

BE-2

Body Electrical System

General Information

General Troubleshooting Information
Before Troubleshooting

1. Check applicable fuses in the appropriate fuse/relay box.
2. Using the battery checker (MCR-570 KIT), check the battery for damage, state of charge, and clean and tight connections.

(Refer to the Engine Electrical System - Battery)

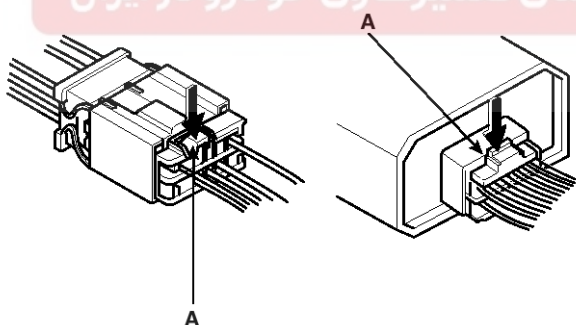
NOTICE

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

3. Check the alternator belt tension.

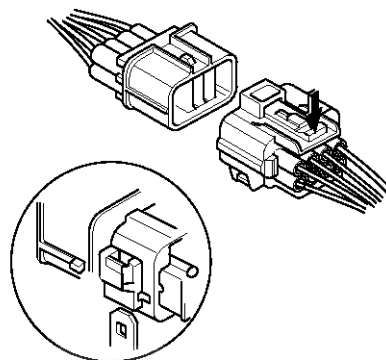
Handling Connectors

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).



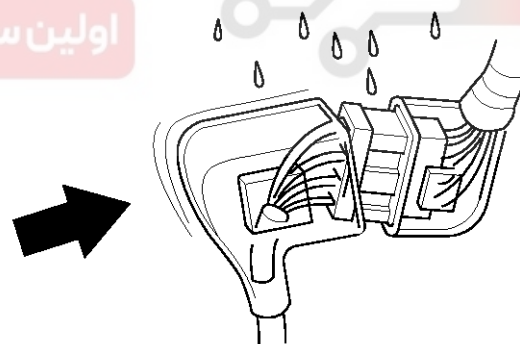
ETKD150A

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



ETKD150B

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

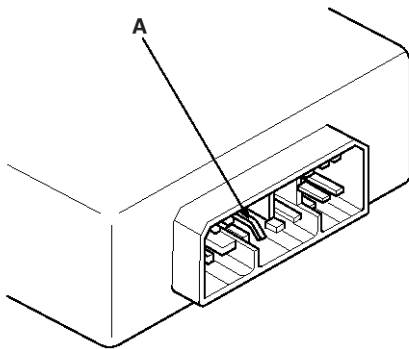


ETKD150C

General Information

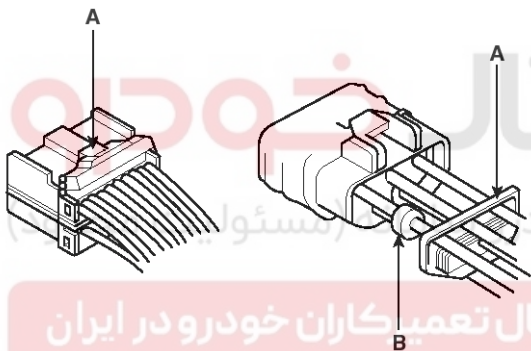
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8. Before connecting connectors, make sure the terminals (A) are in place and not bent.



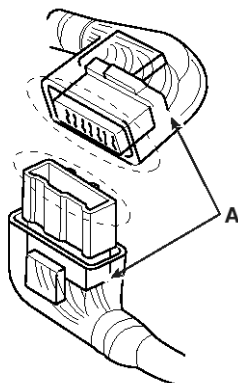
ETKD150D

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



ETKD150E

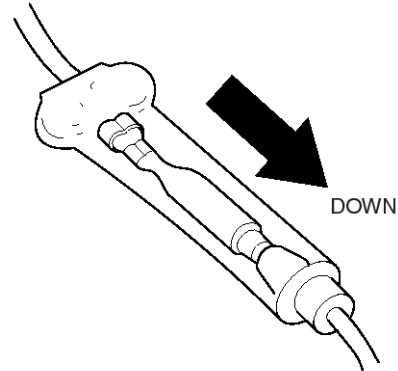
10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



ETKD150F

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

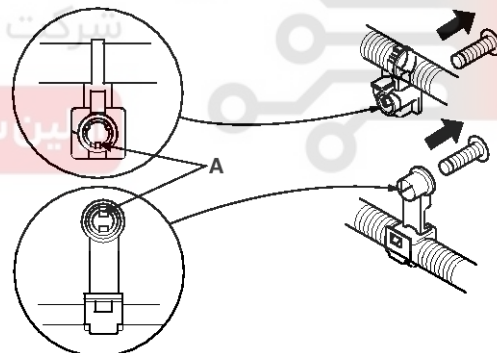
12. Position wires so that the open end of the cover faces down.



ETKD150G

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).

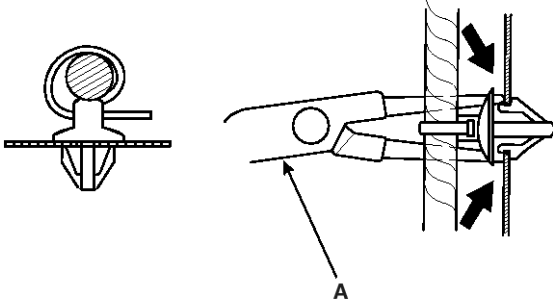


ETKD150H

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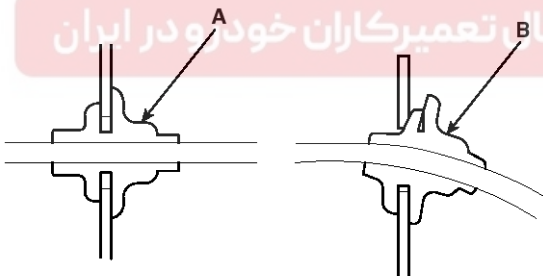
Body Electrical System

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



ETKD150I

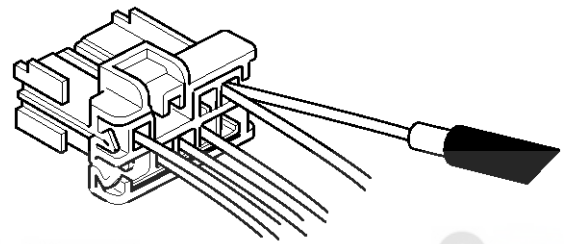
- After installing harness clips, make sure the harness doesn't interfere with any moving parts.
- Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
- Seat grommets in their grooves properly (A). Do not leave grommets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



ETKD150J

Testing And Repairs

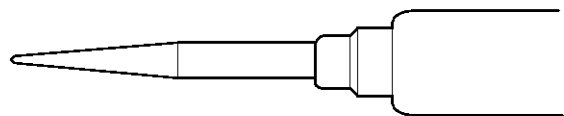
- Do not use wires or harnesses with broken insulation. Replace them or repair them by wrapping the break with electrical tape.
- After installing parts, make sure that no wires are pinched under them.
- When using electrical test equipment, follow the manufacturer's instructions and those described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



ETKD150K

- Use a probe with a tapered tip.

Refer to the user's guide in the wiring repair kit (Pub No. : TRK 015.)



ETKD150L

General Information

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Five-step Troubleshooting

1. Verify the complaint

Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.

2. Analyze the schematic

Look up the schematic for the problem circuit.

Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.

Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.

3. Isolate the problem by testing the circuit.

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

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

4. Fix the problem

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

5. Make sure the circuit works

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



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Body Electrical System

Audio

Specification

Audio

Item		Specification		
Model		RADIO/CD	RADIO/CD/MP3	RADIO/CDC/MP3
Power supply		DC 14.4V		
Rated output		Max 43W x 4		
Antenna		80PF 75Ω		
Tuning type		PLL SYNTHESIZED TUNING		
Frequency range / Channel space	FM	87.5 ~ 108.0 MHz/100 KHz (for General)		
	AM	531 ~ 1602 KHz/9 KHz (for General)		
	FM	87.5 ~ 108.0 MHz/50 KHz (for Europe)		
	MW	522 ~ 1620 KHz/9 KHz (for Europe)		
	LW	153 ~ 279 KHz/1 KHz (for Europe)		

Speaker

Item		Specification	
Input Power (W)	Front	Max. 50	
	Rear	Max. 50	
	Tweeter	Max. 40	
Speaker Impedance (Ω)	Front	4.0 ± 0.6	
	Rear	4.0 ± 0.6	
	Tweeter	3.4 ± 0.5	
Speaker Number		6	

External Amplifier

Item	Specification
Power Supply	DC 14.4V
Output Power (W)	180W (45×4CH)
LOAD Impedance (Ω)	2

Audio

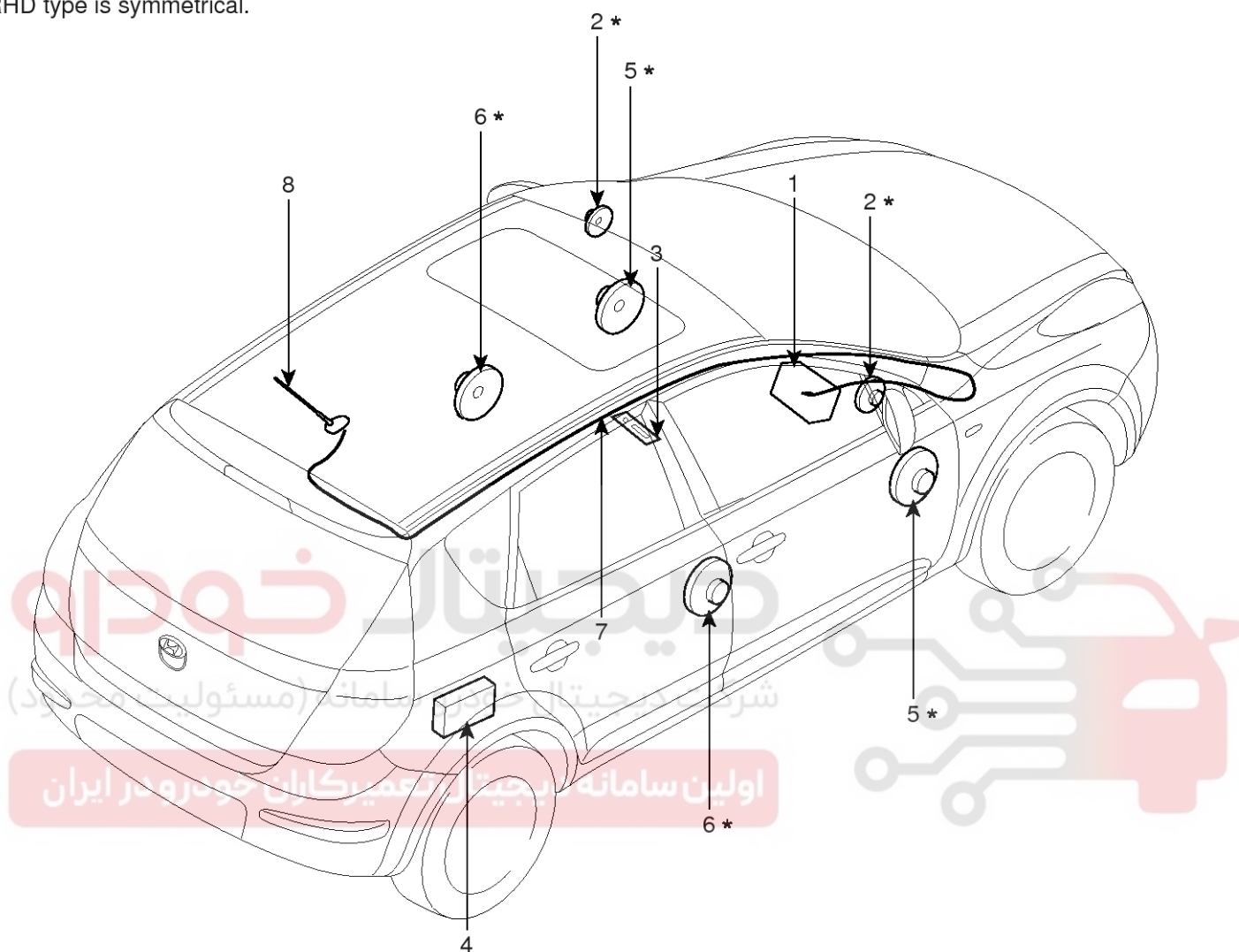
BE-7

Component Location

The parts with asterisk (*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. Audio unit
2. Tweeter speaker
3. AUX Jack / USB Port
4. External amplifier

5. Front door speaker
6. Rear door speaker
7. Antenna feeder cable
8. Roof antenna (Radio)

SFDBE8001L

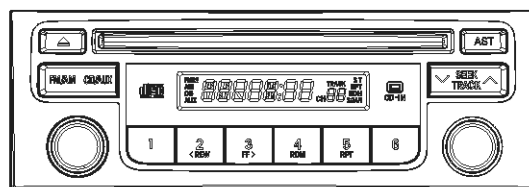
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Body Electrical System

Audio Unit

Components

[RADIO/CD]

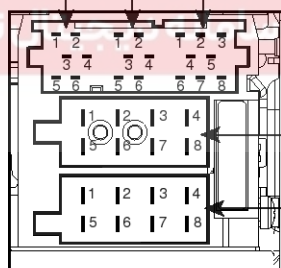


Connector A

Antenna

 Connector B
 Connector C

C1 C2 C3



Connector B

Connector A

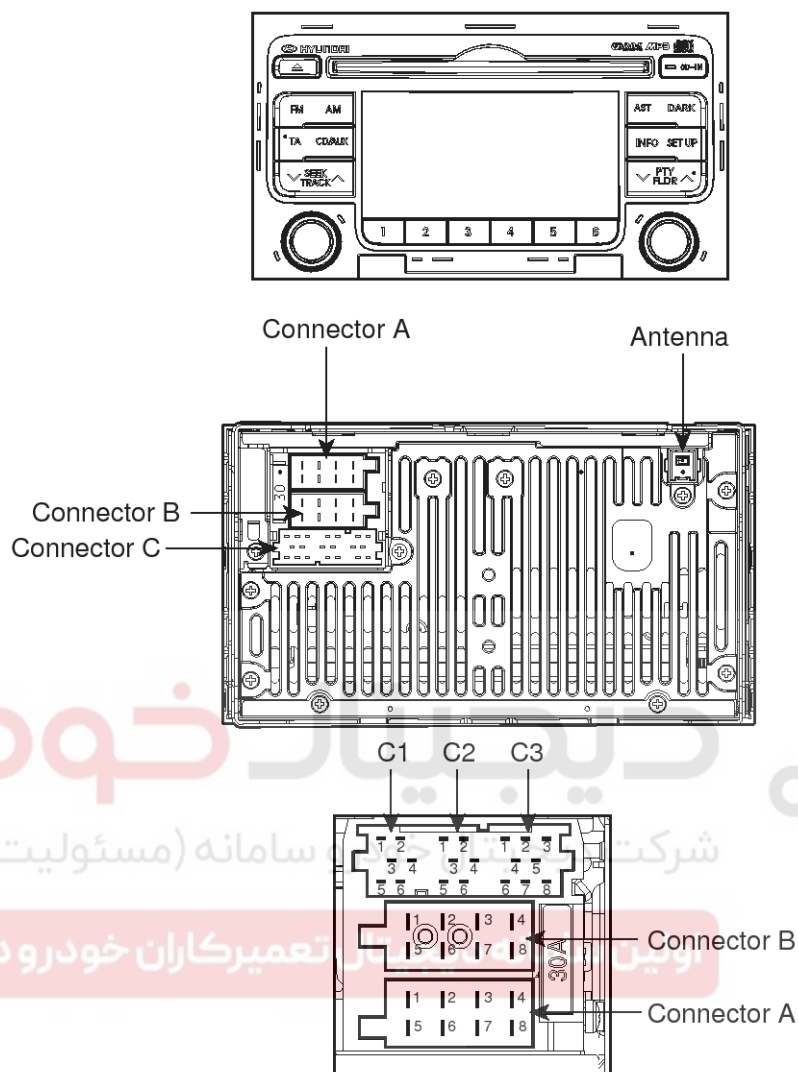
NO	CONNECTOR A	CONNECTOR B	CONNECTOR C1	CONNECTOR C2	CONNECTOR C3
1	SPEED	SPEAKER RR+	-	AUX R IN	-
2	ILL (+)	SPEAKER FR+	-	AUX L IN	-
3	REMOTE ANTENNA	SPEAKER FL+	-	AUX REF	-
4	BACK UP	SPEAKER RL+	-	AUX DETECT	-
5	-	SPEAKER RR-	TEL MUTE	REMOTE CONTL+	-
6	ACC	SPEAKER FR-	-	REMOTE GND	-
7	ILL (-)	SPEAKER FL-			AUX VDD
8	POWER GND	SPEAKER RL-			-

SFDBE8002L

Audio

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[RADIO/CD/MP3]



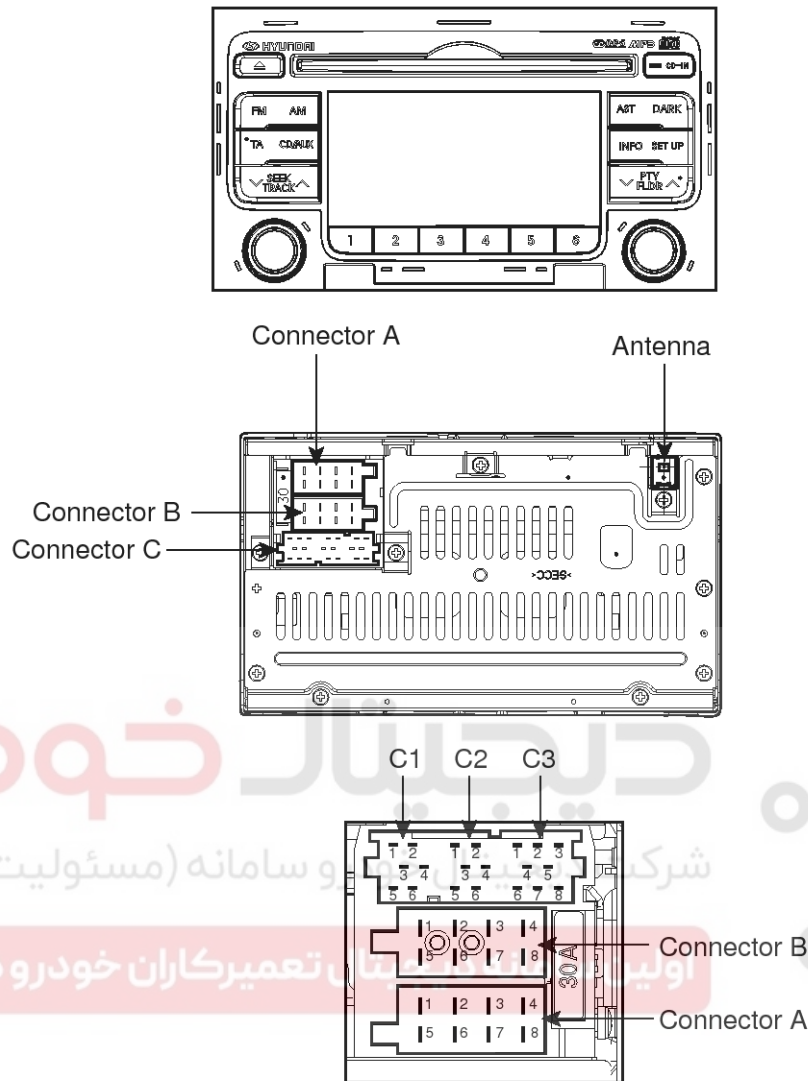
NO	CONNECTOR A	CONNECTOR B	CONNECTOR C1	CONNECTOR C2	CONNECTOR C3
1	SPEED	SPEAKER RR+	-	AUX R IN	-
2	ILL (+)	SPEAKER FR+	-	AUX L IN	USB D-/IPOD TX
3	REMOTE ANTENNA	SPEAKER FL+	-	AUX REF	-
4	BATT +	SPEAKER RL+	-	AUX DETECT	USB D+/IPOD RX
5	TEMP	SPEAKER RR-	TEL MUTE	REMOTE CONTL +	IPOD/USB GND
6	ACC	SPEAKER FR-	-	REMOTE GND	-
7	ILL (-)	SPEAKER FL-			USB/IPOD VDO
8	POWER GND	SPEAKER RL-			-

SFDBE8003L

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Body Electrical System

[RADIO/CDC/MP3]



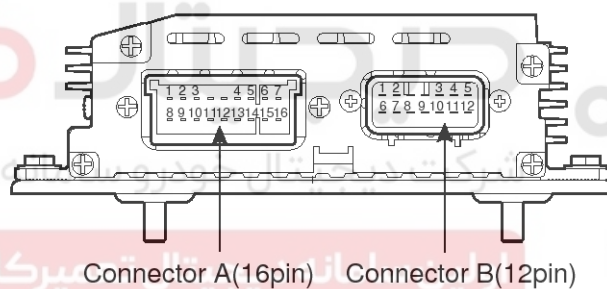
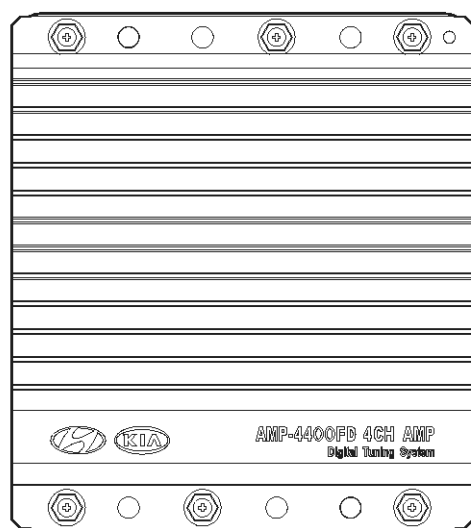
NO	CONNECTOR A	CONNECTOR B	CONNECTOR C1	CONNECTOR C2	CONNECTOR C3
1	SPEED	SPEAKER RR+	-	AUX R IN	E AMP MUTE
2	ILL (+)	SPEAKER FR+	-	AUX L IN	USB D-/IPOD TX
3	REMOTE ANTENNA	SPEAKER FL+	-	AUX REF	-
4	BATT +	SPEAKER RL+	-	AUX DETECT	USB D+/IPOD RX
5	TEMP	SPEAKER RR-	TEL MUTE	REMOTE CONTRL +	IPOD/USB GND
6	ACC	SPEAKER FR-	-	REMOTE GND	REMOTE E AMP
7	ILL (-)	SPEAKER FL-			USB/IPOD VDO
8	POWER GND	SPEAKER RL-			-

SFDBE8004L

Audio

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[EXTERNAL AMPLIFIER]



NO	CONNECTOR A	CONNECTOR B
1	FRONT LEFT OUT +	MUTE
2	-	REMOTE
3	REAR LEFT OUT+	REAR RIGHT IN+
4	B+	FRONT LEFT IN+
5	REAR RIGHT OT+	FRONT RIGHT IN+
6	-	-
7	FRONT RIGHT OUT+	S_GND
8	FRONT LEFT OUT -	REAR LEFT IN-
9	-	REAR LEFT IN+
10	REAR LEFT OUT-	REAR RIGHT IN-
11	GND	FRONT LEFT IN-
12	GND	FRONT RIGHT IN-
13	B+	
14	REAR RIGHT OUT+	
15	-	
16	FRONT RIGHT OUT-	

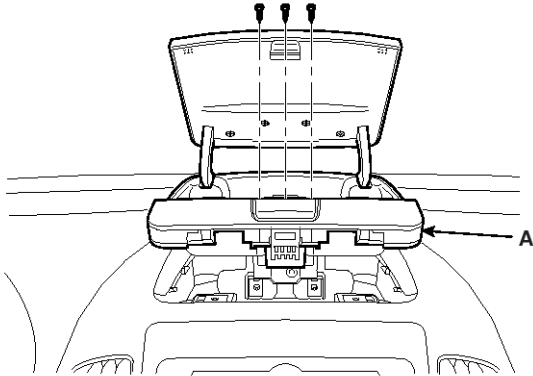
SFDBE8005L

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Body Electrical System

Removal

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

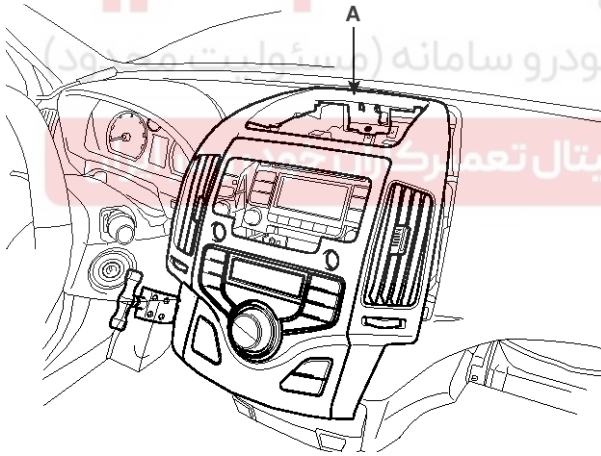


SFDBE8006L

3. Remove the crash pad center facia panel (A).

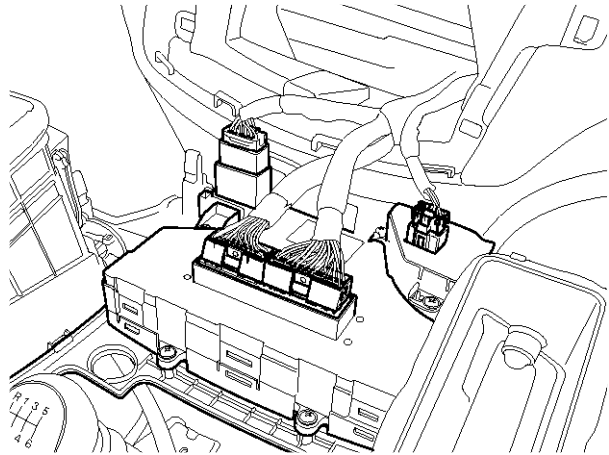
NOTICE

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



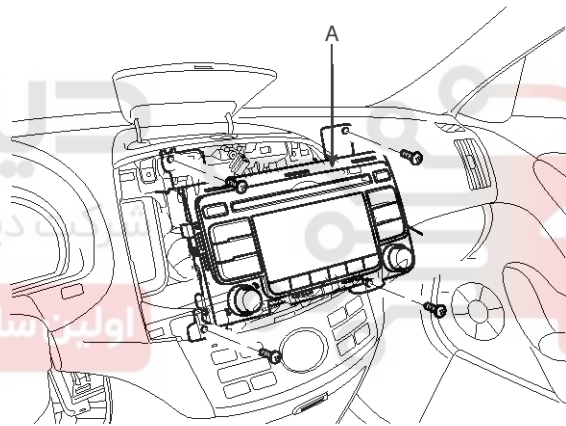
SFDBE8007L

4. Disconnect the connectors from the crash pad center facia panel.



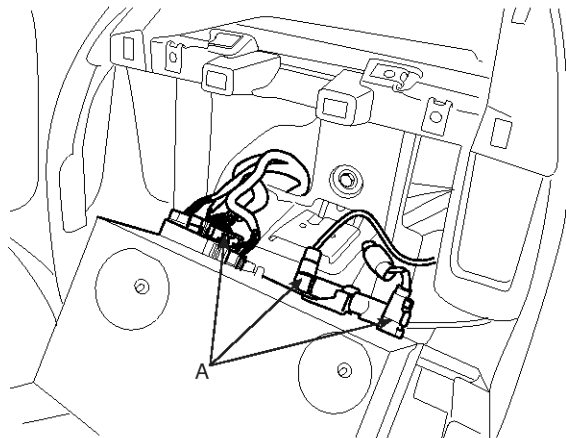
SFDBE8008L

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



SFDBE8009L

6. Disconnect the audio connectors and cable (A).



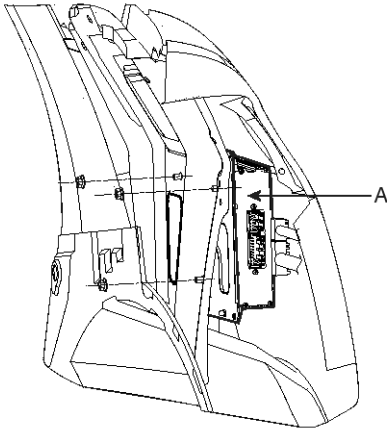
SFDBE8010L

Audio

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External Amplifier

1. Remove the right side trunk trim and disconnecting the connector
(Refer to the BD group - "Interior trim")
2. Remove the external amplifier (A) after loosening the 3 nuts.



SHDBE6029D

Installation

1. Connect the audio unit connectors and cable.
2. Install the audio unit.
3. Install the crash pad center facia panel.
4. Install the upper tray.
5. Check the audio system.

NOTICE

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

External Amplifier

1. Install the external amplifier and connect the external amplifier connector.
2. Install the right side trunk trim.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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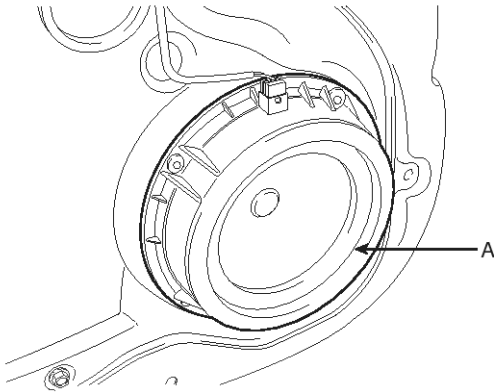
Body Electrical System

Speakers

Removal

Front Speaker

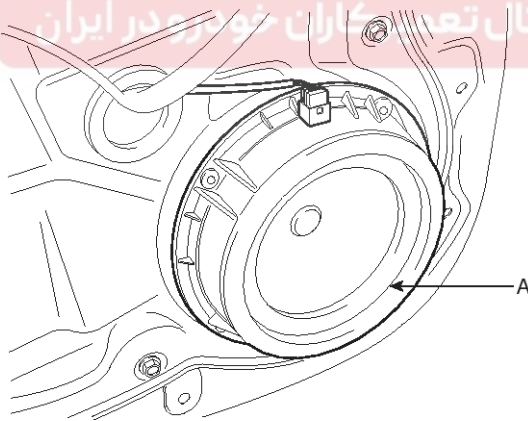
1. Remove the front door trim.
(Refer to the BD group - "Front door")
2. Remove the front speaker (A) after removing 4 rivets.



SFDBE8011L

Rear Speaker

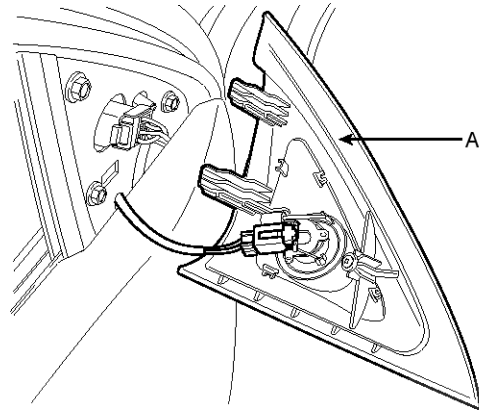
1. Remove the rear door trim.
(Refer to the BD group - "Rear door")
2. Remove the rear speaker (A) after removing 4 rivets.



SFDBE8012L

Tweeter Speaker

1. Remove the front door delta cover.
(Refer to the BD group - "Front door")
2. Remove the tweeter speaker (A) after disconnecting the connector.



SEDBE7022L

Installation

Front Speaker

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

Rear Speaker

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

Tweeter Speaker

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

Audio

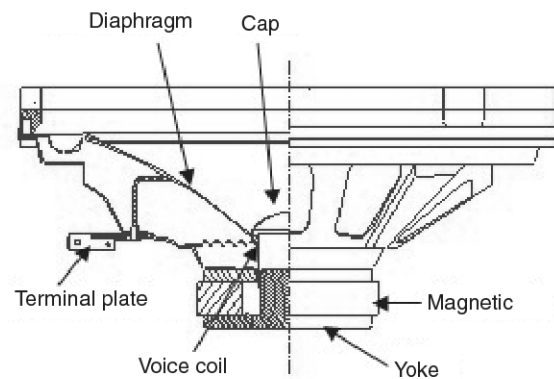
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Inspection

1. Troubleshooting for Speaker

1) Basic inspection of speaker

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



SNFBE8015N

2) Case Troubleshooting

No.	Case	Inspection/Remedy
1	Trembling sound	<ol style="list-style-type: none"> Before replacing the speaker, inspect that the mounting screw is installed normally. After re-installing the speaker, verify that no trembling sound is heard. When hearing a trembling sound again, replace the speaker with new one.
2	Noise	<ol style="list-style-type: none"> Check if the wiring connector is connected normally. If not, reconnect the wiring connector. In case of radio static, check if there is a noise from cassette. When a noise is heard on turning radio, cassette and CD on, replace the speaker with new one. <p>NOTICE In case there is only radio static, this causes from poor radio reception. Thus the speaker needs no repair and replacement.</p>
3	Poor working	<p>Inspection of the wiring connection between the battery and the speaker</p> <ol style="list-style-type: none"> Before replacing the speaker, inspect the wiring connection between the battery and the speaker is normal. Check the supplying power to the speaker and the resistance, then inspect the sound quality. ■ Specified impedance : 2 ~ 4Ω <p>SED BE7028L</p> <ol style="list-style-type: none"> If the speaker works poorly, replace it with new one.

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Body Electrical System

⚠ CAUTION

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

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Audio

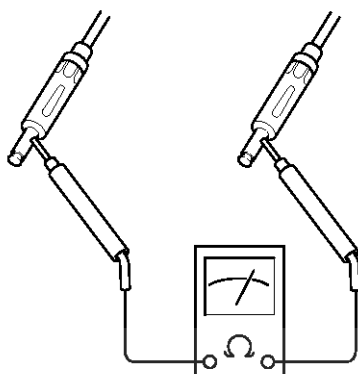
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Antenna

Inspection

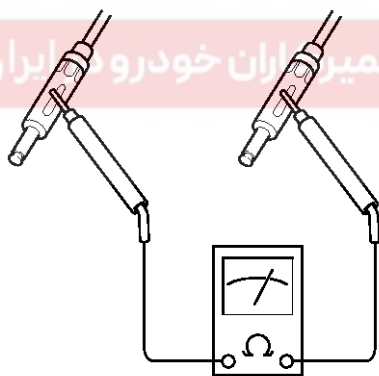
Antenna Cable

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



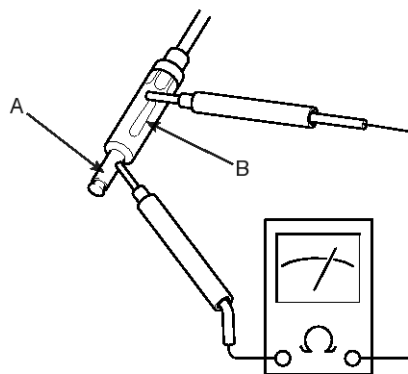
ATJF023C

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



ATJF023D

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



ATJF023F

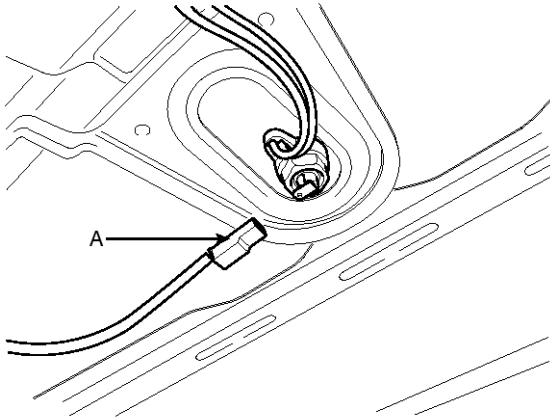
6. If there is continuity, replace the antenna cable.

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Body Electrical System

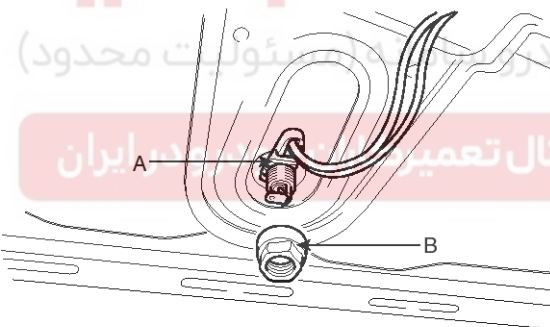
Replacement

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



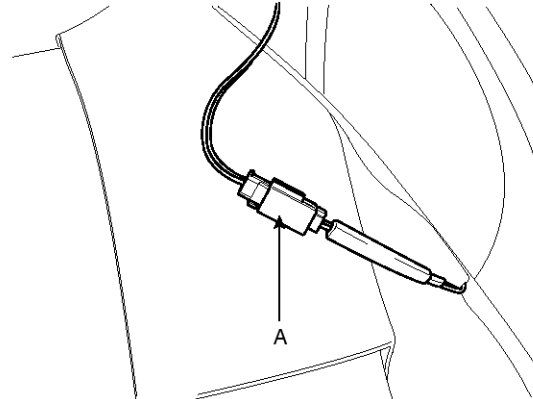
SEDBE7026L

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



SEDBE7024L

4. Disconnect the roof antenna feeder cable connector (A) on the quarter inner panel.



SEDBE7025L

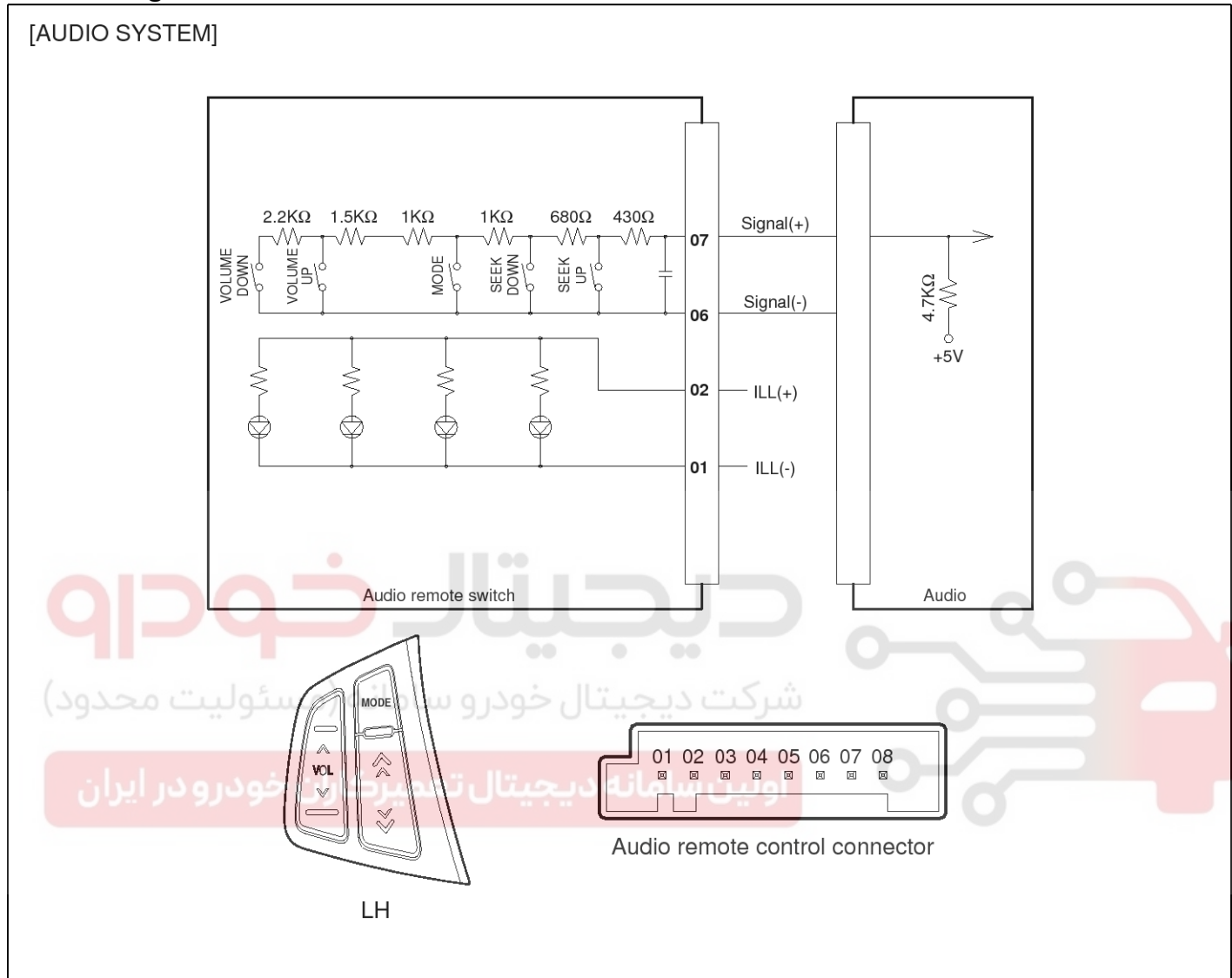
5. Installation is the reverse of removal.

Audio

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Audio Remote control

Circuit Diagram

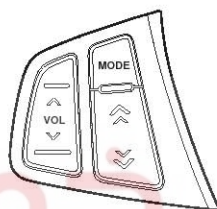
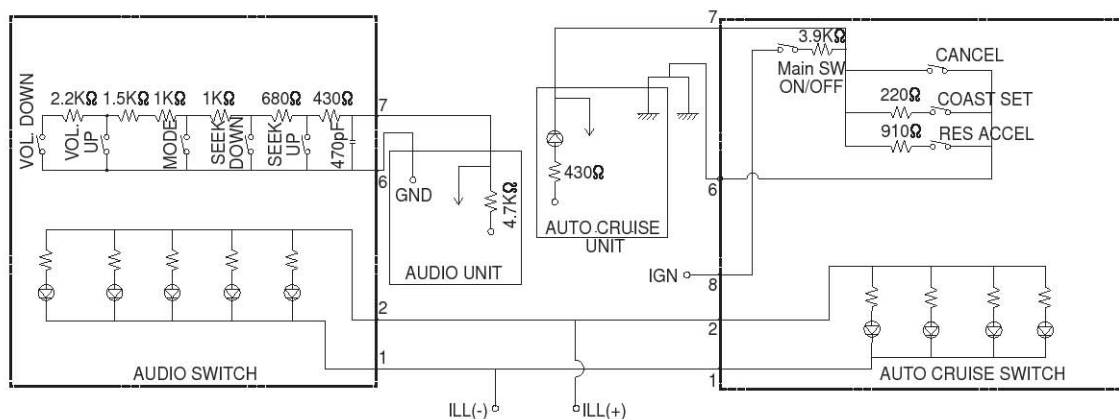


SFDBE8045L

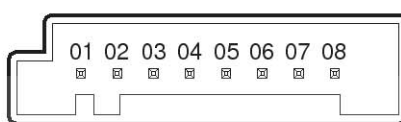
BE-20

Body Electrical System

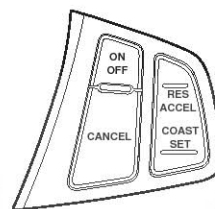
[AUDIO SYSTEM + AUTO CRUISE]



LH



Audio remote control connector



RH

SFDBE8013L

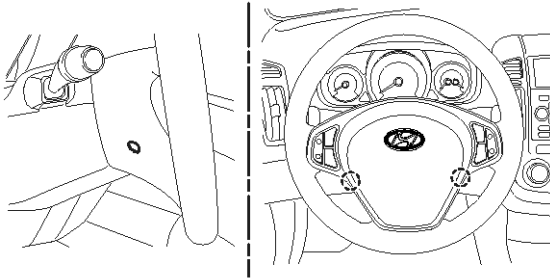
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Audio

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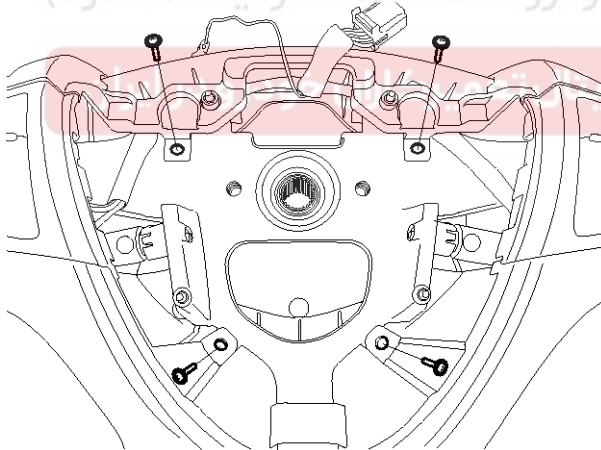
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the driver airbag module.
(Refer to the RT group - "Airbag module and clock spring")



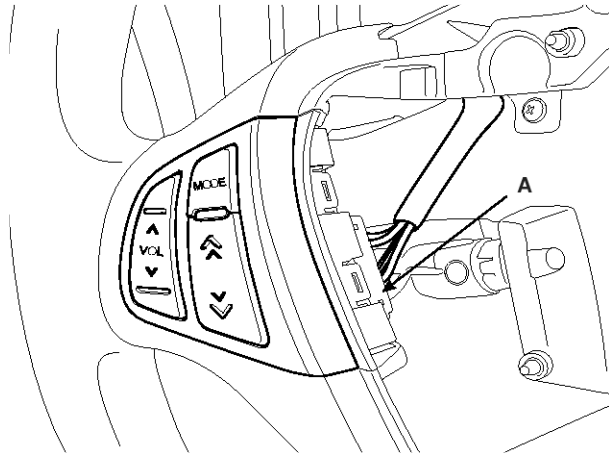
SFDBE8427L

3. Remove the steering wheel after loosening the nut and disconnecting the connector.
(Refer to the ST group - "Steering column and shaft")
4. Remove the steering wheel lower cover after loosening the 4 screws.



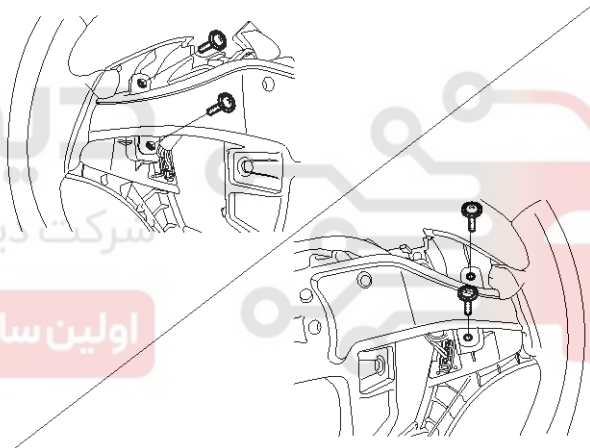
SFDBE8016L

5. Disconnect the audio remote control switch connector (A).



SFDBE8015L

6. Loosen the screws (4EA) on the opposite side of the steering wheel.



SFDBE8017L

7. Remove the audio remote control switch.

Installation

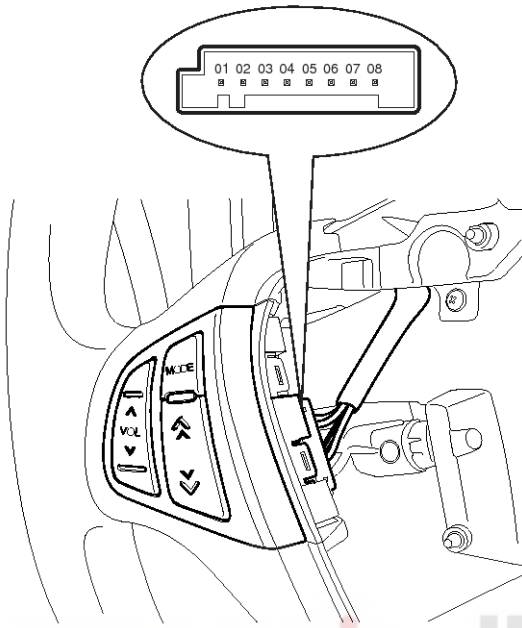
1. Install the audio remote control switch on the steering wheel.
2. Connect the audio remote control switch connector.
3. Install the steering wheel.
4. Install the driver airbag module.

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Body Electrical System

Inspection

1. Check for resistance between No.6 and No.7 terminals in each switch position.



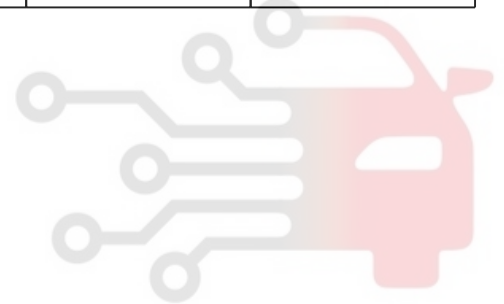
SFD8E8014L

[Audio System]

Switch	Connector terminal	Resistance ($\pm 1\%$)
VOLUME DOWN	6-7	6.81 k Ω
VOLUME UP	6-7	4.61 k Ω
MODE	6-7	2.11 k Ω
SEEK DOWN	6-7	1.11 k Ω
SEEK UP	6-7	430 Ω

[Audio system + Audio Cruise]

Switch	Connector terminal	Resistance ($\pm 1\%$)
VOLUME DOWN	6-7	6.81 k Ω
VOLUME UP	6-7	4.61 k Ω
MODE	6-7	2.11 k Ω
SEEK DOWN	6-7	1.11 k Ω
SEEK UP	6-7	430 Ω



دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

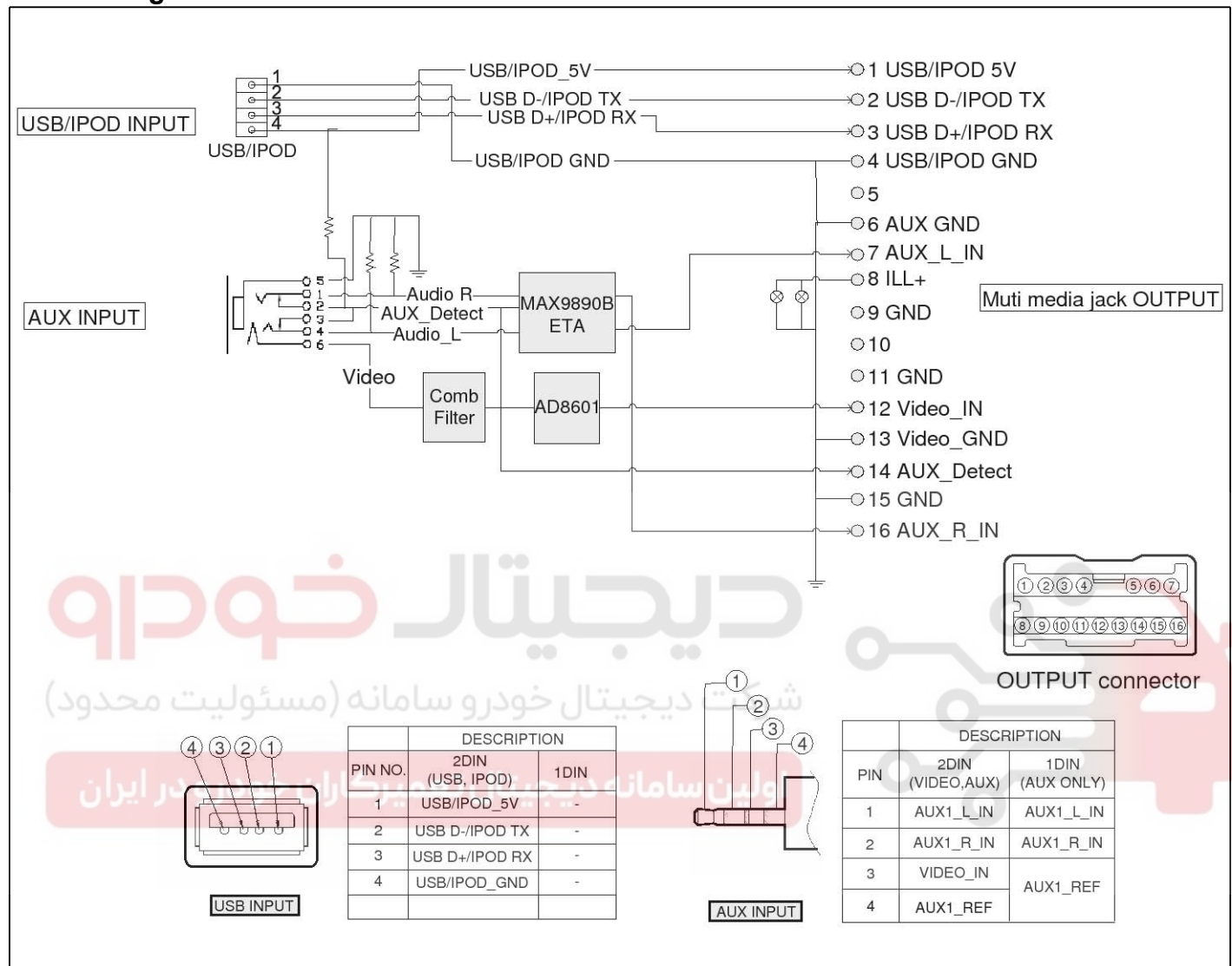
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Audio

BE-23

AUX(Auxiliary) jack

Circuit Diagram



SFDBE8328L

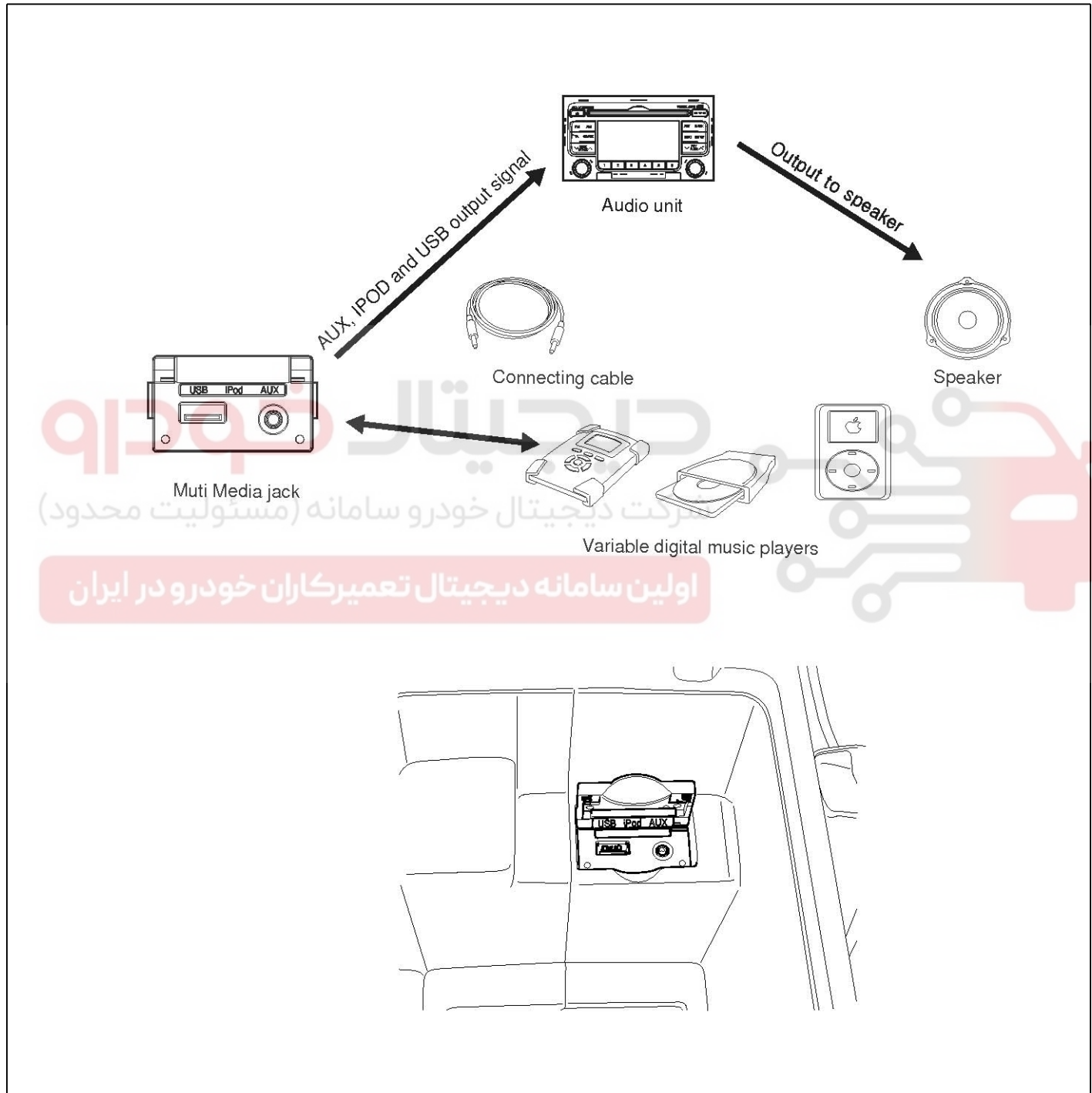
BE-24

Body Electrical System

Description

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

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



SFD8018L

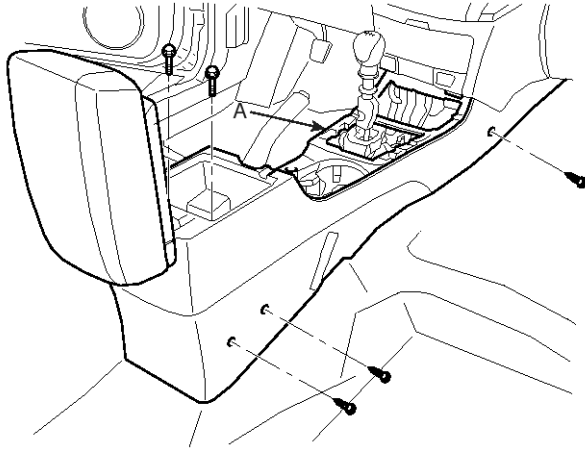
Audio

BE-25

Removal

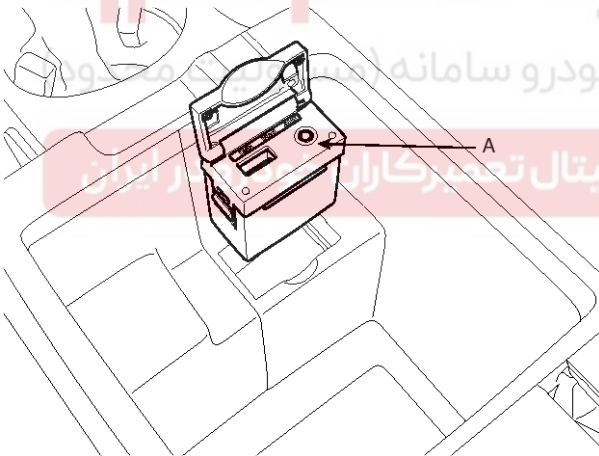
Multi Media Jack

1. Remove the floor console (A).
(Refer to the BD Group - "Console")



SFDBE8159L

2. Disconnect the jack assembly connector from the floor console.
3. Remove the Multi Media Jack (A) from the floor console.



SFDBE8181L

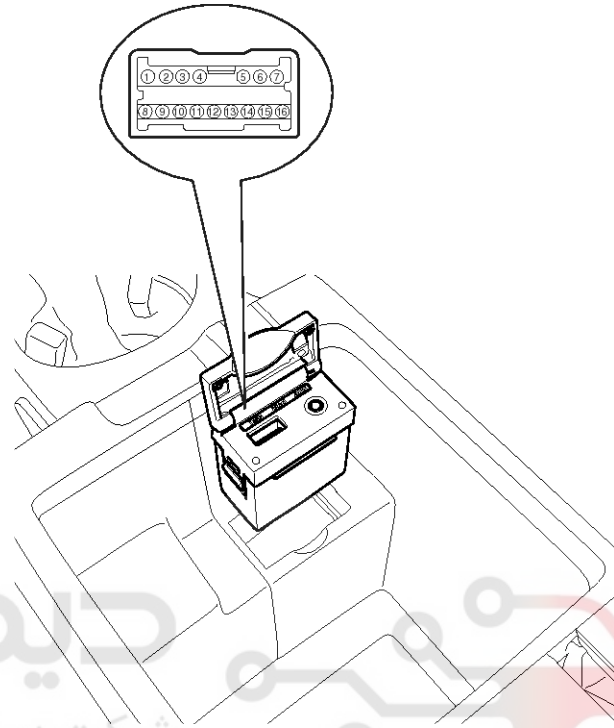
Installation

Multi Media Jack

1. Install the Multi Media Jack.
2. Connect the Multi Media Jack connector.
3. Install the under cover to the floor console.

Inspection

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



SFDBE8182L

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

Standard value : 5V

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

Standard value : 5V

BE-26

Body Electrical System

Troubleshooting

Customer Complaint Analysis Check Sheet

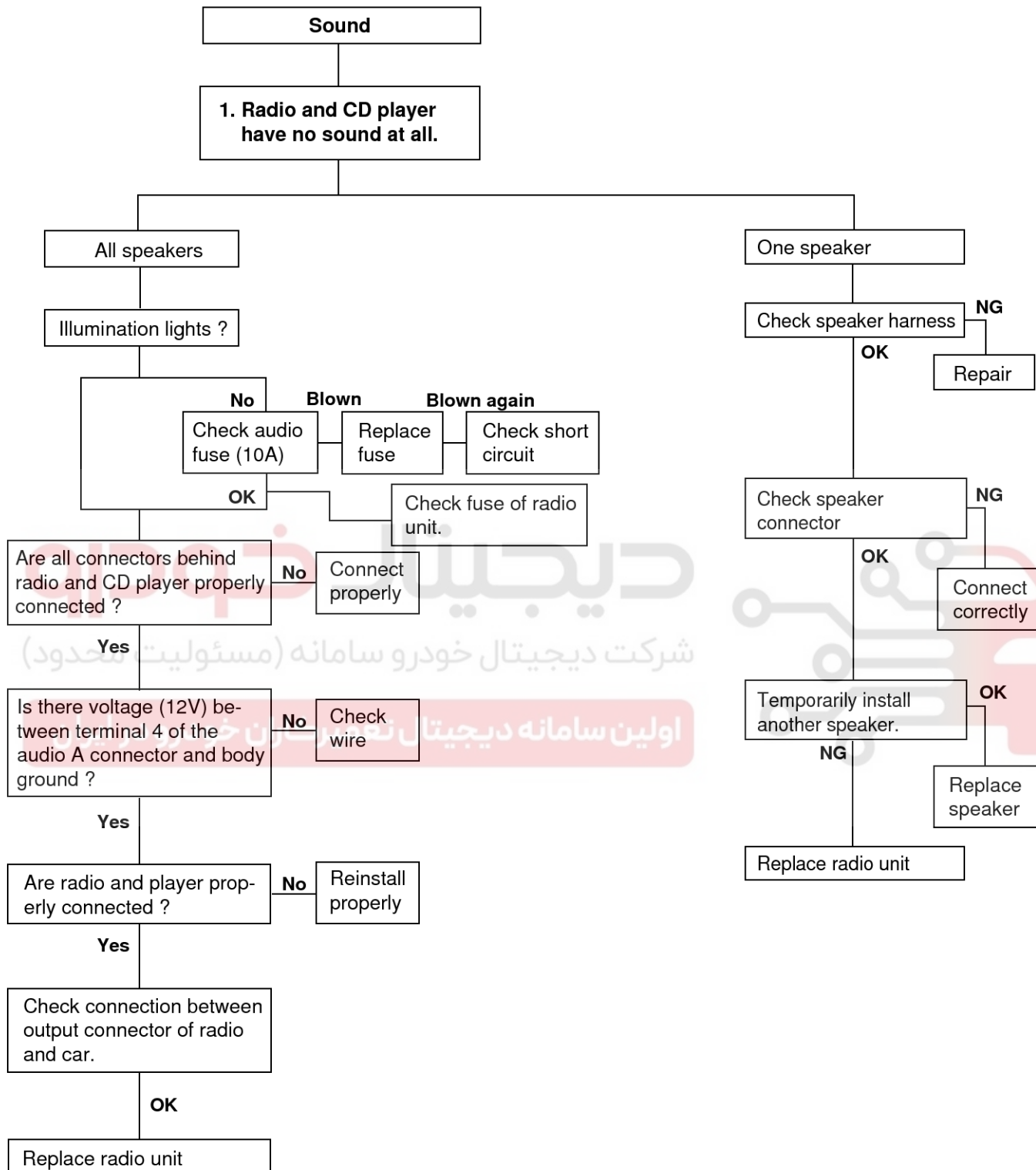
Item	Status	How to check
System	Audio is not functioning and no function of display	<ul style="list-style-type: none"> ▶ Check the fuse audio unit and vehicle ▶ Check power connections
Radio	No radio reception	▶ Check if the antenna is completely and correctly connected.
	Poor radio reception	<ul style="list-style-type: none"> ▶ Antenna (disc antenna) obscured, antenna rod bent or antenna defective. ▶ Please arrange for an authorized dealer to check the antenna.
	The frequency instead of the station name is displayed.	▶ The unit is tuned to a station that does not transmit RDS signals or the transmitter is too weak.
	The required station cannot be tuned to using automatic search	<ul style="list-style-type: none"> ▶ Set desired station manually (manual tuning) ▶ Check whether the antenna is completely and correctly connected
	No traffic announcements are switched through (during CD playback)	<ul style="list-style-type: none"> ▶ Activate the traffic announcement by pressing the TA button ※ TA : Traffic Announcement
CD	CD will not be accepted	<ul style="list-style-type: none"> ▶ Clean CD with damp cloth ▶ The CD does not comply with the CD player specification ▶ See notes on Audio and MP3 CDs
	Distorted sound/skips during CD play	▶ With the set on, wait for 5 minutes until the condensation evaporates
	No sound during CD playback	<ul style="list-style-type: none"> ▶ Some CDs contain multimedia data which is not recognized by the unit ▶ Advance the tracks until music is heard
USB	USB mode is not functioned	▶ Plug in USB drive again

SFDBE8043L

Audio

BE-27

1. System Check Procedure



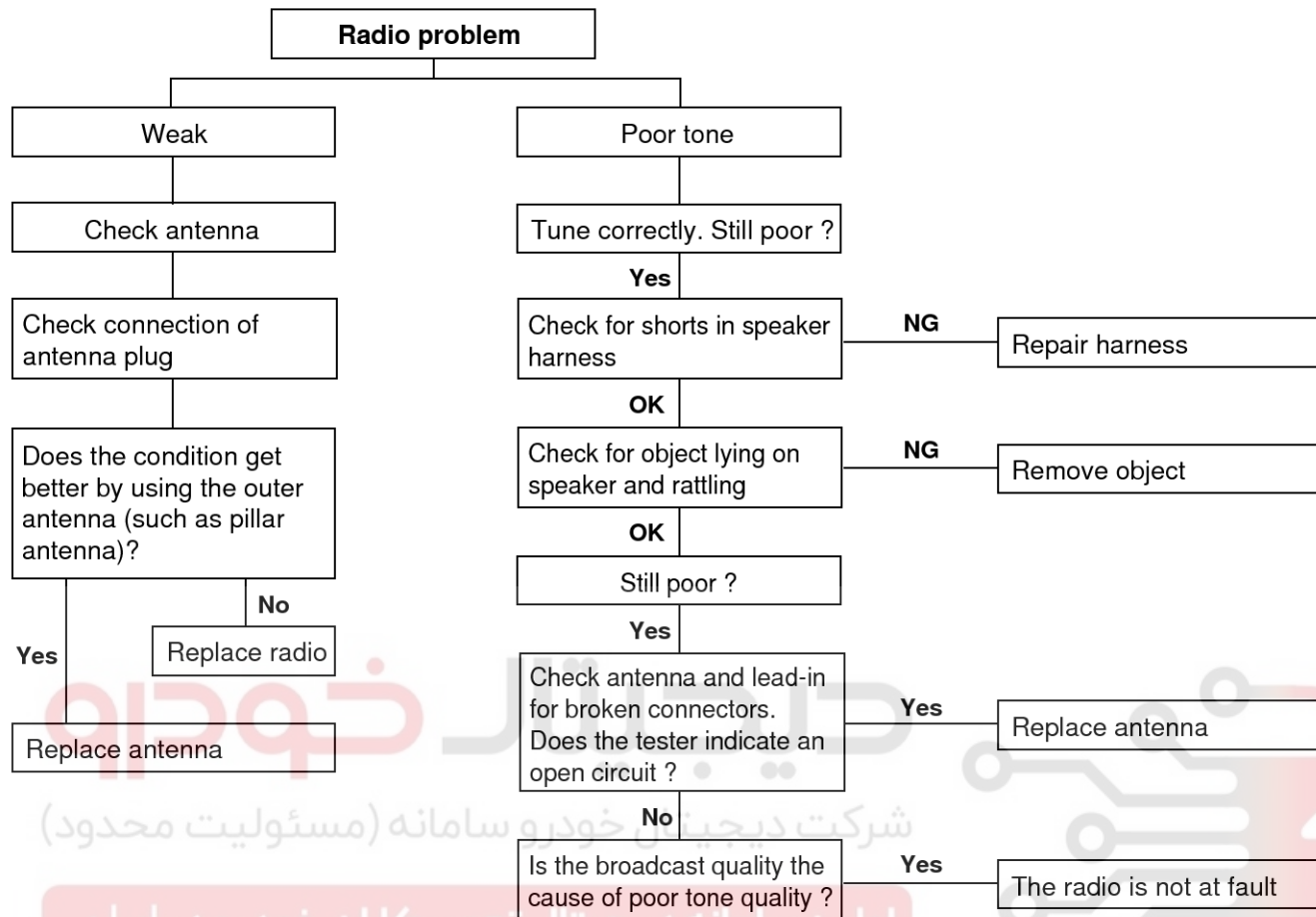
SFDBE8022L

BE-28

Body Electrical System

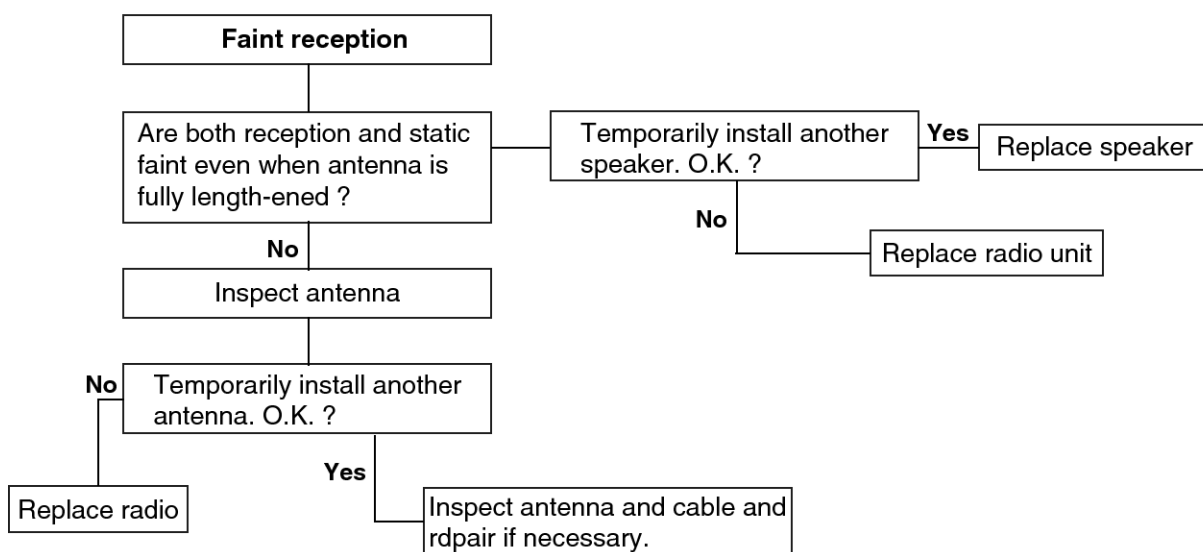
2. Radio Check Procedure

Chart 1



SFDBE8414L

Chart 2

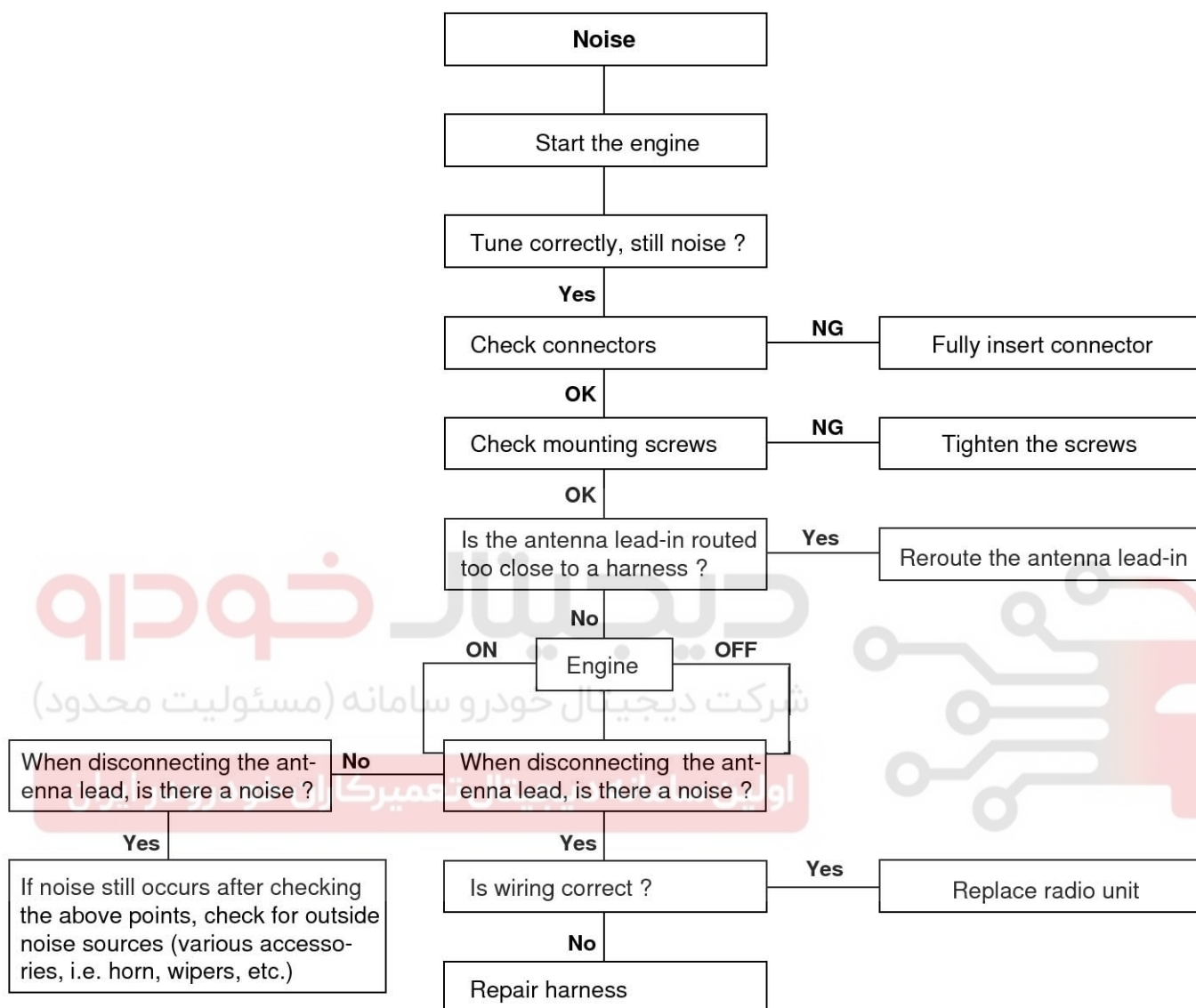


SFDBE8023L

Audio

BE-29

Chart 3

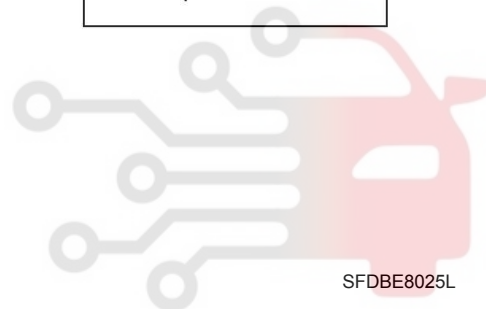
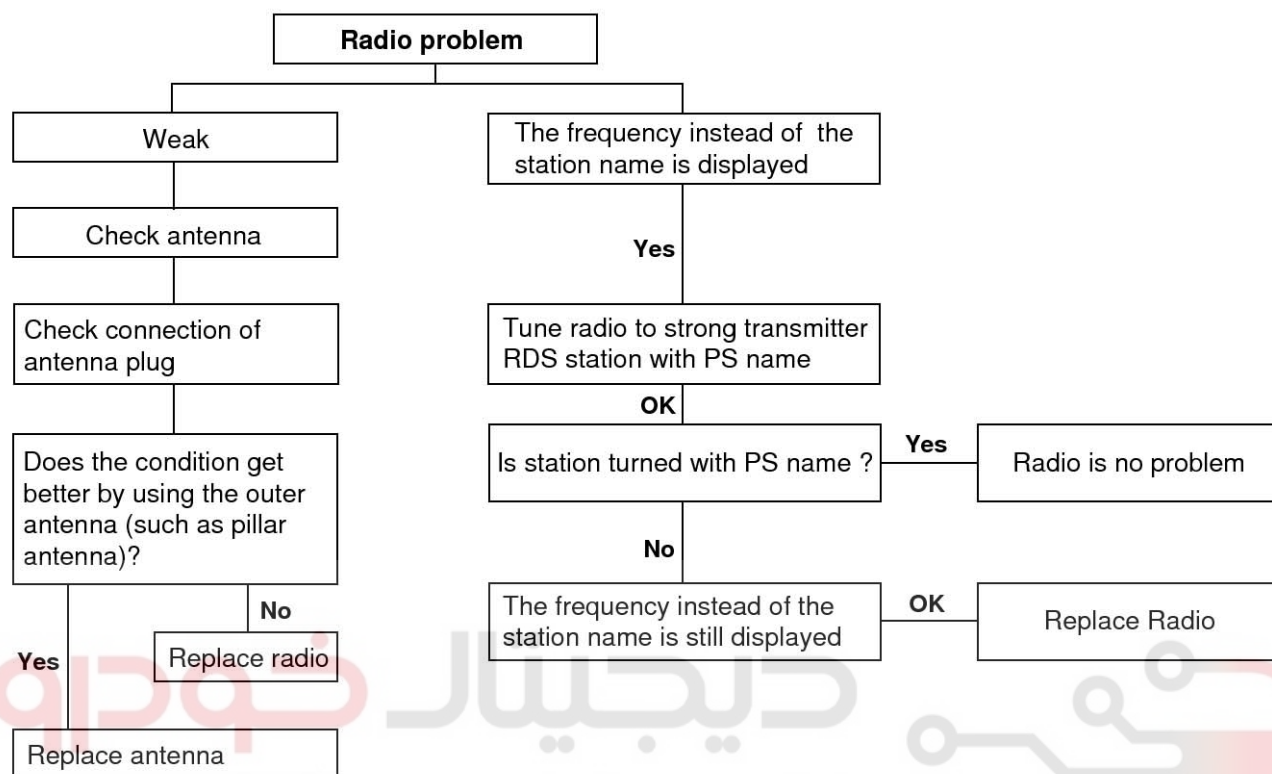


SFD8024L

BE-30

Body Electrical System

Chart 4

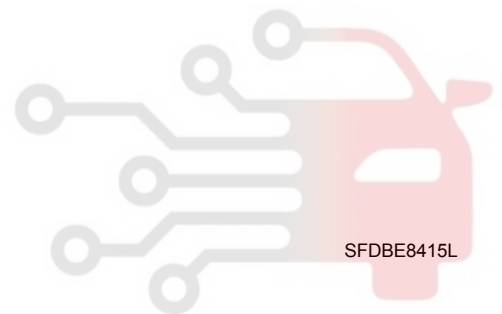
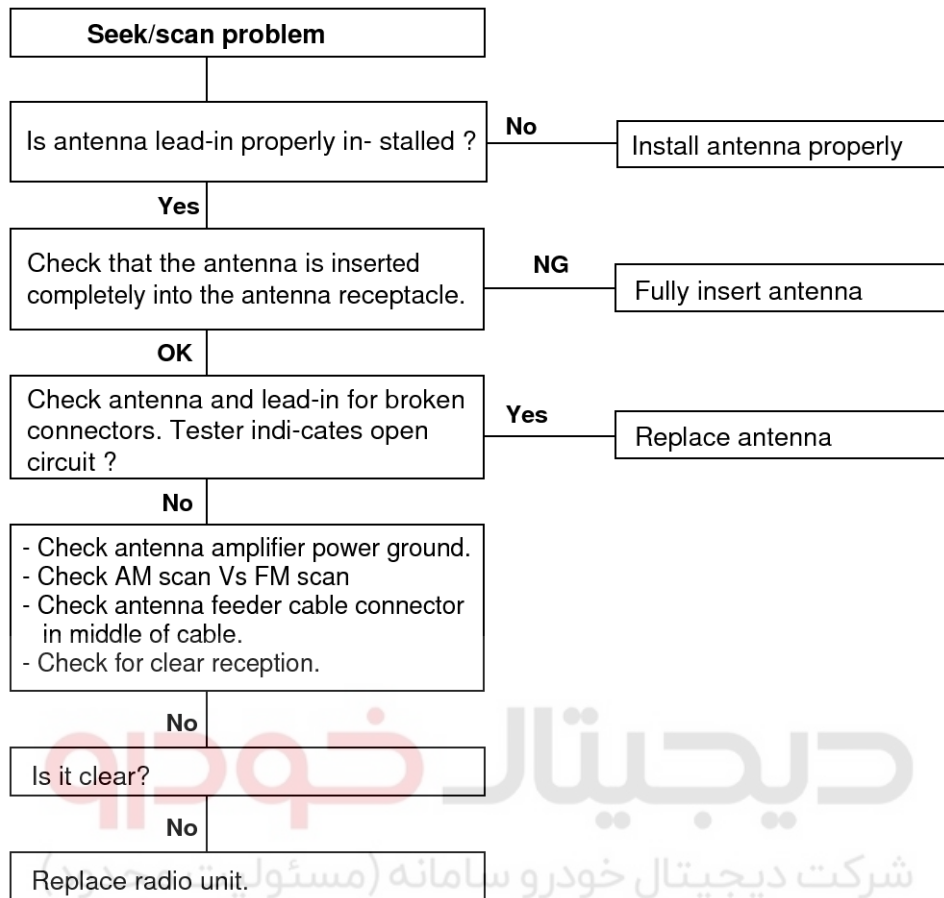


SFDBE8025L

Audio

BE-31

Chart 5

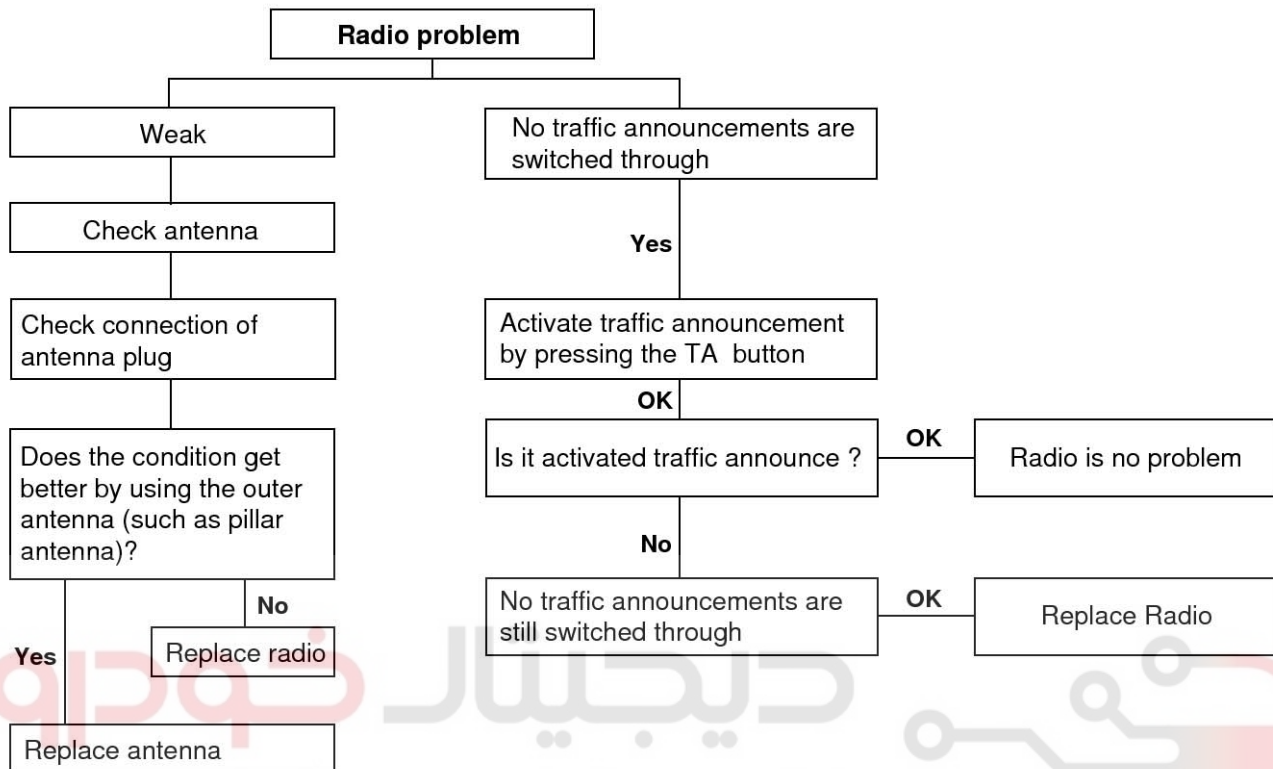


اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BE-32

Body Electrical System

Chart 6



شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SFDBE8026L

Audio

BE-33

3. CD Check Procedure

Chart 1. CD Will Not Be Accepted

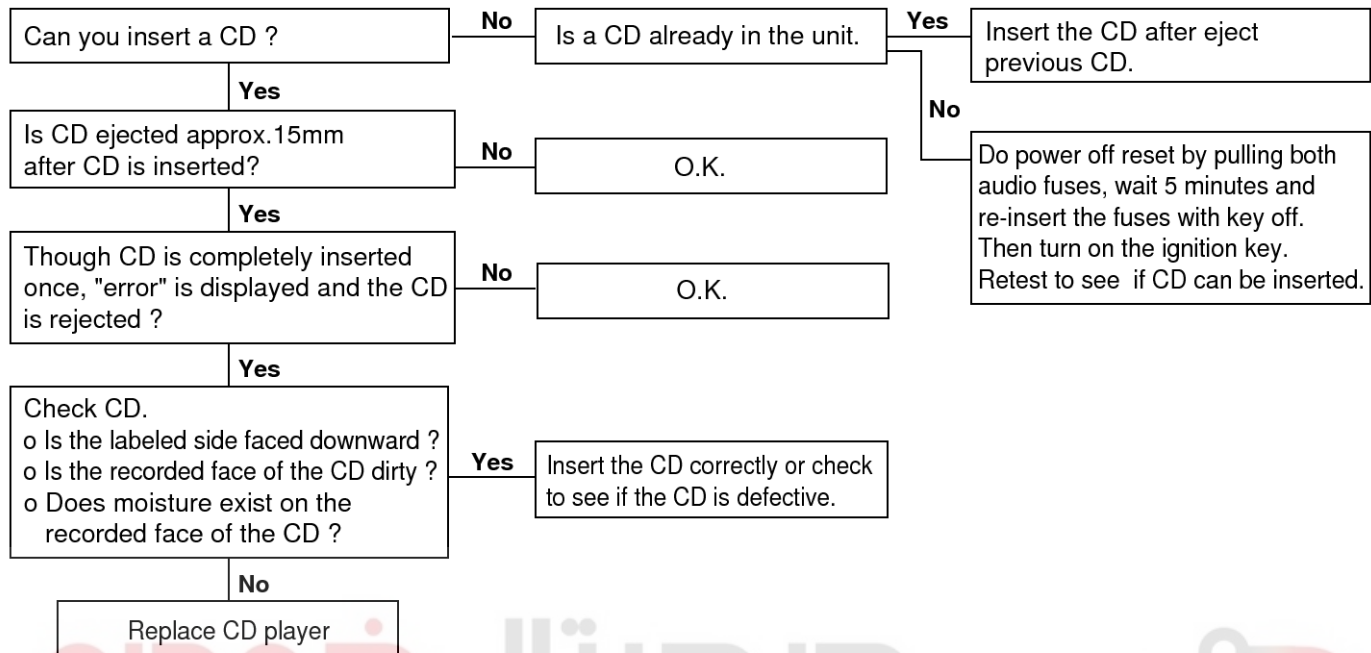
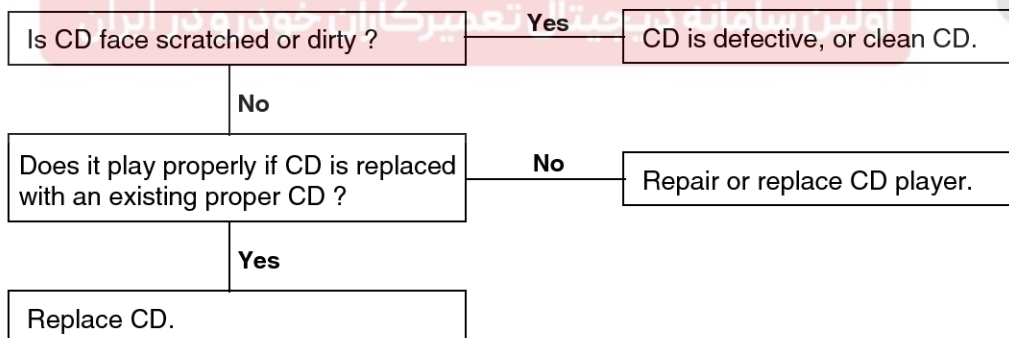


Chart 2. CD Sound Skips

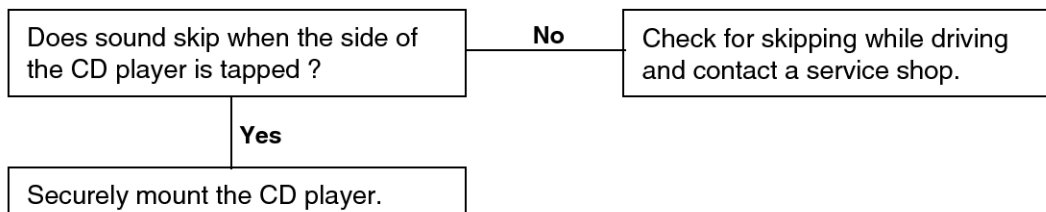
1) Sound sometimes skips when parking.



2) Sound sometimes skips when driving.

(Stop vehicle, and check it.)

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



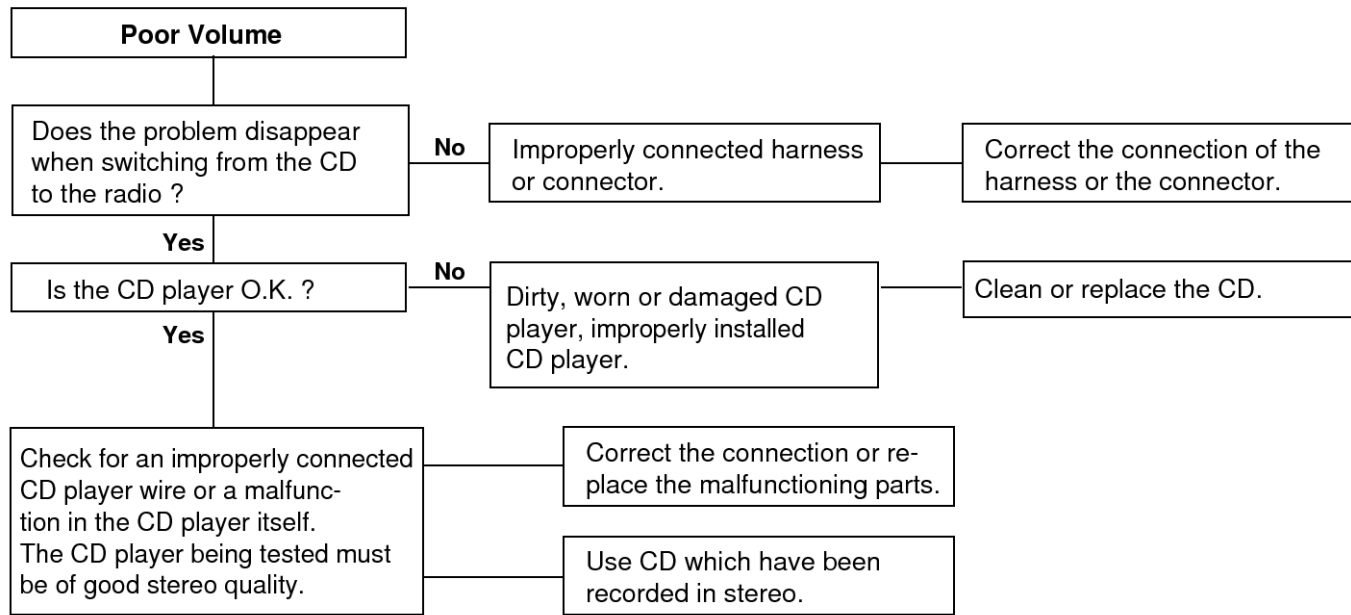
SFDBE8046L

SFDBE8047L

BE-34

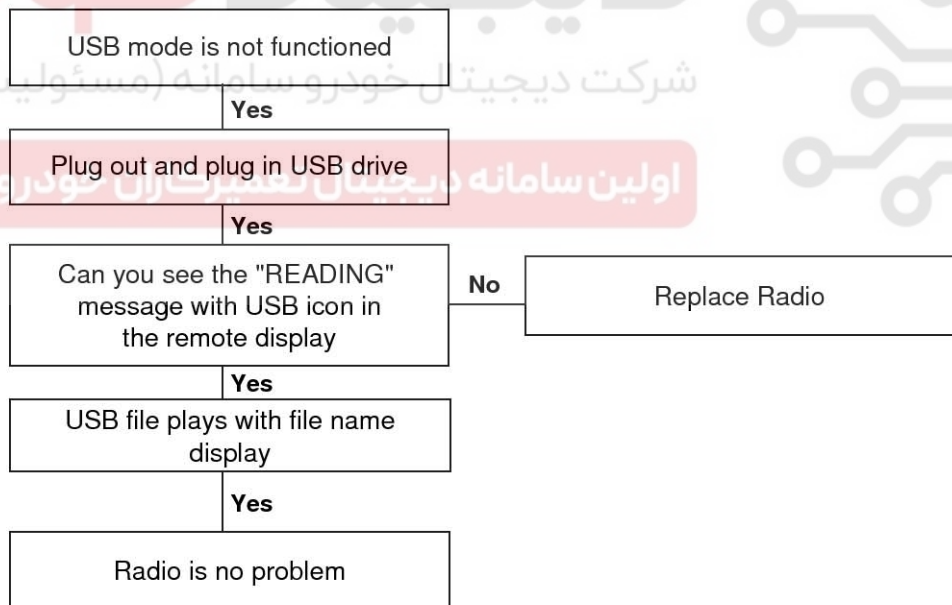
Body Electrical System

Chart 3



SEDBE7112L

4. USB Check Procedure



SFDBE8027L

Multifunction switch

BE-35

Multifunction switch

Specifications

Items		Specifications
Rated voltage		DC 12V
Operating temperature range		-30°C ~ +80°C (-22 ~ +176°F)
Lever end play		0.098 in (2.5 mm)
Rated load	Dimmer & passing switch	High : 1A (Relay load) Low : 1A (Relay load) Passing : 1A (Relay load)
	Lighting switch	Lighting : 1A (Relay load)
	Turn signal switch	6.6 ± 0.5A (Lamp load)
	Wiper & mist switch	High : 6.5A (Motor load) Low : 4.5 A (Motor load) Intermittent : 0.22±0.05A(Relay Load) Lock : Max. 28A (Motor load) Mist : 4.5A (Motor load)
	Fog lamp switch	1A (Relay load)
	Rear wiper & Washer	Wiper : 0.2A (Relay load) Washer : 4A (Motor load)

شرکت دیجیتال خودرو (مسئولیت محدود)

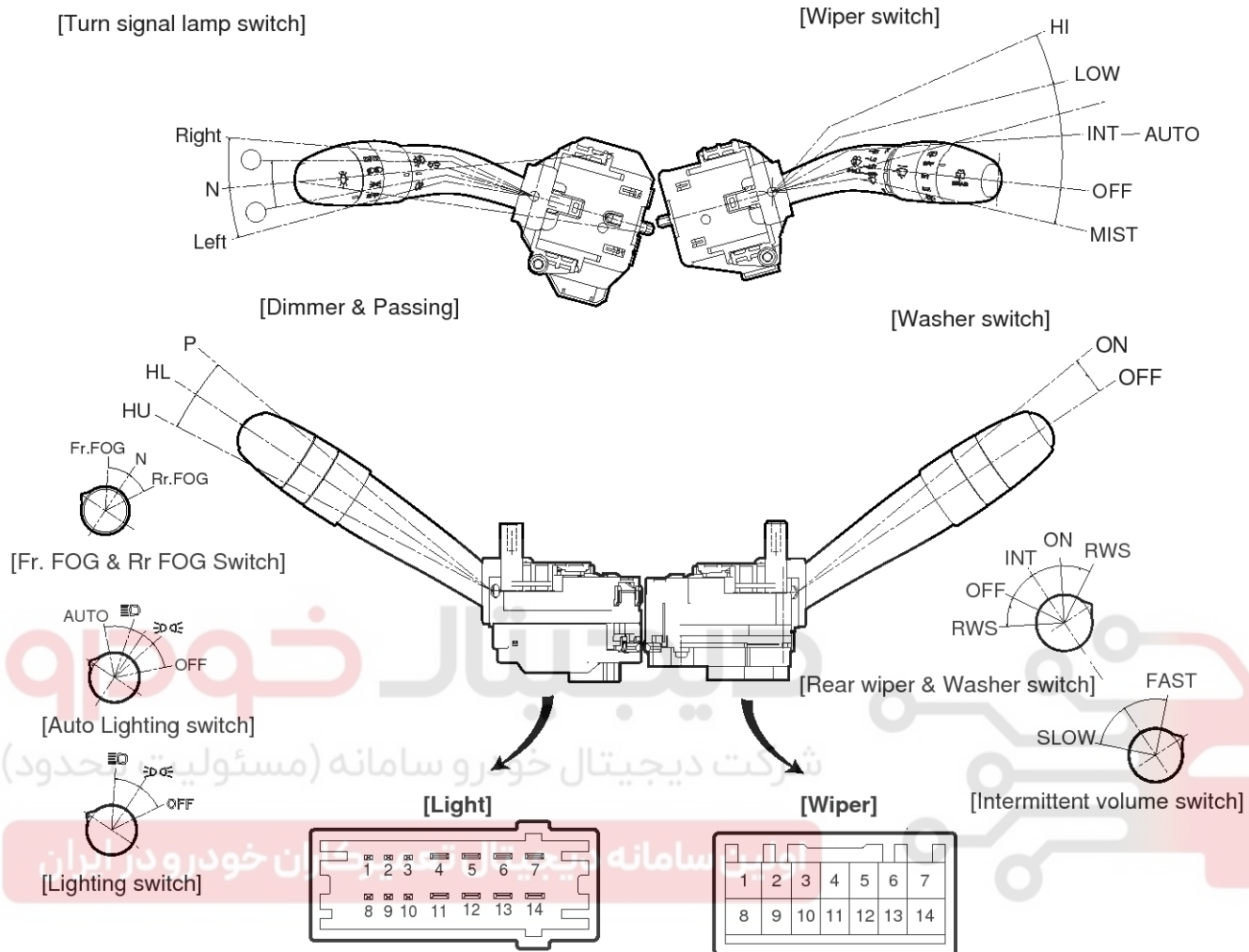
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BE-36

Body Electrical System

Component

[LHD]



Circuit connection

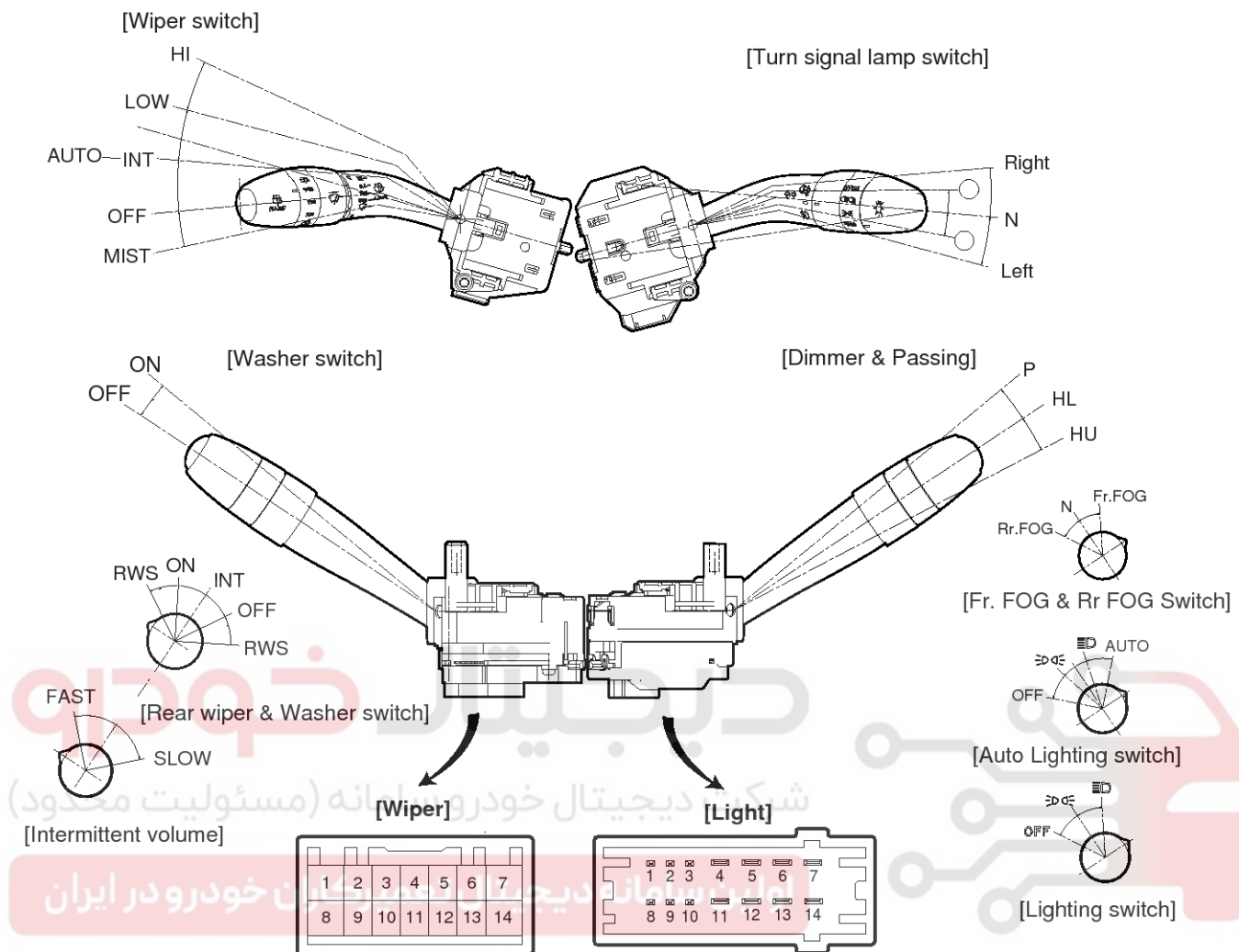
Connector Name	Terminal No.	Description	Connector Name	Terminal No.	Description
Light	1	Lighting switch ground	Wiper	1	Rear washer
	2	Front fog lamp switch		2	-
	3	Front fog lamp ground		3	Rear wiper
	4	Flasher unit power		4	Rear wiper & washer IGN
	5	Turn signal lamp (LH) switch		5	Intermittent wiper (t)
	6	Turn signal lamp (RH) switch		6	Intermittent wiper ground
	7	Rear fog lamp switch		7	-
	8	Tail lamp switch		8	Wiper Low speed
	9	Head lamp switch		9	Wiper parking
	10	Rear fog lamp/Auto light switch		10	Mist switch
	11	Dimmer & Passing ground		11	Front washer switch
	12	Head lamp high beam power		12	IGN(2)
	13	Head lamp low beam power		13	Intermittent wiper
	14	Head lamp passing		14	Wiper High speed

SFD8E8028L

Multifunction switch

BE-37

[RHD]



Circuit connection

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

SFD8028R

BE-38

Body Electrical System

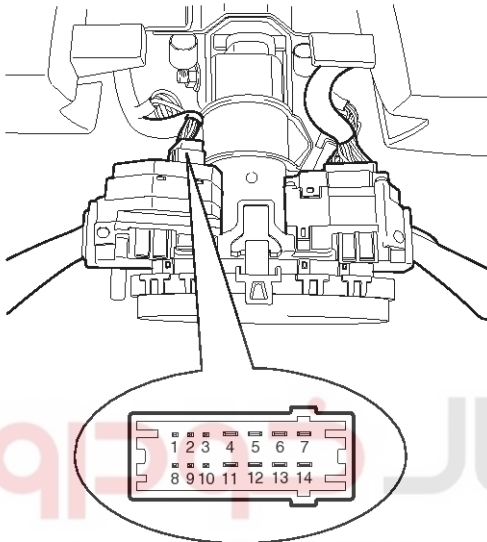
Inspection

Lighting Switch Inspection

1. With the multi function switch in each position, make sure that continuity exists between the terminals below.

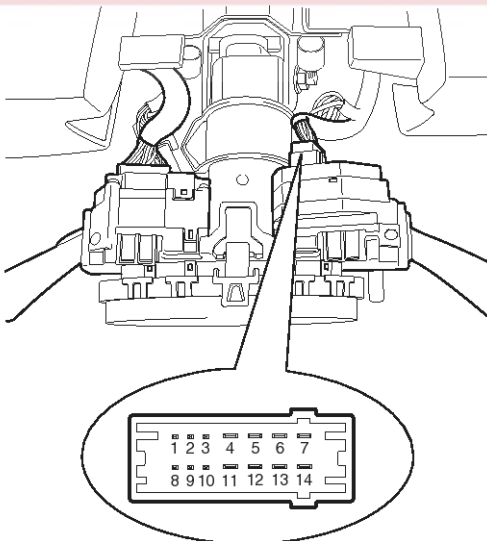
If continuity is not as specified, replace the multi-function switch

[LHD]



SEDBE7044L

[RHD]



SEDBE7044R

Lighting Switch (Auto Light)

() : RHD

Terminal Position	8(9)	9(10)	10(14)	1(8)
OFF				
I	○	—	—	○
II	○	○	—	○
AUTO			○	○

SEDBE7045L

Lighting Switch

() : RHD

Terminal Position	8(9)	9(10)	10(14)	1(8)
OFF				
I	○	—	—	○
II	○	○	○	○

SEDBE7046L

Dimmer And Passing Switch

() : RHD

Terminal Position	14(7)	12(5)	13(6)	11(4)
HU		○	—	○
HL			○	○
P	○	○	—	○

HU : Head lamp high beam

HL : Head lamp low beam

P : Head lamp passing switch

SEDBE7047L

Multifunction switch

BE-39

Turn Signal Switch

() : RHD

Terminal		6(12)	5(13)	4(11)
Hazard switch	Turn signal switch			
	L		○ — ○	
	N			
OFF	R	○ —		○

SFDBE8029L

Front Fog Lamp

() : RHD

Terminal		3(2)	2(1)
Position	OFF		
	ON	○ —	○

SEDBE7049L

Rear Fog Lamp

() : RHD

Terminal		3(2)	7(3)
Position	OFF		
	ON	○ —	○

SEDBE7055L



BE-40

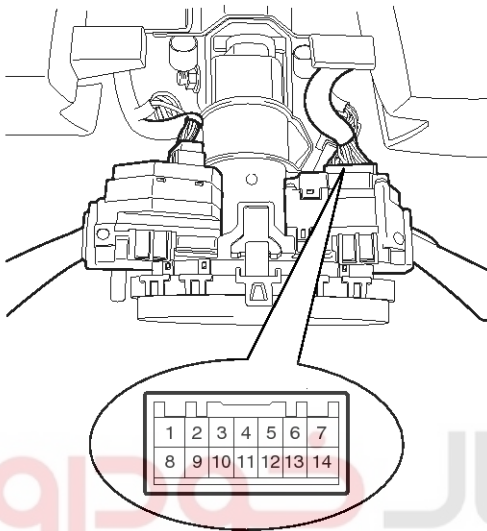
Body Electrical System

Wiper And Washer Switch Inspection

1. With the multi function switch in each position, make sure that continuity exists between the terminals below.

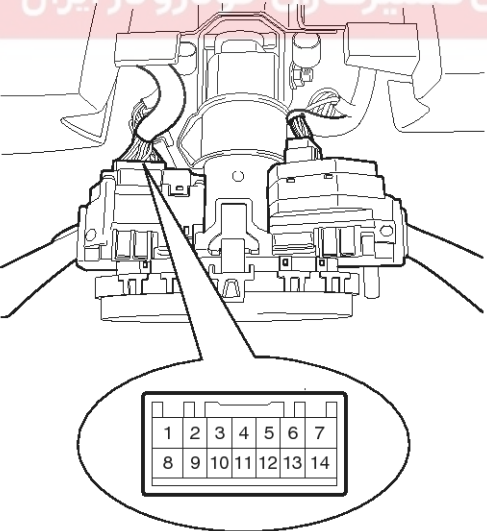
If continuity is not as specified, replace the multi-function switch.

[LHD]



SEDBE7050L

[RHD]



SEDBE7050R

Wiper Switch

[RAIN SENSOR]

() : RHD

Terminal Position	14 (8)	8 (14)	13 (9)	9 (13)	10 (12)	12 (10)	6 (7)	5 (6)
MIST	○	—	○		○	○		
OFF	○	—	○					
AUTO	○	—	○	○	○		○	○
LOW	○	—	○	○	○			
HI		○	—	○	○			

SFD8E8030L

[STANDARD]

() : RHD

Terminal Position	14 (8)	8 (14)	13 (9)	9 (13)	10 (12)	12 (10)	6 (7)	5 (6)
MIST	○	—	○		○	○		
OFF	○	—	○					
INT	○	—	○	○	○		○	○
LOW	○	—	○	○	○			
HI		○	—	○	○			

SFD8E8031L

Washer Switch

() : RHD

Terminal Position	11(11)	10(12)
OFF		
ON	○	○

SFD8E8032L

Rear Wiper & Washer Switch

() : RHD

Terminal Position	4(5)	3(4)	1(2)
WIPER	○	—	○
OFF			
ON	○	—	○
WASHER	○	—	○

SFD8E8033L

Multifunction switch

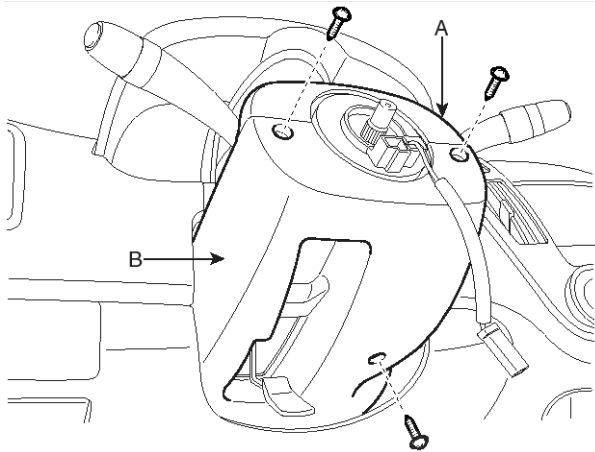
BE-41

Removal

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

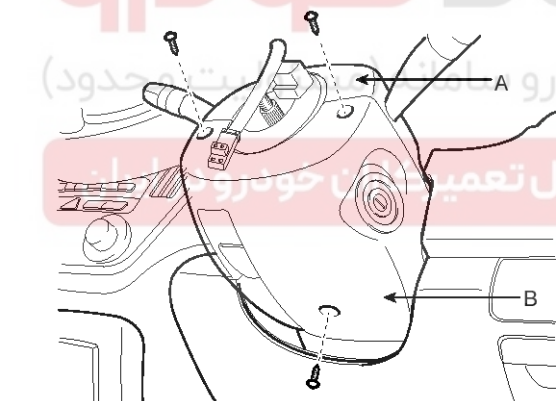
(Refer to ST group - Steering column and shaft).

[LHD]



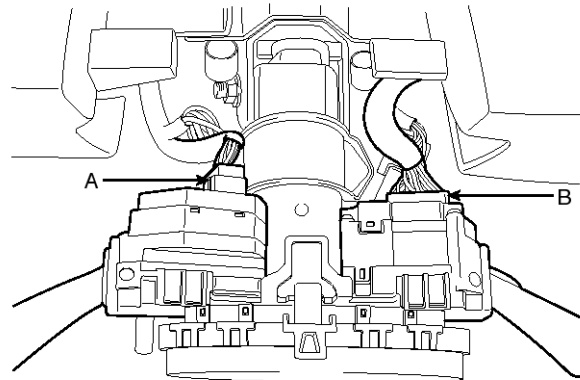
SEDBE7041L

[RHD]



SEDBE7041R

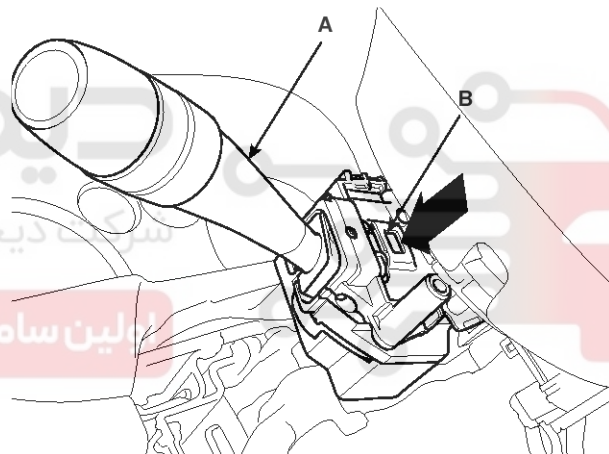
3. Disconnect the light switch connector (A) and the wiper switch connector (B).



SEDBE7056L

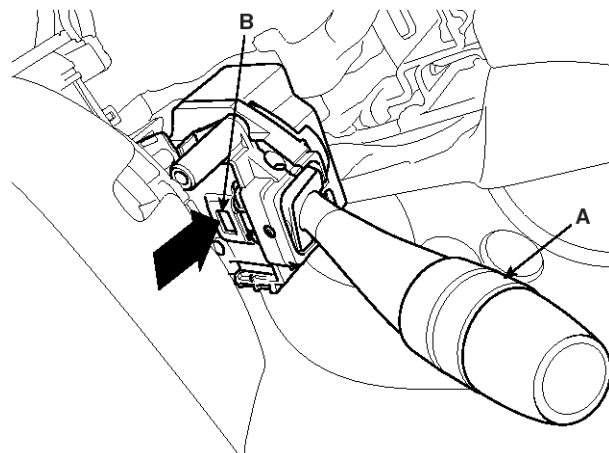
4. Remove the lighting switch (A) by pushing the lock pin (B).

[LHD]



SFDBE8038L

[RHD]



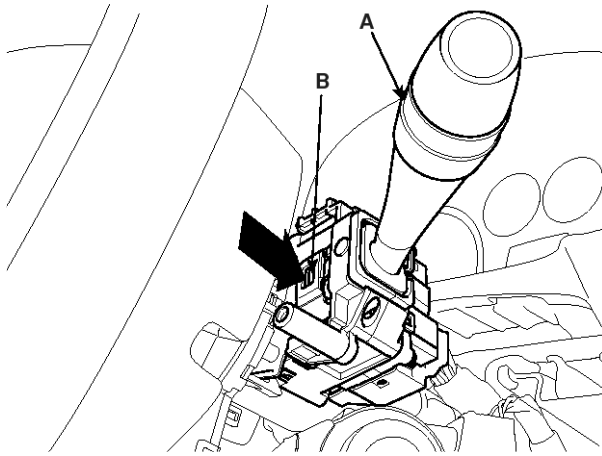
SFDBE8038R

BE-42

Body Electrical System

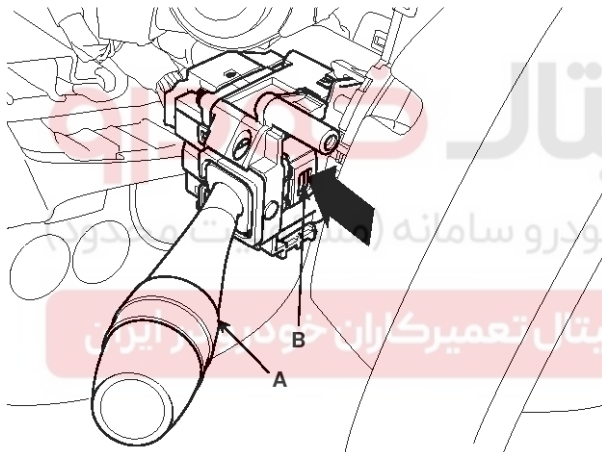
5. Remove the wiper switch (A) by pushing the lock pin (B).

[LHD]



SFDBE8039L

[RHD]



SFDBE8039R

Installation

1. Install the wiper switch then connect the lighting switch connector.
2. Install the lighting switch then connect the wiper switch connector.
3. Install the steering column upper and lower shrouds.

Horn

BE-43

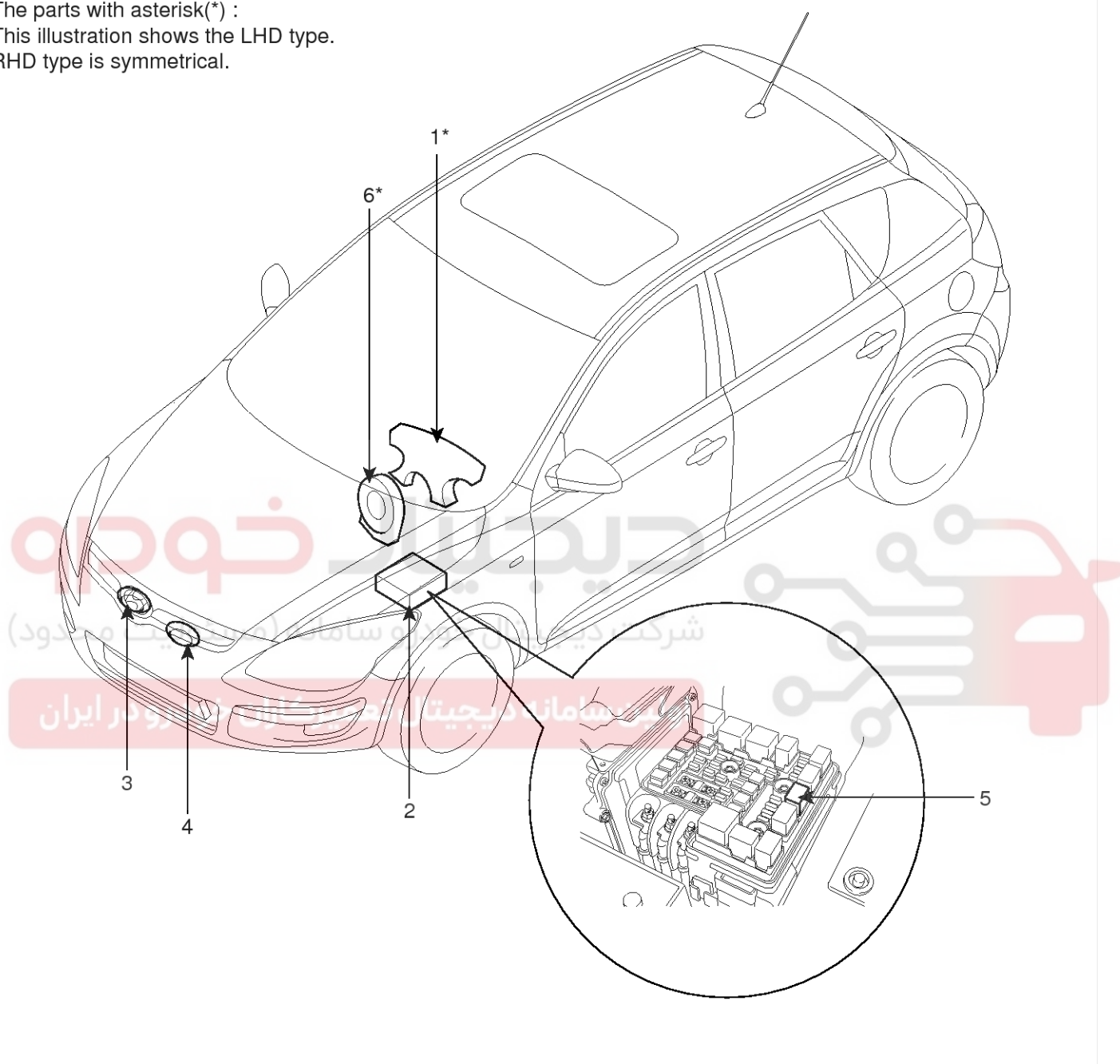
Horn

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



- 1. Horn switch
- 2. Relay box (Engine room compartment)
- 3. Horn (Low pitch - Single)

- 4. Horn (High pitch "-Europe only")
- 5. Horn relay
- 6. Clock spring

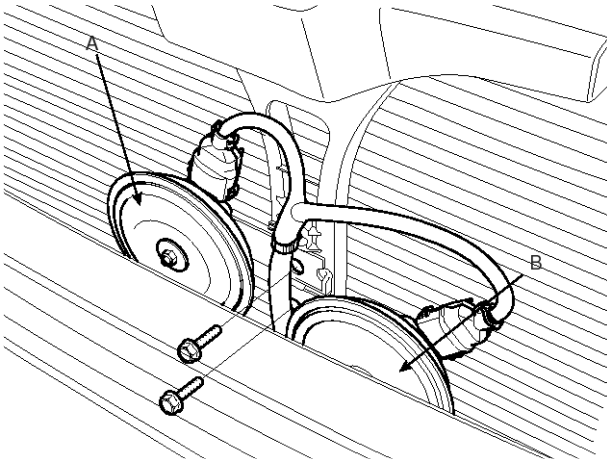
SFDBE8312L

BE-44

Body Electrical System

Removal

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



SFD8E8184L

Installation

1. Install the horns after connecting the horn connectors.
2. Install the front bumper.
(Refer to the BD group - "Front bumper")

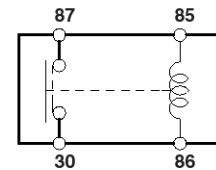
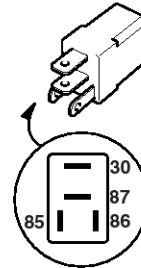
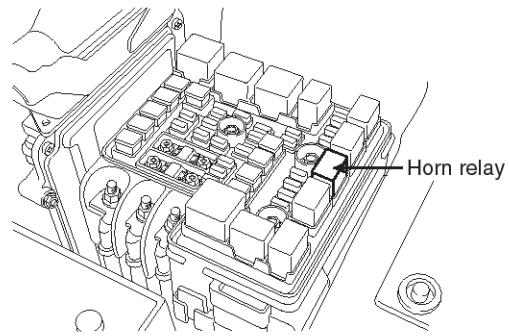
Inspection

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

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

Horn Relay Inspection

1. Remove the horn relay (A) from the engine room relay box.
2. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
3. There should be no continuity between the No.30 and No.87 terminals when power is disconnected.



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

SEDBE7062L

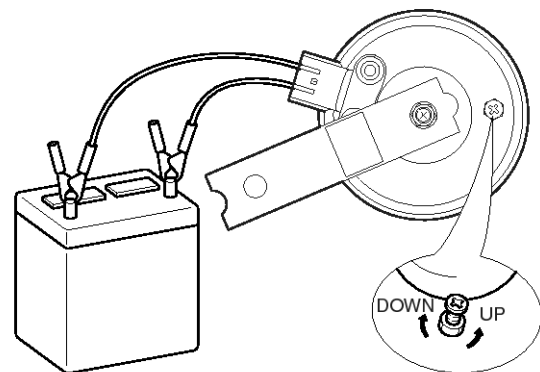
SCMBE6063L

Adjustment

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

NOTICE

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



SHDBE6064D

Navigation

BE-45

Navigation

Specification

Audio

Item		Specification
Model		TBT (Turn by Turn) Navigation
Power supply		DC 14.4V
Load Impedance		$4\Omega \times 4$
Rated output		Max 43W x 4
Antenna		75PF 75 Ω
Tuning type		CREST TUNER
Frequency range / Channel space	FM	87.9 ~ 108.0 MHz/50 KHz
	MW	522 ~ 1620 KHz/9 KHz
	LW	153 ~ 279 KHz/1 KHz

Speaker

Item		Specification
Input Power (W)	Front	Max. 50
	Rear	Max. 50
	Tweeter	Max. 40
Speaker Impedance (Ω)	Front	4.0 ± 0.6
	Rear	4.0 ± 0.6
	Tweeter	3.4 ± 0.5
Speaker Number		6

Roof Antenna

Item	Specification
Installation Position	Roof
Input Voltage	DC 10.5V~16.0V (AM/FM), DC 4.5V \pm 0.5V (GPS)
Rated Voltage	DC 12V (AM/FM), DC 4.5V (GPS)
Output Impedance	75 Ω (AM/FM), 50 Ω (GPS)

BE-46

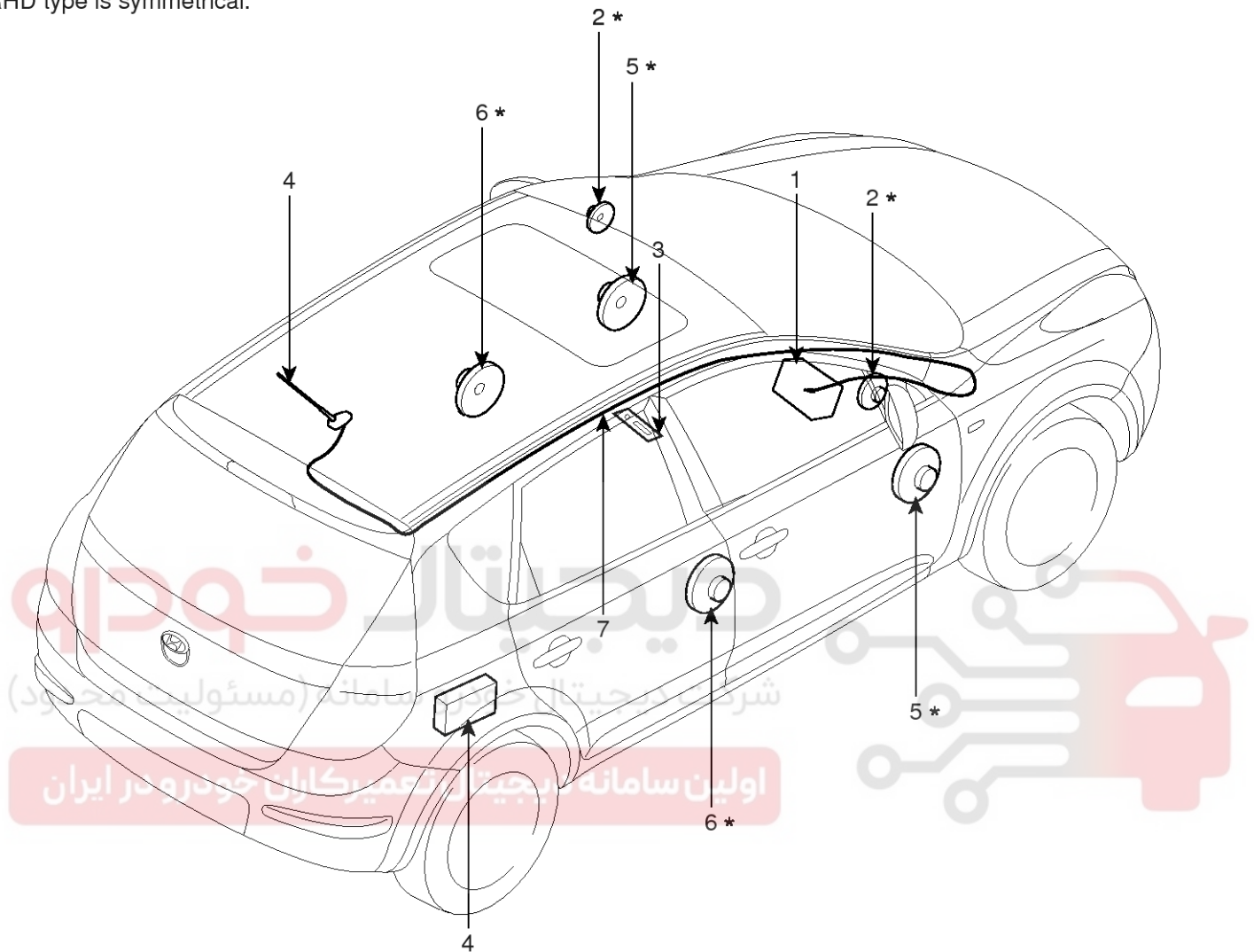
Body Electrical System

Component Location

The parts with aster TSK (*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. TBT Navigation unit
2. Tweeter speaker
3. AUX Jack / USB Port
4. External amplifier

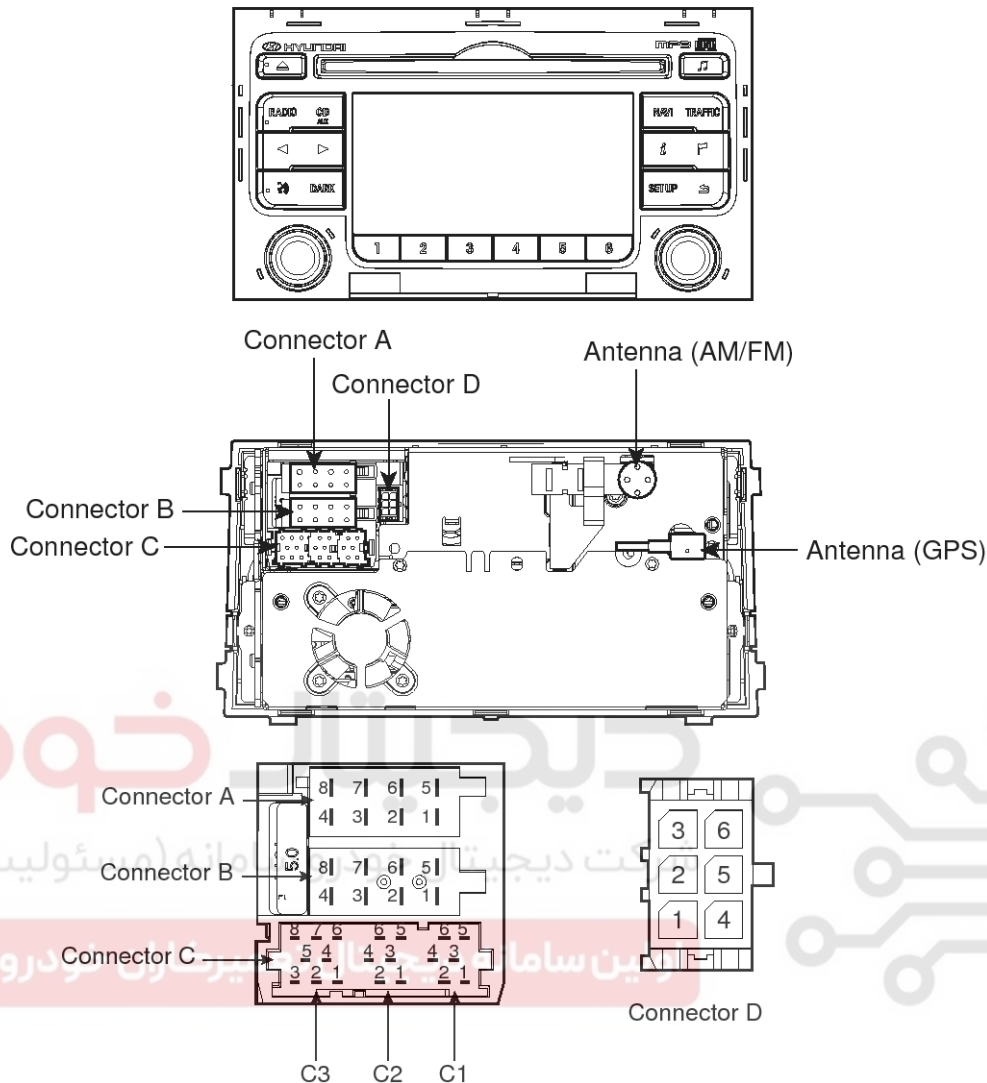
5. Front door speaker
6. Rear door speaker
7. Antenna feeder cable
8. Roof antenna (Radio/GPS)

SFD8E8034L

Navigation

BE-47

Component



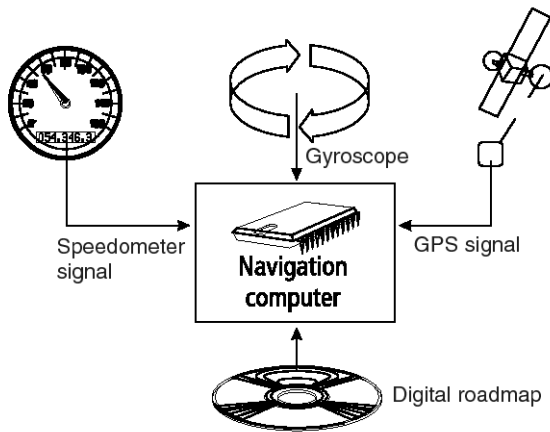
NO	CONNECTOR A	CONNECTOR B	CONNECTOR C1	CONNECTOR C2	CONNECTOR C3	CONNECTOR D
1	SPEED	SPEAKER RR+	-	-	USB D+/IPOD	AUX IN RIGHT
2	TAIL SW	SPEAKER FR+	-	-	-	AUX DETECT
3	REMOTE/ANTENNA	SPEAKER FL+	-	REMOTE CONTL GND	-	Temperature
4	BATT +	SPEAKER RL+	-	-	USB GND	AUX IN LEFT
5	DIRECTION	SPEAKER RR-	-	REMOTE CONTL +	USB Vbus	Temperature GND
6	IGNITION(+12V)	SPEAKER FR-	-	-	USB D-/IPOD	AUX IN AUDIO Ref
7	PWM ILLUM.	SPEAKER FL-			-	
8	POWER GND	SPEAKER RL-			GND	

SFD8035L

BE-48

Body Electrical System

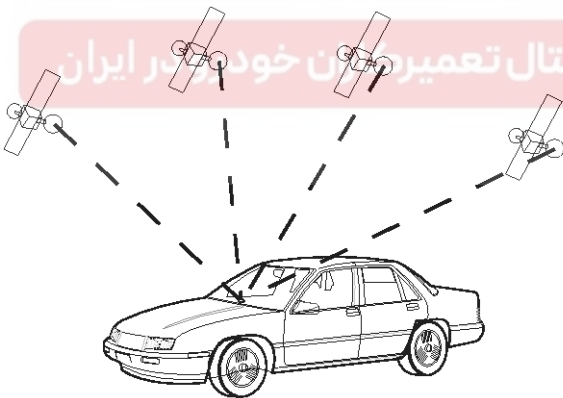
Description



SEDBE7115L

How does the navigation system work?

The position and movements of the vehicle are recorded by the navigation system's sensors. The distance travelled is determined by the vehicle speedometer signal, rotary motion in bends is detected by a gyro sensor (inertial compass). The position is determined via the GPS (Global Positioning System) satellites. The position can be calculated within a range of approx. 10 m by comparing the sensor signals with the digital map on the navigation CD.



SEDBE7116L

Important notes on the function of your navigation radio

In principle, the system is functional with poor GPS reception, although the accuracy of the positioning may be impaired by poor or interrupted GPS reception or errors can occur in the determination of the position, which result in incorrect position reporting.

Start-up characteristics

If the vehicle is parked for longer periods of time, the satellites continue their orbit. After the ignition is switched on, it may take several minutes until the navigation system receives signals from sufficient satellites for evaluation. During the start-up sequence, it is possible that the navigation system will report: "You are leaving the digitised area". The navigation system assumes that the vehicle is not located on a digitised road. If other roads exist in this area, the navigation system may issue incorrect messages. The navigation system assumes that the vehicle is located on another road.

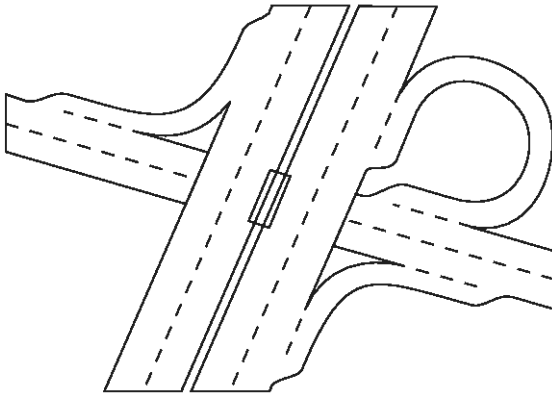
Comments

After transport of the vehicle by train or ferry, the navigation system may require a few minutes for exact positioning. After disconnecting the vehicle battery, up to 15 minutes may be required for exact positioning. For this, the vehicle must be outdoors and the system must be switched on in order to receive transmissions from the GPS satellites.

Navigation

BE-49

The digital road map



SEDBE7117L

To be able to plan a route to a destination address, the navigation system not only requires the current position of the vehicle but also a digital road map containing the destination address itself and the roads leading to the destination address. This digital road map is on the map CD which you insert into the navigation computer.



SEDBE7118L

The road system is stored on the map CD as a line model, i.e. even large junctions have only one focal point that is approached by all roads in point-to-point fashion. Thus the navigation system indicates the distance to the turn-off point as the distance to the centre of the junction. This is why the distances for motorway exits indicated on road signs may not agree with those of the navigation system. The road signs indicate the distance to the beginning of the exit.

Areas with limited road information

In some areas, not all of the information on a road is available on the map CD. Thus, for example, turn-off prohibitions, information on the direction of travel in a one-way street or prohibited entry into a pedestrian zone may be missing. The navigation system will display a warning if you drive into such an area. Local traffic laws always take precedence over navigation system instructions. Always observe the road signs and motor vehicle traffic regulations.

Topicality of the map CD

Roughly 10 - 15% of the road system characteristics change each year. Due to these constantly changing traffic conditions (construction of new roads, traffic calming, etc.) we cannot guarantee that the digital road map will be in 100 % agreement with existing traffic conditions. We recommend that you always use the most current version of the map CD for navigation. More information can be found under "CIQ - Intelligent Content On Demand", section 5.

BE-50

Body Electrical System

Route & Sound - Navigating and listening to A CD

With this new generation navigation radio unit, you may insert a map CD, plan your route, then insert an audio or MP3 CD and the system will still guide you to your intended destination. The navigation computer saves the road system in a defined area around the planned route (corridor) in its main memory. Within this corridor, the map CD does not have to be inserted in order for the navigation to function. As soon as you leave this corridor, a message will appear automatically, prompting you to insert the map CD so that the navigation computer can reload the data required for a new route. What is meant by "corridor"?

The navigation system plans a route and then loads a "belt" around the planned route (the corridor) as map data from the map CD into the main memory.

Functional restrictions in corridor mode

Please note that some navigation system functions are not or are only partially available when the map CD (Route & Sound mode) is not inserted (e.g. dynamic route planning, alternative route, route selection, traffic info outside of the planned route)

It is only possible to load stored addresses if they are located within the corridor. Route planning is only possible with roads located within the corridor. Even if a destination address is located within the corridor and can be entered as a destination, it may not be possible to plan a route to that destination. In this case, please insert the map CD.

TMC traffic information is only available for the map region stored in the corridor. Travel info and POIs (Points of Interest) can only be called up using the map CD. Some C-IQ functions (in particular code entry) are only possible when the map CD is inserted.

As soon as you insert the map CD, these functions are available again.

Leaving the corridor

If you leave the corridor, e.g. if you are not following the planned route, the navigation system will attempt to guide you back into the corridor. The directional arrow and the distance to the planned route will be displayed.

If you continue travelling away from the corridor, the navigation system will display only the directional arrow and the distance to the destination.

In this case, please insert the map CD so that the navigation system can plan a new route to your destination.

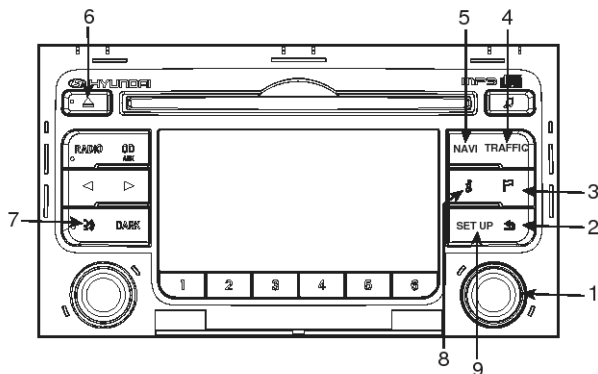


Navigation

BE-51

Function

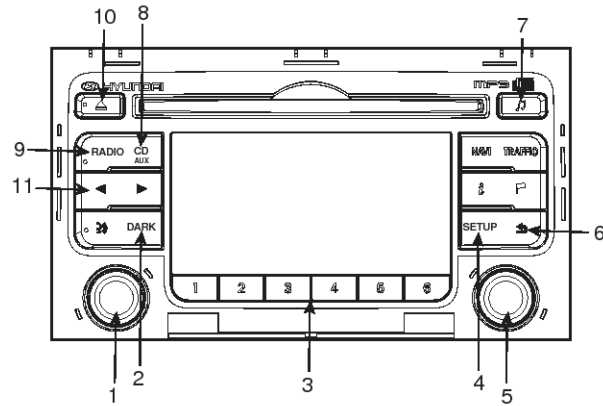
Navigation Control Elements



SFDBE8036L

1. Rotary control for menu operating
Turn: Selecting menu options
Press: Confirming menu options
2. Return to the next higher menu level.
Deletes the last entry.
3. Store the current destination in the address book.
4. Open the TRAFFIC menu (e.g. TMC information).
5. Switchover to navigation mode.
Open the NAVIGATION menu.
6. Eject the inserted disc.
7. Play back current guidance information and (If available) the current TMC information.
8. Open the TRIP INFO menu containing information on the trip.
9. Open the SETUP menu.

Audio Control Elements



SFDBE8037L

1. Left rotaryPress: Switching on/offTurn: Volume control.
2. Switched off/on the illumination of the display and the front buttons.
3. Station buttons for the first 6 stations on the preset list, from the wavebands FM 123, AM 123, LW 123 and SW 123.
4. Open the SETUP menu.
5. Right rotary control for menu operating
Turn : Selecting menu options
Press: Confirming menu options and opening lists (e.g. preset list)
6. Return to the next higher menu level.
Deletes the last entry.
7. Open the sound settings menu.
8. Switchover to CD player / USB volume/ Auxiliary input/ipod
Open CD, MP3 or USB menu.
9. Switchover to radio mode
Open the radio menu.
10. Eject the inserted disc.
11. Search buttons.
Search function in the radio and/or CD/USB mode.

BE-52

Body Electrical System

Navigation Menu

During guidance:

- Press the NAVI button to call up the Navigation menu.

From any other menu:

- Press the NAVI button twice to call up the Navigation menu.

The Navigation menu provides the following options:

1. Destin. input

Input of destinations with various options (direct input via city/ postcode and street, via special destinations and Travel info as well as via GPS coordinates).

2. Guidance

Starting guidance and selecting route criteria.

3. Address book

Saving, editing and deleting destinations and via points in a personal addressbook.

4. Stop guid.

Stopping guidance.

5. Via points

Entering, displaying and deleting via points (intermediate destinations) on the way to your final destination.

Inserting a CD

Insert the CD (printed side up) into the drive, in the case of Audio / MP3 CD'S, playback starts automatically.

Removing a CD

Press the eject button and carefully remove the CD.

Inserting and removing an USB stick (thumb drive)

Insert the USB stick into the USB hub. The USB hub is located in the console (terminal box), in the case of MP3, WMA or OGG files on the USB stick, playback starts automatically.

Connecting external audio equipment to the AUX input

Connect the line-out or headphone output of the external audio player to the AUX socket (terminal box) using a 3.5mm (with space) Stereo plug.

Switching on/off

Press the left rotary to switch the unit on or off.

Switching on and off with the ignition key

If the unit is switched on, it can be switched off by turning the ignition key to the "Off" position.

Turn the ignition key to "ACC" or "ON" position to switch on the unit again.

Automatic switch off

If the unit was turned on using the left rotary with the ignition in "OFF" position, it automatically switches itself off after one hour.

Notes

1. RDS (Radio Data System)

Many VHF stations transmit RDS information. The navigation radio evaluates the RDS telegram and offers the following advantages:

- PS (Program Service name): Display of station name.
- Radio text: Display of additional information concerning the radio station.
- PTY (Program TYpe): Station selection by program type.
- AF (Alternative Frequency): Automatic re-tuning to best alternative frequency.
- TA (Traffic Announcement): Traffic announcements.
- EON (Enhanced Other Networks): Automatic fade-in of traffic announcements on other stations.
- NEWS: Fading in of messages and items of news.
- TMC (Traffic Message Channel): Traffic information for dynamic route planning.

Navigation

BE-53

2. Notes on audio and MP3 CDs

You can play 12 cm CDs on your CD player. The use of 8 cm CDs (with or without adapter) and of CDs with irregular shapes is not recommended.

CAUTION

- **Do not insert warped or poor quality discs into the CD player as damage to the unit may occur.**
- **Do not insert anything like coins into the player slot as damage to the unit may occur.**
- **Off-road or rough surface driving may cause the compact disc to skip. Do not use the compact disc when driving in such conditions as damage to the compact disc face could occur.**
- **Do not attempt to grab or pull the compact disc out while the disc is being pulled into the audio unit by the self-loading mechanism. Damage to the audio unit and compact disc could occur.**
- **Avoid using recorded compact discs in your audio unit. Original compact discs are recommended for best results.**
- **Do not attempt to insert two discs into the player simultaneously (One upon the other). This will destroy the unit!**

3. CD formats

The following CD formats are supported by the CD player :

- CD Audio (CD-DA in accordance with the Red Book Standard); A maximum of 22 CD Text titles are displayed in the title list.
- CD-ROM (in accordance with Yellow Book)
- CD-ROM XA (mode 2, form 1, in accordance with Green Book)
- CD-R/RW (in accordance with Orange Book, part 2/3)
- CD Text with CD Audio (in accordance with Red Book)
- CD Mixed Mode (in accordance with Light Yellow Book); Only the audio tracks are played.
- CD-Extra; Only the audio tracks are played.
- Multisession CD (in accordance with multisession CD specification 1.0)

4. Notes on map CDs

The navigation system is based on a database, which is stored on a CD in encrypted format. The CD contains map data for navigation as well as travel and traffic information (TMC) for dynamic route planning.

5. Handling CDs

- Avoid leaving fingerprints on the CD when removing it.
- Always store map and audio CDs in their protective covers.
- Always ensure that CDs are clean and dry before inserting.
- Protect CDs from heat and direct sunlight.
- Depending on the type of CD-R/CDRW CDs, certain CDs may not operate normally according to manufacturing companies or making and recording methods. In such circumstances, if you still continue to use those CDs, they may cause the malfunction of your car audio system.

6. Notes on MP3 files

The following MP3 files are supported by the CD player :

- Up to 345 titles in up to 99 directories (each data name with 32 characters)
- Bit rate: Maximum of 320 kbit/s, constant or variable
- Sampling frequency: Maximum of 48 kHz
- Text display: ID3 tag V1 and ID3 tag V2
- Files conform with MPEG 1/2 or 2.5 ?Layer 3
- MP3 file names must have the "mp3" extension

7. Notes on USB Sticks (Thumb drives)

8. Notes on AUX devices

9. Cleaning the unit

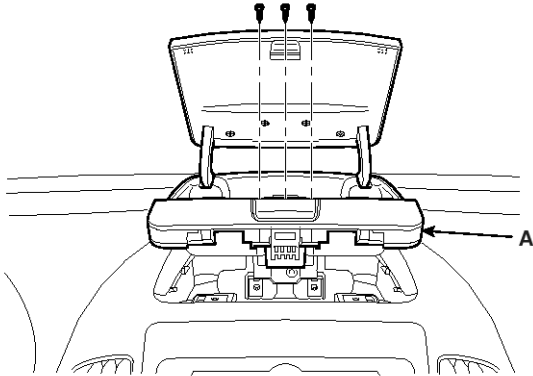
Do not clean using cleaning fluid, alcohol or other solvents. Use only a damp cloth.

BE-54

Body Electrical System

Removal

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

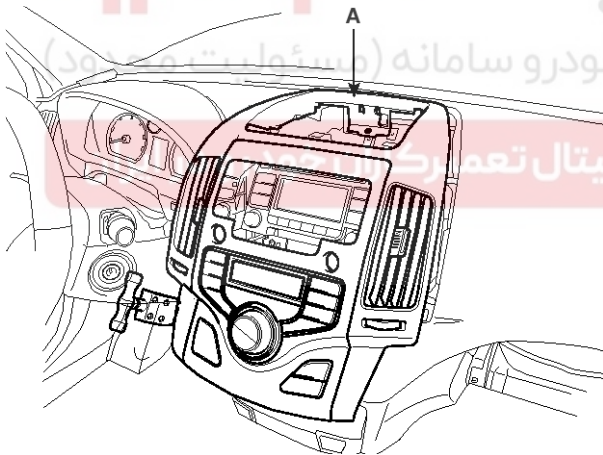


SFDBE8006L

3. Remove the crash pad center facia panel (A).

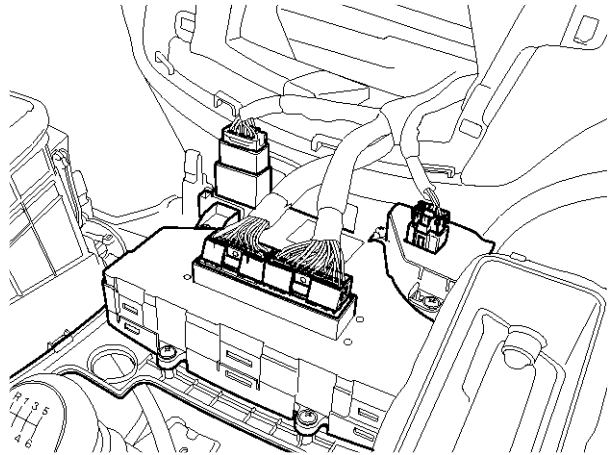
NOTICE

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



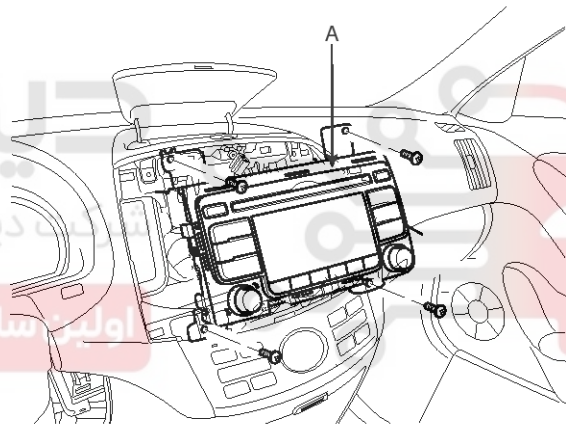
SFDBE8007L

4. Disconnect the connectors from the crash pad center facia panel.



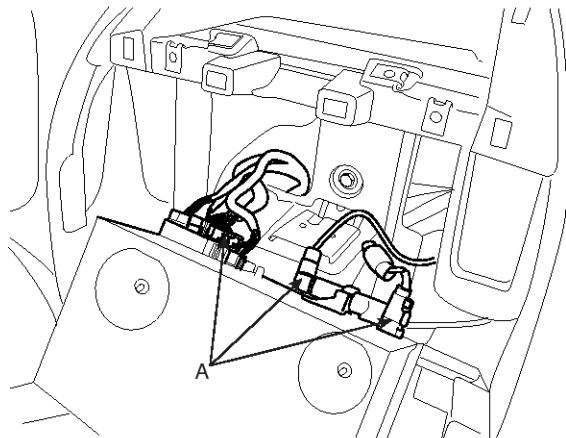
SFDBE8008L

5. Remove the mounting bolts then remove the navigation unit (A).



SFDBE8009L

6. Disconnect the navigation connectors and cable (A).



SFDBE8010L

Navigation

BE-55

Installation

1. Connect the navigation unit connectors and cable.
2. Install the navigation unit.
3. Install the crash pad center facia panel.
4. Install the upper tray.
5. Check the navigation system.

NOTICE

- *Make sure the navigation unit connectors are plugged in properly, and the antenna cable is connected properly.*

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



BE-56

Body Electrical System

Troubleshooting Check Procedure

Status	Cause	How to check
• Audio/ MP3 rejected by the unit.	1. CD may be dirty	1. Clean CD with damp cloth. 2. The CD does not comply with the CD player specification. 3. See notes on Audio and MP3 CDs
• The operating panel generates some heat.	1. No error	1. Normal. The unit feels warm.
• The volume decreases automatically.	1. An integrated safety circuit prevents the temperature in the unit from exceeding a certain value.	1. Allow the unit to cool down (set low volume or switch off for a while)
• Navigation radio not functioning, no function of display	1. No power supply	1. Check the fuse (unit and vehicle) and the connections
• No radio reception		1. Check if the antenna is completely and correctly connected.
• Poor radio reception		1. Antenna (disc antenna) obscured, antenna rod bent or antenna defective. 2. Please arrange for an authorized dealer to check the antenna.
• The frequency instead of the station name is displayed.		1. The unit is tuned to a station that does not transmit RDS signals or the transmitter is too weak.
• The required station cannot be tuned to using automatic search.	1. The desired station is too weak	1. Set desired station manually (manu. tuning) 2. Check whether the antenna is completely and correctly connected.
• No traffic announcements are switched through (during CD playback)		1. Activate the traffic announcement by pressing the TRAFFIC button
• Distorted sound/skips during CD play.		1. Player cannot read CD. CD is damaged or soiled.
• CD player does not work	1. In cold weather conditions, condensation may occur on the laser.	1. With the set on, wait for 5 minutes until the condensation evaporates.
• No sound during CD playback		1. Some CDs contain multimedia data which is not recognized by the unit. 2. Advance the tracks until music is heard. 3. See notes on Audio and MP3 CDs.
• Problems with new copy-protected audio CDs.	1. See notes on Audio and MP3 CDs.	1. Some copy protection procedures are incompatible with acceptable standards for audio CDs. This is not a fault on the unit.

Navigation

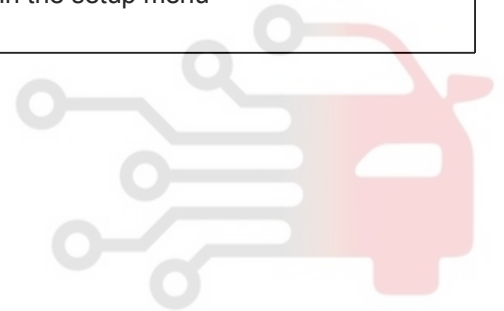
BE-57

Navigation Check Procedure

Status	Cause	How to check
<ul style="list-style-type: none"> Display shows "Please insert map CD" 	The map CD is required for some functions in navigation mode.	Insert the map CD into the radio CD drive with the label facing upwards.
<ul style="list-style-type: none"> The guidance advice cannot be heard or are very quiet. 	Navi volume to low.	Set the navigation volume in the setup menu under "Navigation → Navi volume"
<ul style="list-style-type: none"> Guidance is not accurate 	An inaccuracy of appr. 30 m is within the tolerance limits.	<ol style="list-style-type: none"> If greater inaccuracies occur repeatedly, please contact your dealer. The displayed distance to the turning point is calculated to the centre of the junction (especially for extended junctions and mainroad exits).
<ul style="list-style-type: none"> Display position does not correspond to the actual traffic conditions. 	It is possible that the car's position as calculated by the navigation system is not currently correct.	The routing may have been changed and does not correspond with the information stored on the map CD.
<ul style="list-style-type: none"> Displayed time is incorrect. 		Adjust the time zone using the "Clock/Date → Time Zone" option in the setup menu
<ul style="list-style-type: none"> Estimated time of arrival displayed on the guidance screen is incorrect. 		Check the time zone using the "Clock/Date → Time Zone" option in the setup menu

دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



BE-58**Body Electrical System****Keyless Entry And Burglar Alarm****Specifications**

Item	Specification
Rated voltage	DC 3V
Service voltage range	DC 2.5V ~ 3.2V
Temperature range	-4°F ~ 140°F (-20°C ~ +60°C)
Storage temperature range	-22°F ~ 176°F (-30°C ~ +80°C)
Modulation method	FSK/ASK
Keyless entry transmitterPower source	Lithium 3V battery (1EA)
Transmissible distance	30m or more
Life of battery	2 years or more (at 20 times per day)
Button	3 (Door lock, Door unlock, Trunk)
Transmission frequency	433.92 MHz (GEN RHD, AUS, MES, EUR), 315 MHz (GEN LHD, JAPAN, CHINA)

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Keyless Entry And Burglar Alarm

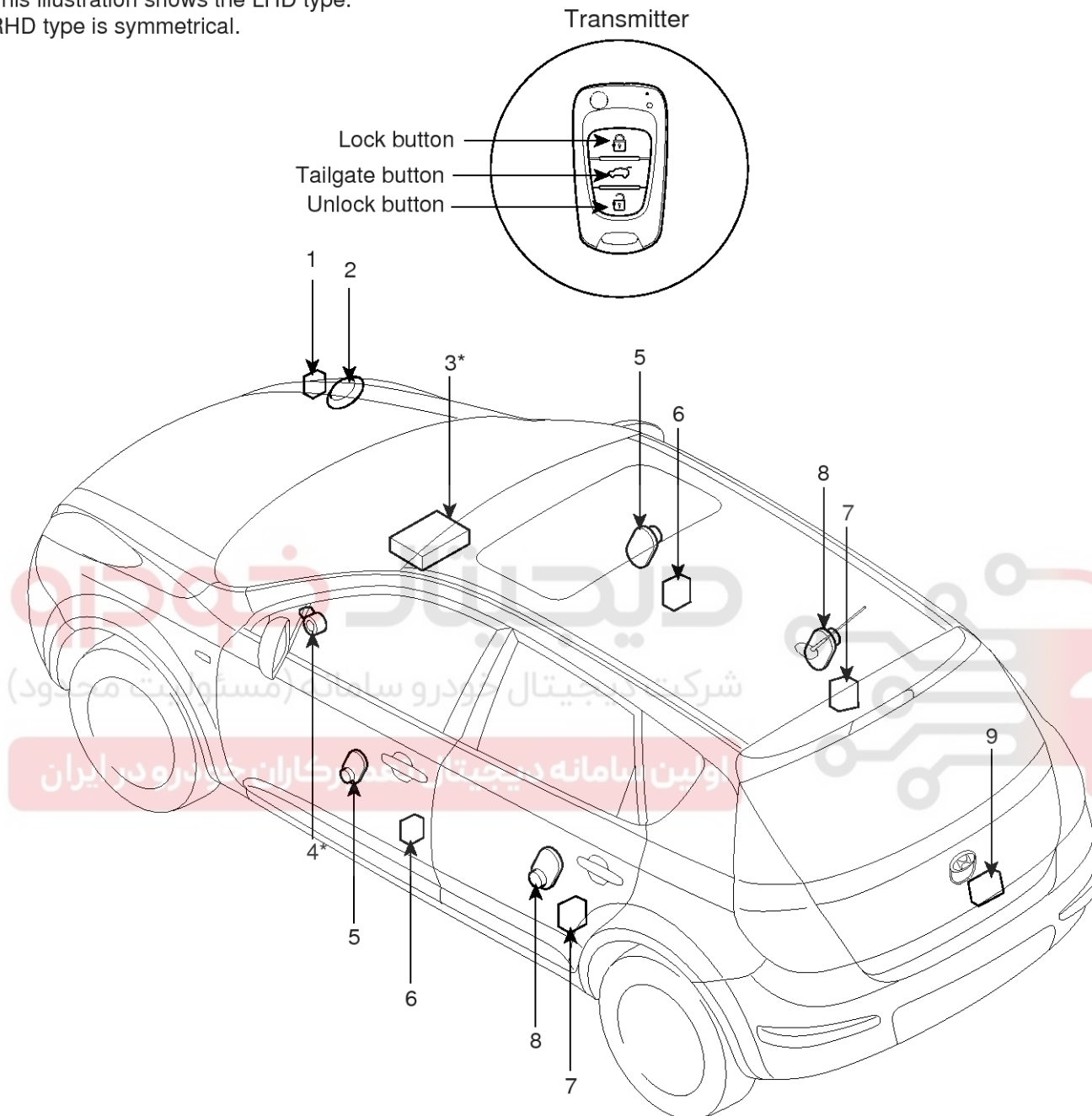
BE-59

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. Hood switch
2. Burglar horn
3. Body control module
4. Key warning switch
5. Front door switch

6. Front door lock actuator & switch
7. Rear door lock actuator & switch
8. Rear door switch
9. Tailgate actuator & switch

SFD8E8080L

BE-60

Body Electrical System

Description

Burglar Alarm System

The burglar alarm system is armed automatically after the doors, hood, and tailgate are closed and locked.

The system is set off when any of these things occur :

- A door is forced open.
- The tailgate is opened.
- The hood is opened.

When the system is set off, the alarm sounds and the hazard lamp flash for about 30 seconds or until the system is disarmed by unlocking the transmitter or door key.

For the system to arm, the ignition switch must be off and the key removed. Then, the body control module must receive signals that the doors, hood, and tailgate are closed and locked. When everything is closed and locked, none of the control unit inputs are grounded.

The door switches, hood switch and tailgate switch are all close and lock the doors with the remote transmitter and then the system arms after 30s.

If anything is opened after the system is armed, the body control module gets a ground signal from that switch, and the system is set off.

If one of the switches is misadjusted or there is a short in the system, the system will not arm. As long as the body control module continues to get a ground signal, it thinks the vehicle is not closed and locked and will not arm.

Keyless Entry System

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

The room lamp, if its switch is in the center position, will come on when you press the UNLOCK button. If you do not open a door, the light will go off in about 30 seconds, the doors will automatically relock, and the burglar alarm system will rearm. If you relock the doors with the remote transmitter within 30 seconds, the light will go off immediately.

You cannot lock or unlock the doors with the remote transmitter if the key is in the ignition switch.

The system will signal you when the doors lock and unlock by flashing the hazard lamp once when they lock and closed, and twice when they unlock.

Function

Keyless Entry Function

DOOR LOCK / UNLOCK and Tailgate operations are performed with remocon

1. Keyless entry function is performed in a state that key in SW is eliminated from key cylinder
2. LOCK / UNLOCK and tailgate signals are received from the transmitter and DOOR LOCK / UNLOCK and Tailgate signals are output.
3. In case of tailgate, this operation is performed when pushing the button for 0.5s or more.

Transmitter(TX) SPEC

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

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

- 3) For the registration procedures by using Hi-scan tool, refer to "TRANSMITTER CODE REGISTRATION".

Keyless Entry And Burglar Alarm

BE-61

3. Transmitter signal & Receiver Spec

1) Transmission signal

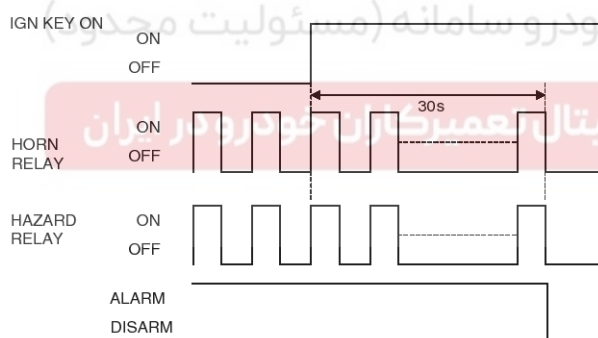
- Transmit relevant transmission DATA (Transmission frame) twice by pushing TX SW.

- Only LOCK signal is output when pushing TX LOCK SW and UNLOCK SW at the same time.

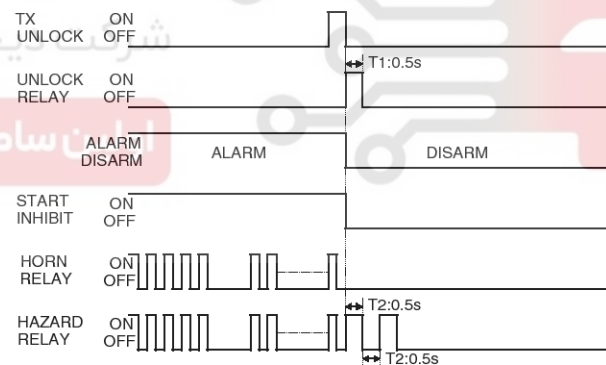
DISARM

Condition 1

State	Description
Initial Condition	ALARM state
Event	<ul style="list-style-type: none"> • IGN KEY ON during 30sec or ALT"L" = ON • IGN KEY ON during 3sec • TX(Transmitter) Unlock & Any Door open(4Door SW ON) • TX(Transmitter) Lock & Lock confirm failed • Driver door key unlock switch ON. (user select option : enable) • Driver door key lock SW ON & Lock confirm failed (user select option : enable) • TX tailgate ON.
Action	<ul style="list-style-type: none"> • The state goes to DISARM state • Hazard relay off, Horn relay off and start inhibit relay off. • TX Unlock <ul style="list-style-type: none"> - Unlock relay on for 0.5 sec. - Hazard relay on (TWICE)



SHDBE6102L



SHDBE6081L

Condition 2

State	Description
Initial Condition	DISARM state & (IGN KEY OUT) & Any Door open
Event	<ul style="list-style-type: none"> • TX Unlock
Action	<ul style="list-style-type: none"> • No state change • TX UNLOCK <ul style="list-style-type: none"> - Unlock relay on for 0.5 sec - Hazard relay on (Twice)

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Body Electrical System

Condition 3

State	Description
Initial Condition	ARMWAIT state
Event	<ul style="list-style-type: none"> At least one entrance opened Any door is unlocked Key in SW ON Driver door key unlock SW ON (user select option : enable)
Action	The state goes to DISARM state

Condition 4

State	Description
Initial Condition	AUTOLOCKTIMER1 state
Event	<ul style="list-style-type: none"> At least one entrance opened Key in SW ON Lock by AUTOLOCK, but Lock confirmation failure Tx Lock, but Lock confirmation failure Driver door key unlock SW ON, but Lock confirmation failure (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to DISARM state

Condition 5

State	Description
Initial Condition	AUTOLOCKTIMER2 state
Event	<ul style="list-style-type: none"> Any Door open Key in SW ON Lock by AUTOLOCK, but Lock confirmation failure Tx Lock, but Lock confirmation failure Driver door key lock SW ON, but Lock confirmation failure (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to DISARM state

Condition 6

State	Description
Initial Condition	ARM state
Event	<ul style="list-style-type: none"> IGN KEY ON Driver door key unlock SW ON (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to DISARM state

Keyless Entry And Burglar Alarm

BE-63

Condition 7

State	Description
Initial Condition	REARM state
Event	<ul style="list-style-type: none"> IGN KEY ON during 30sec or (ALT"L" = ON & IGN KEY ON during 3sec) Tx Lock, but Lock confirmation failure Driver door key unlock SW ON (user select option : enable) Driver door key lock SW ON & Lock confirmation failure (user select option : enable) TX tailgate ON.
Action	<ul style="list-style-type: none"> The state goes to DISARM state Start Inhibit relay OFF

Condition 8

State	Description
Initial Condition	PREARM state
Event	<ul style="list-style-type: none"> Key in SW ON Driver door key unlock SW ON (user select option : enable) All entrance closed & Any Door is unlocked Any Door open & Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to DISARM state TX UNLOCK <ul style="list-style-type: none"> Unlock relay on for 0.5sec Hazard relay on (Twice)

Condition 9

State	Description
Initial Condition	AutoLockTimer3 state
Event	<ul style="list-style-type: none"> Key in SW ON Hood open TX LOCK, but LOCK confirmation failure → (user select option : enable) Driver door key unlock SW ON Any Door open Tailgate Driver door key lock SW ON Tailgate & Lock confirmation failure
Action	<ul style="list-style-type: none"> The state goes to DISARM state (user select option : enable)

ARM

Condition 1

State	Description
Initial Condition	ARM state
Event	<ul style="list-style-type: none"> Tx Lock
Action	<ul style="list-style-type: none"> No state change Hazard relay 1Time on(1sec)

BE-64

Body Electrical System

Condition 2

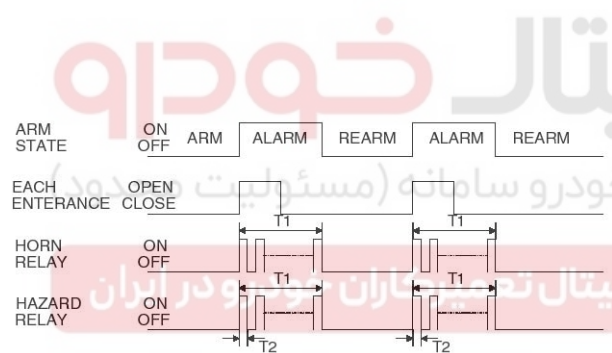
State	Description
Initial Condition	ARMWAIT state
Event	<ul style="list-style-type: none"> ARMWAITTIMER is expired
Action	<ul style="list-style-type: none"> The state goes to ARM state

ALARM

- LED is Blinking

Condition 1

State	Description
Initial Condition	ARM state
Event	<ul style="list-style-type: none"> Any entrance open (DOORS, TAILGATE, or HOOD) Key in SW on(only for china)
Action	<ul style="list-style-type: none"> The state goes to ALARM state The horn is ON one time for 27sec(± 2sec) The hazard is driven also (During Horn driving) Engine Start Inhibit is ON



SEDBE7125L

T1 : 27s \pm 2sec, T2 : 0.5s \pm 0.1sec.

Condition 2

State	Description
Initial Condition	REARM state
Event	<ul style="list-style-type: none"> Any door open or Hood open or tailgate open
Action	<ul style="list-style-type: none"> The state goes to ALARM state The horn is ON one time for 27sec (± 2sec.) The hazard is driven also (During horn driven)

NOTICE

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

Keyless Entry And Burglar Alarm

BE-65

ARM WAIT MODE

Condition 1

State	Description
Initial Condition	ARMWAIT state
Event	<ul style="list-style-type: none"> Tx Lock
Action	<ul style="list-style-type: none"> NO state change TX LOCK <ul style="list-style-type: none"> Hazard relay 1 Time on(1sec)

Condition 2

State	Description
Initial Condition	DISARM state & IGN KEY OUT & All entrances closed (DOORS, HOOD and TAILGATE)
Event	<ul style="list-style-type: none"> Tx Lock & locked confirmed All doors are closed or Tailgate is closed when all doors locked (user select option : enable) Driver door key lock SW ON & Locked confirmed → (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to ARMWAIT State Start ARMWAITTIMER Hazard relay 1 Time on (1 sec.) (Except key lock)

Condition 3

State	Description
Initial Condition	ALARM state & IGN KEY OUT & All entrances closed(DOORS, HOOD and TAILGATE)
Event	<ul style="list-style-type: none"> Tx Lock & locked confirmed Driver door key lock SW ON & Locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to ARMWAIT state Start ARMWAITTIMER Horn relay off Start inhibit relay off Hazard relay 1Time on(1sec) (TX LOCK)

Condition 4

State	Description
Initial Condition	AUTOLOCKTIMER1 state
Event	<ul style="list-style-type: none"> AUTO LOCK confirmed Tx Lock & locked confirmed Driver door key lock SW ON & Locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to ARMWAIT state Start ARMWAITTIMER Hazard relay 1Time on(1sec) (AUTO LOCK, TX LOCK)

BE-66

Body Electrical System

Condition 5

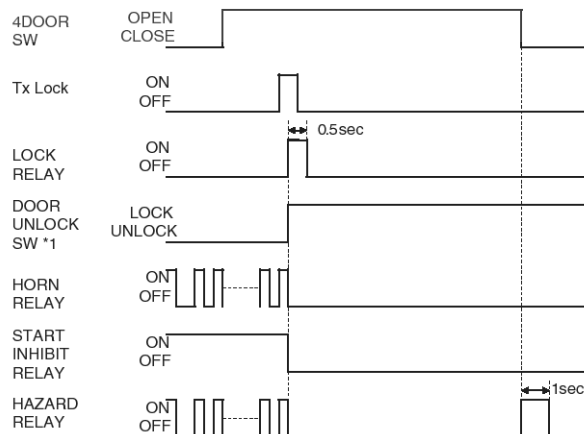
State	Description
Initial Condition	PREARM state
Event	<ul style="list-style-type: none"> Hood and 4door are closed & All doors locked & Tailgate closed.
Action	<ul style="list-style-type: none"> The state goes to ARMWAIT state Start ARMWAITTIMER Hazard relay 1Time on(1sec)

Condition 6

State	Description
Initial Condition	REARM state
Event	<ul style="list-style-type: none"> Tx Lock & locked confirmed Drive door key lock SW ON & locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to ARMWAIT state Start ARMWAITTIMER Start inhibit relay off Hazard relay 1Time on(1sec) (TX LOCK)

Condition 7

State	Description
Initial Condition	Auto Lock Timer3 state
Event	<ul style="list-style-type: none"> Tx Lock & locked confirmed Drive door key lock SW ON & locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to ARMWAIT state Start ARMWAITTIMER Hazard relay 1Time on(1sec) (TX LOCK)



*1 : Lock : Driver door unlock SW or Passenger door unlock SW or Rear door unlock SW is LOCK
 Unlock : Driver door unlock SW or Passenger door unlock SW or Rear door unlock SW is UNLOCK

SHDBE6103L

Keyless Entry And Burglar Alarm

BE-67

REARM MODE

Condition 1

State	Description
Initial Condition	ALARM state
Event	<ul style="list-style-type: none"> All entrance is closed & Alarm Patten finished
Action	<ul style="list-style-type: none"> The state goes to REARM state

AUTOLOCKTIMER1 MODE

Condition 1

State	Description
Initial Condition	ARM state
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER1 state Start AUTOLOCKTIMER1 Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 2

State	Description
Initial Condition	AUTOLOCKTIMER1 state
Event	<ul style="list-style-type: none"> AUTO LOCK TIMER1 is expired Tx Unlock
Action	<ul style="list-style-type: none"> No state change Tx Unlock <ul style="list-style-type: none"> Hazard relay Twice on(0.5s ON/0.5s OFF) Restart AUTOLOCKTIMER1 Expire AUTOLOCKTIMER1 <ul style="list-style-type: none"> AUTOLOCK

Condition 3

State	Description
Initial Condition	ARMWAIT state
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER1 state Start AUTOLOCKTIMER1 Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 4

State	Description
Initial Condition	DISARM state & All entrances closed (DOORS, HOOD & TAILGATE) & IGN KEY OUT
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER1 state Start AUTOLOCKTIMER1 Hazard relay Twice on(0.5s ON/0.5s OFF)

BE-68

Body Electrical System

Condition 5

State	Description
Initial Condition	ALARM state & All entrances are closed (DOORS, HOOD & TAILGATE)
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER1 state Start AUTOLOCKTIMER1 Hazard relay Twice on(0.5s ON/0.5s OFF) Start inhibit relay off Horn relay off

Condition 6

State	Description
Initial Condition	REARM state
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER1 state Start AUTOLOCKTIMER1 Hazard relay Twice on(0.5s ON/0.5s OFF) Start inhibit relay off

Condition 7

State	Description
Initial Condition	AutoLock Timer3 state
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER1 state Start AUTOLOCKTIMER1 Hazard relay Twice on(0.5s ON/0.5s OFF)

Keyless Entry And Burglar Alarm

BE-69

AUTOLOCKTIMER2 MODE

Condition 1

State	Description
Initial Condition	AUTOLOCKTIMER2 state
Event	<ul style="list-style-type: none"> Timer is expired Tx Unlock
Action	<ul style="list-style-type: none"> No State change Tx Unlock <ul style="list-style-type: none"> Hazard relay Twice on(0.5s ON/0.5s OFF) The timer restart Expire AUTOLOCKTIMER2 <ul style="list-style-type: none"> AUTOLOCK

Condition 2

State	Description
Initial Condition	DISARM state & All Doors are closed & (HOOD is opened) & IGN KEY OUT
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER2 state Start AUTOLOCKTIMER2 Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 3

State	Description
Initial Condition	ALARM state & All Door are closed & (HOOD is opened)
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER2 state Start AUTOLOCKTIMER2 Hazard relay Twice on(0.5s ON/0.5s OFF) Start inhibit relay off Horn relay off

Condition 4

State	Description
Initial Condition	PREARM state All Doors are closed & (HOOD is opened)
Event	<ul style="list-style-type: none"> Tx Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCKTIMER2 state Start AUTOLOCKTIMER2 Hazard relay Twice on(0.5s ON/0.5s OFF)

BE-70

Body Electrical System

AUTOLOCK TIMER3 MODE

Condition 1

State	Description
Initial Condition	ARM state
Event	<ul style="list-style-type: none"> Tx TAILGATE Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCK TIMER3 state Start AUTOLOCK TIMER3 Hazard relay Twice on(0.5s ON/0.5s OFF)

Condition 2

State	Description
Initial Condition	AutoLockTimer3 state
Event	<ul style="list-style-type: none"> Tx TAILGATE Unlock
Action	<ul style="list-style-type: none"> Restart AUTOLOCK TIMER3 state

Condition 3

State	Description
Initial Condition	ARMWAIT state
Event	<ul style="list-style-type: none"> Tx TAILGATE Unlock
Action	<ul style="list-style-type: none"> The state goes to AUTOLOCK TIMER3 state Start AUTOLOCK TIMER3 Hazard relay Twice on(0.5s ON/0.5s OFF)

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Keyless Entry And Burglar Alarm

BE-71

PREARM MODE

Condition 1

State	Description
Initial Condition	AUTOLOCKTIMER2 state
Event	<ul style="list-style-type: none"> AUTOLOCK & Locked confirmed Tx Lock & locked confirmed Driver door key lock SW ON & Locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to PREARM state

Condition 2

State	Description
Initial Condition	DISARM state & IGN KEY OUT
Event	<ul style="list-style-type: none"> ((4Door Not Closed = ON or Tailgate SW = Open or (Hood SW = ON)) & Tx Lock & Locked confirmed ((4Door Not Closed = ON or Tailgate SW = Open or (Hood SW = ON)) & driver door key lock SW ON on & Locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to PREARM state

Condition 3

State	Description
Initial Condition	ALARM state & IGN KEY OUT (Hood SW ON or Tailgate unlock SW ON or any door open)
Event	<ul style="list-style-type: none"> Tx Lock & Locked confirmed Driver door key lock SW ON & Locked confirmed (user select option : enable)
Action	<ul style="list-style-type: none"> The state goes to PREARM state Start inhibit relay off Horn relay off Hazard relay OFF

Condition 4

State	Description
Initial Condition	AUTOLOCKTIMER3 state
Event	<ul style="list-style-type: none"> Expire Auto Lock Timer3 Tailgate open
Action	<ul style="list-style-type: none"> The state goes to PREARM state.

BE-72

Body Electrical System

RESET

Condition 1

State	Description
Initial Condition	During ALARM, REARM
Event	<ul style="list-style-type: none"> TAKING THE BATTERY OUT then take on.
Action	<ul style="list-style-type: none"> The state goes to ALARM mode Horn relay 1 Times on Start inhibitor relay ON

Condition 2

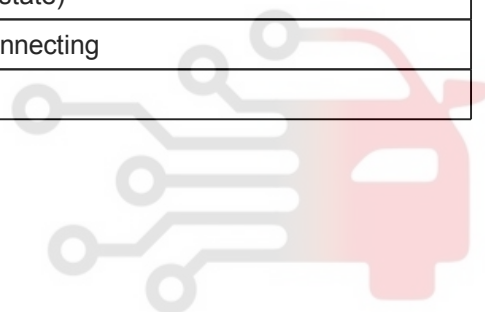
State	Description
Initial Condition	ARM state
Event	<ul style="list-style-type: none"> TAKING THE BATTERY OUT Then reconnecting
Action	<ul style="list-style-type: none"> The state goes to ARM mode

Condition 3

State	Description
Initial Condition	Other state (Except ARM, ALARM, REARM state)
Event	<ul style="list-style-type: none"> TAKING THE BATTERY OUT Then reconnecting
Action	<ul style="list-style-type: none"> The state goes to DISARM mode

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

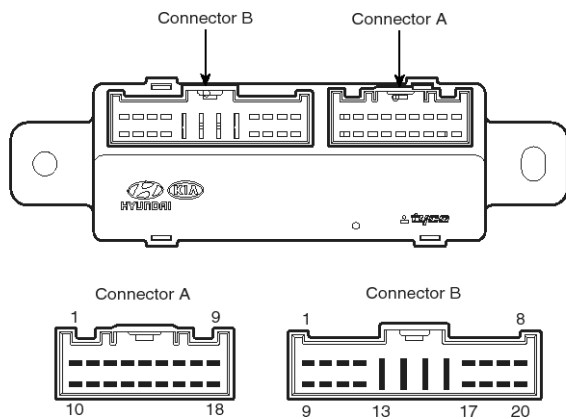
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Keyless Entry And Burglar Alarm

BE-73

Inspection



SHDBE6137L

Burglar Alarm Horn Relay

Check for continuity between the terminals.

1. There should be continuity between the No.8 and No.18 terminals when power and ground are connected to the No.6 and No.19 in the ICM-B.
2. There should be no continuity between the No.8 and No.18 terminals when power is disconnected.

Burglar Alarm Relay

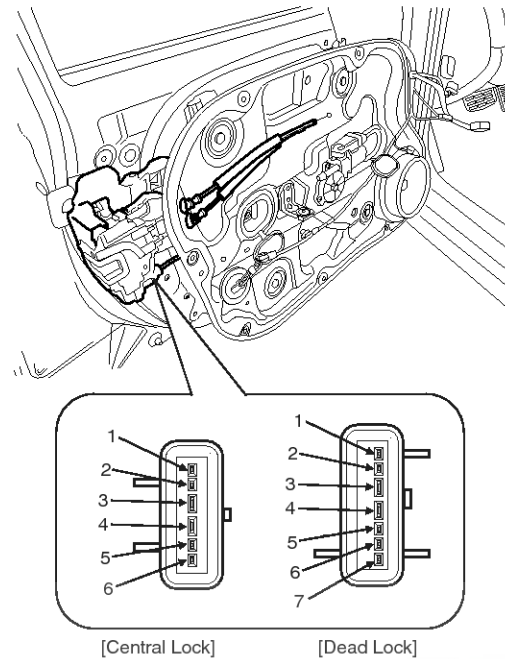
Check for continuity between the terminals.

1. There should be continuity between the No.3 and No.10 terminals when power and ground are connected to the No.1 and No.11 terminals in the ICM-A.
2. There should be no continuity between the No.3 and No.10 terminals when power is disconnected.

Front Door Lock Actuator

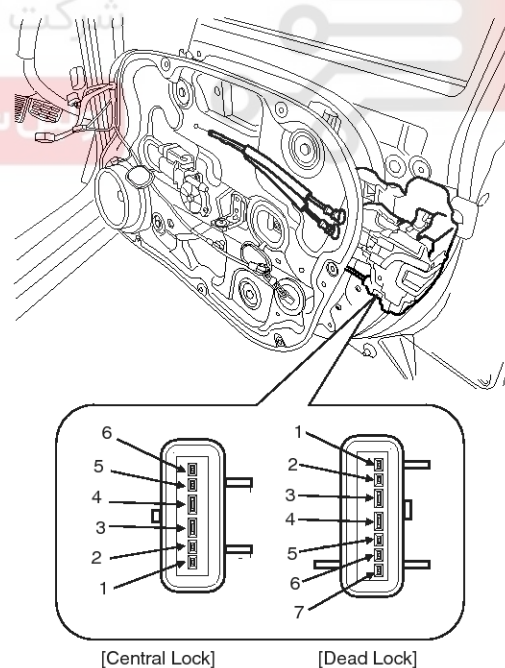
1. Remove the front door trim.
(Refer to the BD group - "Front door")
2. Remove the front door module.
(Refer to the BD group - "Front door")

3. Disconnect the connectors from the actuator.
[LHD]



SFDBE8048L

[RHD]



SFDBE8048R

BE-74

Body Electrical System

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

[Central Lock] () : RHD

Terminal		4(3)	3(4)
Position			
Front left	Central Lock	⊕	⊖
	Central Unlock	⊖	⊕
Terminal		3(4)	4(3)
Position			
Front right	Central Lock	⊖	⊕
	Central Unlock	⊕	⊖

SFD8E8049L

[Dead Lock] RHD only

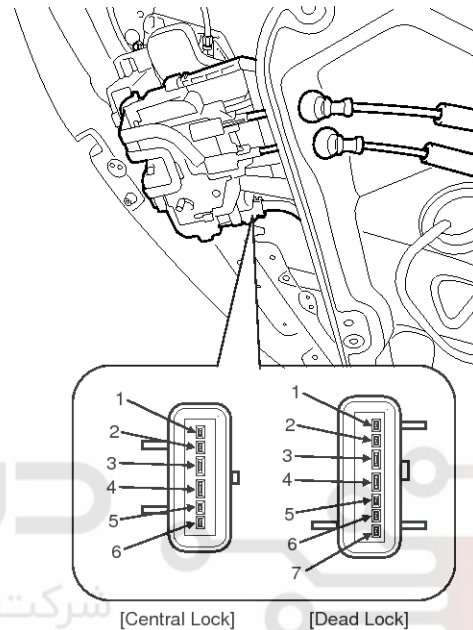
Terminal			5	6	7
Position					
Front left	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖
Terminal			3	2	1
Position					
Front Right	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖

SFD8E8050L

Rear Door Lock Actuator

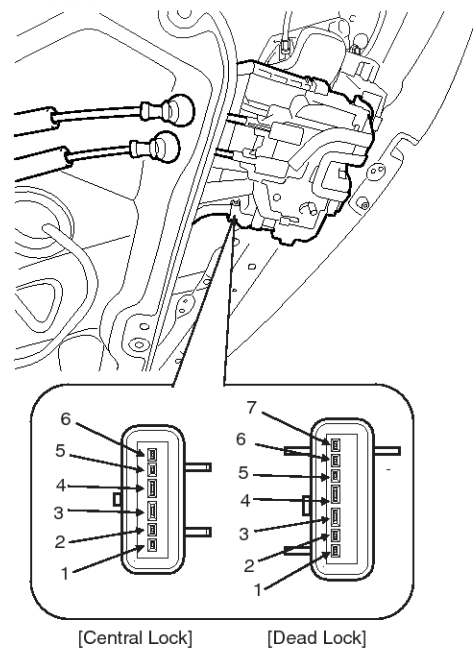
1. Remove the rear door trim.
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
(Refer to the BD group - "Rear door")
3. Disconnect the connectors from the actuator.

[LHD]



SFD8E8051L

[RHD]



SFD8E8051R

Keyless Entry And Burglar Alarm

BE-75

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

[Central Lock] () : RHD

Terminal		4(3)	3(4)
Position			
Rear left	Central Lock	⊕	⊖
	Central Unlock	⊖	⊕
Terminal		3(4)	4(3)
Position			
Rear right	Central Lock	⊖	⊕
	Central Unlock	⊕	⊖

SFDBE8160L

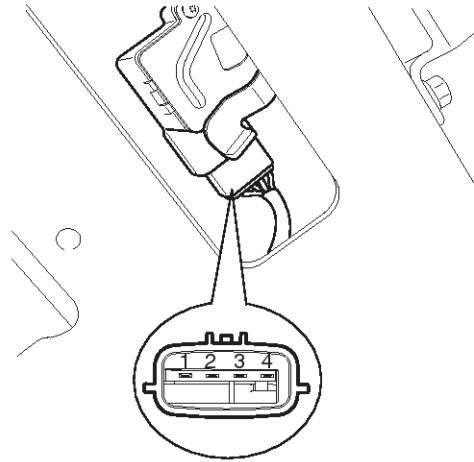
[Dead Lock] RHD only

Terminal			5	6	7
Position					
Rear left	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖
Terminal			3	2	1
Position					
Rear Right	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖

SFDBE8161L

Tailgate Lock Actuator Inspection

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



SEDBE7134L

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

Terminal		3	4
Position			
Unlock		⊕	⊖

SEDBE7135L

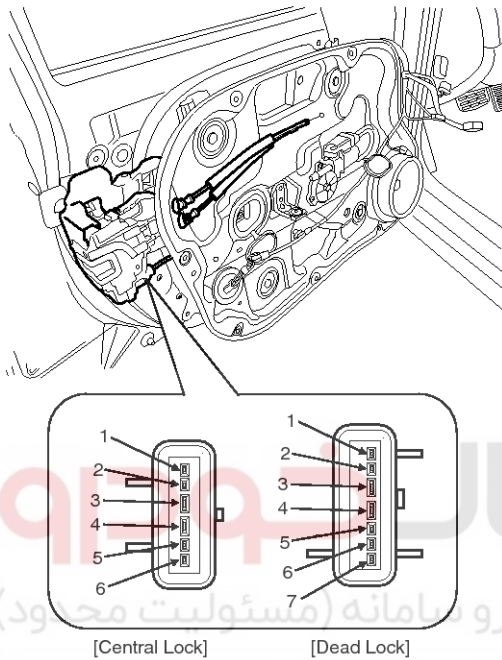
BE-76

Body Electrical System

Front Door Lock Switch

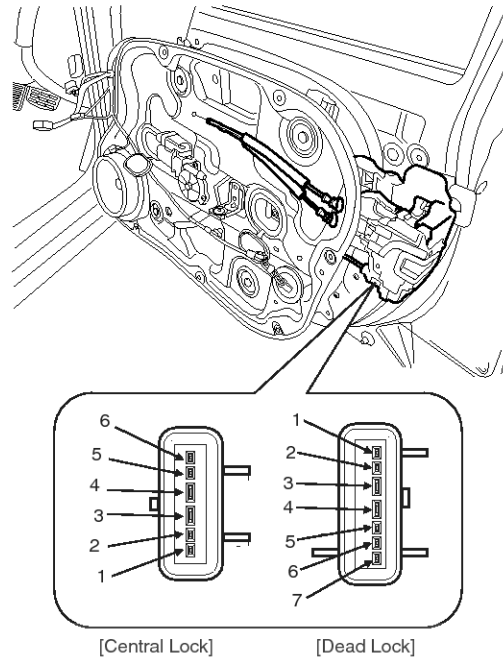
1. Remove the front door trim.
(Refer to the BD group - "Front door")
2. Remove the front door module.
(Refer to the BD group - "Front door")
3. Disconnect the connectors from the actuator.

[LHD]



SFD8E8048L

[RHD]



SFD8E8048R

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

CENTRAL LOCK () : RHD

Terminal		2(5)	5(2)	1(6)
Position				
Front left	Clockwise	○—○		
	Counter-clockwise		○—○	
Terminal		5(2)	2(5)	6(1)
Position				
Front right	Clockwise	○—○		
	Counter-clockwise		○—○	○—○

SFD8E8052L

[DEAD LOCK] RHD only

Terminal		2	3	4
Position				
Front left	Clockwise	○—○		
	Counter-clockwise		○—○	
Terminal		4	5	6
Position				
Front right	Clockwise	○—○		
	Counter-clockwise		○—○	

SFD8E8148L

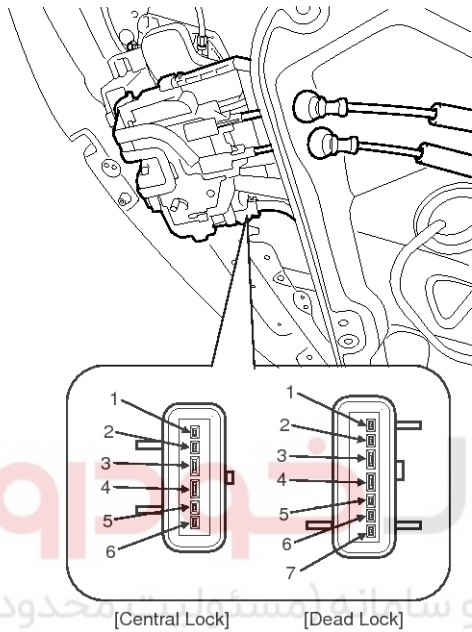
Keyless Entry And Burglar Alarm

BE-77

Rear Door Lock Switch

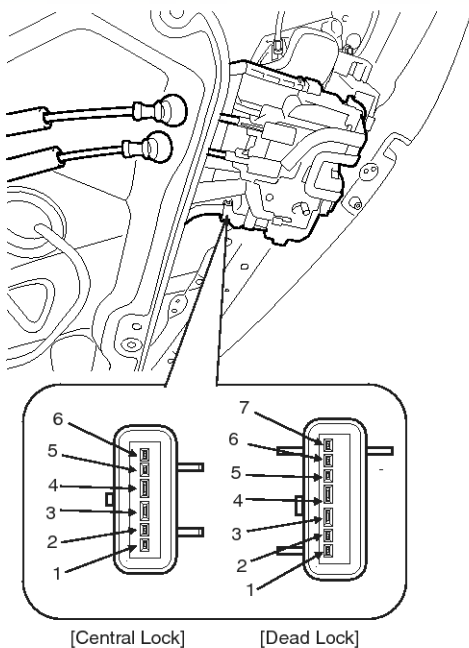
1. Remove the rear door trim.
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
(Refer to the BD group - "Rear door")
3. Disconnect the connectors from the actuator.

[LHD]



SFDBE8051L

[RHD]





SFDBE8051R

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

[CENTRAL LOCK]



() : RHD

Terminal			5(2)	6(1)
Position				
Central door lock	Rear left	Lock		
		Unlock		
Terminal			2(5)	1(6)
Position				
Central door lock	Rear right	Lock		
		Unlock		

SFDBE8053L

[DEAD LOCK]

RHD only

Terminal			1	3
Position				
Central door lock	Rear left	Lock		
		Unlock		
Terminal			7	5
Position				
Central door lock	Rear right	Lock		
		Unlock		

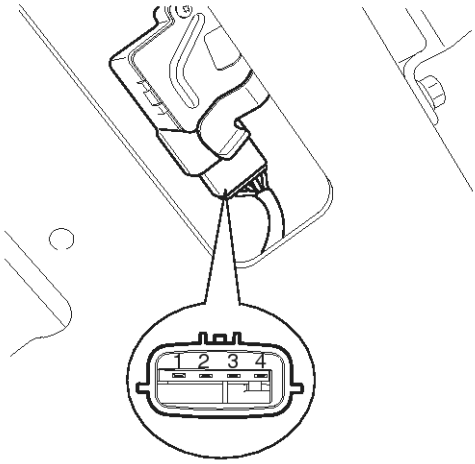
SFDBE8163L

BE-78

Body Electrical System

Tailgate Switch

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



SEDBE7134L

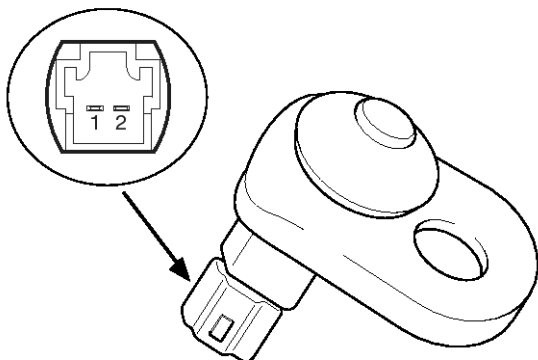
3. Check for continuity between the terminals in each switch position according to the table.

Terminal	1	2
Position		
Lock		
Unlock	○	○

SEDBE7138L

Door Switch

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



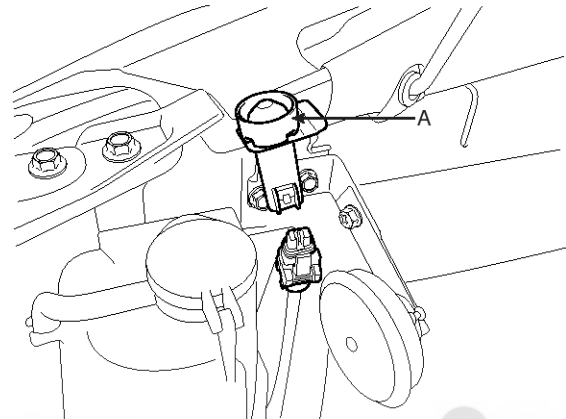
SHDBE6202D

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

ETQF180D

Hood Switch

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



SHDBE6139D

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

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

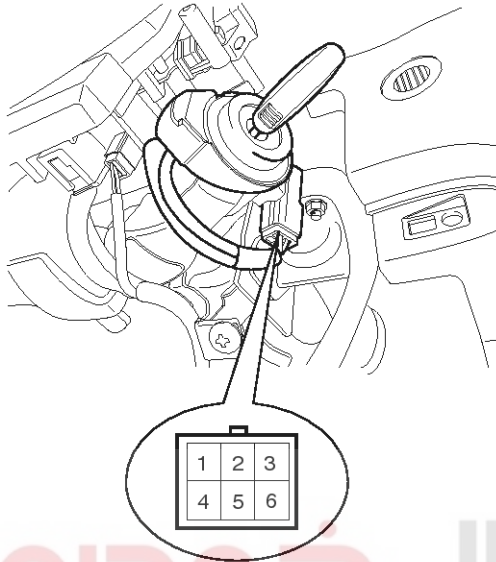
ETBF180B

Keyless Entry And Burglar Alarm

BE-79

Key In Switch

1. Remove the crash pad lower panel.
(Refer to BD group - "Crash pad")
2. Disconnect the 6P connector from the key warning switch.



SEDBE7141L

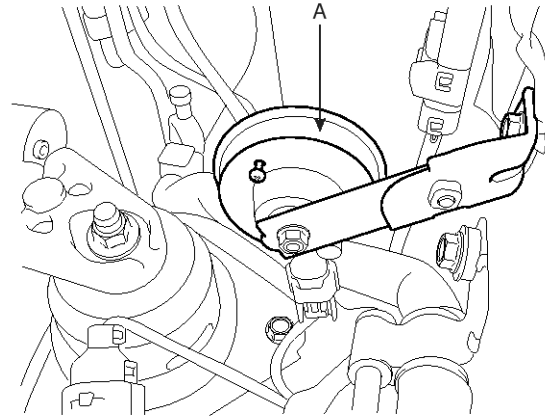
3. Check for continuity between the terminals in each position according to the table.

Terminal	2	4
Key position		
Insert	○	○
Removal		

SHDBE6203L

Burglar Horn

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



SHDBE6143D

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

BE-80

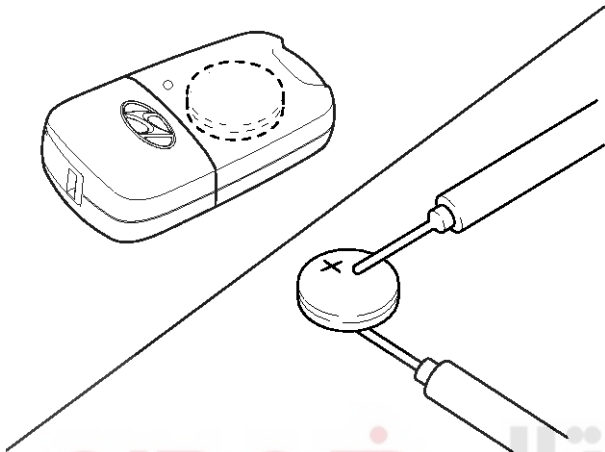
Body Electrical System

Transmitter

Inspection

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

Standard voltage : 3V

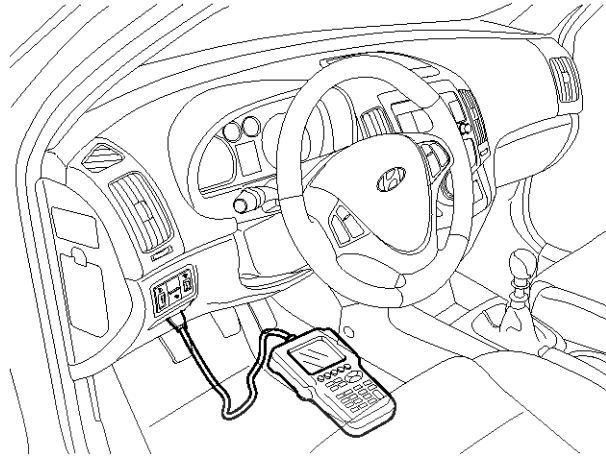


SFD8E8318L

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

Transmitter Code Registration

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



SFD8E8185L

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

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

- 01. ENGINE (GASOLINE)
- 02. ENGINE (DIESEL)
- 03. AUTOMATIC TRANSAXLE
- 04. ABS/ESP
- :
- :
- :

09. CODE SAVING

SFD8E8054L

Keyless Entry And Burglar Alarm

BE-81

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

TRANSMITTER CODE SAVE

REMOVE THE IG. KEY FROM THE KEY CYLINDER. CONNECT THE DLC CABLE AND 16 PIN CONNECTOR OF THE VEHICLE.

PRESS [ENTER], IF YOU ARE READY!

ETRF065M

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

TRANSMITTER CODE SAVE

1ST. TRANSMITTER SAVE
PRESS THE TRANSMITTER [LOCK] BUTTON
OR [UNLOCK] BUTTON FOR 1 SECOND.

* NO. OF CODED KEY : 0 EA

ETRF065N

TRANSMITTER CODE SAVE

1ST. TRANSMITTER SAVE
PRESS THE TRANSMITTER [LOCK] BUTTON
OR [UNLOCK] BUTTON FOR 1 SECOND.

1ST. TRANSMITTER SAVE SUCCESS!
IF YOU WANT TO SAVE THE 2ND KEY
PRESS [YES], OR NOT PRESS [NO]

* NO. OF CODED KEY : 1 EA

ETRF065O

TRANSMITTER CODE SAVE

2ND. TRANSMITTER SAVE
PRESS THE TRANSMITTER [LOCK] BUTTON
OR [UNLOCK] BUTTON FOR 1 SECOND.

* NO. OF CODED KEY : 1 EA

ETRF065P

TRANSMITTER CODE SAVE

2ND. TRANSMITTER SAVE
PRESS THE TRANSMITTER [LOCK] BUTTON
OR [UNLOCK] BUTTON FOR 1 SECOND.

2ND. TRANSMITTER SAVE SUCCESS!
CODE SAVING IS COMPLETED!
IF YOU STOP, PRESS [ESC] KEY!!!

* NO. OF CODED KEY : 2 EA

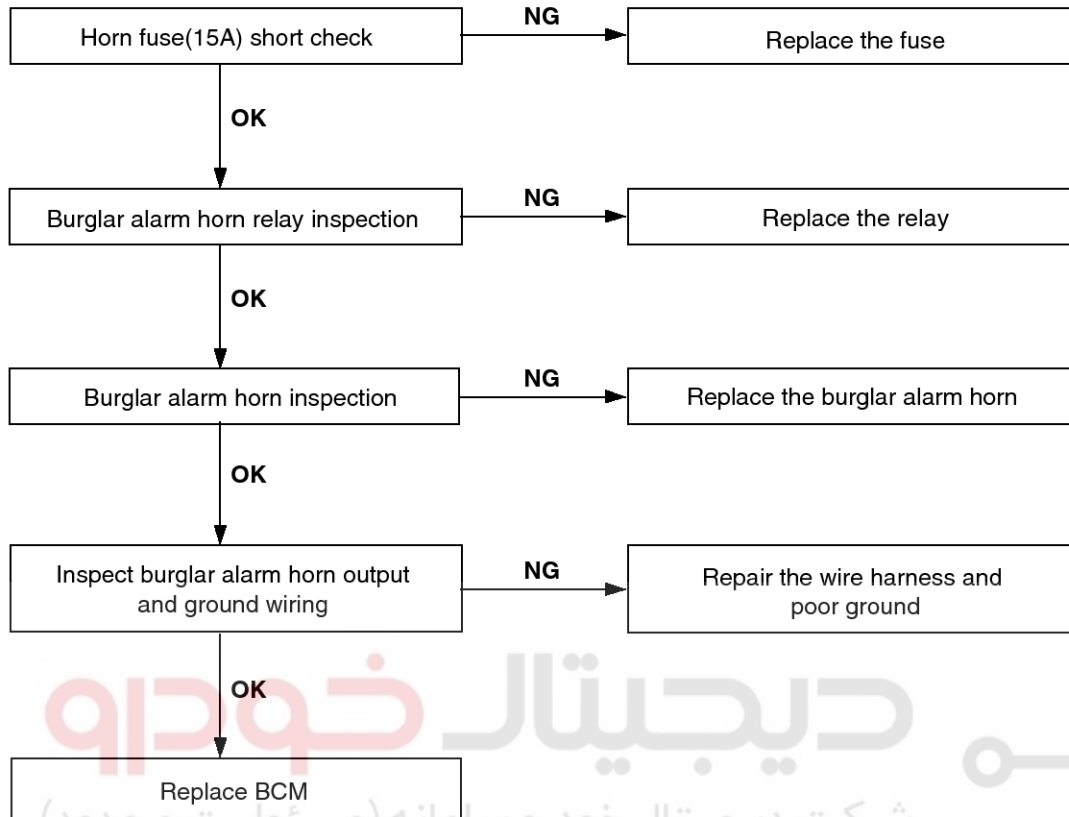
ETRF065Q

BE-82

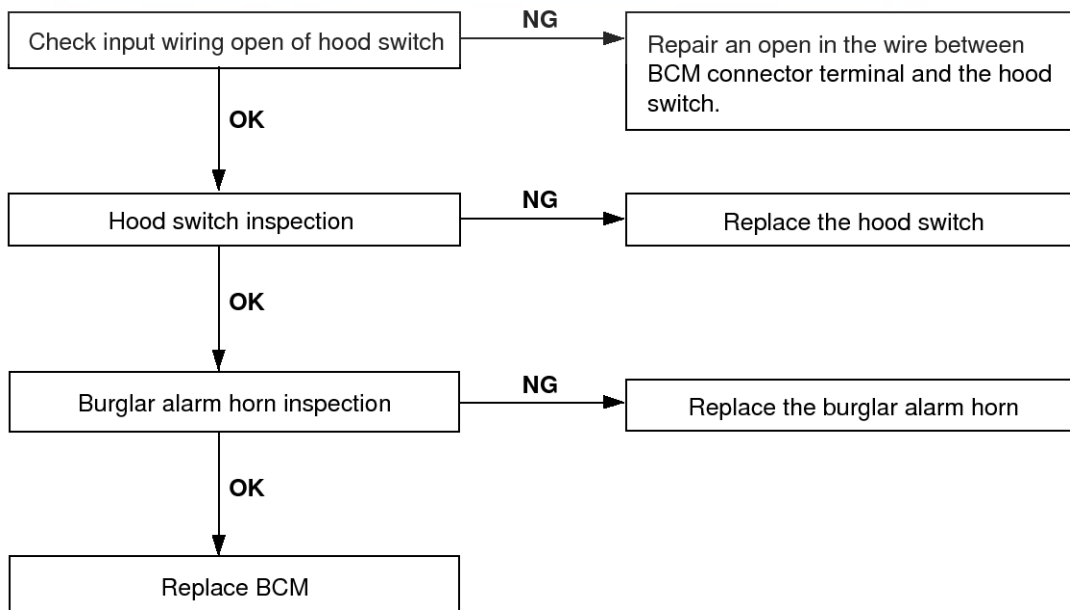
Body Electrical System

Troubleshooting

1. Alarm does not work. (Hazard lamps work)



2. When hood is opened in ARM mode, burglar alarm does not work.



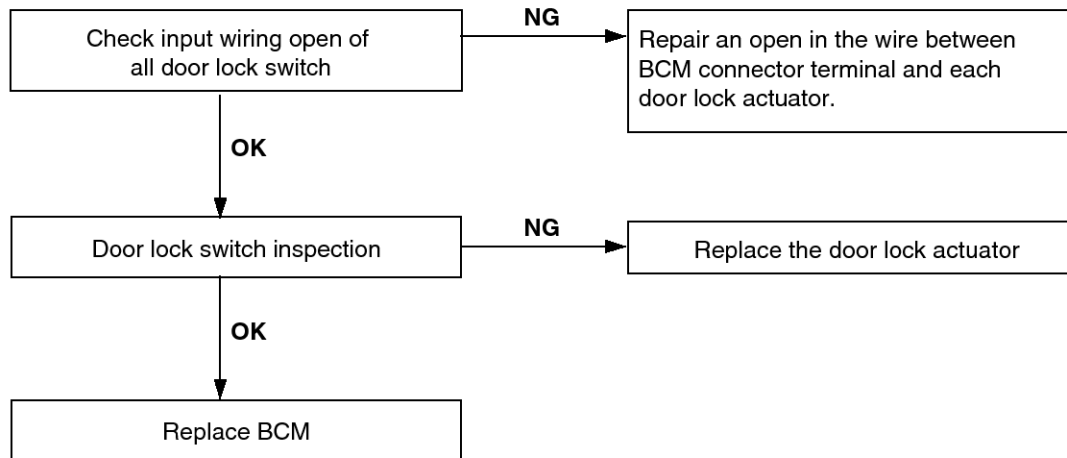
SCMBE6126L

SFDBE8401L

Keyless Entry And Burglar Alarm

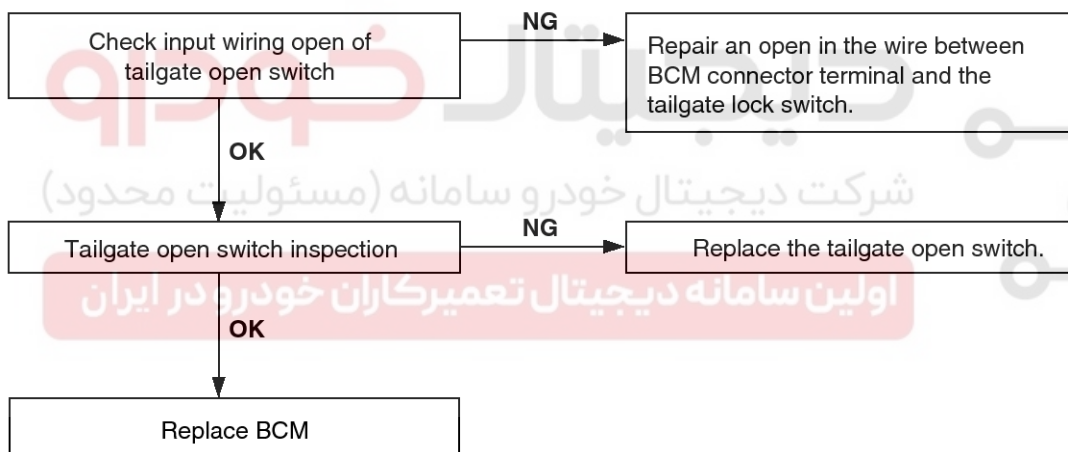
BE-83

3. When door is opened, burglar alarm does not work.
(If tailgate and hood is opened, alarm works)



SHDBE6128L

4. When tailgate is opened in ARM mode, burglar alarm does not work.

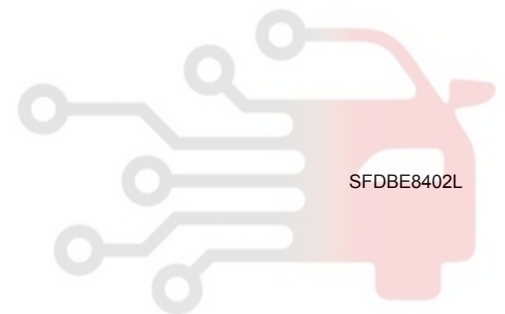
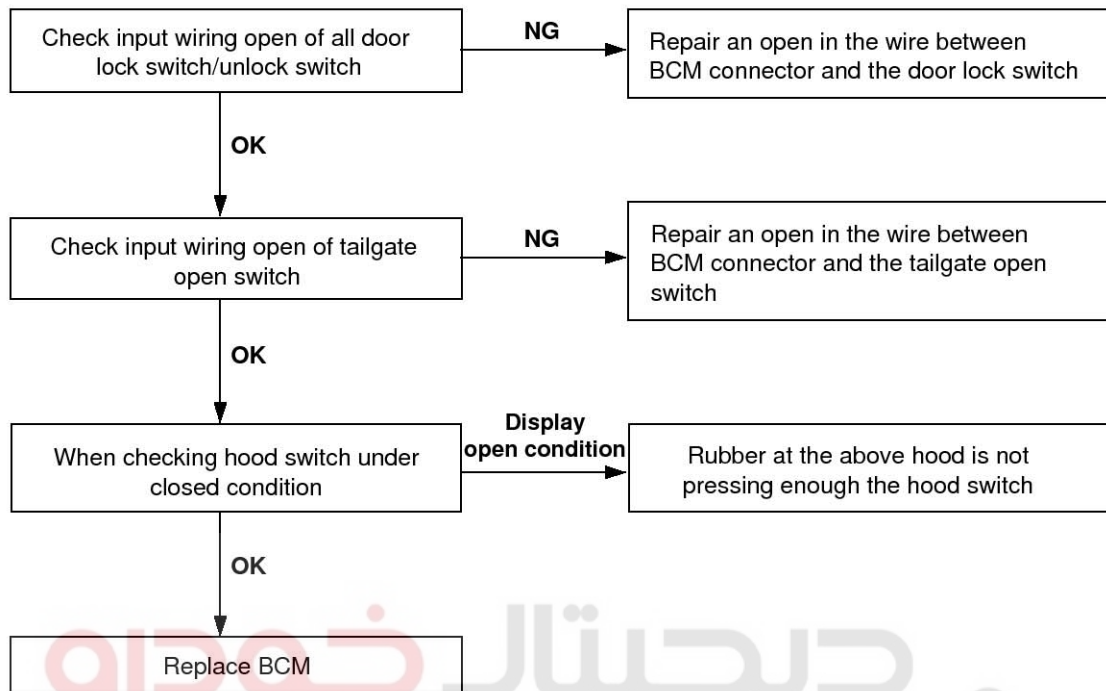


SHDBE6129L

BE-84

Body Electrical System

5. When the vehicle is locked by the transmitter, central door lock function works but hazard lamp doesn't blink.



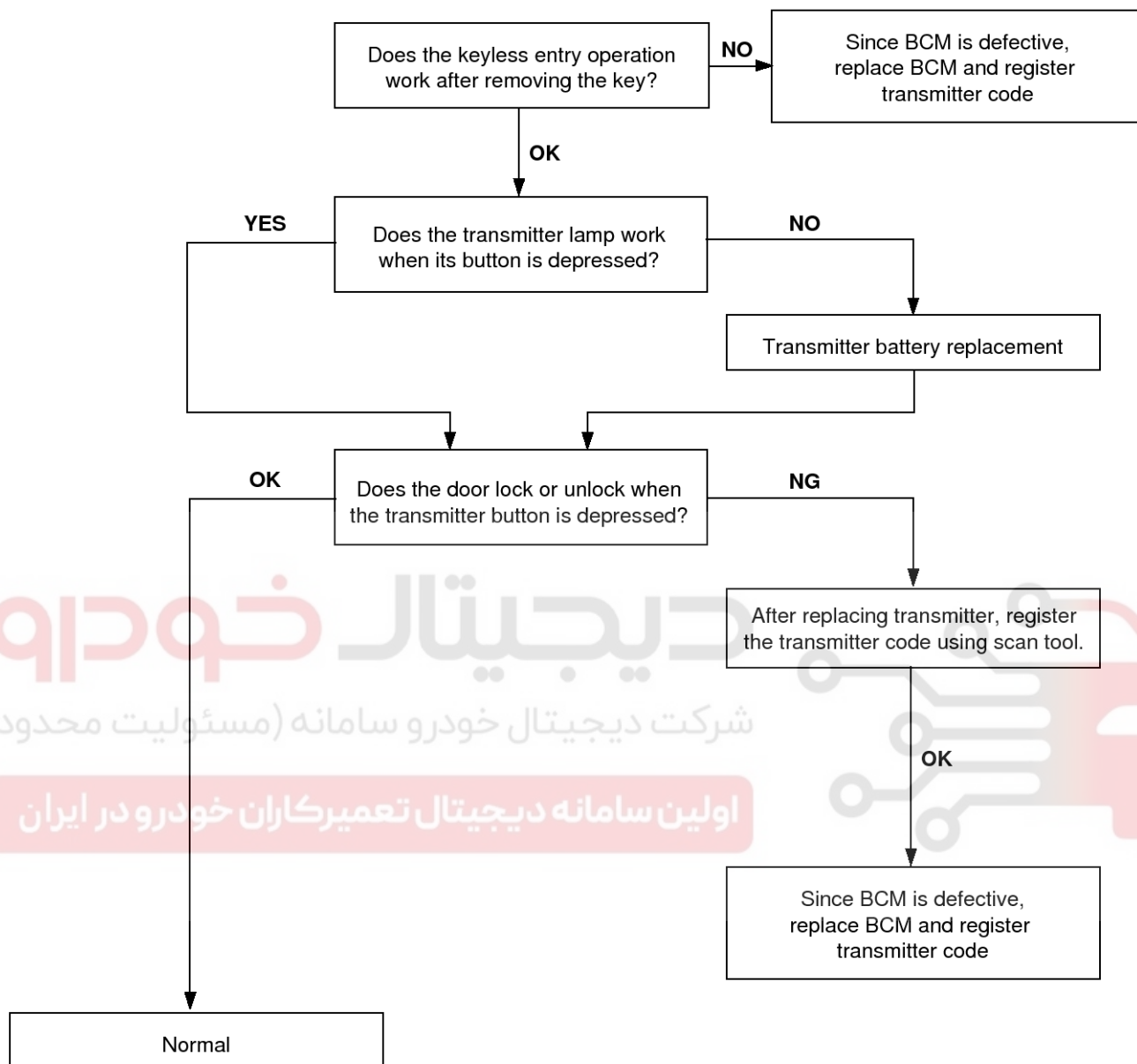
شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Keyless Entry And Burglar Alarm

BE-85

6. Central door lock function works, but keyless entry system does not work.



SFDBE8403L

BE-86**Body Electrical System****BCM (Body Control Module)****Body Control Module (BCM)****Specifications**

Item	Requirement	Remark
Rated voltage	DC 12V	Shall activate normally in these range.
Operating voltage range	DC 9 ~ 16V	
Operating temperature range	-30°C ~ +80°C	
Storage temperature range	-40°C ~ +85°C	
Max humidity in use	95%	
High voltage resistance	24V	
Insulation resistance	100Mohm or more (measured with 500V MEGGER)	Specify as well as parts that insulation like PCB, moisture-proof COATING is required
Dark Current	Max 4mA (KEYLESS) Max 3mA (NON-KEYLESS)	Measure when the state, all output loads are OFF and there are no Input SW(including TX operation) changes, continues 2sec.
Voltage drop	1.2V or less	Output terminals for TAIL LAMP RELAY, POWER WINDOW RELAY, SAFETY POWER WINDOW, BURGLAR ALARM RELAY shall be 2.0V or less

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BCM (Body Control Module)

BE-87

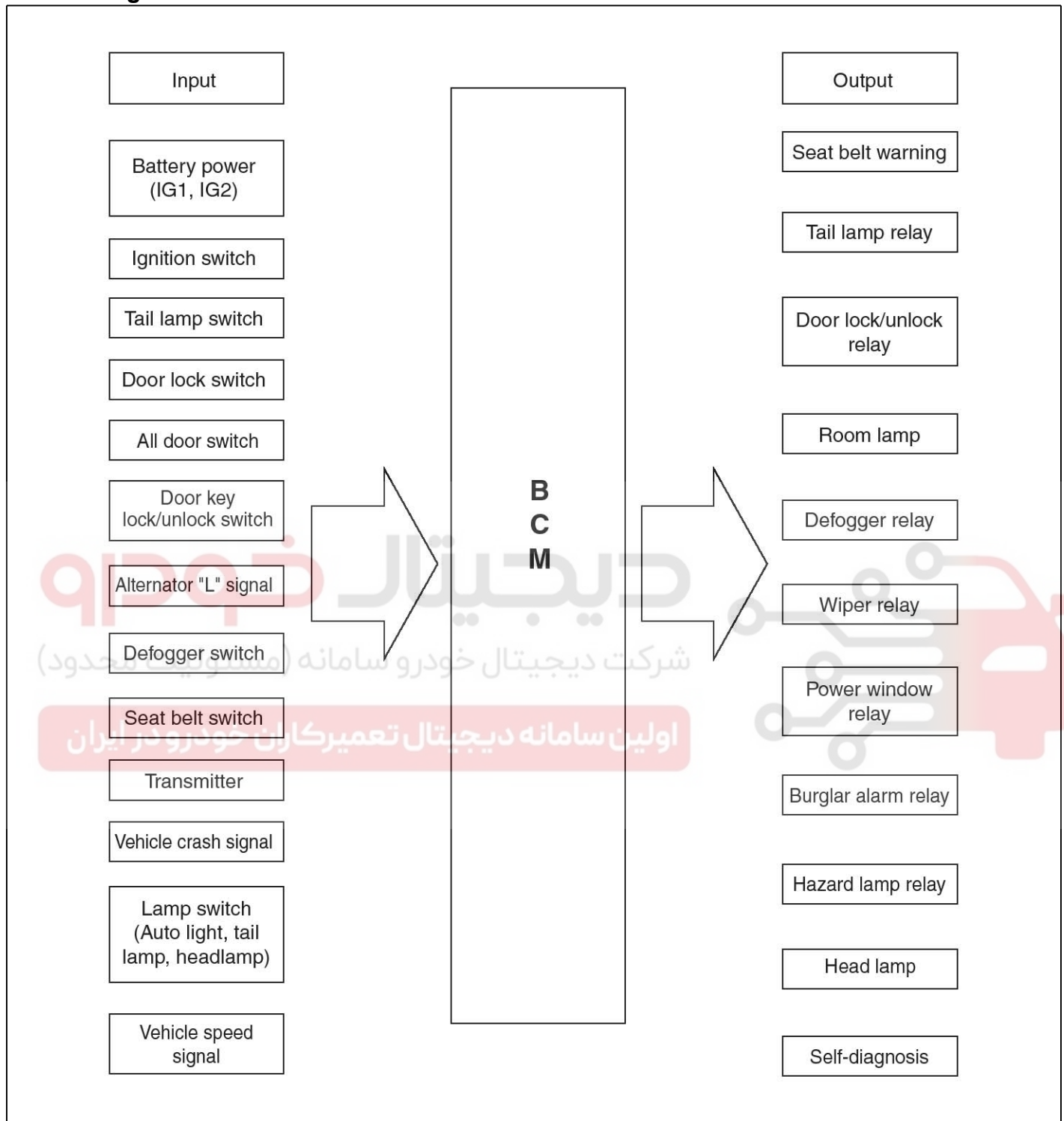
Rated Load

Item	Rated load
Room lamp	DC 12V 25W (LAMP load)
Key hole illumination	DC 12V 1.4W (LAMP load)
Seat belt indicator (Driver / Passenger)	DC 12V 1.2W (LED load)
Dead lock relay	DC 12V 200mA (Inductive load)
Hazard relay	DC 12V 200mA (Inductive load)
Wiper relay	DC 12V 200mA (Inductive load)
Defogger relay	DC 12V 200mA (Inductive load)
Tail lamp relay	DC 12V 200mA (Inductive load)
Head lamp relay	DC 12V 200mA (Inductive load)
Front deicer relay	DC 12V 200mA (Inductive load)
Front fog relay	DC 12V 200mA (Inductive load)
Rear fog relay	DC 12V 200mA (Inductive load)
Horn relay	DC 12V 200mA (Inductive load)
Start inhibit Relay	DC 12V 200mA (Inductive load)
Central door unlock relay	DC 12V 200mA (Inductive load)
Central door lock relay	DC 12V 200mA (Inductive load)
Power window relay	DC 12V 200mA (Inductive load)
Tailgate unlock relay	DC 12V 200mA (Inductive load)
Over speed indicator lamp	DC 12V 1.2W (LED)

BE-88

Body Electrical System

Circuit Diagram

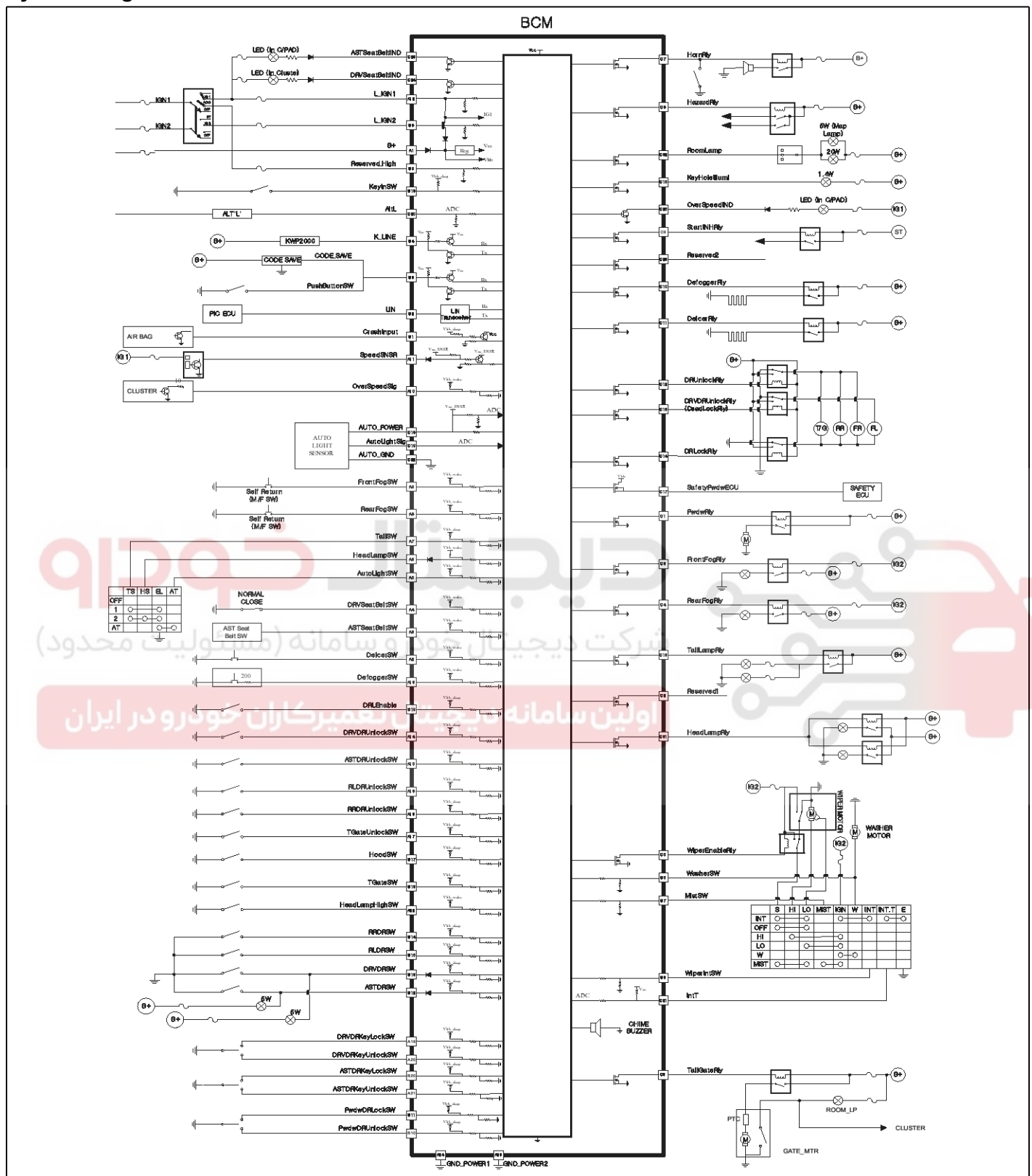


SEDBE7151L

BCM (Body Control Module)

BE-89

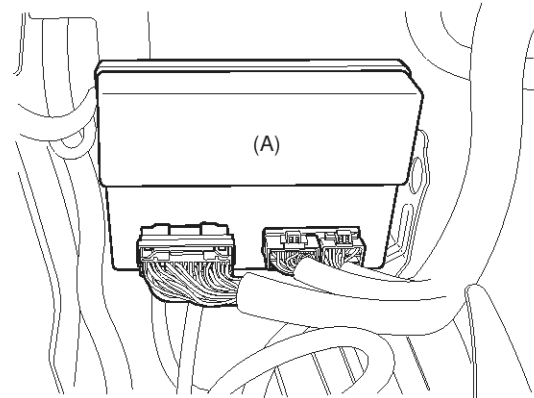
System Diagram



SFDBE8400L

BE-90**Body Electrical System****Description**

Body control module (A) receives various input switch signals controlling time and alarm functions for tail lamp, rear fog lamp, wiper control, buzzer warning, front deicer timer, tail lamp auto cut, central door lock, seat belt warning, key operated warning, over speed warning, ignition key hole illumination, room lamp control, power window timer, keyless entry control, burglar alarm control, crash door unlock, key reminder.



SFDBE8413L

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



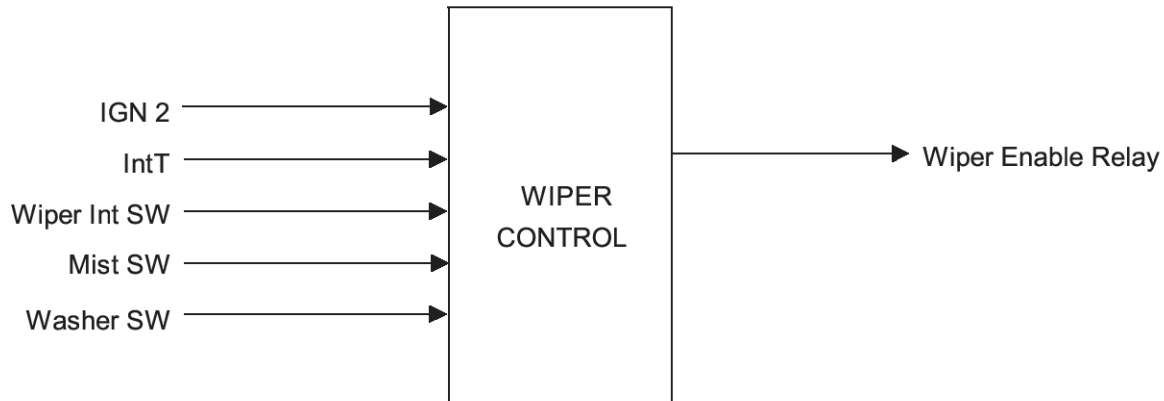
BCM (Body Control Module)

BE-91

Function

Wiper Control

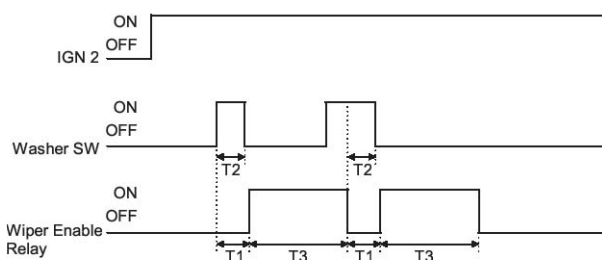
1. WIPER DATA FLOW



SFDBE8330L

2. WASHER INTERLOCKING WIPER

Turn Wiper Enable Relay ON after T1 when turning Washer SW ON at the status of IGN2 ON and if the input of Washer SW is between 0.06 and 0.2sec, turn the output of Wiper Enable Relay OFF after T3. But, ignore the input of Washer SW occurred while Wiper Enable Relay is being operated and accept it from the input of Washer SW after operating Wiper Enable Relay.



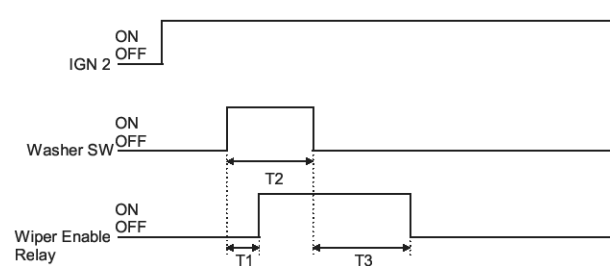
SFDBE8331L

T1 : $0.2 \pm 0.03\text{sec}$, T2 : $0.06 \sim 0.2\text{sec}$, T3 : $0.7 \pm 0.1\text{sec}$

T3 = 0 (In case of $T2 \leq 0.06 \text{ sec.}$)

1) Turn Wiper Enable Relay ON after T1 when turning Washer SW ON at the status of IGN2 ON and if the input of Washer SW is more than 0.2sec, turn the output of Wiper Enable Relay OFF for 2.5~3.8sec after turning Washer SW OFF.

But, ignore the input of Washer SW occurred while Wiper Enable Relay is being operated and accept it from the input of Washer SW after operating Wiper Enable Relay.



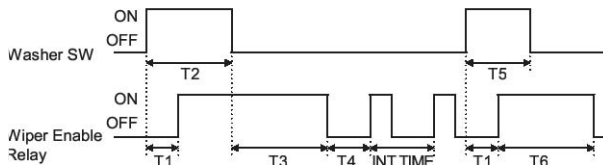
SFDBE8332L

T1 : $0.3 \pm 0.03\text{s}$, T2 : over 0.6s, T3 : $2.5 \sim 3.8\text{s}$

BE-92

Body Electrical System

- 2) Turn the output of WASHER INTERLOCKING WIPER when Washer SW is turned ON for more than 0.2sec during the operation of INT WIPER. If Washer SW is turned on for less than 0.2sec, turn the output of Wiper Enable Relay once.



SFDBE8333L

T1 : $0.3 \pm 0.03s$, T2 : over 0.6s,

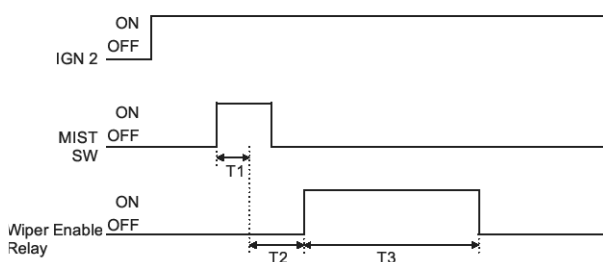
T3 : 2.5 ~ 3.8s, T4 : INT TIME - 0.7s,

T5 : 0.2 ~ 0.6s, T6 : $0.7 \pm 0.1s$

- 3) In case of starting (IGN1 ON & IGN2 OFF) ignore the input of Washer SW.

3. MIST INTERLOCKING WIPER

- 1) Turn the output of Wiper Enable Relay for 700ms when turning Mist SW ON at the status of IGN2 ON.

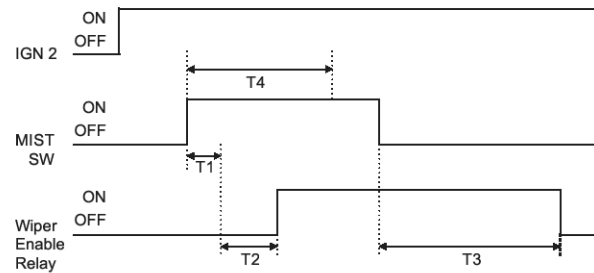


SFDBE8334L

T1 : Min 60 ms, T2 : Max 100ms,

T3 : $700 \pm 100ms$

- 2) If the input of Mist SW is continuous (for more than 700ms), keep the condition of Wiper Enable Relay is ON and if Mist SW is turned OFF turn the output of Wiper Enable Relay for 700ms from that point.
- 3) Ignore the input of Mist SW while operating WIPER by INT WIPER, WASHER Interlocking WIPER.



SFDBE8335L

T1 : Min 60 ms, T2 : Max 100ms,

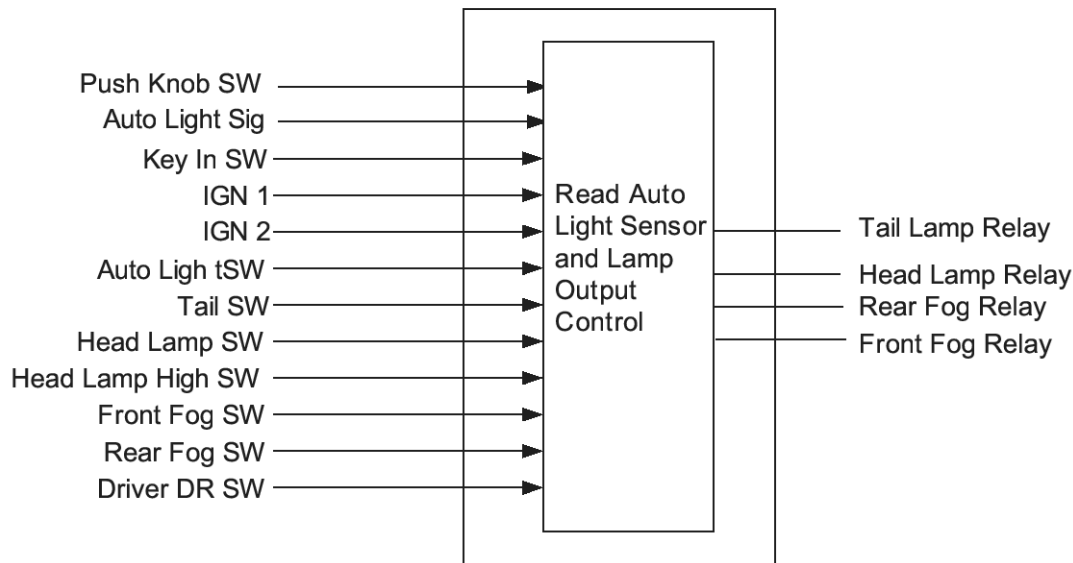
T3 : $700 \pm 100ms$, T4 : 700ms

BCM (Body Control Module)

BE-93

Lamp Control

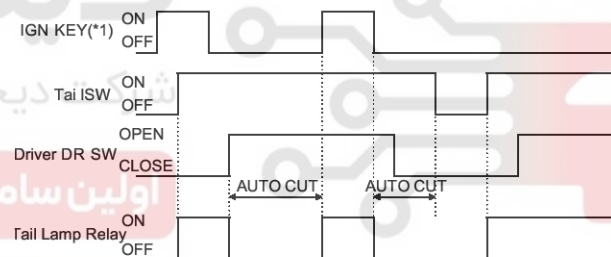
1. EXTERIOR LAMP CONTROL DATA FLOW



SFDBE8336L

2. TAIL LAMP AUTO CUT

- 1) Turn IGN KEY OFF when turning Tail SW ON after turning IGN KEY ON and turn Tail Lamp Relay OFF (automatic blackout) when opening Driver door SW.
- 2) Also, turn Tail Lamp Relay OFF (automatic blackout) even though IGN KEY is turned OFF after opening Driver door SW at the condition that IGN KEY is ON.
- 3) When turning Tail SW ON again from OFF after the automatic blackout, Tail Lamp Relay will be turned ON and AUTO CUT function will be cancelled.
- 4) When turning IGN KEY ON after the automatic blackout, Tail Lamp Relay will be turned ON and AUTO CUT function will be cancelled.
- 5) AUTO CUT will be kept when removing or installing B+ at the status of AUTO CUT.
- 6) Tail Lamp Relay will be kept turning OFF though Driver door SW is closed from opened at the status of AUTO CUT.



SFDBE8337L

*1 IGN KEY ON : (Push Knob SW or Key In SW ON or IGN 1 ON or IGN 2 ON)

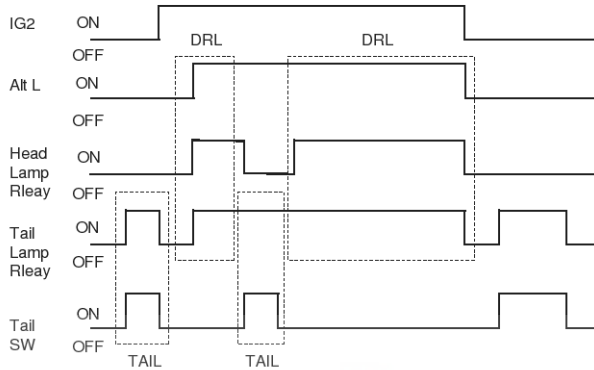
IGN KEY ON : (Push Knob SW and Key In SW OFF and IGN 1 OFF and IGN 2 OFF)

BE-94

Body Electrical System

3. DAYTIME RUNNING LAMPS

- 1) If the condition of vehicles is Alt L ON, turn Head Lamp Relay and Tail Lamp Relay ON.(DRL operation)
- 2) If Tail SW is ON, turn Head Lamp Relay OFF.(cancellation of DRL)
- 3) DRL ENABLE/ DISABLE: When DRL Enable is ON (GND LEVEL) DRL function should be operated.



SFDBE8338L

4. AUTO LIGHT CONTROL

- 1) If the service voltage of AUTO LIGHT SENSOR is less than 4v or more than 6v at the status of IGN1 ON, it means it has defects. Always turn Tail Lamp Relay and Head Lamp Relay ON regardless of the value of SENSOR when turning Auto Light SW ON with rouble. The FILTERING time for defects and recovery of the service voltage is 300msec each.
- 2) If the value of Auto Light Signal is input value of LIGHT ON at the status of IGN1 ON and Auto Light SW ON, turn the LIGHT ON in 2.5sec \pm 100msec.
- 3) If the value of Auto Light Signal is input value of LIGHT OFF at the status of LIGHT ON, turn the LIGHT OFF in 2.5sec \pm 100msec.
- 4) If the value of Auto Light Signal is input value of TAIL LAMP ON, turn Tail Lamp Relay ON only and if it is input value of HEAD LAMP ON, turn Tail Lamp Relay and Head Lamp Relay ON.
- 5) Turn the proper LIGHT ON immediately when turning Auto Light SW ON in the condition of LIGHT ON and turn the LIGHT OFF when turning Auto Light SW OFF.

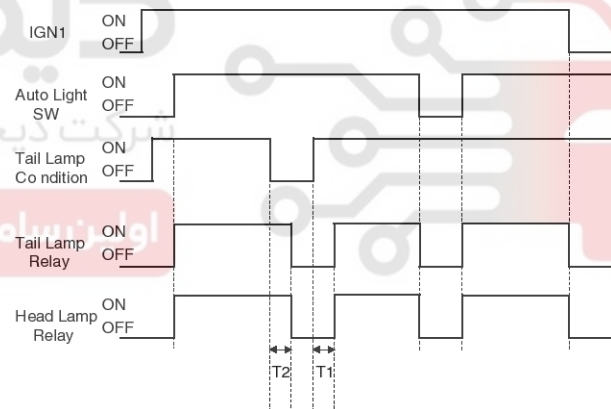
- 6) Follow the table below for each value of LIGHT ON for Auto Light Signal.

	TAIL LAMP	HEAD LAMP
ON	$1.92 \pm 0.05V$	$1.92 \pm 0.05V$
OFF	$4.12 \pm 0.05V$	$4.12 \pm 0.05V$

Tail Lamp Condition & Head Lamp Condition



SFDBE8339L



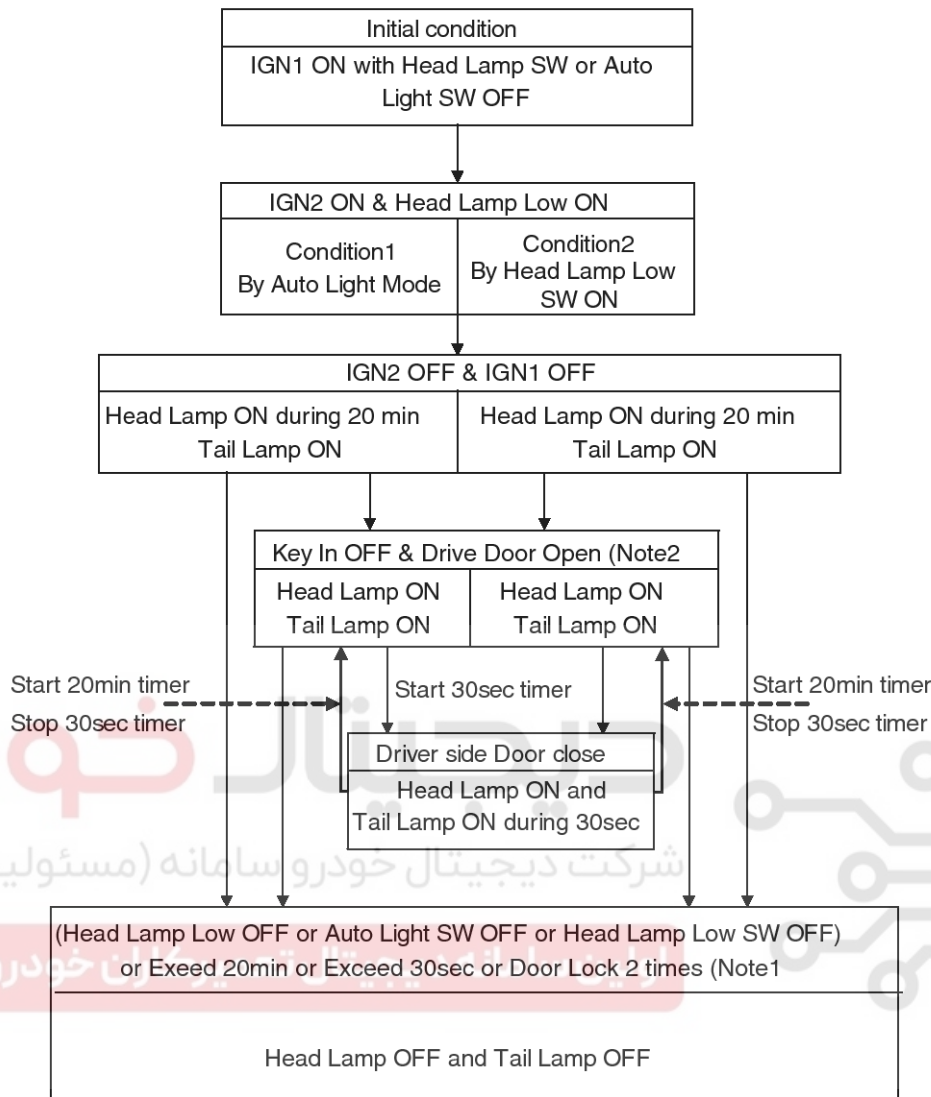
SFDBE8212L

T1 : 12 \pm 0.2s, T2 : 12 \pm 0.2s

BCM (Body Control Module)

BE-95

5. ESCORT

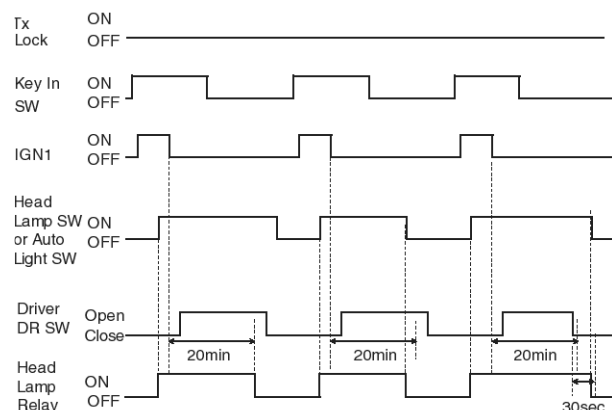


SFD8E8340L

NOTICE

1. Door Lock 2 times : Tx(Transmitter) Door Lock 2 times
2. When Open the Driver door, former 2 times lock counter is cleared, and Start new 2 times lock counting.

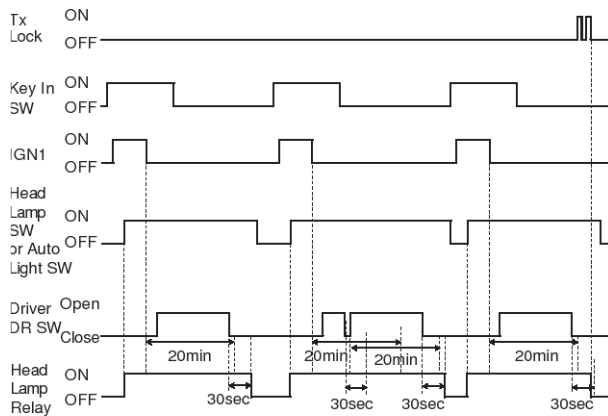
During active the Escort function(counting 30sec), if Driver door is re-opened, re-start 20min counter and if Driver door is re-close, re-start 30sec counter.



SFD8E8342L

BE-96

Body Electrical System



SFD8343L

6. HEAD LAMP LOW

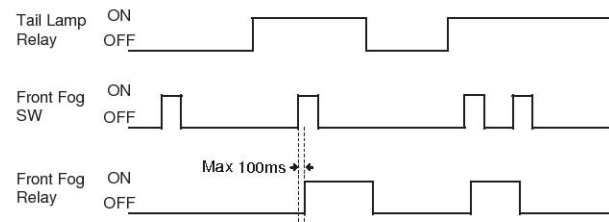
- 1) Turn Head Lamp Relay ON when turning Head Lamp SW ON while IGN1 is ON.
- 2) Turn Head Lamp Relay OFF if IGN1 OFF or Head Lamp SW is OFF.
- 3) Do not control things above if Head Lamp Relay can be controlled by Escort / Auto Light / DRL function.



SFD8344L

7. FRONT FOG LAMP

- 1) Turn Front Fog Relay On when turning Front Fog SW ON while Tail Lamp Relay is ON.
- 2) Turn Front Fog Relay OFF when turning Front Fog SW ON while Front Fog Relay is ON.



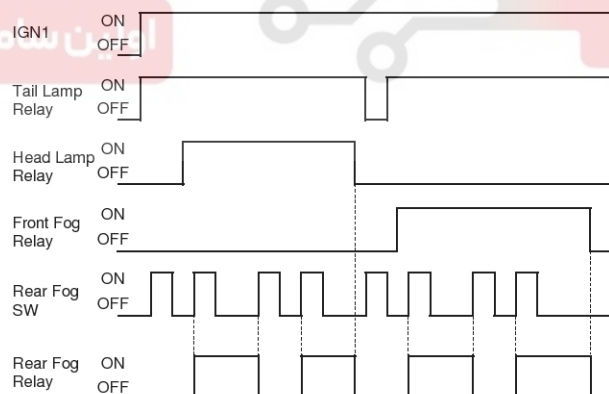
SFD8345L

NOTICE

Front Fog Lamp SW is Self-Return Type

8. REAR FOG LAMP

Turn Rear Fog Relay On when pressing Rear Fog SW when Head Lamp Relay or Front Fog Relay is ON after IGN1 and Tail Lamp Relay turn ON.



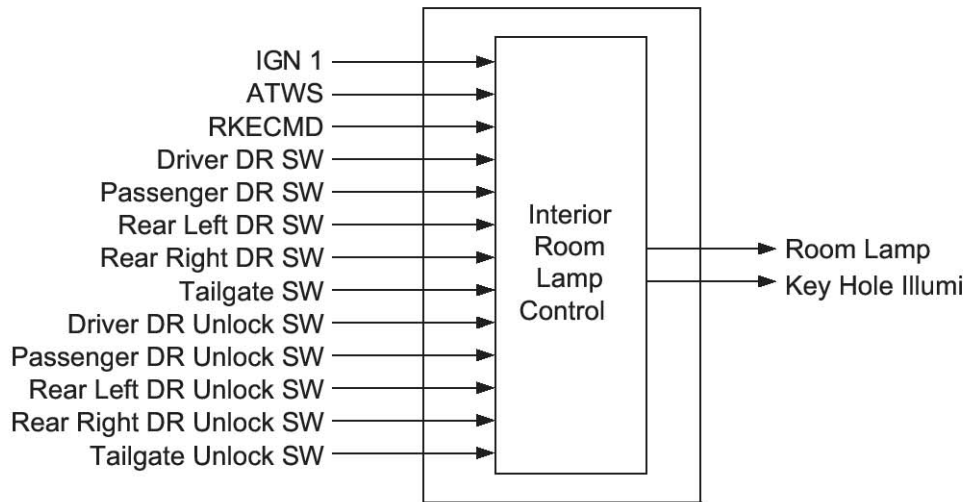
SFD8346L

BCM (Body Control Module)

BE-97

Interior Room Lamp

1. INTERIOR ROOM LAMP DATA FLOW



SFDBE8347L

ATWS : Logic signal of ATWS

RKECMD : RKE LOCK/UNLOCK signal

2. ROOM LAMP DECAYING & KEYLESS UNLOCK TIMER

When removing or installing the Battery

- 1) Start Room Lamp on the state of 20min, if the DOOR is OPENED.
- 2) Start Room Lamp when it is OFF if the DOOR is CLOSED.

BE-98

Body Electrical System

3. Room Lamp Off

1) Condition 1

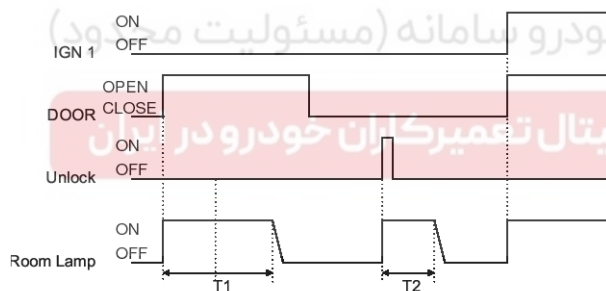
State	Description
Initial condition	Room Lamp OFF and DOOR CLOSE
Event	UNLOCK by TX(Transmitter)
Action	Room Lamp ON for 30 ± 3 sec.

2) Condition 2

State	Description
Initial condition	Room Lamp OFF
Event	Any DOOR OPEN for over 0.1 sec. when ALL DOORS are closed
Action	ROOM LAMP ON for 20 min

3) Condition 3

State	Description
Initial condition	Room Lamp OFF and IGN1 OFF
Event	IGN1 ON and DOOR OPEN for over 0.1 sec.
Action	ROOM LAMP ON



SFDBE8350L

T1 : 20 ± 1 min, T2 : 30 ± 3 sec

BCM (Body Control Module)

BE-99

4. Room Lamp On for 30s

1) Condition 1

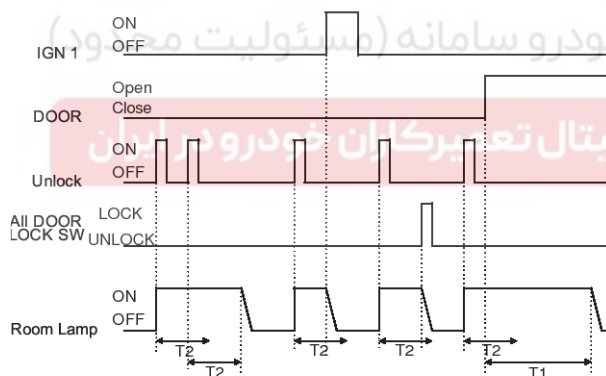
State	Description
Initial condition	ROOM LAMP ON for 30s and IGN1 OFF
Event	DOOR OPEN for over 0.1 sec. when ALL DOORS are closed.
Action	ROOM LAMP ON for 20min

2) Condition 2

State	Description
Initial condition	ROOM LAMP ON for 30s and IGN1 OFF
Event	UNLOCK by TX
Action	ROOM LAMP ON for 30s

3) Condition 3

State	Description
Initial condition	ROOM LAMP ON for 30s and IGN1 OFF
Event	IGN1 ON, after 30sec, entering ARM state or ALL DOOR LOCK
Action	The state go to ROOM LAMP DECAYING state Room Lamp decaying for 2 ± 0.2 sec and OFF



SFD8E351L

T1 : 20 ± 1 min, T2 : 30 ± 3 sec

BE-100

Body Electrical System

5. Room Lamp On for 20min

1) Condition 1

State	Description
Initial condition	Room Lamp ON for 20min and IGN1 OFF
Event	IGN1 ON
Action	ROOM LAMP ON

2) Condition 2

State	Description
Initial condition	Room Lamp ON for 20min and IGN1 OFF
Event	DOOR CLOSE and ALL DOOR LOCK Or after 20min
Action	ROOM LAMP DECAYING for 2 ± 0.2 sec and OFF

3) Condition 3

State	Description
Initial condition	ROOM LAMP ON for 20min and IGN1 OFF
Event	DOOR CLOSE
Action	ROOM LAMP ON for 30s



SFD8E352L

T1 : $20 \pm 1\text{min}$, T2 : $30 \pm 3\text{sec}$

BCM (Body Control Module)

BE-101

6. Room Lamp Decaying

1) Condition 1

State	Description
Initial condition	ROOM LAMP DECAYING and IGN1 OFF
Event	DOOR OPEN for over 0.1 sec. when All doors are closed
Action	ROOM LAMP ON for 20min

2) Condition 2

State	Description
Initial condition	ROOM LAMP DECAYING and IGN1 OFF and DOOR CLOSE
Event	UNLOCK by TX
Action	ROOM LAMP ON for 30s

3) Condition 3

State	Description
Initial condition	ROOM LAMP DECAYING
Event	After decaying
Action	ROOM LAMP OFF

4) Condition 4

State	Description
Initial condition	ROOM LAMP DECAYING
Event	IGN1 ON and DOOR OPEN for 0.1 sec.
Action	ROOM LAMP ON



SFD8E353L

T1 : 20 ± 1min, T2 : 30 ± 3sec.

BE-102

Body Electrical System

7. Room Lamp On

1) Condition 1

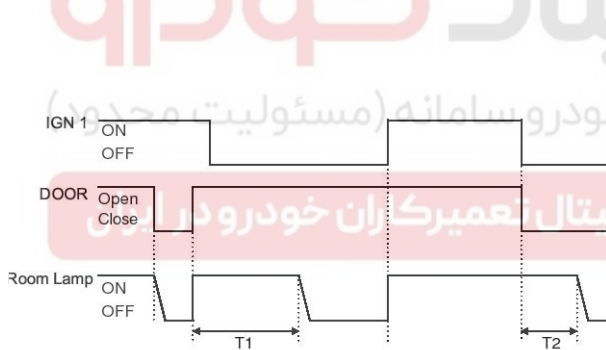
State	Description
Initial condition	Room Lamp ON and IGN1 ON and DOOR OPEN
Event	DOOR CLOSE
Action	ROOM LAMP DECAYING for 2 ± 0.2 sec. and OFF

2) Condition 2

State	Description
Initial condition	Room Lamp ON and IGN1 ON and DOOR OPEN
Event	IGN1 OFF
Action	ROOM LAMP ON for 20min

3) Condition 3

State	Description
Initial condition	Room Lamp ON and IGN1 ON and DOOR OPEN
Event	DOOR CLOSE and IGN1 OFF
Action	ROOM LAMP ON for 30s



SFD8E354L

T1 : 20 ± 1 min, T2 : 30 ± 3 sec

NOTICE

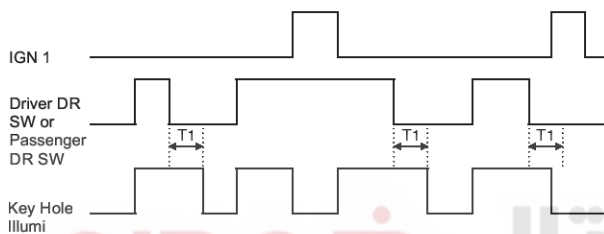
1. ROOM LAMP should not be flickered when turning IGN1 ON.
2. Exposure for the ROOM LAMP should be more than 32 steps.

BCM (Body Control Module)

BE-103

8. IGN KEY HOLE ILLUMINATION

- 1) Turn Key Hole Illumination On when opening Driver door SW (Or Passenger Door SW) at the status of IGN1 OFF.
- 2) Turn the Key Hole Illumination lamp ON for 30sec and then OFF when closing Driver Door SW (Or Passenger Door SW) at the condition of (1).
- 3) Turn Key Hole Illumination OFF right after IGN1 or IGN2 turns ON during the operations of (1) and (2).
- 4) However, turn Key Hole Illumination OFF immediately at REARM, ARMWAIT and ALARM MODE.



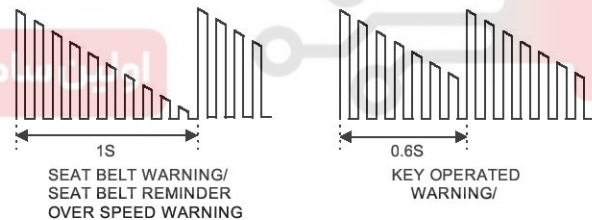
SFDBE8355L

T1 : 30 ± 1sec

9. BUZZER CONTROL

1) SPECIFICATION of BUZZER SOUND

	Frequency	Frequency DUTY	Cycle	Sound pressure	Remark
SEAT BELT WARNING/ SEAT BELT REMINDER OVER SPEED WARNING	800Hz	50%	1.0s	70±10 dB	Decreasing sound
KEY OPERATED WARNING	800Hz	50%	0.6s	70±10 dB	Decreasing sound



SFDBE8326L

2) Priority :

S/BELT WARNING/SEAT BELT REMINDER & OVER SPEED WARNING & KEY OPERATED WARNING

3) Keep the output up to the OFF cycle when turning the output OFF.

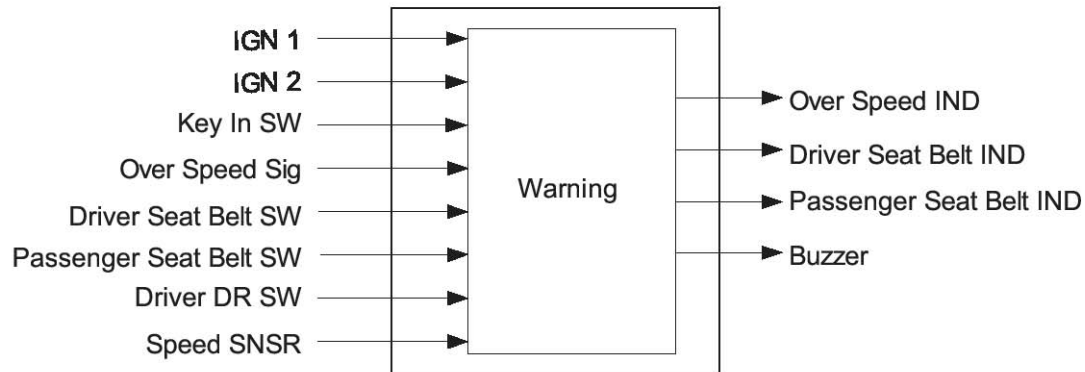
4) Measurement distance for sound pressure: 1.0 m

BE-104

Body Electrical System

Warning Control

1. WARNING CONTROL DATA FLOW



SFDBE8357L

2. SEAT BELT WARNING TIMER (GENERAL, MIDDLE EAST)

State	Description
Initial condition	IGN1 OFF
Event	Driver Seat Belt SW belted and IGN1 ON
Action	<ul style="list-style-type: none"> - Start 6 seconds driver indicator blinking - The automaton state is changed to IGN1 ON DRIVER BELTED
State	Description
Initial condition	IGN1 OFF
Event	Driver Seat Belt SW unbelted and IGN1 ON
Action	<ul style="list-style-type: none"> - Start 6 seconds blinking for Driver Seat Belt IND - Start 6 seconds warning for Buzzer - The automaton state is changed to IGN1 ON DRIVER UNBELTED
State	Description
Initial condition	IGN1 ON DRIVER BELTED
Event	IGN1 OFF
Action	<ul style="list-style-type: none"> - Stop 6 seconds blinking for Driver Seat Belt IND - Stop 6 seconds warning for Buzzer - The automaton state is changed to IGN1 OFF

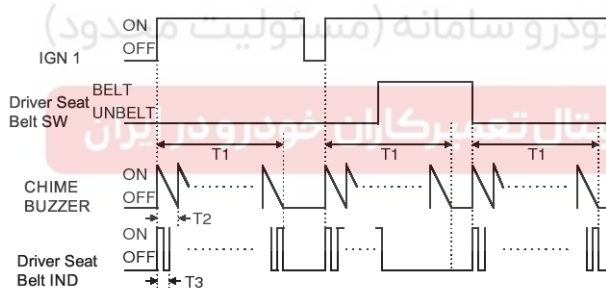
BCM (Body Control Module)

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State	Description
Initial condition	IGN1 ON DRIVER BELTED
Event	Driver Seat Belt SW unbelted
Action	<ul style="list-style-type: none"> - Start 6 seconds blinking for Driver Seat Belt IND - Start 6 seconds warning for Buzzer - The automaton state is changed to IGN1 ON DRIVER UNBELTED

State	Description
Initial condition	IGN1 ON DRIVER UNBELTED
Event	IGN1 OFF
Action	<ul style="list-style-type: none"> - Stop 6 seconds blinking for Driver Seat Belt IND - Stop 6 seconds warning for Buzzer - The automaton state is changed to IGN1 OFF

State	Description
Initial condition	IGN1 ON DRIVER UNBELTED
Event	Driver Seat Belt SW belted
Action	<ul style="list-style-type: none"> - Stop 6 seconds warning for Buzzer - The automaton state is changed to IGN1 ON DRIVER BELTED



$T1 : 6 \pm 1\text{sec}$, $T2 : 1 \pm 0.1\text{sec}$, $T3 : 1 \pm 0.1\text{sec}$

3. SEAT BELT REMINDER (EUROPE/AUSTRALIA/JAPAN)

1) OVERVIEW Description

The SBR(Seat Belt Reminder) includes the following features :

- SBR Indicator warning
- SBR Buzzer warning

a. This functional description will be applied to both Driver and Passenger SBR.

b. Basic warning mode

- Indicator blinking mode : indicator "ON" for 0.5 second/"OFF" for 0.5 second.
- Buzzer mode : decremental sound(1Hz)
- Indicator Blinking & Buzzer sound will be synchronized.

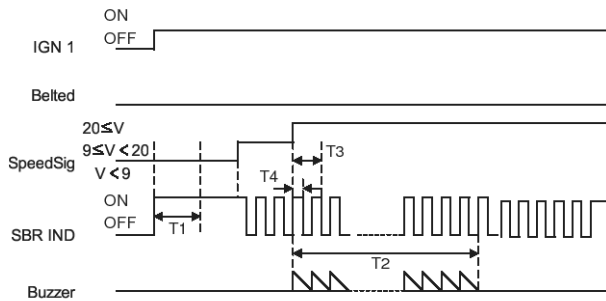
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Body Electrical System

2) TIME FLOW CHART

a. PATTERN "START" CONDITION

- Unbelted & $[(V < 20\text{kph}) \rightarrow (V \geq 20\text{kph})]$

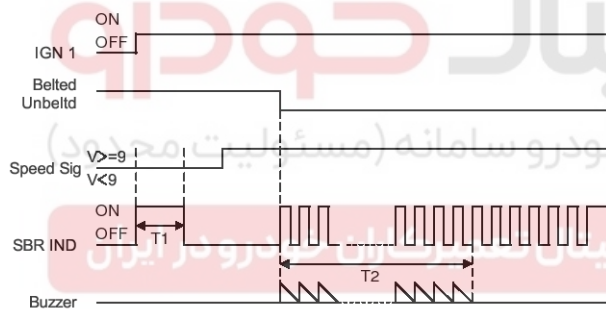


SFDBE8359L

T1 : 6sec, T2 : 100sec,

T3 : 1sec, T4 : 0.5sec

- $V \geq 20\text{kph}$ & (Belted \rightarrow Unbelted)

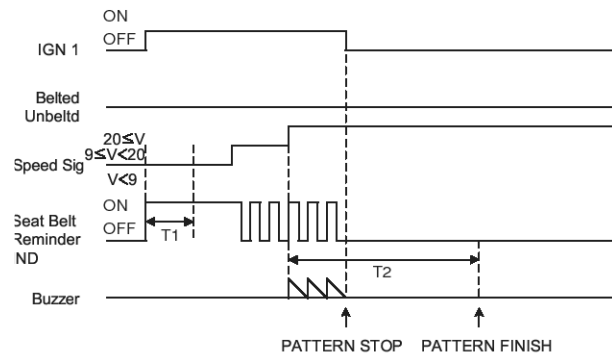


SFDBE8360L

T1 : 6sec, T2 : 100sec

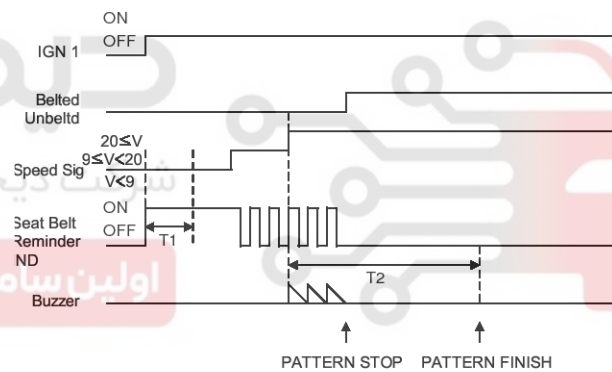
3) PATTERN "STOP" CONDITION

a. IGN 1 OFF



SFDBE8361L

T1 : 6sec, T2 : 100sec

b. Unbelted \rightarrow Belted

SFDBE8362L

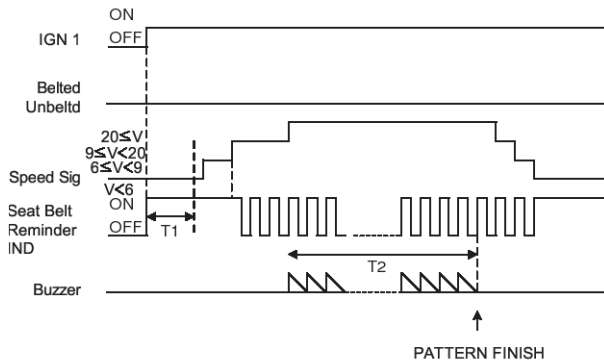
T1 : 6sec, T2 : 100sec

BCM (Body Control Module)

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c. Pattern Finished

- After pattern finished, state cannot be activated for V (0 ↔ 100kph)

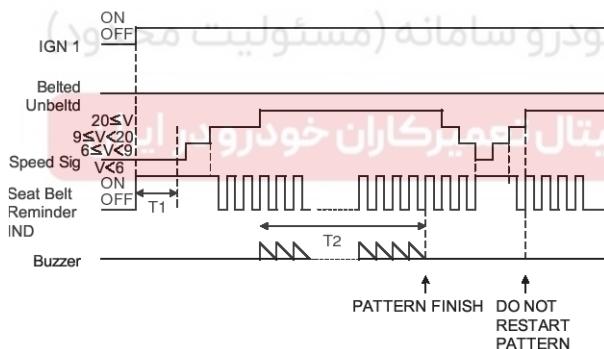


SFD8E8363L

T1 : 6sec, T2 : 100sec

4) THE NUMBER OF PATTERN PER 1 IGN1 CYCLE

a. Only Once

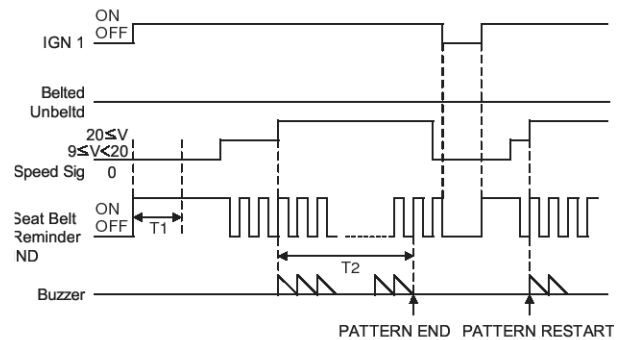


SFD8E8364L

T1 : 6sec, T2 : 100sec

b. Necessary condition for restarting Pattern (after Pattern is finished)

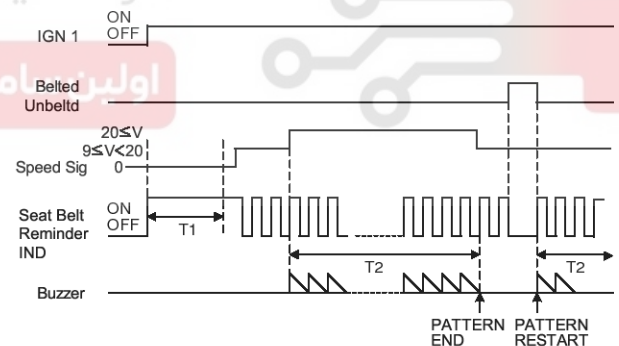
- IGN 1 ON → OFF → ON, and then PATTERN "start" conditions (section 3.1) are fulfilled



SFD8E8365L

T1 : 6sec, T2 : 100sec

- Unbelted → Belted → Unbelted, and then PATTERN "start" conditions (section 3.1) are fulfilled



SFD8E8366L

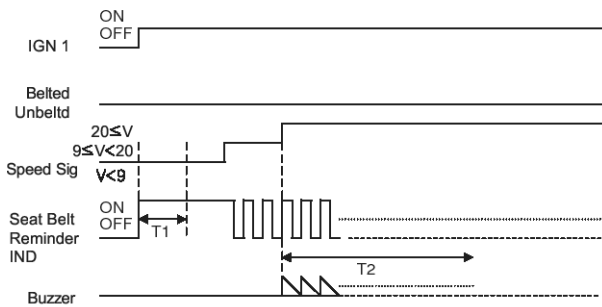
T1 : 6sec, T2 : 100sec

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Body Electrical System

5) BULB CHECK

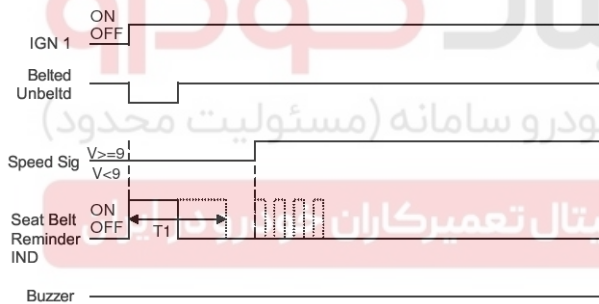
a. Initial L_IGN 1 ON, Start 6s Bulb Check



SFDBE8367L

T1 : 6sec, T2 : 100sec

b. Belt → Unbelt after L_IGN 1 ON, No Bulb Check



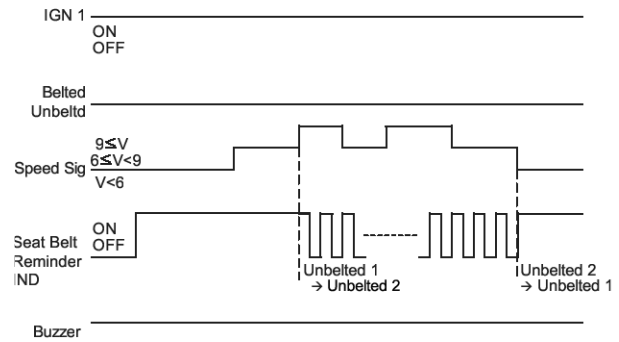
SFDBE8368L

T1 : 6sec

6) MISCELLANEOUS BEHAVIOR FOR OTHER STATES

a. Behavior after Pattern is finished.

After Pattern is finished, Buzzer will not be operated. Only indicator operate "ON" or "Blinking", according to vehicle speed.



SFDBE8369L

Vehicle Speed	Precedent state of SBR Indicator	Present state of SBR Indicator
< 6kph	-	ON
Between 6 and 9 kph	ON	ON
Between 6 and 9 kph	BLINKING	BLINKING
> 9kph	-	BLINKING

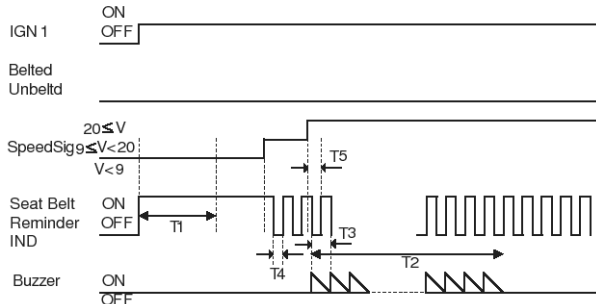
BCM (Body Control Module)

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b. Time delay for Pattern " start"

When indicator blinking timing do not match Pattern "start" time, Pattern will be delayed for synchronizing visual signal (indicator blinking) & audible signal (buzzer sound).

It may be maz. 1.0 second theoretically.

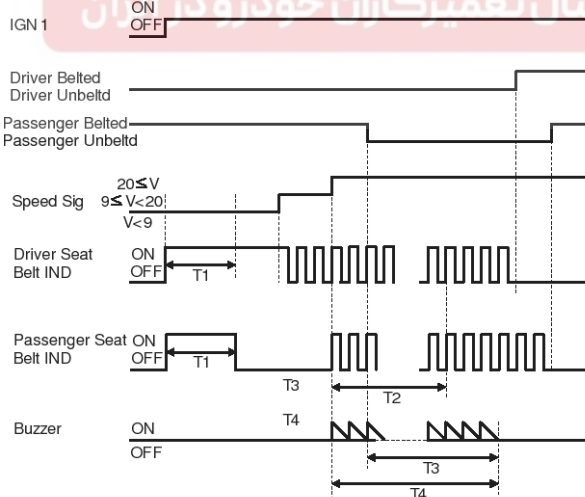


SFDBE8370L

T1 : 6sec, T2 : 100sec, T3 : 1sec,
T4 : 0.5sec, T5 : Max. 1.0sec (delay)

c. Overlap For Driver SBR Pattern & Assist SBR Pattern

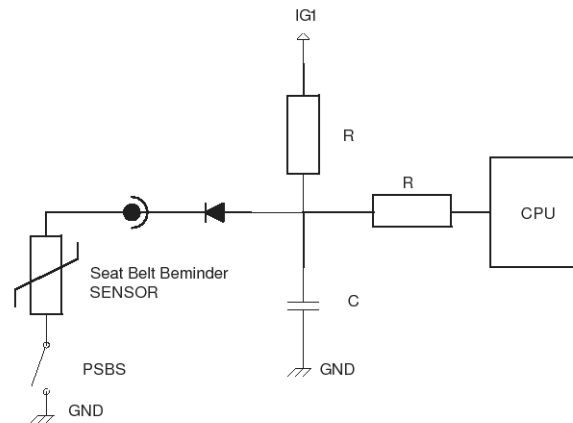
When Assist SBR Pattern starts, during Driver SBR Pattern, BuzzerWill be overlapped.



SFDBE8371L

T1 : 6sec, T2 : 100sec,
T3 : 1sec, T4 : T2 + T3 - (T2 ∩ T3)

*PASSENGER SEAT BELT BUCKLE SWITCH



SFDBE8372L

■ Logic Table Of Psbs(passenger Seat Belt Buckle Switch)

PASSENGER	NOT BUCKLED	BUCKLED
PSBS	CLOSED	OPEN

■ Logic Table Of Sbr Sensor(seat Belt Reminder Sensor)

SEAT	NOT OCCUPIED	OCCUPIED
RSBR SENSOR	OPEN	< 400 OHM

■ Logic Table Of Psbs And Sbr Sensor Connected In Series

PSBS	SBR SENSOR	R(SBR SENSOR + PSBS)
RSBR SENSOR	NOT OCCUPIED	OPEN
BUCKLED	OCCUPIED	OPEN
NOT BUCKLED	NOT OCCUPIED	OPEN
NOT BUCKLED	OCCUPIED	< 400 OHM

4. REAR SEAT BELT REMINDER (EUROPE /AUSTRALIA/JAPAN):

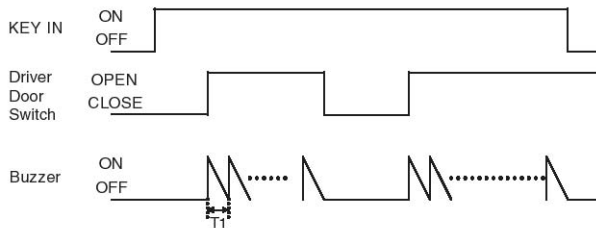
- 1) When Rear SBR Signal turns ON at the status of IGN1 ON, Buzzer will be outputted per 1sec.
- 2) If IGN1 or Rear SBR Signal is OFF, Buzzer output will be stopped.

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Body Electrical System

5. KEY OPERATED WARNING

- 1) When Driver Door SW is ON at the status of KEY IN ON, Buzzer will be outputted per 0.6sec continuously.
- 2) If KEY IN turns OFF or Driver Door SW is CLOSED during Buzzer output, the output will turn OFF.
- 3) When IGN1 turns ON while outputting, the output will be stopped.



SFD8E8373L

T1 : 0.6 ± 0.1sec

NOTICE

KEY IN ON : Key In ON

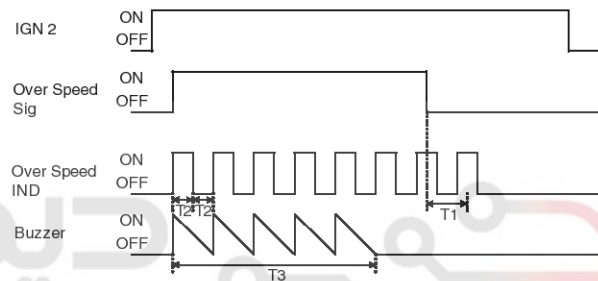
KEY IN OFF : Key In OFF

6. OVER SPEED WARNING

Over Speed Signal turns ON by Cluster if the speed of a car exceed 120km/h.

Over Speed Warning will start if the conditions above are satisfied at the status of IGN1 On.

- 1) When Over Speed Signal is ON, the warning starts without any Filtering Time.
- 2) Over Speed IND will flicker endlessly until Over Speed Signal turns off and Buzzer will start for 5sec.
- 3) When Over Speed Signal is Off, Over Speed IND outputs the remainder after Filtering Time for 1sec and then stops.



SFD8E8374L

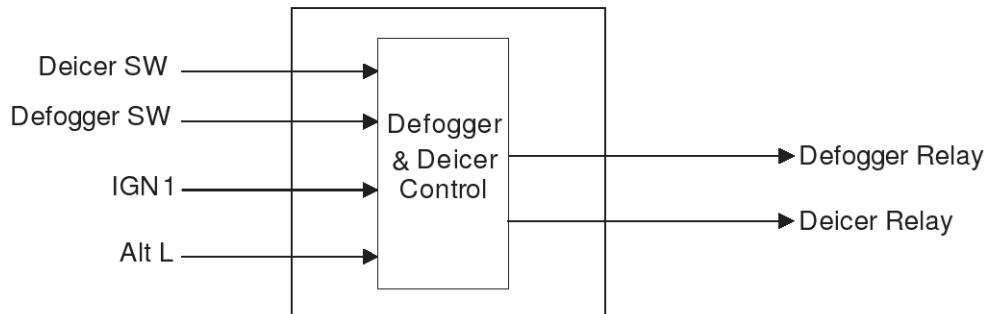
T1 : 1 ± 0.1sec, T2 : 0.5 ± 0.1sec, T3 : 5 ± 0.5sec

BCM (Body Control Module)

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Defogger & Deicer Timer Control

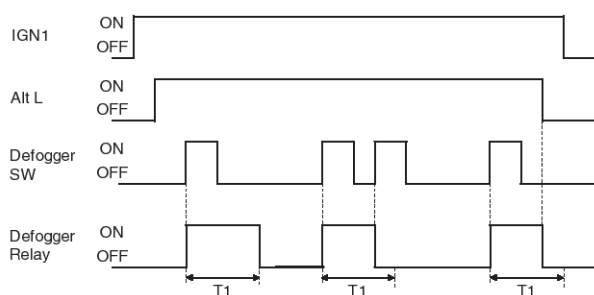
1. DEFOGGER & DEICER CONTROL DATA FLOW



SFDBE8375L

2. DEFOGGER TIMER

- 1) If Defogger SW turns ON after Alt L is ON while IGN1 is ON, turn Defogger Relay output ON for 20min. (It is operated while ENGINE is RUNNING)
- 2) If Defogger SW turns ON again while Defogger Relay output is ON, turn Defogger Relay output OFF.
- 3) Also turn Defogger output OFF in case of Alt L OFF or IGN1 OFF while Defogger Relay output is ON.
- 4) If Alt L is over 10 Volts ENGINE is RUNNING (Alt L ON) and if Alt L is less than 5 Volts ENGINE is STOPPED (Alt L OFF). Also, Alt L is between 5 and 10 Volts, keep the previous condition.
- 5) Defogger Relay should not be outputted when turning Alt L ON while Defogger SW is pressed.

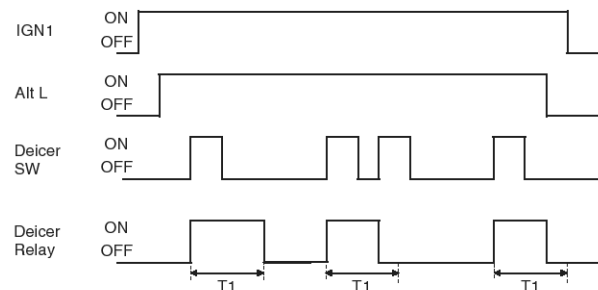


SFDBE8376L

T1 : 20 ± 1min

3. FRONT DEICER TIMER

- 1) Turn Deicer Relay output ON for 20min when turning Deicer SW ON after turning Alt L ON while IGN1 is ON (It is operated while ENGINE is RUNNING.)
- 2) Turn Deicer Relay output OFF if Deicer SW turns ON again while Deicer Relay output is ON.
- 3) Also Deicer Relay output OFF when turning ALT "L" or IGN1 OFF while Deicer Relay output is ON.
- 4) If Alt L is over 10 Volts ENGINE is RUNNING (Alt L ON) and if Alt L is less than 5 Volts ENGINE is STOPPED (Alt L OFF). Also, Alt L is between 5 and 10 Volts, keep the previous condition.
- 5) Deicer Relay should not be outputted when turning Alt L ON while Deicer SW is pressed.



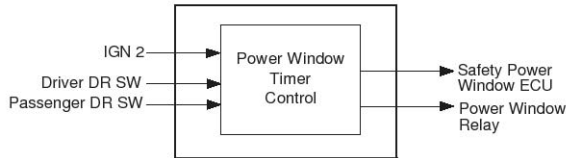
SFDBE8377L

T1 : 20 ± 1min

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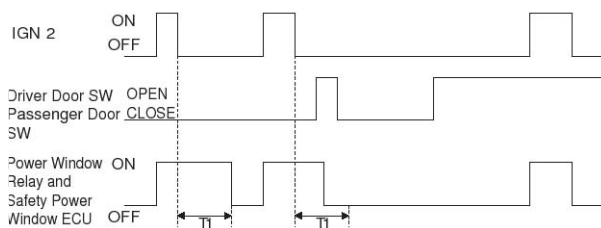
Body Electrical System

4. POWER WINDOW TIMER



SFDBE8378L

- 1) Turn Power window Relay output ON when turning L_IGN2 ON.
- 2) Turn Power window Relay output OFF after keeping Power window Relay output for 30sec when IGN2 is OFF.
- 3) Turn Power window Relay OFF immediately when opening Driver Door SW or Passenger Door SW within the condition (2) above.
- 4) Turn Power window Relay output OFF when IGN2 is OFF while Driver Door SW or Passenger Door SW is open.
- 5) Control Safety Power window ECU equally like Power window Relay.



SFDBE8379L

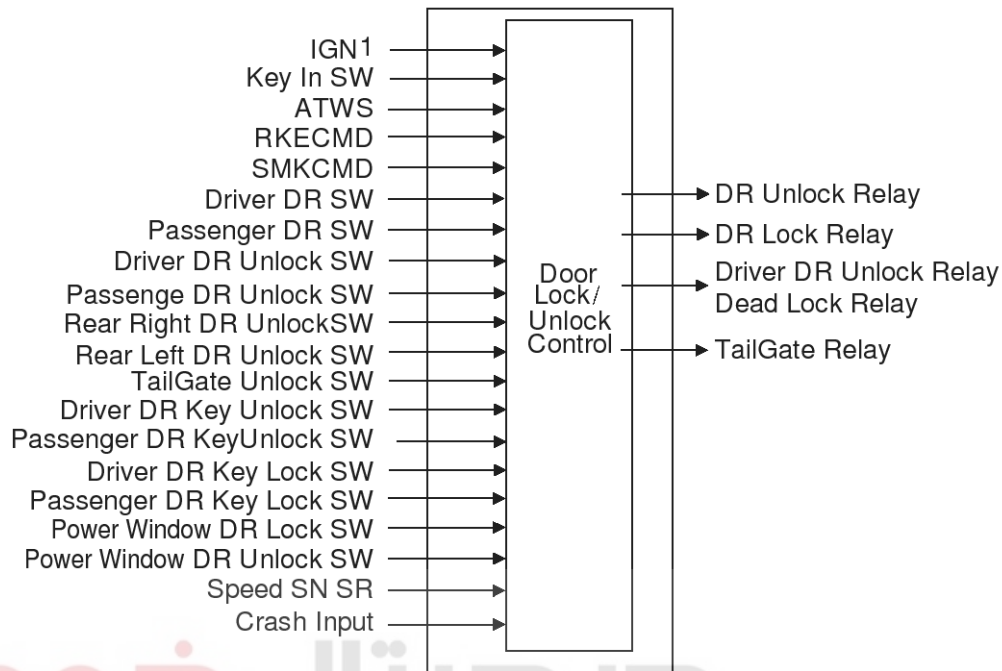
T1 : 30 ± 3sec

BCM (Body Control Module)

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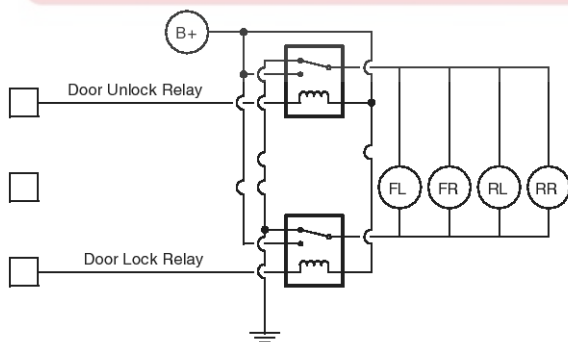
Door Lock/unlock Control

1. DOOR LOCK/UNLOCK CONTROL DATA FLOW



2. DOOR LOCK/UNLOCK RELAY CONTROL

1) NON-APPLICABLE SPEC FOR 2-TURN, DEAD LOCK



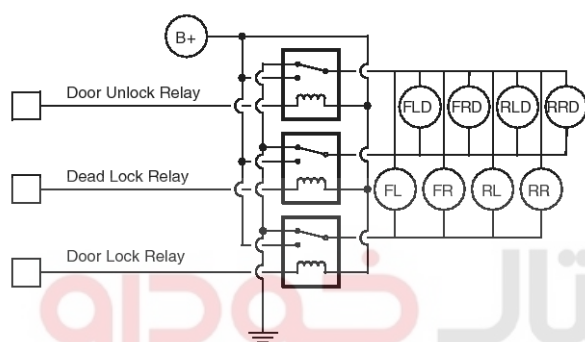
SFDBE8381L

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Body Electrical System

Mode	Door Unlock Relay	Driver Door Unlock Relay / Dead Lock Relay	Door Lock Relay
CENTRAL LOCK	OFF	NC *1)	ON
CENTRAL UNLOCK	ON	NC	OFF

2) DEAD LOCK SPEC (AUSTRALIA, EUROPE RHD SPEC)



SFD8E8382L

Mode	Door Unlock Relay	Driver Door Unlock Relay / Dead Lock Relay	Door Lock Relay
CENTRAL LOCK	OFF	OFF	ON
CENTRAL UNLOCK	ON	ON	OFF
DEAD LOCK	OFF	ON	OFF
DEAD UNLOCK	ON	OFF	ON

*1) NC : Not Connected

3) Turn the present output OFF immediately when reciprocal output is requested while outputting and start outputting reciprocally in 100ms. However, output the last request if there is request for output during the delay of 100ms.

- 4) Execute LOCK output and ignore UNLOCK output when the condition for LOCK and UNLOCK is occurred at the same time.
 - 5) Prohibit the operation by Power window Door Unlock SW at the status of ARM, ARMWAIT, REARM and ALARM.
3. DOOR KEY LOCK/UNLOCK
- 1) In case of DOOR KEY LOCK (UNLOCK) signal of driver's seat, handle as KEY LOCK (UNLOCK) of driver's seat is inputted if the knob in the driver's seat is LOCKED (UNLOCKED) after checking it for 3s.
 - 2) In case of DOOR KEY LOCK (UNLOCK) signal of the passenger seat, handle as KEY LOCK (UNLOCK) of the passenger seat is inputted if the knob in the passenger seat is LOCKED (UNLOCKED) after checking it for 3s.
4. CENTRAL DOOR LOCK/UNLOCK
- 1) If Driver Door Key Lock SW or Passenger Door Key Lock SW turns ON, turn Door Lock Relay output ON during T1. But prohibit the output when KEY IN ON *2) and IGN1 are ON.
 - 2) When Driver Door Key Unlock and Passenger Door Key Unlock turn ON, turn Door Unlock Relay and Driver Door Unlock Relay output ON during T1.
 - 3) Turn CENTRAL LOCK *3) ON during T1 when receiving TX LOCK signal. But ignore LOCK input when Driver Door SW or Passenger Door SW is ON.
 - 4) Turn CENTRAL UNLOCK *4) ON during T1 when receiving TX UNLOCK signal.
 - 5) Turn Door Lock Relay output ON during T1 when Power window Door Lock SW turns ON.
 - 6) Turn CENTRAL UNLOCK output ON during T1 when Power window Door Unlock SW turns ON. But prohibit the operation by Power window Door Unlock SW at the condition of ARM, ARMWAIT, REARM and ALARM.
 - 7) LOCK/UNLOCK by SAFETY KNOB is not interlock (Mechanical operation).
 - 8) Malfunction should be free when joining BATTERY (Also malfunction should be free at the location of Key In SW ON).
 - 9) Input which is less than 60msec should not be received (KEY LOCK/UNLOCK SW).

BCM (Body Control Module)

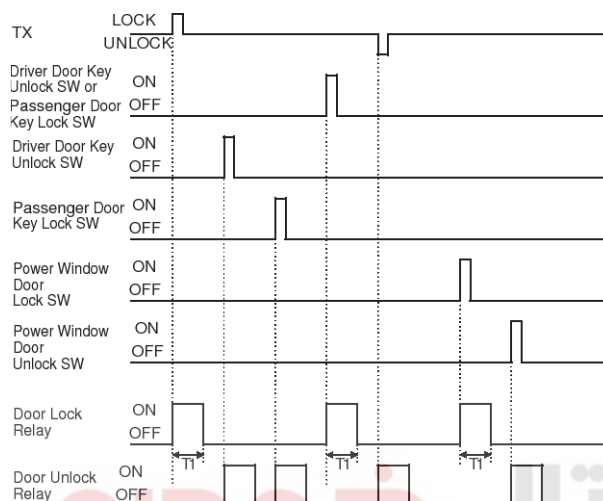
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10) Do not execute the output of DOOR LOCK (UNLOCK) by KNOB change.

*2) KEY IN ON : Key In ON

*3) CENTRAL LOCK : Refer to control mode for each Spec.

*4) CENTRAL LOCK : Refer to control mode for each Spec.



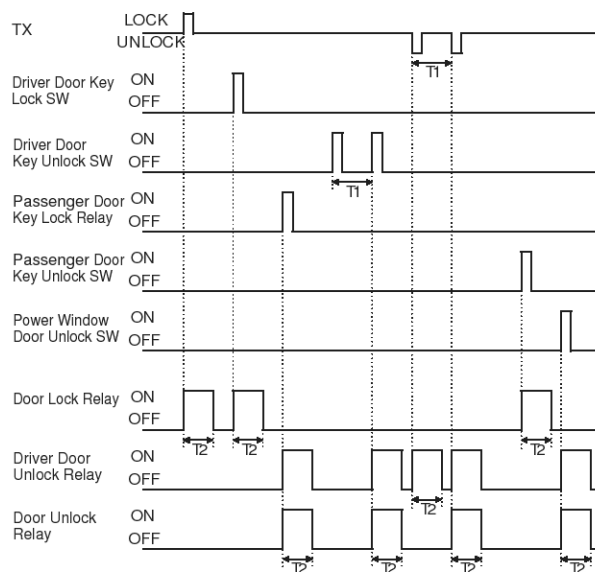
SFDBE8383L

T1 : 0.5 ± 0.1sec

5. TURN UNLOCK

- 1) If Driver Door Key Unlock SW turns OFF from ON within T1 after Driver Door Key Unlock SW turns ON from OFF (Driver Door Unlock SW becomes UNLOCKED mechanically and does not output BCM.), turn Door Unlock Relay output ON during T2.
- 2) If TX UNLOCK is received within T1 after Driver Door Key Unlock SW turns ON from OFF (Driver Door Unlock SW becomes UNLOCKED mechanically and does not output BCM.), turn Driver Door Unlock Relay and Door Unlock Relay output ON during T2.
- 3) Turn Driver Door Unlock Relay output ON during T2 when receiving TX UNLOCK signal. However, turn Driver Door Unlock Relay and Door Unlock Relay output during T2 if TX UNLOCK is received within T1.
- 4) Also, turn Driver Door Unlock Relay and Door Unlock Relay ON during T2 in case that Driver Door Key Unlock SW turns ON from OFF within T1 after receiving TX UNLOCK.

5) Regard as the same TX even though different signal which is registered within T1 is received.



SFDBE8384L

T1: 4 ± 1sec, T2 : 0.5 ± 0.1sec

6. IGN KEY REMINDER

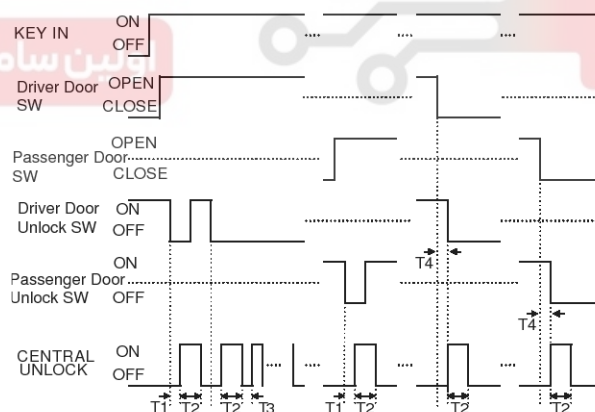
- 1) This function will not be operated if the speed of cars exceed 3km/h.
- 2) Perform Door Unlock Relay output for 1s after 0.5s when the condition becomes to be KEY IN ON, Driver Door SW is OPENED and Driver Door Unlock SW is LOCKED.
- 3) Turn CENTRAL UNLOCK *2) output ON for 1sec in 200msec after outputting DEAD UNLOCK1 *5) for 0.5s in 0.5s when the condition becomes to be KEY IN ON, Driver Door SW is OPENED and Driver Door Unlock SW is LOCKED (DEAD LOCK SPEC ONLY).
- 4) Perform Door Unlock Relay output for 1s in 0.5s when the condition becomes to be KEY IN ON, Passenger Door SW is OPENED and Passenger Door Unlock SW is LOCKED (excluding DEAD LOCK SPEC).
- 5) Output CENTRAL UNLOCK *2) for 1sec in 200msec after outputting DEAD UNLOCK1 *6) for 0.5s in 0.5s when condition becomes to be KEY IN ON, Passenger Door SW is OPENED and Passenger Door Unlock SW is LOCKED (DEAD LOCK SPEC ONLY).
- 6) Output CENTRAL UNLOCK for 1s in 0.5s based on (4) if ?(2) and ?(4) are satisfied.(excluding DEAD LOCK SPEC).

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Body Electrical System

- 7) Turn CENTRAL UNLOCK output ON for 1s in 200msec after outputting DEAD UNLOCK for 0.5s in 0.5s based on (5) if (3) and (5) are satisfied at the same time (DEAD LOCK SPEC ONLY).
- 8) Output UNLOCK up to 3 times (excluding output for 1s) if LOCK condition is maintained though UNLOCK output is performed for 1s by (2), (4)(cycle for 1s: 0.5s ON/OFF DEAD LOCK SPEC is excluded.).
- 9) Output CENTRAL UNLOCK up to 3 times in 200msec after outputting DEAD UNLOCK for 0.5s if LOCK condition is maintained though UNLOCK output is performed for 1s by (3), (5)(cycle for 1s:0.5s ON/OFF, DEAD LOCK SPEC ONLY).
- 10) Try UNLOCK once when DOOR is CLOSED while keeping LOCK condition after performing (8) and (9).
- 11)Output Door Unlock Relay once for 1s when Driver Door SW is closed within 0.5s since Driver Door Unlock SW is changed from UNLOCK to LOCK during KEY IN ON(Excluding DEAD LOCK SPEC).
- 12)Output CENTRAL UNLOCK signal for 1s in 200msec after outputting DEAD UNLOCK for 0.5s when L_DRVDRSW is closed within 0.5s since Driver Door Unlock SW is changed from UNLOCK to LOCK during KEY IN ON (DEAD LOCK SPEC ONLY).
- 13)Output CENTRAL UNLOCK once only for 1s when Passenger Door SW is closed within 0.5s since Passenger Door Unlock SW is changed from UNLOCK to LOCK during KEY IN ON (Excluding DEAD LOCK SPEC).
- 14)Output CENTRAL UNLOCK for 1s in 200msec after outputting DEAD UNLOCK for 0.5s when Passenger Door SW is closed within 0.5s since Passenger Door Unlock SW is changed from UNLOCK to LOCK during KEY IN ON (DEAD LOCK SPEC ONLY).
- 15)Output Door Unlock Relay once only for 1s if Driver Door Unlock SW becomes LOCK from UNLOCK within 0.5s since Driver Door SW is changed from OPEN to CLOSE during KEY IN ON(Excluding DEAD LOCK SPEC).
- 16)Turn CENTRAL UNLOCK *7) output ON for 1s in 200msec after outputting DEAD UNLOCK *8) for 0.5s if Driver Door Unlock SW becomes LOCK from UNLOCK within 0.5s since Driver Door SW is changed from OPEN to CLOSE during KEY IN ON (DEAD LOCK SPEC ONLY).

- 17)Output CENTRAL UNLOCK once only for 1s if Passenger Door Unlock SW becomes to be LOCK from UNLOCK within 0.5s since Passenger Door SW is changed from OPEN to CLOSE during KEY IN ON (Excluding DEAD LOCK SPEC).
- 18)Turn CENTRAL UNLOCK output ON for 1sec in 200msec after outputting DEAD UNLOCK for 0.5s when Passenger Door Unlock SW turns LOCK from UNLOCK within 0.5s since Passenger Door SW is changed to CLOSE from OPEN during KEY IN ON (DEAD LOCK SPEC ONLY).
- 19)Perform the function of KEY REMINDER when turning Power window Door Lock SW ON after opening Driver Door SW or Passenger Door SW during KEY IN ON.
- 20)Judge if RETRY output is performed or not at the point of the beginning of RETRY output(in 1.5s from the initial UNLOCK output).
- 21)Output UNLOCK though the condition is not kept for 0.5sec after realizing that of UNLOCK. But, do not output UNLOCK in case that KEY IN is OFF at the point of 0.5s passed after realizing the condition by the change of UNLOCK → LOCK in Driver Door Unlock SW or Passenger Door Unlock SW.



SFDBE8385L

T1, T3 : $0.5 \pm 0.1\text{sec}$, T2 : $1 \pm 0.1\text{sec}$,

T4 : 0.5sec Max

** KEY IN ON : Key In ON or IGN1 ON or IGN2 ON

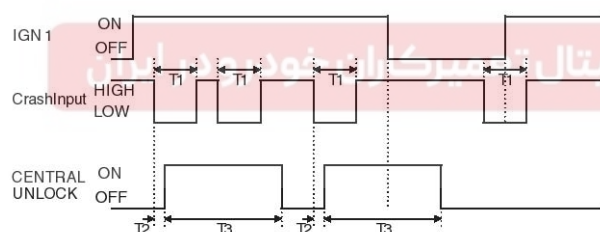
KEY IN OFF : Key In OFF and IGN1 OFF and IGN2 OFF

BCM (Body Control Module)

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7. CRASH DOOR UNLOCK

- 1) Always perform CENTRAL UNLOCK *9) output whenever Crash Input signal is inputted while IGN1 is ON.
- 2) Keep CENTRAL UNLOCK output for the time left though IGN1 turns OFF from ON while outputting CENTRAL UNLOCK.
- 3) Do not output CENTRAL UNLOCK if IGN1 SW turns ON from OFF after Crash Input signal is already inputted.
- 4) Output CENTRAL UNLOCK during T3 if Driver Door Unlock SW or Passenger Door Unlock SW or Rear Right Door Unlock SW or Rear Left Door Unlock SW turns to LOCK from UNLOCK after outputting CENTRAL UNLOCK.
- 5) Do not perform AUTO DOOR LOCK function at the condition of CRASH UNLOCK.
- 6) CRASH DOOR UNLOCK function has priority to LOCK/UNLOCK control by other functions.
- 7) Ignore the request for LOCK/UNLOCK by other functions while or after outputting CRASH DOOR UNLOCK. But, control LOCK/UNLOCK by other functions if IGN1 SW becomes OFF.



SFD8E8386L

T1 : 0.2sec, T2 : 40msec,
T3 : 5 ± 0.5sec

8. AUTO DOOR LOCK

- 1) AUTO DOOR LOCK is classified into non-activation/20km activation/40km activation. And follow the table below for the basic value and selected value of the regional operation SPEC.

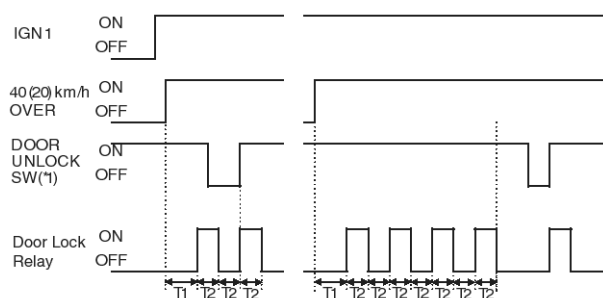
Item	Description
Standard	Disable
Option 1	40km/h

- 2) On condition of IGN1 SW ON, turn Door Lock Relay output ON within T1 when keeping more than setting speed in (1). But, do not output LOCK if all DOORS are LOCKED or FAIL at first.
- 3) Perform outputting LOCK up to 3 times (cycle for 1s) if either of DOORS is UNLOCKED after outputting LOCK in (2). But, ignore the DOOR that has changed to LOCK condition from UNLOCK during the output 3 times.
- 4) Regard the respective DOOR FAILED if it is UNLOCKED after outputting 3 times.
- 5) Output LOCK once only if the DOOR is UNLOCKED after the failed DOOR changes (UNLOCK ⇒ LOCK).
- 6) Output LOCK once only if DOOR which was LOCKED after outputting LOCK in (2) becomes to be UNLOCKED.
But, output LOCK once for the respective DOOR although it keeps UNLOCK after LOCK output.
- 7) Clear the FAILED DOOR when L_IGN1 SW is OFF.

BE-118

Body Electrical System

- 8) Do not perform AUTO DOOR LOCK function on condition of CRASH UNLOCK.



SFD8E8387L

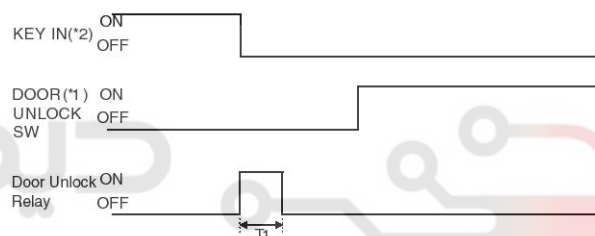
T1 : Max 1.5sec, T2 : $0.5 \pm 0.1\text{sec}$

*1 ON (UNLOCK) : Driver DR Unlock SW | Passenger DR Unlock SW | Rear Right DR Unlock SW | Rear Left DR Unlock SW UNLOCK
 OFF (LOCK) : Driver DR Unlock SW | Passenger DR Unlock SW | Rear Right DR Unlock SW | Rear Left DR Unlock SW LOCK

9. AUTO DOOR UNLOCK

- 1) AUTO DOOR UNLOCK is classified into non-activation and activation and activated for domestic ones only but not activated for others.
- 2) If it is set up to be activated, turn DR Unlock Relay ON when turning KEY IN OFF after KEY IN is ON.

[(But, if all conditions for KNOB are UNLOCK, it will not output.) AUTO DOOR UNLOCK should operate after outputting AUTO DOOR LOCK (UNLOCK OUTPUT will not occur though the key is removed later if LOCK OUTPUT did not occur because all KNOBS are already LOCKED even though it reached to the operating speed of AUTO DOOR LOCK.)]



SFD8E8388L

T1 : $0.5 \pm 0.1\text{sec}$

*1 ON (UNLOCK) : Driver DR Unlock SW | Passenger DR Unlock SW | Rear Right DR Unlock SW | Rear Left DR Unlock SW UNLOCK
 OFF (LOCK) : Driver DR Unlock SW | Passenger DR Unlock SW | Rear Right DR Unlock SW | Rear Left DR Unlock SW LOCK

*2 KEY IN ON : Key In ON or IGN1 ON or IGN2 ON

KEY IN OFF : Key In OFF and IGN1 OFF and IGN2 OFF

BCM (Body Control Module)

BE-119

10.DEAD LOCK (RHD IN AUSTRALIA, EUROPE)

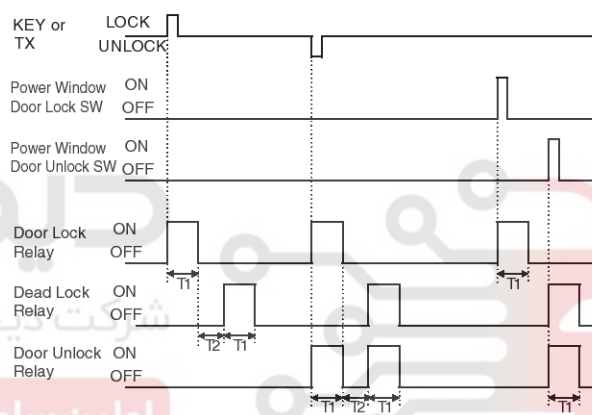
- 1) Turn DEAD LOCK *2) signal output ON for 0.5sec after checking the condition (in 200msec) after outputting CENTRAL LOCK for 0.5sec if ALL DOOR LOCK can be performed properly.
- 2) Do not perform DEAD LOCK after outputting CENTRAL LOCK *1) for 0.5sec if ALL DOOR LOCK can be performed properly by Power window Door Lock SW. (No Safety/KNOB.)
- 3) Turn CENTRAL UNLOCK *1) signal output ON for 0.5sec in 200msec after outputting DEAD UNLOCK *2) for 0.5sec if ALL DOOR UNLOCK can be performed properly by Driver Door Key Lock SW or TX.
- 4) Perform CENTRAL UNLOCK *1) only but do not perform DEAD UNLOCK *2) if ALL DOOR UNLOCK can be performed properly by Power window Door Unlock SW.

But, do not perform ALL DOOR UNLOCK by CTRL DR UNLOCK SW of P/WDW SW on condition of DEAD LOCK.

- 5) Perform DEAD LOCK/UNLOCK regardless of DR OPEN/CLOSE.
- 6) Stop the current output immediately when inputting CENTRAL DOOR LOCK/ UNLOCK orders during CENTRAL DOOR LOCK/UNLOCK output by KEY or TX and then output it with a new input condition in 200msec.
- 7) Stop the current output immediately when inputting CENTRAL DOOR UNLOCK orders during DEAD LOCK output after CENTRAL DOOR LOCK by KEY or TX and then output it with a new input condition in 200msec. Also, stop the current output immediately when inputting CENTRAL DOOR LOCK orders during CENTRAL DOOR UNLOCK output after DEAD UNLOCK by KEY or TX and then output it with a new input condition in 200msec.
- 8) Perform LOCK function first when performing LOCK/UNLOCK at the same time.
- 9) The priority is TX > KEY > DR LOCK SW when inputting at the same time by KEY/TX/DR LOCK SW.
- 10) (9) has priority to (8) when the same condition in (8) and (9) happens.

- 11) Output DEAD LOCK without delay for 200msec in case of ACTUATOR UNLOCK SW *10)=LOCK when performing DEAD LOCK.
- 12) Perform DEAD UNLOCK in case of ACTUATOR UNLOCK SW=UNLOCK but do not perform CENTRAL UNLOCK when performing DEAD UNLOCK.
- 13) Output DEAD UNLOCK for 0.5sec in case of KEY IN and IGN1 OFF → ON on condition of DEAD LOCK.
- 14) Regard as DEAD LOCK condition when RESETTING by removing or installing BATTERY etc.

*10) ACTUATOR UNLOCK SW :Driver DR Unlock SW & Passenger DR Unlock SW & Rear Right DR Unlock SW & Rear Left DR Unlock SW



SFDBE8389L

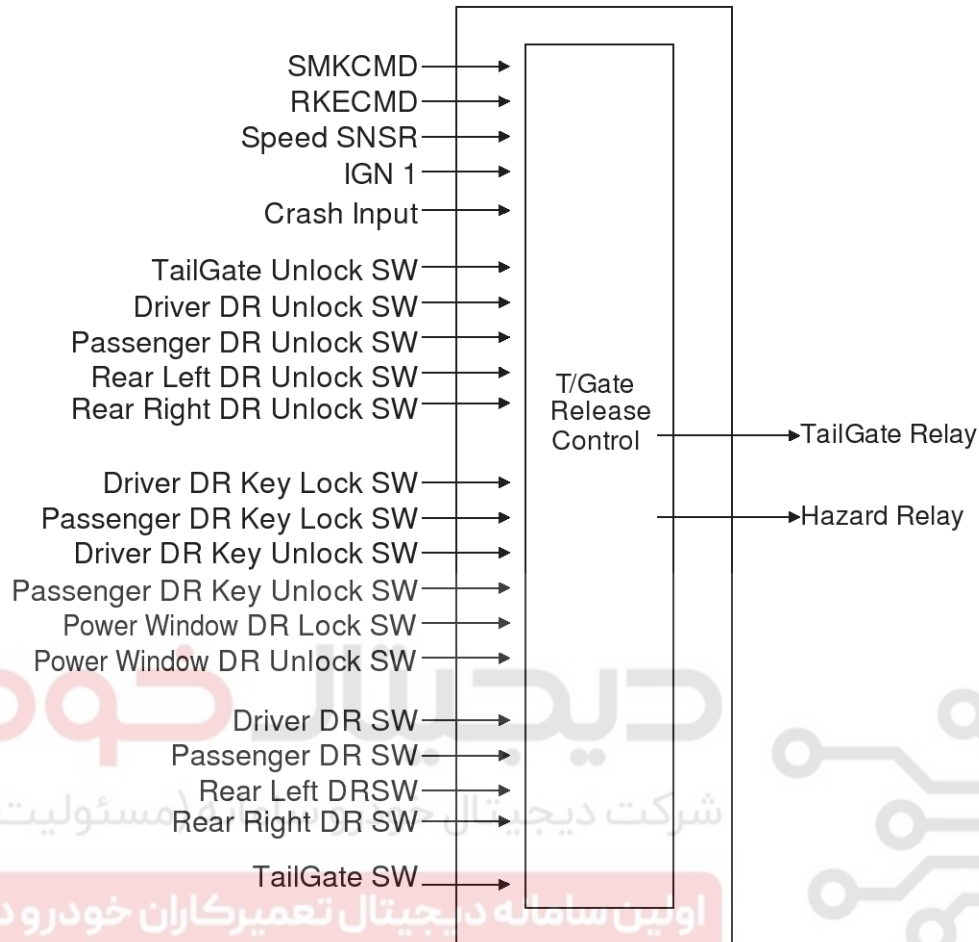
T1 : 0.5 ± 0.1sec, T2 : 0.2 ± 0.05sec

BE-120

Body Electrical System

T/gate Release Control

1. T/GATE RELEASE CONTROL DATA FLOW



SFDBE8390L

RKECMD : TX LOCK, TX UNLOCK, TAILGATE UNLOCK

BCM (Body Control Module)

BE-121

1) Permission mode STATE

State	Description
Initial condition	Permission mode STATE
Event	TAILGATE UNLOCK (or RKE_UNLOCK)
Action	Keep Permission mode Hazard Relay 2times FLASHING

State	Description
Initial condition	Prohibition mode STATE
Event	1. TX UNLOCK (or RKE UNLOCK) 2. Driver Door Key Unlock SW or Passenger Door Key Unlock SW ON 3. Power window Door Unlock SW ON (Except ARM, ARMWAIT, REARM and ALARM mode) 4. AUTO DOOR UNLOCK 5. KEY REMINDER UNLOCK (IGN) 6. CRASH UNLOCK 7. ANY KNOB UNLOCK
Action	Go to Permission mode STATE 5. Tailgate Relay ON for 0.5S

State	Description
Initial condition	30s Permission mode STATE
Event	1. TX UNLOCK (or RKE UNLOCK) 2. Driver Door Key Unlock SW or Passenger Door Key Unlock SW ON 3. Power window Door Unlock SW ON (Except ARM, ARMWAIT, REARM and ALARM mode) 4. AUTO DOOR UNLOCK 5. KEY REMINDER UNLOCK (IGN) 6. CRASH UNLOCK 7. ANY KNOB UNLOCK
Action	Go to Permission mode STATE

State	Description
Initial condition	Permission mode STATE
Event	Tailgate SW ON at below 5km/h
Action	Tailgate Relay for 0.5 sec. Go to Permission mode STATE

BE-122

Body Electrical System

2) 30s Permission mode STATE

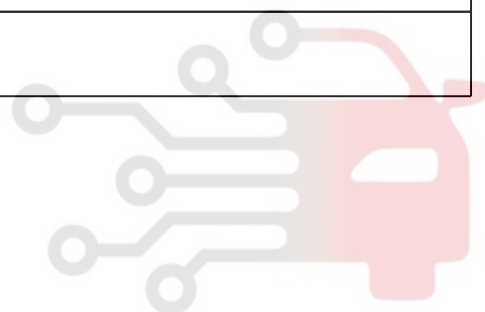
State	Description
Initial condition	Prohibition mode STATE
Event	TailGATE UNLOCK
Action	START Tailgate TIMER Hazard Relay 2times FLASHING Go to 30s Permission mode STATE

State	Description
Initial condition	30s Permission mode STATE
Event	TailGATE UNLOCK
Action	RESTART Tailgate TIMER Hazard Relay 2times FLASHING Go to 30s Permission mode STATE

State	Description
Initial condition	30s Permission mode STATE
Event	Tailgate SW ON at below 5km/h
Action	Tailgate Relay for 0.5sec. Go to 30s Permission mode STATE

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



BCM (Body Control Module)

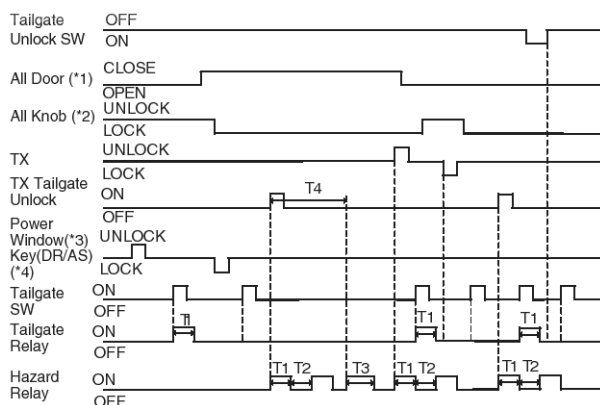
BE-123

3) Prohibition mode STATE

State	Description
Initial condition	30s Permission mode STATE
Event	1. TX LOCK(RKE_LOCK) 2. Driver Door Key Lock SW ON 3. Power window Door Lock SW ON 4. AUTO DOOR LOCK 5. RELOCK 6. Tailgate SW OPEN → CLOSE 7. Go to ARMWAIT
Action	Go to prohibition mode STATE State

State	Description
Initial condition	30s Permission mode STATE
Event	TailGATE TIMER IS EXPIRED
Action	Go to Prohibition mode STATE

State	Description
Initial condition	Permission mode STATE
Event	1. TX LOCK(RKE_LOCK) 2. Driver Door Key Lock SW ON 3. Power window Door Lock SW ON 4. AUTO DOOR LOCK 5. RELOCK 6. Go to ARM WAIT 7. ALL KNOB LOCK
Action	Go to Prohibition mode STATE



SFD8E8391L

T1,T2 : 0.5 ± 0.1s, T3 : 1 ± 0.2s

T4 : 30 ± 3s

*1 ALL DOOR : Driver DR SW, Passenger DR SW, Rear Left DR SW, Rear Right DR SW

*2 ALL KNOB : Driver DR Unlock SW, Passenger DR Unlock SW, Rear Left DR Unlock SW, Rear Right DR Unlock SW

*3 P/WINDOW(*3) : Power Window DR Lock SW, Power Window DR Unlock SW

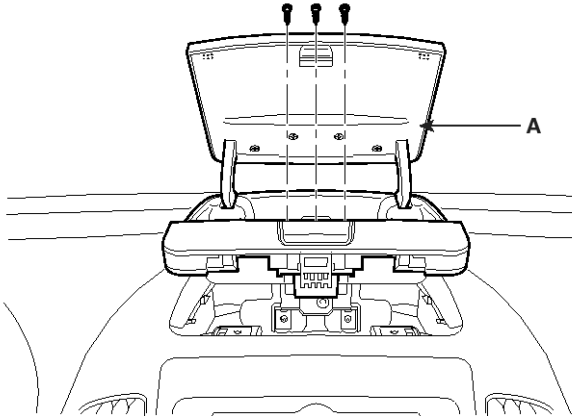
*4 KEY(DR/AS)(*4) : Driver DR Key Lock SW, Passenger DR Key Lock SW, Driver DR Key Unlock SW, Passenger DR Key Unlock SW

BE-124

Body Electrical System

Removal

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

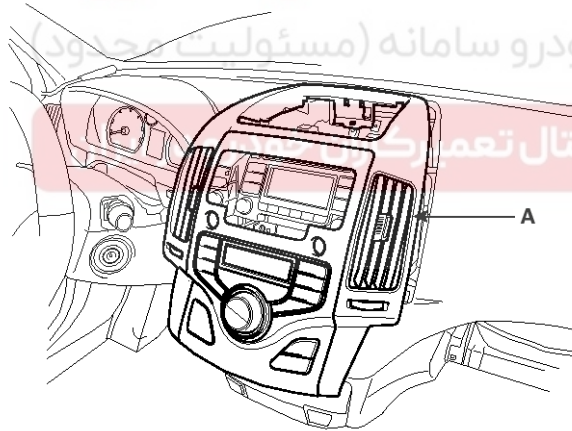


SFDBE8206L

3. Remove the crash pad center fascia panel (A).

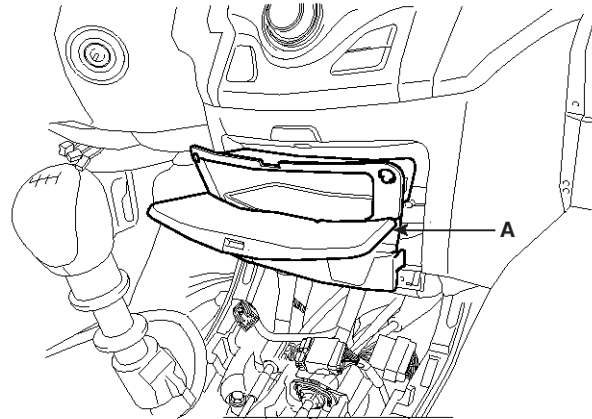
NOTICE

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



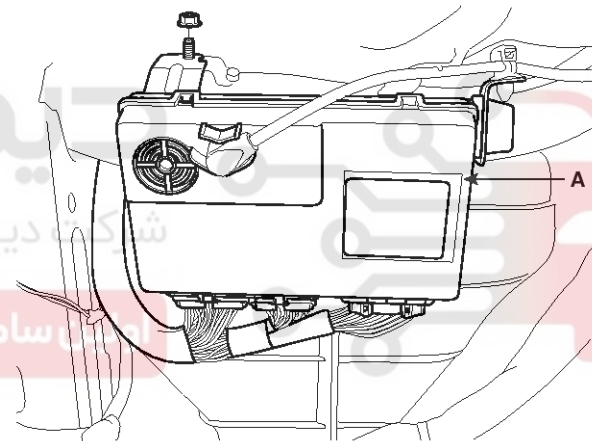
SFDBE8207L

4. After loosening the mounting clips, then remove the center fascia lower tray (A).



SFDBE8284L

5. Remove the body control module (A) after loosening 1 bolts and disconnecting connector.



SFDBE8208L

Installation

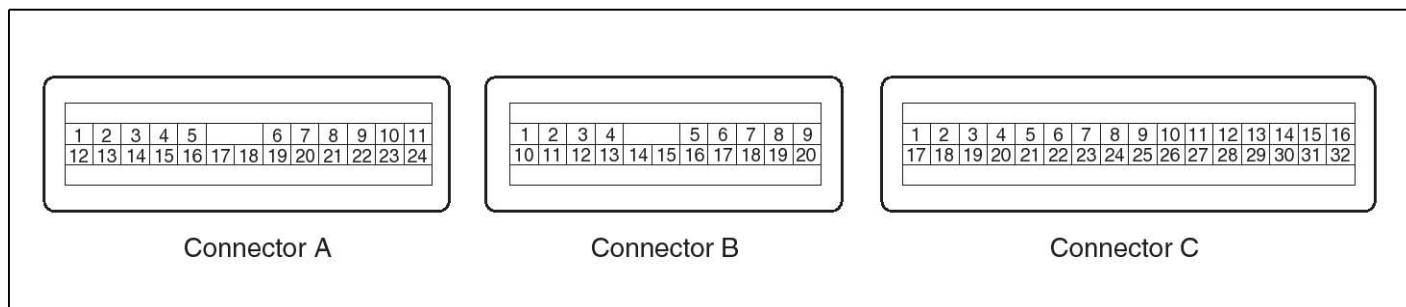
1. Install the body control module.
2. Install the center fascia lower tray.
3. Install the center fascia panel.
4. Install the upper tray.

BCM (Body Control Module)

BE-125

Inspection

BCM Connectors



SFDBE8200L

Pin No.	Connector A	Connector B	Connector C
1	B+	CRASH INPUT	POWER WINDOW RELAY
2	FRONT DEICER SW	-	-
3	PASSENGER SEAT BELT SW	SAVE CODE	FRONT FOG RELAY
4	DRIVER SEAT BELT SW	K_LINE	REAR FOG RELAY
5	AUTO LIGHT SW	WASHER SW	WIPER RELAY
6	HEAD LAMP SW	WIPER INT SW	TAIL GATE RELAY
7	TAIL SW	MIST SW	HORN RELAY
8	REAR FOG SW	IGN2	HAZARD RELAY
9	FRONT FOG SW	-	START INHIBIT RELAY
10	OVER SPEED SIGNAL/ RR SBR BUZZER SIGNAL	POWER WINDOW DOOR UNLOCK SW	DEFOGGER RELAY
11	SPEED SENSOR	POWER WINDOW DOOR LOCK SW	DEICER RELAY
12	IGN1	PASSENGER DOOR SW	DOOR UNLOCK RELAY
13	DEFOGGER SW	DRIVER DOOR SW	Dead Lock RELAY
14	DRIVER DOOR UNLOCK SW	REAR RIGHT DOOR SW	DOOR LOCK RELAY
15	PASSENGER DOOR UNLOCK SW	REAR LEFT DOOR SW	KEY HOLE ILLUMINATION
16	REAR RIGHT DOOR UNLOCK SW	TAILGATE SW	TAIL LAMP RELAY
17	TAILGATE OPEN SW	HOOD SW	SAFETY POWER WINDOW ECU
18	REAR LEFT DOOR UNLOCK SW	KEY IN SW	AUTO LIGHT POWER
19	DRIVER DOOR KEY LOCK SW	DRL SW	AUTO LIGHT SIGNAL
20	DRIVER DOOR KEY UNLOCK SW	PASSENGER DOOR KEY LOCK SW	ALT_L

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Body Electrical System

Pin No.	Connector A	Connector B	Connector C
21	PASSENGER KEY UNLOCK SW		INT T
22	-		AUTO LIGHT GROUND
23	POWER2 GROUND		PASSENGER SEAT BELT INDICATOR
24	POWER1 GROUND		DRIVER SEAT BELT INDICATOR
25			OVER SPEED INDICATOR
26			-
27			-
28			-
29			-
30			-
31			HEAD LAMP RELAY
32			ROOM LAMP

Terminal Voltage

Function	Pin Name	State	Voltage Level	
			Low Level	High Level
Analog Input	B+	8V ~ 16V	-	-
	Auto Light Signal	0V ~ 5V	-	-
	Int T	0V ~ 5V	-	-
	IGN1	8V ~ 16V	-	-

BCM (Body Control Module)

BE-127

Logic Input	IGN2	OPEN/ON	Below 1V	Over 8V
	Washer SW	OPEN/ON	Below 1V	Over 8V
	Wiper Int SW	OPEN/ON	Below 1V	Over 8V
	Mist SW	OPEN/ON	Below 1V	Over 8V
	Key In SW	OPEN/ON	Below 1V	Over 6V
	Driver Door Unlock SW	OPEN/ON	Below 1V	Over 6V
	Passenger Door Unlock SW	OPEN/ON	Below 1V	Over 6V
	Rear Left Door Unlock SW	OPEN/ON	Below 1V	Over 6V
	Rear right Unlock SW	OPEN/ON	Below 1V	Over 6V
	Tailgate Unlock SW	OPEN/ON	Below 1V	Over 6V
	Hood SW	OPEN/ON	Below 1V	Over 6V
	Tailgate open SW	OPEN/ON	Below 1V	Over 6V
	Rear Left Door SW	OPEN/ON	Below 1V	Over 6V
	Rear Right Door SW	OPEN/ON	Below 1V	Over 6V
	Driver Door SW	OPEN/ON	Below 1V	Over 6V
	Passenger Door SW	OPEN/ON	Below 1V	Over 6V
	Driver door Key Lock SW	OPEN/ON	Below 1V	Over 6V
	Driver door Key Unlock SW	OPEN/ON	Below 1V	Over 6V
	Passenger Door Key Lock SW	OPEN/ON	Below 1V	Over 6V
	Passenger Door Key Unlock SW	OPEN/ON	Below 1V	Over 6V
	Power window Door Lock SW	OPEN/ON	Below 1V	Over 6V
	Power window Door Unlock SW	OPEN/ON	Below 1V	Over 6V
	Defogger SW	OPEN/ON	Below 1V	Over 6V
	Deicer SW	OPEN/ON	Below 1V	Over 6V
	Passenger Seat Belt SW	OPEN/ON	Below 1V	Over 6V
	Driver Seat Belt SW	OPEN/ON	Below 1V	Over 6V
	Auto Light SW	OPEN/ON	Below 1V	Over 6V
	Head Lamp SW	OPEN/ON	Below 1V	Over 6V
	Tail SW	OPEN/ON	Below 1V	Over 6V
	Rear Fog SW	OPEN/ON	Below 1V	Over 6V
	Front Fog SW	OPEN/ON	Below 1V	Over 6V
	Over Speed Signal	OPEN/ON	Below 1V	Over 6V
	Crash Input	OPEN/ON	Below 1V	Over 6V
	Push Knob SW	OPEN/ON	Below 1V	Over 4V
	DRL	OPEN/ON	Below 1V	Over 6V
Frequency	Speed Sensor	OPEN/ON	Below 1V	Over 6V

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Body Electrical System

Communication	CODE_SAVE	OPEN/ON	Below 1V	Over 4V
	K LINE	OPEN/ON	Below 1V	Over 6V

BCM Actuator Operation

SCAN tool can operates all actuators controlled by BCM by force.

NO.	BCM DISPLAY
1	DOOR LOCK RELAY
2	DOOR UNLOCK RELAY
3	TAILGATE RELEASE RELAY
4	POWER WINDOW RELAY
5	WIPER RELAY
6	HAZARD RELAY (+RK)
7	BURGLAR HORN RELAY (+RK)
8	STARTER INHIBIT RELAY (+RK)
9	TAIL LAMP RELAY/DRL UNIT
10	HEAD LAMP RELAY
11	REAR FOG RELAY
12	FRONT DEICER RELAY
13	REAR DEFOGGER RELAY
14	DRIVER SEAT BELT INDICATOR
15	IGN KEY HOLE ILLUMINATION
16	ROOM LAMP

BCM Diagnosis With SCAN Tool

1. It will be able to diagnose defects of BCM with scan tool quickly. Scan tool can operates actuator forcefully, input/output value monitoring and self diagnosis.

2. Select model and menu.

1. HYUNDAI VEHICLE DIAGNOSIS ▼

MODEL : FD

01. ENGINE (GASOLINE)
02. ENGINE (DIESEL)
03. AUTOMATIC TRANSAXLE
04. ABS/ESP
05. SRS-AIRBAG
06. FULL AUTO AIR/CON.
07. ELEC.POWER STEERING
08. BODY CONTROL MODULE

SFDBE8201L

3. Select "Current data", if you will check current data of BCM. It provides power supply status, multi function status, lamp status, door status, lock system status, wiper, auto light status and so on.

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : BODY CONTROL MODULE

01. CURRENT DATA
02. FLIGHT RECORD
03. ACTUATION TEST
04. SIMU-SCAN
05. IDENTIFICATION CHECK
06. USER OPTION
07. DATA SETUP (UNIT CONV.)

SFDBE8202L

BCM (Body Control Module)

BE-129

1.11 CURRENT DATA 04/66

KEY IN SW	OFF
START INHIBIT RLY (+RK)	OFF
POWER WINDOW RELAY	OFF
TAIL LAMP SW	OFF
AUTO LIGHT SW	OFF
REAR FOG SW	OFF
HEAD LAMP SW	OFF
FRONT FOG SW	OFF

SEDBE7217L

4. If you will check BCM data operation forcefully, select "Actuation test".

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD
SYSTEM : BODY CONTROL MODULE

01. CURRENT DATA
02. FLIGHT RECORD
03. ACTUATION TEST

04. SIMU-SCAN
05. IDENTIFICATION CHECK
06. USER OPTION
07. DATA SETUP (UNIT CONV.)

SFD8E203L

1.3 ACTUATION TEST 01/16

DOOR LOCK RELAY	
DURATION	0.5S 1 TIMES
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE OFF
PRESS [STRT], IF YOU ARE READY ! SELECT TEST ITEM USING UP/DOWN KEY	

STRT STOP

SEDBE7219L

5. You can turn ON/OFF as below option function with the user option program.

- 1) LOCK / UNLOCK confirming alarm: Alarm sound ON/OFF control when you LOCK/UNLOCK doors with transmitter.
- 2) Mechanical LOCKING system: Arm/Disarm ON/OFF when you lock the door with the mechanical key.
- 3) AUTO DOOR LOCK/UNLOCK system ON/OFF.
 - Vehicle speed gearing AUTO DOOR LOCK (more than 20km/h)
 - AUTO DOOR LOCK non application
 - Shift lever gearing AUTO DOOR LOCK
 - Driver seat AUTO DOOR LOCK
 - AUTO DOOR UNLOCK non application
 - All doors UNLOCK in the case of driver door UNLOCK
 - All doors UNLOCK in the case of IGN key separation.
- 4) Riding & Getting off gearing
 - Seat installation state ON/OFF
 - Seat riding & getting off gearing ON/OFF
 - Column installation state ON/OFF
 - Column riding & getting off gearing ON/OFF

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Body Electrical System

User Option Mode

The BCM offers 3 items user option mode for a user convenience (AUTO DOOR LOCK/UNLOCK, DOOR KEY ARM/DISARM)

- It is able to set up the enable or disable of AUTO DOOR LOCK function or AUTO DOOR LOCK operation when using it.
- It is able to set up the enable or disable of AUTO DOOR UNLOCK function or AUTO DOOR LOCK operation when using it.
- It is able to set up the enable or disable of burglar alarm mode when using door lock by the key.

1. Select option "FD" and press ENTER.
2. Select option "BODY CONTROL MODULE" and press ENTER.

1. HYUNDAI VEHICLE DIAGNOSIS ▼

MODEL : FD

01. ENGINE (GASOLINE)
02. ENGINE (DIESEL)
03. AUTOMATIC TRANSAXLE
04. ABS/ESP
05. SRS-AIRBAG
06. FULL AUTO AIR/CON.
07. ELEC.POWER STEERING
08. BODY CONTROL MODULE

SFDBE8204L

3. Select option "USER OPTION" and press ENTER.

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : BODY CONTROL MODULE

01. CURRENT DATA
02. FLIGHT RECORD
03. ACTUATION TEST
04. SIMU-SCAN
05. IDENTIFICATION CHECK
06. USER OPTION
07. DATA SETUP(UNIT CONV.)

SFDBE8205L

4. Select option "AUTO DOOR LOCK STATUS" by using the direction button(▲ / ▼).
5. Select the parameter by using the direction button(◀ / ▶) and press ENTER to save it.
(Disable / FIXING)

1.6 USER OPTION	
AUTO DOOR LOCK STATUS	DISABLE
AUTO DOOR UNLOCK STATUS	DISABLE
ARM/DISARM BY KEY(+RK)	DISABLE

DATA WRITE

DISABLE

AFTER SELECT (◀/▶)KEY, PRESS [ENTER].

SFDBE8416L

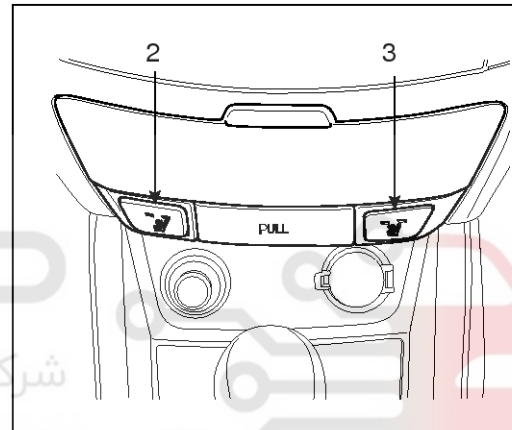
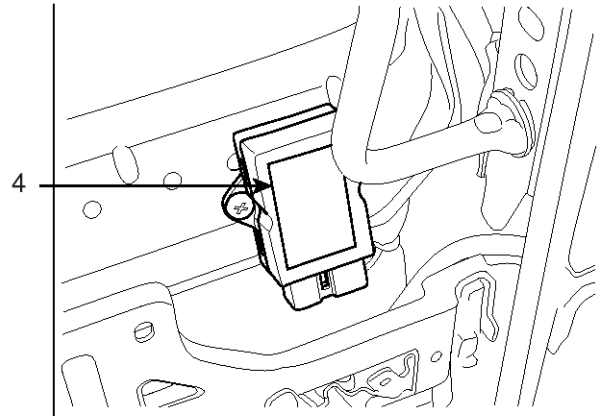
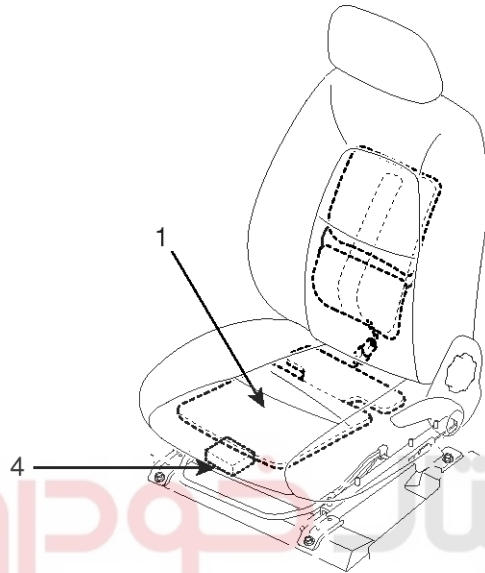
6. Select option "AUTO DOOR UNLOCK STATUS" by using the direction button(▲ / ▼).
7. Select the parameter by using the direction button(◀ / ▶) and press ENTER to save it.
(Disable / Enable)
8. Select option "DOOR KEY ARM/DISARM" by using the direction button(▲ / ▼).
9. Select the parameter by using the direction button (▲ / ▼) and press ENTER to save it (Disable/Enable)

Seat Electrical

BE-131

Seat Electrical

Component Location



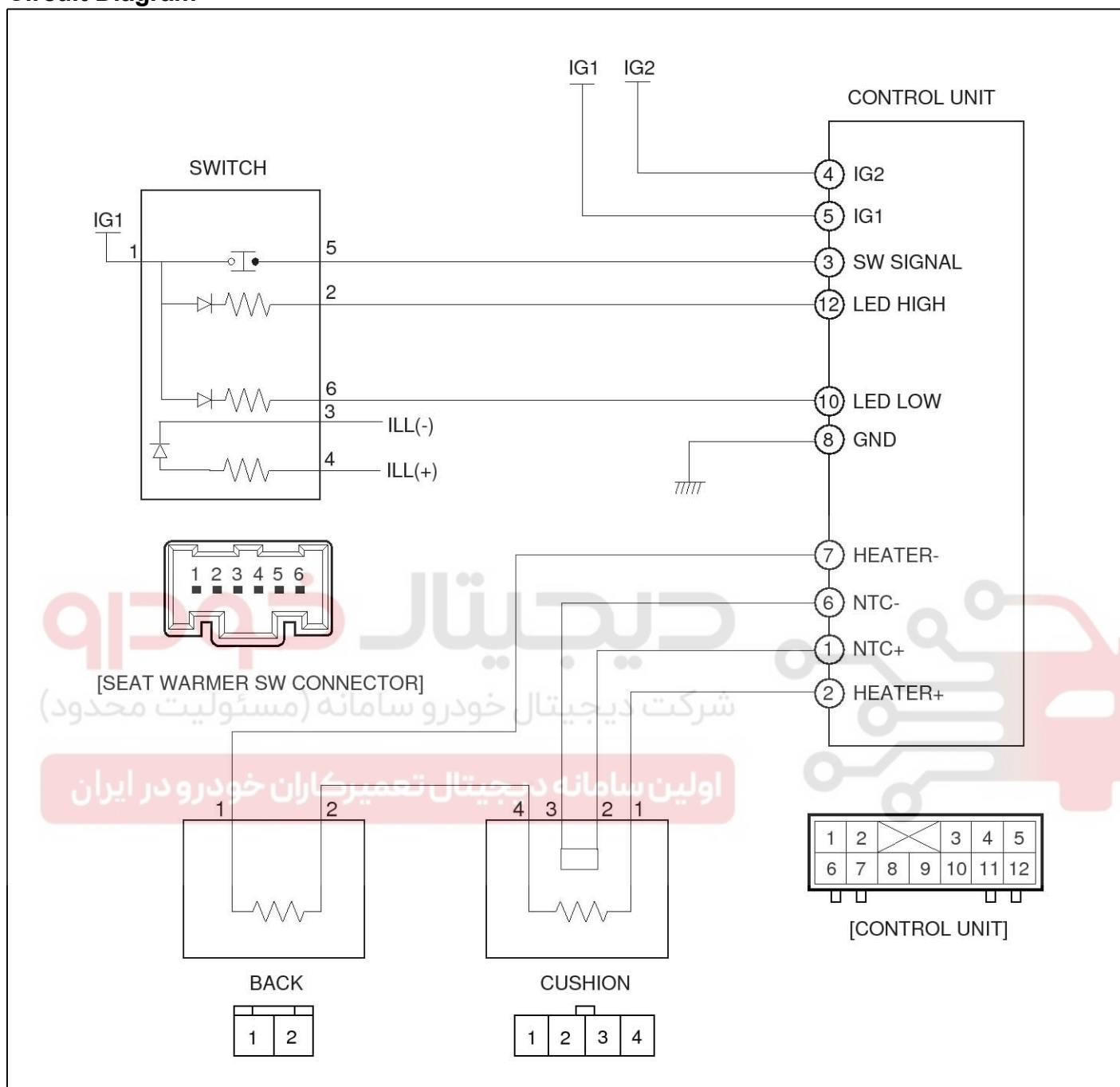
- | | |
|----------------------------|----------------------------|
| 1. Seat warmer | 3. Seat warmer switch (RH) |
| 2. Seat warmer switch (LH) | 4. Control unit |

SFD8E117L

BE-132

Body Electrical System

Circuit Diagram



SFDBE8116L

Seat Electrical

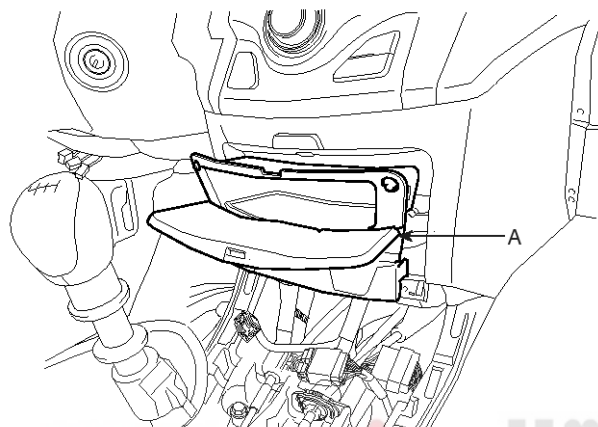
BE-133

Seat Heater Switch

Inspection

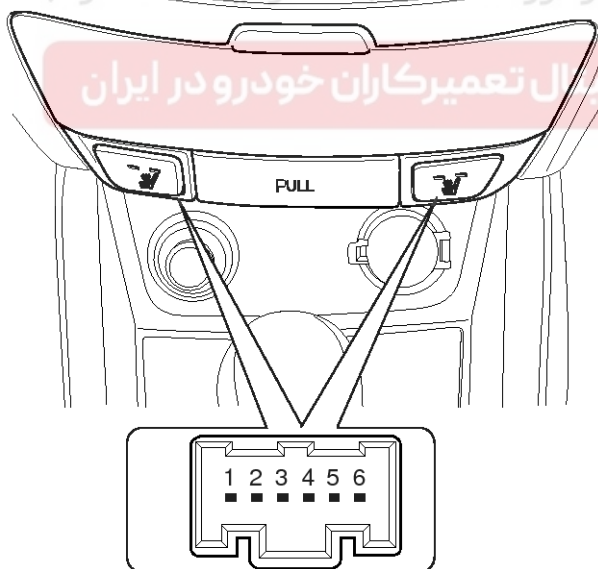
Front Seat Warmer Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia lower tray (A) after loosening the mounting clips.
(Refer to the BD group - "Crash pad")



SFDBE8118L

3. Disconnect the seat warmer switch connector.



SFDBE8119L

4. Check that continuity exists between the terminals.

		Terminal	
		1	5
Direction	ON		
	OFF		

SFDBE8120L

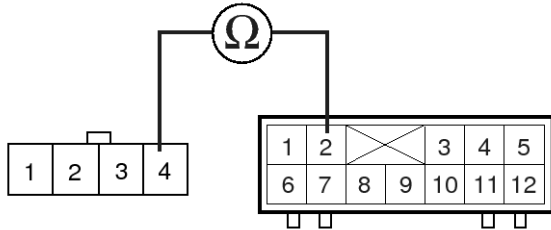
BE-134

Body Electrical System

Seat Heater

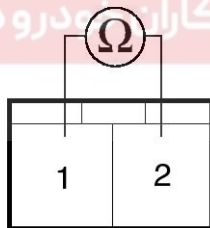
Inspection

1. For cushion side of seat warmer, check for continuity and measure the resistance between No.2 terminal of control unit harness connector and No.4 terminal of cushion connector.



SFDBE8286L

2. For back side of seat warmer, check for continuity and measure the resistance between No.1 and No.2 terminal of back connector.



SEDBE7389L

Standard value

Cushion : $1.32\Omega \pm 10\%$, Back : $1.30\Omega \pm 10\%$

3. Operate the seat warmer after connecting the connectors, and then check the NTC(Negative Temperature Coefficient) thermostat by measuring the temperature of seat surface.

Standard value

Item	Cushion	Back	Remark
LOW	97°F (36°C)	104°F (40°C)	$\pm 36^\circ\text{F} (\pm 2^\circ\text{C})$
HIGH	104°F (40°C)	115°F (46°C)	$\pm 36^\circ\text{F} (\pm 2^\circ\text{C})$

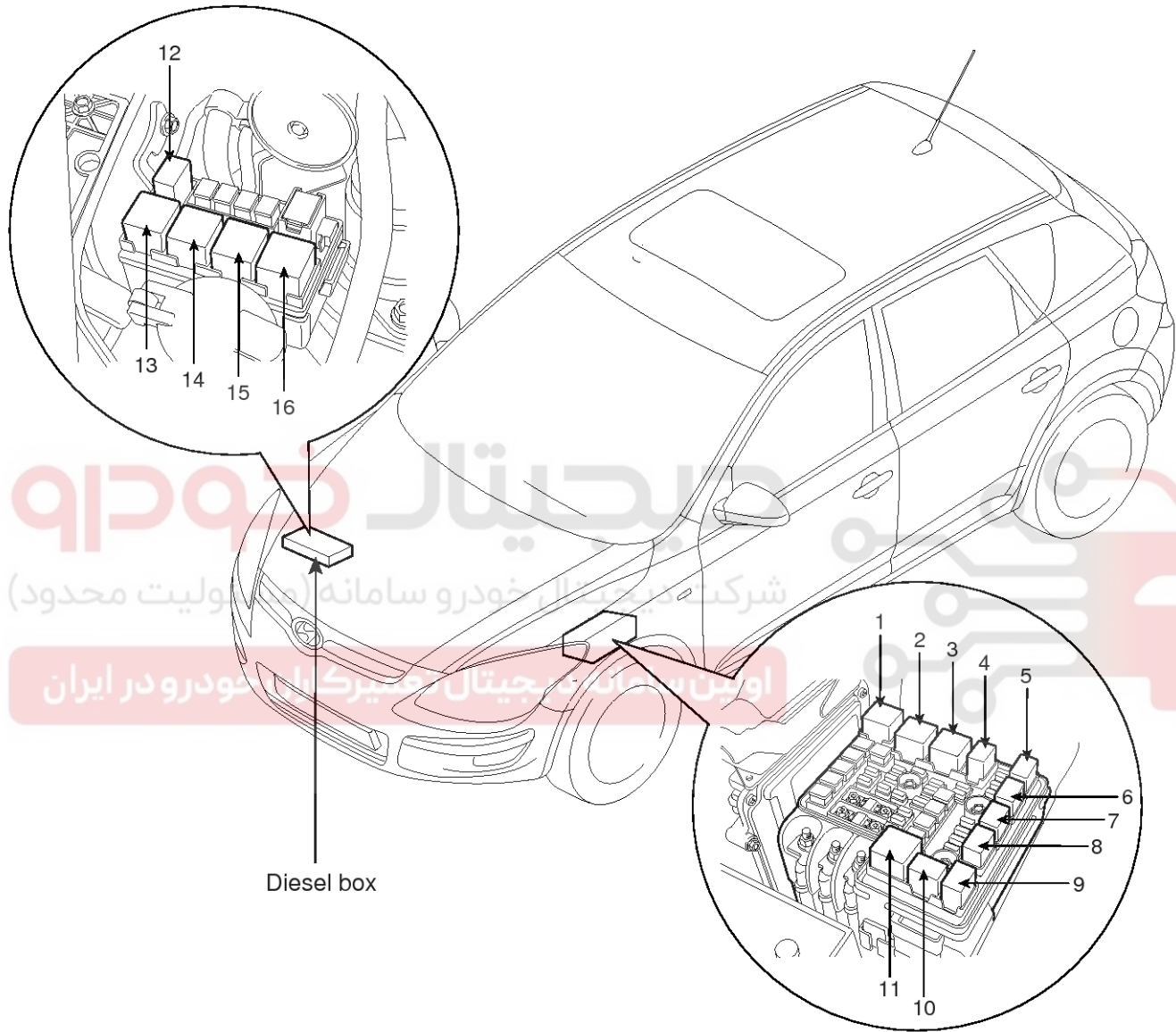
Fuses And Relays

BE-135

Fuses And Relays

Component Location

[Engine room relay box]



1. Condenser fan 2 relay
2. Condenser fan 1 relay
3. Start relay
4. Fuel pump relay
5. A/C relay
6. Head lamp relay (Low-left side)
7. Horn relay
8. Head lamp relay (High)

9. Front fog lamp relay
10. Wiper relay
11. Main relay
12. Fuel filter heater relay
13. PTC heater relay #3
14. PTC heater relay #2
15. PTC heater relay #1
16. Glow relay

SFDBE8055L

BE-136

Body Electrical System

[Passenger compartment relay]

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.

Passenger compartment junction box*

ICM relay box*

2*

1*

1. Tail lamp relay, Power window relay, Rear heater relay, Trunk lid relay (Built-in-Junction box)

2. Door unlock relay, Door lock relay, Front decier relay, Rear fog relay, Buglar alarm horn relay, Buglar alarm relay, Hazard relay (Built-in-ICM relay Box)

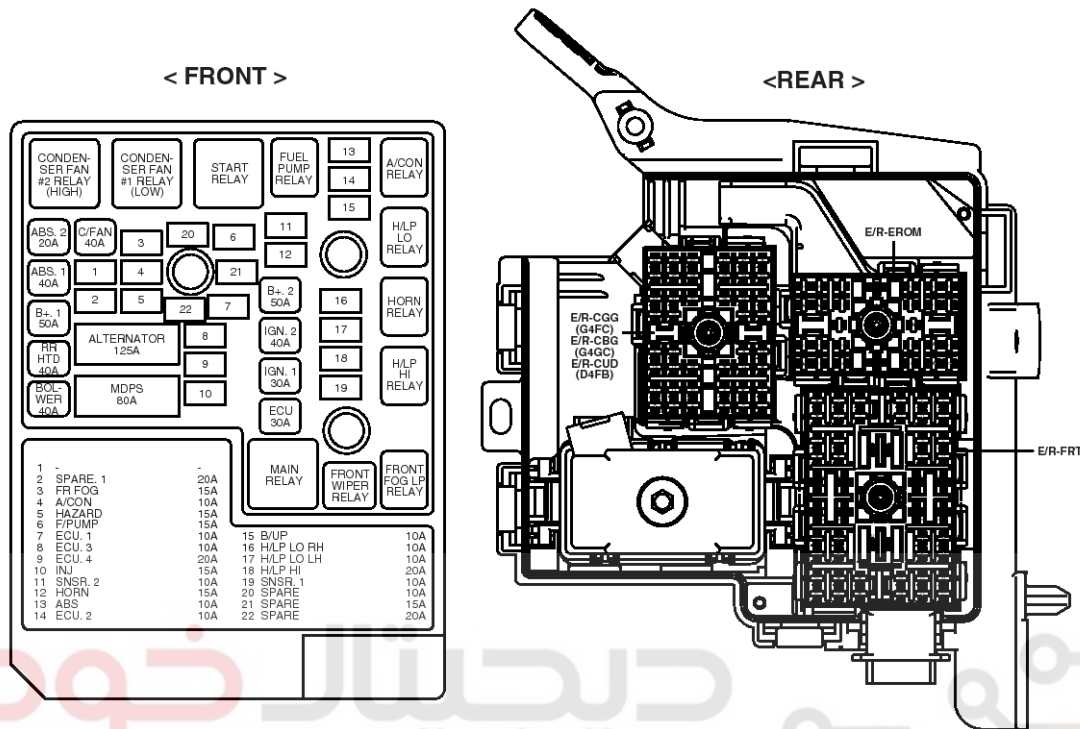
SFDBE8056L

Fuses And Relays

BE-137

Relay Box (Engine Compartment)

Component Location



CIRCUIT

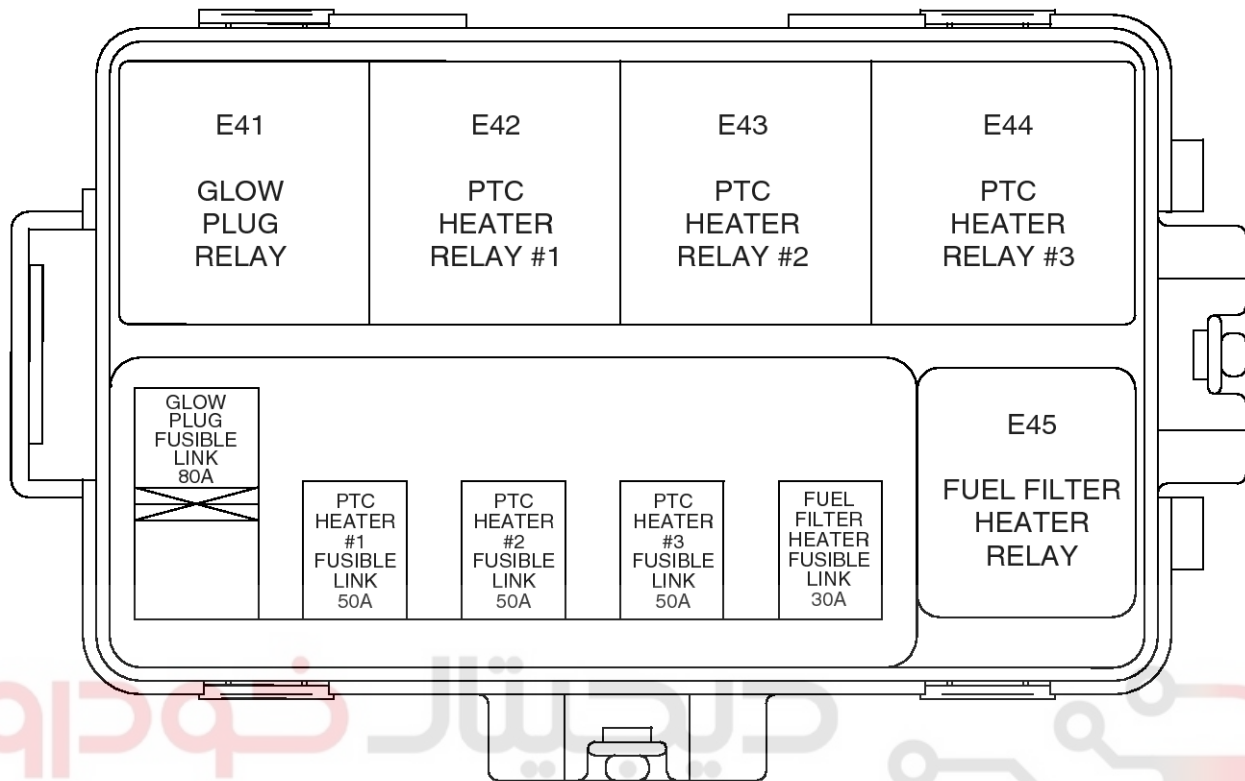
	Description	(A)	Circuit Protected
FUSIBLE LINK	ALTERNATOR	125A	Generator, Fusible Link Box (D4FB)
	IGN. 1	30A	Ignition Switch
	IGN. 2	40A	Ignition Switch, Start Relay
	B+. 2	50A	I/P Junction Box
	ECU	30A	Main Relay, PCM (G4GC)
	C/FAN	40A	Condenser Fan #1 Relay (Low), Condenser Fan #2 Relay (High)
	RR HTD	40A	I/P Junction Box
	B+. 1	50A	I/P Junction Box
	BLOWER	40A	Blower Relay
	ABS. 1	40A	ESP Control Module, ABS Control Module, Multipurpose Check Connector
	ABS. 2	20A	ESP Control Module, ABS Control Module, Multipurpose Check Connector
	MDPS	80A	MDPS Control Module
FUSE	SNSR. 1	10A	Immobilizer Module (G4FC/G4GC), Oxygen Sensor (G4FC/G4GC), PCM (G4FC), Camshaft Position Sensor (G4FC/G4GC), Purge Control Solenoid Valve (G4FC), Crankshaft Position Sensor (G4GC), Stop Lamp Switch (D4FB), Lambda Sensor (D4FB)
	INJ	15A	A/Con Relay, Fuel Pump Relay, Injector #1, 2, 3, 4 (G4FC/G4GC), PCM (G4FC/G4GC), Oil Control Valve (G4FC/G4GC), Idle Speed Actuator (G4FC/G4GC), ECM (G4FC), Purge Control Solenoid Valve (G4GC), Camshaft Position Sensor (D4FB), Throttle Flap Actuator (D4FB), EGR Actuator (D4FB), VGT Actuator (D4FB), Immobilizer Module (D4FB), Fusible Link Box (D4FB)
	HAZARD	15A	Hazard Switch, ICM Relay Box (Hazard Relay)
	F/PUMP	15A	Fuel Pump Relay
	HORN	15A	Horn Relay, ICM Relay Box (Burglar Alarm Horn Relay)
	SNSR. 2	10A	Pulse Generator 'A', Pulse Generator 'B', TCM (D4FB), Air Flow Sensor (D4FB), Stop Lamp Switch (G4FC/G4GC), Fuel Filter Warning Switch (D4FB), PCM (G4FC/G4GC), ECM (G4FC/D4FB), Vehicle Speed Sensor
	H/LP HI	20A	H/LP Hi Relay
	H/LP LO LH	10A	Head Lamp LH, Head Lamp Leveling Actuator LH, Head Lamp Leveling Switch
	H/LP LO RH	10A	Head Lamp RH, Head Lamp Leveling Actuator RH
	ECU. 1	10A	ECM (G4FC), PCM (G4FC), TCM (D4FB)
	ECU. 3	10A	ECM (D4FB)
	ECU. 4	20A	ECM (D4FB)
	FR FOG	15A	Front Fog Lp Relay
	A/CON	10A	A/Con Relay
	ABS	10A	ESP Control Module, ABS Control Module, Yaw Rate Sensor, Multipurpose Check Connector
	B/UP	10A	Back-up Lamp Switch, Transaxle Range Switch, Multifunction Switch, Cruise Control Module
	ECU. 2	10A	Condenser (G4FC), Ignition Coil #1, 2, 3, 4 (G4FC), PCM (G4GC)
	SPARE. 1	20A	-
	SPARE	10A	-
	SPARE	15A	-
	SPARE	20A	-

✱USE THE DESIGNATED FUSE ONLY

SHDBE6192L

BE-138

Body Electrical System



شرکت دیجیتال خودرو (مسئولیت محدود)

※ USE THE DESIGNATED FUSE ONLY

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SEDBE7193L

Fuses And Relays

BE-139

Inspection

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

Power Relay (Type A)

Check for continuity between the terminals.

A : Fuel pump relay

B : A/C relay

C : Head lamp relay (Low)

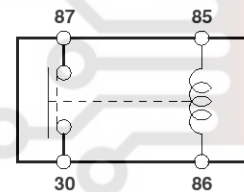
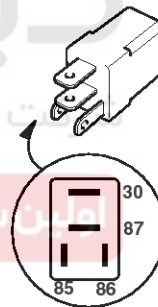
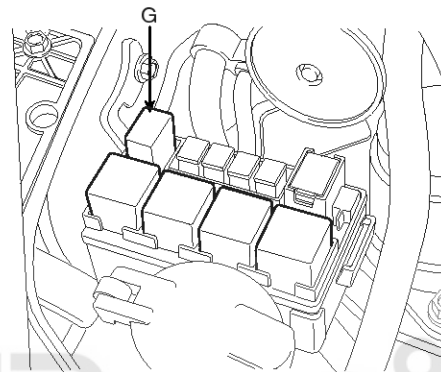
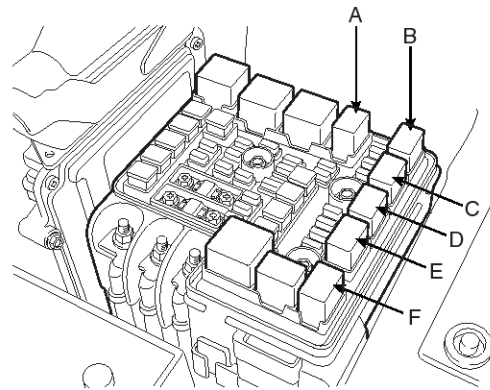
D : Horn relay

E : Head lamp relay (High)

F : Front fog lamp relay

G : Fuel filter heater relay

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



SEDBE7194L

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

SCMBE6195L

BE-140

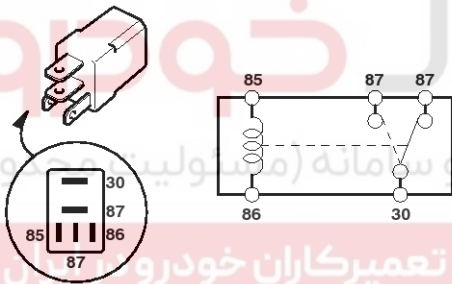
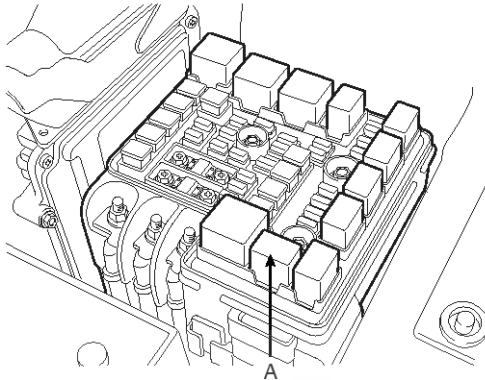
Body Electrical System

Power Relay (Type B)

Check for continuity between the terminals.

A : Wiper relay

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



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

SEDBE7196L

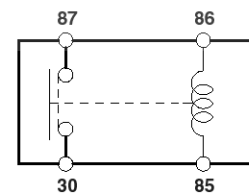
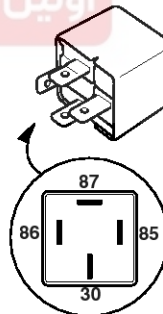
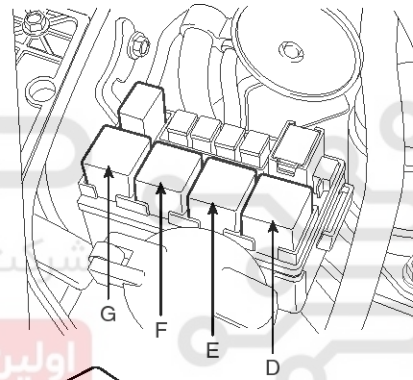
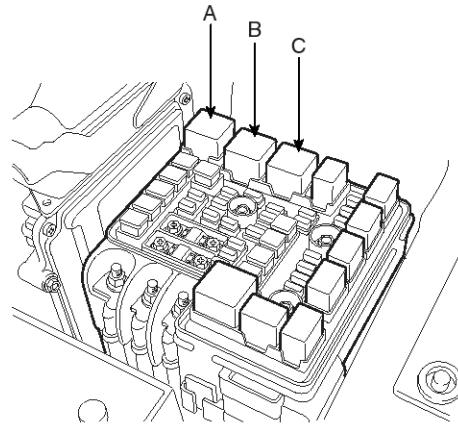
SCMBE6197L

Power Relay (Type C)

Check for continuity between the terminals.

- A : Condenser pan2 relay
 B : Condenser pan 1 relay
 C : Start relay
 D : Glow relay
 E : PTC heater relay #1
 F : PTC heater relay #2
 G : PTC heater relay #3

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



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

SEDBE7198L

SCMBE6199L

Fuses And Relays

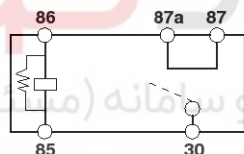
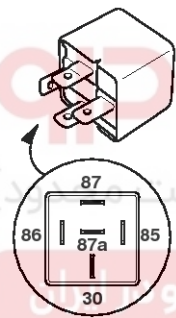
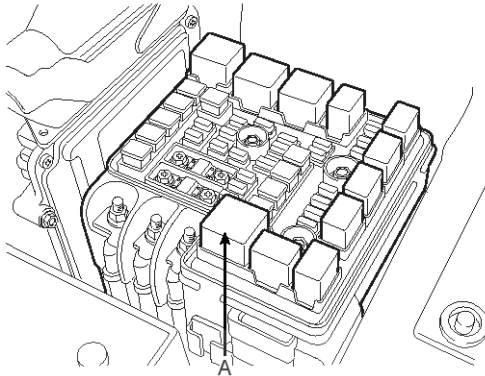
BE-141

Power Relay (Type D)

Check for continuity between the terminals.

A : Main relay

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



SEDBE7200L

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

SCMBE6201L

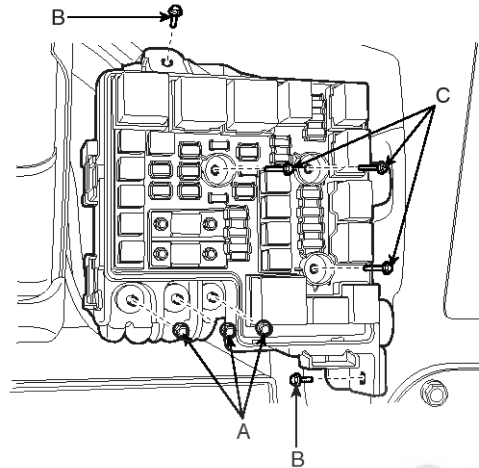
Fuse

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

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

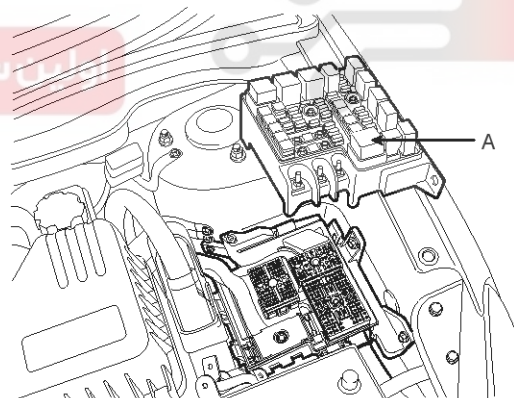
Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the engine room junction box upper cover.
3. Loosen the ring terminal mounting 3 nuts (A) then remove the ring terminal cables.
4. Loosen the body and lower cover 2 bolts (B).
5. Loosen the connector 3 bolts (C).



SEDBE7205L

6. Remove the fuse and relay box (A) from the lower cover.

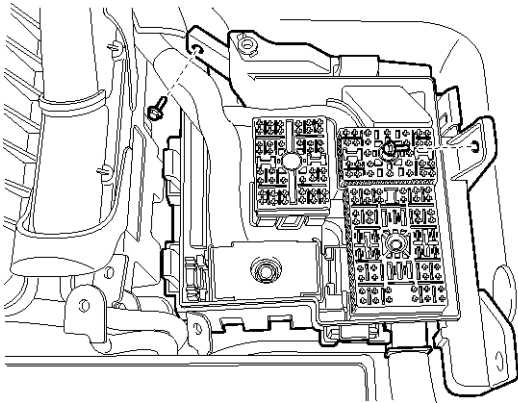


SEDBE7206L

BE-142

Body Electrical System

7. Remove the lower cover and mating connectors after loosening the box mounting 2 bolts.



SEDBE7207L

Installation

1. Install the lower cover.

Torque : 10 ~ 12Nm (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lbf.ft)

2. Install the fuse and relay box to the lower cover.

Torque :

Connector bolt : 10 ~ 12Nm (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lbf.ft)

Ring terminal mounting nut : 10 ~ 12Nm (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lbf.ft)

Body and lower cover bolt : 10 ~ 12Nm (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lbf.ft)

3. Install the junction box upper cover.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

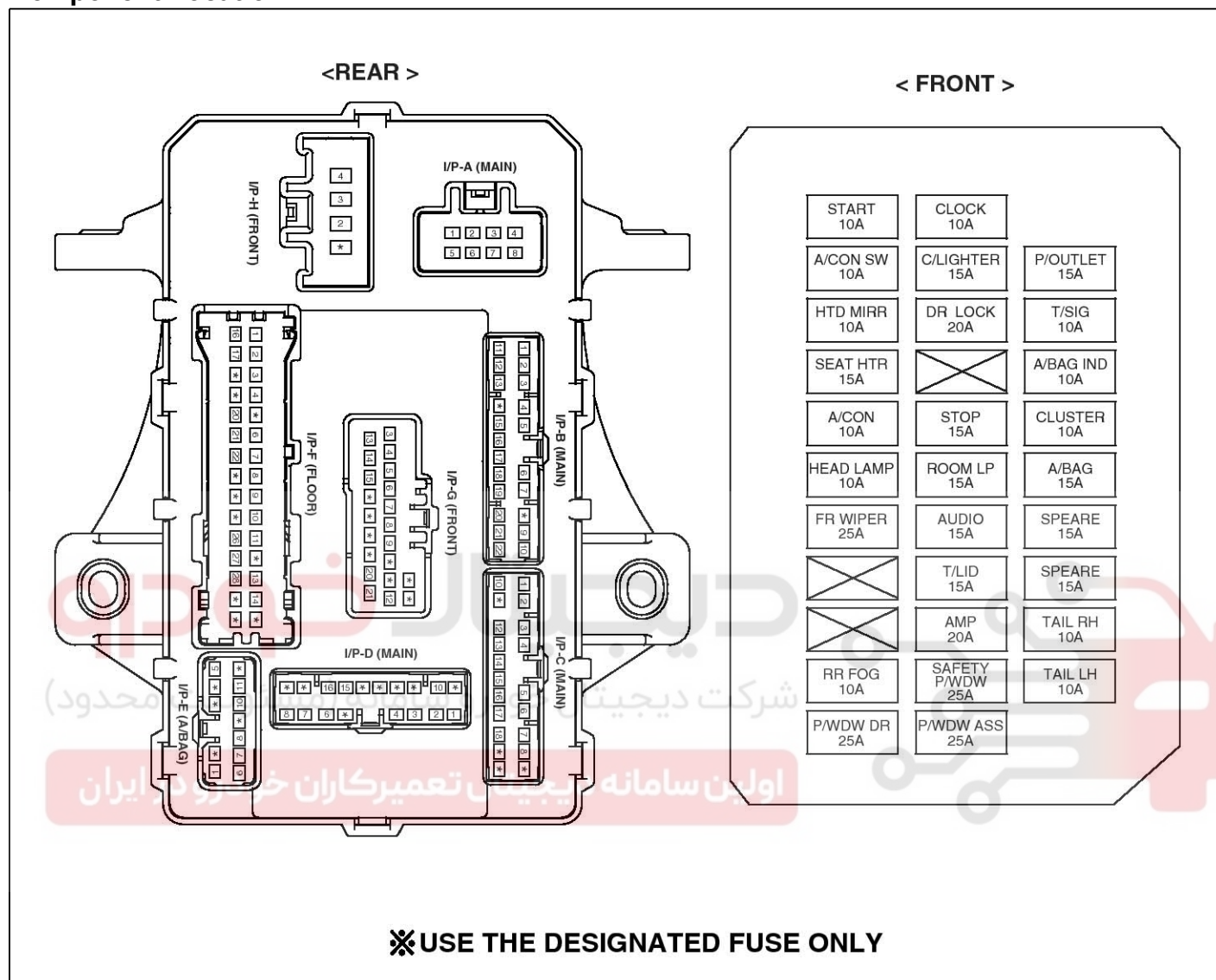


Fuses And Relays

BE-143

Relay Box (Passenger Compartment)

Component Location



SEDBE7210L

BE-144

Body Electrical System

CIRCUIT

FUSE	(A)	Circuit Protected
CLOCK	10A	Audio, ATM Key Lock Control Module, Digital Clock, Power Outside Mirror Switch
C/LIGHTER	15A	Power Outlet
P/OUTLET	15A	Power OUTlet
A/BAG	15A	SRS Control Module
A/BAG IND	10A	Instrument Cluster
T/SIG	10A	Hazard Switch
CLUSTER	10A	Instrument Cluster, MDPS Control Module, ESP Switch, BCM, Steering Angle Sensor, ATM Key Lock Control Module
A/CON SW	10A	A/C Control Module
A/CON	10A	A/C Control Module, Blower Relay, BCM, Incar & Humidity Sensor (Auto), Fusible Link Box (D4FB), AQS & AMB Sensor (Auto), Sunroof Control Module, Electro Chromic Mirror
FR WIPER	25A	Multifunction Switch, Front Wiper Relay
HEAD LAMP	10A	H/LP Lo Relay, H/LP Hi Relay
HTD MIRR	10A	A/C Control Module, ECM (G4FC), PCM (G4FC), Power Outside Mirror Motor
POWER CONNECTOR	AUDIO	15A Audio
	ROOM LP	15A Room Lamp, Data Link Connector, Instrument Cluster, Room Lamp, Map Lamp, Vanity Lamp Switch, A/C Control Module, Digital Clock, BCM, Ignition Key ILL. & Door Warning Switch
DR LOCK	20A	Sunroof Control Module, ICM Relay Box (Door Unlock/Lock Relay)
STOP	15A	Key Solenoid, ATM Lever Switch, Stop Lamp Switch
TAILGATE	15A	Tailgate Relay
RR FOG	10A	ICM Relay Box (Rear Fog Lamp Relay)
AMP	20A	AMP
SAFETY P/WDW	25A	Safety Power Window Module
START	10A	Ignition Lock Switch, Start Relay, Transaxle Range Switch, ICM Relay Box (Burglar Alarm Relay)
P/WDW DR	25A	Power Window Main Switch, Rear Power Window Switch LH
P/WDW ASS	25A	Power Window Main Switch, Rear Power Window Switch RH, Passenger Power Window Switch
TAIL LH	10A	Head Lamp LH, Power Window Main, Switch Power Window Switch, License Lamp Rear, Combination Lamp LH (OUT)
TAIL RH	10A	License Lamp, Rear Combination Lamp RH (OUT), Glove Box Lamp, Head Lamp RH, Shunt Connector, Front Fog Lp Relay
SEAT HTR	15A	Front Seat Warmer Switch

✱ USE THE DESIGNATED FUSE ONLY

SEDBE7211L

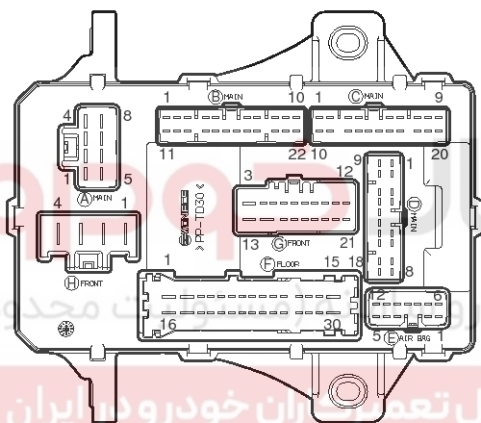
BE-145

Fuse

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

Passenger Compartment Relay

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



SHDBE6292D

Power Window

Check for continuity between the terminals.

1. There should be continuity between the No.2 terminal in the I/P-H and the No.16 or 17 terminal in the I/P-F when power and ground are connected to the No.2 terminal in the I/P-H and the No.17 terminal in the I/P-B.
2. There should be no continuity between the No.2 terminal in the I/P-H and the No.16 or 17 terminal in the I/P-F when power and ground are connected to the No.2 terminal in the I/P-H and the No.17 terminal in the I/P-B.

Tail Lamp

Check for continuity between the terminals.

1. There should be continuity between the No.2 terminal in the I/P-H and the No.15(LH) or 4(RH) terminal in the I/P-G when power and ground are connected to the No.2 terminal in the I/P-H and the No.6 terminal in the I/P-D.
2. There should be no continuity between the No.2 terminal in the I/P-H and the No.15(LH) or 4(RH) terminal in the I/P-G when power and ground are connected to the No.2 terminal in the I/P-H and the No.6 terminal in the I/P-D.

Tailgate Lid Open

Check for continuity between the terminals.

1. There should be continuity between the No.3 terminal in the I/P-H and the No.2 terminal in the I/P-D when power and ground are connected to the No.3 terminal in the I/P-H and the No.28 terminal in the I/P-F.
2. There should be no continuity between the No.3 terminal in the I/P-H and the No.2 terminal in the I/P-D when power and ground are connected to the No.3 terminal in the I/P-H and the No.28 terminal in the I/P-F.

Rear Heater

Check for continuity between the terminals.

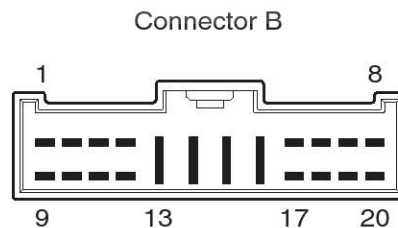
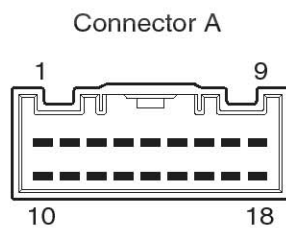
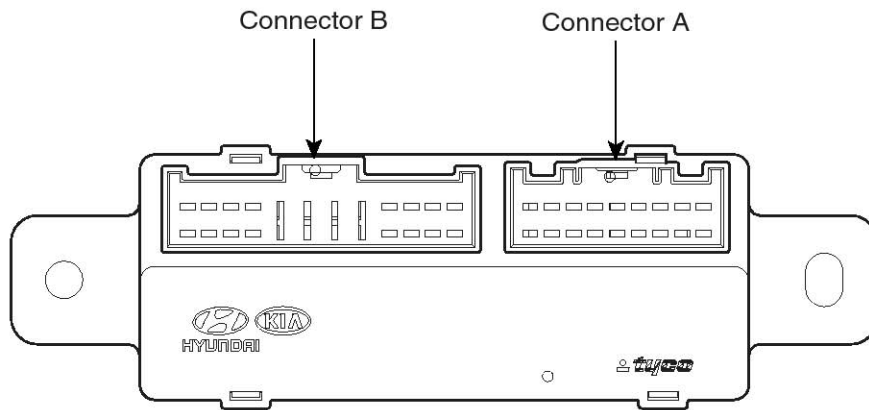
1. There should be continuity between the No.3 terminal in the I/P-G and the No.2 or 4 terminal in the I/P-F when power and ground are connected to the No.3 terminal in the I/P-G and the No.16 terminal in the I/P-B.
2. There should be no continuity between the No.3 terminal in the I/P-G and the No.2 or 4 terminal in the I/P-F when power and ground are connected to the No.3 terminal in the I/P-G and the No.16 terminal in the I/P-B.

BE-146

Body Electrical System

ICM (Integrated Circuit Module) Relay Box

Component



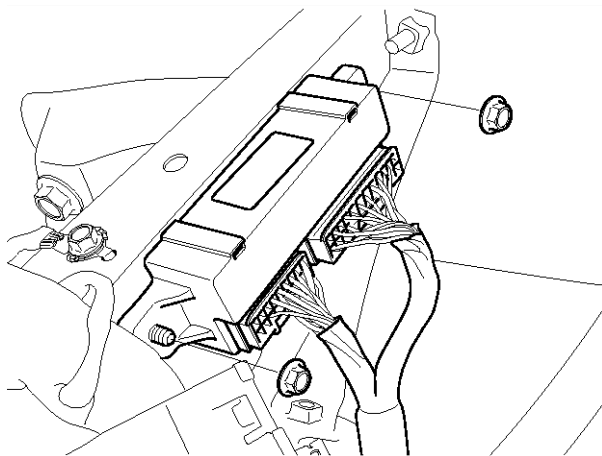
SHDBE6213L

Fuses And Relays

BE-147

Description

The ICM is united with many kinds of relays and installed over the instrument panel box.



SFDBE8057L

Inspection

1. Disconnect the negative(-) battery terminal.
2. Remove the ICM relay box.

Door Lock

Check for continuity between the terminals.

1. There should be continuity between the No.5 and No.14 terminals when power and ground are connected to the No.11 and No.13 in the ICM-B.
2. There should be no continuity between the No.5 and No.14 terminals when power is disconnected.

Door Unlock

Check for continuity between the terminals.

1. There should be no continuity between the No.4 and No.14 terminals when power and ground are connected to the No.10 and No.13 in the ICM-B.
2. There should be continuity between the No.4 and No.14 terminals when power is disconnected.

Burglar Alarm Horn

Check for continuity between the terminals.

1. There should be continuity between the No.8 and No.18 terminals when power and ground are connected to the No.6 and No.19 in the ICM-B.
2. There should be no continuity between the No.8 and No.18 terminals when power is disconnected.

Burglar Alarm

Check for continuity between the terminals.

1. There should be continuity between the No.3 and No.10 terminals when power and ground are connected to the No.1 and No.11 terminals in the ICM-A.
2. There should be no continuity between the No.3 and No.10 terminals when power is disconnected.

Rear Fog Lamp

Check for continuity between the terminals.

1. There should be continuity between the No.8 and No.18 terminals when power and ground are connected to the No.6 and No.19 terminals in the ICM-B.
2. There should be no continuity between the No.8 and No.18 terminals when power is disconnected.

Hazard Lamp

Check for continuity between the terminals.

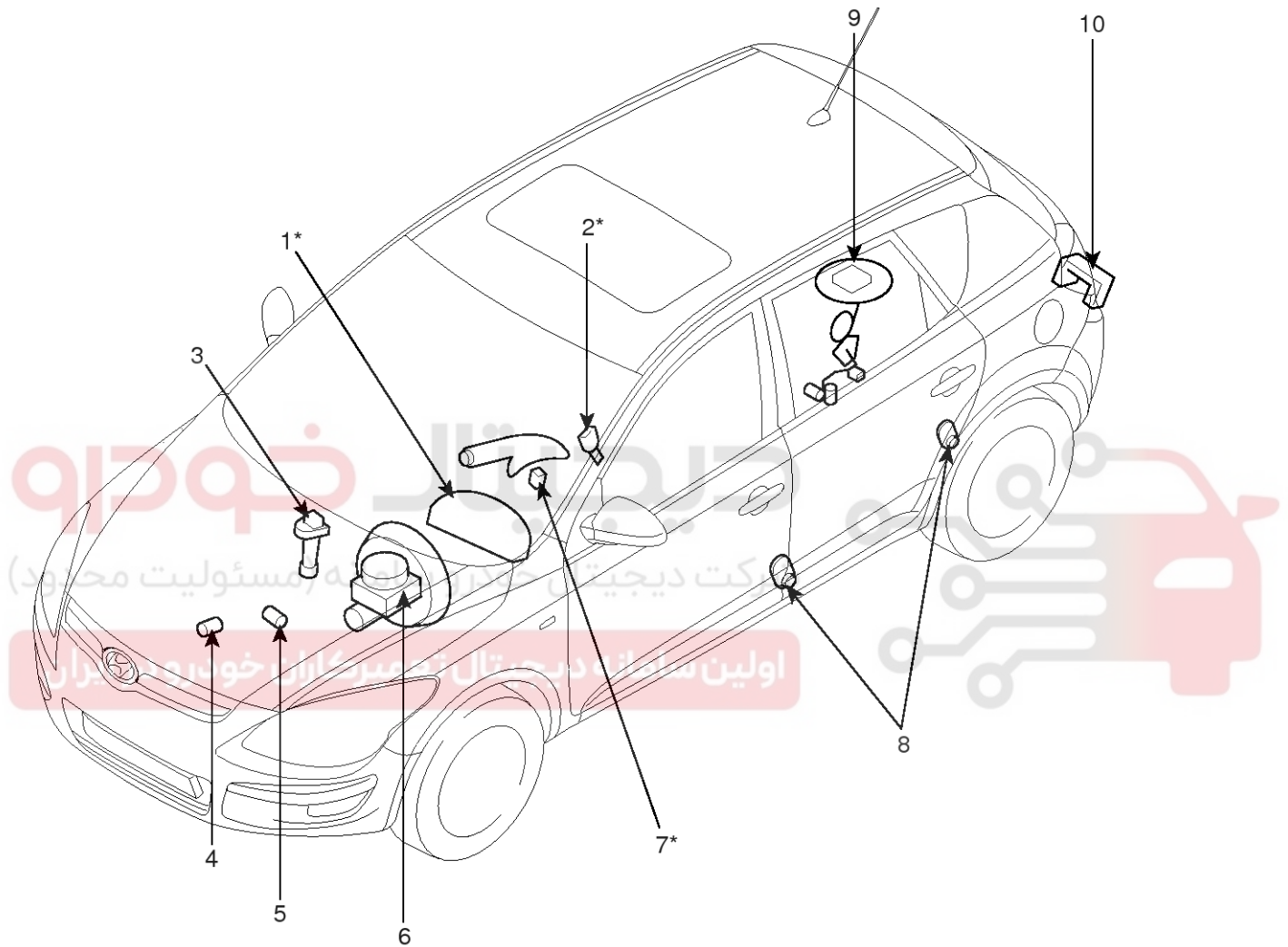
1. There should be continuity between the No.3 and No.12 terminals when power and ground are connected to the No.3 and No.17 terminals in the ICM-B.
2. There should be no continuity between the No.3 and No.12 terminals when power is disconnected.

BE-148**Body Electrical System****Indicators And Gauges****Component Location**

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



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

SFD8E8192L

Indicators And Gauges

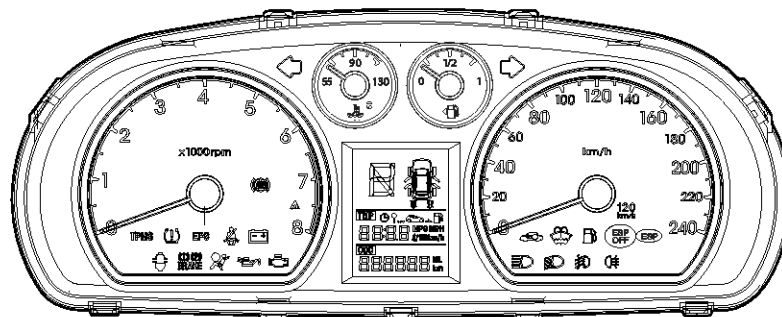
BE-149

Instrument Cluster

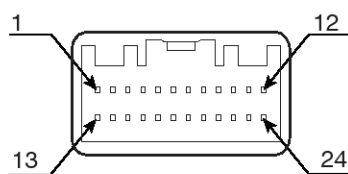
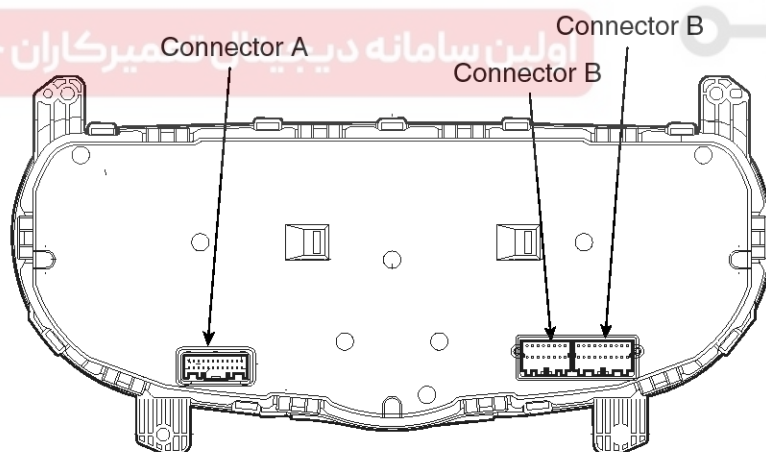
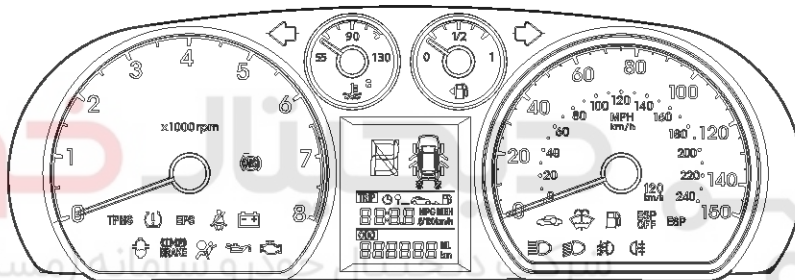
Components

[GASOLINE]

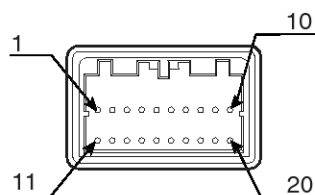
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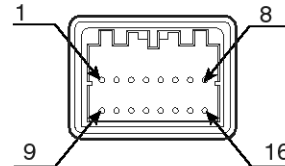
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Connector A



Connector B



Connector C

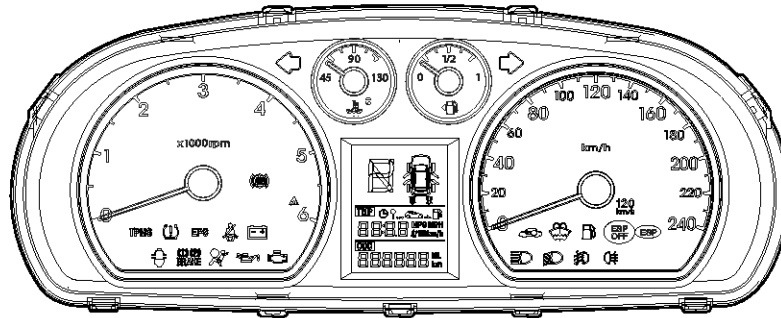
SFDBE8081L

BE-150

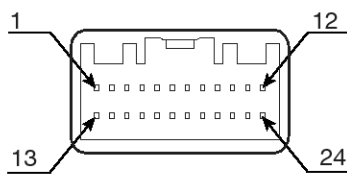
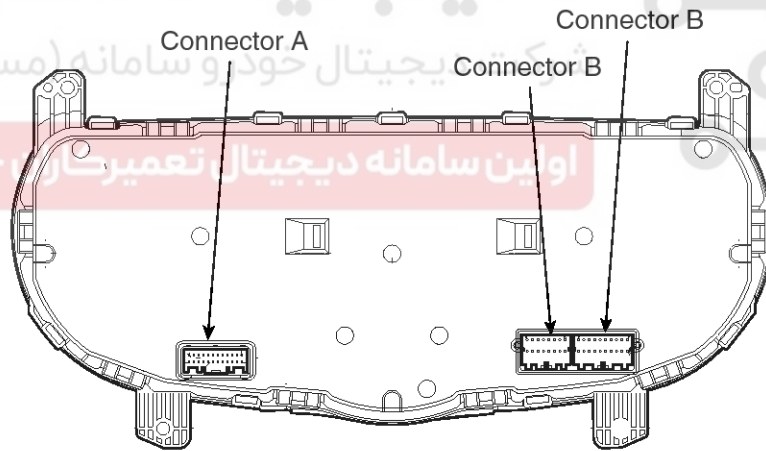
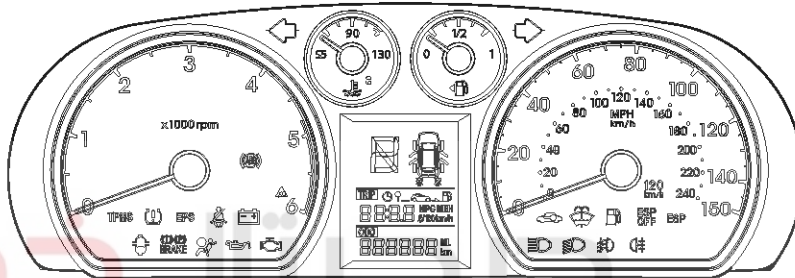
Body Electrical System

[DIESEL]

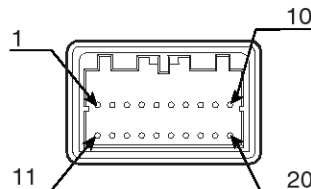
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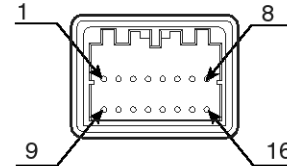
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Connector A



Connector B



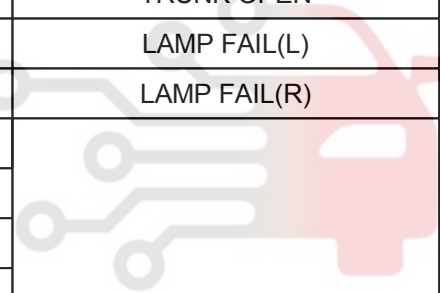
Connector C

SFDBE8082L

Indicators And Gauges

BE-151

Instrument Cluster

Pin No	Connector A	Connector B	Connector C
1	-	BRAKE	P
2	-	ABS	R(+)
3	OIL PRESSURE	EBD	N
4	CHARGE	TURN-L	D
5	SEAT BELT	TURN-R	PWM SIGNAL(A/T)
6	CAN HI	POWER GROUND	-
7	CAN LOW	HIGH SPEED WARNING	-
8	MODE SW	AIR/BAG(+)	WATER SEPARATOR
9	IMMOBILIZER	AIR/BAG(-)	GLOW
10	-	LOWER WASHER	DOOR OPEN(FL)
11	CHECK ENGINE	120Km/h OVER WARNING	DOOR OPEN(FR)
12	FUEL SENDER	ESP	DOOR OPEN(RL)
13	B+	ESP OFF	DOOR OPEN(RR)
14	-	HIGH BEAM(+)	TRUNK OPEN
15	IGN+	HIGH BEAM(-)	LAMP FAIL(L)
16	-	SET	LAMP FAIL(R)
17	ILLUMINATION(+)	-	
18	ILLUMINATION(-)	LOW BEAM	
19	SPEED SIGNAL	FRONT FOG LAMP	
20	TACHO SIGNAL	REAR FOG LAMP	
21	TEMPERATURE SENDER		
22	INJECTION SIGNAL		
23	SIGNAL GROUND		
24	FUEL GROUND		

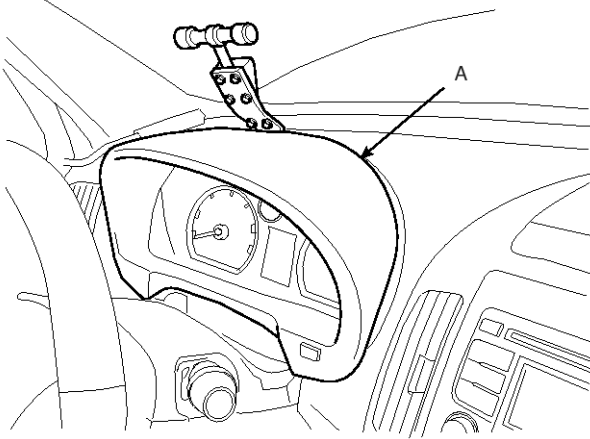
BE-152

Body Electrical System

Removal

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

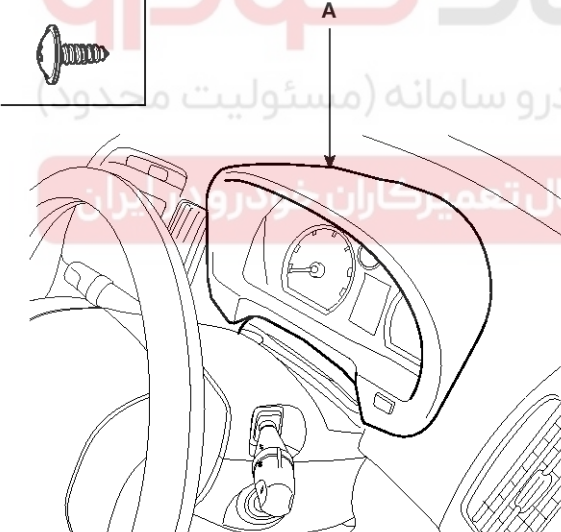
[LHD]



SFDBE8186L

[RHD]

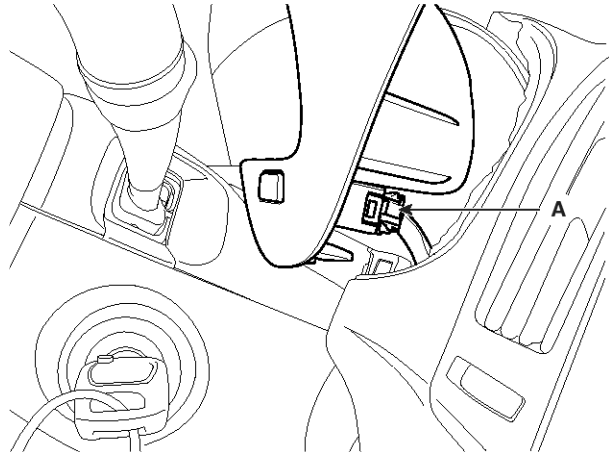
▷: Screw



SFDBE8187L

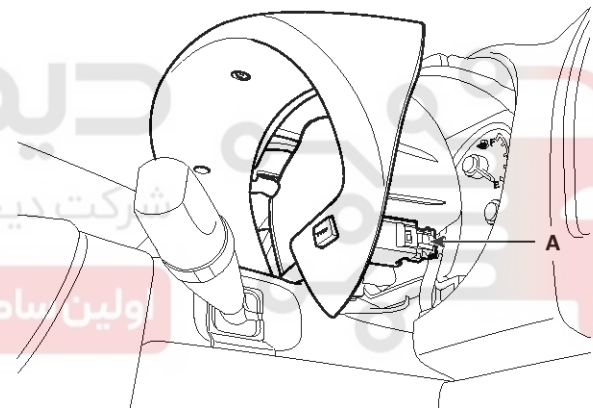
3. Disconnect the trip computer switch connector (A) from the cluster fascia panel.

[LHD]



SFDBE8060L

[RHD]



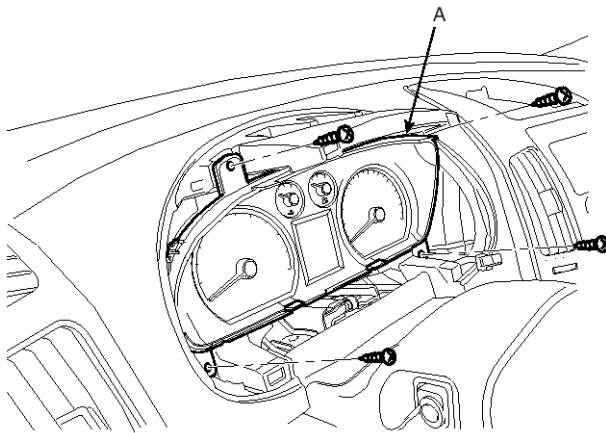
SFDBE8165L

Indicators And Gauges

BE-153

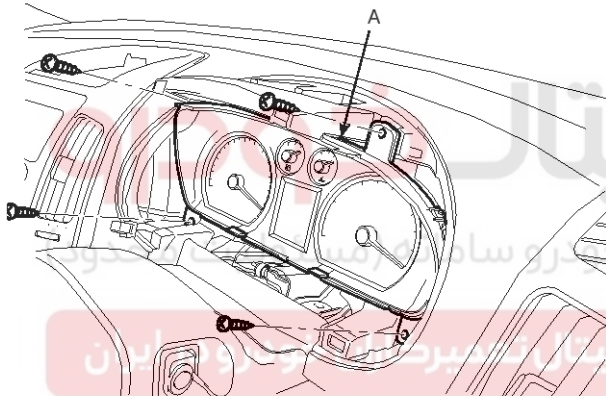
4. Remove the cluster fascia (A) from the housing after removing 4 screws.

[LHD]



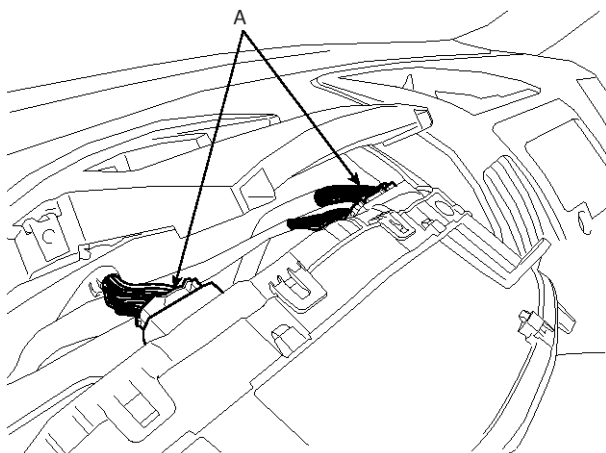
SFDBE8188L

[RHD]



SFDBE8188R

5. Disconnect the cluster fascia connectors (A) and then remove the cluster.



SFDBE8061L

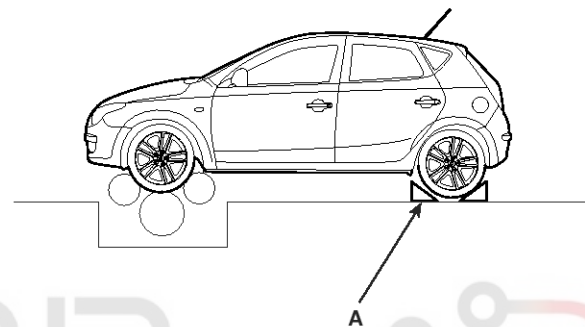
Installation

1. Connect the cluster connector.
2. Install the cluster assembly.
3. Connect the trip switch connector.
4. Install the center facia panel.

Inspection

Speedometer

1. Adjust the pressure of the tires to the specified level.
2. Drive the vehicle onto a speedometer tester. Use wheel chocks (A) as appropriate.



SFDBE8313L

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

⚠ CAUTION

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

📢 NOTICE

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

[km/h - Except Australia]

Velocity (km/h)	20	40	60	80	100
Tolerance (km/h)	+5.0 +1.0	+5.6 +1.6	+8.3 +3.3	+9.9 +4.9	+11.0 +6.0
Velocity (km/h)	120	140	160	180	220
Tolerance (km/h)	+12.2 +7.2	+13.4 +8.4	+14.6 +9.6	+15.8 +10.8	+19.4 +14

BE-154

Body Electrical System

[KM/H - Australia]

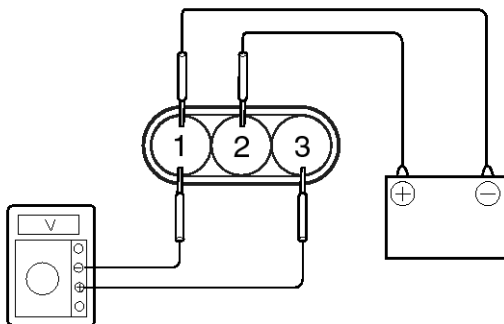
Velocity (km/h)	20	40	60	80	100
Tolerance (km/h)	+3.4 +0.8	+4.0 +1.0	+5.0 +1.4	+6.4 +2.0	+7.4 +3.0
Velocity (km/h)	120	140	160	180	220
Tolerance (km/h)	+7.7 +3.3	+8.5 +3.5	+9.0 +4.0	+9.5 +4.5	+10.5 +5.5

[MPH]

Velocity (MPH)	20	40	60	80
Tolerance (MPH)	+3.7 +1.2	+4.5 +2.0	+6.0 +3.0	+7.0 +4.0
Velocity (MPH)	100	120	140	-
Tolerance (MPH)	+8.0 +5.0	+9.0 +6.0	+10.0 +7.0	-

Vehicle Speed Sensor

1. Connect the positive (+) lead from battery to terminal 2 and negative (-) lead to terminal 1.
 2. Connect the positive (+) lead from tester to terminal 3 and the negative (-) lead to terminal 1.
 3. Rotate the shaft.
 4. Check that there is voltage change from approx. 0V to 11V or more between terminals 3 and 1.
 5. The voltage change should be 4 times for every revolution of the speed sensor shaft.
- If operation is not as specified, replace the sensor.



SHDBE6225L

Tachometer

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

⚠ CAUTION

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

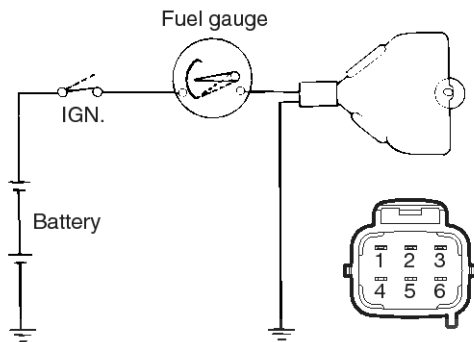
Revolution (rpm)	1,000	2,000	3,000	4,000	Remark
Tolerance (rpm)	±100	±125	±150	±150	Gasoline
Tolerance (rpm)	±100	±125	±150	±170	Diesel
Revolution (rpm)	5,000	6,000	7,000	-	Remark
Tolerance (rpm)	±150	±180	±210	-	Gasoline
Tolerance (rpm)	±200	-	-	-	Diesel

Indicators And Gauges

BE-155

Fuel Gauge

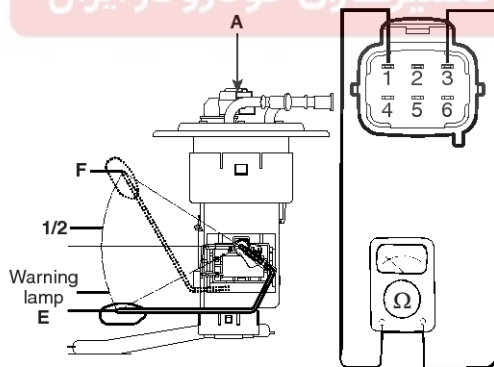
1. Disconnect the fuel sender connector from the fuel sender.
2. Connect a 3.4 wattages, 12V test bulb to terminals 1 and 3 on the wire harness side connector.
3. Turn the ignition switch to the ON, and then check that the bulb lights up and the fuel gauge needle moves to full.



SHDBE6226L

Fuel Gauge Sender

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



SHDBE6227L

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

Position	Resistance(Ω)
E	$184 \pm 1\Omega$
Warning lamp	$170 \pm 1\Omega$
1/2	$66 \pm 1\Omega$
Sender (F)	$15 \pm 1\Omega$

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

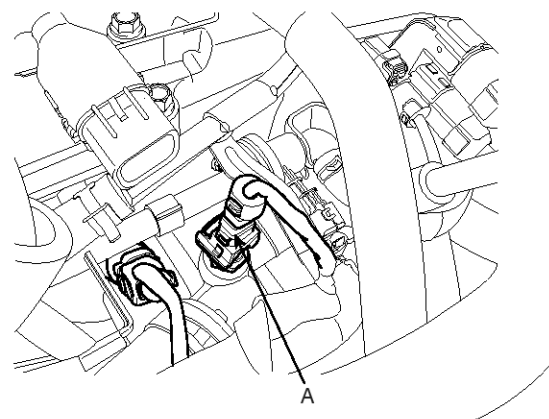
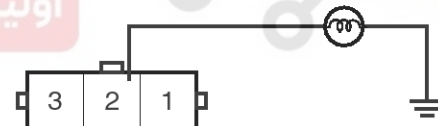
CAUTION

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

Engine Coolant Temperature Gauge

1. Disconnect the wiring connector (A) from the engine coolant temperature sender in the engine compartment.
2. Connect a 12V, 3.4 wattages test bulb between the harness side connector 2 terminal and ground.
3. Turn the ignition switch ON.
4. Verify that the test bulb flashes and that the indicator moves to HOT position.

If operation is not as specified, replace the cluster (Engine coolant temperature gauge). Then recheck the system.



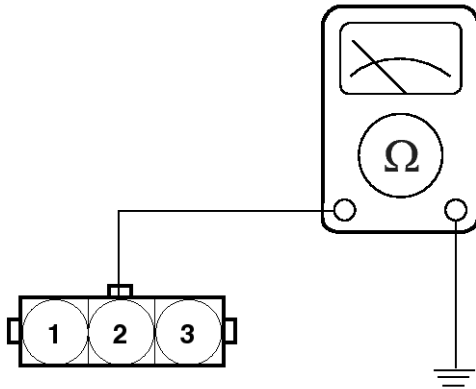
SEDBE7228L

BE-156

Body Electrical System

Engine Coolant Temperature Sender

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



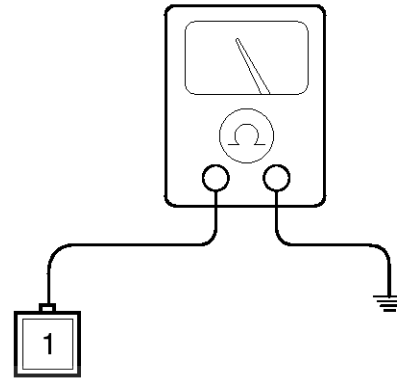
ETKE110I

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

Temp °F(°C)	131 (55)	185 (85)	230 (110)	257 (125)	E/G
Resista- nce (Ω)	155	53.8	22.5	16.1	Gasoli- ne
Temp °F(°C)	113 (45)	160 (71)	230 (110)	257 (125)	E/G
Resista- nce (Ω)	242	86.5	22.5	16.1	Diesel

Oil Pressure Switch

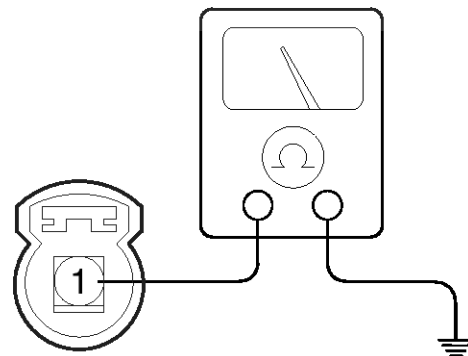
1. Check that there is continuity between the oil pressure switch terminal and ground with the engine off.
2. Check that there is no continuity between the terminal and ground with the engine running.
3. If operation is not as specified, replace the switch.



SHDBE6229L

Oil Pressure Warning Lamp

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



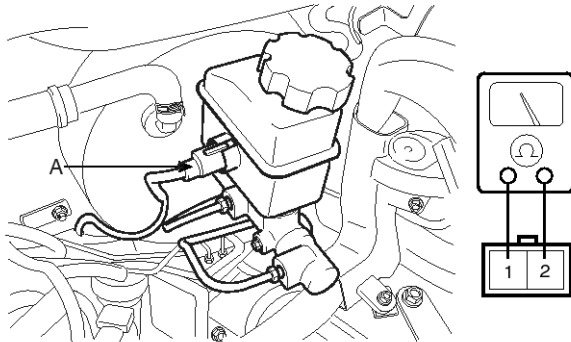
SHDBE6230L

Indicators And Gauges

BE-157

Brake Fluid Level Warning Switch

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



SEDBE7231L

Brake Fluid Level Warning Lamp

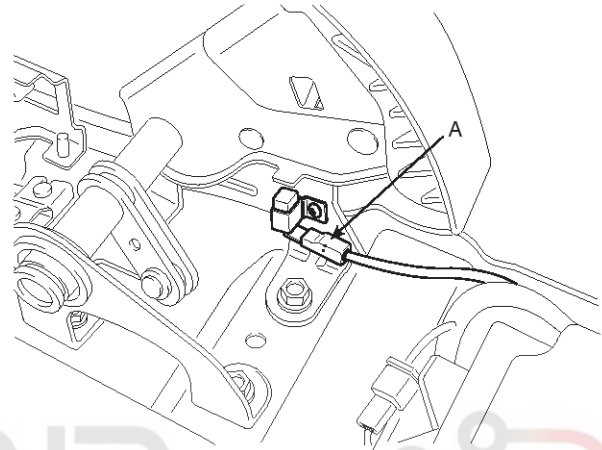
1. Ignition "ON".
2. Release the parking brake.
3. Remove the connector from the brake fluid level warning switch.
4. Ground the connector at the harness side.
5. Verify that the warning lamp lights.

Parking Brake Switch

The parking brake switch is a pull type. It is located at the side of the parking brake lever.

1. Check that there is continuity between the terminal and switch body with the switch (A) ON.
2. Check that there is no continuity between the terminal and switch body with the switch OFF.

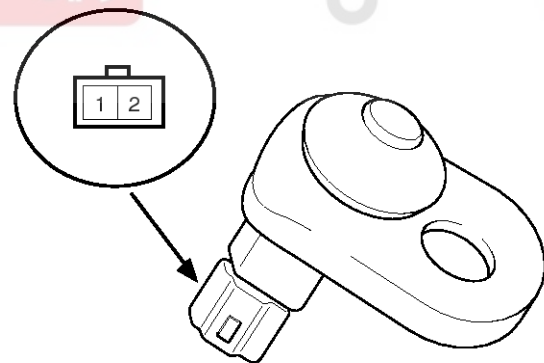
If continuity is not as specified, replace the switch or inspect its ground connection.



SEDBE7232L

Door Switch

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



ATIE121Q

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

ETQF180D

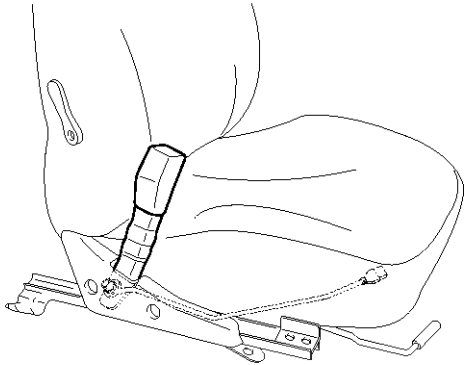
BE-158

Body Electrical System

Seat Belt Switch

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

Seat belt condition	Continuity
Fastened	Non-conductive ($\infty\Omega$)
Not fastened	Conductive (Ω)



V5BE060Q

Seat Belt Warning Lamp

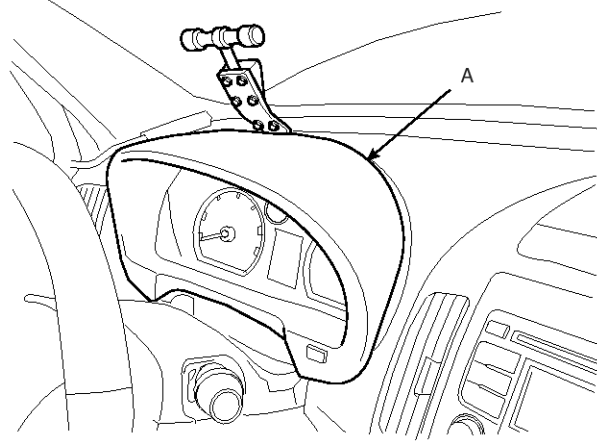
With the ignition switch turned ON, verify that the lamp glows.

Seat belt condition	Warning lamp
Fastened	OFF
Not fastened	ON

Trip Switch

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

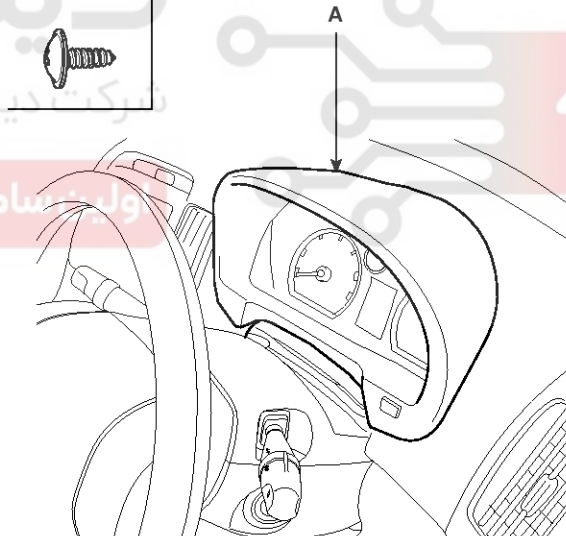
[LHD]



SFD8E8186L

[RHD]

▷ : Screw



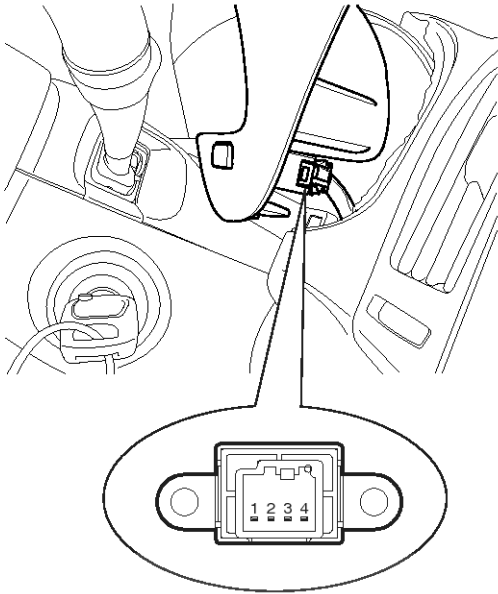
SFD8E8187L

Indicators And Gauges

BE-159

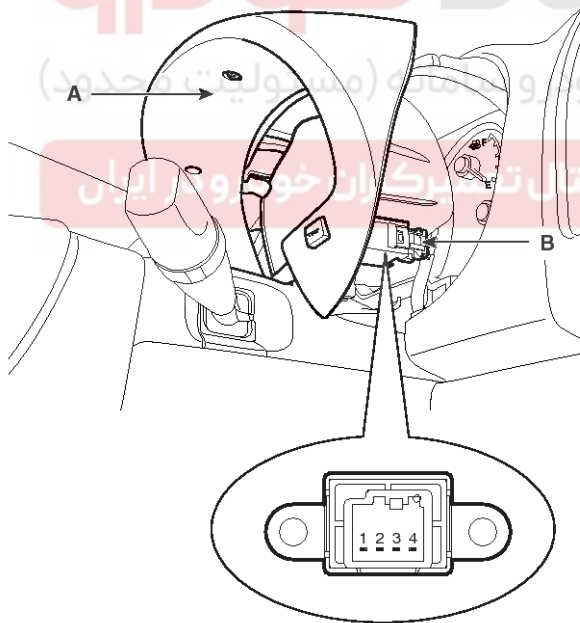
3. Remove the trip switch (A) from the cluster facia panel (B).

[LHD]



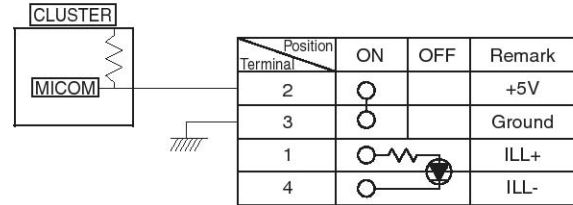
SFDBE8059L

[RHD]



SFDBE8059R

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



SFDBE8164L

BE-160

Body Electrical System

Troubleshooting

Symptom	Possible cause	Remedy
Speedometer does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Speedometer faulty	Check speedometer
	Vehicle speed sensor faulty	Check vehicle speed sensor
	Wiring or ground faulty	Repair if necessary
Tachometer does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Tachometer faulty	Check tachometer
	Wiring or ground faulty	Repair if necessary
Fuel gauge does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Fuel gauge faulty	Check gauge
	Fuel sender faulty	Check fuel sender
	Wiring or ground faulty	Repair if necessary
Low fuel warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Fuel sender faulty	Check fuel sender
	Wiring or ground faulty	Repair if necessary
Water temperature gauge does not operate	Cluster fuse (10A) blown	Check for short and replace fuse
	Water temperature gauge faulty	Check gauge
	Water temperature sender faulty	Check sender
	Wiring or ground faulty	Repair if necessary
Oil pressure warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Oil pressure switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Parking brake warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Brake fluid level warning switch faulty	Check switch
	Parking brake switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Open door warning lamp and tailgate warning lamp do not light up	Memory fuse (15A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Door switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

Indicators And Gauges

BE-161

Symptom	Possible cause	Remedy
Seat belt warning lamp does not light up	Cluster fuse (10A) blown	Check for short and replace fuse
	Bulb burned out	Replace bulb
	Seat belt switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

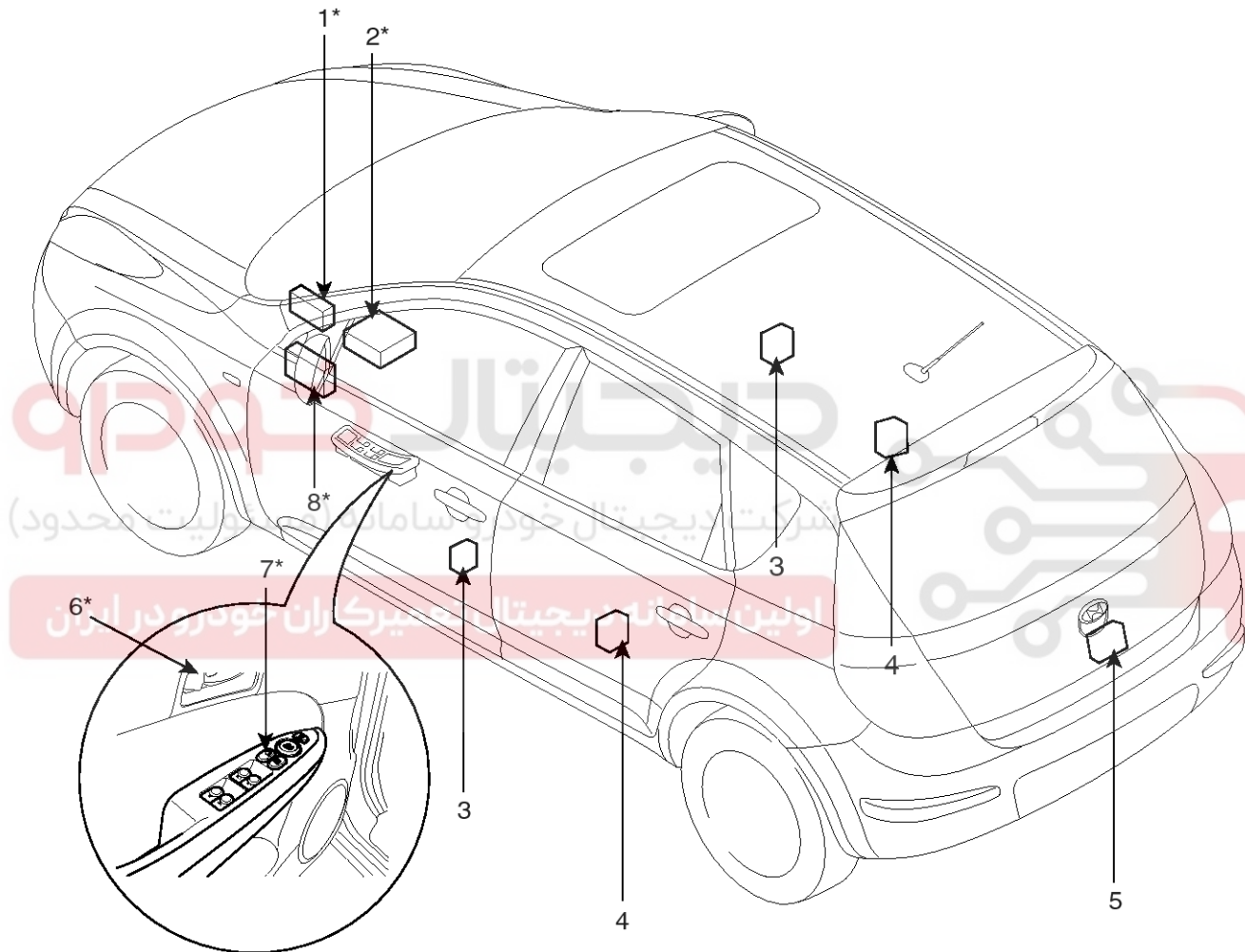


BE-162**Body Electrical System****Power Door Locks****Component Location**

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. ICM relay box (Door lock/unlock relay)

2. Body control module (BCM)

3. Front door lock actuator & switch

4. Rear door lock actuator & switch

5. Tailgate actuator & switch

6. Door lock knob

7. Door lock switch

8. Passenger compartment junction box
(Tailgate relay)

SFDBE8062L

Power Door Locks

BE-163

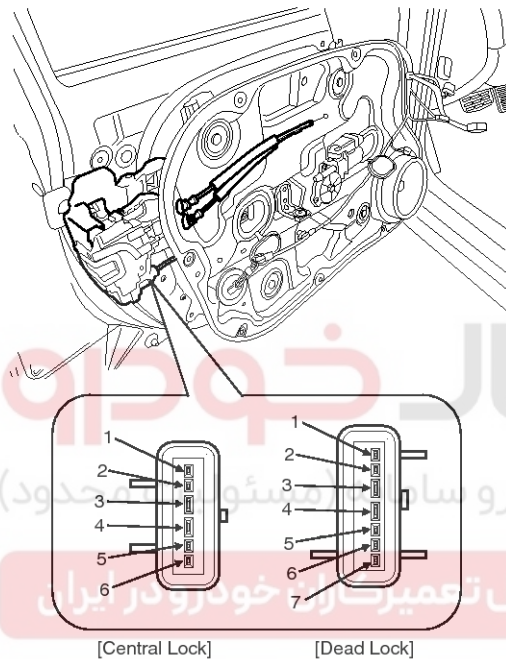
Power Door Lock Actuators

Inspection

Front Door Lock Actuator

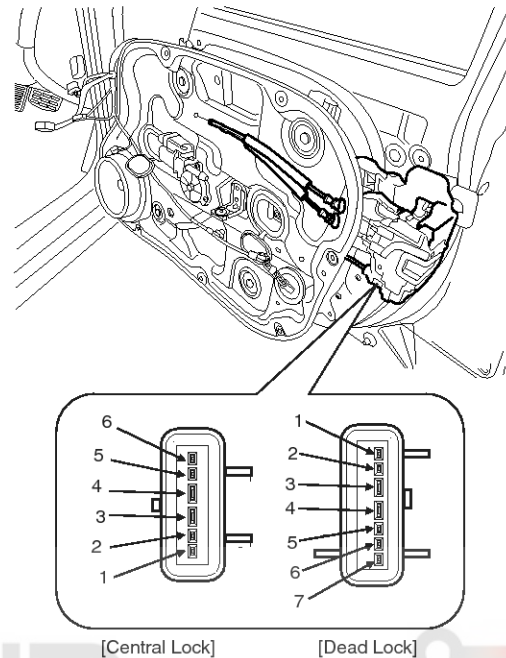
1. Remove the front door trim.
(Refer to the BD group - "Front door")
2. Remove the front door module.
(Refer to the BD group - "Front door")
3. Disconnect the connectors from the actuator.

[LHD]



SFDBE8048L

[RHD]



SFDBE8048R

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

[Central Lock] () : RHD

Terminal		4(3)		3(4)	
Position					
Front left	Central Lock	⊕		⊖	
	Central Unlock	⊖		⊕	
Terminal		3(4)		4(3)	
Position					
Front right	Central Lock	⊖		⊕	
	Central Unlock	⊕		⊖	

SFDBE8049L

BE-164

Body Electrical System

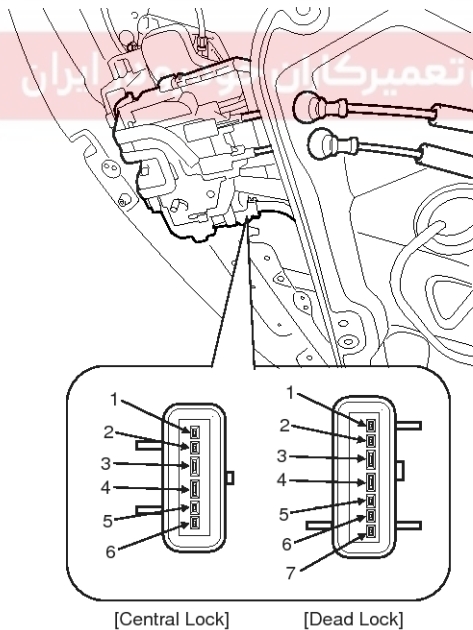
[Dead Lock]			RHD only		
Terminal			5	6	7
Position					
Front left	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖
Terminal			3	2	1
Position					
Front Right	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖

SFDBE8050L

Rear Door Lock Actuator

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

[LHD]

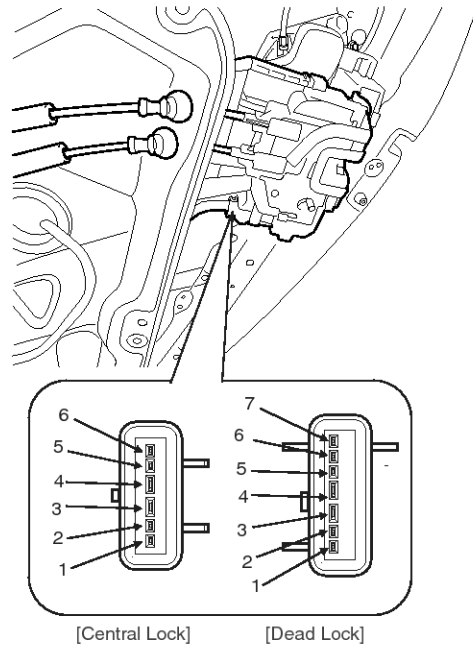


[Central Lock]

[Dead Lock]

SFDBE8051L

[RHD]



[Central Lock]

[Dead Lock]

SFDBE8051R

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

[Central Lock] () : RHD

Terminal		4(3)	3(4)
Position			
Rear left	Central Lock	⊕	⊖
	Central Unlock	⊖	⊕
Terminal		3(4)	4(3)
Position			
Rear right	Central Lock	⊖	⊕
	Central Unlock	⊕	⊖

SFDBE8160L

Power Door Locks

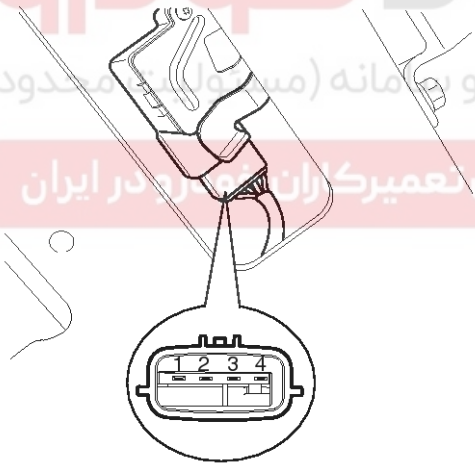
BE-165

[Dead Lock]			RHD only		
Terminal			5	6	7
Position					
Rear left	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖
Terminal			3	2	1
Position					
Rear Right	Central Lock	Lock	⊕	⊖	⊖
		Unlock	⊖	⊕	⊕
	Dead Unock	Lock	⊖	⊖	⊕
		Unlock	⊕	⊕	⊖

SFDBE8161L

Tailgate Lock Actuator Inspection

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



SEDBE7134L

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

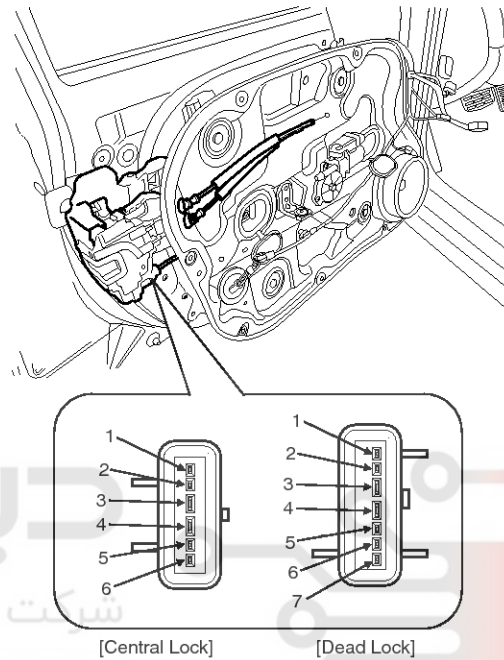
Terminal		3	4
Position			
Unlock		⊕	⊖

SEDBE7135L

Front Door Lock Switch

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

[LHD]

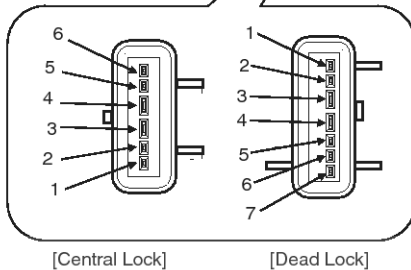
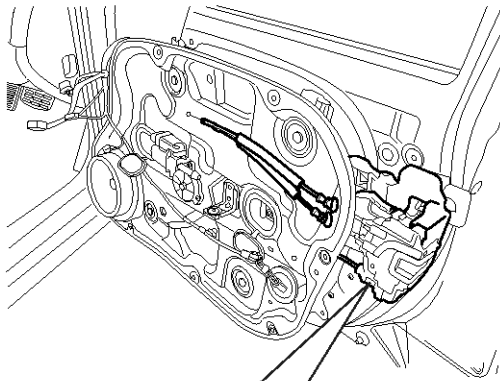


SFDBE8048L

BE-166

Body Electrical System

[RHD]



SFDBE8048R

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

CENTRAL LOCK] () : RHD

Terminal		2(5)	5(2)	1(6)
Position				
Front left	Clockwise	○	○	
	Counter-clockwise		○	○
Terminal		5(2)	2(5)	6(1)
Position				
Front right	Clockwise	○	○	
	Counter-clockwise		○	○

SFDBE8052L

DEAD LOCK] RHD only

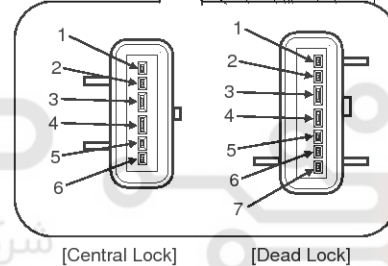
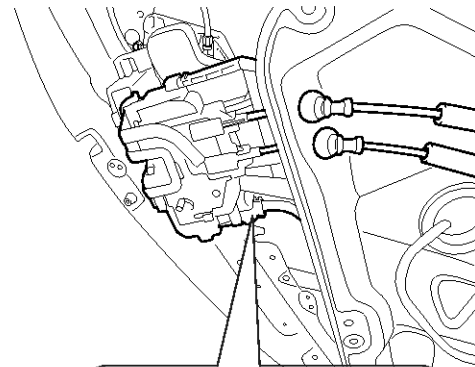
Terminal		2	3	4
Position				
Front left	Clockwise	○	○	
	Counter-clockwise		○	○
Terminal		4	5	6
Position				
Front right	Clockwise	○	○	
	Counter-clockwise		○	○

SFDBE8148L

Rear Door Lock Switch

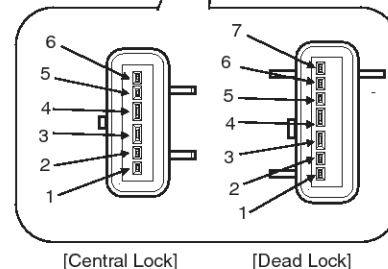
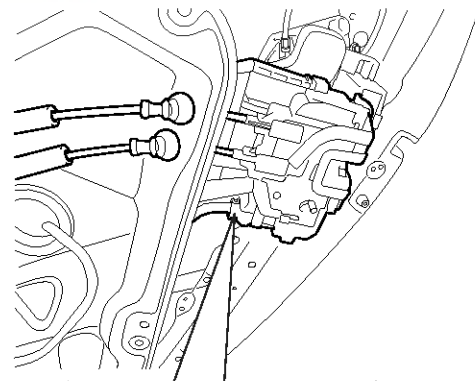
1. Remove the rear door trim.
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
(Refer to the BD group - "Rear door")
3. Disconnect the connectors from the actuator.

[LHD]



SFDBE8051L

[RHD]



SFDBE8051R


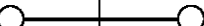
Power Door Locks

BE-167

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

[CENTRAL LOCK]



() : RHD

Terminal			5(2)	6(1)
Position				
Central door lock	Rear left	Lock		
		Unlock		
Terminal			2(5)	1(6)
Position				
Central door lock	Rear right	Lock		
		Unlock		

SFDBE8053L

[DEAD LOCK]

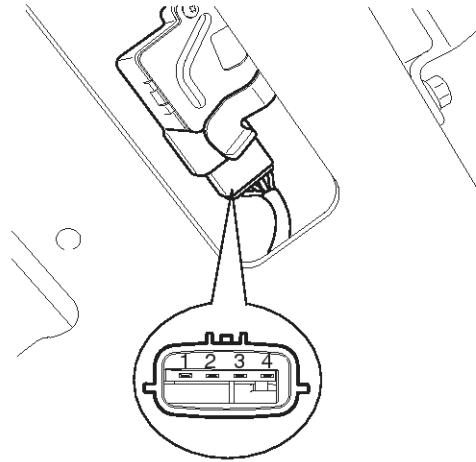
RHD only

Terminal			1	3
Position				
Central door lock	Rear left	Lock		
		Unlock		
Terminal			7	5
Position				
Central door lock	Rear right	Lock		
		Unlock		

SFDBE8163L

Tailgate Switch

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



SEDBE7134L

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

Terminal		1	2
Position			
Lock			
Unlock		○ — ○	

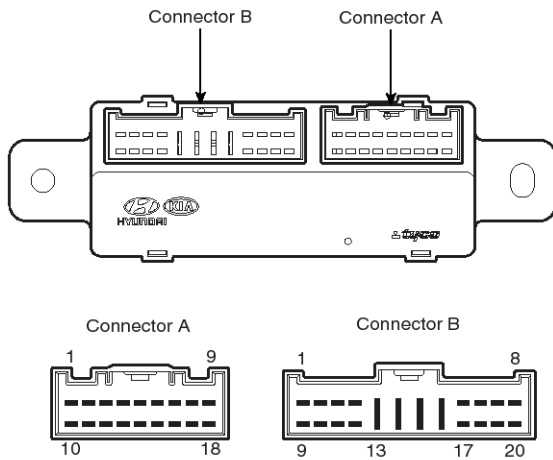
SEDBE7138L

BE-168

Body Electrical System

Power Door Lock Relay

Inspection



SHDBE6332L

Door Lock

1. Disconnect the negative (-) battery terminal.
2. Remove the ICM relay box.
3. Check for continuity between the terminals.
4. There should be continuity between the No.5 terminal and No.4 terminals in the ICM-B when power and ground are connected to the No.11 terminal and No.13 terminal in the ICM-B.
5. There should be no continuity between the No.5 terminal and No.14 terminal in the ICM-B when power is disconnected.

Terminal \ Power	ICM-B (5)	ICM-B (14)	ICM-B (11)	ICM-B (13)
Disconnected			○—○	○—○
Connected	○—○		⊖—⊕	⊖—⊕

SFD8E8168L

Door Unlock

1. Disconnect the negative (-) battery terminal.
2. Remove the ICM relay box.
3. Check for continuity between the terminals.
4. There should be continuity between the No.4 terminal and No.14 terminal in the ICM-B when power and ground are connected to the No.10 terminal and No.13 terminal in the ICM-B.

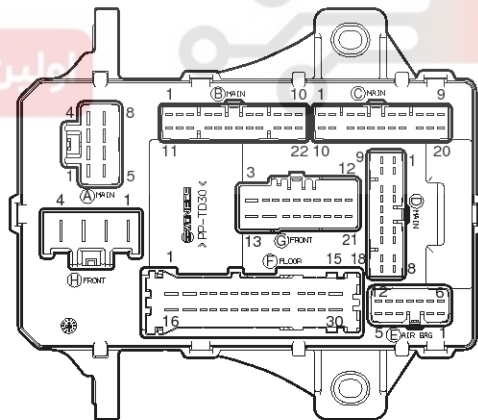
5. There should be no continuity between the No.4 terminal and No.14 terminal in the ICM-B when power is disconnected.

Terminal \ Power	ICM-B (4)	ICM-B (14)	ICM-B (10)	ICM-B (13)
Disconnected			○—○	○—○
Connected	○—○		⊖—⊕	⊖—⊕

SFD8E8169L

Tailgate Open

1. Disconnect the negative (-) battery terminal.
2. Remove the passenger compartment junction box.
3. Check for continuity between the terminals.
4. There should be continuity between the No.3 terminal in the I/P-H and the No.2 terminal in the I/P-D when power and ground are connected to the No.3 terminal in the I/P-H and the No.28 terminal in the I/P-F.
5. There should be no continuity between the No.3 terminal in the I/P-H and the No.2 terminal in the I/P-D when power and ground are connected to the No.3 terminal in the I/P-H and the No.28 terminal in the I/P-F.



SHDBE6292D

Terminal \ Power	H-3	F-28	H-3	D-2
Disconnected			○—○	○—○
Connected	○—○		⊕—⊖	⊕—⊖

SHDBE6199L

Power Door Locks

BE-169

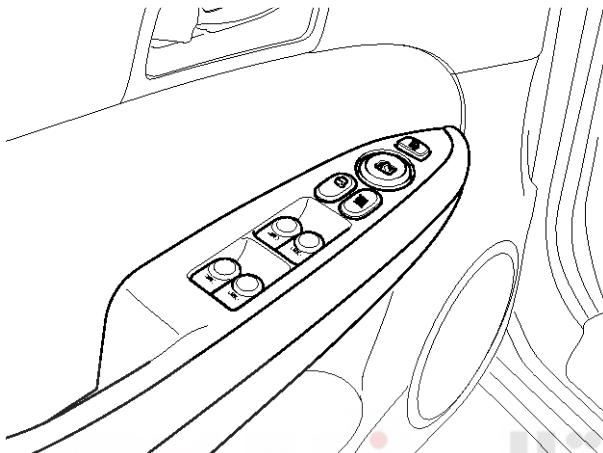
Power Door Lock Switch

Inspection

Driver Door Lock Switch

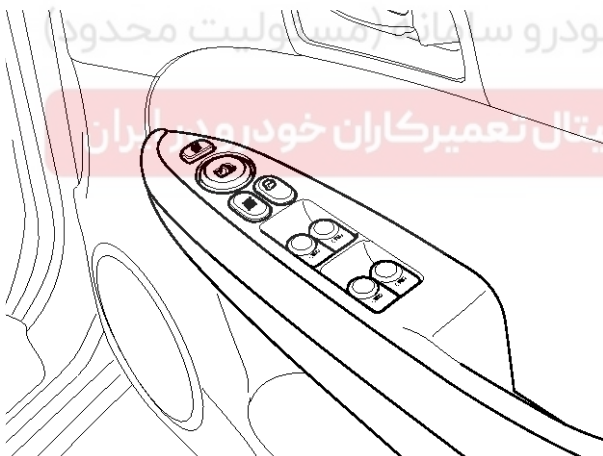
1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim and power window switch.
(Refer to the BD group - "Front door")

[LHD]



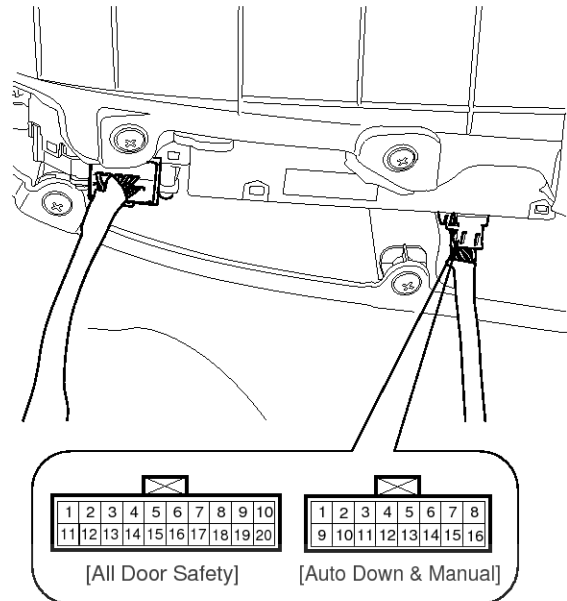
SFDBE8063L

[RHD]



SFDBE8063R

3. Disconnect the connector from the switch.



SFDBE8064L

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

[Auto down & Manual]

() : RHD

Terminal Position	11(11)	5(5)	4(4)
LOCK		○ — ○	○ — ○
UNLOCK	○ — ○		

SFDBE8065L

[All safety]

() : RHD

Terminal Position	11(11)	15(15)	1(1)
LOCK		○ — ○	○ — ○
UNLOCK	○ — ○		

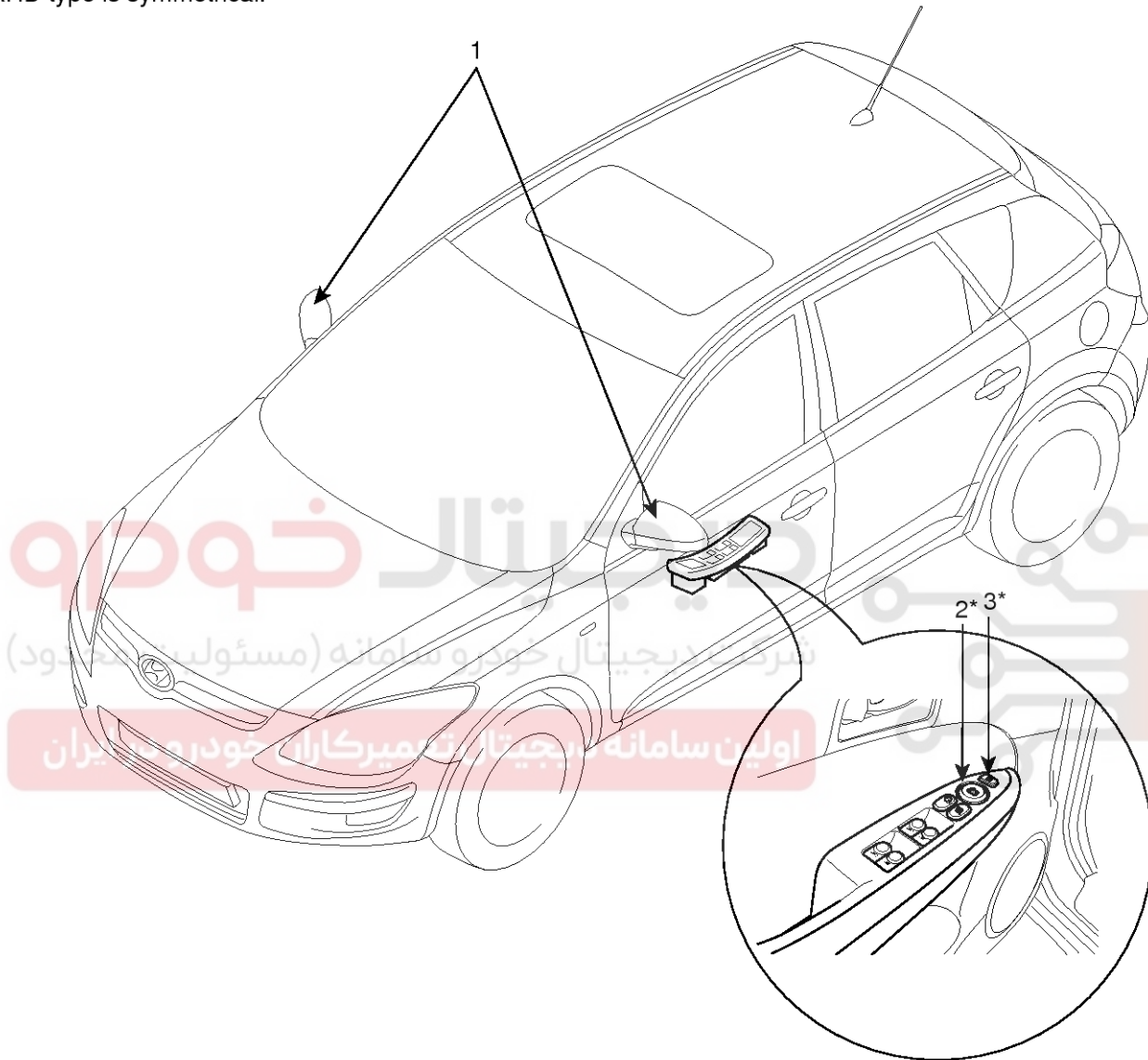
SFDBE8167L

BE-170**Body Electrical System****Power Door Mirrors****Component Location**

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. Power door mirror
3. Folding mirror switch

2. Power door mirror switch

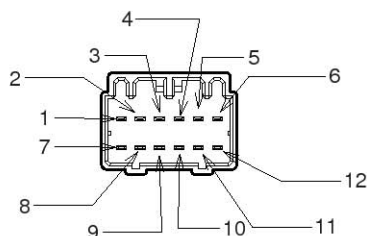
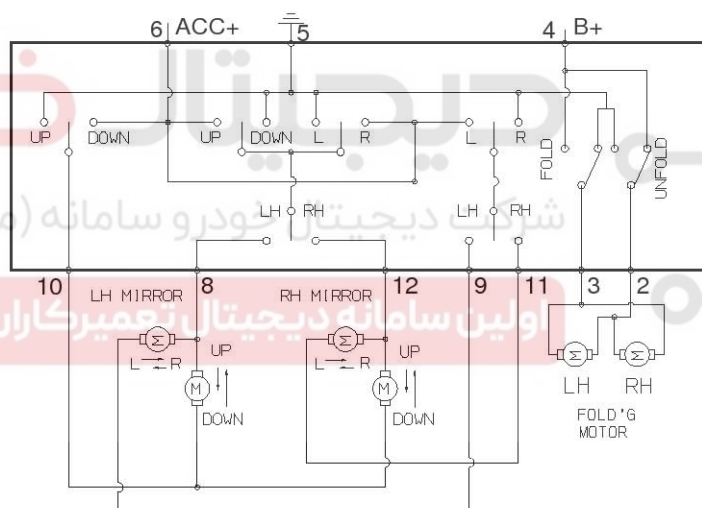
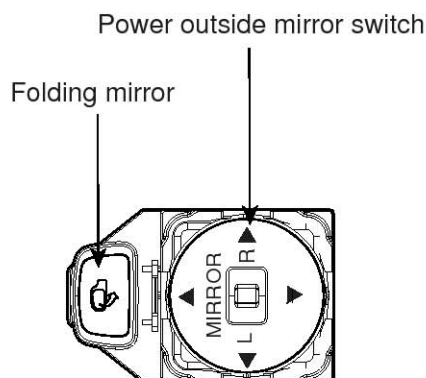
SFDBE8066L

Power Door Mirrors

BE-171

Power Out Side Mirror Switch

Components



SFDBE8083L

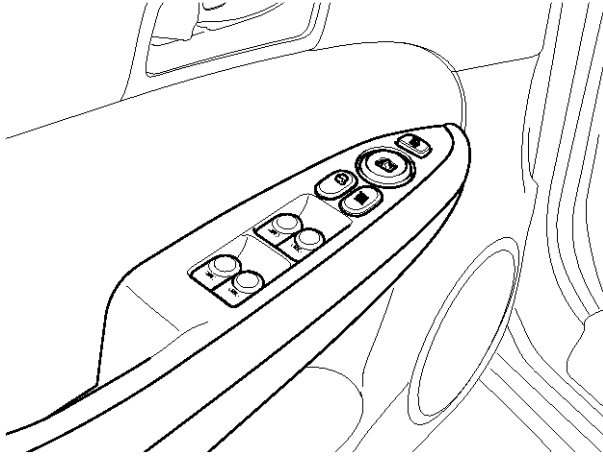
BE-172

Body Electrical System

Inspection

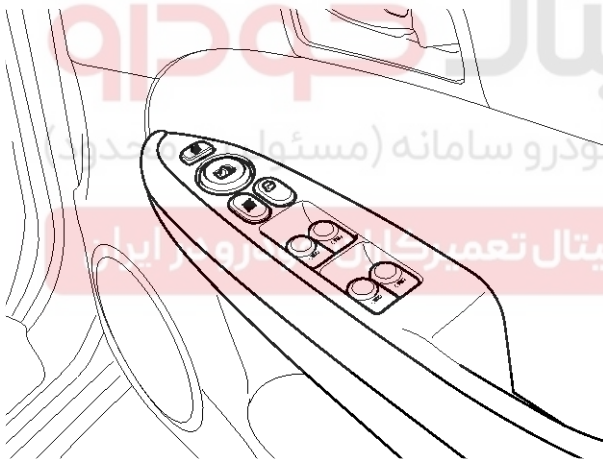
1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim and power window switch module. (Refer to the BD group - "Front door")

[LHD]



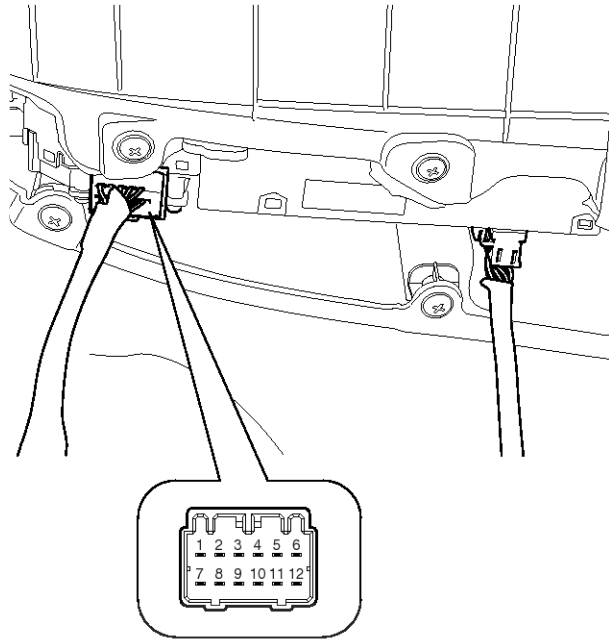
SFDBE8189L

[RHD]



SFDBE8189R

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



SFDBE8190L

Power Door Mirrors

BE-173

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

() : RHD

Item	Terminal Direction	6 (1)	5 (2)	8 (11)	9 (10)	10 (9)	11 (8)	12 (7)
Left	UP	○	○	○	○	○		
	DOWN	○	○	○	○	○		
	OFF		○	○	○	○		
	LEFT	○	○	○	○	○		
	RIGHT	○	○	○	○	○		
Right	UP	○	○	○	○	○	○	○
	DOWN	○	○	○	○	○	○	○
	OFF		○	○	○	○	○	○
	LEFT	○	○	○	○	○	○	○
	RIGHT	○	○	○	○	○	○	○

SFDBE8170L

() : RHD

Terminal Direction	2(5)	3(4)	4(3)	5(2)
Folding	○	○	○	○
Unfolding	○	○	○	○

SFDBE8171L



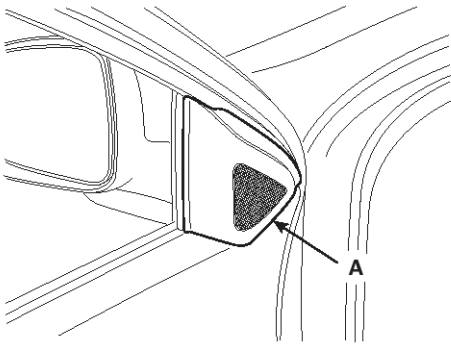
BE-174

Body Electrical System

Power Door Mirror Actuator

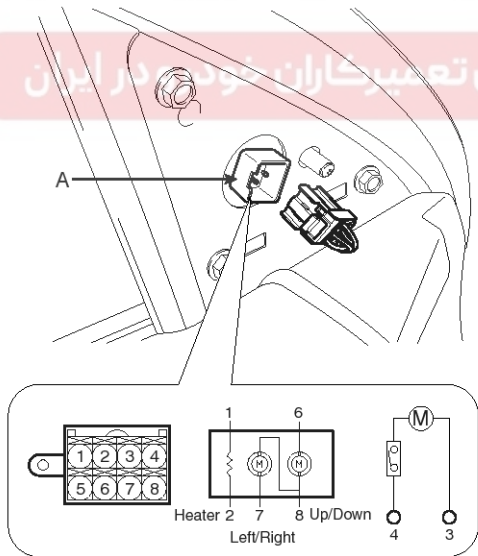
Inspection

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



SEDBE7262L

2. Disconnect the power door mirror connector from the harness.
3. Apply battery voltage to each terminal as shown in the table and verify that the mirror operates properly.



SEDBE7263L

Terminal Position	8	7	6	1	2
UP	○	○	○	○	○
DOWN	○	○	○	○	○
OFF	○	○	○	○	○
RIGHT	○	○	○	○	○
LEFT	○	○	○	○	○

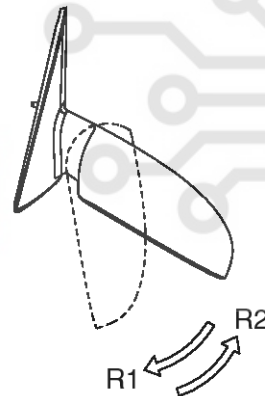
SHDBE6264L

Mirror Heater

Terminal Position	1	2
Heater	○	○

SCMBE6265L

Folding Mirror



ETJA055B

Terminal Direction	1	2	3	4
Folding R1	○	○	○	○
Folding R2	○	○	○	○

SEDBE7267L

Power Windows

BE-175

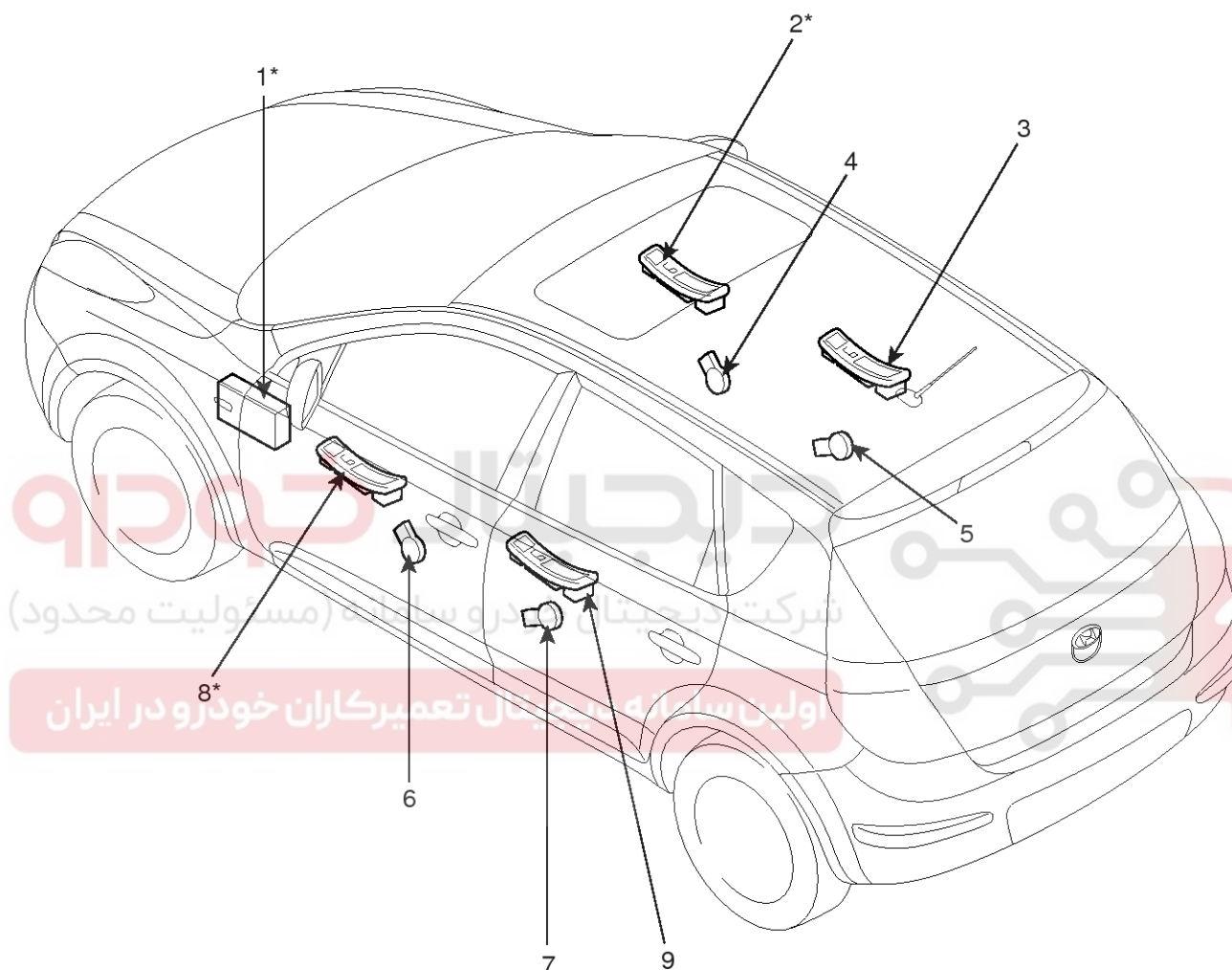
Power Windows

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. Instrument panel junction box (Power window relay)
2. Passenger window switch
3. Rear window switch
4. Front window motor & Safety power window unit
5. Rear window motor & Safety power window unit

6. Front window motor & Safety power window unit
7. Rear window motor & Safety power window unit
8. Driver power window main switch
9. Rear window switch

SFD8E8193L

BE-176

Body Electrical System

Operation

Function Of Safety Power Window

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

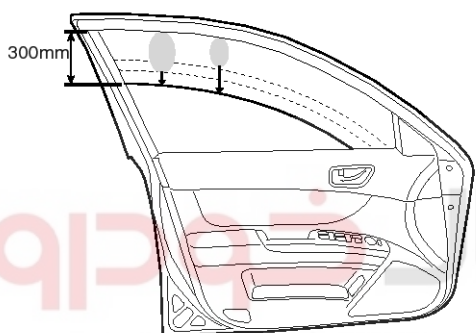
1. Safety function condition

When detect the force of 100N during the window rising, window is reversed.

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

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

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



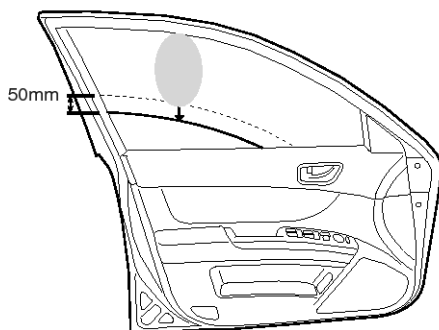
رکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال میرکاران خودرو در ایران

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

→ Window is reversed until 50mm from jamming position.

→ Window is reversed 50mm or bottom position in case of 50mm reversing distance.



SEDBE7321L

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

→ Window stops at reverse point.

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

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

→ Window is reversed until 25mm from jamming position.

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

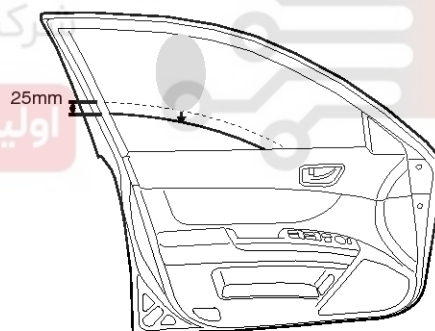
→ When holding the auto-up switch, window is operated as a manual-up function. (Safety function is not activated.)

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

→ Window is reversed until 25mm from jamming position.

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

→ Window is reverse until 25mm from jamming position.



SEDBE7322L

4. Safety function is not available area

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

Power Windows

BE-177

Initializing method of the safety power window

1. Position counter and position initialization

1) Position counter

Window position counting is implemented by use of one Hall Effect sensor (HEF) connected to timer capture unit of the Controller with a resolution of 180° electrical.

Even the battery was separated from the car, it must keep the window position information.

2) Position initialization

For position initialization, position counter detect the upper mechanical stop and lower mechanical Position. Motor control unit (MCU) allow only Manual mode activity (without ASD Anti-Squeeze Detection algorithm) feature) before to be initialized.

Initialization means the condition to move the window system with full anti-pinch function and related functions by detecting the window travel distance (Upper/Lower mechanical limits).

Conditions for initialization are

- de-initialized position counter
- Power window switch Up activated
- block condition detected

(no motor movement of more than 1 count during 1sec/ SW dependent)

Switch action with De-initialized condition :

- Up direction : Manual & Auto P/WDW sw input → manual mode;
- Down direction : Manual P/WDW sw input → manual mode, + Auto s/w input → auto mode

3) Re-initialization

During re-initialization, position counter is set to "zero" at upper block position to compensate counting errors by software, mechanical tolerances or physics. Conditions for re-initialization are

- initialized position counter.
 - window at upper block position (capture range EEPROM programmable)
 - block condition detected
- (no motor movement of more than 1 count during 1 sec/ SW dependent)

4) De-initialization

The system initialization/calibration will be lost in the following cases:

- After parameter modification via diagnostic
- Wrong EEPROM checksum at ECU wake-up or power-on
- Movement outside predefined window stroke (above learned top position, below predefined bottom position)
- De-initialization after a defined number (EEPROM) of reversals without re-initialization in the upper seal (activation /de-activation controlled by EEPROM value). A window down movement or switching off the window lifter permission resets the reversal counter value(activation by EEPROM bit).
- De-initialization after a defined number of movements (EEPROM) without re-initialization in the upper seal (activation /de-activation controlled by EEPROM value)
- Special de-initialization procedure :

The special window lifter de-initialization procedure works as follows:

- System is initialized
- Move window below soft-stop position (position EEPROM adjustable)
- Press MANU-down switch and keep it pressed
- Apply permission signal (serial-link = PIN 6) ON → OFF → ON within 2 seconds (time EEPROM adjustable)

BE-178

Body Electrical System

5) Soft stop function

In order to reduce noise and mechanical stress, the window movement is stopped under control of the ECU before the bottom position is reached.

The clearance is 0 / +10 mm (at 11.5 V to 14.5 V).

To activate the soft bottom stop function, the top reference position and bottom reference position have to be initialized. Therefore, the window is lifted into the top position until the block condition is detected. This position is taken as top reference position.

Afterwards, the window is moved to the bottom position until the block condition is detected (mechanical stop). This position is taken as bottom reference position.

The bottom reference position is re-initialized :

- When window is operated down starting from soft stop position
- Every "9" stops at soft stop position.

6) Thermal protection

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

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

7) Operation time limiter

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

8) Continuous reverse

Current Number of Continuous reverse of window is 5. With the below condition, this counter Will be initialized.

- IG OFF
- DOWN signal ON
- WINDOW CLOSE



Power Windows

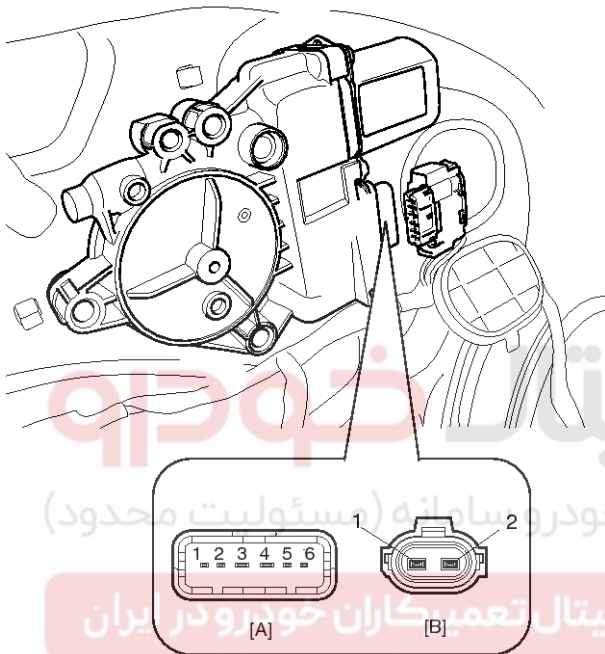
BE-179

Power Window Motor

Inspection

Front Power Window Motor

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



SFDBE8071L

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]

Terminal			1	2
Position				
Left	UP	Clockwise	⊕	⊖
	DOWN	Counter-clockwise	⊖	⊕
Right	DOWN	Clockwise	⊖	⊕
	UP	Counter-clockwise	⊕	⊖

SFDBE8072L

[SAFETY]

Terminal			1	6
Position				
Left	UP	Clockwise	⊖	⊕
	DOWN	Counter-clockwise	⊕	⊖
Right	DOWN	Clockwise	⊕	⊖
	UP	Counter-clockwise	⊖	⊕

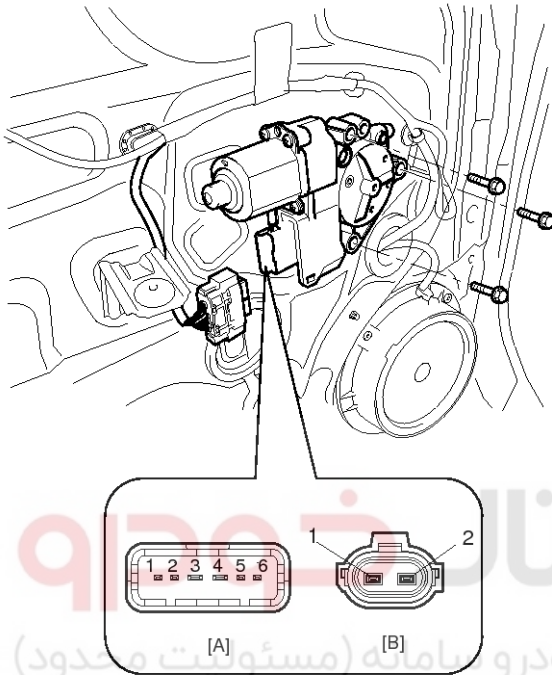
SFDBE8073L

BE-180

Body Electrical System

Rear Power Window Motor

1. Remove (-) negative battery terminal.
2. Remove the rear door trim.
(Refer to the BD group - "Rear door")
3. Disconnect the connector from the motor.
(A : Safety, B : Standard)



SFD8E8172L

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.

Terminal			1	2
Position				
Left	DOWN	Clockwise	⊕	⊖
	UP	Counter-clockwise	⊖	⊕
Right	UP	Clockwise	⊖	⊕
	DOWN	Counter-clockwise	⊕	⊖

SFD8E8173L

[SAFETY]

Terminal			1	6
Position				
Left	DOWN	Clockwise	⊖	⊕
	UP	Counter-clockwise	⊕	⊖
Right	UP	Clockwise	⊕	⊖
	DOWN	Counter-clockwise	⊖	⊕

SFD8E8174L

Power Windows

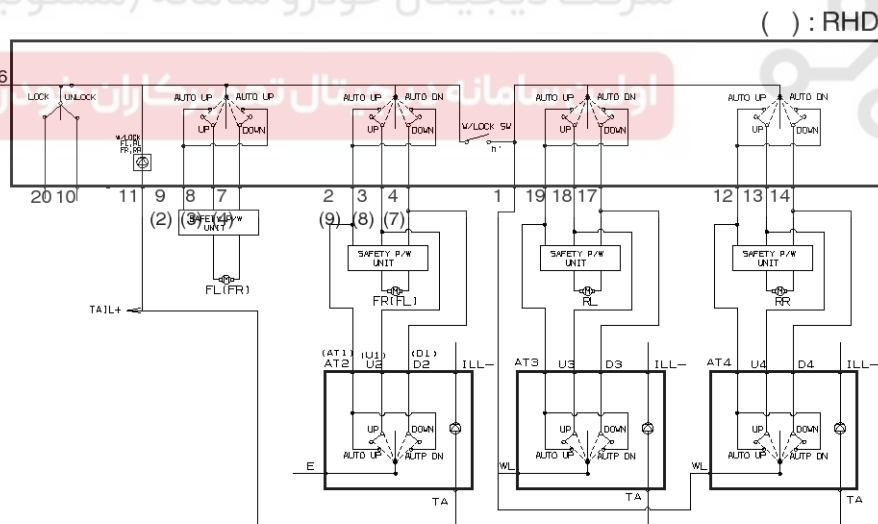
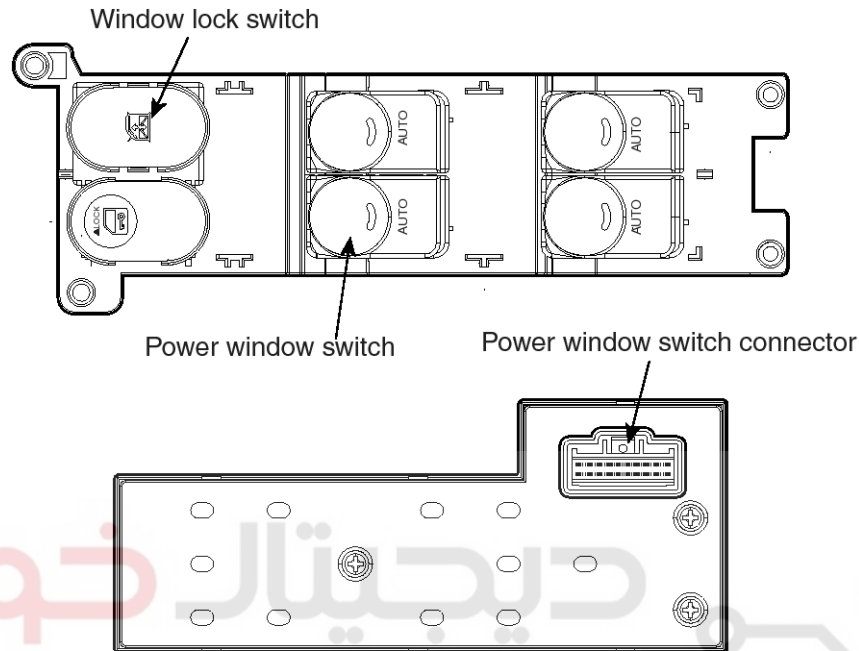
BE-181

Power Window Switch

Components

Power Window Main Switch

[ALL SAFETY POWER WINDOW]



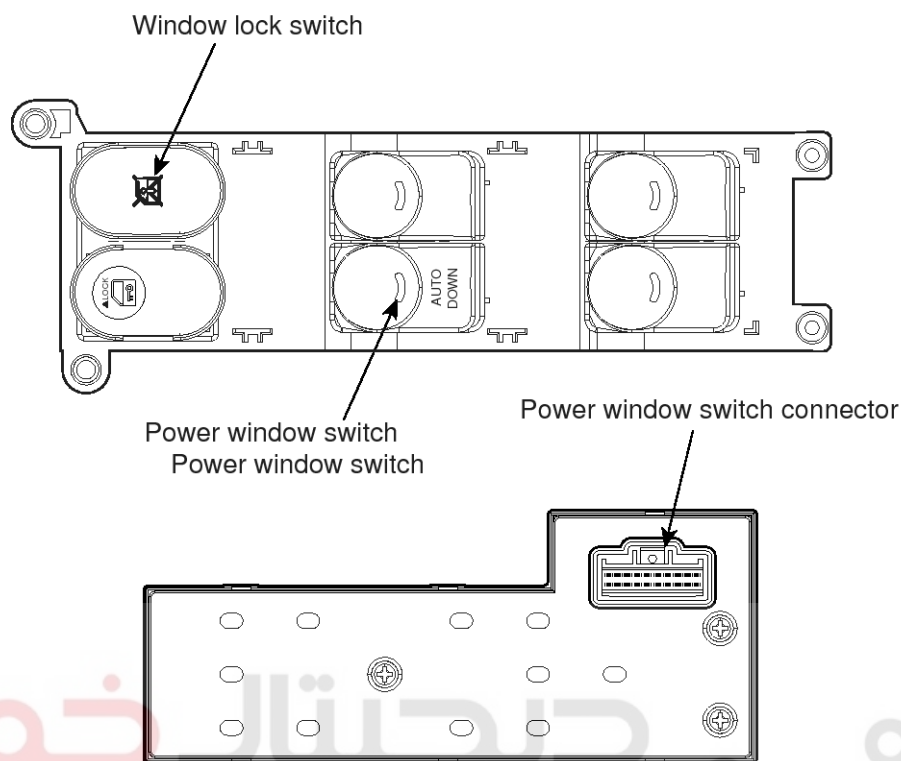
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

SFDBE8084L

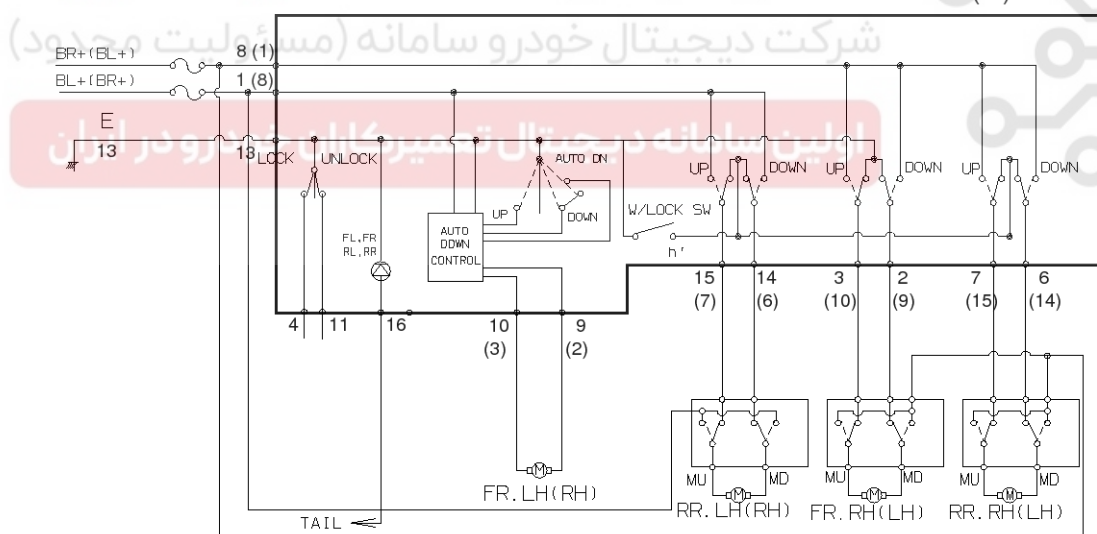
BE-182

Body Electrical System

[AUTO DOWN POWER WINDOW]



() : RHD



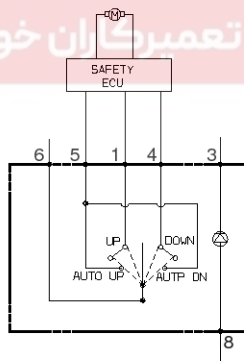
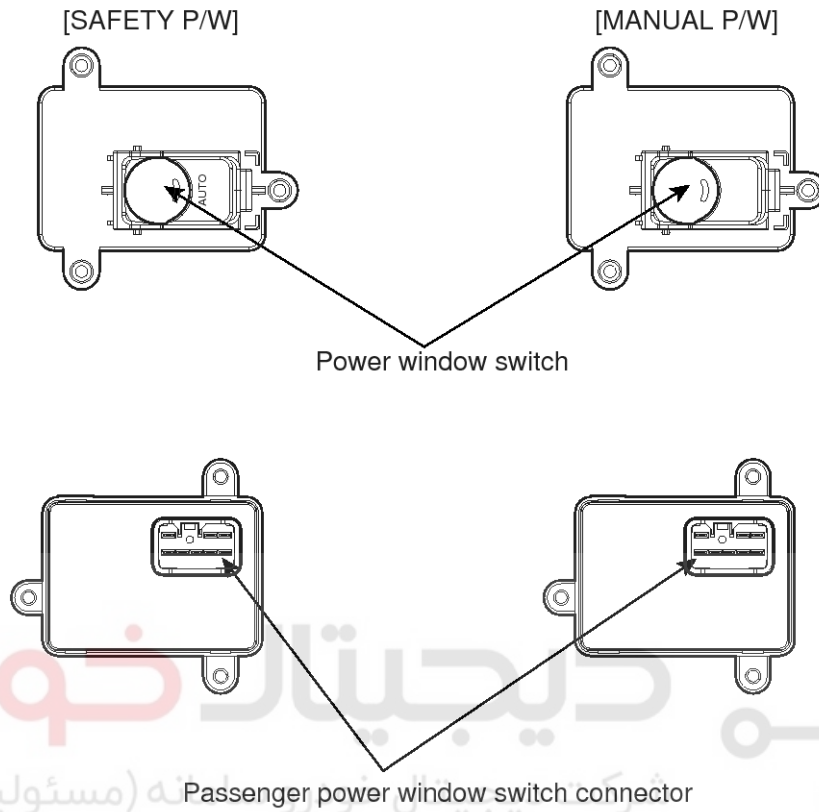
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16


SFDBE8085L

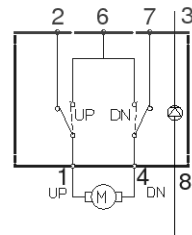
Power Windows


BE-183

Passenger/rear Power Window Switch



1			2	3
4	5	6	7	8



1			2	3
4	5	6	7	8

SFD8E8086L

BE-184

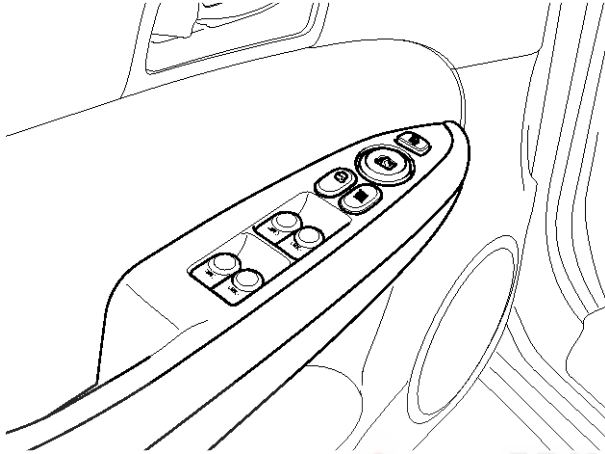
Body Electrical System

Inspection

Power Window Main Switch Inspection

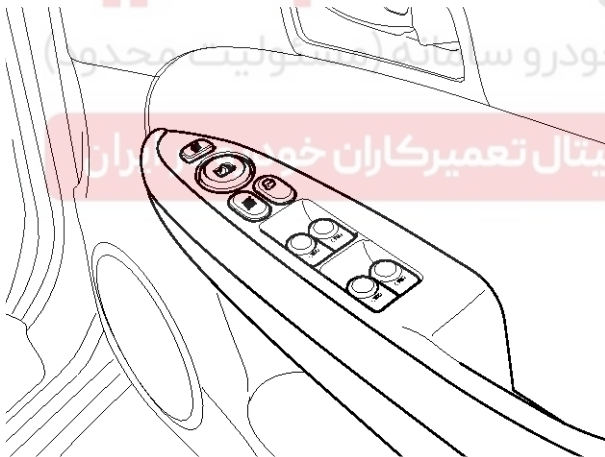
1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
(Refer to the BD group - "Front door")
3. Disconnect the connector from the switch.

[LHD]



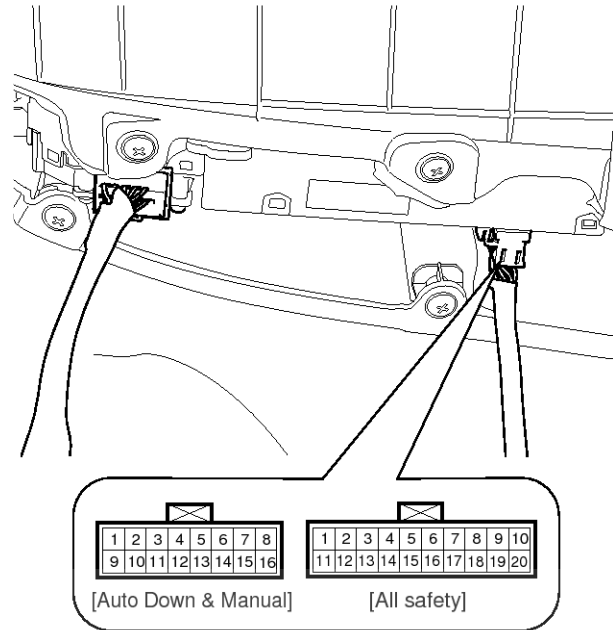
SFD8E8067L

[RHD]



SFD8E8067R

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.



SFD8E8087L () : RHD

Terminal Position	20(20)	6(6)	10(10)
Lock	○ — ○	○ — ○	
Unlock		○ — ○	○ — ○

SFD8E8074L

[AUTO DOWN & MANUAL]

Terminal Position	4(4)	13(13)	11(11)
Lock	○ — ○	○ — ○	
Unlock		○ — ○	○ — ○

SFD8E8075L

Power Windows

BE-185

[ALL SAFETY WINDOW] () : RHD

Position \ Terminal	Front left				Front right			
	9(12)	8(3)	7(4)	6(6)	3(8)	4(7)	2(9)	6(6)
AUTO UP	○	○	○	○	○	○	○	○
UP		○	○	○	○	○	○	○
OFF								
DOWN			○	○	○	○	○	○
AUTO DOWN	○	○	○	○	○	○	○	○

Position \ Terminal	Rear left				Rear right			
	6(6)	18(18)	17(17)	19(19)	6(6)	13(13)	14(14)	12(12)
AUTO UP	○	○	○	○	○	○	○	○
UP	○	○			○	○		
OFF								
DOWN	○	○	○		○	○	○	
AUTO DOWN	○	○	○	○	○	○	○	○

SFDBE8076L

[AUTO DOWN POWER WINDOW] () : RHD

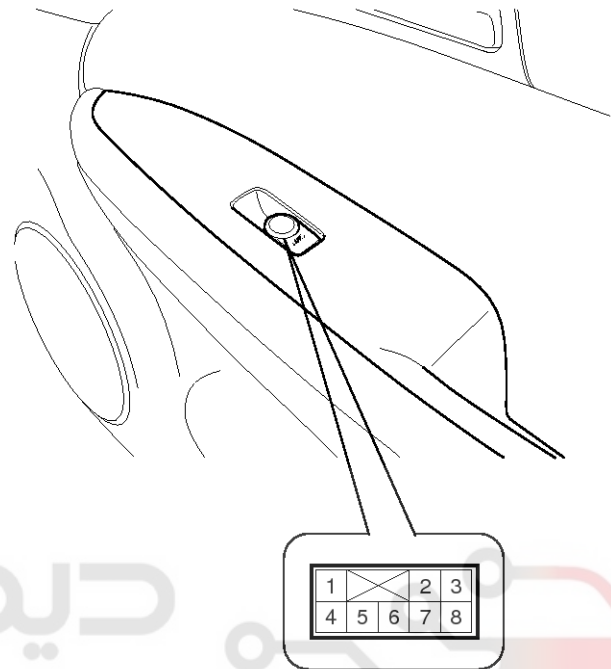
Position \ Terminal	Front left				Front right			
	10(3)	9(2)	13(13)	1(8)	3(10)	2(9)	8(1)	13(13)
UP	○	○	○	○	○	○	○	○
OFF	○	○	○	○	○	○	○	○
DOWN	○	○	○	○	○	○	○	○

Position \ Terminal	Rear left				Rear right			
	13(13)	15(7)	14(6)	1(8)	8(1)	7(15)	6(14)	13(13)
UP	○	○	○	○	○	○	○	○
OFF	○	○	○	○	○	○	○	○
DOWN	○	○	○	○	○	○	○	○

SFDBE8077L

Passenger Power Window Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
(Refer to the BD group - "Front door")
3. Disconnect the 8P connector from the switch.



SFDBE8078L

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

[Safety Window]

Position \ Terminal	6	4	1	5
AUTO UP	○	○	○	○
UP	○	○	○	
OFF				
DOWN	○	○		
AUTO DOWN	○	○	○	○

SEDBE7294L

BE-186

Body Electrical System

[Manual Power Window]

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

SHDBE6288L

Rear Power Window Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim.
(Refer to the BD group - "Rear door")
3. Disconnect the 8P connector from the switch.



SFD8079L

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

[Safety Window]

Terminal Position	6	4	1	5
AUTO UP	○		○	○
UP	○		○	
OFF				
DOWN	○	○		
AUTO DOWN	○	○		○

SEDBE7294L

[Manual Power Window]

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

SHDBE6288L

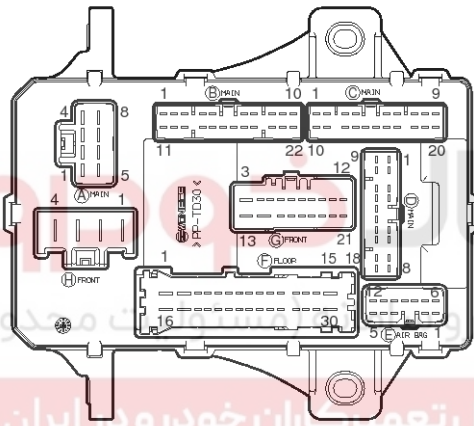
Power Windows

BE-187

Power Window Relay

Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
(Refer to the BD group - "Crash pad")
3. Remove the junction box.
4. Check for continuity between the terminals.
5. There should be continuity between the No.2 in the I/P-F and No.17 terminal in the I/P-B when power and ground are connected to the No.2 terminal in the I/P-H and No.17 terminal in the I/P-B.
6. There should be no continuity between the No.2 terminal in the I/P-F and No.17 terminal in the I/P-B when power is disconnected.



SHDBE6292D

Terminal Power	I/P-H (2)	I/P-F (17)	I/P-H (2)	I/P-B (17)
Disconnected			○ — ○	
Connected	○ — ○		⊕ — ⊖	

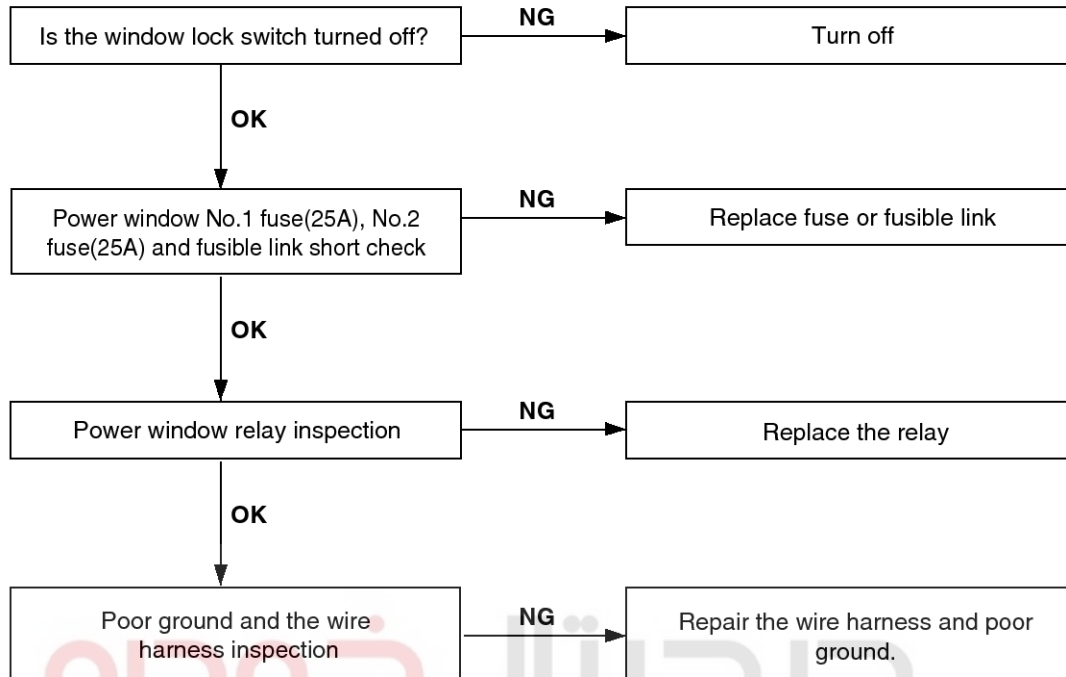
SHDBE6293L

BE-188

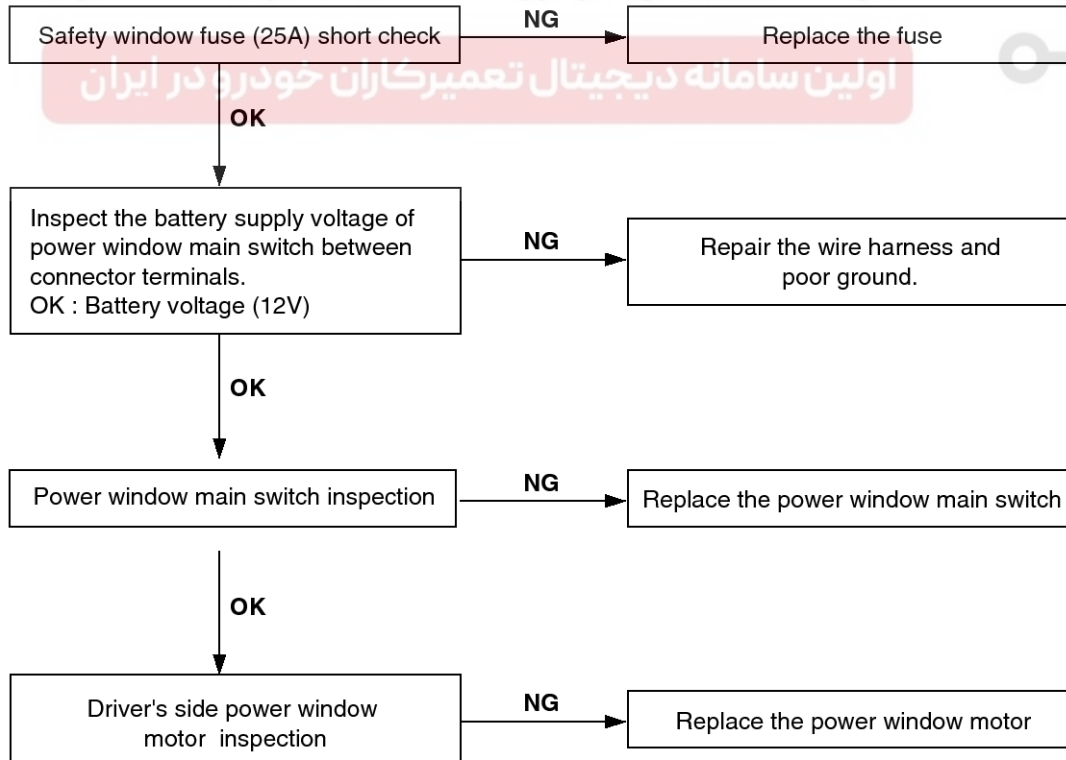
Body Electrical System

Troubleshooting

1. No windows operate from the main switch on the driver's door.



2. Driver's side window does not operate.



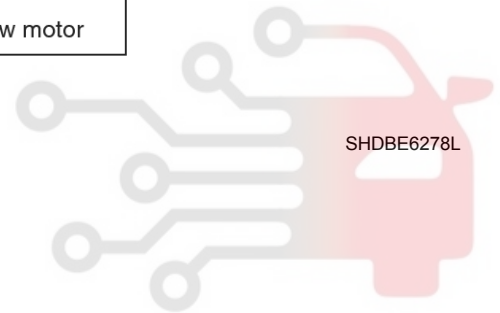
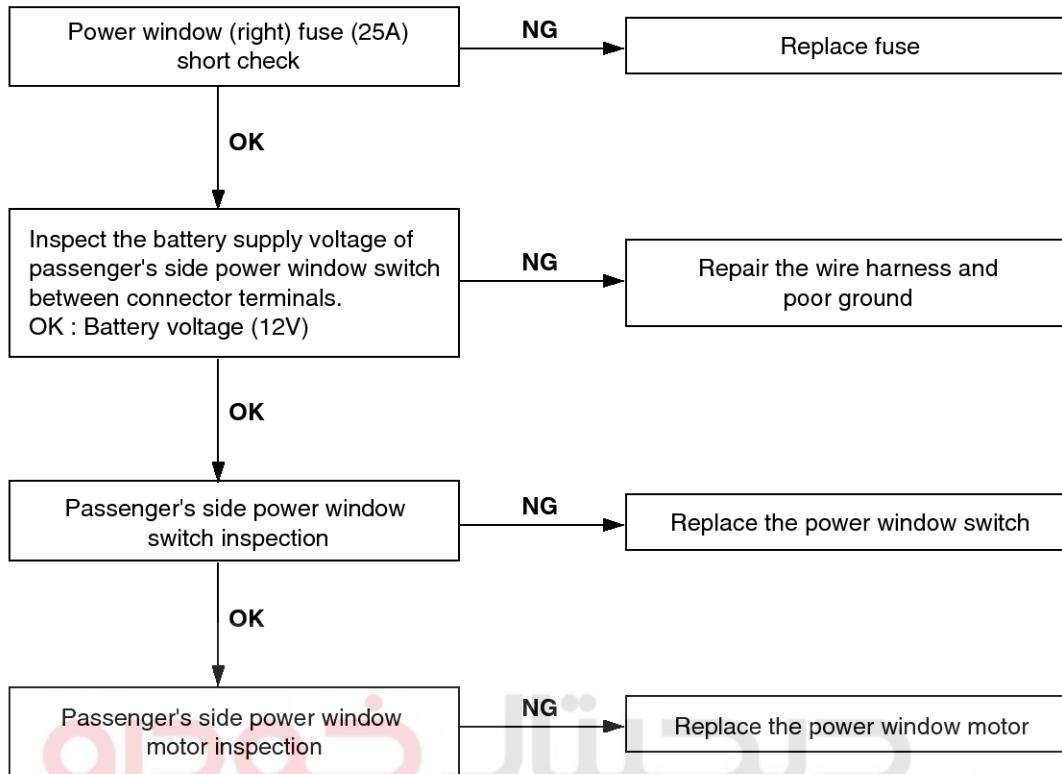
SHDBE6276L

SHDBE6277L

Power Windows

BE-189

3. Passenger's side window does not operate.



شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BE-190

Body Electrical System

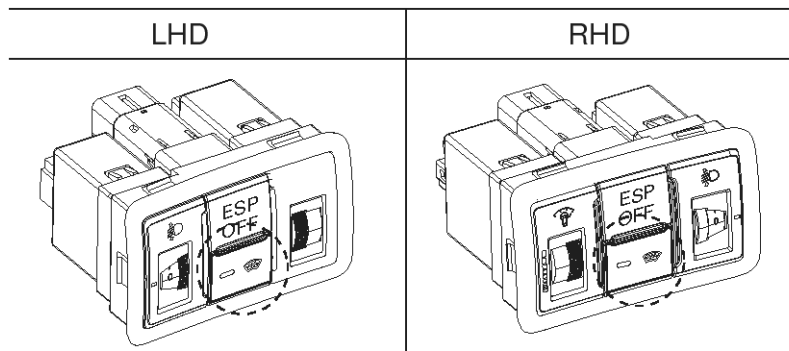
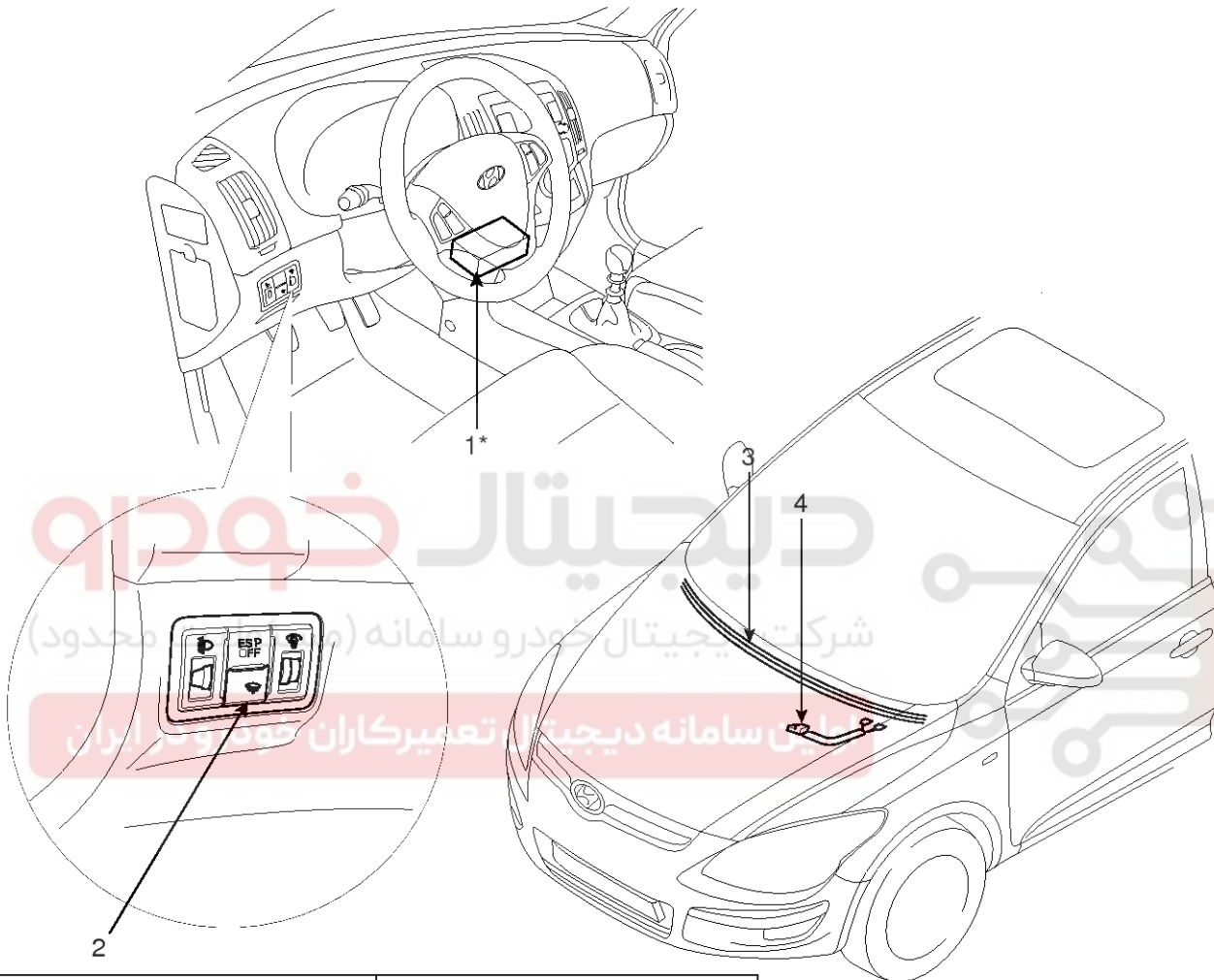
Windshield Deicer

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. Body control module
2. Windshield deicer switch
3. Windshield deicer

4. Deicer connector

SFD8E8088L

Windshield Deicer

BE-191

Description

Windshield deicer system prevent windshield wiper from freezing in the winter season. It consists of deicer in the lower part of windshield, switch and relay. Body control module receives an input signal from the deicer switch, then controls relay.

Since the generator "L" is switched ON, if the deicer switch is ON, then deicer output is ON for 20 minutes.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



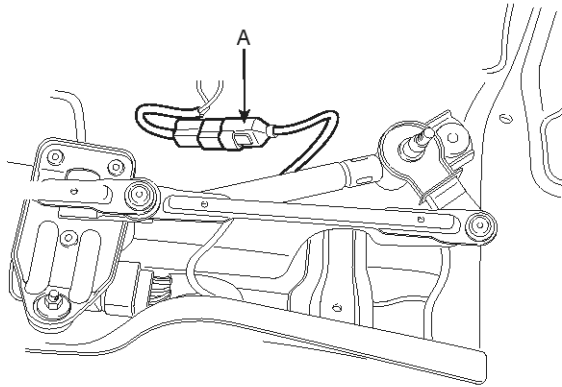
BE-192

Body Electrical System

Windshield Deicer

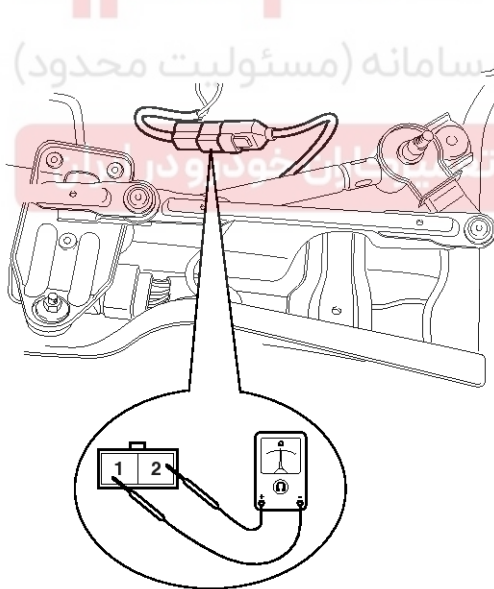
Inspection

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



SEDBE7301L

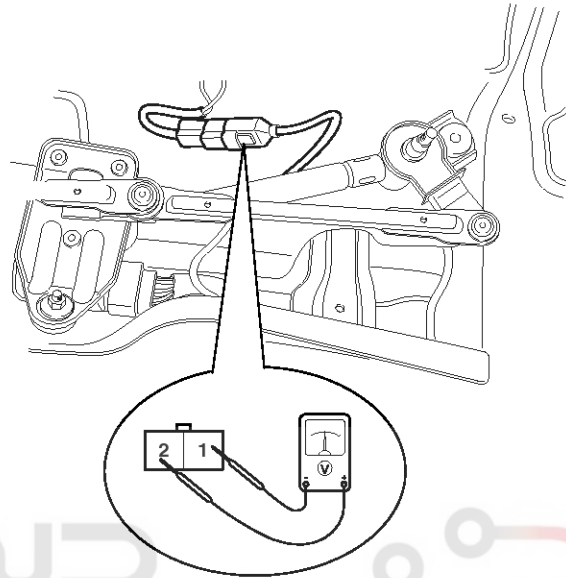
3. Check for continuity between the terminals of deicer lines.



SEDBE7302L

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

O K : approx. Battery voltage (12V)



SEDBE7303L

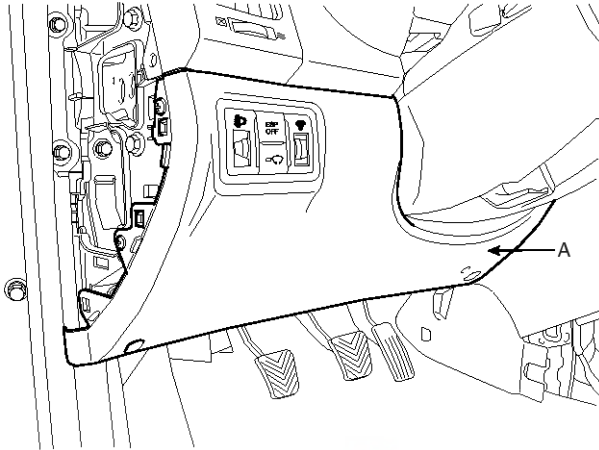
Windshield Deicer

BE-193

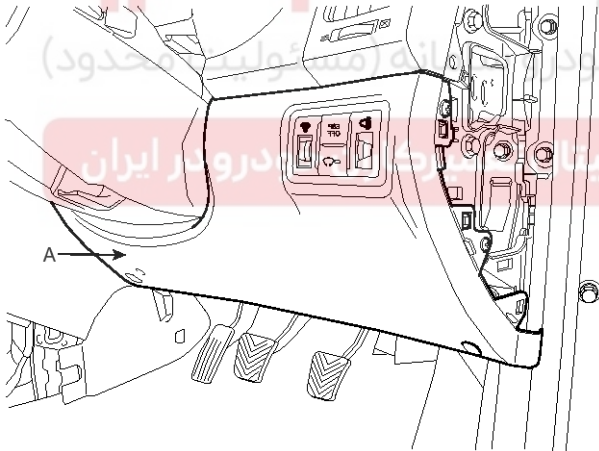
Windshield Deicer Switch

Inspection

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

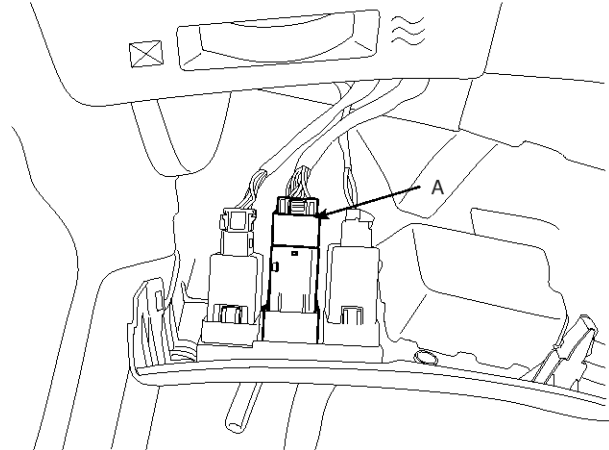
[LHD]

SFD BE8089L

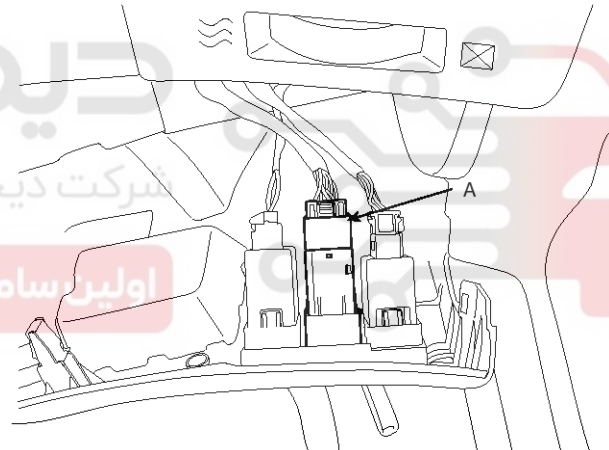
[RHD]

SFD BE8089R

3. Disconnect deicer switch connectors.

[LHD]

SFD BE8090L

[RHD]

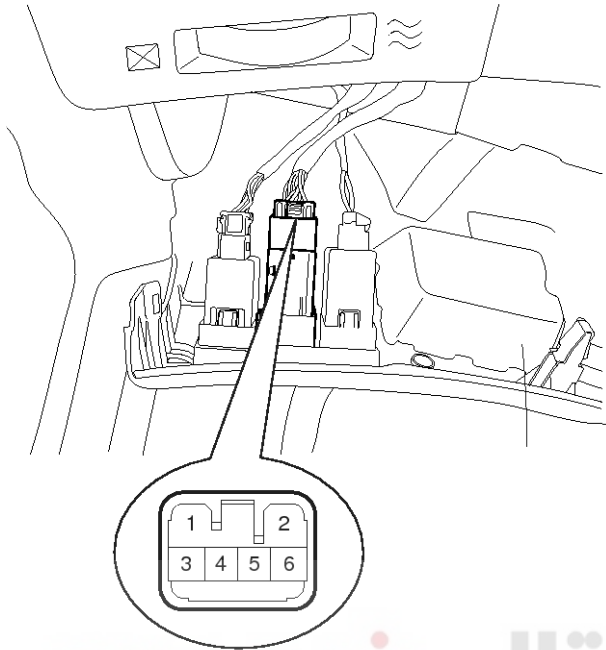
SFD BE8090R

BE-194

Body Electrical System

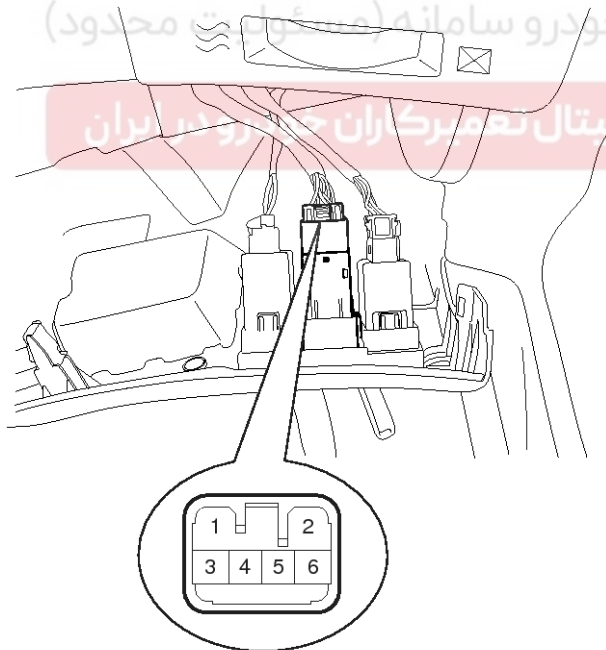
4. Using an ohmmeter, inspect the continuity between the terminals.

[LHD]



SFD8091L

[RHD]



SFD8091R

Position Terminal	ON(PUSH)	OFF(FREE)	Remark
3			GND
6			BCM
4			
1			IND+
5			ILL-
2			ILL+

SFD8092L

Rear Glass Defogger

BE-195

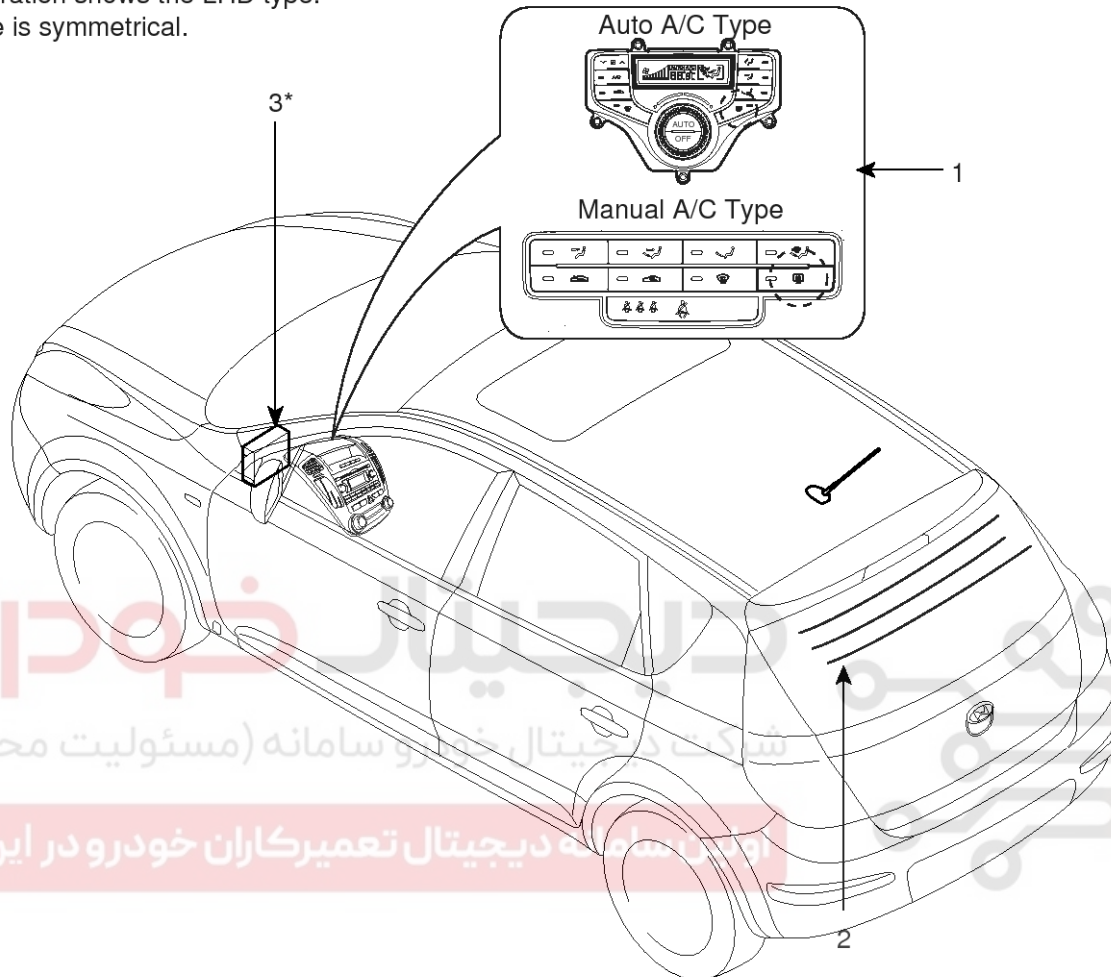
Rear Glass Defogger

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



Auto A/C Type		Manual A/C Type	
<EURORE>	<GENERAL>	<EURORE>	<GENERAL>

1. Rear window defogger switch

2. Rear window defogger

3. Body control module

SFDBE8093L

BE-196

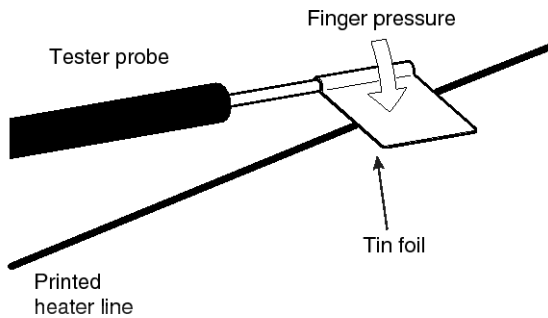
Body Electrical System

Rear Glass Defogger Printed Heater

Inspection

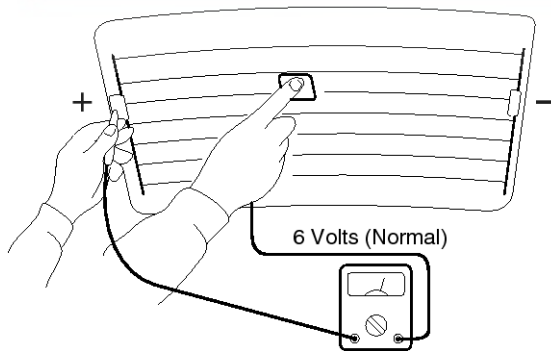
⚠ CAUTION

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



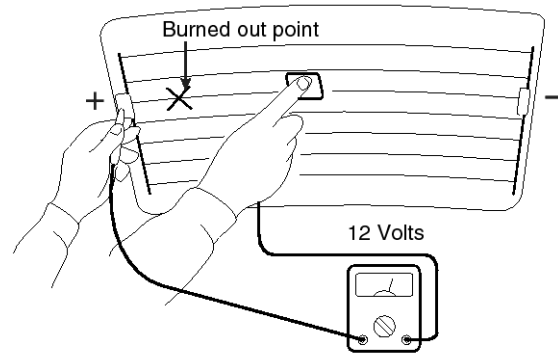
ETA9165A

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



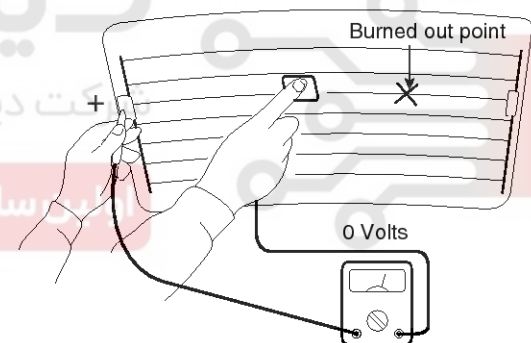
ETA9165B

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



ETA9165C

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

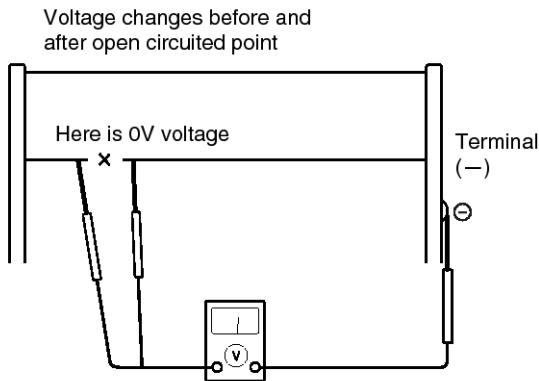


ETA9165D

Rear Glass Defogger

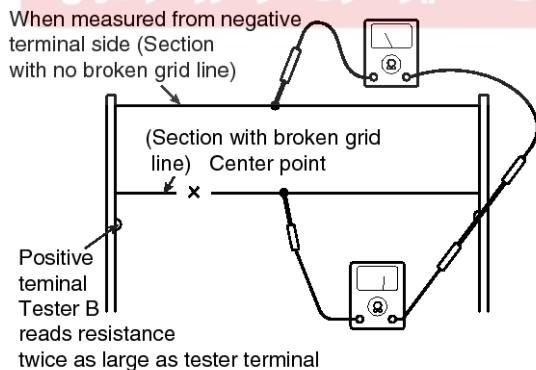
BE-197

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



ETA9165E

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



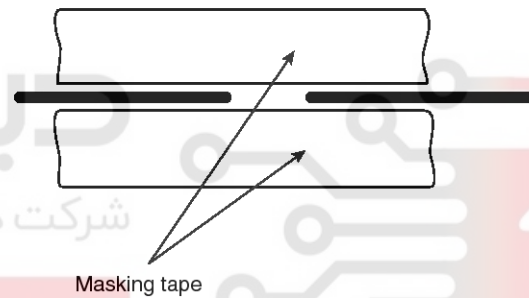
ETA9165F

Repair of broken heater line

Prepare the following items :

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

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



ETA9165G

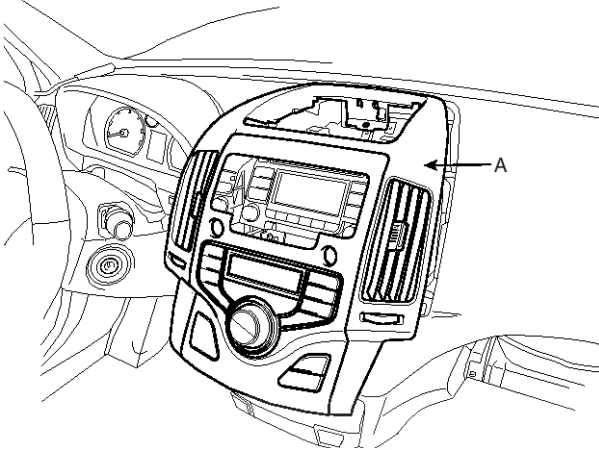
BE-198

Body Electrical System

Rear Glass Defogger Switch

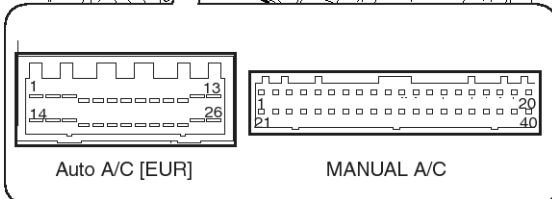
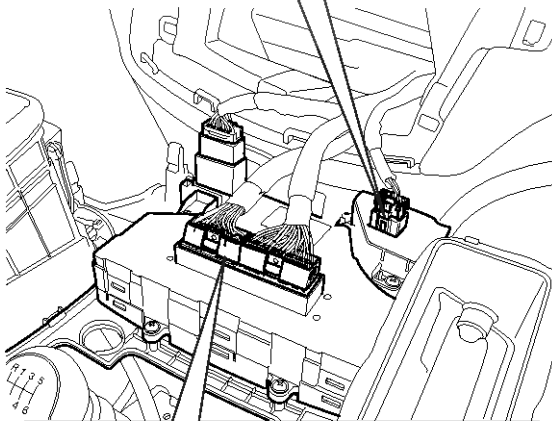
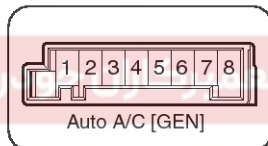
Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel (A) after removing upper tray. Take care not to damage fixing clips. (Refer to the BD group - "Crash pad")



SFDBE8094L

3. Disconnect connectors.
4. Using an ohmmeter, inspect the continuity between the terminals after removing controller.



SFDBE8095L

[Manual A/C]

Terminal Position	3	GND
ON(PUSH)		
OFF(FREE)		

SFDBE8096L

[Auto A/C & EUROPE]

Terminal Position	10	GND
ON(PUSH)		
OFF(FREE)		

SFDBE8191L

[Auto A/C & GENERAL]

Position Terminal	ON(PUSH)	OFF(FREE)	Remark
5			
8			GND
2			IND+
7			ILL-
1			ILL+

SFDBE8311L

Windshield Wiper/Washer

BE-199

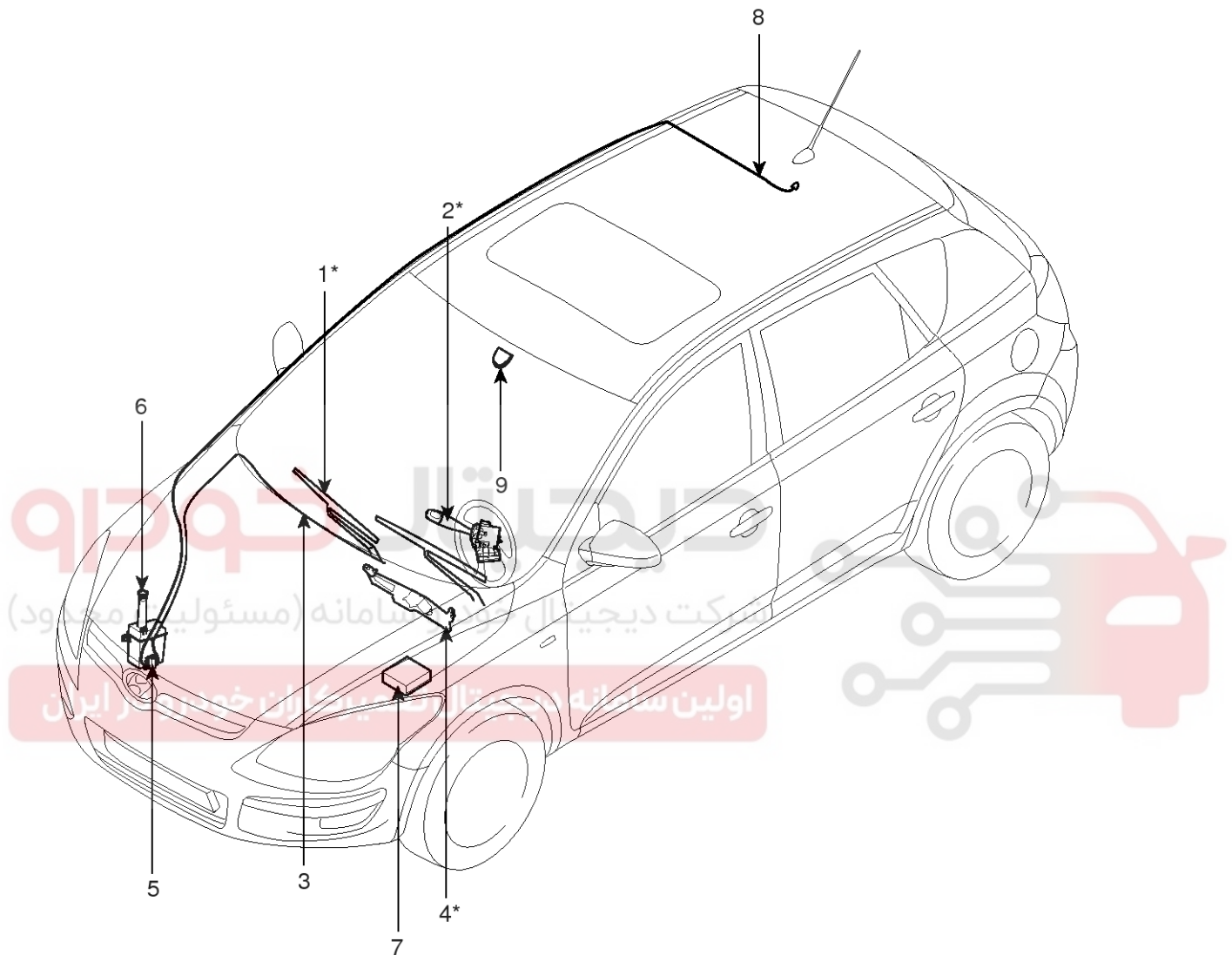
Windshield Wiper/Washer

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



- | | |
|-------------------------------------|--|
| 1. Windshield wiper arm & blade | 6. Washer reservoir |
| 2. Wiper & washer switch | 7. Wiper relay (Engine room relay box) |
| 3. Windshield washer hose | 8. Rear washer hose |
| 4. Windshield wiper motor & linkage | 9. Rain sensor |
| 5. Washer motor | |

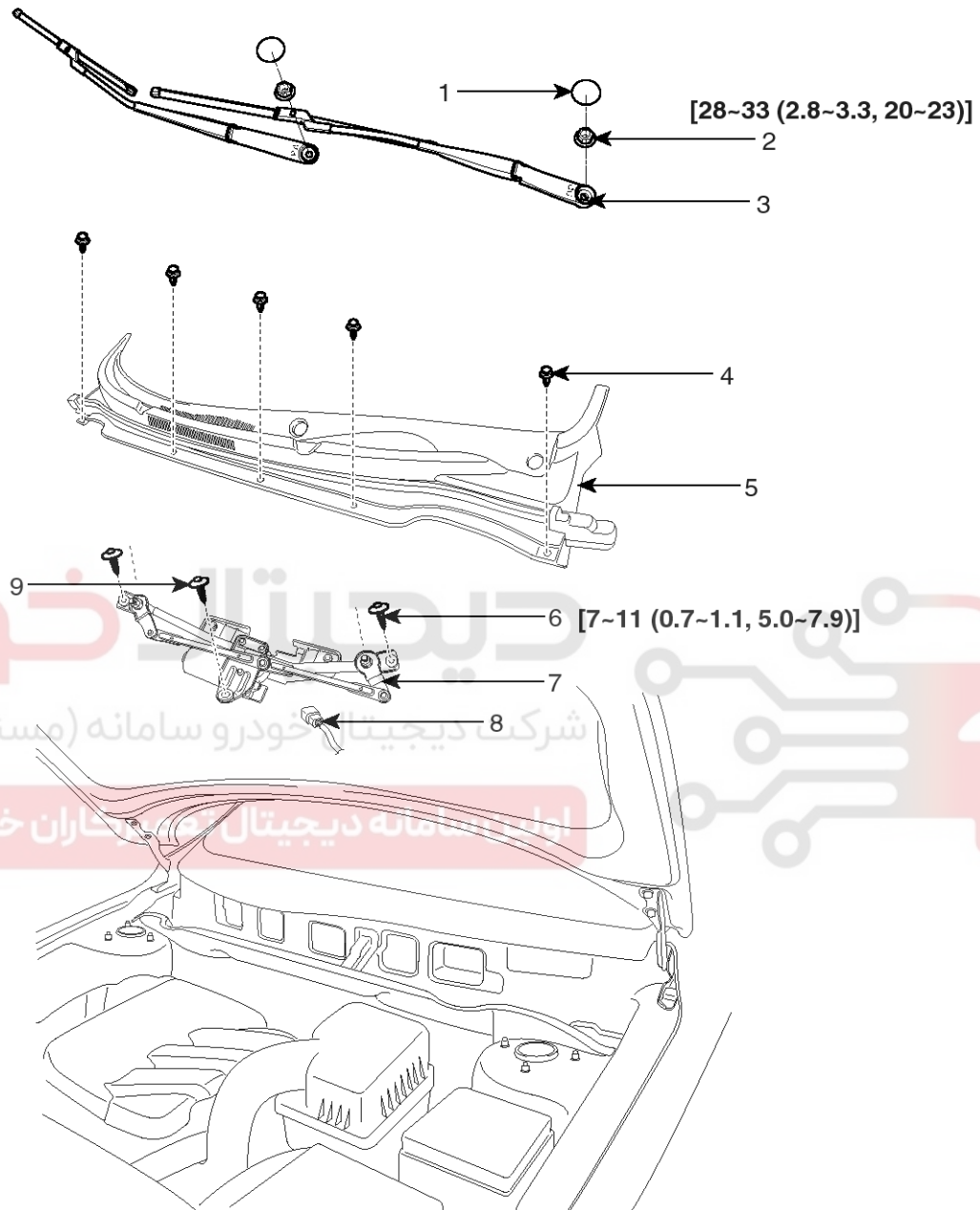
SFD8314L

BE-200

Body Electrical System

Windshield Wiper-Washer Switch

Component Location



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

- | | |
|----------------------|-----------------------------------|
| 1. Cap | 6. Bolt |
| 2. Nut | 7. Wiper motor & linkage assembly |
| 3. Wiper arm & blade | 8. Wiper motor connector |
| 4. Retainer | 9. Nut |
| 5. Cowl top cover | |

SFDBE8097L

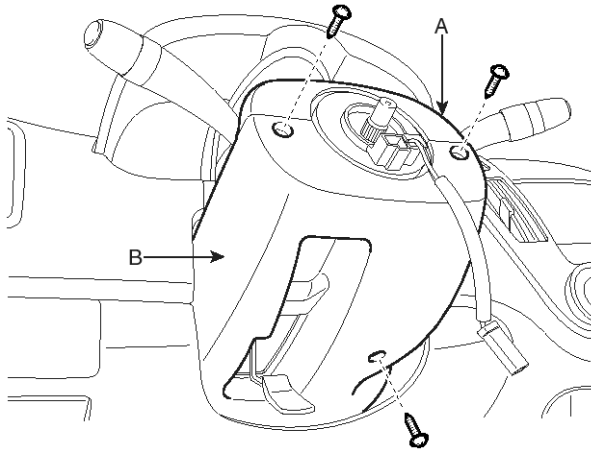
Windshield Wiper/Washer

BE-201

Removal

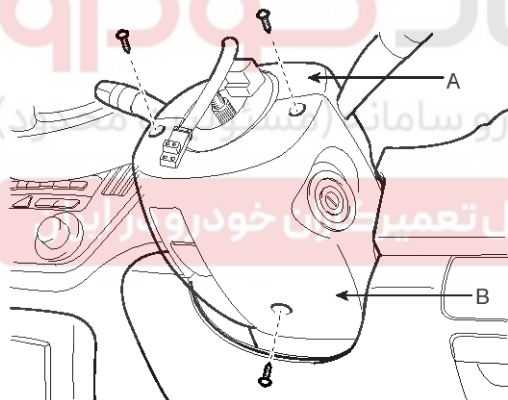
1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper (A) and lower (B) shrouds after loosening 3 screws.

[LHD]



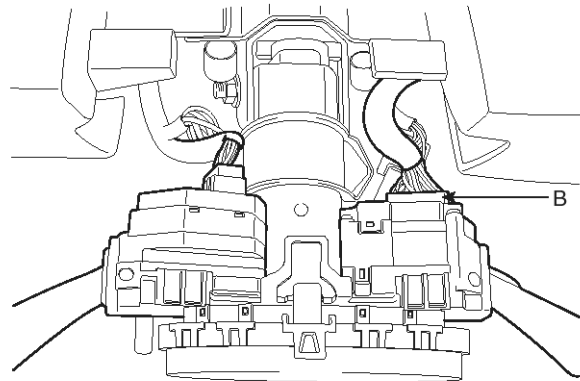
SEDBE7323L

[RHD]



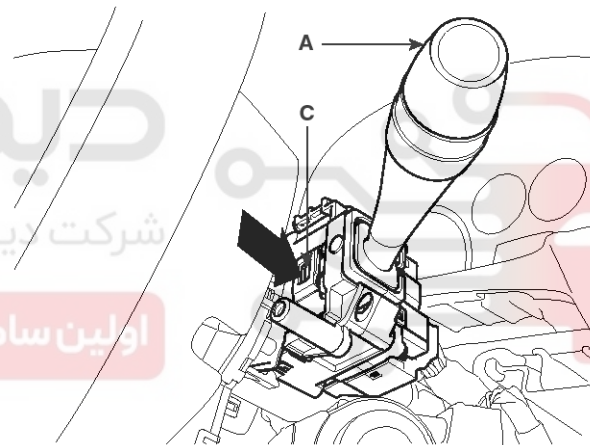
SEDBE7323R

3. Remove the wiper switch (A) after disconnecting the connector (B) with pushing the lock pin (C) and loosening 2 screws.



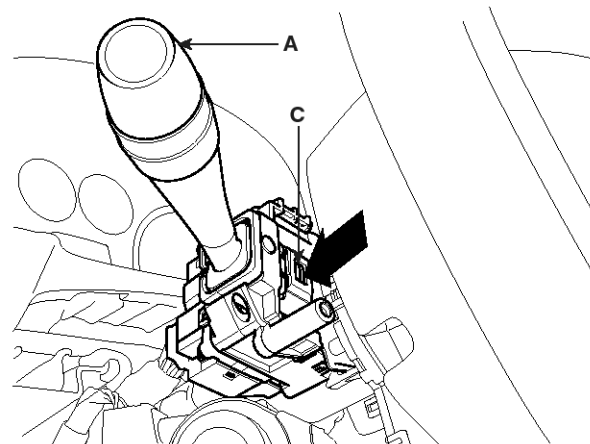
SEDBE7324L

[LHD]



SFDBE8100L

[RHD]



SFDBE8100R

BE-202

Body Electrical System

Installation

1. Install the windshield wiper switch.
2. Connect the wiper switch connector.
3. Install the steering column upper and lower shrouds.

Inspection

1. Multifunction switch operates head lamps and wiper by communicating with BCM through LIN communication.
2. Check BCM input/output value of each position of multifunction switch when you inspect the module whether faulty or not.
3. Select model and BCM menu.

1. HYUNDAL. VEHICLE DIAGNOSIS ▼

MODEL : FD

01. ENGINE (GASOLINE)
02. ENGINE (DIESEL)
03. AUTOMATIC TRANSAXLE
04. ABS/ESP
05. SRS-AIRBAG
06. FULL AUTO AIR/CON.
07. ELEC.POWER STEERING
08. BODY CONTROL MODULE

SFDBE8098L

4. Select "Current data" and wiper.

1. HYUNDAL. VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : BODY CONTROL MODULE

01. CURRENT DATA
02. FLIGHT RECORD
03. ACTUATION TEST
04. SIMU-SCAN
05. IDENTIFICATION CHECK
06. USER OPTION
07. DATA SETUP (UNIT CONV.)

SFDBE8099L

5. Check input/output value of washer & wiper switch.

1.1 CURRENT DATA		45/66
WASHER SW	OFF	▲
WIPER INT SW	OFF	■
DEFROSTER SW	OFF	
WIPER RELAY	OFF	
DEFROSTER REPLAY	OFF	
MIST SW	OFF	
DRIVE SEAT BELT SW	OFF	▼
FIX	SCRN	FULL
PART	GRPH	HELP

SEDBE7358L

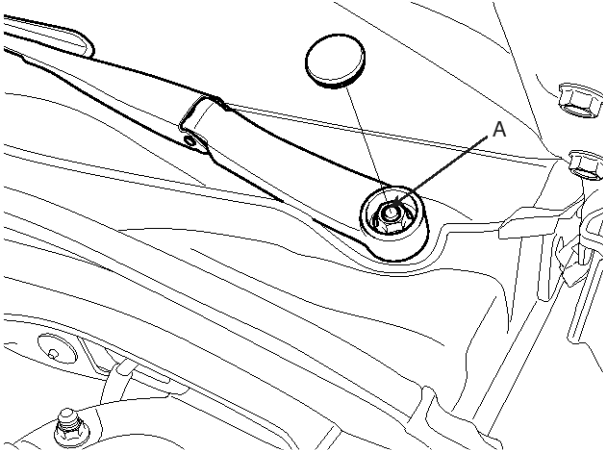
Windshield Wiper/Washer

BE-203

Front Wiper Motor

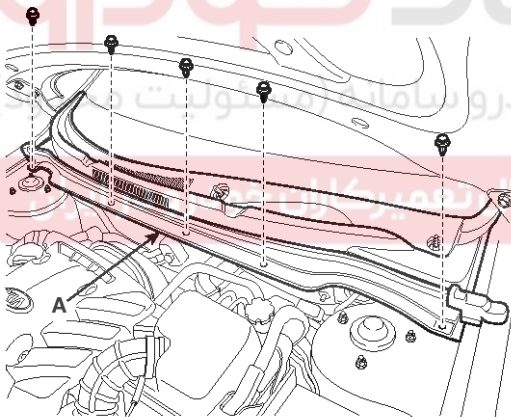
Removal

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



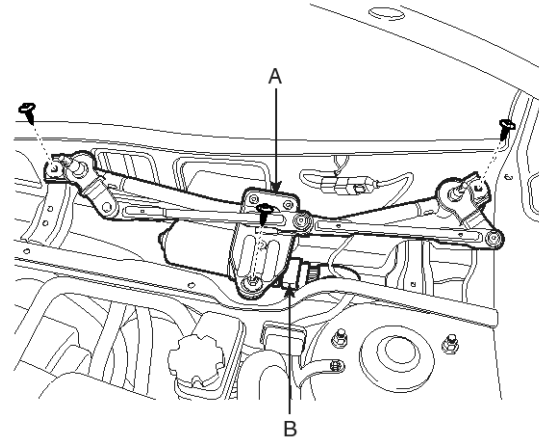
SFDBE8101L

2. Remove the weather strip and the cowl top cover (A) after removing 5 retainers.



SEDBE7338L

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



SFDBE8104L

Installation

1. Install the wiper motor and linkage assembly and then connect the wiper motor connector.

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

2. Install the cowl top cover.
3. Install the windshield wiper arm and blade.

Torque : 28~33 Nm (2.8~3.3 kgf.m, 20~23.1 lbf.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.

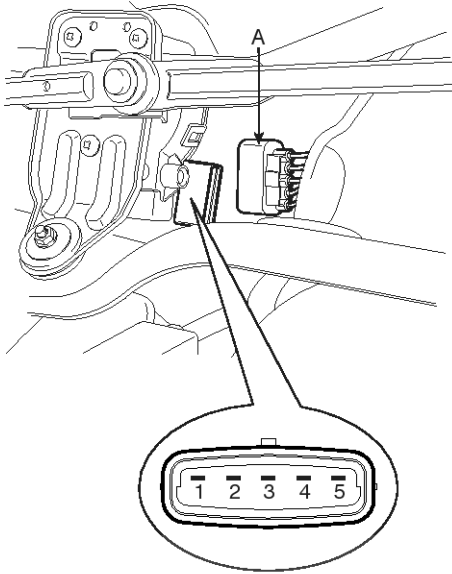
BE-204

Body Electrical System

Inspection

Speed Operation Check

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

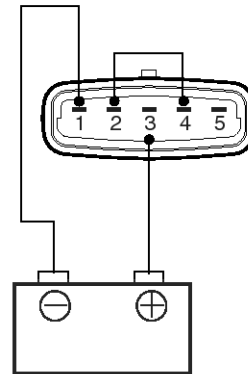


SEDBE7343L

2. Attach the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 2.
3. Check that the motor operates at low speed.
4. Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 2.
5. Check that the motor operates at high speed.

Automatic Stop Operation Check

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



SEDBE7344L

Windshield Wiper/Washer

BE-205

Front Washer Motor

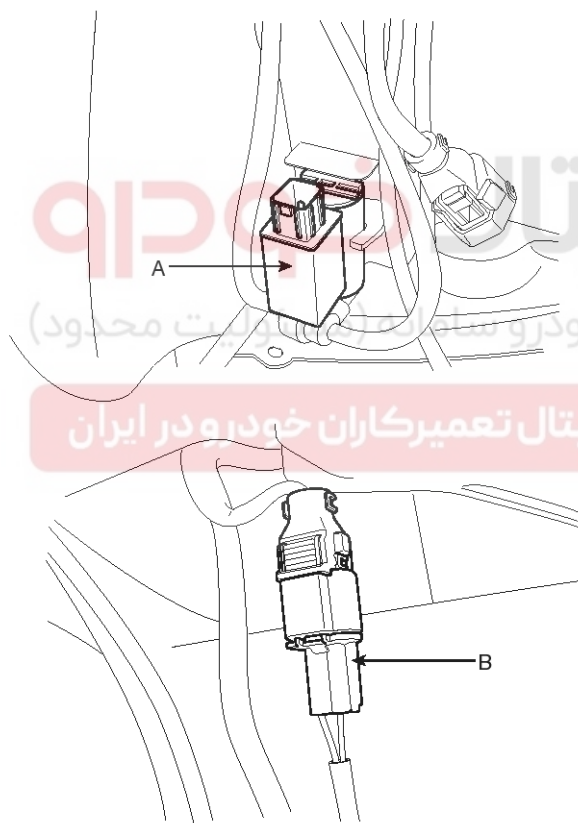
Removal

⚠ CAUTION

- When servicing the washer pump, be careful not to damage the washer pump seal.
- Do not operate the washer pump before filling the washer reservoir.

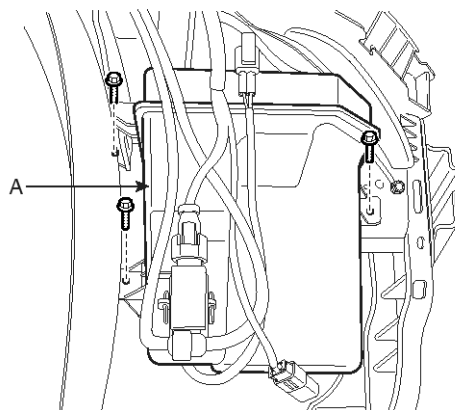
Failure to do so could result in premature pump failure.

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



SEDBE7335L

4. Remove the washer reservoir (A) after removing 3 bolts.



SEDBE7347L

Installation

1. Install the washer reservoir.

⚠ NOTICE

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

2. Install the washer motor and connect the washer hose, the motor and level sensor connector.
3. Install the front bumper cover.

Inspection

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

⚠ NOTICE

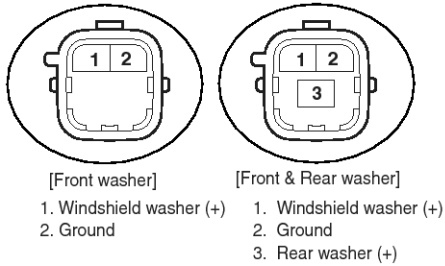
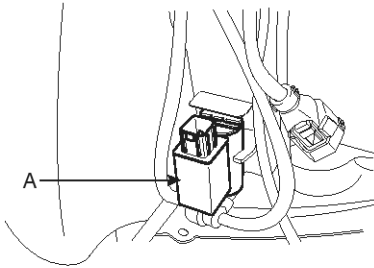
Before filling the reservoir tank with water, check the filter for foreign material or contamination. if necessary, clean the filter.

2. Connect positive (+) battery cables to terminal 2 and negative (-) battery cables to terminal 1 respectively.
3. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles.

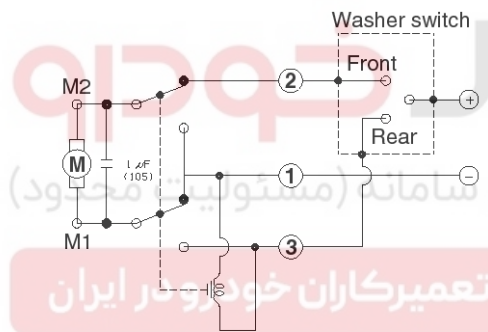
BE-206

Body Electrical System

4. If they are abnormal, replace the washer motor (A).

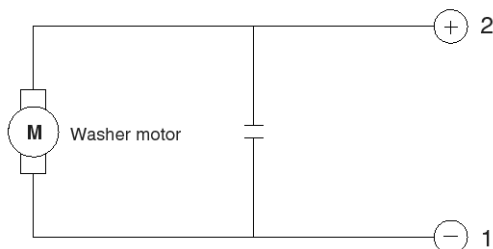


SEDBE7348L



<Windshield & Rear washer motor>

SCMBE6349L

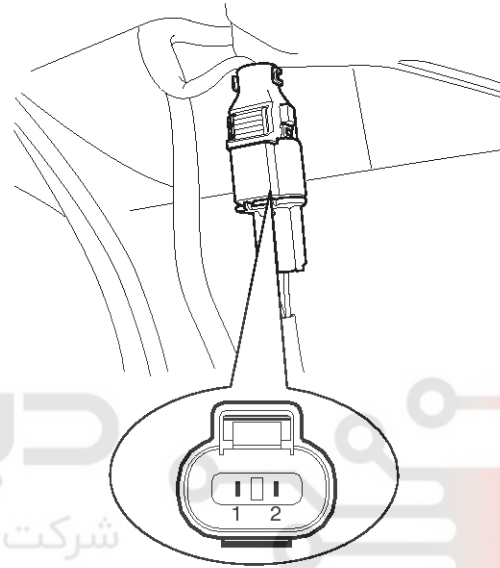


[Windshield washer motor]

SHDBE6346L

Washer Fluid Level Sensor Switch

1. Disconnect the negative(-) battery terminal.
2. Drain the washer fluid less than 700 cc.
3. Check for continuity between the No. 1 and No.2 terminal in each float position.
There should be continuity when the float is down.
There should be no continuity when the float is up.
4. If the continuity is not as specified, replace the washer fluid level switch



SEDBE7352L

Terminal	1	2
Position		
Over 700cc		
Under 700cc	○	○

(Tolerance : -50cc ~ +100cc)

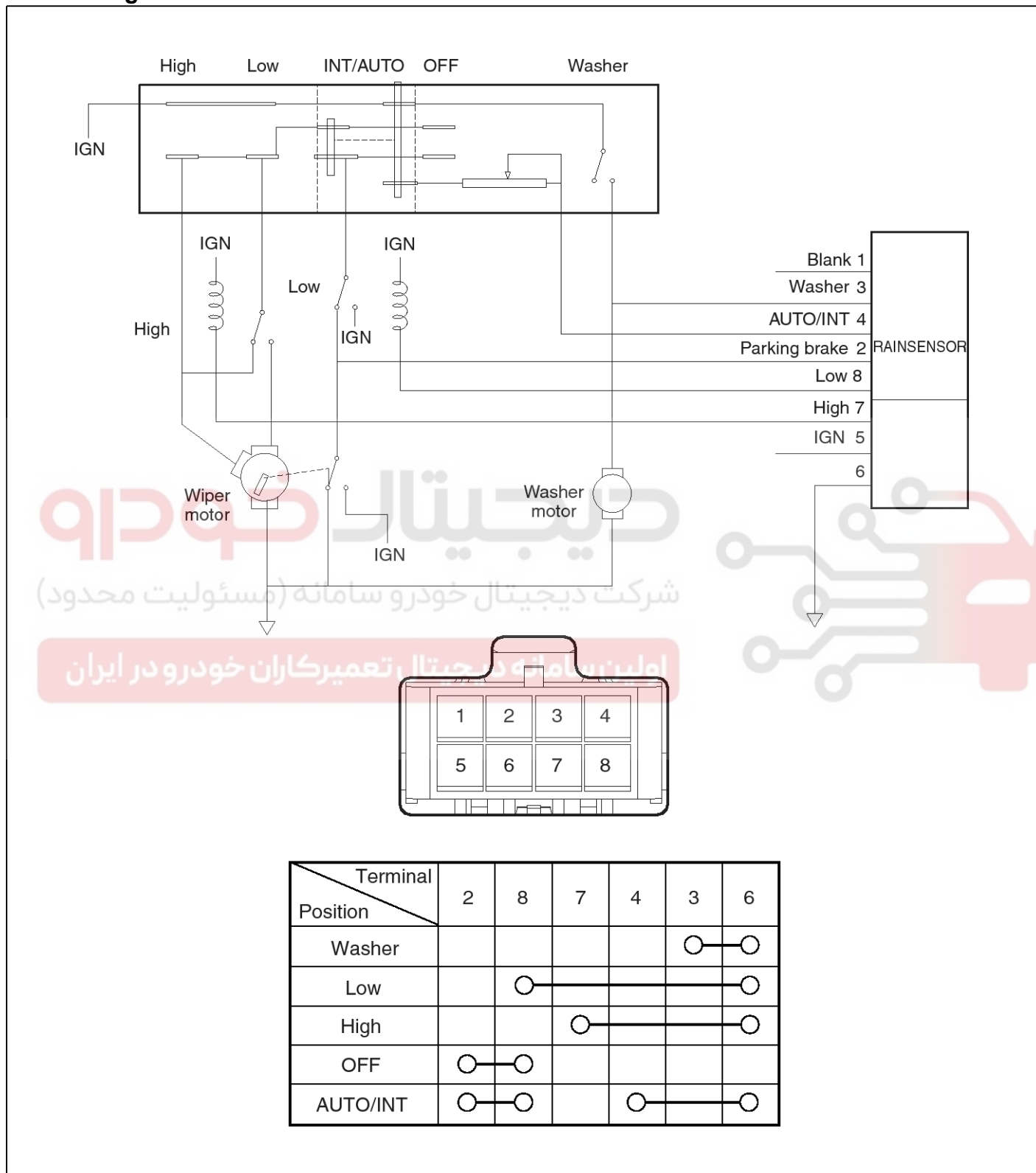
SEDBE7353L

Windshield Wiper/Washer

BE-207

Rain Sensor

Circuit Diagram



SEDBE7337L

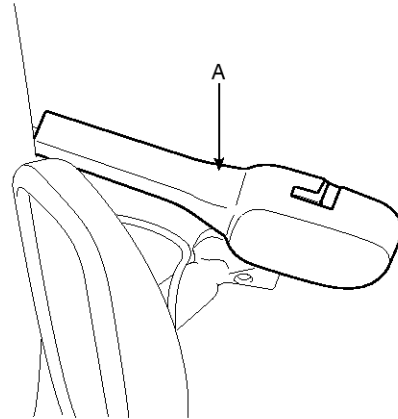
BE-208

Body Electrical System

Description

The Rain sensing windshield wiper system is a wiper system that, in addition to providing normal wiper functions off, mist, manual low speed, manual high speed, and wash, provides automatic control of automatic intermittent, automatic low, and automatic high speeds.

When the ignition key is in the ON position, the rain sensor (A) will be activated.



SEDBE7354L

Operating Modes - Rain Sensing Windshield Wiper System

Multi Function Switch Position	Rainsensor Operating Mode	Sensor Action
MIST	MIST	Mist is controlled by the column switch. The sensor has no effect on this function
OFF	OFF	If not already parked, wiper motor runs in low speed until blades are in the depressed park position.
AUTOMATIC Automatic mode has 5 SENSITIVITY settings.	AUTOMATIC	AUTOMATIC Automatic INT/speed control. The sensitivity to raindrop accumulation on the windshield is set by the MULTI FUNCTION SWITCH sensitivity adjustment.
LOW SPEED	MANUAL	Wiper motor runs continuously in low speed, for example 4 5 wipes/minute. The sensor has no effect on this function
HI SPEED	MANUAL	Wiper motor runs continuously in high speed, for example 60 wipes/minute. The sensor has no effect on this function
WASH - DEMAND WASHER SW \geq 0.6 SEC	WASH	If washer sw on after 0.6 sec then wipes during 2.5 to 3.8 sec. The rain sensor enables the wipers and controls the after wipes.
WASH - DEMAND WASHER SW $<$ 0.6 SEC	WASH	If washer sw on less than 0.2 to 0.6 sec then once wipes

Windshield Wiper/Washer

BE-209

Off Mode

With the wipe switch in the OFF position and the ignition switch in the ON positions, the Rain sensor is considered to be in "OFF" mode. In this mode, the sensor commands the wiper to be off.

The Rain sensor monitors the state of the windshield during OFF mode so that knowledge of the state of the windshield is present when the MULTI FUNCTION SWITCH is moved to any SENSITIVITY setting. This optimizes the performance of the sensor when moving from the OFF condition to an AUTOMATIC mode. The algorithm assumes the nominal sensitivity setting when in the OFF mode.

Automatic Mode

When the MULTI FUNCTION SWITCH is moved to AUTO position and the ignition switch is in the RUN or ACCESSORY positions, the Rain sensor is considered to be in "AUTOMATIC" mode. Once a single "Instant wipe" has occurred, the wipers remain at "Inner wiper/park" until the Rain sensor determines that the dwell time at that position is appropriate for the amount of precipitation on the windshield, considering the driver input from the switch SENSITIVITY setting. After the dwell time the Rain sensor provides input to the wiper motor to activate the wipers to clear the precipitation from the windshield.

Automatic INT

For all AUTOMATIC INT operations the Rain sensor commands the wipers to operate in LOW SPEED for one wipe, followed by a variable dwell period in the inner wipe position.

Automatic Low

AUTOMATIC LOW SPEED operation is utilized when the amount of precipitation impinge on the windshield exceeds the AUTOMATIC INT TO AUTOMATIC LOW threshold. This threshold includes sufficient hysteresis to prevent cycling between AUTOMATIC INT and AUTOMATIC LOW SPEED operation with a steady amount of precipitation accumulation on the windshield.

Automatic High

AUTOMATIC HIGH SPEED operation is utilized when the amount of precipitation impinge on the windshield exceeds the AUTOMATIC LOW to AUTOMATIC HIGH threshold. This threshold includes sufficient hysteresis to prevent cycling between AUTOMATIC LOW to AUTOMATIC HIGH operation with a steady amount of precipitation accumulation on the windshield.

Wash Mode

The Rain sensor monitors the MULTI FUNCTION SWITCH to determine if the wash function is selected. Rain sensor enables the wiper motor to run in low speed during the wash mode and performs follow up wipes during 2.5 to 3.8 sec.

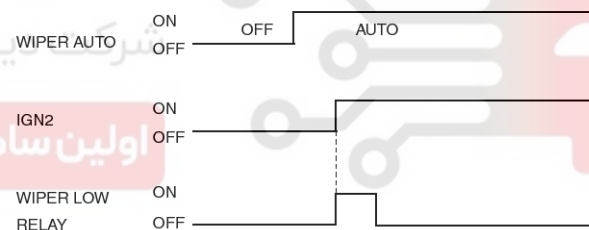
Manual Mode

The Rain sensor determines when a manual mode such as manual low, Mist, Off or manual high is selected. The column switch performs these modes and the rain sensor has no affect.

Inspection

Rain Sensing Wiper

1. In IGN2 ON state, if auto switch input (LIN communication) is ON then both wiper low relay and wiper high relay outputs are controlled by the rain sensor input signal.
2. If the wiper switch has been left in automatic mode with the vehicle ignition OFF, and then the vehicle ignition switch is turned on, a single wipe will be performed.

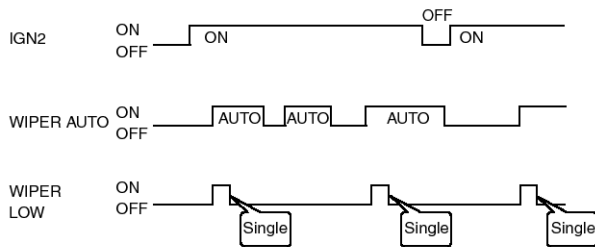


ETBF145E

3. A single wipe will be performed whenever rain has been detected (Rain Detected signal from Rain sensor) and the wiper switch is moved to the AUTO position. But a single wipe will not be performed when the wiper switch is moved to the AUTO position and OFF signal is being received from Rain sensor. But if the wiper switch is moved to AUTO position for the first time since vehicle ignition switch is turned on then a single wipe will be performed regardless of Rain Detected or OFF signal.

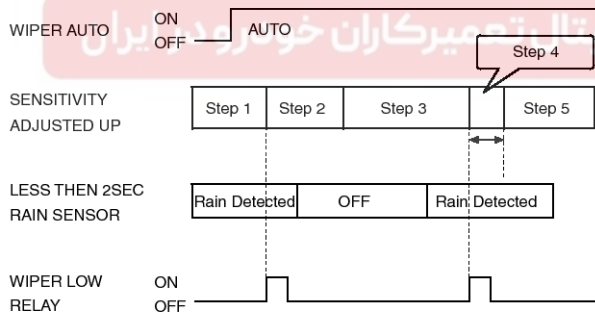
BE-210

Body Electrical System



ETBF145F

4. The driver may adjust the rain sensor performance by adjusting the sensitivity input. When in automatic mode, the BCM will perform a single wipe each time the sensitivity is adjusted upward to a more sensitive setting (downward more than one step). This single wipe will only be performed if Rain Detected signal is being received from the Rain sensor. If the sensitivity adjustment is adjusted upward more than one sensitivity, the BCM will only perform a single wipe unless the time between Increases is more than 2 seconds.



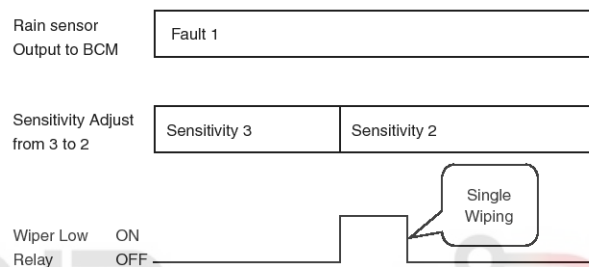
ETBF145G

5. Fault strategy for the rain sensor

Rain Sensor Fault 1 - Internal Fault Detected

This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 1. The confirmation delay for the failure is of 1 sec.

When this failure is detected, the wiper outputs are OFF and the wiper will also do a wipe in slow speed on the transition from sensitivity 3 to sensitivity 2 (Step 2 to 3) in order to signal the presence of this fault. If another sensitivity is set, the wiper won't make any additional wipe.



ETBF145H

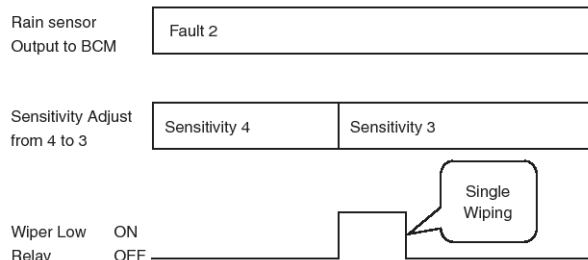
Rain Sensor Fault 2 - Glass Attachment Fault Detected

This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 2. The confirmation delay for the failure is of 1 s.

When this failure is detected, the wiper outputs are OFF and the wiper will also do a wipe on the transition from sensitivity 4 to sensitivity 3 (Step 1 to 2) in order to signal the presence of this fault. If another sensitivity is set, the wiper won't make any additional wipe.

Windshield Wiper/Washer

BE-211



ETBF145I

Rain Sensor Fault 3 - No Input Signal Present

This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 3 or in case the duty cycle of the input faulty rain sensor is 0% or 100%. The confirmation delay for the failure is of 1 s.

When this failure is detected, the wiper outputs are OFF.

Removal

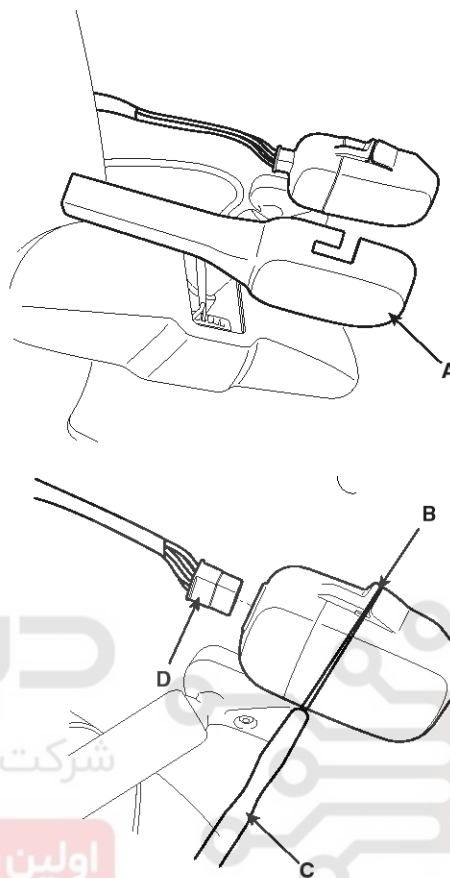
⚠ CAUTION

The dust or foreign substance on the rain sensor have 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 function.

The coupling pad on the rain sensor surface has adhesive strength, so the coupling pad could stick to the windshield by environment condition during the using time.

If separate it by force, it could be damaged. So make sure to separate the rain sensor from the windshield carefully.

1. Remove the rain sensor cover (A) first. Be careful not to damage the cover latch by applying excessive force. To remove the latch, pull aside the latch using the cover hole (B) with the little (-) screwdriver (C).



SEDBE7367L

2. Remove the wiring harness connector (D) from sensor.
3. Rain sensor module is attached to the front windshield by glue replacing the front windshield, remove the rain sensor module from the existing front windshield and install on the new front windshield.

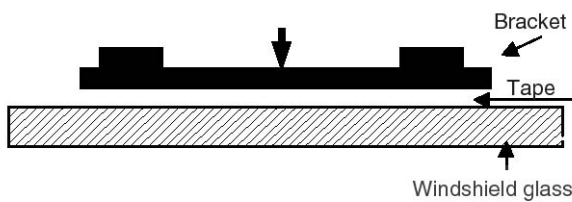
BE-212

Body Electrical System

Installation

NOTICE

- In case of the windshield with reflection layer which reflects the infrared rays in sensing field, should install the rain sensor into the field removed the reflection layer.
 - Install the rain sensor after some time and be care not to be settled the dust after installation.
1. Install the rain sensor bracket to the windshield glass using the tape.



دیجیتال خودرو

ETZE015I

CAUTION

It is very important that the coupling pad pushes the windshield completely to stick to each other without bubbles.

2. Connect the rain sensor connector, and then install the sensor cover.

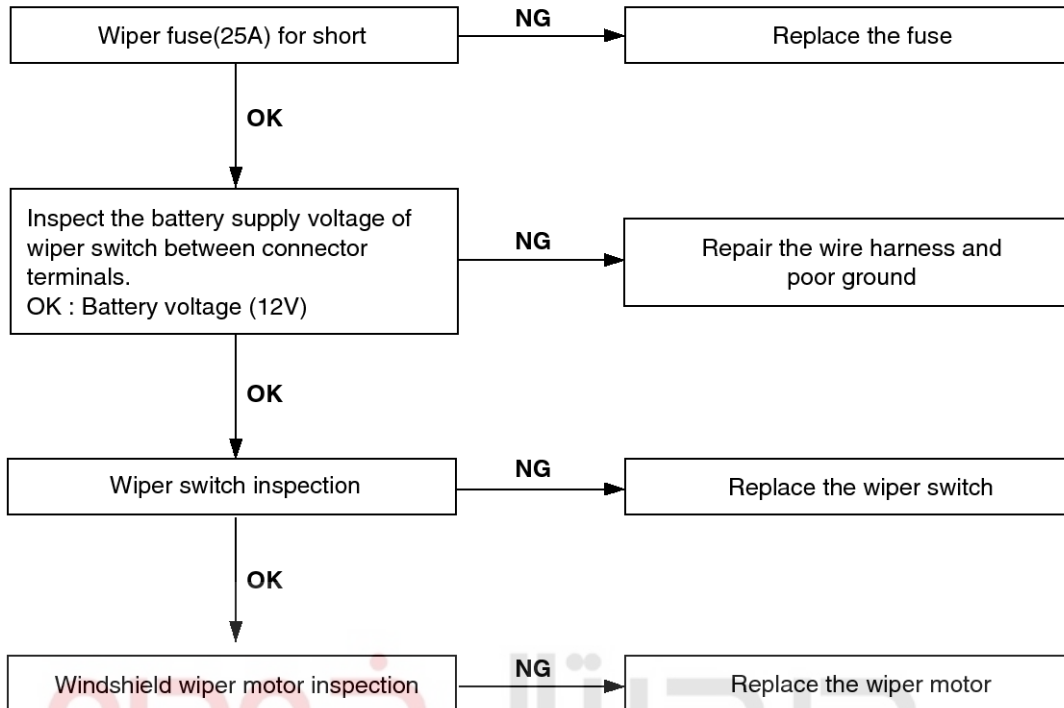


Windshield Wiper/Washer

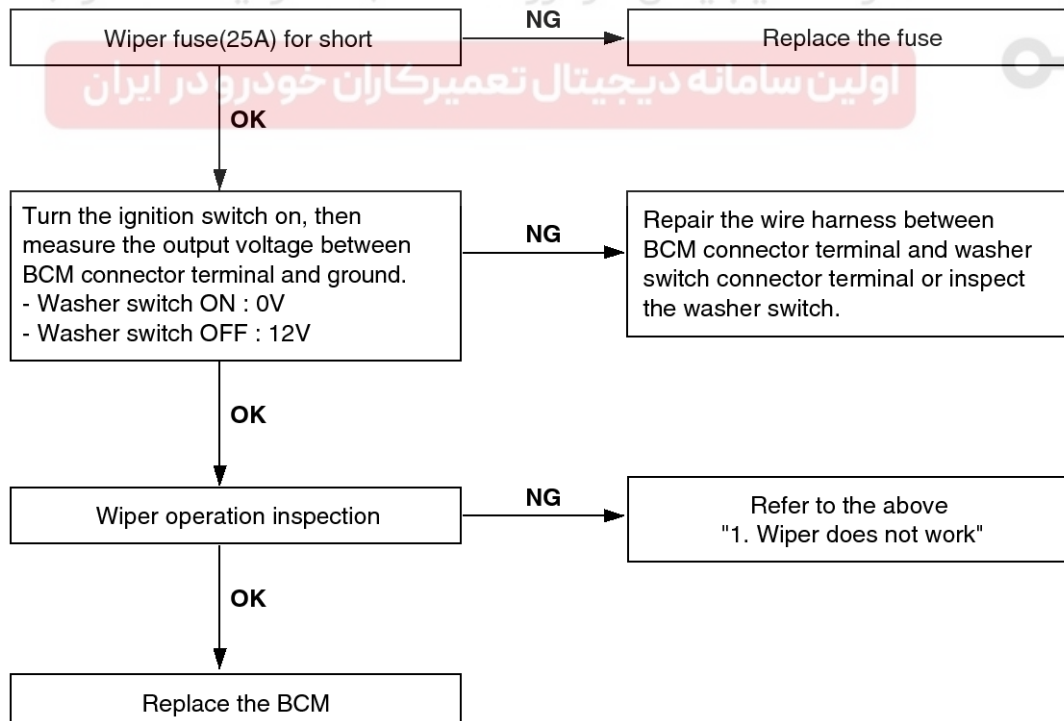
BE-213

Troubleshooting

1. Wiper low and wiper high do not work.



2. When washer switch is on, wiper does not work.



SHDBE6333L

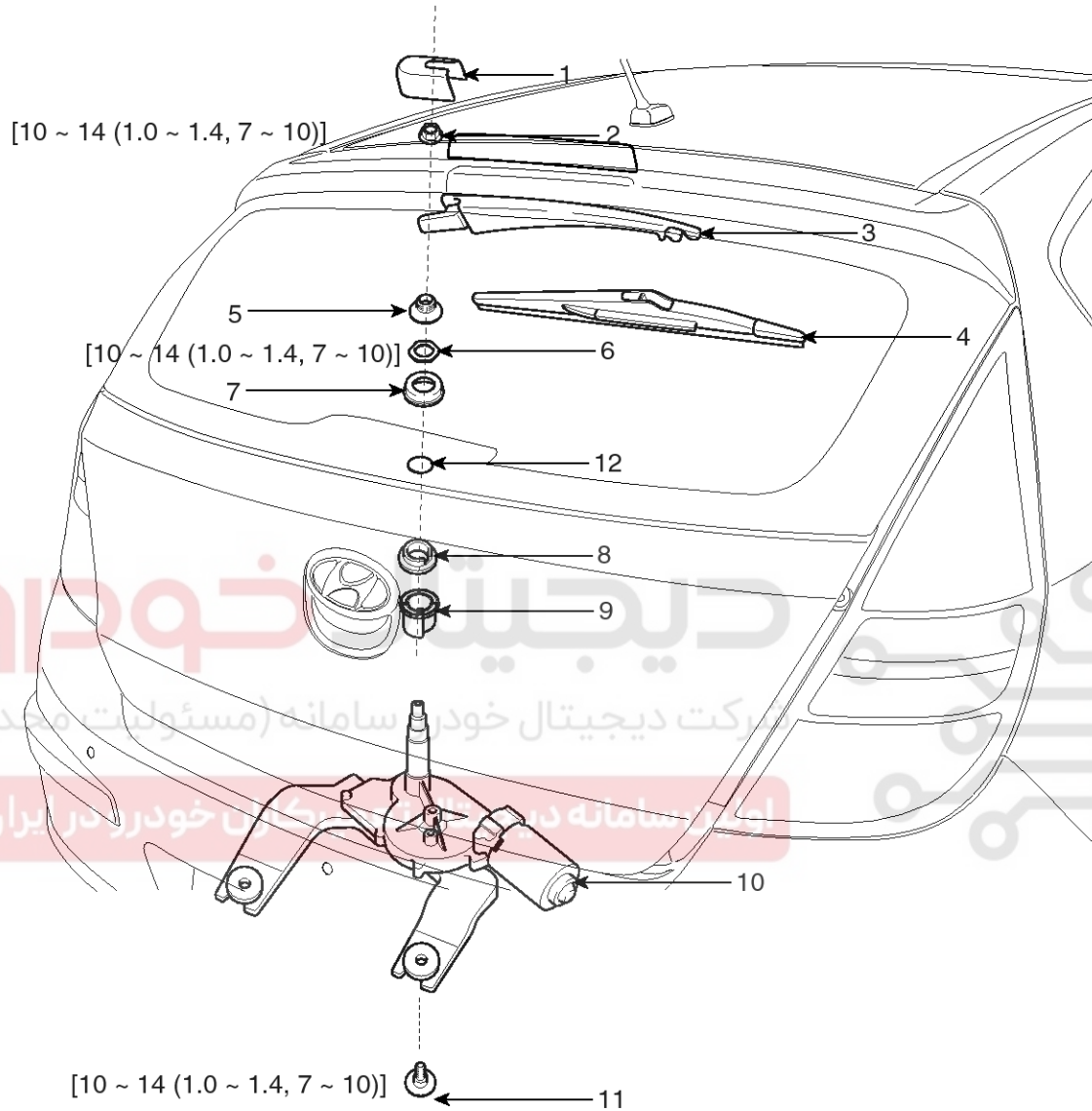
SHDBE6334L

BE-214

Body Electrical System

Rear Wiper/Washer

Component Location



TORQUE : N.m (kg.cm, lb.ft)

- | | |
|---------------------|-------------------------------|
| 1. Head cap | 7. Rear wiper cap & Pad |
| 2. Nut | 8. Pad |
| 3. Rear wiper arm | 9. Support |
| 4. Rear wiper blade | 10. Rear wiper motor assembly |
| 5. Cover | 11. Bolt |
| 6. Nut | 12. Glass hole |

SFDBE8106L

Rear Wiper/Washer

BE-215

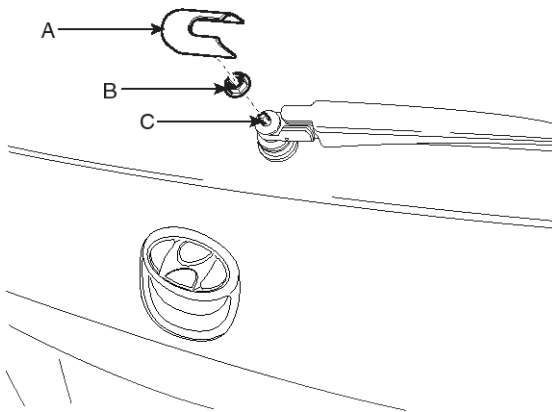
Rear Wiper Motor

Replacement

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

Tightening torque Nut (B) :

10~14 Nm (1.0~1.4 kgf.m, 7~10 lbf.ft)

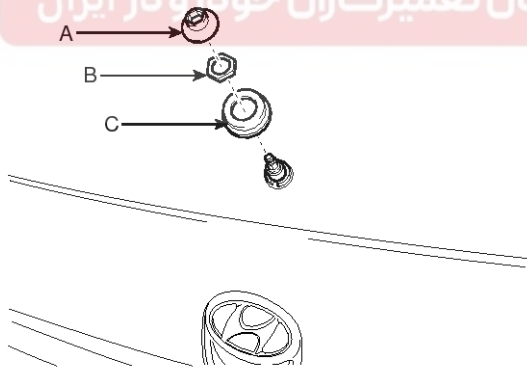


SFD8E8107L

2. Remove the rear wiper cap & pad (C) after removing a nut (B) and cover (A).

Tightening torque Nut (A) :

10~14 Nm (1.0~1.4 kgf.m, 7~10 lbf.ft)



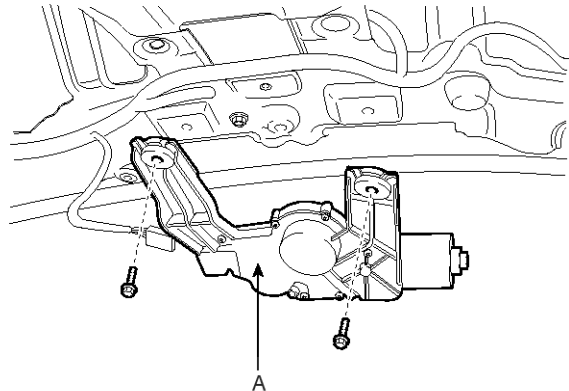
SFD8E8108L

3. Open the tailgate then remove the tailgate trim.

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

Tightening torque Nut :

10~14 Nm (1.0~1.4 kgf.m, 7~10 lbf.ft)



SEDBE7363L

5. Installation is the reverse of removal.

NOTICE

Before installation, be sure that the rear wiper motor is in the park position.

Turn the wiper switch ON and OFF to allow the rear wiper motor to cycle and stop in the park position.

BE-216

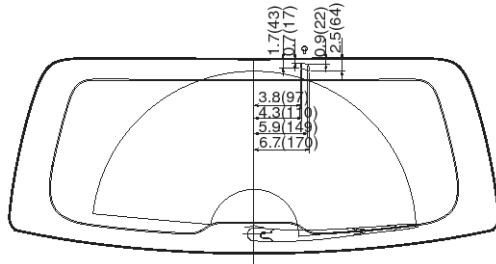
Body Electrical System

Inspection

Rear Wiper And Nozzle Setting

1. Set the rear washer nozzle on the specified spray position.

[5DOOR]



Unit : in(mm)

SFDBE8109L

[WAGON]



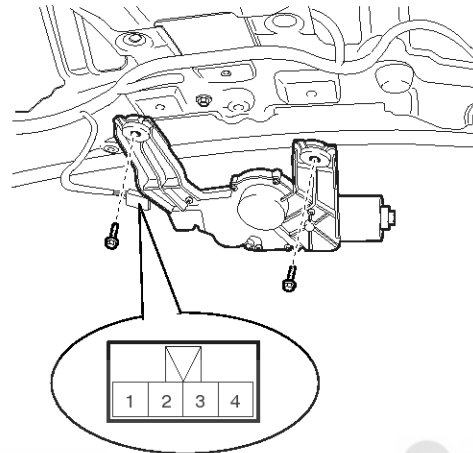
Unit : in(mm)

SFDBE8110L

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

Rear Wiper Motor

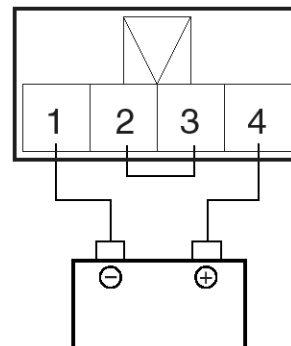
1. Remove the 4P connector from the rear wiper motor.
2. Connect battery positive (+) and negative (-) cables to terminals 4 and 1 respectively.
3. Check that the motor operates normally. Replace the motor if it operates abnormally.
(1. GND, 2. Switch, 3. Parking, 4. B+)



SEDBE7365L

Automatic Stop Operation Check

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



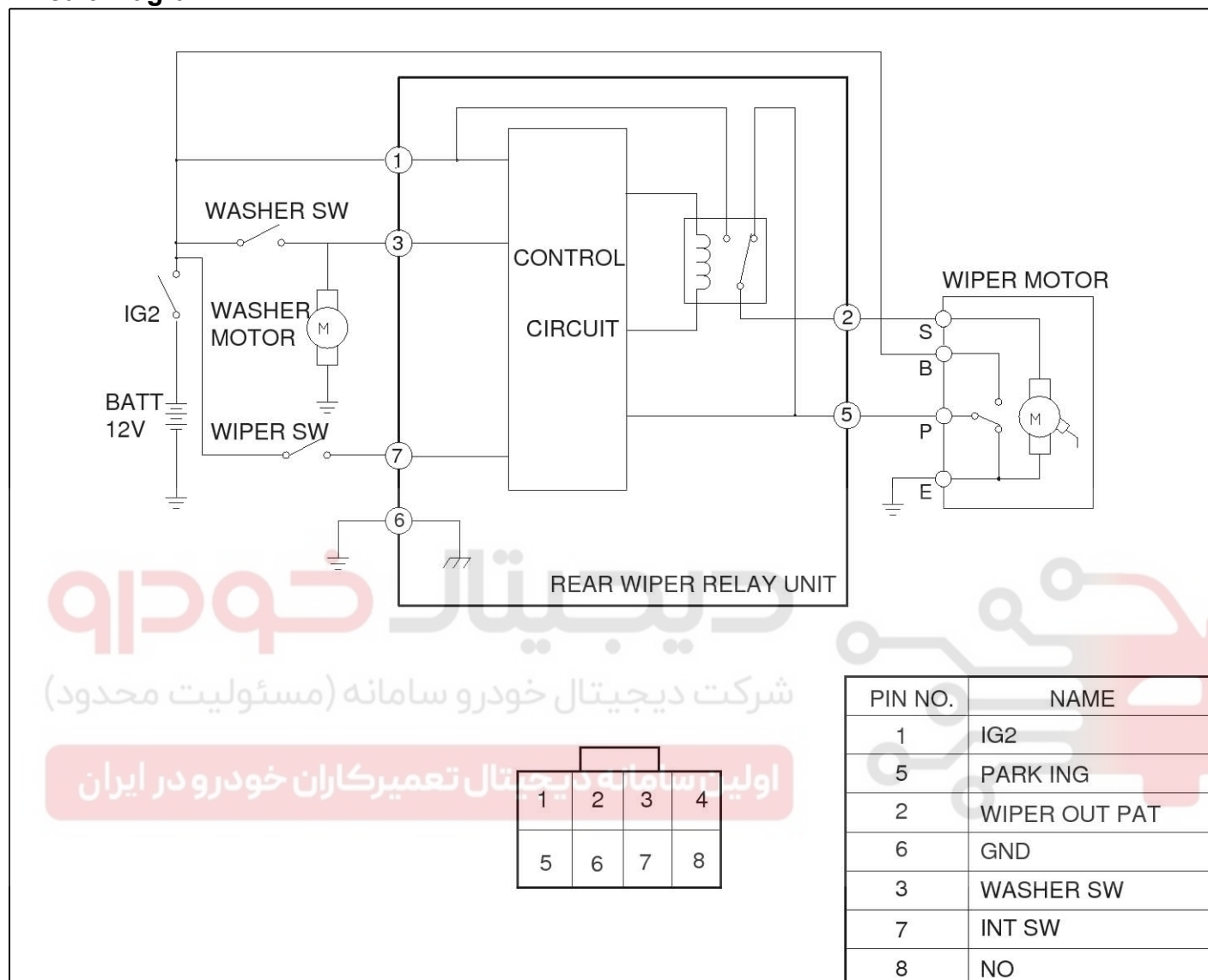
SEDBE7366L

Rear Wiper/Washer

BE-217

Rear Wiper Relay

Circuit Diagram



SFDBE8301L

BE-218

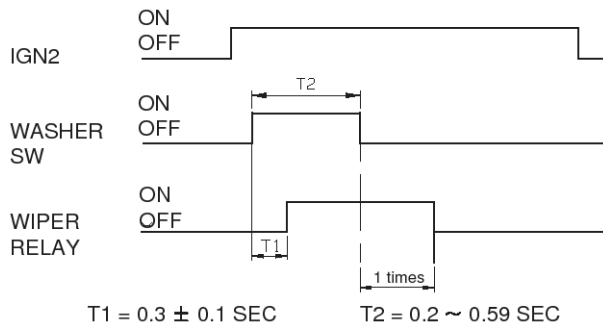
Body Electrical System

Inspection

1. Washer interlocking must conform to the mode shown in figure.

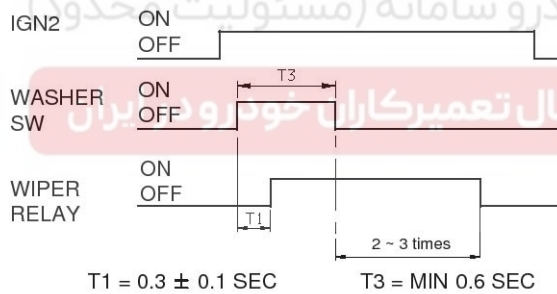
This function shall be operated preferentially if wiper is operating.

[Washer SW input more than 0.6 sec.]



SFDBE8302L

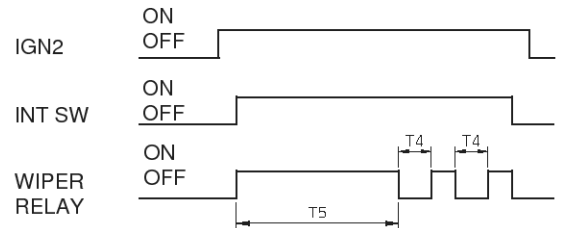
[Washer SW input less than 0.6 sec.]



SFDBE8303L

2. Wiper operation must conform to the mode shown in figure.

[INT Mode]

 $T_4 = 6.0 \pm 0.6 \text{ SEC}$ $T_5 = \text{WIPER 3 times}$

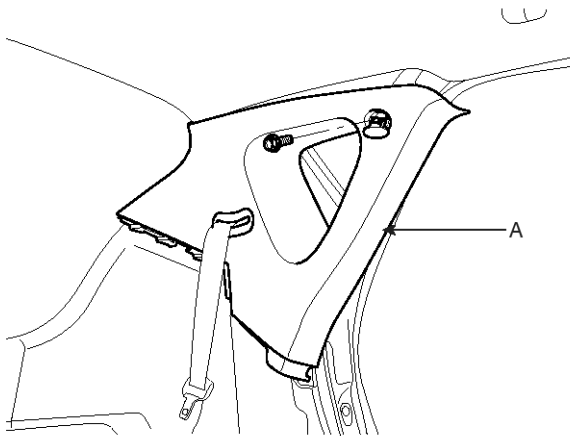
SFDBE8304L

Rear Wiper/Washer

BE-219

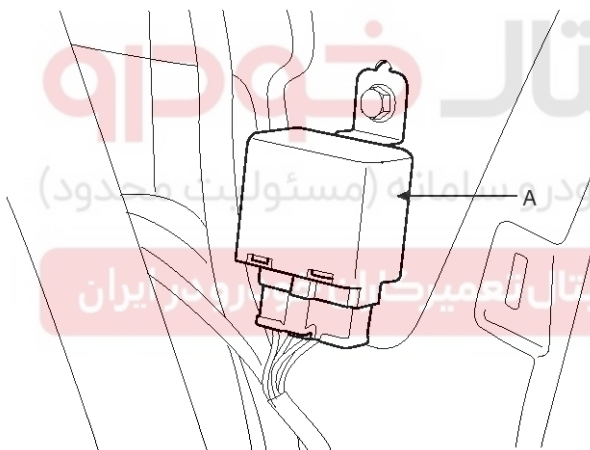
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the rear left pillar lower trim (A).



SFDBE8305L

3. Remove the rear wiper relay (A) after loosening a bolt and disconnecting the rear wiper relay connector.



SFDBE8309L

Installation

1. Install the rear wiper relay.
2. Install the rear left pillar lower trim.

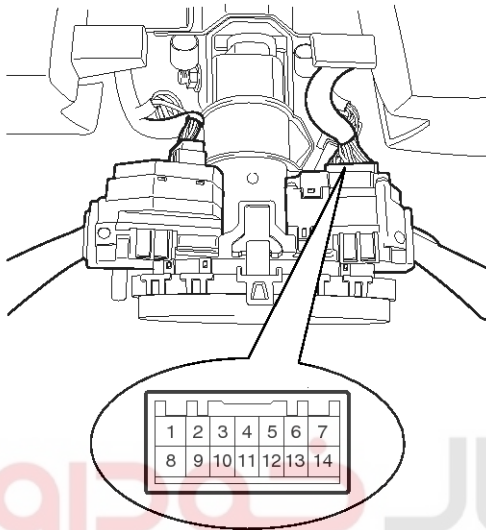
BE-220

Body Electrical System

Rear Washer Switch

Inspection

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



SEDBE7050L

Rear Wiper & Washer Switch

() : RHD

Terminal Position	4(5)	3(4)	1(2)
WIPER	○	—	○
OFF			
ON	○	○	
WASHER	○	—	○

SFD8E8111L

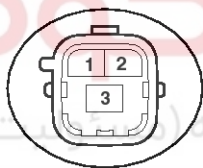
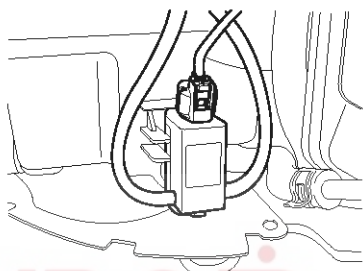
Rear Wiper/Washer

BE-221

Rear Washer Motor

Inspection

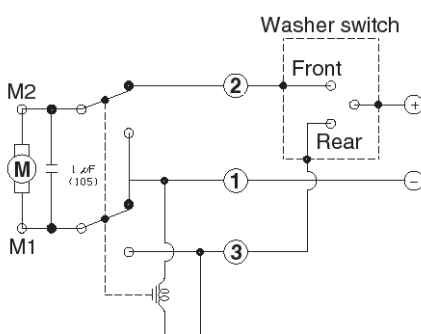
1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.
2. Remove the front bumper cover.
(Refer to the BD group- "Front bumper")
3. Connect positive (+) and negative (-) battery cables to terminals 3 and 1 respectively to see that the washer motor runs and water is pumped.
4. Check that the motor operates normally.
Replace the motor if it operates abnormally.



[Front & Rear washer]

1. Windshield washer (+)
2. Ground
3. Rear washer (+)

SCMBE6368L



<Windshield & Rear washer motor>

SCMBE6369L

BE-222

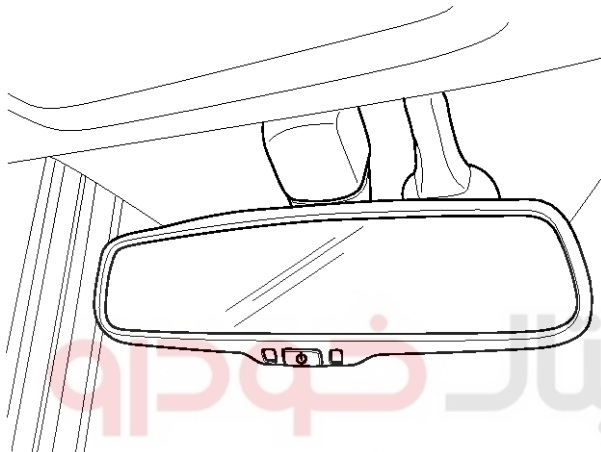
Body Electrical System

Electro chromic Inside Rear View Mirror

Description

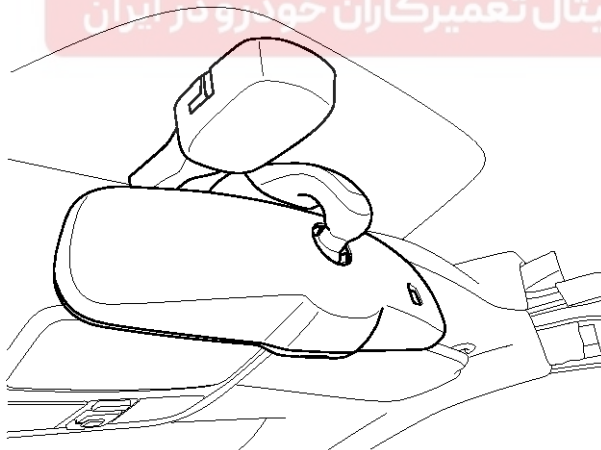
The ECM (Electro Chromic inside rear view Mirror) is for dimming the reflecting light from a vehicle behind at night, in order the user not to be dazzled by the light. The front looking sensor detects brightness of the surroundings, while the rearward looking sensor the strength of the reflecting light so that adjusts the reflexivity of the mirror in the range of 10~70%. But, when the reverse gear is engaged, it stops functioning.

[Front]



SFD8112L

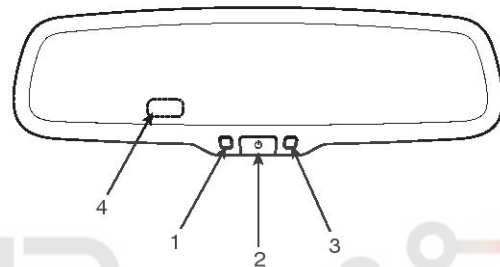
[Rear]



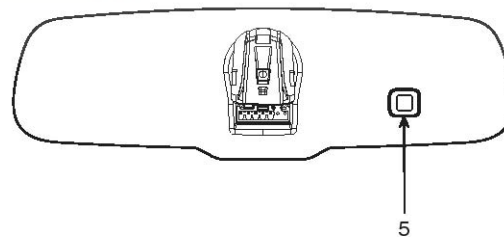
SFD8113L

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

(1. Status indicator LED, 2. Button, 3. Rear indicator, 4. Front light sensor, 5. Front light sensor)



SEDBE7371L



SEDBE7374L

Electro chromic Inside Rear View Mirror

BE-223

Automatic-dimming Function

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

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

NOTICE

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

Inspection

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

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

NOTICE

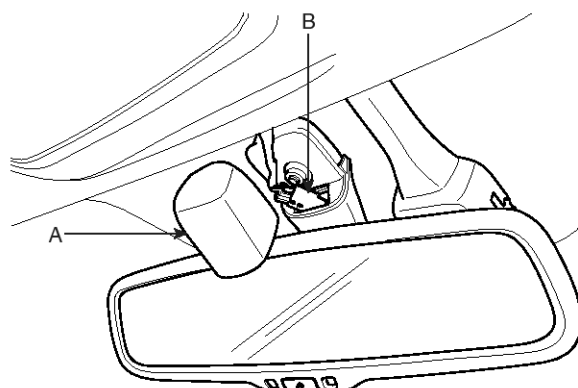
If this test is performed in daytime, the ECM may be darkened as soon as the forward looking sensor is covered.

5. When the reverse gear is engaged, the ECM should not be darkened.

When heading lights to both the forward looking and rearward looking sensors, the ECM should not be darkened.

Removal

1. Remove the mirror wire cover (A).



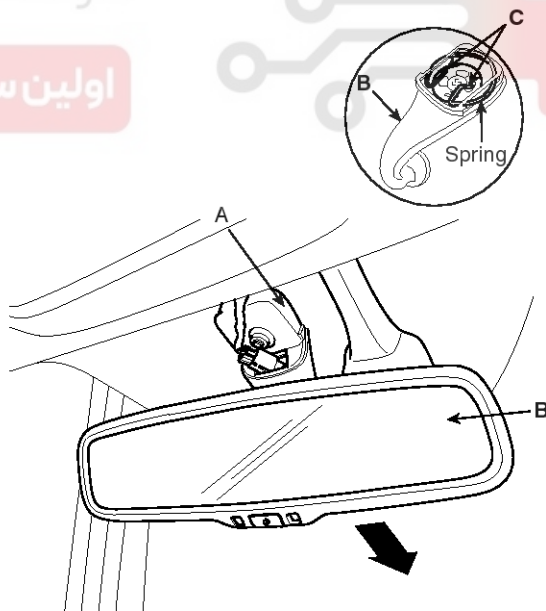
SFD BE8158L

2. Disconnect the inside rear view mirror connector (B).
3. Remove the inside rear view mirror pulling it upside carefully.

NOTICE

Mirror it adheres closely in the mirror base (A) and it separates while removing the mirror (B).

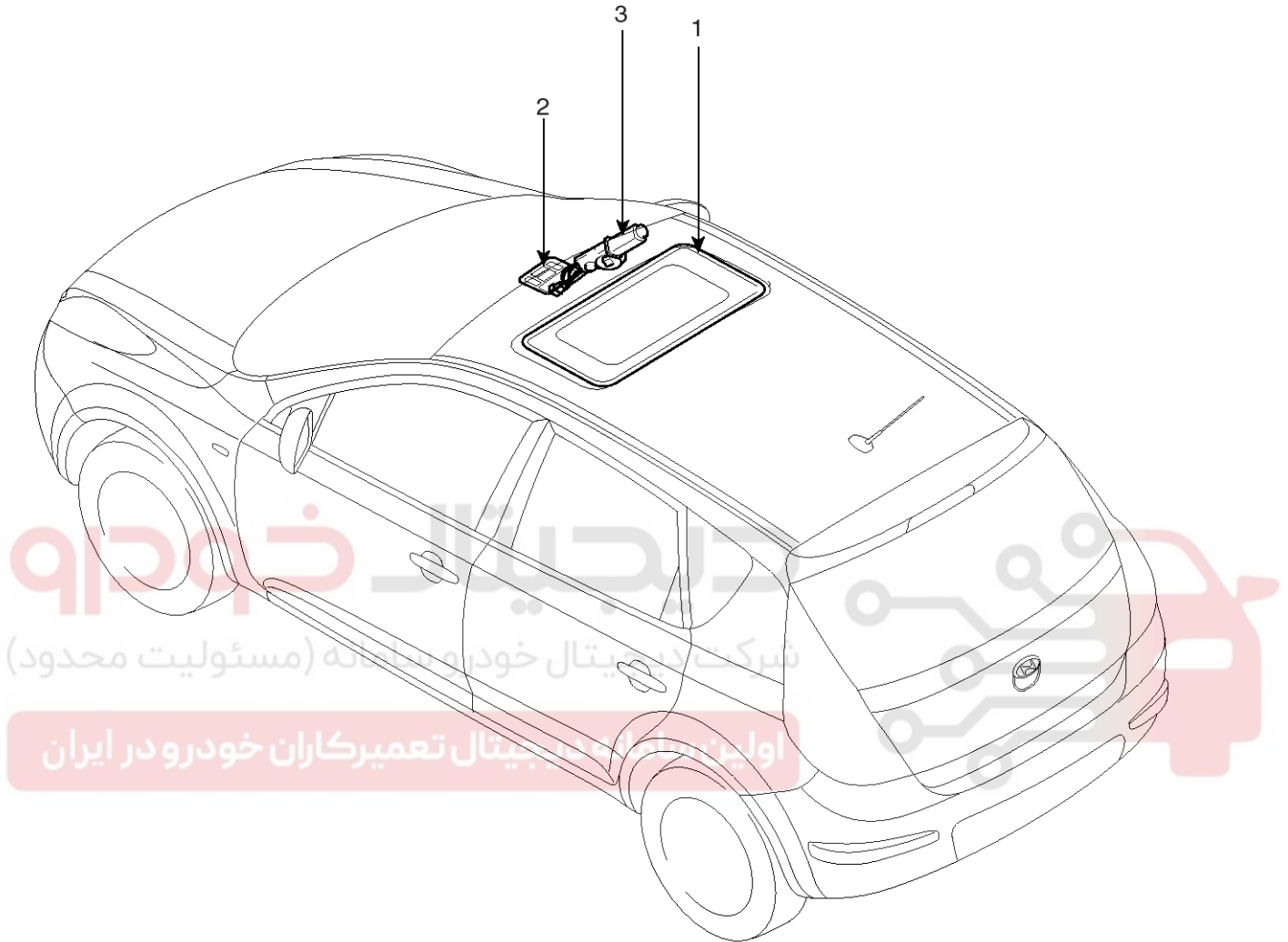
Make sure the spring mounting bracket (C) of the mirror not to be damaged.



SFD BE8115L

Installation

1. Install the inside rear view mirror.
2. Connect the inside rear view mirror connector.
3. Install the mirror wire cover.

BE-224**Body Electrical System****Sun Roof****Component Location**

- 1. Sunroof
- 2. Sunroof switch

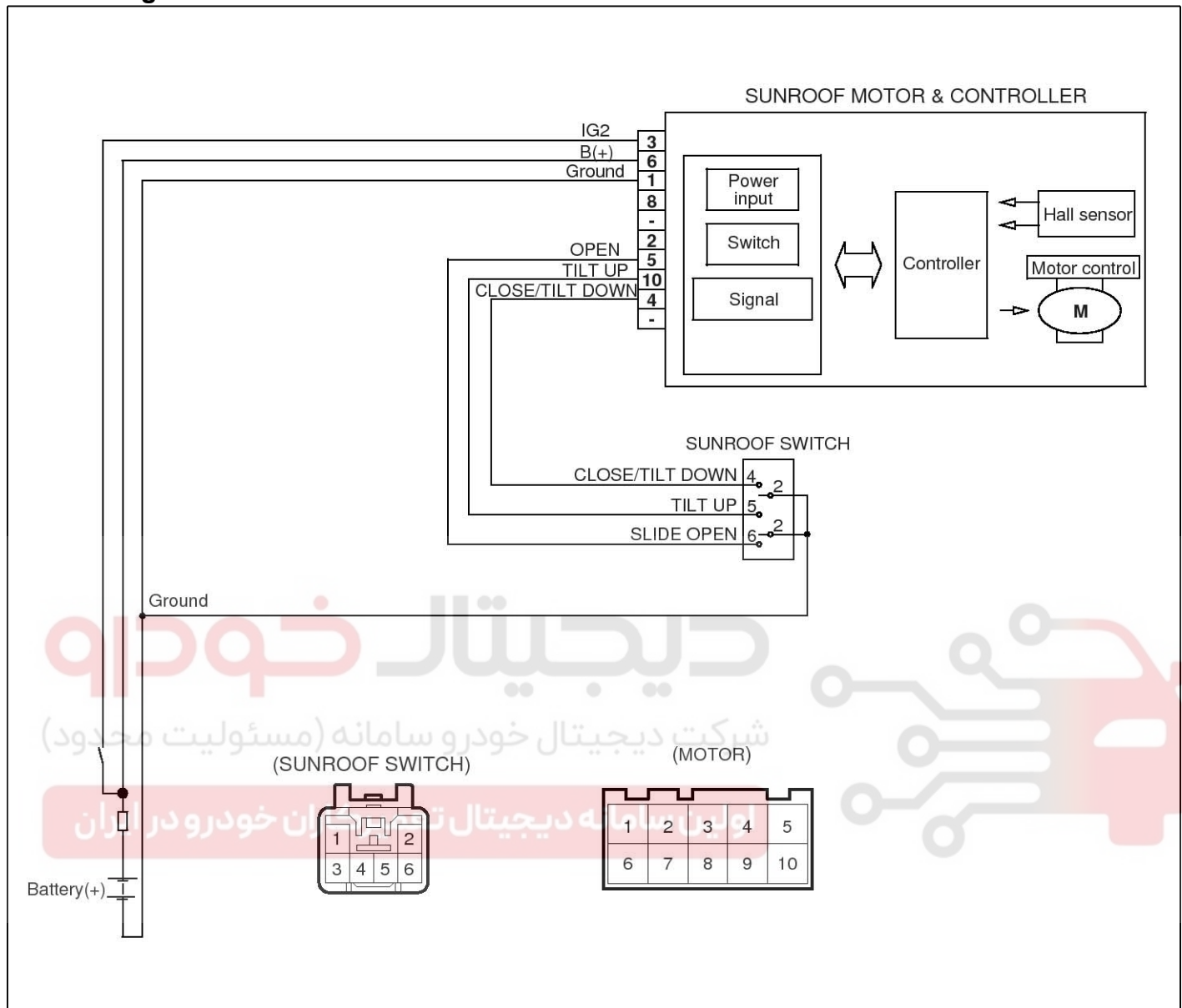
- 3. Sunroof motor & controller

SFDBE8306L

Sun Roof

BE-225

Circuit Diagram



SFDBE8121L

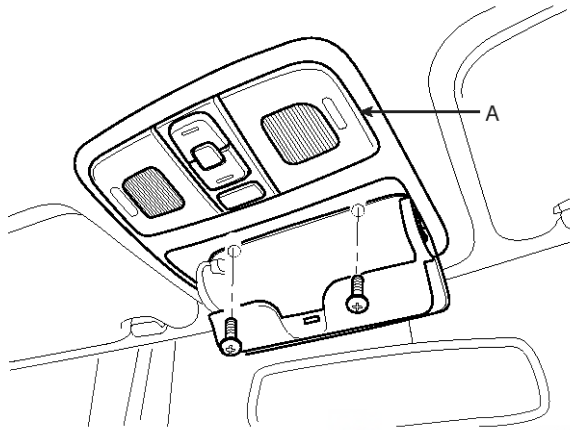
BE-226

Body Electrical System

Sunroof Switch

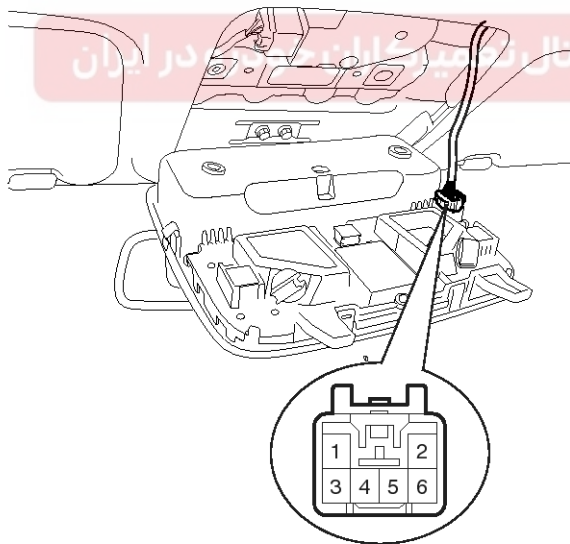
Inspection

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



SFDBE8122L

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



[Switch side connector]

SFDBE8123L

Terminal Position	2	6	4	5
TILT UP	○	—	—	○
CLOSE/ TILT DOWN	○	—	○	
SLIDE OPEN	○	○		

SFDBE8124L

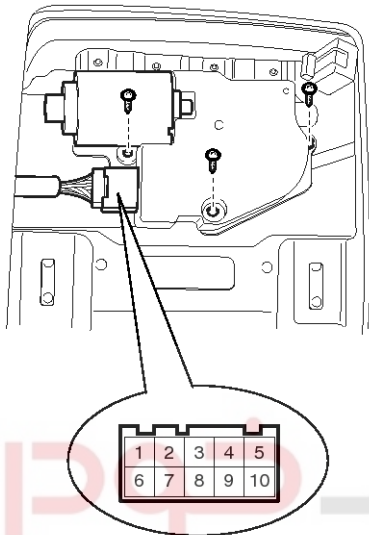
Sun Roof

BE-227

Sunroof Motor

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console then remove the sun roof motor mounting screws (3EA). And then remove the sunroof motor after disconnecting the connector (10 Pin).



SEDBE7425L

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

Terminal	3	4	5	10
Position				
TILT UP	⊕			⊖
SLIDE CLOSE/DOWN	⊕	⊖		
SLIDE OPEN	⊕		⊖	

ETQF965A

4. Make these input tests at the connector
if any test indicates a problem, find and correct the cause, then recheck the system.

If all the input tests prove OK, the sunroof motor must be faulty; replace it.

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

Resetting The Sunroof

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

1. Turn the ignition key to the ON position.
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 and hold the CLOSE button for more than 5 seconds after 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.

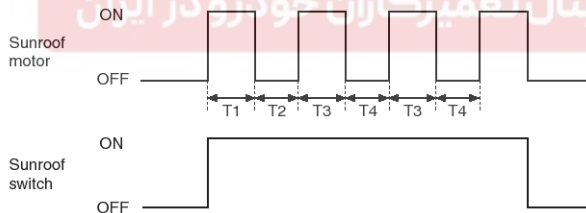
BE-228

Body Electrical System

Protecting Motor From Overheating

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

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



SHDBE6476L

T1 : $120 \pm 10 \text{ sec.}$, T2 : $18 \pm 2 \text{ sec.}$,

T3 : $10 \pm 2 \text{ sec.}$, T4 : $18 \pm 2 \text{ sec.}$

Lighting System

BE-229

Lighting System

Specification

Items	Bulb Wattage (W)
Head lamp (High)	55
Head lamp (Low)	55
Front turn signal lamp	21
Front fog lamp	27
Rear stop/tail lamp	21/5
Back up lamp	16
Rear turn signal lamp	21
Rear fog lamp - Europe	21
License plate lamp	5
Side repeater	5
Room lamp	10
Overhead console lamp	10
High mounted stop lamp	16
Glove box lamp	2.4 (LED)
Map lamp	10

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BE-230

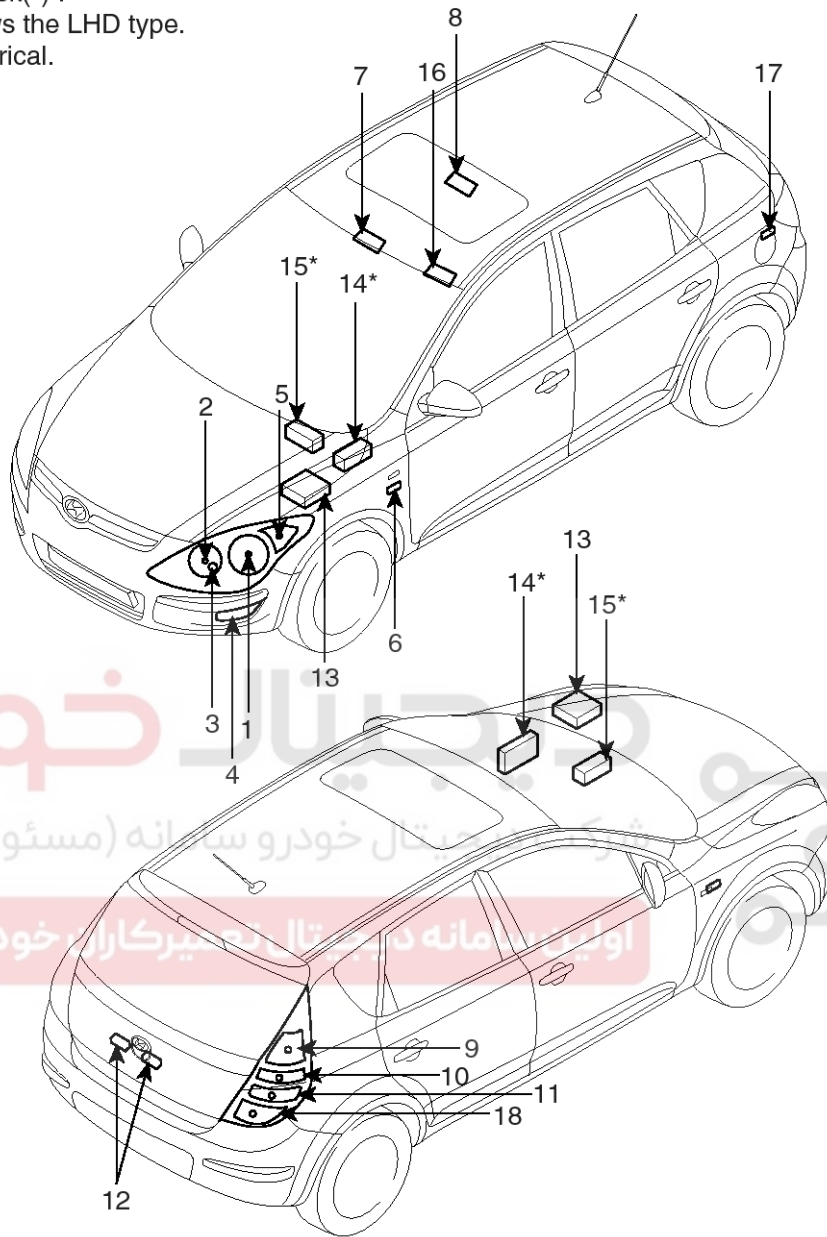
Body Electrical System

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



- | | |
|---------------------------|--|
| 1. Head lamp (Low) | 10. Rear turn signal lamp |
| 2. Head lamp (High) | 11. Back up lamp |
| 3. Position lamp | 12. License plate lamp |
| 4. Front fog lamp | 13. Engine room junction box |
| 5. Front turn signal lamp | (Head lamp Low/High, Fog lamp relay) |
| 6. Side repeater | 14. Passenger compartment junction box (Tail lamp relay) |
| 7. Over head lamp | 15. ICM relay box (Hazard relay) |
| 8. Room lamp(Center) | 16. Vanity lamp |
| 9. Tail/Stop lamp | 17. Luggage room lamp |
| | 18. Rear fog lamp (EUR)/Stop lamp(GEN) |

SFDBE8125L

Lighting System

BE-231

Head Lamps

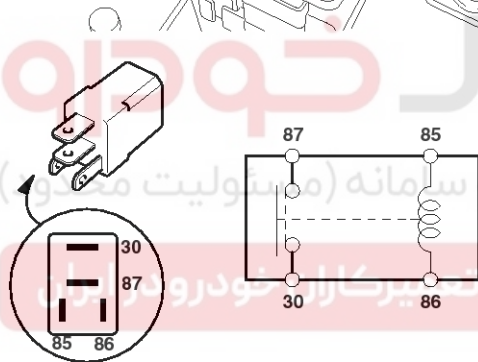
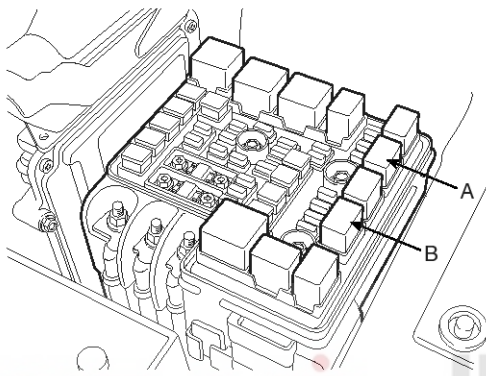
Inspection

Head Lamp Relay / Front Lamp Relay

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




A : Head lamp(Low) relay

B : Head lamp (High) relay



SEDBE7434L

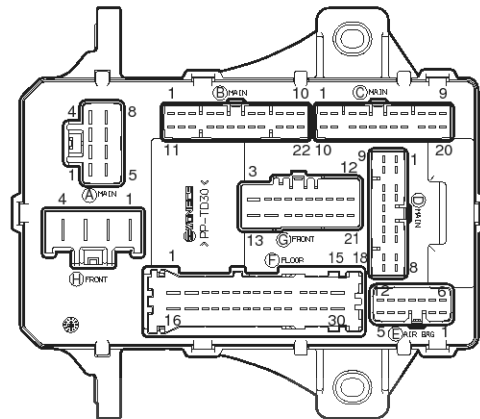
3. Check for continuity between terminals. There should be continuity between the No.87 and No.30 terminals when power and ground are connected to the No.86 and No.85 terminals.
4. There should be no continuity between the No.87 and No.30 terminals when power is disconnected.

Terminal \ Power	30	87	85	86
Disconnected				
Connected				

SCMBE6195L

Tail Lamp

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



SHDBE6292D

4. Check for continuity between the terminals.
- 1) There should be continuity between the No.2 terminal in the I/P-H and the No.15(LH) or 4(RH) terminal in the I/P-G when power and ground are connected to the No.2 terminal in the I/P-H and the No.6 terminal in the I/P-D.
 - 2) There should be no continuity between the No.2 terminal in the I/P-H and the No.15(LH) or 4(RH) terminal in the I/P-G when power and ground are connected to the No.2 terminal in the I/P-H and the No.6 terminal in the I/P-D.

BE-232

Body Electrical System

Adjustment

Head Lamp Aiming Instructions

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

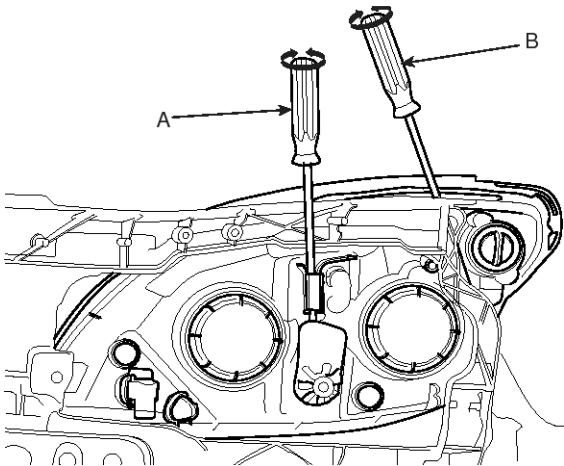
The head lamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer's instructions.

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

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

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

Condition	Aiming Direction	
	A	B
Turning Clockwise	UP	LEFT
Turning Counter clockwise	DOWN	RIGHT



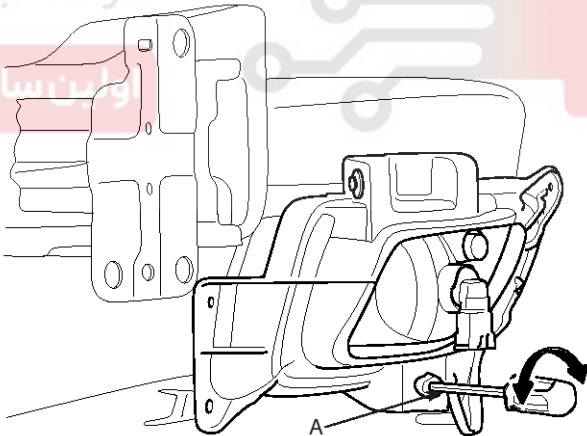
SFDBE8126L

Front Fog Lamp Aiming

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

With the front fog lamps and battery normal condition, aim the front fog lamps by turning the adjusting gear (A).

Condition	Aiming Direction
Turning Clockwise	DOWN
Turning Counter clockwise	UP

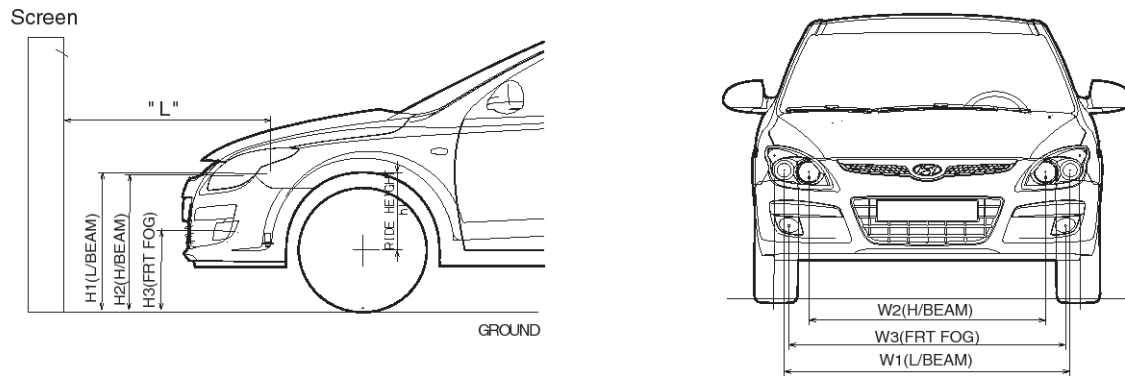


SFDBE8127L

Lighting System

BE-233

Head Lamp And Fog Lamp Aiming Point



H1 : Height between the head lamp bulb center and ground (Low beam)

H2 : Height between the head lamp bulb center and ground (High beam)

H3 : Height between the fog lamp bulb center and ground

W1 : Distance between the two head lamp bulbs centers (Low beam)

W2 : Distance between the two head lamp bulbs centers (High beam)

W3 : Distance between the two fog lamp bulbs centers

L : Distance between the head lamp bulb center and screen

h1 : Ride height

SFDBE8307L

Unit : in (mm)

Vehicle condition	H1	H2	H3	h1	W1	W2	W3	L
Without driver	25.9(658)	22.5(648)	14.6(370)	15.3(388)	56.7(1,440)	47.0(1,194)	54.9(1,395)	118(3,000)
With driver	25.6(651)	27.2(641)	14.3(363)	15.0(381)				

SFDBE8128L

BE-234

Body Electrical System

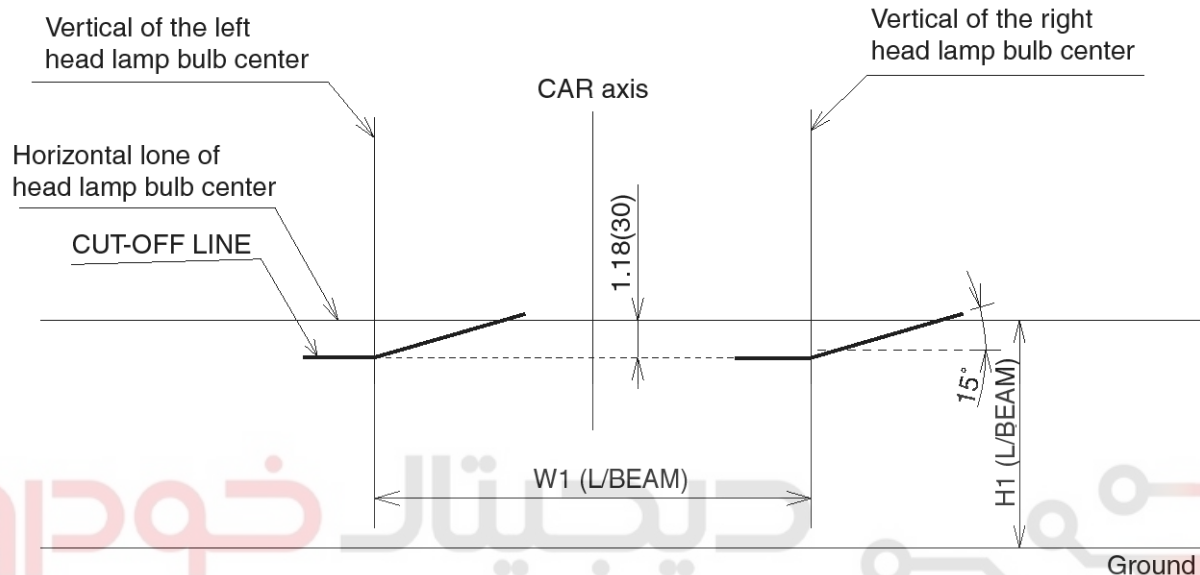
1. Turn the low beam on with driver.

The cut-off line should be projected in the allowable range shown in the picture.

In case of equipping with the manual leveling device, set the leveling device switch on the "O" position.

In case of equipping with the auto leveling device, set the initialization by using the diagnostic tool before aiming.

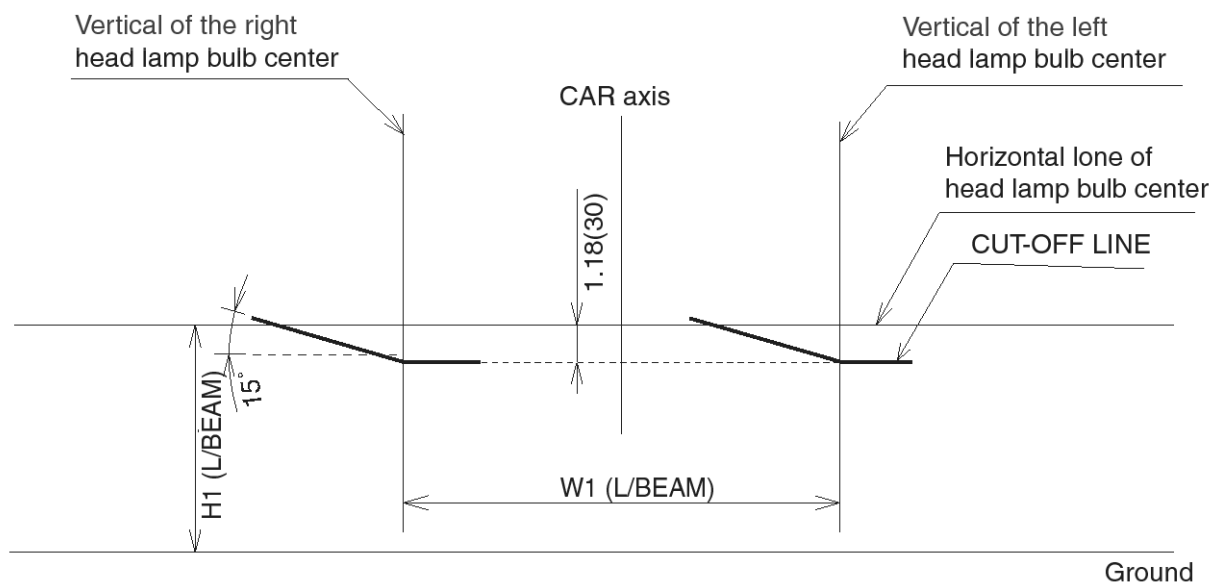
[LHD]



Unit : in.(mm)

SHDBE6445L

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران [RHD]



Unit : in.(mm)

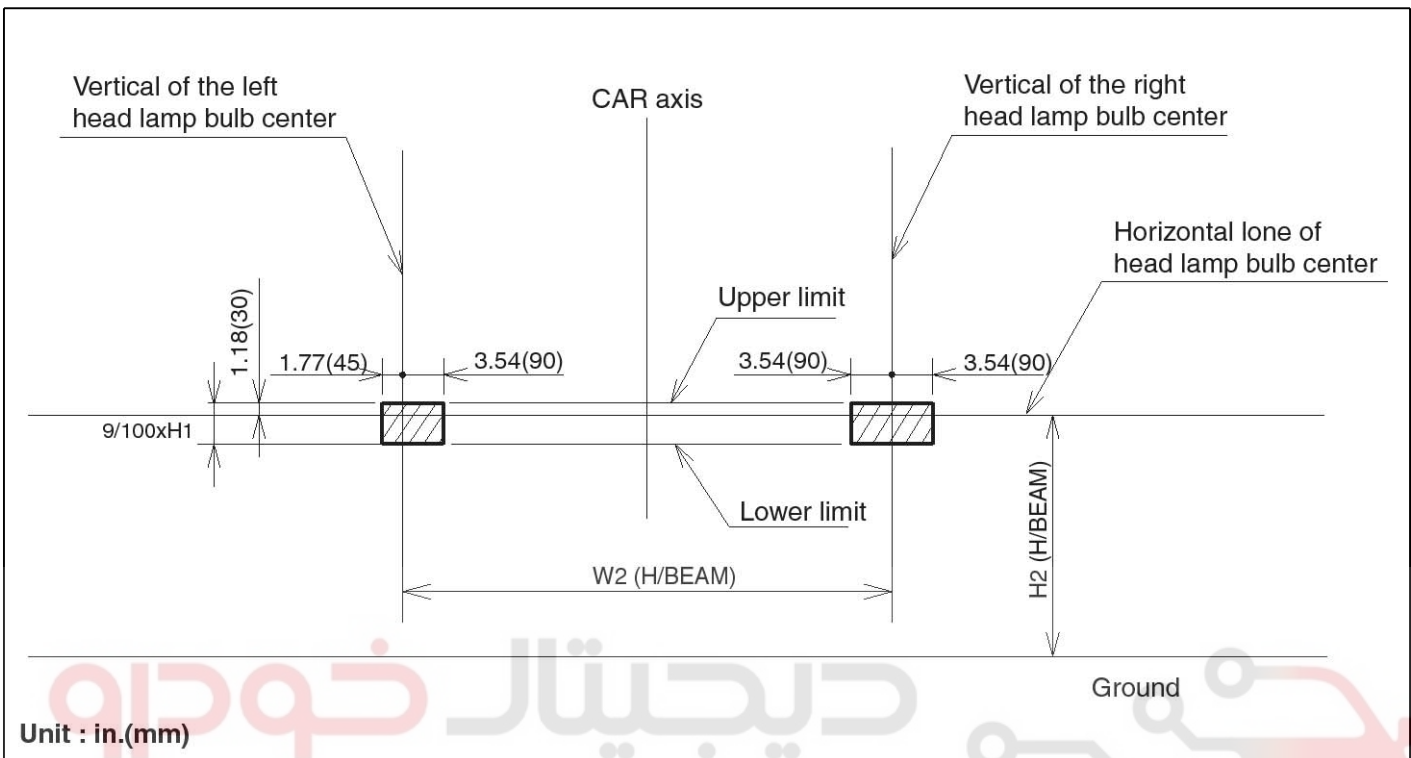
SHDBE6459R

Lighting System

BE-235

2. Turn the high beam on with driver.

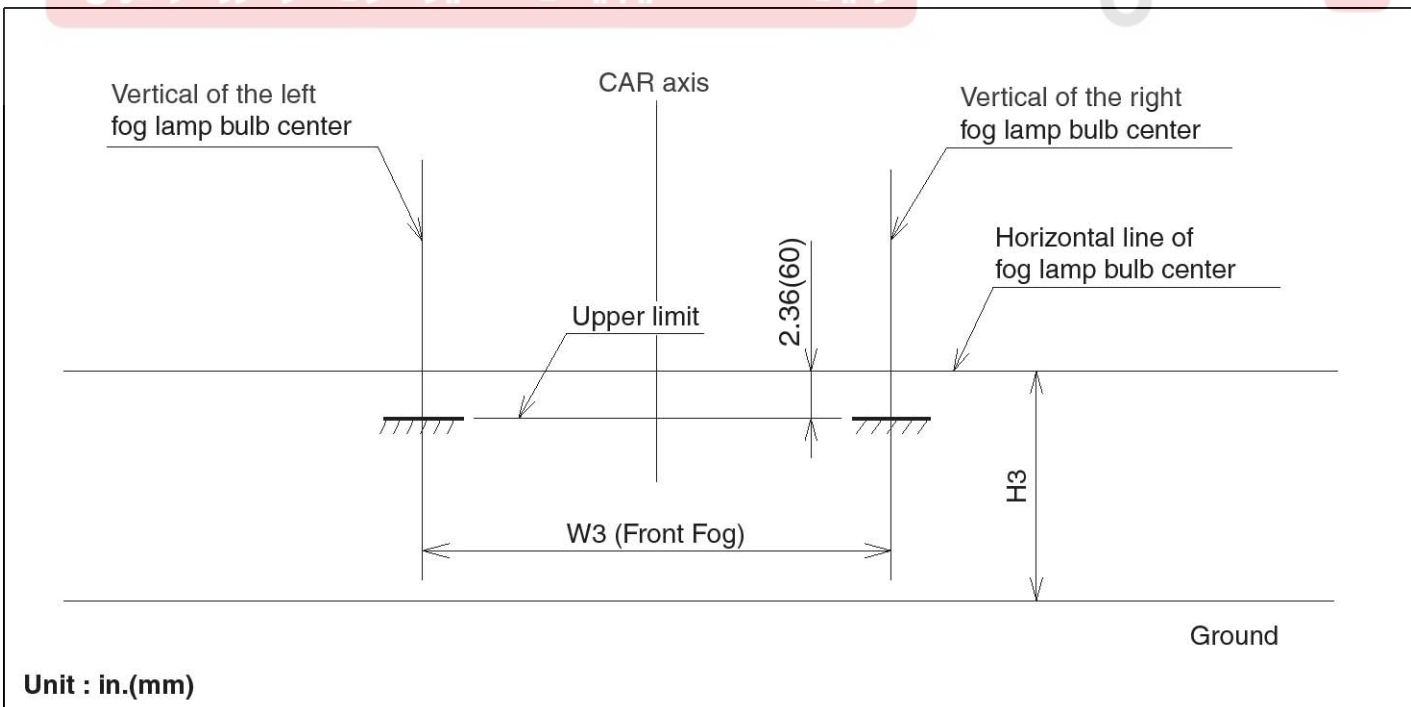
The hot point should be projected in the allowable range shown in the picture.



SHDBE6446L

3. Turn the front fog lamp on with driver.

The cut-off line should be projected in the allowable range shown in the picture.



SFD BE8131L

BE-236

Body Electrical System

Removal

⚠ CAUTION

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

📖 NOTICE

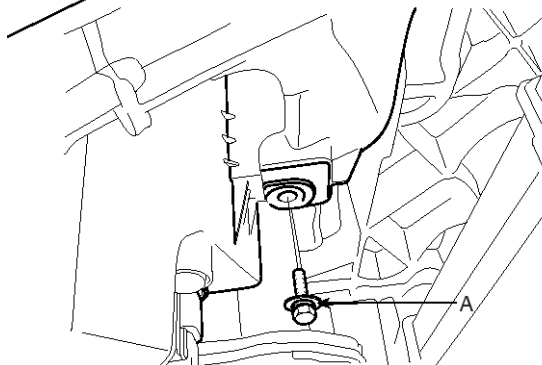
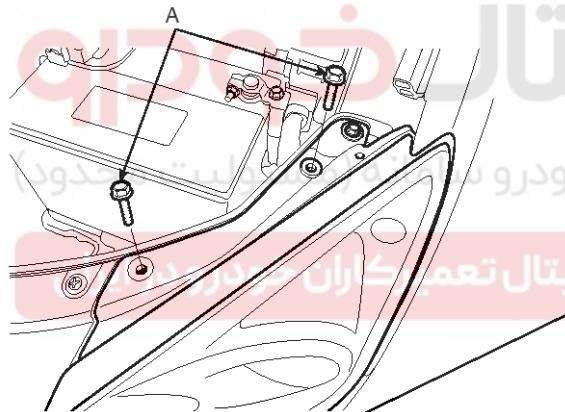
The headlamp bulb should not be removed from the headlamp assembly until just before a new bulb is installed.

Removing bulb for an extended period of time may affect headlamp bulb performance.

Contaminants may enter the headlamp assembly where they can settle on the lens and reflector.

Never turn on the head lamps with the bulb removed from the headlamp assembly.

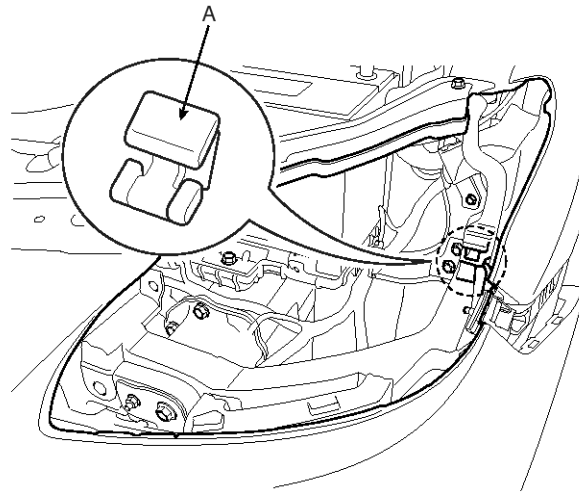
1. Disconnect the negative (-) battery terminal.
2. Loosen the mounting bolts (3EA) of head lamp. Remove the head lamp assembly (A) after disconnecting the lamp connectors.



SFD8E8132L

📖 NOTICE

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



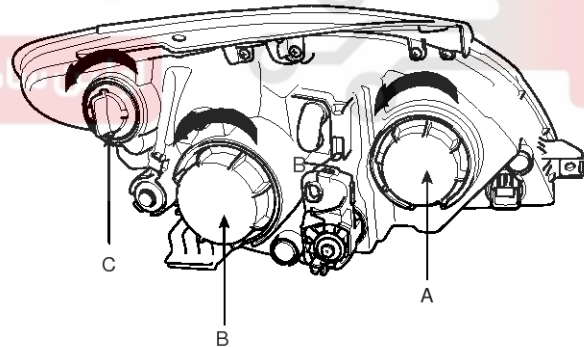
SFD8E8133L

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

A : Head lamp high bulb & position bulb cab

B : Head lamp low bulb cab

C : Turn signal bulb cab



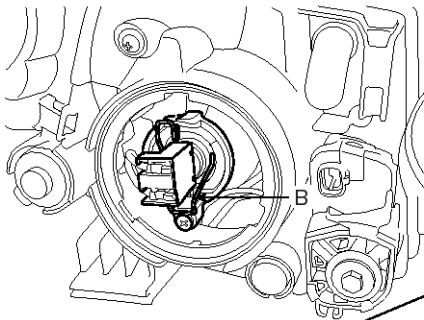
SFD8E8134L

Lighting System

BE-237

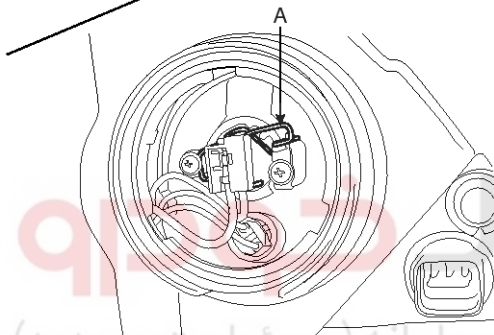
4. Remove the head lamp bulbs after releasing the lock of the set spring.

A : Head lamp high bulb, B : Head lamp low bulb.



Installation

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



دیجیتال خودرو سامانه (مسئولیت محدود)
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SFDBE8135L

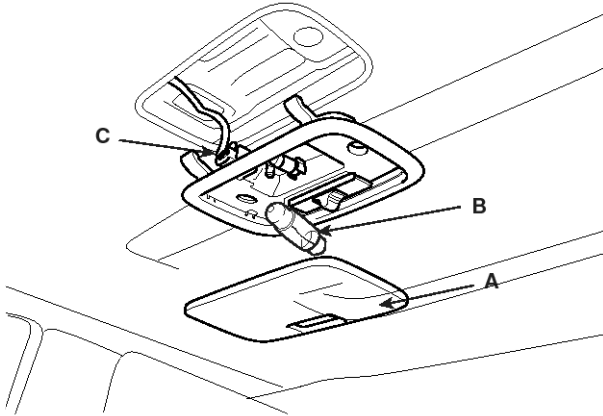
BE-238

Body Electrical System

Room Lamp

Removal

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



SFDBE8143L

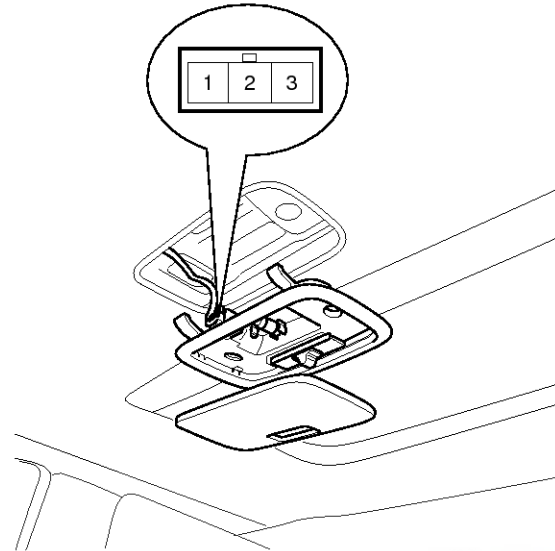
3. Loosen the fixing screw (2EA) and disconnect the 3P connector (C). And then remove the room lamp assembly.

Installation

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

Inspection

1. Remove the room lamp assembly then check for continuity between terminals.



SFDBE8141L

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

SFDBE8142L

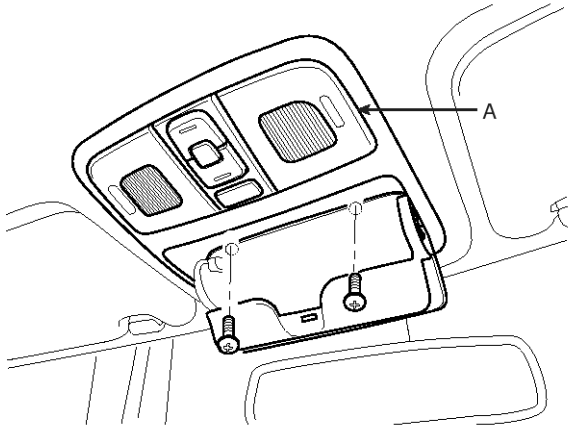
Lighting System

BE-239

Overhead Console Lamp

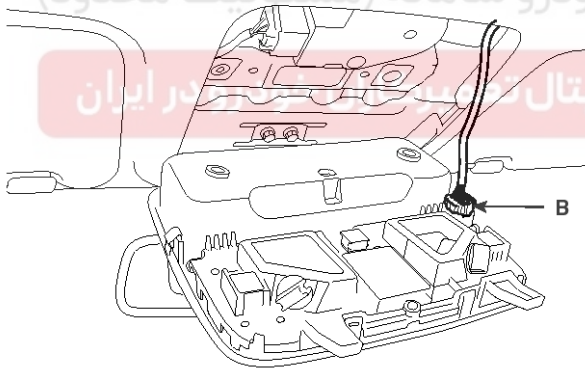
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console lamp (A) after loosening the overhead console lamp screw (2EA).

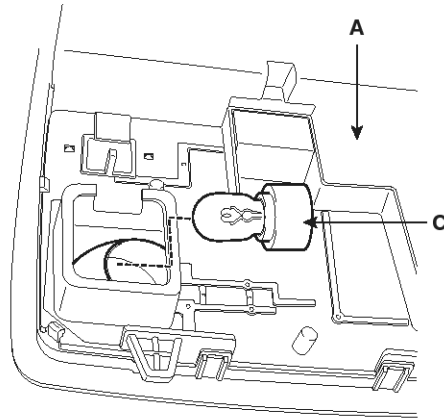


SFD8E8146L

3. Disconnect the sunroof switch and lamp connector (B) and then remove the overhead console (A) lamp (C).



SFD8E8147L



SEDBE7452L

Installation

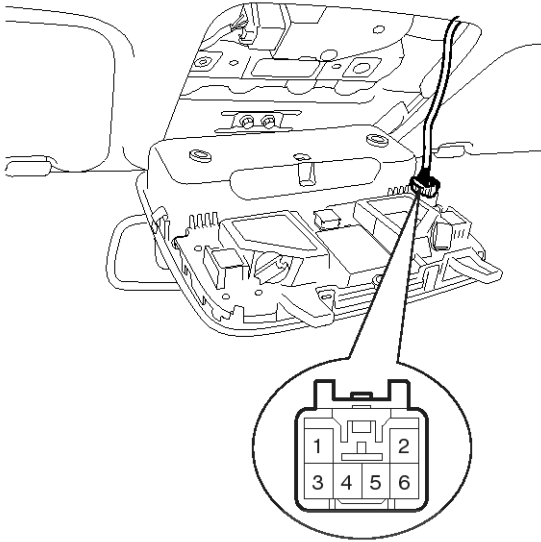
1. Install the overhead console lamp after connecting the sunroof switch and lamp connector.
2. Install the lens after tightening 2 screws.

BE-240

Body Electrical System

Inspection

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



SFD8E8144L

Sort Position Terminal	Map lamp switch				DOOR Switch	
	LH		RH		ON	OFF
1	○		○		○	
2	○		○		○	
3					○	

SFD8E8145L



Lighting System

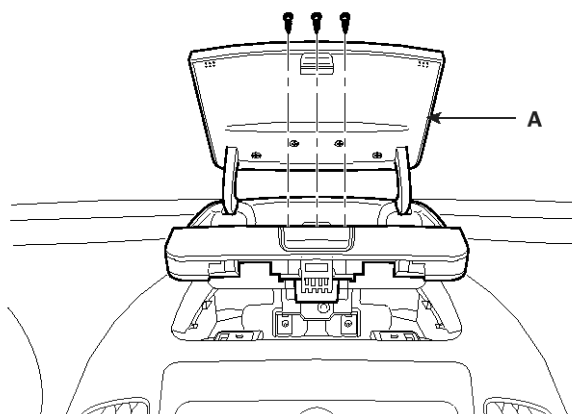
BE-241

Hazard Lamp Switch

Inspection

Hazard Lamp Switch

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

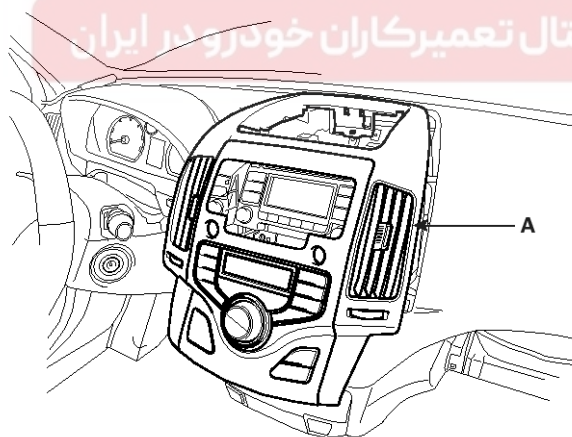


SFDBE8156L

3. Remove the crash pad center fascia panel (A).

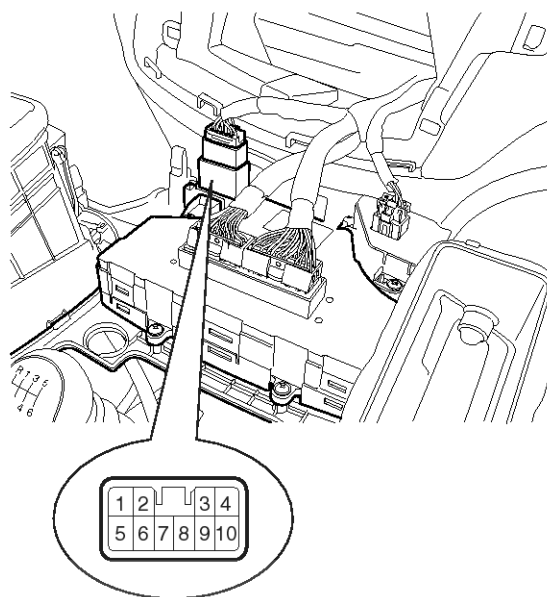
NOTICE

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



SFDBE8207L

4. Disconnect the hazard lamp switch connector.



SFDBE8149L

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

Terminal Position	OFF	ON	Remark
5			IGN
7			Battery
8			Common
6			F BATT
10			Right
9			Left
2			Illumination +
3			Illumination -

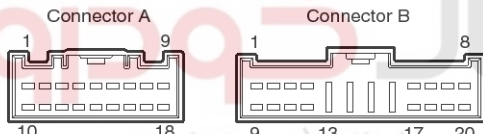
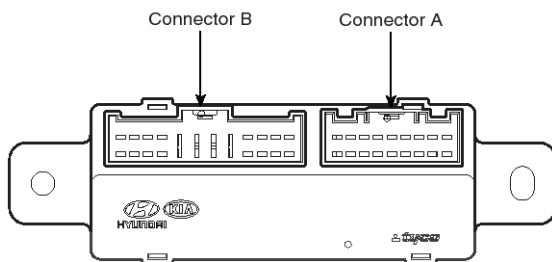
SHDBE6461L

BE-242

Body Electrical System

Hazard Lamp Relay

1. Disconnect the negative (-) battery terminal.
2. Disconnect the ICM relay box connector.
3. Check for continuity between terminals. There should be continuity between the No.3 and No.12 or No.7 of ICM-B terminals when power and ground are connected to the No.3 and No.17 of ICM-B terminals.
4. There should be no continuity between the No.3 and No.12 or No.7 of ICM-B terminals when power is disconnected to the No.3 and No.17 of ICM-B terminals.



Terminal Position		SHDBE6462L			
		ICM-B (3)	ICM-B (7 or 12)	ICM-B (3)	ICM-B (17)
Power off				○ — ○	○ — ○
Power on		○ — ○		⊖ — ⊕	⊖ — ⊕

SHDBE6463L



Lighting System

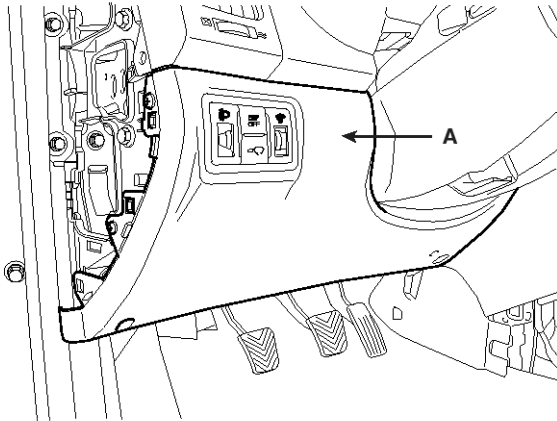
BE-243

Flasher Unit

Inspection

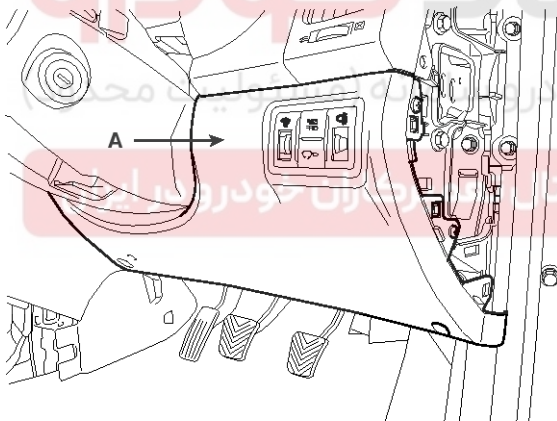
1. Disconnect the negative (-) battery terminal.
2. Remove the driver crash pad lower panel (A).

[LHD]



SFDBE8151L

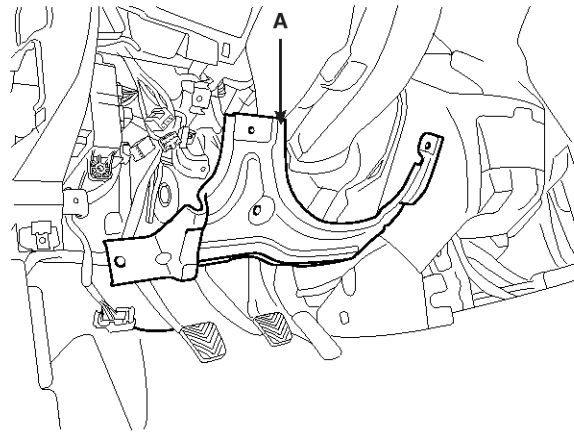
[RHD]



SFDBE8151R

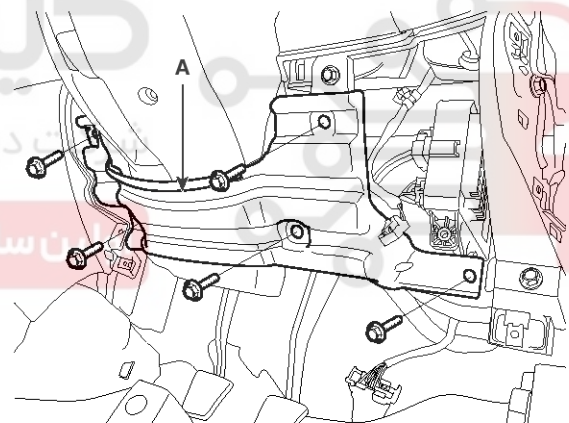
3. Remove the driver crash pad reinforcing panel (A) after loosening 5 bolts.

[LHD]



SFDBE8152L

[RHD]

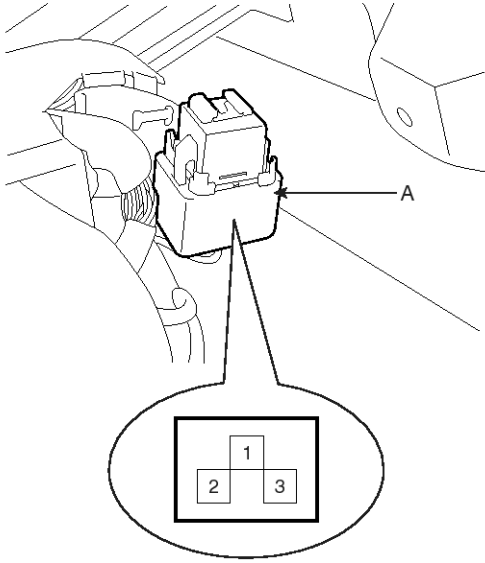


SHDBE6481R

BE-244

Body Electrical System

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



SHDBE6482D

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

NOTICE

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



Lighting System

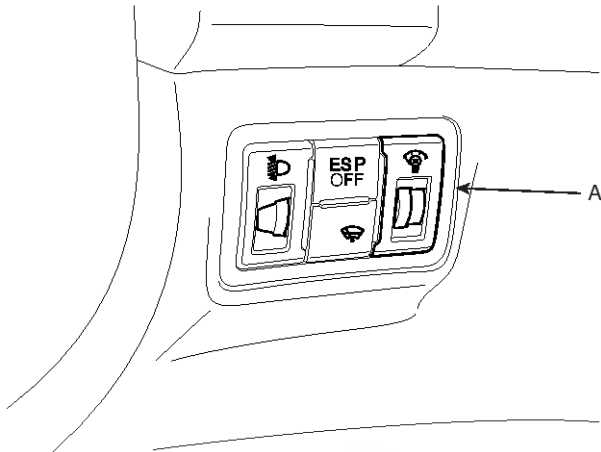
BE-245

Rheostat

Inspection

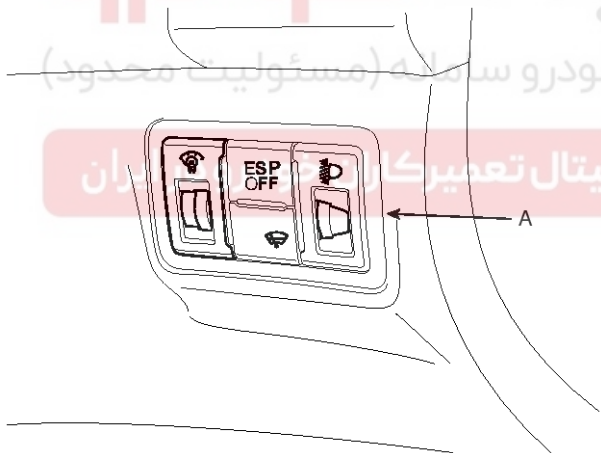
1. Disconnect the negative (-) battery terminal.
2. Remove the lower side crash pad switch assembly (A) by using the trim remover tool.

[LHD]



SFDBE8154L

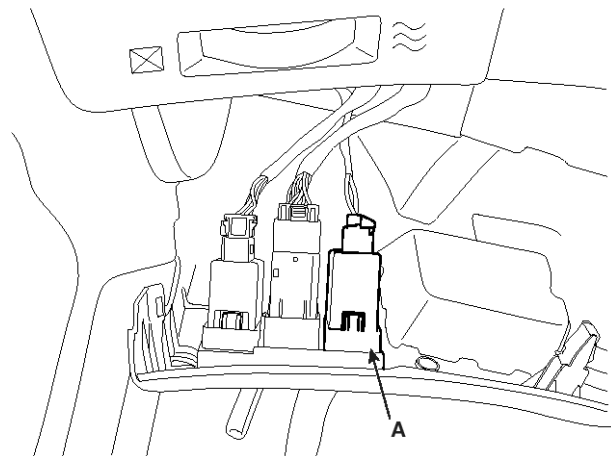
[RHD]



SFDBE8154R

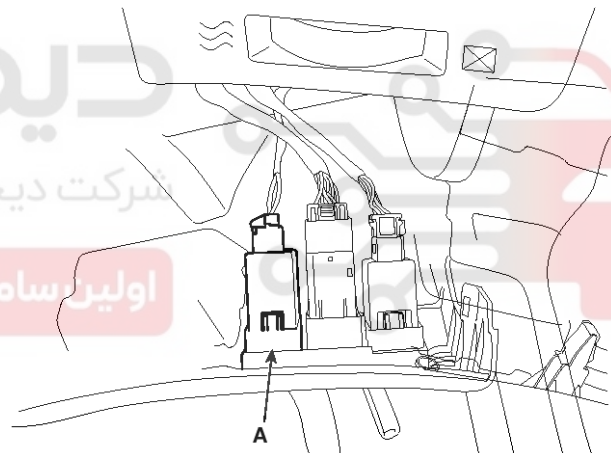
3. Disconnect the rheostat switch connector (A).

[LHD]



SFDBE8155L

[RHD]

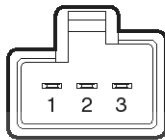
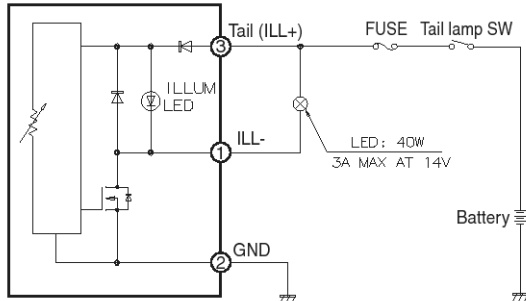


SFDBE8155R

BE-246

Body Electrical System

4. 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.



SHDBE6475L

دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



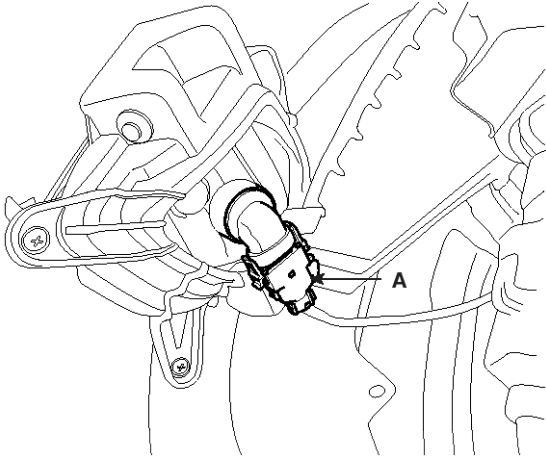
Lighting System

BE-247

Front Fog Lamps

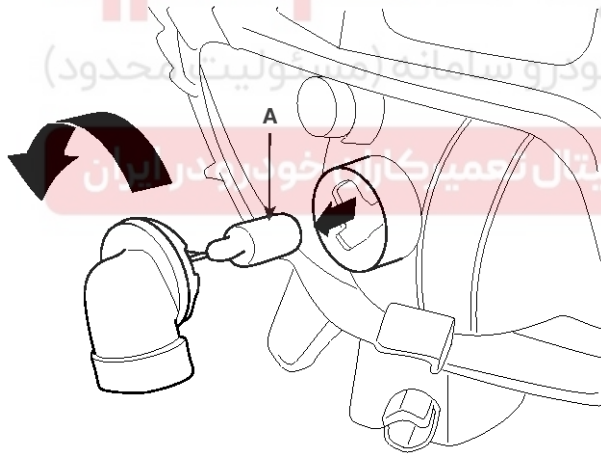
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front side cover screw.
3. Remove the front fog lamp assembly connector (A).



SFDBE8157L

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



SFDBE8150L

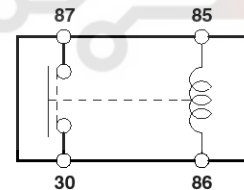
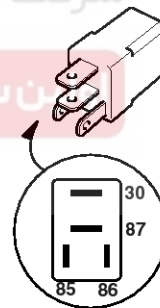
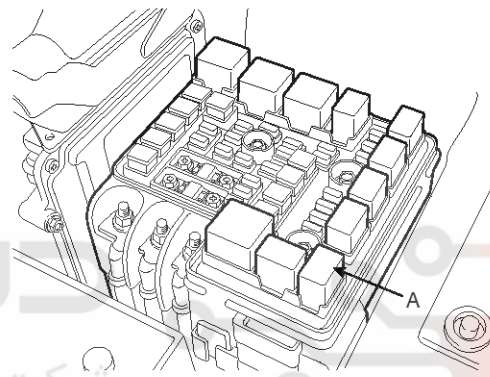
Installation

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

Inspection

Front Fog Lamp Relay

1. Disconnect the negative(-) battery terminal.
2. Pull out the front fog lamp relay (A) from the engine compartment relay box.
3. Check for continuity between terminals. There should be continuity between the No.87 and No.30 terminals when power and ground are connected to the No.85 and No.86 terminals.
4. There should be no continuity between the No.87 and No.30 terminals when power is disconnected.



SEDBE7464L

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

LTGE221B

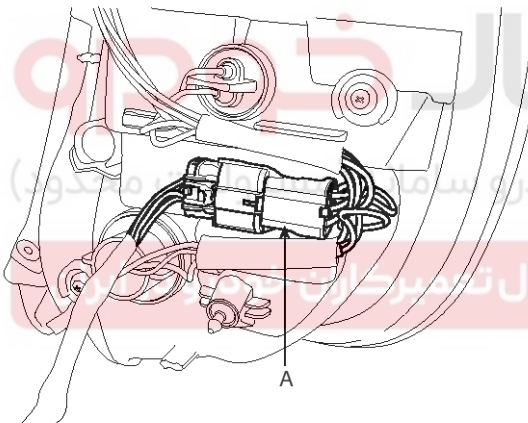
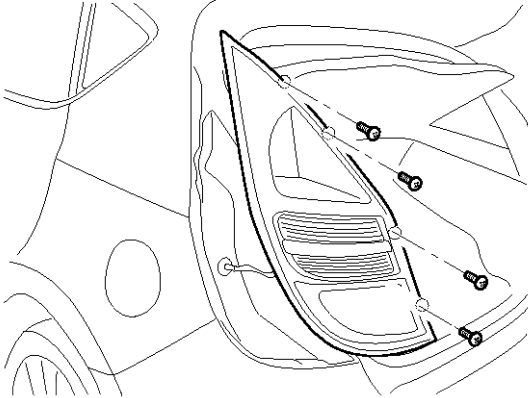
BE-248

Body Electrical System

Rear Fog Lamps

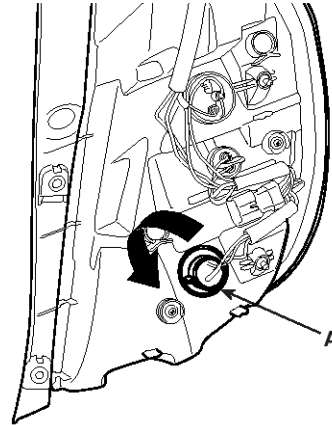
Removal

1. Disconnect the negative (-) battery terminal.
2. Loose the screws (4EA) holding the rear combination lamp then disconnect the 4P connector (A) then remove the rear combination lamp.



SFDBE8136L

3. Replace the rear fog lamp bulb (A) turning in the counter clockwise direction.



SFDBE8153L

Installation

1. Connect the lamp connector after assembling the rear fog lamp bulb.
2. Install the rear combination lamp assembly.

Lighting System

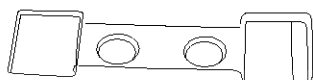
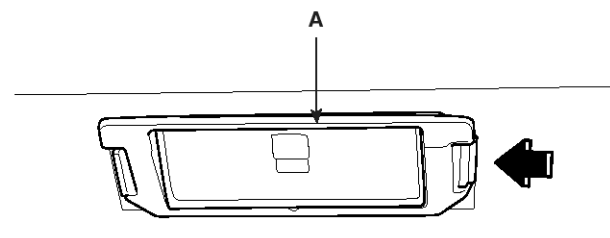
BE-249

License Lamps

Removal

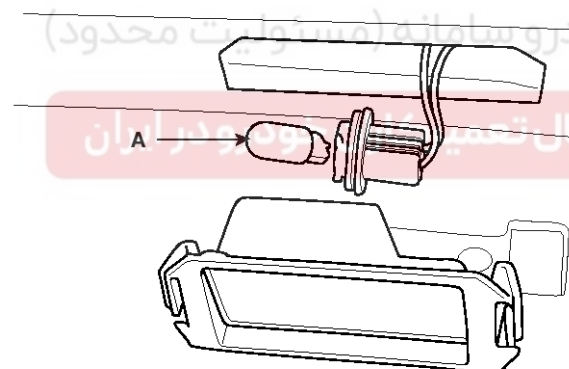
License Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the license lamp lens (A) by using the remover tool



SFDBE8285L

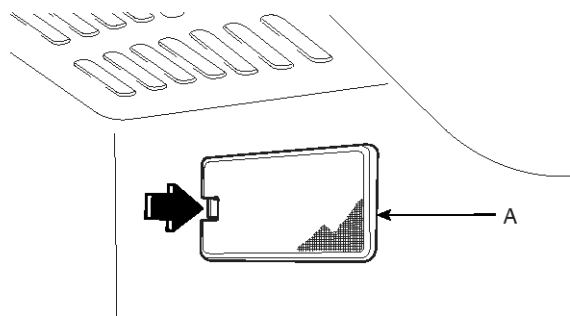
3. Replace the bulb (A).



SFDBE8209L

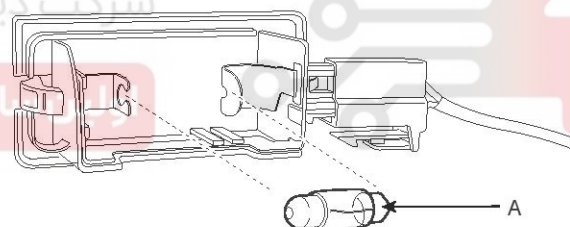
Tailgate Room Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the tailgate room lamp len (A) from the luggage side trim.



SEDBE7478L

3. Remove the bulb (A).



SEDBE7479L

Installation

License Lamp

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

Tailgate Room Lamp

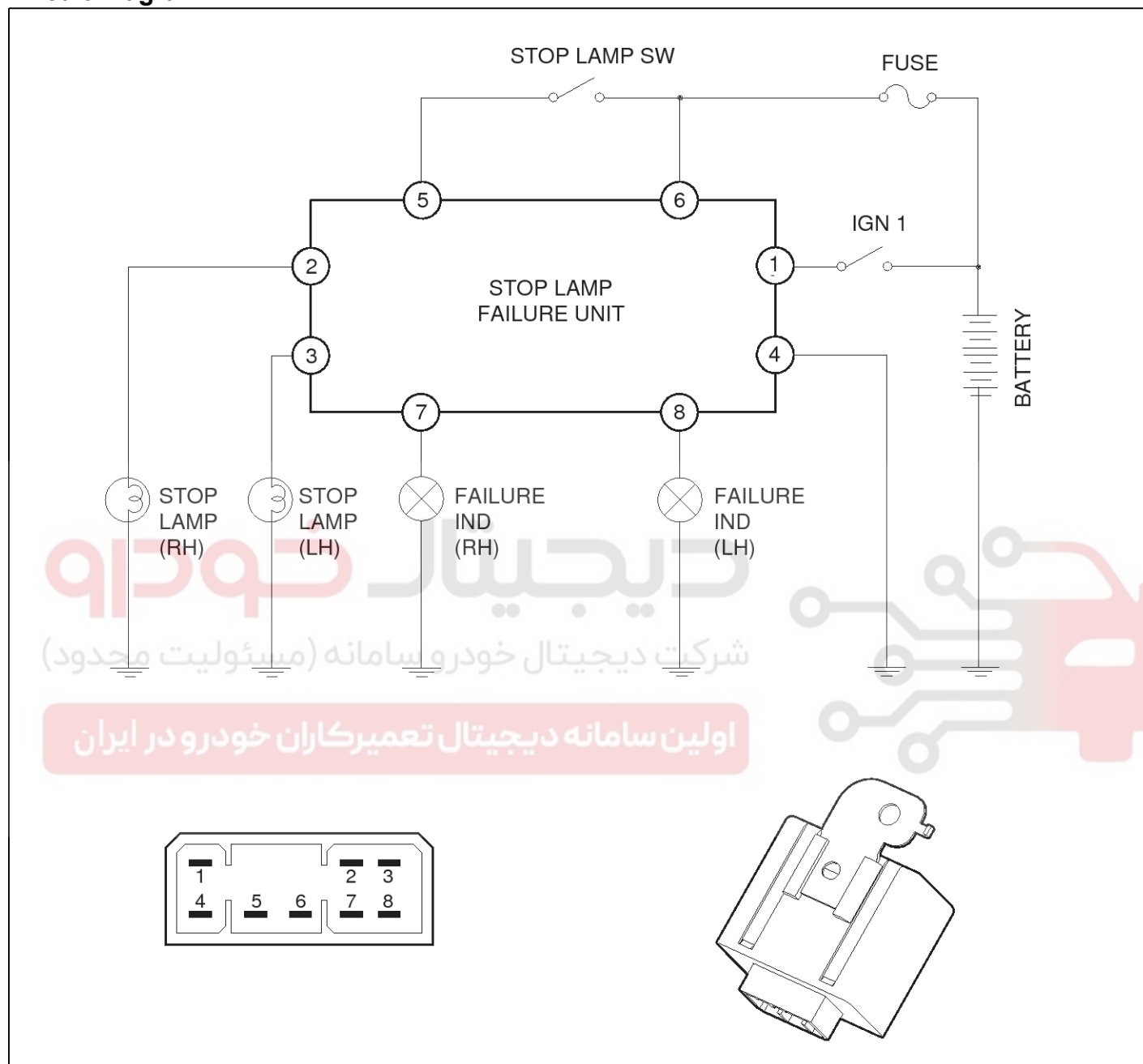
1. Install the bulb.
2. Install the tailgate room lamp len.

BE-250

Body Electrical System

High Mounted stop lamp

Circuit Diagram

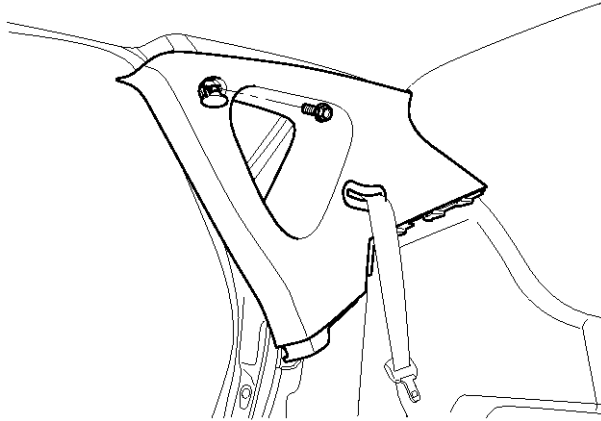


Lighting System

BE-251

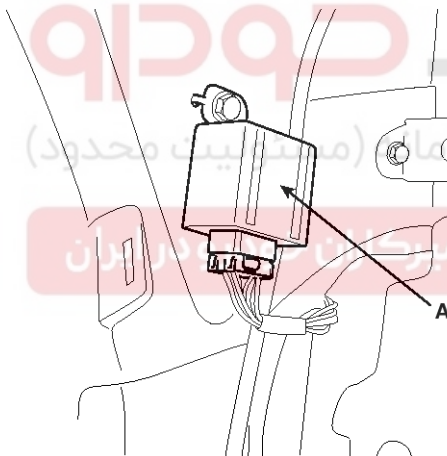
Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the rear right pillar lower trim (A).
(Refer to the BD Group - "Interior trim")



SFDBE8315L

3. Remove the stop lamp failure unit (A) after loosening a bolt and disconnecting the unit connector.



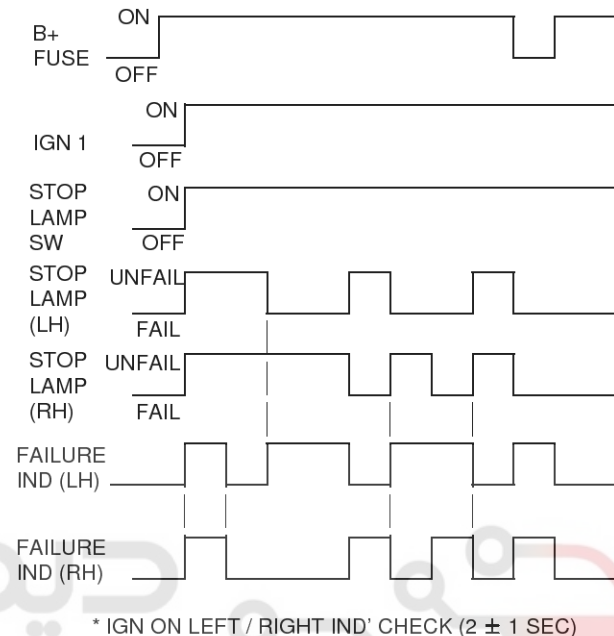
SFDBE8316L

Installation

1. Install the stop lamp failure unit.
2. Install the rear right pillar lower trim.

Inspection

1. First make sure that the stop lamps come on when the brake pedal is pressed.
If necessary, replace the bulb.
2. Check for operation of this function properly as shown in figure.



SFDBE8317L

3. Remove the rear right pillar lower trim.
(Refer to the BD Group - "Interior trim")
4. Check the voltage between NO.1 terminal of harness connector and ground when the IG is turned on and the brake pedal is pressed.

Standard value : 12V (for 2 ± 1 sec.)

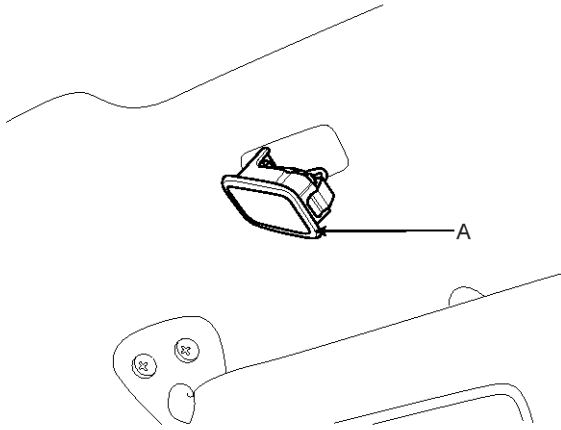
BE-252

Body Electrical System

Personal Lamp

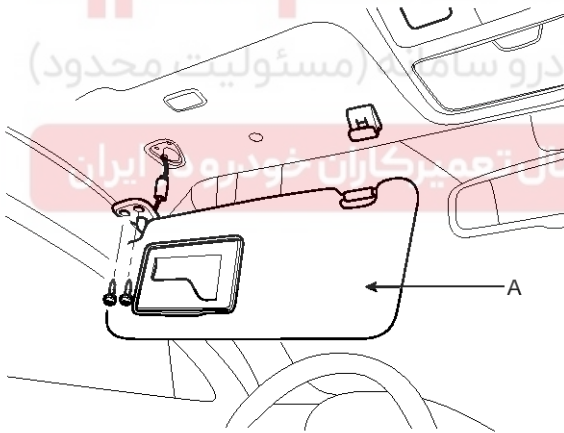
Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the vanity lamp lens (A) and then remove the bulb.



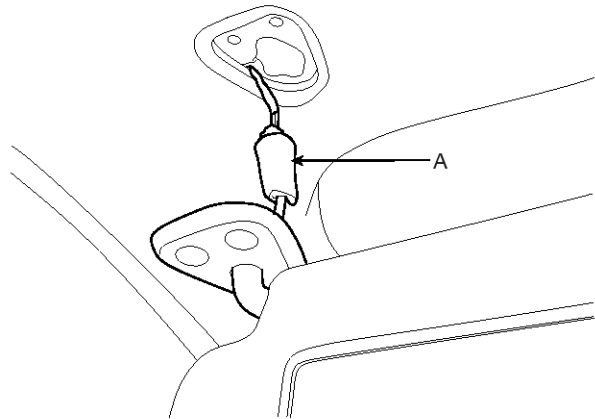
SFDBE8138L

3. Remove the sunvisor (A) after loosening the screws(2EA).



SFDBE8139L

4. Disconnect the sunvisor connector (A).



SFDBE8140L

Installation

1. Install the vanity bulb.
2. Install the vanity lamp lens.
3. Install the sunvisor assembly.

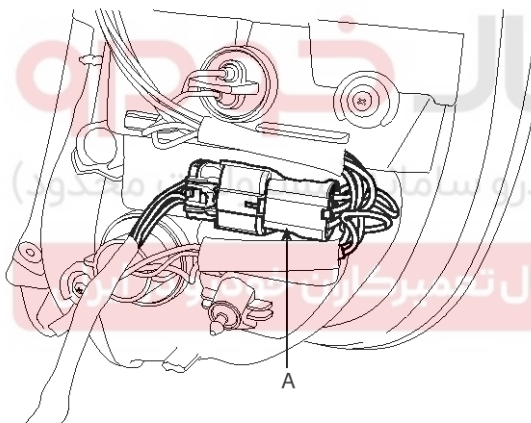
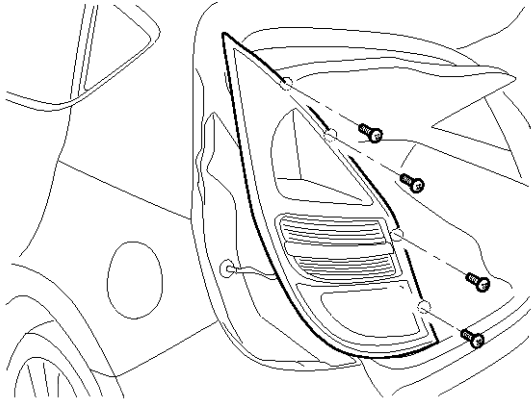
Lighting System

BE-253

Rear combination lamp

Removal

1. Disconnect the negative (-) battery terminal.
2. Loose the screws (4EA) holding the rear combination lamp then disconnect the connector (A) then remove the rear combination lamp.



SFDBE8136L

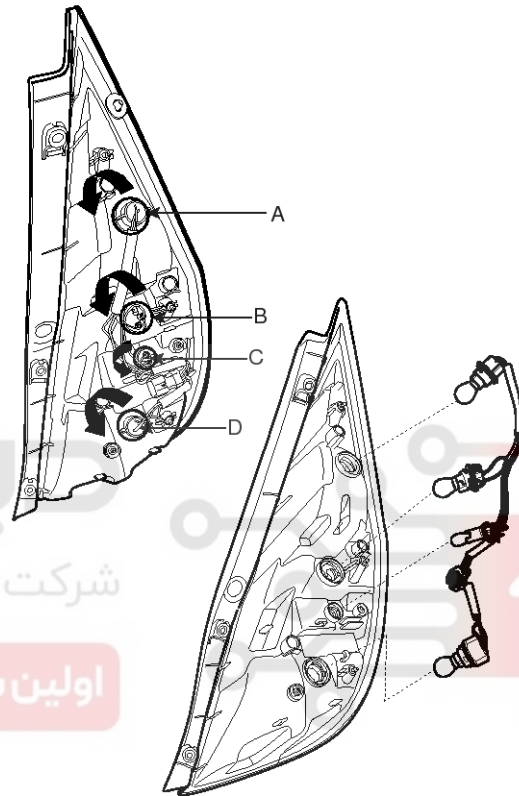
3. Replace the bulbs (4EA) turning in the counter clockwise direction.

A : Tail / Stop lamp

B : Rear turn signal lamp

C : Back up lamp

D : Rear fog lamp (Europe) / Stop lamp (General)



SFDBE8137L

Installation

1. Connect the lamp connector after assembling the bulb.
2. Install the rear combination lamp assembly.

BE-254

Body Electrical System

Troubleshooting

Symptom	Possible cause	Remedy
One lamp does not light (all exterior)	Bulb burned out	Replace bulb
	Socket, wiring or ground faulty	Repair if necessary
Head lamps do not light	Bulb burned out	Replace bulb
	Head lamp fuse (LOW:10A, HIGH:20A) blown	Check for short and replace fuse
	Head lamp fuse (10A) blown	Check for short and replace fuse
	Head lamp relay faulty	Check relay
	Lighting switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Tail lamps and license plate lamps do not light	Bulb burned out	Replace bulb
	Tail lamp fuse (10A) blown	Check for short and replace fuse
	Tail lamp relay faulty	Check relay
	Lighting switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Stop lamps do not light	Bulb burned out	Replace bulb
	Stop lamp fuse (15A) blown	Check for short and replace fuse
	Stop lamp switch faulty	Adjust or replace switch
	Wiring or ground faulty	Repair if necessary
Stop lamps do not turn off	Stop lamp switch faulty	Repair or replace switch
Instrument lamps do not light (Tail lamps light)	Rheostat faulty	Check rheostat
	Wiring or ground faulty	Repair if necessary
Turn signal lamp does not flash on one side	Bulb burned out	Replace bulb
	Turn signal switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Turn signal lamps do not light	Bulb burned out	Replace bulb
	Turn signal lamp fuse (10A) blown	Check for short and replace fuse
	Flasher unit faulty	Check flasher unit
	Turn signal switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Hazard warning lamps do not light	Bulb burned out	Replace bulb
	Hazard warning lamp fuse (15A) blown	Check for short and replace fuse
	Flasher unit faulty	Check flasher unit
	Hazard switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

Lighting System

BE-255

Symptom	Possible cause	Remedy
Flasher rate too slow or too fast	Lamps' wattages are smaller or larger than specified	Replace lamps
	Flasher unit faulty	Check flasher unit
Back up lamps do not light	Bulb burned out	Replace bulb
	Back up lamp fuse (10A) blown	Check for short and replace fuse
	Back up lamp switch (M/T) faulty	Check switch
	Transaxle range switch (A/T) faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Room lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (15A) blown	Check for short and replace fuse
	Room lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Front fog lamps do not light	Bulb burned out	Replace bulb
	Front fog lamp fuse (15A) blown	Check for short and replace fuse
	Front fog lamp relay faulty	Check relay
	Front fog lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Rear fog lamps do not light	Bulb burned out	Replace bulb
	Rear fog lamp fuse (10A) blown	Check for short and replace fuse
	Rear fog lamp fuse (10A) blown	Check for short and replace fuse
	Rear fog lamp switch faulty	Check switch
	Rear fog lamp relay faulty	Check relay
	Wiring or ground faulty	Repair if necessary
Room lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (10A) blown	Check for short and replace fuse
	Map lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Tailgate room lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (10A) blown	Check for short and replace fuse
	Tailgate room lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

BE-256**Body Electrical System****Auto Lighting Control System****Specifications**

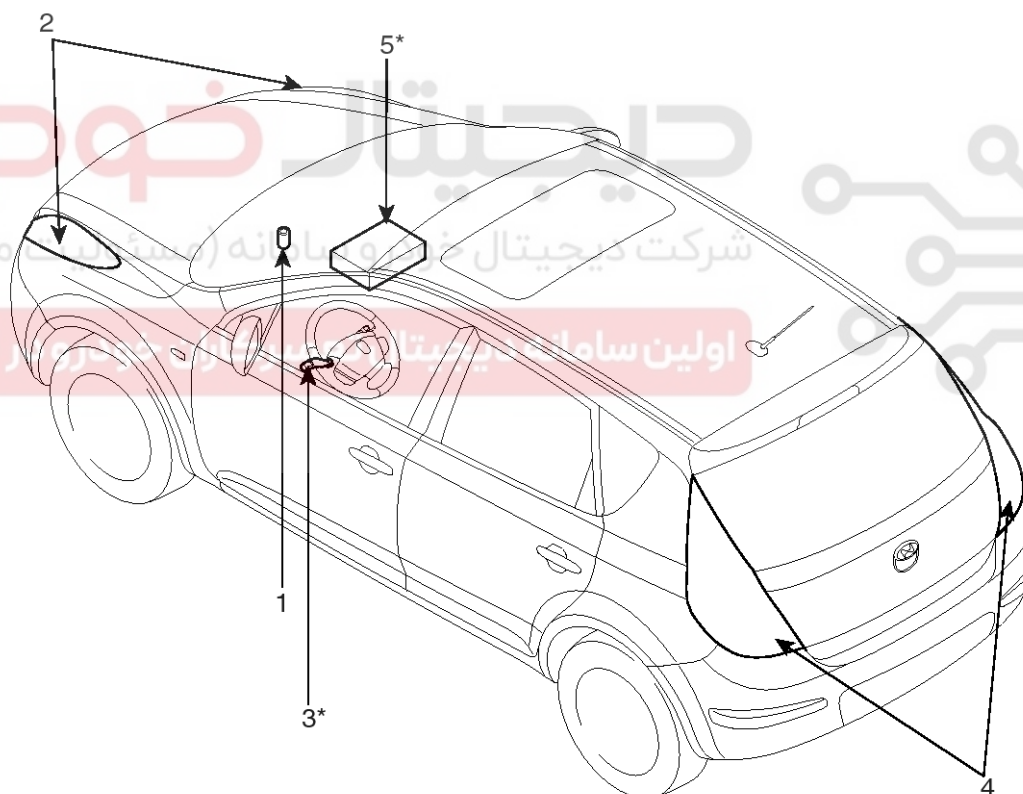
Item			Specifications
Rated voltage			5V
Operating current			Max. 1mA
Signal output	Head lamp	ON	$0.81 \pm 0.05V$
		OFF	$1.41 \pm 0.05V$
	Tail lamp	ON	$0.81 \pm 0.05V$
		OFF	$1.41 \pm 0.05V$

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



1. Auto light sensor unit
2. Head lamps
3. Lighting switch (Auto)

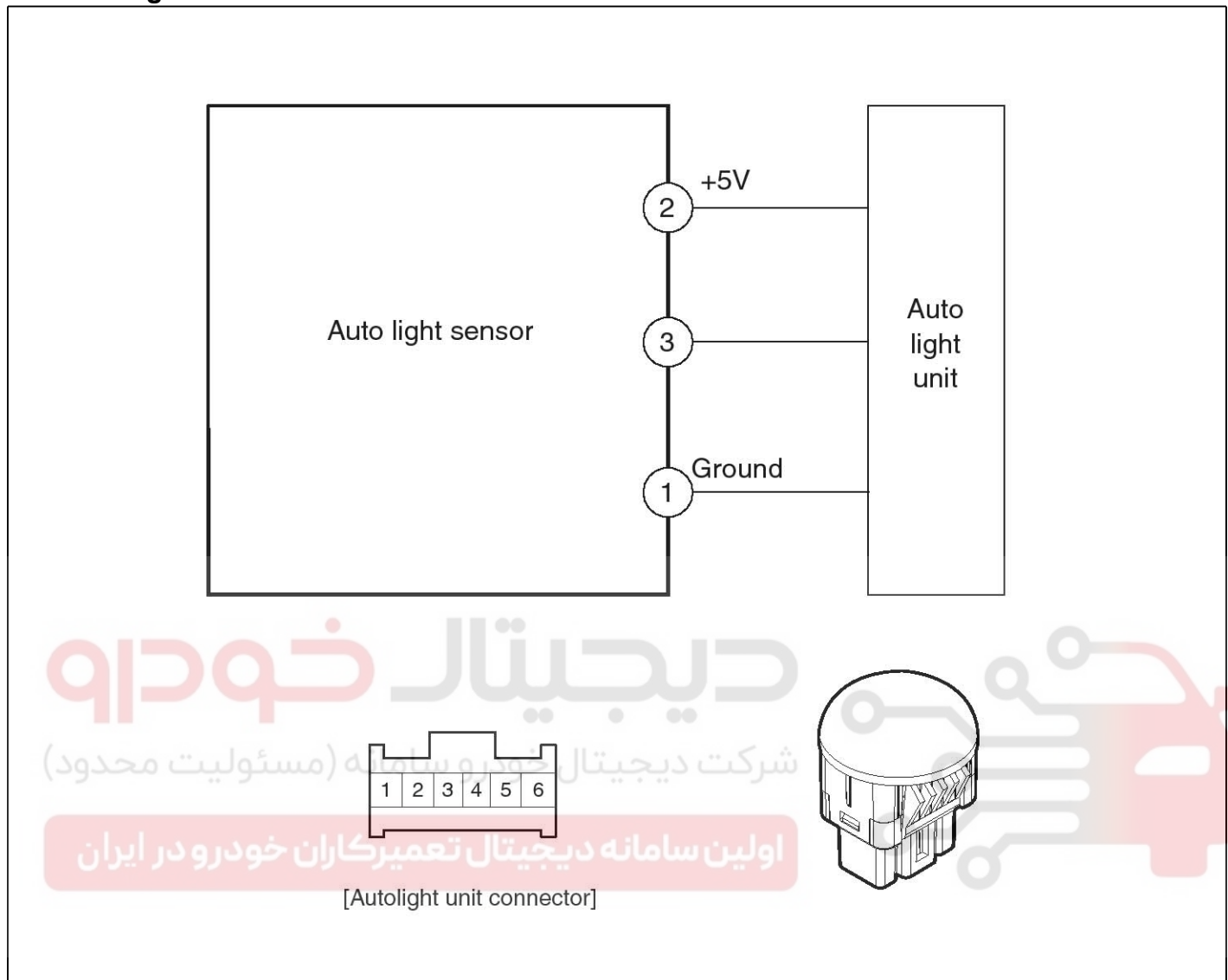
4. Tail lamps
5. Body control module

SFD8E210L

Auto Lighting Control System

BE-257

Circuit Diagram



SFDBE8211L

Description

The auto light control system operates by using the auto light switch.

If you set the multi-function switch to "AUTO" position, the tail lamp and head lamp will be turned automatically on or off according to external illumination.

BE-258

Body Electrical System

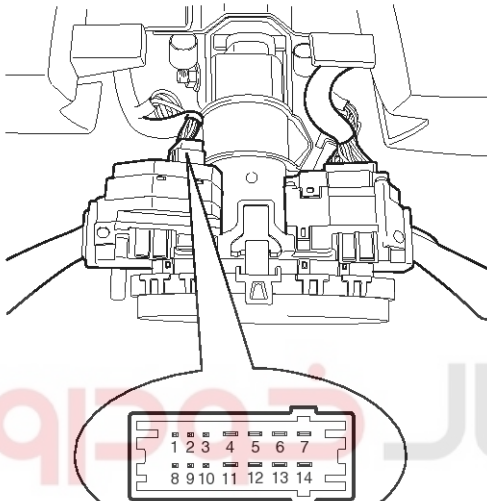
Auto Light Switch

Inspection

1. With the multi function switch in each position, make sure that continuity exists between the terminals below.

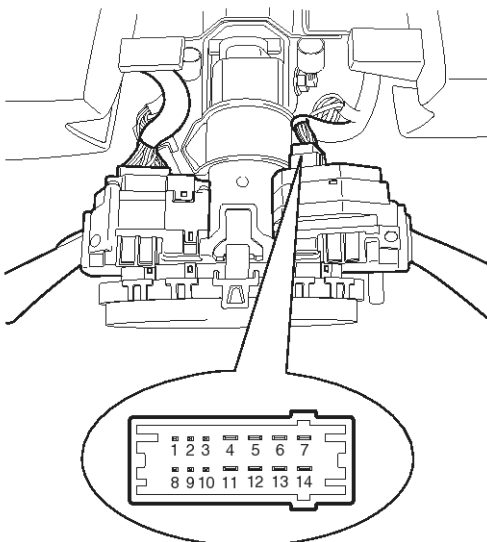
If continuity is not as specified, replace the multi-function switch

[LHD]



SEDBE7044L

[RHD]



SEDBE7044R

Lighting Switch (Auto Light)

() : RHD

Terminal Position	8(9)	9(10)	10(14)	1(8)
OFF				
I	○	—	—	○
II	○	○	—	○
AUTO			○	○

SEDBE7045L

Auto Lighting Control System

BE-259

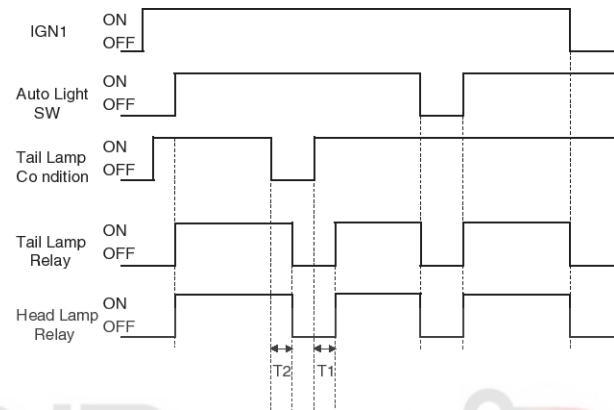
Auto Light Sensor

Inspection

1. AUTO LIGHT SENSOR value is always read at IGN1 ON.
2. LIGHT is turned ON after $2.5\text{sec} \pm 0.1\text{sec}$ when AUTO LIGHT SENSOR value is same as LIGHT ON input value.
3. LIGHT is turned OFF after $2.5\text{sec} \pm 0.1\text{sec}$ when AUTO LIGHT SENSOR value is same as LIGHT OFF input value.
4. LIGHT ON value of SENSOR is based on the below table.
5. Head Lamp signal is output when Head Lamp OUTPUT is ON.
6. After Head Lamp is turned OFF, Head Lamp signal output is kept if Head Lamp & Tail Lamp ON.
luminance condition is met at Auto Light SW ON.
7. After Head Lamp is turned OFF, Head Lamp signal output is immediately stopped if HEAD LAMP & Tail Lamp OFF luminance condition is met at Auto Light SW ON.
8. After Head Lamp is turned OFF, Head Lamp signal output is immediately stopped at TAIL SW signal input.
9. After Head Lamp is turned OFF, Head Lamp signal output is stopped if there is no input of Auto Light SW or TAIL SW. (shall be no flashing of Head Lamp)
10. Head Lamp signal output is stopped when SW position is changed from AUTO to Head Lamp SW during Head Lamp ON with Auto Light. (shall be no flashing of Head Lamp)

Light Sensor Reading

	Head lamp	Tail lamp
ON	$18.5 \pm 4(\text{Lux}), 0.81 \pm 0.05\text{V}$	$74 \pm 16(\text{Lux}), 0.81 \pm 0.05\text{V}$
OFF	$37 \pm 8(\text{Lux}), 1.41 \pm 0.05\text{V}$	$148 \pm 32(\text{Lux}), 1.41 \pm 0.05\text{V}$

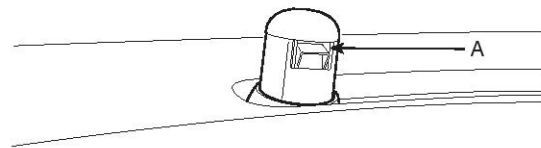


SFD8E8212L

T1 : 12 ± 0.25 T2 : 12 ± 0.25

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the Photo & auto light sensor (A) using screw (-) driver.



SEDBE7510L

3. Remove the auto light connector.
4. Installation is the reverse of removal.

BE-260

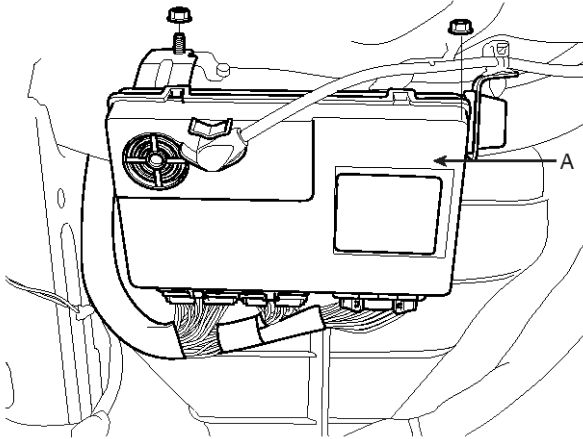
Body Electrical System

Daytime Running Lights

DRL Control Module

Inspection

1. The daytime running unit is integrated in the BCM (A).



SFDBE8213L

2. Check that the light operate according to the following timing chart.

1) Operation condition

a. DRL ON

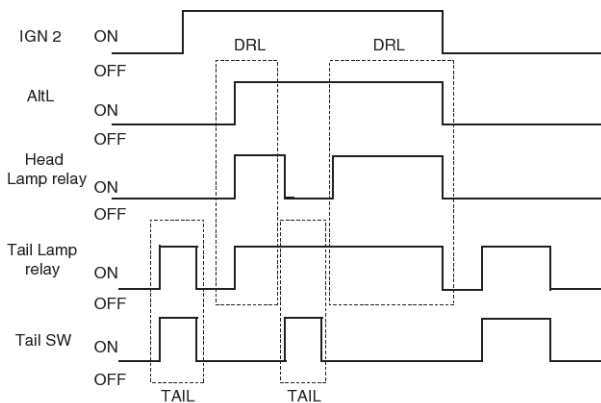
- ALT L signal and IGN2 signal input

b. DRL operation

- ALT L ON
- The head lamp relay and tail lamp relay ON.

c. DRL OFF

- Tail lamp Relay ON.
- Head Lamp relay OFF.



SFDBE8214L

3. If the daytime running light is not operated well, Inspect the connector and terminals to be sure they are all making good contact.

If the terminals are bent, loose or corroded, repair them as necessary, and recheck the system.

If the terminals look OK, go to step 4.

4. Make these input tests at the connector by using ETM.

If any test indicates a problem, find and correct the cause, then recheck the system.

If all the input tests prove OK, the I/P (Instrument panel) junction box must be faulty; replace it.

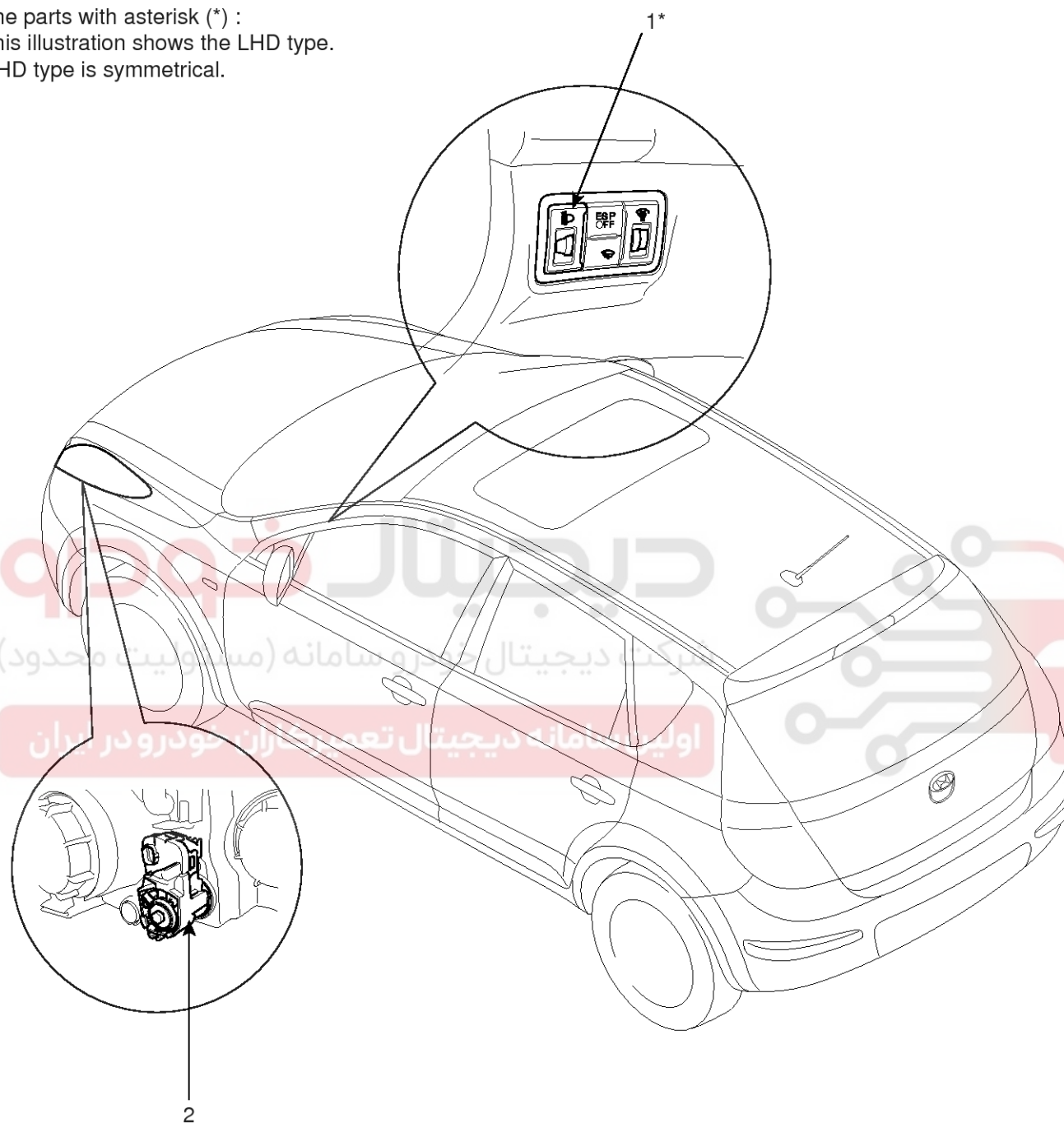
Head lamp leveling Device

BE-261

Head lamp leveling Device

Component Location

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



1. Headlamp leveling switch

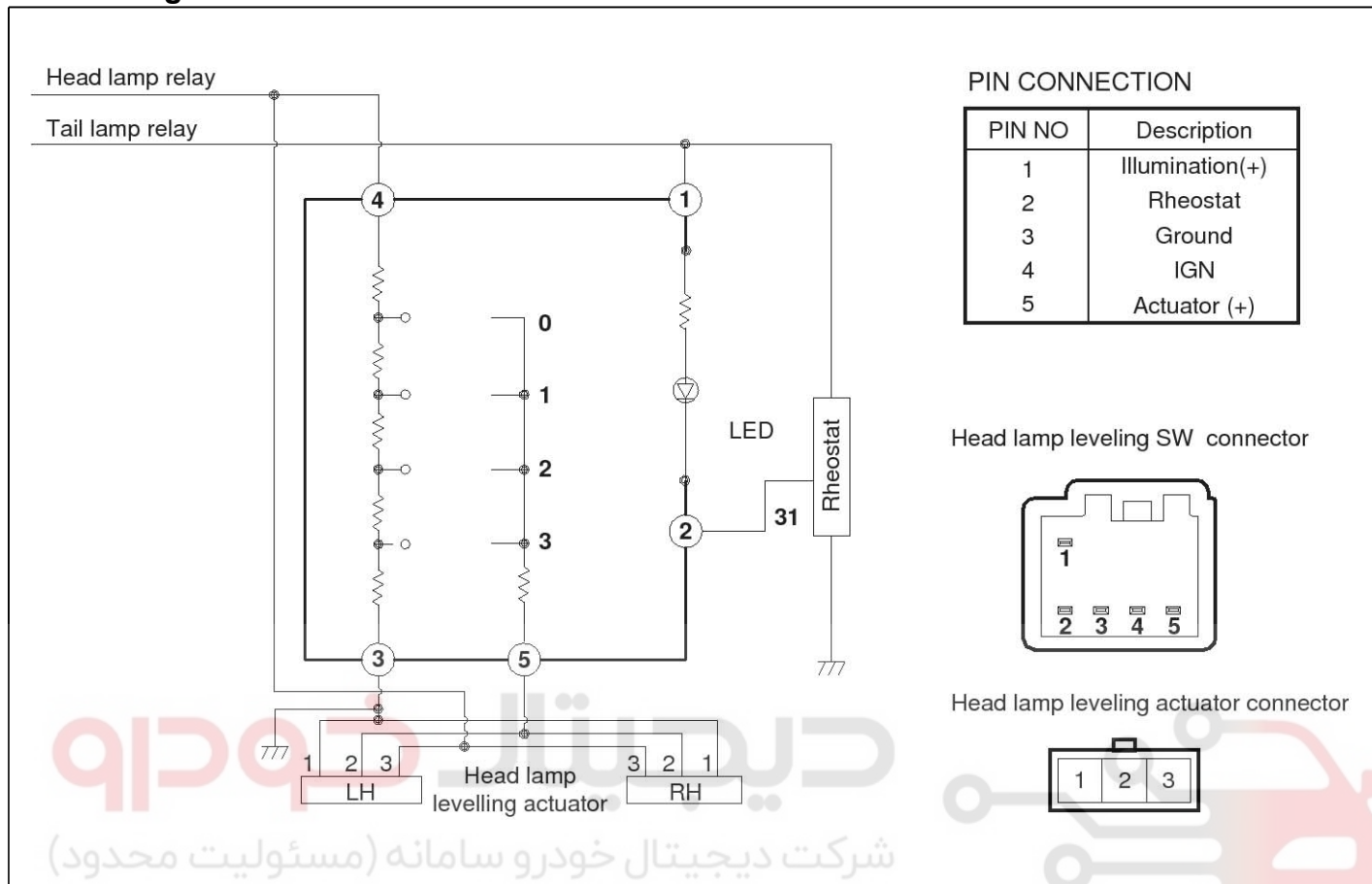
2. Headlamp leveling actuator

SFDBE8215L

BE-262

Body Electrical System

Circuit Diagram



SFDBE8287L

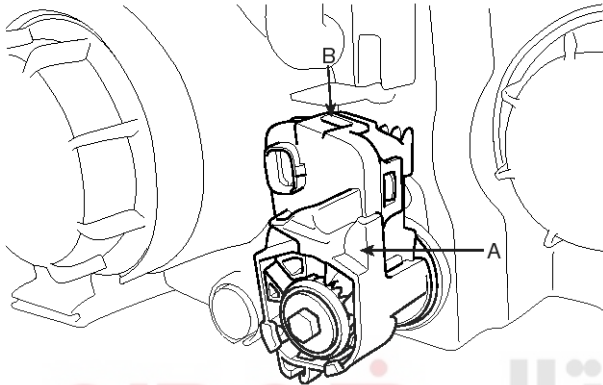
Head lamp leveling Device

BE-263

Head lamp leveling Actuator

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the head lamp assembly.
(Refer to the head lamp)
3. Remove the head lamp leveling actuator (A) by turning the adjusting gear in the hole (B) using the adjusting wheel or screw driver.



SFDBE8216L

Installation

1. Install the head lamp leveling actuator by turning the adjusting gear.
2. Install the head lamp assembly.
3. Adjust the head lamp in accordance with the head lamp aiming instructions.



BE-264

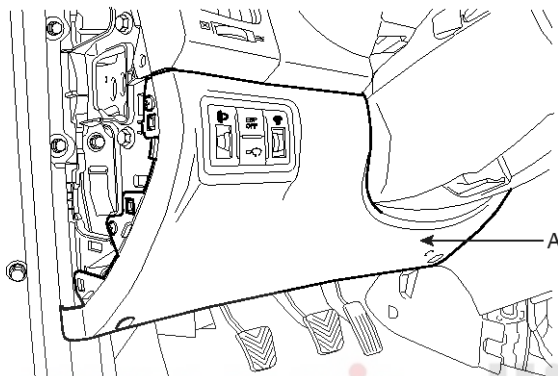
Body Electrical System

Head Lamp Leveling Switch

Inspection

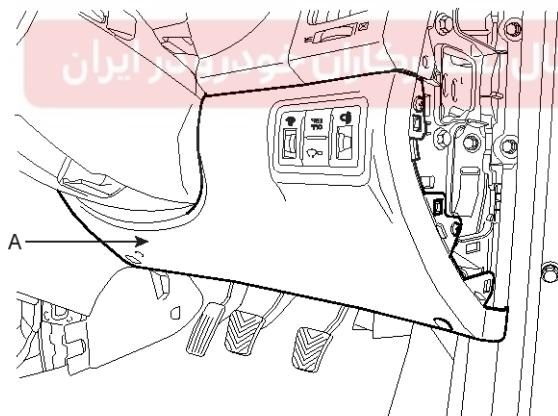
1. Disconnect the negative (-) battery terminal.
2. Remove the side crash pad cover.
(Refer to the BD group - "Crash pad")
3. Remove the lower side crash pad switch (A) from the side crash pad cover by using the trim removal tool.

[LHD]



SFDBE8217L

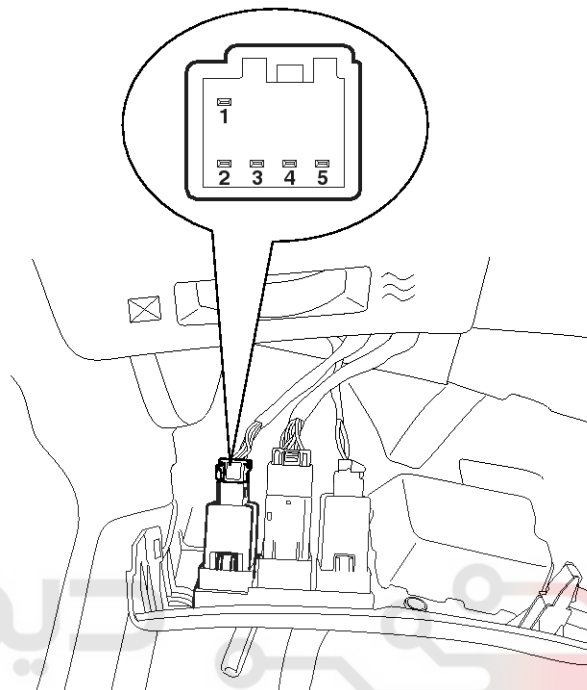
[RHD]



SFDBE8218L

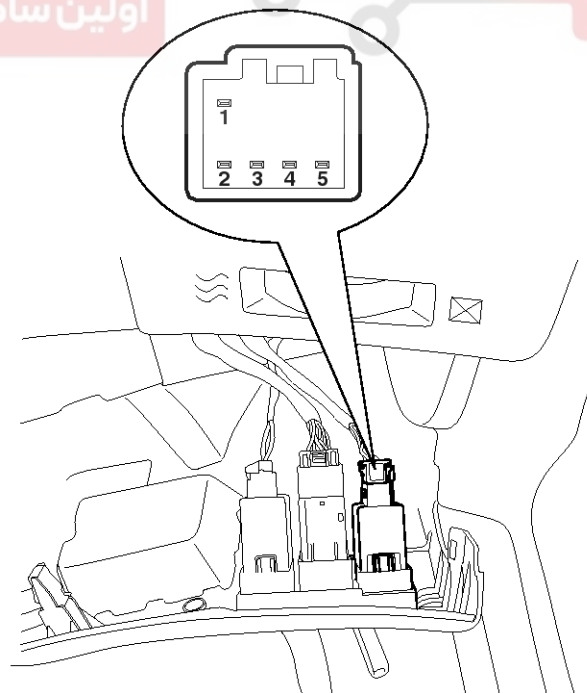
4. Remove the head lamp leveling switch connector from the lower crash pad switch.

[LHD]



SFDBE8219L

[RHD]



SFDBE8220L

Head lamp leveling Device

BE-265

5. Connect the battery voltage between terminals 3 and 4.
6. Measure the voltage between terminals 4 and 5 at each position.

Position No.	Rotation	Voltage (V) ($\pm 5\%$)
0	0°	11.55
1	20°	10.2
2	40°	8.9
3	60°	8.2

7. If the voltage is not as specified, replace the head lamp leveling switch.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



BE-266

Body Electrical System

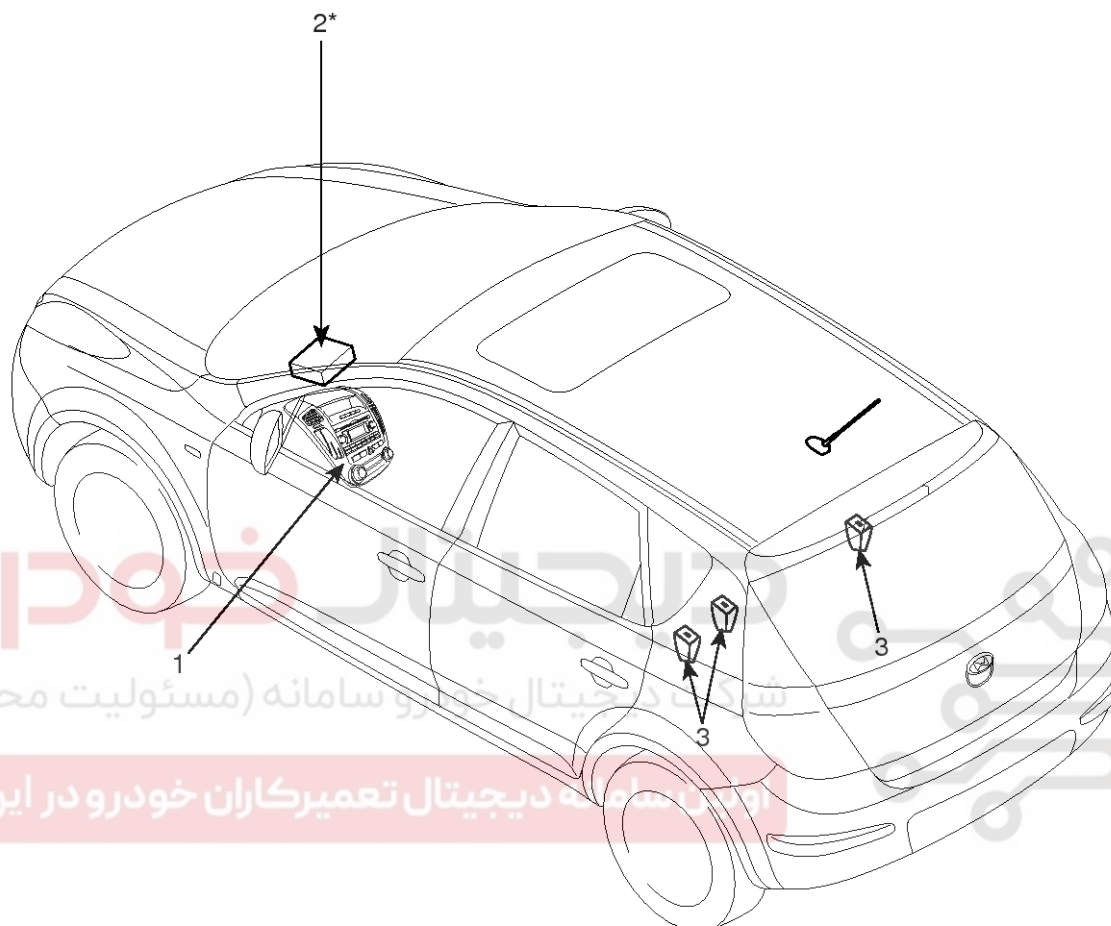
Seat Belt Reminder

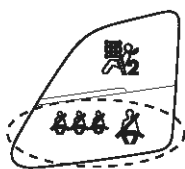

Component Location

The parts with asterisk(*) :

This illustration shows the LHD type.

RHD type is symmetrical.



Auto A/C Type	Manual A/C Type
	

1. Fasten seat belt reminder light
2. Rear seat belt reminder control unit

3. Rear seat belt buckle switch

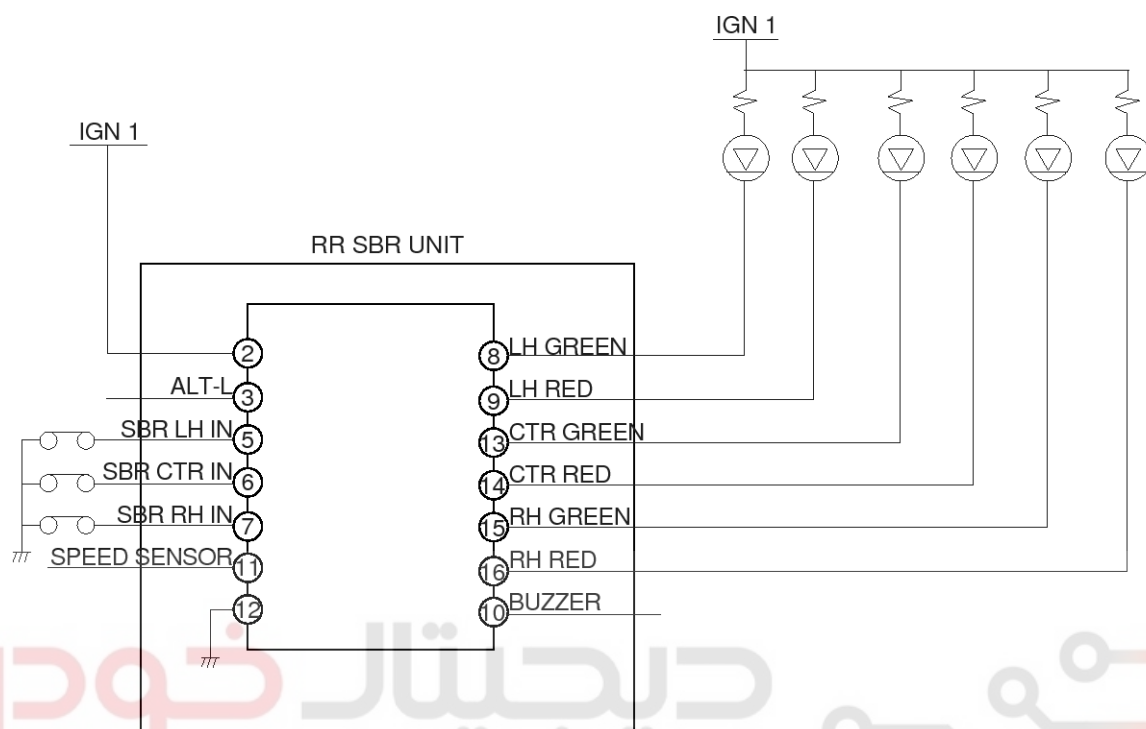
SFD8E8420L

Seat Belt Reminder

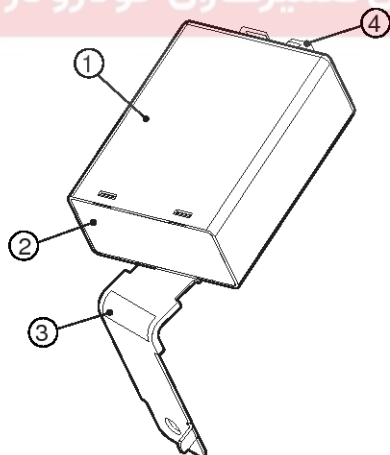
BE-267

Seat Belt Reminder Control Unit

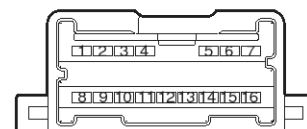
Circuit Diagram



Connector (16Pin)



PIN NO	PIN DESCRIPTION
1	-
2	IGN 1
3	ALT_L
4	-
5	SBR LH IN
6	SBR CTR IN
7	SBR RH IN
8	LH_GREEN
9	LH_RED
10	BUZZER
11	SPEED
12	GND
13	CTR_GREEN
14	CTR_RED
15	RH_GREEN
16	RH_RED



SFD8E421L

BE-268

Body Electrical System

Rear SBR unit Input/Output Voltage Level

Function	Pin Name	State	Voltage Level	
Analog Input	ALT_L	OFF/ON	Low Level	High Level
Frequency			Less than 5V	More than 10V
	SBR LH IN	OPEN/ON	Less than 0.8V	More than 4.3V
	SBR CTR IN	OPEN/ON	Less than 0.8V	More than 4.3V
	SBR RH IN	OPEN/ON	Less than 0.8V	More than 4.3V
	Speed	OPEN/ON	Less than 0.8V	More than 4.3V

Functions

- On the state of IGN1 ON and Alt_L off, SBR (Seat Belt Reminder) light is turned on as follows.
 - S/BELT Belted : GREEN light on
 - S/BELT Unbelted : RED light on
- On the state of (1), if S/BELT state is changed, SBR light is changed as follows.
 - S/BELT Belted → Unbelted : Green → RED
 - S/BELT Unbelted → Belted : RED → GREEN
- On the state of Alt_L ON and Vehicle Speed is less than 9 ± 0.7 KPH, SBR light is turned on as follows.
 - S/BELT Belted : Green light on for 35 ± 3 second after the time of Alt_L ON start
 - S/BELT Unbelted : Red light on for 35 ± 3 second after the time of Alt_L ON start
- On the state of (3) if S/BELT state is changed, SBR light is changed as follows.
 - S/BELT Belted → Unbelted : Red light on for 35 ± 3 second after the time of S/Belt unbelted
 - S/BELT Unbelted → Belted : Green light on for 35 ± 3 second after the time of S/Belt Belted
- On the state of Alt_L ON and Vehicle Speed is more than 9 ± 0.7 KPH, SBR light is turned on as follows.
 - S/BELT Belted : Green light on for 35 ± 3 second in 0.5second after the time of the 9 ± 0.7 KPH
 - S/BELT Unbelted : Red light on for 35 ± 3 second in 0.5second after the time of the 9 ± 0.7 KPH
- On the state of (5) if S/BELT state is changed, SBR light is changed as follows.
 - S/BELT Belted → Unbelted: Red light blinking (1Hz,50% Duty) for 35 ± 3 second after the time of S/Belt Unbelted and Buzzer SIGNAL(ACTIVE LOW : TO BCM) on for 35 ± 3 second
 - However, if any SBR RED LED is blinking ,after the time RED ON, LED blinking(synchronization) on for 35 ± 3 second
 - S/BELT Belted → Unbelted : Green light on for 35 ± 3 second after the time of S/Belt
- More than 9 ± 0.7 KPH to enter less than 9 ± 0.7 KPH , Maintenance former LED ON / Blinking or OFF state.
- On the state of IGN ON → ALT Off, return to (1).
- IGN OFF → LED OFF.
- If all of the rear S/BELTS(3 seat) are belted, all of SBR OFF.0
- On the state of (10) if any S/BELT is unbelted, LED of Belted State Green light on for 35 ± 3 second, On the state of ALT_ON for 35 ± 3 second GREEN light on
- Short Term Deactivation Function Operating → LED OFF (However, each Rear Seat)
 - Operation mode : After S/BELT Belted, S/BELT must be Unbelted → Belted → Unbelted within 9 ± 0.5 seconds
 - Cancellation : On the state of Deactivation mode, S/BELT is Belted or IGN1 OFF

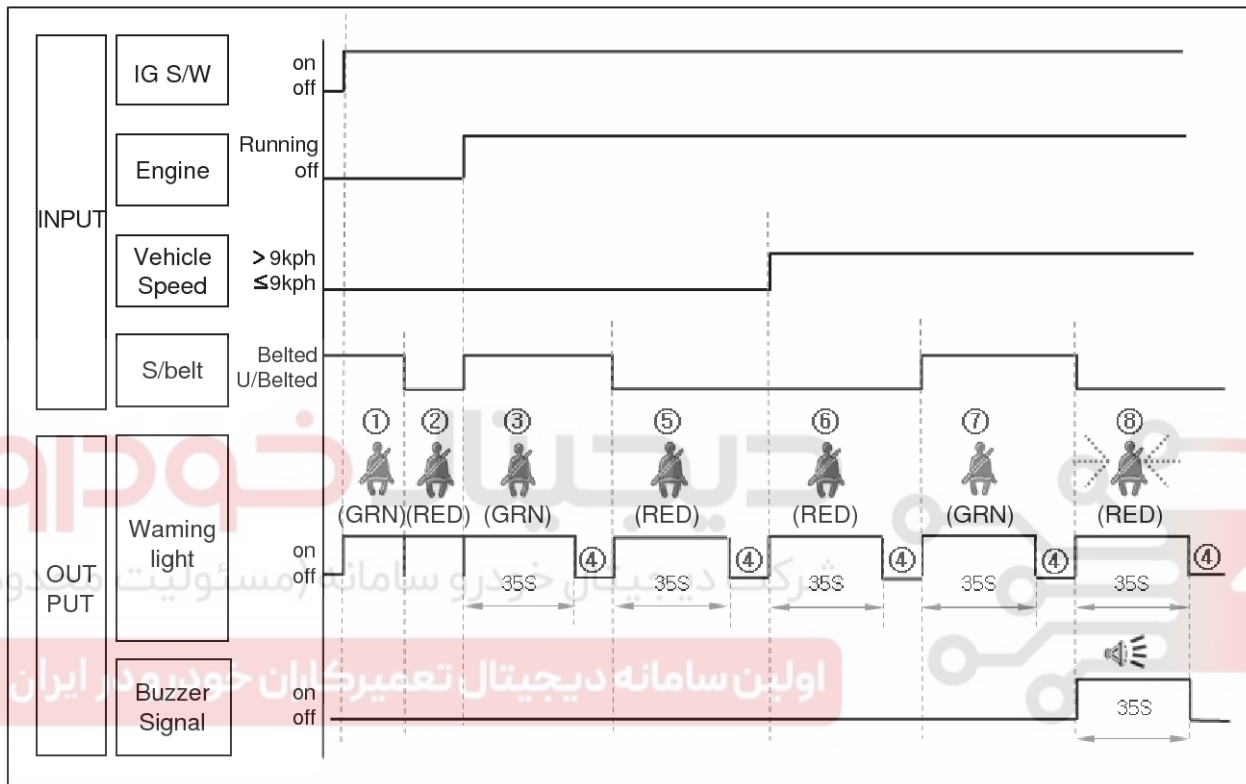
Seat Belt Reminder

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Deactivation Sequence

1. On the state IGN OFF , for clear Deactivation flag and T1 timer(deactivation 9s timer)
2. On the state of IGN ON S/BELT Belted If T1 timer start , IGN ON
3. IGN ON and S/BELT Unbelted → Belted , If Deactivation flag were to clear ,T1 timer start.

4. IGN ON and S/BELT Belted → Unbelted
 - If Deactivation flag were to clear , Deactivation flag set.
 - If Deactivation flag were to set Deactivation state , Deactivation flag is clear, T1 timer is stop and clear.
5. Deactivation flag is clear, T1 timer stop and clear if more than 9second ,T1 timer.



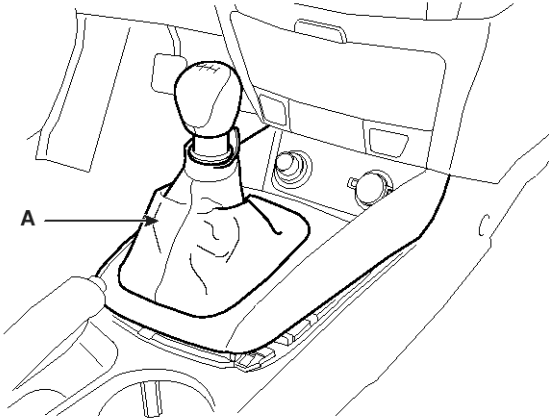
SFDBE8422L

BE-270

Body Electrical System

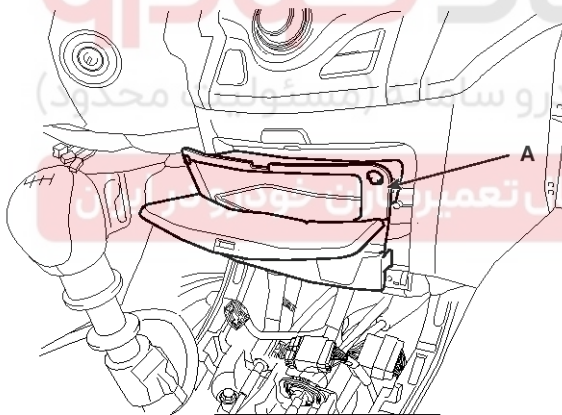
Replacement

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



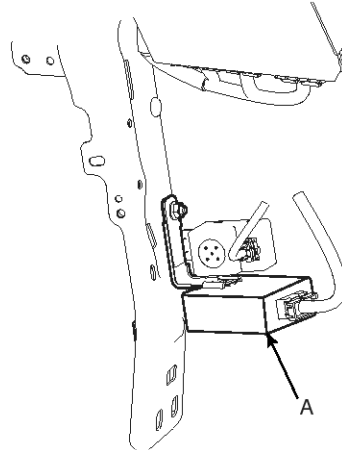
SFDBE8277L

3. Remove the center facia lower tray (A) after loosening 2 screws and disconnecting the connectors.



SFDBE8278L

4. Remove the seat belt reminder unit (A) after loosening the nut and disconnecting the connector.



SFDBE8423L

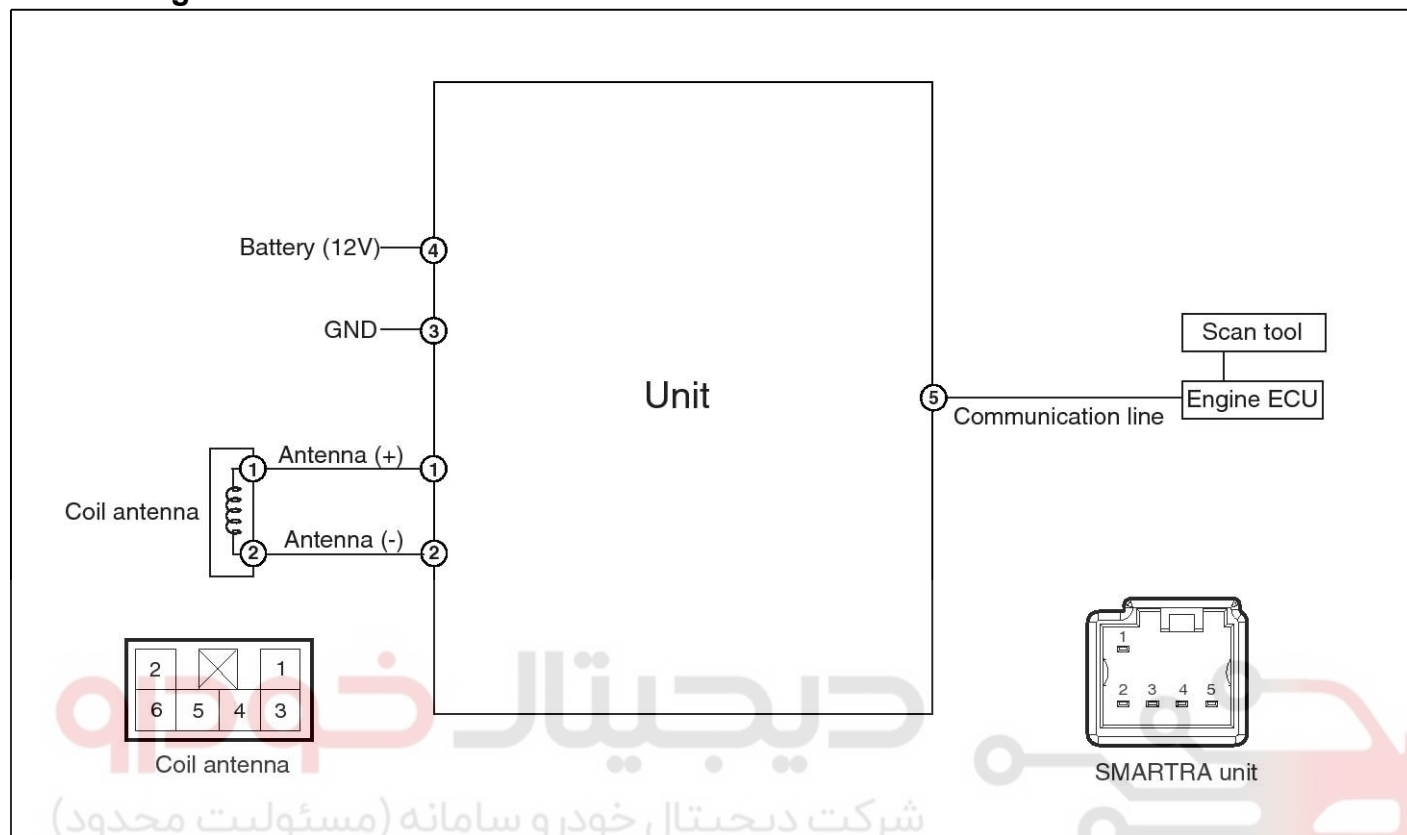
5. Installation is the reverse of removal procedure.

Immobilizer System

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Immobilizer System

Circuit Diagram



SEDBE7543L

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BE-272

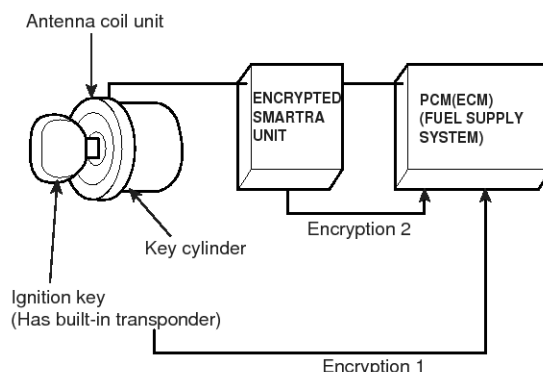
Body Electrical System

Description

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

1. Encrypted SMARTRA type immobilizer

- The SMARTRA system consists of a passive challenge - response (mutual authentication) transponder located in the ignition key, an antenna coil, an encoded SMARTRA unit, an indicator light and the PCM(ECM).
- The SMARTRA communicates to the PCM(ECM) (Engine Control Module) via a dedicated communications line. Since the vehicle engine management system is able to control engine mobilization, it is the most suitable unit to control the SMARTRA.
- When the key is inserted in the ignition and turned to the ON position, the antenna coil sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the SMARTRA unit to the PCM(ECM).
- If the proper key has been used, the PCM(ECM) will energize the fuel supply system. The immobilizer indicator light in the cluster will simultaneously come on for more than five seconds, indicating that the SMARTRA unit has recognized the code sent by the transponder.
- If the wrong key has been used and the code was not received or recognized by the PCM(ECM) the indicator light will continue blinking for about five seconds until the ignition switch is turned OFF.
- If it is necessary to rewrite the PCM(ECM) to learn a new key, the dealer needs the customer's vehicle, all its keys and the Hi-scan (pro) equipped with an immobilizer program card. Any key that is not learned during rewriting will no longer start the engine.
- The immobilizer system can store up to eight key codes.
- If the customer has lost his key, and cannot start the engine, contact Hyundai motor service station.



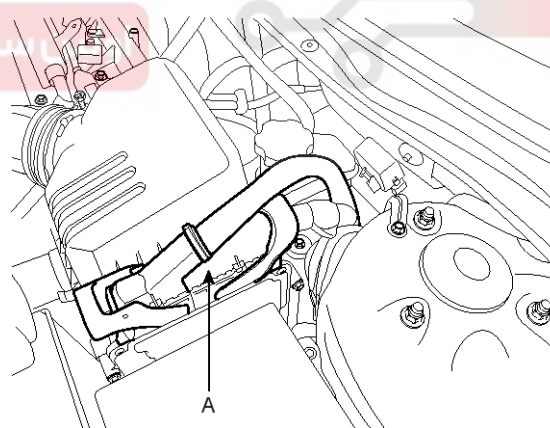
SFD8E8404L

Components Operations

PCM (Power Train Control Module)

1. The PCM(ECM) (A) carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the PCM(ECM) simultaneously. Only if the results are equal, the engine can be started. The data of all transponders, which are valid for the vehicle, are stored in the PCM(ECM).

ERN (Encrypted Random Number) value between EMS and encrypted smartra unit is checked and the validity of coded key is decided by EMS.



SEDBE7547L

Immobilizer System

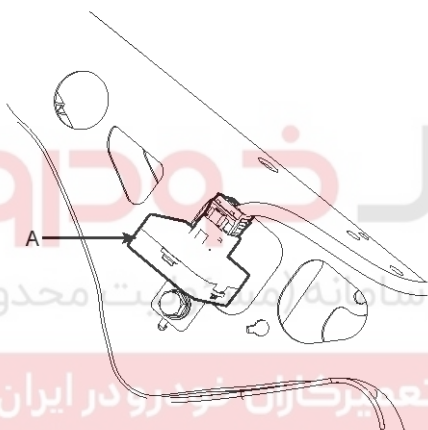
BE-273

Encrypted SMARTRA unit (A)

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

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

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

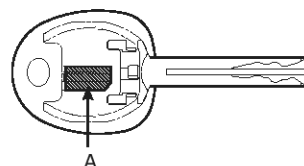


SFDBE8221L

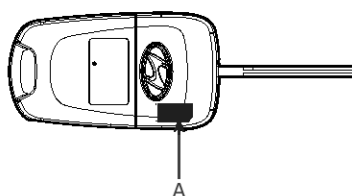
Transponder (Built-in keys)

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

[Master key]



[Folding key]



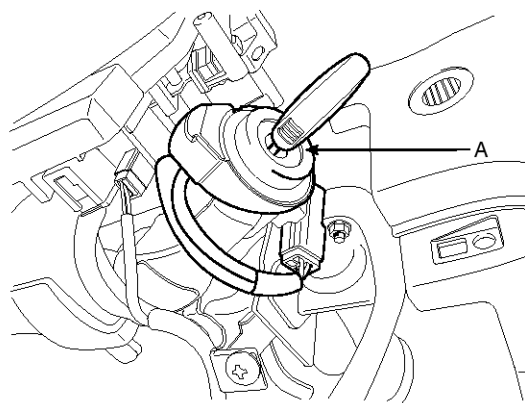
SFDBE8222L

Antenna coil

The antenna coil (A) has the following functions.

- The antenna coil supplies energy to the transponder.
- The antenna coil receives signal from the transponder.
- The antenna coil sends transponder signal to the SMARTRA.

It is located directly in front of the steering handle lock.



SEDBE7541L

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Body Electrical System

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 a 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 a PCM(ECM), the key is considered to be invalid.

The maximum number of taught keys is 8

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



Immobilizer System

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SFDBE8405L

1) PCM(ECM) learnt status.

1. HYUNDAI VEHICLE DIAGNOSIS ▼

MODEL : FD

- 03. AUTOMATIC TRANSAXLE
- 04. ABS/ESP
- 05. SRS-AIRBAG
- 06. FULL AUTO AIR/CON
- 07. ELEC. POWER STEERING
- 08. BODY CONTROL MODULE
- 09. CODE SAVING
- 10. IMMOBILIZER**

SFDBE8223L

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : IMMOBILIZER

- 01. CURRENT DATA
- 02. PASSWORD TEACHING/CHANGING
- 03. TEACHING**
- 04. NEUTRAL MODE
- 05. LIMP HOME MODE
- 06. SMARTRA NEUTRAL

SFDBE8224L

1.3 TEACHING

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : LEARNT

INPUT PIN OF SIX
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

SFDBE8225L

BE-276

Body Electrical System

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

1st KEY TEACHING
ARE YOU SURE ? [Y/N]

CODE : 234567

SFDBE8226L

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

1st KEY TEACHING
COMPLETED

CODE : 234567

SFDBE8227L

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

2st KEY TEACHING
ARE YOU SURE ? [Y/N]

CODE : 234567

SFDBE8228L

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

2st KEY TEACHING
COMPLETED

CODE : 234567

SFDBE8229L

2) PCM(ECM) virgin status.

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

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

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

INPUT PIN OF SIX
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

SFDBE8230L

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

1st KEY TEACHING
ARE YOU SURE ? [Y/N]

CODE : 234567

SFDBE8231L

Immobilizer System

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1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

1st KEY TEACHING
COMPLETED

CODE : 234567

SFDBE8232L

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

2st KEY TEACHING
ARE YOU SURE ? [Y/N]

CODE : 234567

SFDBE8233L

1.3 TEACHING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

2st KEY TEACHING
COMPLETED

CODE : 234567

SFDBE8234L

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 a 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.

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Body Electrical System

1) User password teaching

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

06. SMARTRA NEUTRAL

SFDBE8235L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : VIRGIN

INPUT NEW PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD :

SFDBE8236L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : VIRGIN

INPUT NEW PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD : 2345

SFDBE8237L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : VIRGIN

ARE YOU SURE ? [Y/N]

NEW PASSWORD : 2345

SFDBE8238L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : VIRGIN

COMPLETED
PRESS [ESC] TO EXIT

NEW PASSWORD : 2345

SFDBE8239L

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

Immobilizer System

BE-279

2) User password changing

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD
SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

06. SMARTRA NEUTRAL

SFDBE8235L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT OLD PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

OLD PASSWORD :

SFDBE8241L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT OLD PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

OLD PASSWORD : 2345

SFDBE8242L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT NEW PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD : 1234

SFDBE8243L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

ARE YOU SURE ? [Y/N]

NEW PASSWORD : 1234

SFDBE8244L

1.2 PASSWORD TEACHING/CHANGING

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : LEARNT

COMPLETED
PRESS [ESC] TO EXIT

NEW PASSWORD : 1234

SFDBE8245L

BE-280

Body Electrical System

Limp Home Function

1. LIMP HOME BY TESTER

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

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

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

If the wrong user password is sent, the PCM(ECM) will reject the request of limp home for one hour. Disconnecting the battery or any other action cannot reduce this time. After connecting the battery to the PCM(ECM), the timer starts again for one hour.

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD
SYSTEM : IMMOBILIZER

01. CURRENT DATA
02. PASSWORD TEACHING/CHANGING
03. TEACHING
04. NEUTRAL MODE
05. LIMP HOME MODE
06. SMATRA NEUTRAL

SFDBE8246L

1.5 LIMP HOME MODE

MODEL : FD
SYSTEM : IMMOBILIZER

INPUT PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

PASSWORD :

SFDBE8247L

1.5 LIMP HOME MODE

MODEL : FD
SYSTEM : IMMOBILIZER

INPUT PASSWORD OF FOUR
FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD : 2345

SFDBE8248L

1.5 LIMP HOME MODE

MODEL : FD
SYSTEM : IMMOBILIZER

COMPLETED
PRESS [ESC] TO EXIT

SFDBE8249L

Immobilizer System

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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.).

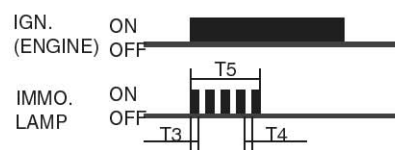
The engine can be started during this time. After the time has elapsed, engine start is not possible. After a new password has been input, the timer (30 sec.) will start again.

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.

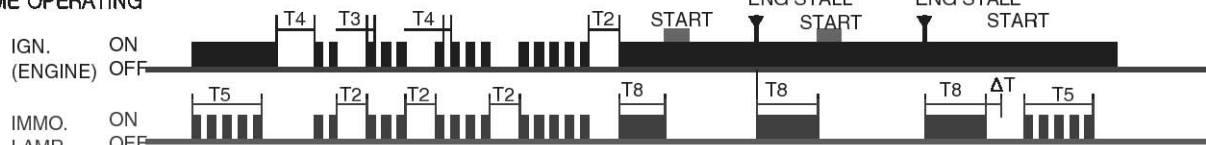
1. NORMAL CONDITION(NO FAILURE)



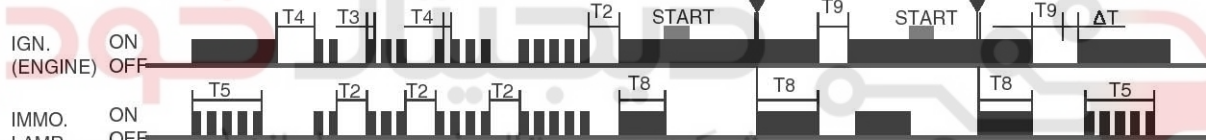
2. IN CASE OF FAILURE(LIMP HOME)



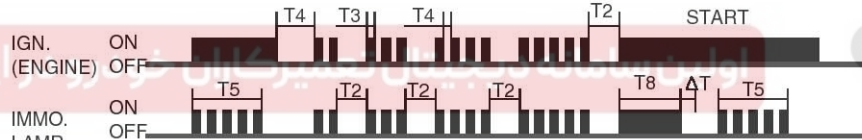
3. LIMP HOME OPERATING



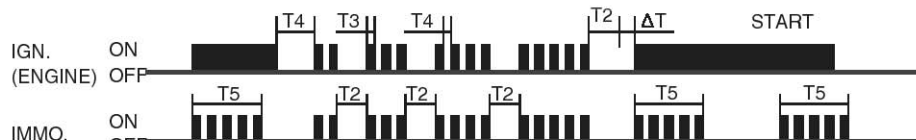
USER PASSWORD : 2345H



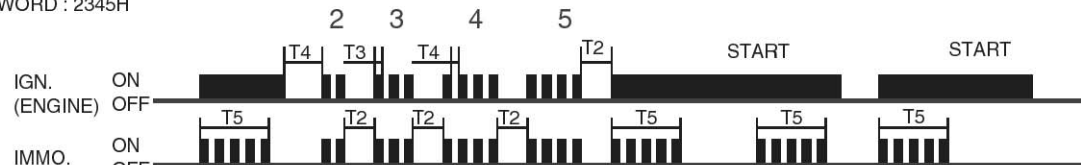
USER PASSWORD : 2345H



USER PASSWORD : 2345H



USER PASSWORD : 2345H



USER PASSWORD : 2345H

NOTE :

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

LTIF740N

BE-282

Body Electrical System

Replacement

Problems And Replacement Parts:

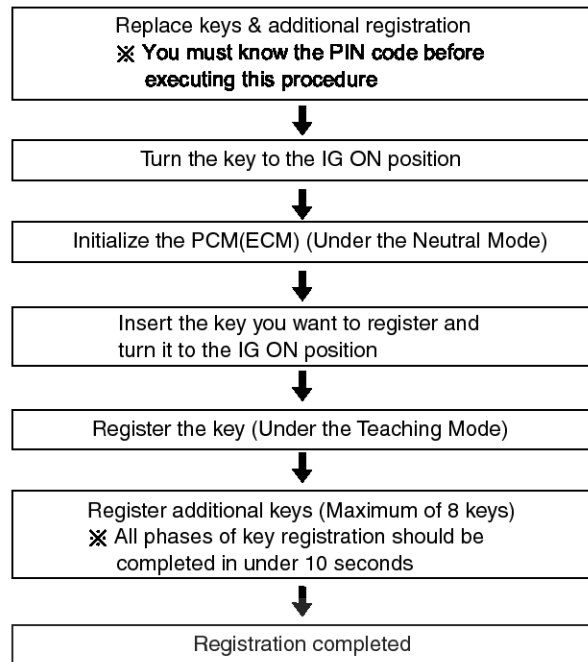
Problem	Part set	Scan tool required?
All keys have been lost	Blank key (4)	YES
Antenna coil unit does not work	Antenna coil unit	NO
ECM does not work	PCM(ECM)	YES
Ignition switch does not work	Ignition switch with Antenna coil unit	YES
Unidentified vehicle specific data occurs	Key, PCM(ECM)	YES
SMARTRA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

Replacement Of ECM and SMARTRA

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

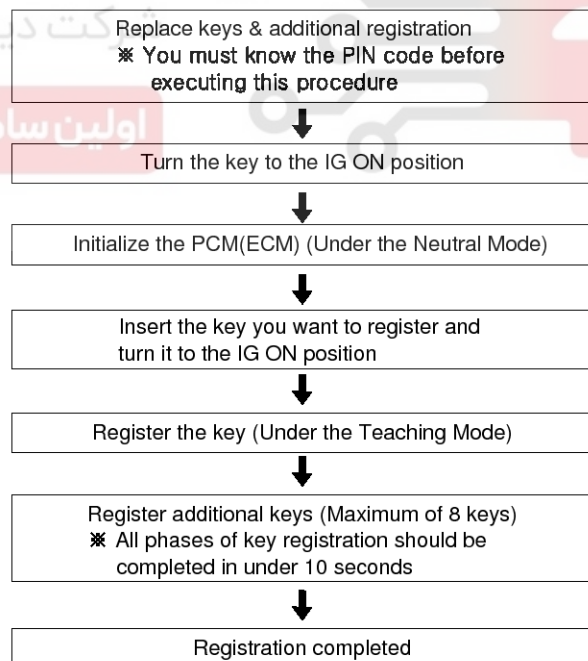
In case of a defective SMARTRA, it needs teaching the smartra. A new SMARTRA device replaces the old one and smartra need teaching.

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



SEDBE7592L

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



SFDBE8406L

Immobilizer System

BE-283

NOTICE

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

NEUTRALIZING OF ECM

The 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.

BE-284

Body Electrical System

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

SFDBE8407L

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

06. SMARTRA NEUTRAL

SFDBE8250L

1.4 EMS NEUTRAL

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : LEARNT

INPUT PIN OF SIX
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

SFDBE8251L

1.4 EMS NEUTRAL

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : NEUTRAL

COMPLETED
PRESS [ESC] TO EXIT

SFDBE8252L

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

06. SMARTRA NEUTRAL

SFDBE8253L

1.1 CURRENT DATA

01. NO. OF LEARNT KEY 0

02. ECU STATUS NEUTRAL

03. KEY STATUS NOT CHECK

[FIX] [SCRN] [FULL] [PART] [GRPH] [HELP]

SEDBE7577L

Immobilizer System

BE-285

NEUTRALIZING OF SMARTRA

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

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

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

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

If wrong vehicle specific data have been sent to 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", "Learnt"
 - Input correct Pin code by tester
- Neutralizing meaning :
 - Vehicle password(DPN Code) & SEK Code deletion.
 - Permission of New DPN Learning.

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

SFDBE8408L

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : FD

SYSTEM : IMMOBILIZER

01. CURRENT DATA

02. PASSWORD TEACHING/CHANGING

03. TEACHING

04. NEUTRAL MODE

05. LIMP HOME MODE

06. SMARTRA NEUTRAL

SFDBE8409L

1.6 SMARTRA3 NEUTRAL

MODEL : FD

SYSTEM : IMMOBILIZER

STATUS : LEARNT

INPUT PIN OF SIX
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

SFDBE8410L

BE-286

Body Electrical System

1.6 SMARTRA3 NEUTRAL

MODEL : FD
SYSTEM : IMMOBILIZER
STATUS : NEUTRAL

COMPLETED
PRESS [ESC] TO EXIT

SFDBE8411L

1.1 CURRENT DATA

01. NO. OF LEARNT KEY 0
02. EMS STATUS
03. KEY STATUS VIRGIN
04. SMARTRA3 STATRS

[FIX] [SCRN] [FULL] [PART] [GRPH] [HELP]

SFDBE8412L

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



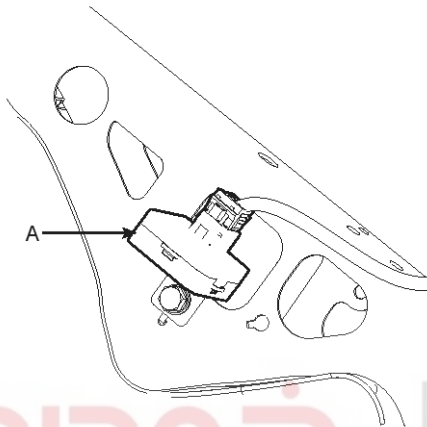
Immobilizer System

BE-287

Immobilizer Control Unit

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad.
(Refer to the BD group - "Crash pad")
3. Disconnect the 5P connector of the SMARTRA unit and then remove the SMARTRA unit (A) after loosening a nut.



SFDBE8221L

Installation

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



دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

BE-288

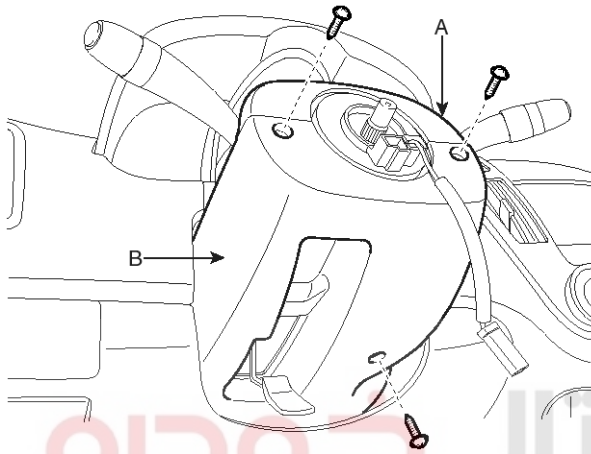
Body Electrical System

Antenna Coil

Removal

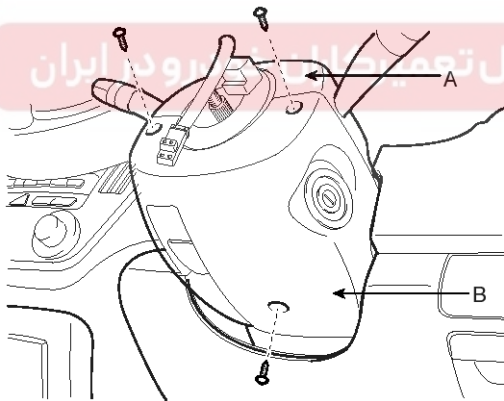
1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper (A) and lower (B) shrouds.
(Refer to the ST group - "Steering column and shaft").

[LHD]



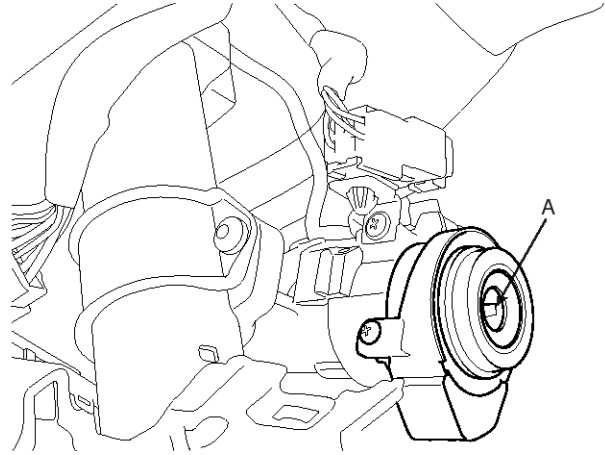
SEDBE7590L

[RHD]



SEDBE7590R

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



SFD8E8310L

Installation

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

Immobilizer System

BE-289

DIAGNOSIS OF IMMOBILIZER FAULTS

- Communication between the ECM and the SMARTRA.
- Function of the SMARTRA and the transponder.

- Data (stored in the ECM related to the immobilizer function.

The following table shows the assignment of immobilizer related faults to each type:

Immobilizer Related Faults	Fault types	Diagnostic codes
PCM(ECM) fault	1. Non-Immobilizer-EMS connected to an Immobilizer	P1610
Transponder key fault	1. Transponder not in password mode 2. Transponder transport data has been changed.	P1674 (Transponder status error)
Transponder key fault	1. Transponder programming error	P1675 (Transponder programming error)
SMARTRA fault	1. Invalid message from SMARTRA to PCM(ECM)	P1676 (SMARTRA message error)
SMARTRA fault	1. Virgin SMARTRA at learnt EMS 2. Neutral SMARTRA at learnt EMS 3. Incorrect the Authentication of EMS and SMARTRA 4. Locking of SMARTRA	P169A (SMARTRA Authentication fail)
SMARTRA fault	1. No response from SMARTRA 2. Antenna coil error 3. Communication line error (Open/Short etc.) 4. Invalid message from SMARTRA to PCM(ECM)	P1690 (SMARTRA no response)
Antenna coil fault	1. Antenna coil open/short circuit	P1691 (Antenna coil error)
Immobilizer indicator lamp fault	1. Immobilizer indicator lamp error (Cluster)	P1692 (Immobilizer lamp error)
Transponder key fault	1. Corrupted data from transponder 2. More than one transponder in the magnetic field (Antenna coil) 3. No transponder (Key without transponder) in the magnetic field (Antenna coil)	P1693 (Transponder no response error/invalid response)
PCM(ECM) fault	1. Request from PCM(ECM) is invalid (Protocol layer violation- Invalid request, check sum error etc.)	P1694 (PCM(ECM) message error)
PCM(ECM) internal permanent memory (EEPROM) fault	1. PCM(ECM) internal permanent memory (EEPROM) fault 2. Invalid write operation to permanent memory (EEPROM)	P1695 (PCM(ECM) memory error)
Invalid key fault	1. Virgin transponder at PCM(ECM) status "Learnt" Learnt (Invalid) Transponder at PCM(ECM) status "Learnt"(Authentication fail)	P1696 (Authentication fail)
Hi-Scan fault	1. Hi-Scan message error	P1697
Locked by timer	1. Exceeding the maximum limit of Twice IGN ON (≥ 32 times)	P1699 (Twice IG ON over trial)

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Body Electrical System

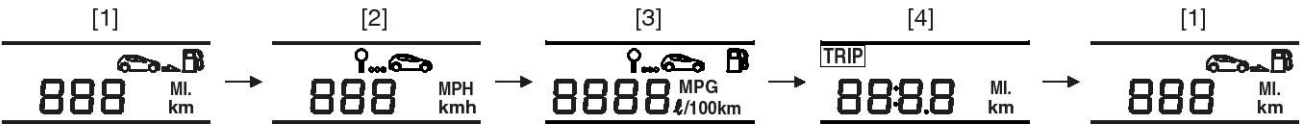
Trip Computer

Description

The trip computer displays information related to driving, including distance to empty, average speed and average fuel consumption on this display.

To change the function as described below, push the mode button less than 2 second.

Distance to empty [1] → Average fuel consumption [2] → Average speed [3] → TRIP [4] → Distance to empty [1].

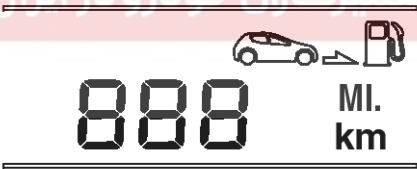


SFDBE8254L

OPERATION
FUNCTION

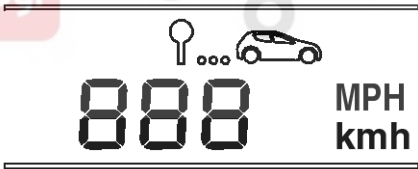
Item	Function	Detection	Remark
Distance to empty	The estimated distance indication to empty	Fuel sender	1Km(1mile)
Average fuel consumption	The average fuel consumption indication since the last driving time reset	Fuel sender	0.1L
Average speed	The average speed indication since the last driving time reset	Speed sensor	1Km/h(1MPH)

Distance to empty mode



SFDBE8255L

Average fuel consumption mode



SFDBE8256L

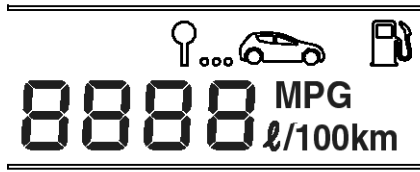
1. Description
- This mode indicates the estimated distance to empty based on the current fuel in the fuel thank and the amount of fuel delivered to the engine.
2. Indication range : 50Km ~ 999Km(30miles ~ 999miles)
3. Indication division : 1Km(mile)
- When the remaining distance is below 50Km (30miles), a blinking "---" symbol will be displayed. (Blinking interval : 1.0sec.)
4. Data clear : at battery + off

1. Description
- This mode calculates the average fuel consumption from the total used fuel and the distance after reconnecting the batter or resetting the data.
2. Indication range : 0.1L ~ 199.9L/100Km or MPG(mile per gallon)
3. Indication division : 0.1L/100Km(MPG)
- When there is no pulse signal on vehicle speed after reconnecting the battery or resetting the data, "---L/100Km (MPG)" symbol will be displayed.
4. Indication interval : 10 sec.
5. Data clear: press the reset button for more than 1 sec. or Battery + on

Trip Computer

BE-291

Average speed mode



SFD8E8257L

1. Description

This mode indicates the estimated speed by the driving distance to the indication timing after reconnecting the batter or resetting the data.

2. Indication range : 0 Km/h(MPH) ~ 999 Km/h(MPH)

3. Indication division : 1Km/h(MPH)

When the battery is reconnected or the data are reset, "---" symbol will be displayed until display timing.

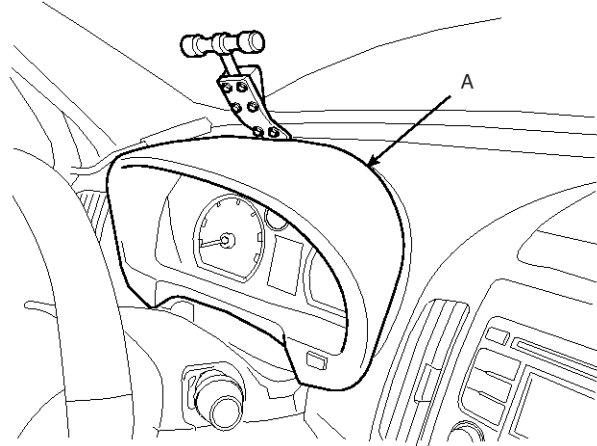
4. Indication interval : 10 sec.

5. Data clear: press the reset button for more than 1 sec. or Battery + on

Removal

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

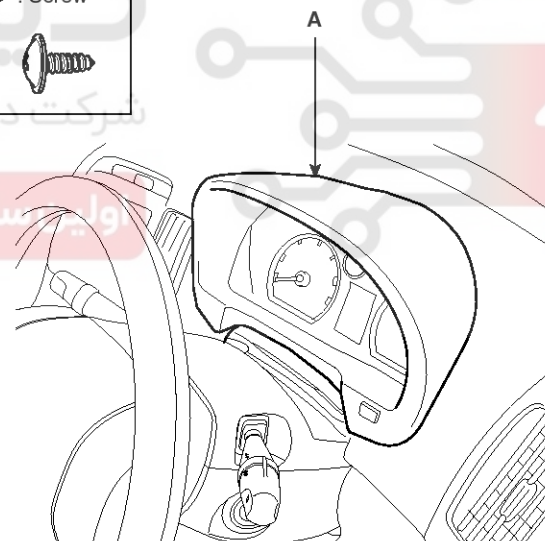
[LHD]



SFD8E8186L

[RHD]

▷ : Screw



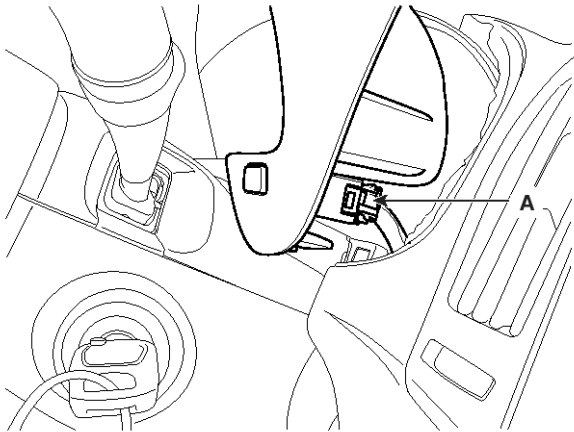
SFD8E8187L

BE-292

Body Electrical System

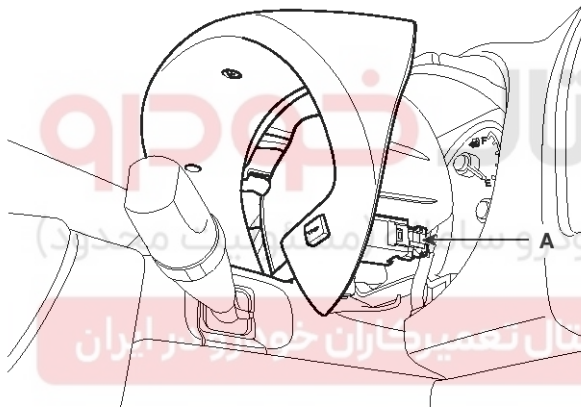
3. Disconnect the trip computer connector (A).

[LHD]



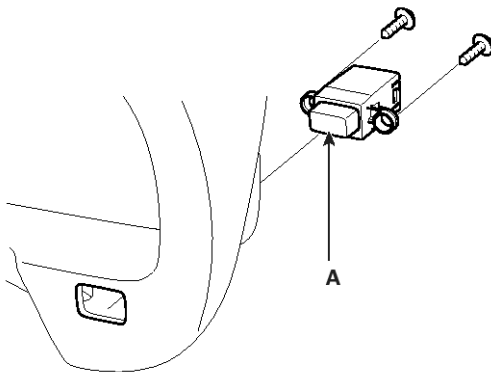
SFDBE8260L

[RHD]



SFDBE8261L

4. Remove the trip computer switch (A) from the cluster facia panel after loosening 2 screws.



SFDBE8262L

Installation

1. Install the trip computer to the cluster facia panel.
2. Install the cluster facia panel.

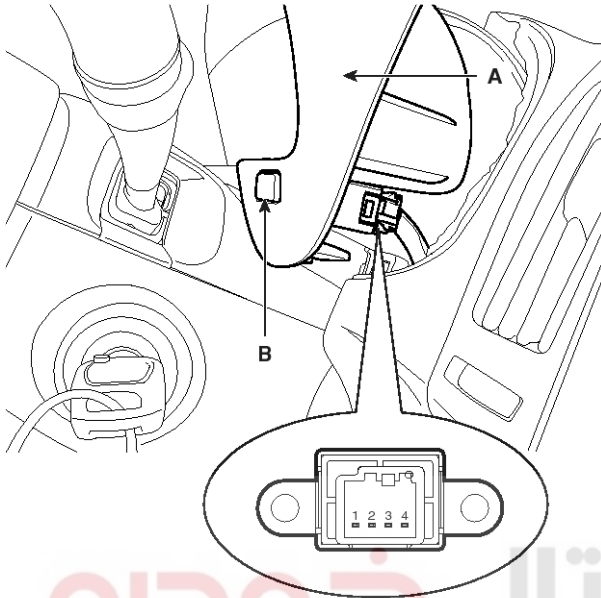
Trip Computer

BE-293

Inspection

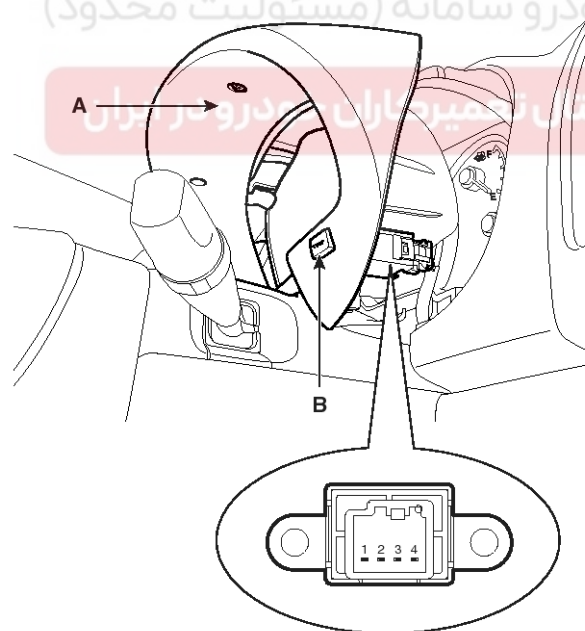
1. Remove the cluster facia panel (A).
2. Operate the switch (B) and check for continuity between terminals with an ohmmeter.

[LHD]

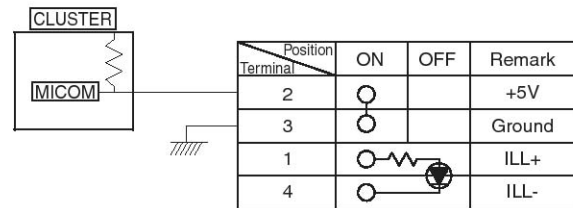


SFDBE8263L

[RHD]



SFDBE8264L



SFDBE8265L

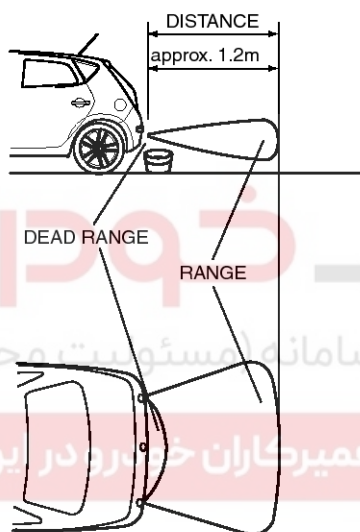
BE-294

Body Electrical System

Rear Parking Assist System

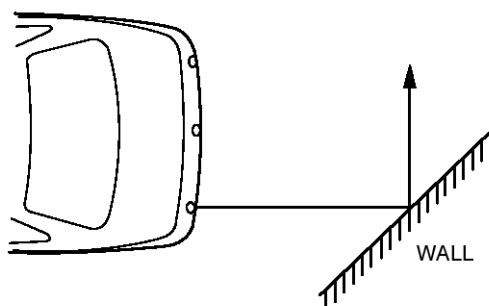
WARNING

1. Range detected by back sensors is limited.
Watch back before reversing.
2. There is a blind spot below the bumper. Low objects (for example boundary barrier) may be detected from minimum 1.5m away unable to detect at nearer.
3. Besides there are some materials unable to be detected even in detection range as follows.
 - 1) Needles, ropes, rods, or other thin objects.
 - 2) Cotton, snow and other material absorbing ultrasonic wave (for example, fire extinguisher device covered with snow)



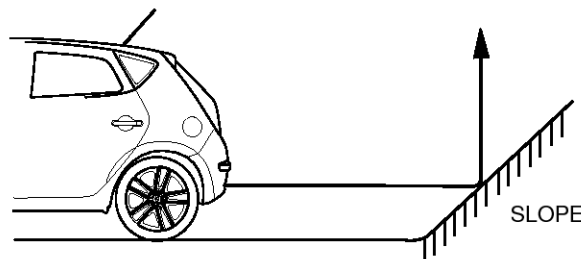
SFDBE8269L

4. Reversing toward the sloped walls.



SFDBE8270L

5. Reversing toward the sloped terrain.



SFDBE8271L

6. False alarm may operate in the following condition: irregular road surface, gravel road, sloped road and grass. Upon alarm generation by grass the alarm may be generated by rock behind grass. Be sure to check for the safety.

Ultrasonic sensor cannot discriminate among glass, stake, and rock.

7. Sensors may not operate correctly in the below conditions.

Ensure sensors clean from mud or dirt.

- 1) When spraying the bumper, the sensor opening is covered with something in order not to be contaminated. If sensor opening is contaminated with mud, snow, or dirt, detection range will be reduced and alarm may not be generated under the crash condition. Dirt accumulated on the sensor opening shall be removed with water.
Do not wipe or scrape sensor with a rod or a hard object.
- 2) If the sensor is frozen, alarm may not operate until sensor thaws.
- 3) If a vehicle stays under extremely hot or cold environment, the detection range may be reduced. It will be restored at the normal temperature.
- 4) When heavy cargo is loaded in tailgate, it changes the vehicle balance, which reduces the detection range.
- 5) When other vehicle's horn, motor cycle engine noise, or other ultra-sonic wave sources are near.
- 6) Under heavy rain.

Rear Parking Assist System

BE-295

- 7) When reversing towards a vertical wall and the gap between the vehicle and the wall is 15cm. (Alarm may sound despite of no barrier)
- 8) If radio antenna is installed at the rear.
- 9) If the vehicle rear wiring is re-routed or electrical component is added at the rear part.
- 10) Vehicle balance is changed due to the replacement of the rear spring.
- 11) The unit will operate normally when the vehicle speed is 5km/h or less. Above the speed, the unit may not operate normally.
8. Check the rear bumper for installation condition and deformation. If installed improperly or the sensor orientation is deviated, it may cause malfunction.
9. Be careful not to apply shock during sensor installation on the transmission or reception unit.
10. When adding electrical devices or modifying harness at the rear body of the vehicle, ensure not the change the transmission and reception unit wiring. Tagging the transmission side and reception side, it may cause malfunction.
11. High power radio transmitter (above 10W) may cause malfunction. Do not install it on the vehicle.
12. Be careful that heating or sharp objects shall not touch ultrasonic sensor surface.
Besides do not cover the sensor opening or press the sensor.



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Body Electrical System

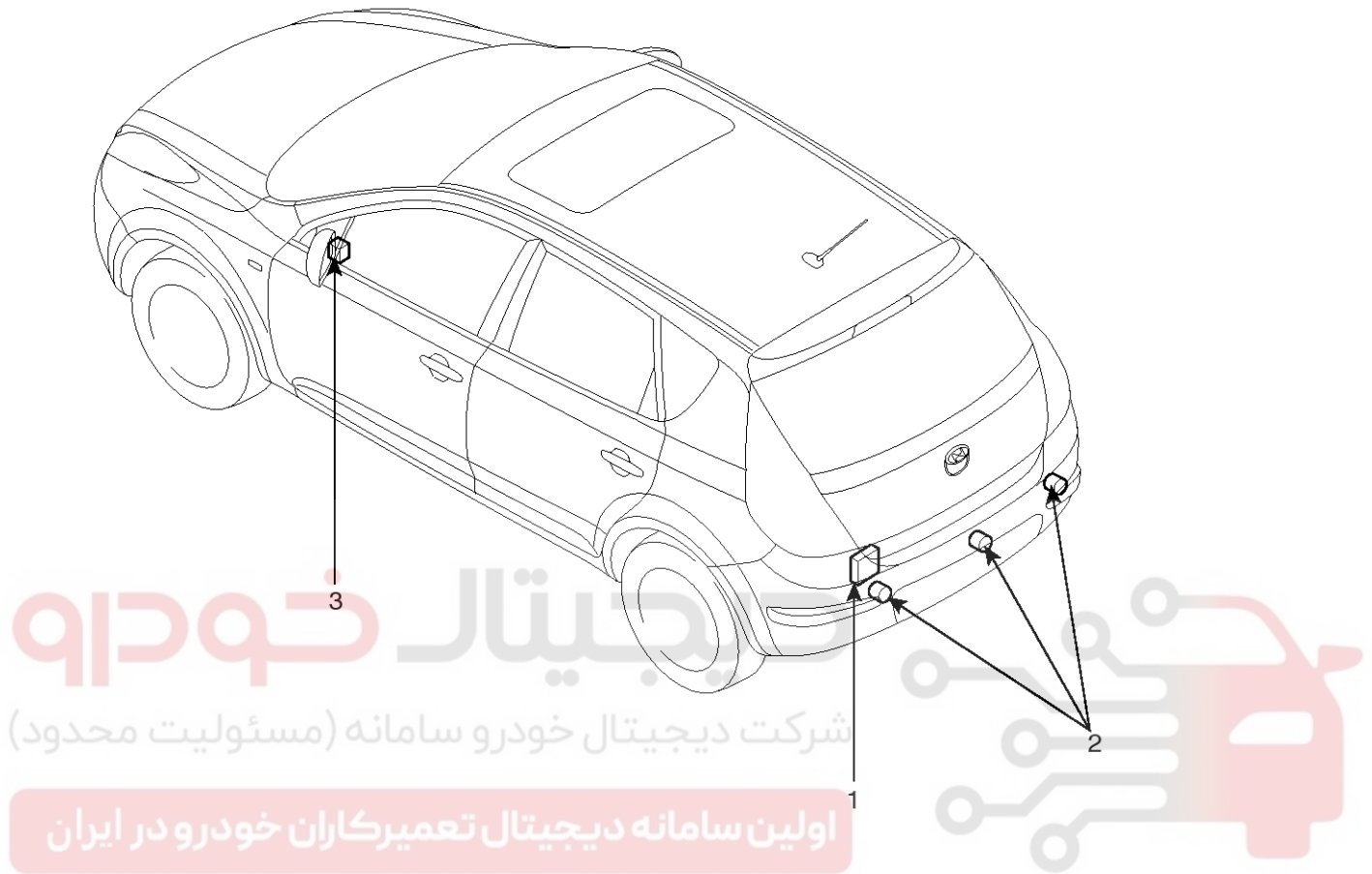
SPECIFICATION

Item		Specification
Rear parking assist system control unit	Voltage rating	DC 12V
	Operation voltage	DC 9 ~ 16 V
	Operation temperature	-30°C ~ + 80°C
	Operation current	MAX 500 mA
	Operation frequency	40 ± 5 KHz
	Detective method	Direct and indirect detection
Ultrasonic sensor	Voltage rating	DC 8 V
	Detecting range	40 cm ~ 120 cm
	Operation voltage	DC 9 ~ 16 V
	Operation current	MAX 20 mA
	Operation temperature	-30°C ~ + 80°C
	Beam width	Horizontal : 100±5°(70cm), Vertical : 60±5°(50cm)
	Number of sensors	4 (Right, center, Left)
Piezo buzzer	Voltage rating	DC 12 V
	Operation voltage	DC 9 ~ 16 V
	Operation temperature	-30°C ~ + 80°C
	Operation current	MAX 60 mA
	Sound, tone	Oscillation frequency : 2.2±0.5 KHz Sound level : MIN 65 dB (DC 13V /m)

Rear Parking Assist System

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Component Location



1. Rear parking assist system control unit
2. Ultrasonic sensor

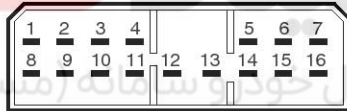
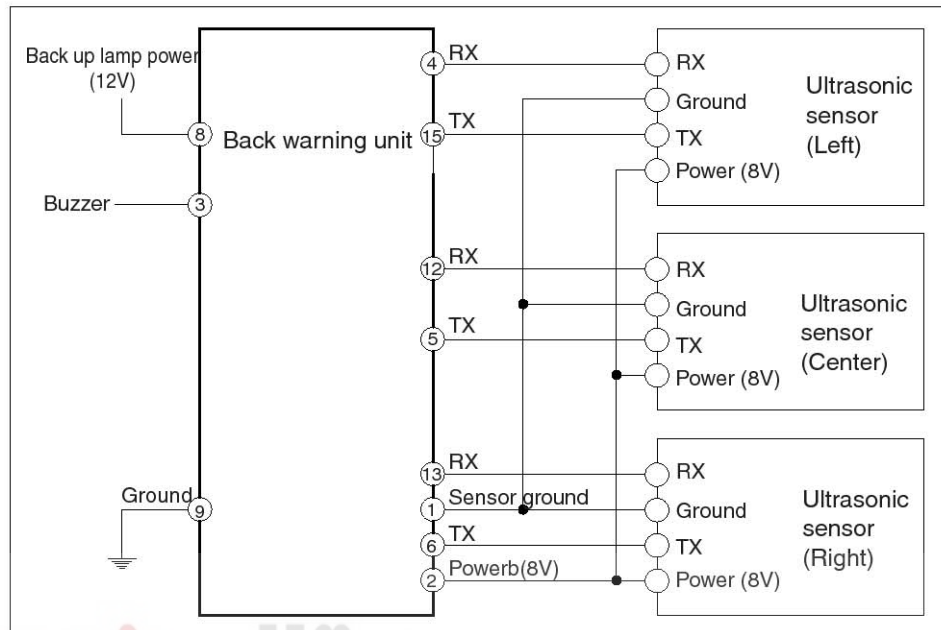
3. Buzzer

SFDBE8266L

BE-298

Body Electrical System

Circuit Diagram



(Rear parking assist system control unit connector)



(Ultrasonic sensor connector)

Pin configuration

Pin No.	Signal	Test : Desired result
1	Sensor ground	0V
2	Sensor power	8V (While operating)
3	Buzzer	0V (While operating)
4	RX - Sensor(Left)	0~1V voltage change (Inspect waveform)
5	TX - Sensor(Center)	0~3V voltage change (Inspect waveform)
6	TX - Sensor(Right)	0~3V voltage change (Inspect waveform)
8	Back up lamp power	12V (While shifting to "R")
9	Ground	0V
12	RX - Sensor(Center)	0~1V voltage change (Inspect waveform)
13	RX - Sensor(Right)	0~1V voltage change (Inspect waveform)
15	TX - Sensor(Left)	0~3V voltage change (Inspect waveform)

PIN NO	SIGNAL
1	TX
2	RX
3	8V
4	GND

SFDBE8267L

Description

When reversing, the driver is not easy to find objects in the blind spots and to determine the distance from the object. In order to provide the driver safety and convenience, rear parking assist system will operate

upon shifting to "R" Ultrasonic sensor will emit ultrasonic wave rearward and detect the reflected wave. Control unit will calculate distance to the object using the sensor signal input and output buzzer alarm in three steps (first, second and third alarm).

Rear Parking Assist System

BE-299

ALARM RANGE

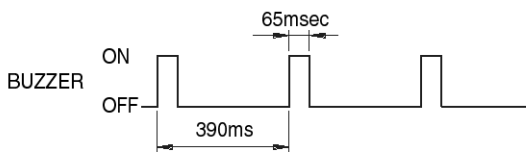
Upon detecting an object at each range out of 3 ranges as stated below within the operation range, it will generate alarm.

First alarm : Object comes near to the sensor located at the rear of vehicle, within 81-120cm \pm 15cm

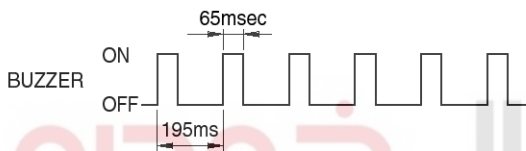
Second alarm : Object comes near to the sensor located at the rear of vehicle, within 41-80cm \pm 10cm

Third alarm : Object comes near to the sensor located at the rear of vehicle, within 40cm \pm 10cm

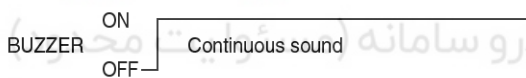
First



Second



Third



NOTICE

1. Time tolerance of the above waveform : Time \pm 10%
2. At nearer distance than 40cm, detection may not occur.
3. Alarm will be generated with vehicle reversing speed 10km/h or less.

For moving target, maximum operation speed shall be target approach speed of 10km/h.

4. When the vehicle or the target is moving, sequential alarm generation or effective alarm may be failed.
5. Misalarm may occur in the following conditions.

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

ETRF976C

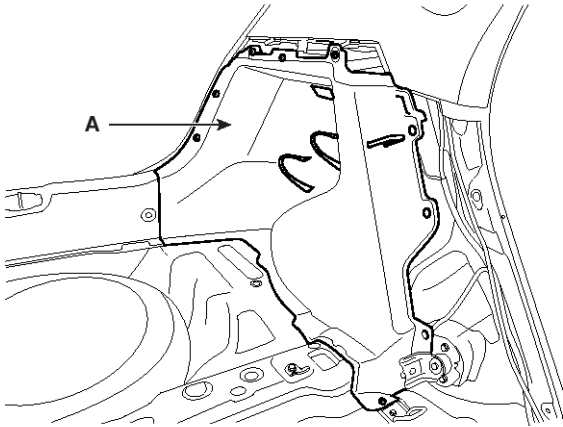
BE-300

Body Electrical System

Rear Parking Assist System Control Unit

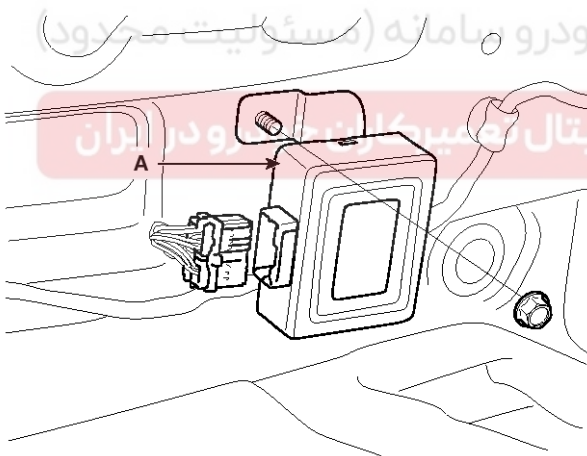
Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the left side trim (A) of the trunk room.
(Refer to the BD group - "Interior trim")



SFDBE8272L

3. Loosen a mounting nut and disconnect the connector.
4. Remove the rear parking assist system control unit (A).



SFDBE8273L

5. Installation is the reverse of removal procedure.



Rear Parking Assist System

BE-301

Parking Assist Sensor

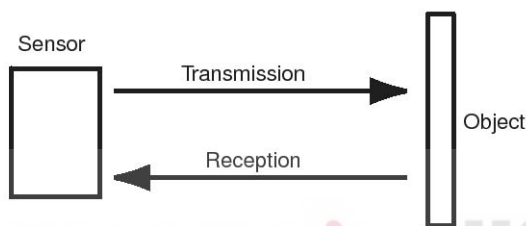
OPERATION PRINCIPLE

The sensor emits ultrasonic wave to the objects, and it measures the time until reflected wave returns, and calculates the distance to the object.

DISTANCE DETECTION TYPE

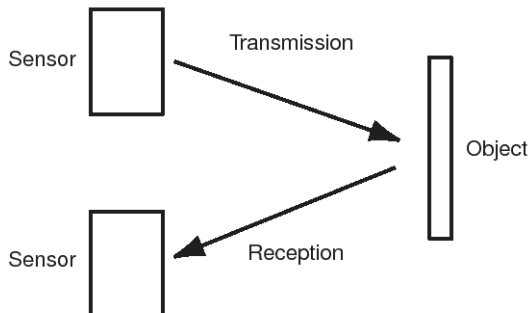
Direct detection type and indirect detection type are used together for improving effectiveness of the detection.

1. Direct detection type: One sensor transmits and receives signals to measure the distance.



ETRF762A

2. Indirect detection type: One sensor transmits signals and the other sensor receives the signals to measure the distance.



ETRF762B

MEASUREMENT PRINCIPLE

Rear parking assist system is a complementary device for reversing. Rear parking assist system detects objects behind vehicle and provides the driver with buzzer alarm finding objects in a certain area, using ultrasonic wave propagation speed and time.

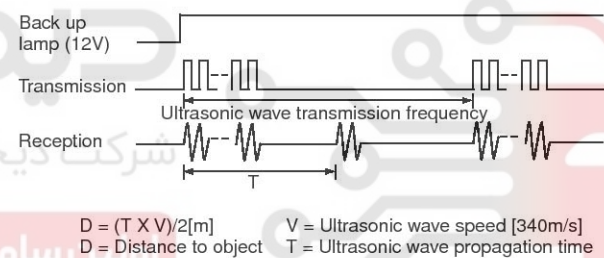
The propagation speed formula of ultrasonic wave in air is following :

$$v = 331.5 + 0.6t \text{ (m/s)}$$

v = ultrasonic wave propagation speed

t = ambient temperature

The basic principle of distance measurement using ultrasonic wave is :



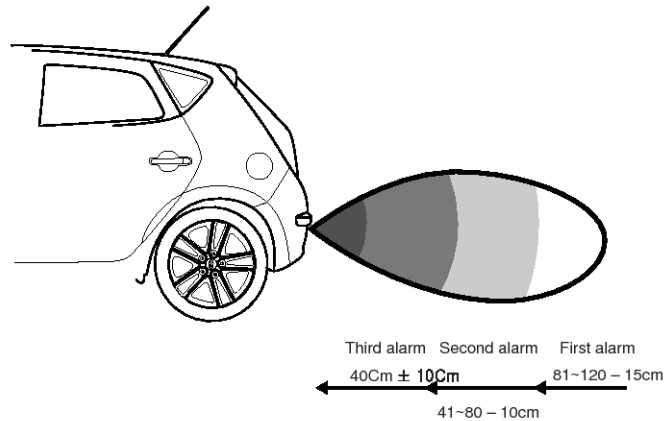
ETRF762C

BE-302

Body Electrical System

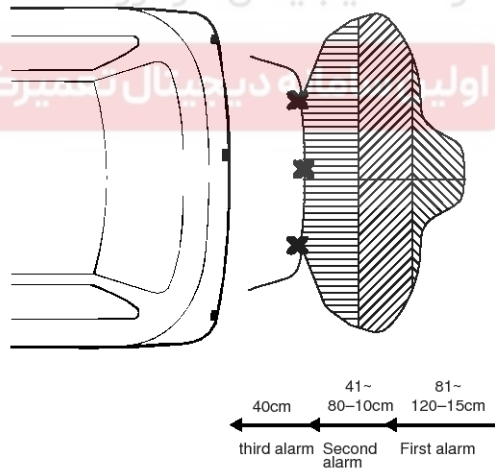
Sensor detection range

[Vertical range]



1. Distance tolerance(Measured at the front of sensor)
 81~120cm : -15cm
 41~80cm : -10cm
 40cm : -10cm
2. Detection tolerance
 At 40cm : 45° - 15°
 At 80cm : 30° - 15°
 At 120cm : 20° - 15°
3. At nearer distance than 40cm detection may occur.
4. Measurement condition : Room temperature (20℃), 140mm diameter, 1m length rod.

[Horizontal range]



1. Distance tolerance(Measured at the front of sensor)
 81~120cm : -15cm
 41~80cm : -10cm
 40cm : -10cm
2. Detection tolerance
 At 80cm : 90° + 20°
 At 120cm : 10° + 20°
3. At nearer distance than 40cm detection may occur.
4. Measurement condition : Room temperature (20℃), 140mm diameter, 1m length rod.

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Rear Parking Assist System

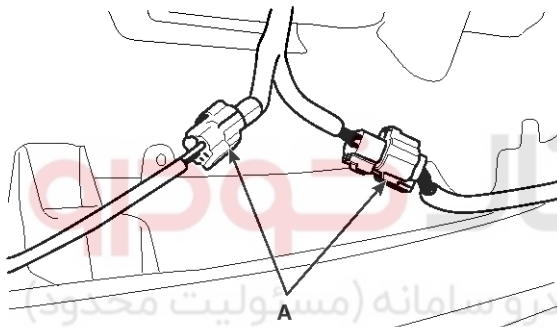
BE-303

NOTICE

1. 14cm (dia.) plastic rod is used for the test target.
2. The test result may differ by a different target object.
3. Detection range may be reduced by dirt accumulated on sensor, and extremely hot or cold weather.
4. The following object may not be detected.
 - Sharp object or thin object like rope.
 - Cotton sponge, snow or other materials absorbing sonic wave.
 - Smaller objects than 14cm (dia.), 1m length.

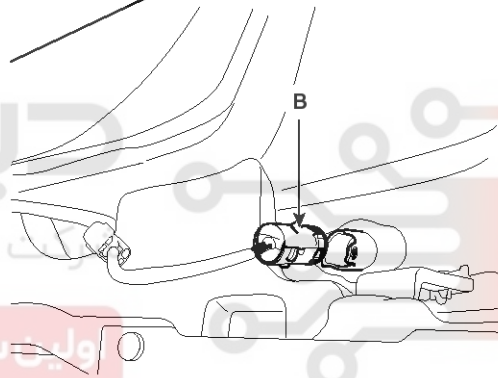
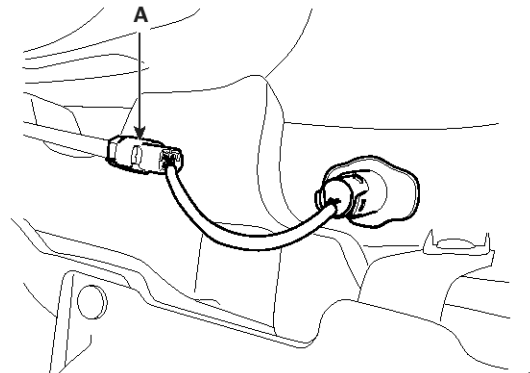
Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the rear bumper (Refer to the Body group - "Rear bumper")
3. Disconnect the connectors (A) from the rear bumper.



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4. Disconnect the sensor connector (A) at the inside of the rear bumper, and then remove the sensor (B) from the housing.



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5. Installation is the reverse of removal procedure.

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Body Electrical System

Buzzer

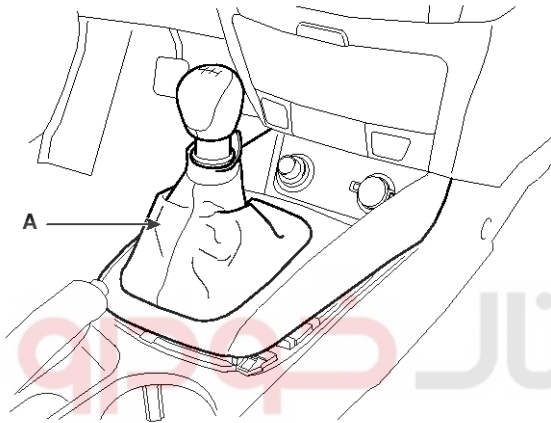
Inspection

Test the buzzer by connecting battery voltage to the 1 terminal and ground the 2 terminal.

The buzzer should make a sound. If the buzzer fails to make a sound, replace it.

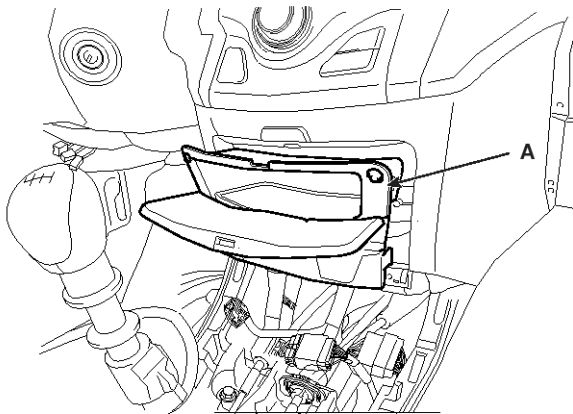
Replacement

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



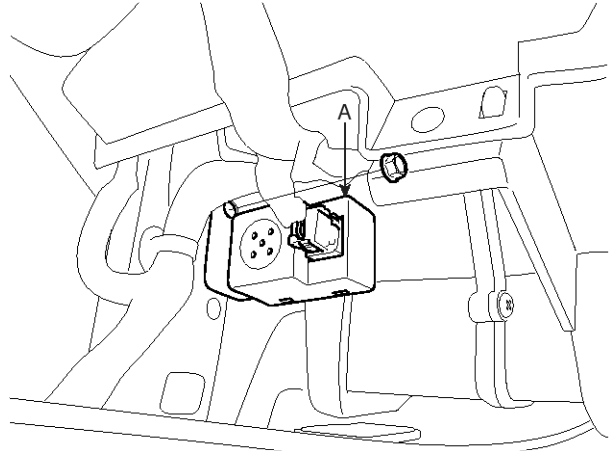
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3. Remove the center facia lower tray (A) after loosening 2 screws and disconnecting the connectors.



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4. Remove the buzzer (A) after loosening the nut and disconnecting the 2P connector.



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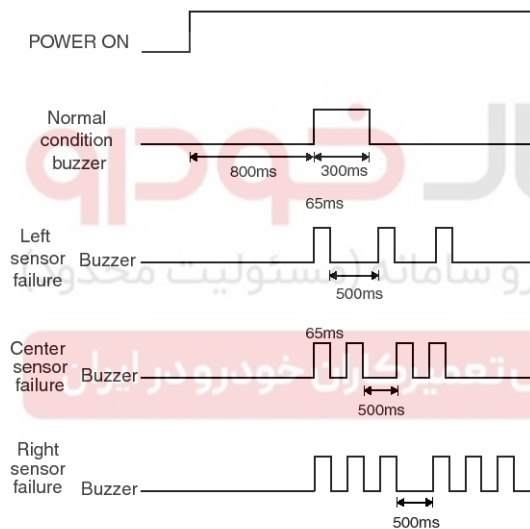
5. Installation is the reverse of removal procedure.

Rear Parking Assist System

BE-305

DIAGNOSIS

1. Operate with ignition switch on and shift the lever to position "R"
2. Then it checks the system condition.
If no trouble, it generates buzzer alarm sound for 0.3 seconds after 0.8 seconds from power approval. In case of system failure, then it indicates the failed point as follows.
 - Left sensor failure : beep-beep-beep
 - Center sensor failure : beep beep-beep beep-beep beep
 - Right sensor failure: beep beep beep-beep beep beep-beep beep beep
3. Alarm is generated 3 times sequentially.
4. Effective operation range is 10km/h or less for the vehicle speed.



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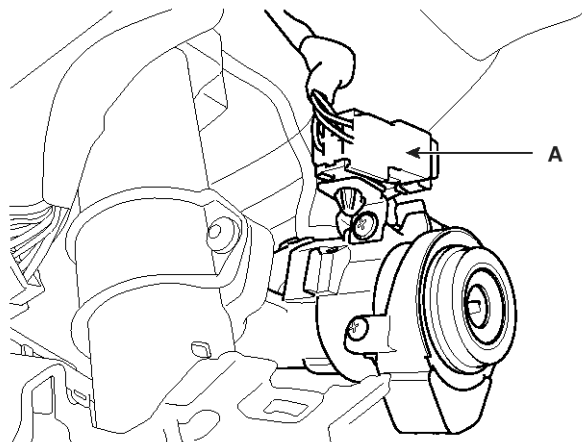


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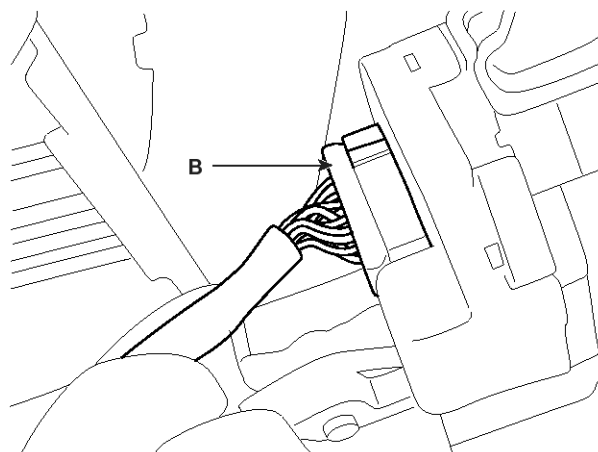
Body Electrical System

Ignition Switch Assembly

Inspection



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SFDBE8425L

1. Disconnect the ignition switch connector (B) and key warning switch connector (A) from under the steering column.
2. Check for continuity between the terminals.
3. If continuity is not specified, replace the switch.

POSITION	KEY	IGNITION SWITCH (B)						STEERING		KEY WARNING SWITCH (A)		KEY HOLE ILLUMINATION(A)	
		2	4	6	5	3	1	TRAVEL	TRAVEL	5	6	3	4
LOCK	REMOVAL							LOCK					
								LOCK	UNLOCK				
ACC	INSERT	○—○						UNLOCK		○—○			
ON		○—○—○			○—○								
START		○—○—○			○—○—○								

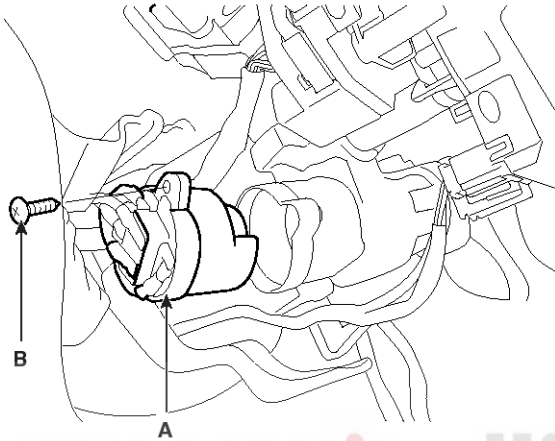
SFDBE8426L

Ignition Switch Assembly

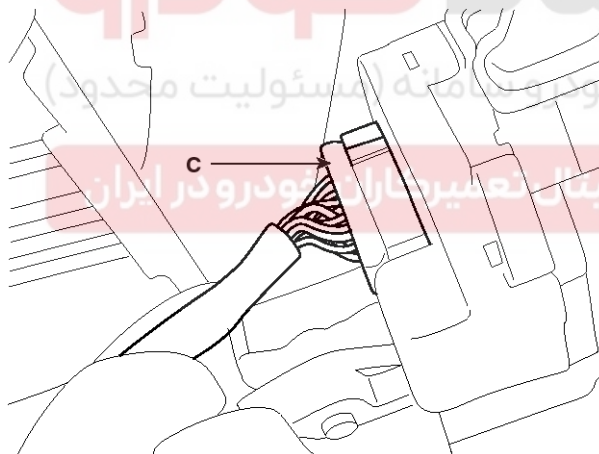
BE-307

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds (Refer to ST group - "Steering column and shaft").
3. Remove the ignition switch (A) after loosening the screw (B) with IG ON and disconnecting the 6P connector (C).

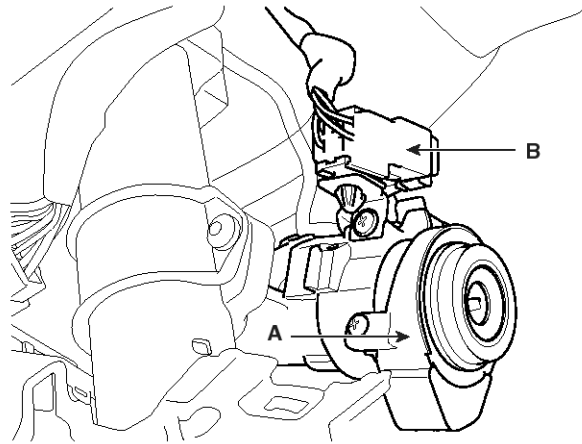


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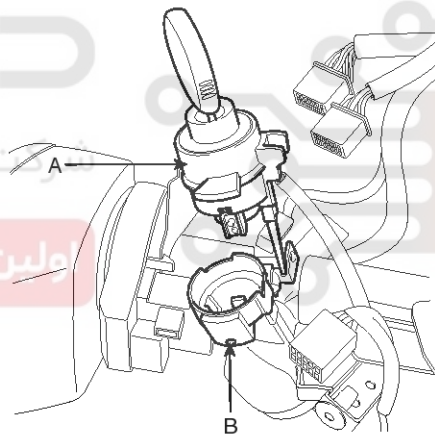
SFDBE8281L

4. Remove the door warning switch and key illumination lamp (A) after loosening the screw and disconnecting the 6P connector (B).



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5. If it is necessary to remove the key lock cylinder (A), Remove the key lock cylinder after pushing lock pin (B) with key ACC.



SFDBE8283L

Installation

1. Install the key lock cylinder.
2. Install the door warning switch and key illumination lamp.
3. Install the ignition switch.
4. Install the steering column cover.