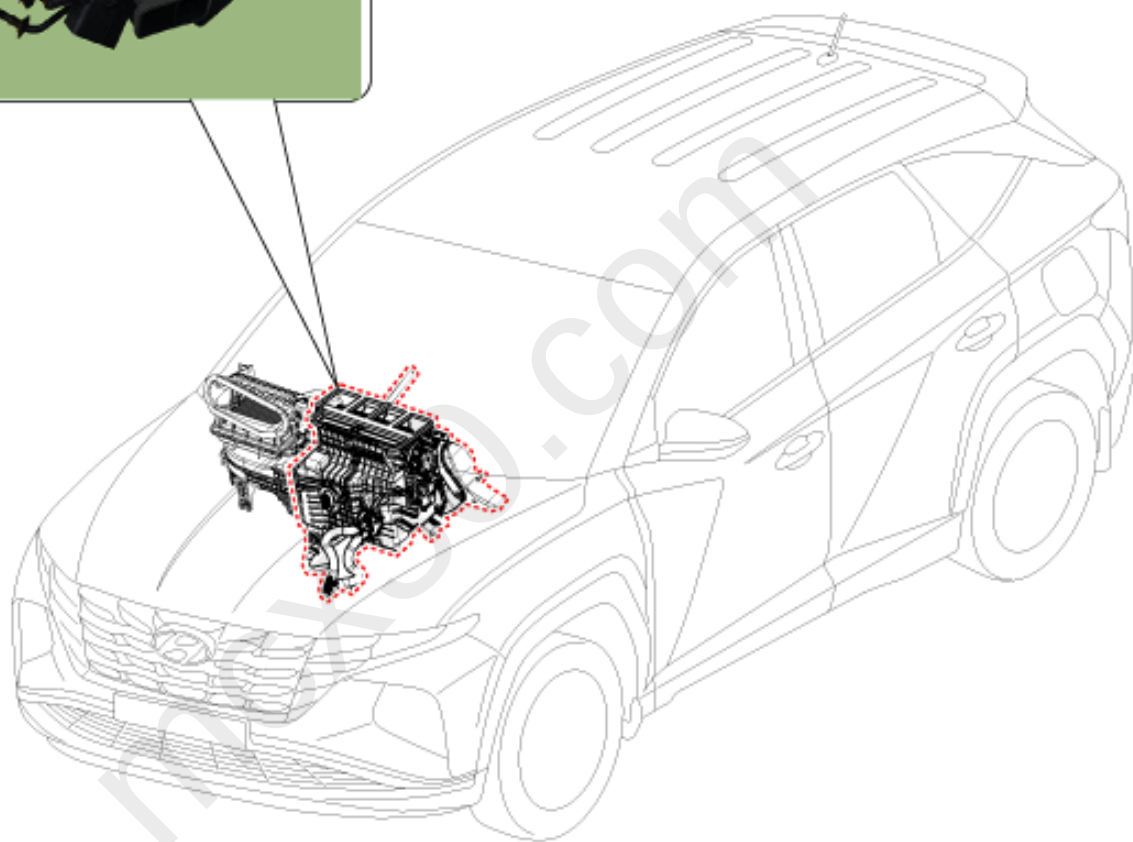
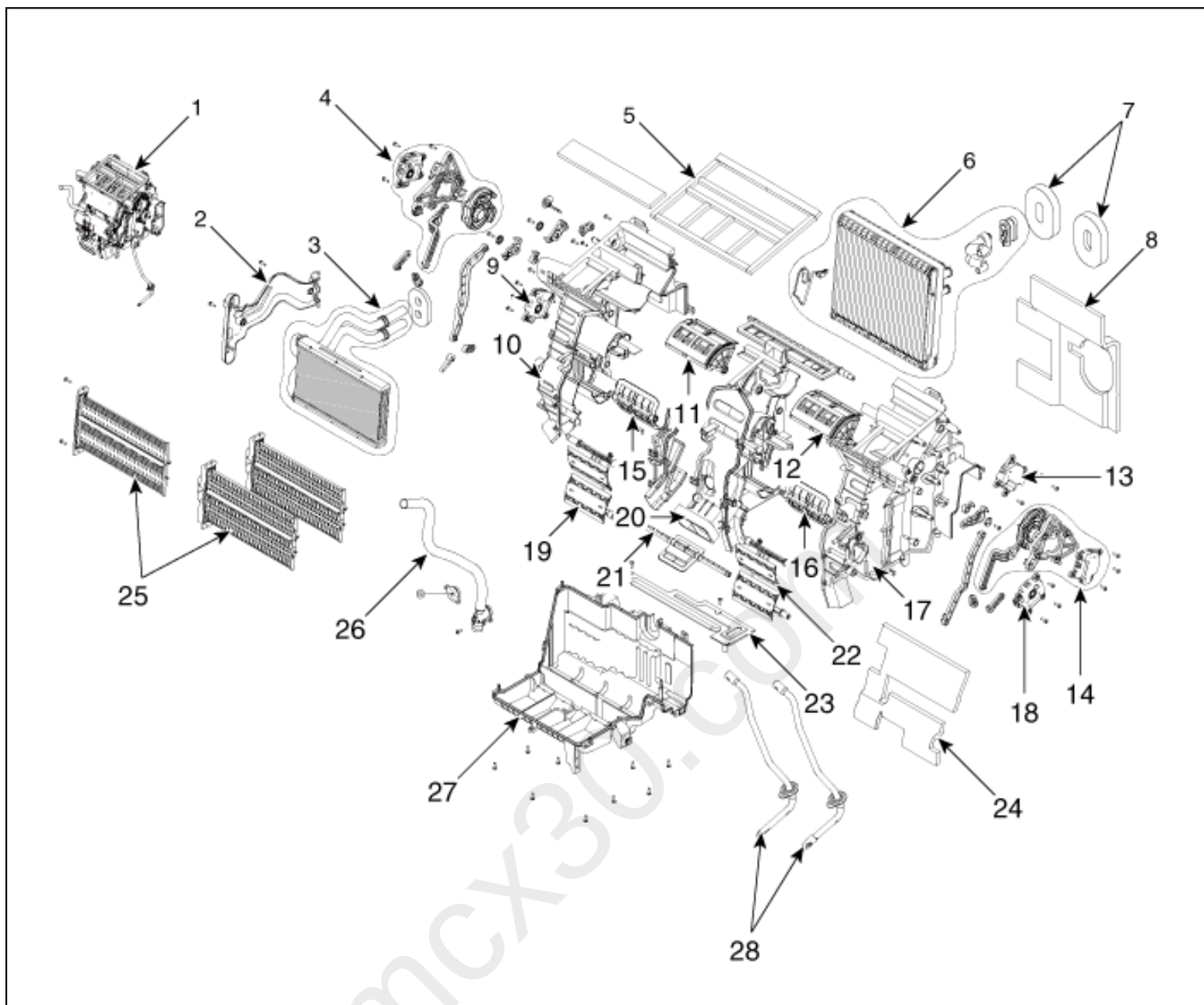


Component
Location



1. Heater unit assembly

Components



- | | | |
|--------------------------------------|---------------------------------------|-----------------------------------|
| 1. Heater unit assembly | 11. Vent door assembly [LH] | 20. Console seal duct |
| 2. Heater core cover | 12. Vent door assembly [RH] | 21. Console door assembly |
| 3. Heater core assembly | 13. Auto defogging actuator | 22. Temperature door assembly[RH] |
| 4. Mode control actuator [LH] | 14. Mode control actuator [RH] | 23. Heater blind case |
| 5. DEF duct seal | 15. Foot door [LH] | 24. Heater NVH pad |
| 6. Evaporator assembly | 16. Foot door [RH] | 25. PTC heater |
| 7. Flange seal | 17. Heater case [RH] | 26. Aspirator hose assembly |
| 8. Heater NVH pad | 18. Temperature control actuator [RH] | 27. Heater lower case |
| 9. Temperature control actuator [LH] | 19. Temperature door assembly [LH] | 28. Drain hose assembly |
| 10. Heater case [LH] | | |

Replacement

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/recycling/charging station.
(Refer to Air conditioning System - "Repair procedures")
3. When the engine is cool, drain the engine coolant from the radiator.
(Refer to Engine Mechanical System - "Coolant")
4. Remove the cowl top cover.
(Refer to Body (Interior and Exterior) - "Cowl Top Cover")
5. Loosen the mounting nut and separate the expansion valve cover (A).

Tightening torque :

7.8 - 11.8 N.m (0.8 - 1.2 kgf.m, 5.8 - 8.7 lb-ft)



6. Loosen the mounting bolts and separate the expansion valve (A) from the evaporator core.

Tightening torque :

21.6 - 32.4 N.m (2.2 - 3.3 kgf.m, 15.9 - 23.9 lb-ft)



7. Separate the heater hose (A).



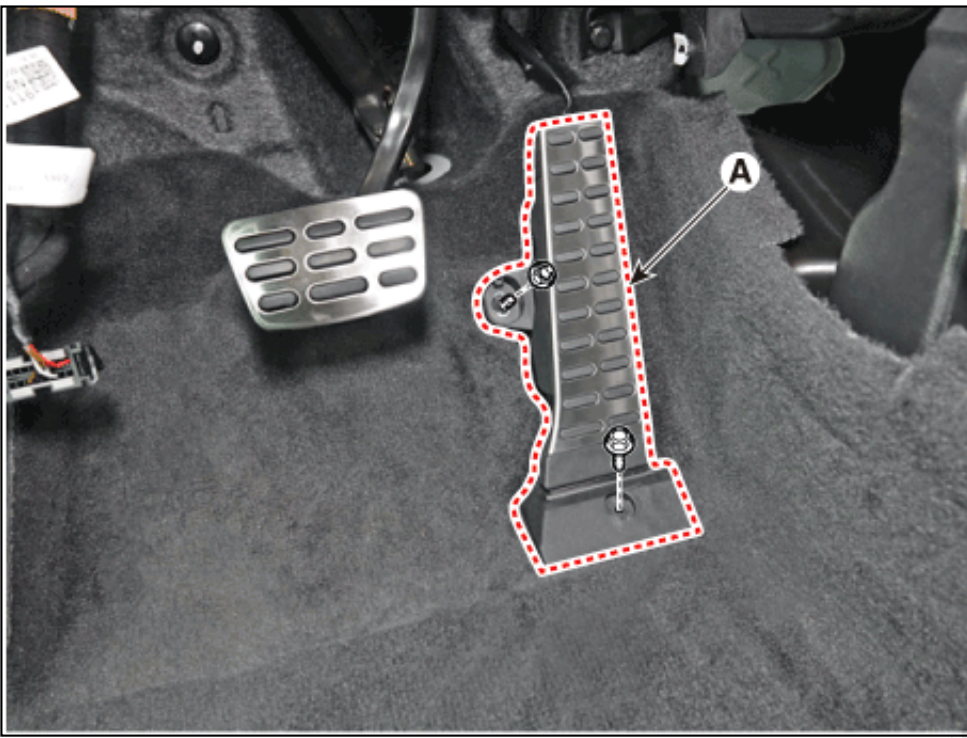
8. Loosen the cowl cross bar assembly mounting bolts (A).

Tightening torque :

16.7 - 25.5 N.m (1.7 - 2.6 kgf.m, 12.3 - 18.8 lb-ft)



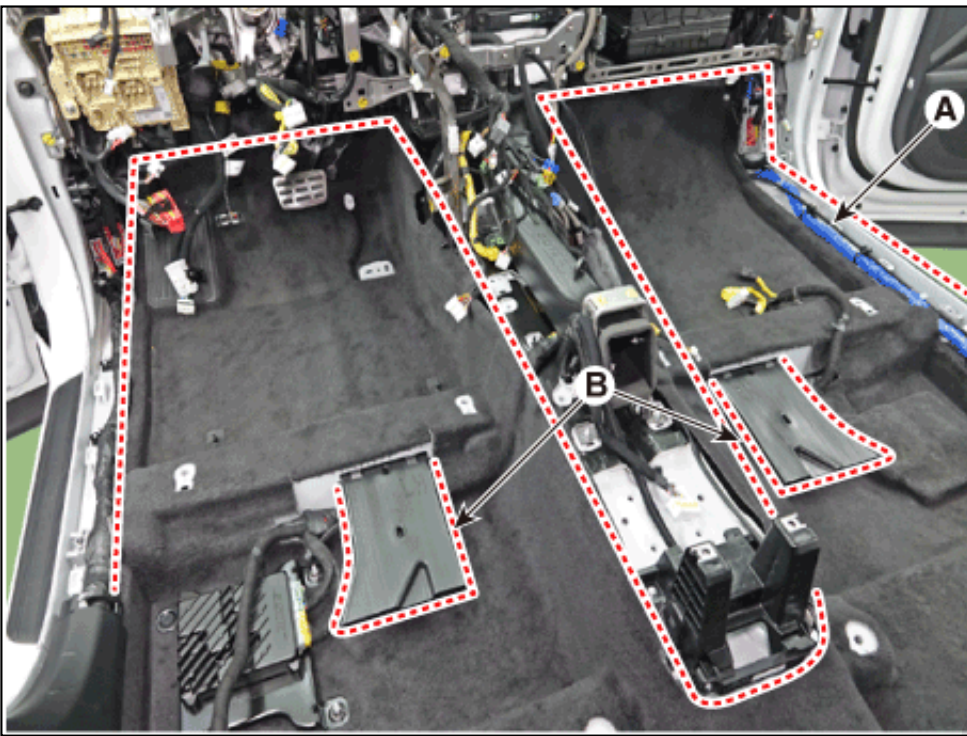
9. Remove the front seat assembly.
(Refer to Body (Interior and Exterior) - "Front Seat Assembly")
10. Remove the floor console assembly.
(Refer to Body (Interior and Exterior) - "Floor Console Assembly")
11. Remove the front pillar trim.
(Refer to Body (Interior and Exterior) - "Front Pillar Trim")
12. Remove the cowl side trim.
(Refer to Body (Interior and Exterior) - "Cowl Side Trim")
13. Remove the crash pad lower panel.
(Refer to Body (Interior and Exterior) - "Crash Pad Lower Panel")
14. Remove the steering column shroud lower panel.
(Refer to Body (Interior and Exterior) - "Steering Column Shroud Panel")
15. Remove the steering wheel.
(Refer to Steering System - "Steering Wheel")
16. Remove the multifunction switch.
(Refer to Body Electrical System - "Multifunction Switch")
17. Lower the steering column after loosening the mounting bolts.
(Refer to Steering System - "MDPS PowerPack Assembly")
18. Loosen the mounting bolt and nut, remove the accelerator pedal module (A).



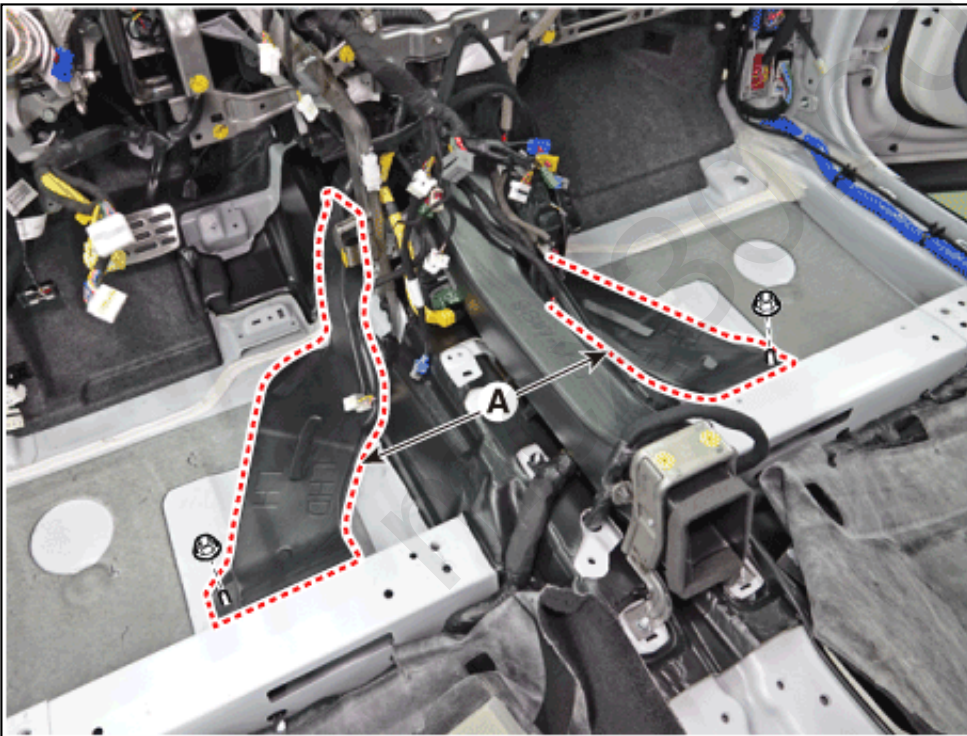
19. Press the lock pin, separate the accelerator pedal connector (A).



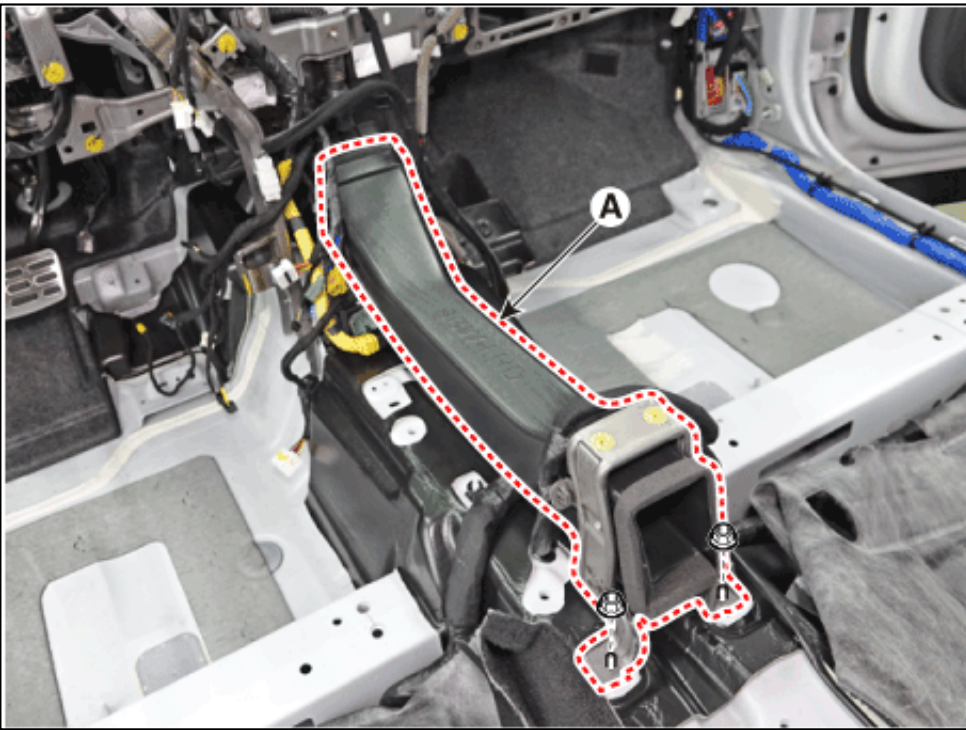
20. Remove the rear air duct (B) and then separate the floor carpet (A) backwards.



21. Loosen the mounting nuts and remove the rear heating duct (A).



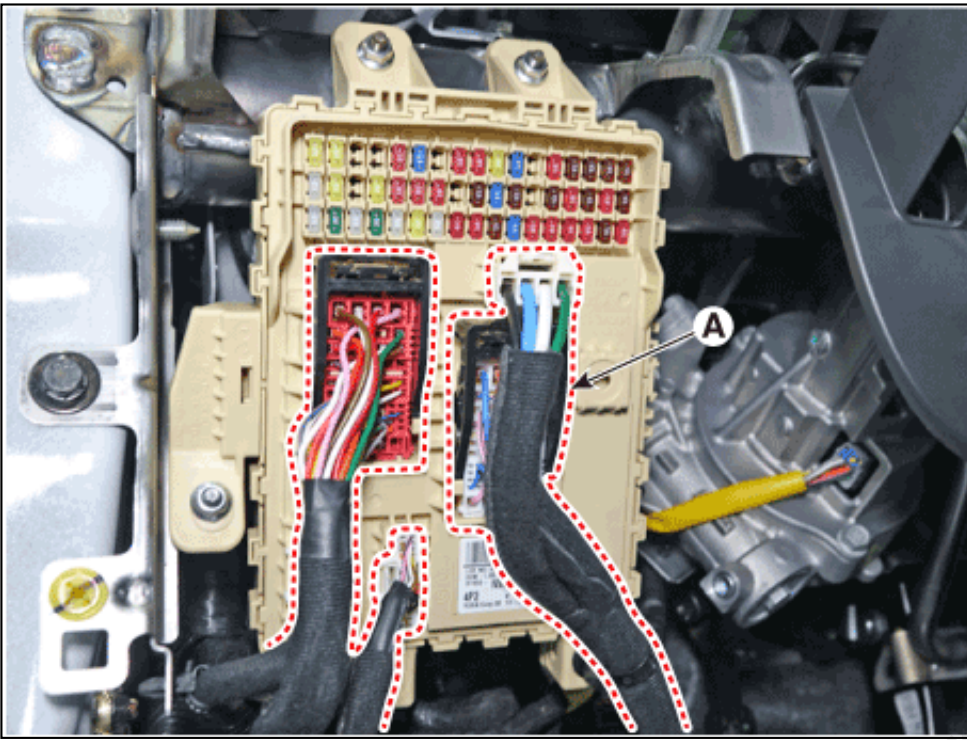
22. Loosen the mounting nuts and remove the console duct (A).



23. Disconnect the airbag control module(SRSCM) connector (A).

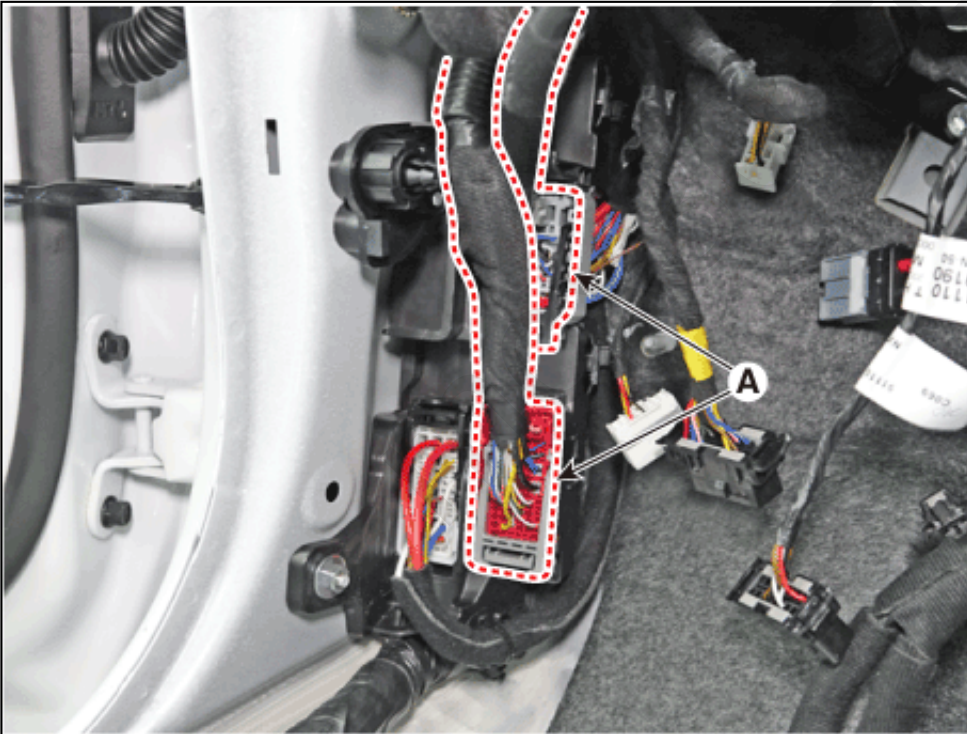


24. Disconnect the passenger compartment junction box connectors (A).

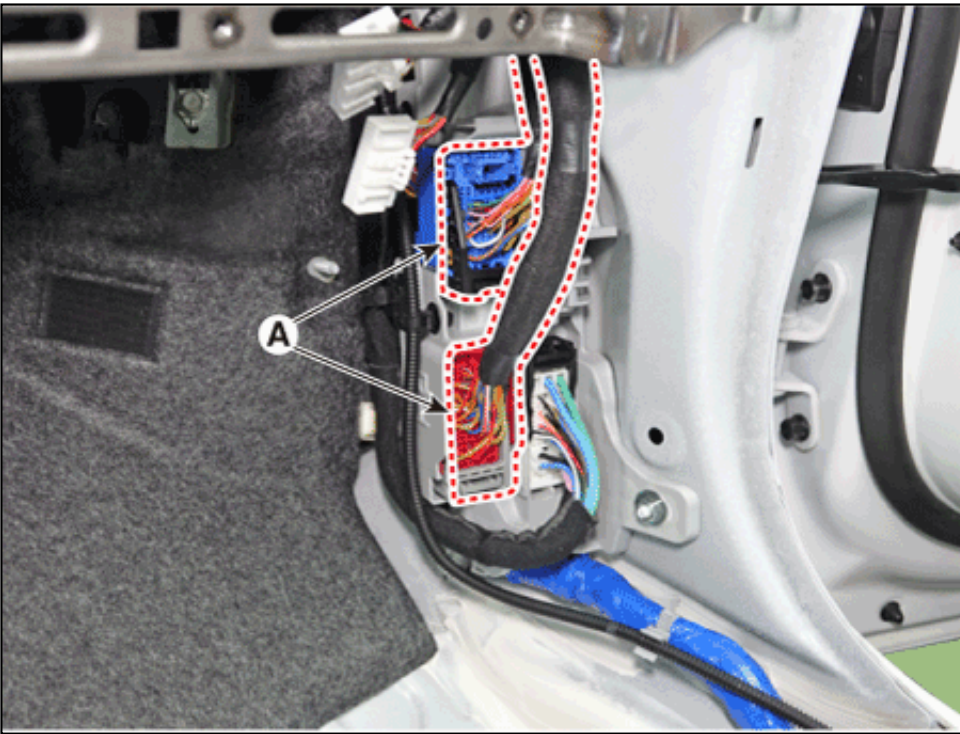


25. Disconnect the multi box connectors (A).

[Driver's]

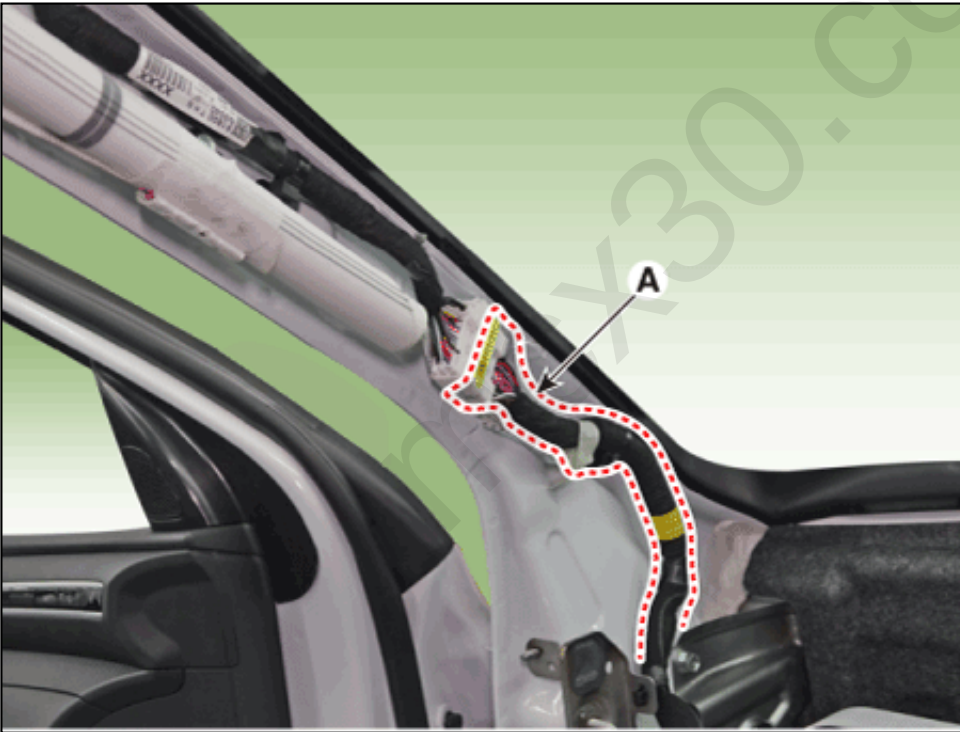


[Passenger's]

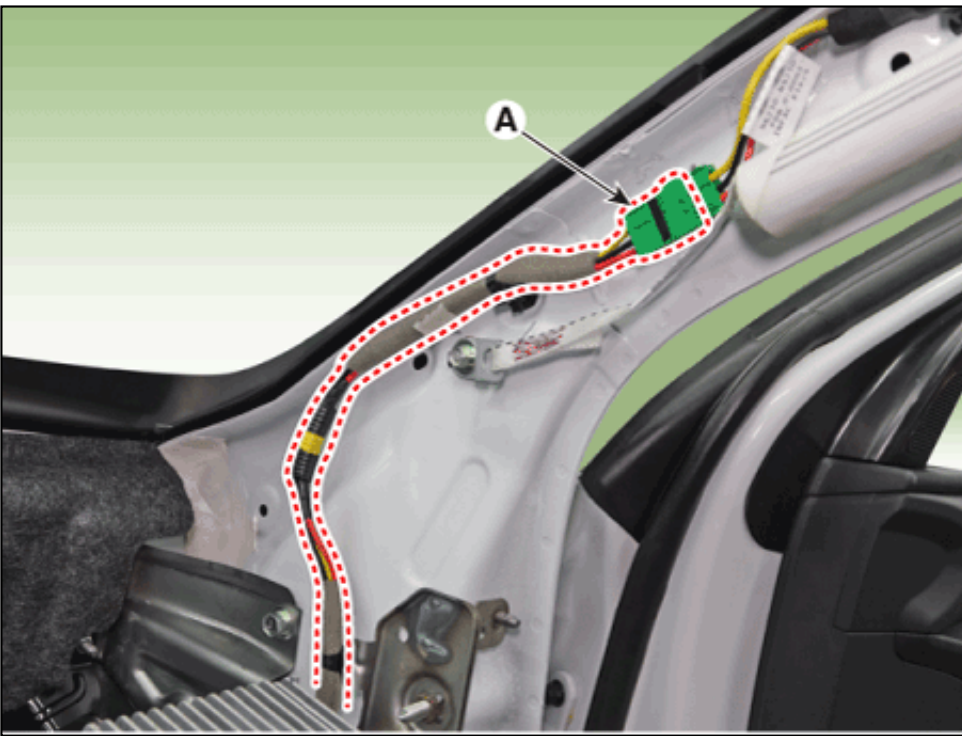


26. Disconnect the connector (A) and the mounting wiring fasteners in the front pillar.

[Driver's]



[Passenger's]



27. Remove the drain hose (A).

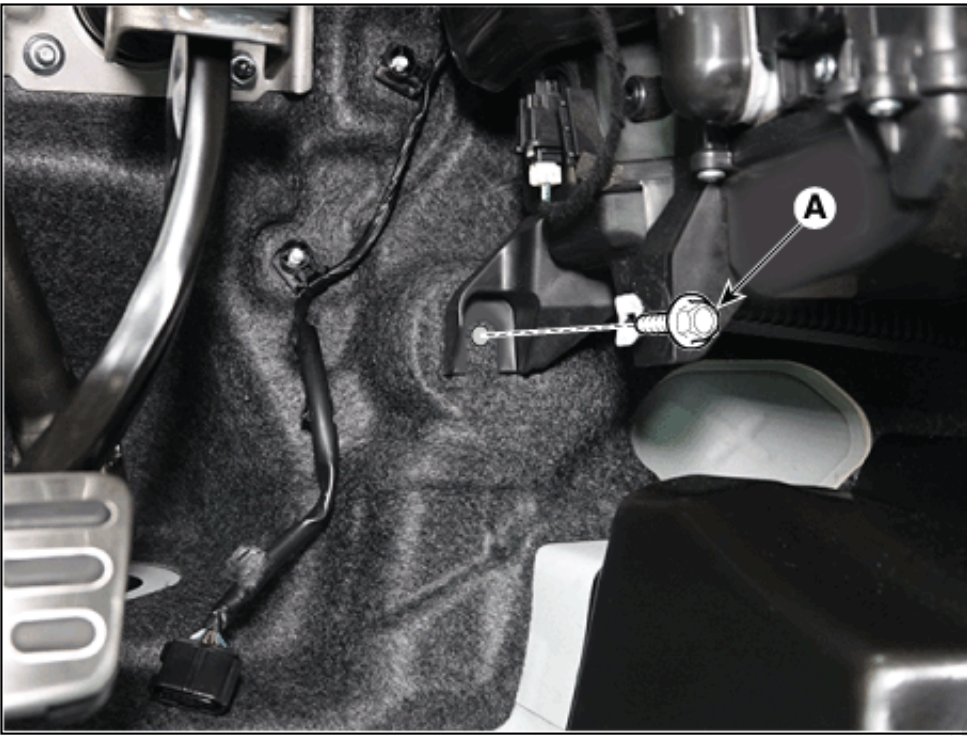


28. Remove the lower mounting bolt of the blower unit.

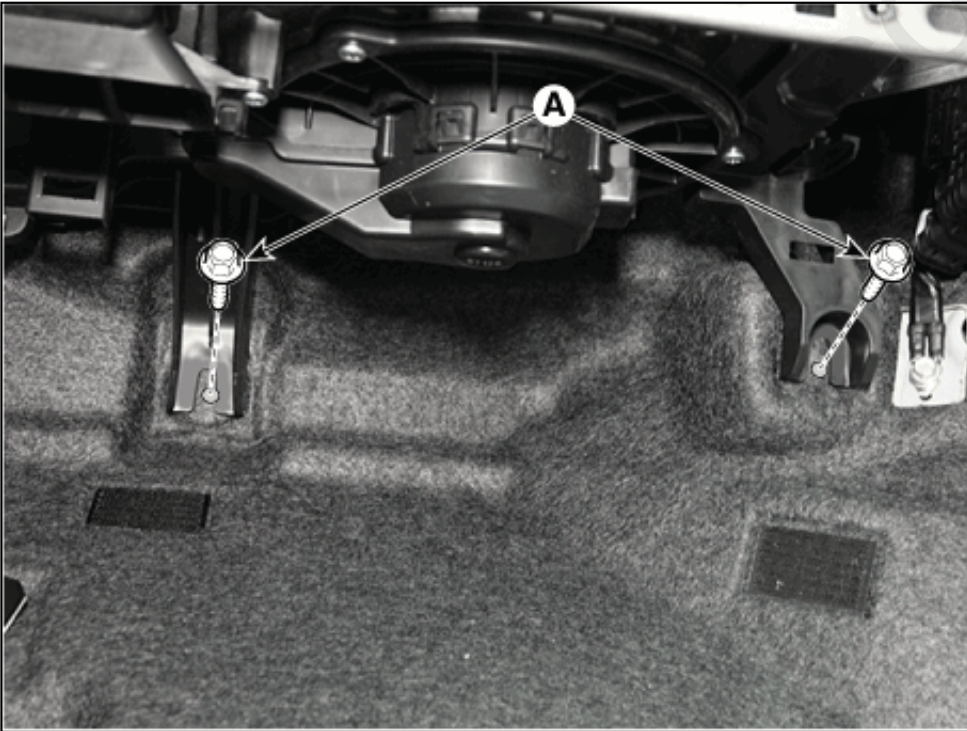
Tightening torque :

3.9 - 5.9 N.m (0.4 - 0.6 kgf.m , 2.9 - 4.3 lb-ft)

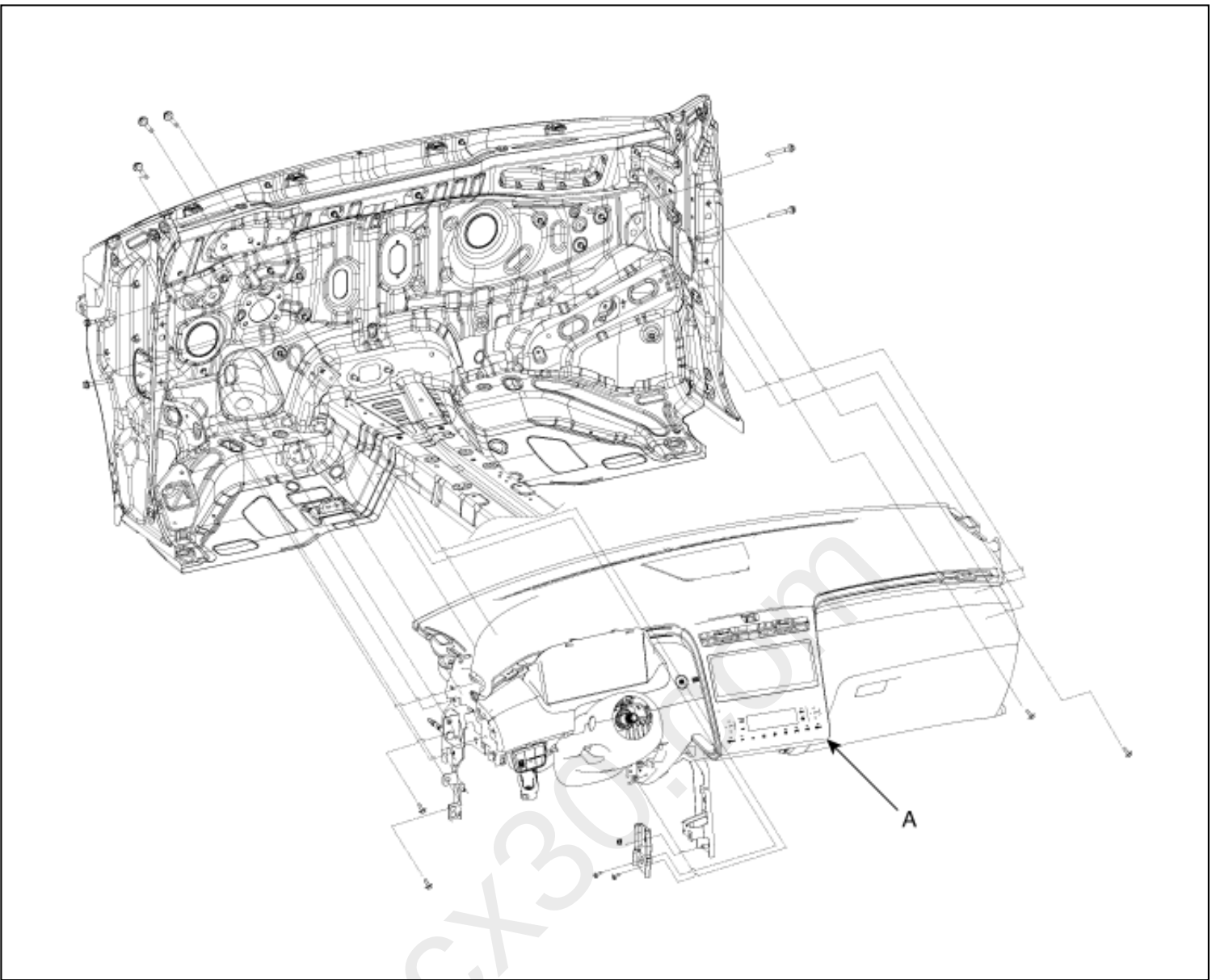
[Driver's]



[Passenger's]



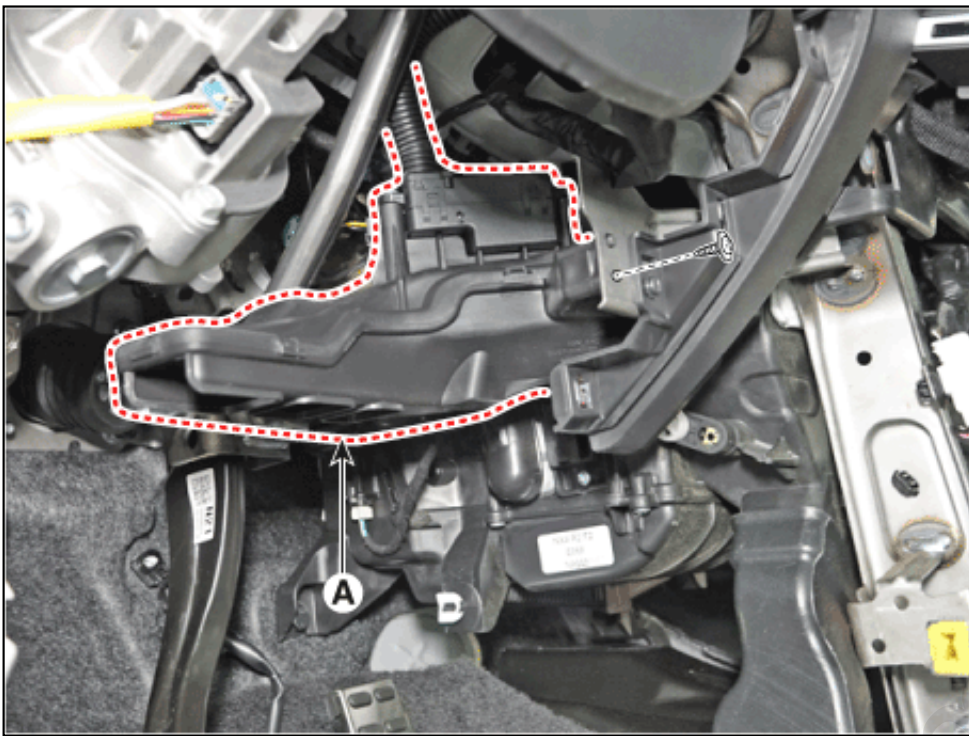
29. After loosening the bolts and nuts remove the crash pad and heater & blower unit assembly (A) together.



30. Remove the DC DC converter.
(Refer to Engine Electrical System - "DC DC converter")
31. Remove the IBU.
(Refer to Body Electrical System - "Integrated Body Control Unit (IBU)")
32. Remove the heater control unit.
(Refer to Controller - "Heater Control Unit")
33. Remove the shower duct.

[LH]

- (1) Loosen the mounting screw, remove the shower duct (A).

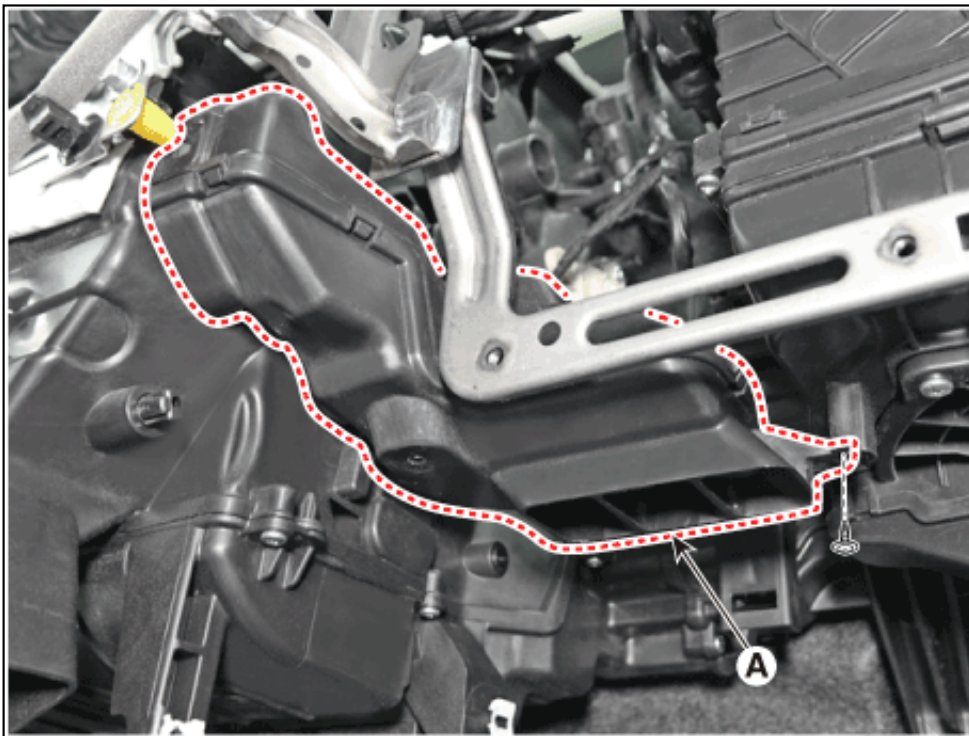


(2) Disconnect the PM sesnor connector (A) and hose (B).



[RH]

(3) Loosen the mounting screw, remove the shower duct (A).

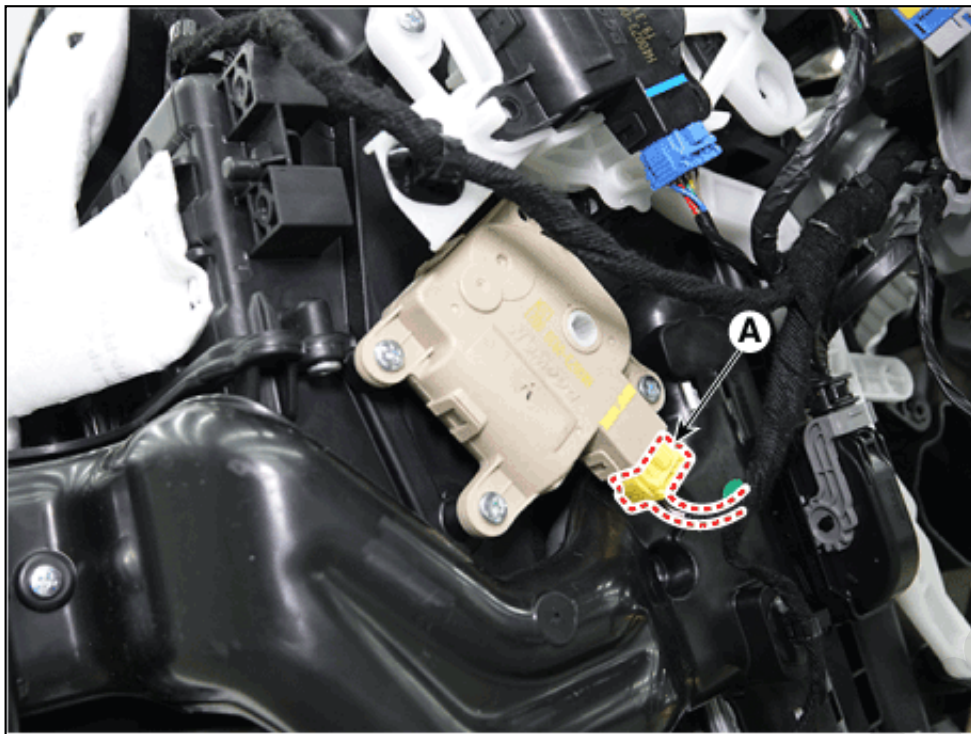


34. Disconnect the heater and blower unit connectors.

(1) Disconnect the PTC heater connector (A).



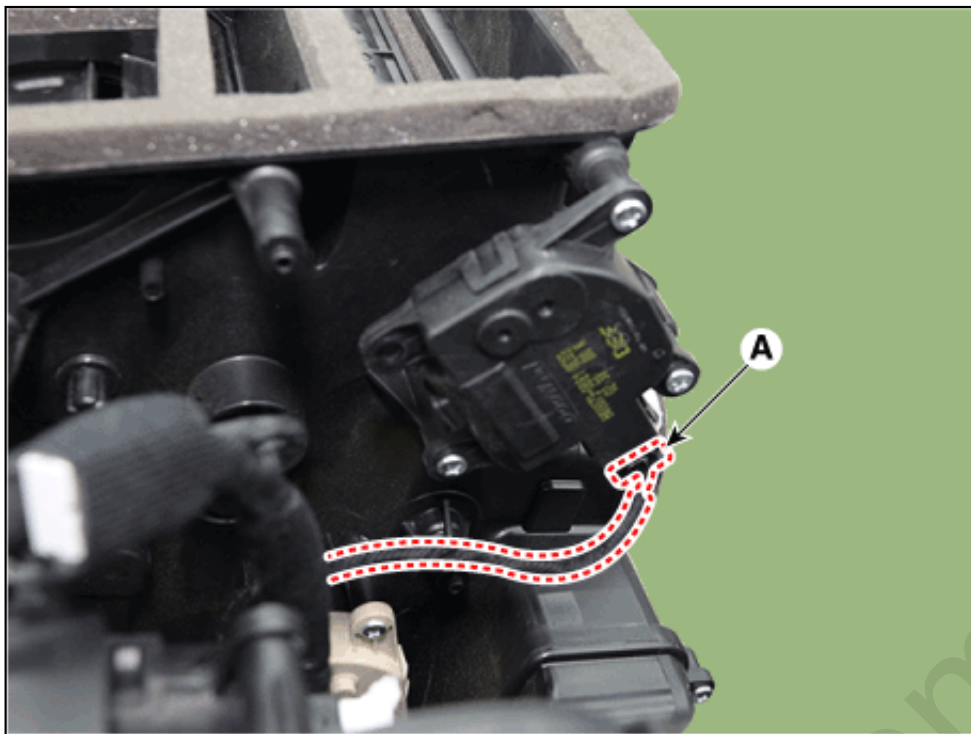
(2) Disconnect the driver's temperature control actuator connector (A).



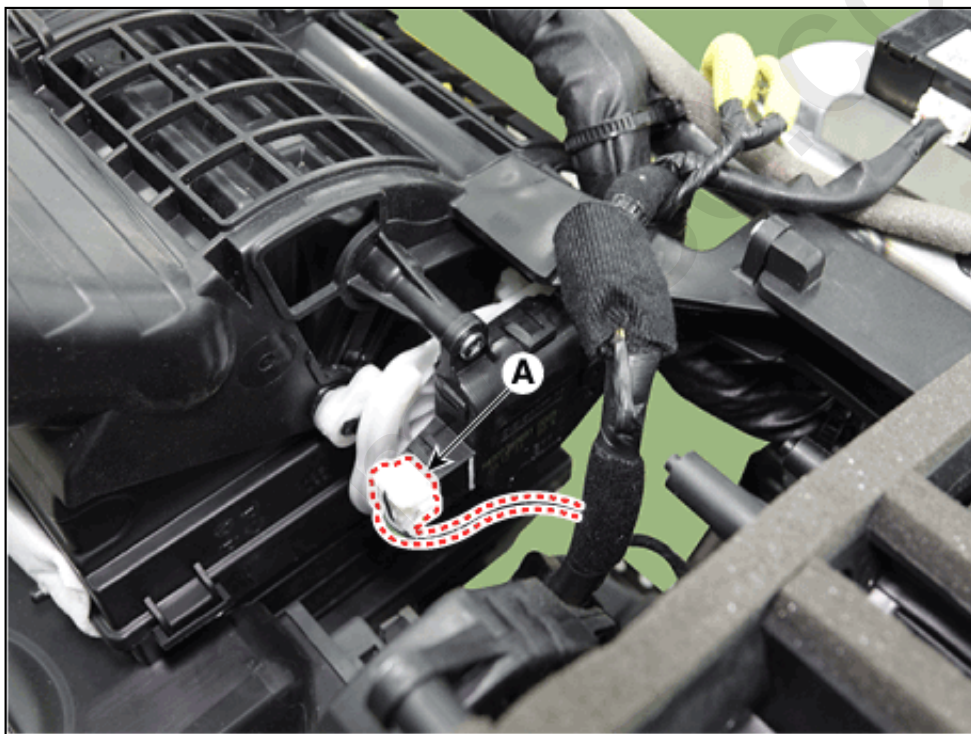
(3) Disconnect the mode control actuator connector (A).



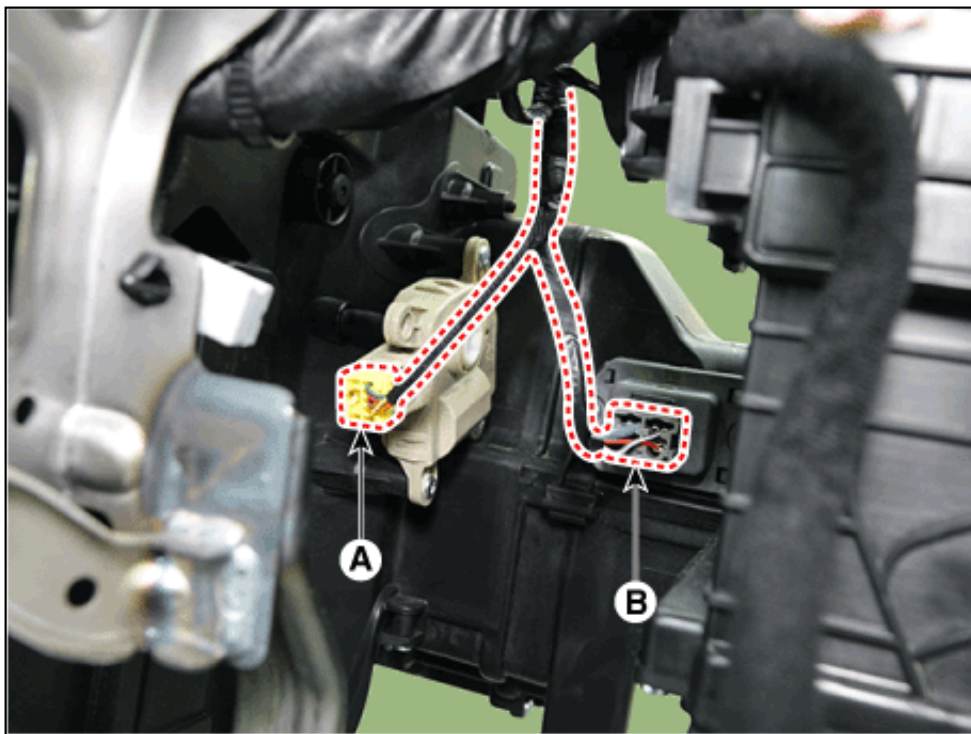
(4) Disconnect the auto defogging actuator connector (A).



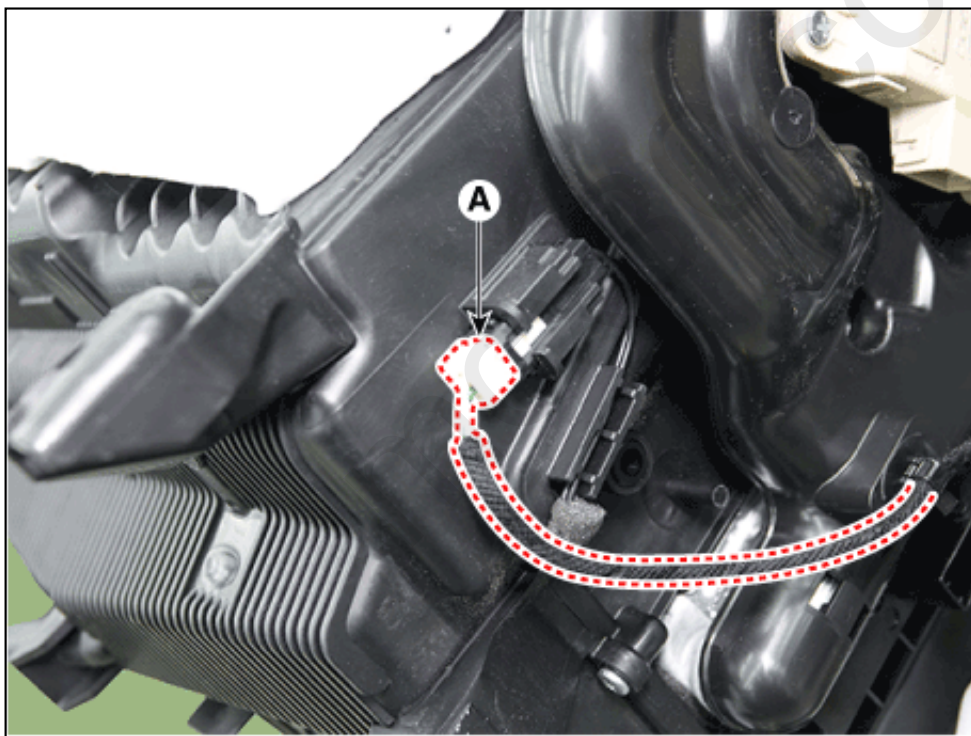
(5) Disconnect the intake actuator connector (A).



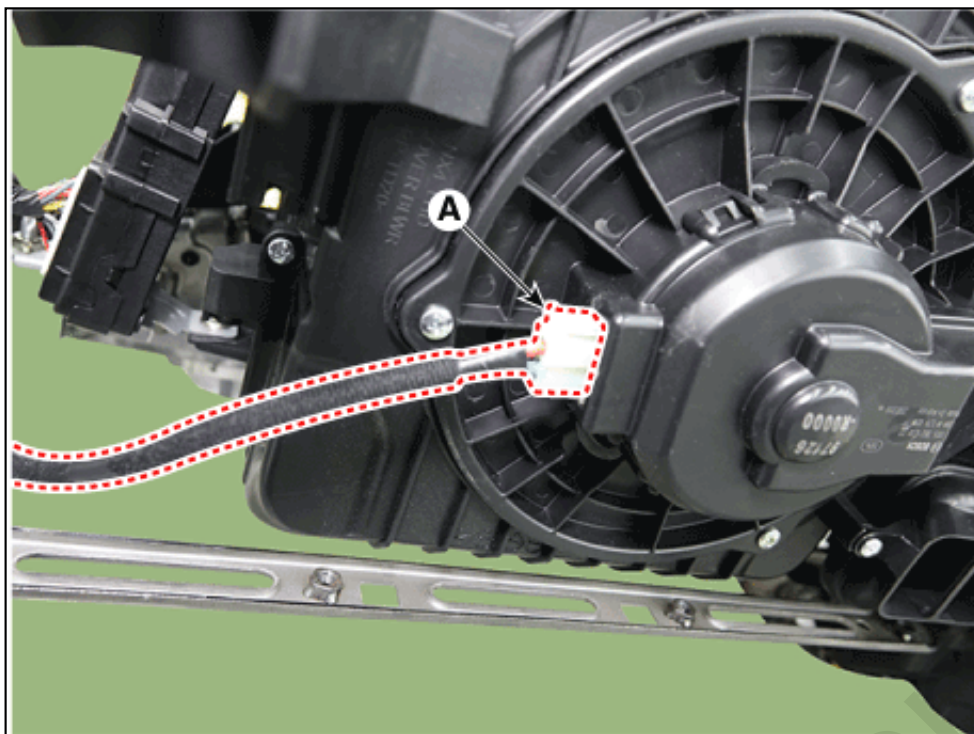
(6) Disconnect the passenger's temperatur actuator connector (A) and power mosfet connector (B).



(7) Disconnect the evaporator sensor connector (A).



(8) Disconnect the blower motor connector (A).



35. Loosen the heater & blower unit mounting bolt (A).

Tightening torque :

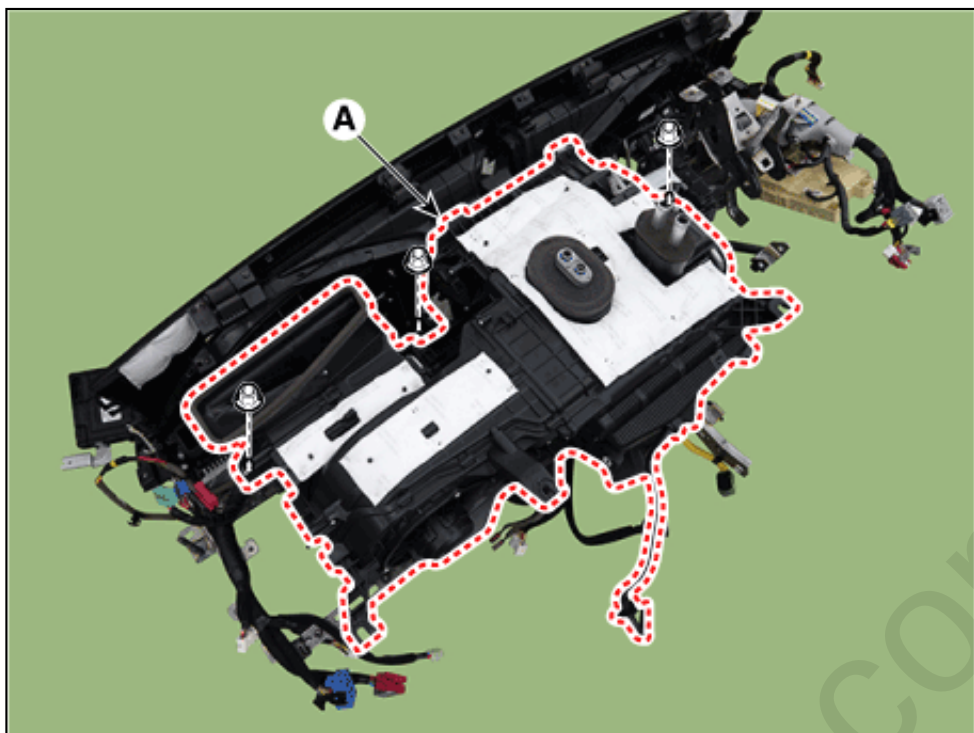
3.9 - 5.9 N.m (0.4 - 0.6 kgf.m , 2.9 - 4.3 lb-ft)



36. Loosen the mounting nuts and remove the heater & blower unit (A) from the crash pad.

Tightening torque :

3.9 - 5.9 N.m (0.4 - 0.6 kgf.m , 2.9 - 4.3 lb-ft)



37. Loosen the mounting screw and separate the heater unit (A).

Tightening torque :

3.9 - 5.9 N.m (0.4 - 0.6 kgf.m , 2.9 - 4.3 lb-ft)



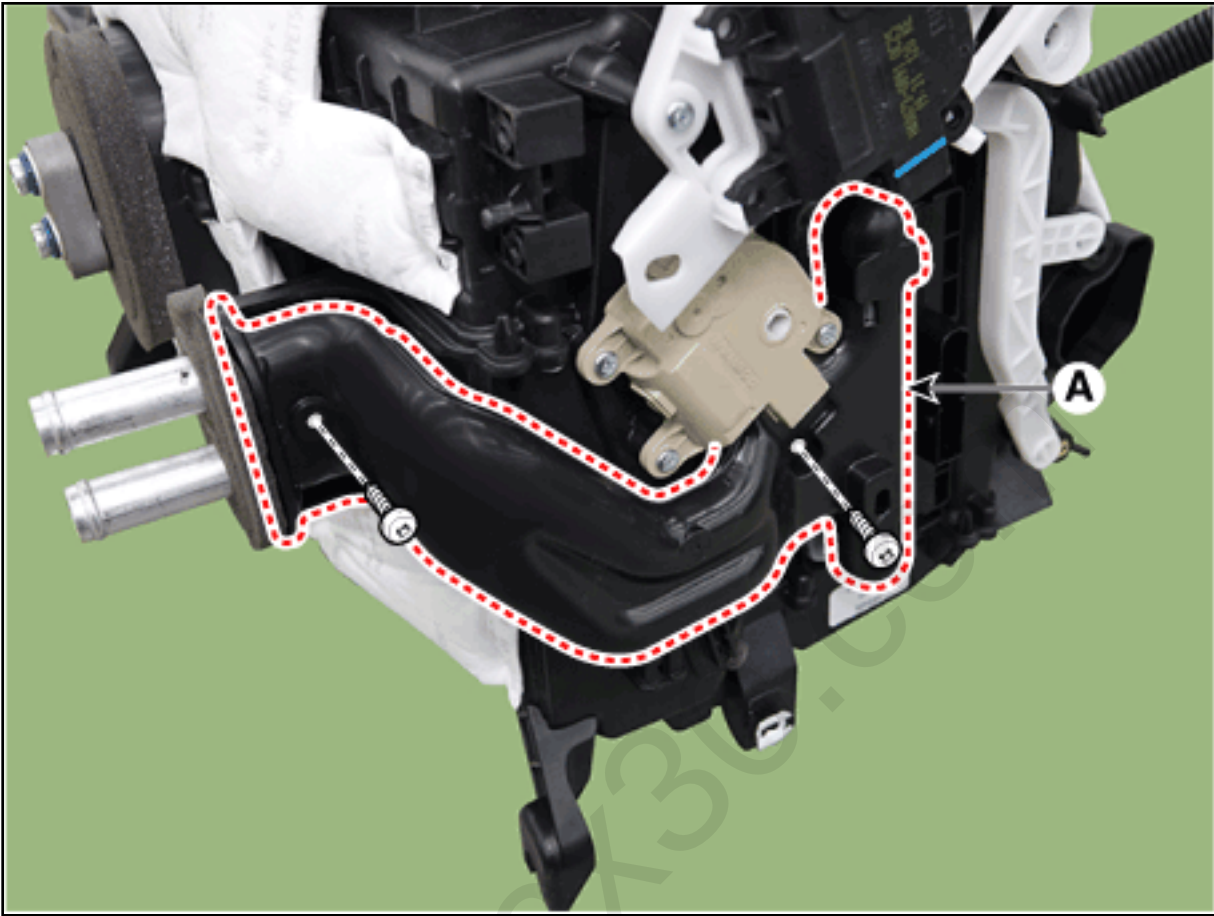
38. Install in the reverse order of removal.



- Make sure that each of the assembly components operates properly.
- Replace any damaged clips (or pin-type retainers).

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the heater and blower assembly.
(Refer to Heater - "Heater Unit")
3. Loosen the mounting screws and remove the heater core cover (A).



4. Separate the heater core (A) from the heater unit.



5. Install in the reverse order of removal.



- Refill the cooling system with engine coolant.
- Do not interchange the inlet and outlet heater hoses and install the hose clamps securely.
- Make sure that there is no air leakage.
- Charge the system and test its performance.

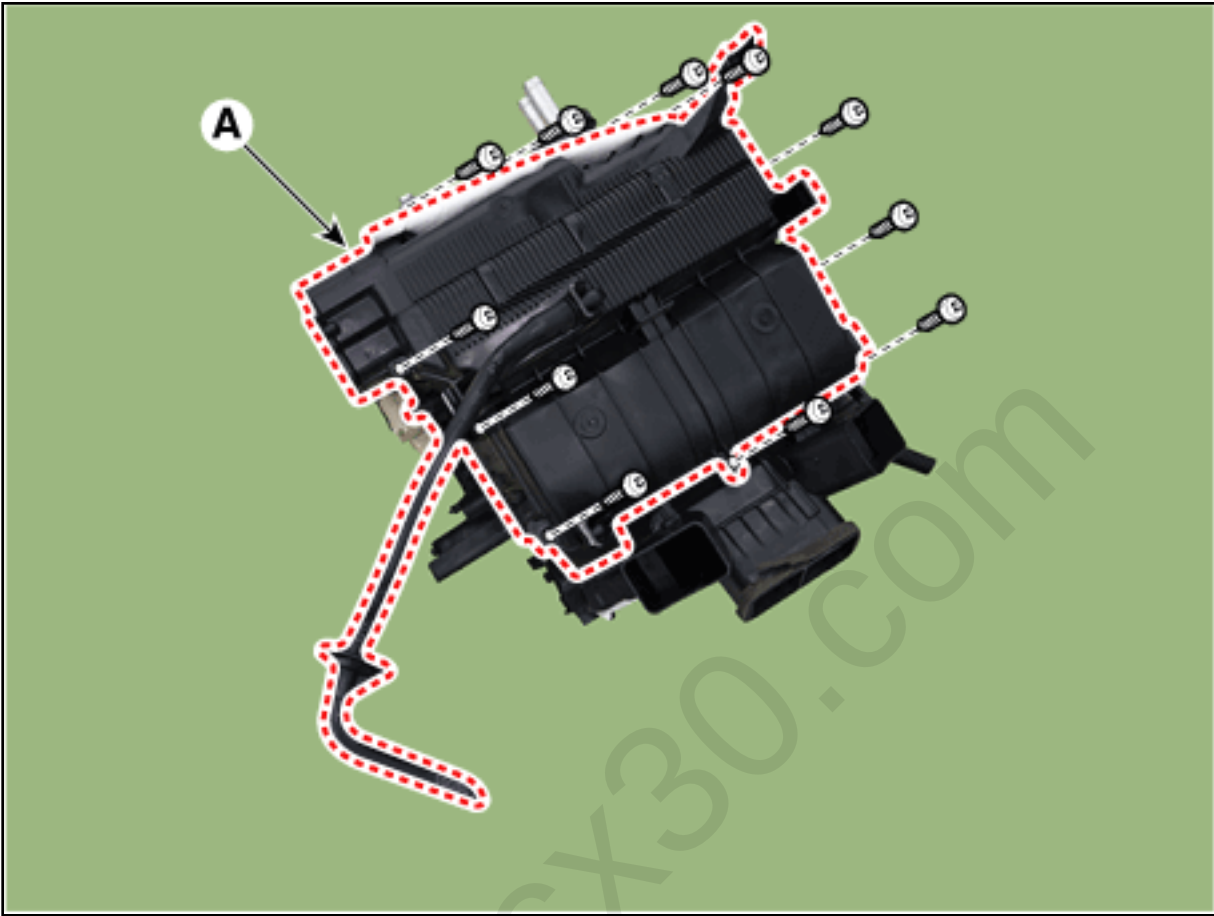
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Replacement

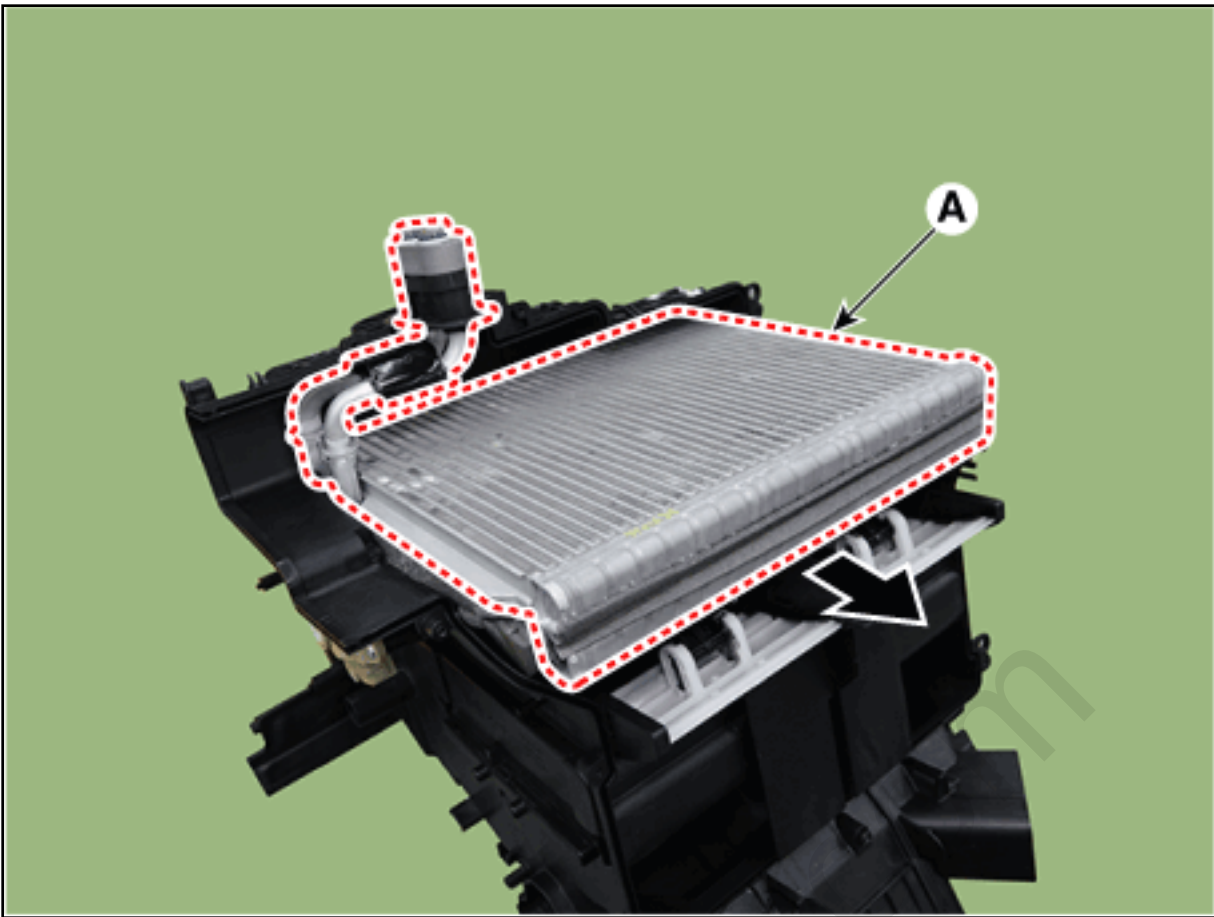
1. Disconnect the negative (-) battery terminal.
2. Remove the heater core.

(Refer to Heater - "Heater Core")

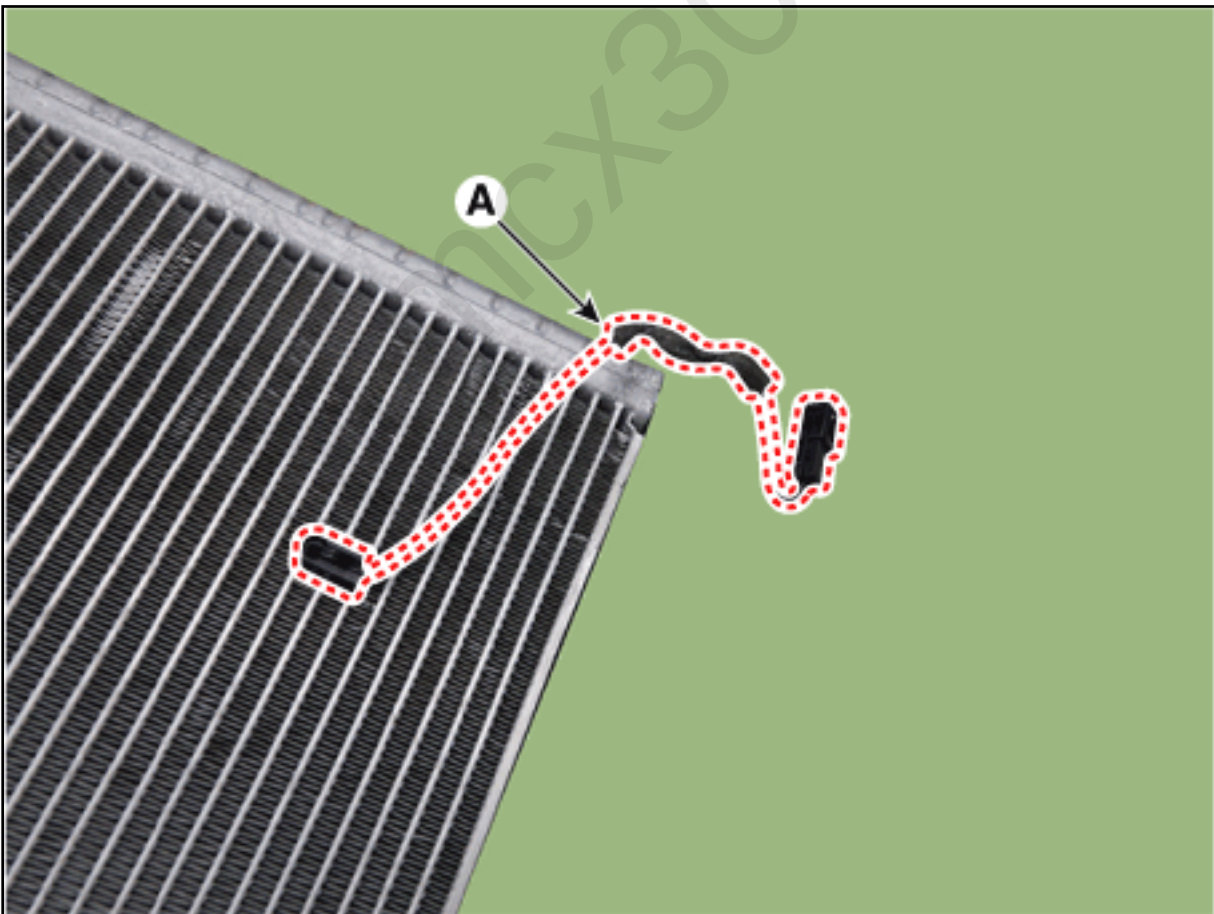
3. Loosen the mounting screws and remove the evaporator core cover (A).



4. Remove the evaporator core (A) from the heater unit.



5. Remove the evaporator temperature sensor (A) from the evaporator core.





6. Install in the reverse order of removal.



- If you're installing a new evaporator core, add refrigerant oil (PAG OIL).
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a or R-1234yf to avoid leakage.
- Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
- Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint, wash it off immediately.
- Apply sealant to the grommets.
- Make sure that there is no air leakage.
- Charge the system and test its performance.
- Do not interchange the inlet and outlet heater hoses and install the hose clamps securely.
- Refill the cooling system with engine coolant.

Description

The PTC (Positive Temperature Coefficient) heater is installed at the exit or the backside of the heater core.

The PTC heater is an electric heater using a PTC element as an auxiliary heating device that supplements deficiency of interior heat source in highly effective diesel engine. The electric heater heats up the interior by directly heating the air that passes through the heater. The name itself implies that the element has a proportional resistance change sensitive to temperature.



Operation Principle

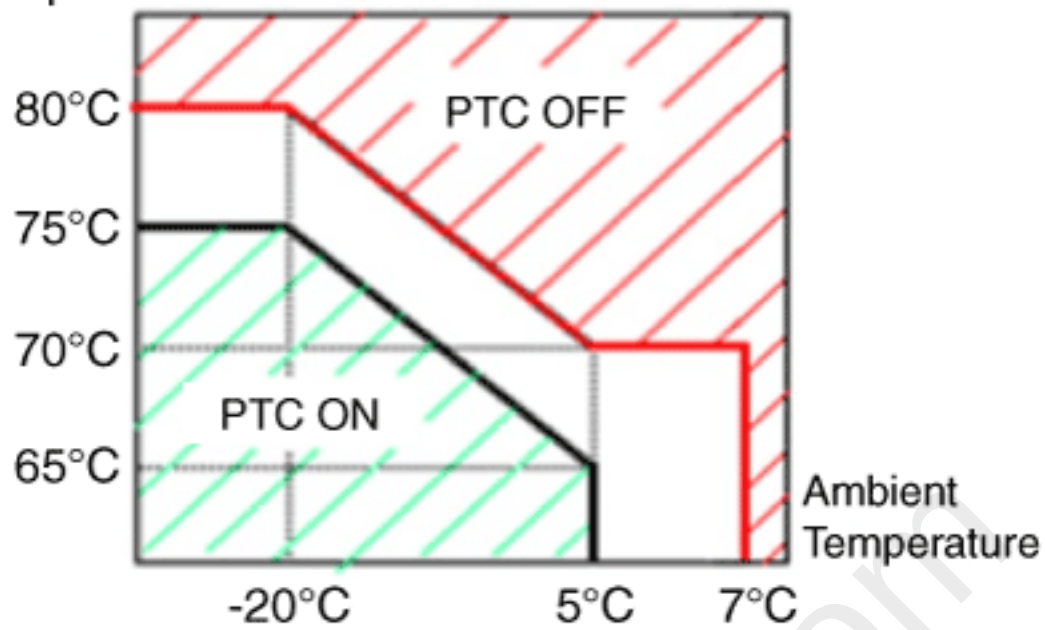
ECM outputs a PTC ON signal and operates PTC relay 1. Then the heater controller operates PTC relay 2 with an interval of 15 seconds.

Operating Condition

PTC heater operates according to the following conditions :

- Battery voltage : 13V or above
- Engine : Running
- Ambient temperature and coolant temperature

Coolant
Temperature



Inspection

Operating Logic Test (Manual only)

Inspect the PTC operation with the confirmation logic below :

1. Entering

- (1) Set the mode to FLOOR.
- (2) Set the temperature to MAX HOT.
- (3) Turn off the blower switch.
- (4) Press the intake (recirculation) button 5 times or more.

2. Forced operation

- (1) Non-A/C : The intake button indicator will blink with an interval of 0.5 second for 30 seconds.
With A/C : The intake and A/C button indicator will blink with an interval of 0.5 second for 30 seconds.
- (2) The PTC2 and PTC3 will operate by turning on the blower switch.
 - PTC2 and PTC3 will operate with an interval of 3 seconds.
 - PTC2 and PTC3 will turn off simultaneously when the blower switch is turned off.
 - Only PTC2 and PTC3 will be forced operated.

3. Cancellation

- (1) Select A/C or intake (recirculation) switch.
- (2) The test cancels automatically after 30 seconds.
- (3) Turn the ignition switch off.

Operating Logic Test (DATC only)

The operating logic test can be confirmed with GDS.

Operating Test

This test should be performed in the PTC ON conditions.

1. Run the engine.
2. Check the current on the wiring with a clamp multi tester.

Pattern	Current (A)
PTC 1 ON	0.1 ~ 49
PTC 2 ON	0.1 ~ 49
Total	0.1 ~ 100

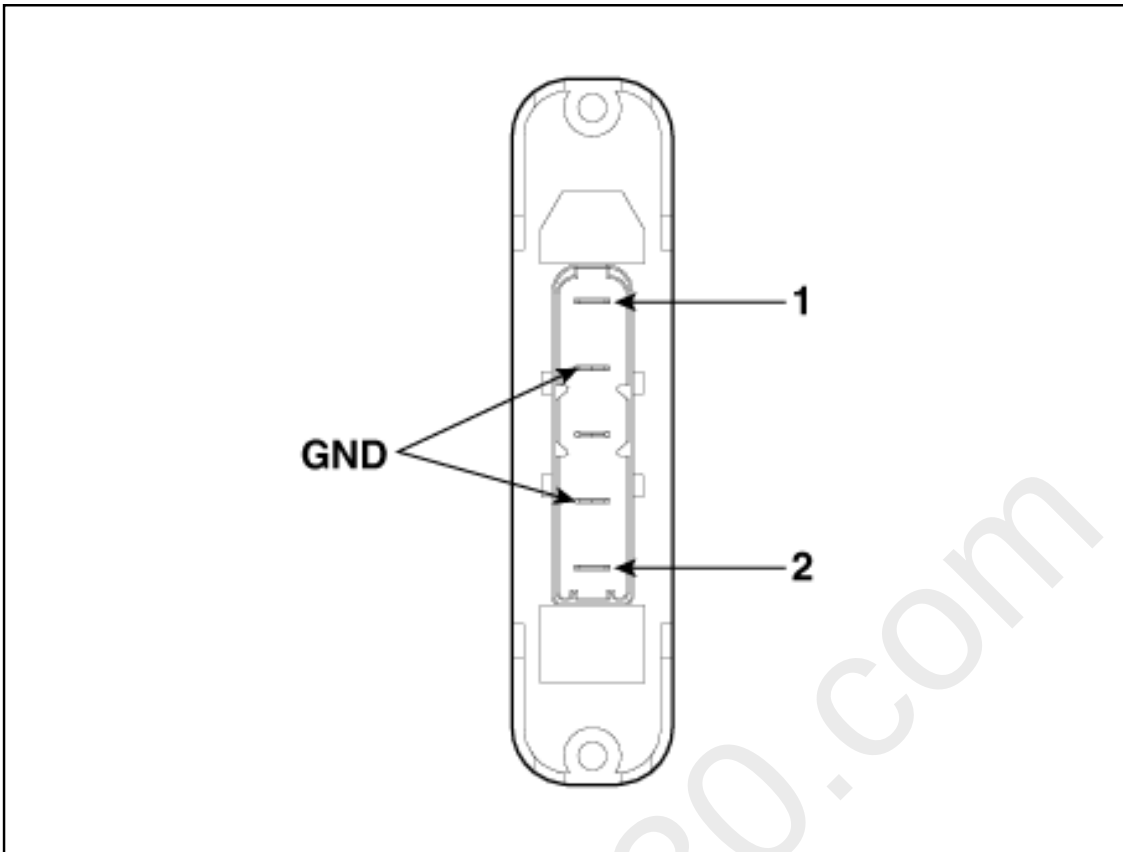
3. If the current is not within specification, inspect the related wiring.

Resistance Test

1. Turn the ignition switch OFF.
2. Disconnect the PTC heater connector.

3. Measure the resistance between terminal 1, 2 of PTC heater and ground line.

Resistance : 0.3 - 1.5Ω



1)PTC 1

2)PTC 2

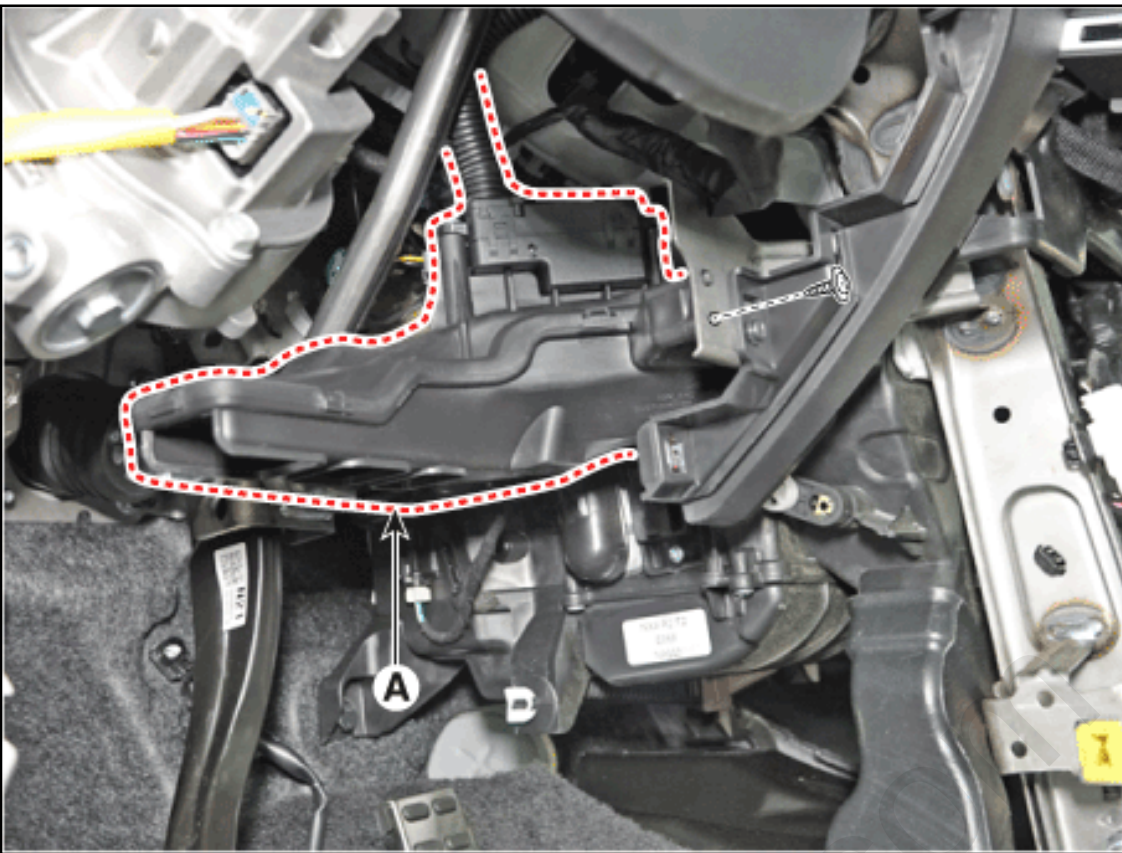
4. If the measured resistance is not within specification, replace the PTC heater with a new one.

Replacement

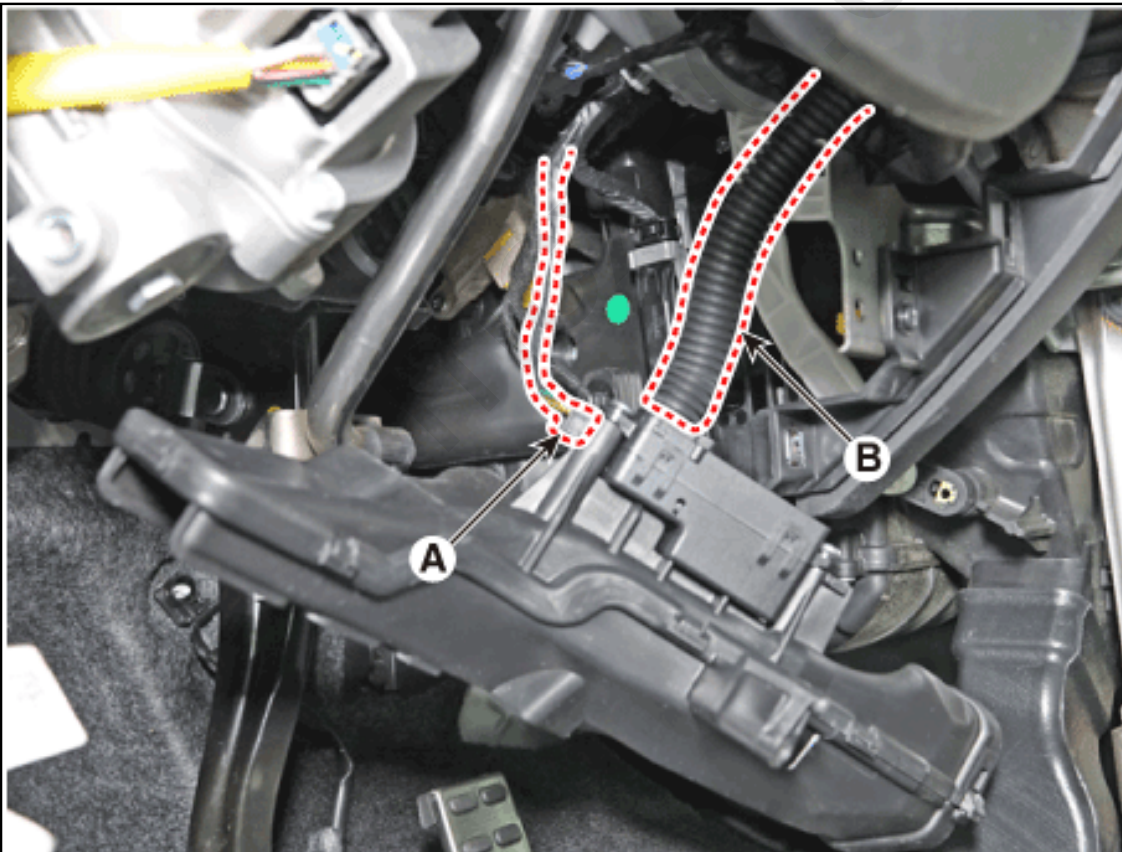
1. Disconnect the negative (-) battery terminal.
2. Remove the cowl cross bar assembly.

(Refer to Body (Interior and Exterior) - "Cowl Cross Bar Assembly")

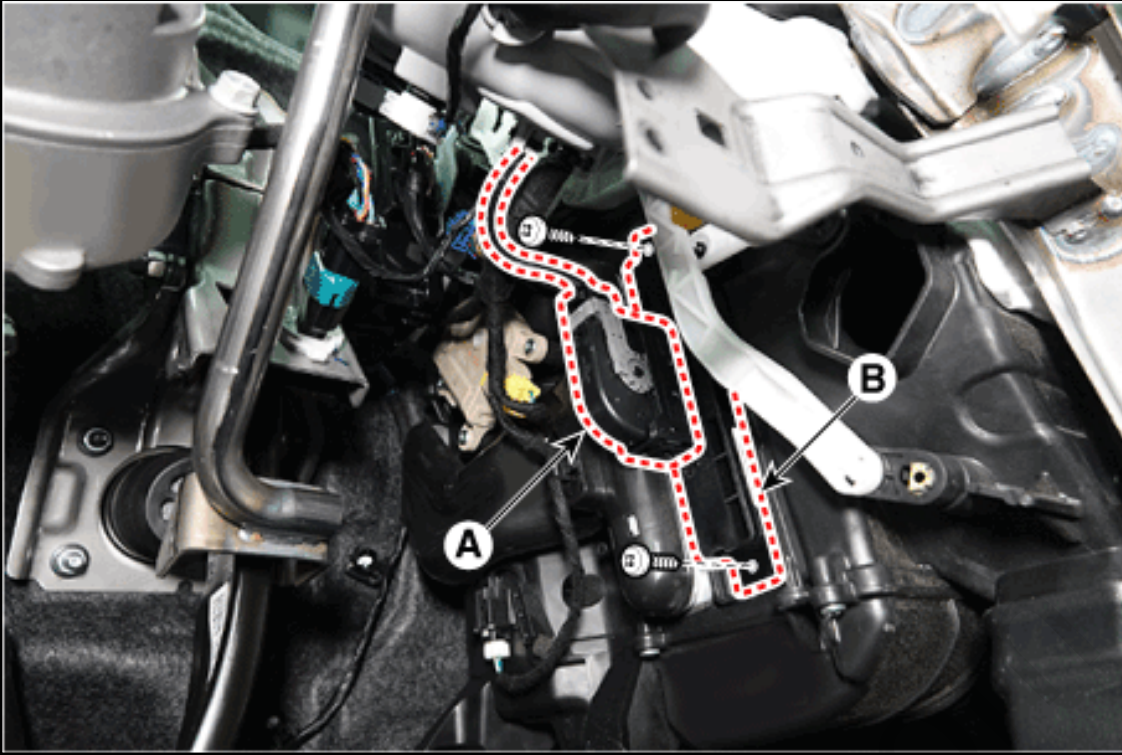
3. Loosen the mounting screw, remove the driver's shower duct (A).



4. Disconnect the PM sesnor connector (A) and hose (B).



5. Disconnect the PTC heater connector (A) and remove the PTC heater (B).



6. Install in the reverse order of removal.



- Make sure the connector is connected properly.

Description

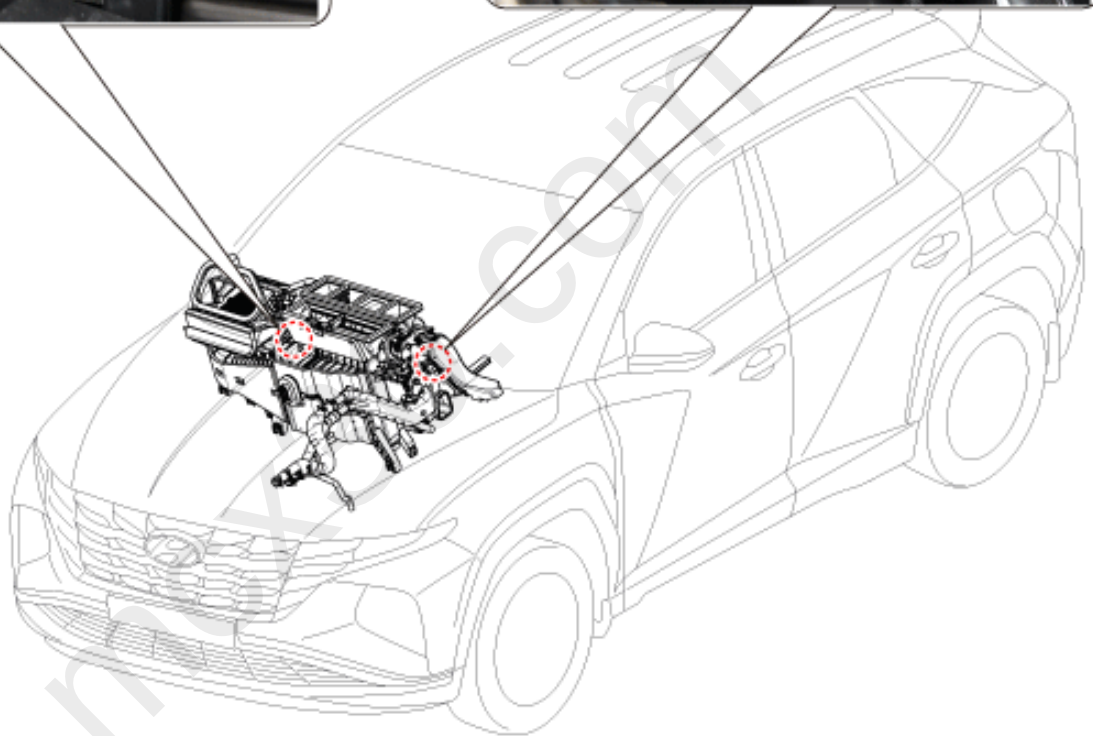
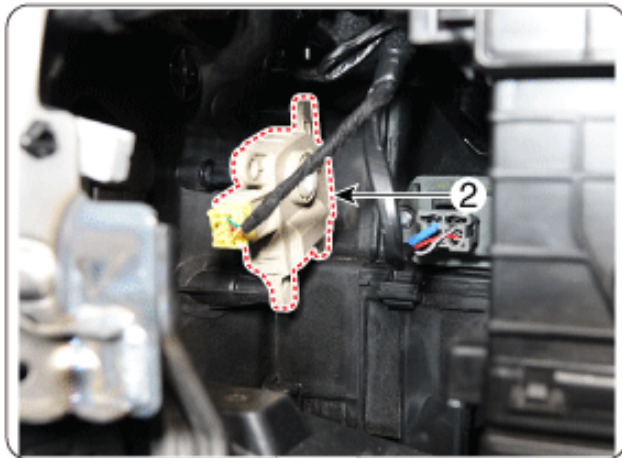
The heater unit includes mode control actuator and temperature control actuator.

The temperature control actuator is located at the heater unit. It regulates the temperature by the procedure as follows.

Signal from control unit adjusts the position of the temperature door by operating the temperature switch. Then the temperature will be regulated by the hot/cold air ratio decided by the position of the temperature door.

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Component
Location



1. Driver side temperature control actuator

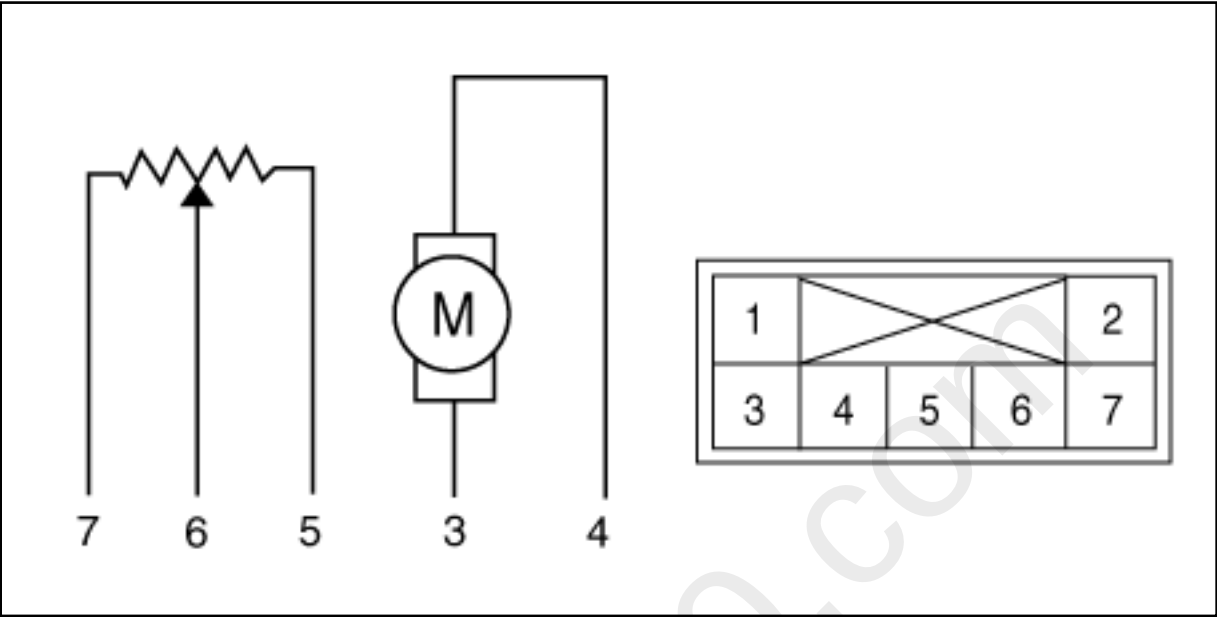
2. Passenger side temperature control actuator

Inspection

1. Turn the ignition switch OFF.
2. Disconnect the temperature control actuator connector.
3. Verify that the temperature control actuator operates to the cool position when connecting 12V to terminal 3 and grounding terminal 4.

Verify that the mode control actuator operates to the vent mode when connected in reverse.

[Driver]



- | | |
|------------------|--------------------|
| 1. - | 5. Sensor (+ 5V) |
| 2. - | 6. Feedback signal |
| 3. Cool position | 7. Sensor ground |
| 4. Warm position | |

[Passenger]

- | | |
|------------------|--------------------|
| 1. - | 5. Sensor (+ 5V) |
| 2. - | 6. Feedback signal |
| 3. Cool position | 7. Sensor ground |
| 4. Warm position | |

4. Connect the temperature control actuator connector.
5. Turn the ignition switch ON.
6. Check the voltage between terminal 5 and 6.

Door Position	Voltage (V)	Error Detecting
Max. cooling	0.5 ± 0.15V	Low voltage : 0.1V or less High voltage : 4.9V or more
Max. heating	4.5 ± 0.15V	

* It will feedback the current position of the actuator to controls.

7. If the measured voltage is not within specification, substitute with a known-good temperature control actuator and check for proper operation.
8. Replace the temperature control actuator if it is proved that there is a problem with it.

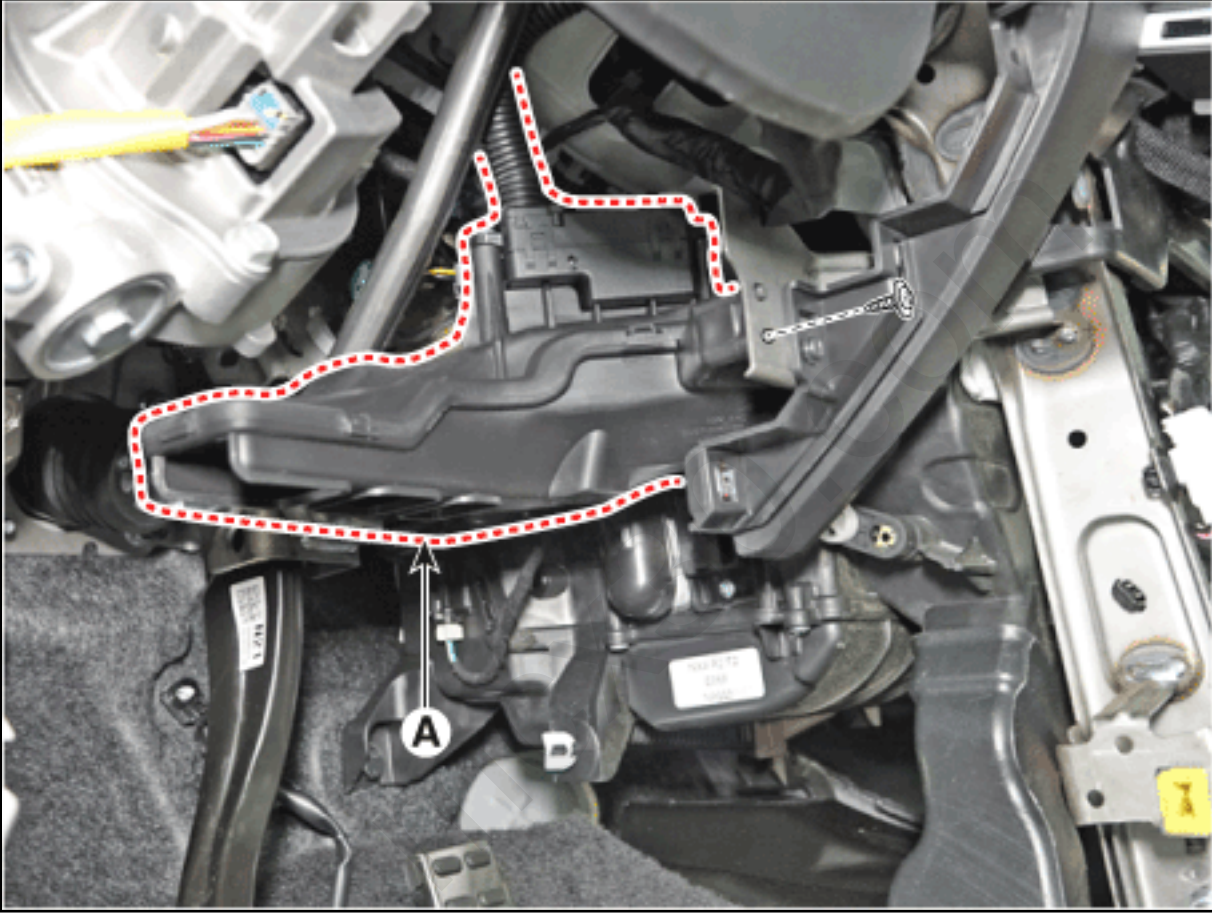
Replacement

[Driver]

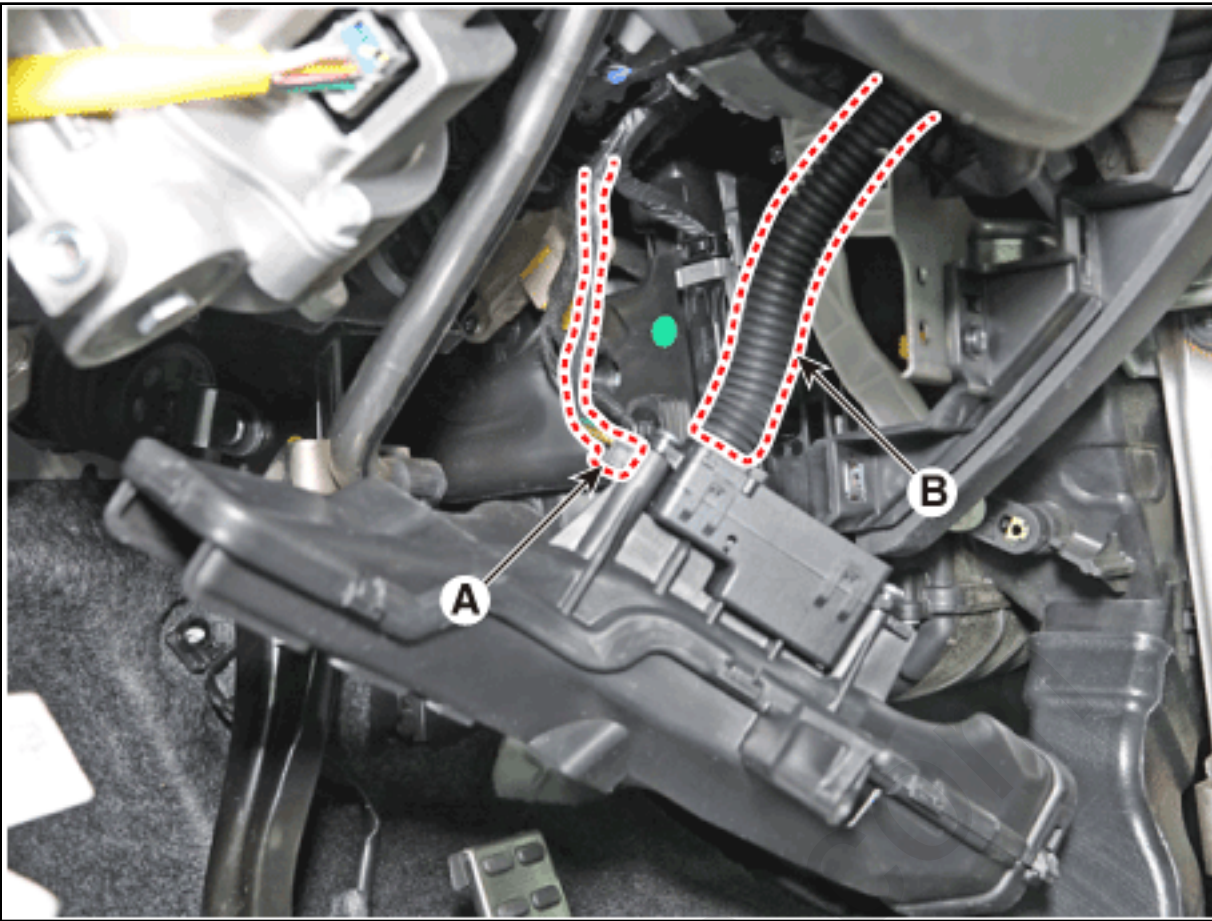
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.

(Refer to Body (Interior and Exterior) - "Crash Pad Lower Panel")

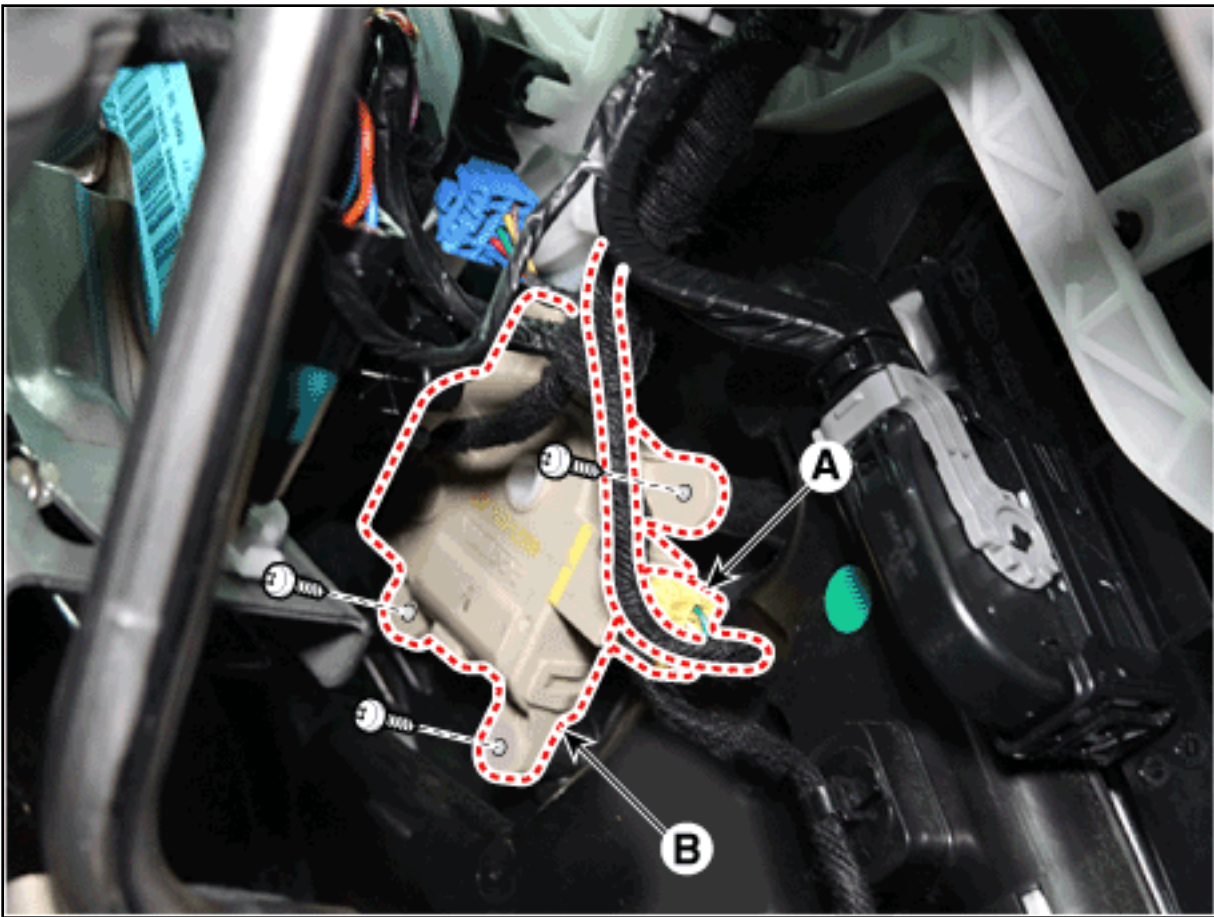
3. Loosen the mounting screw and remove the driver shower duct (A).



4. Disconnect the PM sensor connector (A) and hose (B).



5. Disconnect the temperature control actuator connector (A) and loosen the mounting screw and remove the temperature control actuator (B).



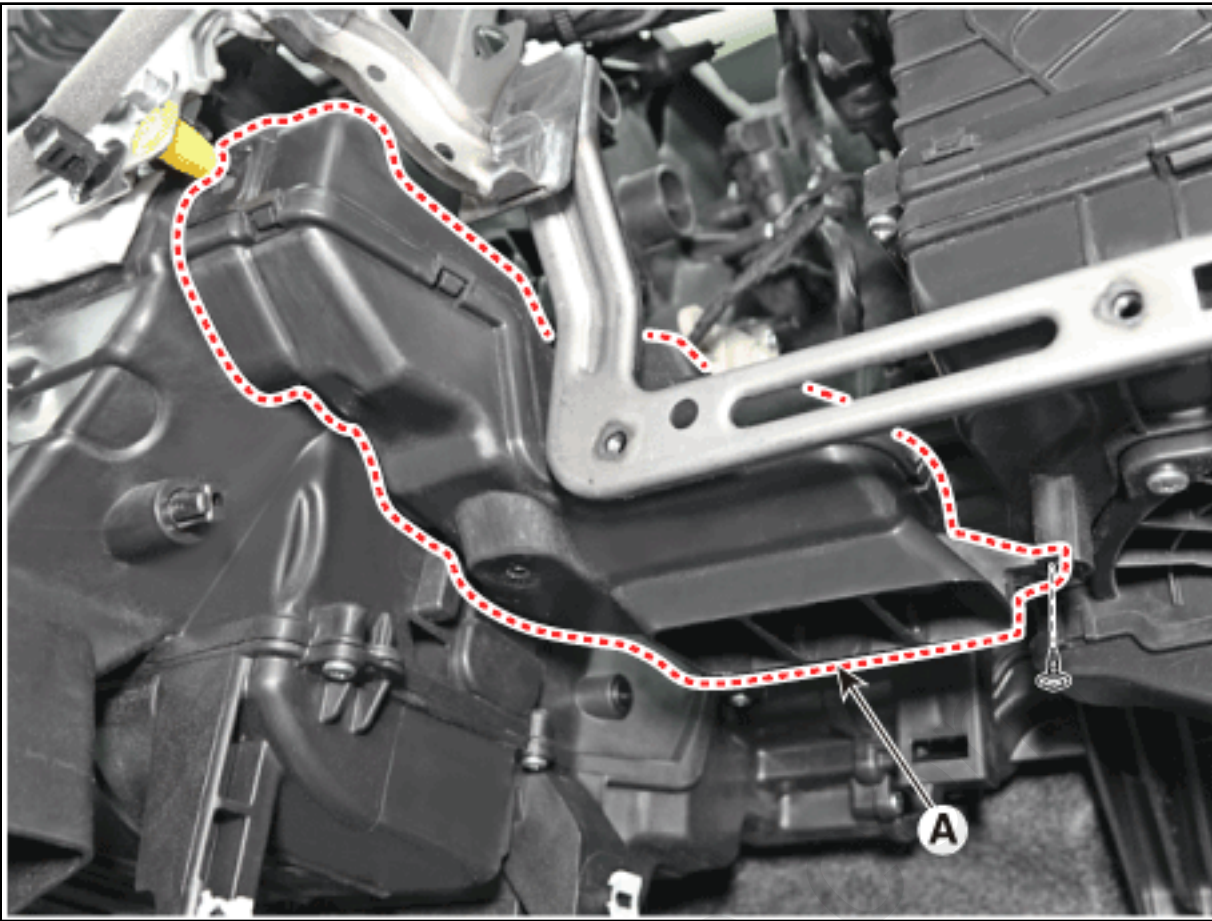
6. Install in the reverse order of removal.

[Passenger]

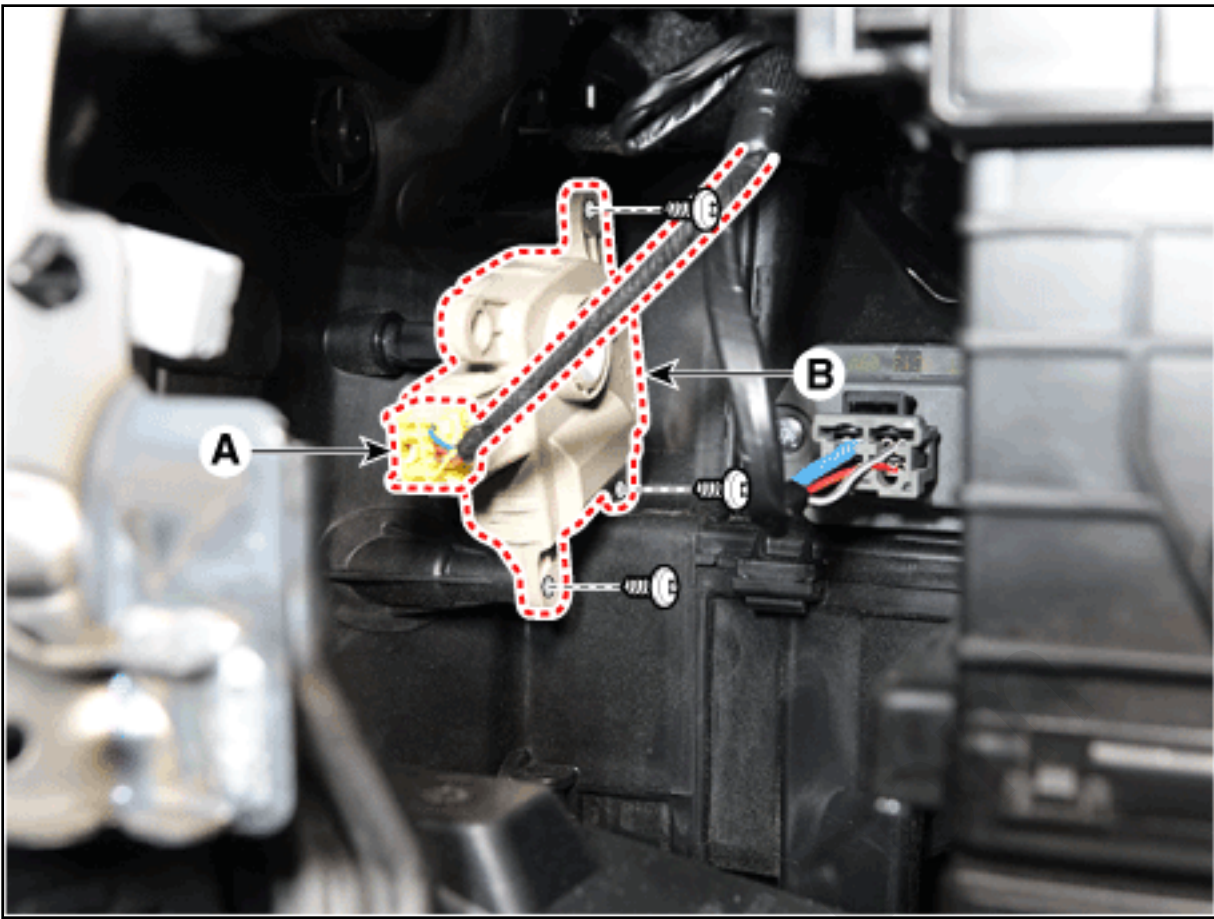
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center panel.

(Refer to Body (Interior and Exterior) - "Crash Pad Center Panel")

3. Loosen the mounting screw and remove the passenger shower duct (A).



4. Disconnect the temperature control actuator connector (A) and loosen the mounting screw and remove the temperature control actuator (B).



5. Install in the reverse order of removal.

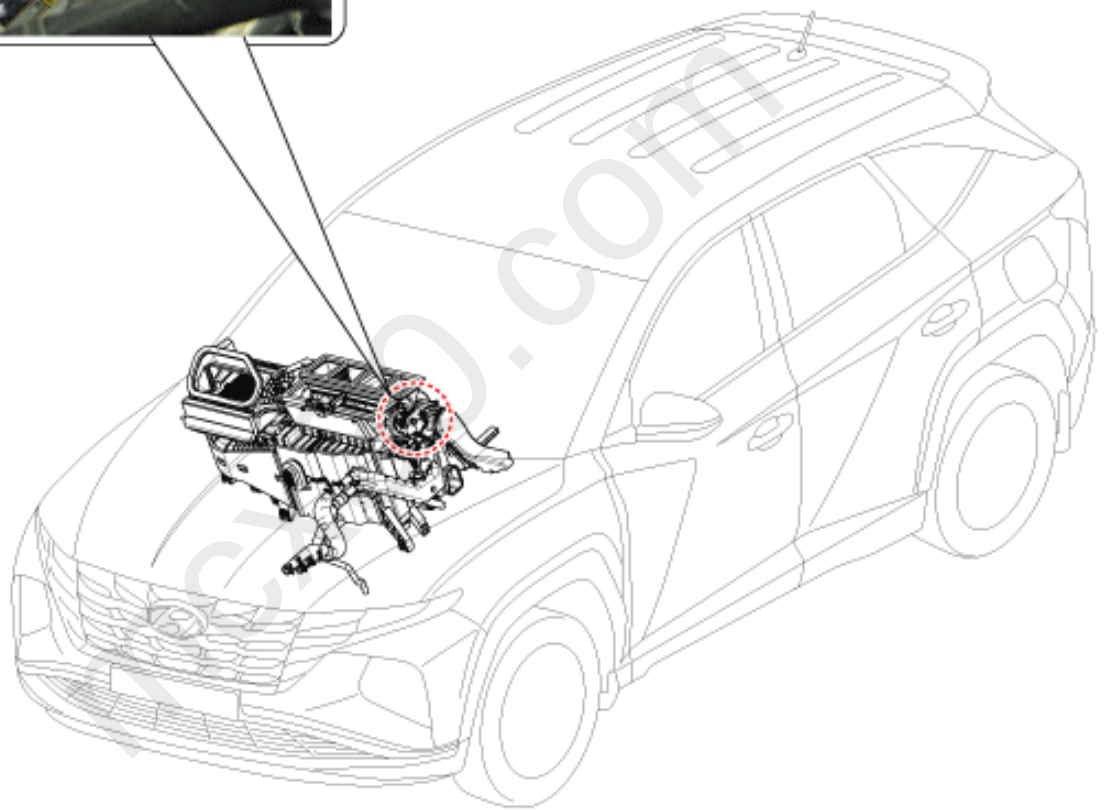
Description

The mode control actuator is located at the heater unit.

It adjusts the position of the mode door by operating the mode control actuator based on the signal of the A/C control unit. Pressing the mode select switch makes the mode control actuator shift in order of Vent → Bi-Level → Floor → Mix.

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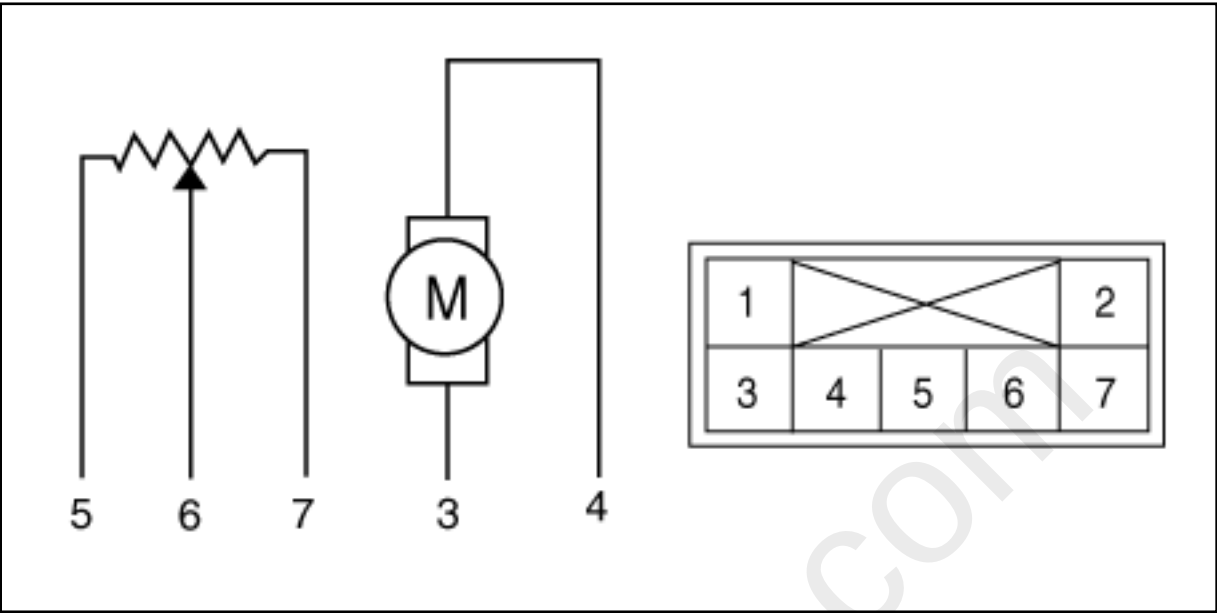
Components
Location



1. Mode control actuator

Inspection

1. Turn the ignition switch OFF.
2. Disconnect the mode control actuator connector.
3. Verify that the mode control actuator operates to the defrost mode when connecting 12V to terminal 3 and grounding terminal 4.
Verify that the mode control actuator operates to the vent mode when connected in reverse.



1. -
 2. -
 3. Defrost mode
 4. Vent mode
 5. Sensor ground
 6. Feedback signal
 7. Sensor (+ 5V)
4. Connect the mode control actuator connector.
 5. Turn the ignition switch ON.
 6. Check the voltage between terminal 5 and 4.

Door position	Voltage (V)	Error detecting
Vent	0.5 ± 0.15V	Low voltage : 0.1V or less High voltage : 4.9V or more
Defrost	4.5 ± 0.15V	

- * It will feedback the current position of the actuator to controls.
7. If the measured voltage is not within specification, substitute with a known-good mode control actuator and check for proper operation.
 8. Replace the mode control actuator if it is proved that there is a problem with it.

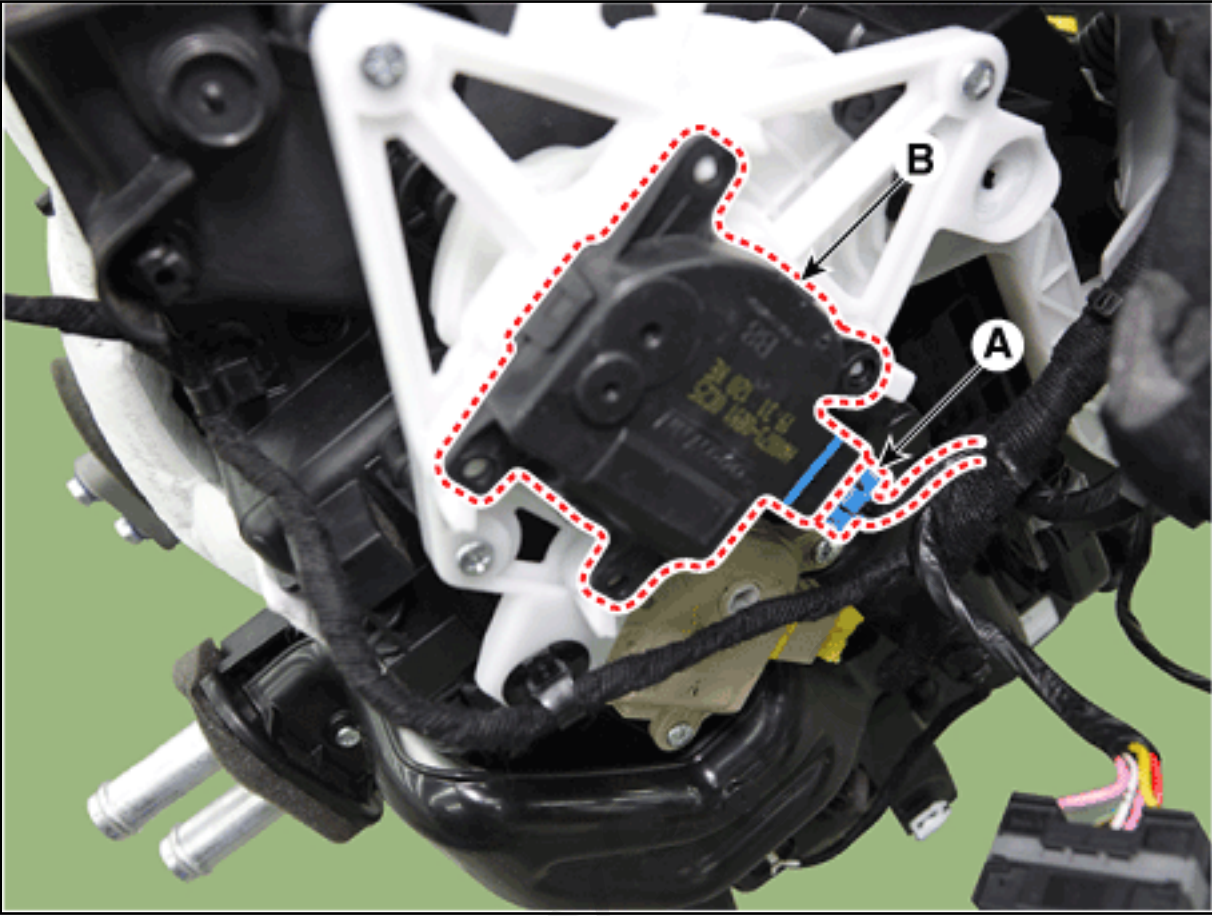
Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the main crash pad assembly.
(Refer to Body (Interior and Exterior) - "Main Crash Pad Assembly")

3. Remove the DC DC converter.

(Refer to Engine Electrical System - "DC DC converter")

4. Disconnect the mode control actuator connector (A) and loosen the mounting screw and remove the mode control actuator (B).



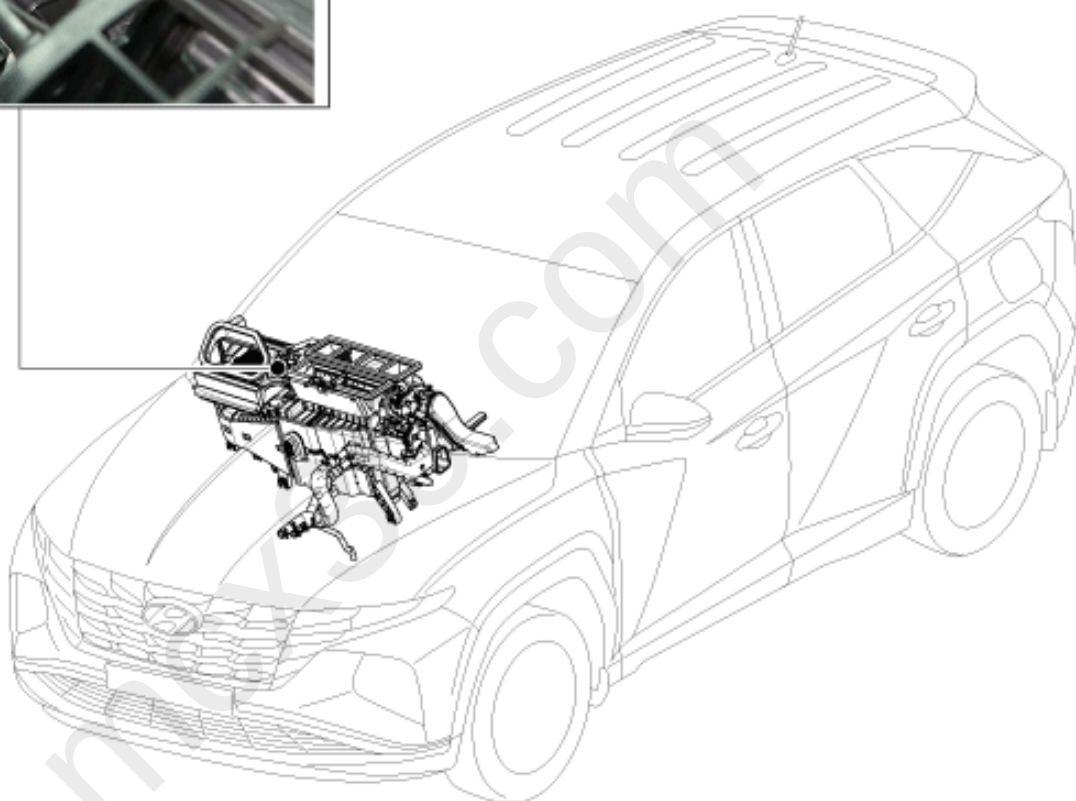
5. Install in the reverse order of removal.

Description

The auto defogging sensor is installed on the front window glass. The sensor judges and sends signal if moisture occurs to blow out wind for defogging. The air conditioner control module receives a signal from the sensor and restrains moisture and eliminates defog by the intake actuator, A/C, auto defogging actuator, blower motor rpm and mode actuator.

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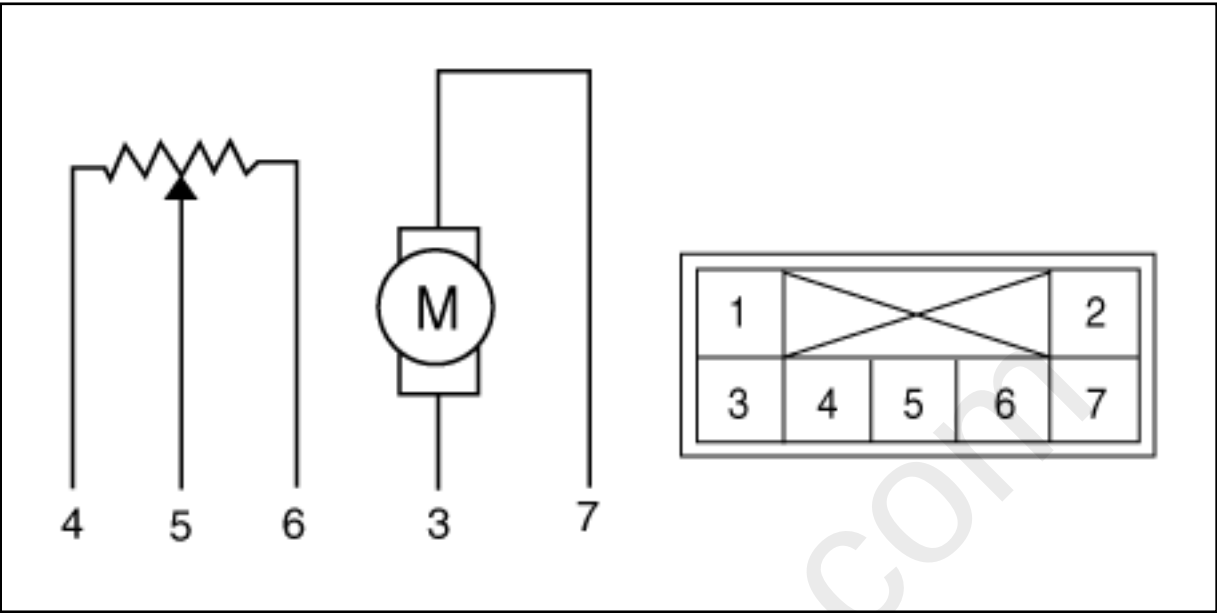
[1]



1. Auto defogging actuator

Inspection

1. Turn the ignition switch OFF.
2. Disconnect the auto defogging connector.
3. Verify that the auto defogging actuator operates to the open position when connecting 12V to terminal 3 and grounding terminal 6.
Verify that the auto defogging actuator operates to the close position when connected in reverse.



1. -
 2. -
 3. DEF (Close)
 4. DEF (Open)
 5. Sensor (+ 5V)
 6. Feedback signal
 7. Sensoer ground
4. Connect the auto defogging actuator connector.
 5. Turn the ignition switch ON.
 6. Check the voltage between terminals 5 and 4.

Door position	Voltage (4-5)	Error detecting
DEF (ON)	3.5 ± 0.15 V	Low voltage : 0.1V or less
DEF (OFF)	0.5 ± 0.15 V	High voltage : 4.9V or more

- * It will feedback the current position of the actuator to controls.
7. If the measured voltage is not within specification, check the operation by replacing the existing auto defogging actuator with a new genuine part. After that, determine whether replacement of the auto defogging actuator is required or not.
 8. Replace the auto defogging actuator if it is proved that there is a problem with it.

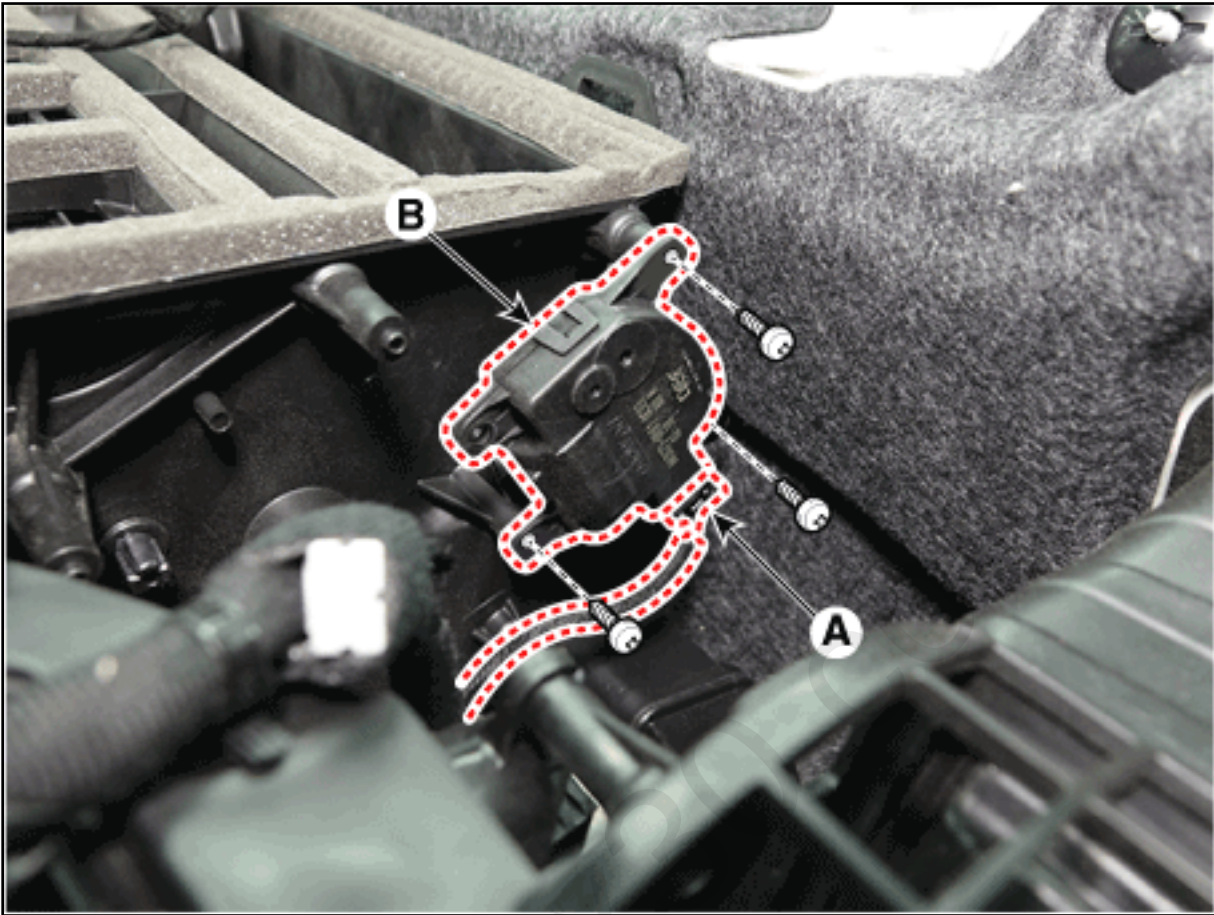
Replacement

1. Disconnect the negative (-) battery terminal.

2. Remove the main crash pad assembly.

(Refer to Body (Interior and Exterior) - "Main Crash Pad Assembly")

3. Disconenct the connector (A) and loosen the mounting screws and remove the auto defogging actuator (B).



4. Install in the reverse order of removal.