

LAMP**8310-00****GENERAL INFORMATION****1. SPECIFICATIONS****1) Exterior Lamp**

Lamp			Type	Specification	Quantity
Headlamp	High beam		Bulb	H1 55W	1 EA × 2
	Low beam		Bulb	H7 55 W	1 EA × 2
			HID	D5S 25W	1 EA × 2
	Tail lamp/DRL		Bulb	W5W	1 EA × 2
			LED	1 W	-
	Turn signal lamp		Bulb	PY21W	1 EA × 2
Fog lamp	Front		Bulb	H16 19W	1 EA × 2
	Rear		Bulb	P21W	1 EA
Rear combination lamp	TIVOLI	Tail lamp/Stop lamp (surface emission type)	LED	0.2 W	-
		Stop lamp	LED	0.5 W	-
		Turn signal lamp	Bulb	PY21W	1 EA × 2
		Backup lamp	Bulb	W16W	1 EA × 2
	XLV	Tail lamp/Stop lamp (surface emission type)	LED	0.2W	-
		Stop lamp	LED	0.2W	-
		Turn signal lamp	Bulb	PY21W	1 EA × 2
		Backup lamp	Bulb	W16W	1 EA × 2
Outside turn signal lamp			LED		-
Side repeater lamp			Bulb	WY5W	1 EA × 2
Rear reflex reflector			Lens	-	1 EA × 2
License plate lamp			Bulb	W5W	1 EA × 2

Modification basis	
Application basis	
Affected VIN	

LAMP

TIVOLI/XLV 2016.09

FUSE

BCM

SKM

FCM

INSTRUMENT

SWITCH

LAMP

WIPER AND

AVN

MP3 AUDIO

LCD AUDIO

ISG SYSTEM

AC INVERTE

Lamp			Type	Specification	Quantity
High-mounted stop lamp	TIVOLI	With spoiler	LED	0.2W	-
		Without spoiler	LED	0.5W	-
	XLV	With spoiler	LED	0.2W	-
		Without spoiler	LED	0.2W	-

2) Interior Lamp

Lamp		Type	Specification	Quantity
Front room lamp		Bulb	10 W	1 EA × 2
Center room lamp		Bulb	10 W	1 EA × 1
Sun visor lamp		Bulb	5 W	1 EA × 2
Glove box lamp		Bulb	5 W	1 EA × 1
Luggage compartment lamp	TIVOLI	Bulb	5W	1EA X 1
	XLV	Bulb	8W	1EA X 1
Front door courtesy lamp		Lens	-	1 EA × 2
		Bulb	5 W	1 EA × 2
Door mood lamp		LED	0.5 W	-
IP center lower mood lamp		LED	0.5 W	-

2. AUTO LIGHT SENSOR SPECIFICATIONS

Item	Specifications
Operating voltage	9 to 16 V
Rated load	Max. 200 mA (relay load)
Operating temperature	-30°C to +85°C
Mounting location	Top center of inner side of windshield glass



NOTE

► LED

- The LED stands for "Light Emitting Diode" or "Luminescent Diode." LED is a semiconductor diode that emits incoherent narrow-spectrum light when electrically biased in the forward direction of the p-n junction, as in the common LED circuit. In short, it is an element that converts electric signals into light signals. Yellow, blue, red and white LEDs are currently available. The followings are the features of LED.
- It is not glaring and doesn't have short circuit unlike the conventional lamps. It is semi-permanent and doesn't generate heat. Its power consumption is much lower than that of conventional bulbs.

► Luminous intensity

- Luminous intensity is an expression of the amount of light power emanating from a point source within a solid angle of one steradian. That is, this indicates an amount of light that passes through the unit area for the unit time. The SI unit of luminous intensity is candela (cd).

► Luminance

- Luminance describes the amount of light that passes through, is reflected, or emitted from a particular area, and falls within a given solid angle. It is measured in stilb (sb) or nit (nt).

► Illuminance (luminous intensity)

- This indicates the amount of light reaching a given area. Measuring unit is lux (lx) and it is not directly proportional to the brightness of the area as the reflection rate is not included.

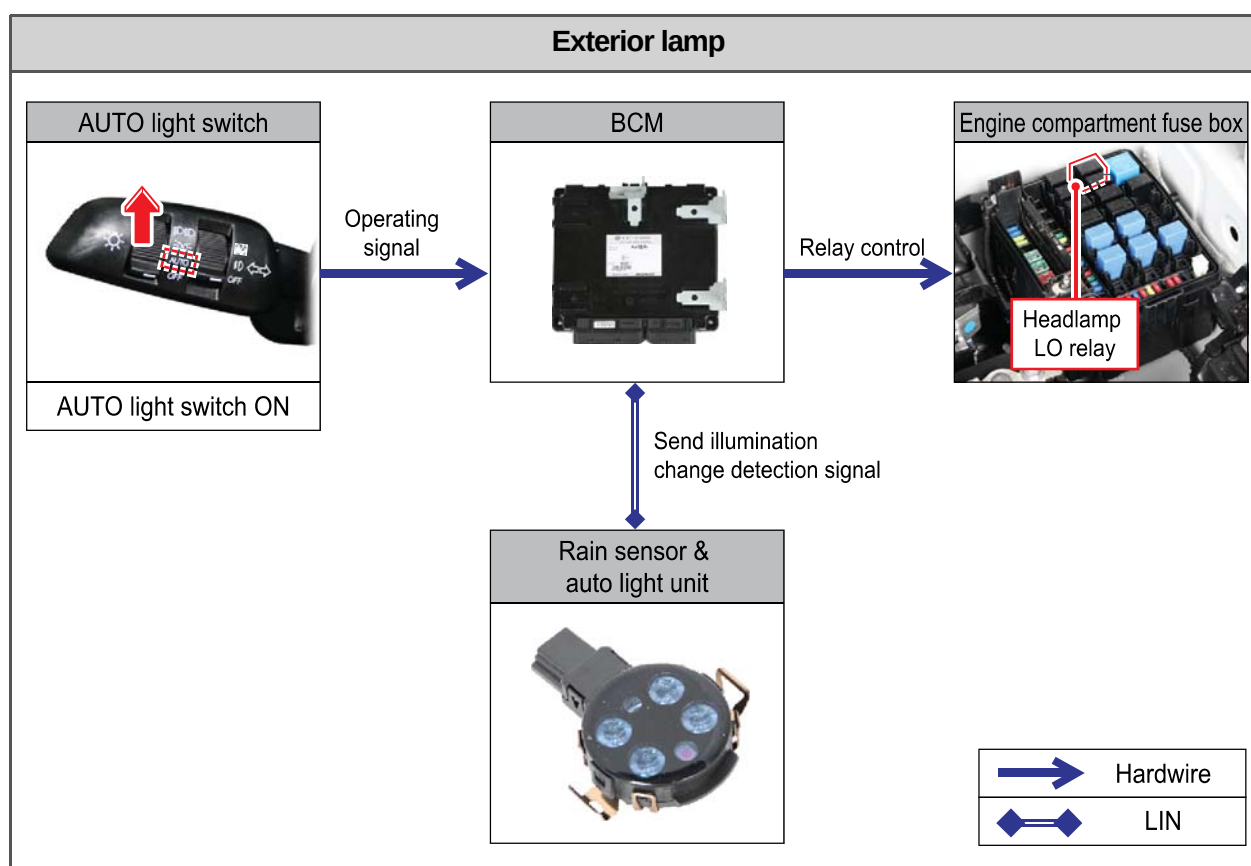
Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATING PROCESS

1. OVERVIEW

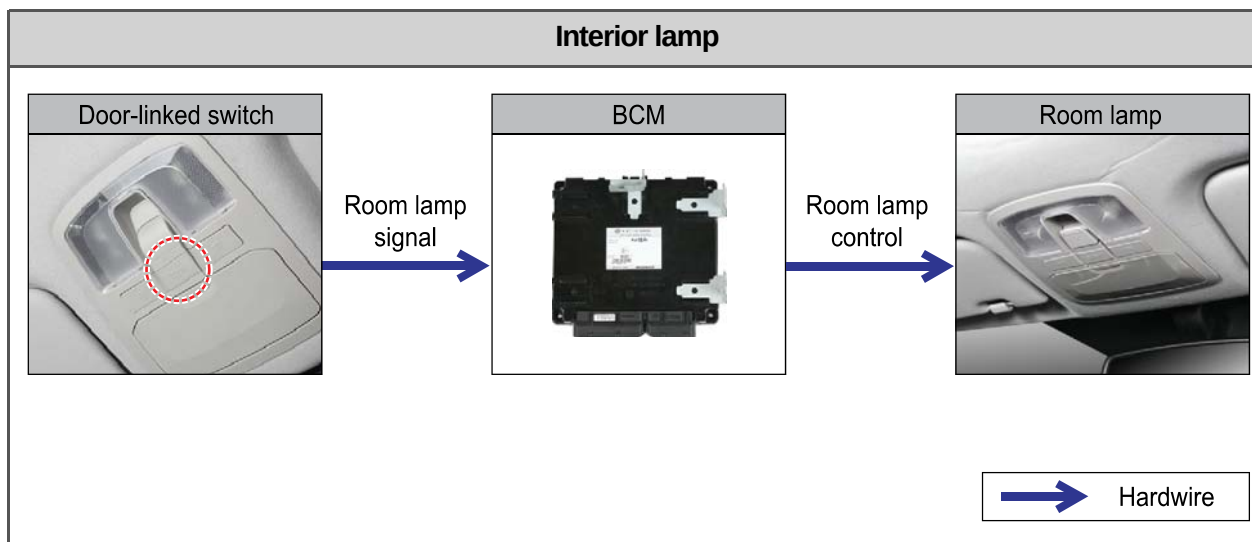
1) Exterior Lamp

The exterior lamps consist of multifunction light switch, headlamps, rear combination lamps, AUTO light sensor, fog lamps, side repeater lamps, license plate lamps, reflex reflector, and high mounted stop lamp, etc. The BCM controls the various lamps including the headlamps, tail lamps, AUTO lights, fog lamps by using the operation signals from the multifunction turn signal lamp switch. The AUTO light control system is to turn on or off the tail lamps and headlamps automatically. The AUTO light sensor unit for the system is installed behind the ECM mirror on the top center of the windshield glass. This sensor unit detects the ambient brightness and automatically turns on or off the tail lamps and headlamps when the multifunction turn signal lamp switch is move to the AUTO position.



2) Interior Lamp

The interior lamps include 2 front room lamps, a center room lamp, a glove box lamp, 2 sun visor lamps, a luggage room lamp, 2 door courtesy lamps (front door), 2 door mood lamps (front door), an IP center lower mood lamp. The BCM controls the lamps according to the signals with the front room lamp coupled switch in door coupled operation side.

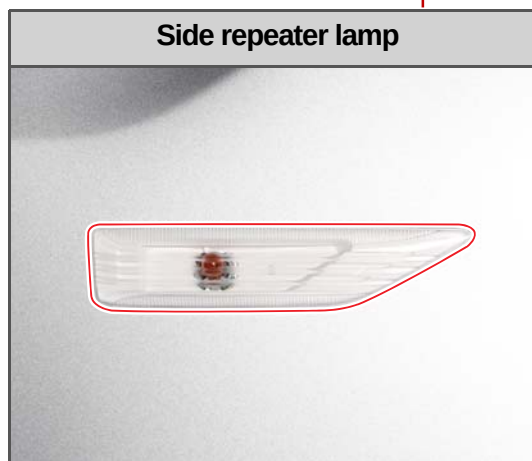
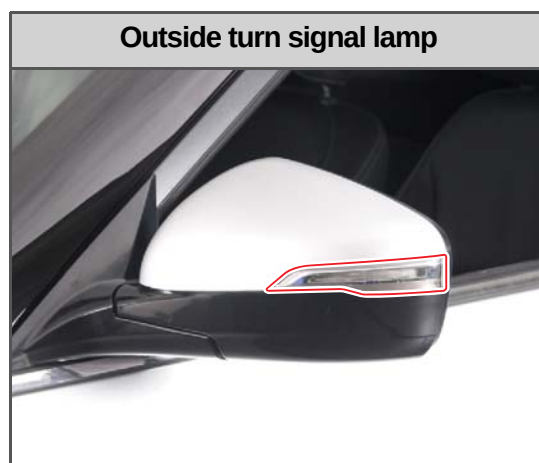


Modification basis	
Application basis	
Affected VIN	

2. COMPONENTS

1) Exterior Lamp

► Front / Side

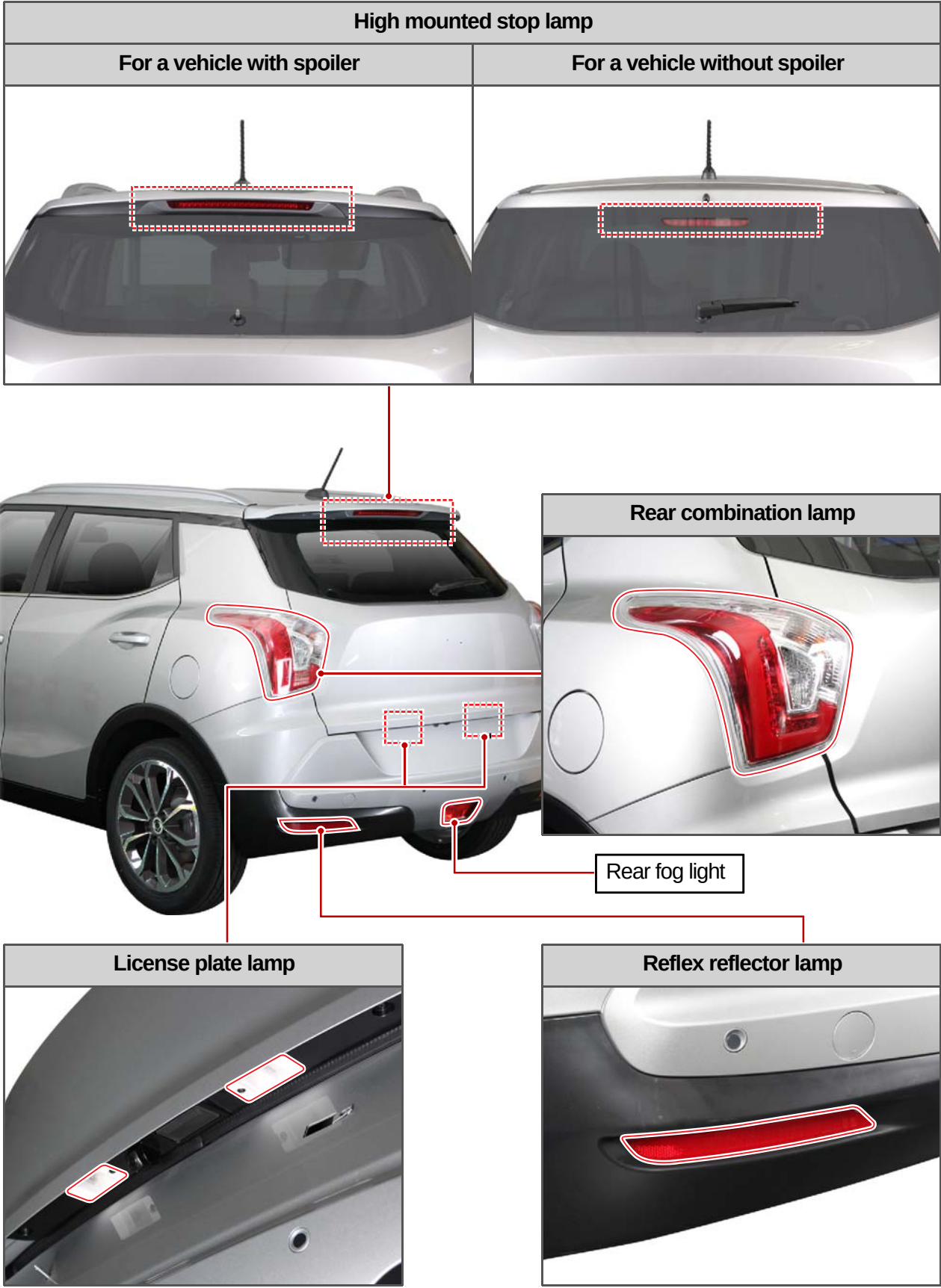


LAMP

TIVOLI/XLV 2016.09

Modification basis	
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► Rear (TIVOLI)



FUSE

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INSTRUMENT

SWITCH

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AC INVERTE

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Application basis	
Affected VIN	

LAMP

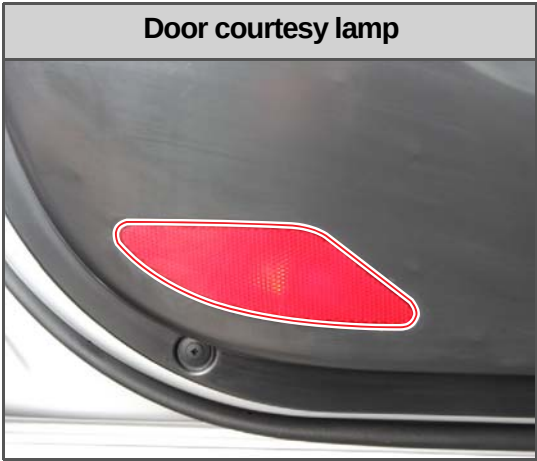
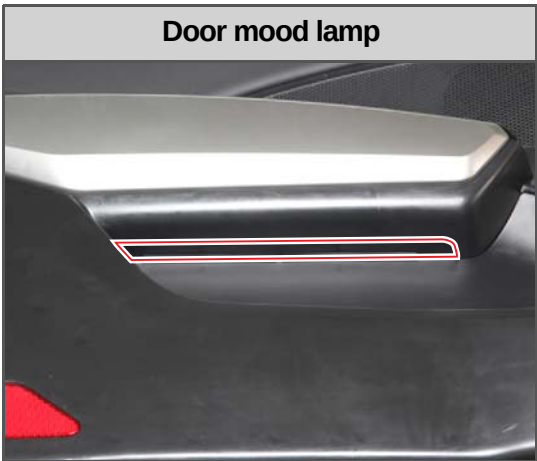
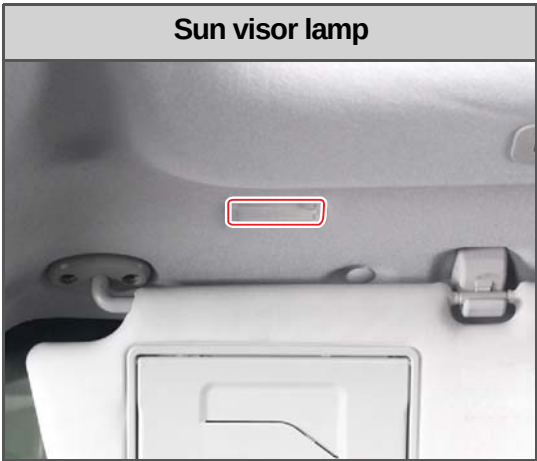
TIVOLI/XLV 2016.09

► Rear side (XLV)

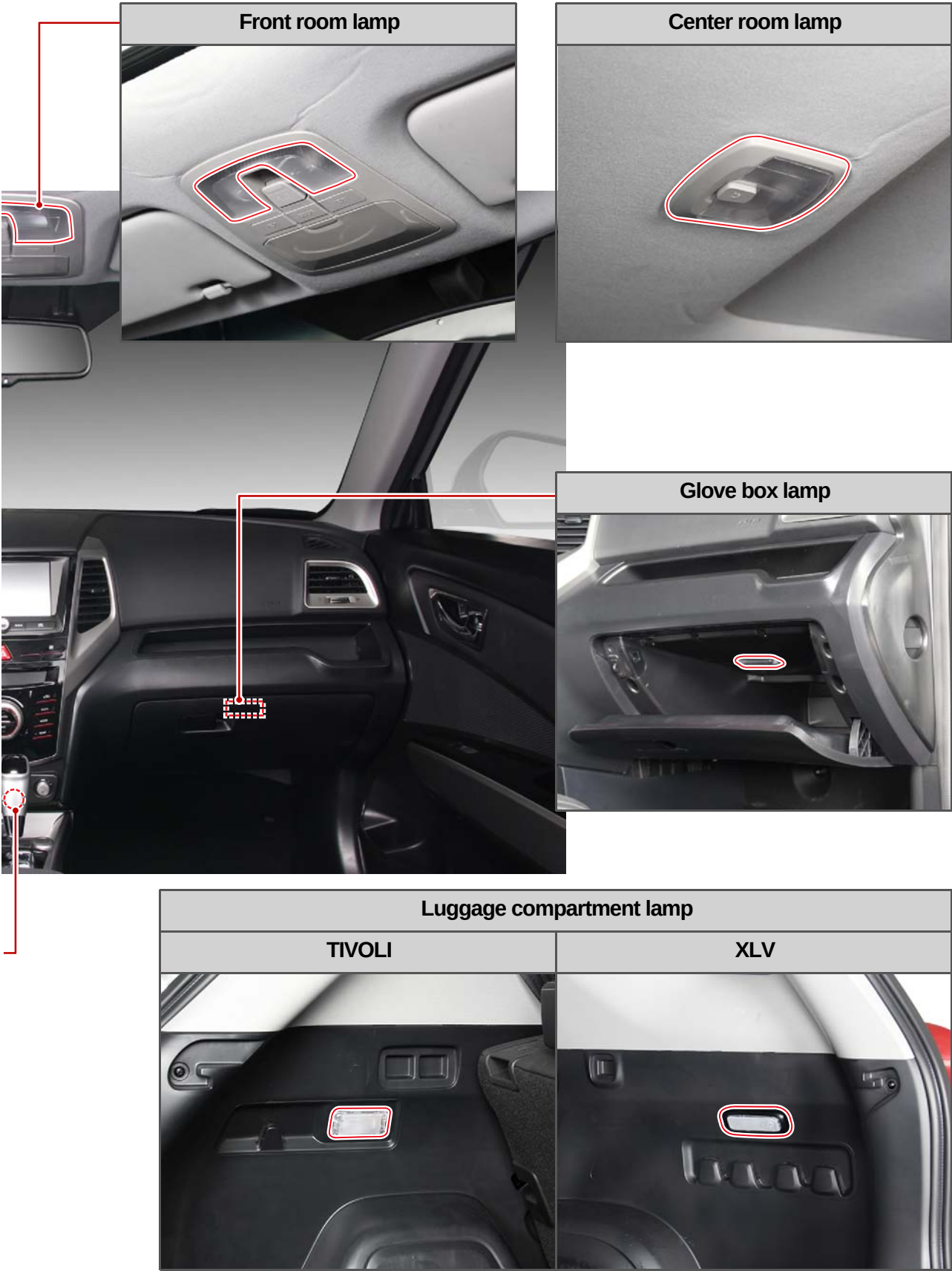


Modification basis	
Application basis	
Affected VIN	

2) Interior Lamp



Modification basis	
Application basis	
Affected VIN	

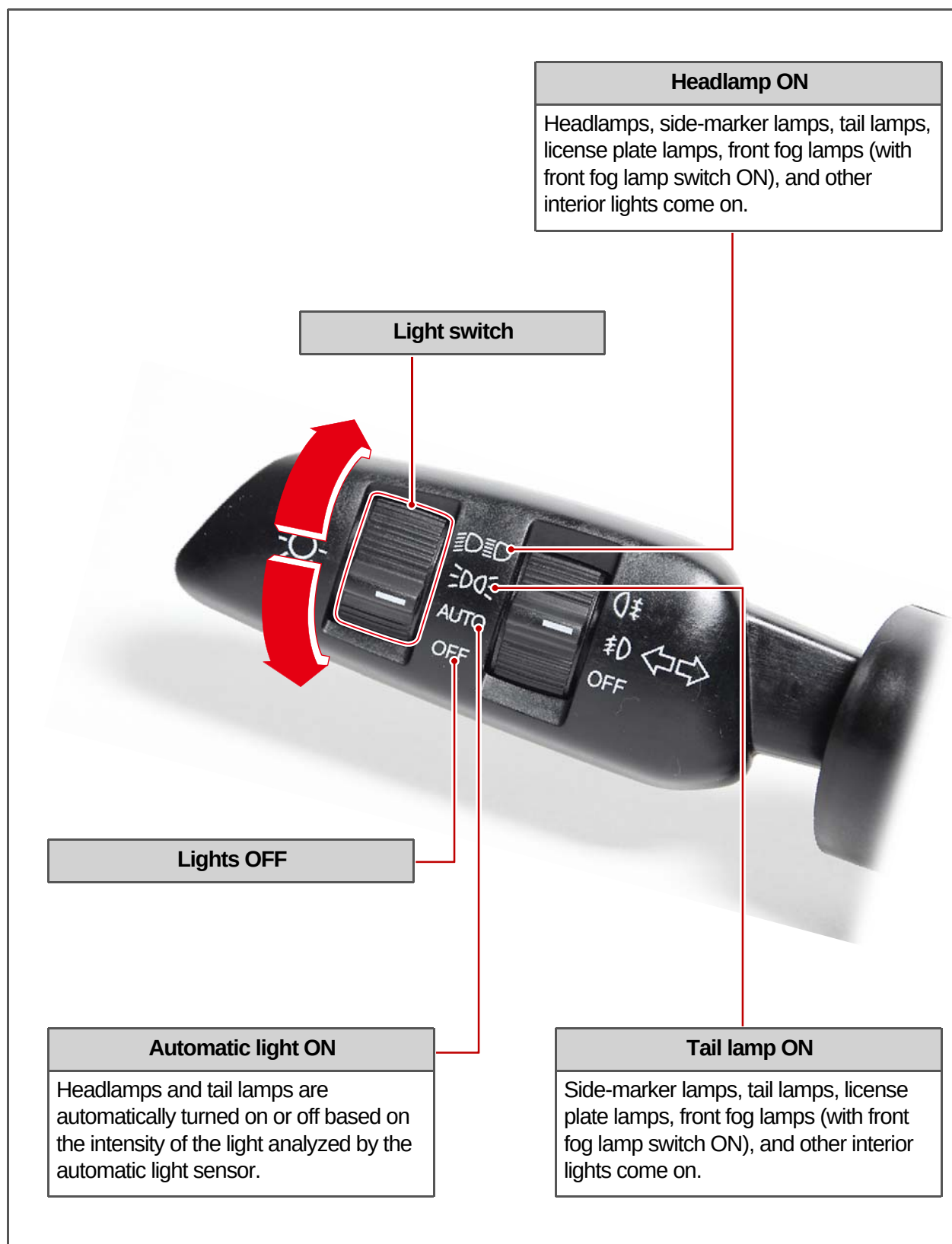


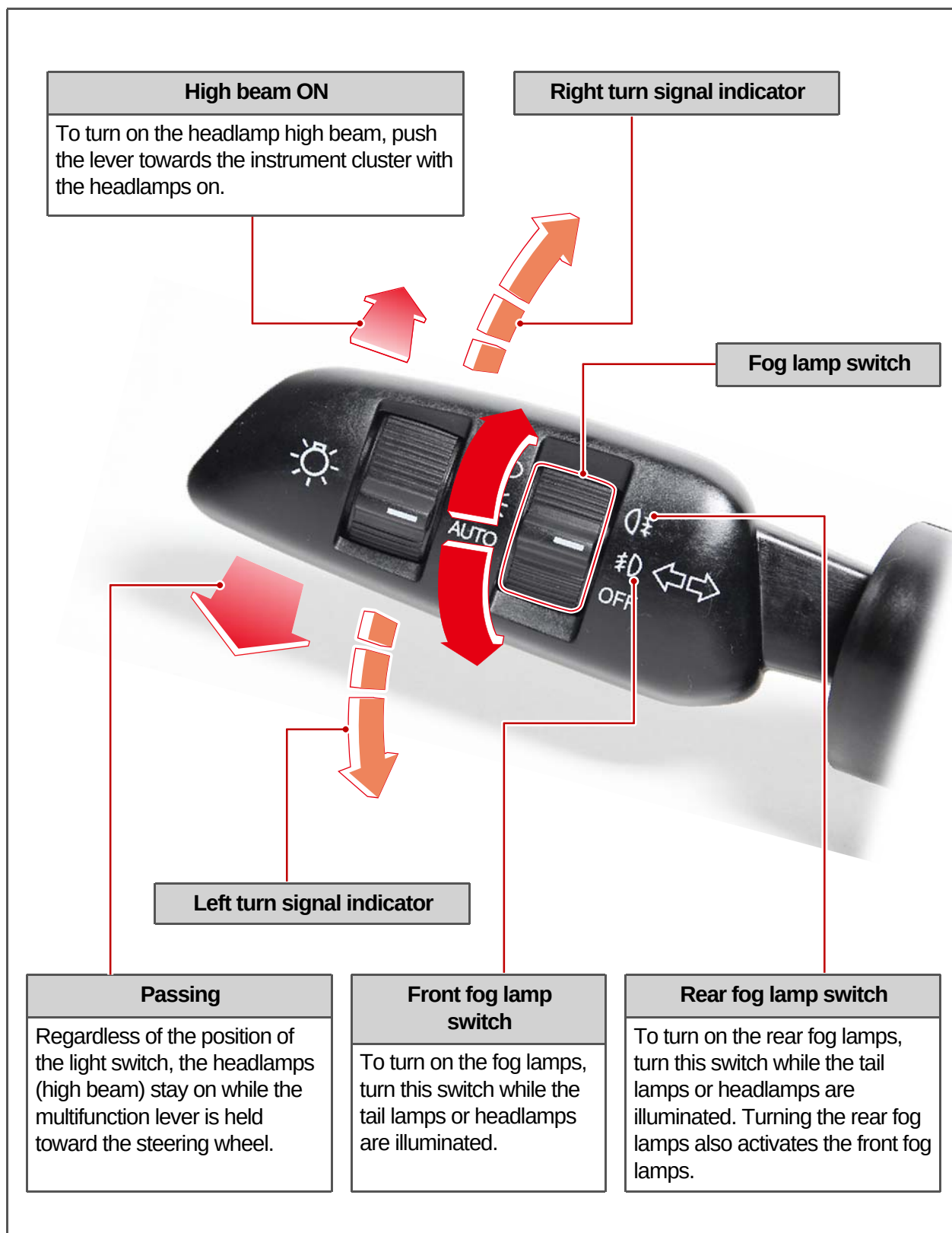
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3. OPERATING PROCESS

1) Multifunction Turn Signal Lamp Switch





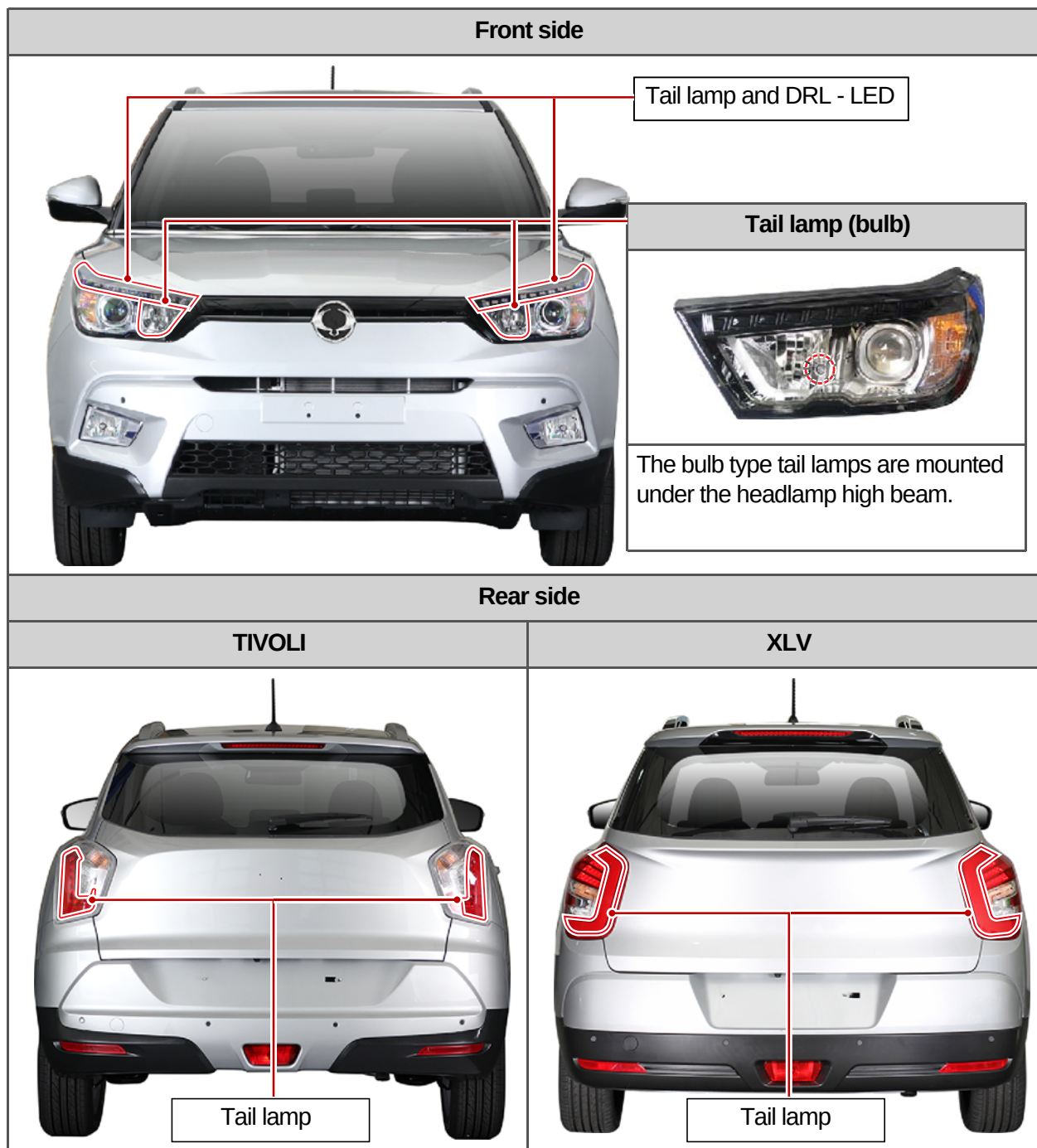
Modification basis	
Application basis	
Affected VIN	

2) Exterior Lamp

(1) Tail lamp

The tail lamp relay is operated by the BCM when the BCM receives a signal from the multifunction switch. For a vehicle with DRL, the BCM activates the tail lamp relay and DRL relay at the same time when the ignition is turned on.

The DRLs go off and the tail lamps stay on when the tail lamp switch signal from the multifunction switch is input to the BCM with the ignition ON.



► Tail lamp ON warning

Operation 1.

A. The driver door is opened with the tail lamp switch ON and ACC or IGN OFF (ignition key removed).
The BCM outputs the tail lamp ON warning signal for 10 seconds (T2).

B.

Operation 2.

C. The tail lamp switch is turned OFF or the driver door is closed while the tail lamp ON warning is activated.

D. The tail lamp ON warning output is stopped immediately.

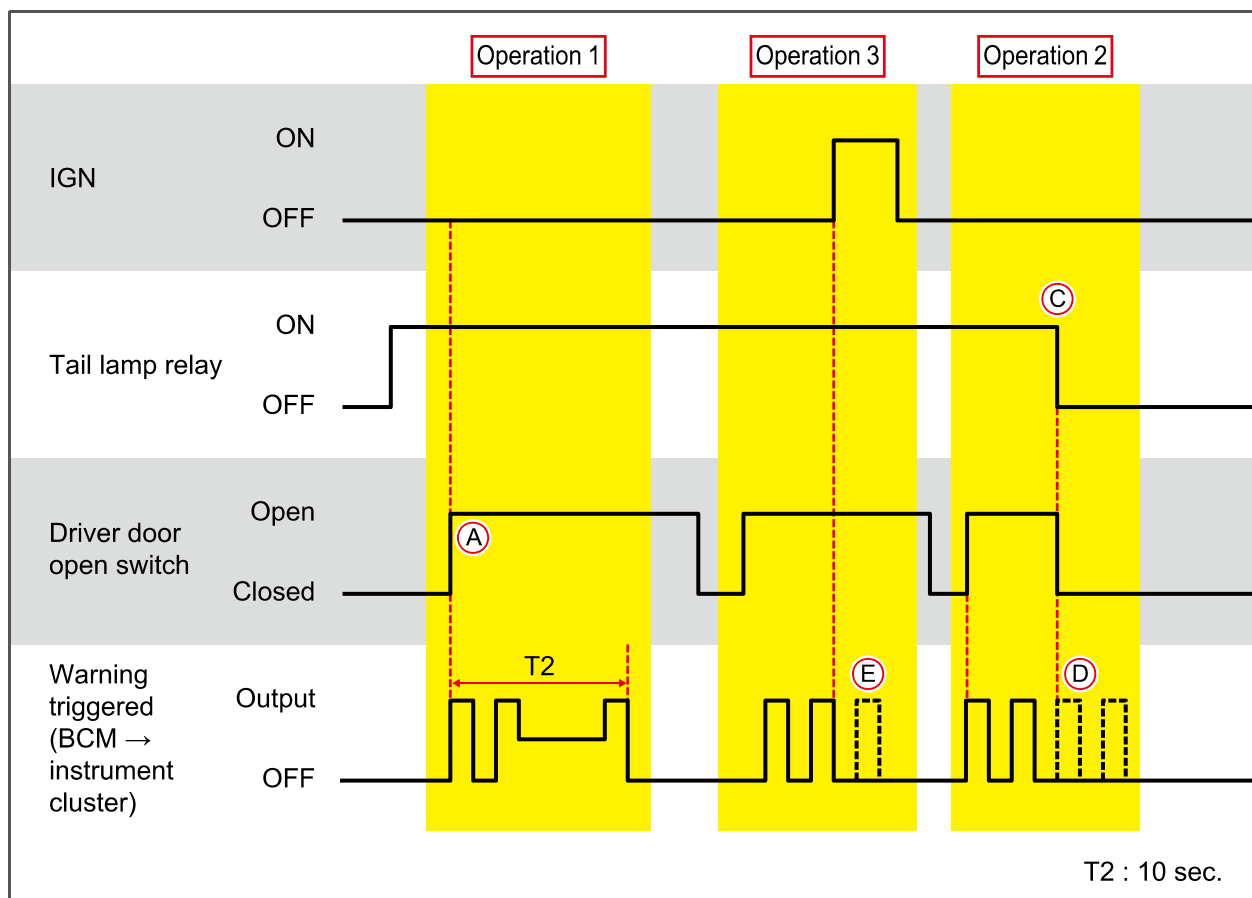
Operation 3.

E. The tail lamp ON warning is not activated when the ignition is ON.

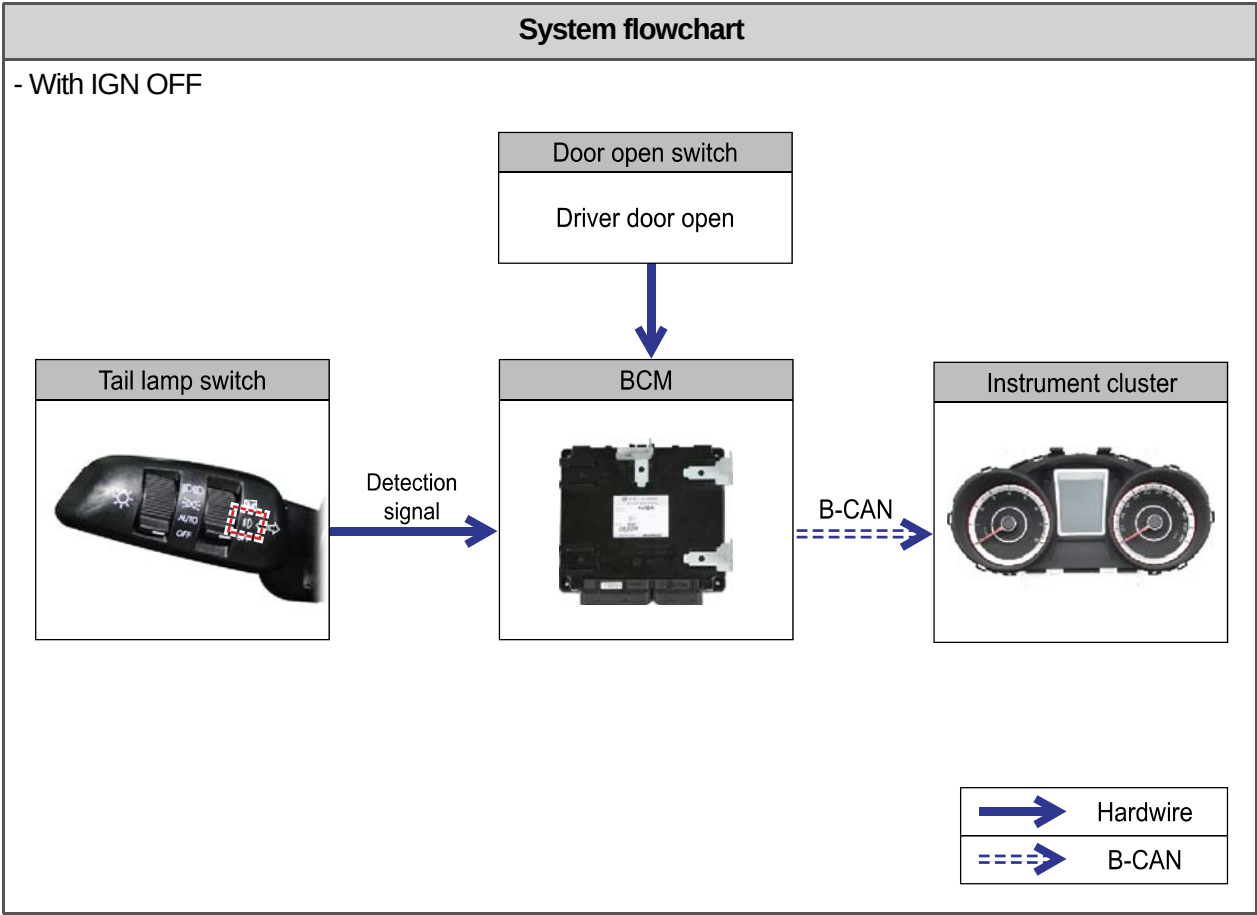


NOTE

When the tail lamp switch is operated (OFF → ON) during the tail lamp ON warning, the tail lamp ON warning is not activated again.



Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	

► Tail lamp automatic OFF

Operation 1.

A. The tail lamp relay and interior tail lamp relay are turned ON or OFF according to the operation of the tail lamp switch (ON/OFF).

Operation 2.

B. The ignition is turned OFF or the ignition key is turned to ACC ON (ignition key removed) when the tail lamp switch is in ON position and the ignition is ON.

C. The tail lamp relay and interior tail lamp relay are turned off when the driver's door is closed. (with the tail lamp switch ON)

Operation 3.

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

Operation 4.

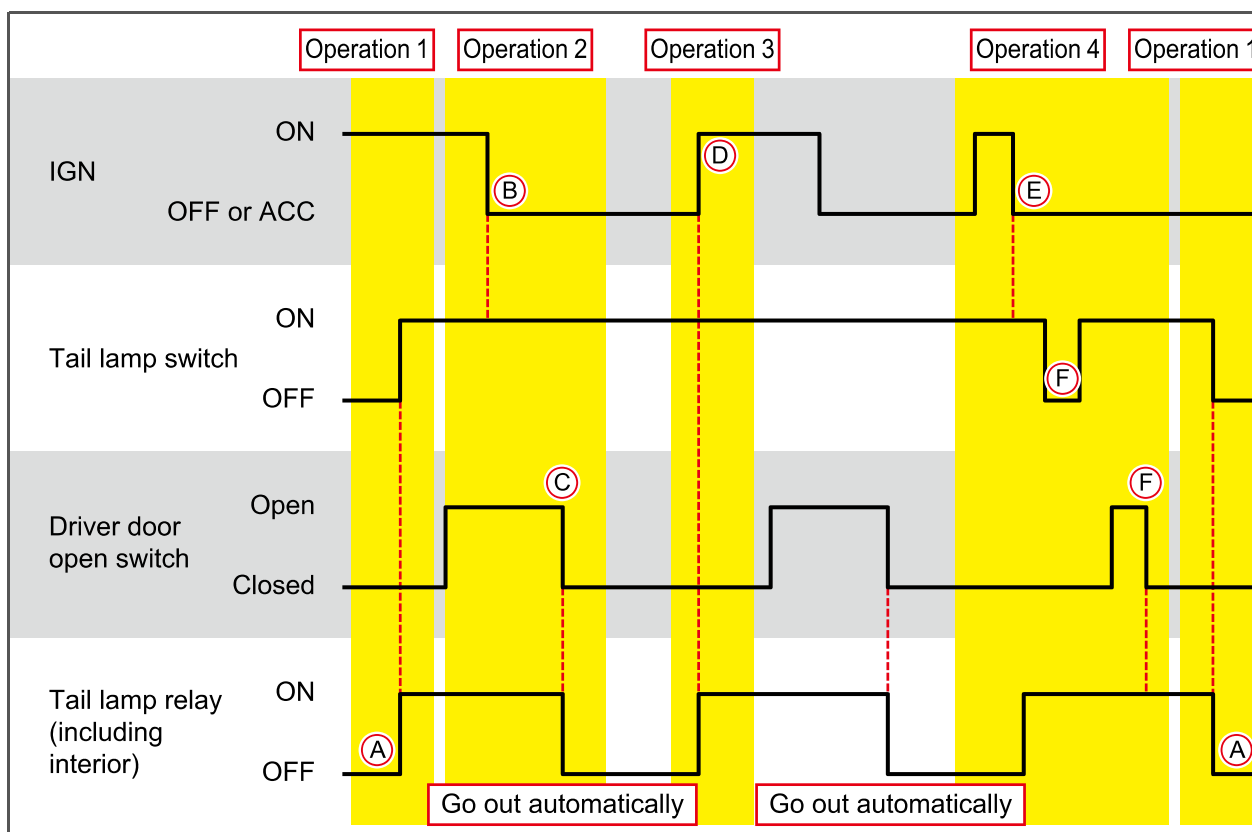
E. The ignition is turned OFF or the ACC is turned ON (ignition key removed).

F. When the tail lamp switch is operated (OFF → ON), the tail lamp automatic off is not activated. (with the tail lamp switch ON)



NOTE

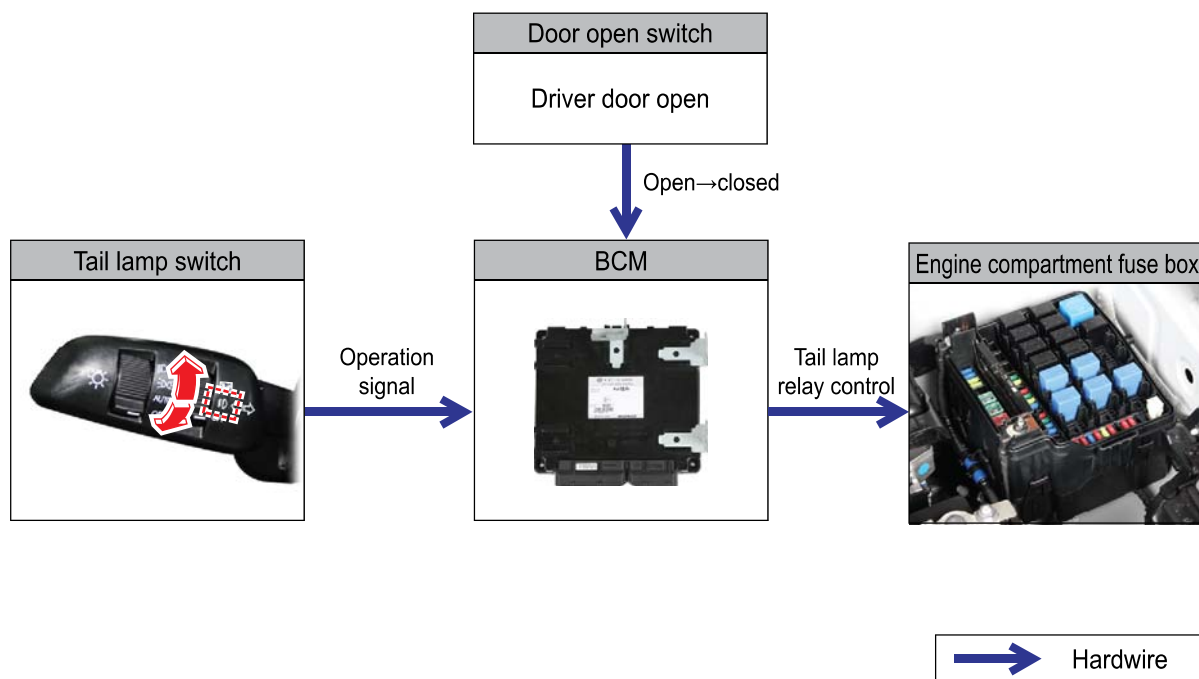
To reset, turn the ignition to ON position (ignition key inserted)



Modification basis	
Application basis	
Affected VIN	

System flowchart

- With IGN OFF



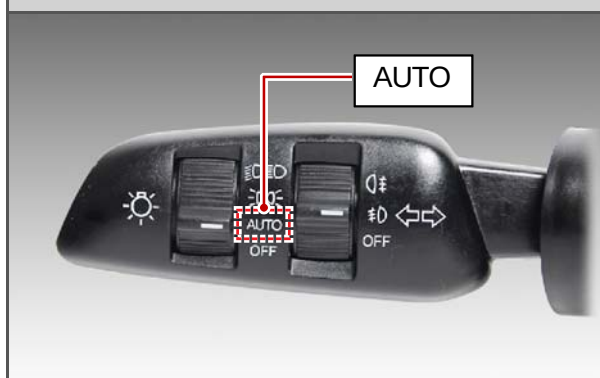
(3) AUTO light

The AUTO light control system is to turn on or off tail lamps and headlamps automatically. It is installed behind the ECM mirror in top center of the windshield glass. This sensor unit detects the ambient brightness and automatically turns on and off the tail lamps and headlamps while the multifunction light switch is in the AUTO position. The system turns on the lamps when passing through the tunnel during day driving and getting dark due to fog, rain or snow.

When the AUTO light is activated, the lights such as instrument cluster, FACT and AV screen which illuminate at daytime are dimmed when the ambient illumination becomes 200 lux or below.



Multifunction light switch



AUTO light and rain sensor module

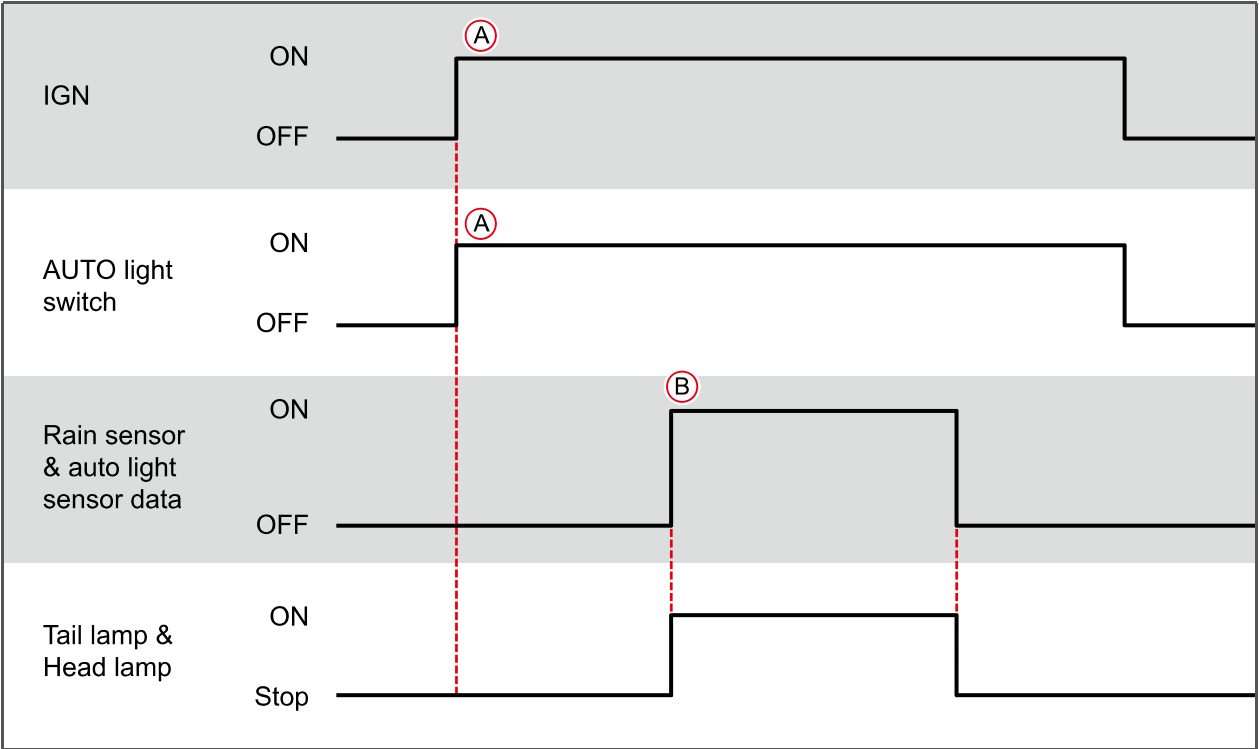


Modification basis	
Application basis	
Affected VIN	

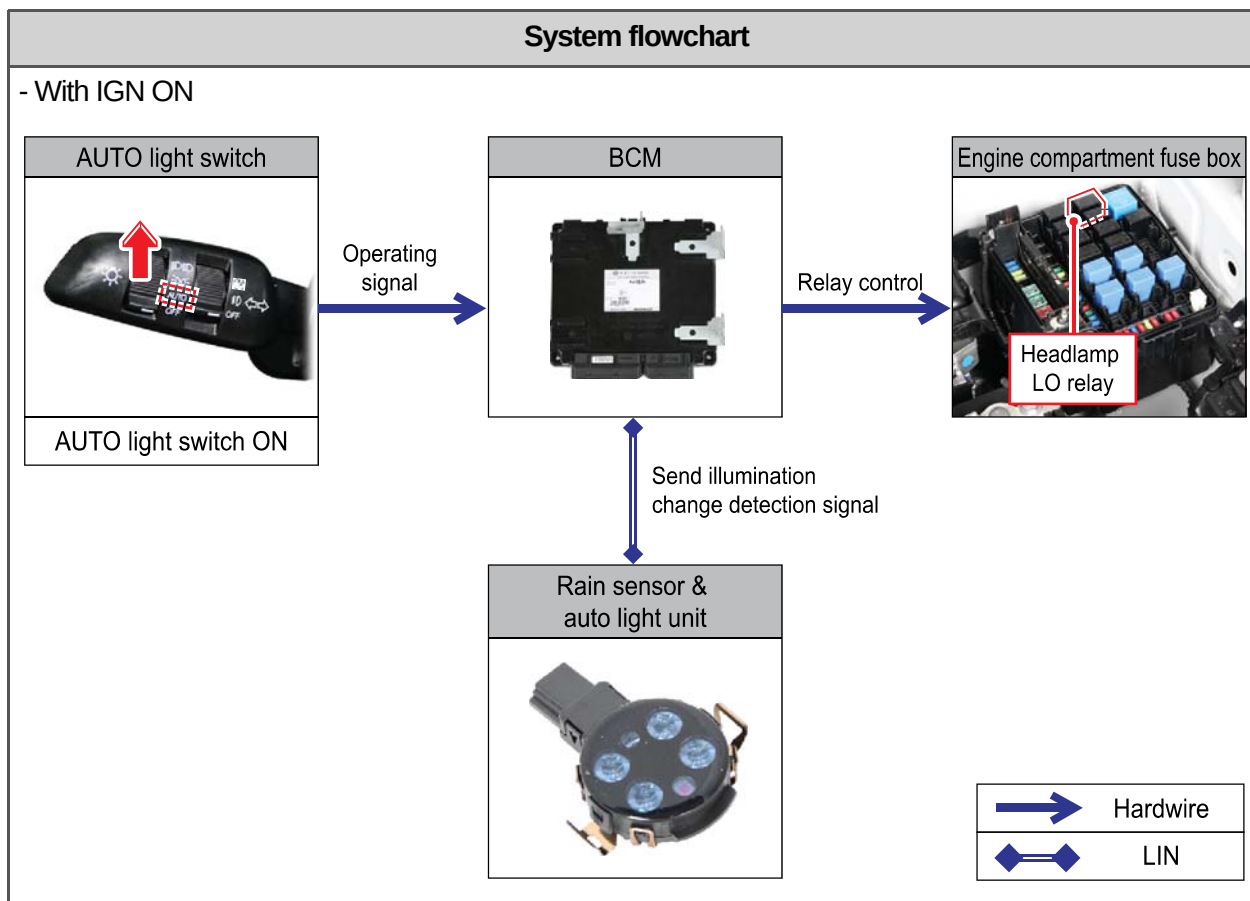
► Auto light control

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.



Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	

(4) Fog lamp

The fog lamps are operated by the fog lamp switch only when the tail lamps are operating.
Turning on the rear fog lamps also activates the front fog lamps.
The front and rear fog lamps go off when turning the ignition switch or tail lamp switch to the OFF position.
For a vehicle with DRL, the BCM activates the tail lamp relay and DRL relay at the same time when the ignition is turned on.
The DRLs go off and the tail lamps with fog lamps stay on when the tail lamp switch signal from the multifunction switch is input to the BCM with the ignition ON.



Modification basis	
Application basis	
Affected VIN	

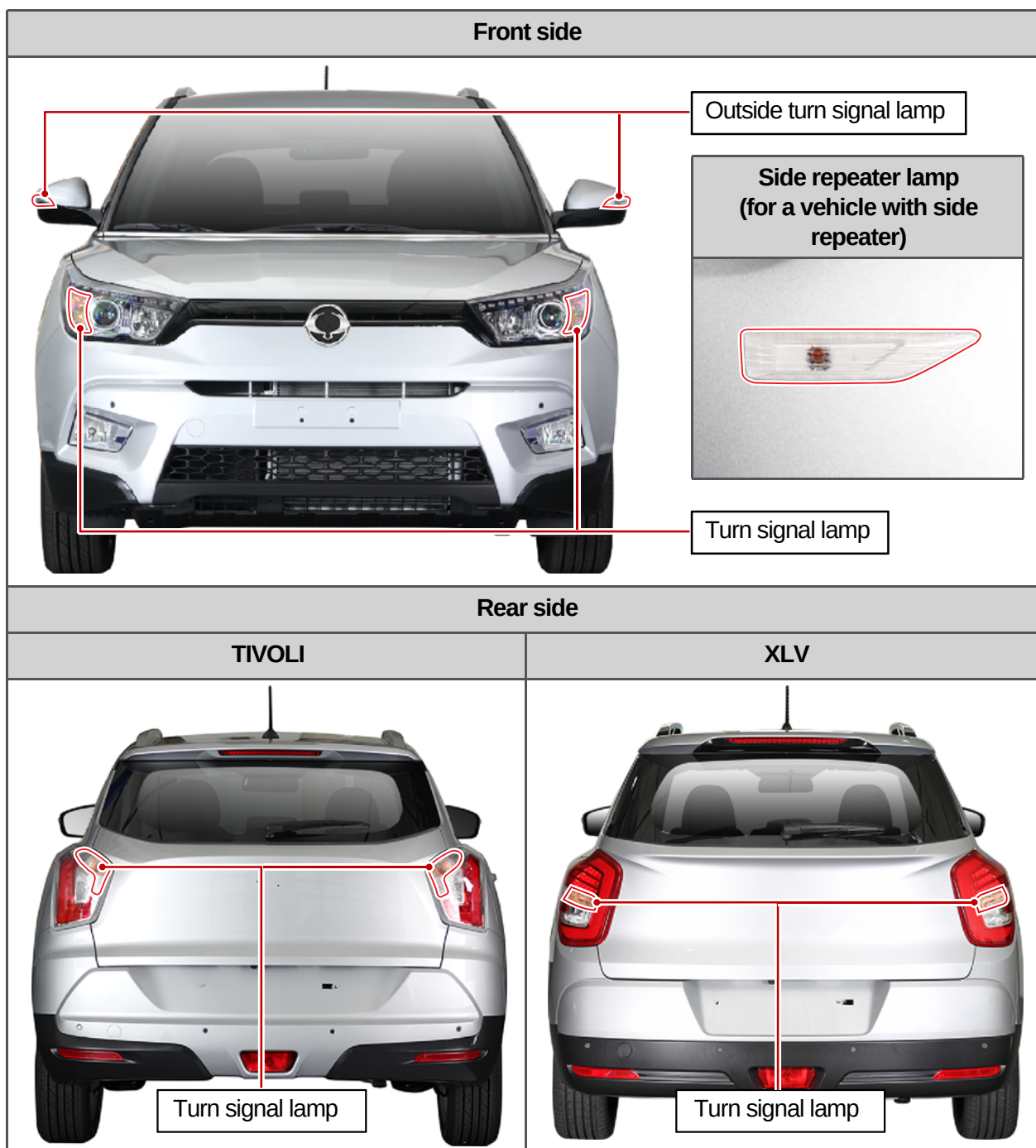
(5) Turn signal lamp and hazard warning lamp

Pushing up or down the multifunction turn signal lamp switch makes the turn signal lamp on the corresponding side flash. Pressing the hazard warning lamp switch makes the turn signal lamps flash on both sides at the same time.



NOTE

The hazard warning lamp flashes during emergency hazard warning lamp control and air bag deployment.



Modification basis	
Application basis	
Affected VIN	

► 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 is turned off, the LH (RH) turn signal lamp completes its operating cycle and goes out.

Operation 2.

- D. Abnormal current (less than 3 A or more than 7 A) detection signal is input during Operation 1.
- E. The 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.

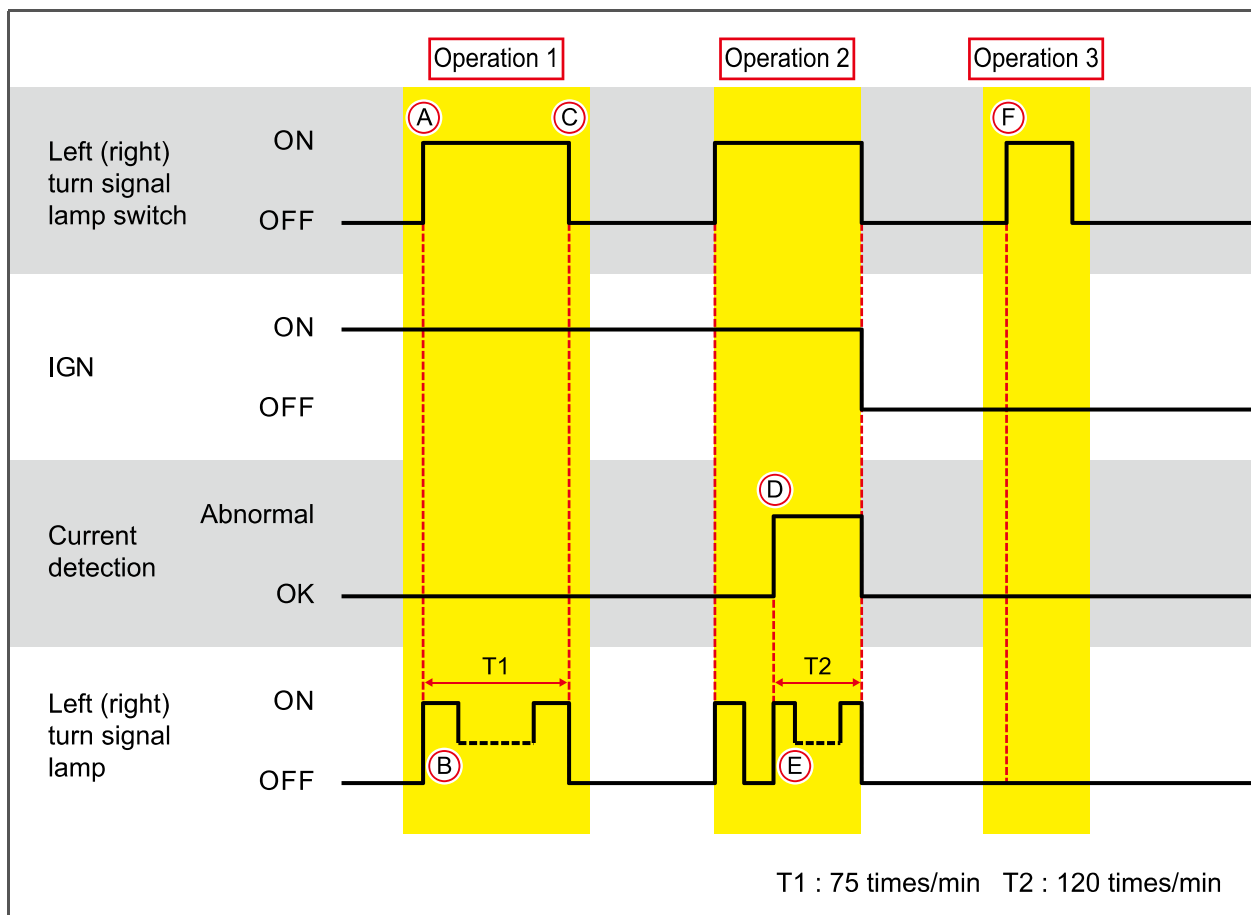
- F. The LH (RH) turn signal lamp is activated only with IGN ON.

**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	



Modification basis	
Application basis	
Affected VIN	

► Hazard warning lamp switch control

Operation 1.

- A. 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 the hazard warning lamp switch is turned off, the hazard warning lamp completes its operating cycle and goes out.

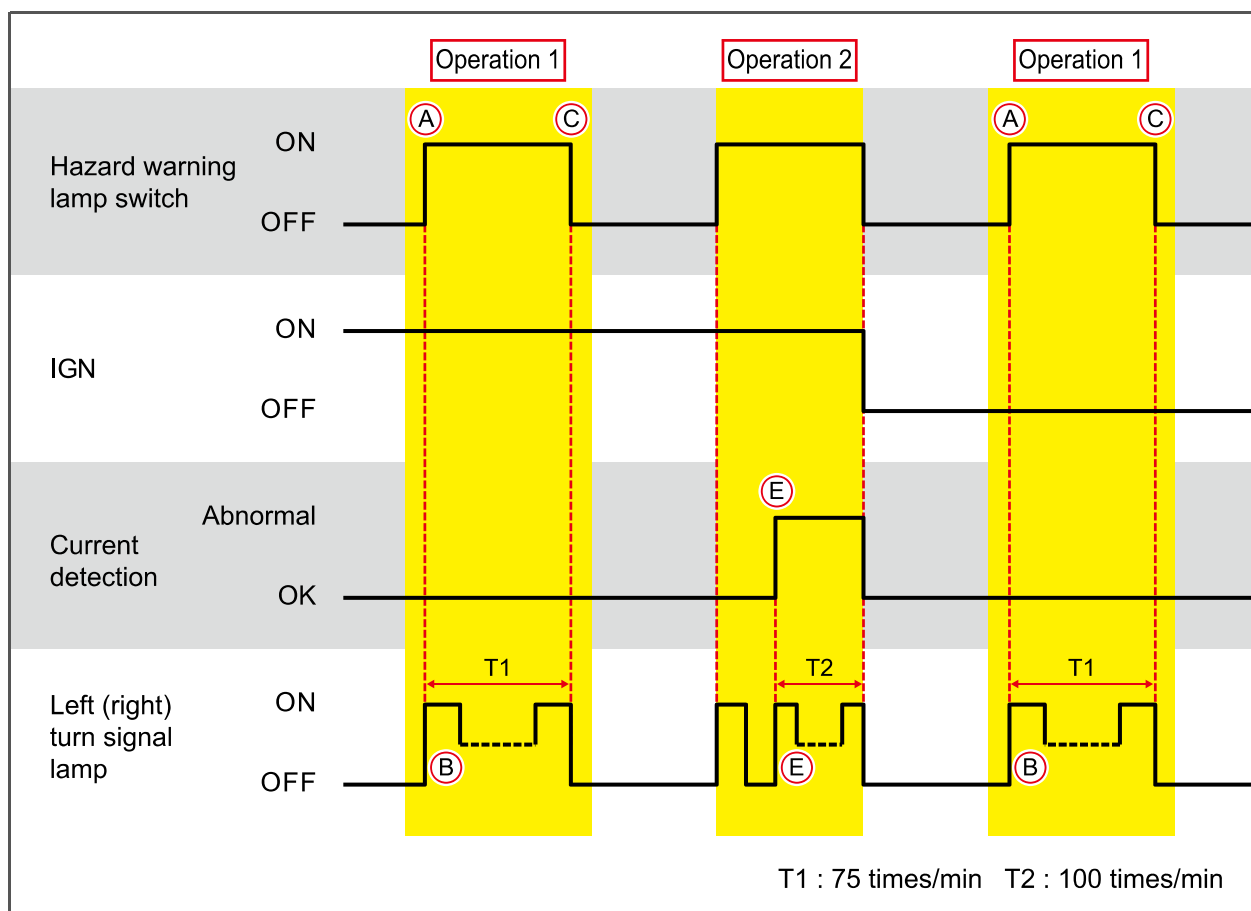
Operation 2.

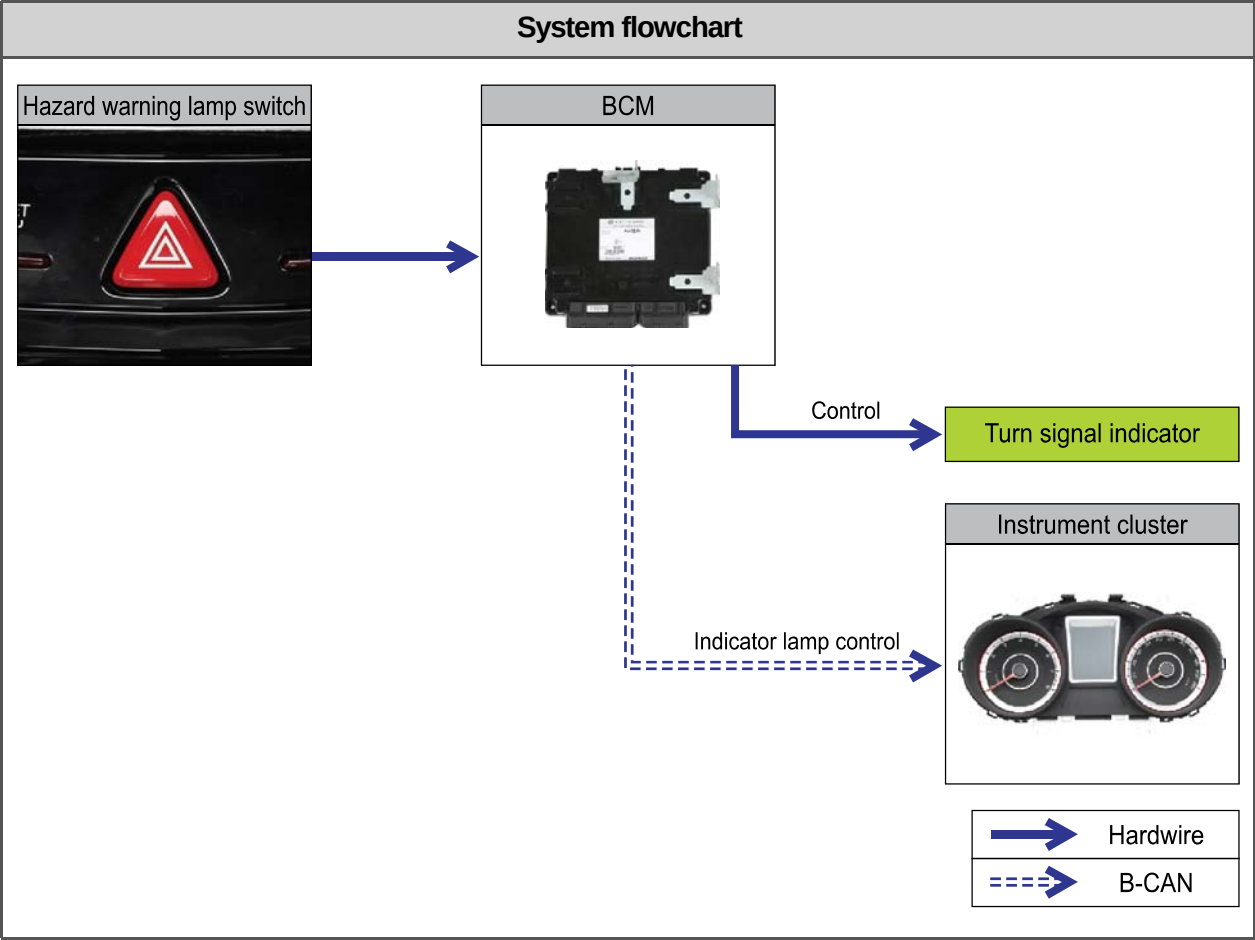
- D. Abnormal current (less than 3 A or more than 7 A) detection signal is input during Operation 1.
- E. The hazard warning lamp flashes 120 times per minute (T2) at a cycle of 0.25 sec. ON and 0.25 sec. OFF.



NOTE

- The 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	

► Emergency hazard warning lamp control (coupled with ESP)

The stop lamps flash rapidly and hazard warning lamp flashes for 10 seconds automatically to warn a following vehicle at the time of abrupt braking or operating of ESP system.

Conditions for activating emergency braking signal

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

Conditions for deactivating emergency braking signal

- E. The stop lamps go out immediately when operating hazard warning lamp switch manually during operation A.
- F. The stop lamps go out immediately when emergency braking signal is no longer received.
- G. The hazard warning lamp goes out 10 seconds after completing operation C.
- H. The hazard warning lamp goes out when turning the hazard warning switch to off during operation C.
The hazard warning lamp goes out when the vehicle speed increases by more than 10 km/h (no
I. emergency braking signal received).

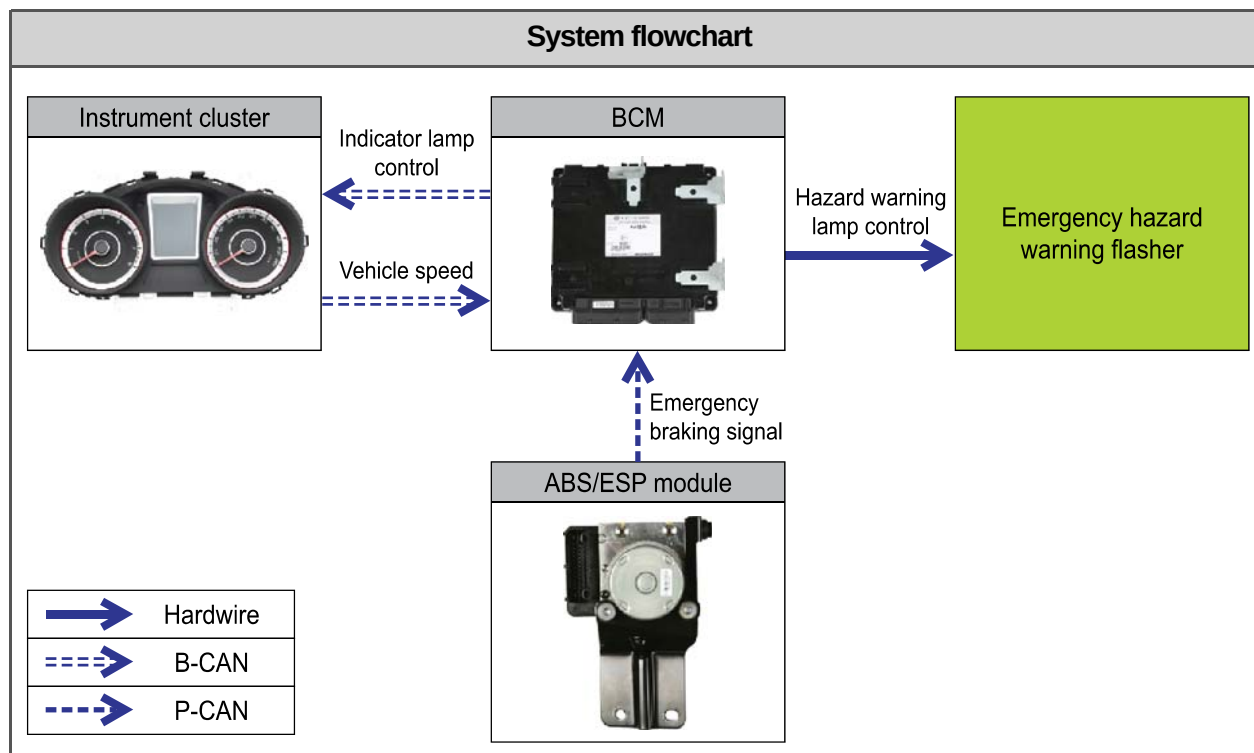
Conditions for not activating emergency braking signal

- J. If the vehicle speed is above 50 km/h when emergency braking signal is no longer received, the hazard warning lamp does not flash.
- K. The 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 lamps regardless of ignition status when brake pedal switch depressed signal is received.



Modification basis	
Application basis	
Affected VIN	

(7) Stop lamp

Depressing the brake pedal turns on the stop lamps using a signal from the stop lamp switch fitted to the brake pedal, and releasing the brake pedal turns off the lamps.

► TIVOLI

Stop lamp

High mounted stop lamp

For a vehicle with spoiler

For a vehicle without spoiler

Stop lamp

Modification basis	
Application basis	
Affected VIN	

► XLV

Stop lamp

High-mounted stop lamp

Vehicle with spoiler

Vehicle without spoiler

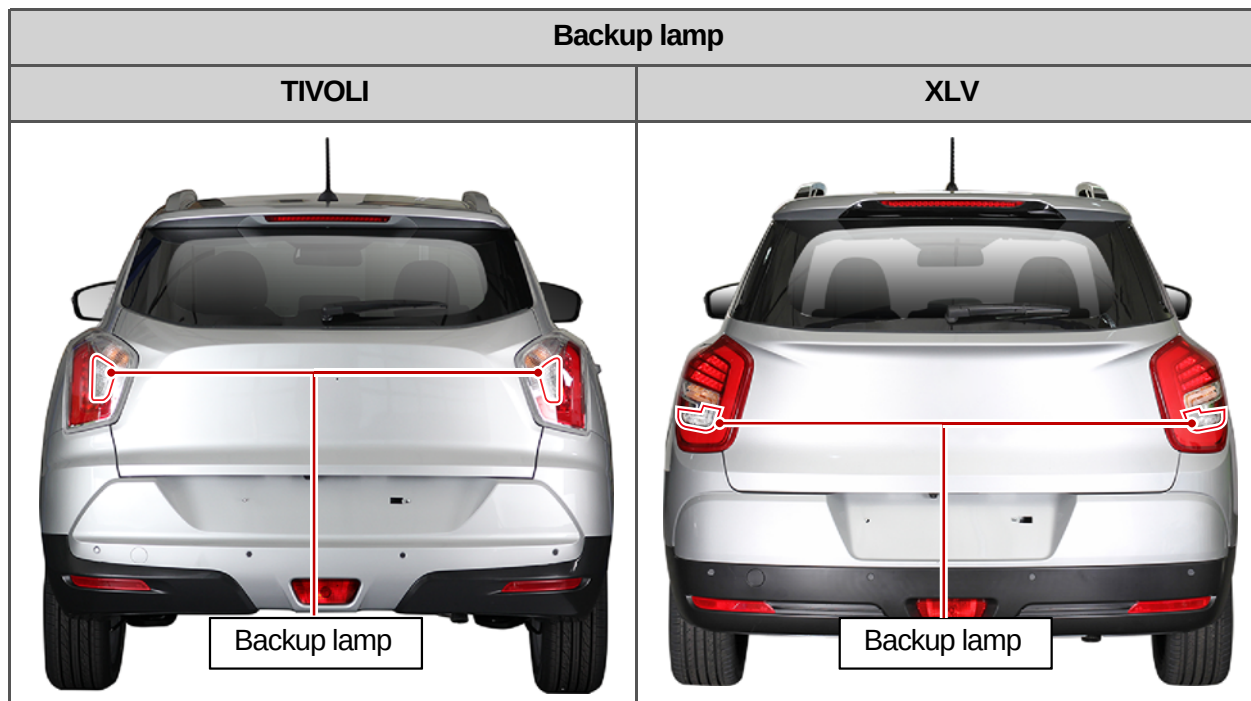
Stop lamp

FUSE
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Modification basis	
Application basis	
Affected VIN	

(8) Backup lamp

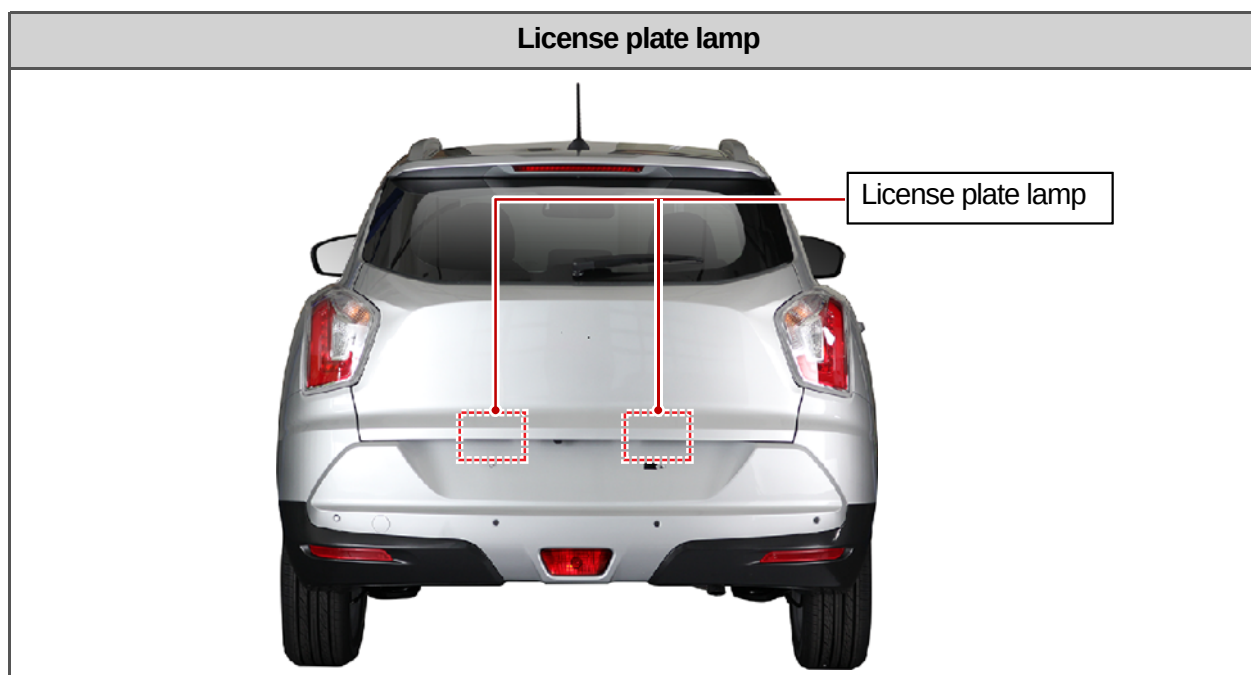
When shifting the TGS lever into the "R" position with the ignition switch ON, the backup lamps come on. If the lever is placed in other positions, the lamps go out.



(9) License plate lamp

When the tail lamps, AUTO light, high beam and low beam come on or go out by the signals from the multifunction switch, the license plate lamps also come on or go out.

For a vehicle with DRL, the BCM activates the tail lamp relay when the ignition is turned on.



2) Interior Lamp

(1) Front room lamp and center room lamp

- When the room lamp switch is in the door coupled position and any of the driver/passenger/ rear (LH & RH) doors is opened, 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.



Modification basis	
Application basis	
Affected VIN	

► 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 fades out over 3 seconds (T2) and goes off.

- When the ignition is turned ON while the room lamp is fading out, the lamp goes out immediately.

Operation 3.

D. When the UNLOCK signal by the smart key (REKES key) is received with IGN OFF (ignition key

E. removed) and all doors closed, the room lamp remains ON for 30 seconds (T3).

When the UNLOCK signal is received again while the room lamp is ON, the lamp remains ON for another 30 seconds.

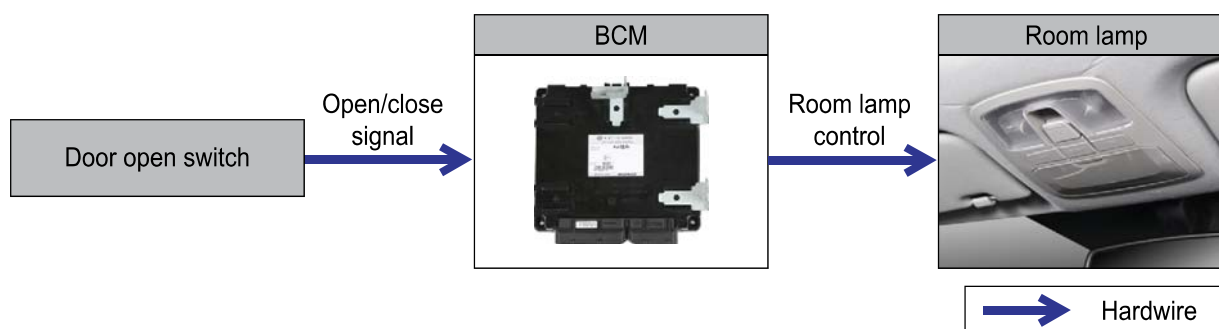


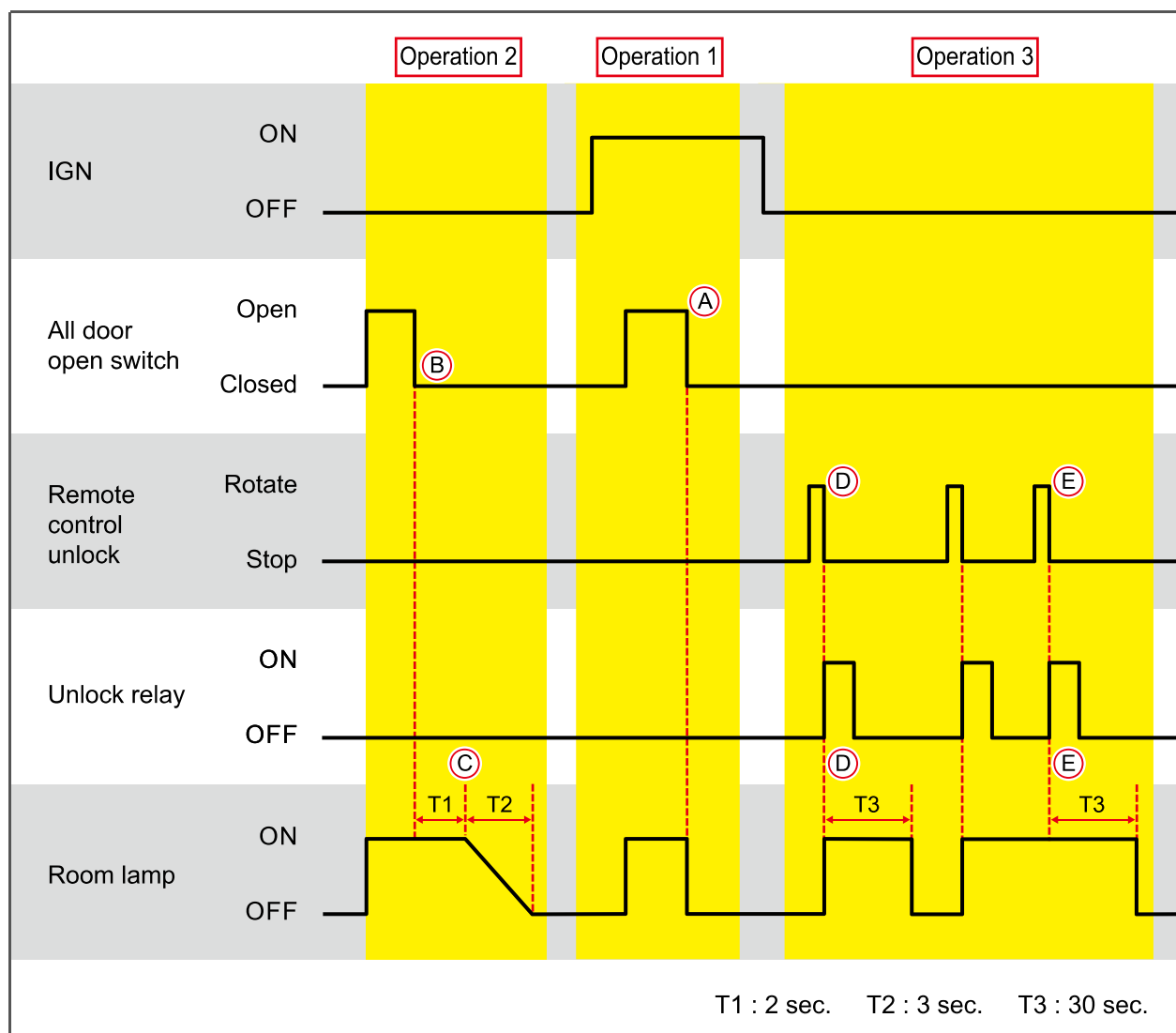
NOTE

- The room lamp stays on when a door is opened during fading out. (The lamp fades out or goes out immediately when the door is closed)
- When the open driver/passenger/rear (LH or RH) doors are closed the room lamp fades out. When the system is arming, the room lamp goes out immediately.

System flowchart

- With front room lamp coupled switch ON





Modification basis	
Application basis	
Affected VIN	

► 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) with 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	

(2) Luggage room lamp



The luggage room lamp comes on when the tailgate is opened and goes off as soon as the tailgate is closed.

(3) XLV



The luggage compartment lamp is operated by the switch when the tailgate is opened; it is turned on when the switch is pressed and turned off when pressed again.

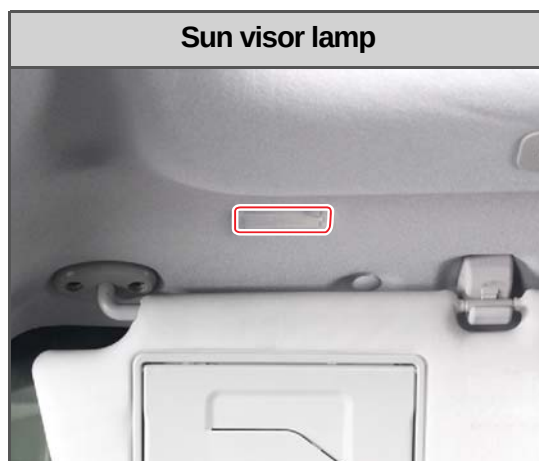
(4) Glove box lamp



The glove box lamp comes on when the glove box is opened after the tail lamp switch is operated.

Modification basis	
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Affected VIN	

(5) Sun visor lamp



The sun visor lamp comes on when the sun visor vanity mirror cover is opened.

(6) Door courtesy lamp



The door courtesy lamp comes on when the driver's door or passenger's door is opened.

(7) Door mood lamp



The door mood lamp comes on when the tail lamp switch is operated.

(8) IP center lower mood lamp



The IP center lower mood lamp comes on when the tail lamp switch is operated.

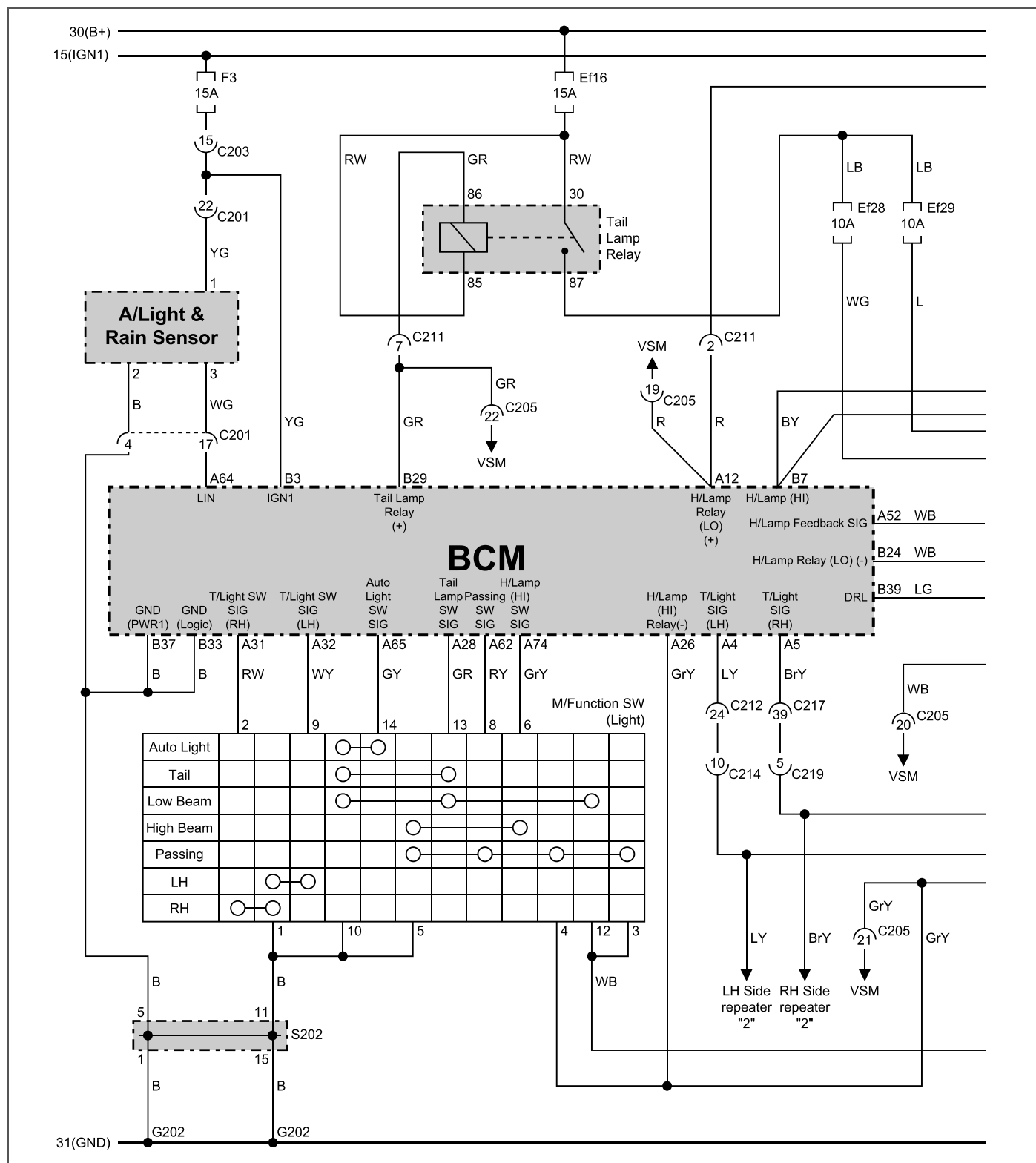
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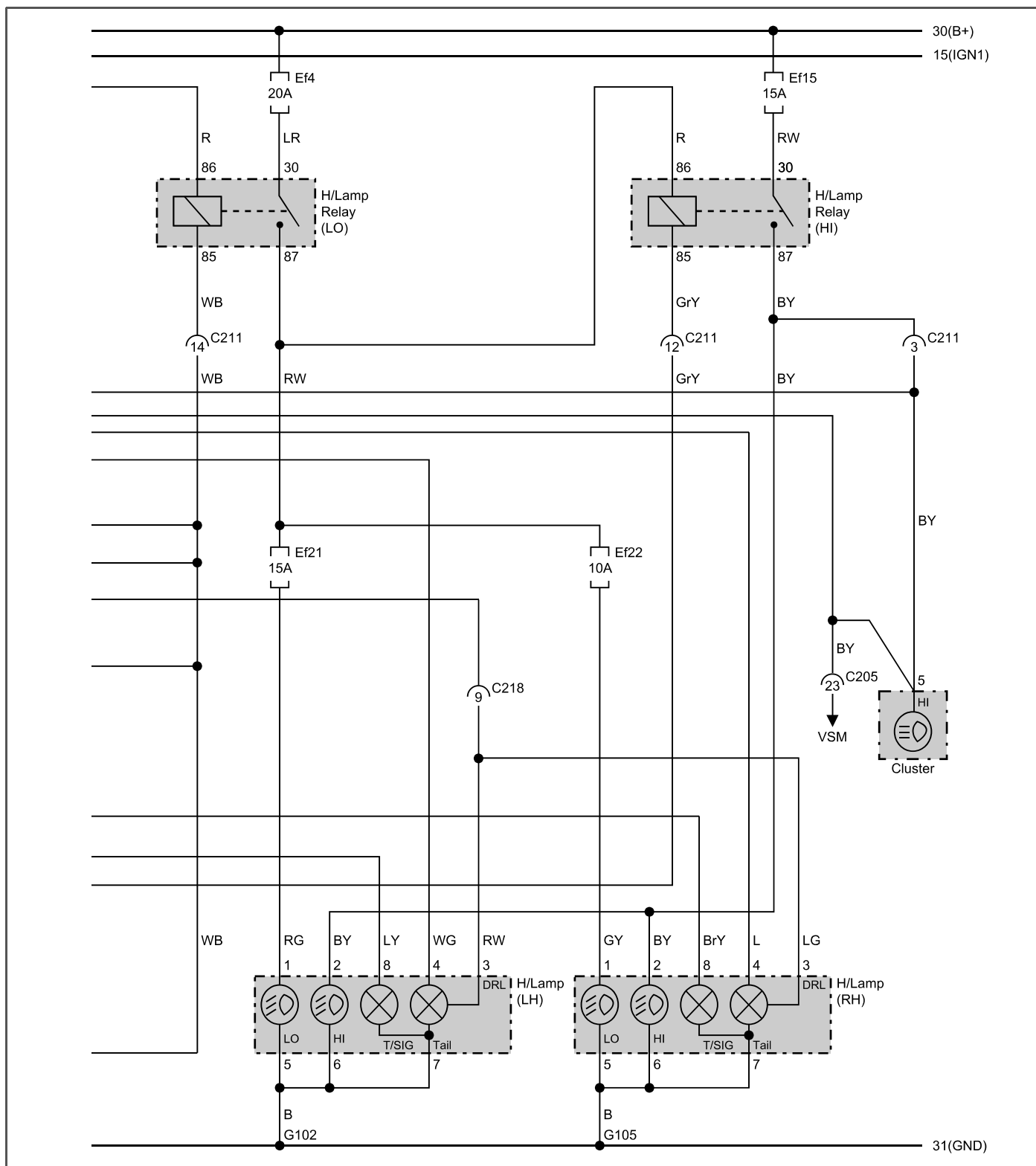
4. CIRCUIT DIAGRAM

1) Exterior Lamp

(1) Headlamp (AUTO light, low beam, high beam, passing)

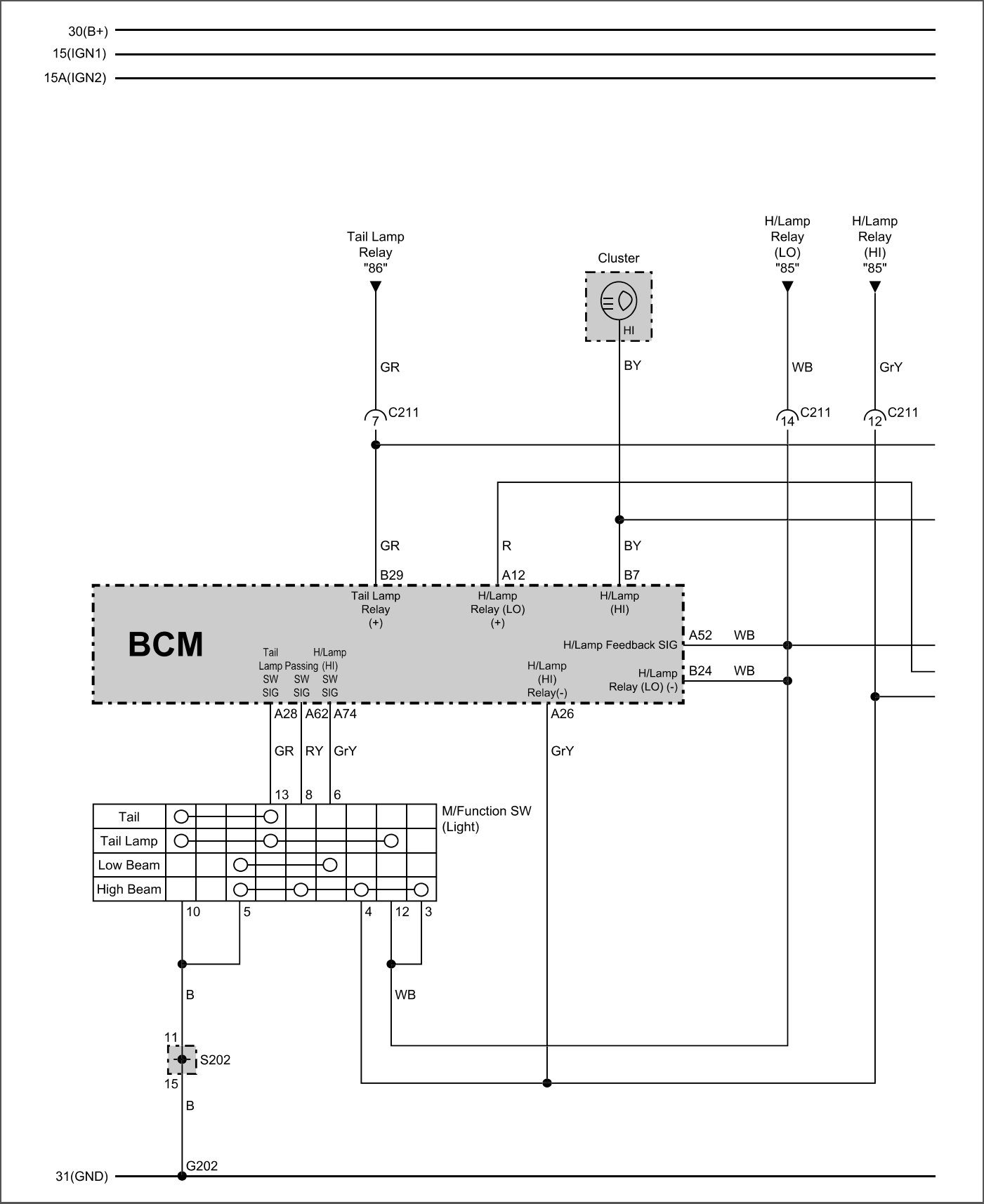


Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	

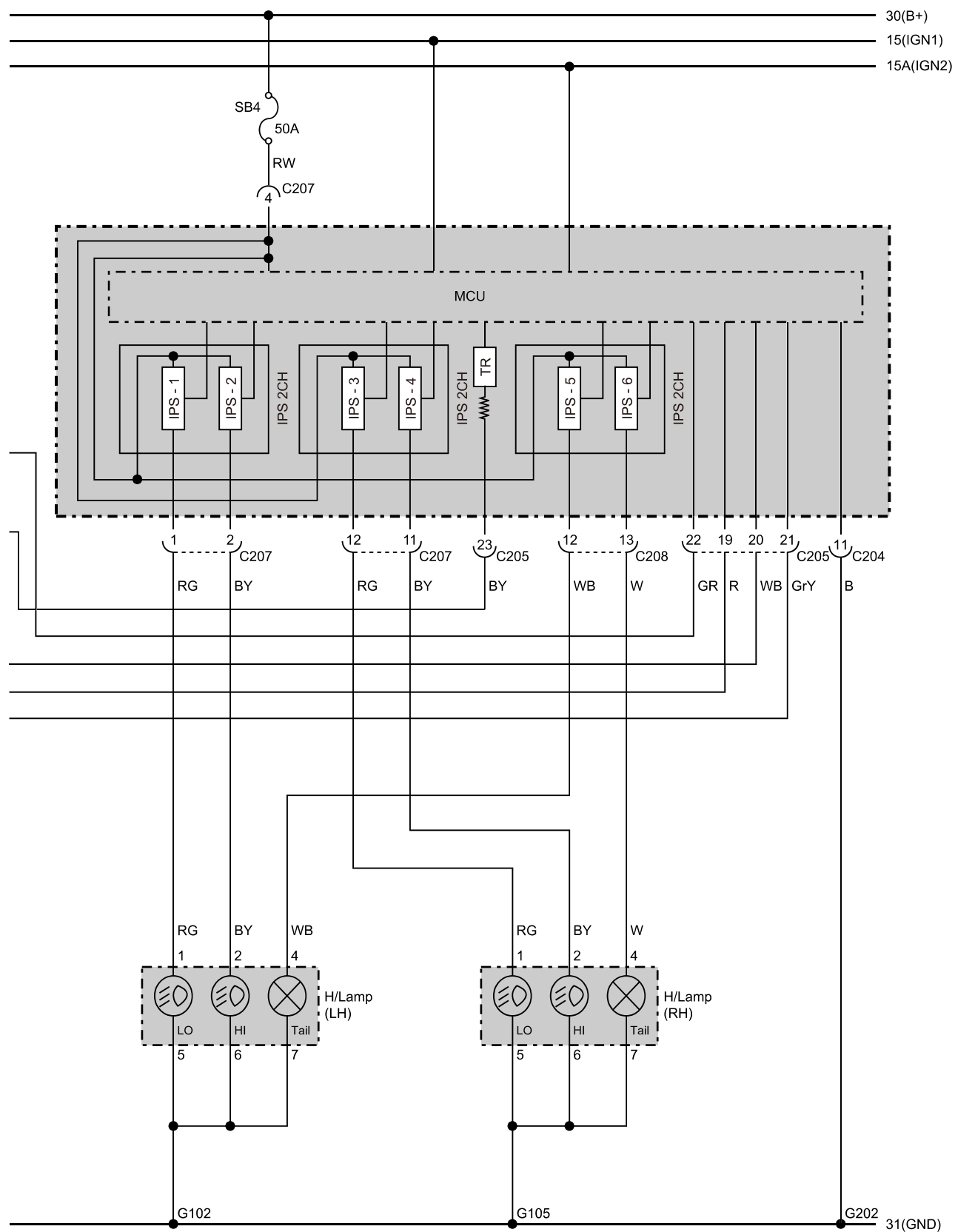
(2) VSM



LAMP

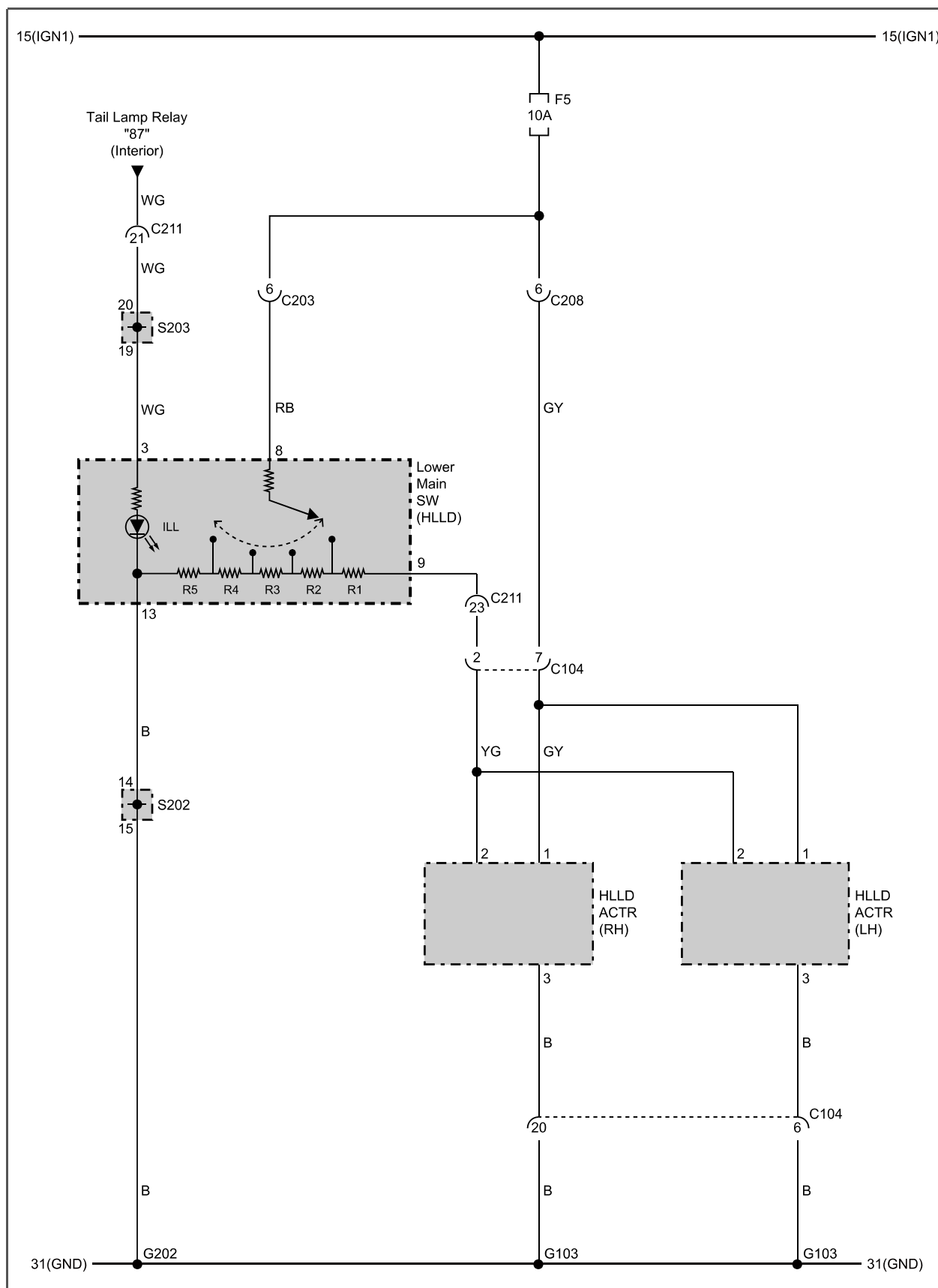
TIVOLI/XLV 2016.09

Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	

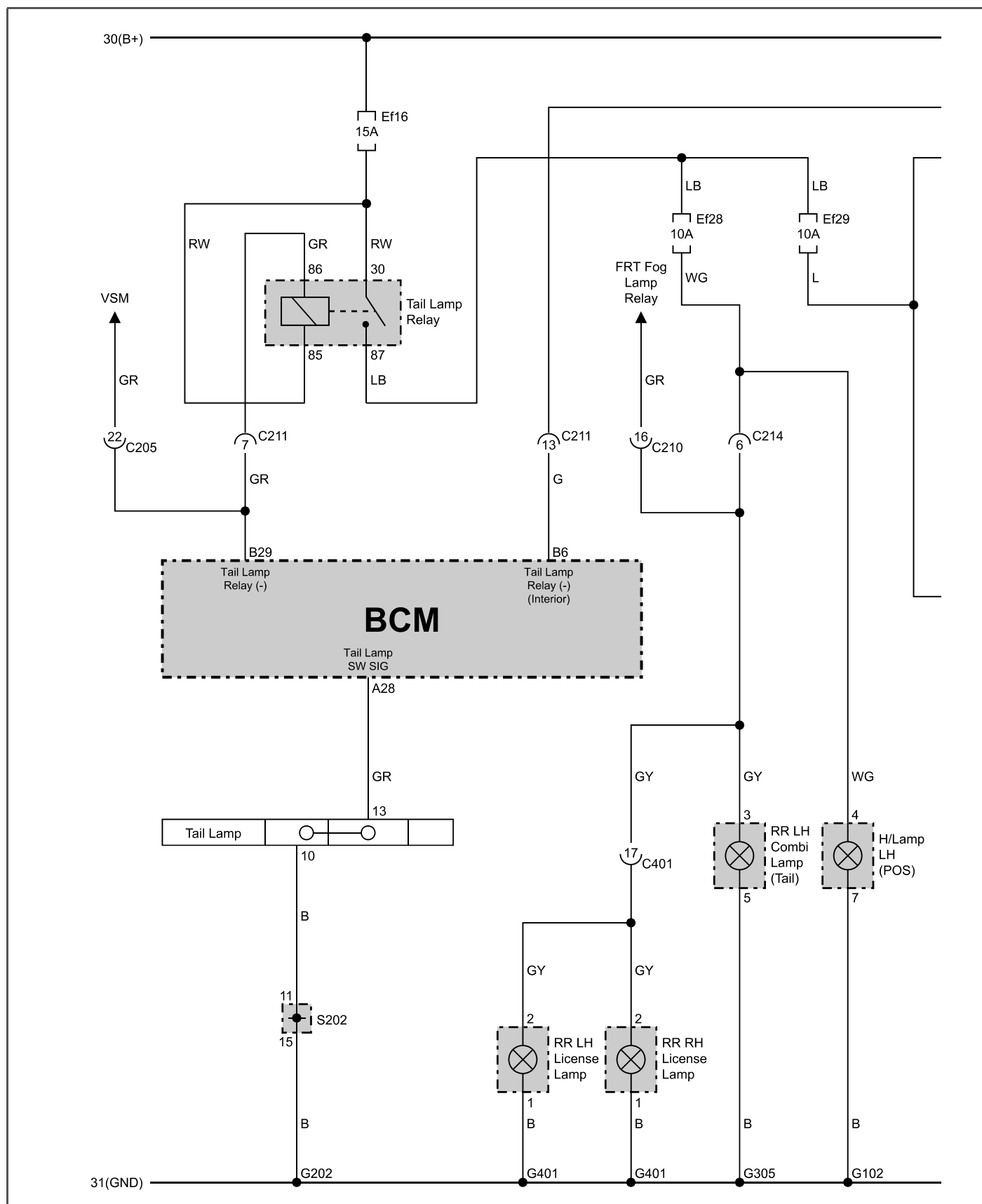
(3) Headlamp Leveling



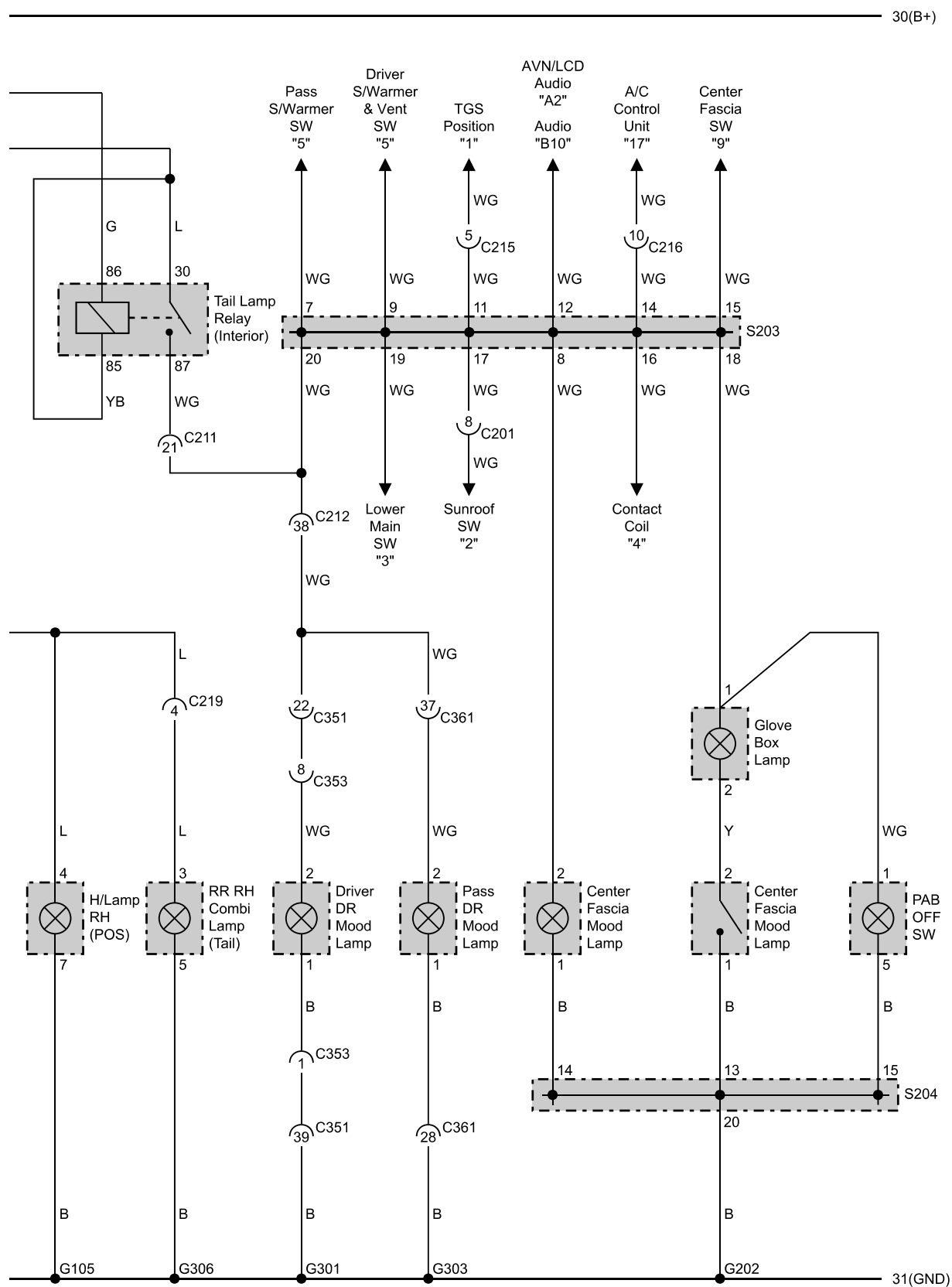
LAMP

TIVOLI/XLV 2016.09

Modification basis	
Application basis	
Affected VIN	

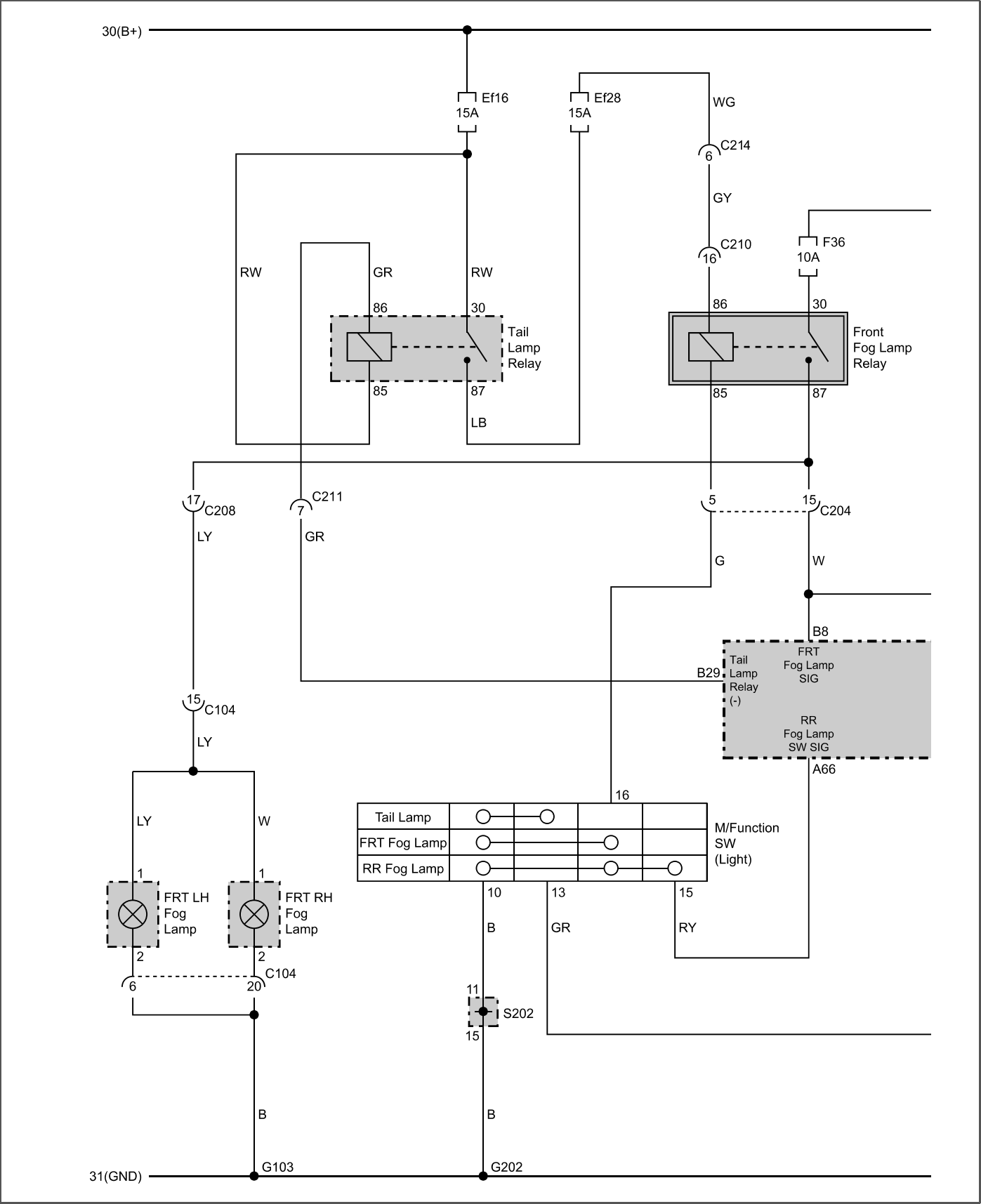
(4) Tail lamp, front fog lamp

Modification basis	
Application basis	
Affected VIN	

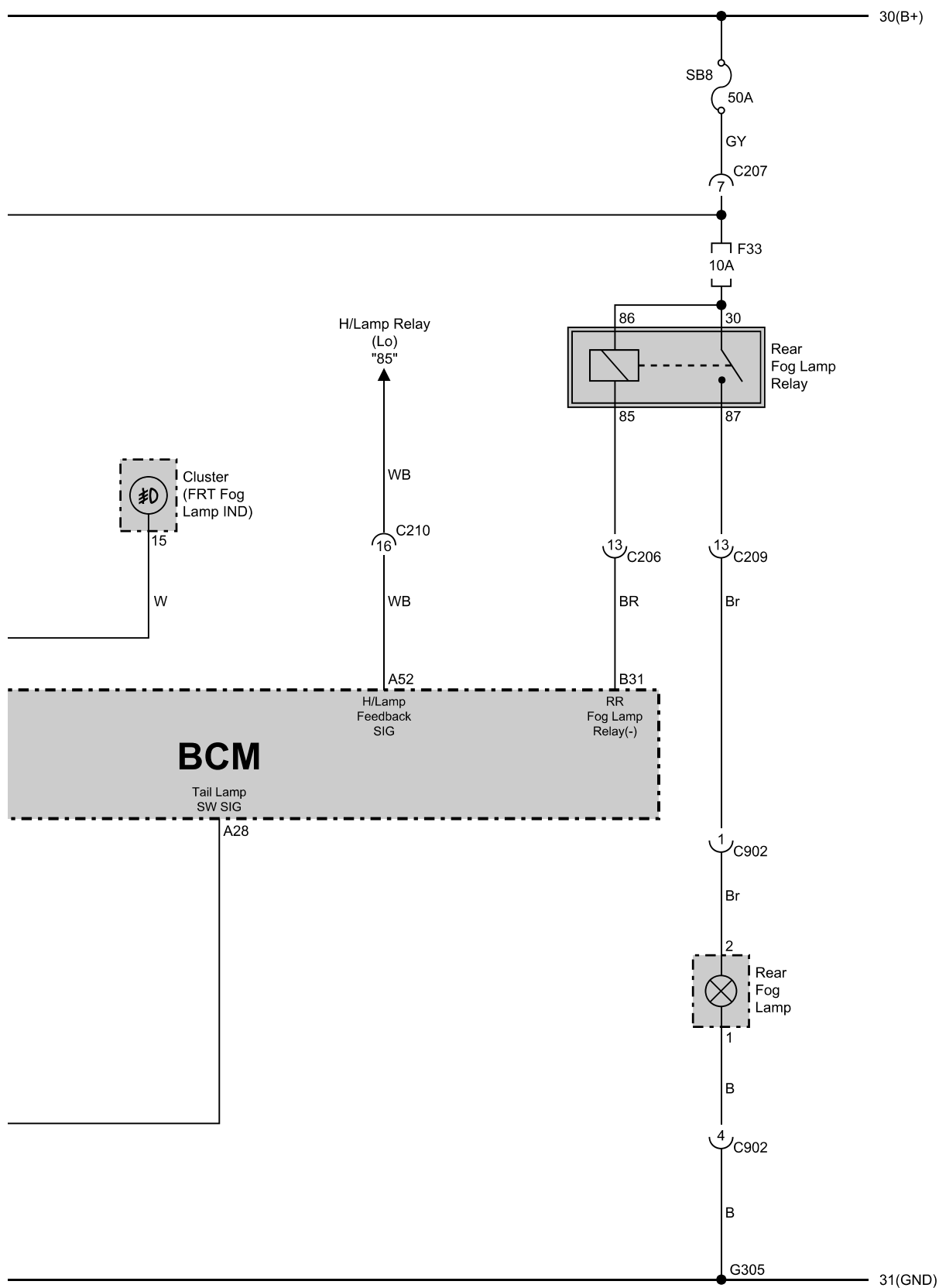


Modification basis	
Application basis	
Affected VIN	

(5) Fog lamp

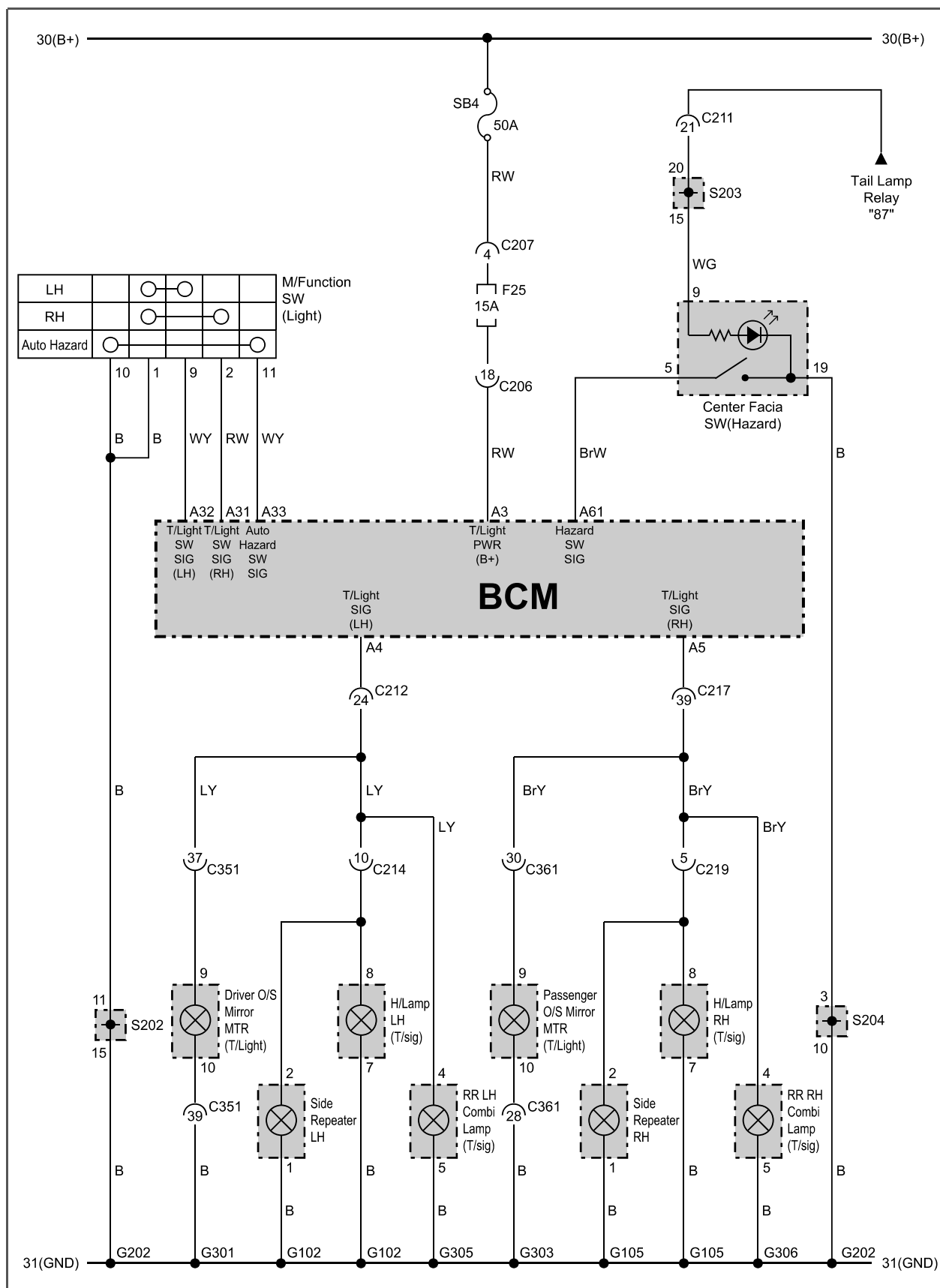


Modification basis	
Application basis	
Affected VIN	



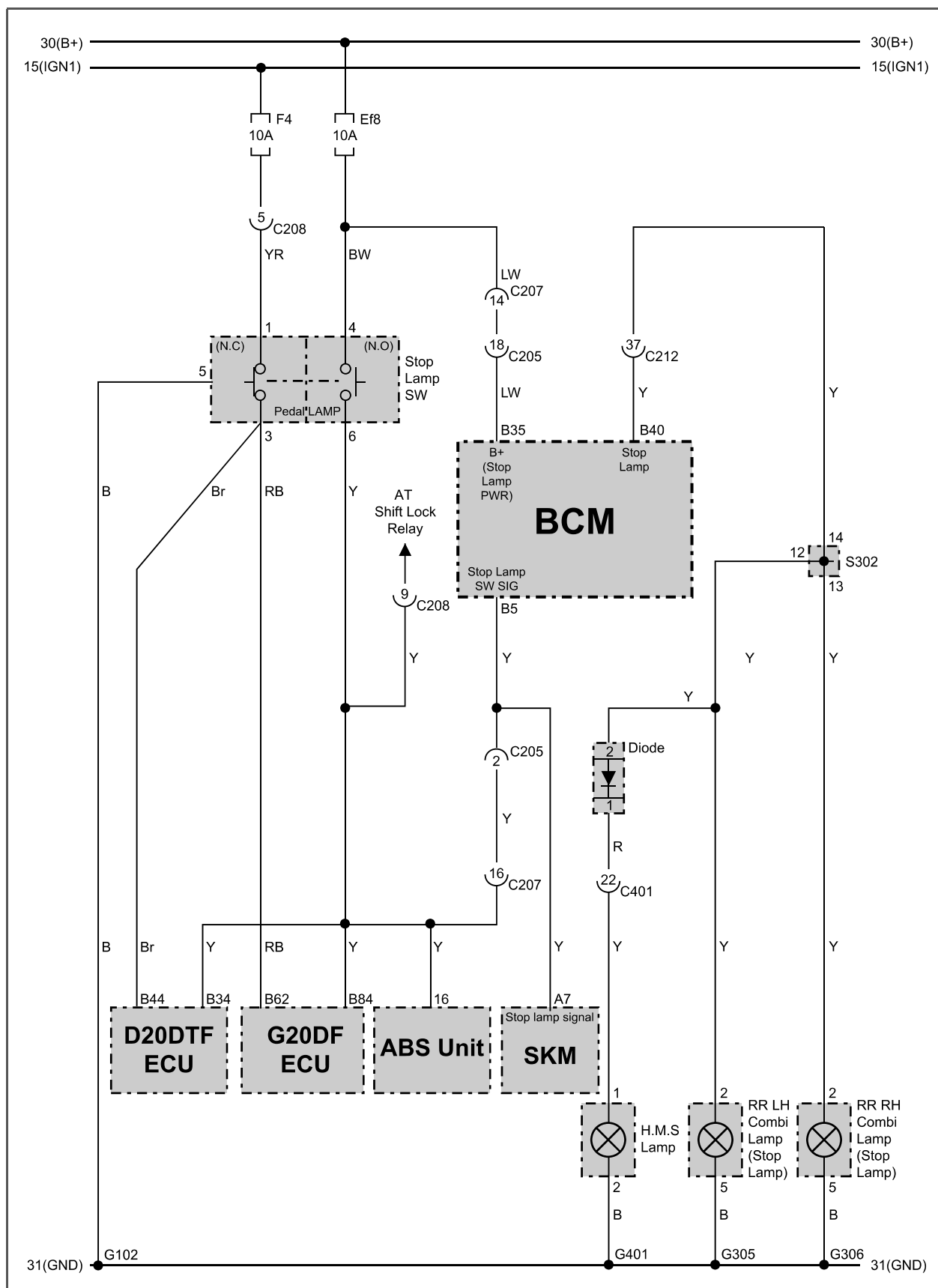
Modification basis	
Application basis	
Affected VIN	

(6) Turn signal lamp



Modification basis	
Application basis	
Affected VIN	

(7) Stop lamp



Modification basis	
Application basis	
Affected VIN	

LAMP

TIVOLI/XLV 2016.09

FUSE

BCM

SKM

FCM

INSTRUMENT

SWITCH

LAMP

WIPER AND

AVN

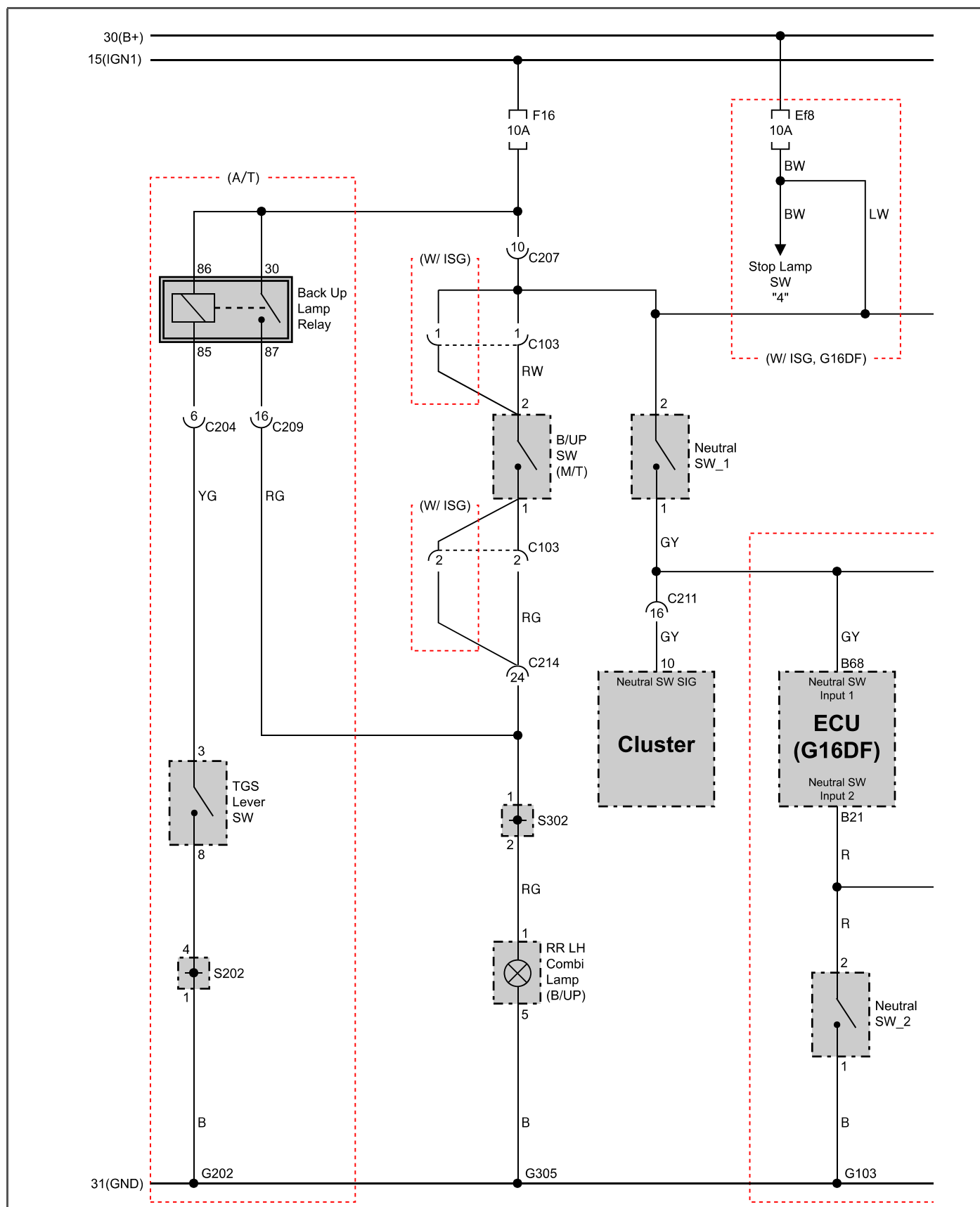
MP3 AUDIO

LCD AUDIO

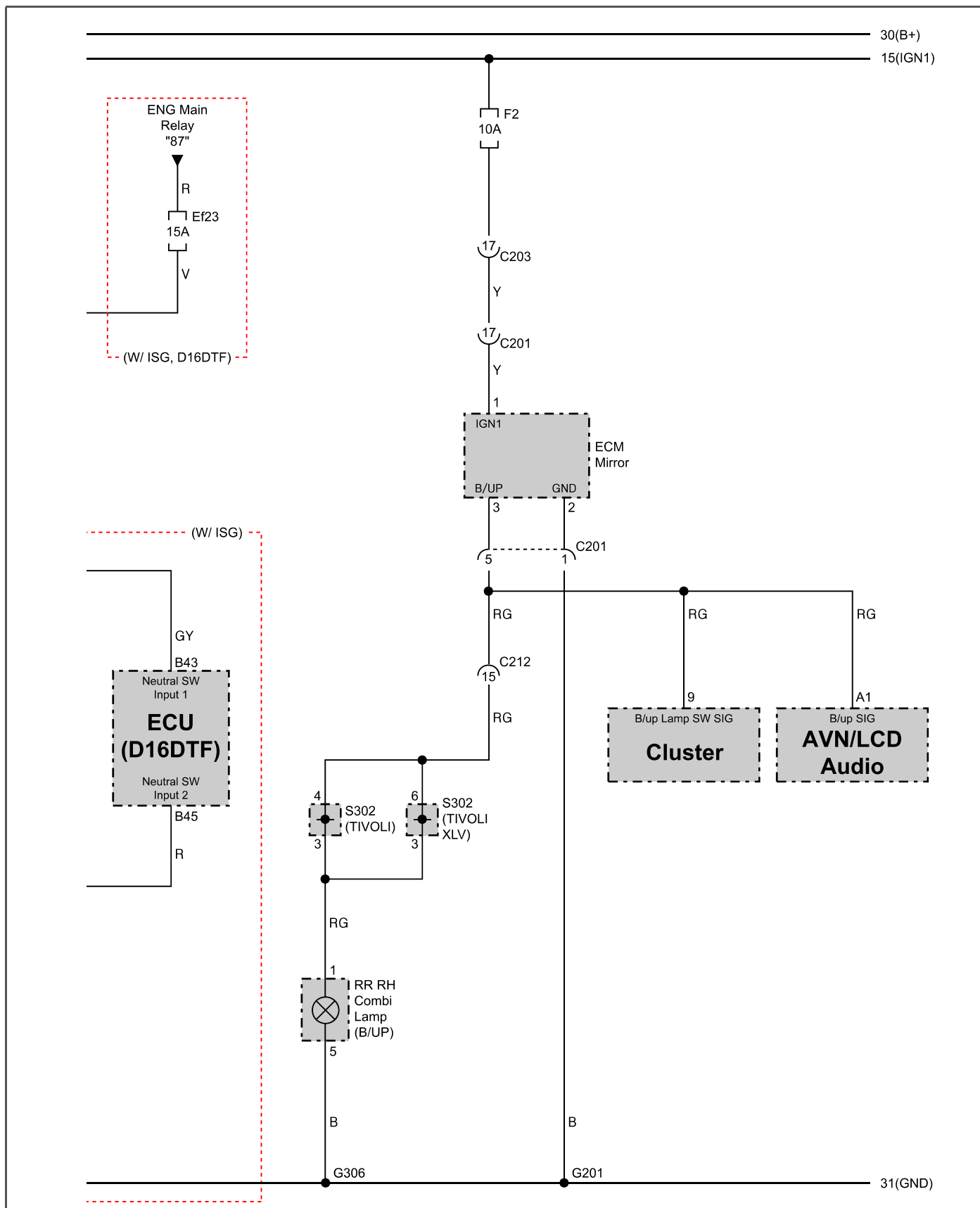
ISG SYSTEM

AC INVERTE

(8) Backup lamp



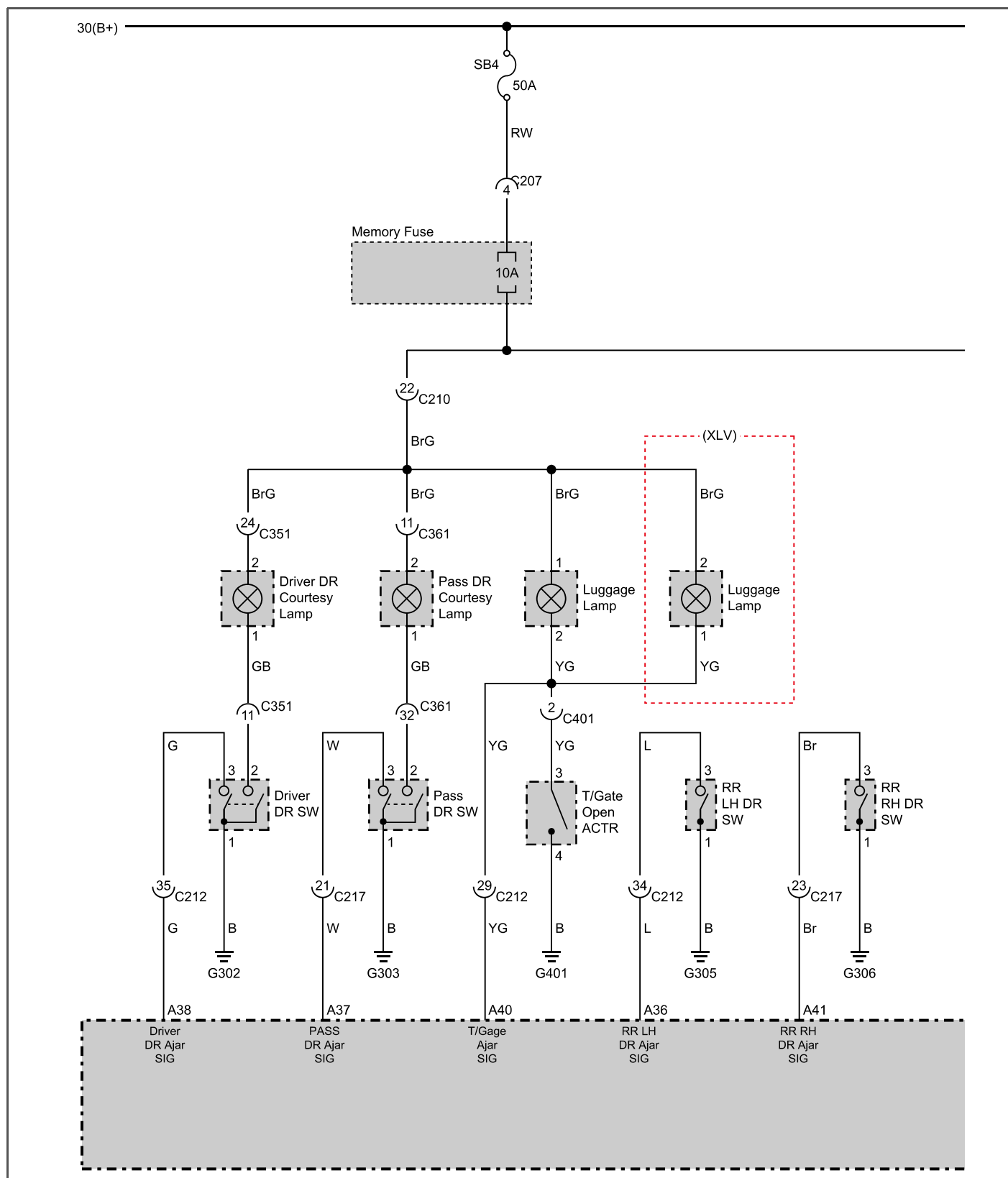
Modification basis	
Application basis	
Affected VIN	



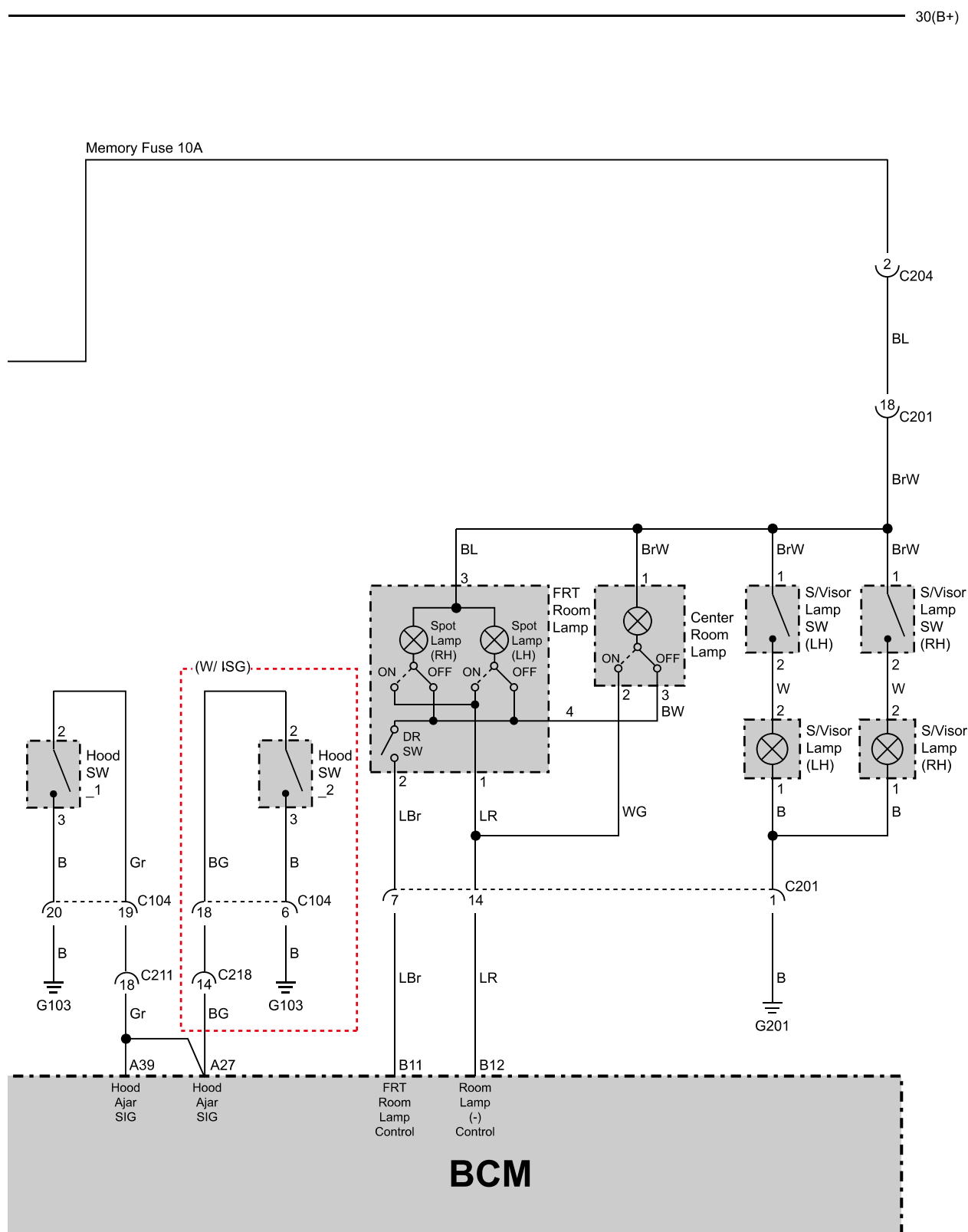
Modification basis	
Application basis	
Affected VIN	

1) Interior Lamp

(2) Interior lamp



Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	