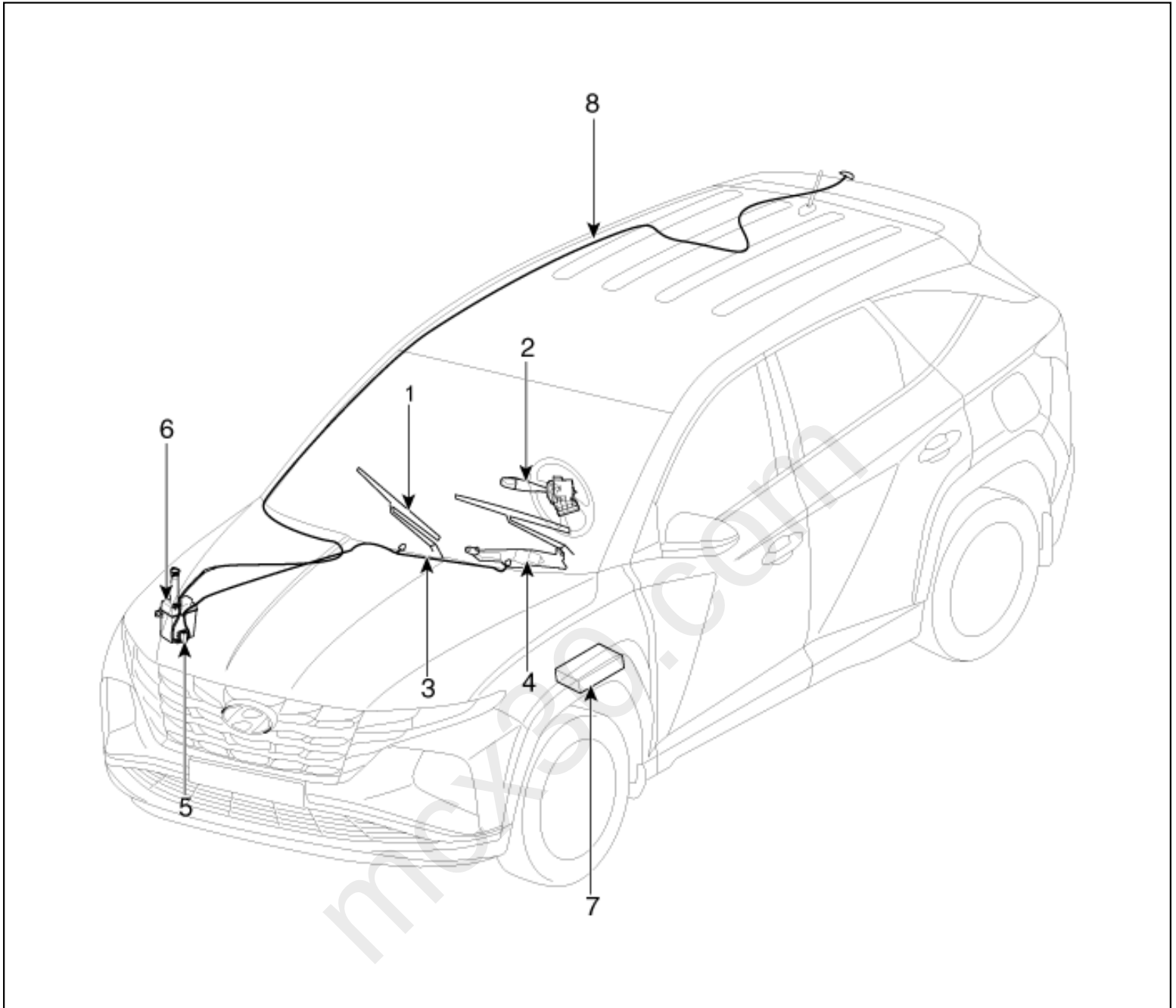


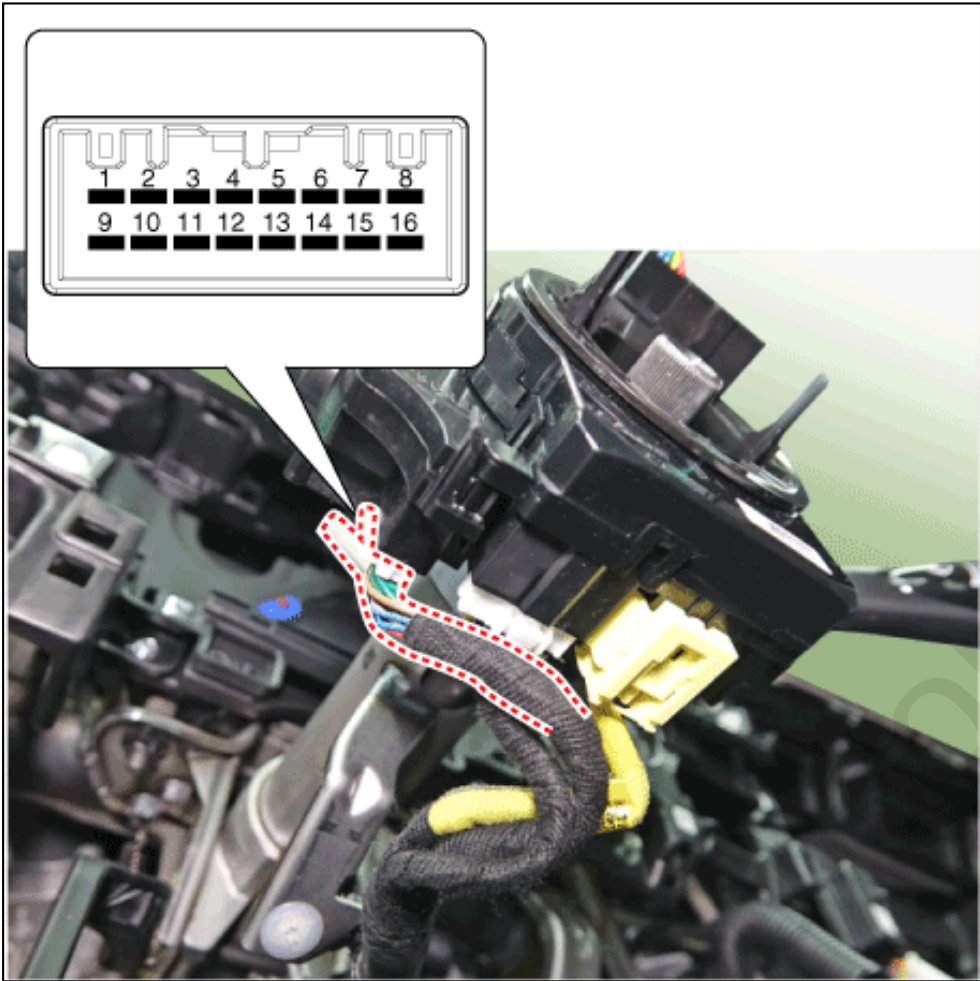
Component
Location



- | | |
|-------------------------------------|---|
| 1. Windshield wiper arm & blade | 5. Washer motor |
| 2. Wiper & washer switch | 6. Washer reservoir |
| 3. Windshield washer hose & nozzle | 7. Front wiper relay (Engine room junction block) |
| 4. Windshield wiper motor & linkage | 8. Rear washer hose & nozzle |

Inspection

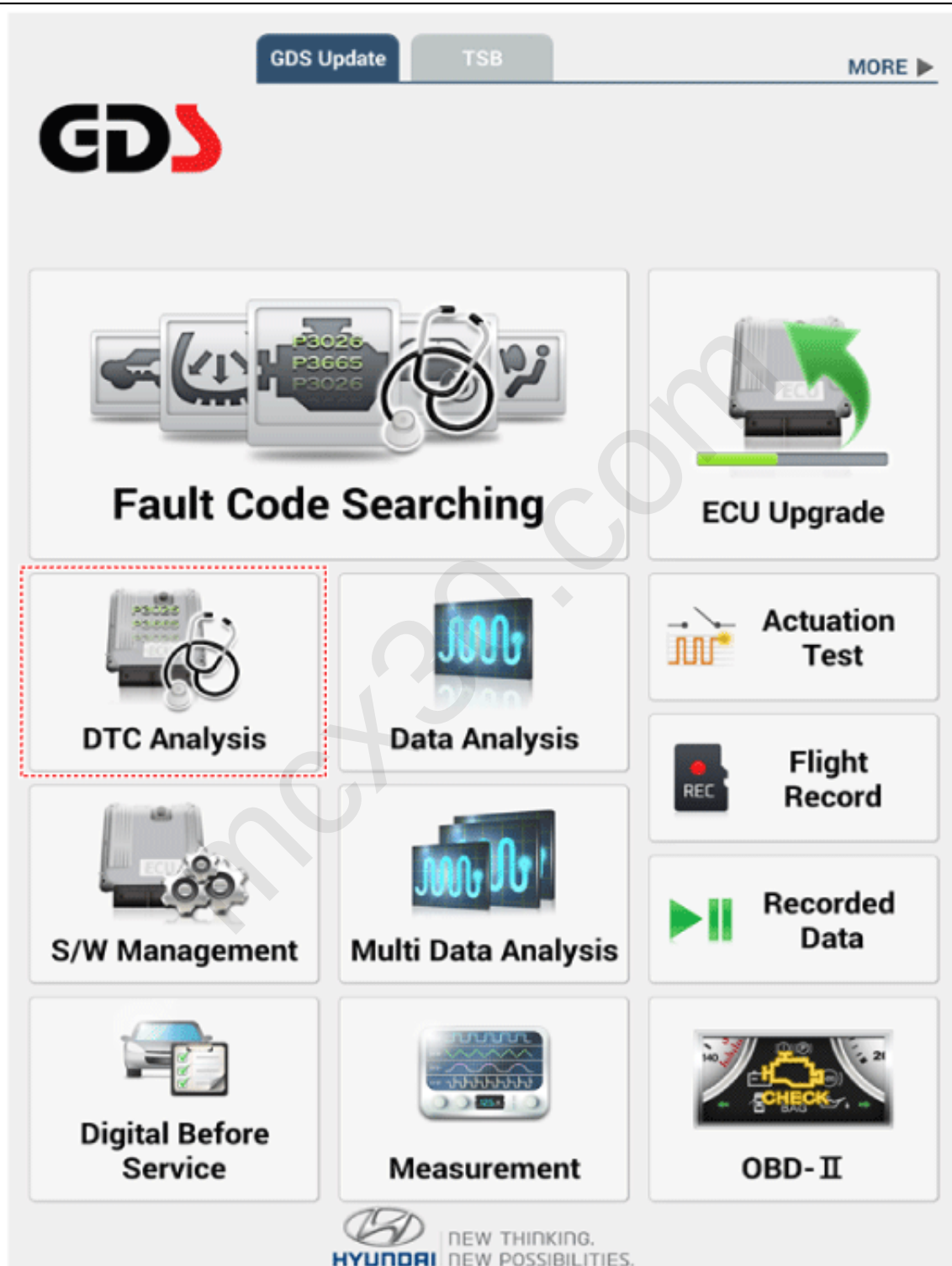
1. Check for continuity between the terminals in each switch position as shown below.



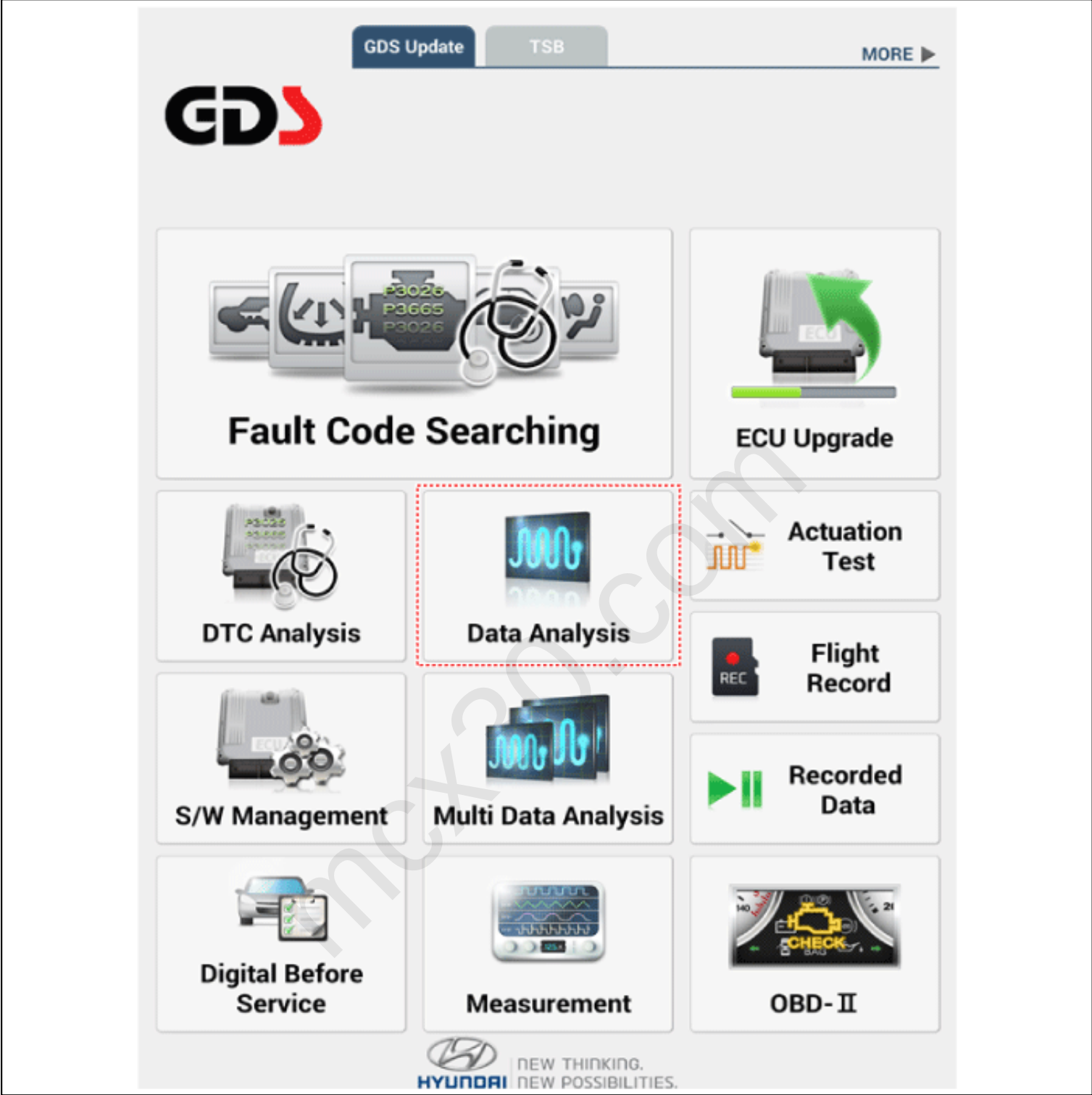
Switch	Switch position	Resistance (Ω , $\pm 3.5\%$)
Front wiper switch	MIST	330
	OFF	∞
	INT (Auto)	800
	Low	1800
	High	5700
Front wiper intermittent volume	Volume1	330
	Volume 2	690
	Volume 3	1310
	Volume 4	2610
	Volume 5	7310

Inspection (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. If diagnose the vehicle by diagnostic tool, select "DTC Analysis" and "Vehicle".



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



4. Select the 'IBU_BCM' to search the current state of the input/output data.



Data Analysis			
Sensor Name(67)	Value	Unit	Link Up
Head Lamp Escort	ON	-	
Rear Wiper Option Setting	ON	-	
Welcome Mirror or Light (Enable on Door Unlock)	ON	-	
Welcome Mirror or Light (Enable on Driver Approach)	ON	-	
Battery Voltage Monitoring Input	11.6	V	
Light Switch Voltage(Voltage Divided)	2.0	V	
Head Lamp High Switch Voltage(Voltage Divided)	5.0	V	
Fog Lamp Switch Voltage(Voltage Divided)	5.0	V	
Front Wiper Switch Voltage(Voltage Divided)	2.2	V	
Wiper INT Volume Voltage(Voltage Divided)	2.8	V	
Rear Wiper Switch Voltage(Voltage Divided)	5.0	V	
ACC Input Voltage	0.00	V	
Ignition 1 Voltage	0.00	V	
Ignition 2 Voltage	0.00	V	
ACC	OFF	-	
IGN1	OFF	-	
IGN2	OFF	-	
Security LED	ON	-	
PAS Switch/RPAS OFF Switch	OFF	-	
PAS Indicator/RPAS OFF Indicator	OFF	-	

Removal

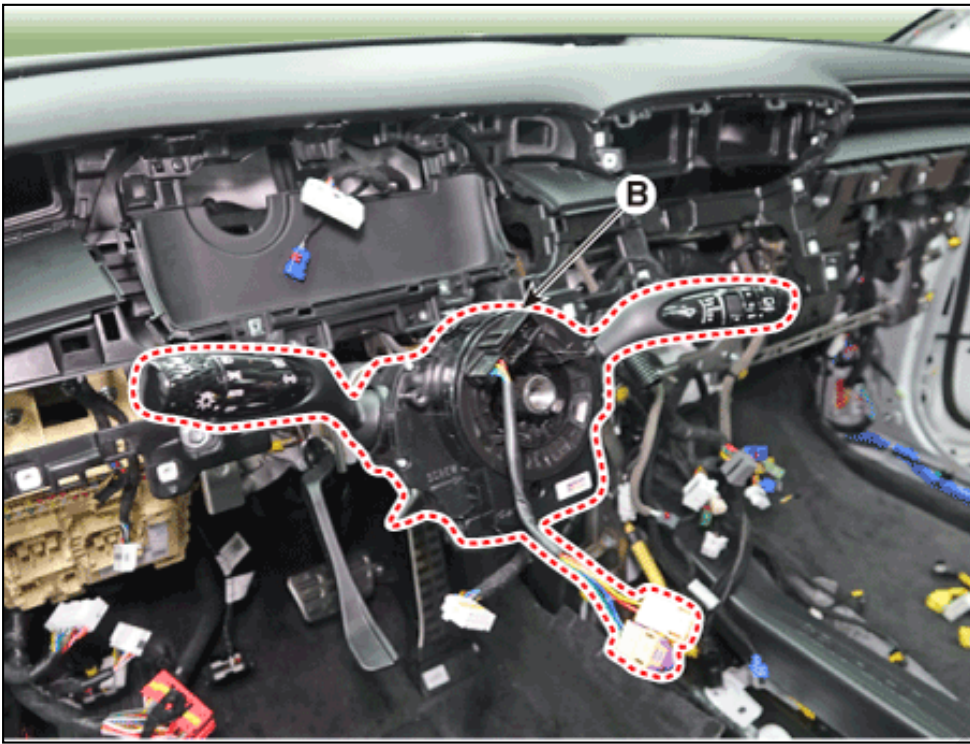
1. Disconnect the negative (-) battery terminal.
2. Remove the clock spring.
(Refer to Restraint - "Driver Airbag(DAB) and Clock Spring")

3. Disconnect multifunction connectors (A).



4. Remove the multifunction switch (B) after loosening the mounting clamp (A).





Installation

1. Install the multifunction switch after connecting switch connectors.
2. Install the clock spring .
3. Install the upper and lower shroud.
4. Install the steering wheel.
5. Install the driver airbag.

Component
Location

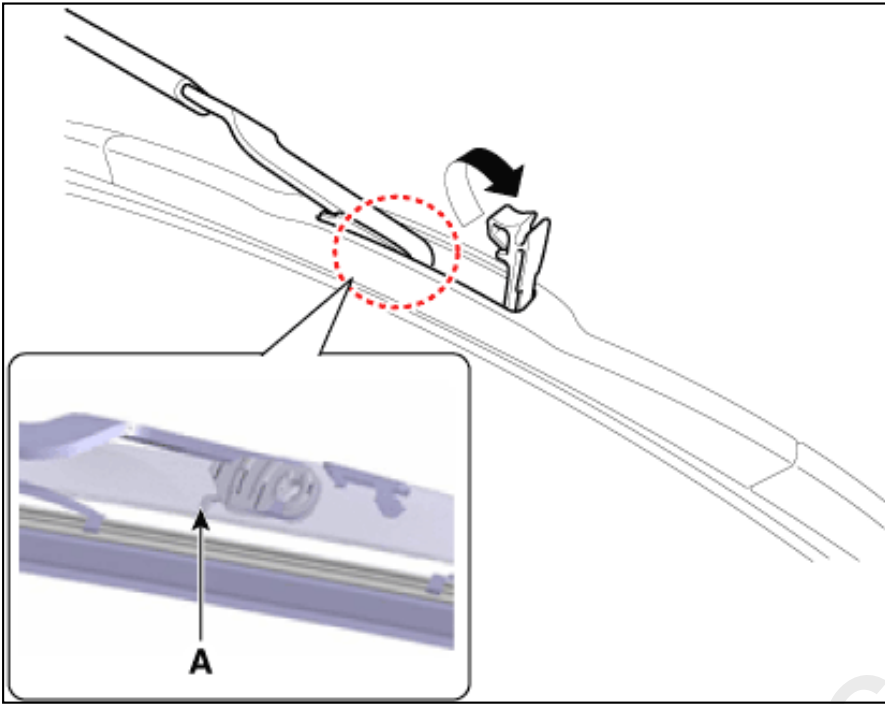


- | | |
|----------------------|-----------------------------------|
| 1. Cap | 5. Bolt |
| 2. Nut | 6. Wiper motor & linkage assembly |
| 3. Wiper arm & blade | 7. Wiper motor connector |
| 4. Cowl top cover | |

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Removal

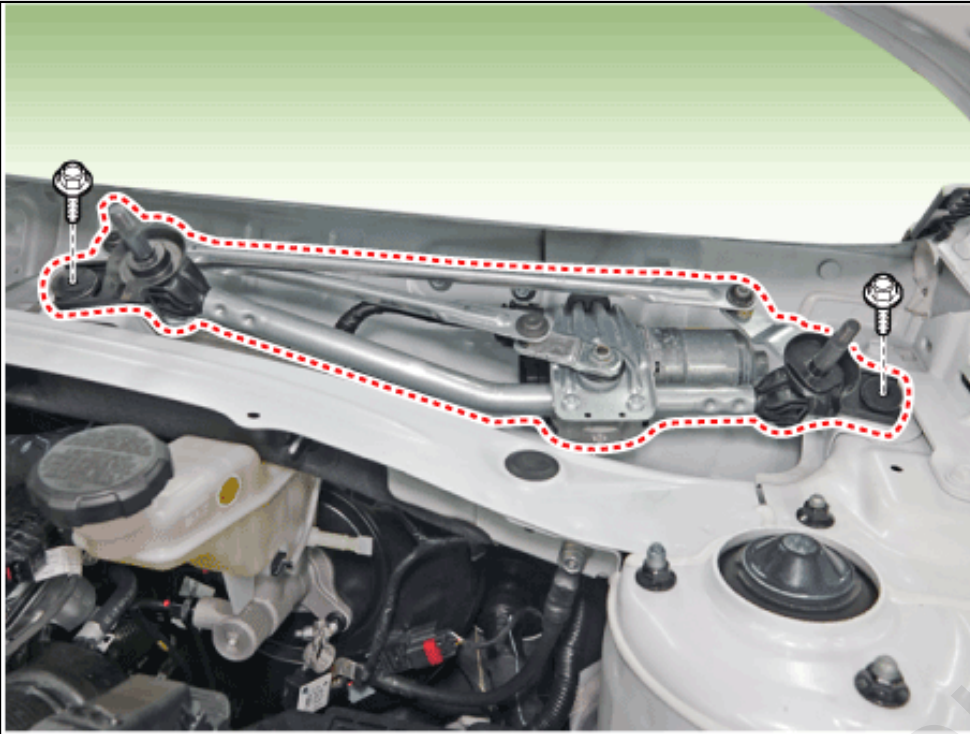
1. Disconnect the negative (-) battery terminal.
2. If necessary, release the wiper blade fixing clip(A) by pulling up and remove the wiper blade(B) from the inside radius of wiper arm.



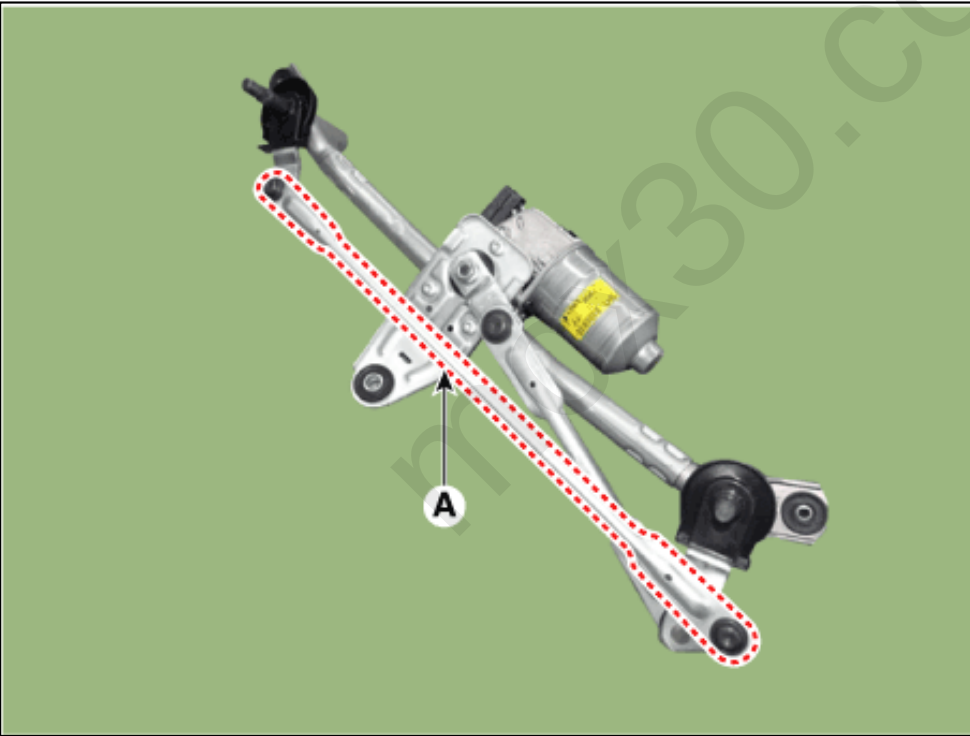
3. Remove the cowl top cover.
(Refer to Body - "Cowl Top Cover")
4. Disconnect the wiper motor connector (A).



5. Remove the windshield wiper motor and linkage assembly (A) after removing mounting bolts.

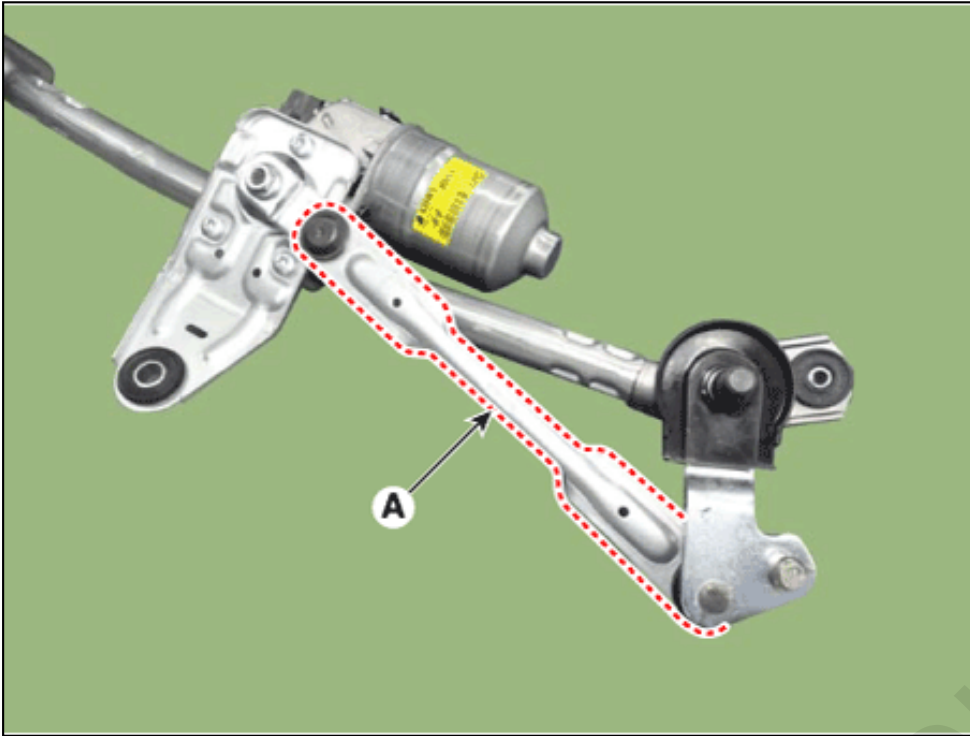


6. Hold the wiper motor crank arm and remove the upper linkage (A) from the wiper motor crank arm.



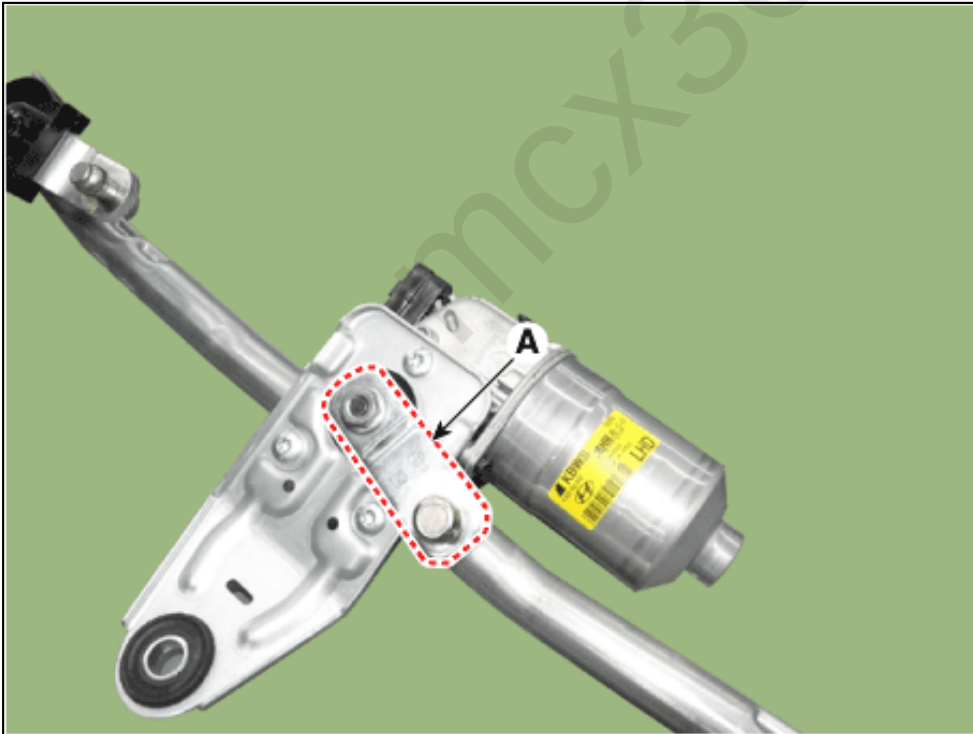
Before removing the wiper motor and linkage assembly, make sure that the linkage is stopped at auto stop position. To install the wiper motor crank arm exactly, check that the linkage is aligned with the crank arm in straight line and the angle of each linkages. Be careful not to bend the linkage.

7. Remove the lower linkage (A) from the wiper motor crank arm.

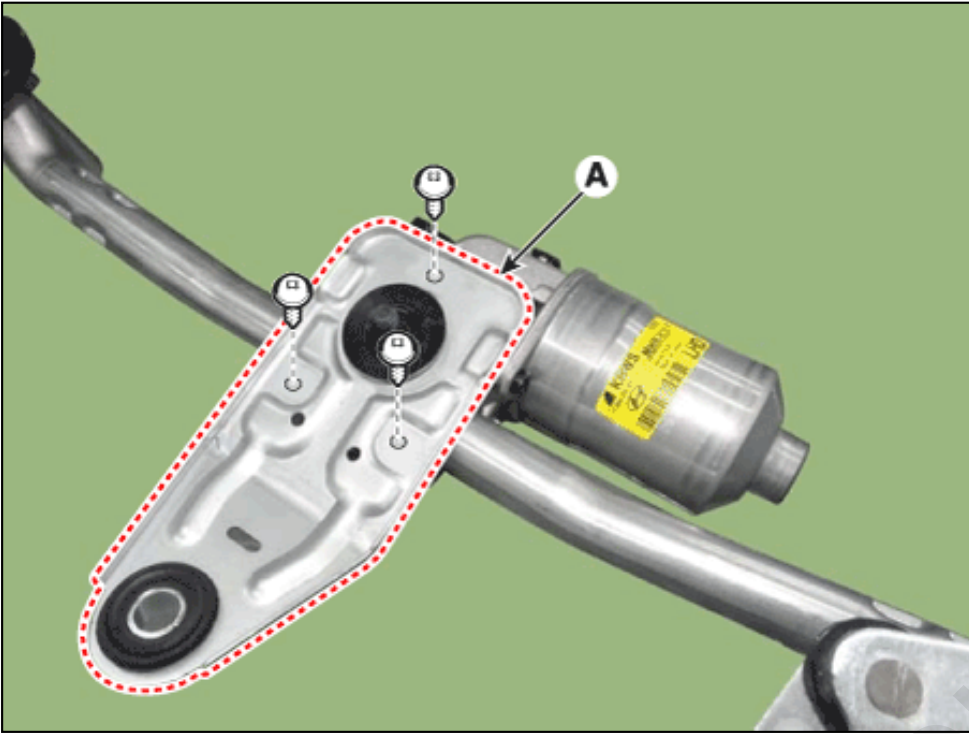


To install the wiper motor crank arm exactly, check that the linkage is aligned with the crank arm in straight line and the angle of each linkages.
Be careful not to bend the linkage.

8. Remove the crank arm (A) after loosening a nut.



9. Remove the bracket (A) after loosening mounting screws.



10. Remove the wiper motor.

Installation

1. Install the wiper motor and linkage assembly and then connect the wiper motor connector.

Tightening torque :

6.9 - 10.8 Nm (0.7 - 1.1 kgf.m, 5.0 - 7.9 lbf.ft)

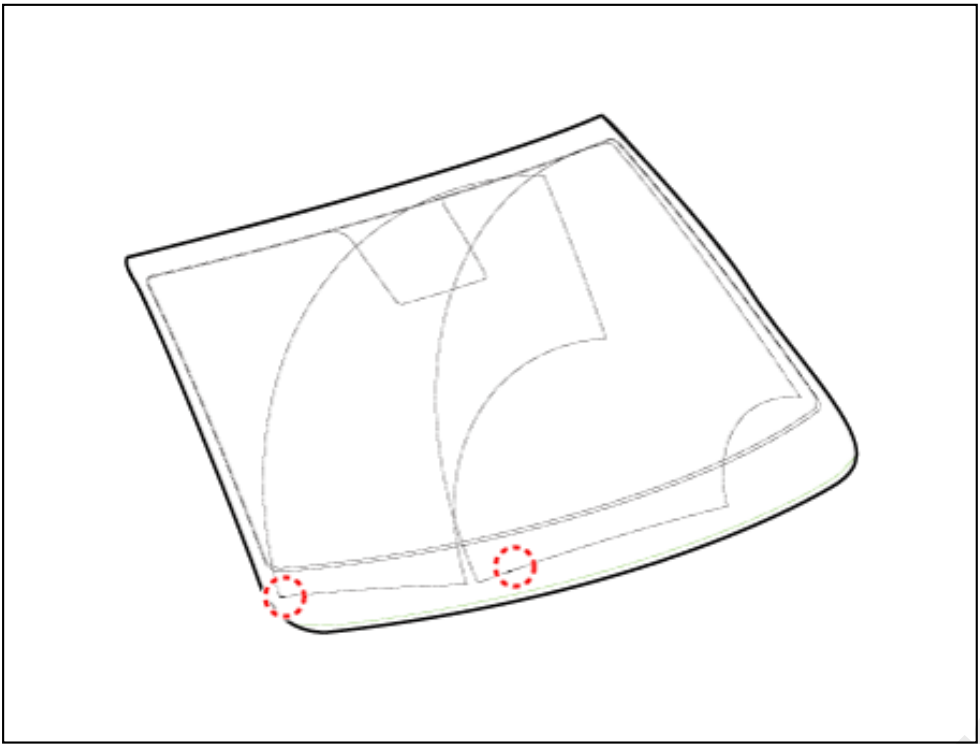
2. Install the cowl top cover.

3. Install the windshield wiper arm and blade.

Tightening torque :

22.5 - 26.5 Nm (2.3 - 2.7 kgf.m, 16.6 - 19.5 lbf.ft)

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



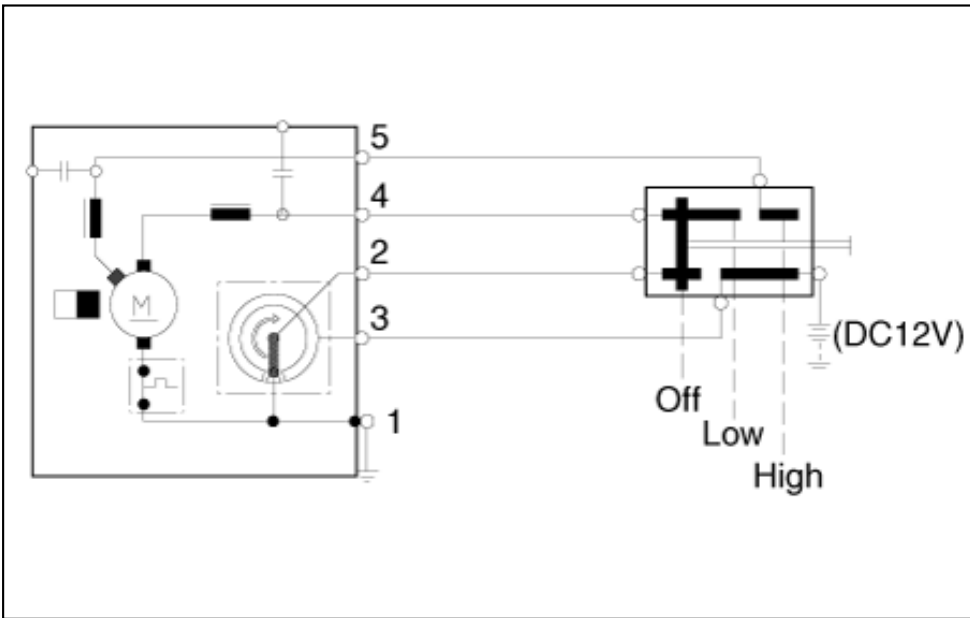
Check if the wiper stops at the specified position by operating it 2-3 times.

Inspection

- 1. Remove the connector (A) from the wiper motor.



2. Attach the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 1.
Check that the motor operates at low or high speed as below table.



img

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. If diagnose the vehicle by diagnostic tool, select "DTC Analysis" and "Vehicle".

GDS Update

TSB

MORE ►



Fault Code Searching



ECU Upgrade



DTC Analysis



Data Analysis



**Actuation
Test**



**Flight
Record**



S/W Management



Multi Data Analysis



**Recorded
Data**



**Digital Before
Service**



Measurement

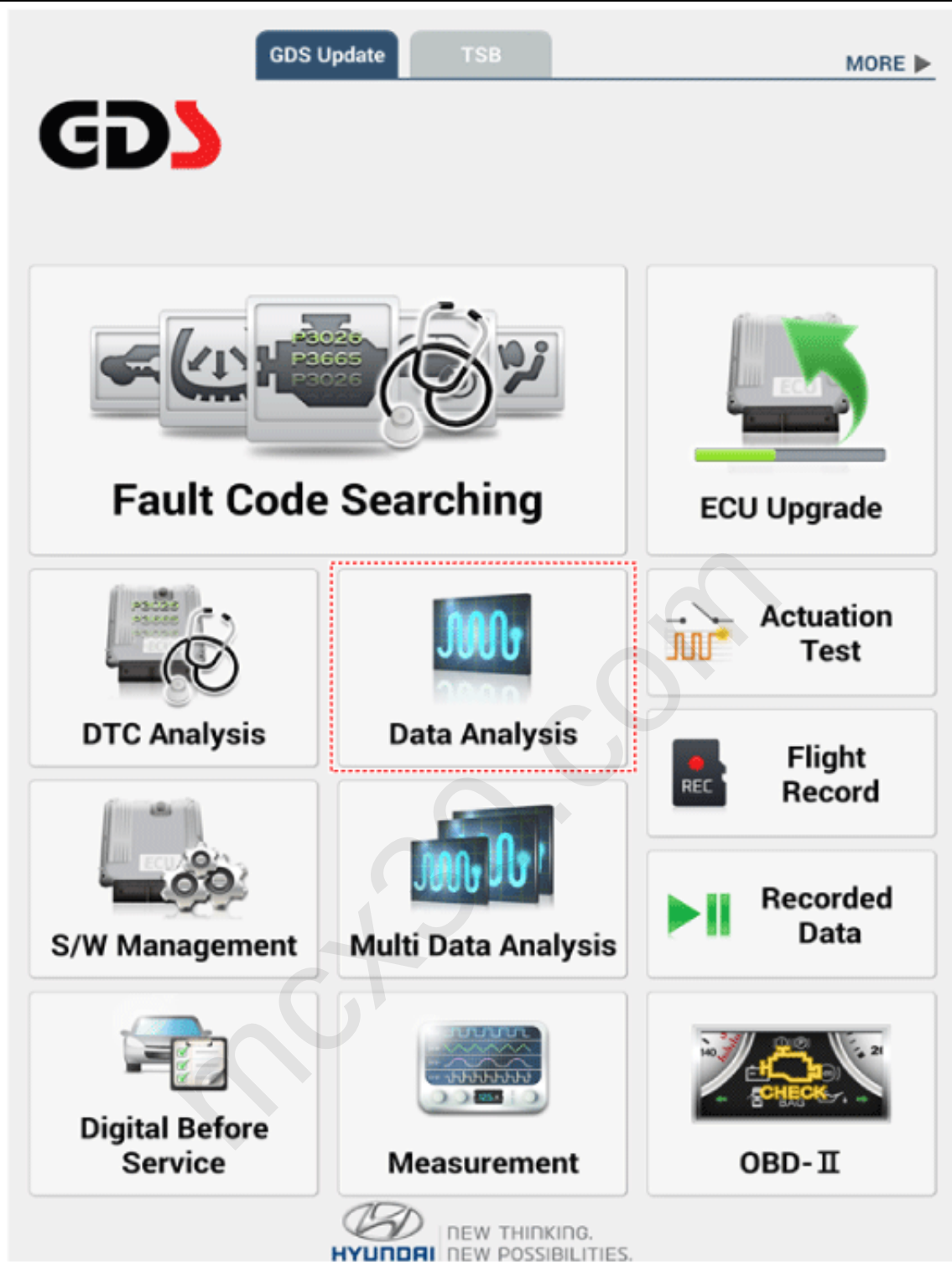


OBD- II



NEW THINKING.
NEW POSSIBILITIES.

3. Select the 'Data Analysis'.



4. Select the 'IBU_BCM' to search the current state of the input/output data.

Vehicle Selection

 x | 🔍

PREV

AUTO
VIN

RESET

SANTAFE(SM)		
SANTAMO(M2)		D 2.2 TCI-R

System Selection



• System

IBU-BCM

OK



Data Analysis

[Stop](#)[Graph](#)[Selective Display](#)[Actuation Test](#)

Sensor Name(67)	Value	Unit	Link Up
Head Lamp Escort	ON	-	
Rear Wiper Option Setting	ON	-	
Welcome Mirror or Light (Enable on Door Unlock)	ON	-	
Welcome Mirror or Light (Enable on Driver Approach)	ON	-	
Battery Voltage Monitoring Input	11.6	V	
Light Switch Voltage(Voltage Divided)	2.0	V	
Head Lamp High Switch Voltage(Voltage Divided)	5.0	V	
Fog Lamp Switch Voltage(Voltage Divided)	5.0	V	
Front Wiper Switch Voltage(Voltage Divided)	2.2	V	
Wiper INT Volume Voltage(Voltage Divided)	2.8	V	
Rear Wiper Switch Voltage(Voltage Divided)	5.0	V	
ACC Input Voltage	0.00	V	
Ignition 1 Voltage	0.00	V	
Ignition 2 Voltage	0.00	V	
ACC	OFF	-	
IGN1	OFF	-	
IGN2	OFF	-	
Security LED	ON	-	
PAS Switch/RPAS OFF Switch	OFF	-	
PAS Indicator/RPAS OFF Indicator	OFF	-	

Inspection

Front and Rear Washer Motor

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.



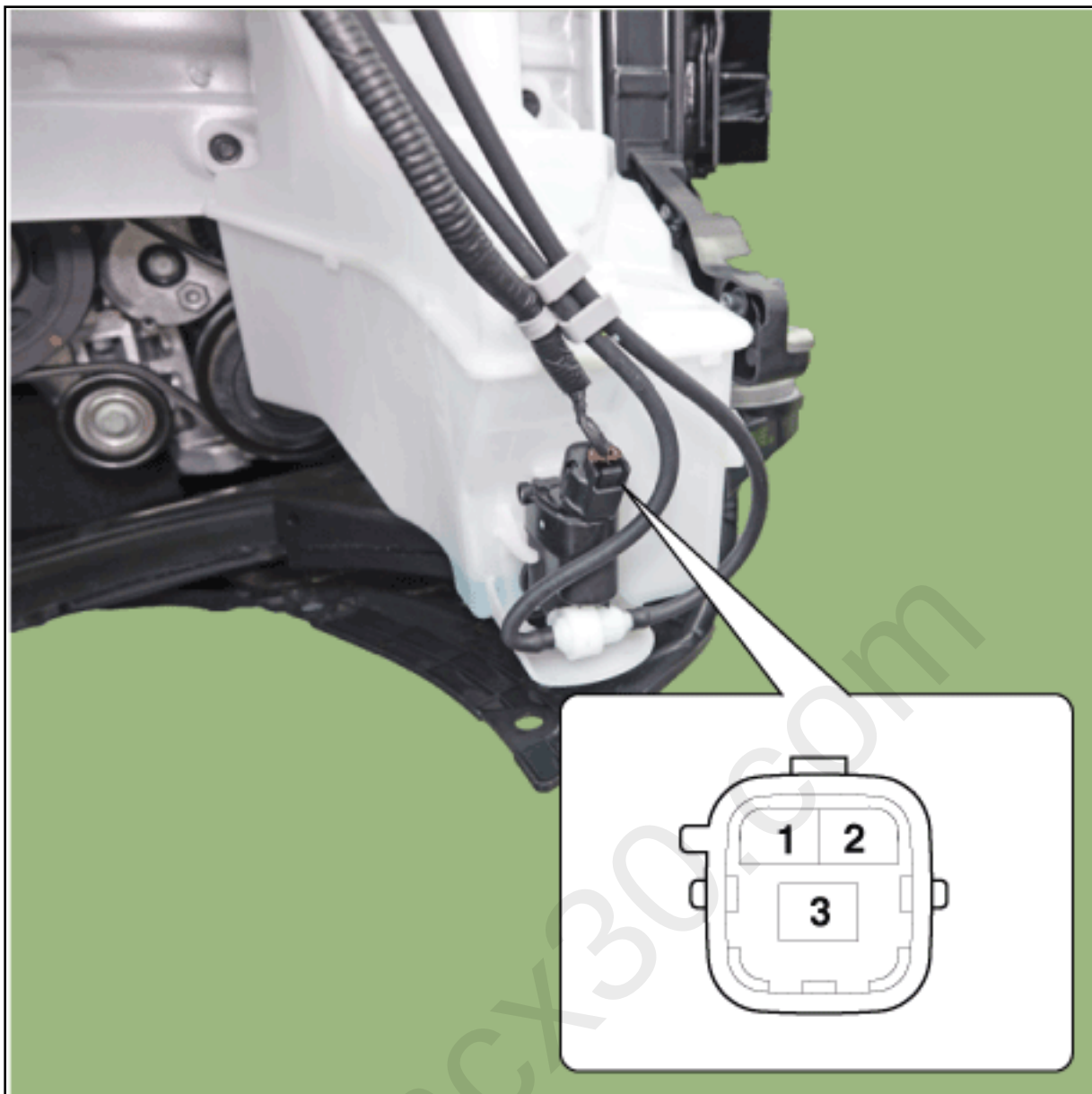
•Before filling the reservoir tank with water, check the filter for foreign material or contamination. if necessary, clean the filter.

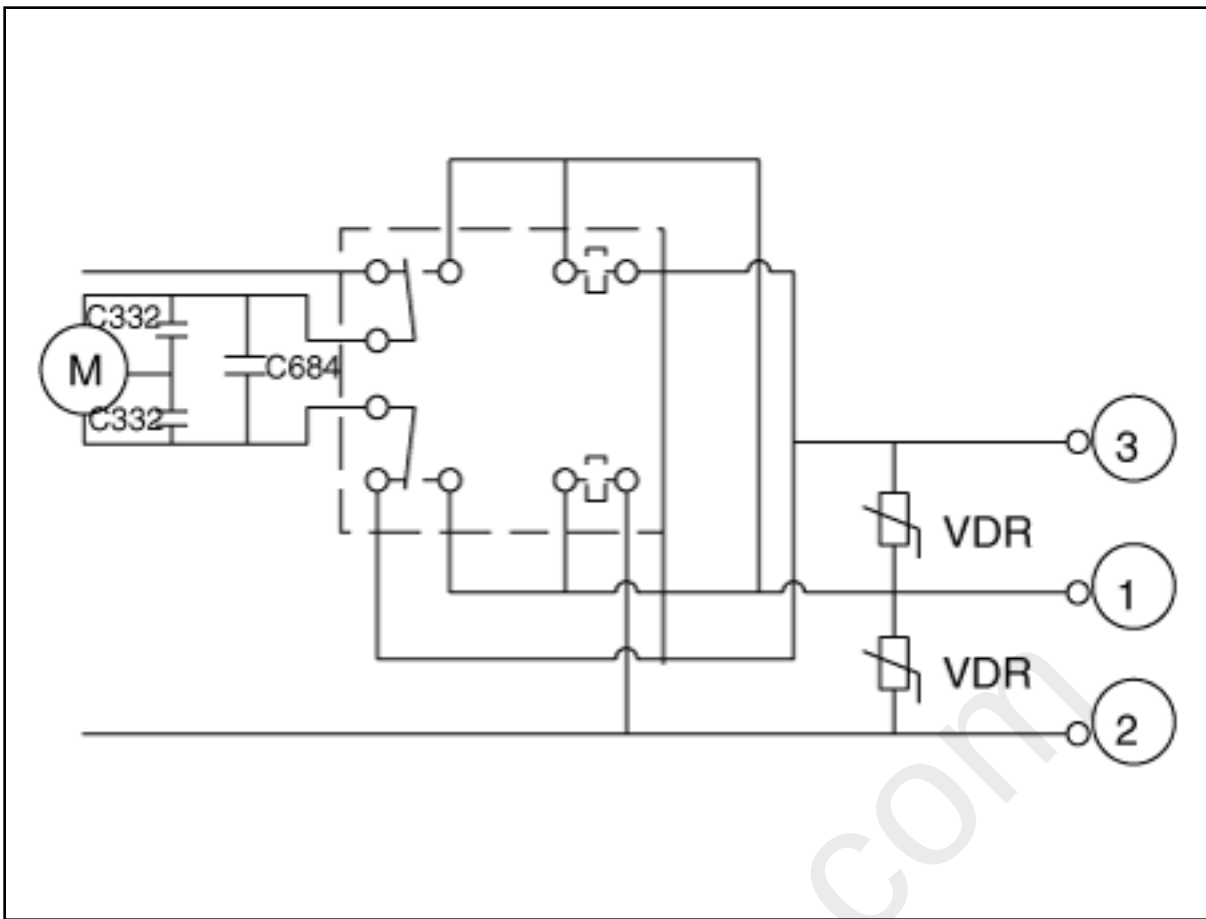
2. Connect positive (-) battery cables to terminal 1 and negative (+) battery cables to terminal 2 respectively.

3. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles.

If they are abnormal, replace the washer motor.

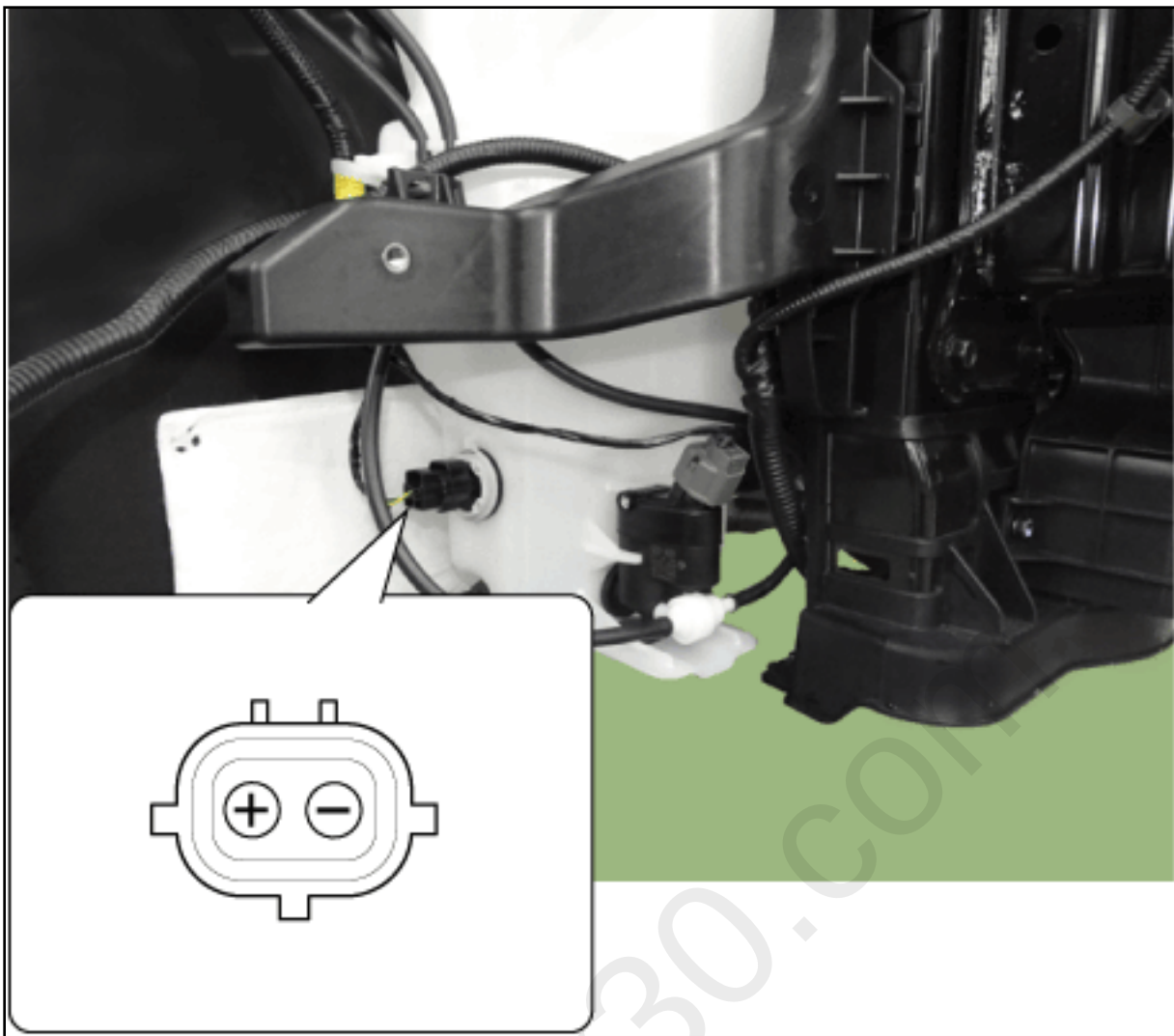
PIN	Description
1	Ground
2	Windshield washer (+)
3	Rear washer (+)

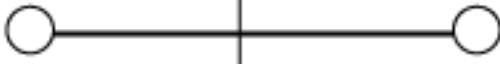




Washer Fluid Level Sensor

1. Disconnect the negative(-) battery terminal.
2. Drain the washer fluid less than 400 cc.
3. Check for continuity between the No. 1 and No.2 terminal in each float position.
If the continuity is not as specified, replace the washer fluid level sensor



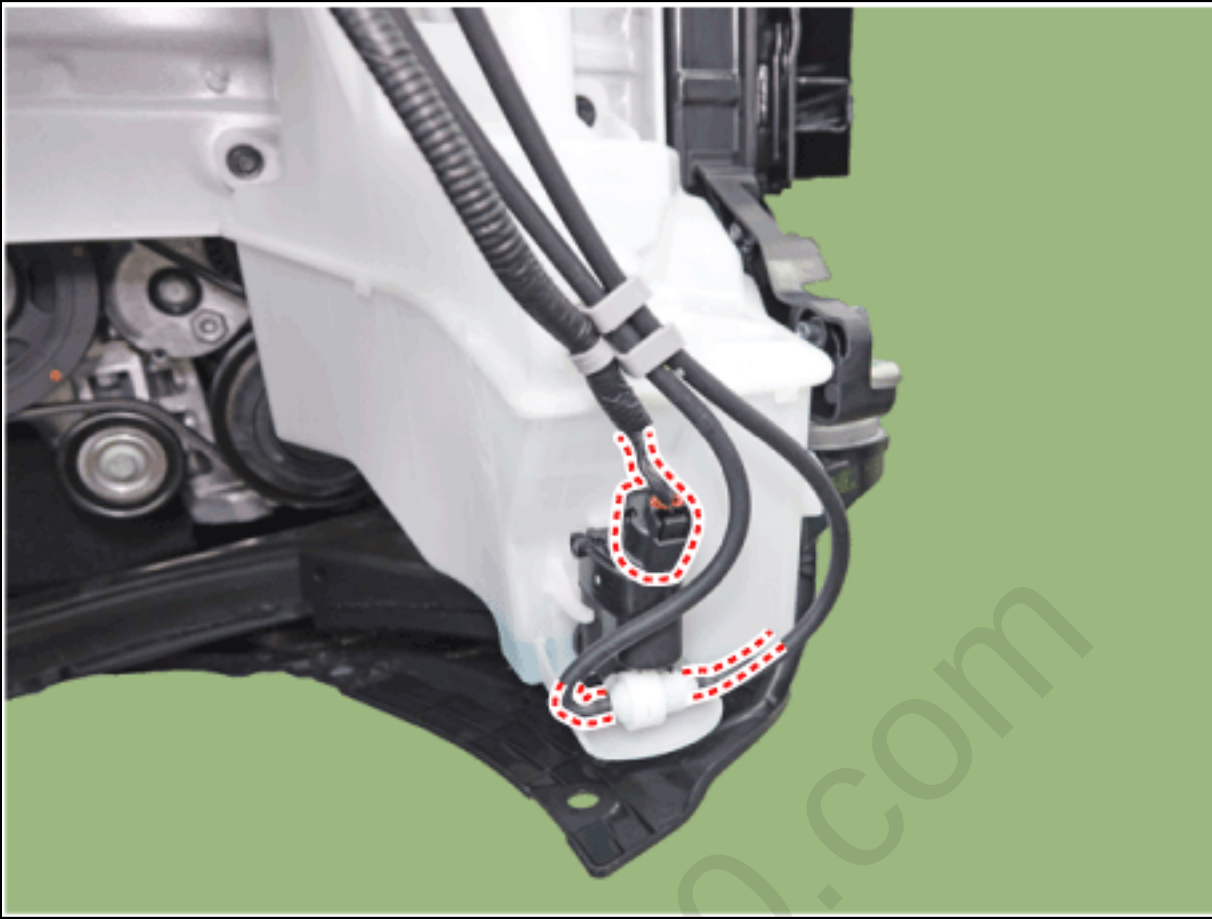
Terminal Position	1	2
Over 650cc		
Under 650cc		

(Tolerance : -50cc ~ +100cc)

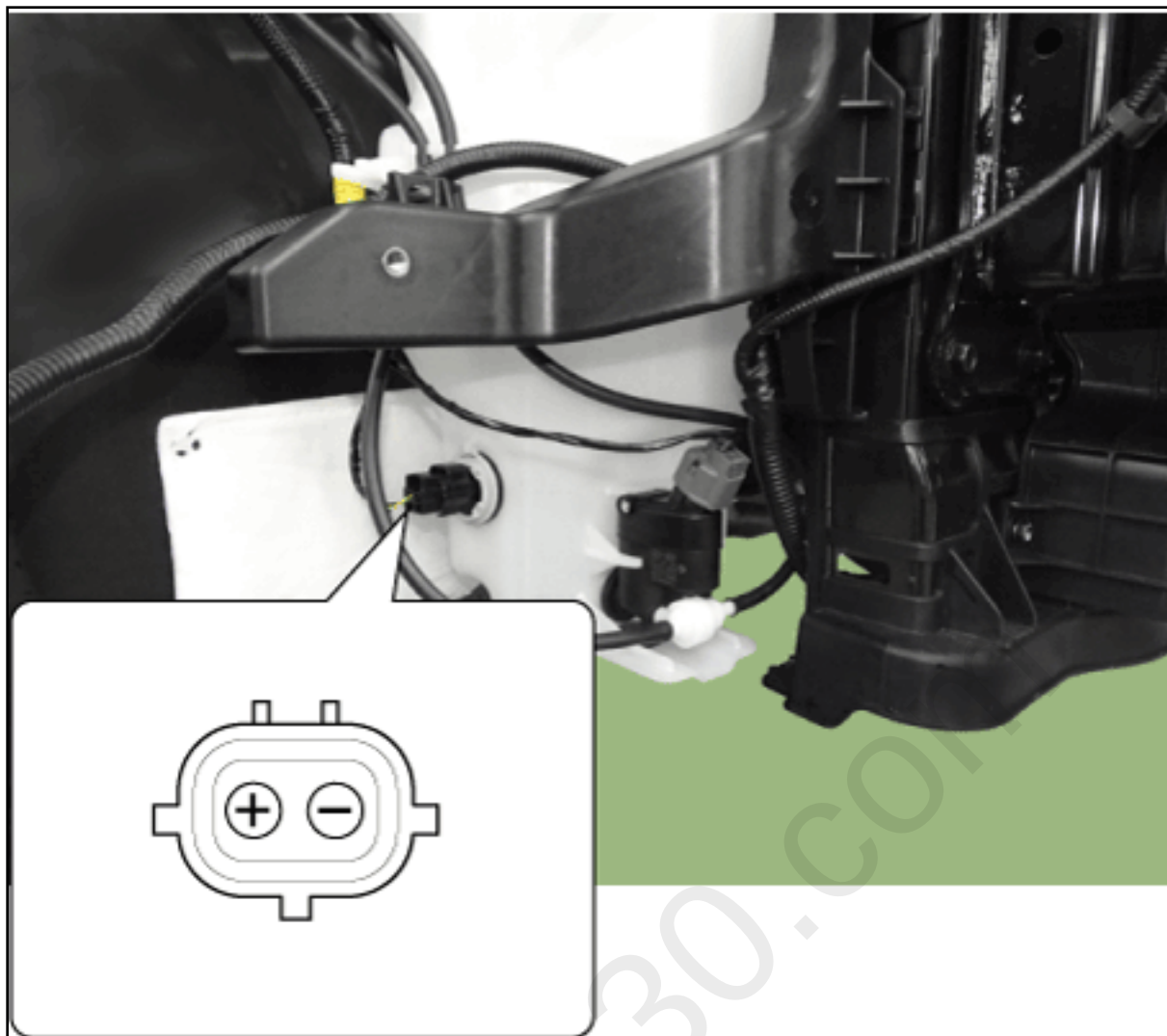
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the right front wheel guard.
(Refer to Body - "Front Wheel Guard")

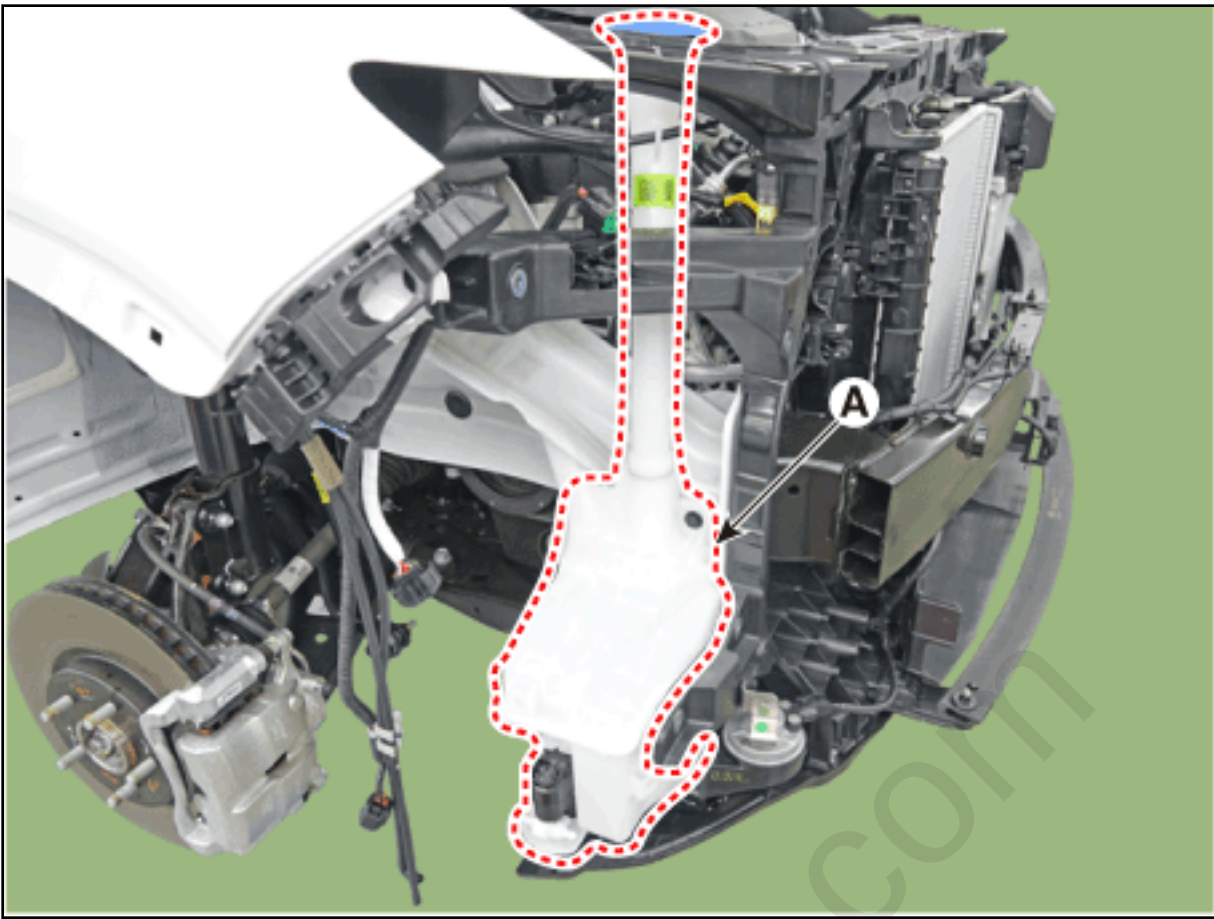
3. Remove the washer hose and disconnect the washer motor connector.



4. Remove the washer motor.



5. Remove the washer reservoir (A) after loosening mounting bolts .



Installation

1. Check the filter for foreign material or contamination.
2. Install the washer reservoir.
3. Install the washer motor.
4. Connect the washer motor connector and washer hose.
5. Install the front wheel guard.

Description

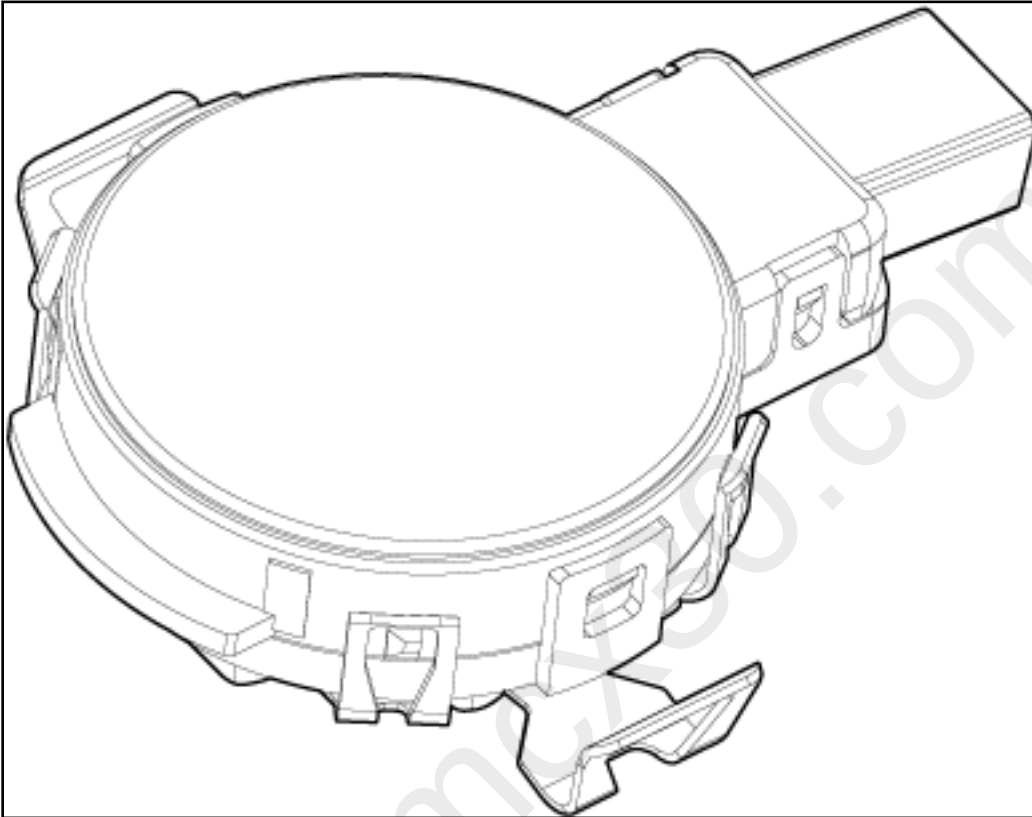
Integrated Rain Sensor

Integrated rain sensor (A) controls three systems: front wiper, auto-light, and central air conditioner.

1. Wiper Control System

When "AUTO" switch signal is received from the multi-function switch on the right, the integrated rain sensor detects the amount of rainfall. The sensor is installed inside the upper part of the front window for wiper motor control.

This system automatically controls the operation duration and speed of the wiper depending on the measured amount of rainfall even if the driver does not operate the wiper switch.



Functions and Operating Principles

Basic Principle

1. Detecting the amount of rainfall

The light (beam) emitted from light emitting diodes (LED) is totally reflected on the external surface of the windshield and comes back to the photo diodes. When there is water on the external surface of the windshield, the light is optically separated and reflected partially and the remaining brightness is measured by the photo diodes. Water remaining on the windshield results in the light being not totally reflected. The loss of brightness due to this indicates how much the glass surface is wet.

Interference

Rain sensor might malfunction due to the interferences listed below.

1. Dust on the measuring surface and other surfaces on the light path (surface of light emitting diodes and photo diodes, fiber optics, bracket, and glass surface of windshield joint area) weakens the received light.
2. Movement of windshield and bracket
3. Movement of bracket due to vibration
4. Damaged wiper blade



- When the integrated rain sensor does not operate or malfunctions, the driver should operate the wiper switch manually.

Automatic Operation

1. Operational status of rain sensor

Operation Mode	Operation
Direct Mode	It is the normal operational status of the integrated rain sensor when the wiper switch is in "Auto" and the sensor detected dry windshield. Based on this state, integrated rain sensor determines the operation mode of wiper depending on the rainfall and its duration.
Intermittent Mode	Integrated rain sensor activates the intermittent mode when wiper operation is done successively more than twice with a pause of 0.5 - 5 seconds.
Low Speed	The wiper operates continuously in low speed
High Speed	The wiper operates continuously in high speed

Safety Function

1. When there is ice or foreign matter in the detecting area, integrated rain sensor cannot recognize the condition for operation correctly.

Detecting Special Conditions

1. Rain sensor

Special Condition	Operation based on special conditions detecting
Splash	When integrated rain sensor detects a high level of water (splash) in Direct or Intermittent mode, the system switches from Park to High speed. Then, wiping is done once in High speed and once more in Low speed. If the condition of rainfall does not change after wiping, it returns to the original condition (Direct or Intermittent).
Smearing	Smearing is a thin oil film that has dried fast and occurs when a small amount of rainfall is wiped by a dirty or worn-out wiper blade. Operational signal should not be issued when smearing occurs in Direct or Intermittent mode.
Dirt	When no change is detected after wiping, integrated rain sensor determines that the windshield is dirty. In this state, operational signal should not be issued. If the windshield becomes clean (for example, by washer fluid), the integrated rain sensor returns to the normal condition.
Washer fluid	Integrated rain sensor does not respond to the washer fluid during the Washer mode. In other words, wiping speed does not change even if the washer fluid is sprayed (automatic operation of the washer pump is not reflected in the functioning of integrated rain sensor).

Circuit
Diagram



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Removal

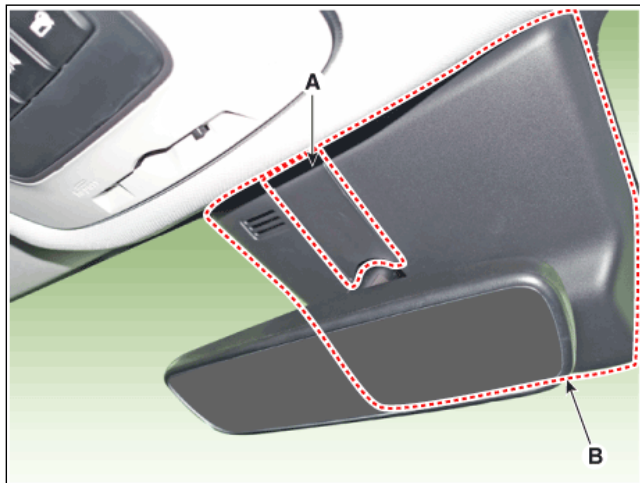


- Do not damage or touch the silicone (coupling medium).
- Be careful so that the silicon is not contaminated by foreign substances, dust, etc. .
- Use caution, as the silicon may be damaged if you try to separate the rain sensor forcibly.



- The dust or foreign substance on the rain sensor may have bad influence on the performanec of the rain sensor. In order to ensure accurate function of the rain sensor, protect the sensor surface with the protection cover until the sensor is installed on the bracket
- The coupling pad on the rain sensor surface is adhesive and the coupling pad may stick to the windshield during the use depending on the environment condition. Therefore, it may be damaged when you try to remove the rain sensor from the windshield forcibly. Use caution when sepearting it from the windshield.

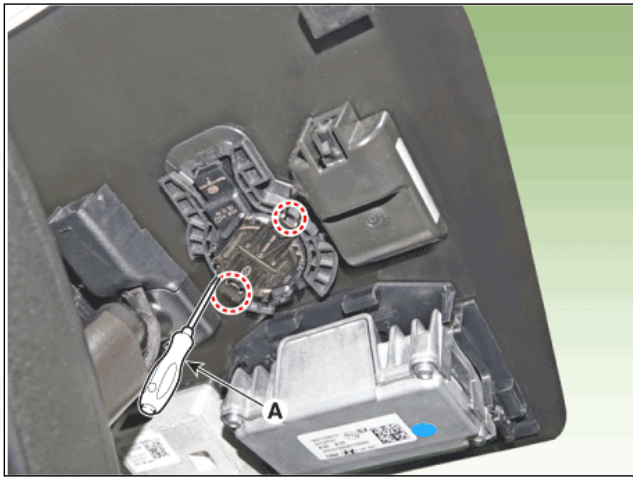
1. Remove the multi sensor cover (A)&(B).



2. Disconnect the wiring harness connector from the rain sensor by inserting a small flat-blade screwdriver (A) into the space.



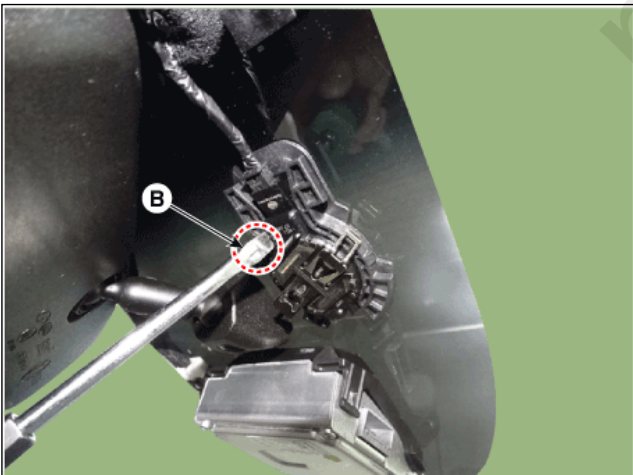
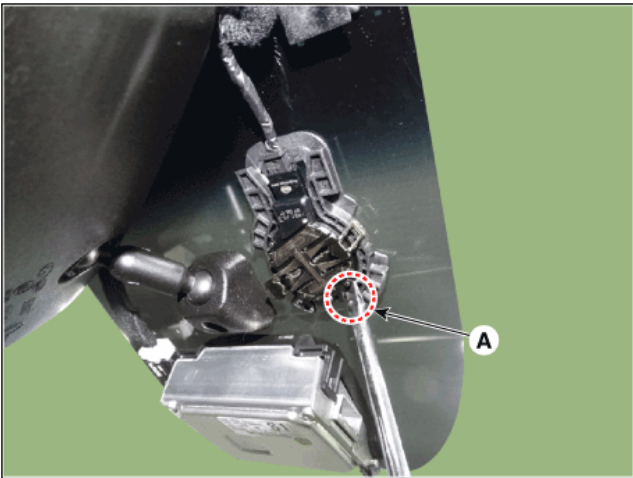
3. Using a flat-blade screwdriver (-), remove the rain sensor bracket.



4. Remove the rain sensor.

1) Insert a small flat-blade screwdriver (-) into a space at the bottom(B) or top(A), between the rain sensor and bracket. .

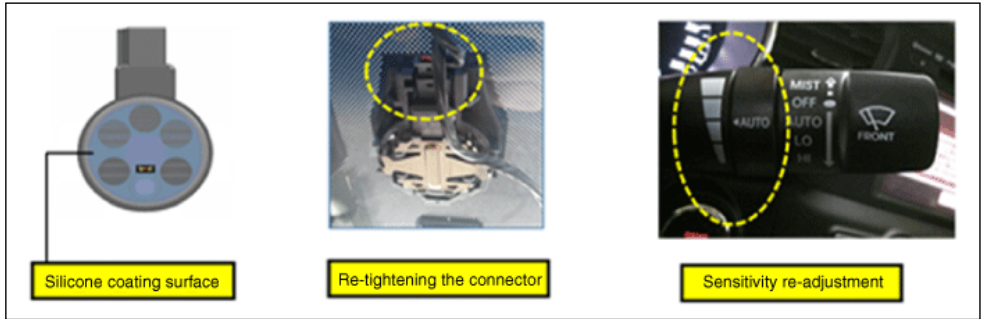
2) the rain sensor slowly up and down in the vertical direction of the glass, then disassemble the rain sensor slowly from windshield without damaging the silicone on the sensor.



- It may be damaged when you try to remove the rain sensor from the windshield forcibly. Use caution when sepearting it from the windshield.
- When detaching the silicone under a high temperature, it may be easily damaged because of the adhesive strength of the silicone. Remove the silicone in a cool enviroment.

Installation

- Check the operation of the rain sensor and the light sensor before mounting.
- Check the sensor for silicon damage.
- Check whether the rain sensor connector is tightened.
- Check whether the rain sensor and bracket are properly tightened.
- Check whether the sensor mounted area is free from foreign matters.
- Recalibrate sensitivity of the swtich if the auto-wiping operation is insensitivity or too much sensitive.



•In case the silicone of the rain sensor is normal or slightly damaged as shown in the below images, it can be reused.

Normal	Damage within 1.5 mm of outer part
	

•In case the silicone of the rain sensor is damaged as shown in the below images, it should be replaced with a new silicone.

Foreign substances	Fingerprint	Damege



Damage

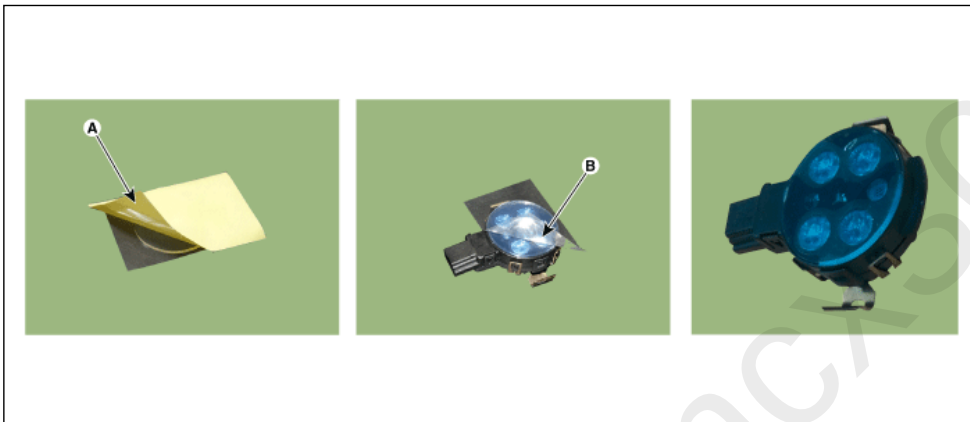


- In case the silicone of the rain sensor is damaged it should be replaced it as shown below.
- 1) Remove the damaged silicone gel pad from the lens plate completely.



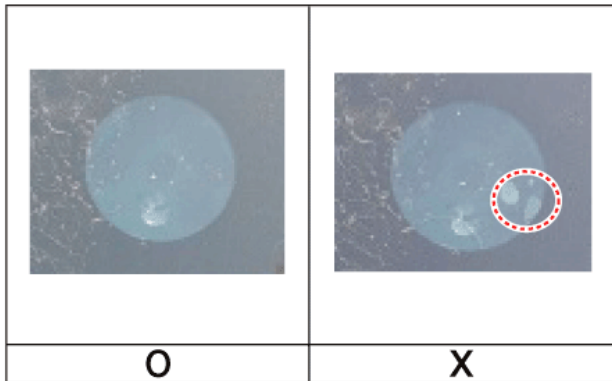
- Be careful not to damage or contaminate the surface of the lens plate during removal.

2) Attach the new silicone gel pad after removing the silicone paper (A) then remove the transparent film (B).



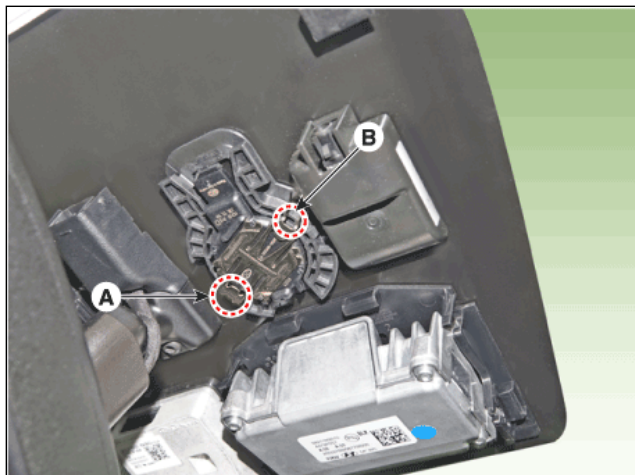
- When attaching the silicone gel pad to the sensor, be careful not to contaminate

• It is very important that the silicon (coupling pad) is completely pushed against the windshield and stuck without any air bubble.



- In case of replacing the damaged windshield, you may reuse the undamaged existing rain sensor.
- The windshield glass has to be clean and free of contamination or foreign substances.

1. Connect the rain sensor connector.
2. Push one of the latch of spring arm (A) down until it snaps and you hear a click sound.
And then push the latch of second spring arm (B) for keeping the sensor in right position.



- Do not snap both spring arms at the same time.
- An incorrectly mounted snap connection may cause malfunctions of the rain/light sensor.