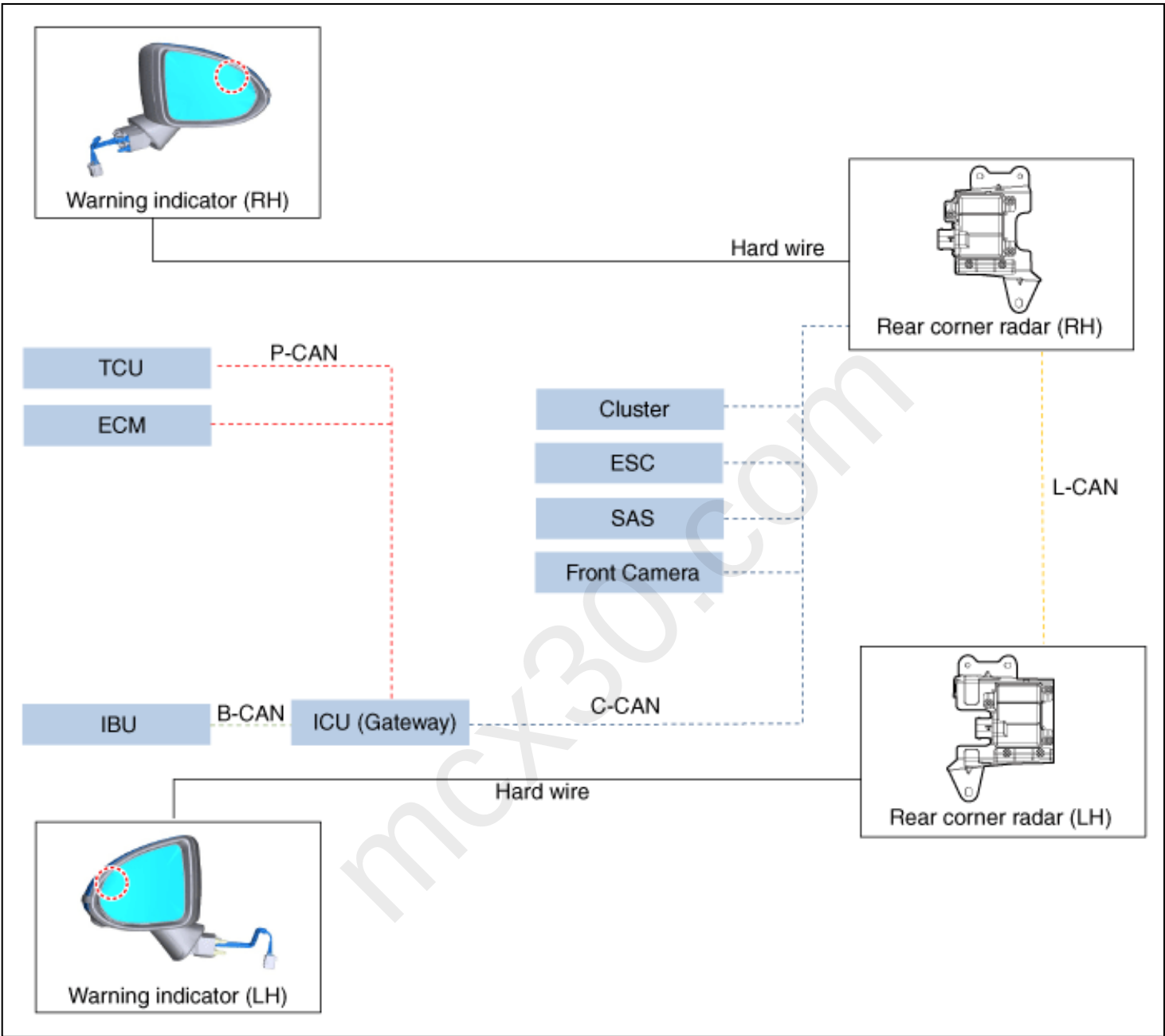


Description

Rear Corner Radar is a system that measures the relative speed and distance from the following vehicles by using two electromagnetic wave radar sensors attached to the rear bumper, and detects any vehicle within the blind spot zone and gives off alarm.

System Interface



It is a system that provides detecting, warning (visual and audible) and controlling the obstacle in the blind spots of the rear corner side while driving by measuring the distance and speed of the rear corner vehicles using the radar waves emitted from the 2 rear corner radar sensors mounted inside the rear bumper.

- BCW**(Blind-spot Collision Warning): The BCW detects the vehicle approaching at high speed from the blind spot and rear of your vehicle while driving and warns the driver.
- BCA**(Blind-Spot Collision-Avoidance Assist): The BCA assists to avoid collision with the vehicle approaching from the blind spot by controlling the brake partially when your vehicle departs the lane.
- RCCW** (Rear Cross-Traffic Collision Warning): The RCCW detects the vehicles approaching from the left and right sides and warns the driver while your vehicle is reversing.

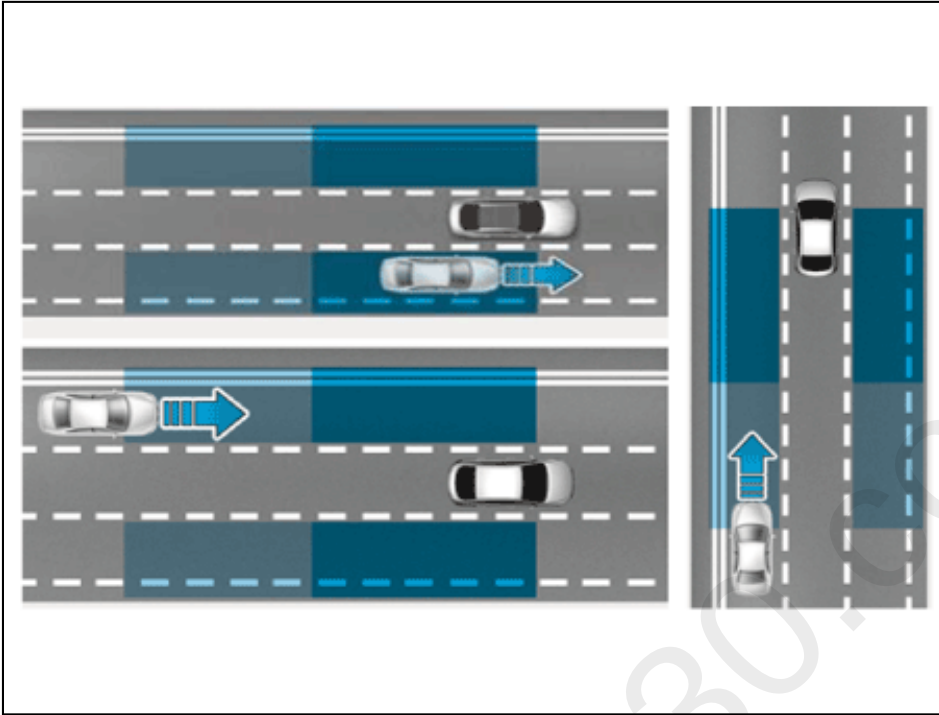
- RCCA (Rear Cross-Traffic Collision-Avoidance Assist): The RCCA assists to avoid collision with the vehicles approaching from the left and right sides by controlling the brake while your vehicle is reversing.

System Function

The Rear Corner Radar (RR_C_RDR) supports the functions below using the detecting information (vehicle/2-wheeled vehicle) of the rear corner radar, recognition information (lane) of the front camera and the vehicle signal information (CAN communication).

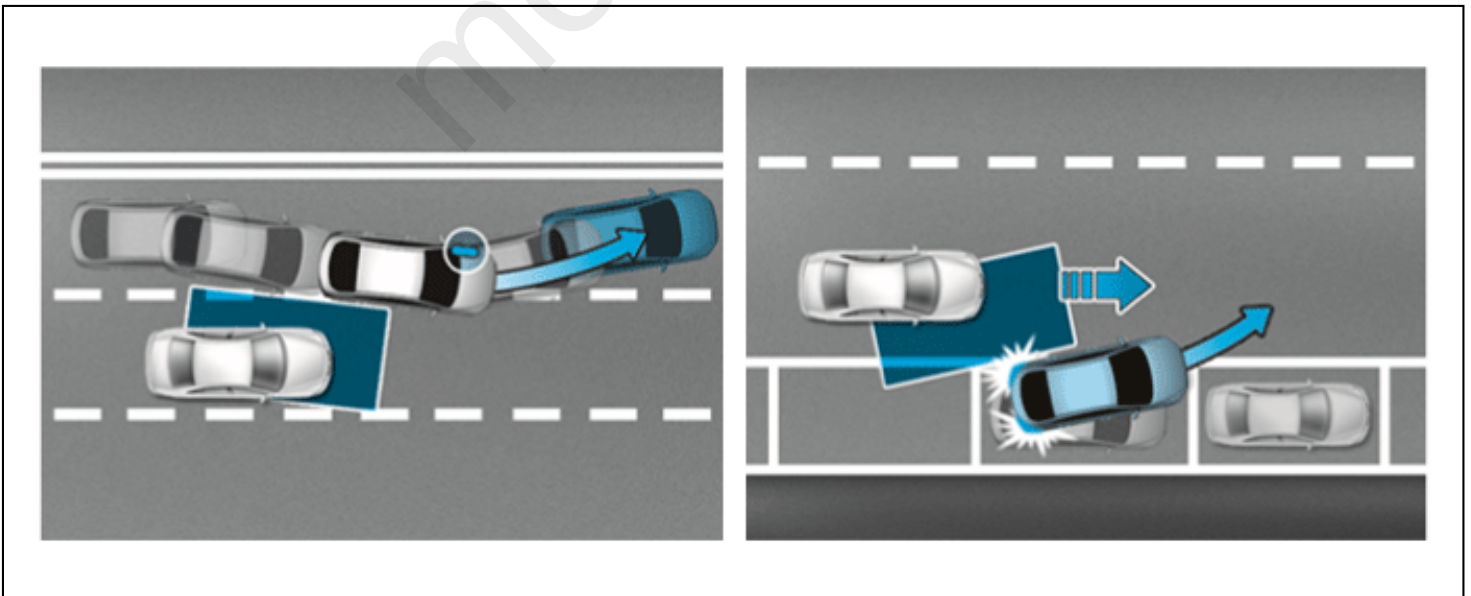
1. BCW (Blind-Spot Collision Warning): It detects the vehicles approaching from the blind spot and informs the driver of a possible collision with a warning message and audible warning while driving at the speed of over specific speed.

Also, when you are driving forward to exit the vehicle, it helps braking to avoid collision if the system judges that there is a collision risk with the vehicle approaching from the rear corner.

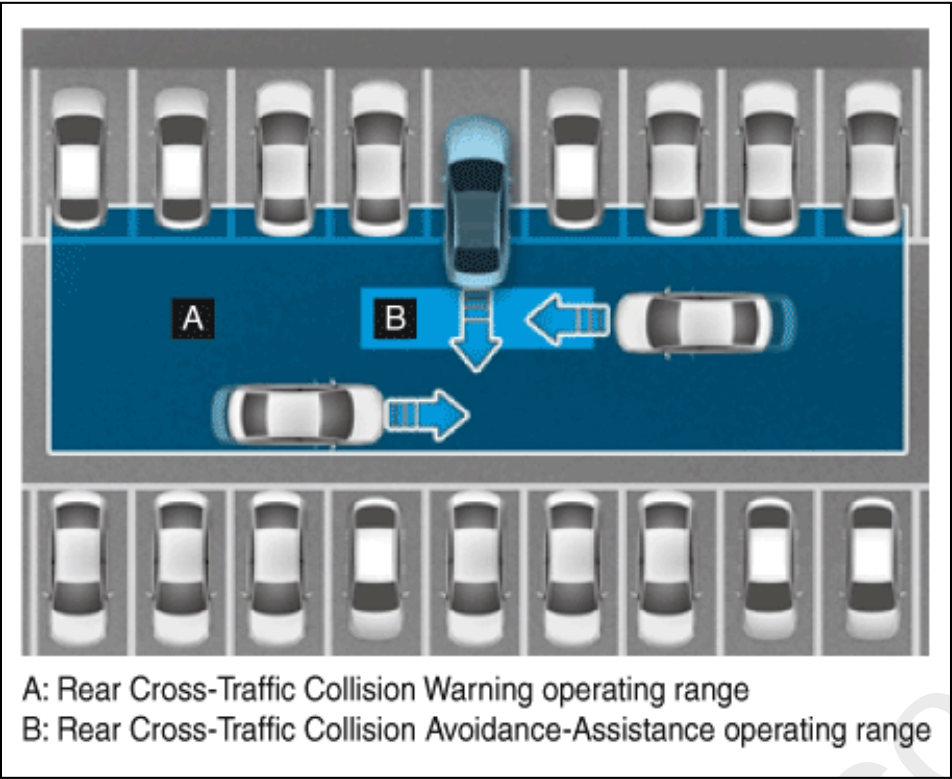


2. BCA (Blind-Spot Collision-Avoid Assist): It assists the collision avoidance by controlling the brake partially if the system judges that there is a collision risk with the vehicle approaching from the rear corner when changing lanes by detecting the lane ahead.

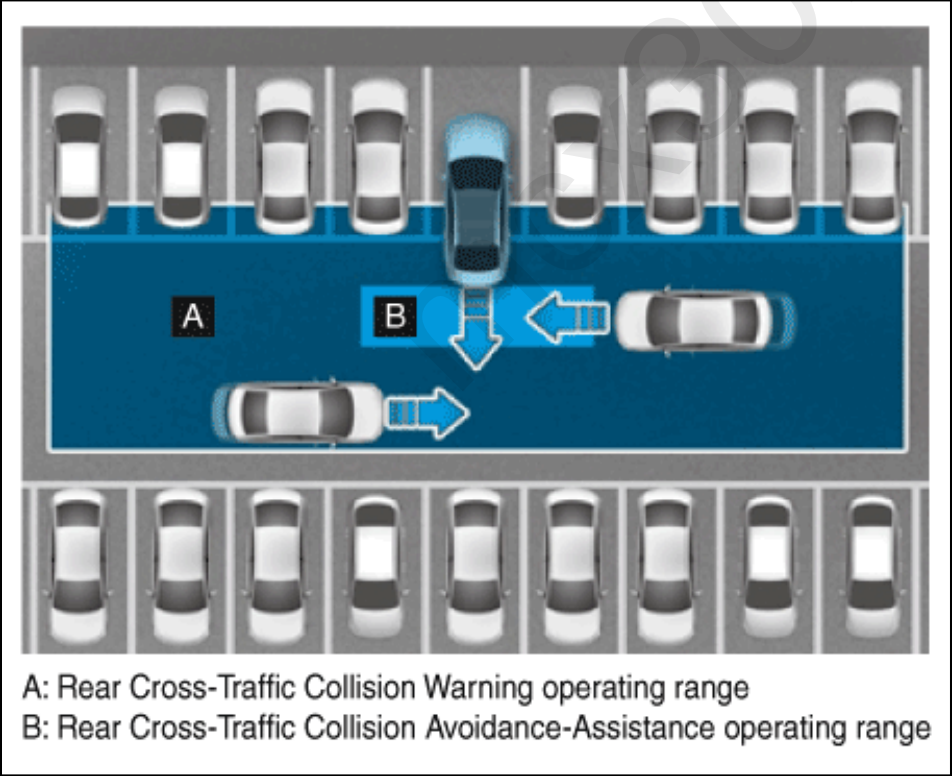
Also, when you are driving forward to exit the vehicle, it helps braking to avoid collision if the system judges that there is a collision risk with the vehicle approaching from the rear corner.



3. RCCW (Rear Cross-Traffic Collision Warning): It warns the driver with a warning message and an audible warning if the system judges that there is a collision risk with the vehicle approaching from the left and right sides while your vehicle is reversing.



4. RCCA (Rear Cross-Traffic Collision-Avoidance Assist): It warns the driver with a warning message and an audible warning and helps braking to avoid collision if the system judges that there is a collision risk with the vehicle approaching from the left and right sides while your vehicle is reversing.



Warning Condition

Blind-Spot Collision Warning (BCW)

1. BCW activating conditions

- (1) User Setting Menu (USM): Select 'Driver Assistance' → 'Blind-Spot Safety' → 'Blind-Spot Collision Warning'
- (2) Vehicle speed: 20 km/h or faster
- (3) Curvature radius: 100m or more
- (4) Relative vehicle speed: -15 ~ 255 km/h
("-" means overtaking the preceding vehicle)

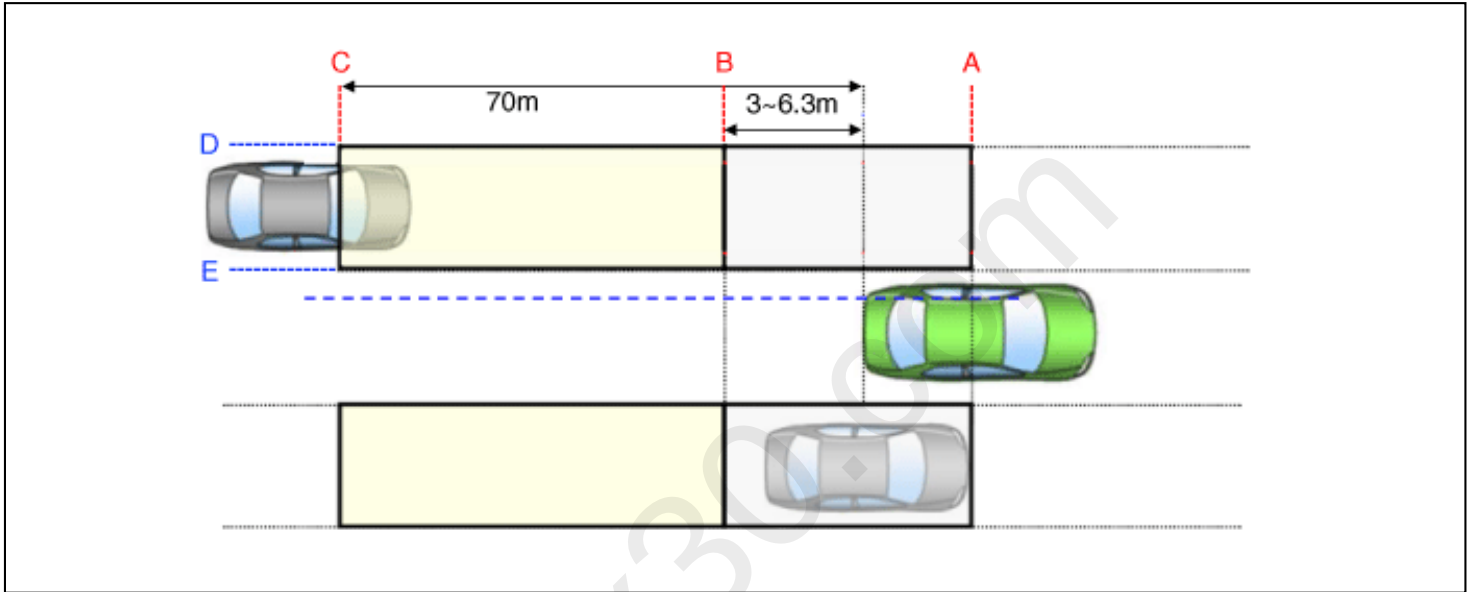
2. BCW deactivating conditions

- (1) Vehicle speed: 17 km/h or slower
- (2) Curvature radius: 70m or less
- (3) Relative vehicle speed: All cases except -15 ~ 255 km/h
("-" means overtaking the preceding vehicle)

3. Warning zone

A ~ B: Blind spot zone

B ~ C: Detecting range for vehicles approaching at high speed



4. Conditions for BCW warning ON



A. Driver's position in your vehicle

B. 3 ~ 6.3m from the rear bumper end

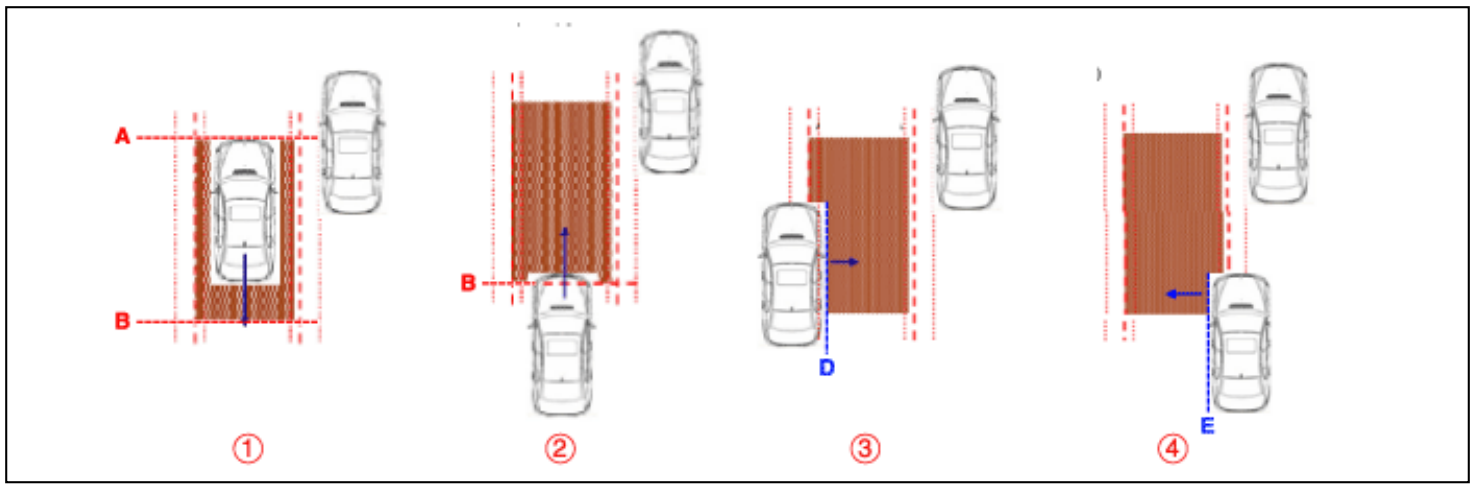
D. 70kph or less: $3\text{m} + (\text{your vehicle width}/2)$

80kph or more: $3.4\text{m} + (\text{your vehicle width}/2)$

70kph ≤ your vehicle speed ≤ 80kph: Follows the standard of your vehicle speed entered among 70kph/80kph

E. 0.4 from the center of your vehicle + (your vehicle width/2)

- (1) The entire body of the target vehicle is located behind the line A.
- (2) Any part of the target vehicle pass the line B.
- (3) Any part of the target vehicle passes the line D and Hysteresis In.
- (4) The entire part of the target vehicle passes the line E and Hysteresis In.



5. Conditions for BCW warning OFF



A. Driver's position in your vehicle

B. 4 ~ 7.3m from the rear bumper end

D. 70kph or less: $3.7\text{m} + (\text{your vehicle width}/2)$

80kph or more: $4.1\text{m} + (\text{your vehicle width}/2)$

70kph ≤ your vehicle speed ≤ 80kph: Follows the standard of your vehicle speed entered among 70kph/80kph

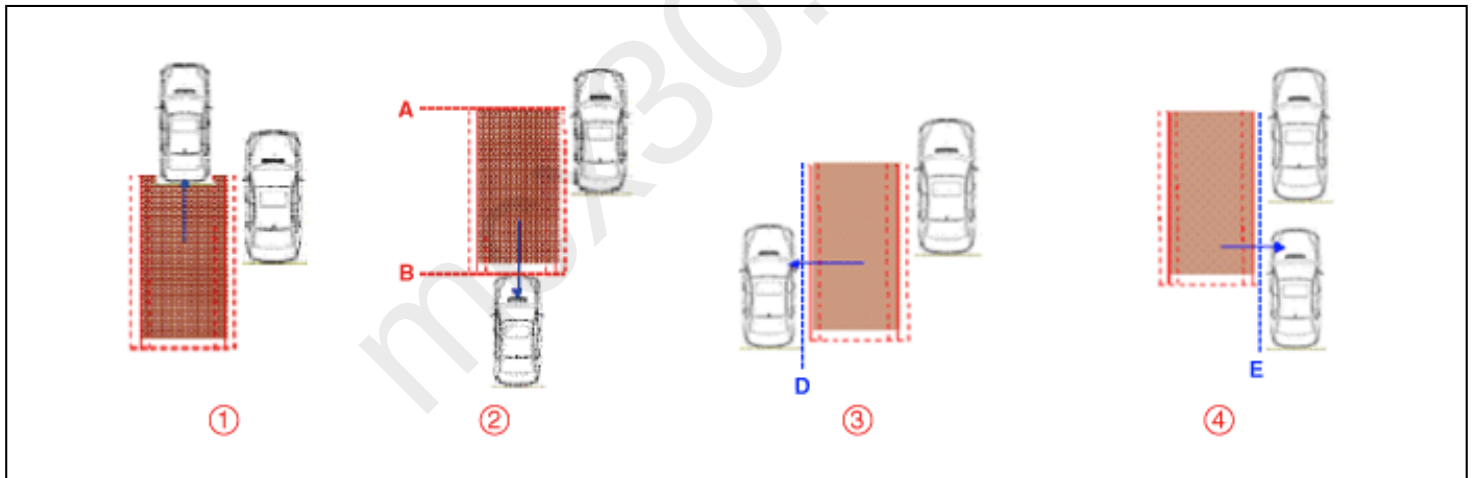
E. 0.7 from the center of your vehicle + (your vehicle width/2)

(1) The entire body of the target vehicle moves before the line A.

(2) The entire body of the target vehicle moves behind the line B.

(3) The entire body of the target vehicle passes the line D and Hysteresis Out.

(4) The entire part of the target vehicle passes the line E and Hysteresis Out.



6. Warning ON conditions for vehicles approaching at high speed



B. 3 ~ 6.3m from the rear bumper end

C. Within 30 ~ 70m from the rear bumper end

D. 70kph or less: $3\text{m} + (\text{your vehicle width}/2)$

80kph or more: $3.4\text{m} + (\text{your vehicle width}/2)$

70kph ≤ your vehicle speed ≤ 80kph: Follows the standard of your vehicle speed entered among 70kph/80kph

E. 0.4 from the center of your vehicle (your vehicle width/2)

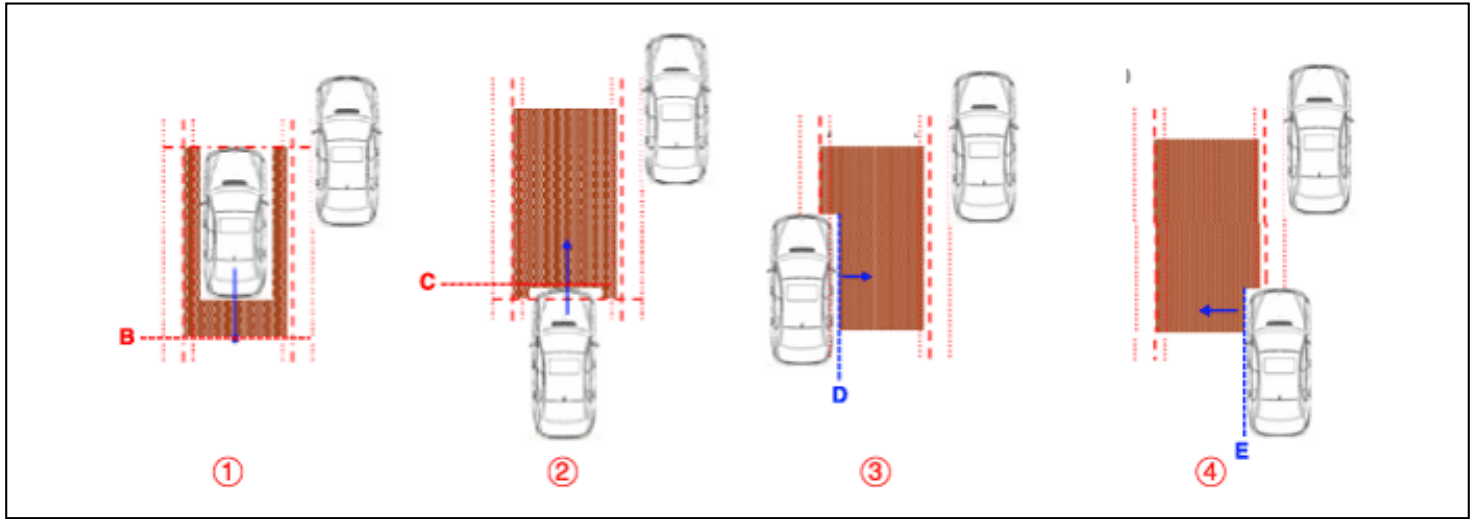
(1) The entire body of the target vehicle is located behind the line B.

(2) Any part of the target vehicle pass the line C.

(3) Any part of the target vehicle passes the line D and Hysteresis In.

(4) The entire part of the target vehicle passes the line E and Hysteresis In.

(5) In the all above condition, TTC(Time to Collision) is not less than 4.5 sec.



7. Warning OFF conditions for vehicles approaching at high speed



B. 30 ~ 70m from the rear bumper end

D. 70kph or less: $3.7\text{m} + (\text{your vehicle width}/2)$

80kph or more: $4.1\text{m} + (\text{your vehicle width}/2)$

70kph ≤ your vehicle speed ≤ 80kph: Follows the standard of your vehicle speed entered among 70kph/80kph

E. 0.7 from the center of the vehicle + $(\text{your vehicle width}/2)$

(1) If the entire body of the target vehicle is out of the line C

(2) If the entire body of the target vehicle crosses the line D

(3) If the entire body of the target vehicle crosses the line E

(4) When the TTI (Time To Intersection) exceeds 4.5 seconds (normal) / 3.8 seconds (slow)

(5) The right side area of the vehicle is symmetrical

8. System control prohibition

(1) If the entire surface of rear corner radar is covered with foreign materials: System conditions - Blockage message is displayed.



• If the sensing area on the rear bumper is contaminated by snow, mud or stickers, sensor detecting performance may deteriorate.

(2) If the mounting angle of the rear corner radar is distorted by the external shock: DTC is sent

(3) When BCW system fails: DTC is sent



• If the surroundings of the rear bumper are contaminated by the foreign material interfering with the rear corner radar, an error message may be sent but it is not the BCW system failure.

Blind-Spot Collision-Avoidance Assist (BCA)

9. BCA activating conditions

(1) User Setting Menu (USM): Select 'Driver Assistance' → 'Blind-Spot Safety' → 'Blind-Spot Collision-Avoidance-Assist'

(2) Vehicle speed: 60 km/h ~ 200 km/h

(3) Curvature radius: 600m or more

(4) Both lanes are recognized

(5) Other functions related with ESC not working

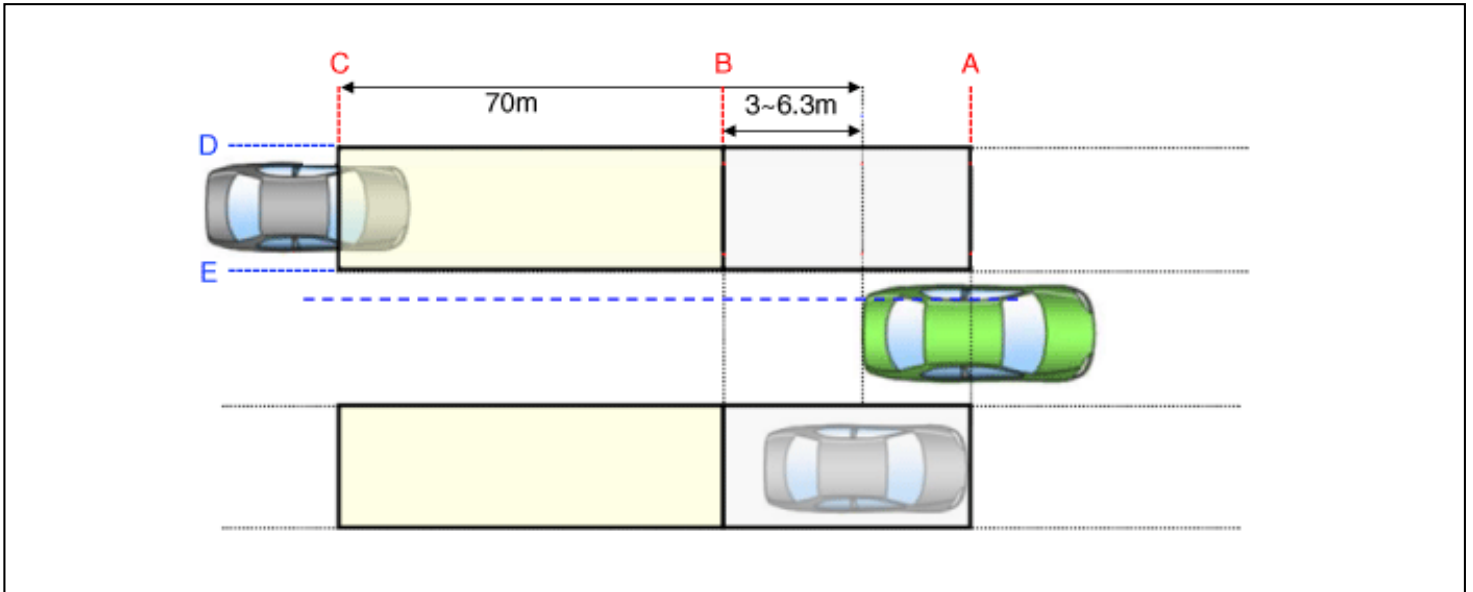
10. BCA deactivating conditions

(1) Vehicle speed: 55 km/h or slower, 210 km/h or faster

(2) Curvature radius: 570m or less

(3) Other functions related with ESC working

11. Warning zone (driving condition)



12. Conditions for BCA (driving condition) control ON

☐

- A. Distance from the rear bumper end to the driver's eyes.
- B. 1.5m from the rear of your vehicle
- D. 2.2m from left side of your vehicle + (your vehicle width/2)
- E. 0.4m from left side of your vehicle + (your vehicle width/2)

- (1) When the entire body of the target vehicle enters inside the line A, B, C, D area
- (2) The right side area of the vehicle is symmetrical

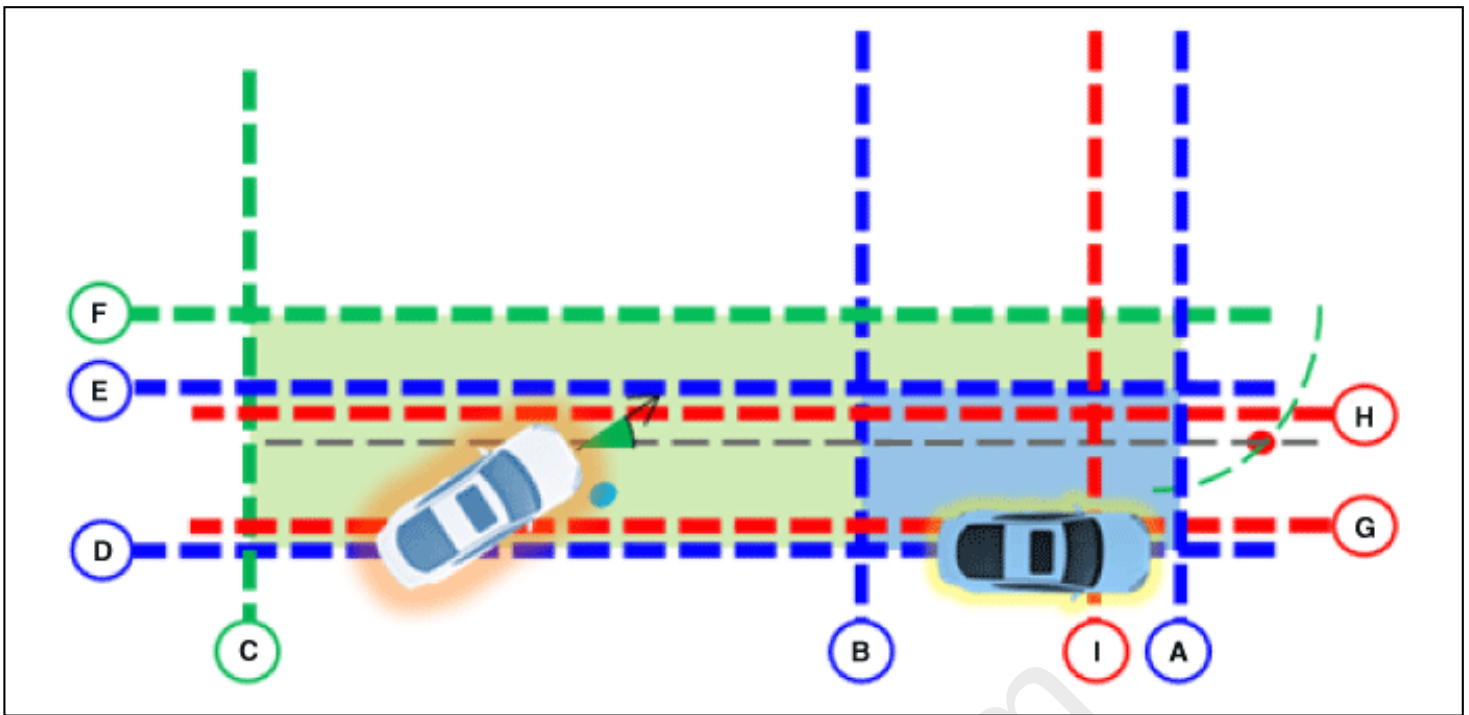
13. Conditions for BCA (driving condition) control OFF

☐

- A. Distance from the rear bumper end to the driver's eyes - 1m
- B. 1.7m from the rear of your vehicle
- D. 2.4m from the left side of your vehicle + (your vehicle width/2)
- E. 0.7m from the left side of your vehicle + (your vehicle width/2)

- (1) When the entire body of the target vehicle moves out of the line A, B, C, D area
- (2) The right side area of the vehicle is symmetrical

14. Conditions for BCA (pulling out/exit condition) control



- ☐
- A. 0.2m from the front of your vehicle
 - B. 4m from the rear of your vehicle
 - C. 60m from the rear of your vehicle
 - D. 0m from your vehicle
 - E. 1m from the left side of your vehicle + (your vehicle width/2)
 - F. 1.5m from the left side of your vehicle (check variable condition) + (your vehicle width/2)

* Condition 1

- (1) When the entire body of the target vehicle is positioned inside the line A, B, D, F area
- (2) When approaching angle of the opponent vehicle is between $-55^{\circ} \sim 55^{\circ}$ based on the driving direction
- (3) When the cross point of the route is between the D and E
- (4) The right side area of the vehicle is symmetrical

* Condition 2

- (5) When the entire body of the target vehicle is positioned inside the line A, C, D, F area
- (6) When approaching angle of the opponent vehicle is between $-55^{\circ} \sim 55^{\circ}$ based on the driving direction
- (7) When the cross point of the route is between the D and E
- (8) When meets the TTI (Time to Intersection) variable condition
- (9) The right side area of the vehicle is symmetrical

Rear Cross-Traffic Collision Warning (RCCW)

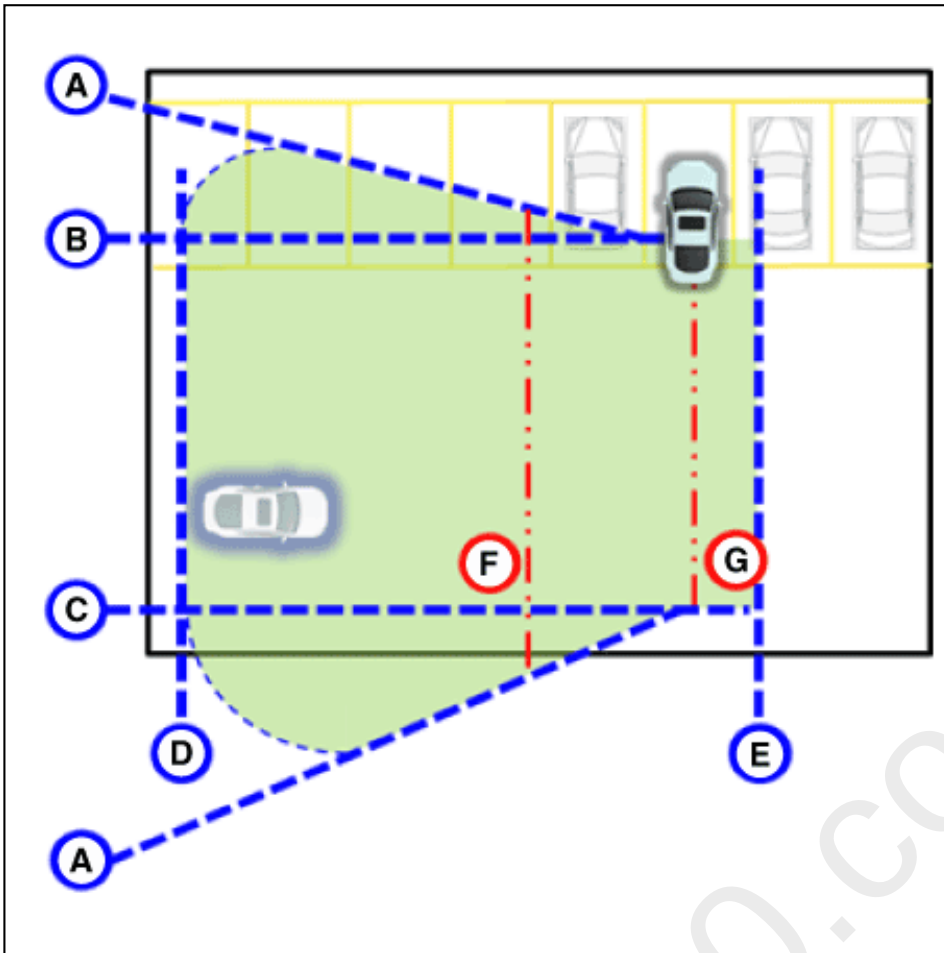
15. RCCW activating conditions

- (1) User Setting Menu (USM): Select 'Driver Assist Parking Safety' → 'Rear Cross-Traffic Safety'
- (2) Shift lever position: R
- (3) Vehicle speed: 0 ~ 8 km/h
- (4) Speed of opponent vehicle: 5 km/h or faster

16. RCCW deactivating condition

- (1) Vehicle speed: 10 km/h or faster

17. Warning zone



18. RCCW warning conditions

- (1) Condition: A warning occurs when the collision risk with the vehicle approaching from the rear corner is detected while pulling out your vehicle backward.
- (2) Warning occurs within 3.5~2.1 seconds (normal)/2.9~2.1 seconds (slow) based on the TTI (Time To Intersection)



• It is the estimated collision time calculated by using the relative distance/speed, which means that a collision may occur after estimated collision time. (It varies depending on the relative speed of the approaching vehicle)



- A. Vehicles approaching at a diagonal angle of 35°
- A' Vehicles approaching at a diagonal angle of 55°
- B 2m from the rear bumper end
- C 6m from the rear bumper end
- D 25m of distance from the center line of the vehicle + (your vehicle width/2)
- E. 1m of distance from the center line of the vehicle + (your vehicle width/2)

- (3) When a part of the target vehicle enters inside the line A, B, C, D, E area
- (4) When the driving direction of the target vehicle passes through the F and G
- (5) The right side area of the vehicle is symmetrical

Rear Cross-Traffic Collision-Avoidance Assist (RCCA)

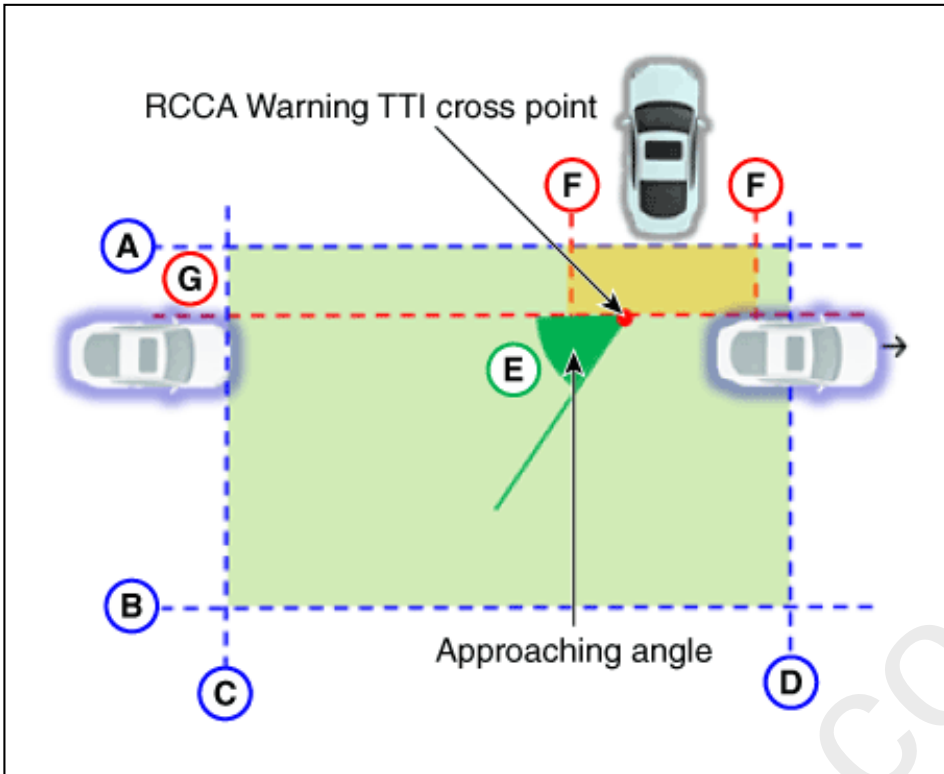
19. RCCA activating conditions

- (1) User Setting Menu (USM): Select 'Driver Assist' - 'Parking Safety' → 'Rear Cross-Traffic Safety'
- (2) Shift lever position: R
- (3) Vehicle speed: 0 ~ 8 km/h
- (4) Speed of opponent vehicle: 5 km/h or faster
- (5) Other functions related with ESC not working

20. RCCW deactivating conditions

- (1) Vehicle speed: 10 km/h or faster
- (2) Other functions related with ESC working

21. Warning zone



22. Conditions for RCCA control

- (1) Warning occurs approximately within 2.1 ~ 3.5 seconds based on the TTI (Time to Intersection) when a target vehicle enters the warning zone.
- (2) Refer to conditions below based on the TTI (Time to Intersection)



A Rear bumper end

B 6m from the rear bumper end

C 10m from the center of the vehicle + (your vehicle width/2)

D 1m from the center of the vehicle + (your vehicle width/2)

E. Based on the transverse of rear bumper of your vehicle / Approaching angle is below 55°

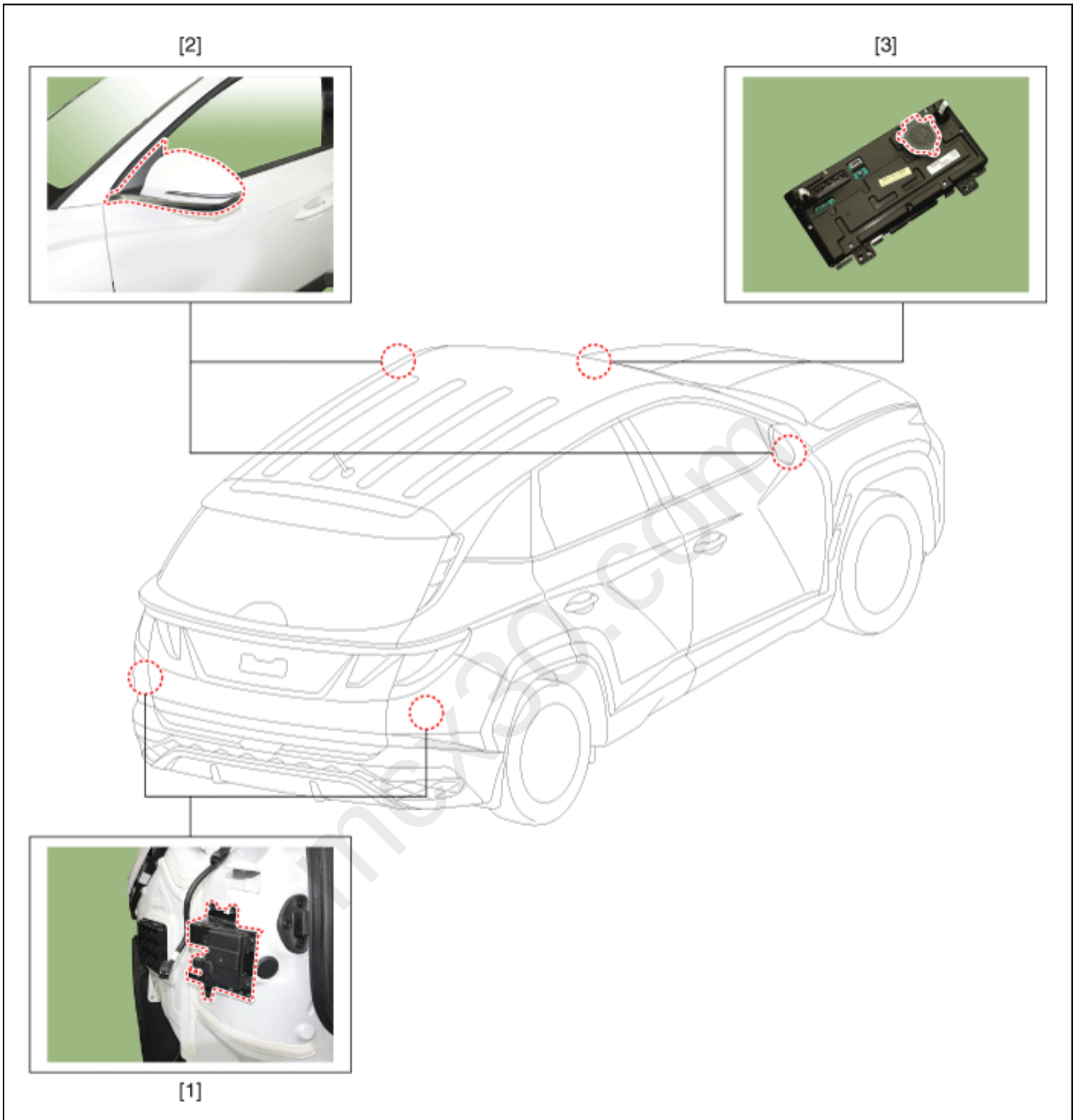
F 0.5m from the center of the vehicle + (your vehicle width/2)

G Xcp position is -1m from the rear bumper end

* Xcp: To the collision position of your vehicle and the target vehicle / Positioned at X direction

- (3) When a part of the target vehicle enters inside the line F & G area (Selected as a target to be interested if target vehicle enters inside the line A, B, C, D)
- (4) When the driving direction of the target vehicle passes through the F and G
- (5) In case of the opponent vehicle $TTI \leq 1$ second & your vehicle $TTI \leq 2$ seconds (varies depending on the vehicle model)
- (6) The right side area of the vehicle is symmetrical

Components



1. Rear corner radar unit
2. Warning indicator

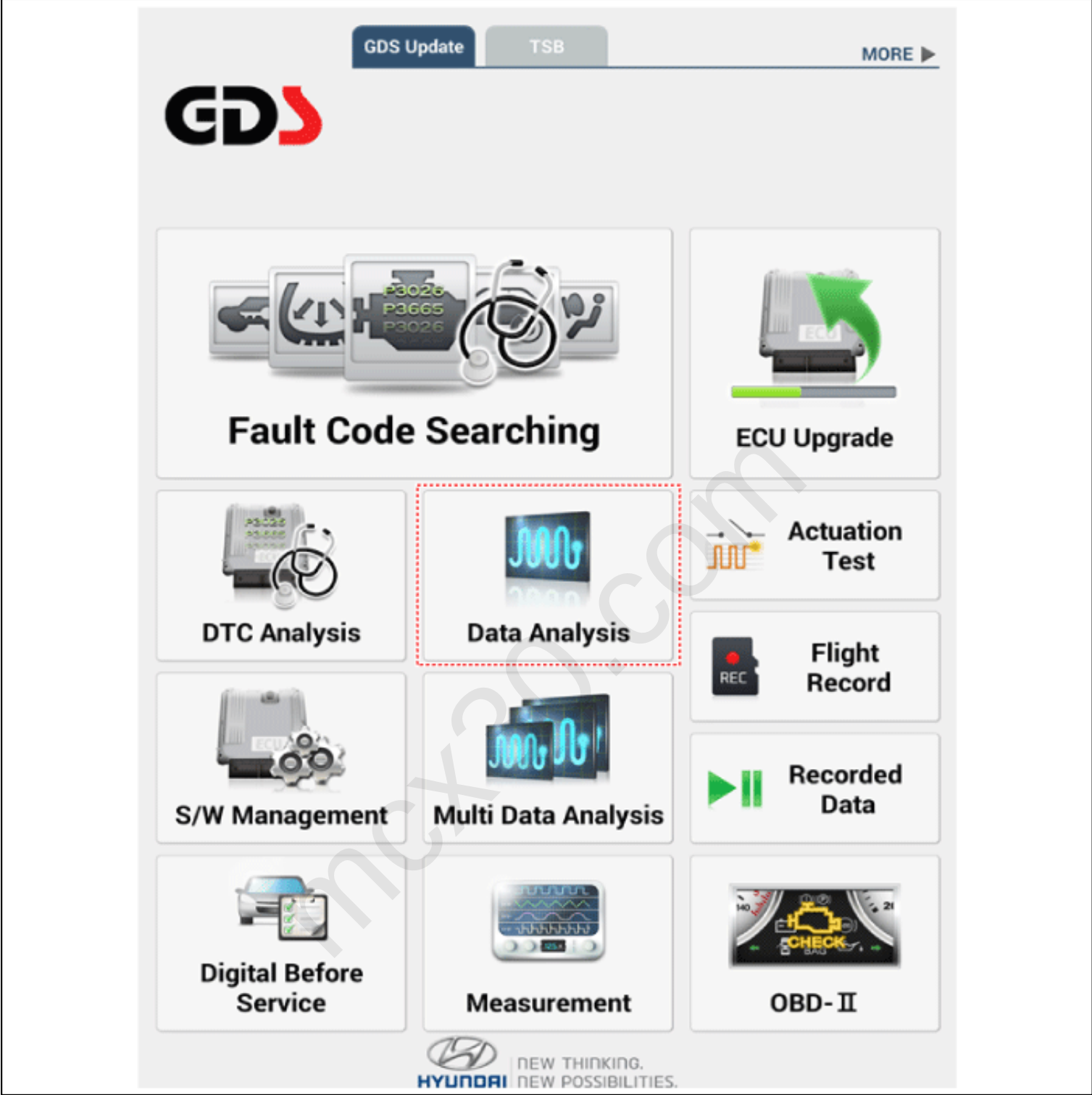
3. Speaker (Cluster)

Diagnosis with Diagnostic tool

1. In the body electrical system, failure can be quickly diagnosed by using the vehicle diagnostic system (Diagnostic tool).
The diagnostic system (Diagnostic tool) provides the following information.
 - (1) Fault Code Searching : Checking failure and code number (DTC)
 - (2) Data Analysis : Checking the system input/output data state
 - (3) Actuation test : Checking the system operation condition
 - (4) S/W Management : Controlling other features including system option setting and zero point adjustment
2. Connect the cable of Diagnostic tool to the data link connector in driver side crash pad lower panel, and turn on the Diagnostic tool.
3. If diagnose the vehicle by Diagnostic tool, select "DTC Analysis" and "Vehicle".



4. If check current status, select the "Data Analysis" .



5. Select "BCW", if you want to check current data of BCW system.



Data Analysis			
< Stop Graph Selective Display Actuation Test >			
Sensor Name(27)	Value	Unit	Link Up
Power Supply Voltage (Main Module)	11.2	V	
Power Supply Voltage (Sub Module)	11.2	V	
Internal Temperature Main Module	36	'C	
Internal Temperature Sub Module	38	'C	
Yaw Rate	0.00	deg/s	
Vehicle Speed	0	KPH	
BSD System State	Passive ON	-	
Warning Indicator - LH	0	-	
Warning Indicator - RH	0	-	
Active Diagnostic Session	-	-	
Master Autocalibration Value	0.0	DEG	
Slave Autocalibration Value	0.0	DEG	
Activation Switch LED Min Brightness High	100	%	
Activation Switch LED Min Brightness Low	10	%	
Activation Switch LED Max Brightness High	100	%	
Activation Switch LED Max Brightness Low	60	%	
Warning LED Brightness High	100	%	
Warning LED Brightness Middle	87	%	
Warning LED Brightness Low	41	%	
Number of Trouble Codes Set due to Dianostic	1	-	

6. If you want to check each module operation forcefully, select "Actuation test".

Data Analysis

<

Stop

Graph

Selective Display

Actuation Test

>

Sensor Name(27)	Value	Unit	Link Up
warning indicator - LH	0	-	
Warning Indicator - RH	0	-	
Active Diagnostic Session	-	-	
Master Autocalibration Value	0.0	DEG	
Slave Autocalibration Value	0.0	DEG	
Activation Switch LED Min Brightness High	100	%	
Activation Switch LED Min Brightness Low	10	%	
Activation Switch LED Max Brightness High	100	%	

Actuation Test

● Test Item(4)

Activation Switch LED	
Mirror LED Left	
Mirror LED Right	
ALL LEDs	

Specifications

[BCW, BCA]

Items	Blind-Spot Collision Warning (BCW)	Blind-Spot Collision- Avoidance Assist (BCA)	Blind-Spot Collision- Avoidance Assist (BCA)
			※Parallel Exit
Rated voltage	DC 12V		
Operating voltage	9V ~ 16V		
Operating speed	20 km/h ~ 255 km/h	60 km/h ~ 200 km/h	0 km/h ~ 3 km/h
Sensible distance	70m		60m
Frequency	77 GHz		
Numbers	2 EA		

[RCCW, RCCA]

Items	Rear Cross-Traffic Collision Warning System (RCCW)	Rear Cross-Traffic Collision-Avoidance Assist (RCCA)
Rated voltage	DC 12V	
Operating voltage	9V ~ 16V	
Operating speed	0 km/h ~ 8 km/h	0.1 km/h ~ 8 km/h
Sensible distance	25m	
Curvature radius	-	
Frequency	77 GHz	
Numbers	2 EA	

[SEW]

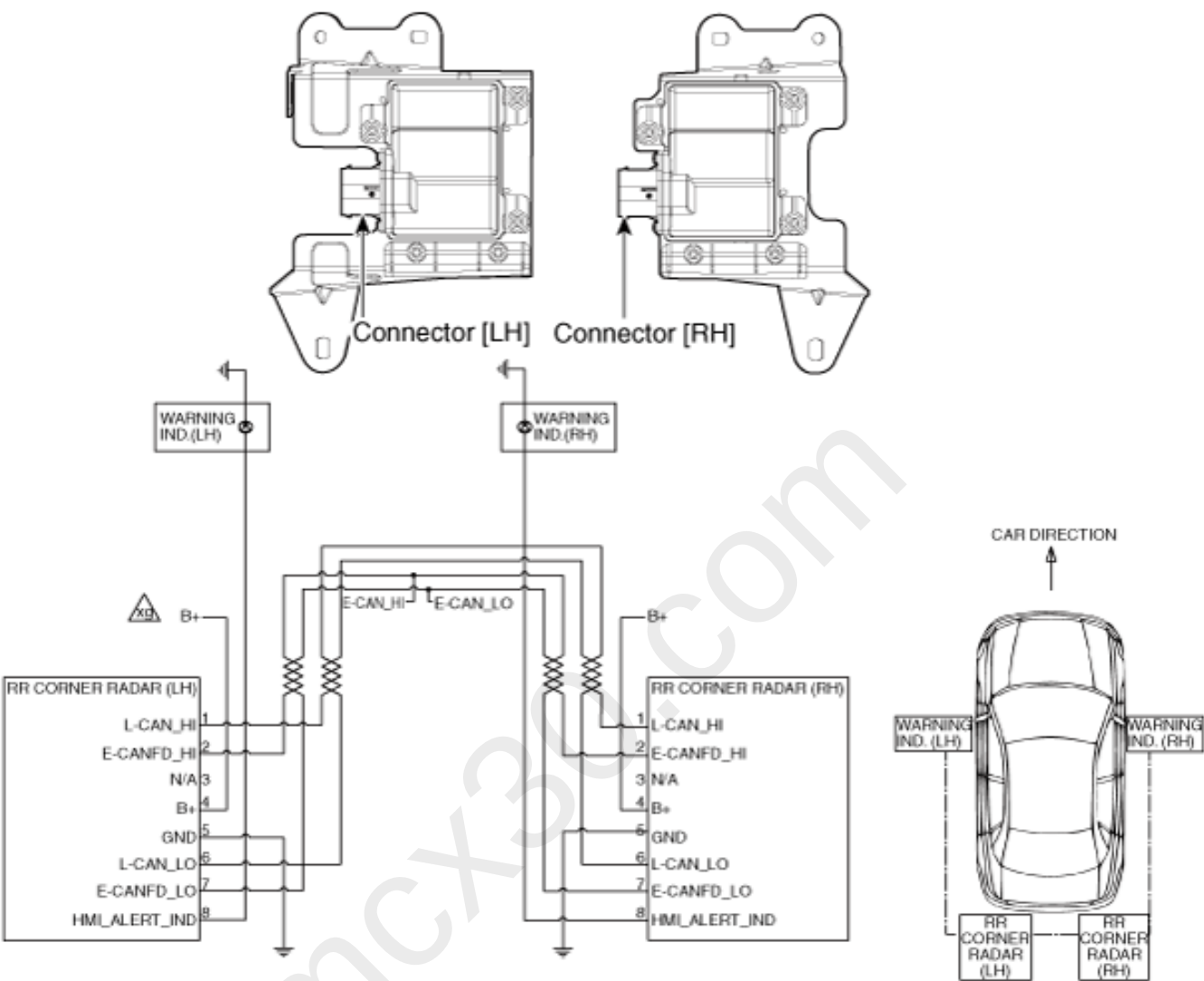
Items	Safe Exit Warning (SEW)
Rated voltage	DC 12V
Operating voltage	9V ~ 16V
Operating speed	0 km/h ~ 3 km/h

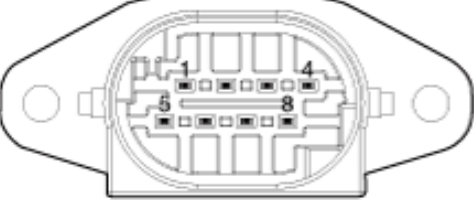
Sensible distance	30m
Curvature radius	-
Frequency	77 GHz
Numbers	2 EA

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Connector and Terminal
Function

[Connector Funtion]



Connector [LH/RH]	Pin NO	Description [LH]	Pin NO	Description [LH]
	1	L-CAN (High)	1	L-CAN (High)
	2	E-CAN FD (High)	2	E-CAN FD (High)
	3	-	3	-
	4	Battery (+)	4	Battery (+)
	5	Ground	5	Ground
	6	L-CAN (Low)	6	L-CAN (Low)
	7	E-CAN FD (Low)	7	E-CAN FD (Low)
	8	Warning Indicator [LH]	8	Warning Indicator [RH]

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the rear bumper assembly.
(Refer to Body - "Rear Bumper Assembly")
3. Disconnect the rear corner radar connector (A).



4. Loosen the mounting nuts and remove the rear corner radar unit (A)



•Be careful not to damage the bracket when removing the rear corner radar unit.



Installation

1. Install the rear corner radar unit and bracket.

Tightening torque :

9.0 - 10.5 N.m (0.92 - 1.07 kgf.m, 6.7 - 7.7 lb-ft)

2. install the rear bumper cover.
3. Connect the negative (-) battery terminal.



- Take care not to confuse left side (master) and right side (slave) unit when installing.

4. Perform "Correcting the Rear Corner Radar Unit Angle" procedures.
5. Perform "Rear Corner Radar Calibration" procedures.

Inspection

Correcting the Rear Corner Radar Unit Angle

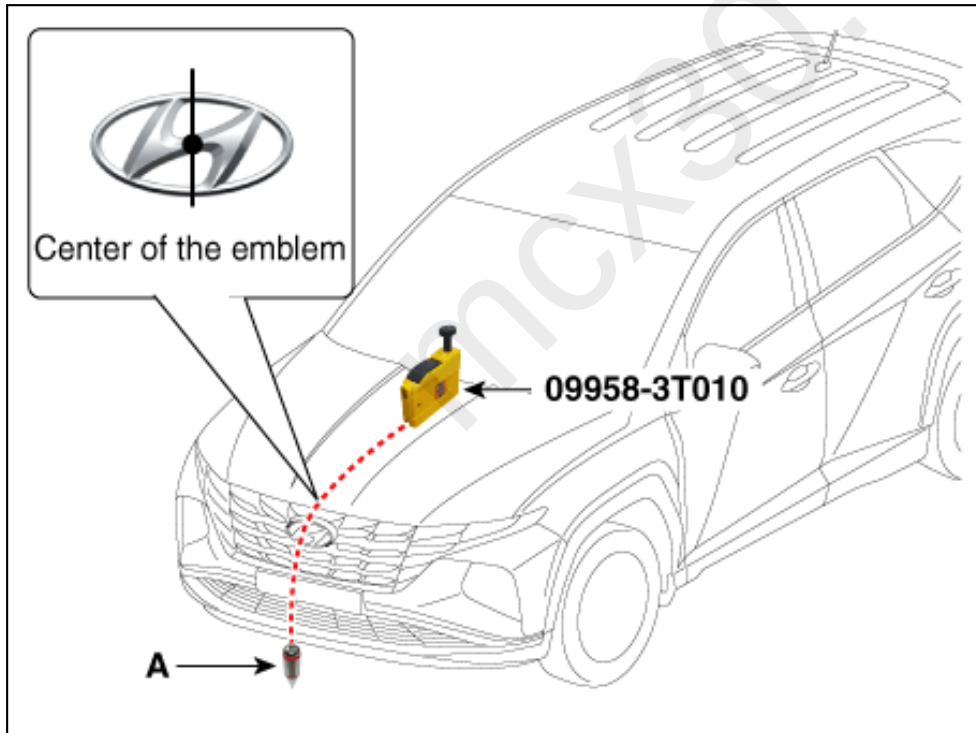
1. After replacing the rear corner radar unit or bracket, with the bumper removed, use the rear corner radar unit correction tool set (special tool : 09985-3T500) to perform angle correction.



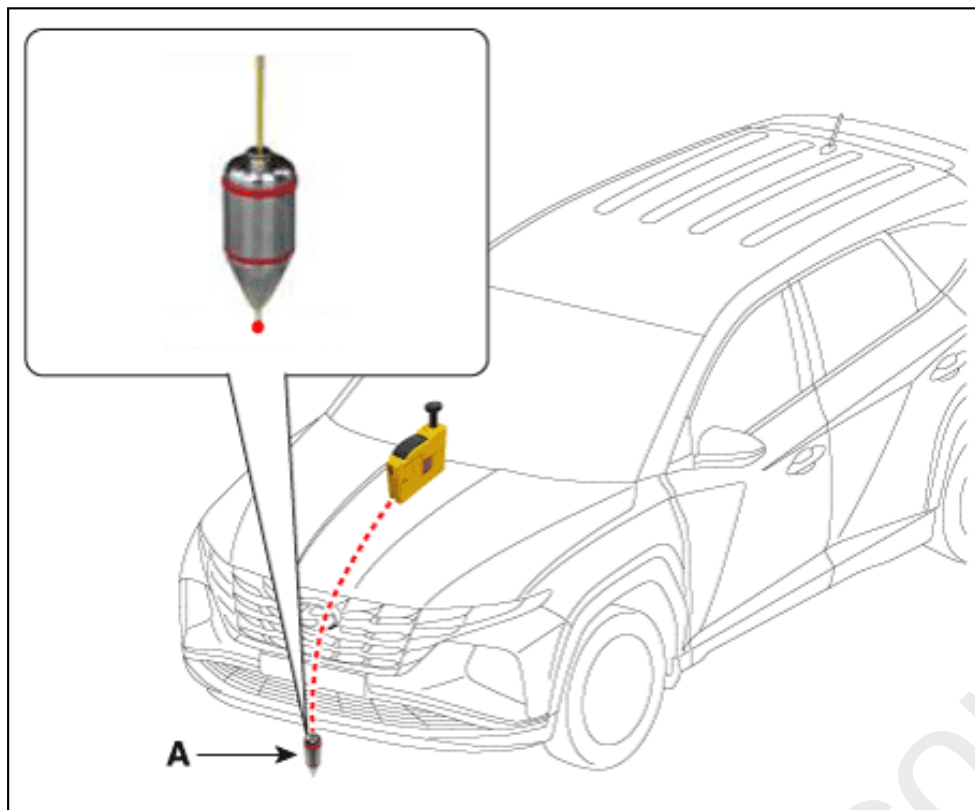
- Perform the task on a level place.
- Perform the task after checking the tire pressure.



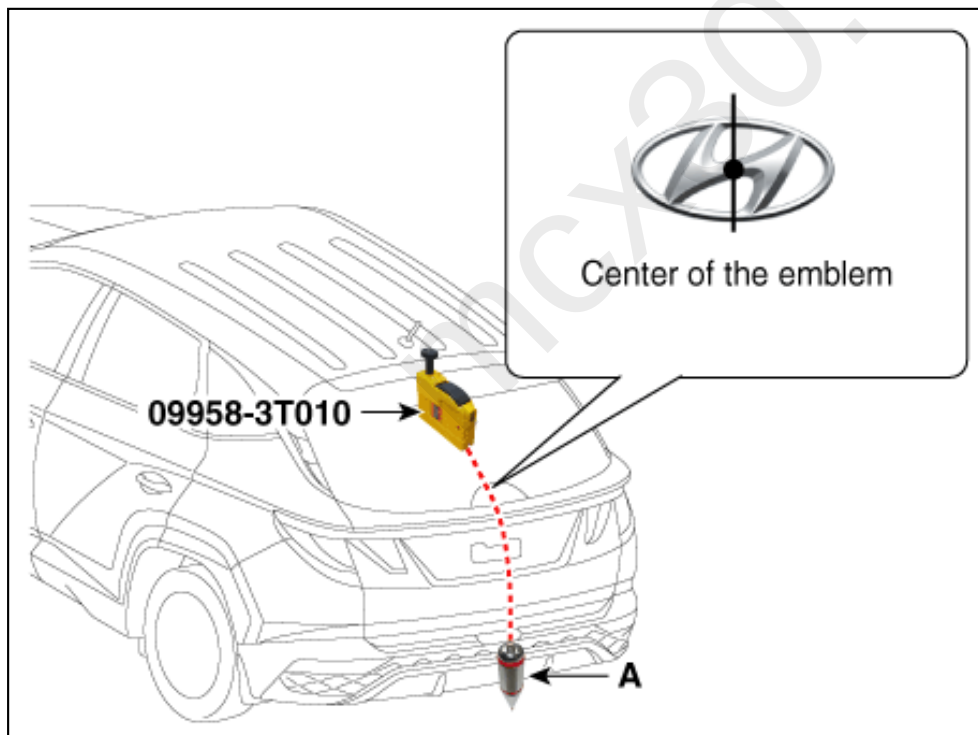
2. Attach a vertical plumb (special tool : 09958-3T010) on the hood, and lower the plumb (A) to the ground so that it passes through the center of the emblem.



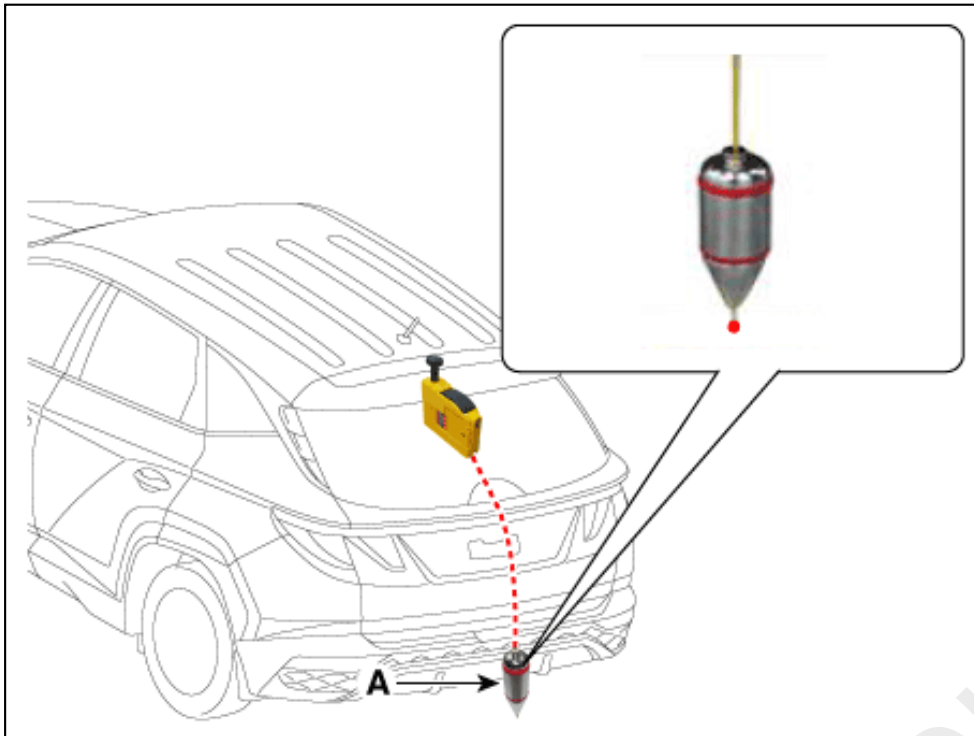
3. Marking the center point below the plumb (A).



4. Attach a vertical plumb (special tool : 09958-3T010) on the trunk (or tailgate), and lower the plumb (A) to the ground so that it passes through the center of the emblem.

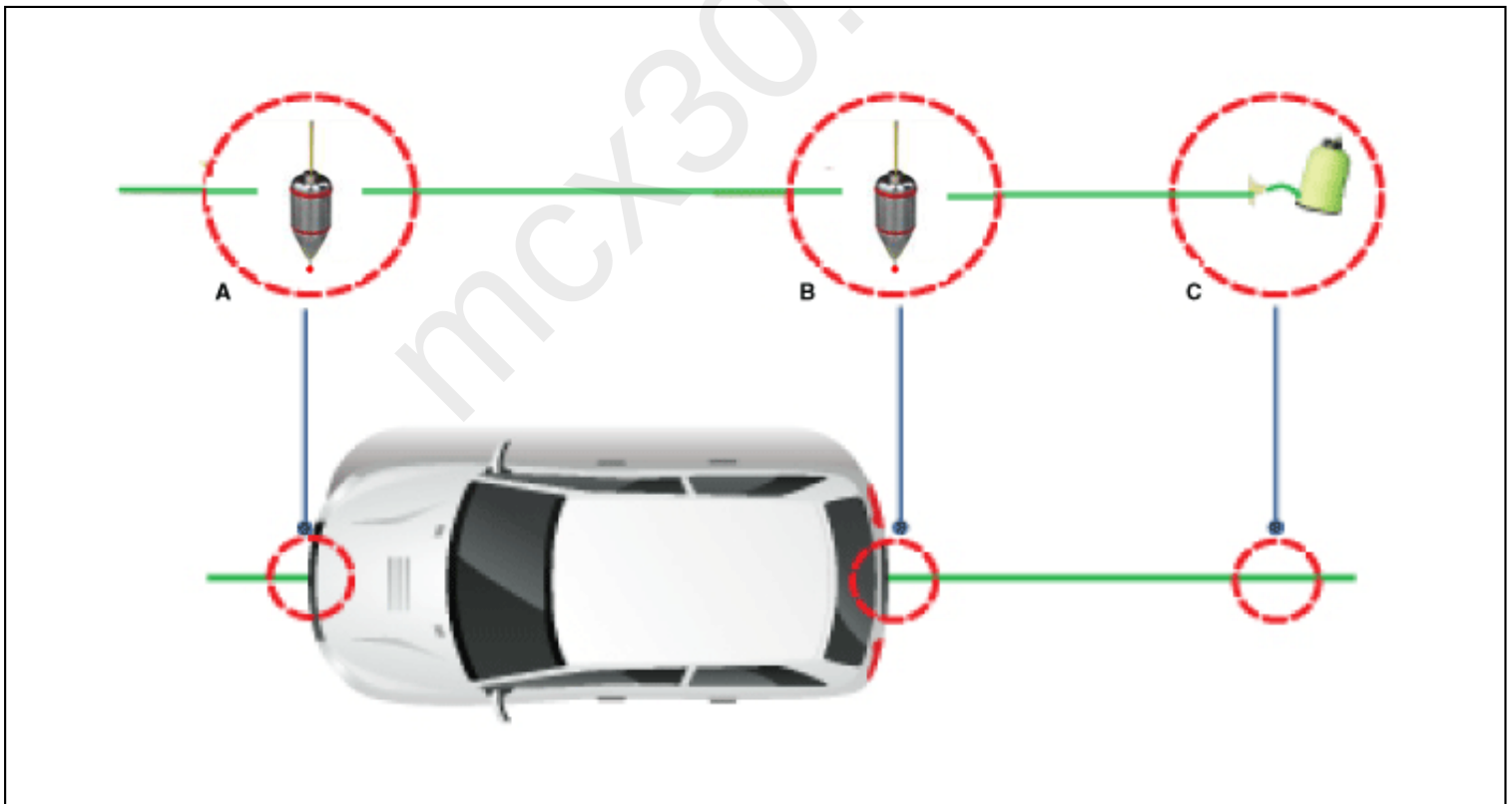


5. Marking the center point below the plumb (A).

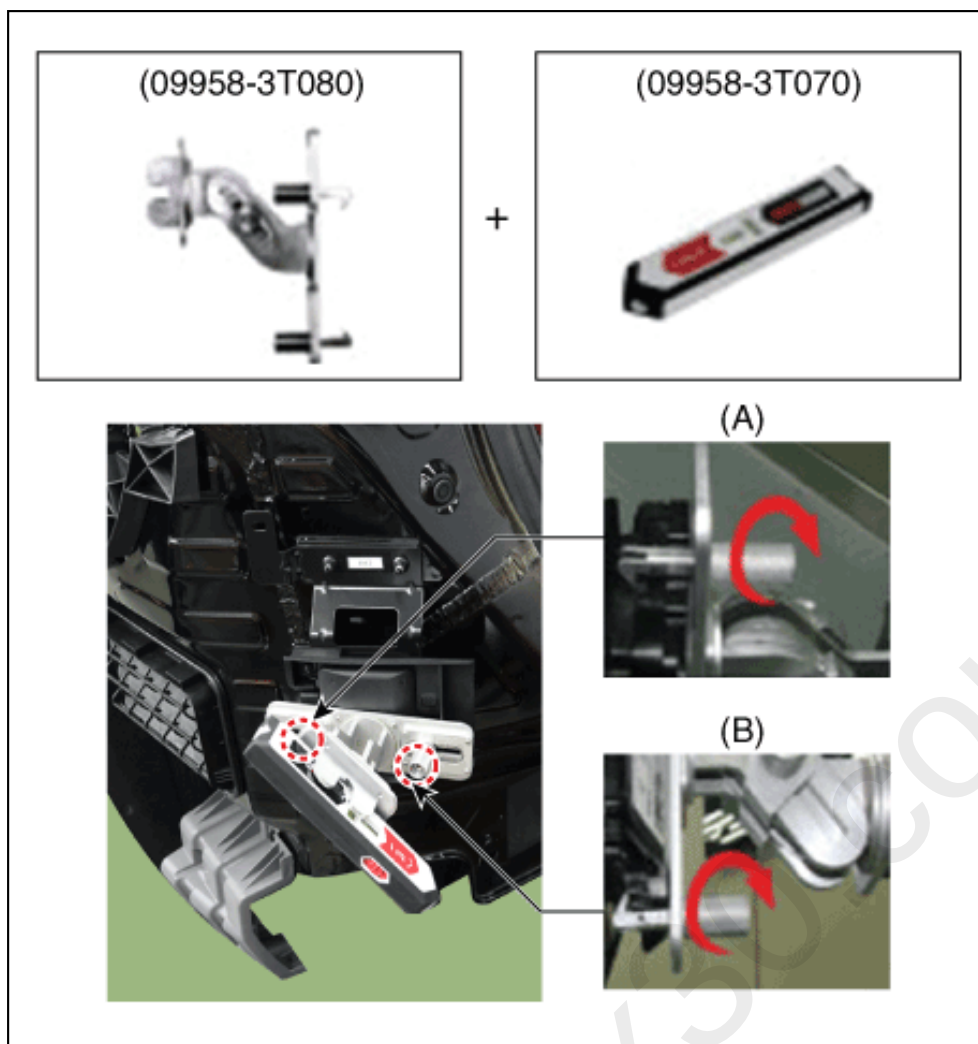


6. Marking the center of vehicle by a string.

- 1) Pass the string through the bottom of the vehicle from the rear of the vehicle to the front and fix the string to the center point (A) of the front of the vehicle.
- 2) Fix the string to the point (C) about 1.5 - 2m from the back of the vehicle so that it passes the rear center point (B).



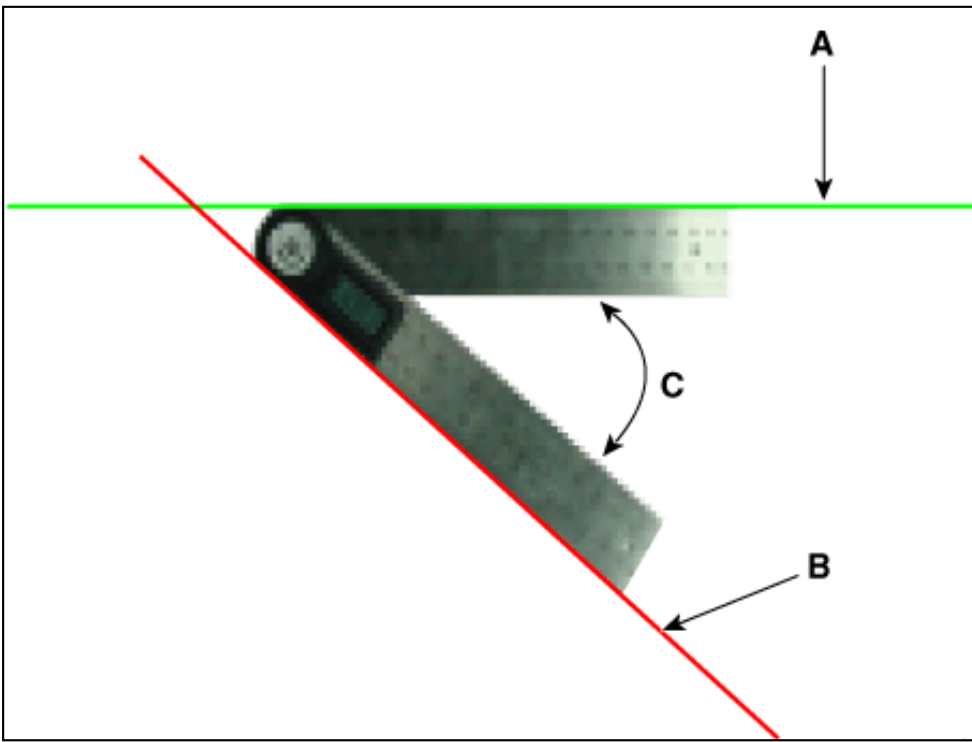
7. Mount the rear corner radar unit fixing adaptor (special tool : 09958-3T080) on the rear corner radar unit and fix the level laser (special tool : 09958-3T070).



- When with the rear corner radar unit cover, remove the cover and then mount the fixing adaptor (special tool: 09958-3T080).

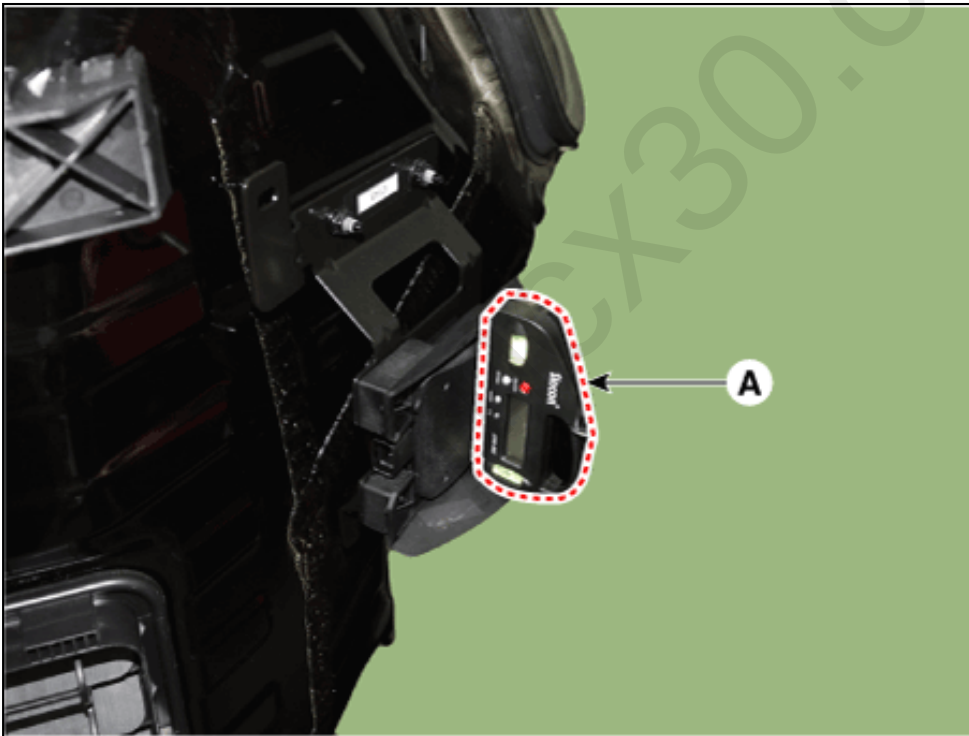
8. Measure the angle (C) between the center line (A) of the angle measuring plate and the horizontal laser beam (B) using a digital protractor (special tool : 09958-3T090).

Horizontal Angle (C): $45^{\circ} \pm 3^{\circ}$



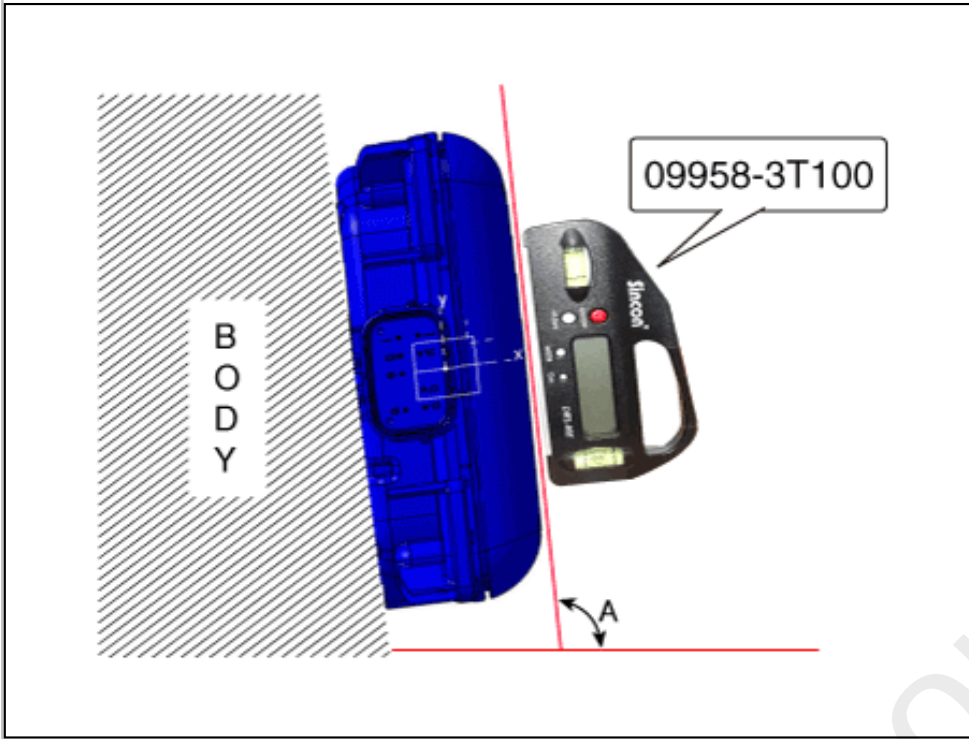
9. Use a digital inclinometer (special tool : 09958-3T100) to measure the vertical angle of the rear corner radar unit.

Vertical Angle : $90^\circ \pm 1.5^\circ$





- Digital Inclinator (09958-3T100) Vertical measurement angle (A) : $90^{\circ} \pm 1.5^{\circ}$

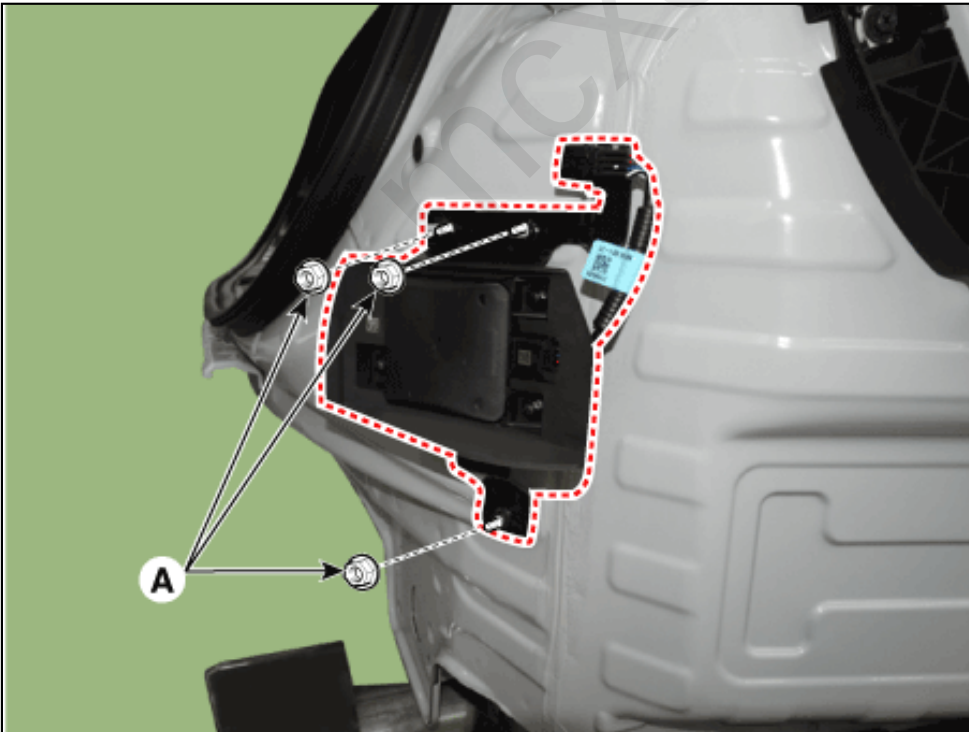


10. Measure the horizontal and vertical angles of left and right rear corner radar units. If the measured values deviate from the specified values, insert a washer between the bracket of the rear corner radar unit.

Specified Values

Horizontal Angle : $45^{\circ} \pm 3^{\circ}$

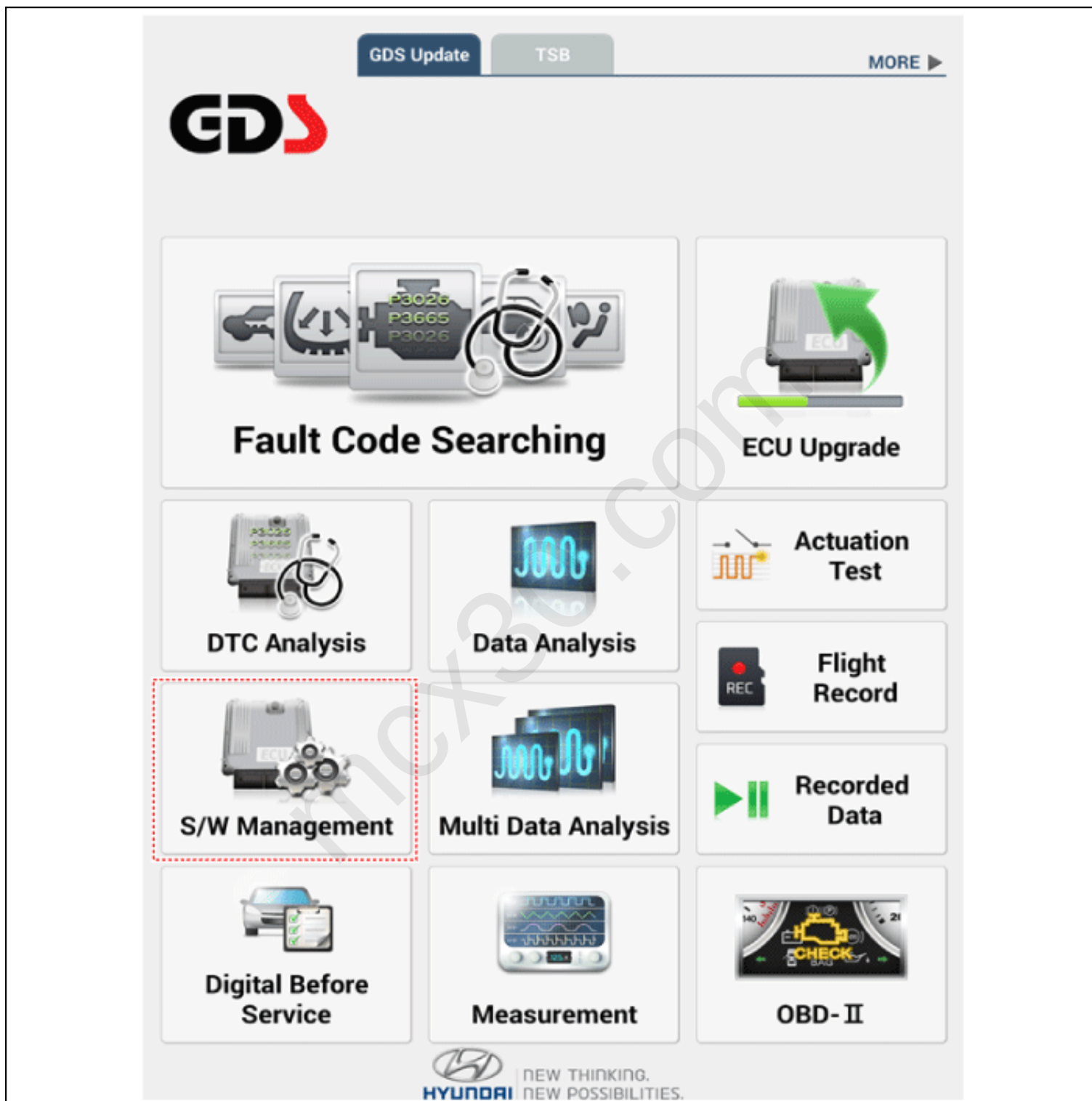
Vertical Angle : $90^{\circ} \pm 1.5^{\circ}$



11. After checking and correcting the rear corner radar unit angle, perform the rear corner radar correction procedure.

Rear Corner Radar Calibration

1. Rear bumper accident vehicles and vehicles that replaced rear corner radar units must perform rear corner radar unit alignment using Diagnostic tool.
2. Connect the cable of Diagnostic tool to the data link connector in driver side crash pad lower panel, and turn on the Diagnostic tool.
3. Select the 'S/W Management' and 'Car model'.



4. Select "Blind -Spot Collision Warning" and "BSD Radar Calibration".

S/W Management

Systems

Components

Unfold All

Air Conditioner

4WD Control

Motor Driven Power Steering

Rear View Monitor

Surround View Monitor

Parking Assist

Blind-Spot Collision Warning

System Identification

BSD Radar Calibration

Front View Camera

Adaptive Front Lighting System

Auto Headlamp Leveling System

Audio Video Navigation

Cluster Module

Driver Door Module

Head Up Display

!

Do not touch any system buttons while performing this function.

5. Perform the "BSD Radar Calibration" procedure according to the Diagnostic tool screen message.

S/W Management

■ BSD Radar Calibration

● [BSD Radar Calibration]

This function sets BSD Radar after replacement.

This calibration procedure will clear any 'Missing Calibration' DTCs which allows the Radar Sensors to go through the Self Alignment Procedure.

The Sensors continually self-align while the vehicle is driven.

It may take up to 30 seconds.

It will not allow cancelation of the process.

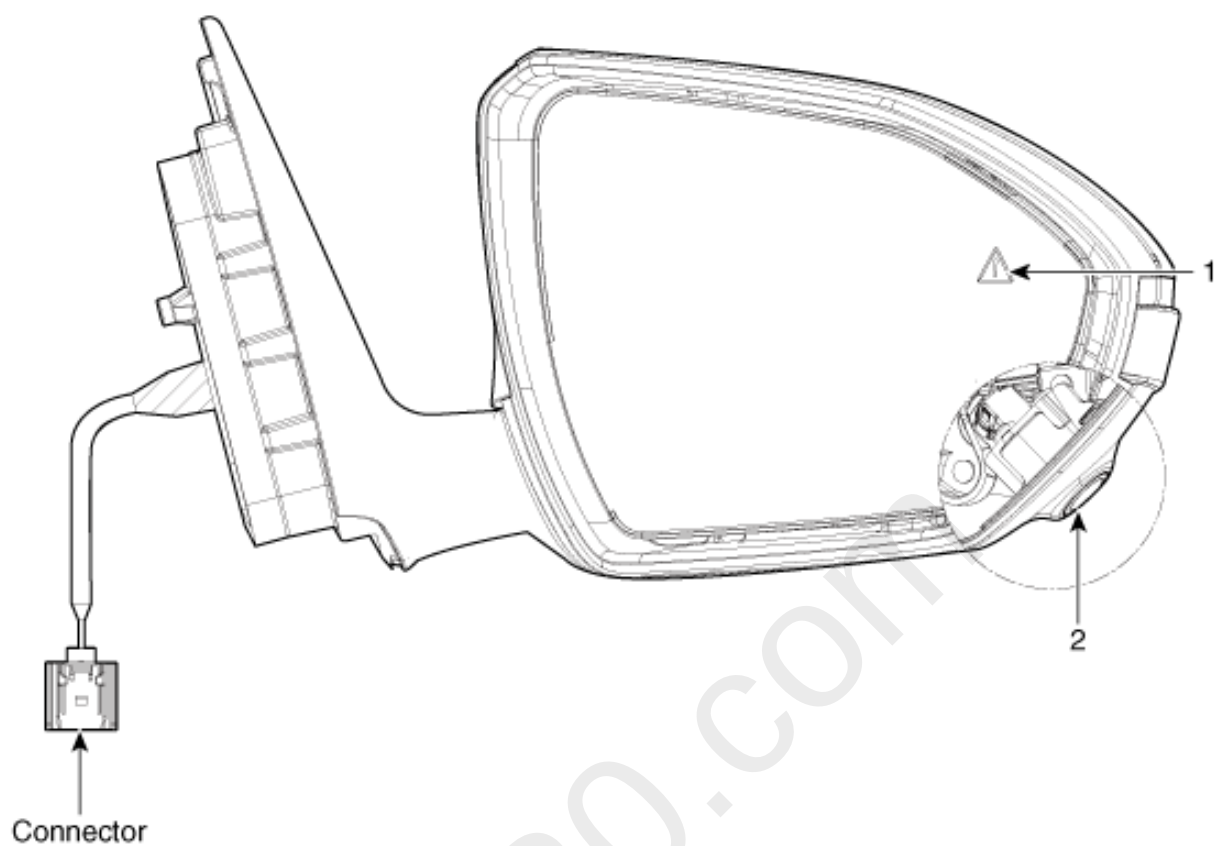
Press **[OK]** below to continue.

OK

Cancel



Do not touch any system buttons while performing this function.



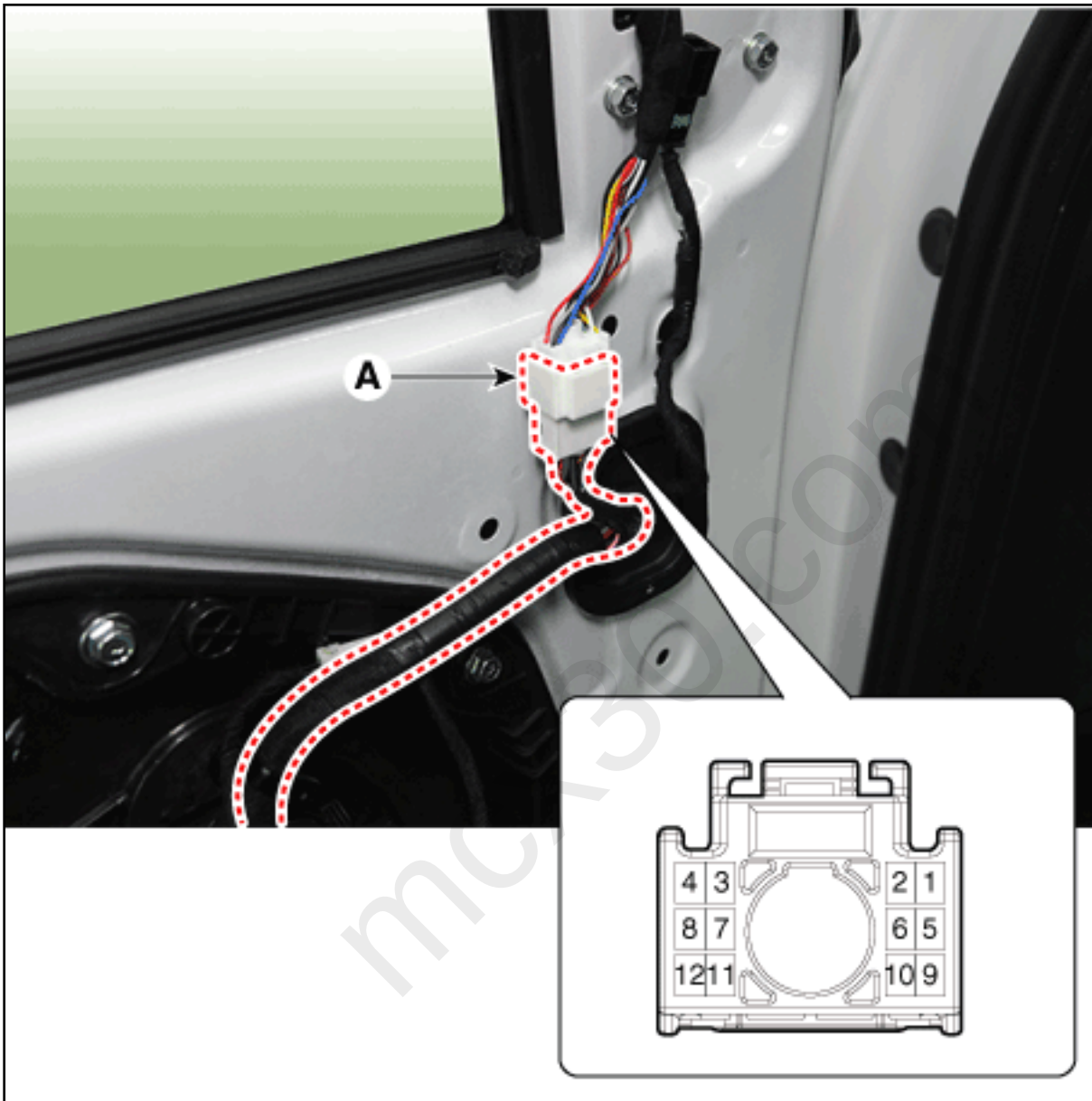
Connector	Pin NO	Description	Pin NO	Description
	1	Mirror motor (Vertical)	7	Mirror unfolding
	2	Mirror motor (COM)	8	Side repeater lamp (+)
	3	Mirror motor (Horizontal)	9	BCW Warning indicator (+)
	4	Mirror heater (+)	10	BCW Warning indicator (-)
	5	Mirror heater (-) / Side repeater lamp (-)	11	-
	6	Mirror folding	12	-

1. BCW Indicator

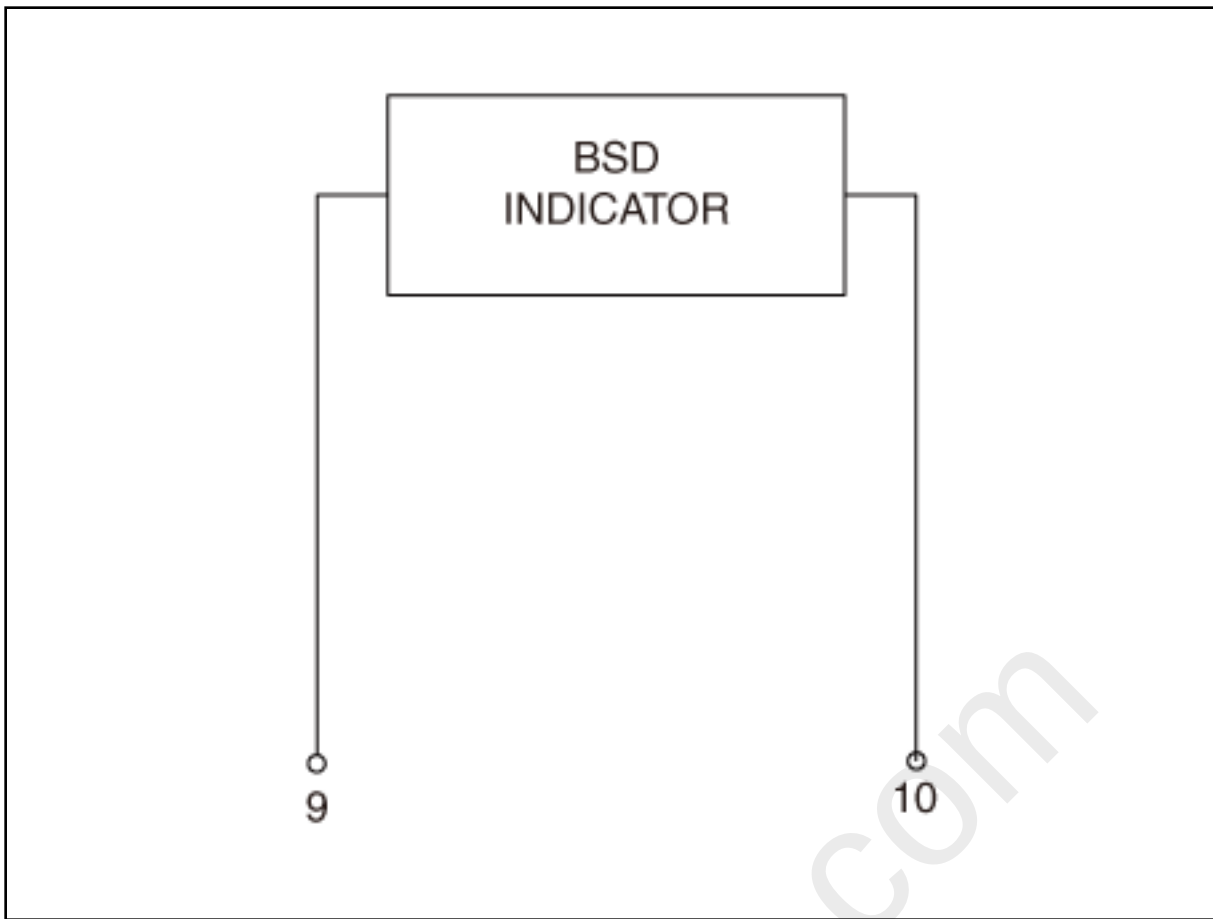
2. SVM Camera

Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
(Refer to Body - "Front door trim")
3. Disconnect the power door mirror connector from the harness

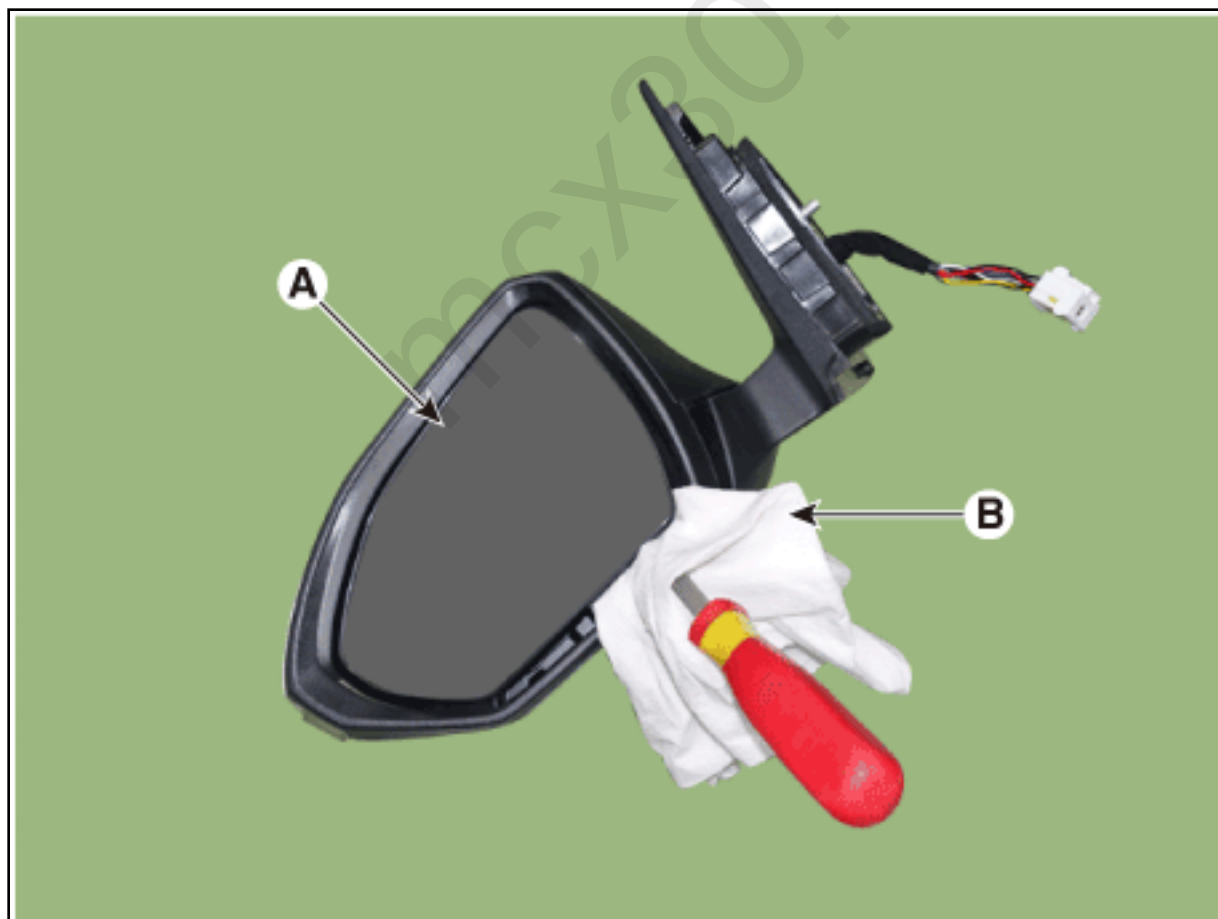
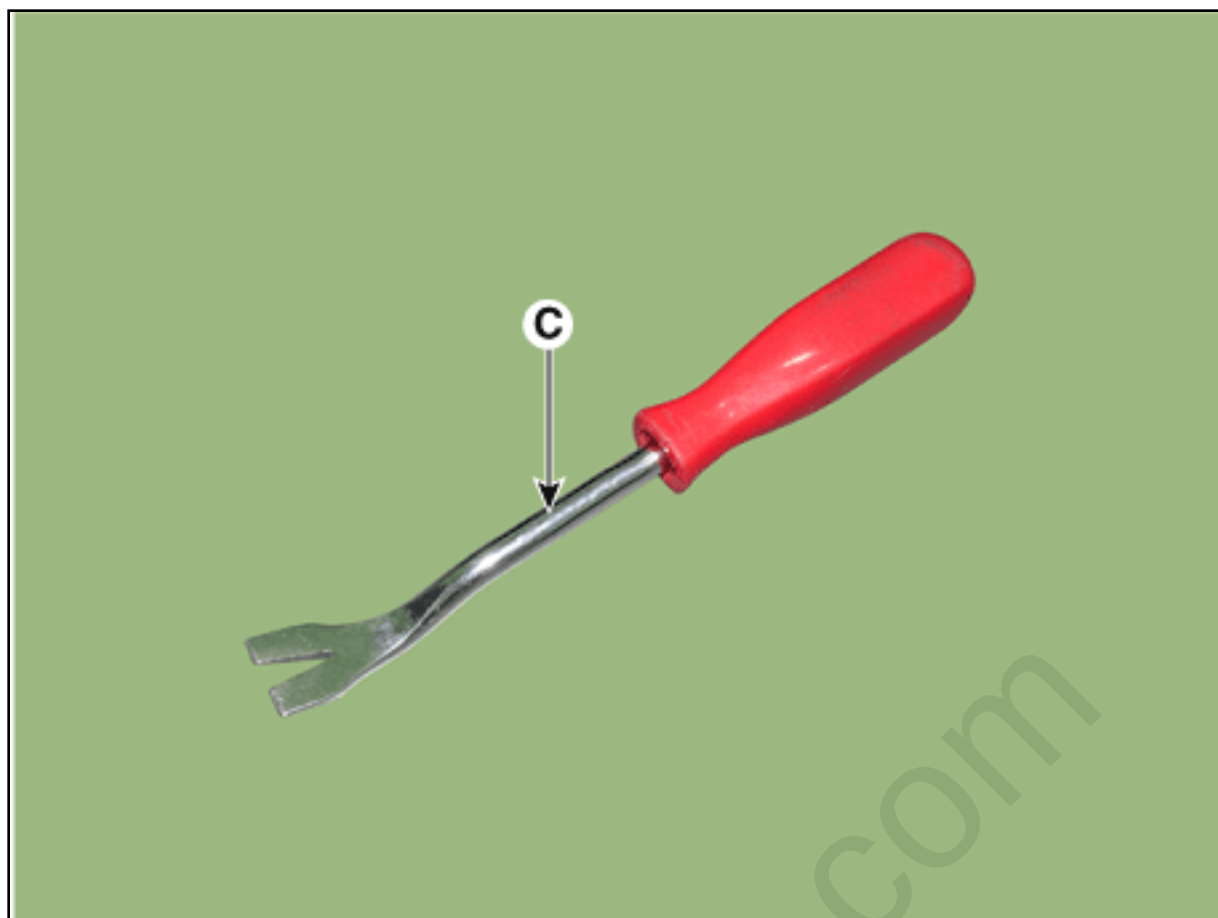


BCW indicator



Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the door mirror assembly.
(Refer to Body - "Outside Rear View Mirror")
3. Using a fastener remover (C), remove the mirror (A) as illustration below.

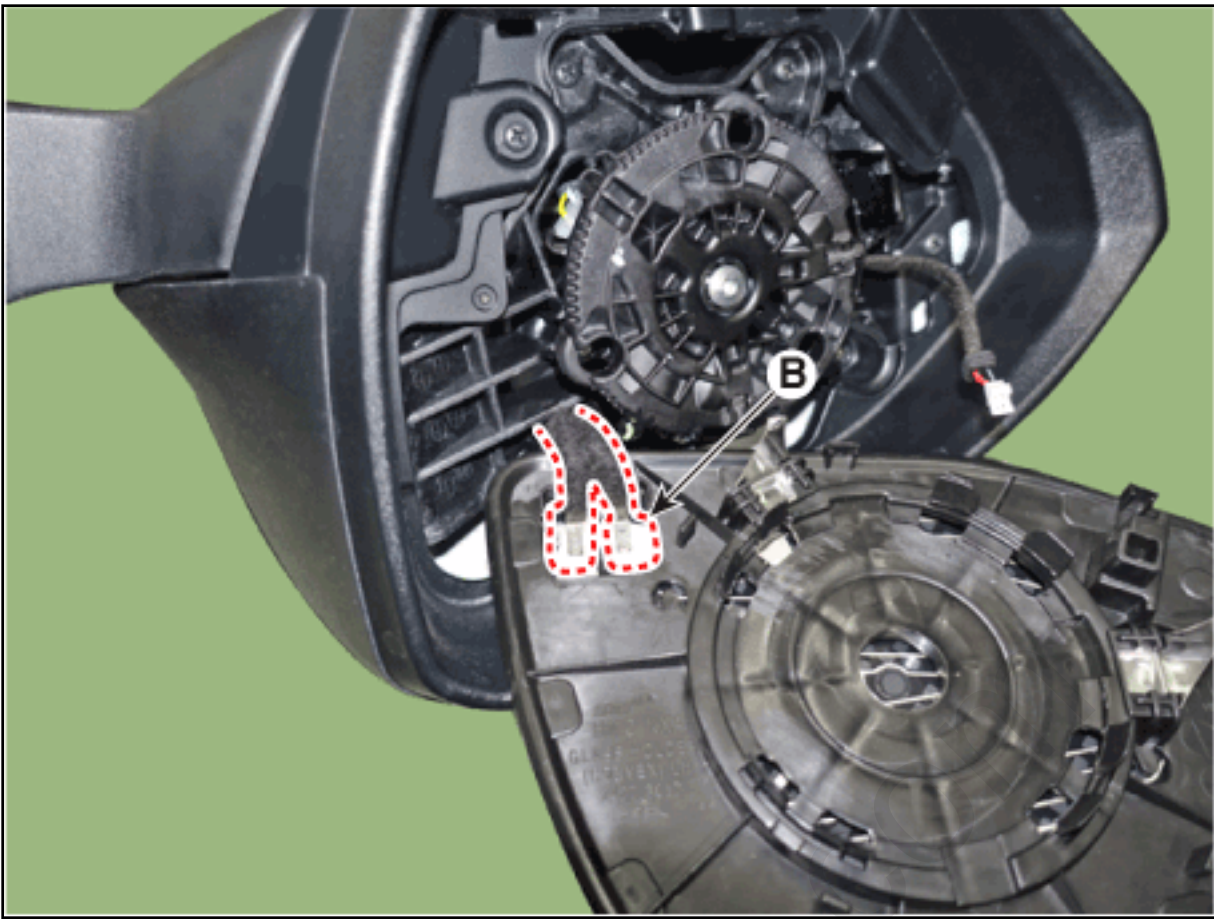




- Protect mirror from removing tool with cloth (B) wrapped.
- Be careful not to damage mirror and mirror housing during removing process.
- Apply force around the center of mirror because to apply force the end of mirror will break it.

4. Disconnect the mirror heater connector (B) and BCW connectors (A) and then remove the mirror.





Installation

1. Connect mirror heat wire connector and BCW connector then mount mirror.
2. Install the door mirror assembly.
3. Connect (-) battery terminal then check if door mirror lamp works normally.