# Body Electrical System

# GENERAL

## GENERAL TROUBLESHOOTING INFORMATION E8A45E43

### 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.

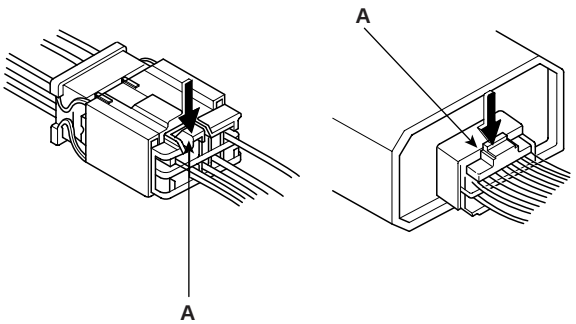
***NOTE***

- *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).

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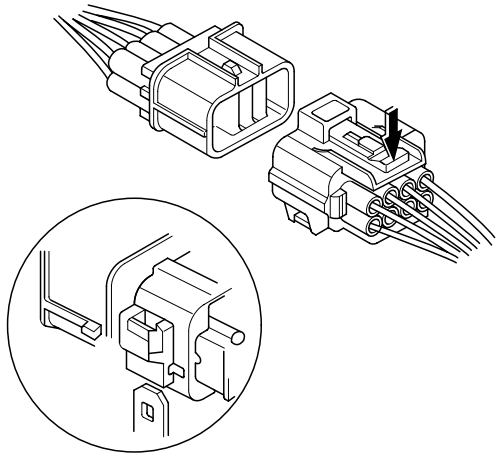
4. Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
5. Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket (A).



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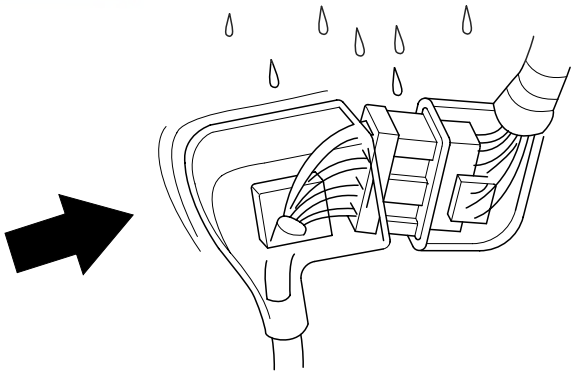
6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
7. Always reinstall plastic covers.



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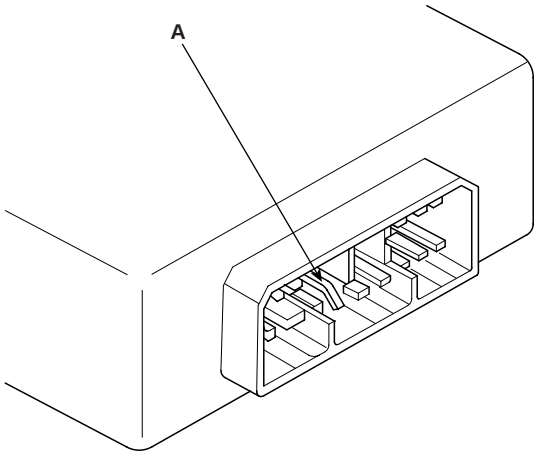
8. Before connecting connectors, make sure the terminals (A) are in place and not bent.

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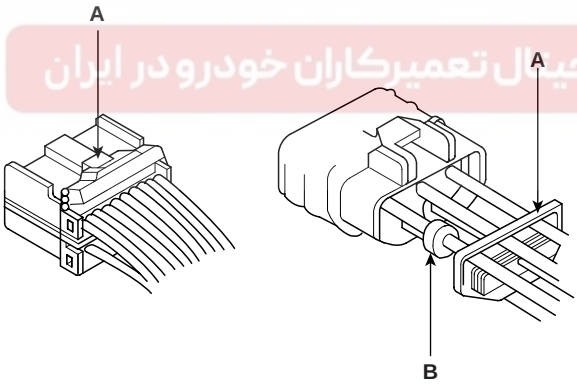
9. Check for loose retainer (A) and rubber seals (B).

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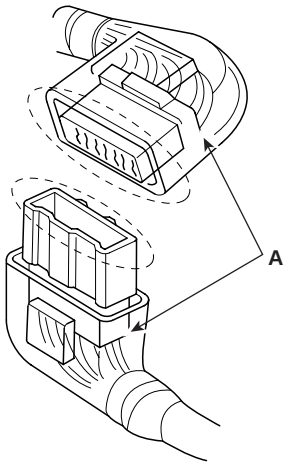
10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease(A) is contaminated, replace it.

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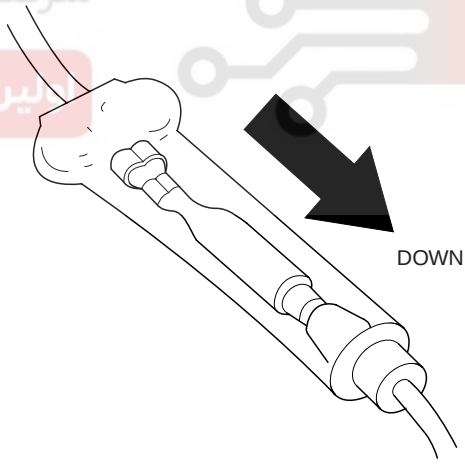
11. Insert the connector all the way and make sure it is securely locked.

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

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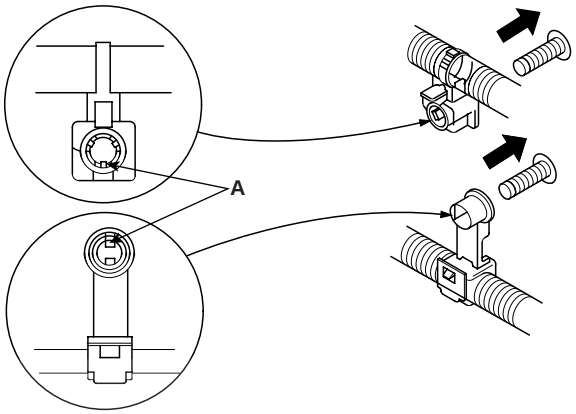
## HANDLING WIRES AND HARNESSES

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).

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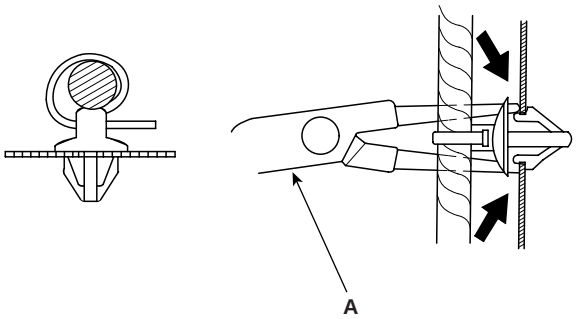
3. Slip pliers(A) under the clip base and through the hole at an angle, then squeeze the expansion tabs to release the clip.

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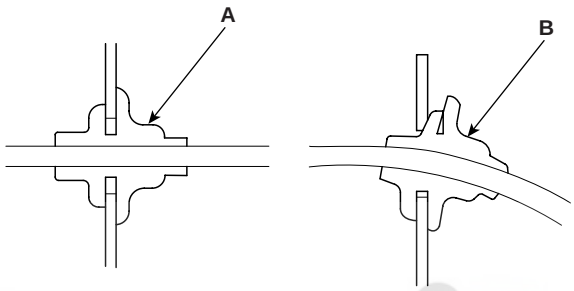
4. After installing harness clips, make sure the harness doesn't interfere with any moving parts.
5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
6. Seat grommets in their grooves properly (A). Do not leave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

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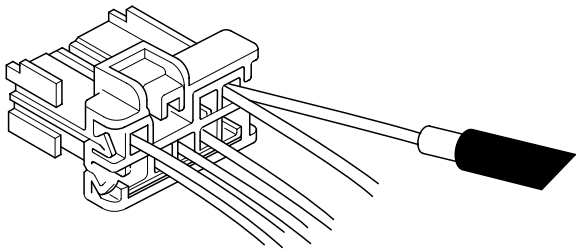
## TESTING AND REPAIRS

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).



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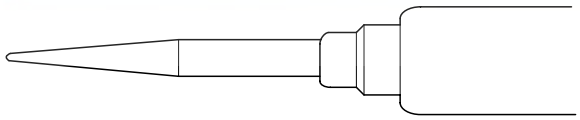
5. Use a probe with a tapered tip.



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**FIVE-STEP TROUBLESHOOTING**

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

2. Analyze the schematic
   Look up the schematic for the problem circuit.
   Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.
   Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.

3. Isolate the problem by testing the circuit
   Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting.
   Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

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

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

## SPECIFICATIONS EA4A7D47

### MULTIFUNCTION SWITCH

| Items | Specifications |
|---|---|
| Rated voltage | DC 12 V |
| Operating temperature range | -30°C ~ +80°C (-22 ~ +176°F) |
| **Rated load**<br>Dimmer & passing switch<br><br><br>Lighting switch<br>Turn signal & lane change switch<br>Wiper & mist switch<br><br><br><br>Washer switch<br>Variable intermittent volume switch<br>Rear wiper & washer switch | <br>High : 1A (Relay load)<br>Low : 1A (Relay load)<br>Passing : 1A (Relay load)<br>Lighting : 1A (Relay load)<br>6.6±0.5A (Lamp load)<br>Low, High : 5A (Motor load)<br>Intermittent : 0.22±0.05A (Relay load)<br>Lock : Max. 28A (Motor load)<br>Mist : 5A (Motor load)<br>4A (Motor load)<br>Max. 25mA<br>Rear wiper : 200mA (Relay load)<br>Rear washer : 4A (Motor load) |

### INSTRUMENTS AND WARNING SYSTEM

| Warning lamps | Bulb wattage (W) | Color |
|---|---|---|
| Illumination | LED | White green |
| High beam | LED | Blue |
| Low fuel | LED | Amber |
| Turn signal (LH, RH) | LED | Green |
| Battery (charge) | LED | Red |
| Oil pressure | 1.4 | Red |
| Air bag | 1.4 | Red |
| Parking brake | LED | Red |
| Seat belt | LED | Red |
| Check engine | 1.4 | Amber |
| ABS | LED | Amber |
| Door ajar | LED | Red |
| Tailgate open | LED | Amber |
| Immobilizer | LED | Amber |
| Cruise | LED | Green |
| SET | LED | Green |
| Glow | LED | Amber |
| Water separater | LED | Red |
| 4WD | LED | Green |
| 4WD LOCK | LED | Amber |
| TCS (ESP) | LED | Amber |
| TCS OFF (ESP OFF) | LED | Amber |

## INDICATORS AND GAUGE

### Speedometer

**Type**

- Stepper motor type

**Input spec.**

- Hall IC type : 4 pulses/rev.

**Indication**

- Km/h : 637rpm x 4 pulses/rev. indicates 60Km/h
- MPH : 1024 rpm x 4 pulses/rev. indicates 60MPH

**Standard values**

| Velocity (km/h) | 20 | 40 | 60 | 80 | 100 |
|---|---|---|---|---|---|
| Tolerance (km/h) | 20.4-24.7 | 42.5-46.5 | 64-69 | 86-91.6 | 108.4-114 |
| Velocity (km/h) | 120 | 140 | 160 | 180 | 200 |
| Tolerance (km/h) | 130-136 | 152-158 | 174.4-181 | 196.4-203 | 216-223 |

| Velocity (MPH) | 10 | 20 | 40 | 60 |
|---|---|---|---|---|
| Tolerance (MPH) | 10.5-13.5 | 21-24 | 42.4-46 | 64-68 |
| Velocity (MPH) | 80 | 100 | 120 | Remark |
| Tolerance (MPH) | 85.4-90 | 107-112 | 129-134 | |

- Tap the speedometer to prevent hysterisis effects during inspection.

### Tachometer

**Type**

- Stepper motor type

**Input spec.**

- 4cyl : 2pulses/rev.(2.0 GSL), 3pulses/rev.(2.7 GSL), 4pulses/rev.(DSL)

**Standard values**

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

- Tap the tachometer to prevent hysterisis effects during inspection.

### Fuel gauge

**Type**

- Stepper motor type

**Standard values**

| Level | Gauge | |
|---|---|---|
| | Resistance (Ω) | Gauge angle (˚) |
| E (Empty) | 194.4 | -40 ± 2.4 |
| Low fuel warning | 185.1 | -37 ± 2.5 |
| 1/2 | 103.8 | 0 ± 2.4 |
| F (Full) | 13.6 | 40 ± 2.4 |

- Inspection order : E → F → E

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<table>
<tr><th>Items</th><th>Specifications</th></tr>
<tr><td>Temperature gauge<br>Type<br>Standard values</td><td>o Stepper motor type
<table>
<tr><th>Temperature</th><th>Angle (˚)</th><th>Resistance (Ω )</th></tr>
<tr><td>49˚C</td><td>-40</td><td>195</td></tr>
<tr><td>71˚C</td><td>-7 ± 2.4</td><td>86.5</td></tr>
<tr><td>110˚C</td><td>-7 ± 2.4</td><td>24</td></tr>
<tr><td>127.4˚C</td><td>35 ± 5</td><td>16.1</td></tr>
</table>
o Inspection order : OFF → C → H</td></tr>
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## LIGHTING SYSTEM

| Items | Bulb wattage (W) |
|---|---|
| Head lamp | 60W /55W (High / Low beam) |
| Front turn signal lamp | 21W x 2EA |
| Front position lamp | 5W |
| Front fog lamp | 27W |
| **Rear combination lamps**<br>Tail/stop lamp<br>Back up lamp<br>Turn signal lamp<br>Rear fog lamp | <br>5W / 21W<br>16W<br>21W<br>21W |
| Side repeater lamp | 5W |
| Luggage & glove lamp | 5W |
| Room lamp | 10W |
| Cargo room lamp | 10W |
| Center high mounted stop lamp | LED |
| Map lamp | 10W x 2 |
| License plate lamp | 5W |

## AUDIO

| Items | K240 (K260) | M280 (J290) |
|---|---|---|
| Rated output | Max. 20W x 4 | Max. 20W x 4 (Max. 35Wx4) |
| Load impedance | 4Ω x 4 | 4Ω x 4 (2Ω x 4) |
| Band | AM/FM, LW/MW/FM | AM/FM, LW/MW/FM |
| Tuning type | PLL Synthesized type | PLL Synthesized type |
| Dark current | Max. 2mA (Max. 3.8mA) | Max. 2mA (Max. 3.8mA) |
| Frequency range / Channel | AM : 531 ~ 1602KHZ/9 KHZ | AM : 531 ~ 1602KHZ/9 KHZ |
| | FM : 87.5 ~ 108MHZ/100 KHZ | FM : 87.5 ~ 108 MHZ/100KHZ |
| | LW : 153 ~ 279KHZ/1 KHZ | LW : 153 ~ 279 KHZ/1KHZ |
| | MW : 531 ~ 1602KHZ/9KHZ | MW : 531 ~ 1602KHZ/9KHZ |
| | FM : 87.5~108 MHZ/50KHZ | FM : 87.5~108 MHZ/50KHZ |

## WINDSHIELD WIPER AND WASHER

| Items | Specifications |
|---|---|
| **Windshield wiper motor** | |
| Speed/current at 20kgf·cm load test (2.0 Nm, 1.47 lbf·ft) | Low : 40~48 rpm/4.0A or less<br>High : 59~73 rpm/5.0A or less |
| Speed/current at 70kgf·cm load test (7.0 Nm, 5.16 lbf·ft) | Low : 34~42 rpm/7.0A or less<br>High : 49~61 rpm/9.0A or less |
| Torque when locking | Low : 38N.m/35A or less<br>High : 32N.m/37A or less |
| **Windshield washer motor** | |
| Motor type | DC ferrite magnet |
| Pump type | Centrifugal type |
| Current | Max. 5.0A |
| Discharge pressure | Min. 1.8kgf/cm² |
| Flow rate | Min. 1,450cc/min. |
| Overload capacity (Continuous operation) | |
| With water | Max. 60 sec. |
| Racing | Max. 20 sec. |
| **Rear wiper motor** | |
| Speed/current at no load test | 28 rpm/Max. 2.2A |
| Speed/current at 10 kgf·cm load test (1.0 Nm, 0.74 lbf·ft) | 21~29 rpm/Max. 3.5A |
| Torque when locking | Min. 80 kgf·cm/Max.14A |
| Wiping angle | 157° ± 3° |

## TROUBLESHOOTING E5ECAB55

### INSTRUMENTS AND WARNING SYSTEM

| Symptom | Possible cause | Remedy |
|---|---|---|
| Speedometer does not operate | No.22 fuse (10A) blown<br>Speedometer faulty<br>Vehicle speed sensor faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Check speedometer<br>Check vehicle speed sensor<br>Repair if necessary |
| Tachometer does not operate | No.22 fuse (10A) blown<br>Tachometer faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Check tachometer<br>Repair if necessary |
| Fuel gauge does not operate | No.22 fuse (10A) blown<br>Fuel gauge faulty<br>Fuel sender faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Check gauge<br>Check fuel sender<br>Repair if necessary |
| Low fuel warning lamp does not light up | No.6 fuse (10A) blown<br>Bulb burned out<br>Fuel sender faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Replace bulb<br>Check fuel sender<br>Repair if necessary |
| Water temperature gauge does not operate | No.22 fuse (10A) blown<br>Water temperature gauge faulty<br>Water temperature sender faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Check gauge<br>Check sender<br>Repair if necessary |
| Oil pressure warning lamp does not light up | No.6 fuse (10A) blown<br>Bulb burned out<br>Oil pressure switch faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Replace bulb<br>Check switch<br>Repair if necessary |
| Low brake fluid warning lamp does not light up | No.6 fuse (10A) blown<br>Bulb burned out<br>Brake fluid level warning switch faulty<br>Parking brake switch faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Replace bulb<br>Check switch<br><br>Check switch<br>Repair if necessary |
| Open door warning lamp and tailgate warning lamp do not light up | No.22 fuse (10A) blown<br>Bulb burned out<br>Door switch faulty<br>Tailgate switch faulty<br>Wiring or ground faulty | Check for short and replace fuse<br>Replace bulb<br>Check switch<br>Check switch<br>Repair if necessary |
| Seat belt warning lamp does not light up | No.6 fuse (10A) blown<br>Bulb burned out<br>Seat belt switch faulty<br>Wiring or gound faulty | Check for short and replace fuse<br>Replace bulb<br>Check switch<br>Repair if necessary |
| All illumination lights do not light up | Battery fusible link (50A) blown<br>Tail lamp relay faulty<br>No.6, No.7 fuse (10A) blown<br>Rheostat faulty<br>Wiring or ground faulty | Replace the fusible link<br>Check relay<br>Check for short and replace fuse<br>Check rheostat<br>Repair if necessary |

## LIGHTING SYSTEM

| Symptom | Possible cause | Remedy |
|---|---|---|
| One lamp does not light (all exterior) | Bulb burned out<br>Socket, wiring or ground faulty | Replace bulb<br>Repair if necessary |
| Head lamps do not light | Bulb burned out<br>No.28 fuse (10A) blown<br>Head lamp fuse (15A) blown<br>Head lamp relay faulty<br>Lighting switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check for short and replace fuse<br>Check relay<br>Check switch<br>Repair if necessary |
| Tail lamps and license plate lamps do not light | Bulb burned out<br>No.3, No.7 fuse (10A) blown<br>Battery fusible link (50A) blown<br>Tail lamp relay faulty<br>ETACS module faulty<br>Lighting switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Replace the fusible link<br>Check relay<br>Check ETACS module<br>Check switch<br>Repair if necessary |
| Stop lamps do not light | Bulb burned out<br>No.31 fuse (15A) blown<br>Stop lamp switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Adjust or replace switch<br>Repair if necessary |
| Instrument lamps do not light (Tail lamps light) | Rheostat faulty<br>Wiring or ground faulty | Check rheostat<br>Repair if necessary |
| Turn signal lamp does not flash on one side | Bulb burned out<br>Turn signal switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check switch<br>Repair if necessary |
| Turn signal lamps do not light | Bulb burned out<br>No.24 fuse (10A) blown<br>Flasher unit faulty<br>Turn signal switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check flasher unit<br>Check switch<br>Repair if necessary |
| Hazard warning lamps do not light | Bulb burned out<br>No.29 fuse (10A) blown<br>Flasher unit faulty<br>Hazard switch faulty<br>Hazard relay faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check flasher unit<br>Check switch<br>Check relay<br>Repair if necessary |
| Flasher rate too slow or too fast | Lamps' wattages are smaller or larger than specified<br>Defective flasher unit | Replace lamps<br><br>Check flasher unit |
| Back up lamps do not light | Bulb burned out<br>No.24 fuse (10A) blown<br>Back up lamp switch(M/T) faulty<br>Transaxle range switch(A/T) faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check switch<br>Check switch<br>Repair if necessary |
| Front fog lamps do not light | Bulb burned out<br>Front fog lamp fuse (15A) blown<br>Front fog lamp relay faulty<br>Front fog lamp switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check relay<br>Check switch<br>Repair if necessary |

| Symptom | Possible cause | Remedy |
|---|---|---|
| Rear fog lamps do not light | Bulb burned out<br>No.19 fuse (10A) blown<br>No.25 fuse (15A) blown<br>Rear fog lamp switch faulty<br>Rear fog lamp relay faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check for short and replace fuse<br>Check switch<br>Check relay<br>Repair if necessary |
| Room lamp does not light | Bulb burned out<br>No.22 fuse (10A) blown<br>Room lamp switch faulty<br>Door switch faulty<br>ETACS module faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check switch<br>Check switch<br>Check ETACS module<br>Repair if necessary |
| Map lamp does not light | Bulb burned out<br>No.25 fuse (15A) blown<br>Map lamp switch faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check switch<br>Repair if necessary |
| Tailgate room lamp does not light | Bulb burned out<br>No.25 fuse (15A) blown<br>Trunk room lamp switch (4 door) faulty<br>Tailgate switch (5 door) faulty<br>Wiring or ground faulty | Replace bulb<br>Check for short and replace fuse<br>Check switch<br>Check switch<br>Repair if necessary |

**AUDIO**

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

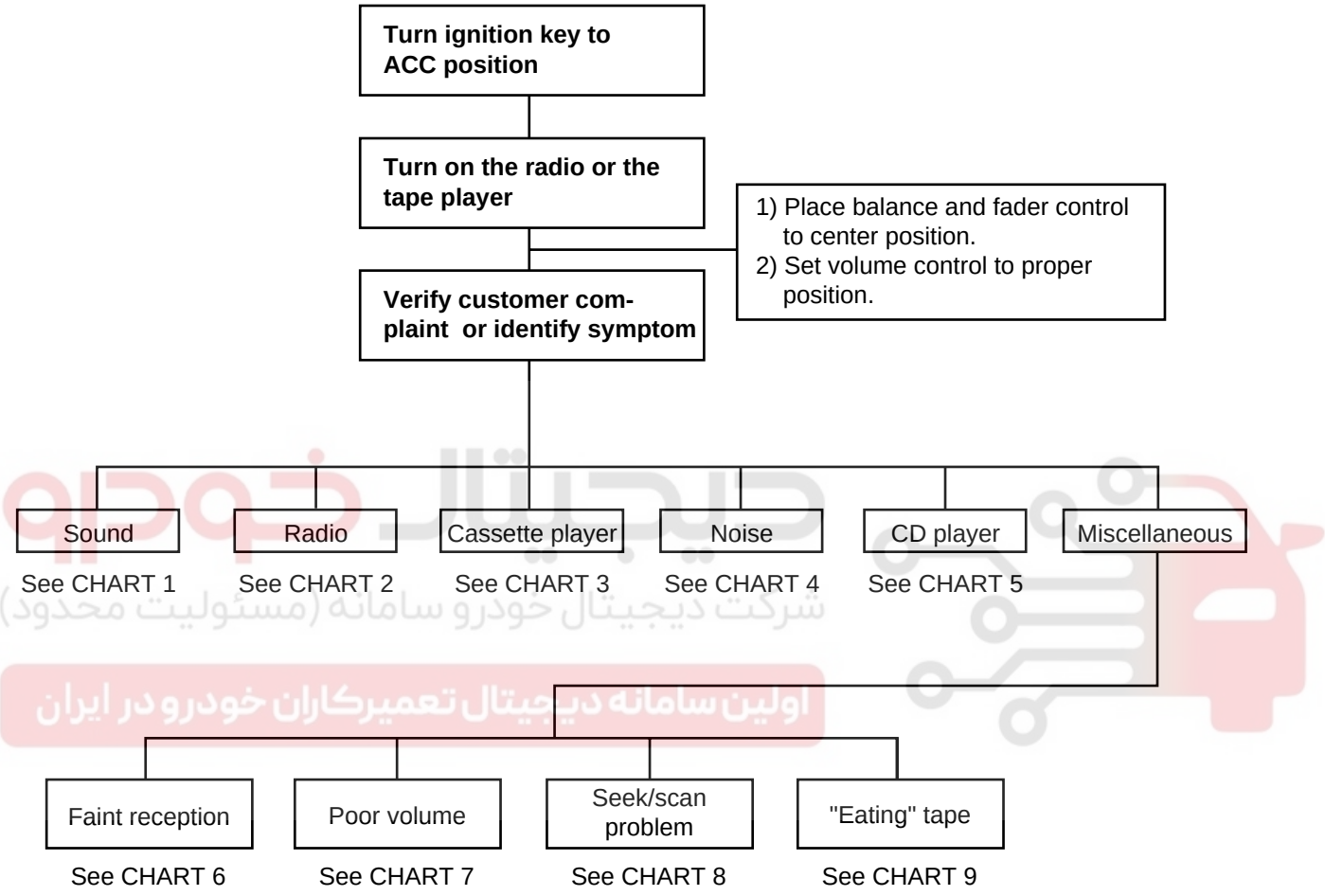


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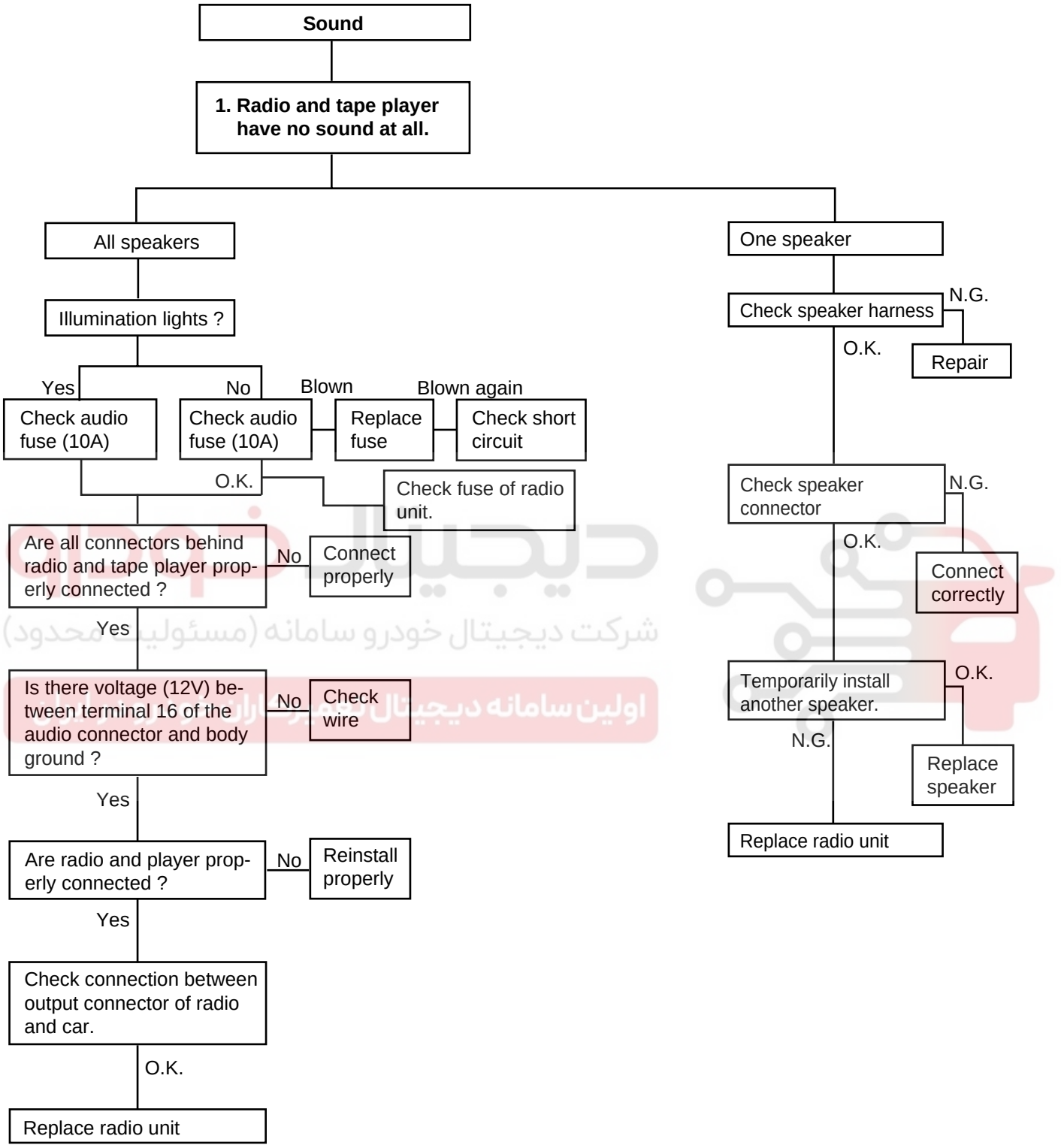
**CHART 1**

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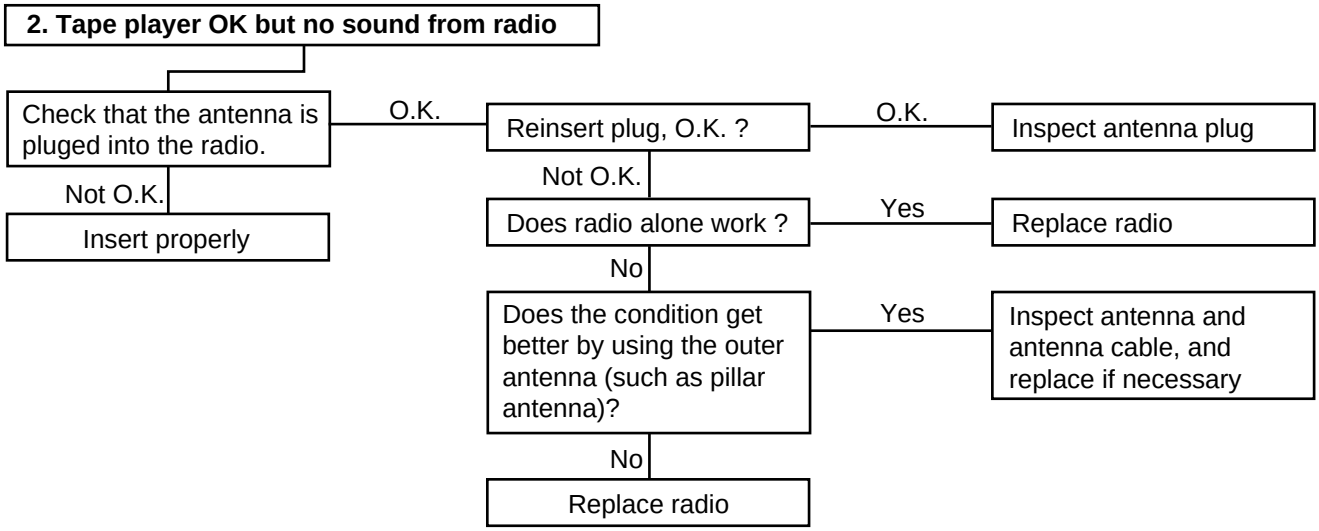


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**CHART 2**

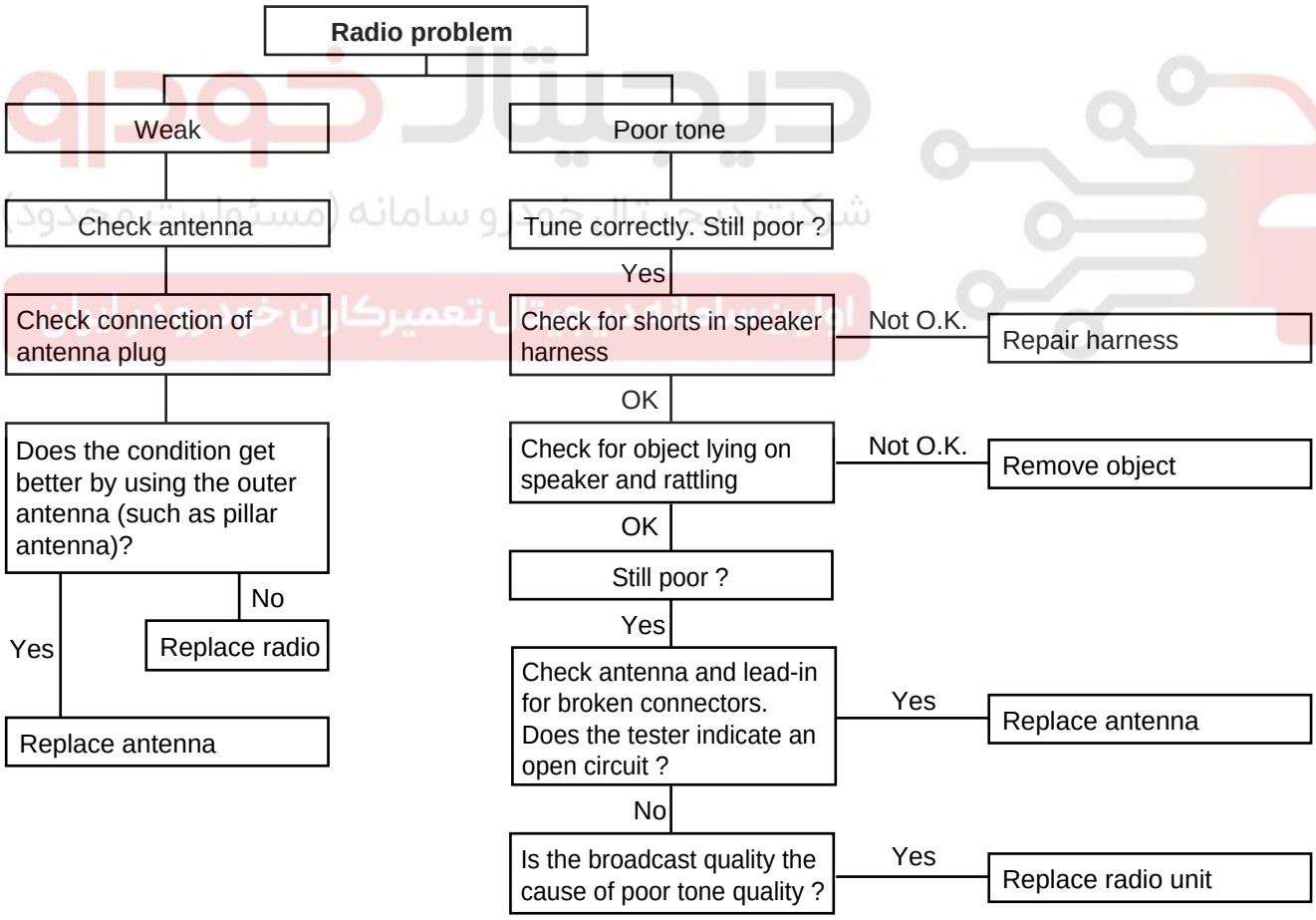


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CHART 3

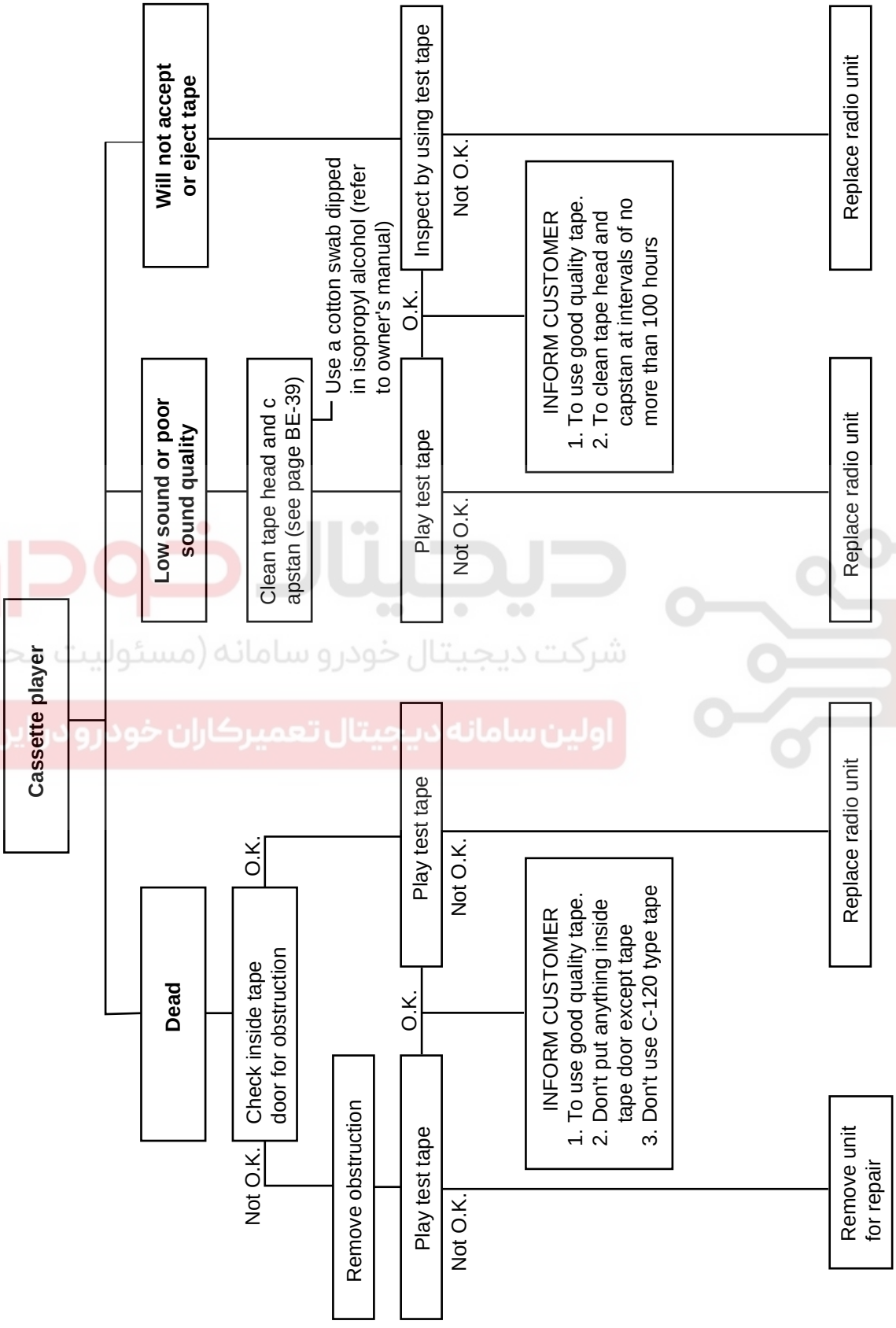


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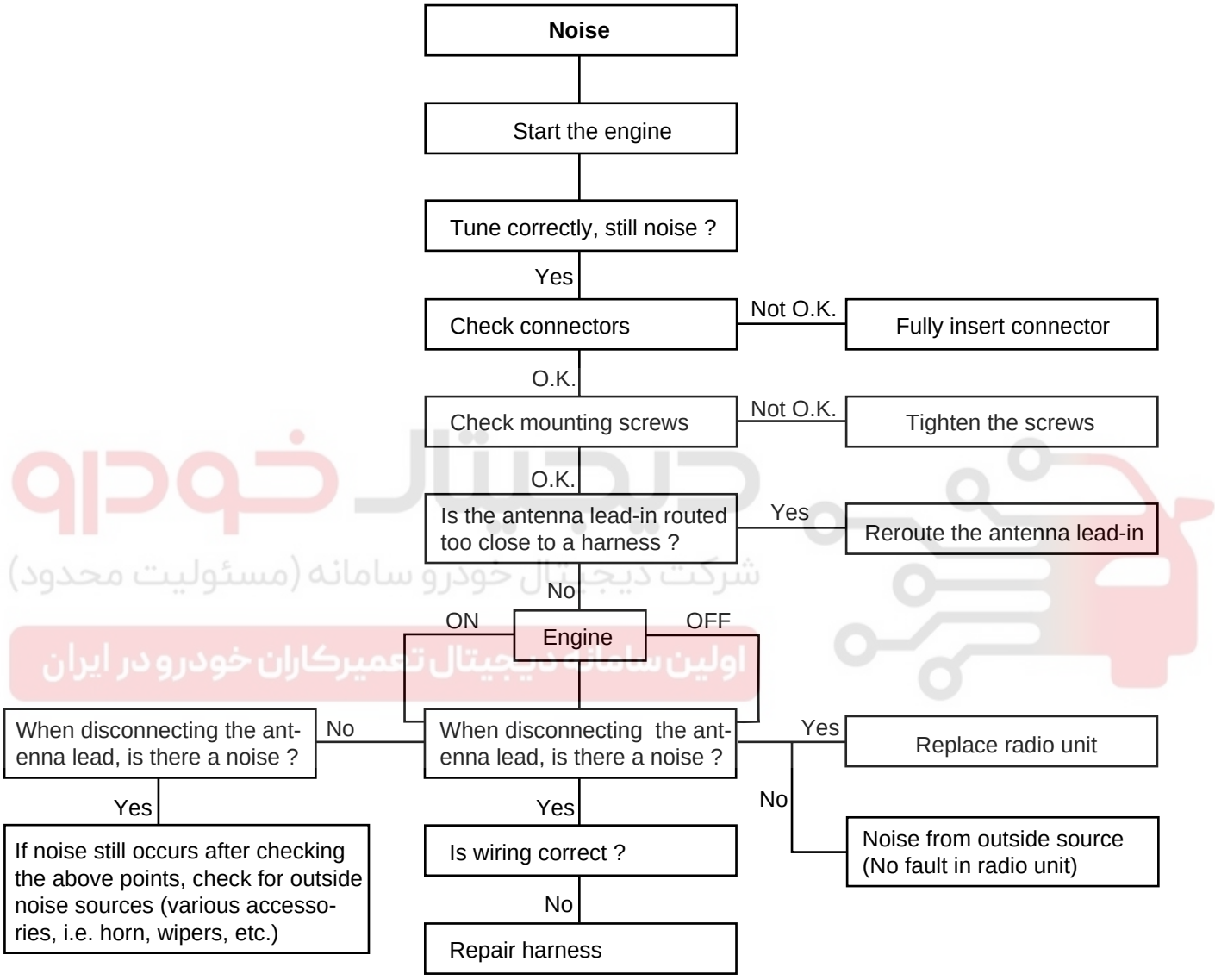
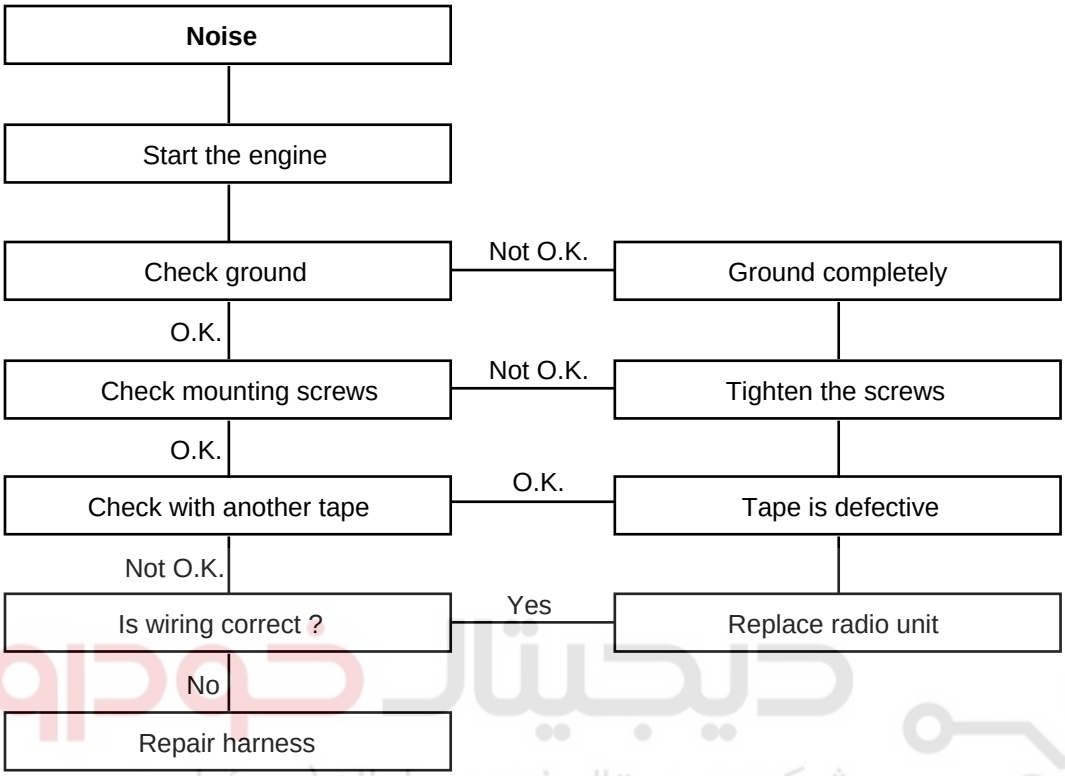
**CHART 4**

1. RADIO




ETA9010F

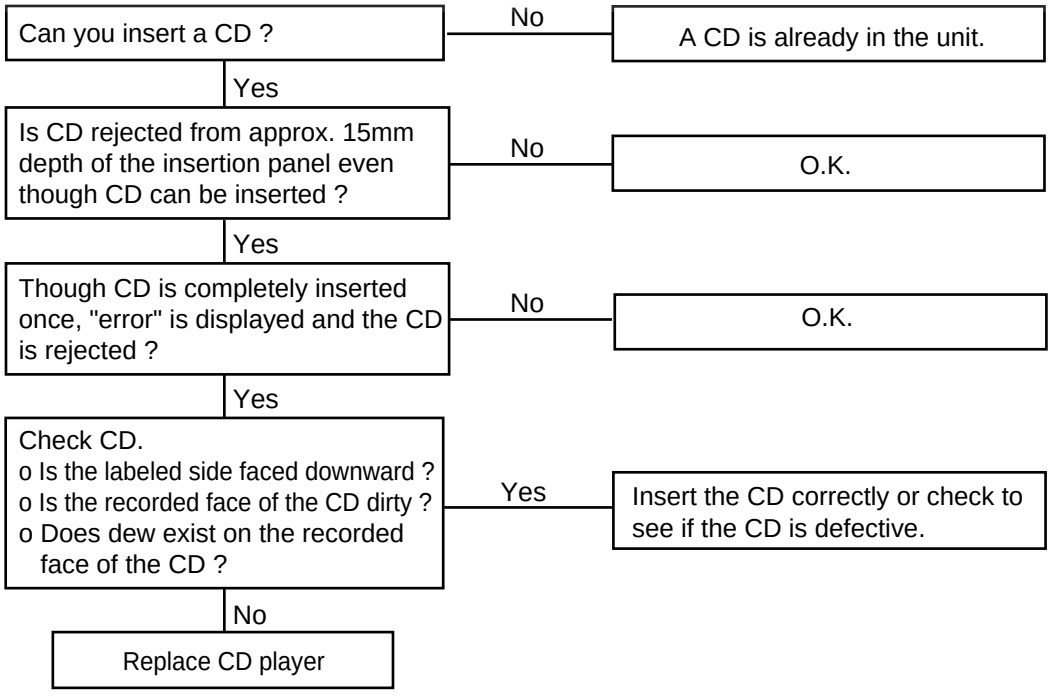
2. TAPE




ETA9010G

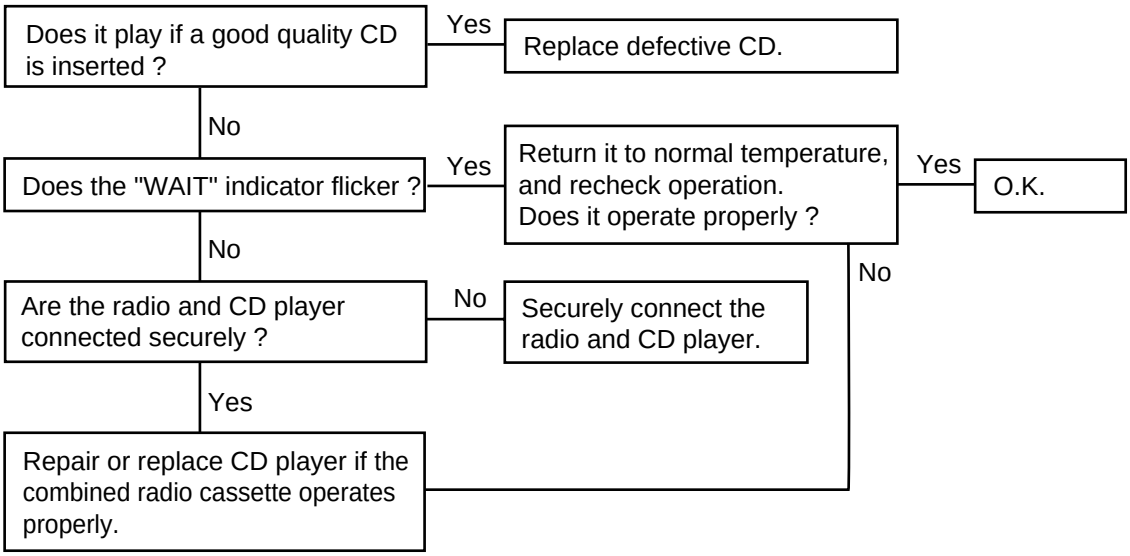
**CHART 5**

1. CD WILL NOT BE ACCEPTED




ETA9010H

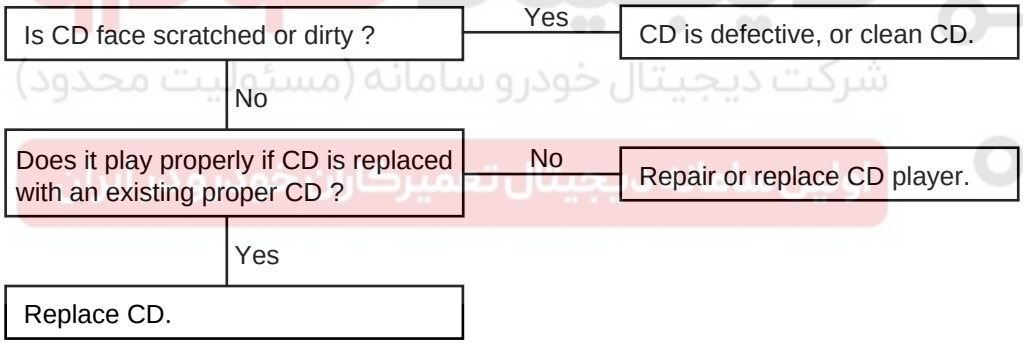
2. NO SOUND



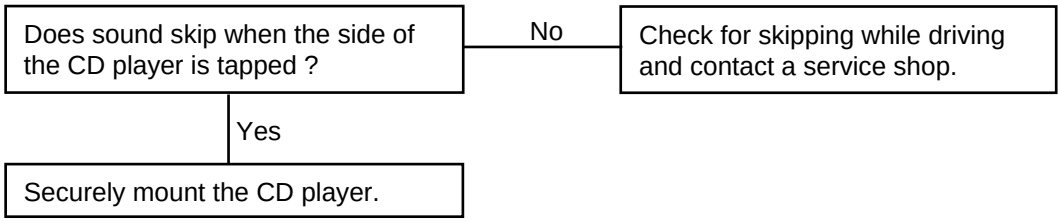

ETA9010O

3. CD SOUND SKIPS

1) Sound sometimes skips when parking.

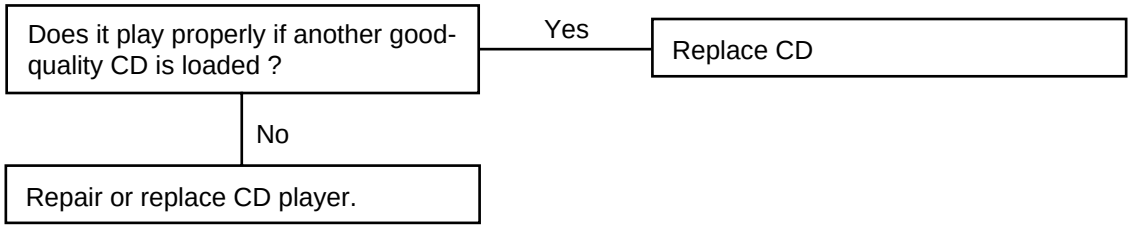



2) Sound sometimes skips when driving.
(Stop vehicle, and check it.)
(Check by using a CD which is free of scratches, dirt or other damage.)



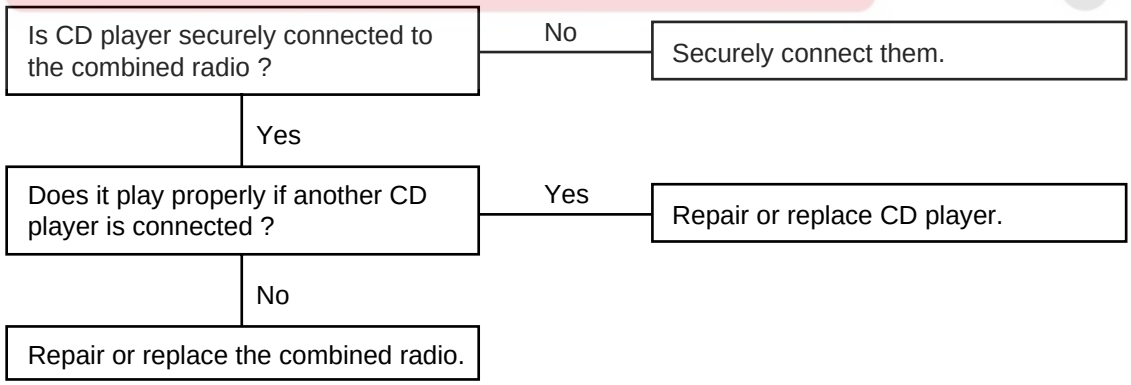

ETA9010I

4. SOUND QUALITY IS POOR



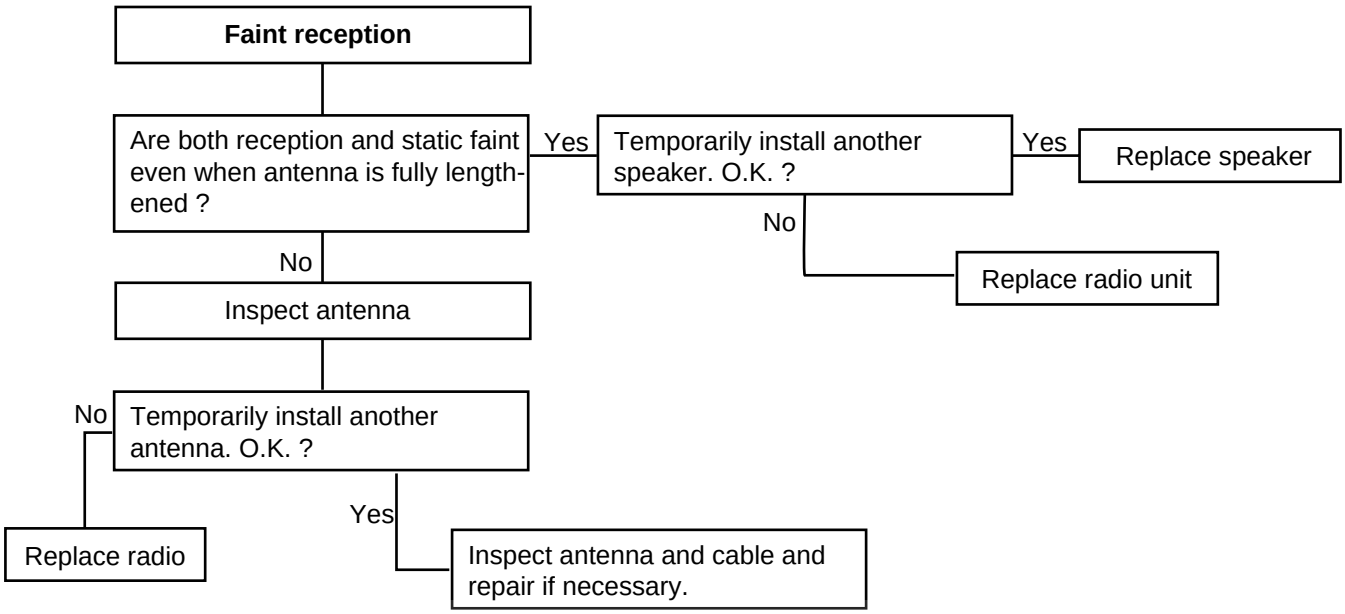

5. CD WILL NOT EJECT


6. NO SOUND FROM ONE SPEAKER



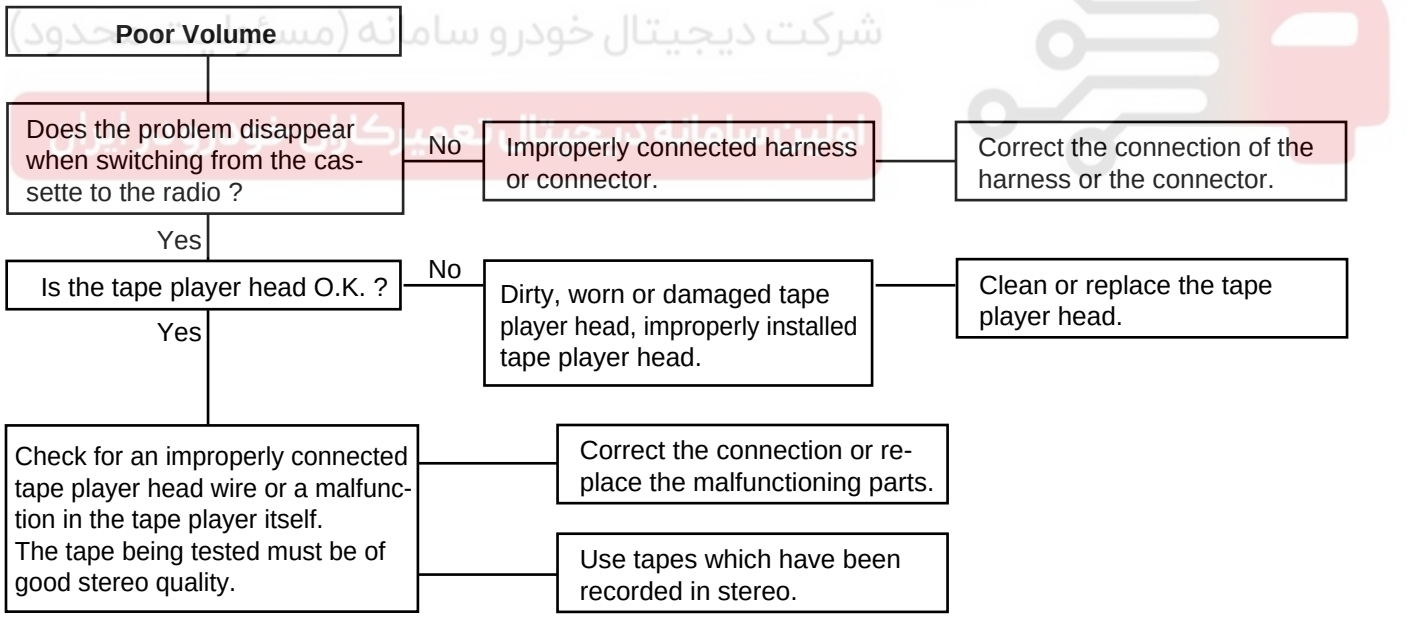

ETA9010J

**CHART 6**



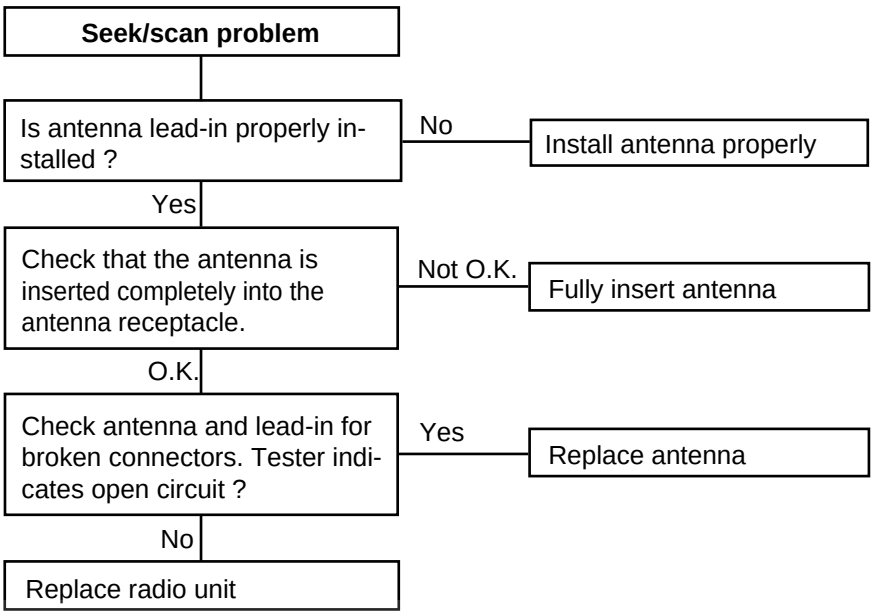

ETA9010K

**CHART 7**



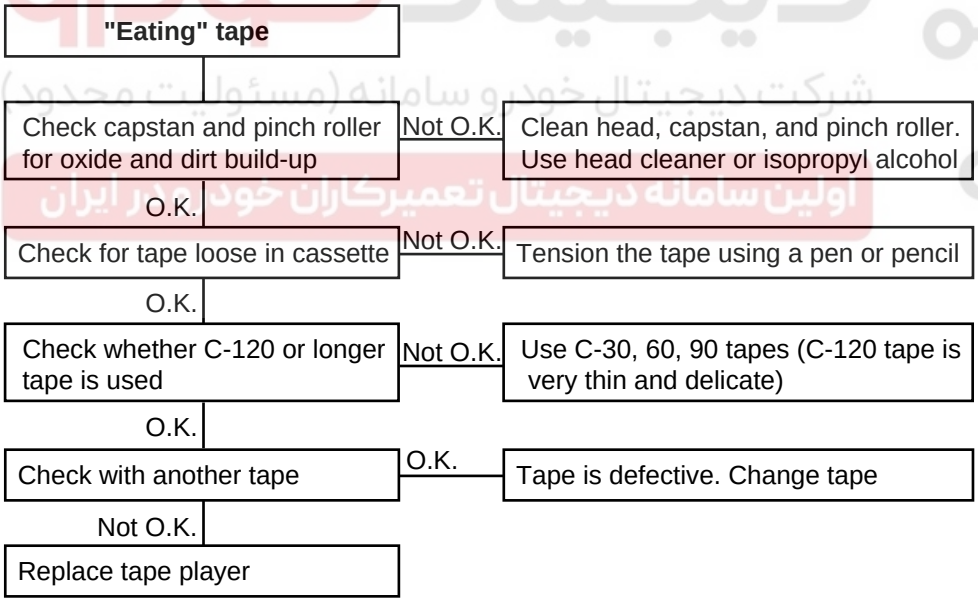

ETA9010L

**CHART 8**




ETA9010M

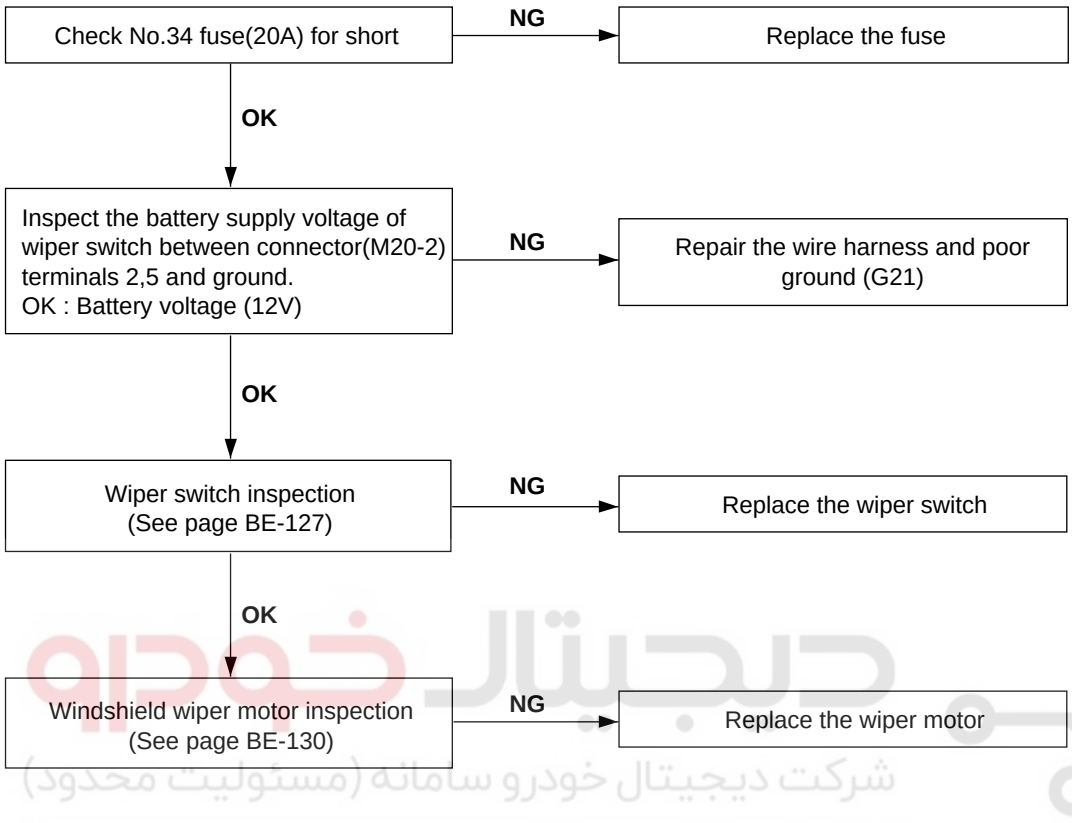
**CHART 9**




ETA9010N

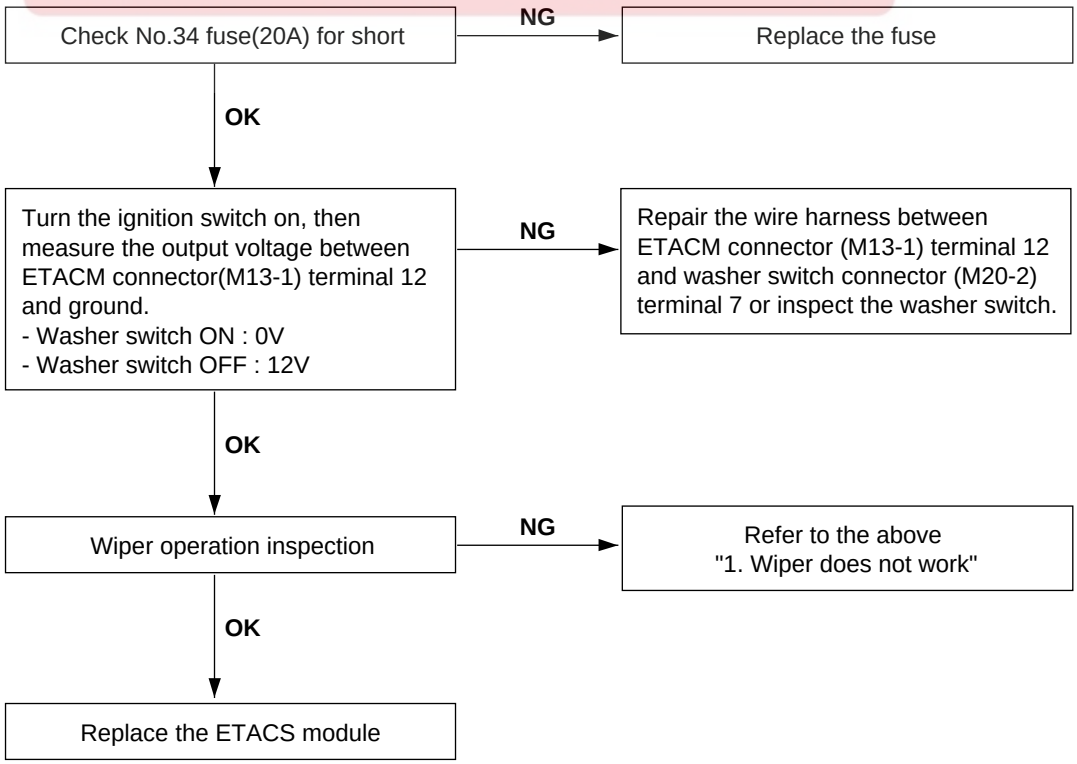
## WINDSHIELD WIPER

1. Wiper low and wiper high does not work.




ETQF901E

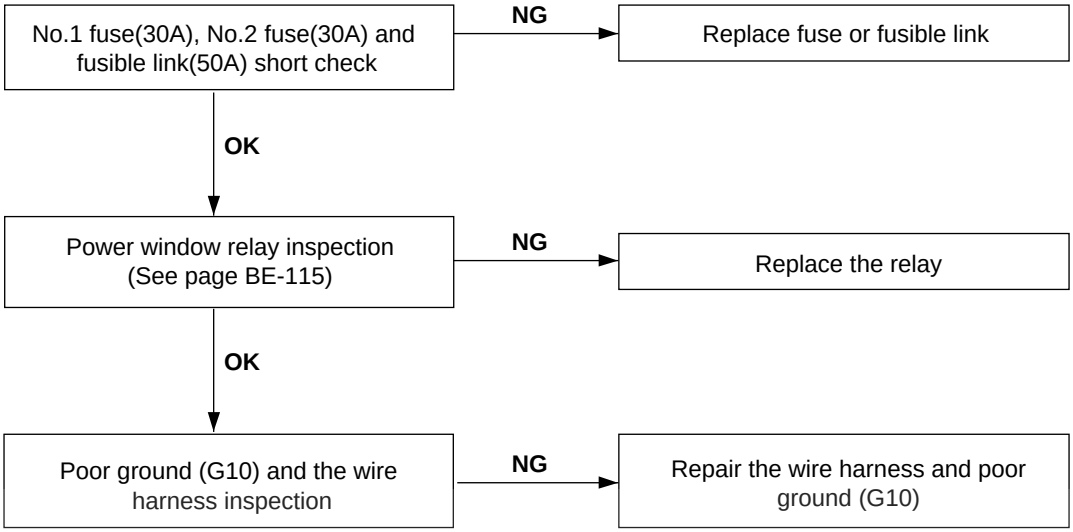
2. When washer switch is on, wiper does not work.




ETQF901F

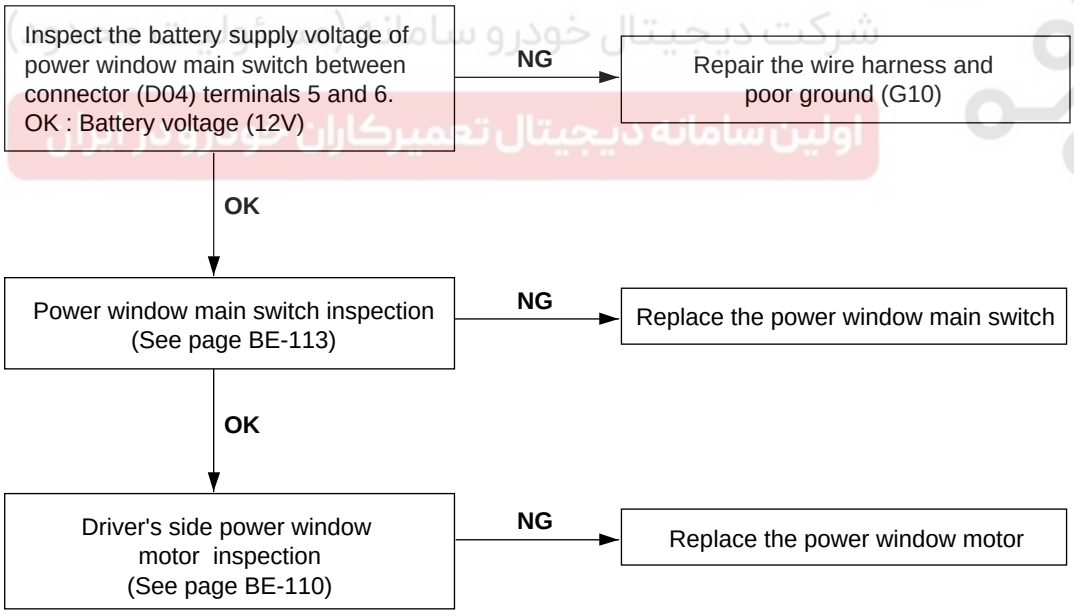
## POWER WINDOW

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



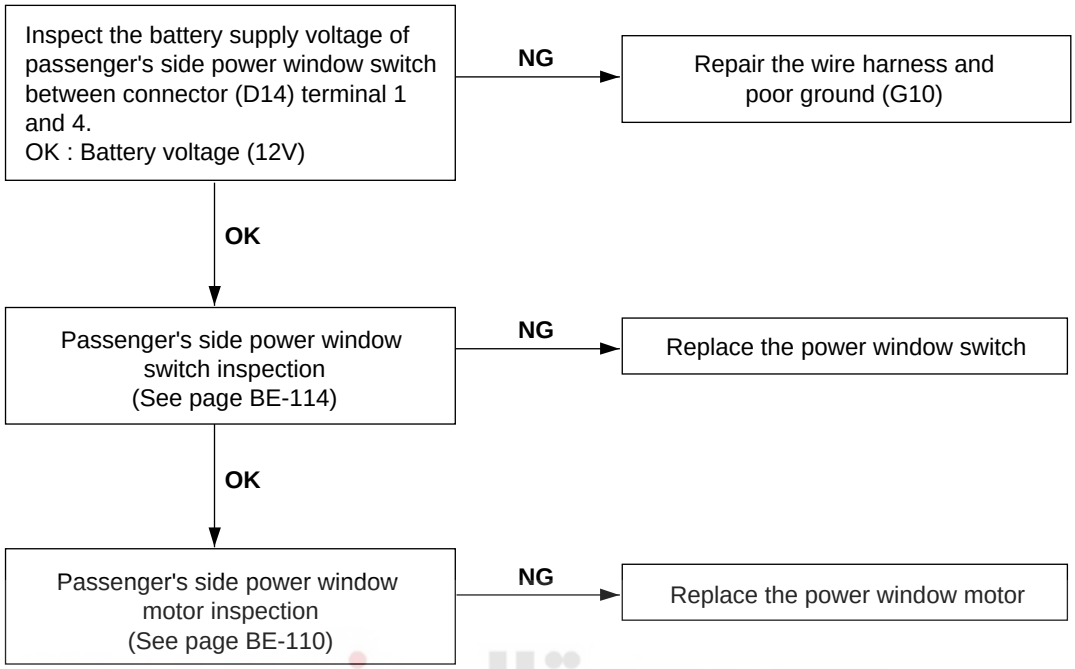

ETQF901G

2. Driver's side window does not operate.




ETQF901H

3. Passenger's side window does not operate.



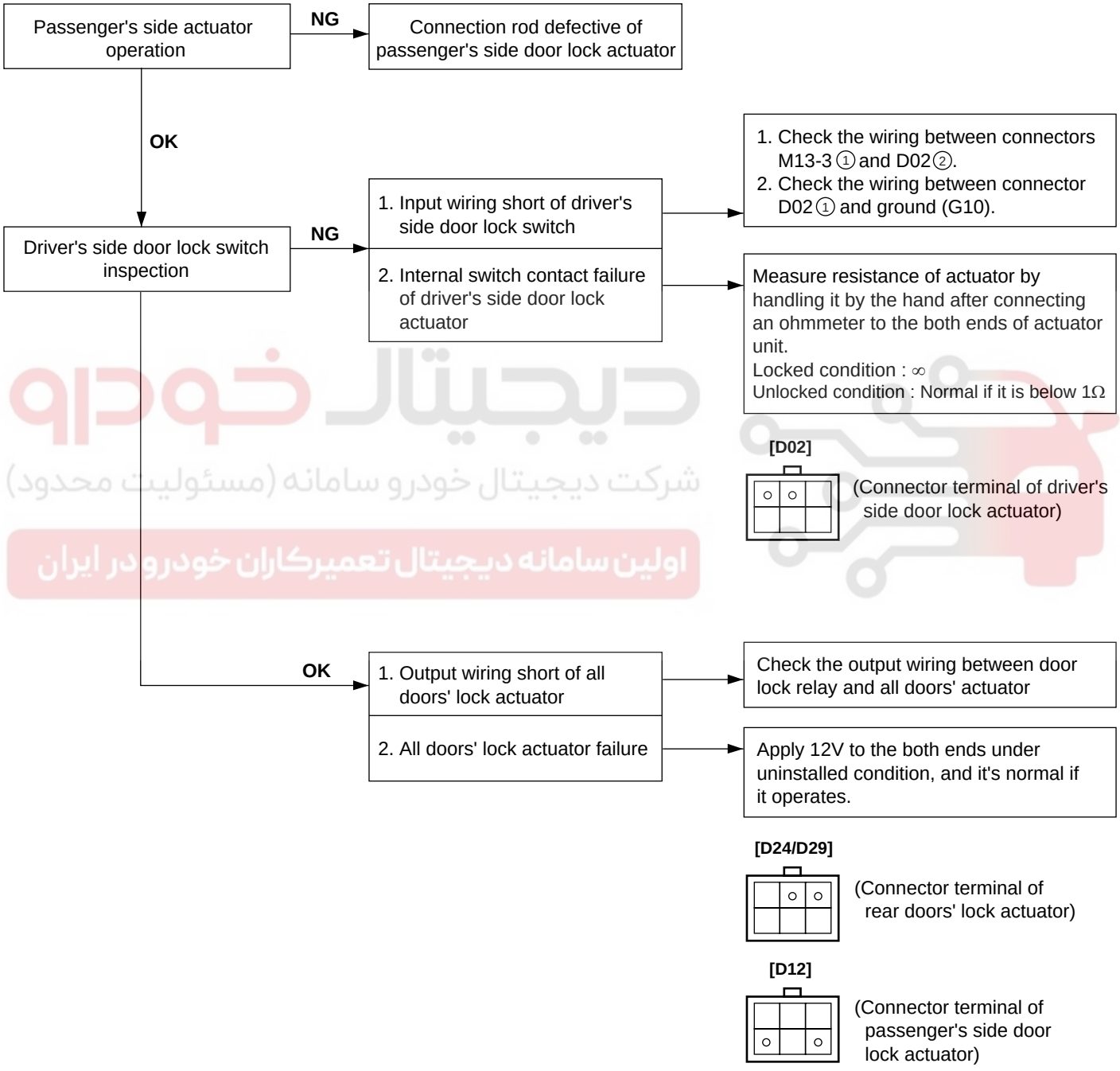

ETQF901I

**POWER DOOR LOCK**

1. Lock function works but unlock function does not work.
   ⇒ Since door unlock relay is fail, replace the door unlock relay.

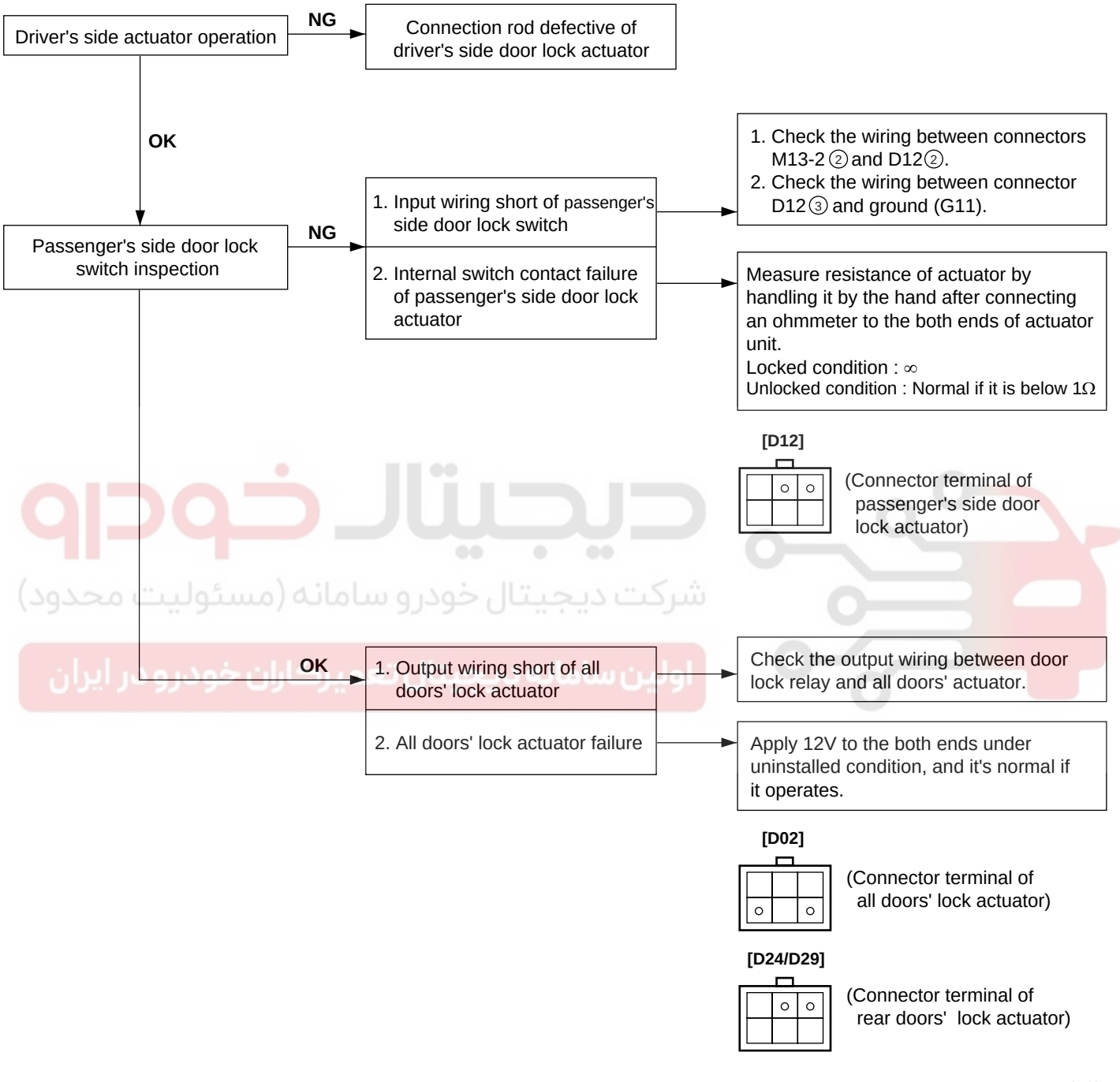
2. Unlock function works but lock function does not work.
   ⇒ Since door lock relay is fail, replace the door lock relay.

3. When passenger side knob is controlled, all doors interlocks, but when driver side knob is controlled, all doors do not interlock.



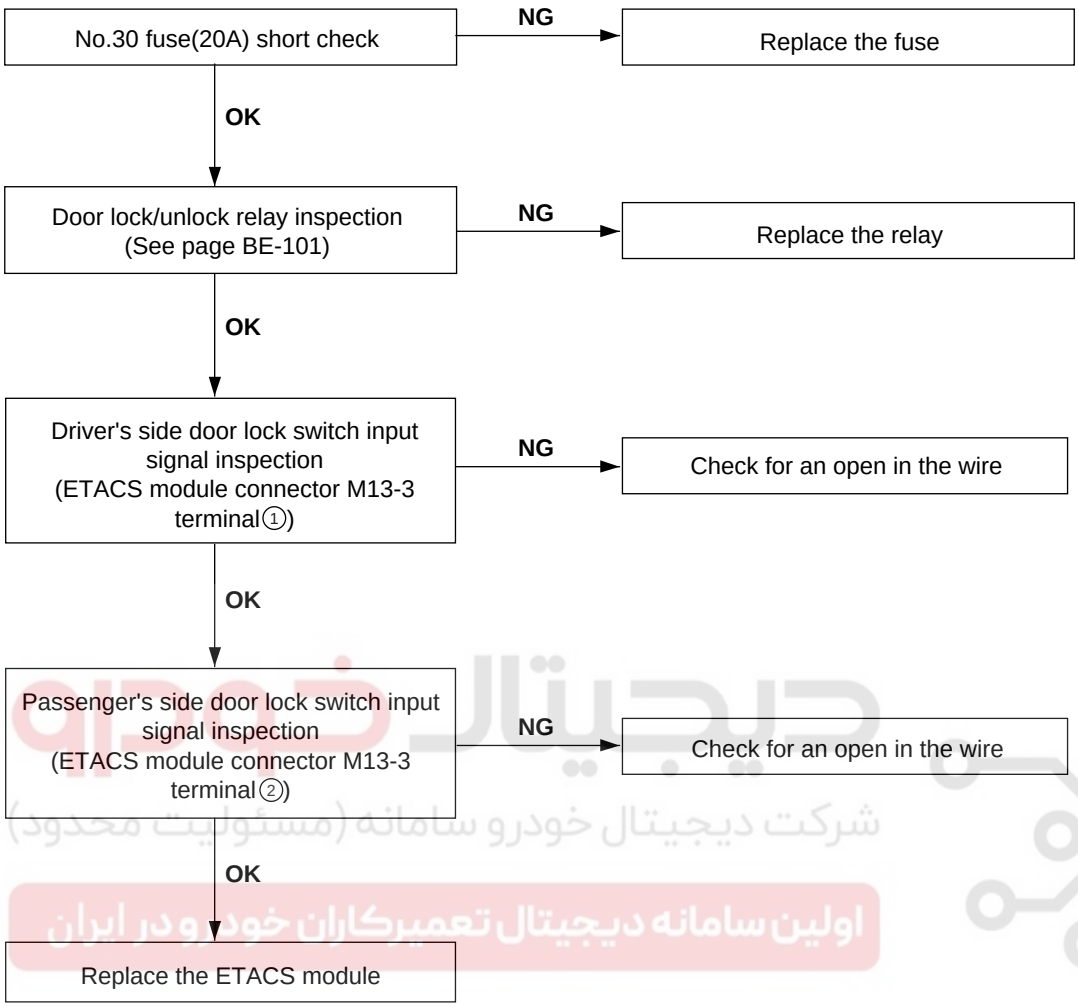

ETQF901J

4. When passenger side knob is controlled. All doors interlocks. But when the driver side knob is controlled, all doors do not interlock.




ETQF901K

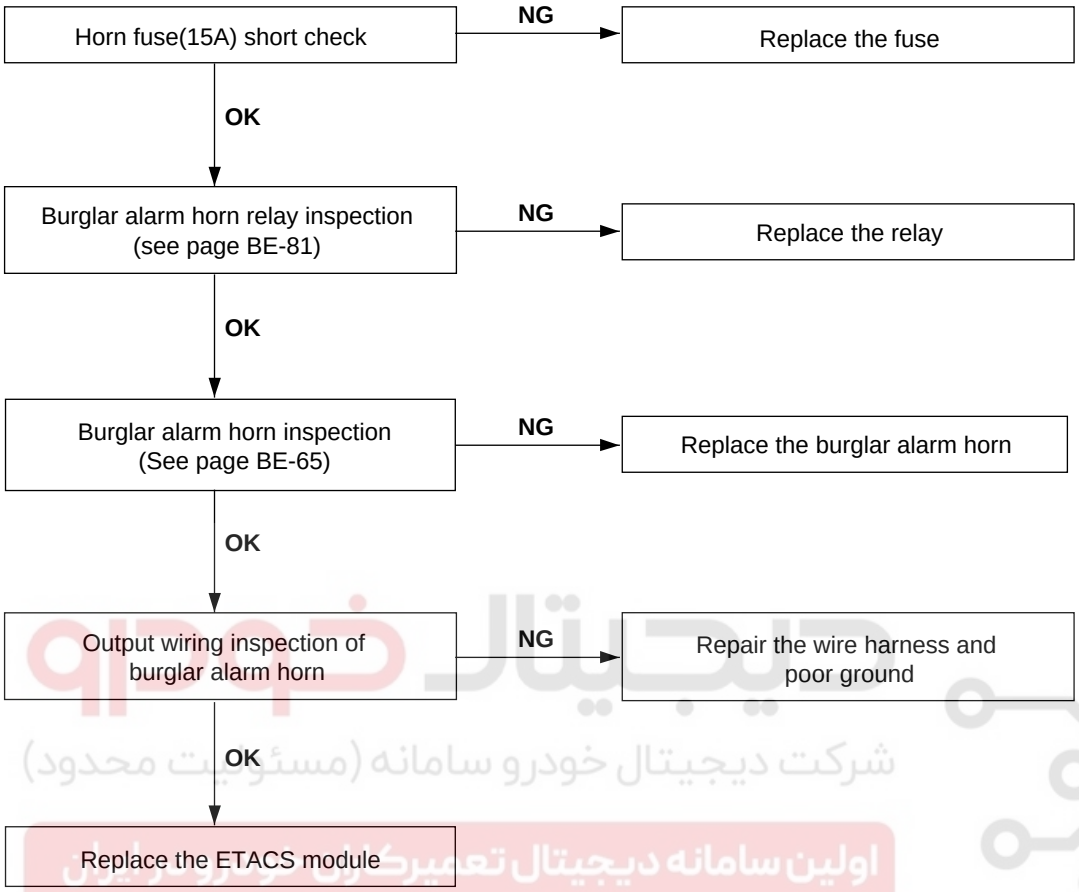
5. Both sides do not interlock either.




ETQF901L

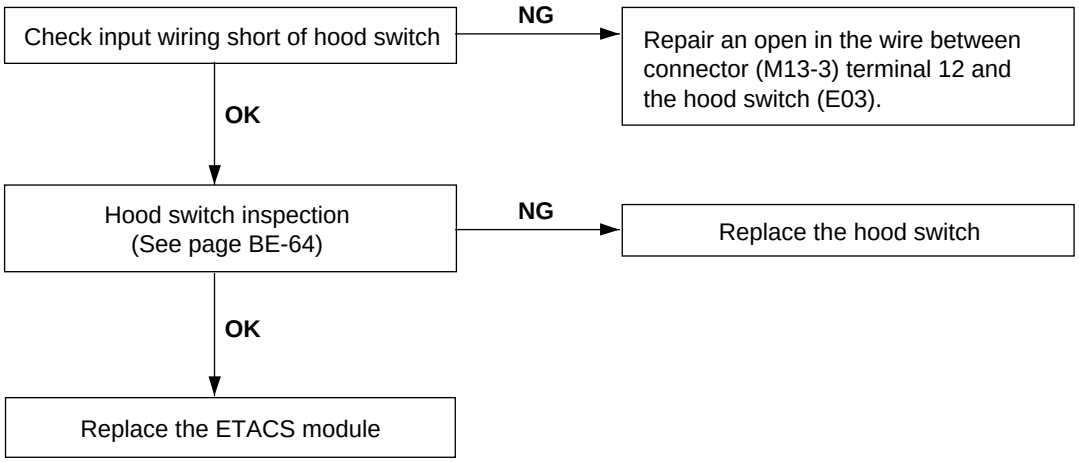
## KEYLESS ENTRY & BURGLAR ALARM SYSTEM

1. Alarm does not work. (Hazard lamp works)



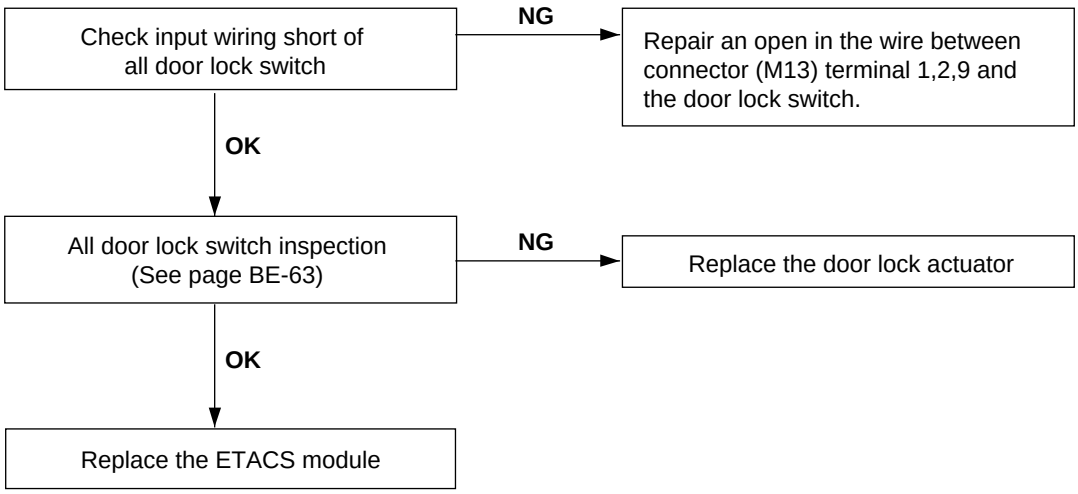

ETQF901M

2. When hood is opened inside the car like alarm test, horn does not work.



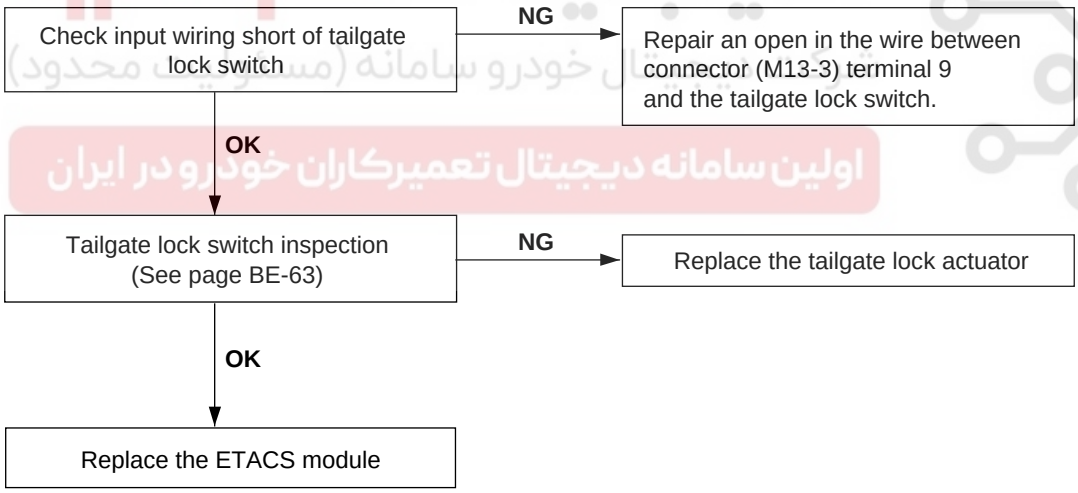

ETQF901N

3. When door is opened inside the car like alarm test, horn does not work (If tailgate and hood is opened, alarm works)



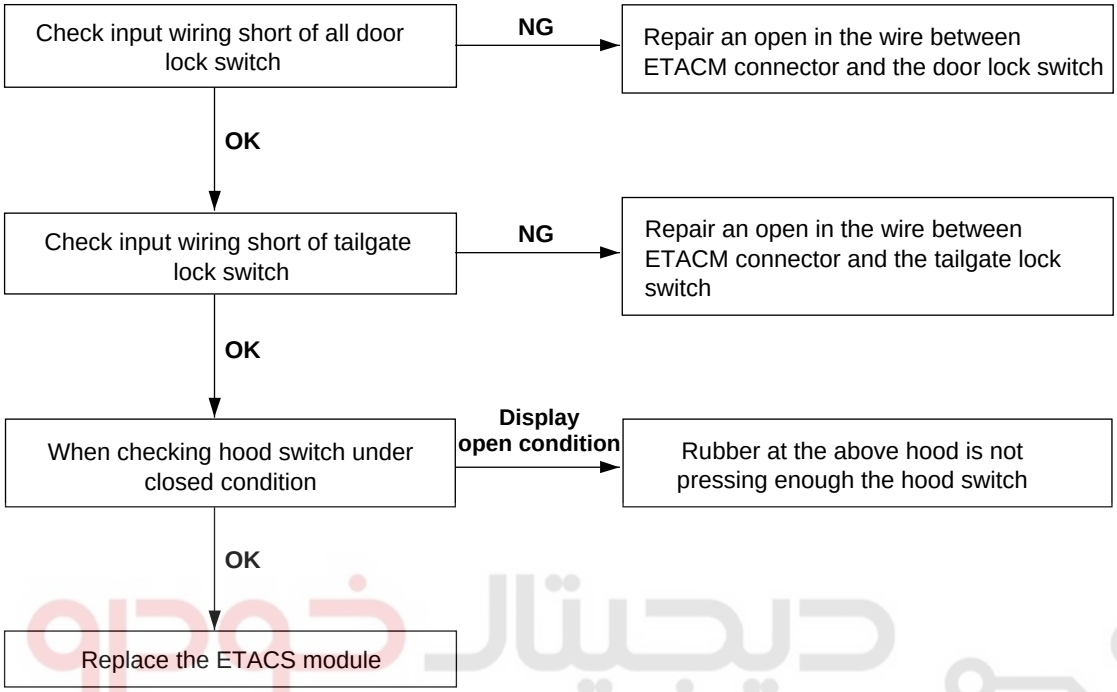

ETQF901O

4. When tailgate is opened inside the car like alarm test, horn does not work.



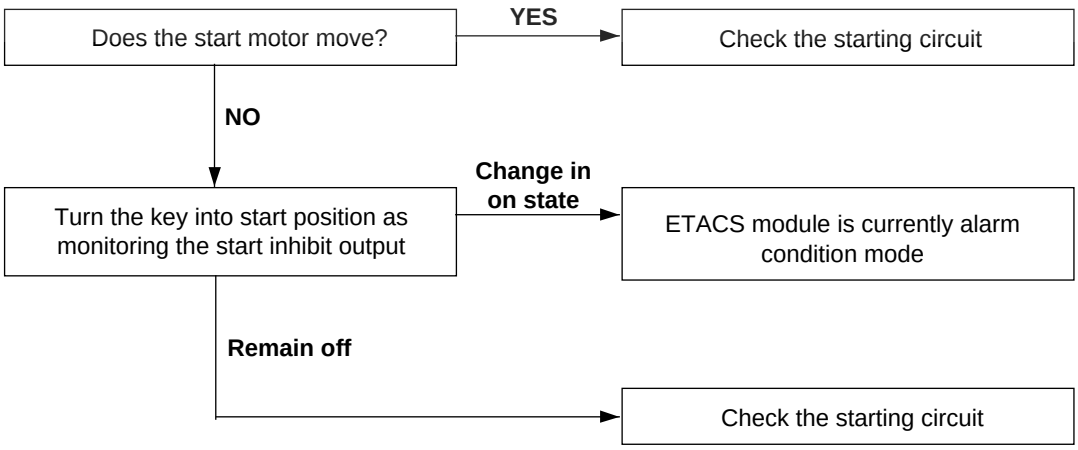

ETQF901P

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



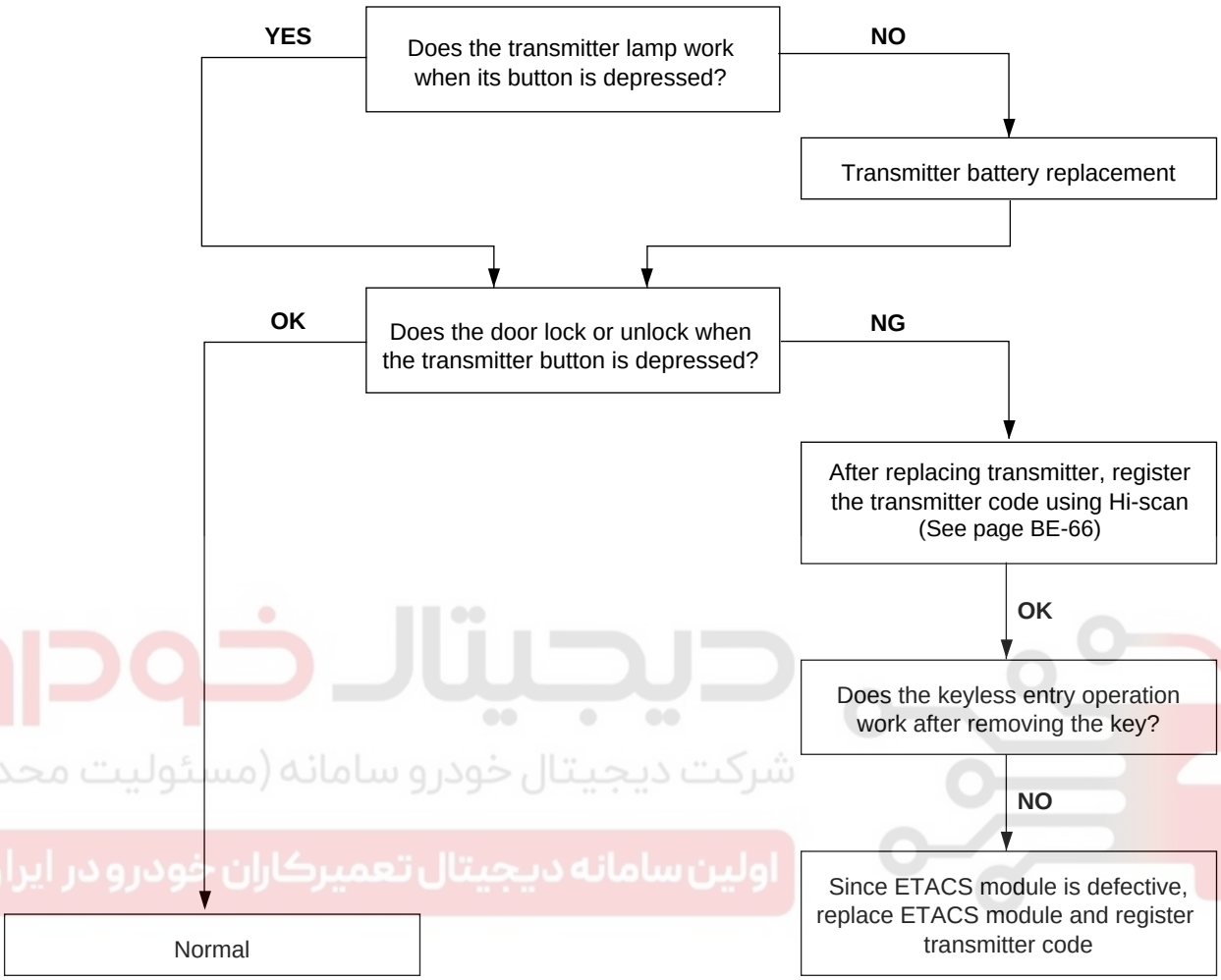

ETKE901Q

6. Engine does not start, when the alarm released condition.




ETKE901R

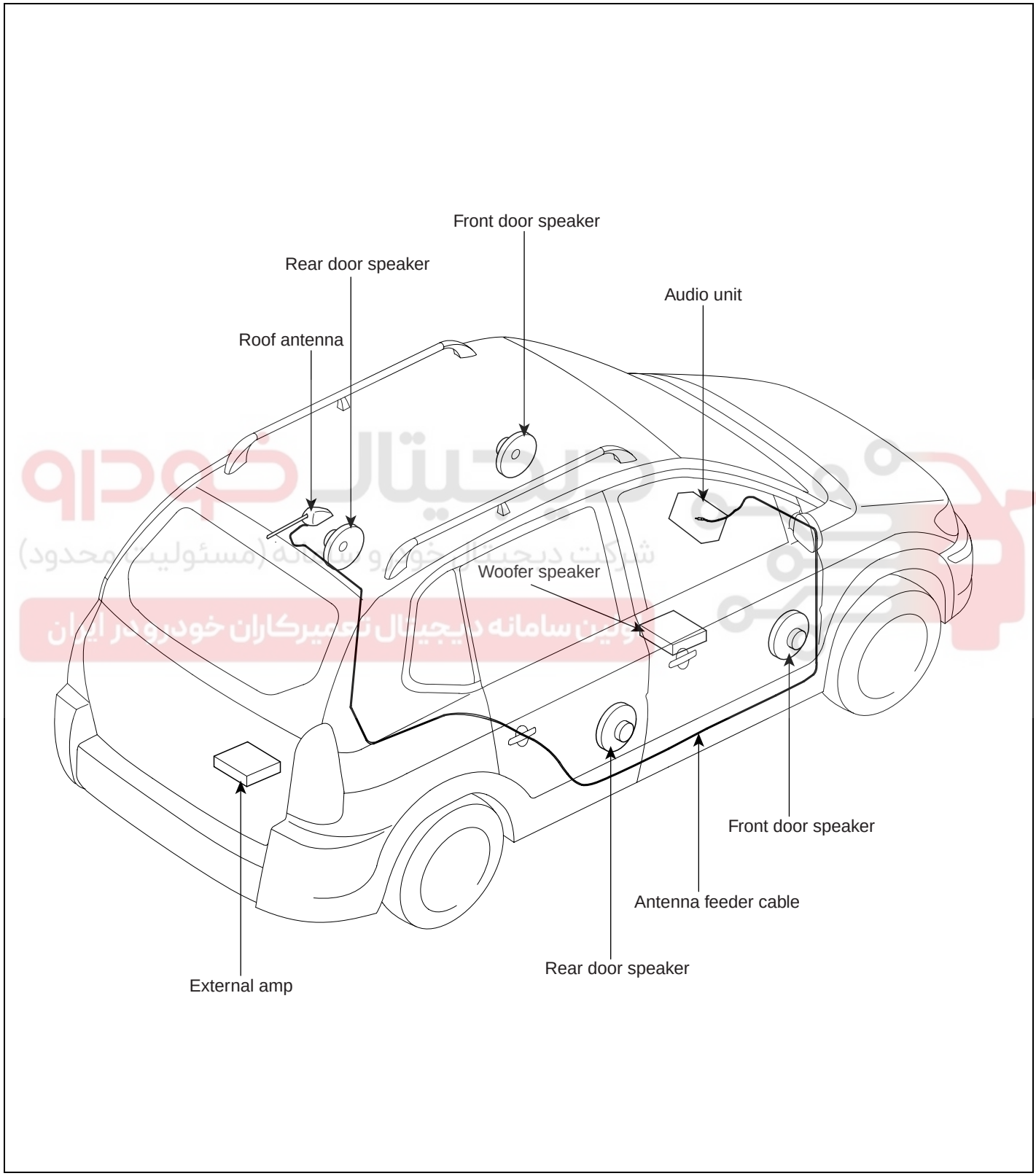
7. Central door lock function works, but keyless entry system does not work.




ETKE901S

# AUDIO SYSTEM

## COMPONENTS E085DAD0

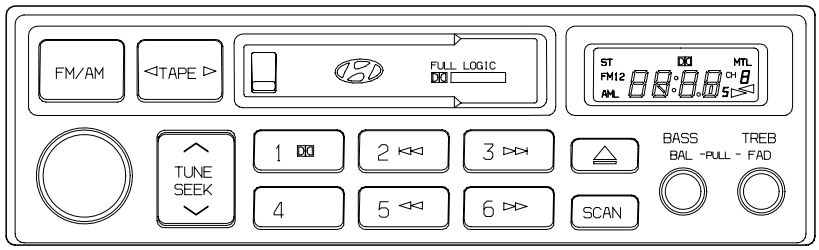


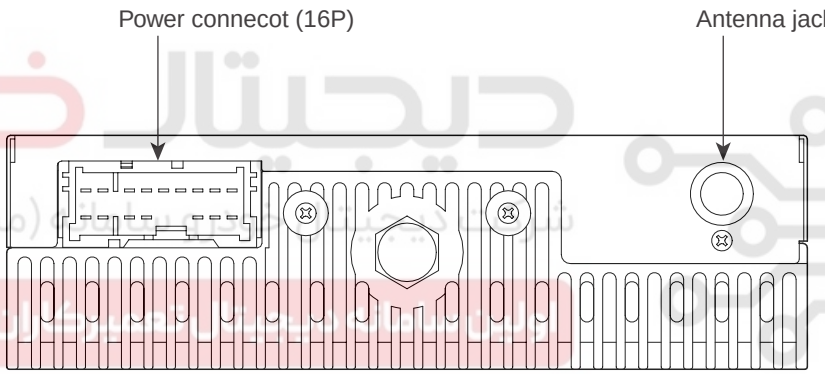

ETQF880A

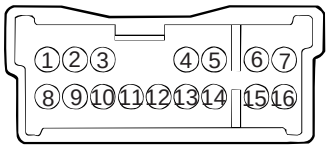
# AUDIO UNIT

## COMPONENTS ED8BB7DA

**[ K240 ]**

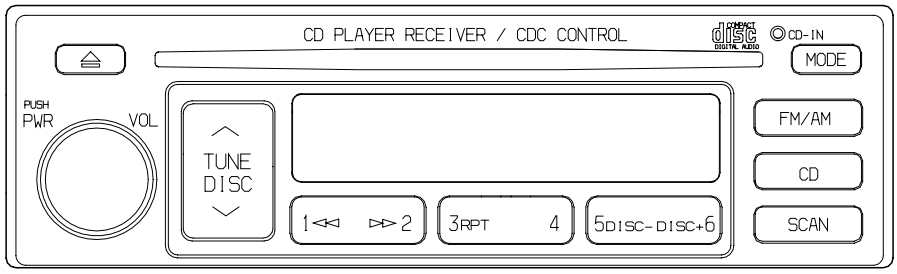


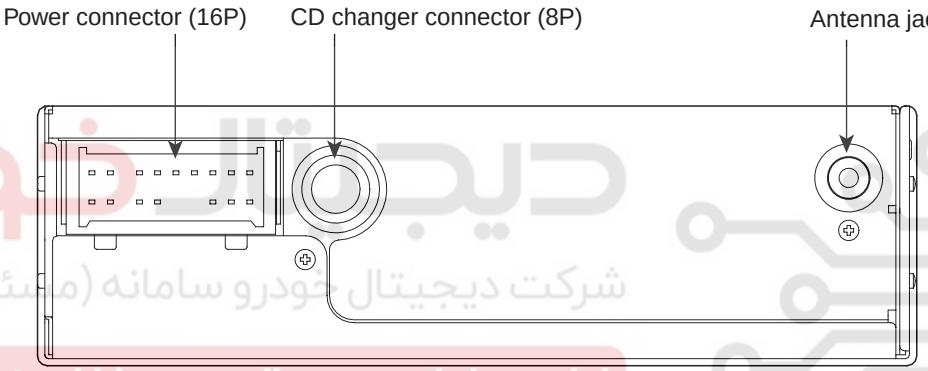




| Power connector (16P) | Terminal | Description |
|---|---|---|
|  ETJA001C | 1 | Antenna |
| | 2 | Rear left speaker(-) |
| | 3 | Front left speaker(-) |
| | 4 | Front right speaker(-) |
| | 5 | Rear right speaker(-) |
| | 6 | Illumination(-) |
| | 7 | ACC(+) |
| | 8 | Ground |
| | 9 | Rear left speaker(+) |
| | 10 | Front left speaker(+) |
| | 11 | N.C. |
| | 12 | N.C. |
| | 13 | Front right speaker(+) |
| | 14 | Rear right speaker(+) |
| | 15 | Illumination(+) |
| | 16 | Battery(+) |

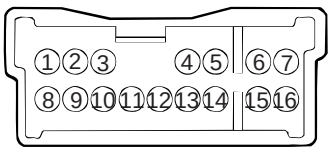
ETQF010A

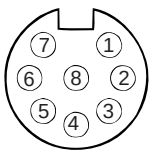
**[ K260 ]**



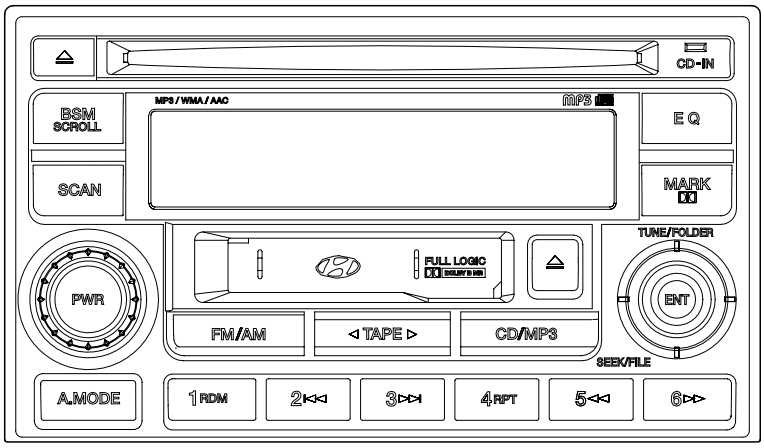


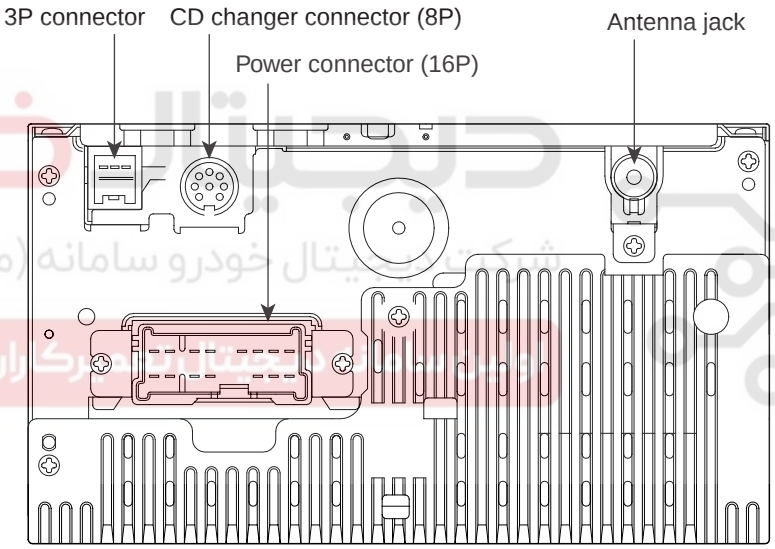

| Power connector (16P) | Terminal | Description |
|---|---|---|
|  ETJA001C | 1 | N.C. |
| | 2 | Rear left speaker(-) |
| | 3 | Front left speaker(-) |
| | 4 | Front right speaker(-) |
| | 5 | Rear right speaker(-) |
| | 6 | Illumination(-) |
| | 7 | ACC(+) |
| | 8 | Ground |
| | 9 | Rear left speaker(+) |
| | 10 | Front left speaker(+) |
| | 11 | N.C. |
| | 12 | N.C. |
| | 13 | Front right speaker(+) |
| | 14 | Rear right speaker(+) |
| | 15 | Illumination(+) |
| | 16 | Battery(+) |

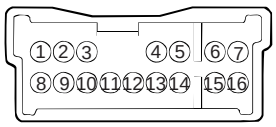
| CDC connector (8P) | Terminal | Description |
|---|---|---|
|  ETJA001G | 1 | R |
| | 2 | CD ON |
| | 3 | BUS |
| | 4 | B+ |
| | 5 | M. Ground |
| | 6 | N.C. |
| | 7 | L |
| | 8 | A.Ground |

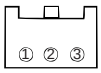
ETQF010C

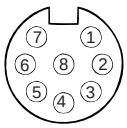
**[ M280 ]**



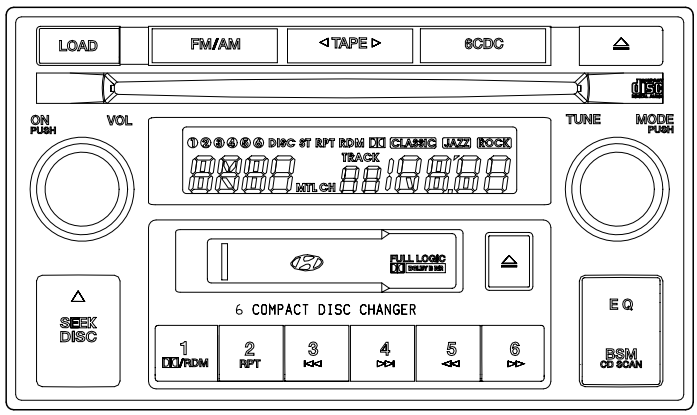

| Power connector (16P) | Terminal | Description |
|---|---|---|
|  ETJA001C | 1 | Antenna |
| | 2 | Rear left amp(-) |
| | 3 | Front left amp(-) |
| | 4 | Front right amp(-) |
| | 5 | Rear right amp(-) |
| | 6 | Illumination(-) |
| | 7 | ACC(+) |
| | 8 | Ground |
| | 9 | Rear left amp(+) |
| | 10 | Front left amp(+) |
| | 11 | N.C. |
| | 12 | Amp remote |
| | 13 | Front right amp(+) |
| | 14 | Rear right amp(+) |
| | 15 | Illumination(+) |
| | 16 | Battery(+) |

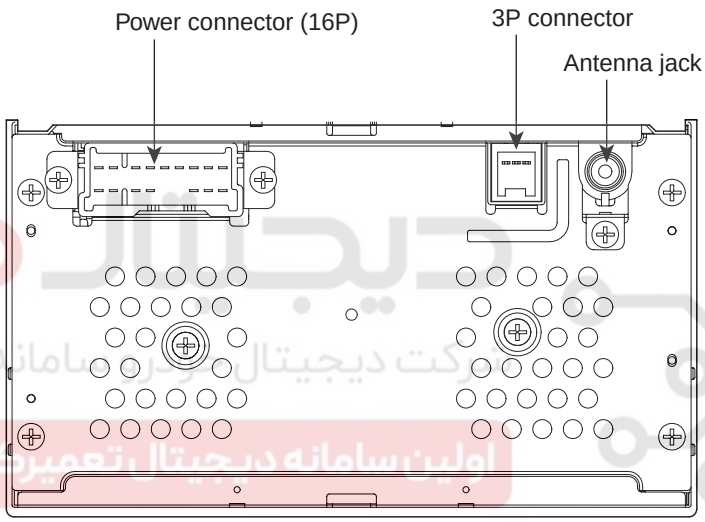
| Connector (3P) | Terminal | Description |
|---|---|---|
|  ETJA001K | 1 | Signal |
| | 2 | Signal |
| | 3 | Ground |

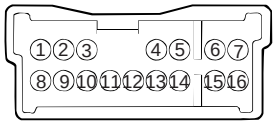
| CDC Connector (8P) | Terminal | Description |
|---|---|---|
|  ETJA001G | 1 | R |
| | 2 | CD ON |
| | 3 | BUS |
| | 4 | B+ |
| | 5 | M. Ground |
| | 6 | N.C. |
| | 7 | L |
| | 8 | A.Ground |

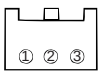
ETQF010E

**[ J290 ]**



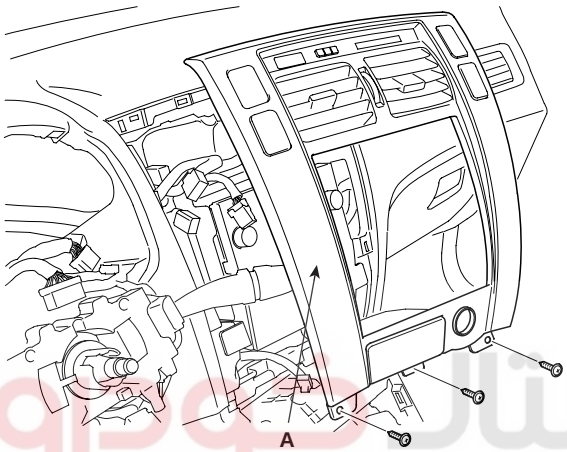

| Power connector (16P) | Terminal | Description |
|---|---|---|
|  ETJA001C | 1 | Antenna |
| | 2 | Rear left amp(-) |
| | 3 | Front left amp(-) |
| | 4 | Front right amp(-) |
| | 5 | Rear right amp(-) |
| | 6 | Illumination(-) |
| | 7 | ACC(+) |
| | 8 | Ground |
| | 9 | Rear left amp(+) |
| | 10 | Front left amp(+) |
| | 11 | N.C. |
| | 12 | Amp remote |
| | 13 | Front right amp(+) |
| | 14 | Rear right amp(+) |
| | 15 | Illumination(+) |
| | 16 | Battery(+) |

| Connector (3P) | Terminal | Description |
|---|---|---|
|  ETJA001K | 1 | - |
| | 2 | Signal |
| | 3 | Ground |

ETQF010G

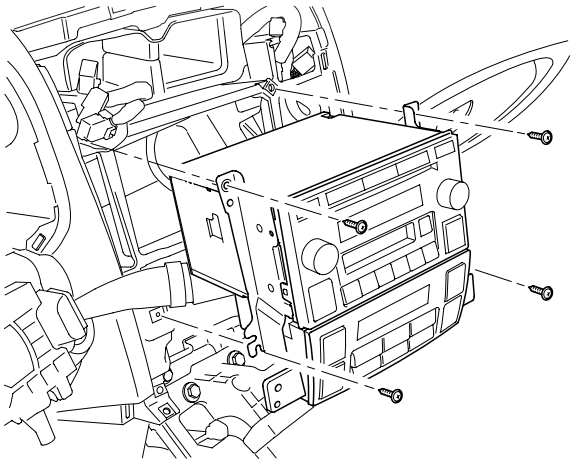
## REMOVAL E3DD1577

1. Disconnect the negative(-) battery terminal.
2. Remove the upper plate from the transmission shift lever, then remove the 3 screws holding the center facia panel.
   Remove the center facia panel(A) and disconnect the wire connectors.




KTQE260A

3. Remove the audio unit after removing 4 screws.



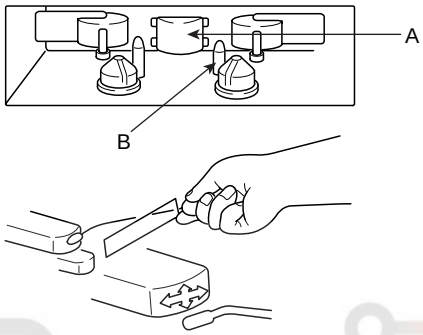
KTQE260J

4. Installation is the reverse of removal.

## INSPECTION EEF0C2E6

### TAPE HEAD AND CAPSTAN CLEANING

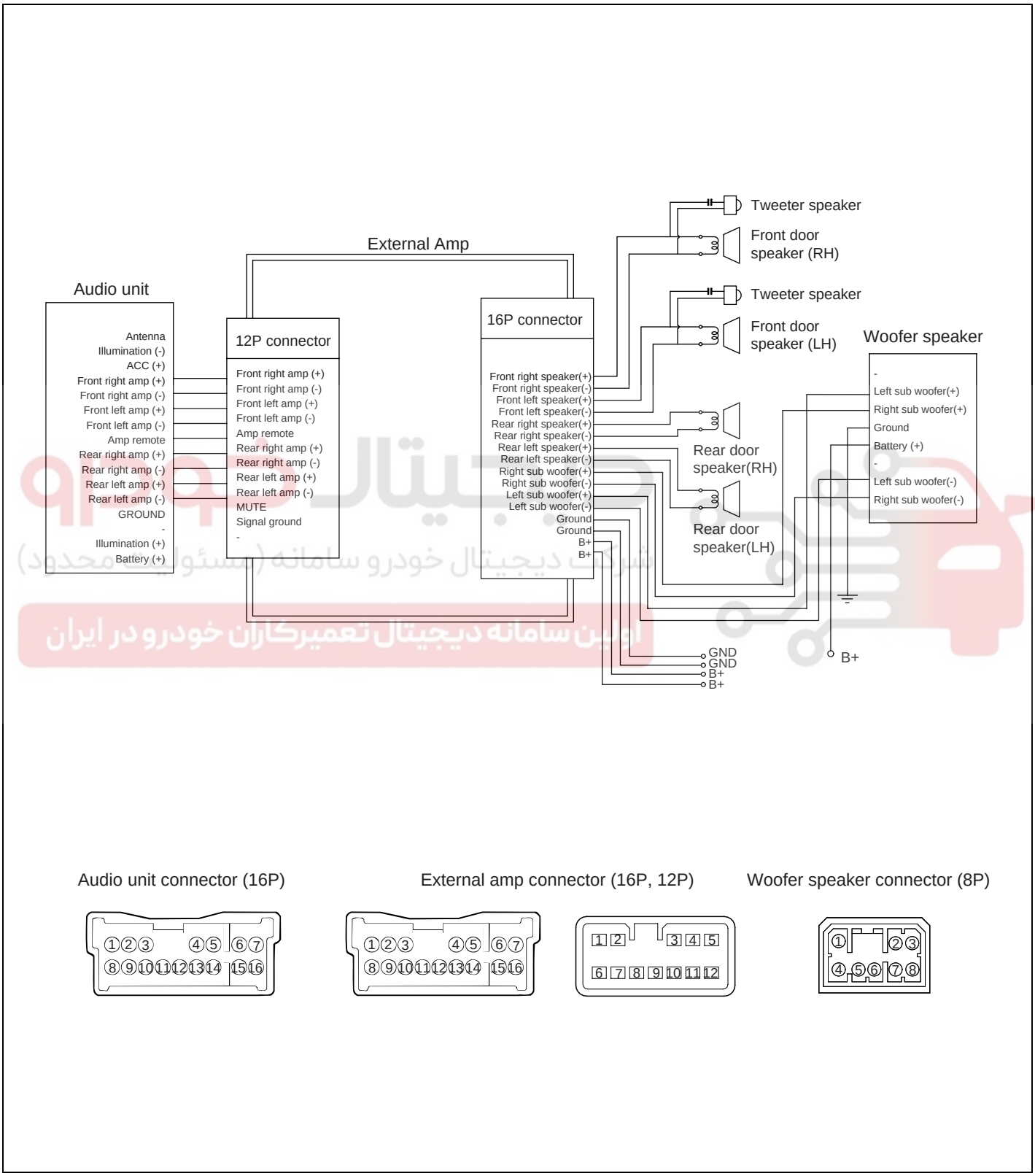
1. To obtain optimum performance, clean the head(A), and capstan(B) as often as necessary, depending on frequency of use and tape cleanness.
2. To clean the tape head and capstan, use a cotton swab dipped in ordinary rubbing alcohol. Wipe the head(A) and capstan(B).




ETKE035E

# SPEAKERS

## CIRCUIT DIAGRAM EBF0908A




Audio unit connector (16P)




External amp connector (16P, 12P)







Woofer speaker connector (8P)

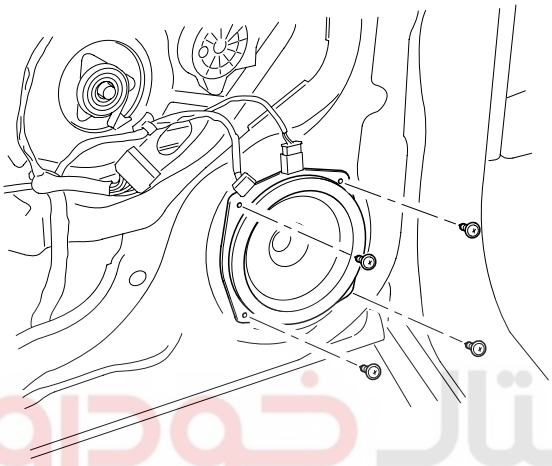



ETQF050A

## REMOVAL EFFEDE9B

### FRONT DOOR SPEAKER

1. Remove the front door trim panel (see BD group - front door).
2. Remove the front door speaker after removing 4 screws.

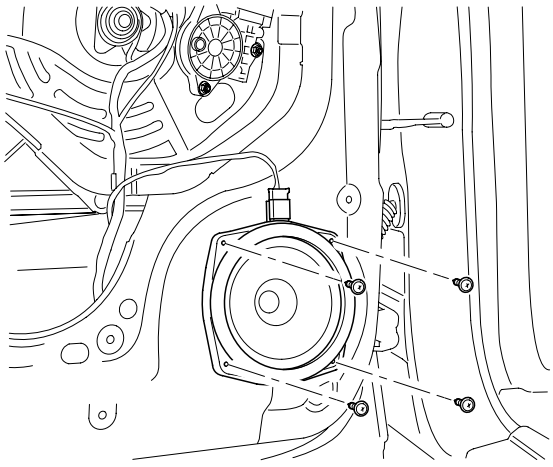


KTQE320A

3. Installation is the reverse of removal.

### REAR DOOR SPEAKER

1. Remove the rear door trim panel (see BD group - rear door).
2. Remove the rear door speaker after removing 4 screws.

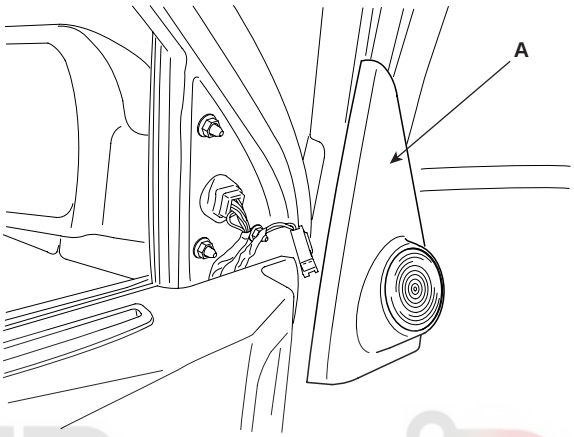


KTQE280C

3. Installation is the reverse of removal.

### TWEETER SPEAKER

1. Remove the delta cover from the front door then disconnect the 2P connector.
   Remove the tweeter speaker(A).

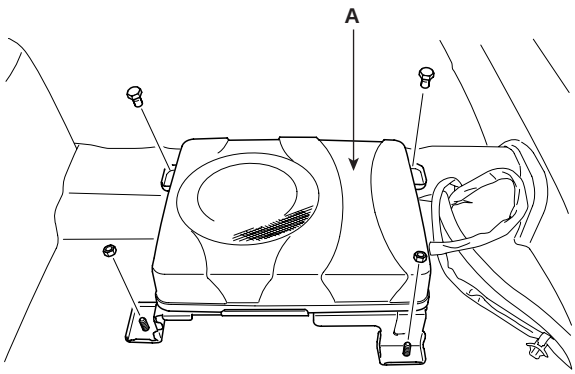



KTQE280H

2. Installation is the reverse of removal.

### WOOFER SPEAKER

1. Remove the assist side seat (see BD group - front seats)
2. Remove the woofer speaker(A) from the assist side floor after removing 2 bolts and 2 nuts.

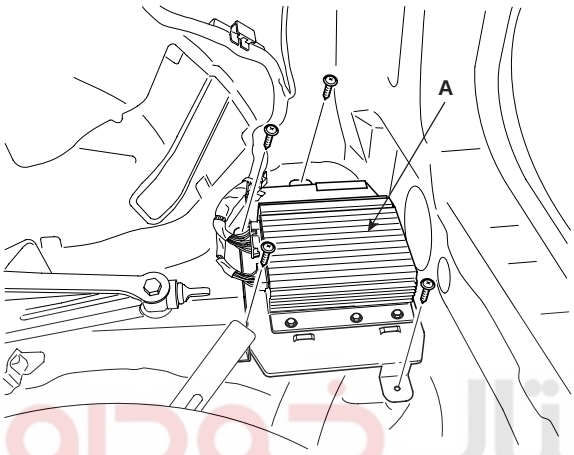



KTQE260B

3. Installation is the reverse of removal.

**EXTERNAL AMP**

1. Open the tailgate then remove the luggage floor mat and trim.
2. Remove the external amp(A) from the luggage right side floor.

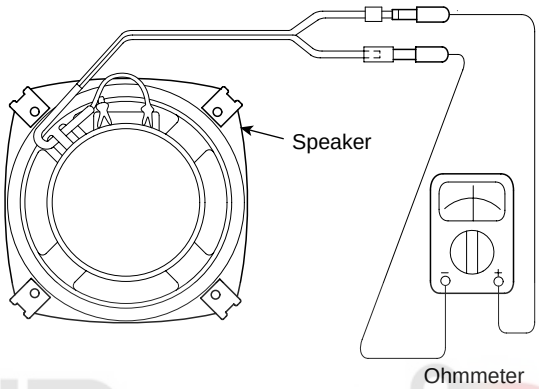



KTQE260C

3. Installation is the reverse of removal.

## INSPECTION E134E5FC

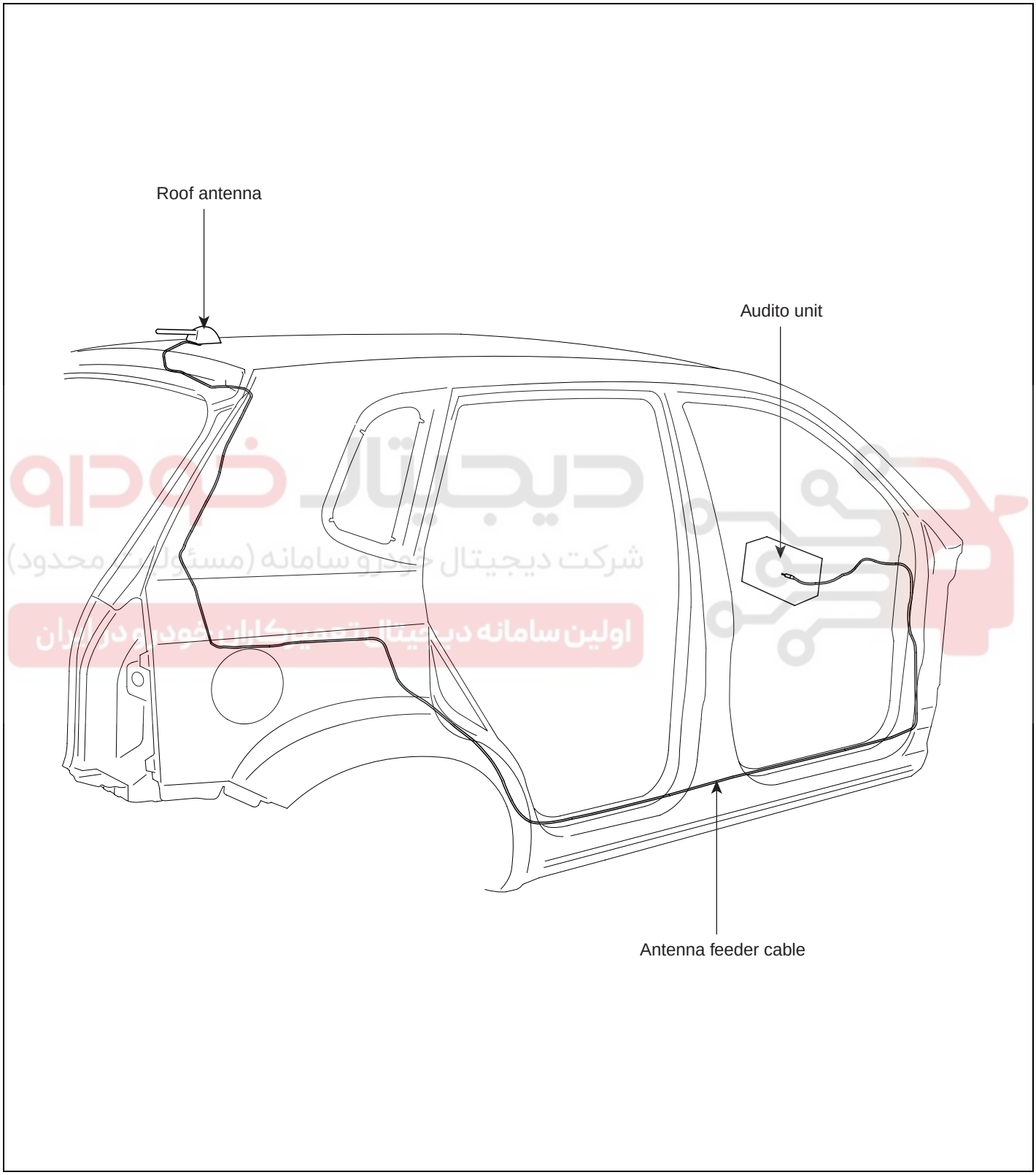
1. Check the speaker with an ohmmeter. If an ohmmeter indicates the correct impedance of the speaker when checking between the speaker (+) and speaker (-) of the same channel, the speaker is ok.
2. If a clicking sound is emitted from the speaker when the ohmmeter is connected to the speaker terminals, the speaker is ok.




ETA9040A

# ANTENNA

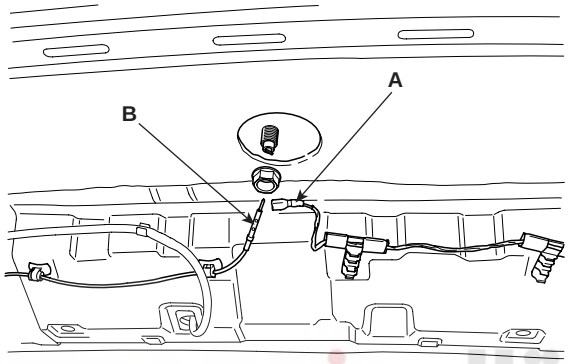
## COMPONENTS ED6EABAC




ETQF050E

## REMOVAL EAEFDAAF

1. Remove the rear roof trim (see BD group-roof trim).
2. Disconnect the 1P connector(A) and antenna jack(B) from the roof antenna.
3. Remove the roof antenna after removing a nut.

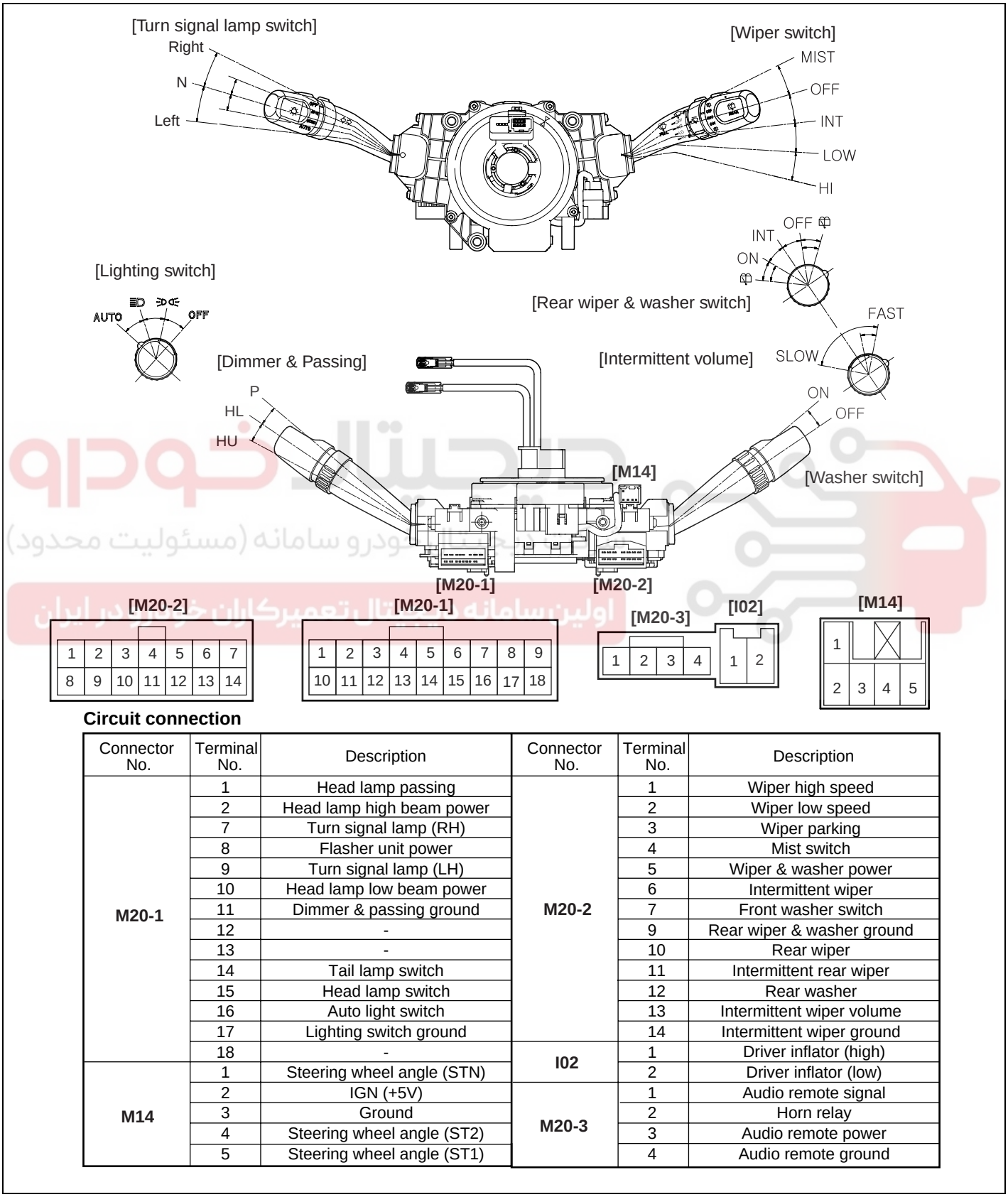



KTQE260G

4. Installation is the reverse of removal.

# MULTI FUNCTION SWITCH

## COMPONENTS E675CEA9




### Circuit connection

| Connector No. | Terminal No. | Description | Connector No. | Terminal No. | Description |
|---|---|---|---|---|---|
| M20-1 | 1 | Head lamp passing | M20-2 | 1 | Wiper high speed |
| | 2 | Head lamp high beam power | | 2 | Wiper low speed |
| | 7 | Turn signal lamp (RH) | | 3 | Wiper parking |
| | 8 | Flasher unit power | | 4 | Mist switch |
| | 9 | Turn signal lamp (LH) | | 5 | Wiper & washer power |
| | 10 | Head lamp low beam power | | 6 | Intermittent wiper |
| | 11 | Dimmer & passing ground | | 7 | Front washer switch |
| | 12 | - | | 9 | Rear wiper & washer ground |
| | 13 | - | | 10 | Rear wiper |
| | 14 | Tail lamp switch | | 11 | Intermittent rear wiper |
| | 15 | Head lamp switch | | 12 | Rear washer |
| | 16 | Auto light switch | | 13 | Intermittent wiper volume |
| | 17 | Lighting switch ground | | 14 | Intermittent wiper ground |
| | 18 | - | I02 | 1 | Driver inflator (high) |
| M14 | 1 | Steering wheel angle (STN) | | 2 | Driver inflator (low) |
| | 2 | IGN (+5V) | M20-3 | 1 | Audio remote signal |
| | 3 | Ground | | 2 | Horn relay |
| | 4 | Steering wheel angle (ST2) | | 3 | Audio remote power |
| | 5 | Steering wheel angle (ST1) | | 4 | Audio remote ground |

ETQF050G

# MULTI FUNCTION SWITCH

## REMOVAL ECDA242D

Prior to removing of the multifunction switch assembly in vehicles equipped with air bags, be careful to keep the following items.

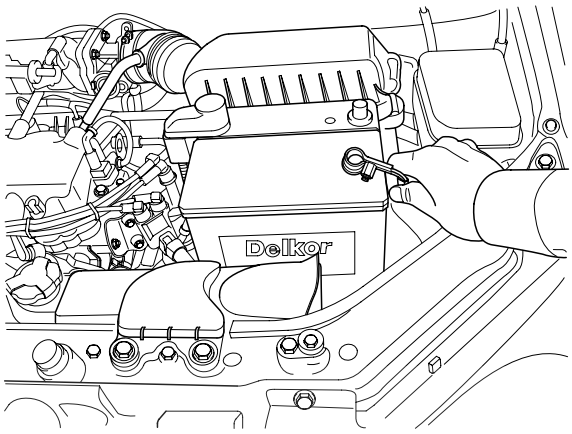
***CAUTION***

- ***Never attempt to disassemble or repair the air bag module or clock spring. If faulty, replace it.***
- ***Do not drop the air bag module or clock spring or allow contact with water, grease or oil. Replace if a dent, crack, deformation or rust are detected.***
- ***The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of it.***
- ***Do not expose the air bag module to temperatures over 93°C (200°F).***
- ***After deployment of an air bag, replace the clock spring with a new one.***
- ***Wear gloves and safety glasses when handling an air bag that has already been deployed.***
- ***An undeployed air bag module should only be disposed of in accordance with the procedures. mentioned in the Restraints section.***
- ***When you disconnect the air bag module-clock spring connector, take care not to apply excesive force to it.***
- ***The removed air bag module should be stored in a clean, dry place.***
- ***Prior to installing the clock spring, align the mating mark and "NEUTRAL" position indicator of the clock spring, and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch. If the mating mark of the clock spring is not properly aligned, the steering wheel may not completely rotate during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver. To inspect the clock spring, refer to the Restraints section.***

1. Disconnect the negative(-) battery terminal.

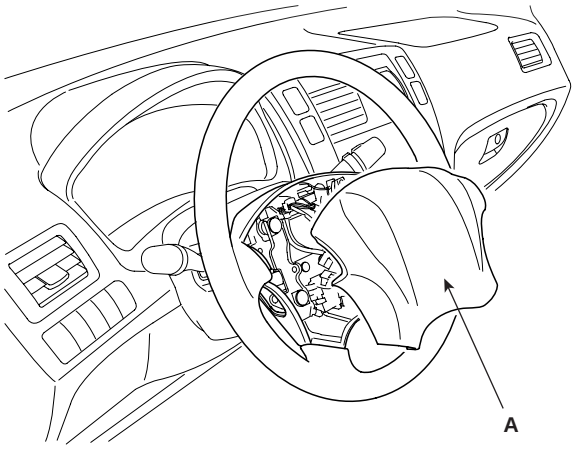
***NOTE***

*Prior to doing any further work after disconnection of the battery cable, wait at least 30 seconds.*



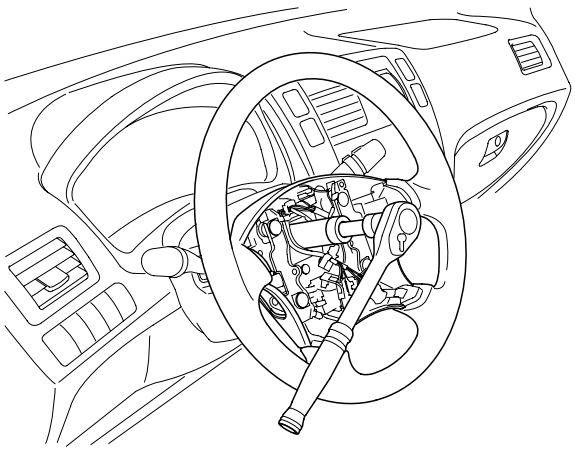

KPPD004A

2. Remove the 2 screws holding the air bag module with an asterix wrench. (Tor-x socket)
Disconnect the horn connector and the air bag module connector, and remove the air bag module(A).




KTQE230A

3. Remove the steering wheel after removing a nut.



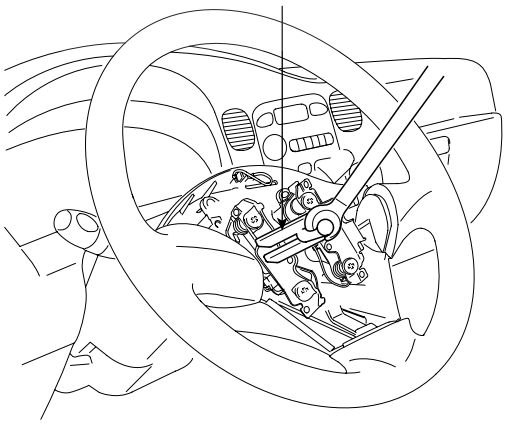
KTQE230B

4. Align the steering shaft with wheel then remove the steering wheel using special tool (09561-11002).

***CAUTION***

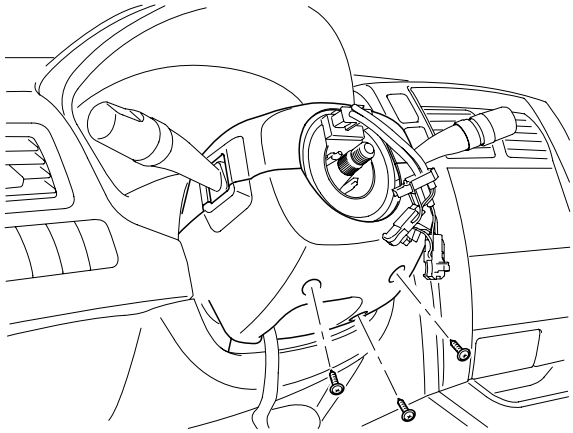
***Do not hammer on the steering wheel to remove it; dong so may damage the collapsible mechanism.***

09561-11002



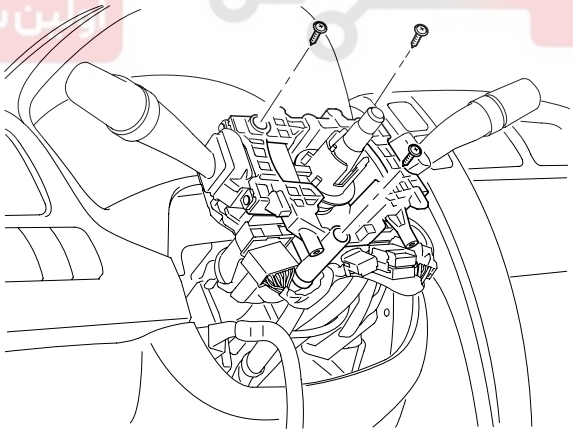
KTUE050B

5. Remove the steering column upper and lower shrouds after removing 3 screws.



KTQE230C

6. Remove the 3 screwsholding the multi-function switch, then disconnect the wire connector. Remove the multi-function switch assembly.



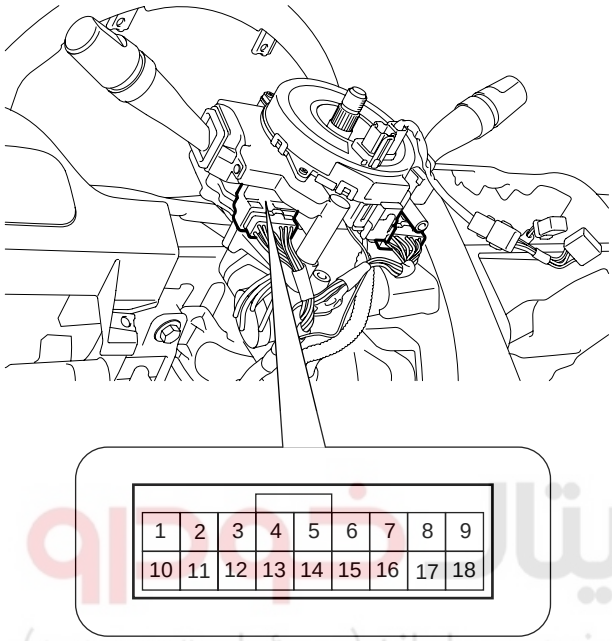
KTQE230D

7. Installation is the reverse of removal.

## INSPECTION E7ECD22C

### LIGHTING SWITCH INSPECTION

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




KTDD075G

### LIGHTING SWITCH [M20-1]

| Position \ Terminal | 14 | 15 | 16 | 17 |
|---|---|---|---|---|
| OFF | | | | |
| I | ○ | — | — | ○ |
| II | ○ | ○ | ○ | ○ |

ETQF040B

### LIGHTING SWITCH (WITH AUTO-LIGHT CONTROL) [M20-1]

| Position \ Terminal | 14 | 15 | 16 | 17 |
|---|---|---|---|---|
| OFF | | | | |
| I | ○ | — | — | ○ |
| II | ○ | ○ | — | ○ |
| AUTO | | | ○ | ○ |

ETQF040A

### DIMMER AND PASSING SWITCH [M20-1]

| Position \ Terminal | 1 | 2 | 10 | 11 |
|---|---|---|---|---|
| HU | | ○ | — | ○ |
| HL | | | ○ | ○ |
| P | ○ | ○ | — | ○ |

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

ETFA040B

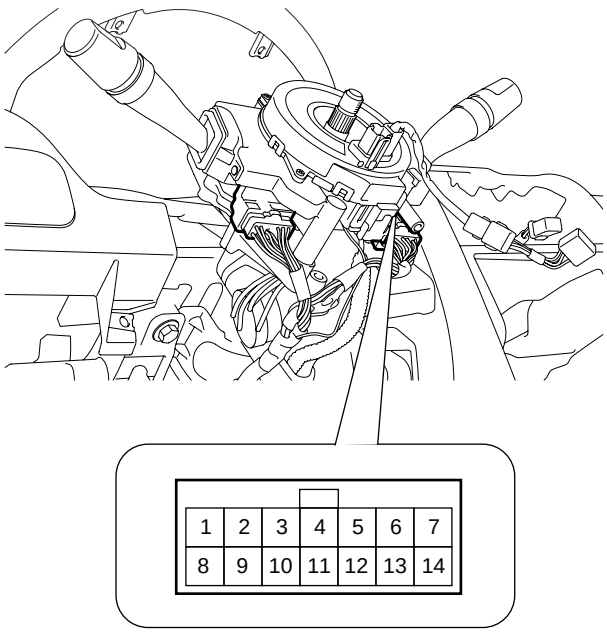
### TURN SIGNAL SWITCH [M20-1]

| Hazard switch \ Turn signal switch \ Terminal | 7 | 8 | 9 |
|---|---|---|---|
| OFF — Left | | ○ | ○ |
| OFF — N | | | |
| OFF — Right | ○ | — | ○ |

ETQF040C

### WIPER AND WASHER SWITCH INSPECTION

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




KTDD075I

### WIPER SWITCH [M20-2]

| Position \ Terminal | 1 | 2 | 3 | 4 | 5 | 6 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|
| MIST | | | | ○ | ○ | | | |
| OFF | | ○ | ○ | | | | | |
| INT | | ○ | ○ | | ○ | ○ | ○ | ○ |
| LOW | | ○ | | | ○ | | | |
| HI | ○ | | | | ○ | | | |

ETFA040D

### WASHER SWITCH [M20-2]

| Position \ Terminal | 5 | 7 |
|---|---|---|
| OFF | | |
| ON | ○ | ○ |

ETFA040E

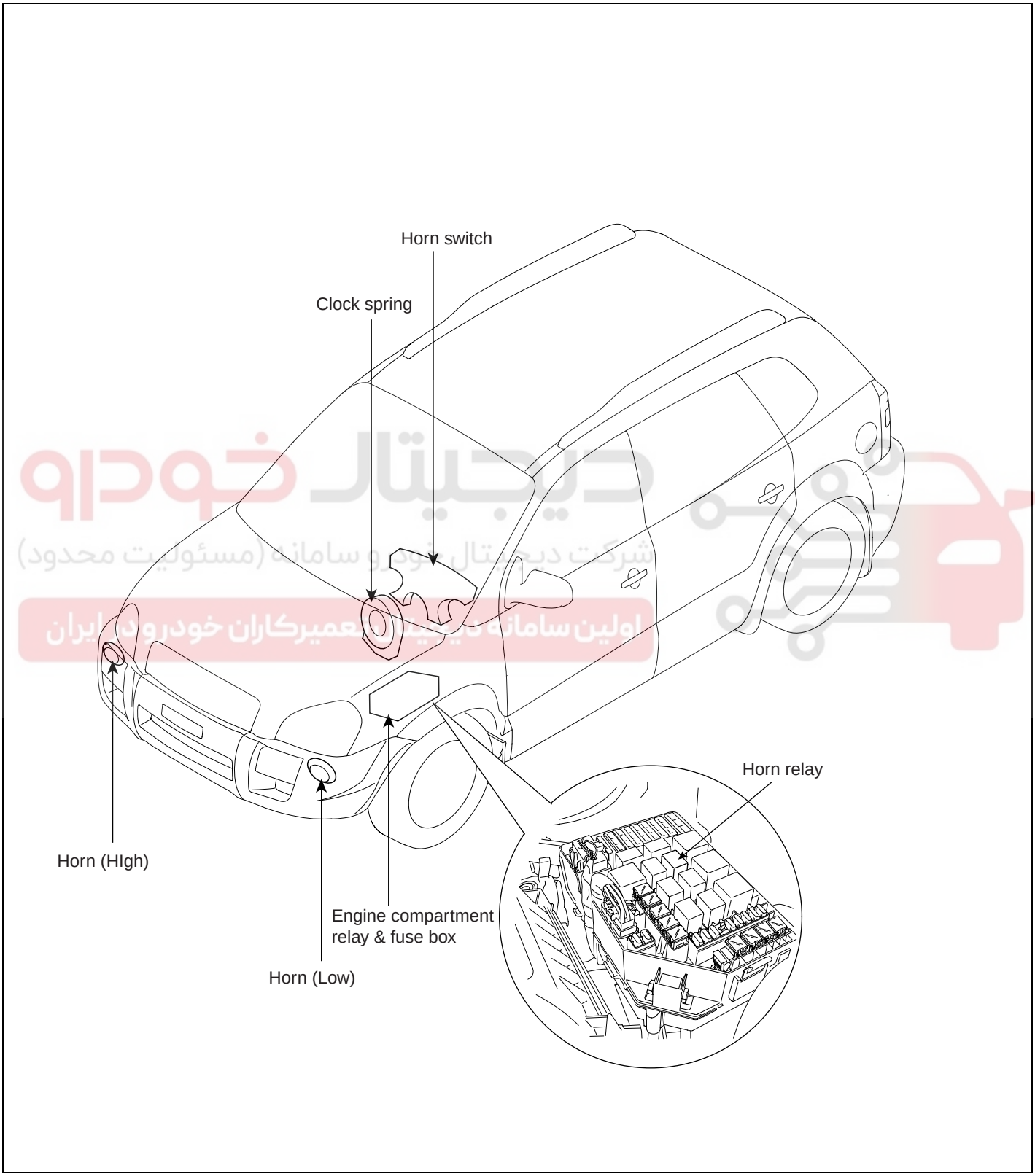
### REAR WIPER & WASHER SWITCH [M20-2]

| Position \ Terminal | 9 | 10 | 11 | 12 |
|---|---|---|---|---|
| Rear washer | ○ | | | ○ |
| OFF | | | | |
| INT | ○ | ○ | | |
| ON | ○ | | ○ | |
| Rear washer | ○ | | | ○ |

ETQF040D

# HORNS

## COMPONENTS E39CA0C9

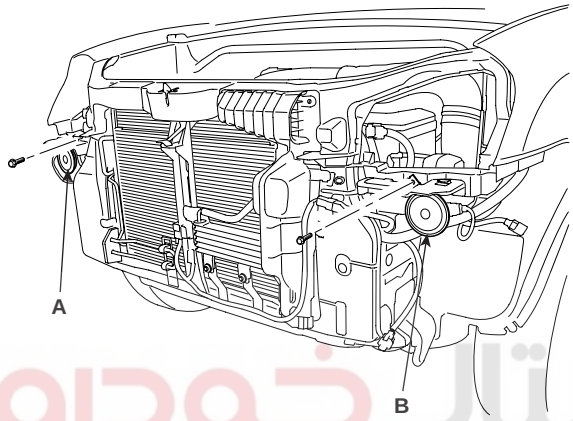



ETQF880B

# HORN

## REMOVAL E55C083D

1. Remove the head lamps assembly.
2. Remove the horns(high:A, low:B) assembly after removing a bolt, then disconnect the 2P connector.




KTQE260N

3. Installation is the reverse of removal.

## INSPECTION EB38F5C2

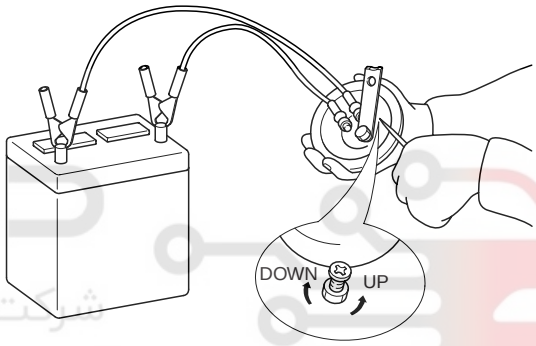
1. Test the horn by connecting battery voltage to the 1 terminal and ground the 2 terminal.
2. The horn should make a sound. If the horn fails to make a sound, replace it.

### ADJUSTMENT

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

***NOTE***

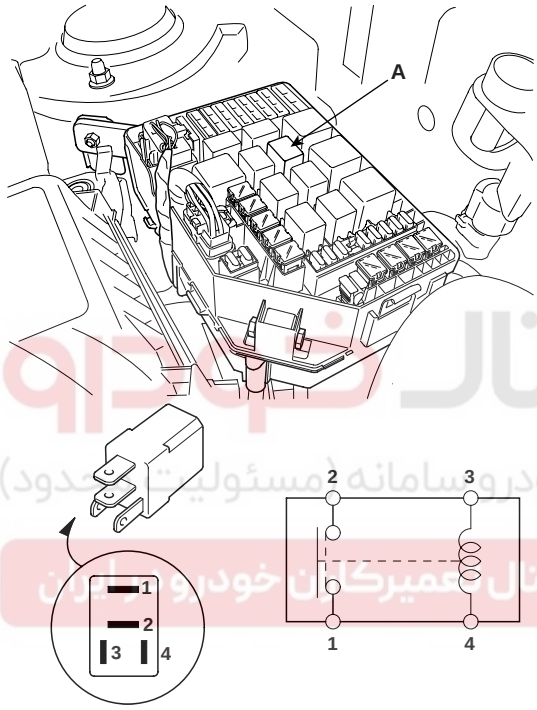
*After adjustment, apply a small amount of paint around the screw head to keepit from loosening.*




ETDA050A

## HORN RELAY INSPECTION

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



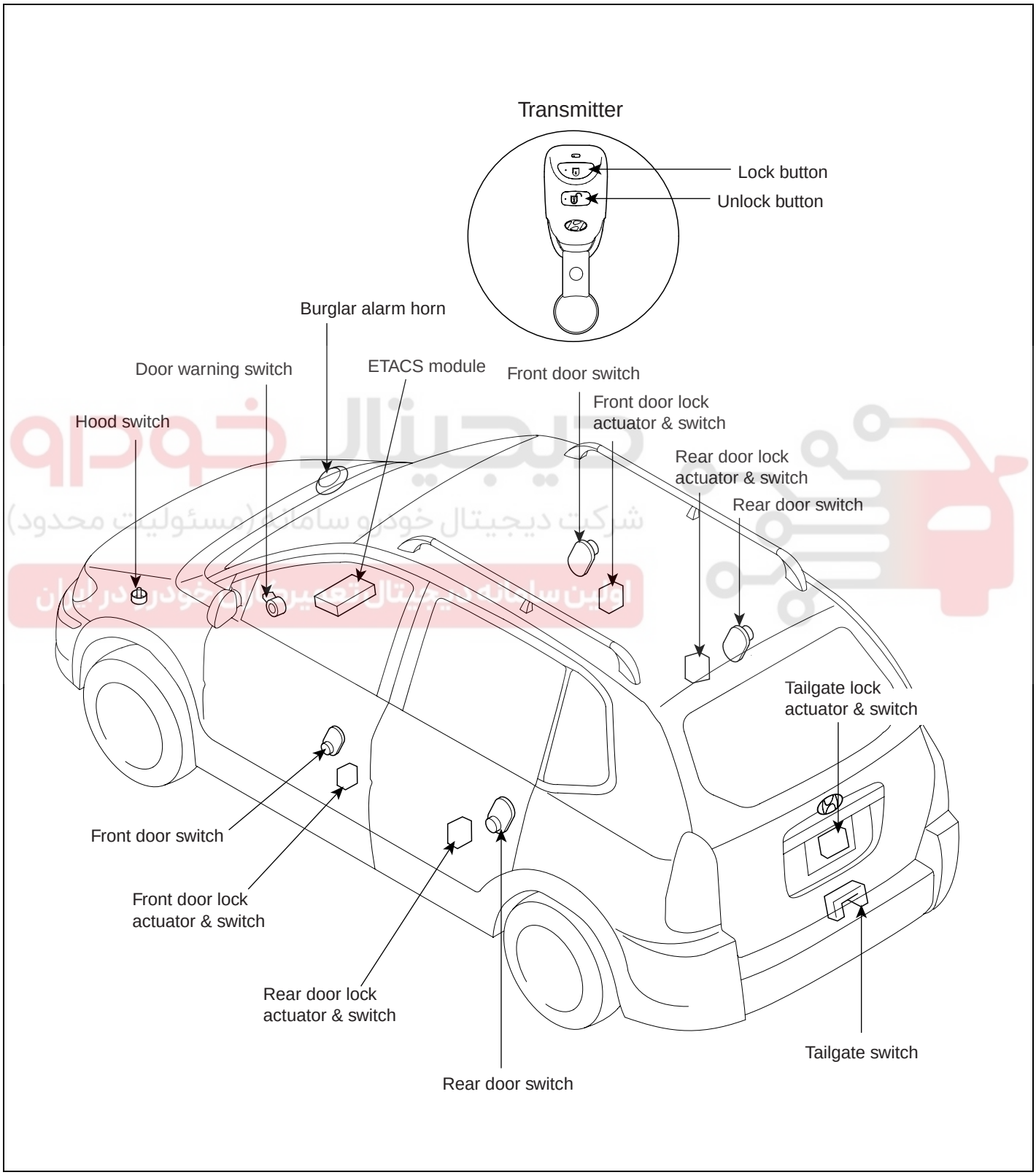

KTQE210K

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

ETKE215E

# KEYLESS ENTRY AND BURGLAR ALARM

## COMPONENTS ED5122D1




ETQF880F

## DESCRIPTION EAE2E05D

### BURGLAR ALARM SYSTEM

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

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

- A door is forced open.
- A door is unlocked without using the transmitter.
- The tailgate is opened without using the key.
- The hood is opened.
- The engine starter circuit and battery circuit are by-passed by breaking the ignition switch.

When the system is set off, the alarm (horn) sounds and the hazard lamp flash for about two minutes or until the system is disarmed by unlocking the transmitter.

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

The door switches, hood switch and tailgate switch are all open then immediately after locking the doors with the remote transmitter the system arms.

If anything is opened or improperly unlocked after the system is armed, the ETACS 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 ETACS module continues to get a ground signal, it thinks the vehicle is not closed and locked and will not arm.

An alarm that sounds for no apparent reason may have been set off by a switch that is on the threshold of misadjustment. In this case, it may only take a significant change in outside temperature, the vibration of a passing truck, or someone bumping into the vehicle to make the alarm sound.

### KEYLESS ENTRY SYSTEM

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

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

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

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

## ANTI-THEFT FUNCTION EEDF4E6E

1. **ARM FUNCTION**

Pressing the remote key lock button will result in a 0.5-second pulse issued to lock all doors.

Pressing the remote keypad unlock button once will result in a 0.5-second unlock pulse issued to unlock all doors.

As part of the arming sequence the alarm first enters a pre-armed state before falling into the armed state. During this pre-armed state alarm triggers are ignored. Pre-armed state can be reached from the alarmed state, the start inhibit state or the disarmed state. Pre-Arming of the alarm can be achieved by a press of the lock button on the remote key.

In the pre-armed state the visible and audible warnings are disabled.

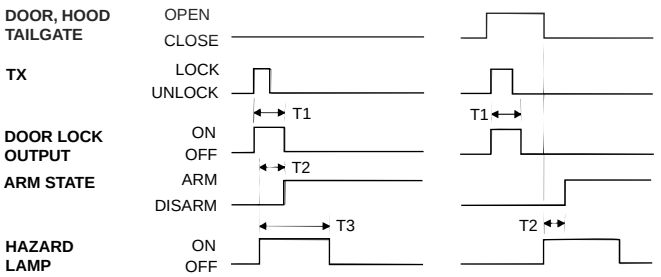
This system enters the armed state if it is in the pre-armed state and,after 0.6 sec, check actuator lock and each door, hood and tailgate close,and no door warning switch (no key in ignition).

On entering the arm state, a single flash of the hazard lamps is given,period of cycle 2 second, duty rate 50%.

If transmitter(TX) lock signal is received when a door, tailgate or hood is open,then lock output is given and a flash of hazard is not given.

After the armed state is entered, if a lock signal is received then a single flash of the hazard lamps is given, period of cycle 2 second, duty rate 50%.

The armed state cannot be reached by locking the car with the keys.




ETQF115Q

Time specification
T1 : 0.5 ± 0.1 sec.
T2 : Max. 2 sec.
T3 : 1.0 ± 0.2 sec.

2. **DISARM FUNCTION**

Disarming can be performed while the alarm is armed, or alarming, orafter alarming. The alarm can be disarmed by the following methods :

- Pressing the unlock button on the transmitter(TX) key. The hazard lamps shall be flashed twice for 1sec period (of cycle), 50% duty rate.
- If door warning switch is on, IGN1 and IGN2 are on in arm state,then arm state should be immediately cancelled. This means that the driveris inside the vehicle before pushing TX lock, so system should not arm.

In the disarm state the visible and audible warnings are disabled and start is enabled.

In the disarm state, if TX key unlock command is received, then the hazard lamps shall be flashed twice for period of cycle 1 sec, 50% duty rate.

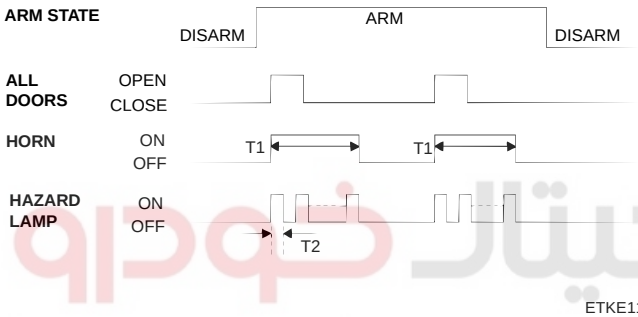

ETHA115R

Time specification
T1, T2 : 0.5 ± 0.1 sec.

## 3. ALARM FUNCTION

1) European contries
Once armed, should any door, hood or the tail-gate be opened, then :
- Start relay drive output is disabled, so starting is inhibited.
- Audible (horn) and visual (hazard lamp) warnings are issued, for 27 seconds duration. The horn warning is continuously occurring in this period.The hazard lamps operate with 1 sec period, 50 % duty rate.

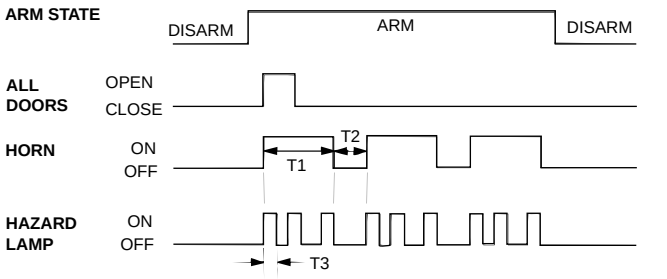
The alarm is given in the case where a door is opened with a key.




Time specification
T1 : 27 ± 2 sec.
T2 : 0.5 ± 0.1 sec.

2) Non European countries
Once armed, should any door, hood or the tail-gate be opened, then.
- Start relay drive output is disabled, so starting is inhibited.
- Audible (horn) and visual (hazard lamp) warnings are issued, for three cycles, each cycle 27±2 sec. duration on, 10±1 sec. off. The horn warning is continuously occurring during the on period. The hazard lamps operate with 1 sec period, 50 % duty rate during the on period.

The alarm is given in the case where a door is opened with a key.
After this time, the system maintains the start inhibit state, where no audible and visual warnings are issued but engine starting is not possible.

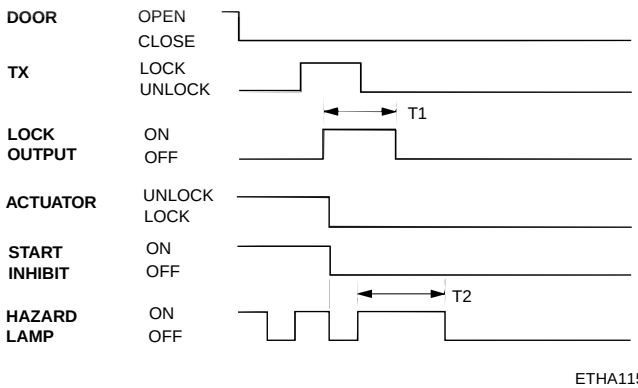



Time specification
T1 : 27 ± 2 sec.
T2 : 10 ± 1sec.
T3 : 0.5 ± 0.1 sec.

## 4. OPERATION DURING ALARM CONDITIONS

1) Cancelling audible alarm with the remote transmitter.

**CASE 1 : Door closed**
During or after alarming and then closing all doors and a transmitter (TX) lock signal is received Then
- The lock command is executed with 0.5 sec. ON
- Horn and start inhibition are OFF
- Hazard lamp is flashed one time (period : 2 sec., duty: 50%, within2 sec.)
- The state goes to arming mode (after a lock state check)
- The start is enabled

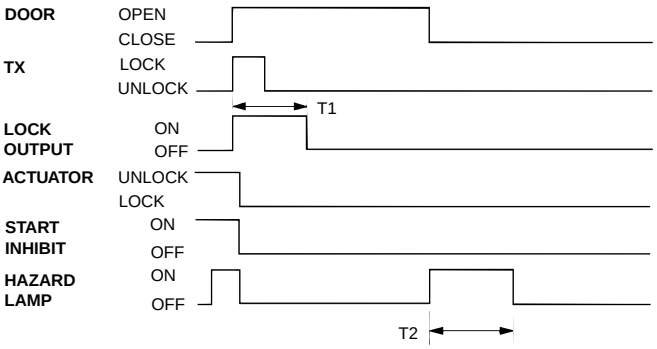



Time specification
T1 : 0.5 sec.
T2 : 1.0 ± 0.2 sec.

**CASE 2 : Door Open**
During or after alarming, with a door open and a TX lock signal is received Then
- The lock command is executed with 0.5 sec. ON

- Horn is disabled and start is enabled after confirmation of actuator lock

At this time, when the door is closed,
- Hazard lamp is flashed one time (period : 2 sec., duty 50%)
- The state goes to arming mode

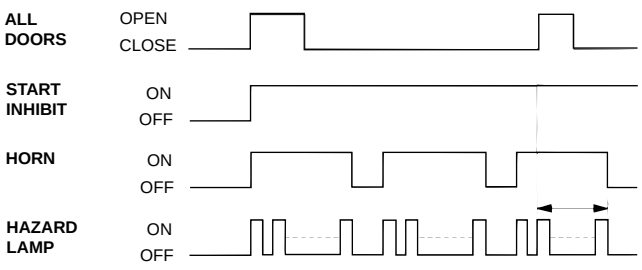



ETHA115W

Time specification
T1 : 0.5 sec.
T2 : 1.0 ± 0.2 sec.

2) New alarm conditions
Second alarm condition during alarming.
When another alarm occurs during alarming, the starting is disabled,and the alarm continues to sound for the remained time of warning signal.The alarm continues to sound after the second alarm condition is removed.
New alarm condition occurs after alarming (with all entrances closed)
If any entrance is opened again then
- The horn is ON 3 times (EC area : one time for 27sec.)
- Start is disabled
- Hazard lamps flash during the ON time of horn

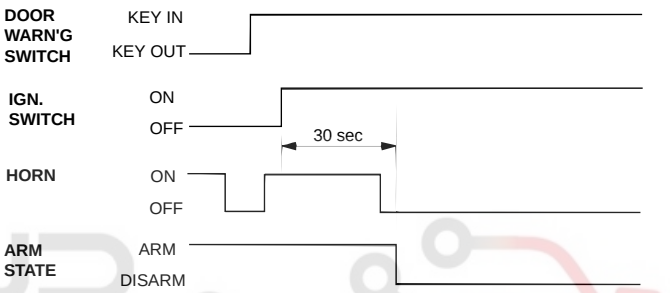
New alarm condition occur after alarming (with any entrance open).
If another entrance is opened, the ETACS module keeps start disabled and there is no horn output.




ETOC100N

3) Key operation during alarm
After the alarm state or start inhibit state are entered, if door warning switch on (key in ignition) & IGN 2 ON, if IGN 2 state is changed to OFF within 30sec., remain in alarm state.

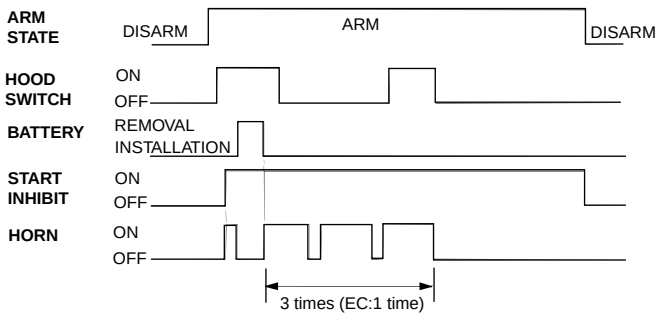
4) Disarming using the key
During alarming, in case that door warning switch (key in) is ON and then IGN1 and IGN2 are both ON for 30 sec continuously, the alarm is cancelled,and the system enters the disarm state.
After alarming, in case that door warning switch (key in) is ON and then IGN1 and IGN2 are both ON for 30 sec continuously, the alarm is cancelled,and the system enters the disarm state.




ETOC100O

5. **ALARM STATE IN POWER DOWN**
If the battery is disconnected to the ETACS module in the following states :
- Alarm
- After alarming

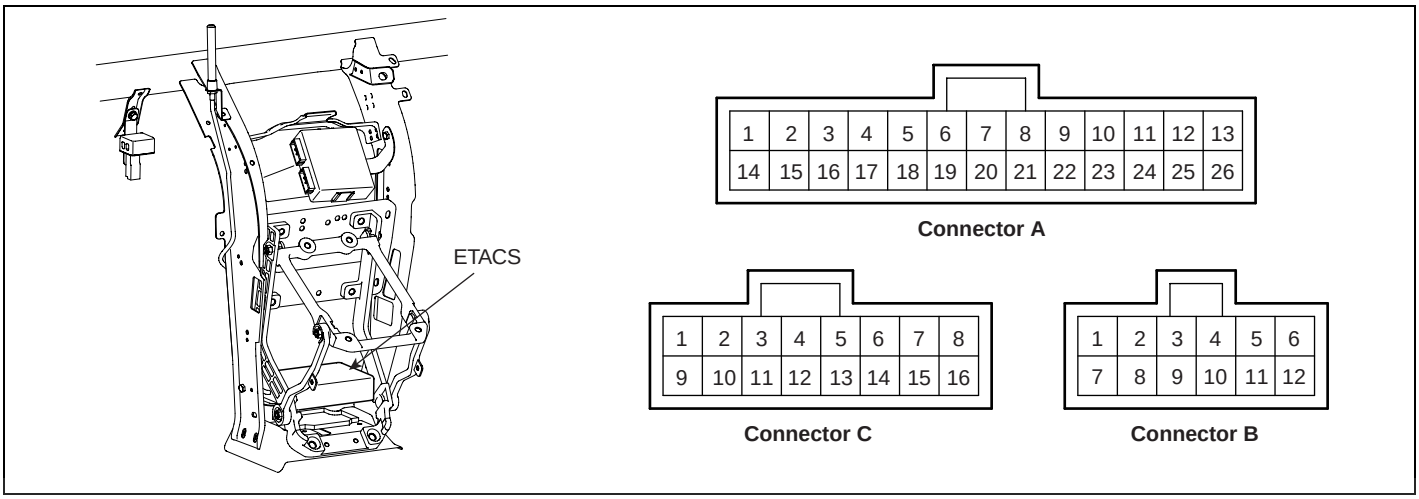
Upon restoring the battery, the alarm state shall be entered and the alarm cycle shall restarted (timer reset to 0).




ETHA115Z

## ETACS MODULE INPUT SIGNAL TEST E01D55EA

1. Disconnect the wire connector from the ETACS module.
2. Inspect the connector on wire harness side as shown in the below.




ETQF250C

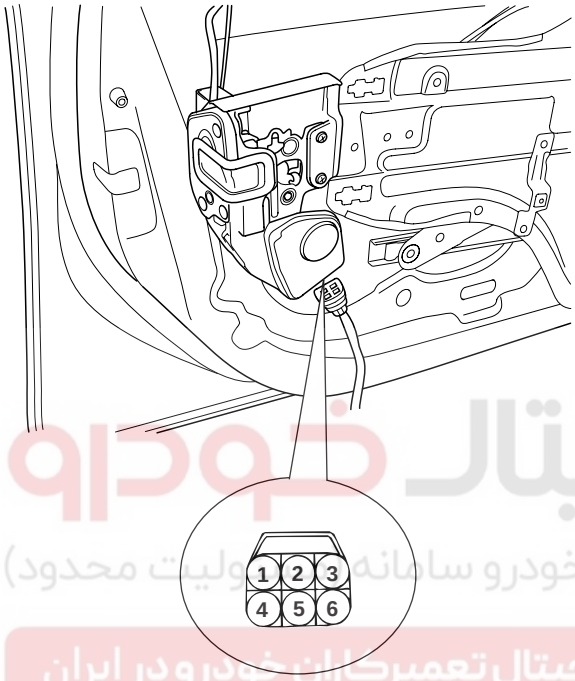
| Terminals No. | Test condition | Standard value |
|---|---|---|
| A6-B12 (GND) | Door switch "ON" (Door opened) | Below 1Ω |
| | Door switch "OFF" (Door closed) | 1MΩ or higher |
| C13-B12 (GND) | Tailgate switch "ON" (Tailgate opened) | Below 1Ω |
| | Tailgate switch "OFF" (Tailgate closed) | 1MΩ or higher |
| C12-B12 (GND) | Engine hood switch "ON" (Engine hood opened) | Below 1Ω |
| | Engine hood switch "OFF" (Engine hood closed) | 1MΩ or higher |
| A5-B12 (GND) | Driver's door switch "ON" (Driver's door opened) | Below 1Ω |
| | Driver's door switch "OFF" (Driver's door closed) | 1MΩ or higher |
| A18-B12 (GND) | Assist door switch "ON" (Assist door opened) | Below 1Ω |
| | Assist door switch "OFF" (Assist door closed) | 1MΩ or higher |
| A16-B12 (GND) | Door warning switch "ON" (Key inserted) | Battery voltage |
| | Door warning switch "OFF" (Key removed) | Below 1V |
| A2-B12 (GND) | Always | Battery voltage |
| A15-B12 (GND) | Ignition switch is turned to "ON" position | Battery voltage |

| Terminals No. | Test condition | Standard value |
|---|---|---|
| C1-B12 (GND) | Driver's door lock switch "ON" (Driver's door unlock detection) | Below 1Ω |
| | Driver's door lock switch "OFF" (Driver's door lock detection) | 1MΩ or higher |
| C2-B12 (GND) | Assist door lock switch "ON" (Assist door unlock detection) | Below 1Ω |
| | Assist door lock switch "OFF" (Assist door lock detection) | 1MΩ or higher |
| C9-B12 (GND) | Rear door lock switch "ON" (Rear door unlock detection) | Below 1Ω |
| | Rear door lock switch "OFF" (Rear door lock detection) | 1MΩ or higher |
| A4-B12 (GND) | Engine Start | Battery voltage |
| B12(GND) - Body ground | Always | Below 1Ω |
| B6-B12 (GND) | Burglar alarm horn operation | ON |

## INSPECTION E8E7627B

### FRONT DOOR LOCK ACTUATOR INSPECTION

1. Remove the front door trim panel. (see BD group-front door)
2. Disconnect the 6P connector from the actuator.




KTKD047A

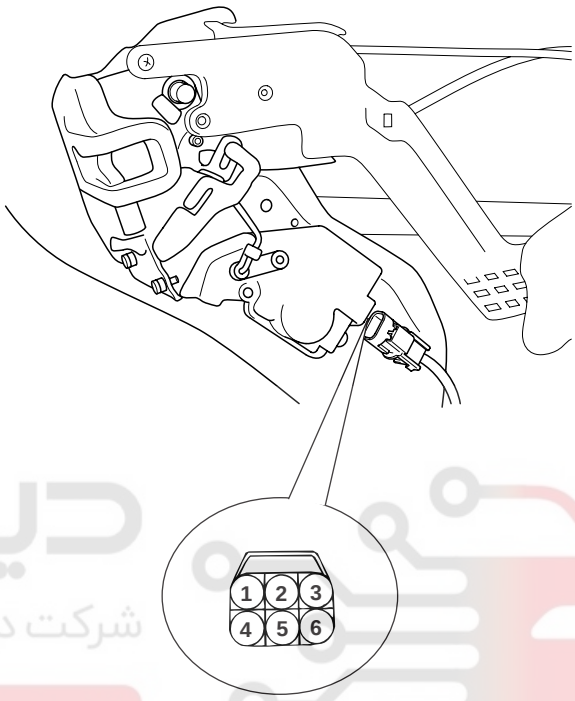
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | | 4 | 6 |
|---|---|---|---|
| Front left | Lock | ⊖ | ⊕ |
| | Unlock | ⊕ | ⊖ |
| Front right | Lock | ⊕ | ⊖ |
| | Unlock | ⊖ | ⊕ |

ETKE270B

### REAR DOOR LOCK ACTUATOR INSPECTION

1. Remove the rear door trim panel. (see BD group-rear door)
2. Disconnect the 6P connector from the actuator.




KTKD048A

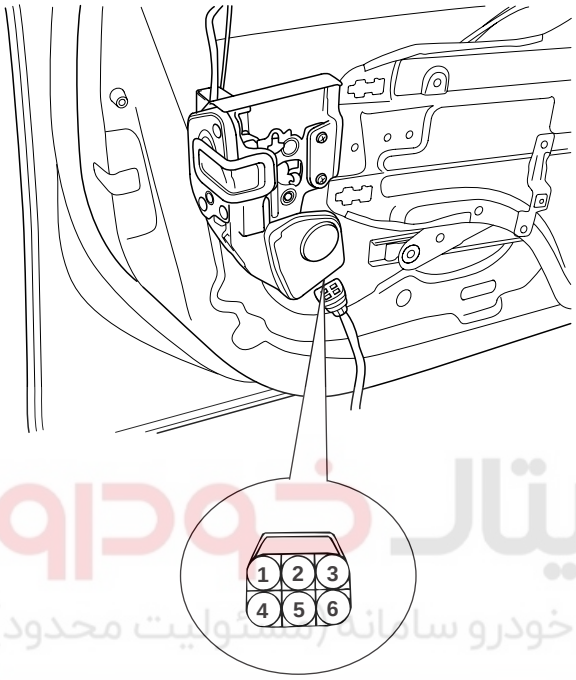
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | | 2 | 3 |
|---|---|---|---|
| Rear left | Lock | ⊕ | ⊖ |
| | Unlock | ⊖ | ⊕ |
| Rear right | Lock | ⊖ | ⊕ |
| | Unlock | ⊕ | ⊖ |

ETQF275B

## FRONT DOOR LOCK SWITCH INSPECTION

1. Remove the front door trim panel. (see BD group-front door)
2. Disconnect the 6P connector from the actuator.




KTKD047A

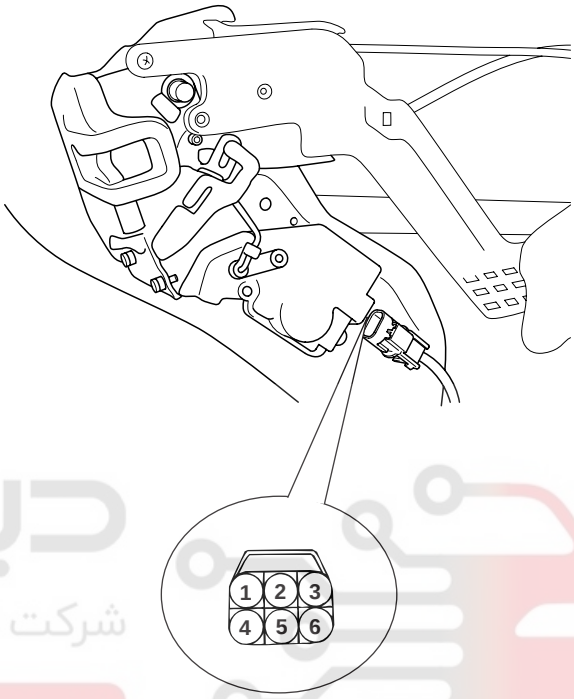
3. Check for continuity between the terminals in each switch position according to the table.

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

ETQF280A

## REAR DOOR LOCK SWITCH INSPECTION

1. Remove the rear door trim panel. (see BD group-rear door)
2. Disconnect the 6P connector from the actuator.




KTKD048A

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

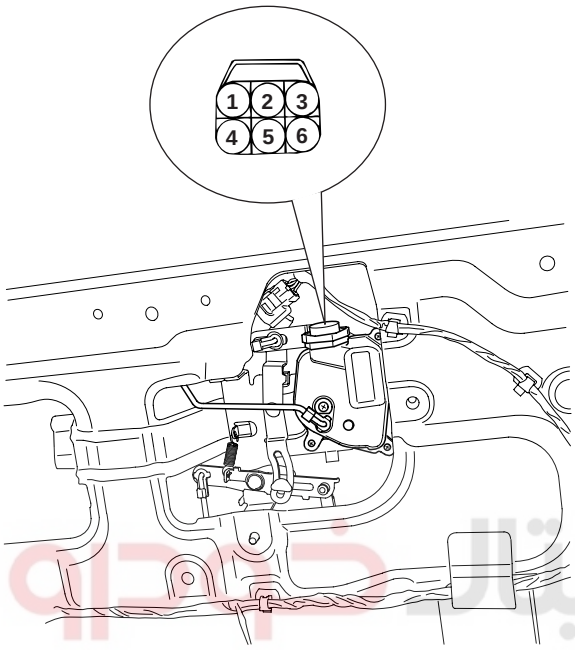
| Position \ Terminal | | 4 | 5 | 6 |
|---|---|---|---|---|
| Rear left | Lock | | ○ | ○ |
| | Unlock | ○ | | ○ |
| Rear right | Lock | ○ | | ○ |
| | Unlock | | ○ | ○ |

ETQF280B

## TAILGATE LOCK ACTUATOR INSPECTION

1. Remove the tailgate trim panel.
   (see BD group - tailgate)

2. Disconnect the 6P connector from the actuator.




KTQE280F

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

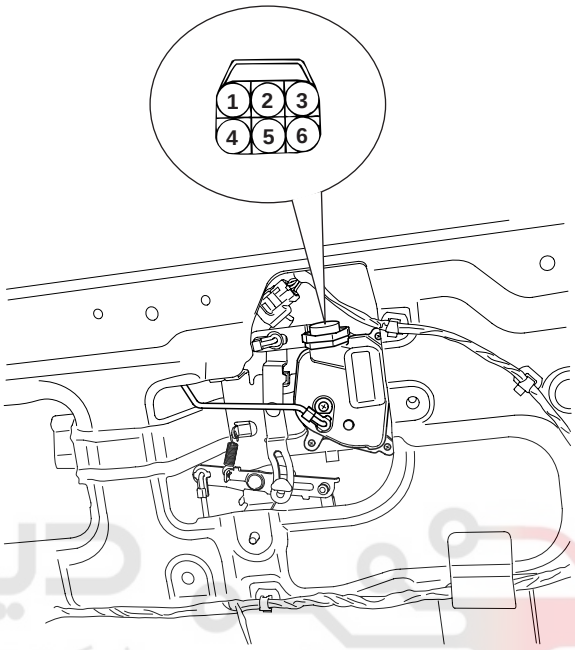
| Position \ Terminal | 4 | 6 |
|---|---|---|
| LOCK | ⊕ | ⊖ |
| UNLOCK | ⊖ | ⊕ |

ETQF165B

## TAILGATE LOCK SWITCH INSPECTION

1. Remove the tailgate trim panel.
   (see BD group - tailgate)

2. Disconnect the 6P connector from the actuator.




KTQE280F

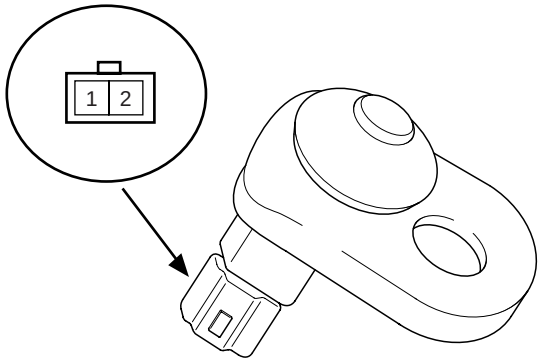
3. Check for continuity between the terminal in each switch position according to the table.

| Position \ Terminal | 1 | 2 | 3 |
|---|---|---|---|
| LOCK | ○ | | ○ |
| UNLOCK | | ○ | ○ |

ETQF180C

## DOOR SWITCH INSPECTION

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




KTQE804A

### [FRONT DOOR SWITCH]

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

ETQF180D

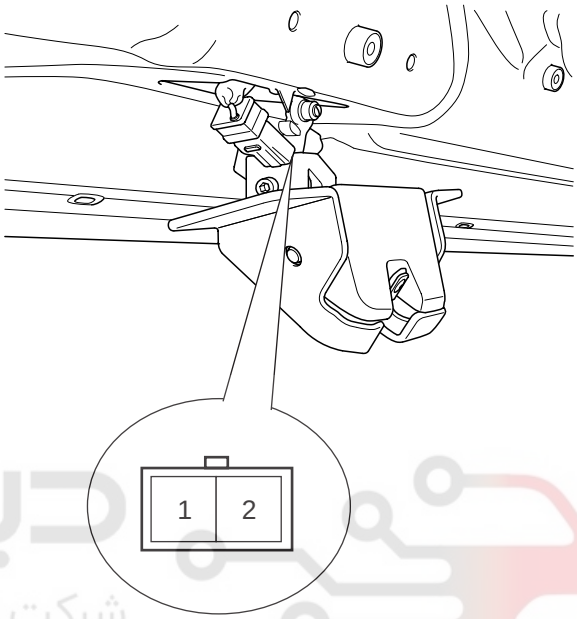
### [REAR DOOR SWITCH]

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

ETQF180E

## TAILGATE SWITCH INSPECTION

1. Remove the tailgate trim panel.
2. Remove the tailgate latch after removing 3 bolts and disconnect the 2P connector from the tailgate switch.




ETKE024A

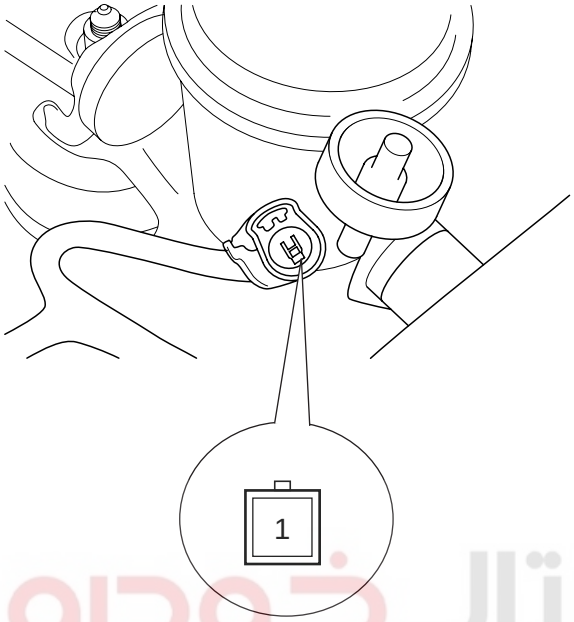
3. Check for continuity between the terminals according to the table.

| Terminal / Position | 1 | 2(Ground) |
|---|---|---|
| Tailgate open | ○ | ○ |
| Tailgate close | | |

ETKE175C

## HOOD SWITCH INSPECTION

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




KTKD026A

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

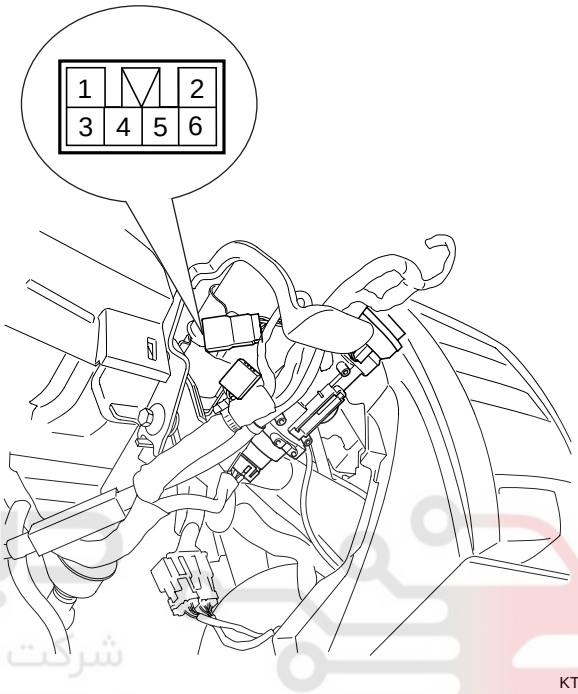
| Terminal / Position | Ground (Body) | 1 |
|---|---|---|
| Hood open (Free) | ○ | ○ |
| Hood close (Push) | | |

ETPD180B

## DOOR WARNING SWITCH INSPECTION

1. Remove the driver's crash pad lower panel. (see BD group-crash pad)

2. Disconnect the 6P connector from the door warning switch.




KTQE280G

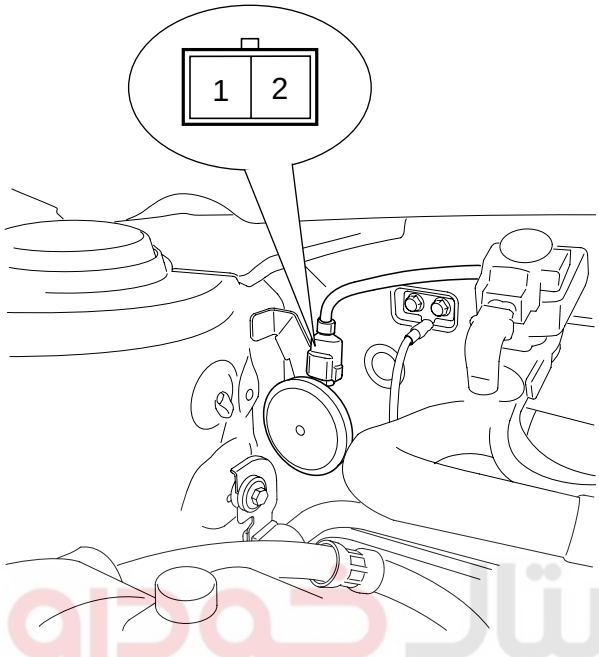
3. Check for continuity between the terminals in each position according to the table.

| Terminal / Key position | 5 | 6 |
|---|---|---|
| Insert | ○ | ○ |
| Removal | | |

ETQF180F

### BURGLAR ALARM HORN INSPECTION

1. Remove the horn after removing a bolts and disconnect the 2P connector from the horn.




KTQE530D

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

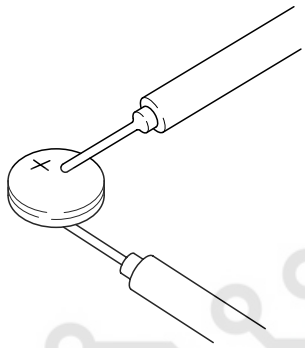
## TRANSMITTER

### INSPECTION E387AAFE

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 |
|---|



KTQE994A

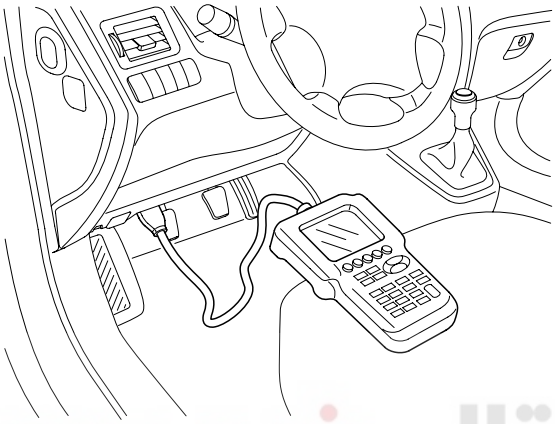
3. Replace the transmitter battery with a new one, if voltage is below 3V then try to lock and unlock the doors with the transmitter by pressing the lock or unlock button five or six times.

4. If the door lock still does not operates, register the transmitter code, then try to lock and unlock the doors.

5. If the door lock still does not operates, replace the transmitter.

## TRANSMITTER CODE REGISTRATION E5471EF4

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



KRQE900A

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

| 1. HYUNDAI VEHICLE DIAGNOSIS |
|---|
| MODEL : ALL |
| 02. ENGINE<br>03. AUTOMATIC TRANSAXLE<br>04. ANTI-LOCK BRAKE SYSTEM<br>:<br>:<br>:<br>07. CODE SAVING |

ETPD700I

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

| KEYLESS ENTRY CODE SAVING |
|---|
| 1. REMOVE THE IG.KEY FROM KEY CYLINDER.<br>2. CONNECT THE DLC CABLE TO THE 16 PIN DATA LINK CONNECTOR.<br>3. AFTER PRESSING [ENTER], FINISH CODE SAVING WITHIN 10 SECONDS.<br>4. PRESS [ENTER], IF YOU ARE READY! |

ETQF065M

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 3 and then code saving is completed.

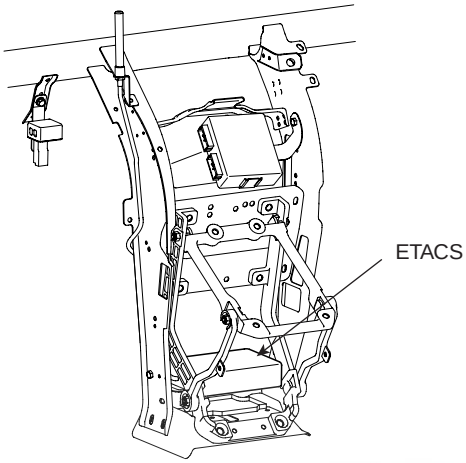
| KEYLESS ENTRY CODE SAVING |
|---|
| 1. PRESS THE TRANSMITTER [LOCK] BUTTON FOR 1 SECOND.<br>2. IF SAVE ONE MORE PRESS OTHER TRANSMITTER [LOCK] BUTTON FOR 1 SECOND.<br>3. PRESS [ESC] AND DISCONNECT DLC CABLE FROM VEHICLE AND CHECK THE KEYLESS ENTRY SYSTEM. |

ETQF065N

# ETACS (ELECTRONIC TIME AND ALARM CONTROL SYSTEM)

## DESCRIPTION EBBAF59A

ETACS module(A) receives various input switch signals, and controls time and alarm such as intermittent wiper timer, washer timer, rear defogger timer, seat belts warning, decayed 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 automatically.



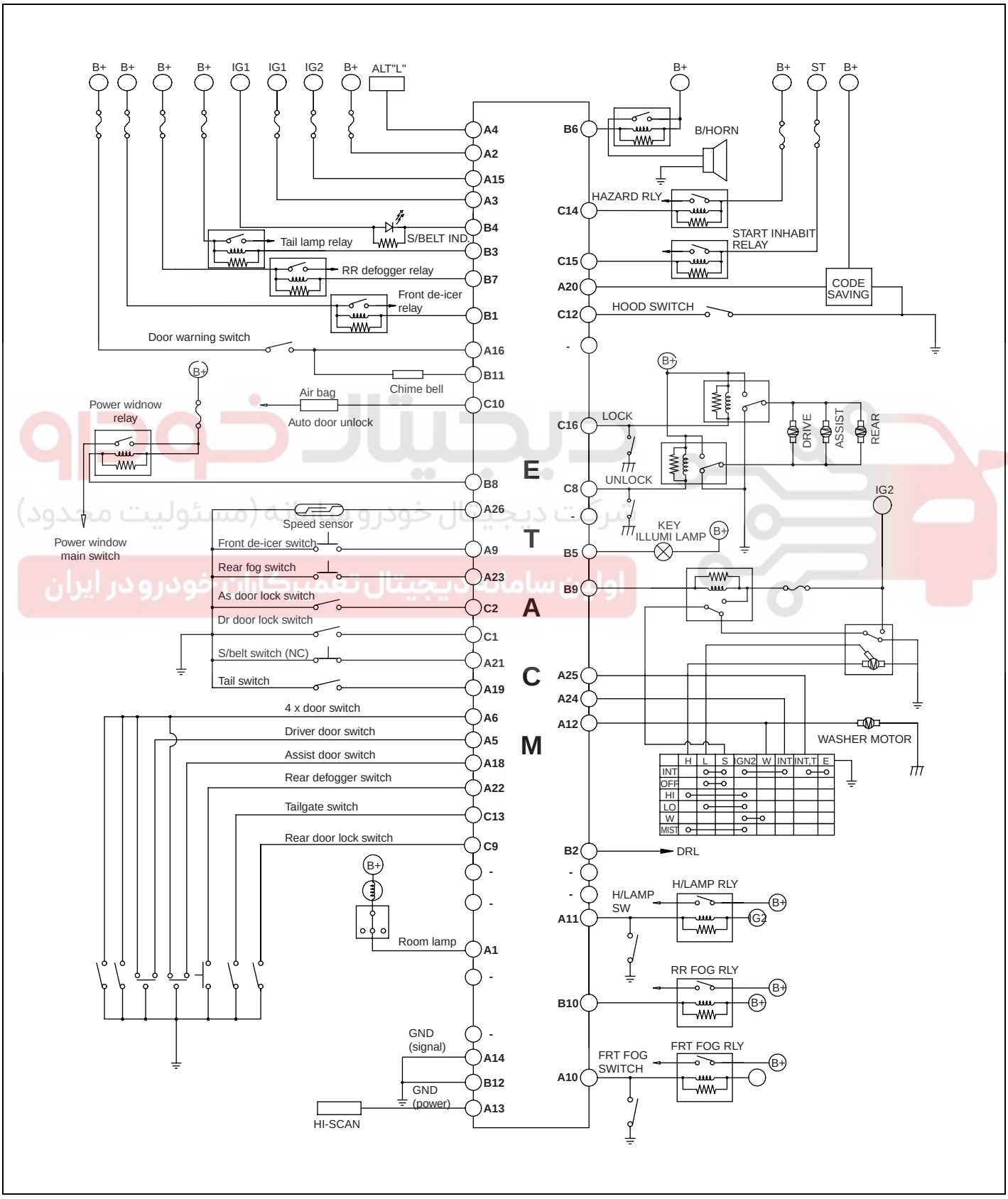

ETQE998A

## SPECIFICATIONS E6DD320F

| Items | Specifications |
|---|---|
| Rated voltage | DC 12V |
| Operating voltage | DC 9 ~ 16V |
| Dark current | 3mA(ETACS) or 4mA(ETACS & RECEIVER) |
| Insulation resistance | 100MΩ or more |
| **RATED LOAD** | |
| Burglar alarm horn | DC 12V, 200mA (Inductance load) |
| Chime bell | DC 12V, 350mA (Inductance load) |
| Rear defogger relay | DC 12V, 200mA (Inductance load) |
| Hazard lamp relay | DC 12V, 200mA (Inductance load) |
| Tail lamp relay | DC 12V, 200mA (Inductance load) |
| Seat belt warning indicator | DC 12V, LED (Lamp load) |
| Room lamp | DC 12V, 12W (Lamp load) |
| Power window relay | DC 12V, 200mA (Inductance load) |
| Intermittent wiper relay | DC 12V, 200mA (Inductance load) |
| Key hole illumination lamp | DC 12V, 5W (Lamp load) |
| Door lock relay | DC 12V, 2W (Lamp load) |
| Door unlock relay | DC 12V, 200mA (Inductance load) |
| Start inhibit relay | DC 12V, 200mA (Inductance load) |
| Windshield deicer relay | DC 12V, 200mA (Inductance load) |
| Rear fog lamp relay | DC 12V, 200mA (Inductance load) |

# ELECTRONIC TIME AND ALARM CONTROL MODULE

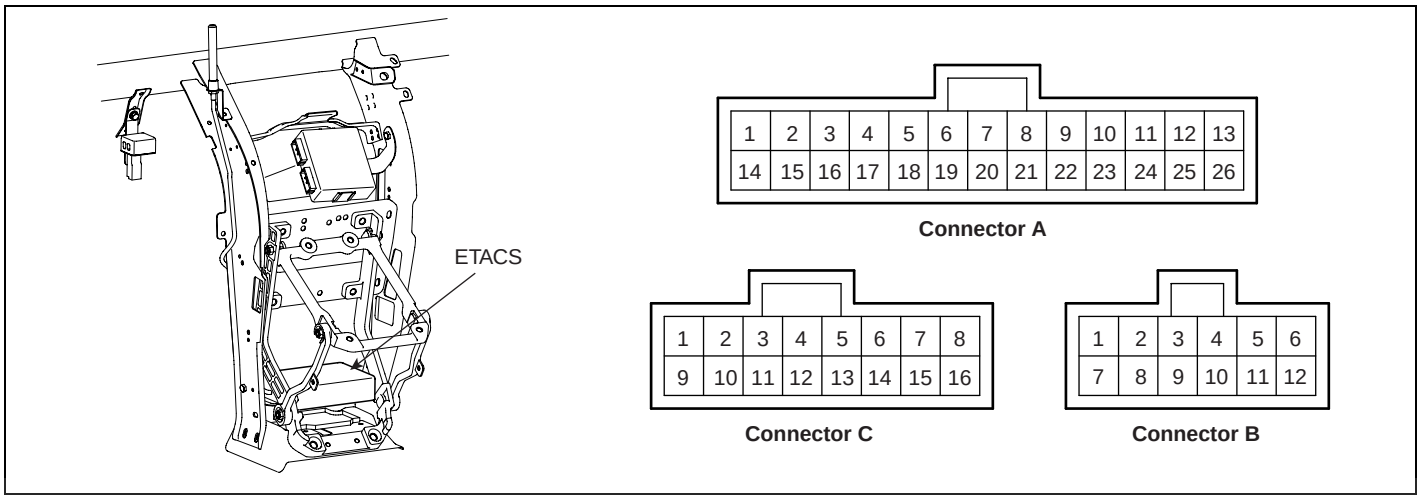
## CIRCUIT DIAGRAM E16D8004




ETQF250A

## ETACS MODULE INPUT SIGNAL TEST E7D25E1C

1. Disconnect the wire connector from the ETACS module.
2. Inspect the connector on wire harness side as shown in the below.




ETQF250C

| Terminal No. | Connector A | Connector B | Connector C |
|---|---|---|---|
| 1 | Room lamp | Windshield deicer relay | Driver's door lock switch |
| 2 | B+ | D.R.L | Assist door lock switch |
| 3 | IGN1 | Tail lamp relay | - |
| 4 | Alternator (L) | Seat belt indicator | - |
| 5 | Driver door switch | Key hole illumination | - |
| 6 | Door switch | Burglar alarm relay | - |
| 7 | - | Rear defogger relay | - |
| 8 | - | Power window relay | Door unlock relay |
| 9 | Windshield deicer switch | Wiper relay | Rear door lock switch |
| 10 | Front fog lamp switch | Rear fog lamp relay | Auto door unlock |
| 11 | Head lamp switch | Chime bell | - |
| 12 | Washer switch | Ground | Hood switch |
| 13 | Diagnosis | | Tailgate switch |
| 14 | Signal ground | | Hazard lamp relay |
| 15 | IGN2 | | Start inhibit relay |
| 16 | Door warning switch | | Door lock relay |
| 17 | - | | |
| 18 | Assist door switch | | |
| 19 | Tail lamp switch | | |
| 20 | Code saving | | |
| 21 | Seat belt switch | | |
| 22 | Rear defogger switch | | |
| 23 | Rear fog lamp switch | | |

| Terminal No. | Connector A | Connector B | Connector C |
|---|---|---|---|
| 24 | Intermittent wiper switch | | |
| 25 | Intermittent wiper volume | | |
| 26 | Speed sensor | | |

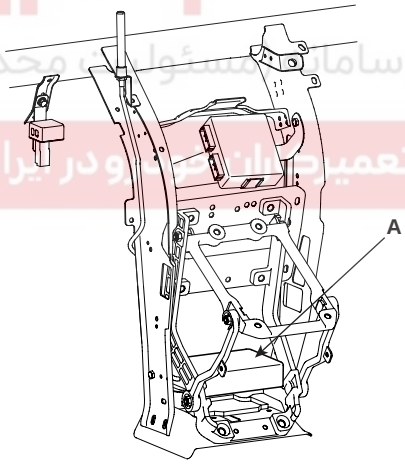
**ETACS MODULE INPUT SIGNAL TEST**

| Pin No. | Input signal name | Test condition | Desired result |
|---|---|---|---|
| A3 | IGN1 | Ignition switch ON or START | Check for voltage to ground; There should be battery voltage |
| A15 | IGN2 | Ignition switch ON | Check for voltage to ground; There should be battery voltage |
| A4 | Alternator "L" | Engine start condition | Check for voltage to ground; There should be battery voltage |
| A16 | Door warning switch | Key is inserted into the ignition switch | Check for voltage to ground; There should be battery voltage |
| A6 | All door switch | One of all doors is opened | Check for continuity to ground; There should be continuity |
| A5 | Driver's door switch | Driver's door open | Check for continuity to ground; There should be continuity |
| A18 | Assist door switch | Assist door open | Check for continuity to ground; There should be continuity |
| C9 | Rear door lock switch | One of rear doors is unlock | Check for continuity to ground; There should be continuity |
| C13 | Tailgate switch | Tailgate open | Check for continuity to ground; There should be continuity |
| A9 | Windshield deicer switch | Windshield deicer switch ON | Check for continuity to ground; There should be continuity |
| C12 | Hood switch | Hood open | Check for continuity to ground; There should be continuity |
| A12 | Washer switch | Washer switch ON | Check for continuity to ground; There should be continuity |
| A24 | Intermittent wiper switch | INT. wiper switch ON | Check for continuity to ground; There should be continuity |
| A25 | Intermittent wiper volume switch | INT. wiper volume switch ON | Resistance should vary from 0Ω to 50kΩ |
| A22 | Rear defogger switch | Rear defogger switch ON | Check for continuity to ground; There should be continuity |
| A19 | Tail lamp switch | Tail lamp switch ON | Check for continuity to ground; There should be continuity |
| A21 | Seat belt switch | Seat belt is unbuckled | Check for continuity to ground; There should be continuity |
| A20 | Code saving tool | Code save signal | There should be open at unused |
| A2 | Battery (+) | Constant | Check for voltage to ground ; There should be battery voltage |
| B12 | Ground | Constant | Check for continuity to ground ; There should be continuity |

| Pin No. | Input signal name | Test condition | Desired result |
|---|---|---|---|
| C1 | Driver's door lock switch | Driver's door is unlock | Check for continuity to ground ; There should be continuity |
| C2 | Assist door lock switch | Assist door is unlock | Check for continuity to ground ; There should be continuity |
| A11 | Head lamp switch | Head lamp switch ON | Check for continuity to ground ; There should be continuity |
| A26 | Speed sensor | Speed sensor input | Check for voltage to ground; There should be about 0~5V |
| A10 | Front fog lamp switch | Front fog lamp switch ON<br>Tail lamp swtich ON | Check for continuity to ground ; There should be continuity |
| C10 | Air bag signal | Ignition switch ON | Check for voltage to ground ; There should be about 5V |

## REMOVAL EA0965B8

1. Disconnect the negative (-) battery terminal.
2. Remove the shift lever upper plate and lower trim.
3. Remove the ETACS module (A) after removing 2 bolts.



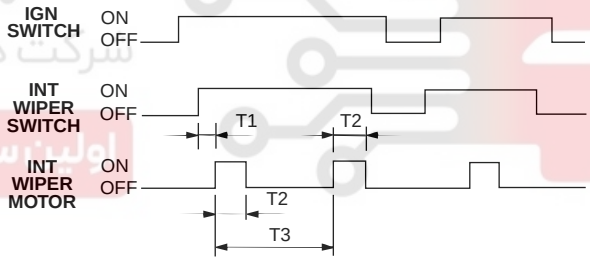

KTQE210B

4. Installation is the reverse of removal.

## INSPECTION E433A3B6

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

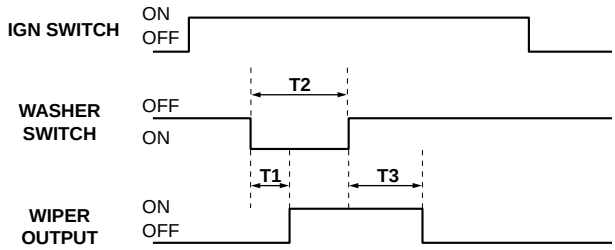
1. VARIABLE INTERMITTENT WIPER




ETHA115C

Time specification
T1 : Max. 0.3sec.
T2 : 0.6~0.8 sec. (Time of wiper motor 1 rotation)
T3 : 2.2±0.2 sec. (VR=0kΩ )~10.0±1 sec. (VR=50kΩ )

2. WASHER TIMER




ETQF983A

a. Time specification
T1 : 0.3 sec.
T2 : 0.2~0.6 sec.
T3 : 0.6~0.8 sec.

b. Time specification
T1 : 0.3 sec.
T2 : 0.6 sec. or more
T3 : 2.5~3.8 sec.

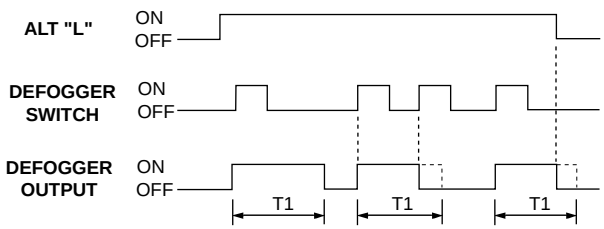
c. Time specification
T1 : 0.3 sec.
T2 : 0.2 sec. or less
T3 : 0 sec.

d. This function should be operated preferentially even though the variable intermittent wiper is operating.

3. REAR DEFOGGER TIMER

1) After ALT "L" ON, if the defogger is switched ON, the defogger output is ON for 20 minutes duration.

2) If the defogger switch is pressed again, or if the ignition is switched OFF during this time, the defogger output is OFF.




ETQF983B

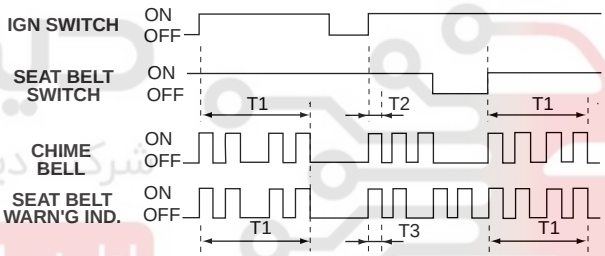
T1 : 20 ± 1min.

4. SEAT BELT WARNING TIMER

1) Since the ignition is switched ON, the seat belt warning indicator is illuminated (with period : 0.6 sec., duty rate : 50%) and the chime bell is sounded (with period : 0.9 sec., duty rate : 50%) for total time 6 seconds.

2) If the ignition is swithced off during the indicator and the chime bell output, the indicator and the chime bell are switched OFF.
If the seat belt is sensed as fastened during the indicator and the chime bell output, the chime bell is switched OFF immediately and the seat belt warning indicator is illuminated for the remained seconds.

3) When the ignition is already switched ON, if the seat belt is removed, the warning indicator and the chime bell are output for total time 6 seconds.




ETMB902B

T1 : 6±1 sec., T2 : 0.45 ± 0.1 sec., T3 : 0.3 ± 0.1 sec.

5. DECAYED ROOM LAMP & KEYLESS UNLOCK TIMER

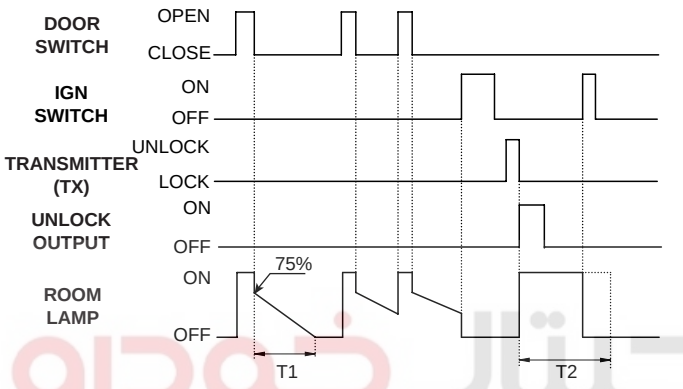
1) When the first door (driver's or assist) is opened, the room lamp shall brighten. When the last door is closed, the room lamp will drop to 75% intensity, then fade out over 5-6 seconds.

2) If the door switch is ON for less than 0.1 sec., then no illumination occurs.

3) The fade resolution is over 32 steps.

4) The room lamp must not flicker during fade operation, if the ignition is switched ON.

5) With keyless UNLOCK, when the door is closed, the room lamp is turned ON, then OFF after about 30 seconds. While the room lamp is ON due to keyless UNLOCK, if another UNLOCK is received, the room lamp is again ON for 30 seconds.
While the room lamp is ON, If the door is opened, the lamp is continued to ON. If the door is closed, the lamp follows as the above step 1.
If keyless LOCK (ARM state) is received during fade out, the room lamp is switched off immediately.



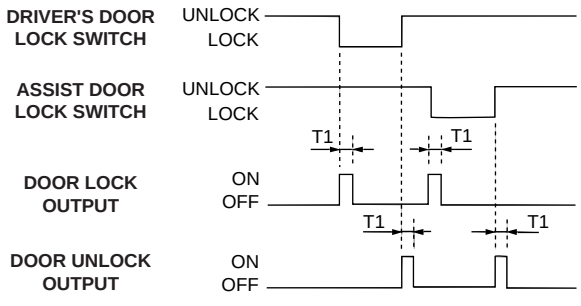

ETQF983C

T1 : 5.5 ± 0.5 sec., T2 : 30 ± 3 sec.

6. CENTRAL DOOR LOCK/UNLOCK

1) The driver's door lock, assist door lock, or the inside door lock knob is switched LOCK to UNLOCK or UNLOCK to LOCK, the all doors lock and unlock outputs will follow.

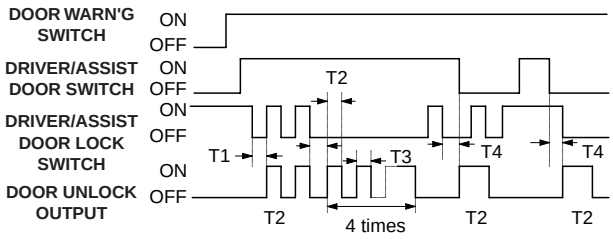
2) Battery connecting would not change the LOCK/UNLOCK states.




ETQF983D

T1 : 0.5 ± 0.1 sec.

7. IGNITION KEY REMINDER
If the key is in the ignition and the driver's door or assist door is opened and the vehicle is locked using driver's knob or assist knob, then the central locking system will issue an unlock pulse of 1 second duration to the all doors thus preventing locking of the vehicle. (With a knob remains locked, if the switch in the actuator is not changed, the central locking shall issue 1 pulse of 1 seconds duration and 3 pulses of 0.5 second duration to unlock the vehicle.)




ETPD120A

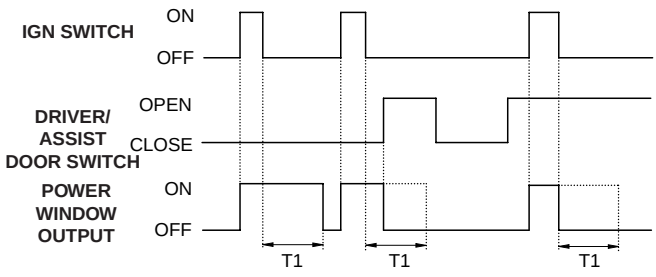
T1,T3 : 0.5 sec., T2 : 1 sec., T4 : Max.0.5 sec.

8. POWER WINDOW TIMER

1) When the ignition is switched ON, the power window relay output is turned ON.

2) When the ignition is switched OFF, the power window output is maintained ON for 30 seconds and then turned OFF.

3) With the state of step 2, if the driver's door or assist door is opened, the output shall be turned OFF immediately.



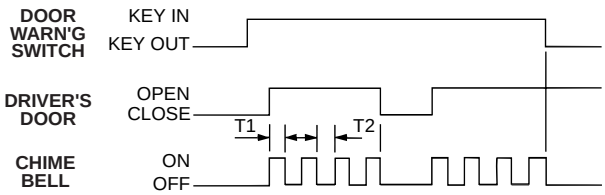

ETQF983E

T1 : 30 ± 3 sec.

9. DOOR OPEN WARNING

1) If the key is in the ignition key cylinder and the driver's door is opened, the chime bell sounds continually (period:0.9 sec. Duty rate:50%).

2) If the door is closed or the key is removed, the chime stops immediately.




ETMB180G

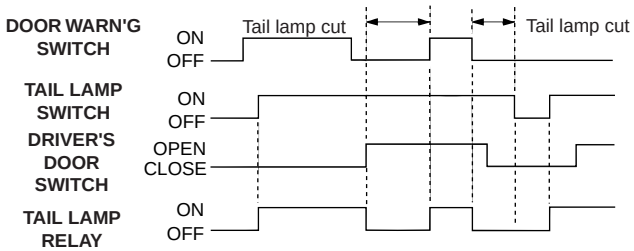
T1,T2 : 0.45 ± 0.1 sec.

10. TAIL LAMP AUTO CUT

1) When the tail lamp is switched ON, if the ignition is switched OFF and the driver's door is opened, the tail lamp should be automatically OFF.

2) With the ignition switched ON, if the driver's door is opened and the ignition is switched OFF, the tail lamp should be automatically OFF.

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

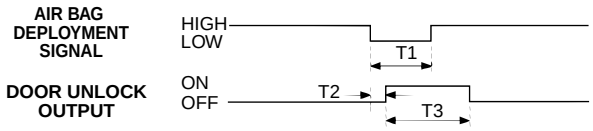



ETQF983F

11. CRASH DOOR UNLOCK

1) With the ignition turned ON, if the air bag is deployed, a crash signal is received and send an UNLOCK output to all doors UNLOCK.

2) After UNLOCK output, when LOCK is set, UNLOCK pulse is output for 5 second period again.




ETJA020F

T1 : 200 msec.
T2 : 40 msec.
T3 : 5±0.5sec.

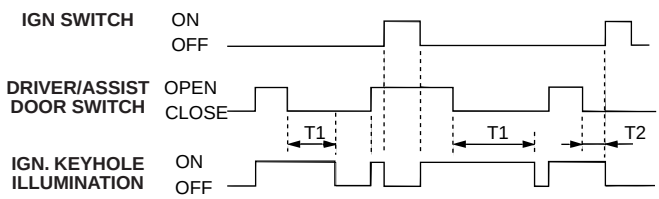
12. IGNITION KEY HOLE ILLUMINATION

1) Ignition key hole illumination is turned ON when driver door or assist door is opened with ignition switch OFF.

2) Delaying "ON" state of ignition key hole illumination for 10 seconds when the door is closed in case of (1) state.

3) Ignition key hole illumination is turned off if the ignition switch turned ON in case of (1), (2) state.

4) Ignition key hole illumination is turned off if arm state is entered in case of (1), (2) state.



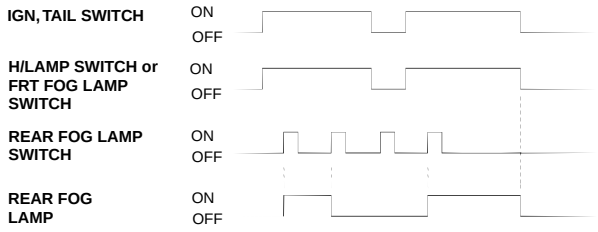

ETQF983G

T1 : 10±1 sec.
T2 : 0~10 sec.

13. REAR FOG LAMP CONTROL

1) With the ignition switch and the head lamp switch turned ON, if the rear fog lamp switch is turned ON, the rear fog lamp relay output is ON.

2) With the rear fog lamp output ON if the rear fog lamp switch is pressed again, the rear fog lamp switch is pressed again, the rear fog lamp output is OFF.

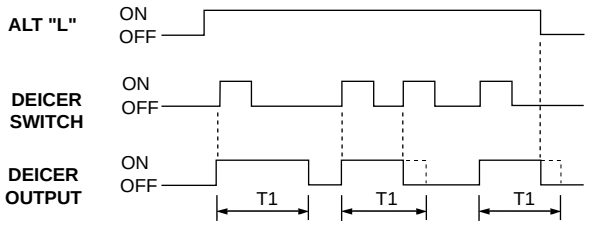



ETHA120E

14. WINDSHIELD DEICER TIMER

1) After ALT "L" ON, the windshield deicer is switched ON, the deicer relay output is ON for 20 minutes duration.

2) If the windshield dicer switch is pressed again, or if the ignition is switched OFF during this time, the deicer output is OFF.




ETQF983I

T1 : 20 ± 1min.

## ETACS INPUT/OUTPUT MONITORING

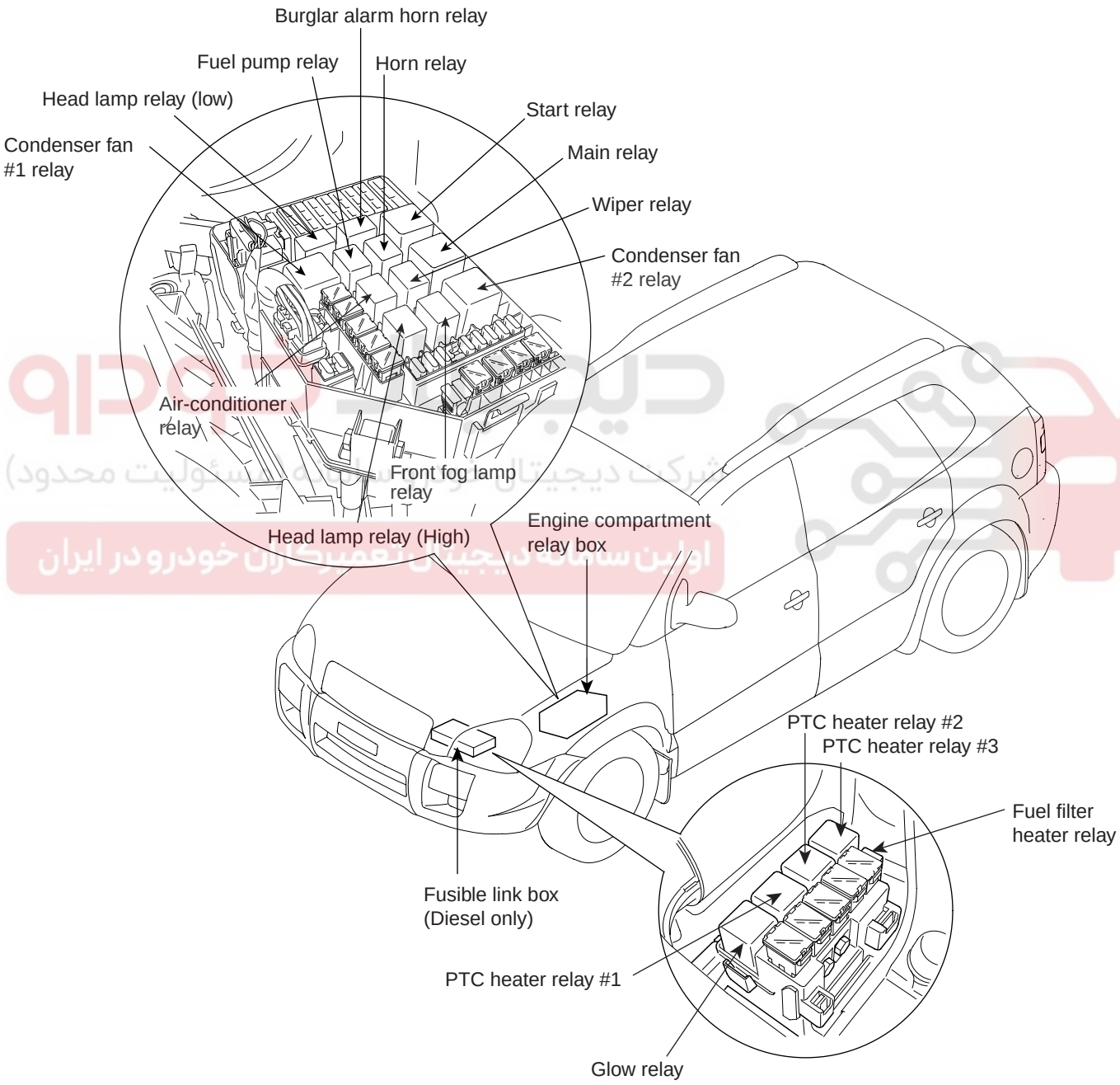
| INPUT/OUTPUT MONITORING | ACTUATION | REMARKS |
|---|---|---|
| IGN1 | | |
| IGN2 | | |
| ALT "L" | | |
| Key in switch | | |
| Start inhibit relay | Start inhibit relay | with Keyless-entry |
| Power window relay | Power window relay | |
| Tail lamp switch | | |
| Rear fog switch | | |
| Head lamp switch | | |
| Front fog switch | | |
| Tail lamp relay | Tail lamp relay | |
| Rear fog relay | Rear fog relay | |
| Hazard lamp relay | Hazard lamp relay | with Keyless-entry |
| Driver seat belt indicator | Driver seat belt indicator | |
| Room lamp output | Room lamp output | |
| IGN key hole illumination | IGN key hole illumination | |
| Driver door open switch | | |
| Assist door open switch | | |
| 4 door open switch | | |
| Hood open switch | | with Keyless-entry |
| Tailgate switch | | |
| Driver door actuator position switch | | |
| Assist door actuator position switch | | |
| Door lock relay | Door lock relay | |
| Door unlock relay | Door unlock relay | |
| Rear door actuator position switch | | |
| Washer switch | | |
| Wiper INT switch | | |
| Rear defogger switch | | |
| Wiper relay | Wiper relay | |
| Rear defogger relay | Rear defogger relay | |
| Front deicer switch | | |
| Front deicer relay | Front deicer relay | |
| Driver seatbelt switch | | |
| Burglar horn relay | Burglar horn relay | with Keyless-entry |
| Chime bell | Chime bell | |
| Wiper INT volume | | |

| INPUT/OUTPUT MONITORING | ACTUATION | REMARKS |
|---|---|---|
| Speed signal | | |
| Tx data record | | with keyless-entry |

# FUSES AND RELAYS

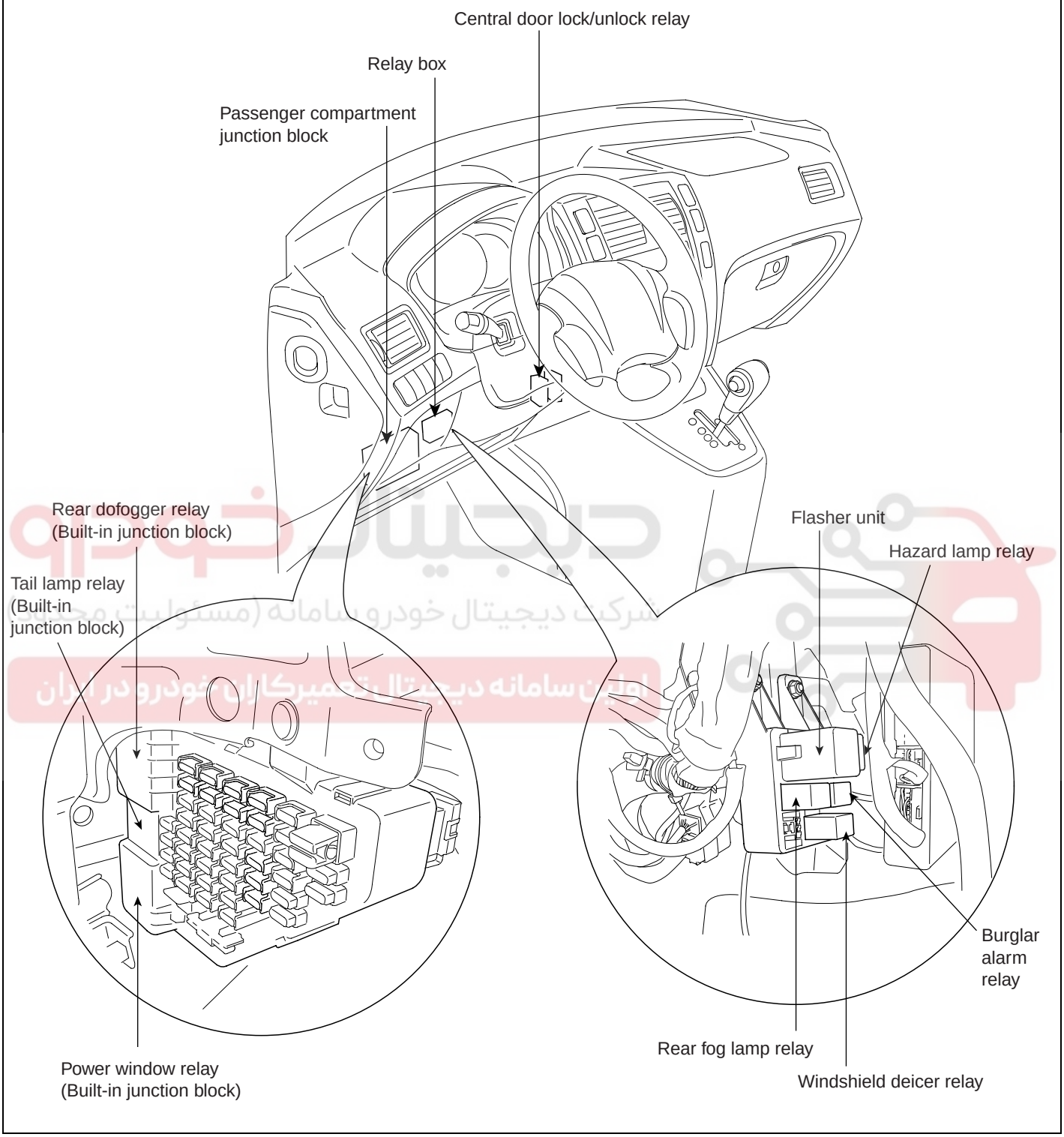
## COMPONENTS E0C35031

**[Engine compartment relay & fuse box]**




ETQF880G

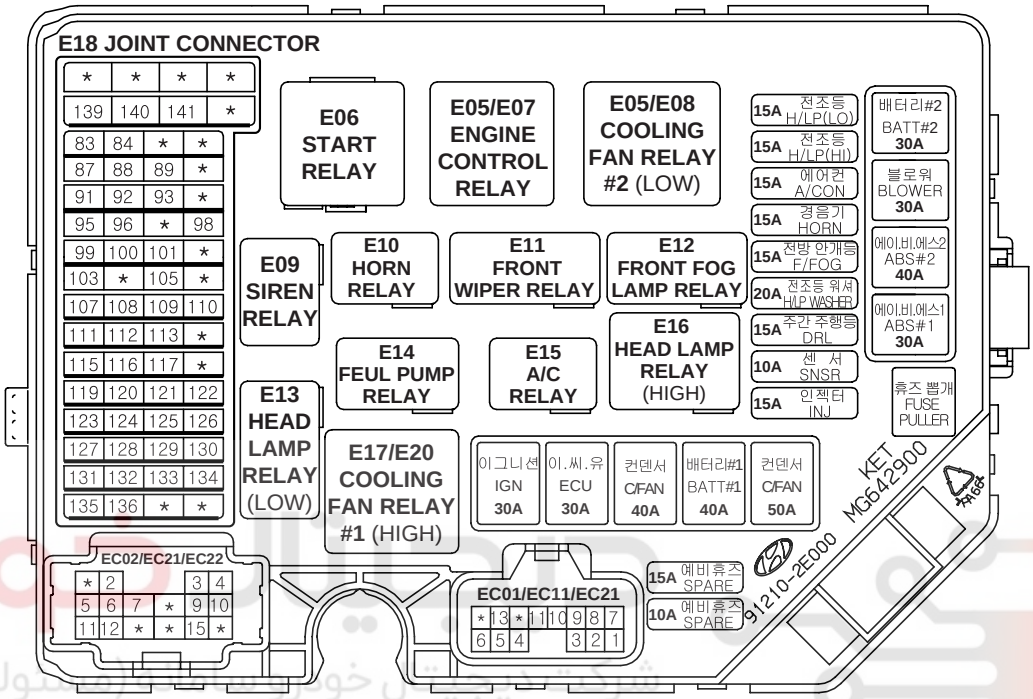
**[Passenger compartment relay box]**




ETQF880H

# RELAY BOX (ENGINE COMPARTMENT)

## COMPONENTS EDCABE3B




## CIRCUIT

| Description | | (A) | Circuit protected |
|---|---|---|---|
| FUSIBLE LINK | BATT #2 | 30A | Ignition switch(IG2, START), Fuse(4,21,23,29~31,35~37), Power connector |
| | BLOWER | 30A | Blower relay |
| | ABS #2 | 40A | ABS control module/ESP control module, Multipurpose check connector |
| | ABS #1 | 30A | ABS control module/ESP control module, Multipurpose check connector |
| | C/FAN | 50A | Cooling fan relay #1/#2(2.7GAS/DSL) |
| | BATT #1 | 50A | Ignition switch(IG2, START), Fuse(4,21,23,29~31,35~37), Power connector |
| | C/FAN | 40A | Cooling fan relay #1/#2(2.0 GAS) |
| | ECU | 30A | Engine control relay, Fuel pump relay, A/C relay, Generator, ATM control relay |
| | IGN | 30A | Start relay, Ignition switch(IG1, ACC) |
| FUSE | H/LP(LOW) | 15A | Head lamp relay (LOW) |
| | H/LP(HI) | 15A | Head lamp relay (HIGH) |
| | A/CON | 15A | A/C relay |
| | HORN | 15A | Horn relay, Siren relay |
| | F/FOG | 15A | Front fog lamp relay, Multipurpose check connector |
| | DRL | 15A | DRL control module |
| | INJ | 15A | Injector(GAS),Glow plug relay(DSL) |
| | SNSR | 10A | Cooling fan relay #1/#2, Stop lamp switch(DSL), SMATRA(2.0 GAS/DSL), Oxygen sensor(GAS), MAF sensor, ECM/PCM, CPS(GAS), ISA(GAS) |

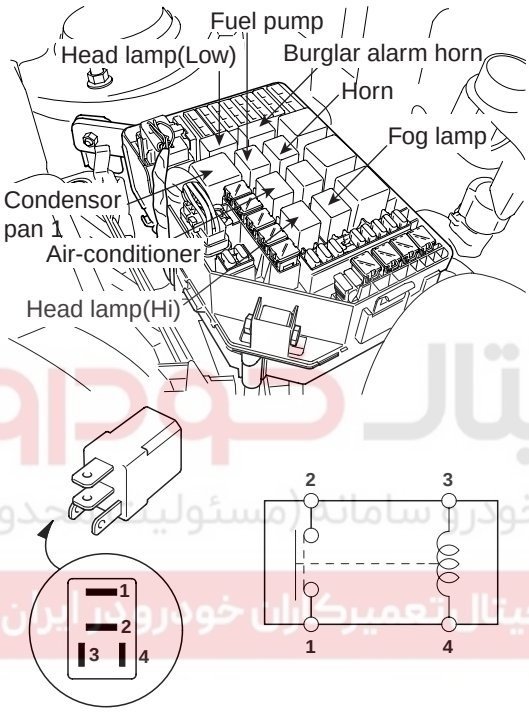
ETQF032A

## INSPECTION E3A40D4F

### POWER RELAY TEST (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.4 and No.3 terminals.
2. There should be no continuity between the No.1 and No.2 terminals when power is disconnected.




ETQF925A

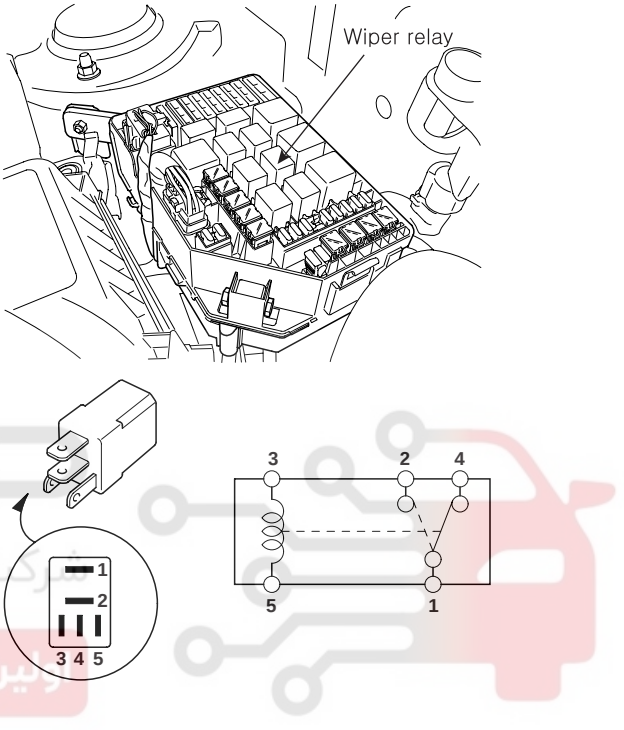
| Power (No.3-No.4) \ Terminal | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Disconnected | | | ○ | ○ |
| Connected | ○ | ○ | ⊖ | ⊕ |

ETKE903A

### POWER RELAY TEST (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.5 and No.3 terminals.
2. There should be continuity between the No.1 and No.4 terminals when power is disconnected.




ETQF926A

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

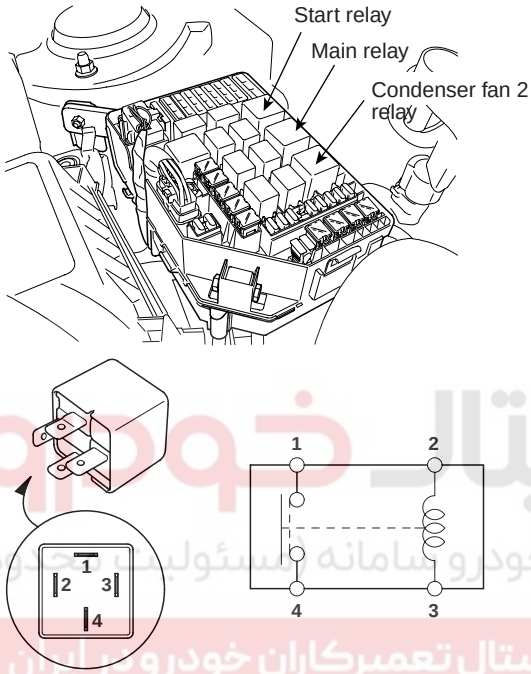
ETKE215H

**POWER RELAY TEST (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.3 and No.2 terminals.

2. There should be no continuity between the No.1 and No.4 terminals when power is disconnected.



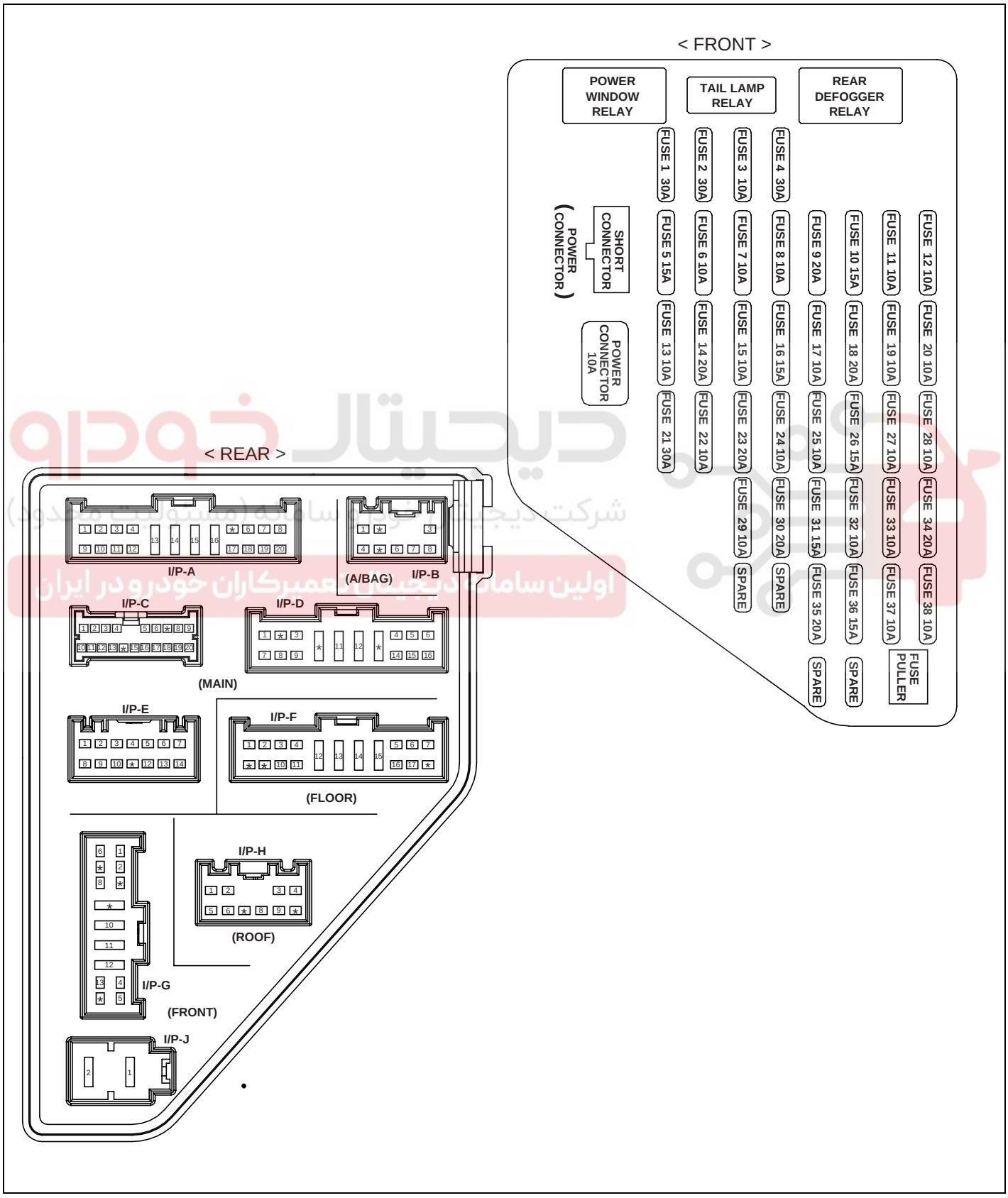

ETQF927A

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

ETKE215B

# RELAY BOX (PASSENGER COMPARTMENT)

## COMPONENTS EEC8C25E




ETQF992A

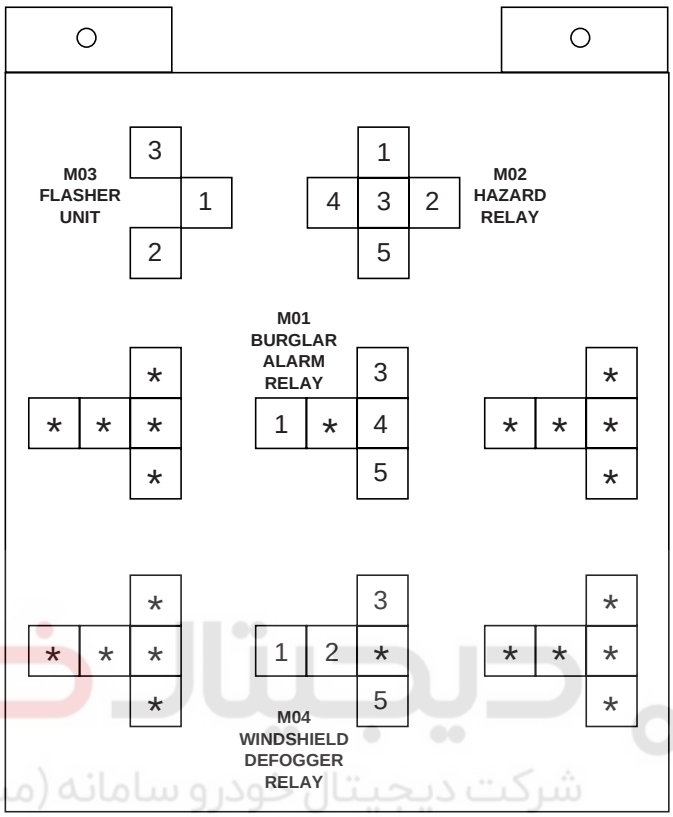
## CIRCUIT

| FUSE | (A) | Circuit Protected |
|---|---|---|
| 1 | 30A | Left power window switch |
| 2 | 30A | Right power window switch |
| 3 | 10A | Right rear combination lamp, Glove box ILL, Illuminations |
| 4 | 30A | Rear defogger relay |
| 5 | 15A | SRS control module |
| 6 | 10A | Instrument cluster, ETACM/TACM |
| 7 | 10A | Left head lamp, Left rear combination lamp, License lamp |
| 8 | 10A | Digital clock, Audio, Power outside mirror folding module,Power outside mirror & mirror folding switch |
| 9 | 20A | Cigarette lighter |
| 10 | 15A | (SPARE) |
| 11 | 10A | Rear fog lamp relay |
| 12 | 10A | Left/Right power outsider mirror & mirror folding motor, Rear defogger switch |
| 13 | 10A | Audio |
| 14 | 20A | Ignition coil(2.7 GAS) |
| 15 | 10A | Immobilizer control module (2.7 GAS) |
| 16 | 15A | Rear power outlet #1/#2 |
| 17 | 10A | (Not used) |
| 18 | 20A | Left/Right front seat warmer switch |
| 19 | 10A | A/C control module (Manaul A/C) |
| 20 | 10A | Burglar alarm relay, Transaxle range switch, Ignition lock switch |
| 21 | 30A | Ignition switch (IG2, START) |
| 22 | 10A | Room lamp, A/C control module, Digital clock, ETACM/TACM, Key remind switch |
| 23 | 20A | Audio amp #2, Sub woofer |
| 24 | 10A | Hazard switch, Auto light & Photo sensor, Transaxle range switch |
| 25 | 10A | Instrument cluster, Pre-excitation resistor |
| 26 | 15A | Safety relay |
| 27 | 10A | Sunroof controller, A/C control module, Blower relay, ETACM/TACM |
| 28 | 10A | PTC heater relay, Fuel filter heater relay, DRL control module, Head lamp relay |
| 29 | 10A | Hazard switch, Hazard relay, Immobilizer control module (2.7 GAS) |
| 30 | 20A | Sunroof controller, Door lock/unlock relay |
| 31 | 15A | Stop lamp switch, Power outside mirror folding module |
| 32 | 10A | (Not used) |
| 33 | 10A | Cruise control module, Stop lamp switch, TCS switch, ESP switch, 4WD ECM, ECM, PCM, TCM, Pulse generator 'A'/'B', Vehicle speed sensor |
| 34 | 20A | Front wiper relay, Front wiper motor, Multifunction switch |
| 35 | 20A | 4WD/ECM |
| 36 | 15A | Winshield defogger relay |
| 37 | 10A | TCM (2.7 GAS/DSL) |
| 38 | 10A | G-Sensor, ESP control module, ABS control module, Multipurpos check connector |

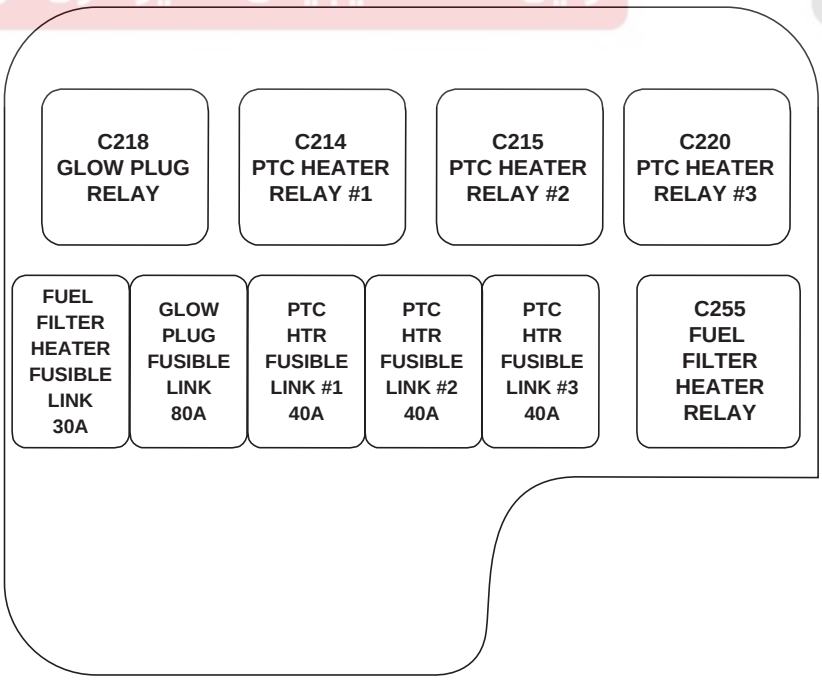
ETQF992B

## RELAY BOX

### I/P RELAY BOX




### FUSIBLE BOX (DIESEL)



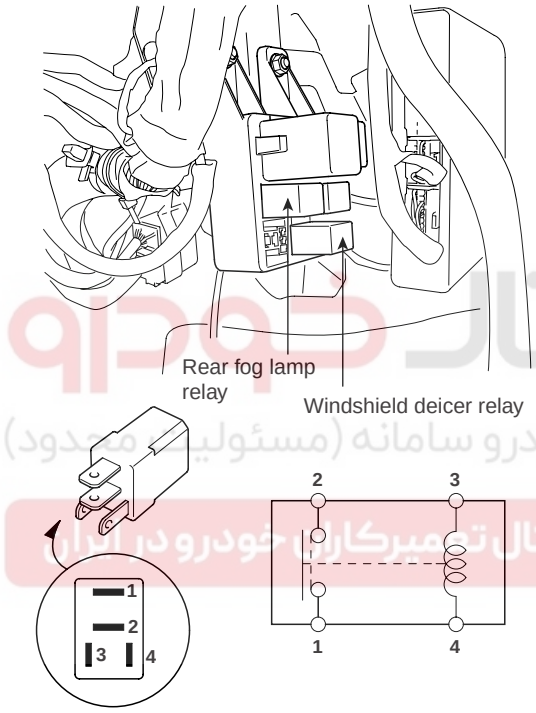

ETQF992C

## INSPECTION EB589ADB

### POWER RELAY TEST (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.4 and No.3 terminals.
2. There should be no continuity between the No.1 and No.2 terminals when power is disconnected.




ETQF034A

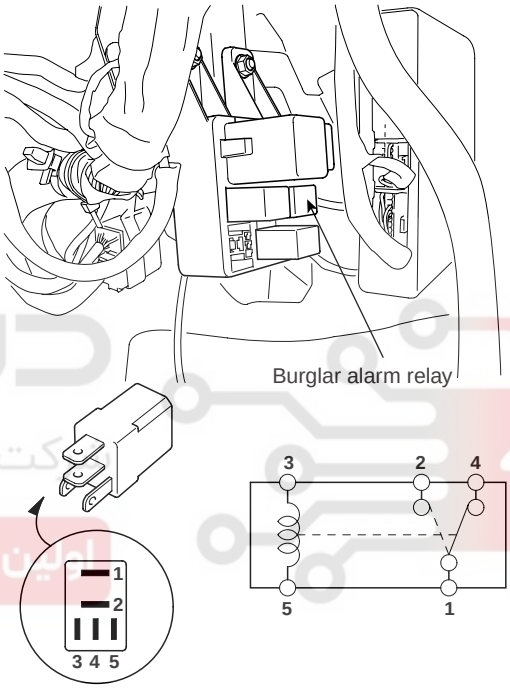
| Terminal / Power (No.3-No.4) | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Disconnected | | | ○ | ○ |
| Connected | ○ | ○ | ⊖ | ⊕ |

ETKE903A

### POWER RELAY TEST (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.5 and No.3 terminals.
2. There should be no continuity between the No.1 and No.4 terminals when power is disconnected.




ETQF035A

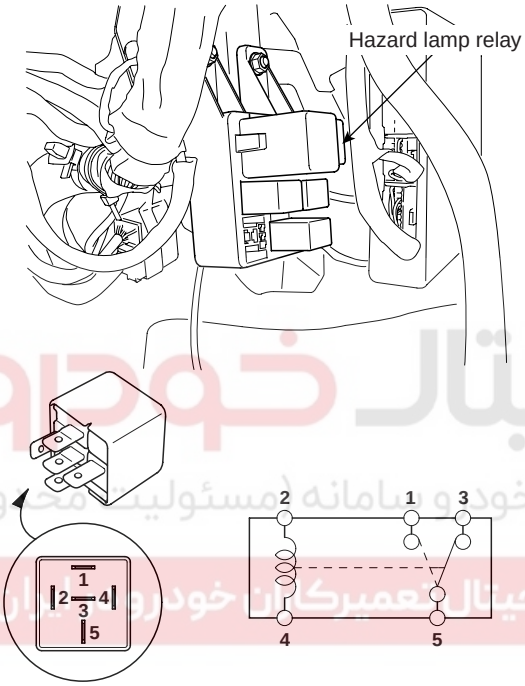
| Terminal / Power (No.3-No.5) | 3 | 5 | 1 | 2 | 4 |
|---|---|---|---|---|---|
| Disconnected | | | ○ | | ○ |
| Connected | ⊖ | ⊕ | ○ | ○ | |

ETKE215H

### POWER RELAY TEST (TYPE C)

Check for continuity between the terminals.

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



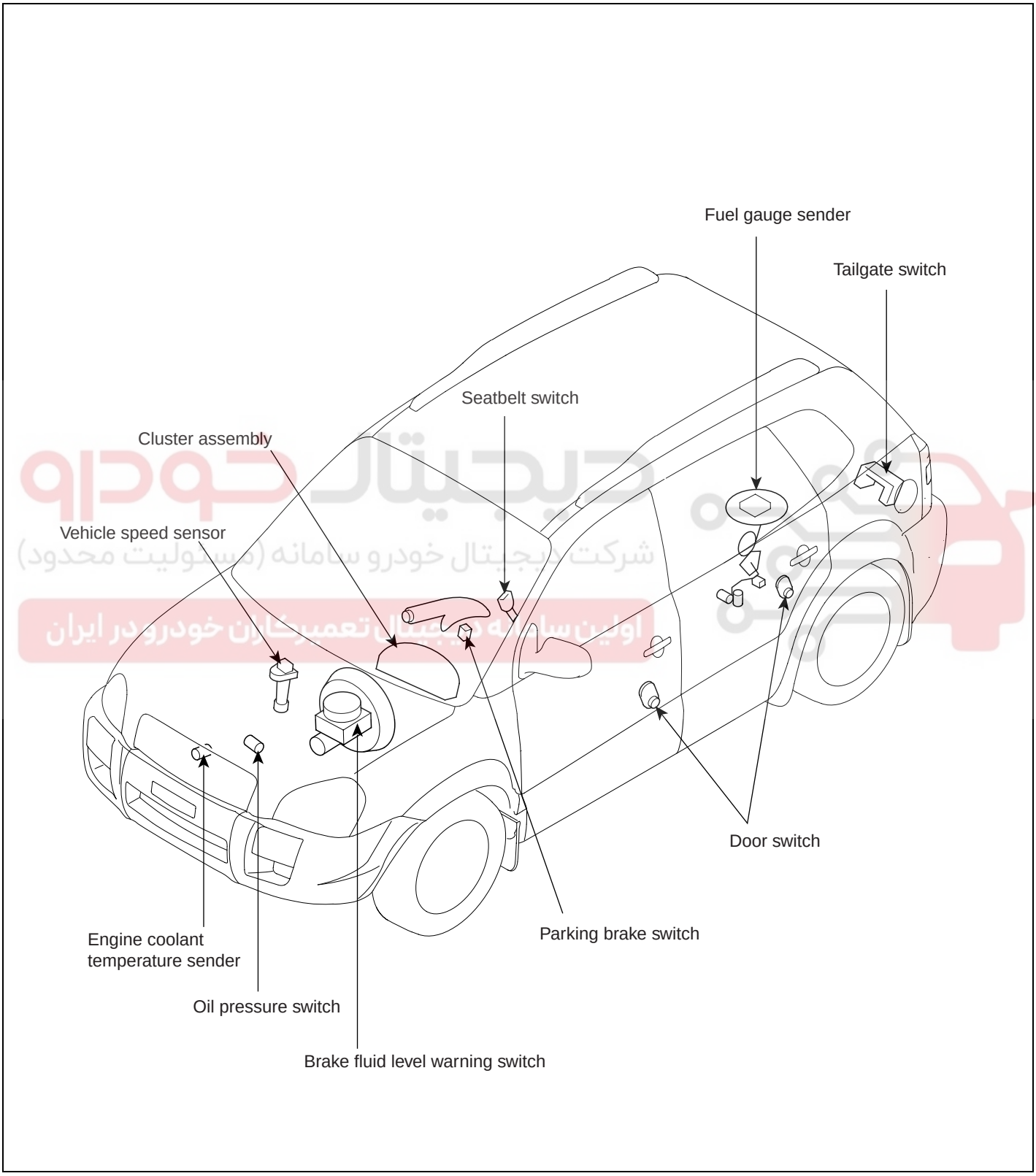

ETQF037A

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

ETKE038A

# INDICATORS AND GAUGES

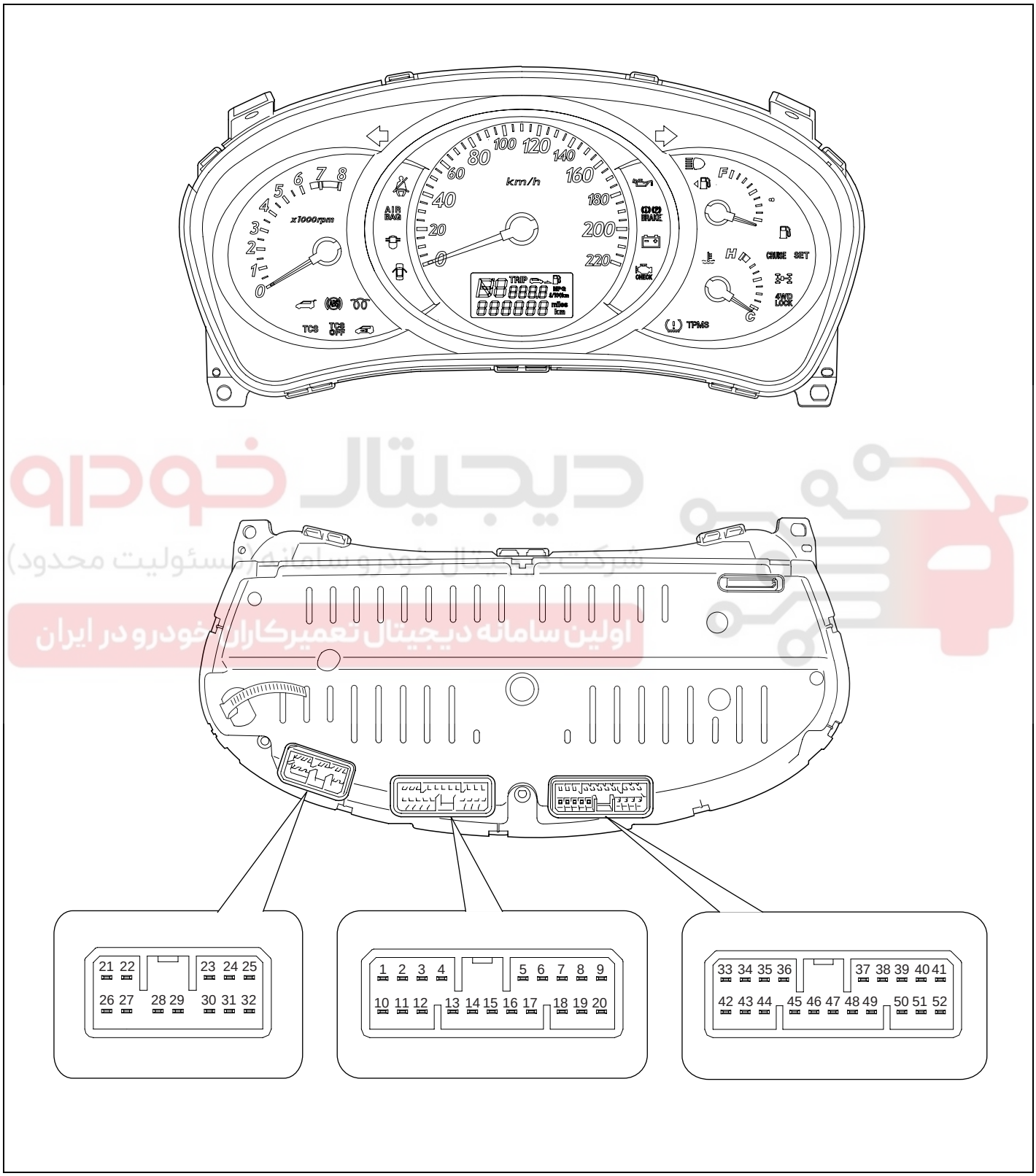
## COMPONENTS E84D67D2




ETQF880I

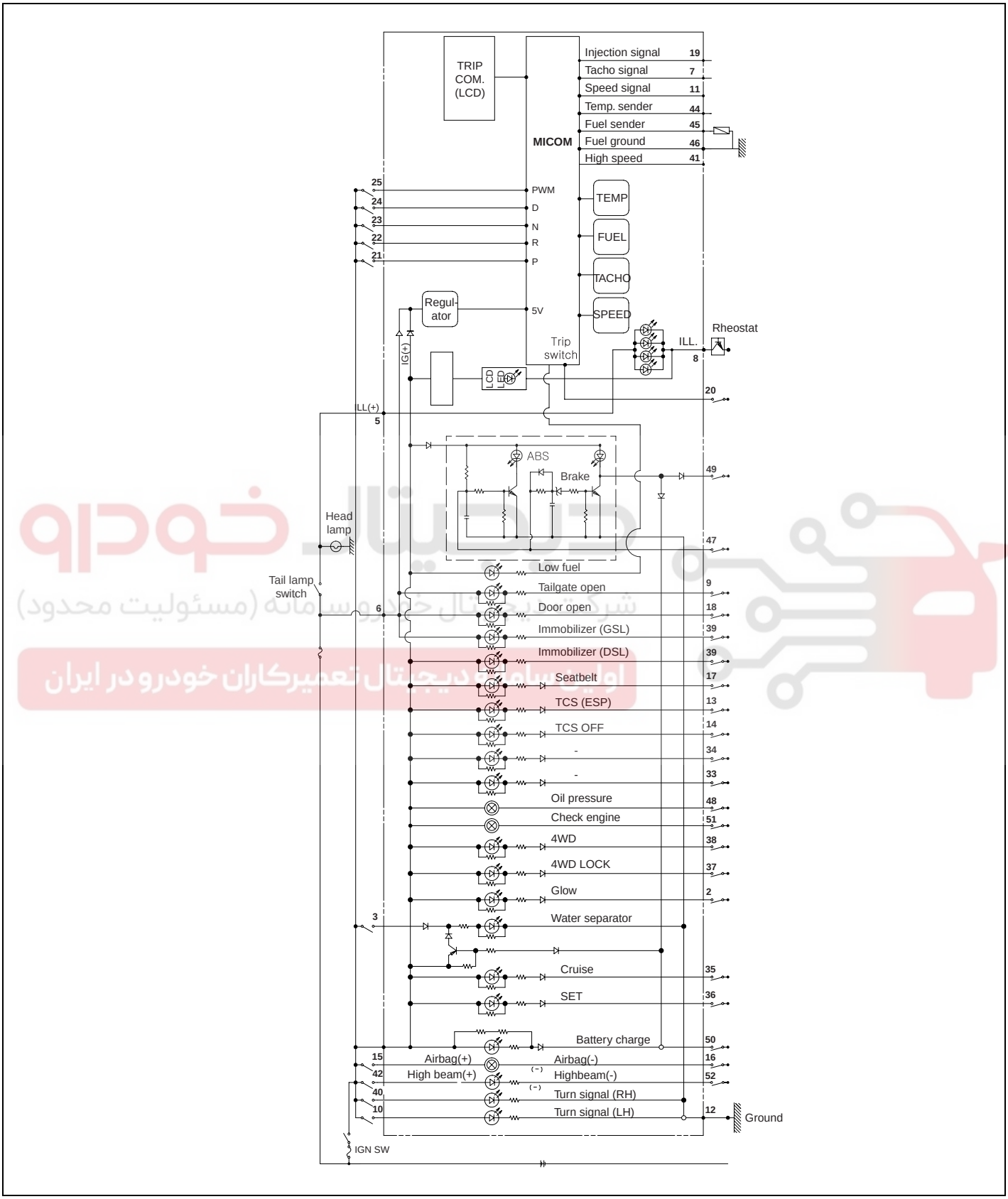
# INSTRUMENT CLUSTER

## COMPONENTS E56388D2




KTQE300A

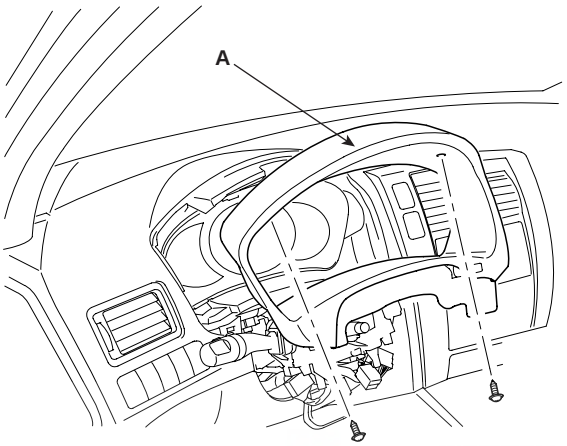
## CIRCUIT DIAGRAM E997BDD1




ETQF300E

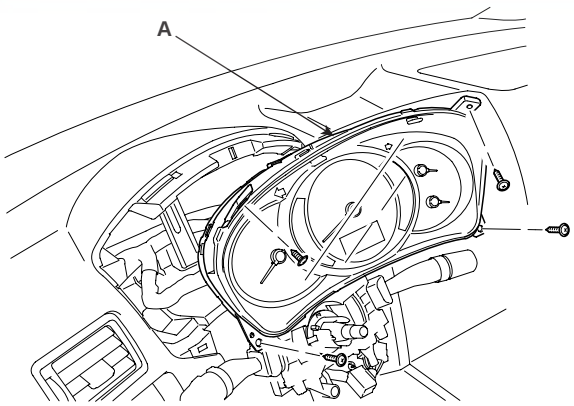
## REMOVAL E4AE7BDD

1. Disconnect the negative(-) battery terminal.
2. Remove the cluster facia panel(A) after removing 2 screws.




KTQE230F

3. Remove the cluster(A) after removing 4 screws, then disconnect the wire connectors.




KTQE230G

4. Installation is the reverse of removal.

## INSPECTION E0ADCAE7

### 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.*

| Velocity (km/h) | 20 | 40 | 60 | 80 | 100 |
|---|---|---|---|---|---|
| Tolerance (km/h) | 20.7-24.7 | 42.5-46.5 | 64-69 | 86-91.6 | 108.4-114 |
| Velocity (km/h) | 120 | 140 | 160 | 180 | 200 |
| Tolerance (km/h) | 130-136 | 152-158 | 174.4-181 | 196.4-203 | 216-223 |

| Velocity (MPH) | 10 | 20 | 40 | 60 | 80 | 100 | 120 |
|---|---|---|---|---|---|---|---|
| Tolerance (MPH) | 10.5-13.5 | 21-24 | 42.4-46 | 64-68 | 85.4-90 | 107-112 | 129-134 |

## VEHICLE SPEED SENSOR

1. Connect the positive (+) lead from battery to terminal 31and negative (-) lead to terminal 2.
2. Connect the positive (+) lead from tester to terminal 3 and the negative (-) lead to terminal 2.
3. Rotate the shaft.
4. Check that there is voltage change from approx. 0V to 11V or more between terminals 2 and 3.
5. The voltage change should be 4 times for every revolution of the speed sensor shaft.
   If operation is not as specified, replace the sensor.

## TACHOMETER

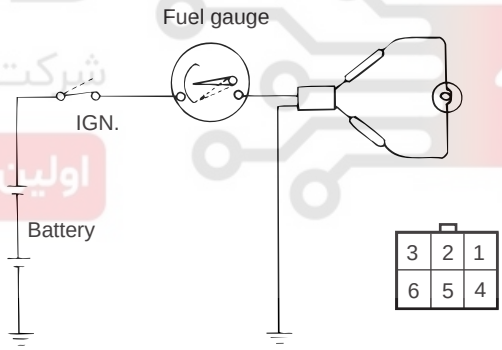
1. Connect the scan tool to the diagnostic link connector or install a tachometer.
2. With the engine started, compare the readings of the tester with that of the tachometer. Replace the tachometer if the tolerance is exceeded.

***CAUTION***

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

## FUEL GAUGE

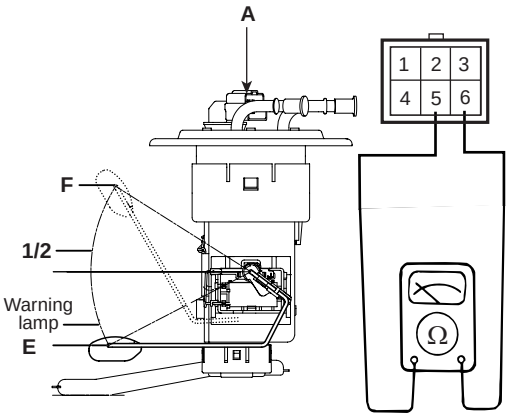
1. Disconnect the fuel sender connector from the fuel sender.
2. Connect a 3.4 watt, 12V test bulb to terminals 5 and 6 on the wire harness side connector.
3. Turn the ignition switch to the ON, and then check that the bulb lights up and the fuel gauge needle moves to full.




ETQF986A

## FUEL MAIN SENDER

1. Using an ohmmeter, measure the resistance between terminals 5 and 6 of main sender connector(A) at each float level.




ETQF987A

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

| Position | Resistance(Ω ) |
|---|---|
| Sender (E) | 104.8 ± 1 |
| Warning lamp | 89.9 ± 1 |
| 1/2 | 13.7 ± 1 |
| Sender (F) | 4.2 ± 1 |

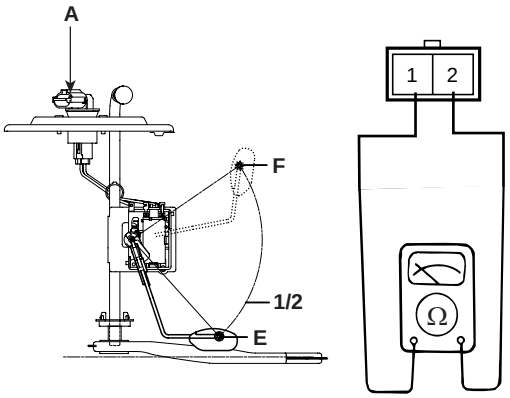
3. If the height resistance is unsatisfied, replace the fuel sender as an assembly.

***CAUTION***

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

## FUEL SUB SENDER

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




KTQE988A

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

| Position | Resistance(Ω ) |
|---|---|
| Sender (E) | 95.2 ± 1 |
| 1/2 | 90.2 ± 1 |
| Sender (F) | 3.8 ± 1 |

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

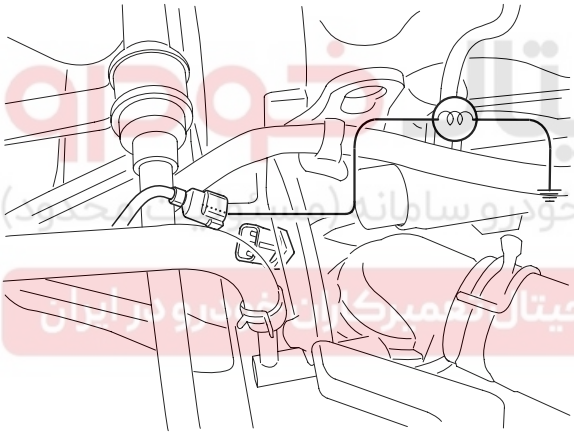
***CAUTION***

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

## ENGINE COOLANT TEMPERATURE GAUGE

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

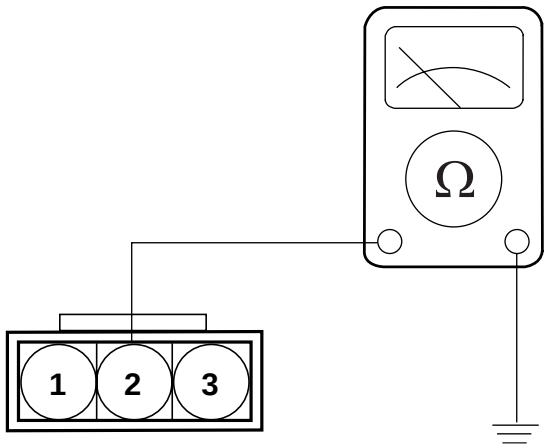
If operation is not as specified, replace the engine coolant temperature gauge. Then recheck the system.



KTQE530C

## ENGINE COOLANT TEMPERATURE SENDER

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



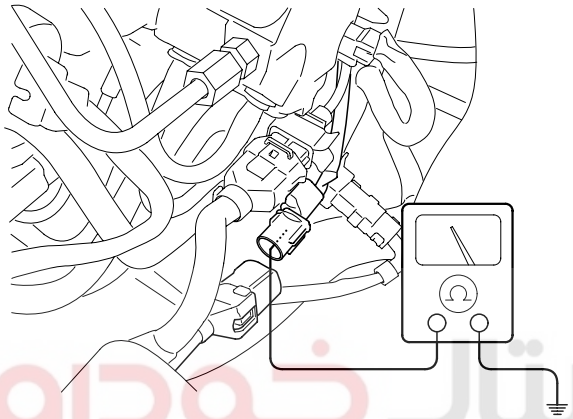

ETKE110I

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

| Temperature (°C) | 49 | 71 | 110 | 127.4 |
|---|---|---|---|---|
| Gauge angle (°) | -40 | -7±2.4 | -7±2.4 | 35±5 |
| Resistance (Ω ) | 195 | 86.5 | 24 | 16.1 |

## OIL PRESSURE SWITCH

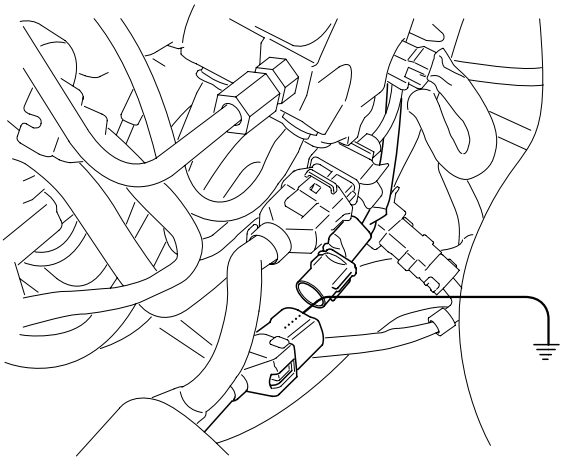
1. Check that there is continuity between the oil press switch terminal and ground with the engine off.
2. Check that there is no continuity between the terminal and ground with the engine running.
3. If operation is not as specified, replace the switch.



KTQE530A

## OIL PRESSURE WARNING LAMP

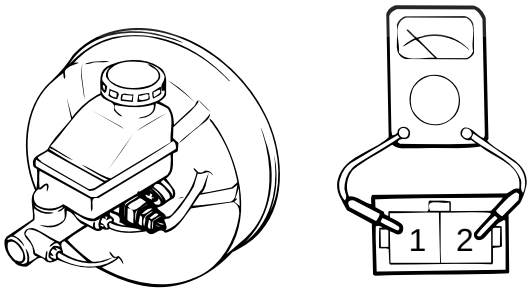
1. Disconnect the connector from the warning switch and ground the terminal on the wire harness side connector.
2. Turn the ignition switch ON. Check that the warning lamp lights up.If the warning lamp doesn't light, test the bulb or inspect the wire harness.



KTQE530B

## BRAKE FLUID LEVEL WARNING SWITCH

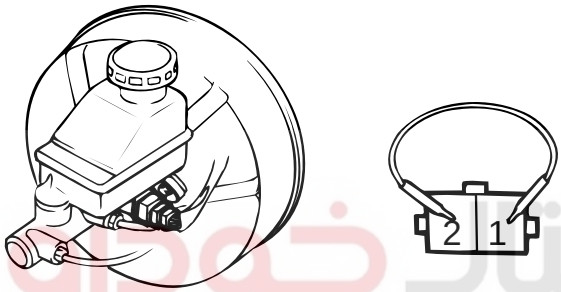
1. Remove the connector from the switch located at the brake fluid reservoir.
2. Verify that continuity exists between switch terminals 1 and 2 while pressing the switch (float) down with a rod.




V5BE060M

## BRAKE FLUID LEVEL WARNING LAMP

1. Start the engine.
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.



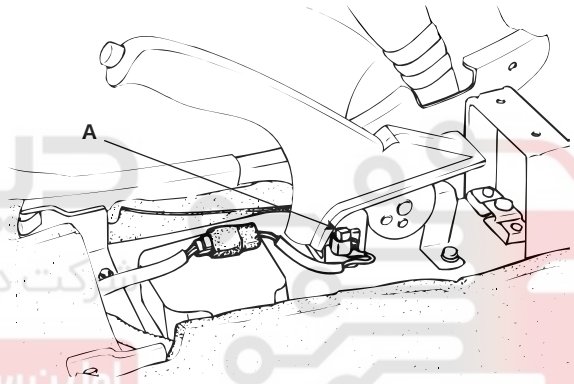

ETQF060N

## PARKING BRAKE SWITCH

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

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

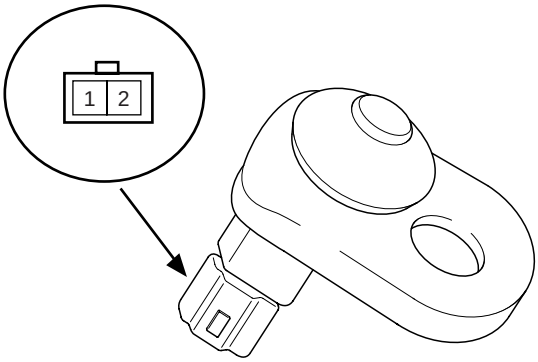
If continuity is not as specified, replace the switch or inspect its ground connection.




ETKE060O

## DOOR SWITCH

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




KTQE804A

### [ FRONT DOOR SWITCH ]

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

ETQF021A

### [ REAR DOOR SWITCH ]

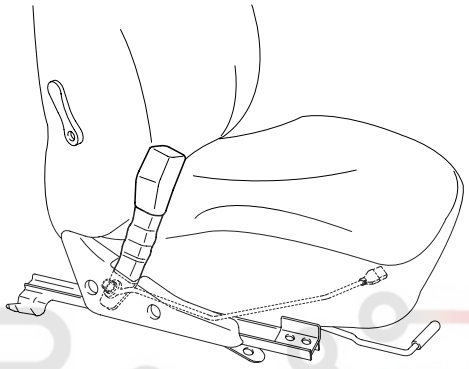
| Terminal / Position | 2 | 1 (Ground) |
|---|---|---|
| Free(Door open) | ○ | ○ |
| Push(Door close) | | |

ETQF021B

## 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 (0Ω ) |



V5BE060Q

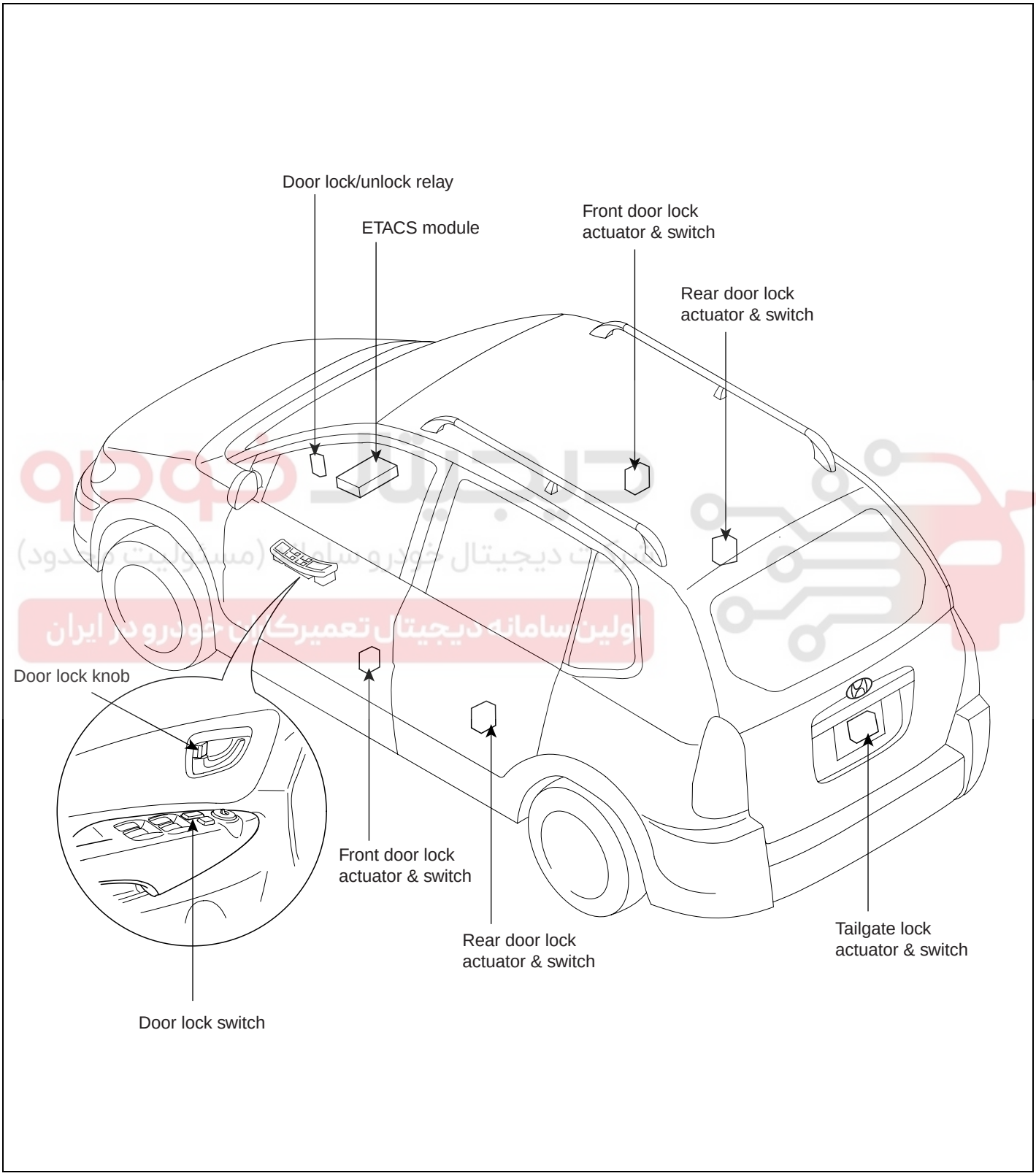
## SEAT BELT WARNING LAMP

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

| Seat belt condition | Warning lamp |
|---|---|
| Fastened | OFF |
| Not fastened | ON |

# POWER DOOR LOCKS

## COMPONENTS EEE9277C



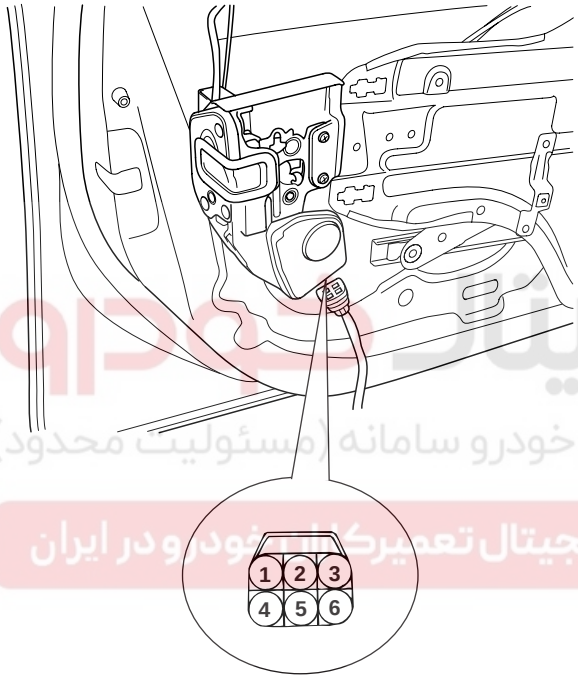

ETQF880J

# POWER DOOR LOCK ACTUATORS

## INSPECTION EAABD58B

### FRONT DOOR LOCK ACTUATOR INSPECTION

1. Remove the front door trim panel. (see BD group-front door)
2. Disconnect the 6P connector from the actuator.




KTKD047A

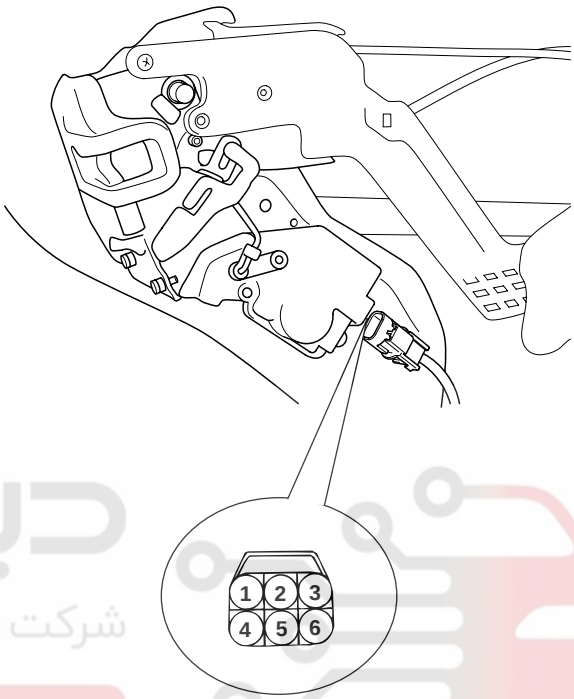
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | | 4 | 6 |
|---|---|---|---|
| Front left | Lock | ⊖ | ⊕ |
| | Unlock | ⊕ | ⊖ |
| Front right | Lock | ⊕ | ⊖ |
| | Unlock | ⊖ | ⊕ |

ETKE270B

### REAR DOOR LOCK ACTUATOR INSPECTION

1. Remove the rear door trim panel. (see BD group-rear door)
2. Disconnect the 6P connector from the actuator.




KTKD048A

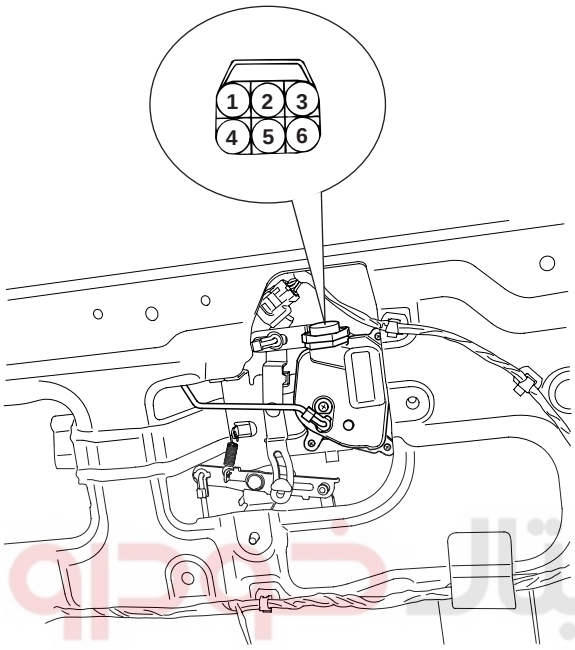
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | | 2 | 3 |
|---|---|---|---|
| Rear left | Lock | ⊕ | ⊖ |
| | Unlock | ⊖ | ⊕ |
| Rear right | Lock | ⊖ | ⊕ |
| | Unlock | ⊕ | ⊖ |

ETQF275B

## TAILGATE LOCK ACTUATOR INSPECTION

1. Remove the tailgate trim panel. (see BD group-tailgate)
2. Disconnect the 6P connector from the actuator.




KTQE280F

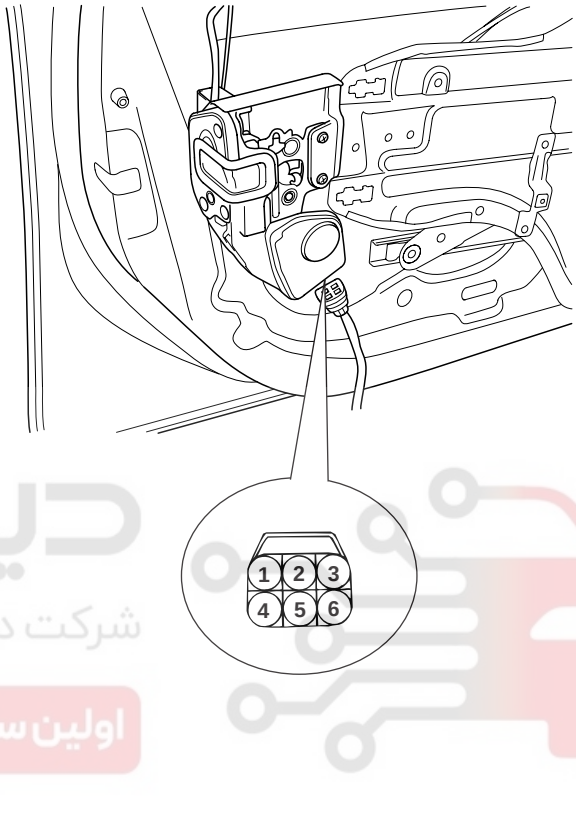
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | 4 | 6 |
|---|---|---|
| Lock | ⊕ | ⊖ |
| Unlock | ⊖ | ⊕ |

ETQF270B

## FRONT DOOR LOCK SWITCH INSPECTION

1. Remove the front door trim panel. (see BD group-front door)
2. Disconnect the 6P connector from the actuator.




KTKD047A

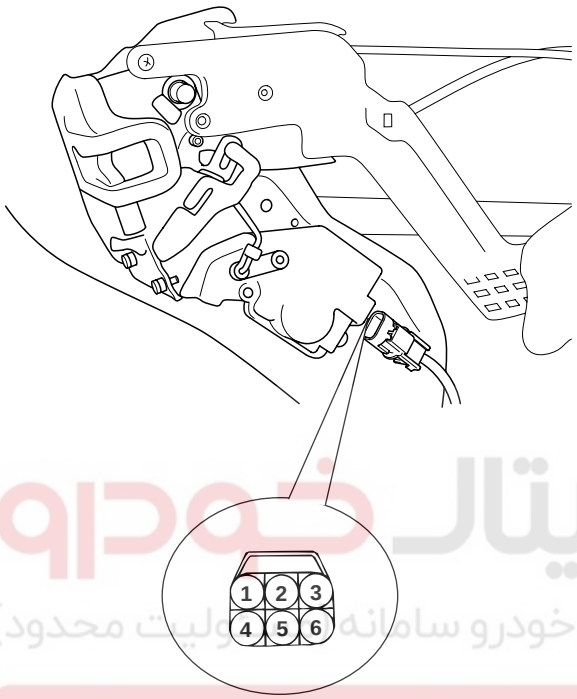
3. Check for continuity between the terminals in each switch position according to the table.

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

ETQF281A

## REAR DOOR LOCK SWITCH INSPECTION

1. Remove the rear door trim panel. (see BD group-rear door)
2. Disconnect the 6P connector from the actuator.




KTKD048A

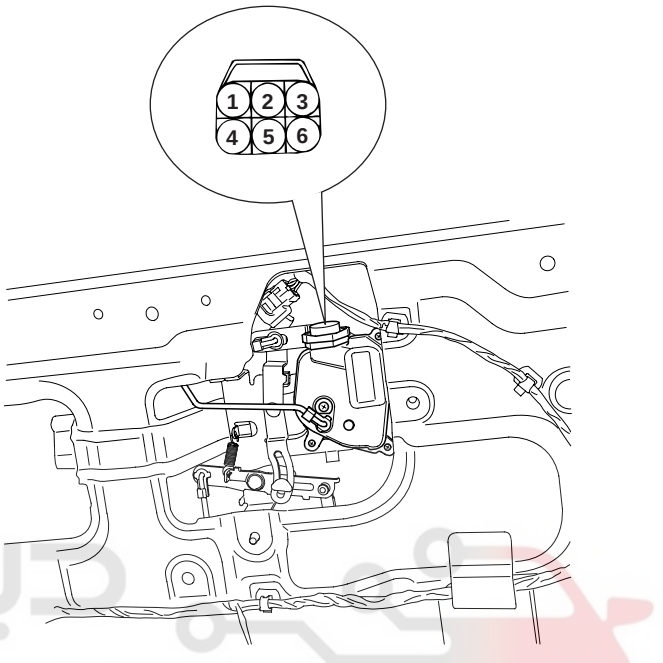
3. Check for continuity between the terminals in each switch position according to the table.

| Position \ Terminal | | 4 | 5 | 6 |
|---|---|---|---|---|
| Rear left | Lock | | ○—— | ——○ |
| | Unlock | ○—— | | ——○ |
| Rear right | Lock | ○—— | | ——○ |
| | Unlock | | ○—— | ——○ |

ETQF280B

## TAILGATE LOCK SWITCH INSPECTION

1. Remove the tailgate trim panel. (see BD group - tailgate)
2. Disconnect the 6P connector from the actuator.




KTQE280F

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

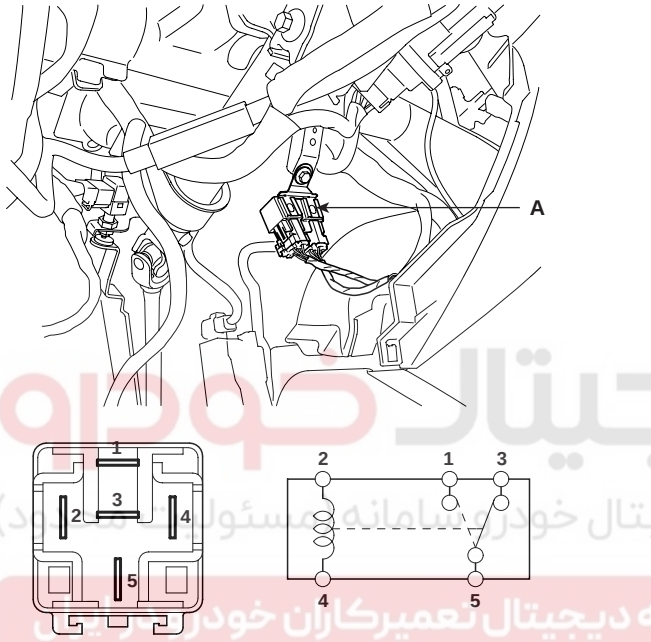
| Position \ Terminal | 1 | 2 | 3 |
|---|---|---|---|
| Lock | ○—— | | ——○ |
| Unlock | | ○—— | ——○ |

ETQF281B

# POWER DOOR LOCK RELAY

## INSPECTION E61B12FE

1. Remove the negative(-) battery terminal.
2. Remove the driver side crash pad lower panel.
3. Remove the door lock and unlock relay(A) from the cross member bracket, then check for continuity between the terminals.




KTQE230H

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

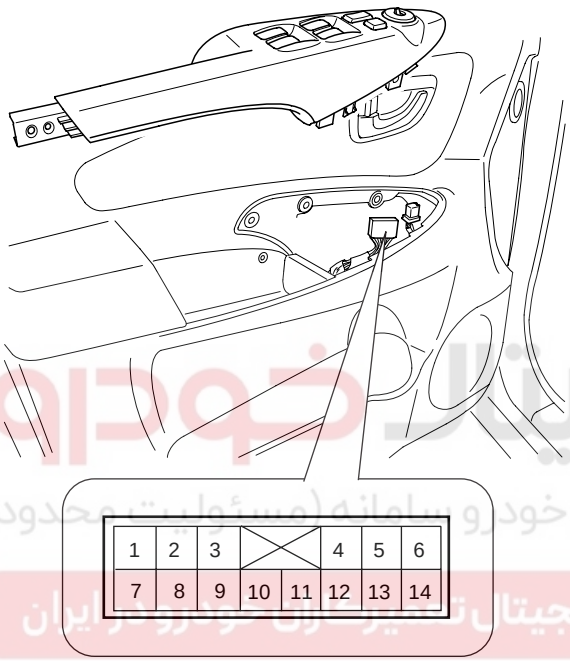
ETQF932A

# POWER DOOR LOCK SWITCH

## INSPECTION EB108AF7

### DRIVER'S DOOR LOCK SWITCH INSPECTION

1. Remove the driver's door trim panel. (see BD group - front door)
2. Disconnect the 14P connector from the door lock switch assembly.




KTQE530J

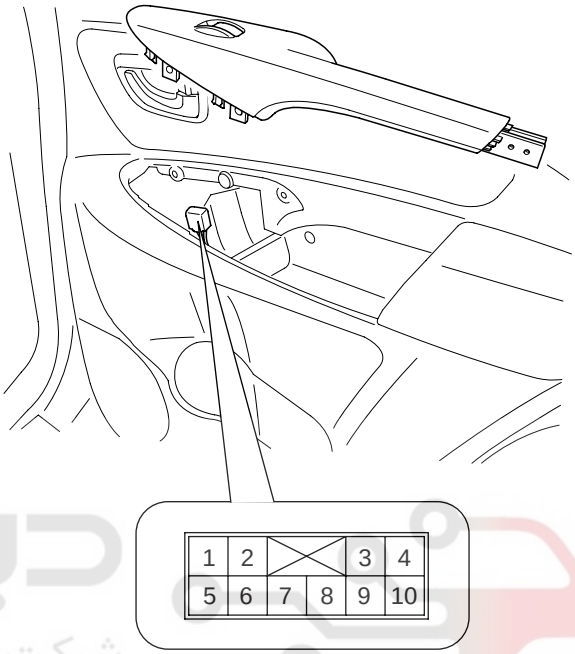
3. Check for continuity between the terminals in each switch position according to the table.

| Terminal / Position | 4 | 10 | 11 |
|---|---|---|---|
| Lock | | ○ | ○ |
| Unlock | ○ | ○ | |

ETQF933A

### ASSIST DOOR LOCK SWITCH INSPECTION

1. Remove the assist door trim panel. (see BD group - front door)
2. Disconnect the 10P connector from the door lock switch assembly.




KTQE530L

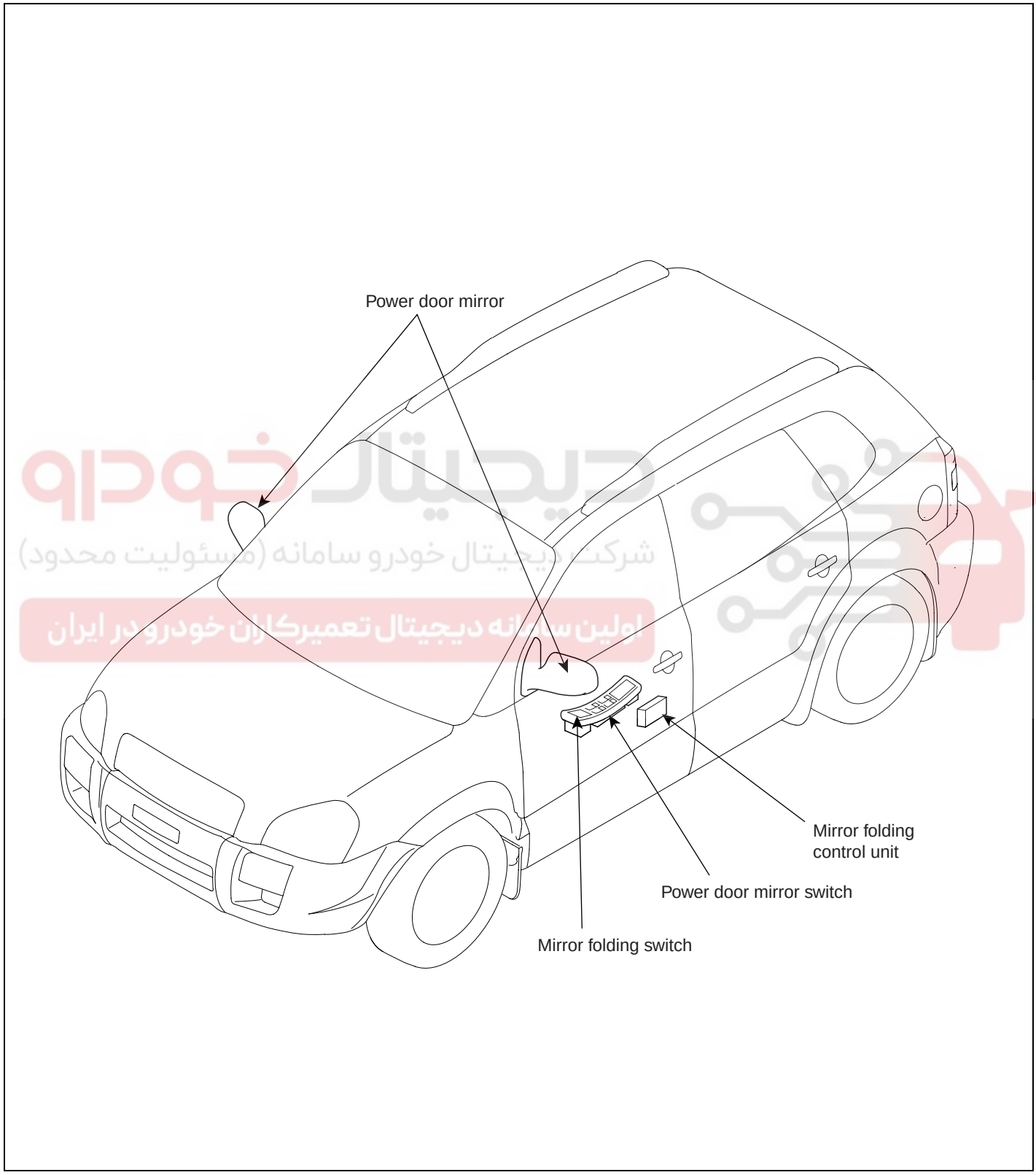
3. Check for continuity between the terminals in each switch position according to the table.

| Terminal / Position | 3 | 4 | 7 |
|---|---|---|---|
| Lock | | ○ | ○ |
| Unlock | ○ | | ○ |

ETQF934A

# POWER DOOR MIRRORS

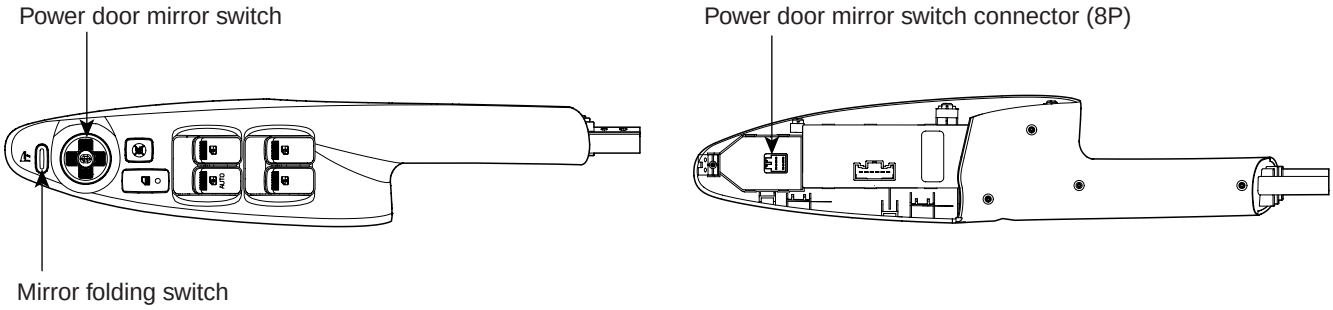
## COMPONENTS E5DE98A0

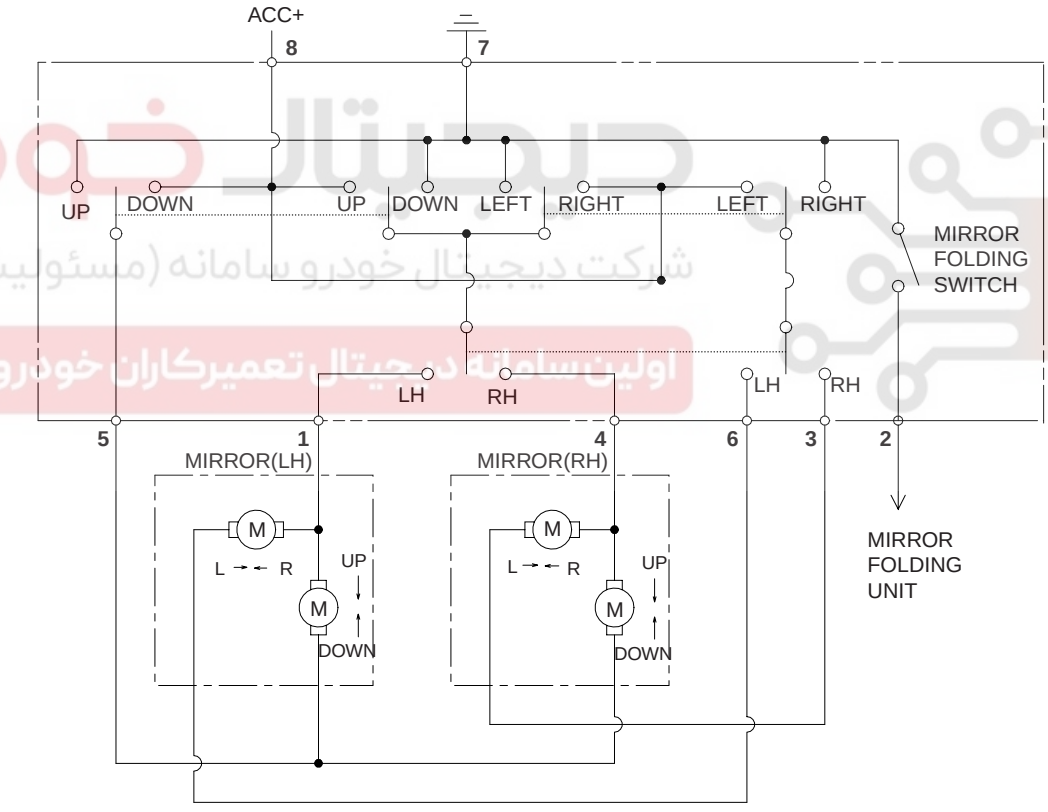


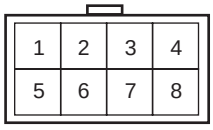

ETQF880K

# POWER DOOR MIRROR SWITCH

## CIRCUIT DIAGRAM EFF0B5A9



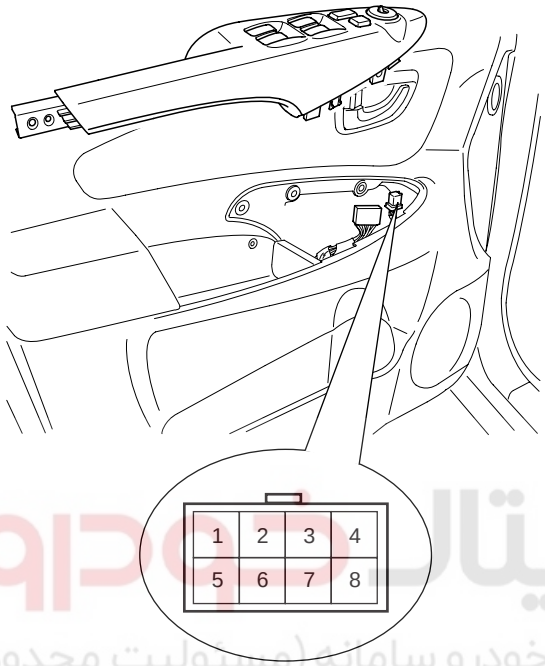




(Power door mirror switch side connector)

ETQF350A

## INSPECTION ECF1E314

1. Remove the driver's door trim panel. (see BD group- front door)
2. Disconnect the 8P connector from the power door mirror switch.




KTQE935A

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

| Class | Terminal / Direction | 1 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| LEFT HAND | UP | ○ | | | ○ | ○ | ○ | ○ |
| | DOWN | ○ | | | ○ | ○ | ○ | ○ |
| | OFF | ○ | | | ○ | ○ | ○ | |
| | LEFT | ○ | | | ○ | | ○ | ○ |
| | RIGHT | ○ | | | ○ | ○ | ○ | ○ |
| RIGHT HAND | UP | | ○ | ○ | ○ | | ○ | ○ |
| | DOWN | | ○ | ○ | ○ | | ○ | ○ |
| | OFF | | ○ | ○ | ○ | | ○ | |
| | LEFT | | ○ | ○ | ○ | | ○ | ○ |
| | RIGHT | | ○ | ○ | ○ | | ○ | ○ |

ETQF936A

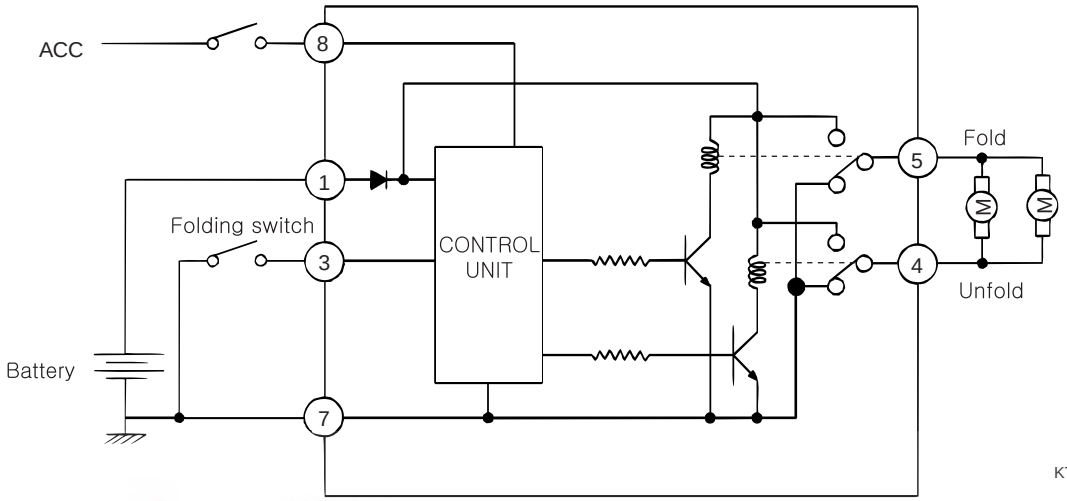
### MIRROR FOLDING SWITCH INSPECTION

| Terminal / Position | 2 | 7 |
|---|---|---|
| ON(PUSH) | ○ | ○ |
| OFF(FREE) | | |

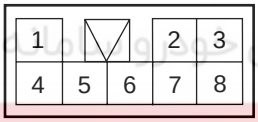
ETQF937A

# DOOR MIRROR FOLDING CONTROL MODULE

## CIRCUIT DIAGRAM EAFFCA2D




KTMB001Z



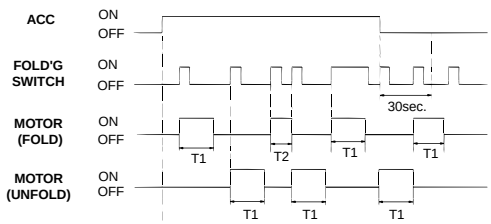

PIN CONNECTION

| Pin No. | Description |
|---|---|
| 1 | B+ |
| 2 | - |
| 3 | Folding switch |
| 4 | Unfold |
| 5 | Fold |
| 6 | - |
| 7 | Ground |
| 8 | ACC+ |

ETKE099A

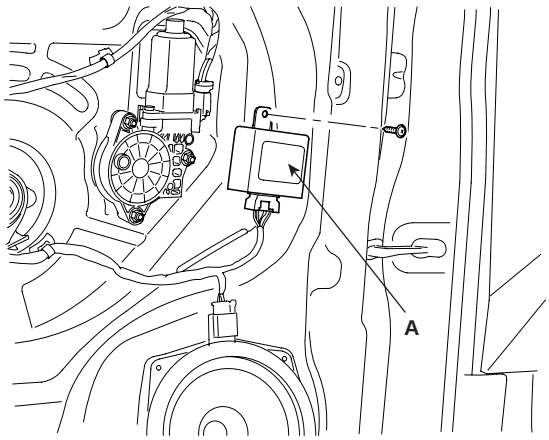
## INSPECTION E335D8B8

1. While operating the folding mirror switch, check if the operations are normal as shown in the timing chart.




T1 = 16 ± 6sec. T1>T2

ETKE002A



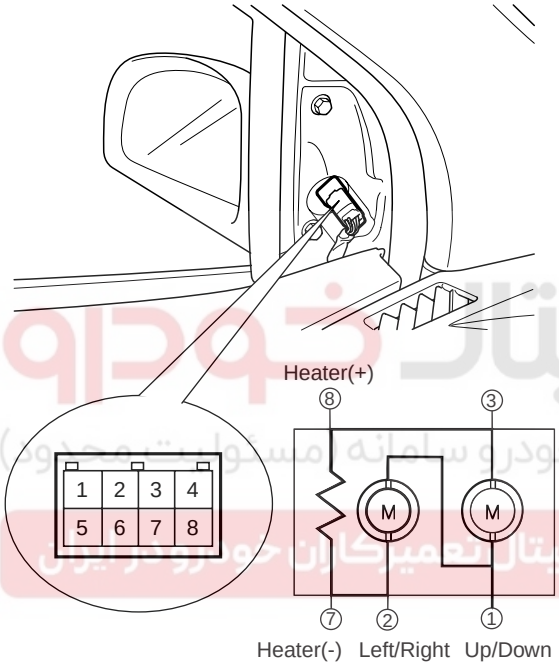

KTQE530M

2. If operations are abnormal, check the control unit (A) inside of driver's door trim panel.

# POWER DOOR MIRROR ACTUATOR

## INSPECTION E196E530

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




ETQF310A

| Terminal / Position | 1 | 2 | 3 |
|---|---|---|---|
| UP | ⊕ | ⊕ | ⊖ |
| DOWN | ⊖ | ⊖ | ⊕ |
| OFF | ⊕ | ⊕ | ⊕ |
| LEFT | ⊖ | ⊕ | ⊖ |
| RIGHT | ⊕ | ⊖ | ⊕ |

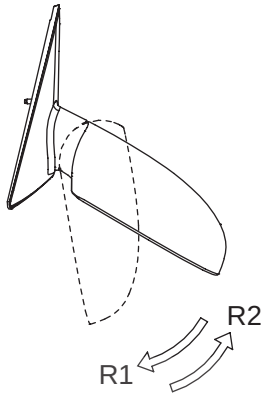
ETQF195B

## MIRROR HEATER INSPECTION

| Terminal / Position | 7 | 8 |
|---|---|---|
| Heater | ○ | ○ |

ETQF195D

## MIRROR FOLDING INSPECTION



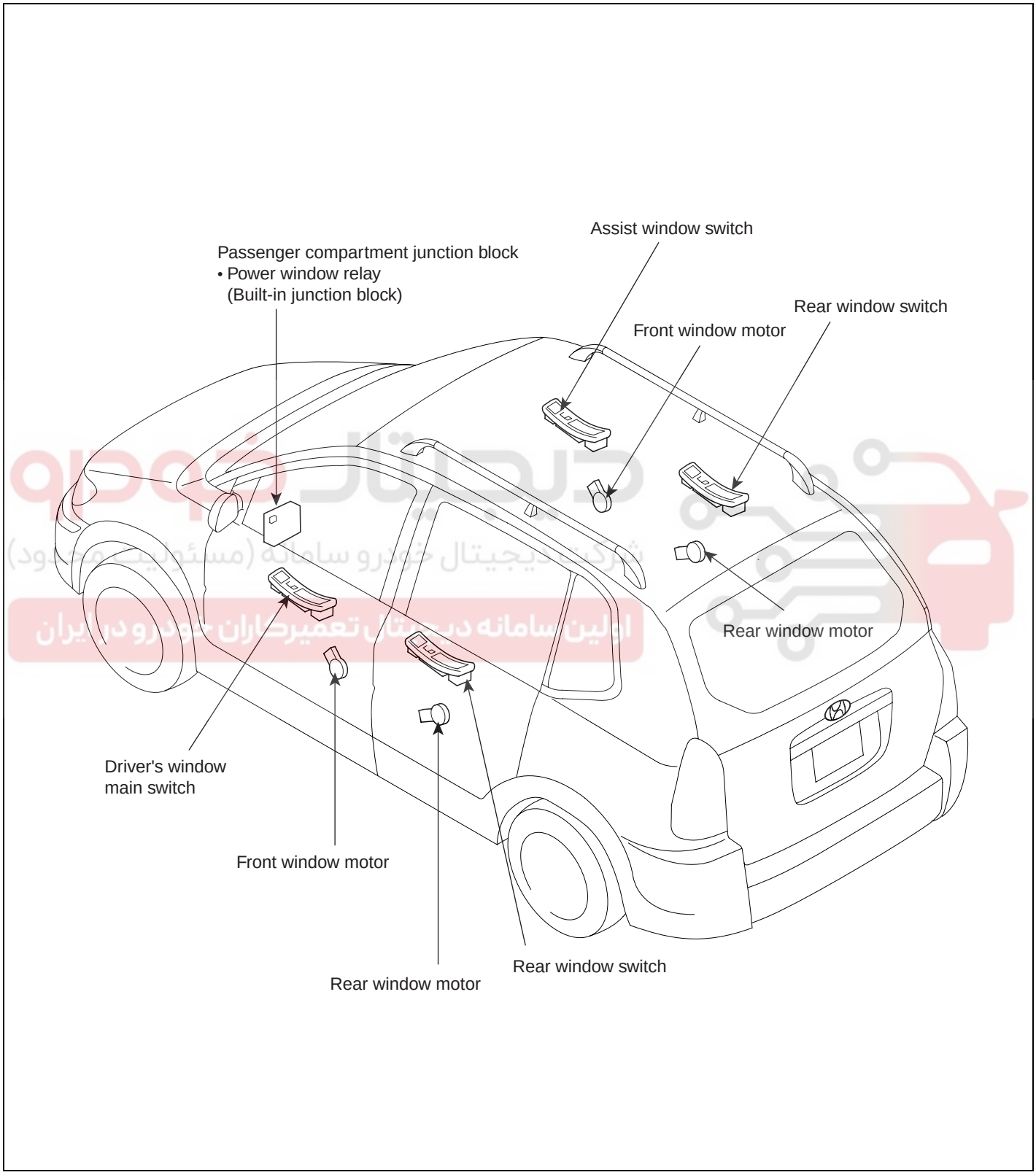

ETJA055B

| Terminal / Direction | 5 | 6 |
|---|---|---|
| R1 | ⊕ M ⊖ | |
| R2 | ⊖ M ⊕ | |

ETQF055A

# POWER WINDOWS

## COMPONENTS E716BBC5



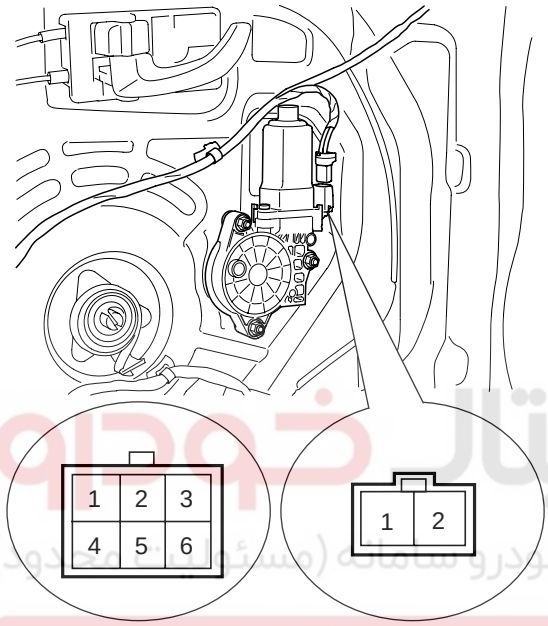

ETQF880L

# POWER WINDOW MOTOR

## INSPECTION E9761ACB

### FRONT POWER WINDOW MOTOR INSPECTION

1. Remove the front door trim panel. (see BD group-front door)
2. Disconnect the 2P connector from the motor.




[With safety window]

ETQF320B

3. 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 |
|---|---|---|---|---|
| LH | UP | Clockwise | ⊖ | ⊕ |
| | DOWN | Counter-clockwise | ⊕ | ⊖ |
| RH | DOWN | Clockwise | ⊕ | ⊖ |
| | UP | Counter-clockwise | ⊖ | ⊕ |

ETQF057A

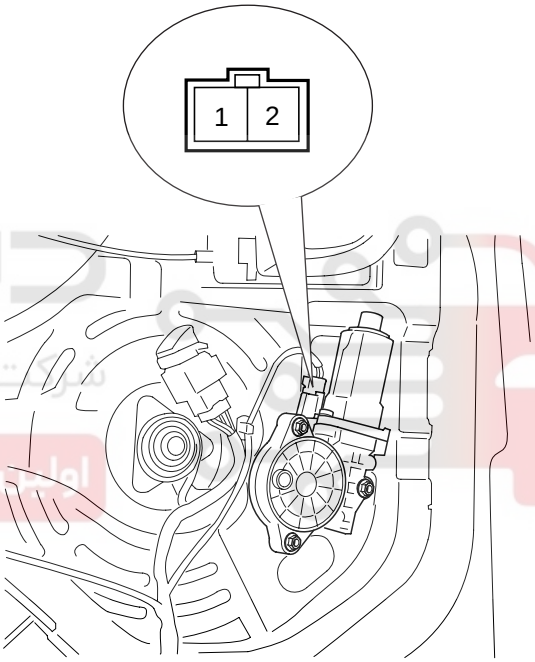
**[WITH DRIVER'S SIDE SAFETY WINDOW]**

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

ETQF057B

### REAR POWER WINDOW MOTOR INSPECTION

1. Remove the rear door trim panel. (see BD group-rear door)
2. Disconnect the 2P connector from the motor.




KTQE280B

3. 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.

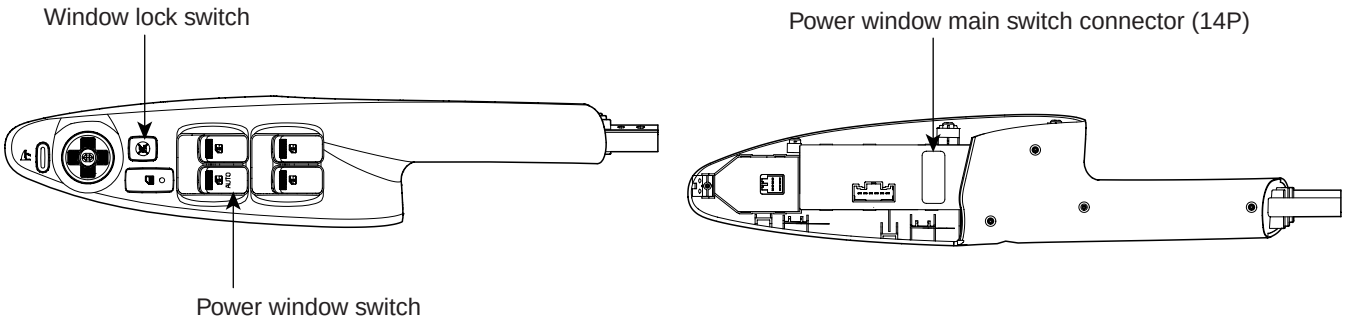
| Position \ Terminal | | | 1 | 2 |
|---|---|---|---|---|
| LH | UP | Clockwise | ⊖ | ⊕ |
| | DOWN | Counter-clockwise | ⊕ | ⊖ |
| RH | DOWN | Clockwise | ⊕ | ⊖ |
| | UP | Counter-clockwise | ⊖ | ⊕ |

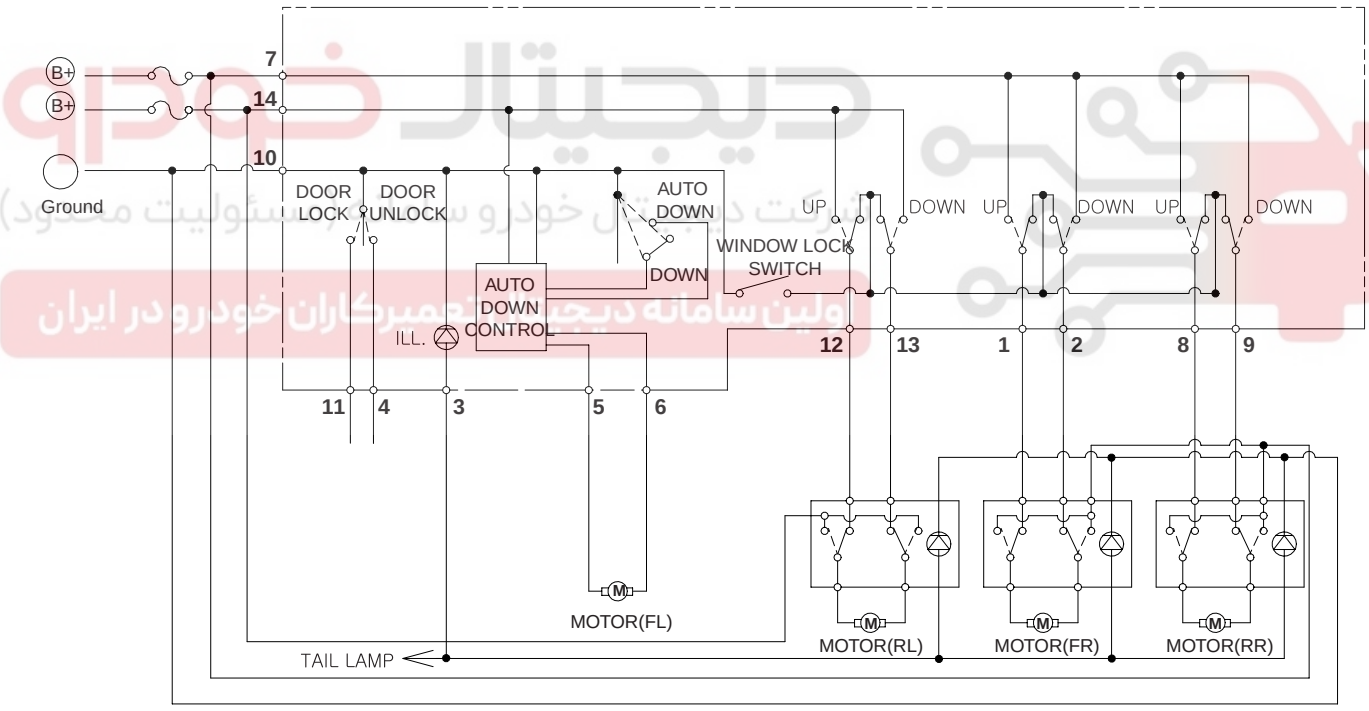
ETQF057A

# POWER WINDOW SWITCH

## CIRCUIT DIAGRAM EDDAA75F

**[Power window main switch]**



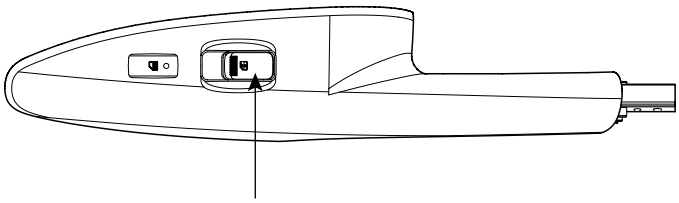




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | | | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

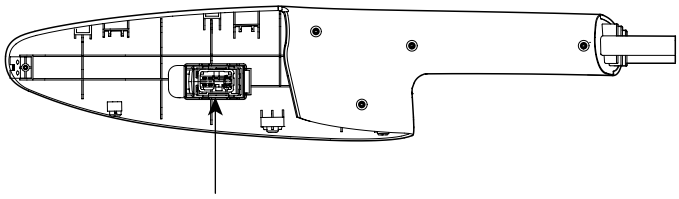
(Power window main switch side connector)

ETQF350E

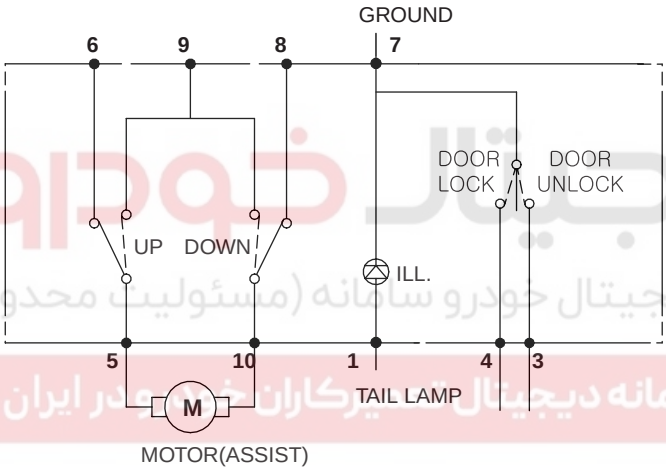
**[Power window sub-switch]**

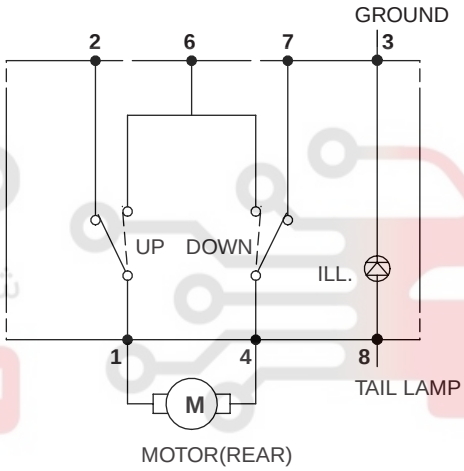


Power window switch

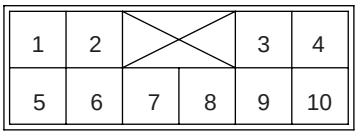


Power window sub-switch connector

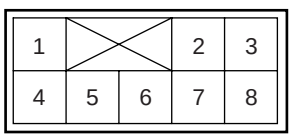



[With Door Lock Switch : Assist]




[Without Door Lock Switch : Assist or Rear]

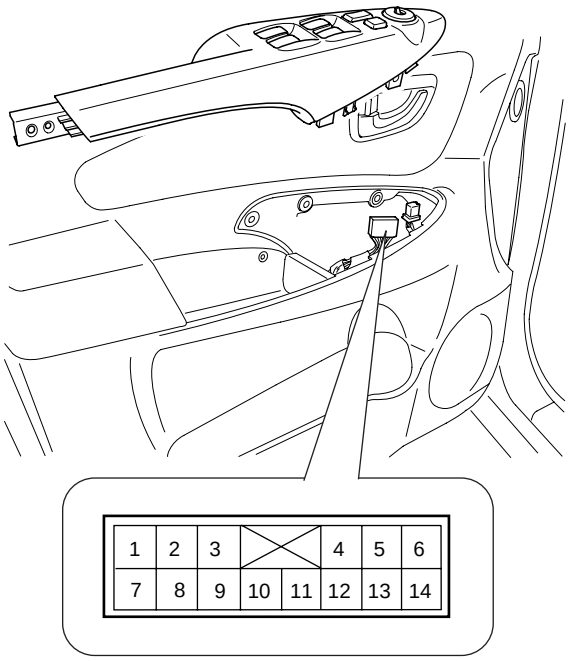



ETQF350H

## INSPECTION E0EC355E

### POWER WINDOW MAIN SWITCH

1. Remove the power window main switch from the driver's door trim panel.




KTQE530J

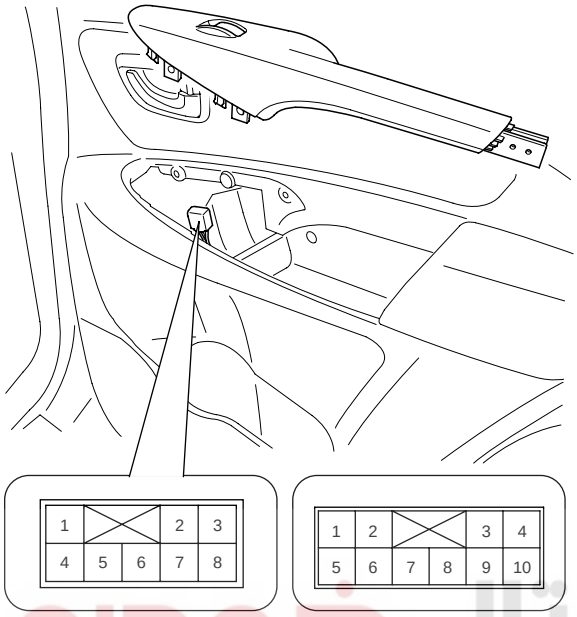
2. Check for continuity between the terminals.

| Terminal / Position | Front left | | | | Front right | | | | Rear left | | | | Rear right | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14 | 5 | 6 | 10 | 1 | 7 | 2 | 10 | 12 | 14 | 13 | 10 | 8 | 7 | 9 | 10 |
| UP | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| OFF | | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | ○ | ○ | ○ | | ○ | ○ |
| DOWN | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

ETQF945A

## ASSIST POWER WINDOW SWITCH

1. Remove the assist power window switch from the assist door trim panel.




[Without door lock switch] [With door lock switch]

ETQF350I

2. Check for continuity between the terminals.
If continuity is not as specified in the table, replace the power window switch.

**[WITHOUT DOOR LOCK SWITCH]**

| Terminal / Position | 1 | 2 | 4 | 6 | 7 |
|---|---|---|---|---|---|
| UP | ○ | | ○ | ○ | ○ |
| OFF | ○ | ○ | ○ | | ○ |
| DOWN | ○ | ○ | ○ | ○ | |

ETQF946A

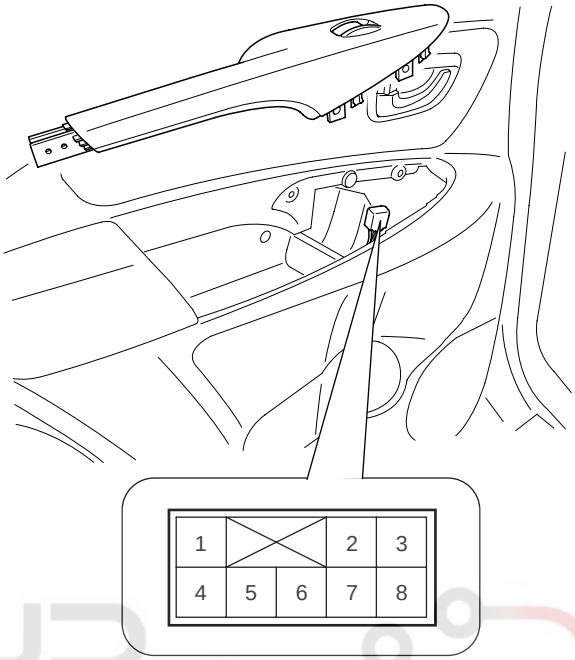
**[WITH DOOR LOCK SWITCH]**

| Terminal / Position | 5 | 6 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| UP | ○ | | ○ | ○ | ○ |
| OFF | ○ | ○ | ○ | | ○ |
| DOWN | ○ | ○ | | ○ | ○ |

ETQF947A

## REAR POWER WINDOW SWITCH

1. Remove the rear power window switch from the rear door trim panel.




KTQE530K

2. Check for continuity between the terminals.
If continuity is not as specified in the table, replace the power window switch.

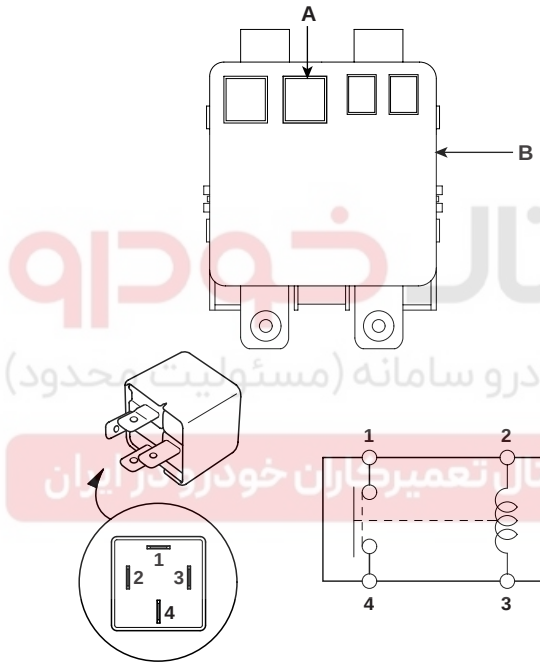
| Terminal / Position | 1 | 2 | 4 | 6 | 7 |
|---|---|---|---|---|---|
| UP | ○ | | ○ | ○ | ○ |
| OFF | ○ | ○ | ○ | | ○ |
| DOWN | ○ | ○ | ○ | ○ | |

ETQF946A

# POWER WINDOW RELAY

## INSPECTION E59CF36B

1. Remove the power window relay(A) from the passenger compartment junction block(B).
2. There should be continuity between the No.1 and No.4 terminals when power and ground are connected to the No.3 and No.2 terminals.
3. There should be no continuity between the No.1 and No.4 terminals when power is disconnected.




ETKE061A

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

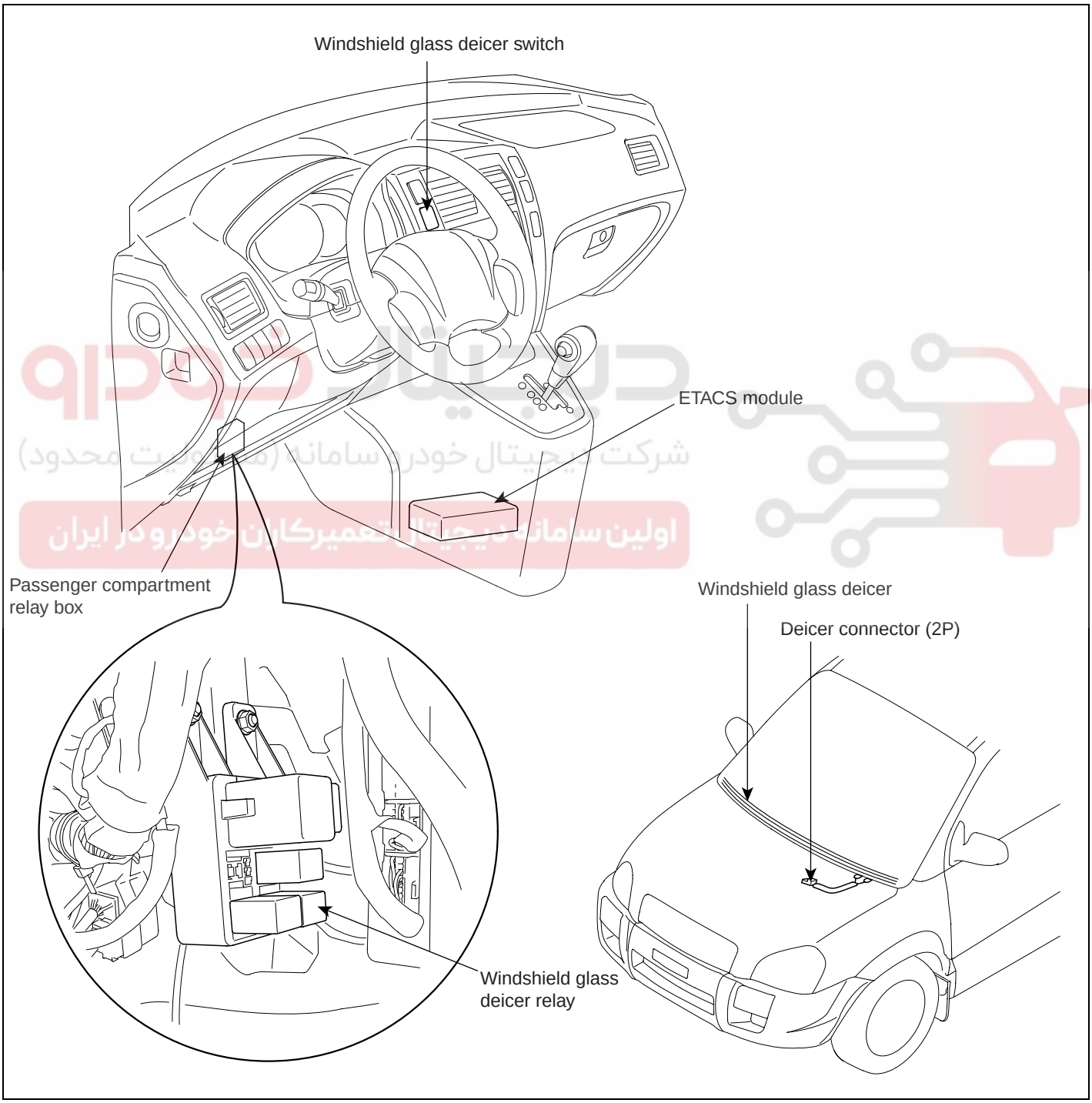
ETKE215B

# WINDSHIELD GLASS DEICER

## COMPONENTS EAF1DA72

Windshield glass deicer system prevent windshield wiper from freezing in the winter season. It consist of deicer in the lower part of windshield glass, switch and relay.

ETACS 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.

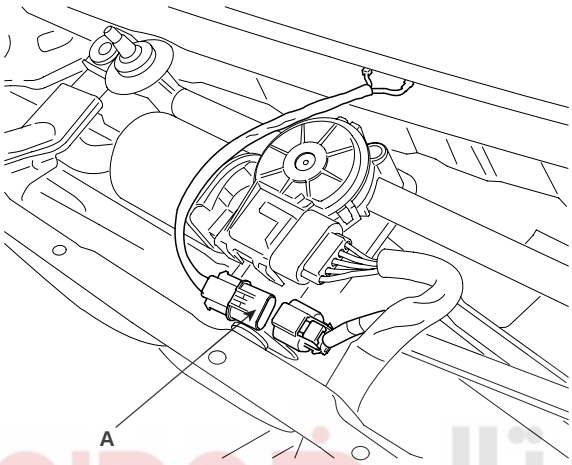



ETQF880M

# WINDSHIELD GLASS DEICER

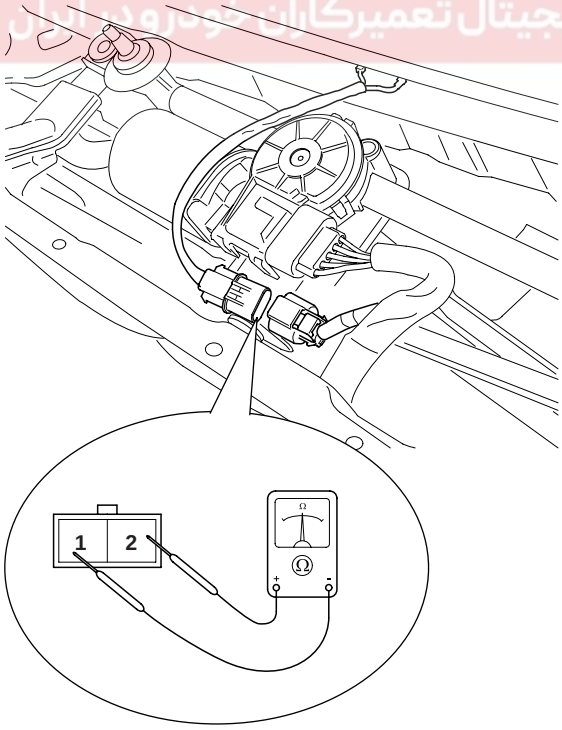
## INSPECTION EC38E8ED

1. Disconnect the windshield glass deicer connetor(A) from the wiper motor linkage.



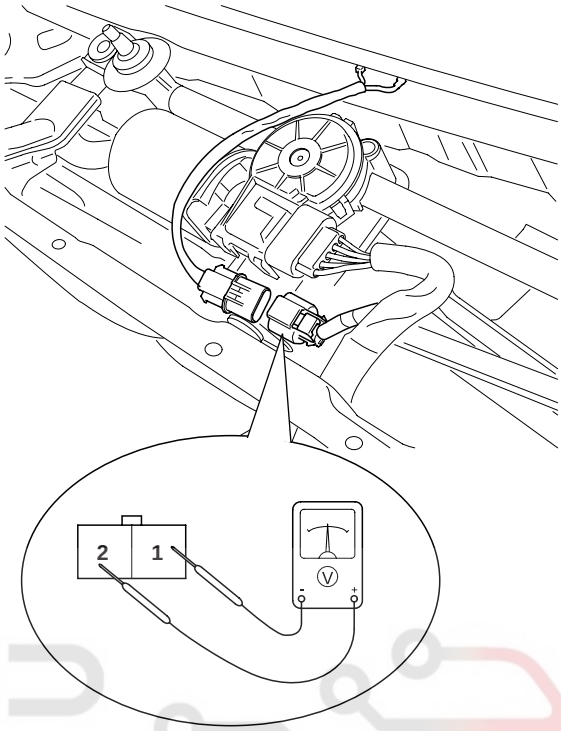

KTQE310C

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




KTQE948A

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



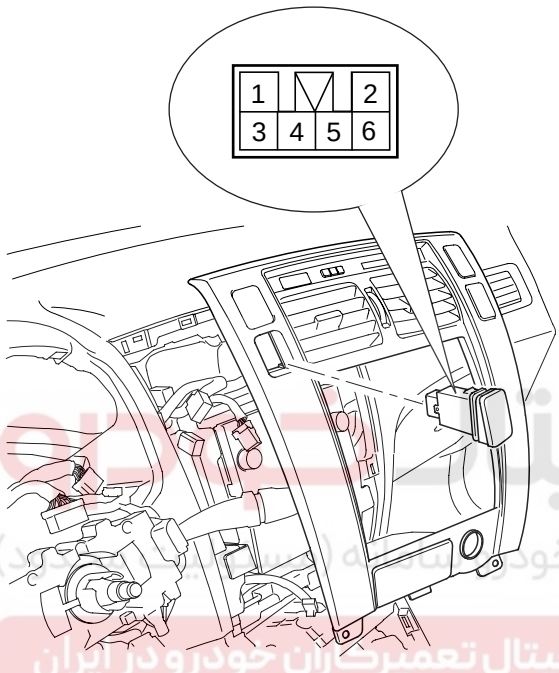

KTQE948B

OK : approx. Battery voltage

# WINDSHIELD GLASS DEICER SWITCH

## INSPECTION EB9FEDFE

1. Disconnect the negative(-) battery terminal.
2. Remove the center facia panel then disconnect the 6P connector from the windshield glass deicer switch.




KTQE230J

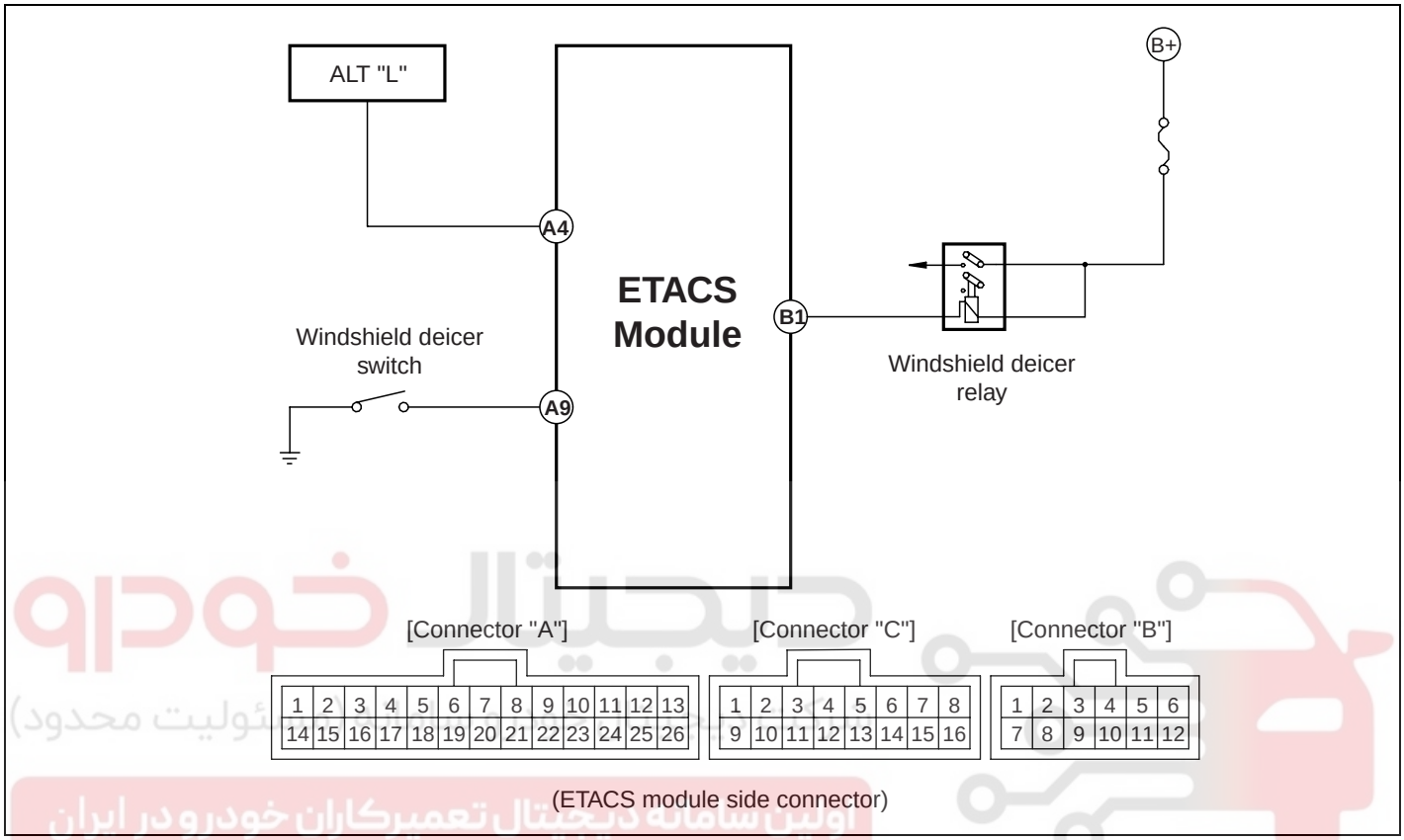
3. Check for continuity between terminals while operating the deicer switch.

| Terminal / Position | 3 | 6 | 4 | 1 | 5 | 2 |
|---|---|---|---|---|---|---|
| ON | ○—○ | | ○ IND. ○ | | ○ ILL. ○ | |
| OFF | | | ○ IND. ○ | | | |

ETQF949A

# WINDSHIELD GLASS DEICER TIMER

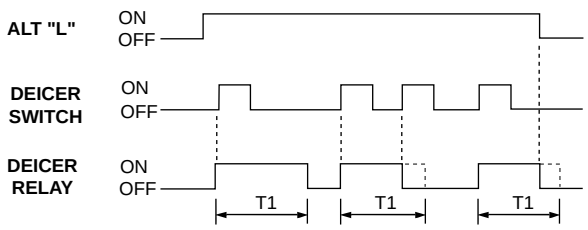
## INSPECTION EEAFBB92




ETQF950A

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

1. After ALT "L" ON, if the deicer is switched ON, the deicer output is ON for 20 minutes duration.
2. If the deicer switch is pressed again, or if the ignition is switched OFF during this time, deicer output is OFF.



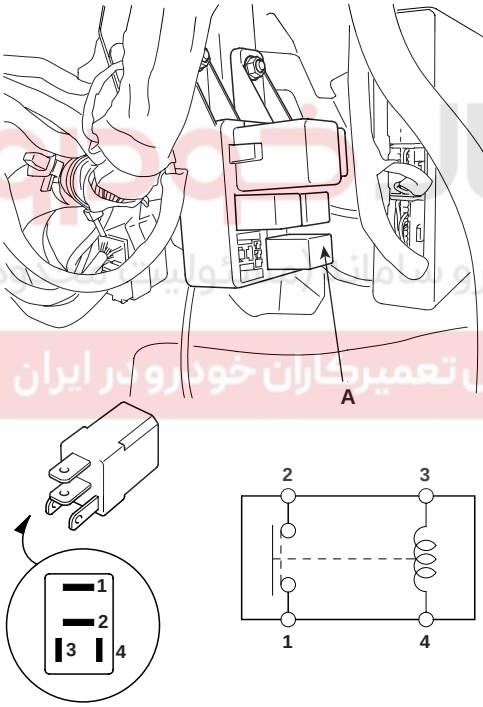

ETQF017A

T1 : 20 ± 1min.

# WINDSHIELD GLASS DEICER RELAY

## INSPECTION EFDF2AFA

1. Remove the windshield deicer relay(A) from the passenger compartment relay box.
2. Check for continuity between the terminals.
3. There should be continuity between the No.1 and No.2 terminals when power and ground are connected to the No.4 and No.3 terminals.
4. There should be no continuity between the No.1 and No.2 terminals when power is disconnected.



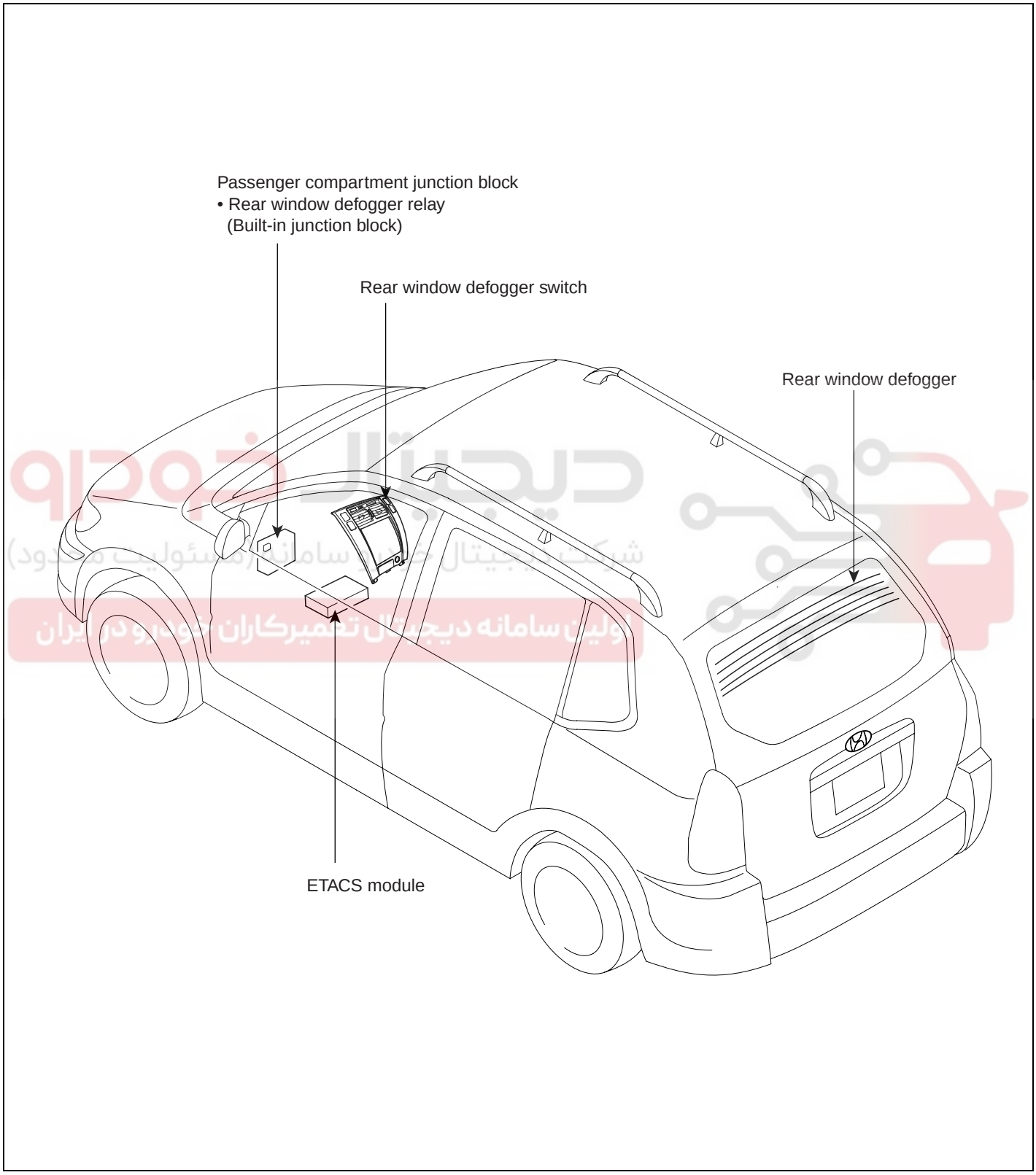

ETQF034B

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

ETKE903A

# REAR WINDOW DEFOGGER

## COMPONENTS E644AE06



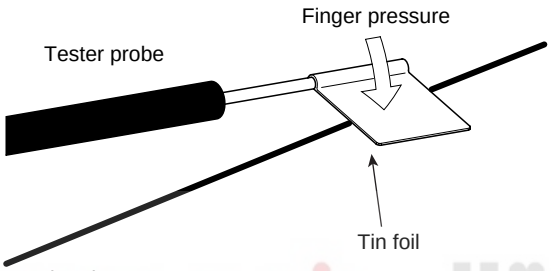

ETQF880N

# REAR WINDOW DEFOGGER PRINTED HEATER

## INSPECTION E0E74505

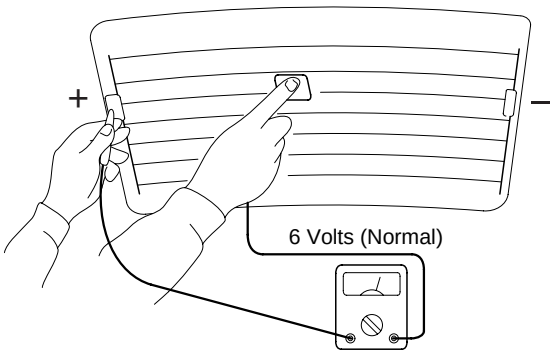
***CAUTION***

***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.***



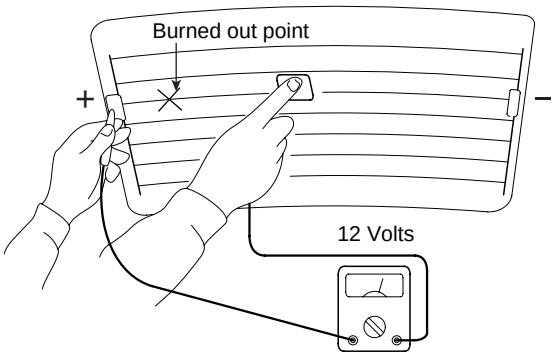

ETA9165A

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.



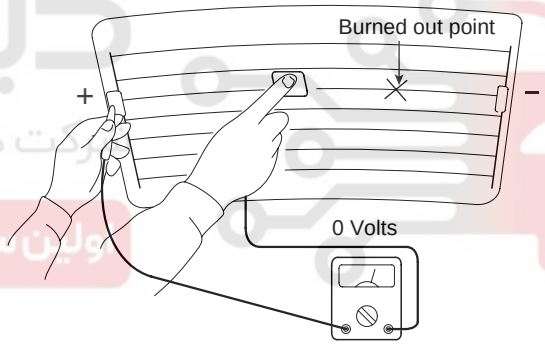

ETA9165B

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



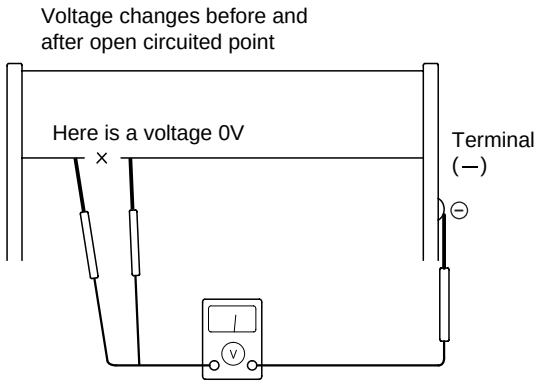

ETA9165C

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



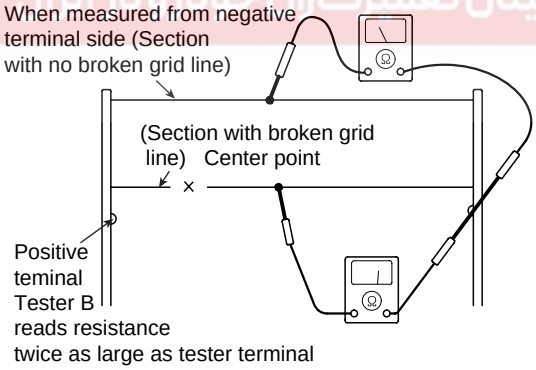

ETA9165D

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.

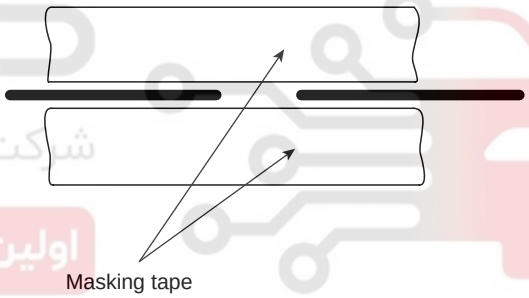



ETA9165F

**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).

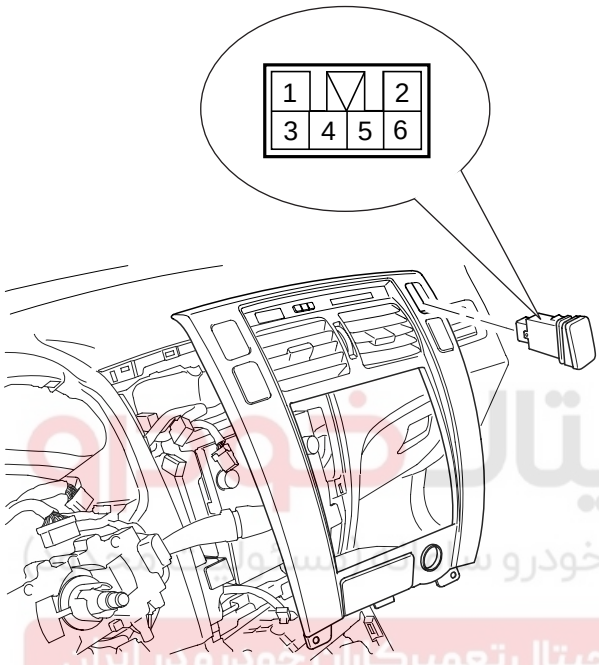



ETA9165G

# REAR WINDOW DEFOGGER SWITCH

## INSPECTION ED889BA0

1. Remove the negative(-) battery terminal.
2. Remove the center facia panel then disconnect the 6P connector from the rear window defogger switch.




KTQE230L

3. Check for continuity between terminals while operating the defogger switch.

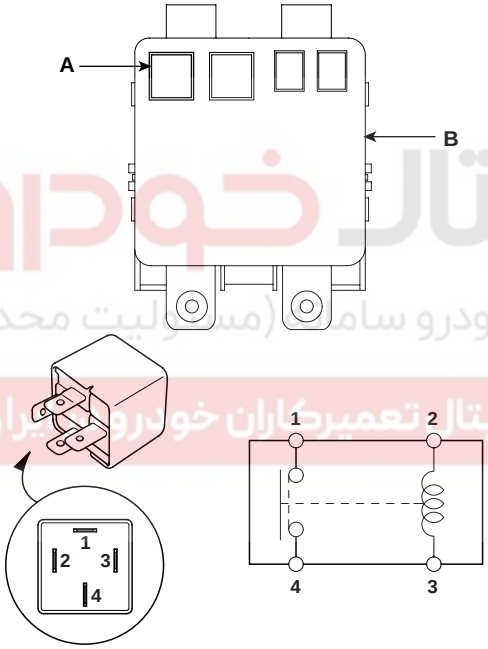
| Position \ Terminal | 3 | 4 | 1 | 5 | 2 |
|---|---|---|---|---|---|
| ON | | | IND. | | ILL. |
| OFF | | | | | |

ETQF951A

# REAR WINDOW DEFOGGER RELAY

## INSPECTION E17D60BA

1. Remove the rear window defogger relay(A) from the passenger compartment junction block(B).
2. There should be continuity between the No.1 and No.4 terminals when power and ground are connected to the No.3 and No.2 terminals.
3. There should be no continuity between the No.1 and No.4 terminals when power is disconnected.



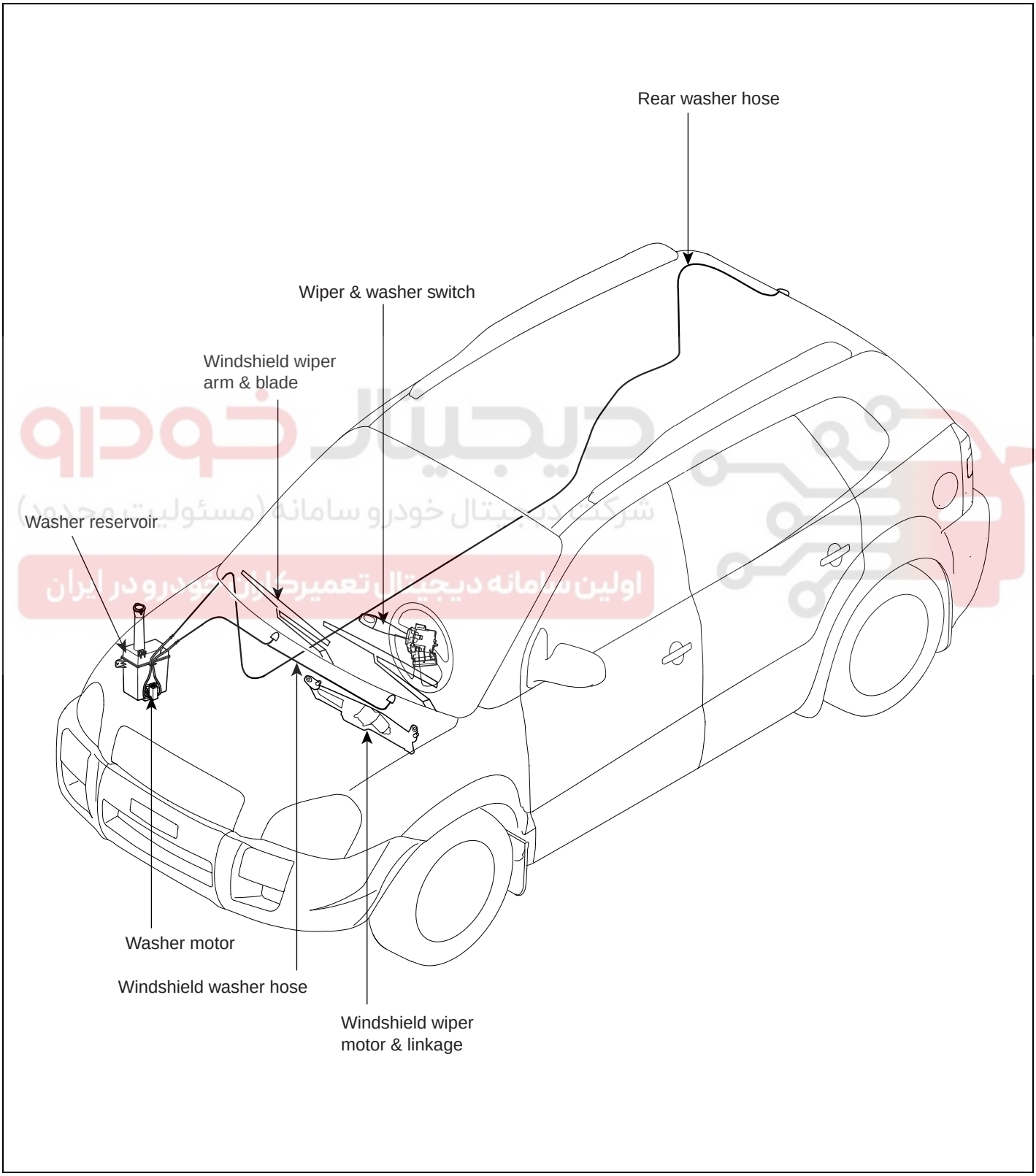

ETKE042B

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

ETKE215B

# WINDSHIELD WIPER / WASHER

## COMPONENTS ECBB882C

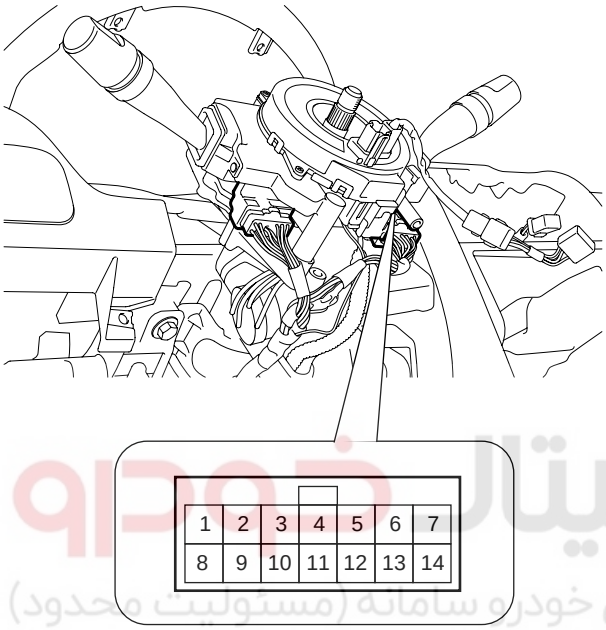



ETQF880P

# WINDSHIELD WIPER／WASHER SWITCH

## INSPECTION E8DDA5BB

Check for continuity between the terminals while operating the wiper and washer switch.




KTDD075I

### WIPER SWITCH

| Position \ Terminal | 1 | 2 | 3 | 4 | 5 | 6 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|
| MIST | | | | ○ | ○ | | | |
| OFF | | ○ | ○ | | | | | |
| INT | | ○ | ○ | | ○ | ○ | ○ | ○ |
| LOW | | ○ | | | ○ | | | |
| HI | ○ | | | | ○ | | | |

ETDD075C

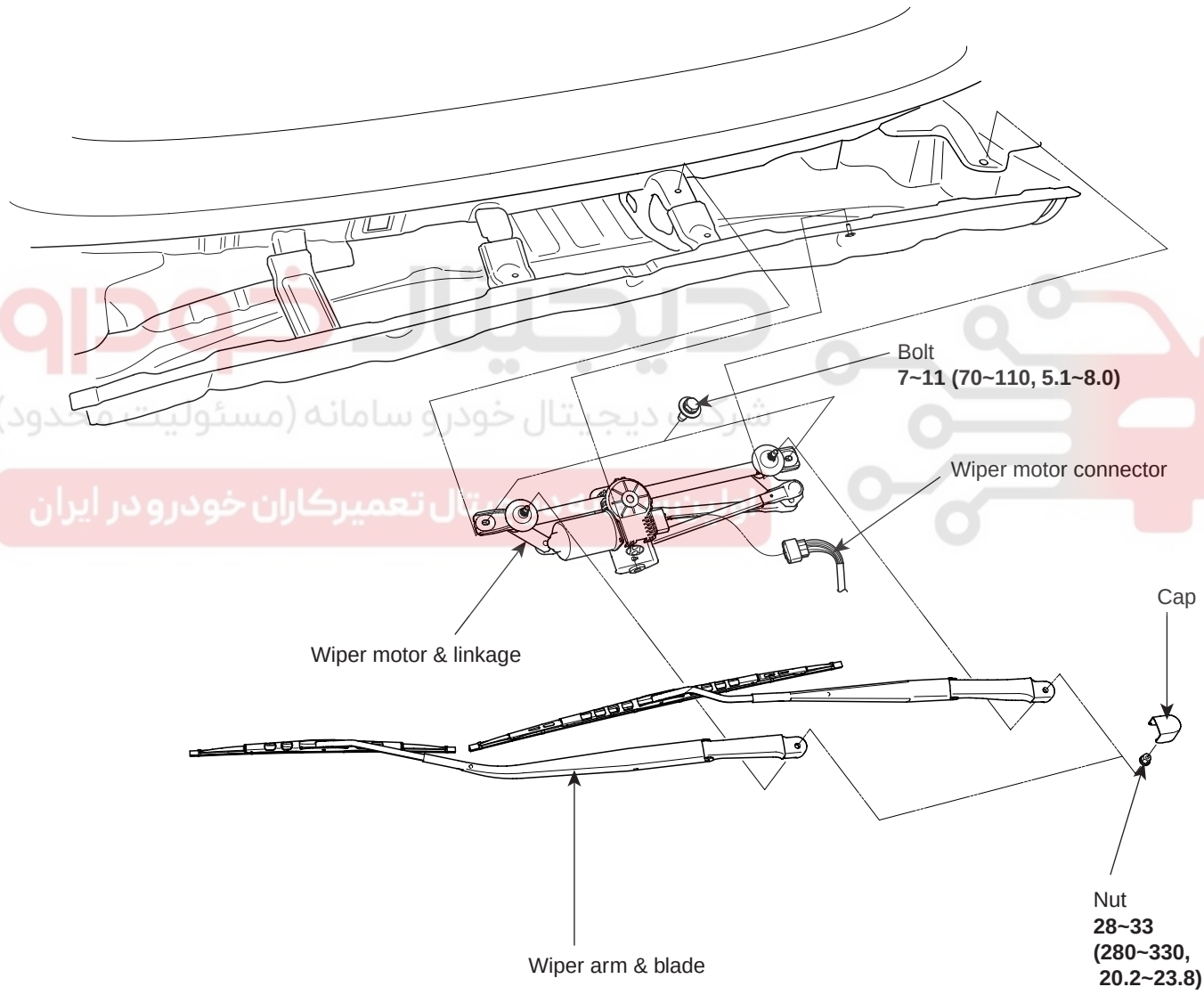
### WASHER SWITCH

| Position \ Terminal | 5 | 7 |
|---|---|---|
| OFF | | |
| ON | ○ | ○ |

ETDD075D

# FRONT WIPER MOTOR

## COMPONENTS E46D633E

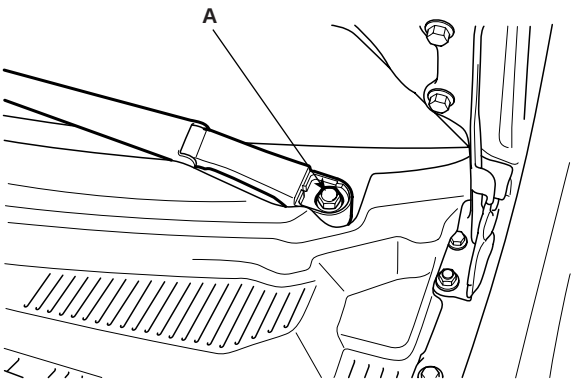



**TORQUE : Nm (kgf·cm, lbf·ft)**

ETQF400A

## REMOVAL E0D3CA48

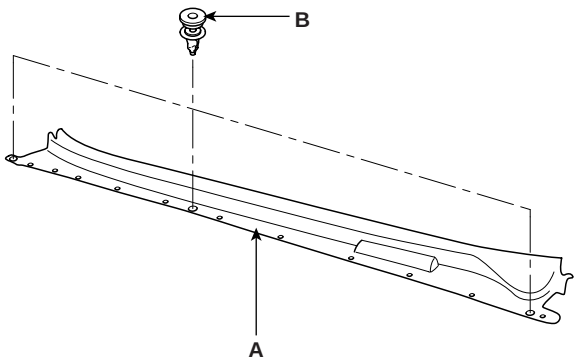
1. Detach the wiper cap, then remove the windshield wiper arm and blade after removing a nut(A).




ETKE365A

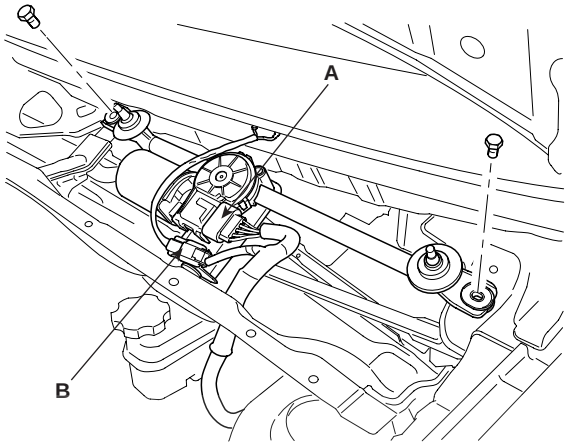
**Tightening torque**
28~33 Nm (280~330 kgf·cm, 20.2~23.8 lbf·ft)

2. Remove the weatherstrip then remove the cowl top cover(A) after removing 3 screws(B).




ETKE250B

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




KTQE310A

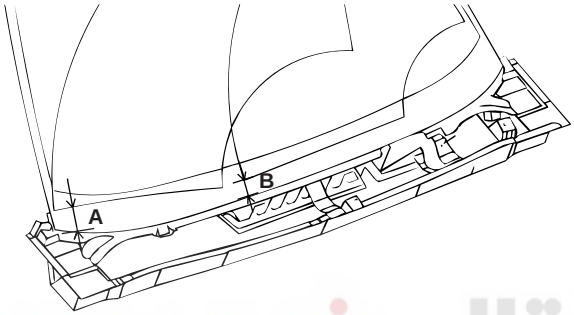
**Tightening torque**
7~11 Nm (70~110 kgf·cm, 5.1~8.0 lbf·ft)

4. Installation is the reverse of removal.

## INSTALLATION E73E2EDC

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

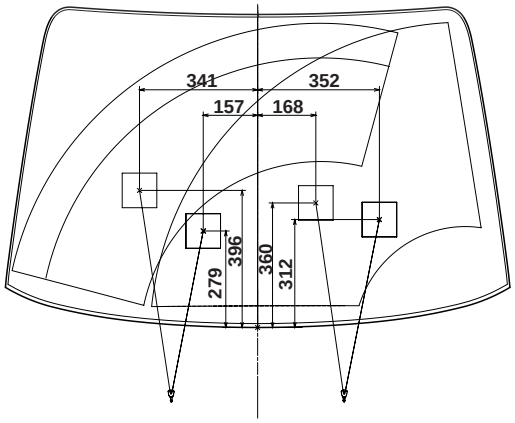
| Specified position | A | B |
|---|---|---|
| Distance (mm) | 31~41 | 31~41 |




ETJA060I

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

unit:mm

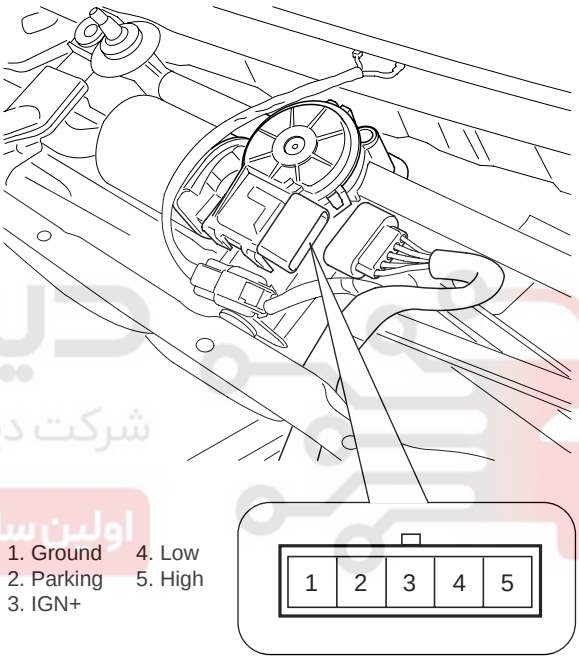



ETQF400D

## INSPECTION EA6A5DDC

### 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.



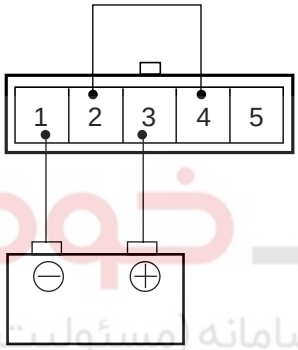
1. Ground
2. Parking
3. IGN+
4. Low
5. High




ETQF310B

**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.

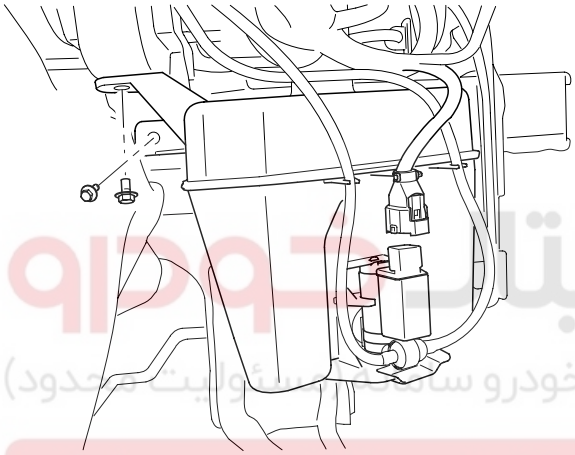



KTQE953A

# FRONT WASHER MOTOR

## REMOVAL EDEA0B68

1. Disconnect the negative(-) battery terminal.
2. Remove the front bumper cover.
   (see BD group-front bumper)
3. Remove the washer hose and the washer motor connector.
4. Remove the washer reservoir after removing 2 bolts.

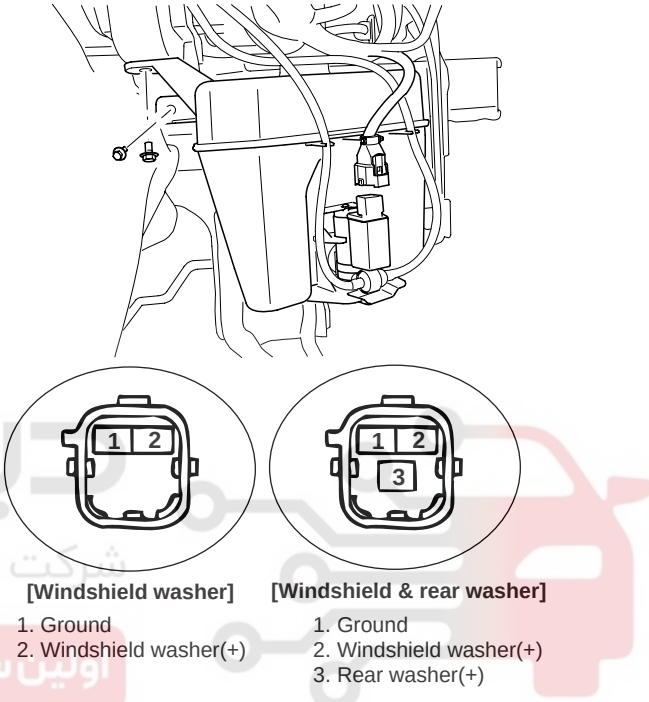


KTQE220D

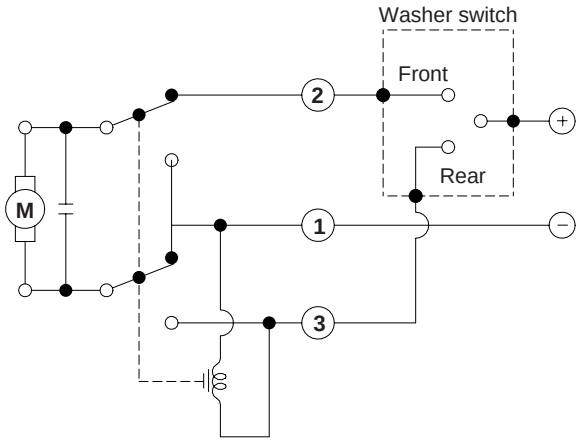
5. Installation is the reverse of removal.

## INSPECTION EB6870E8

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

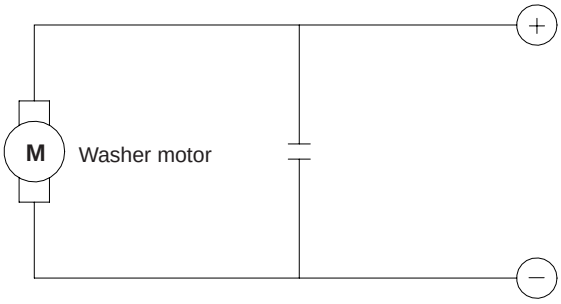



ETQF954A




[ Windshield & rear washer motor]

ETQF390B

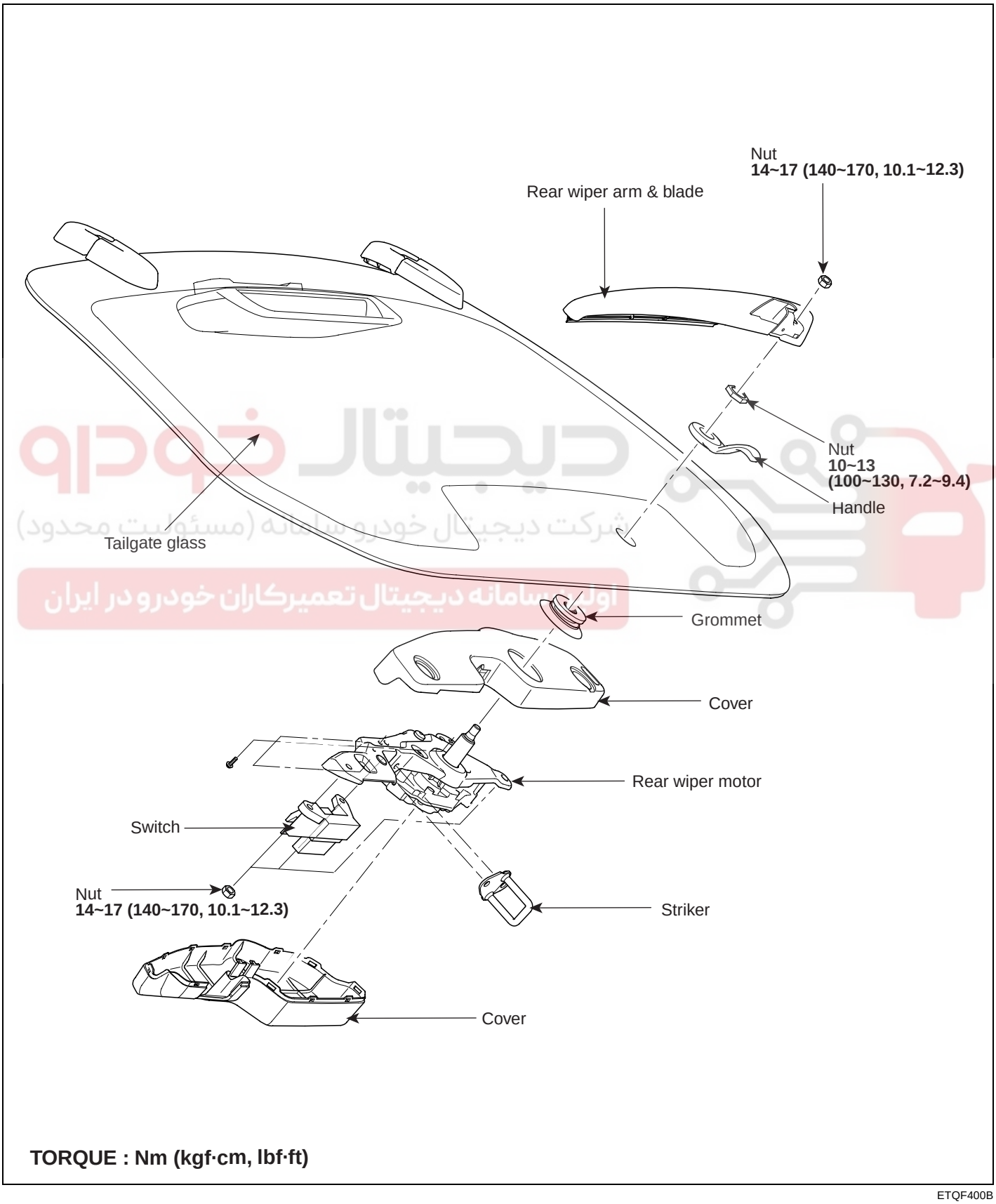



[ Windshield washer motor ]

ETQF390C

# REAR WIPER／WASHER

## COMPONENTS E5A59E71



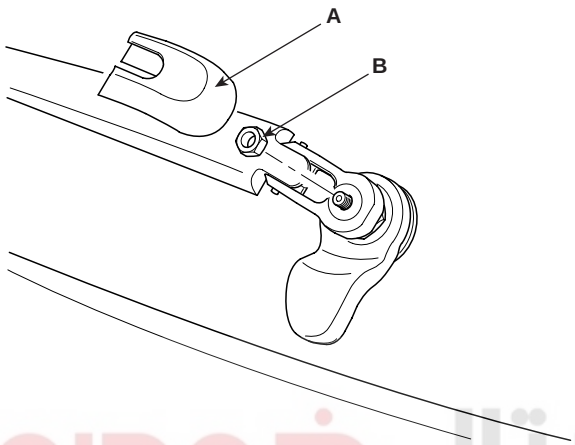

**TORQUE : Nm (kgf·cm, lbf·ft)**

ETQF400B

# REAR WIPER MOTOR

## REMOVAL EFC9B580

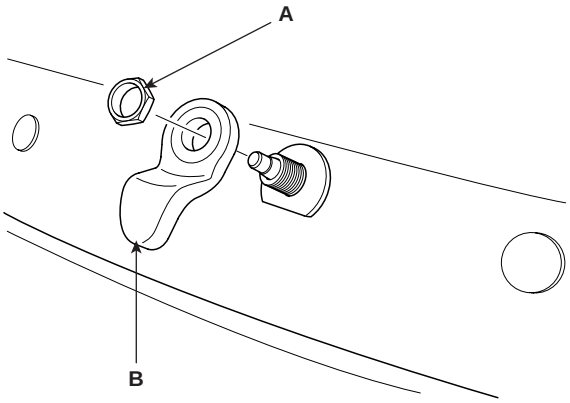
1. Detach the wiper cap(A), then remove the rear wiper arm after removing a nut(B).




KTQE220A

**Tightening torque**
Nut(B) : 14~17 Nm (140~170 kgf·cm, 10.1~12.3 lbf·ft)

2. Remove the handle(B) after removing a nut(A).

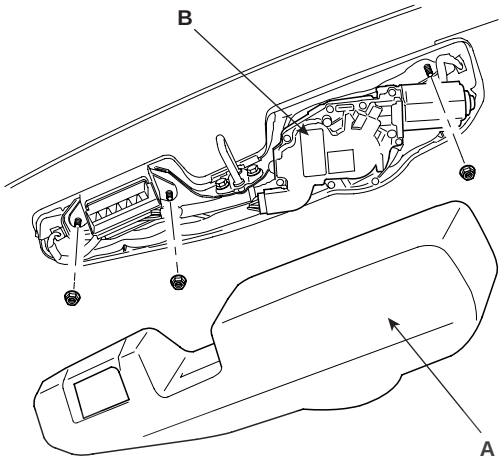



KTQE220B

**Tightening torque**
Nut(A) : 10~13 Nm (100~130 kgf·cm, 7.2~9.4 lbf·ft)

3. Open the tailgate glass then remove the rear wiper motor cover(A).

4. Disconnect the rear wiper motor connector then remove the rear wiper motor(B) after removing 3 nuts.




KTQE220C

**Tightening torque**
Nut : 14~17 Nm (140~170 kgf·cm, 10.1~12.3 lbf·ft)

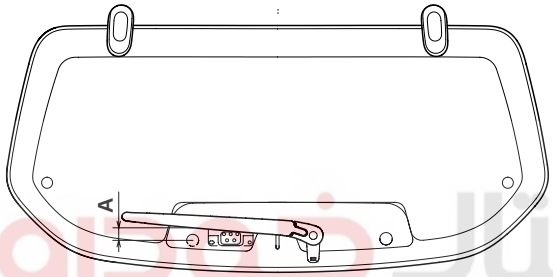
5. Installation is the reverse of removal.

## INSTALLATION EC59EBF5

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

| Specified position | A |
|---|---|
| Distance | 19 ± 5 mm |

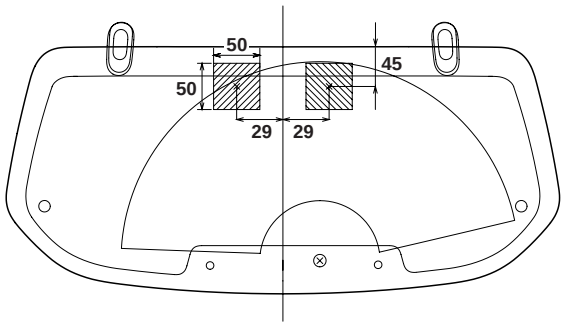
※ Specified position : The first deicer line from bottom of the rear window.




KTQE400C

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

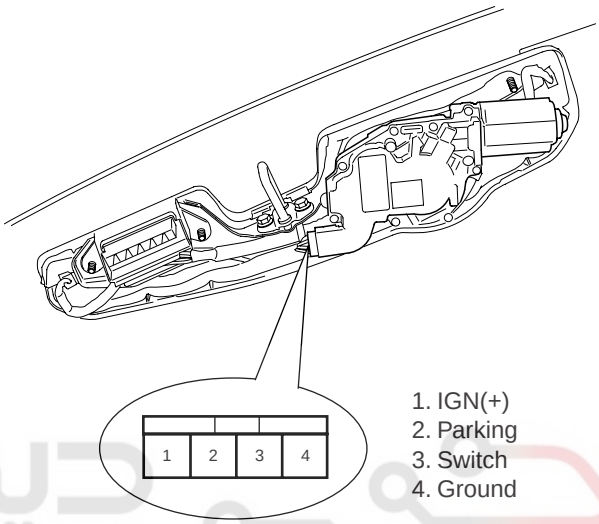
unit:mm




ETQF400E

## INSPECTION E04EC0FD

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

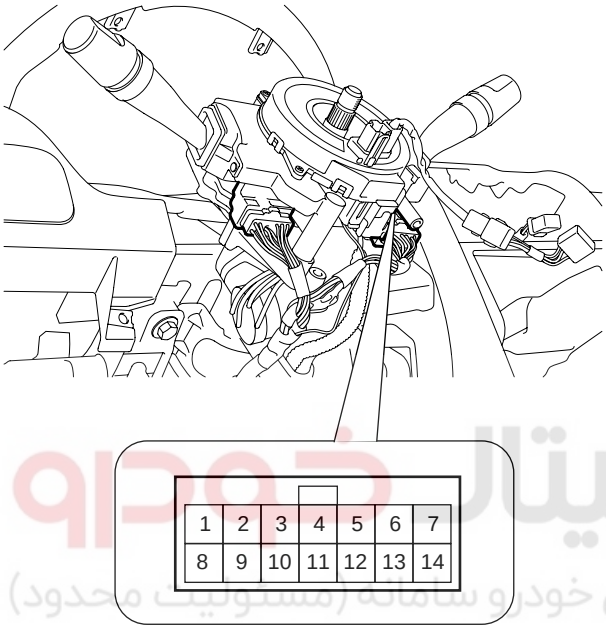



ETQF957A

# REAR WASHER SWITCH

## INSPECTION EE2037A2

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




KTDD075I

**REAR WIPER & WASHER SWITCH**

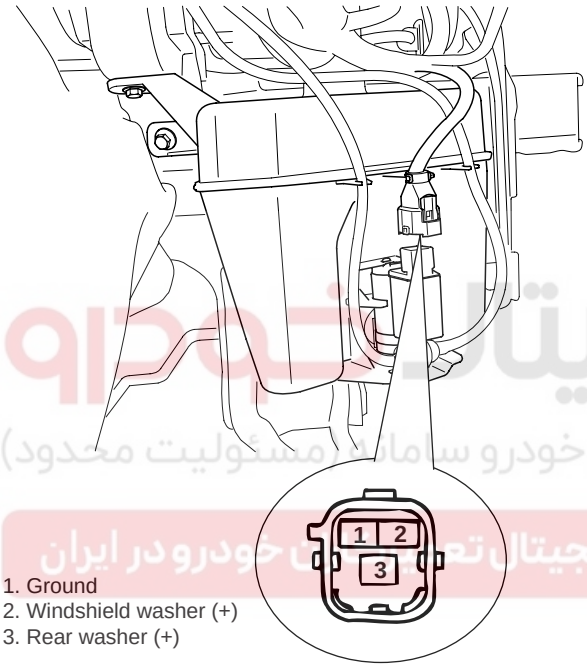
| Terminal / Position | 9 | 10 | 11 | 12 |
|---|---|---|---|---|
| Rear washer | ○ | | | ○ |
| OFF | | | | |
| INT | ○ | ○ | | |
| ON | ○ | | ○ | |
| Rear washer | ○ | | | ○ |

ETQF073A

# REAR WASHER MOTOR

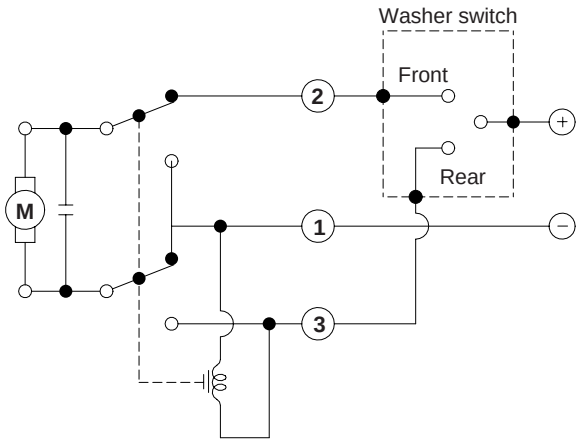
## INSPECTION E154DDA1

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




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

ETQF220E



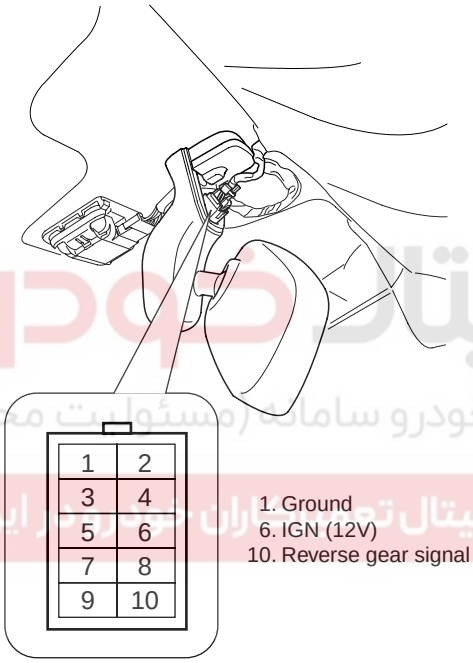

[ Windshield & rear washer motor]

ETQF390B

# ELECTROCHROMIC INSIDE REAR VIEW MIRROR

## DESCRIPTION E6DC1B1D

The ECM (ElectroChromic 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 7~85%. But, when the reverse gear is engaged, it stops functioning.




ETQE280J

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.

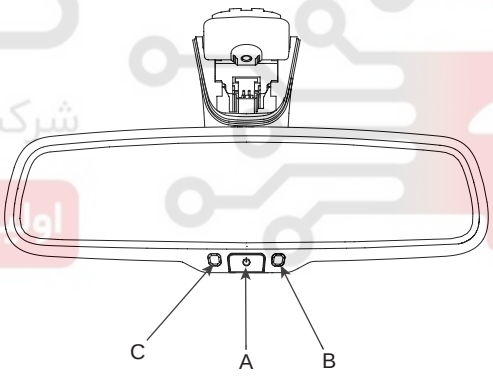
## AUTOMATIC DIMMING FUNCTION EB7936AE

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 (A):

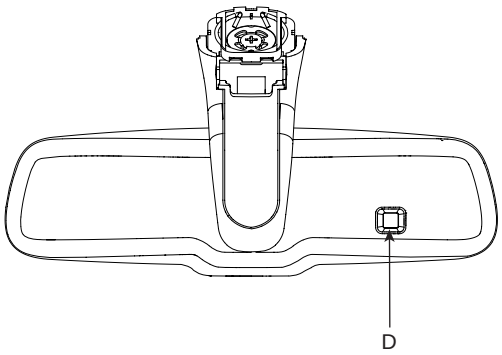
1. Pressing and holding the feature control button (A) for more than 3 but less than 6 seconds turns the auto-dimming function OFF which is indicated by the green Status Indicator LED (C) turning off.
2. Pressing and holding the feature control button (A) again for more than 3 but less than 6 seconds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

***NOTE***

*1. The mirror defaults to the "ON" position each time the vehicle is started.*
*2. The display may change state (ON/OFF) during this 3 second hold time.*




ETQF241A




ETQF241B

## INSPECTION EFE91A06

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 (D) to stop functioning.
3. Shed a light to the rearward looking sensor (B).
4. The ECM should be darkened as soon as the rearward looking sensor detects the glaring of the light.

   ***NOTE***

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

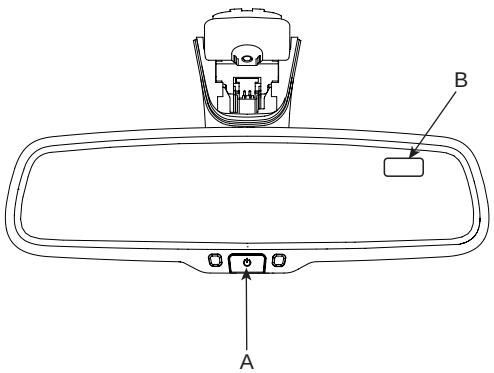
5. When the reverse gear is engaged, the ECM should not be darkened.
6. When shedding lights to both the front looking and rearward looking sensors, the ECM should not be darkened.

# COMPASS MIRROR

## FUNCTION E1FB67CC

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

1. Press and release the feature control button (A) to turn the display feature OFF.
2. Press and release the feature control button (A) again to turn the display back ON.
   Additional options can be set with press and hold sequences of the feature control button (A) and are detailed below.




ETQF241C

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

## ADJUSTMENT E38E9CB3

**TO ADJUST THE ZONE SETTING:**

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

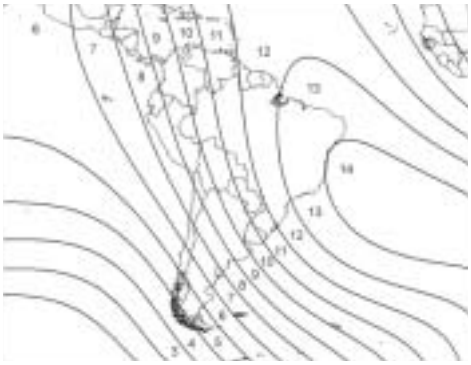
**TO RE-CALIBRATE THE COMPASS:**

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

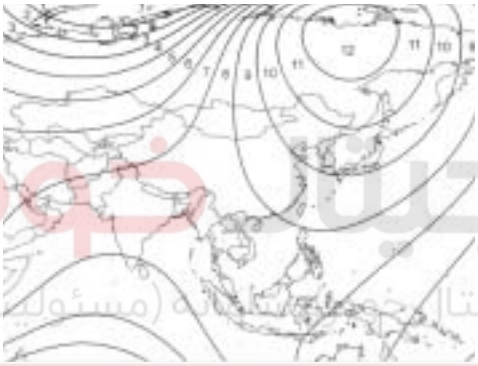
1. Press and hold the feature control button (A) for more than 9 seconds. When the compass memory is cleared a "C" will appear in the display (B).
2. To calibrate the compass, drive the vehicle is 2 complete circles at less than 8 KPH (5 MPH).

**ZONE MAP**

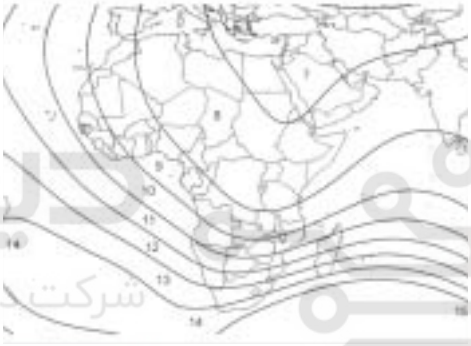
NORTH AMERICA



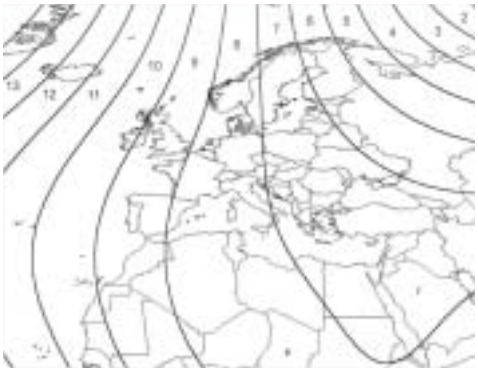
SOUTH AMERICA



ASIA



AFRICA



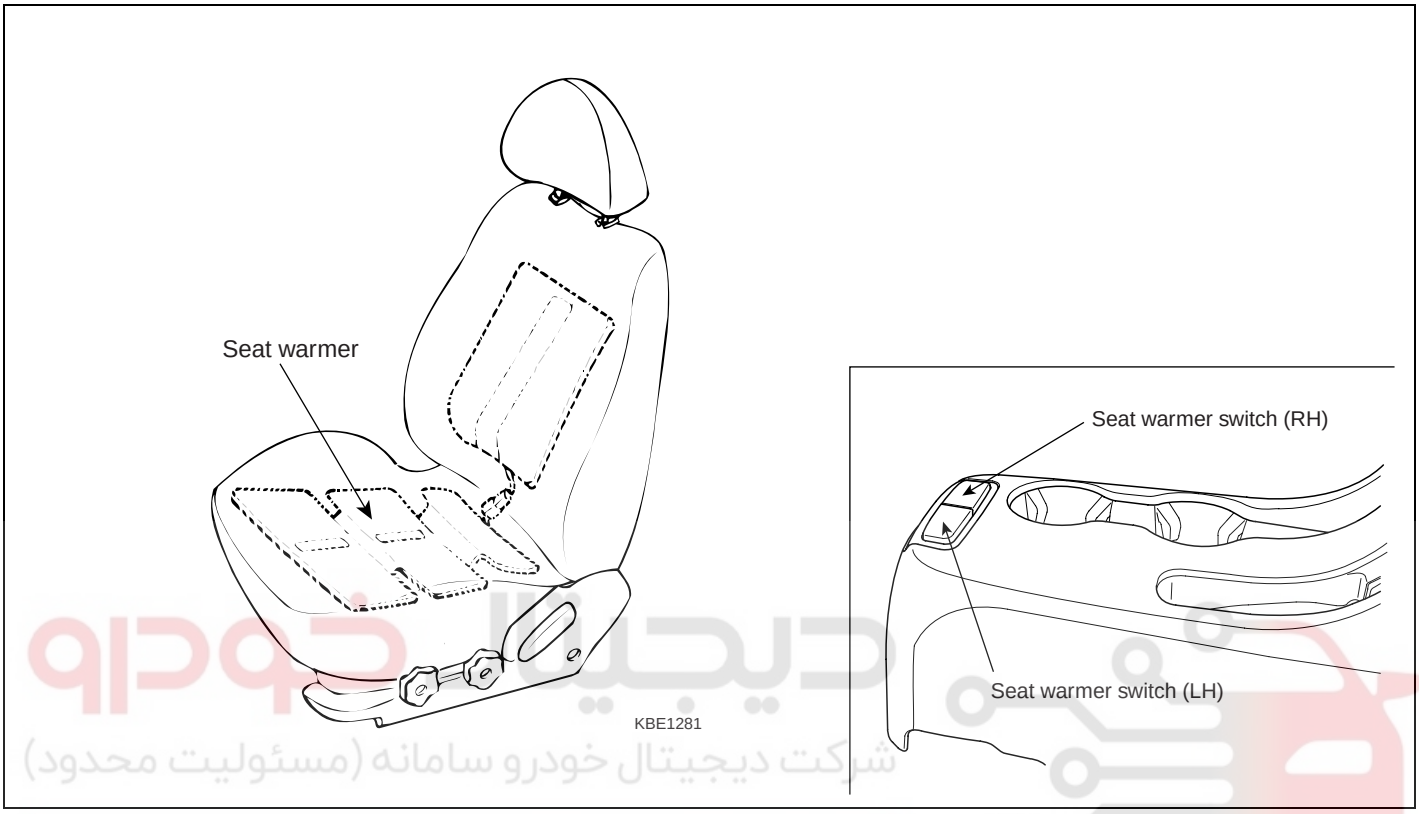
EUROPE

AUSTRALIA

ETQF241D

# SEAT WARMER

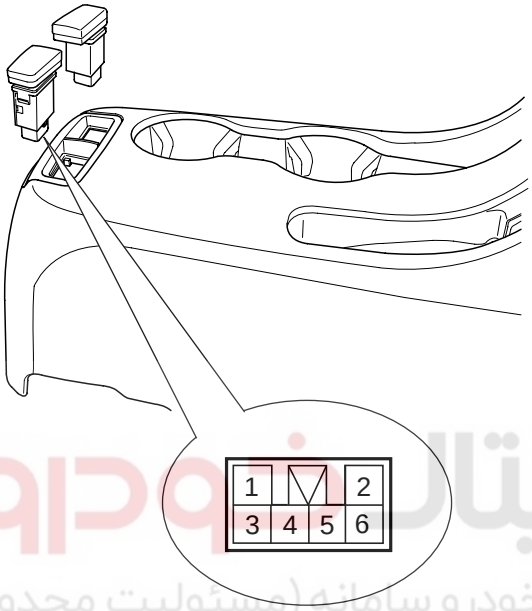
## COMPONENTS E3ABC815



# SEAT WARMER SWITCH

## INSPECTION E81CF52A

1. Disconnect the negative (-) battery terminal.
2. Remove the seat warmer switch from the floor console upper cover.




KTQE989A

3. Check for continuity between the terminals.

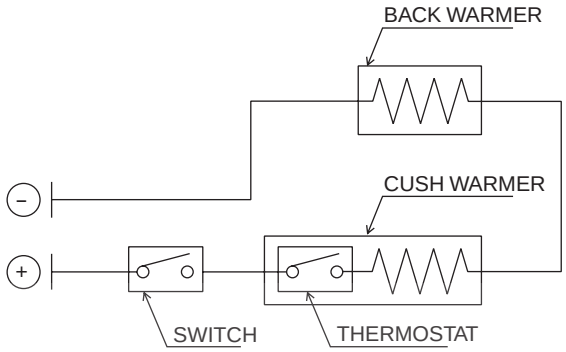
| Terminal / Position | 2 | 5 | 1 | 4 | 3 |
|---|---|---|---|---|---|
| ON | | ILL. | | IND. | |
| OFF | | | | | |

ETQF990A

## SEAT WARMER INSPECTION

1. Check for continuity and measure the resistance between the terminals.

Standard value : 2.6Ω ± 10%



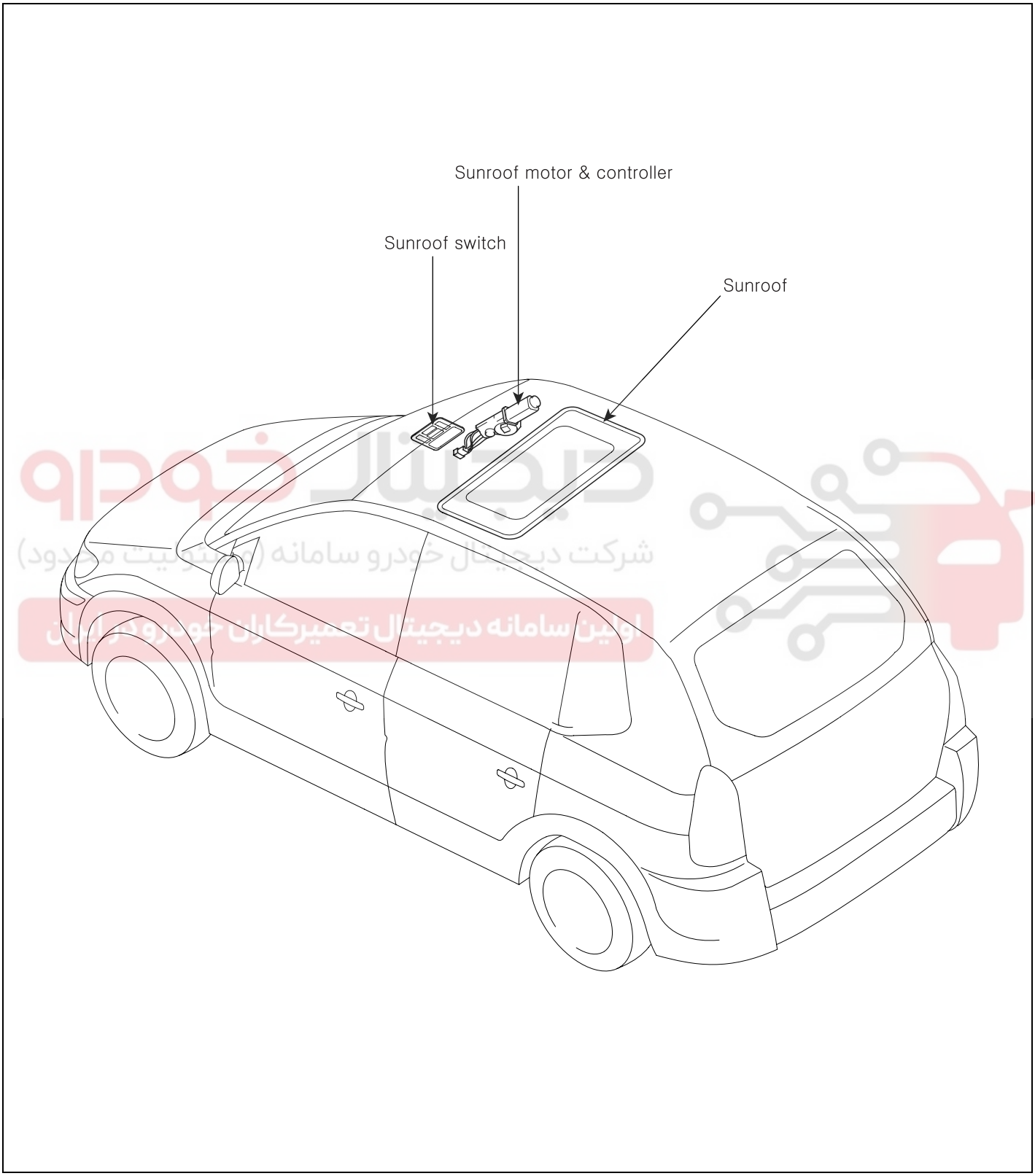

ETQF441C

2. Operate the seat warmer after connecting the 2P connector and then check for the thermostat by measuring the temperature of seat surface.
3. Check for continuity between the terminals after disconnecting the 2P connector.

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

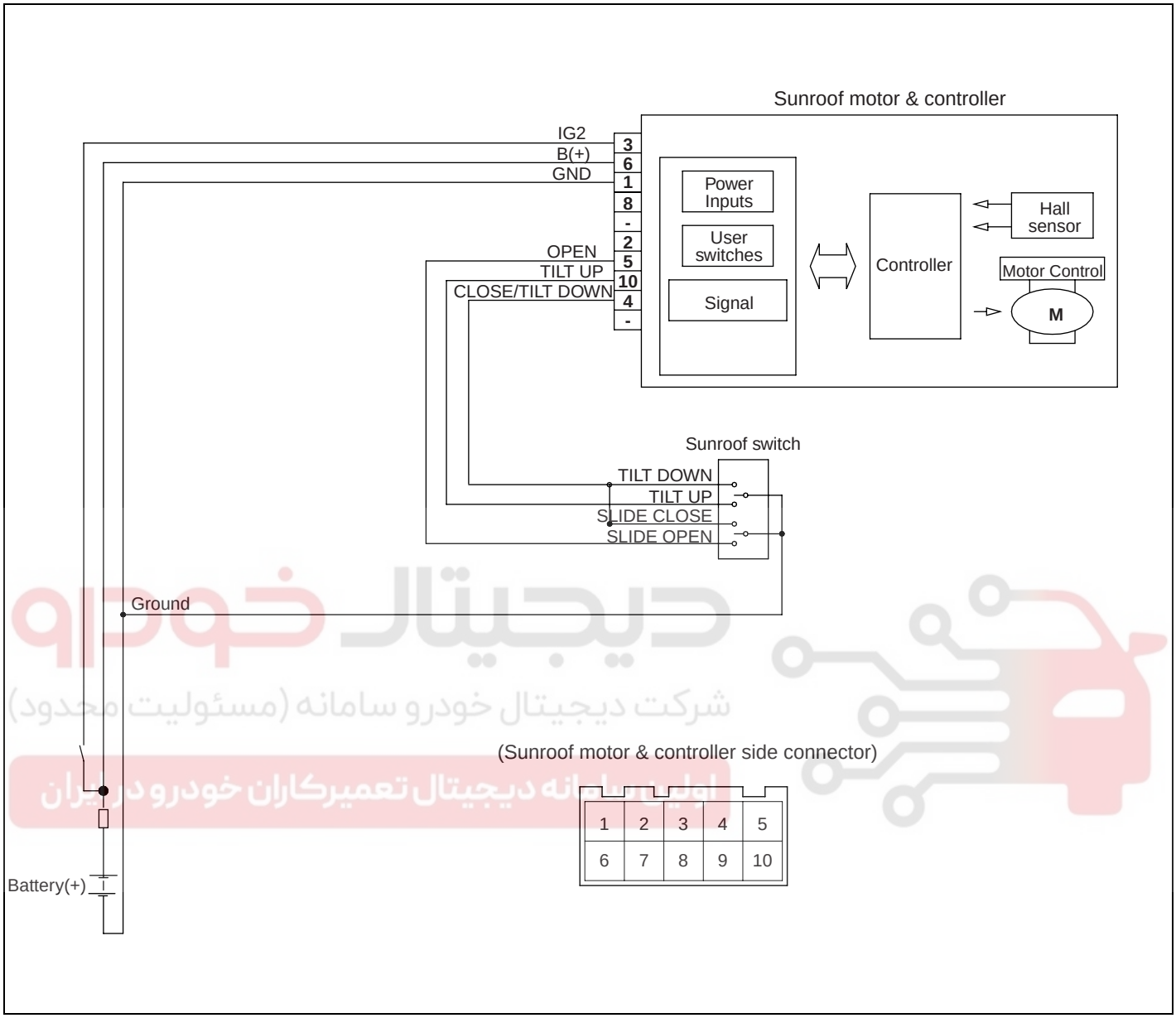
# SUNROOF

## COMPONENTS EC10DB2A




ETQF880R

## CIRCUIT DIAGRAM E7DEE1BC

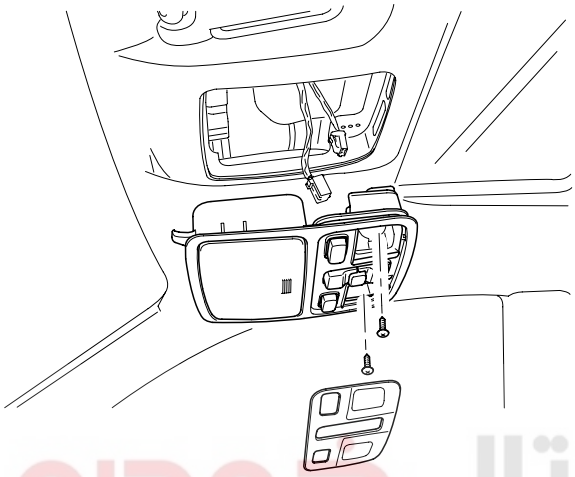



ETQF450A

# SUN ROOF SWITCH

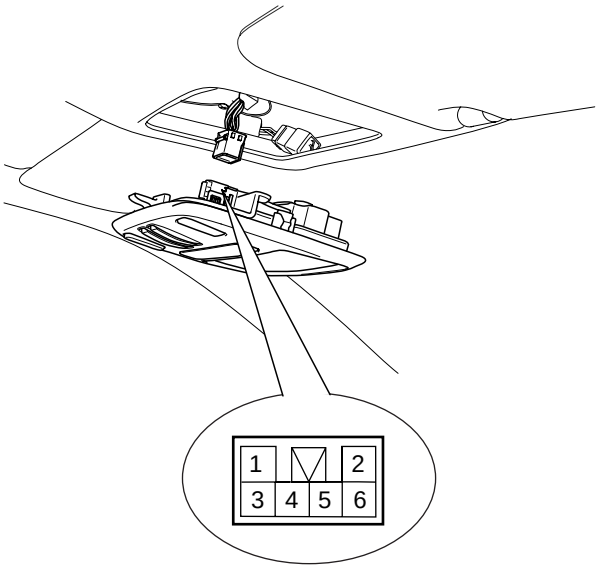
## INSPECTION ED1FFECD

1. Disconnect the negative (-) battery terminal.
2. Detach the lens from the overhead console then remove the 2 screws holding the overhead console.



KTQE210G

3. Disconnect the sunroof switch connector(6P) and map lamp connector(2P)then remove the overhead console lamp assembly from the headliner.
   Check for continuity between the terminals of sunroof switch connector. If the continuity is not as specified, replace the sunroof switch.




[Switch side connector]

ETQF963A

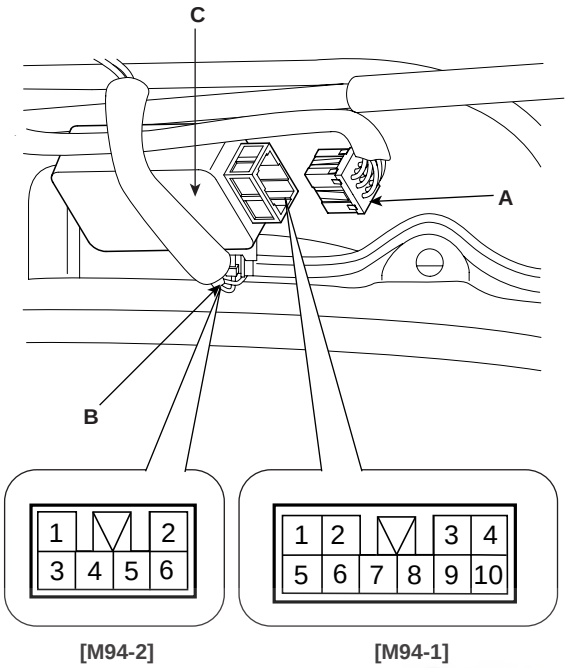
| Position \ Terminal | 2 | 4 | 5 | 6 |
|---|---|---|---|---|
| SLIDE OPEN | ○ | | | ○ |
| CLOSE/DOWN | ○ | ○ | | |
| TILT UP | ○ | | ○ | |

ETQF964A

# SUN ROOF RELAY

## INSPECTION EABF3D4A

1. Disconnect the 10P connector (A) and 6P connector (B) from the sunroof controller(C).




ETKE450A

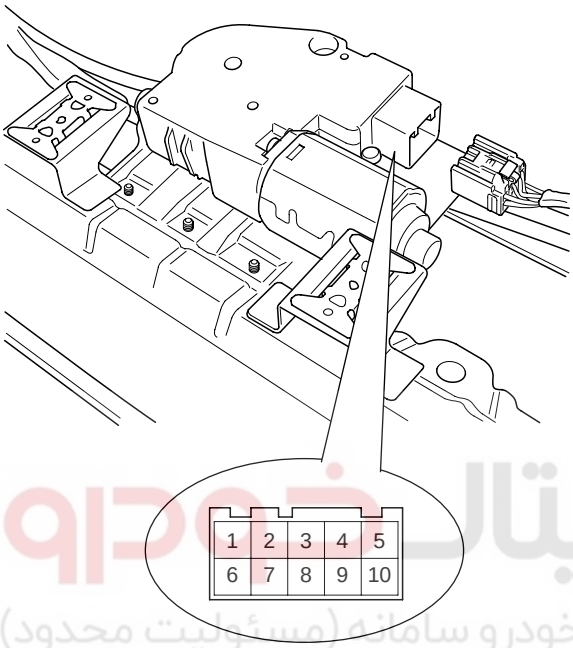
2. Inspect the connectors on the wire harness side, as shown in the chart.

| Connector | Tester connection | Condition | Specified condition |
|---|---|---|---|
| M94-1 | 1-Ground | Constant | Continuity |
| | 7-Ground | Sunroof switch position (slide) CLOSE | Continuity |
| | 6-Ground | Sunroof switch position (slide) OPEN | Continuity |
| | 4-Ground | Ignition switch position ON | Battery voltage |
| | 5-Ground | Sunroof switch position (Tilt) UP | Continuity |
| | 8-Ground | Sunroof switch position (Tilt) DOWN | Continuity |
| | 2-10 | No.1 limit switch OFF | No continuity |
| | 2-10 | No.1 limit switch ON | Continuity |
| | 3-9 | No.2 limit switch OFF | No continuity |
| | 3-9 | No.2 limit switch ON | Continuity |
| M94-2 | 5-Ground | Constant | Continuity |
| | 6(+) - 4(-) | Battery connection between terminal 6(+) and 4(-) | Motor turns clockwise |
| | 4(+) - 6(-) | Battery connection between terminal 4(+) and 6(-) | Motor turns counter-clockwise |
| | 3-Ground | Constant | Battery voltage |

# SUN ROOF MOTOR

## INSPECTION EBFF3CD8

1. Remove the sunroof motor after removing 3 screws and disconnect the 10P connector from the sunroof motor.




KTQE460A

2. Inspect the sunroof motor side connector while the battery voltage and ground are connected as below table.

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

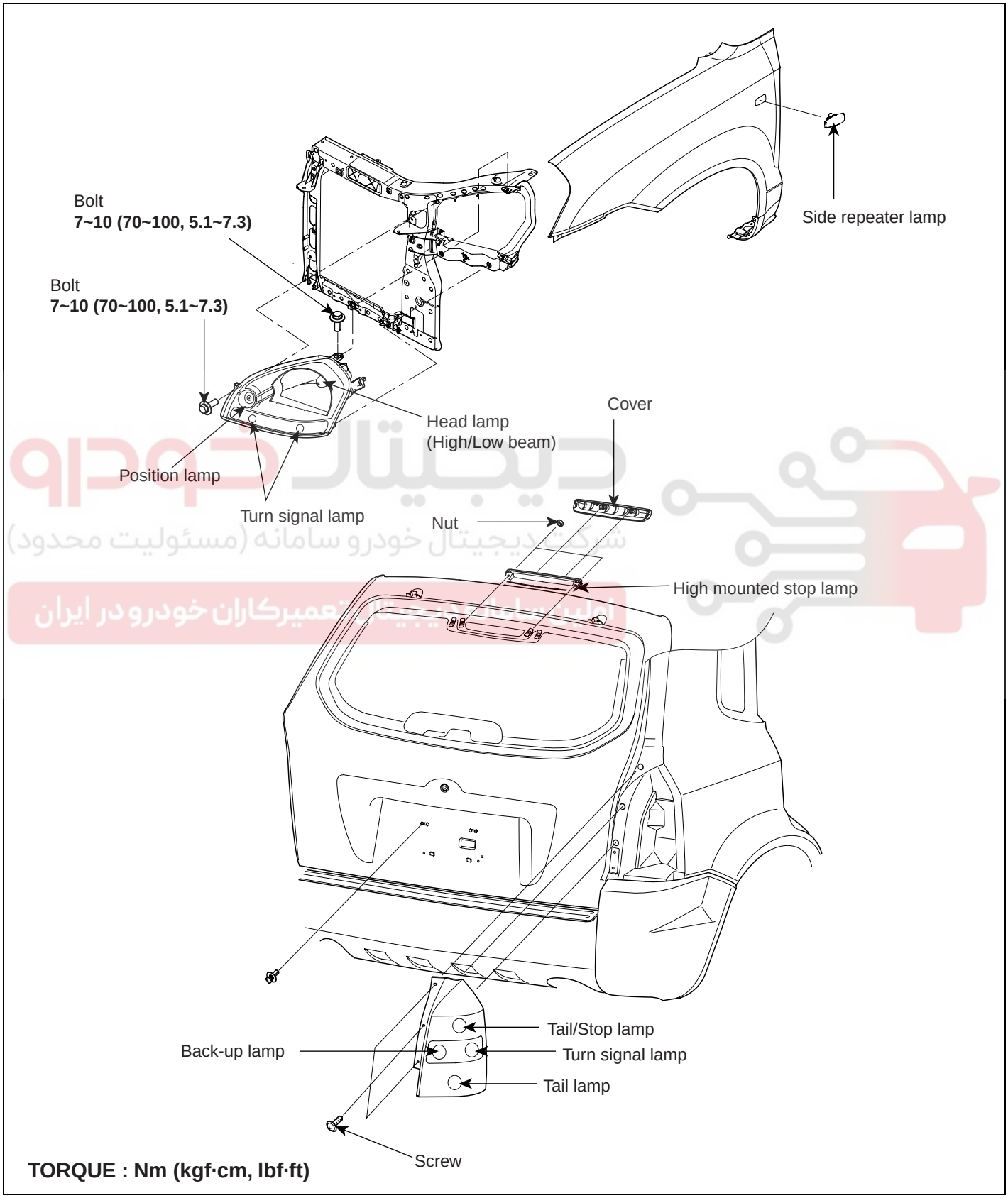
ETQF965A

3. Inspect the sunroof motor harness side, as shown in the chart.

| Tester connection | Condition | Specified condition |
|---|---|---|
| 3-Ground | IGN2 switch ON | Battery voltage |
| 1-Ground | Constant | Continuity |
| 6-Ground | Constant | Battery voltage |

# LIGHTING SYSTEM

## COMPONENTS E073BA5C

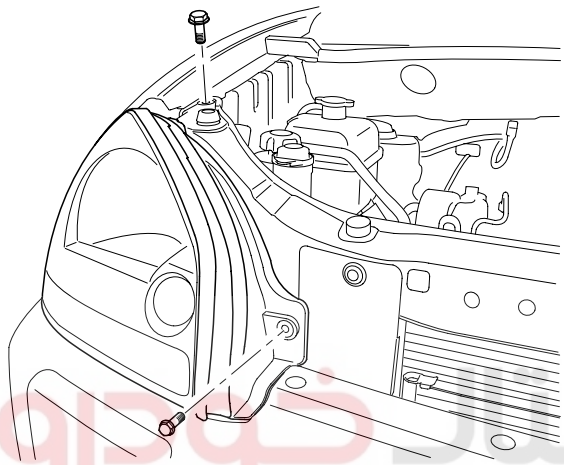



ETQF500A

# HEAD LAMPS

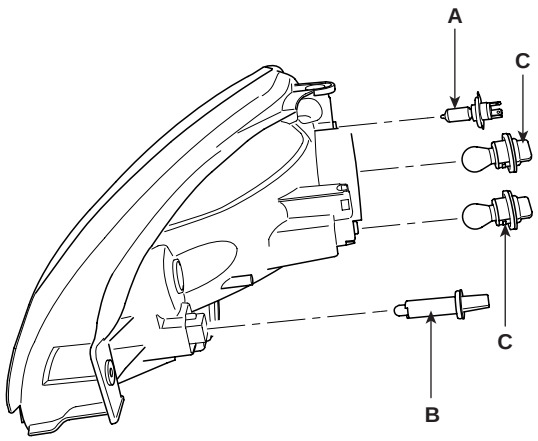
## REMOVAL E496D86C

1. Disconnect the negative(-) battery terminal.
2. Remove the head lamp mounting bolts (2EA), then disconnect the lamp connectors.



KTQE210N

3. Replace the head lamp bulb(A), position bulb(B) and turn signal bulbs(C).




ETQF210P

4. Installation is the reverse of removal.

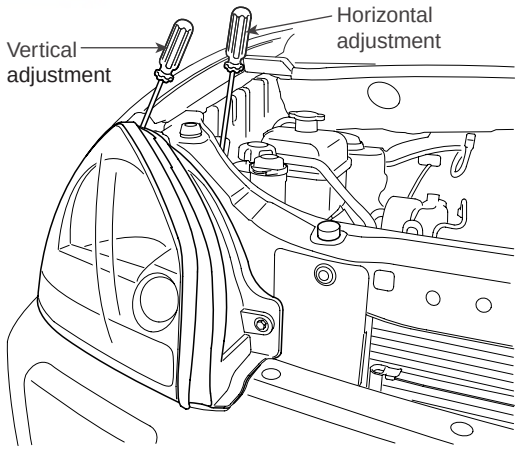
## AIMING INSTRUCTIONS E917ADE8

### HEAD LAMP AIMING

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

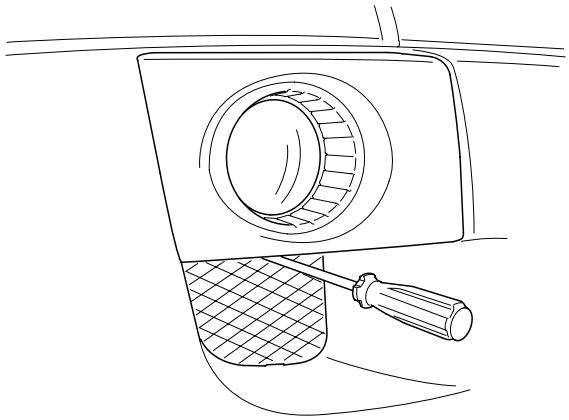
1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.
2. The vehicle should be placed on a flat floor.
3. Draw vertical lines (Vertical lines passing through respective head lamp centers) and a horizontal line (Horizontal line passing 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.



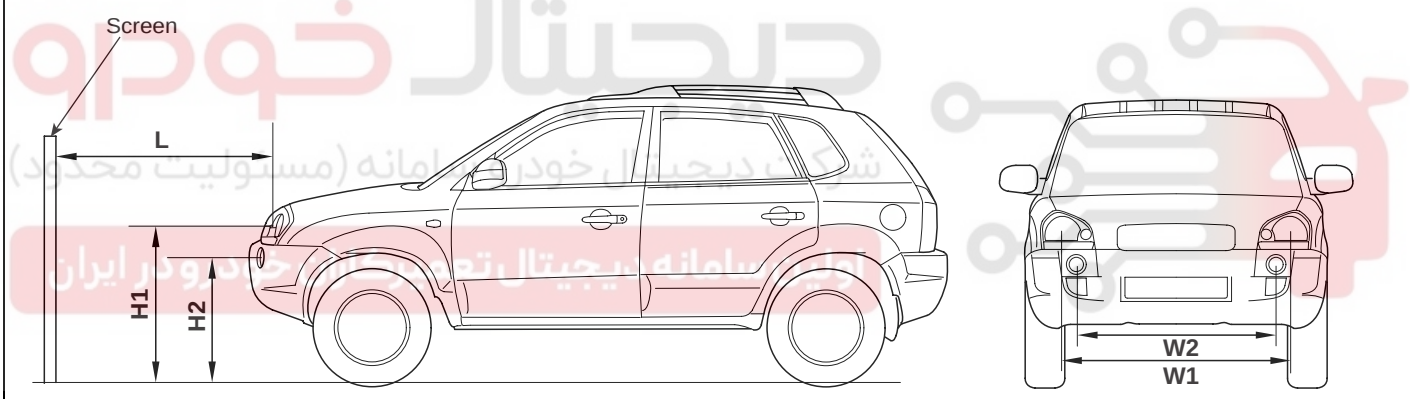

ETQF210D

## 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.



KTQE210C




H1 : Height between the head lamp bulb center and ground
H2 : Height between the fog lamp bulb center and ground

W1 : Distance between the head lamp bulb center
W2 : Distance between the fog lamp bulb center

L : Distance between the head lamp bulb center and screen

ETQF500D

## HEAD LAMP AND FOG LAMP AIMING POINT

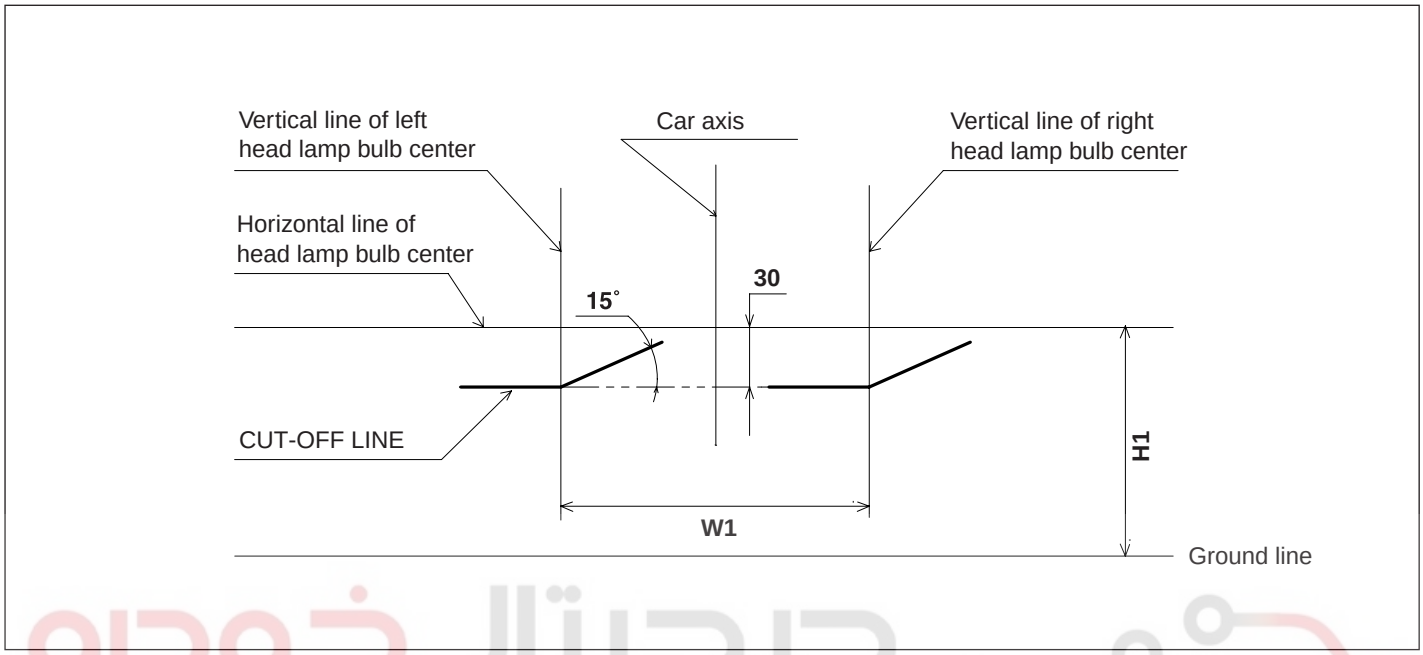
Unit : mm

| Vehicle condition | H1 | H2 | W1 | W2 | L |
|---|---|---|---|---|---|
| Without driver | 904 | 694 | 1,356 | 1,176 | 3,000 |
| With driver | 891 | 681 | | | |

ETQF082A

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

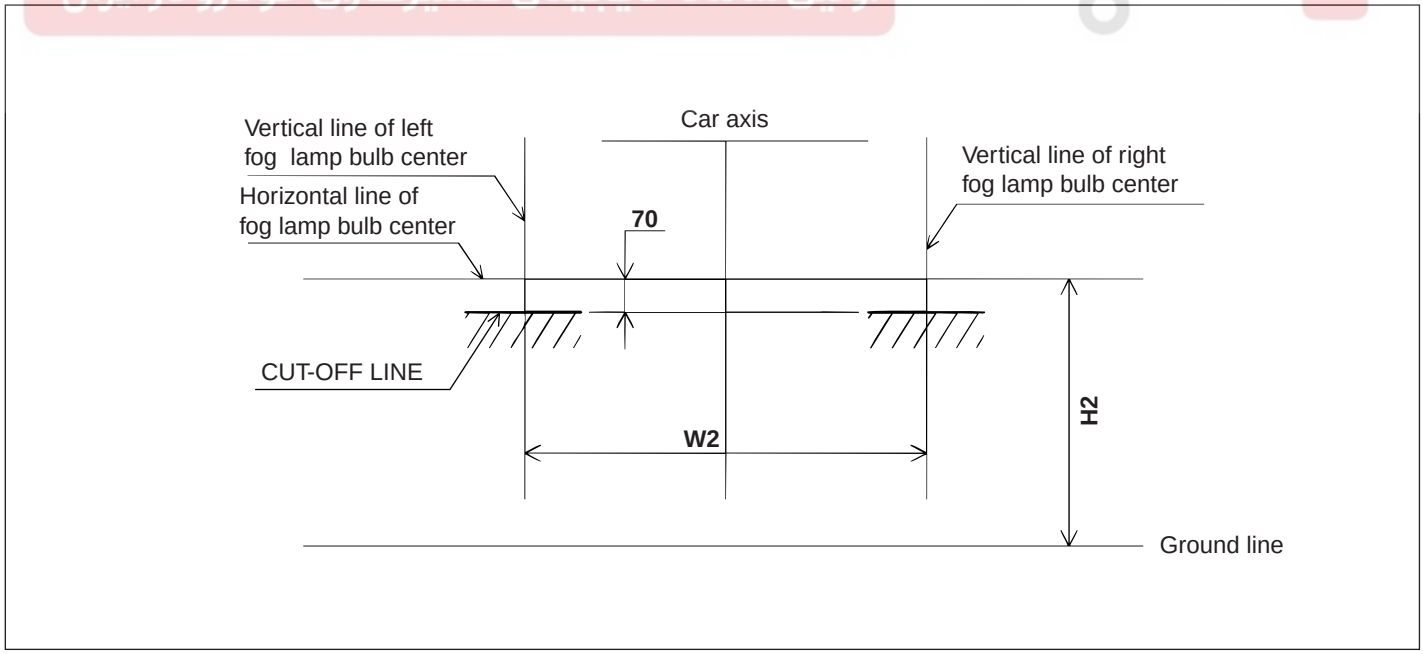
Unit : mm




ETKE310D

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

Unit : mm




ETQF505G

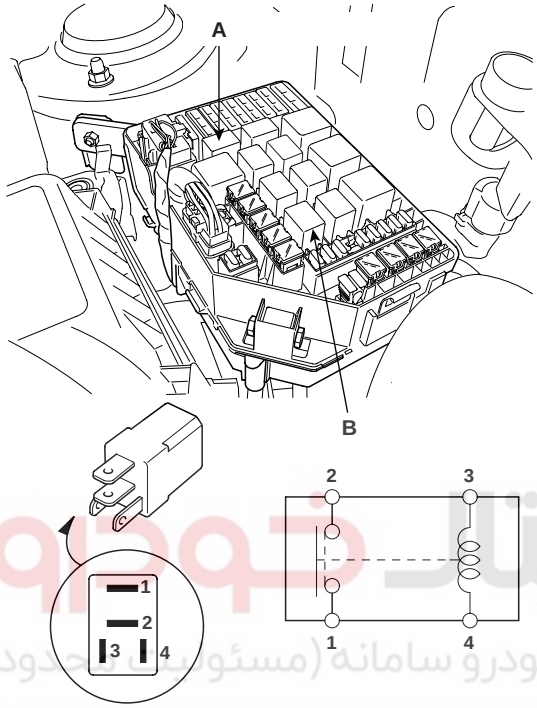
## INSPECTION E50CE3EF

### HEAD LAMP RELAY

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

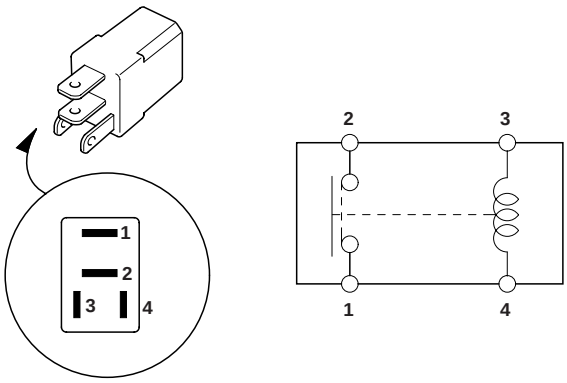
| Terminal / Power (No.3-No.4) | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Disconnected | | | ○ | ○ |
| Connected | ○ | ○ | ⊖ | ⊕ |

ETKE215E




ETQF801A

2. Check for continuity between terminals.

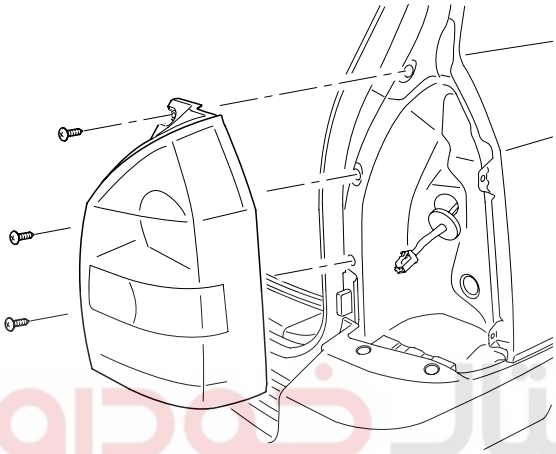



ETKE224C

# TURN SIGNAL LAMP

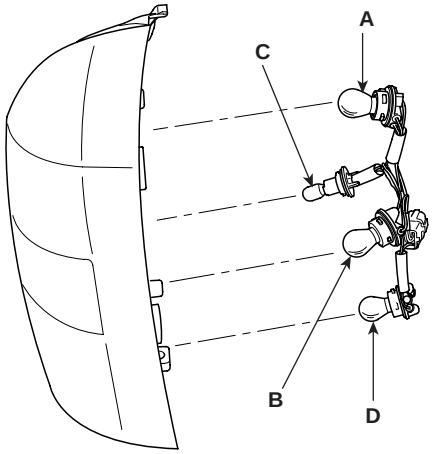
## REMOVAL EFDAFA81

1. Disconnect the negative (-) battery terminal.
2. Remove the 3 screws holding the rear combination lamp then disconnect the wire connector.



KTQE210L

3. Remove the rear combination lamp and replace the bulbs; stop & tail lamp (A), turn signal lamp (B), back up lamp (C), rear fog lamp(D).



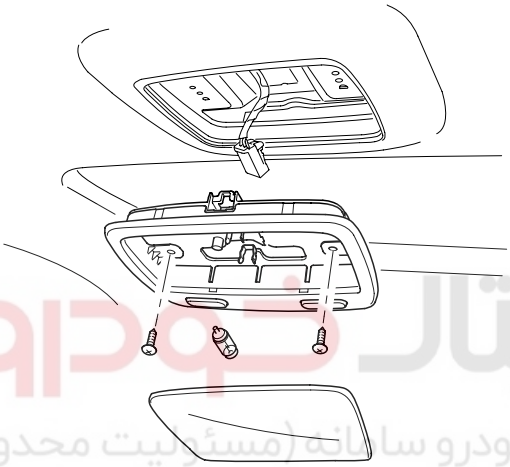

ETQF210M

4. Installation is the reverse of removal.

# ROOM LAMP

## REMOVAL E2EC28F0

1. Disconnect the negative(-) battery terminal.
2. Detach the lamp lens from the room lamp with a flat-tip screwdriver, then replace the bulb.
3. Remove the room lamp assembly after removing 2 screws and disconnecting the 3P connector.

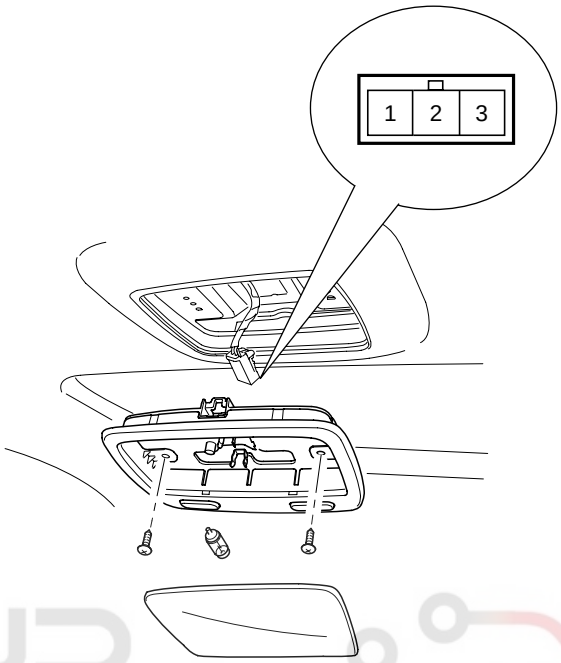


KTQE210E

4. Installation is the reverse of removal.

## INSPECTION E79D7695

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




KTQE210F

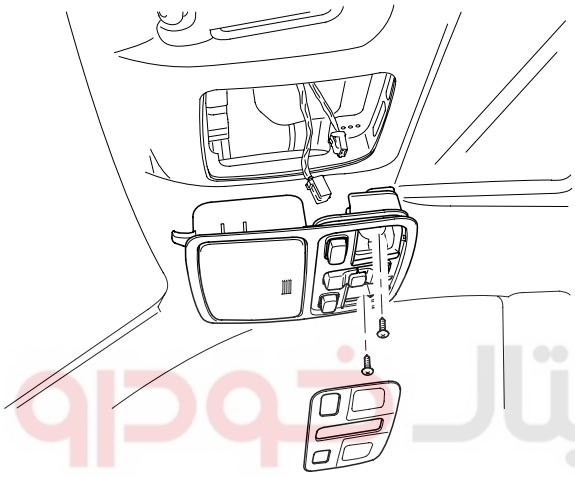
| Terminal / Position | 1 | 2 | 3 |
|---|---|---|---|
| ON | | ● | ● |
| DOOR | ● | ● | ● |
| OFF | | | |

ETQF088A

# OVERHEAD CONSOLE LAMP

## REMOVAL EC824C0D

1. Disconnect the negative (-) battery terminal.
2. Detach the lamp lens from the overhead console lamp with a flat-tip screwdriver, then replace the bulb.
3. Remove the overhead console lamp assembly after removing 2 screws and disconnecting the connector.

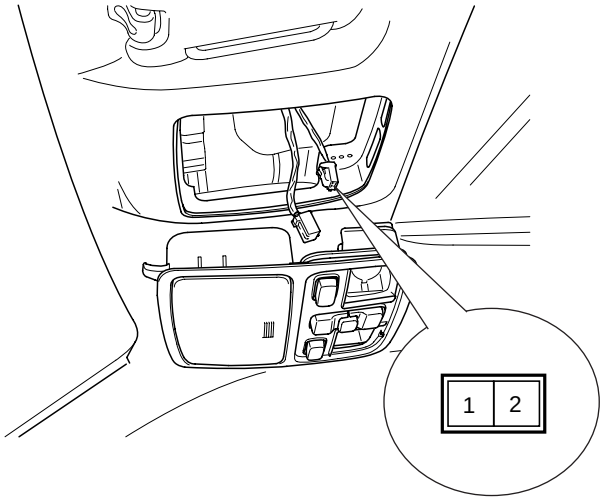


KTQE210G

4. Installation is the reverse of removal.

## INSPECTION E06DBAAB

Remove the overhead console lamp assembly then check for continuity between terminals.




KTQE972A

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

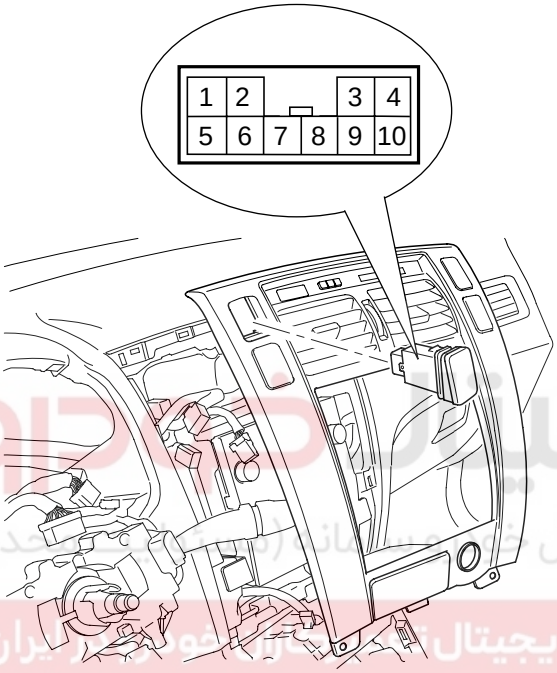
ETQF007L

# TURN ／ HAZARD LAMPS

## INSPECTION EC9A6EAA

### HAZARD LAMP SWITCH

1. Disconnect the negative (-) battery terminal.
2. Remove the hazard lamp switch from the center facia panel and disconnect the 10P connector.




KTQE230K

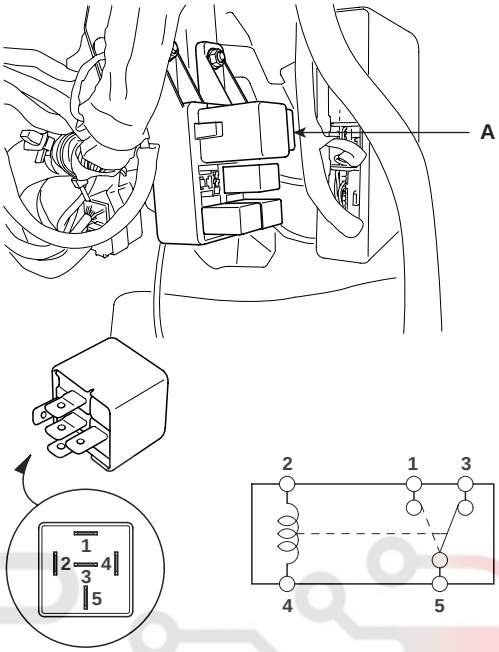
3. Operate the switch and check for continuity between terminals with an ohmmeter.

| Terminal / Position | 2 | 3 | 6 | 9 | 10 | 5 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| OFF | | | | | | ○ | | ○ |
| ON | | ILL. | ○ | ○ | ○ | | ○ | ○ |

ETQF086A

### HAZARD LAMP RELAY

1. Remove the hazard lamp relay (A) from the passenger compartment relay box.
2. Check for continuity between terminals.




KTQE969A

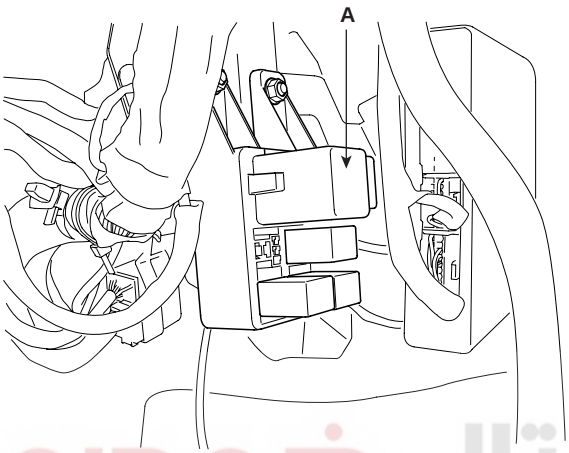
| Terminal / Power (No.2-No.4) | 2 | 4 | 1 | 3 | 5 |
|---|---|---|---|---|---|
| Disconnected | | | | ○ | ○ |
| Connected | ⊖ | ⊕ | ○ | ○ | ○ |

ETQF762C

# FLASHER UNIT

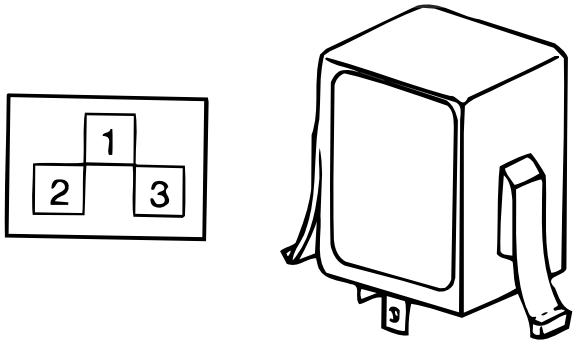
## INSPECTION EFAAADBD

1. Remove the flasher unit(A) from the passenger compartment relay box.




KTQE210S

2. Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3.




KTDA212A

3. Connect the two turn signal lamps in parallel to terminal 1. Check that the bulbs turn on and off.

***NOTE***

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

# FRONT FOG LAMPS

## REMOVAL E5F783B6

1. Disconnect the negative(-) battery terminal.
2. Disconnect the 2P connector (A) then remove the front fog lamp from the front bumper.

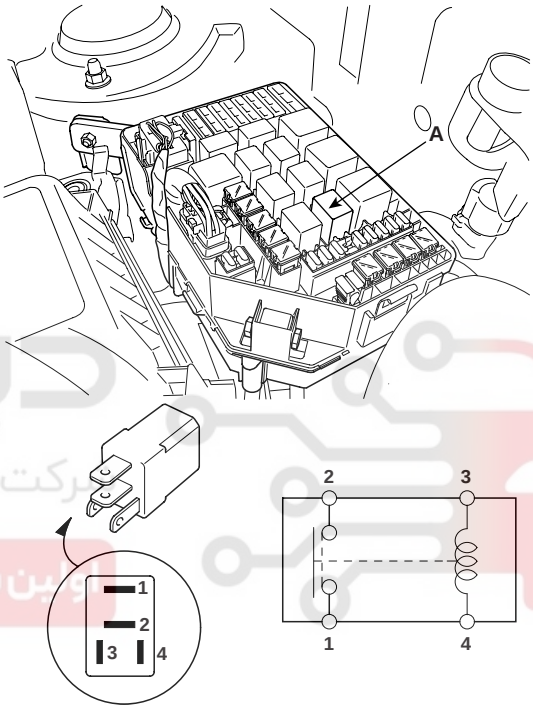

ETKE007H

3. Installation is the reverse of removal.

## INSPECTION E8449A3F

### FRONT FOG LAMP RELAY

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



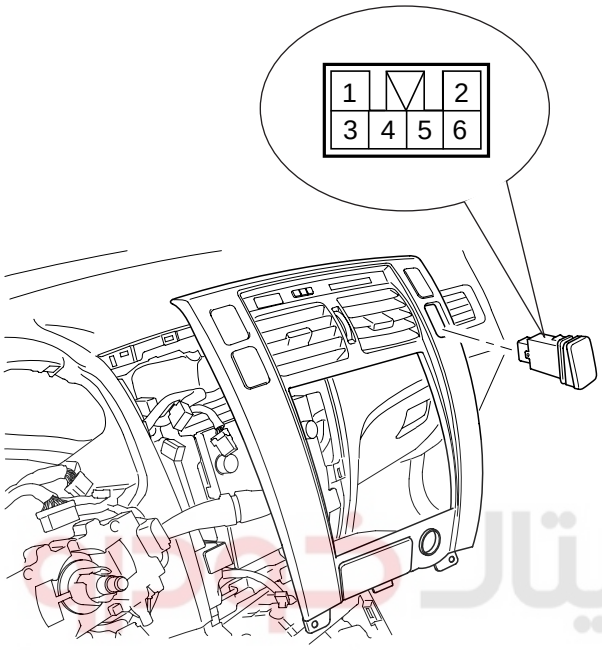

KTQE801B

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

ETKE215E

**FRONT FOG LAMP SWITCH**

1. Disconnect the negative(-) battery terminal.
2. Remove the front fog lamp switch from the center facia panel and disconnect the 6P connector.




KTQE230M

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

| Terminal / Position | 3 | 4 | 1 | 5 | 2 |
|---|---|---|---|---|---|
| ON | ● | ● | ● IND. | ● | ● ILL. |
| OFF | | | | | |

ETQF962A

# TAIL, PARKING AND LICENSE LAMPS

## REMOVAL EBE8283F

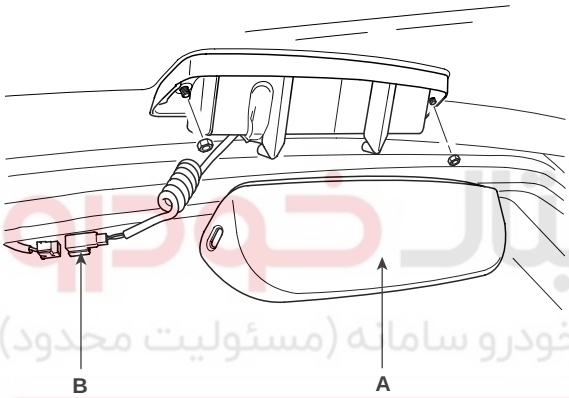
1. Disconnect the negative (-) battery terminal.
2. Remove the license plate lamp after removing 2 screws.
3. Replace the bulb.
4. Installation is the reverse of removal.

# STOP LAMPS

## REMOVAL EE888DC3

### HIGH MOUNTED STOP LAMP

1. Disconnect the negative (-) battery terminal.
2. Open the tailgate glass then pull up the cover(A).
3. Remove the high mounted stop lamp assembly after removing 2 nuts, then disconnect the wire connector(B).



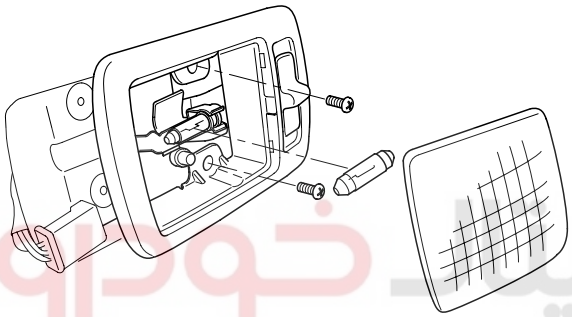

KTQE210J

4. Installation is the reverse of removal.

# COURTESY AND TRUNK LAMPS

## REMOVAL E47D53DC

1. Disconnect the negative (-) battery terminal.
2. Remove the trunk room lamp lens with a flat-tip screwdriver and replace the bult.
3. Remove the trunk room lamp assembly after removing 2 screws, then disconnect the 3P connector.

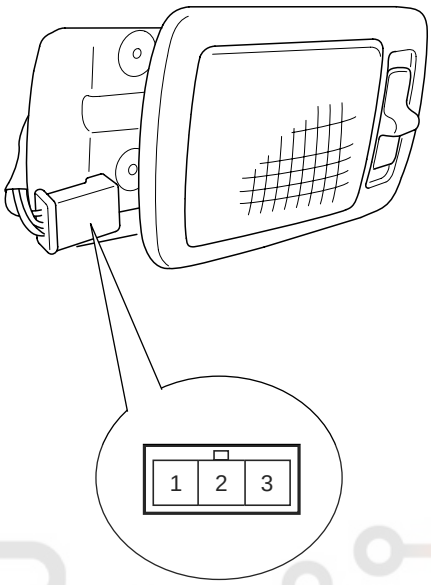


KTKD008A

4. Installation is the reverse of removal.

## INSPECTION EAD9C0D0

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




KTKD087A

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

ETQF088A

# AUTO LIGHTING CONTROL SYSTEM

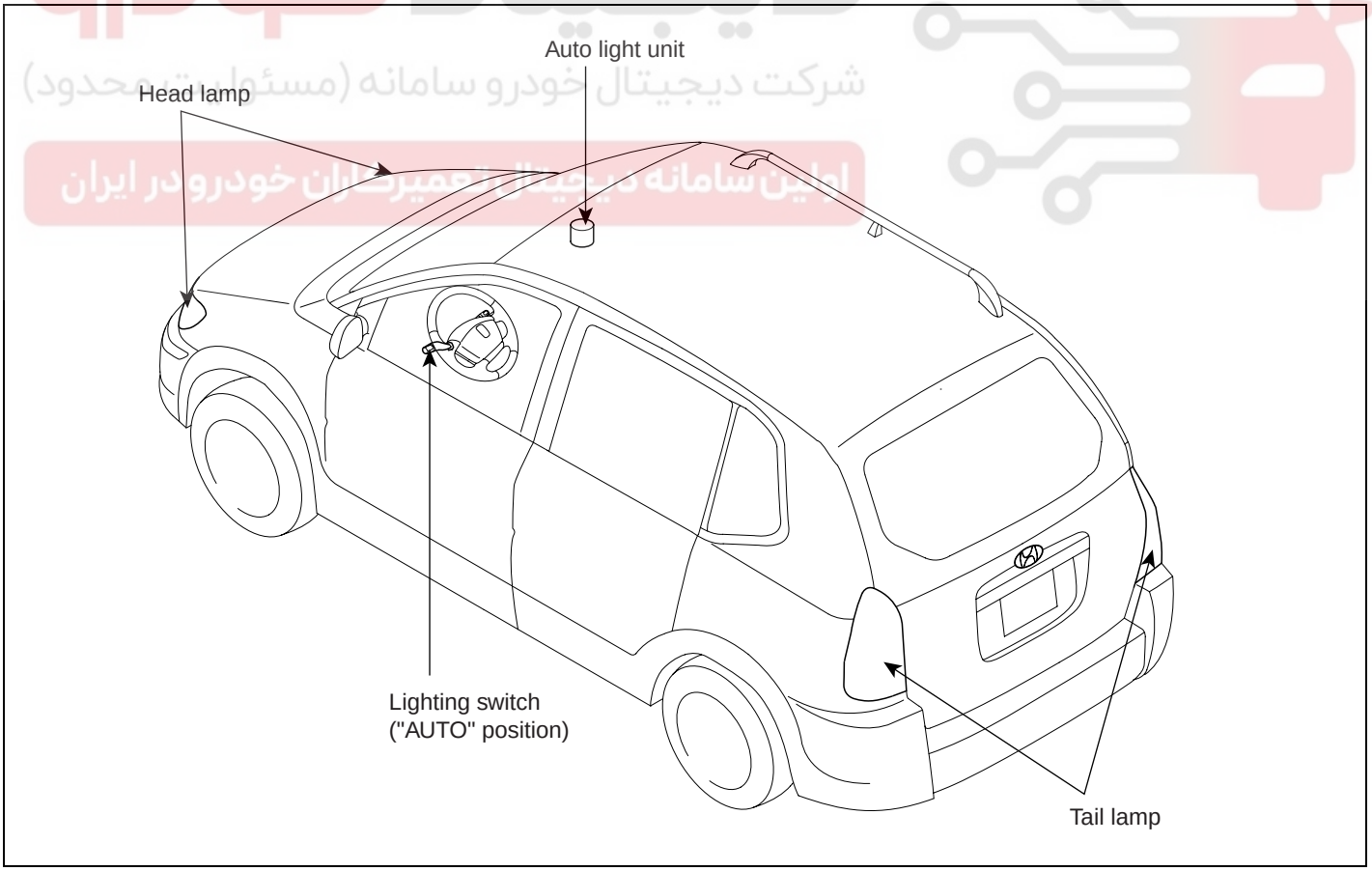
## DESCRIPTION E5837ED9

The auto light control system operates by using the auto light switch.
If you set the multi-function to "AUTO" position, the tail lamp and head lamp will be turned automatically on or off according to external illumination.

### SPECIFICATIONS

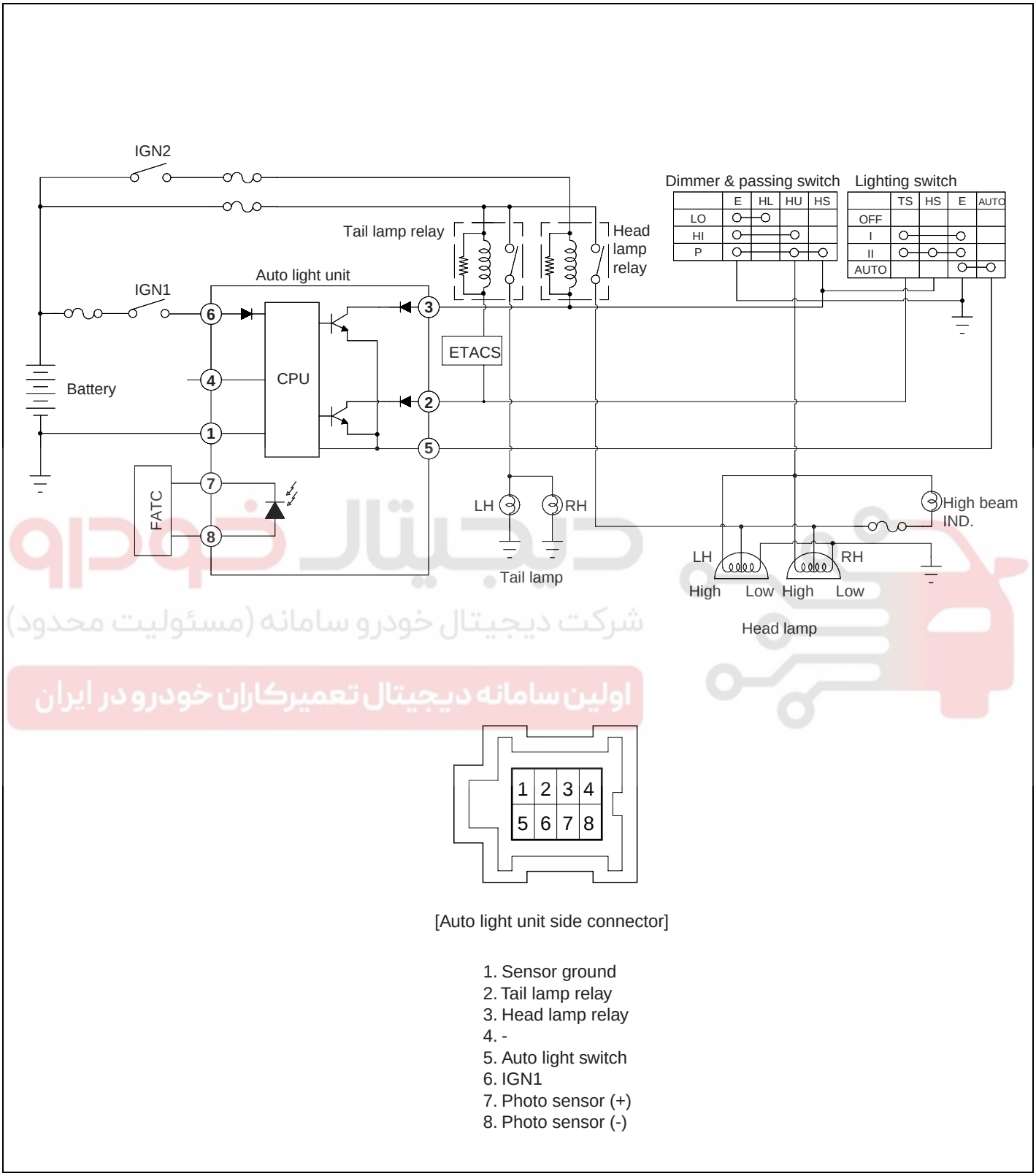
| Items | Specifications |
|---|---|
| Rated voltage | 12V |
| Load | Max. 200mA (Relay load) |
| Detection illuminations<br>Tail lamp<br><br>Head lamp | <br>ON : 24 ± 5.2 (Lux), 0.81 ± 0.05V<br>OFF : 48 ± 10.5 (Lux), 1.41 ± 0.05V<br>ON : 6 ± 1.4 (Lux), 0.36 ± 0.05V<br>OFF : 12 ± 2.7 (Lux), 0.51 ± 0.05V |

## COMPONENTS E0F32574




ETQF880S

## CIRCUIT DIAGRAM EDFA9B7C




[Auto light unit side connector]

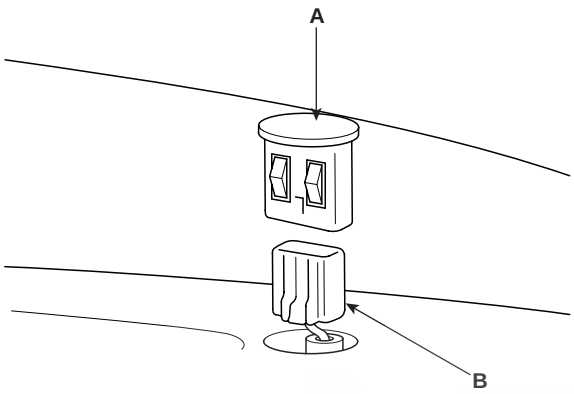
1. Sensor ground
2. Tail lamp relay
3. Head lamp relay
4. -
5. Auto light switch
6. IGN1
7. Photo sensor (+)
8. Photo sensor (-)

ETQF200L

# AUTO LIGHT CONTORL MODULE

## INSPECTION EF3E0AFE

1. Remove the photo & auto light sensor (A) from the center crash pad upper.




ETKE220D

2. Disconnect the 8P connector (B) from the auto light unit then inspect the connector on the wire harness side, as shown in the chart.

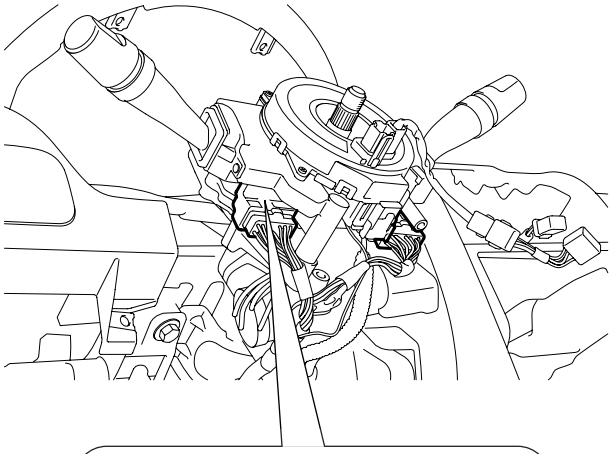
| Tester connec-tion | Condition | Specified condition |
|---|---|---|
| 2-Ground | Constant | 5V |
| | Tail lamp switch ON | 0V |
| 3-Ground | Ignition switch ON | 12V |
| 5-Ground | Auto light switch ON | Continuity |
| 6-Ground | Ignition switch ON | 12V |
| 1-Ground | Constant | Continuity |

3. If the circuit is not as specified, inspect the circuits connected to other parts.

# AUTO LIGHT SWITCH

## INSPECTION EC6ACF8E

Operate the auto light switch, then check for continuity between terminals of 18P multi-function switch connector.



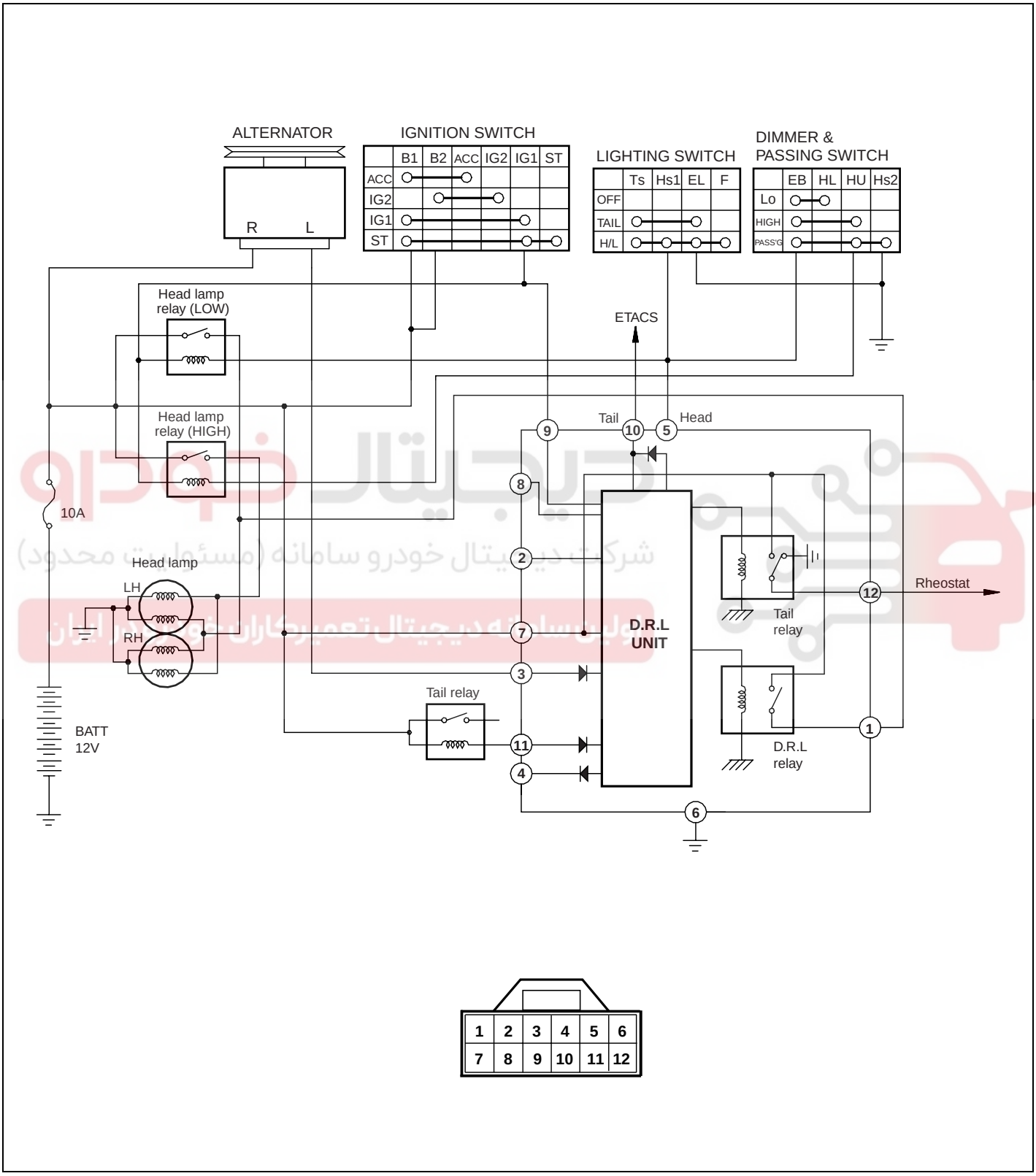

KTDD075G

| Terminal / Position | 14 | 15 | 16 | 17 |
|---|---|---|---|---|
| OFF | | | | |
| I | ○ | | | ○ |
| II | ○ | ○ | | ○ |
| AUTO | | | ○ | ○ |

ETQF092A

# DAYTIME RUNNING LIGHTS

## CIRCUIT DIAGRAM EFEB9DFA

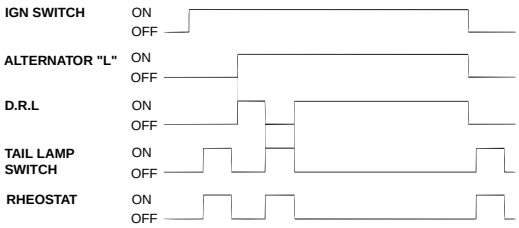



ETQF801B

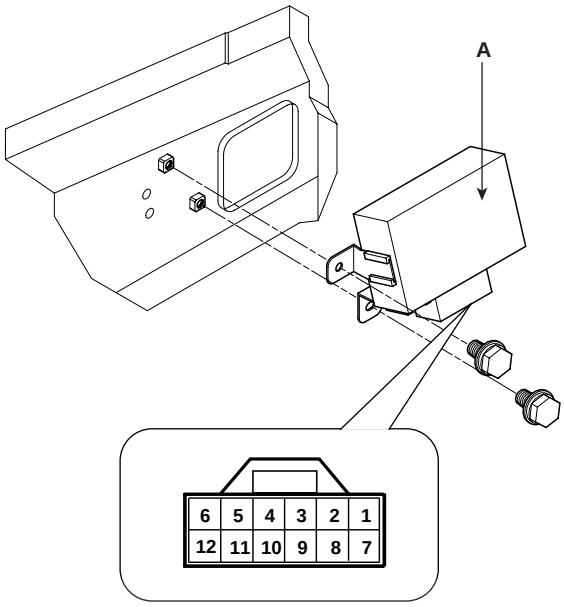
## INSPECTION EC69D3A1

### OPERATION CHECK

Check that the lights operate according to the following timing chart.




ETMB711B




[ DRL module harness side connector ]

### INSPECT CIRCUITS FOR DAYTIME RUNNING LIGHT SYSTEM

1. Disconnect the wire connector to DRL module(A) from the right side strut housing.
2. Inspect the connector on wire harness side as shown.

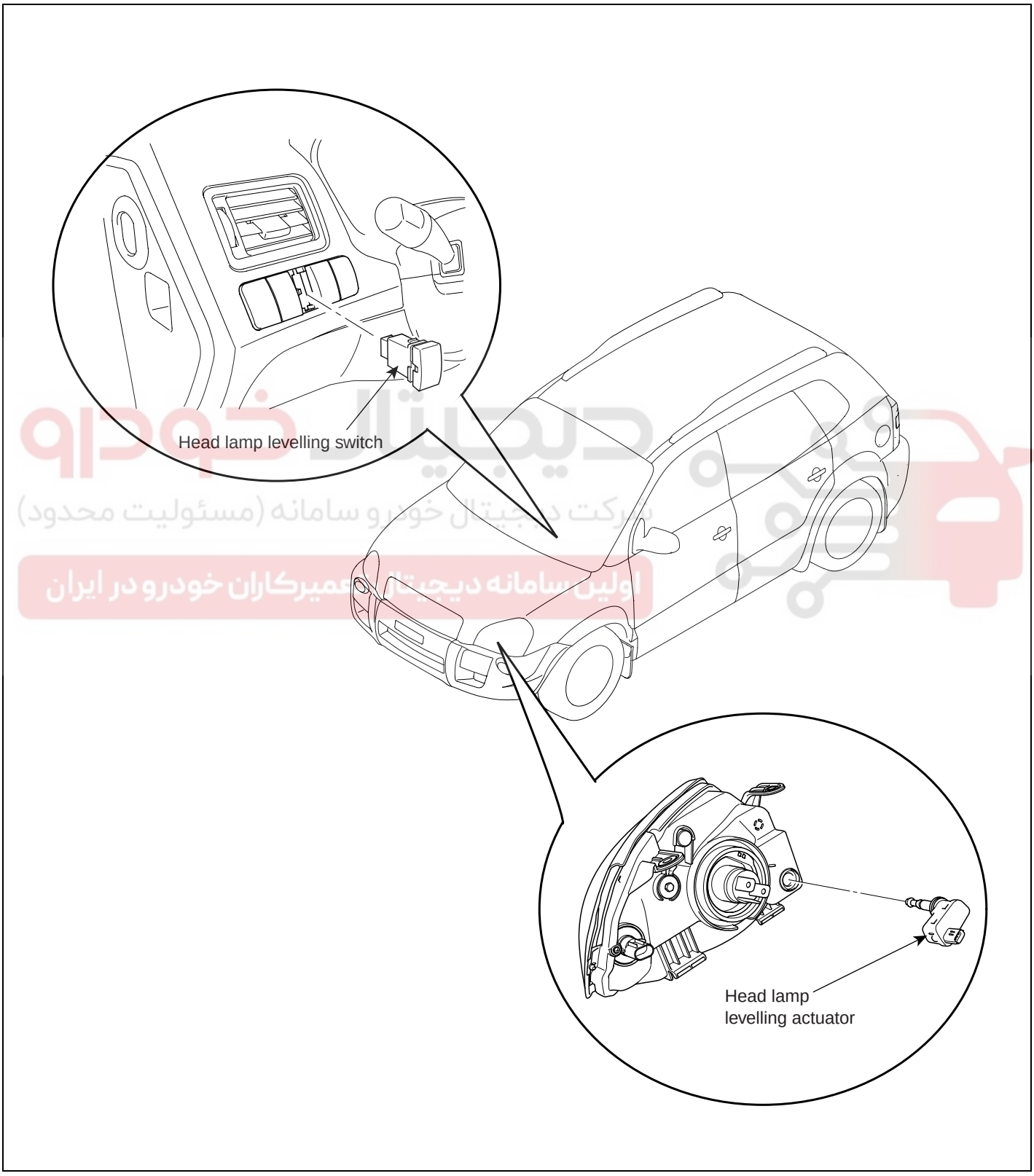
ETQF260A

| Tester connection | Condition | Specified condition |
|---|---|---|
| 1-Ground | Constant | Continuity |
| 5-Ground | Head lamp switch OFF | No continuity |
| | Head lamp switch ON | Continuity |
| 6-Ground | Constant | Continuity |
| 7-Ground | Constant | Battery voltage |
| 9-Ground | Ignition switch ON or START | Battery voltage |
| | Ignition switch ACC or LOCK | No voltage |
| 11-Ground | Constant | Battery voltage |
| 3-Ground | Engine Stop | No voltage |
| | Engine Running | Battery voltage |

If circuit is not as specified, refer to schematic diagram and inspect short or circuits.

# HEAD LAMP LEVELLING DEVICE

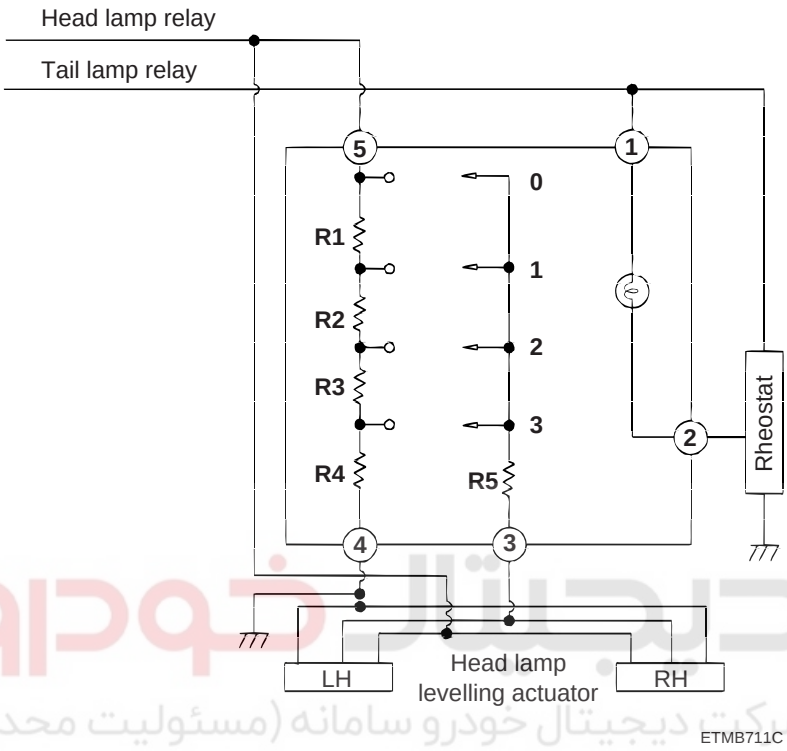
## COMPONENTS E7A6EA0D




ETQF715A

# HEAD LAMP LEVELING SWITCH

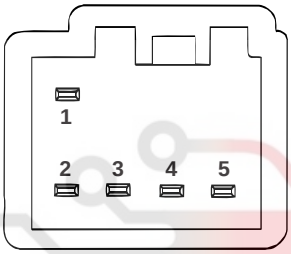
## CIRCUIT DIAGRAM E5EEE81E




ETMB711C

PIN CONNECTION

| PIN NO | Description |
|---|---|
| 1 | Illumination(+) |
| 2 | Rheostat |
| 3 | Actuator (+) |
| 4 | Ground |
| 5 | IGN |

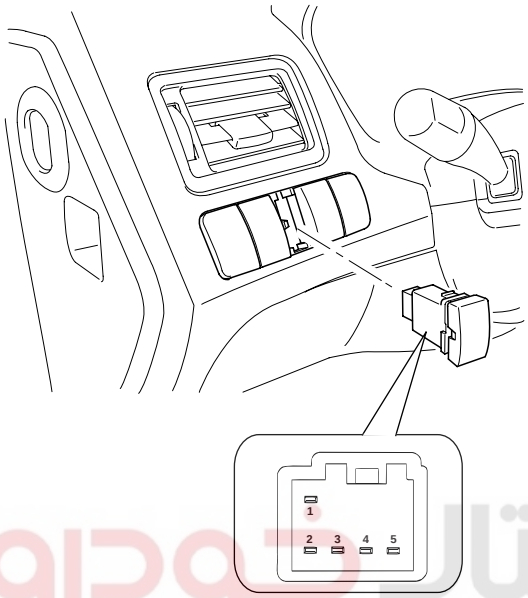



ETMB711D

ETQF268A

## INSPECTION E08735BB

1. Disconnect the 5P switch connector from the floor side crash pad switch plate.




ETQF715B

2. Connect the battery voltage between terminals 4 and 5(Reference voltage=$V_B$)
3. Measure the voltage between terminals 3 and 4(V).
4. Check the percent ratio(V/$V_B$x 100%) between voltages $V_B$and V at each position.

| Position No. | Rotation | Ratio(±5%) | Voltage (V) |
|---|---|---|---|
| 0 | 0° | 88.7% | 11.97 ± 0.5V |
| 1 | 20° | 78.5% | 10.60 ± 0.5V |
| 2 | 40° | 71.7% | 9.68 ± 0.5V |
| 3 | 60° | 67.87% | 9.16 ± 0.5V |

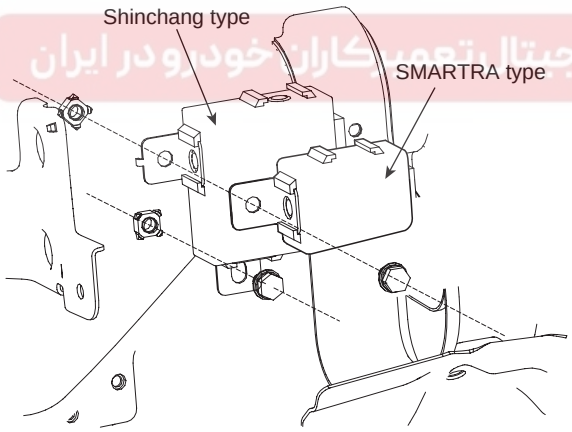
5. If the voltage is not as specified, replace the head lamp levelling switch.

# IMMOBILIZER CONTROL SYSTEM

## DESCRIPTION E24EB329

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. There are two types of immobilizer. One is a "SMARTRA (SMART TRansponder Antenna)" type and another is a "shinchang" type.

1. SMARTRA type immobilizer
   - The "SMARTRA" type immobilizer system is applied to the D2.0 engine and 2.0β engine.
   - The SMARTRA system consists of a transponder located in the ignition key, a coil antenna, a SMARTRA unit, an indicator light and the ECM.
   - The SMARTRA communicates to the 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.




ETQE716A

   - When the key is inserted in the ignition and turned to the ON position, the coil antenna sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the SMARTRA unit to the ECM.
   - If the proper key has been used, the 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 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 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.

2. Shinchang type immobilizer
   - The " Shinchang " type immobilizer system is applied to the 2.7δ engine.
   - The shinchang system consists of a transponder located in the ignition key, a coil antenna, an ICM (Immobilizer control module) , an indicator light and the ECM.
   - When the key is inserted in the ignition and turned to the ON position, the coil antenna sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the coil antenna to the ICM.
   - If the ID code transmitted from the key does not match the pre-registered code in the ICM, injection is not performed by the engine ECM. Hence, each vehicle has a set of keys containing a unique ID code which are registered on the ICM. This signal is captured by the coil antenna located in the front section of the steering handle lock and transmitted to the ICM. The ICM analyses and verifies the signal to determine if the signal matches the pre-registered code.If the signal is verified, the ICM transmits a message to the engine ECM to allow injection. The immobilizer indicator light in the cluster will simultaneously come on for more than five seconds, indicating that the ICM has recognized the code sent by the transponder.If the signal is not verified by the ICM, fuel injection is not performed by the engine ECM. The indicator light will continue blinking for five seconds until the ignition switch is turned OFF.Communication between ICM and ECM communicates through the K-line of ECM. K-line is also used for the communication between ECM and scan tool. there is a regal inside of ICM to switch the communication.
   - If it is necessary to rewrite the ICM 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.

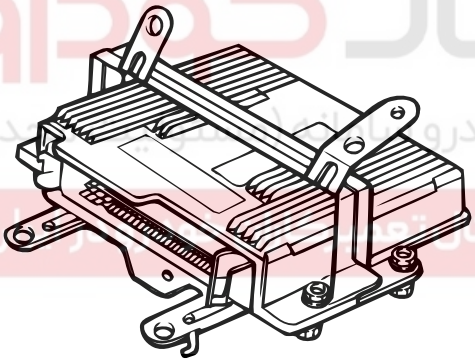
- The immobilizer system can store up to four key codes.
- If the customer has lost his key, and cannot start the engine, contact HMC motor service station.

## OPERATION EF2110C5

### ECM (ENGINE CONTROL MODULE)

1. SMARTRA type immobilizer
   The ECM carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the 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 ECM.

2. Shinchang type immobilizer
   In the Ignition ON position, the engine ECM receives information from the ICM and permits injection to take place.



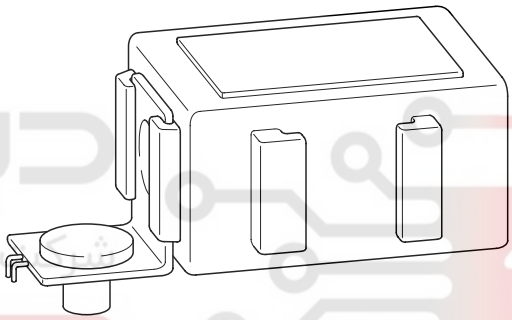
ETQE710E

### ICM (IMMOBILIZER CONTROL MODULE)

The ICM carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The ICM is mounted at the behind of the crush pad under panel close to the antenna coil for RF transmission and receiving.
The ICM carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the ICM simultaneously. Only if the results are equal, transmits the signal to the ECM to permits injection. The data of all transponders, which are valid for the vehicle, are stored in the ICM.

### SMARTRA UNIT

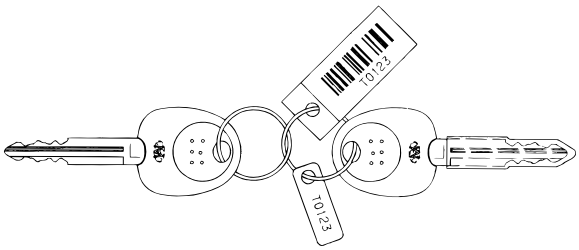
The SMARTRA carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The SMARTRA is mounted at the behind of the crush pad under panel close to the antenna coil for RF transmission and receiving. The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the SMARTRA device. And, the received messages from the 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 ECM and vice versa.



ETQE291C

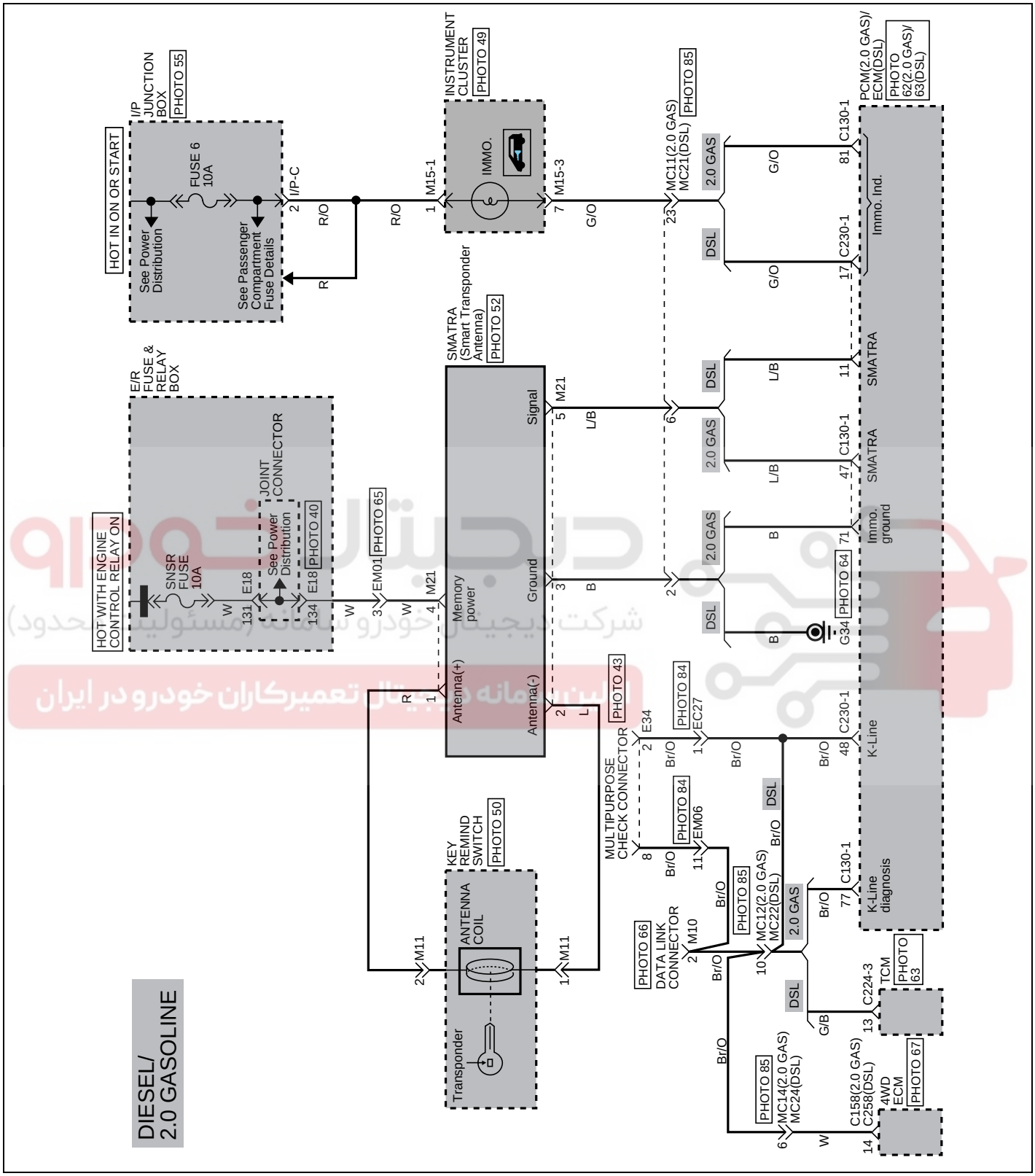
### TRANSPONDER (BUILT-IN KEYS)

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.



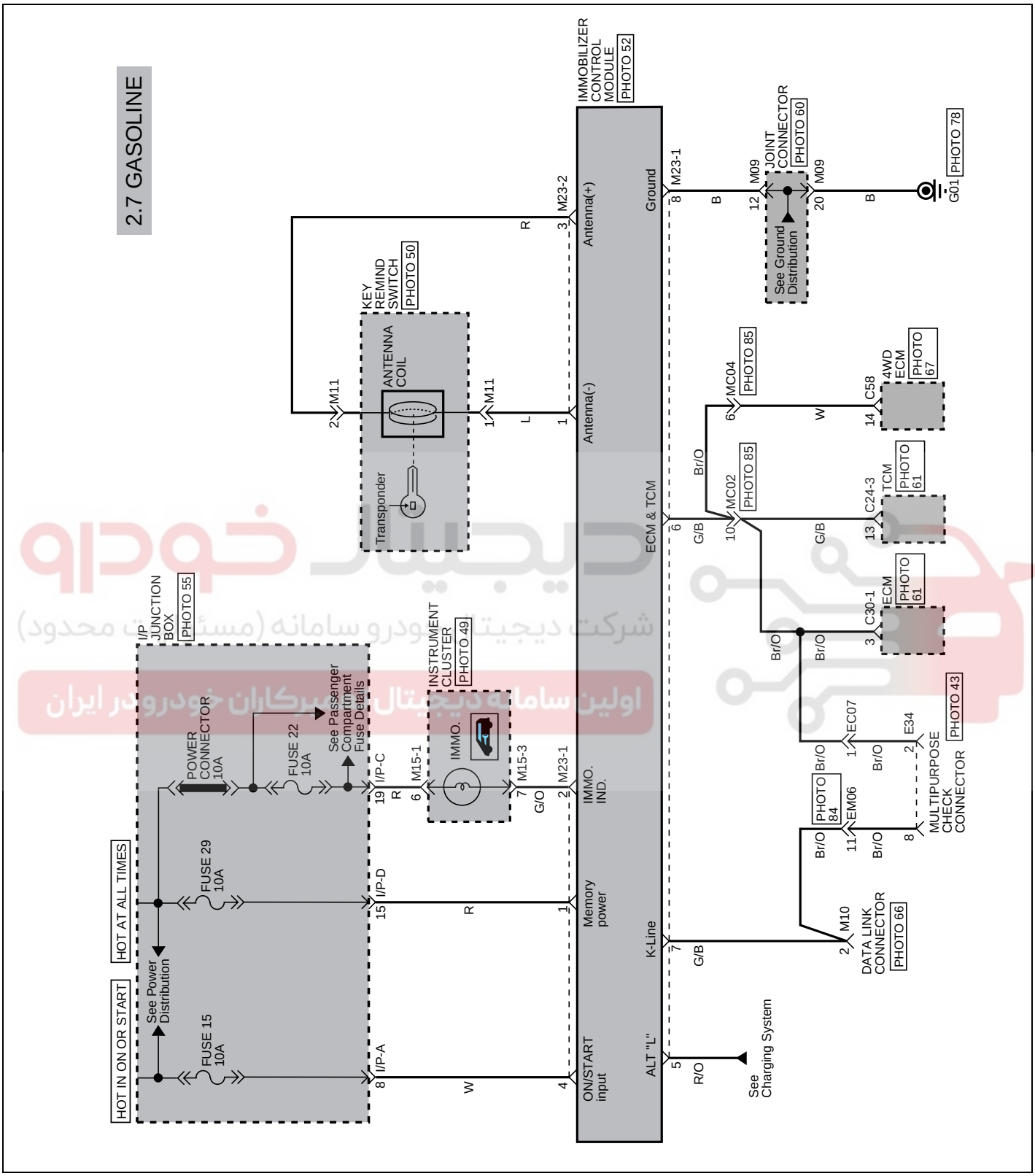
ETQE470C

## CIRCUIT DIAGRAM (1) E355CEC4



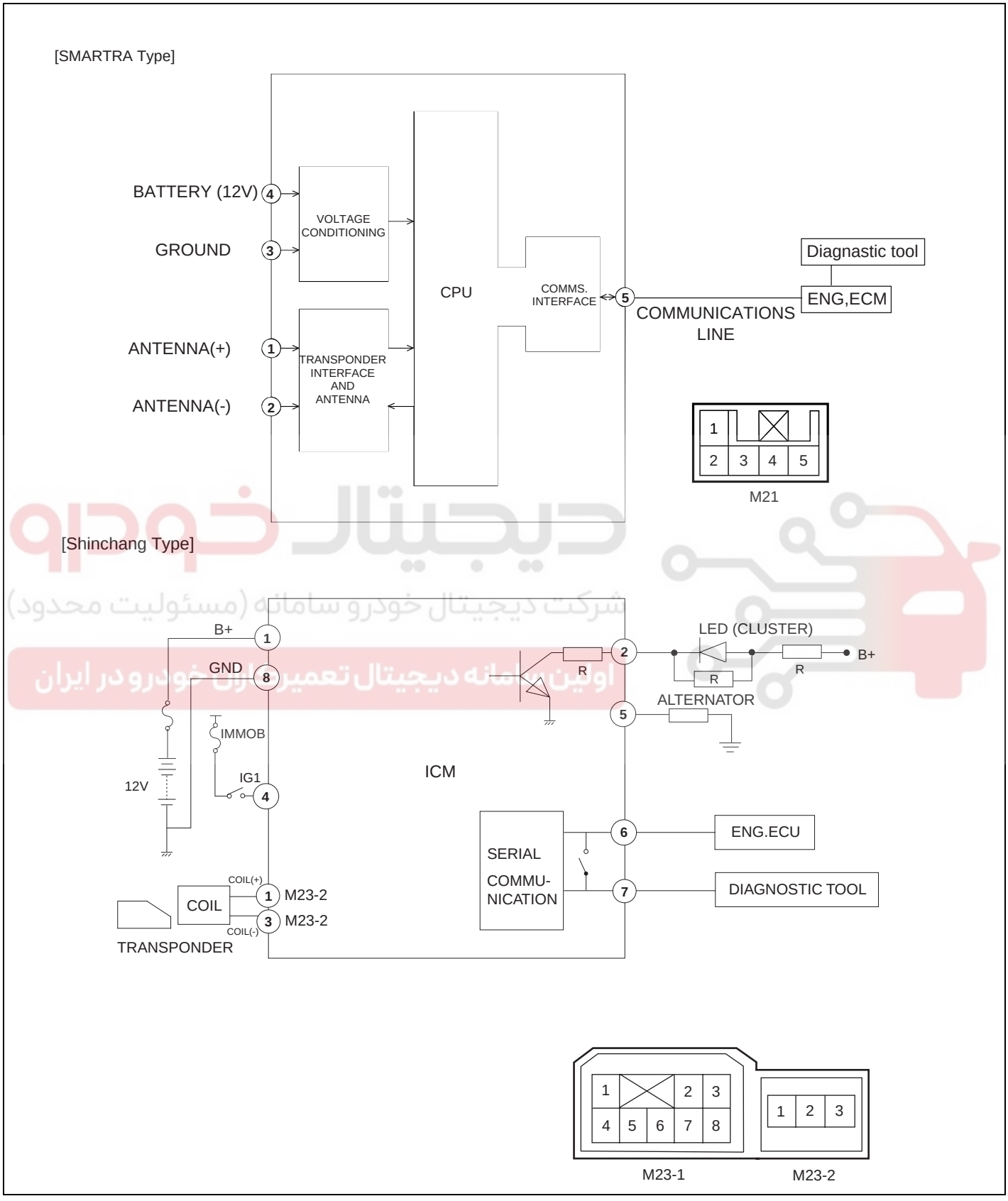

ETQE029A

## CIRCUIT DIAGRAM (2)

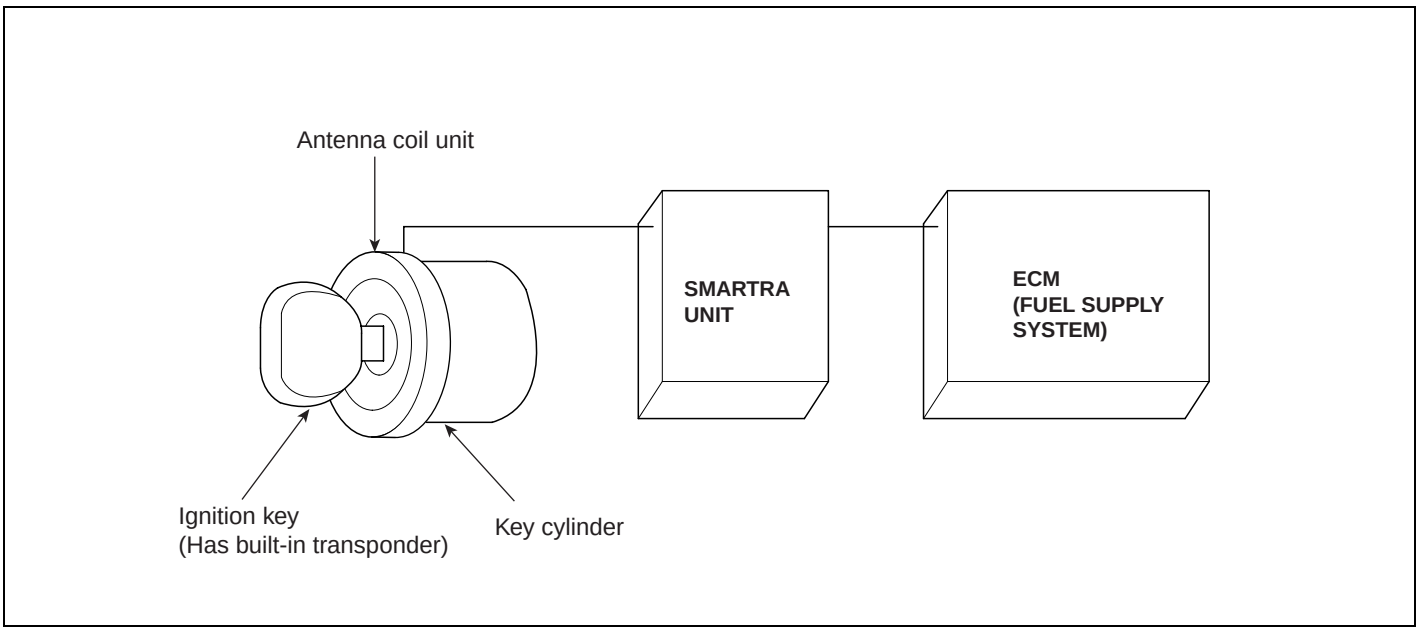



ETQE029B

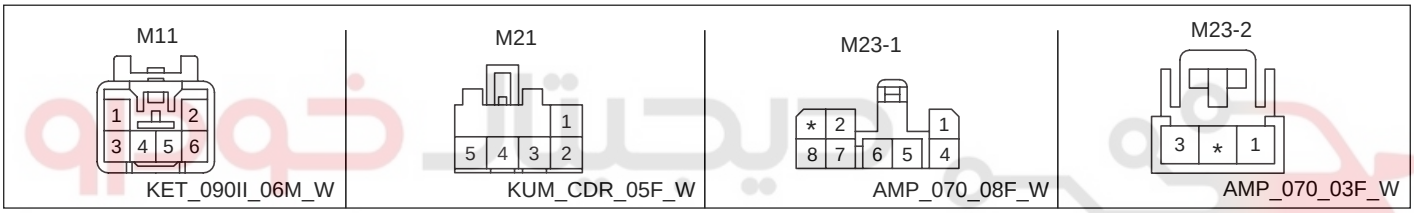
## SCHEMATIC DIAGRAM E9DDF549




ETQE700D




ETQE740A




ETQE029C

## DIAGNOSIS OF IMMOBILIZER FAULTS EDDBEB5F

- Communication between the ECM and the SMARTRA/ICM.
- Function of the SMARTRA/ICM and the transponder.
- Data (stored in the ECM/ICM 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 fault | 1. Corrupted data from transponder<br>2. More than one transponder in the magnetic field (Antenna coil)<br>3. No transponder (Key without transponder) in the magnetic field (Antenna coil)<br>4. Transponder not in the password mode<br>5. Transponder transport data has been changed6. Transponder programming error | P1693 (Transponder no response error/ transponder invalid response, Transponder status error, Transponder programming error) |
| SMARTRA/ICM fault | 1. Antenna coil error | P1690(D2.0)<br>P1691(β2.0, δ 2.7)<br>(Antenna coil error) |
| | 1. Communication line error (Open/Short etc.)<br>2. Invalid message from SMARTRA/ICM to ECM | P1678 (δ 2.7)<br>P1690 (D2.0, β2.0)(SMARTRA/ICM no response, SMARTRA message error) |
| ECM/ICM internal permanent memory(EEPROM) fault | 1. ECM/I/ICM internal permanent memory (EEPROM) fault<br>2. Invalid write operation to permanent memory (EEPROM) | P1677 (δ 2.7)<br>P1695(D2.0, β2.0)<br>(ECM/ICM memory error) |
| ECM/ICM fault | 1. Request from ECM/ICM is invalid (Protocol layer violation- Invalid request, check sum error etc.) | P1679 (δ 2.7)<br>P1694(D2.0, β2.0)<br>(ECM/ICM message error) |
| Immobilizer indicator lamp error | Immobilizer indicator lamp error (Cluster) | P1692(D2.0, β2.0)<br>(Immobilizer lamp error) |
| Tester (HI-SCAN) fault | 1. Request from tester is invalid(Protocol layer violation- Invalid request, check sum error etc.) | P1697(D2.0, β2.0)<br>(Tester message error) |
| Invalid key fault | 1. Virgin transponder at EMS status “ Learnt”<br>2. Learnt (Invalid) Transponder at EMS status “ Learnt” (Authentication fail) | P1696(D2.0, β2.0),<br>P1698(D2.0, β2.0)<br>(Authentication fail) |

**PROBLEMS AND REPLACEMENT PARTS :**

| Problem | Part set | Hi-scan (pro) required? |
|---|---|---|
| All keys have been lost | Blank key (4) | YES |
| Antenna coil unit does not work | Antenna coil unit | NO |
| ECM/ICM does not work | ECM/ICM | YES |
| Ignition switch does not work | Ignition switch with Antenna coil unit | YES |
| Unidentified vehicle specific data occurs | Key, ECM/ICM | YES |
| SMARTRA unit does not work | SMARTRA unit | NO |

**REPLACEMENT OF ECM/ICM AND SMARTRA**

In case of a defective ECM/ICM, the unit has to be replaced with a "virgin" or "neutral" ECM/ICM. All keys have to be taught to the new ECM/ICM. Keys, which are not taught to the ECM/ICM, are invalid for the new ECM/ICM (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.

**NEUTRALISING OF ECM/ICM**

The ECM/ICM can be set to the "neutral" status by a tester. A valid ignition key is inserted and after ignition on is recorded, the ECM/ICM requests the vehicle specific data from the tester. The communication messages are described at "Neutral Mode". After successfully receiving the data, the ECM/ICM is neutralized.
The ECM/ICM remains locked. Neither the limp home mode nor the "twice ignition on" function, is accepted by the ECM/ICM.
The teaching of keys follows the procedure described for the virgin ECM/ICM. 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.

# DTC P1677 EMS VIN DATA ERROR (EMS HAS DIFFERENT VIN)

## DTC DETECTING CONDITION EE0FEA53

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1677 | ICM memory error | ICM internal permanent memory (EEPROM) fault, Invalid write operation to permanent memory (EEPROM). | δ 2.7 |

## INSPECTION PROCEDURE EDD0F765

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1677" is displayed.

   3) Erase the DTC "P1677" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and ICM memory was not cleared.

   **YES**

   ▶ Key teaching procedure

2. KEY TEACHING PROCEDURE

   1) Connect the hi-can (pro) to data link connector.

   2) Turn the ignition switch to ON and select "TEACHING" mode of immobilizer system on the hi-scan (pro).

   3) Input the pin code which consists of 6 digits.

   ***NOTE***

   *Because the pin code is security code, contact authorized HMC service staff to know the pin code.*

   4) If the data is correct, the key teaching is completed.

   Is the key taught completely ?

   **NO**

   ▶ Check for these problems ;
   - Storage of invalid data in transponder.
   - Different kind of transponder.
   - Omitted transponder in the key.

   **YES**

   ▶ Check if DTC "P1677" is displayed again

3. CHECK IF DTC "P1677" IS DISPLAYED AGAIN

1) Connect the hi-scan (pro) to data link connector.

2) Erase the DTC with the hi-scan (pro).

3) Check if DTC "P1677" is displayed again.

Is the same code displayed ?

**NO**

▶ Problem is intermittent and ICM memory was not cleared.

**YES**

▶ If all the tests are OK, replace the ICM and recheck.

***NOTE***

*After replacing the ICM, key teaching must be done.*

# DTC P1678 EMS NO REQUEST ( EMS DATA LINE OPEN, NO IMMO.)

## DTC DETECTING CONDITION EA7AC5EF

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1678 | ICM no responce,<br>ICM message error | Communication line error (Open/Short etc.),<br>Invalid message from ICM to ECM | δ 2.7 |

## INSPECTION PROCEDURE EB3033E7

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1678" is displayed.

   3) Erase the DTC "P1678" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and ICM memory was not cleared

   **YES**

   ▶ Check engine control main relay

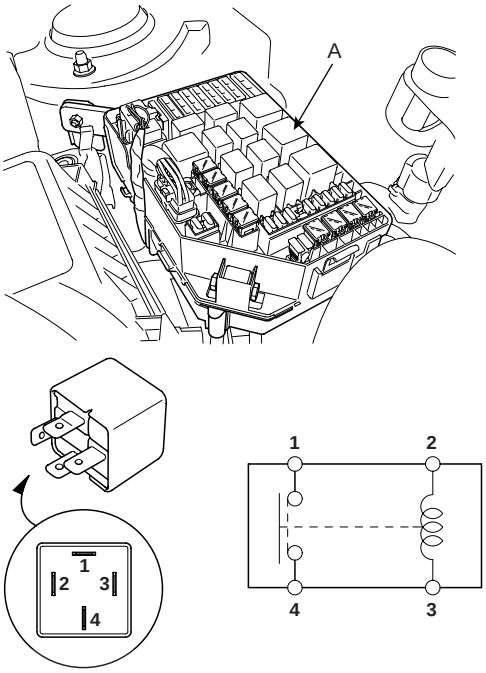
2. CHECK ENGINE CONTROL MAIN RELAY

   1) Check that an operating noise can be heard from the engine control main relay(A).

   2) Check for continuity between the terminals of main relay.

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

ETKE215B




ETQE927A

Is there continuity?

**NO**

▶ Replace the engine control main relay.

**YES**

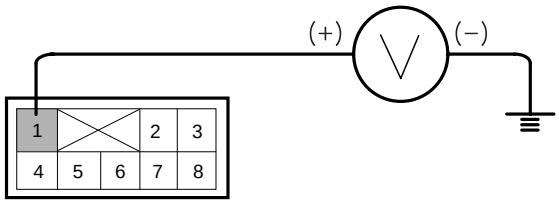
▶ Check power voltage to SMARTRA

3. CHECK POWER VOLTAGE TO ICM

1) Turn the ignition switch to ON.

2) Measure the power input voltage of ICM between ICM harness connector terminal 1 and body ground.

Specification : approximately B+ (12V)




ETQE927C

Is the voltage within the specification?

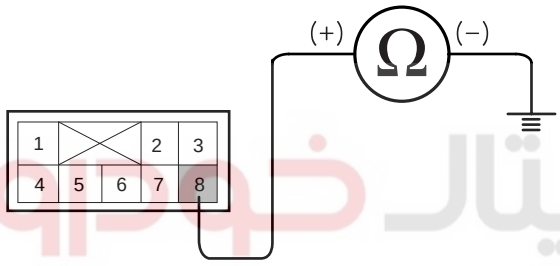
**NO**

▶ Check for these problems ;
- A blown ECU fusible link (20A) or sensor fuse (10A) in the engine compartment relay & fuse box.
- An open or short in the wire between the engine control main relay and ICM.

**YES**

▶ Check harness and connector between ICM and body ground

4. CHECK HARNESS AND CONNECTOR BETWEEN ICM AND BODY GROUND
Check for continuity between ICM harness connector(M23-1) terminal 8 and body ground.




ETQE927D

Is there continuity ?

**NO**

▶ Repair an open in the wire between the ICM and the body ground.

**YES**

▶ Check harness and connector between ICM and ECM

5. CHECK HARNESS AND CONNECTOR BETWEEN ICM AND ECM
Check for continuity between ICM harness connector(M23-1) terminal 6 and ECM harness connector (C30-1) terminal 3.
Is there continuity ?

**NO**

▶ Repair an open in the wire between the ICM and the ECM.

**YES**

▶ If all the tests are OK, replace the ICM and recheck.

# DTC P1679 EMS DATA FAIL (DATA FRAME, CS, MESSAGE ERROR)

## DTC DETECTING CONDITION E49D3BD0

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1679 | ICM message error | Request from ICM is invalid (Protocol layer violation- Invalid request, check sum error etc.) | δ 2.7 |

## INSPECTION PROCEDURE EE2FEAE9

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1679" is displayed.

   3) Erase the DTC "P1679" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and ICM memory was not cleared.

   **YES**

   ▶ Check harness and connector between ICM and ECM

2. CHECK HARNESS AND CONNECTOR BETWEEN ICM AND ECM
   Check for continuity between ICM harness side connector(M23-1) terminal 6 and ECM harness sideconnector (C30-1) terminal 3.
   Is there continuity ?

   **NO**

   ▶ Repair an open in the wire between the ICM and the ECM.

   **YES**

   ▶ If all the tests are OK, replace the ICM or ECM and recheck.

# DTC P1690 SMARTRA NO RESPONSE

## DTC DETECTING CONDITION EBBFBFE4

| DTC No. | Detecting Condition | Possible Cause | Application engine |
|---|---|---|---|
| P1690 | SMARTRA no response, SMARTRA message error | Communication line error (Open/Short etc.), Invalid message from SMARTRA to ECM | D2.0, β 2.0 |

## INSRECTION PROCEDURE E9B6F5FC

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1690" is displayed.

   3) Erase the DTC "P1690" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶ Check engine control main relay

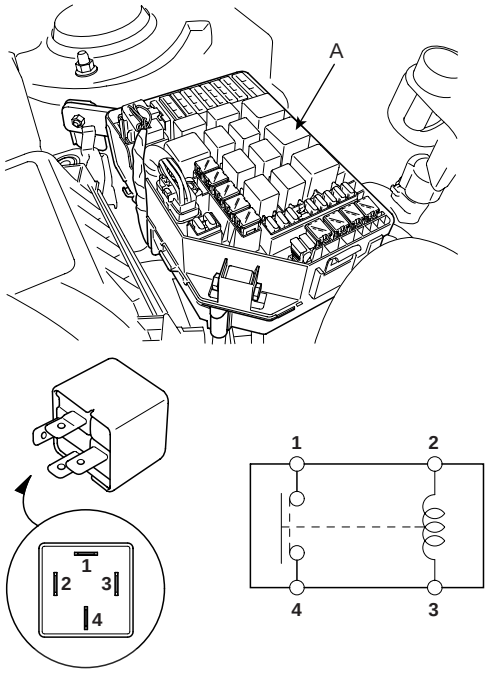
2. CHECK ENGINE CONTROL MAIN RELAY

   1) Check that an operating noise can be heard from the engine control main relay(A).

   2) Check for continuity between the terminals of main relay.

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

ETKE215B




ETQE927A

**NO**

▶ Replace the engine control main relay.

**YES**

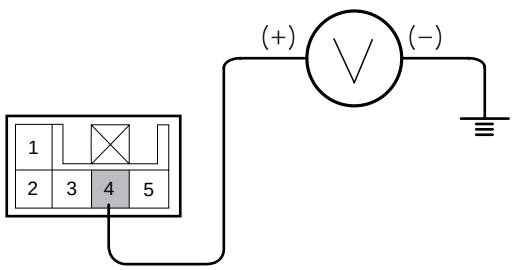
▶ Check power voltage to SMARTRA

3. CHECK POWER VOLTAGE TO SMARTRA

1) Turn the ignition switch to ON.

2) Measure the power input voltage of SMARTRA between SMARTRA harness connector terminal 4 and body ground.

Specification : approximately B+ (12V)




ETQE927E

Is the voltage within the specification?

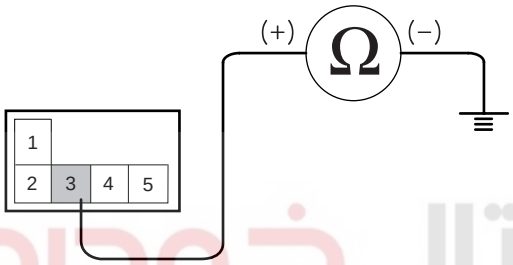
**NO**

▶ Check for these problems ;
- A blown ECU fusible link (20A) or sensor fuse (10A) in the engine compartment relay & fuse box.
- An open or short in the wire between the engine control main relay and SMARTRA unit.

**YES**

▶ Check harness and connector between SMARTRA unit and body ground

4. CHECK HARNESS AND CONNECTOR BETWEEN SMARTRA UNIT AND BODY GROUND
Check for continuity between SMARTRA harness connector terminal 3 and body ground.




ETQE927F

Is there continuity ?

**NO**

▶ Repair an open in the wire between the SMARTRA unit and the ECM.

**YES**

▶ Check harness and connector between SMARTRA unit and ECM

5. CHECK HARNESS AND CONNECTOR BETWEEN SMARTRA UNIT AND ECM
Check for continuity between SMARTRA harness connector terminal 5 and ECM harness connector(C230-1/C130-1) terminal(11/47).
Is there continuity ?

**NO**

▶ Repair an open in the wire between the SMARTRA unit and the ECM.

**YES**

▶ If all the tests are OK, replace the SMARTRA unit and recheck.

# DTC P1691 ANTENNA COIL ERROR

## DTC DETECTING CONDITION E273AC8E

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1691 | Antenna coil error | An open in the wire between SMARTRA and antenna coil, Faulty antenna coil | D2.0: P1690<br>β 2.0: P1691 |

## INSPECTION PROCEDURE E6073A9E

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1691"is displayed.

   3) Erase the DTC "P1691" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶Check for continuity between antenna coil and SMARTRA unit

2. CHECK FOR CONTINUITY BETWEEN ANTENNA COIL AND SMARTRA UNIT

   1) Check for continuity between SMARTRA harness connector terminal 1 and antenna coil harness connector(M11) terminal 2.

   2) Check for continuity between SMARTRA harness connector terminal 2 and antenna coil harness connector(M11) terminal 1.

   Is there continuity ?

   **NO**

   ▶ Repair an open in the wire between the antenna coil and the SMARTRA unit.

   **YES**

   ▶ If all the tests are OK, replace the antenna coil assembly and recheck.

## DTC DETECTING CONDITION E117FFAA

| DTC No. | Detecting Condition | Possible Cause | Application engine |
|---|---|---|---|
| P1691 | Antenna coil error | An open in the wire between ICM and antenna coil, Faulty antenna coil | δ 2.7 |

## INSPECTION PROCEDURE E6073A9E

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1691"is displayed.

   3) Erase the DTC "P1691" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶Check for continuity between antenna coil and SMARTRA unit

2. CHECK FOR CONTINUITY BETWEEN ANTENNA COIL AND SMARTRA UNIT

   1) Check for continuity between SMARTRA harness connector terminal 1 and antenna coil harness connector(M11) terminal 2.

   2) Check for continuity between SMARTRA harness connector terminal 2 and antenna coil harness connector(M11) terminal 1.

   Is there continuity ?

   **NO**

   ▶ Repair an open in the wire between the antenna coil and the SMARTRA unit.

   **YES**

   ▶ If all the tests are OK, replace the antenna coil assembly and recheck.

# DTC P1692 IMMOBILIZER LAMP ERROR

## DTC DETECTING CONDITION ECE9C3BF

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1692 | Immobilizer indicator lamp error | Immobilizer indicator lamp error (Cluster) | D2.0, β 2.0 |

## INSPECTION PROCEDURE EFA27ABE

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1692" is displayed.

   3) Erase the DTC "P1692" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶ Check cluster and ECM connectors

2. CHECK CLUSTER AND ECM CONNECTORS
   Thoroughly check connectors for loose, poor connection, bent, corrosion, contamination, deterioration, or damage.
   Are all connectors good?

   **YES**

   ▶ Repair or replace it.

   **NO**

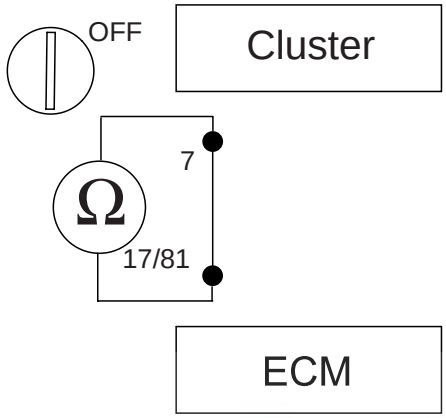
   ▶ Check for open in harness

3. CHECK FOR OPEN IN HARNESS

1) Turn ignition switch to OFF and disconnect Cluster and ECM connectors.

2) Measure resistance between the terminals 7 of Cluster harness connector (M15-3) and (17/81) of ECM harness connector (C230-1/C130-1).

Specification: below 1Ω




ETQE927G

Does each resistance indicate continuity?

**NO**

▶ Repair open in harness.

**YES**

▶ Replace the cluster

4. REPLACE THE CLUSTER
Temporarily install a good cluster.
Is operating of the immobilizer lamp possible?

**YES**

▶ Replace the cluster.

**NO**

▶ Proceed with ECM problem procedure.

# DTC P1693 TRANSPONDER NO RESPONSE ERROR / INVALID RESPONSE

## DTC DETECTING CONDITION ECB3B822

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1693 | Transponder no response error/ transponder invalid response, Transponder status error,Transponder programming error | Corrupted data from transponder,<br>More than one transponder in the magnetic field (Antenna coil),<br>No transponder (Key without transponder) in the magnetic field (Antenna coil),<br>Transponder not in the password mode,<br>Transponder transport data hasbeen changed,Transponder programming error | D2.0,β 2.0,δ 2.7 |

## INSPECTION PROCEDURE EFBAFD32

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1693" is displayed.

   3) Erase the DTC "P1693" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module or ICM memory was not cleared.

   **YES**

   ▶ Key teaching procedures

2. KEY TEACHING PROCEDURE

   1) The key teaching is done after replacing a defective ECM or ICM for providing of additional keys to the vehicle owner.

   2) Connect the hi-scan (pro) to data link connector.

   3) Turn the ignition switch to ON and select "TEACHING" mode of immobilizer system on the hi-scan (pro).

   4) Input the pin code which consists of 6 digits.

   ***NOTE***

   *Because the pin code is security code, contact authorized HMC service staff to know the pin code.*

   5) If incorrect pin code is inputted for 3 consecutive times, ECM or ICM should disallow key teaching function for 1 hours.

   6) If the data is correct, the key teaching is completed.

Is the key taught completely ?

**NO**

▶ Check for these problems ;
- Storage of invalid data in transponder.
- Different kind of transponder.
- Omitted transponder in the key.

**YES**

▶ Check if DTC "P1693" is displayed again

3. CHECK IF DTC "P1693" IS DISPLAYED AGAIN

1) Connect the hi-scan (pro) to data link connector.

2) Turn the ignition switch to ON and verify the DTC "P1693" is displayed.

Is the same code displayed ?

**NO**

▶ Problem is intermittent and engin control module or ICM memory was not cleared.

**YES**

▶ Replace the key set assembly and key teaching must be done.

# DTC P1694 EMS MESSAGE ERROR

## DTC DETECTING CONDITION E26EACC5

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1694 | ECM message error | Request from ECM is invalid<br>(Protocol layer violation- Invalid request, check sum error etc.) | β 2.0 |

## INSPECTION PROCEDURE EE9A4A44

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1694" is displayed.

   3) Erase the DTC "P1694" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶ Check harness and connector between SMARTRA unit and ECM

2. CHECK HARNESS AND CONNECTOR BETWEEN SMARTRA UNIT AND ECM
   Check for continuity between SMARTRA harness side connector terminal 5 and ECM harness side connector (C130-1) terminal 47.
   Is there continuity ?

   **NO**

   ▶ Repair an open in the wire between the SMARTRA unit and the ECM.

   **YES**

   ▶ If all the tests are OK, replace the SMARTRA unit or ECM and recheck.

   ***NOTE***

   *After replacing the ECM, key teaching must be done.*

# DTC P1695 EMS MEMORY ERROR

## DTC DETECTING CONDITION EBAA9FD9

| DTC No. | Detecting Condition | Possible Cause | Application engine |
|---|---|---|---|
| P1695 | ECM memory error | ECM internal permanent memory (EEPROM) fault,<br>Invalid write operation to permanent memory (EEPROM). | D2.0,β 2.0 |

## INSPECTION PROCEDURE EEF865DF

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1695" is displayed.

   3) Erase the DTC "P1695" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶ Key teaching procedures

2. KEY TEACHING PROCEDURES

   1) Connect the hi-can (pro) to data link connector.

   2) Turn the ignition switch to ON and select "TEACHING" mode of immobilizer system on the hi-scan (pro).

   3) Input the pin code which consists of 6 digits.

   ***NOTE***

   *Because the pin code is security code, contact authorized HMC service staff to know the pin code.*

   4) If the data is correct, the key teaching is completed.

   Is the key taught completely ?

   **NO**

   ▶ Check for these problems ;
   - Storage of invalid data in transponder.
   - Different kind of transponder.
   - Omitted transponder in the key.

   **YES**

   ▶ Check if DTC "P1695" is displayed again

3. CHECK IF DTC "P1695" IS DISPLAYED AGAIN

1) Connect the hi-scan (pro) to data link connector.

2) Erase the DTC with the hi-scan (pro).

3) Check if DTC "P1695" is displayed again.

Is the same code displayed ?

**NO**

▶ Problem is intermittent and engine control module memory was not cleared.

**YES**

▶ If all the tests are OK, replace the ECM and recheck.

***NOTE***

*After replacing the ECM, key teaching must be done.*

# DTC P1696 AUTHENTICATION FAIL

## DTC DETECTING CONDITION EDEBD366

| DTC No. | Detecting Condition | Possible Cause | Related engine |
|---|---|---|---|
| P1696, P1698 | Authentication fail | Virgin transponder at ECM status “ Learnt” , Learnt (Invalid) Transponder at ECM status “ Learnt” (Authentication fail) | D2.0,β 2.0 |

## INSPECTION PROCEDURE E9AD8075

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1696" or "P1698" is displayed.

   3) Erase the DTC "P1696" or "P1698" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

   **NO**

   ▶ Problem is intermittent and engine control module memory was not cleared.

   **YES**

   ▶ Replace the transponder key

2. REPLACE THE TRANSPONDER KEY
   Use another key supplied with the vehicle.

   Is starting of the vehicle possible?

   **YES**

   ▶ Replace the faulty key.

   **NO**

   ▶ Check the state of the transponder key

3. CHECK THE STATE OF THE TRANSPONDER KEY
   Check the state of the transponder key by using the tester.

   Is the ignition key virgin?

   **NO**

   ▶ Replace the faulty ley.

   **YES**

   ▶ Teach the ignition key.

# DTC P1697 HI-SCAN MESSAGE ERROR

## DTC DETECTING CONDITION E41D38EA

| DTC No. | Detecting Condition | Possible Cause | Application engine |
|---|---|---|---|
| P1697 | Tester message error | Request from tester is invalid (Protocol layer violation- Invalid request, check sum error etc.) | D2.0,β 2.0 |

## INSPECTION PROCEDURE E67DB687

1. PROBLEM VERIFICATION

   1) Connect the hi-scan (pro) to data link connector.

   2) Turn the ignition switch to ON and verify the DTC "P1697" is displayed.

   3) Erase the DTC "P1697" with the hi-scan (pro) and then monitor again.

   Is the same code displayed ?

**NO**

▶ Problem is intermittent and engine control module memory was not cleared.

**YES**

▶ Replace the tester(HI-SCAN)

## TEACHING PROCEDURE EEE6B7E5

Key Teaching Procedure

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

The procedure starts with an ECM(ICM) request for vehicle specific data(PIN code : 6digits) from the tester. The "virgin" ECM(ICM) stores the vehicle specific data and the key teaching can be started. The "learnt" ECM(ICM) 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 ECM(ICM) three times, the ECM(ICM) 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 ECM(ICM) stores the relevant data in the EEPROM and in the transponder. Then the ECM(ICM) runs the authentication required for confirmation of the teaching process. The successful programming is then confirmed by a message to the tester.

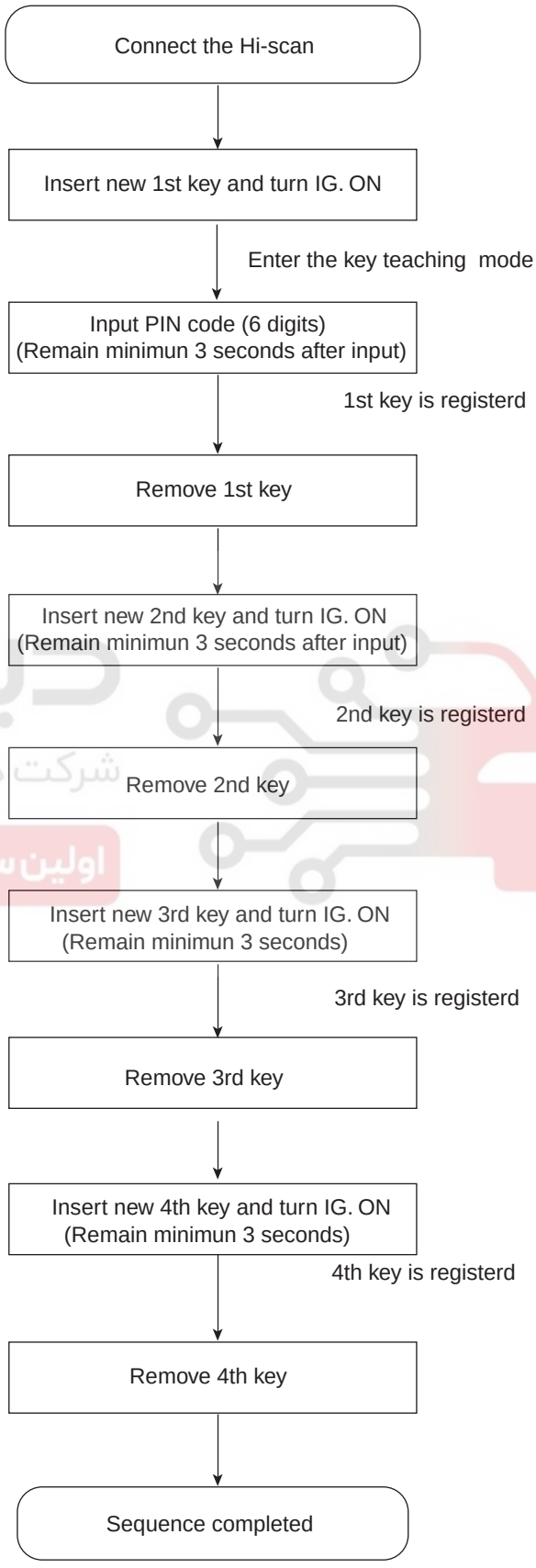
If the key is already known to the ECM(ICM) from a previous teaching, the authentication will be accepted and the EEPROM data are updated. There is no changed transponder content (this is impossible for a learnt transponder).

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

The ECM(ICM) 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 ECM(ICM) detects different authenticators of a transponder and an ECM(ICM), 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 ECM(ICM) status remains unchanged and a specific fault code is stored.If the ECM(ICM) 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 ECM(ICM).




ETQE740B

User Password Teaching Procedure

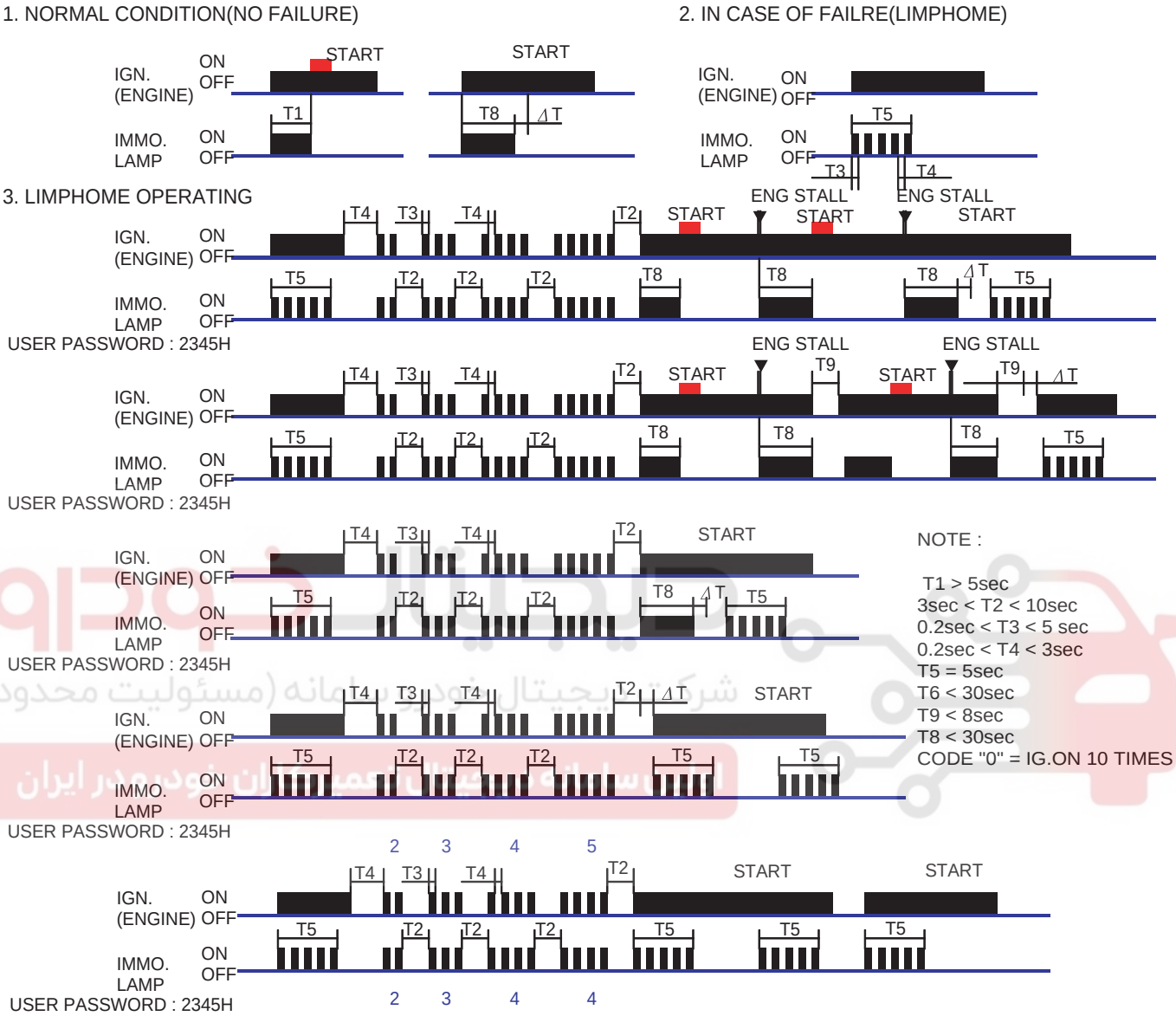
The user password for limp home is taught at the service station. The owner of the vehicle can select a number with four digits.

User password teaching is only accepted by a "learnt" ECM(ICM). Before first teaching of user password to an ECM(ICM), 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 ECM(ICM) 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 ECM(ICM) three times, the ECM(ICM) 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.

## LIMP HOME FUNCTION E2EB475B




ETQE740C

1. LIMP HOME BY TESTER

If the ECM(ICM) detects the fault of the SMARTRA or transponder, the ECM(ICM) will allow limp home function of the immobilizer. Limp home is only possible if the user password (4 digits) has been given to the ECM(ICM) 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 ECM(ICM) via the special tester menu.

Only if the ECM(ICM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the ECM(ICM) 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 ECM(ICM) 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 ECM(ICM), the timer starts again for one hour.

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 ECM(ICM) by a special sequence of ignition on/off.

Only if the ECM(ICM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the ECM(ICM) 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.

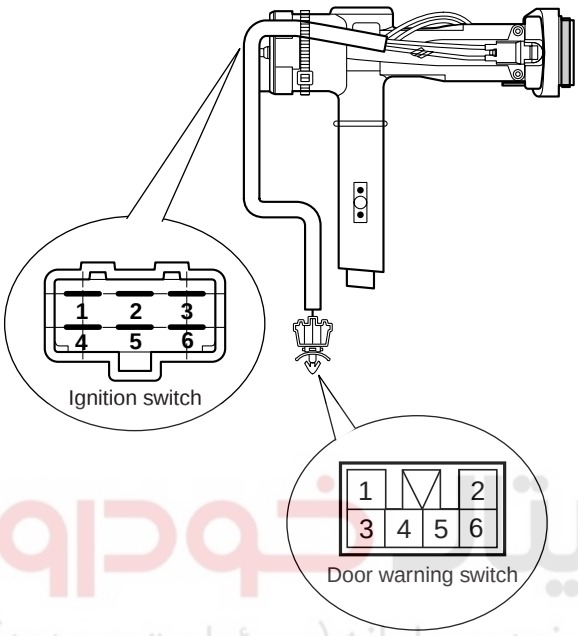
After ignition off, the ECM(ICM) is locked if the timer has elapsed 8 seconds. For the next start, the input of the user password is requested again.

# IGNITION SYSTEM

## IGNITION SWITCH

### INSPECTION ECD023FC

1. Disconnect the ignition switch connector(6P) and the door warning switch connector(6P) under the steering column.
2. Check for continuity between the terminals.
3. If continuity is not as specified, replace the switch.




ETQF980A

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

ETQF094A