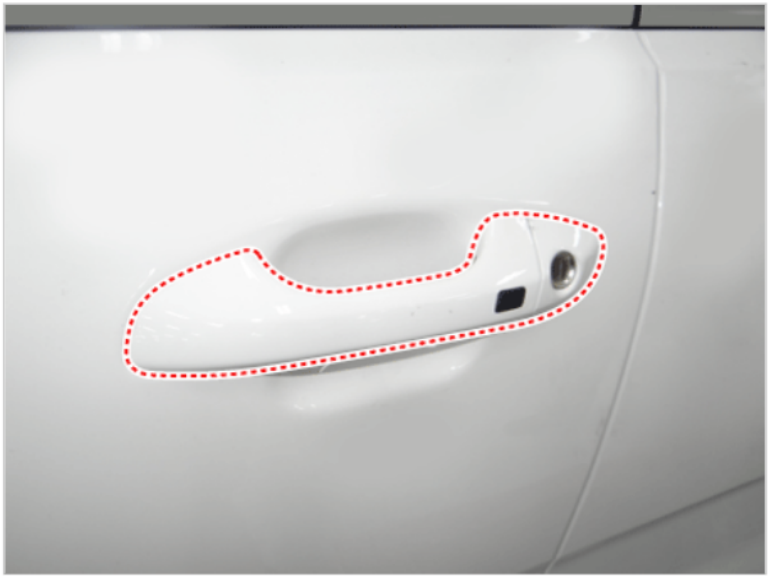
Buzzer

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper assembly.
   (Refer to Body - "Front Bumper Assembly")
3. Remove the buzzer (A) after disconnecting the connector.



Door Outside Handle

1. Disconnect the negative (-) battery terminal.
2. Remove the front door outside handle.
   (Refer to Body - "Front Door Outside Handle")

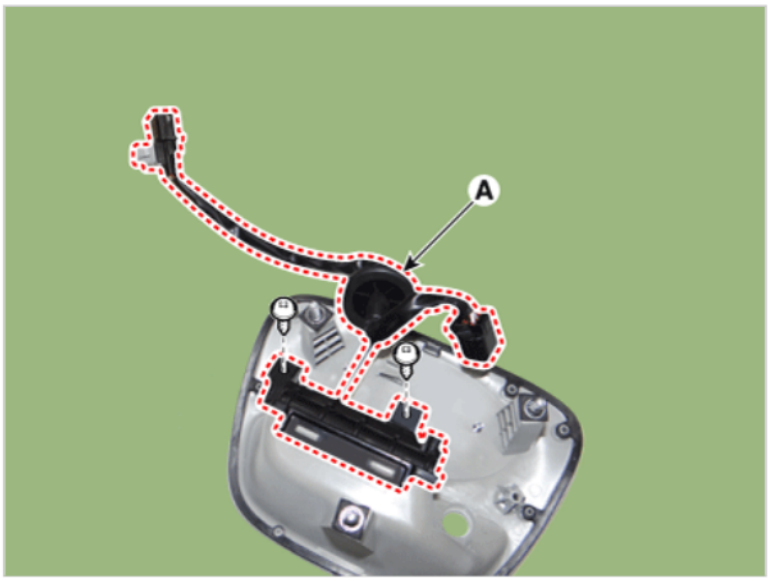




Tailgate Open Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the back view camera assembly.
   (Refer to Body Electrical System - "Back View Camera System")
3. Remove the tailgate open switch assembly (A) after loosening the mounting screws.

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Inspection

Smart Key Unit

(Refer to Smart Key System - "Smart Key Diagnostic")

Smart Key Switch

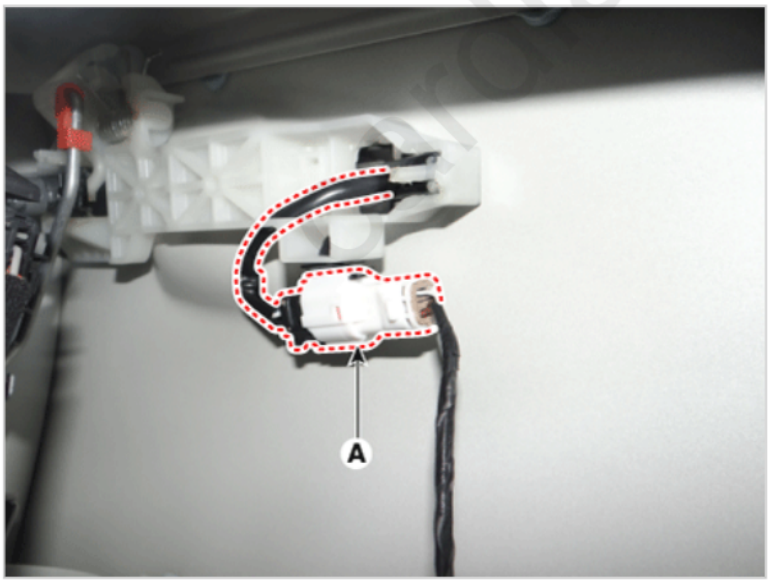
(Refer to Smart Key System - "Smart Key Diagnostic")

Antenna

(Refer to Smart Key System - "Smart Key Diagnostic")

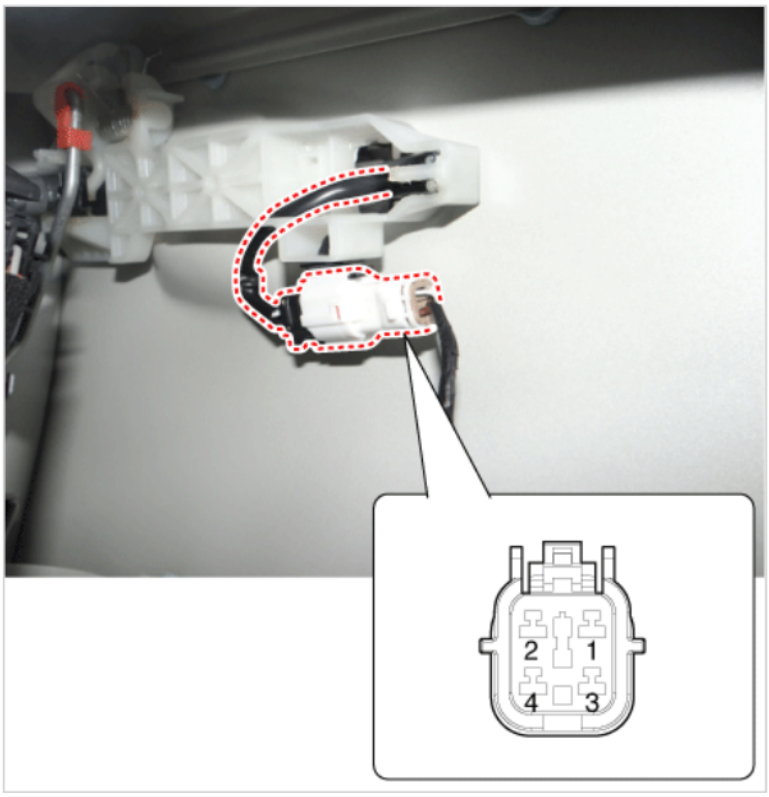
Door Outside Handle

1. Disconnect the front door outside handle connector (A).



2. Check for continuity between terminals No 2 and No 4.

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No.	Description
1	Door antenna 1
2	Door lock/unlock button 1
3	Door antenna 2
4	Door lock/unlock button 2

Tailgate Open Switch

1. Check for continuity between the tailgate open switch terminals.



2. If continuity is not specified, inspect the switch

Position / Terminal	OFF	ON(PUSH)
3		○
4		○

Installation

Smart Key Unit

1. Install the smart key unit after connecting the connectors.
2. Install the glove box.
3. Connect the negative (-) battery terminal and check the smart key system.

Interior 1 Antenna

1. Install the interior 1 antenna.
2. Install the heater and A/C controll unit.
3. Install the negative (-) battery terminal and check the smart key system.

Interior 2 Antenna

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

Tailgate Antenna

1. Install the tailgate antenna.
2. Install the rear transverse trim.
3. Connect the negative (-) battery terminal and check the smart key system.

Rear Bumper Antenna

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

Buzzer

1. Install the buzzer.
2. Install the front bumper assembly.
3. Connect the negative (-) battery terminal and check the smart key system.

Door Outside Handle

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

Tailgate Open Switch

1. Install the tailgate open switch assembly.
2. Install the back view camera assembly.
3. Install the tailgate outside handle assembly.
4. Connect the tailgate outside handle assembly connector.

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5. Install the tailgate trim.
6. Install the negative (-) battery terminal and check the smart key system.

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Inspection

Self Diagnosis With Scan Tool

It will be able to diagnose defects of SMART KEY system with KDS quickly. KDS can operates actuator forcefully, input/output value monitoring and self diagnosis.

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

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

So the following three diagnosis operates will be the major problem solution process.

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

Switch Diagnosis

1. Connect the cable of KDS to the data link connector in driver side crash pad lower panel, turn the power on KDS.
2. Select the vehicle model and then SMART KEY system.
3. Select the "SMART KEY unit".
4. After IG ON, select the "Current data".
5. You can see the situation of each switch on scanner after connecting the "current data" process.

Display	Description
FL Toggle SW	ON : Push button is ON in the driver door handle.
FR Toggle SW	ON : Push button is ON in the assist door handle.
Tailgate open SW	ON : Tailgate button is ON.
Gear P Position	ON : Shift lever is P position.
IGN 1	ON : IGN switch is IG position.
ACC	ON : IGN switch is ACC position.
Brake SW	ON : Brake switch is ON.

Communication Diagnosis With KDS (Self Diagnosis)

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

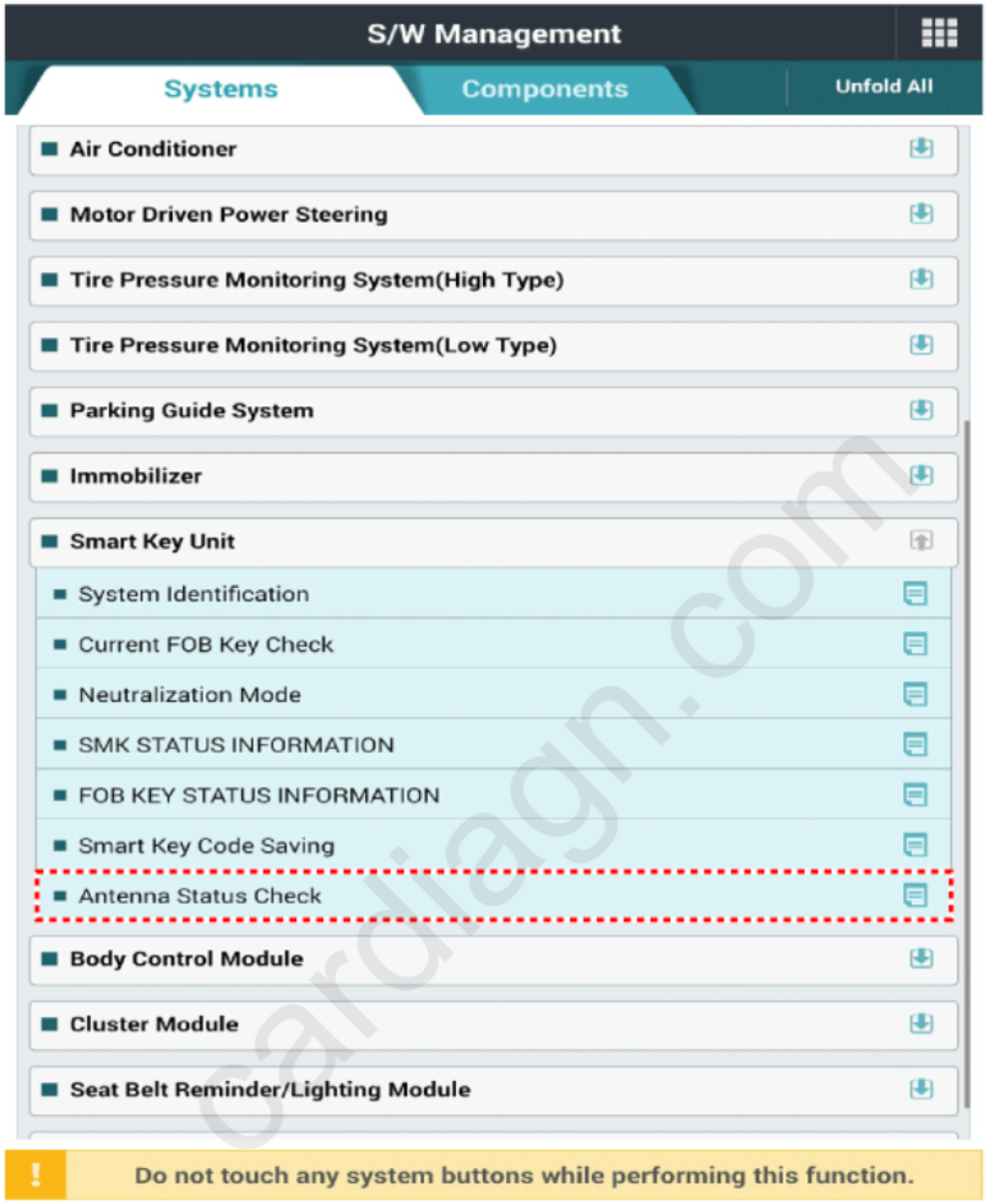
Antenna Actuation Diagnosis

1. Connect the cable of KDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "Actation Test".
3. Set the smart key near the related antenna and operate it with a KDS.
4. If the LED of smart key is blinking, the smart key is normal.
5. If the LED of smart key is not blinking, check the voltage of smart key battery.
6. Antenna actuation
   - Interior Antenna 1
   - Interior Antenna 2
   - Tailgate Antenna
   - Bumper Antenna
   - Driver Door Antenna
   - Assist Door Antenna

Antenna Actuation Diagnosis

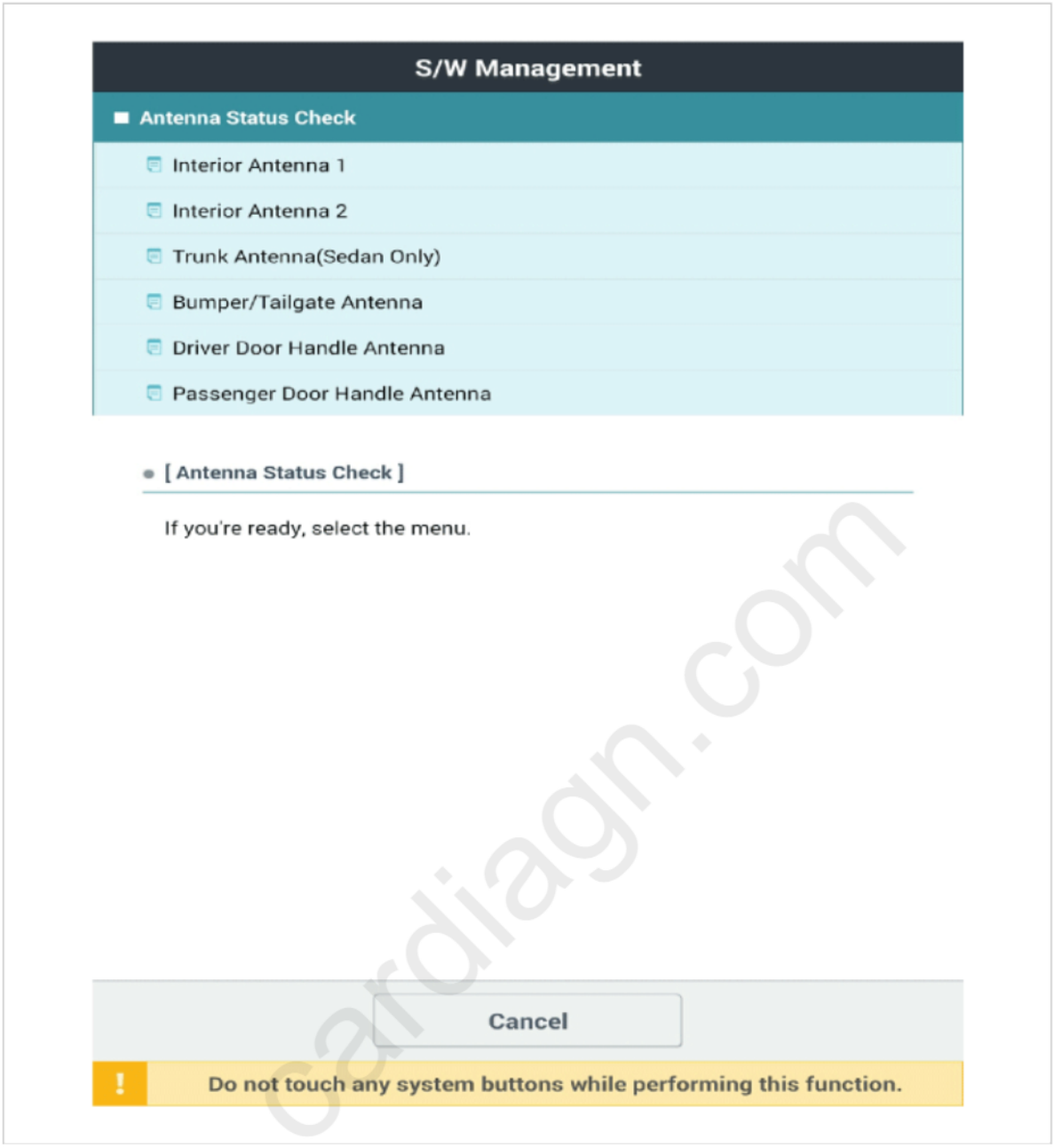
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1. Connect the cable of KDS to the data link connector in driver side crash pad lower panel.
2. Select the "Antenna Status Check".



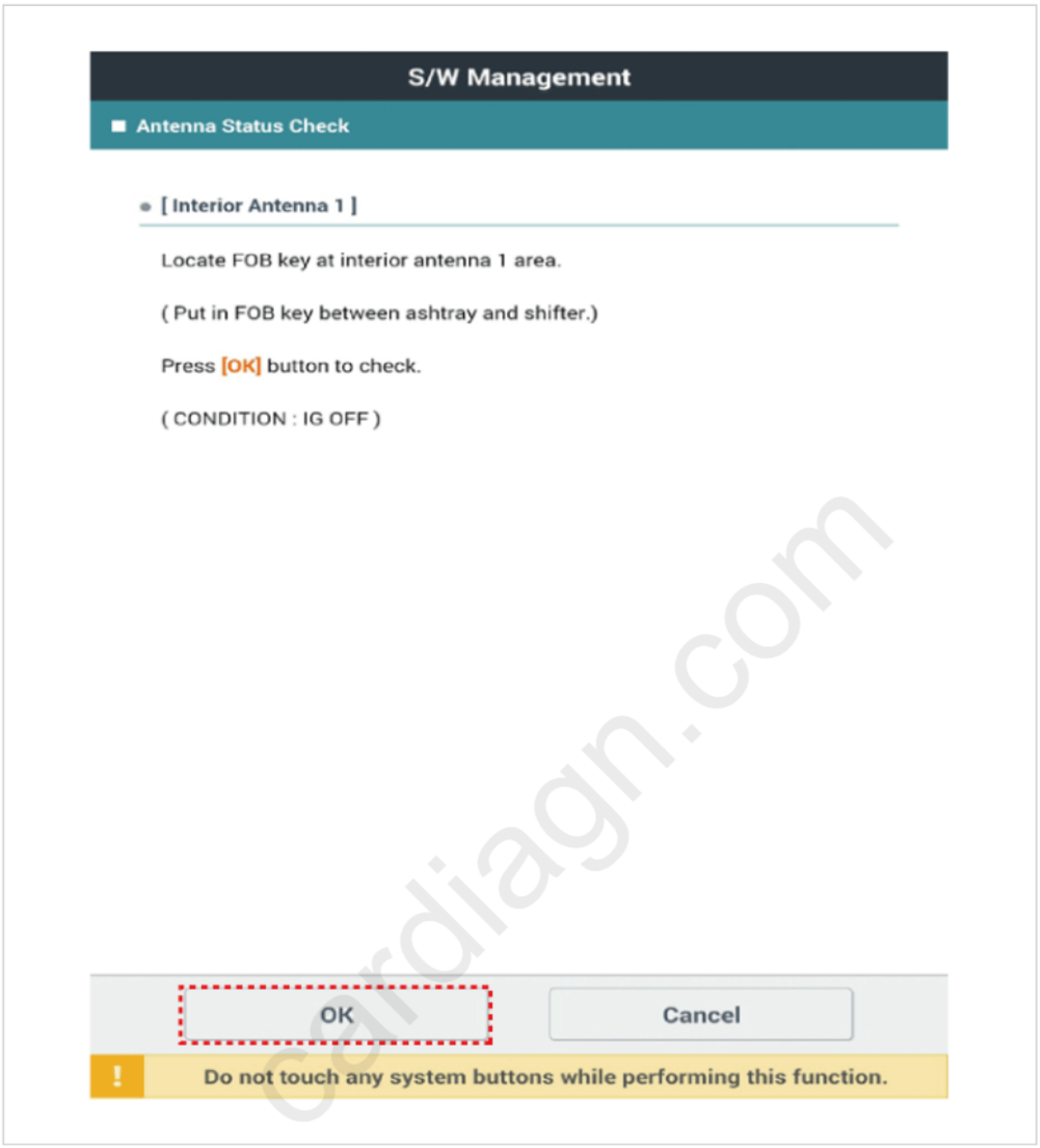
3. After IG ON, select the "Antenna Status Check".

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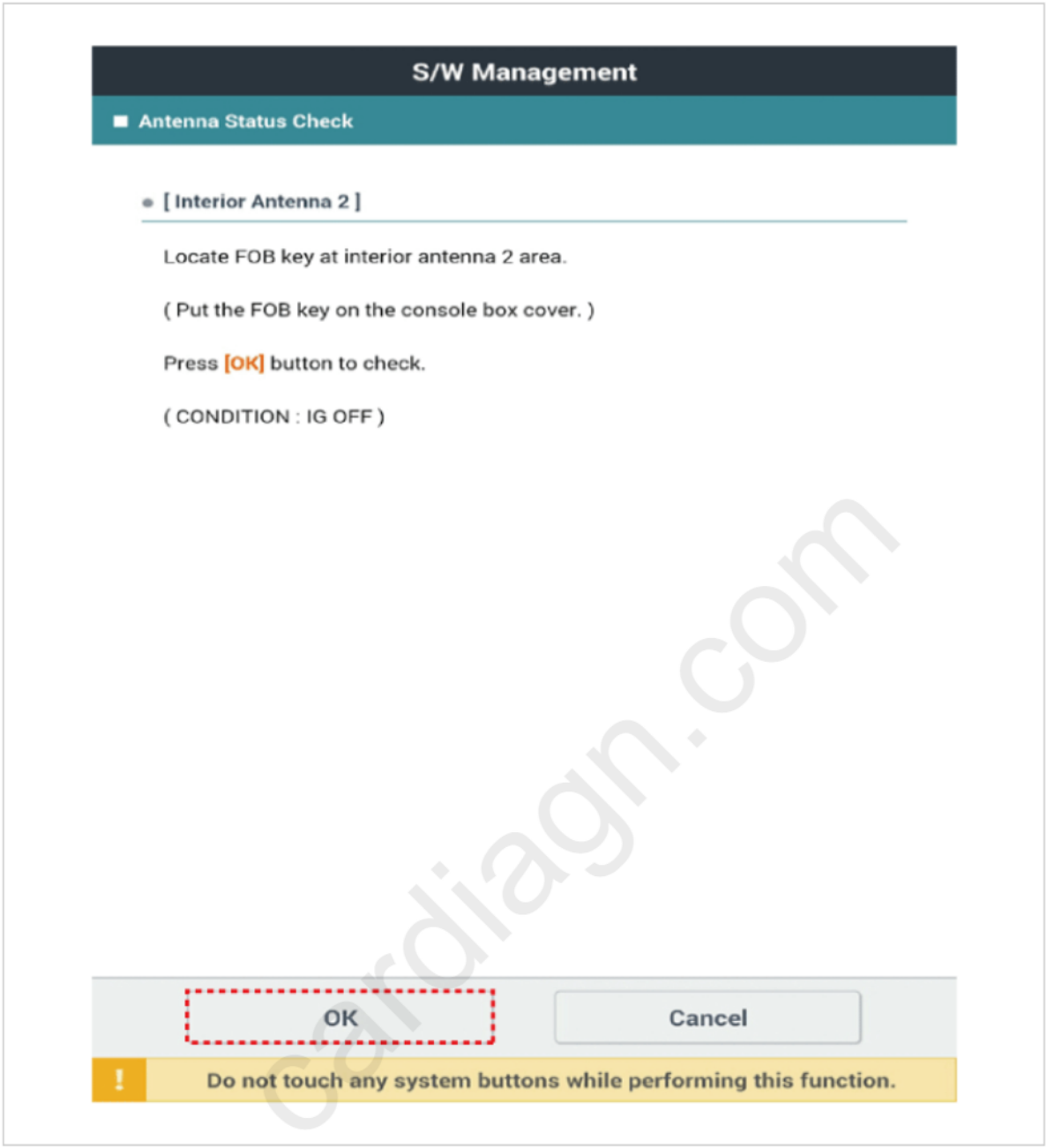
4. Set the smart key near the related antenna and operate it with a KDS.



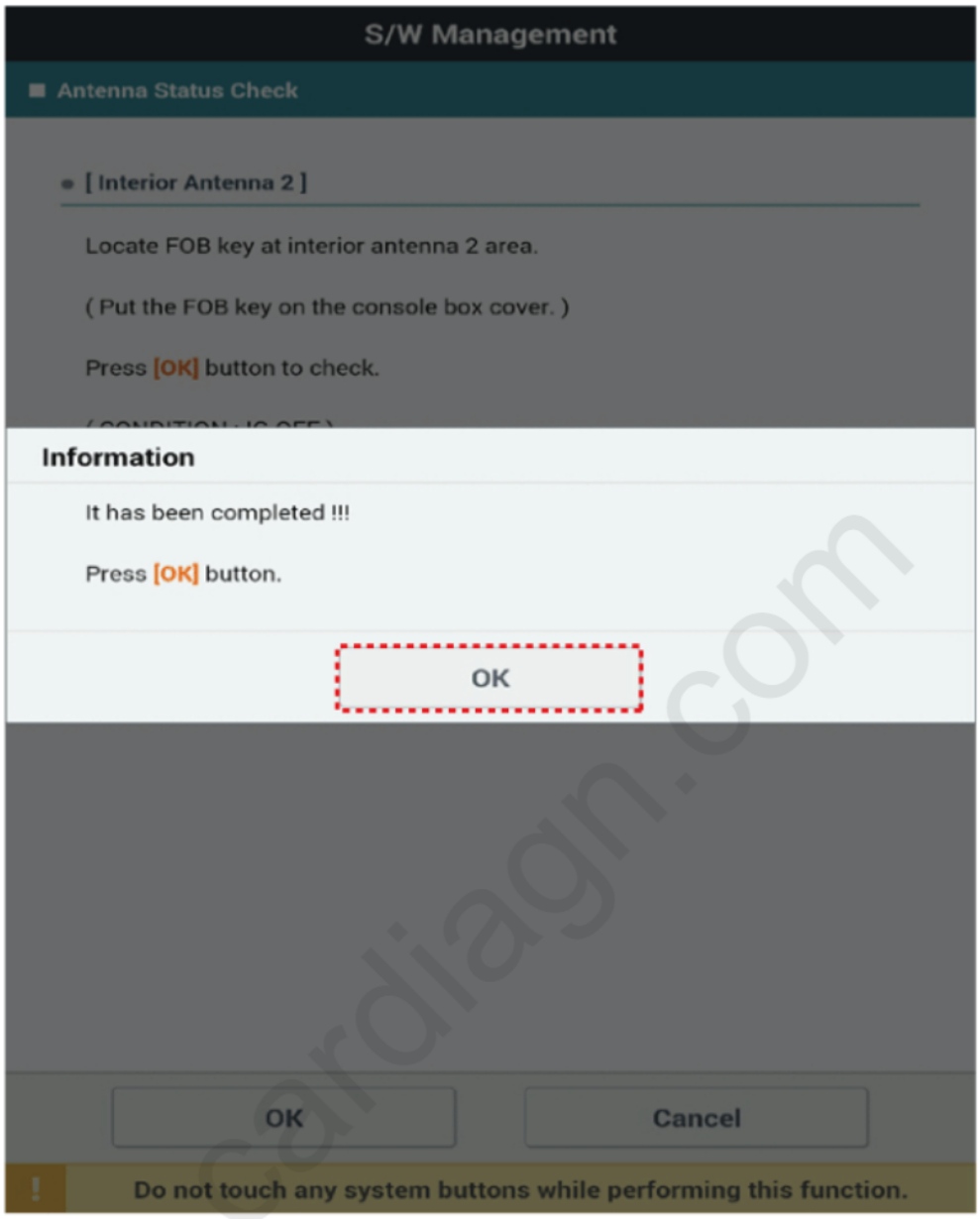
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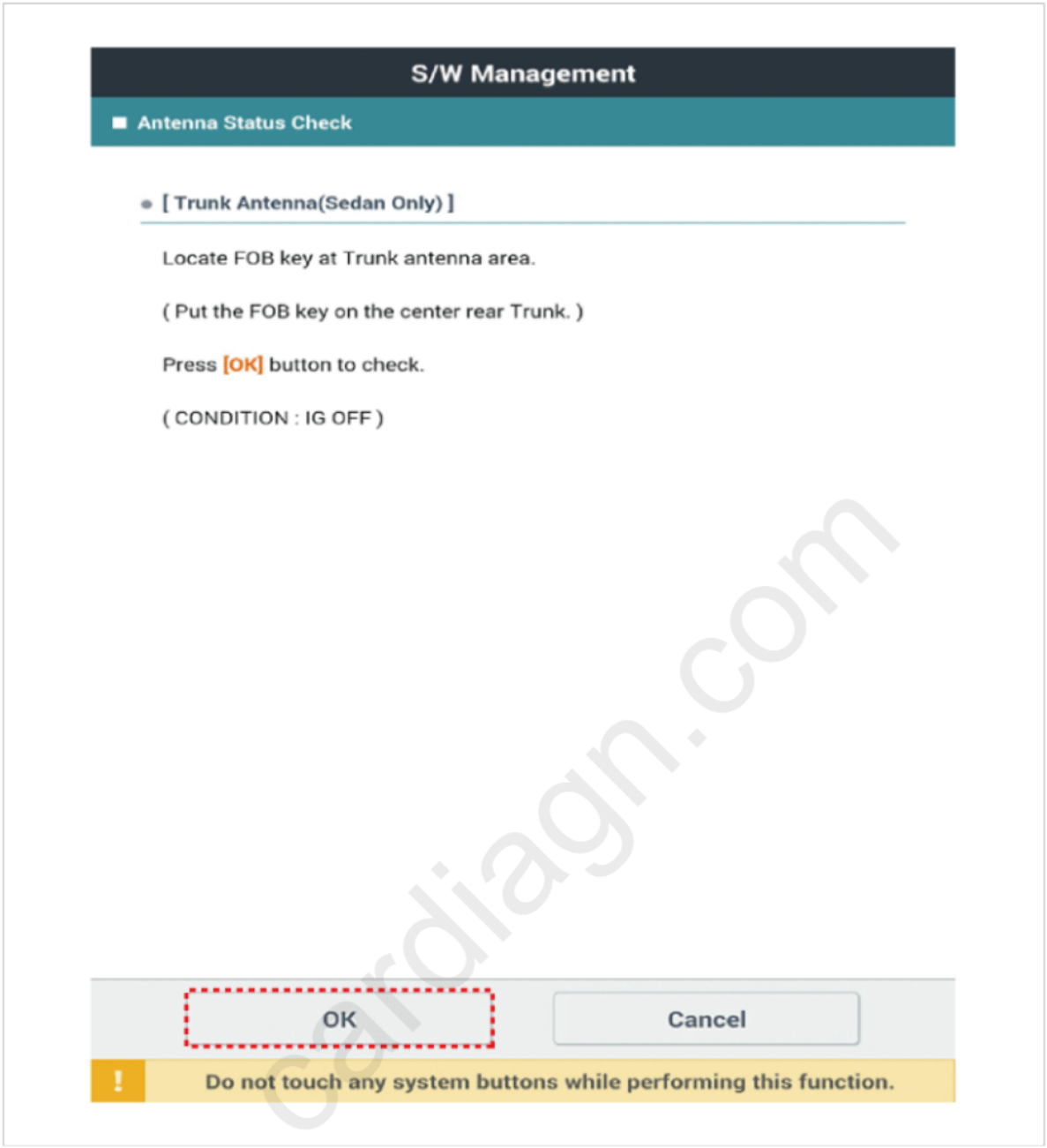
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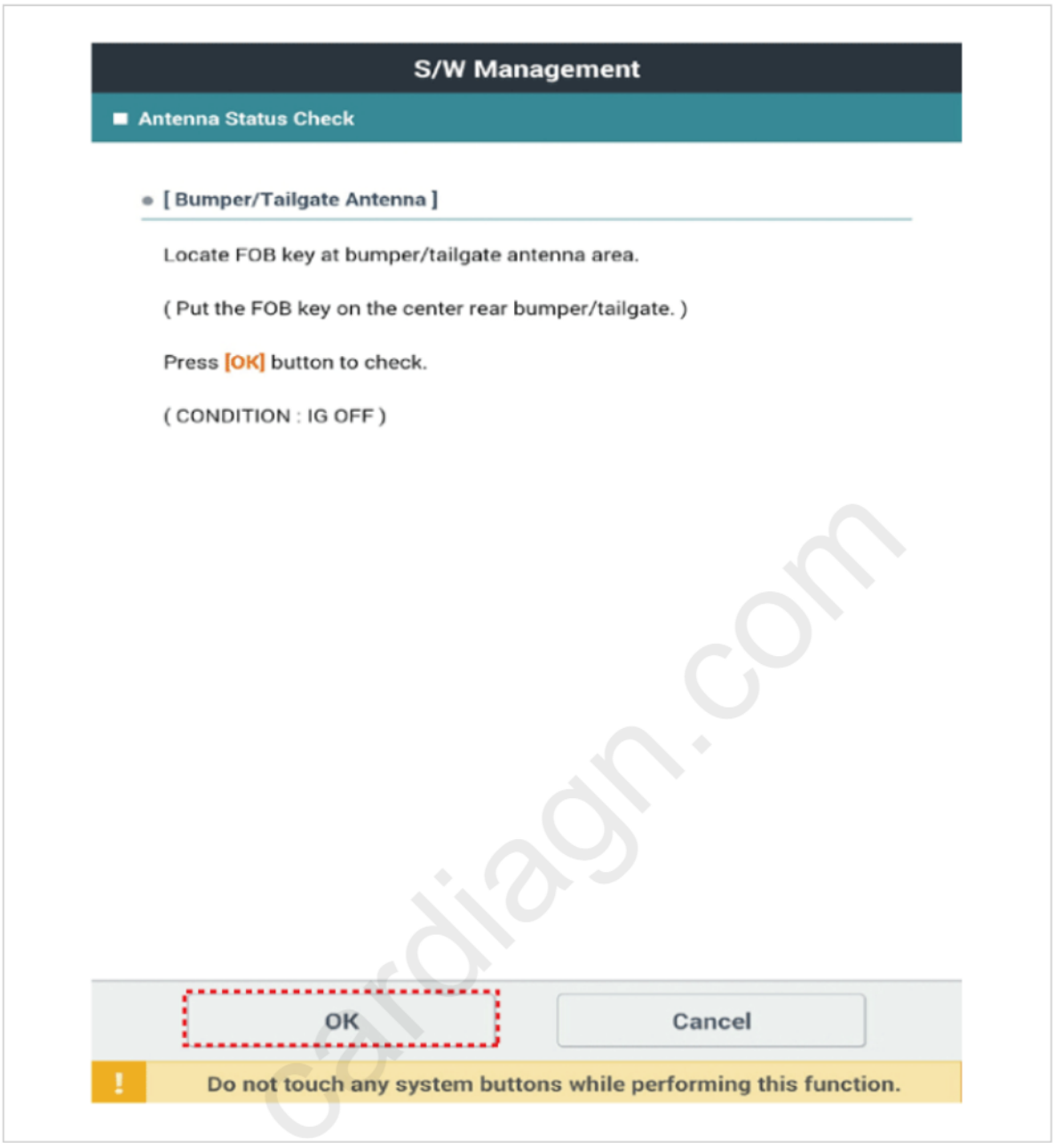
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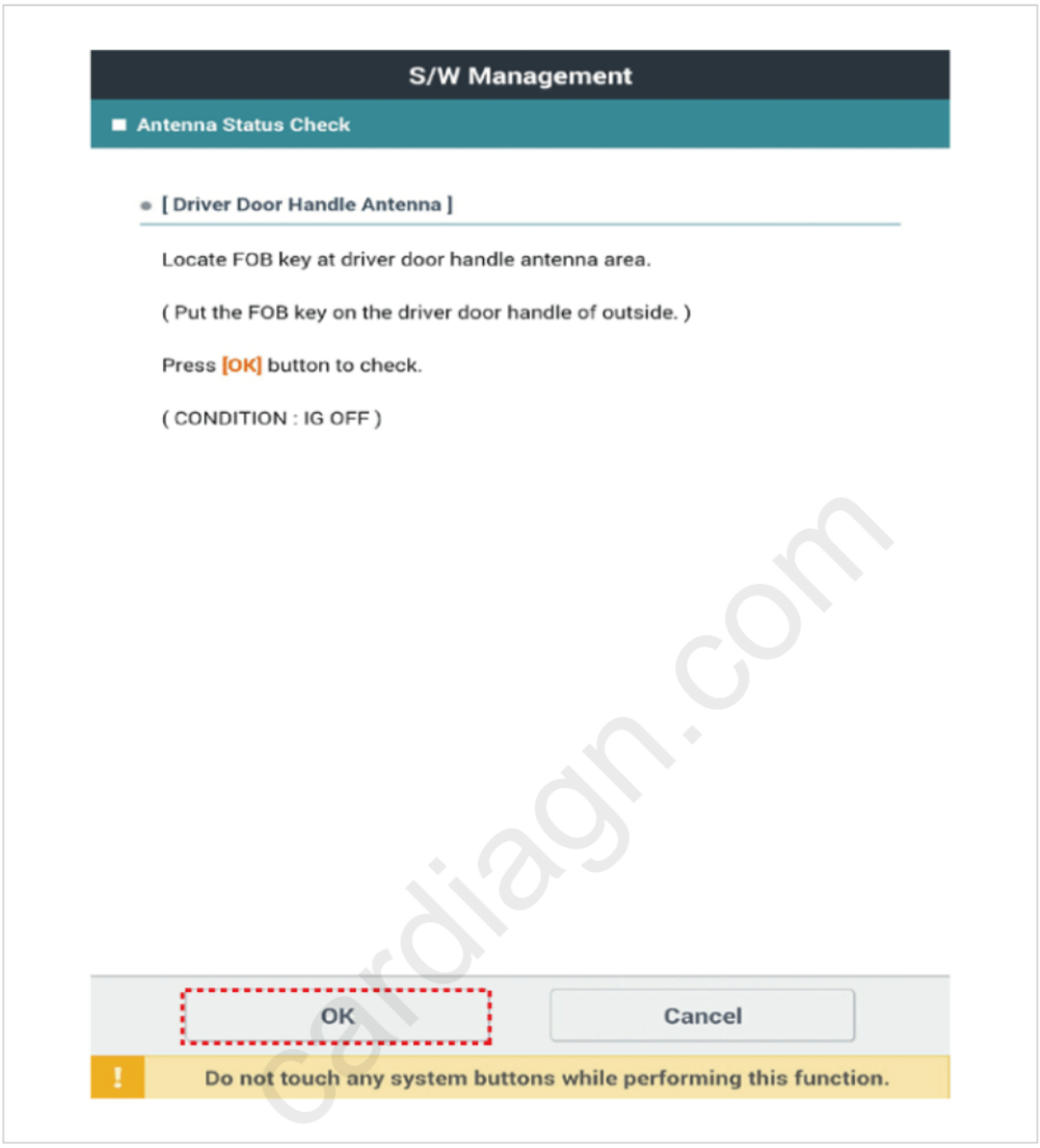
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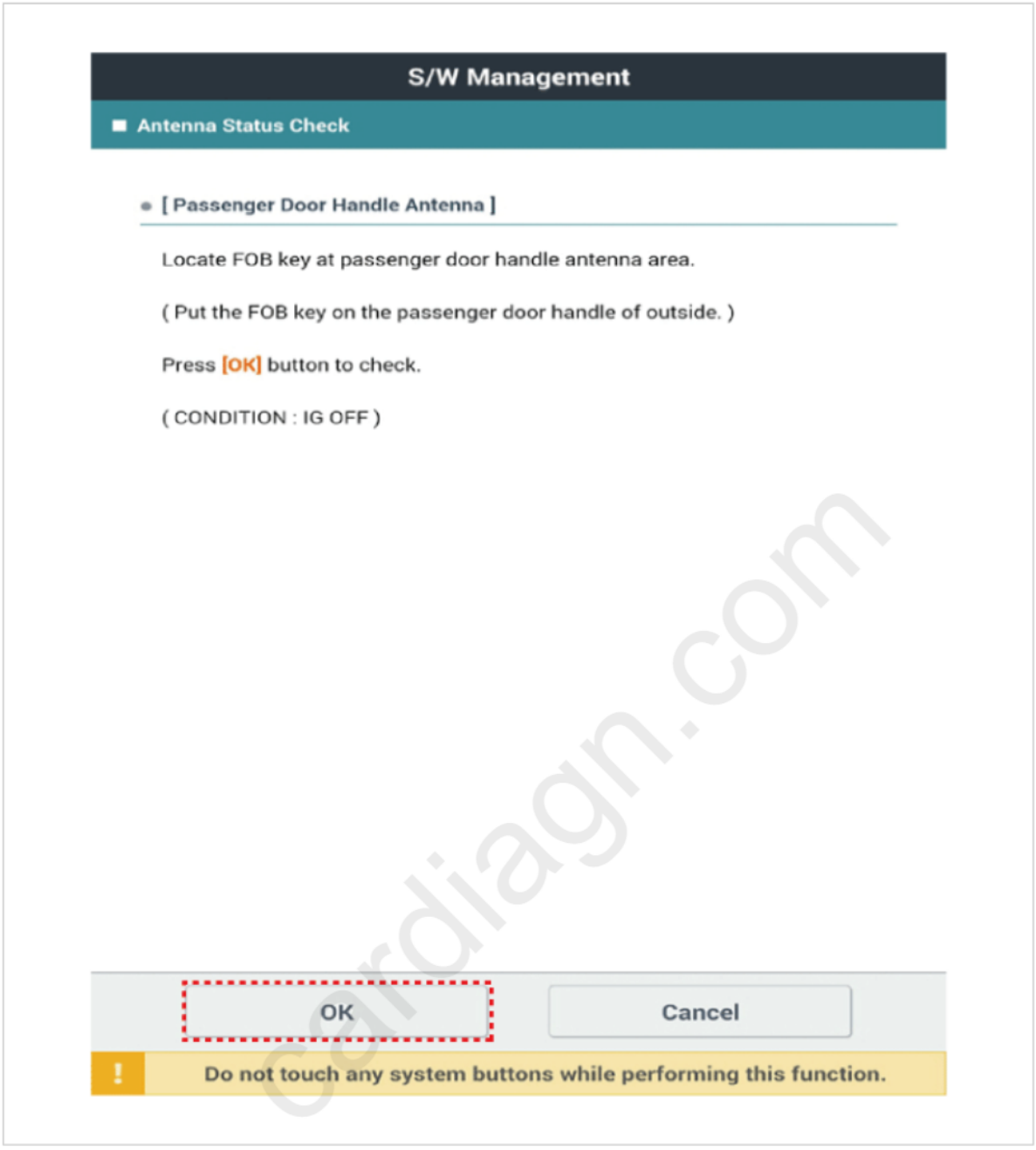
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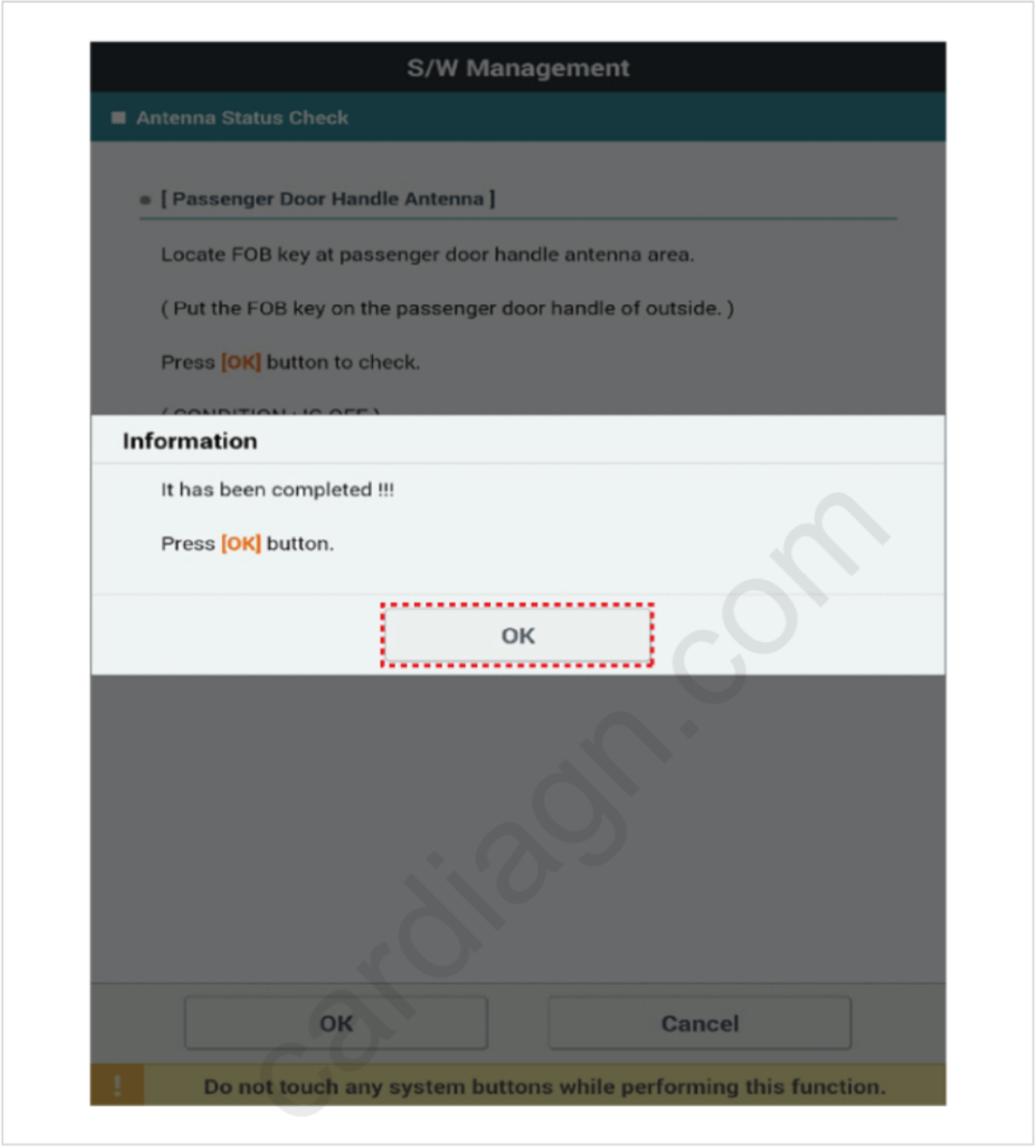
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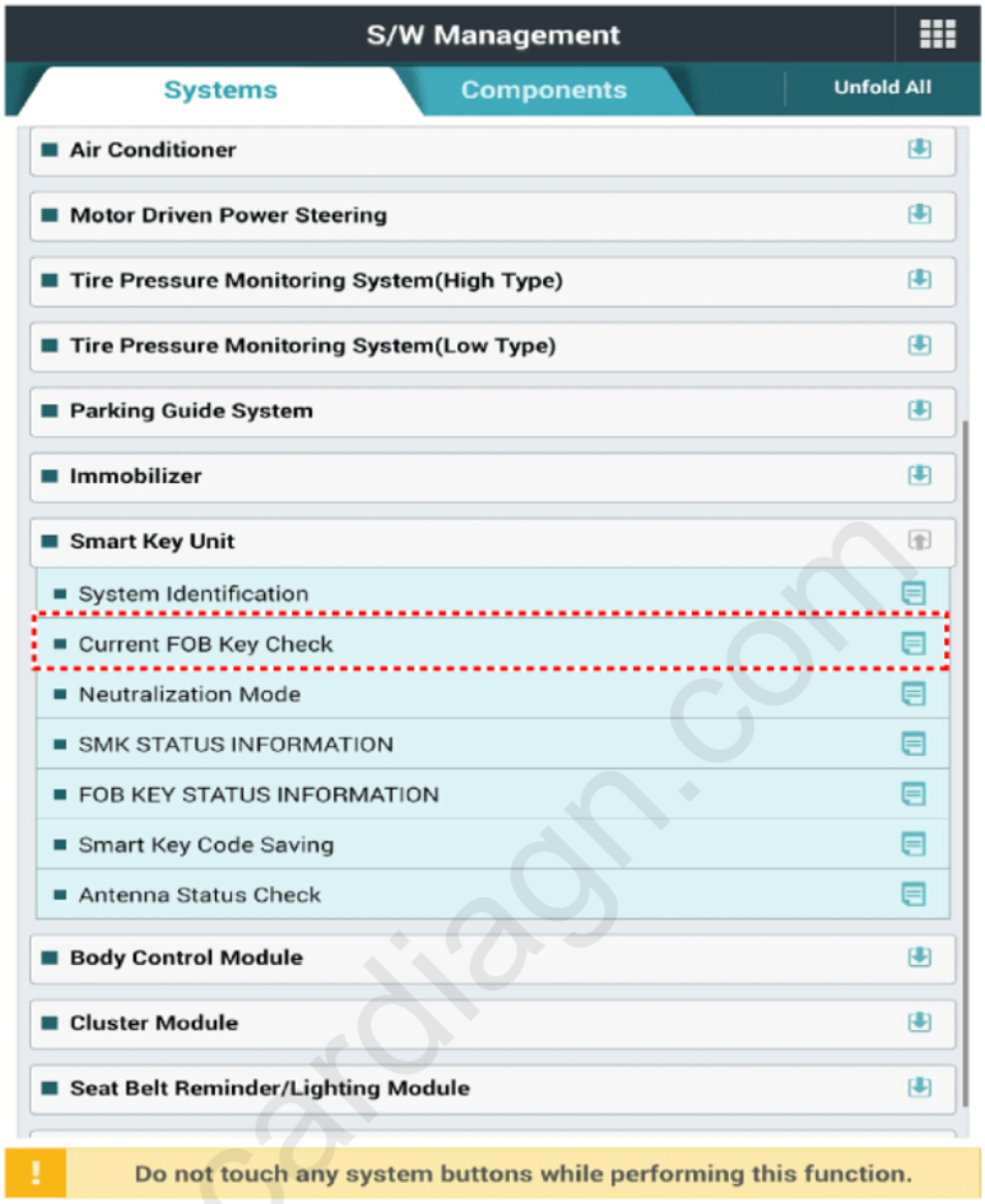
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5. If the smart key runs normal , the related antenna, smart key(transmission, reception) and exterior receiver are normal.
6. Antenna status
   - Interior Antenna 1
   - Interior Antenna 2
   - Tailgate Antenna
   - Bumper Antenna
   - Driver Door Antenna
   - Assist Door Antenna

FOB Status Check

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



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S/W Management

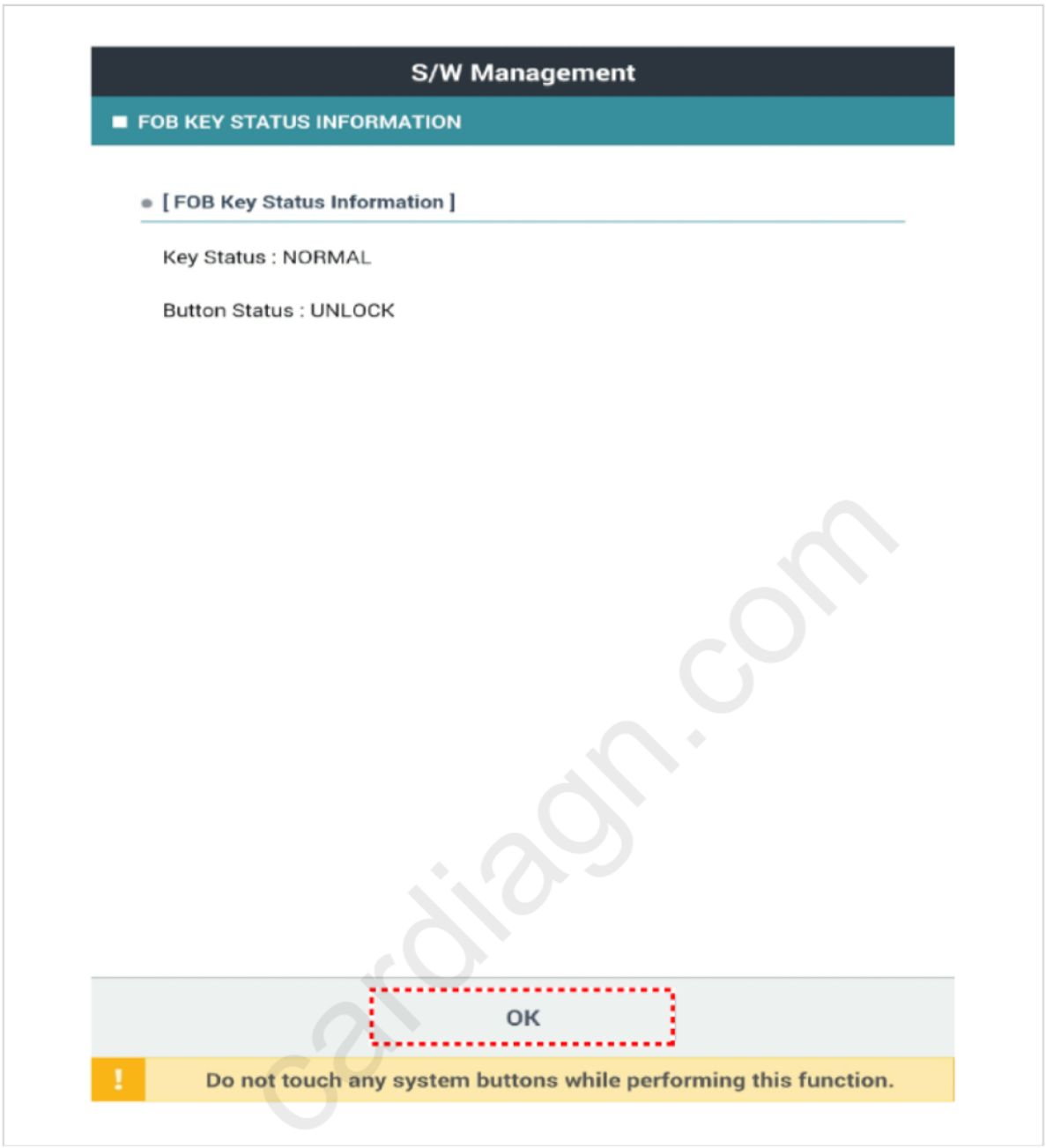
• FOB KEY Status Information

Purpose	To check unit's status.
Enable Condition	1.Engine Off 2.Ignition Switch On
Concerned Component	Smart Key(SMK) Module
Concerned DTC	-
Fail Safe	-
Etc	KEY Status : NORMAL Button Status : UNLOCK

OK

! Do not touch any system buttons while performing this function.

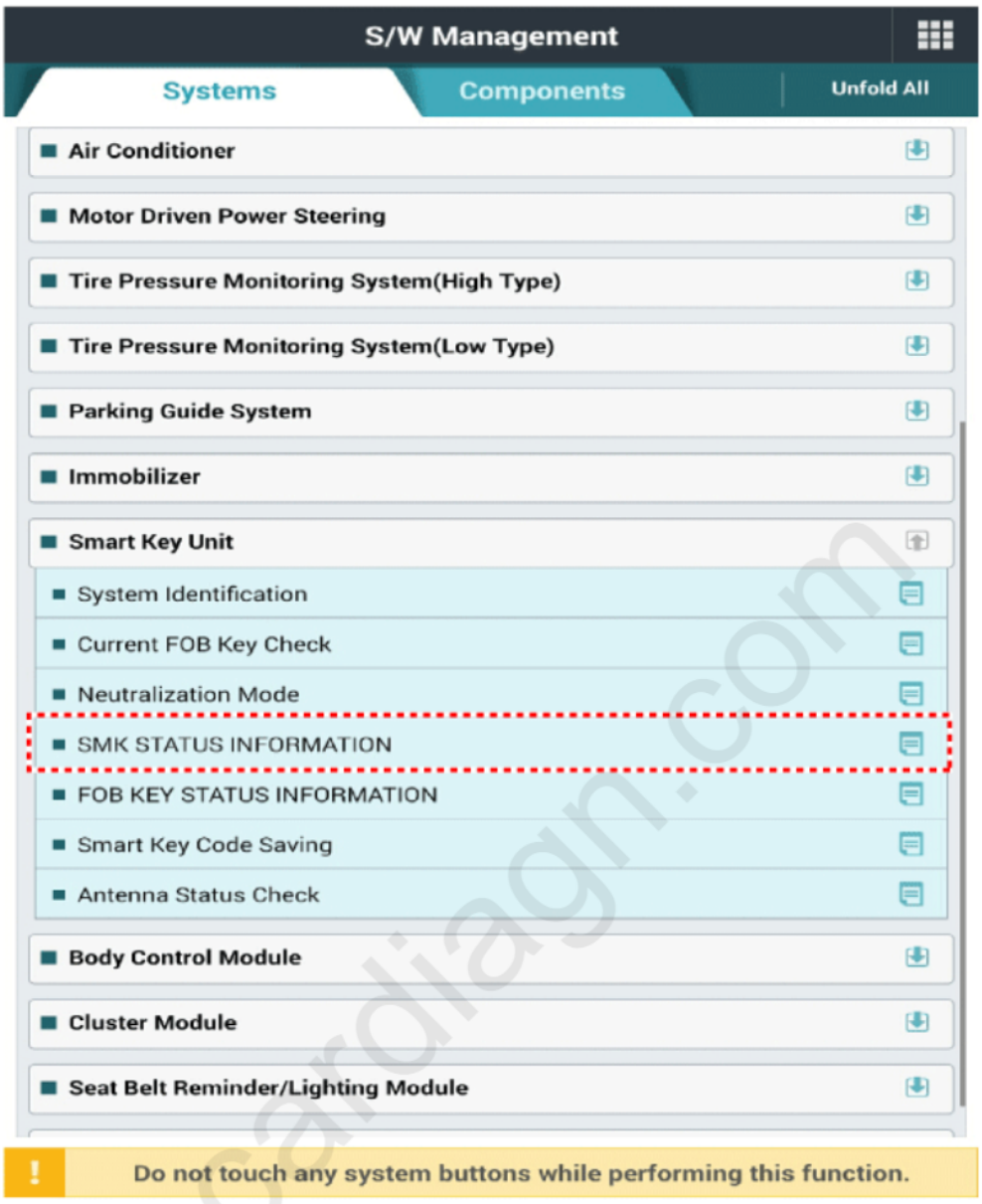
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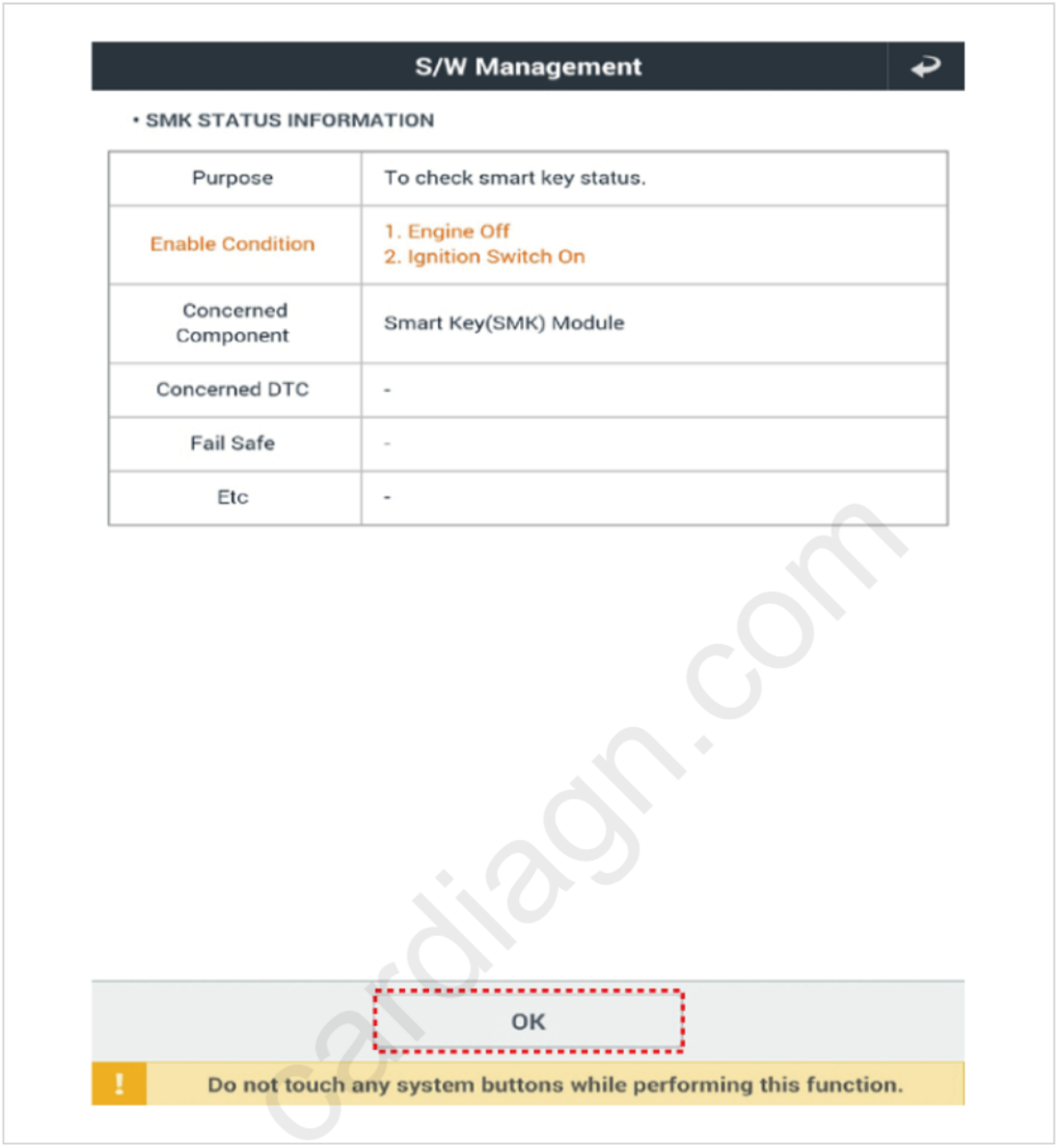
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Smart Key Status Check

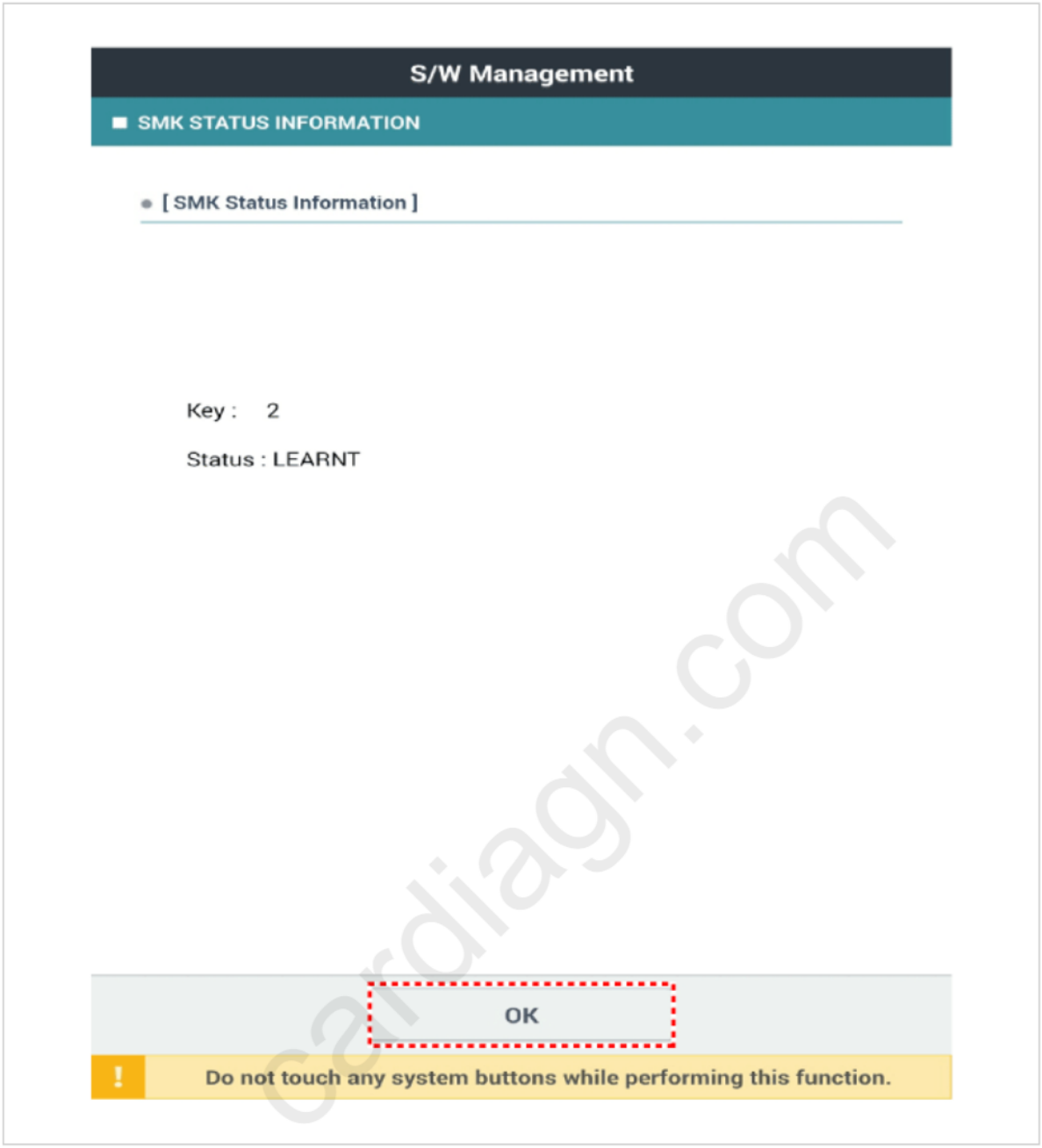
1. Connect the cable of KDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "SMK STATUS INFO".



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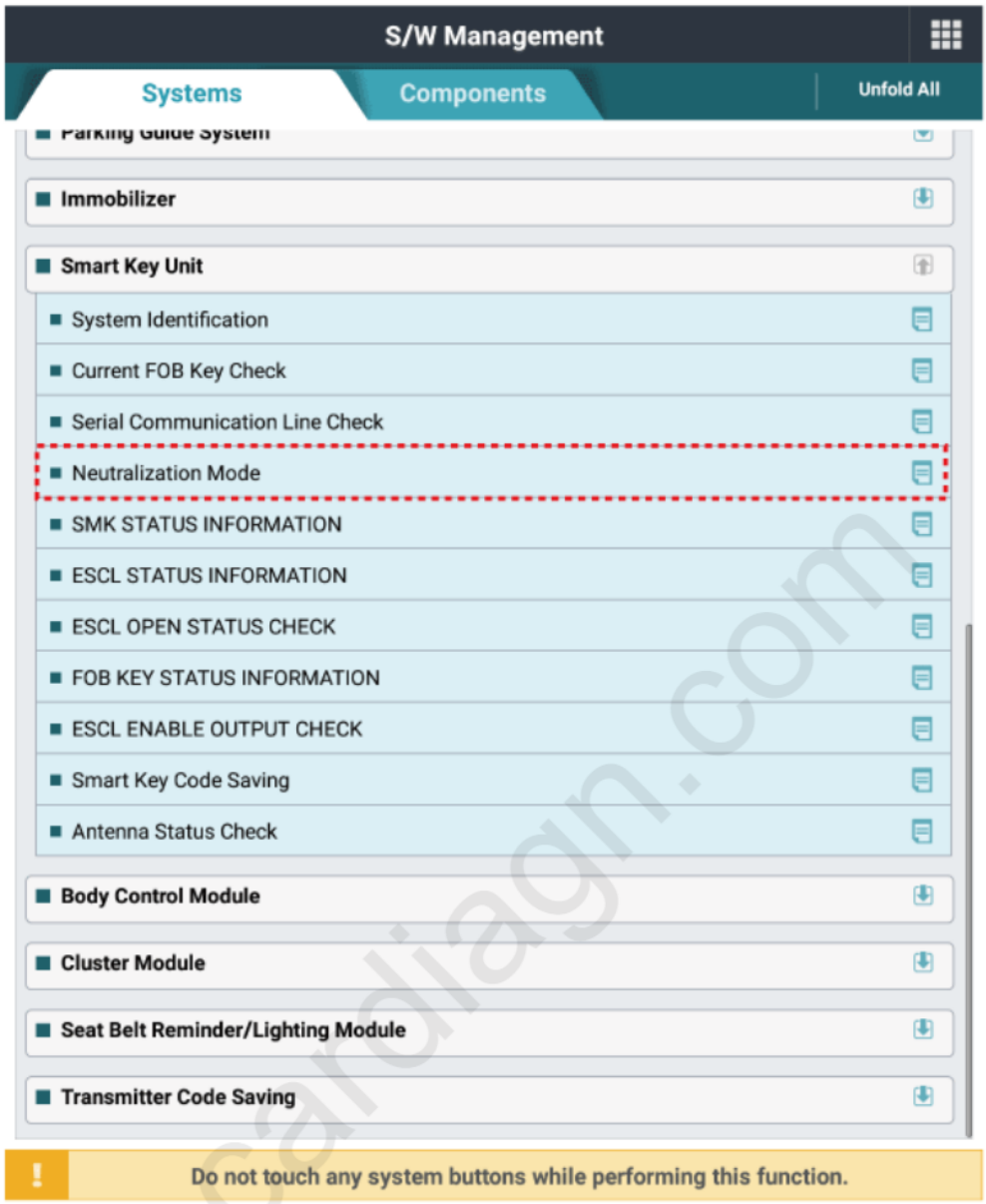
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Neutralization Status Check

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



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S/W Management

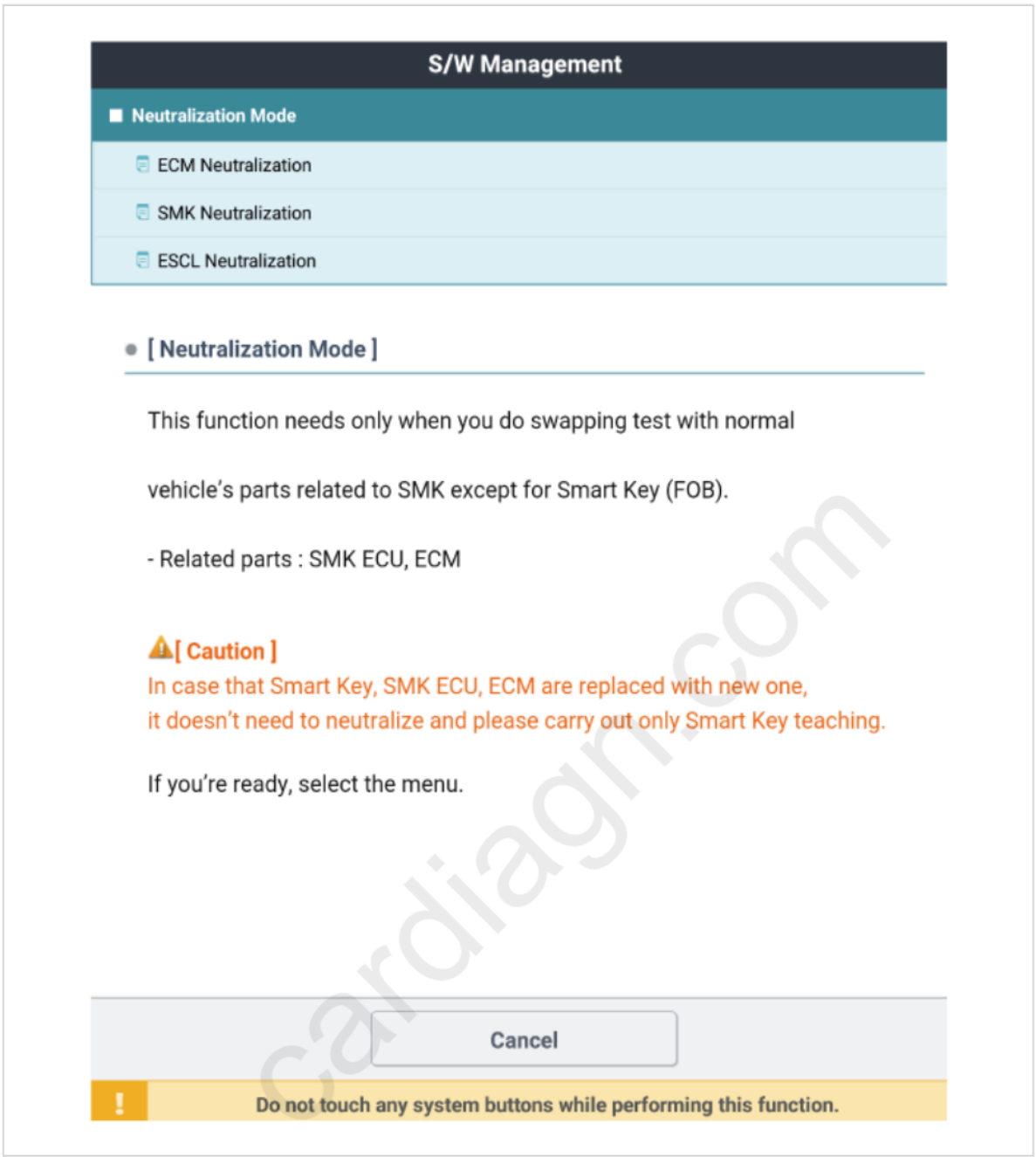
• **Neutralization Mode**

Purpose	To initialize the units that related to SMK.
Enable Condition	1.Engine Off 2.Ignition Switch On
Concerned Component	ECM, Intelligent Power Module(IPM), Power Distribution Module(PDM), Electronic Steering Column Lock(ESCL)
Concerned DTC	-
Fail Safe	-
Etc	- Neutralization Mode ECM Neutralization, IPM Neutralization, PDM Neutralization, ESCL Neutralization

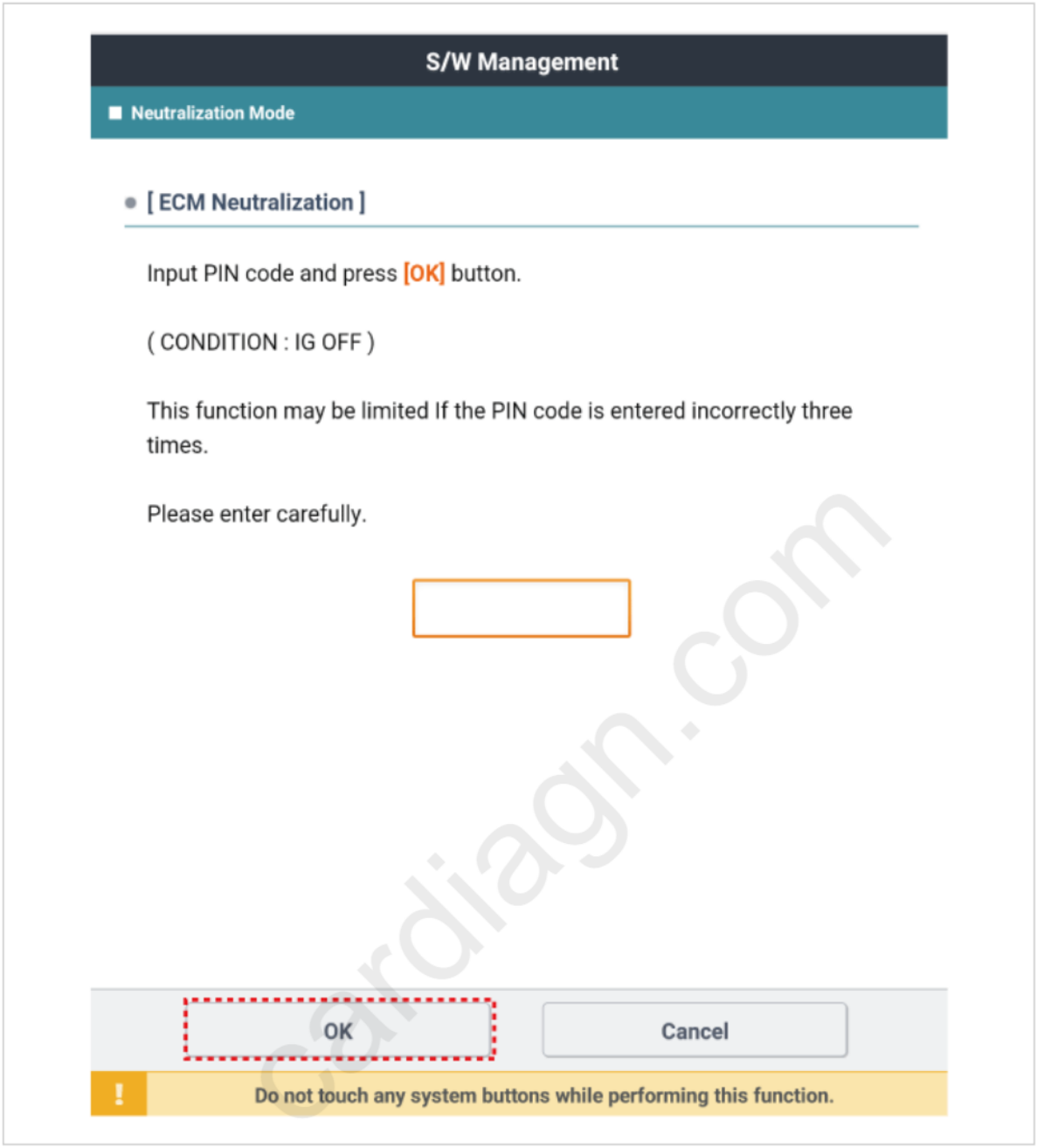
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OK

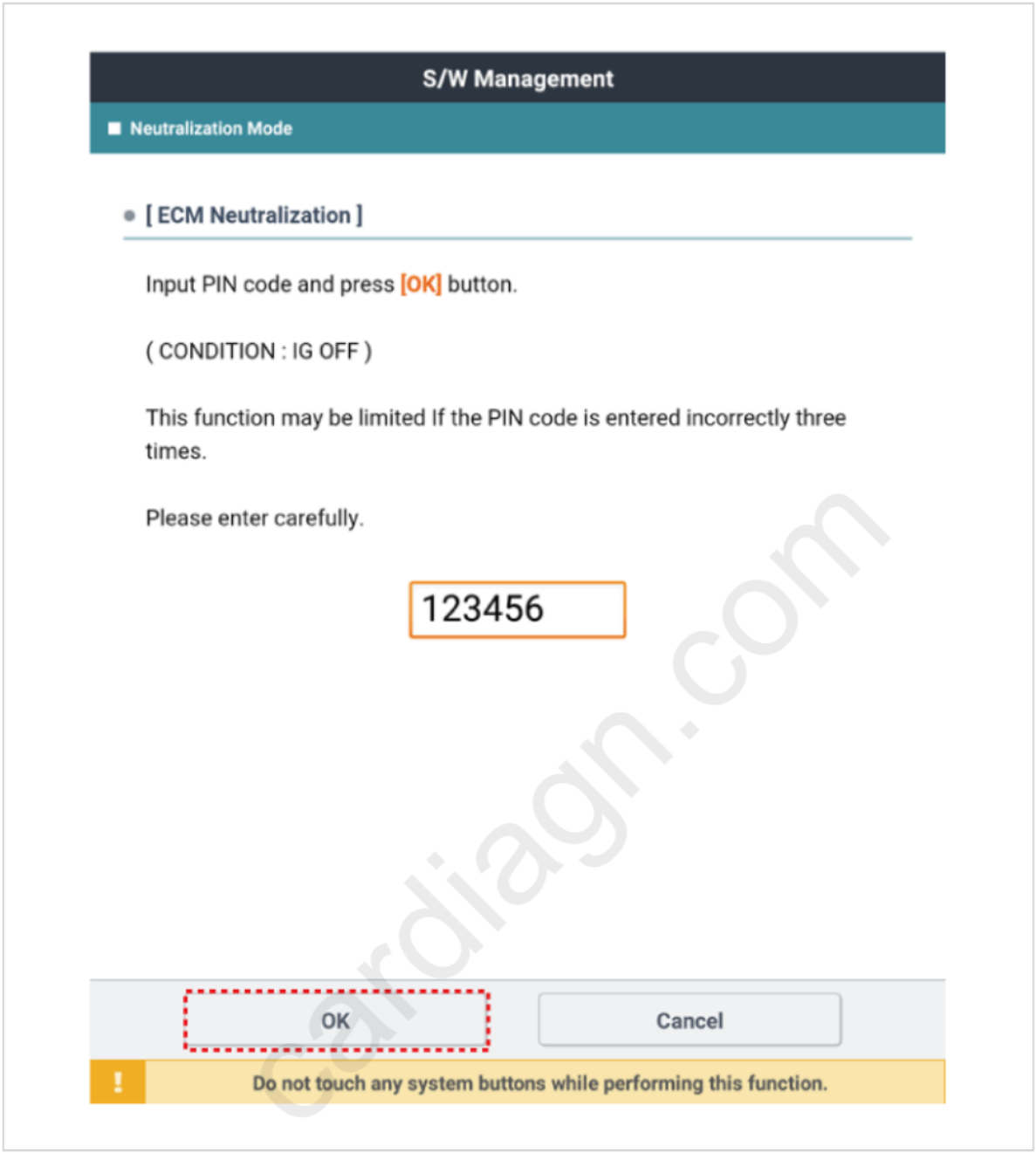
! Do not touch any system buttons while performing this function.



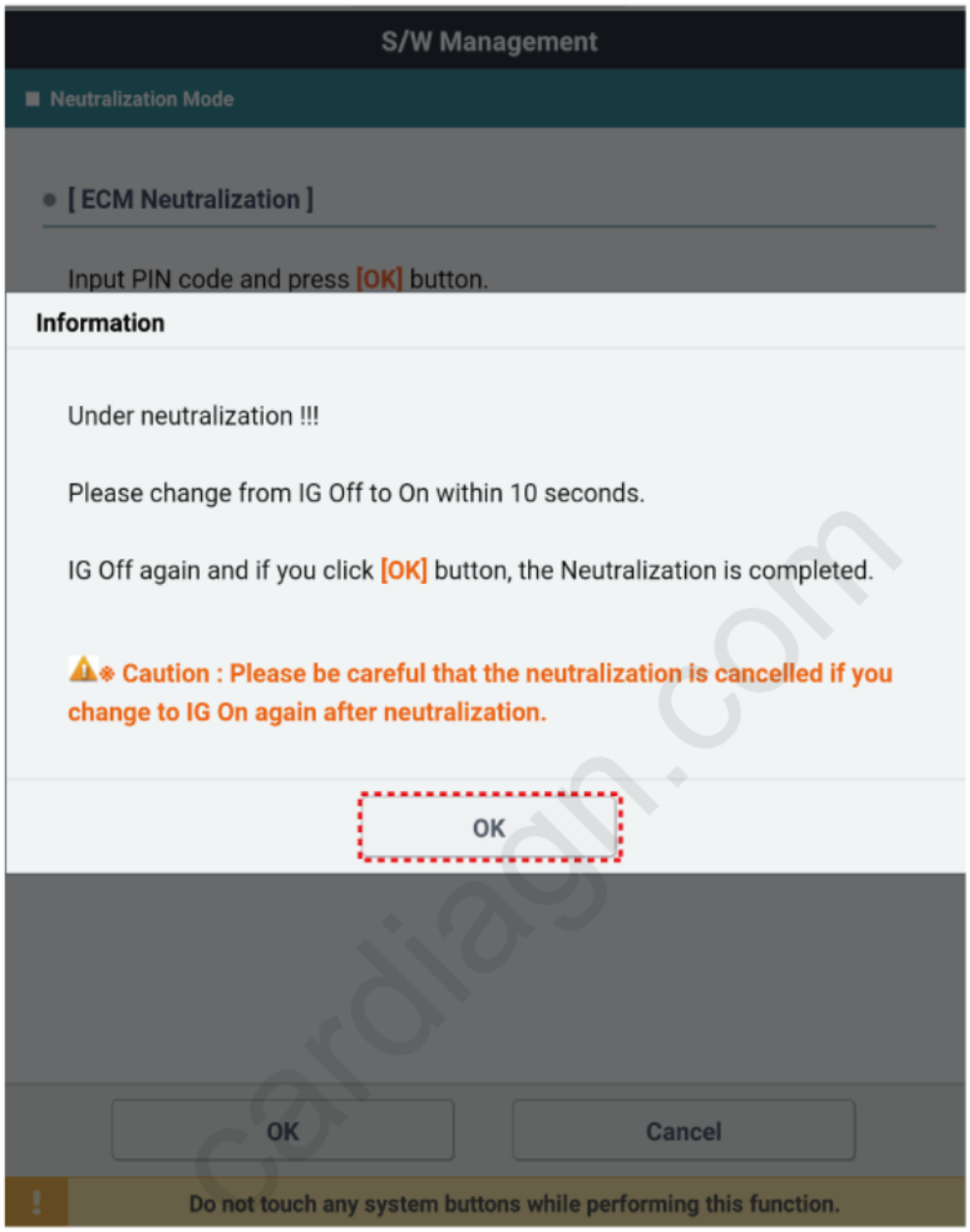
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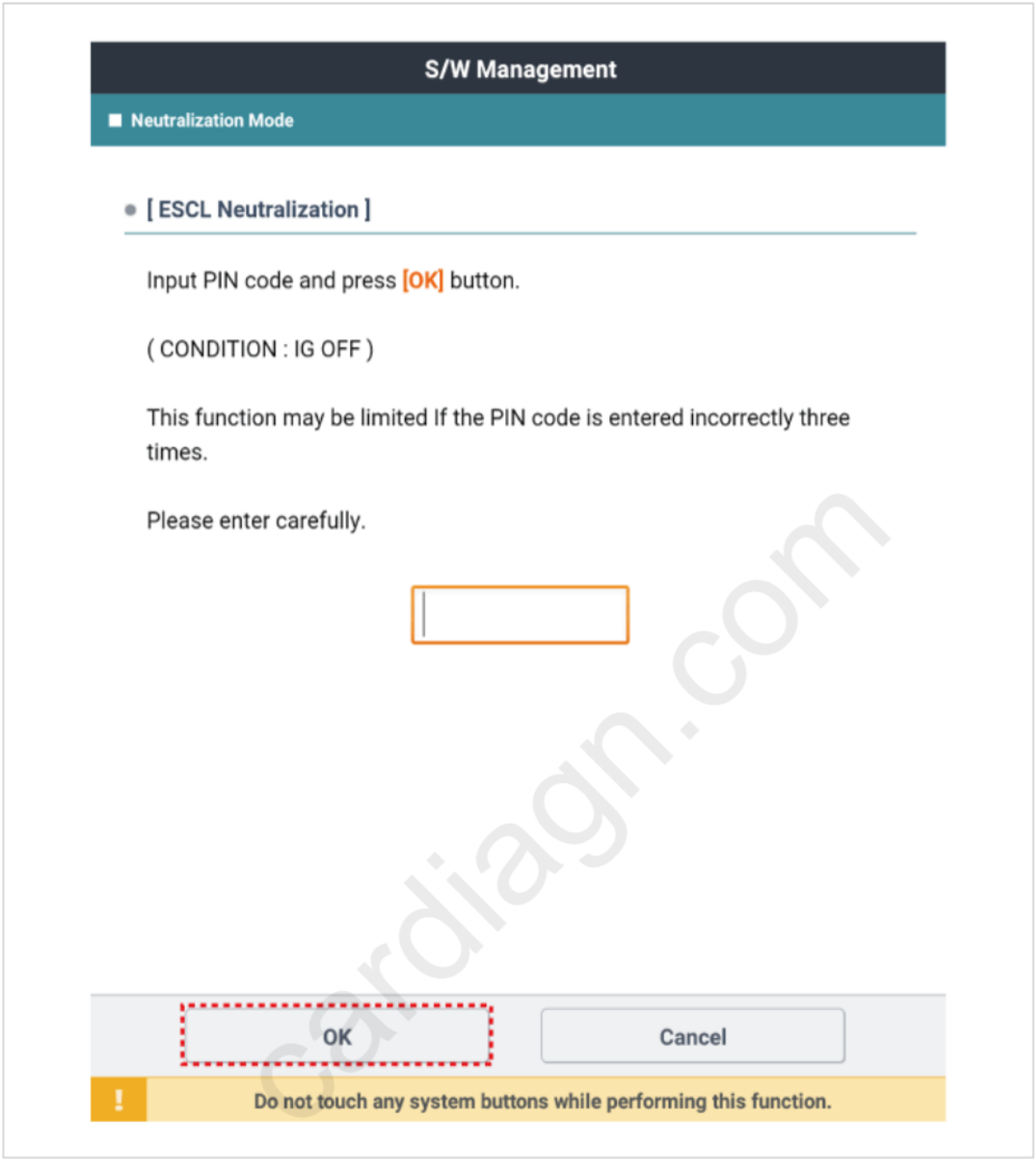
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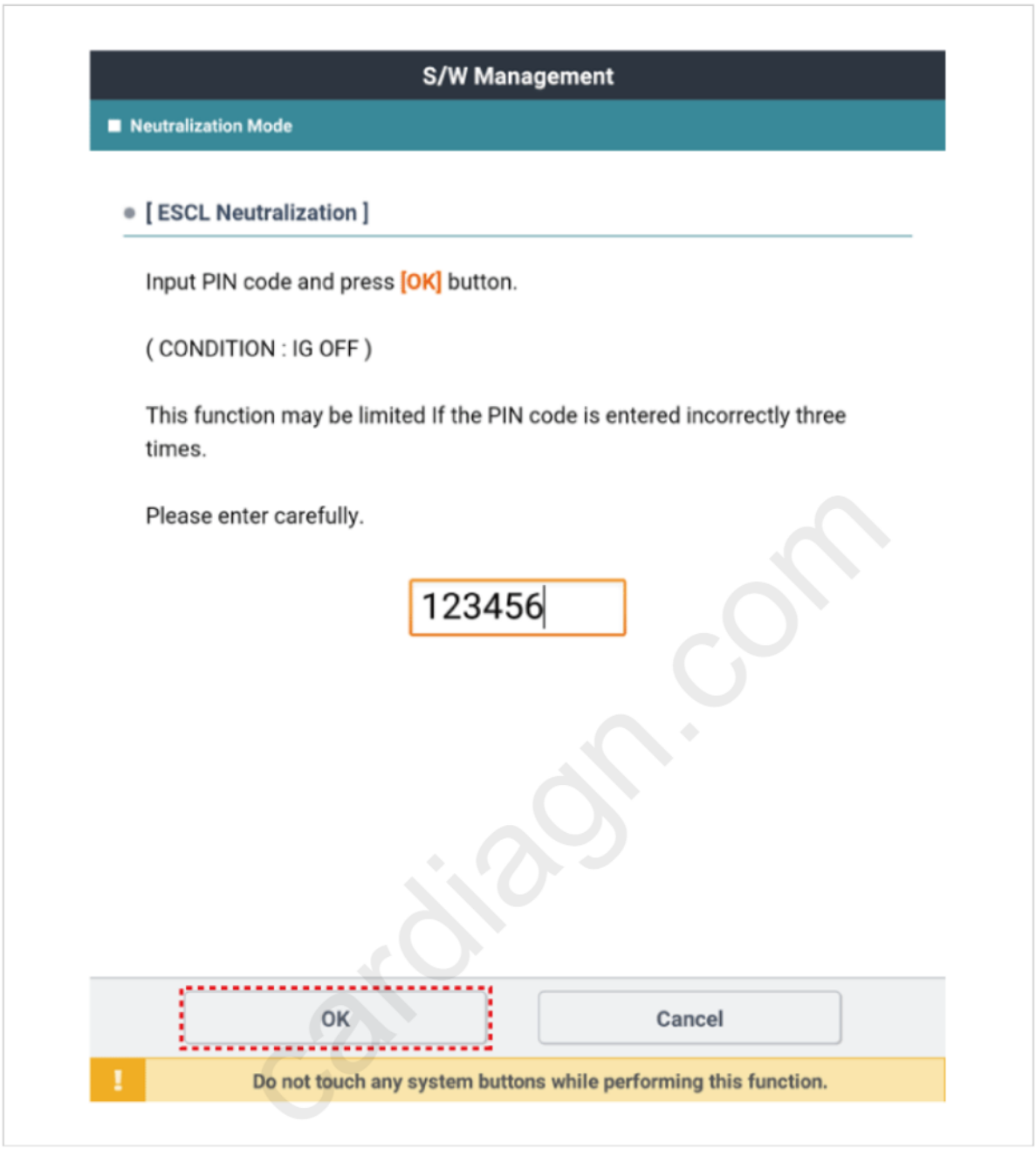
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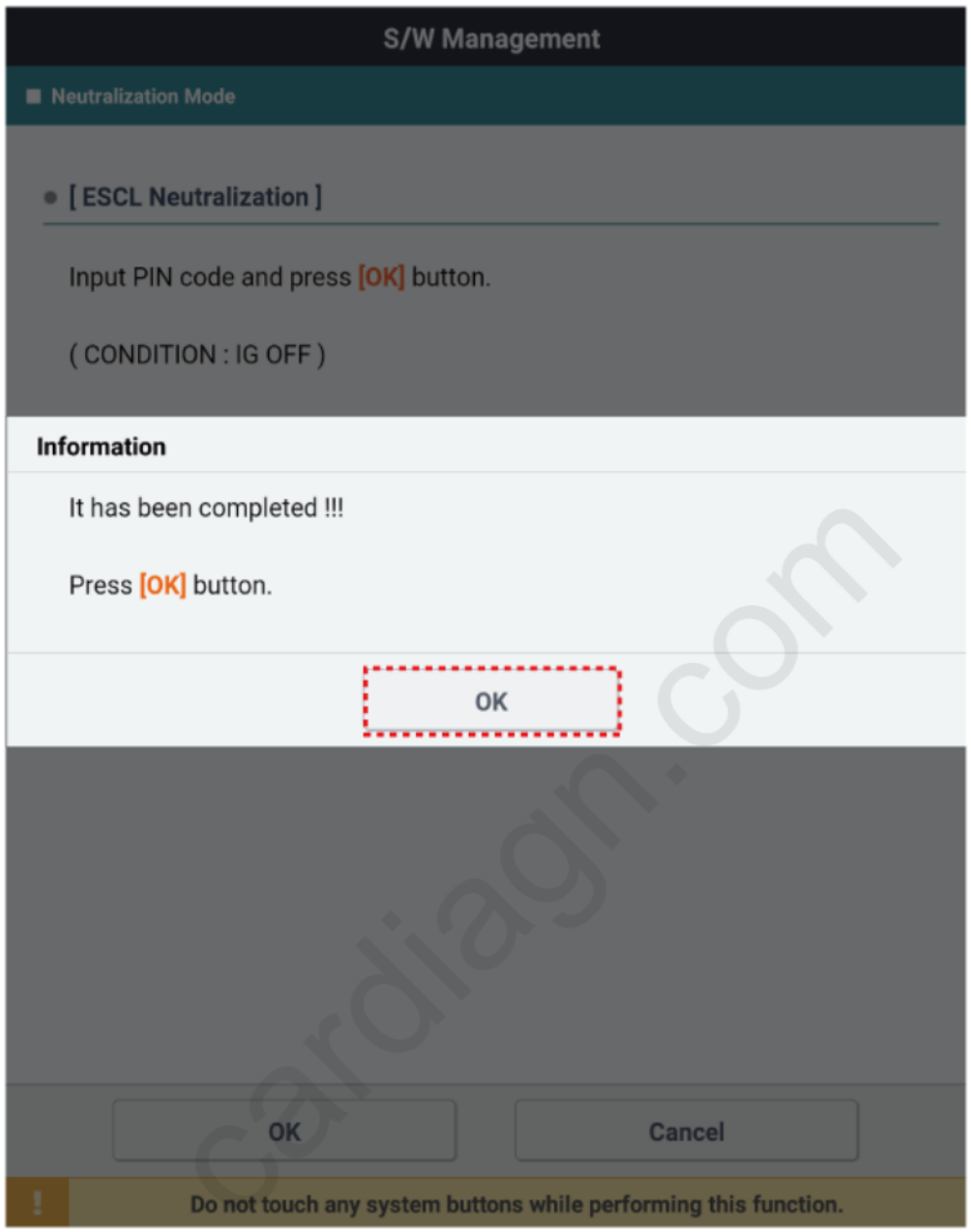
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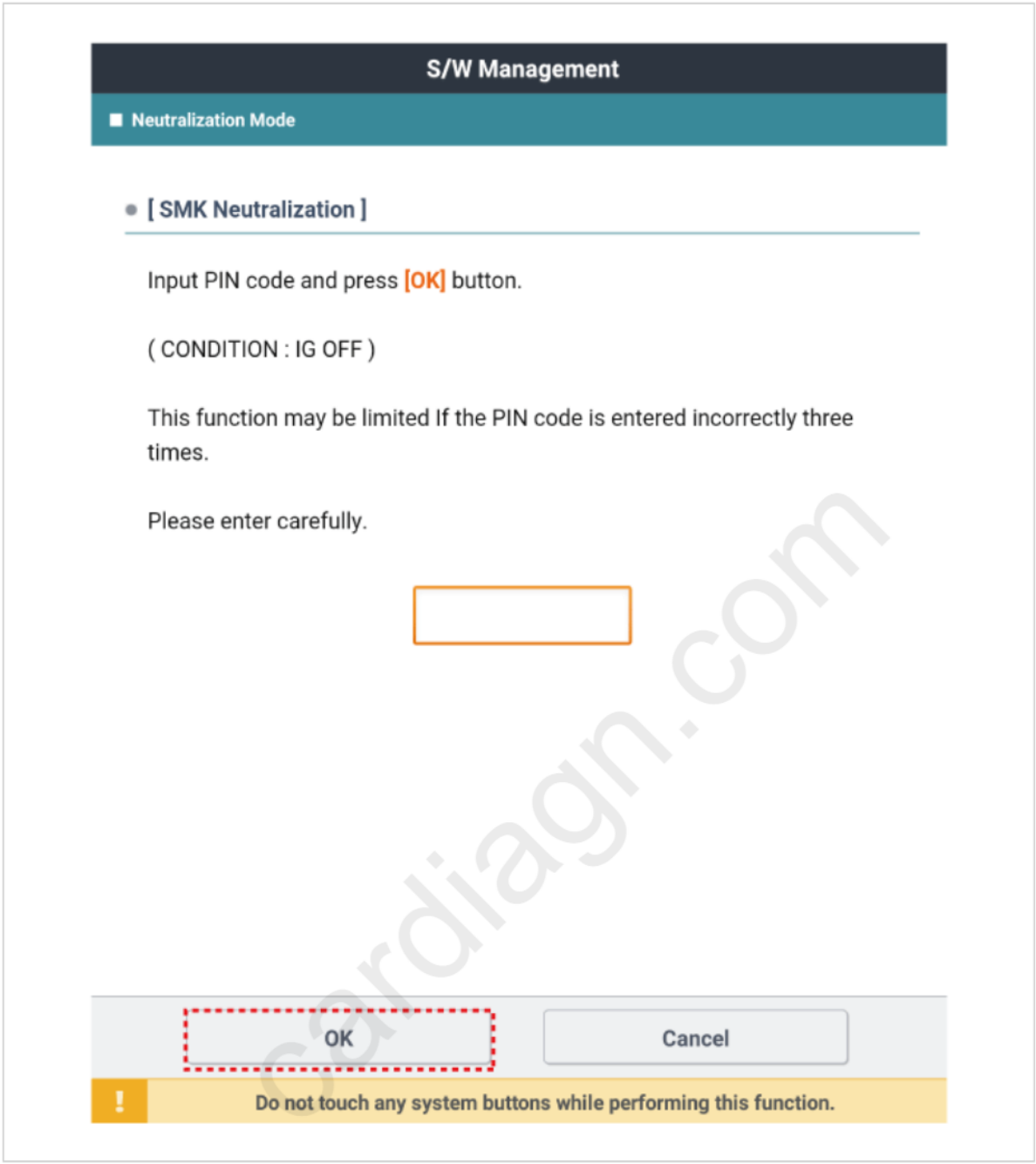
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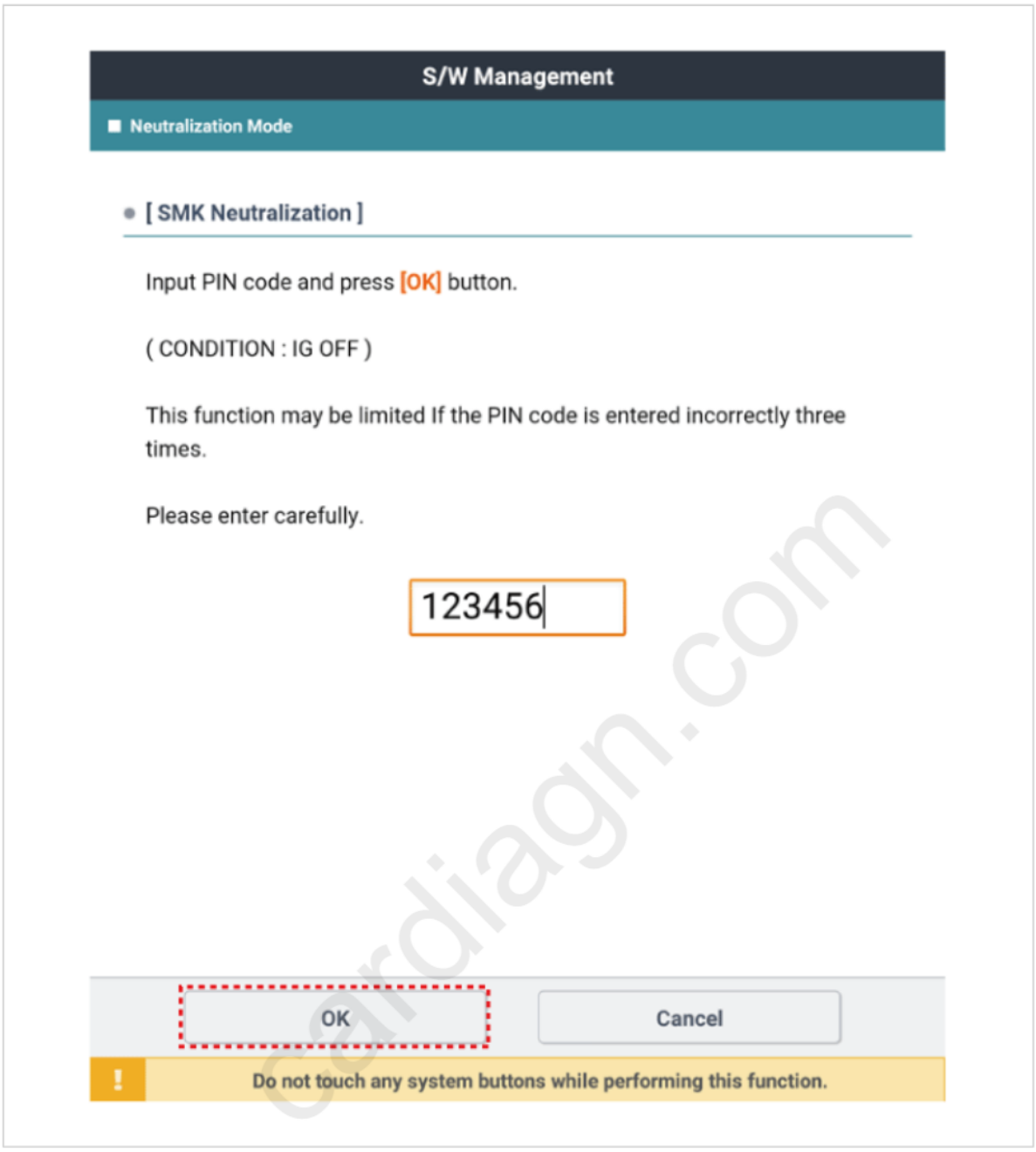
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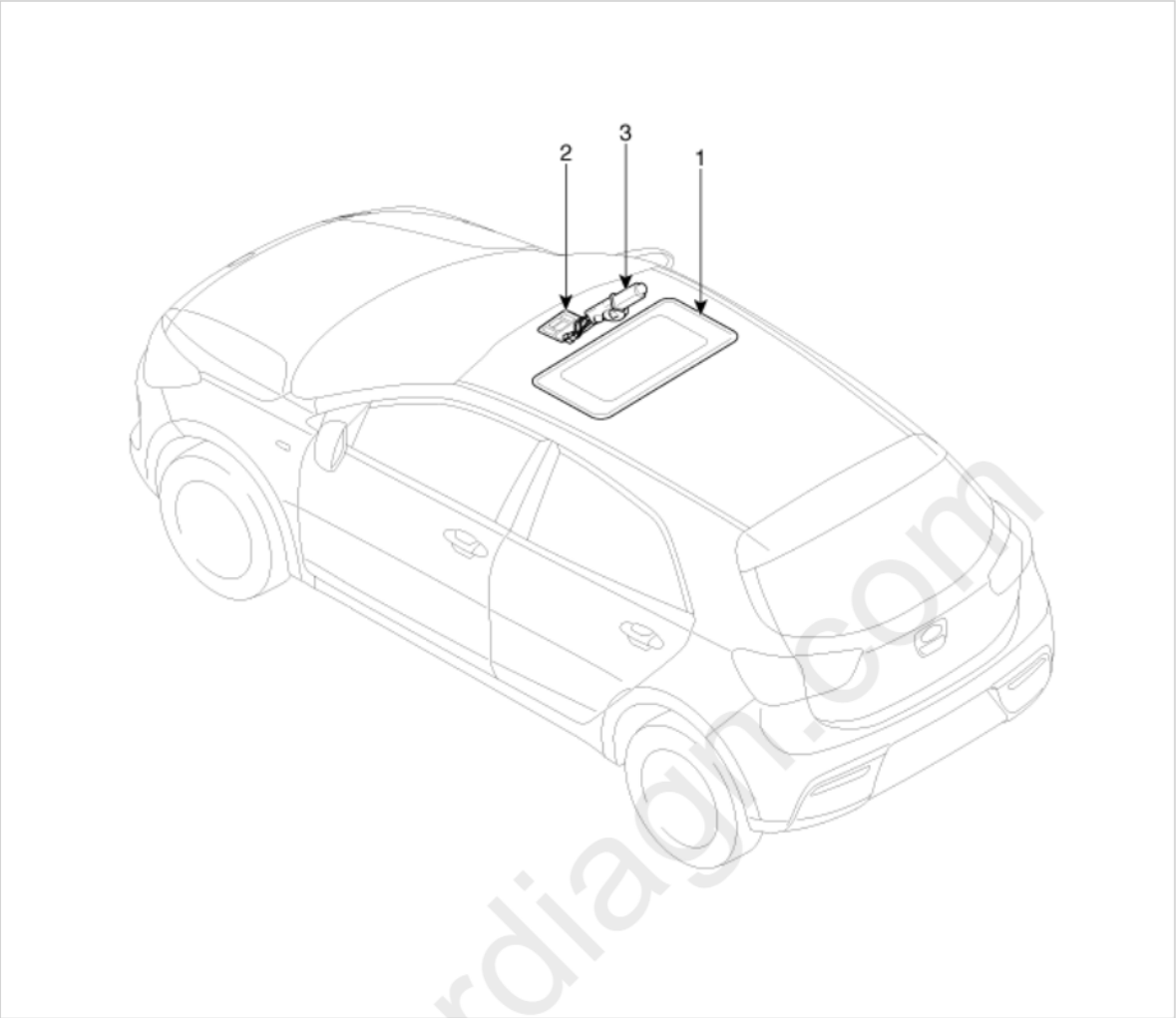
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Special Service Tools

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

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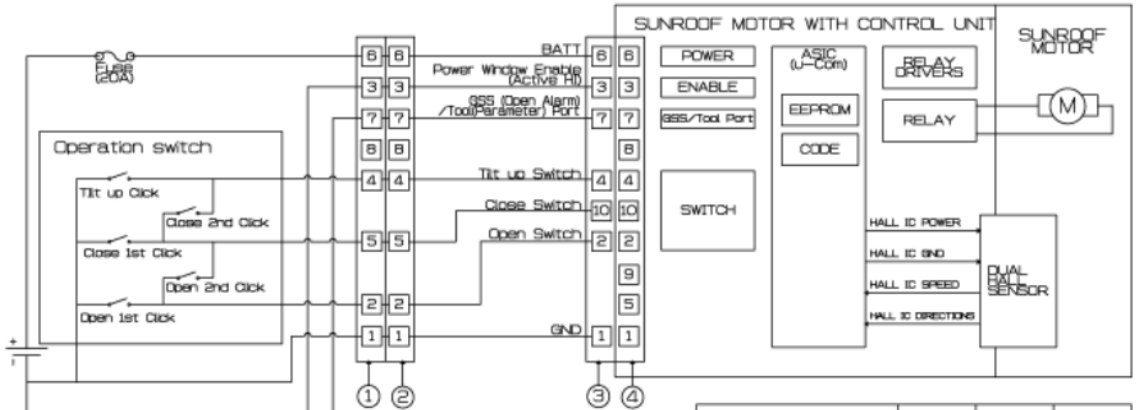
Component Location



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

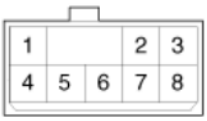
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Circuit Diagram



Item		A Signal	B Signal	C Signal
Open	Manual	ON	OFF	OFF
	Auto	ON	ON	OFF
Close	Manual	OFF	ON	OFF
	Auto	OFF	ON	ON
Tilt up	Manual	OFF	OFF	ON
Tilt down				

Map lamp side



No.	Description
1	Ground
2	-
3	Room lamp
4	Battery (+)
5	Signal A
6	Signal B
7	Signal C
8	Door

Motor side



No.	Description	No.	Description
1	Ground	6	Power
2	Open switch	7	Glass status signal
3	Power window enable	8	-
4	Tilt up switch	9	-
5	-	10	Close switch

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Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the roof trim assembly.
   (Refer to Body - "Roof Trim Assembly")
3. Remove the glass motor (A) after loosening the mounting screws.



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

Position \ Terminal	3	4	2	10
Manual close	⊕			⊖
Tilt up	⊕	⊖		
Manual open	⊕		⊖	

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

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

Adjustment

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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.
2. According to the position of the sunroof, do as follows.
   (1) In case that the sunroof has closed completely or been tilted :
   Press the TILT button until the sunroof has tilted upward completely.
   (2) In case that the sunroof has slide-opened :
   Press and hold the CLOSE button for more than 5 seconds until the sunroof has closed completely.
   Press the TILT button until the sunroof has tilted upward completely.
3. Release the TILT button.
4. Press and hold the TILT button once again until the sunroof has returned to the original position of TILT after it is raised a little higher than the maximum TILT position.

When this is complete, the sunroof system is reset.

Protecting The Overheated Motor

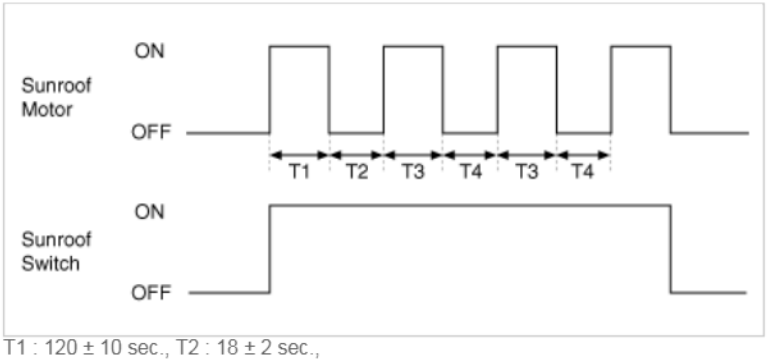
In order to protect the overheated sunroof motor by continuous motor operation, the sunroof ECU controls the Run-time and Cool-time of motor as followings;

1. The Sunroof ECU detects the Run- time of motor
2. Motor can be operated continuously for the 1st Run-time.
3. Motor which is operated continuously stops operating after the 1st Run-time.
4. And then Motor is not operated for the 1st Cool-time.
5. Motor is operated for the 2nd Run-time at the continued motor operation after 1st Cool-time.
6. Motor which is operated continuously stops operating after the 2nd Run-time.
7. Motor is not operated for the 2nd Cool-time.
8. Motor repeats the 2nd Run-time and 2nd Cool-time at the continued motor operation.
   – In case that motor is not operated continuously, the Run-time which is limited for protecting the overheated motor is increased.
   – The Run-Time of motor is initialized to "0" if the battery or fuse is reconnected after being disconnected, discharged or blown.

Protecting The Overheated Motor

In order to protect the overheated sunroof motor by continuous motor operation, the sunroof ECU controls the Run-time and Cool-time of motor as followings.

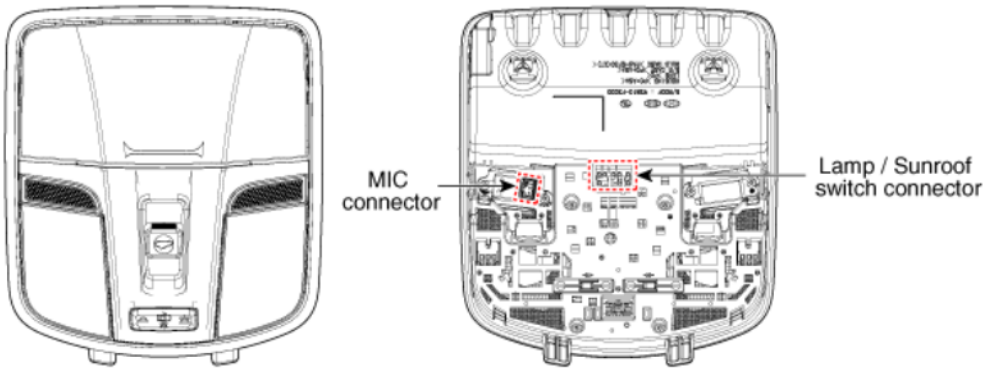
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   – In case that motor is not operated continuously, the Run-time which is limited for protecting the overheated motor is increased.
   – The Run-Time of motor is initialized to "0" if the battery or fuse is reconnected after being disconnected, discharged or blown.



T1 : 120 ± 10 sec., T2 : 18 ± 2 sec.,
T3 : 9 ± 2 sec., T4 : 18 ± 2 sec.

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Components



<Close switch>

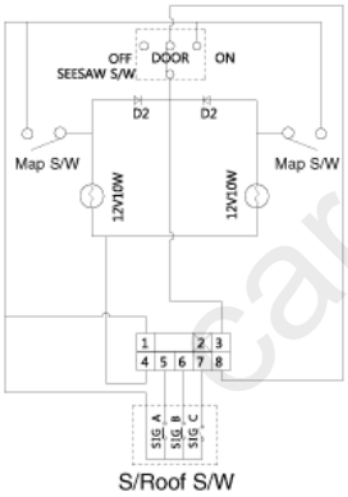
Switch	Sunroof
1nd	Tilt down
	Manual close
2nd	Auto close

<Open switch>

Switch	Sunroof
1st	Manual open
2nd	Auto open

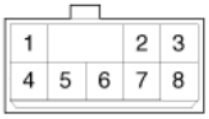
<Tilt switch>

Switch	Sunroof
Push	Tilt up



S/Roof S/W

Sunroof switch connector

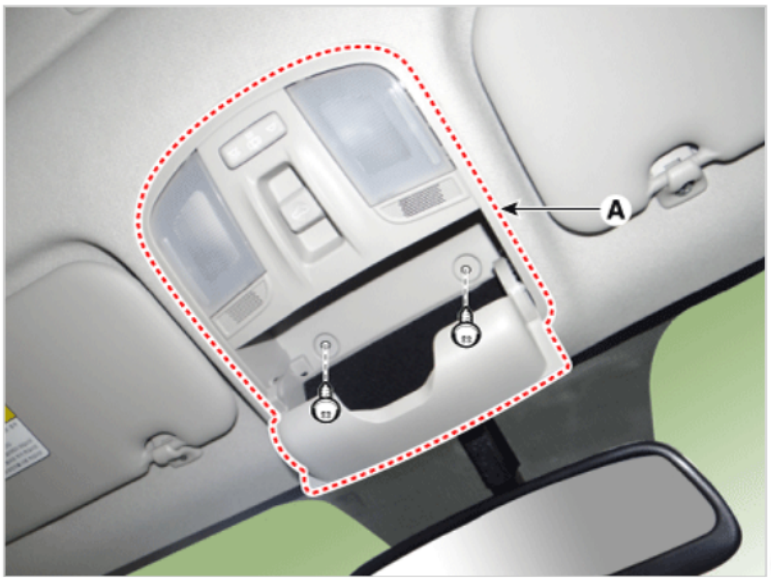


No.	Description
1	Ground
2	-
3	Room lamp
4	Battery (+)
5	Signal A
6	Signal B
7	Signal C
8	Door

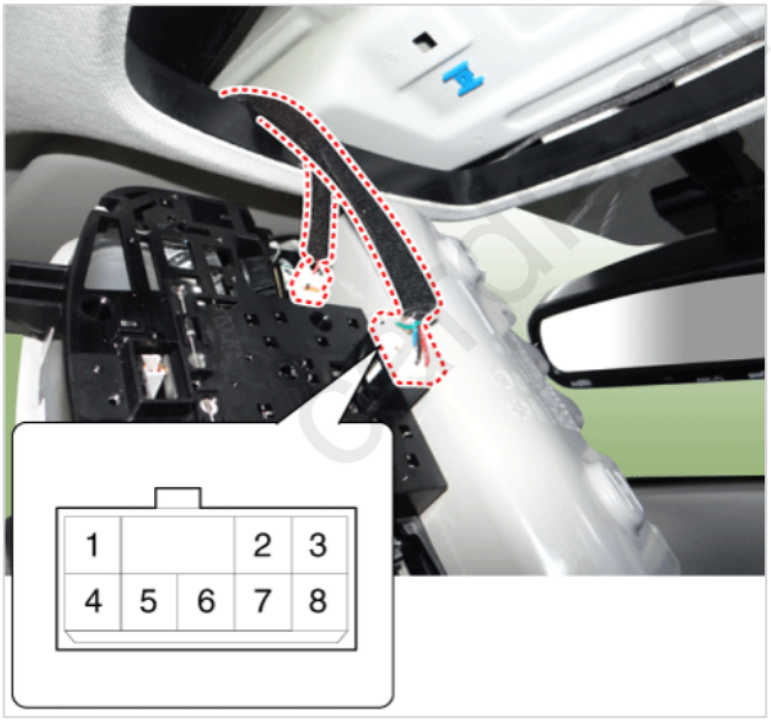
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Inspection

1. Disconnect the negative (-) battery terminal.
2. Open the sunglass case cover from the overhead console and remove the 2 screws holding the overhead console. Disconnect the switch connector and Map lamp connector, and then remove the overhead console lamp (A).



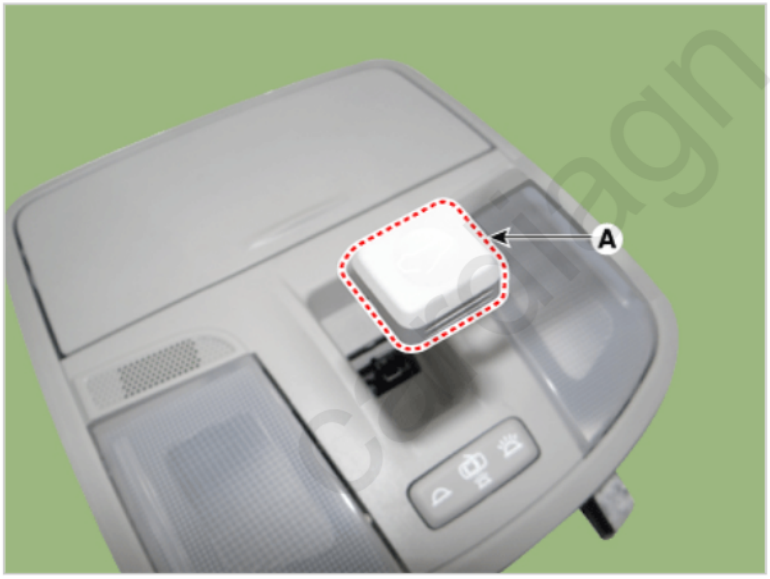
3. Check for continuity between the terminals. If the continuity is not shown as specified, replace the panoramaroof switch.



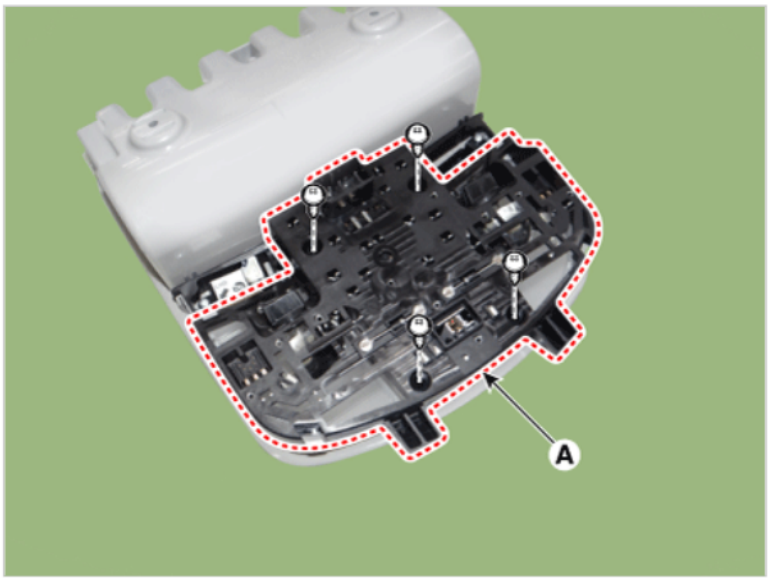
Terminal / Position	1	5	6	7
Maunal Open	○	○		
Auto Open	○	○	○	
Maunal Close	○		○	
Auto Close	○		○	○
Tilt Up	○			○
Tilt Down	○			○

Removal

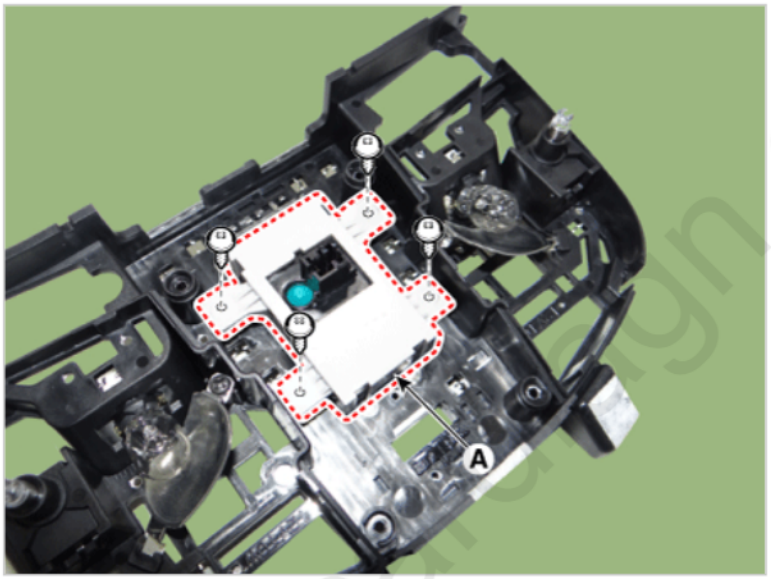
1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console lamp.
   (Refer to Lighting System - "Overhead Console Lamp")
3. Remove the sunroof switch knob (A).



4. Remove the sunroof bulb base (A) after loosening the mounting screws.



5. Remove the sunroof switch assembly (A) after loosening the mounting screws.

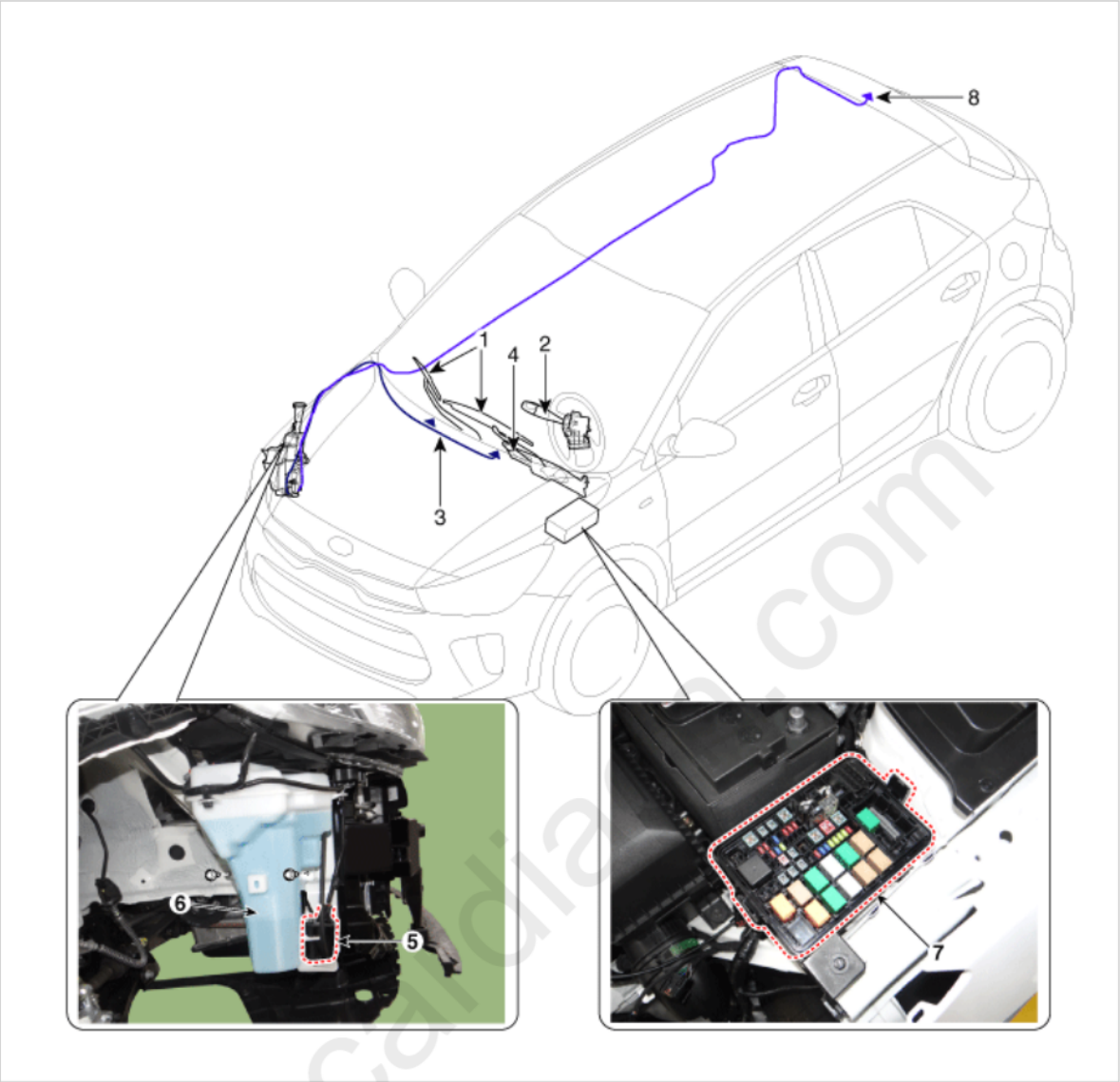


Installation

1. Install the sunroof switch assembly.
2. Install the sunroof bulb base.
3. Install the sunroof switch knob.
4. Install the overhead console lamp.
5. Connect the negative (-) battery terminal.

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Component Location



1. Windshield wiper arm & blade
2. Wiper & washer switch
3. Windshield washer hose & nozzle
4. Wiper motor & linkage assembly
5. Washer motor
6. Washer reservoir tank
7. Wiper/Washer relay
8. Rear washer hose & nozzle

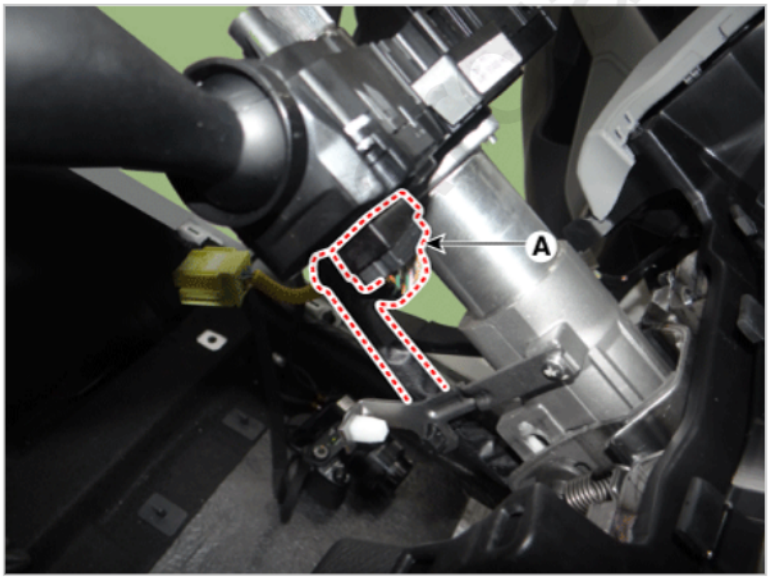
Removal

[BCM Type]

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



5. Disconnect the multifunction switch connector (A).

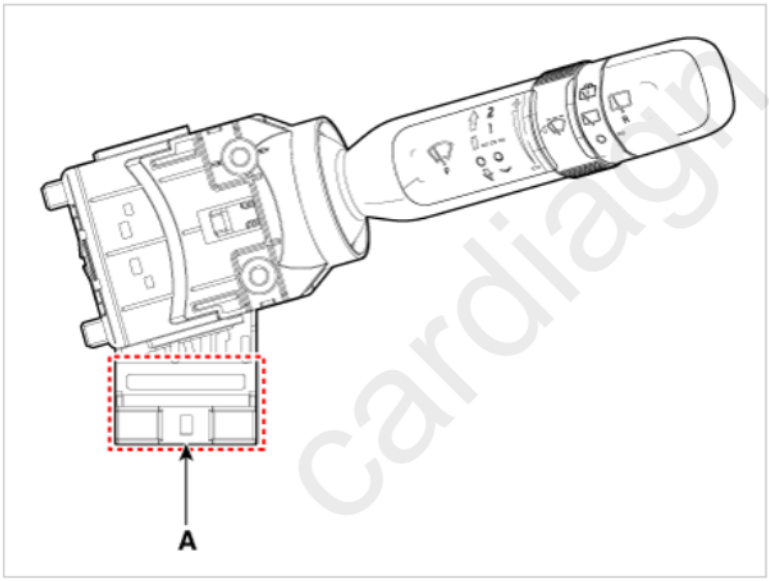


6. Remove the multifunction switch assembly (A) after loosening the mounting screws.



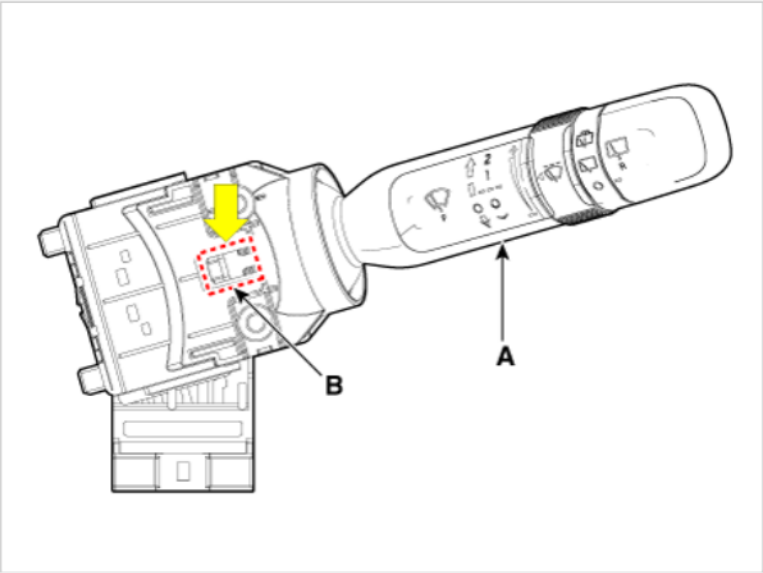
[Non-BCM Type]

1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds after loosening the screws. **(Refer to Body - "Steering Column Shroud Panal")**
3. Disconnect the wiper switch / washer switch connector (A).



4. Remove the wiper switch / washer switch (A) by pushing the lock pin (B).

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Installation

[BCM Type]

1. Install the multifunction switch.
2. Install the clock spring.
3. Install the steering column upper and lower shrouds.
4. Install the steering wheel.
5. Connect the negative (-) battery terminal.

[Non-BCM Type]

1. Install the wiper switch / washer switch.
2. Connect the wiper switch / washer switch connector.
3. Install the steering column upper and lower shrouds.
4. Connect the negative (-) battery terminal.

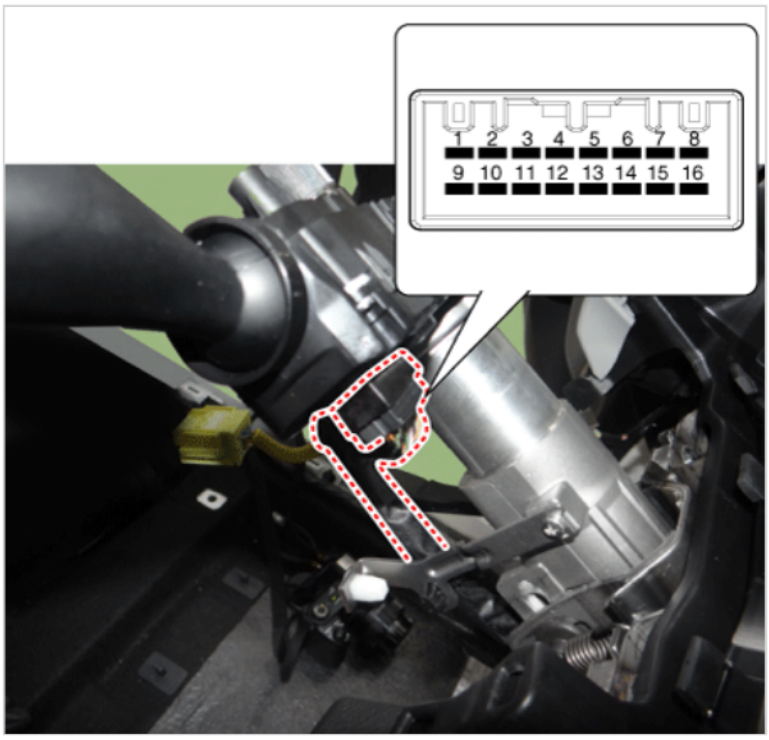
Inspection

Multifunction Switch Inspection

[BCM Type]

1. Check for continuity between the terminals in each switch position as shown below.

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Switch	Switch position	Switch terminal	Resistance (Ω, ±3.5%)
Front wiper switch	MIST	1-9	330
	OFF		∞
	Intermittent (AUTO)		800
	LOW		1,800
	HIGH		5,700
Rear wiper switch	OFF	9-16	∞
	LOW		910
	HIGH		2,910

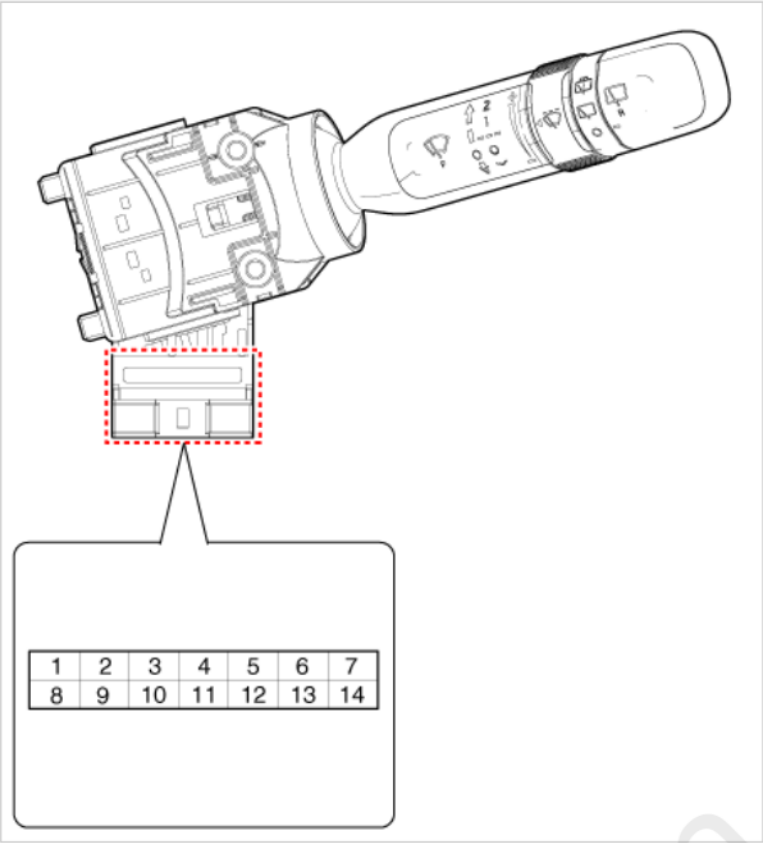
Inspection (With KDS)

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system(KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. Select the "Current Data" menu to search the current state of the input/output data.

[Non-BCM Type]

1. Check for continuity between the terminals in each switch position as shown below.

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Front Wiper & Washer Switch

Terminal / Position	14	2	4	5
Mist	○		○	
↕				
OFF			○	○
INT			○	○
↕				
Low	○		○	
High	○	○		

Front Washer Switch

Terminal / Position	3	6
OFF		
ON	○	○

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Inspection

Front Washer Motor

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

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

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

[Front & Rear washer]

No.	Description
1	Front windshield washer (+)
2	Ground
3	Rear washer (+)

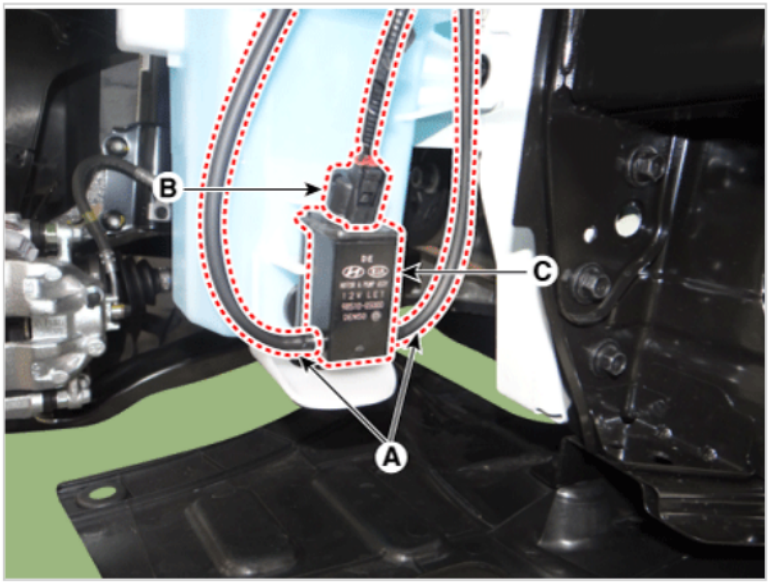


Removal

Front Washer Motor

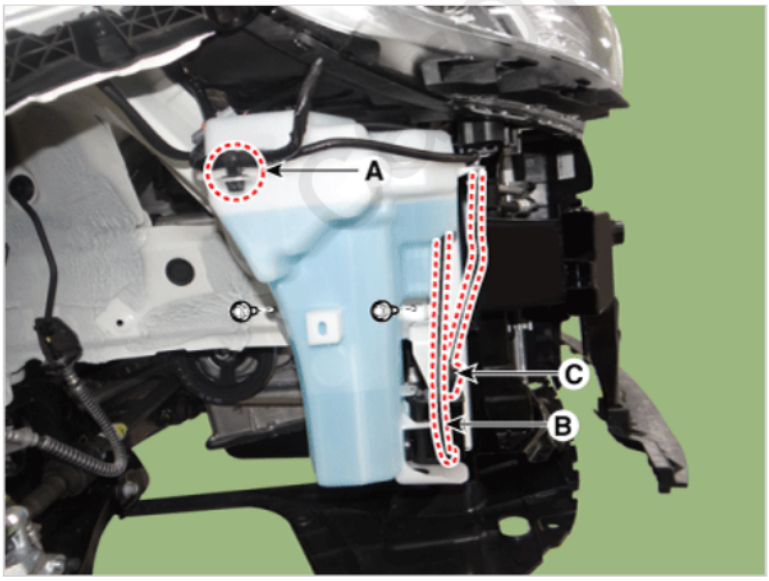
1. Disconnect the negative (-) battery terminal.
2. Remove the engine room under cover.
   G 1.6 GDI (Refer to Engine Mechanical System - "Engine Room Under Cover")
3. Remove the front wheel guard [RH].
   (Refer to Body - "Front Wheel Guard")
4. Drain the washer fluid to less than 650 cc.

5. Disconnect the washer hose (A) and washer motor connector (B).
6. Remove the front washer motor (C).



Reservoir Tank

1. Disconnect the negative (-) battery terminal.
2. Remove the engine room under cover.
   G 1.6 GDI (Refer to Engine Mechanical System - "Engine Room Under Cover")
3. Remove the front wheel guard [RH].
   (Refer to Body - "Front Wheel Guard")
4. Drain the washer fluid to less than 650 cc.
5. Remove the wiring mounting clip (A).
6. Disconnect the washer hoses (B) and connector (C).
7. Remove the reservoir tank (D) after loosening the bolts.



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Installation

Front Washer Motor

1. If necessary, clean the washer motor filter.

> **NOTICE**
> Before installing the pump motor, check the filter for any foreign material or contamination. If necessary, clean the filter in the pump motor.

2. Install the front washer motor.
3. Connect the front washer motor connector.
4. Install the front wheel guard [RH].
5. Install the engine room under cover.
6. Connect the negative (-) battery terminal.

Reservoir Tank

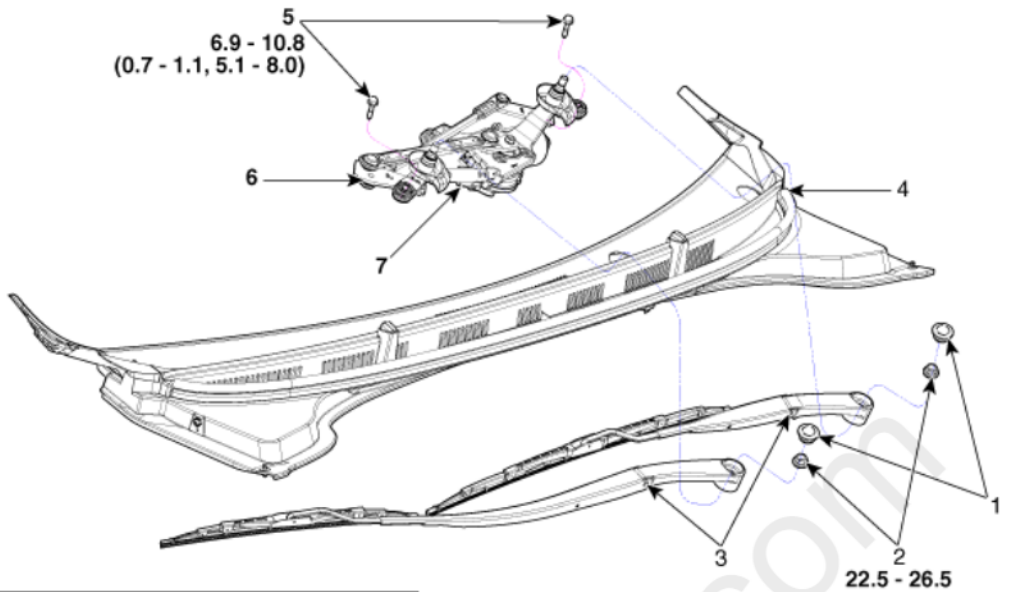
1. If necessary, clean the washer motor filter.

> **NOTICE**
> Before installing the pump motor, check the filter for any foreign material or contamination. If necessary, clean the filter in the pump motor.

2. Install the reservoir tank.
3. Install the washer motor hose and connectors.
4. Install the front wheel guard [RH].
5. Install the engine room under cover.
6. Connect the negative (-) battery terminal.

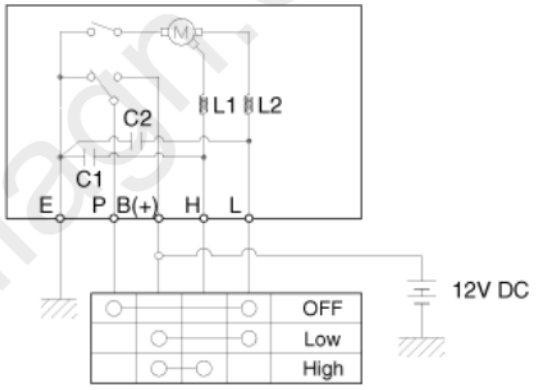
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Component Location



Connector


No.	Description
1	-
2	Battery (+)
3	Wiper motor (Parking)
4	Wiper motor (High)
5	Ground
6	Wiper motor (Low)



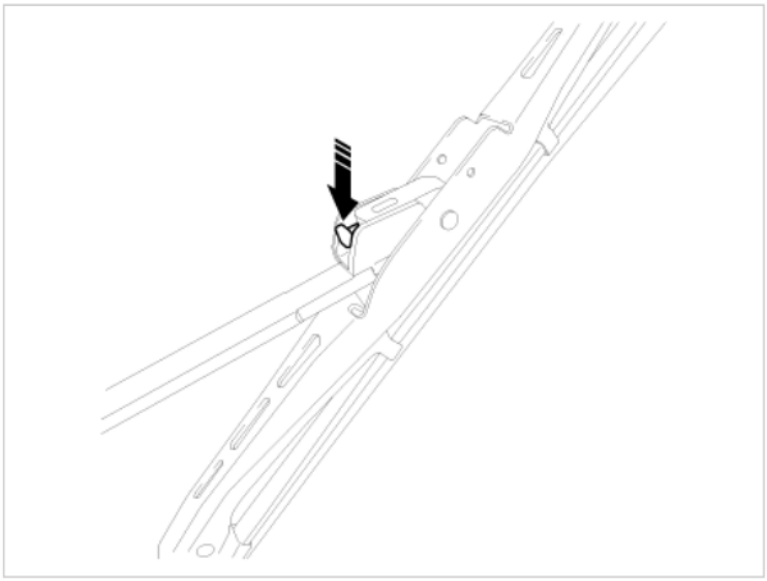
Torque : N·m (kgf·m, lb·ft)

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

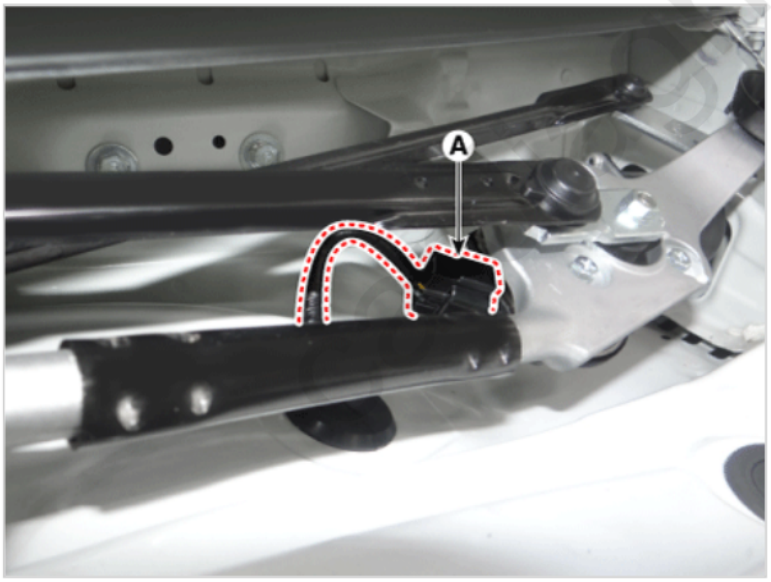
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Removal

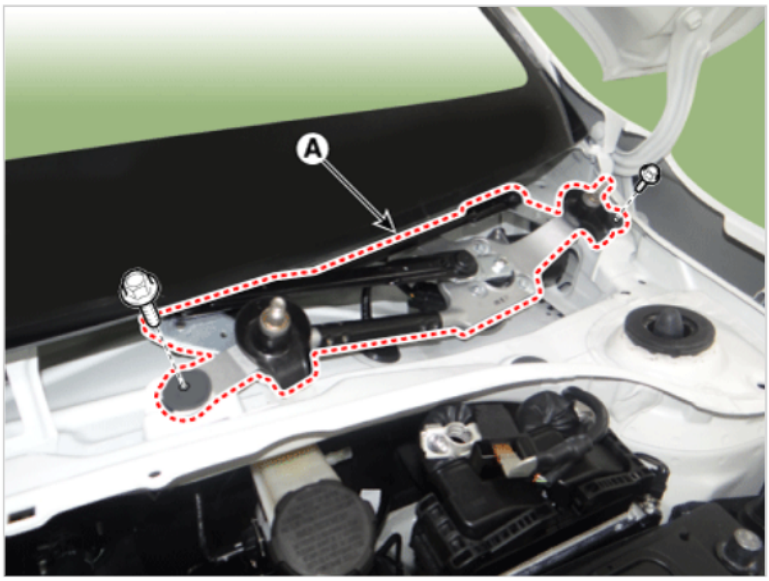
1. Disconnect the negative (-) battery terminal.
2. If necessary, release the wiper blade fixing clip by pulling it up and remove the wiper blade from the inside radius of wiper arm.



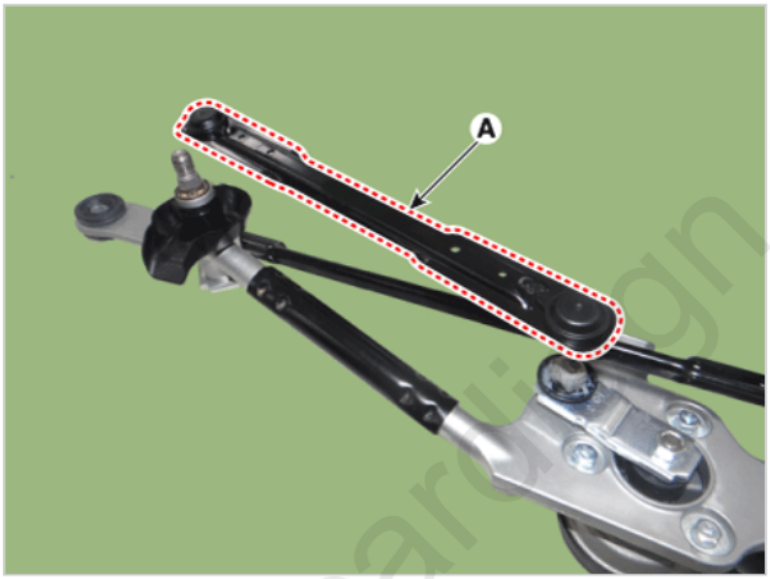
3. Remove the cowl top cover.
   (Refer to Body - "Cowl Top Cover")
4. Disconnect the wiper motor connector (A).



5. Remove the wiper motor & linkage assembly (A) after loosening the mounting bolts.



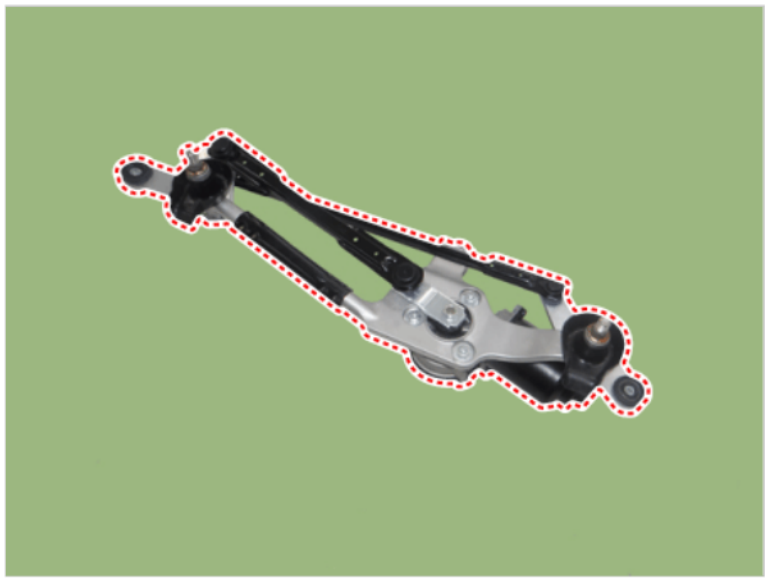
6. Hold the wiper motor crank arm and remove the upper linkage (A).



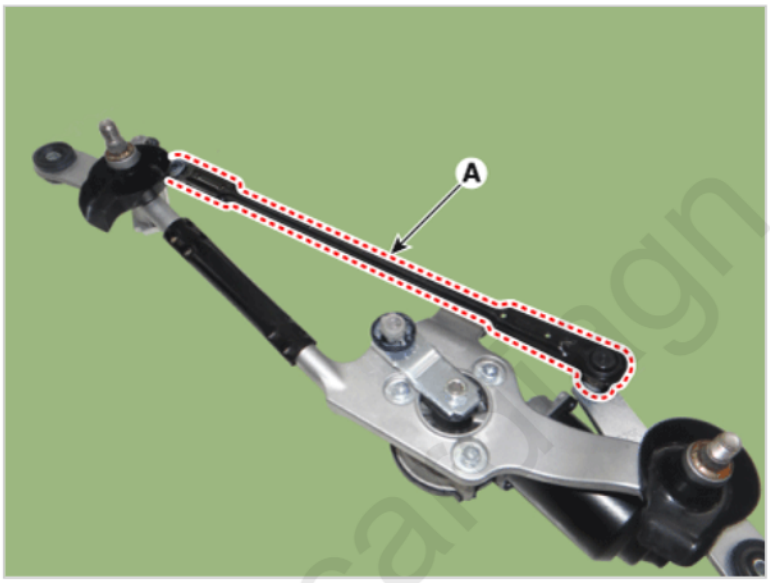
⚠ CAUTION

- Before removing the wiper motor and linkage assembly, make sure that the linkage is stopped at auto stop position.
- To correctly install the wiper motor crank arm, check that the linkage is aligned with the crank arm in straight line and check the angle of each linkage.
- Be careful not to bend the linkage.

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7. Remove the lower linkage (A) from the wiper motor crank arm.

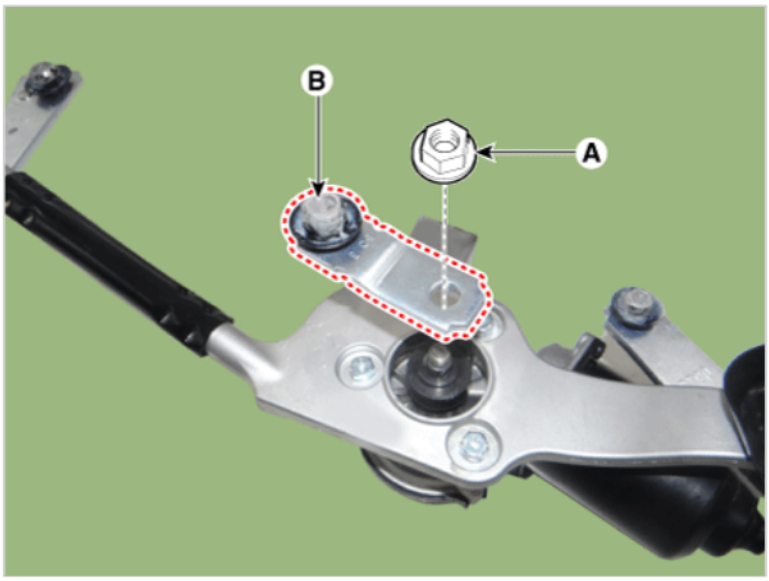


⚠ CAUTION

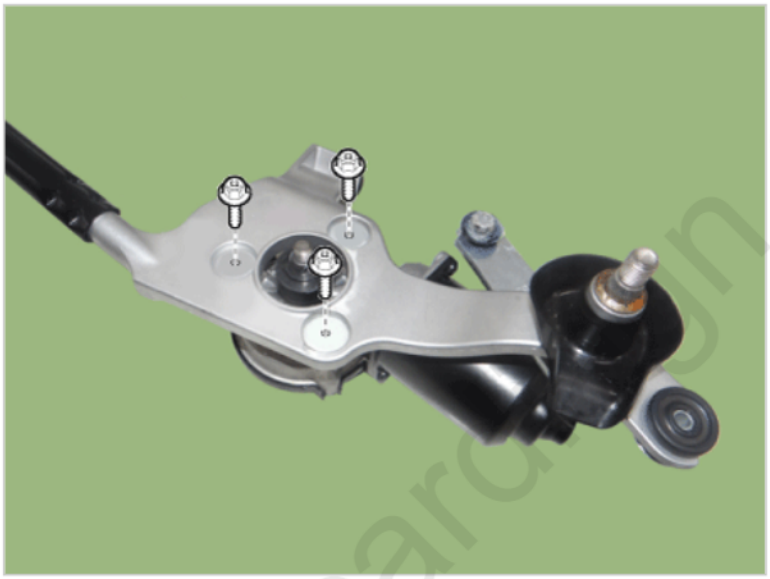
- To correctly install the wiper motor crank arm, check that the linkage is aligned with the crank arm in straight line and check the angle of each linkage.
- Be careful not to bend the linkage.

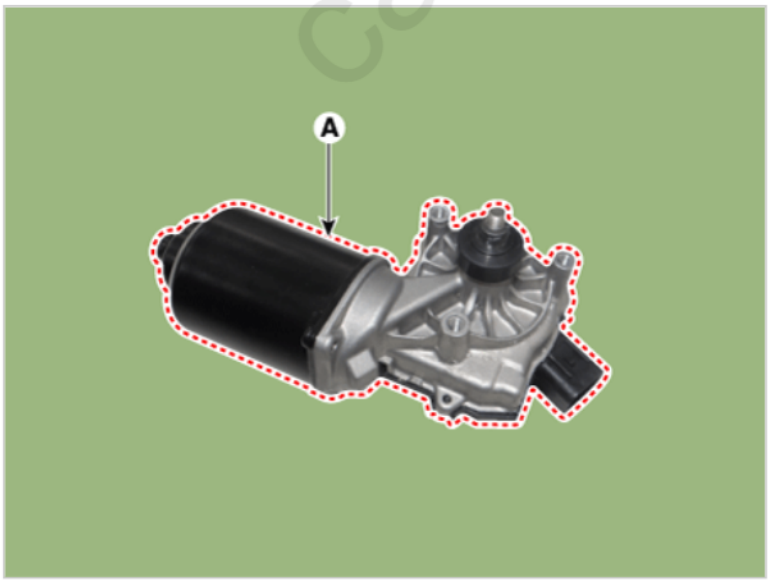
8. Remove the crank arm (B) after loosening a nut (A).

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9. Remove the wiper motor (A) after loosening the mounting bolts.





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Installation

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

Tightening torque :
14.7 - 19.6 N·m (1.5 - 2.0 kgf·m, 10.8 - 14.5 lb·ft)

> **⚠ CAUTION**
> To install the wiper motor crank arm, make sure that the linkage is aligned with the crank arm in straight line and set the angle of each linkages exactly.

3. Install the lower and upper linkage to the wiper motor crank arm.
4. Install the wiper motor and linkage assembly and then connect the wiper motor connector.

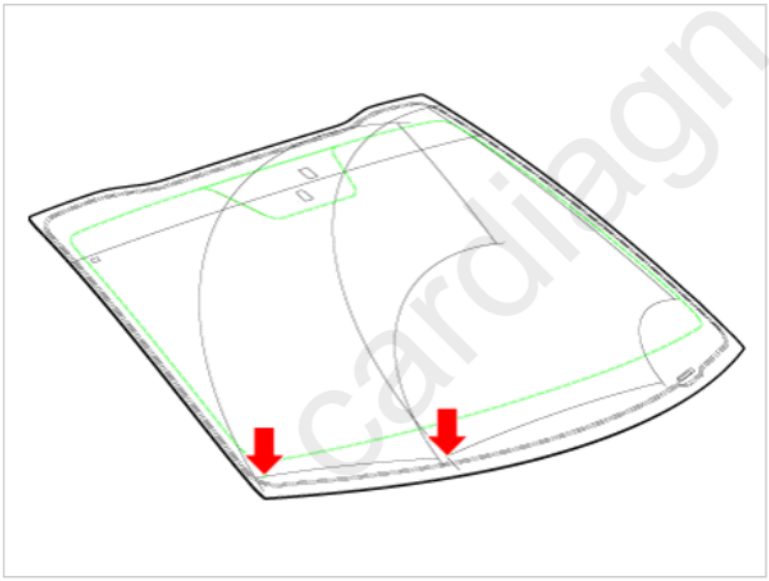
Tightening torque :
6.9 - 10.8 N·m (0.7 - 1.1 kgf·m, 5.1 - 8.0 lb·ft)

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

Tightening torque :
22.5 - 26.5 N·m (2.3 - 2.7 kgf·m, 16.6 - 19.5 lb·ft)

> **NOTICE**
> The windshield wiper motor must be cycled to make sure that it is in the park position.
> If necessary, adjust the wiper arm and blade.

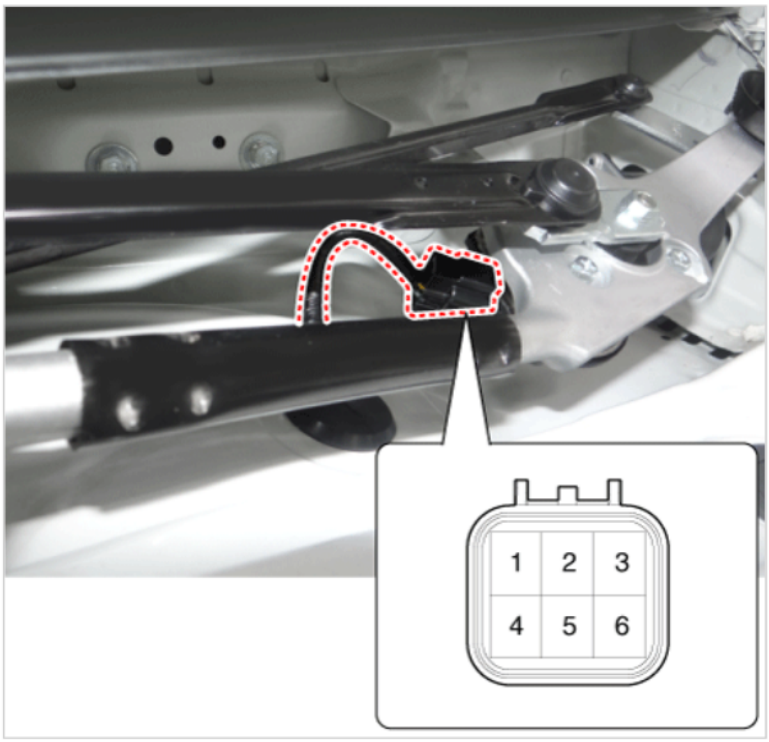
7. Install the wiper arm and blade to the specified position.
   Auto stop position (Blade)



Inspection

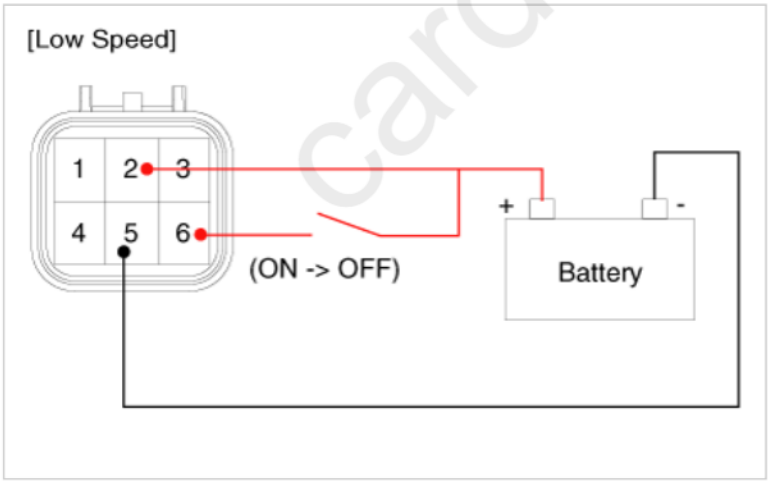
1. Remove the connector from the wiper motor.

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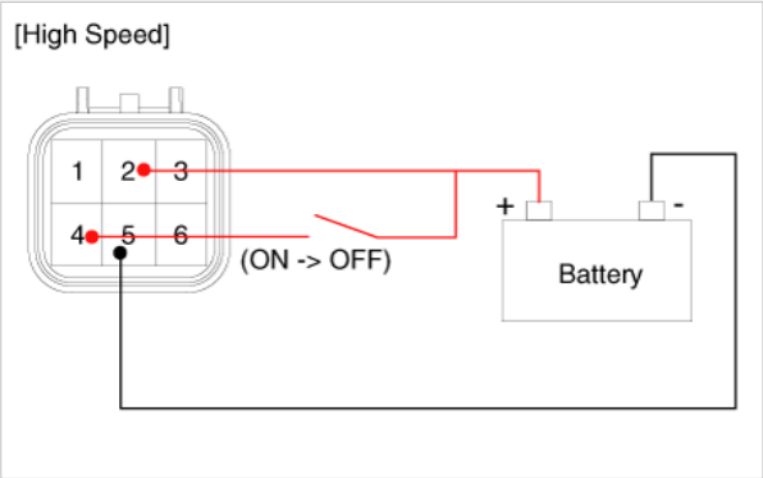


No.	Description
1	-
2	Battery (+)
3	Wiper motor (Parking)
4	Wiper motor (High)
5	Ground
6	Wiper motor (Low)

2. Attach the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 5.



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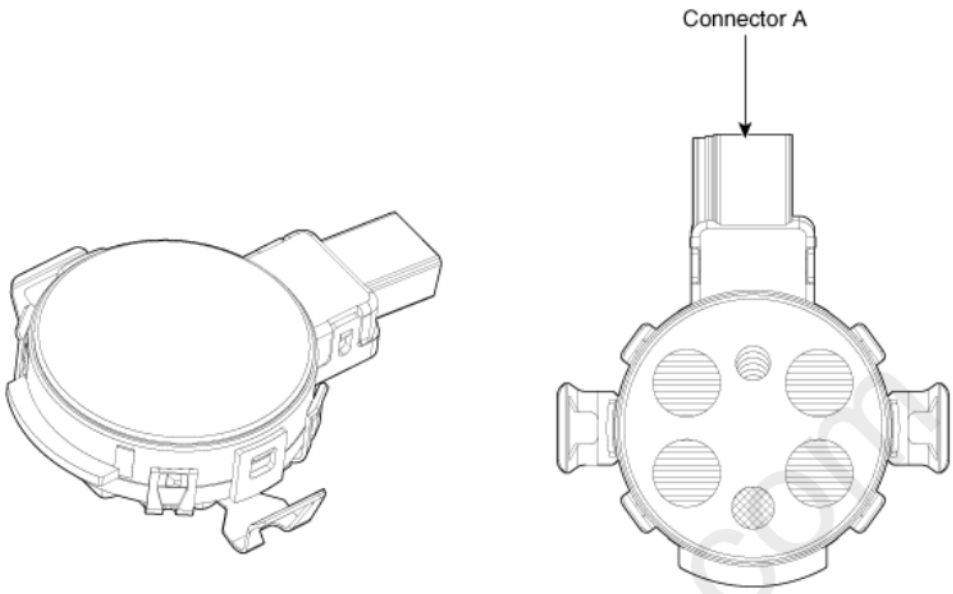


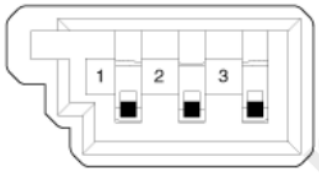
Inspection (With KDS)

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (KDS).
   The diagnostic system(KDS) provides the following information.
   (1) Self diagnosis : Checking failure and code number (DTC)
   (2) Current data : Checking the system input/output data state
   (3) Actuation test : Checking the system operation condition
   (4) Additional function : Controlling other features including system option setting and zero point adjustment
2. Select the "Car model" and the "Body Control Module (BCM)" to be checked in order to check the vehicle with the tester.
3. Select the "Current Data" menu to search the current state of the input/output data.

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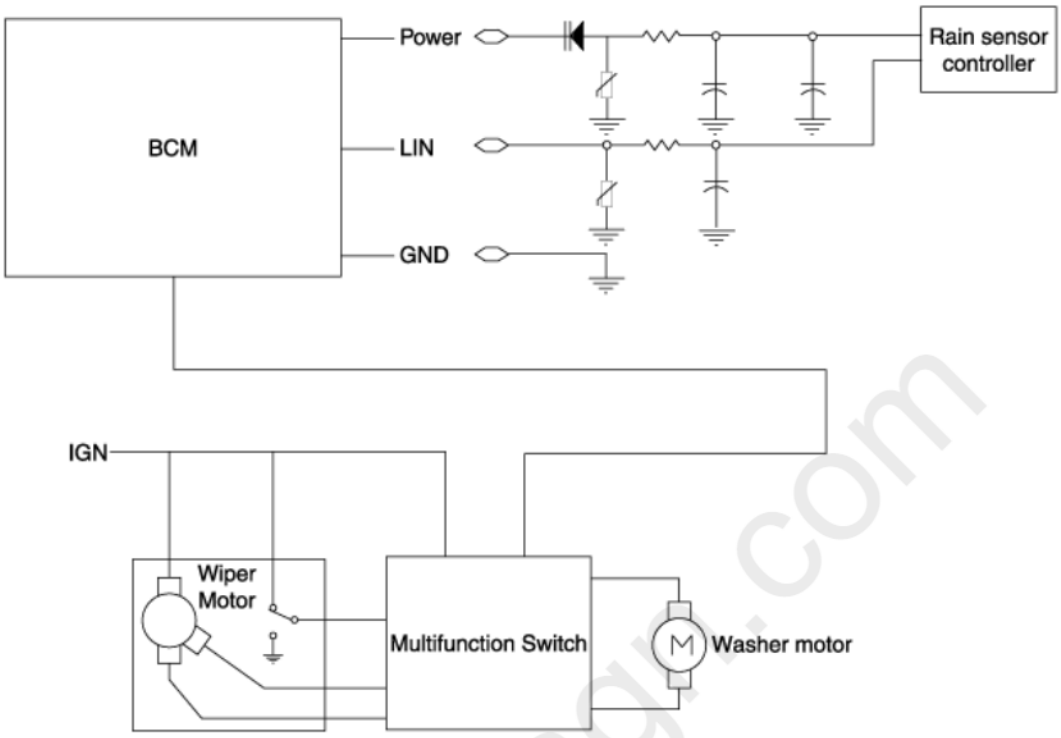
Components



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

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Circuit Diagram



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Description

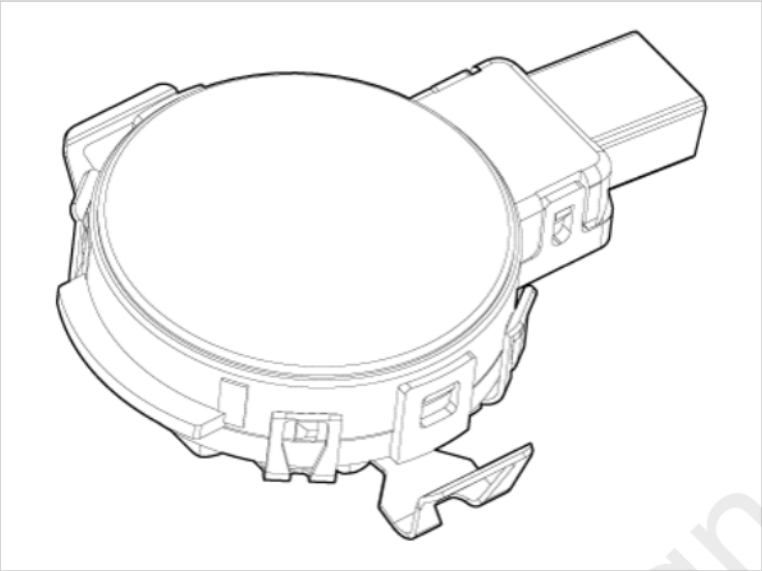
Integrated Rain Sensor

Integrated rain sensor (A) controls three systems: front wiper, auto-light, and central air conditioner.

1. Wiper Control System

   When the multifunction switch on the right receives "AUTO" switch signal, the integrated rain sensor detects the amount of rainfall. The sensor is installed inside the upper part of the front window for wiper motor control.

   This system automatically controls the operating duration and speed of the wipers depending on the measured amount of rainfall even if the driver does not operate the wiper switch.



Functions and Operating Principles

Basic Principle

1. Detecting the amount of rainfall

   The light (beam) emitted from light emitting diodes (LED) is totally reflected on the external surface of the windshield and comes back to the photo diodes. When there is water on the external surface of the windshield, the light is optically separated and reflected partially and the remaining brightness is measured by the photo diodes. Water remaining on the windshield results in the light being not totally reflected. The loss of brightness due to this indicates how much the glass surface is wet.

Interference

Rain sensor might malfunction due to the interferences listed below.

1. Dust on the measuring surface and other surfaces on the light path (surface of light emitting diodes and photo diodes, fiber optics, bracket, and glass surface of windshield joint area) weakens the received light.
2. Movement of windshield and bracket
3. Movement of bracket due to vibration
4. Damaged wiper blade

NOTICE

When the integrated rain sensor does not operate or malfunctions, the driver should operate the wiper switch manually.

Automatic Operation

1. Operational status of rain sensor

Operation Mode	Operation
Direct Mode	This is the basic operating status when the rain sensor detected dry windshield with wiper switch in"Auto". In this mode, the integrated rain sensor determines the operating mode of wipers depending on the rainfall and its duration.
Intermittent Mode	Integrated rain sensor activates the intermittent mode when wiper operation is done successively more than twice with a pause of 0.5 - 5 seconds.

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Low Speed	The wiper operates continuously in low speed
High Speed	The wiper operates continuously in high speed

Safety Function

1. When there is ice or foreign matter in the detecting area, integrated rain sensor cannot recognize the condition for operation correctly.

Detecting Special Conditions

1. Rain sensor

Special Condition	Operation based on special conditions detecting
Splash	When integrated rain sensor detects a high level of water (splash) in Direct or Intermittent mode, the system switches from Park to High speed. Then, wiping is done once in High speed and once more in Low speed. If the condition of rainfall does not change after wiping, it returns to the original condition (Direct or Intermittent).
Smearing	Smearing is a thin oil film that has dried fast and occurs when a small amount of rainfall is wiped by a dirty or worn-out wiper blade. Operational signal should not be issued when smearing occurs in Direct or Intermittent mode.
Dirt	When no change is detected after wiping, integrated rain sensor determines that the windshield is dirty. In this state, operational signal should not be issued. If the windshield becomes clean (for example, by washer fluid), the integrated rain sensor returns to the normal condition.
Washer fluid	Integrated rain sensor does not respond to the washer fluid during the Washer mode. In other words, wiping speed does not change even if the washer fluid is sprayed (automatic operation of the washer pump is not reflected in the functioning of integrated rain sensor).

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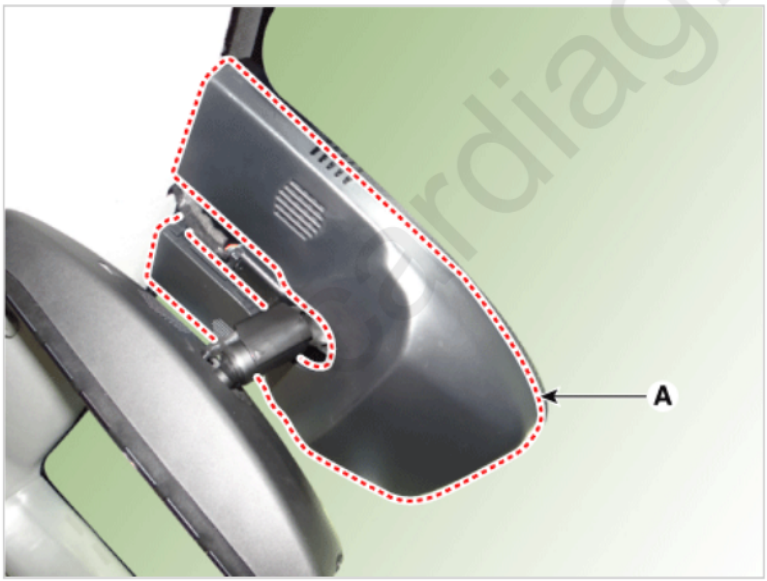
Removal

⚠ CAUTION

- The dust or foreign substance on the rain sensor has a bad effect upon the rain sensor capability, so protect the sensor surface with protection cover until installing the rain sensor to bracket for accurate funtion.
- As the coupling pad on the rain sensor surface has adhesive strength, it may stick to the windshield based on environmental condition.
- Carefully separate the rain sensor from the windshield as it may be damaged if separated by force.

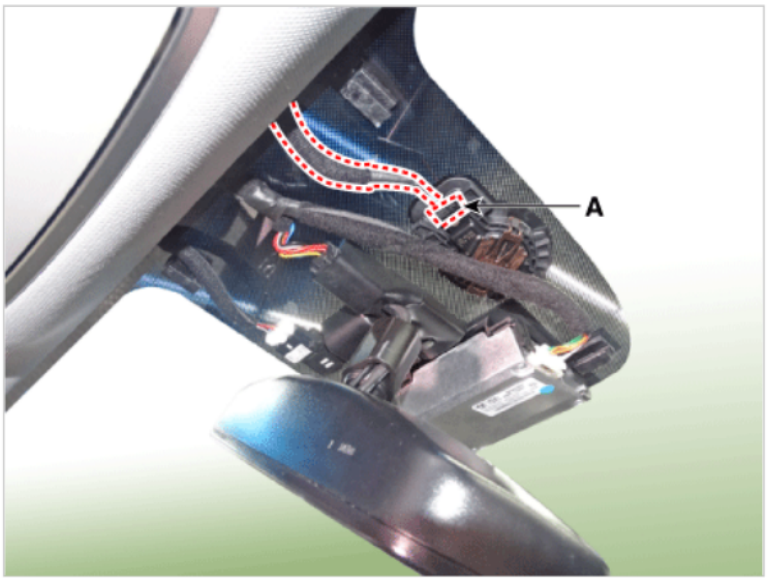
1. Reomve the mirror wiring cover (A).



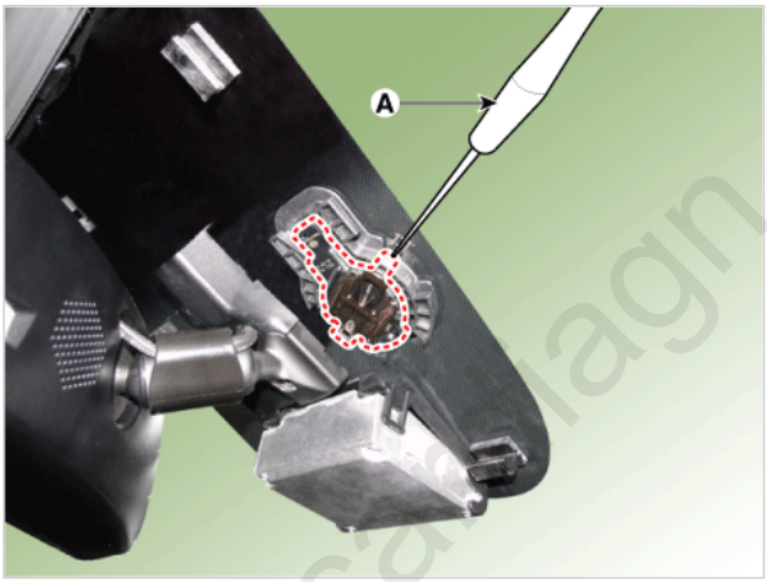


2. Disconnect the rain sensor connector (A).

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3. Be careful not to damage the cover latch by applying excessive force. To remove the latch, pull aside the latch using the cover hole with a small flat-blade screwdriver (A).





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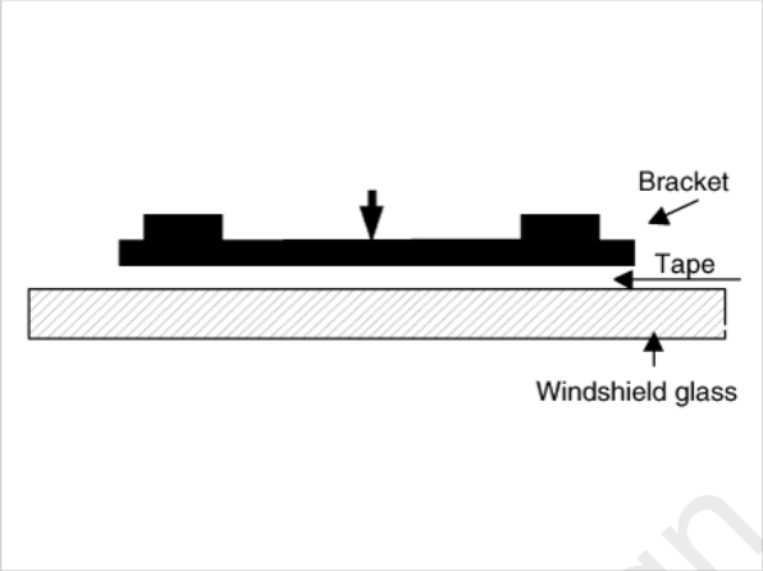
4. Rain sensor module is attached to the front windshield by glue. To replace the front windshield, remove the rain sensor module from the existing front windshield and install on the new front windshield.

Installation

NOTICE

- For windshield with reflection layer that reflects infrared rays in sensing field, install the rain sensor in the field with the reflection layer removed.
- Install the rain sensor after some time and avoid settling of dust after installation.

1. Install the rain sensor bracket to the windshield glass using the tape.



⚠ CAUTION

It is very important that the coupling pad is pressing against the windshield completely without bubbles for full adherence.

2. Connect the rain sensor connector, and then install the sensor cover.

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