8710-01/8710-10/8710-13/8712-10/8712-14/8790-01/

GENERAL INFORMATION

OVERVIEW AND OPERATING PROCESS

CONFIGURATION AND FUNCTIONS

REMOVAL AND INSTALLATION

CODING PROCESS

BCM (BODY CONTROL MODULE)

8710-01

GENERAL INFORMATION

1. SPECIFICATIONS

Category	Conditions		Description
Rated voltage	12.0V		-
Operating voltage	9.0 V ~ 16.0 V (CAN and LIN com.: 7.0 V to 18.0 V)		-
Operating temperature	−30ºC ~ +80ºC		-
Storage temperature	−40ºC ~ +85ºC		-
Max. operating humidity	95%		-
Dark current	**With SKM**	**Without SKM**	When vehicle enters sleep mode with all switches OFF, IGN OFF, all doors locked/unlocked and all doors closed
	Below 4.0 mA (with locked)	Below 7.0 mA (with locked)	

2. INPUT SIGNALS

NO	Input signal name	Logic state
1	Wiper switch 1	On = GND, Off = Open
2	Wiper switch 2	On = GND, Off = Open
3	Front wiper (intermittent) volume switch	51 kΩ
4	Front wiper motor (parking switch)	STOP = GND, RUN = BATTERY VOLTAGE
5	Front auto washer switch	On = GND, Off = Open
6	Windshield washer switch	On = GND, Off = Open
7	Rear washer switch	On = GND, Off = Open
8	Rear wiper switch	On = GND, Off = Open
9	Rear wiper (intermittent) switch	On = GND, Off = Open
10	Rear wiper motor (parking switch)	Stop = GND, Run = Battery voltage
11	Key reminder switch	In = Battery voltage (key inserted)
12	Tail lamp switch	On = GND, Off = Open
13	Driver's/passenger's door open switch	On = GND, Off = Open
14	Rear door (LH/RH) open switch	On = GND, Off = Open
15	Tailgate switch	On = GND, Off = Open
16	Hood switch	On = GND, Off = Open
17	Driver/Passenger seat belt switch	Not fastened = GND, Fastened = Open
18	Passenger Seat Belt siwch sensor	ON/OFF VARIABLE RESISTER (Less than 400 Ohm: Detection)
19	Sunroof open switch	On = GND, Off = Open
20	Rear defogger switch	On = GND, Off = Open
21	Driver door LOCK switch	Lock = Open, Unlock = GND
22	Passenger door LOCK switch	Lock = Open, Unlock = GND
23	Rear door (LH, RH) lock switch	Lock = Open, Unlock = GND
24	Center door lock/unlock switch	On = GND, Off = Open
25	Air bag crash sensor	Signal for 20 ms: ON (crash) = 2 (High):8 (Low) Duty OFF (normal) = 8 (High):2 (Low) Duty
26	RR, LH, CTR, RH Seat Belt siwch	Not Wearing = GND , Wearing = OPEN

Modification basis	
Application basis	
Affected VIN	

NO	Input signal	Logic
27	Left turn signal lamp switch	On = GND, Off = Open
28	Right turn signal lamp switch	On = GND, Off = Open
29	Hazard warning lamp switch	On = GND, Off = Open
30	Front fog lamp Status	On = GND, Off = Open
31	Rear fog lamp switch	On = GND, Off = Open
32	AUTO light switch	On = GND, Off = Open
33	Folding switch	On = GND, Off = Open
34	Unfolding switch	On = GND, Off = Open
35	Brake switch	ON = BAT (battery voltage)
36	Headlamp passing switch	On = GND, Off = Open
37	Key cylinder lock switch	Lock = GND, Unlock = Open
38	Key cylinder unlock switch	Unlock = Open, Other than unlock = GND
39	Front PAS ON/OFF switch	On = GND, Off = Open
40	IGN1	ON = Battery voltage (ignition key in ON or START position)
41	IGN2	ON = Battery voltage (IGN ON)

3. RATED LOAD

NO	Item	RATED LOAD
1	Windshield washer motor relay	250 mA
2	Rear washer motor relay	250 mA
3	Front wiper LO relay	200 mA
4	Front wiper HI relay	200 mA
5	Rear wiper motor relay	200 mA
6	Tail lamp relay	200 mA
7	PAB OFF	200 mA
8	Front room lamp control	30 W (10*3)
9	Room lamp ground control	30 W (10*3)
10	Key hole illumination control	1.2 W (130 mA)
11	Key hole illumination control	1.2 W (130 mA)
12	Rear defogger relay	200 mA
13	Door lock motor relay	200mA
14	Door unlock motor relay	200mA
15	Headlamp relay (+)	200mA
16	Headlamp relay (-)	200mA
17	Tailgate open relay	200mA
18	Warning horn relay	200mA
19	Power window relay	200mA
20	Left turn signal indicator	42W + 3.2W
21	Right turn signal indicator	42W + 3.2W
22	DRL lamp	22W
23	Folding relay	200mA
24	Unfolding relay	200mA
25	Exterior buzzer (SKM buzzer)	600mW
26	Brake lamp	18.9 W (8.2+8.2+2.5)
27	Front PAS ON/OFF indicator	200mA
28	Interior tail lamp relay	200mA
29	Rear fog lamp relay	200mA
30	RR(LH, RH, CTR) seat belt IND	200mA

Modification basis	
Application basis	
Affected VIN	

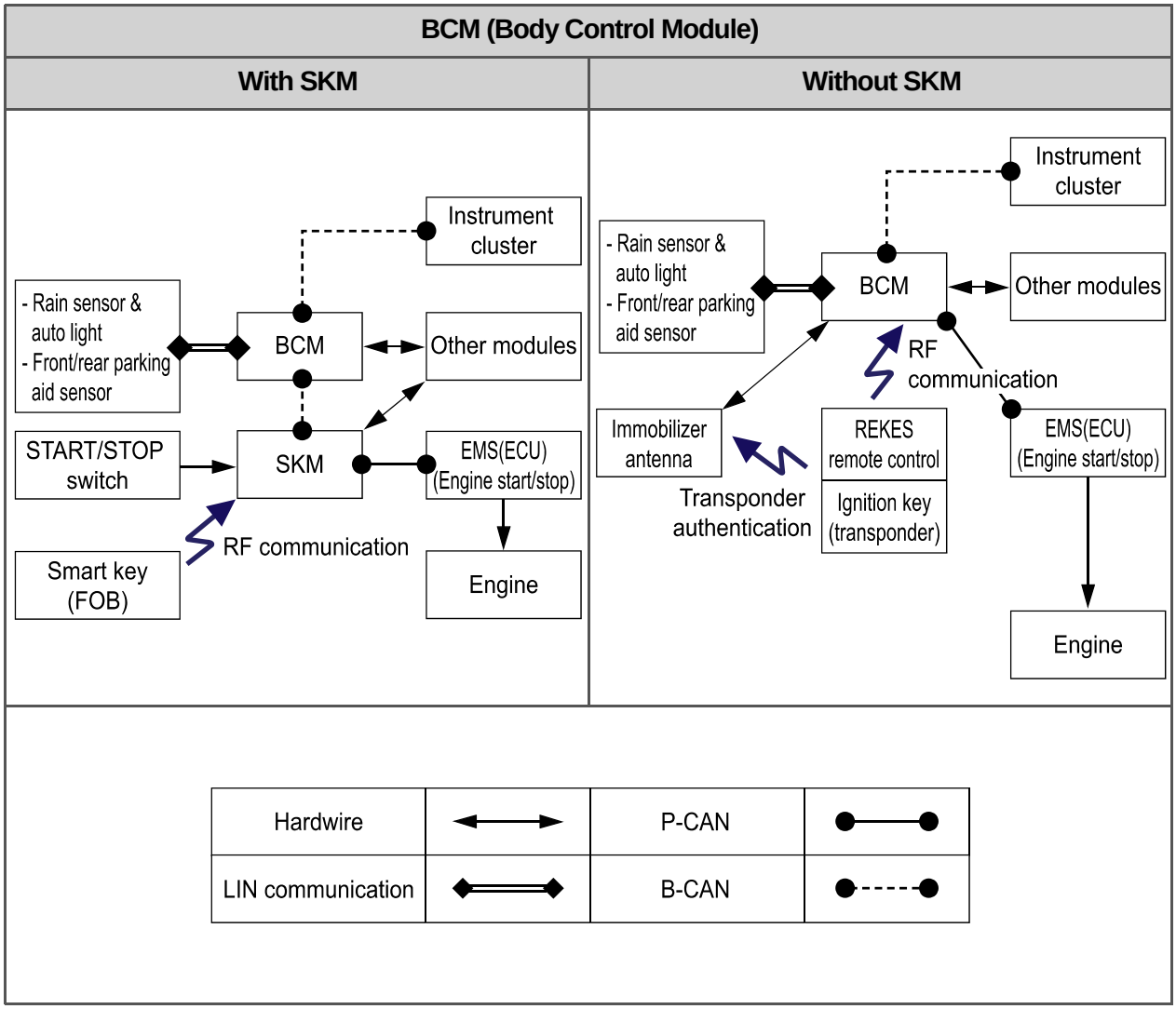
4. MAJOR FUNCTIONS

No.	Item		Without SKM	With SKM
1	Wiper control	Front wiper LO/HI control	O	O
		Front washer interlocking wiper control	O	O
		Auto washer interlocking wiper control	O	O
		Rear wiper control	O	O
		Rear washer interlocking wiper control	O	O
		Rain sensor interlocking wiper (LIN) control	O	O
		Speed sensitive intermittent wiper control	O	O
		Power-up reminder control	O	O
2	Auto light	Auto light control	O	O
3	Tail lamp control	Tail lamp switch ON warning	O	O
		Tail lamp warning display (with supervision)	O	O
		Tail lamp auto off control	O	O
4	Door ajar warning	Door ajar warning	O	O
		Door ajar control	O	O
5	Seat belt control	Seat belt warning	O	O
		Seat belt reminder	O	O
6	Sunroof control	Sunroof open warning	O	O
		Sunroof warning display (with supervision)	O	O
7	Room lamp control	Door coupled room lamp dim control	O	O
		Room lamp control display	-	-
		Room lamp AUTO OFF	O	O
8	Defogger (heating element) control	Rear defogger (heating element) control	O	O
9	REKES key & smart key	Remote control door LOCK	O	O
		Remote control door UNLOCK	O	O
		Remote control panic	O	O
		Remote control escort	O	O

No.	Item		Without SKM	With SKM
10	Door LOCK/UNLOCK control	Door LOCK/UNLOCK Control by door LOCK Switch	O	O
		Door LOCK/UNLOCK Control by center door LOCK Switch	O	O
		Door LOCK/UNLOCK control by door handle switch (passive entry)	-	O
		Auto door lock control	O	O
		AUTO UNLOCK upon receiving air bag deployment signal	O	O
11	Tailgate control	Tailgate open control(passive entry)	-	O
12	Theft deterrent alarm control	Theft deterrent alarm control (without SKM)	O	-
		Theft deterrent alarm control (with SKM)	-	O
13	Time lag window control	Time lag power window control	O	O
14	System power sleep mode	System power sleep mode control	O	O
15	Flasher control	LH/RH turn signal lamp control	O	O
		Hazard warning lamp control	O	O
		Auto hazard warning flasher control	O	O
		Emergency hazard warning flasher control	O	O
16	DRL control	DRL lamp control	O	O
17	Outside rearview mirror control	Folding/unfolding control	O	O
18	Stop lamp control	Stop lamp control	O	O
		Emergency stop lamp control	O	O
19	PAS control	Front PAS control	O	O
		Rear PAS control	O	O

Modification basis	
Application basis	
Affected VIN	

5. COMPARISON BETWEEN MODELS WITH AND WITHOUT SKM



The BCM receives the signal from the different switches and sensors and exchanges data with other modules through the hard wire and CAN and LIN communications to control the body and electronic system of the vehicle.

For the vehicles with SKM, the SKM communicates with BCM through B-CAN. It sends the door LOCK/UNLOCK signal by smart key, theft deterrent mode signal, and passive entry signal, etc. to the BCM to control each module. The signals for engine running and stopping controls are sent to the EMS (ECU) through the P-CAN.

For the vehicles without SKM, the BCM receives door LOCK/UNLOCK signal by smart key, theft deterrent mode signal, and passive entry signal, etc. directly from the modules to control them. It controls the engine start/stop operation by sending the corresponding signals to the EMS (ECU) after authenticating the ignition key by the immobilizer logic. The controls for other modules may vary depending on the vehicle specifications.

6. CODING LISTS WHEN REPLACING ELECTRONIC SYSTEMS

▶ **With SKM**

Item	EMS registration	Variant coding	Smart key & transponder coding	Remarks
ECU replacement	Carried out by SKM	-	-	-
BCM replacement	-	Carried out by BCM	-	-
Smart key replacement	-	-	Carried out by SKM	-
SKM replacement	Carried out by SKM	-	Carried out by SKM	

▶ **With REKES**

Item	EMS registration	REKES Key coding	Transponder registration	Variant coding
ECU replacement	Carried out by BCM	-	-	-
REKES key replacement	-	Carried out by BCM	Carried out by BCM	-
BCM replacement	-	Carried out by BCM	Carried out by BCM	Carried out by BCM

Modification basis	
Application basis	
Affected VIN	

Memo

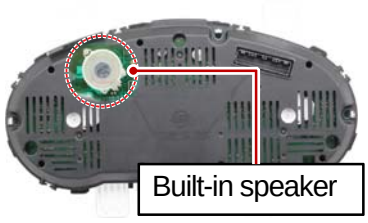
OVERVIEW AND OPERATING PROCESS

1. OVERVIEW

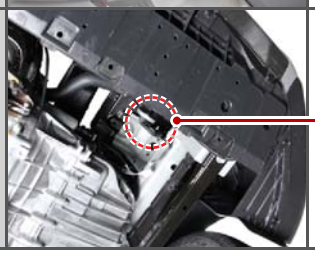
The BCM (Body Control Module) is a module that receives data from the different switches and sensors, exchanges data with other modules through the hard wire and CAN communication, and controls the body, electronic system, and chassis of the vehicle.

2. SYSTEM CONFIGURATION

1) With SKM

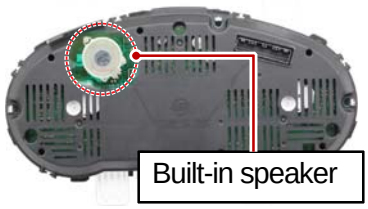
BCM (w/ SKM)	Interior buzzer (IP)	SKM
		

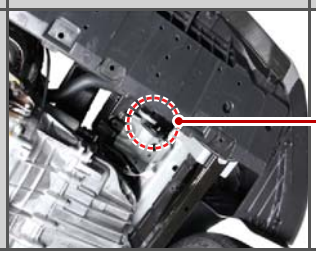
Smart key


Item	Mounting location	Single item
Exterior buzzer (SKM buzzer)		
Warning horn		

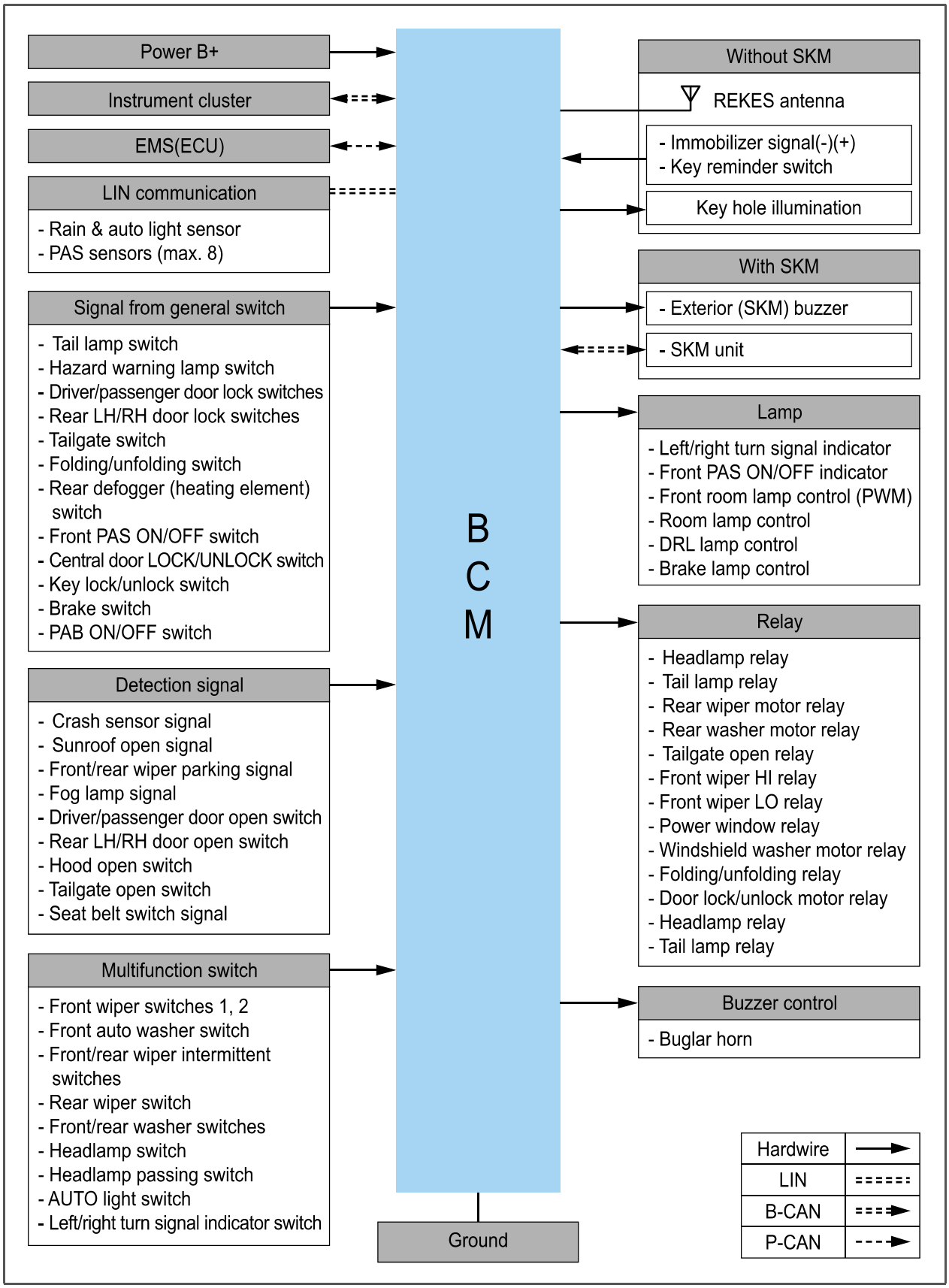
Modification basis	
Application basis	
Affected VIN	

2) Without SKM

BCM (w/o SKM)	Immobilizer antenna assembly	Interior buzzer (IP)
		

REKES Key	Item	Mounting location	Single item
	Warning horn		

3. I/O ELEMENTS

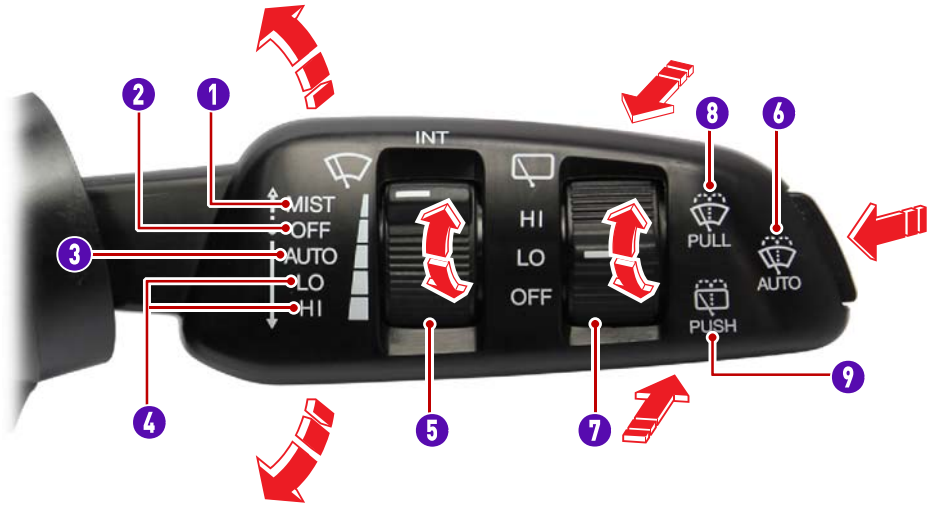


Modification basis	
Application basis	
Affected VIN	

4. WIPER CONTROL

The wiper system operates the wiper and washer using the signals from the multi-function switch, and receives rain sensing signal from the rain sensor unit.

▶ **Functions of wiper & washer switch (multifunction switch)**



1. Mist

- When the wiper switch is pushed up to the mist position, the front wiper operation cycles once and then stops.

2. OFF

- Stops the windshield wiper operation.

3. AUTO

- When the wiper switch is placed to the AUTO position, the wiper speed is adjusted automatically according to the rain of volume measured by the rain sensor mounted on the windshield.

4. LO/HI

- When the wiper switch is set to the LO position, the wiper speed is decreased. When the switch is set to the HI position, the wiper speed is increased.

5. Front wiper volume sensitivity switch

- When the wiper switch is in AUTO position, the wiper speed can be adjusted as follows:
  * FAST: increases wiper speed
  * SLOW: decreases wiper speed

6. AUTO washer switch

- When the AUTO washer switch is pressed, the washer fluid is sprayed once and the wiper is operate 4 times. Then, the fluid is sprayed once again with 3 wiping operations.

7. Rear wiper switch

- Operates the rear wiper.

8. Pull

- The windshield washer fluid sprays out and front wiper operates only when the switch is being pulled.

9. Push

- The rear washer fluid sprays out and rear wiper operates only when the switch is being pressed down.

Modification basis	
Application basis	
Affected VIN	

▶ Windshield washer switch linked windshield wiper operation

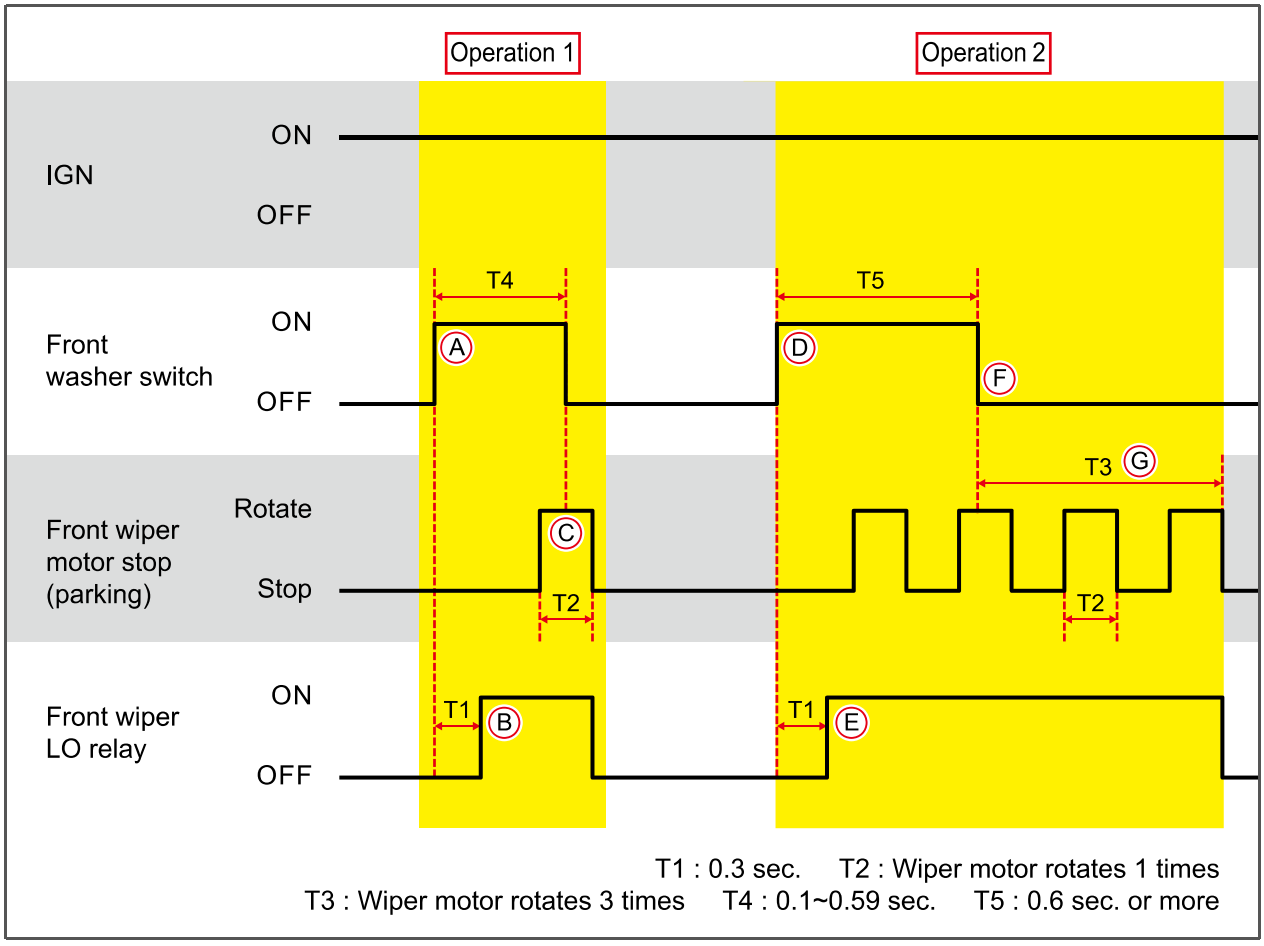
Prerequisite condition	IGN ON

Operation 1. (windshield washer switch pulled for 0.1 to 0.59 sec.)

A. Windshield washer switch ON for 0.1 ~ 0.59 sec. (T4)
B. After 0.3 sec. (T1), windshield wiper LO relay activated
C. Windshield wiper LO relay deactivated after windshield wiper motor rotates 1 turn (T2)

Operation 2. (windshield washer switch pulled for more than 0.6 sec.)

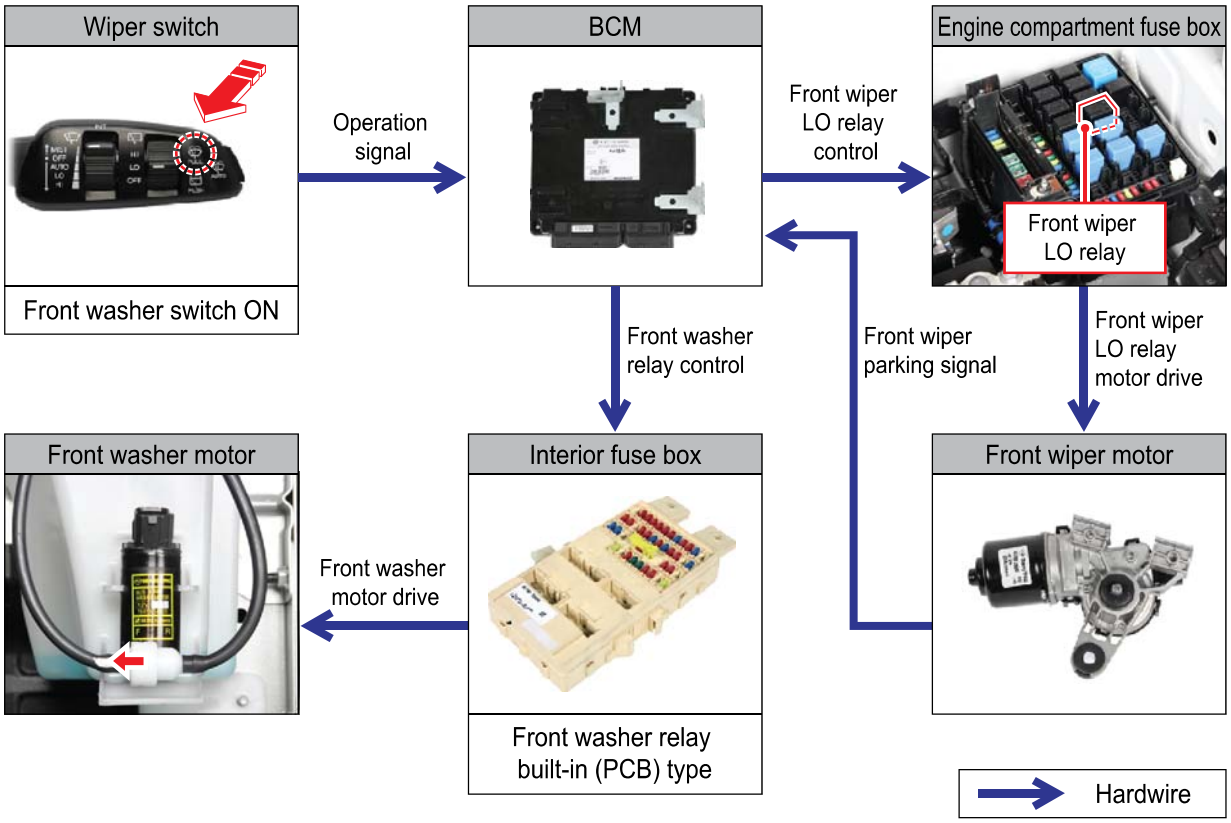
D. Windshield washer switch ON for more than 0.6 sec. (T5)
E. After 0.3 sec. (T1), windshield wiper LO relay activated
F. Windshield washer switch OFF
G. Windshield wiper LO relay deactivated after windshield wiper motor rotates 3 turns (T3)



Modification basis	
Application basis	
Affected VIN	

System flowchart

- With IGN ON



▶ Windshield washer switch linked wiper operation during intermittent wiper operation

Prerequisite condition	- Windshield intermittent wiper operates with IGN ON and wiper AUTO switch in ON position

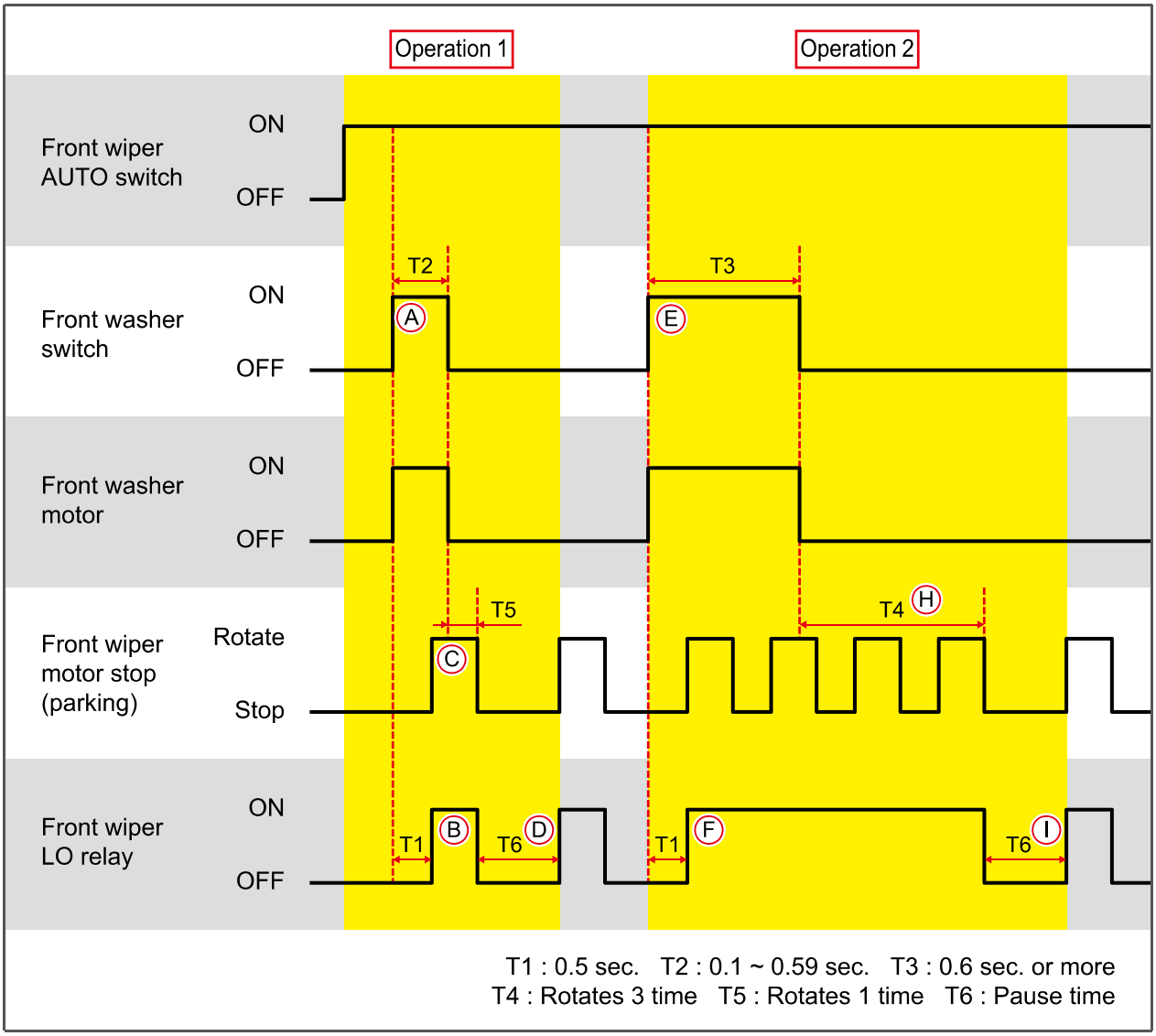
Operation 1. (windshield washer switch pulled for 0.1 to 0.59 sec.)

A. Windshield washer switch ON for 0.1 ~ 0.59 sec. (T4)
B. After 0.5 sec. (T1), windshield wiper LO relay activated
C. Windshield wiper LO relay deactivated after windshield wiper motor rotates 1 turn (T5)
D. Intermittent wiper operated by front wiper LO relay after rest time (T6)

Operation 2. (windshield washer switch pulled for 0.6 sec. or more)

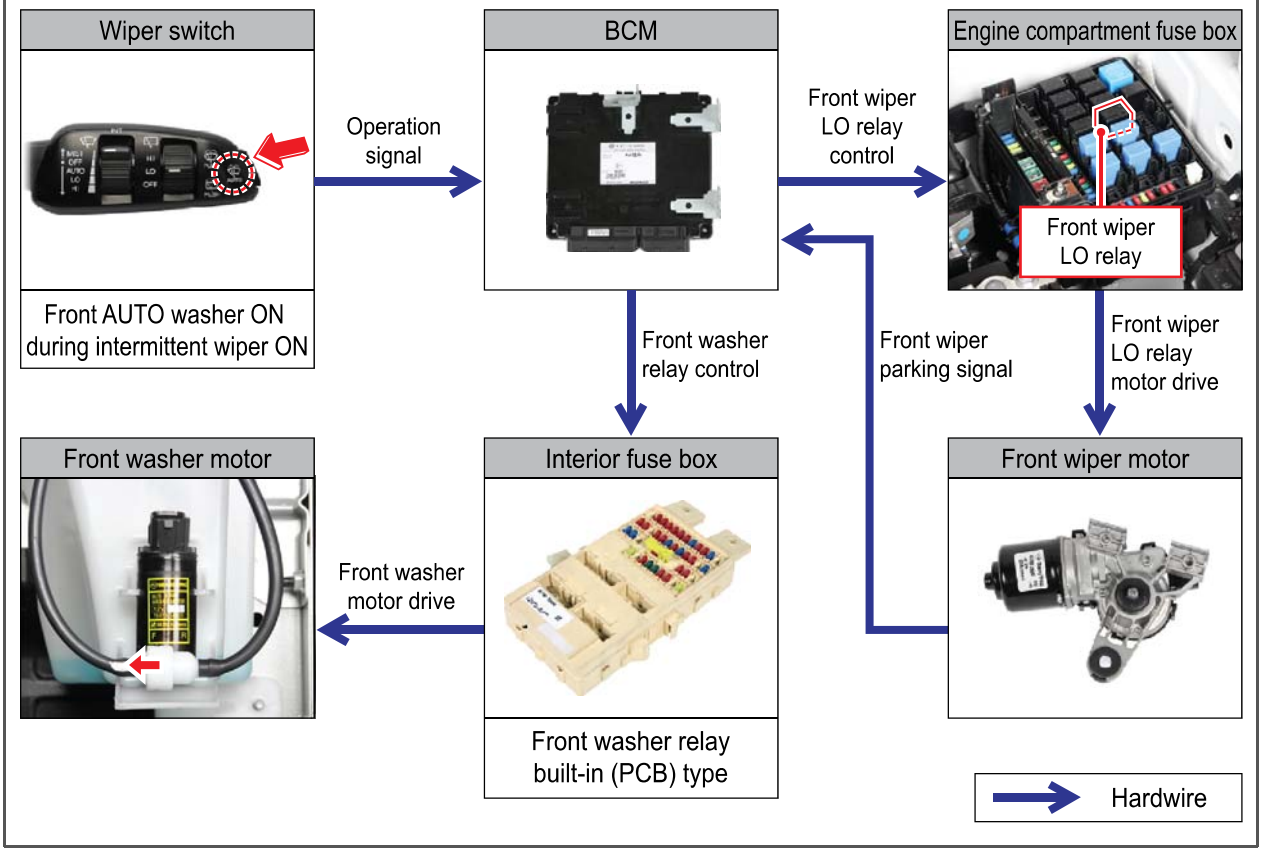
E. Windshield washer switch ON for more than 0.6 sec. (T5)
F. After 0.5 sec. (T1), windshield wiper LO relay activated
G. Windshield washer switch OFF
H. Windshield wiper LO relay deactivated after windshield wiper motor rotates 3 turns (T3)
I. Intermittent wiper operated by front wiper LO relay after rest time (T6)

Modification basis	
Application basis	
Affected VIN	


Operation 1
Operation 2
Front wiper AUTO switch
ON
OFF
Front washer switch
ON
OFF
T2
T3
A
E
Front washer motor
ON
OFF
Front wiper motor stop (parking)
Rotate
Stop
T5
T4
H
C
Front wiper LO relay
ON
OFF
T1
B
T6
D
T1
F
T6
I
T1 : 0.5 sec. T2 : 0.1 ~ 0.59 sec. T3 : 0.6 sec. or more
T4 : Rotates 3 time T5 : Rotates 1 time T6 : Pause time

System flowchart

- With IGN ON and wiper auto switch ON



Modification basis	
Application basis	
Affected VIN	

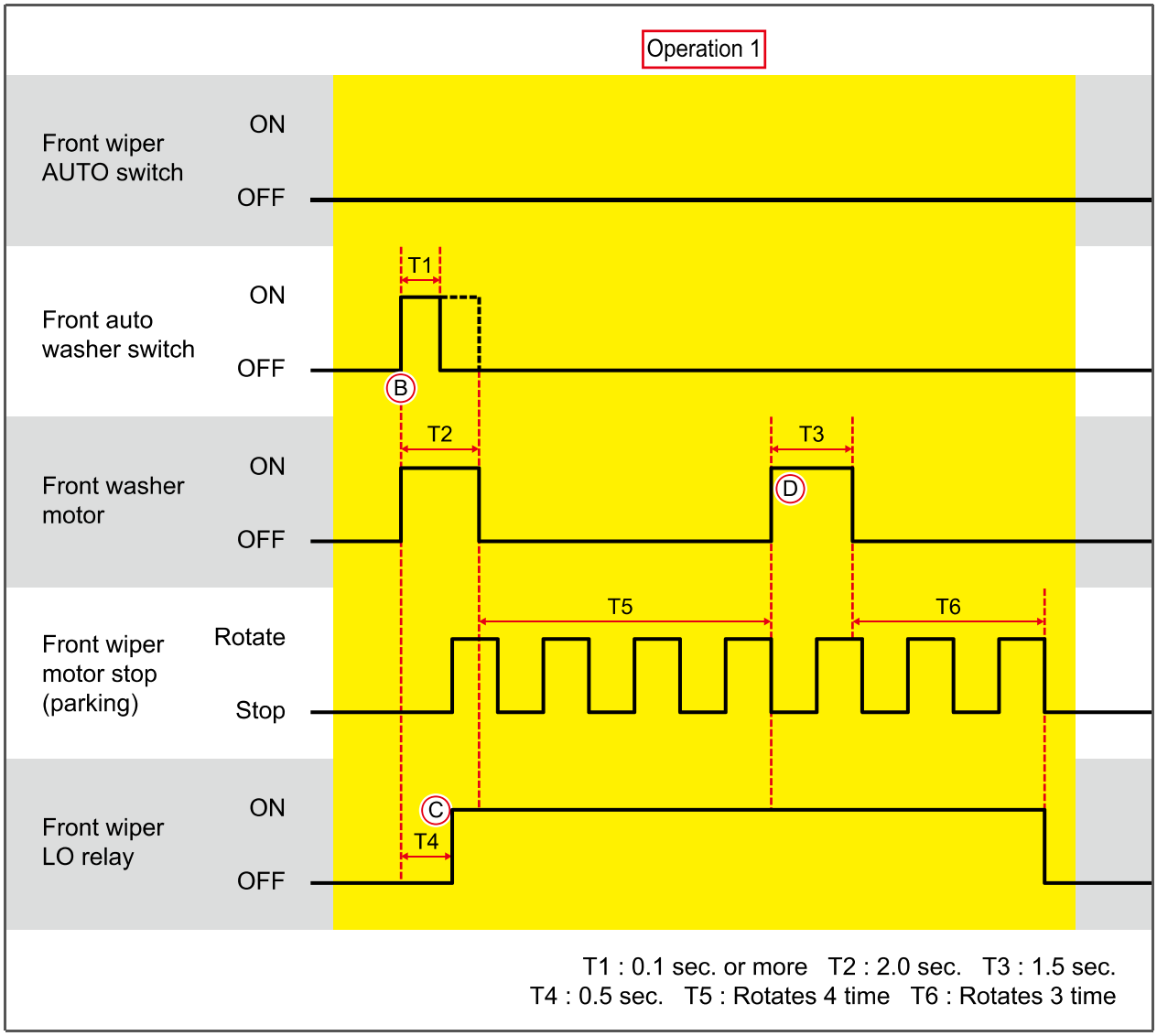
▶ Windshield auto washer switch linked windshield wiper operation

Operation 1.

A. With IGN ON and windshield wiper auto switch OFF
B. Windshield auto washer switch ON for 0.1 seconds or more (T1) and windshield washer motor ON for 2.0 seconds (T2)
C. The windshield wiper LO relay is operated 4 times (T5) 0.5 seconds (T4) after the windshield washer motor has been activated.
D. And then the windshield wiper LO relay is deactivated 3 times (T6) of operation while the windshield washer motor is activated for 1.5 seconds (T3).

NOTE

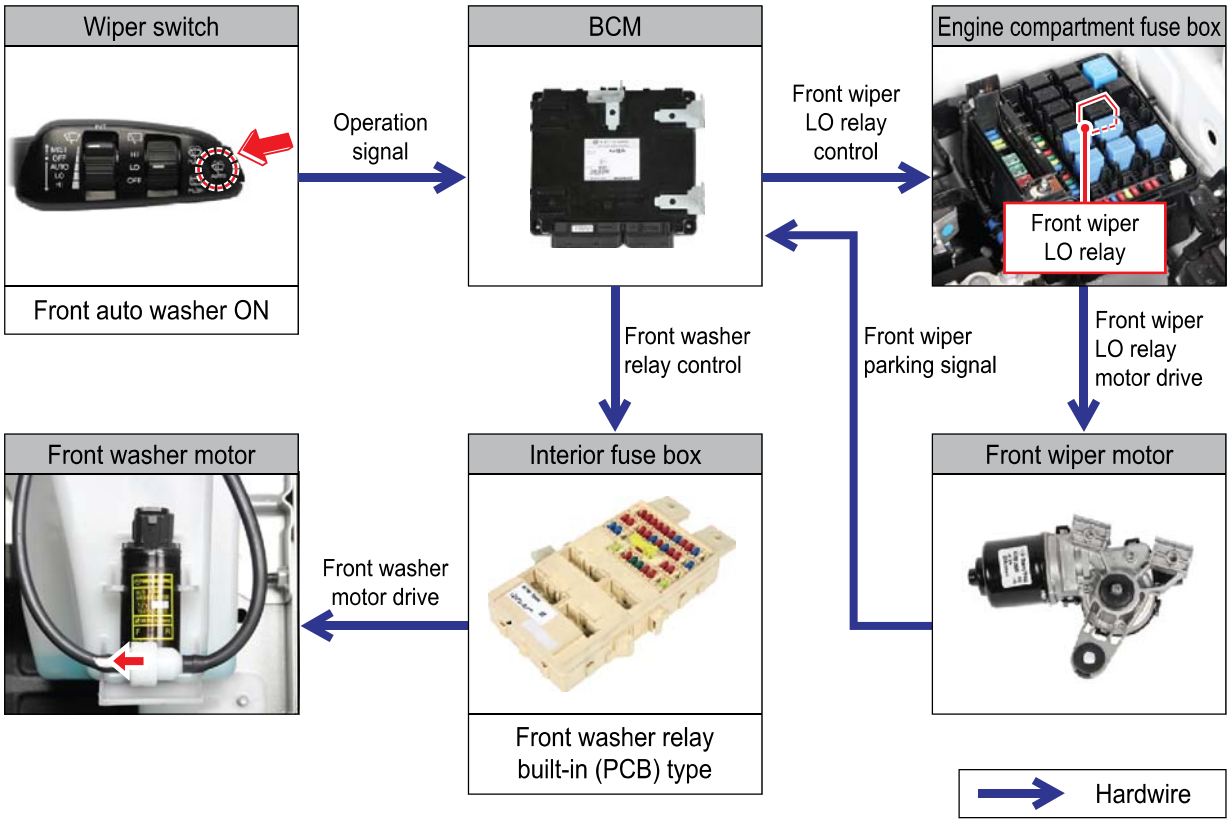
- Input from windshield auto washer overridden during windshield washer motor operation
- Input from windshield auto washer overridden again during windshield auto washer linked windshield wiper operation
- Input from windshield auto washer overridden during speed sensitive intermittent wiper operation
- When ON signal of windshield intermittent wiper switch received during windshield auto washer operation, windshield auto washer stops operation and windshield intermittent wiper operates
- Input from windshield washer switch overridden during windshield auto washer operation



Modification basis	
Application basis	
Affected VIN	

System flowchart

- With IGN ON and wiper auto switch OFF



NOTE

Priority of operation:

Windshield washer switch → Wiper auto switch

Modification basis	
Application basis	
Affected VIN	

▶ **Operates the rear wiper.**

Prerequisite condition	IGN ON

Operation 1. (Rear wiper switch)

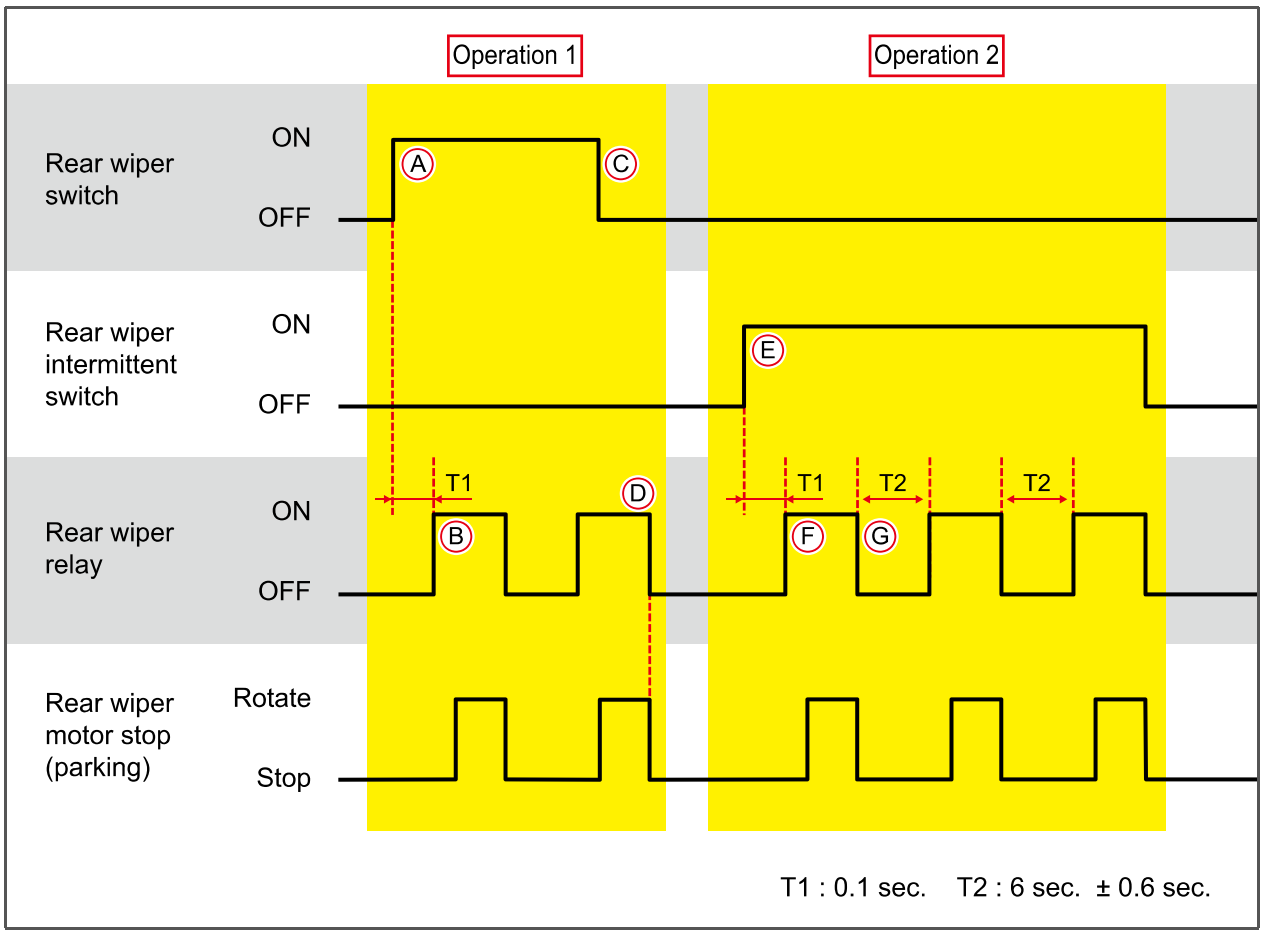
A. Rear wiper switch ON
B. After 0.1 sec. (T1), rear wiper relay activated
C. Rear wiper switch OFF
D. Rear wiper relay deactivated upon receiving rear wiper motor parking signal

Operation 2. (Rear wiper intermittent switch)

E. Rear wiper intermittent switch ON
F. After 0.1 sec. (T1), rear wiper relay activated once
G. After rest of 0.6 sec. (T2), rear wiper relay activated once again

NOTE

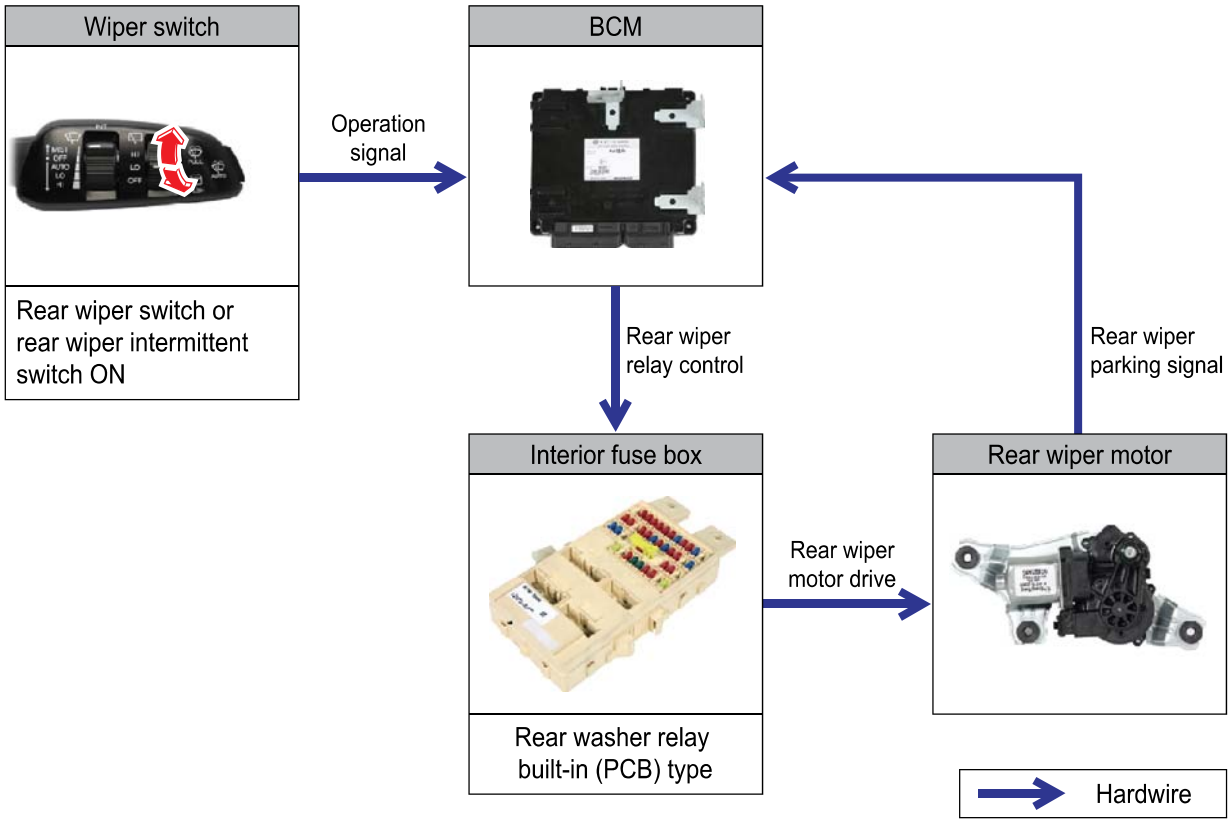
When turning ignition off during the rear wiper operation, the rear wiper operates until the rear wiper motor parking signal is received.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- With IGN ON



▶ Rear washer linked rear wiper operation

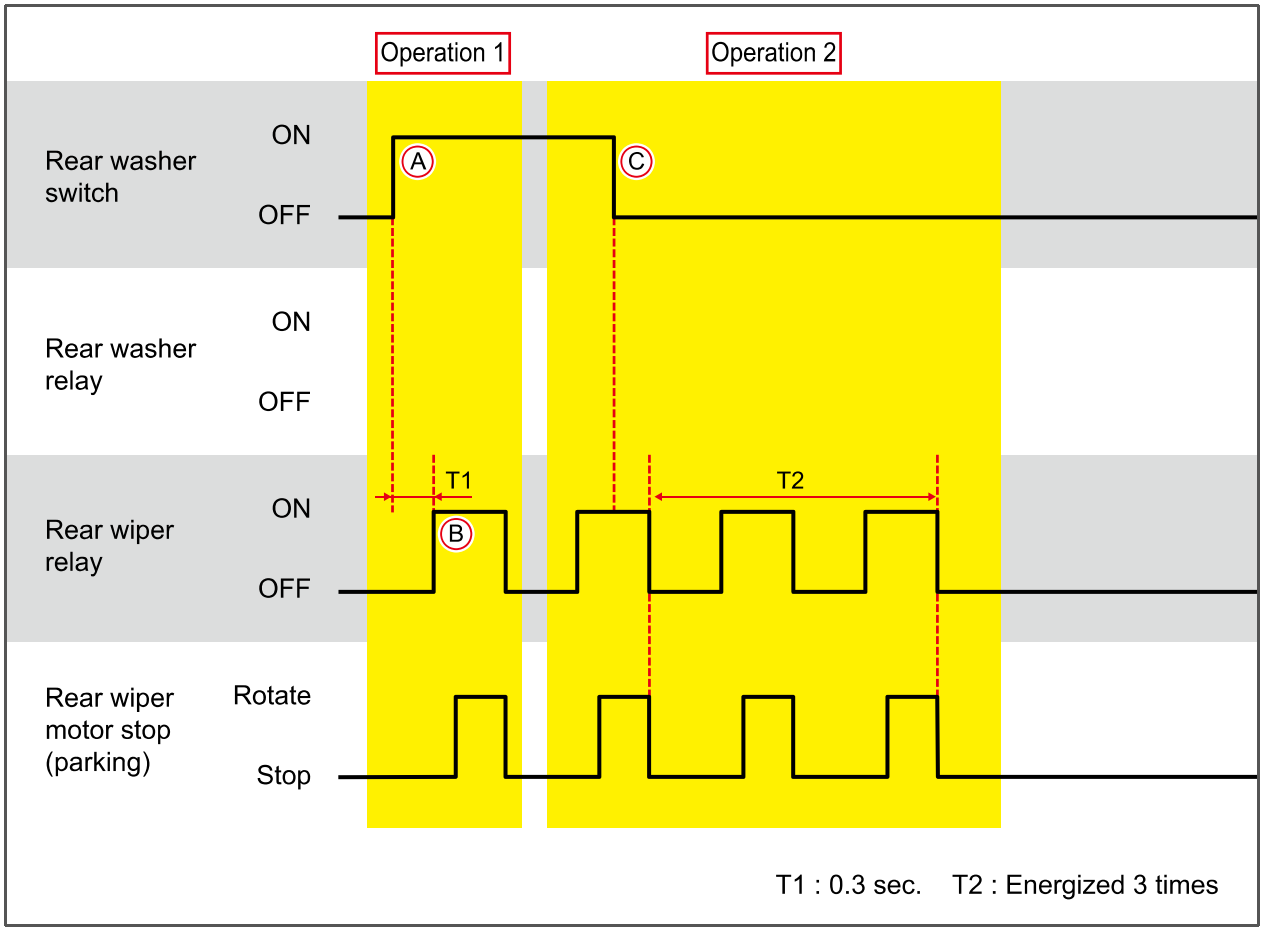
Prerequisite condition	IGN ON

Operation 1.

A. Rear washer relay ON when rear washer switch ON
B. After 0.3 sec. (T1), rear wiper relay ON

Operation 2.

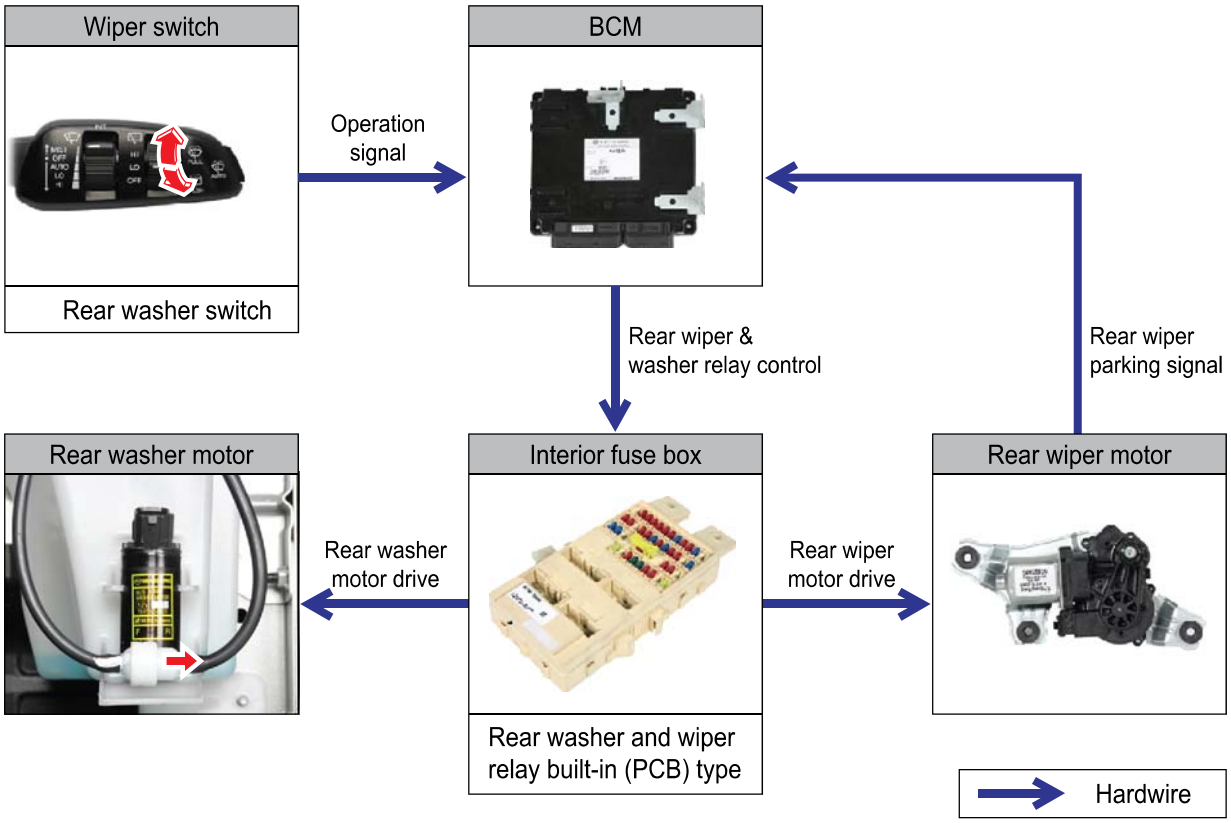
C. Rear washer motor OFF when rear washer switch OFF
D. Rear wiper relay operates 3 times (T2) and stops since rear washer switch off



Modification basis	
Application basis	
Affected VIN	

System flowchart

- With IGN ON

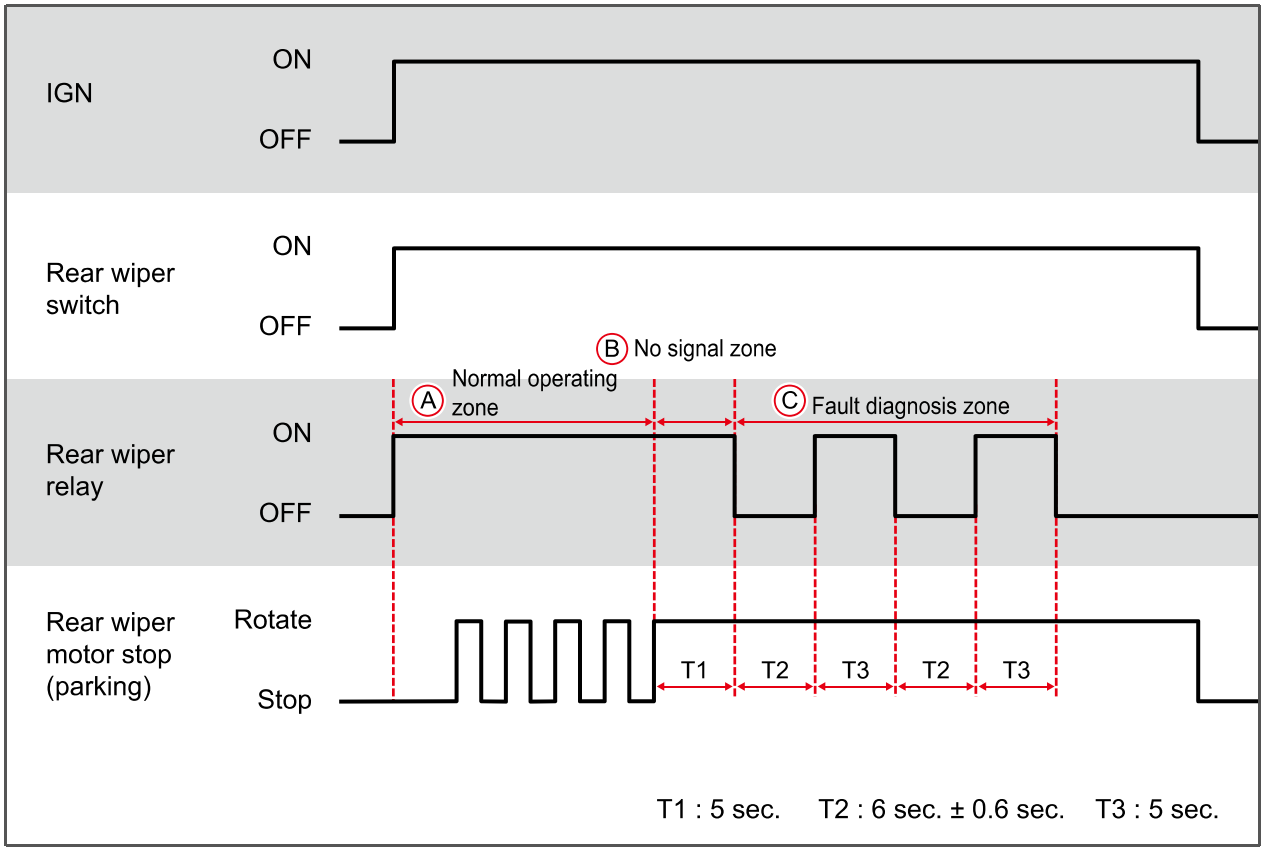


▶ **Rear wiper DTC set**

Prerequisite condition	IGN ON, rear wiper switch and rear wiper intermittent switch ON

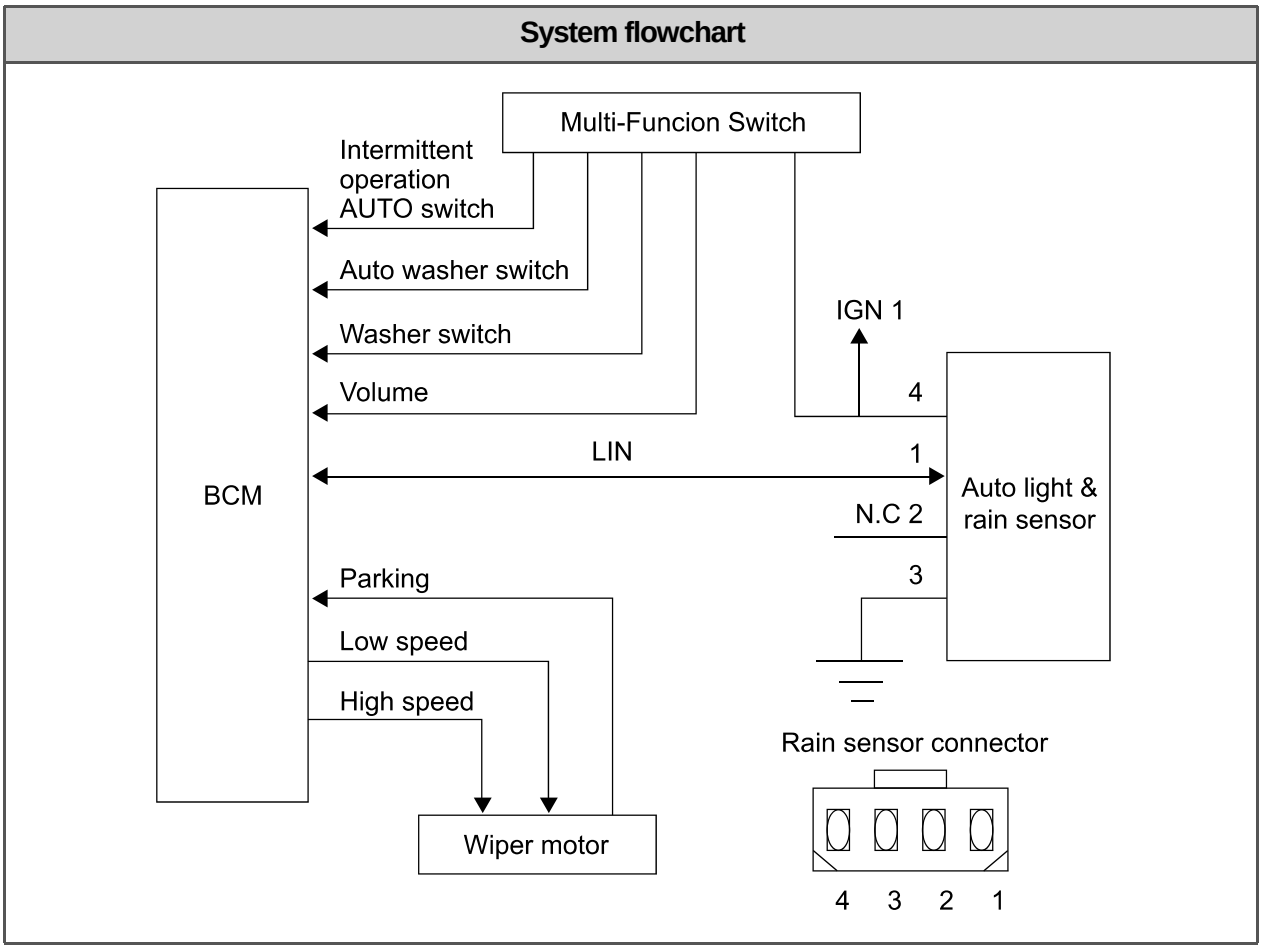
Operation 1. (DTC set)

A. Rear wiper normal operation
B. No change in rear wiper motor parking signal for 5 s (T3) or longer
C. Rear wiper stops after 2 cycles with rear wiper parking for 6 s (T2) and rear wiper operation for 5 s (T1)



Modification basis	
Application basis	
Affected VIN	

▶ System diagram for BCM and rain sensor



Data recognition time

The LIN communication is established when the ignition is turned ON, regardless of the wiper and light switch operation. Then the function for the LIN data is carried out with the wiper AUTO switch or AUTO light switch in the AUTO position.
The data from the rain sensor is recognized as 2 consecutive data.

Operation when data is recognized

Data OFF: Lo/HI relay output OFF
Low speed signal: LO relay output ON (ON for at least 1 revolution), HI relay output OFF
High speed signal: HI relay output ON (ON for at least 1 revolution), LO relay output ON
The washer input is overridden during continuous operation of wiper. (washer coupled wiper operation during intermittent operation)

Power-up reminder

Washer coupled wiper in rain sensing mode

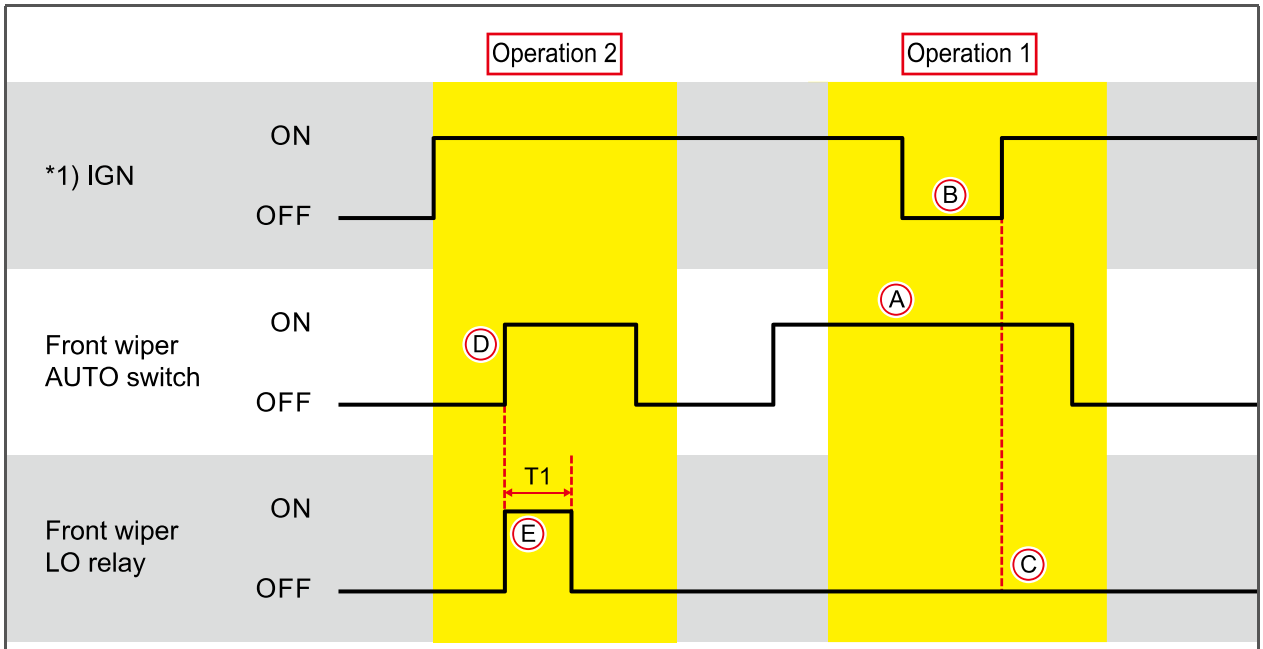
▶ Windshield wiper auto switch position reminder (power-up reminder wiper)

Operation 1.

A. With windshield wiper auto switch ON,
B. Cycling ignition key (ON → OFF → ON)
C. Windshield wiper LO relay not operated

Operation 2.

D. With IGN ON, changing windshield wiper auto switch from OFF to ON position
E. Windshield wiper LO relay is operated and front wiper motor rotates 1 turn (T1) and stops



T1 : Rotates 1 time

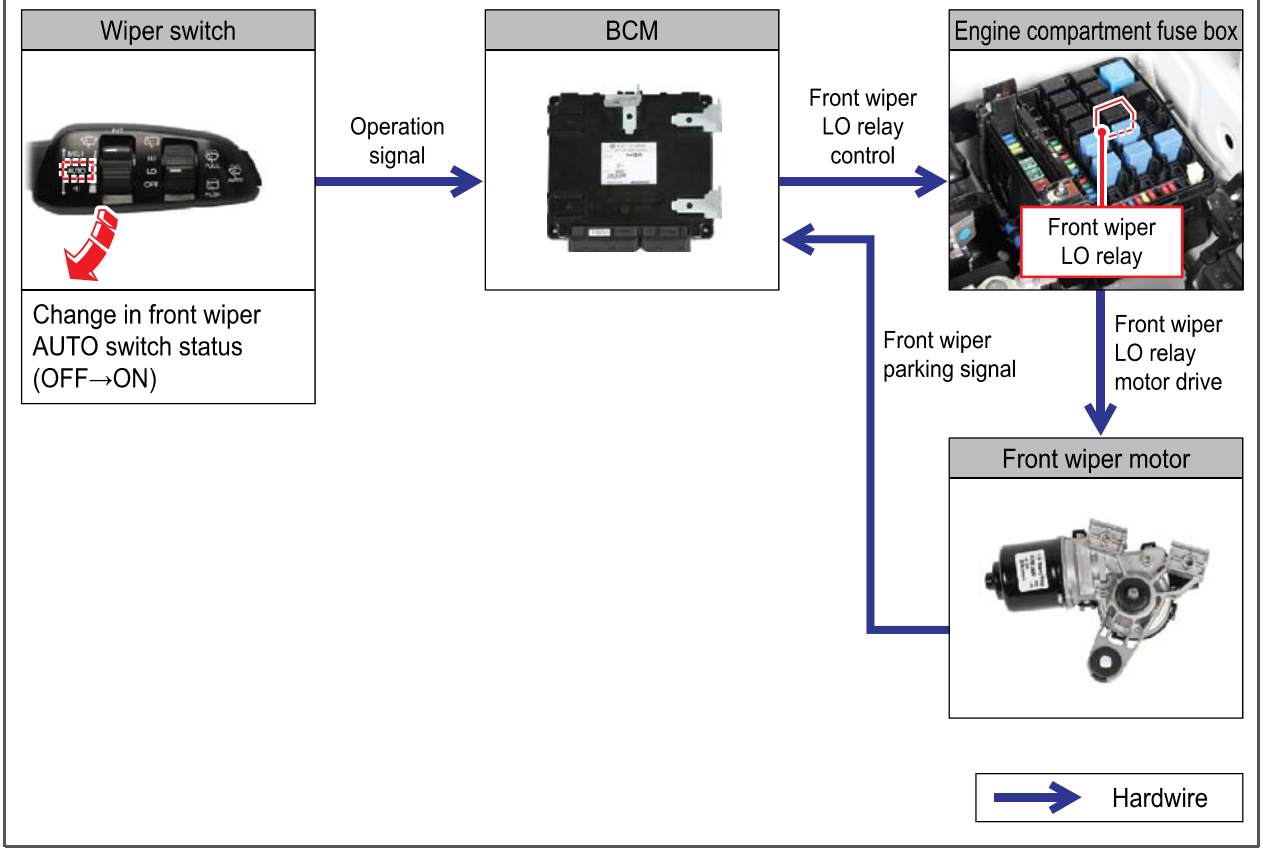
Operating conditions based on *1)

Conditions	Without SKM	With SKM
IGN ON	Ignition key inserted	IGN ON
IGN OFF	Ignition key removed	IGN OFF

Modification basis	
Application basis	
Affected VIN	

System flowchart

- IGN ON



▶ Washer switch linked rain sensor operation

Prerequisite condition	Intermittent operation with IGN ON and wiper AUTO switch in ON position

Operation 1.

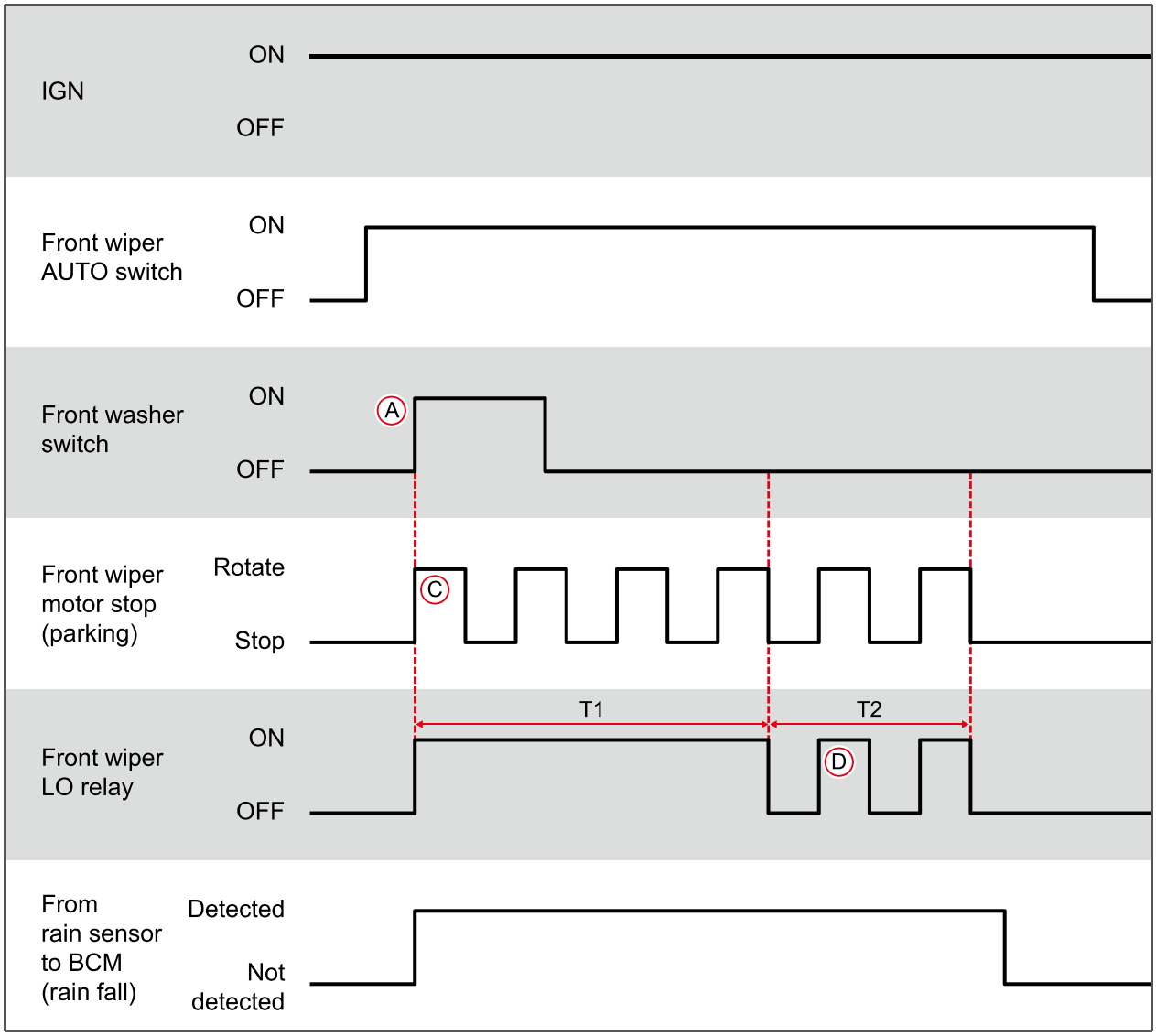
- If rain sensor linked data is not for wiper continuous operation

A. Windshield washer switch ON
B. Communication with rain sensor overridden (can misread washer fluid as rain drops)
C. Windshield washer linked wiper operation (T1)
D. Rain sensor linked operation (T2) after windshield washer linked wiper operation
However, if the washer switch signal is received the washer relay is activated and wiper relay remains activated, when the data coupled with rain sensor indicates continuous wiper operation.

NOTE

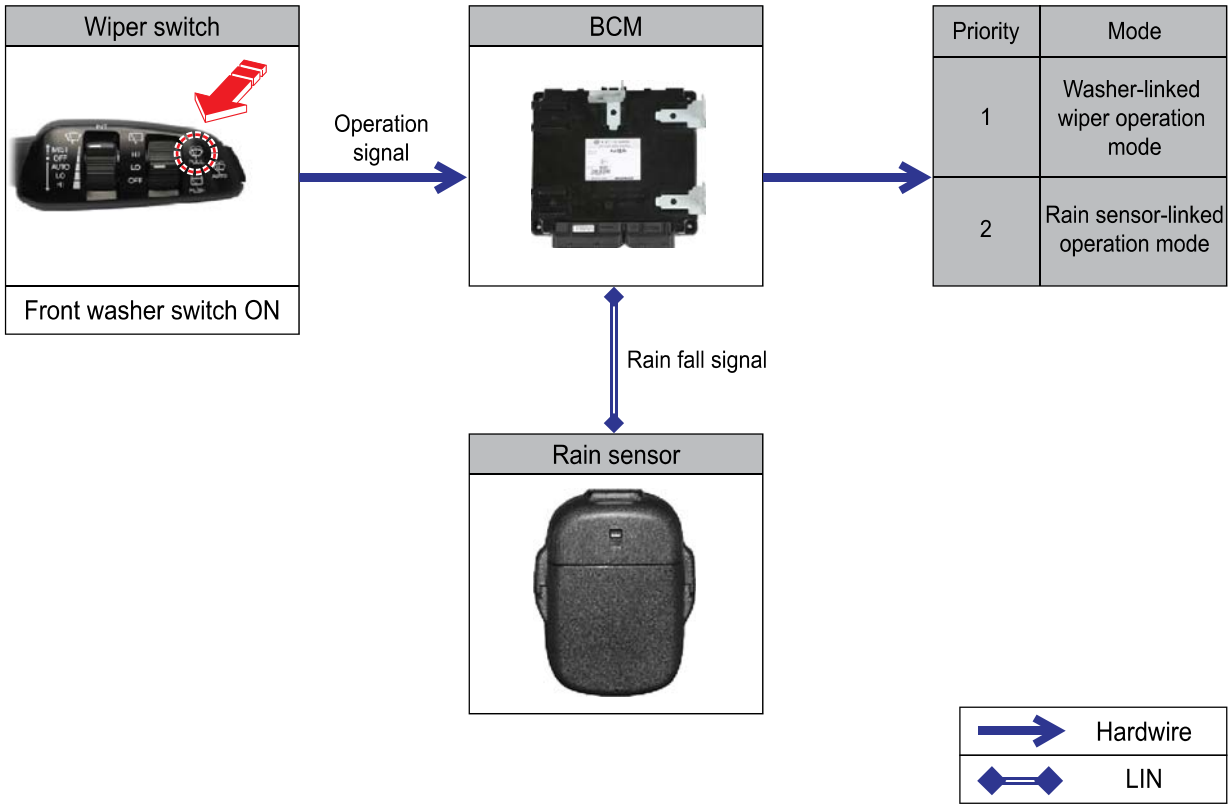
Even though the wiping system is in washer coupled wiper mode, the operating data are sent to rain sensor from the BCM.

Modification basis	
Application basis	
Affected VIN	


IGN
ON
OFF
Front wiper AUTO switch
ON
OFF
Front washer switch
ON
OFF
A
Front wiper motor stop (parking)
Rotate
Stop
C
T1
T2
Front wiper LO relay
ON
OFF
D
From rain sensor to BCM (rain fall)
Detected
Not detected

System flowchart

- During intermittent operation with IGN ON and windshield wiper auto switch ON



Modification basis	
Application basis	
Affected VIN	

▶ Wiper sensitivity control

Basic conditions	IGN ON/Wiper AUTO switch ON/Wiper motor in parking position

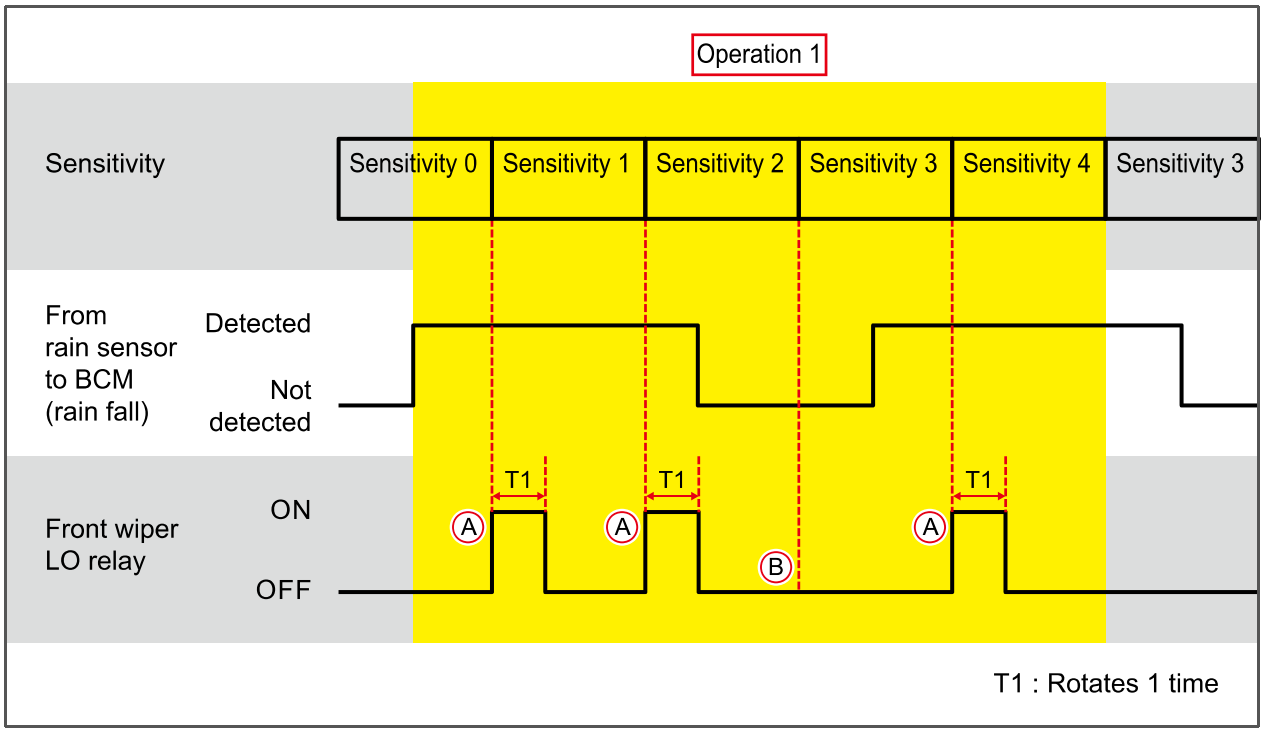
Operation 1.

– Increasing the speed level (ex: speed level 0 → level 1)

A. The amount of rain is detected by the rain sensor.
B. The windshield wiper LO relay is operated once (T1).
The amount of rain is not detected by the rain sensor.
The windshield wiper LO relay is not operated.

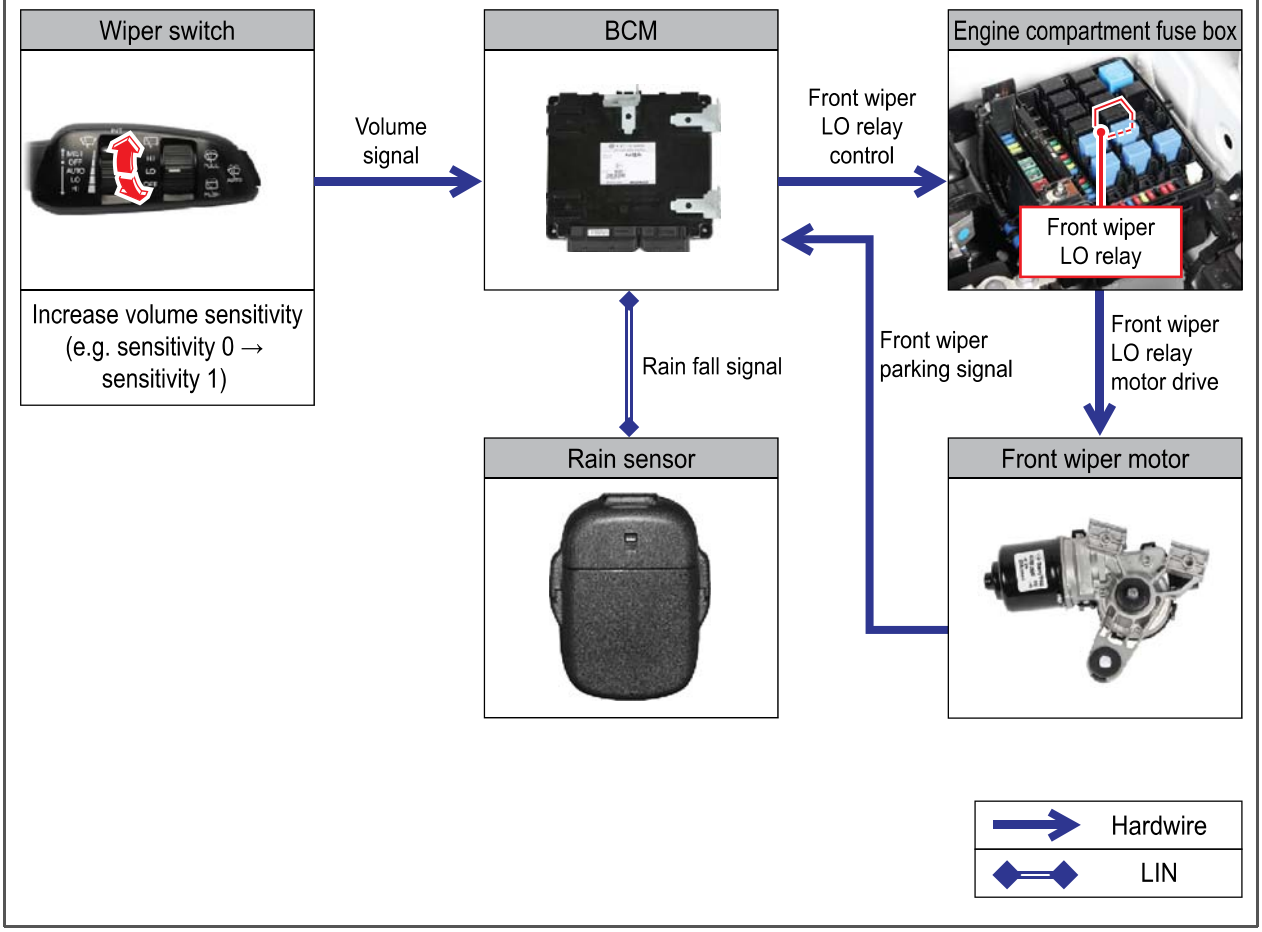
NOTE

If the speed level is changed more than 1 stage within 2 seconds, the windshield wiper motor runs only one cycle.



System flowchart

- IGN ON/Wiper AUTO switch ON/Wiper motor in parking position

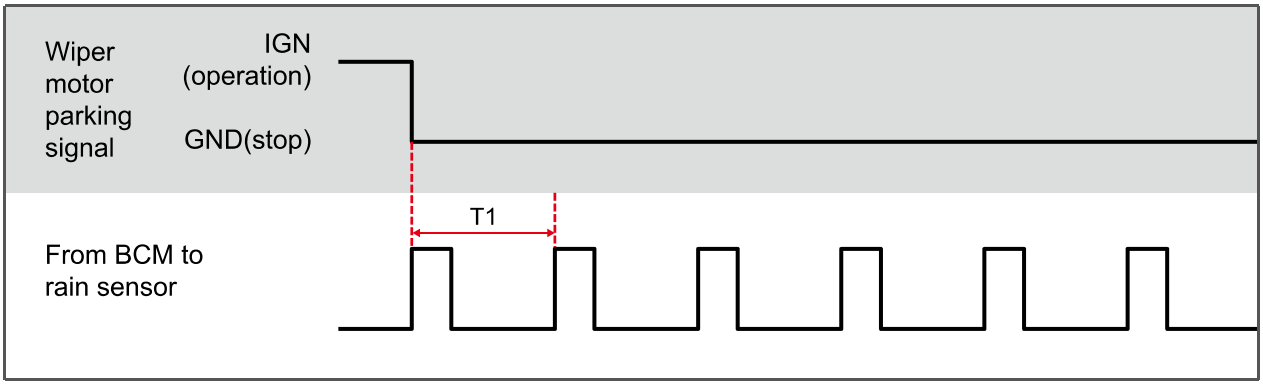


Modification basis	
Application basis	
Affected VIN	

▶ Abnormal wiper parking signal stop (GND)

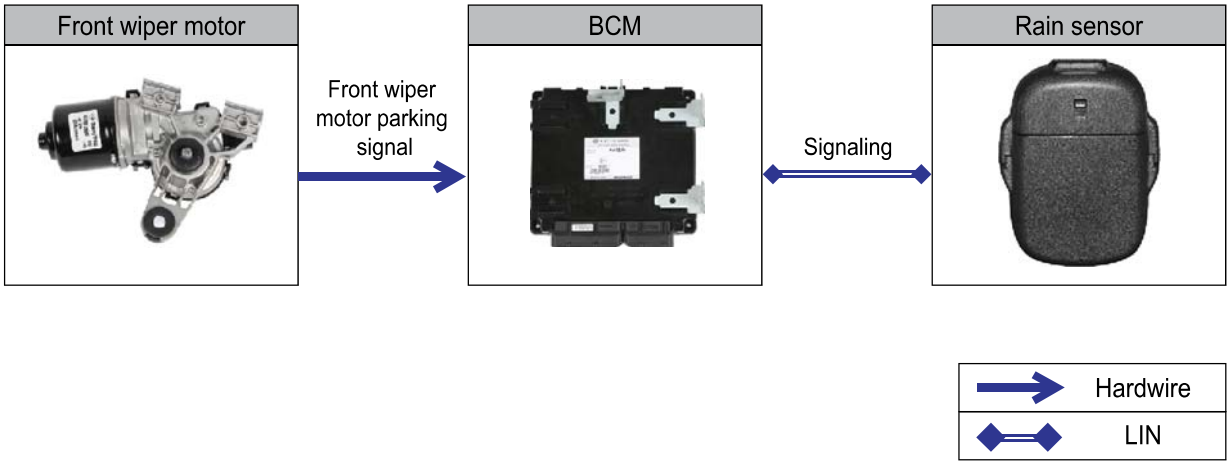
Operation 1. (When the wiper motor parking signal stopped at GND)

A. The wiper system sends the corresponding signal of current status with IGN ON and wiper AUTO switch ON. (The wiper motor is operated only when the request signal from the rain sensor is received.)



System flowchart

- IGN ON/windshield wiper auto switch ON/wiper motor in parking position



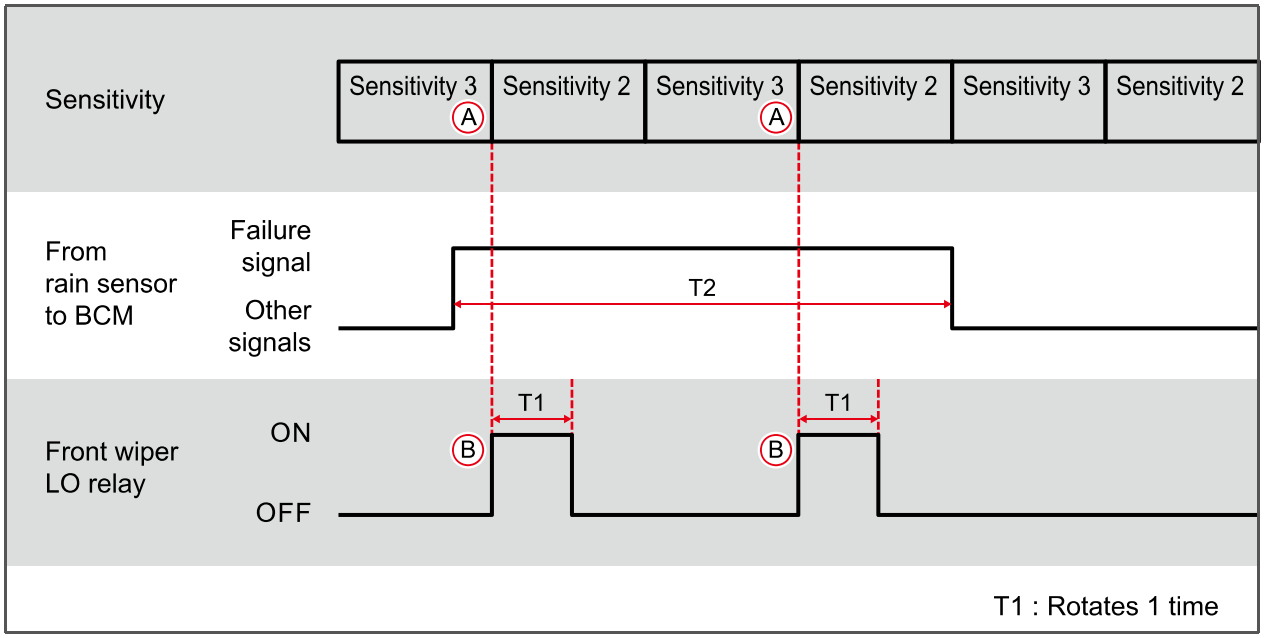
Modification basis	
Application basis	
Affected VIN	

▶ Rain sensor malfunction (rain sensor external malfunction)

Prerequisite condition	IGN ON and wiper AUTO switch in ON position

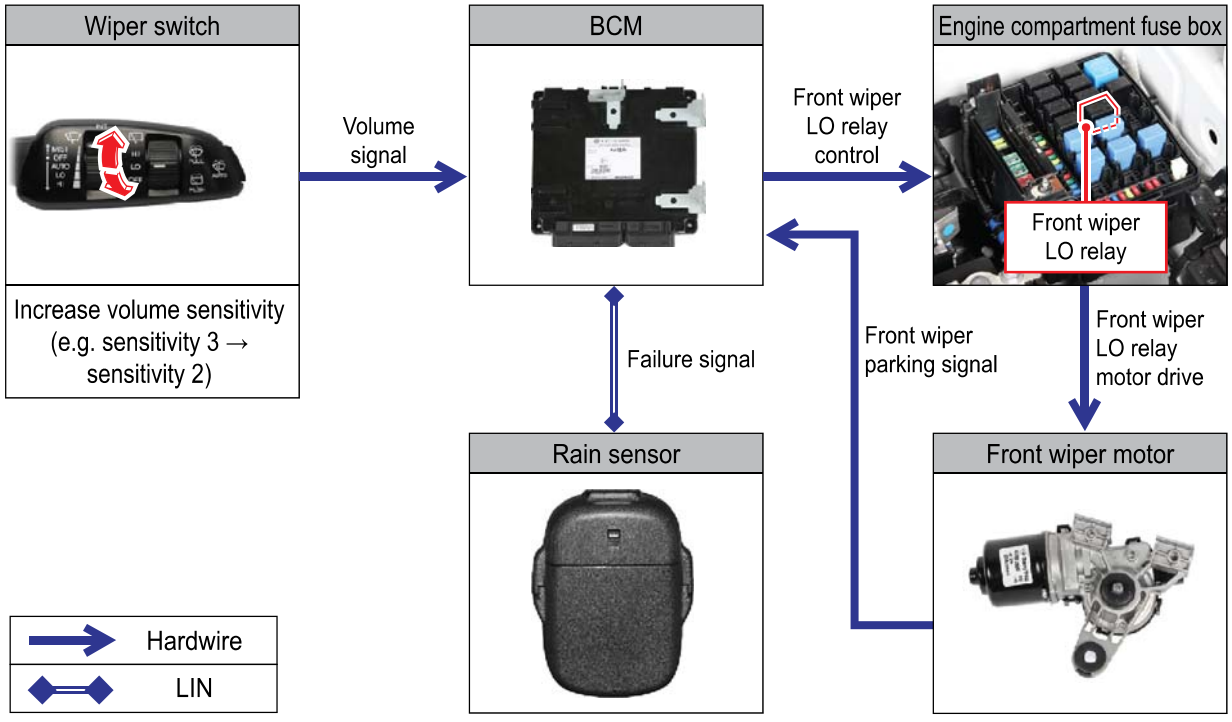
Operation 1. ("rain sensor installed improperly" signal received from the rain sensor)

A. The wiper AUTO switch speed level is adjusted (speed level 3 → level 2)
B. The wiper LO relay is operated for one cycle (T1).



System flowchart

- With IGN ON / windshield wiper auto switch ON



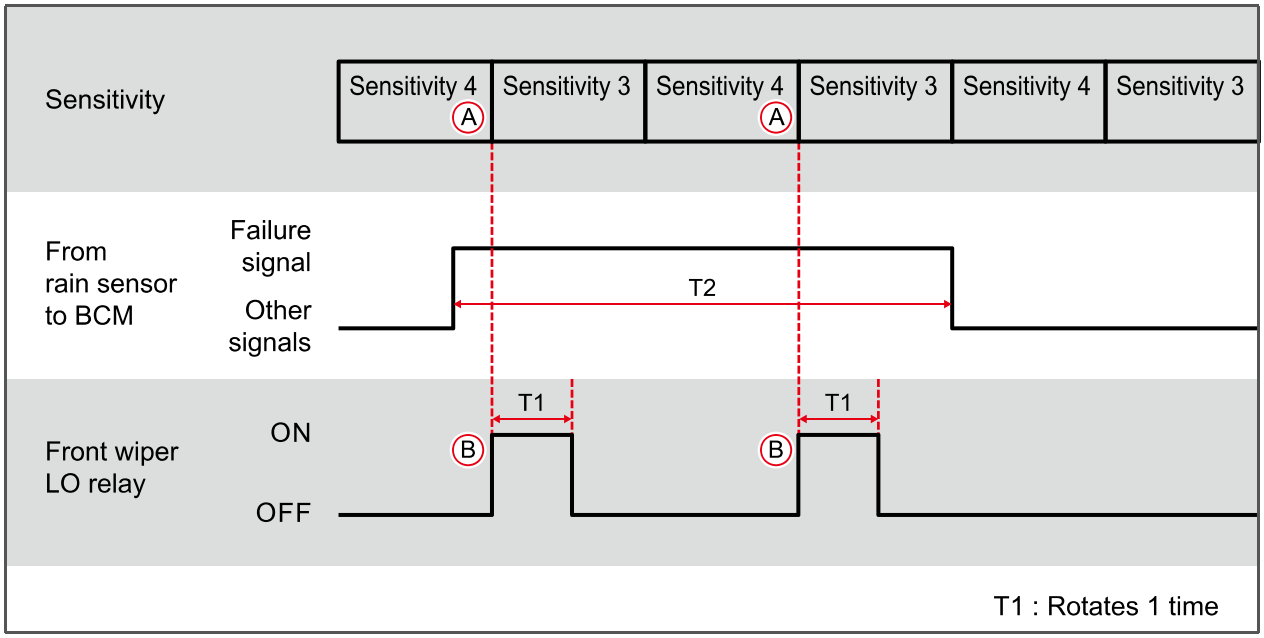
Modification basis	
Application basis	
Affected VIN	

▶ Rain sensor malfunction (no rain sensor signal)

Prerequisite condition	IGN ON and AUTO switch ON

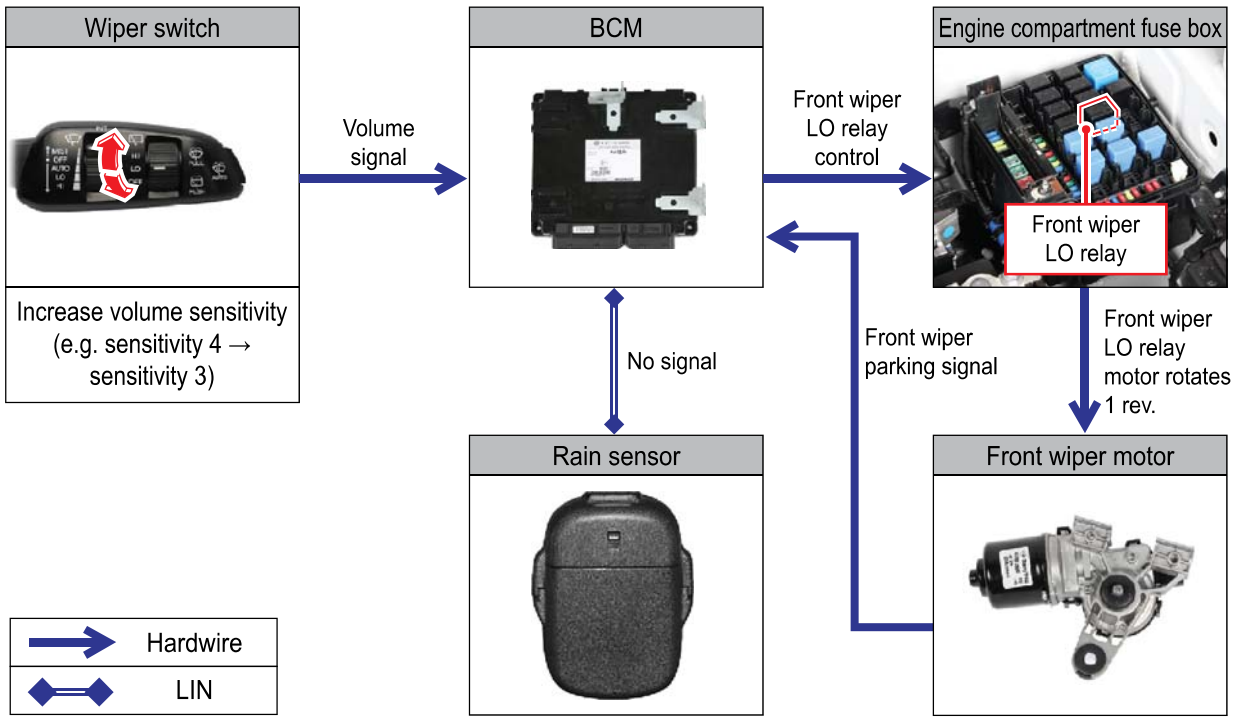
Operation 1. ("no signal detected" signal received from the rain sensor)

A. The AUTO switch speed level is adjusted (ex: speed level 4 → level 3)
B. The wiper LO relay is operated for one cycle (T1).



System flowchart

- With IGN ON / windshield wiper auto switch ON



▶ Speed sensitive AUTO wiper

Operation 1. (At vehicle speed of 0 km/h)

A. Windshield wiper auto switch ON with IGN ON(or IGN ON with windshield wiper auto switch ON)
B. Wiper LO relay operates within 0.3 s (T1)

Operation 2.

C. The front wiper LO relay operation time changes depending on the windshield wiper intermittent switch volume settings and vehicle speed.

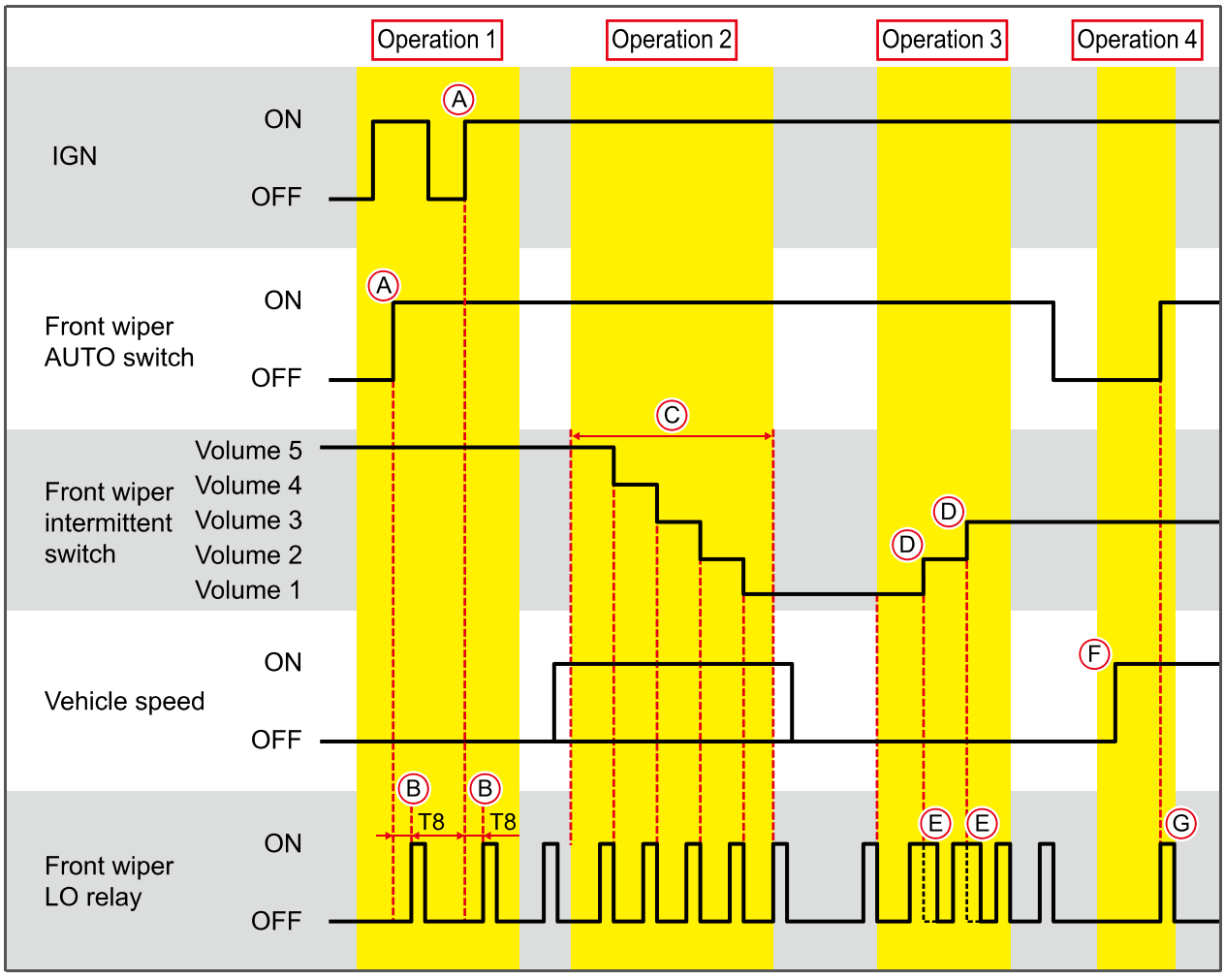
reference See the graph for correlation between windshield wiper auto switch rest time and vehicle speed.

Operation 3.

D. Increase windshield intermittent wiper interval (volume 1 → volume 2)
E. The front wiper LO relay operates once.

Operation 4.

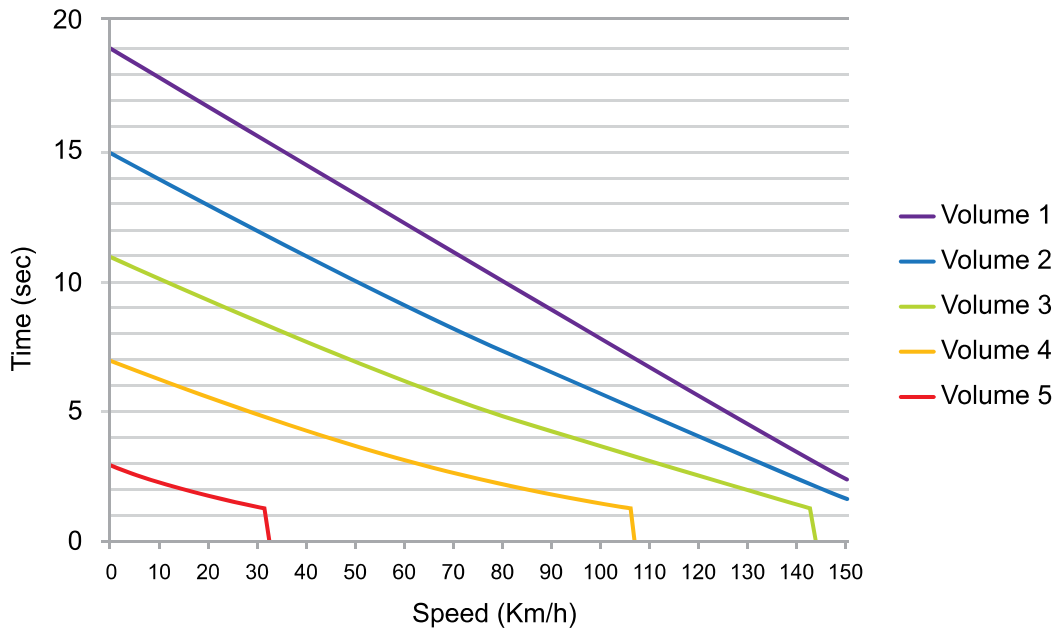
F. When windshield wiper auto switch is ON position at vehicle speed of above 0 km/h,
G. Windshield wiper LO relay operates immediately.



Modification basis	
Application basis	
Affected VIN	

NOTE

Graph for correlation between windshield wiper auto switch rest time and vehicle speed



Wiper rest time depending on vehicle speed and volume settings

Vehicle speed	Volume 5	Volume 4	Volume 3	Volume 2	Volume 1
0 km/h	Approx. 3 s	Approx. 7 s	Approx. 11 s	Approx. 15 s	Approx. 19 s
70 km/h	Approx. 0 s	Approx. 3 s	Approx. 6 s	Approx. 8 s	Approx. 11 s

▶ Wiper Troubleshooting

Symptom 1. The wipers do not cycle one time when the multi-function wiper switch is turned from OFF to AUTO position or when the engine is started with the multi-function wiper switch in AUTO position.

1. When starting the engine with the multi-function wiper switch in AUTO position, the wipers always cycle once to remind the driver of system in AUTO mode.
2. This wiper operation is carried out only for the first time when turning the multi-function wiper switch from OFF to AUTO position with IGN ON. If the switch is turned from OFF to AUTO again after that, the wipers are operated only when it rains to prevent the wiper blade from wear.

NOTE

The wipers also cycle one time when the multi-function wiper switch is turned from OFF to AUTO position during 5 minutes after the rain stops.

Symptom 2. It rains but the wipers do not work with the wiper switch in AUTO position.

1. Check if the multi-function wiper switch is in AUTO position.
2. Check the power to the rain sensor. That is, check the pin no. 3 (GND) and pin no. 4 (IGN).
3. Check that the wiper relay is intact.

Symptom 3. The wipers cycle 3 or 4 times at high speed abruptly.

Check if the wiper speed control switch is set to the fast side.
The fast stage has the highest sensitivity and is very sensitive to the small change of the amount of rain drops. Therefore, adjust the lever to lower the sensitivity level.

Symptom 4. The wipers continue to work even if the windshield glass is dry.

1. Check the wiper blades for wear. If the wiper blades cannot wipe the glass uniformly and clearly, this problem could occur. In this case, replace the wiper blades with new ones.
2. Check if the wiper speed control switch is set to the FAST side.

The fast stage has the highest sensitivity and is very sensitive to the small change of the amount of rain drops. Therefore, adjust the lever to lower the sensitivity level.

Symptom 5. The overall wiper response is too fast or slow.

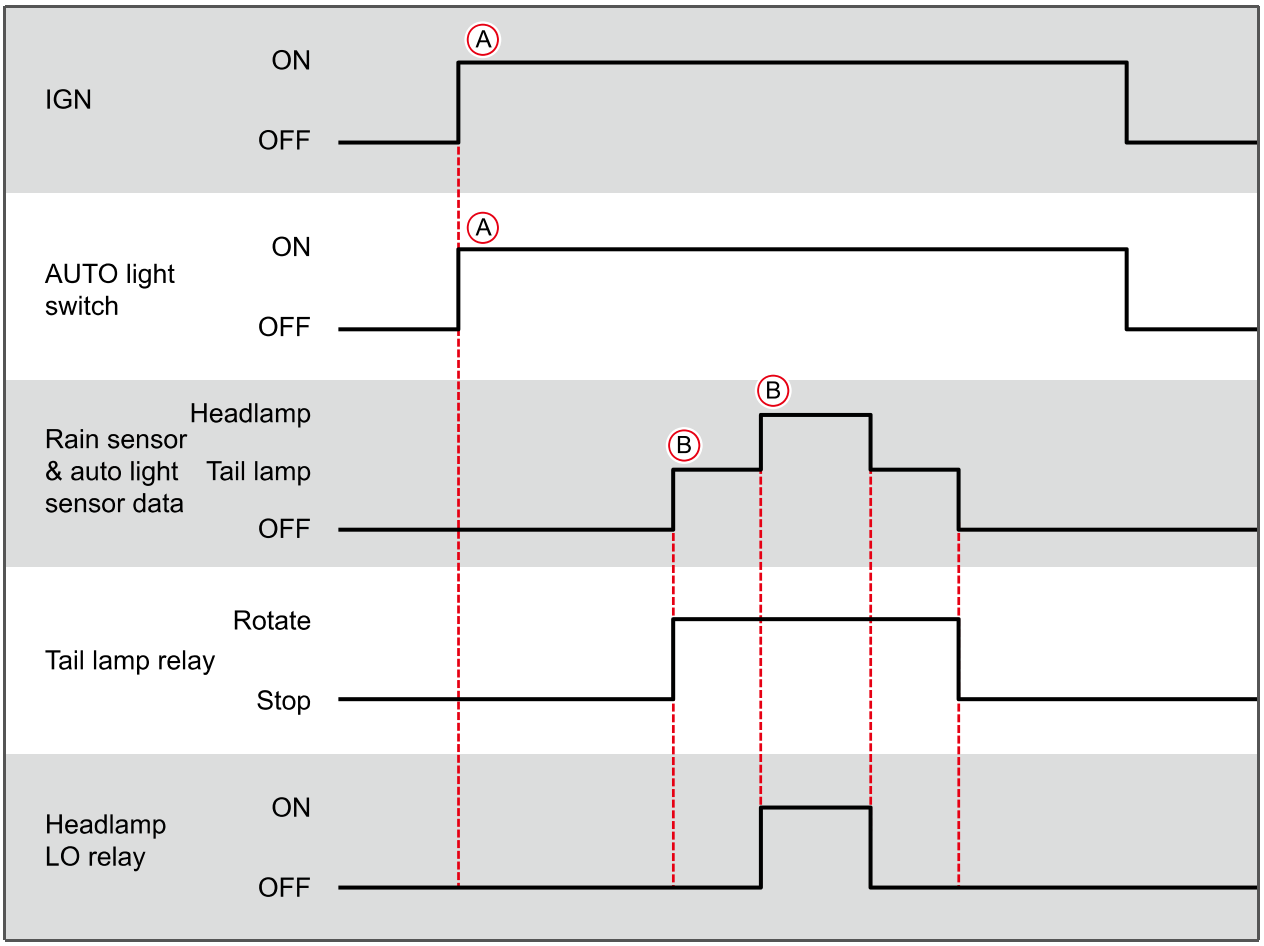
Check if the wiper speed control switch is set to the FAST or SLOW side.
Notify that the user can select the sensitivity by selecting the variable resistance value. And, select a proper stage.

Modification basis	
Application basis	
Affected VIN	

▶ Auto light control

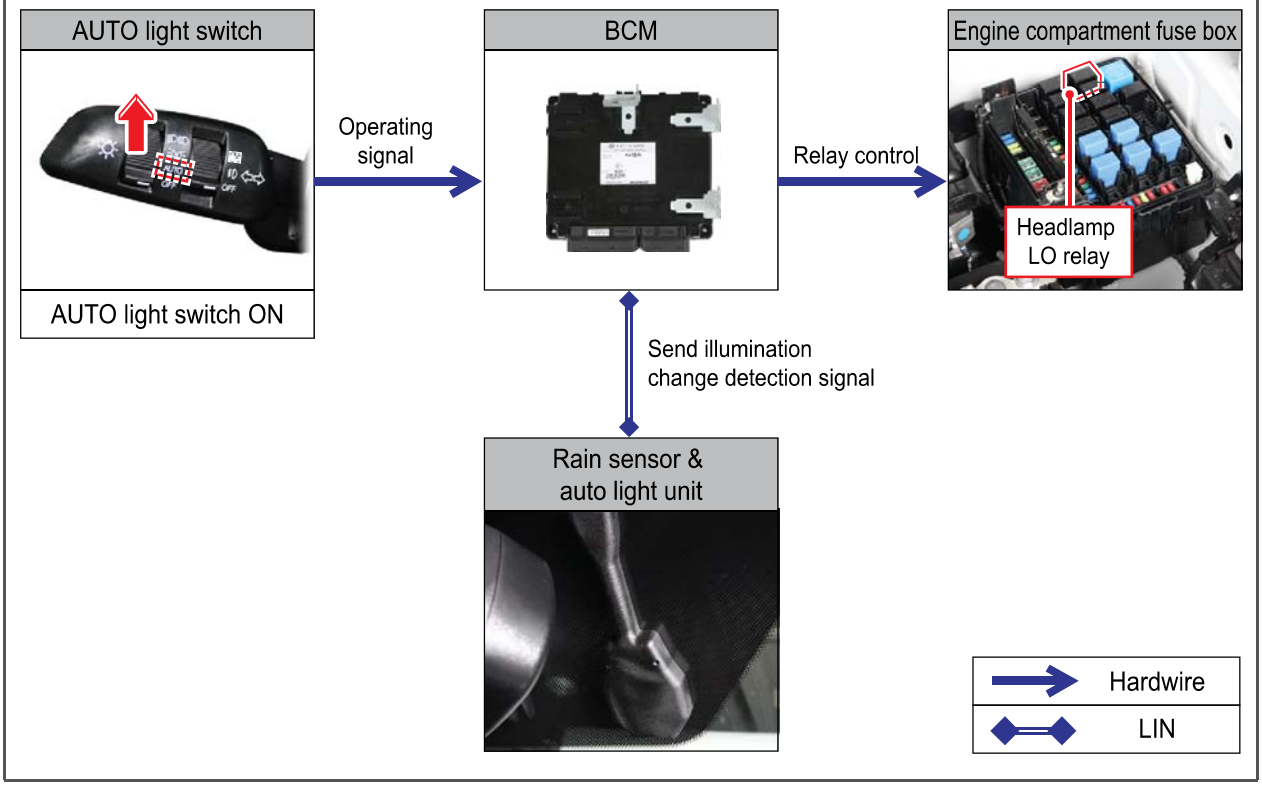
Operation 1.

A. The ignition is turned ON and AUTO light switch is in ON position.
B. The tail lamp relay and headlamp LO relay are controlled automatically in accordance with the signals from the rain sensor and AUTO light unit.



System flowchart

- IGN ON



Modification basis	
Application basis	
Affected VIN	

5. IGNITION KEY REMINDER (WITHOUT SKM)

▶ **Ignition key reminder warning**

Operation 1.

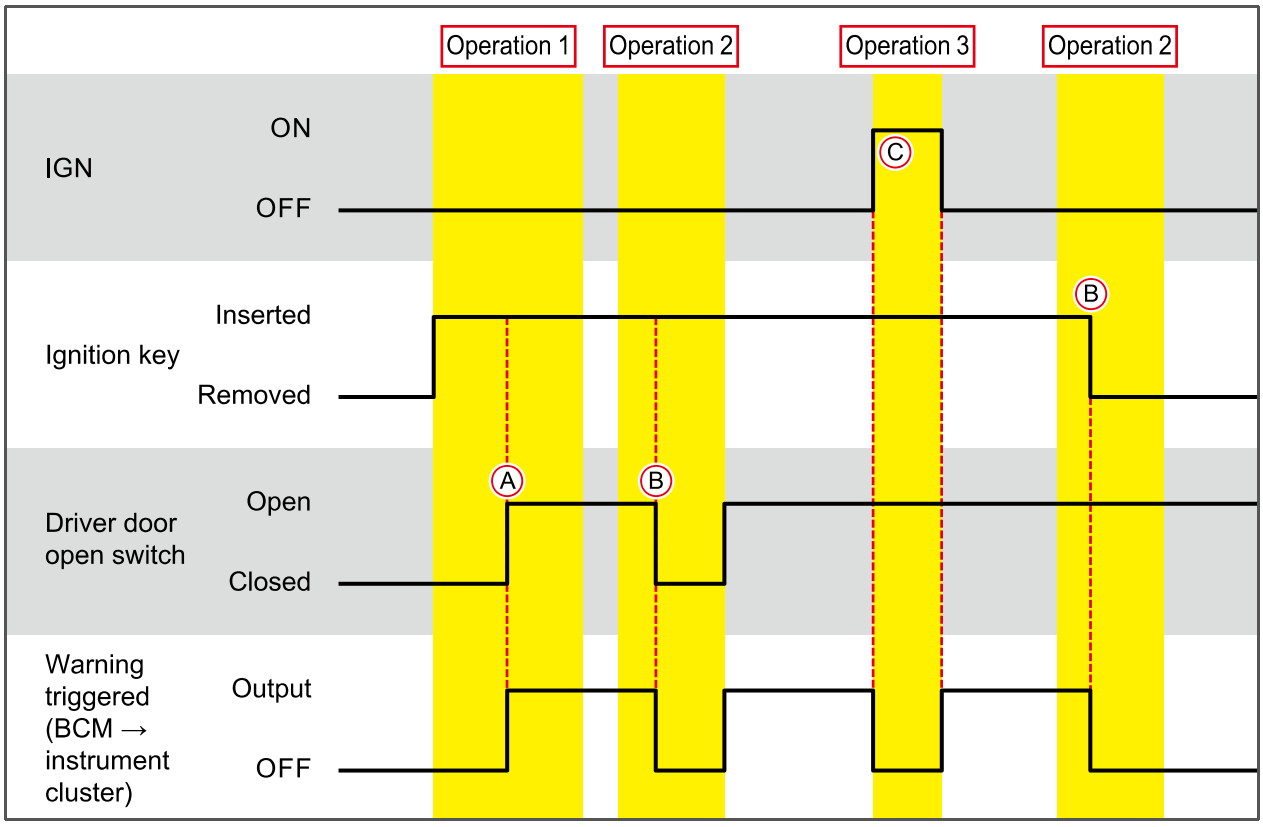
A. When driver door opens with ignition key inserted, BCM sends ignition key reminder warning to instrument panel.

Operation 2.

B. When removing ignition key or closing driver door while ignition key reminder warning buzzer sounds, warning signal stops.

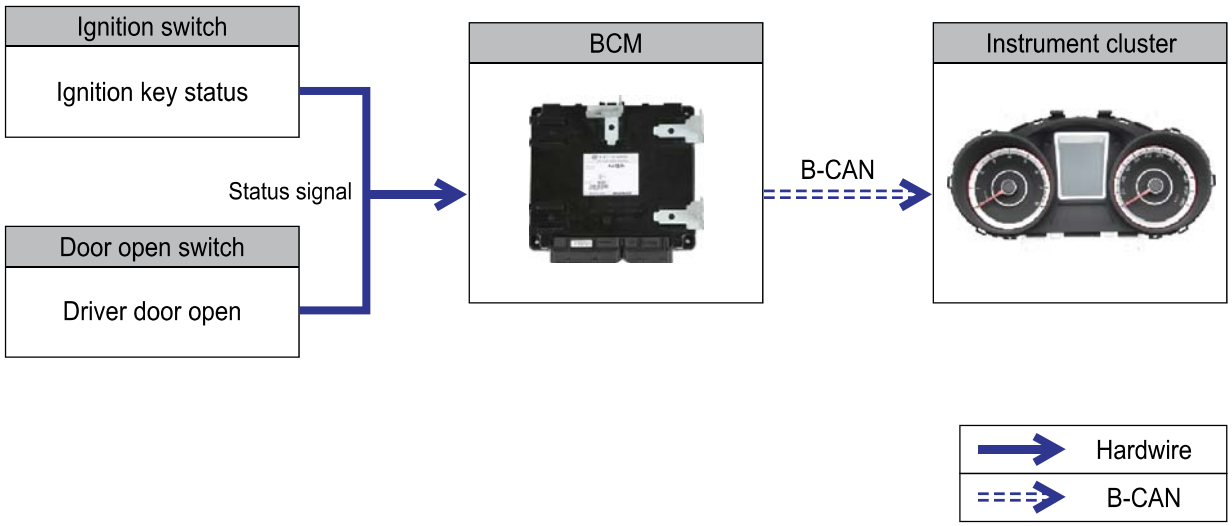
Operation 3.

C. The ignition key reminder warning does not work when the ignition key is in ON position.



System flowchart

- IGN ON



Modification basis	
Application basis	
Affected VIN	

6. KEY HOLE ILLUMINATION CONTROL (WITHOUT SKM)

Operation 1.

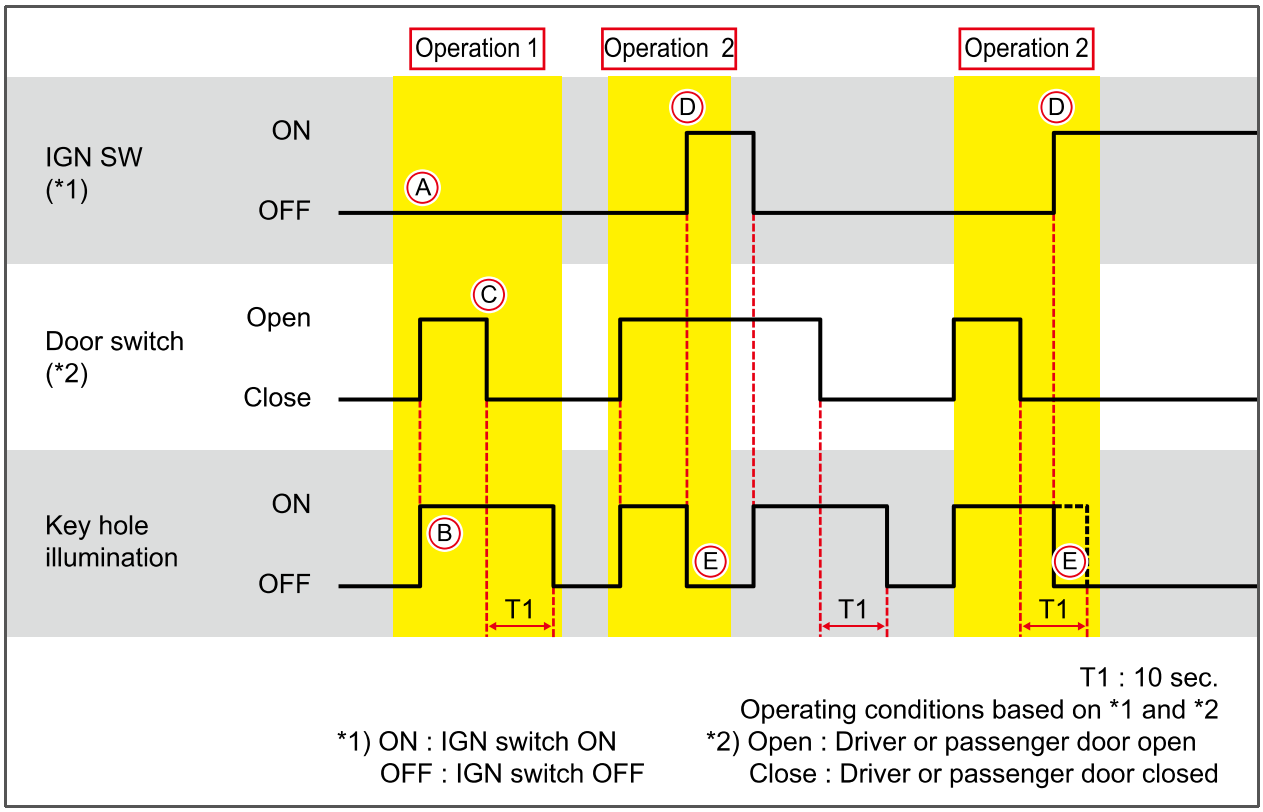
A. A door is opened with IGN OFF.
B. The key hole lamp comes on.
C. The key hole lamp comes on for 10 seconds (T1) when the door is closed.

Operation 2.

D. The ignition is turned ON with the key hole lamp ON.
E. The key hole lamp goes out.

NOTE

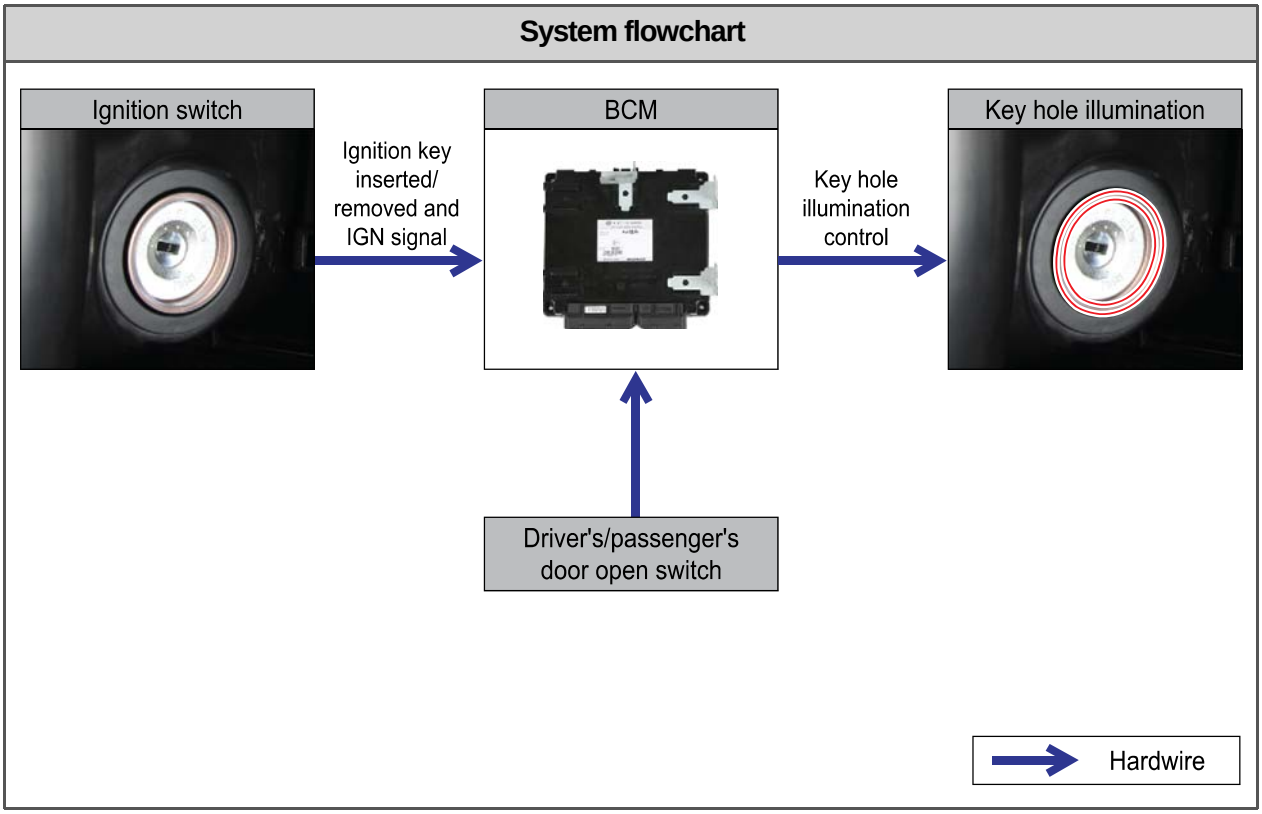
- The key hole illumination goes out when the REKES LOCK signal is received (in armed mode).
- When the key hole lamp and immobilizer signals are received simultaneously, the immobilizer signal overrides the key hole lamp signal.
- When the immobilizer confirmation is failed, regardless of the key hole lamp operation condition, it flashes for 11 seconds at intervals of 0.5 sec. ON/0.5 sec. OFF.
- When the ignition is turned ON in virgin status, the key hole lamp flashes for 8 seconds at intervals of 0.5 sec. ON/0.5 sec. OFF.



T1 : 10 sec.
Operating conditions based on *1 and *2
*1) ON : IGN switch ON
OFF : IGN switch OFF
*2) Open : Driver or passenger door open
Close : Driver or passenger door closed

Modification basis	
Application basis	
Affected VIN	

System flowchart



Modification basis	
Application basis	
Affected VIN	

7. TAIL LAMP CONTROL

▶ **Tail lamp ON warning**

Operation 1.

A. When driver door opens with tail lamp ON and IGN ACC or OFF (ignition key removed),
B. BCM sends tail lamp ON warning to instrument panel for 10 s (T2)

Operation 2.

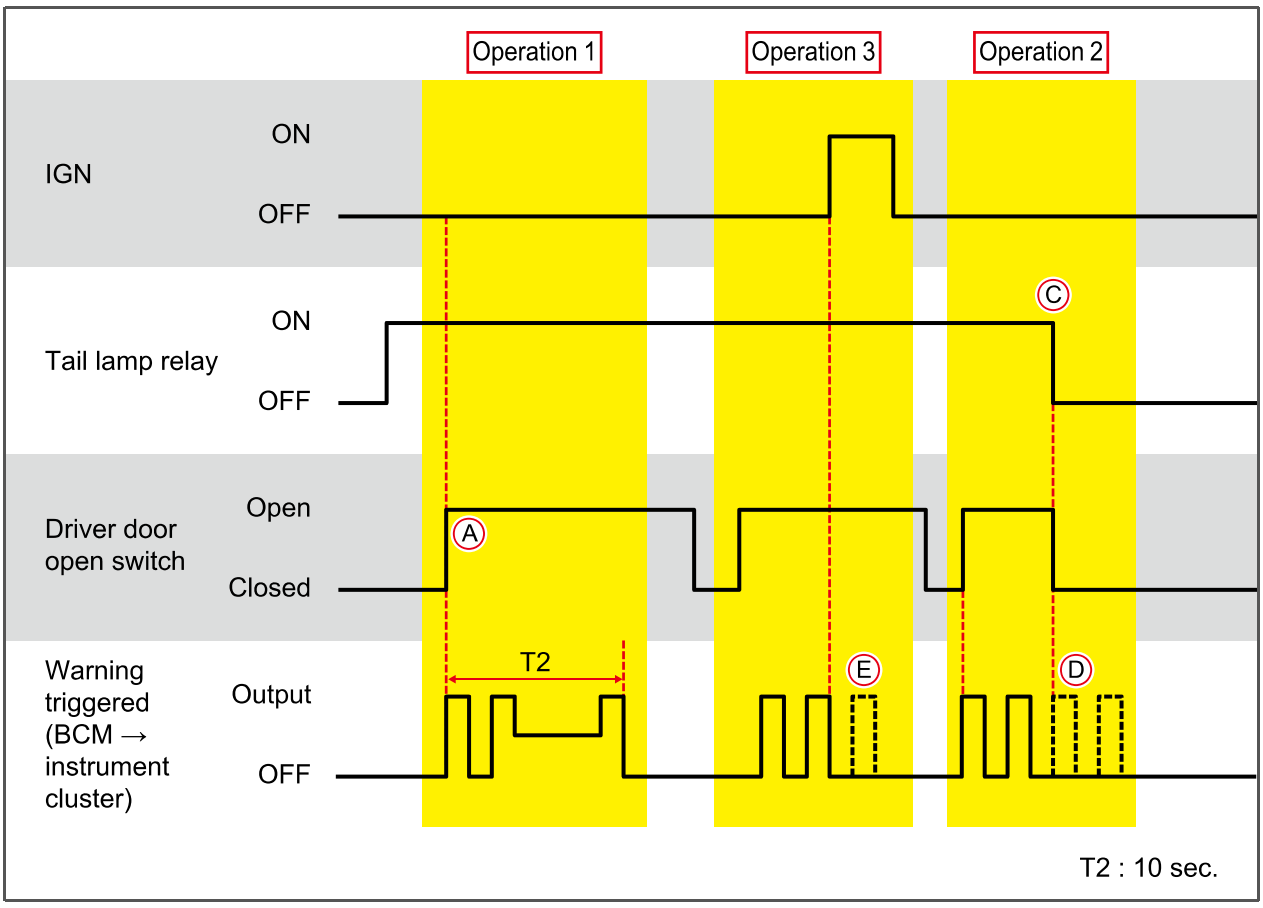
C. When tail lamp goes out or driver door is closed while tail lamp ON warning is triggered,
D. Tail lamp ON warning stops immediately.

Operation 3.

E. The tail lamp ON warning does not work when the ignition key is in ON position.

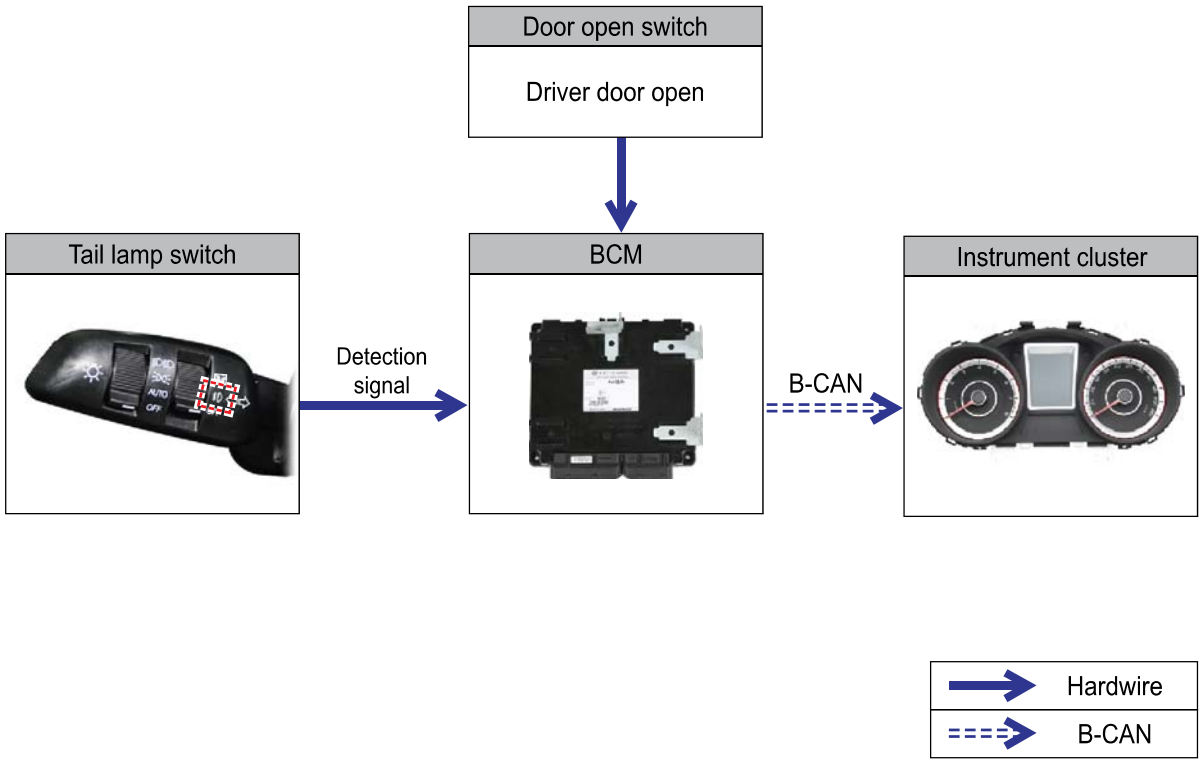
NOTE

When the tail lamp switch is moved from OFF to ON position while tail lamp ON warning is active, tail lamp ON warning is not triggered again.



System flowchart

- With IGN OFF



Modification basis	
Application basis	
Affected VIN	

▶ Tail lamp auto OFF

Operation 1.

A. The tail lamp and interior tail lamp relays are turned on or off according to the tail lamp switch ON/OFF status.

Operation 2.

B. When the ignition is turned OFF or the ignition key is turned to the ACC ON position (ignition key removed) with the tail lamp switch ON.
C. When the door is closed, the tail lamp and interior tail lamp relays are turned off automatically. (with tail lamp switch ON)

Operation 3.

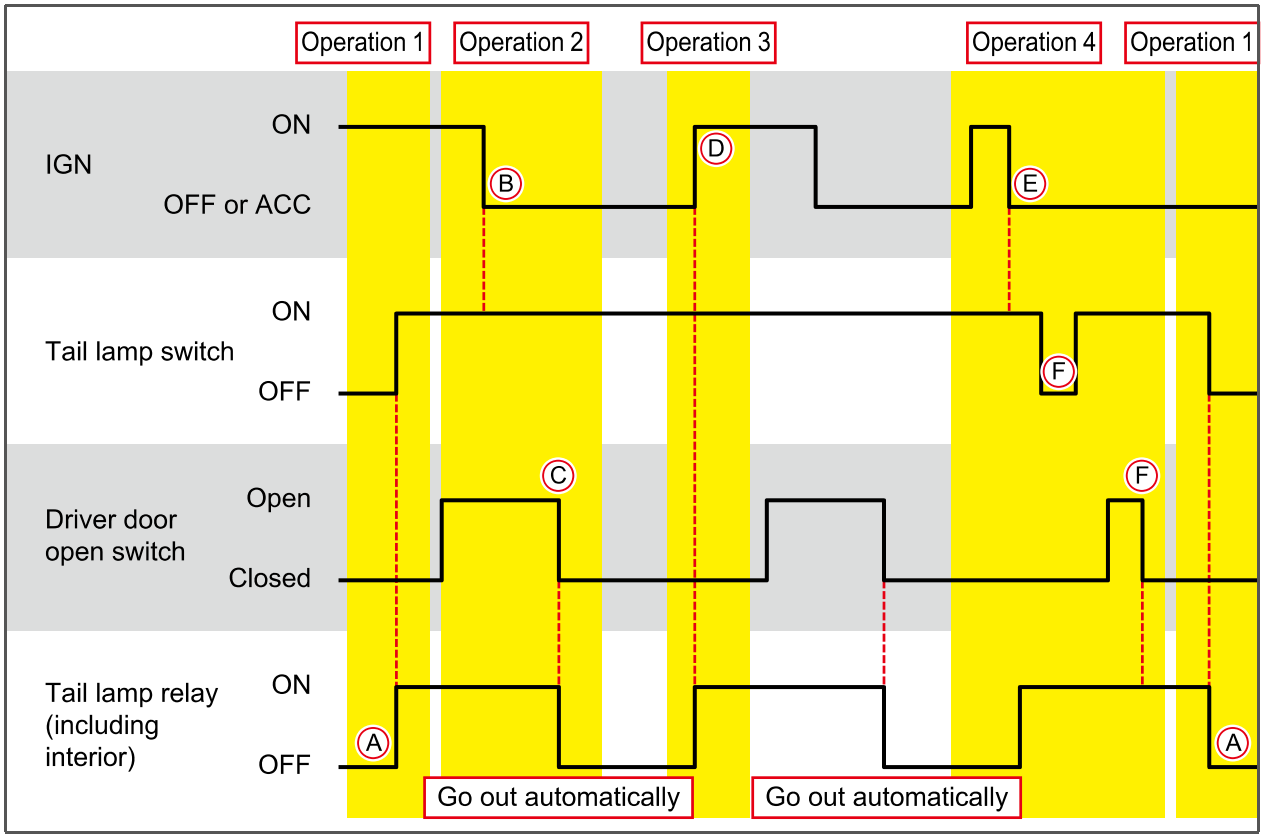
D. When the ignition key is turned to ON position (ignition key inserted) after the operation 2, the tail lamp and interior tail lamp relays are turned on.

Operation 4.

E. The ignition is turned OFF or the ACC is turned ON (ignition key removed).
F. When the tail lamp switch is moved from OFF to ON position, the tail lamp auto off does not work. (with tail lamp switch ON)

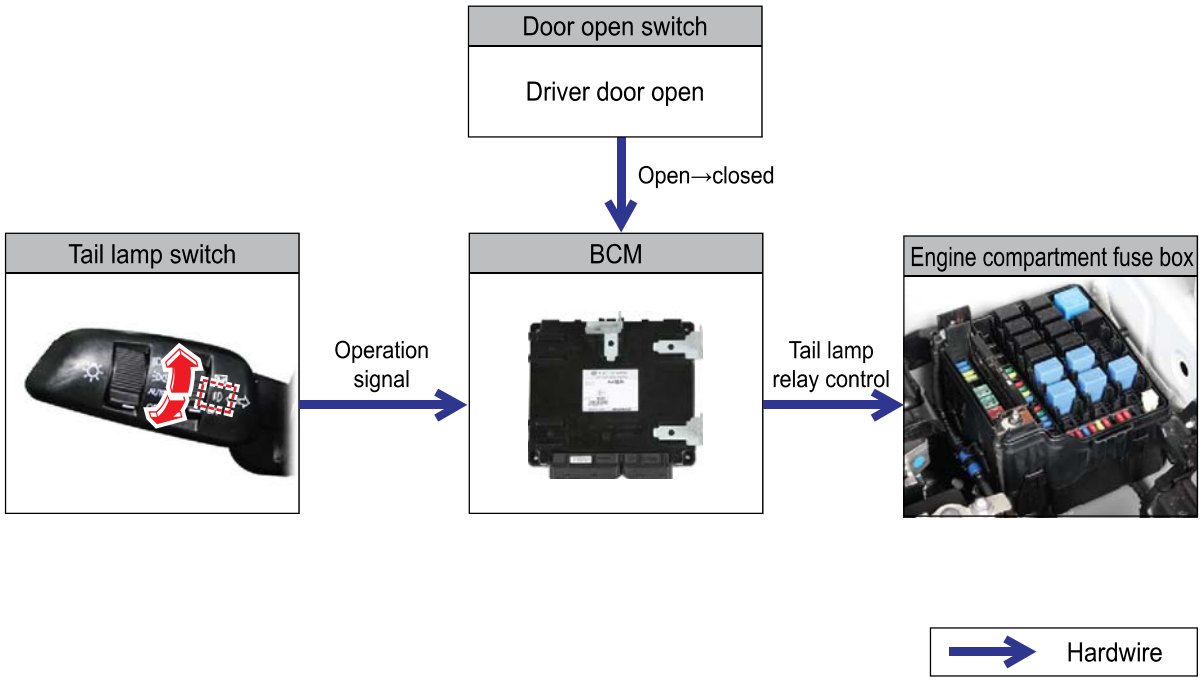
NOTE

To reset, turn the ignition to ON position (ignition key inserted)



System flowchart

- With IGN OFF



Modification basis	
Application basis	
Affected VIN	

8. DRIVER & PASSENGER SEAT BELT CONTROL

▶ **Seat belt warning buzzer and indicator**

Operation 1. (Driver and passenger seat belts unfastened)

A. The ignition key is turned ON position from OFF position.
B. The BCM sends the request to activate the seat belt warning indicator (at a cycle of 0.5 s ON and 0.5 s OFF) and warning sound to the instrument panel for 6 seconds.

NOTE

The driver seat belt is prioritized higher than the front passenger seat belt. When the driver seat belt is fastened, the passenger seat belt is detected and works the same as the driver seat belt.

Operation 2. (Driver and passenger seat belts fastened)

C. The ignition key is turned ON position from OFF position.
D. The BCM sends the request to activate the seat belt reminder indicator (at a cycle of 0.5 s ON and 0.5 s OFF) to the instrument panel for 6 seconds.
(warning sound will not be activated.)

Operation 3. (During output of seat belt warning sound and indicator)

E. The output stops immediately when the ignition is turned off.
F. When both the driver seat belt and passenger seat belt are fastened, the warning buzzer stops and warning indicator (at a cycle of 0.5 s ON and 0.5 s OFF) output is sent to the instrument panel for remaining time.

Operation 4.

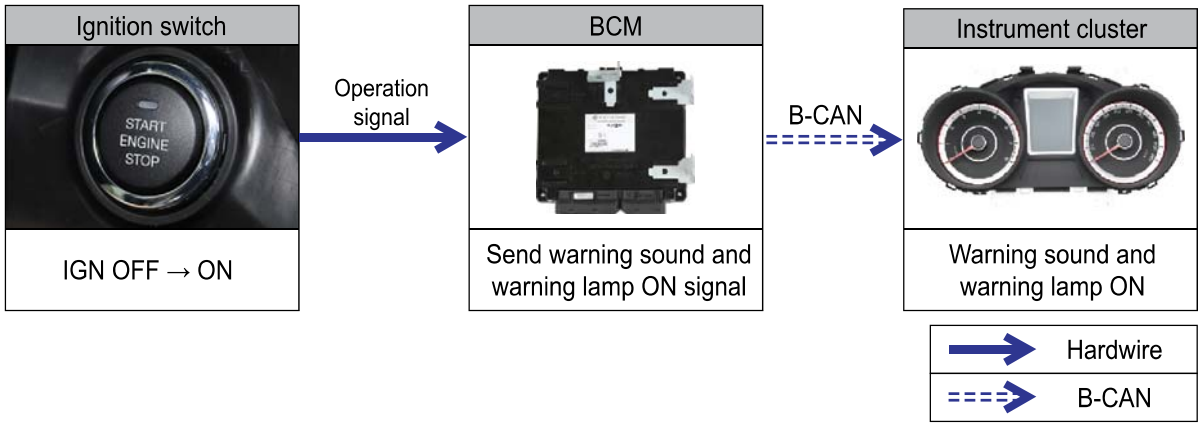
G. When the driver seat belt is unfastened with IGN ON
H. The BCM re-sends the request to activate the seat belt reminder indicator (at a cycle of 0.5 s ON and 0.5 s OFF) and warning sound to the instrument panel for 6 seconds.

NOTE

The warning buzzer will not sound when the passenger seat belt is unfastened with the ignition on.

System flowchart

- Driver seat belt not fastened



Modification basis	
Application basis	
Affected VIN	

▶ Seat belt reminder

Operation 1.

A. The BCM sends the request to activate the seat belt reminder indicator (at a cycle of 0.5 s ON and 0.5 s OFF) and warning sound to the instrument panel for 100 seconds.

Operation 2.

B. Seat belt is still not fastened after seat belt reminder is triggered
C. Seat belt reminder indicator (at a cycle of 0.5 s ON and 0.5 s OFF) stays on and warning sound stops

Operation 3.

D. Vehicle speed is below 10 km/h within 100 seconds since seat belt reminder is triggered
E. Seat belt reminder indicator (at a cycle of 0.5 s ON and 0.5 s OFF) and warning sound stop
However, if vehicle speed reaches 10 km/h or higher, seat belt reminder indicator (at a cycle of 0.5 s ON and 0.5 s OFF) and warning sound are activated again for 100 seconds

Operation 4.

F. With seat belt reminder activated, when seat belt is fastened, seat belt reminder indicator and warning sound stop immediately.
However, if the conditions to trigger the seat belt reminder are met, the seat belt reminder is re-activated.

Item	Seat belt reminder
Operating conditions	- IGN ON - Engine running (alternator output: high) - Vehicle speed of 10 km/h or higher - Seat belt not fastened
Deactivation conditions	- Vehicle speed of below 10 km/h - Seat belt fastened

NOTE

- When the seat belt reminder operation conditions are met during the warning, the seat belt reminder is activated.
- The seat belt reminder is activated only when the vehicle is driven at 10 km/h or above and seat belt is not fastened.

9. REAR SEAT BELT CONTROL

▶ **Rear seat belt warning buzzer and indicator**

Operation 1. (Rear seat belt unfastened)

A. Ignition off → engine started (rear door closed)
B. The BCM illuminates the indicator for the unfastened rear seat belt (LH, RH, and center) on the center fascia switch assembly for 30 seconds and activates the warning buzzer.

Operation 2. (Ignition turned off with indicator on)

C. Rear seat belt indicator on → ignition off
D. The BCM turns off the rear seat belt indicator and stops the warning buzzer on the instrument cluster.

Operation 3. (Unfastening rear seat belt with it fastened)

E. Rear seat belt fastened → rear seat belt unfastened
F. The BCM illuminates the rear seat belt indicator for max. 33 seconds and activates the warning buzzer on the instrument cluster. (Passenger recognized when the rear LH, RH or center seat belt is fastened with engine started)

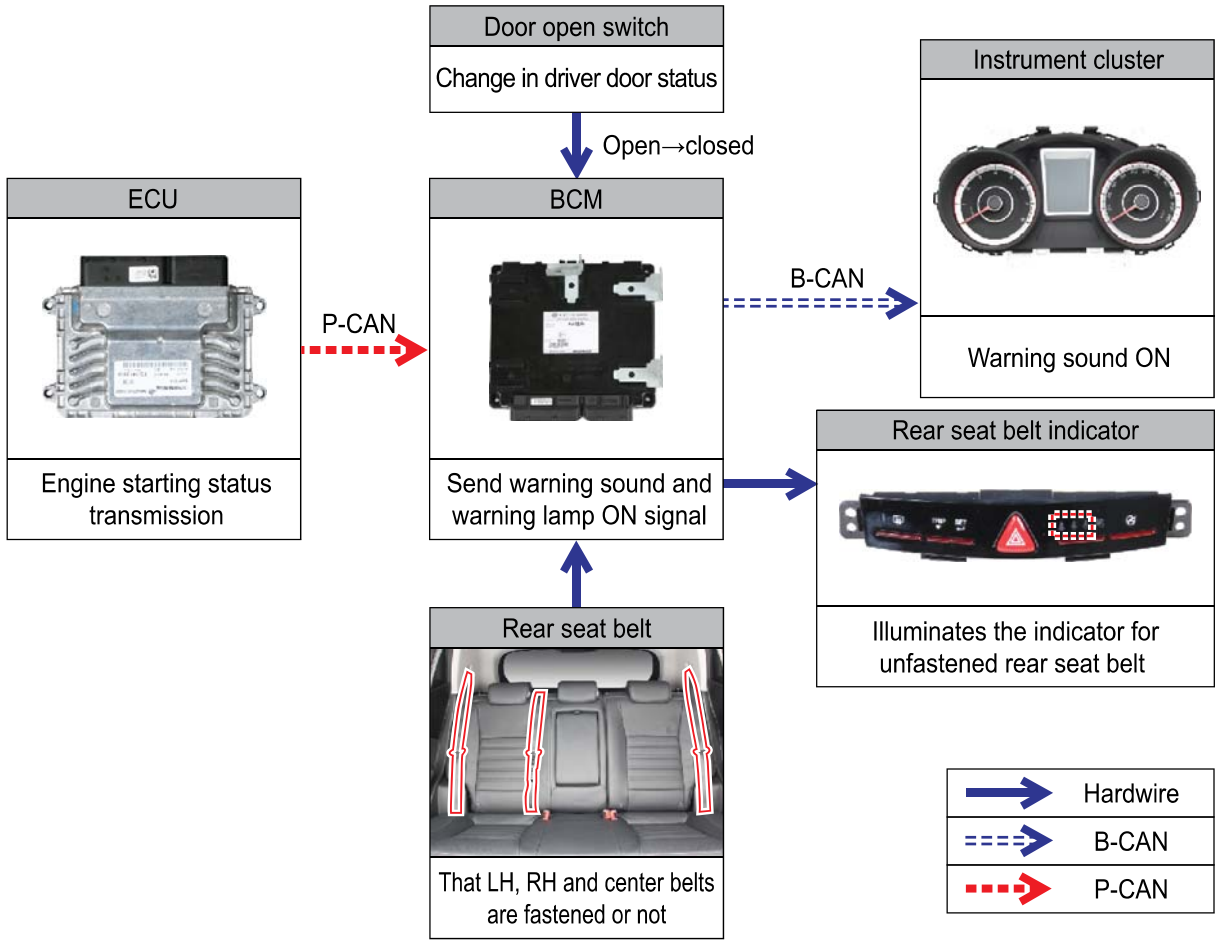
NOTE

- It illuminates the indicator for max. 33 seconds each time the rear seat belt which has been buckled by a passenger is unfastened.
- When the vehicle is stationary and the rear LH and RH doors are open, the rear seat belt passenger recognition is reset, the rear seat belt indicator output is off. The operation above is repeated when the rear door is closed.

Modification basis	
Application basis	
Affected VIN	

System flowchart

- IGN OFF → ON(engine started)



10. SUNROOF WARNING LAMP CONTROL

Operation 1.

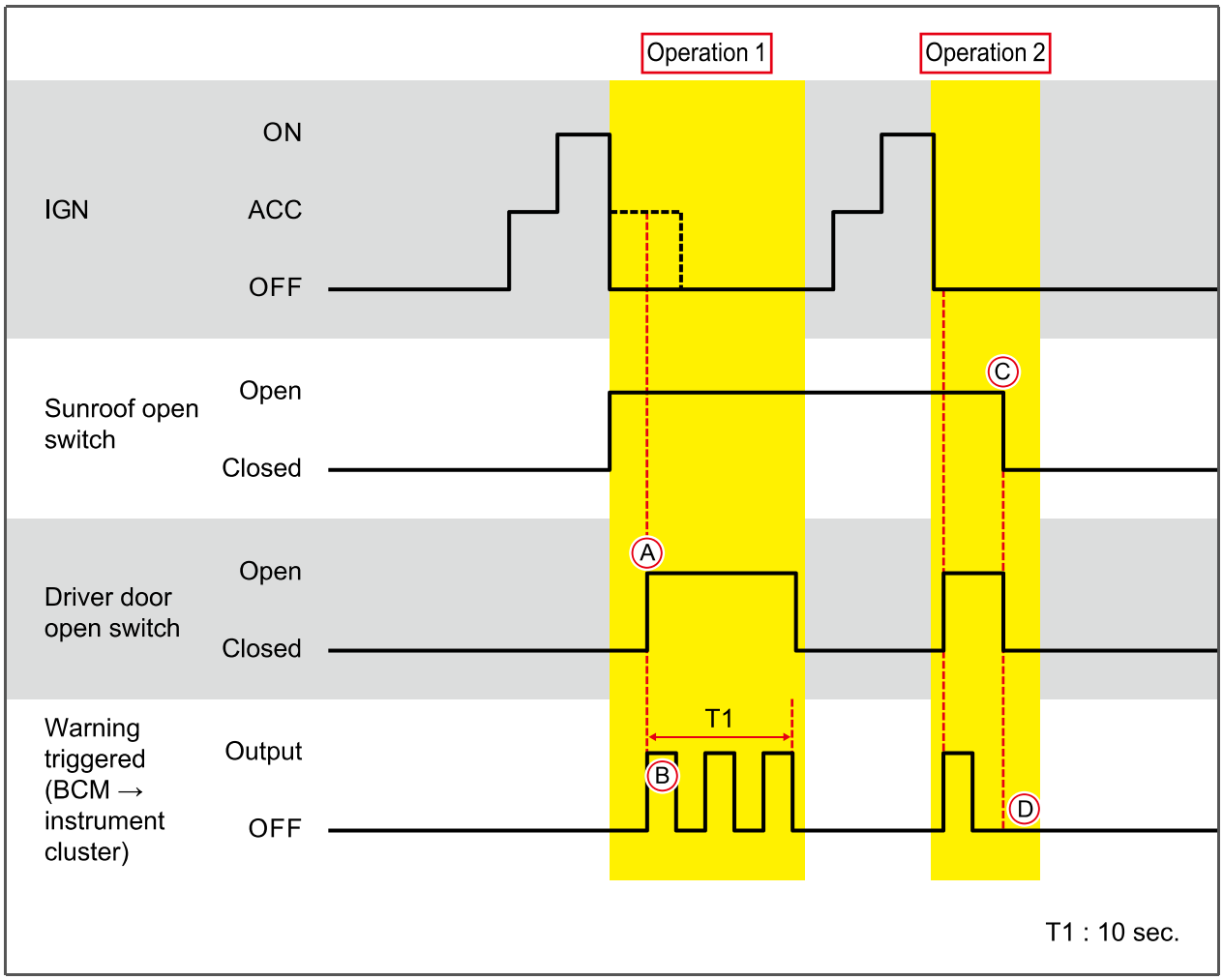
A. Driver door opens with sunroof open and IGN OFF and ACC ON (ignition key removed)
B. BCM sends a request to activate the sunroof open warning to instrument panel for 10 seconds (T1)

Operation 2. (during operation 1)

C. Driver door and sunroof closed
D. BCM stops output of sunroof open warning immediately.

NOTE

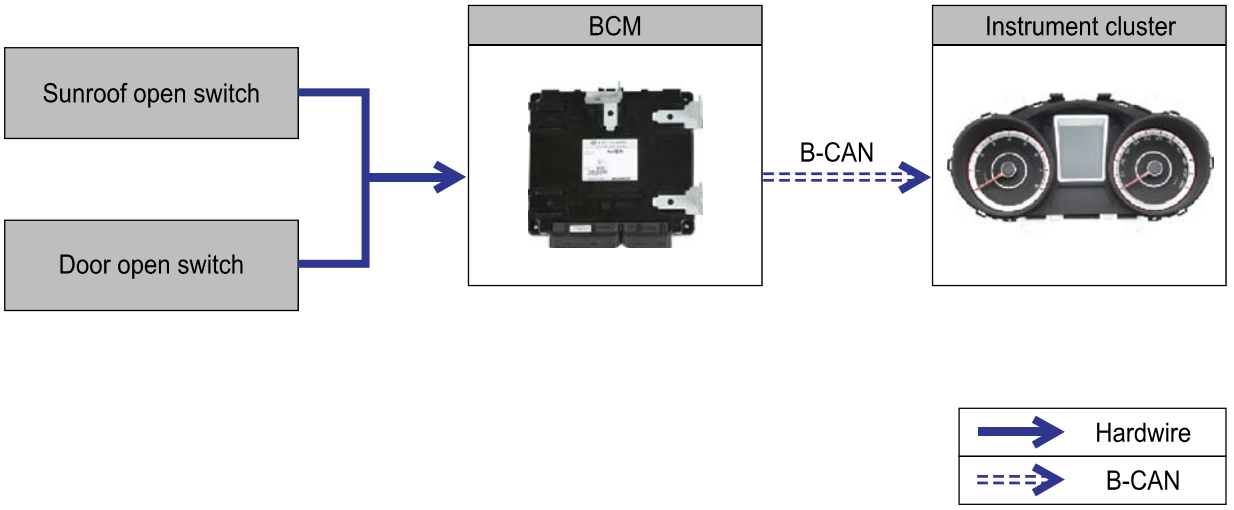
- To reset, turn the ignition ON.
- Even if sunroof open warning output conditions (operation 1) are met after sunroof open warning output stops (operation 2), the BCM does not output the sunroof open warning.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- With IGN OFF



11. ROOM LAMP CONTROL

- When the room lamp switch is in the door coupled position and the driver/passenger/rear (LH & RH) doors open, the room lamp comes on.
- The room lamp goes out automatically after 10 minutes of illumination when the ignition is turned off (ignition key is removed) and any door is open.
- The sleep mode is deactivated when the door status is changed or UNLOCK signal is received after automatic switching off.

▶ Door coupled room lamp control

Operation 1.

A. When all doors are closed with IGN ON, the room lamp goes out immediately.

Operation 2.

B. All doors are closed with IGN OFF.
C. The room lamp stays on for 2 seconds (T1) and then dims down over 3 seconds (T2) and goes out.
- When the ignition is turned on while the room lamp is dimming down, the lamp goes out immediately.

Operation 3.

D. When UNLOCK signal by the smart key (REKES key) is received with IGN OFF (ignition key removed) and all doors closed, the room lamp remains ON for 30 seconds (T3).
E. When the UNLOCK signal is received again while the room lamp is ON, the lamp remains ON for another 30 seconds.

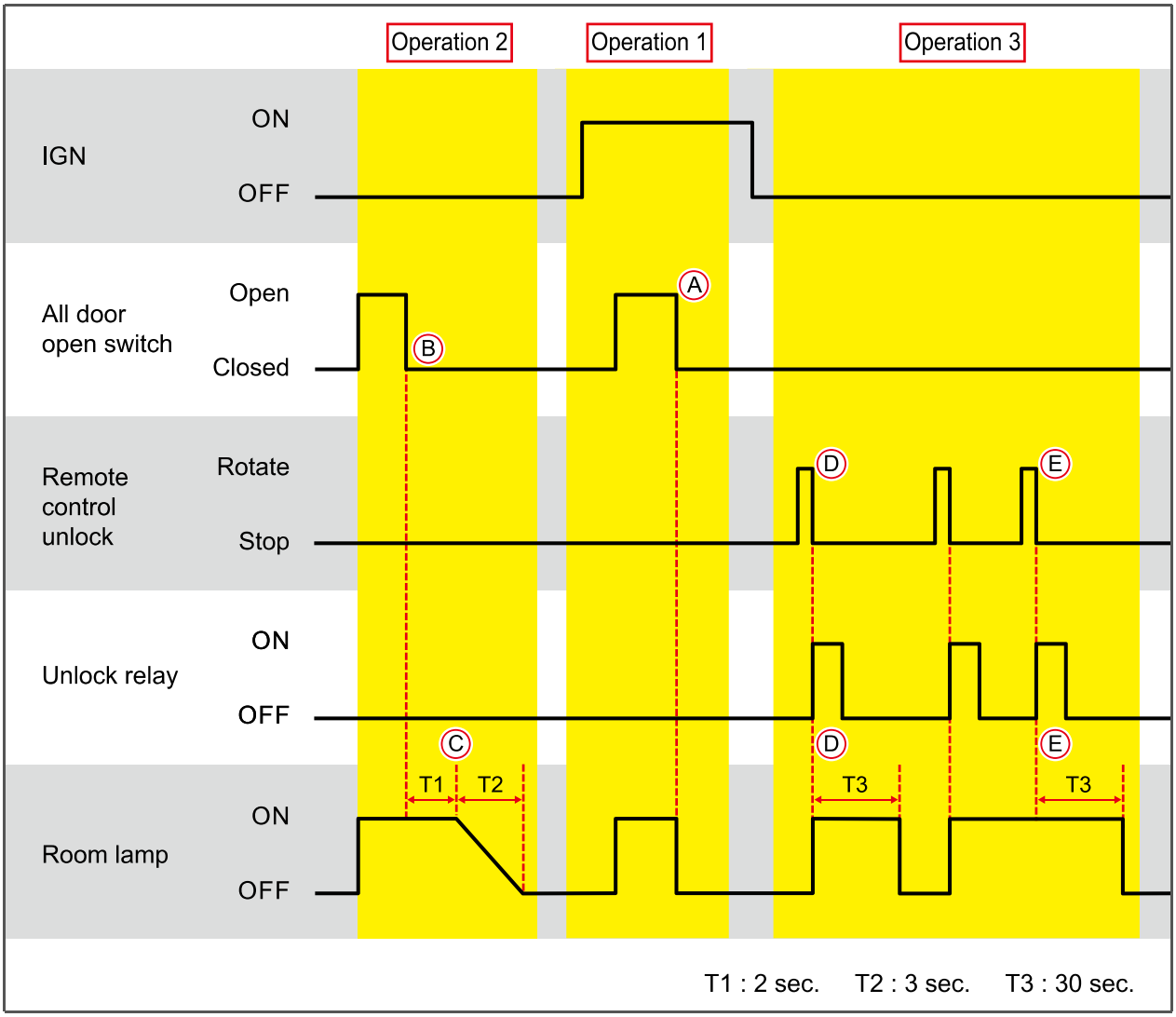
NOTE

- The room lamp stays on when a door is opened during fading out. (The lamp dims down or goes out immediately when the door is closed)
- While the open driver/passenger/rear (LH & RH) doors are closed the room lamp dims down, the system enters the armed mode the room lamp goes out immediately.

System flowchart

- With front room lamp coupled switch ON

Modification basis	
Application basis	
Affected VIN	


Operation 2
Operation 1
Operation 3
IGN
ON
OFF
All door open switch
Open
Closed
A
B
Remote control unlock
Rotate
Stop
D
E
Unlock relay
ON
OFF
C
D
E
T1
T2
T3
T3
Room lamp
ON
OFF
T1 : 2 sec.
T2 : 3 sec.
T3 : 30 sec.

▶ Room lamp cut off control

Operation 1.

A. The lamp is turned off when entering sleep mode or armed mode.

Operation 2.

B. When the ignition is turned OFF (ignition key removed) with the room lamp switch ON, the room lamp comes on for 10 minutes and then goes out automatically.

C. When the room lamp is turned off automatically, the room lamp automatic switching off signal is sent to the instrument cluster before entering sleep mode.

Operation 3.

D. When the ignition key is turned to ACC or IGN ON position (ignition key inserted) on the room lamp auto off, the room lamp comes on.

NOTE

When the room lamp cut off operation is activated, the BCM sends cut off operation signal to the instrument cluster through B-CAN to prevent the battery discharge.

Modification basis	
Application basis	
Affected VIN	

12. DEFOGGER (HEATING ELEMENT) TIMER CONTROL

▶ **Rear defogger (heating element) timer control**

Operation 1.

A. When the rear defogger (heating element) switch is turned on,
B. The rear defogger (heating element) is activated for 12 minutes (T1).

Operation 2.

C. When the rear defogger (heating element) switch is turned on again during output, the output will deactivate.

Operation 3.

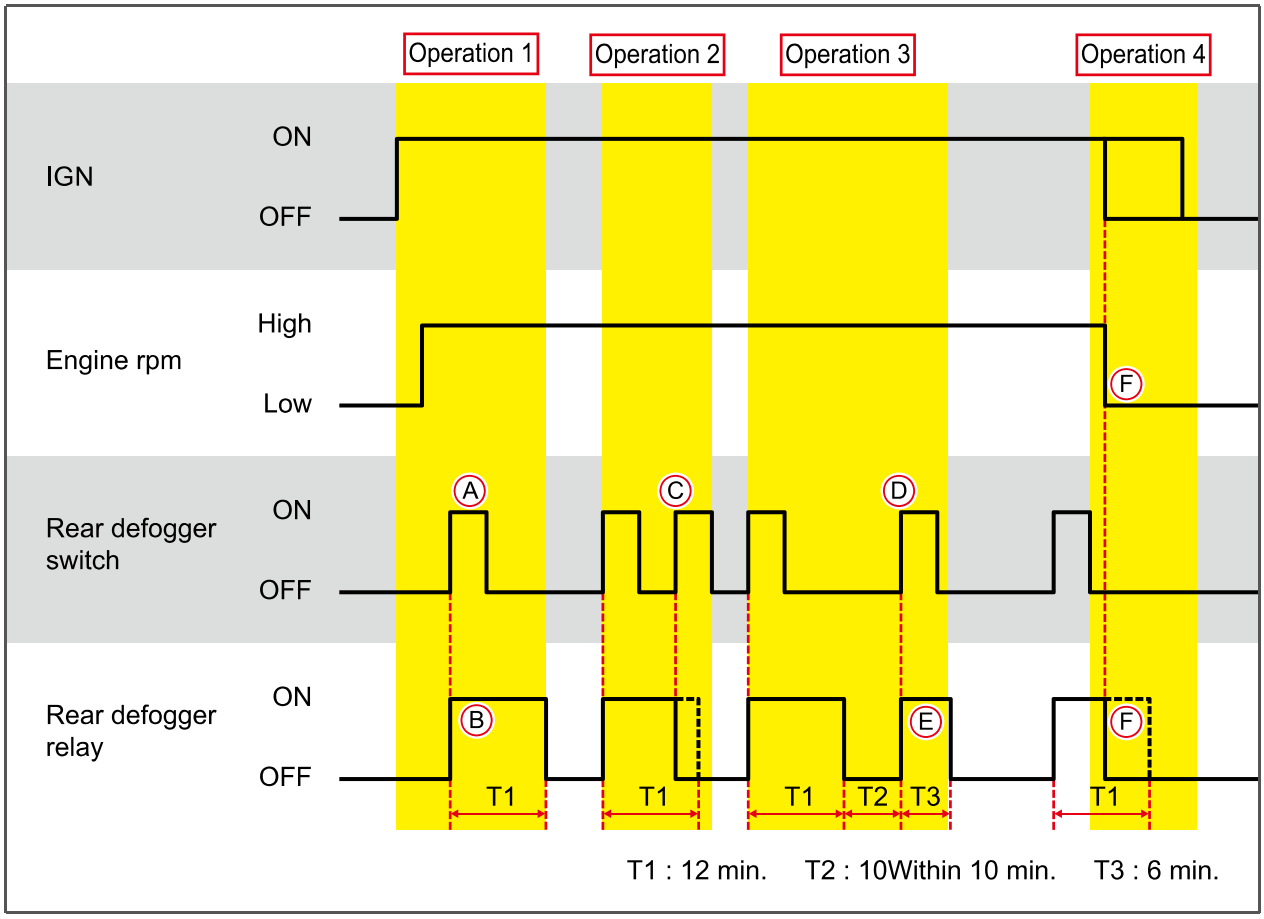
D. Within 10 minutes (T2) after the output of the rear defogger (heating element) for 12 minutes (T1). When the rear defogger (heating element) switch is turned ON, the front defogger is activated for only
E. 6 minutes (T3)
This operation is not available when the rear defogger is turned off by turning off engine, IGN OFF, or front defogger (heating element) switch).

Operation 4.

F. If the engine is running at low speed with IGN OFF or IGN ON, the rear defogger (heating element) is deactivated.

NOTE

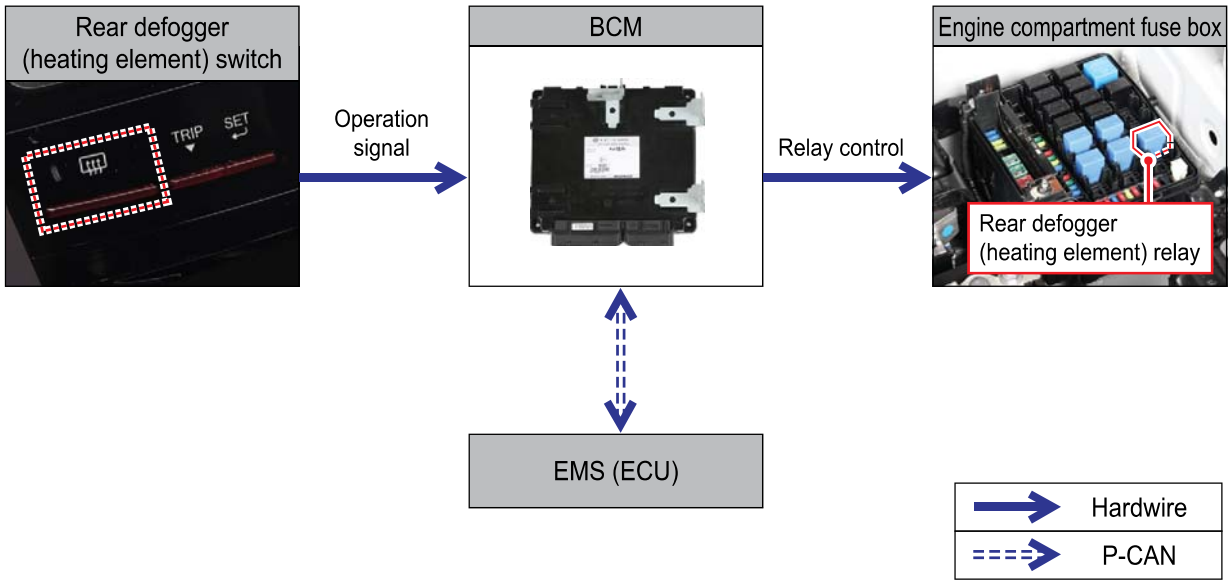
- The rear defogger is turned OFF when the ignition is turned OFF or engine is not running.
- When the rear defogger (heating element) output conditions are met during output, the rear defogger (heating element) indicator also comes on.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- Engine running (Alternator output: High)



Rear defogger (heating element) switch

Modification basis	
Application basis	
Affected VIN	

13. REMOTE KEYLESS ENTRY (REKES KEY)

When the user operates the switches of the REKES key, the signal message is transmitted to the BCM or SKM wirelessly. For the vehicle with smart key, the SKM sends BCAN signal to the BCM according to the received signal, which controls the vehicle. For the vehicle without smart key, the BCM controls the vehicle according to the received signal.

REKES Key	
Front view	**Rear view**
	

Function	Switch operation	Operation time
Door lock	Short press on LOCK button	0.03 s or longer
Door unlock	Short press on UNLOCK button	0.03 s or longer
Panic	Long press on PANIC button	1.0 s or more

▶ Certification for FOB/Folding

FCC	FCC ID: DEO-MT-FLIP01 This device complies with Part 15 of the Federal Communications Commission (FCC) rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. **WARNING** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.	AMERICA
TR	LOGO Certificate in the user manual due to product size	CIS

Modification basis	
Application basis	
Affected VIN	

14. DOOR LOCK/UNLOCK CONTROL

- If all doors are unlocked 5 times within 1 minute after door LOCK signal output, because of faulty door knob switch and door open switch, the doors are forced to lock and not allowed to unlock. However, the UNLOCK conditions are met, the UNKLOCK signal is input normally.

▶ Door LOCK/UNLOCK control by door knob switch

Operation 1.

A. The driver and passenger door LOCK knob switches are set to LOCK from UNLOCK.
B. Door lock relay operated for 0.2 s (T1)

Operation 2.

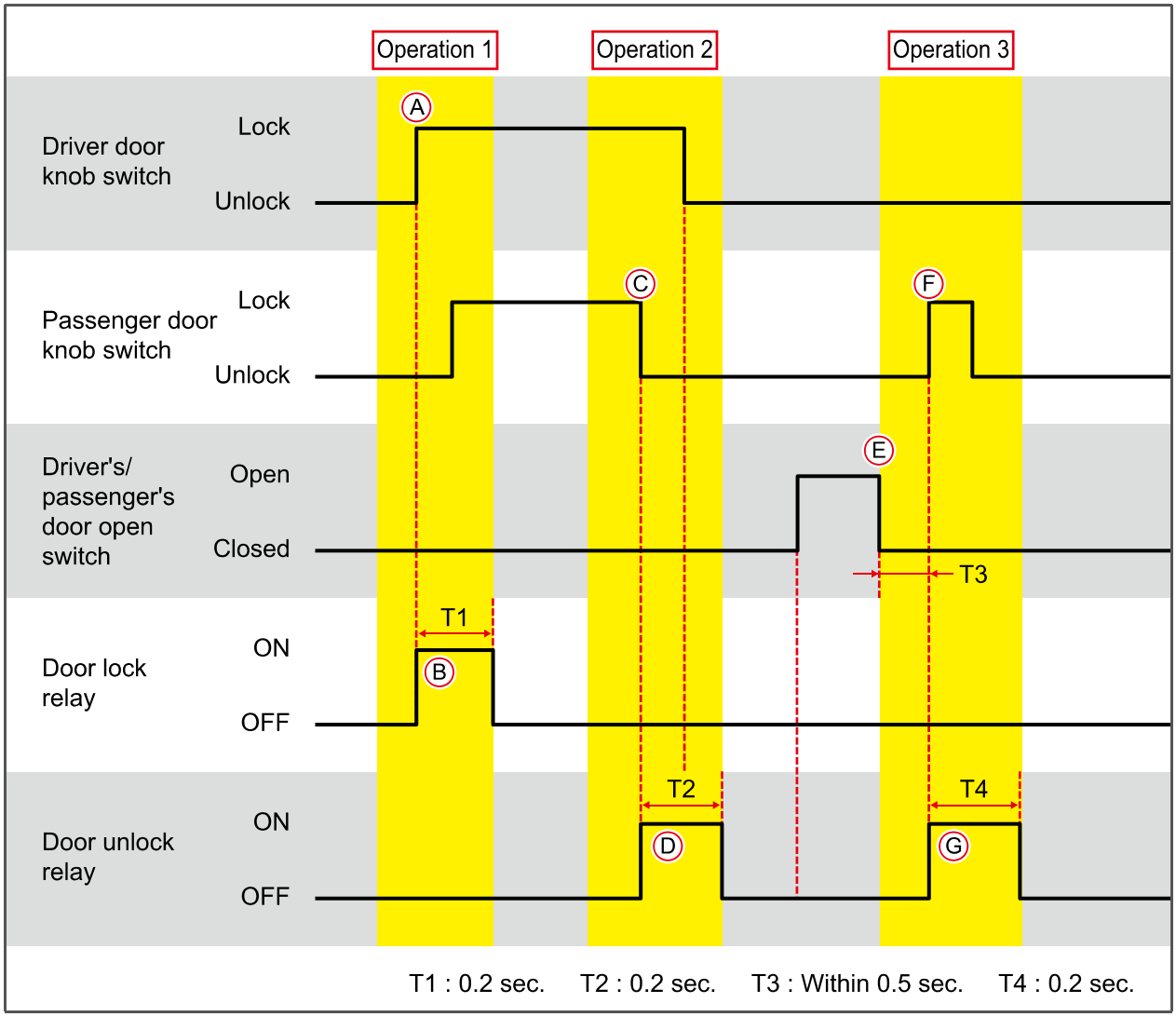
C. The driver and passenger door LOCK knob switches are in the UNLOCK position from LOCK position.
D. Door unlock relay operated for 0.2 s (T2)
   - The door LOCK/UNLOCK system does not work regardless of the door LOCK/UNLOCK switch position, when reconnecting the battery.

Operation 3.

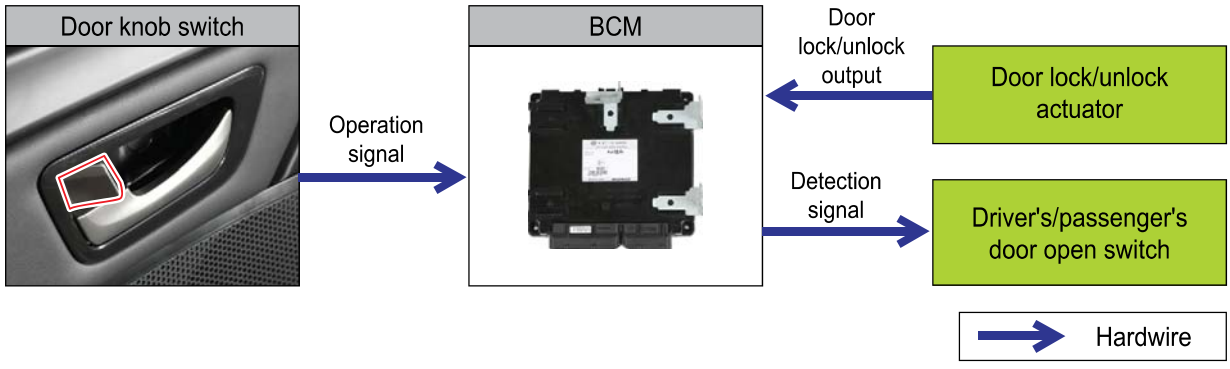
E. All open doors are closed.
F. The LOCK signal is input within 0.5 seconds (T3).
G. The UNLOCK signal for all doors is output once for 0.2 seconds (T4).

NOTE

- The auto folding does not work when locking/unlocking by the door knob switch.
- Operative only when the ignition key is inserted(EU).



System flowchart



Modification basis	
Application basis	
Affected VIN	

▶ Door LOCK/UNLOCK Control by Central Door LOCK Switch

Operation 1.

A. The central door LOCK switch is turned ON.
B. The door LOCK/UNLOCK relay is operated for 0.2 seconds (T1, T2).

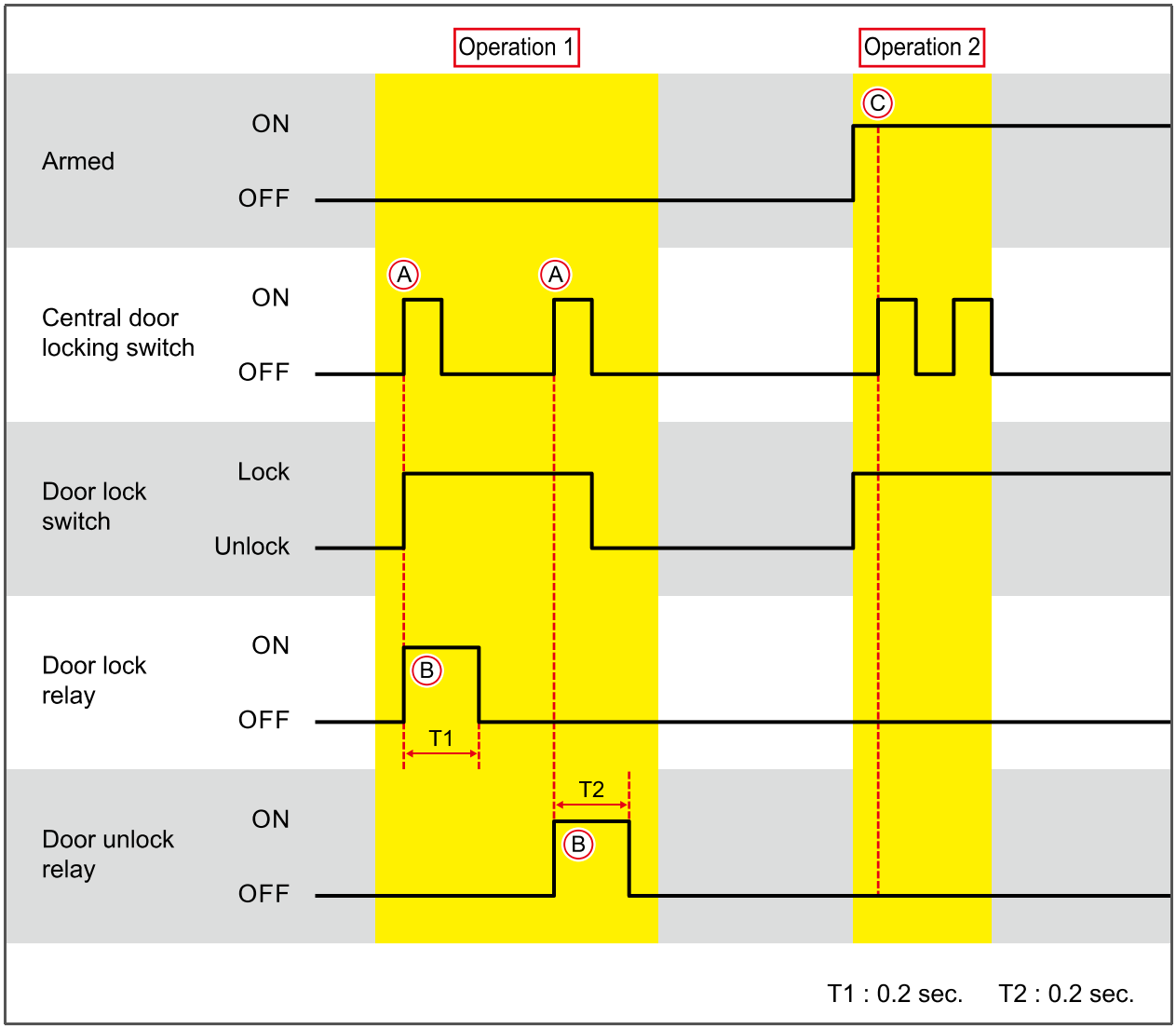
Operation 2.

C. The central door switch signal is ignored in the armed mode.

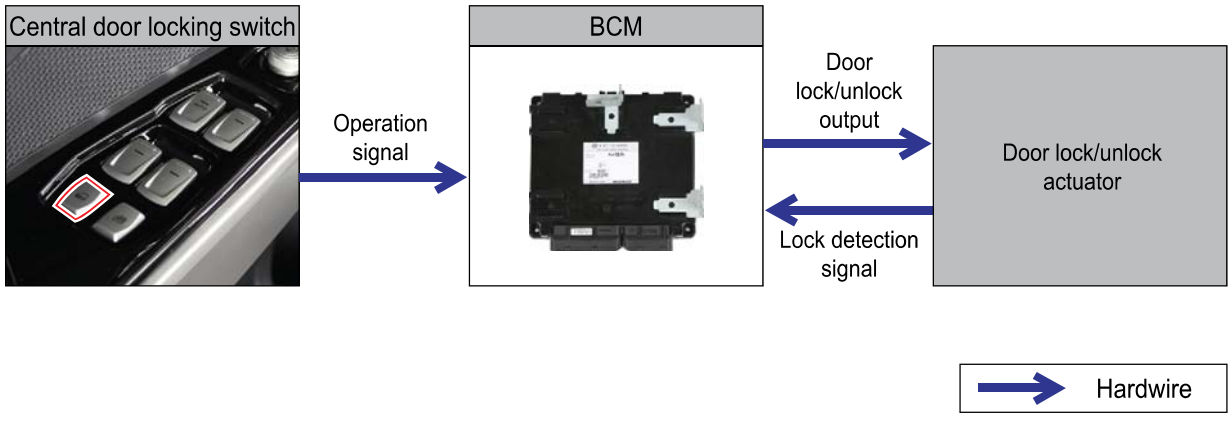
NOTE

- When one of the door LOCK detection switches* is in LOCK position with the ignition turned OFF, all doors are unlocked automatically.
- When the central door switch is set to LOCK with all doors unlocked and any door ajar, the door LOCK relay is activated followed by activation of the UNLOCK relay. (This is to prevent the door LOCK by mal-operation.)

* Door LOCK detection switch: The switch is installed inside the door actuator and detects the door LOCK status.



System flowchart



Modification basis	
Application basis	
Affected VIN	

▶ Door LOCK/UNLOCK by REKES key (without SKM)

Operation 1.

A. When the REKES LOCK switch is pressed for 0.03 seconds or longer (T1), the door LOCK relay is operated for 0.5 seconds (T2).

B. All of following conditions are met within 0.2 seconds (T4) after the chattering time (T3):

- All doors closed
- Hood closed
- Tailgate closed
- Door LOCK detection switch in LOCK state

C. The turn signal lamp flashes 2 times at intervals of 0.5 sec. ON/0.5 sec. OFF.

Operation 2.

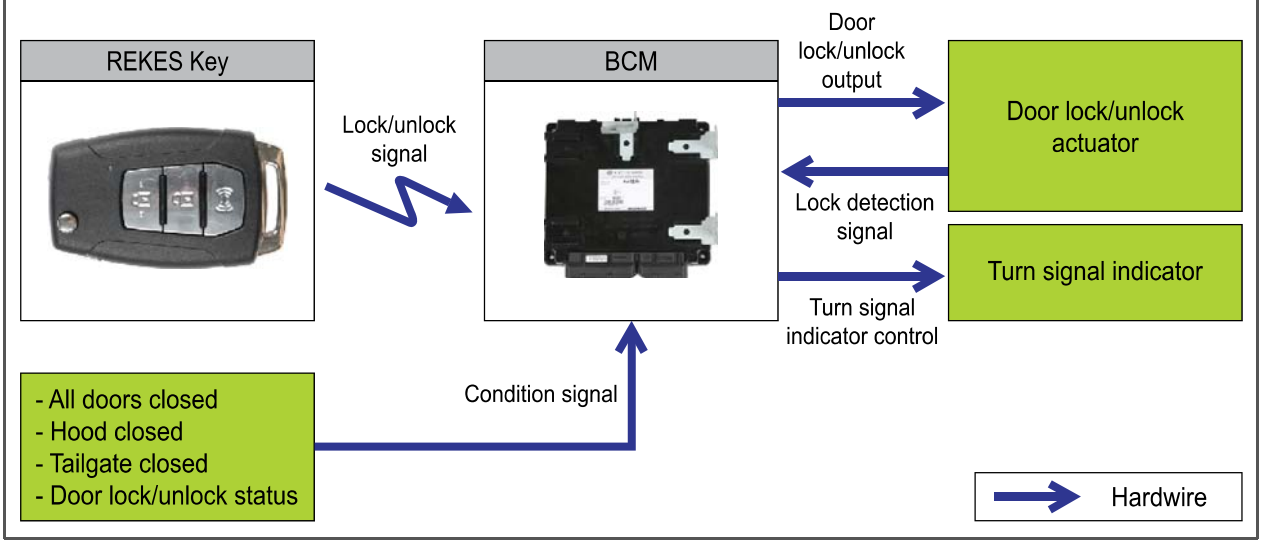
D. When the REKES UNLOCK switch is pressed for 0.03 seconds or longer (T5), the door UNLOCK relay is activated for 0.5 seconds (T2).

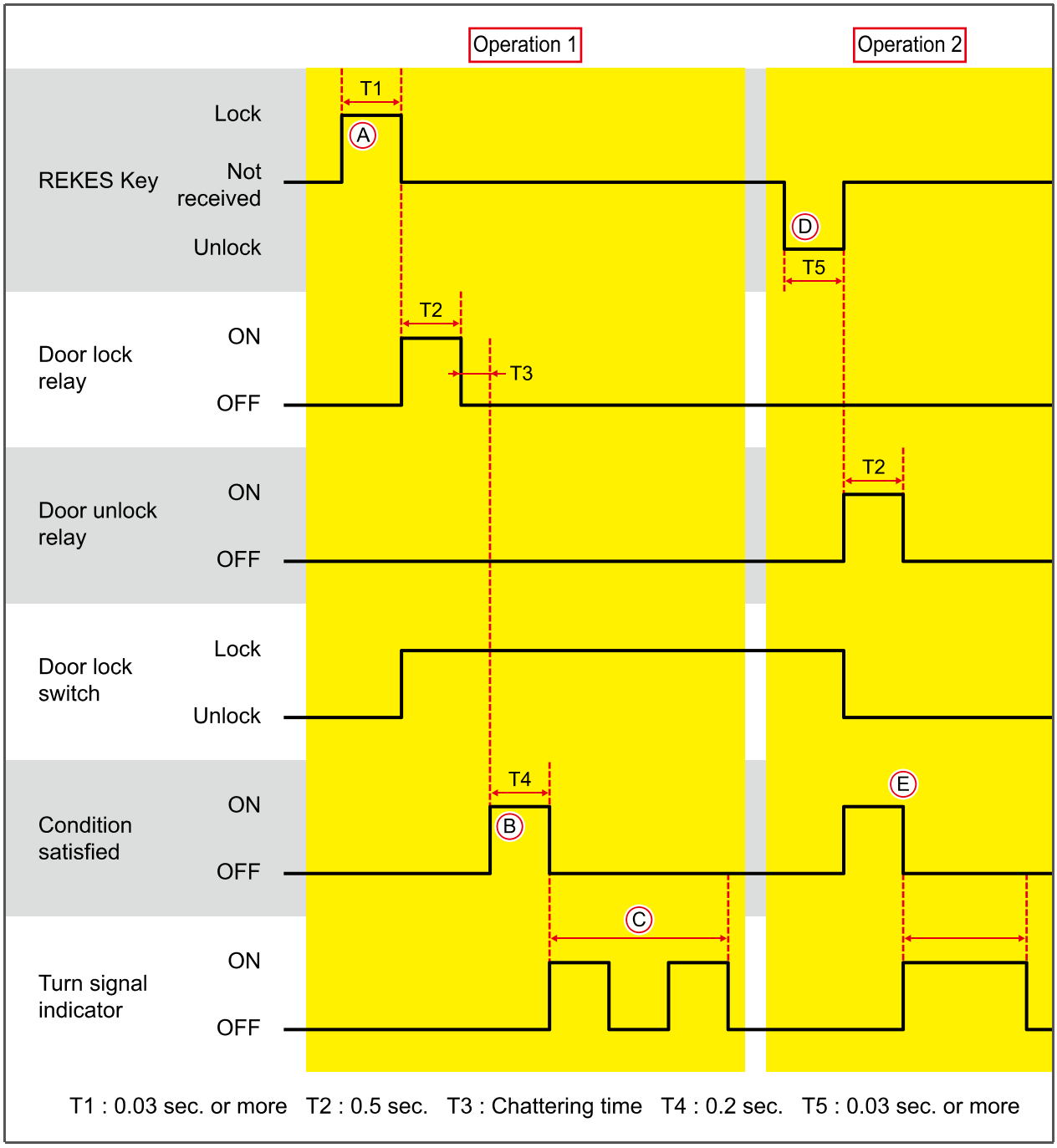
E. The door UNLOCK conditions are met, the turn signal lamp is operated once for 1 second.

NOTE

- Do not operate the REKES key with the ignition key inserted or for 1 second after the ignition key is removed. (to prevent the remote controller switch malfunction)
- When one of the LOCK switches is unlocked after the door LOCK, all doors will be unlocked.
- For auto folding/unfolding when door locking/unlocking by the smart key, see "OUTSIDE REARVIEW MIRROR FOLDING/UNFOLDING".
- The outside rearview mirrors are folded and unfolded depending on the outside rearview mirror folding/unfolding switch and conditions for entering/exiting the armed mode. For detailed information, see "OUTSIDE REARVIEW MIRROR FOLDING/UNFOLDING" and "THEFT DETERRENT FUNCTION".

Operating process (for vehicles without SKM)





Modification basis	
Application basis	
Affected VIN	

▶ Door LOCK/UNLOCK control by smart key (with SKM)

Operation 1.

A. The SKM receives LOCK signal through B-CAN with IGN OFF or ACC ON.
B. The BCM activates the LOCK relay for 0.5 seconds (T2).
C. The turn signal lamp flashes twice at a cycle of 0.5 s on and 0.5 s off and exterior buzzer (SKM buzzer) sounds once.

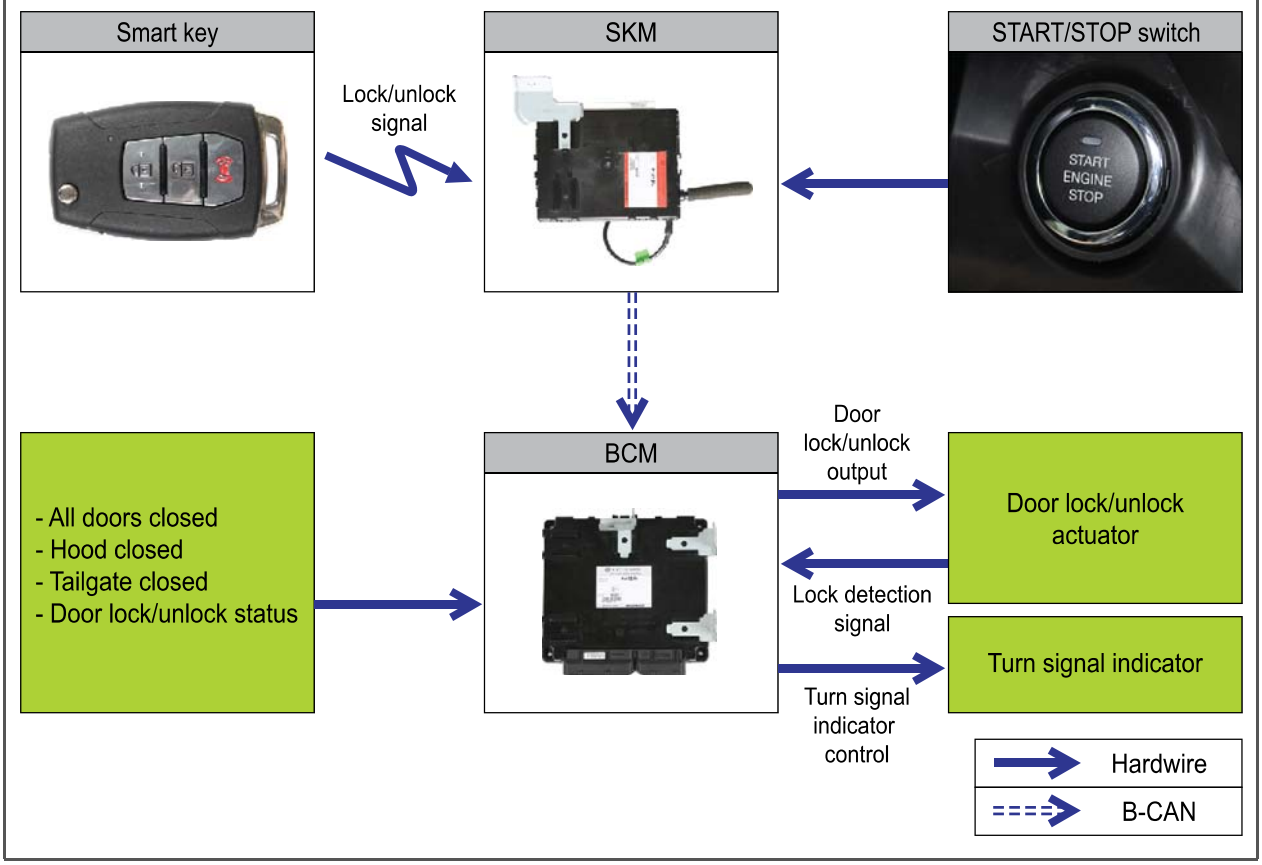
Operation 2.

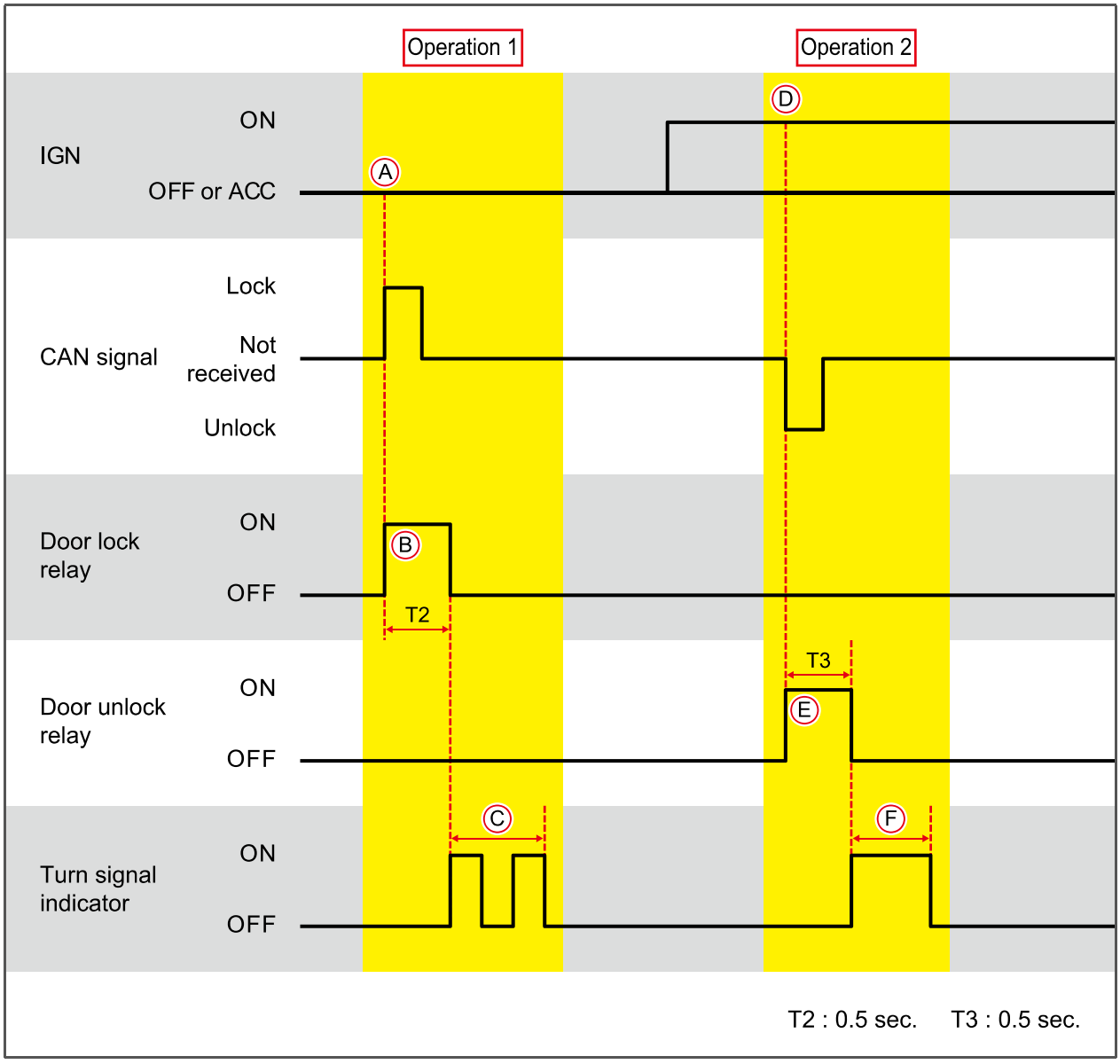
D. SKM receives UNLOCK signal through B-CAN with IGN ON, IGN OFF, or ACC ON.
E. BCM outputs UNLOCK relay signal for 0.5 seconds (T3).
F. The turn signal lamp flashes once for 1.0 sec. and exterior buzzer (SKM buzzer) sounds twice.

NOTE

- For auto folding/unfolding when door locking/unlocking by the smart key, see "OUTSIDE REARVIEW MIRROR FOLDING/UNFOLDING".
- The outside rearview mirrors are folded and unfolded depending on the outside rearview mirror folding/unfolding switch and conditions for entering/exiting the armed mode. For detailed information, see "OUTSIDE REARVIEW MIRROR FOLDING/UNFOLDING" and "THEFT DETERRENT FUNCTION".

Operating process (for vehicles with SKM)





Modification basis	
Application basis	
Affected VIN	

▶ Door LOCK/UNLOCK control by door outside handle switch (with SKM)

Operation 1. (when driver door locked)

A. The ignition is turned ON or OFF or ACC is turned ON.
B. When the door handle switch is operated, the door LOCK/UNLOCK signal is sent to the BCM through B-CAN.
C. The SKM operates the turn signal lamp once for 1 second after 0.5 seconds (T3) of door UNLOCK relay operation.

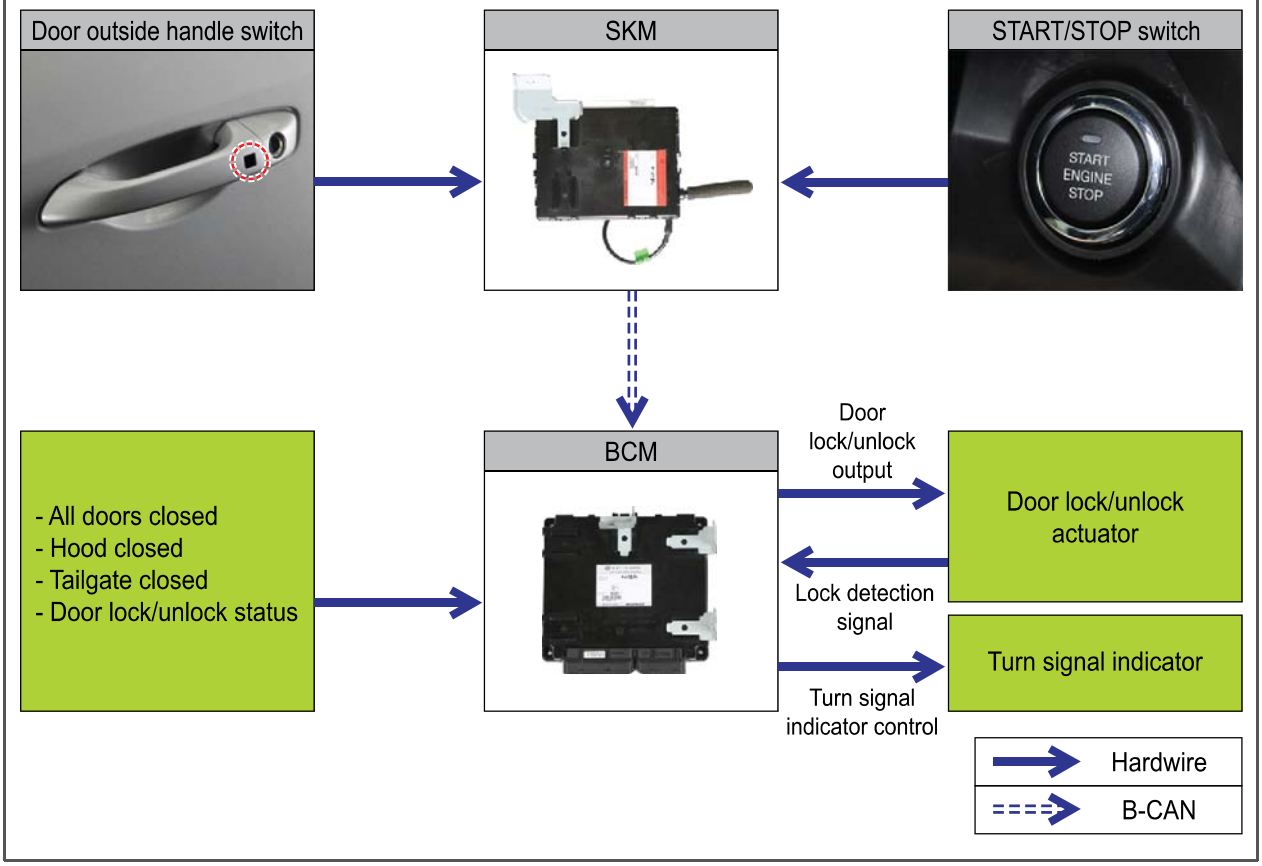
Operation 2. (when driver's door unlocked)

D. The ignition is turned OFF or ACC is turned ON.
E. When the door handle switch is operated, the door LOCK/UNLOCK signal is sent to the BCM through B-CAN.
F. The SKM operates the turn signal lamp twice at intervals of 0.5 sec. ON/0.5 sec. OFF after 0.5 seconds (T2) of door LOCK relay operation.

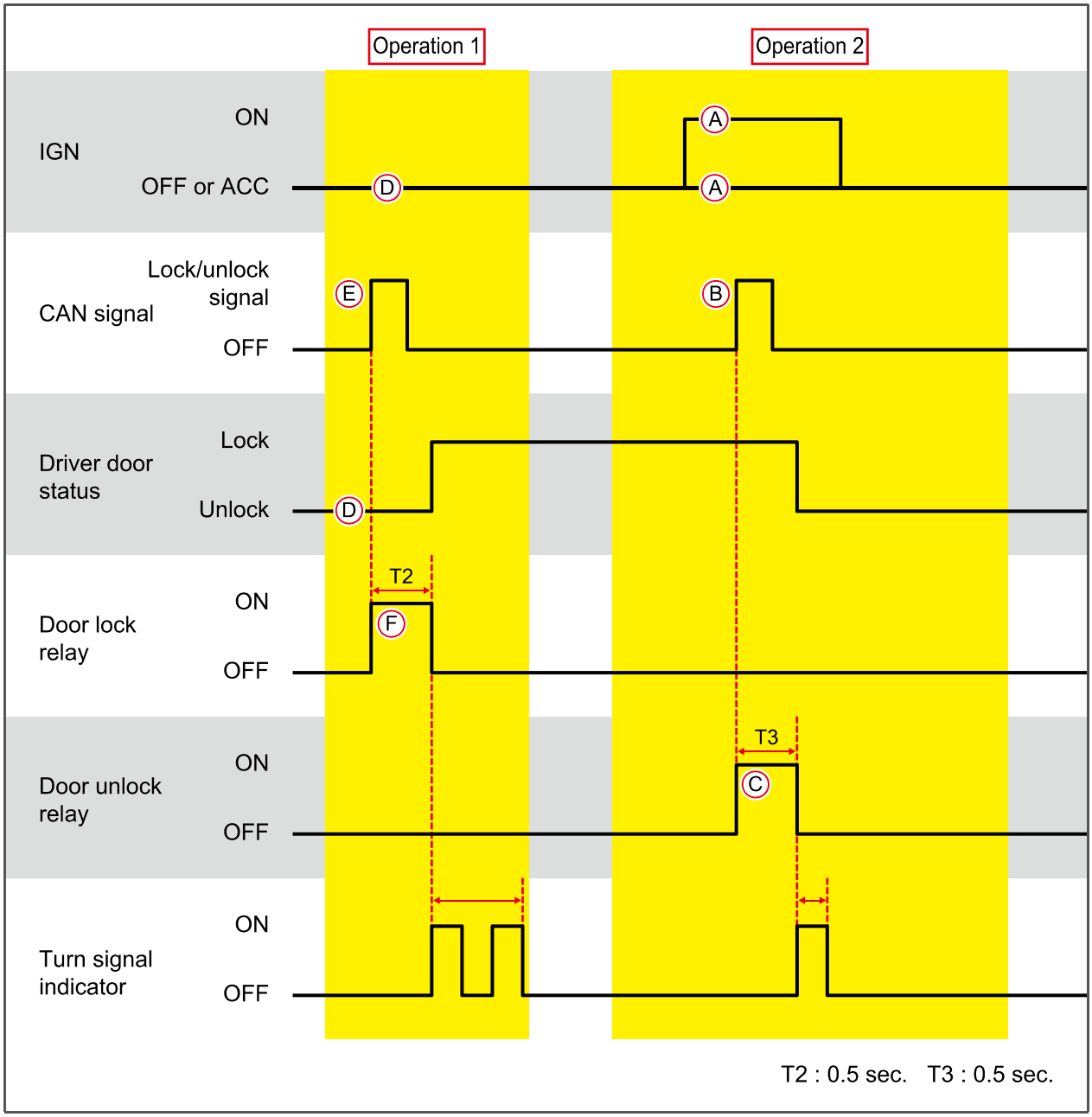
NOTE

- When the driver door is unlocked after passive UNLOCK signal is received with IGN ON, the door is not locked.
- For auto folding/unfolding when door locking/unlocking by the smart key, see "OUTSIDE REARVIEW MIRROR FOLDING/UNFOLDING".
- The outside rearview mirrors are folded and unfolded depending on the outside rearview mirror folding/unfolding switch and conditions for entering/exiting the armed mode. For detailed information, see "OUTSIDE REARVIEW MIRROR FOLDING/UNFOLDING" and "THEFT DETERRENT FUNCTION".

Operating process (for vehicles with SKM)



Modification basis	
Application basis	
Affected VIN	


Operation 1
Operation 2
IGN
ON
OFF or ACC
A
A
D
CAN signal
Lock/unlock signal
OFF
E
B
Driver door status
Lock
Unlock
D
T2
Door lock relay
ON
OFF
F
T3
Door unlock relay
ON
OFF
C
Turn signal indicator
ON
OFF
T2 : 0.5 sec. T3 : 0.5 sec.

▶ AUTO Door LOCK Control

Operation 1.

A. Turn on the ignition.
B. The vehicle is driven at 30 km/h or more.
C. The door LOCK relay is operated for 0.2 seconds (T2).
The door LOCK relay is not activated when all doors (except tailgate) are locked or door malfunction signal is input.

Operation 2. (after output of operation 1)

D. Any door is unlocked.
E. The door LOCK signal is sent 5 times (T3) except the door LOCK carried out in operation 1.

NOTE

- If a door is unlocked after the 5 times of LOCK output, the door is regarded as malfunctioning.
If there is a malfunctioning door, the AUTO door LOCK is not activated but the LOCK operation by
- the central door LOCK switch is available.
If a malfunction occurs when the vehicle is driven at 30 km/h or more, the AUTO door LOCK will
- not be activated even when the vehicle speed decreases to 30 km/h or less and then increases to 30 km/h or more.
The faulty door will be reset when the unlocked malfunctioning door is locked.
-

Operation 3. (during output of operation 2)

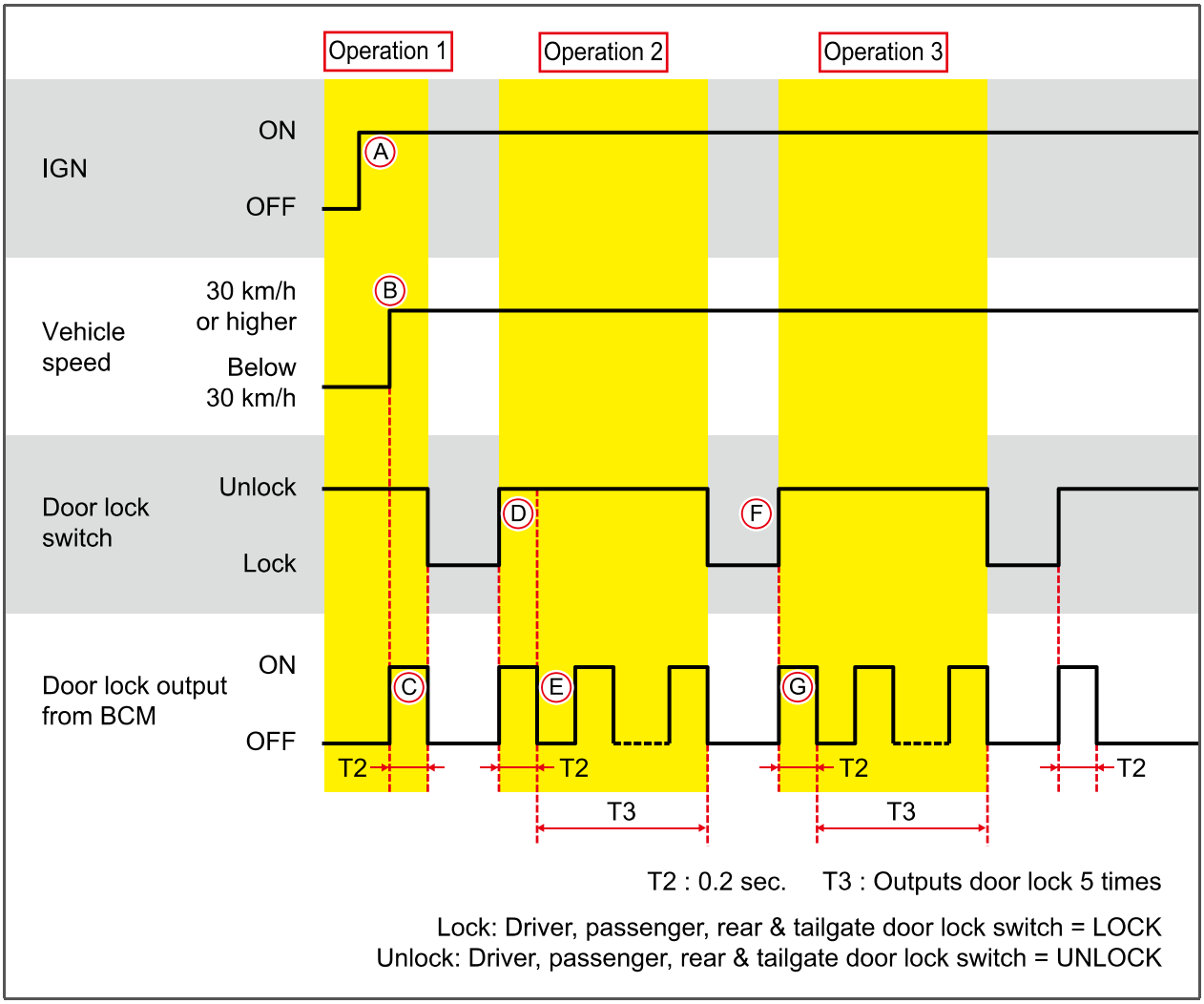
F. The UNLOCK signal by other switch is received.
G. The door LOCK signal is output 5 times for the switch.

- The door LOCK system outputs UNLOCK signal automatically when the LOCK output conditions are met by this function or the ignition is turned ON to OFF. (If the door is locked with ignition ON, the door will be always unlocked when the ignition is turned OFF)

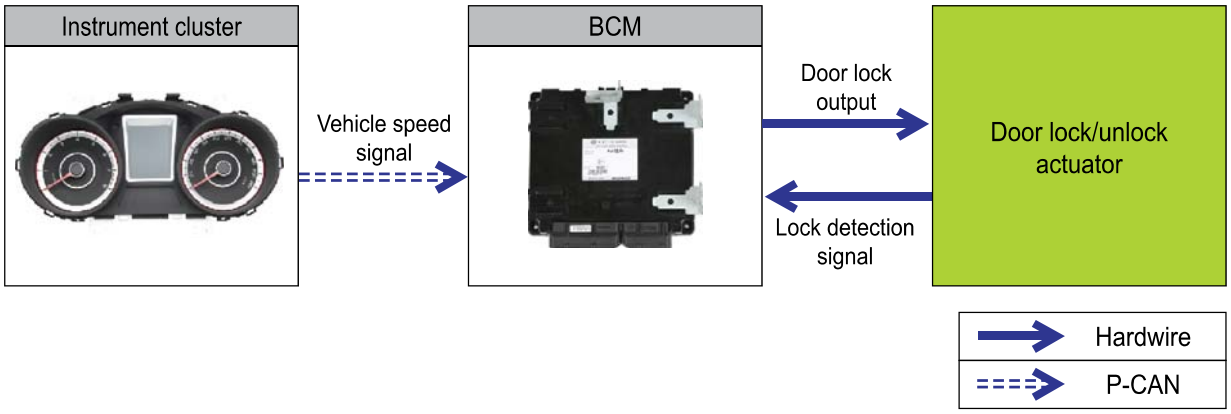
NOTE

- The faulty door will be reset when the ignition is turned OFF.
- When one of the door LOCK switches is in LOCK position with the ignition OFF, all doors are unlocked.

Modification basis	
Application basis	
Affected VIN	



System flowchart



▶ AUTO UNLOCK upon receiving air bag deployment signal

Operation 1.

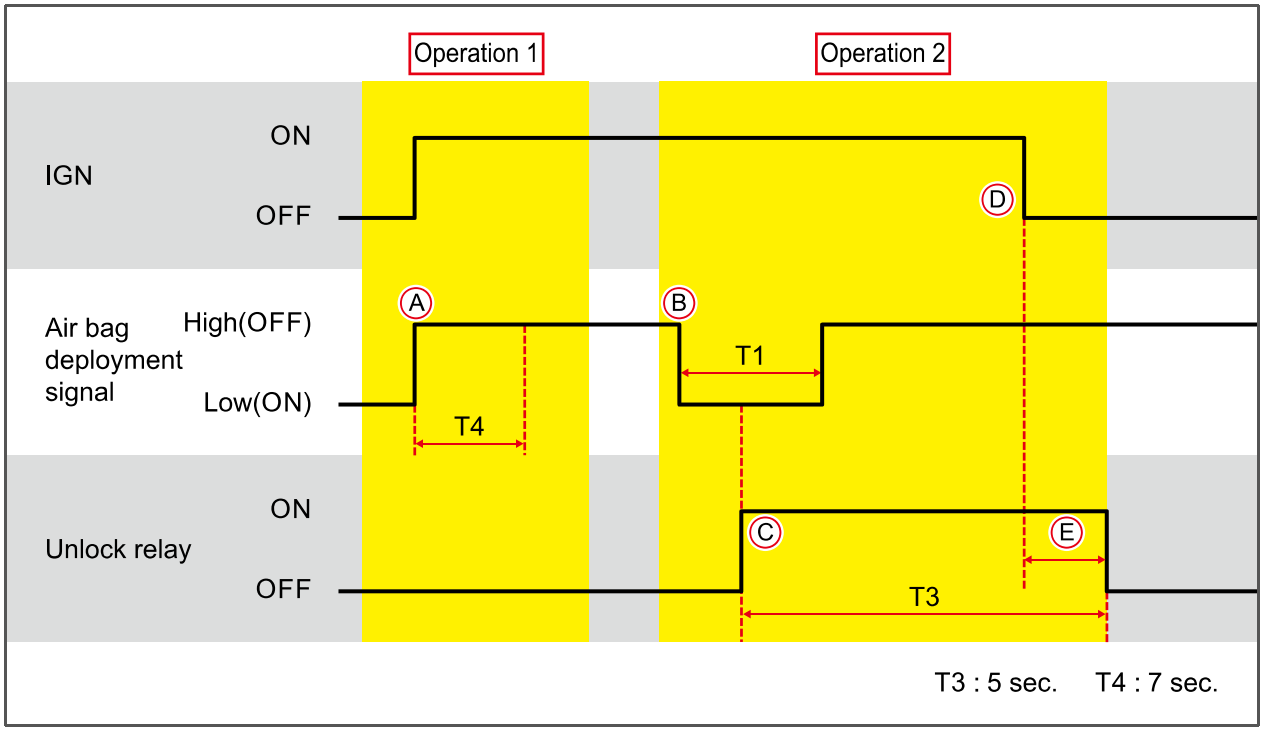
A. Air bag deployment signal is not input for initial 7 seconds (T4) after IGN ON

Operation 2.

B. When the air bag deployment signal (OFF→ON) is received 7 seconds (T4) after the ignition is turned ON.
C. The UNLOCK relay is activated for 5 seconds (T3)
D. When the ignition is turned OFF during the 5 seconds (T3) of UNLOCK relay activation.
E. The UNLOCK relay is activated for the remaining time.

NOTE

- The room lamp comes on when the air bag deployment signal is input except when the room lamp switch is turned off.
- The hazard warning lamp flashes at this time.
- Resetting the AUTO door UNLOCK function turns off the battery power (cutting off BCM power). If any DTC exists when the BCM is supplied with power, the operation 2 is performed.
- Clear the DTC and turn off the battery power (BCM off) to reset the system.
- The air bag is deployed as long as one of either crash signal from hardware or crash signal from
- CAN is received.



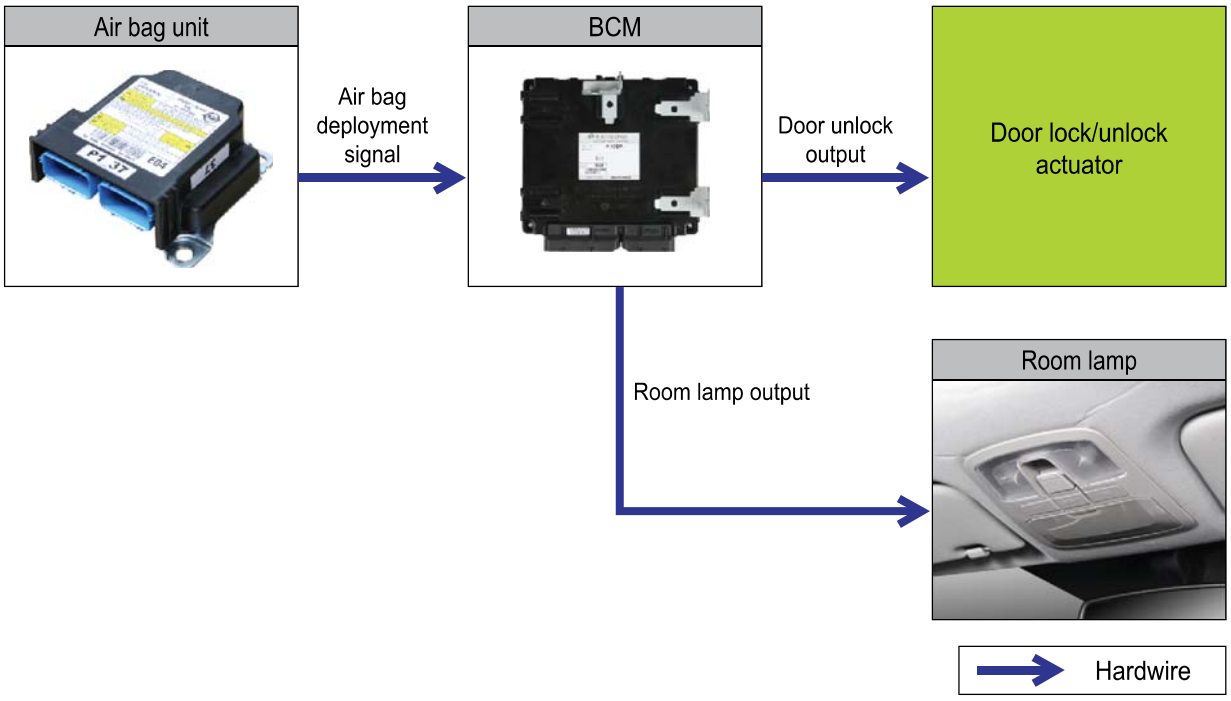
Modification basis	
Application basis	
Affected VIN	

CAUTION

1. The UNLOCK by the air bag deployment signal takes priority over the LOCK/UNLOCK control from other functions.
2. The LOCK/UNLOCK requests from other functions during or after the UNLOCK output by the air bag signal are ignored. However, the LOCK control is carried out when the ignition switch is turned to the "OFF" position.
3. The same request during the LOCK/UNLOCK output is ignored. However, the UNLOCK by the air bag deployment signal or operation by the smart key is carried out.
4. When LOCK and UNLOCK outputs occur at the same time, the LOCK output is carried out and UNLOCK is ignored.
5. When the BCM has been unlocked by the air bag deployment signal, clear any relevant DTC, remove and refit the battery terminals to reset the BCM.

System flowchart

- IGN ON/Room lamp switch in any position other than OFF



15. OUTSIDE REAR VIEW MIRROR FOLDING/UNFOLDING

▶ **Folding/unfolding control**

Prerequisite condition	IGN ON

Operation 1.

A. When the folding switch is pressed, a folding output is activated for a period of T1.

Operation 2.

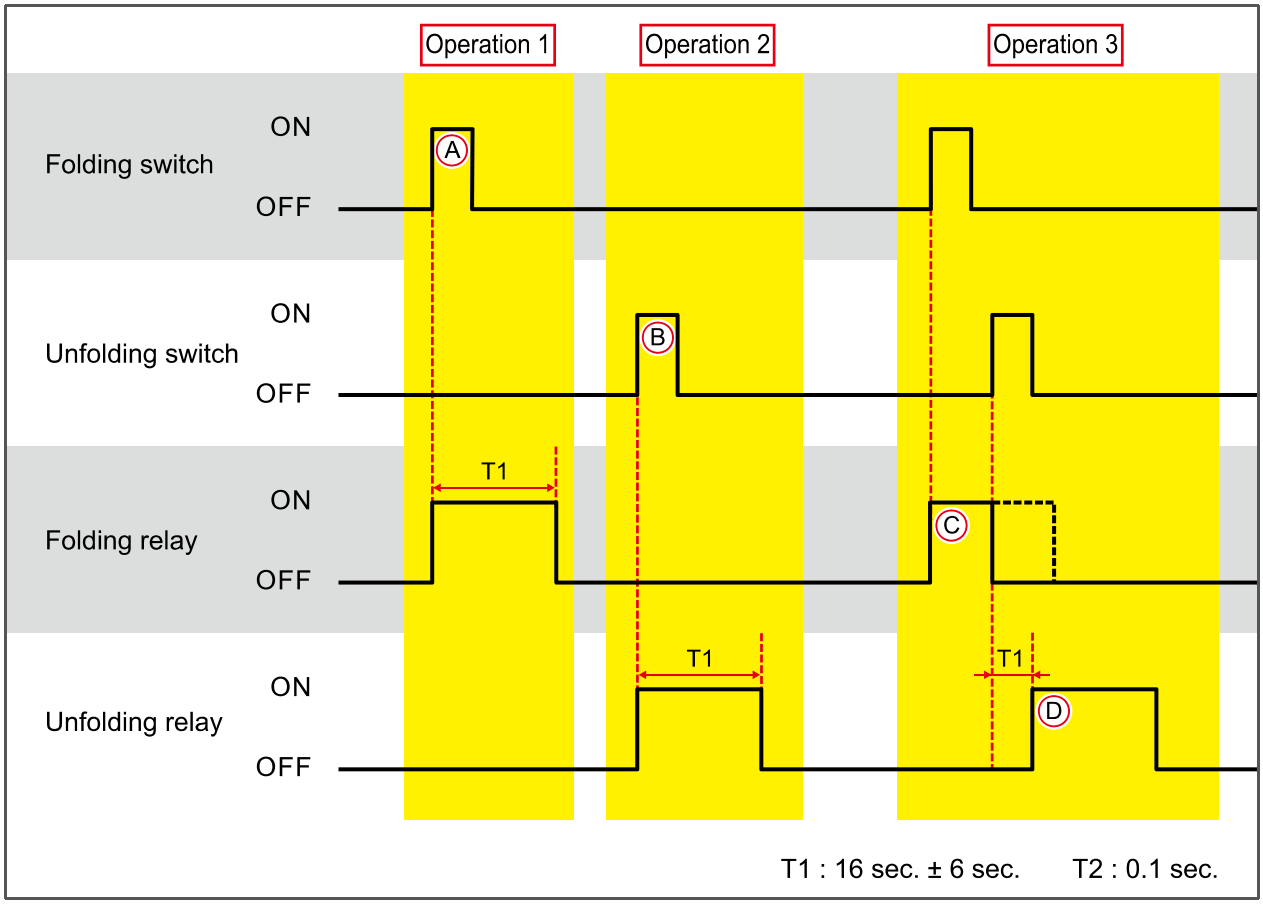
B. When the unfolding switch is pressed, an unfolding output is activated for a period of T1.

Operation 3.

C. When folding (unfolding) command is entered while unfolding (folding) command is outputting,
D. Folding (unfolding) output stops and 0.1 sec. after unfolding (folding) output begins

NOTE

The mirror is folded/erected regardless of the vehicle speed.



Modification basis	
Application basis	
Affected VIN	

▶ Auto folding/unfolding control

When the outside rearview mirror switch is in folding or unfolding position, auto folding/unfolding is disabled. Auto folding/unfolding control works only when it is in neutral position.

Operation 1. (auto folding)

1. Without smart key: REKES lock signal or lock signal from driver door key cylinder switch received
   With smart key: smart key lock signal or lock signal from outside handle switch and driver door key cylinder switch received
   Door locked
2. Vehicle enters armed mode
3. Outside rearview mirrors folded
4.

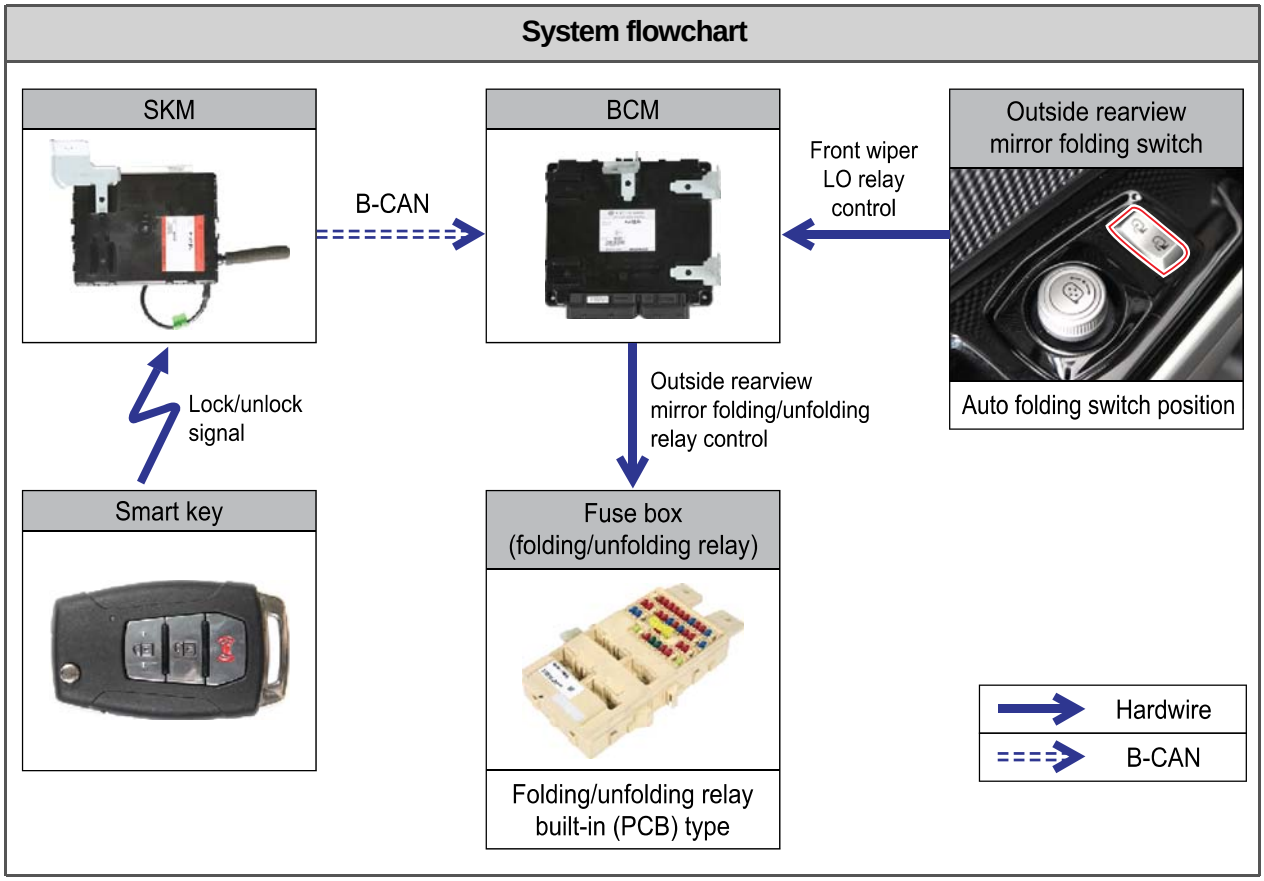
Operation 2. (auto unfolding)

1. Without smart key: REKES unlock signal or unlock signal from driver door key cylinder switch received
   With smart key: smart key unlock signal or unlock signal from outside handle switch and driver door key cylinder switch received
2. Door unlocked
3. Vehicle exits armed mode
4. Outside rearview mirrors unfolded

NOTE

- When the door is locked 30 seconds after the door is unlocked, auto folding will not work.
- For detailed information, see "THEFT DETTERENT FUNCTION".

System flowchart



Modification basis	
Application basis	
Affected VIN	

16. PANIC ALARM CONTROL

▶ **REKES key panic alarm (for vehicles without SKM)**

Operation 1.

A. The REKES key panic signal is received.
B. The hazard warning lamp and warning horn are activated for 30 seconds (T1) at intervals of 0.5 sec. ON/0.5 sec. OFF.

Operation 2.

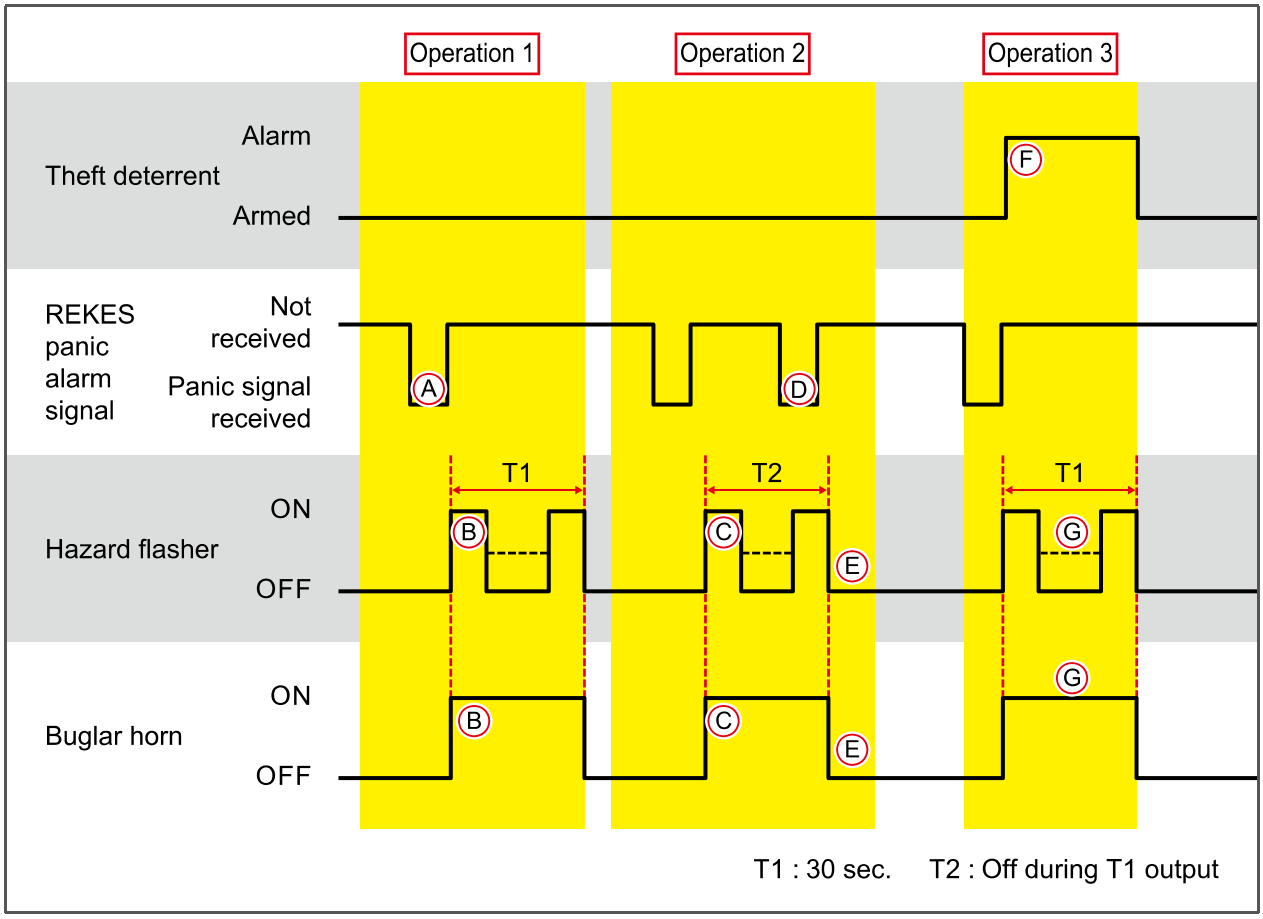
C. The hazard warning lamp and warning horn are activated by REKES panic function.
D. The REKES key panic signal is received.
E. The panic function is interrupted and other functions are activated by the corresponding command.

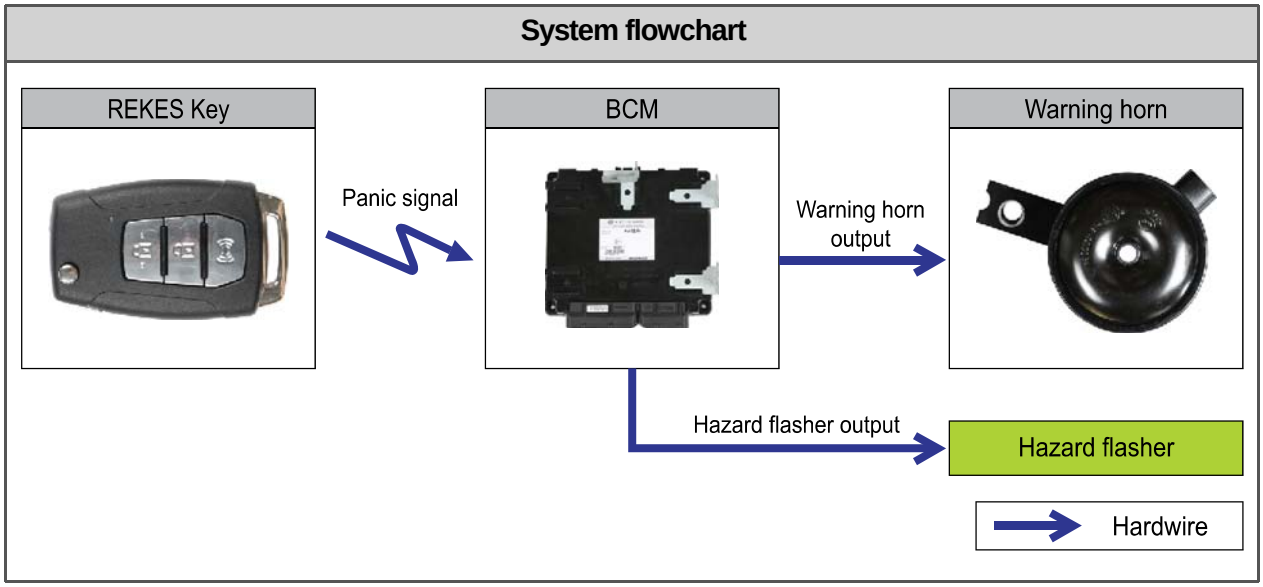
Operation 3. (during operation 1)

F. The theft deterrent alarm is activated.
G. The panic function is interrupted and theft deterrent alarm is set.

NOTE

- Operation can be made when ignition key is in ACC, IGN ON or IGN OFF position.
- Operative only when the ignition key is inserted(EU).





Modification basis	
Application basis	
Affected VIN	

▶ Smart key panic alarm (for vehicles with SKM)

Operation 1.

A. The ignition is turned ON or OFF, or the ACC is turned ON.
B. The smart key panic signal is received.
C. The hazard warning lamp and siren are activated for 30 seconds (T1) at intervals of 0.5 sec. ON/0.5 sec. OFF.

Operation 2.

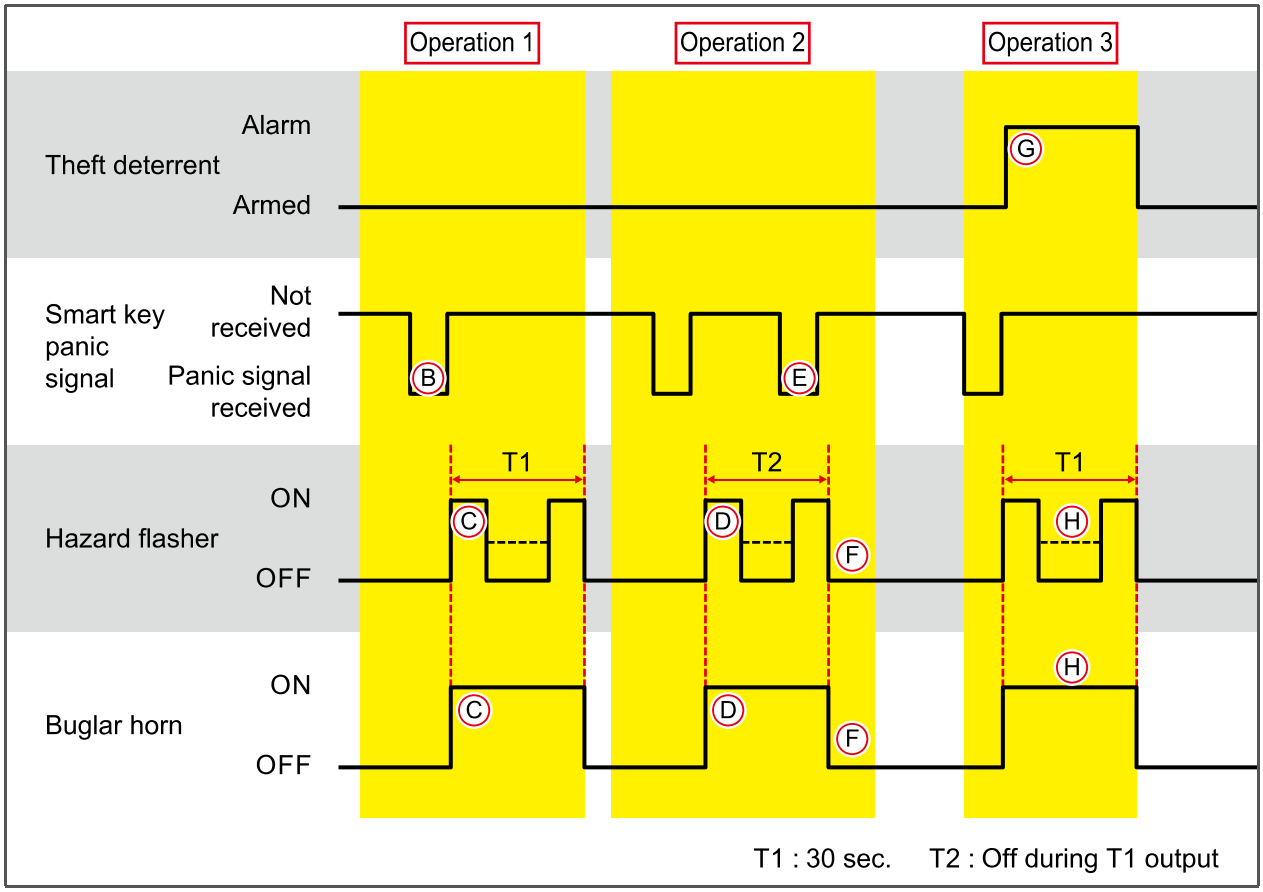
D. The hazard warning lamp and warning horn are activated by smart key panic function (operation 1).
E. The followings occur:
- The panic button of the smart key is pressed.
- When a signal for other function is received, the command is executed with the panic function remains ON.

F. The panic function is interrupted and other functions are activated by the corresponding command.

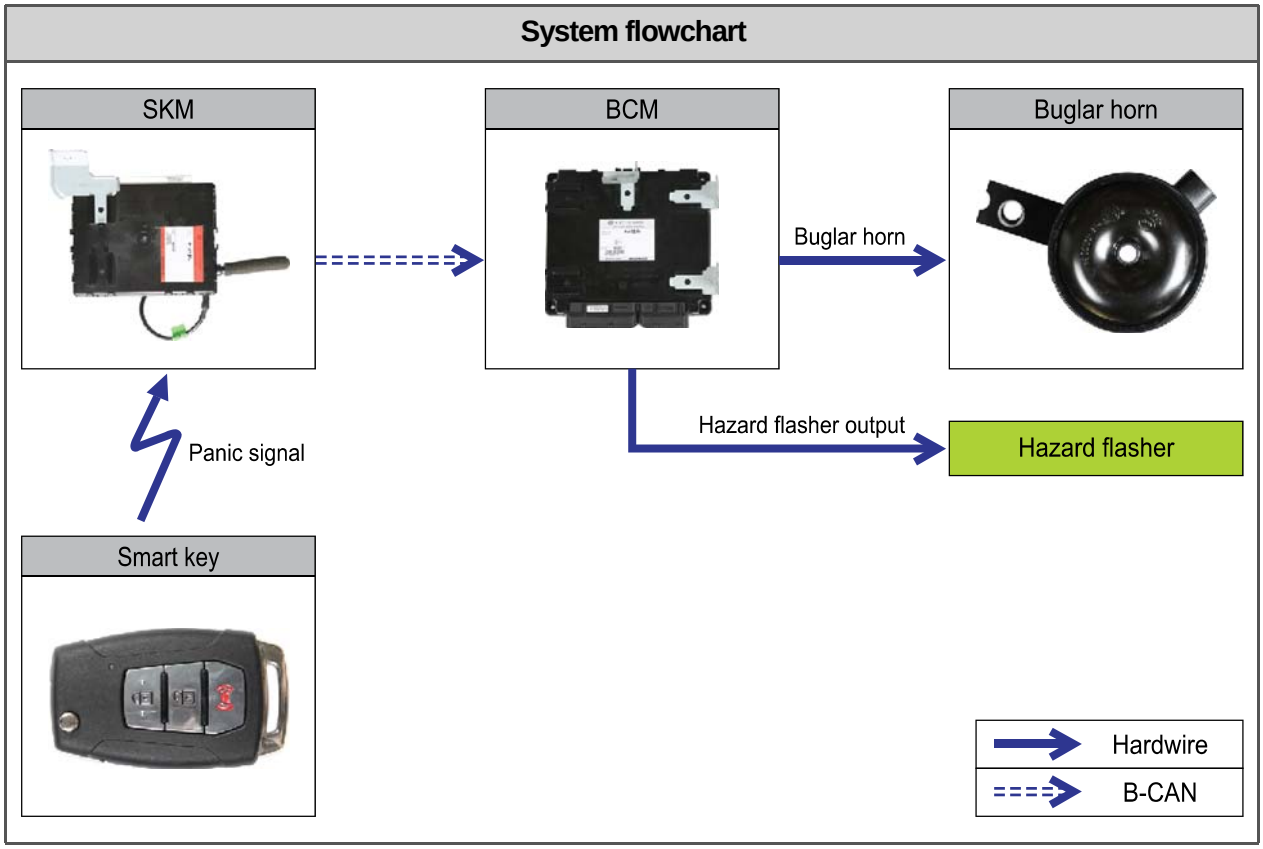
Operation 3. (During Operation 1) activated)

G. The theft deterrent alarm is activated.
H. The panic function is interrupted and theft deterrent alarm is set.

NOTE
- The panic function is activated by the signals from SKM.
- Operation can be made when ignition key is in ACC, IGN ON or IGN OFF position.
- The panic button will work only if pressed inside of the vehicle(EU).



System flowchart



Modification basis	
Application basis	
Affected VIN	

17. TAILGATE OPEN CONTROL

▶ **Tailgate open control (for vehicles without SKM)**

Operation 1.

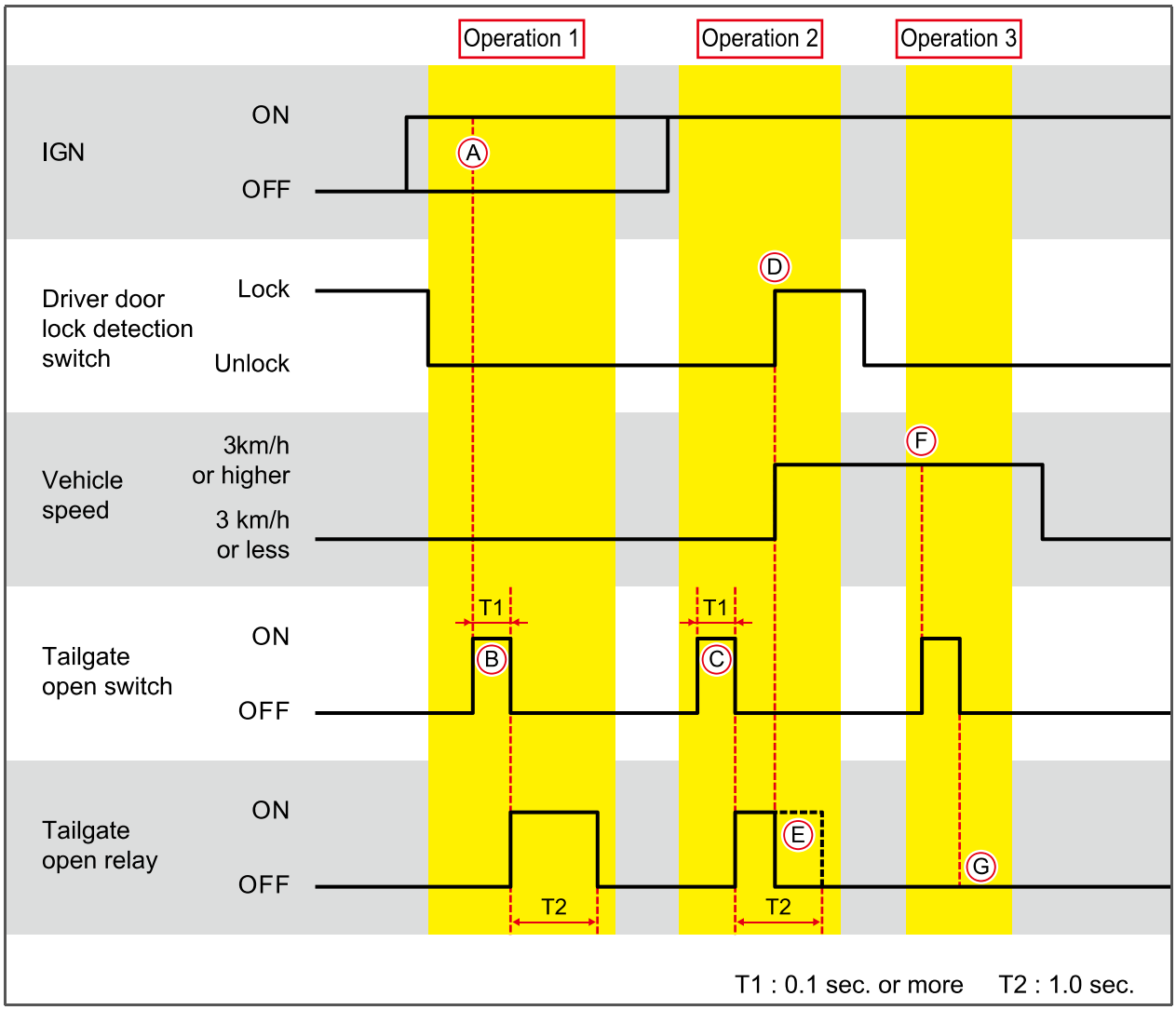
A. The ignition is turned OFF or ON, or ACC is turned ON with the driver door unlocked.
B. When the tailgate open switch is pressed for more than 0.1 seconds (T1), the tailgate open relay is activated for 1 second.

Operation 2.

C. The tailgate open relay is activated.
D. The vehicle is driven at 3 km/h or more with the driver door locked or IGN ON.
E. The tailgate open relay is deactivated immediately.

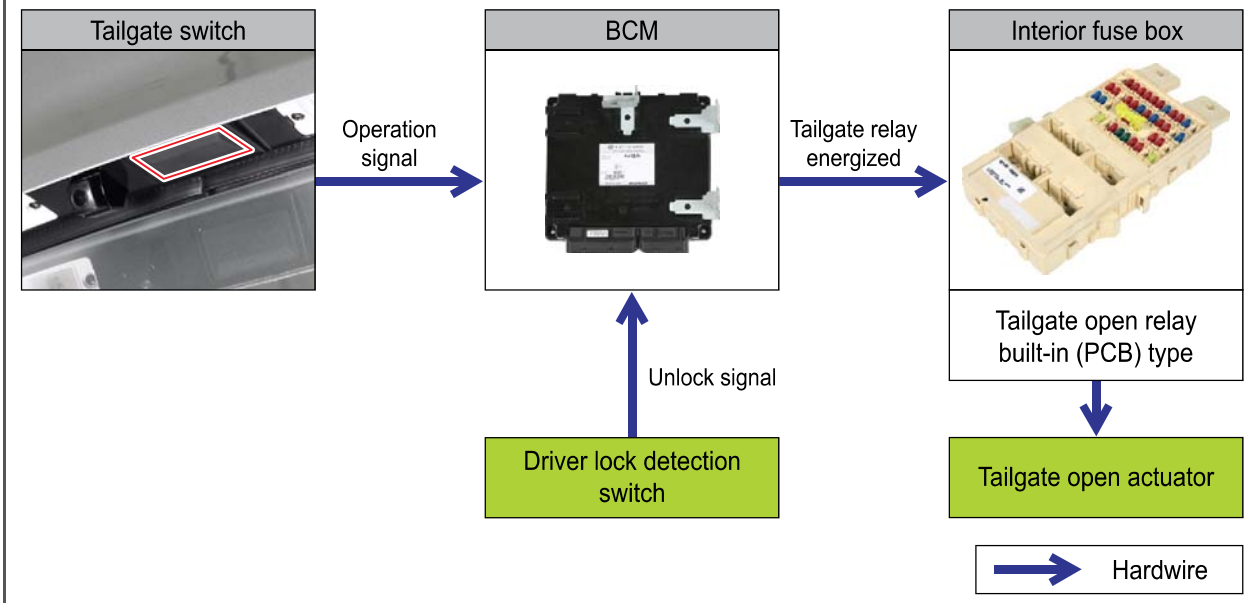
Operation 3.

F. The vehicle is driven at 3 km/h or more with IGN ON.
G. The tailgate open relay is not activated when the tailgate open switch is pressed.



System flowchart

- When the driver door is unlocked with the power OFF, ACC ON, or IGN ON.



Modification basis	
Application basis	
Affected VIN	

▶ Tailgate open control (for vehicles with SKM)

Operation 1.

A. The ignition is turned OFF or ON, or ACC is turned ON with the driver door unlocked.
B. When the tailgate open switch is pressed for more than 0.1 seconds (T1), the tailgate open relay is activated for 1 second. With the ignition turned ON, the tailgate open relay is activated only when the vehicle is driven at 3 km/h or less.

Operation 2.

C. The tailgate open relay is activated.
D. The vehicle is driven at 3 km/h or more with the driver door locked or IGN ON.
E. The tailgate open relay is deactivated immediately.

Operation 3.

F. The vehicle is driven at 3 km/h or more with IGN ON.
G. The tailgate open relay is not activated when the tailgate open switch is pressed.

Operation 4.

- The ignition is turned OFF or ON, or ACC is turned ON with the driver door and tailgate door locked. The tailgate open switch is pressed for 0.1 seconds or more.
- The BCM sends the verification request to the SKM through B-CAN. The SKM verifies the smart key
- and sends the signal to the BCM through B-CAN.
  The BCM activates the tailgate open relay after the valid smart key verification.
- (In armed mode, only the tailgate is disarmed.)

Operation 5.

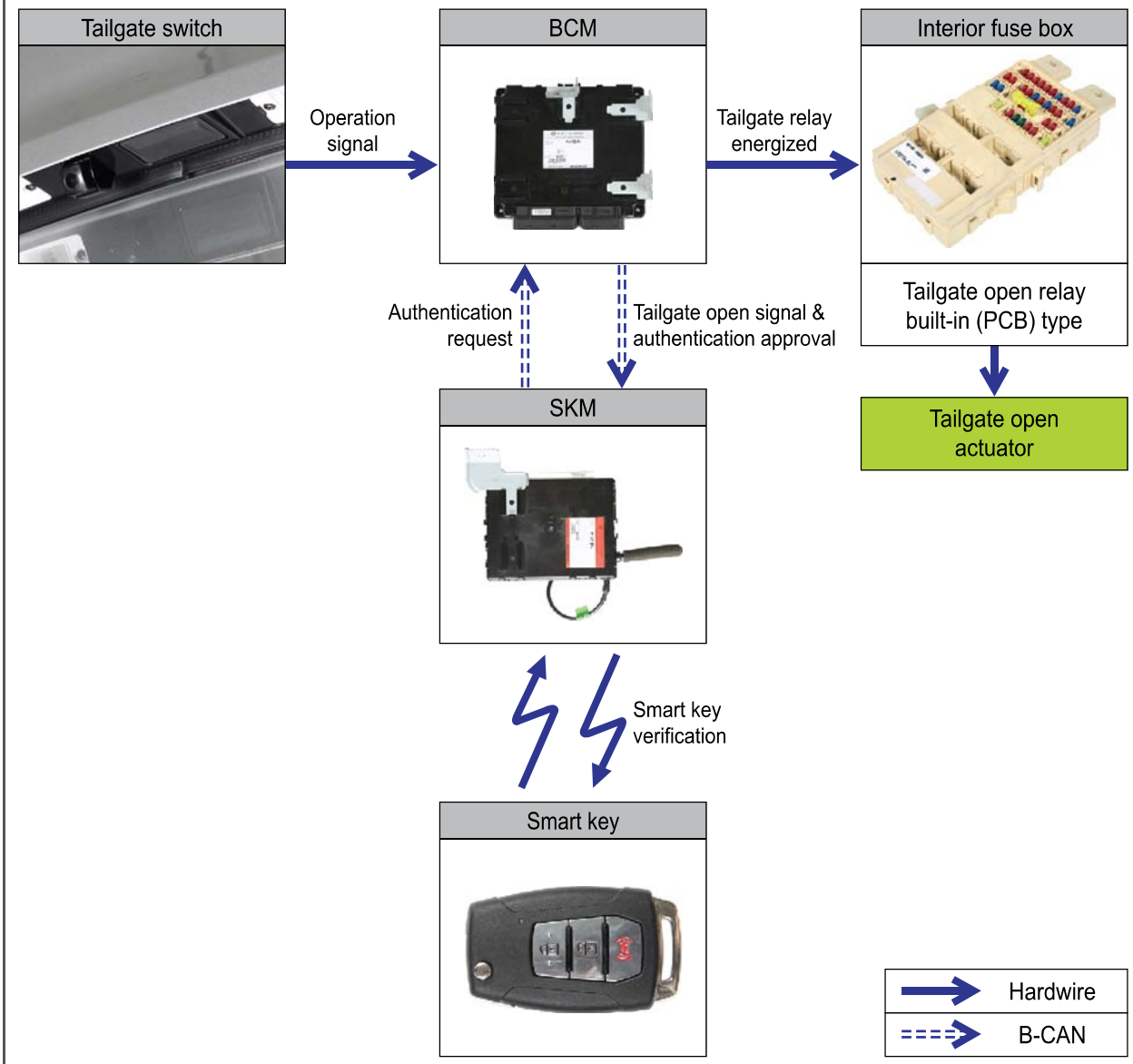
- The tailgate open signal is input by the smart key when the vehicle is not in stationary or the power is not turned OFF.
- The BCM keeps the tailgate open relay ready to operate for 30 seconds.
- If the signal from the tailgate open switch is input within this 30 seconds,
- The tailgate open relay is activated.
  If no signal is input within 30 seconds in theft deterrent mode, the mode remains on. The system enters the theft deterrent mode immediately when the LOCK signal from the smart key is input.

Operation 6.

- The tailgate closed signal is input in theft deterrent mode with power OFF.
- The BCM searches a verified smart key in the luggage compartment after 1 second.
- If a verified smart key is found in the luggage compartment, the BCM activates the external buzzer for 5 seconds.
- The driver presses the tailgate open switch to find the smart key.
- The BCM deactivates the tailgate LOCK function so that the tailgate can be opened even when the driver door is locked. (standby to operate without verification)

System flowchart

- in theft deterrent mode



Modification basis	
Application basis	
Affected VIN	

18. THEFT DETERRENT FUNCTION

▶ **Theft deterrent mode entering by REKES key (for vehicles without SKM)**

Operation 1.

A. All doors (including hood and tailgate) are closed with the ignition key removed.
B. REKES LOCK signal is received.
C. The door LOCK relay is activated.
D. All doors (including hood and tailgate) are locked
E. The system enters the theft deterrent mode after operating the hazard warning lamp twice.

Operation 2.

F. REKES LOCK signal is received again within 4 seconds of theft deterrent mode activation.
G. The hazard warning lamp flashes twice and the warning horn is operated once in the theft deterrent mode.

Operation 3.

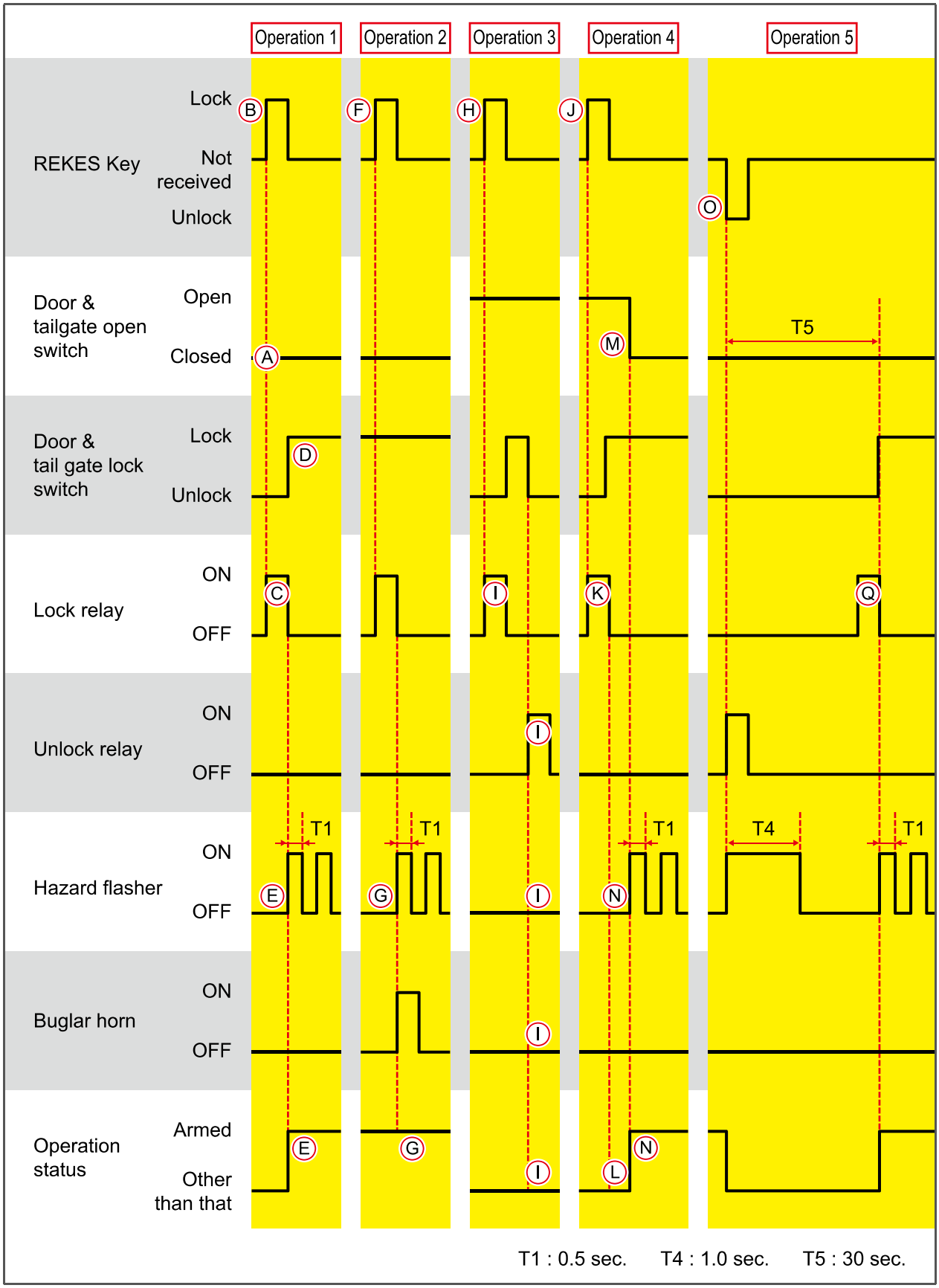
H. REKES LOCK signal is received with one or more doors open.
I. The LOCK relay is activated followed by activation of UNLOCK relay.

Operation 4.

J. REKES LOCK signal is received with the tailgate and hood open.
K. Only door lock relay energized when door (excepting hood and tailgate) closed.
L. Vehicle does not enter theft deterrent mode.
M. All doors (including hood and tailgate) closed.
N. Vehicle enters theft deterrent mode after operating hazard warning lamp twice.

Operation 5.

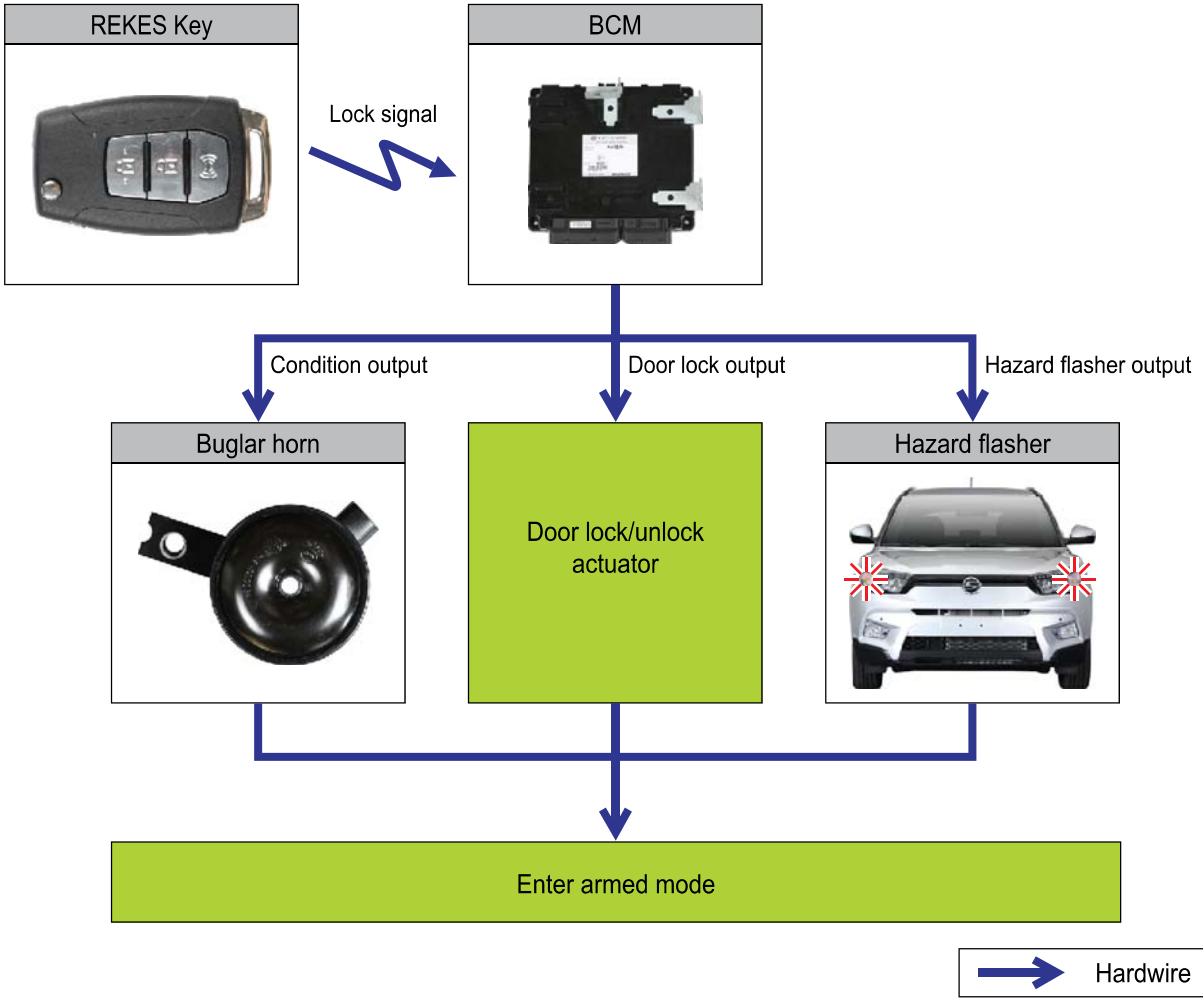
O. All doors are opened or the ignition key is not inserted within 30 seconds (T5) after the REKES UNLOCK signal is received.
P. The lock relay is energized and the vehicle enters the theft deterrent mode after operating the hazard warning lamp twice.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- IGN OFF/ACC ON
- All doors (including hood and tailgate) closed



▶ **Entering theft deterrent mode by key cylinder (without SKM)**

Operation 1.

A. All doors (including hood and tailgate) are closed with the ignition key removed,
B. Lock relay is energized when receiving Lock signal from driver door key cylinder switch,
C. All doors (including hood and tailgate) are locked,
D. Hazard warning lamp flashes twice and vehicle enters theft deterrent mode.

Operation 2.

E. When lock signal is received again from driver door key cylinder within 4 seconds after vehicle enters theft deterrent mode,
F. Warning lamp flashes twice and warning buzzer sounds once while vehicle stays in theft deterrent mode

Operation 3.

G. When driver door is unlocked and one or more doors open,
H. Driver door key cylinder lock signal is received,
I. Lock relay and unlock relay are energized in order and vehicle does not enter theft deterrent mode.

Operation 4.

J. With tailgate or hood open,
K. When driver door key cylinder lock signal is received,
L. Only door lock relay is energized if any door (excepting hood and tailgate) is closed.
M. Vehicle does not enter theft deterrent mode.
N. When all doors (including hood and tailgate) are closed,
O. Hazard warning lamp flashes twice and vehicle enters theft deterrent mode.

Operation 5.

P. When all doors (including hood and tailgate) open or ignition key is not inserted for 30 seconds after driver door key cylinder unlock signal is received,
Q. The lock relay is energized, hazard warning lamp flashes twice, horn sounds once and vehicle re-enters theft deterrent mode.

Modification basis	
Application basis	
Affected VIN	

▶ Theft deterrent mode deactivation conditions (without SKM)

- With REKES unlock or IGN ON
- When REKES unlock signal and driver door key cylinder unlock signal are received in the theft deterrent mode or disarmed mode, the hazard warning lamp flashes once and the theft deterrent mode is deactivated (no warning horn output).

▶ Theft deterrent mode (for vehicles without SKM)

The BCM monitors the following conditions continuously in theft deterrent mode.

- Battery power
- Front/rear door open
- Tailgate open
- 4 doors LOCK/UNLOCK
- Hood open

▶ Theft deterrent alarm activation (for vehicles without SKM)

- When any door including hood and tailgate opens in theft deterrent mode,
- The lock switch of any door including tailgate is unlocked in theft deterrent mode and
- Any door is closed and then opened after 30 seconds of alarming,
- The hazard warning lamp and warning horn are activated for 30 seconds at a cycle of 0.5 sec. ON and 0.5 sec. OFF.

▶ Theft deterrent alarm deactivation conditions (for vehicles without SKM)

- When IGN ON signal is received (however, for vehicle without immobilizer, alarm will be deactivated 30 s after ignition is turned on.)
- If no disarm signal is received, alarm mode is deactivated after a maximum of 30 seconds and theft deterrent mode is maintained.
- Alarm and armed modes are deactivated as soon as the driver door key cylinder is unlocked.

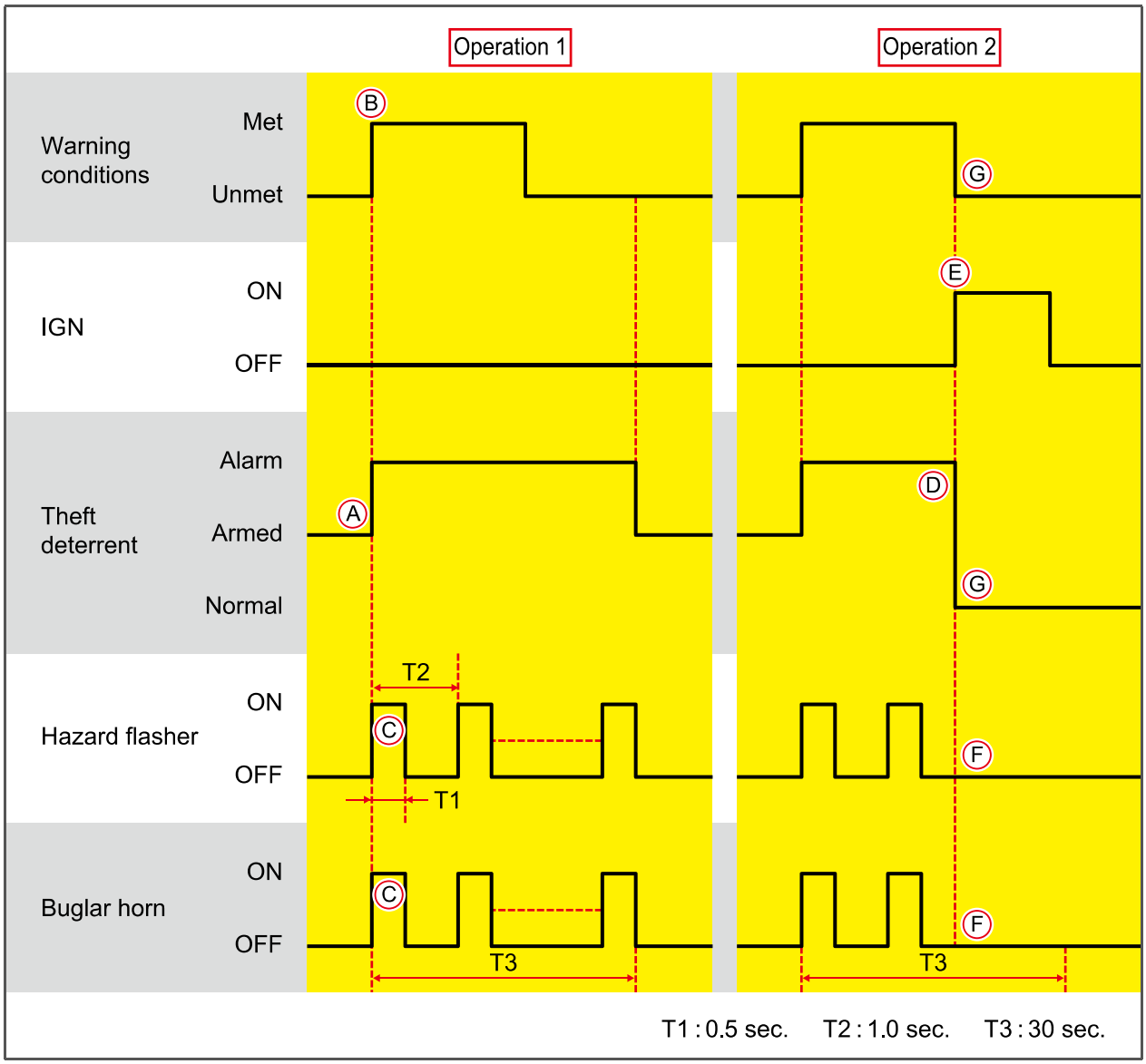
▶ Operation when deactivating alarm (without SKM)

Operation 1.

A. The system is in theft deterrent mode.
B. The conditions for theft deterrent alarm are met.
C. The hazard warning lamp flashes and the warning horn is activated.

Operation 2.

D. The theft deterrent alarm is activated.
E. The conditions for deactivation of theft deterrent alarm are met.
F. The hazard warning lamp and warning horn are deactivated.
G. The theft deterrent alarm is deactivated because the conditions are not met, and the system enters the theft deterrent mode.



Modification basis	
Application basis	
Affected VIN	

▶ Theft deterrent mode entering by smart key (for vehicles with SKM)

Operation 1.

A. When the ignition key is in IGN OFF or ACC ON position, all doors (including hood and tailgate) are closed and
B. The door lock signal is received through B-CAN,
C. The door lock relay is output.
(If the key is in ACC ON, the power is turned off first.)
D. When all doors (including hood and tailgate) are locked,
E. The hazard warning lamp flashes twice, external buzzer (SKM buzzer) sounds once and system enters the armed mode.

Operation 2.

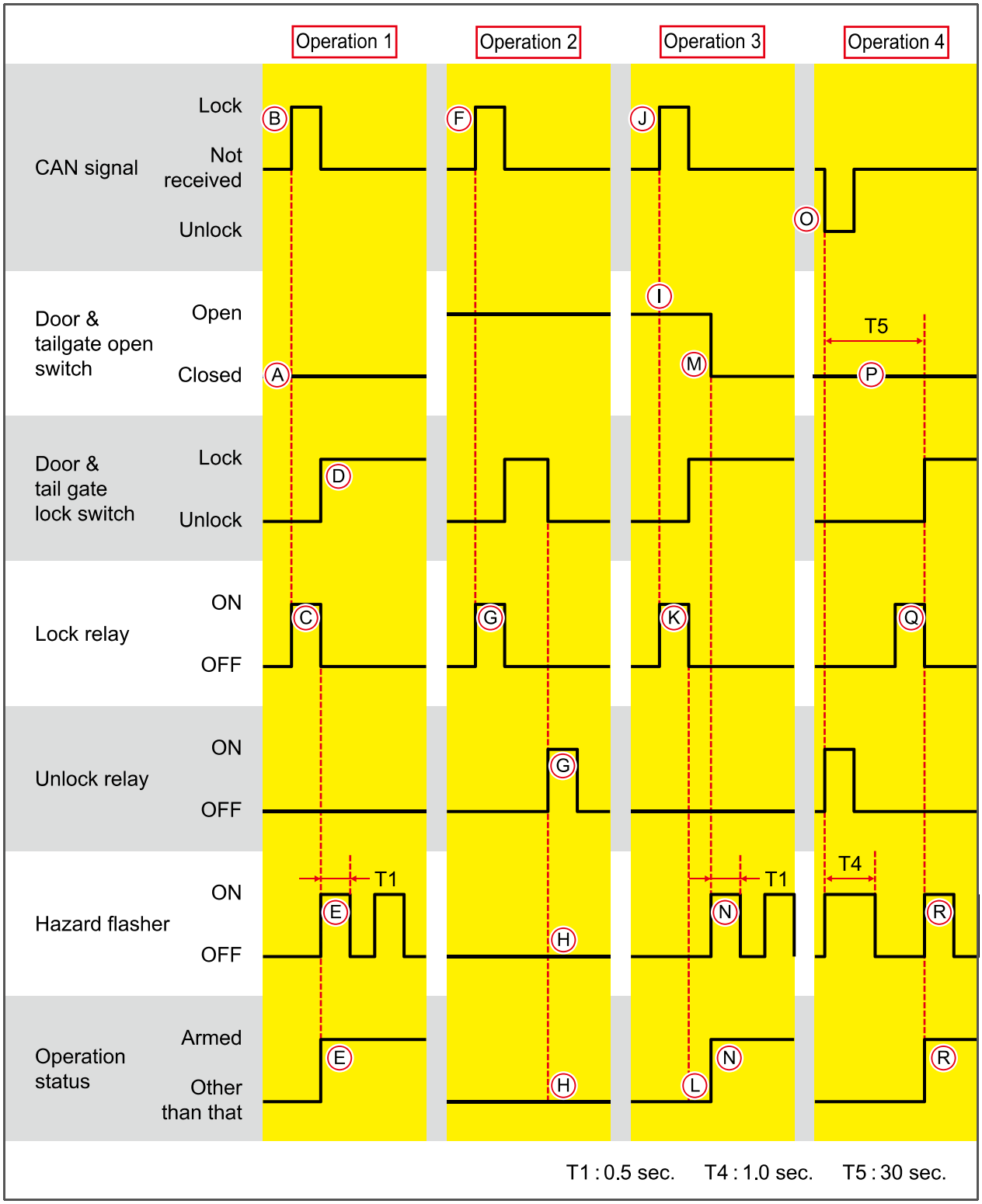
F. The door LOCK signal is received through B-CAN when one or more doors are open with driver door unlocked.
G. The LOCK relay is activated followed by activation of UNLOCK relay.
H. The hazard warning lamp and external buzzer (SKM buzzer) are not operated and the system does not enter the theft deterrent mode.

Operation 3.

I. The tailgate and hood are open.
J. The door LOCK signal is received through B-CAN.
K. If all doors (including hood and tailgate) are closed, door LOCK relay is activated.
L. The system does not enter the theft deterrent mode.
M. If the open tailgate and hood are closed.
N. The system enters the theft deterrent mode after operating the hazard warning lamp twice and external buzzer (SKM buzzer) once.

Operation 4.

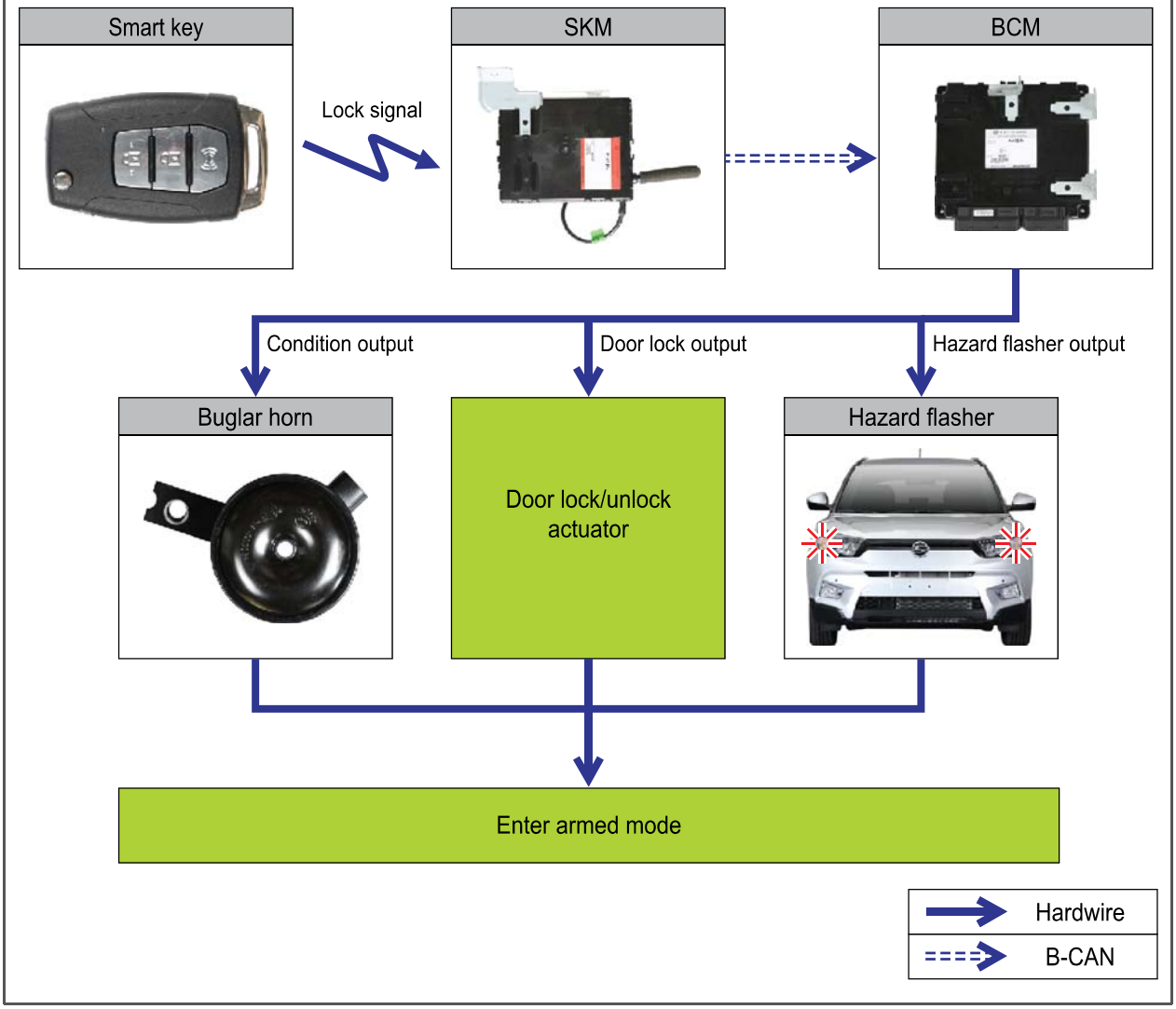
O. The door UNLOCK signal is received through B-CAN.
P. All doors (including hood and tailgate) are not opened or the ignition is not turned ON within 30 seconds (T5).
Q. The door LOCK relay is activated.
R. The system enters the theft deterrent mode again after operating the hazard warning lamp twice and external buzzer (SKM buzzer) once.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- IGN OFF/ACC ON
- All doors (including hood and tailgate) closed



▶ **Entering armed mode by key cylinder (with SKM)**

Operation 1.

A. When the ignition key is in IGN OFF or ACC ON position, all doors (including hood and tailgate) are closed and
B. Driver door key cylinder lock signal is received, lock relay is output.
(If the key is in ACC ON, the power is turned off first.)
C. When all doors (including hood and tailgate) are locked,
D. The hazard warning lamp flashes twice, external buzzer (SKM buzzer) sounds once and system enters the armed mode.

Operation 2.

E. When driver door is unlocked and one or more doors open, and
F. Driver door key cylinder lock signal is received,
G. The lock relay is output followed by output of unlock relay.
H. The hazard warning lamp and external buzzer (SKM buzzer) are not operated and the system does not enter the armed mode.

Operation 3.

I. When tailgate or hood opens, and
J. Driver door key cylinder lock signal is received,
K. Only all door lock relays are output if any door (excepting hood and tailgate) is closed.
L. Vehicle does not enter armed mode.
M. When all doors (including hood and tailgate) become closed,
N. The hazard warning lamp flashes twice, external buzzer (SKM buzzer) sounds once and system enters armed mode.

Operation 4.

O. When any door (including hood and tailgate) is not opened or ignition key not in IGN ON position within 30 seconds after driver door key cylinder unlock signal is received,
P. The lock relay is output, hazard warning lamp flashes twice, horn sounds once and vehicle re-enters armed mode.

Modification basis	
Application basis	
Affected VIN	

▶ Conditions for theft deterrent mode deactivation (with SKM)

- When smart key unlock signal is received with IGN OFF, door handle switch unlock signal received with driver door locked or driver door key cylinder unlock signal received, unlock is output, hazard warning lamp flashes once, external buzzer (SKM buzzer) sounds twice and vehicle exits armed mode.
- When smart key unlock signal or driver door key cylinder unlock signal is received in disarmed mode, hazard warning lamp relay and external buzzer (SKM buzzer) are output.
- The theft deterrent mode is deactivated when the ignition is turned ON.

▶ Theft deterrent mode (for vehicles with SKM)

In armed mode, BCM continuously monitors for:

- Battery power
- Front/rear door open
- Tailgate open
- 4 doors are locked or unlocked
- Hood open

▶ Alarm horn (with SKM)

- Any door including hood and tailgate opens in armed mode
- Any door or tailgate is unlocked in armed mode
- Status of any door or hood changes (from closed to open) or status of any door or tailgate lock switch changes (from locked to unlocked) after buzzer is turned off (for 30 seconds).
  Theft deterrent activated: Locked → unlocked / closed → open
  Theft deterrent deactivated : Unlocked → locked / open → closed
- The hazard warning lamp and alarm horn are output for 30 seconds at a cycle of 0.5 sec. ON and 0.5 sec. OFF.

▶ Conditions for deactivating alarm (with SKM)

- The alarm mode is deactivated in the following conditions. However, the armed mode is maintained.

  a. Smart key door lock/unlock signal received
  b. Door switch unlock signal received
  c. IGN ON signal received
  d. Panic function operated

- Alarm is deactivated as soon as ignition is turned on during alarm sounding.
- When alarm sounds in armed mode, armed mode is deactivated immediately and alarm is turned off 30 seconds (remaining time) after the ignition is turned on.
- If none of the conditions specified in the above are met, alarm mode is deactivated within 30 seconds, system maintains the theft deterrent mode.
- Alarm and armed modes are deactivated as soon as the driver door key cylinder is unlocked.

▶ Theft deterrent mode re-activation after tailgate open (with SKM)

When all doors except the tailgate are in theft deterrent mode, the system searches for the smart key inside the vehicle 1 second after the tailgate is closed. If no smart key is found, the system enters the theft deterrent mode again. The hazard warning lamp and warning horn are activated when the system enters the mode.

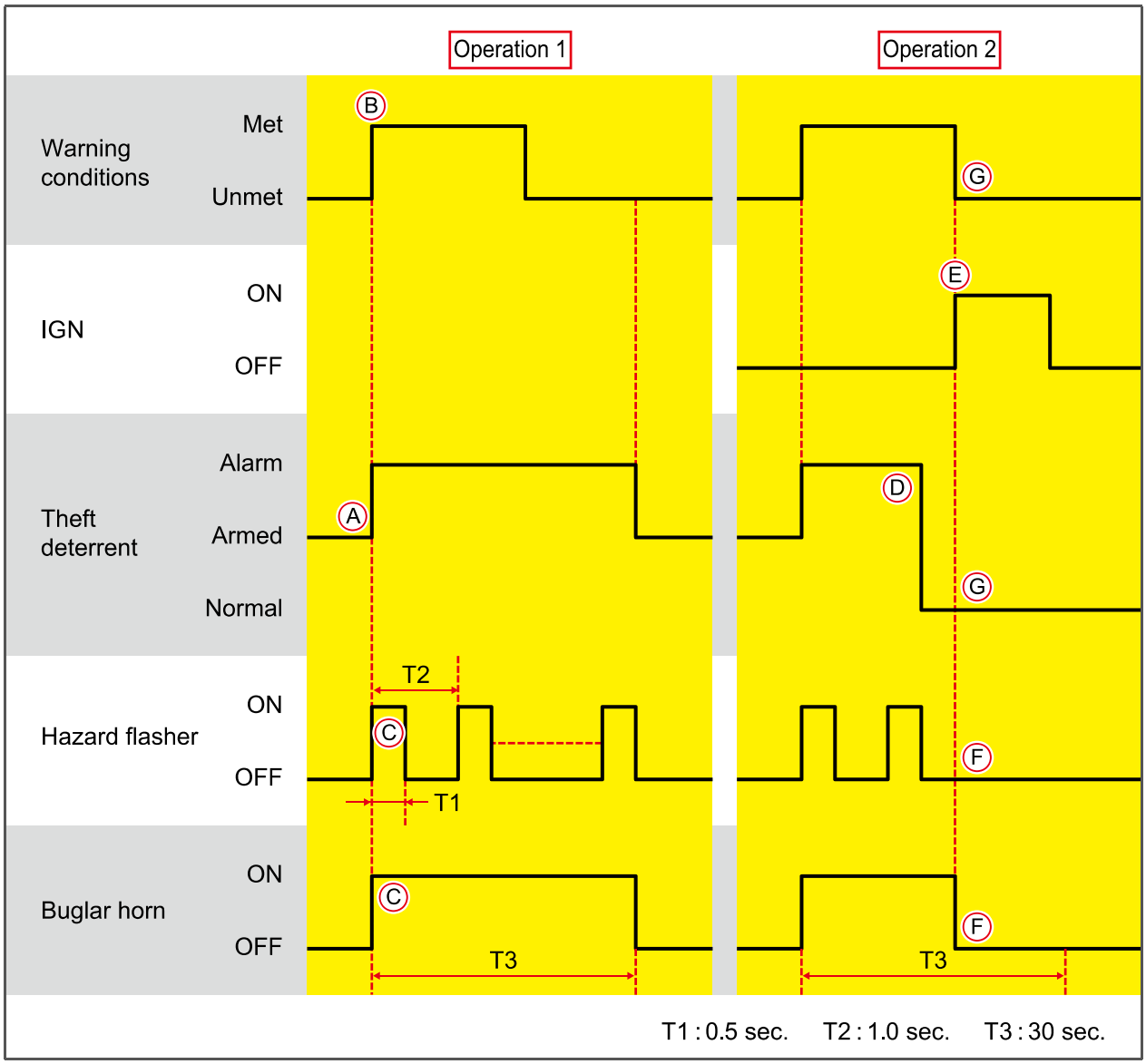
▶ Operation when deactivating alarm (with SKM)

Operation 1.

A. The system is in theft deterrent mode.
B. The conditions for theft deterrent alarm are met.
C. The hazard warning lamp flashes and the warning horn is activated.

Operation 2.

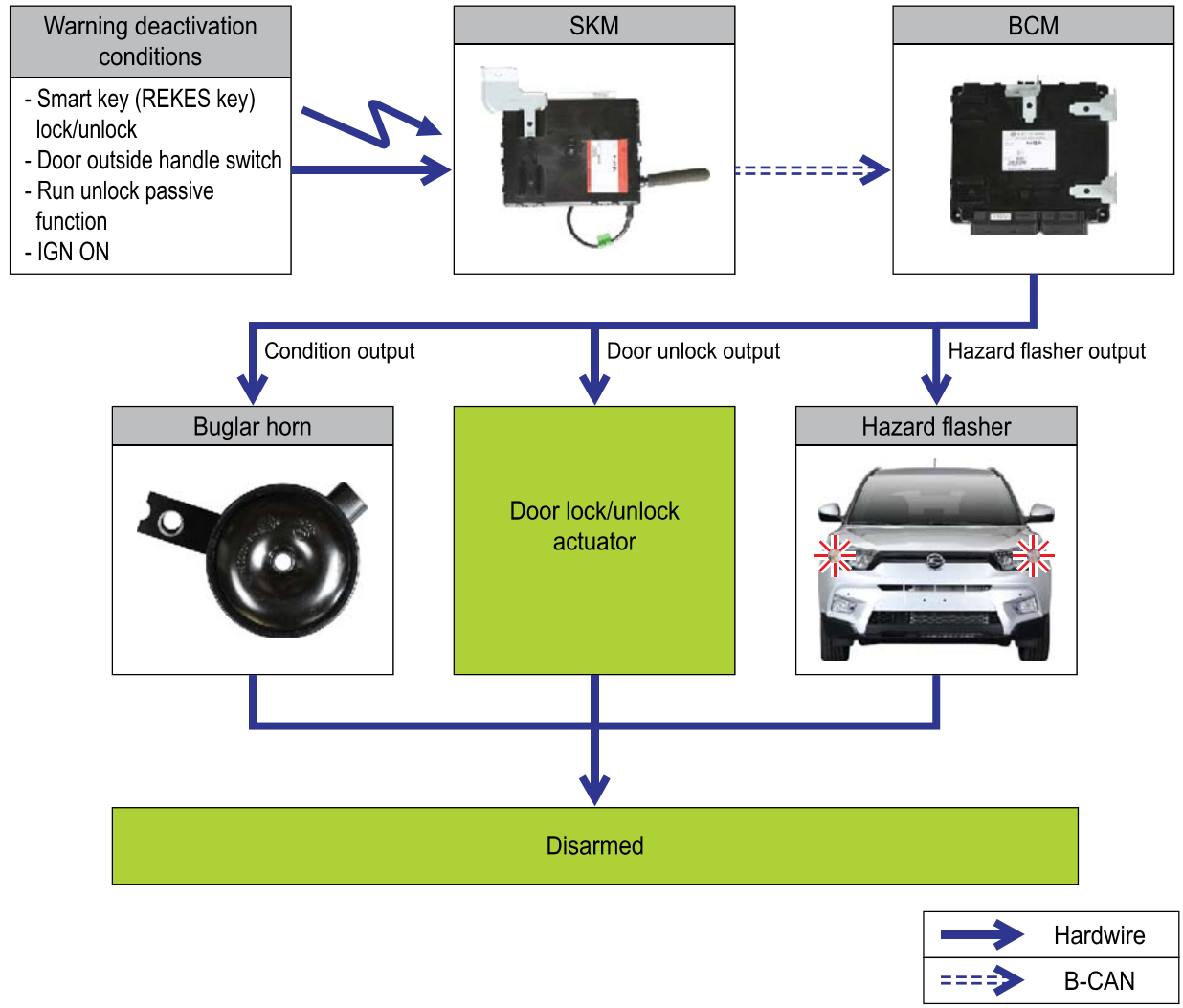
D. The theft deterrent alarm is activated.
E. The conditions for deactivation of theft deterrent alarm are met.
F. The hazard warning lamp and warning horn are deactivated.
G. The theft deterrent alarm is deactivated because the conditions are not met, and the system enters the theft deterrent mode.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- Theft deterrent alarm activated



19. POWER WINDOW RELAY CONTROL

▶ **Time lag power window control**

Operation 1.

A. The ignition is turned ON.
B. The power window relay is turned ON.
C. The ignition is turned OFF from ON.
D. The power window relay is activated for 30 seconds (T1).

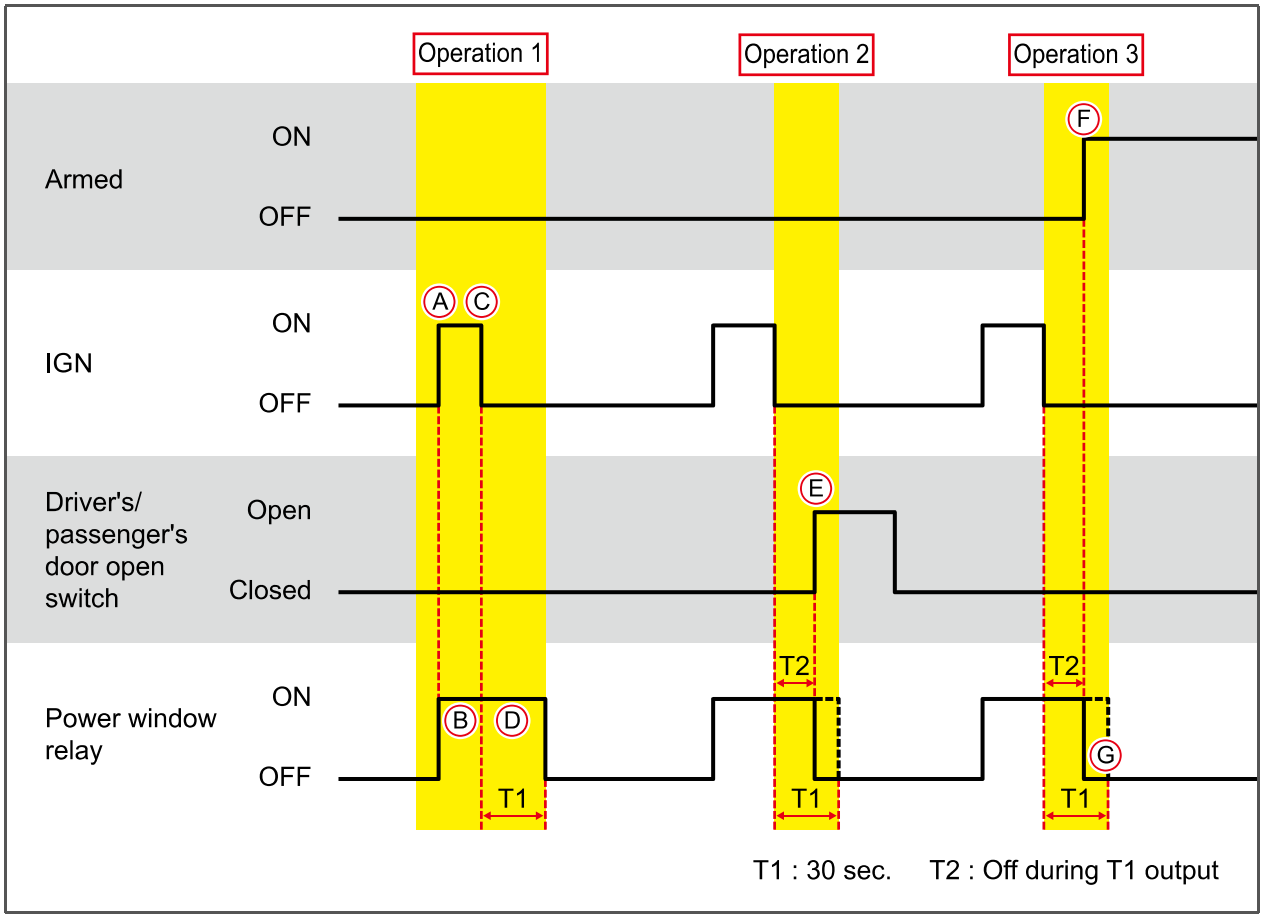
Operation 2.

(During the 30 seconds (T1) of power window relay activation)

E. The power window relay is turned OFF immediately when the driver/passenger door is opened.

Operation 3.

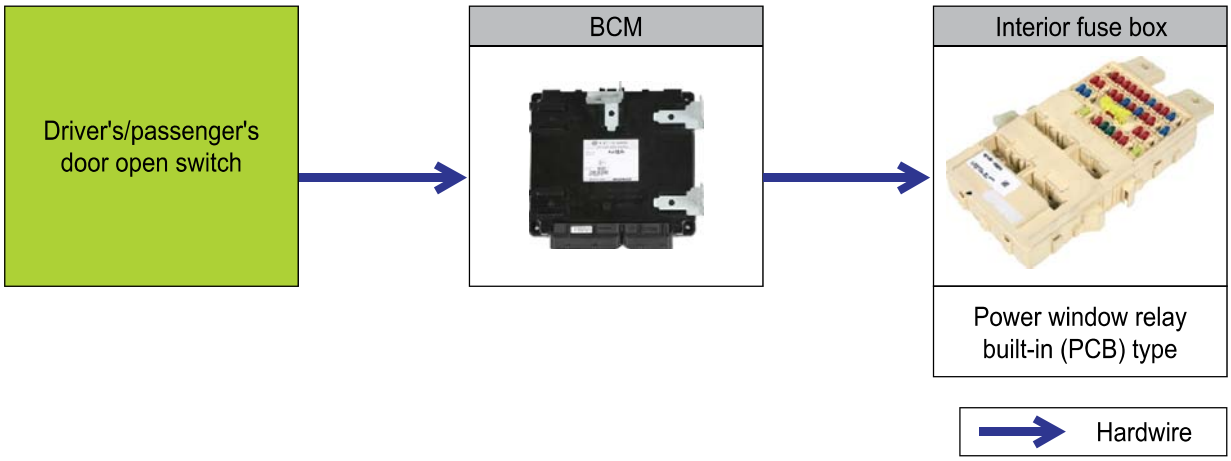
F. The theft deterrent mode is activated.
G. The power window relay is deactivated immediately.



Modification basis	
Application basis	
Affected VIN	

System flowchart

- The ignition is turned OFF.



20. SLEEP MODE

1. If the state of the LOCK switches of driver/passenger/rear doors and tailgate is not changed for 6 seconds with the all doors including tailgate closed and IGN OFF (ignition key removed), even if the state is not LOCK, the system enters the sleep mode to power down.
2. If any condition of the (1) is not met, the system enters the wake up mode immediately.
3. When the room lamp, key hole lamp, tail lamp, or power window is already activated, or all doors are closed for continuous 30 seconds after the door UNLOCK under the conditions stated in (1), the system waits in normal mode. If the lamps or power window is deactivated and no change is detected for 6 seconds after all doors are closed, the system enters the sleep mode.
4. When the front room lamp is ON, the system turns of the room lamp in 10 minutes and enters the sleep mode after 6 seconds.
5. The sleep mode is deactivated when a door is opened or key is inserted.

21. FLASHER FUNCTION

▶ **LH/RH turn signal lamp control**

Operation 1.

A. The LH/RH turn signal lamp switch is turned ON with IGN ON.
B. The LH/RH turn signal lamp flashes 75 times per minute (T1) at a cycle of 0.4 sec. ON and 0.4 sec. OFF.
C. When LH (RH) turn signal lamp switch turned off, LH (RH) turn signal lamp completes its operating cycle and goes out.

Operation 2.

D. When abnormal current (reference load: less than 3.0 A or more than 7.0 A) detection signal is received during operation 1 output,
E. LH (RH) turn signal lamp flashes 120 times per minute (T2) at a cycle of 0.25 sec. ON and 0.25 sec. OFF.

Operation 3.

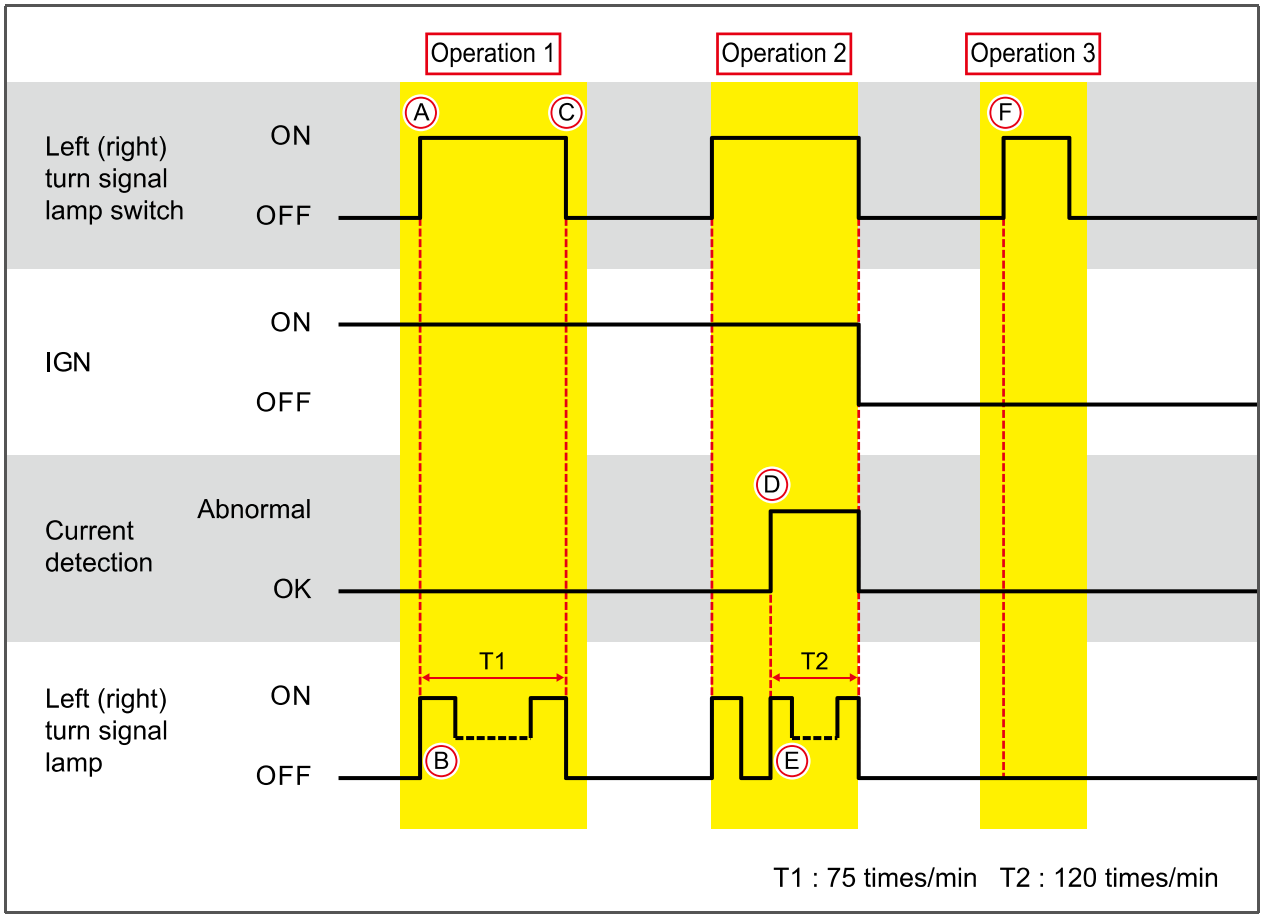
F. The LH/RH turn signal lamp is activated only with IGN ON.

NOTE

The LH/RH turn signal lamp flashes 3 times once the corresponding lamp switch is turned ON.

- When the LH turn signal lamp switch is turned OFF during the 3 times flashing, the turn signal lamp goes out after the flashing operation.
- When the LH turn signal lamp switch is turned ON during the 3 times flashing, the turn signal lamp flashes 3 more times.
- When the RH turn signal lamp switch is turned ON during the 3 times flashing, the LH turn signal lamp goes out immediately and the RH turn signal lamp flashes 3 times before switching off.

Modification basis	
Application basis	
Affected VIN	


Operation 1
Operation 2
Operation 3
Left (right) turn signal lamp switch
ON
OFF
A
C
F
IGN
ON
OFF
Current detection
Abnormal
OK
D
T1
T2
Left (right) turn signal lamp
ON
OFF
B
E
T1 : 75 times/min T2 : 120 times/min

▶ Hazard warning lamp switch control

Operation 1.

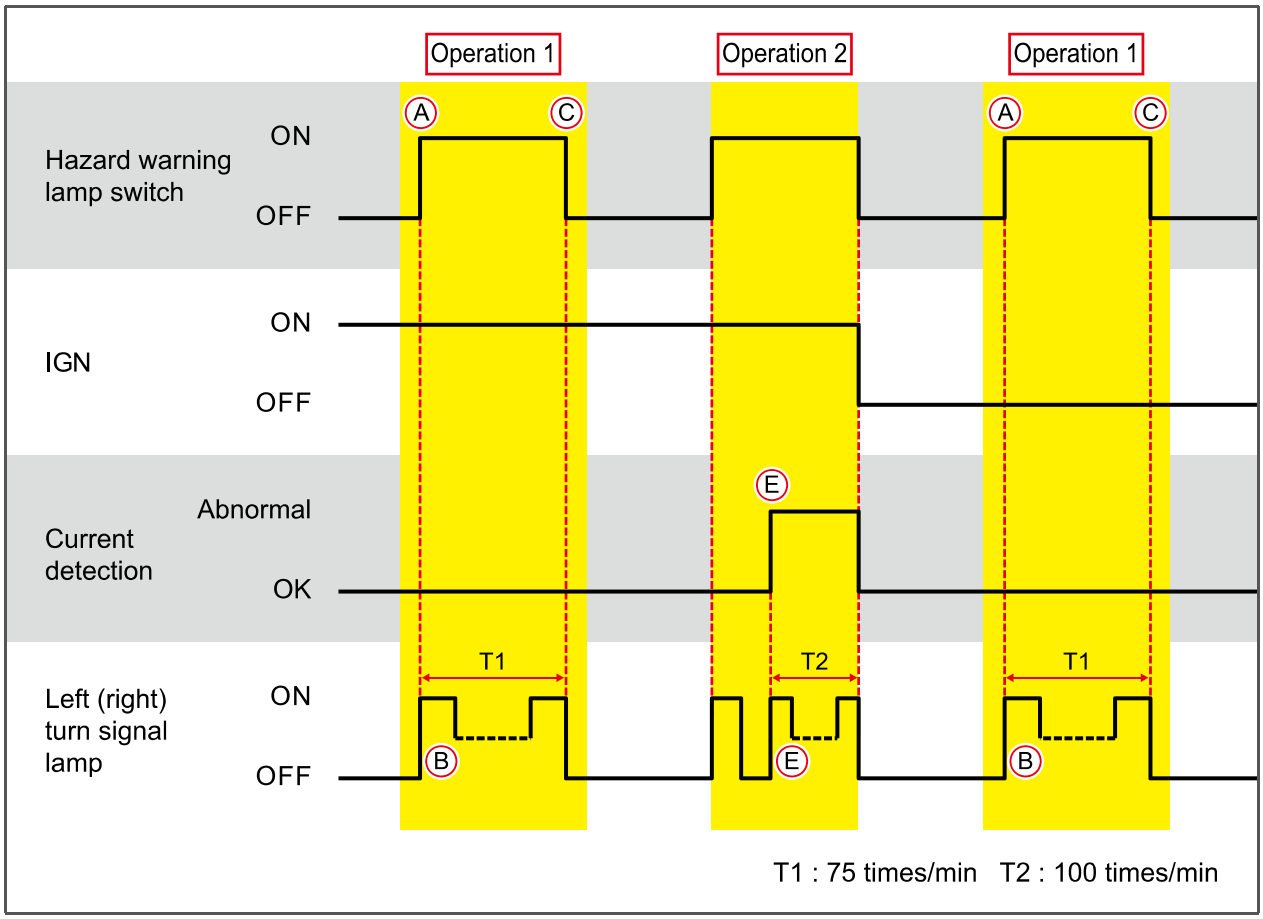
A. When the hazard warning lamp switch is turned ON with IGN ON or OFF,
B. The hazard warning lamp flashes 75 times per minute (T1) at a cycle of 0.4 sec. ON and 0.4 sec. OFF.
C. When hazard warning lamp switch is turned off, hazard warning lamp completes its operating cycle and goes out.

Operation 2.

D. When abnormal current detection signal is received during operation 1 output,
E. Hazard warning lamp flashes 120 times per minute (T2) at a cycle of 0.25 sec. ON and 0.25 sec. OFF.

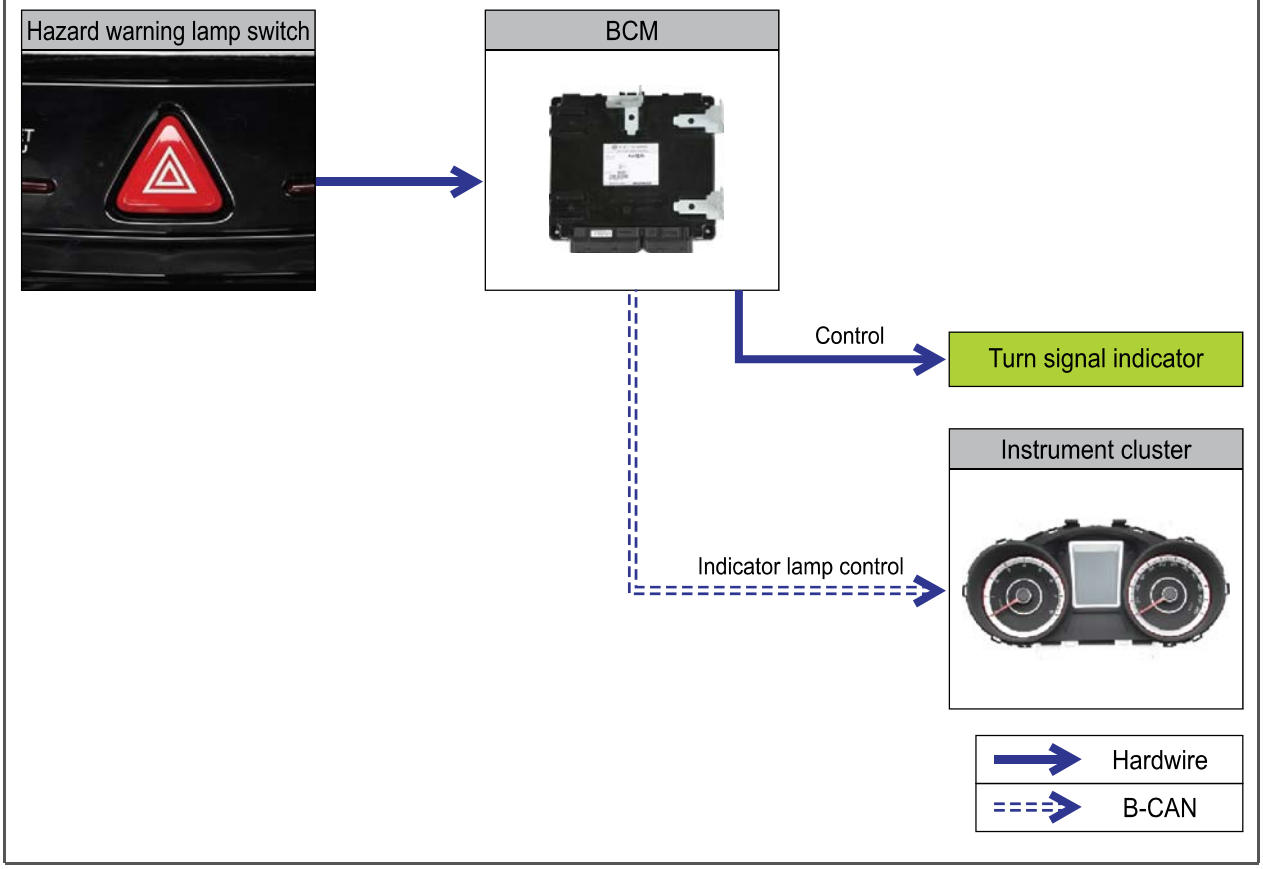
NOTE

- Hazard warning lamp functions at B+ or more.
- The allowed time difference between the LH and RH turn signal lamp operations is within 0.1 seconds.
- The hazard warning lamp overrides the turn signal lamp.



Modification basis	
Application basis	
Affected VIN	

System flowchart



Modification basis	
Application basis	
Affected VIN	

▶ Emergency hazard warning lamp control (coupled with ESP)

The stop lamp flashes quickly and hazard warning lamp flashes for 10 seconds automatically to warn a following vehicle when abrupt braking or operating of ESP system.

Conditions for activating emergency braking signal

A. The stop lamp flashes at intervals of 0.25 seconds as long as emergency braking signal is received, at vehicle speed of 50 km/h or higher.
B. Even though vehicle speed falls to 50 km/h or lower at the status of point A above, stop lamp keeps flashing.
C. If vehicle speed is below 50 km/h when emergency braking signal is no longer received, hazard warning lamp flashes for max. 10 seconds.
D. Both stop lamp and hazard warning lamp flashes when conditions in points A and B are met during auto hazard warning lamp operation.

Conditions for deactivating emergency braking signal

E. Stop lamp goes out immediately when operating hazard warning lamp switch manually during point A operation.
F. Stop lamp goes out immediately when emergency braking signal is no longer received.
G. Hazard warning lamp goes out 10 seconds after point C operation.
H. Hazard warning lamp goes out when turning hazard warning switch off during point C operation.
I. Hazard warning lamp goes out when vehicle speed increases by more than 10 km/h (no emergency braking signal received).

Conditions for not activating emergency braking signal

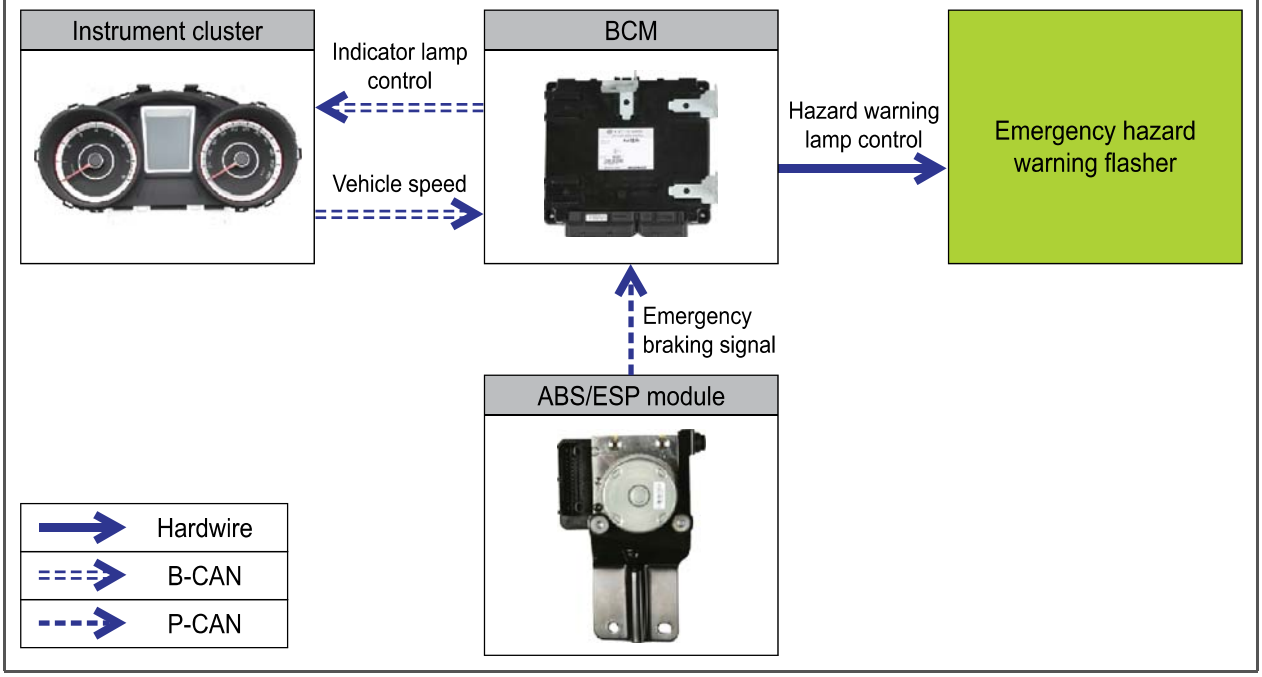
J. If vehicle speed is above 50 km/h when emergency braking signal is no longer received, hazard warning lamp does not flash.
K. Emergency braking signal is not activated when operating hazard warning lamp switch.

NOTE

- Priority: Manual operation of hazard warning lamp → emergency braking signal → auto hazard warning lamp
- The BCM operates the stop lamp regardless of ignition status when brake pedal switch on signal is received.

Modification basis	
Application basis	
Affected VIN	

System flowchart



Modification basis	
Application basis	
Affected VIN	

22. DRL LAMP CONTROL

▶ **DRL lamp control**

A. Tail lamp relay and DRL lamp on when turning ignition on
B. Tail lamp and DRL lamp stay on and interior tail lamp comes on when turning tail lamp switch on while tail lamp and DRL lamp come on. (also applies to tail lamp operation by auto light)
C. DRL lamp goes out when turning front fog lamp switch on during DRL lamp output.
D. DRL lamp goes out when turning headlamp LO switch on during DRL lamp output. (also applies to headlamp operation by auto light)
E. DRL lamp output stays on regardless of headlamp feedback when turning passing switch on.

Condition		Tail lamp	Headlamp	Fog lamp	Daytime running light (DRL)
IGN OFF		Non-operating	Non-operating	Non-operating	Non-operating
ACC	Tail lamp off	Non-operating	Non-operating	Non-operating	Non-operating
	Tail lamp ON	Operating	Non-operating	Non-operating	Non-operating
IGN ON or turning ignition on	Tail lamp ON/OFF	Operating	Non-operating	Non-operating	Operating
	Headlamp ON	Operating	Operating	Non-operating	Non-operating
	Fog lamp ON	Operating	Non-operating	Operating	Non-operating
	Headlamp ON + Fog lamp ON	Operating	Operating	Operating	Non-operating

Modification basis	
Application basis	
Affected VIN	

23. REAR FOG LAMP CONTROL

Operation 1.

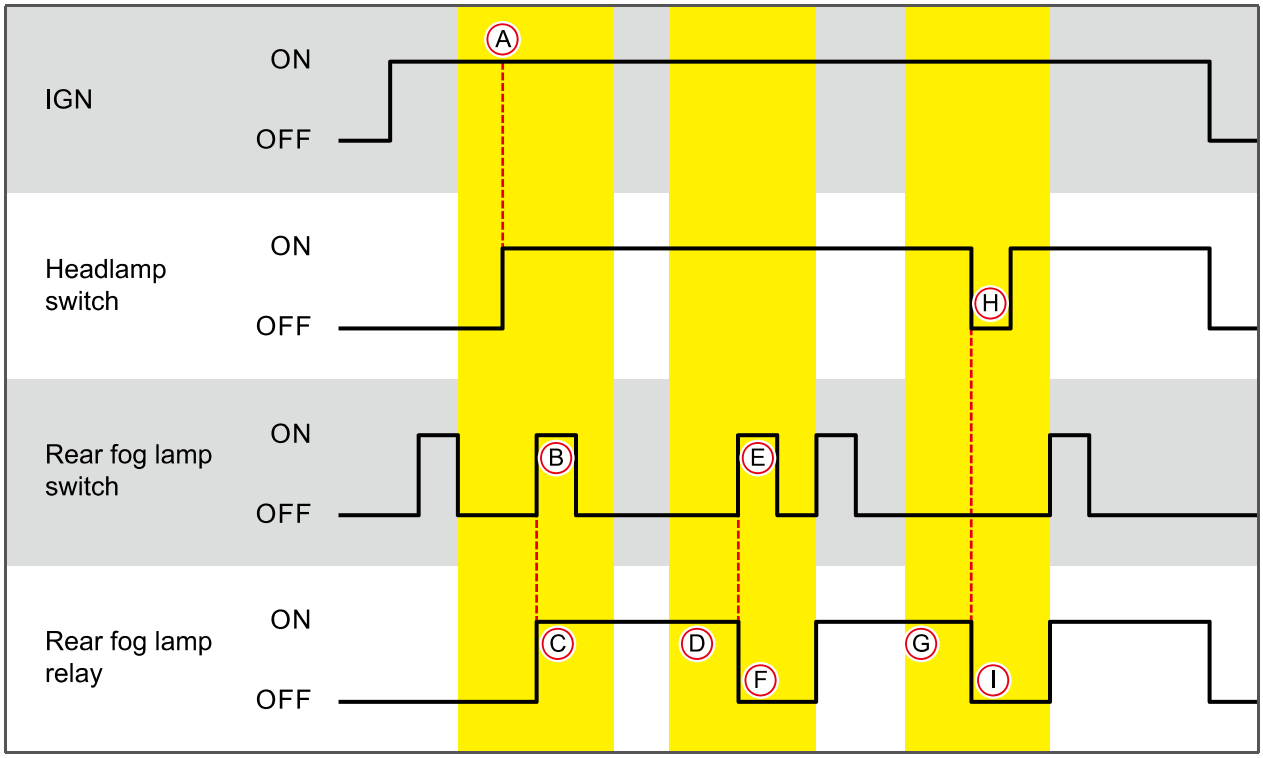
A. With IGN ON and headlamp switch on,
B. When turning rear fog lamp switch on,
C. Fog lamp will come on.

Operation 2.

D. With fog lamp on,
E. When turning rear fog lamp switch on,
F. Fog lamp will go out.

Operation 3.

G. With rear fog lamp on,
H. When turning headlamp switch off,
I. Rear fog lamp will go out.

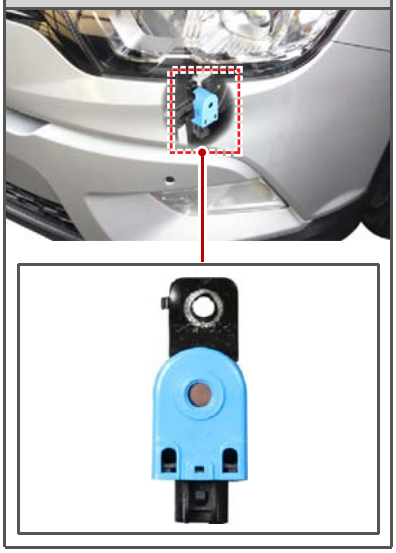


24. BUZZER CONTROL

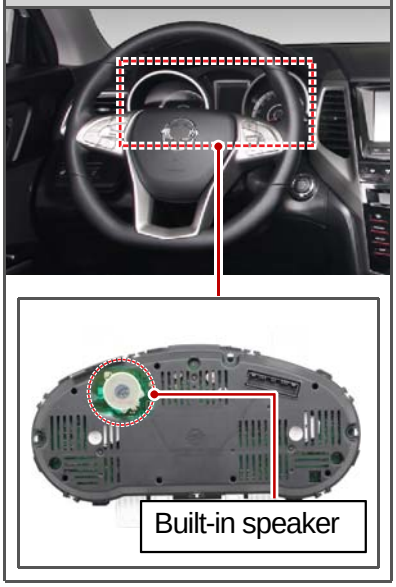
▶ **Priority of BCM buzzer control**

Designation	Buzzer type	Priority
Lock alarm (with SKM)	Exterior buzzer (SKM buzzer)	1
Unlock alarm (with SKM)	Exterior buzzer (SKM buzzer)	1
Panic alarm	Warning horn	2
Theft deterrent alarm	Warning horn	1
Smart key reminder alarm (with SKM)	Exterior buzzer (SKM buzzer)	2
Smart key authentication failure (with SKM)	Exterior buzzer (SKM buzzer)	2

Exterior buzzer (SKM buzzer)



Interior buzzer (chime)



Warning horn

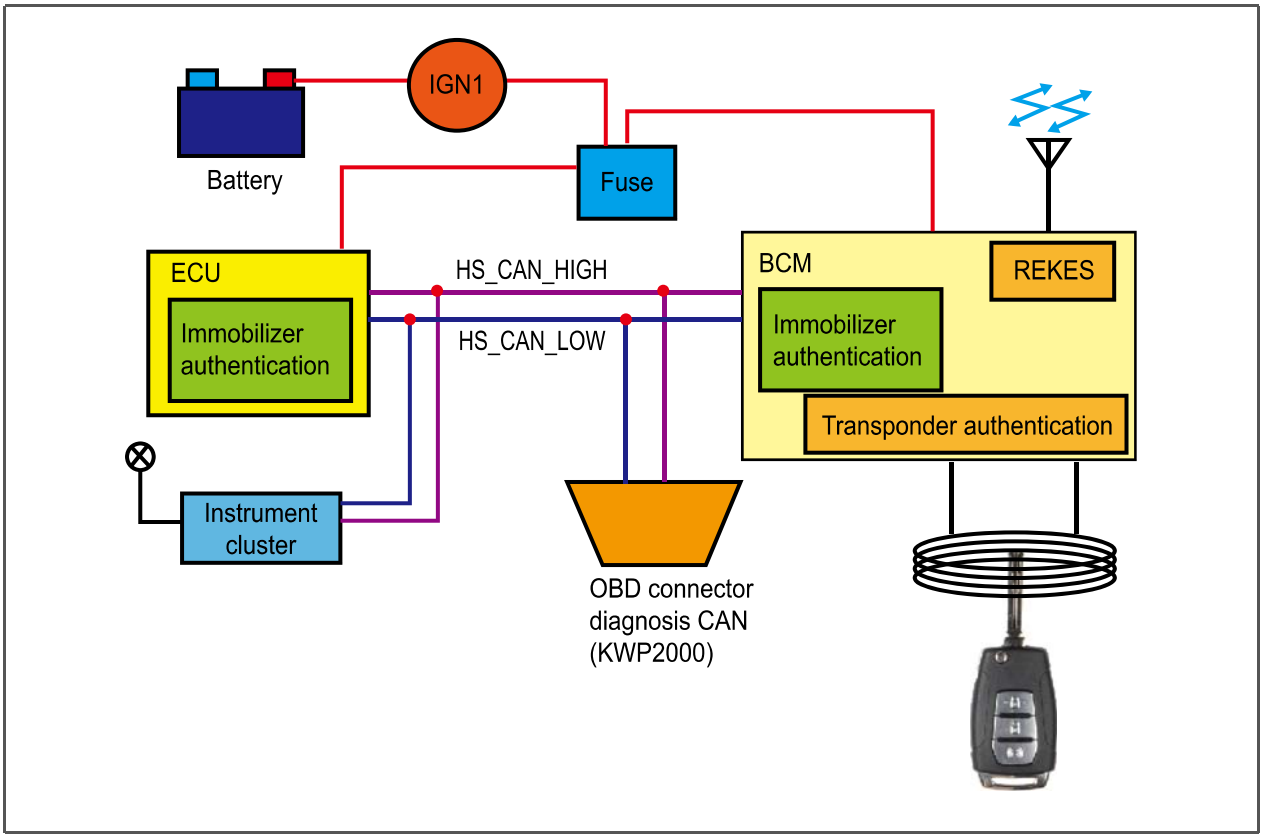
Modification basis	
Application basis	
Affected VIN	

25. IMMOBILIZER SYSTEM

1) System Description

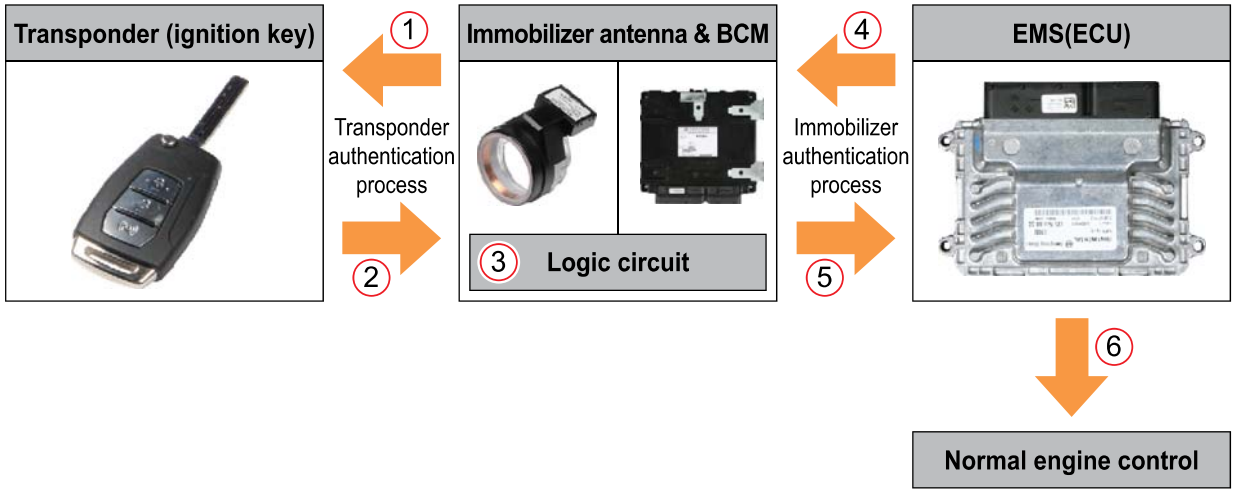
The BCM without SKM communicates with the transponder in the REKES key and immobilizer antenna in the key box through wireless communication. The immobilizer unit and BCM check the encrypted codes received through hard wire communication to start the engine.
Immobilizer indicator on: Bad communication between immobilizer and EMS (ECU)
Immobilizer indicator flashes: Immobilizer coding failure (flashes at interval of 1 sec.)

2) System Diagram



3) Immobilizer Ignition Key Verification

When turning the ignition key to the ON position, the power is supplied to the immobilizer unit, BCM and EMS (ECU). The ECU communicates with the immobilizer unit to verify the key and transponder. If it is valid, the ECU starts to control the engine or immobilizer indicator (illumination or flashing) when the ignition key is turned to the START position.
Once the key is verified, valid key verification time is provided for 10 seconds and the engine can be started by turning the ignition key to the engine START position during this verification time. If the ignition key is turned to the START position again after the 10 seconds of verification time, the key verification should be re-performed.



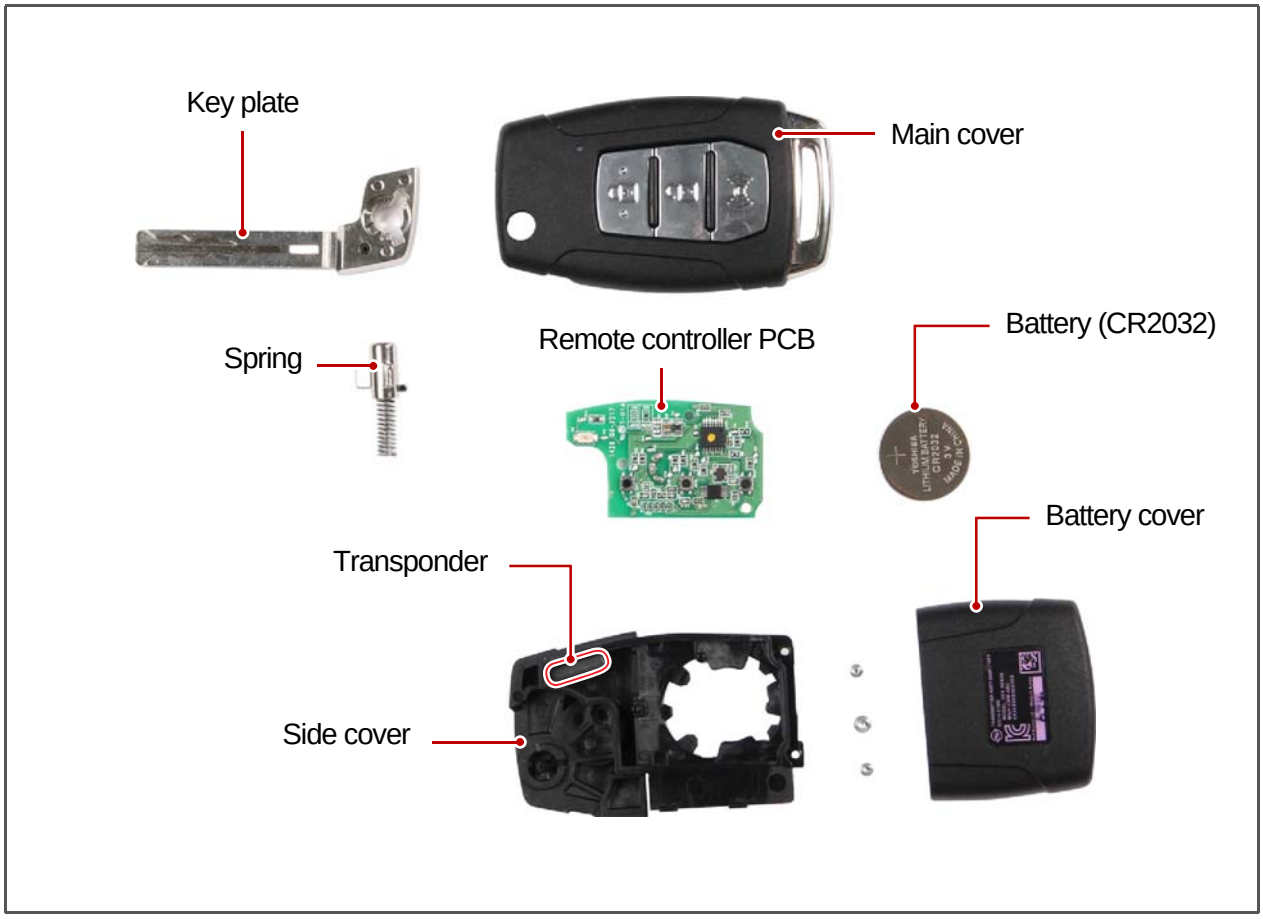
1. When the ignition key is inserted, the BCM requests the transponder verification through the immobilizer antenna.
2. The transponder sends the encrypted message to the BCM through the immobilizer antenna.
3. The BCM compares the encrypted message received from the transponder to the coded value through the logic circuit. If they are identical, it requests the transponder approval.
4. When the ignition is turned ON, the EMS (ECU) requests immobilizer verification process through the P-CAN.
5. The BCM sends the encrypted message to the EMS (ECU).
6. The EMS (ECU) controls the engine normally when the coded value and the encrypted message sent from the BCM are identical.

NOTE

When the immobilizer verification has failed, the verification signal is sent again 3 times for 2 seconds, and the verification procedure is carried out up to 3 times by turning the ignition ON within 10 seconds. If the three re-verifications fail, verification procedure is stopped and will be restarted after 10 seconds.

Modification basis	
Application basis	
Affected VIN	

4) REKES Key Configuration



▶ Battery replacement

Remove the battery cover with a flat-bladed screwdriver to replace the battery.

▶ Transponder replacement

- Remove the battery cover to remove the battery.
- Remove the key plate after removing the rubber cover and screws.
- Remove the side cover and main cover.
- Replace the transponder

5) Cautions for immobilizer

CAUTION

1. When deleting the old code of the transponder registering an extra ignition key, please attend on the site and observe the process personally.
2. In any cases, the immobilizer system cannot be removed from the vehicle. If you attempt to remove it and damage the system, starting will be impossible. So never attempt to remove, damage or modify it.
3. The remote engine starter cannot be installed to the vehicle equipped with the immobilizer system.
4. Do not drop the key or subject it to impact the key, as it may damage the transponder inside the key.
5. The engine cannot be started using a key with damaged transponder.
6. In the following cases, you may experience starting problem or a system error can occur.
   - When two or more ignition keys come into contact with (each) other(s), or the key is close to any device that sends/receives electromagnetic fields or waves.
   - When the ignition key is close to any electromagnetic device, such as lighting equipment, security keys or security cards.
   - When the key is close to a magnetic, metal object, or battery.

Modification basis	
Application basis	
Affected VIN	

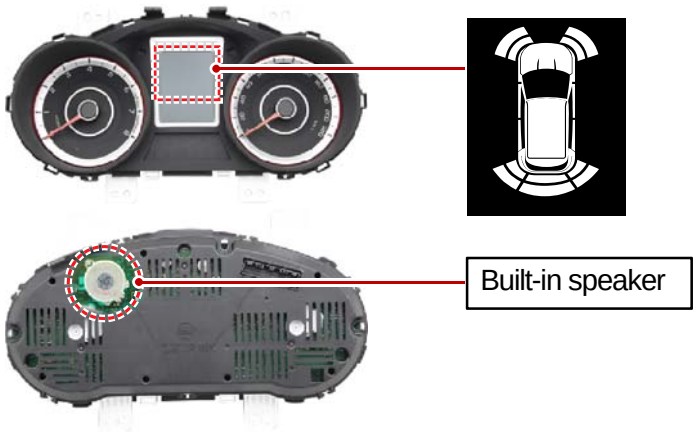
26. PARKING AID SYSTEM

1) Overview

When the vehicle is being driven at a lower speed or reversing, the parking aid system is activated and 2 ultrasonic sensors at the front bumper and 4 at the rear bumper detect the distance to any obstacle. The PAS detects the returning signals reflected to the obstacles at regular intervals when the vehicle is parked to indicate the display and alarm for the distance between the obstacles by phase so as to allow the driver easy parking by securing safe distance.

2) Components

Instrument cluster (supervision)



LIN communication	
B-CAN	

Front obstacle detection ON/OFF switch

BCM

Location of front parking aid sensor

Location of rear parking aid sensor

3) Cautions

▶ **Sensor Cannot Detect**

- When the sensor is frozen (operate normally when it's thawed)
- When the sensor is covered with foreign materials such as snow or condensation (if the foreign materials are removed, the sensor operates normally.)

▶ **Not defective but improperly working**

- When the sensing portion is frozen (operates normally after thawed)
- When reversing on rough roads, gravel roads, hills, or grass.
- When receiving other ultrasonic signals (metal sounds or air braking noises from heavy commercial vehicles).
- When there is heavy rainfall or water drops.
- When the sensor is covered with snow.

▶ **Certain obstacles that sensors cannot detect**

- Thin and narrow objects, such as wires, ropes, or chains
- Cotton, sponge, clothes, snow that absorb ultrasonic waves.

▶ **Weak Sensing Scopes**

- When the ambient temperature is too high or too low.
- When a 1 m or less long small object with a diameter of 100 mm or less is detected.

4) Operating Conditions

Item	Conditions
Front PAS	Transmission in "R" with IGN ON Transmission in "D" with IGN ON (Only activate at vehicle speeds below 10 km/h)
Rear PAS	Transmission in "R" with IGN ON

Modification basis	
Application basis	
Affected VIN	

5) Diagnosis & Operation Process

▶ Normal mode

1. When the transmission is in "R" or "D" position with IGN ON, LIN setting for each sensor is initialized for 0.5 seconds, initially one time only.
2. When PAS operating conditions are met, the BCM sends a self-diagnosis command to each sensor and requests a diagnosis result after 0.1 second. When the status of the PAS sensor is identified, it sends the result value to B-CAN.
3. After the status of the PAS sensor is identified, it enters obstacle detection mode. The BCM performs self-diagnosis each time it enters obstacle detection mode.
4. When the self-diagnosis shows that error occurs 3 times in succession, the BCM sends the relevant information to B-CAN and error code is stored.
5. The BCM detects for any obstacle every 0.06 seconds. If any obstacle is detected, it sends warning sound information for top level to B-CAN.
6. The status of the front PAS OFF switch is stored even if the ignition is turned off.

▶ Diagnosis mode

1. If the transmission is in "R" or "D" position with ignition on, a self-diagnosis for the sensor is requested and the result is received after 0.1 second.
2. A self-diagnosis for the sensor is judged by an output frequency and output reduction signal. When both of two diagnosis results are not received, the PAS requests the results up to 2 times. If any reception error occurs, it sends the relevant information to the BCM.
3. The PAS sensor performs a initial diagnosis after a 0.5 seconds initialization period. The order of diagnosis is as follows: rear LH sensor→rear center LH sensor→rear center RH sensor→rear RH sensor→front LH sensor→front RH sensor.
4. The PAS resets the LIN settings and tries to establish the communication in the event of no response from each sensor after 4 attempts. If there is no response after 4 more attempts, it stores an error code.

▶ Self-diagnosis error occurs if:

- Open/short circuit in sensor LIN communication line
- Open/short circuit in power line
- Sensor failure itself

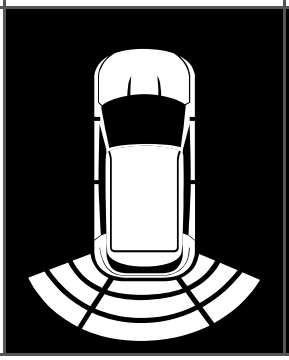
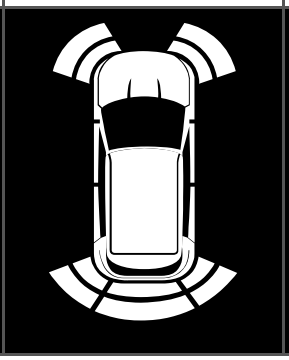
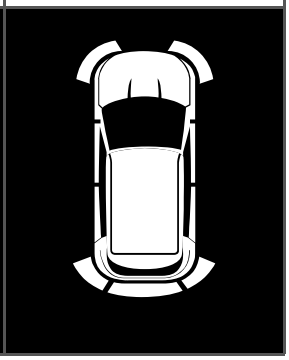
If any faults above occurs, the alarm sounds for 3 seconds and warning information is displayed on the instrument panel. If the system is normal, alarm sounds for 0.04 seconds and the system enters obstacle detection mode.

▶ Self-diagnosis error occurs if:

- Open/short circuit in sensor LIN communication line
- Open/short circuit in power line
- Sensor failure itself

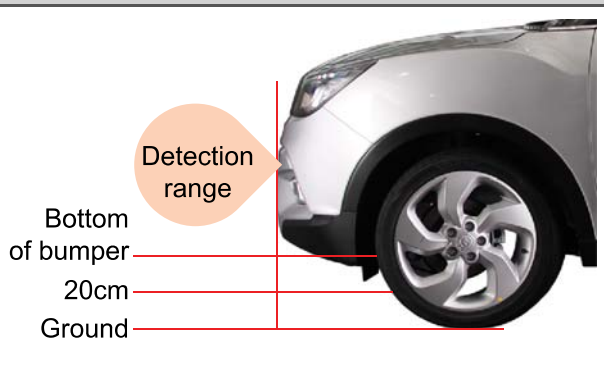
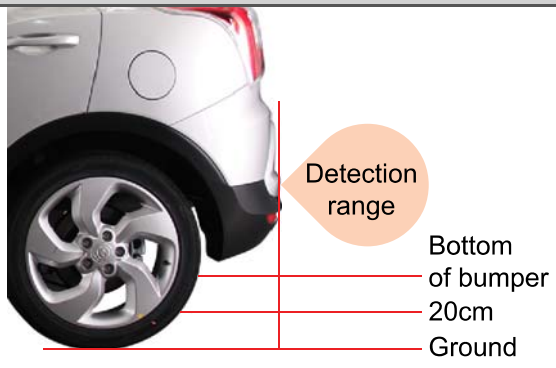
If any faults above occurs, the alarm sounds for 3 seconds and warning information is displayed on the instrument panel. If the system is normal, alarm sounds for 0.04 seconds and the system enters obstacle detection mode.

▶ Sensing distance of PAS

Item		Level 1	Level 2	Level 3
Distance	Front	-	600 ~ 500 mm	500 ~ 300 mm
	Rear	1200 ~ 800 mm	800 ~ 500 mm	500 ~ 300 mm
Alarm		Interval of 300 ms	Interval of 150 ms	Continuant sound
Cluster display (Supervision type)				

Modification basis	
Application basis	
Affected VIN	

▶ Vertical sensing range of PAS

Front	Rear
	

Height	Ground ~ 20 cm	20 cm ~ 30 cm	30 cm ~ 70 cm
Detected	Impossible to detect	Could be detected	Detected

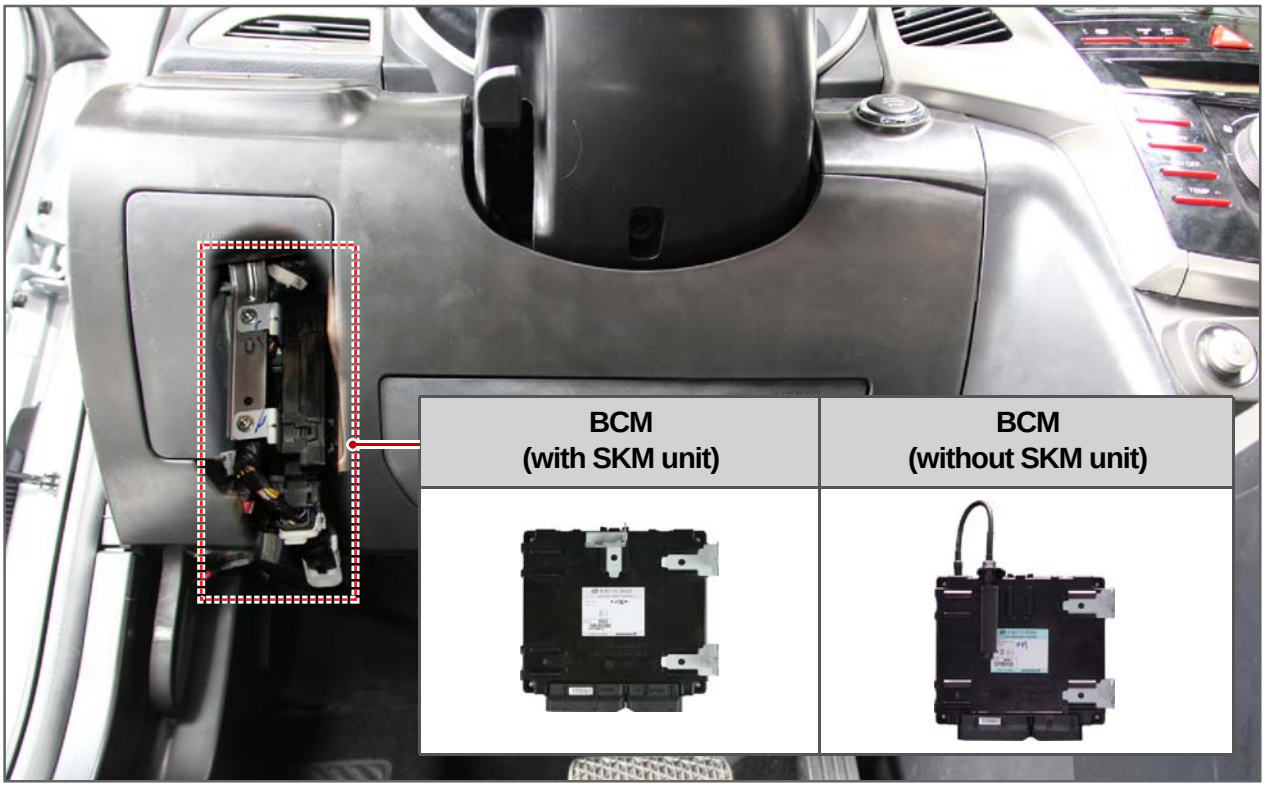
NOTE

Varies depending on the number of passengers and loading weight.

CONFIGURATION AND FUNCTIONS

S.G.N. 8710-01 BCM (BODY CONTROL MODULE)

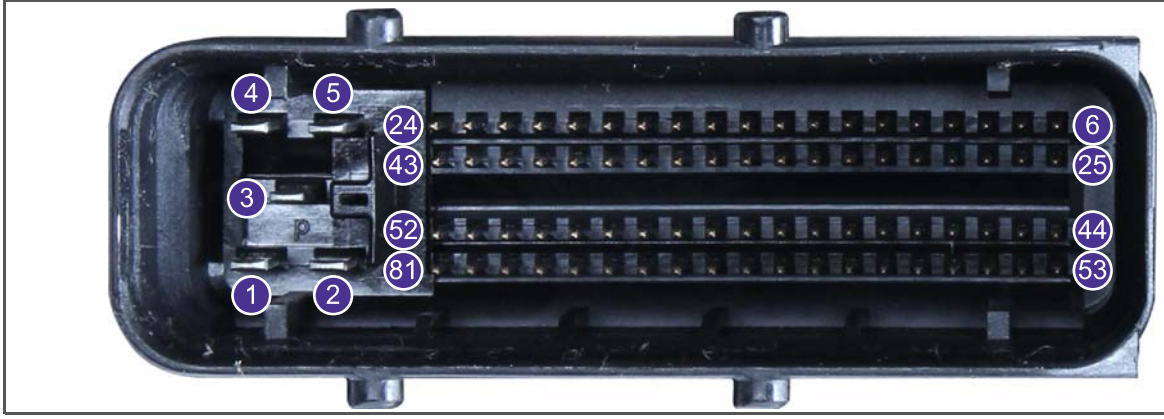
1) Mounting Location



Modification basis	
Application basis	
Affected VIN	

2) Connector Pin Description

Connector A



No.	Input signal name
1	B+ (BCM logic power)
2	-
3	B+ turn signal power
4	LH turn signal output
5	RH turn signal output
6	B-CAN LOW
7	B-CAN HIGH
8	-
9	Warning horn relay
10	Key hole illumination
11	-
12	Headlamp relay (+)
13	Front PAS ON/OFF indicator
14	-
15	Rear RH seat belt indicator
16	-
17	Rear CTR seat belt indicator
18	Rear heating element (defogger) indicator
19	-
20	Rear LH seat belt indicator

No.	Input signal
21	-
22	External buzzer
23	Immobilizer signal (-)
24	Immobilizer signal (+)
25	ISG mode output
26	-
27	Hood switch2
28	Tail lamp switch
29	Rear CTR seat belt switch (-)input
30	Rear RH seat belt switch (-)input
31	RH turn signal switch (-) input
32	LH turn signal switch (-) input
33	-
34	Passenger door lock switch (-) input
35	Driver door lock switch (-) input
36	Rear LH door ajar switch (-) input
37	Passenger door ajar switch (-) input
38	Driver door ajar switch (-) input
39	Hood switch (-) input
40	Tailgate switch (-) input

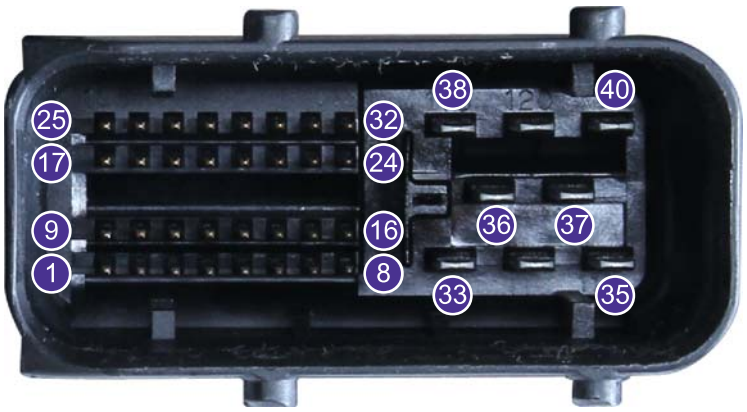
Connector A

No.	Input signal name
41	Rear RH door ajar switch (-) input
42	Unfolding switch (-) input
43	Folding switch (-) input
44	-
45	-
46	-
47	-
48	-
49	-
50	Front wiper intermittent volume
51	Passenger seat belt sensor
52	Headlamp feedback signal
53	Rear LH/RH lock switch (-) input
54	Crash signal
55	Sunroof open switch
56	Rear heating element (defogger) switch
57	Front PAS ON/OFF switch
58	Key hole illumination voltage
59	Central door LOCK/UNLOCK switch
60	Tailgate open switch

No.	Input signal
61	Hazard warning lamp switch
62	Headlamp passing switch
63	PAS_LIN communication
64	Rain sensor_LIN communication
65	Auto light switch (-) input
66	Rear fog lamp switch (-)
67	Driver seat belt switch (-) input
68	Passenger seat belt switch (-) input
69	Rear LH seat belt switch (-)input
70	Rear wiper motor parking signal
71	Key lock switch (-) input
72	Key unlock switch (-) input
73	Rear intermittent wiper switch
74	-
75	Front wiper motor parking signal
76	Windshield washer switch (-) input
77	Rear washer switch (-) input
78	Rear wiper switch (-) input
79	Wiper switch 1 (-) input
80	Wiper switch 2 (-) input
81	Auto washer switch (-) input

Modification basis	
Application basis	
Affected VIN	

Connector B

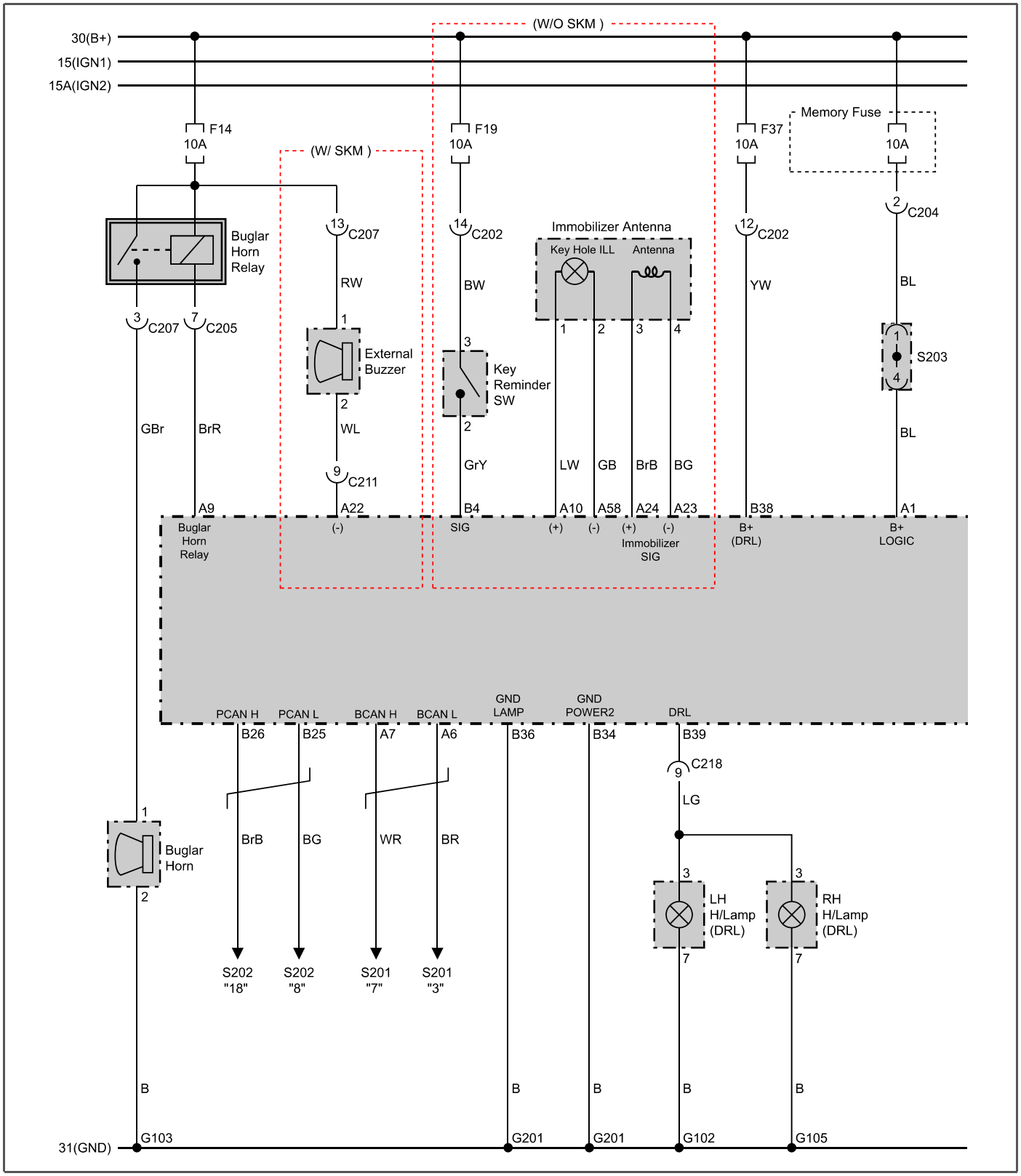


No.	Input signal
1	-
2	IGN2 switch
3	IGN1 switch
4	Key reminder switch
5	Brake switch (+) input
6	Tail lamp relay
7	Head lamp relay (HIGH)
8	Front fog lamp
9	-
10	-
11	Front room lamp control
12	Room lamp control
13	Rear wiper motor relay
14	Rear washer motor relay
15	Tailgate open relay
16	Wiper high relay control
17	Wiper low relay control
18	Power window relay
19	Windshield washer motor relay
20	Rear defog relay control

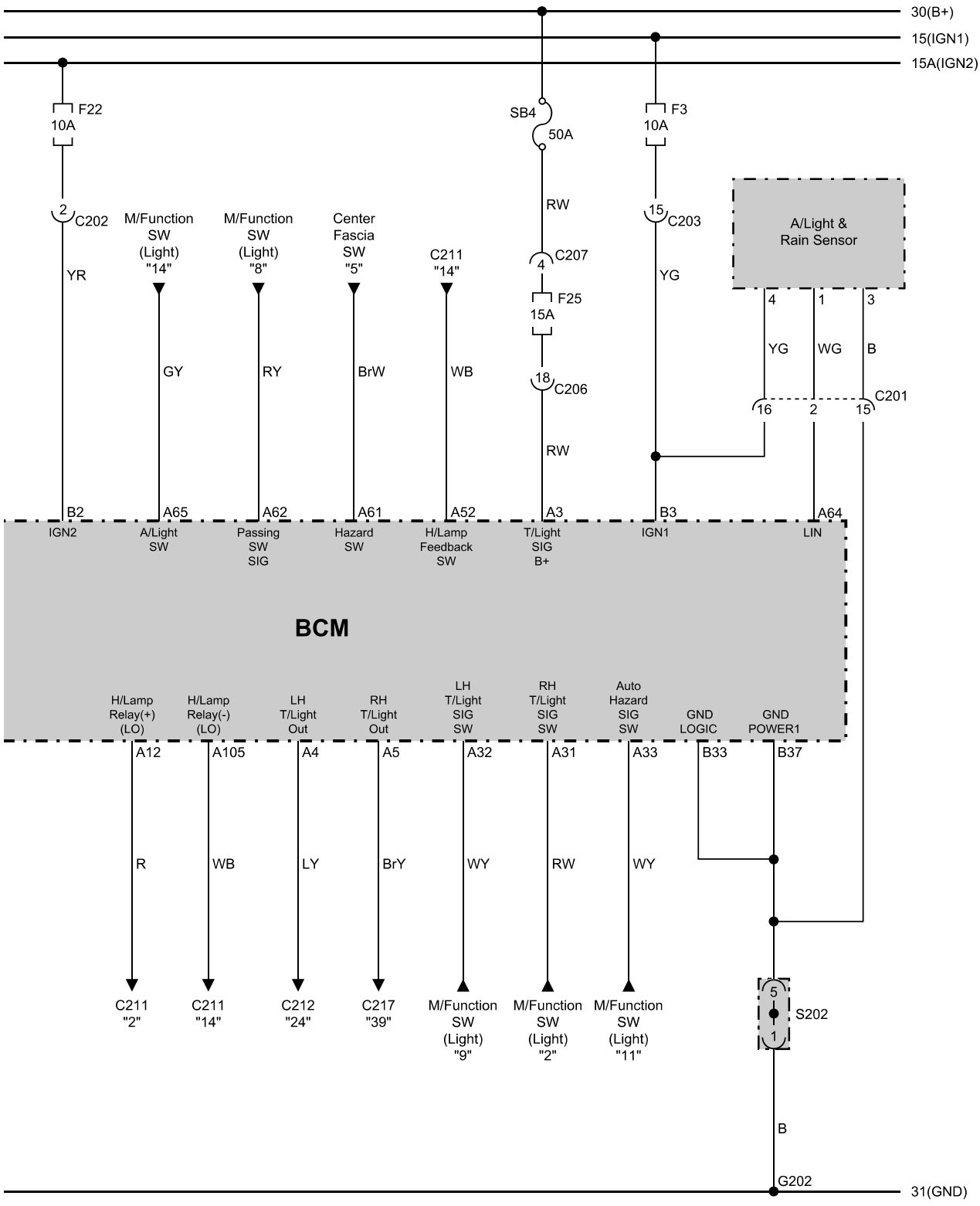
No.	Input signal
21	-
22	Outside rearview mirror folding relay
23	Door unlock motor relay
24	Headlamp relay (-)
25	P-CAN LOW
26	P-CAN HIGH
27	-
28	Door lock motor relay
29	Tail lamp relay control
30	-
31	Rear fog lamp relay control
32	Outside rearview mirror unfolding relay
33	Ground (BCM logic)
34	Ground (power 2)
35	B+ (brake switch power)
36	Ground (lamp power)
37	Ground (power 1)
38	B+ (DRL power)
39	DRL lamp
40	Brake lamp

3) Circuit Diagram

▶ Buglar Horn Relay, Immobilizer Antenna, DRL, Head Lamp, Turn Light, A/Light & Rain Sensor, CAN

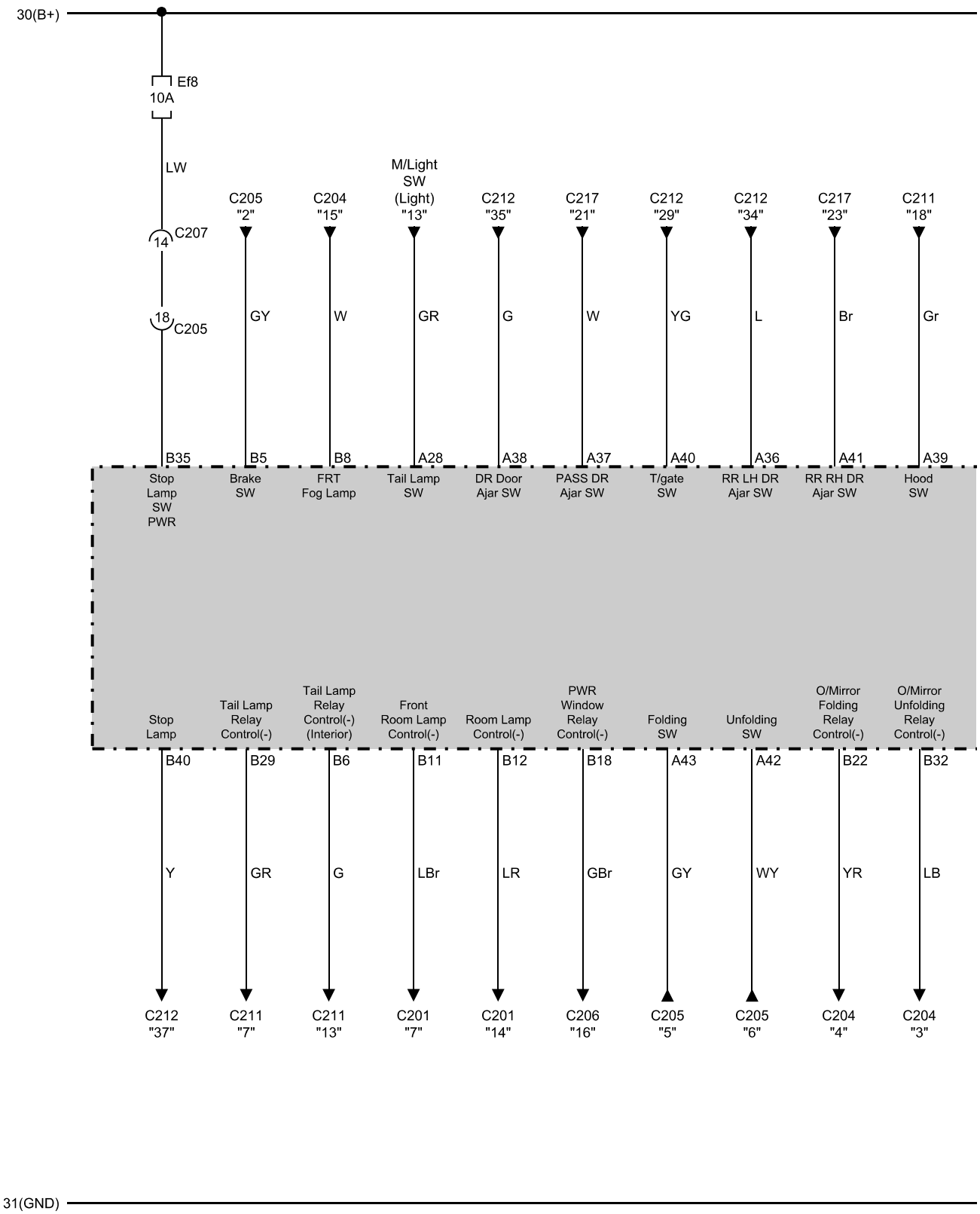


Modification basis	
Application basis	
Affected VIN	

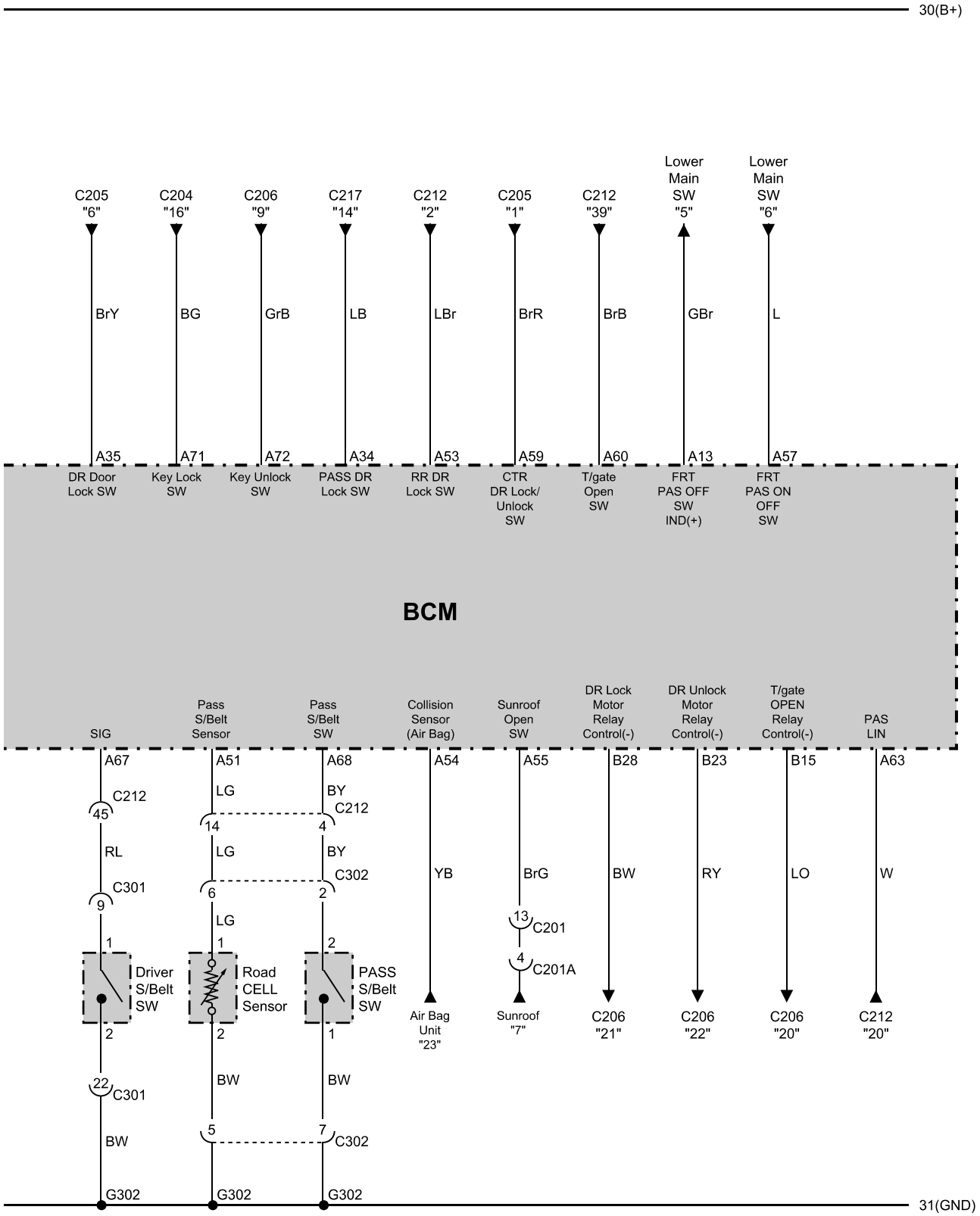


Modification basis	
Application basis	
Affected VIN	

▶ Stop Lamp, Tail Lamp, Fog Lamp, Tail Lamp(Interior), Door Lock, T/Gate Open SW, PAS

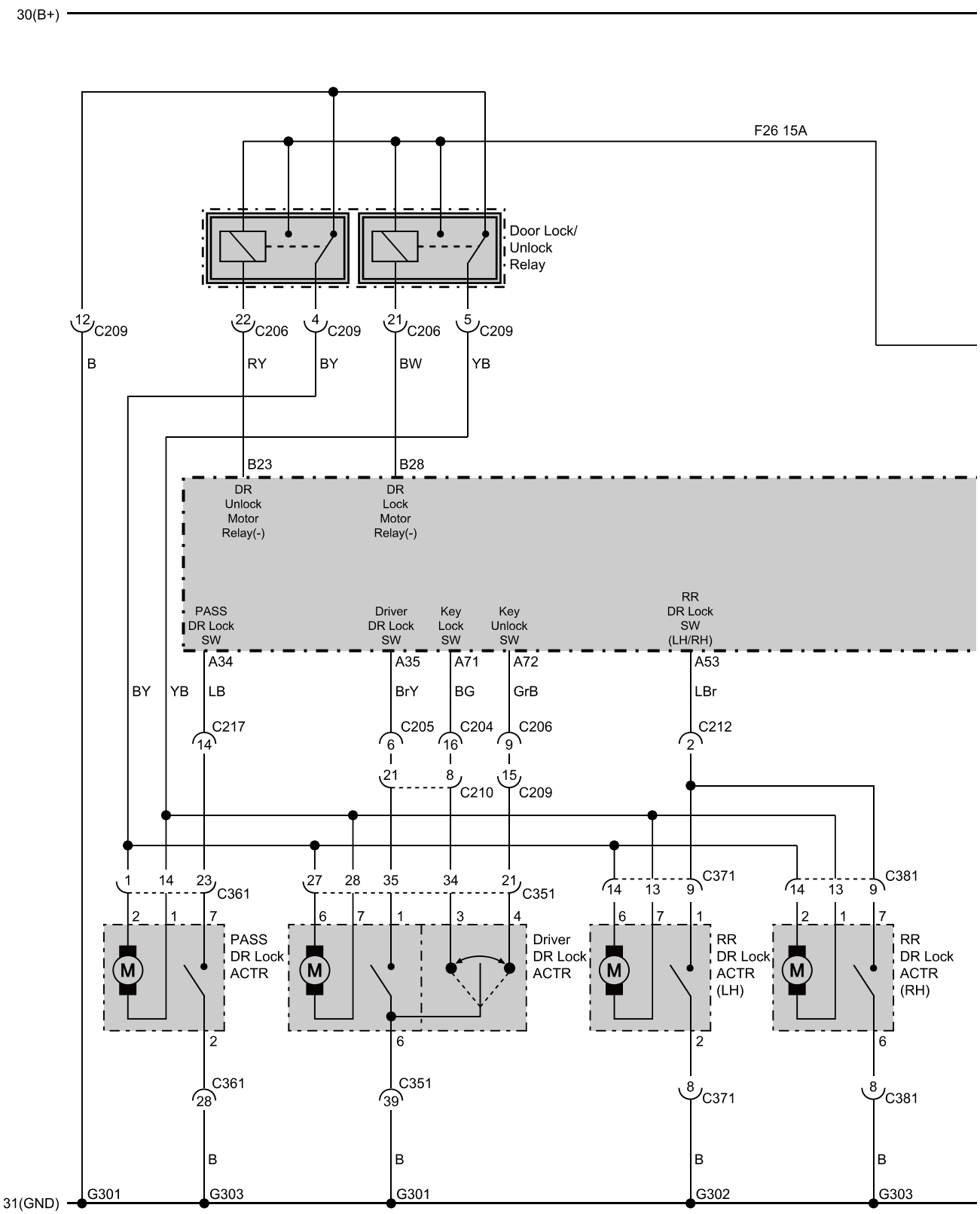


Modification basis	
Application basis	
Affected VIN	

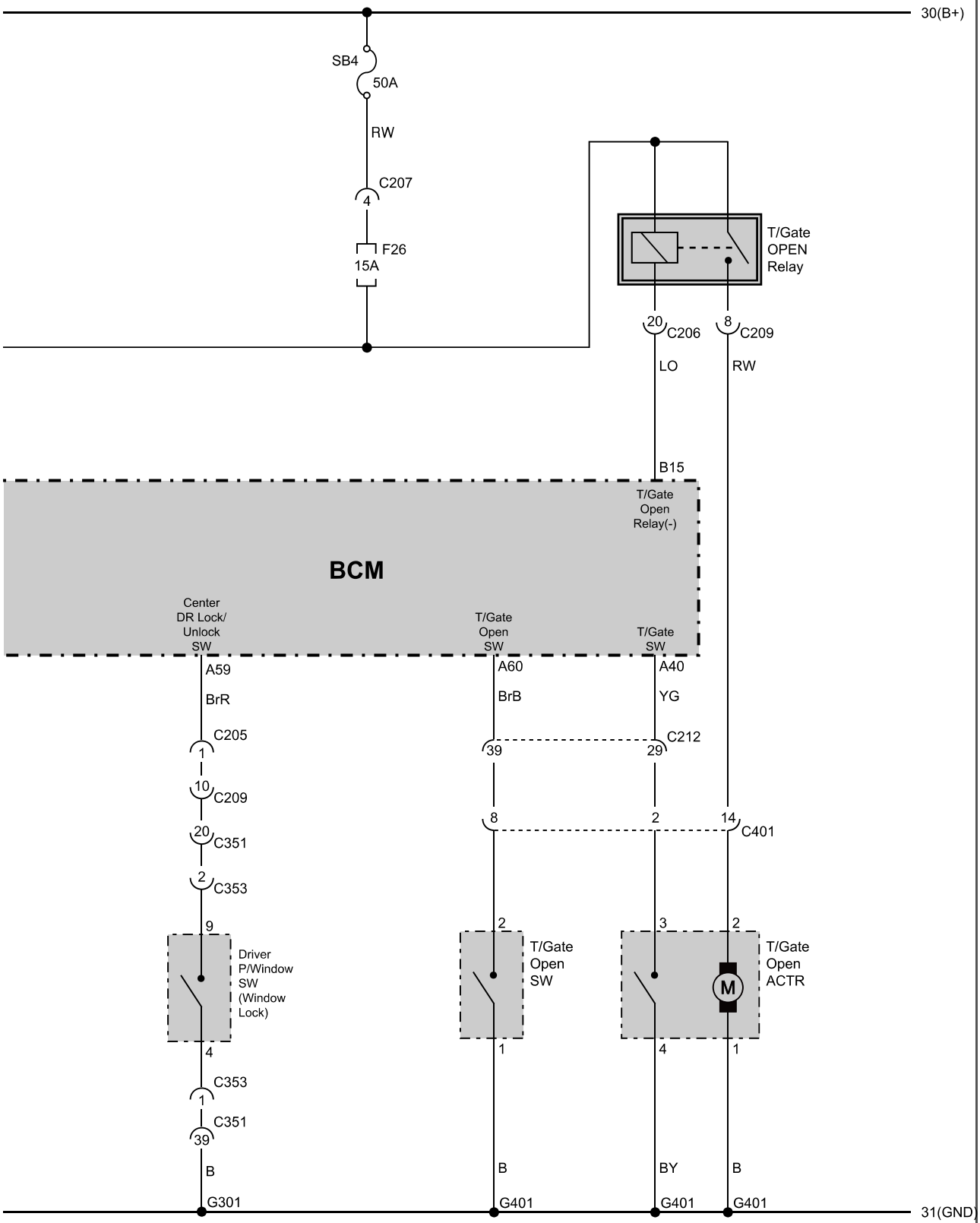


Modification basis	
Application basis	
Affected VIN	

▶ Door lock

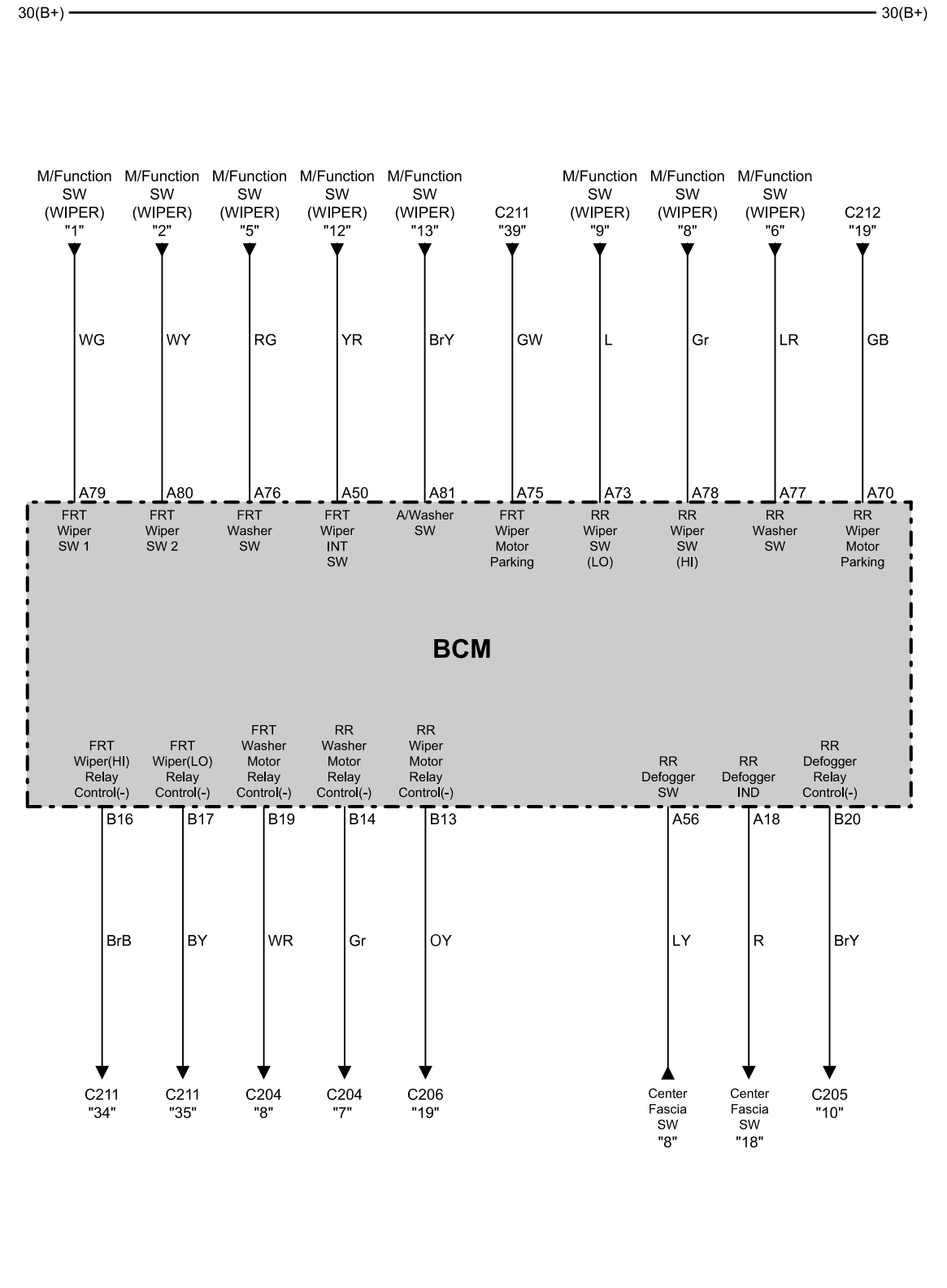


Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	

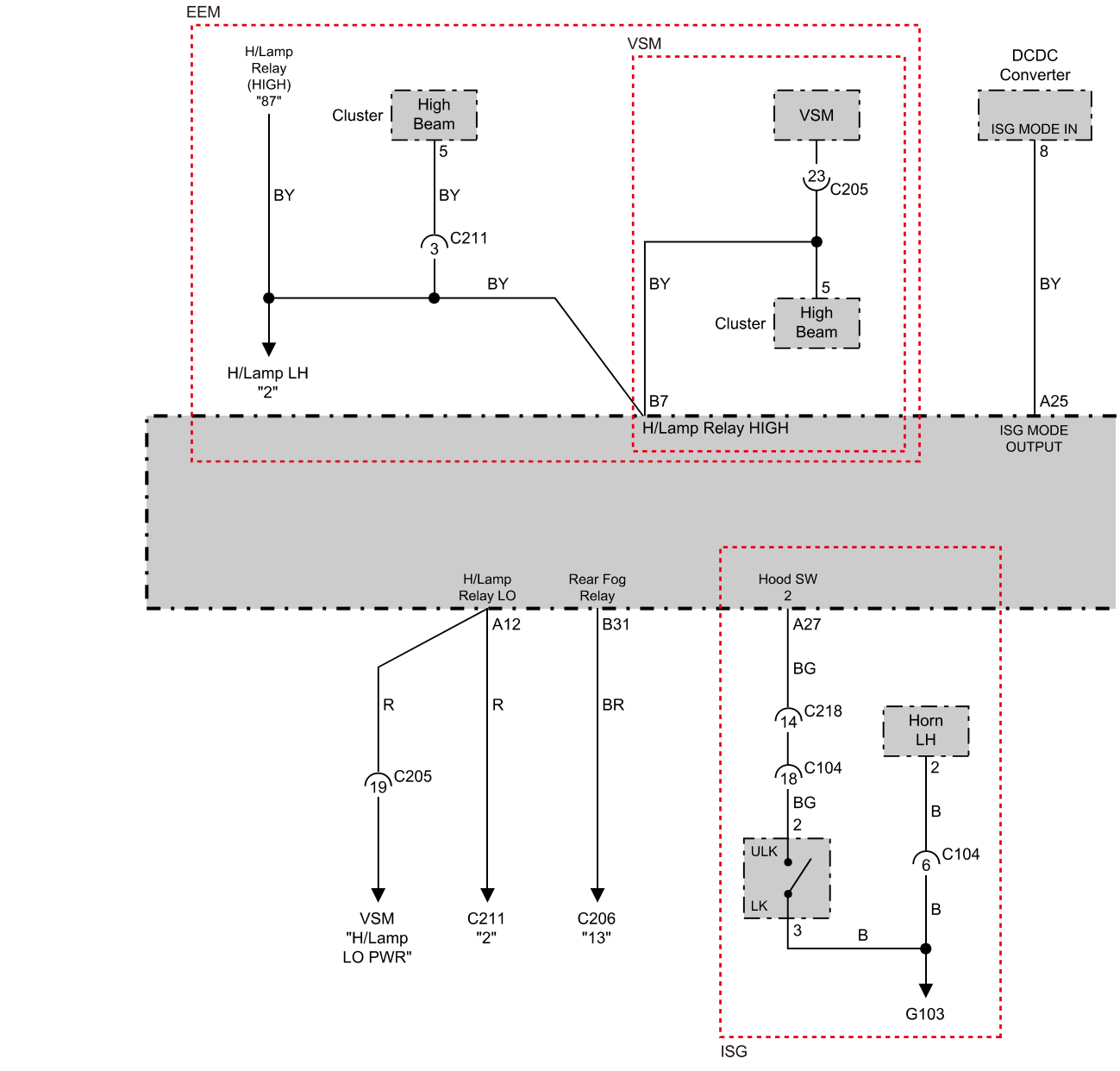
▶ Wiper, Deffoger



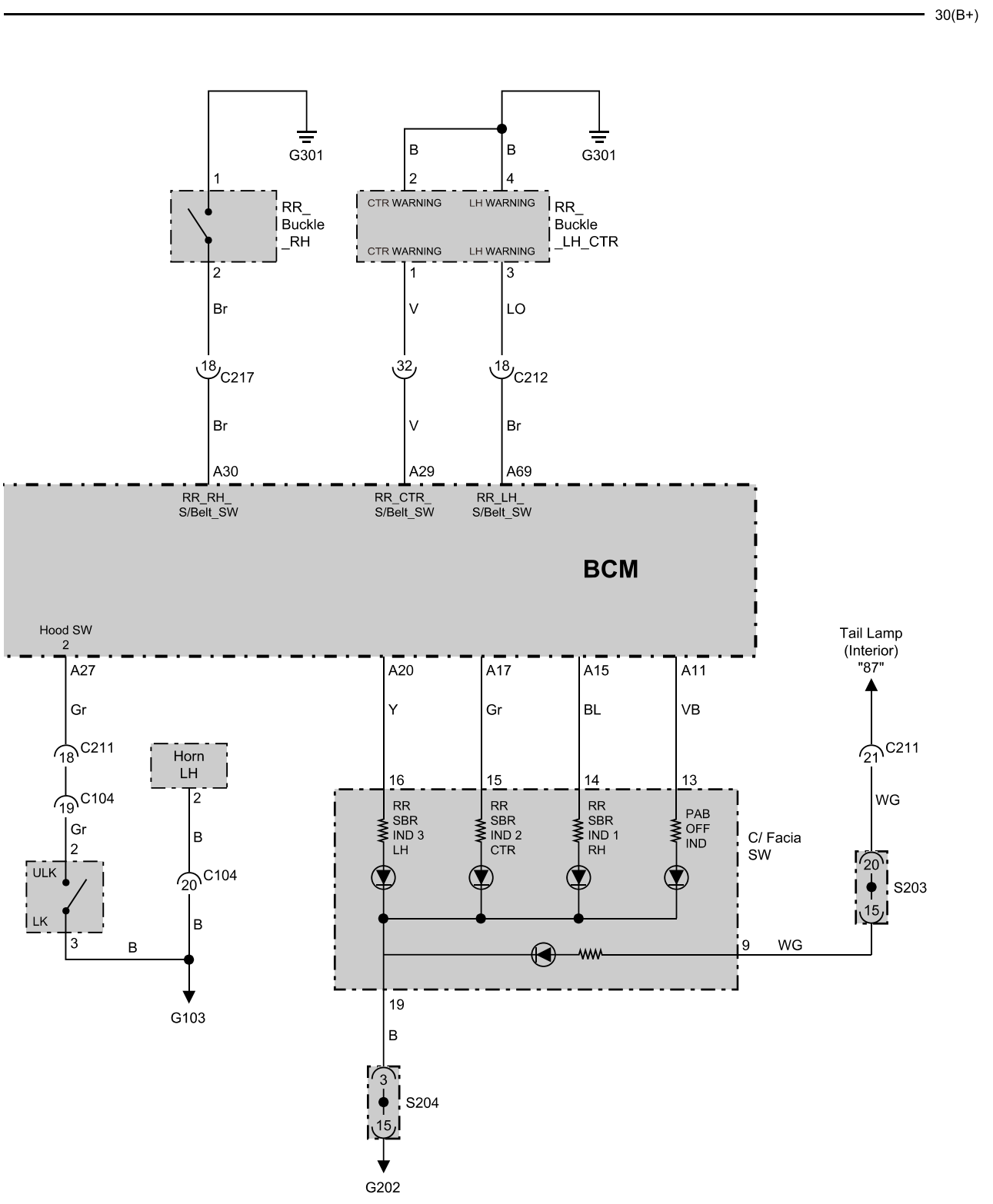
Modification basis	
Application basis	
Affected VIN	

Memo

▶ EEM, VSM, DCDC Converter, Hood SW, Rear Fog, RR S/Belt SW, C/Facia SW



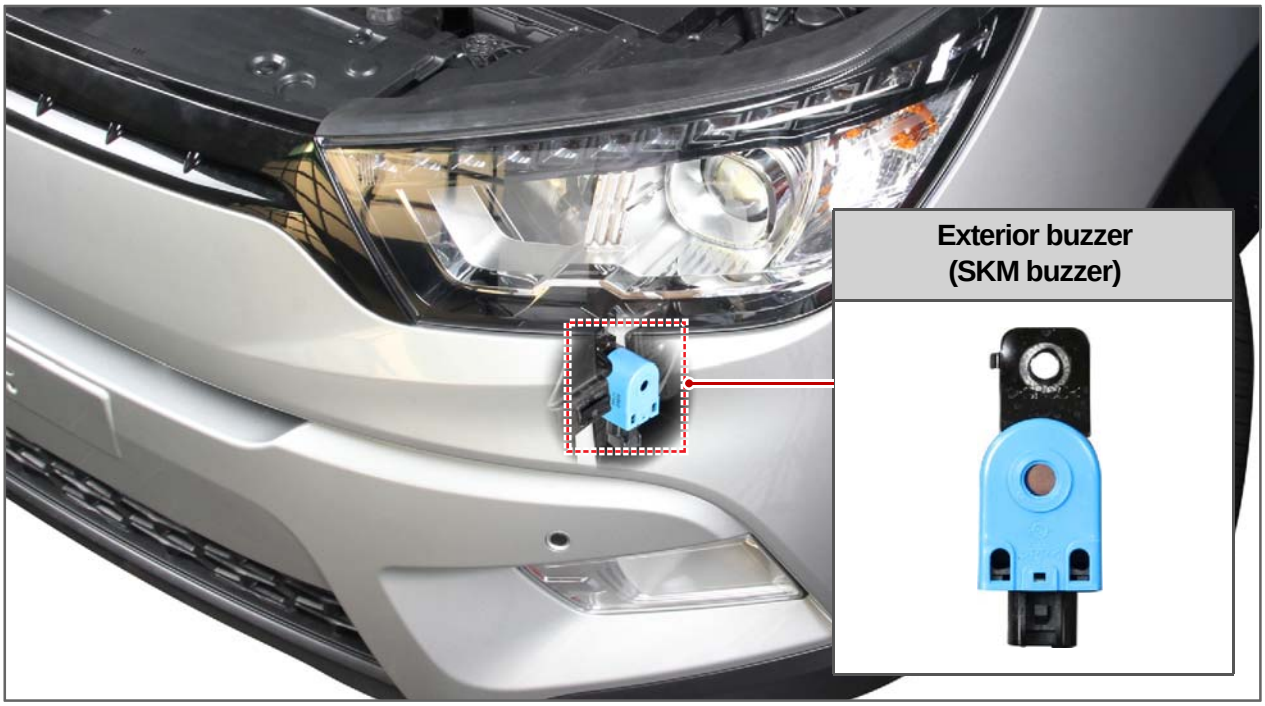
Modification basis	
Application basis	
Affected VIN	



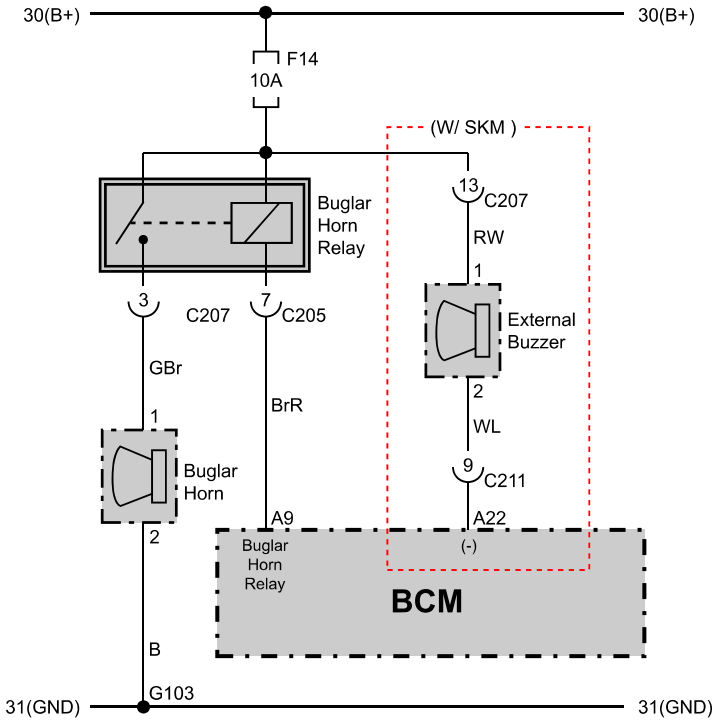
Modification basis	
Application basis	
Affected VIN	

S.G.N.
8712-14 EXTERIOR BUZZER (SKM BUZZER)

1) Mounting Location

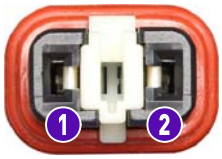


2) Wiring Diagram



To component

To wiring

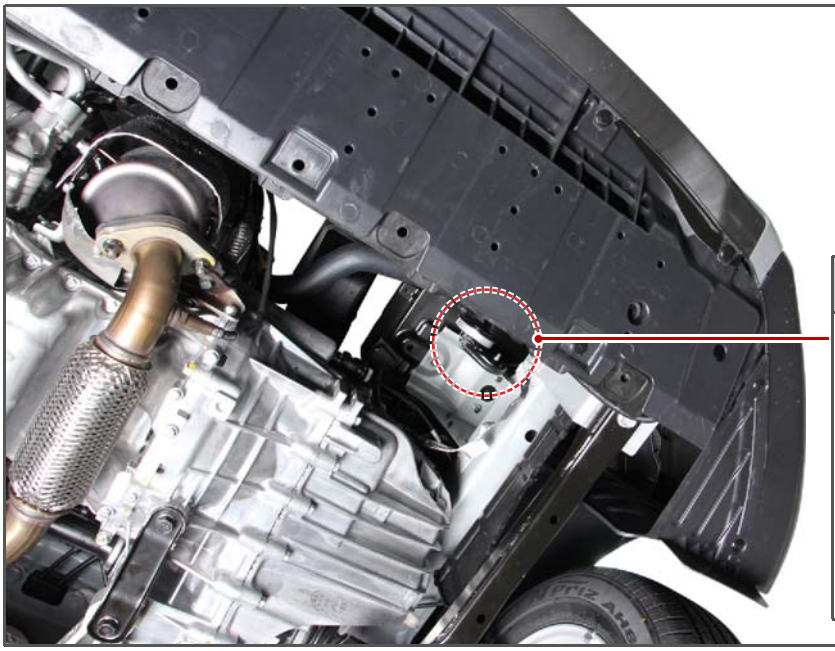


Pin No.	Function
1	B+ (12 V)
2	Exterior buzzer control(BCM)

Modification basis	
Application basis	
Affected VIN	

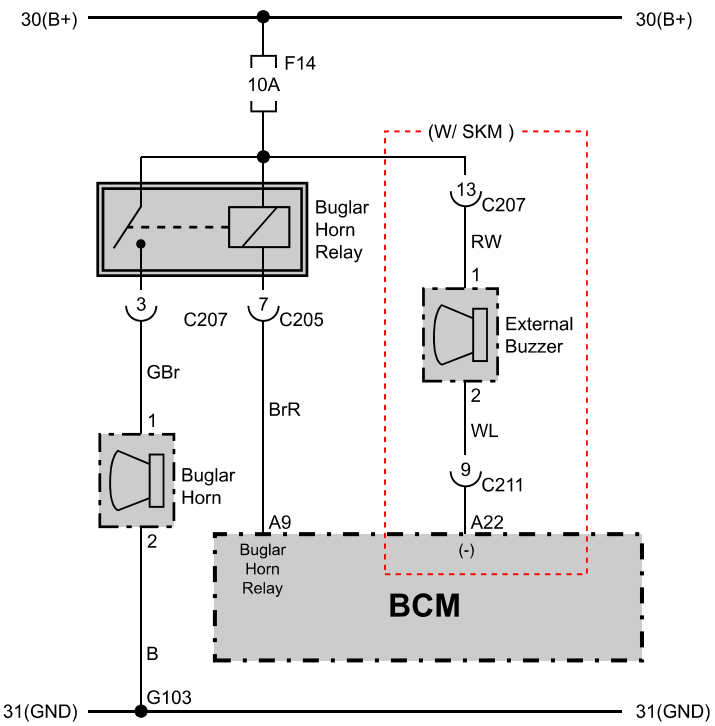
S.G.N.
8710-13 WARNING HORN

1) Mounting Location

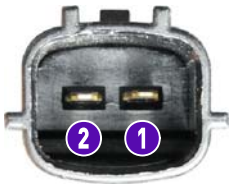


Warning horn

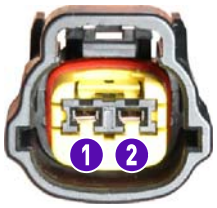
2) Wiring Diagram



To component



To wiring



Pin No.	Function
1	B+ (12 V)
2	Buglar horn control (BCM)

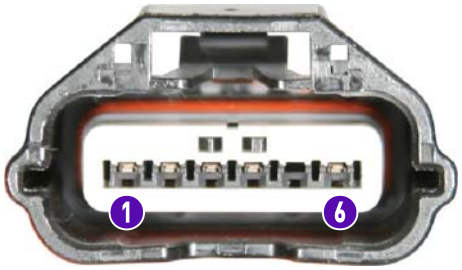
Modification basis	
Application basis	
Affected VIN	

S.G.N. 8790-01 PARKING AID SENSOR

1) Specifications

Category	Conditions
Rated voltage	12.0 V
Operating voltage	9.0 V ~ 16.0 V (CAN and LIN com.: 7.0 V to 18.0 V)
Operating temperature	−30˚C ~ +80˚C
Max. operating humidity	95%
Operating frequency	48 kHz ± 1 kHz

2) Connector Pin Description

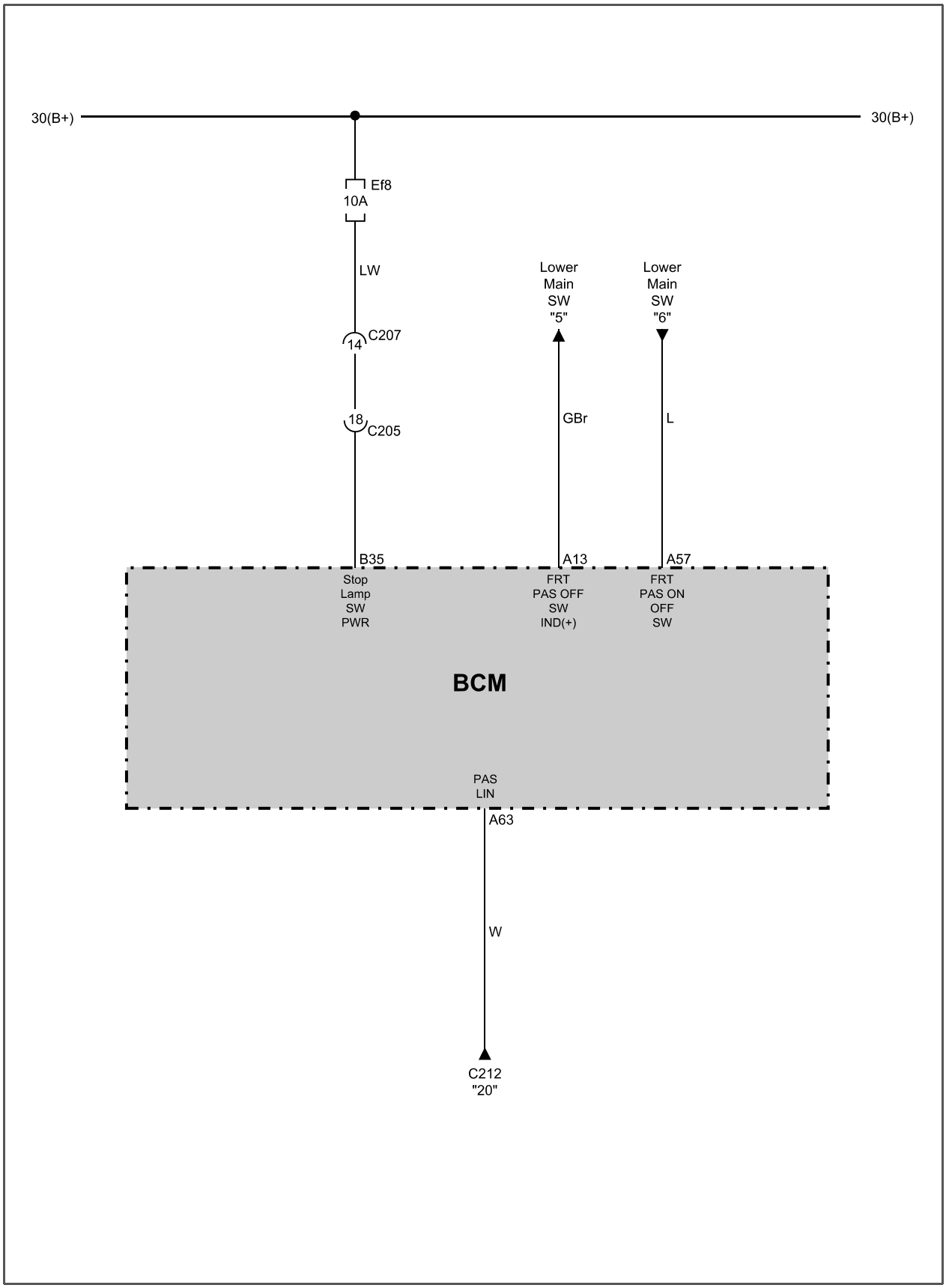
To component	To wiring
	

Sensor position		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
		LIN communication	Ground				Voltage
Front	LH sensor	O	-	O	O	O	O
	RH sensor	O	-	-	O	-	O
Rear	LH sensor	O	O	-	O	-	O
	Central LH sensor	O	O	-	O	O	O
	Central RH sensor	O	O	O	O	-	O
	RH sensor	O	O	O	O	O	O

* The position of each sensor depends on the ground position.

Modification basis	
Application basis	
Affected VIN	

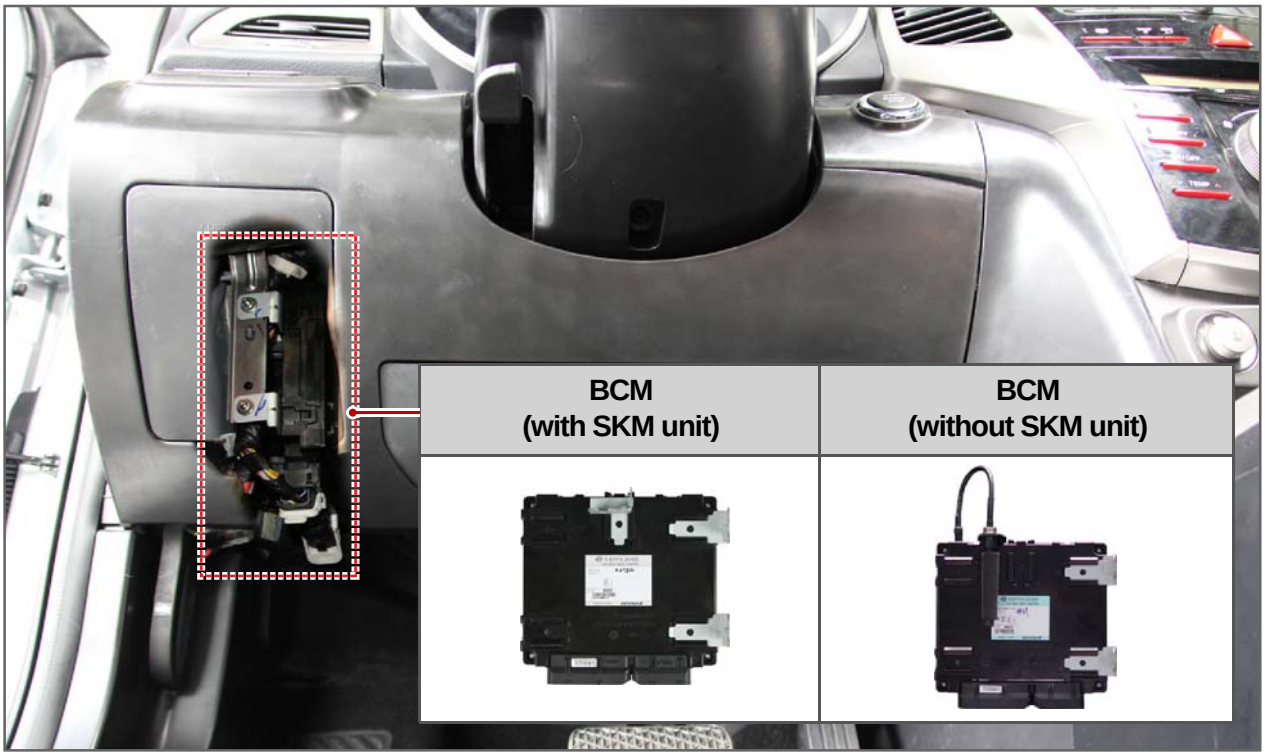
3) Circuit Diagram



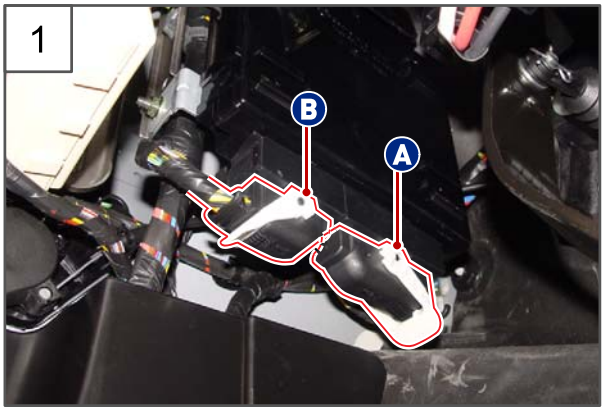
Modification basis	
Application basis	
Affected VIN	

REMOVAL AND INSTALLATION

S.G.N. 8710-01 BCM



1

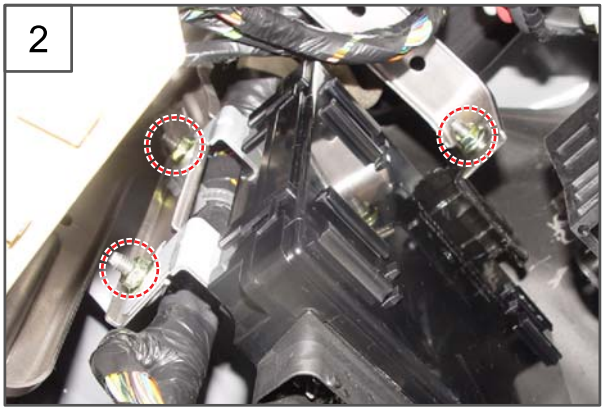


1. Disconnect the BCM connectors A and B.

CAUTION

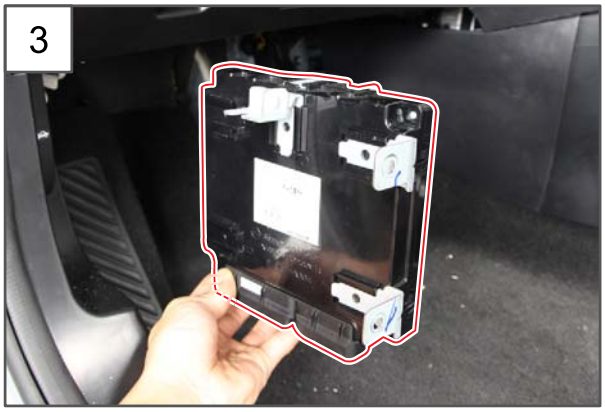
The sharp cutting edge of the bracket may scratch or damage the wiring because the working space for removing is not enough.

2



2. Unscrew the 3 BCM mounting nuts (10 mm).

Modification basis	
Application basis	
Affected VIN	



3. Remove the BCM.

BCM (with SKM unit)	BCM (without SKM unit)
	

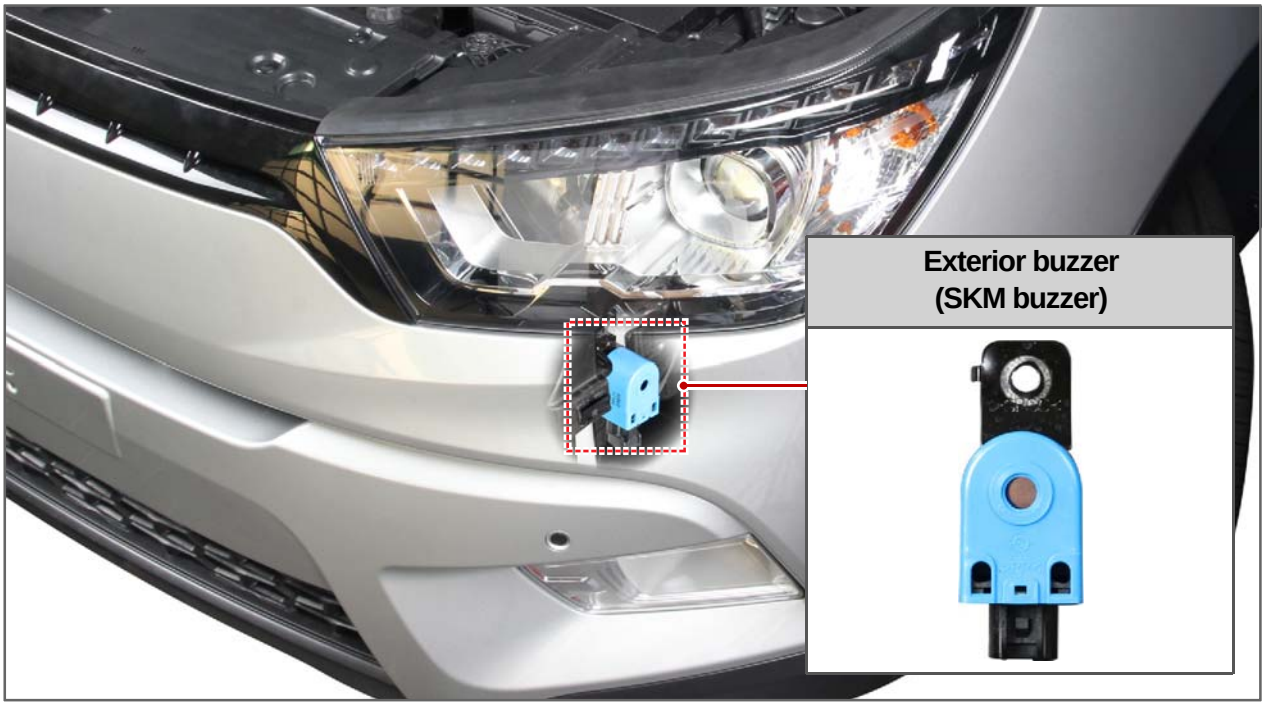
4. Install in the reverse order of removal.

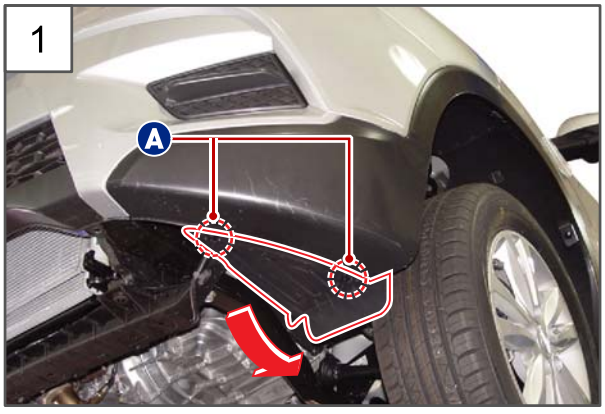
NOTE

Check the variant coding and correct it, if needed, using a diagnostic program after replacing the BCM.

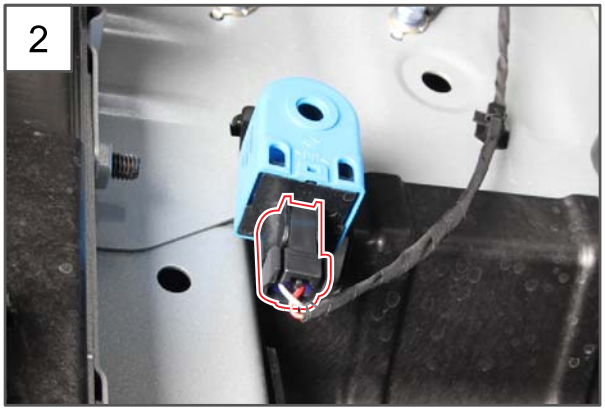
S.G.N.
8712-14 EXTERIOR BUZZER (SKM BUZZER)

Preceding work - Disconnect the negative battery cable.





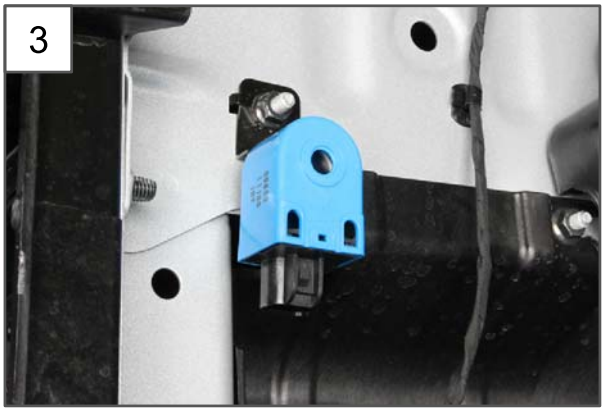
1. Undo the 2 driver wheel house cover mounting screw rivets (A) under the vehicle and pull it out to the arrow direction.



2. Disconnect the exterior buzzer connector.

Modification basis	
Application basis	
Affected VIN	

3



3. Unscrew the mounting nut (10 mm) for the external buzzer (SKM buzzer).

4

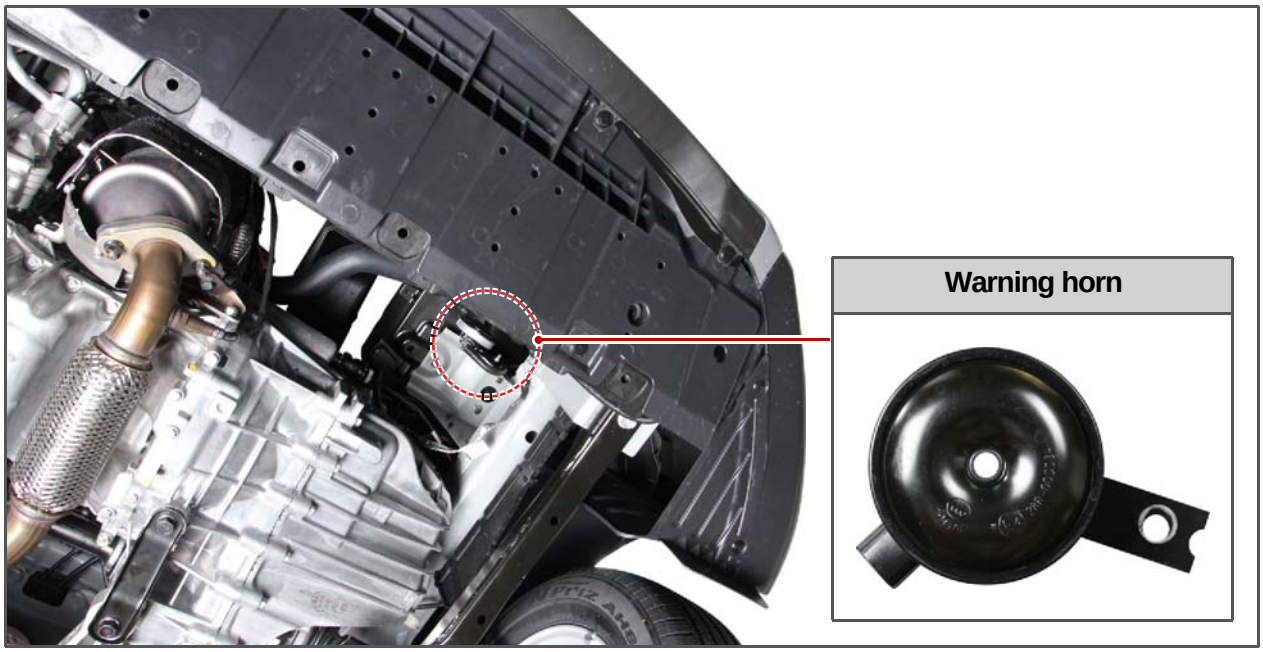
4. Remove the external buzzer (SKM buzzer).

5

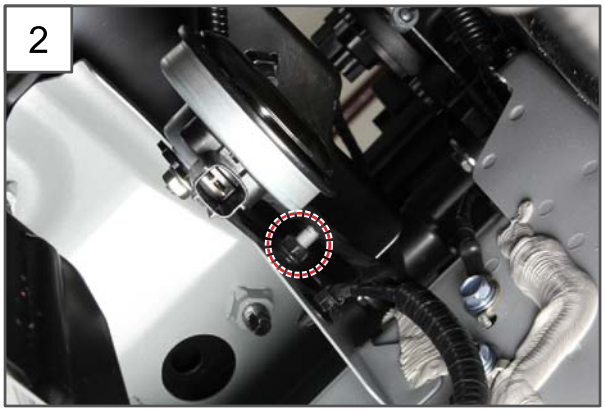
5. Install in the reverse order of removal.

S.G.N.
8710-13 WARNING HORN

Preceding work - Remove the under cover.



1. Disconnect the warning horn connector.



2. Unscrew the mounting nut (10 mm) for the warning horn.

Modification basis	
Application basis	
Affected VIN	

3

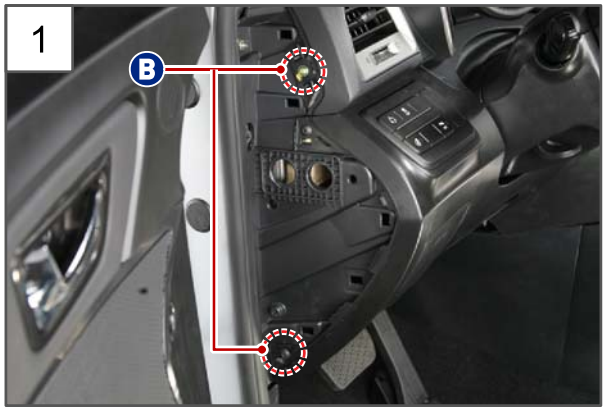
3. Remove the warning horn.

4

4. Install in the reverse order of removal.

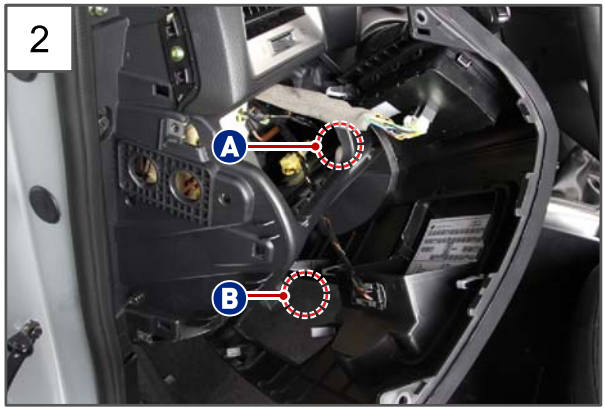
S.G.N. 8712-10 IMMOBILIZER ANTENNA

1



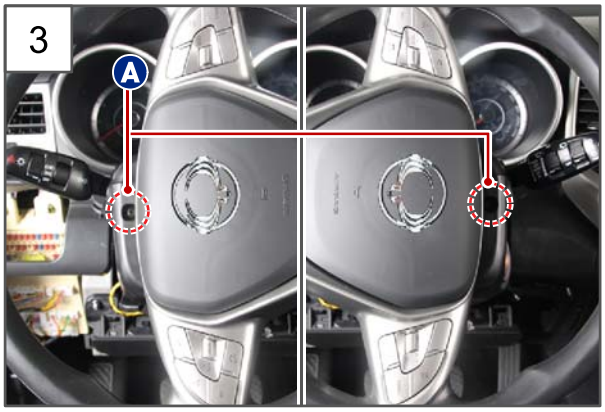
1. Remove the LH crash pad side cover (A) and unscrew the 2 mounting screws (B) for the lower main panel.

2



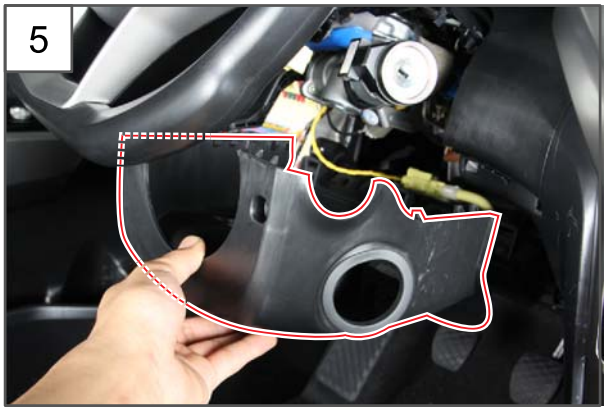
2. Remove the lower main panel, disconnect the connector (B, lower main switch) and (C, diagnosis connector) and remove the lower main panel.

Modification basis	
Application basis	
Affected VIN	

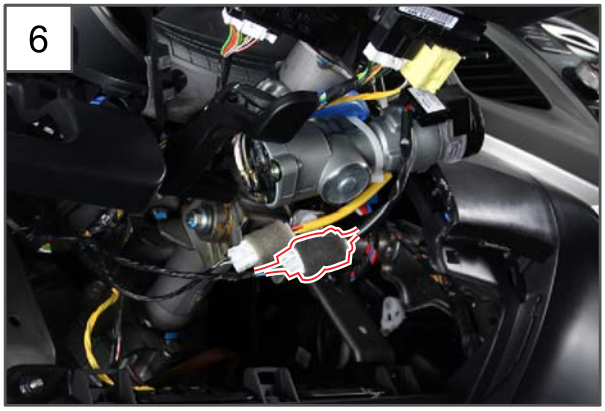


3. Unscrew the 2 shroud cover mounting screws (A) while turning the steering wheel to the left/right directions.

4. Unscrew the one mounting screw for the shroud lower cover.



5. Remove the shroud lower cover.



6. Remove the immobilizer connector.

7

7. Pry off the immobilizer antenna mountings using a flat bladed screwdriver to remove the antenna.

8

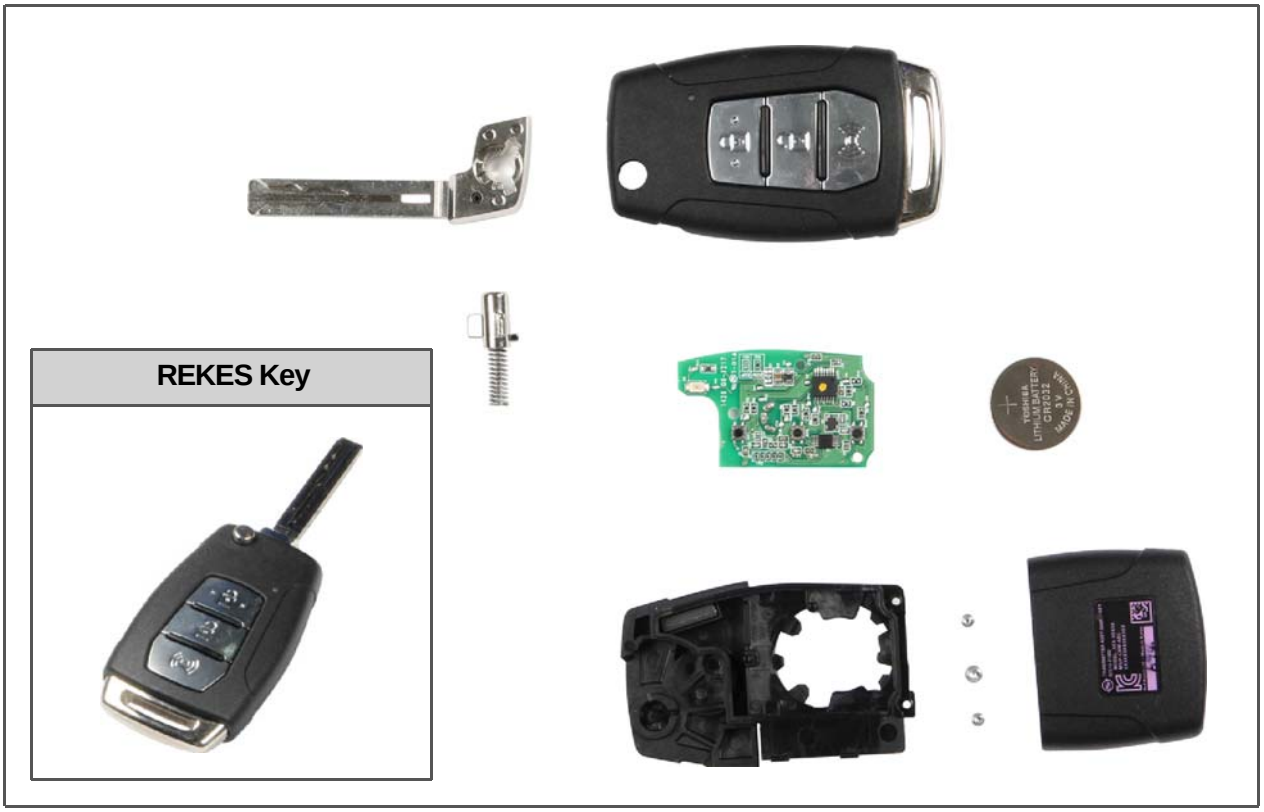
8. Remove the immobilizer antenna.

9

9. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N.
8710-10 REKES KEY



1

1. Remove the REKES key battery cover.

2

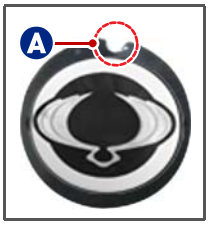
2. Remove the REKES key battery.

Modification basis	
Application basis	
Affected VIN	

3

3. Remove the SSANGYONG emblem in the upper side of the REKES key.

CAUTION



Align the groove (A) of the emblem with the protrusion of the side cover when fitting the emblem.

4

4. Unscrew the 3 mounting screws securing the REKES key side cover.

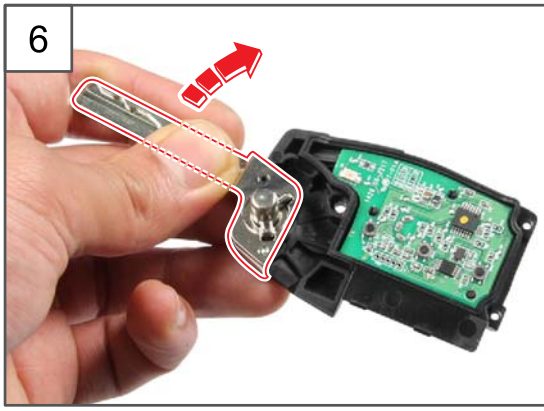
5

5. Remove the REKES key main cover.

NOTE

Refer to Cautions for installation.

6

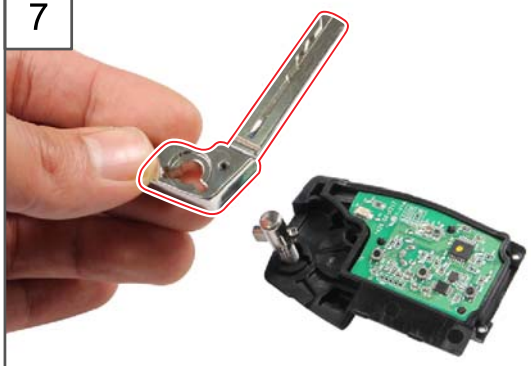


6. Rotate the key plate (A) about 1.25 turns clockwise to relieve the spring force.

Spring force relieved

Modification basis	
Application basis	
Affected VIN	

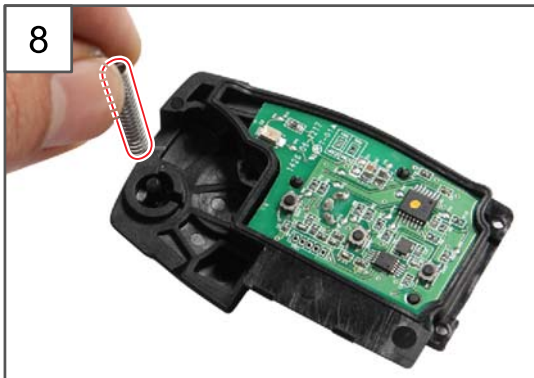
7



7. Remove the key plate.

NOTE
Refer to Cautions for installation.

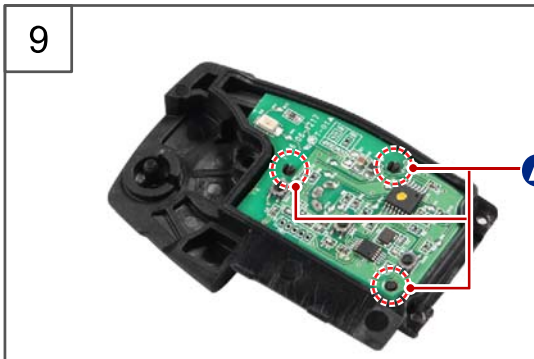
8



8. Remove the spring.

NOTE
Refer to Cautions for installation.

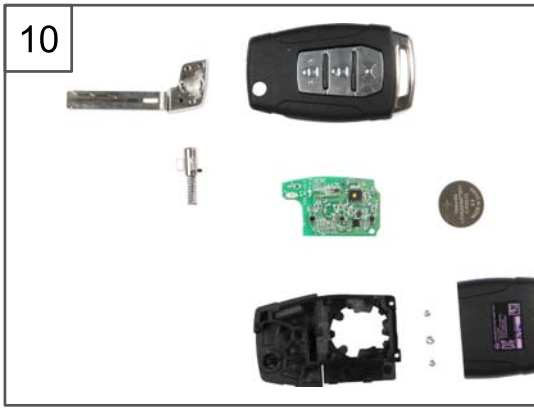
9



9. Disengage the mountings (A) and remove the PCB.

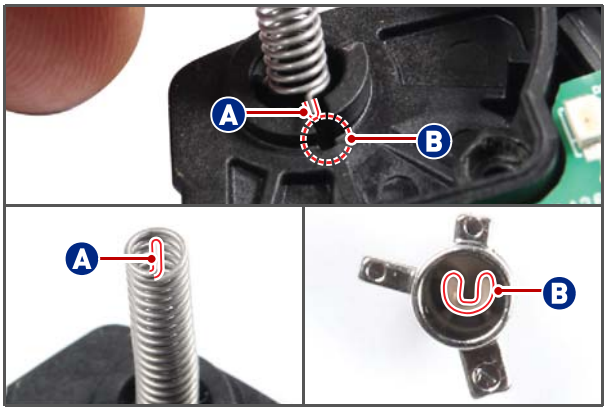
CAUTION
Do not apply excessive force to remove the PCB. Otherwise, it could be damaged.

10



10. Install in the reverse order of removal.

Cautions for fitting spring pin



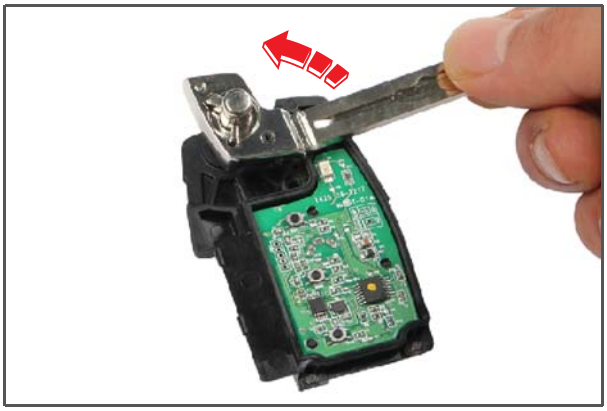
Align the protrusion (A) at the end of the spring with the spring mounting hole (B) of the main cover.

Align the protrusion (A) at the end of the spring with the mounting hole (B) of the spring cover.

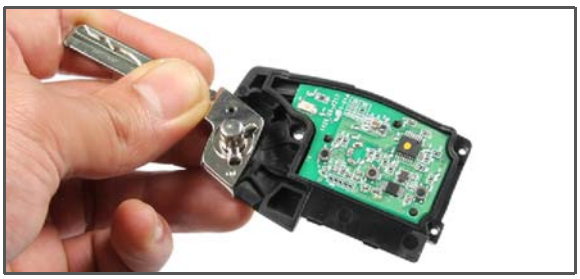
Cautions for fitting key plate

Install the key plate by aligning the protrusions (A) of the spring cover to the grooves (B) of the key plate.

Cautions for fitting side cover

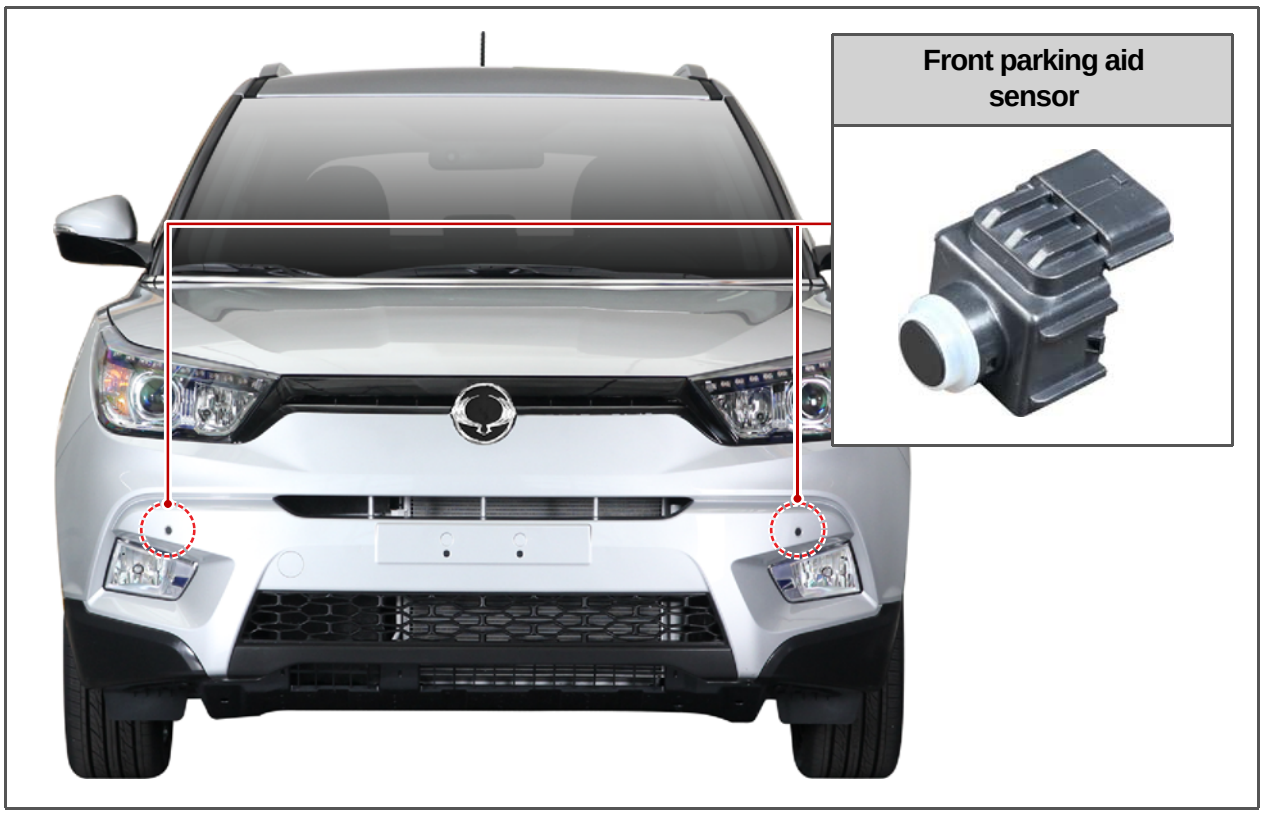


Fit the side cover after rotating the key plate about 1.25 turns anti-clockwise to create the spring force.

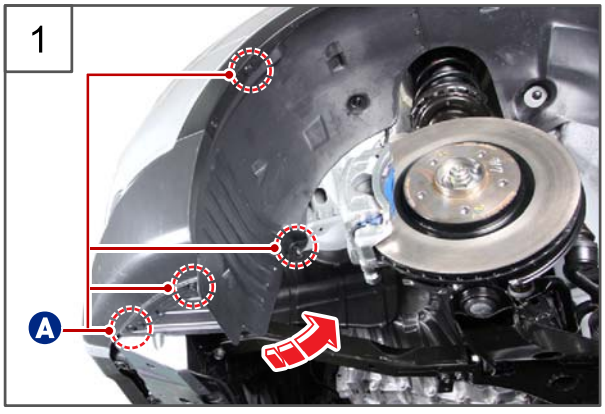


Modification basis	
Application basis	
Affected VIN	

S.G.N.
8790-01 FRONT PARKING AID SENSOR



1



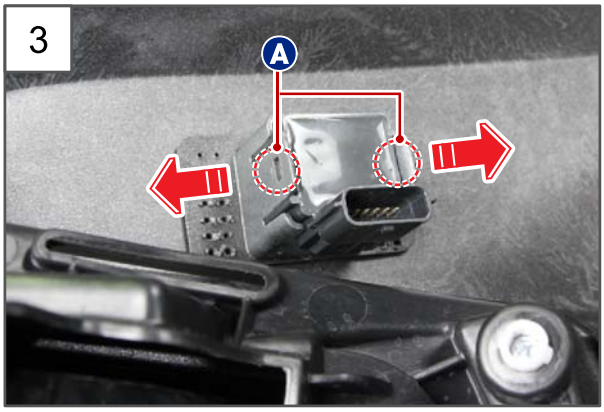
1. Undo the 4 driver wheel house cover mounting screw rivets (A) under the vehicle and pull it out to the arrow direction.

2

2. Disconnect the front parking aid sensor connector.

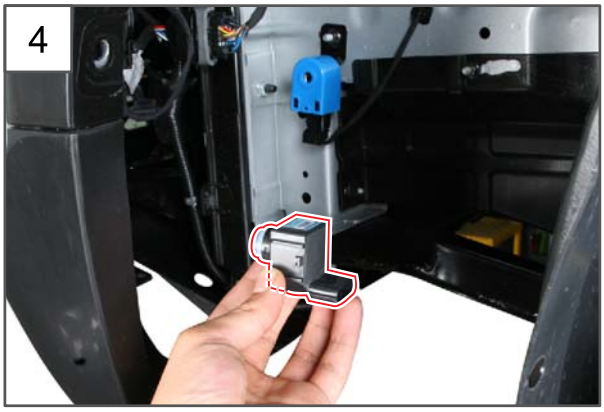
Modification basis	
Application basis	
Affected VIN	

3



3. Set the mounting parts (A) of the front parking aid sensor connector apart to the arrow direction and remove it while pressing the sensor down gently at front of the front bumper.

4



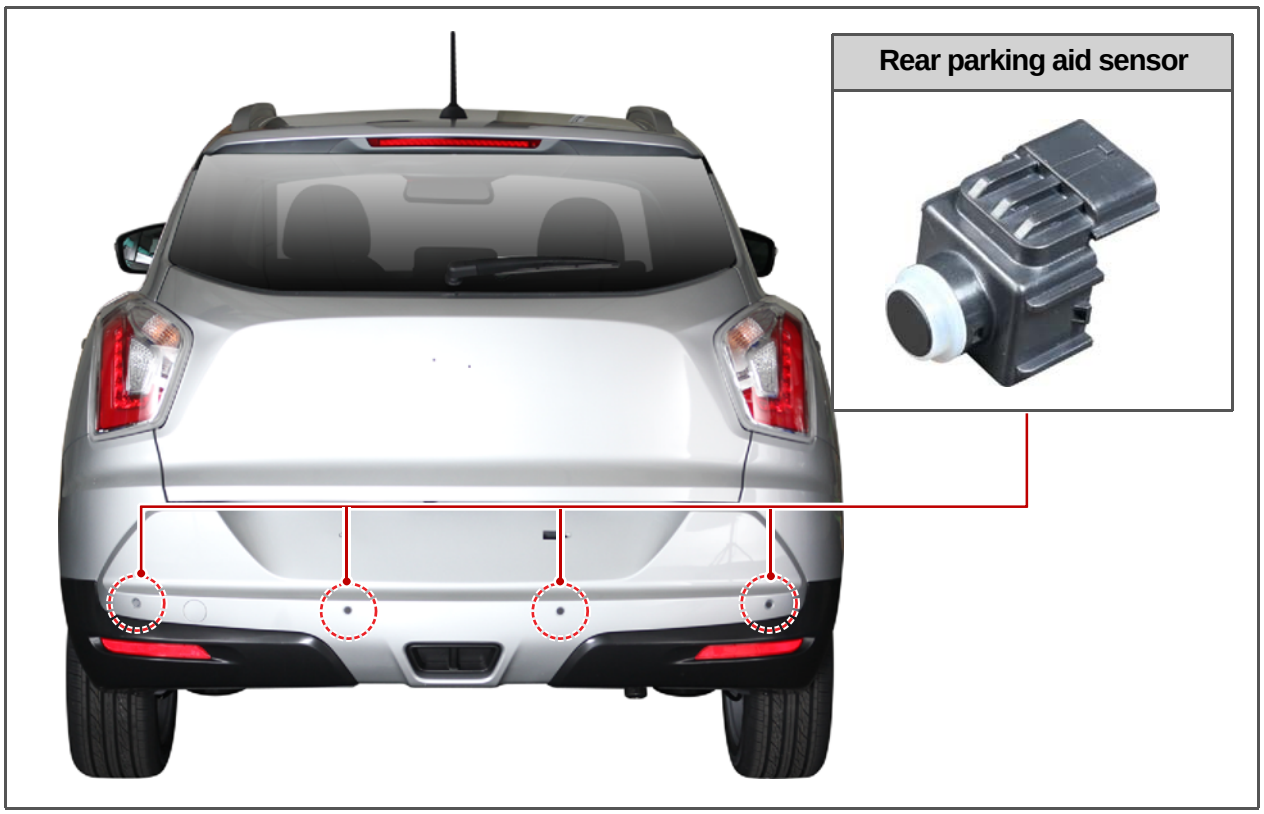
4. Remove the front parking aid sensor.

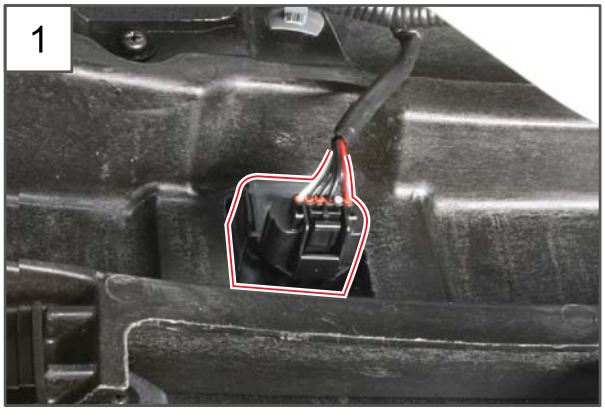
5

5. Install in the reverse order of removal.

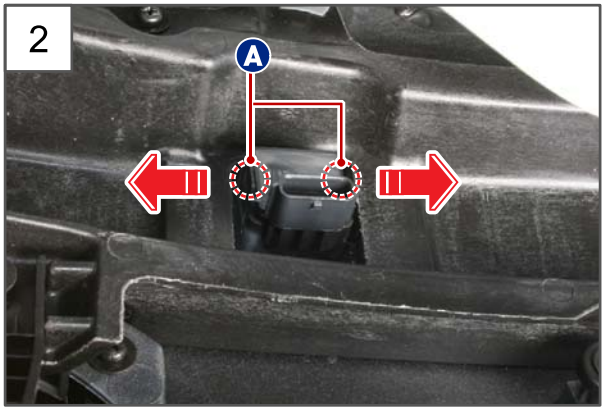
Modification basis	
Application basis	
Affected VIN	

S.G.N.
8790-01 REAR PARKING AID SENSOR





1. Disconnect the rear parking aid sensor connector.

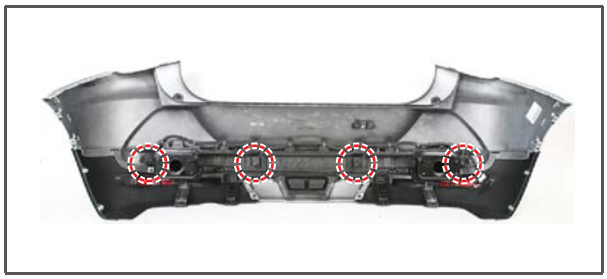


2. Set the mounting parts (A) of the rear parking aid sensor connector apart to the arrow direction and remove it while pressing the sensor down gently at front of the front bumper.

Modification basis	
Application basis	
Affected VIN	

3

3. Remove the rear parking aid sensor.



4

4. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

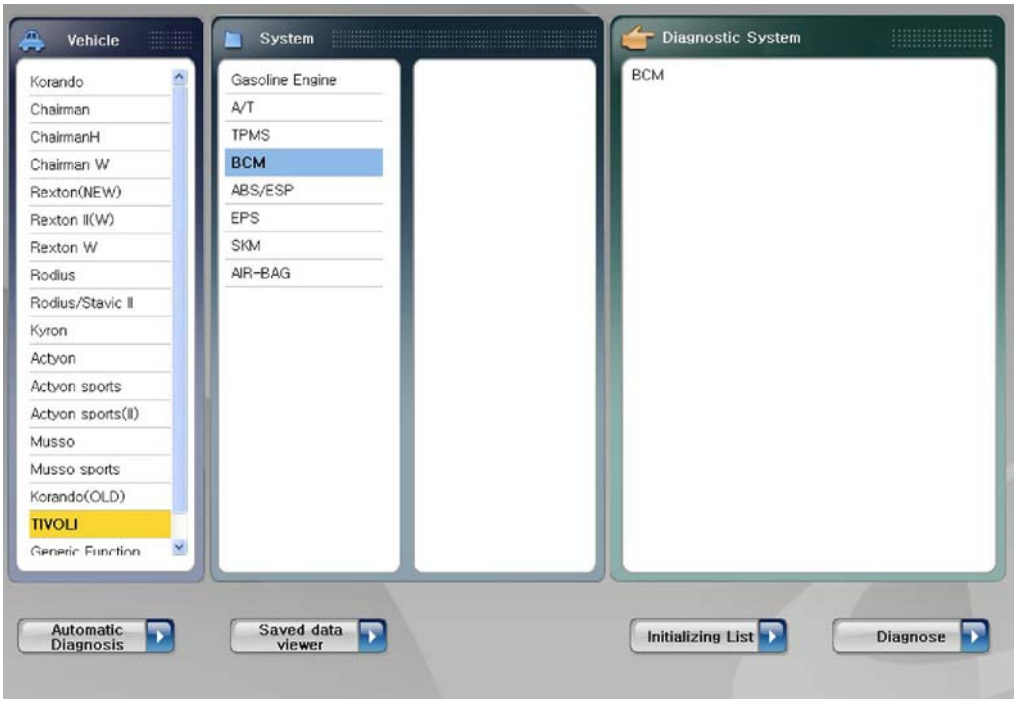
CODING PROCESS

1. REKES KEY CODING

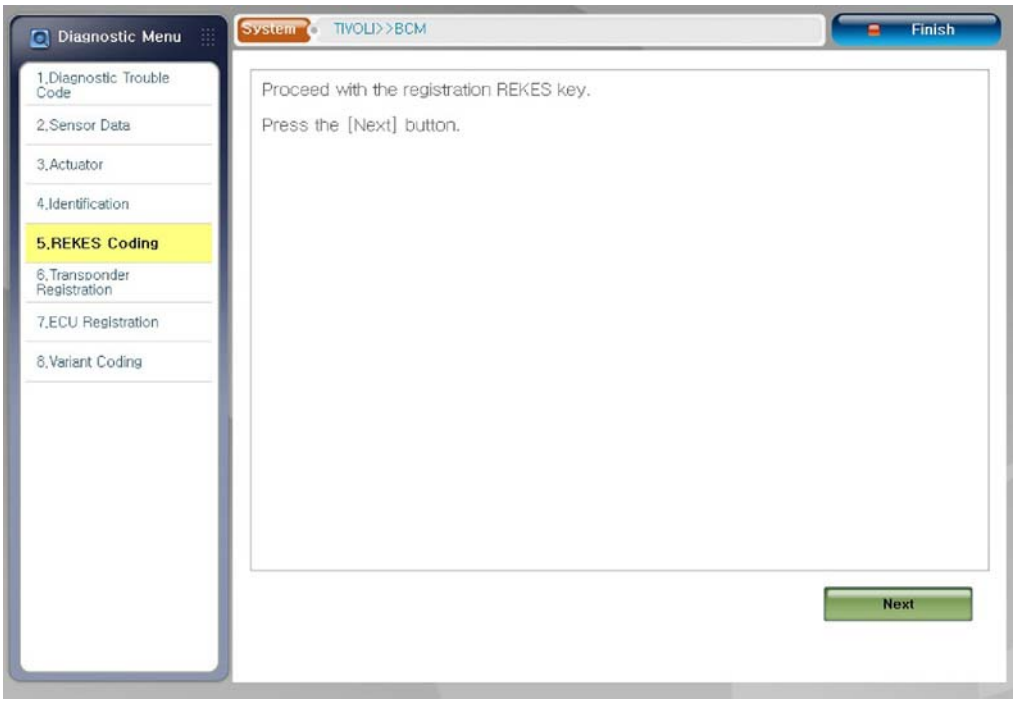
▶ **Perform the REKES key coding when the BCM or REKES key is replaced.**

1. Insert the REKES key into the key cylinder and turn it to the ON position.

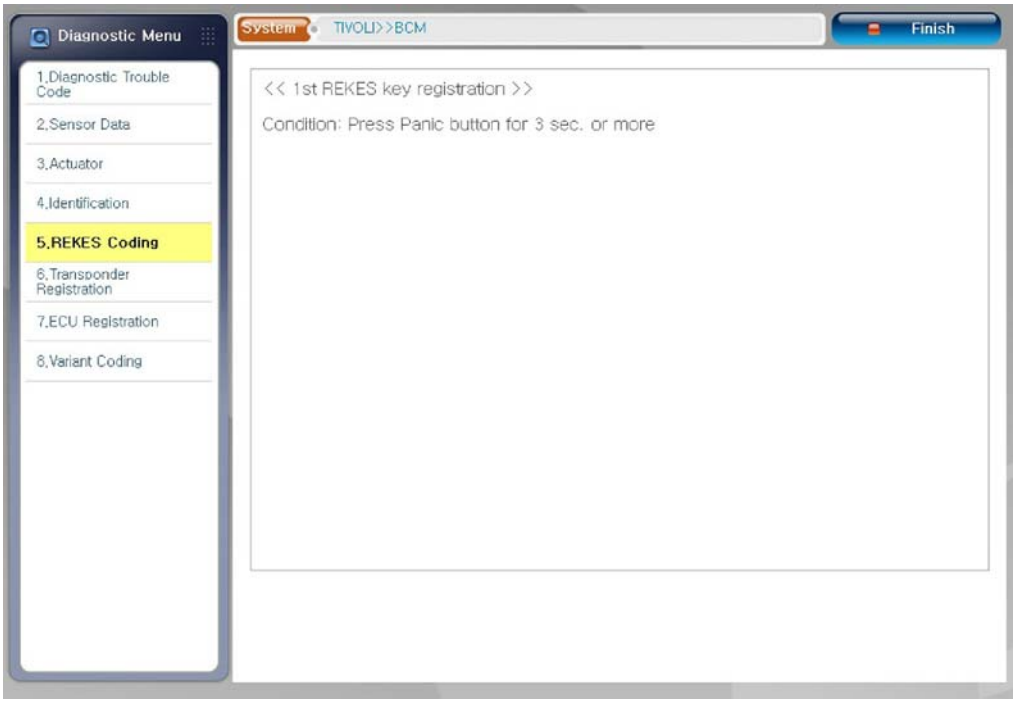
2. Select the vehicle type and system (BCM) on the diagnostic program and perform the diagnosis.



3. Select REKES key coding menu and press Next button.

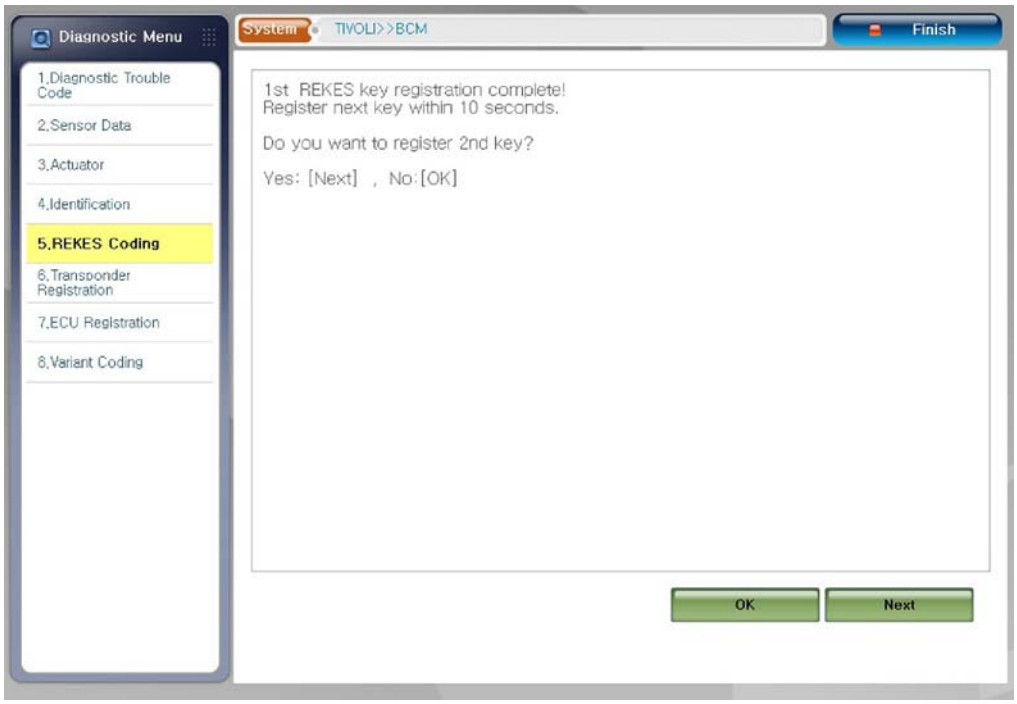


4. Press the panic button on the first REKES key for more than 3 seconds and listen for beep from the vehicle.



Modification basis	
Application basis	
Affected VIN	

5. If you want to continue coding after completing the first REKES key coding, press Next button within 10 seconds. Otherwise, press Done button.



CAUTION

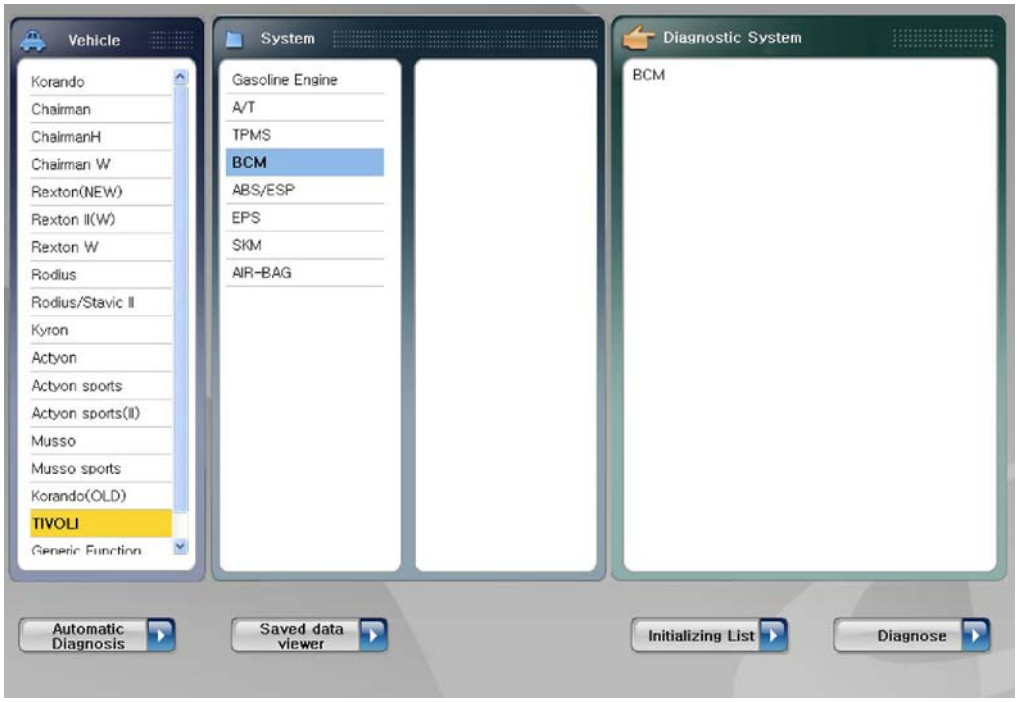
Perform the coding without changing the key inserted to the key cylinder after coding for the first REKES key since the ignition must stay on for additional coding.

2. TRANSPONDER CODING

▶ **Perform the transponder key coding when the BCM or REKES key is replaced.**

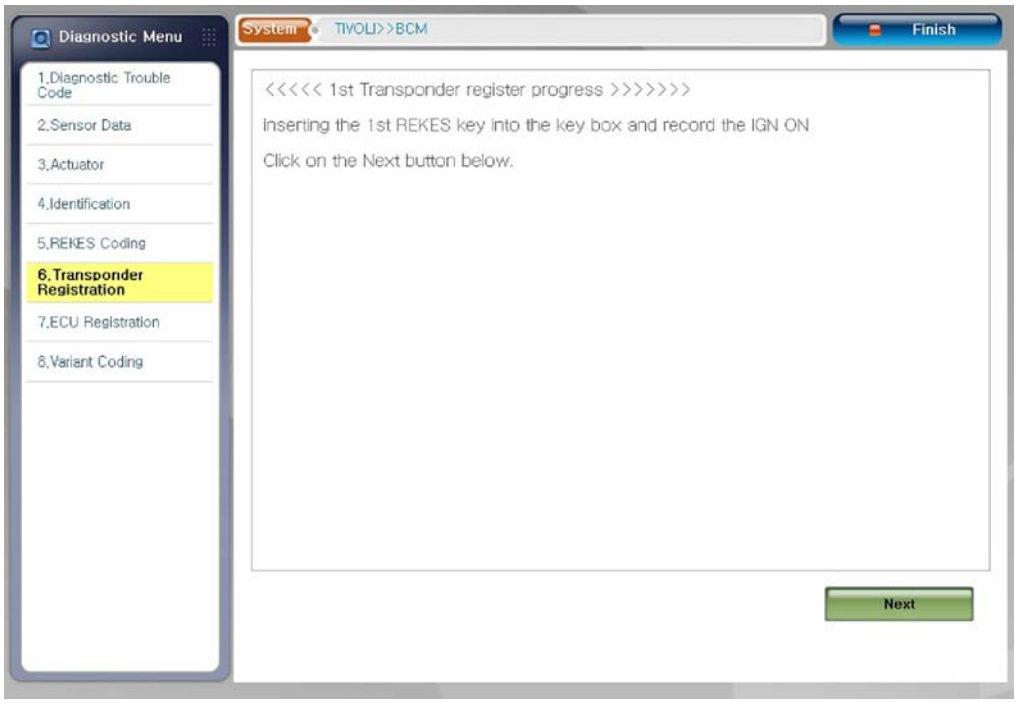
1. Insert the key into the key cylinder and turn it to the ON position.

2. Select the vehicle type and system (BCM) on the diagnostic program and perform the diagnosis.

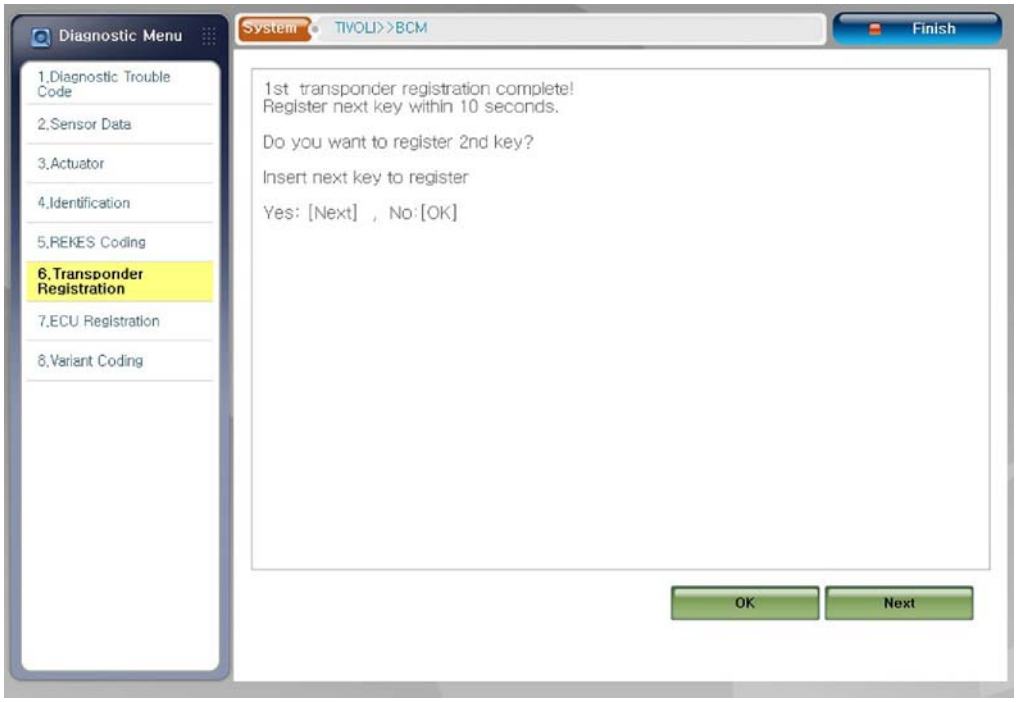


Modification basis	
Application basis	
Affected VIN	

3. Select Transponder registration menu and press Next button.



4. If you want to continue coding after completing the first transponder key coding, press Next button within 10 seconds after inserting other key into the key cylinder and turning the key to IGN ON position. Otherwise, press Done button.

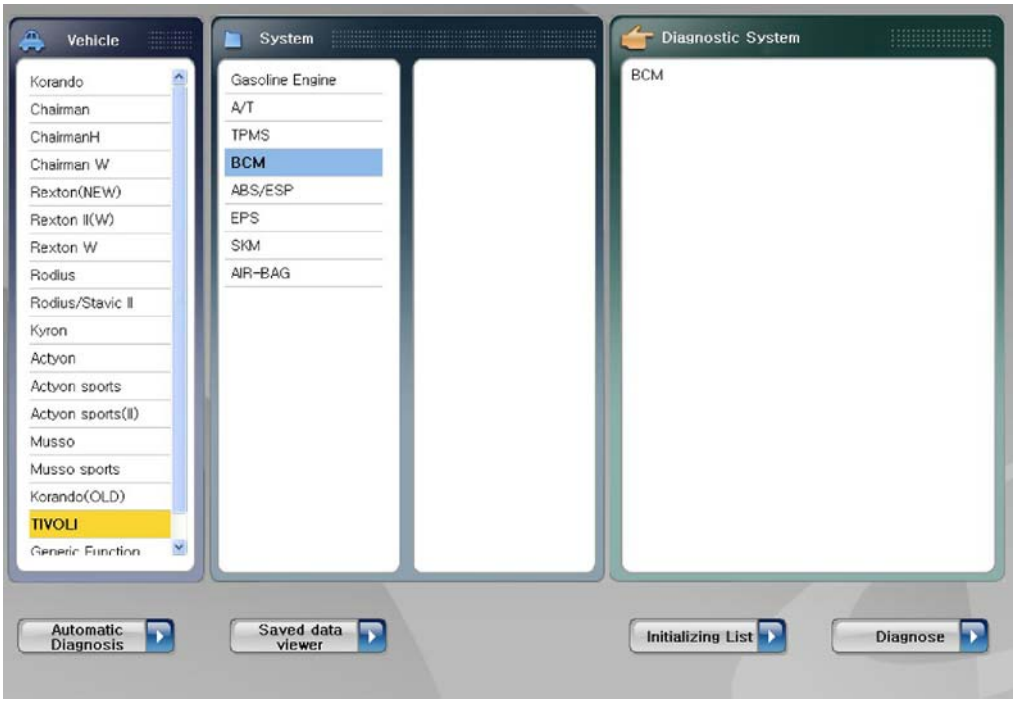


3. EMS REGISTRATION

▶ **Perform the EMS registration when the BCM or ECU is replaced.**

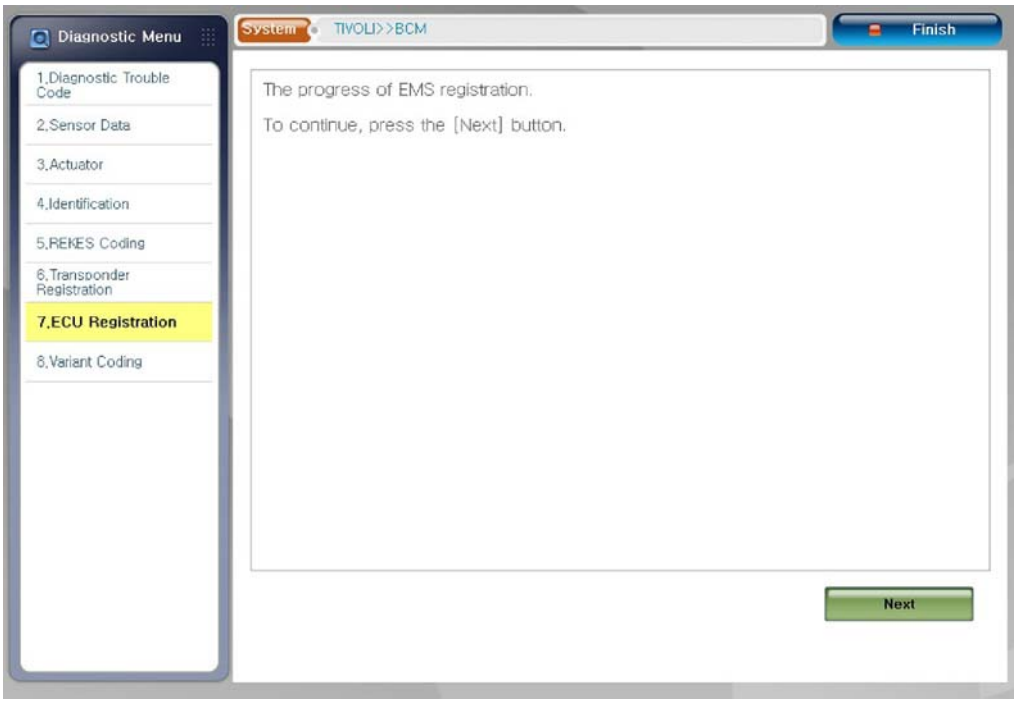
1. Insert the key into the key cylinder and turn it to the ON position.

2. Select the vehicle type and system (BCM) on the diagnostic program and perform the diagnosis.

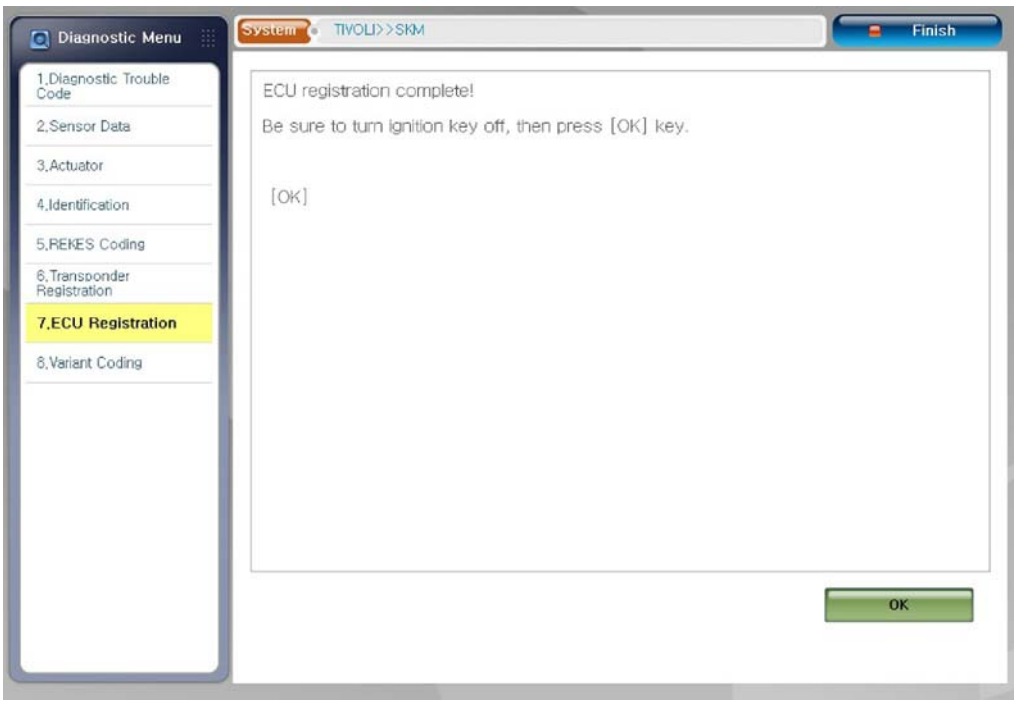


Modification basis	
Application basis	
Affected VIN	

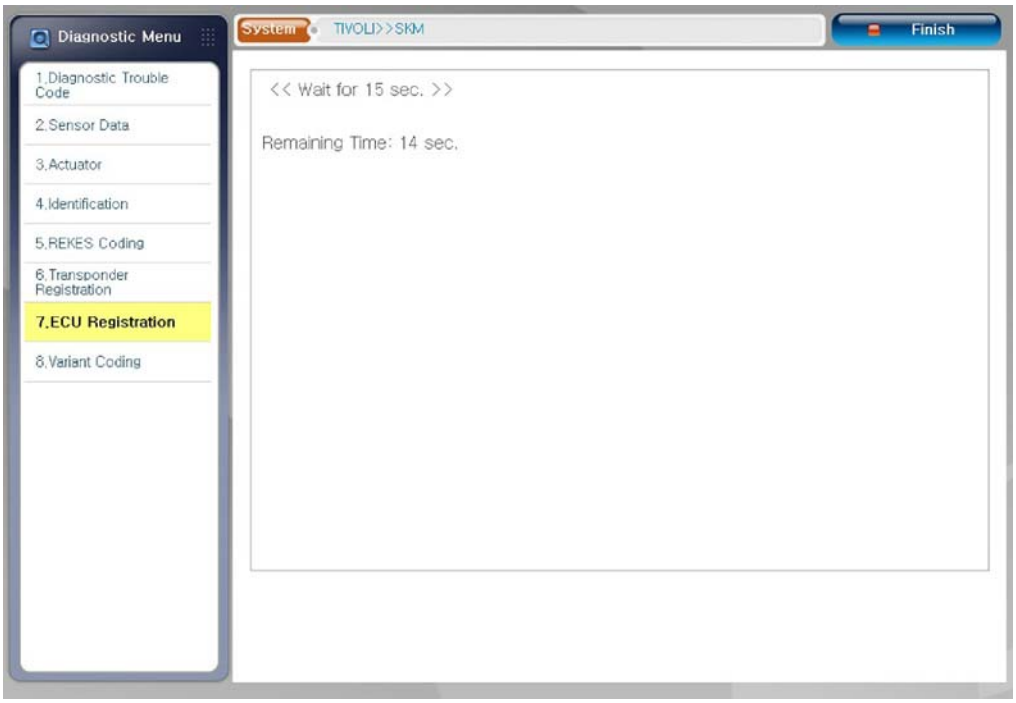
3. Select EMS registration menu and press Next button.



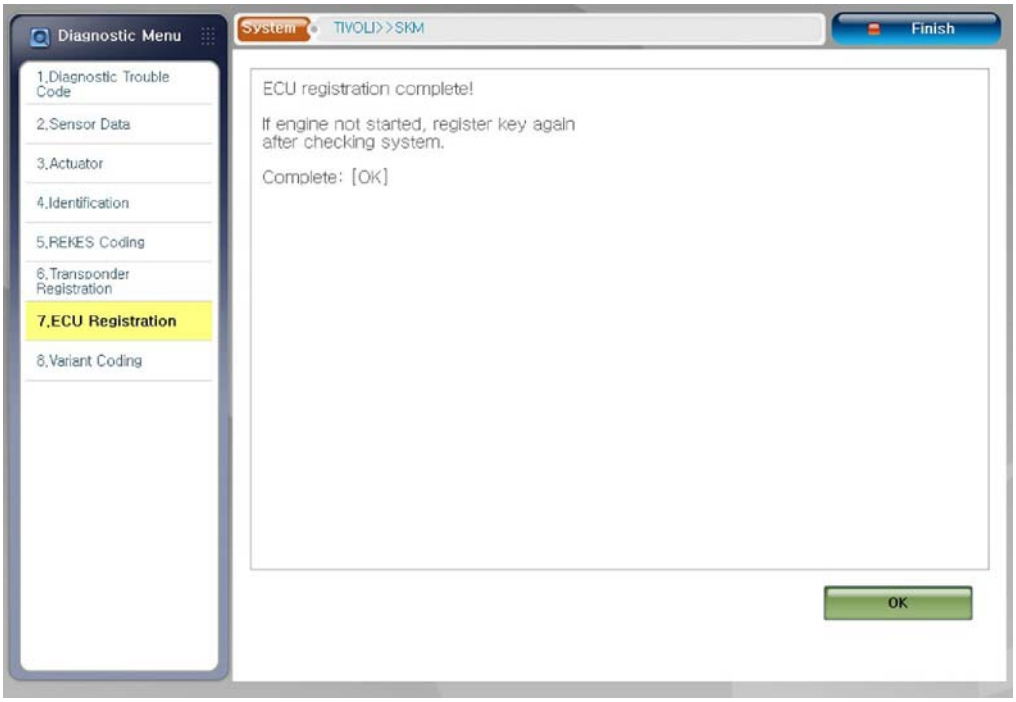
4. When the registration is completed, turn the ignition OFF and then click OK button.



5. Wait for 15 seconds.



6. Once the EMS registration is completed, press OK button.



Modification basis	
Application basis	
Affected VIN	

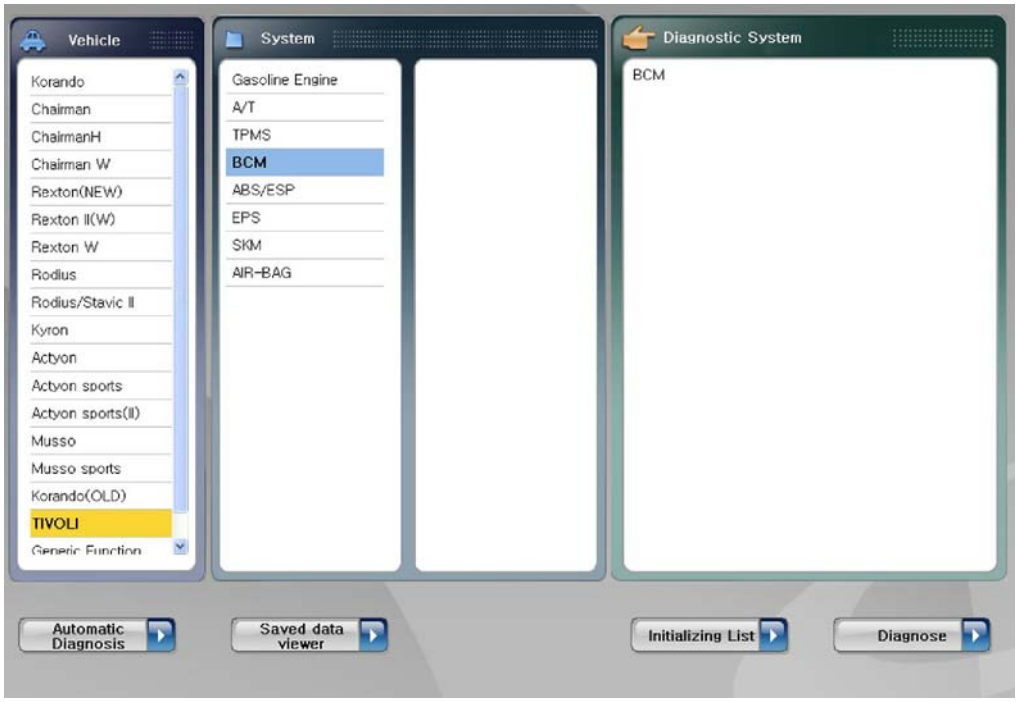
4. VARIANT CODING

Variant Code	Select	Remark
KWR_EXP	Korea	Automatic selection
	EU	
	GEN	
Climate sys	MANUAL	Select “MANUAL” or “FATC”.
	FATC	
DRL	NO	Select “NO” or “YES”.
	YES	
Auto light	NO	Select “NO” or “YES”.
	YES	
TM	MANUAL	Automatic selection
	AUTO	
Rain Sensor	NO	Select “NO” or “YES”.
	YES	
Driver Handle	LEFT	Select “LEFT” or “RIGHT”.
	RIGHT	
PAS	NON PAS	Select appropriate system
	REAR PAS ONLY	
	REAR, FRONT PAS ENABLE	
PS RR Seat belt	NO	Select “NO” or “YES”.
	YES	
Coming Home	NO	Select " NO ".
	YES	

▶ **Perform the variant coding when the BCM is replaced.**

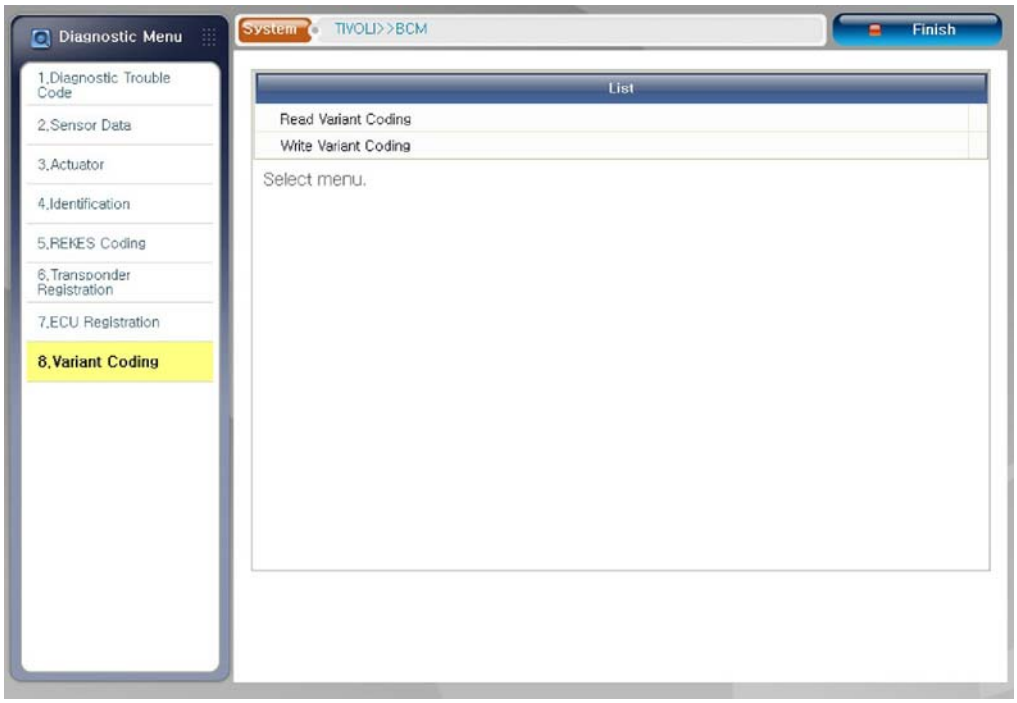
1. Insert the key into the key cylinder and turn it to the ON position.

2. Select the vehicle type and system (BCM) on the diagnostic program and perform the diagnosis.

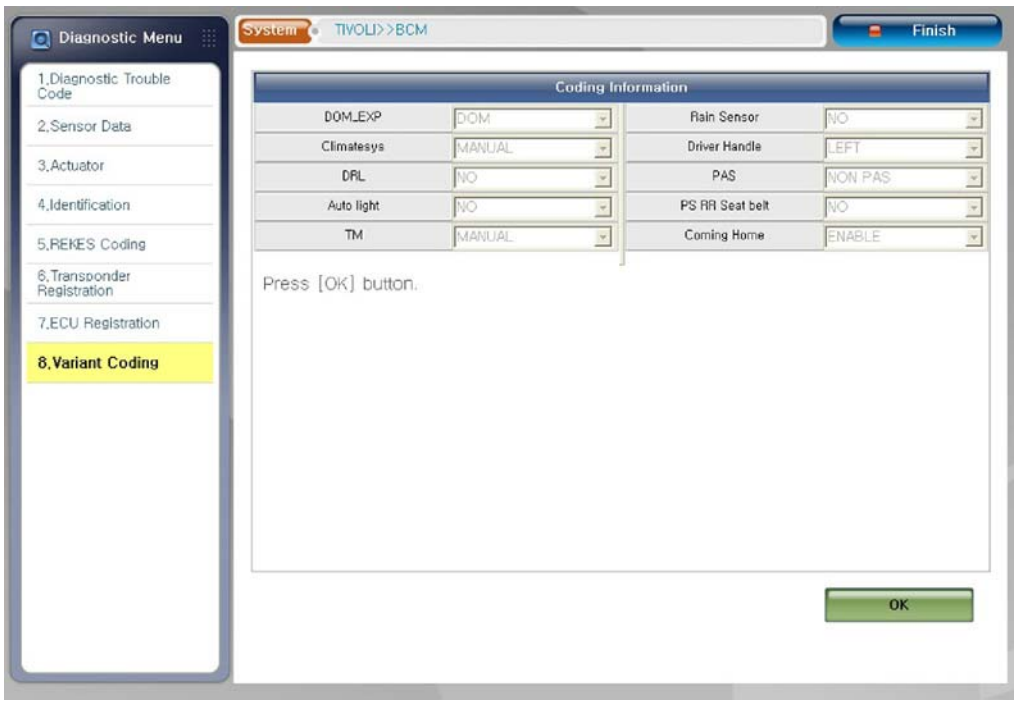


Modification basis	
Application basis	
Affected VIN	

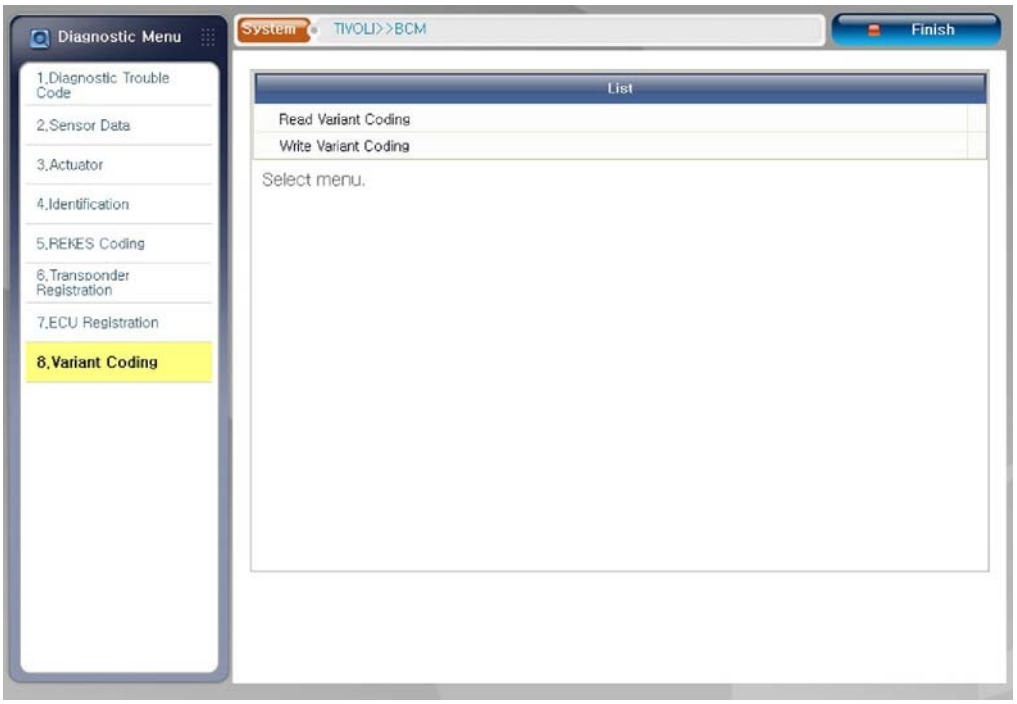
3. Select Variant coding menu and Check variant coding.



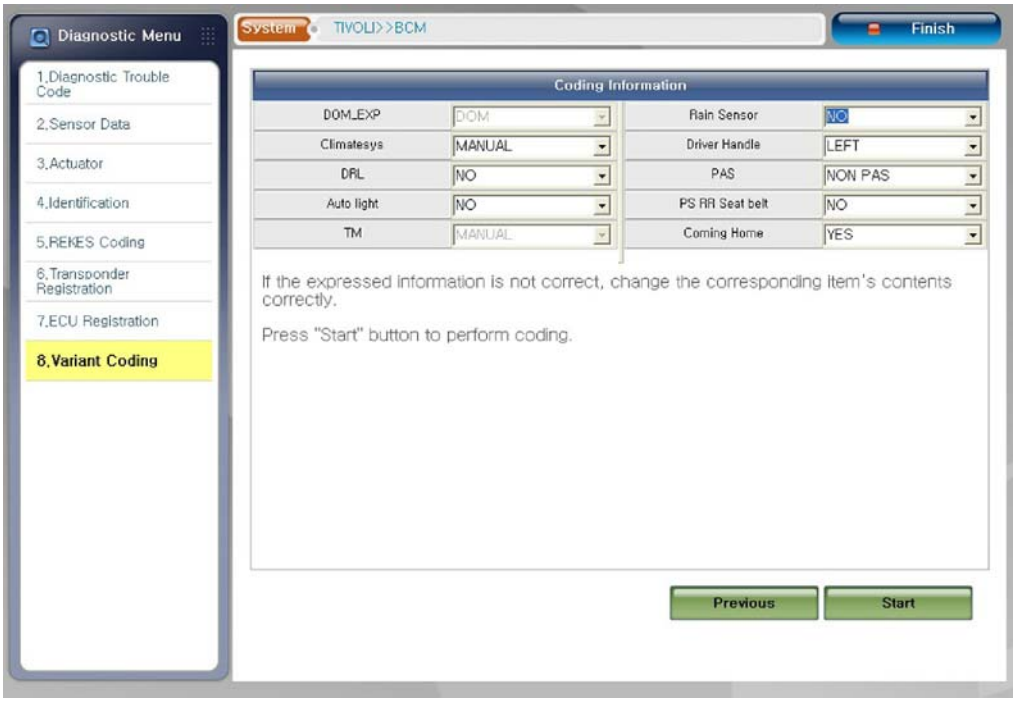
4. Check the variant coding and press OK button if there is nothing to change.



5. If something is to be changed, select Change variant coding on the start-up screen of variant coding.

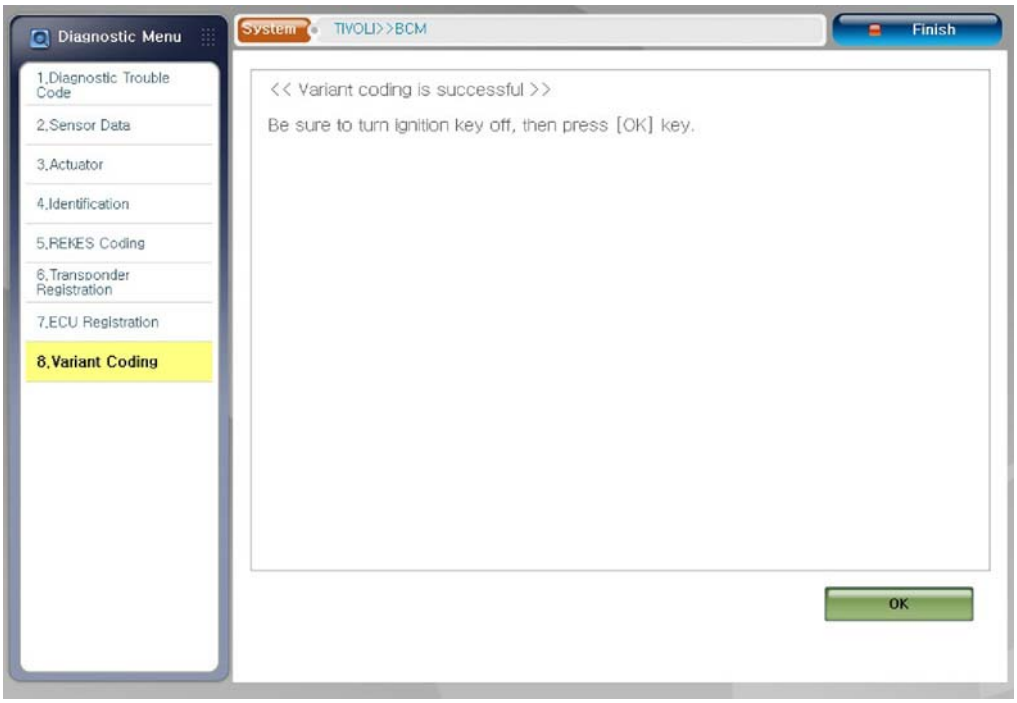


6. Change the variant coding item and press Start button.

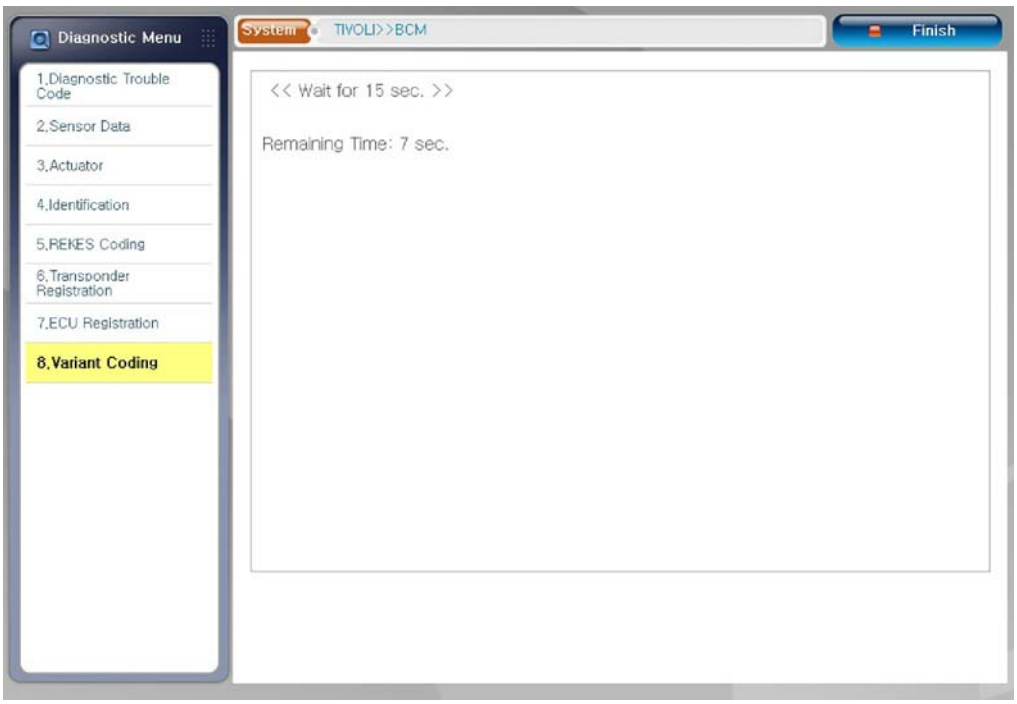


Modification basis	
Application basis	
Affected VIN	

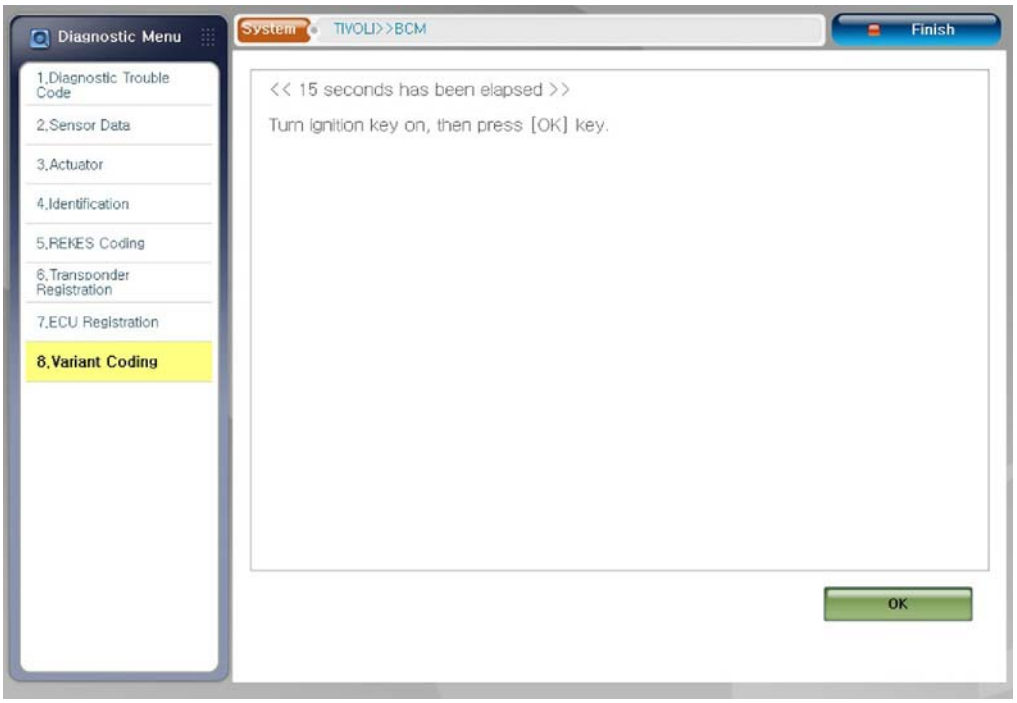
7. When the variant coding succeeds, turn the ignition OFF and then click OK button.



8. Wait for 15 seconds.



9. Turn the ignition on and press OK button.



Modification basis	
Application basis	
Affected VIN	