Body Electrical System

GENERAL

GENERAL TROUBLESHOOTING INFORMATION E1998D25

BEFORE TROUBLESHOOTING

1. Check applicable fuses in the appropriate fuse/relay box.
2. Check the battery for damage, state of charge, and clean and tight connections.

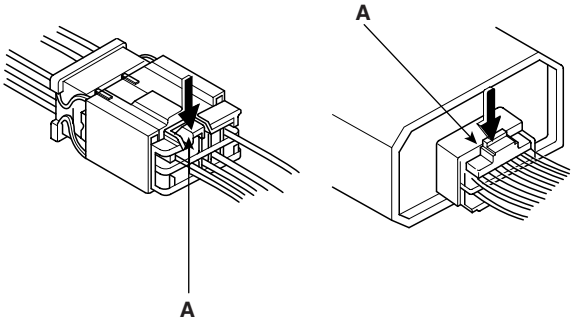
NOTE

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

3. Check the alternator belt tension.

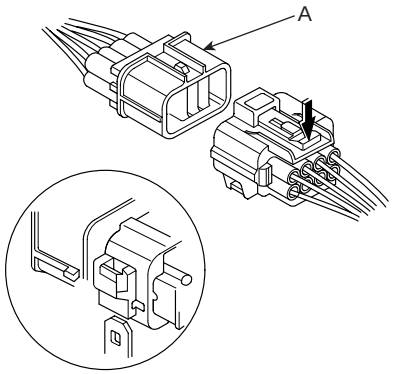
HANDLING CONNECTORS

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



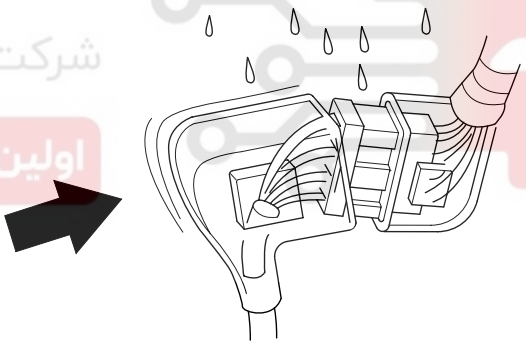
ETKD150A

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).



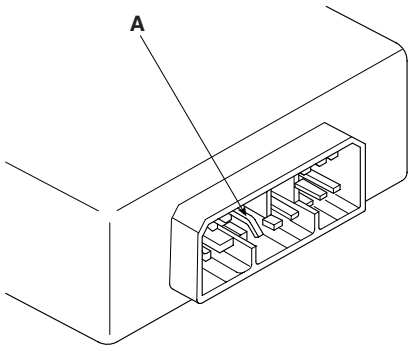
ETKD150B

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



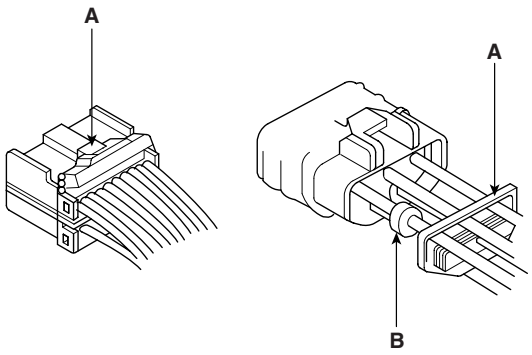
ETKD150C

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



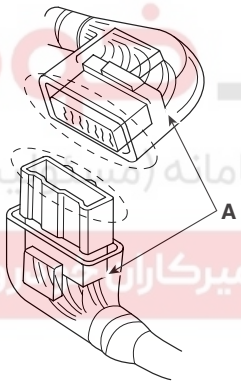
ETKD150D

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



ETKD150E

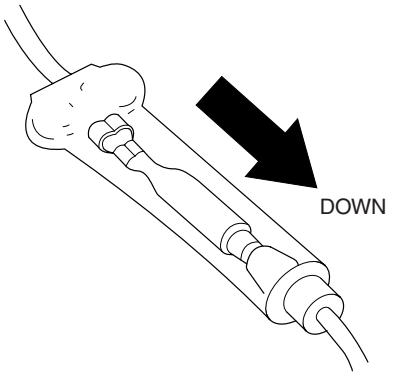
10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



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.

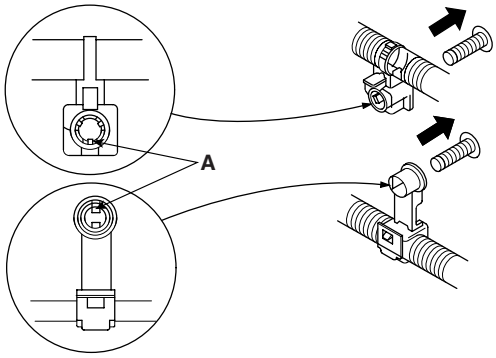


ETKD150G

HANDLING WIRES AND HARNESSES

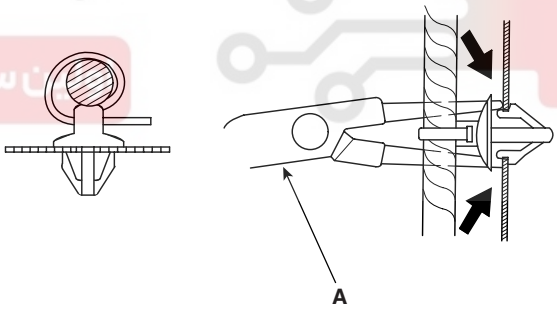
1. Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.

2. Remove clips carefully; don't damage their locks (A).



ETKD150H

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

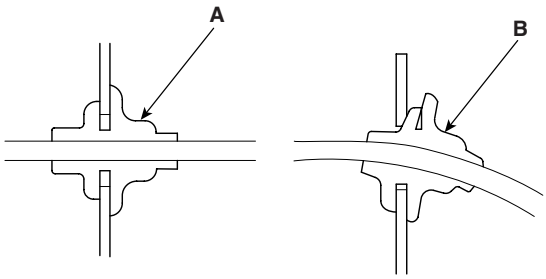


ETKD150I

4. After installing harness clips, make sure the harness doesn't interfere with any moving parts.

5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.

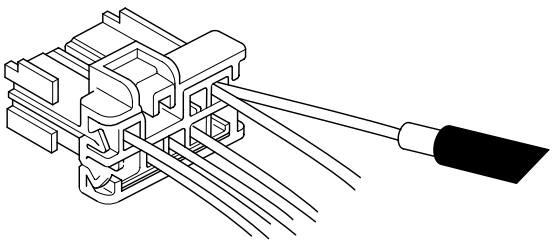
6. Seat grommets in their grooves properly (A). Do not leave grommets distorted (B).



ETKD150J

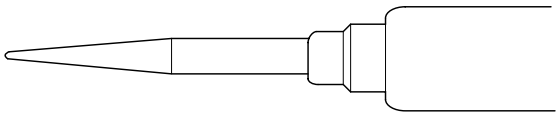
TESTING AND REPAIRS

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



ETKD150K

5. Use a probe with a tapered tip.



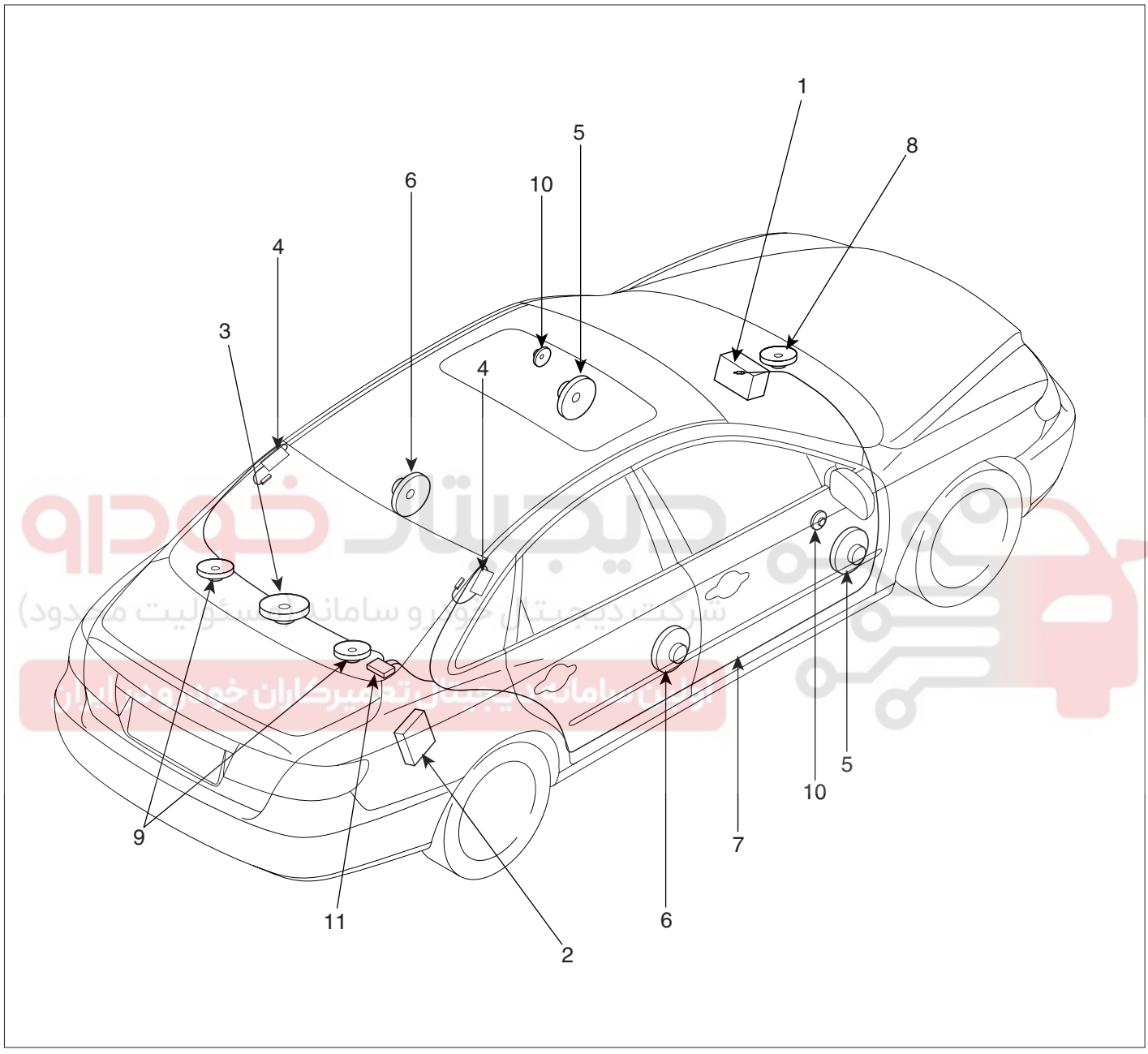
ETKD150L

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.

AUDIO SYSTEM

COMPONENT LOCATION E08C130C



1. Audio unit
2. External amplifier
3. Woofer speaker
4. Glass antenna
5. Front door speaker
6. Rear door speaker
7. Antenna feeder cable
8. Front center speaker
9. Rear package tray speaker
10. Tweeter speaker
11. Diversity
12. Roof antenna

ETBF020A

SPECIFICATION E018F3E5

AUDIO

Item		Specification			
Model		AM/FM/Cassette (M440)	AM/FM/MP3 (M445)	AM/FM/Cas-sette/MP3 (M455)	AM/FM/Cas-sette/6CDC (M465)
Power supply		DC 14.4V			
Rated output		Max 43W x 4		3.2Vrms	
Speaker impedance		4Ω x 4		10Ω	
Antenna		80PF 75Ω			
Tuning type		PLL synthesized type			
Frequency range / Channel space	FM	87.5~108 MHz / 100KHz (General), 50KHz(Europe)			
	AM	531~1602 KHz / 9KHz (General)			
	MW	522~1620 KHz / 9KHz (Europe)			
	LW	153~279 KHz / 1KHz (Europe)			

SPEAKER

Item	Specification					
Model	Front	Rear	Tweeter	-	-	
Input power	Max 40W	Max 40W	Max 40W	-	-	
Impedance	4±0.6Ω	4±0.6Ω	4±0.6Ω	-	-	
Audio external amplifier	Front	Rear	Tweeter	Center	Sub woofer	
Input power	Max 45W	Max 45W	Max 45W	Max 45W	Max 45W	
Impedance	2Ω	2Ω	2Ω	2Ω	2Ω	
DVD external amplifier	Front	Rear	Tweeter	Center	Sub woofer	Rear package tray
Input power	Max 55W	Max 55W	Max 55W	Max 55W	Max 55W	Max 55W
Impedance	2Ω	2Ω	2Ω	2Ω	2Ω	2Ω

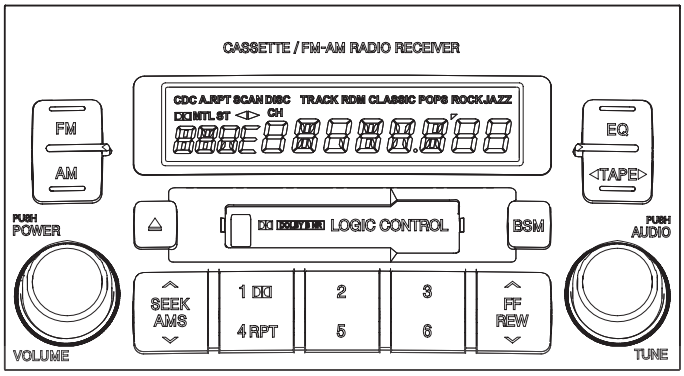
EXTERNAL AMPLIFIER

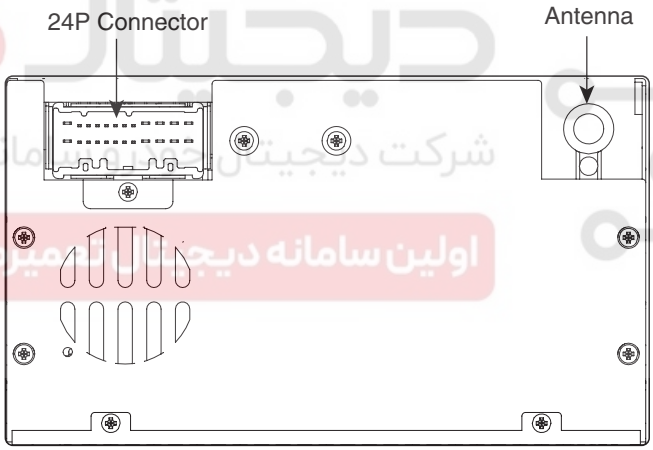
Item	Audio	DVD
Power supply	DC 14.4V	DC 14.4V
Output power	45W x 7ch	55W x 11ch

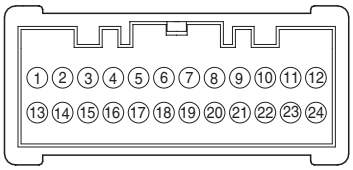
AUDIO UNIT

COMPONENT E2022732

AM/FM/CASSETTE (M440)

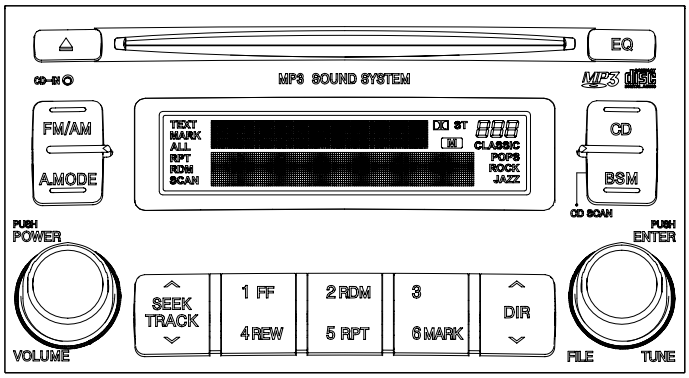


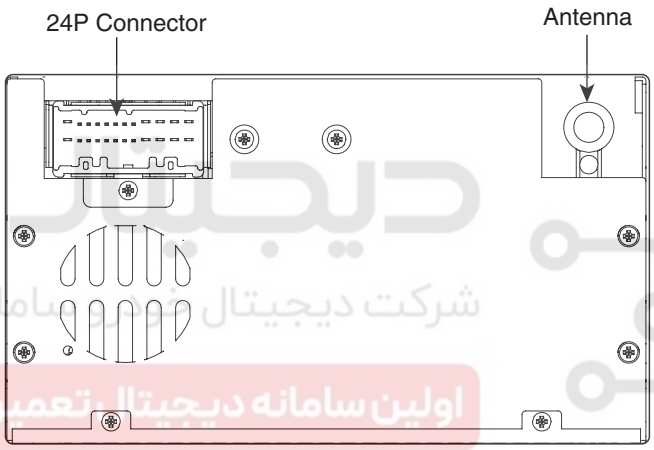


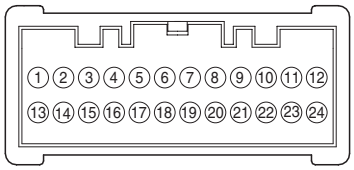
24P Connector	Pin	Description	Pin	Description
	1	Front left speaker (+)	13	Front left speaker (-)
	2	Front right speaker (+)	14	Front right speaker (-)
	3	Rear right speaker (+)	15	Rear right speaker (-)
	4	Rear left speaker (+)	16	Rear left speaker (-)
	5	Illumination (+)	17	Illumination (-)
	6	Steering remote control	18	Remote control ground
	7	Rear arm remote control	19	MUTE
	8	-	20	-
	9	-	21	-
	10	-	22	-
	11	ACC	23	Antenna B+
	12	Battery	24	Ground

ETBF021B

AM/FM/MP3 (M445)

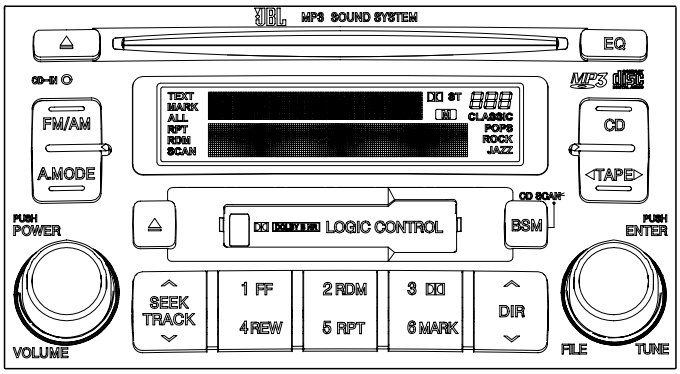


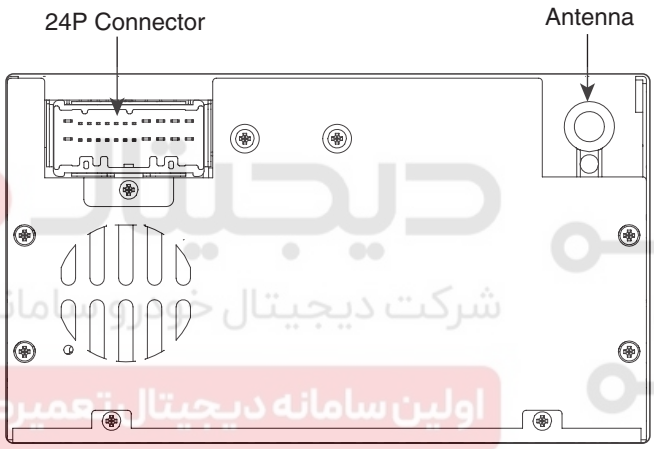


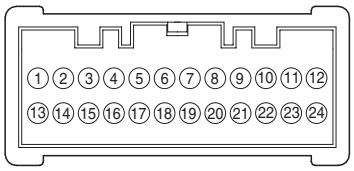
24P Connector	Pin	Description	Pin	Description
	1	Front left speaker (+)	13	Front left speaker (-)
	2	Front right speaker (+)	14	Front right speaker (-)
	3	Rear right speaker (+)	15	Rear right speaker (-)
	4	Rear left speaker (+)	16	Rear left speaker (-)
	5	Illumination (+)	17	Illumination (-)
	6	Steering remote control	18	Remote control ground
	7	Rear arm remote control	19	MUTE
	8	-	20	-
	9	-	21	-
	10	-	22	-
	11	ACC	23	Antenna B+
	12	Battery	24	Ground

ETBF021C

AM/FM/CASSETTE/MP3 (M455)

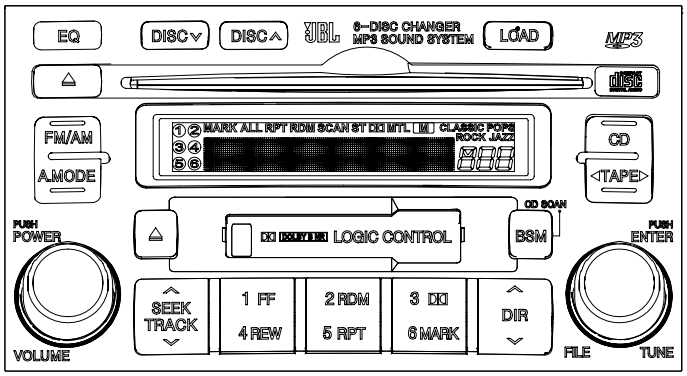


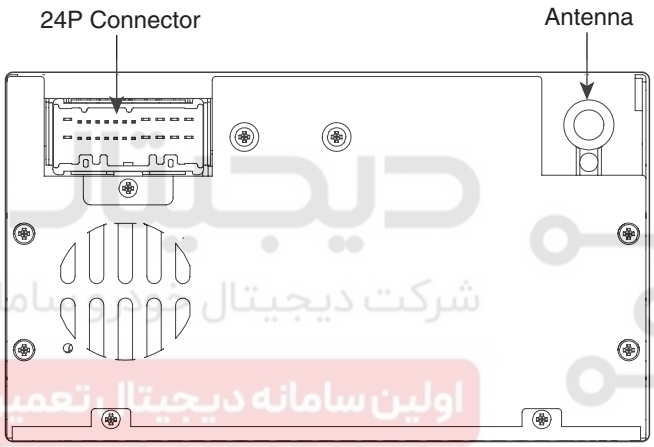


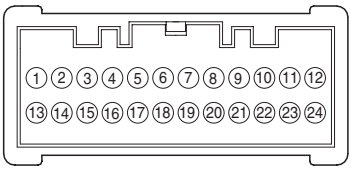
24P Connector	Pin	Description	Pin	Description
	1	Front left speaker (+)	13	Front left speaker (-)
	2	Front right speaker (+)	14	Front right speaker (-)
	3	Rear right speaker (+)	15	Rear right speaker (-)
	4	Rear left speaker (+)	16	Rear left speaker (-)
	5	Illumination (+)	17	Illumination (-)
	6	Steering remote control	18	Remote control ground
	7	Rear arm remote control	19	MUTE
	8	-	20	EQ SEL
	9	-	21	-
	10	REMOTE	22	-
	11	ACC	23	Antenna B+
	12	Battery	24	Ground

ETBF021D

AM/FM/CASSETTE/6CDC (M465)





24P Connector	Pin	Description	Pin	Description
	1	Front left speaker (+)	13	Front left speaker (-)
	2	Front right speaker (+)	14	Front right speaker (-)
	3	Rear right speaker (+)	15	Rear right speaker (-)
	4	Rear left speaker (+)	16	Rear left speaker (-)
	5	Illumination (+)	17	Illumination (-)
	6	Steering remote control	18	Remote control ground
	7	Rear arm remote control	19	MUTE
	8	-	20	EQ SEL
	9	-	21	-
	10	REMOTE	22	-
	11	ACC	23	Antenna B+
	12	Battery	24	Ground

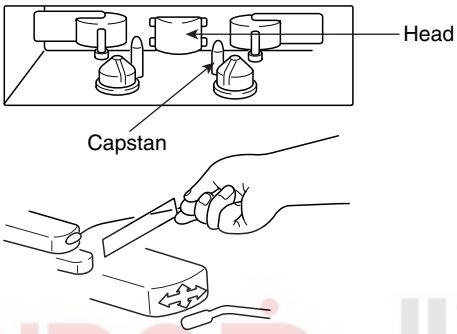
ETBF021E

INSPECTION E689984E

TAPE HEAD AND CAPSTAN CLEANING

1. To obtain optimum performance, clean the head, and capstan as often as necessary, depending on frequency of use and tape cleanness.

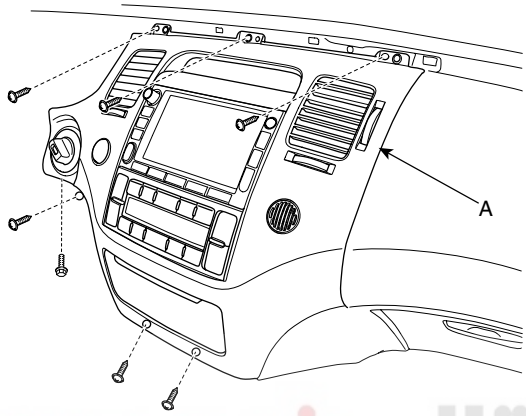
2. To clean the tape head and capstan, use a cotton swab dipped in ordinary rubbing an alcohol. Wipe the head and capstan.



LTAC005A

REPLACEMENT EC419C89

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center garnish.(Refer to the Body group - Crash pad)
3. Remove the center facia panel (A) after loosening the screws. Avoid damaging retaining clips.



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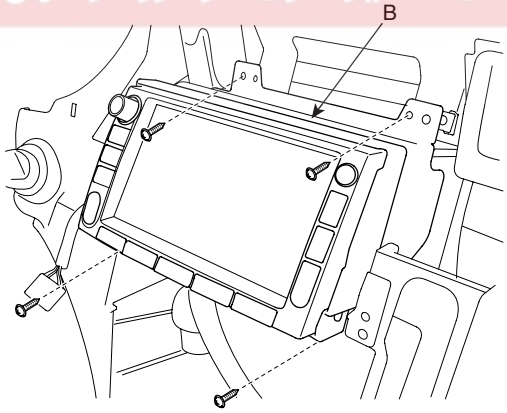
4. Remove the connectors of digital clock and hazard switch.
5. Remove the mounting screws then remove the audio unit (B).



KTBF021G

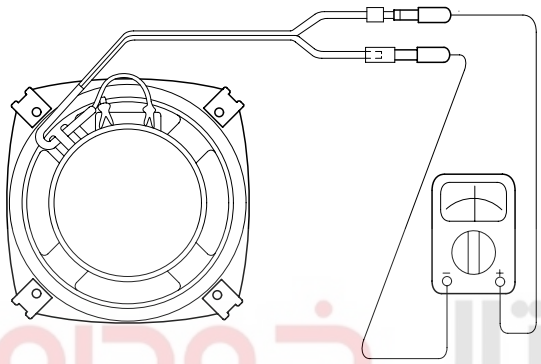
6. Installation is the reverse of removal.

SPEAKERS

INSPECTION E23344B7

1. Check the speaker with an ohmmeter. If an ohmmeter indicates the correct impedance of the speaker when checking between the speaker (+) and speaker (-) of the same channel, the speaker is ok.

Specified impedance : 2~4 Ω

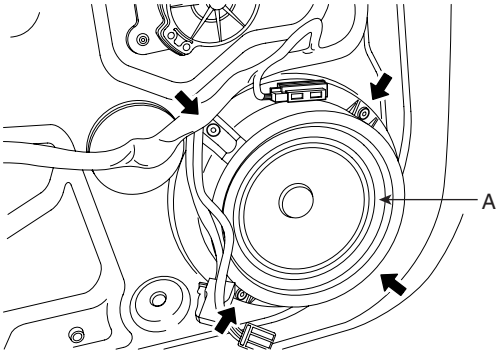


KTMB060A

REPLACEMENT E34E0C71

FRONT SPEAKER

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

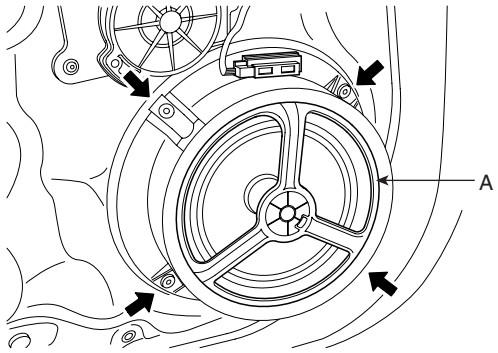


KTBF022B

3. Installation is the reverse of removal.

REAR SPEAKER

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

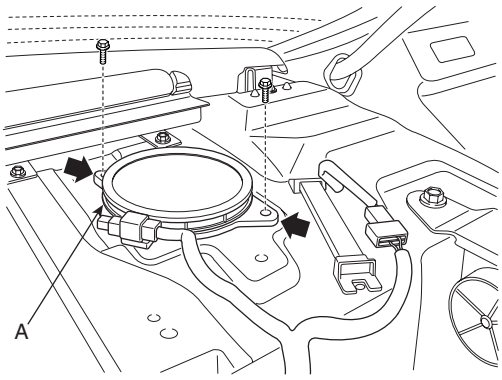


KTBF022C

3. Installation is the reverse of removal.

REAR SPEAKER (DVD EXTERNAL AMPLIFIER)

1. Remove the rear seat (Refer to the Body group - Rear seat).
2. Remove the rear package tray (Refer to the Body group - Rear seat).
3. Remove the rear package tray speaker (A) after removing 2 bolts.

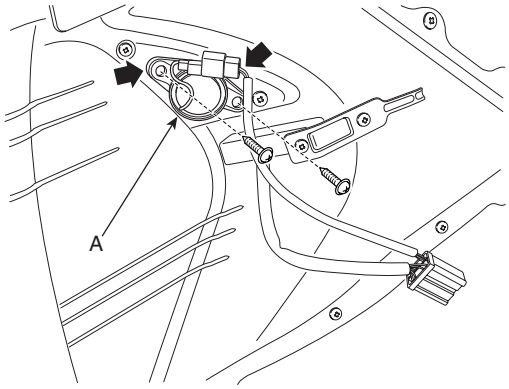


KTBF022G

4. Installation is the reverse of removal.

TWEETER SPEAKER

1. Remove the front door trim panel (Refer to the Body group - Front door).
2. Remove the tweeter speaker (A) after loosening 2 screws and disconnecting the connector.

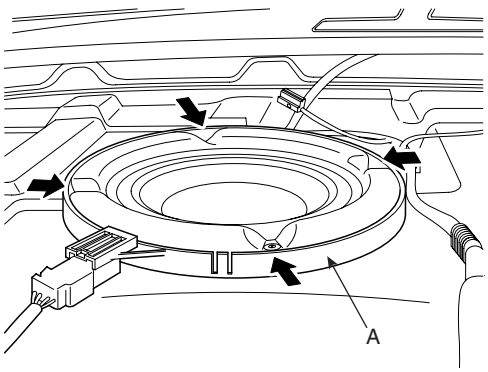


KTBF022D

3. Installation is the reverse of removal.

WOOFER SPEAKER

1. Remove the rear seat. (Refer to the Body group - Rear seats)
2. Remove the rear package tray. (Refer to the Body group - Package tray)
3. Remove the woofer speaker (A) after removing 4 bolts.

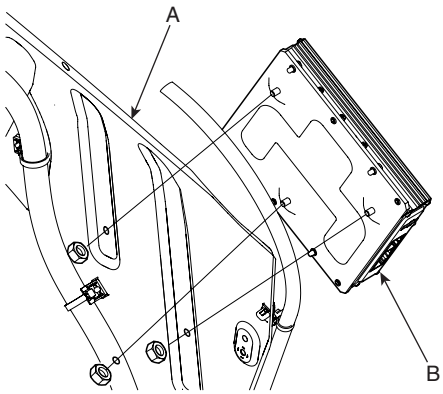


KTBF022E

4. Installation is the reverse of removal.

EXTERNAL AMPLIFIER

1. Remove the right luggage side trim.
2. Remove the external amplifier (B) from the quarter inner panel (A) after removing 3 nuts.

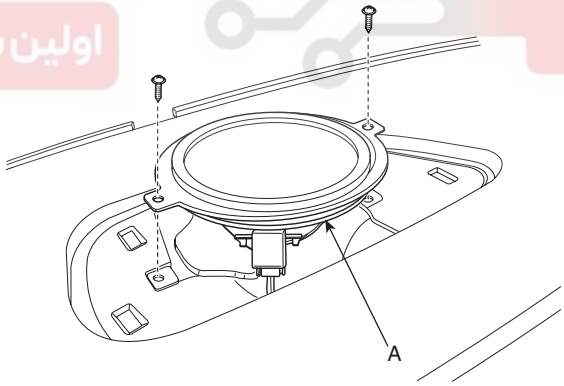


KTBF022F

3. Installation is the reverse of removal.

FRONT CENTER SPEAKER

1. Remove the center speaker (A) after front center speaker grill.



KTBF022H

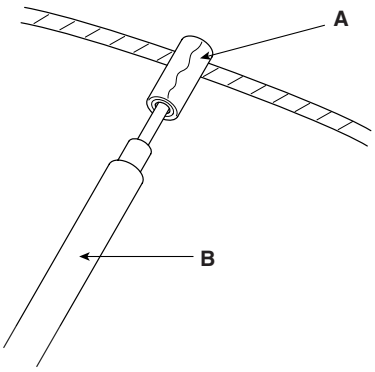
2. Installation is the reverse of removal.

ANTENNA

INSPECTION E62D929B

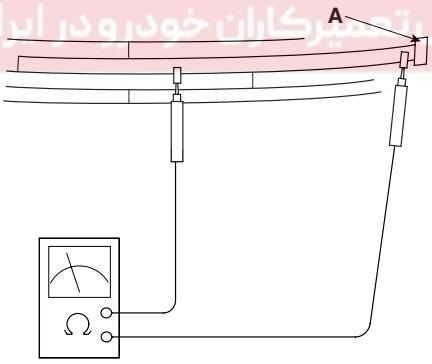
GLASS ANTENNA TEST

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



ETKD003A

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



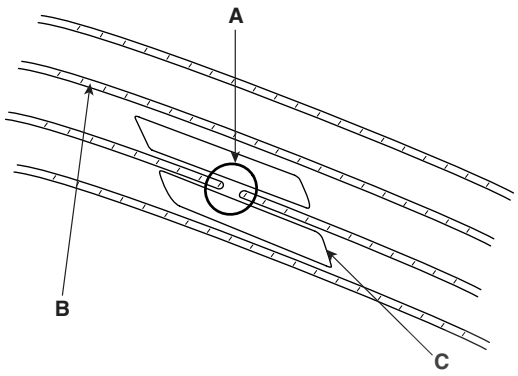
ETKD004A

GLASS ANTENNA REPAIR

NOTE

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

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



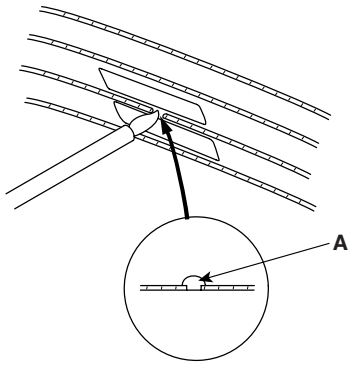
ETKD004K

2. Carefully mask above and below the broken portion of the glass antenna wire (B) with cellophane tape (C).

3. Using a small brush, apply a heavy coat of silver conductive paint (A) extending about 1/8˝ on both sides of the break. Allow 30 minutes to dry.

NOTE

Thoroughly mix the paint before use.



ETKD006Z

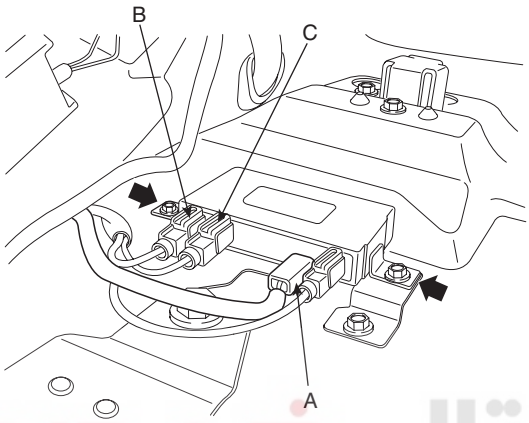
4. Check for continuity in the repaired wire.

5. Apply a second coat of paint in the same way. Let it dry three hours before removing the tape.

DIVERSITY & RADIO AMPLIFIER INSPECTION

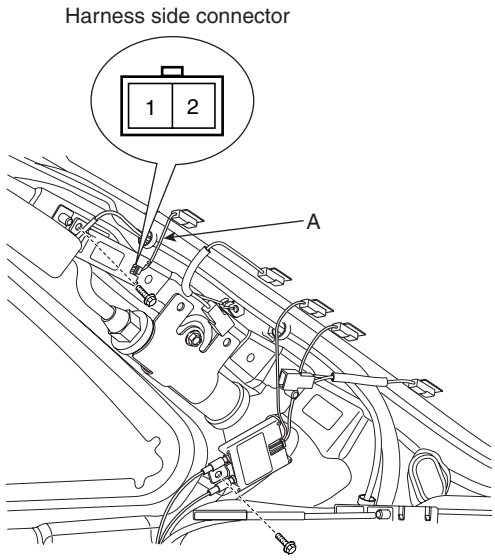
1. Disconnect power connector 1P (A) from the diversity.
2. Turn the radio ON.
   Measure the voltage between the harness side power connector and body ground.

OK : approximately 12V (ACC+)



KTBF023D

3. Remove the radio feeder cable from the diversity and radio amp.
4. Check for continuity between diversity and right side radio amp feeder cable (B).
5. Check for continuity between diversity and left side radio ampl feeder cable (C).
6. Disconnect the 2P power connector from the glass antenna radid amp.

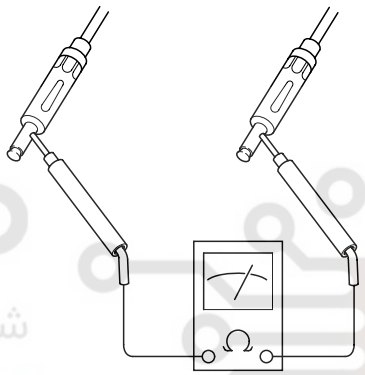


ETBF023E

7. Check for continuity between terminals of harness side connector and antenna grid terminals (AM, FM).
8. Check the grid lines that continuity exists.
9. When a poor radio reception is not repaired through the above inspection methods, replace the amp.
   If the radio reception is still poor, check the radio cable for short and radio head unit for failure.

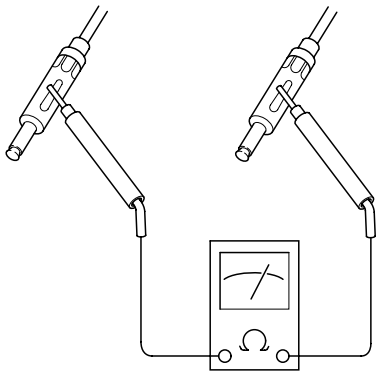
ANTENNA CABLE

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



ATJF023C

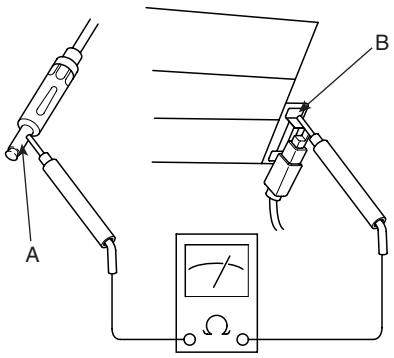
3. Check for continuity between the outer poles of antenna cable. There should be continuity.



ATJF023D

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

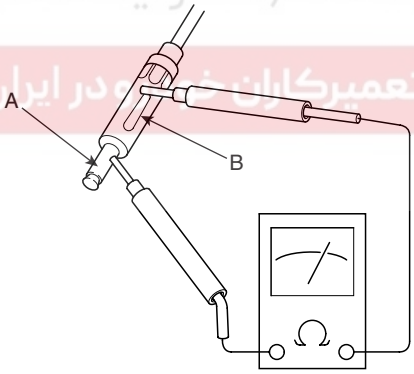
5. Check for continuity between the center pole of antenna cable and terminal of glass antenna. There should be continuity.



ATJF023E

6. If there is no continuity, replace the antenna amplifier.

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



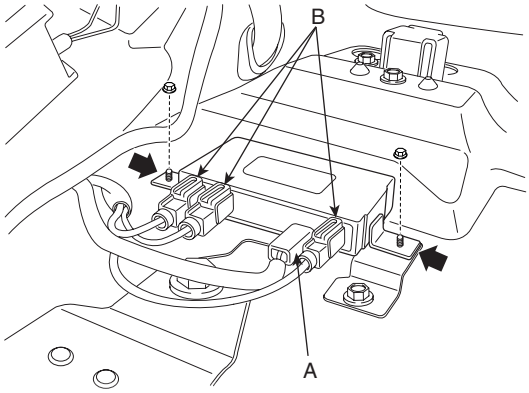
ATJF023F

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

REPLACEMENT E3ED0F16

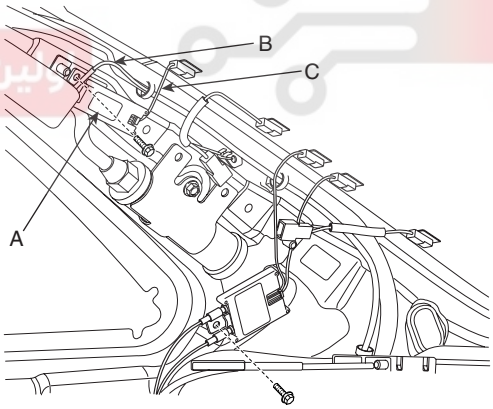
1. Remove the rear filler trim and package tray. (Refer to Body group-Interior trim).

2. Remove the diversity after removing 1P connector (A) and radio feeder cable (B).



KTBF023B

3. Remove the glass antenna radio amplifier (A) - Left/Right each 1 ea- after removing radio feeder cable (B) and amplifier wiring (C) from the glass antenna radio amplifier (A).

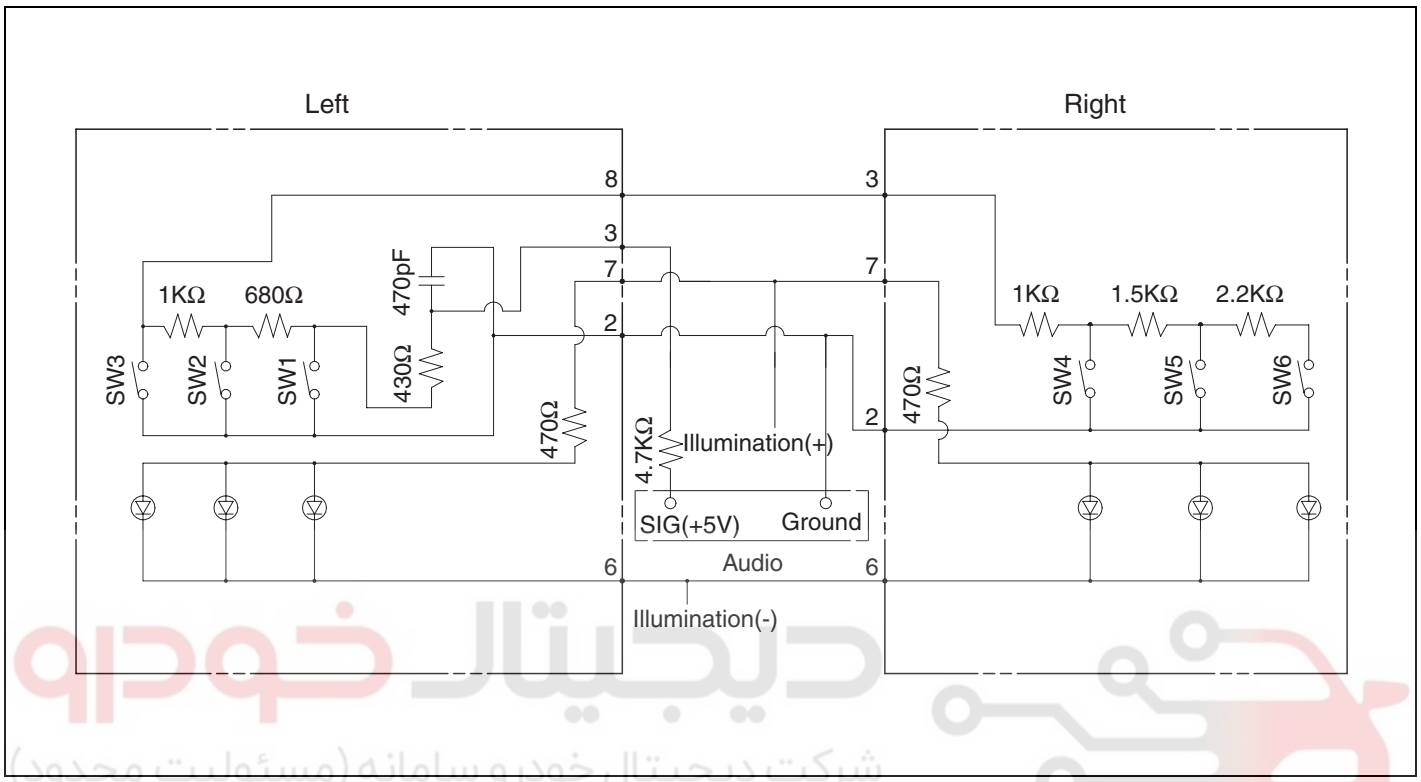


KTBF023C

4. Installation is the reverse of removal.

AUDIO REMOTE CONTROL

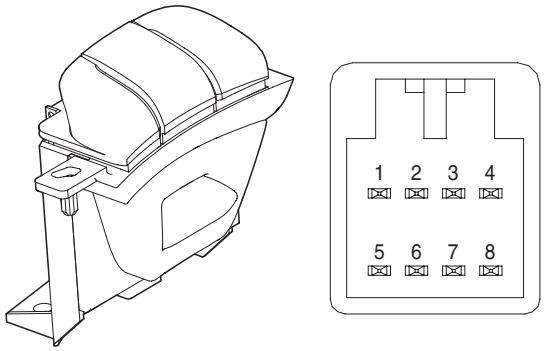
CIRCUIT DIAGRAM EE6A7C07



ETBF024C

INSPECTION E06D0678

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

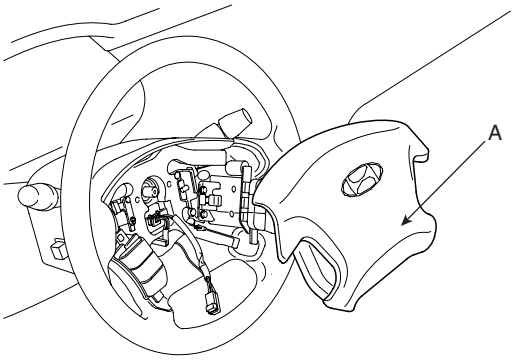


KTBF024B

Switch	Connector terminal	Resistance (±5%)
VOLUME DOWN	2 - 3 (Right)	6.81 kΩ
VOLUME UP	2 - 3 (Right)	4.61 kΩ
MODE	2 - 3 (Left)	2.11 kΩ
SEEK DOWN	2 - 3 (Right)	1.11 kΩ
SEEK UP	2 - 3 (Left)	430 Ω
MUTE	2 - 3 (Right)	3..11 kΩ

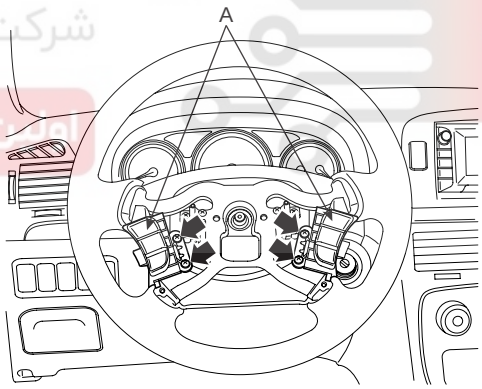
REPLACEMENT E2420AFD

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



KTBF452A

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

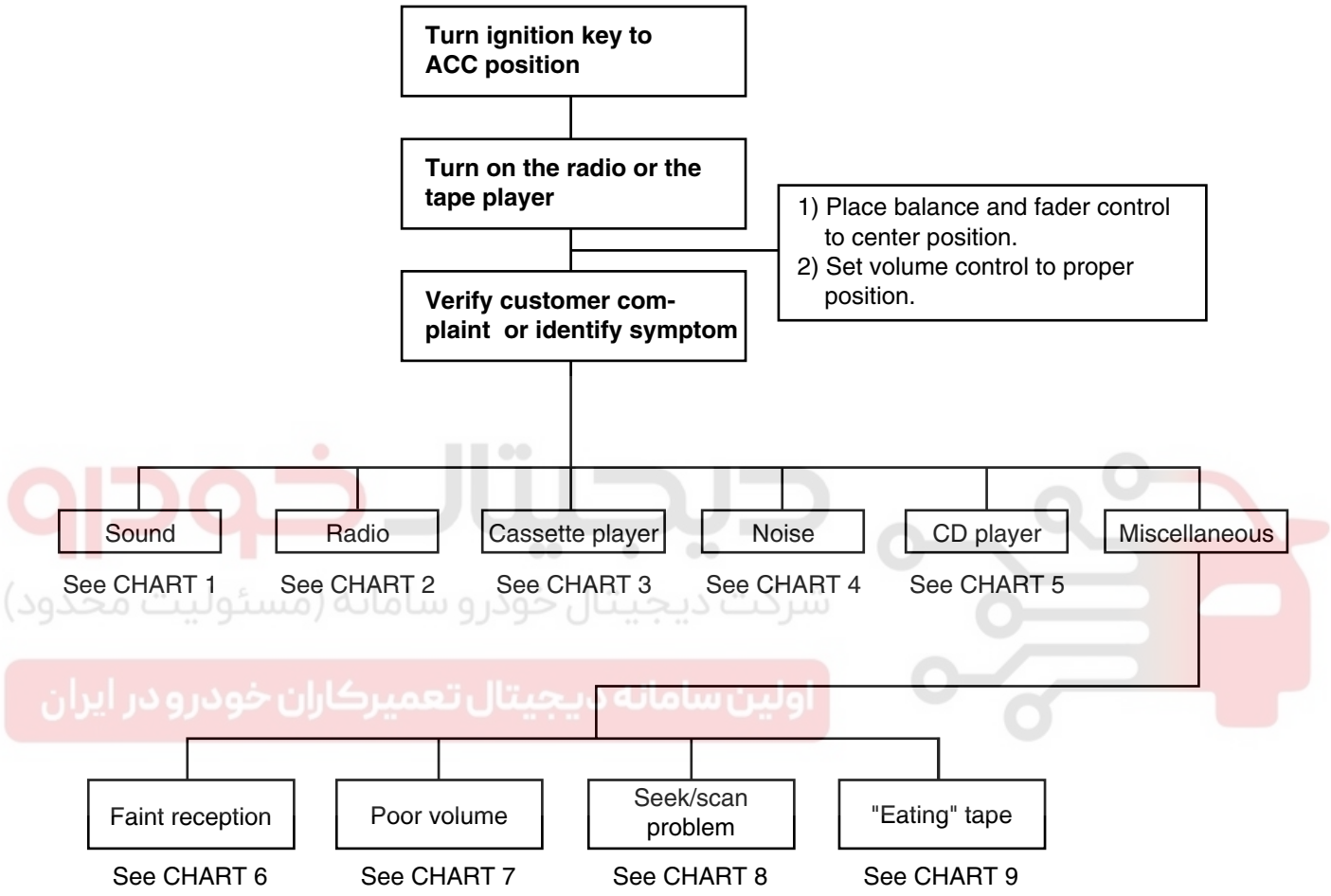


KTRE024A

4. Installation is the reverse of removal.

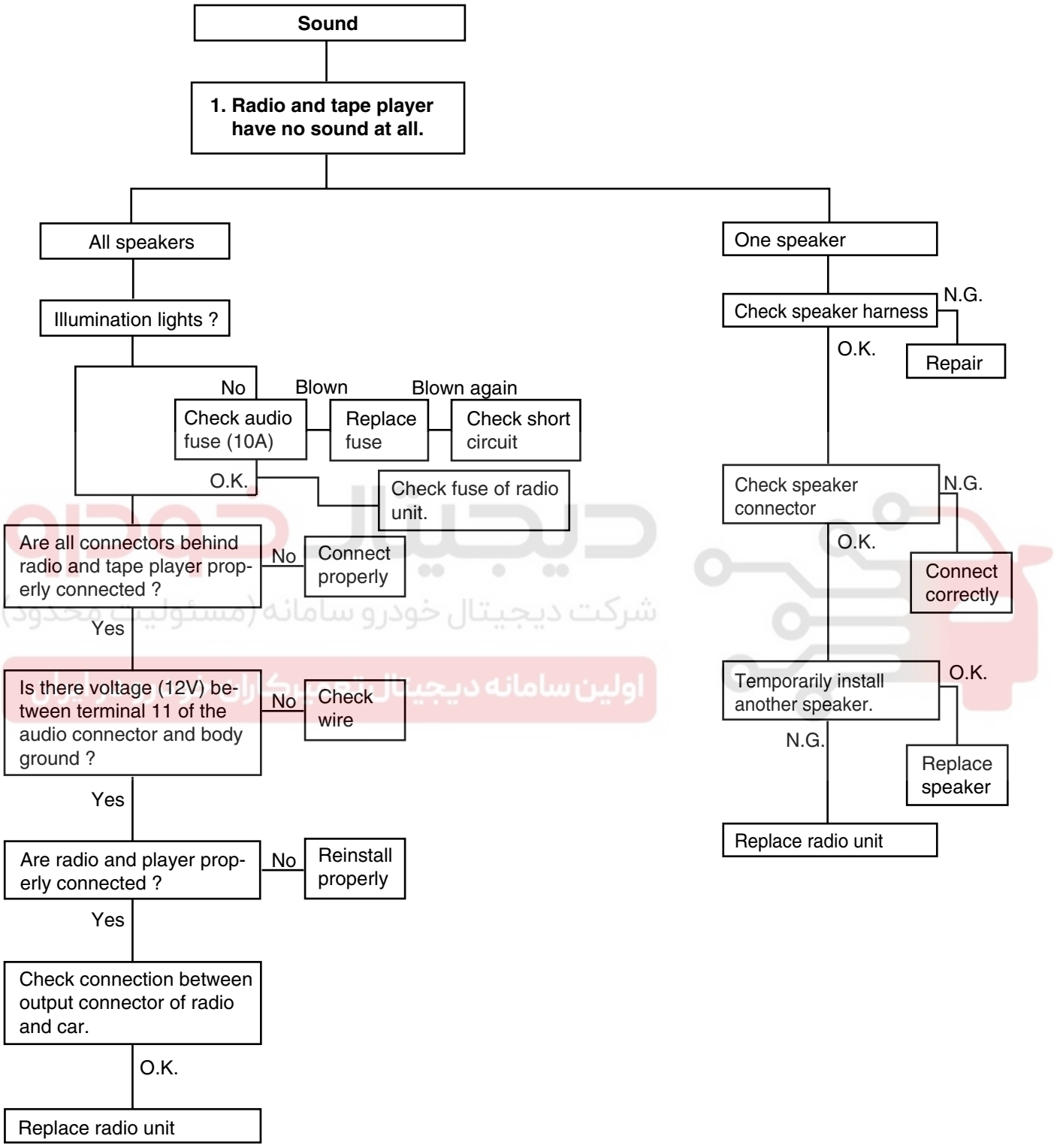
TROUBLESHOOTING E7CCAE8A

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

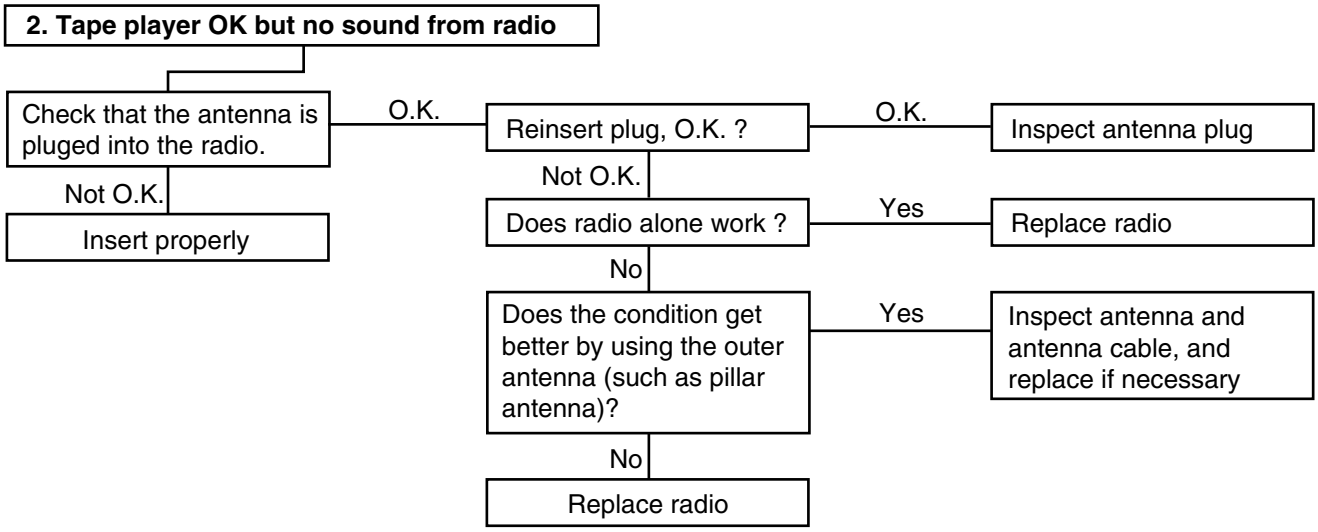


LTIF001A

CHART 1

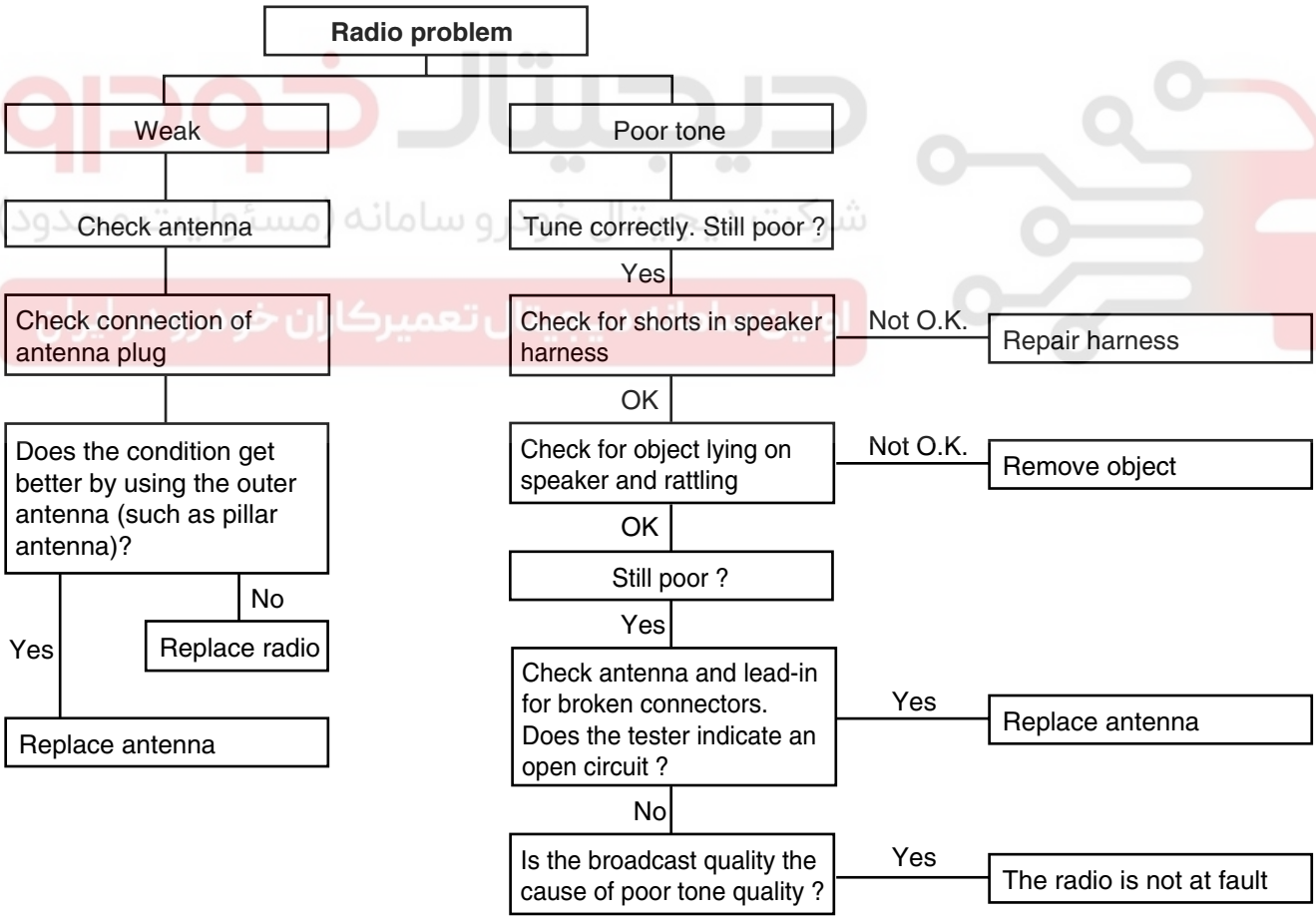


LTJF001B



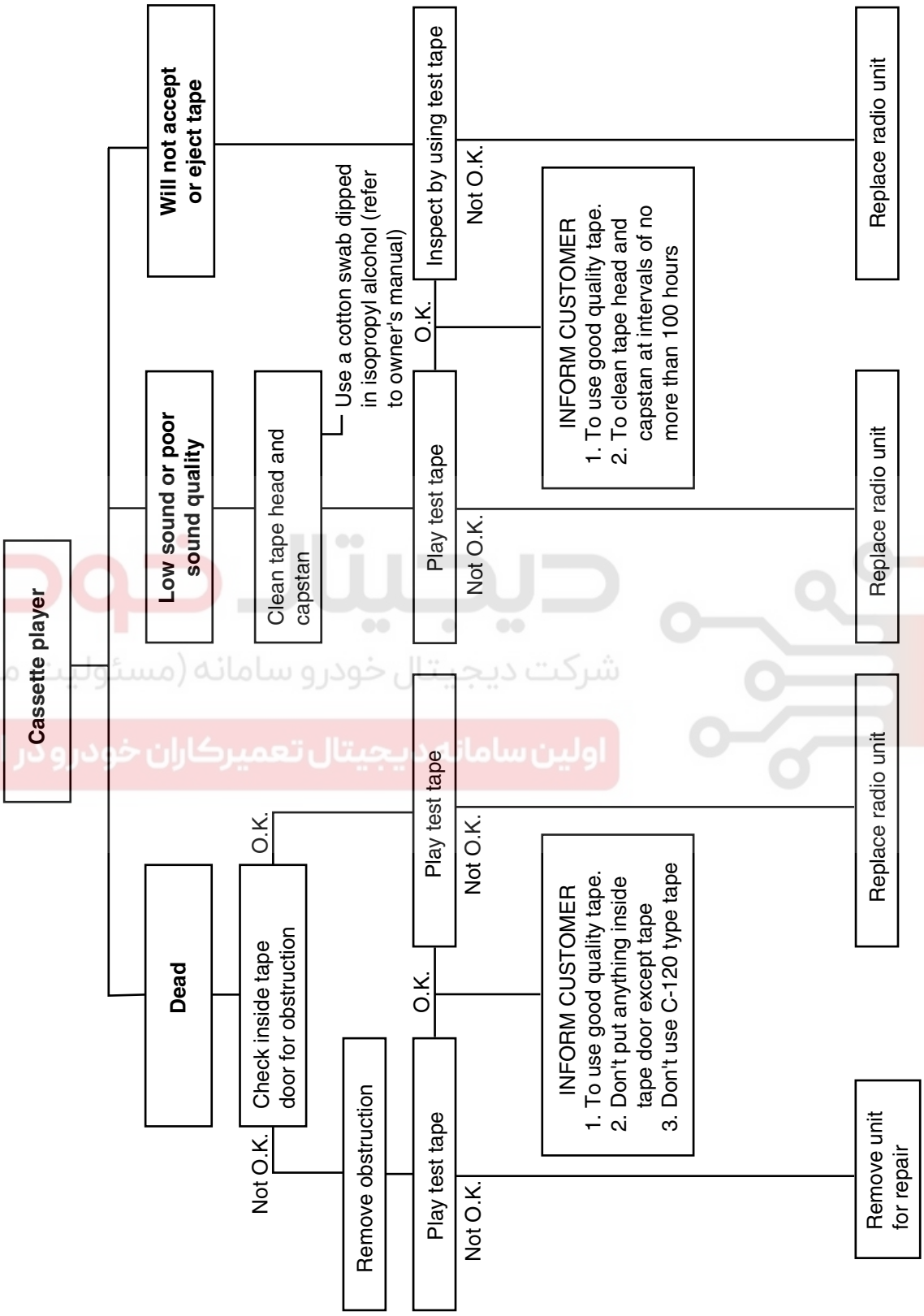
LTIF001C

CHART 2



BTIF001D

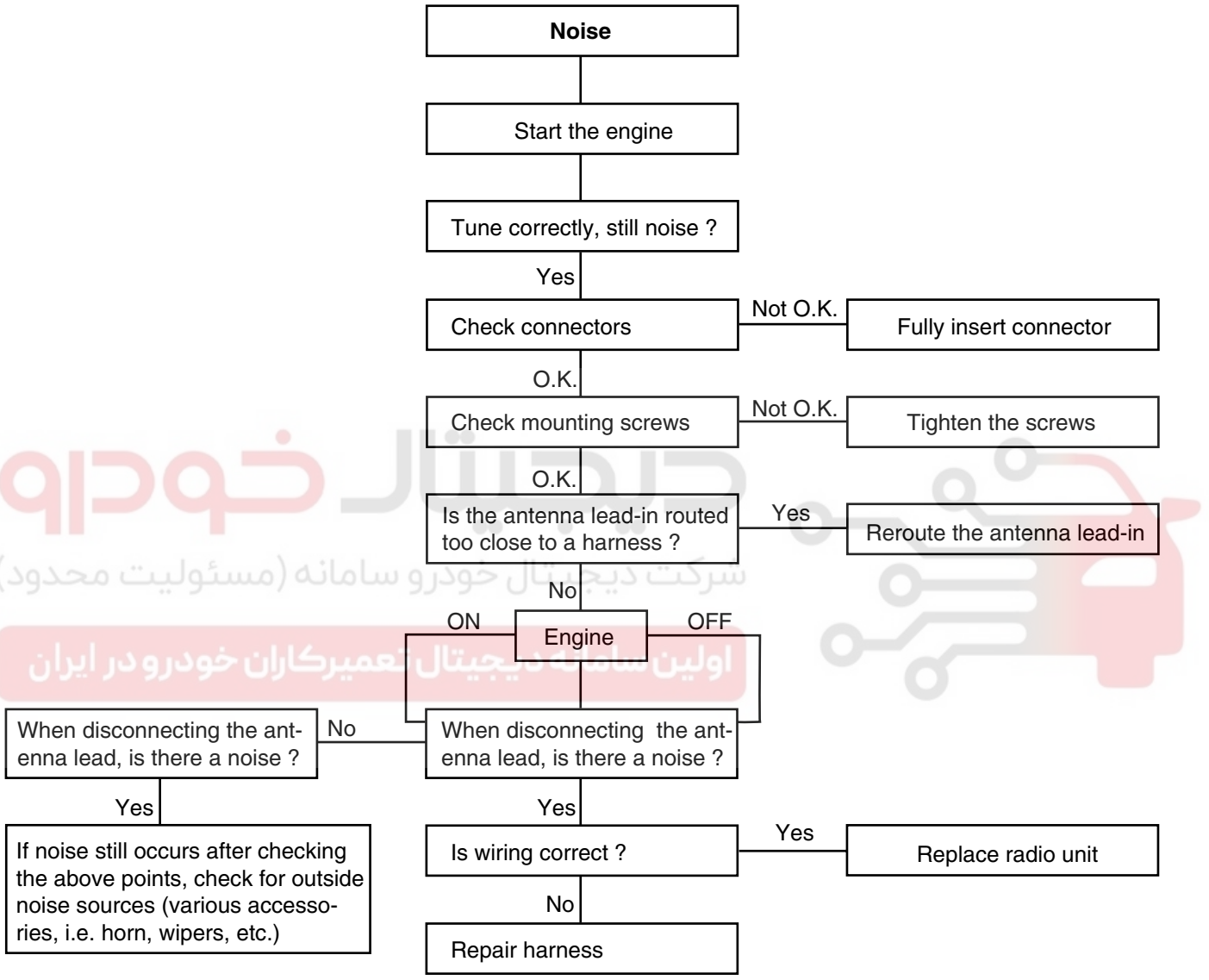
CHART 3



ETBF001E

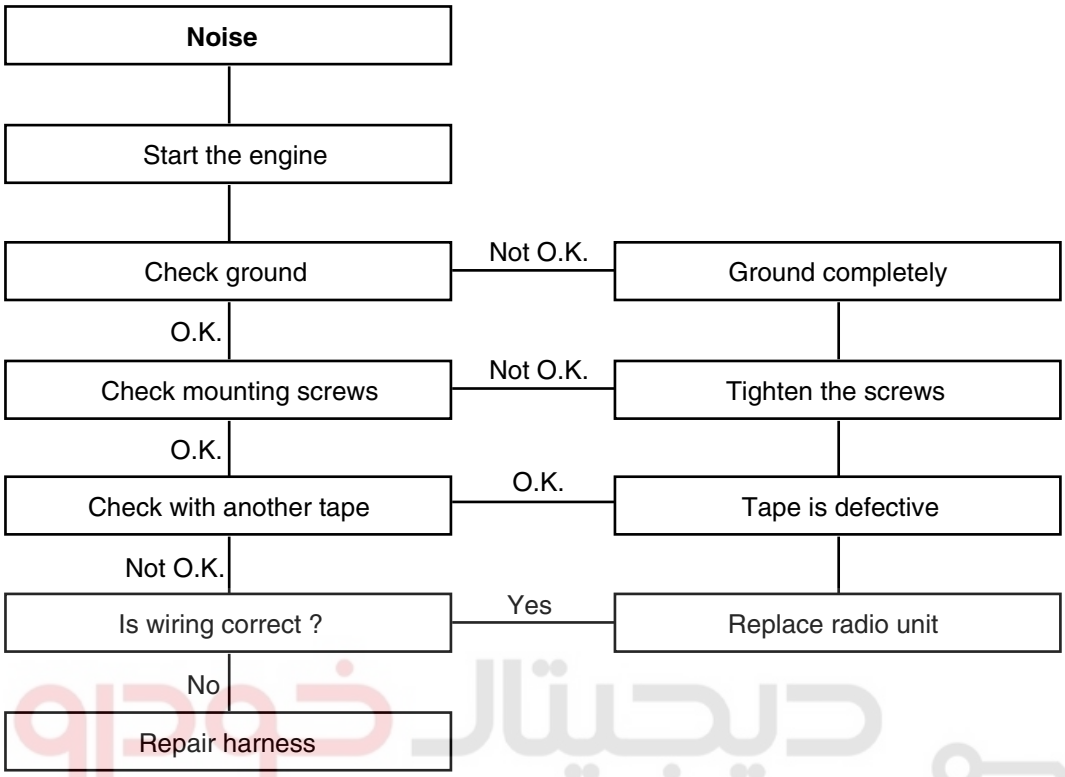
CHART 4

1. RADIO



LTIF001F

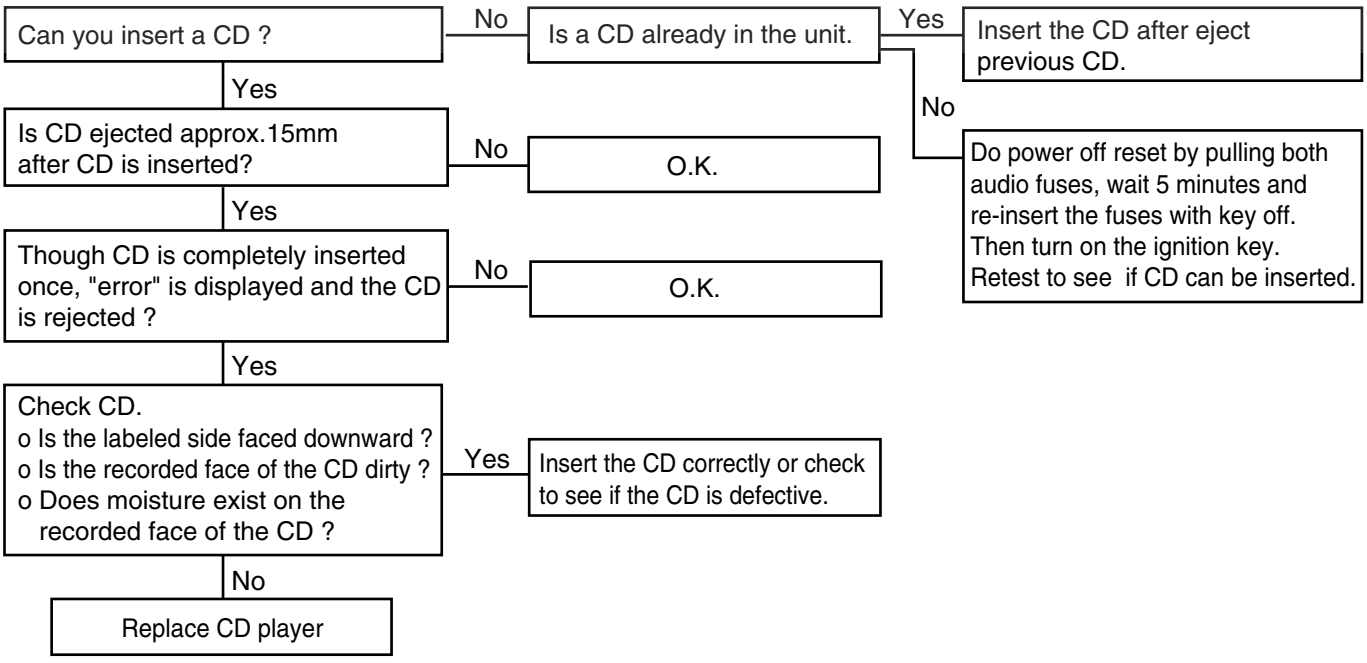
2. TAPE



LTIF001G

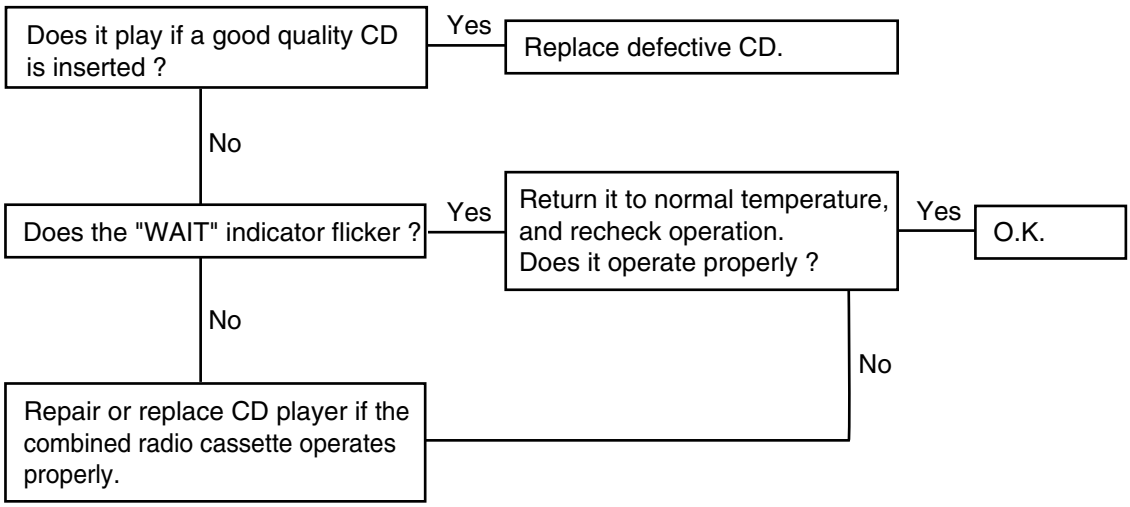
CHART 5

1. CD WILL NOT BE ACCEPTED



LTIF001H

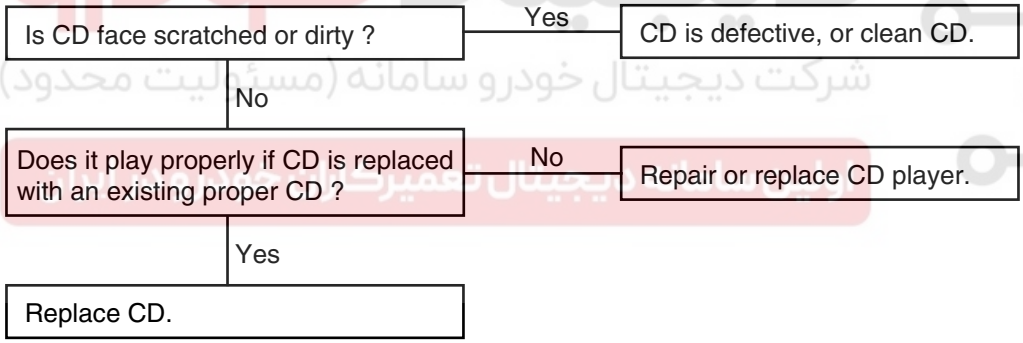
2. NO SOUND



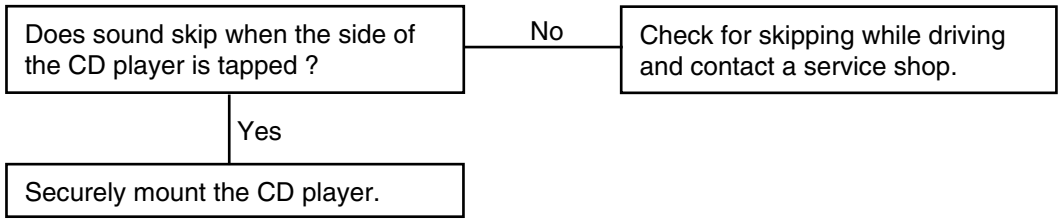
LTIF001I

3. CD SOUND SKIPS

1) Sound sometimes skips when parking.

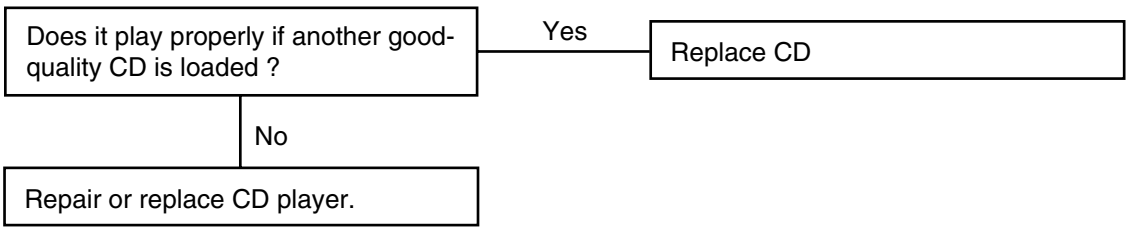


2) Sound sometimes skips when driving.
(Stop vehicle, and check it.)
(Check by using a CD which is free of scratches, dirt or other damage.)

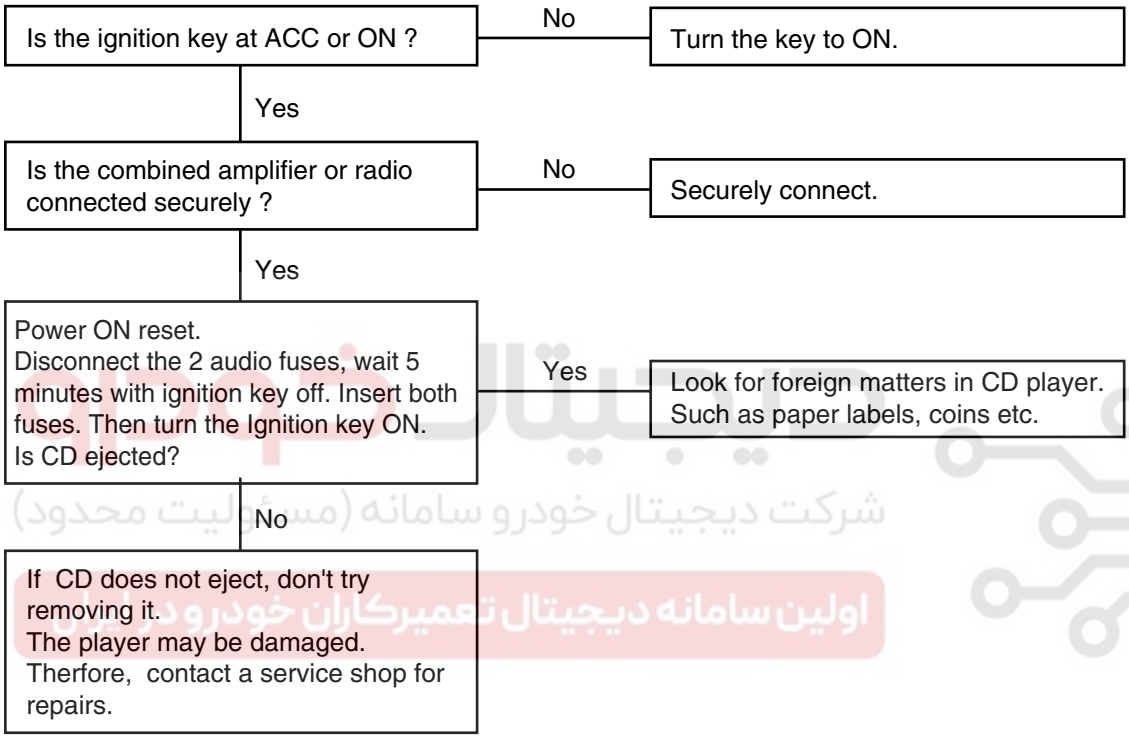


LTIF001J

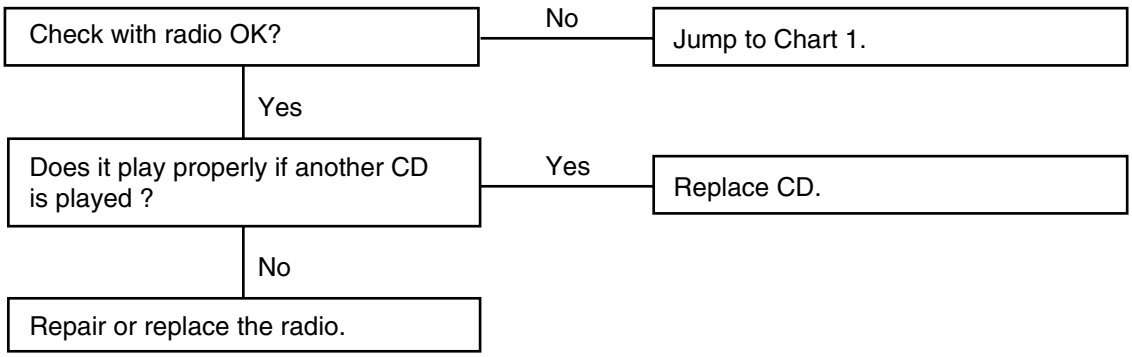
4. SOUND QUALITY IS POOR



5. CD WILL NOT EJECT

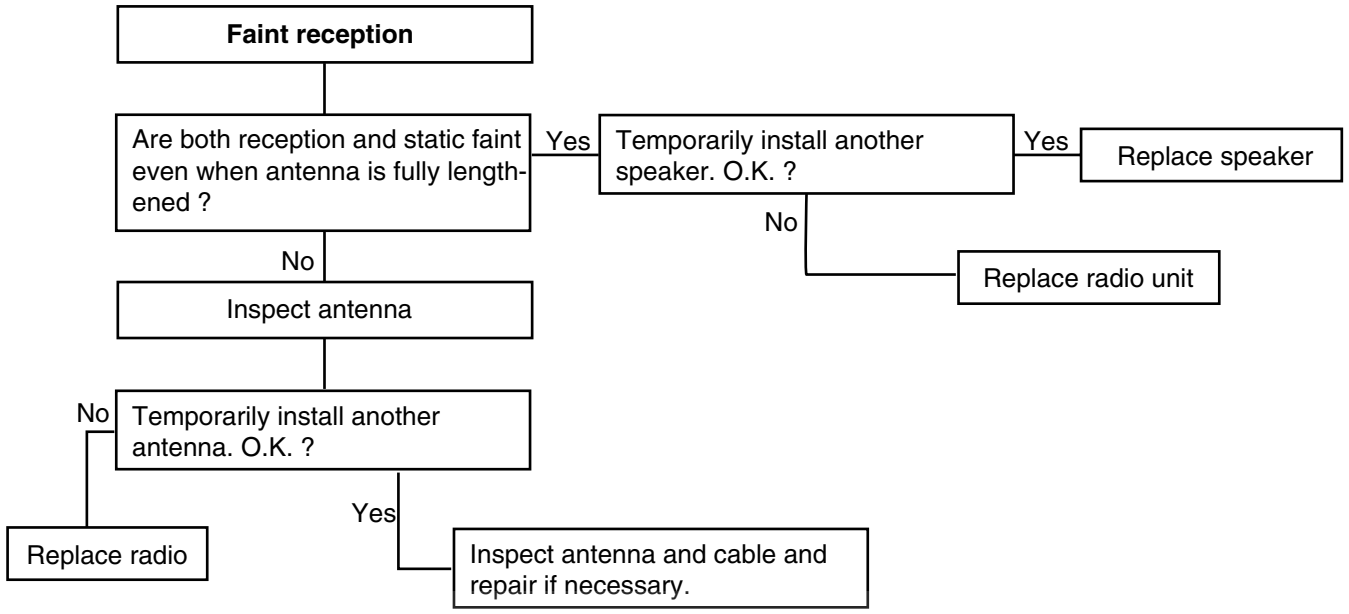


6. NO SOUND FROM ONE SPEAKER



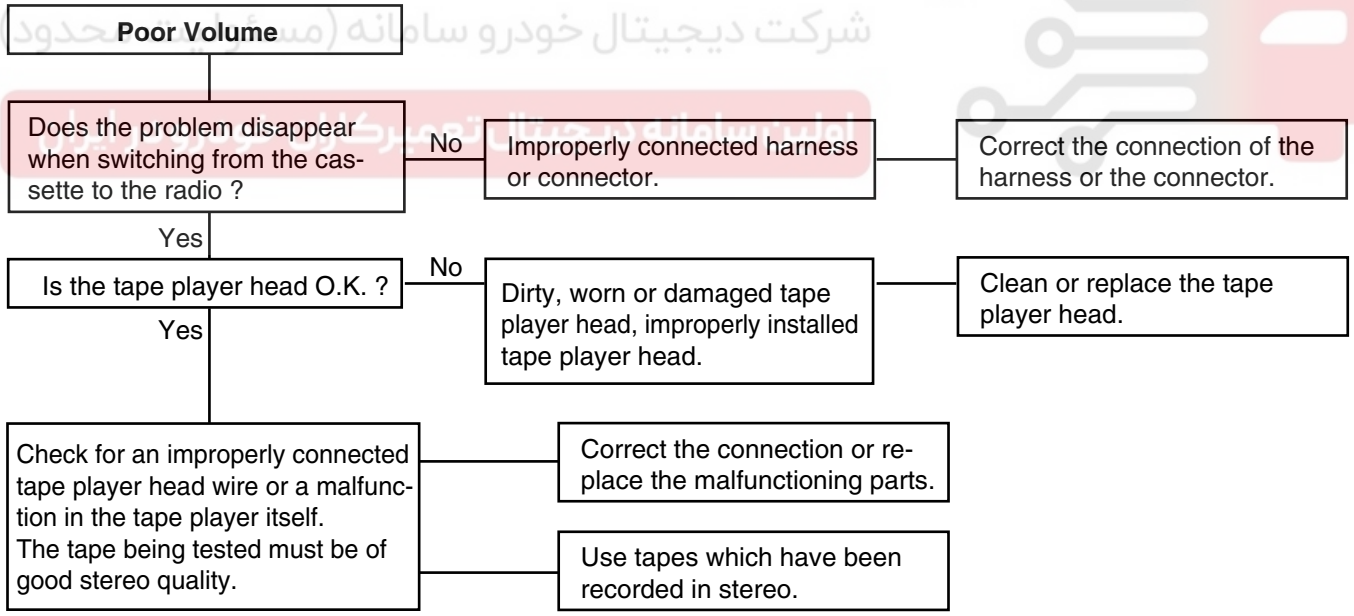
LTIF001K

CHART 6



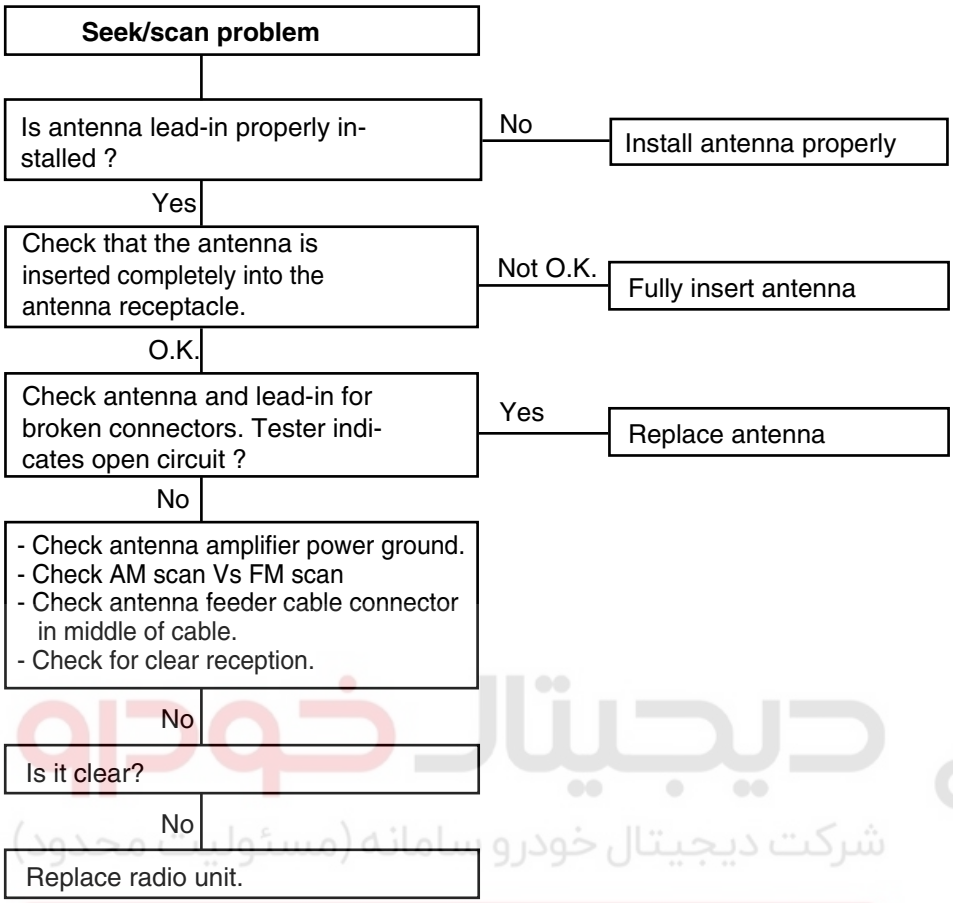
LTIF001L

CHART 7



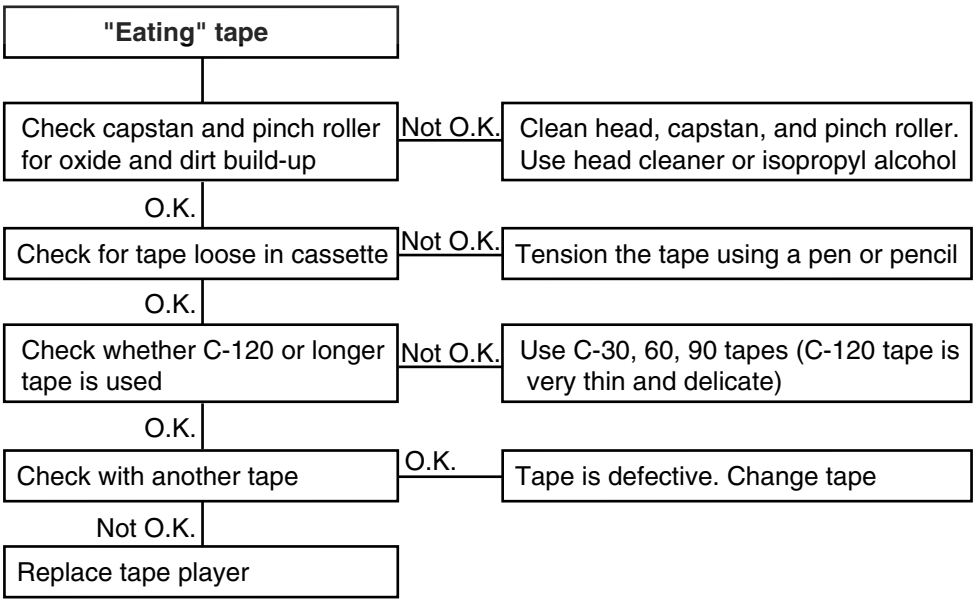
LTIF001M

CHART 8



LTIF001N

CHART 9

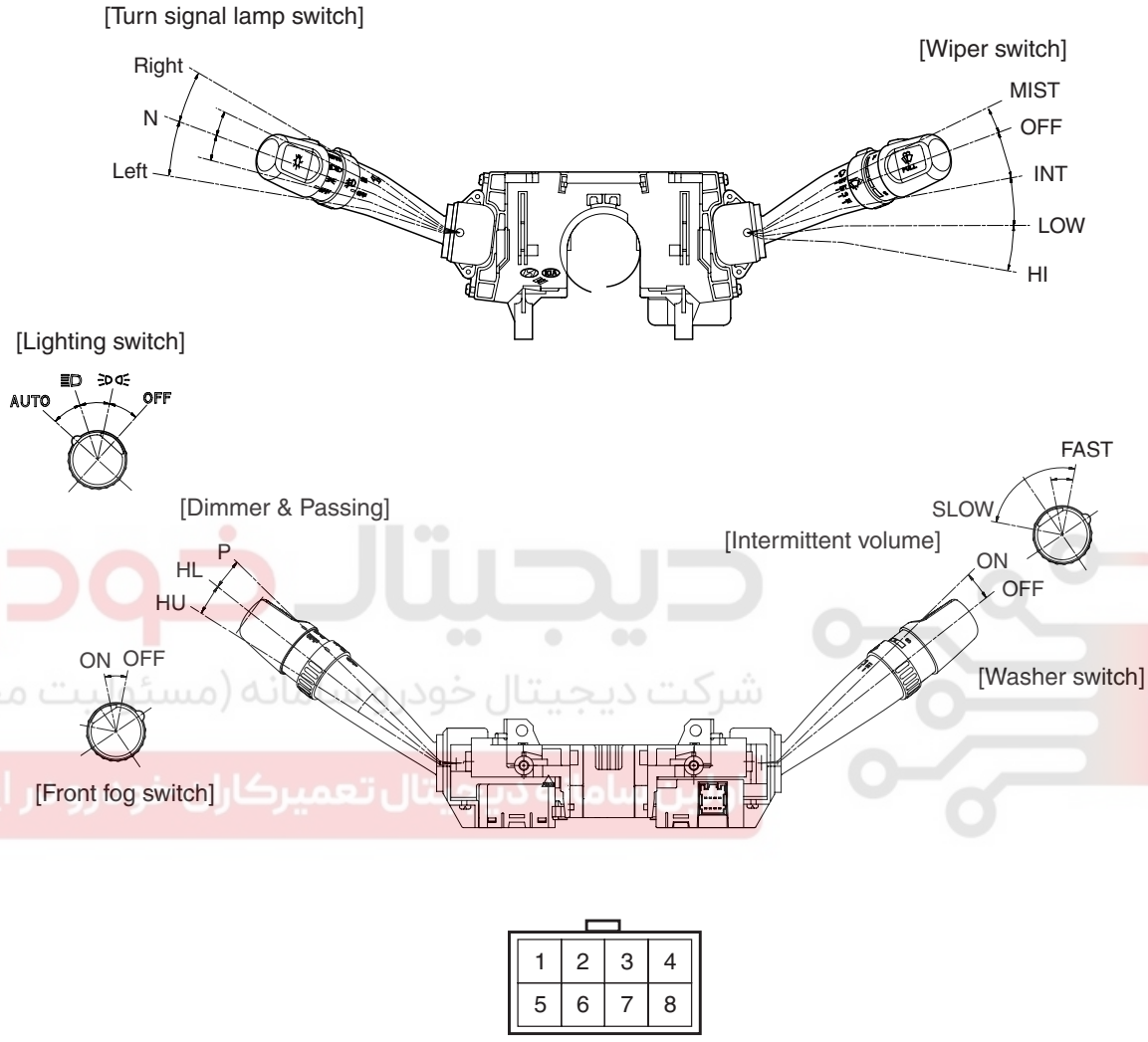


LTIF001O

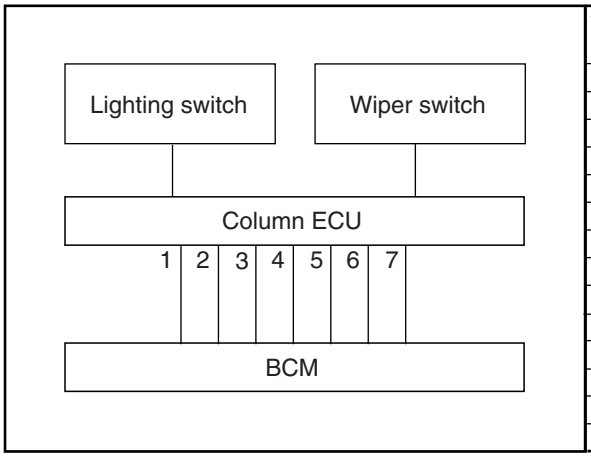
MULTI FUNCTION SWITCH

COMPONENT E80B1909

[LHD]



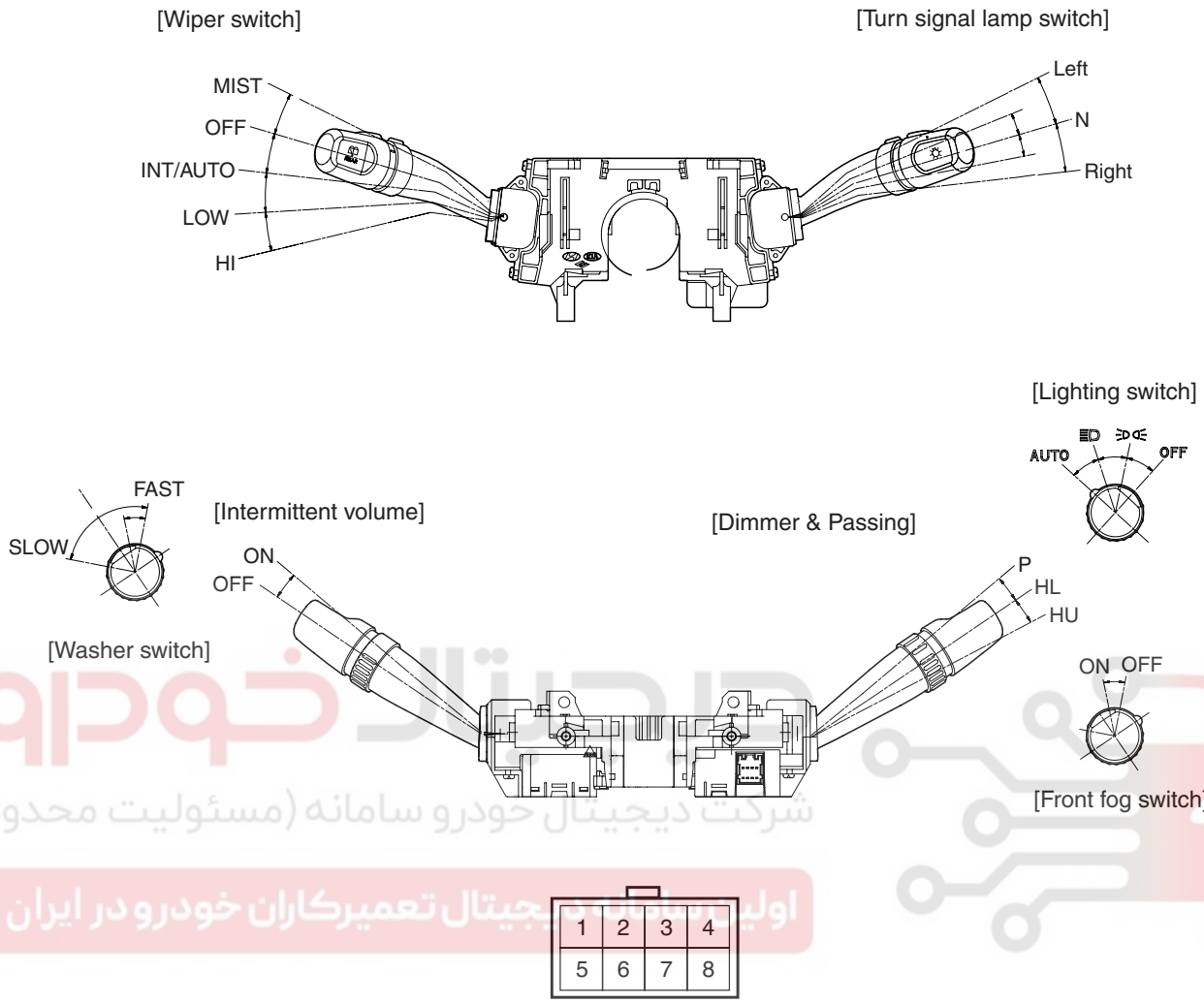
Circuit connection



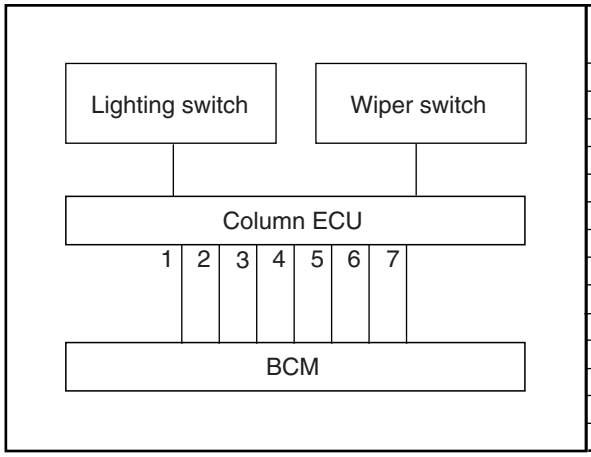
Terminal No.	Description
1	Washer low
2	Head lamp low beam power
3	IG 1
4	B+
5	Wiper low
6	-
7	LIN Communication
8	Ground

ETBF031B

[RHD]



Circuit connection

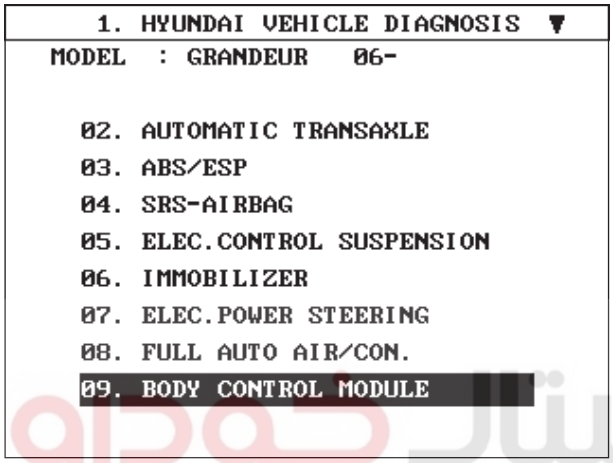


Terminal No.	Description
1	Washer low
2	Head lamp low beam power
3	IG 1
4	B+
5	Wiper low
6	-
7	LIN Communication
8	Ground

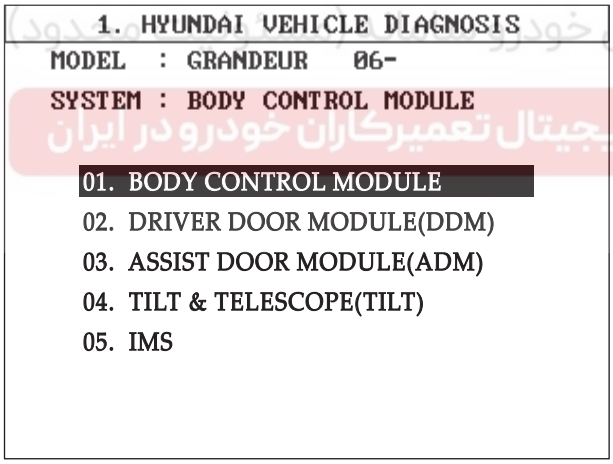
ETBF031L

INSPECTION E39C4A2E

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

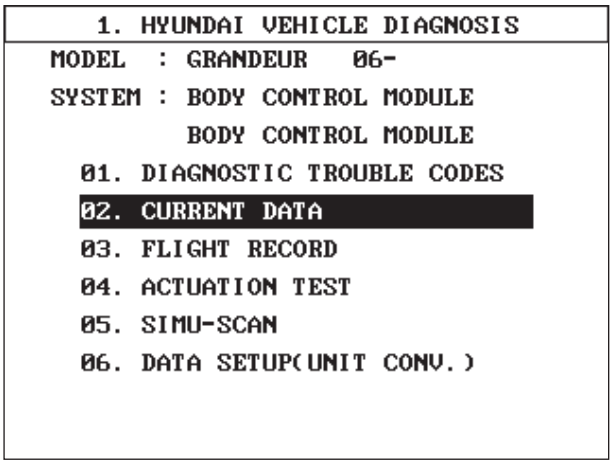


ETBF804A

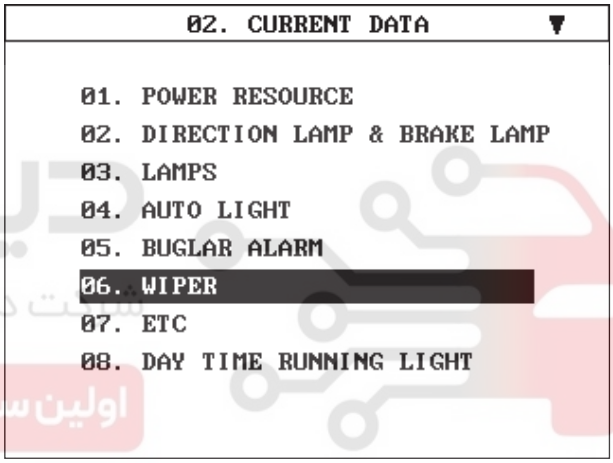


ETBF032A

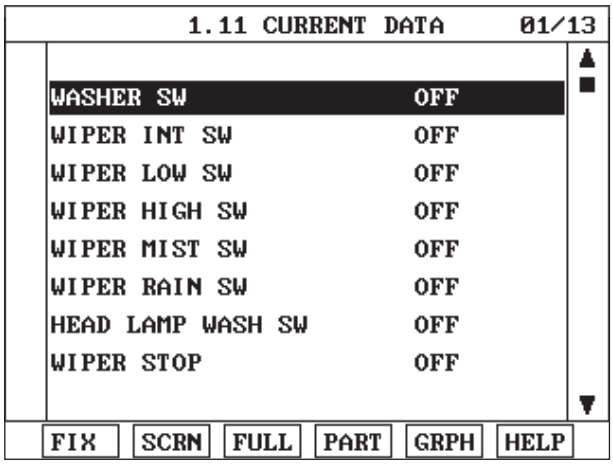
4. Select "Current data" and check the Input/Output condition of BCM.



ETBF032B



ETBF032C

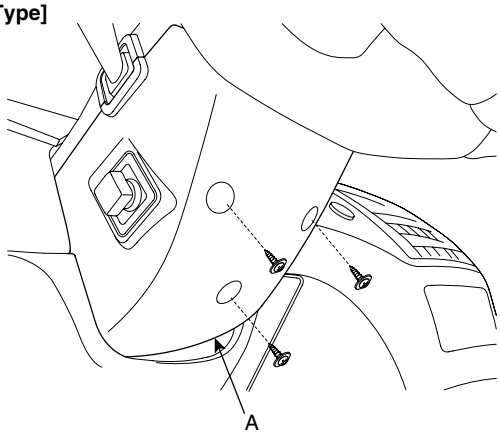


ETBF032D

REPLACEMENT ECFB98AB

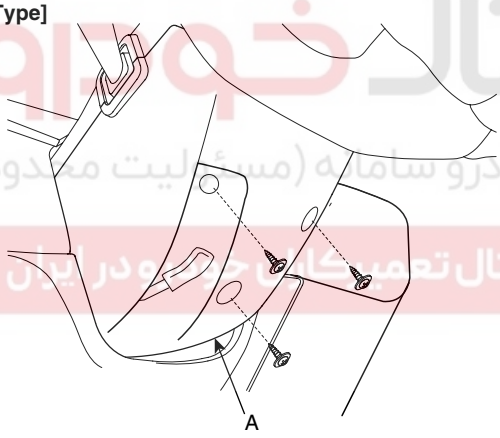
1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds (A) after removing 3 screws.

[A-Type]



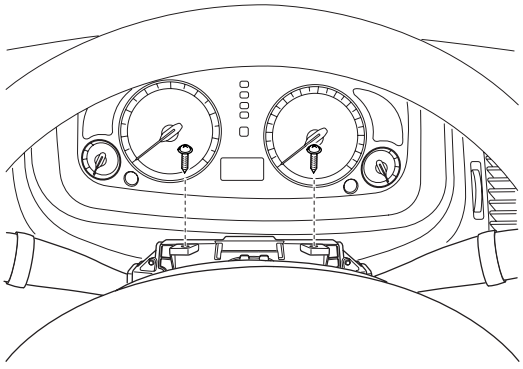
ETBF031C

[B-Type]



ETBF031D

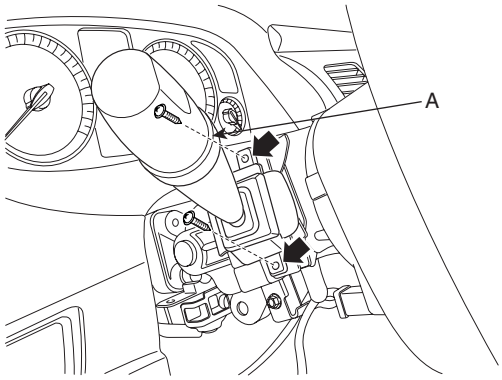
3. Remove the multi function switch after loosening 2 screws and disconnecting connector. (In case of multi function switch assembly replacement)



KTBF031G

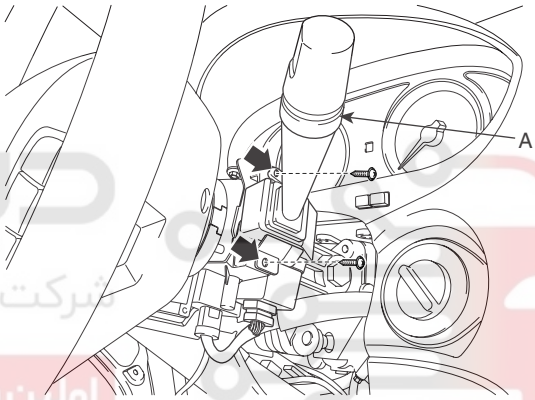
4. Remove the light switch (A) after loosening 2 screws.

[LHD]



ETBF031E

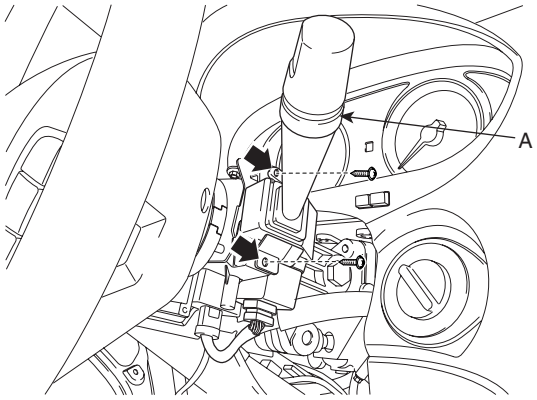
[RHD]



ETBF031F

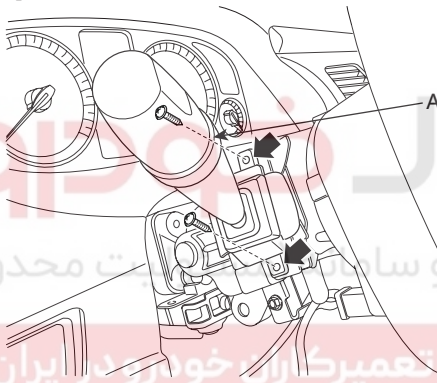
5. Remove the wiper switch (A) after disconnecting the connector and loosening 2 screws.

[LHD]



ETBF031G

[RHD]

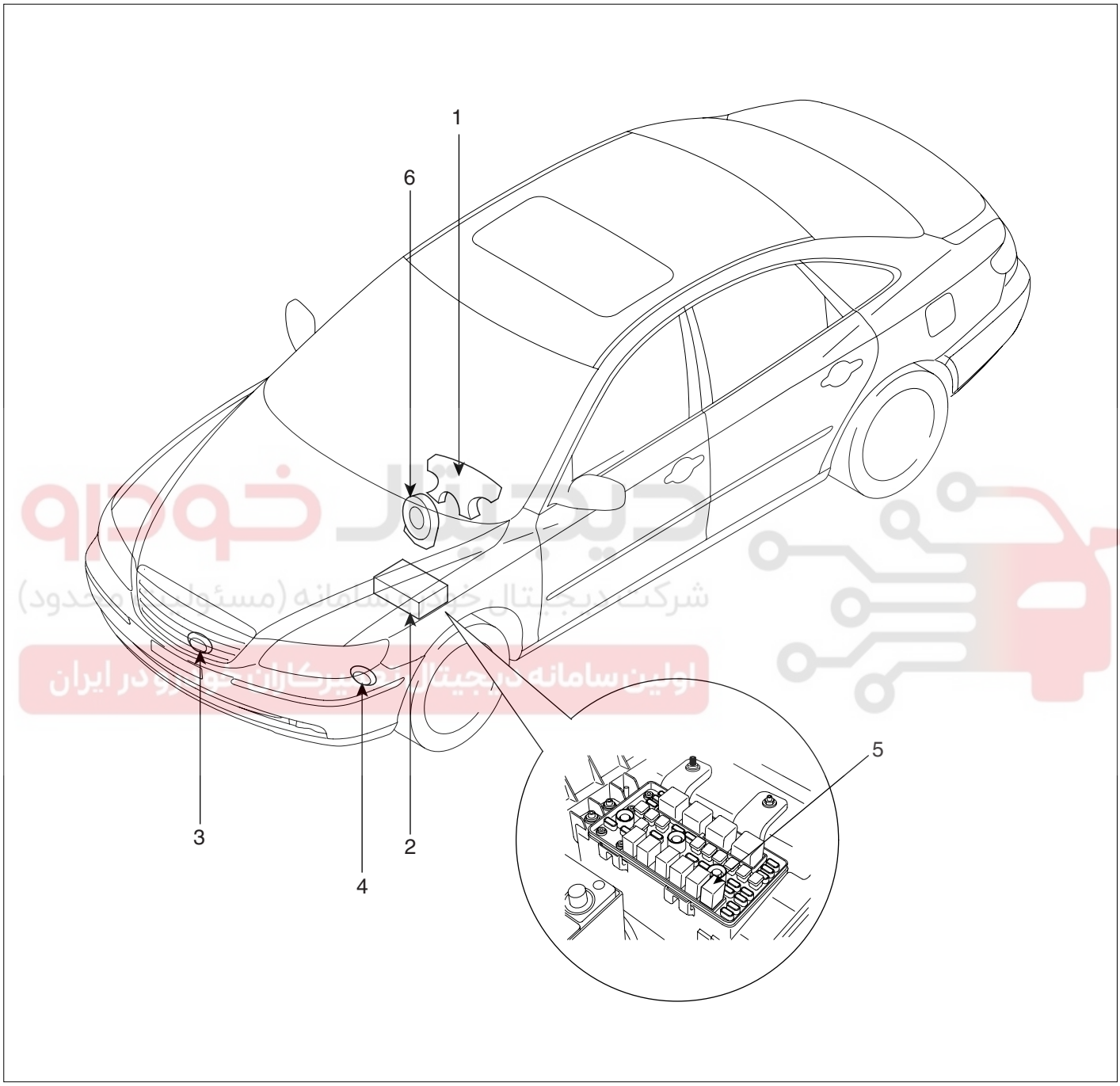


ETBF031H

6. Installation is the reverse of removal.

HORNS

COMPONENT LOCATION E7A3C6AA



1. Horn switch
2. Relay box (Engine room compartment)
3. Horn (Low pitch)
4. Horn (High pitch)
5. Horn relay
6. Clock spring

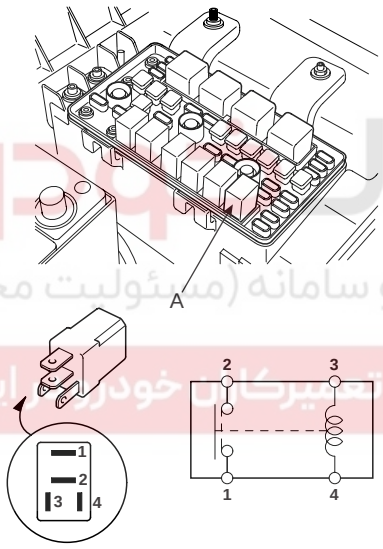
ETBF051A

INSPECTION E6F6CBF5

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



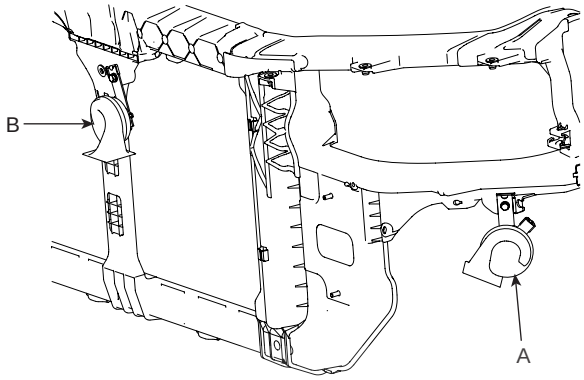
KTRE051C

Terminal / Power (No.3-No.4)	1	2	3	4
Disconnected			○	○
Connected	○	○	⊖	⊕

ETKE215E

REPLACEMENT E36398C1

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



KTBF051B

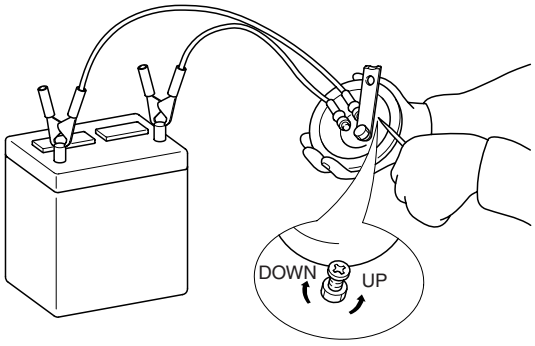
3. Installation is the reverse of removal.

ADJUSTMENT EB921F1D

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

NOTE

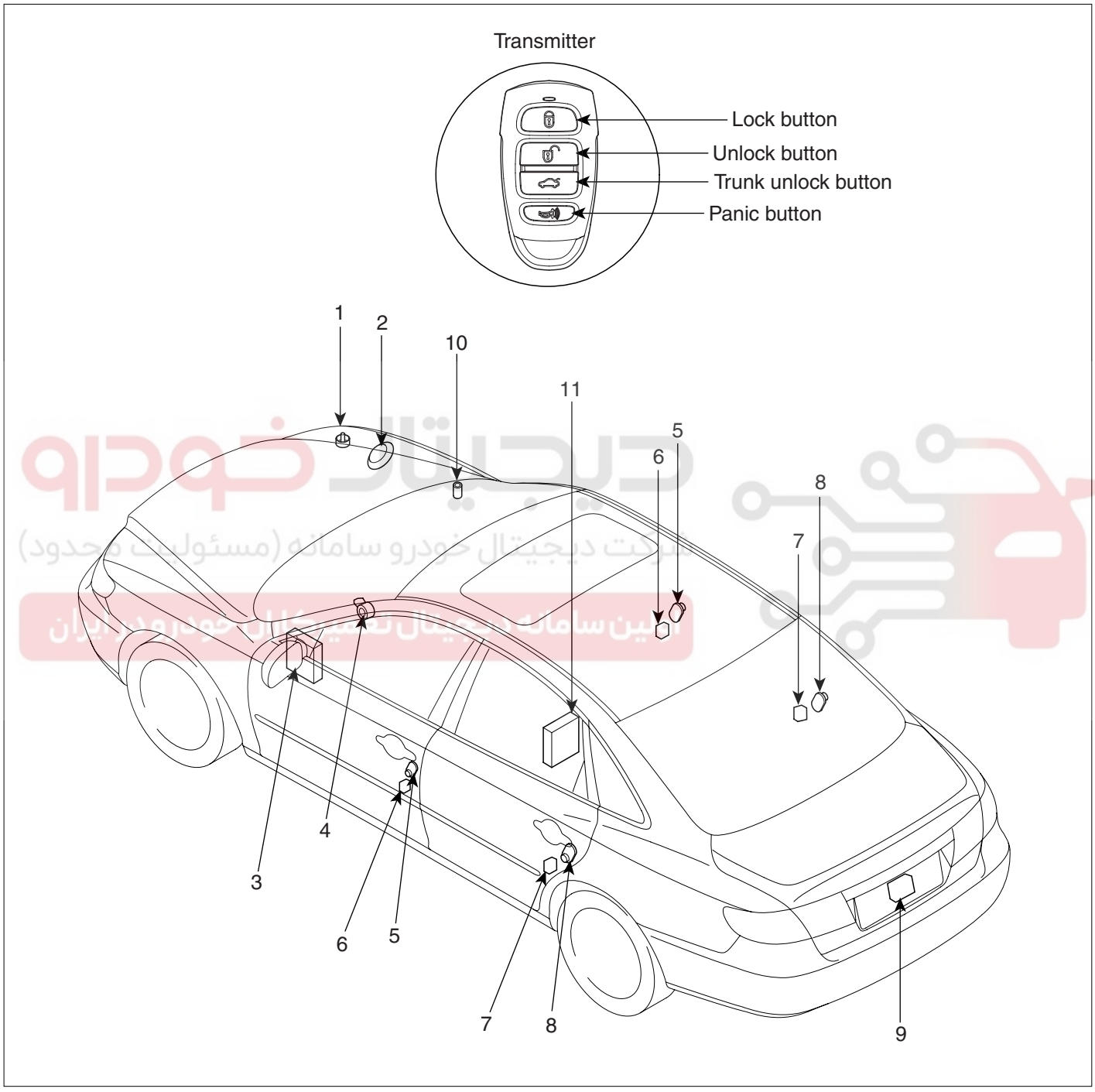
After adjustment, apply a small amount of paint around the screw head to keep it from loosening.



ETDA050A

KEYLESS ENTRY AND BURGLAR ALARM

COMPONENT LOCATION EBD6FED9



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. Trunk lid lock actuator
10. Security indicator
11. Receiver

ETBF120A

DESCRIPTION E33B57D2

BURGLAR ALARM SYSTEM

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

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

- A door is forced open.
- The trunk lid is opened without using the key.
- 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.

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

The door switches, hood switch and trunk lid switch are all close and lock the doors with the remote transmitter and then the system arms immediately.

If anything is opened 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/UNLOCK button, all doors lock. When you push the LOCK/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 twice when they unlock.

PANIC MODE(AUSTRALIA ONLY)

The panic mode causes the BCM & receiver to sound the alarm with the remote transmitter in order to attract attention. When the PANIC button is pressed, the alarm will sound and exterior lights will flash for about 30 seconds.

- The panic mode can be canceled at any time by pressing any button on the remote transmitter or by turning the ignition switch ON. The panic mode will not function if the key in.
- The panic mode can be canceled by lock or unlock with the key.

FUNCTIONS EFBAFDC4

ANTI-THEFT FUNCTION

1. ARM Function

   1) When using LOCK on the RKE (Remote Keyless Entry) the system enters the arm waiting mode. (Buzzer sound once - China, Japan only). If there is no change in the status of all entrances for 30 seconds, the doors will be locked. the hazard lamp will blink once within 1 second and the Anti-Theft System will ARM, if the following conditions have been met.
      - The ignition key is removed from the ignition switch.
      - All entry points are closed (doors, trunk, tail gate and hood)

   2) If either the door or trunk or hood is open when activating LOCK using the RKE, the doors will lock, however the hazard lamp will not flash and the Anti-Theft System will not arm.

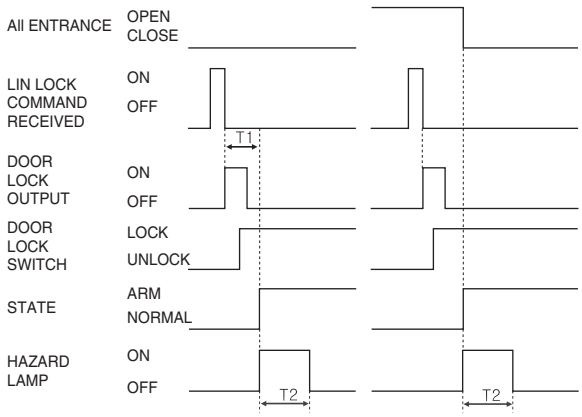
   3) In Step 2) if the opened entry points are subsequently closed, the door will be locked, the hazard lamp will blink once and the Anti-Theft System will enters the arm waiting mode. (Buzzer sound once - China, Japan only). If there is no change in the status of all entrances for 30 seconds, the doors will be locked.

   4) The ARM mode of the Anti-Theft System can only be set using the LOCK feature of the RKE. The door key will not arm the Anti-theft System.

   5) If LOCK is activated on the RKE while the Anti-Theft system is already in the ARM mode, the hazard lamp will blink once. (If, however, any of the vehicle entry points is unlocked, the Anti-Theft System will lock the door, the hazard lamp will blink once, and the system will re-ARM itself.

6) Automatic lock WILL NOT function if an entry point is opened within 30 seconds of activating UNLOCK.

7) Once the 30 seconds have passed, after the initial UNLOCK, the Anti-Theft System will lock the doors, blink the hazard lamps and then ARM.



ETRF121A

T1 : 0.6 sec,
T2 : 1.0 ± 0.2 sec, output

2. DISARM Function

1) When UNLOCK is pressed on the RKE (Remote Keyless Entry control) the ANTI-Theft System will DISARM, the hazard lamps blink 2 times (Buzzer sound 2 times at the same time - China, Japen only) and the doors unlock.
(Whether entry points are open or Closed is irrelevant)

2) Once the ignition key is IN (inserted into the ignition switch) and the ignition is turned to the ON position the Anti-Theft system will immediately DISARM.

3) If the UNLOCK signal is sent by the RKE, and either the ignition key is not inserted or entry (door, trunk, tail gate, hood) to the vehicle is not made within 30 seconds, the LOCK mode will be automatically reset, the hazard lamps will blink, and the Anti-Theft System will rearm. (Key IN = Key Insertion)
(Provided that there is no automatic lock function at a period of 30 seconds, when the UNLOCK is done by the RKE with an entry being open).

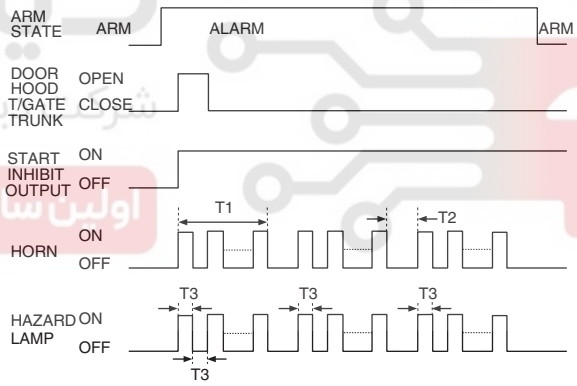
4) In steps 3), when UNLOCK is activated within the initial 30 seconds, another period of 30 seconds occurs.

5) The DISARM mode of the Anti-Theft System can only be set using the UNLOCK feature of the RKE. The door key will not disarm the Anti-theft System.

6) When repeating UNLOCK on the RKE, the hazard lamps blink 2 times and the doors unlock.

3. ALARM Function

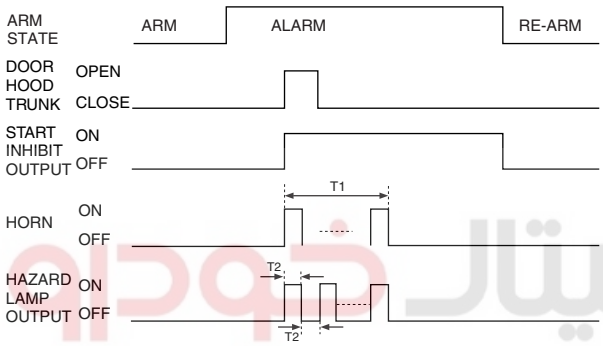
1) GENERAL AREA
a. When a point of entry is opened while the Anti-Theft System is in the ARM mode, the hazard lamp and horn alarm will activate (ON/OFF once each) for a period of 30 seconds(China, Japan 3 times).
b. Output intervals for the horn alarm and hazard lamps are identical.
c. The alarm sequence, when activated will continue for the duration of the alarm period even when the entry point is closed. (The alarm will reactivate if entry port is reopened after the initial alarm sequence completes.)



ETBF121C

T1 : 30 ± 2 sec, T2 : 10 ± 2 sec,
T3 : 0.4 ~ 0.5 sec output

2) EUROPE, AUSTRALIA AREA
   a. When a point of entry is opened while the Anti-Theft System is in the ARM mode, the hazard lamp and horn alarm will activate (ON/OFF 1 time each) for a period of 27 seconds.
   b. Output intervals for the horn alarm and hazard lamps are identical.
   c. The alarm sequence, when activated will continue for the duration of the alarm period even when the entry point is closed. (The alarm will reactivate if entry port is reopened after the initial alarm sequence completes.)



T1 : 27 ± 2 sec,
T2 : 0.4 ~ 0.5 sec.

4. ALARM CLEARANCE

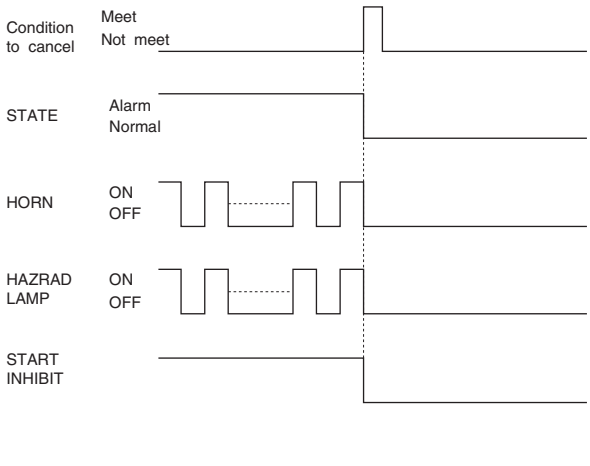
1) When choosing LOCK on the RKE (Remote Keyless Entry) either during or after alarm activation, the alarm is cleared.

2) When choosing UNLOCKS on the RKE either during or after alarm activation, the alarm is cleared.

3) When choosing TRUNK OPEN on the RKE either during or after alarm activation, the alarm is delayed.

4) If the ignition key is turned to ON for 30 seconds either during or after alarm activation the alarm will be cleared and the start inhibitor reset.

5) If during an alarm sequence the ignition key is turned ON and then OFF within 30 seconds, the alarm will continue.



T1: 30 sec Output

5. Battery Separation

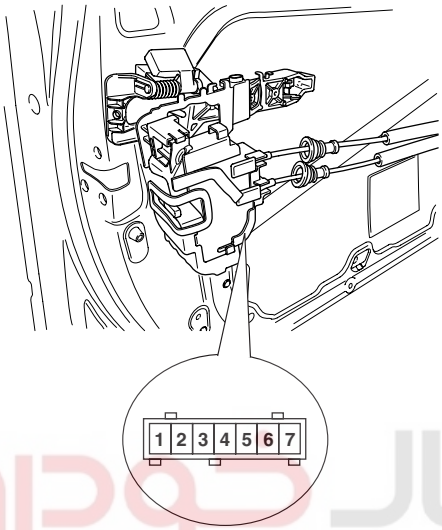
1) Case detaching battery during alarm.
   - Start inhibit is ON and horn alarm output 3 times again after detaching battery regardless of hood switch and installing.(output hazard lamp, horn equally.) where, do not regard horn alarm regard horn alarm as continuous alarm.
   ※ EC/Australia : The horn alarm shall be On at once.
   (Alarm when re-installing after detaching battery for alarming)

2) Case detaching battery at ARM condition.
   - Hold ARM condition when installing after detaching battery at ARM condition.

INSPECTION EBCCDDB6

FRONT DOOR LOCK ACTUATOR

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the 7P connector from the actuator.



KTBF122A

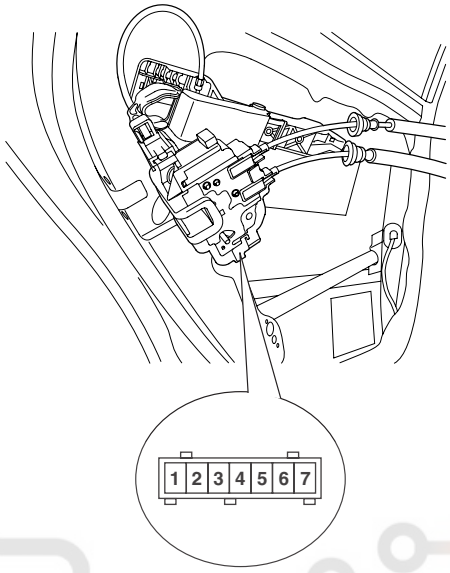
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal		5	3	6	2
Front left	Lock	⊕		⊖	
	Unlock	⊖		⊕	
Front right	Lock		⊕		⊖
	Unlock		⊖		⊕

ETRF122B

REAR DOOR LOCK ACTUATOR

1. Remove the rear door trim panel. (Refer to the Body group - rear door)
2. Disconnect the 7P connector from the actuator.



KTBF122C

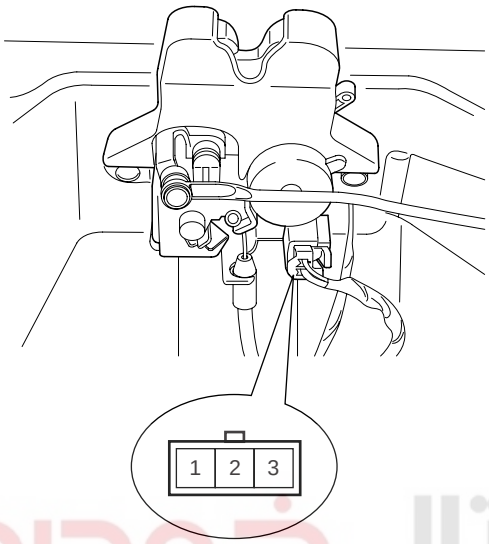
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal		5	3	6	2
Rear left	Lock	⊕		⊖	
	Unlock	⊖		⊕	
Rear right	Lock		⊕		⊖
	Unlock		⊖		⊕

ETRF122D

TRUNK LID RELEASE ACTUATOR INSPECTION

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



KTBF122E

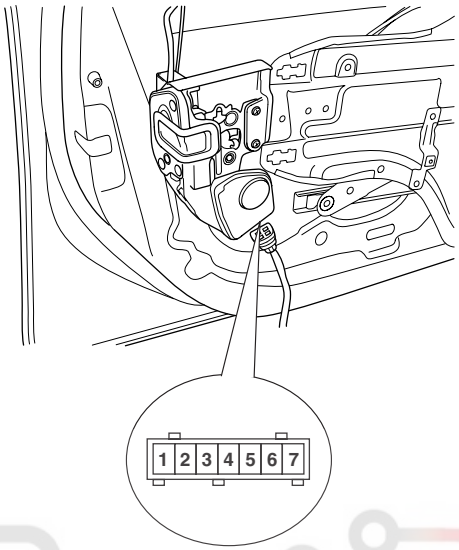
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	2	1
Open	⊕	⊖

ETBF122I

FRONT DOOR LOCK SWITCH

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the 7P connector from the actuator.



KTRE122A

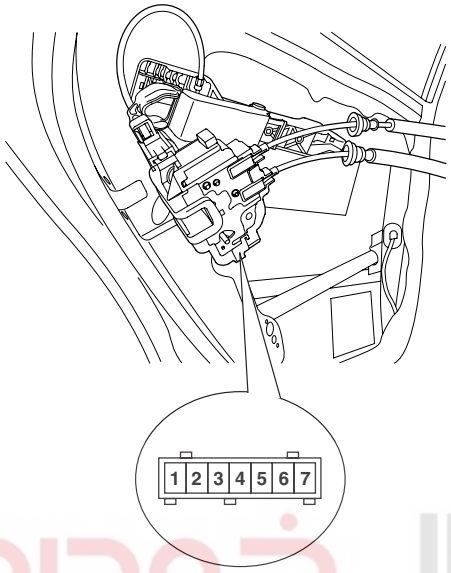
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal		1	5	3	7
Front left	Lock				
	Unlock	○	—	○	
Front right	Lock				
	Unlock		○	—	○

ETRF122G

REAR DOOR LOCK SWITCH

1. Remove the rear door trim panel. (Refer to the Body group - rear door)
2. Disconnect the 7P connector from the actuator.



KTBF122C

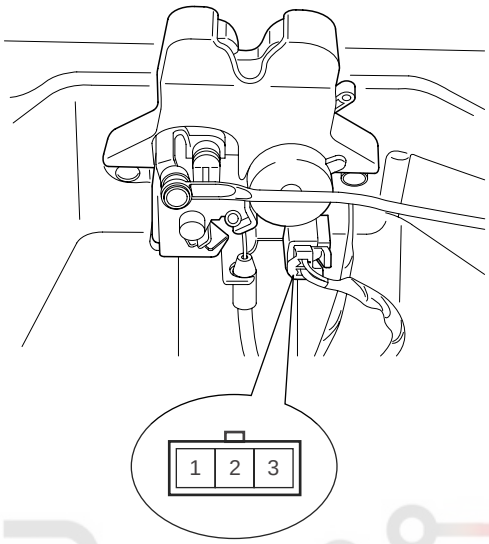
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal		1	5	3	7
Rear left	Lock				
	Unlock	○		○	
Rear right	Lock				
	Unlock		○		○

ETRF122H

TRUNK LID OPEN SWITCH

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



KTBF122E

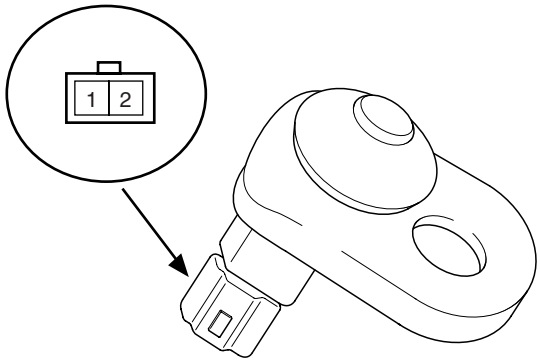
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	3	1
Open	○	○

ETBF122F

DOOR SWITCH

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



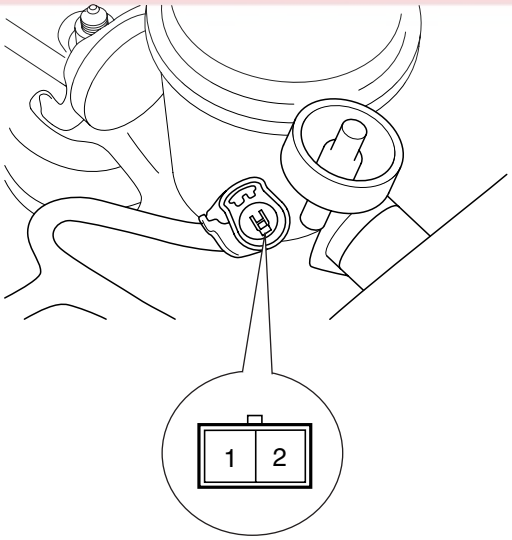
KTKD020A

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

ETQF180D

HOOD SWITCH

1. Disconnect the 2P connector from the hood switch.



ETBF122J

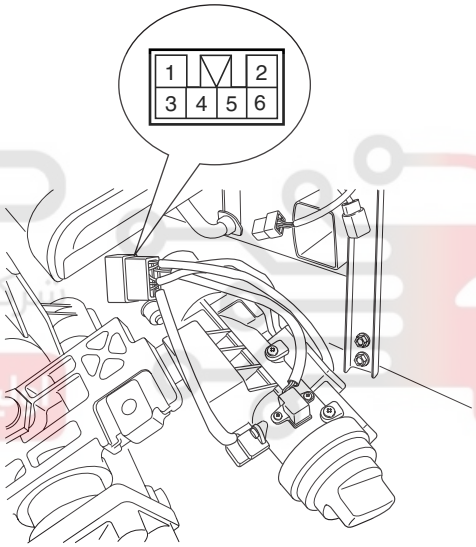
2. Check for continuity between the terminals and ground according to the table.

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

ETBF180B

DOOR WARNING SWITCH

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



ETBF122L

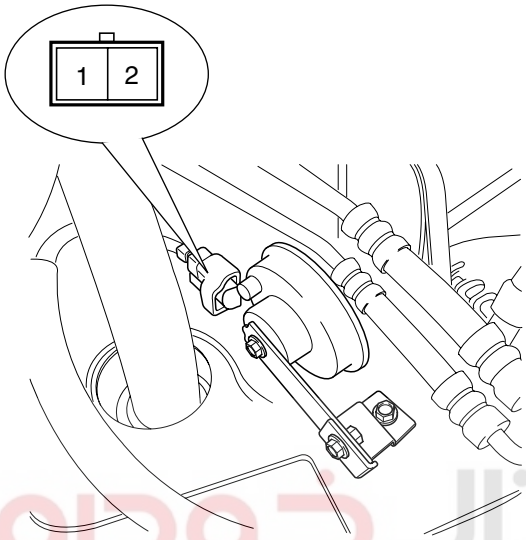
3. Check for continuity between the terminals in each position according to the table.

Terminal / Key position	5	6
Insert	○	○
Removal		

ETQF180F

BURGLAR HORN

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



KTBF122N

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

TRANSMITTER

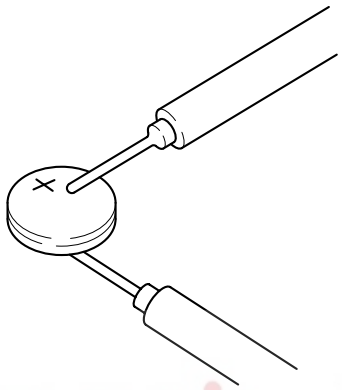
SPECIFICATION ED5E97E4

Items	Specifications
Keyless entry transmitter Power source	Lithium 3V battery (1EA)
Transmissible distance	10m or more
Life of battery	3 years or more (at 10 times per a day)
Button	Door lock Door unlock Trunk lid open panic
Transmission frequency	433.92 MHz(GEN, EUR), 315 MHz (JAPAN, CHINA)

INSPECTION E5C9F3A0

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

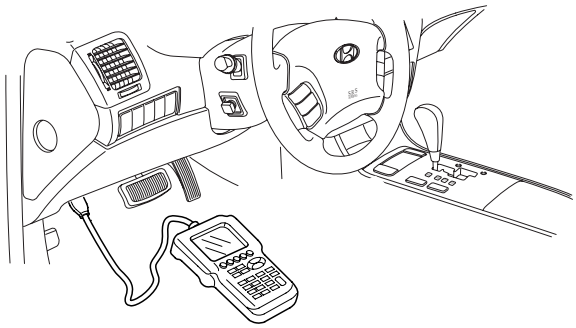


KTBF122B

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

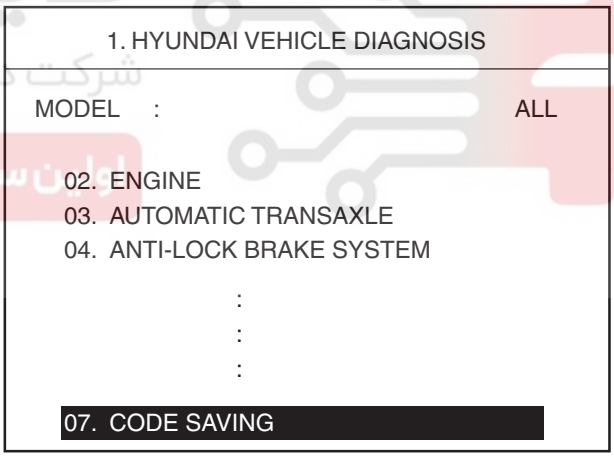
TRANSMITTER CODE REGISTRATION E5290191

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.



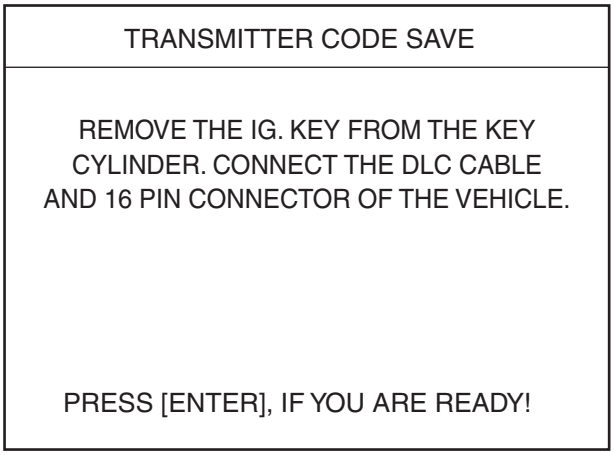
KTBF121T

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



ETPD700I

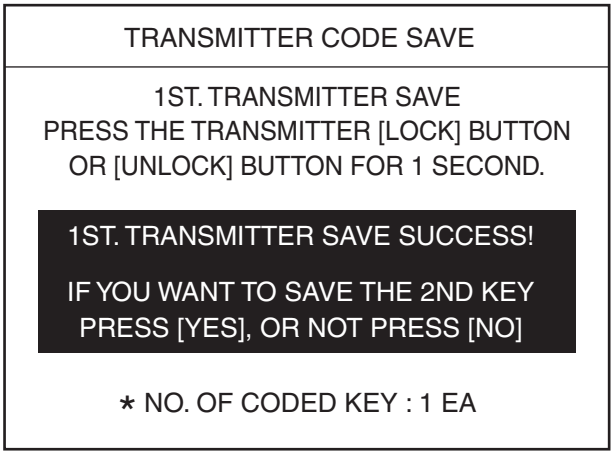
3. After selecting "CODE SAVING" menu, push "ENTER" key, then the screen will be shown as below.



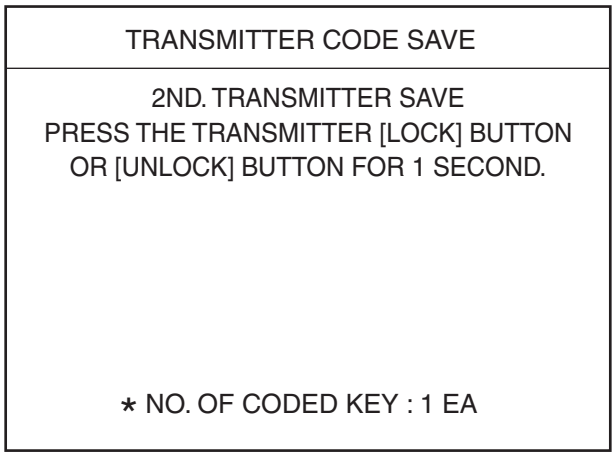
ETRF065M

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.

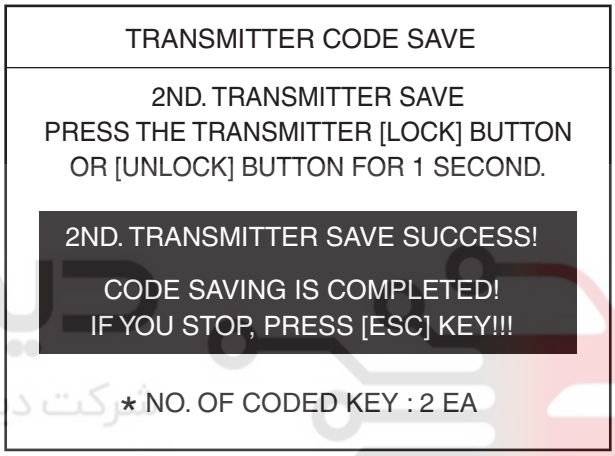
ETRF065N



ETRF065O



ETRF065P

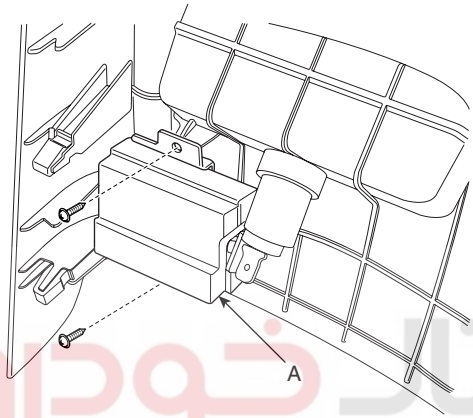


ETRF065Q

RECEIVER

REPLACEMENT EDFDC8FA

1. Disconnect the negative (-) battery terminal.
2. Remove the console rear cover. (Refer to Body group - Console)
3. Remove the receiver (A) from console rear cover after disconnecting the connector.

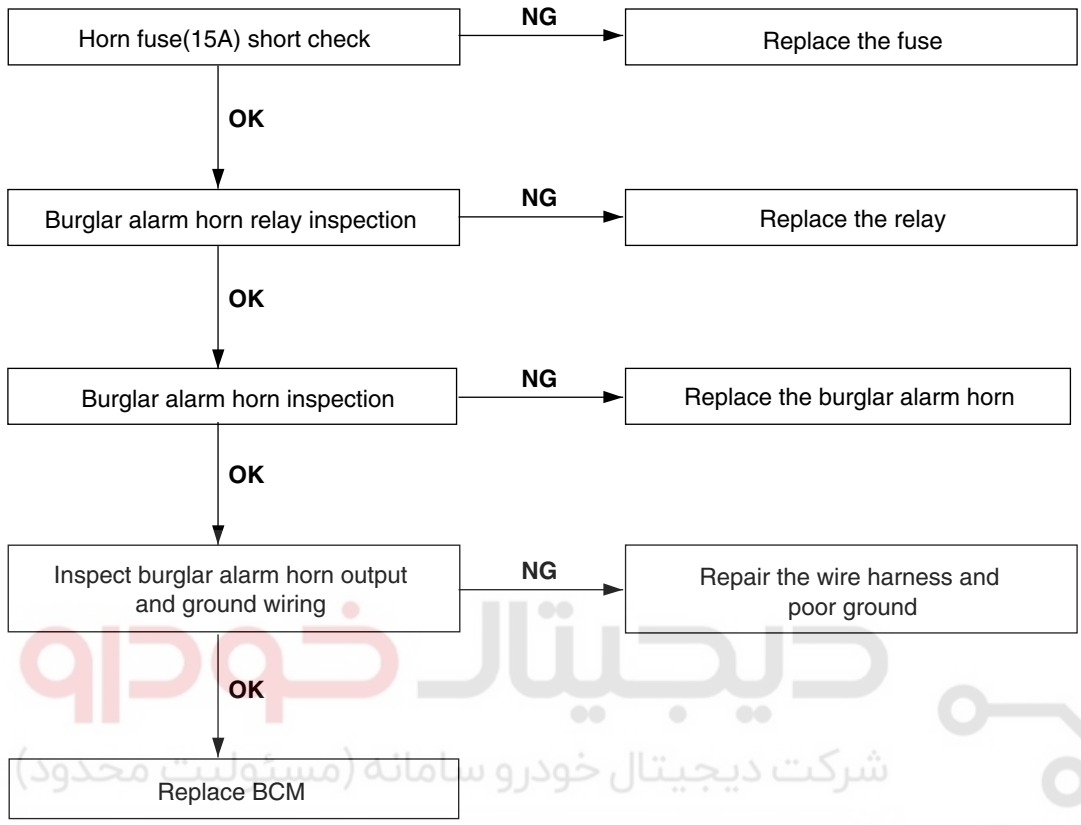


KTBF111C

4. Installation is the reverse of removal.

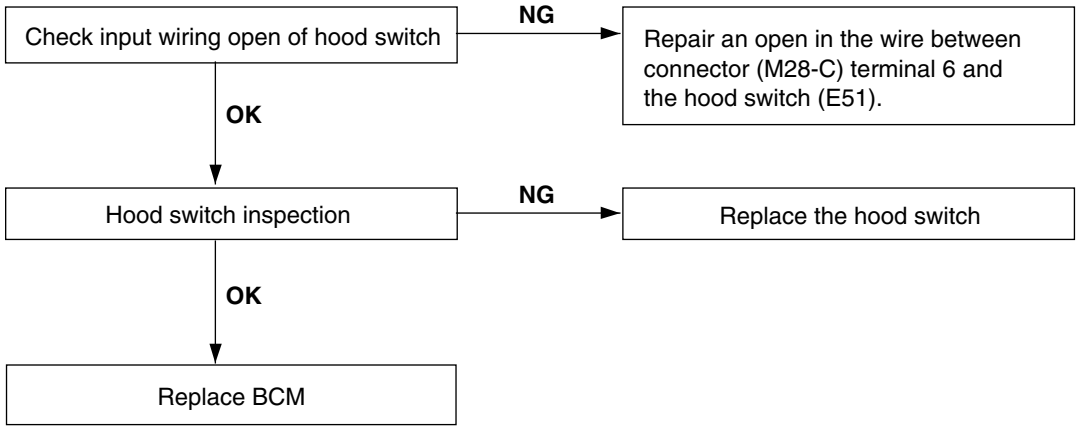
TROUBLESHOOTING EEAE520B

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



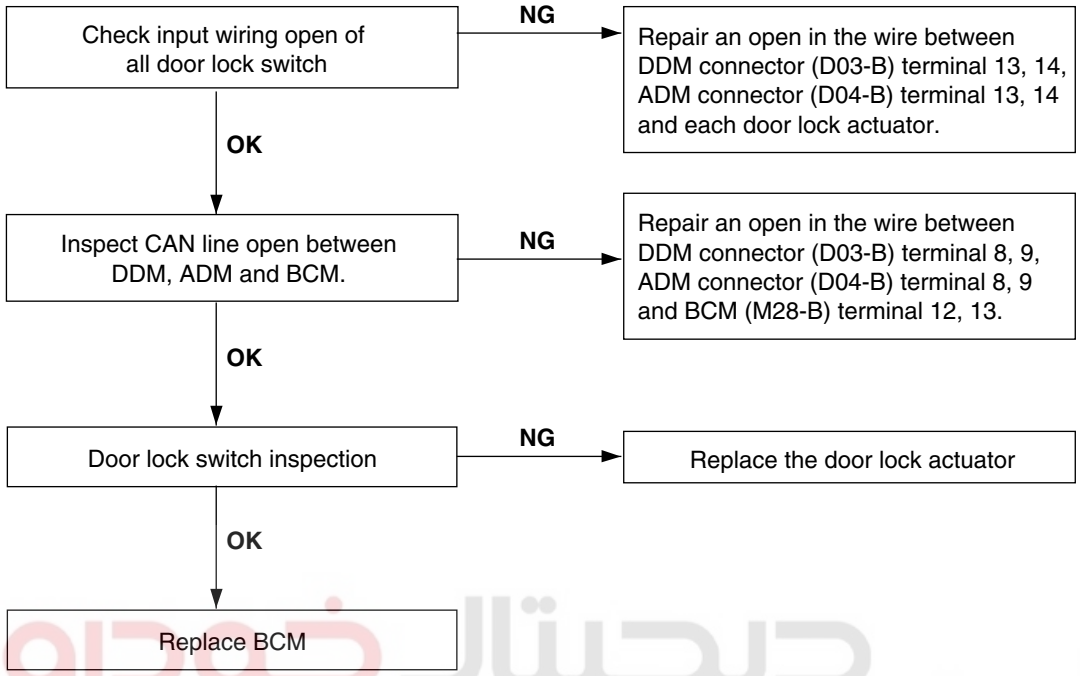
ETBF900I

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



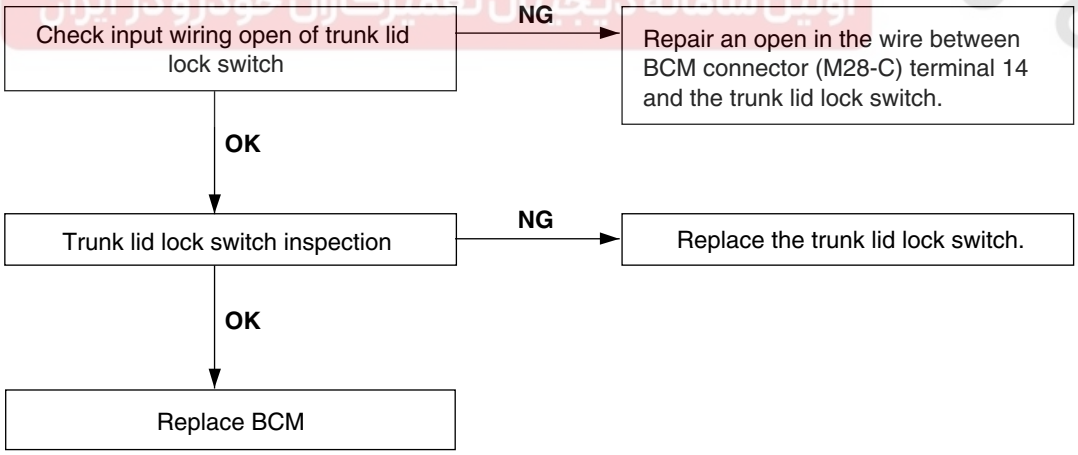
ETBF900J

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



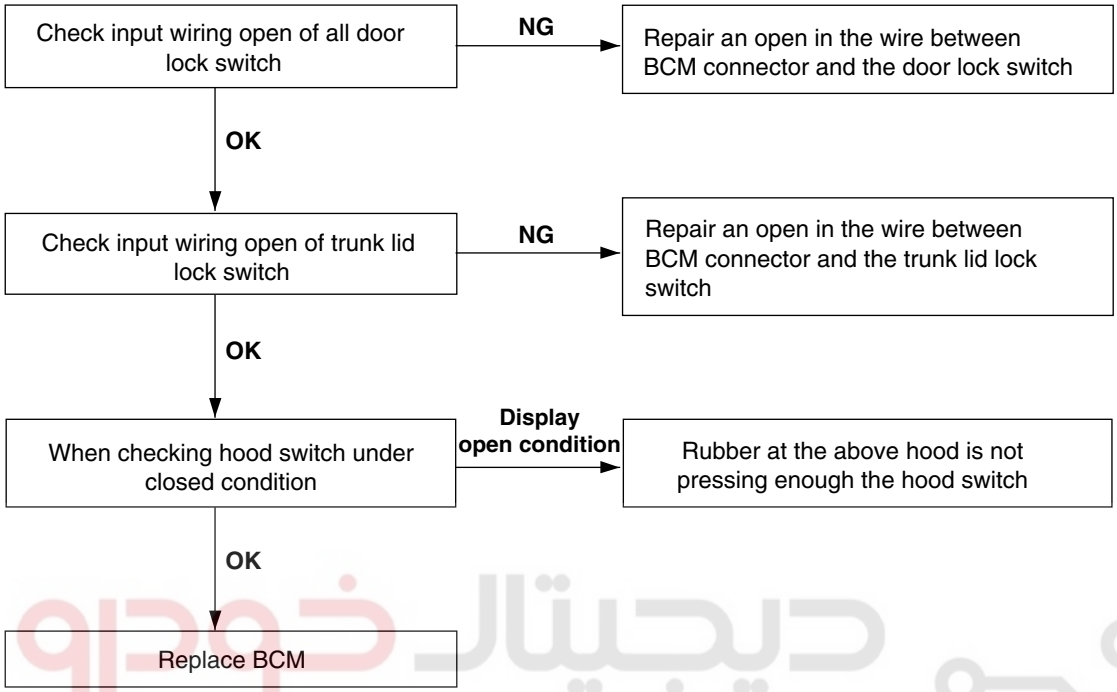
ETBF900K

4. When Trunk lid is opened in ARM mode, burglar horn does not work.

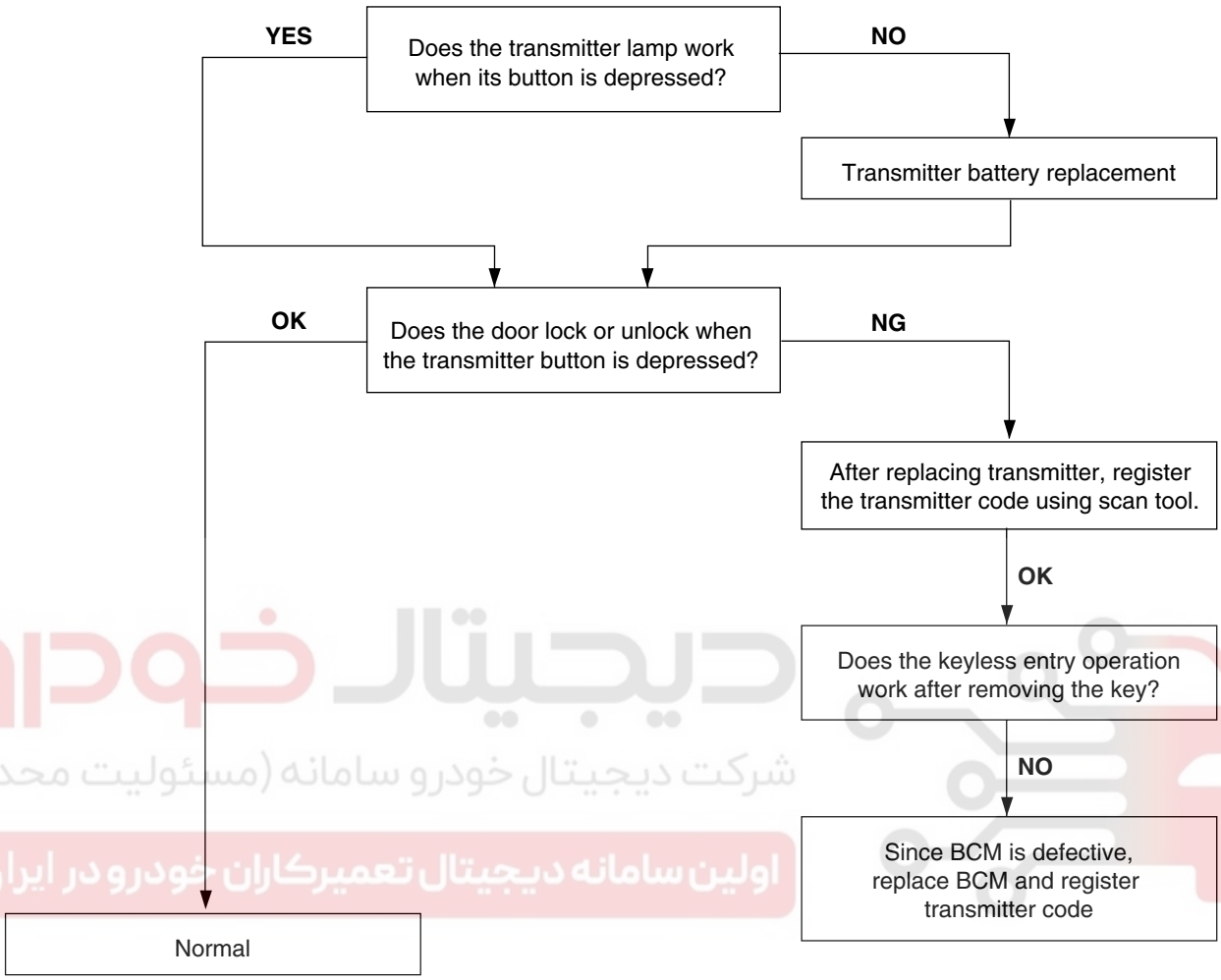


ETBF900L

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



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



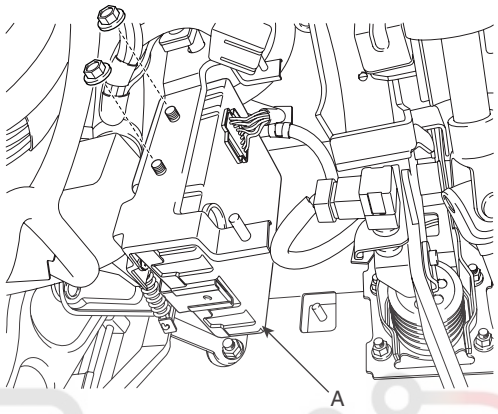
ETBF900O

ETACS (ELECTRONIC TIME AND ALARM CONTROL SYSTEM)

BODY CONTROL MODULE

DESCRIPTION E5317BB2

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



KTBF140C

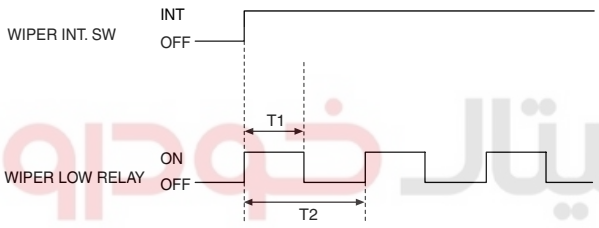
OPERATION ED3408E0

1. WIPER CONTROL BY WIPER SWITCH

1) In IGN2 ON state, if there is wiper low input (LIN communication), then wiper low relay output is turned on.

2) In IGN2 ON state, if there is wiper high input (LIN communication), then both wiper low relay and wiper high relay outputs are turned on.

3) In IGN2 ON state, if there is wiper intermittent input (LIN communication), then wiper is controlled by vehicle speed and wiper intermittent time input.



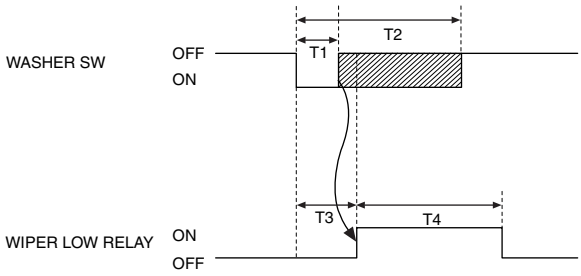
ETBF145A

T1 : 0.7 ± 0.1 sec,
T2 : Interval time.

4) In IGN2 ON state, if MIST switch input is ON then wiper low relay output is turned on until MIST switch is OFF.

2. WIPER MOTOR CONTROL FOR WASHER

1) If the duration of washer switch input is measured from 0.2 sec to 0.6 sec, after T3, the wiper low relay output is ON for 0.7 sec. (For 1 Time wiping)

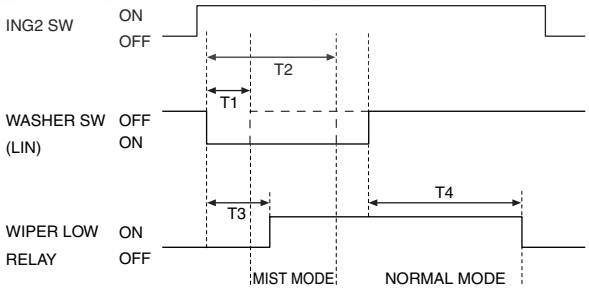


ETBF145B

T1 : 0.2 sec, T2 : 0.6 sec,
T3 : 0.3 sec, T4 : 0.7 ± 0.1 sec.

2) If washer switch is ON more than 0.6 sec, The wiper activation output is on after T3 (0.3sec)

3) If washer switch is OFF, the wiper motor will stop wiper after 3 ± 0.3 sec later.



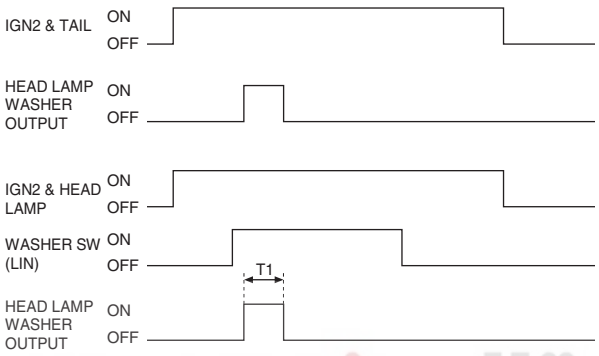
ETBF145C

T1 : 0.2 sec, T2 : 0.6 sec,
T3 : 0.3 sec, T4 : 3 sec.

3. HEAD LAMP WASHER FUNCTION.

1) In case of IGN2 ON & TAIL LAMP ON status, if head lamp washer switch input is detected, head lamp washer output is turned ON.

2) In case of IGN2 ON & HEAD LAMP ON status, if washer switch input is detected, head lamp washer output is turned ON.



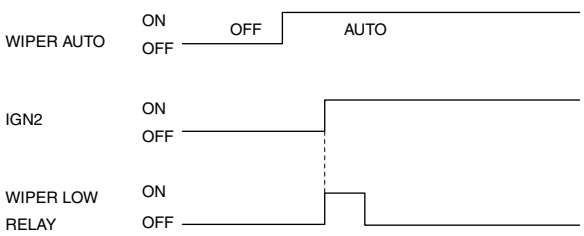
ETBF145D

T1 : 0.8 ± 0.1 sec.

4. RAIN SENSING WIPER

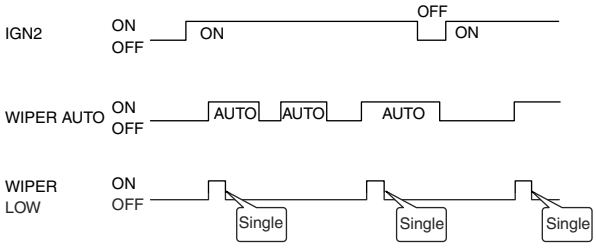
1) In IGN2 ON state, if auto switch input (LIN communication) is ON then both wiper low relay and wiper high relay outputs are controlled by the rain sensor input signal.

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.



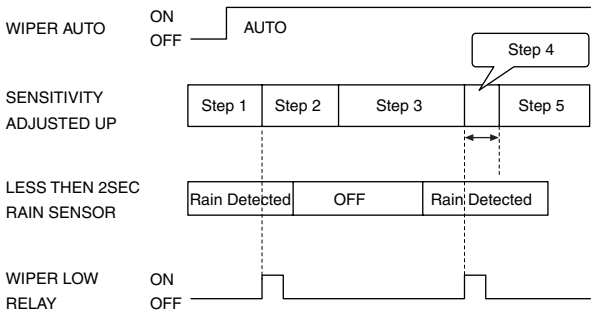
ETBF145E

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.



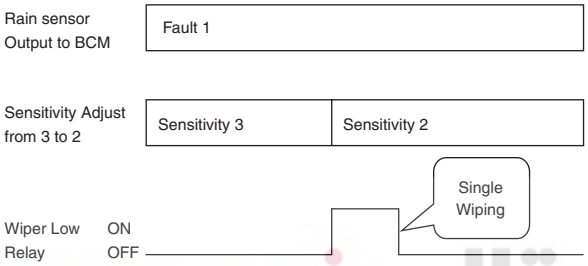
ETBF145F

4) The drive 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 then 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.



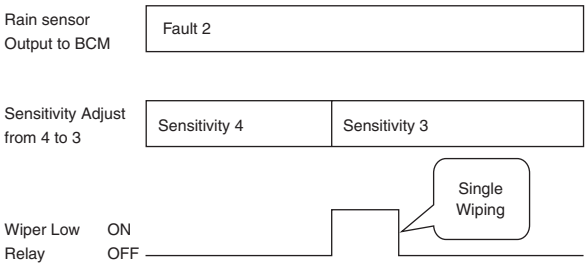
ETBF145G

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 sec.
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.



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

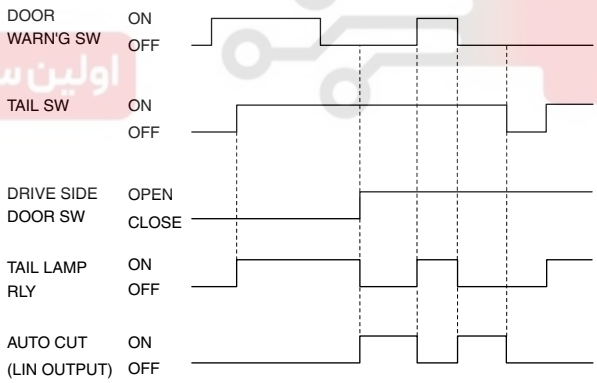
5. TAIL LAMP AUTO CUT

1) With the tail lamp switched ON, if the ignition Is switched OFF and the Driver door opened, the tail lamp should be automatically turned OFF.

2) With the ignition switch ON, if the Driver door is opened and the ignition is switched to OFF, the tail lamp should be automatically turned OFF.

3) When the tail lamp is cut automatically and the tail lamp switch is turned OFF and ON, the tail lamp illuminates and auto cut function is cancelled.

4) When the tail lamp is cut automatically and the ignition key is inserted, the tail lamp illuminates and auto cut function is canceled.



ETBF145J

6. HEAD LAMP LOW CONTROL

1) In IGN1 ON state, if there is head lamp low switch input (LIN communication), head lamp low relay output is turned ON.

2) In IGN1 ON state, If head lamp high switch input (LIN communication) and head lamp low relay is detected then head lamp high relay output is turned ON. Which means the head lamp high relay and also the head lamp high indicator on the cluster.

3) In IGN1 ON state, If head lamp passing input (LIN communication) is detected then head lamp high relay output and head lamp low relay are turned ON.

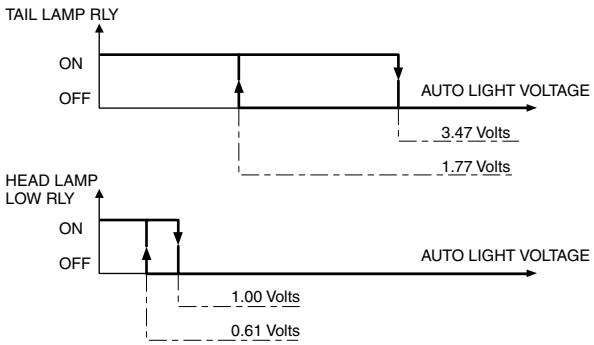
7. AUTO LIGHT CONTROL

In the state of IGN1 ON, when multi function switch module detects auto light switch on, tail lamp relay output and head lamp low relay output are controlled according to auto light sensor's input.

The auto light control doesn't work if the pin sunlight supply (5V regulated power from Ignition 1 power to sunlight sensor) is in short circuit with the ground.

If IGN1 ON, The BCM monitors the range of this supply and raises up a failure as soon as the supply's voltage is out of range. Then this failure occurs and as long as this is present, the head lamp must be turned on without taking care about the sunlight level provided by the sensor.

This is designed to prevent any head lamp cut off when the failure occurs during the night.

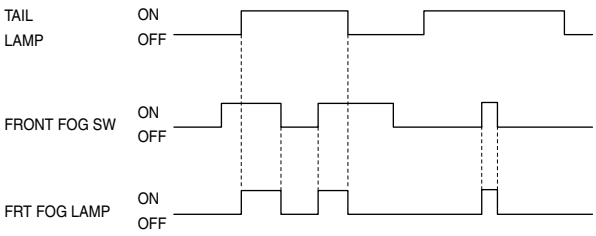


ETBF145K

	Tail lamp	Head lamp
ON	1.77 ± 0.08[V]	0.61 ± 0.06[V]
OFF	3.47 ± 0.10[V]	1.00 ± 0.06[V]

8. FRONT FOG LAMP CONTROL

Tail lamp output ON, if front fog switch input is detected (LIN communication), front fog lamp relay output is turned ON.



ETBF145M

9. FLASHER CONTROL

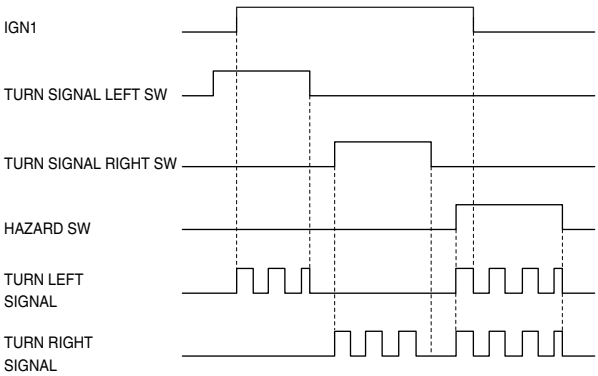
1) Normal operating condition

Turn signal period : 85±10 period/min

While IGN2 is ON if turn signal left switch or turn signal right switch or hazard switch input is detected, then turn signal outputs are turned ON following the switch input (left, right or hazard).

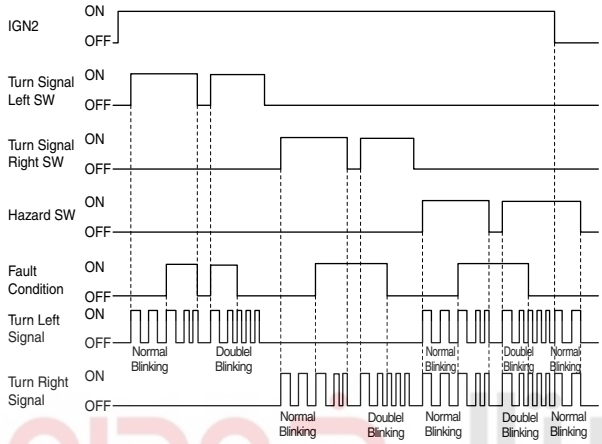
NOTE

Priority : hazard > turn signal



ETBF145N

2) Lamp failure condition
When one of the front or rear is broken-down (Lamp failure), the turn signal blinks with double frequency.
The double blinking works at IGN2 ON condition, double blinking for Hazard: Except side lamp, if any error condition is detected then triggered the double blinking.
Period : More than 120 Cycle/min



ETBF145O

10. MAGNETIC & BUZZER & SOUND CONTROL
Sound priority
1st : Diagnostic sound (provided to test the Buzzer by way of Diagnostic tool)
2nd : Seatbelt warning
3rd : Over speed warning (Middle east area)
4th : FOB key operated warning
5th : Key learning sound (Learning with diagnostic tool)

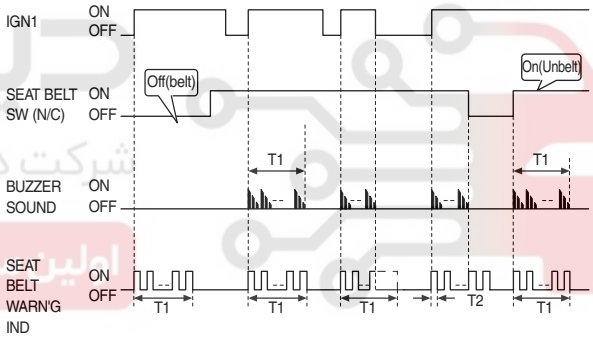
11. SEAT BELT WARNING TIMER

1) Seat belt warning lamp and warning sound stop at IGN1 OFF during the operation
With a seat belt switch on, warning sound stops immediately but seat belt warning indicator continues working for the remained time.

2) Warning lamp and warning sound are always activated for one period if seat belt is released after seatbelt was fastened during IGN1 ON status.

3) If IGN1 is turned OFF during seat belt warning, the seat belt warning indicator and buzzer stops immediately.

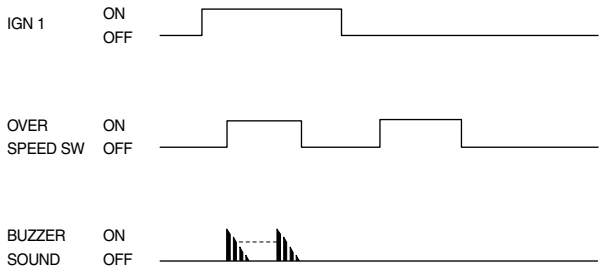
4) Whether the seat belt is fasten or not, BCM detected IGN ON signal, Seat belt warning Indicator should be triggered for defined timing but buzzer warning should follow the status of seat belt switch.



ETBF145P

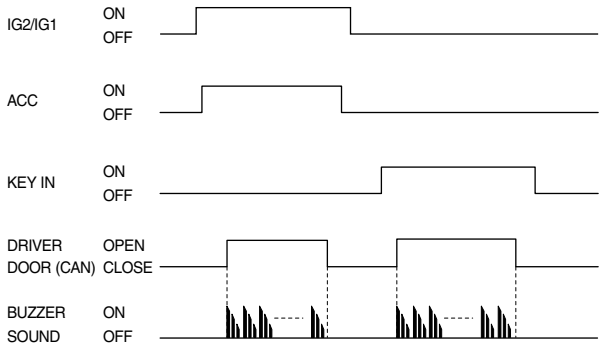
T1 : 6 ± 1 sec,
T2 : 0.3 ± 0.1 sec.

12. OVER SPEED WARNING FUNCTION (Middle east area)
    If vehicle runs over 120km/h, the cluster input is to be set.
    When the cluster input indicates that vehicle runs over 120km/h, the over speed warning starts.



ETBF145Z

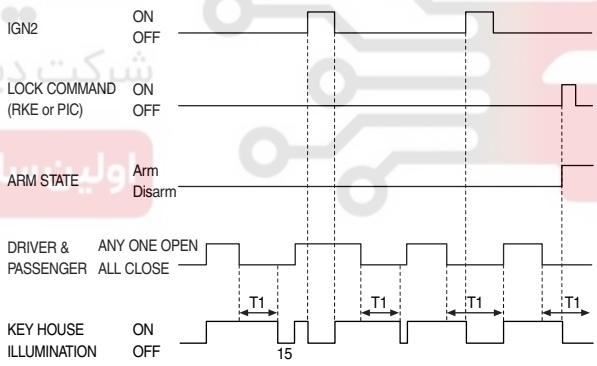
13. KEY OPERATED WARNING (Key reminder warning)
    1) While IGN KEY is inserted into the key cylinder or ACC is on or IGN2 is on or IGN1 is on, if driver side door is opened. Key operated warning starts.
    2) If the key is pulled out from key cylinder and ACC = IGN2 = IGN1 = OFF, or if driver side door is closed, then the key operated warning stops immediately.
    3) Duration : Permanent (The key operated warning continues permanently if the condition has not changed)



ETBF145R

14. KEY HOLE ILLUMINATION
    1) Turn ON condition
       a. IGN2 OFF
       b. Door open [(front left door switch ON) or (front right door switch ON)]
       c. IGN key hole illumination is turned on. key hole illumination ON
    2) 10 sec illumination condition
       a. Turn on condition
       b. Door close [(front left door switch OFF) and (front right door switch OFF)]
       c. The IGN key hole is illuminated for 10 sec.

       If doors open again during 10sec illumination, the turn ON condition starts again.
    3) Illumination stops condition
       a. IGN key hole is illuminated
       b. IGN ON or Entered arm mode (by RKE or PIC)
       c. IGN key hole illumination is turned off immediately. key hole illumination = OFF



ETBF145T

T1 : 30 ± 1 sec.

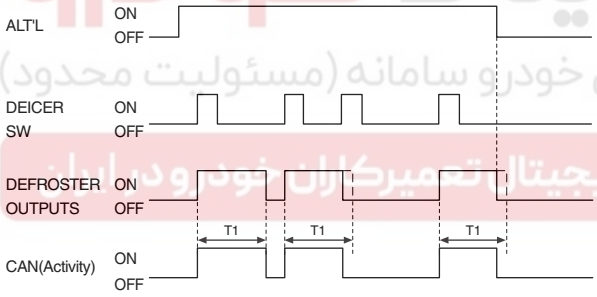
15. DEFOGGER TIMER

1) Condition 1
   a. Alternator level high & defogger is OFF (Defogger relay OFF and defogger activity OFF)
   b. Defogger is activated (defogger switch ON)
   c. Defogger outputs are turned ON

2) Condition 2
   a. Alternator level high & defogger is ON
   b. Defogger switch Input pushed again or T1 delay has elapsed since defogger has been turned ON
   c. Defogger outputs are turned OFF

3) Condition 3
   If alternator input is changed to low, defogger outputs should be turned OFF immediately.

4) Outside mirror defogger of door module can be controlled by CAN communication at the same time.



ETBF145U

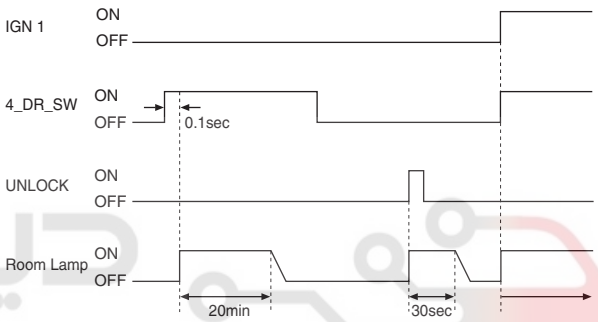
T1 : 20 min ± 1 min

16. DECAYED ROOM LAMP

1) When room lamp off & IGN1 off & all door closed, if transition of all doors closed to not (all doors closed) for more than 0.1sec, room lamp is turned on for 20 min.

2) When room lamp off & IGN1 off & all door closed, if remote control unlock is received, room lamp is turned on for 30 seconds.

3) When room lamp off & IGN1 off & all door closed, if IGN1 ON & all doors closed to not (all doors closed), the room lamp is turned ON without time limitation.



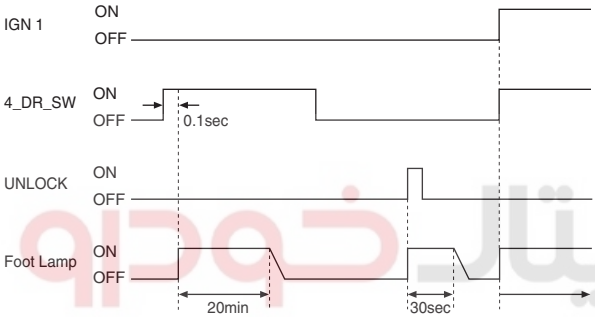
ETBF145V

17. DECAYED FOOT LAMP

1) When foot lamp off & IGN1 off & all door closed, if transition of all doors closed to not (all doors closed) for more than 0.1sec, foot lamp is turned on for 20 min.

2) When foot lamp off & IGN1 off & all door closed, if remote control unlock is received, foot lamp is turned on for 30 seconds.

3) When foot lamp off & IGN1 off & all door closed, if IGN1 ON & all doors closed to not (all doors closed) or P position (transmission), the foot lamp is turned ON without time limitation.



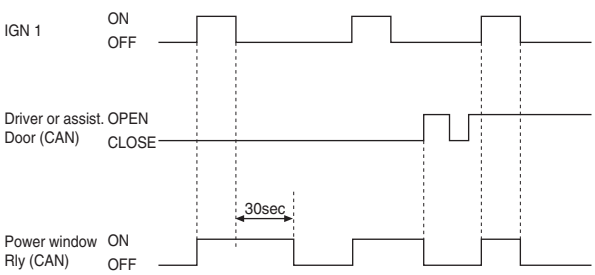
ETBF145W

18. POWER WINDOW TIMER

1) Power window relay CAN signal is switched ON when IGN1 switch ON.

2) When IGN1 switch is turned off, the power window relay CAN signal remains on for 30sec and then is turned OFF.

3) During the operation 2), if driver or assistant side door is opened, the power window relay CAN signal is turned OFF immediately.

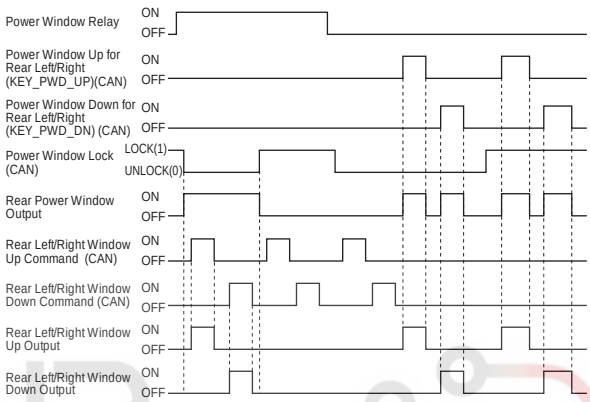


ETBF145X

19. REAR POWER WINDOW CONTROL

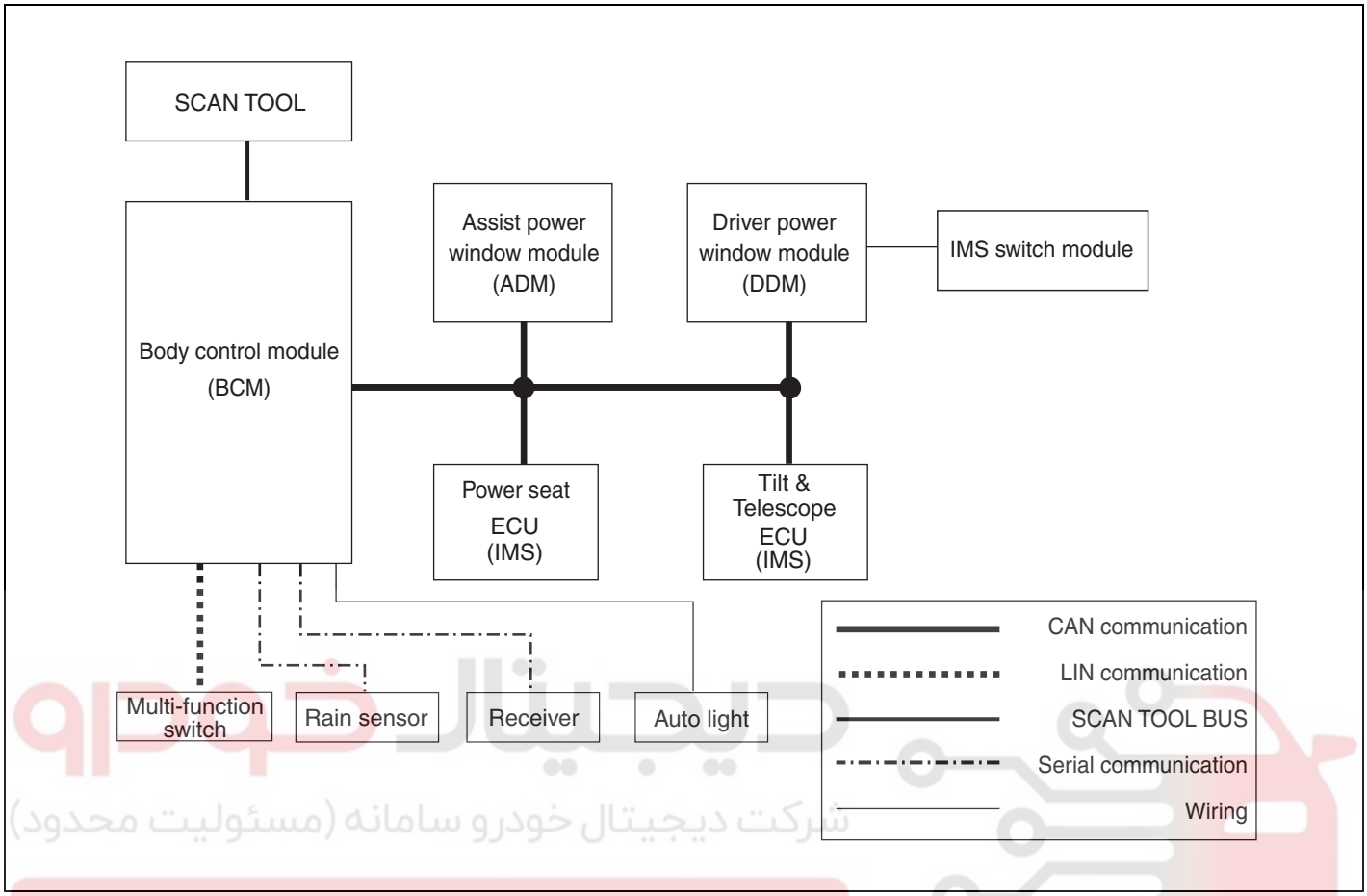
1) Operation ON condition
Power window relay ON, Power window LOCK CAN signal UNLOCK or rear Power window UP/DOWN CAN signal ON.

2) Operation OFF condition
Power window relay OFF or Power window LOCK CAN signal LOCK and rear power window UP/DOWN CAN signal OFF.



ETBF145Y

COMMUNICATION SYSTEM EE6DDF9E



ETBF140B

INSPECTION EAD4BB69

Trouble diagnostics when using scan tool.

1. If the self-diagnostic function is in operation, CAN communication stops and LIN communication is converted into self-diagnostic communication.

2. Only BCM communicates directly with scan tool, and the other units perform self-diagnostic function by BCM through the mediator of CAN or LIN.

BCM CURRENT DATA

The body control module can diagnose with the diagnosis tool more quickly.
The BCM communicates with the diagnosis tool and then reads the input/output value and drives the actuator.

INPUT/OUTPUT VALUE

SECTION	BCM DISPLAY	DESCRIPTION	UNIT
POWER SUPPLY	KEY IN	Key input condition	ON/OFF
	ACC	ACC ON condition	ON/OFF
	IGN 1	IGN 1 ON condition	ON/OFF
	IGN 2	IGN 2 ON condition	ON/OFF
	BATT. VOLTAGE	Battery voltage monitoring (0 Volt~ 20.4 Volts)	Volts
	IGN 1 VOLTAGE	IGN1 voltage monitoring (0 Volt~ 20.4 Volts)	Volts
	ALTERNATER VOLTAGE	ALT L voltage monitoring (0 Volt~ 20.4 Volts)	Volts
TURN SIGNAL LAMP	HAZARD	Hazard lamp switch ON condition	ON/OFF
	LEFT TURN SIG. SW	Left turn signal lamp switch ON condition	ON/OFF
	RIGHT TURN SIG.SW	Right turn signal lamp switch ON condition	ON/OFF
	LEFT TURN SIG. OUT	Left turn signal lamp output	ON/OFF
	RIGHT TURN SIG.SW	Right turn signal lamp output	ON/OFF
LAMPS	REAR FOG LAMP SW	Rear fog lamp switch ON condition	ON/OFF
	FRONT FOG LAMP SW	Front fog lamp switch ON condition	ON/OFF
	TAIL LAMP SW	Tail lamp switch ON condition	ON/OFF
	HEAD LAMP LOW SW	Head lamp low switch ON condition	ON/OFF
	HEAD LAMP HIGH SW	Head lamp high switch ON condition	ON/OFF
	PASSING SW	Passing switch ON condition	ON/OFF
	REAR FOG RELAY	Rear fog lamp relay ON	ON/OFF
	FRONT FOG RELAY	Front fog lamp relay ON	ON/OFF
	FORNT FOG INDICATOR	Front fog lamp indicator ON	ON/OFF
	TAIL LAMP RELAY	Tail lamp relay ON	ON/OFF
	HEAD LAMP LOW RELAY	Head lamp low relay ON	ON/OFF
	HEAD LAMP HGIH RELAY	Head lamp high relay ON	ON/OFF
	HEAD LAMP HGIH INDICATOR	Head lamp high indicator ON	ON/OFF

SECTION	BCM DISPLAY	DESCRIPTION	UNIT
AUTO LIGHT	AUTO LIGHT SW	Auto light switch ON	ON/OFF
	AUTO LIGHT SNSR	Auto light sensor voltage monitoring (0 Volt~ 5.1 Volts)	Volts
	TAIL LAMP RELAY	Tail lamp relay ON	ON/OFF
	HEAD LAMP LOW RELAY	Head lamp low relay ON	ON/OFF
BURGLAR ALARM	4-DOOR OPEN	One in the 4 door is being opened.	ON/OFF
	HOOD OPEN	Hood is being opened.	ON/OFF
	TRUNK OPEN SW	Trunk open switch ON at the trunk lid	ON/OFF
	TRUNK LAMP OPEN	Trunk is being opened.	ON/OFF
	TRUNK KEY UNLOCK SW	Trunk key unlock switch ON	ON/OFF
	TRUNK OPEN RELAY	Trunk open relay ON	ON/OFF
	BUGLAR ALARM RELAY	Buglar alarm realy ON	ON/OFF
	SECURITY LED	Security LED ON	ON/OFF
	BUG. ALARM RELAY	Buglar alarm horn relay ON	ON/OFF
	EXTERNAL BUZZER	External buzzer ON	ON/OFF
	BUGLAR ALARM STATUS	Buglar alarm status	
WIPER	WASHER SW	Washer switch ON	ON/OFF
	WIPER INT SW	Intermittent wiper switch ON	ON/OFF
	WIPER LOW SW	Wiper low switch ON	ON/OFF
	WIPER HIGH SW	Wiper high switch ON	ON/OFF
	WIPER MIST SW	Wiper mist switch ON	ON/OFF
	WIPER RAIN SW	Auto wiper switch ON (Rain sensor)	ON/OFF
	HEAD LAMP WASH SW	Head lamp washer switch ON	ON/OFF
	WIPER STOP	Wiper "P" position	ON/OFF
	WIPER INT. MODE	01 : 1 step 02 : 2 step 03 : 3 step 04 : 4 step 05 : 5 step (1 step: FASTEST)	ON/OFF
	WIPER LOW RELAY	Wiper low relay ON	ON/OFF
	WIPER HIGH RELAY	Wiper high relay ON	ON/OFF
	HEAD LAMP WASHER RLY	Head lamp washer relay ON	ON/OFF
	VEHICLE SPEED	Vehicle speed 00 : 0km/h, FF : 255km/h (resolution : 1km/h)	km/h

SECTION	BCM DISPLAY	DESCRIPTION	UNIT
The others	DEFROSTER SW	Defrost switch ON	ON/OFF
	DR SEAT BELT	Fastened driver seat belt	ON/OFF
	PASSENGER SEAT BELT	Fastened passenger seat belt	ON/OFF
	OVERSPEED	Over speed command from the cluster	ON/OFF
	KEY ILLUMINATION	Key illumination ON	ON/OFF
	DR.S/BELT WARN. LAMP	Driver seat belt warning indicator ON	ON/OFF
	PA.S/BELT WARN. LAMP	Assist seat belt warning indicator ON	ON/OFF
	DEFROSTER RLY	Defrost relay ON	ON/OFF
	ROOM LAMP	Room lamp ON	ON/OFF
	BUZZER	Buzzer ON in the BCM	ON/OFF
	SAFETY BELT STATE	Safety belt state transition	ON/OFF
	KEY OPERA. WARNING		
	OVERSPEED WARNING		
	INT. BUZZER		
	PARK BRAKE SW	Parking brake switch ON	
	VEHICLE SPEED	Vehicle speed 00 : 0km/h, FF : 255km/h (resolution : 1km/h)	
	DRL OPTION	Daytime Running Light option	
	DRL RELAY	DRL RELAY ON	
	PARK BRAKE SW	Parking brake switch ON	km/h
DAYTIME RUNING LIGHT	ALTERNATER VOLTAGE	ALT L voltage monitoring (0 Volt~ 20.4 Volts)	ON/OFF
	RF STATUS		ON/OFF
	PESSURE BUTTON		ON/OFF
	TRANSMIT CODE	Numbers	ON/OFF
	WINDOW LOCK	Window LOCK signal from DDM	Volts
TRANSMITTER	RR WINDOW UP	Rear right window up signal from DDM	
	RR WINDOW DOWN	Rear right window down signal from DDM	
	RL WINDOW UP	Rear left window up signal from DDM	EA

SECTION	BCM DISPLAY	DESCRIPTION	UNIT
POWER WINDON	RL WINDOW DOWN	Rear left window down signal from DDM	ON/OFF
	REAR P/WINDOW LOCK	Rear power window LOCK ON	ON/OFF
	RR P/WINDOW DOWN	Rear right power window down ON	ON/OFF
	RR P/WINDOW UP	Rear right power window up ON	ON/OFF
	RL P/WINDOW DOWN	Rear left power window down ON	ON/OFF
	RL P/WINDOW UP	Rear left power window up ON	ON/OFF
	EC HORN	Europe HORN OPTION (ALARM 27 sec single operation) NON Europe OPTION (ALARM 27 sec t triple operation)	ON/OFF
	MECHANICAL LOCK	Mechanical key can adjust ARM or DISARM. 0: Mechanical key can't adjust ARM or DISARM.	ON/OFF
	ALARM HORN	CHIP sound is occurred when transmitter LOCK/UNLOCK	ON/OFF
OPTION	PASSEN. S/BELT WARN.	Passenger seat belt warning	ON/OFF
	INHIBIT P SWITCH	Shift lever "P" position	ON/OFF
	FOOT LAMP	Foot lamp output ON	ON/OFF

SELF DIAGNOSIS : BCM DTC LIST

DTC	BCM DISPLAY	DTC DESCRIPTION
B1602	CAN ERROR	CAN LINE ERROR
B1605	CAN TIMEOUT BETWEEN BCM AND DDM	CAN TIMEOUT BETWEEN BCM AND DDM FOR 10 sec.
B1606	CAN TIMEOUT BETWEEN BCM AND ADM	CAN TIMEOUT BETWEEN BCM AND ADM FOR 10 sec.
B1607	CAN TIMEOUT BETWEEN BCM AND PS	CAN TIMEOUT BETWEEN BCM AND POWER SEAT UNIT FOR 10 sec.
B1608	CAN TIMEOUT BETWEEN BCM AND TILT	CAN TIMEOUT BETWEEN BCM AND TILT & TELESCOPE UNIT FOR 10 sec.
B1629	LIN RECEPTION ERROR	LIN DATA RECEPTION ERROR FROM MULTI FUNCTION SWITCH
B1630	LIN TRANSMISSION ERROR	LIN DATA TRANSMISSION ERROR TO MULTI FUNCTION SWITCH
B1905	RAIN SENSOR FAULT 1	RAIN SENSOR FAULT 1 - ITSELF
B1906	RAIN SENSOR FAULT 2	RAIN SENSOR FAULT 2 - STICKING FAULT TO THE WINDSHIELD GLASS
B1907	RAIN SENSOR FAULT 3	RAIN SENSOR FAULT 3- DATA RECEPTION ERROR FROM BCM MORE THAN 0.5 sec.
B1901	AUTO LIGHT OUT OF RANGE	AUTO LIGHT OUT OF RANGE (< 4 Volts, > 6 Volts , NORMAL : 5 Volts)
B1603	CAN BUS OFF	CAN BUS OFF

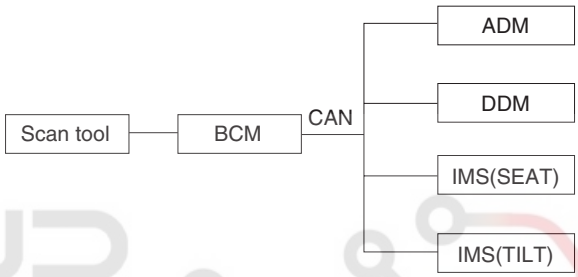
BCM ACTUATOR OPERATION

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

NO.	BCM DISPLAY
1	Tail lamp
2	Head lamp low
3	Head lamp high
4	Head lamp high indicator
5	Front fog lamp
6	Front fog lamp indicator
7	Rear fog lamp
8	Day Running light
9	Low speed wiping relay
10	High speed wiping relay
11	Defroster relay
12	Trunk release
13	B/A Horn
14	Room Lamp
15	Hazard Lamp + Flasher Buzzer Output
16	Left turn signal + Flasher Buzzer Output
17	Right turn signal + Flasher Buzzer Output
18	Buzzer
19	Key illumination
20	Seat Belt Indicator(Driver side and Assist side)
21	Head Lamp Washer
22	Start Inhibition output
23	External Buzzer output
24	Security Led output
25	Rear RH Power window Up
26	Rear RH Power Window Down
27	Rear LH Power window Up
28	Rear LH Power Window Down
29	Foot lamp output
30	AV TAIL output

ADM, DDM, IMS SELF DIAGNOSTIC FUNCTION

1. It can be communicated with scan tool through of BCM.
2. BCM receives the commands from scan tool and remits to DDM, ADM and IMS units with CAN. BCM receives the response from the units with CAN inversely, and feedback to scan tool with CAN.
3. Input display and output forced drive can be performed in each of DDM, ADM and IMS units. Though, failure diagnosis is limited to the certain diagnosis ranges.



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DRIVER DOOR MODULE (DDM)

INPUT/ OUTPUT VALUE

DDM DISPLAY	DESCRIPTION	UNIT
DR.MIRROR UP SW	DRIVER MIRROR UP SWITCH ON	ON/OFF
DR.MIRROR DOWN SW	DRIVER MIRROR DOWN SWITCH ON	ON/OFF
DR.MIRROR LEFT SW	DRIVER MIRROR LEFT SWITCH ON	ON/OFF
DR.MIRROR RIGHT SW	DRIVER MIRROR RIGHT SWITCH ON	ON/OFF
PA.MIRROR UP SW	PASSENGER MIRROR UP SWITCH ON	ON/OFF
PA.MIRROR DOWN SW	PASSENGER MIRROR DOWN SWITCH ON	ON/OFF
PA.MIRROR LEFT SW	PASSENGER MIRROR LEFT SWITCH ON	ON/OFF
PA.MIRROR RIGHT SW	PASSENGER MIRROR RIGHT SWITCH ON	ON/OFF
MIRROR FOLDER SW	MIRROR FOLDER SWITCH ON	ON/OFF
IMS AUTO SW	IMS AUTO SWITCH ON	ON/OFF
TRUNK OPEN SW	TRUNK OPEN SWITCH ON	ON/OFF
DR.DOOR UNLOCK	DRIVER DOOR UNLOCK/LOCK	ON/OFF
DR. REAR DOOR LOCK	DRIVER REAR DOOR UNLOCK/LOCK	ON/OFF
DR. KEY UNLOCK	DRIVER KEY UNLOCK SWITCH ON	ON/OFF
DR. KEY LOCK	DRIVER KEY LOCK SWITCH ON	ON/OFF
POWER WINDOW LOCK SW	POWER WINDOW LOCK SWITCH ON	ON/OFF
RR WINDOW DOWN SW	REAR RIGHT WINDOW DOWN SWITCH ON	ON/OFF
RR WINDOW UP SW	REAR RIGHT WINDOW UP SWITCH ON	ON/OFF
PA.WINDOW AUTO DOWN SW	PASSENGER WINDOW AUTO DOWN SWITCH ON	ON/OFF
PA.WINDOW DOWN SW	PASSENGER WINDOW DOWN SWITCH ON	ON/OFF
PA.WINDOW AUTO UP SW	PASSENGER WINDOW AUTO UP SWITCH ON	ON/OFF
PA.WINDOW UP SW	PASSENGER WINDOW UP SWITCH ON	ON/OFF
RL WINDOW DOWN SW	REAR LEFT WINDOW DOWN SWITCH ON	ON/OFF
RL WINDOW UP SW	REAR LEFT WINDOW UP SWITCH ON	ON/OFF
DR.WINDOW AUTO DOWN SW	DRIVER WINDOW AUTO DOWN SWITCH ON	ON/OFF
DR.WINDOW DOWN SW	DRIVER WINDOW DOWN SWITCH ON	ON/OFF
DR.WINDOW AUTO UP SW	DRIVER WINDOW AUTO UP SWITCH ON	ON/OFF
DR.WINDOW UP SW	DRIVER WINDOW UP SWITCH ON	ON/OFF
IGN2 SW	IGN2 SWITCH ON	ON/OFF
IMS SET SW	IMS SET SWITCH ON	ON/OFF
IMS 1 SW	IMS 1 SWITCH ON	ON/OFF
IMS 2 SW	IMS 2 SWITCH ON	ON/OFF
CRUSH INPUT SIGNAL	CRUSH INPUT SIGNAL ON	ON/OFF
DR. DOOR OPEN	DRIVER DOOR OPEN	ON/OFF
DOOR LOCK SW	DOOR LOCK SWITCH ON	ON/OFF

DDM DISPLAY	DESCRIPTION	UNIT
DOOR UNLOCK SW	DOOR UNLOCK SWITCH ON	ON/OFF
MIRROR HORI. POS.	DRIVER MIRROR HORIZONTAL POSITION SENSOR VOLTAGE	Volts
MIRROR VERT. POS.	DRIVER MIRROR VERTICAL POSITION SENSOR VOLTAGE	Volts

DDM DTC LIST

DTC CODE	DDM DISPLAY	DESCRIPTION
B1910	LOSM_H	Driver outside mirror horizontal operation failure
B1911	LOSM_V	Driver outside mirror vertical operation failure
B1602	CAN ERROR	CAN line error
B1630	CAN BUS OFF	CAN BUS OFF

DDM ACTUATOR LIST

ACTUATOR	DESCRIPTION
CENTRAL DOOR LOCK	All door LOCK for 0.5 sec at the operation command
CENTRAL DOOR UNLOCK	All door UNLOCK for 0.6 sec at the operation command
DRIVER SIDE WINDOW AUTO UP	Driver power window operation by the highest of the window
DRIVER SIDE WINDOW AUTO DOWN	Driver power window operation by the lowest of the window
DRIVER OUTSIDE MIRROR HIGH	Driver outside mirror operation by the highest
DRIVER OUTSIDE MIRROR LOW	Driver outside mirror operation by the lowest
DRIVER OUTSIDE MIRROR LEFT	Driver outside mirror operation by the end of left
DRIVER OUTSIDE MIRROR RIGHT	Driver outside mirror operation by the end of right
DRIVER SIDE FOLD	Driver outside mirror fold operation
DRIVER SIDE UNFOLD	Driver outside mirror unfold operation

ASSIST DOOR MODULE (ADM)

INPUT/ OUTPUT VALUE

ADM DISPLAY	DESCRIPTION	UNIT
PA.DOOR LOCK	PASSENGER DOOR LOCK/ UNLOCK	ON/OFF
PA.DOOR UNLOCK	PASSENGER REAR DOOR LOCK/ UNLOCK	ON/OFF
PA.DOOR OPEN	PASSENGER DOOR OPEN/ CLOSE	ON/OFF
PA.DOOR LOCK SW	PASSENGER DOOR LOCK SWITCH ON	ON/OFF
PA.DOOR UNLOCK SW	PASSENGER DOOR UNLOCK SWITCH ON	ON/OFF
IGN 2 SWITCH	IGN 2 SWITCHITCH ON	ON/OFF
PA.WINDOW AUTO SW-DOWN	PASSENGER WINDOW AUTO SWITCH ON-DOWN	ON/OFF
PA.WINDOW SW-DOWN	PASSENGER WINDOW SWITCH ON-DOWN	ON/OFF
PA.WINDOW AUTO SW-UP	PASSENGER WINDOW AUTO SWITCH ON-UP	ON/OFF
PA.WINDOW SW-UP	PASSENGER WINDOW SWITCH ON-UP	ON/OFF
MIRROR HORI. POS.	PASSENGER MIRROR HORIZONTAL POSITION SENSOR VOLTAGE	Volts
MIRROR VERT. POS.	PASSENGER MIRROR VERTICAL POSITION SENSOR VOLTAGE	Volts

ADM DTC LIST

DTC	DDM DISPLAY	DESCRIPTION
B1912	ROSM_H	Passenger outside mirror horizontal operation failure
B1913	ROSM_V	Passenger outside mirror vertical operation failure
B1602	CAN ERROR	CAN ERROR
B1603	CAN BUS OFF	CAN BUS OFF

ADM ACTUATOR LIST

ACTUATOR	DESCRIPTION
PASSENGER WINDOW AUTO UP	Passenger power window operation by the highest of the window
PASSENGER WINDOW AUTO DOWN	Passenger power window operation by the lowest of the window
PASSENGER OUTSIDE MIRROR HIGH POSITION	Passenger outside mirror operation by the highest
PASSENGER OUTSIDE MIRROR LOW POSITION	Passenger outside mirror operation by the lowest
PASSENGER OUTSIDE MIRROR LEFT POSITION	Passenger outside mirror operation by the end of left
PASSENGER OUTSIDE MIRROR RIGHT POSITION	Passenger outside mirror operation by the end of right
PASSENGER SIDE FOLD	Passenger outside mirror fold operation
PASSENGER SIDE UNFOLD	Passenger outside mirror unfold operation

POWER SEAT MODULE (IMS)

INPUT/ OUTPUT VALUE

DISPLAY	DESCRIPTION	UNIT
"P" POSITION SWITCH	SHIFT LEVER "P" POSITION SWITCH ON	ON/OFF
"R" POSITION SWITCH	SHIFT LEVER "R" POSITION SWITCH ON	ON/OFF
RECLINE FORWARD SWITCH	RECLINING FORWARD SWITCH ON	ON/OFF
RECLINE BACKWARD SWITCH	RECLINING BACKWARD SWITCH ON	ON/OFF
RECLINE FORWARD LIMIT SWITCH	RECLINING FORWARD LIMIT SWITCH ON	ON/OFF
RECLINE BACKWARD LIMIT SWITCH	RECLINING BACKWARD LIMIT SWITCH ON	ON/OFF
SLIDE FORWARD SWITCH	SLIDE FORWARD SWITCH ON	ON/OFF
SLIDE BACKWARD SWITCH	SLIDE BACKWARD SWITCH ON	ON/OFF
SLIDE FORWARD LIMIT SWITCH	SLIDE FORWARD LIMIT SWITCH ON	ON/OFF
SLIDE BACKWARD LIMIT SWITCH	SLIDE BACKWARD LIMIT SWITCH ON	ON/OFF
FRONT HEIGHT UP SWITCH	FRONT HEIGHT UP SWITCH ON	ON/OFF
FRONT HEIGHT DOWN SWITCH	FRONT HEIGHT DOWN SWITCH ON	ON/OFF
REAR HEIGHT UP SWITCH	REAR HEIGHT UP SWITCH ON	ON/OFF
REAR HEIGHT DOWN SWITCH	REAR HEIGHT DOWN SWITCH ON	ON/OFF
IGN 2 SWITCH	IGN 2 SWITCH ON	ON/OFF
RECLINE POSITION	RECLINE POSITION	ON/OFF
FRONT HEIGHT POSITION	FRONT HEIGHT POSITION	ON/OFF
REAR HEIGHT POSITION	REAR HEIGHT POSITION	ON/OFF
SLIDE POSITION	SLIDE POSITIO	ON/OFF

IMS DTC LIST

DTC CODE	DISPLAY	DESCRIPTION
B1954	SLI	Slide motor & position sensor faulty
B1955	REC	Recline motor & position sensor faulty
B1956	FRH	Front height motor & position sensor faulty
B1960	RRH	Rear height motor & position sensor faulty
B1602	CAN ERR	CAN ERROR
B1603	CAN BUS OFF	CAN BUS OFF

IMS ACTUATOR LIST

ACTUATOR	DESCRIPTION
P/SEAT SLIDE FORMOST POSITION	POWER SEAT SLIDE FORMOST POSITION
P/SEAT SLIDE LAST POSITION	POWER SEAT SLIDE LAST POSITION
P/SEAT RECLINE FORMOST POSITION	POWER SEAT RECLINE FORMOST POSITION
P/SEAT RECLINE LAST POSITION	POWER SEAT RECLINE LAST POSITION
P/SEAT HEIGHT POSITION-FR	POWER SEAT HEIGHT POSITION-FR
P/SEAT LOWEST POSITION-FR	POWER SEAT LOWEST POSITION-FR
P/SEAT HEIGHT POSITION-RR	POWER SEAT HEIGHT POSITION-RR
P/SEAT LOWEST POSITION-RR	POWER SEAT LOWEST POSITION-RR

TILT & TELESCOPE MODULE (IMS)

INPUT/ OUTPUT VALUE

TILT DISPLAY	DESCRIPTION	UNIT
TILT UP SWITCH	TILT UP SWITCH ON	ON/OFF
TILT DOWN SWITCH	TILT DOWN SWITCH ON	ON/OFF
TILT UP LIMIT SW	TILT UP LIMIT SWITCH ON	ON/OFF
TILT DOWN LIMIT SW	TILT DOWN LIMIT SWITCH ON	ON/OFF
TELESCO. FORWARD SW	TELESCOPE FORWARD SWITCH ON	ON/OFF
TELESCO. BACKWARD SW	TELESCOPE BACKWARD SWITCH ON	ON/OFF
TELE. FORW. LIMIT SW	TELESCOPE FORWARD LIMIT SWITCH ON	ON/OFF
TELE. BACKW. LIMIT SW	TELESCOPE BACKWARD LIMIT SWITCH ON	ON/OFF
IGN2 SW	IGN 2 SWITCH ON	ON/OFF
TILT SENSOR	The value , The lowest point = 0	
TELESCOPE SENSOR	The value , The backwardest point = 0	

TILT DTC LIST

DTC	DISPLAY	DESCRIPTION
B1959	TILT	Tilt motor & position sensor faulty
B1960	TELE	Telescope motor & position sensor faulty
B1602	CAN ERR	CAN ERROR
B1604	BCM CAN TIMEOUT ERROR	BCM CAN TIMEOUT ERROR
B1603	CAN BUS OFF	CAN BUS OFF

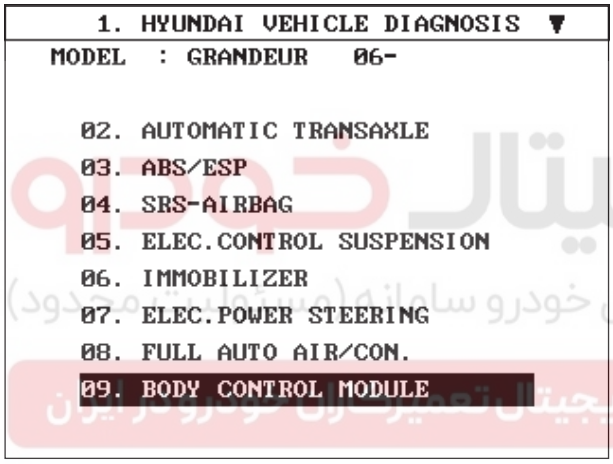
TILT ACTUATOR LIST

ACTUATOR	DESCRIPTION
STEERING COLUMN HIGH-TILT	Tilt motor operation by the highest
STEERING COLUMN LOW-TILT	Tilt motor operation by the lowest
STEERING COLUMN SHORT-TELESCOPE	Telescope motor operation by the forwardest
STEERING COLUMN LONG-TELESCOPE	Telescope motor operation by the backwardest

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.



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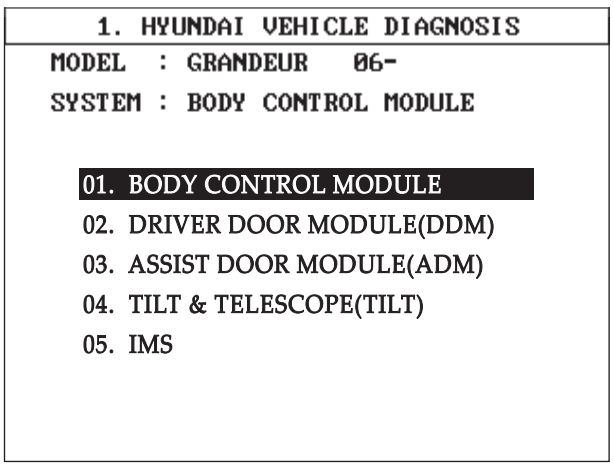

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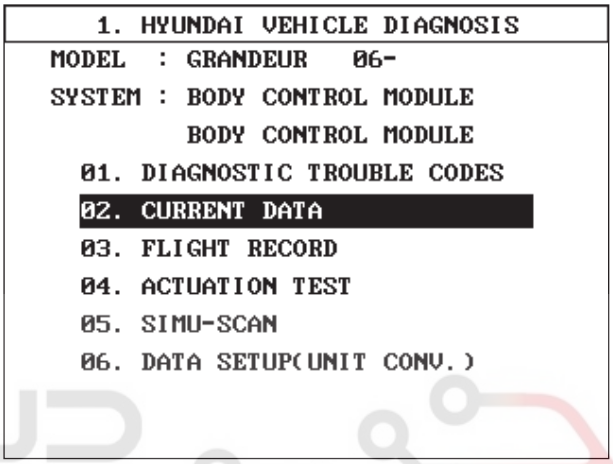
3. Select "Current data", if you will check current data of BCM. It provides power supply status, multi function status, lamp status, door status, lock system status, wiper, auto light status and so on.



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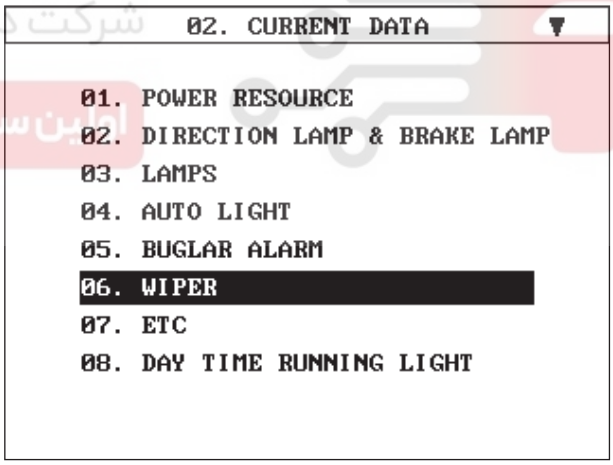
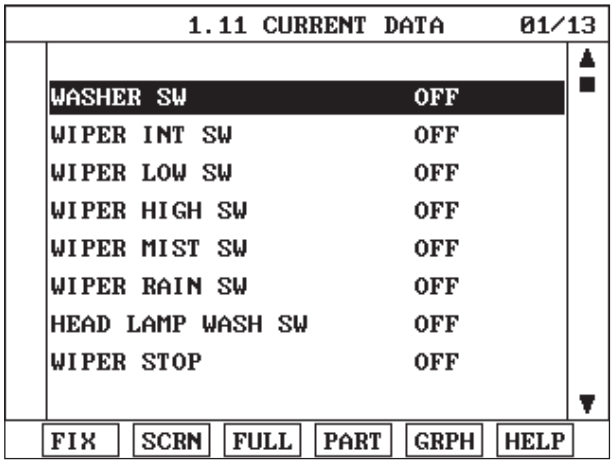
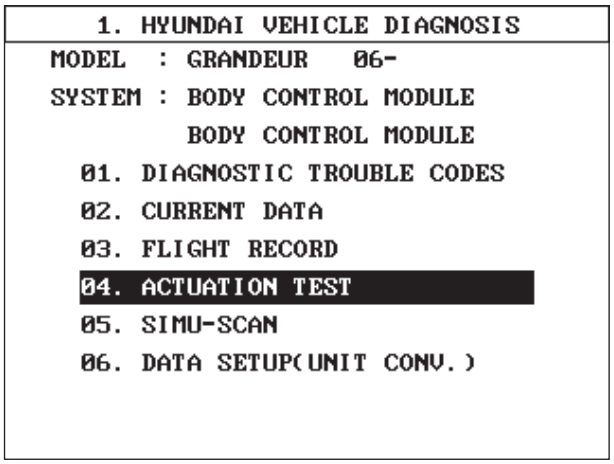


ETBF032C

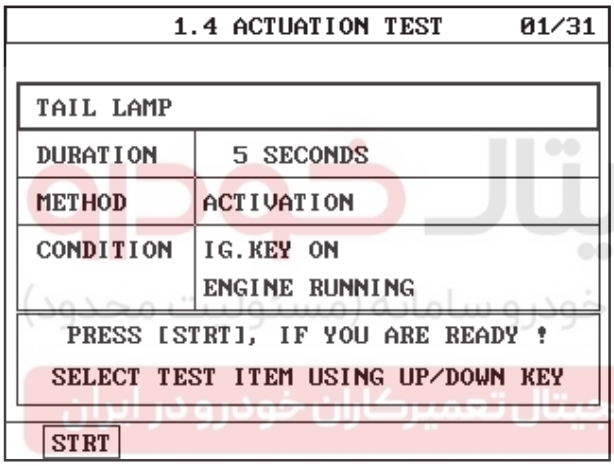


ETBF032D

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



ETBF144D



ETBF144E

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

   1) LOCK / UNLOCK comfirming alarm: Alarm sound ON/OFF control when you LOCK/UN-LOCK doors with transmitter.

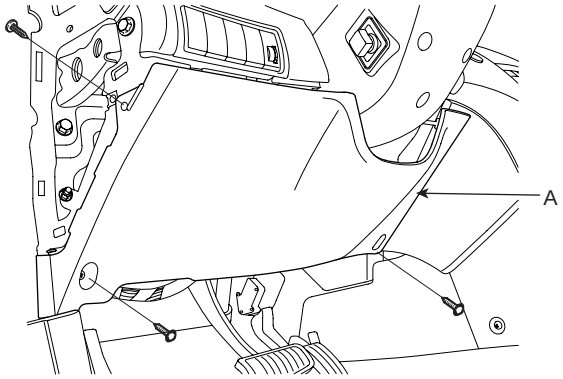
   2) Mechanical LOCKING system: Arm/Disarm ON/OFF when you lock the door with the mechanical key.

   3) AUTO DOOR LOCK/UNLOCK system ON/OFF.
      - Vehicle speed gearing AUTO DOOR LOCK(more than 20 km/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 seperation.

   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

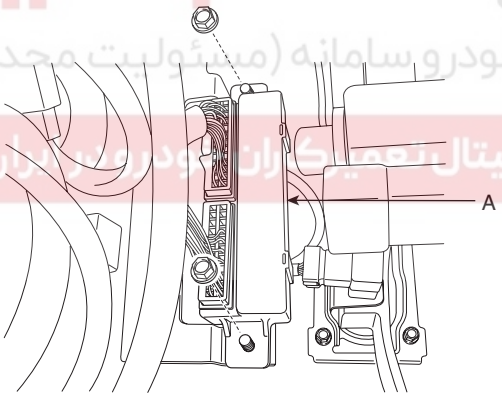
REPLACEMENT E4F1D182

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



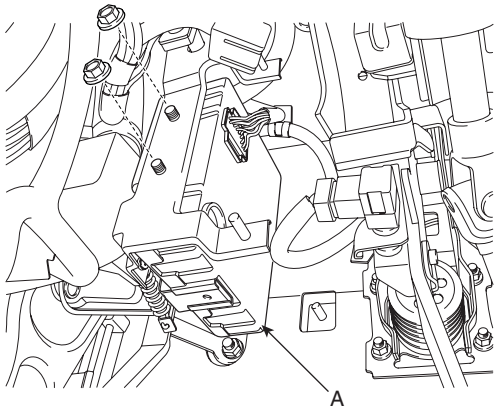
KTBF140E

3. Remove ICM relay connector and 2 nuts.



KTBF204A

4. Remove the body control module (A) and tilt & telescope unit after loosening 2 nuts and disconnecting connector.



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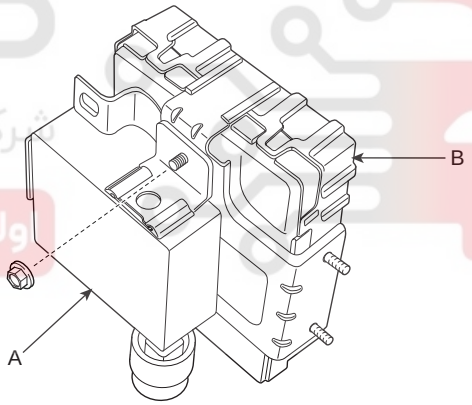
5. Remove the body control module (B) from the tilt & telescope unit (A) after loosening a bolt.



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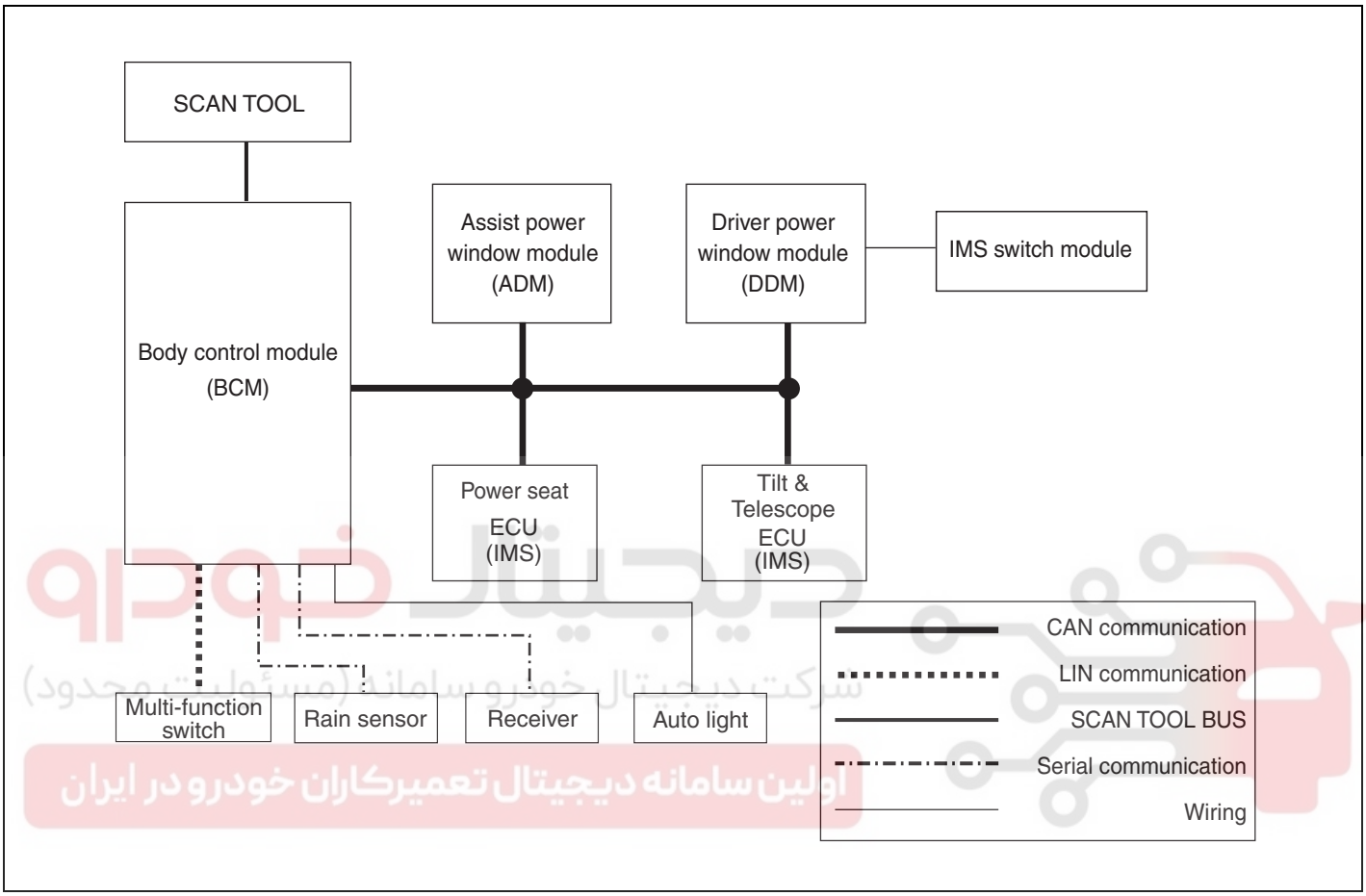
6. Installation is the reverse of removal.

IMS (INTEGRATED MEMORY SYSTEM)

COMMUNICATION SYSTEM E4C843F4



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DESCRIPTION E1AD37D0

Seat, steering column and mirror positions set by the driver are memorized in the IMS control unit by the position sensors. So, those positions can be returned to the memorized positions by the IMS control switch and keyless control even when the seat, steering column and mirror positions are changed. (This is called replay operation). For the sake of safety, replay is prohibited during driving and replay operation can be stopped immediately.

IMS POWER SEAT CONTROL

DESCRIPTION E8BFDAA2

Driver may choose and store the best seat position at the memory power seat unit using the memory switch and the position sensor, in order to restore the seat position at once.
There are CAN communication for data transmission and reception between the memory power seat unit and the driver side door module. The operation is inhibited for safety during driving.

FEATURE

1. Manual operation of the seats by the manual switch. (Manual operation)
2. Memory and regeneration operation of the seats by memory switch. (Memory and replay operation) : for 2 persons.
3. Auto memory upon the keyless LOCK and regeneration upon the UNLOCK. (Keyless memory and regeneration operation): for 2 persons.
4. Function description
   1) Driver power seat, sliding control, forward and backward
   2) Driver power seat, reclining control, forward and backward
   3) Driver power seat, height control, up and down

OPERATION E0F2E12E

MANUAL OPERATION

1. Motor operation by the seat manual switch (Slide, reclining, front height and rear height control)
2. Seat position setting and 4-way simultaneous operation can be made by the manual switch operation.
3. Seat slide and reclining operation can be made directly in case of communication failure.

MEMORY REGISTRATION

1. Data related to the registration are received through the CAN communication from the power window main on the CAN line.
2. If any of the following conditions is met, memory permit status is released.
   When the ignition is OFF.
   When the manual switch is ON.
3. If 2 position switches are pressed ON simultaneously (within time interval of 50 ms) in memory registration, none of the switches are valid, and the first pressed switch is valid if the time interval is greater than 50 ms.
4. If the vehicle speed is over the limit speed of 3km/h or shift lever is at the position other than P, registration cannot be performed.
5. Registration can be revised without any limitation.
6. Memory will be cleared if the battery is removed.
7. If the memory registration is permitted (memory switch is ON), it sounds the buzzer.

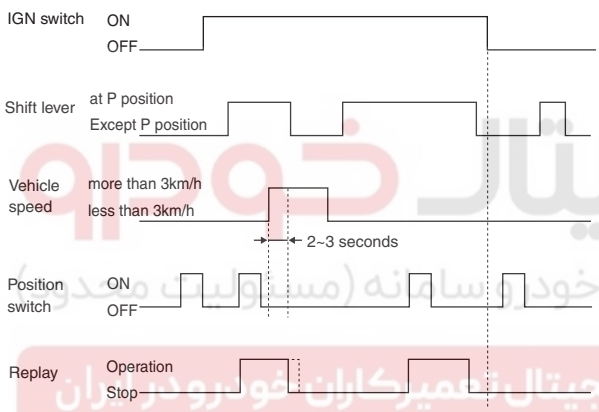
MEMORY REPLAY OPERATION

1. Data related to the memory replay are received through the CAN communication from the power window main on the CAN line.
2. Seat is set to the registered position as each position switch is pressed when the ignition is ON.
3. Memory replay will not be performed unless it is registered.

4. If the position switch is pressed while the memory replay is in operation, the final switch is effective. Though, if the switches are pressed within the time interval of 50 ms, replay will not be performed.

5. When the replay is in operation (position switch is ON), buzzer will sounds once.

6. If any of the following conditions is met, replay is prohibited and operation will stop if it is in replay.
   When the ignition is OFF.
   When the "P" position switch is OFF (when the shift lever is at the position other than "P")
   When the vehicle speed is over 3 km/h (when it last more than 2 or 3 seconds)
   When the manual switch in relation to the seat is in operation. (Seat related replay operation stops)
   When the stop switch is ON.



ETBF155A

7. Control in reverse operation
   When the motor is driven reverse during the operation, it performs reverse operation after 60 ± 10 ms and 100 ± 10 ms from completing the current operation in slide, reclining and front/rear height respectively.

8. Determining operational priority
   In order to prevent overlapping of rushing current when the motor starts up, motor start-up is delayed for 100 ± 10 ms respectively and its operational priority is as follows.
   Slide > Reclining > Front height > Rear height

9. Sequential timer settings for motor start-up.
   Slide : 20 ± 2 seconds (in memory replay)
   Reclining : 35 ± 3 seconds (in memory replay)
   Front /Rear height : 10 ± 1 seconds
   ※ Slide, Reclining: It operates depending on the switch input time in manual switch input (direct drive type)

BUZZER OUTPUT

1. In case of memory permit status (memory switch is ON) : once

2. When memory registration is complete (position switch is ON) : twice

3. When the memory replay is in operation (position switch is ON) : once

4. When error is detected due to the sensor failure : 10 times

ERROR DETECTION

1. If the sensor fluctuations of slide and front/rear height for one second after motor start-up are less than 6 pulses and 4 pulses respectively, and if the sensor fluctuation of reclining for 3.5 seconds is less than 50mV, it is determined that the harness is short or sensor is fail.

2. Countermeasure when error is detected.
   Stop the operation if it is in auto replay. Though, it should be operable manually. When the failure is completely repaired, it can be automatically adjusted from the stop of auto replay. If the position sensor senses the pulse from the position sensor by the manual operation, we judge it is complete. This is called stop release of automatic operation.

IMS TILT AND TELESCOPE CONTROL

DESCRIPTION E1A028CE

Driver may choose and store the best steering column position at the tilt & telescope unit using the memory switch and the position sensor, in order to restore the steering column position at once.
There are CAN communication for data transmission and reception between the memory power seat unit and the driver side door module. The operation is inhibited for safety during driving.

FEATURE

1. Manual operation of the tilt & telescope by the manual switch. (Manual operation)
2. Memory and regeneration operation of the tilt & telescope by memory switch. (Memory and replay operation): for 2 persons.
3. Auto memory upon the keyless LOCK and regeneration upon the UNLOCK. (Keyless memory and regeneration operation): for 2 persons.

OPERATION E2534DA4

MANUAL OPERATION

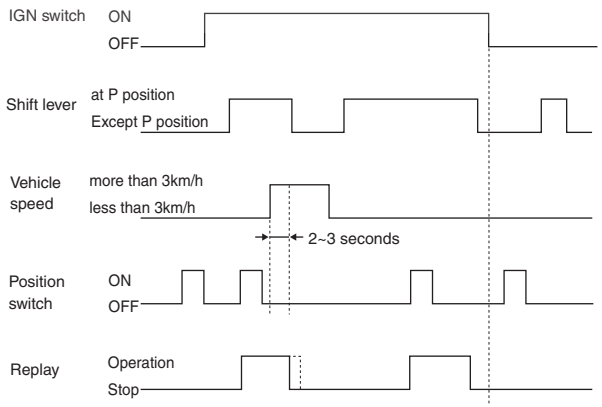
1. Motor operation by the manual switch (Tilt & telescope steering column tilt up & down, telescope forward & backward)
2. Manual switch operation auto stop by limit switch OFF.

MEMORY REGISTRATION

1. Data related to the registration are received through the CAN communication from DDM.
2. If any of the following conditions is met, memory permit status is released.
   When the ignition is OFF.
   When the manual switch is ON.
3. If 2 position switches are pressed ON simultaneously (within time interval of 50 ms) in memory registration, none of the switches are valid, and the first pressed switch is valid if the time interval is greater than 50 ms.
4. If the vehicle speed is over the limit speed of 3km/h or shift lever is at the position other than P, registration cannot be performed.
5. Registration can be revised without any limitation.
6. Memory will be cleared if the battery is removed.
7. If the memory registration is permitted (memory switch is ON), it sounds the buzzer.

MEMORY REPLAY OPERATION

1. Data related to the memory replay are received through the CAN communication from DDM.
2. Memory replay will not be performed unless it is registered.
3. If the position switch is pressed while the memory replay is in operation, the final switch is effective. Though, if the switches are pressed within the time interval of 50 ms, replay will not be performed.
4. When the replay is in operation (position switch is ON), buzzer will sounds once.
5. If any of the following conditions is met, replay is prohibited and operation will stop if it is in replay.
   When the ignition is OFF.
   When the "P" position switch is OFF (when the shift lever is at the position other than "P")
   When the vehicle speed is over 3 km/h (when it last more than 2 or 3 seconds)
   When the manual switch in relation to the tilt & telescope is in operation. (Tilt & telescope related replay operation stops)
   When the stop switch is ON.



ETBF155A

6. Determining operational priority
   In order to prevent overlapping of rushing current when the motor starts up, motor start-up is delayed for 100 ± 10 ms respectively and its operational priority is as follows.
   Tilt > Telescope

BUZZER OUTPUT

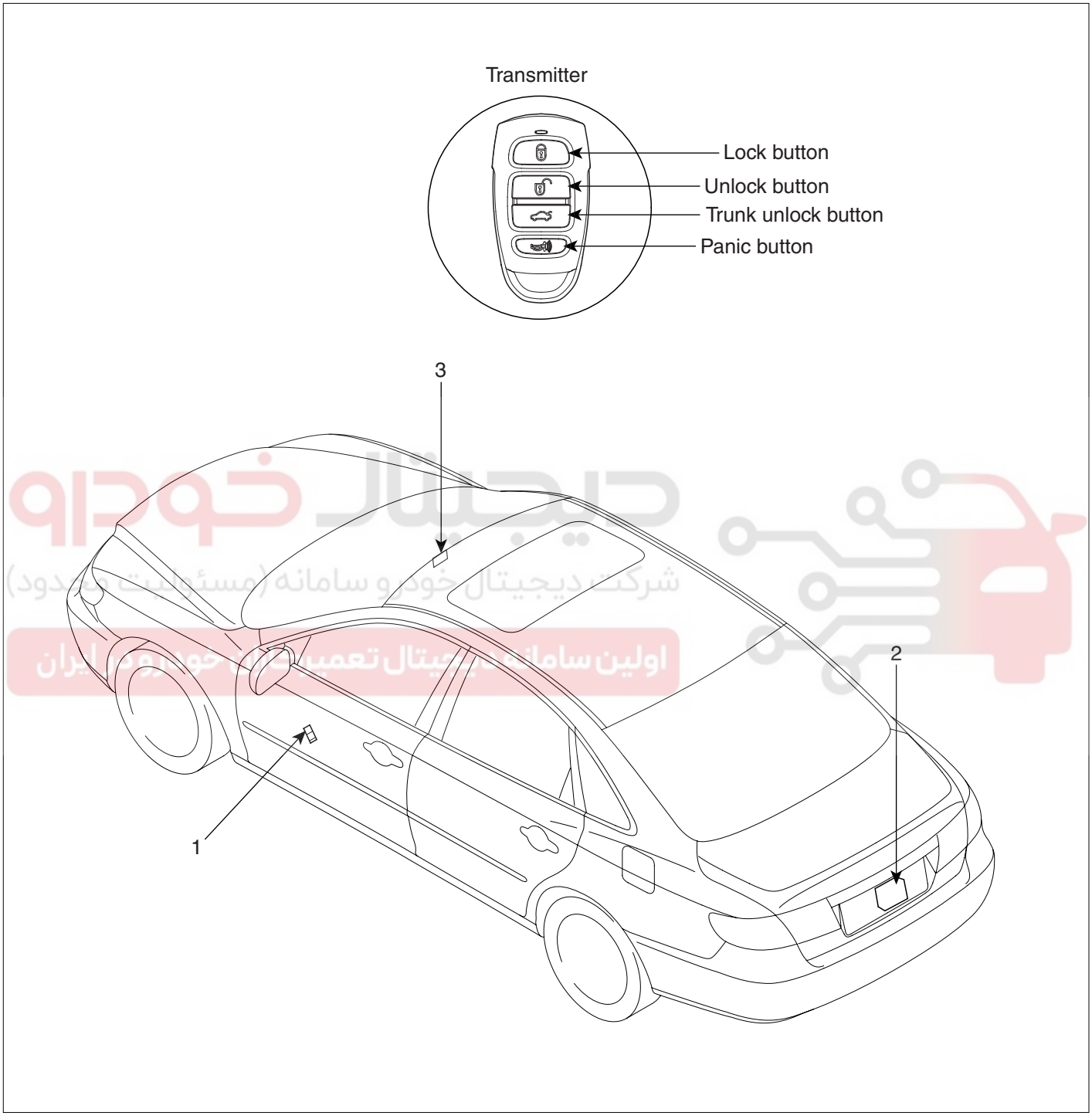
1. In case of memory permit status (memory switch is ON) : once
2. When memory registration is complete (position switch is ON) : twice
3. When the memory replay is in operation (position switch is ON) : once
4. When error is detected due to the sensor failure : 10 times

ERROR DETECTION

1. If the sensor fluctuations of tilt & telescope for one second after motor start-up are less than 4 pulses respectively (Limit switch ON/CLOSE), the harness is short or sensor is fail.
2. Countermeasure when error is detected.
   Stop the operation if it is in auto replay. Though, it should be operable manually. When the failure is completely repaired, it can be automatically adjusted from the stop of auto replay. If the position sensor senses the pulse from the position sensor by the manual operation (in case of sensor fluctuation for 1 seconds is greater than 4 pulses), we judge it is complete. This is called stop release of automatic operation.

TRUNK LID OPENER

COMPONENT LOCATION E0ACBDD7



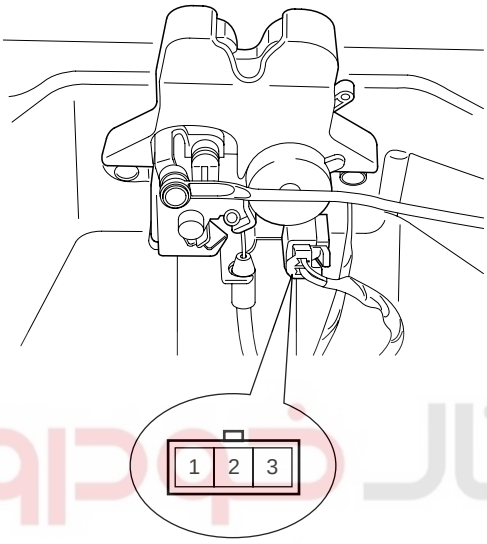
1. Trunk lid open switch
2. Trunk lid release actuator
3. Main trunk lid opener

ETBF160A

TRUNK LID RELEASE ACTUATOR

INSPECTION EBCB3E90

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



KTBF122E

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

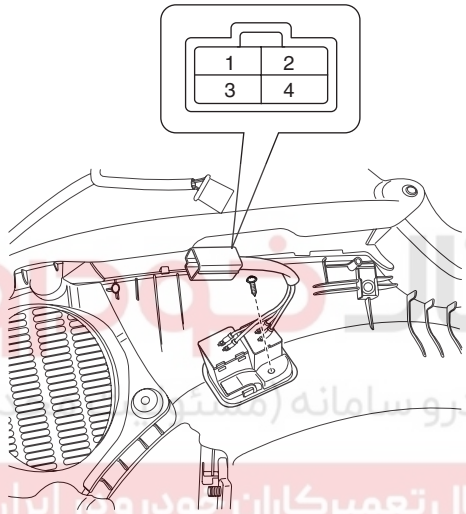
Terminal / Position	2	1
Open	⊕	⊖

ETBF122I

TRUNK LID OPEN SWITCH

INSPECTION EE7FFEC3

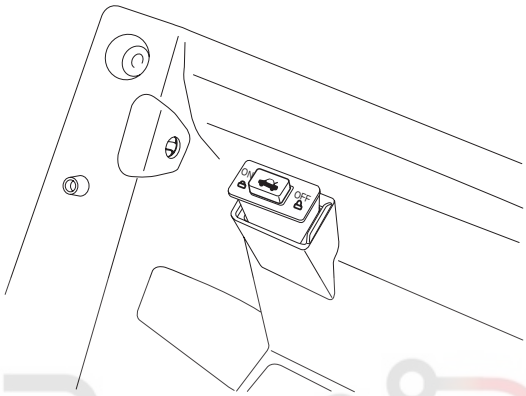
1. Remove the front door trim panel.(Refer to the Body group - Front door)
2. Disconnect the switch connector (4P) from wiring.
3. Check the switch for continuity between the No. 3 and No. 4 terminals.
4. If the continuity is not as specified, replace the switch.



KTBF162A

MAIN TRUNK LID OPEN SWITCH

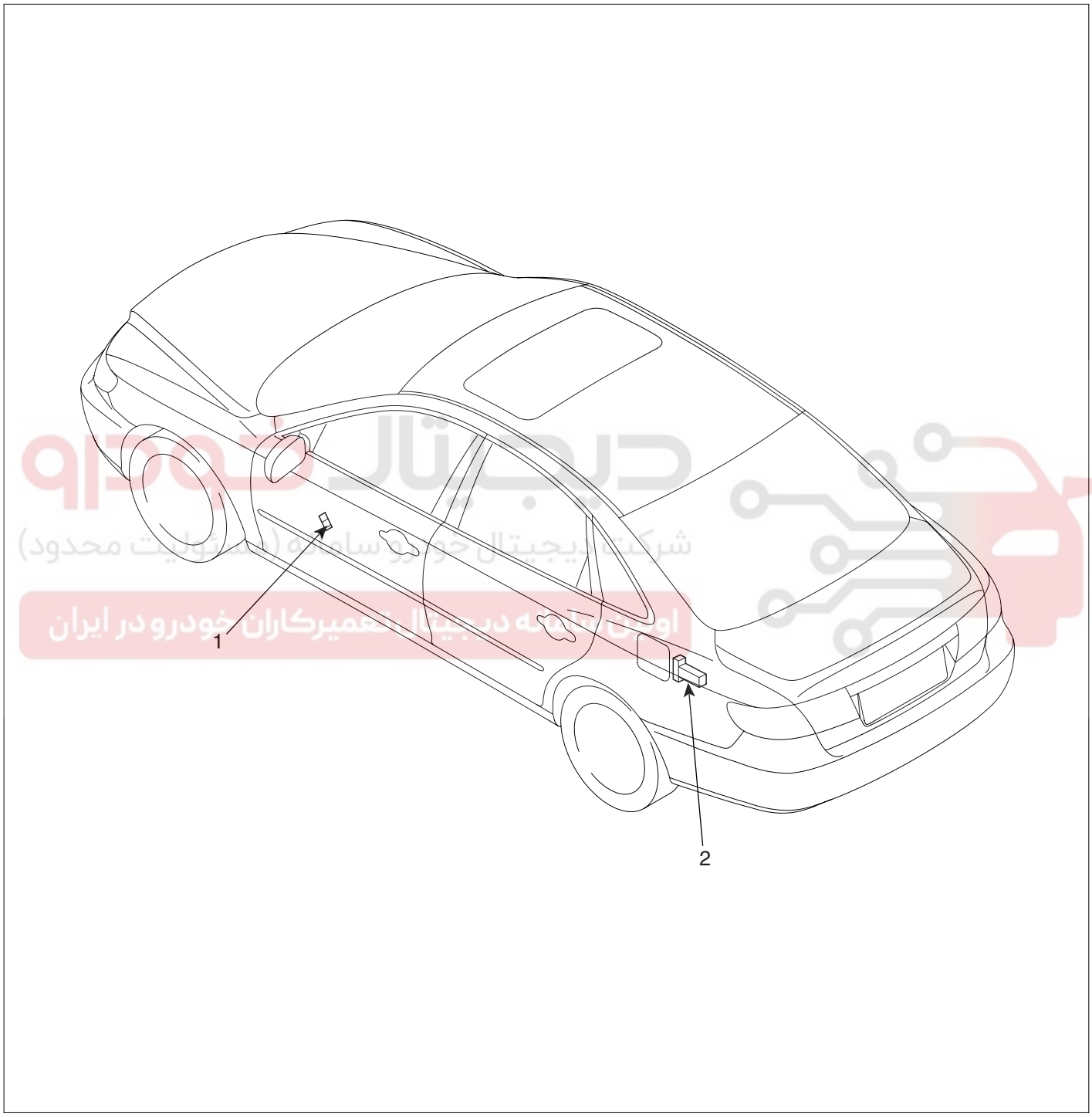
1. Remove the glove box and lower crash pad panel. (Refer to the Body group - Crash pad)
2. Disconnect the switch connector (2P) from wiring.
3. Check the switch for continuity between the No. 1 and No. 2 terminals.
4. If the continuity is not as specified, replace the switch.



KTBF162B

FUEL FILLER DOOR OPENER

COMPONENT LOCATION E1BF2732



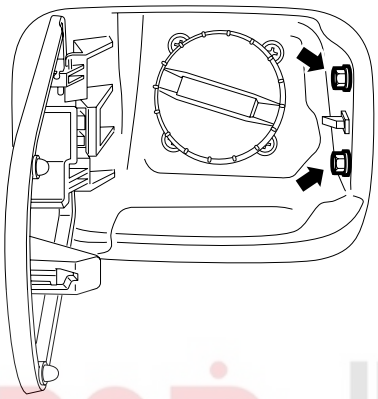
1. Fuel filler door open switch
2. Fuel filler door release actuator

ETBF180A

FUEL FILLER DOOR RELEASE ACTUATOR

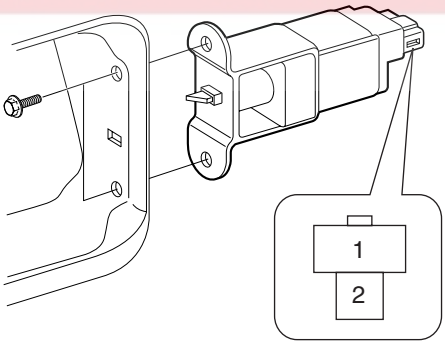
INSPECTION E6E30DBF

1. Remove the trunk room left trim.
2. Open the fuel filler door and disconnect the wiring connector after loosening 2 bolts.



KFWG044A

3. Check for continuity between terminal No. 1 and No. 2. If there is no continuity replace the fuel filler door opener.

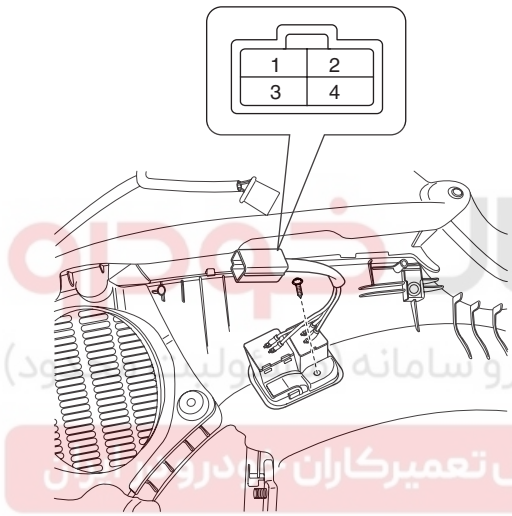


KTRE181A

FUEL FILLER DOOR OPEN SWITCH

INSPECTION EBB3F7D5

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the switch connector (4P) from wiring.
3. Check the switch for continuity between the No. 1 and No. 2 terminals.
4. If the continuity is not as specified, replace the switch.

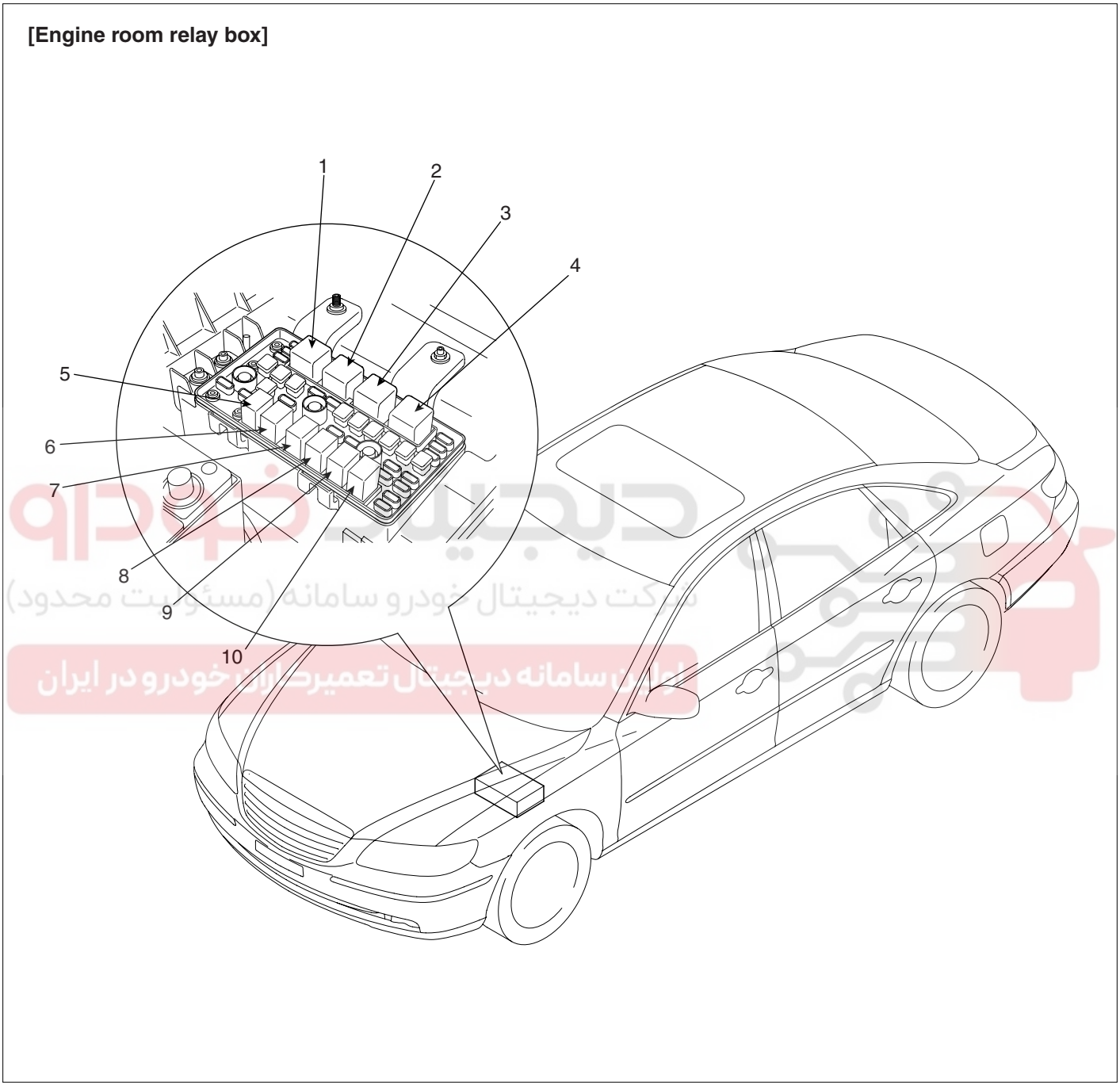


KTBF162A

FUSES AND RELAYS

COMPONENT LOCATION E99B83D6

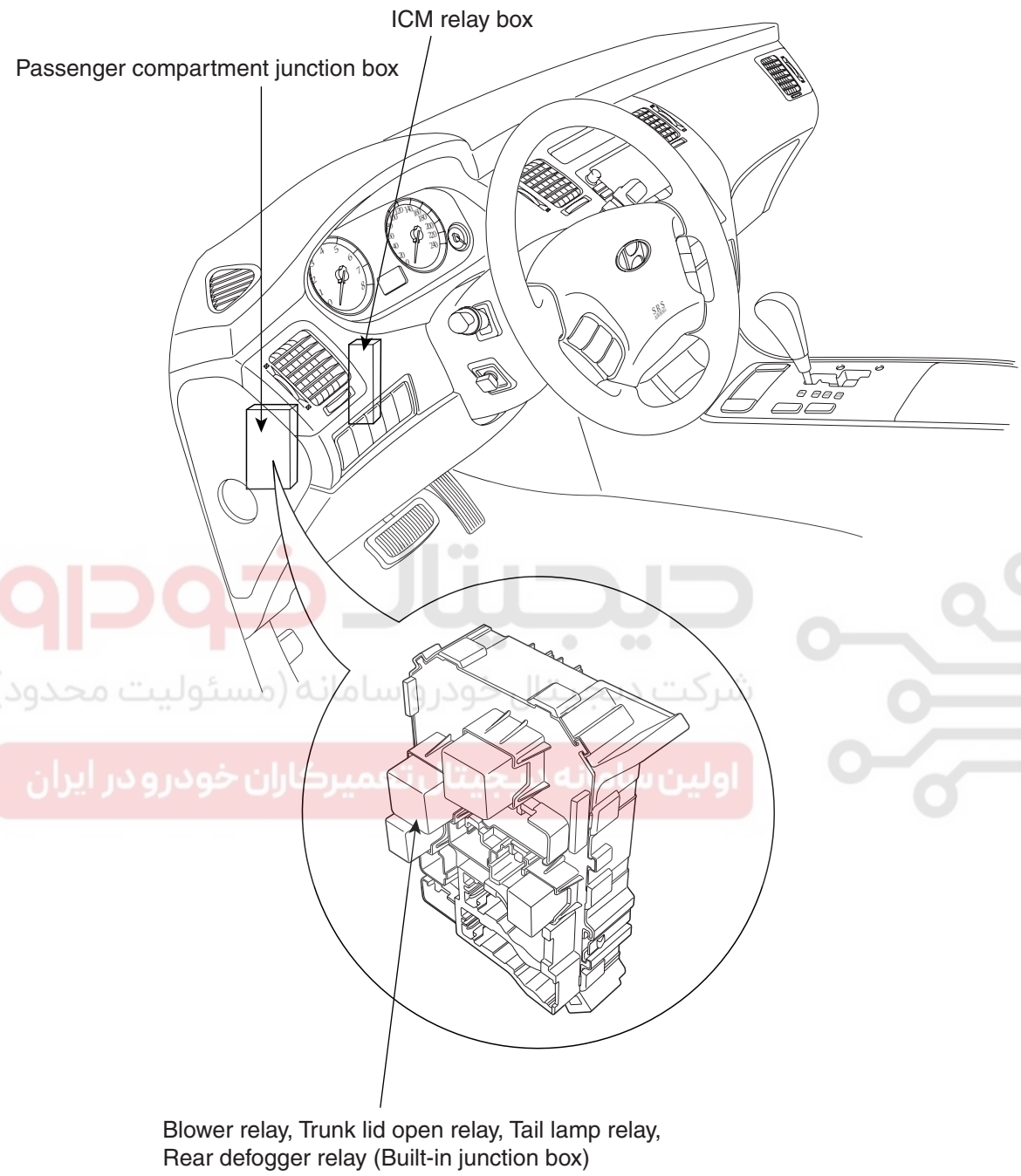
[Engine room relay box]



1. Head lamp relay (Low)
2. Head lamp relay (High)
3. Start relay
4. E/G control relay
5. A/T relay
6. Fuel pump relay
7. Wiper relay
8. Air conditioning relay
9. Front fog relay
10. Horn relay

ETBF220A

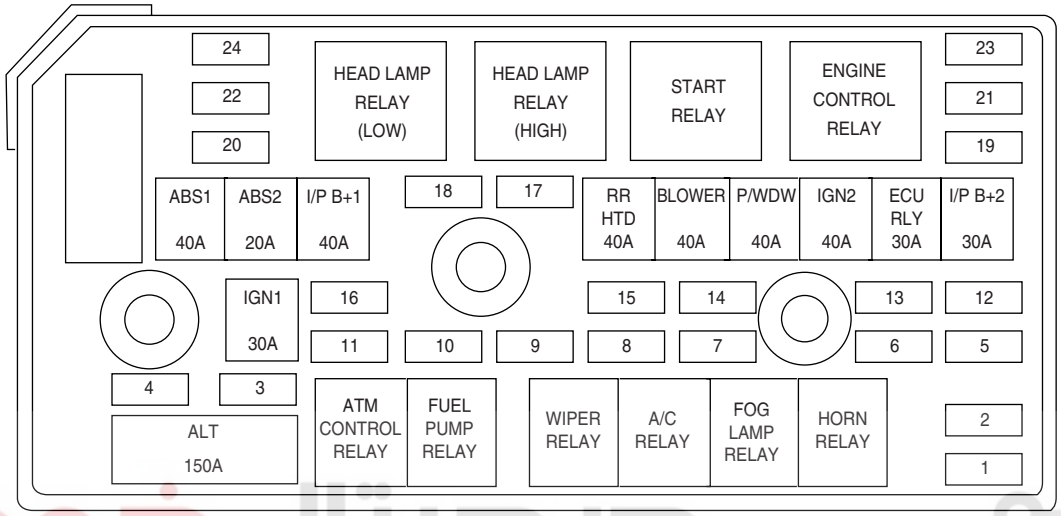
[Passenger compartment relay]



ETBF220B

RELAY BOX (ENGINE COMPARTMENT)

COMPONENT LOCATION ED0C5A20

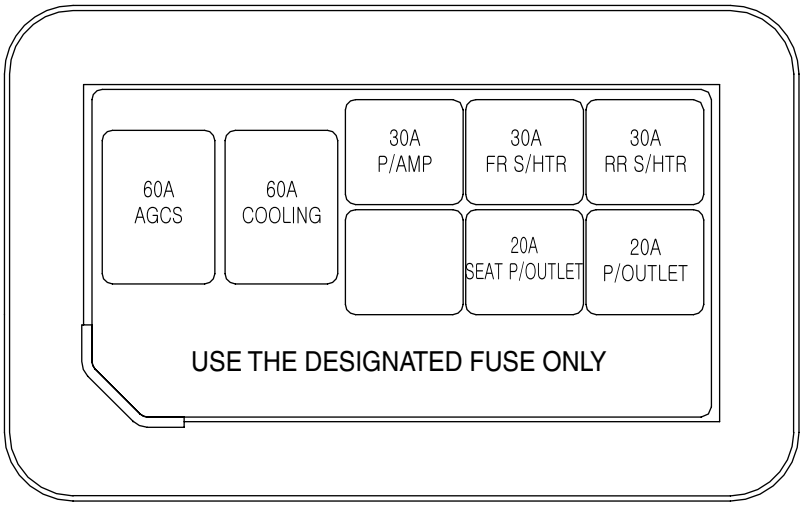


CIRCUIT

FUSIBLE LINK & FUSE		(A)	Circuit Protected
ABS1		40A	ABS Control module, Multipurpose check connector
ABS2		20A	ABS Control module, Multipurpose check connector
I/P (B+)1		40A	Fuse(FR P/SEAT, RR P/SEAT, T/LID, T/SIG, TILT, PEDAL, RR CURTAIN)
RR HTD		40A	Defogger relay
BLOWER		40A	Blower relay
P/WDW		40A	Fuse(P/WDW LH, P/WDW RH)
IGN2		40A	Ignition switch(IG2, START), Start relay
ECU RLY		30A	Engine control relay
I/P (B+)2		30A	Fuse(KEY SOL, ECS/RR FOG), Power connector
IGN1		30A	Ignition switch(ACC, IG1)
ALT		150A	Fusible link(ABS1, ABS2, RR HTD, BLOWER)
-		-	-
1	HORN	15A	Horn relay
2	TAIL	20A	Tail lamp relay
3	ECU	10A	PCM
4	IG1	10A	Not used
5	DRL	15A	Burglar alarm horn relay
6	FR FOG	15A	Front fog lamp relay
7	A/CON	10A	A/C Relay
8	F/PUMP	20A	Fuel pump relay
9	Diode	-	Not used
10	ATM	20A	ATM Control relay
11	STOP	15A	Stop lamp switch
12	H/LP LO RH	15A	HID Relay
13	SUN ROOF	15A	Overhead console lamp
14	H/LP WASHER	20A	Not used
15	H/LP HI	20A	Head lamp relay (HIGH)
16	ECU	10A	PCM
17	SNSR3	10A	Injector#1~#6, A/C Relay, Cooling fan relay
18	SNSR1	15A	Mass air flow sensor, PCM, Immobilizer control module, Oil control valve#1,#2, Variable intake manifold valve
19	SNSR2	15A	O_2 Sensor#1~#4
20	B/UP	10A	Stop lamp switch, Transaxle range switch, Back-up lamp switch, Vehicle speed sensor
21	IGN COIL	20A	Ignition coil#1~#6, Condenser
22	ECU	10A	PCM
23	H/LP LO	20A	Head lamp relay(LOW)
24	ABS	10A	ABS Control module, Multipurpose check connector, ESP Module

※ USE THE DESIGNATED FUSE ONLY

ETBF220C



RELAY NAME

FUSIBLE LINK & FUSE	(A)	Circuit Protected
AGCS	60A	Not used
COOLING	60A	Cooling fan relay
P/AMP	30A	Premium amp
FR S/HTR	30A	Driver seat warmer module
RR S/HTR	30A	Not used
SEAT P/OUTLET	20A	Seat/Power outlet relay
FR P/OUTLET	20A	Accessory relay

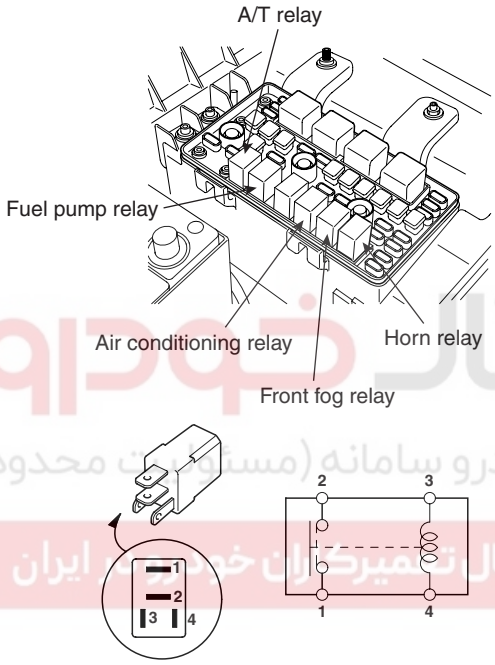
ETBF221A

INSPECTION ECCCDF9C

POWER RELAY (TYPE A)

Check for continuity between the terminals.

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



ETRF201A

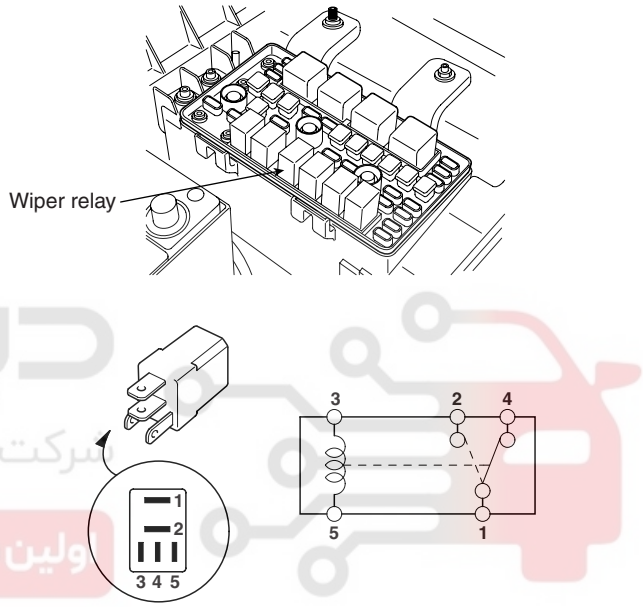
Terminal / Power (No.3-No.4)	1	2	3	4
Disconnected			○	○
Connected	○	○	⊖	⊕

ETKE903A

POWER RELAY (TYPE B)

Check for continuity between the terminals.

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



ETRF201B

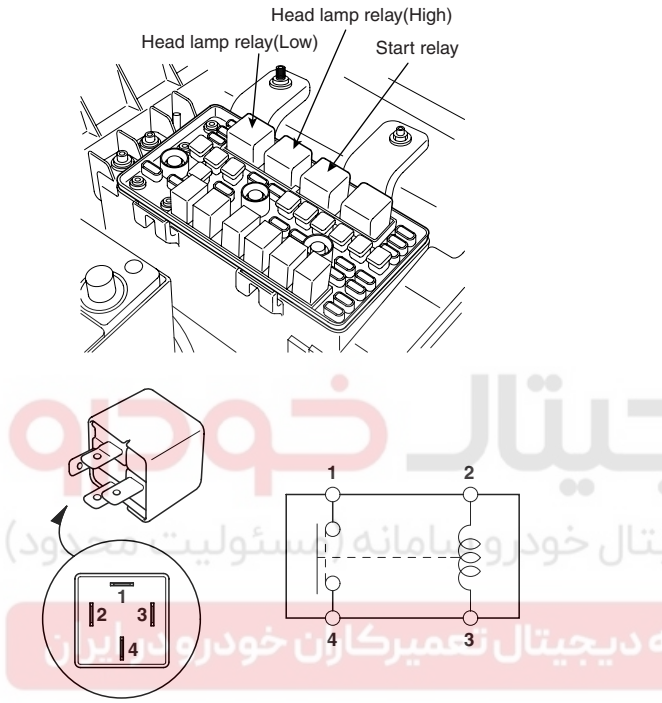
Terminal / Power (No.3-No.5)	3	5	1	2	4
Disconnected			○		○
Connected	⊖	⊕	○	○	

ETKE215H

POWER RELAY (TYPE C)

Check for continuity between the terminals.

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



ETRF201C

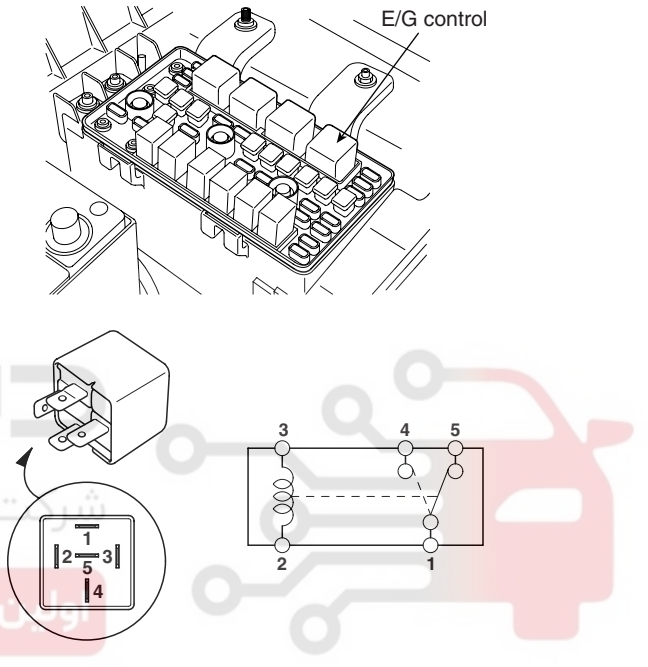
Terminal / Power (No.2-No.3)	2	3	1	4
Disconnected	○	○		
Connected	⊖	⊕	○	○

ETKE215B

POWER RELAY (TYPE D)

Check for continuity between the terminals.

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



ETRF201D

Terminal / Power (No.2-No.3)	2	3	1	4	5
Disconnected			○		○
Connected	⊖	⊕	○	○	

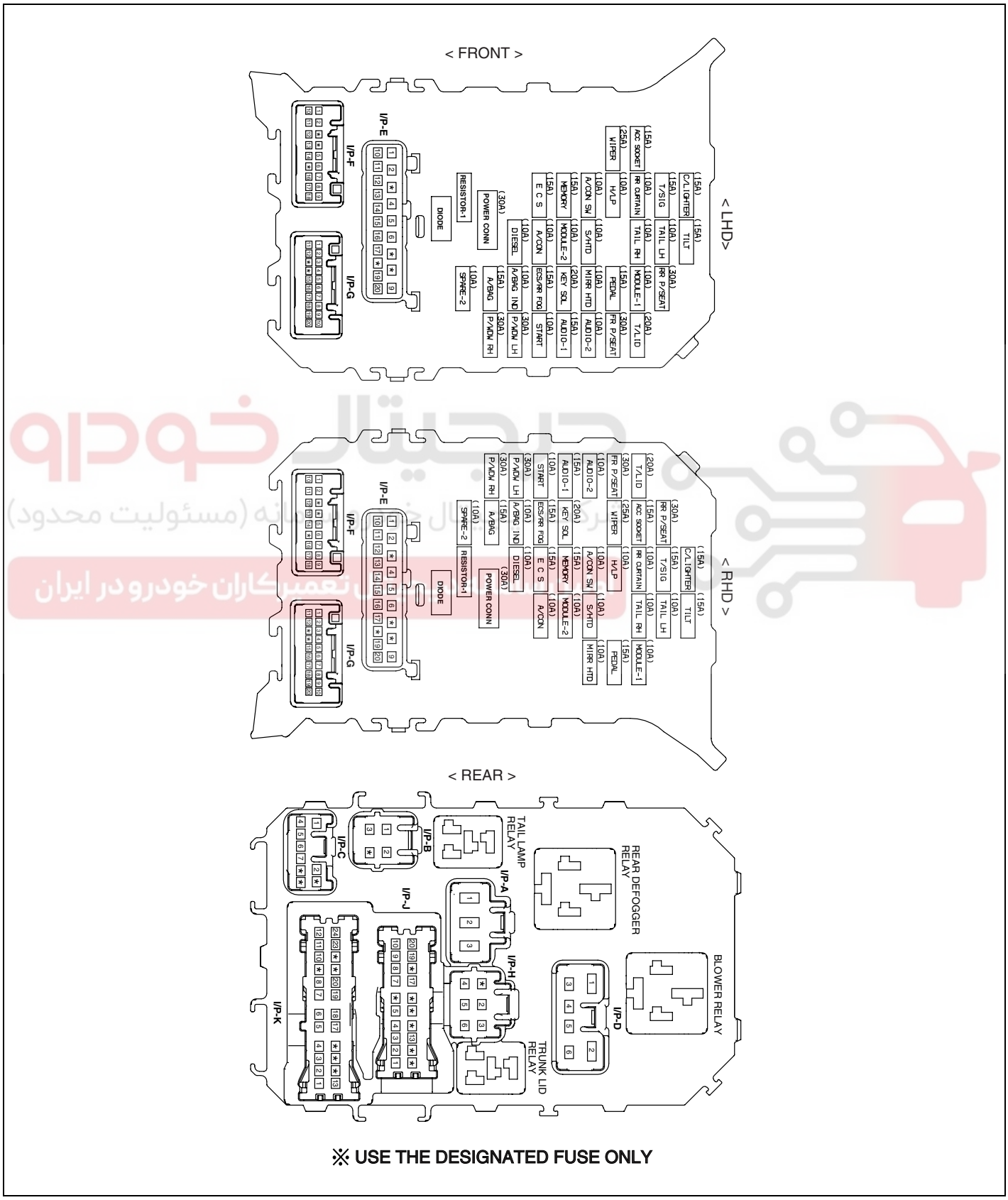
ETRF201E

FUSE

1. Be sure there is no play in the fuse holders, and that the fuses are held securely.
2. Are the fuse capacities for each circuit correct?
3. Are there any blown fuses?
   If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

RELAY BOX (PASSENGER COMPARTMENT)

COMPONENT LOCATION EDA80571



ETBF220D

CIRCUIT

FUSE	(A)	Circuit Protected
T/LID	20A	Fuel lid opener & Trunk lid switch
FR P/SEAT	30A	Front lumbar support switch, IMS Control module, Driver/Assister seat manual switch
AUDIO-2	10A	ATM Key lock control module, Audio, IMS Switch, Accessory relay, Seat/Power outlet relay, Digital clock & Assister seat belt IND.
AUDIO-1	15A	Audio
START	10A	Transaxle range switch, Burglar alarm relay
P/WDW LH	30A	Left front safety window module, Left rear power window switch
P/WDW RH	30A	Right front safety window module, Right rear power window switch
RR P/SEAT	30A	Right rear ICM relay box
MODULE-1	10A	Instrument cluster, BCM, Rear curtain module, Rain sensor, IMS Control module, Power window main switch
PEDAL	15A	Back warning buzzer
MIRR HTD	10A	Left/Right outside mirror & Mirror folding motor, Key console module, A/C Control module
KEY SOL	20A	Key solenoid, Power window main switch
RR FOG	15A	Rear fog lamp relay
A/BAG IND	10A	Instrument cluster
A/BAG	15A	Air bag cut off switch, SRS Control module
-	10A	-
TILT	15A	Tilt & Telescopic module, Sport mode switch
TAIL LH	10A	Front fog lamp relay, Left rear combination lamp, License lamp, Left head lamp
TAIL RH	10A	Right rear combination lamp, License lamp, Right head lamp
S/HTD	10A	Driver seat warmer switch
MODULE-2	10A	Instrument cluster, Steering angle sensor, ESP Switch, BCM, ATM Key lock control module, YAW Rate sensor, Multifunction switch
A/CON	10A	A/C Control module, Tilt & Telescopic module, Rheostat, Electro chrome mirror, Overhead console lamp
DIESEL	10A	Not used
C/LIGHTER	15A	Cigarette lighter
T/SIG	15A	BCM
RR CURTAIN	10A	Rear curtain module
H/LP	10A	Head lamp relay, AQS & Ambient sensor, HID relay, Head lamp leveling actuator
A/CON SW	10A	A/C Control module, Blower relay, A/C Control module(AUTO)
MEMORY	15A	Data link connector, A/C Control module, Instrument cluster, Multifunction switch, Tilt & Telescopic module, BCM, Door warning switch, Room lamp, Left/Right foot lamp, Door lamp
ACC SOCKER	15A	Rear power outlet
WIPER	25A	Washer relay, Wiper relay(High), Wiper relay
POWER CONN	30A	Fuse(MEMORY, AUDIO-1)

※ USE THE DESIGNATED FUSE ONLY

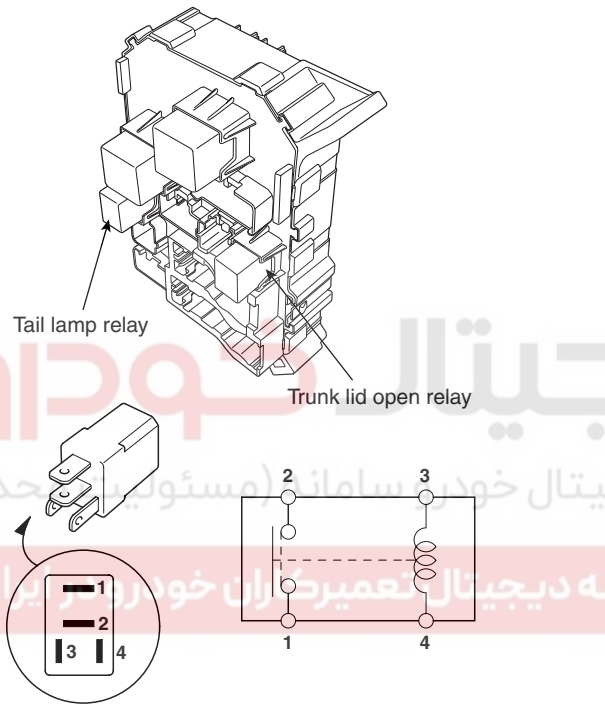
ETBF220E

INSPECTION E7DBD86A

POWER RELAY (TYPE A)

Check for continuity between the terminals.

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



ETBF202A

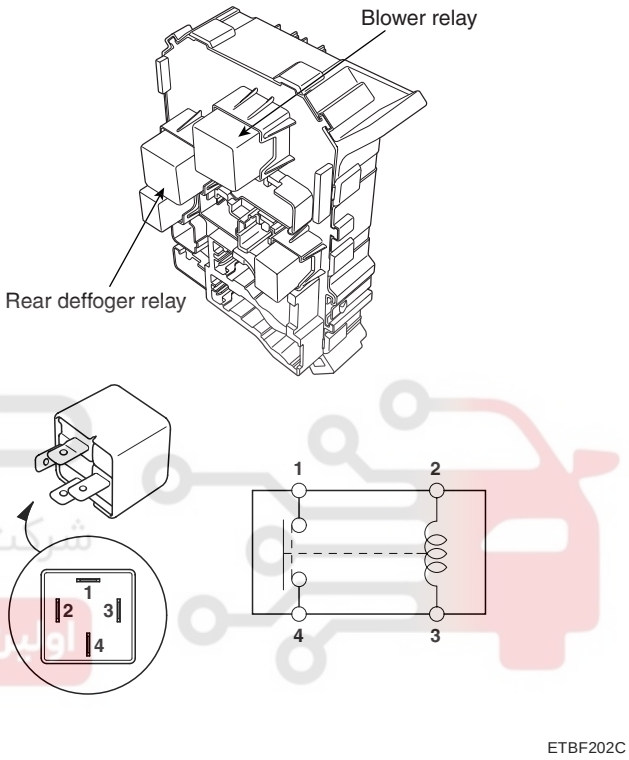
Power (No.3-No.4) \ Terminal	1	2	3	4
Disconnected			○	○
Connected	○	○	⊖	⊕

ETKE903A

POWER RELAY (TYPE C)

Check for continuity between the terminals.

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



ETBF202C

Power (No.2-No.3) \ Terminal	2	3	1	4
Disconnected	○	○		
Connected	⊖	⊕	○	○

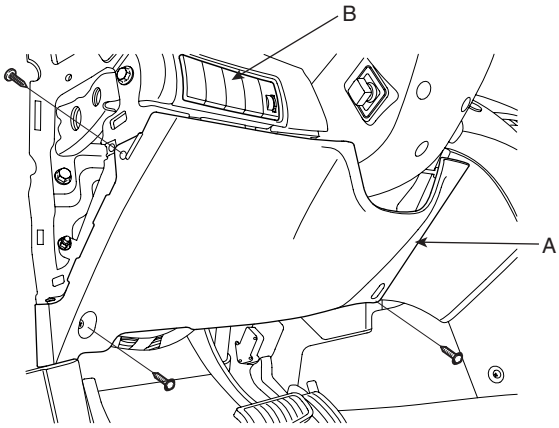
ETKE215B

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.

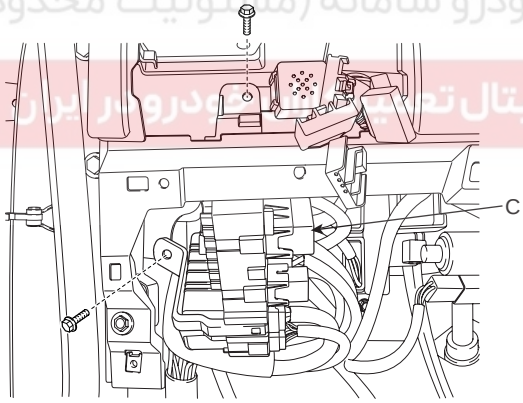
REPLACEMENT E59A98BA

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



ETBF141A

3. Disconnect the connectors (10EA) of junction box.
4. Remove the junction box (C) after loosening the mounting 2 bolts.

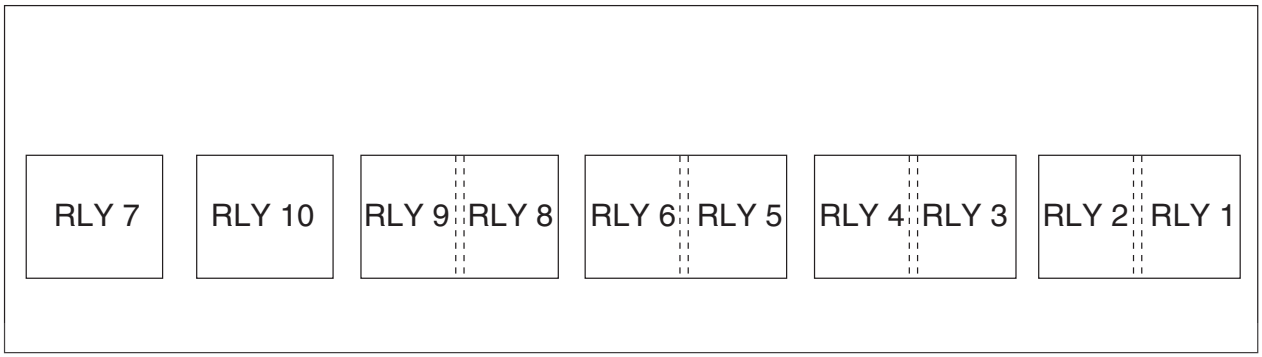


KTBF220H

5. Installation is the reverse of removal.

ICM (INTEGRATED CIRCUIT MODULE) RELAY BOX

COMPONENT LOCATION EE16BDAE



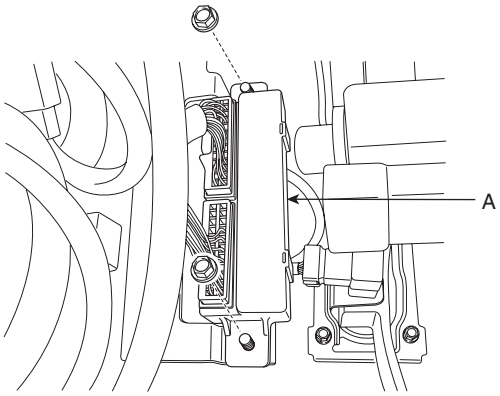
RELAY NAME

NO	NAME	NO	NAME
1	Burglar alarm relay	6	Head lamp Washer relay
2	Burglar alarm horn relay	7	DRL Relay
3	Wiper relay(High)	8	Accessory relay
4	Washer relay	9	Seat/Power outlet relay
5	Not used	10	Rear fog lamp relay

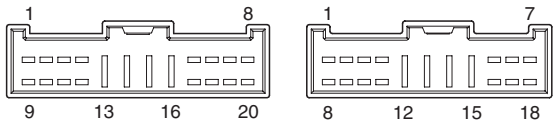
ETBF204D

DESCRIPTION EB2F7B14

The ICM is united with many kinds of relays and installed below the body control module.
relay box (Assist compartment).



KTBF204A



KTBF220F

INSPECTION E38C0DC9

BURGLAR ALARM HORN

Check for continuity between the terminals.

1. There should be continuity between the No.18 and No.19 terminals when power and ground are connected to the No.8 and No.17 in the ICM-A.
2. There should be no continuity between the No.18 and No.19 terminals when power is disconnected.

BURGLAR ALARM

Check for continuity between the terminals.

1. There should be no continuity between the No.20 and No.7 terminals when power and ground are connected to the No.20 and No.8 in the ICM-A.
2. There should be continuity between the No.20 and No.7 terminals when power is disconnected.

ADJUST PEDAL

Check for continuity between the terminals.

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

WIPER

Check for continuity between the terminals.

1. There should be continuity between the No.14 and No.16 terminals when power and ground are connected to the No.15 and No.5 terminals in the ICM-A.
2. There should be continuity between the No.14 and No.6 terminals when power is disconnected.

WASHER

Check for continuity between the terminals.

1. There should be continuity between the No.15 and No.13 terminals when power and ground are connected to the No.15 and No.12 terminals in the ICM-A.
2. There should be no continuity between the No.15 and No.13 terminals when power is disconnected.

HEAD LAMP WASHER

Check for continuity between the terminals.

1. There should be continuity between the No.1 and No.2 terminals when power and ground are connected to the No.9 and No.3 terminals in the ICM-A.
2. There should be no continuity between the No.1 and No.2 terminals when power is disconnected.

FRONT POWER SOCKET

Check for continuity between the terminals.

1. There should be continuity between the No.14 and No.15 terminals when power and ground are connected to the No.10 and No.1 terminals in the ICM-B.
2. There should be no continuity between the No.14 and No.15 terminals when power is disconnected.

REAR SEAT POWER SOCKET

Check for continuity between the terminals.

1. There should be continuity between the No.13 and No.12 terminals when power and ground are connected to the No.10 and No.1 terminals in the ICM-B.
2. There should be no continuity between the No.13 and No.12 terminals when power is disconnected.

REAR FOG LAMP

Check for continuity between the terminals.

1. There should be continuity between the No.13 and No.12 terminals when power and ground are connected to the No.10 and No.1 terminals in the ICM-B.
2. There should be no continuity between the No.13 and No.12 terminals when power is disconnected.

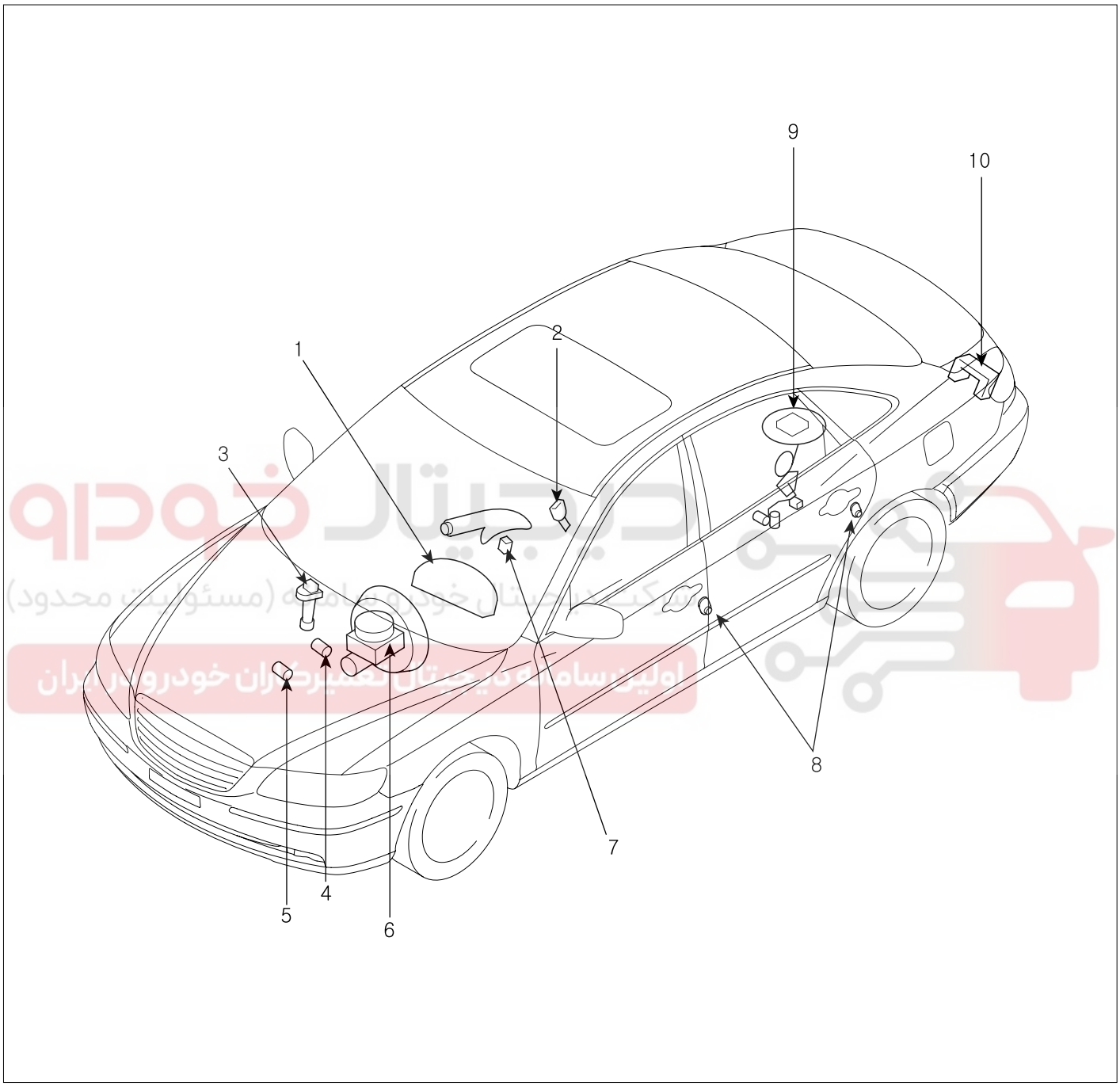
TAIL LAMP

Check for continuity between the terminals.

1. There should be continuity between the No.13 and No.12 terminals when power and ground are connected to the No.10 and No.1 terminals in the ICM-B.
2. There should be no continuity between the No.13 and No.12 terminals when power is disconnected.

INDICATORS AND GAUGES

COMPONENT LOCATION EB2F494B



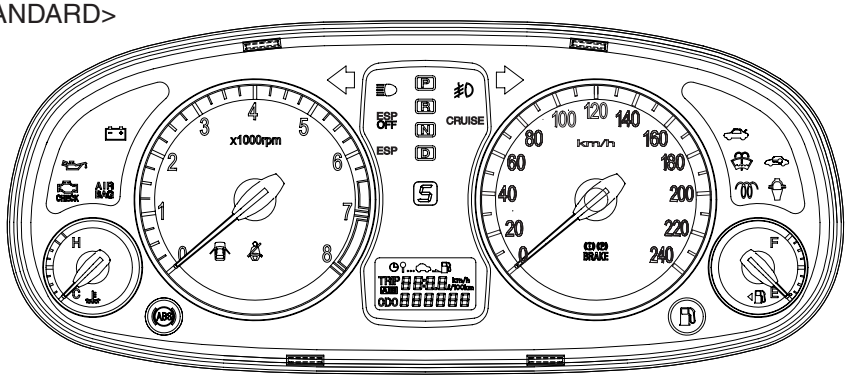
1. Cluster assembly
2. Seat belt switch
3. Vehicle speed sensor
4. Engine coolant temperature sender
5. Oil pressure switch
6. Brake fluid level warning switch
7. Parking brake switch
8. Door switch
9. Fuel gauge sender
10. Trunk lid lock actuator

ETBF260A

INSTRUMENT CLUSTER

COMPONENTS E16E03BC

<STANDARD>



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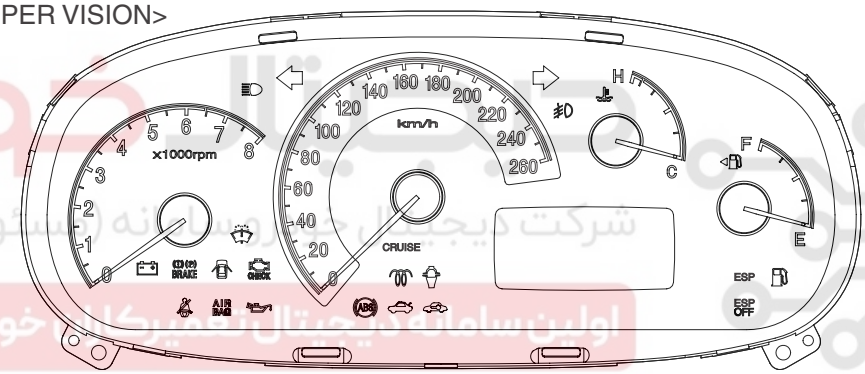
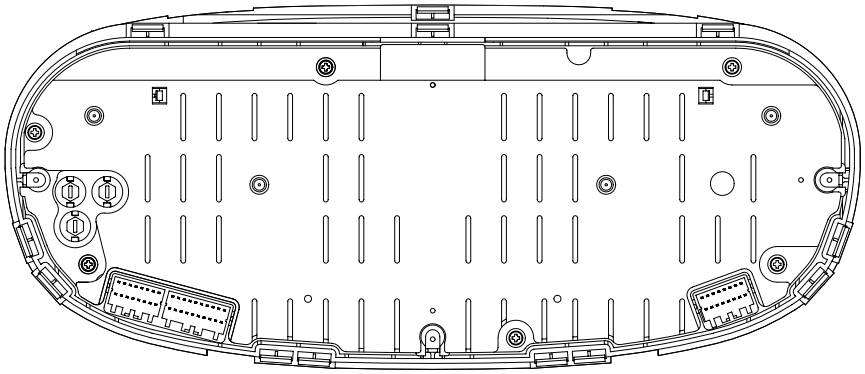
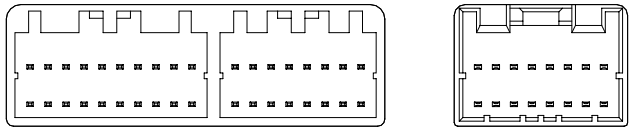




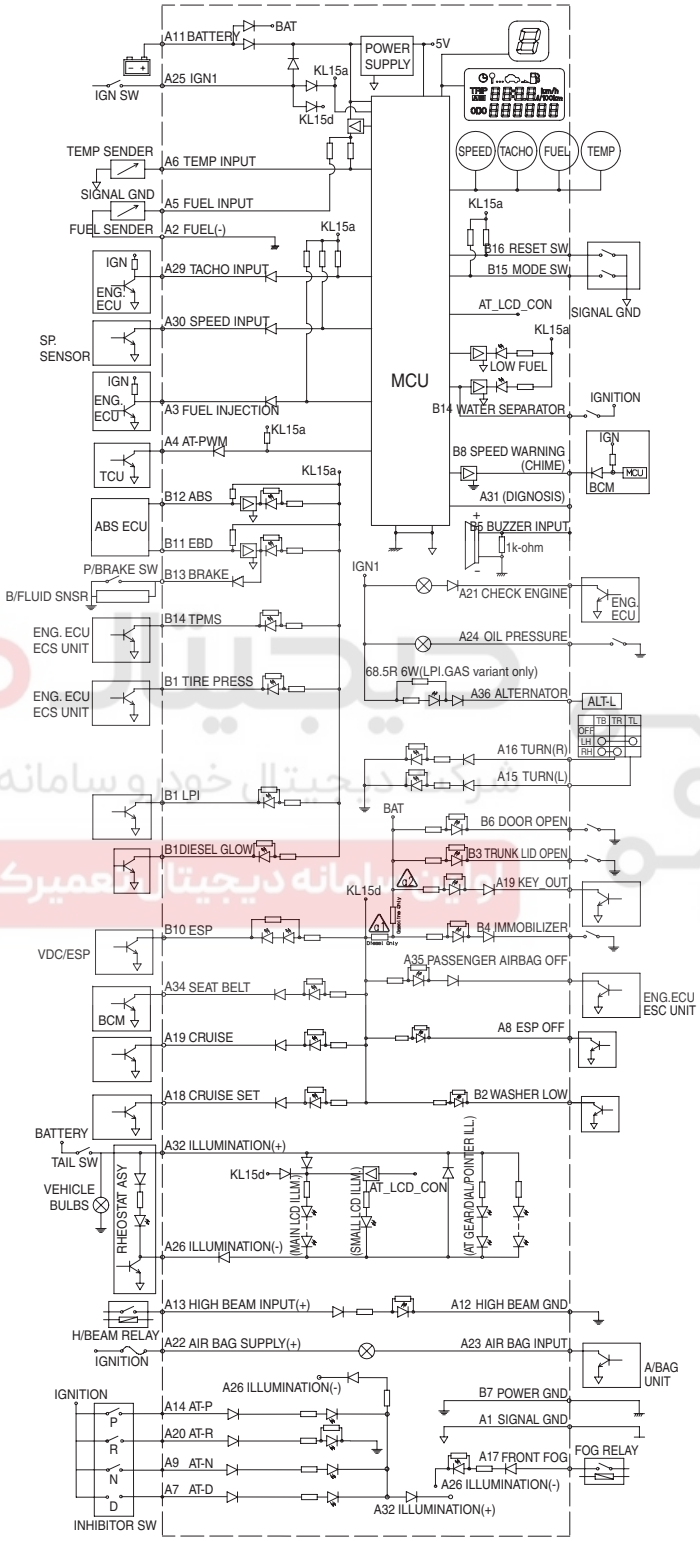


[M08-1(A)] [M08-2(B)]

ETBF260B

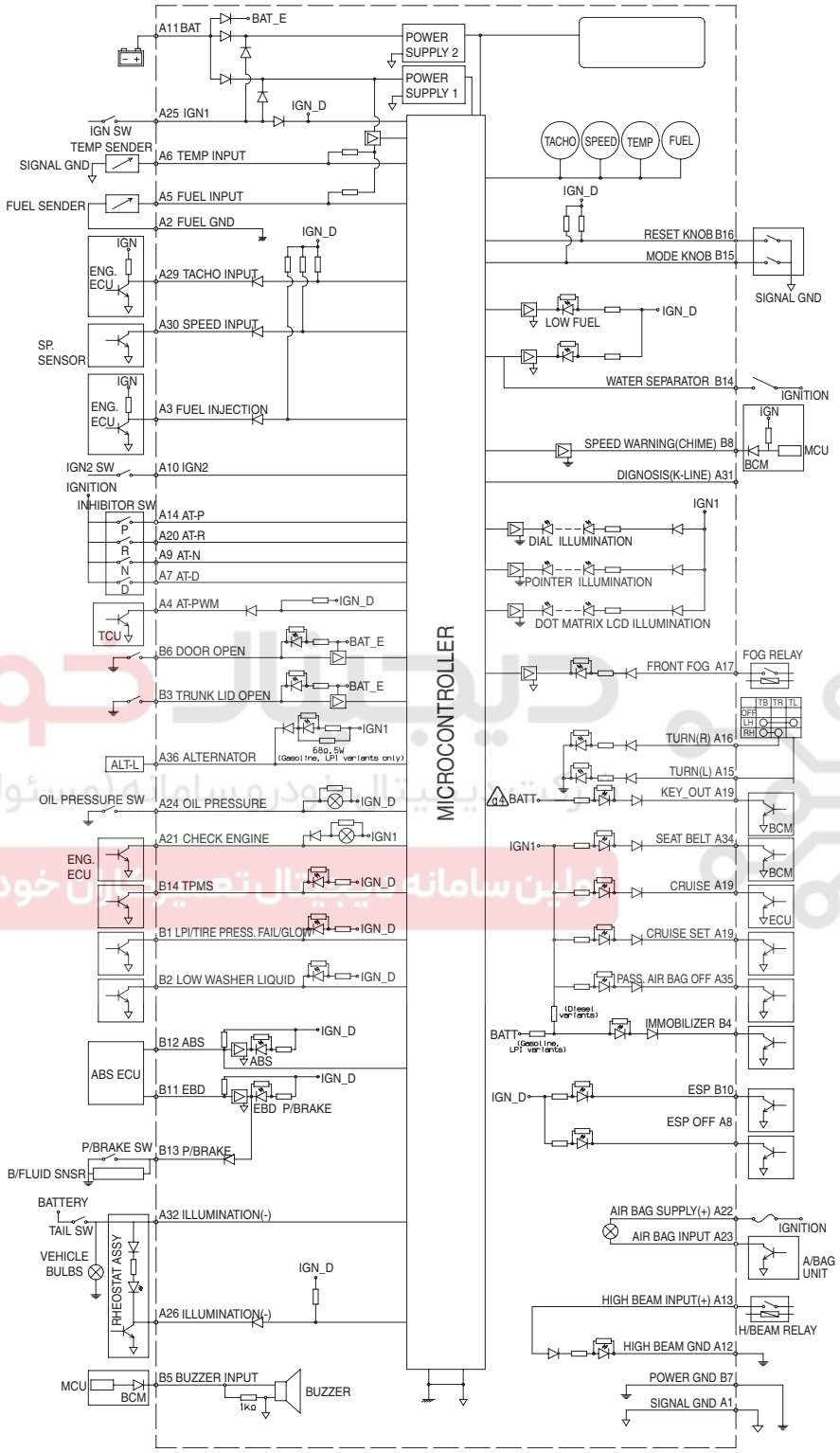
CIRCUIT DIAGRAM EBE5D37C

<STANDARD>



ETBF260C

<SUPER VISION>



ETBF260D

INSPECTION E7D1D019

SPEEDOMETER

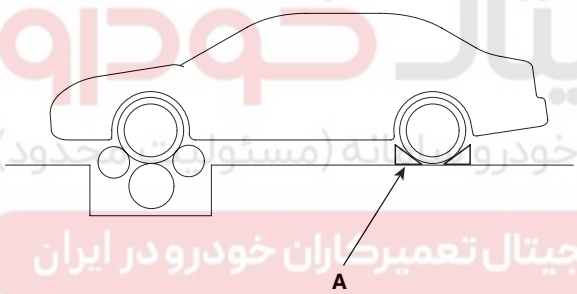
1. Adjust the pressure of the tires to the specified level.
2. Drive the vehicle onto a speedometer tester. Use wheel chocks as appropriate.
3. Check if the speedometer indicator range is within the standard values.

CAUTION

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

NOTE

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



ETKE100E

[EXCEPT AUSTRALIA - KM/H]

Velocity (km/h)	20	40	60	80	100
Tolerance (km/h)	+5.0 +0.0	+6.3 +0.2	+7.5 +0.2	+8.7 +0.2	+9.9 +0.4
Velocity (km/h)	120	140	160	180	200
Tolerance (km/h)	+11.0 +0.4	+12.2 +0.4	+13.4 +0.6	+14.6 +0.6	+15.6 +0.6

[AUSTRALIA- KM/H]

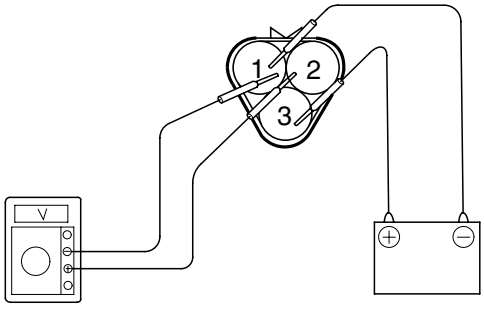
Velocity (km/h)	20	40	60	80	100
Tolerance (km/h)	+3.8 +0.2	+3.8 +0.4	+5.0 +0.6	+6.0 +0.8	+7.6 +1.0
Velocity (km/h)	120	140	160	180	220
Tolerance (km/h)	+8.2 +1.2	+8.6 +1.2	+9.2 1.4	+9.4 +1.4	+10.4 +2.0

[MPH]

Velocity (MPH)	10	20	40	60
Tolerance (MPH)	+3.6 +0.2	+3.6 +0.2	+4.8 +0.2	+6.0 +0.2
Velocity (MPH)	80	100	120	140
Tolerance (MPH)	+7.2 +0.6	+8.4 +1.0	+9.6 +1.6	+10.8 +2.8

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.



ETKD330A

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.

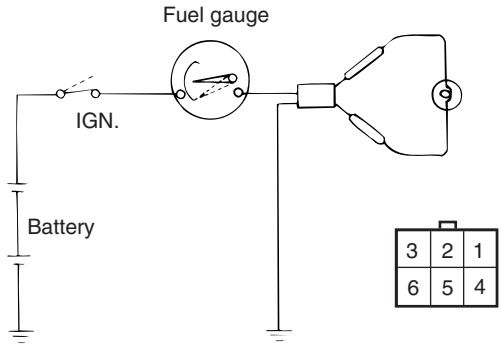
CAUTION

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)	±120	±140	±170	±170	Gasoline
Tolerance (rpm)	±100	±125	±150	±170	Diesel
Revolution (rpm)	5,000	6,000	7,000	-	Remark
Tolerance (rpm)	±200	±240	±260	-	Gasoline
Tolerance (rpm)	±200	-	-	-	Diesel

FUEL GAUGE

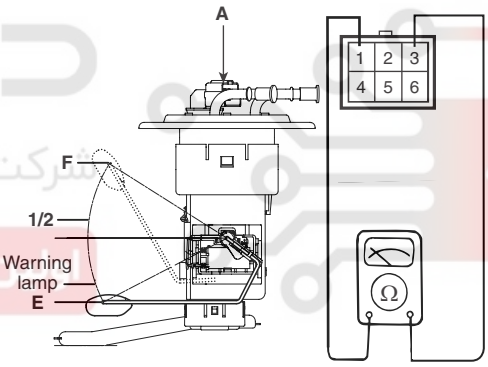
1. Disconnect the fuel sender connector from the fuel sender.
2. Connect a 3.4 wattages, 12V test bulb to terminals 5 and 6 on the wire harness side connector.
3. Turn the ignition switch to the ON, and then check that the bulb lights up and the fuel gauge needle moves to full.



LTIF986A

FUEL GAUGE SENDER

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



ETRF262B

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

Position	Resistance(Ω)
E	183
Warning lamp	174.6
1/2	99
Sender (F)	15

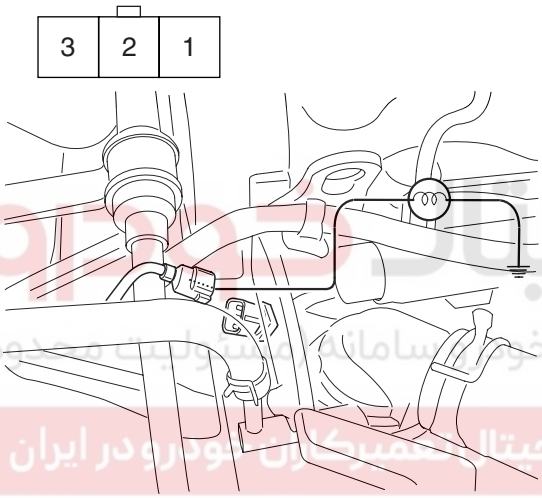
3. If the height resistance is unsatisfied, replace the fuel sender as an assembly.

CAUTION

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

ENGINE COOLANT TEMPERATURE GAUGE

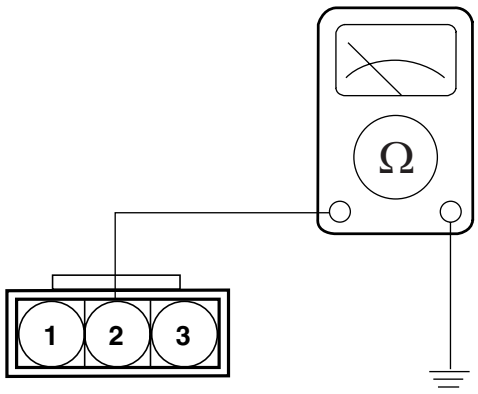
1. Disconnect the wiring connector (A) from the engine coolant temperature sender in the engine compartment.
2. Connect a 12V, 3.4 wattages test bulb between the harness side connector 2 terminal and ground.
3. Turn the ignition switch ON.
4. Verify that the test bulb flashes and that the indicator moves to HOT position.
   If operation is not as specified, replace the cluster (Engine coolant temperature gauge). Then recheck the system.



ETRF262C

ENGINE COOLANT TEMPERATURE SENDER

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



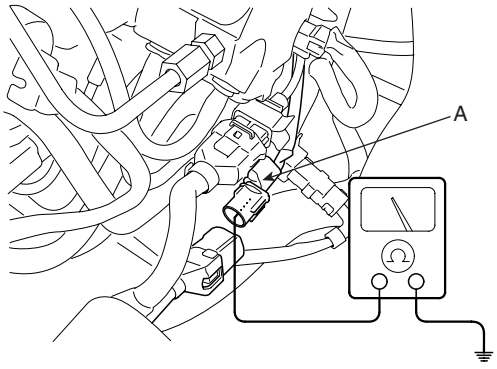
ETKE110I

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

Temperature [°F(°C)]	140 (60)	185 (85)	230 (110)	257 (125)	E/G
Resistance (Ω)	153	66	24.5	18	Gasoline
	215 (49°C)	98 (71°C)	24.5	20	Diesel

OIL PRESSURE SWITCH

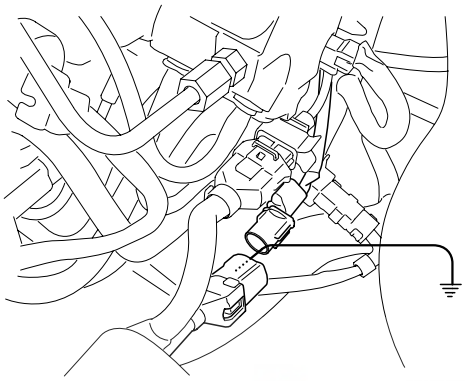
1. Check that there is continuity between the oil press switch terminal and ground with the engine off.
2. Check that there is no continuity between the terminal and ground with the engine running.
3. If operation is not as specified, replace the switch.



KTQE530A

OIL PRESSURE WARNING LAMP

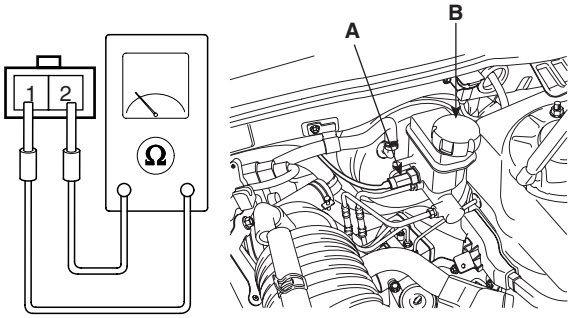
1. Disconnect the connector from the warning switch and ground the terminal on the wire harness side connector.
2. Turn the ignition switch ON. Check that the warning lamp lights up. If the warning lamp doesn't light, test the bulb or inspect the wire harness.



KTQE530B

BRAKE FLUID LEVEL WARNING SWITCH

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



ETBF260E

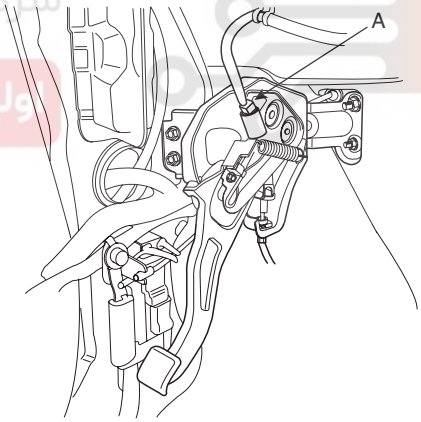
BRAKE FLUID LEVEL WARNING LAMP

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

PARKING BRAKE SWITCH

The parking brake switch (A) is a push type. It is located at the side of the parking brake pedal. To adjust, move the switch mount up and down with the parking brake pedal released all the way.

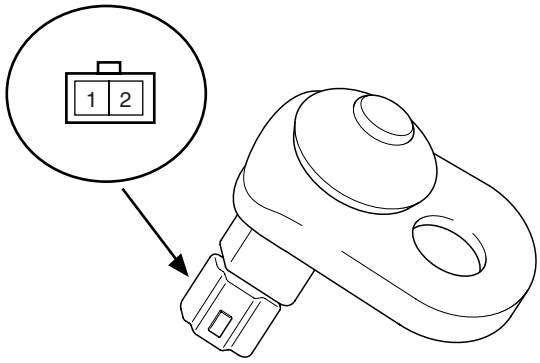
1. Check that there is continuity between the terminal and switch body with the switch ON. (Pedal is pushed)
2. Check that there is no continuity between the terminal and switch body with the switch OFF. (Pedal is released)
   If continuity is not as specified, replace the switch or inspect its ground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



ETBF260F

DOOR SWITCH

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



ATIE121Q

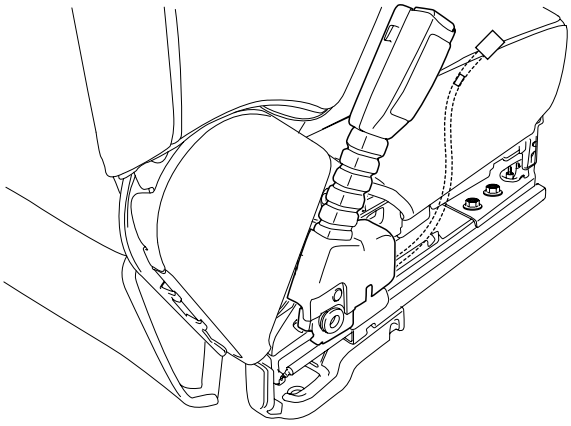
Terminal / Position	1	2	Body (Ground)
Free(Door open)	○	○	○
Push(Door close)			

ETQF180D

SEAT BELT SWITCH

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

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



ETBF260G

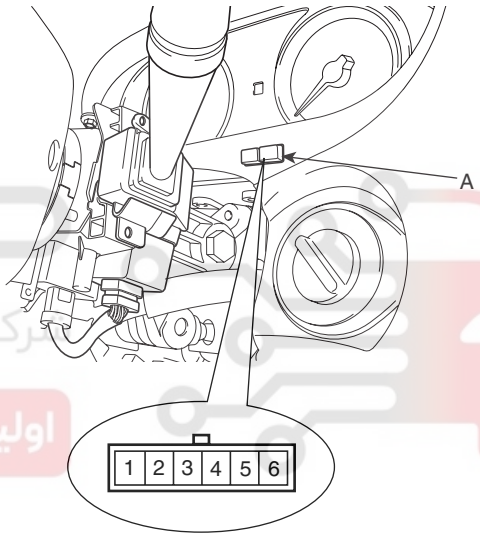
SEAT BELT WARNING LAMP

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



ETBF260H

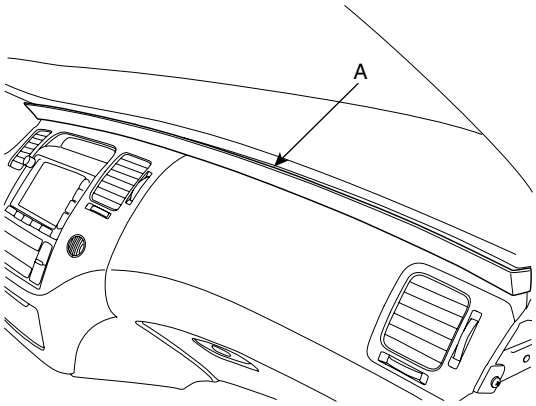
3. Check for continuity between the terminals in each switch position according to the table.

Terminal / Position	2	3	4
MODE(PUSH)		○	○
RESET(PUSH)	○	○	

ETBF260I

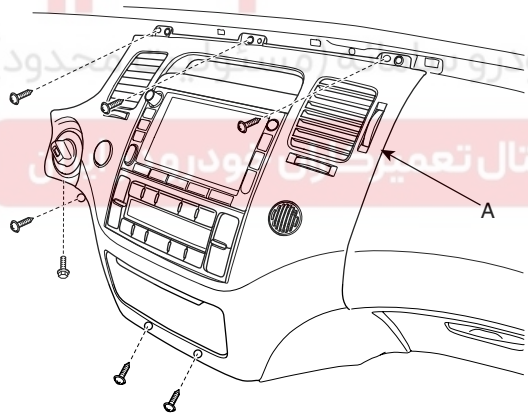
REPLACEMENT E6CD9F29

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



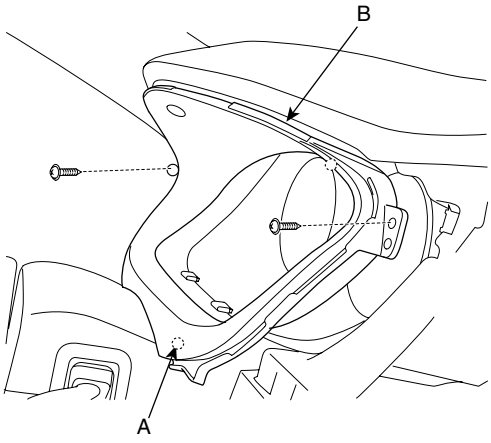
KTBF261A

3. Remove the center facia panel (A) after disconnecting connectors and loosening screws.



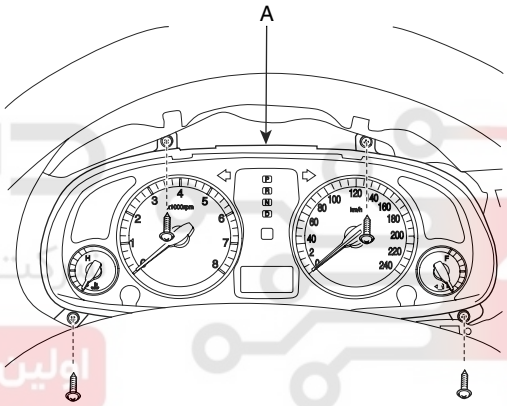
KTBF021F

4. Remove the cluster facia panel after disconnecting trip switch connector.



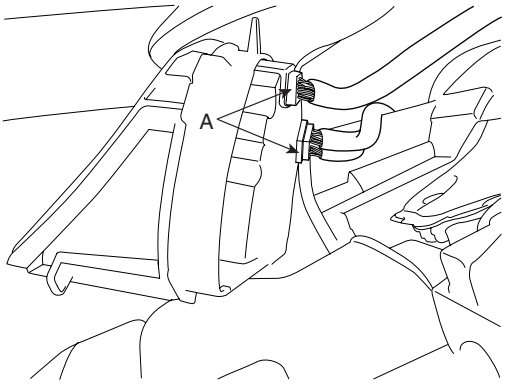
KTBF261B

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



KTBF261C

6. Disconnect the cluster connecter (A) and then remove the cluster.



KTBF261D

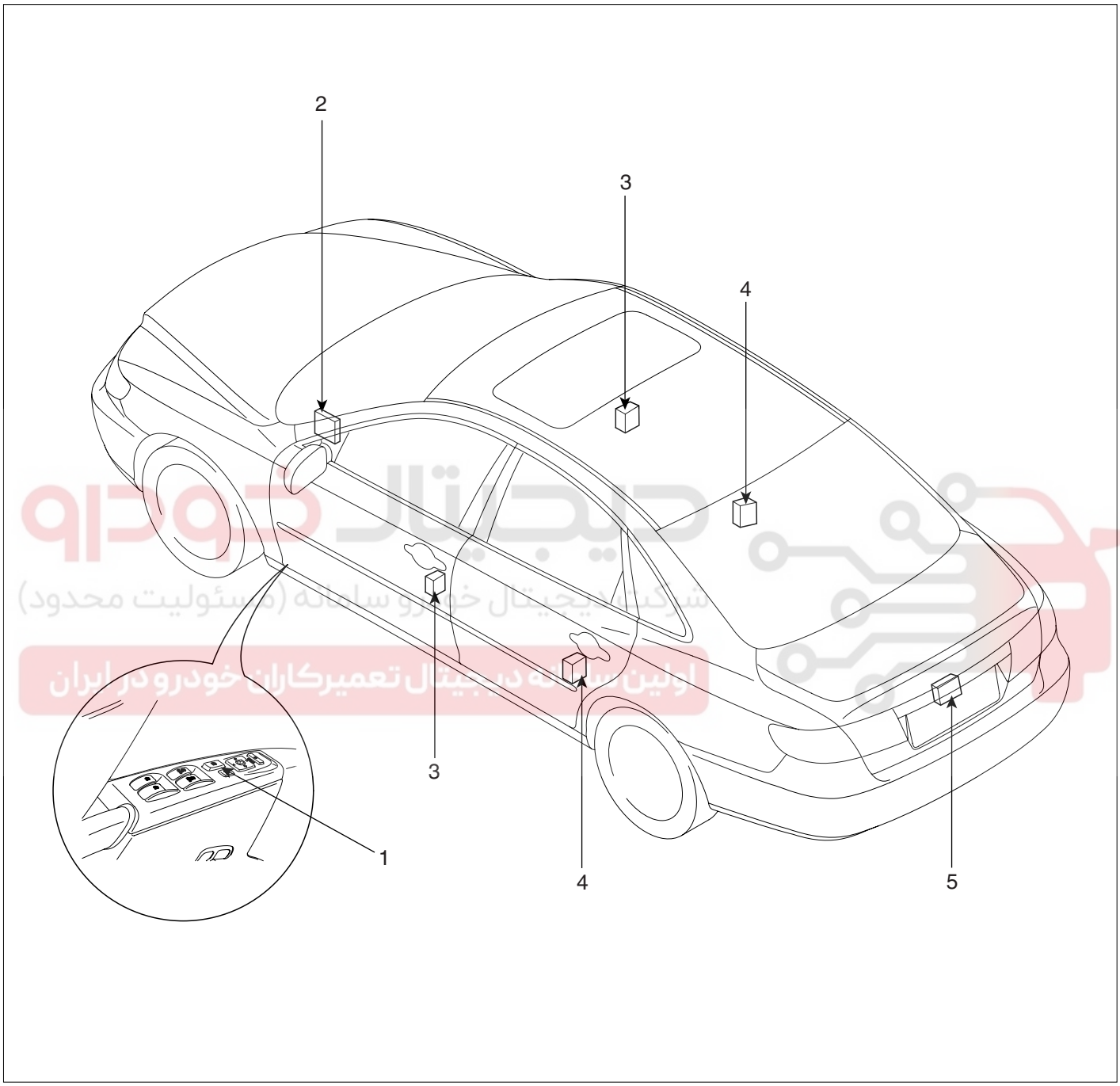
7. Installation is the reverse of removal.

TROUBLESHOOTING EBA1ABB5

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 trunk lid 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
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

POWER DOOR LOCKS

COMPONENT LOCATION EF5E6ACE



1. Door lock switch (Driver Door Module)
2. Body control module (BCM)
3. Front door lock actuator & switch
4. Rear door lock actuator & switch
5. Trunk lid lock actuator

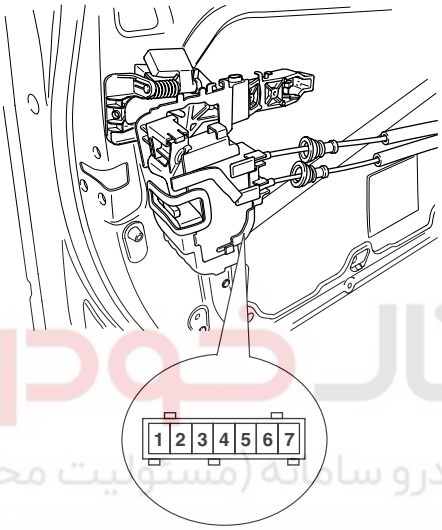
ETBF280A

POWER DOOR LOCK ACTUATORS

INSPECTION EDAA99DA

FRONT DOOR LOCK ACTUATOR

1. Remove the front door trim panel. (Refer to the Body group - front door)
2. Disconnect the 7P connector from the actuator.



KTBF122A

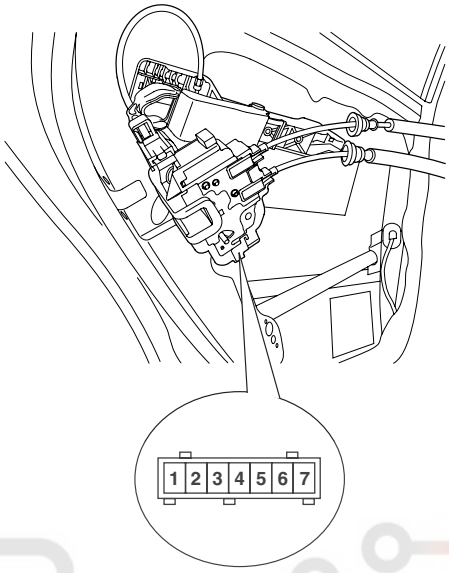
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal		5	3	6	2
Front left	Lock	⊕		⊖	
	Unlock	⊖		⊕	
Front right	Lock		⊕		⊖
	Unlock		⊖		⊕

ETRF122B

REAR DOOR LOCK ACTUATOR

1. Remove the rear door trim panel. (Refer to the Body group - rear door)
2. Disconnect the 7P connector from the actuator.



KTBF122C

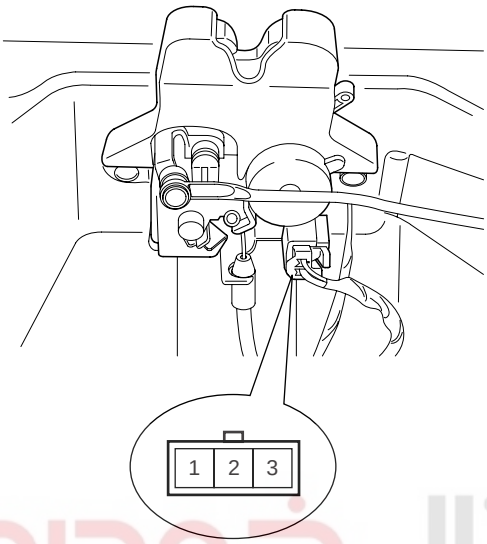
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal		5	3	6	2
Rear left	Lock	⊕		⊖	
	Unlock	⊖		⊕	
Rear right	Lock		⊕		⊖
	Unlock		⊖		⊕

ETRF122D

TRUNK LID RELEASE ACTUATOR

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



KTBF122E

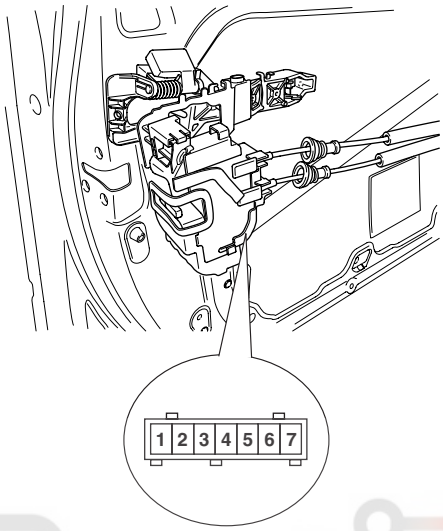
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	2	1
Open	⊕	⊖

ETBF122G

FRONT DOOR LOCK SWITCH

1. Remove the front door trim panel. (Refer to the Body group - Front door)
2. Disconnect the 7P connector from the actuator.



KTBF122A

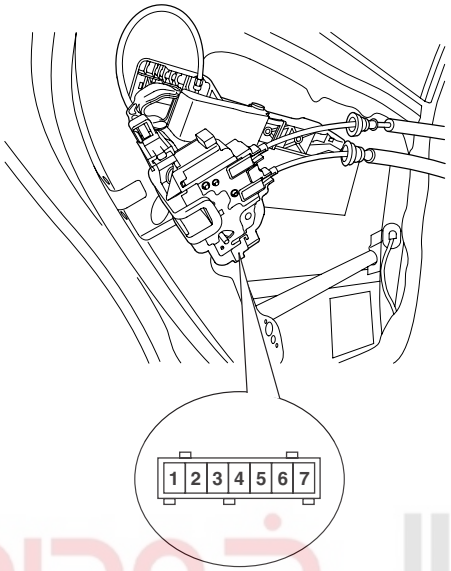
3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal		1	5	3	7
Front left	Lock				
	Unlock	○		○	
Front right	Lock				
	Unlock		○		○

ETRF122G

REAR DOOR LOCK SWITCH

1. Remove the rear door trim panel. (Refer to the Body group - Rear door)
2. Disconnect the 7P connector from the actuator.



KTBF122C

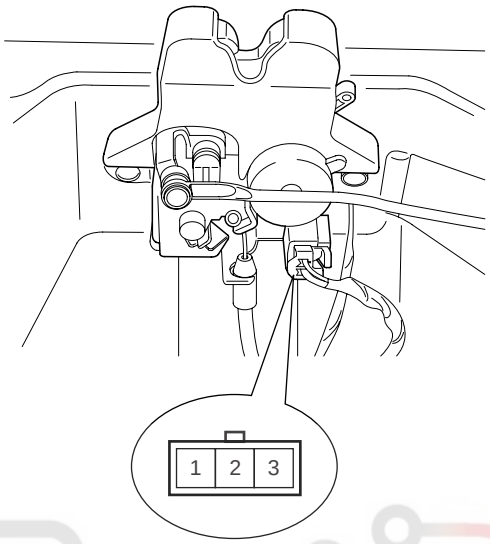
3. Check for continuity between the terminals in each switch position according to the table.

Position		Terminal 1	5	3	7
Rear left	Lock				
	Unlock	○		○	
Rear right	Lock				
	Unlock		○		○

ETRF122H

TRUNK LID OPEN SWITCH

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



KTBF122E

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

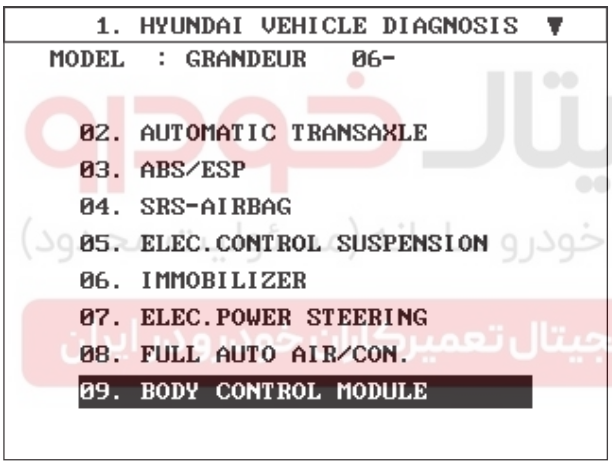
Position	Terminal 2	1
Open	⊕	⊖

ETBF122I

POWER DOOR LOCK SWITCH

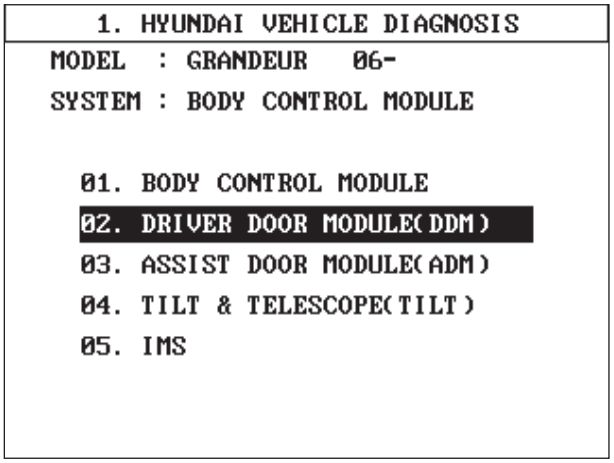
INSPECTION EB00FEB6

1. Power door lock switch, a component of CAN, performs CAN communication with BCM, seat ECU, tilt ECU, passenger side power window switch and it also performs LIN communication with switch module and safety ECU. Driver controls driver side power window switch button located inside of the driver side door to operate power window, mirror, door lock and unlock.
2. Check BCM input/output value of each position of DDM or ADM when you inspect the module whether faulty or not.
3. If the operation of DDM or ADM is abnormal, replace DDM or ADM.
4. Select model and BCM menu.



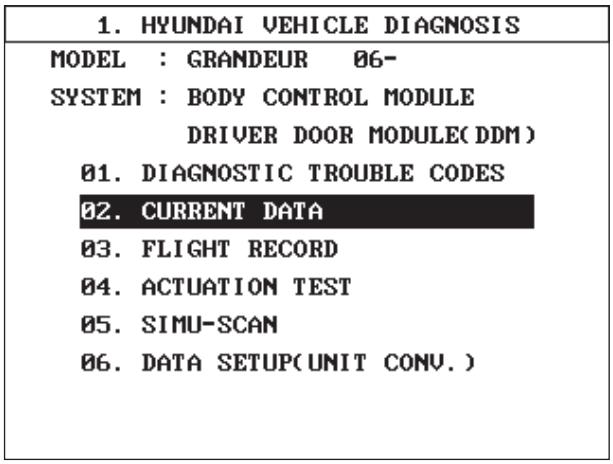
ETBF804A

5. Select "DDM" or "ADM".



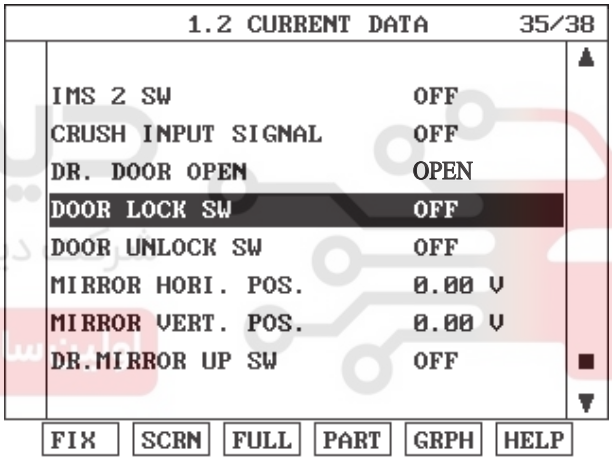
ETBF804B

6. Select "Current data".



ETBF804C

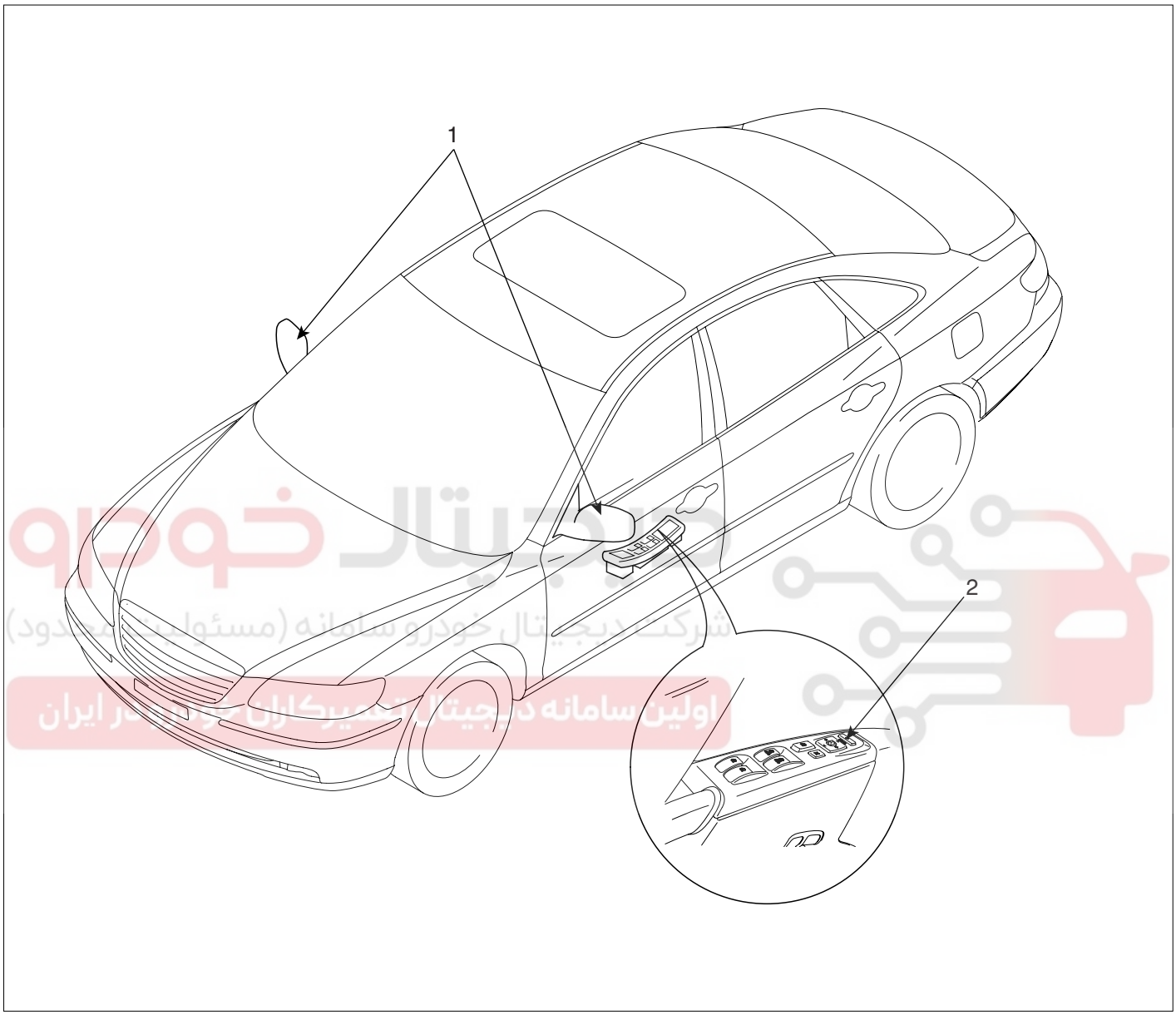
7. Check OFF- > ON when you operate door lock switch or door unlock switch.



ETBF804D

POWER DOOR MIRRORS

COMPONENT LOCATION E671E1F8

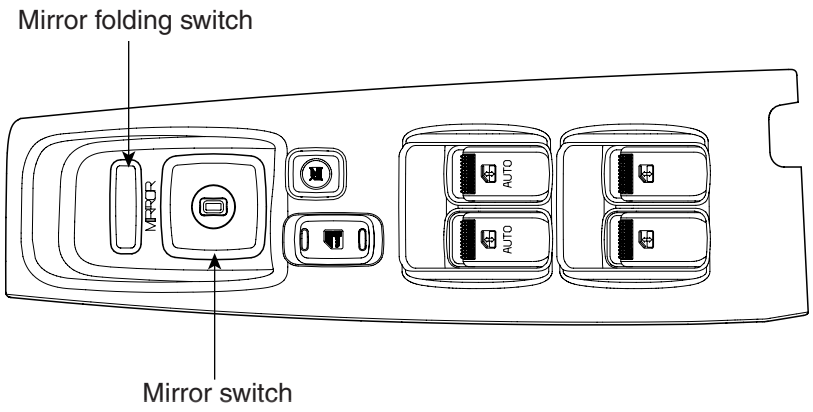


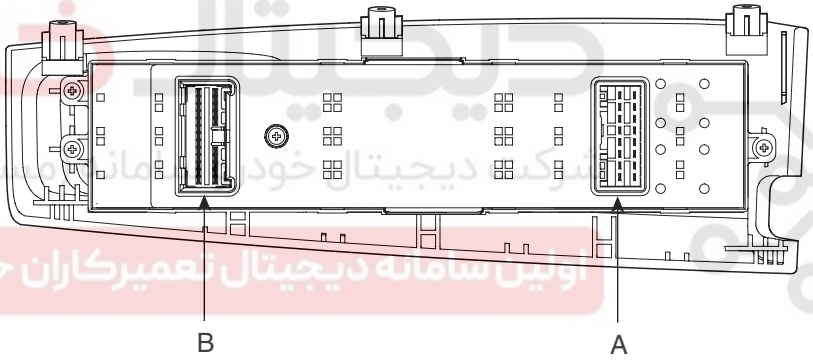
1. Power door mirror
2. Mirror folding switch & Power door mirror switch (DDM)

ETBF300C

POWER DOOR MIRROR SWITCH

COMPONENTS EDECD214





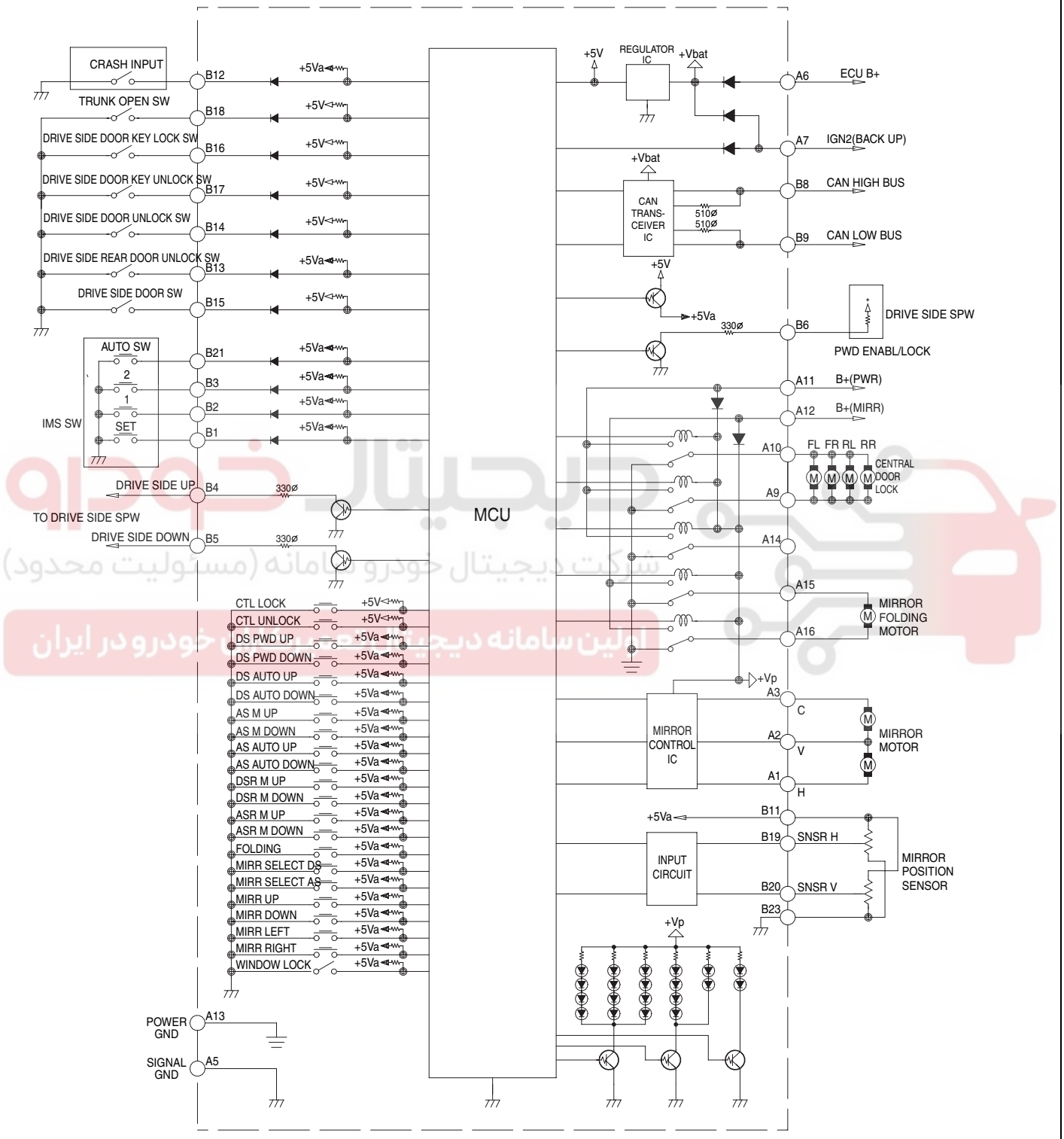
B1	B2	B3	B4	B5				B6	B7	B8	B9	B10
B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23

A1	A2	A3	A4	A5	A6	A7	A8
A9	A10	A11	A12	A13	A14	A15	A16

ETBF304A

CIRCUIT DIAGRAM EA545ACF

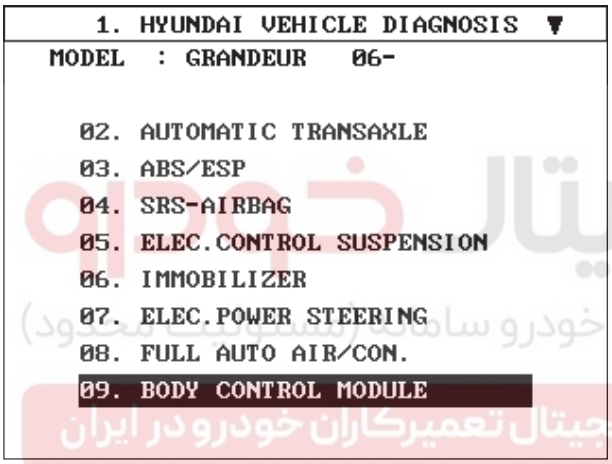
[Driver power window switch]



ETBF304B

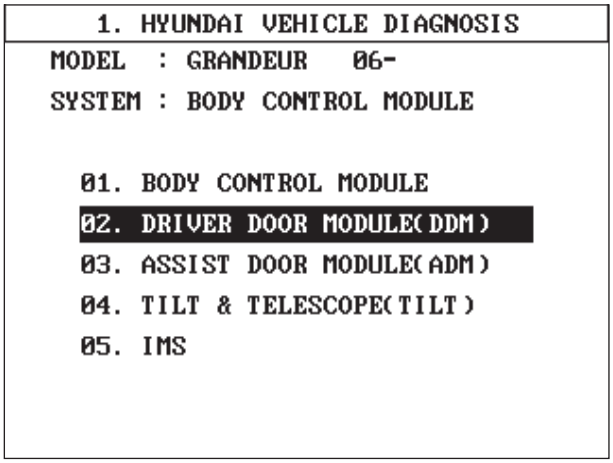
INSPECTION E00D150D

1. Power door mirror switch, a component of CAN, performs CAN communication with BCM, seat ECU, tilt ECU, passenger side power window switch and it also performs LIN communication with switch module and safety ECU. Driver controls driver side power window switch button located inside of the driver side door to operate power window, mirror, door lock and unlock.
2. Check BCM input/output value of each position of DDM or ADM when you inspect the module whether faulty or not.
3. If the operation of DDM or ADM is abnormal, replace DDM or ADM.
4. Select model and BCM menu.



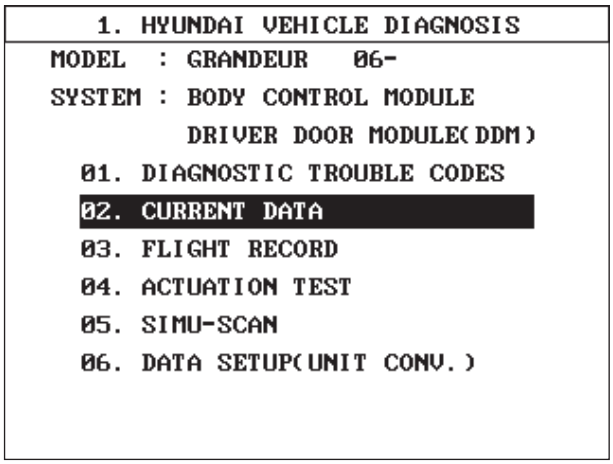
ETBF804A

5. Select "DDM" or "ADM".



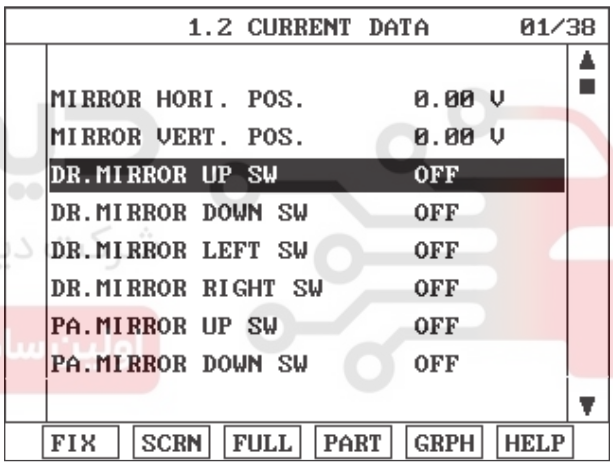
ETBF804B

6. Select "Current data".



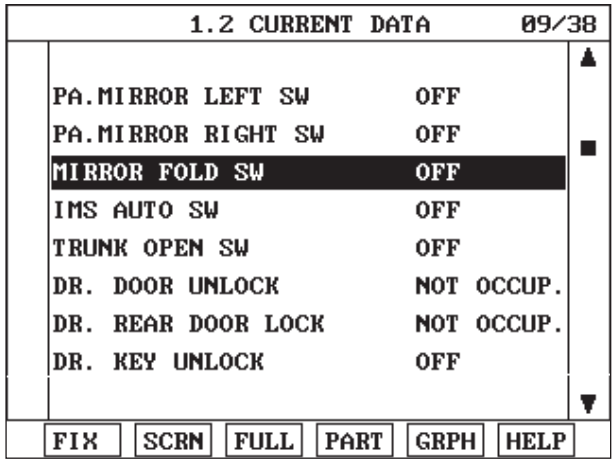
ETBF804C

7. Check OFF- > ON when driver door mirror switch up & down operation.



ETBF301A

8. Check OFF- > ON when you operate mirror folding switch.

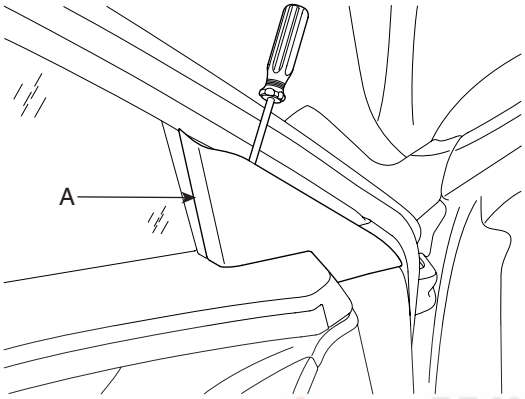


ETBF301B

POWER DOOR MIRROR ACTUATOR

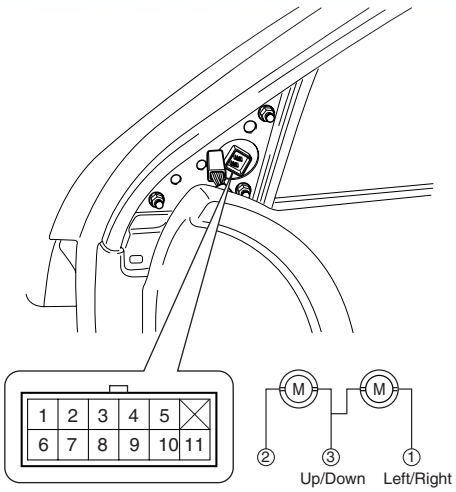
INSPECTION EF3EBA5C

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



ETBF302F

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.



ETBF302B

Position \ Terminal	2	1	3
UP	⊖	⊕	⊕
DOWN	⊕	⊖	⊖
OFF	⊕	⊕	⊕
LEFT	⊖	⊕	⊖
RIGHT	⊕	⊖	⊕

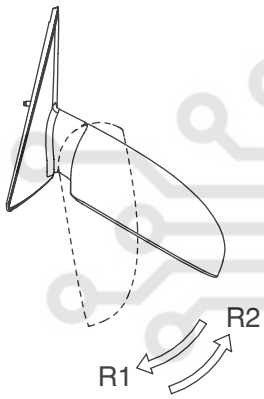
ETBF302C

MIRROR HEATER

Position \ Terminal	6	7
Heater	○	○

ETBF302D

MIRROR FOLDING



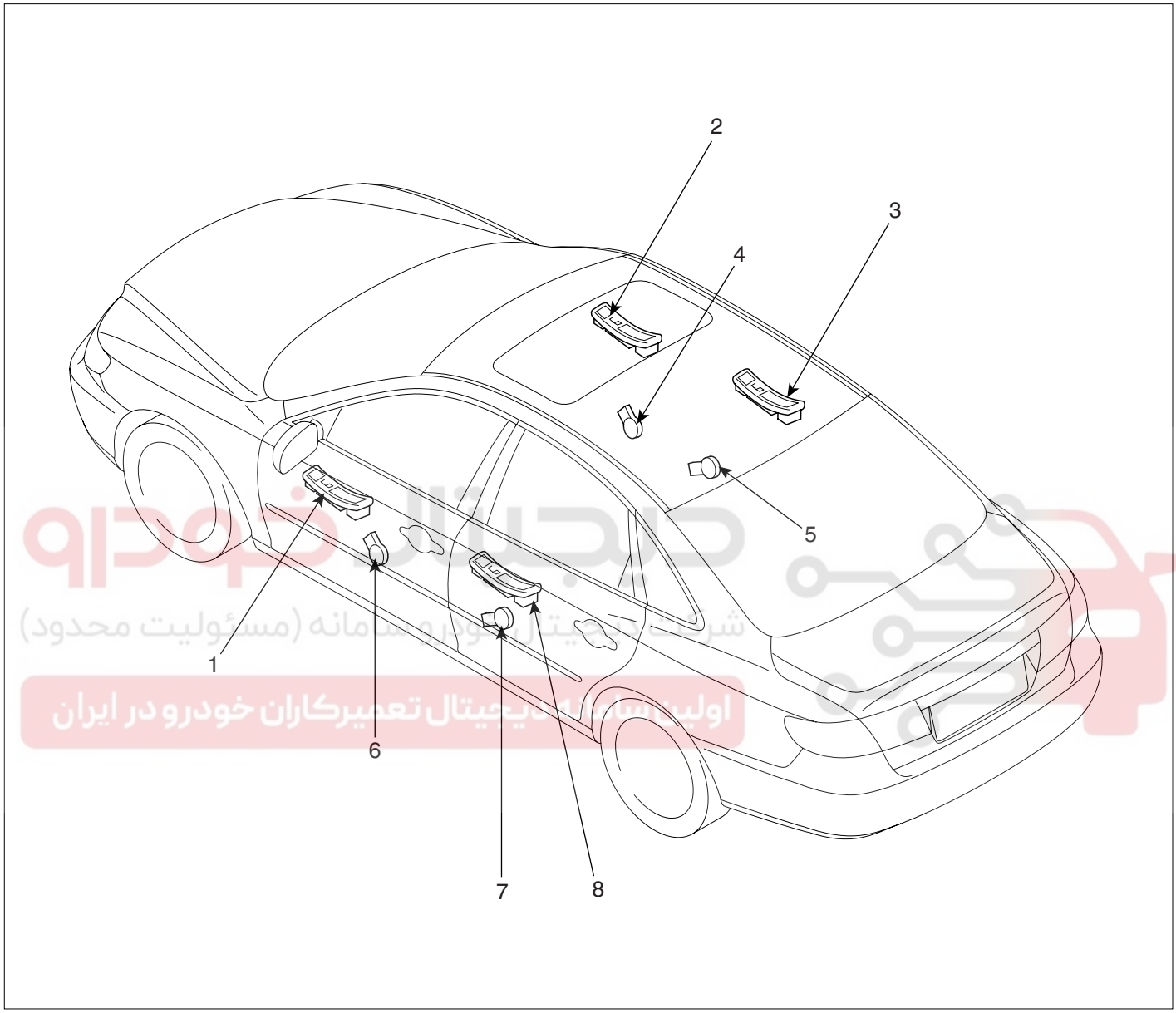
ETJA055B

Direction \ Terminal	4	5
R1	⊕ — M — ⊖	
R2	⊖ — M — ⊕	

ETBF302E

POWER WINDOWS

COMPONENT LOCATION EC9827A5



1. Driver power window main switch
2. Assist window switch
3. Rear window switch
4. Front window motor (Safety unit)
5. Rear window motor
6. Front window motor (Safety unit)
7. Rear window motor
8. Rear window switch

ETBF320A

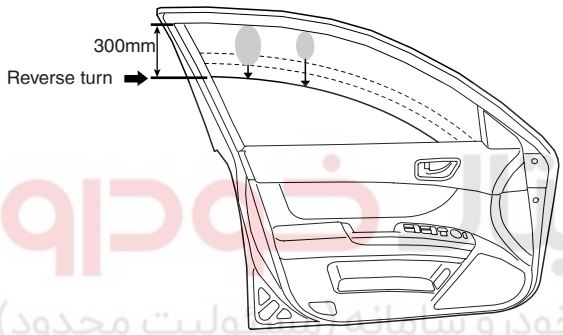
OPERATION EA4EE31B

FUNCTION OF SAFETY POWER WINDOW

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

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

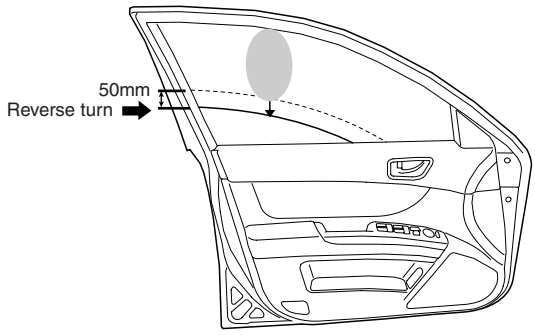
2. Length of window reversing (except holding the auto-up switch)
   - When detect the jamming during the 4mm ~ 250mm from top of the door.
     → Window is reversed until 300mm from top of the door.



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

ETRF320B

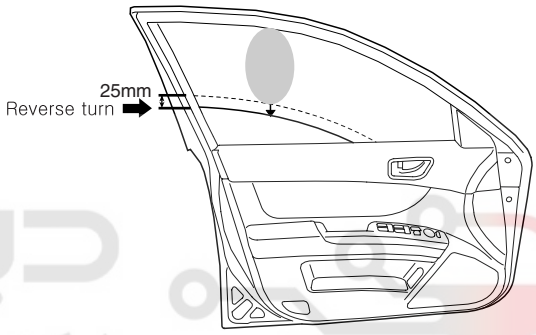
   - When detect the jamming over the 250mm from top of the door.
     → Window is reversed until 50mm from jamming position.



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

ETRF320C

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 holding the auto-up switch after 5 seconds from above condition.
     → Window is reverse until 25mm from jamming position.



When holding the auto-up switch

ETRF320D

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

INITIALIZING METHOD OF THE SAFETY POWER WINDOW

1. Initializing of Battery Connection
   When the battery is not connected the vehicle over the 5 minutes, safety power window switch need the initializing.

   1) Power window operation before initializing
      - Manual-Up/Down function is available
      - Auto-Up function is not available
        (When holding the auto-up/down switch, window is operated as a manual-up/down.)

   2) Initializing method
      Close the window in window open position, and holding the switch in window full close position over the 0.2 second.
      (If start the closing the window in window full close position, initializing could be failed.)

   3) If initialize the safety power window in jamming status, could occur below conditions.
      - Safety function is not available

2. Initializing of fail safe mode

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

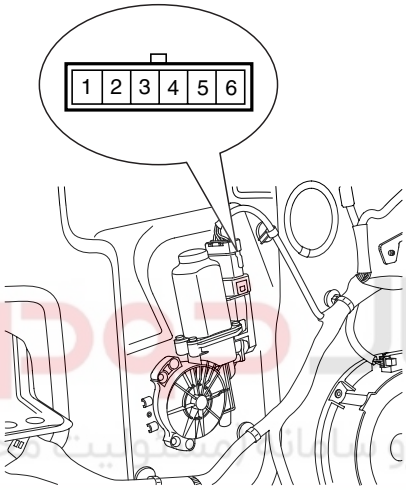
   2) Power window operation in fail mode
      - Auto/Manual-Down function is available
      - Auto/Manual-Up function is not available
        (When auto/manual-up is operated, window is rising 20mm and is stopped the moving.)

POWER WINDOW MOTOR

INSPECTION EEDF4ABE

FRONT POWER WINDOW MOTOR

1. Remove (-) negative battery terminal.
2. Remove the front door trim panel. (Refer to the Body group-front door)
3. Disconnect the connector (6P) from the motor.



KTBF321A

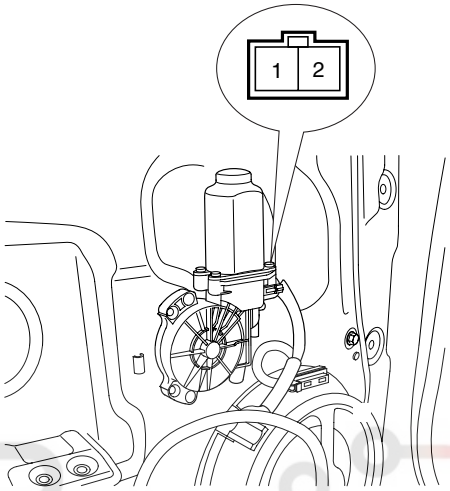
4. Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

Position		Terminal	1	2	3
Driver's side	UP	Clockwise		⊕	⊖
	DOWN	Counter-clockwise	⊕		⊖

ETRF321B

REAR POWER WINDOW MOTOR

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



KTBF321C

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

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

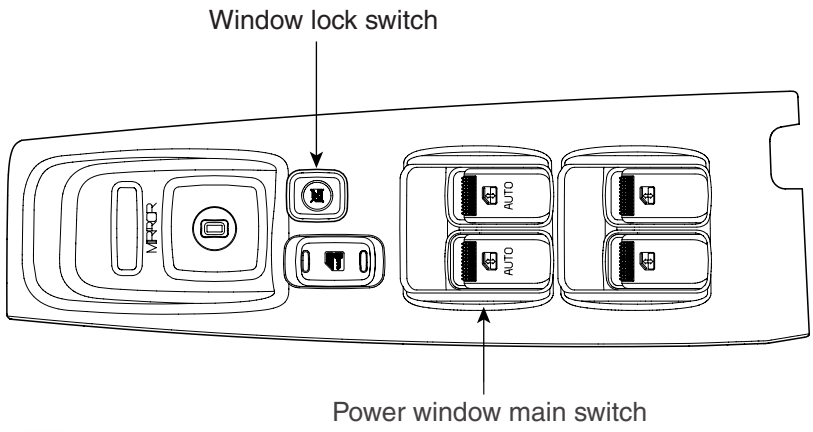
ETBF321D

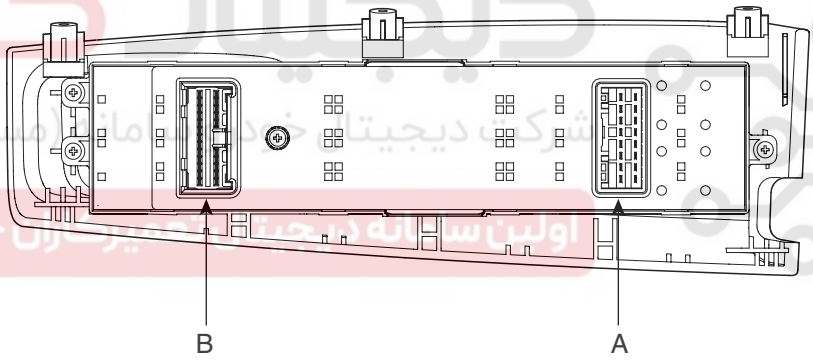
POWER WINDOW SWITCH

COMPONENTS E2AEC2F1

POWER WINDOW MAIN SWITCH

[LHD]



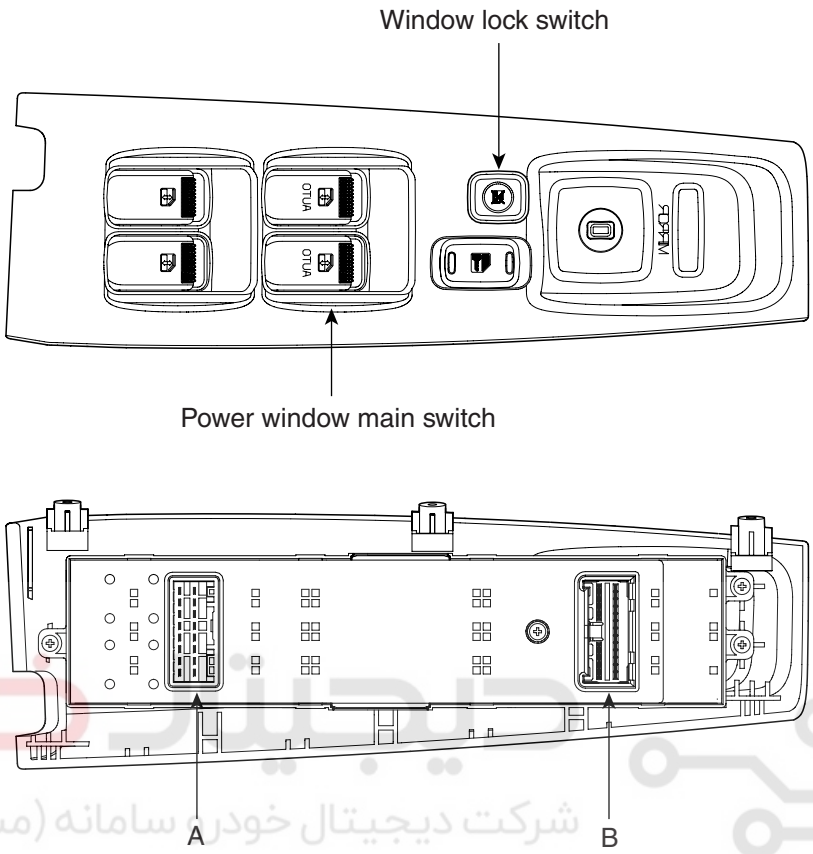


B1	B2	B3	B4	B5				B6	B7	B8	B9	B10
B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23

A1	A2	A3	A4	A5	A6	A7	A8
A9	A10	A11	A12	A13	A14	A15	A16

ETBF322D

[RHD]

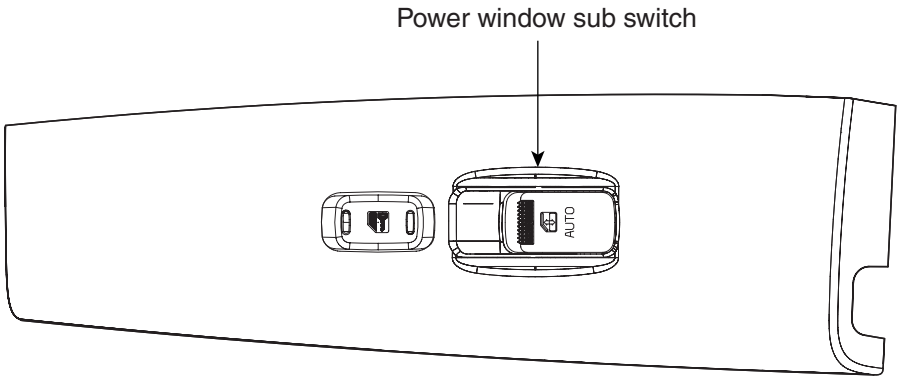


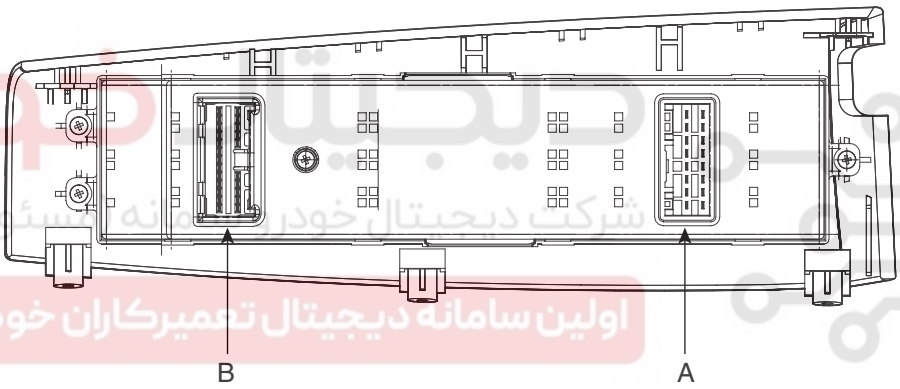
B1	B2	B3	B4	B5				B6	B7	B8	B9	B10
B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23

A1	A2	A3	A4	A5	A6	A7	A8
A9	A10	A11	A12	A13	A14	A15	A16

ETBF322G

ASSIST POWER WINDOW SWITCH



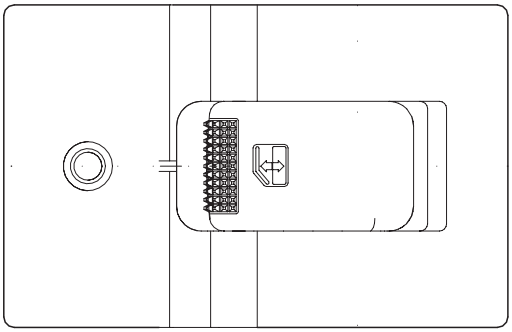


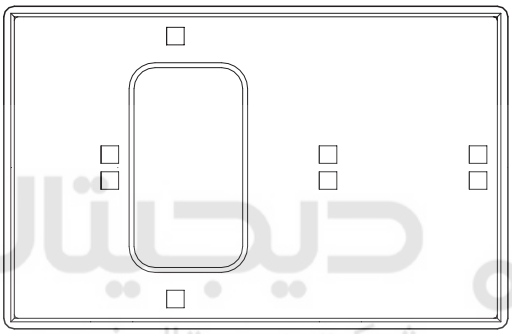
B1	B2	B3	B4	B5				B6	B7	B8	B9	B10
B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23

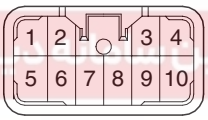
A1	A2	A3	A4	A5	A6	A7	A8
A9	A10	A11	A12	A13	A14	A15	A16

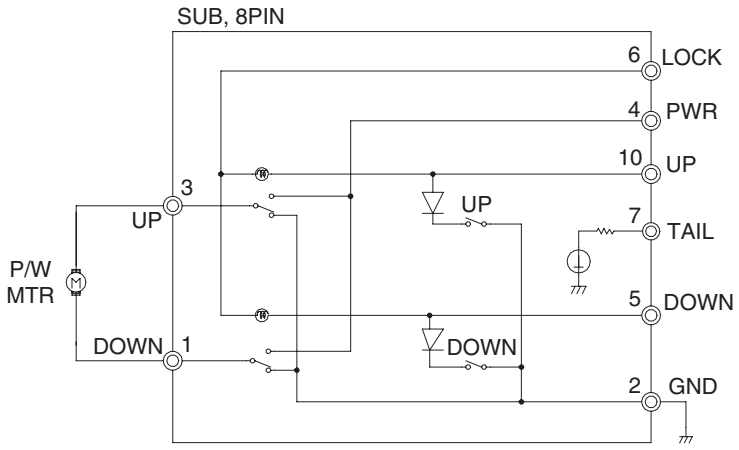
ETBF322C

REAR POWER WINDOW SWITCH





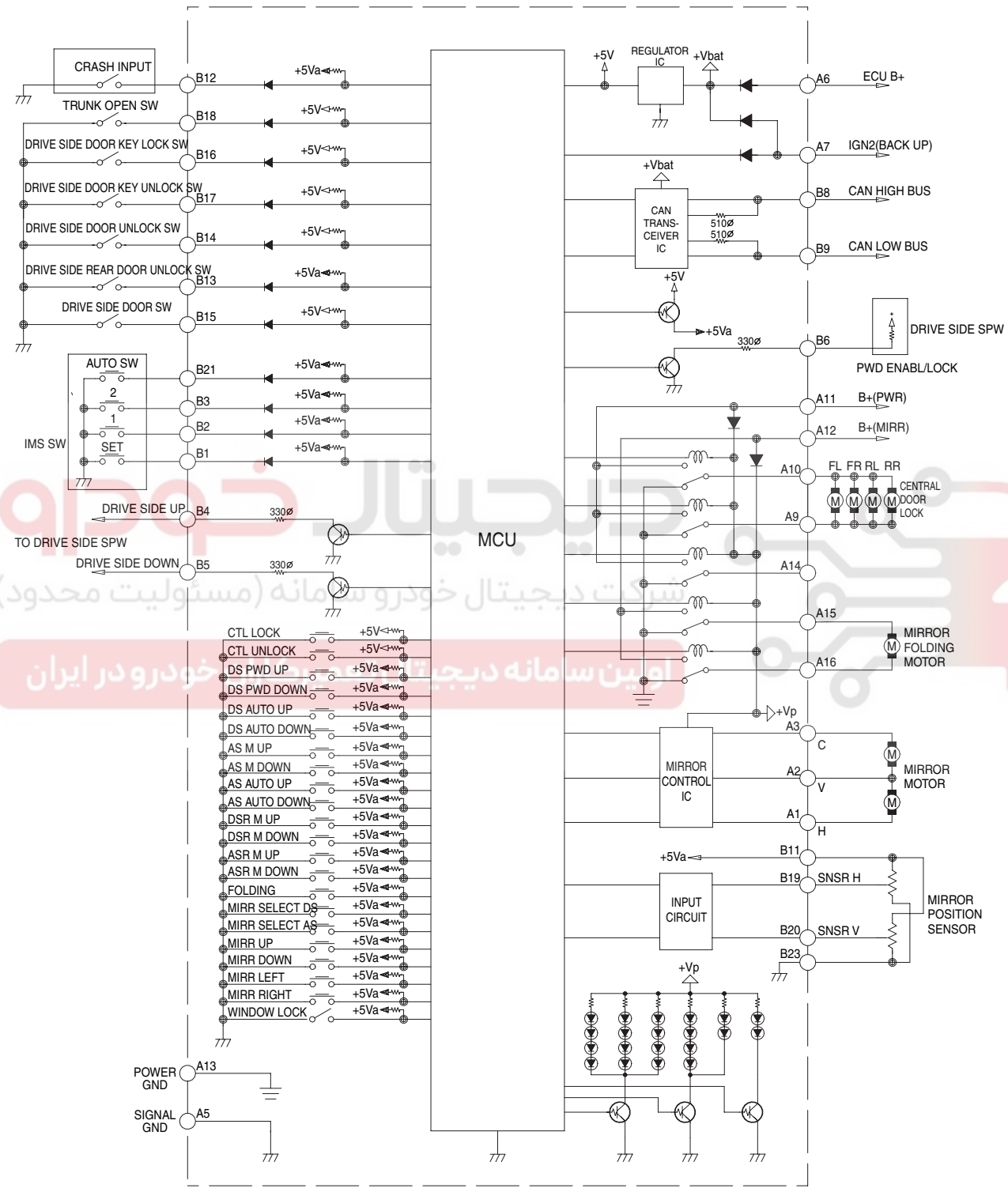




KTBF322D

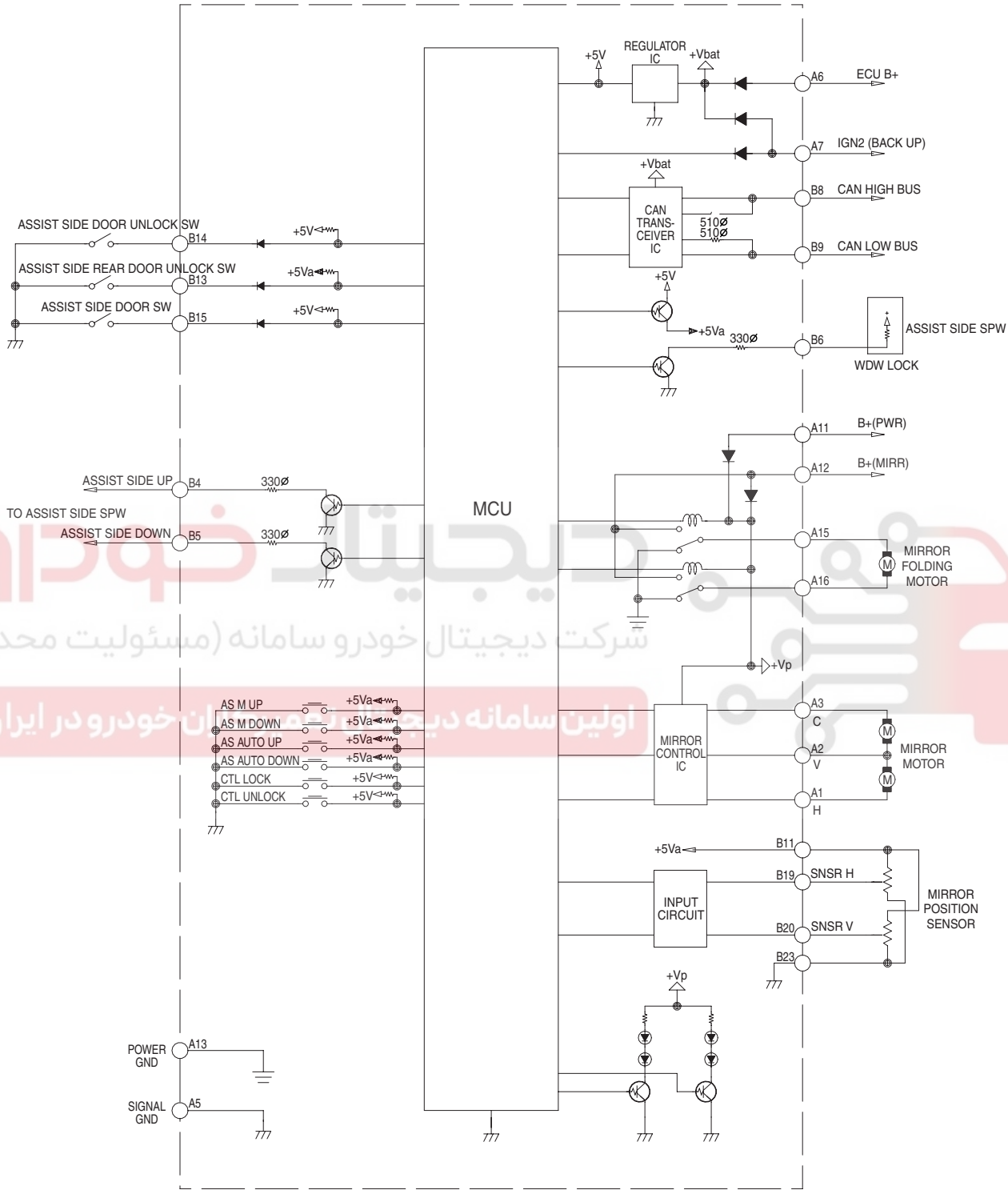
CIRCUIT DIAGRAM EC8ACC1C

[Driver power window switch]



ETBF304B

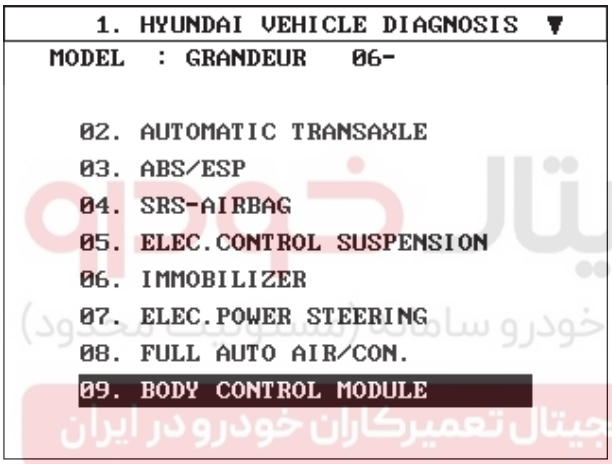
[Assist power window switch]



ETBF304D

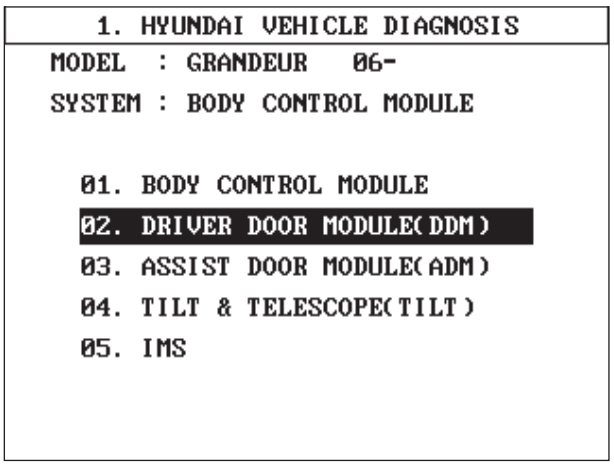
INSPECTION E4DEE23F

1. Power window main switch, a component of CAN, performs CAN communication with BCM, seat ECU, tilt ECU, passenger side power window switch and it also performs LIN communication with switch module and safety ECU. Driver controls driver side power window switch button located inside of the driver side door to operate power window, mirror, door lock and unlock.
2. Check BCM input/output value of each position of DDM or ADM when you inspect the module whether faulty or not.
3. If the operation of DDM or ADM is abnormal, replace DDM or ADM.
4. Select model and BCM menu.



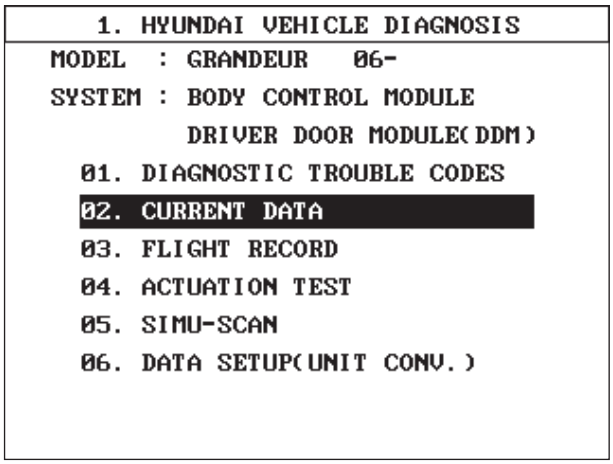
ETBF804A

5. Select "DDM" or "ADM".



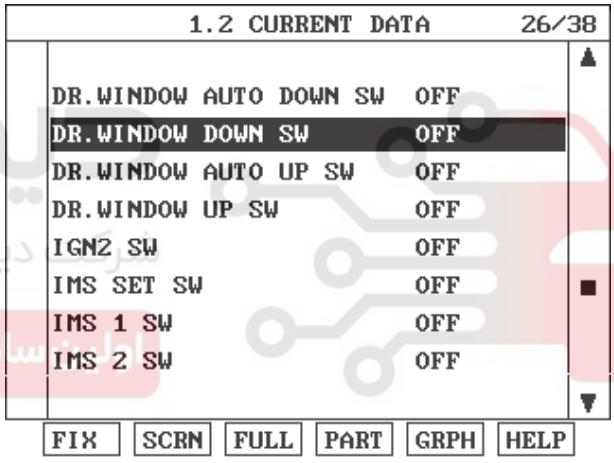
ETBF804B

6. Select "Current data".



ETBF804C

7. Select "Driver window switch" or "Assist window switch".

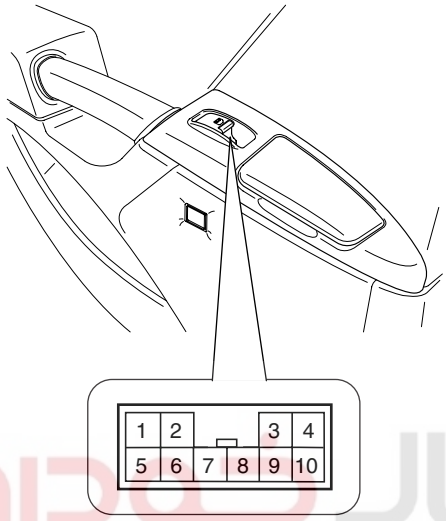


ETBF322A

8. Check OFF- > ON when you operate window switch up & down.

REAR POWER WINDOW SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim panel. (Refer to the Body group-rear door)
3. Disconnect the 10P connector from the switch.



KTBF322H

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

Terminal / Position	2	5	6	10
UP	○			○
OFF		○	○	○
DOWN	○	○		

ETBF322I

POWER WINDOW RELAY

INSPECTION E09C61D5

Rear left/right power window relay

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim panel. (Refer to the Body group - rear door)
3. Disconnect the 10P connector from the switch.

KTBF322H

REAR POWER WINDOW SWITCH UP

Check for continuity between the terminals.

1. There should be continuity between the No.3 and No.4 terminals when power and ground are connected to the No.6 and No.10 terminals.
2. There should be no continuity between the No.3 and No.4 terminals when power is disconnected.

Terminal / Position	3	4	10	6
Disconnected			○	○
Connected	○	○	⊖	⊕

ETBF323E

REAR POWER WINDOW SWITCH DOWN

Check for continuity between the terminals.

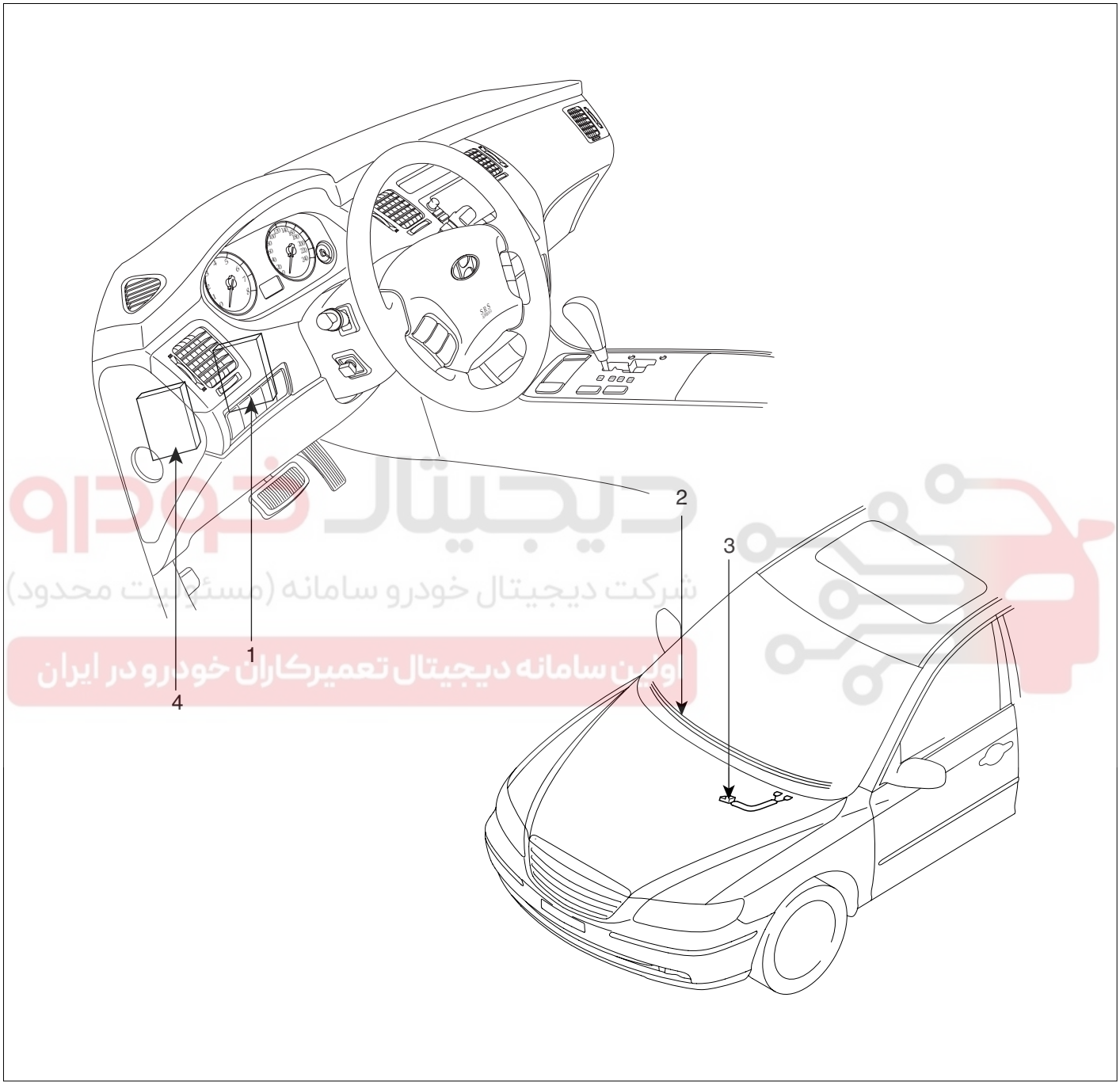
1. There should be continuity between the No.1 and No.4 terminal when power and ground are connected to the No.5 terminal and No.6 terminal.
2. There should be no continuity between the No.1 terminal and No.4 terminal when power is disconnected.

Terminal / Position	1	4	5	6
Disconnected			○	○
Connected	○	○	⊖	⊕

ETBF322F

WINDSHIELD DEICER

COMPONENT LOCATION EE1CCDD8



1. Body control module
2. Windshield deicer
3. Deicer connector
4. Windshield deicer relay (Built-in junction box)

ETBF330A

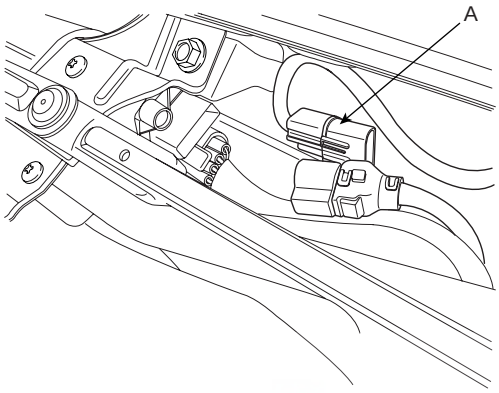
DESCRIPTION E34FE257

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. Operating condition is the same that of rear window defogger system.
Since the generator "L" is switched ON, if the deicer switch is ON, then deicer output is ON for 20 minutes.

WINDSHIELD DEICER

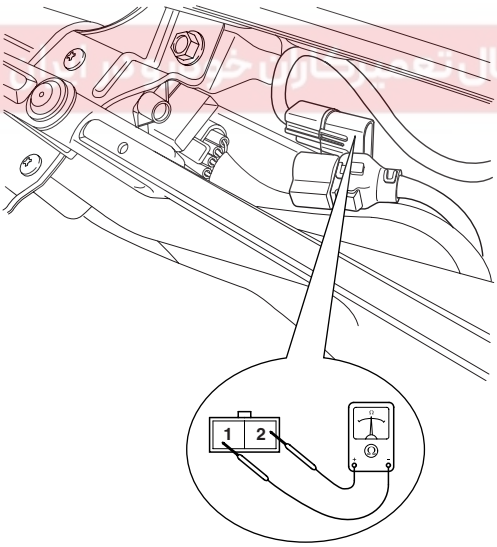
INSPECTION EB36A3DA

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



KTBF331A

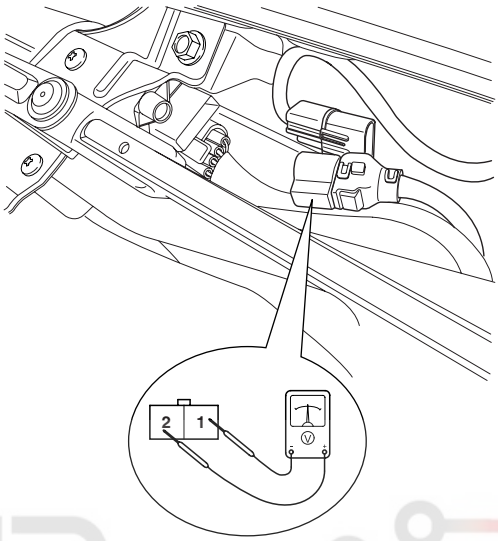
3. Check for continuity between the terminals of deicer lines.



KTBF331B

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)

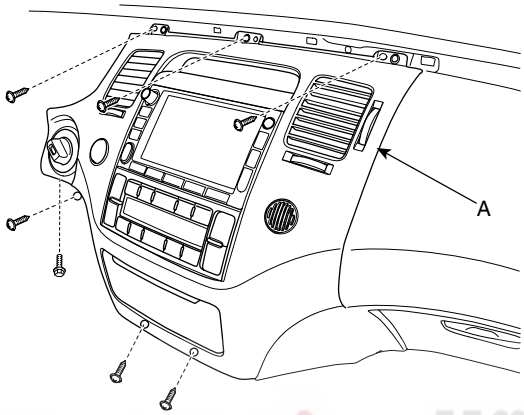


KTBF331C

WINDSHIELD DEICER SWITCH

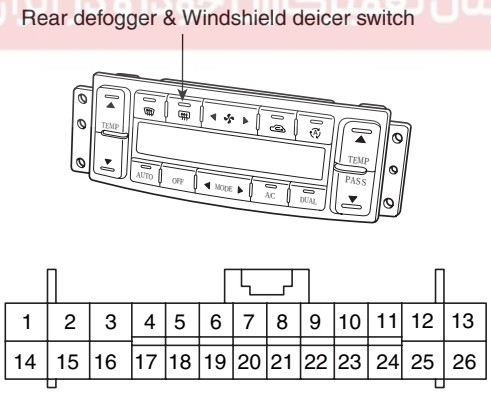
INSPECTION EAADFA3A

1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel(A) after loosening screws. Take care not to damage fixing clips.



KTBF021F

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



ETBF332A

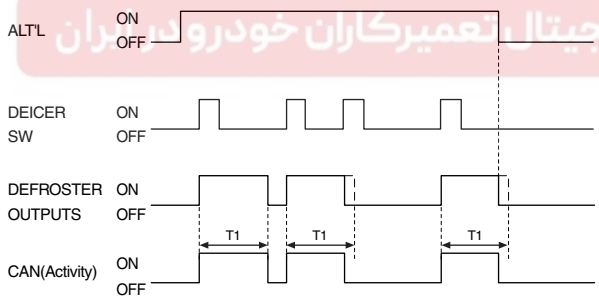
Terminal / Position	M51-B (23)	M51-B (26)	M50-A (26)	M50-A (10)
ON (Manual)	○	○		
ON (Auto)			○	○
OFF				

ETBF332B

WINDSHIELD DEICER TIMER

INSPECTION EE3D1056

1. Condition 1
   1) Alternator level high & defogger is OFF
      (Defogger relay OFF and defogger activity OFF)
   2) Defogger is activated (defogger switch ON)
   3) Defogger outputs are turned ON
2. Condition 2
   1) Alternator level high & defogger is ON
   2) Defogger switch Input pushed again or T1 delay has elapsed since defogger has been turned ON
   3) Defogger outputs are turned OFF
3. Condition 3
   If alternator input is changed to low, defogger outputs should be turned OFF immediately.
4. Outside mirror defogger of door module can be controlled by CAN communication at the same time.

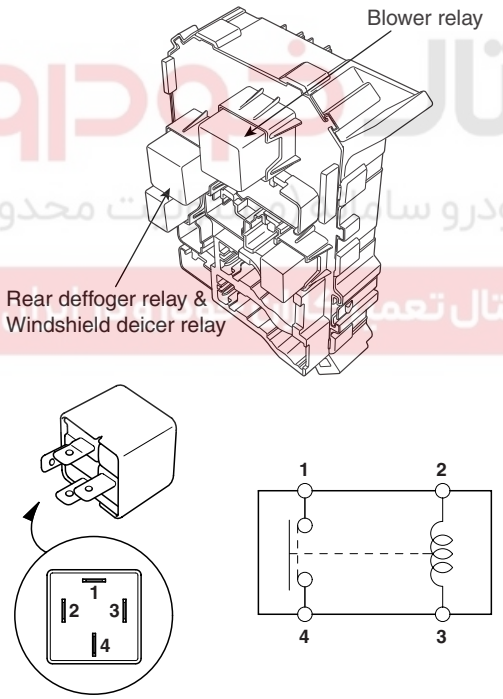


ETBF145U

WINDSHIELD DEICER RELAY

INSPECTION E19E52BC

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel. (Refer to the Body group- Crash pad)
3. Remove the windshield deicer relay from the junction box.
4. Check for continuity between the terminals.
5. There should be continuity between the No.1 and No.4 terminal when power and ground are connected to the No.2 terminal and No.3 terminal.
6. There should be no continuity between the No.1 terminal and No.4 terminal when power is disconnected.



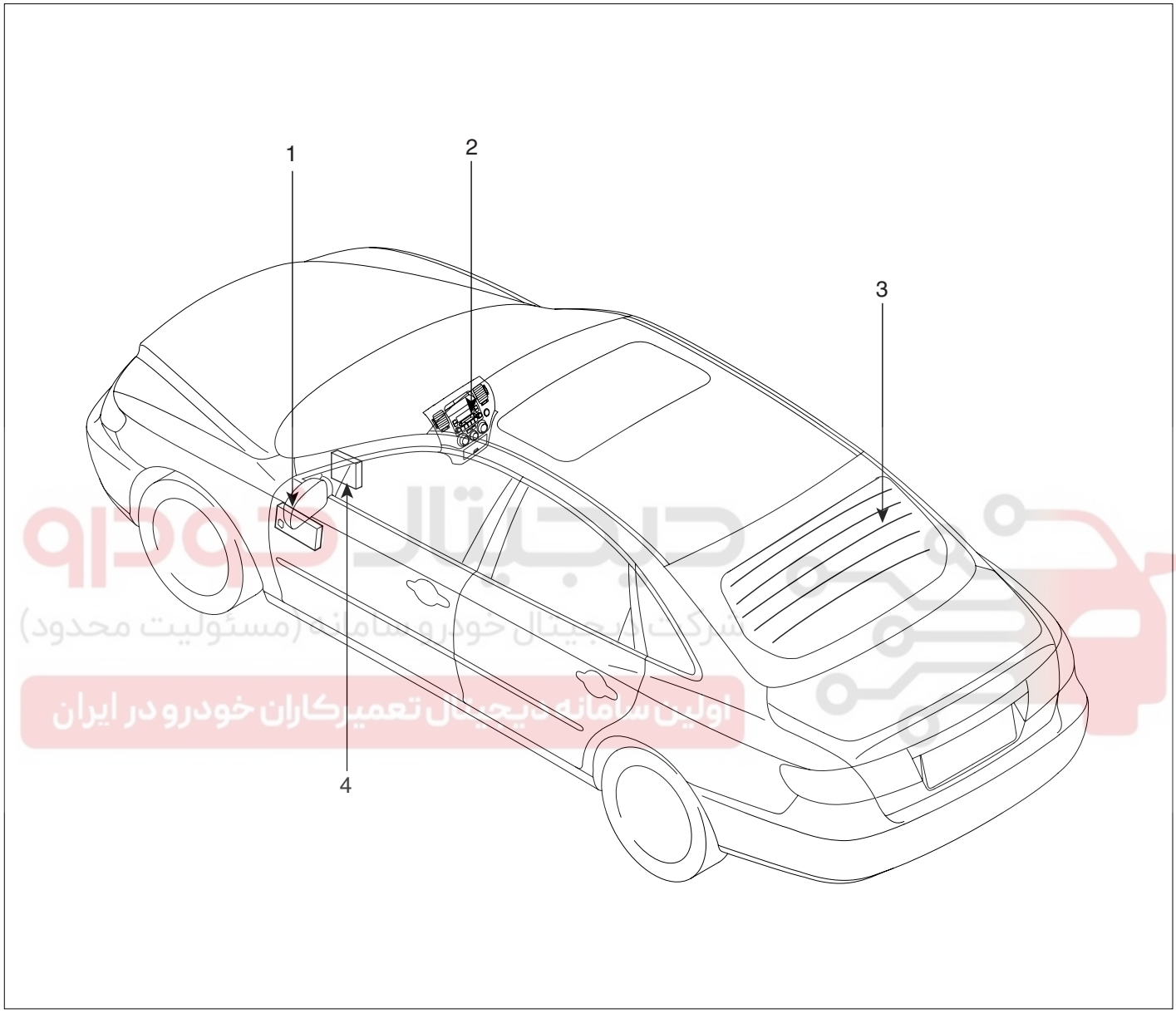
ETBF202B

Terminal / Position	2	3	1	4
Disconnected	○	○		
Connected	⊖	⊕	○	○

ETBF202D

REAR WINDOW DEFOGGER

COMPONENT LOCATION E2B77F29



1. Junction box (Rear window defogger)
2. Rear window defogger switch
3. Rear window defogger
4. Body control module

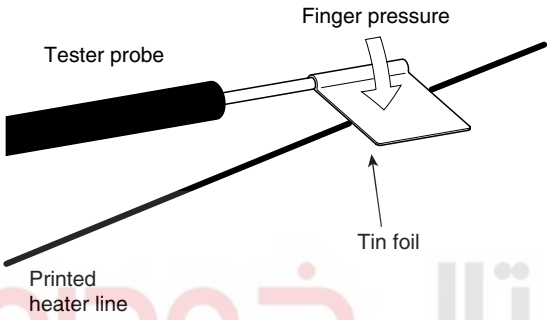
ETBF340B

REAR WINDOW DEFOGGER PRINTED HEATER

INSPECTION E0441EDA

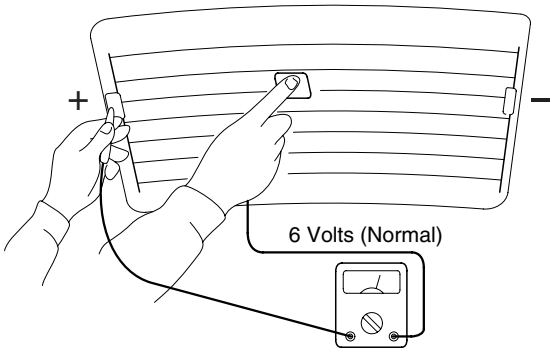
CAUTION

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.



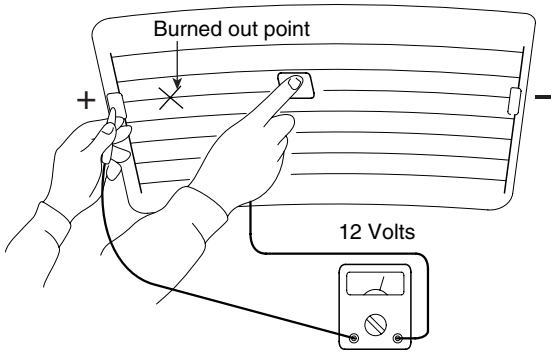
ETA9165A

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.



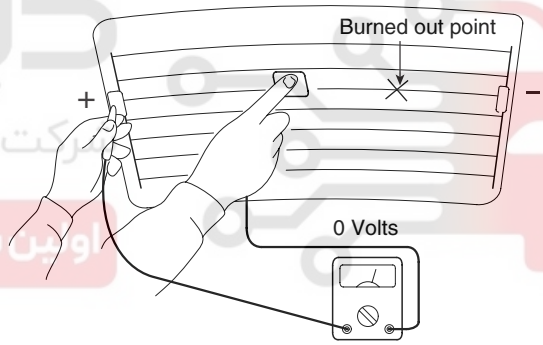
ETA9165B

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



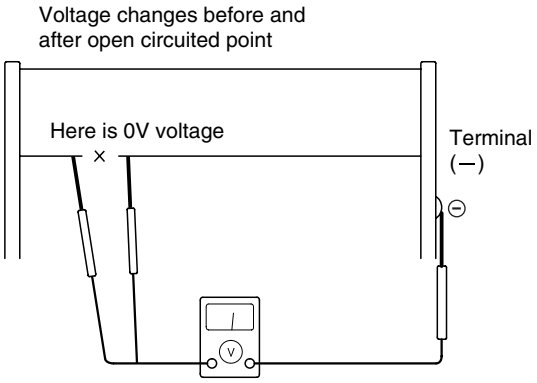
ETA9165C

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



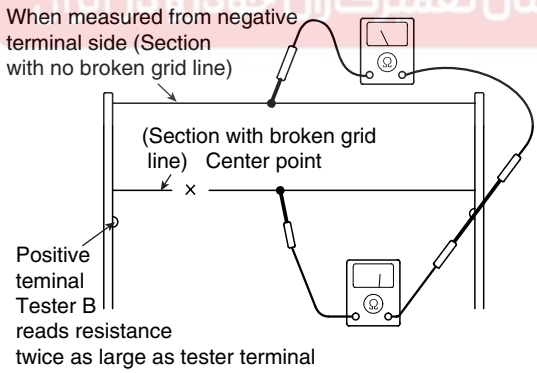
ETA9165D

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.

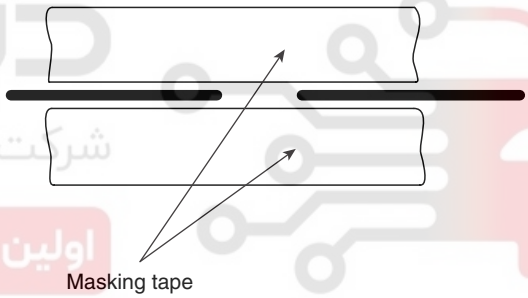


ETA9165F

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).

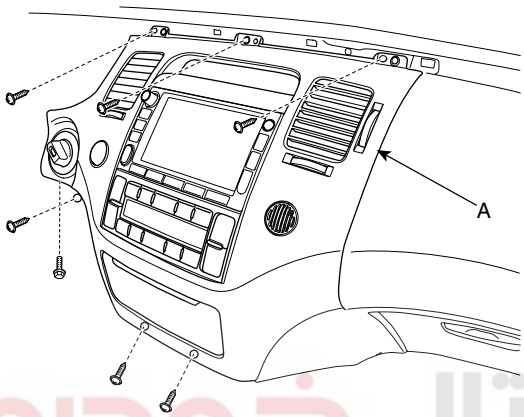


ETA9165G

REAR WINDOW DEFOGGER SWITCH

INSPECTION E5C9EEB0

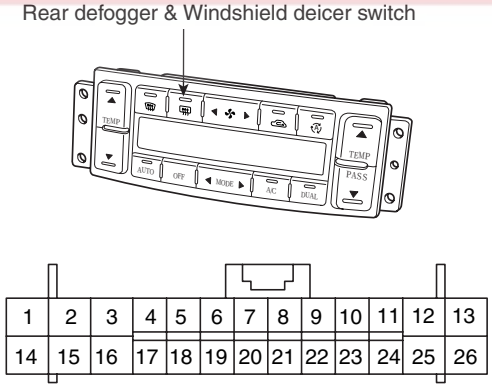
1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel(A) after loosening screws. Take care not to damage fixing clips.



KTBF021F

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

Rear defogger & Windshield deicer switch



ETBF332A

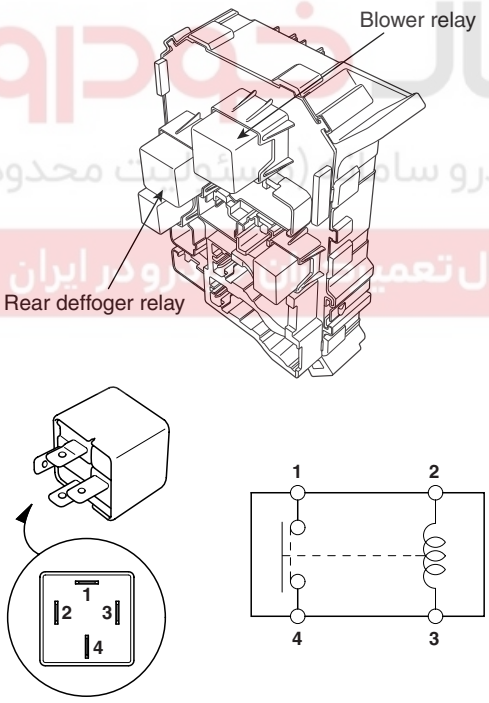
Terminal / Position	M51-B (23)	M51-B (26)	M50-A (26)	M50-A (10)
ON (Manual)	○——	——○		
ON (Auto)			○——	——○
OFF				

ETBF332B

REAR WINDOW DEFOGGER RELAY

INSPECTION E0788498

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel. (Refer to the Body group- Crash pad)
3. Remove the windshield deicer relay from the junction box.
4. Check for continuity between the terminals.
5. There should be continuity between the No.1 and No.4 terminal when power and ground are connected to the No.2 terminal and No.3 terminal.
6. There should be no continuity between the No.1 terminal and No.4 terminal when power is disconnected.



ETBF202C

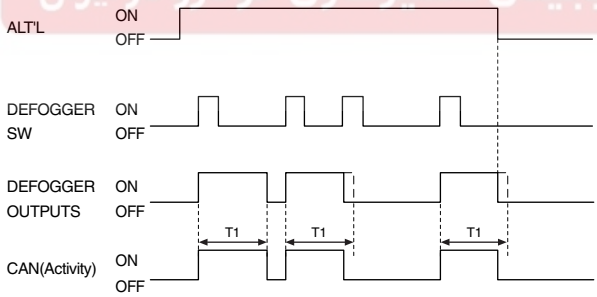
Terminal / Position	2	3	1	4
Disconnected	○	○		
Connected	⊖	⊕	○	○

ETBF202D

REAR WINDOW DEFOGGER TIMER

INSPECTION E5A0A571

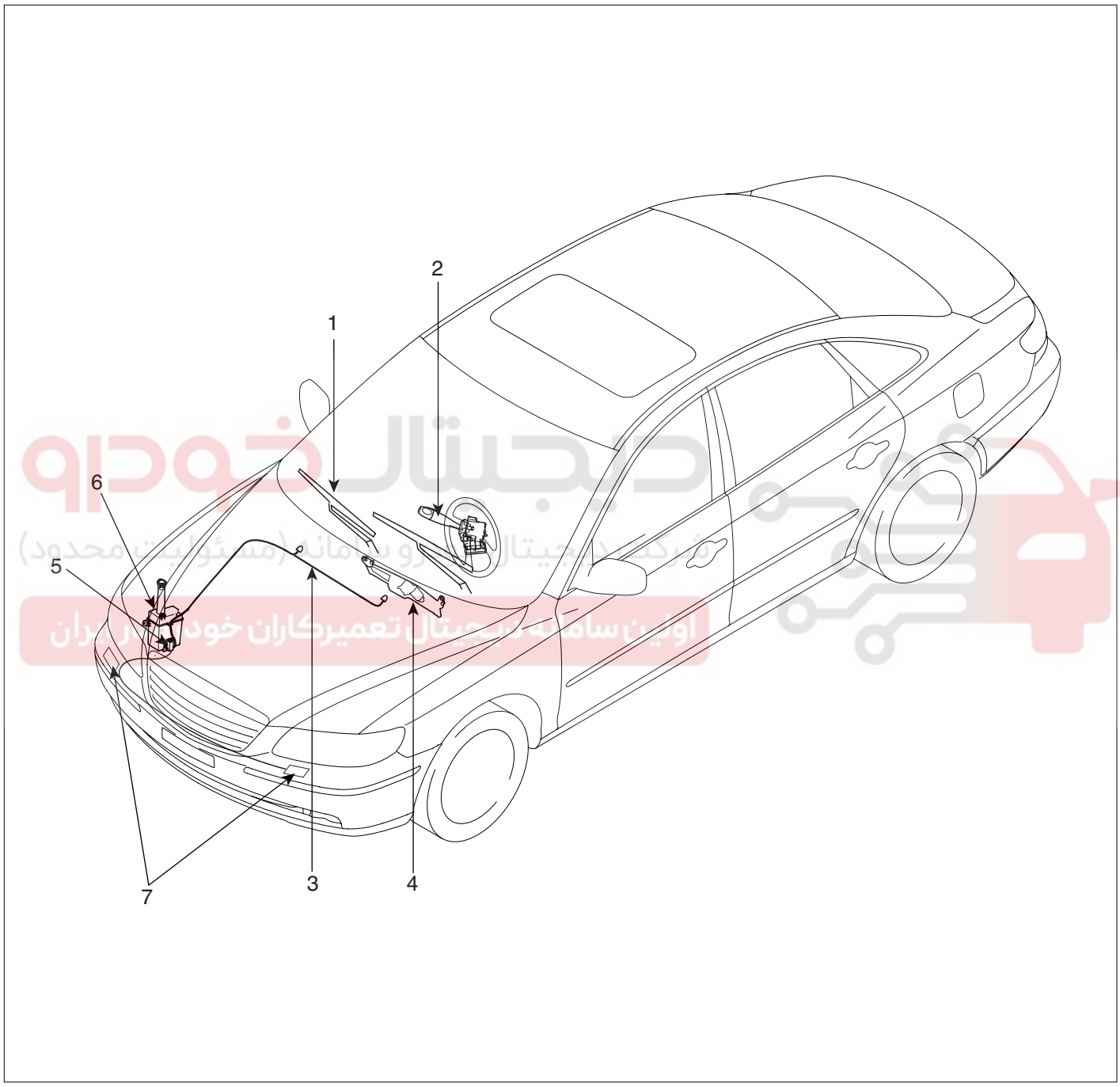
1. Condition 1
   1) Alternator level high & defogger is OFF
      (Defogger relay OFF and defogger activity OFF)
   2) Defogger is activated (defogger switch ON)
   3) Defogger outputs are turned ON
2. Condition 2
   1) Alternator level high & defogger is ON
   2) Defogger switch Input pushed again or T1 delay has elapsed since defogger has been turned ON
   3) Defogger outputs are turned OFF
3. Condition 3
   If alternator input is changed to low, defogger outputs should be turned OFF immediately.
4. Outside mirror defogger of door module can be controlled by CAN communication at the same time.



ETBF144A

WINDSHIELD WIPER / WASHER

COMPONENT LOCATION E7292CC7



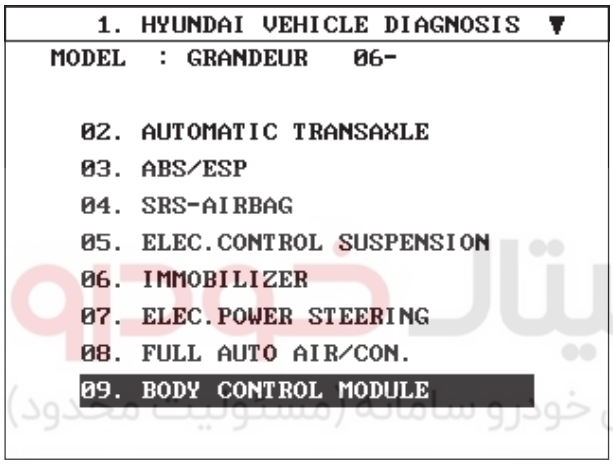
1. Windshield wiper arm & blade
2. Wiper & washer switch
3. Windshield washer hose
4. Windshield wiper motor & linkage
5. Washer motor
6. Washer reservoir
7. Head lamp washer nozzle

ETBF360A

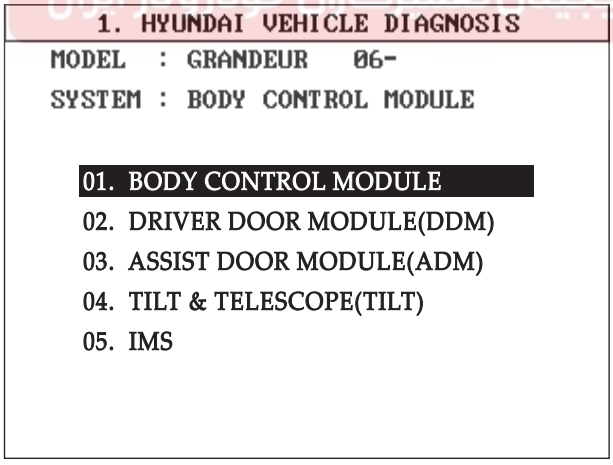
WINDSHIELD WIPER / WASHER SWITCH

INSPECTION E50AEE7D

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.

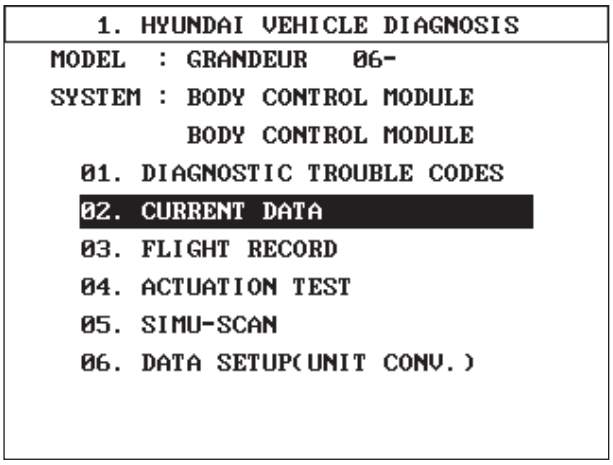


ETBF804A

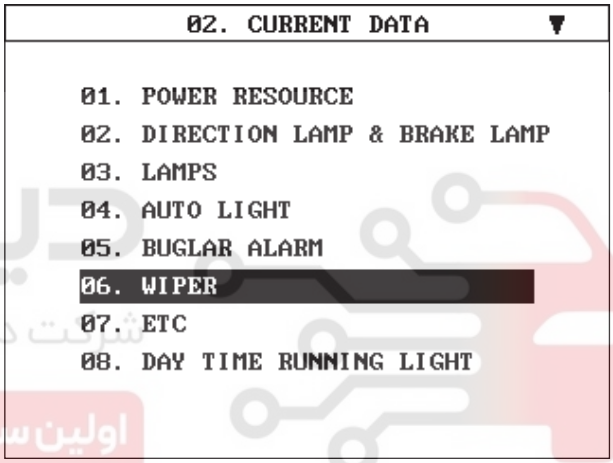


ETBF032A

4. Select "Current data" and wiper.

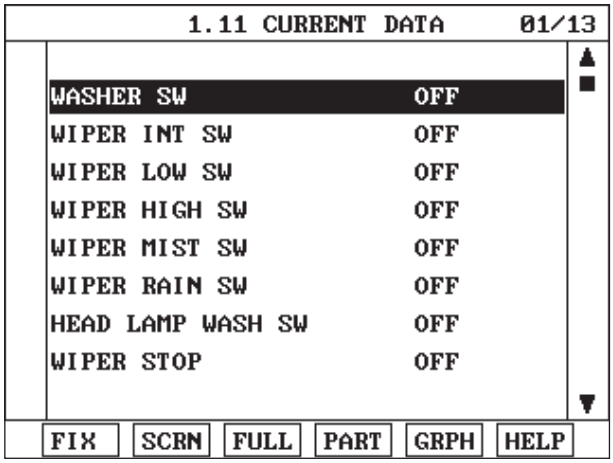


ETBF032B



ETBF032C

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

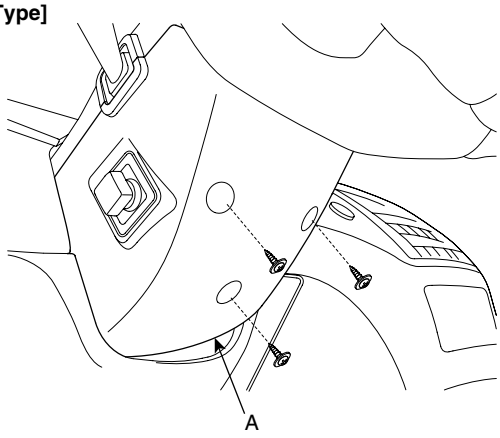


ETBF032D

REPLACEMENT EDA3982F

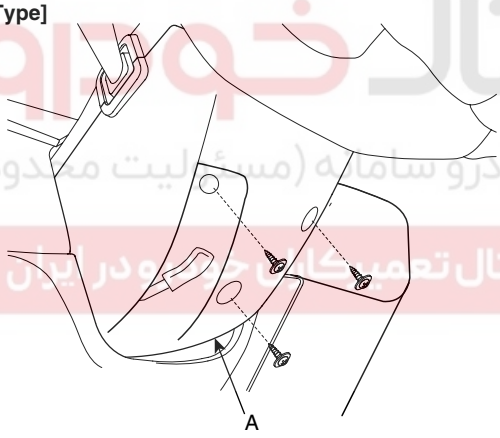
1. Disconnect the negative (-) battery terminal.
2. Remove the steering column upper and lower shrouds (A) after removing 3 screws.

[A-Type]



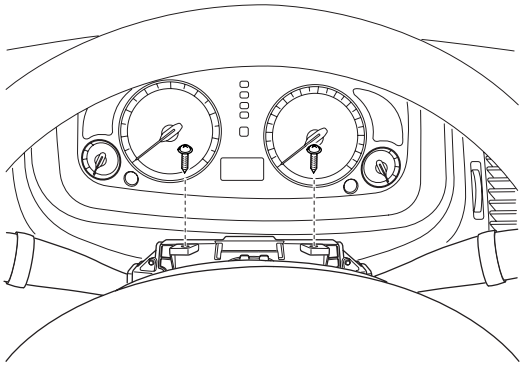
ETBF031C

[B-Type]



ETBF031D

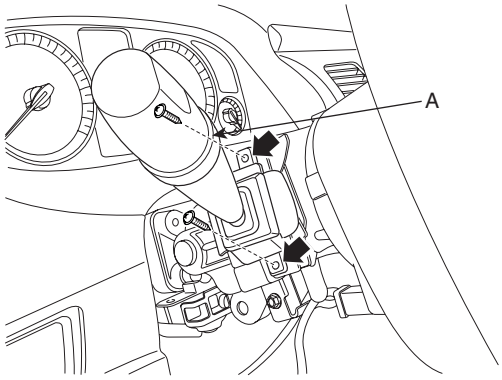
3. Remove the multi function switch after loosening 2 screws and disconnecting connector. (In case of multi function switch assembly replacement)



KTBF031G

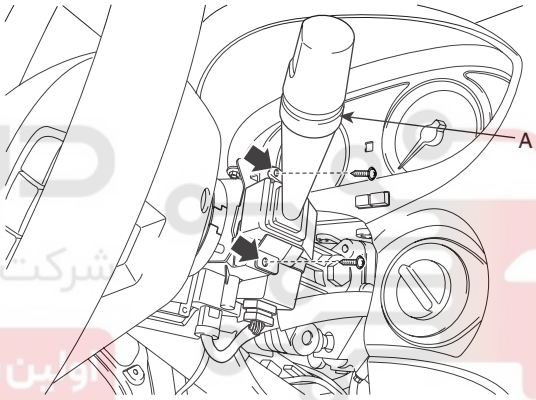
4. Remove the lighting switch (A) after loosening 2 screws.

[LHD]



ETBF031E

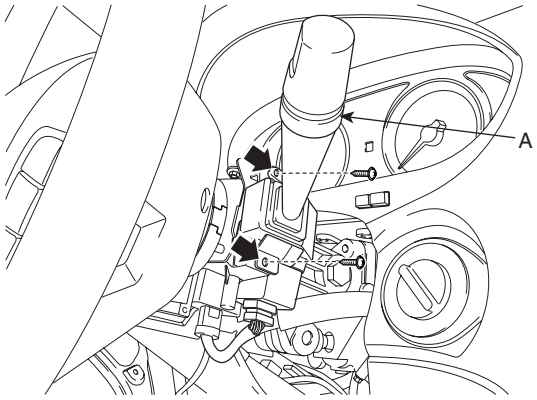
[RHD]



ETBF031F

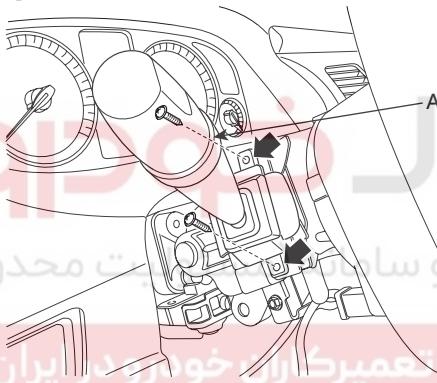
5. Remove the wiper switch (A) after disconnecting the connector and loosening 2 screws.

[LHD]



ETBF031G

[RHD]

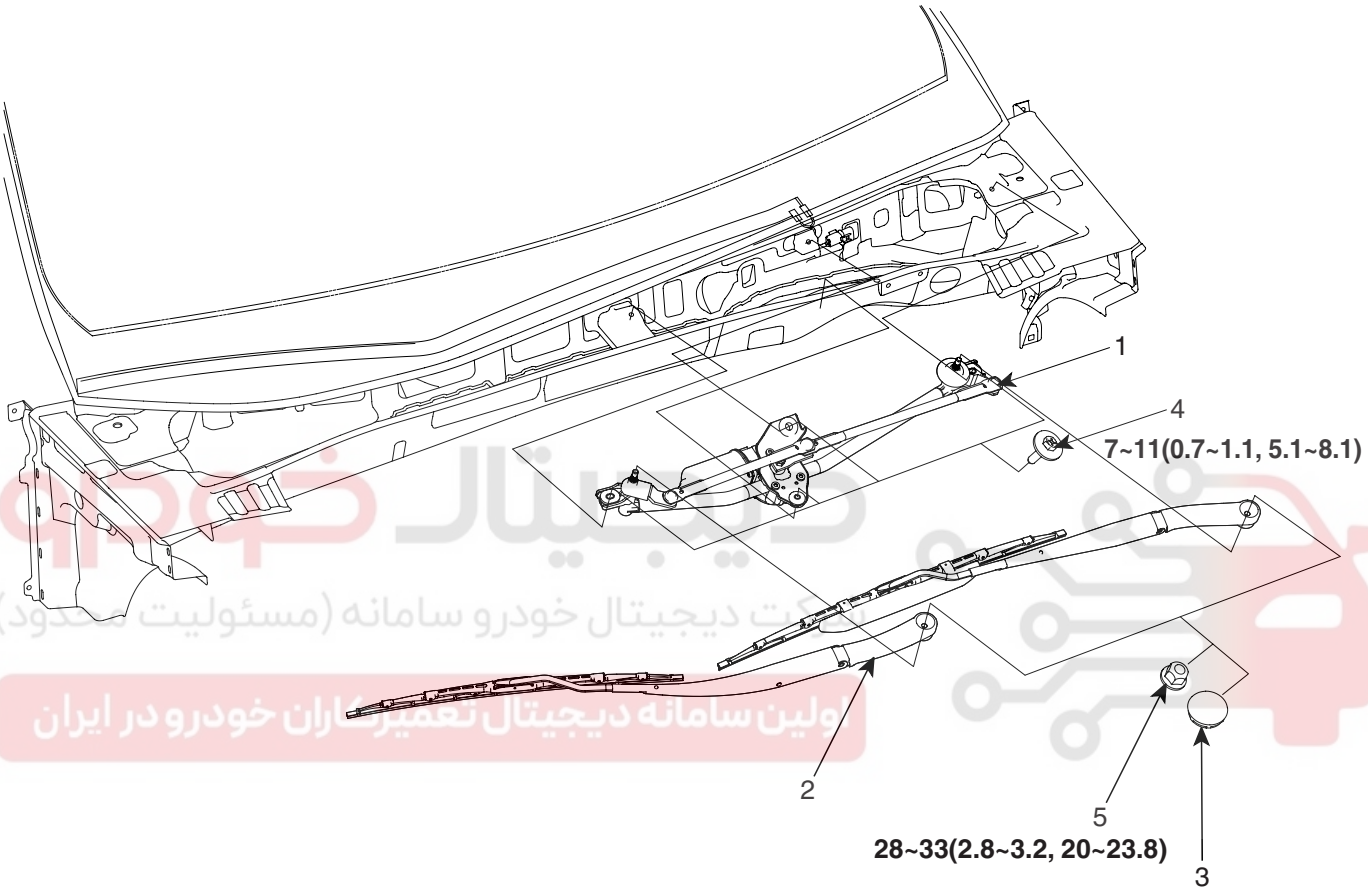


ETBF031H

6. Installation is the reverse of removal.

FRONT WIPER MOTOR

COMPONENT LOCATION E8F0037B



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

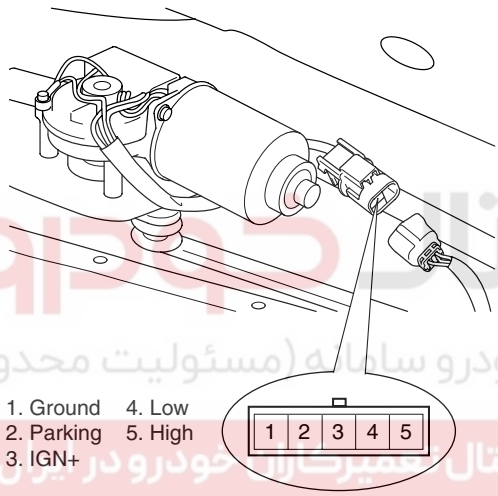
1. Wiper motor & linkage assembly
2. Wiper arm & blade
3. Cap
4. Bolt
5. Nut

ETBF362A

INSPECTION EDFEEE9B

SPEED OPERATION CHECK

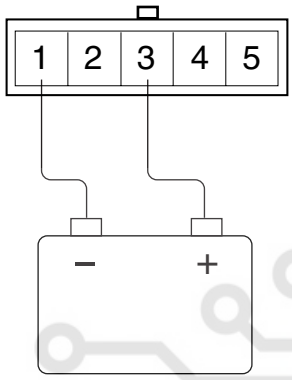
1. Remove the connector from the wiper motor.
2. Attach the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 1.
3. Check that the motor operates at low speed.
4. Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 1.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



ETBF310B

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 2 and 4.
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.

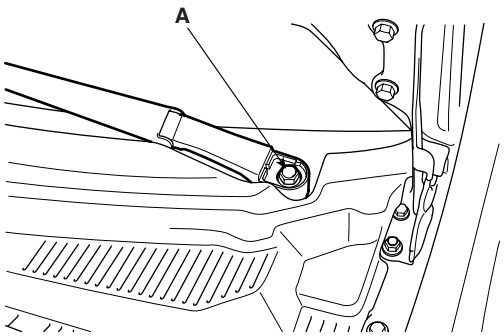


KTBF362D

REMOVAL EDDF6F68

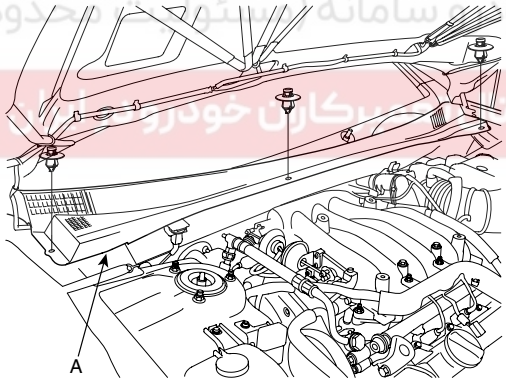
1. Remove the windshield wiper arm and blade after removing a nut (A).

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



ETKE365A

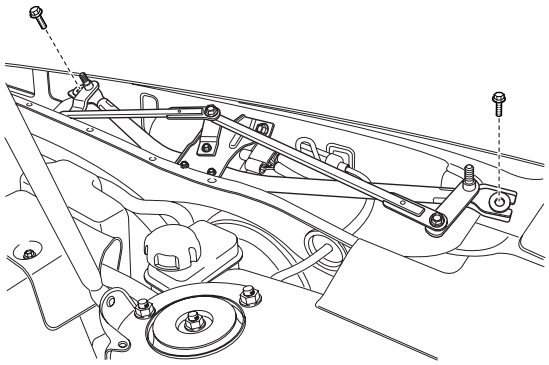
2. Remove the weather strip and the cowl top cover (A) after removing 3 fasteners.



KTBF362B

3. Remove the windshield wiper motor and linkage assembly after removing 2 bolts. Disconnect the wiper motor connector and windshield deicer connector from the wiper motor & linkage assembly.

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



KTBF362C

4. Installation is the reverse of removal.

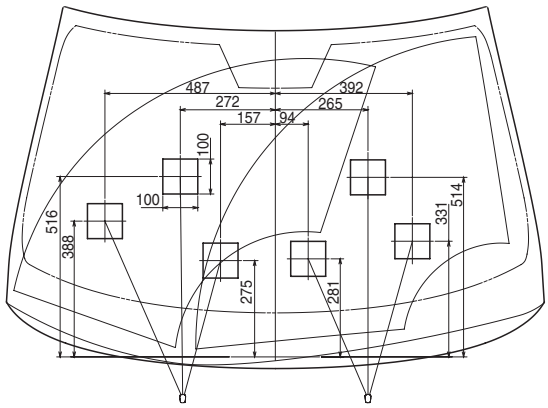
INSTALLATION EBCC8CE9

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

Specified position	A	B
Distance [in (mm)]	1.02+0.2/0 (26+5/0)	1.61+0.2/0 (41+5/0)

ATGE362C

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

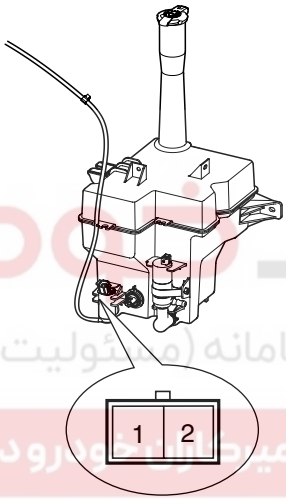


KTBF362E

FRONT WASHER MOTOR

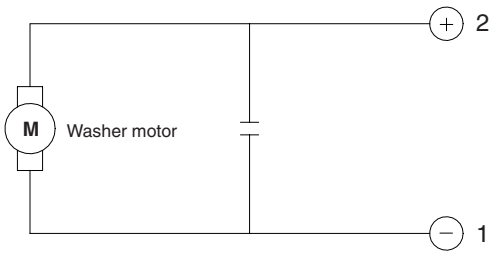
INSPECTION E63A52A7

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



Windshield washer motor

ETBF363B



[Windshield washer motor]

LTIF363C

WASHER FLUID LEVEL SWITCH

1. Remove the washer fluid level switch from the washer reservoir.

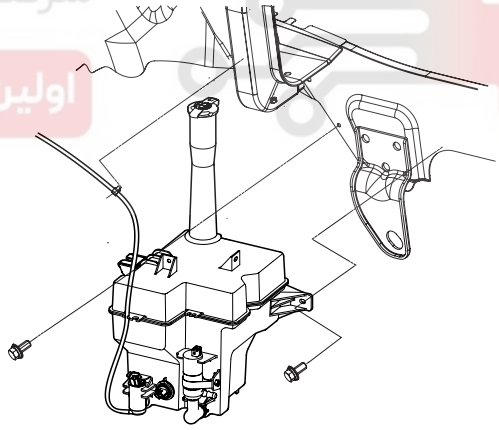
   NOTE

   Fluid may flow out of the opening

2. Check for continuity between the No. 1and No. 2 terminals in each float position.
   There should be continuity when the float is down.
   There should be no continuity when the float is up.
3. If the continuity is not as specified, replace the washer fluid level switch.

REPLACEMENT E01A5B00

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



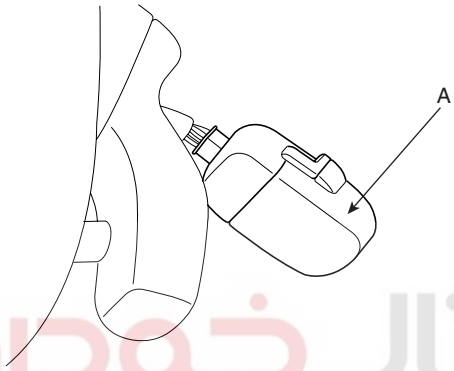
KTBF363A

5. Installation is the reverse of removal.

RAIN SENSOR

DESCRIPTION E219D3AB

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 will be activated.



ATIE365A

SYSTEM FUNCTION EF5EBBEB

BASIC PRINCIPLE

Emitted Beam from luminosity diode is reflected entirely against the windshield exterior, and then turn into photo diode.
If there is water on the windshield exterior, beam seperates optically, and the degree of remained beam is measured in the photo diode.
What there is water in the windshield, it means beam is not reflected all, so the degree of lost beam indicates the degree of glass surface wet.

NOTE

Rainsensor consist of two luminosity diode, two photo diode, optic fiber and coupling pad.

OPERATION CONTROL

Wiper ECU transmits the signal as a rainsesor, and then the rainsensor perceives the rainwater to transmit to the wiping order wiper ECU, wiper ECU controls the wiper motor according to the signal.

CONTACT INFLUENCE

Rainsensor can misoperate according to behind condition

- Measurement signal get feeble by the dust of measurement surface or all beam way surface (the surface of luminosity and photo diode, optic fiber, cupling pad, windshield copula glass surface).
- The bubble on the windshield and the coupling pad contact surface.
- The movement of coupling pad by vibration.
- Damaged wiper blade.

OPERATION CONDITION

In case that engine starts under wiper switch AUTO, rainsensor activates after once wiper operaion to inform the driver that the system is under AUTO.

NOTE

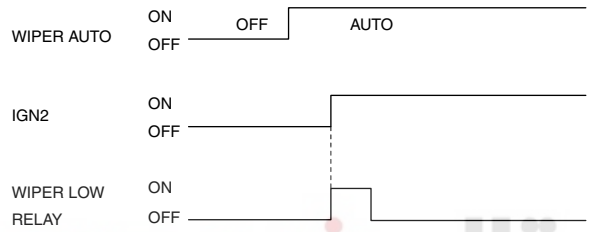
In case that the rainsensor doesn't work or malfunction, it is needed manual wiper switch operation by the driver.

INSPECTION E28FDD78

RAIN SENSING WIPER

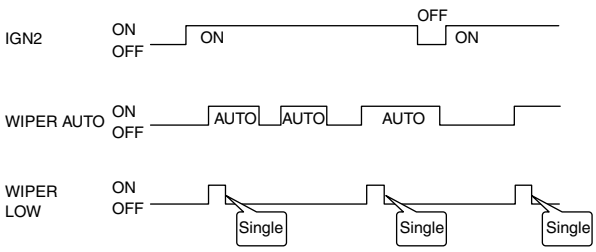
1. In IGN2 ON state, if auto switch input (LIN communication) is ON then both wiper low relay and wiper high relay outputs are controlled by the rain sensor input signal.

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.



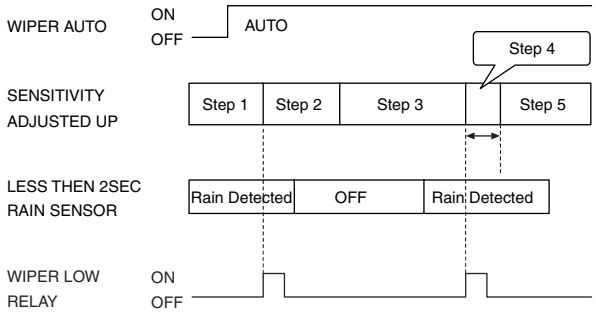
ETBF145E

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.



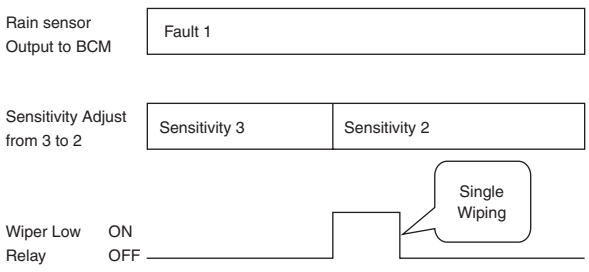
ETBF145F

4. The drive 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 then 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.



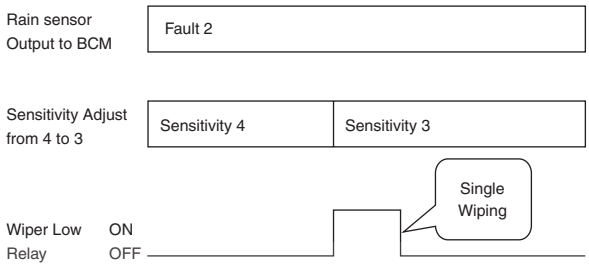
ETBF145G

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.



ETBF145I

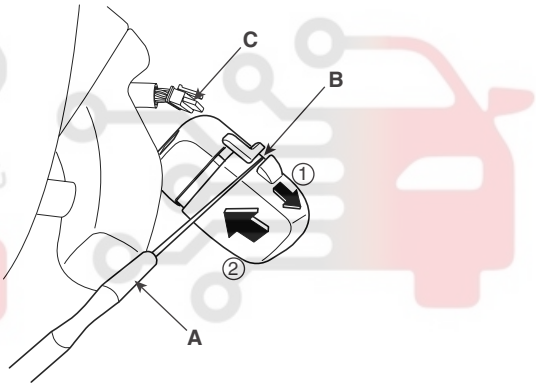
Rain Sensor Fault 3 - No Input Signal Present
This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 3 or in case the duty cycle of the input faulty rain sensor is 0% or 100%. The confirmation delay for the failure is of 1 s.
When this failure is detected, the wiper outputs are OFF.

REMOVAL E6CA0773

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 funtion.
The coupling pad on the rain sensor surface has adherive 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 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 (A).



KTBF365B

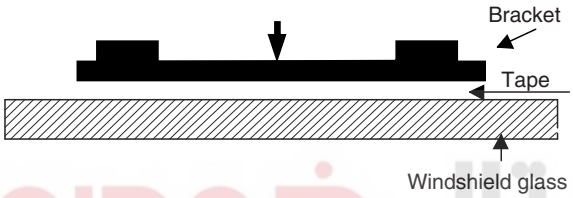
2. Remove the wiring harness connector from sensor.
3. Rain sensor module is attached to the front windshield by glue replacing the front windshield, remove the rain sensor module from the existing front windshield and install on the new front windshield.

INSTALLATION ED447B0B

NOTE

- *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 rainsensor bracket to the windshield glass using the tape.



ETZE015I

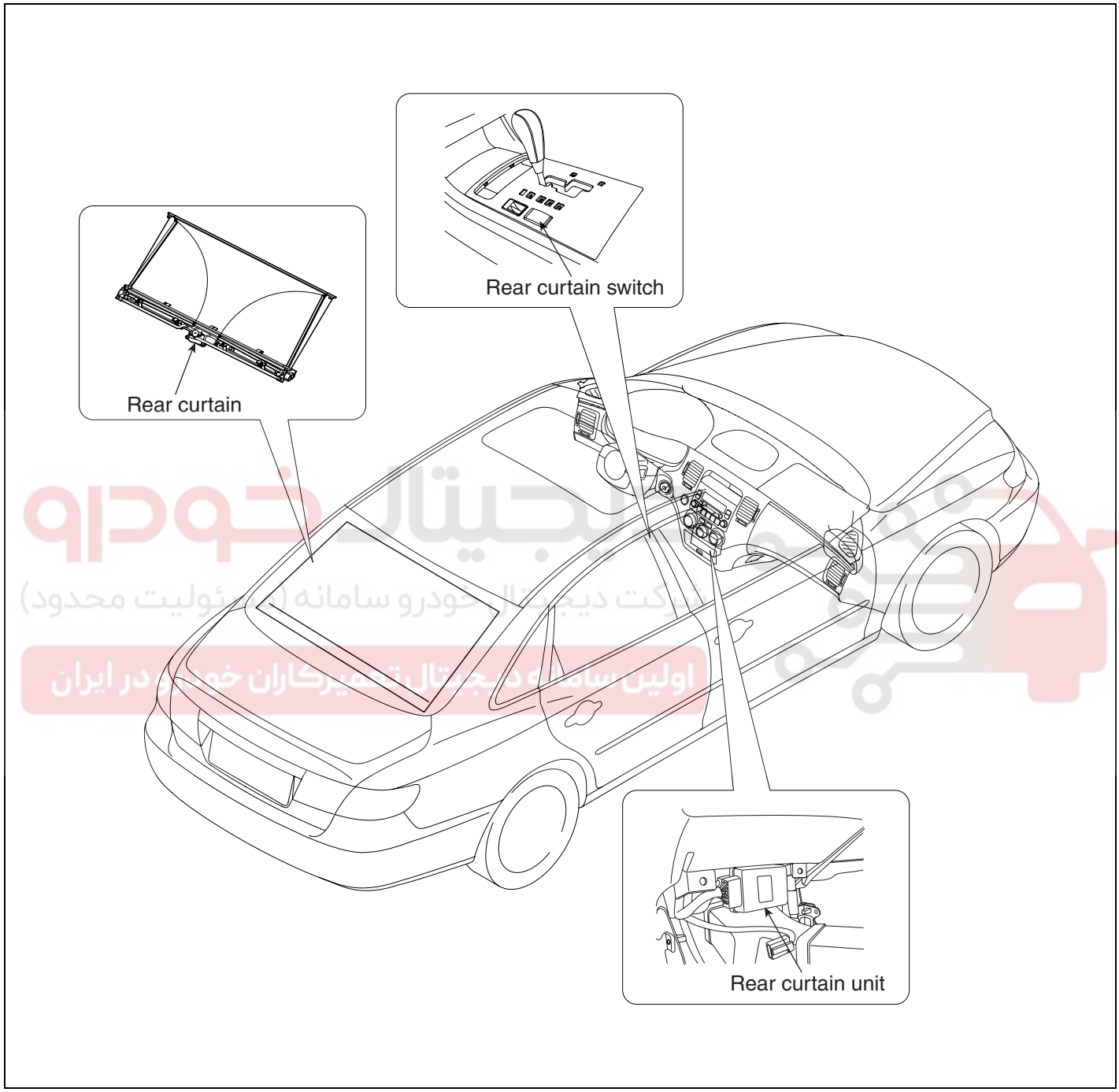
CAUTION

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

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

REAR CURTAIN SYSTEM

COMPONENTS E6BCA4EB

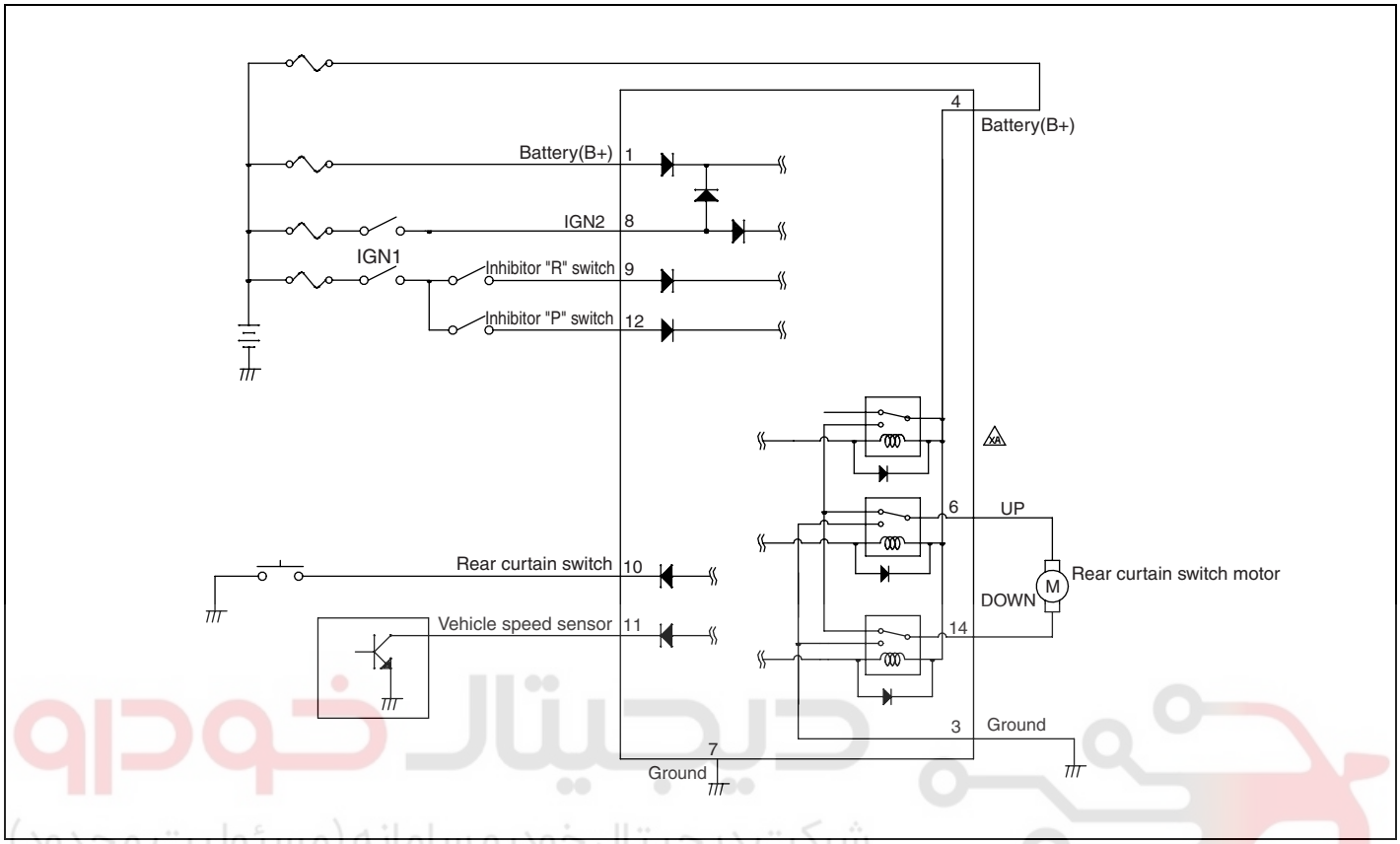


ETBF390C

DESCRIPTION E3D36476

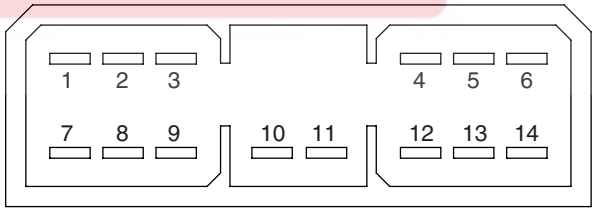
You can up & down rear curtain automatically by pressing the rear curtain switch. Rear curtain protect passenger from a direct ray of light by covering rear glass.

CIRCUIT DIAGRAM EAD3BDD4



ETBF390A

REAR CURTAIN UNIT CONNECTOR



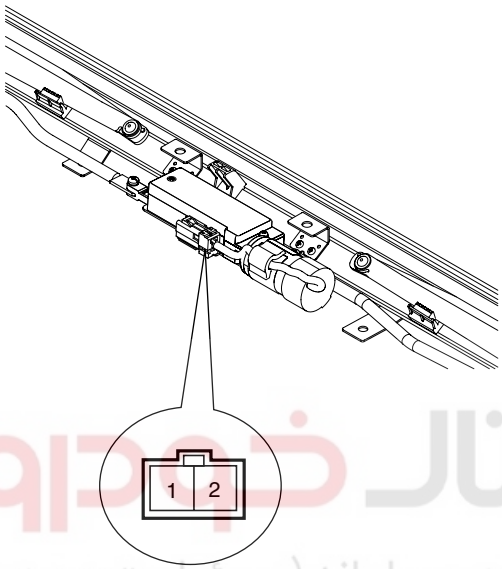
KTCF390B

PIN NO.	Connector	PIN NO.	Connector
1	B+	8	IG2
2	-	9	Inhibitor “ R” switch
3	Ground	10	Rear curtain switch
4	B+	11	Vehicle speed sensor
5	-	12	Inhibitor “ P” switch
6	Motor UP	13	-
7	Ground	14	Motor DOWN

REAR CURTAIN

INSPECTION EEC4CC84

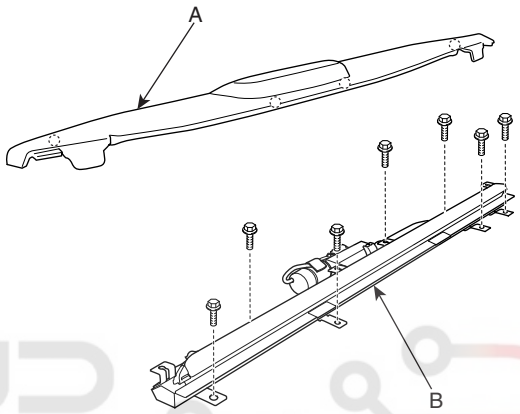
Connect the battery voltage and check the rear curtain motor rotation. If the motor does not operate properly, substitute with a known-good rear curtain motor and check for proper operation.



KTBF391B

REPLACEMENT E57E4263

1. Disconnect the negative (-) battery terminal.
2. Remove the rear package tray after removing the rear seat. (Refer to the Body group- interior trim)
3. Remove the connector of the rear curtain and 6 mounting bolts.
4. Remove the rear curtain (B) from the rear package trim (A).



KTBF391A

5. Install in the reverse order of removal.

REAR CURTAIN UNIT

INSPECTION E45AF4DF

1. AUTO UP/AUTO DOWN FUNCTION

   1) IGN ON, if you press the rear curtain switch, rear curtain motor operates the reverse direction of the before direction. (UP/DOWN)

   2) After replacing battery, if you operates rear curtain switch, rear curtain is operated auto up.

   3) If the switch input occurred during rear curtain auto up or auto down, rear curtain is operated to the reverse direction after making a pause.

   4) AUTO function stop when detect an excess current.

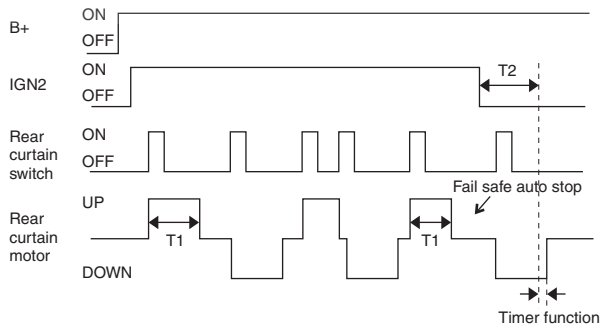
2. TIMER FUNCTION

   1) It can be possible to operate rear curtain for 30 sec after IGN OFF.

   2) It can be possible to operate rear curtain operation by the end of motor operation although timer is finished during auto up/ down.

3. FAIL SAFE FUNCTION

   If motor operation doesn't stop more than 10 sec after starting, motor is stopped by inner relay auto OFF.



ETBF392B

T1 : MAX 10 sec,
T2 : 30 sec.

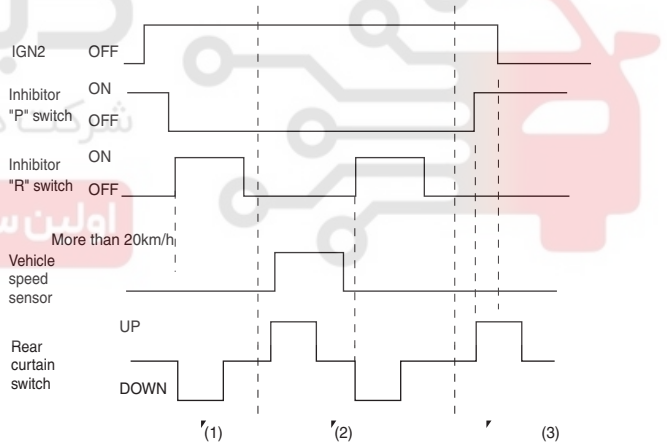
4. RETROGRESSION GEARING FUNCTION

   1) When, rear curtain motor IGN ON, rear curtain UP and shift lever "P" position, rear curtain motor linked with the signal makes auto down.

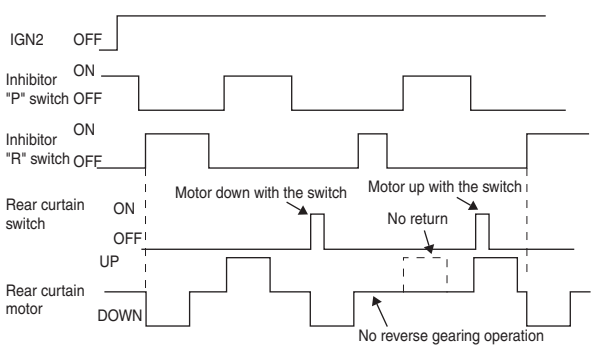
   2) When the vehicle speed is above 20 km/h from 1) condition, rear curtain motor linked with the signal makes auto up. Only, the motor does not operate below 20 km/h.

   3) When shift lever position will be changed from R to P from 1) condition, rear curtain motor linked with the signal makes auto up. Only, the case where the driver presses the knock-down switch is excepted.

   4) To the case where the driver presses the down switch from rear curtain up condition motor does not do a retrogression gearing operation and the up return operation due to a vehicle speed. After that, when driver presses the switch and the motor becomes auto up, the retrogression gearing operation is possible again.



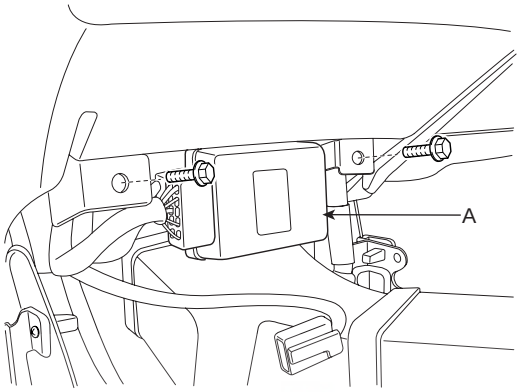
ETBF392C



ETBF392D

REPLACEMENT E5AF9ADF

1. Disconnect the negative (-) battery terminal.
2. Remove the center facia panel. (Refer to the Body group - Crash pad)
3. Remove the rear curtain unit (A) after removing mounting 2 nuts and a connector.



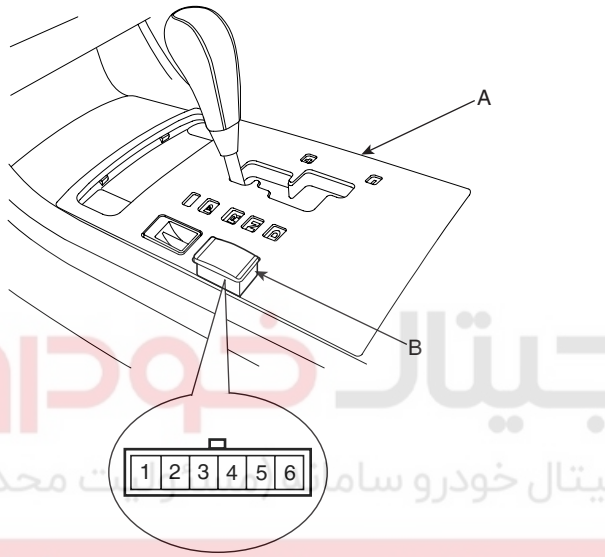
KTBF392A

4. Installation is the reverse of removal.

REAR CURTAIN SWITCH

INSPECTION E8BBDC1F

1. Disconnect the negative (-) battery terminal.
2. Remove the console upper cover (A) by using the scrapper.
3. Remove the rear curtain switch (B) from the console upper cover (A) after removing the connector.



KTBF393A

4. Check for continuity between the terminals. If the continuity is not as specified, replace the rear curtain switch.

Terminal / Position	5	6	4	3
ON		Illumination		
OFF				

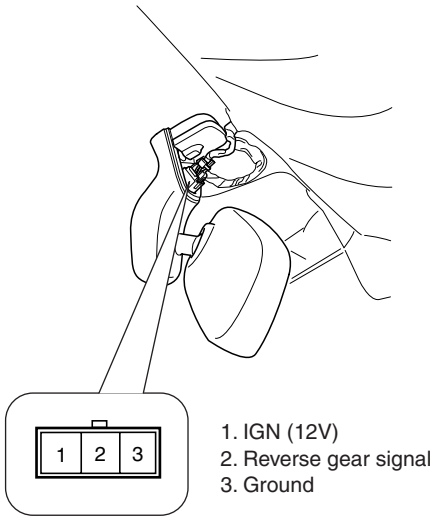
ETBF393B

ELECTRO CHROMIC INSIDE REAR VIEW MIRROR

DESCRIPTION E87E292B

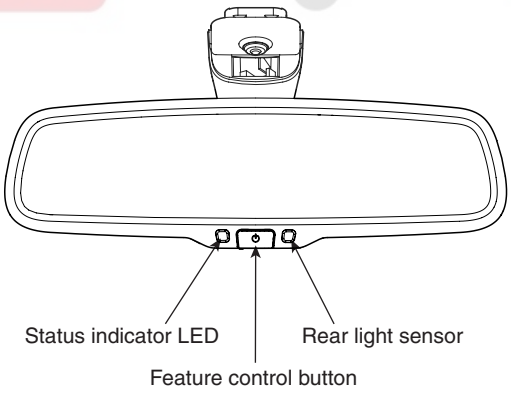
The ECM (Electro Chromic inside rear view Mirror) is for dimming the reflecting light from a vehicle behind at night, in order the user not to be dazzled by the light. The front looking sensor detects brightness of the surroundings, while the rearward looking sensor the strength of the reflecting light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

ETQE280J

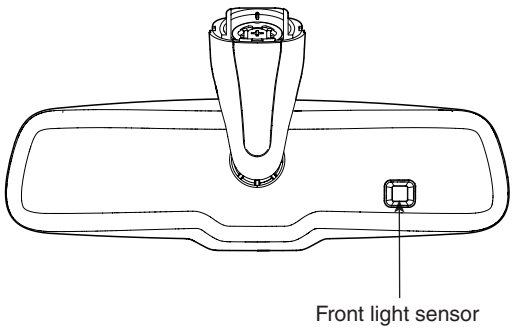


ETRF410A

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.



ETBF410B



ETBF410C

AUTOMATIC-DIMMING FUNCTION E91F5ECF

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.

NOTE

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

INSPECTION EEC339E8

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

1. Turn the ignition key to the "ON" position.
2. Cover the front 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.

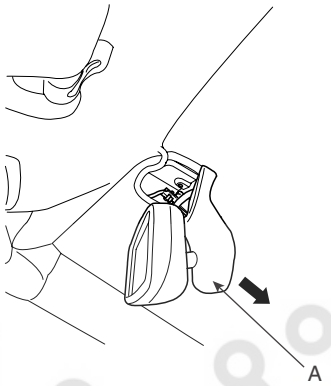
NOTE

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

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

REPLACEMENT EA9675BF

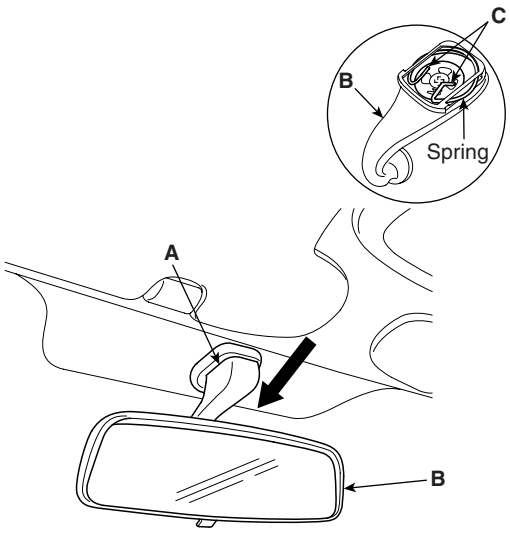
1. Push the inside rear view mirror base down to remove the inside rear view mirror assembly (A) after removing the mirror wire cover.



KTBF410D

NOTE

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.



ETRF410D

2. Installation is the reverse of removal.

POWER SEAT

COMPONENT LOCATION E0DC207A

1. Slide motor
2. Front height motor
3. Rear height motor
4. Reclining motor
5. Power seat switch
6. Lumbar support motor
7. Reclining switch

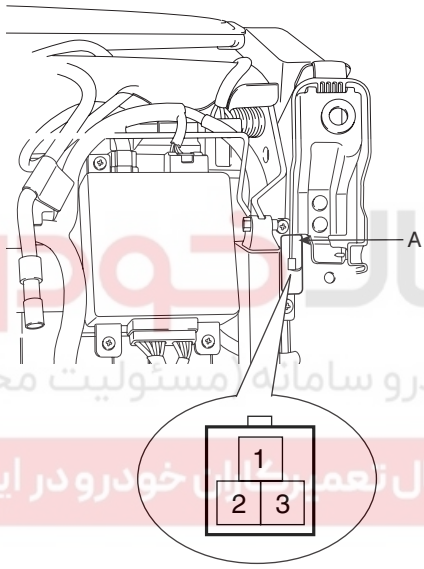
ETBF440A

POWER SEAT MOTOR

INSPECTION EDB2B1DD

SLIDE MOTOR LIMIT SWITCH

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



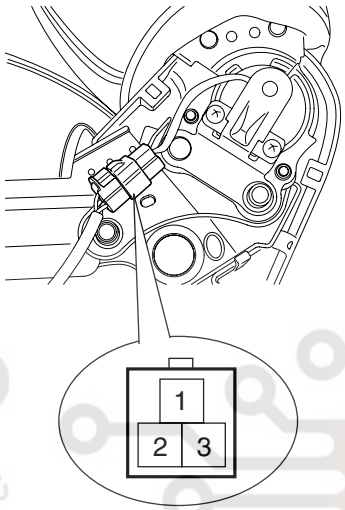
KTBF421A

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

ETRF421B

RECLINING MOTOR LIMIT SWITCH

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



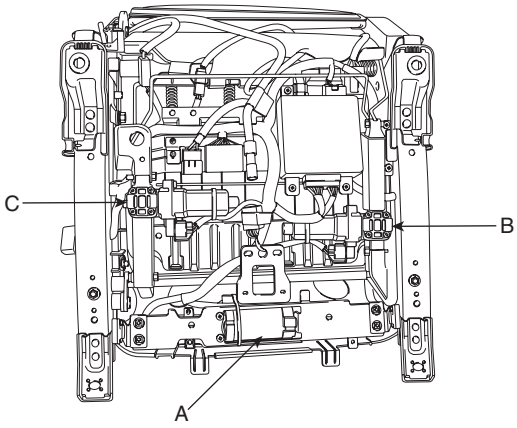
KTRE421C

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

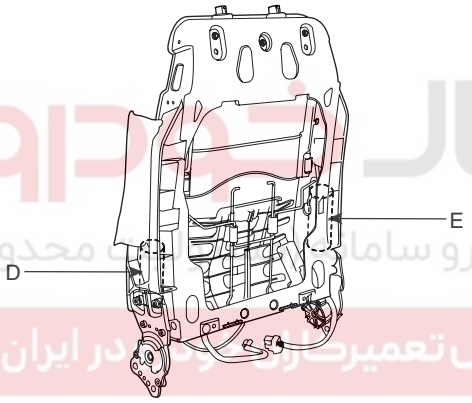
ETBF421B

POWER SEAT MOTOR

1. Disconnect the connectors for each motor.



KTBF421E

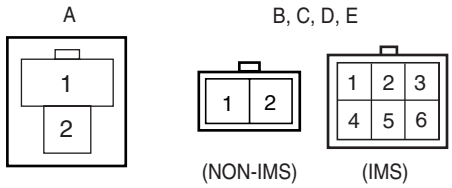


KTBF421L

2. With the battery connected directly to the motor terminals, check if the motors run smoothly.

3. Reverse the connections and check that the motor turns in reverse.

4. If there is an abnormality, replace the motors.



KTBF421K

( ) : IMS Type

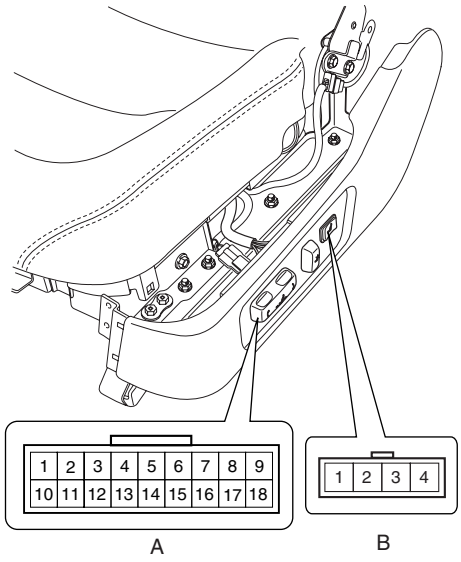
Position	Terminal	1(2)	2(5)
Slide motor A	Frontward	⊕	⊖
	Backward	⊖	⊕
Front height motor B	UP	⊖	⊕
	DOWN	⊕	⊖
Rear height motor C	UP	⊕	⊖
	DOWN	⊖	⊕
Reclining motor D	Forward	⊖	⊕
	Rearward	⊕	⊖
Lumbar support E	Forward	⊕	⊖
	Rearward	⊖	⊕

ETBF421F

POWER SEAT SWITCH

INSPECTION EFE123FC

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



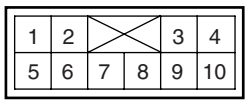
KTBF421G

Position \ Terminal		A17	A11	A10	A6	A5	A8	A18	A15	A16	A2	A4	A1	A3	A13	A14	A12	A7	B1	B2	B3	B4
Slide switch	Frontward	○	○	○		○																
	Backward	○	○	○	○																	
Front height switch	Up	○									○	○	○									
	Down	○									○	○		○								
Rear height switch	Up	○													○	○	○					
	Down	○														○		○				
Reclining switch	Frontward	○					○	○	○													
	Backward	○					○			○												
Lumbar support	Forward																		○	○	○	
	Rearward																		○	○	○	○

<Driver>

ETBF421H

Position \ Terminal		C10	C7	C6	C1	C5	C3	C2	C9	C8
Slide switch	Frontward	○	○	○		○				
	Backward	○	○	○	○					
Reclining switch	Frontward	○					○	○		○
	Backward	○					○	○	○	

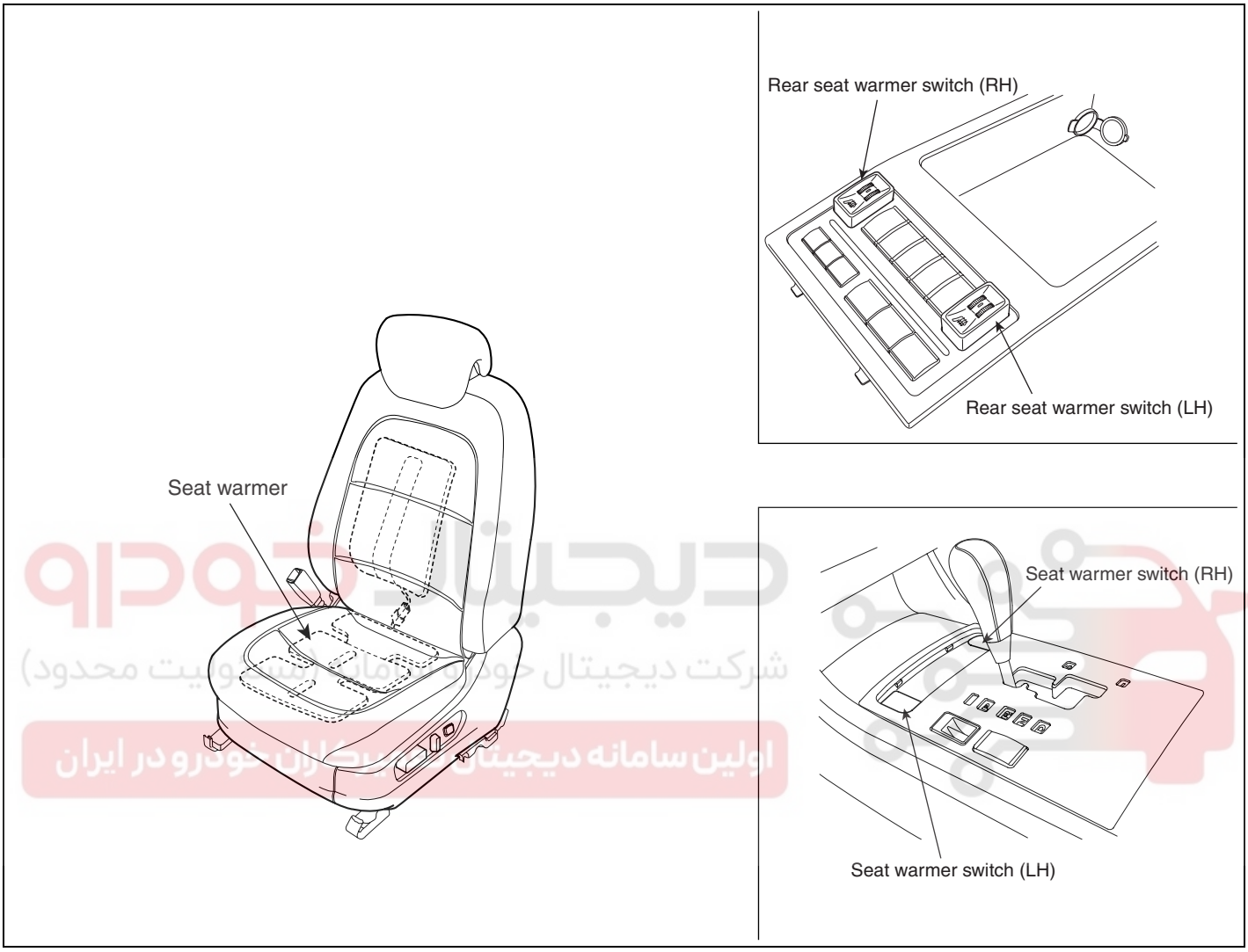


<Assist>

ETBF421I

SEAT WARMER

COMPONENT LOCATION E4D6E8FC



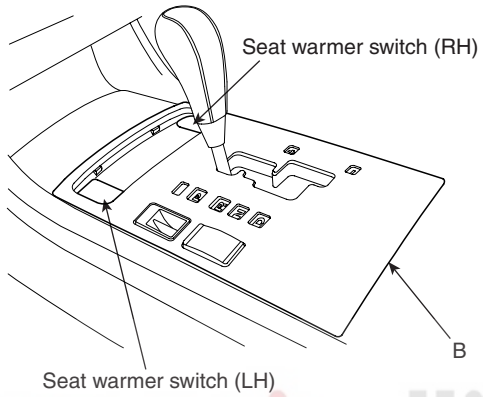
ETBF440B

SEAT WARMER SWITCH

INSPECTION ECFF7AC8

FRONT SEAT WARMER SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console (B) with scraper.

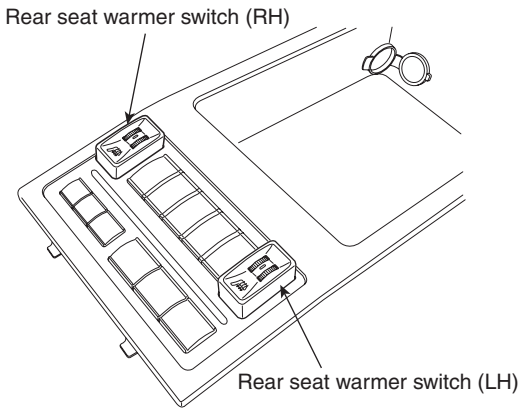


ETBF441A

3. Remove the seat warmer switch from the floor console.
4. Replace new seat warmer switch and check the operation of seat warmer.

REAR SEAT WARMER SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the arm rest floor after loosening screws.



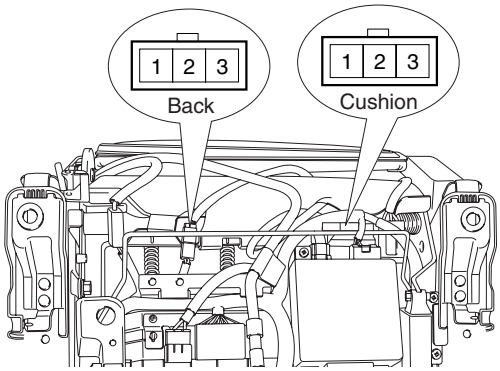
ETBF441C

3. Replace new rear seat warmer switch and check the operation of seat warmer.

SEAT WARMER

INSPECTION EB0D168C

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



ETBF441D

Standard value: 2.45Ω ± 10%
(Cushion : 3.04Ω ± 10%, Back : 3.04Ω ± 10%)

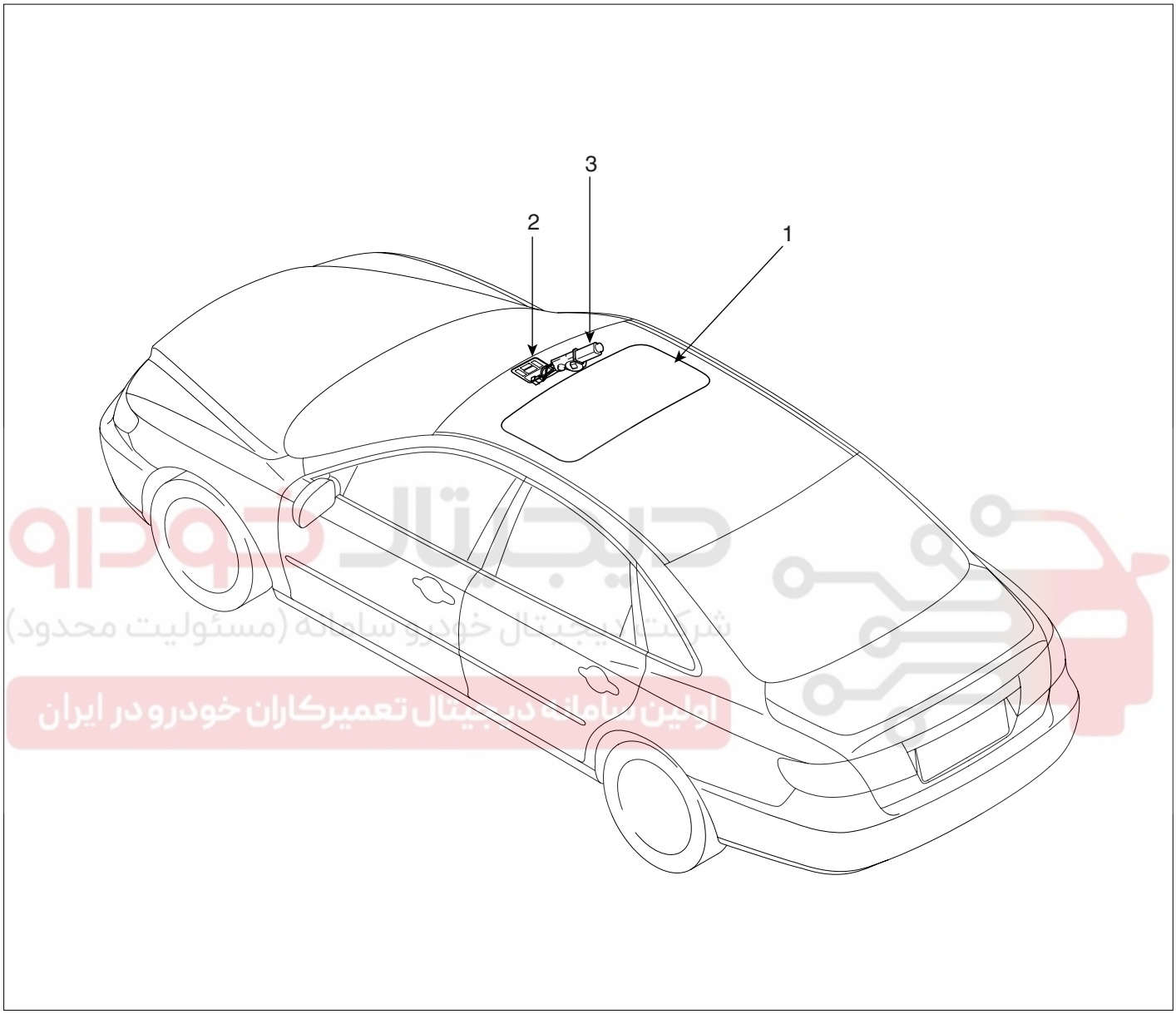
2. Operate the seat warmer after connecting the 3P connector, and then check the thermostat by measuring the temperature of seat surface.

3. Check for continuity between the terminals after disconnecting the 3P connector.

Standard value :
28 ±3.5°C(Continuity), 37 ±3.0°C(Short)

SUNROOF

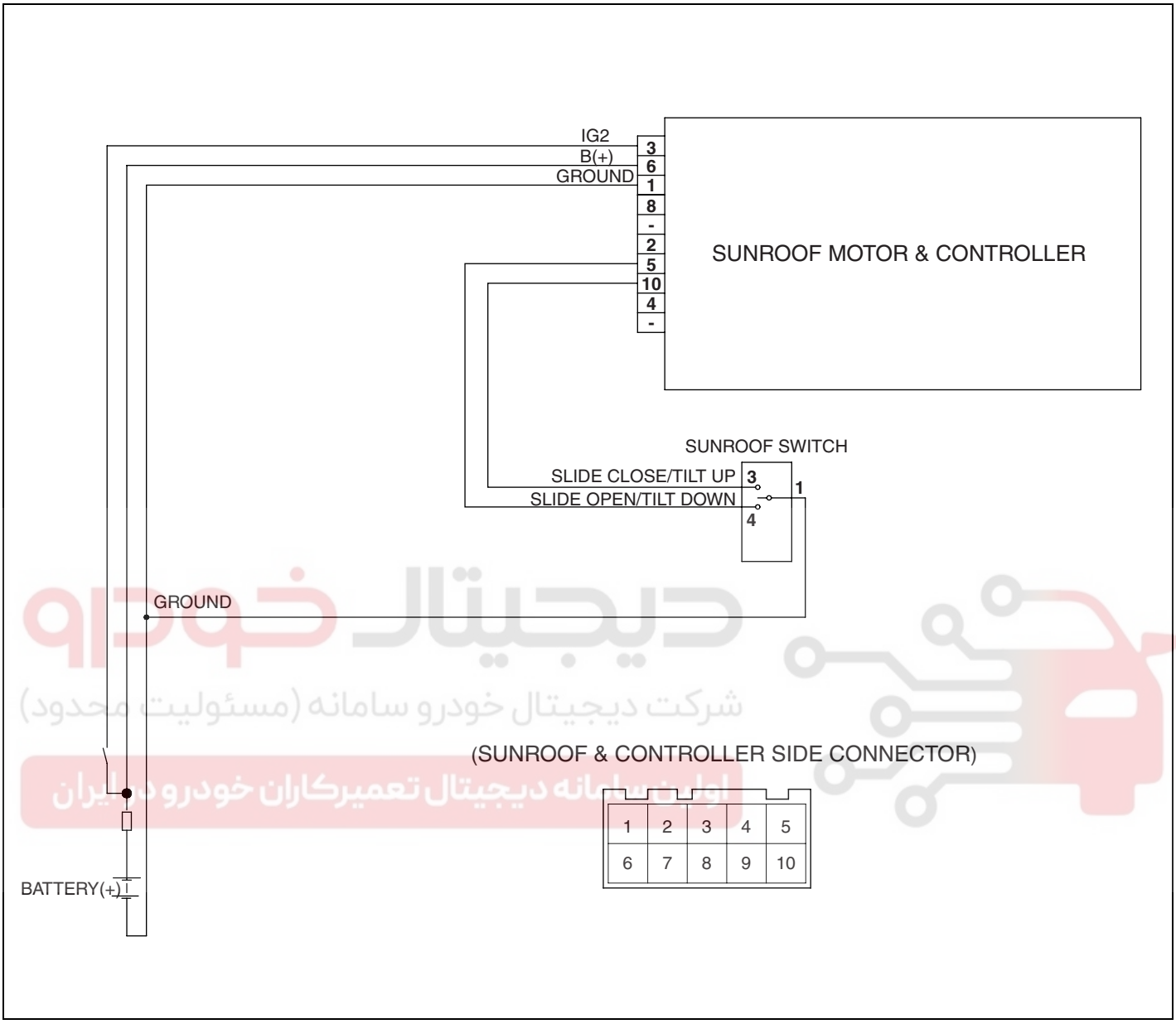
COMPONENT LOCATION EB8CFC5A



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

ETBF480A

CIRCUIT DIAGRAM EE5F4FE2

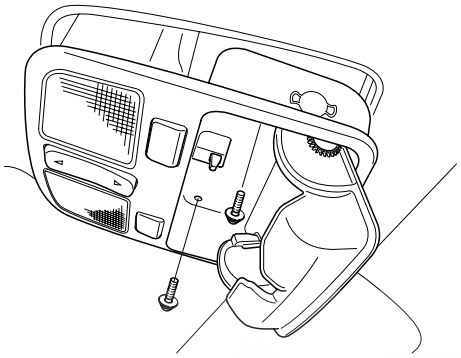


ETRF480B

SUNROOF SWITCH

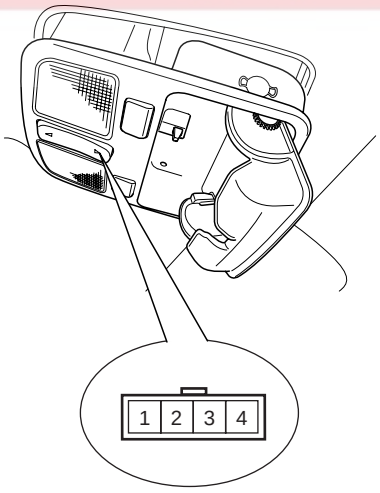
INSPECTION EC1BE2C8

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.



KTRE481A

3. Disconnect the connector then remove the overhead console lamp assembly from the headliner. Check for continuity between the terminals. If the continuity is not as specified, replace the sunroof switch.



[Switch side connector]

ETRF481B

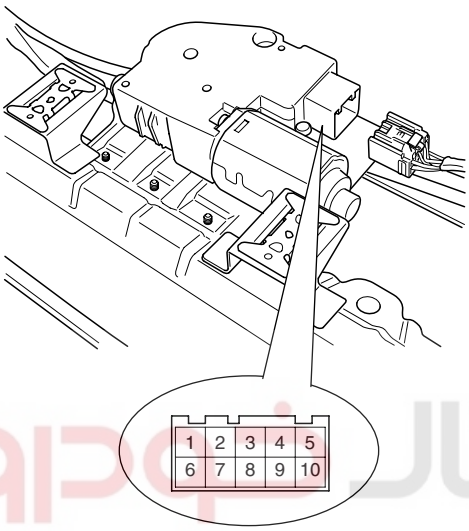
Terminal / position	1	3	4
Slide open	○		○
Tilt down	○		○
Tilt up	○	○	

ETRF481C

SUNROOF MOTOR

INSPECTION EACEA1EA

1. Disconnect the negative (-) battery terminal.
2. Apply the battery voltage to terminal 3, 6 and ground the terminal 1.



KTQE460A

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

Terminal / position	3	4	5	10
Slide close/Tilt up	⊕			⊖
Slide open/Tilt down	⊕		⊖	

ETRF483A

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.

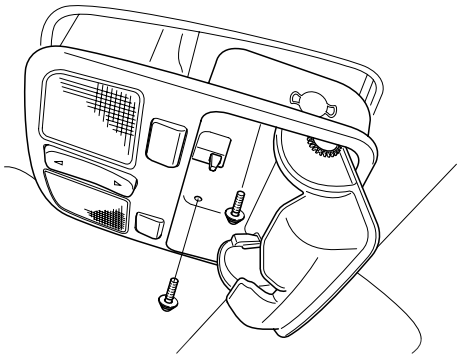
RESETTING THE SUNROOF

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 UP 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 UP button until the sunroof has tilted upward completely.
3. Release the TILT UP button.
4. Press and hold the TILT UP button once again until the sunroof has returned to the original position of TILT UP after it is raised a little higher than the maximum TILT UP position.
When this is complete, the sunroof system is reset.

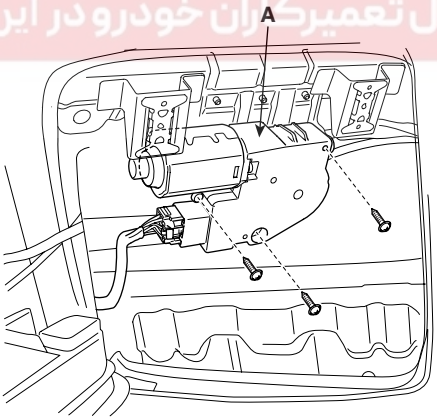
REPLACEMENT E325EC28

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



KTRE481A

3. Remove the head lining. (Refer to Body group - sunroof)
4. Remove the sunroof motor (A) after removing 3 screws and disconnect.

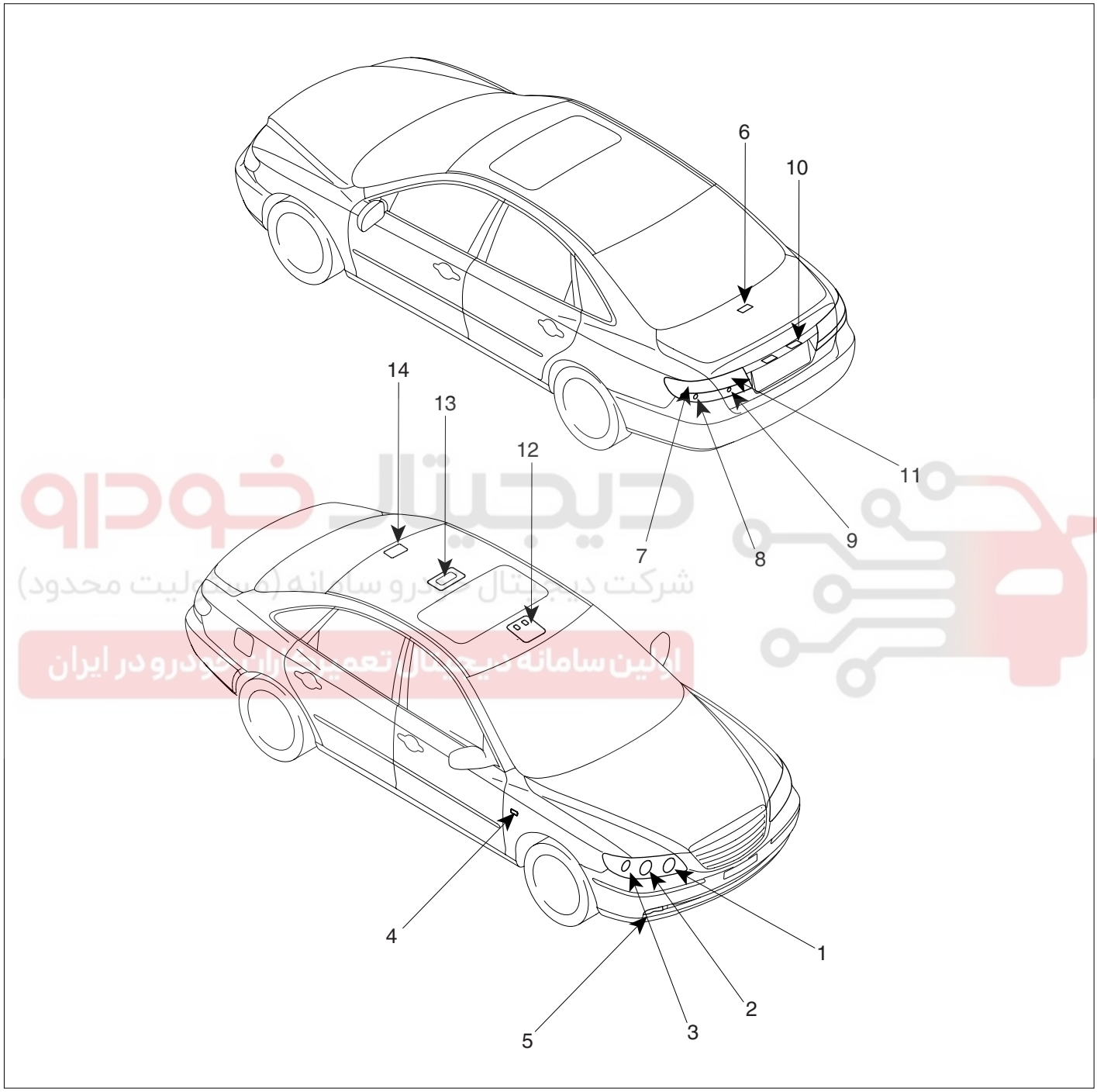


KTBF071D

5. Installation is the reverse of removal.

LIGHTING SYSTEM

COMPONENT LOCATION E59EC8B6



1. Head lamp (High)
2. Head lamp (Low)
3. Front turn signal lamp/Position lamp
4. Side repeater
5. Front fog lamp
6. Luggage lamp
7. Tail/stop lamp
8. Rear turn signal lamp
9. Back up lamp
10. License plate lamp
11. Rear fog lamp(Europe)/Tail lamp(General)
12. Overhead console lamp(Map lamp)
13. Room lamp
14. Personal lamp

ETBF490A

SPECIFICATION E1F41C59

Items	Bulb Wattage (W)
Head lamp (High)	55
Head lamp (Low)	55(HID:35)
Front turn signal lamp	21
Front position lamp	5
Front fog lamp	35
Rear stop/tail lamp (Outside)	2.4/0.4
Rear tail lamp (Inner) - General	0.4
Back up lamp	16
Rear turn signal lamp	21
Rear fog lamp - Europe	4.6
License plate lamp	5
Side repeater	5
Room lamp	10
Overhead console lamp	10x2
High mounted stop lamp	1(LED)
Glove box lamp	5
Luggage lamp	5
Door courtesy lamp	5
Vanity lamp	5
Foot lamp	5
Personal lamp	5

HEAD LAMPS

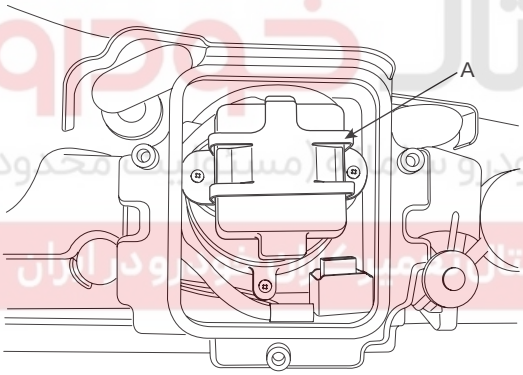
HID HEAD LAMP E9ABC52E

1. Bulb

   1) Elements
   Xenon gas: Xenon gas activates the initial reaction for rapid illuminating.
   Molybdenum electrode: anode arcing
   Metal halide salts: color composing component

   2) Lightening principle
   When Xenon gas and metal halide salt will discharge the molybdenum anode in a capsule, it emits light.

2. Ignitor
   Ignitor (A) is an electromagnetic transformer that receives current from ballast and boost voltage to light on the arc light source in any environment.

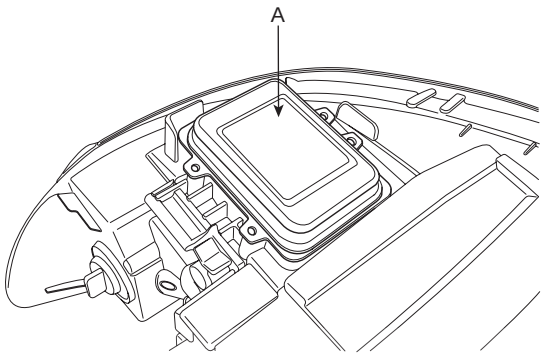


KTBF490B

3. Ballast

   1) Ballast (A) delivers an instant high voltage pulse to the ignitor electrode, to initialize discharge in the source.

   2) Ballast supplies the stable power to the bulb and the ignitor during initialization and normal state of arc.



KTBF490C

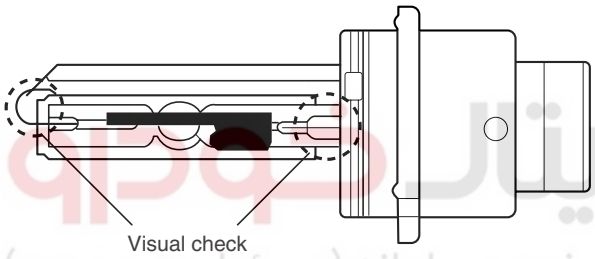
CHARACTERISTIC

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

INSPECTION E76F89A5

CHECK-POINTS UPON HEAD LAMP FAILURE

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

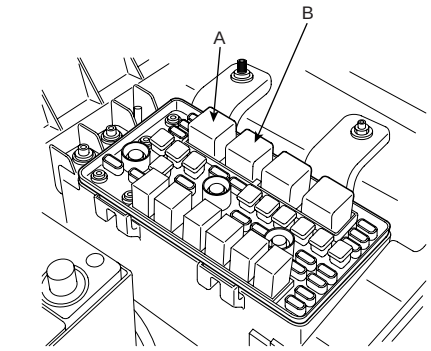


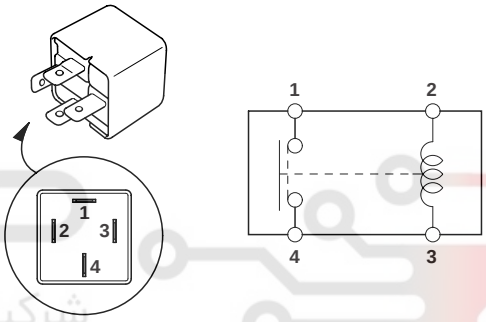
ETAC250A

6. After 1~5, replace the ballast and the ignitor (ballast assembly).

HEAD LAMP RELAY INSPECTION

1. Pull out the head lamp relay (Low) (A) and head lamp relay (High) (B) from the engine compartment relay box.





ETRF491K

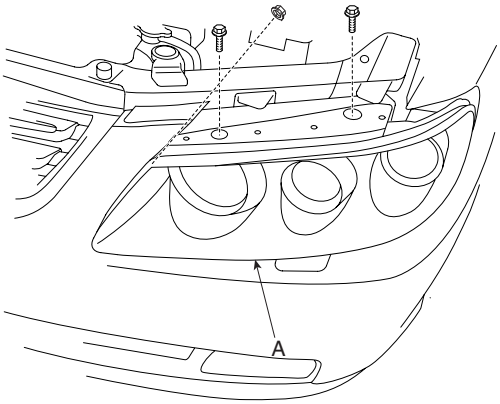
2. Check for continuity between terminals. There should be continuity between the No.1 and No.4 terminals when power and ground are connected to the No.2 and No.3 terminals.
3. There should be no continuity between the No.1 and No.4 terminals when power is disconnected.

Terminal / Power (No.2-No.3)	2	3	1	4
Disconnected	○	○		
Connected	⊖	⊕	○	○

ETKE215B

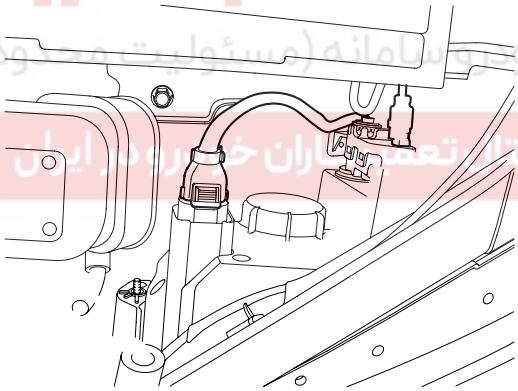
REMOVAL E168AB53

1. Disconnect the negative (-) battery terminal.
2. Loose the mounting bolts (2EA) and a nut of head lamp.



KTBF491A

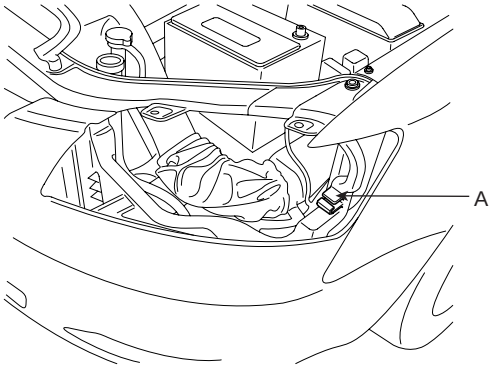
3. Remove the head lamp assembly after disconnecting the lamp connectors.



KTBF491B

NOTE

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



KTBF491C

4. Installation is the reverse of removal.

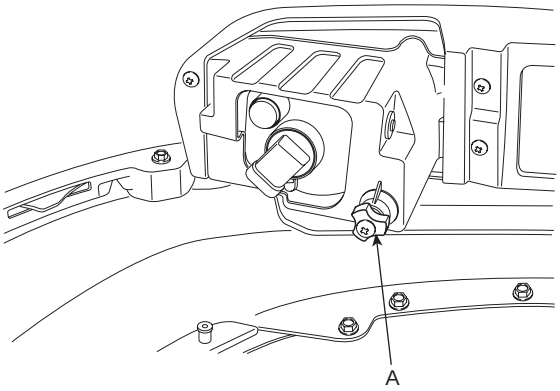
NOTE

When testing the HID head lamp, turn the power on or off with switch between power supply and lamp because of high voltage.

REPLACEMENT EEF1979B

BULB

1. Turn the head lamp switch off.
2. Disconnect the power connector from the lamp.
3. Remove the lamp assembly.
4. Remove the dust cover.
5. Remove the ignitor(B) after disconnecting connector(A).



KTBF491E

6. Remove fixing spring and replace the bulb.

7. Installation is the reverse of removal.

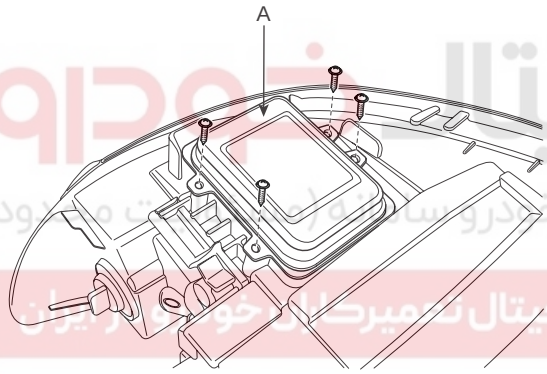
CAUTION

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

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

BALLAST

1. Turn the head lamp switch off
2. Disconnect the power connector from the lamp.
3. Remove the head lamp assembly.
4. Remove the ballast.



KTBF490F

5. Installation is the reverse of removal.

CAUTION

- ***Turn the head lamp switch off to avoid high voltage.***

WARNING

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

HEAD LAMP AIMING INSTRUCTIONS EE9DCE7F

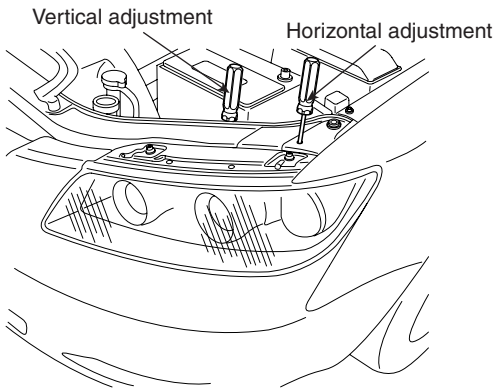
The head lamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer's instructions.

NOTE

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

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

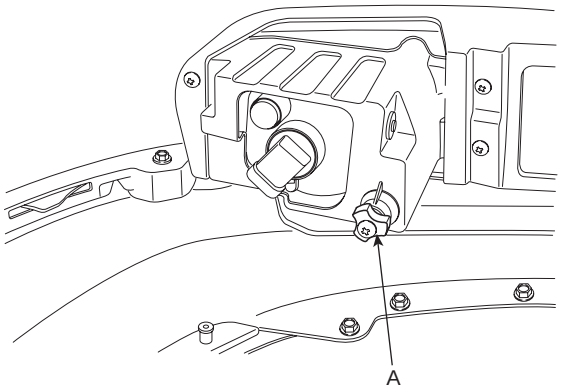
1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.
2. The vehicle should be placed on a flat floor.
3. Draw vertical lines (Vertical lines passing through respective head lamp centers) and a horizontal line (Horizontal line passing through center of head lamps) on the screen.
4. With the head lamp and battery in normal condition, aim the head lamps so the brightest portion falls on the horizontal and vertical lines.
   Make vertical and horizontal adjustments to the lower beam using the adjusting wheel.



ETBF491D

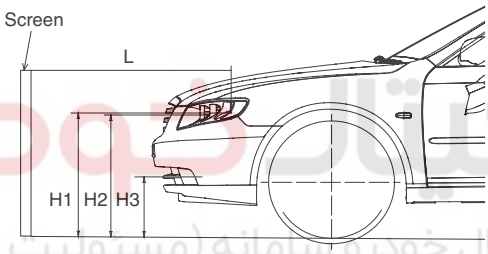
FRONT FOG LAMP AIMING

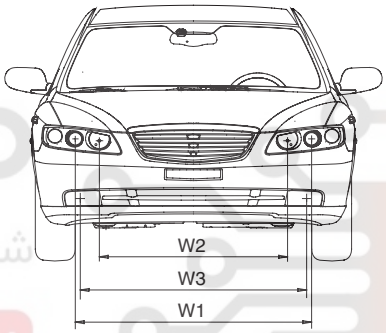
The front fog lamps should be aimed as the same manner of the head lamps aiming.
With the front fog lamps and battery normal condition, aim the front fog lamps by turning the adjusting gear.



KTBF491E

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

ETBF491F

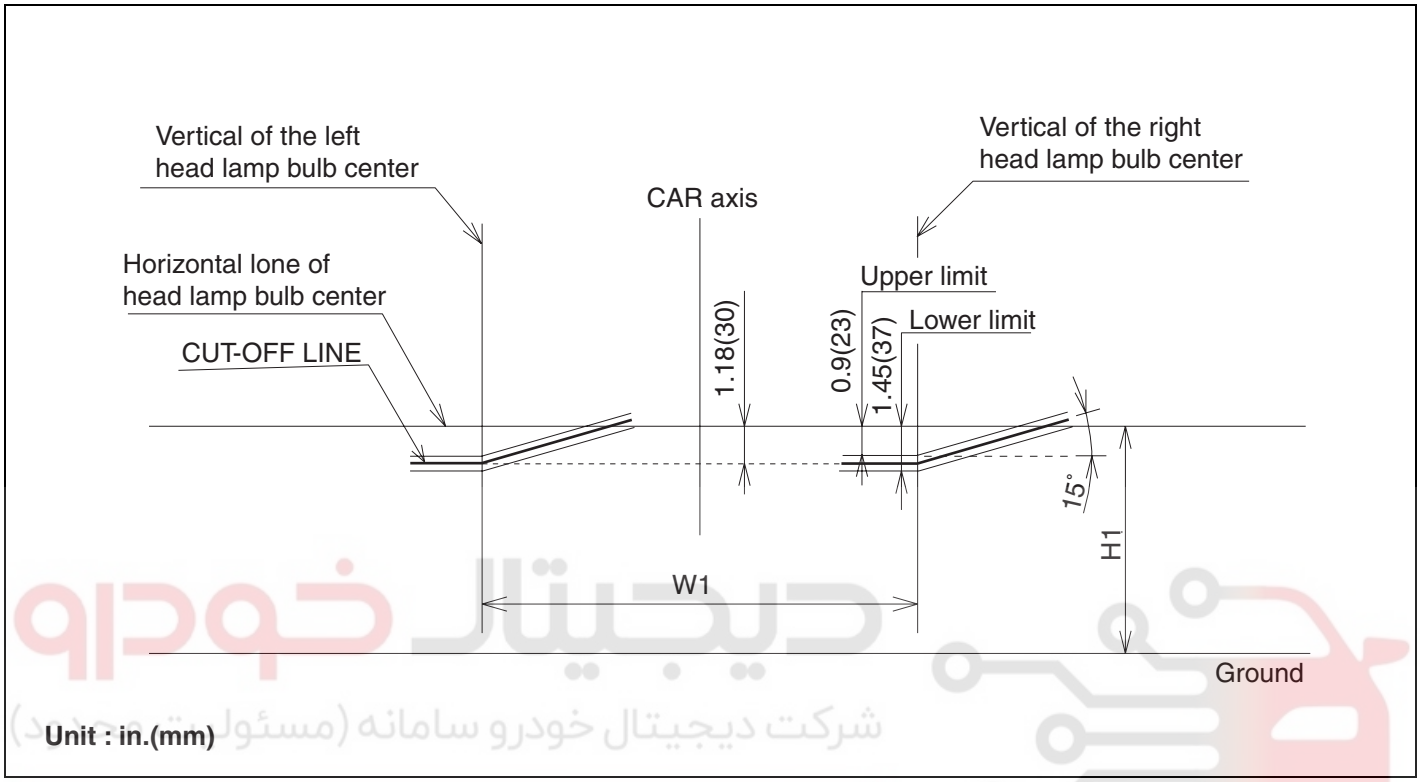
Unit : in (mm)

Vehicle condition	H1/HID H1	H2/HID H2	H3	W1/HID W1	W2/HID W2	W3	L
Without driver	27.5(699)	27.0(688)	13.7(348)	53.1(1,350)	42.5(1,080)	50.7(1,290)	118(3,000)
With driver	27.2(691)	26.7(680)	13.3(340)	53.1(1,350)	42.5(1,080)	50.7(1,290)	118(3,000)

ETBF491G

1. Turn the low beam on without the driver aboard.
   The cut-off line should be projected in the allowable range (shaded region).

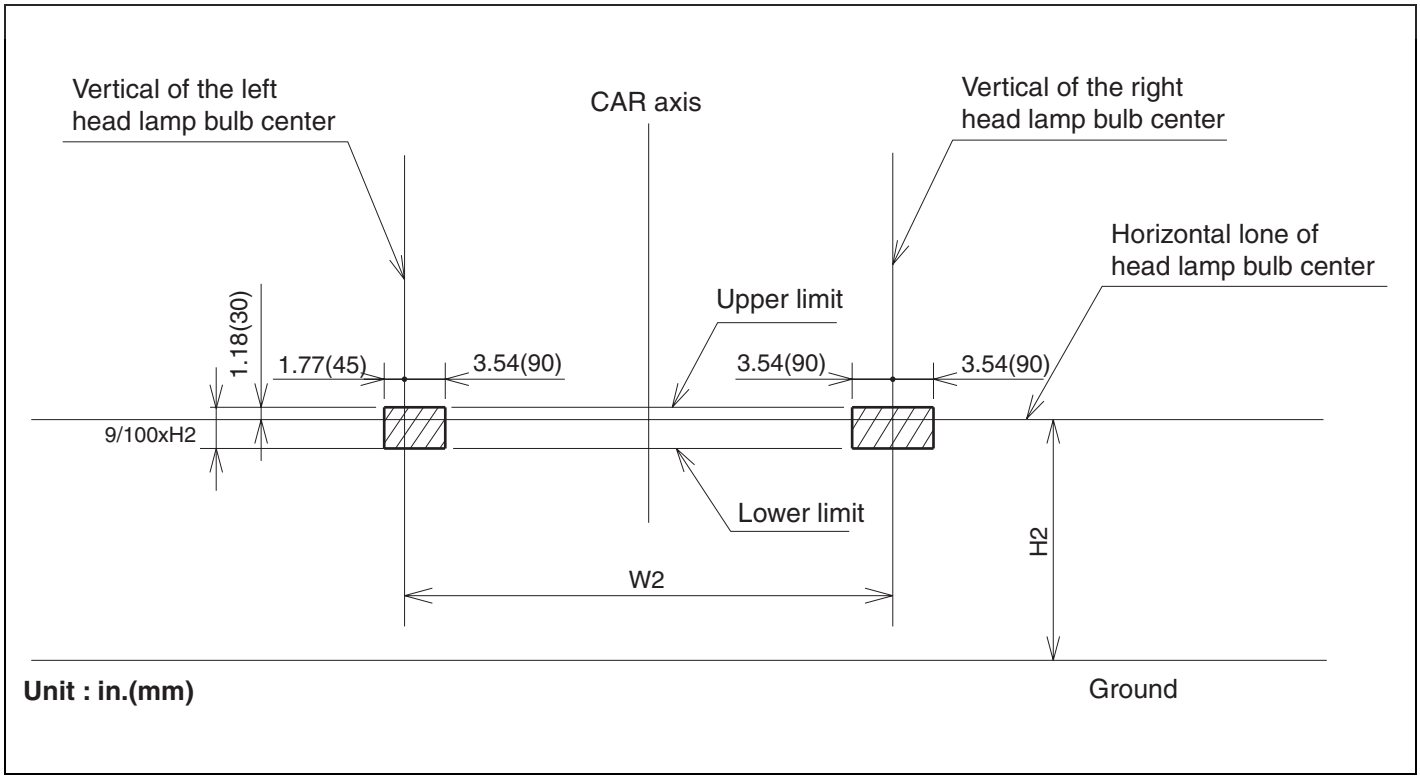
   In case of equipping with the manual leveling device, set the leveling device switch on the "O" position.
   In case of equipping with the auto leveling device, set the initialization by using the diagnostic tool before aiming.



ETBF491H

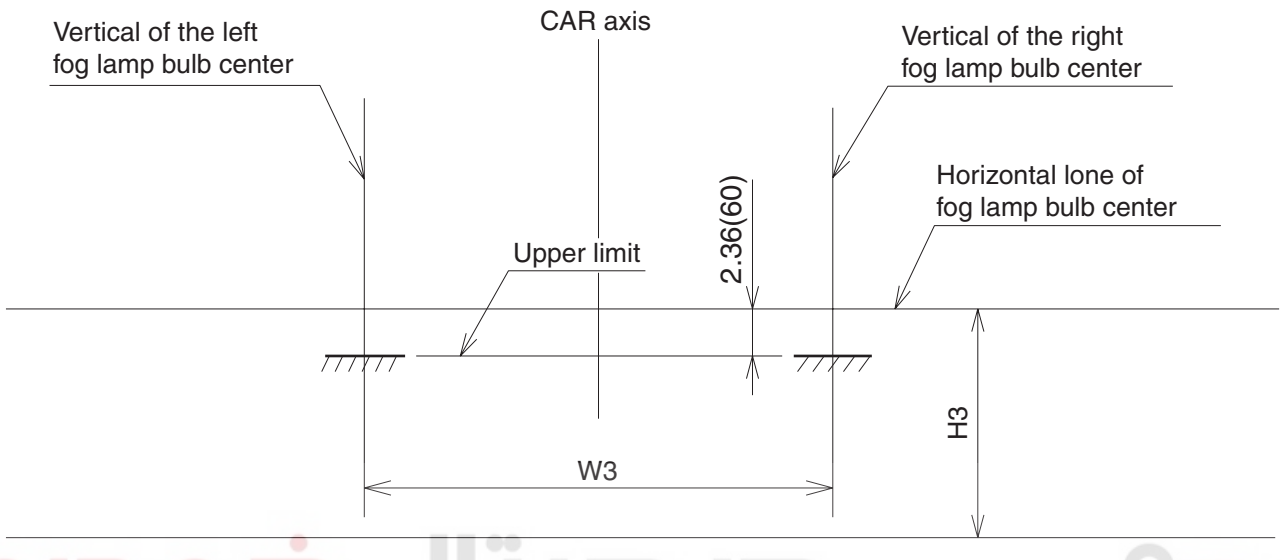
2. Turn the high beam on without the driver aboard.

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



ETBF491I

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



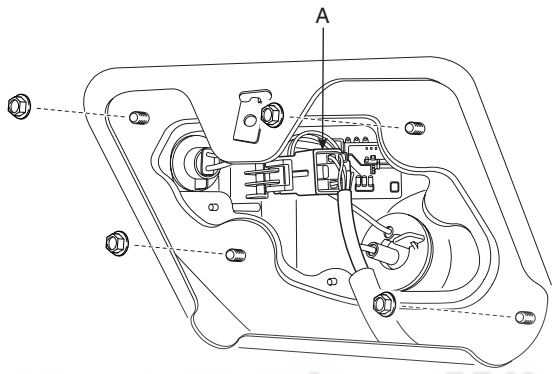
Unit : in.(mm)

ETBF491J

TURN SIGNAL LAMP

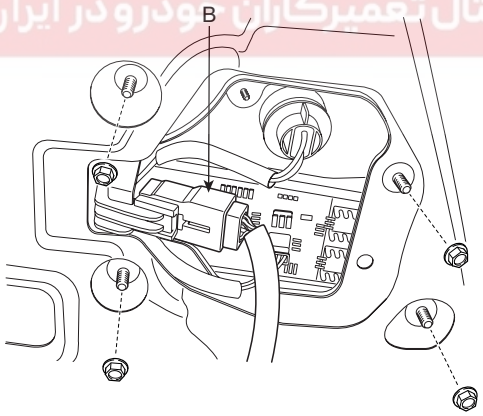
REPLACEMENT E3AC74CE

1. Disconnect the negative (-) battery terminal.
2. Loose the nuts holding the rear combination lamp then disconnect the 4P connector (A) then remove the outside rear combination lamp.



KTBF491L

3. Loose the nuts holding the rear combination lamp then disconnect the 4P connector (B) then remove the inner rear combination lamp.



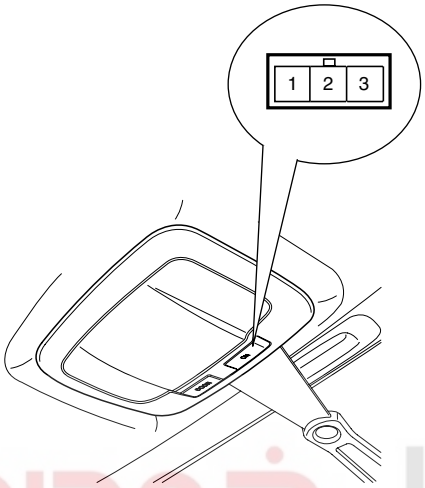
KTBF491M

4. Remove the rear garnish after loosening 4 nuts.
5. Remove inner lamp assembly.
6. Installation is the reverse of removal.

ROOM LAMP

INSPECTION E8CA7DAA

Remove the room lamp assembly then check for continuity between terminals.



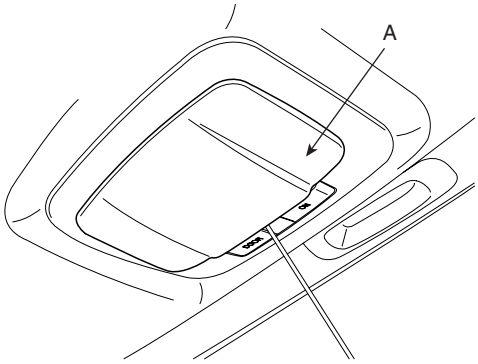
KTRE491P

Terminal / Position	1	2	3
ON		●	●
DOOR	●	●	
OFF			

ETBF971A

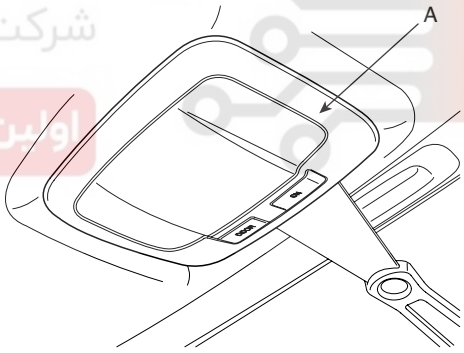
REPLACEMENT EDC98E59

1. Disconnect the negative (-) battery terminal.
2. Detach the lamp lens (A) from the room lamp with a flat-tip screwdriver then replace the bulb.



KTRE491N

3. Remove the room lamp assembly by using the scraper and then disconnect the 3P connector.



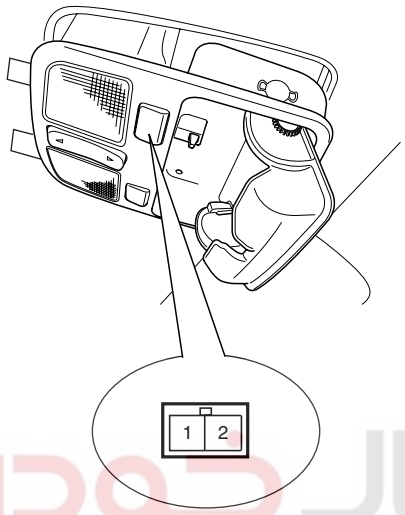
KTRE491O

4. Installation is the reverse of removal.

OVERHEAD CONSOLE LAMP

INSPECTION E313A162

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



[Switch side connector]

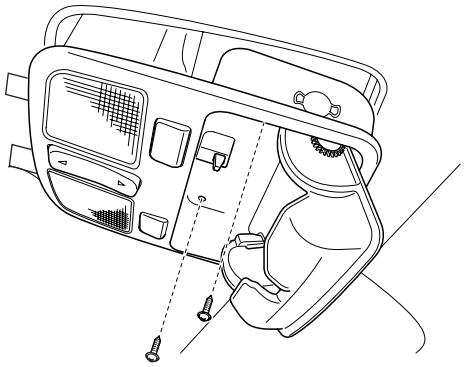
ETBF491Q

Sort / Position / Terminal	Map lamp switch			
	LH		RH	
	ON	OFF	ON	OFF
1	●		●	
2	●		●	

ETKE007M

REPLACEMENT ECCBF70F

1. Disconnect the negative (-) battery terminal.
2. Replace the bulb after the lens.
3. Open the sunglass case cover then remove the 2 screws holding the overhead console.



KTBF481A

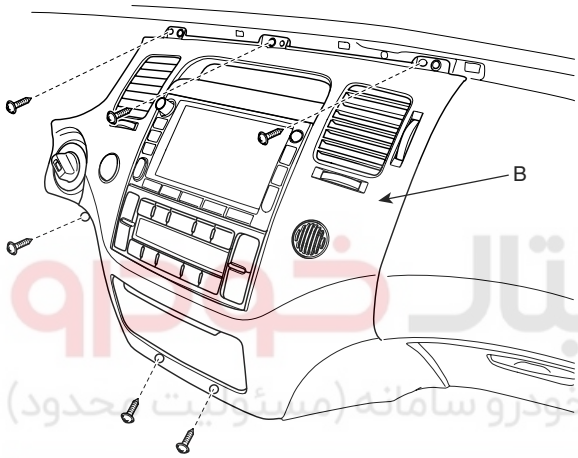
4. Disconnect the connector (4P) of sunroof switch and the connector (2P) of map lamp then remove the overhead console lamp assembly from the headliner.
5. Installation is the reverse of removal.

TURN / HAZARD LAMPS

INSPECTION E3EED10E

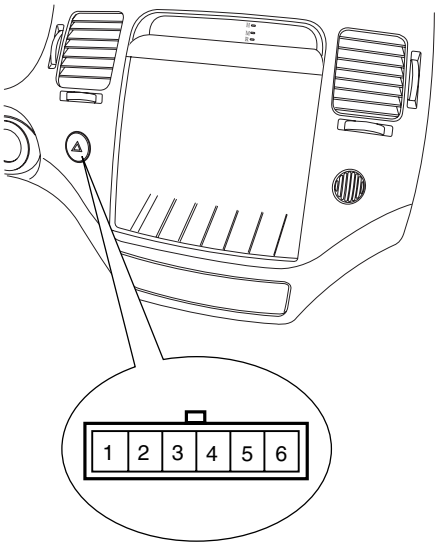
HAZARD LAMP SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the center garnish and driver lower panel. (Refer to the Body group- Crash pad)
3. Remove the center facia panel (B) after loosening the screws. Take care not to damage fixing clips.



ETBF450H

4. Disconnect the hazard lamp switch connector.



KTBF495A

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

Terminal / Position	1	2	3	4	5	6
OFF						
ON		Illumination			○	○

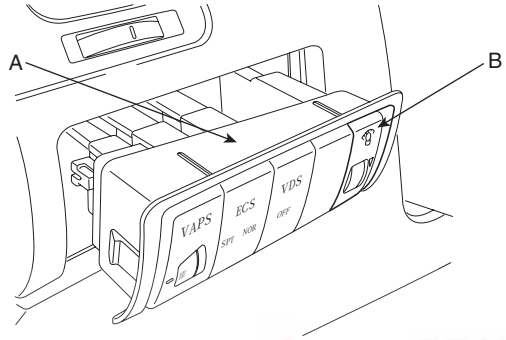
ETBF495G

RHEOSTAT

INSPECTION E678829B

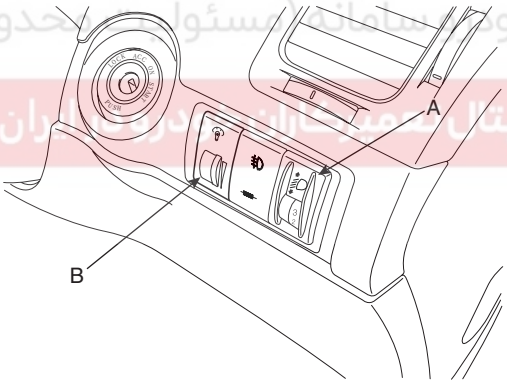
1. Disconnect the negative (-) battery terminal.
2. Remove the lower crash pad switch assembly (A) by using the scraper and then disconnect the connectors.

[LHD]



ETBF495E

[RHD]



ETBF495H

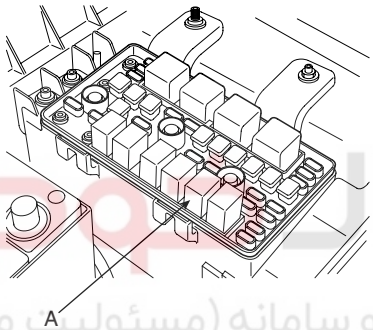
3. Remove the rheostat (B) from lower crash pad switch assembly.
4. Check for intensity of new rheostat switch. If the light intensity of the lamps changes smoothly without any flickering when the rheostat is turned, it can be assumed that the rheostat is normal.

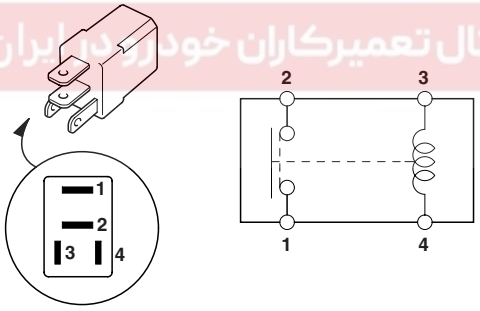
FRONT FOG LAMPS

INSPECTION EA6D2A1B

FRONT FOG LAMP RELAY

1. Pull out the front fog lamp (A) relay from the engine compartment relay box.
2. Check for continuity between terminals. There should be continuity between the No.1 and No.2 terminals when power and ground are connected to the No.3 and No.4 terminals.
3. There should be no continuity between the No.1 and No.2 terminals when power is disconnected.





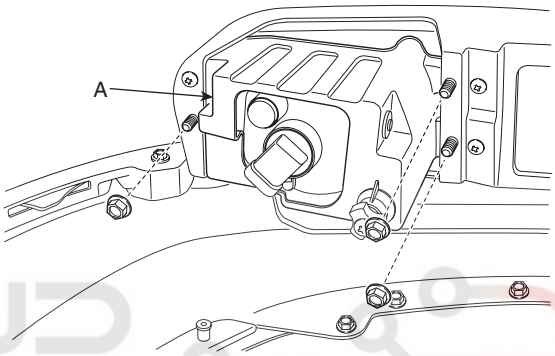
ETRF496A

Terminal / Power (No.3-No.4)	1	2	3	4
Disconnected			○	○
Connected	○	○	⊖	⊕

ETKE903A

REPLACEMENT EC59797F

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper. (Refer to the BD group - front bumper).
3. Replace the bulb by rotating the bulb holder (A) to the clockwise direction after disconnecting the fog lamp connector.
4. Remove the front fog lamp assembly (A) after loosening nuts and disconnecting the fog lamp connector.



KTBF495F

5. Installation is the reverse of removal.

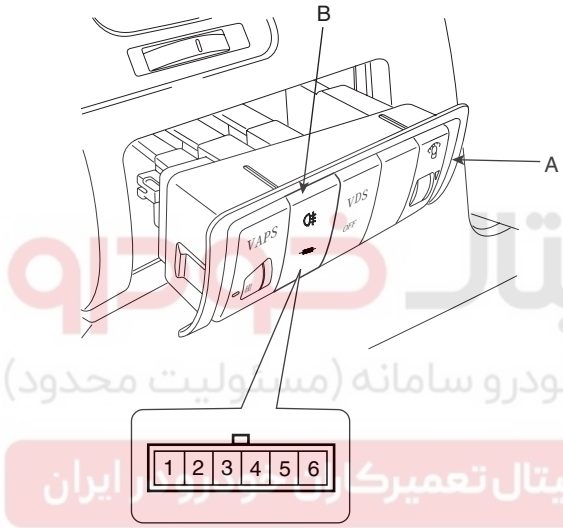
REAR FOG LAMPS

INSPECTION E3ABFEAC

REAR FOG LAMP SWITCH

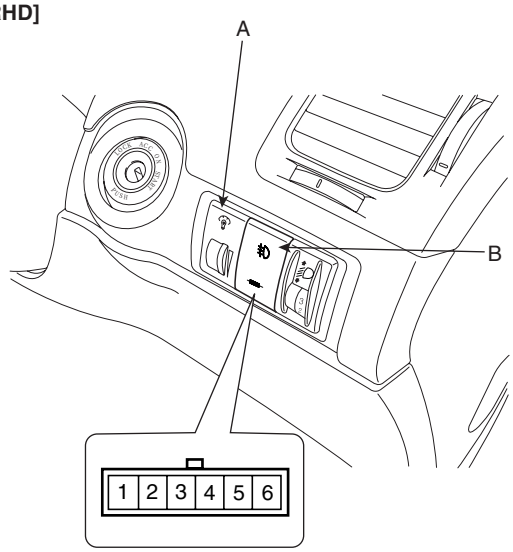
1. Disconnect the negative (-) battery terminal.
2. Remove the lower crash pad switch (A) from the side crash pad cover by using the scraper and then disconnect the connectors.
3. Remove the rear fog lamp (B) switch from lower crash pad switch.

[LHD]



ETBF497D

[RHD]



ETBF497C

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

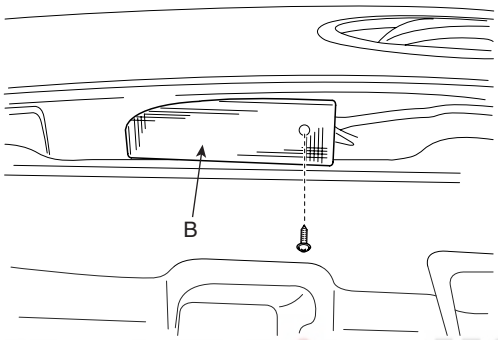
Terminal / Position	6	5	1	3	4
ON		Illumination		IND.	
OFF					

ETBF497B

TAIL, PARKING AND LICENSE LAMPS

REPLACEMENT EB5DE12F

1. Disconnect the negative (-) battery terminal.
2. Remove the license lamp lens (B) from the panel after loosening a screw.



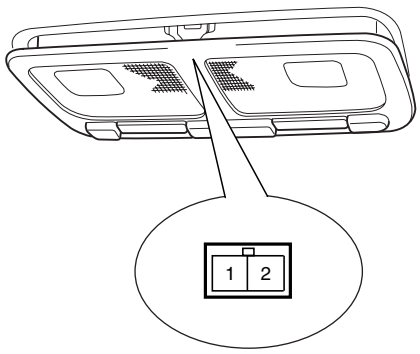
KTBF498B

3. Replace the bulb.
4. Installation is the reverse of removal.

PERSONAL LAMP

INSPECTION E348A4E0

1. Inspect personal lamp switch operation.



[Switch side connector]

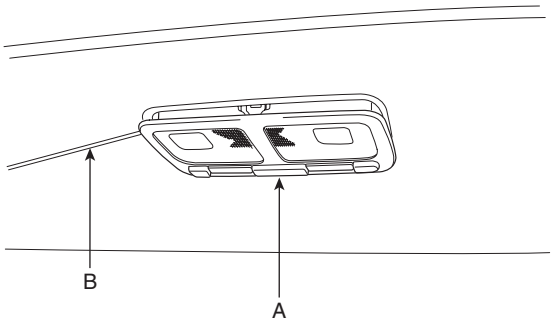
ETBF914A

Lamp / Position / Terminal	Personal lamp switch			
	LH		RH	
	ON	OFF	ON	OFF
1	●		●	
2	●		●	

ETBF914B

REPLACEMENT E1A4380D

1. Disconnect the negative (-) battery terminal.
2. Remove the room lamp assembly (A) by using the scraper (B) and then disconnect the 2P connector.

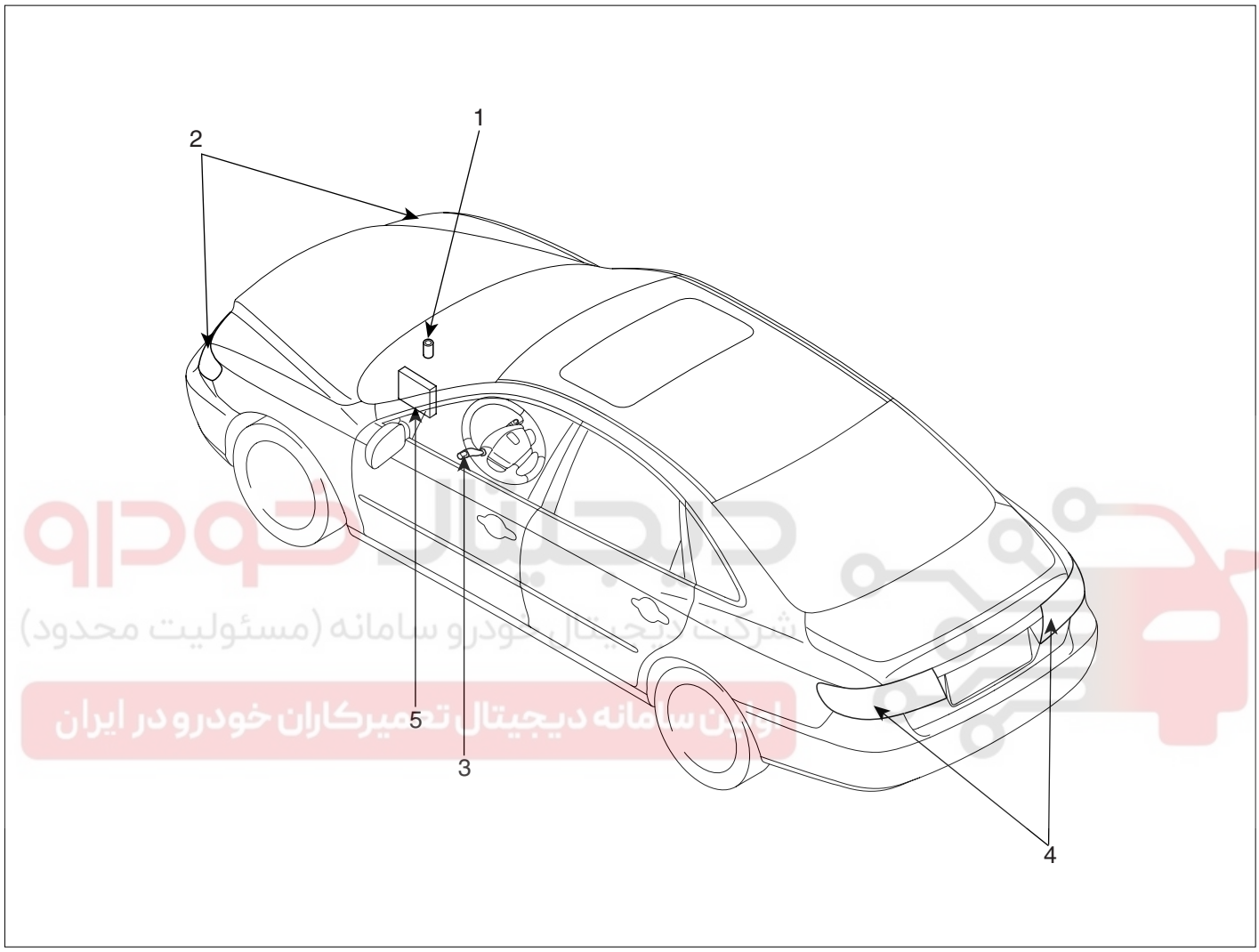


KTBF914C

3. Replace the bulb after removing lamp lens only.
4. Installation is the reverse of removal.

AUTO LIGHTING CONTROL SYSTEM

COMPONENT LOCATION E70326C0



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

ETBF510A

SPECIFICATIONS ED99FDF6

Items	Specifications
Rated voltage	5V
Load	Max. 1mA (Relay load)
Detection illuminations Tail lamp Head lamp	 ON : 1.77 ±0.08 (V) OFF : 3.47 ±0.1 (V) ON : 0.61 ±0.06 (V) OFF : 1.00 ±0.06 (V)

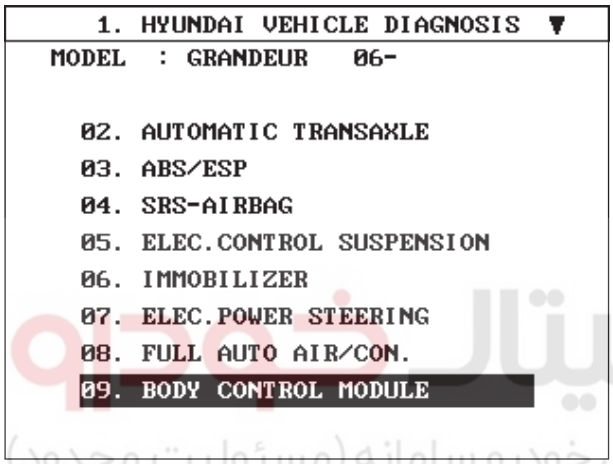
DESCRIPTION E26CB6E1

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.

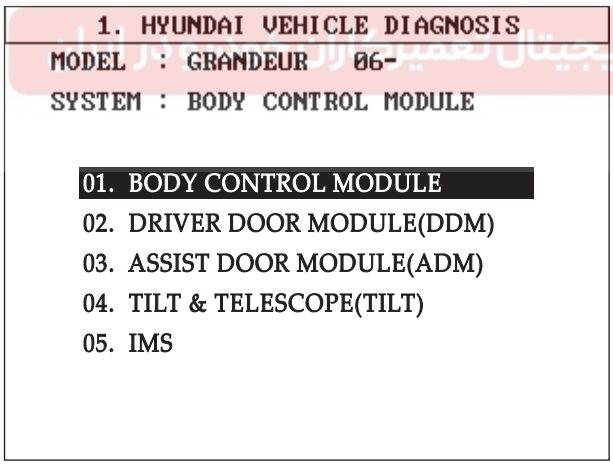
AUTO LIGHT SWITCH

INSPECTION ECD99D58

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.

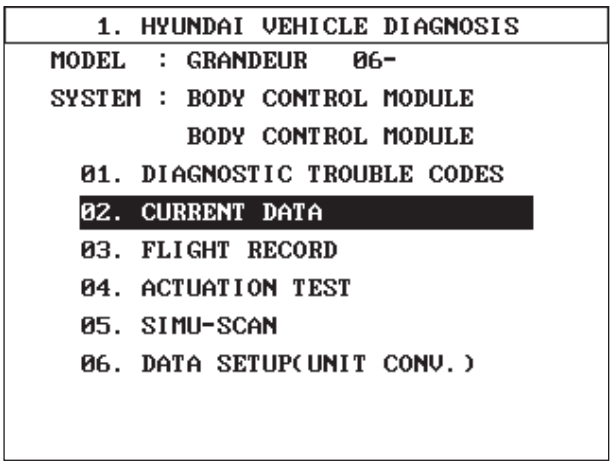


ETBF804A



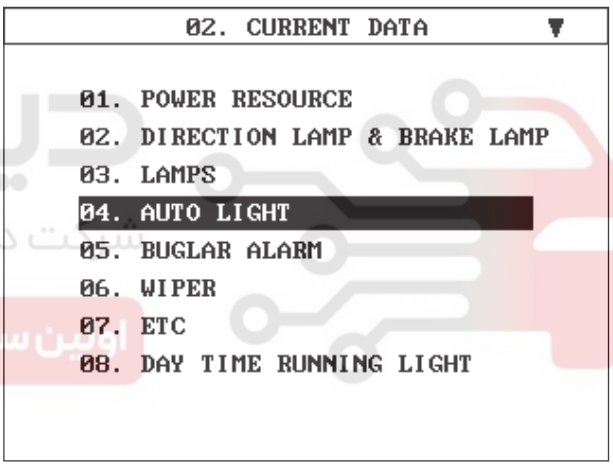
ETBF032A

4. Select "Current data" and wiper. Check auto light & wiper value.



ETBF032B

5. Check input/output value of auto light.

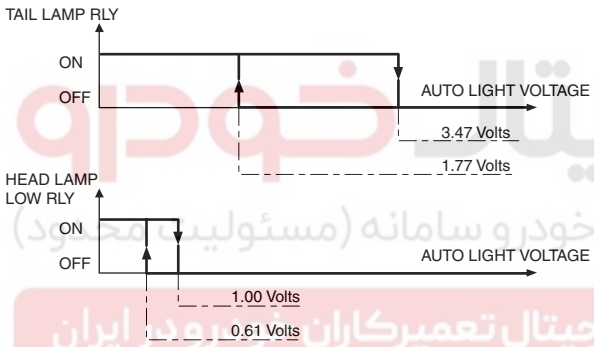


ETBF510C

AUTO LIGHT SENSOR

INSPECTION EBEB17DB

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

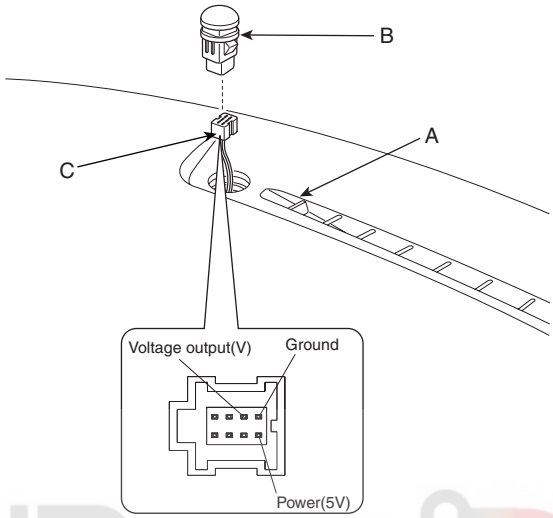


ETBF145K

	Tail lamp	Head lamp
ON	1.77 ± 0.08[V]	0.61 ± 0.06[V]
OFF	3.47 ± 0.10[V]	1.00 ± 0.06[V]

REPLACEMENT E01BBB34

1. Disconnect the negative (-) battery terminal.
2. Remove the Photo & auto light sensor (B) from defrost nozzle by using screw (-) driver.

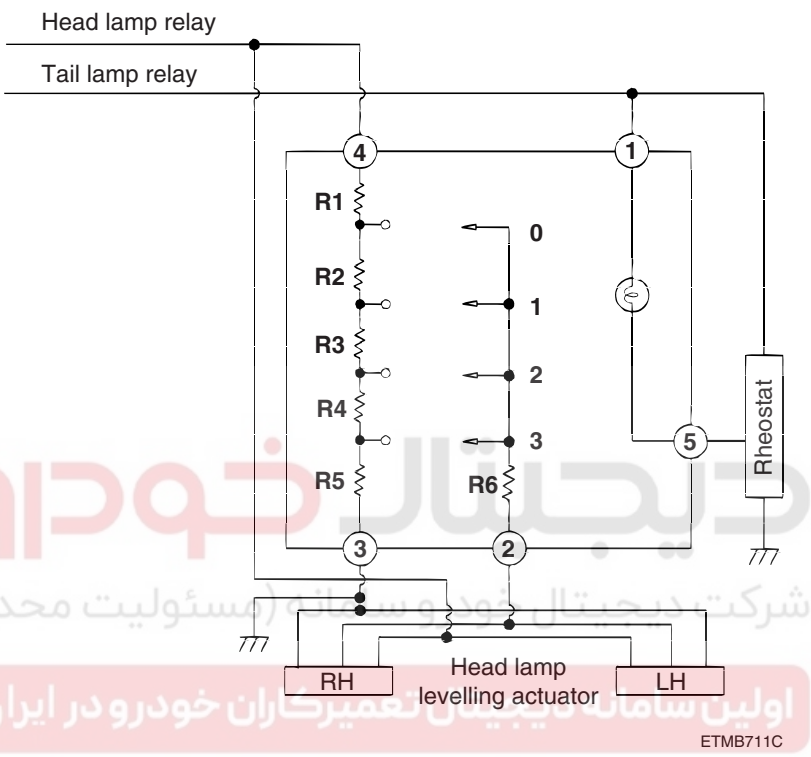


ETBF510B

3. Remove the auto light connector.
4. Installation is the reverse of removal.

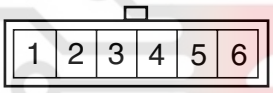
HEAD LAMP LEVELING DEVICE

CIRCUIT DIAGRAM E33E7EBC



PIN CONNECTION

PIN NO	Description
1	Illumination(+)
5	Rheostat
2	Actuator (+)
3	Ground
4	Head lamp relay



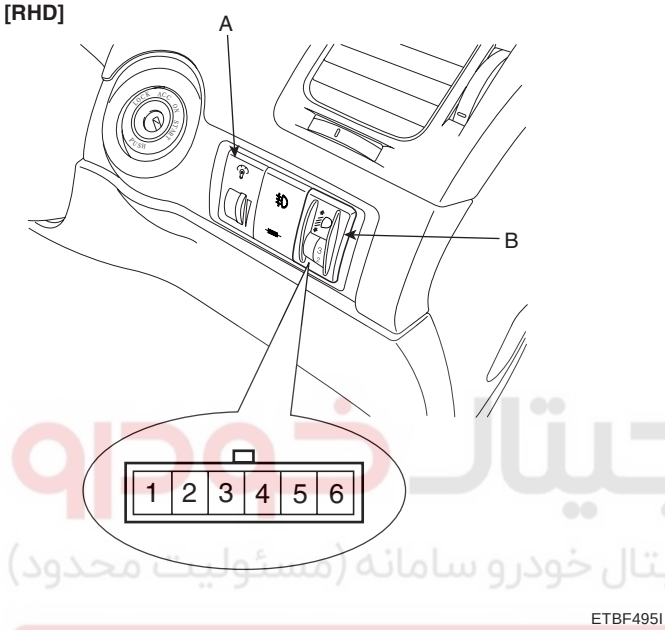
ETBF542A

HEAD LAMP LEVELING SWITCH

INSPECTION EA2CB3CC

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

[RHD]



ETBF495I

3. Remove the head lamp leveling switch (B) from the lower crash pad switch.
4. Connect the battery voltage between terminals 3 and 4.
5. Measure the voltage between terminals 2 and 3 (V) at each position.

Position No.	Rotation	Voltage (V)
0	0°	11.05 ± 0.5V
1	20°	9.1 ± 0.5V
2	40°	7.20 ± 0.5V
3	60°	5.85 ± 0.5V

6. If the voltage is not as specified, replace the head lamp leveling switch.

AUTO HEAD LAMP LEVELING UNIT

DESCRIPTION EBD2C5A9

According to driving environment and loading state of vehicle, head lamp lighting direction is changed to keep the driver's visibility range and to protect the deriver's vision from glare, aiming at safety driving.

Sensor integrated ECU mounting on the rear center arm drives the actuator mounting on the head lamp since sensing the input signal following the vehicle's statical changes.

Head lamp beam is automatically operated by chassis tilt.

OPERATION E0A1678B

OPERATING PROCEDURE

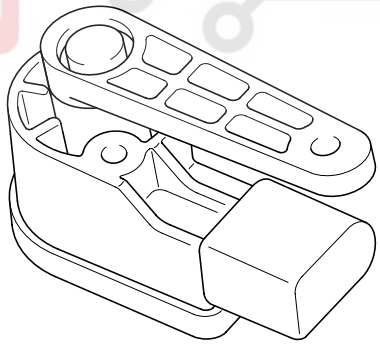
1. Suspension angle change resulted from vehicle's load change.
2. Sensor angle change.
3. Microprocessor calculates necessary head lamp angle change amount.
4. Sending a proper signal to head lamp levelling device and driving actuator.

OPERATING CONDITION

1. Ignition on
2. Low beam on
3. On stop : If sensor lever change is 2° and above, head lamp is operated after max. 1.5 sec.
4. On driving : If vehicle velocity is over 4km/h, velocity change is not over 0.8-1.6km/h per second, and loading condition is changed, then head lamp is operated.

COMPONENTS

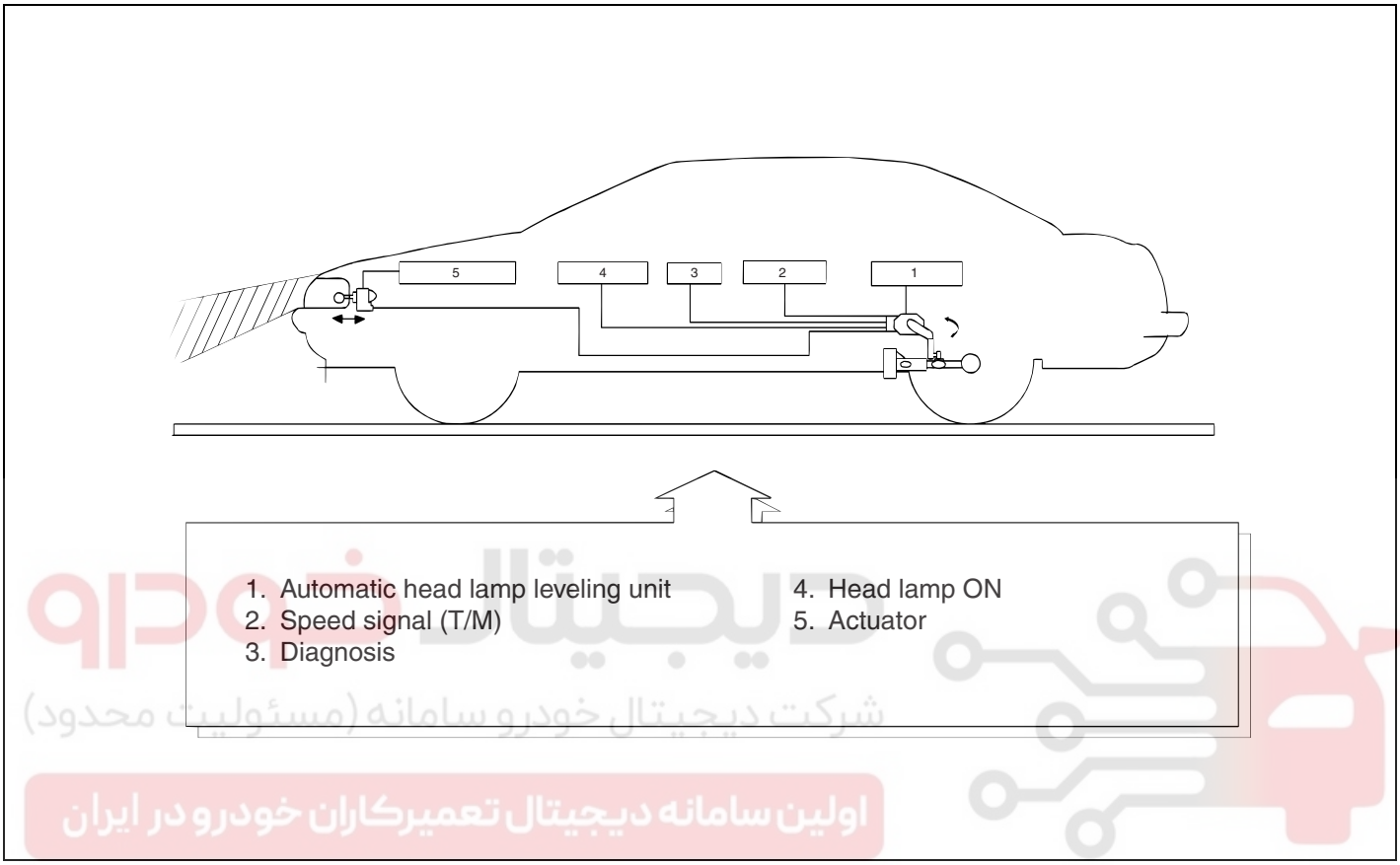
1. Auto head lamp leveling unit



KTOF200A

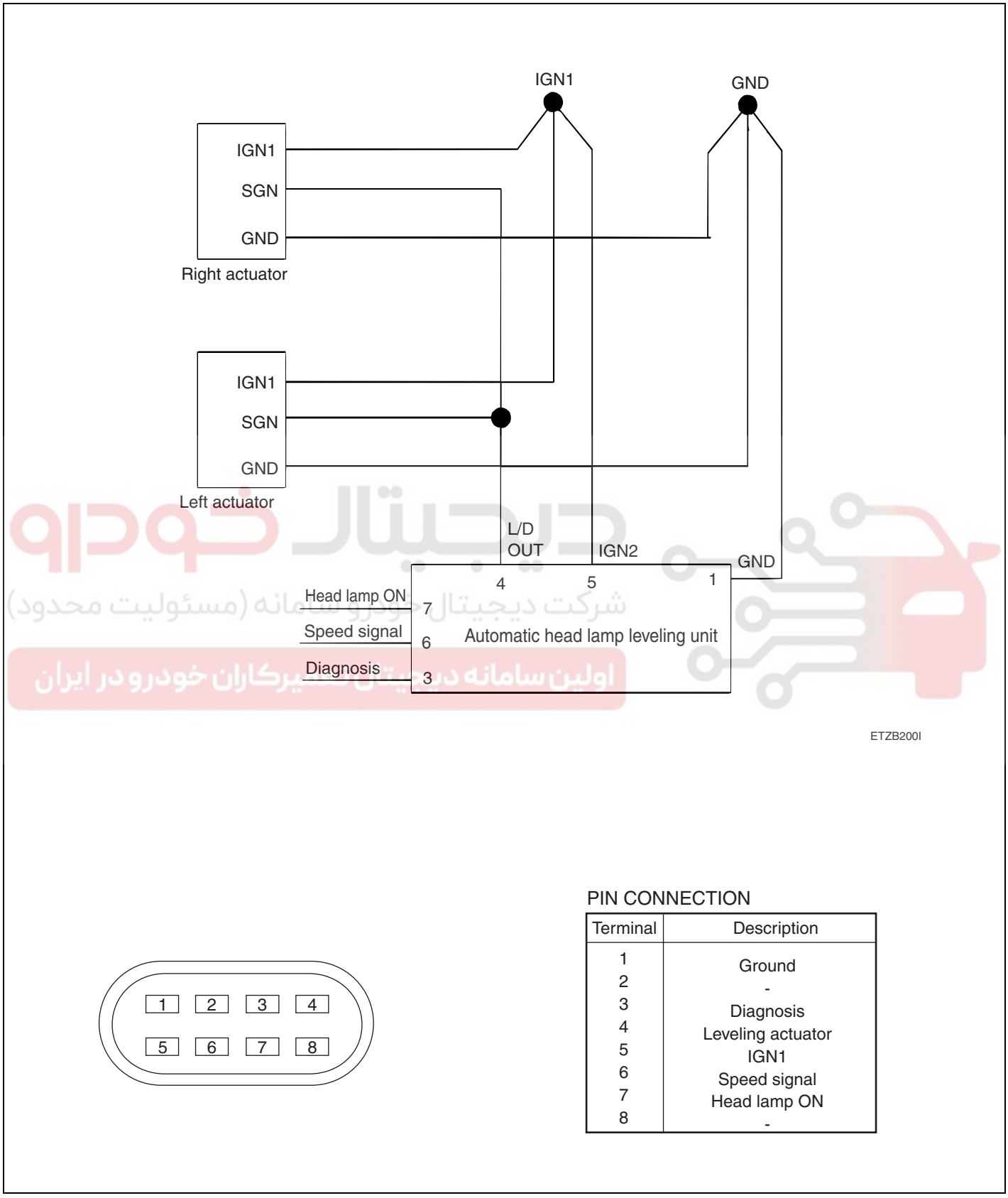
- Using a Micro-processor, percept the operation lever's mechanical angle change or speed signal.
- As an actuator control device of inner control program, mounting on the rear center arm.

2. Actuator
   - Change the head lamp lighting direction up or down since automatic head lamp levelling unit sensing the input signal following the vehicle's statical changes.



LTCD150A

CIRCUIT DIAGRAM EA4E64AB



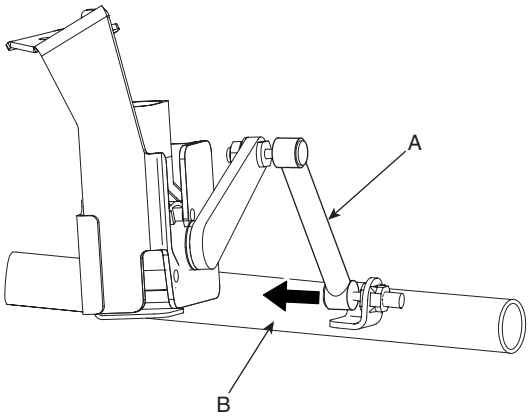
PIN CONNECTION

Terminal	Description
1	Ground
2	-
3	Diagnosis
4	Leveling actuator
5	IGN1
6	Speed signal
7	Head lamp ON
8	-

LTCD498A

REPLACEMENT EEDAA183

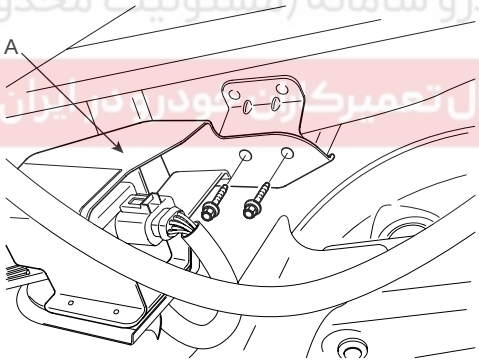
1. Remove the head lamp leveling unit linkage (A) from trailing arm (B).



ETBF540A

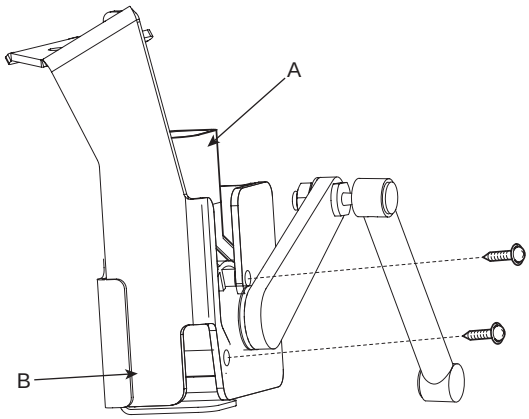
2. Loosen the mounting bolts of automatic head lamp levelling unit assembly (A).

TORQUE: 3-5 Nm (30~50 kg.cm)



ETBF540B

3. Remove the head lamp leveling unit (A) from the bracket (B) after loosening 2 screws.

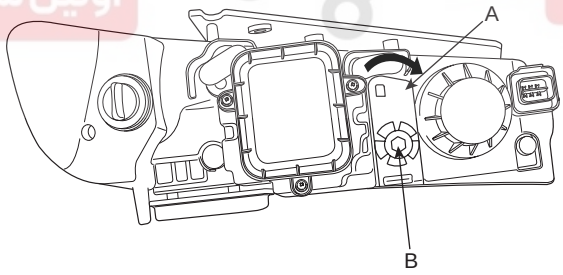


ETBF540C

4. Installation is the reverse of removal.

HEAD LAMP LEVELING ACTUATOR

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 loosening the adjusting bolt (B) after rotating it to an arrow direction.



KTBF540D

4. Installation is the reverse of removal procedure.

INSPECTION E4AAC1FE

1. Ignition "ON".
2. Turn on the head lamp switch.
3. Check for operation. If the aim of the head lamps changes smoothly when the head lamp leveling switch is turned.
4. If the operation does not work well, inspect the connector and terminals to be sure they are all making good contact.
   If the terminals are bent, loose or corroded, repair them as necessary, and recheck the system.
   If the terminals look OK, go to step 5.
5. Substitute with a known-good head lamp assembly and check for proper operation.

DIAGNOSTIC TROUBLE CODES EC5CF3F9

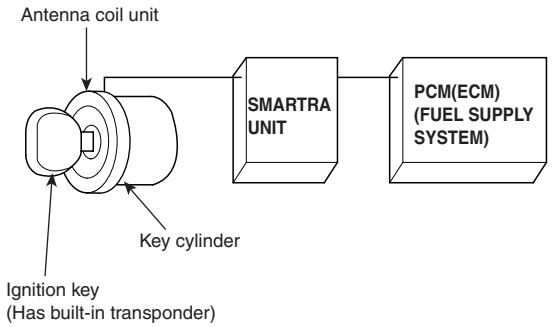
Fault Code	Tester Display	Faults Description
C1604	ECU	Control unit defective
C1606	ECU software	Control unit not coded
C1620	First setup not completed	Control unit not adjusted
C1522	H/Lamp switch	Light signal line open
C1212	Vehicle speed signal	Speed signal is not plausible
C2226	Output voltage short to Batt/GND	Output signal short to Plus/GND
C1255	Height sensor rear circuit	Leveling unit lever overturned (over 90°)
C1621	Excessive operating temperature	Excessive temperature

IMMOBILIZER CONTROL SYSTEM

DESCRIPTION E40896D1

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

1. SMARTRA type immobilizer
   - The SMARTRA system consists of a transponder located in the ignition key, an antenna coil, a SMARTRA unit, an indicator light and the PCM(ECM).
   - 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 four key codes.
   - If the customer has lost his key, and cannot start the engine, contact HMC motor service station.

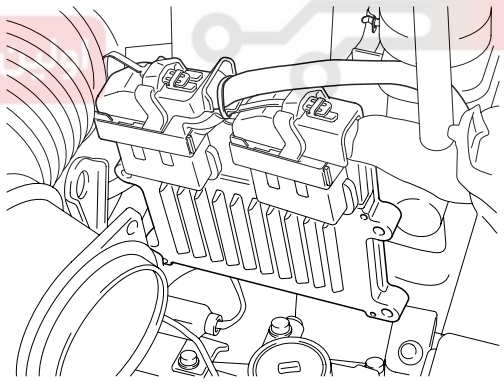


ETBF740B

COMPONENTS OPERATIONS EEFBBDE5

PCM (POWER TRAIN CONTROL MODULE)

1. The PCM(ECM) carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the PCM(ECM) simultaneously. Only if the results are equal, the engine can be started. The data of all transponders, which are valid for the vehicle, are stored in the PCM(ECM).



KTBF741E

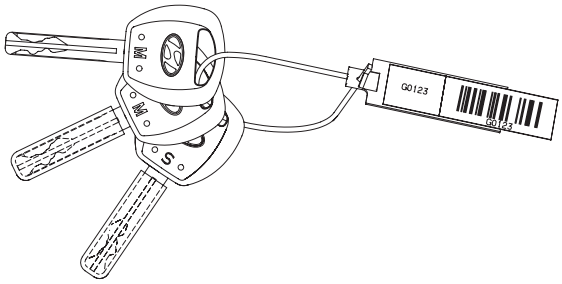
SMARTRA UNIT (B)

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

KTBF741C

TRANSPONDER (BUILT-IN KEYS)

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

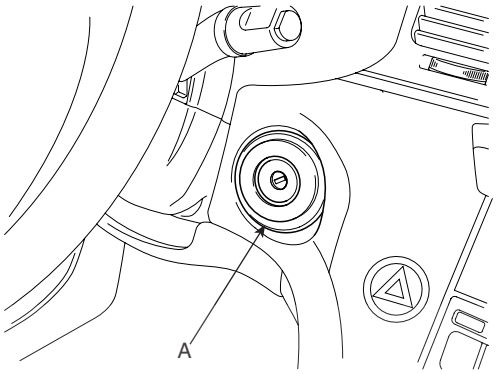


KTBF741A

ANTENNA COIL

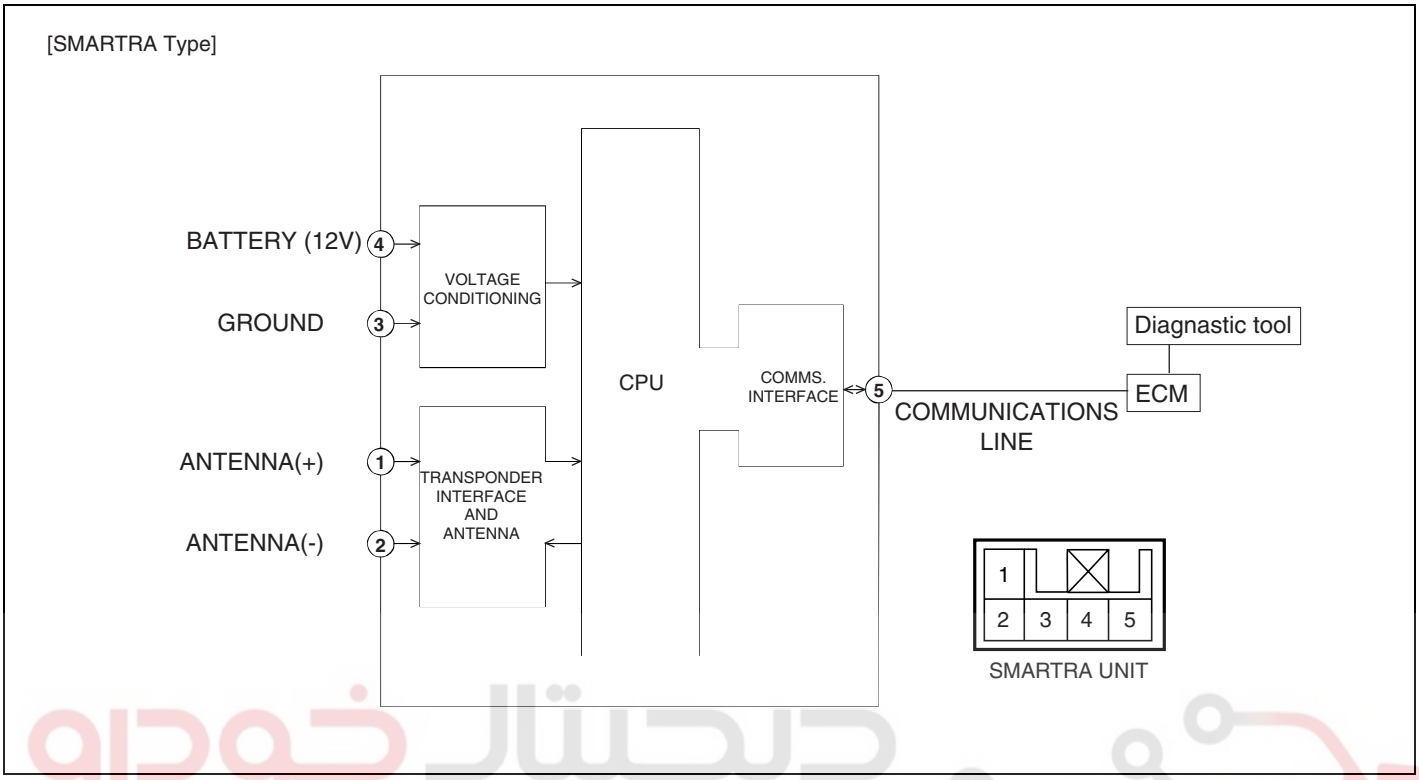
The antenna coil (A) has the following functions.
- The antenna coil supplies energy to the transponder.
- The antenna coil receives signal from the transponder.
- The antenna coil sends transponder signal to the SMARTRA.

It is located directly in front of the steering handle lock.

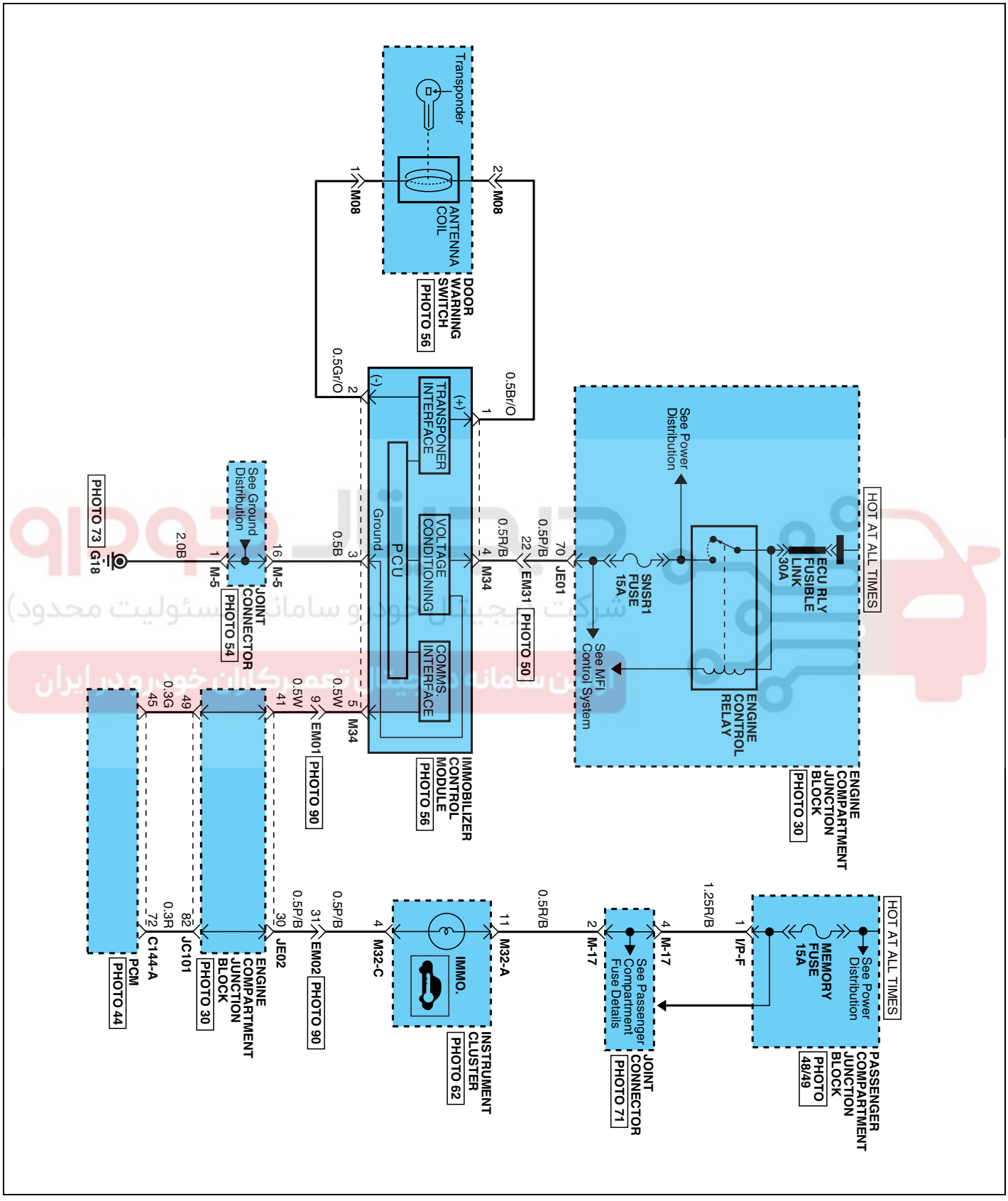


KTBF741B

SYSTEM BLOCK DIAGRAM EDA33595



CIRCUIT DIAGRAM



ETBF740J

ETBF740L

TEACHING PROCEDURES E9BBCC09

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

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

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

   The key teaching is done by ignition on with the key and additional tester commands. The PCM(ECM) stores the relevant data in the EEPROM and in the transponder. Then the PCM(ECM) runs the authentication required for confirmation of the teaching process. The successful programming is then confirmed by a message to the tester.

   If the key is already known to the PCM(ECM) from a previous teaching, the authentication will be accepted and the EEPROM data are updated. There is no changed transponder content (this is impossible for a learnt transponder).

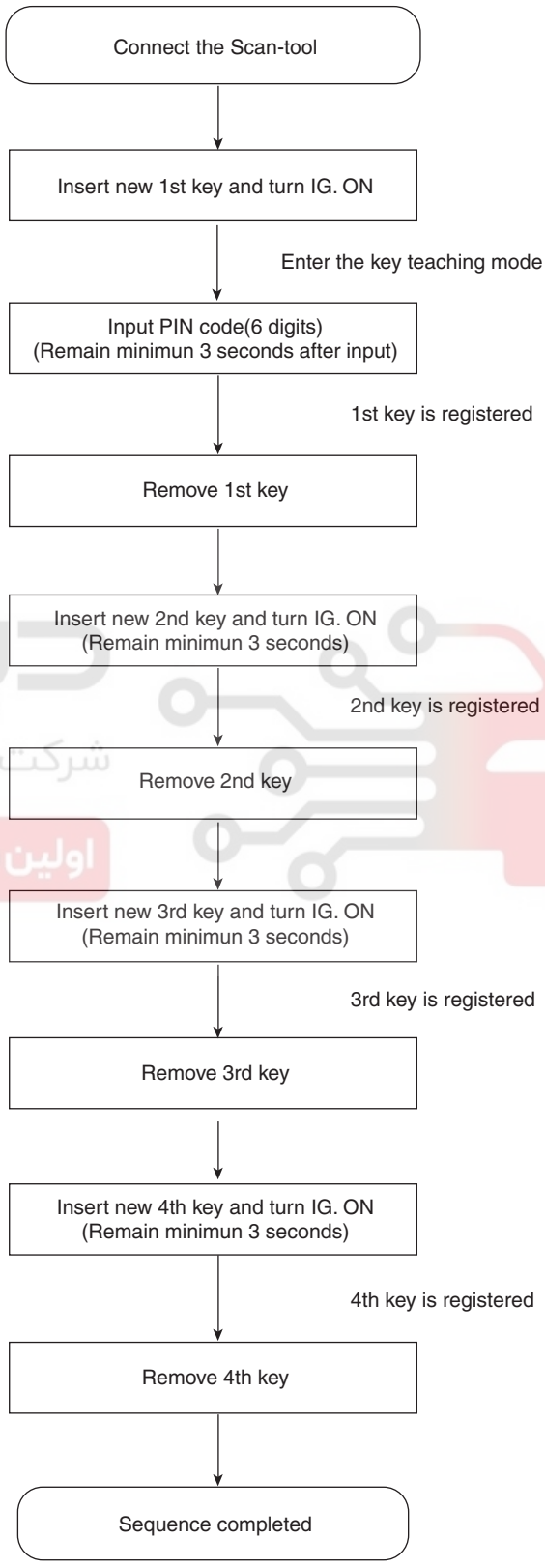
   The attempt to repeatedly teach a key, which has been taught already during the same teaching cycle, is recognized by the PCM(ECM). This rejects the key and a message is sent to the tester.

   The PCM(ECM) rejects invalid keys, which are presented for teaching. A message is sent to the tester. The key can be invalid due to faults in the transponder or other reasons, which result from unsuccessful programming of data. If the PCM(ECM) detects different authenticators of a transponder and an PCM(ECM), the key is considered to be invalid.

   The maximum number of taught keys is 4

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

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



ETBF740M

1) PCM(ECM) learnt status.

1. HYUNDAI VEHICLE DIAGNOSIS ▼

MODEL : GRANDEUR

01. ENGINE
02. AUTOMATIC TRANSAXLE
03. ANTI-LOCK BRAKE SYSTEM
04. SRS-AIRBAG
05. ELEC. CONTROL SUSPENSION
06. IMMOBILIZER
07. ELEC. POWER STEERING
08. FULL AUTO AIR/CON.

ETBF741A

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER

01. CURRENT DATA
02. PASSWORD TEACHING/CHANGING
03. TEACHING
04. NEUTRAL MODE
05. LIMP HOME MODE

ETBF741B

1.3 TEACHING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT PIN OF SIX
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

ETBF741C

1.3 TEACHING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

1st KEY TEACHING
ARE YOU SURE ? [Y/N]

CODE : 234567

ETBF741D

1.3 TEACHING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

1st KEY TEACHING
COMPLETED

CODE : 234567

ETBF741E

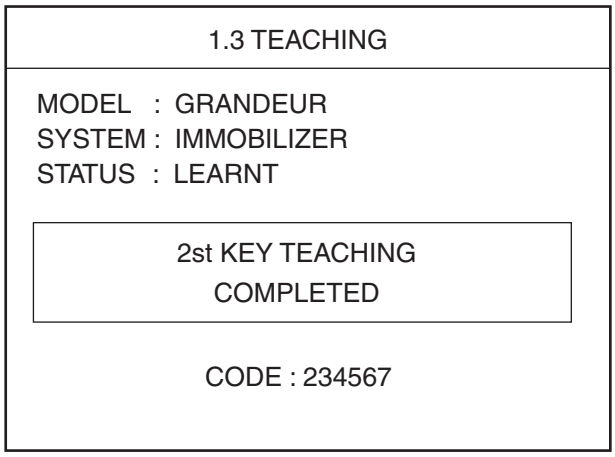
1.3 TEACHING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

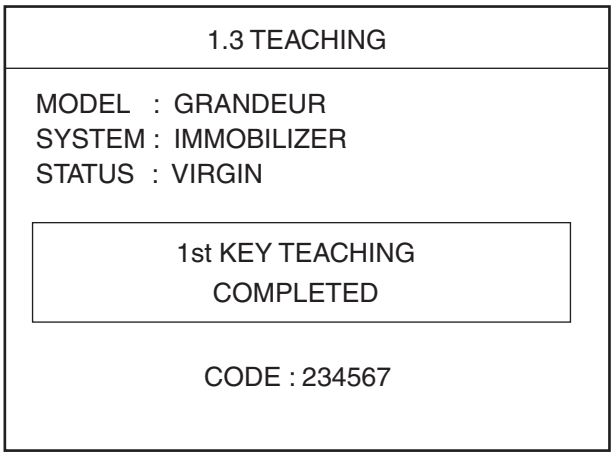
2st KEY TEACHING
ARE YOU SURE ? [Y/N]

CODE : 234567

ETBF741F

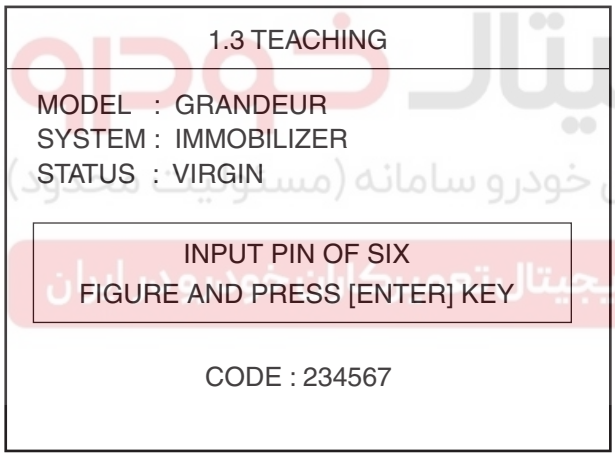


ETBF741G

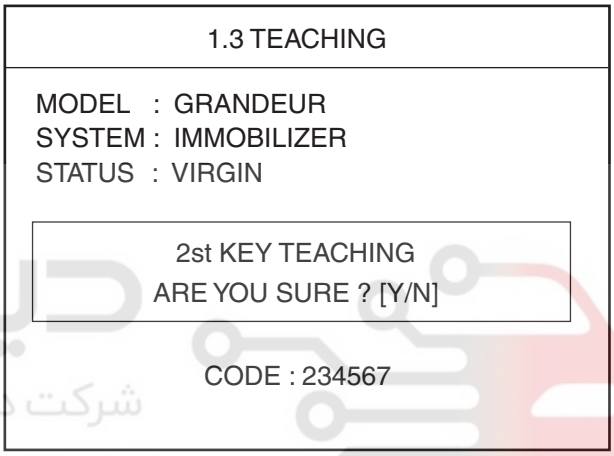


ETBF741J

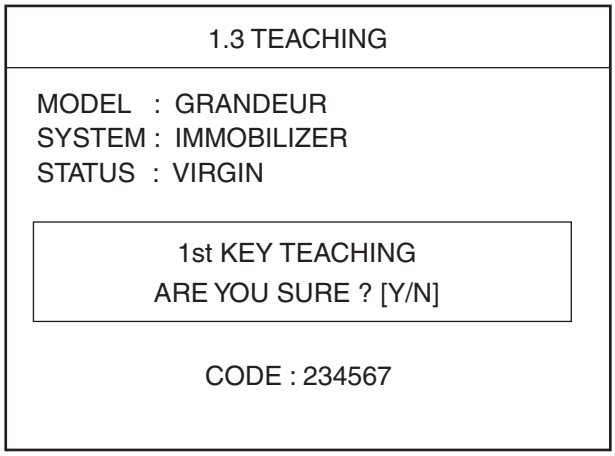
2) PCM(ECM) virgin status.
After replacing new "PCM(ECM)" scantool displays that PCM(ECM) is virgin status in Key Teaching mode.
"VIRGIN" status means that PCM(ECM) has not matched any PIN code before.



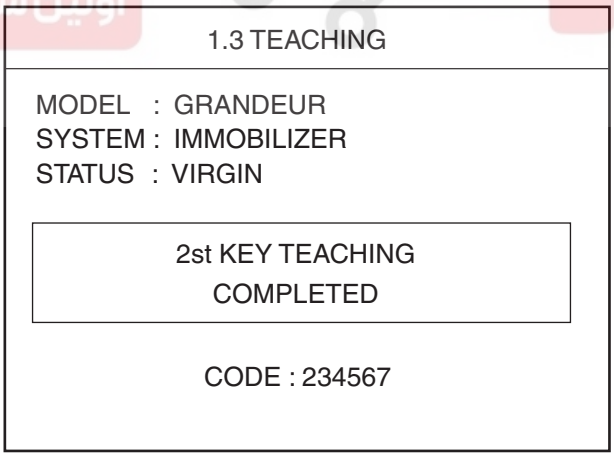
ETBF741H



ETBF741K



ETBF741I



ETBF741L

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

User password teaching is only accepted by a "learnt" PCM(ECM). Before first teaching of user password to an PCM(ECM), the status of the password is "virgin" No limp home function is possible.

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

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

If incorrect user passwords or wrong vehicle specific data have been sent to the PCM(ECM) three times, the PCM(ECM) will reject the request to change the password for one hour. This time cannot be reduced by disconnecting the battery or any other actions. After reconnecting the battery, the timer starts again for one hour.

1) User password teaching

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER

01. CURRENT DATA
02. PASSWORD TEACHING/CHANGING
03. TEACHING
04. NEUTRAL MODE
05. LIMP HOME MODE

ETBF741M

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

INPUT NEW PASSWORD OF FOUR FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD :

ETBF741N

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

INPUT NEW PASSWORD OF FOUR FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD : 2345

ETBF741O

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

ARE YOU SURE ? [Y/N]

NEW PASSWORD : 2345

ETBF741P

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT OLD PASSWORD OF FOUR FIGURES AND PRESS [ENTER] KEY

OLD PASSWORD :

ETBF741R

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : VIRGIN

COMPLETED
PRESS [ESC] TO EXIT

NEW PASSWORD : 2345

ETBF741Q

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT OLD PASSWORD OF FOUR FIGURES AND PRESS [ENTER] KEY

OLD PASSWORD : 2345

ETBF741S

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

2) User password changing

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER

01. CURRENT DATA
02. PASSWORD TEACHING/CHANGING
03. TEACHING
04. NEUTRAL MODE
05. LIMP HOME MODE

ETBF741M

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT NEW PASSWORD OF FOUR FIGURES AND PRESS [ENTER] KEY

NEW PASSWORD : 1234

ETBF741T

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

ARE YOU SURE ? [Y/N]

NEW PASSWORD : 1234

ETBF741U

1.2 PASSWORD TEACHING/CHANGING

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

COMPLETED
PRESS [ESC] TO EXIT

NEW PASSWORD : 1234

ETBF741V

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, there is no special procedure required. A new SMARTRA device simply replaces the old one. There are no transponder-related data stored in this device.

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

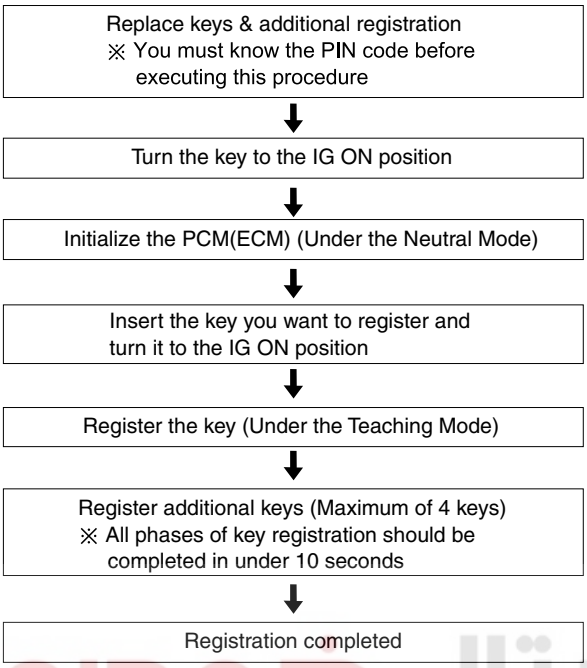
When installing PCM(ECM) of car "A" on car "B"
※ All non-virgin PCM(ECM)`s need to be neutralized before installing on the other vehicles.
↓
Neutralize the PCM(ECM) of car "A"
↓
Installing the PCM(ECM) of car "A" on car "B"
↓
Register the keys with the PIN code of car "B"
↓
Register additional keys (Maximum of keys)
※ All phases of key registration should be completed in under 10 seconds
↓
Registration completed

ETBF746A

PROBLEMS AND REPLACEMENT PARTS: EFE4ACF4

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	NO

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



ETBF746B

NOTE

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

NEUTRALISING 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. A valid ignition key is inserted and after ignition on is recorded, the PCM(ECM) requests the vehicle specific data from the scanner. The communication messages are described at" Neutral Mode". After successfully receiving the data, the PCM(ECM) is neutralized.
The PCM(ECM) remains locked. Neither the limp home mode nor the "twice ignition on" function is accepted by PCM(ECM).
The teaching of keys follows the procedure described for virgin PCM(ECM). The vehicle specific data have to be unchanged due to the unique programming of transponder. If data should be changed, new keys with virgin transponder are requested.

NOTE

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

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER

01. CURRENT DATA
02. PASSWORD TEACHING/CHANGING
03. TEACHING
04. NEUTRAL MODE
05. LIMP HOME MODE

ETBF745A

1. HYUNDAI VEHICLE DIAGNOSIS

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER

01. CURRENT DATA
02. PASSWORD TEACHING/CHANGING
03. TEACHING
04. NEUTRAL MODE
05. LIMP HOME MODE

ETBF745C

1.4 NEUTRAL MODE

MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : LEARNT

INPUT PIN OF SIX
FIGURE AND PRESS [ENTER] KEY

CODE : 234567

ETBF745E

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

ETBF745D

1.4 NEUTRAL MODE

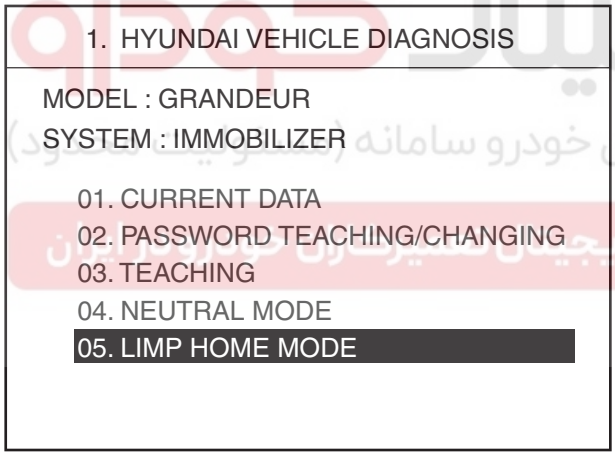
MODEL : GRANDEUR
SYSTEM : IMMOBILIZER
STATUS : NEUTRAL

COMPLETED
PRESS [ESC] TO EXIT

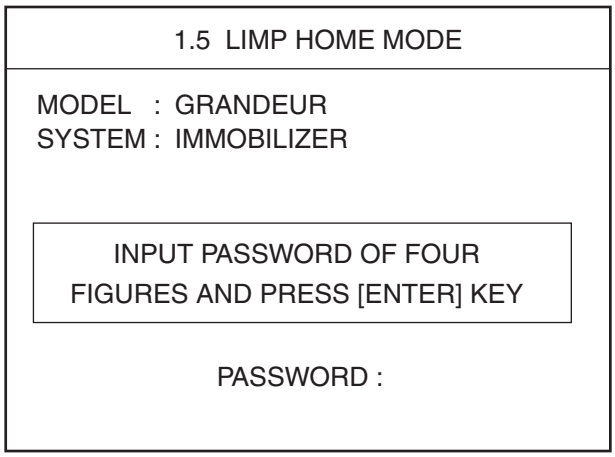
ETBF745B

LIMP HOME FUNCTION E85FBC10

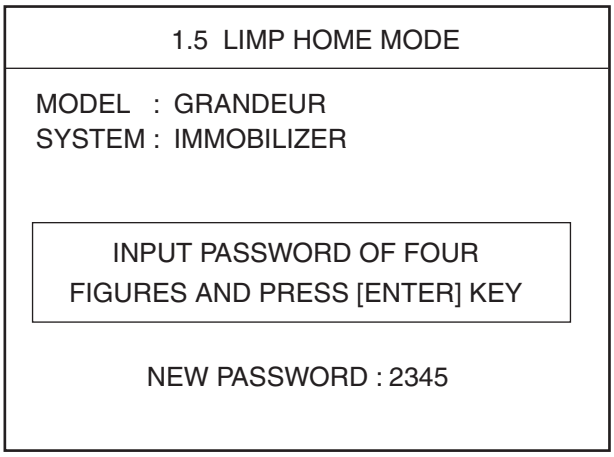
1. LIMP HOME BY TESTER
   If the PCM(ECM) detects the fault of the SMARTRA or transponder, the PCM(ECM) will allow limp home function of the immobilizer. Limp home is only possible if the user password (4 digits) has been given to the PCM(ECM) before. This password can be selected by the vehicle owner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



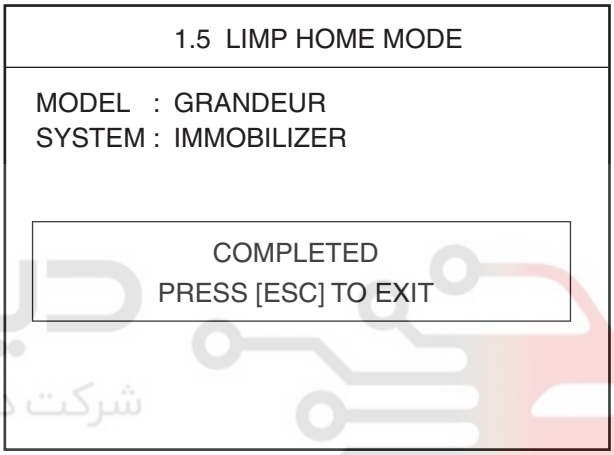
ETBF741W



ETBF741X



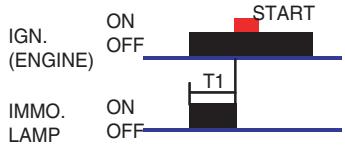
ETBF741Y



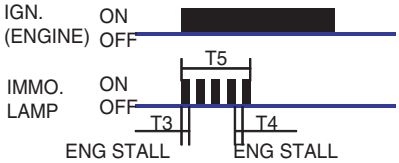
ETBF741Z

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.

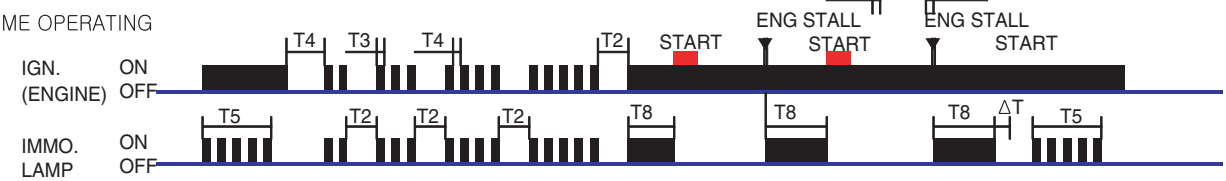
1. NORMAL CONDITION(NO FAILURE)



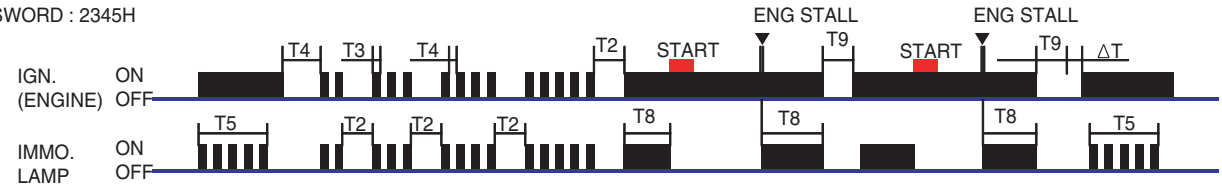
2. IN CASE OF FAILRE(LIMP HOME)



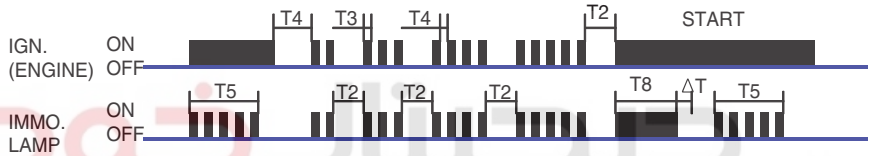
3. LIMP HOME OPERATING



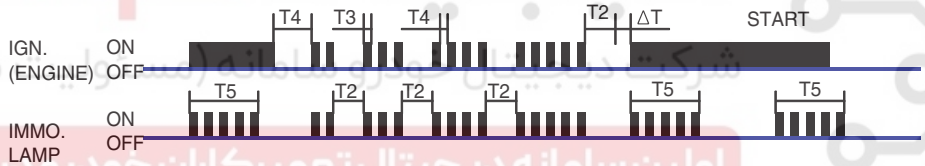
USER PASSWORD : 2345H



USER PASSWORD : 2345H

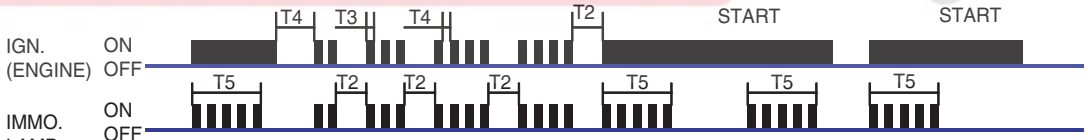


USER PASSWORD : 2345H



USER PASSWORD : 2345H

2 3 4 5



USER PASSWORD : 2345H

2 3 4 4

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

DIAGNOSIS OF IMMOBILIZER FAULTS E0F3CB27

- 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
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. 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) 2.	P1696 (Authentication fail) P1698 (Invalid transponder)
Locked by timer	1. Exceeding the maximum limit of Twice IGN ON (⊇ 32 times)	P1699 (Twice IG ON over trial)
Tester (SCAN TOOL) fault	1. Request from tester is invalid (Protocol layer violation- Invalid request, check sum error etc.)	P1697 (Tester message error)

DTC P1610 NON-IMMOBILIZER-EMS CONNECTED TO AN IMMOBILIZER

GENERAL DESCRIPTION ED2CB093

The PCM and the SMARTRA communicate by dedicated line. During this communication of PCM and SMARTRA the K line of PCM cannot be used for communication. The PCM controls the communication either to SMARTRA or to other devices(e.g. scanner) on K line by switching of a multiplexer and specific communication procedures. The multiplexer is a part of PCM hard ware.

DTC DESCRIPTION EF5BBF2C

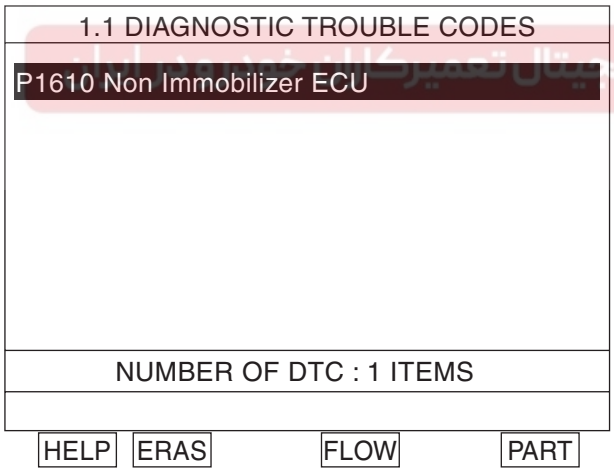
This DTC indicates that the vehicle which has a immobilizer system is equipped with non Immobilizer PCM.

DTC DETECTING CONDITION ECD4D37D

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Faulty PCM
Detecting Criteria	• Equipped with non Immobilizer PCM	

MONITOR SCANTOOL DATA E4D3E6BF

1. Ignition "ON" & Engine "OFF".
2. Connect Scan tool and clear the DTCs.



LTLJF742F

3. Is the DTC "P1610 Non Immobilizer ECU" displayed?

YES

Replace PCM which has a Immobilizer system and perform key teaching.
And then go to "Verification of Vehicle Repair" procedure.

NO

Fault is intermittent caused by poor contact in the SMARTRA's and/or PCM's connector or was repaired and PCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E4465D5B

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC P1674 TRANSPONDER STATUS ERROR

GENERAL DESCRIPTION E4FAAADA

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 unique; therefore the content of transponder can never be modified or changed. The data are a string of 9 bytes defined by vehicle manufacturer.
The transponder memory is split into two strings called authenticator and key password after this programming the transponder memory is locked and the data (PIN code) cannot be read or changed respectively. The transponder status changes from "virgin" to "learnt" Additionally every transponder includes a unique IDE (Identifier number) of 32 bit. Unique means that the IDE of all transponder is different from each other. The IDE is programmed by the transponder manufacturer and is a read-only value. The authenticator and the key password are not transferred from PCM to transponder or vice versa. Only the results from the encryption algorithm are transferred. It is almost impossible to calculate the vehicle specific data from the encryption result.
For teaching of keys and special purposes the PCM is connected to the tester device.

When IG is ON, the coil supplies energy to the transponder which in turn accumulates energy in the condenser.
Once the energy supply from the coil has stopped, using the stored energy in the condenser, the transponder transmits the ID CODE (stored within the ASIC).

DTC DESCRIPTION E9BE25DC

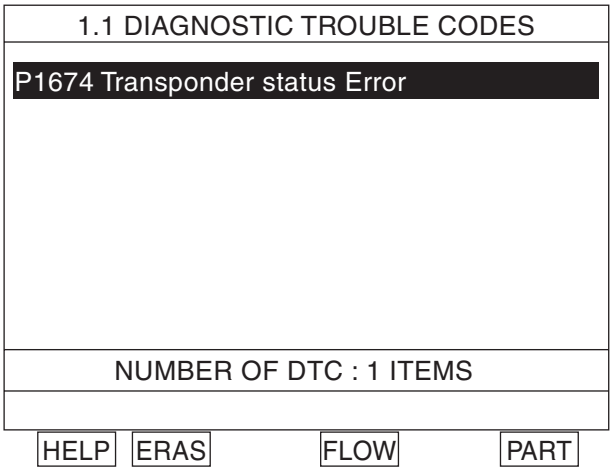
This DTC indicates that the TP is not in password mode, or Transponder transport data has been changed.

DTC DETECTING CONDITION E24D0A16

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Transponder Key
Detecting Factors	• Password mode invalid	
Detecting Window	• During Transponder Write or Read EEPROM Page	
Detecting Criteria	• TP not in password mode, or Transponder transport data has been changed	

MONITOR SCANTOOL DATA EFE0857E

1. Ignition "ON" & Engine "OFF".
2. Connect Scan tool and clear the DTCs.



LTLJF742G

3. Is the DTC "P1674 Transponder status Error" displayed?

YES

Check Key status of the current data.
If Transponder is not virgin, check transponder which is registered other vehicles
Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Fault is intermittent caused by poor contact in the SMARTRA's and/or PCM's connector or was repaired and PCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E0D92C97

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC P1675 TRANSPONDER PROGRAMMING ERROR

GENERAL DESCRIPTION EA0C6B6A

Refer to DTC P1674.

DTC DESCRIPTION E46EBDFA

This DTC indicates that TP has Invalid Transponder Data.

DTC DETECTING CONDITION E9CC291F

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Transponder Key
Detecting Factors	• TP programming error	
Detecting Window	• During Transponder Write EEPROM Page request while Transponder is in authorized state.	
Detecting Criteria	• Corrupted data form Transponder (Tp), or more than one TP in the field, or no TP in the magnetic field.	

MONITOR SCANTOOL DATA E628FBAA

Refer to DTC P1690.

COMPONENT INSPECTION EE9A91C3

1. Check Transponder

   1) Ignition "ON" & Engine "OFF".

   2) Perform neutral mode, key teaching and password teaching/changing.
   (Refer to "Reference Data in General Information")

   NOTE

   Be sure that PIN code is prepared before performing neutral mode.

   3) Is the neutral, teaching and password teaching/changing mode possible?

   YES

   Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to " Verification of Vehicle Repair" procedure.

   NO

   Substitute with a known-good virgin Transponder and monitor CURRENT DATA.
   If the key status is displayed as "Virgin", replace Transponder.
   Perform key teaching mode in " Reference Data"
   Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR ECB38C77

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC P1676 SMARTRA MESSAGE ERROR

GENERAL DESCRIPTION ED15D0CE

Refer to DTC P1690.

DTC DESCRIPTION E5CA2C2D

This DTC indaicates that message from SMARTRA to PCM is invalid.

DTC DETECTING CONDITION E1DECD40

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Open or Short in SMARTRA Circuit • Faulty SMARTRA
Detecting Criteria	• No response from SMARTRA Invalid message from SMARTRA to PCM	

MONITOR SCANTOOL DATA ED31BFBB

Refer to DTC P1690.

COMPONENT INSPECTION EDE2B2AE

Refer to DTC P1675.

VERIFICATION OF VEHICLE REPAIR E578BF0B

Refer to DTC P1690.

DTC P1690 SMARTRA NO RESPONSE

GENERAL DESCRIPTION E8AAADCB

The SMARTRA carries out communication with the built-in transponder of the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The SMARTRA is mounted at the ignition lock close to the antenna coil for RF transmission and receiving.

The RF signal from the transponder received by the antenna coil is converted into messages for serial communication by the SMARTRA device. And the received messages from the PCM 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 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 PCM and vice versa.

SMARTRA : SMARt TRansponder Antenna

DTC DESCRIPTION E1A44367

This DTC indicates that there is no response from SMARTRA because of communication line error.(Open or short etc.)

DTC DETECTING CONDITION E84DFA0A

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Open or Short in SMARTRA Circuit • Faulty SMARTRA
Detecting Criteria	• No response from SMARTRA (Communication Line Error - Open or Short etc.)	

SIGNAL WAVEFORM E59B667B

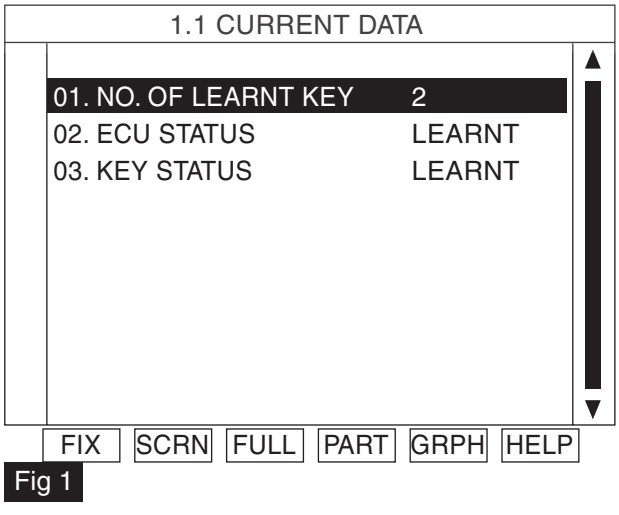


Fig 1

LTIF742A

EMS Status	Engine start with valid key	Engine start by limp home	Teaching of key	Teaching or changing of user password	Twice ignition of function
Not yet checked	No	No	No	No	No
Virgin	No	No	Yes	No	Yes, with virgin key
Learnt	Yes	Yes, with learnt user password	Yes	Yes	No
Neutral	No	No	Yes	No	No
Locked by timer	No	No	No	No	No

Fig 2

ETRF742B

1. PCM :

   1) Virgin(This is status at the end of PCM production line before delivery to customer)

   2) Neutral (This is a status that is erased all data regarding immobilizer by special command from scanner)

   3) Not Check (The status is stored in permanent memory (EEPROM or Flash etc.)
   In case of not plausible data from this circuit the PCM cannot check the status.

   4) Locked by timer (After a certain number of incorrect user Password(4) or PIN Code(6) the PCM is locked for one hour and no inputs are accepted during this time)

2. KEY :

   1) Virgin (It means the key in the key cylinder has not matched with PCM yet)

   2) Invalid (It means that data is mismatched between PCM and transponder)

   3) Not Checked (It means that PCM cannot check the transponder data in the key cylinder)
      - PCM cannot check the transponder data because of SMARTRA error or antenna coil error.
      - PCM cannot check the transponder data because of communication circuit problem between PCM and SMARTRA.
      - Key with NO Transponder
      - More than 1(One) Transponder in the magnetic field
      - No Transponder in the magnetic field
      - TP data blocked
      - TP data does not exist
      - TP data changed
      - TP Teaching error
      - Multiple TP data input

Current Data from Immobilizer will show the numbers of Key learnt, PCM status, and Key status as Fig 1. The current data provides an indication of the probable cause.
Fig 2. shows possibility of Engine start, Teaching or changing of user password according to PCM status.

MONITOR SCANTOOL DATA EFEDD5F5

1. Ignition "ON" & Engine "OFF".

2. Connect Scan tool and clear the DTCs.

3. If the DTCs are retrieved again, monitor "CURRENT DATA" to check No. of Learnt key, PCM and KEY status.

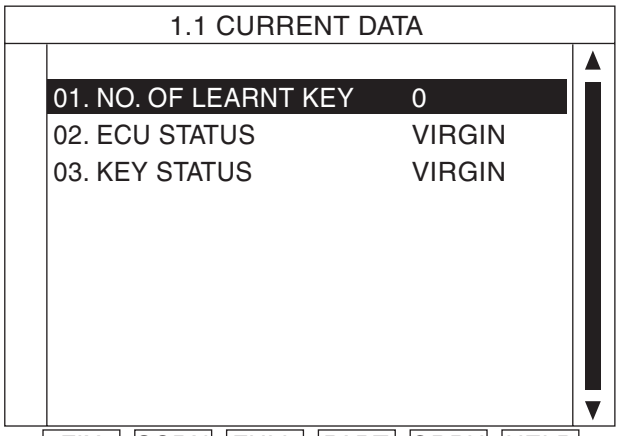


Fig 1

LTIF742C

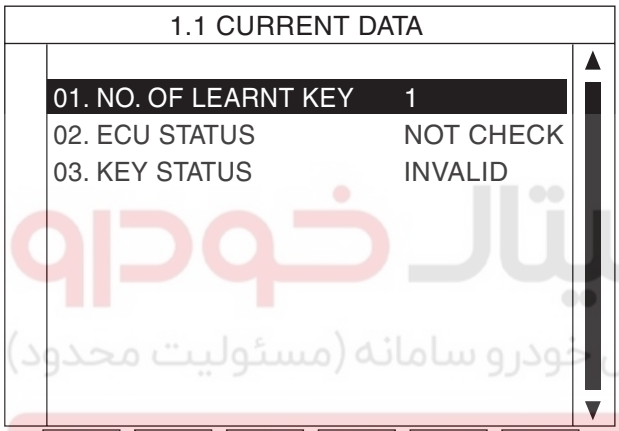


Fig 2

LTIF742D

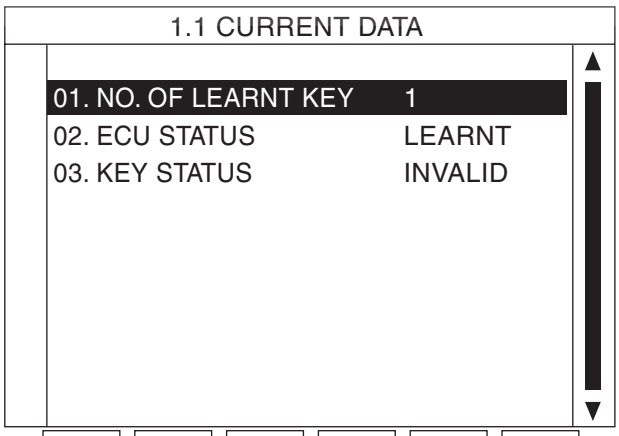


Fig 3

LTIF742E

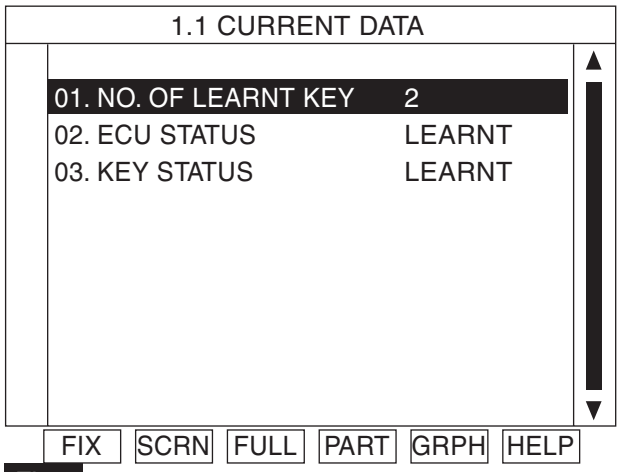


Fig 4

LTIF742F

Fig 1 : PCM has not matched with any Key yet.
Fig 2 : PCM Internal Failure.
Fig 3 : IG On with unmatched key.
Fig 4 : 2(two) Keys have been matched with PCM.

4. Are both Key and PCM status learnt?

YES

Fault is intermittent caused by poor contact in the SMARTRA's and/or PCM's connector or was repaired and PCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Go to "Terminal and connector Inspection" procedure.

TERMINAL AND CONNECTOR INSPECTION ED9E6DA5

1. Many malfunctions in the electrical system are caused by poor harness and terminals.
Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.

2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.

3. Has a problem been found?

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

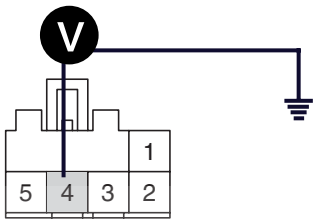
NO

Go to " Power Circuit Inspection " procedure.

POWER SUPPLY CIRCUIT INSPECTION EFBACFCC

1. Ignition "OFF".
2. Disconnect SMARTRA connector.
3. Ignition "ON" & Engine "OFF".
4. Measure voltage between terminal 4 of the SMARTRA harness connector and chassis ground.

Specification : B+



3. Ground
4. Power

LTIF742G

5. Is the measured voltage within specifications?

YES

Go to "Signal Circuit Inspection" procedure.

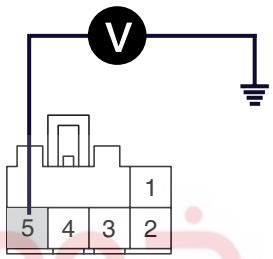
NO

Check open or short in power harness.
Check that 15A SENSOR fuse located between Main relay and Smartra is open or blown off.
Repair as necessary and go to "Verification of Vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION EEF0D31A

1. Check for short in harness.
   1) Ignition "OFF".
   2) Disconnect SMARTRA connector.
   3) Ignition "ON" & Engine "OFF".
   4) Measure voltage between terminal 5 of the SMARTRA harness connector and chassis ground.

Specification : Approx. 5.48V



5. Signal

LTIF742H

5) Is the measured voltage within specifications?

YES

Go to "Check for open in harness" as below.

NO

Check short in signal harness.
Repair as necessary and go to "Verification of Vehicle repair" procedure.

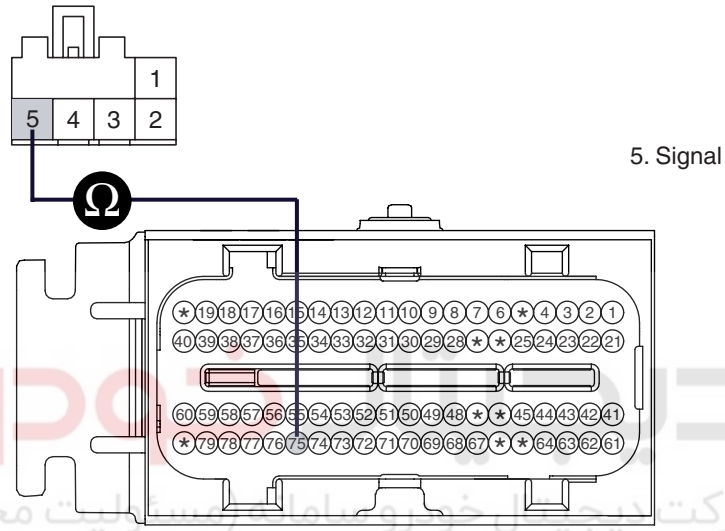
2. Check for open in harness

   1) Ignition "OFF".

   2) Disconnect SMARTRA connector.

   3) Measure resistance between terminal 5 of the SMARTRA harness connector and terminal 75 of PCM harness connector.

Specification : Approx. below 1Ω



   4) Is the measured resistance within specifications?

YES

Go to "Ground Circuit Inspection" procedure.

NO

Check for open in signal harness.
Repair as necessary and go to "Verification of Vehicle repair" procedure.

GROUND CIRCUIT INSPECTION E1E16F4F

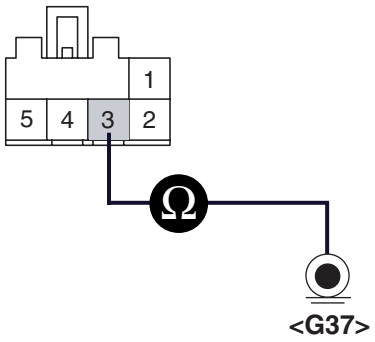
1. Check for open in harness between SMARTRA and Chassis ground.

   1) Ignition "OFF".

   2) Disconnect SMARTRA connector.

3) Measure resistance between terminal 3 of the SMARTRA harness connector and Chassis ground.

Specification : Approx. below 1Ω



3. Ground

LTJF742J

4) Is the measured resistance within specifications?

YES

Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Check for open in ground harness.
Make sure that Chassis ground G37 is firmly tightened properly.
Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EC1196D0

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC P1691 ANTENNA COIL ERROR

GENERAL DESCRIPTION ED11A9DC

This wireless communication runs on RF . The SMARTRA is mounted at the ignition lock close to the antenna coil for RF transmission and receiving. The RF signal from the transponder received by the antenna coil is converted into messages for serial communication by the SMARTRA device. And the received messages from the EMS are converted into an RF signal, which is transmitted, to the transponder by the antenna.

DTC DESCRIPTION E70A3D4A

This DTC indicates that there is open or short in antenna coil circuit.

DTC DETECTING CONDITION E4DDBA09

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Open or short in coil circuit • Faulty Antenna Coil
Detecting factors	• Antenna signal error	
Detecting Window	• Before transponder communications	
Detecting Criteria	• Antenna open/short circuit	

MONITOR SCANTOOL DATA ECA6C8C9

Refer to DTC P1690.

COMPONENT INSPECTION EC217FBC

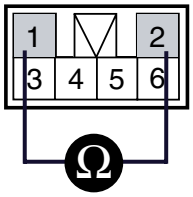
1. Check Antenna Coil

   1) Ignition " OFF".

   2) Disconnect SMARTRA connector.

   3) Measure resistance between terminal 1 and 2 of the SMARTRA connector (Component side)

Specification : Approx. 8.5Ω



1. Antenna coil(+)
2. Antenna coil(-)

ETBF743F

4) Is the measured resistance within specifications?

YES

Go to " Check SMARTRA" as below.

NO

Check for open in harness between SMARTRA and Antenna coil, repair or replace as necessary.
Substitute with a known-good Antenna Coil and check for proper operation. If the problem is corrected, replace Antenna Coil. And then, go to "Verification of Vehicle Repair" procedure.

2. Check SMARTRA

1) Ignition " ON" & Engine "OFF".

2) Perform neutral mode, key teaching/changing and password teaching according to description in "System inspection" procedure.

NOTE

Be sure that PIN code is prepared before performing neutral mode.

3) Is Key teaching completed?

YES

Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known-good SMARTRA and check for proper operation. If the problem is corrected, replace SMARTRA and Go to "Verification of Vehicle Repair" procedure.

NOTE

In case of faulty SMARTRA, there are no special procedures required. A new SMARTRA device simply replaces the old one. (There are no transponder-related data stored in this device.)

VERIFICATION OF VEHICLE REPAIR EBB24E1D

Refer to DTC P1690.

DTC P1692 IMMOBILIZER LAMP ERROR

GENERAL DESCRIPTION EAF6EFCD

The driver is informed about successful authentication by immobilizer lamp at cluster. The lamp is "ON" after successful authentication until the detection of minimum engine speed for PCM operation (begin of engine cranking).
After the IG ON, the Immobilizer lamp will be turned ON for 30 seconds then, goes off if the immobilizer system is O.K.
In case of the immobilizer system is failed, the immobilizer lamp will be blinking for 5 times then goes off.

DTC DESCRIPTION E1D2F7CC

This DTC indicates that there is short in lamp circuit.

DTC DETECTING CONDITION ECEFC20B

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Short in Lamp circuit
Detecting Criteria	• Line : Short circuit	

SYSTEM INSPECTION EE91DAC1

1. Ignition "ON" & Engine "OFF".
2. Check Immobilizer indicator lamp.

   NOTE

   a. Normal Condition : After the IG ON, the Immobilizer lamp will be turned ON for 30 seconds then, goes off if the immobilizer system is O.K.
   b. Malfunction on Immobilizer system : The immobilizer lamp will be blinking for 5 times then goes off.

3. Is the immobilizer lamp operating correctly?

   YES

   Fault is intermittent caused by poor contact in the lamp's and/or PCM's connector or was repaired and PCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
   Repair or replace as necessary and then go to " Verification of Vehicle Repair" procedure.

   NO

   Go to " Component Inspection" procedure.

COMPONENT INSPECTION E7BE47E1

1. Check Immobilizer indicator control

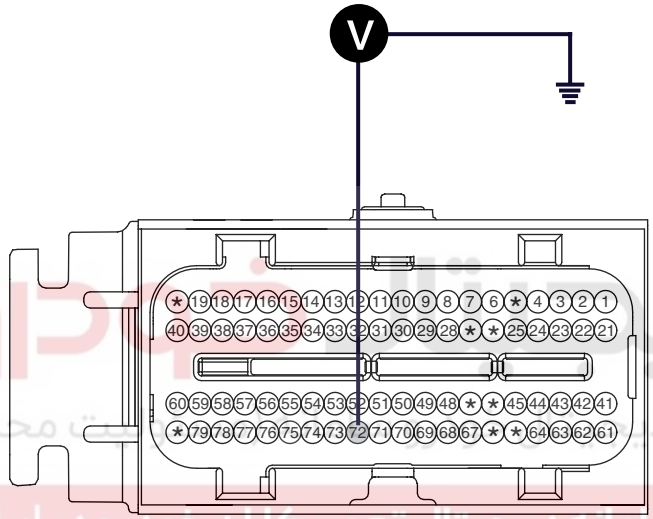
   1) Ignition "OFF"

   2) Disconnect PCM connector

   3) Ignition "ON" & Engine "OFF"

   4) Measure voltage between terminal 72 of PCM harness connector and chassis ground

Specification : Approx. 11 V



ETBF743L

   5) Is the measured voltage within specifications?

YES

Go to " Check Immobilizer indicator bulb" as below

NO

Check for short to battery in the control circuit.
Repair or replace as necessary and then, go to "Verificatio of Vehicle Repair" procedure.

2. Check Immobilizer bulb

   1) Ignition "OFF"

   2) Disconnect PCM connector

   3) Jump between terminal 72 of PCM harness connector and Chassis ground with jumper wire.

   4) Ignition "ON" and Engine "OFF"

Specification : Immobilizer lamp "ON"

   5) Is the Immobilizer indicator lamp turned "ON"?

YES

Substitute with a known-good PCM and check for proper operation.
If the problem is corrected, replace PCM and then go to " Verification of Vehicle repair" procedure.

NOTE

In case of faulty PCM, it has to be replaced with "VIRGIN" or " NEUTRAL" PCM.

NO

Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EB06AFCB

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC P1693 TRANSPONDER NO RESPONSE ERROR / INVALID RESPONSE

GENERAL DESCRIPTION EDBA7FE9

Refer to DTC P1674.

DTC DESCRIPTION E0ACFC8D

This DTC indicates that the TP has invalid Transponder Data.

DTC DESCRIPTION ED45F8AA

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Transponder Key
Detecting factors	• Invalid Transponder Data	
Detecting Window	• During Transponder IDE • During Transponder Authentication requests • During Transponder Write EEPROM page requests • During Transponder Read EEPROM page requests	
Detecting Criteria	• Corrupted data form Transponder (Tp), or more than one TP in the field, or no TP in the magnetic field.	

MONITOR SCANTOOL DATA E6A3DFF5

Refer to DTC P1690.

COMPONENT INSPECTION EC7E3838

Refer to DTC P1675.

VERIFICATION OF VEHICLE REPAIR ED4F4625

Refer to DTC P1690.

DTC P1694 EMS MESSAGE ERROR

GENERAL DESCRIPTION E2B9E594

Refer to DTC P1610.

DTC DESCRIPTION E8209FDC

This DTC indicates that request from PCM is invalid or request has corrupt data.

DTC DETECTING CONDITION EC9CAC89

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Faulty PCM
Detecting factors	• Request from Control unit is invalid	
Detecting Window	• End of PCM request message	
Detecting Criteria	• Protocol layer violation - Invalid request, Invalid check sum.)	

MONITOR SCANTOOL DATA EC541C0C

Refer to DTC P1690.

COMPONENT INSPECTION EB360A1C

1. Check PCM

   1) Ignition " ON" & Engine "OFF".

   2) Perform Key Teaching Procedure in "Reference Data" described in General Information.

   3) Is the Key teaching completed?

      YES

      Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to " Verification of Vehicle Repair" procedure.

      NO

      Substitute with a known-good PCM and check for proper operation. If the problem is corrected, replace PCM and then go to " Verification of Vehicle repair" procedure.

NOTE

1. *Don't forget to prepare for the PIN of the vehicle before removing PCM from the vehicle.*
2. *Remember that substituting with a known-good PCM should be followed "The things to remember before replacement (PCM)".*
   (In case of faulty PCM, it has to be replaced with "VIRGIN" or " NEUTRAL" PCM.)
3. *Ensure that the correct PIN is entered when replacing a new PCM.*

VERIFICATION OF VEHICLE REPAIR ECFE4A9C

Refer to DTC P1690.

DTC P1695 EMS MEMORY ERROR

GENERAL DESCRIPTION E44D8E53

The relevant data for the immobilizer function are stored at permanent memory (EEPROM or Flash etc.).
The immobilizer data are stored by three independent entries.
The data from EEPROM are evaluated by "2 of 3 decision". That means all three entries are read and the content is compared before authentication process.
If the contents of all entries are equal, the authentication will run without additional measures.
If only the contents of two entries are equal, the authentication will run and fault code "EEPROM defective" is stored at PCM.
If the contents of all three entries are different from each other, no authentication will be possible and the fault code "EEPROM defective" will be stored. The limp home function cannot be activated. The PCM shall be replaced if the EEPROM related fault occurs again after new teaching of all keys.

DTC DESCRIPTION E911C6D0

This DTC is indicates that not only PCM have inconsistent data of EEPROM for number of keys taught, user password state and invalid write operation to EEPROM but PCM can not recognize the unique PIN code during Key Authentication.

DTC DETECTING CONDITION E0EE2A4D

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Faulty PCM
Detecting Criteria	• PCM internal permanent memory(EEPROM or Flash etc.) fault. • Invalid write operation to permanent memory(EEPROM or Flash etc.) fault.	

MONITOR SCANTOOL DATA EC64BD29

Refer to DTC P1690.

COMPONENT INSPECTION E21A9380

Refer to DTC P1694.

VERIFICATION OF VEHICLE REPAIR EC79815B

Refer to DTC P1690.

DTC P1696 AUTHENTICATION FAIL

GENERAL DESCRIPTION E4C66AB6

Refer to DTC P1693.

DTC DESCRIPTION E1BBAA1C

This DTC indicates that the TP(Transponder) status is Virgin or Invalid when PCM status is Learnt.(Authentication fail).

DTC DETECTING CONDITION E0EE32FC

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Faulty TP(Virgin or Invalid)
Detecting Criteria	• Virgin TP at EMS STATUS "Learnt" • Learnt(Invalid) TP at EMS status "Learnt"(Authentication fail)	

MONITOR SCANTOOL DATA E8ABCFF0

1. Ignition "ON" & Engine "OFF".
2. Connect Scan tool and clear the DTCs.
3. If the DTCs are retrieved again, monitor "CURRENT DATA" to check No. of Learnt key, PCM and KEY status.

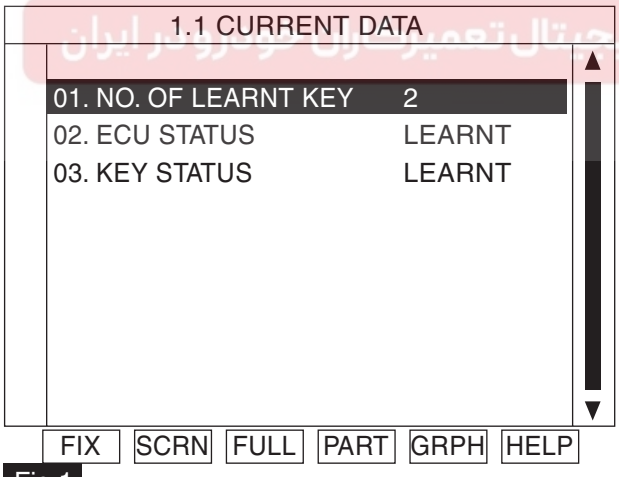


Fig 1

LTJF742L

Fig 1 : 2(two) Keys have been matched with PCM.

4. Are both Key and PCM status learnt?

YES

Fault is intermittent caused by poor contact in the SMARTRA's and/or PCM's connector or was repaired and PCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

In case that key status is "Virgin".
The key is not registered yet.
Perform key teaching of the key and then go to "Verification of Vehicle Repair" procedure.

In case that key status is "Invalid"
The key is registered in other vehicles or the key is not registered when all the keys are registered.
Perform key teaching of all the keys again and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA8B87D2

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC P1697 HI-SCAN MESSAGE ERROR

GENERAL DESCRIPTION EBDA848E

Refer to DTC P1610.

DTC DESCRIPTION ECFEDFF3

This DTC indicates that PCM received invalid tester message / unexpected requests from tester or PCM Locked by timer (e.g. exceeding the maximum limit of twice ignition On or teaching trials).

DTC DETECTING CONDITION E45A5228

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Poor connection between Scanner and DLC (Data Link connector) • Scanner Program Error • Locked by timer (e.g. exceeding the maximum limit of twice ignition On or teaching trials)
Detecting Criteria	• Request from Tester is Invalid(Tester Error) : (Protocol layer violation - Invalid request, check sum error etc.) • Locked by timer (e.g. exceeding the maximum limit of twice ignition On or teaching trials)	

MONITOR SCANTOOL DATA E000AF27

1. Ignition "ON" & Engine "OFF".
2. Connect Scan tool and clear the DTCs.
3. If the DTCs are retrieved again, monitor "CURRENT DATA" to check No. of Learnt key, PCM and KEY status.

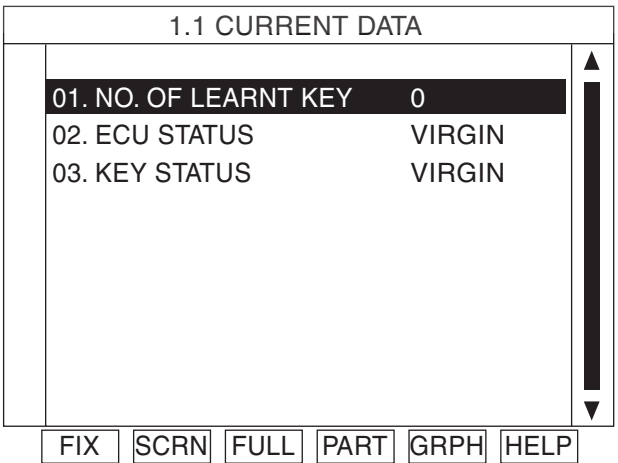


Fig 1

LTIF742C

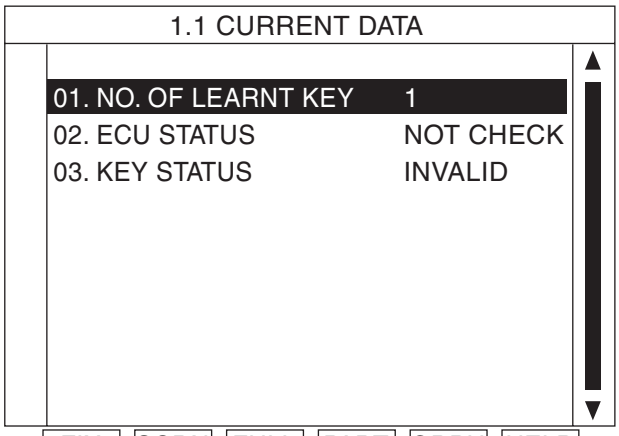


Fig 2

LTIF742D

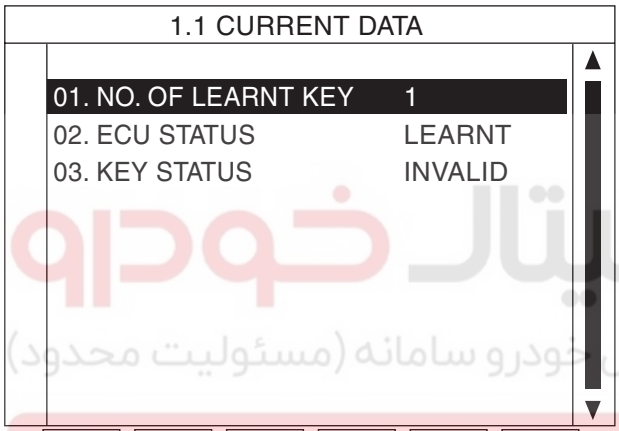


Fig 3

LTIF742E

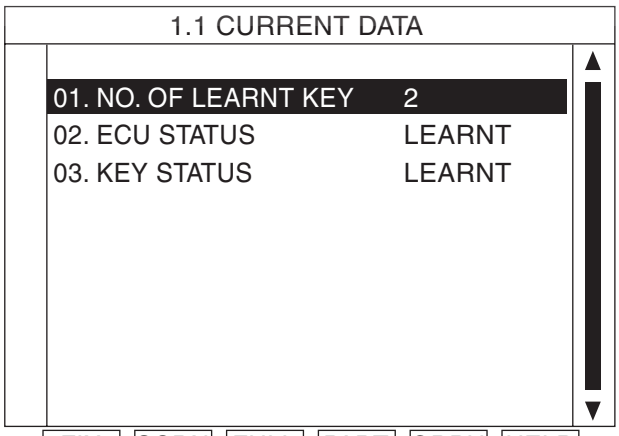


Fig 4

LTIF742F

Fig 1 : PCM has not matched with any Key yet.
Fig 2 : PCM Internal Failure.
Fig 3 : IG On with unmatched key.
Fig 4 : 2(two) Keys have been matched with PCM.

4. Is the communication possible between scan tool and Immobilizer system?

YES

If communication between SMARTRA and PCM is OK, Check PCM status of the current data.
If PCM status is "Lock", Please wait for one hour with IG Key "ON" and then go to " Verification of Vehicle Repair" procedure.

NOTE

Disconnecting battery or others manipulation can not reduce this time. After connecting the battery the timer starts again for one hour.

NO

Check DLC cable connection between Scanner and DLC. And, update the scan tool program card with latest version. Finally try communication between scan tool and Immobilizer system.
If problem still continues, Substitute with a known-good scan tool and check for proper operation. If the problem is corrected, and then go to " Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E7AA3FD9

Refer to DTC P1690.

DTC P1699 TWICE OVERTRIAL

GENERAL DESCRIPTION E291A5EB

This is a special function for engine start by vehicle manufacturer. The engine can be started for moving from the production line to an area where the key teaching is proceeded.

DTC DESCRIPTION E3EAEC03

This DTC indicates that starting time of twice ignition 'ON' exceed the maximum limit.

DTC DETECTING CONDITION E13970DB

Item	Detecting Condition	Possible cause
Enable Condition	• IG ON	• Locked by timer
Detecting Criteria	• Exceeding the maximum limit of Twice IGN ON (≥ 32 times)	

MONITOR SCANTOOL DATA EA5732AB

1. Ignition "ON" & Engine "OFF".
2. Connect Scan tool and clear the DTCs.
3. If the DTCs are retrieved again, monitor "CURRENT DATA" to check No. of Learnt key, PCM and KEY status.

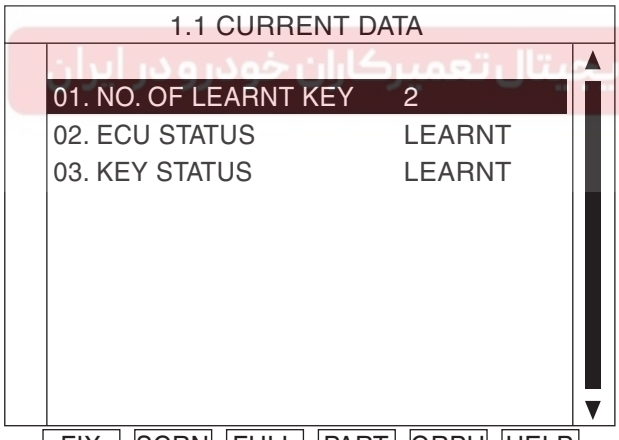


Fig 1

LTJF742L

Fig 1 : 2(two) Keys have been matched with PCM.

4. Is the PCM status displayed as "LOCK"?

YES

Wait for one hour with IG Key On.
Perform key teaching again and then go to " Verification of Vehicle Repair" procedure.

NOTE

Disconnecting battery or others manipulation can not reduce this time. After connecting the battery the timer starts again for one hour.

NO

Fault is intermittent caused by poor contact in the SMARTRA and/or PCM connector or was repaired and PCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination. deterioration, or damage.

Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA4D7B19

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and monitor CURRENT DATA to check No. of Learnt key, PCM and KEY status.
2. Select Diagnostic Trouble Codes(DTCs)" mode and Clear the DTCs.
3. Are any DTCs present?

YES

Go to the applicable troubleshooting procedure.

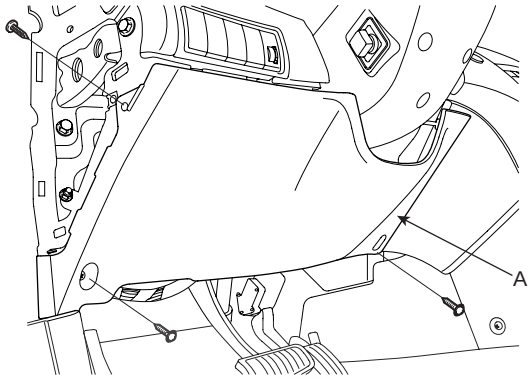
NO

System is performing to specification at this time.

IMMOBILIZER CONTROL UNIT

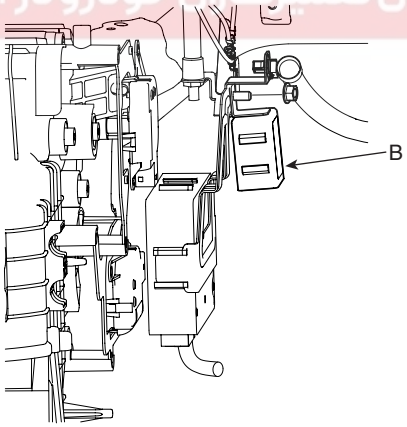
REPLACEMENT E939B8CD

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



KTBF450B

3. Disconnect connectors of lower panel.
4. Disconnect the 5P connector of the SMARTRA unit and then remove the SMARTRA unit (B) after loosening a nut.



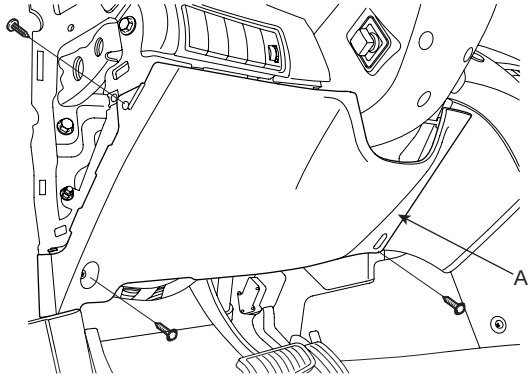
KTBF741C

5. Installation is the reverse of removal procedure.

COIL ANTENNA

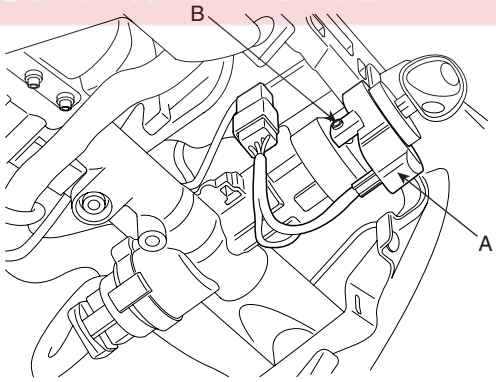
REPLACEMENT EFDE6ACF

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



KTBF450B

3. Remove the steering column shaft (Refer to the ST group).
4. Disconnect the 6P connector of the coil antenna and then remove the coil antenna (A) after loosening the screw.



KTRE781B

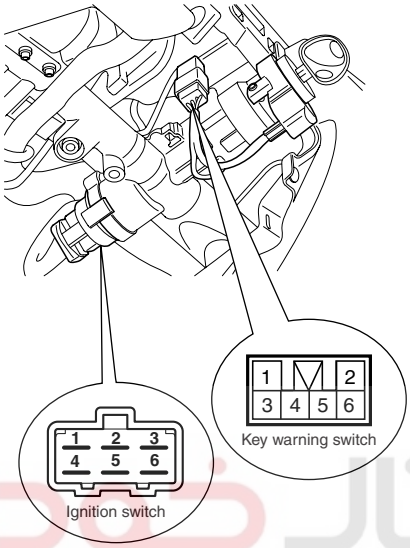
5. Installation is the reverse of removal procedure.

IGNITION SYSTEM

IGNITION SWITCH

INSPECTION E237E56C

1. Disconnect the ignition switch connector and key warning switch connector from under the steering column.
2. Check for continuity between the terminals.
3. If continuity is not specified, replace the switch.



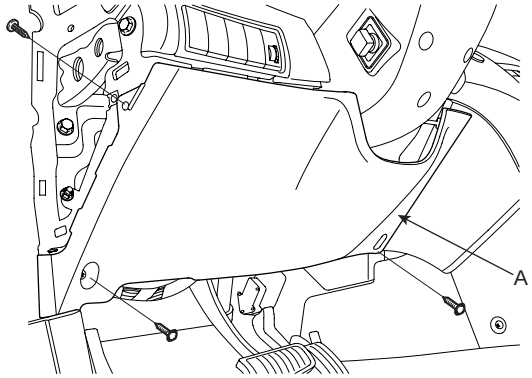
ETRF781D

POSITION \ TERMINAL	KEY	IGNITION SWITCH 2	4	6	5	3	1	STEERING TRAVEL	TRAVEL	KEY WARNING SWITCH 5	6	KEY HOLE ILLUMINATION 3	4
LOCK	REMOVAL							LOCK					
	INSERT							LOCK	UNLOCK				
ACC		○——	——					UNLOCK		○——	——		
ON		○——	——	——○	○——	——	——○						
START		○——	——	——○	○——	——	——○						

LTIF781E

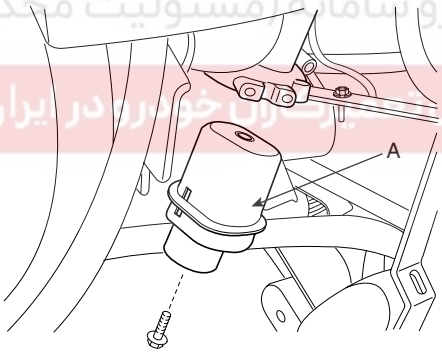
REPLACEMENT EAC4FDDA

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



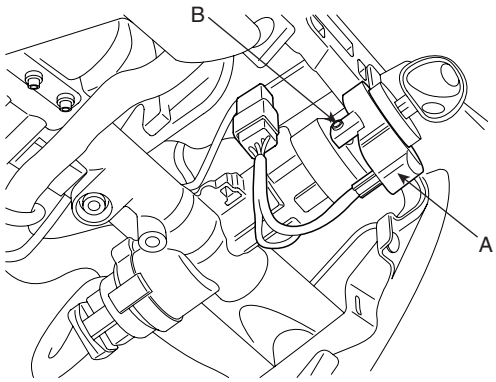
KTBF450B

3. Remove the ignition switch (A) after loosening the screw with IG ON and disconnecting the 6P connector.



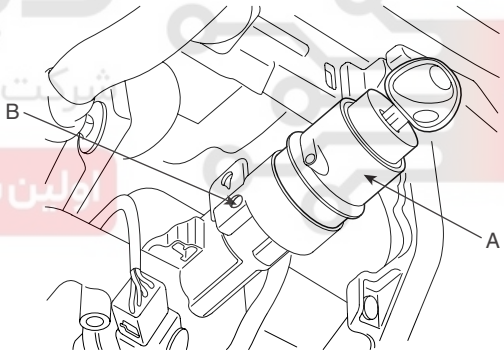
ATIE781A

4. Remove the steering column shaft (Refer to the ST group).
5. Remove the door warning switch and key illumination lamp (A) after loosening the screws (B) and disconnecting the 6P connector.



KTRE781B

6. If it is necessary to remove the key lock cylinder (A), Remove the key lock cylinder (A) after pushing lock pin (B) with key ACC.



KTRE781C

7. Installation is the reverse of removal procedure.

MULTIPLEX COMMUNICATION

DRIVER DOOR MODULE

DESCRIPTION EB1C698F

Driver side power window switch, a component of CAN, performs CAN communication with BCM, seat ECU, tilt ECU, passenger side power window switch. Driver controls driver side power window switch button located inside of the driver side door to operate power window, mirror, door lock and unlock.

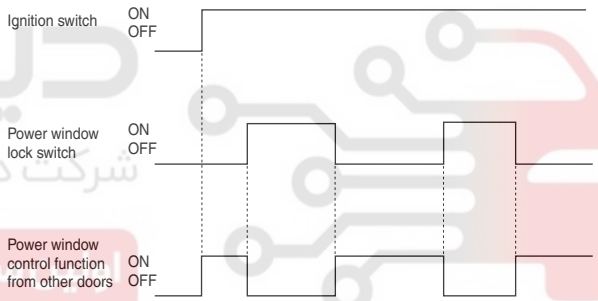
1. It performs 4 types of operation of manual up/down and automatic up/down operation for 4 power windows.
2. It performs manual operation of the mirror position by manual switch. (up/down and left/right)
3. It performs registration and replay of mirror position by the mirror switch up to 2 drivers.
4. It performs central door lock and unlock function
5. It loads trunk-opening signal on the BUS through the CAN communication.

FUNCTION E686BF1F

POWER WINDOW CONTROL

1. This switch controls power window up/down, automatic up/down from driver & assist side. Driver's power window switch sends input signal through CAN communication by the manual up/down and automatic up/down switch input. At the same time passenger side sends manual up/down and automatic up/down signals to the wires.
   → Each safety window ECU receives the signal and performs manual up/down and automatic up/down functions.

2. Power window lock
   When the driver's power window lock switch is ON, each safety window ECU receives the power window lock command to prohibit the operation by the passenger side doors except the driver's door.



LTCD341A

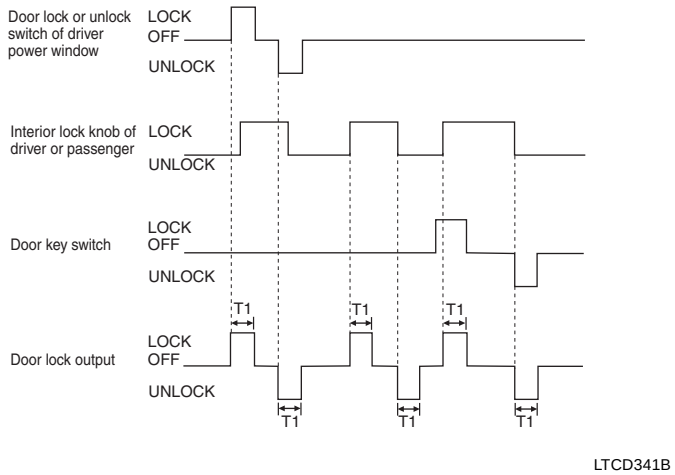
3. Timer function
   Power window switch can be controlled for 30 seconds after the ignition is turned off. This function stops immediately even within 30 seconds if the front door is opened.

CENTRAL DOOR LOCK/UNLOCK

1. Door lock/unlock switch of the driver side power window controls lock and unlock of all doors. (However, it cannot be unlocked when BCM receives the boundary mode through CAN communication, and it cannot be locked until the ignition off in case of crash unlock.)

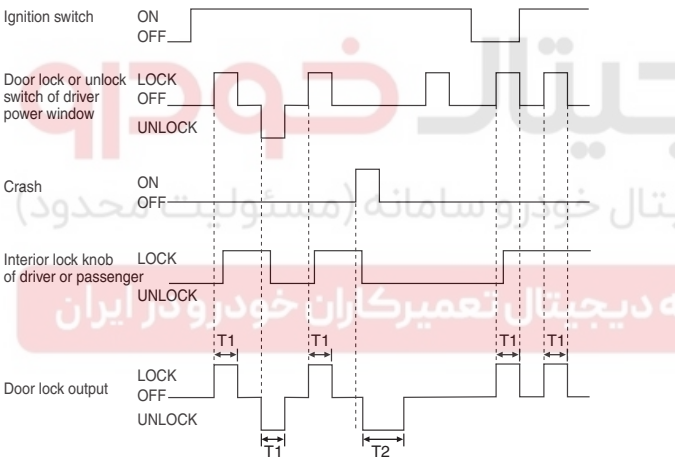
2. When the door is locked by the interior lock knob of the driver' s (or passenger side door), all doors can be locked. (Though, unlocking is not feasible)

3. When locking or unlocking with the door key switch from driver side, all doors can be locked or unlocked.



LTCD341B

T1 : 0.5 ± 0.1 sec.



LTCD341C

T1 : 0.5 ± 0.1 sec.
T2 : 5.0 ± 0.5 sec.

CRASH UNLOCK

1. When locking or unlocking with the door key switch from driver side (or passenger side), all doors can be locked or unlocked)

KEY REMINDER

1. If the door switch of driver side or passenger side is locked when door warning switch is turned on and (CAN communication reception), driver side or passenger side door is open, it executes unlock output for 1 second. If the passenger sidedoor remains locked even after the unlock output, it repeats on and off 3 times with the time interval of 0.5 second.

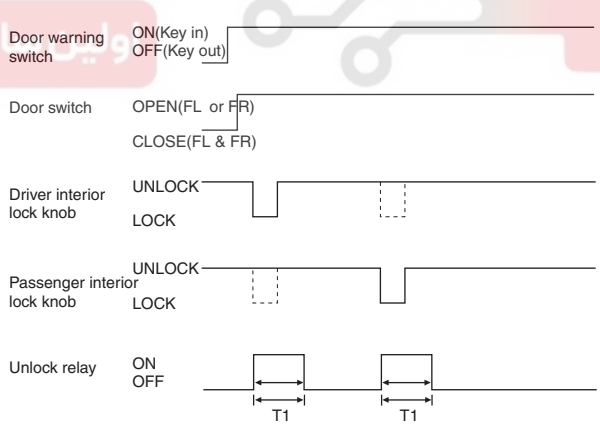
2. If it is converted into unlock during the output of three times, it stops the output. (It stops the next trial)

3. If the door-warning switch turns off during the output of three times, it stops the output. (It stops the next trial)

4. If the door warning switch doesn't turn on when driver door or passenger door is open, or driver side door or passenger side door is locked, it outputs unlock command.

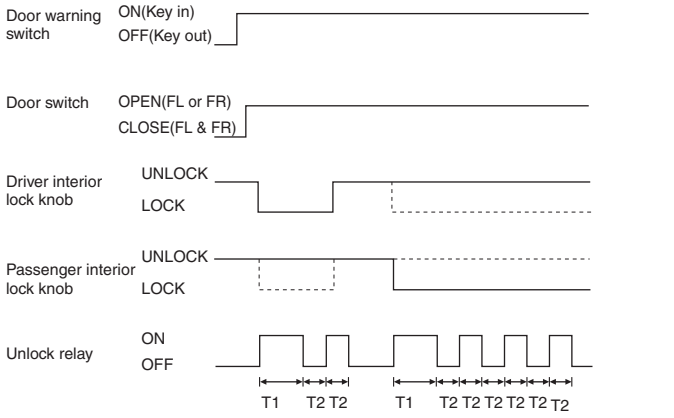
5. If the driver side or passenger side door is locked within 0.5 second after driver side or passenger side door is closed, it outputs unlock command for 1 second.

6. When the vehicle speed is over 3~5km/h (CAN communication reception), key reminder does not operate.



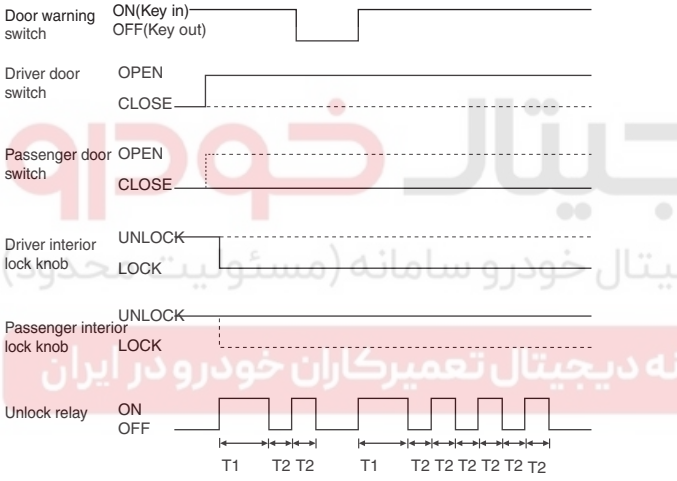
LTCD341H

T1 : 1 ± 0.2 sec.



LTCD341I

T1 : 1 ± 0.2 sec.
T2 : 0.5 ± 0.1 sec.

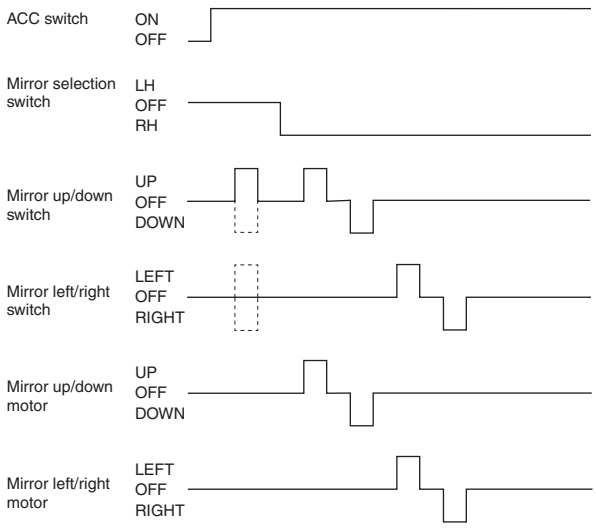


LTCD341J

T1 : 1 ± 0.2 sec.
T2 : 0.5 ± 0.1 sec.

OUTSIDE MIRROR CONTROL BY THE SWITCH

1. Manual control of left outside mirror
   If the mirror direction switch (up, down, left and right) is pressed when mirror selection switch on driver side power window switch is in outside LH under ACC ON condition, then mirror motor moves to the corresponding direction.

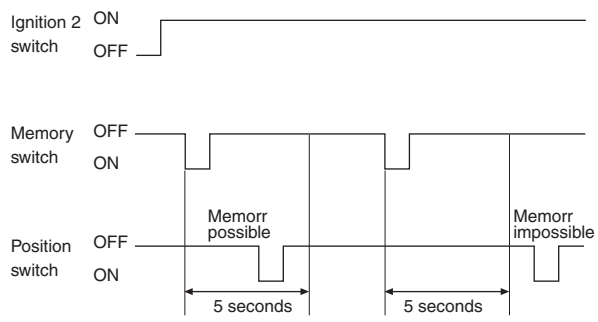


LTCD351M

2. Manual control of right outside mirror
   If the mirror direction switch (up, down, left and right) is pressed when mirror selection switch on driver side power window switch is in outside RH under ACC ON condition, then operating signal is sent to passenger side power window switch through CAN communication.

OUTSIDE MIRROR MEMORY OPERATION BY THE MEMORY SWITCH

1. If position switch (POS1 or POS2) is pressed within 5 seconds after pressing the memory switch under ignition 2 on, it registers current mirror position. (Switch module sends in LIN communication). (Memory permit status lasts for 5 seconds after memory switch ON. After 5 seconds, memory permits status terminates. In other words, current position is registeredif the position switch (POS1 or POS2) is turned on, during the memory permit status). However, RH side mirror position is not registered during the LH side mirror manual switch operation.



LTCD341N

2. Memory permit status is released if any of the following conditions is met.
   - After 5 seconds elapse from memory switch ON.
   - When the ignition 2 is OFF
   - When the memory stop switch is ON
   - When memory registration is complete

3. If more than 2 switches are pressed simultaneously between memory switch and position switches (POS1 or POS2), input is ignored. (Switch module sends in LIN communication)

4. Memory registration cannot be performed if the vehicle speed is over the speed limit or shift lever is not in " P" while the parking brake is released.

5. Memory is cleared if the battery is removed.

OUTSIDE MIRROR REPLAY OPERATION BY THE MEMORY SWITCH

1. Mirror is returned to the registered position as each position switch is pressed while the ignition 2 is ON.

2. Memory replay operation will be performed only if the memory is registered.(POS1 or POS2)

3. If the position switch (POS1 or POS2) is pressed while the memory replay is in operation, the final switch is effective.

4. Replay inhibit condition
   - When inhibit " P" switch is OFF
   - When the ignition 2 is OFF
   - When LH side mirror switch is pressed
   - When the vehicle speed is more than 3 km/h
   - When the memory STOP switch is turned ON

OUTSIDE MIRROR MEMORY AND REPLAY OPERATION BY KEYLESS

1. Memory operation
   - Outside mirror LH position is registered in the driver side power window switch when the ignition is turned off from on.
   - When door is locked by the keyless, outside mirror position is registered corresponding to the keyless code.
   - Data related to the memory operation is received from BCM in CAN communication.

2. Replay operation
   - When door is unlocked by the keyless under ignition off state, it replays the position corresponding to the keyless code.
   - Data related to the replay operation is received from BCM in CAN communication on CAN line.

3. Replay prohibit condition
   - When the inhibit " P" switch is OFF
   - When LH side mirror switch is pressed
   - When mirror switch is pressed after ignition on
   - When the vehicle speed is over 3km/h
   - When the memory stop switch is ON

FAIL-SAFE FUNCTION

1. If the position sensor shows no input change (driving for 5 seconds) above 60 mV while the motor is in operation, it automatically stops the operation judging that wire short, motor failure, or sensor failure.

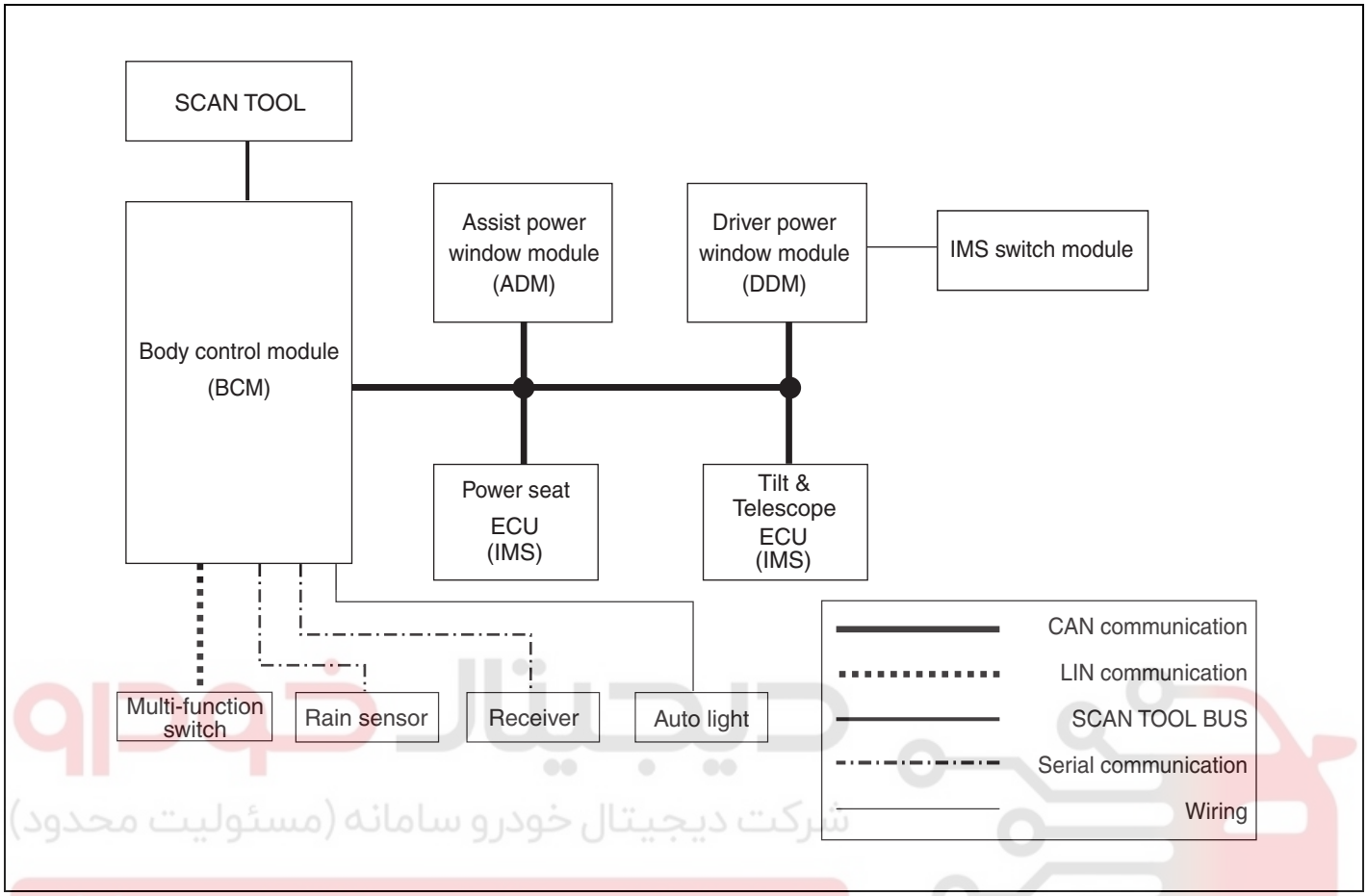
2. Mirror drive signal cannot be outputted for more than 15 seconds in one direction. (In case of memory replay or manual switch operation)

3. Monitoring of replay execution time
   - If replay operation does not complete within 40 seconds from replay starting time, mirror motor stops the output and terminates the replay control.

TRUNK OPEN

When the trunk open switch is on, this data are loaded on the BUS through CAN communication.

COMMUNICATION DIAGRAM E1F26DBA



ETBF140B

ASSIST DOOR MODULE

DESCRIPTION E69BDE94

Assist power window switch, a component of CAN, performs CAN communication with BCM, seat ECU, tilt ECU, driver power window switch. Passenger controlsassist power window switch button located inside of the assist door to operate power window, mirror, door lock and unlock.

1. It performs 4 types of operation of manual up/down and automatic up/down operation for 4 power windows.
2. It performs manual operation of the mirror position by manual switch. (up/down and left/right)
3. It performs registration and replay of mirror position by the mirror switch up to 2 drivers.

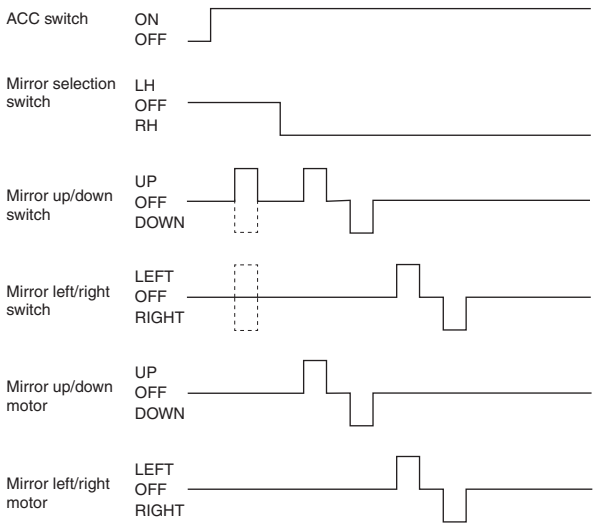
FUNCTION EEBCED7A

POWER WINDOW CONTROL

1. This switch controls power window up/down, automatic up/down from assist side.
   Assist's power window switch sends input signal by the manual up/down and automatic up/down switch input. At the same time manual up/down and automatic up/down signals sends to the wires
   → Assist safety window receives the signal and performs manual up/down and automatic up/down functions.
2. Timer function
   Power window switch can be controlled for 30 seconds after the ignition is turned off. This function stops immediately even within 30 seconds if the front door is opened.

OUTSIDE MIRROR CONTROL BY THE SWITCH

1. Manual control of right outside mirror
   If the mirror direction switch (up, down, left and right) is pressed when mirror selection switch on driver power windowswitch is in outside RH under ACC ON condition, then operating signal is sent to assist power window switch through CAN communication.



LTCD351M

OUTSIDE MIRROR MEMORY OPERATION BY THE MEMORY SWITCH

1. It can be memorized assist outside mirror position by CAN communication from driver door module. However, RH side mirror position is not registered during the LH side mirror manual switch operation.
2. Memory is cleared if the battery is removed.

OUTSIDE MIRROR REPLAY OPERATION BY THE MEMORY SWITCH

1. Mirror is returned to the registered position as each position switch is pressed while the ignition 2 is ON.
2. Memory replay operation will be performed only if the memory is registered.(POS1 or POS2)
3. If the position switch (POS1 or POS2) is pressed while the memory replay is in operation, the final switch is effective.
4. Replay inhibit condition
   - When inhibit " P" switch is OFF
   - When the ignition 2 is OFF
   - When RH side mirror switch is pressed
   - When the vehicle speed is more than 3 km/h
   - When the memory STOP switch is turned ON

OUTSIDE MIRROR MEMORY AND REPLAY OPERATION BY KEYLESS

1. Memory operation
   - Outside mirror LH position is registered in the driver side power window switch when the ignition is turned off from on.
   - When door is locked by the keyless, outside mirror position is registered corresponding to the keyless code.
   - Data related to the memory operation is received from BCM in CAN communication.

2. Replay operation
   - When door is unlocked by the keyless under ignition off state, it replays the position corresponding to the keyless code.
   - Data related to the replay operation is received from BCM in CAN communication on CAN line.

3. Replay prohibit condition
   - When the inhibit " P" switch is OFF
   - When RH side mirror switch is pressed
   - When mirror switch is pressed after ignition on
   - When the vehicle speed is over 3km/h
   - When the memory stop switch is ON

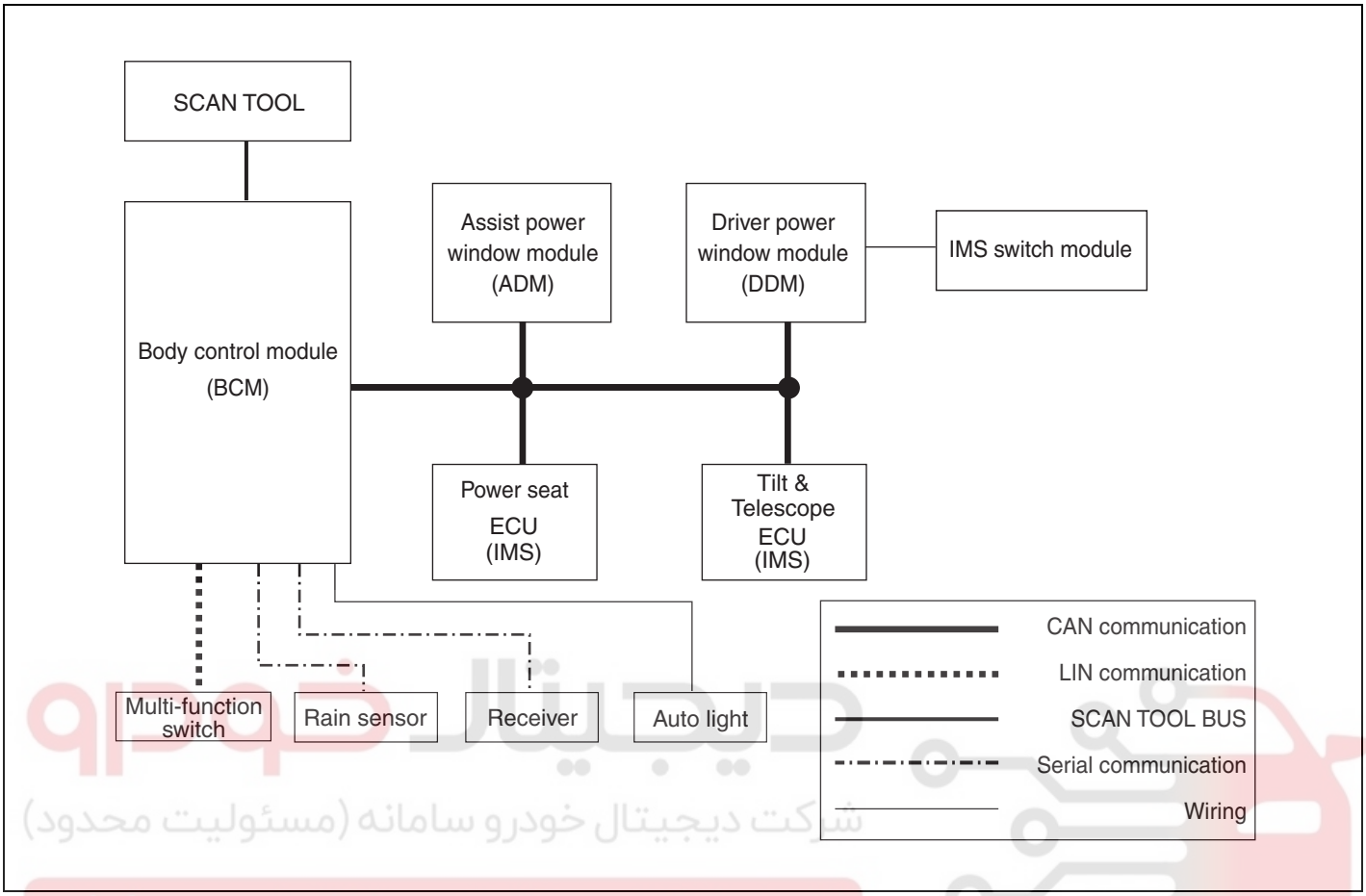
FAIL-SAFE FUNCTION

1. If the position sensor shows no input change (driving for 5 seconds) above 60 mV while the motor is in operation, it automatically stops the operation judging that wire short, motor failure, or sensor failure.

2. Mirror drive signal cannot be outputted for more than 15 seconds in one direction. (In case of memory replay or manual switch operation)

3. Monitoring of replay execution time
   If replay operation does not complete within 40 seconds from replay starting time, mirror motor stops the output and terminates the replay control.

COMMUNICATION DIAGRAM E7D03B1C



ETBF140B