

GENESIS COUPE(BK) > 2010 > G 3.8 DOHC > Heating,Ventilation, Air Conditioning

Heating,Ventilation, Air Conditioning > General Information > Specifications

Air conditioner

Item		Specification
Compressor	Type	10A17C
	Oil type & Capacity	FD46XG(PAG) 150 ± 15cc
	Pulley type	6PK-TYPE
	Displacement	180cc/rev
Condenser	Heat rejection	157,000 ± 5% kcal/hr
APT(A/C pressure transducer)	The method to measure the pressure	Voltage = 0.00878835 * Pressure + 0.5
Expansion valve	Type	Block
Refrigerant	Type	R-134a
	Capacity [oz.(g)]	20.1 ± 0.88 (570 ± 25)

Blower unit

Item		Specification
Fresh and recirculation	Operating method	Actuator
Blower	Type	Sirocco
	Speed step	Auto + 8 speed (Automatic) 1~8 (Manual)
	Speed control	Power mosfet
Air filter	Type	Particle filter

Heater and evaporator unit

Item		Specification
Heater	Type	Pin & Tube type
	Heating capacity	4,550 ± 5% kcal/hr
	Mode operating method	Actuator
	Temperature operating method	Actuator
Evaporator	Temperature control type	Evaporator temperature sensor
	A/C ON/OFF [°C(°F)]	ON : 2.1 ± 0.5 (35.7 ± 32.9), OFF: 0.6 ± 0.5 (33.0 ± 32.9)

Heating,Ventilation, Air Conditioning > General Information > Troubleshooting

Problem symptoms table

Before replacing or repairing air conditioning components, first determine if the malfunction is due to the refrigerant

charge, air flow or compressor.

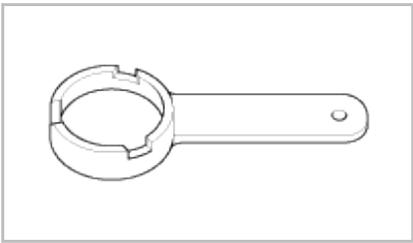
Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

After correcting the malfunction, check the complete system to ensure that performance is satisfactory.

Standard:

Symptom	Suspect Area
No blower operation	1.Blower fuse 2.Blower relay 3.Blower motor 4.Power mosfet 5.Blower speed control switch 6.Wire harness
No air temperature control	1.Engine coolant capacity 2.Heater control assembly
No compressor operation	1.Refrigerant capacity 2.A/C Fuse 3.Magnetic clutch 4.Compressor 5.A/C pressure transducer 6.A/C switch 7.Evaporator temperature sensor 8.Wire harness
No cool air	1.Refrigerant capacity 2.Refrigerant pressure 3.Drive belt 4.Magnetic clutch 5.Compressor 6.A/C pressure transducer 7.Evaporator temperature sensor 8.A/C switch 9.Heater control assembly Wire harness
Insufficient cooling	1.Refrigerant capacity 2.Drive belt 3.Magnetic clutch 4.Compressor 5.Condenser 6.7.8.Expansion valve 9.Evaporator 10.Refrigerant lines 11.A/C pressure transducer 12.Heater control assembly
No engine idle-up when A/C switch ON	1.Engine ECM 2.Wire harness
No air inlet control	1. Heater control assembly
No mode control	1.Heater control assembly 2.Mode actuator
No cooling fan operation	1.Cooling fan fuse 2.Fan motor 3.Engine ECM 4.Wire harness

Heating,Ventilation, Air Conditioning > General Information > Special Service Tools

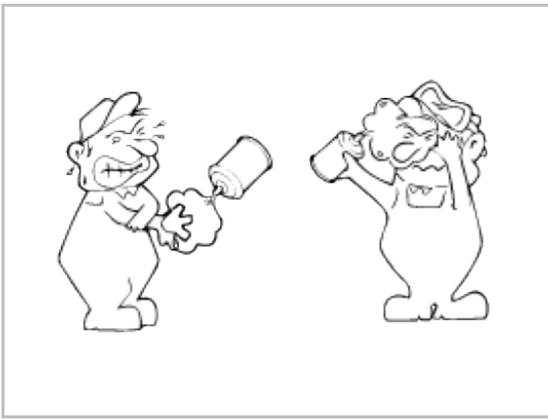
Tool (Number and name)	Illustration	Use
09977-29000 Disc & hub assembly bolt remover		Removal and installation of disc & hub assembly

Heating,Ventilation, Air Conditioning > Air conditioning System > General Information

Instructions

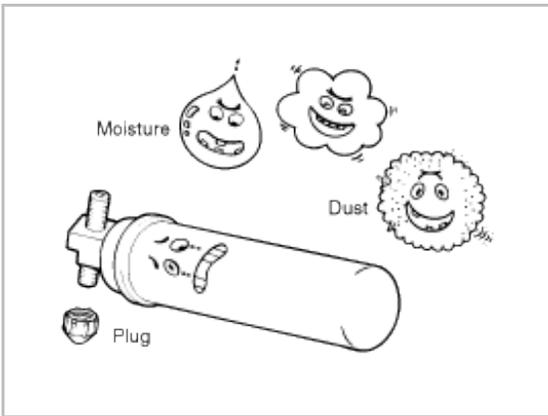
When Handling Refrigerant

1. R-134a liquid refrigerant is highly volatile. A drop on the skin of your hand could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. It is standard practice to wear goggles or glasses to protect your eyes, and gloves to protect your hands. If the refrigerant splashes into your eyes, wash them with clean water immediately.
3. The R-134a container is highly pressurized. Never leave it in a hot place, and check storage temperature is below 52°C (126°F)
4. An electronic leak detector should be used to check the system for refrigerant leakage. Bear in mind that the R-134a, upon coming into contact with flame, produces phosgene, a highly toxic gas.
5. Use only recommended lubricant for R-134a systems. If lubricants other than the recommended one used, system failure may occur.
6. PAG lubricant absorbs moisture from the atmosphere at a rapid rate, therefore the following precautions must be observed:
 - A. When removing refrigerant components from a vehicle, cap the components immediately to prevent entry of moisture.
 - B. When installing refrigerant components to a vehicle, do not remove the cap until just before connecting the components.
 - C. Complete the connection of all refrigerant tubes and hoses without delay to prevent the A/C system from taking on moisture.
 - D. Use the recommended lubricant from a sealed container only.
7. If an accidental discharge in the system occurs, ventilate the work area before resum of service.



When replacing parts ON A/C system

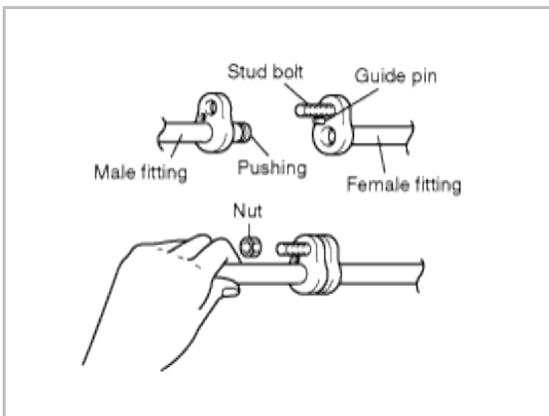
1. Never open or loosen a connection before discharging the system.
2. Seal the open fittings of components with a cap or plug immediately to prevent intrusion of moisture or dust.
3. Do not remove the sealing caps from a Replacement component until it is ready to be installed.
4. Before connecting an open fitting, always install a new sealing ring. Coat the fitting and seal with refrigerant oil before making the connection.



When Installing Connecting Parts

Flange with guide pin

Check the new O-ring for damage (use only the specified) and lubricate by using compressor oil. Tighten the nut to specified torque.



Size	Tightening torque [N.m (kg.m, lbf.ft)]	
	General bolt, nut	
	4T	7T

M6	5 - 6 (0.5 - 0.6, 3.6 - 4.3)	9 - 11 (0.9 - 1.1, 6.5 - 7.9)
M8	12 - 14 (1.2 - 1.4, 8.7 - 10)	20 - 26 (2.0 - 2.6, 14 - 18)
M10	25 - 28 (2.5 - 2.8, 18 - 20)	45 - 55 (4.5 - 5.5, 32 - 39)
Size	Flange bolt, nut	
	4T	7T
M6	5 - 7 (0.5 - 0.7, 3.6 - 5.0)	8 - 12 (0.8 - 1.2, 5.8 - 8.6)
M8	10 - 15 (1.0 - 1.5, 7 - 10)	19 - 28 (1.9 - 2.8, 14 - 20)
M10	21 - 31 (2.1 - 3.1, 15 - 22)	39 - 60 (3.9 - 6.0, 28 - 43)

NOTE

- T means tensile intensity, which is stamped on the head of bolt only numeral.

Handling tubing and fittings

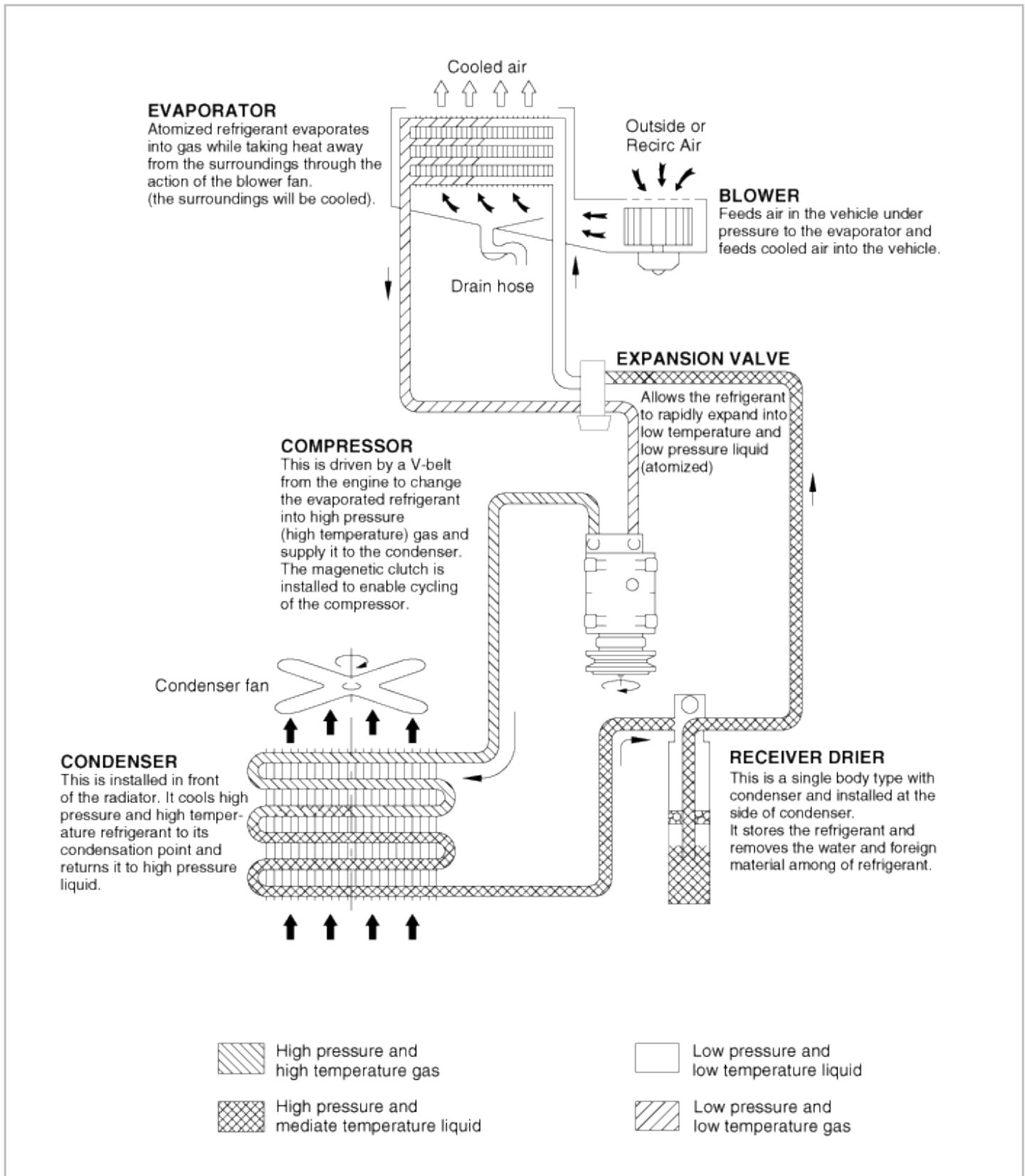
The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure moisture-free refrigerant and refrigerant oil are used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause problems or serious damage.

The Following precautions must be observed

1. When it is necessary to open the refrigeration system, have everything you will need to service the system ready so the system will not be left open any longer than necessary.
2. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture.
3. All lines and components in parts stock should be capped or sealed until they are ready to be used.
4. Never attempt to rebind formed lines to fit. Use the correct line for the installation you are servicing.
5. All tools, including the refrigerant dispensing manifold, the gauge set manifold and test hoses, should be kept clean and dry.

Heating, Ventilation, Air Conditioning > Air conditioning System > Description and Operation

Refrigeration cycle



Heating, Ventilation, Air Conditioning > Air conditioning System > Repair procedures

Refrigerant system service basics

Refrigerant recovery

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

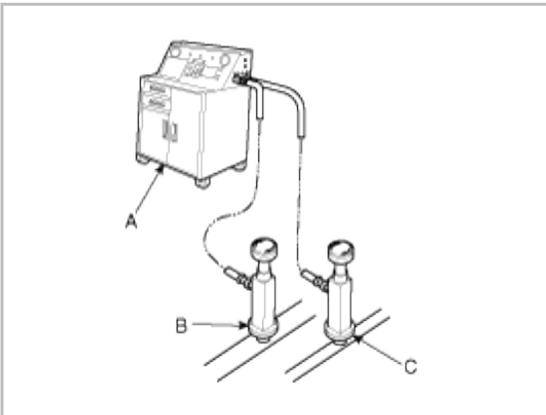
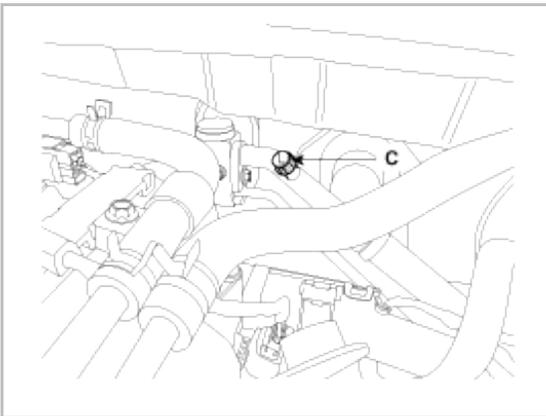
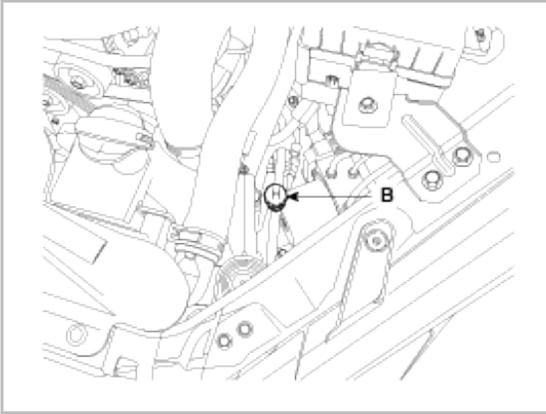
CAUTION

- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resume of service.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect an R-134a refrigerant Recovery/Recycling/Charging System (A) to the high-pressure service port (B) and the low-pressure service port (C) as shown, following the equipment manufacturer's instructions.



2. Measure the amount of refrigerant oil removed from the A/C system after the recovery process is completed. Be sure to install the same amount of new refrigerant oil back into the A/C system before charging.

System evacuation

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

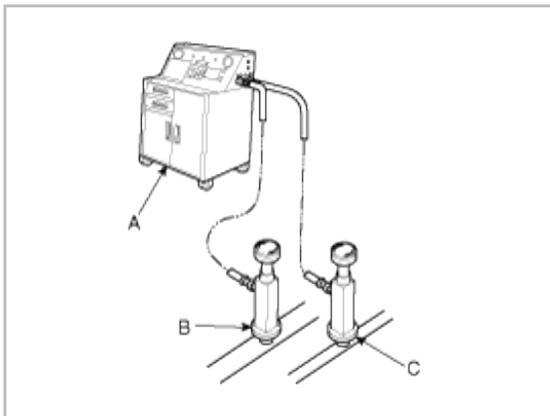
CAUTION

- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resume of service.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. When an A/C System has been opened to the atmosphere, such as during installation or repair, it must be evacuated using an R-134a refrigerant Recovery/Recycling/Charging System. (If the system has been open for several days, the receiver/dryer should be replaced, and the system should be evacuated for several hours.)
2. Connect an R-134a refrigerant Recovery/Recycling/Charging System (A) to the high-pressure service port (B) and the low-pressure service port (C) as shown, following the equipment manufacturer's instructions.



3. If the low-pressure does not reach more than 93.3 kPa (700 mmHg, 27.6 in.Hg) in 10 minutes, there is probably a leak in the system. Partially charge the system, and check for leaks (see Leak Test.).
4. Remove the low pressure valve from the low-pressure service port.

System charging

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

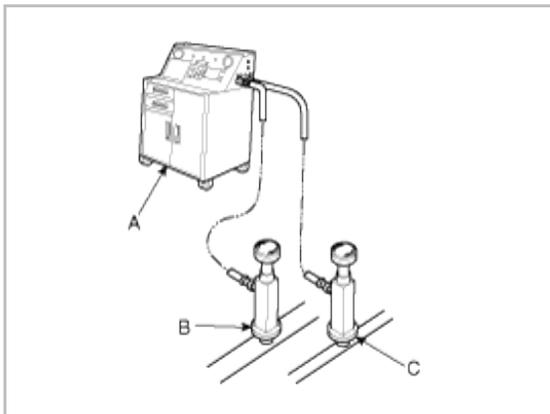
CAUTION

- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resume of service.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect an R-134a refrigerant Recovery/Recycling/Charging System (A) to the high-pressure service port (B) as shown, following the equipment manufacturer's instructions.



2. Add the same amount of new refrigerant oil to system that was removed during recovery. Use only specified

refrigerant oil. Charge the system with 20.1 ± 0.88 oz. (570 ± 25 g) of R-134a refrigerant. Do not overcharge the system the compressor will be damaged.

Refrigerant leak test

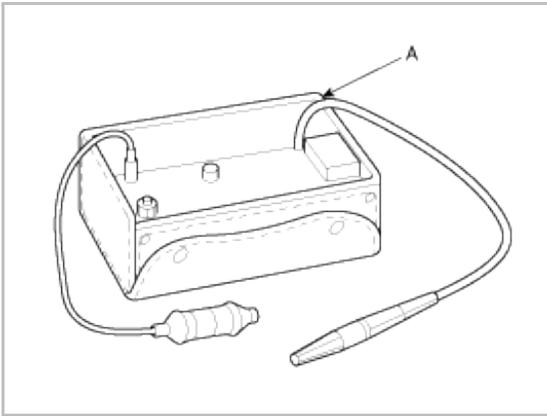
Always conduct a leak test with an electronic leak detector whenever leakage or refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening or connection fittings.

NOTE

In order to use the leak detector properly, read the manual supplied by the manufacturer.

If a gas leak is detected, proceed as follows:

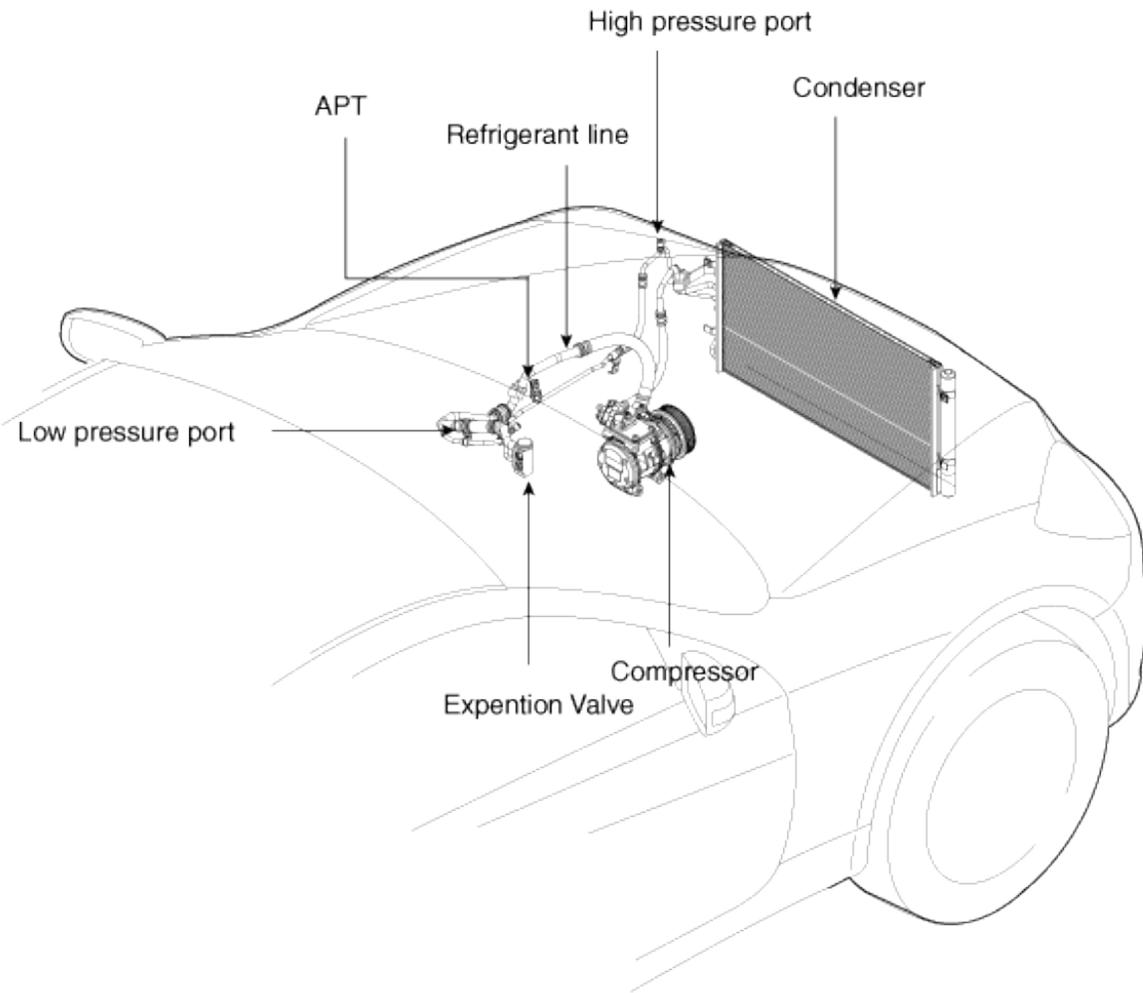
1. Check the torque on the connection fittings and, if too loose, tighten to the proper torque. Check for gas leakage with a leak detector (A).
2. If leakage continues even after the fitting has been tightened, discharge the refrigerant from the system, disconnect the fittings, and check their seating faces for damage. Always replace, even if the damage is slight.
3. Check the compressor oil and add oil if required.
4. Charge the system and recheck for gas leaks. If no leaks are found, evacuate and charge the system again.



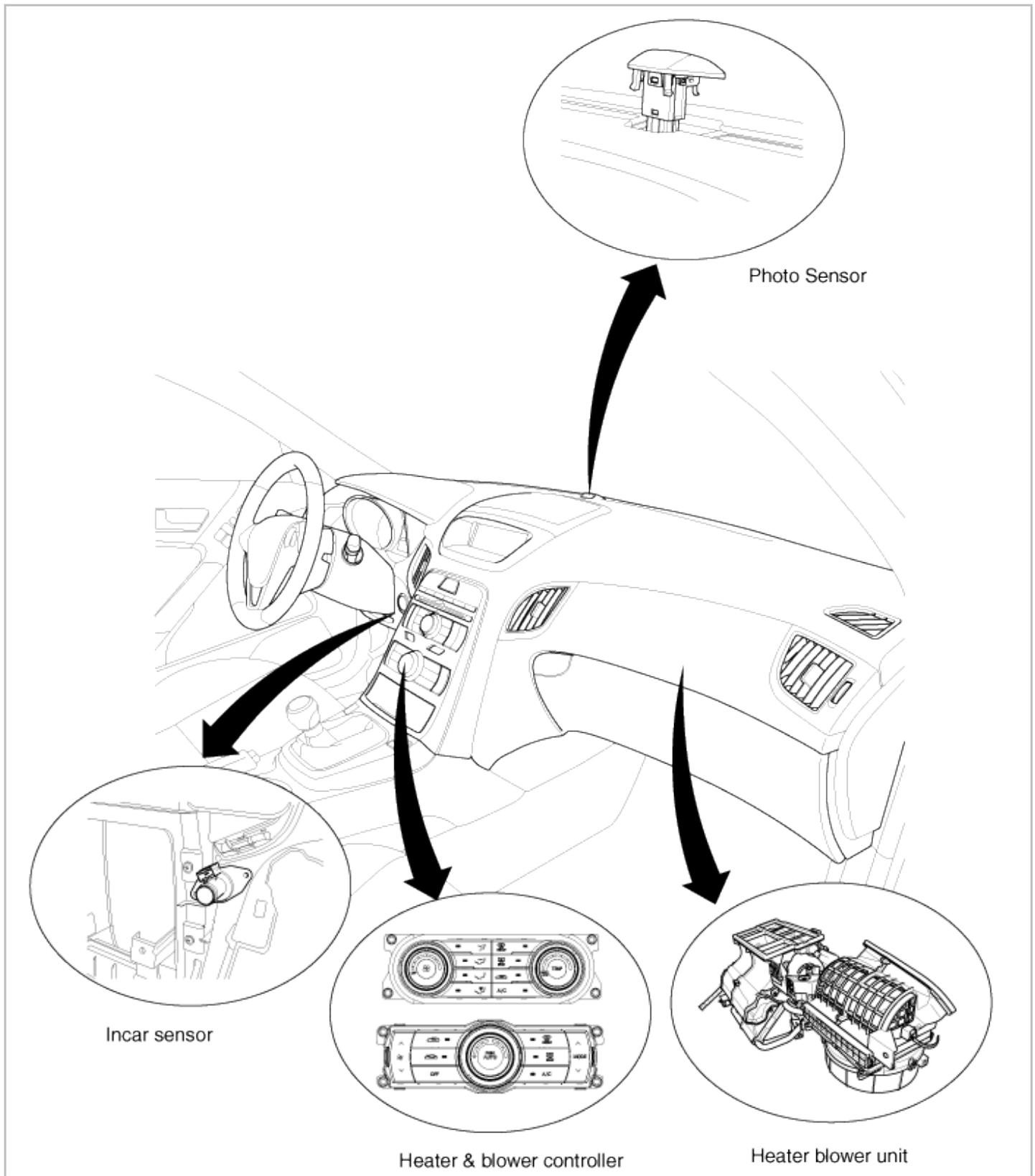
Heating, Ventilation, Air Conditioning > Air conditioning System > Components and Components Location

Component location index

Engine room



Interior



Heating,Ventilation, Air Conditioning > Air conditioning System > Compressor oil > Repair procedures

Oil Specification

1. The HFC-134a system requires synthetic (PAG) compressor oil whereas the R-12 system requires mineral compressor oil. The two oils must never be mixed.

- Compressor (PAG) oil varies according to compressor model. Be sure to use oil specified for the model of compressor.

Handling of Oil

- The oil should be free from moisture, dust, metal powder, etc.
- Do not mix with other oil.
- The water content in the oil increases when exposed to the air. After use, seal oil from air immediately. (HFC-134a Compressor Oil absorbs moisture very easily.)
- The compressor oil must be stored in steel containers, not in plastic containers.

Compressor oil check

The oil used to lubricate the compressor is circulating with the refrigerant.

Whenever replacing any component of the system or a large amount of gas leakage occurs, add oil to maintain the original amount of oil.

Oil total volume in system : 150±15cc (5.3±0.53 fl.oz)

Oil Return Operation

There is close affinity between the oil and the refrigerant.

During normal operation, part of the oil recirculates with the refrigerant in the system. When checking the amount of oil in the system, or replacing any component of the system, the compressor must be run in advance for oil return operation. The procedure is as follows:

- Open all the doors and the engine hood.
- Start the engine and air conditioning switch to "ON" and set the blower motor control knob at its highest position.
- Run the compressor for more than 20 minutes between 800 and 1,000 rpm in order to operate the system.
- Stop the engine.

Replacement of Component Parts

When replacing the system component parts, supply the following amount of oil to the component parts to be installed.

Component parts to be installed	Amount of Oil
Evaporator	50 cc (1.70 fl.oz)
Condenser	30 cc (1.02 fl.oz)
Receiver/dryer	30 cc (1.02 fl.oz)
Refrigerant line (One piece)	10 cc (0.34 fl.oz)

For compressor Replacement, subtract the volume of oil drained from the removed compressor from the specified volume, and drain the calculated volume of oil from the new compressor:

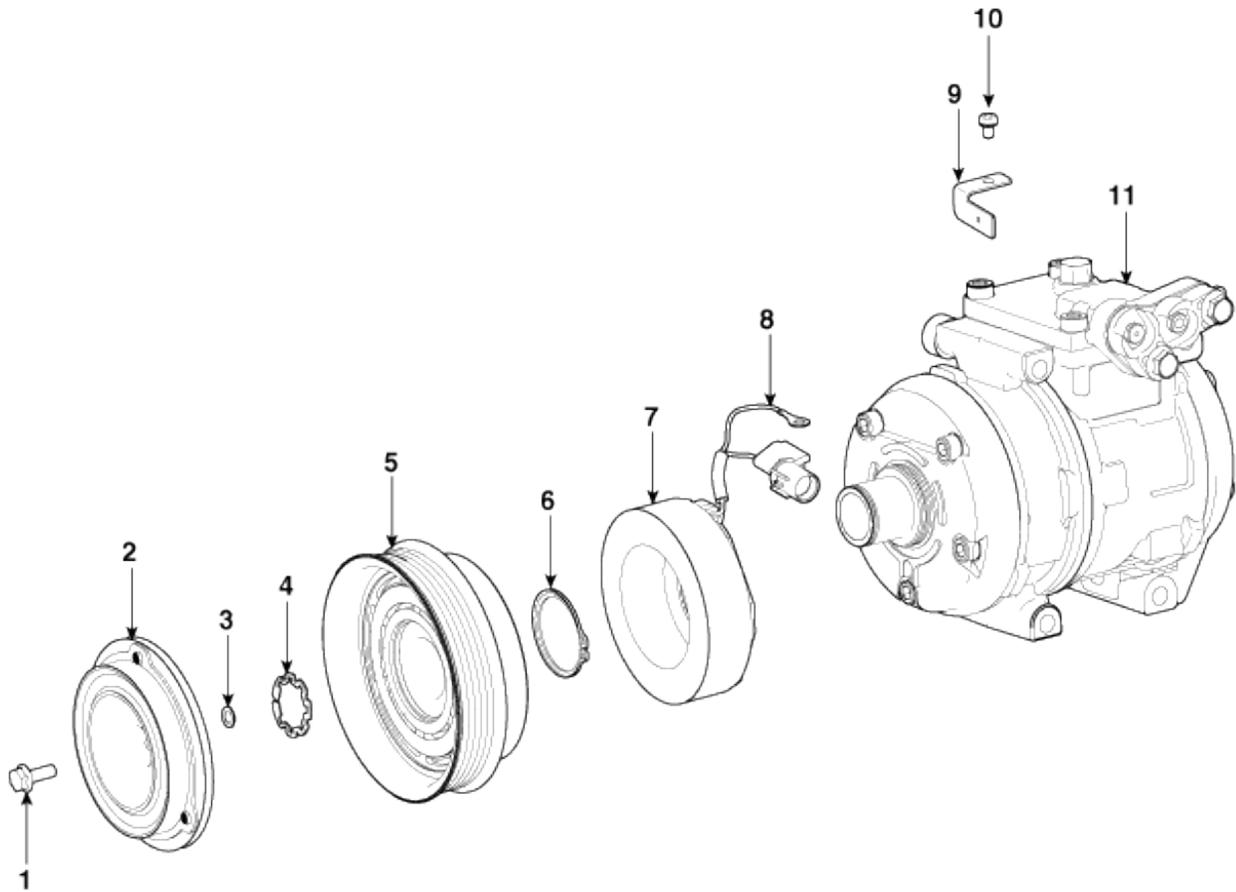
The specified volume - volume of removed compressor = volume to drain from the new compressor.

NOTE

- Even if no oil is drained from the removed compressor, don't drain more than 50cc from new compressor.

Heating,Ventilation, Air Conditioning > Air conditioning System > Compressor > Components and Components Location

Components



- 1. Bolt
- 2. Disc & hub assembly
- 3. Shim (Gap washer)
- 4. Retainer ring
- 5. Pulley

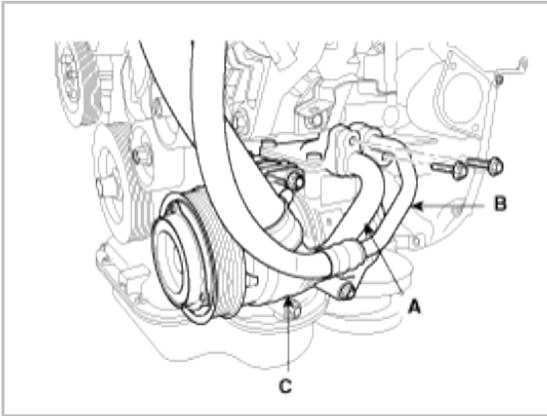
- 6. Retainer ring
- 7. Field coil
- 8. Connector
- 9. Connector bracket
- 10. Screw
- 11. Compressor assembly

Heating, Ventilation, Air Conditioning > Air conditioning System > Compressor > Repair procedures

Removal

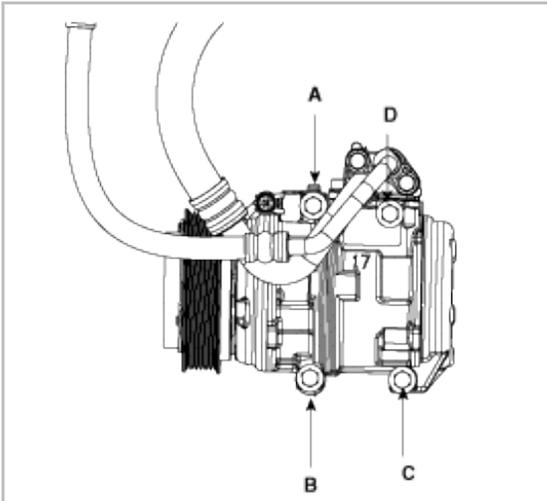
1. If the compressor is marginally operable, run the engine at idle speed, and let the air conditioning work for a few minutes, then shut the engine off.
2. Disconnect the negative cable from the battery.
3. Recover the refrigerant with a recovery/charging station.

4. Loosen the drive belt.
5. Remove the bolts, then disconnect the suction line (A) and discharge line (B) from the compressor. Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.
6. Disconnect the compressor clutch connector, and then remove 4 mounting bolts and the compressor (C).



Installation

1. Make sure of the length of compressor mounting bolts, and then tighten it A→B→C→D order.



Bolt	Length
A	102mm
B	102mm
C	102mm
D	114mm

2. Install in the reverse order of removal, and note these items.
 - A. If you're installing a new compressor, drain all the refrigerant oil from the removed compressor, and measure its volume, Subtract the volume of drained oil from 120cc(4.20 oz.) the result is the amount of oil you should drain from the new compressor (through the suction fitting).
 - B. 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 to avoid leakage.
 - C. To avoid contamination, do not return the oil to the container once dispensed, and never mix it with other refrigerant oils.
 - D. Immediately after using the oil, replace the cap on the container and seal it to avoid moisture absorption.
 - E. Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint,

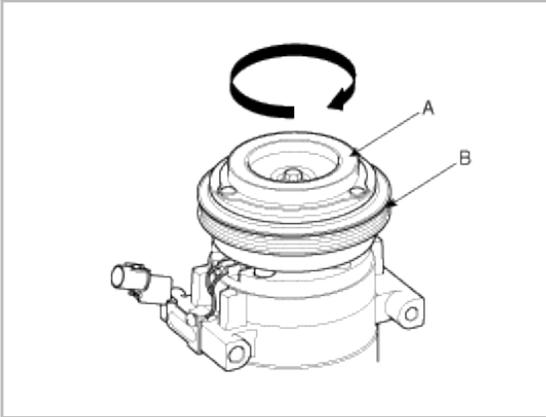
wash it off immediately.

F. Adjust the drive belt.

G. Charge the system and test its performance.

Inspection

1. Check the plated parts of the disc & hub assembly (A) for color changes, peeling or other damage. If there is damage, replace the clutch set.
2. Check the pulley (B) bearing play and drag by rotating the pulley by hand. Replace the clutch set with a new one if it is noisy or has excessive play/drag.

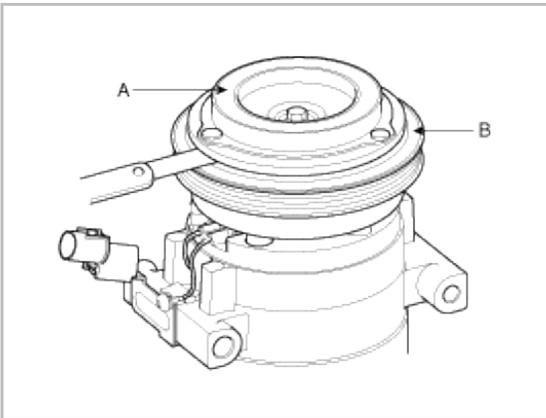


3. Measure the clearance between the pulley (B) and disc & hub assembly (A) all the way around. If the clearance is not within specified limits, remove the disc & hub assembly and add or remove shim (gap washer) as needed to increase or decrease clearance.

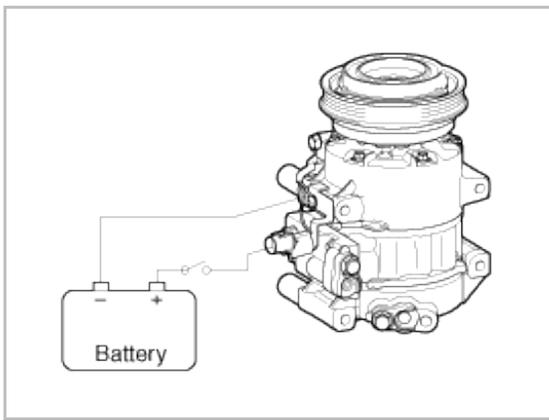
Clearance: $0.45 \pm 0.1\text{mm}$ (0.018 ± 0.004 in.)

NOTE

The shims (gap washers) are available in seven thicknesses: 0.7mm, 0.8mm, 0.9mm, 1.0mm, 1.1mm, 1.2mm and 1.3mm.



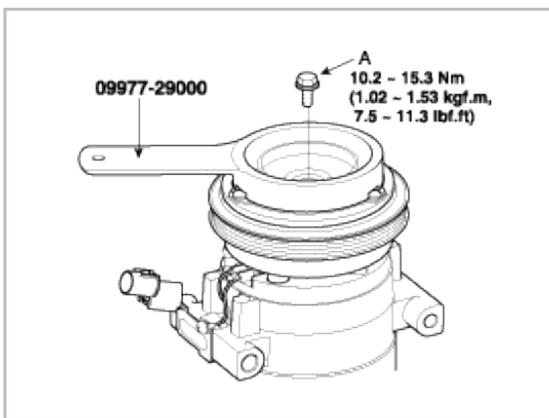
4. Check operation of the magnetic clutch. Connect the compressor side terminals to the battery (+) terminal to the compressor body. Check the magnetic clutch operating noise to determine the condition.



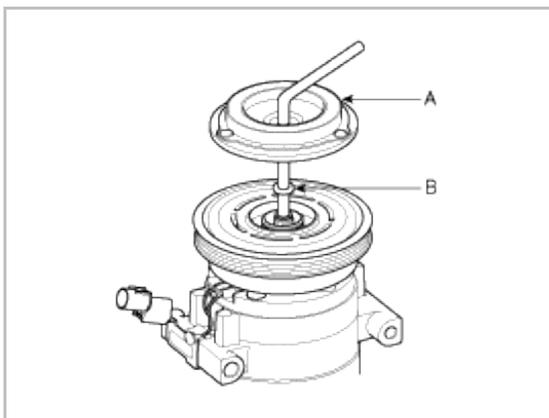
Disassembly

1. Remove the center bolt (A) while holding the disc & hub assembly with a commercially available disc & hub assembly bolt remover; Special tool number 09977-29000.

TORQUE : 10~15N.m (1.02~1.53kgf.m, 7.37~11lbf.ft)



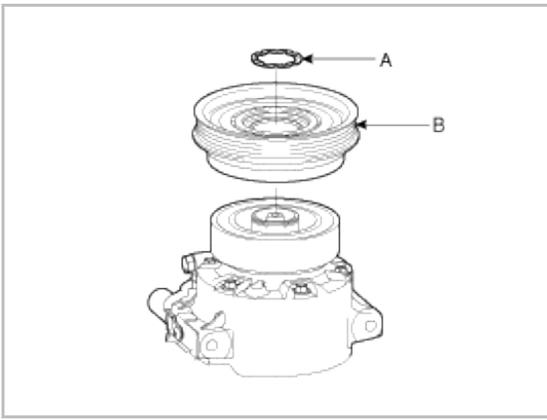
2. Remove the disc & hub assembly (A) and shim (gap washer) (B), taking care not to lose the shims. If the clutch needs adjustment, increase or decrease the number and thickness of shims as necessary, then reinstall the disc & hub assembly, and recheck its clearance.



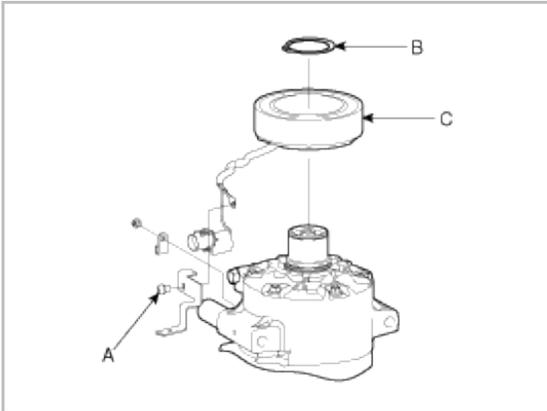
3. If you removal the field coil, remove retainer ring (A) with retainer ring pliers.

NOTE

- Be careful not to damage the pulley (B) and compressor during removal/installation.
- Once retainer ring (A) is removed, replace it with a new one.



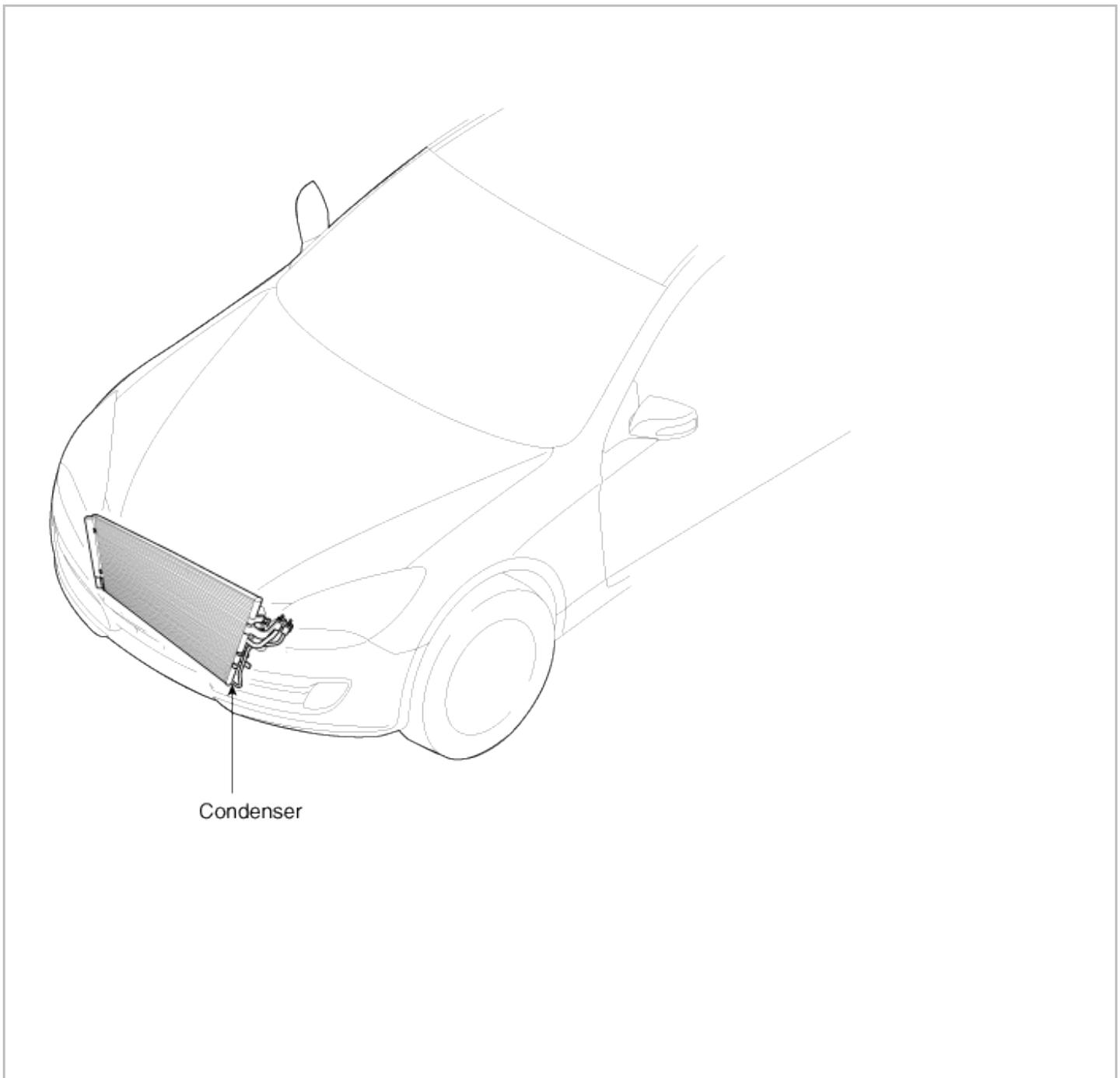
4. Remove the screw (A) from the field coil ground terminal. Remove the retainer ring (B) and then remove the field coil (C) from the shaft with a puller. Be careful not to damage the coil and compressor.



5. Reassemble the compressor clutch in the reverse order of disassembly, and note these items :
- A. Install new retainer rings, and make sure they are fully seated in the groove.
 - B. Make sure that the pulley turns smoothly after its reassembled.

Heating,Ventilation, Air Conditioning > Air conditioning System > Condenser > Components and Components Location

Component location



Heating,Ventilation, Air Conditioning > Air conditioning System > Condenser > Repair procedures

Inspection

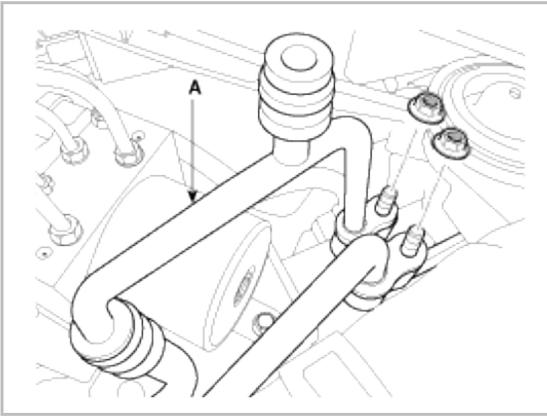
1. Check the condenser fins for clogging and damage. If clogged, clean them with water, and blow them with compressed air. If bent, gently bend them using a screwdriver or pliers.
2. Check the condenser connections for leakage, and repair or replace it, if required.

Replacement

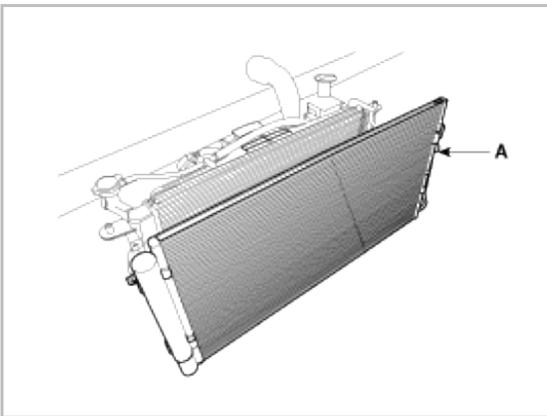
Condenser Assembly

1. Recover the refrigerant with a recovery/ recycling/ charging station .

2. Disconnect the negative (-) battery terminal.
3. Remove 2 nuts, and then disconnect the discharge line and liquid line (A) from the condenser.



4. Remove the radiator. (Refer to EM group-Radiator)
5. Remove 2 bolts, and then remove the condenser (A) by lifting it up. Be careful not to damage the radiator and condenser fins when removing the condenser.

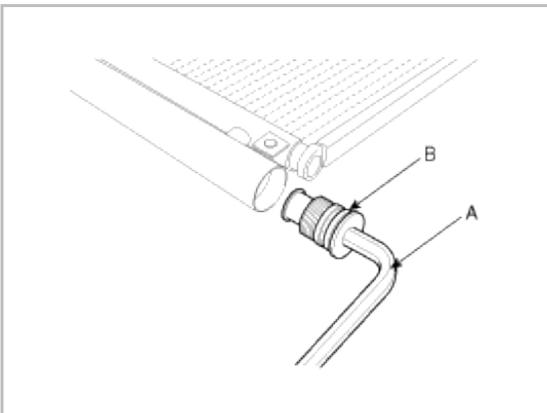


6. Install in the reverse order of removal, and note these items :
 - A. If you're installing a new condenser, add refrigerant oil ND-OIL8.
 - B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
 - C. Be careful not to damage the radiator and condenser fins when installing the condenser.
 - D. Be sure to install the lower mount cushions of condenser securely into the holes.
 - E. Charge the system, and test its performance.

Desiccant

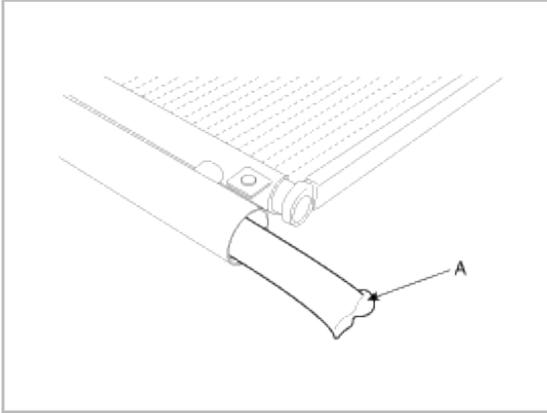
Replacement

1. Remove the condenser, and then remove the bottom cap (B) with L wrench (A) from the condenser.



TORQUE : 20~25N.m (2.0~2.5kgf•m, 14.5~18.2lb-ft)

2. Remove the desiccant (A) from condenser using a long nose plier. Check for crumbled desiccant and clogged bottom cap filter.



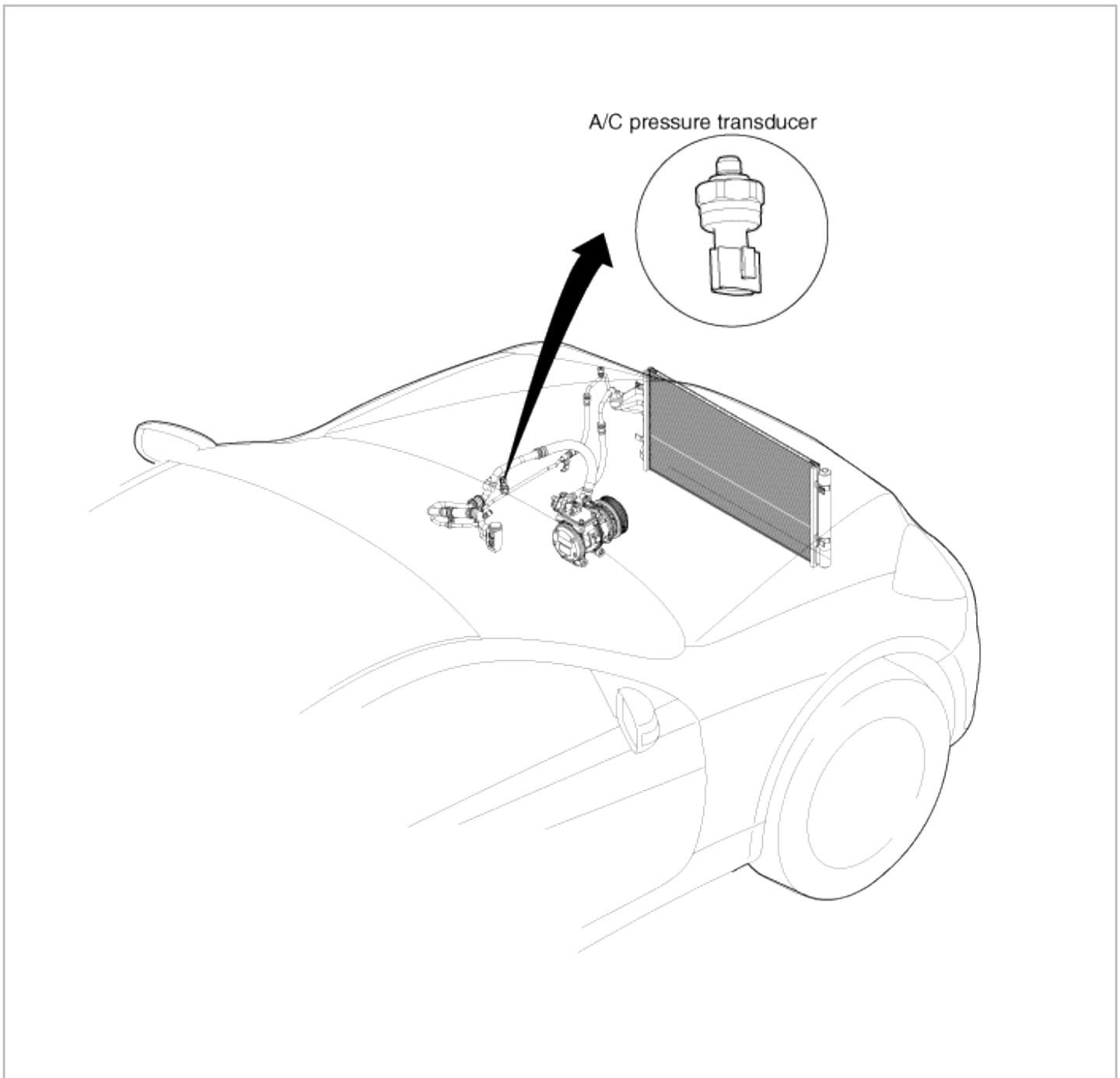
3. Apply air conditioning compressor oil along the O-rings and threads of the new bottom cap.
4. Insert the new desiccant into the receiver drier tank. The desiccant must be sealed in vacuum before it is exposed to air for use.
5. Install the new bottom cap to the condenser.

NOTE

- Always replace the desiccant and bottom cap at the same time.
- 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 to avoid leakage.
- Be careful not to damage the radiator and condenser fins when installing the condenser.
- Be sure to install the lower mount cushions of condenser securely into the holes.
- Charge the system, and test its performance.

Heating, Ventilation, Air Conditioning > Air conditioning System > A/C pressure transducer > Components and Components Location

Component Location



A/C pressure transducer

**Heating,Ventilation, Air Conditioning > Air conditioning System > A/C pressure transducer
> Description and Operation**

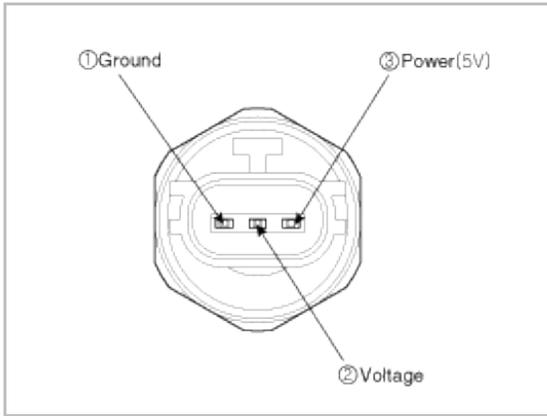
Description

A/C pressure transducer convert the pressure value of high pressure line into voltage value after measure. By converted voltage value, engine ECU controls cooling fan by operating high speed or low speed. Engine ECU stop the operation of compressor when the temperature of refrigerant line is too high or too low irregularly to optimize air conditioning system.

**Heating,Ventilation, Air Conditioning > Air conditioning System > A/C pressure transducer
> Repair procedures**

Inspection

1. Measure the pressure of high pressure line by voltage output between NO.1 and NO.2 terminals



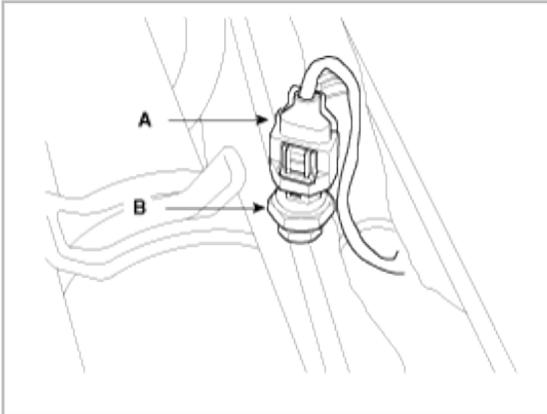
2. Inspect the voltage value whether it is sufficient to be regular value or not.

$$\text{Voltage} = 0.00878835 * \text{Pressure} + 0.37081095 \text{ [PSIA]}$$

3. If the measured voltage value is not specification, replace the A/C pressure transducer.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/charging station.
3. Disconnect A/C pressure transducer connector (3P) (A).
4. Remove the A/C pressure transducer(B).



CAUTION

- Take care that liquid & suction pipe are not bent.

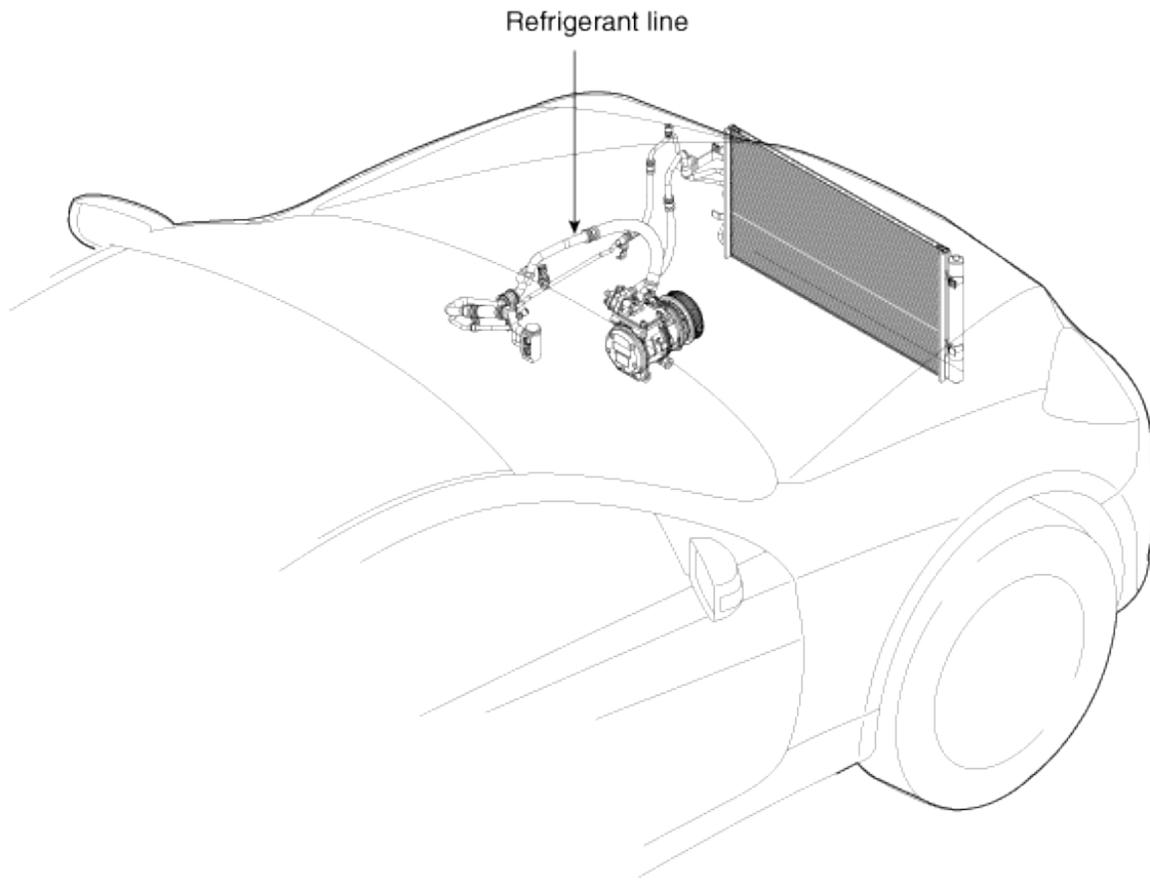
5. Installation is the reverse order of removal.

TORQUE : 10~12N.m (1.0~1.2kgf.m, 7.4~8.8lbf.ft)

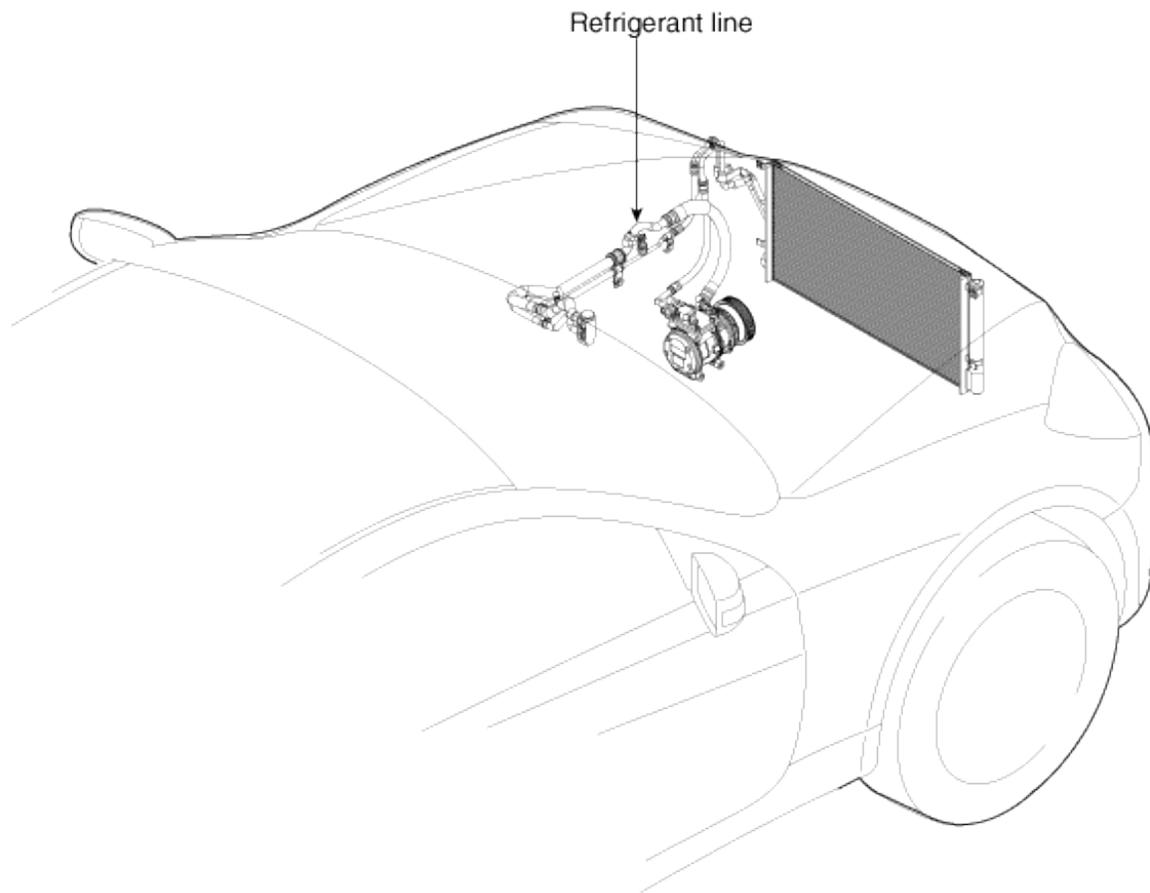
Heating,Ventilation, Air Conditioning > Air conditioning System > Refrigerant line > Components and Components Location

Component location

[Theta engine]



[Lambda engine]



Heating,Ventilation, Air Conditioning > Air conditioning System > Refrigerant line > Repair procedures

Replacement

1. Discharge refrigerant from refrigeration system .
2. Replace faulty tube or hose.

CAUTION

- Cap the open fittings immediately to keep moisture or dirt out of the system.

3. Tighten joint of bolt or nut to specified torque

CAUTION

- Connections should not be torque tighter than the specified torque.

Part tightened	N.m	Kgf.m	lbf.ft
Condenser - Discharge hose	4.9~5.9	0.5~0.6	3.6~4.3
Condenser - Liquid tube			
Compressor - Discharge hose	4.9~5.9	0.5~0.6	3.6~4.3
Compressor - Suction hose			
Expansion valve - Evaporator	11.7~5.9	1.2~1.5	8.7~10.8

4. Evacuate air in refrigeration system and charge system with refrigerant.

Specified amount: 570 ± 25g (20.1 ± 0.88 oz.)

5. Inspect for leakage of refrigerant.
Using a gas leak detector, check for leakage of refrigerant .
6. Inspect A/C operation.

Heating,Ventilation, Air Conditioning > Air conditioning System > Evaporator temperature sensor > Description and Operation

Description

The evaporator temperature sensor will detect the evaporator core temperature and interrupt compressor relay power in order to prevent evaporator freezing by excessive cooling.

Heating,Ventilation, Air Conditioning > Air conditioning System > Evaporator temperature sensor > Repair procedures

Inspection

1. Ignition "OFF"
2. Disconnect evaporator temperature sensor.
3. Using the multi-tester, Measure resistance between terminal "1" and "2" of evaporator temperature sensor.

Specification

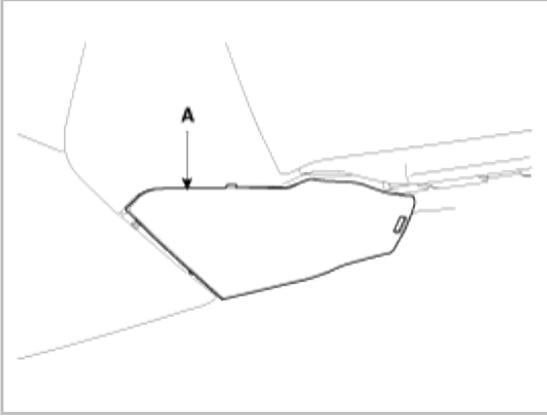
Evaporator core temperature[°C(°F)]	Resistance[KΩ]	Voltage[V]
-10(14)	29.42	3.736
0(32)	18.9	3.221
10(50)	11.36	2.665
20(68)	7.362	2.125
30(86)	4.892	1.647
40(104)	3.326	1.248
50(122)	2.309	0.941

4. If the measured resistance is not specification, substitute with a known-good evaporator temperature sensor and check for proper operation.

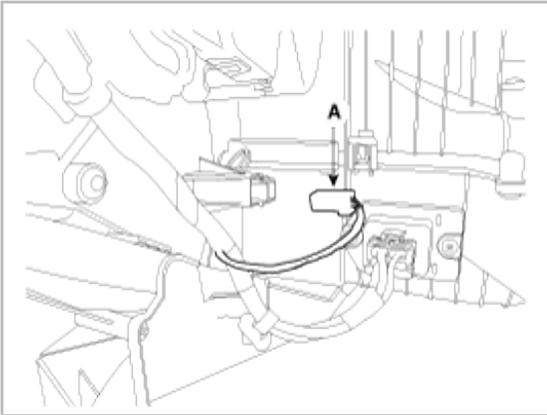
5. If the problem is corrected, replace the evaporator temperature sensor.

Replacement

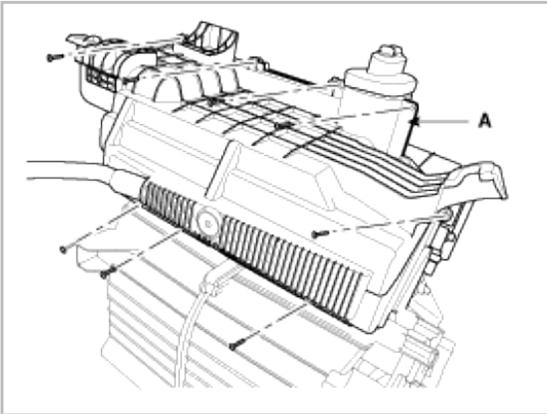
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower cover (A).



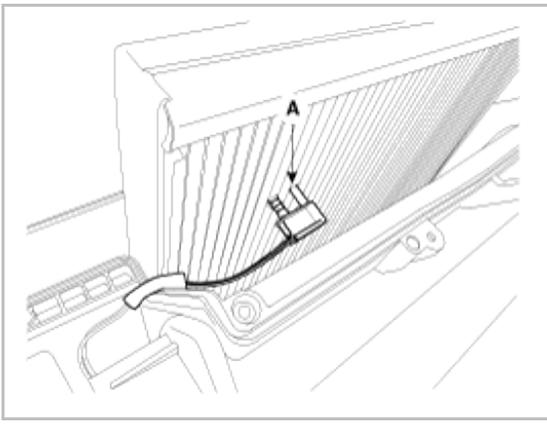
3. Disconnect the evaporator sensor connector (A).



4. Remove the heater unit lower cover (A).



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



CAUTION

- Take care that evaporator core pins are not bent.

6. Installation is the reverse order of removal.

Heating,Ventilation, Air Conditioning > Air conditioning System > In-car sensor > Description and Operation

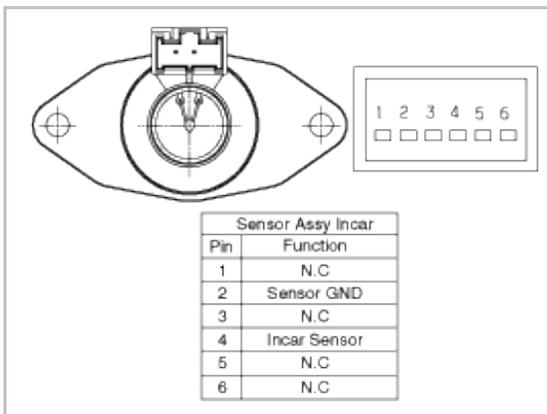
Description

1. In-car air temperature sensor is located at the center facia lower panel.
2. The sensor contains a thermistor which measures the temperature of the inside. The signal decided by the resistance value which changes in accordance with perceived inside temperature, is delivered to heater control unit and according to this signal the control unit regulates incar temperature to intended value.

Heating,Ventilation, Air Conditioning > Air conditioning System > In-car sensor > Repair procedures

Inspection

1. Ignition "ON"
2. Blow air with changing temperature to the in car sensor air inlet. Measure sensor resistance between 2 and 4 terminals.



Specification

Temperature [°C(°F)]	Resistance between terminals 2and 4 (kΩ)
-30(-22)	509.4 ± 4.1%
-15(5)	216 ± 3.2%

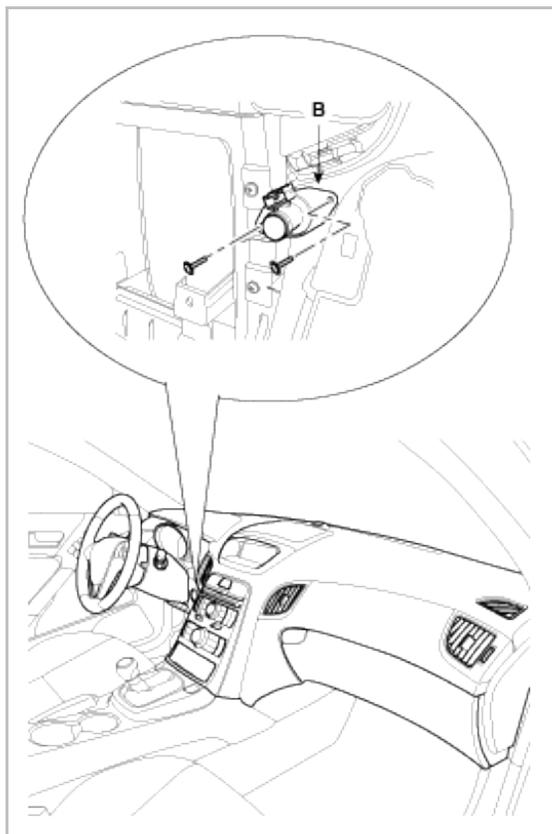
0(32)	97.71 ± 2.4%
15(59)	47.13 ± 1.7%
25(77)	30.00 ± 1.2%
35(95)	19.59 ± 1.6%
50(122)	10.81 ± 2.2%
60(140)	7.463 ± 2.6%

NOTE

In car sensor is negative type thermistor that resistance will rise with lower temperature, and reduce with higher temperature.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad.
3. Disconnect the connector of in-car sensor. Loosen the mounting 2 screws and then remove the in-car sensor (B).



4. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning > Air conditioning System > Photo sensor > Description and Operation

Description

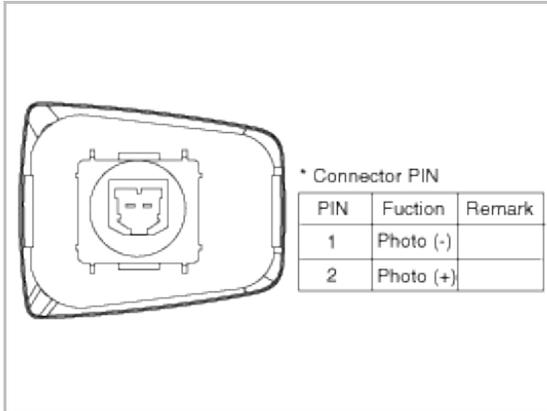
1. The photo sensor is located at the center of defrost nozzle.

- The photo sensor contains a photovoltaic (sensitive to sunlight) diode. The solar radiation received by its light receiving portion, generates an electromotive force in proportion to the amount of radiation received which is transferred to the automatic temperature control module so that the solar radiation compensation will be performed.

Heating,Ventilation, Air Conditioning > Air conditioning System > Photo sensor > Repair procedures

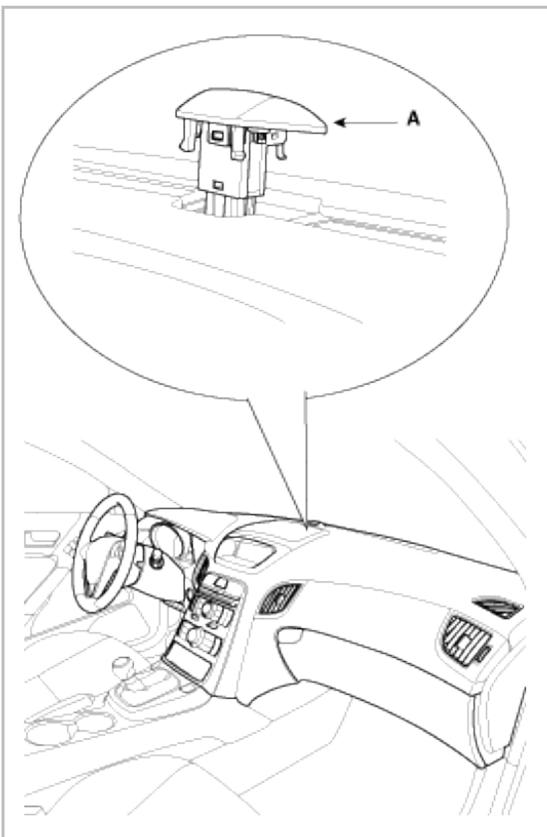
Inspection

- Ignition "ON"
- Using the scan tool.
- Emit intensive light toward photo sensor using a lamp, and check the output voltage change.
- The voltage will rise with higher intensive light and reduce with lower intensive light.



Replacement

- Disconnect the negative (-) battery terminal.
- With the (-) driver, remove the photo sensor (A) from the center of defrost nozzle.



3. Install in the reverse order of removal.

Heating,Ventilation, Air Conditioning > Air conditioning System > Ambient sensor > Description and Operation

Description

1. The ambient temperature sensor is located at the front of the condenser and detects ambient air temperature. It is a negative type thermistor; resistance will increase with lower temperature, and decrease with higher temperatures.
2. The sensor output will be used for discharge temperature control, temperature regulation door control, blower motor level control, mix mode control and in-car humidity control.

NOTE

If the ambient temperature is below 2.0°C (35.6°F), the A/C compressor will be stopped.
The compressor will be operated by manual operating.

Heating,Ventilation, Air Conditioning > Air conditioning System > Ambient sensor > Repair procedures

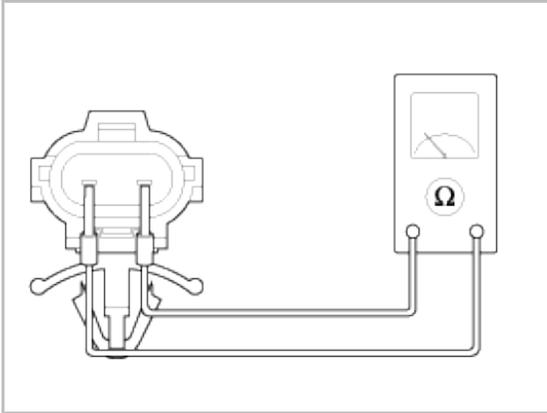
Inspection

1. Ignition "OFF"
2. Disconnect ambient temperature sensor.
3. Check the resistance of ambient temperature sensor between terminals 1 and 2 whether it is changed by changing of the ambient temperature.

Specification

Ambient temperature [°C(°F)]	Resistance between terminals 1and 2 (kΩ)
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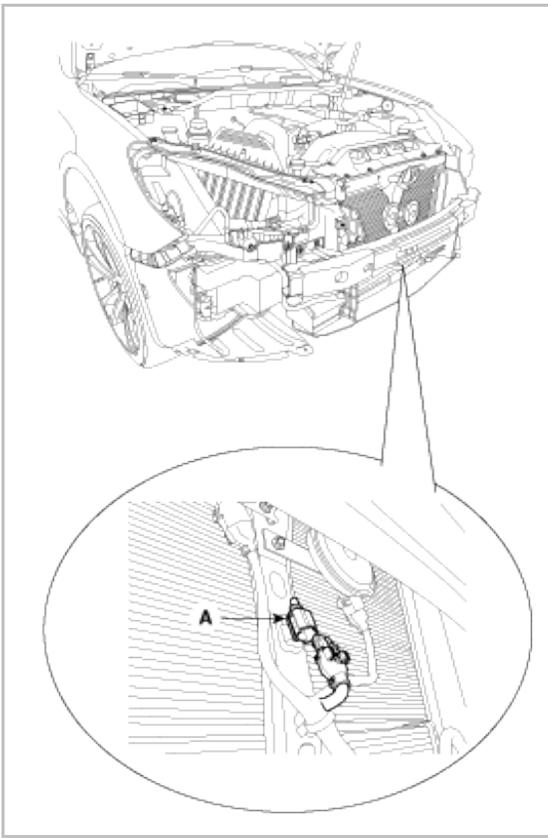
-10(50)	163.31 ± 3%
0(68)	96.892 ± 3%
10(50)	59.365 ± 3%
20(68)	37.147 ± 3%
25(77)	30 ± 3%
40(104)	16.032 ± 3%



4. If the measured resistance is not specification, substitute with a known-good ambient temperature sensor and check for proper operation.
5. If the problem is corrected, replace the ambient temperature sensor.

Replacement

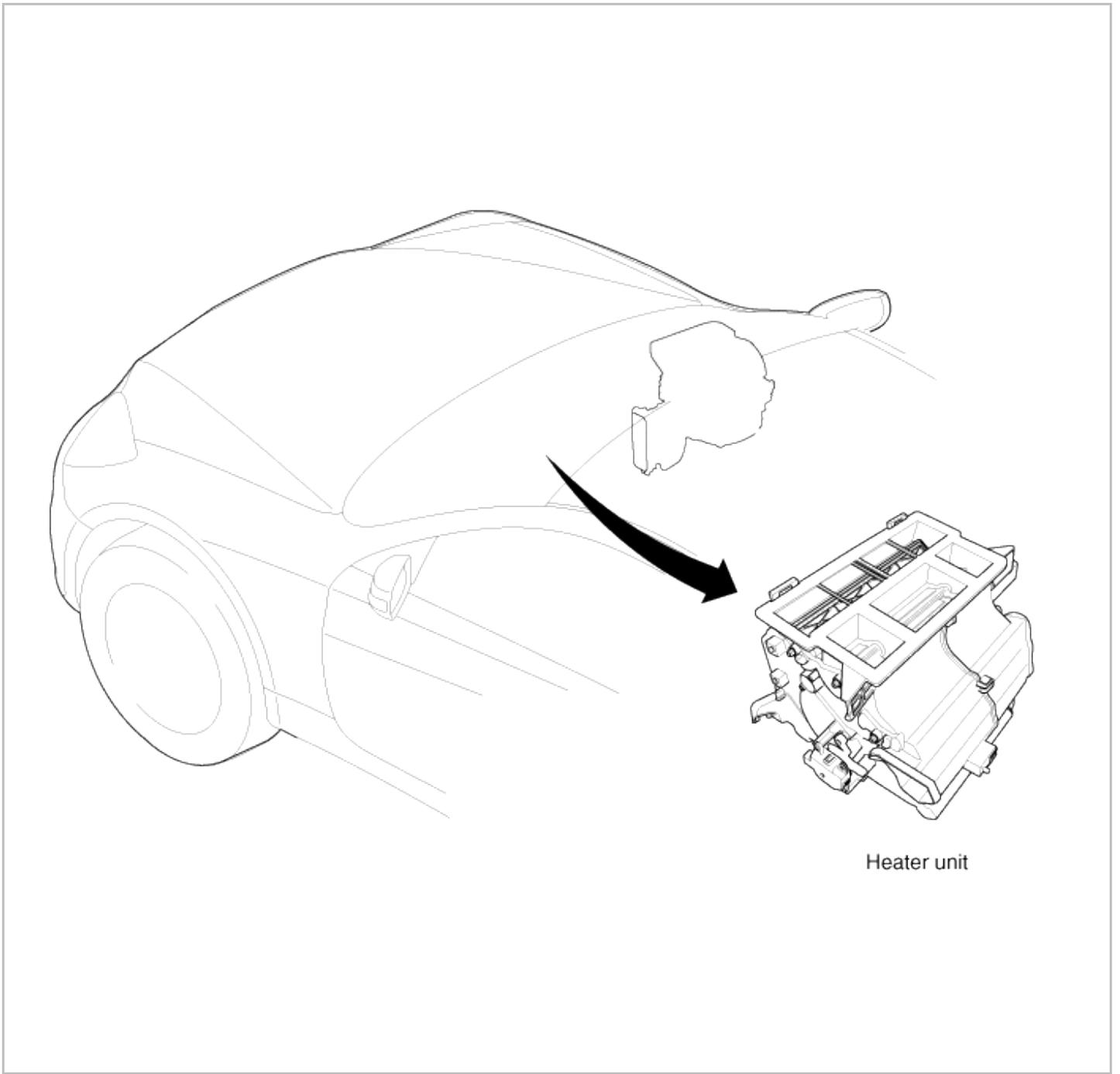
1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper. (Refer to BD group-Front bumper)
3. Remove the ambient temperature sensor (A).



4. Installation is the reverse order of removal.

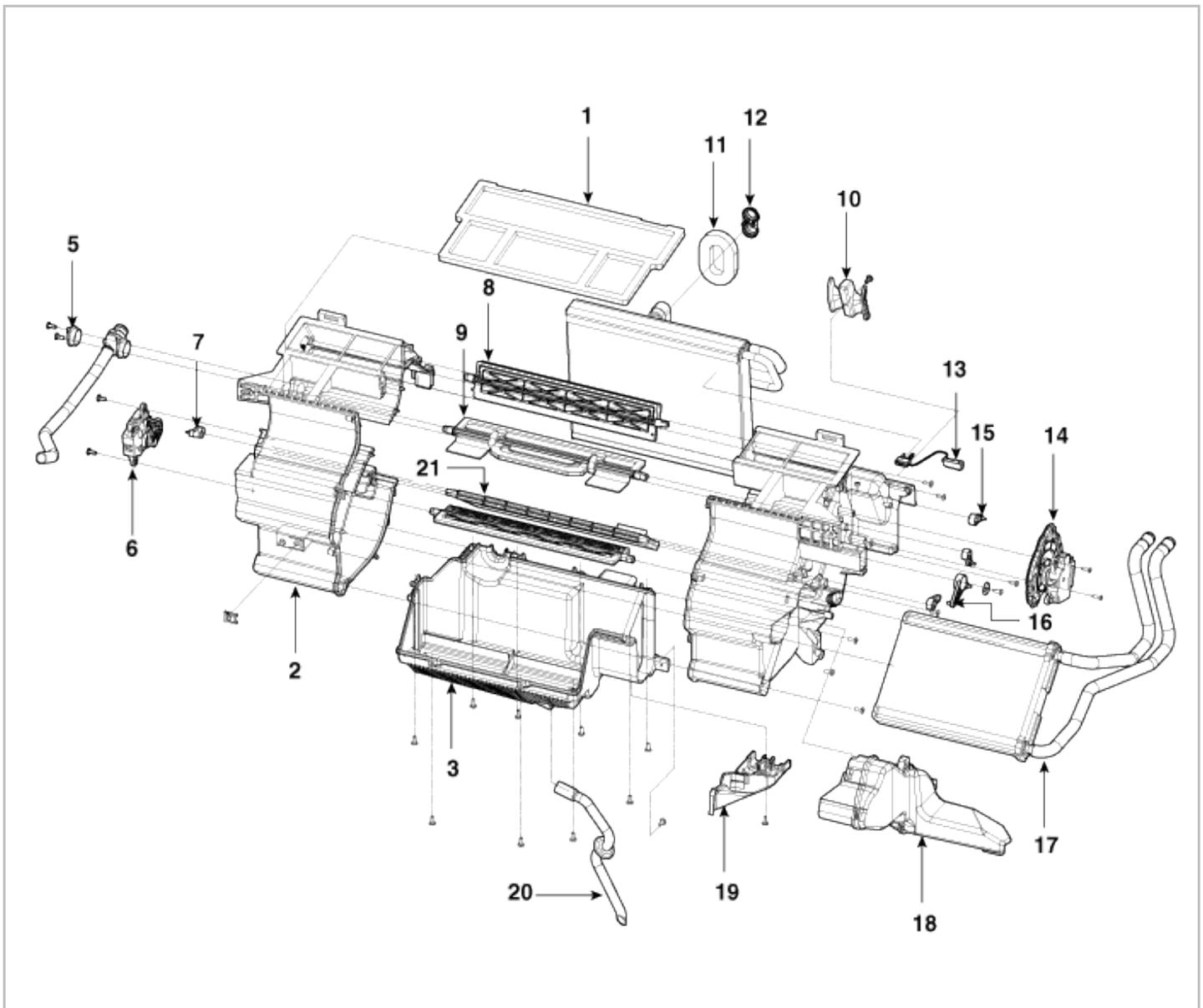
Heating, Ventilation, Air Conditioning > Heater > Heater Unit > Components and Components Location

Component Location



Heater unit

Compoment



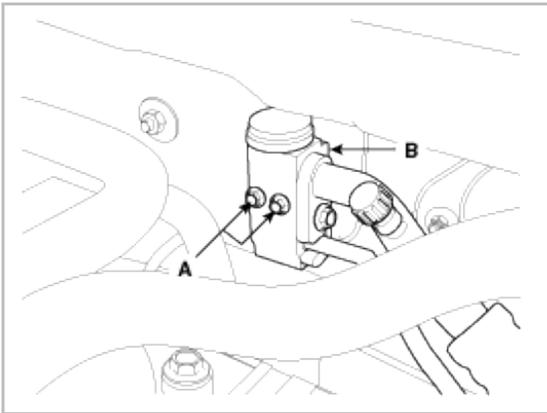
<ul style="list-style-type: none"> 1. Duct 2. Heater case (L) 3. Heater lower case 4. Heater case (R) 5. Aspirator hose 6. Temp actuator 7. Temp lever 8. Foot door 9. Vent door 	<ul style="list-style-type: none"> 10. Heater pipe cover 11. Flange seal 12. Flange cap 13. Evaporator sensor 14. Mode actuator 15. Vent lever 16. Sub foot lever 17. Heater core 	<ul style="list-style-type: none"> 18. Shower duct 19. Heater pipe cover 20. Drain hose 21. Temp door
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Heating, Ventilation, Air Conditioning > Heater > Heater Unit > Repair procedures

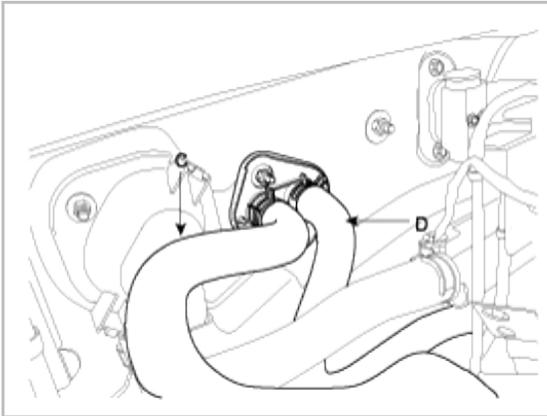
Replacement

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/ recycling/ charging station.
3. When the engine is cool, drain the engine coolant from the radiator.
4. Remove the bolts (A) and the expansion valve (B) from the evaporator core.

Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.



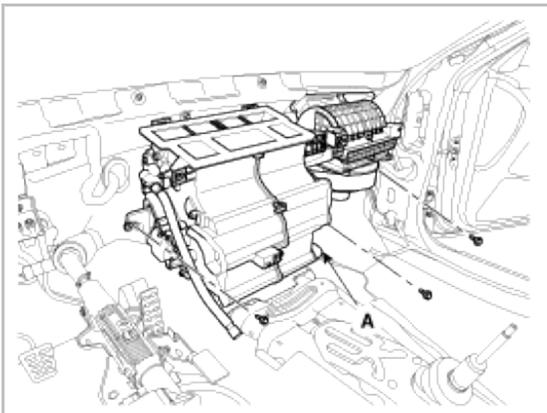
5. Disconnect the inlet (C) and outlet (D) heater hoses from the heater unit.



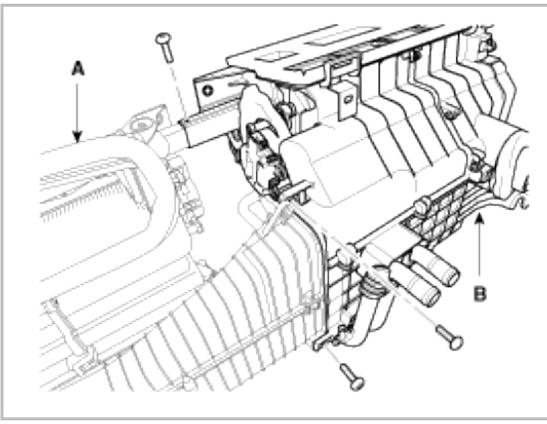
CAUTION

- Engine coolant will spill when the hoses are disconnected; drain it into a clean drip pan. Be sure not to let coolant spill on electrical parts or painted surfaces. If any coolant spills, rinse it off immediately.

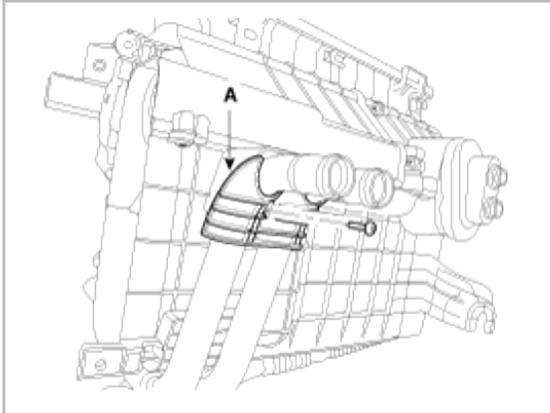
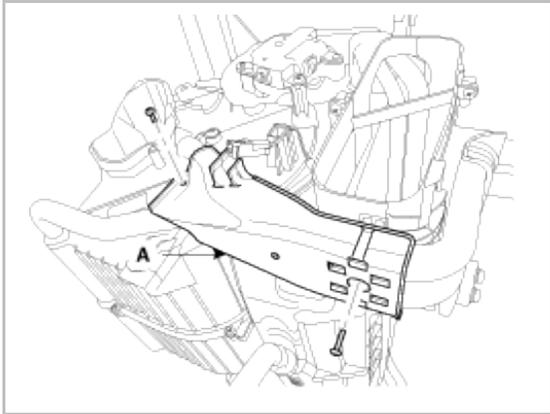
6. Remove the crash pad (Refer to BD group-Crash pad).
7. Remove the cowl cross bar assembly. (Refer to BD group-Crash pad)
8. Remove the heater & blower unit after loosening 3 mounting bolts.



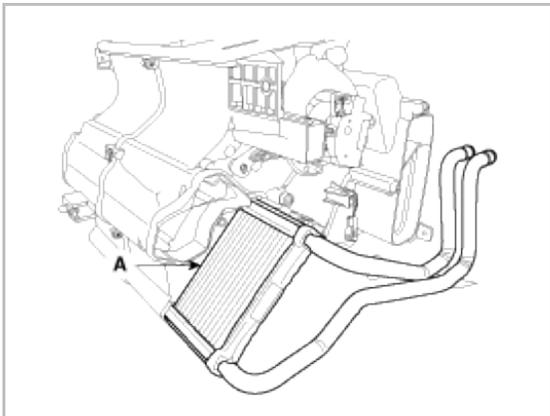
9. Remove the blower unit (A) from heater unit (B) after loosening 2 screws.



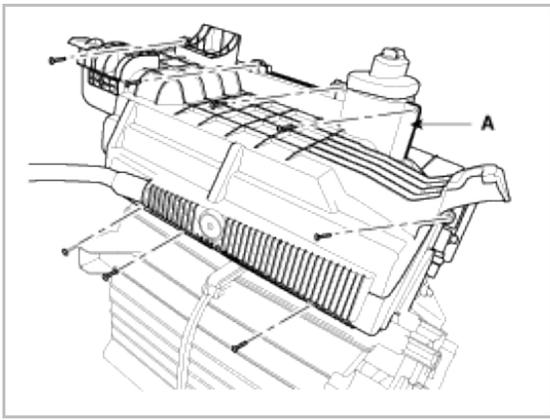
10. Remove the heater core cover after remove the cover (A).



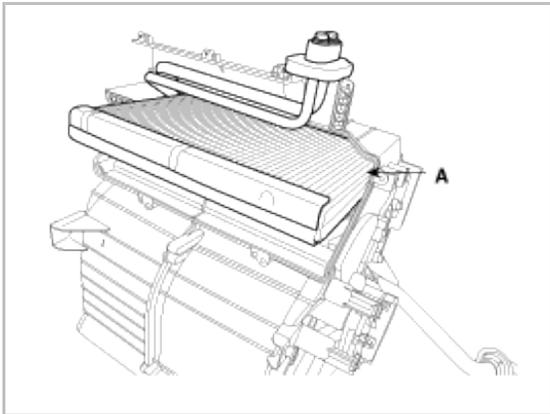
11. Be careful that the inlet and outlet pipe are not bent during heater core removal, and pull out the heater core (A).



12. Remove the heater unit lower case(A).



13. Remove the evaporator core(A).



14. Be careful that the inlet and outlet pipe are not bent during heater core removal, and pull out the heater core.

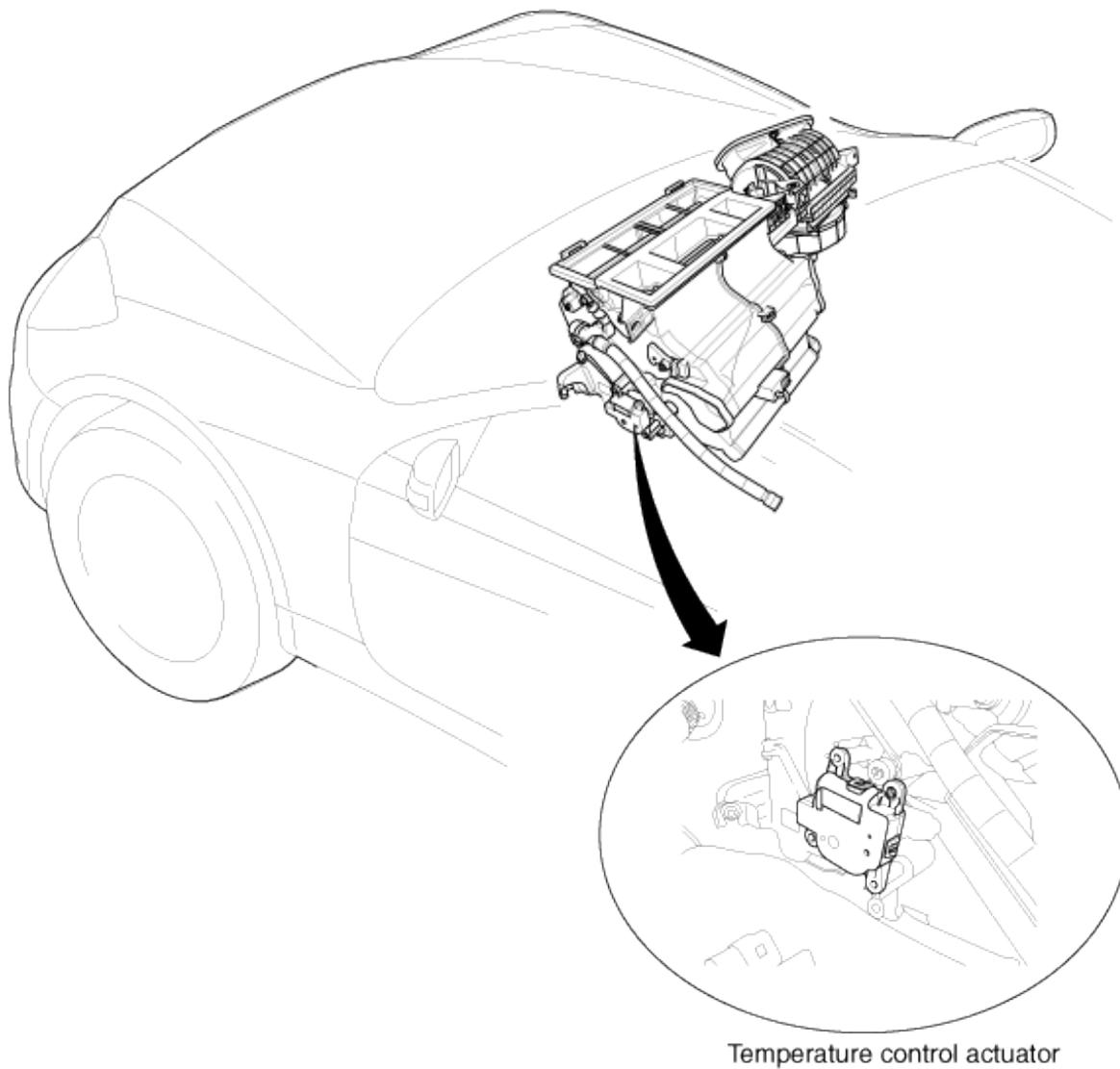
15. Install the heater core in the reverse order of removal.

16. Installation is the reverse order of removal, and note these items :

- A. If you're installing a new evaporator, add refrigerant oil (ND-OIL8).
- B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing. Be sure to use the right O-rings for R-134a to avoid leakage.
- C. Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
- D. Do not spill the refrigerant oil on the vehicle ; it may damage paint ; if the refrigerant oil contacts the paint, wash off immediately.
- E. Apply sealant to the grommets.
- F. Make sure that there is no air leakage.
- G. Charge the system and test its performance.
- H. Do not interchange the inlet and outlet heater hoses and install the hose clamps securely.
- I. Refill the cooling system with engine coolant.

Heating,Ventilation, Air Conditioning > Heater > Temperature Control Actuator > Components and Components Location

Component Location



Heating,Ventilation, Air Conditioning > Heater > Temperature Control Actuator > Description and Operation

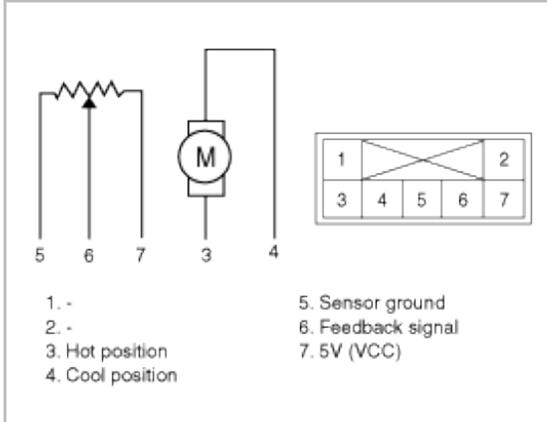
Description

1. Heater unit includes mode control actuator and temperature control actuator.
2. Temperature control actuator is located at the heater unit. It regulates the temperature by the procedure as follows.
Signal from control unit adjusts position of temperature door by operating temperature switch and then temperature will be regulated by the hot/cold air ratio decided by position of temperature door

Heating,Ventilation, Air Conditioning > Heater > Temperature Control Actuator > Repair procedures

Inspection

1. Ignition "OFF"
2. Disconnect the connector of temperature control actuator.
3. Verify that the temperature control actuator operates to the hot position when connecting 12V to the terminal 3 and grounding terminal 4.
Verify that the temperature control actuator operates to the cool position when connecting in the reverse



4. Check the voltage between terminals 5 and 6.

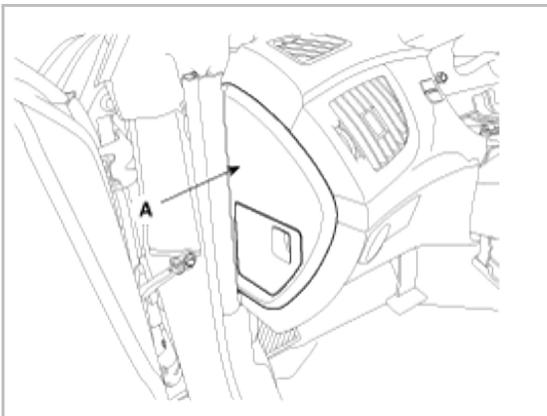
Specification

Door position	Voltage (5-6)	Error detecting
Max. cooling	$0.45 \pm 0.15V$	Low voltage :0.1V or less
Max. heating	$4.55 \pm 0.15V$	High voltage :4.9V or more

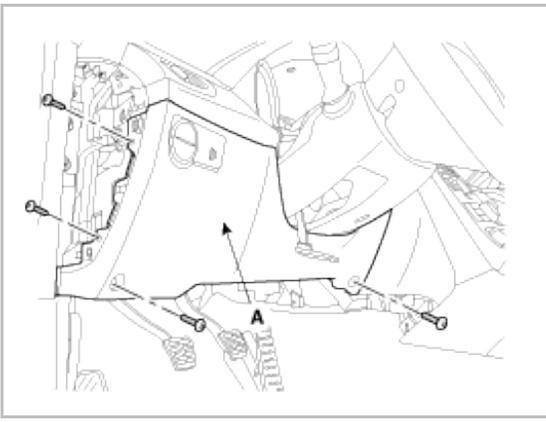
* It will feedback current position of actuator to controls.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad side cover (A).

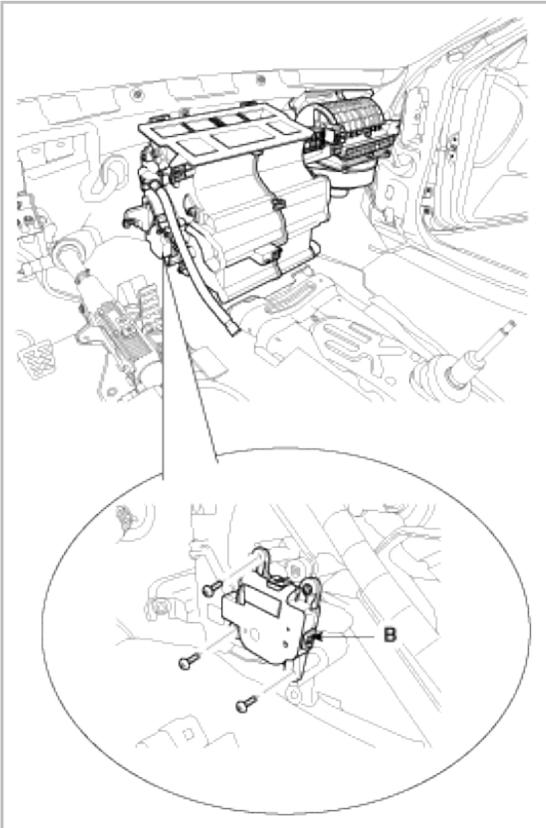


3. After loosening the crash pad lower panel mounting screws, then remove the lower panel (A).



4. Disconnect the temperature control actuator connector after removing the air duct.

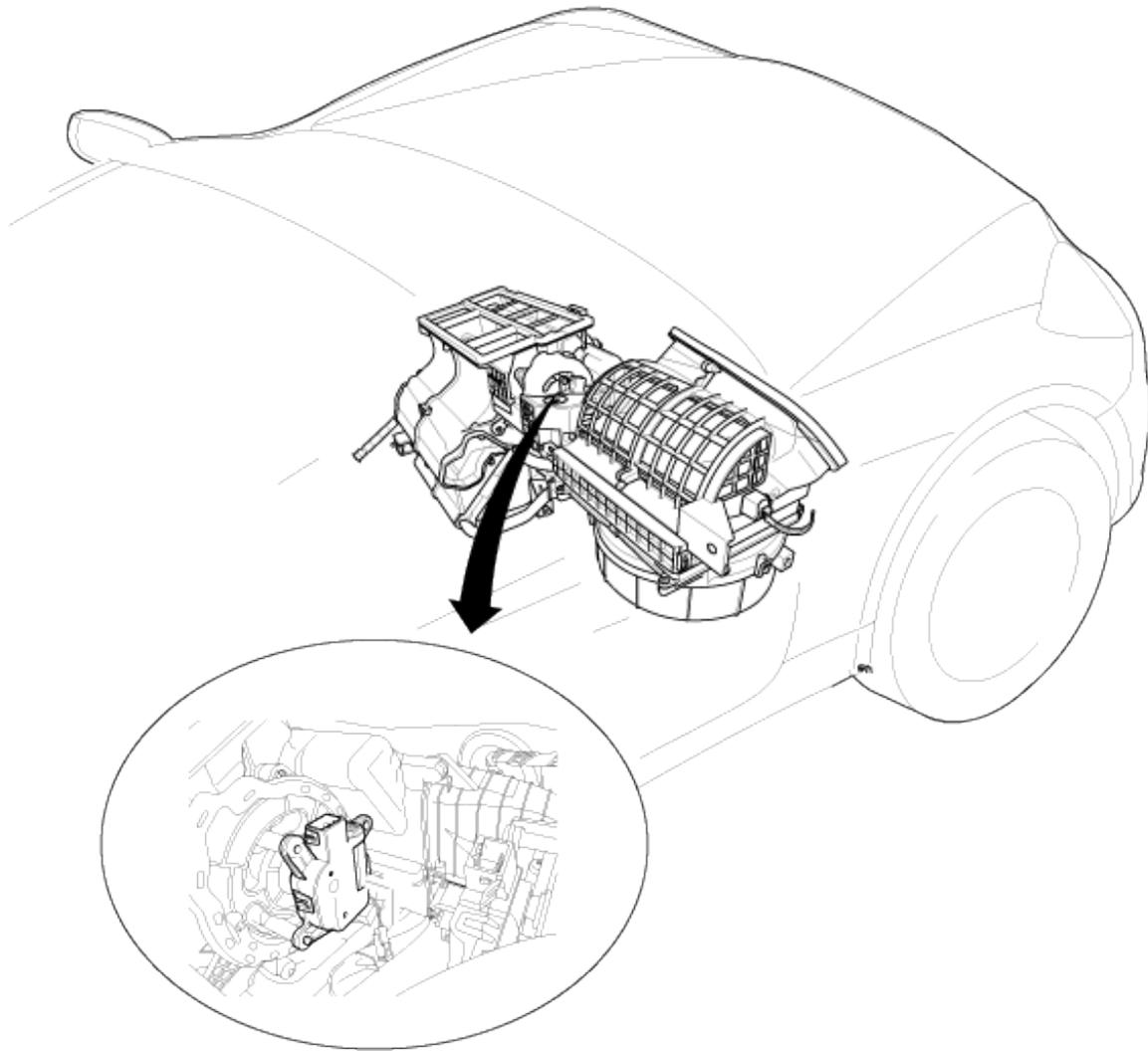
5. Loosen the mounting screw and then remove the temperature control actuator (B).



6. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning > Heater > Mode Control Actuator > Components and Components Location

Component Location



Mode control actuator

Heating,Ventilation, Air Conditioning > Heater > Mode Control Actuator > Description and Operation

Description

The mode control actuator is located at the heater unit.

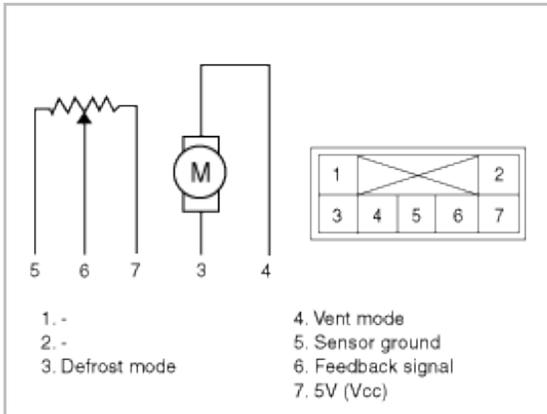
It adjusts position of mode door by operating mode control actuator based on signal of A/C control unit. Pressing mode select switch makes the mode control actuator shift in order of vent→ B/L → floor → mix.

Heating,Ventilation, Air Conditioning > Heater > Mode Control Actuator > Repair procedures

Inspection

1. Ignition "OFF"

2. Disconnect the connector of mode control actuator.
3. Verify that the mode control actuator operates to the defrost mode when connecting 12V to the terminal 3 and grounding terminal 4.
4. Verify that the mode control actuator operates to the vent mode when connecting in the reverse.



5. Check the voltage between terminals 5 and 6.

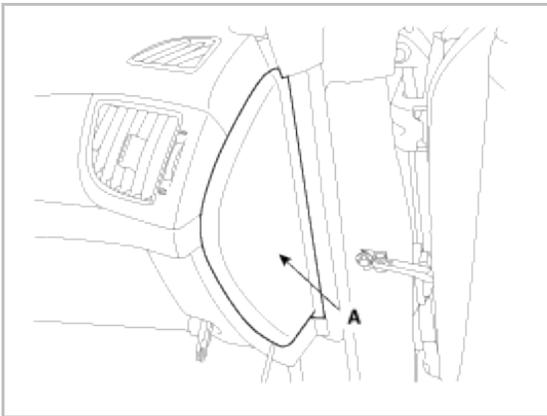
Door position	Voltage (5-6)	Error detecting
Vent	$0.45 \pm 0.15V$	Low voltage :0.1V or less
Defrost	$4.55 \pm 0.15V$	High voltage :4.9V or more

* It will feedback current position of actuator to controls.

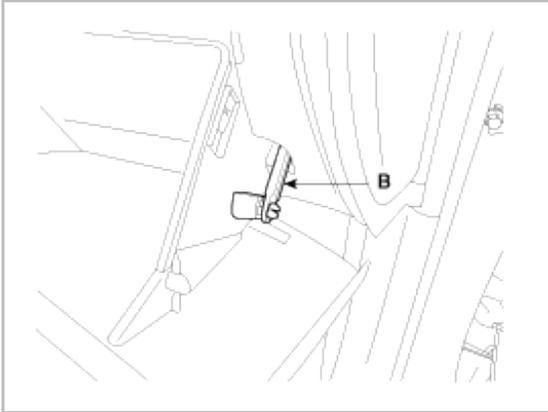
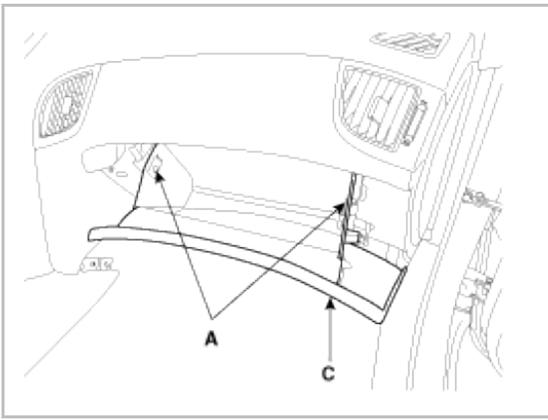
6. If the measured voltage is not specification, substitute with a known-good console temp control actuator and check for proper operation.
7. If the problem is corrected, replace the console temp control actuator.

Replacement

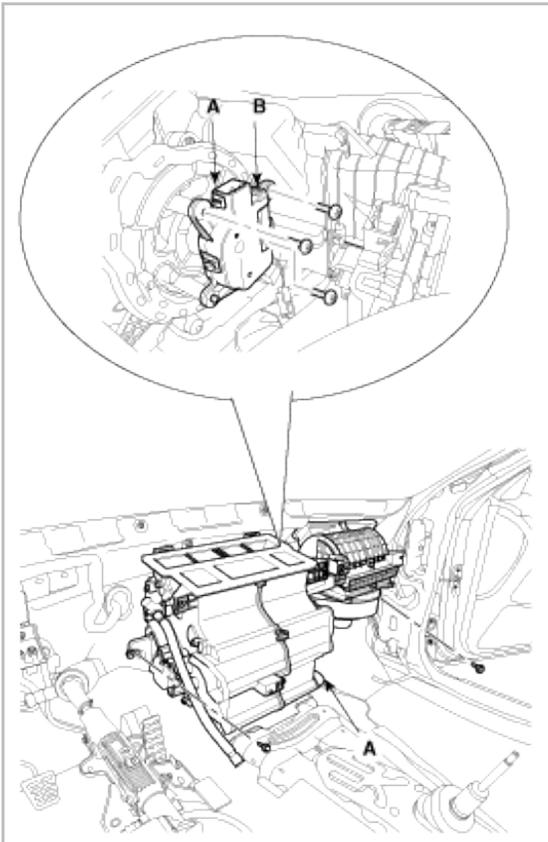
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad side cover (A).



3. Open the glove box. Lower the glove box down completely by removing the glove box damper (A) and lift (B) to the glove box(C).



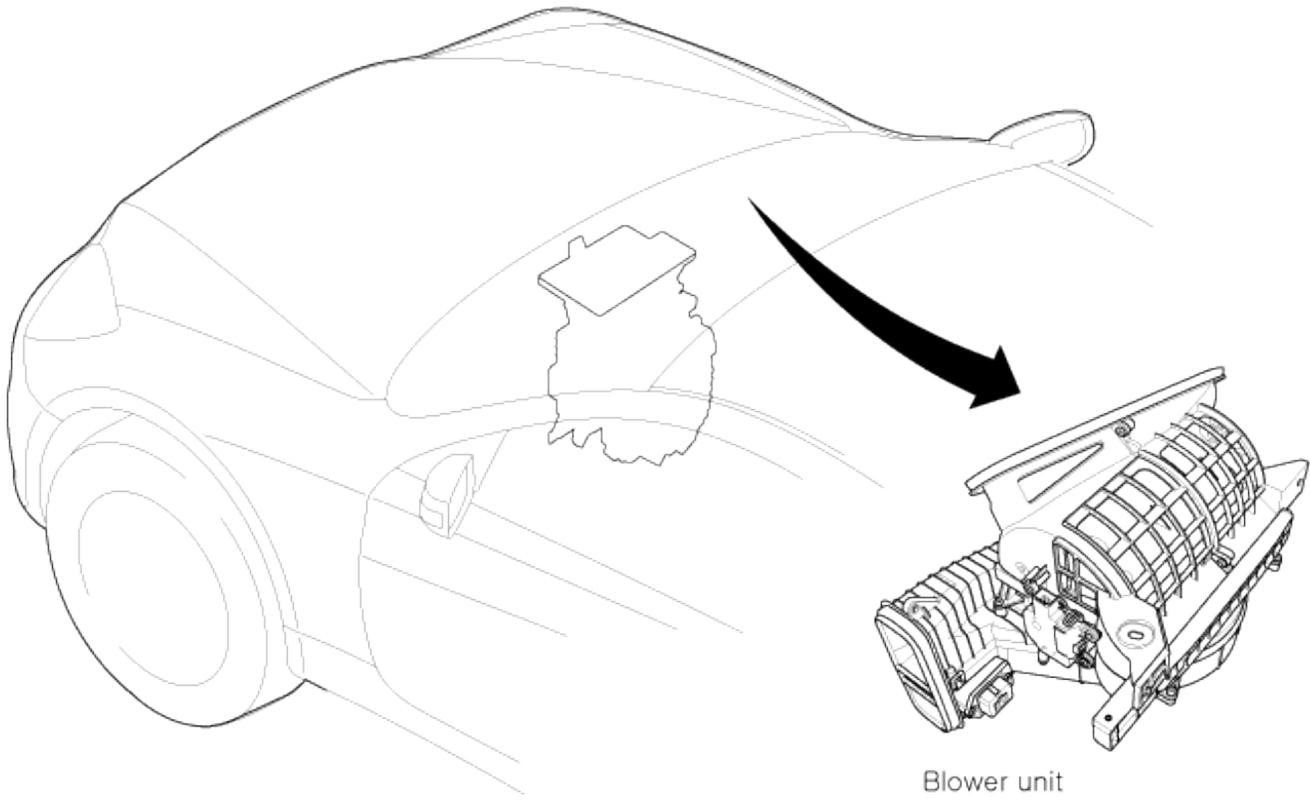
4. Disconnect the mode control actuator connector (A) after removing the air duct.
5. Loosen the mounting screws and then remove the mode control actuator (B).



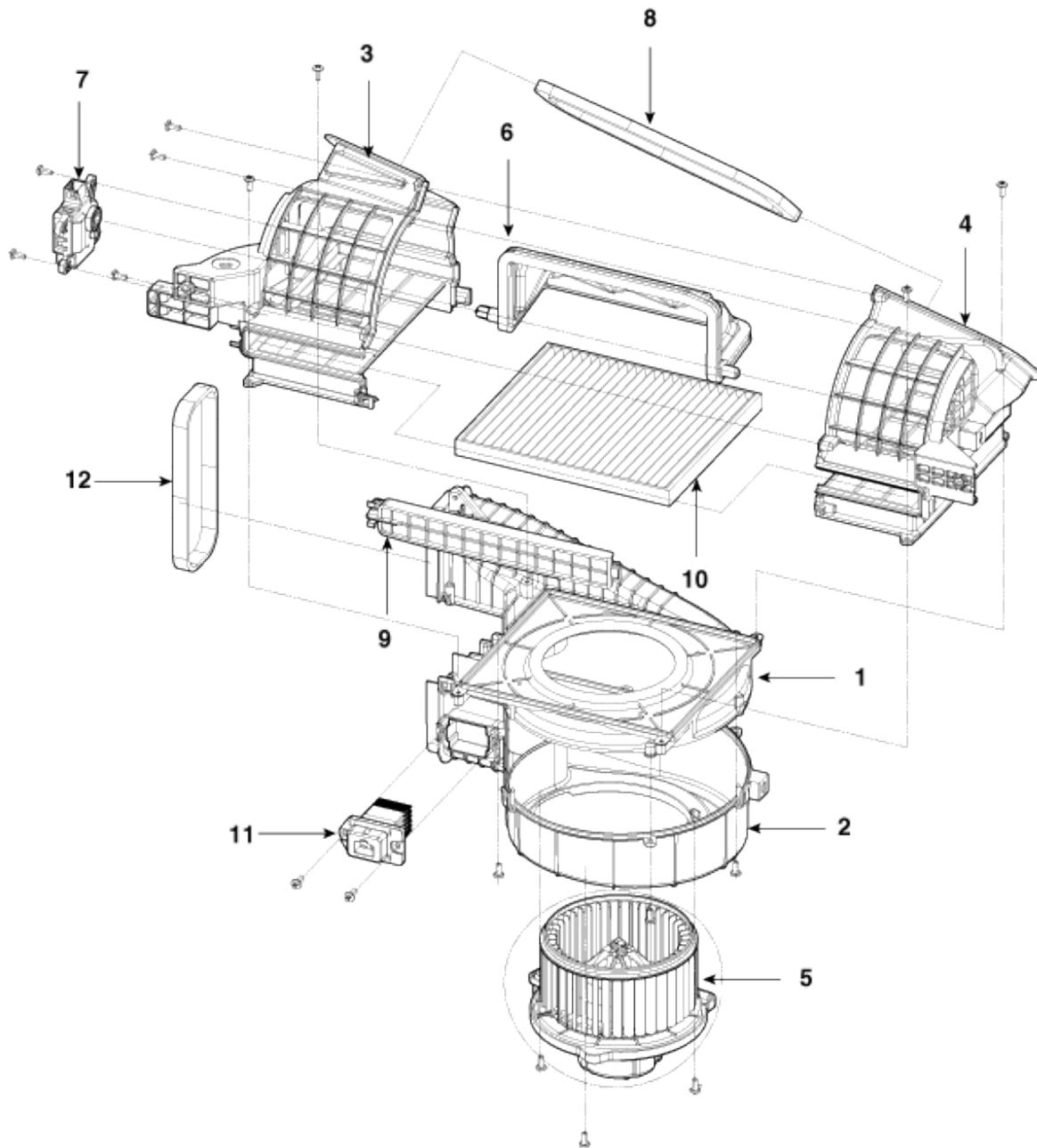
6. Installation is the reverse order of removal.

Components Location

Component Location



Components



1. Blower upper case
 2. Blower lower case
 3. Intake case (L)
 4. Intake case (R)

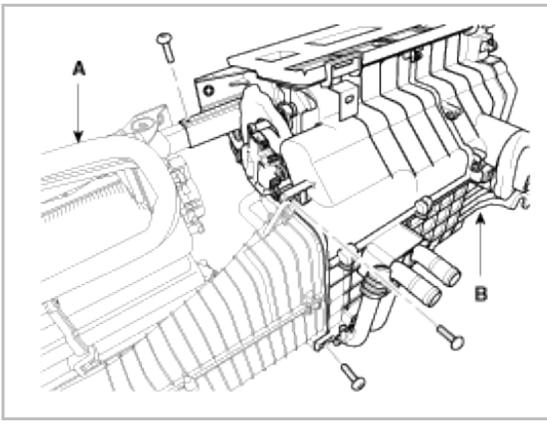
5. Blower motor
 6. Intake door
 7. Intake actuator
 8. Cowl seal

9. Climate control air filter cover
 10. Climate control air filter
 11. Power mosfet
 12. Heater matching lining

Heating, Ventilation, Air Conditioning > Blower > Blower Unit > Repair procedures

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the crush pad. (Refer to BD group-crash pad)
3. Remove the cowl cross bar assembly. (Refer to BD group-crash pad)
4. Remove the heater & blower unit. (Refer to HA group-heater unit)
5. Remove the blower unit from the heater unit (B) after loosening a mounting bolt and 2 screws.



NOTE

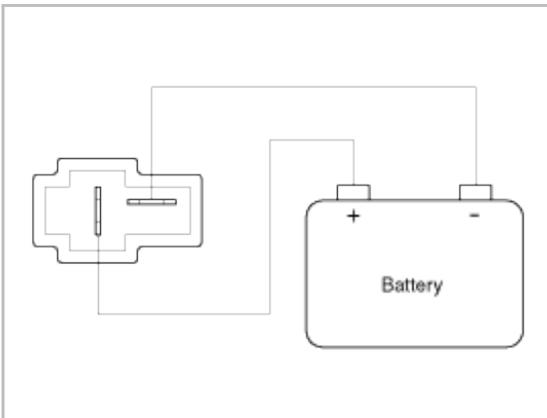
Make sure that there is no air leaking out of the blower and duct joints.

6. Installation is the reverse order of removal.

Heating,Ventilation, Air Conditioning > Blower > Blower Motor > Repair procedures

Inspection

1. Connect the battery voltage and check the blower motor rotation.

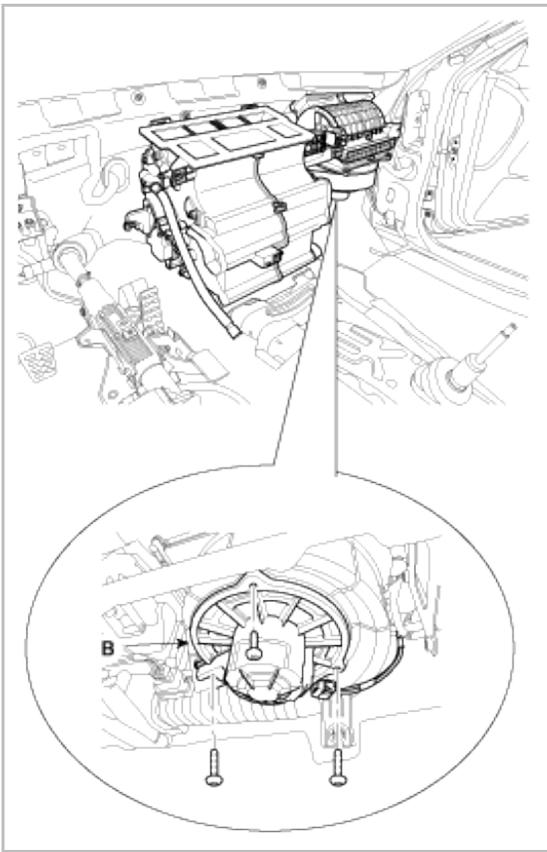


2. If the blower motor voltage is not operated well, substitute with a known-good blower motor and check for proper operation.

3. If the problem is corrected, replace the blower motor.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the crashpad under cover(Refer to BD group-Crash pad).
3. Disconnect the connector of the blower motor.
4. Remove the blower motor (B) after loosening the mounting screws.

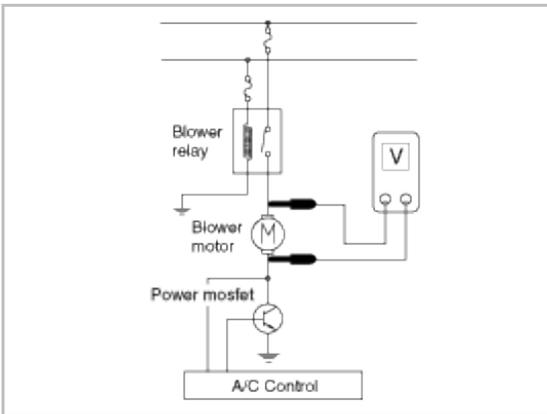


5. Installation is the reverse order of removal.

Heating,Ventilation, Air Conditioning > Blower > Power Mosfet > Repair procedures

Inspection

1. Ignition "ON"
2. Manually operate the control switch and measure the voltage of blower motor between pin 1 and 2.
3. Select the control switch to raise voltage until high speed.



Specification

Fan	Motor Voltage
	Manual
First speed	3.8 ±0.5V
Second speed	4.9 ±0.5V
Third speed	6.1 ±0.5V

Fourth speed	7.2 ±0.5V
Fifth speed	8.3 ±0.5V
Sixth speed	9.5 ±0.5V
Seventh speed	10.6 ±0.5V
eighth speed	Battery

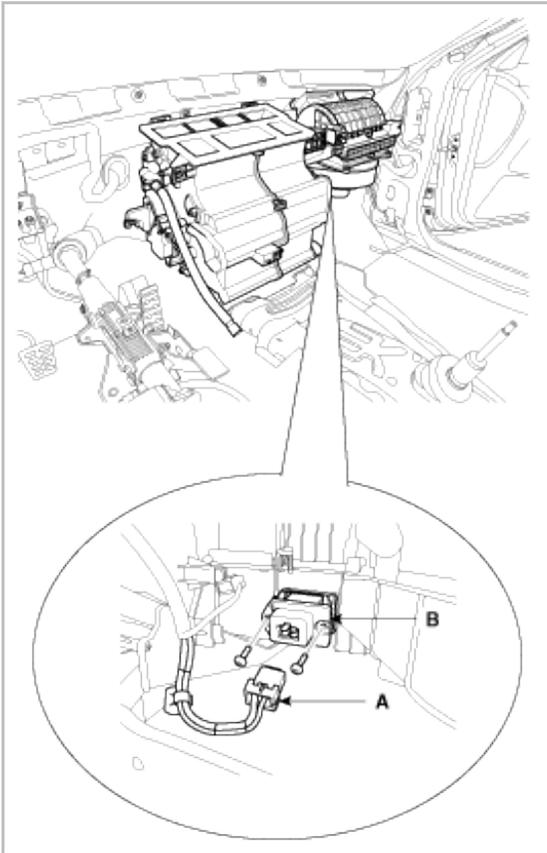
*AUTO COOLING: Auto speed (4.5V~B+)

*AUTO HEATING: Auto speed (4.5V~10.5V)

- If the measured voltage is not specification, substitute with a known-good power mosfet and check for proper operation.
- If the problem is corrected, replace the power mosfet.

Replacement

- Disconnect the negative (-) battery terminal.
- Remove the crashpad under cover(Refer to BD group-Crash pad)
- Disconnect the power mosfet connector (A) at the connecting part between heater and blower unit.
- Remove the power mosfet (B) after loosening the mounting screws.



- Installation is the reverse order of removal.

Heating,Ventilation, Air Conditioning > Blower > Climate control air filter > Description and Operation

Description

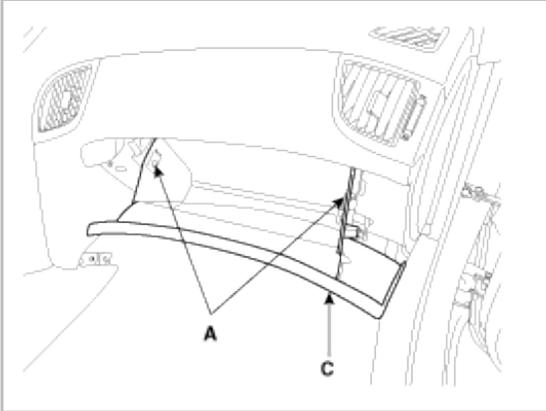
This has particle filter which eliminates foreign materials and odor. The particle filter includes odor filter as well as

conventional dust filter to ensure comfortable interior environment.

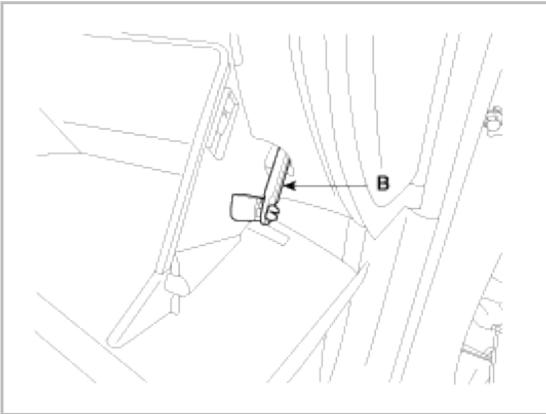
Heating,Ventilation, Air Conditioning > Blower > Climate control air filter > Repair procedures

Replacement

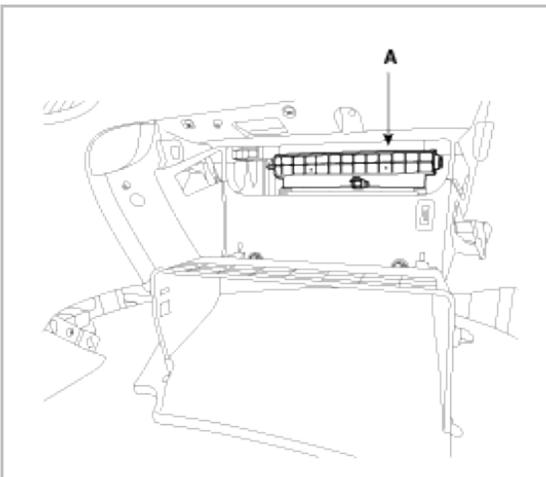
1. Open the glove box (A). Lower the glove box down completely by removing the glove box damper (B) to the glove box.



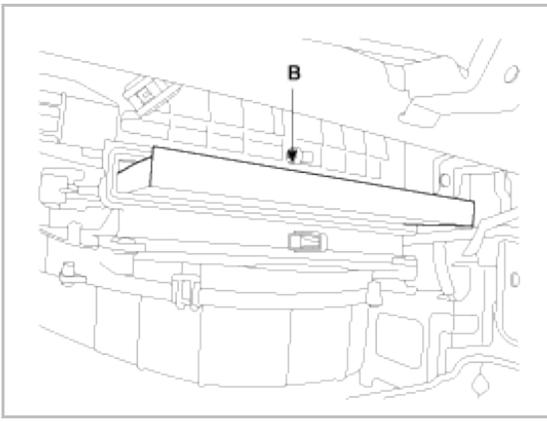
2. Remove the glove box lift(B).



3. Remove the filter cover (A) with pushing the knob.



4. Replace the air filter (B), install it after making sure of the direction of air filter.



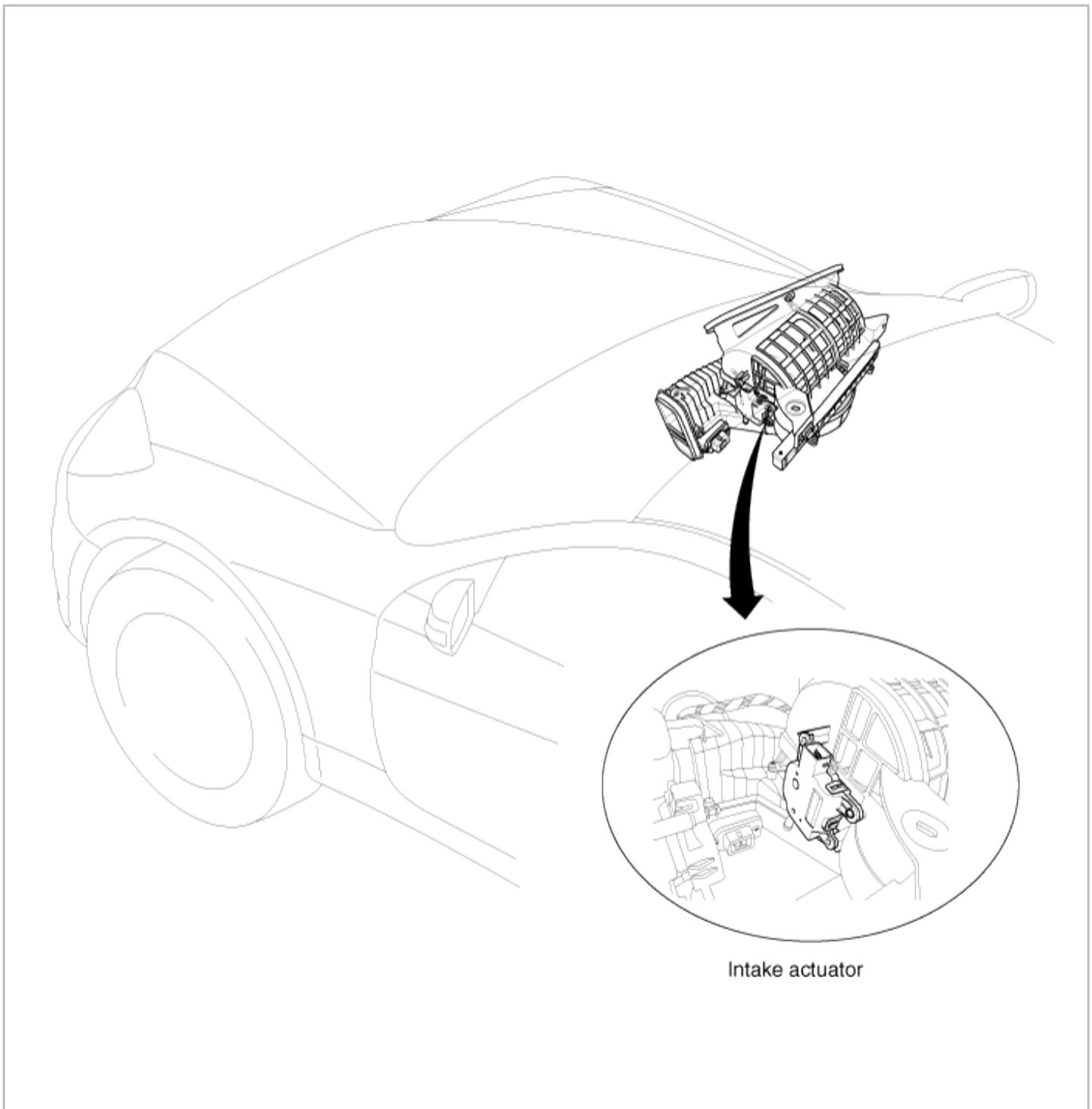
5. Installation is the reverse order of removal.

NOTE

In case of driving in an air-polluted area or rugged terrain, check and replace the air filter as frequently as possible.

Heating, Ventilation, Air Conditioning > Blower > Intake Actuator > Components and Components Location

Component Location



Heating,Ventilation, Air Conditioning > Blower > Intake Actuator > Description and Operation

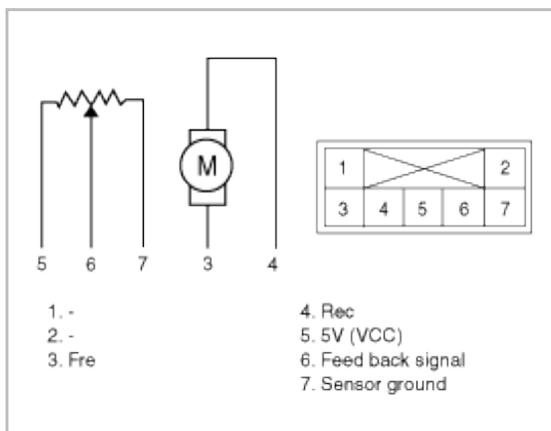
Description

1. The intake actuator is located at the blower unit.
2. It regulates the intake door by signal from control unit.
3. Pressing the intake selection switch will shift between recirculation and fresh air modes.

Heating,Ventilation, Air Conditioning > Blower > Intake Actuator > Repair procedures

Inspection

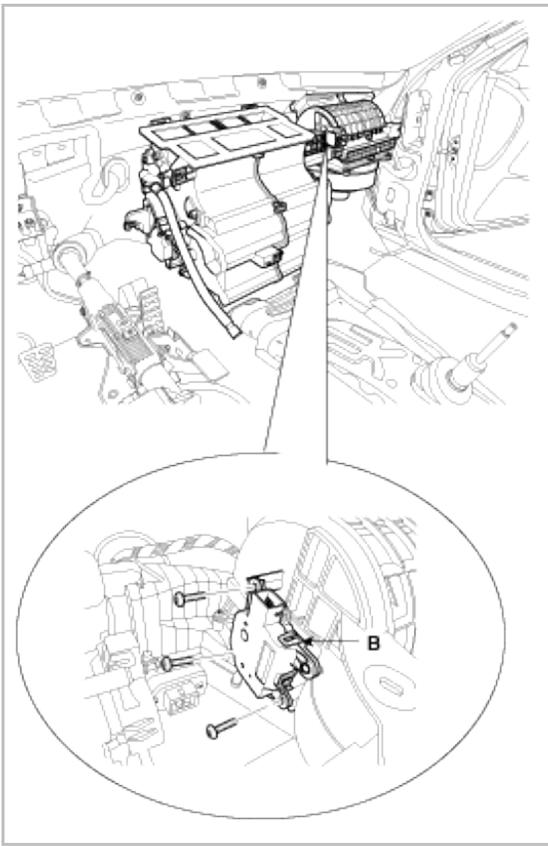
1. Ignition "OFF"
2. Disconnect the intake actuator connector.
3. Verify that the actuator operates to the recirculation position when connecting 12V to the terminal 3 and grounding terminal 4.
4. Verify that the intake actuator operates to the fresh position when connecting in the reverse.



5. If the intake actuator is not operated well, substitute with a known-good intake actuator and check for proper operation.
6. If the problem is corrected, replace the intake actuator.

Replacement

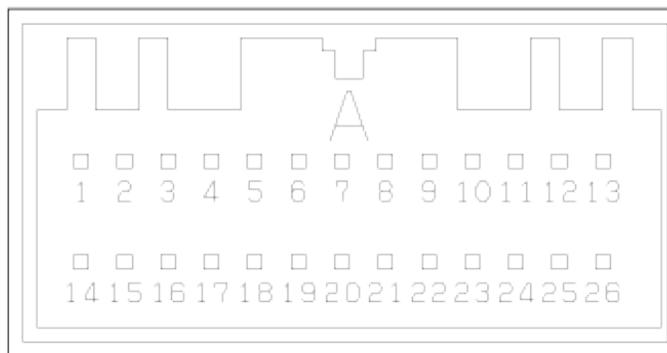
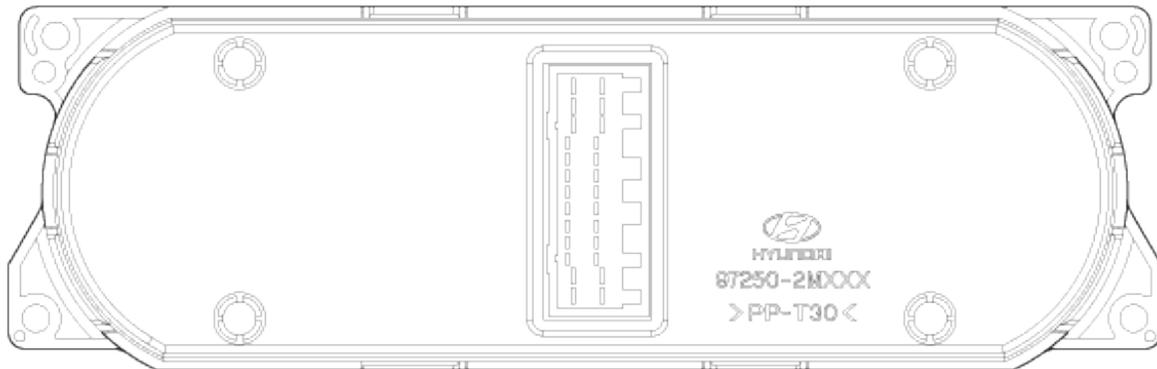
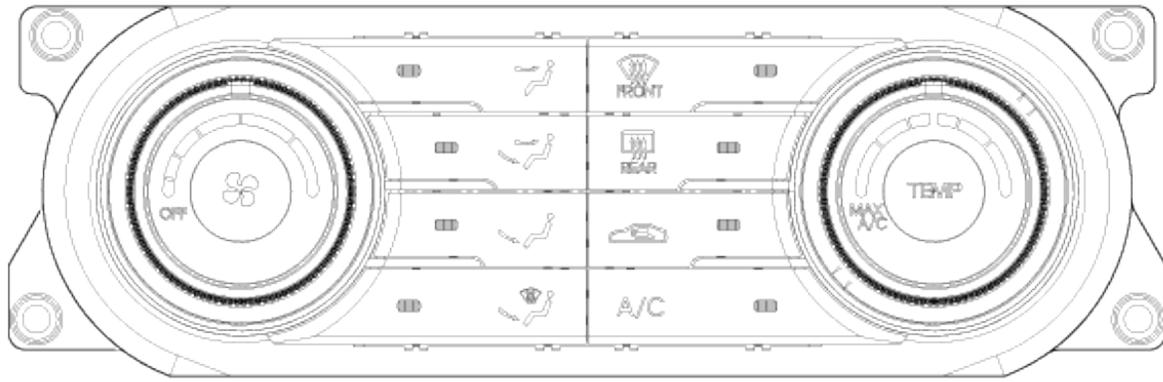
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad (Refer to BD group-crash pad).
3. Disconnect the intake actuator connector.
4. Loosen the mounting screw and then remove the intake actuator (B) from the blower unit.



5. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning > Controller > Heater & A/C Control Unit(Manual) > Components and Components Location

Component



Connector Pin Function

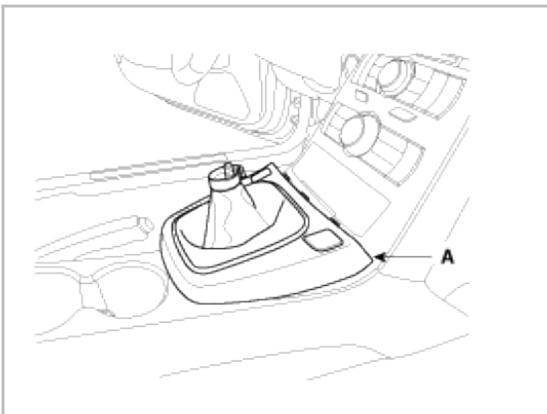
Connector	Pin no.	Function
Connector(A)	1	Battery
	2	Tail lamp (ILL+)
	3	IGN2
	4	Power mosfet (gate)
	5	Mode actuator(Vent)
	6	Mode actuator(Def)
	7	Temp actuator(Cool)

8	Temp actuator(Warm)
9	Intake actuator(Fre)
10	Intake actuator(Rec)
11	N,C
12	Rheostat (ILL-)
13	N,C
14	Vref(5V)
15	Blower motor(+)
16	Power mosfet(Drain)
17	Mode actuator F/B
18	Temp actuator F/B
19	Intake actuator F/B
20	Evaporator sensor (+)
21	A/C select(High)
22	A/C Output(HigH)
23	RR Def switch
24	RR Def indicator
25	GND
26	Sensor GND

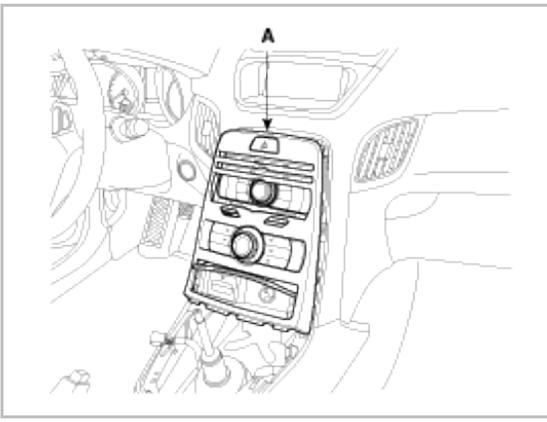
Heating,Ventilation, Air Conditioning > Controller > Heater & A/C Control Unit(Manual) > Repair procedures

Replacement

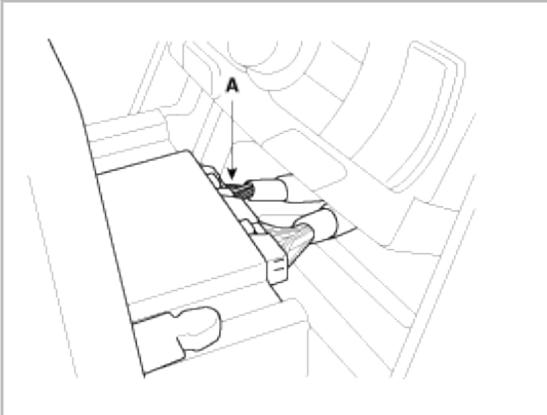
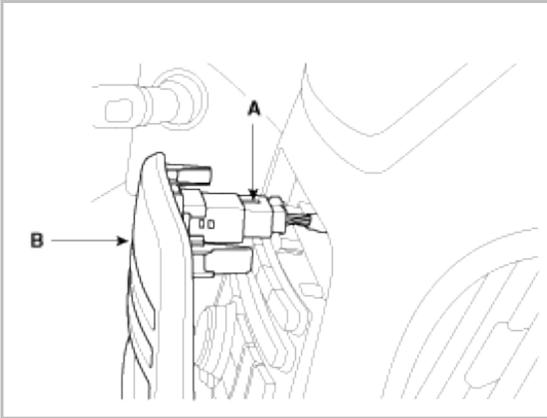
1. Disconnect the negative (-) battery terminal.
2. Remove the console upper cover(A).



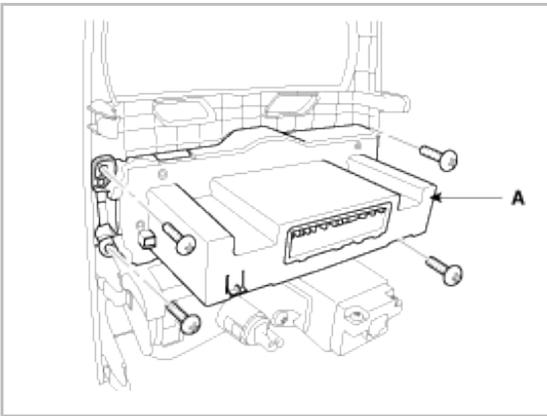
3. Remove the center facia pannel (A).



4. Disconnect the connector(A) and then remove the center facia pane (B).

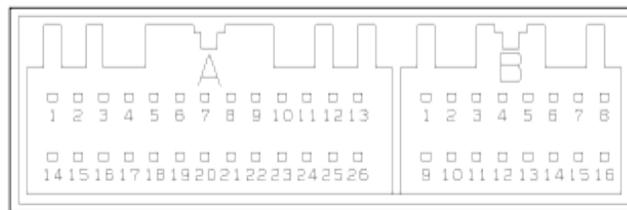
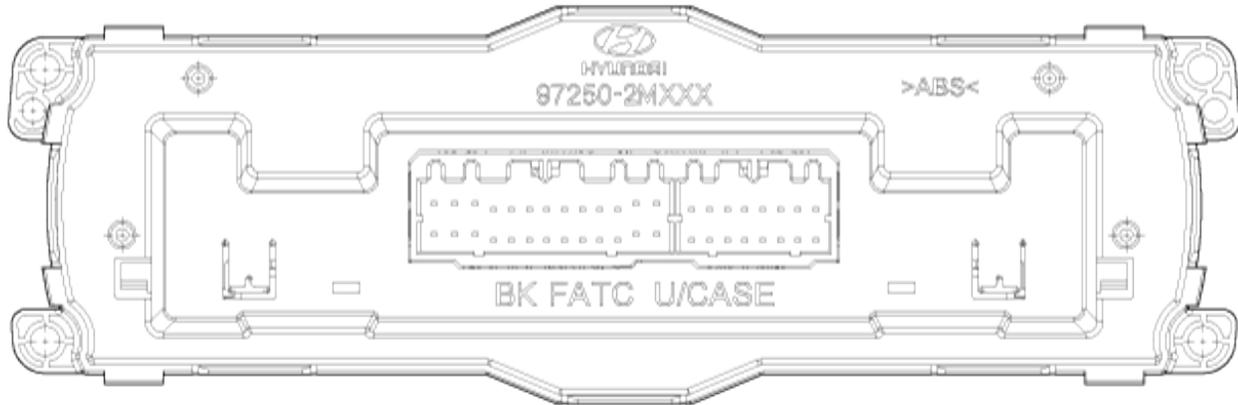
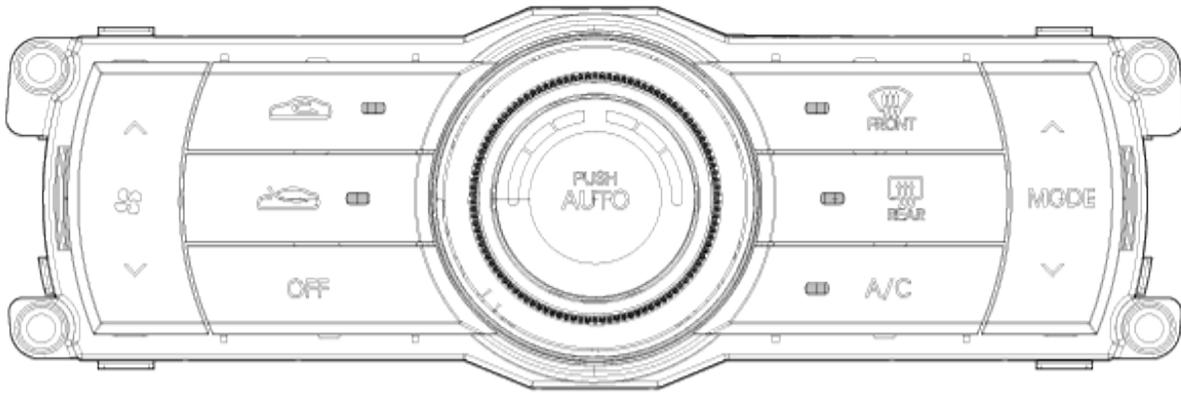


5. Remove the heater & A/C controller (A) from center facia panel.



6. Installation is the reverse order of removal.

Component



Connector Pin Function

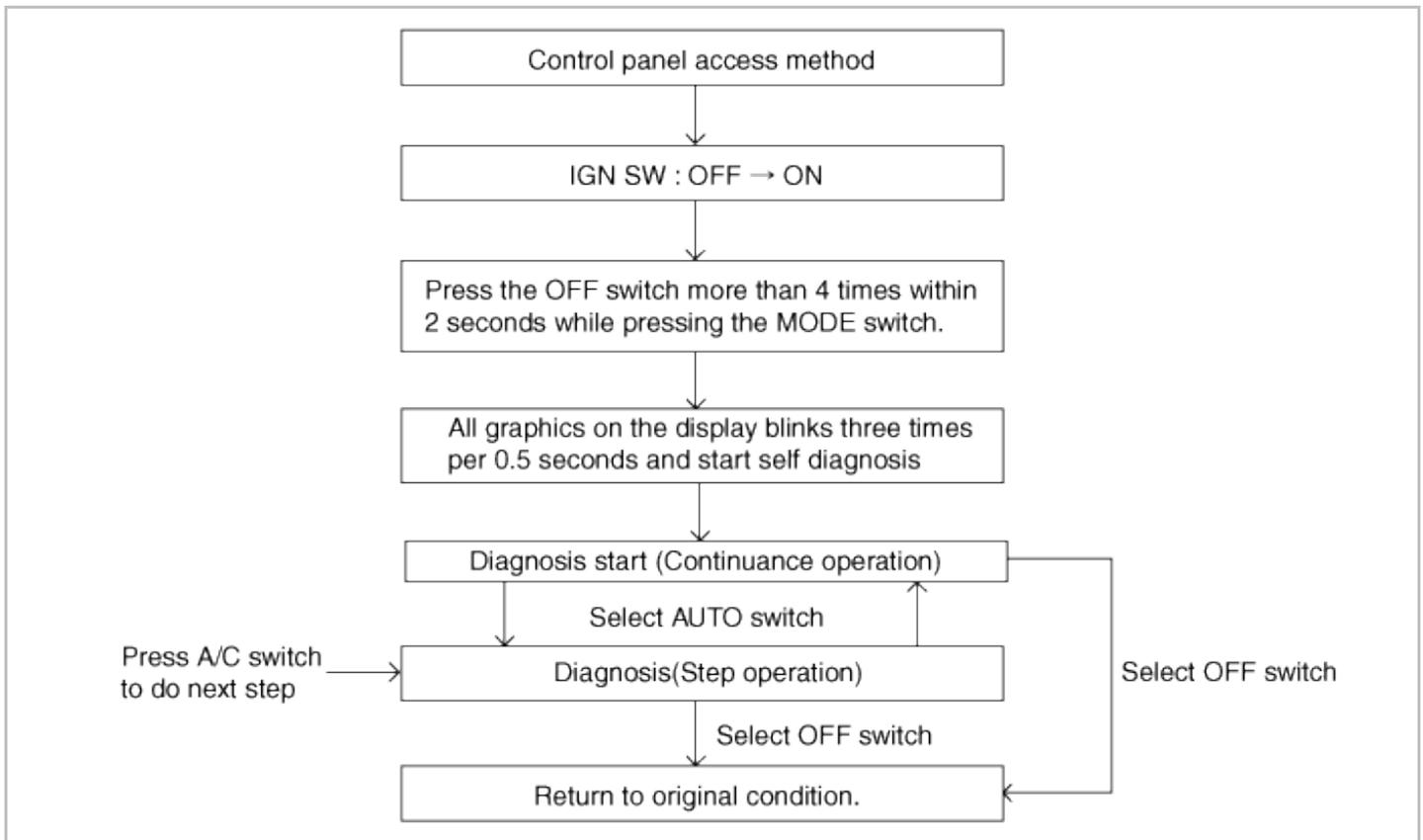
Connector	Pin	Function	Connector	Pin	Function
Connector (A)	1	Battery	Connector (B)	1	N,C
	2	Tail lamp(ILL+)		2	N,C
	3	IGN2		3	Incar sensor
	4	Power mosfet(Gate)		4	Speed sensor
	5	Mode actuator(Vent)		5	Ambient sensor

6	Mode actuator(Def)	6	HI-Scan
7	Temp actuator(Cool)	7	N,C
8	Temp actuator(Warm)	8	N,C
9	Intake actuator(Fre)	9	Photo sensor(+)
10	Intake actuator(Rec)	10	Photo sensor(-)
11	N,C	11	Water sensor(-)
12	Rheostat(ILL-)	12	N,C
13	N,C	13	N,C
14	Vref(5V)	14	Multi media can(L)
15	Blower motor(+)	15	Multi media can(H)
16	Power mosfet(Drain)	16	GND
17	Mode actuator F/B		
18	Temp actuator F/B		
19	Intake actuator F/B		
20	Evaporator sensor		
21	A/C Select(High)		
22	A/C Output(High)		
23	RR Def switch		
24	RR Def indicator		
25	GND		
26	Sensor GND		

Heating,Ventilation, Air Conditioning > Controller > Heater & A/C Control Unit(Full Automatic) > Repair procedures

SELF-DIAGNOSIS

1. Self-diagnosis process



NOTE
 DTC data can be retrieved from the control panel directly or from the DLC using the Hi-Scan Pro.

2. How to read self-diagnostic code

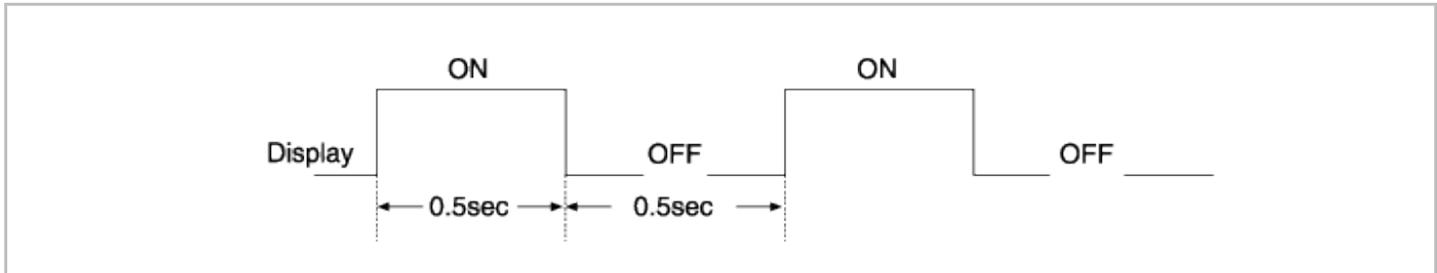
After the display panel flickers three times every 0.5 second, the corresponding fault code flickers on the setup temperature display panel every 0.5 second and will show two figures. Codes are displayed in numerical format.

Fault code

NO.	Fail description
00	Normal
11	Incar sensor OPEN
12	Incar sensor SHORT
13	Ambient sensor OPEN
14	Ambient SHORT
15	Water temp sensor OPEN
16	Water temp sensor SHORT
17	Evaporator sensor OPEN
18	Evaporator sensor SHORT
19	Temp potentiometer OPEN/SHORT
20	Temp potentiometer FAULT
21	Mode potentiometer OPEN/SHORT
22	Mode potentiometer FAULT
25	Intake potentiometer OPEN/SHORT

3. Fault code display

(1) Continuance operation : DTC code is one



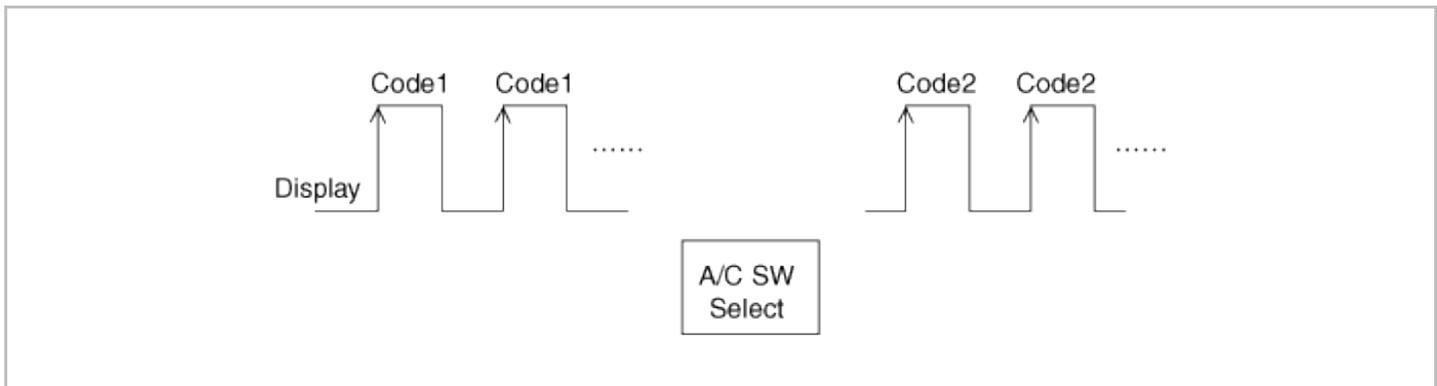
(2) Continuance operation : DTC code is more two



(3) Step operation

A. Normal or one fault code is same as a continuance

B. DTC code is more two



4. If fault codes are displayed during the check, inspect malfunction causes by referring to fault codes.

5. Fail safe

(1) In-car sensor : Control with the value of 23°C(73°F)

(2) Ambient temperature sensor: Control with the value of 20°C(67°F)

(3) Evaporator temperature sensor: Control with the value of -2°C(28.4°F)

(4) Water temperature sensor : Control with the value of 85°C (185°F)

(5) Temperature control actuator (Air mix potentiometer):

If temperature setting 17°C-24.5°C, fix at maximum cooling position.

If temperature setting 25°C-32°C, fix at maximum heating position

(6) Mode control actuator (Direction potentiometer):

Fix vent position, while selecting vent mode.

Fix defrost position, while selecting all except vent mode.

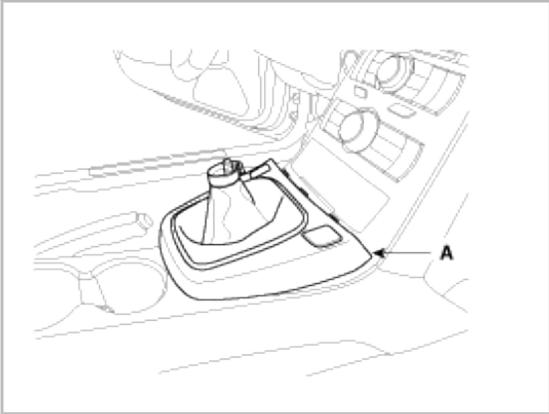
(7) Intake control actuator :

Fix fresh position, while selecting fresh mode.

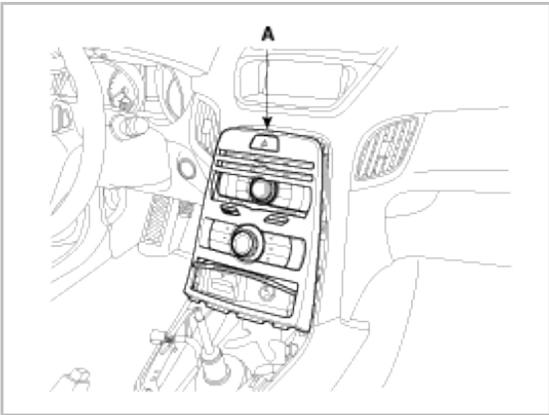
Fix recirculation position, while selecting recirculation mode.

Replacement

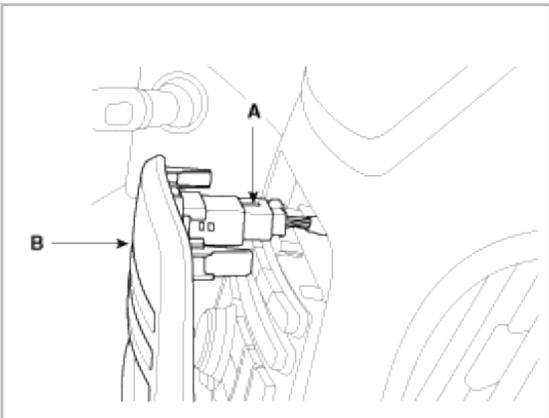
1. Disconnect the negative (-) battery terminal.
2. Remove the console upper cover(A).

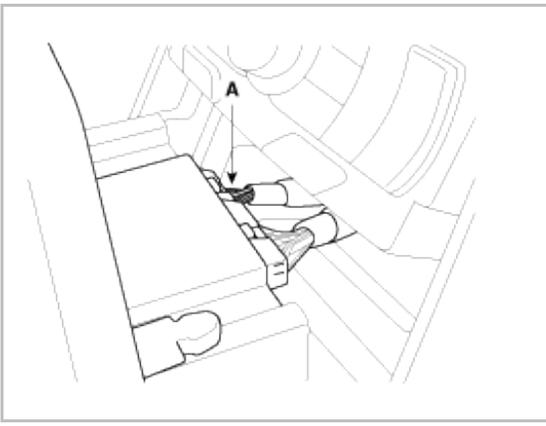


3. Remove the center facia panel (A).

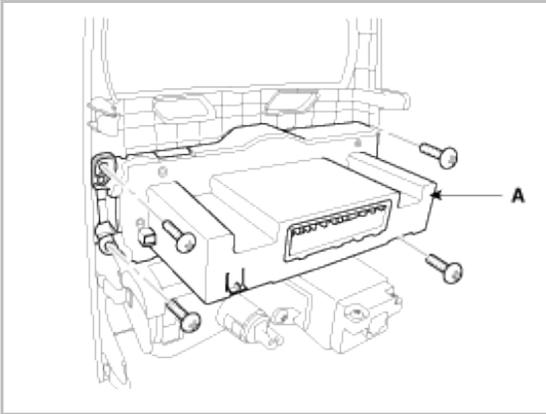


4. Disconnect the connector(A) and then remove the center facia panel (B).





5. Remove the heater & A/C controller (A) from center facia panel.



6. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning > Controller > B1202 Heater Water Temperature Sensor Open(High)

General Description

Engine coolant temperature sensor is located in the engine coolant passage of the cylinder head for detecting the engine coolant temperature.. It contains negative type thermistor whose resistance value is in inverse proportion to temperature. Resistance of watersensor that varies with temperature makes signal voltage of A/C ECU change. In this way A/C ECU detects temperature. Signal of water sensor is used for cold engine lockout control - When the driver operates the heater before the engine is warmed up enough, to prevent driver from unpleasantness of cold air. the heater control unit reduces blower motor speed until coolant temperature reaches the threshold value.

DTC Description

Air conditioner Control Module sets DTC B1202 if Engine coolant temperature sensor has been detected over 4.9V for 4sec.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Poor connection of connected part • Open circuit in signal/power harness • Short circuit in signal/power harness
Enable Conditions	• IG KEY ON	
Threshold value	• Engine coolant temperature sensor has been detected over 4.9V for 4sec.	

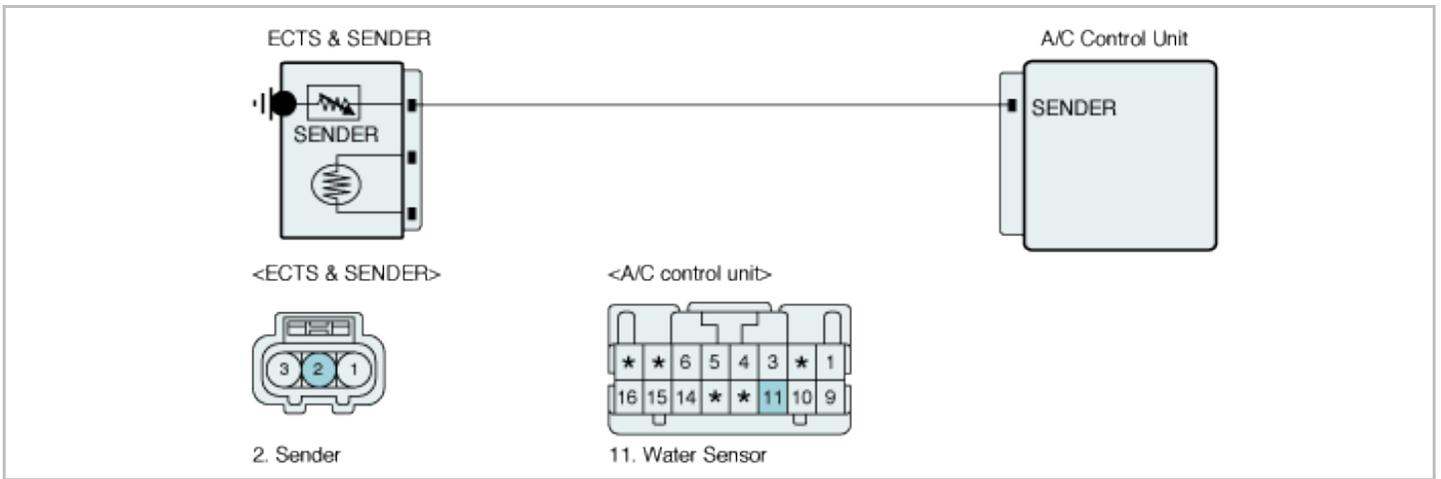
Fail safe	• Control with the value of 85°C(185°F)	• Faulty Engine coolant temperature sensor • Faulty A/C Control Unit
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Specification

※ Resistance value of Engine coolant temperature sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	45.9	40/104	3.27
0/32	25	60/140	1.4
20/68	8.43	80/176	0.7

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Water temperature sensor" parameter.

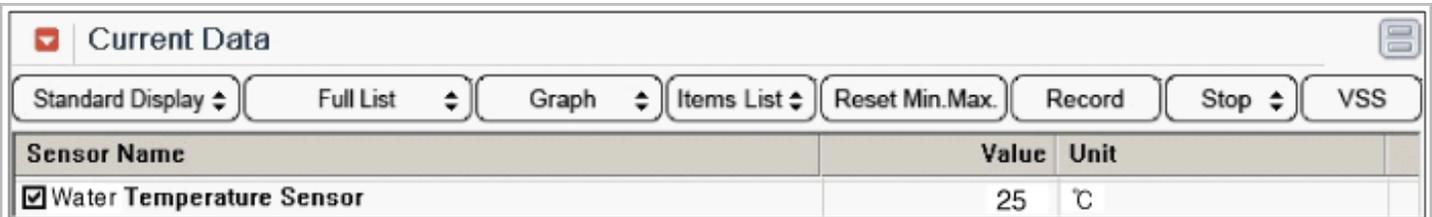


Fig.1

Fig 1) Parameter of "WATER TEMP.SENSOR" will be fixed at 85°C(185°F), if there is any fault in INCAR SENSOR.

4. Is the Water temperature sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	▶ This is an intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check power in harness

1. Ignition "OFF".
2. Disconnect Water temp.sensor and Connect A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Power terminal of Water temp.sensor harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	▶ Go to "Check for open in harness" as follows.
NO	▶ Check for short to battery in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Water temp.sensor and A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Water temp.sensor harness connector and Signal(+) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Incar temp.sensor

1. Ignition "OFF".

2. Disconnect Water temp.sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Water temp.sensor harness connector and Sensor ground harness connector.

Specification : Refer the specifications in fig.1

FIG.1) * Specifications : Resistance value of Water sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	45.9	40/104	3.27
0/32	25	60/140	1.4
20/68	8.43	80/176	0.7

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good Water temp.sensor and check for proper operation. If the problem is corrected, replace Water temp.sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect Water temp.sensor and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of Water temp.sensor harness connector and chassis ground.

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Sensor Short(Low)

General Description

Engine coolant temperature sensor is located in the engine coolant passage of the cylinder head for detecting the engine coolant temperature.. It contains negative type themistor whoses resistance value is in inverse proportion to temperature. Resistance of watersensor that varies with temperature makes signal voltage of A/C ECU change. In this way A/C ECU detects temperature. Signal of water sensor is used for cold engine lockout control - When the driver operates the heater before the engine is warmed up enough, to prevent driver from unpleasantness of cold air. the heater control unit reduces blower motor speed until coolant temperature reaches the threshold value.

DTC Description

Air conditioner Control Module sets DTC B1203 if Engine coolant temperature sensor has been detected open or below 0.1V for 4sec.

DTC Detecting Condition

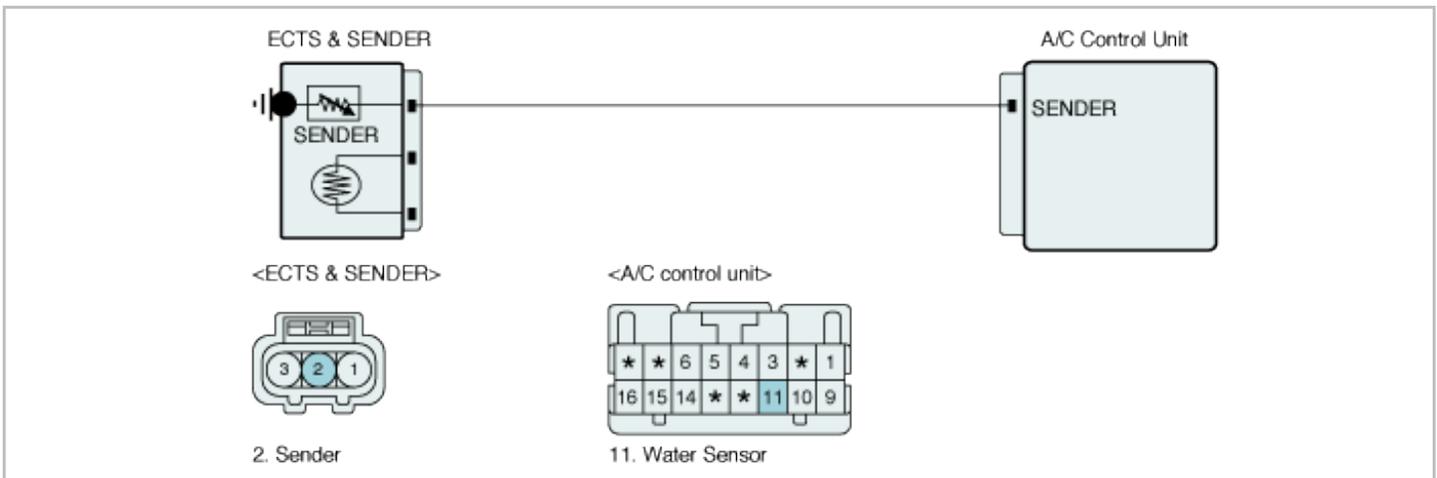
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	• Poor connection in wireharness • Open in signal circuit • Short to battery in signal circuit • Faulty Engine coolant temperature sensor • Faulty A/C Control Unit
Enable Conditions	• IG KEY ON	
Threshold value	• Engine coolant temperature sensor has been detected open or below 0.1V for 4sec.	
Fail safe	• Control with the value of 85°C(185°F)	

Specification

※ Resistance value of Engine coolant temperature sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	45.9	40/104	3.27
0/32	25	60/140	1.4
20/68	8.43	80/176	0.7

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Water temperature sensor" parameter.

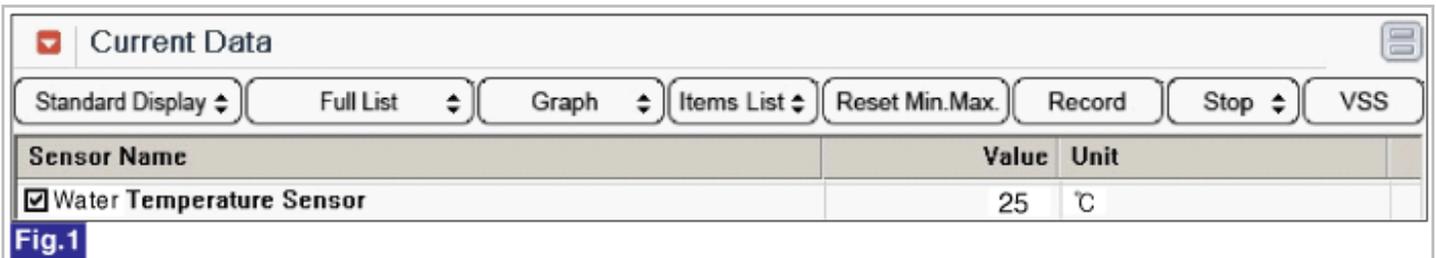


Fig 1) Parameter of "WATER TEMP.SENSOR" will be fixed at 85°C(185°F), if there is any fault in INCAR SENSOR.

4. Is the Water temperature sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ This is an intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

- Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Water temp.sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Water temp.sensor harness connector and chassis ground.

Specification : Infinity

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Incar temp.sensor

1. Ignition "OFF".
2. Disconnect Water temp.sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Water temp.sensor harness connector and Sensor ground harness connector.

Specification : Refer the specifications in fig.1

FIG.1) * Specifications : Resistance value of Water sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	45.9	40/104	3.27
0/32	25	60/140	1.4
20/68	8.43	80/176	0.7

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good Water temp.sensor and check for proper operation. If the problem is corrected, replace Water temp.sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect Water temp.sensor and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of Water temp.sensor harness connector and chassis ground.

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
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NO

▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES

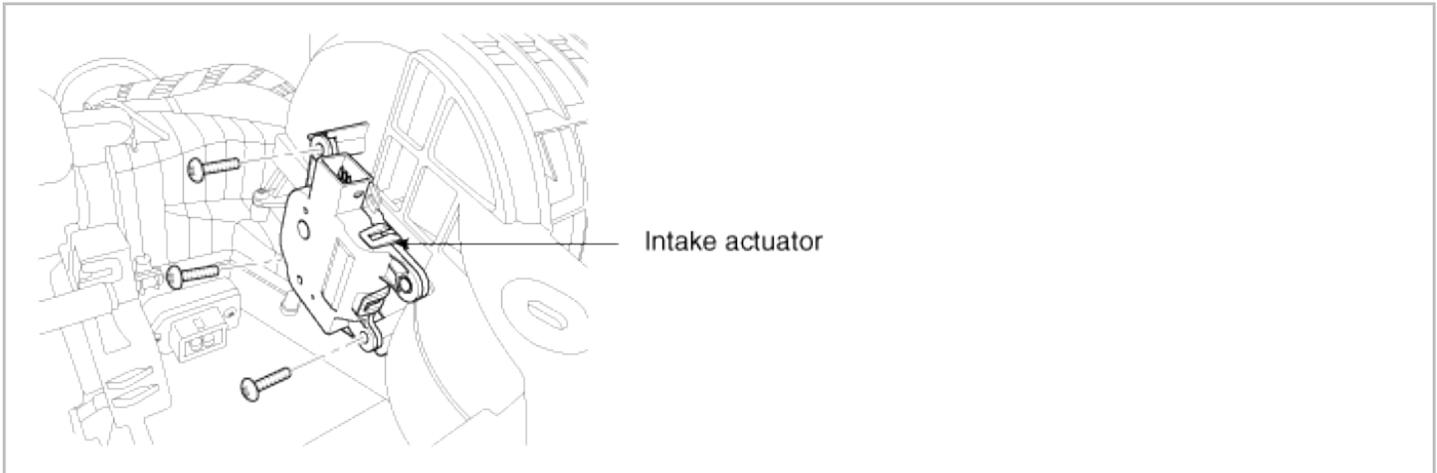
▶ Go to the applicable troubleshooting procedure.

NO

▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1208 Intake Potentiometer Open (Low)

Componet Location



General Description

It contains intake motor that changes intake door position and potentiometer that monitors position of intake door. When driver operates the intake switch, ECU receives mode signal from intake switch and operates intake door motot to turn intake door to intended position. (with FRE mode signal, intake door is closed and with REC mode signal, intake door is opened)

In operation, potentiometer delivers intake door position transformed into voltage value to A/C ECU.

DTC Description

Airconditioner Control Module sets DTC B1208 if the Feed Back signal of Intake Actuator has been detected open or below 0.1V for 100 ms.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	<ul style="list-style-type: none"> • Voltage check 	<ul style="list-style-type: none"> • Poor connection of connected

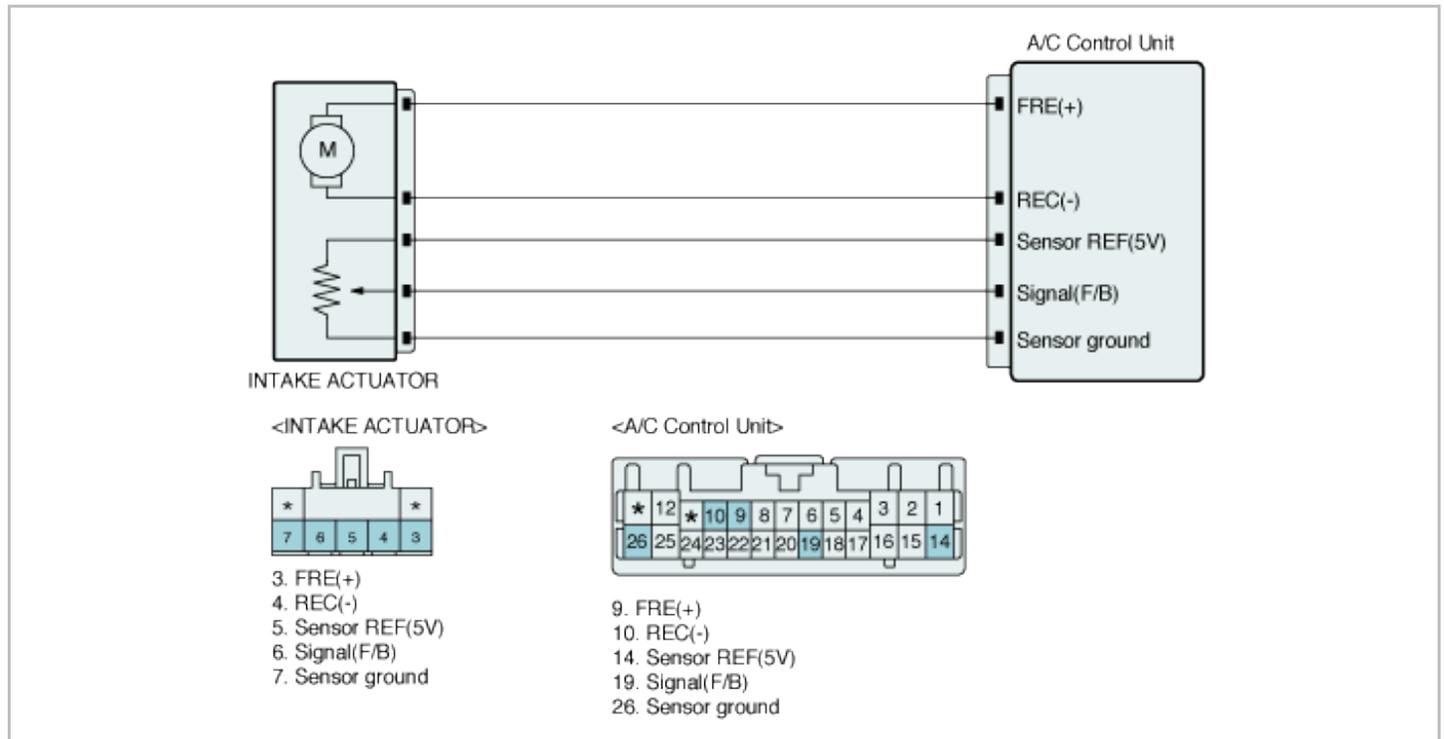
Enable Conditions	• IG KEY ON	part • Open circuit in signal/power harness • Short circuit in signal/power harness • Faulty Intake potentiometer
Threshold value	• Feedback circuit has been detected open or below 0.1V for 100ms.	
Fail safe	• Setting mode : REC Fix at REC position • Setting mode : Except REC Fix at FRE position	

Specification

※ Voltage value of Intake potentiometer as a function of position of Intake door

Door position	Voltage
FRE	0.45V
REC	4.55V

Diagnostic Circuit Diagram

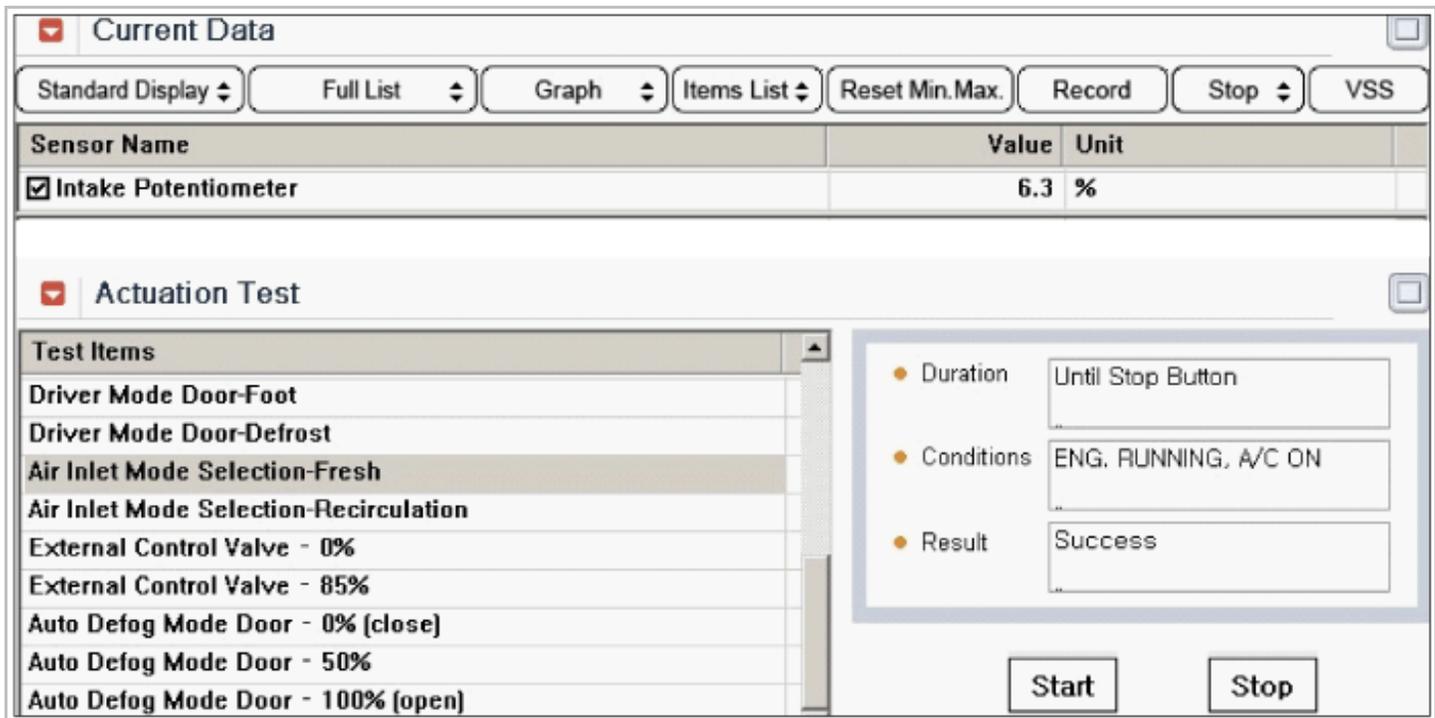


Monitor Scantool Data

■ Check Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal temperature after engine start.
3. Select " Intake Potentiometer " parameter on the current data with scantool.
4. Perform Actuation Test for " Air Inlet Mode Selection - Reculation /Fresh in order.
5. With performing Actuation test, check that the value of each position sensors are changing.

Specification - Recirculation : About 90%, Fresh : About 10%.



6. Are the value of each position sensors changed when performing actuation test ?

YES	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ Go to " Inspection/Repair " procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Measure resistance between Signal(F/B) terminal of Intake actuator harness connector and Signal(F/B) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to "Check short to ground in harness" as follows.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Measure resistance between Signal(F/B) terminal of Intake actuator harness connector and chassis ground.

Specification : Infinity

4. Is the measured resistance within specification?

YES	▶ Go to "Power circuit Inspection " procedure.
NO	▶ Check for short to ground in control harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ Check power in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and Connect A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Sensor REF(5V) terminal of Intake actuator harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open and short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Intake actuator

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to FRE(+) of intake actuator and (-) terminal to REC(-) .(Component side)
4. Verify that the actuator operates to the REC position.
5. Verify that the temperature actuator operates to the FRE position with reverse connecting.(REC(-) and FRE(+)) (Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	FRE(+)	REC(-)	Door position
------------------	--------	--------	---------------

Battery terminal	12 V	Ground	FRE
	Ground	12 V	REC

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Intake actuator and check for proper operation. If the problem is corrected, replace Intake actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(F/B) terminal of Intake actuator harness connector and chassis ground .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) Specifications : Voltage value of intake potentiometer as a function of intake door position.

Door position	Voltage
FRE	0.45V
REC	4.55V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Intake actuator and check for proper operation. If the problem is corrected, replace Intake actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

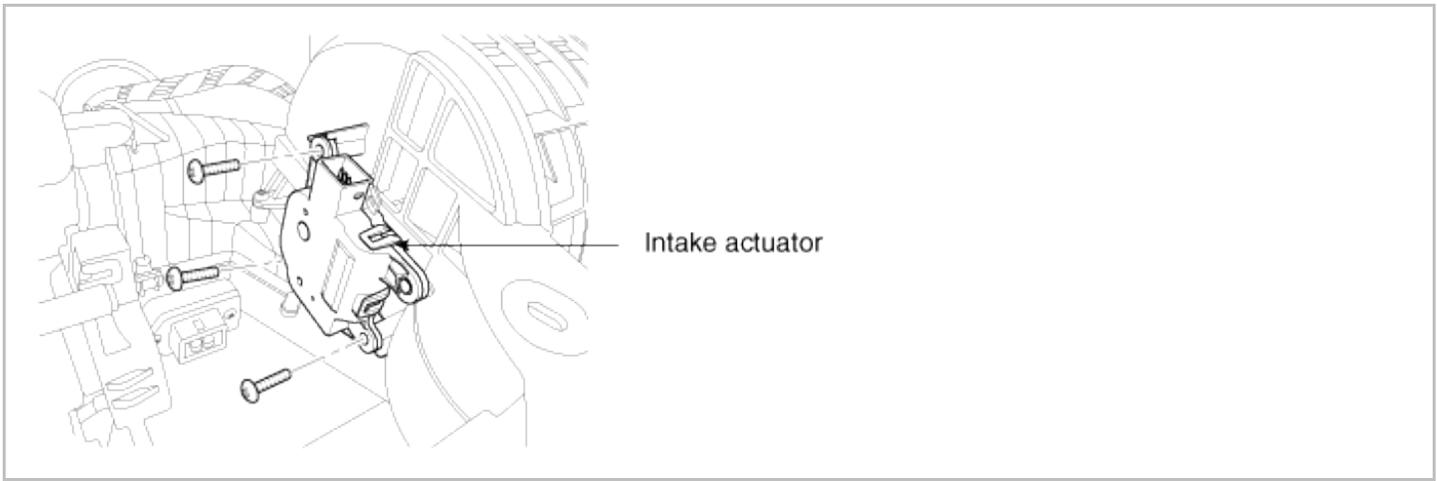
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1209 Intake Potentiometer Short (High)

Componet Location



General Description

It contains intake motor that changes intake door position and potentiometer that monitors position of intake door. When driver operates the intake switch, ECU receives mode signal from intake switch and operates intake door motor to turn intake door to intended position. (with FRE mode signal, intake door is closed and with REC mode signal, intake door is opened)

In operation, potentiometer delivers intake door position transformed into voltage value to A/C ECU.

DTC Description

Airconditioner Control Module sets DTC B1209 if the Feed Back signal of Intake Actuator has been detected over 4.9V for 100ms.

DTC Detecting Condition

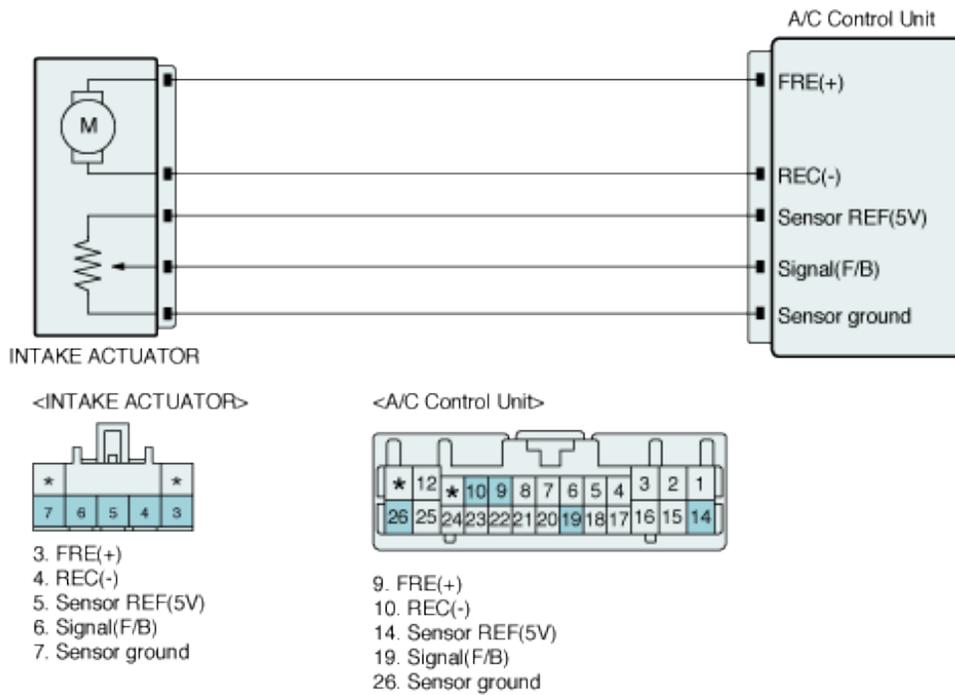
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Short to battery in signal(Feedback) circuit • Open in ground circuit • Faulty Intake Actuator • Faulty Air Conditioner Module
Enable Conditions	• IG KEY ON	
Threshold value	• Feedback circuit has been detected over 4.9V for 100ms.	
Fail safe	• Intake Actuator is moved and fixed at FRE position if FRE is selected or REC position if REC is selected.	

Specification

※ Voltage value of Intake potentiometer as a function of position of Intake door

Door position	Voltage
FRE	0.45V
REC	4.55V

Diagnostic Circuit Diagram



Monitor Scantool Data

■ Check Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal temperature after engine start.
3. Select " Intake Potentiometer " parameter on the current data with scantool.
4. Perform Actuation Test for " Air Inlet Mode Selection - Reculation /Fresh in order.
5. With performing Actuation test, check that the value of each position sensors are changing.

Specification - Recirculation : About 90%, Fresh : About 10%.

Current Data

Standard Display | Full List | Graph | Items List | Reset Min.Max. | Record | Stop | VSS

Sensor Name	Value	Unit
<input checked="" type="checkbox"/> Intake Potentiometer	6.3	%

Actuation Test

<p>Test Items</p> <ul style="list-style-type: none"> Driver Mode Door-Foot Driver Mode Door-Defrost Air Inlet Mode Selection-Fresh Air Inlet Mode Selection-Recirculation External Control Valve - 0% External Control Valve - 85% Auto Defog Mode Door - 0% (close) Auto Defog Mode Door - 50% Auto Defog Mode Door - 100% (open) 	<ul style="list-style-type: none"> ● Duration: Until Stop Button ● Conditions: ENG. RUNNING, A/C ON ● Result: Success <p style="text-align: center;"> <input type="button" value="Start"/> <input type="button" value="Stop"/> </p>
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6. Are the value of each position sensors changed when performing actuation test ?

YES	<ul style="list-style-type: none">▶ This is a intermittent problem caused by poor contact of component or Control Unit▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector.▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none">▶ Go to " Inspection/Repair " procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	<ul style="list-style-type: none">▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none">▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check short to battery in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Intake actuator harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	<ul style="list-style-type: none">▶ Go to "Ground circuit Inspection " procedure.
NO	<ul style="list-style-type: none">▶ Check for short to battery in harness.▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Measure resistance between Sensor ground(-) terminal of Intake actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	<ul style="list-style-type: none">▶ Go to " Component inspection " procedure.
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NO

- ▶ Check for open in harness.
- ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Intake actuator

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to FRE(+) of intake actuator and (-) terminal to REC(-) .(Component side)
4. Verify that the actuator operates to the REC position.
5. Verify that the temperature actuator operates to the FRE position with reverse connecting.(REC(-) and FRE(+)) (Component side)

Specification : Refer the specifications in fig.1

FIG.1) ※ Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	FRE(+)	REC(-)	Door position
Battery terminal	12 V	Ground	FRE
	Ground	12 V	REC

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Intake actuator and check for proper operation. If the problem is corrected, replace Intake actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(F/B) terminal of Intake actuator harness connector and chassis ground .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) Specifications : Voltage value of intake potentiometer as a function of intake door position.

Door position	Voltage
FRE	0.45V
REC	4.55V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Intake actuator and check for proper operation. If the problem is corrected, replace Intake actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

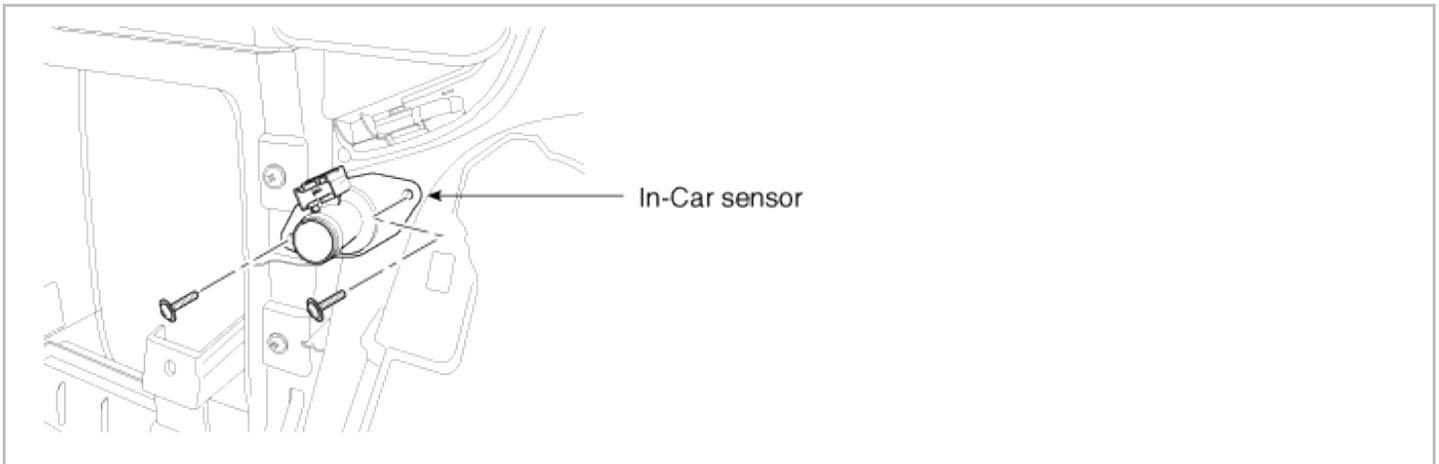
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1233 In-Car Temperature Sensor Short (Low)

Componet Location



General Description

It contains a thermistor which measures the temperature of the inside. The signal,decided by the resistance value which changes in accordance with perceived inside temperature, is delivered to heater control unit. According to this signal, the control unit regulates incar temperature to intended value.

DTC Description

Air conditioner Control Module sets DTC B1233 if Incar temperature sensor has been detected below 0.1V for 4sec.

DTC Detecting Condition

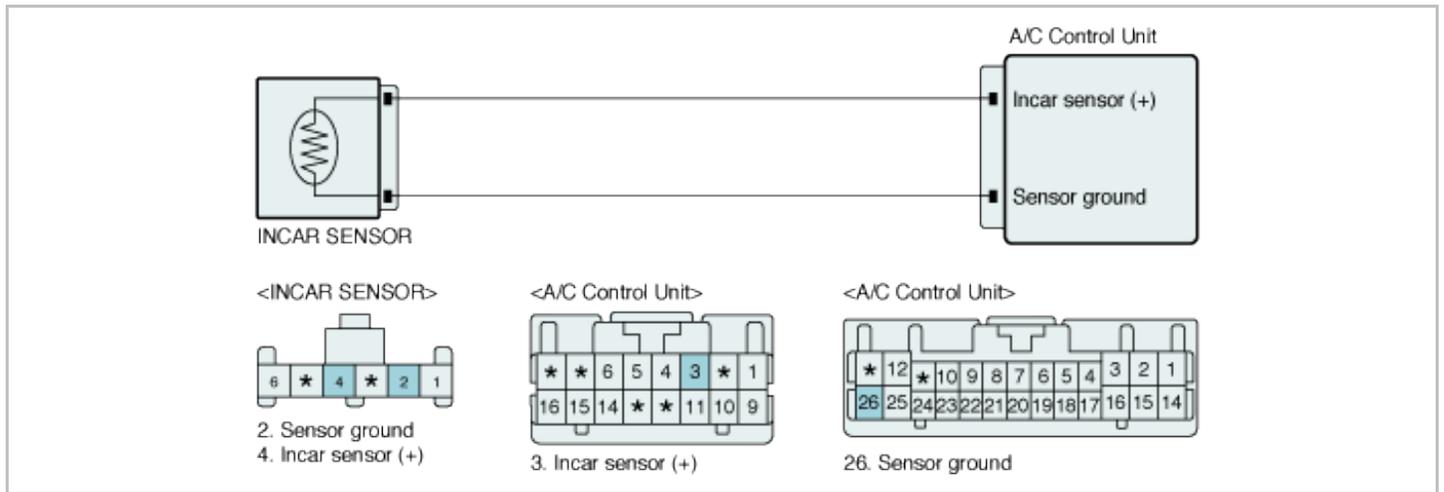
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	• Short circuit in harness • Faulty incar temp.sensor • Faulty A/C Control Unit
Enable Conditions	• IG KEY ON	
Threshold value	• Incar temperature sensor has been detected 0.1V for 4sec.	
Fail safe	• Control with the value of 23°C(73.4°F)	

Specification

※ Resistance value of incar temp sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	164	10/50	59
0/32	97	20/68	37.4
5/41	75.96	40/104	15.9

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "In-car temperature sensor" parameter.

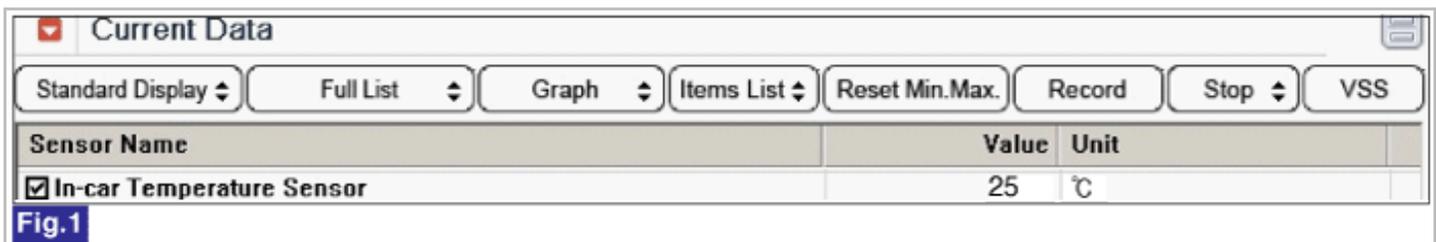


Fig 1) Parameter of "INCAR TEMP.SENSOR" will be fixed at 25°C(77°F), if there is any fault in INCAR SENSOR.

4. Is the Incar temperature sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ This is an intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect In-car temp. sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of in-car temp. sensor harness connector and chassis ground.

Specification : Infinity

4. Is the measured resistance within specification?

YES	▶ Go to "Component inspection" procedure.
NO	▶ Check for short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check In-car temp. sensor

1. Ignition "OFF".
2. Disconnect In-car temp. sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of In-car temp. sensor harness connector and Sensor ground harness connector. (Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Specifications : Resistance value of in-car sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	164	10/50	59
0/32	97	20/68	37.4
5/41	75.96	40/104	15.9

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good In-car temp. sensor and check for proper operation. If the problem is corrected, replace In-car temp. sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect In-car temp.sensor and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of In-car temp.sensor harness connector and chassis ground .(Component side)

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

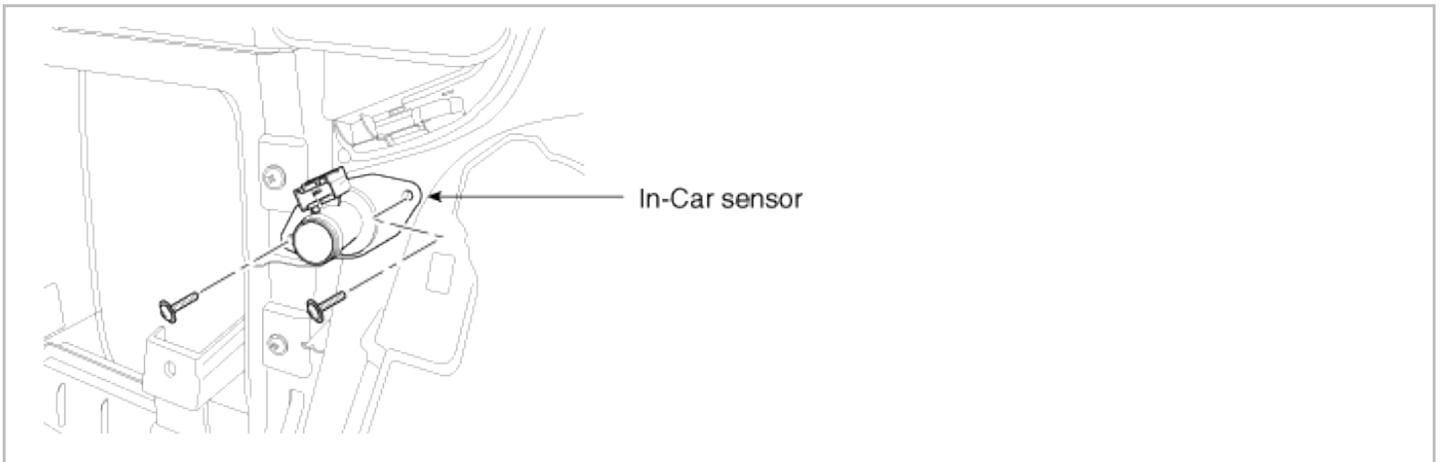
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1234 In-Car Temperature Sensor Open (High)

Component Location



General Description

It contains a thermistor which measures the temperature of the inside. The signal,decided by the resistance value

which changes in accordance with perceived inside temperature, is delivered to heater control unit. According to this signal, the control unit regulates incar temperature to intended value.

DTC Description

Air conditioner Control Module sets DTC B1234 if In-car temperature sensor has been detected over 4.9V for 4sec.

DTC Detecting Condition

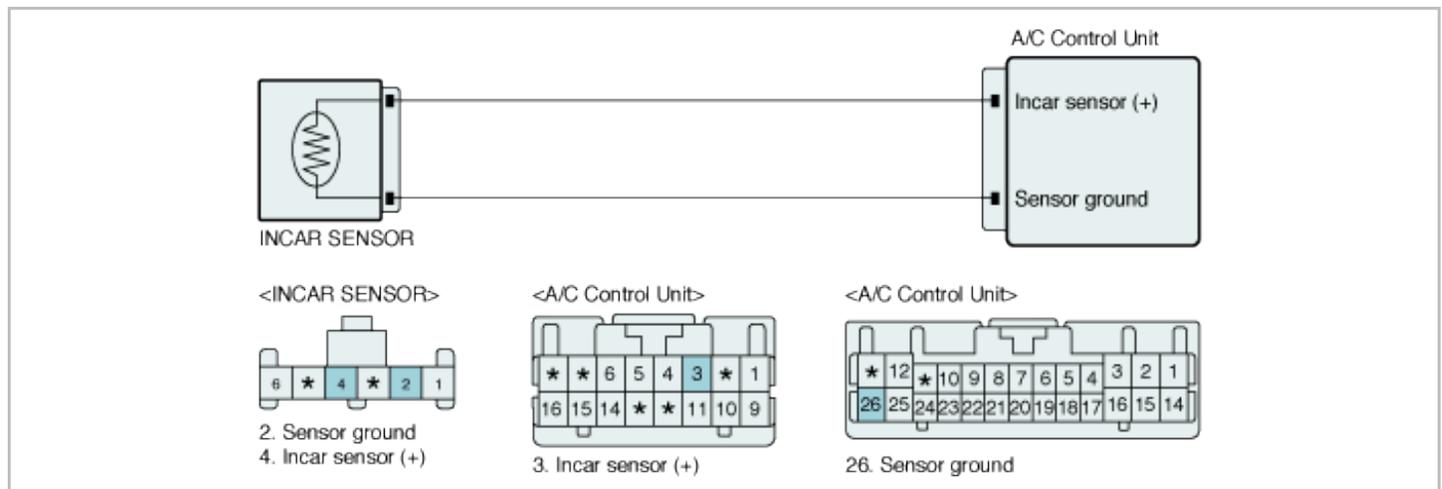
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Poor connection in wireharness • Open in signal circuit • Short to battery in signal circuit • Faulty In-car temperature sensor • Faulty Air conditioner Control Module
Enable Conditions	• IG KEY ON	
Threshold value	• In-car temperature sensor has been detected over 4.9V for 100ms.	
Fail safe	• Control with the value of 23°C(73.4°F)	

Specification

※ Resistance value of incar temp sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	164	10/50	59
0/32	97	20/68	37.4
5/41	75.96	40/104	15.9

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "In-car temperature sensor" parameter.



Fig 1) Parameter of "INCAR TEMP.SENSOR" will be fixed at 25°C(77°F), if there is any fault in INCAR SENSOR.

4. Is the Incar temperature sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	▶ This is a intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check power in harness

1. Ignition "OFF".
2. Disconnect Incar temp.sensor and Connect A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Power terminal of Incar temp.sensor harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	▶ Go to "Check for open in harness" as follows.
NO	▶ Check for short to battery in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Incar temp.sensor and A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Incar temp.sensor harness connector and Signal(+) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Incar temp.sensor and A/C control unit main harness connector.
3. Measure resistance between ground terminal of Incar temp.sensor harness connector and ground terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Incar temp.sensor

1. Ignition "OFF".
2. Disconnect Incar temp.sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Incar temp.sensor harness connector and Sensor ground harness connector .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Specifications : Resistance value of incar sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	164	10/50	59
0/32	97	20/68	37.4
5/41	75.96	40/104	15.9

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good Incar temp.sensor and check for proper operation. If the problem is corrected, replace Incar temp.sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect Incar temp.sensor and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of Incar temp.sensor harness connector and chassis ground
(Component side)

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

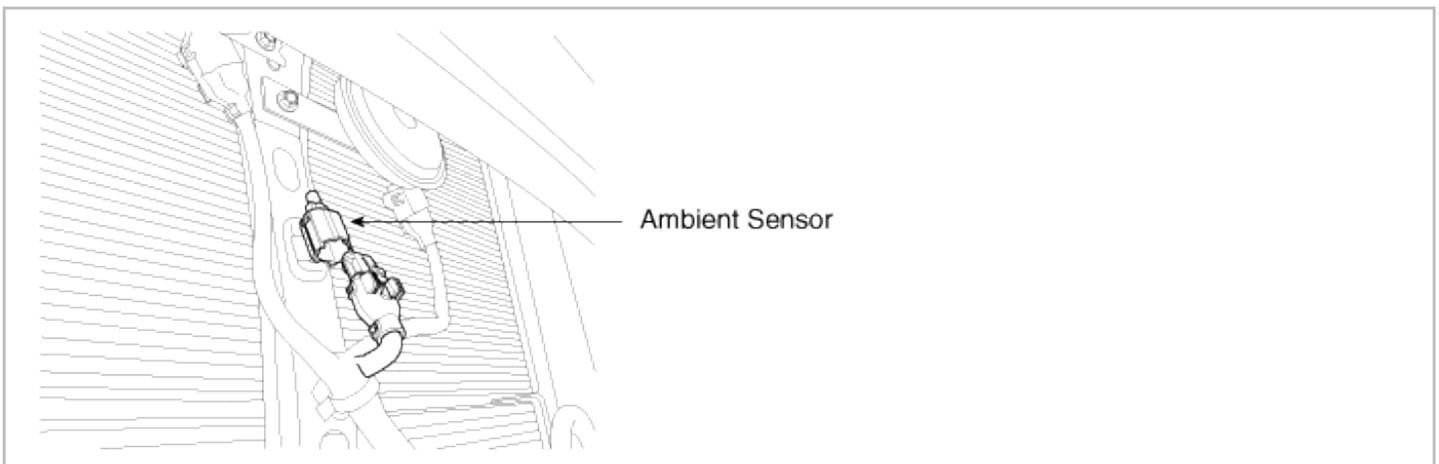
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1237 Ambient Temperature Sensor Short (Low)

Componet Location



General Description

It is a negative type thermistor whose resistance is inversely proportional to temperature. Its output is used for sensor fail-safe, temperature regulation door lock, blower motor level control, mix mode control.

DTC Description

Air conditioner Control Module sets DTC B1237 if Ambient sensor has been detected below 0.1V for 4sec.

DTC Detecting Condition

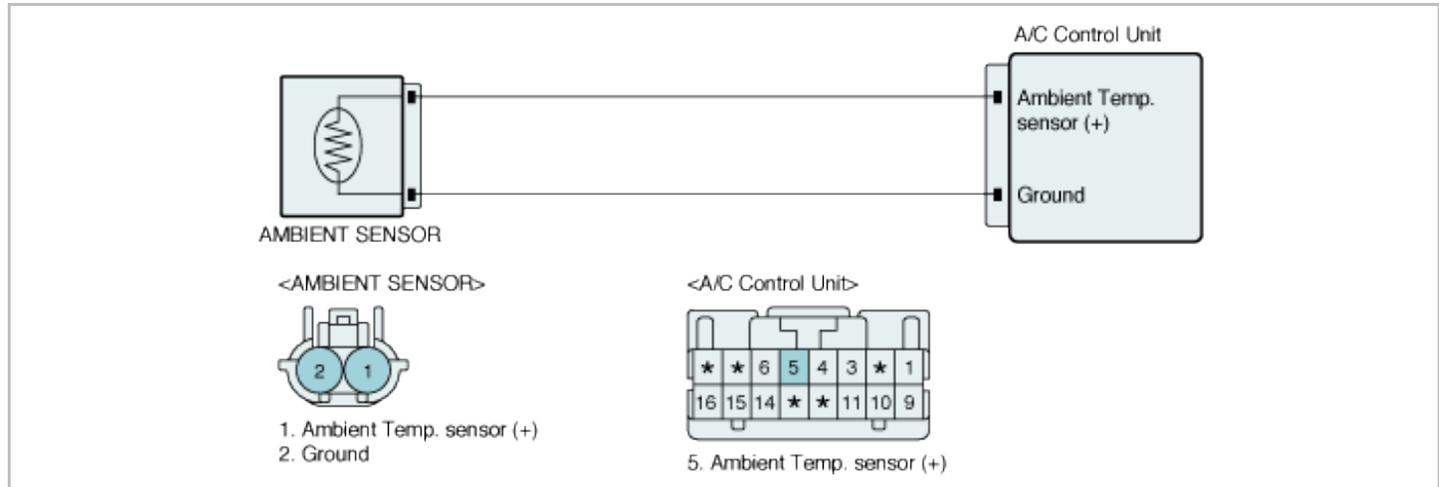
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Short in signal circuit • Faulty Ambient Sensor • Faulty A/C control Module
Enable Conditions	• IG KEY ON	
Threshold value	• Ambient sensor has been detected 0.1V for 4sec.	
Fail safe	• Control with the value of 20°C(68°F)	

Specification

※ Resistance value of incar temp sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-20/-4	284.5	10/50	59.6
-10/14	164.2	30/86	24.18
0/32	97.5	50/122	10.8

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Ambient Air Temperature sensor" parameter.



Fig 1) Parameter of "Ambinent Sensor" will be fixed at 20°C(68°F), if there is any fault in Ambient Sensor.

4. Is the ambient sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check power in harness

1. Ignition "OFF".
2. Disconnect Ambient sensor and Connect A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Power terminal of Ambient sensor harness connector and chassis ground.

Specification : Infinity

5. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	<ul style="list-style-type: none"> ▶ Check for short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Ambient sensor

1. Ignition "OFF".
2. Disconnect ambient sensor and Connect A/C control unit main harness connector.

3. Measure resistance between Signal(+) terminal of ambient sensor harness connector and Sensor ground harness connector .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Specifications : Resistance value of ambient sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-20/-4	284.5	10/50	59.6
-10/14	164.2	30/86	24.18
0/32	97.5	50/122	10.8

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good ambient sensor and check for proper operation. If the problem is corrected, replace ambient sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect Ambient Temp. sensor (+) and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of Ambient Temp. sensor (+) harness connector and chassis ground .(Component side)

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

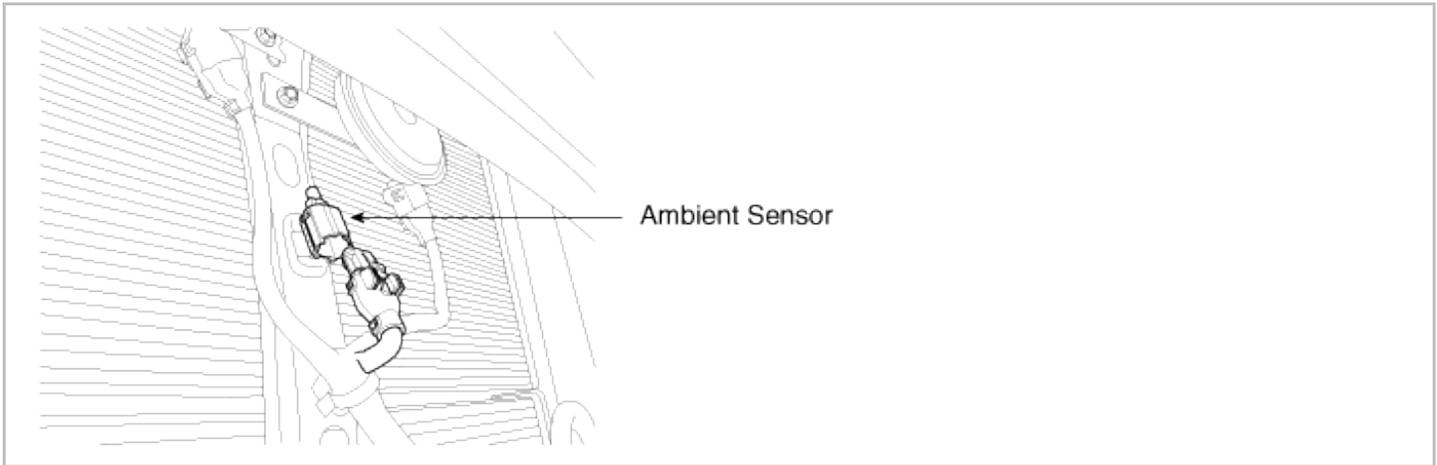
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1238 Ambient Temperature Sensor Open (High)

Componet Location



General Description

It is a negative type thermistor whose resistance is inversely proportional to temperature. Its output is used for sensor fail-safe, temperature regulation door lock, blower motor level control, mix mode control.

DTC Description

Air conditioner Control Module sets DTC B1238 if Ambient sensor has been detected over 4.9V for 4sec.

DTC Detecting Condition

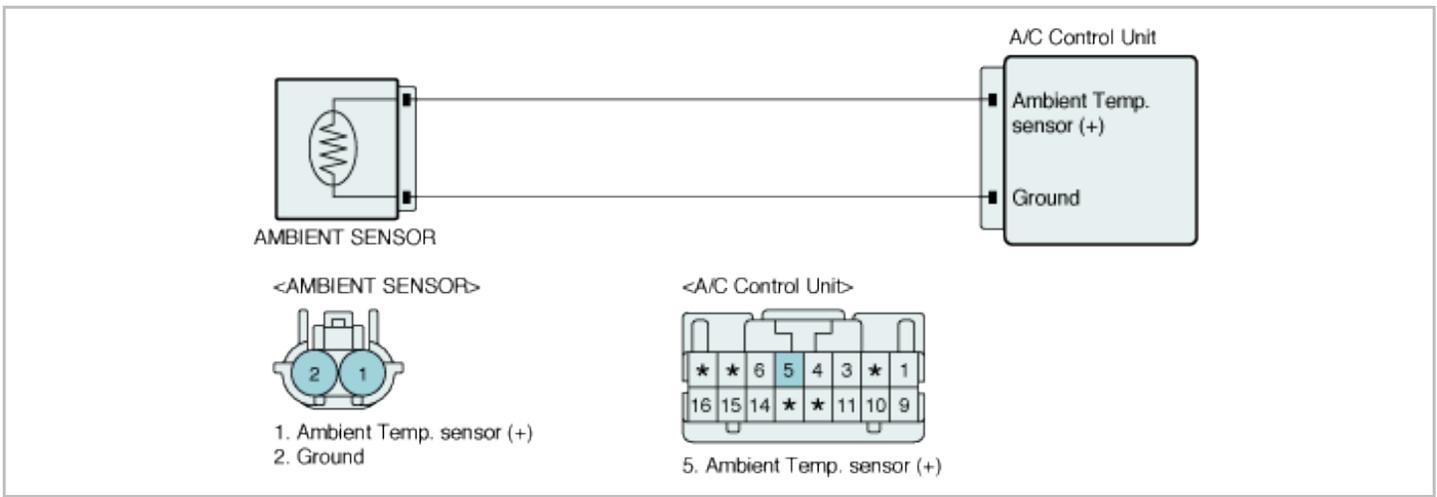
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	• Poor Connection in harness • Open in signal circuit • Short to battery in signal circuit • Faulty Ambient Temperature sensor • Faulty air conditioner control Module
Enable Conditions	• IG KEY ON	
Threshold value	• Ambient Temperature sensor has been detected over 4sec.	
Fail safe	• Control with the value of 20°C(68°F)	

Specification

※ Resistance value of incar temp sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-20/-4	284.5	10/50	59.6
-10/14	164.2	30/86	24.18
0/32	97.5	50/122	10.8

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Ambient Air Temperature sensor" parameter.



Fig 1) Parameter of "Ambient Sensor" will be fixed at 20°C(68°F), if there is any fault in Ambient Sensor.

4. Is the ambient sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ This is an intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

- Check short to battery in harness

1. Ignition "OFF".
2. Disconnect ambient sensor and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of ambient sensor harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	▶ Go to "Check for open in harness" as follows.
NO	▶ Check for short to battery in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect ambient sensor and A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of ambient sensor harness connector and Signal(+) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect ambient sensor and A/C control unit main harness connector.
3. Measure resistance between ground terminal of ambient sensor harness connector and ground terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Ambient sensor

1. Ignition "OFF".
2. Disconnect ambient sensor and Connect A/C control unit main harness connector.

- Measure resistance between Signal(+) terminal of ambient sensor harness connector and Sensor ground harness connector .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Specifications : Resistance value of ambient sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-20/-4	284.5	10/50	59.6
-10/14	164.2	30/86	24.18
0/32	97.5	50/122	10.8

- Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good ambient sensor and check for proper operation. If the problem is corrected, replace ambient sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

- Ignition "OFF".
- Disconnect Ambient Temp. sensor (+) and Connect A/C control unit main harness connector.
- Ignition "ON"(ENGINE "OFF").
- Measure voltage between Signal(+) terminal of Ambient Temp. sensor (+) harness connector and chassis ground .(Component side)

Specification : Approx. 5V

- Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

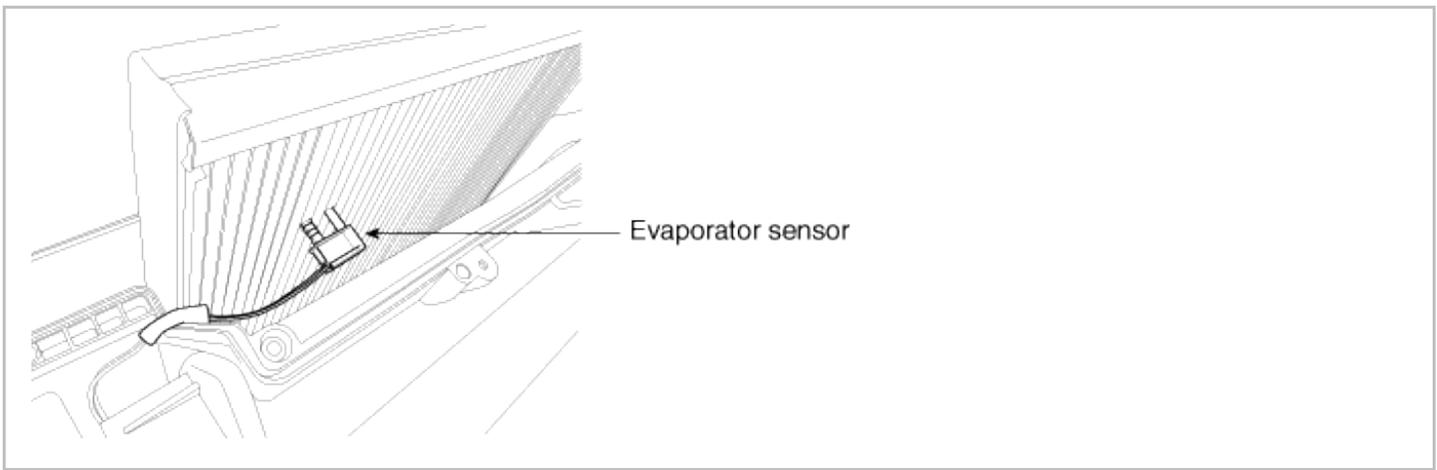
After a repair, it is essential to verify that the fault has been corrected.

- Connect scantool and selet "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
- Operate the vehicle and monitor the DTC on the scantool.
- Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1241 Evaporator Sensor Short (Low)

Componet Location



General Description

The Evaporator sensor located on heater unit detects the core temperature. It is a negative type thermistor whose resistance is inversely proportional to temperature. Evaporator sensor transforms measured temperature into voltage value and delivers it to A/C ECU. when core temperature is blow threshold value, A/C ECU interrupts compressor relay power, in order to prevent evaporator freezing by excessive cooling.

DTC Description

Air conditioner Control Module sets DTC B1241 if Evaporator sensor has been detected below 0.1V for 4sec.

DTC Detecting Condition

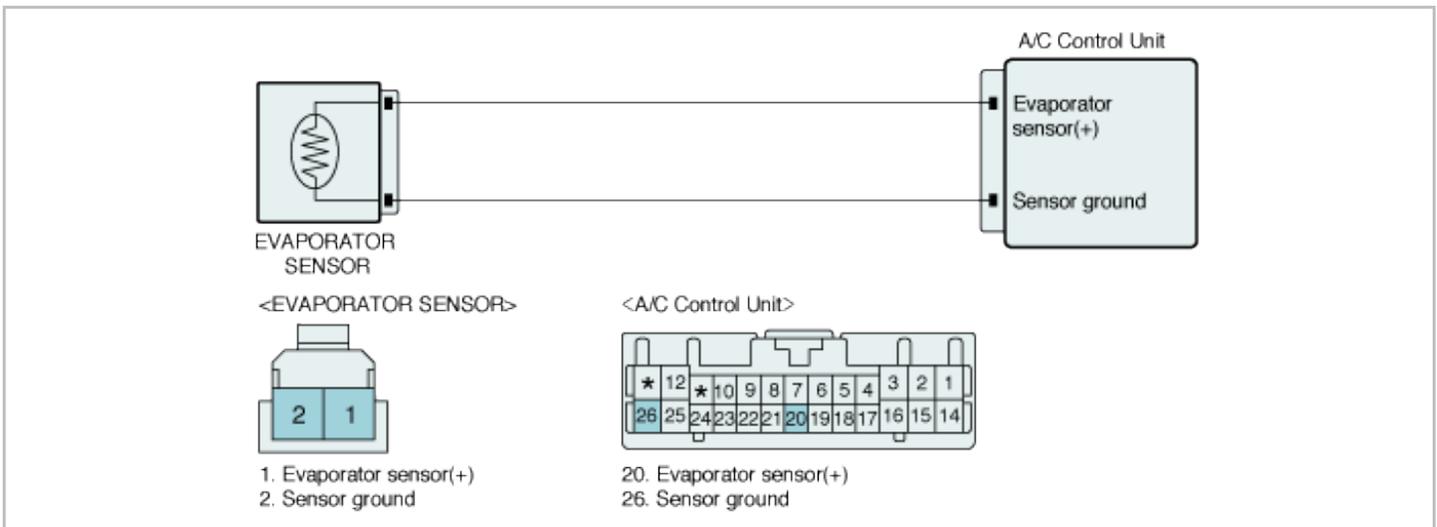
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Short circuit in harness • Faulty Evaporator sensor • Faulty A/C Control Unit
Enable Conditions	• IG KEY ON	
Threshold value	• Evaporator sensor has been detected below 01.V for 4sec.	
Fail safe	• Control with the value of -2°C(28.4°F)	

Specification

※ Resistance value of incar temp sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	18	5/41	9.1
-5/23	14.25	10/50	7.3
0/32	11	20/68	4.8

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Evaporator sensor" parameter on scantool.



Fig 1) Parameter of "Evaporator Sensor" will be fixed at -2°C(28.4°F), if there is any fault in Evaporator Sensor.

4. Is the Evaporator Sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ This is an intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Evaporator sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Evaporator sensor harness connector and chassis ground.

Specification : Infinity

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Incar temp.sensor

1. Ignition "OFF".
2. Disconnect Evaporator sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Evaporator sensor harness connector and Sensor ground harness connector .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) ※ Specifications : Resistance value of Evaporator sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	18	5/41	9.1
-5/23	14.25	10/50	7.3
0/32	11	20/68	4.8

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good Evaporator sensor and check for proper operation. If the problem is corrected, replace Evaporator sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect Evaporator sensor and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of Evaporator sensor harness connector and chassis ground .(Component side)

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination,
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—	deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

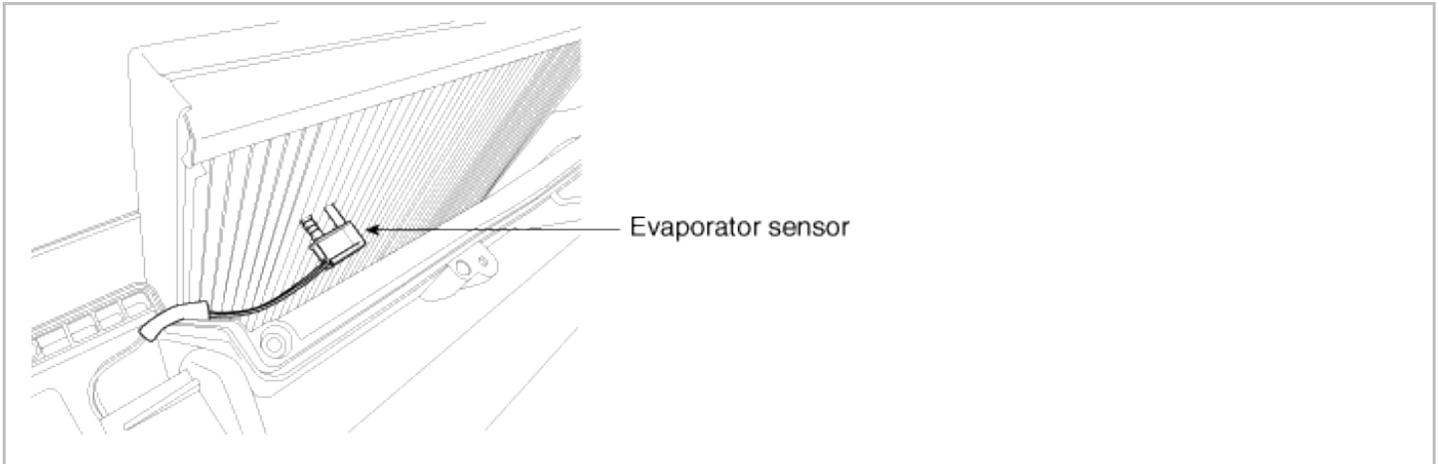
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1242 Evaporator Sensor Open (High)

Componet Location



General Description

The Evaporator sensor located on heater unit detects the core temperature. It is a negative type thermistor whose resistance is inversely proportional to temperature. Evaporator sensor transforms measured temperature into voltage value and delivers it to A/C ECU. when core temperature is blow threshold value, A/C ECU interrupts compressor relay power, in order to prevent evaporator freezing by excessive cooling.

DTC Description

Air conditioner Control Module sets DTC B1242 if Evaporator sensor has been detected over 4.9V for 4sec.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Open in signal circuit • Short to battery in signal circuit
Enable Conditions	• IG KEY ON	

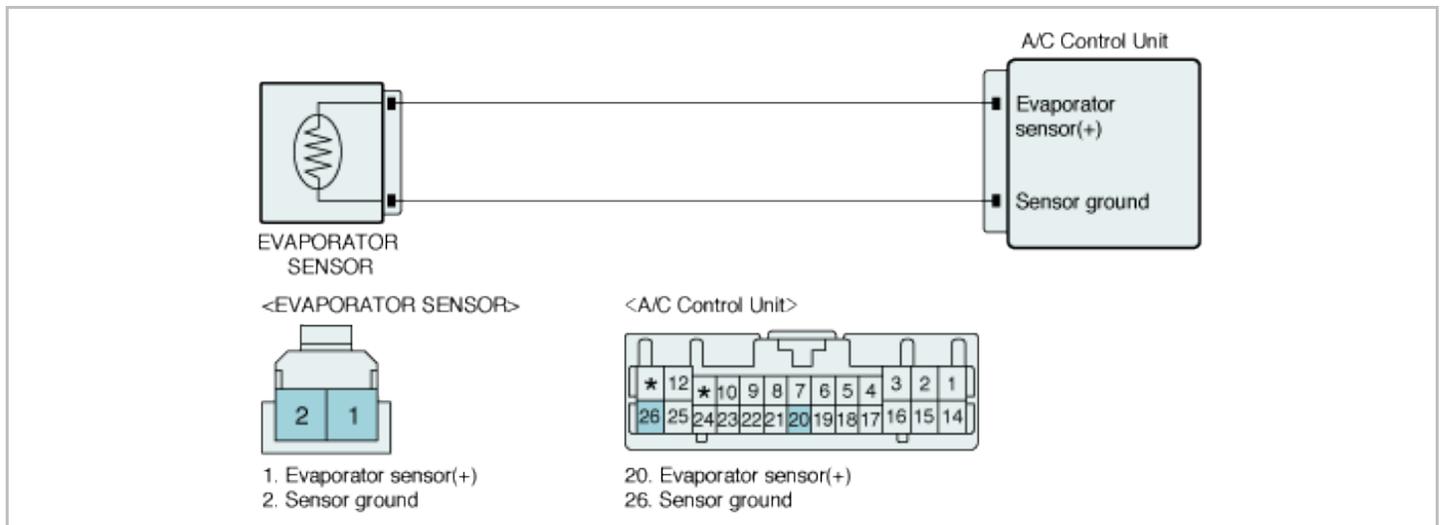
Threshold value	• Evaporator sensor has been detected over 4.9V for 4sec.	• Faulty Evaporator sensor • Faulty Air conditioner control Unit
Fail safe	• Control with the value of -2°C(28.4°F)	

Specification

※ Resistance value of incar temp sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	18	5/41	9.1
-5/23	14.25	10/50	7.3
0/32	11	20/68	4.8

Diagnostic Circuit Diagram



Monitor Scantool Data

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Evaporator sensor" parameter on scantool.

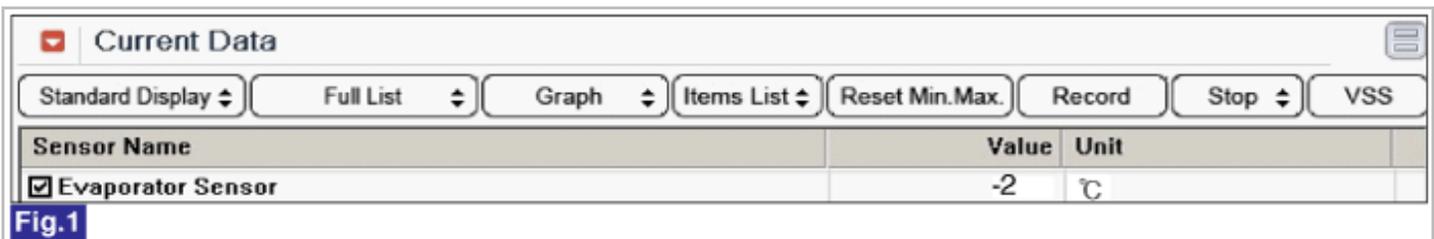


Fig 1) Parameter of "Evaporator Sensor" will be fixed at -2°C(28.4°F), if there is any fault in Evaporator Sensor.

4. Is the Evaporator Sensor normal ?

YES	▶ Go to "Inspection and Repair" procedure.
NO	▶ This is a intermittent problem caused by poor contact of component or Control Unit. ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation

or damage of connector.

▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check short to battery in harness

1. Ignition "OFF".
2. Disconnect Evaporator sensor and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Evaporator sensor harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	▶ Go to "Check for open in harness" as follows.
NO	▶ Check for short to battery in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Evaporator sensor and A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Evaporator sensor harness connector and Signal(+) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Evaporator sensor and A/C control unit main harness connector.
3. Measure resistance between ground terminal of Evaporator sensor harness connector and ground terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Incar temp.sensor

1. Ignition "OFF".
2. Disconnect Evaporator sensor and Connect A/C control unit main harness connector.
3. Measure resistance between Signal(+) terminal of Evaporator sensor harness connector and Sensor ground harness connector .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) ※ Specifications : Resistance value of Evaporator sensor as a function of temperature.

Temperature(°C/°F)	Resistance(kΩ)	Temperature(°C/°F)	Resistance(kΩ)
-10/14	18	5/41	9.1
-5/23	14.25	10/50	7.3
0/32	11	20/68	4.8

4. Is "resistance" display near the specified value?

YES	▶ Go to "Check A/C-ECU" procedure.
NO	▶ Substitute with a known-good Evaporator sensor and check for proper operation. If the problem is corrected, replace Evaporator sensor and then go to "Verification of Vehicle Repair" procedure.

■ Check A/C-ECU

1. Ignition "OFF".
2. Disconnect Evaporator sensor and Connect A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(+) terminal of Evaporator sensor harness connector and chassis ground .(Component side)

Specification : Approx. 5V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination,
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—	deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good A/C-ECU and check for proper operation. If the problem is corrected, replace A/C-ECU and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

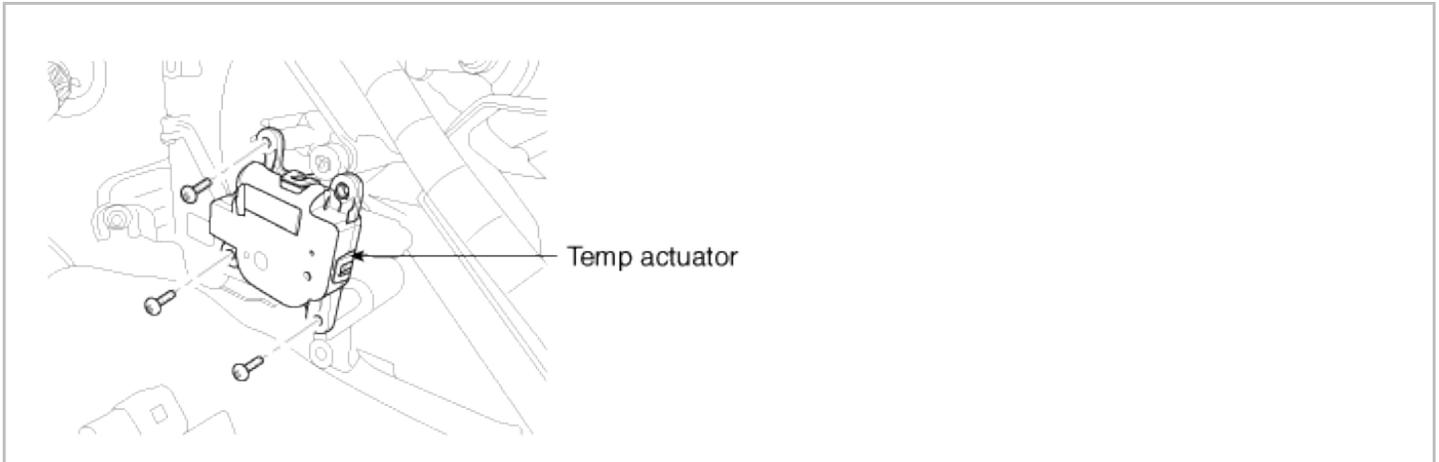
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1245 Air Mix Potentiometer Open (Low)-Driver

Componet Location



General Description

It contains temp motor that changes temp door position and potentiometer that monitors position of temp door. Temperature control actuator regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp door by operating temp motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp door. In operation, potentiometer delivers temp door position transformed into voltage value to A/C ECU .

DTC Description

Air conditioner Control Module sets DTC B1245 if Feedback signal of Driver Temperature Actuator has been detected open or below 0.1V for 100ms.

DTC Detecting Condition

Item	Detecting Condition	Possible Cause
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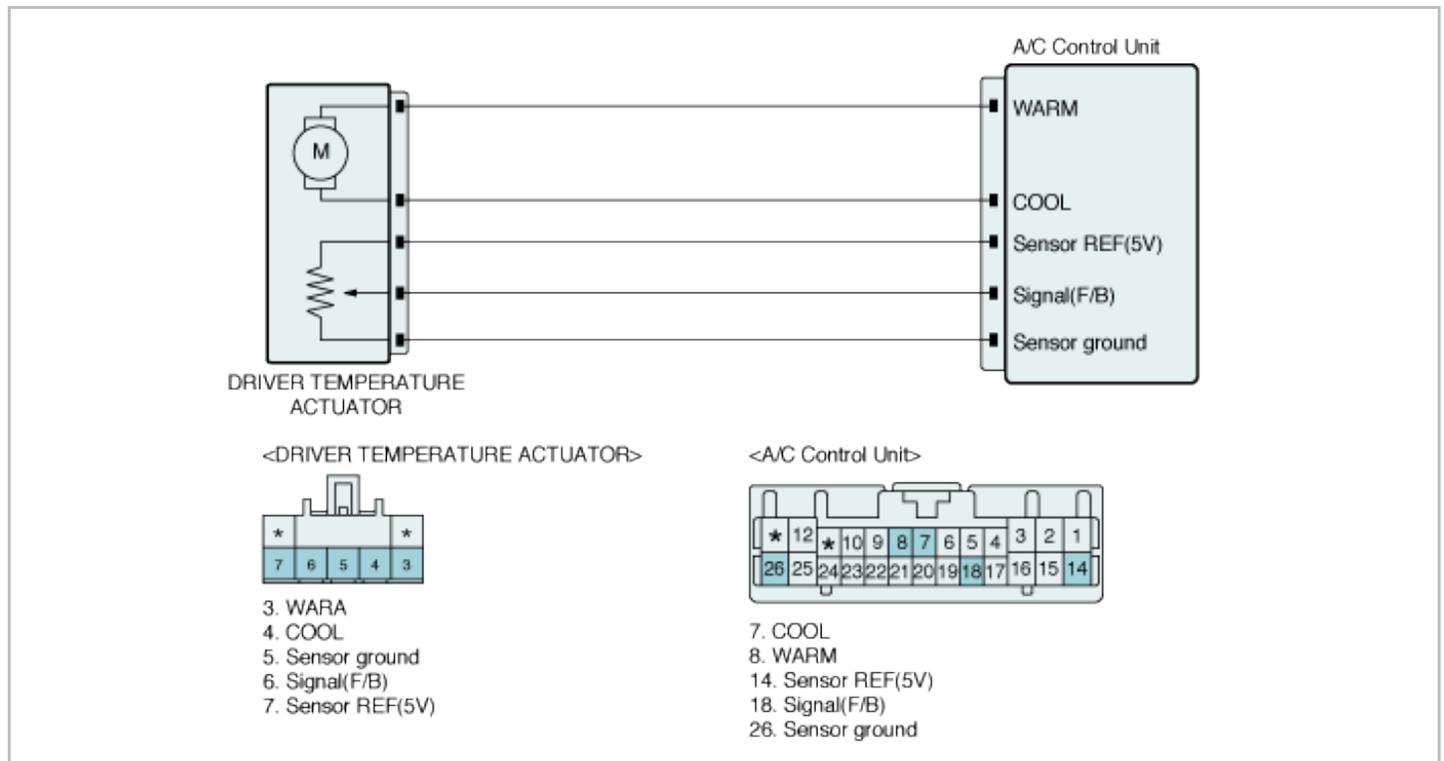
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Poor Connection in harness • Open in signal(Feedback signal), power and ground circuit • Faulty Driver Temperature Actuator • Faulty Air condition Control Module
Enable Conditions	• IG KEY ON	
Threshold value	• Feedback signal of Driver Temperature Actuator has been detected open or below 0.1V for 100ms.	
Fail safe	<ul style="list-style-type: none"> • Setting temperature : 17~24.5°C(63°F~76.1°F), fix at max. cooling position • Setting temperature : 25°C~32°C(77°F~ 89.6°F), fix at max. heating position 	

Specification

※ Voltage value of Air Mix potentiometer as a function of temp door position.

Door position	Voltage
Max. cool	0.45V
Max.warm	4.55V

Diagnostic Circuit Diagram



Monitor Scantool Data

■ Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Air Mix Door Potentiometer-Driver" parameter on scantool.
4. Select and perform Actuation test Air Mix Door Potentiometer-Driver - 0% / 50% / 100% in order.

- With performing Actuation test, check that the value of Air Mix Door Potentiometer follows is changed and close to the value of Actuation Test.

Specification : Check that the value of Air Mix Door Potentiometer at current data should be close to the value of the acutation test.

The screenshot shows a diagnostic software interface. At the top, there's a 'Current Data' section with a table:

Sensor Name	Value	Unit
<input checked="" type="checkbox"/> Air Mix Door Potentiometer-Driver	6.3	%

Below this is the 'Actuation Test' section. It has a list of 'Test Items' on the left and a configuration panel on the right. The 'Test Items' list includes:

- Driver Air Mix Door-0%
- Driver Air Mix Door-50%
- Driver Air Mix Door-100%
- Passenger Air Mix Door-0%
- Passenger Air Mix Door-50%
- Passenger Air Mix Door-100%
- Driver Mode Door-Face
- Driver Mode Door-Foot
- Driver Mode Door-Defrost

The configuration panel on the right has three fields:

- Duration: Until Stop Button
- Conditions: ENG. RUNNING, A/C ON
- Result: Success

At the bottom right of the 'Actuation Test' section, there are 'Start' and 'Stop' buttons.

- Does the value of current data follow in accordance with the each actuation test ?

YES	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ Go to " Inspection and Repair" procedure.

Terminal & Connector Inspection

- Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
- Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
- Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check for open in harness

- Ignition "OFF".
- Disconnect Driver air mix actuator and A/C control unit main harness connector.

3. Measure resistance between Signal(F/B) terminal of Driver air mix actuator harness connector and Signal(F/B) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to "Check short to ground in harness" as follows.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Measure resistance between Signal(F/B) terminal of Driver air mix actuator harness connector and chassis ground.

Specification : Infinity

4. Is the measured resistance within specification?

YES	▶ Go to "Power circuit Inspection " procedure.
NO	▶ Check for short to ground in control harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ Check power in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and Connect A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Sensor REF(5V) terminal of Driver air mix actuator harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for open and short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Measure resistance between Sensor ground(-) terminal of Driver air mix actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check passenger air mix actuator

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to WARM(+) of Driver air mix actuator and (-) terminal to COOL(-) .(Component side)
4. Verify that the temperature actuator operates to the cool position.
5. Verify that the temperature actuator operates to the warm position with reverse connecting.(WARM(+) and COOL(-)) .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	WARM(+)	COOL(-)	Door position
Battery terminal	12 V	Ground	Max.warm
	Ground	12 V	Max.cool

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Driver air mix actuator and check for proper operation. If the problem is corrected, replace Driver air mix actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Connect Driver air mix actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver air mix actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) Voltage value of Air Mix potentiometer as a function of temp door position.

Door position	Voltage
Max. cool	0.45V
Max.warm	4.55V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Driver air mix actuator and check for proper operation. If the problem is corrected, replace Driver air mix actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

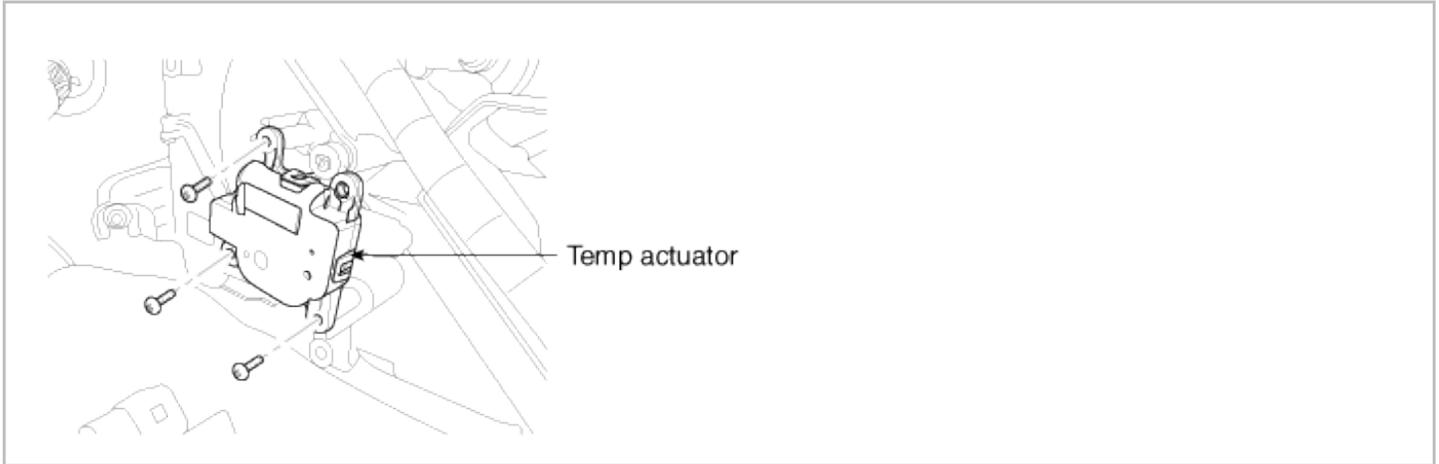
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1246 Air Mix Potentiometer Short (High)-Driver

Componet Location



General Description

It contains temp motor that changes temp door position and potentiometer that monitors position of temp door. Temperature control actuator regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp door by operating temp motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp door. In operation, potentiometer delivers temp door position transformed into voltage value to A/C ECU .

DTC Description

Air conditioner Control Module sets DTC B1246 if Feedback signal of Driver Temperature Actuator has been detected over 4.9V for 100ms.

DTC Detecting Condition

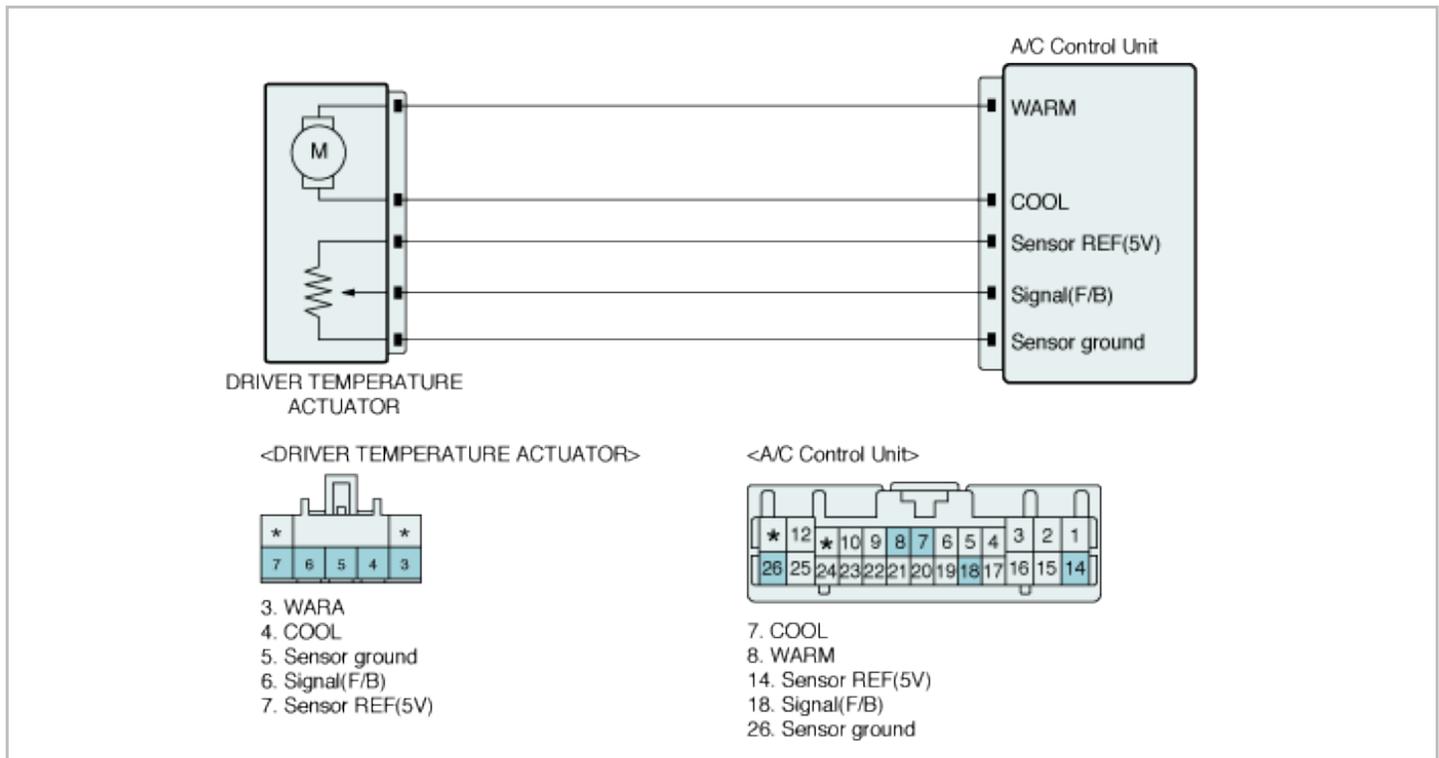
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Short to battery in signal circuit(Feedback signal) • Faulty Driver temperature Actuator • Air conditioner Control Module
Enable Conditions	• IG KEY ON	
Threshold value	• Feedback signal of Driver Temperature Actuator has been detected over 4.9V for 100ms.	
Fail safe	<ul style="list-style-type: none"> • Setting temperature : 17~24.5°C(63°F~76.1°F), fix at max. cooling position • Setting temperature : 25°C~32°C(77°F~ 89.6°F), fix at max. heating position 	

Specification

※ Voltage value of Air Mix potentiometer as a function of temp door position.

Door position	Voltage
Max. cool	0.45V
Max.warm	4.55V

Diagnostic Circuit Diagram



Monitor Scantool Data

■ Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.

3. Select and monitor "Air Mix Door Potentioner-Driver" parameter on scantool.
4. Select and perform Actuation test Air Mix Door Potentioner-Driver - 0% / 50% / 100% in order.
5. With performing Actuation test, check that the value of Air Mix Door Potentiometer follows and close to the value of Actuation Test.

Specification : Check that the value of Air Mix Door Potentiometer at current data should be close to the value of the acutation test.

The screenshot shows a diagnostic tool interface with two main sections:

- Current Data:** A table with columns for Sensor Name, Value, and Unit. The 'Air Mix Door Potentiometer-Driver' sensor is selected, showing a value of 6.3 and a unit of %.
- Actuation Test:** A section with a list of test items and a configuration panel.
 - Test Items:** A list including 'Driver Air Mix Door-0%', 'Driver Air Mix Door-50%', 'Driver Air Mix Door-100%', 'Passenger Air Mix Door-0%', 'Passenger Air Mix Door-50%', 'Passenger Air Mix Door-100%', 'Driver Mode Door-Face', 'Driver Mode Door-Foot', and 'Driver Mode Door-Defrost'.
 - Configuration Panel:**
 - Duration:** Until Stop Button
 - Conditions:** ENG. RUNNING, A/C ON
 - Result:** Success
 - Buttons:** Start and Stop buttons are located at the bottom right of the Actuation Test section.

6. Does the value of current data follow in accordance with the each actuation test ?

YES	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ Go to " Inspection and Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

- Check short to battery in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver air mix actuator harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for short to battery in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Measure resistance between Sensor ground(-) terminal of Driver air mix actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check passenger air mix actuator

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to WARM(+) of Driver air mix actuator and (-) terminal to COOL(-) .(Component side)
4. Verify that the temperature actuator operates to the cool position.
5. Verify that the temperature actuator operates to the warm position with reverse connecting.(WARM(+) and COOL(-)) .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	WARM(+)	COOL(-)	Door position
Battery terminal	12 V	Ground	Max.warm
	Ground	12 V	Max.cool

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Driver air mix actuator and check for proper operation. If the problem is corrected, replace Driver air mix actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Connect Driver air mix actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver air mix actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) Voltage value of Air Mix potentiometer as a function of temp door position.

Door position	Voltage
Max. cool	0.45V
Max.warm	4.55V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Driver air mix actuator and check for proper operation. If the problem is corrected, replace Driver air mix actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

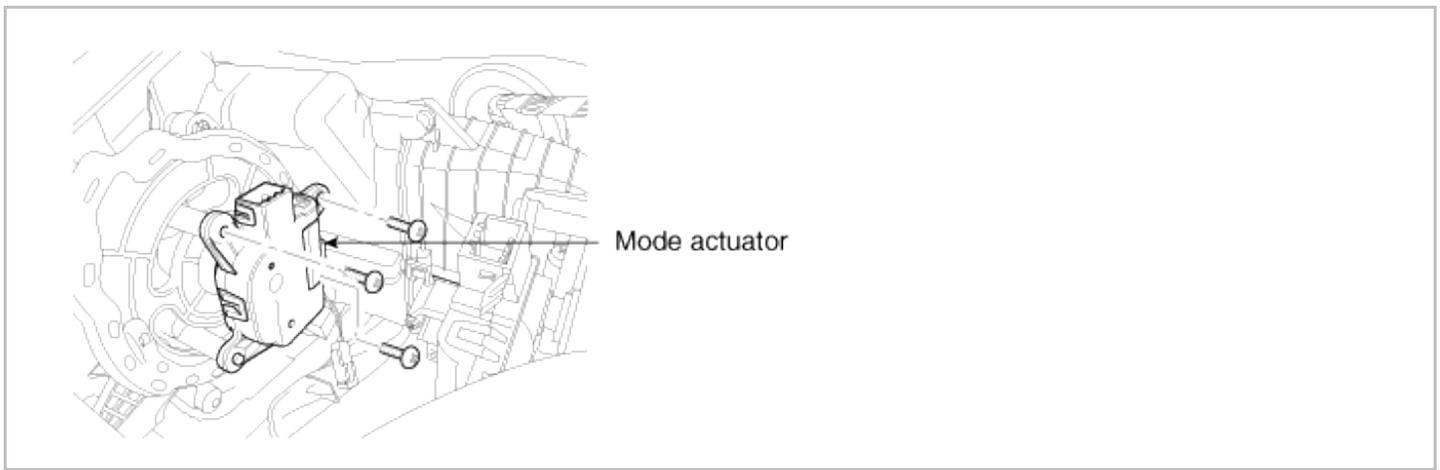
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B1249 Direction Potentiometer Open (Low)-Driver

Componet Location



General Description

The mode control actuator mounted on heater unit adjusts position of mode door by operating Direction Motor based on signal of A/C control unit. Pressing mode select switch makes the mode control actuator shift in order of vent → B/L → floor → mix.

DTC Description

Air conditioner Control Module sets DTC B1249 if Feedback signal of Mode Actuator has been detected below 0.1V for 100ms.

DTC Detecting Condition

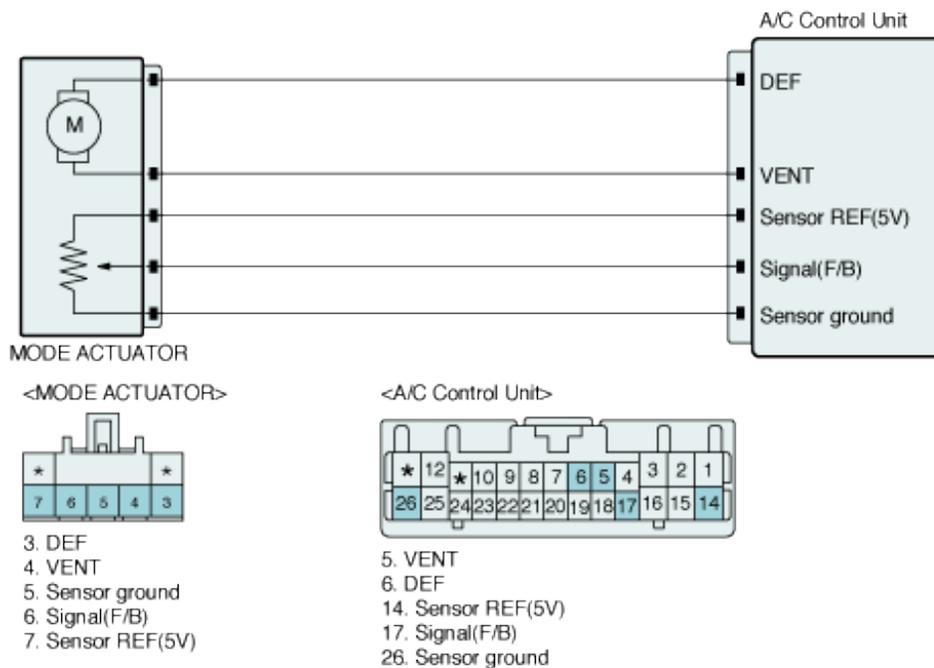
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Poor Connection in harness • Open in signal (Feedback signal), Power or Ground circuit • Faulty Mode Actuator • Faulty Air conditioner Control Unit
Enable Conditions	• IG KEY ON	
Threshold value	• Feedback signal of Mode Actuator has been detected below 0.1V for 100ms.	
Fail safe	<ul style="list-style-type: none"> • Setting mode : VENT Fix at VENT position • Setting mode : Except VENT Fix at DEF position 	

Specification

※ Voltage value of potentiometer as a function of mode door position.

Mode Door Position	Voltage
VENT	0.5±0.2V
BI-LEVEL	1.5±0.2V
FLOOR	2.6±0.3V
MIX	3.5±0.2V
DEF	4.5±0.2V

Diagnostic Circuit Diagram



Monitor Scantool Data

■ Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Direction Potention" parameter on scantool.
4. Select and perform Actuation test Driver Mode Door - Face / Foot / Defrost in order.
5. Check that the value of all the parameters are changed when performing the actuation test.

Specification : Face - About below 10%, Foot : About 50%, Defrost : About 90%.

Current Data
Standard Display
Full List
Graph
Items List
Reset Min.Max.
Record
Stop
VSS

Sensor Name	Value	Unit
<input checked="" type="checkbox"/> Direction Potention	93.7	%

Actuation Test

Test Items
Driver Mode Door-Face
Driver Mode Door-Foot
Driver Mode Door-Defrost
Air Inlet Mode Selection-Fresh
Air Inlet Mode Selection-Recirculation
External Control Valve - 0%
External Control Valve - 85%
Auto Defog Mode Door - 0% [close]
Auto Defog Mode Door - 50%

- Duration
- Conditions
- Result

Start
Stop

6. Are all the parameters changed when performing Actuation test ?

YES	<ul style="list-style-type: none">▶ This is a intermittent problem caused by poor contact of component or Control Unit▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector.▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none">▶ Go to " Inspection and Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	<ul style="list-style-type: none">▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none">▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Measure resistance between Signal(F/B) terminal of Driver Direction actuator harness connector and Signal(F/B) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	<ul style="list-style-type: none">▶ Go to "Check short to ground in harness" as follows.
NO	<ul style="list-style-type: none">▶ Check for open in harness.▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Measure resistance between Signal(F/B) terminal of Driver Direction actuator harness connector and chassis ground.

Specification : Infinity

4. Is the measured resistance within specification?

YES	<ul style="list-style-type: none">▶ Go to "Power circuit Inspection " procedure.
NO	<ul style="list-style-type: none">▶ Check for short to ground in control harness.▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Power Circuit Inspection

■ Check power in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and Connect A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Sensor REF(5V) terminal of Driver Direction actuator harness connector and chassis ground.

Specification : Approx. 5V

5. Is the measured voltage within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for open and short to ground in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Measure resistance between Sensor ground(-) terminal of Driver Direction actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Driver Direction actuator

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to WARM(+) of Driver Direction actuator and (-) terminal to COOL(-) .(Component side)
4. Verify that the temperature actuator operates to the cool position.
5. Verify that the temperature actuator operates to the warm position with reverse connecting.(WARM(+) and COOL(-)) .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	DEF (+)	VENT (-)	Door position
------------------	---------	----------	---------------

Battery terminal	12 V	Ground	VENT.Mode
	Ground	12 V	DEF.Mode

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Driver Direction actuator and check for proper operation. If the problem is corrected, replace Driver Direction actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Connect Driver Direction actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver Direction actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) * Voltage value of Direction potentiometer as a function of position of mode switch

Mode Door Position	Voltage
VENT	0.5±0.2V
BI-LEVEL	1.5±0.2V
FLOOR	2.6±0.3V
MIX	3.5±0.2V
DEF	4.5±0.2V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Driver Direction actuator and check for proper operation. If the problem is corrected, replace Driver Direction actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

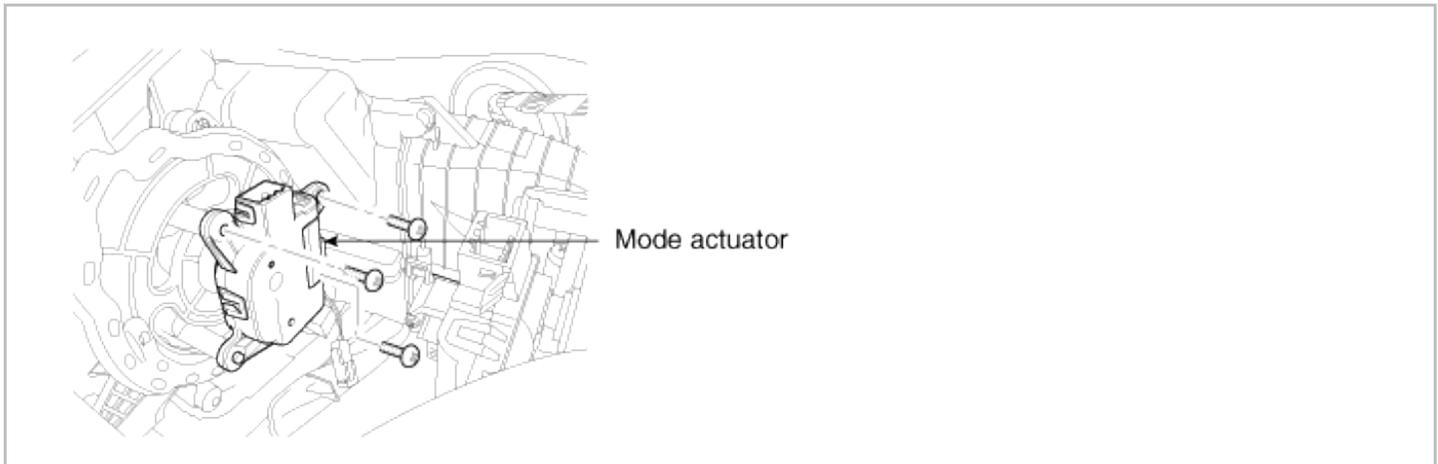
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating, Ventilation, Air Conditioning > Controller > B1250 Direction Potentiometer Short (High)-Driver

Component Location



General Description

The mode control actuator mounted on heater unit adjusts position of mode door by operating Direction Motor based on signal of A/C control unit. Pressing mode select switch makes the mode control actuator shift in order of vent → B/L → floor → mix.

DTC Description

Air conditioner Control Module sets DTC B1250 if Feedback signal of Mode Actuator has been detected over 4.9V for 100ms.

DTC Detecting Condition

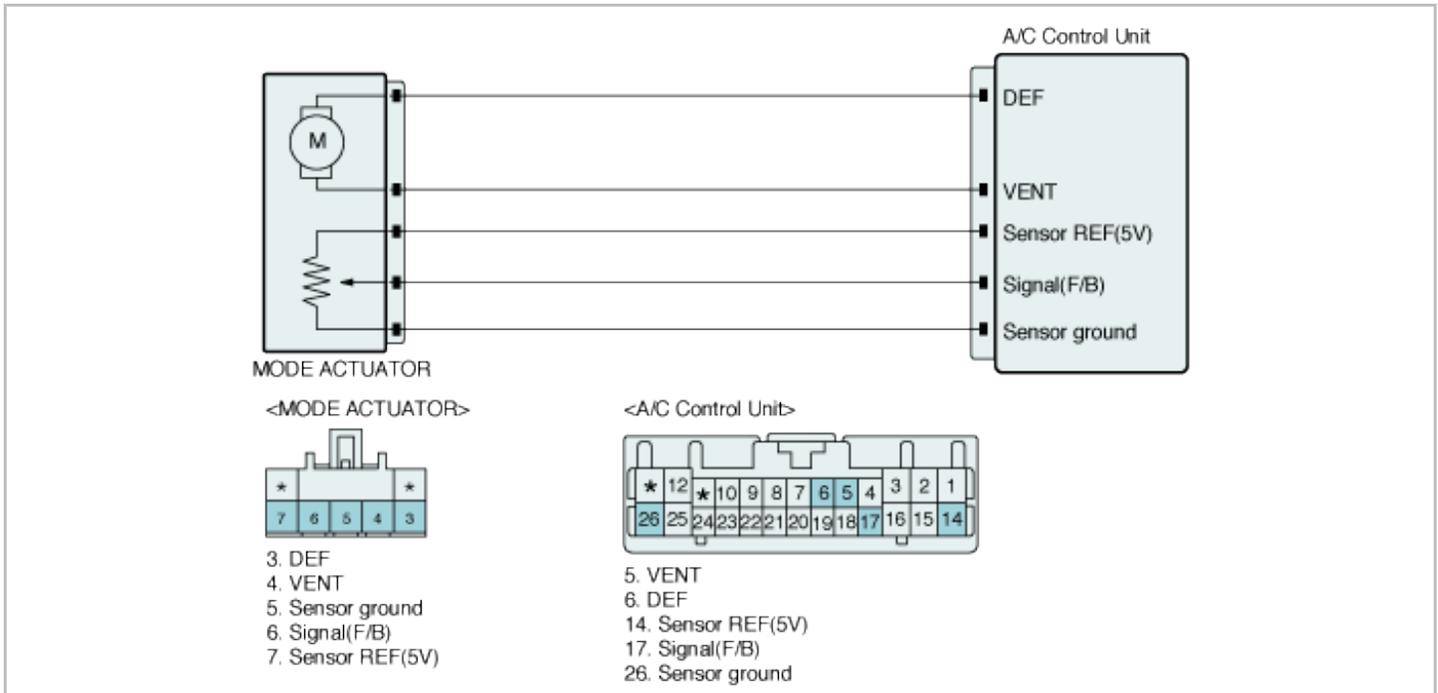
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	• Short in signal circuit(Feedback signal) • Faulty Mode Actuator • Faulty Air conditioner Control Module
Enable Conditions	• IG KEY ON	
Threshold value	• Feedback signal of Mode Actuator has been detected over 4.9V for 100ms.	
Fail safe	• Setting mode : VENT Fix at VENT position • Setting mode : Except VENT Fix at DEF position	

Specification

※ Voltage value of potentiometer as a function of mode door position.

Mode Door Position	Voltage
VENT	0.5±0.2V
BI-LEVEL	1.5±0.2V
FLOOR	2.6±0.3V
MIX	3.5±0.2V

Diagnostic Circuit Diagram

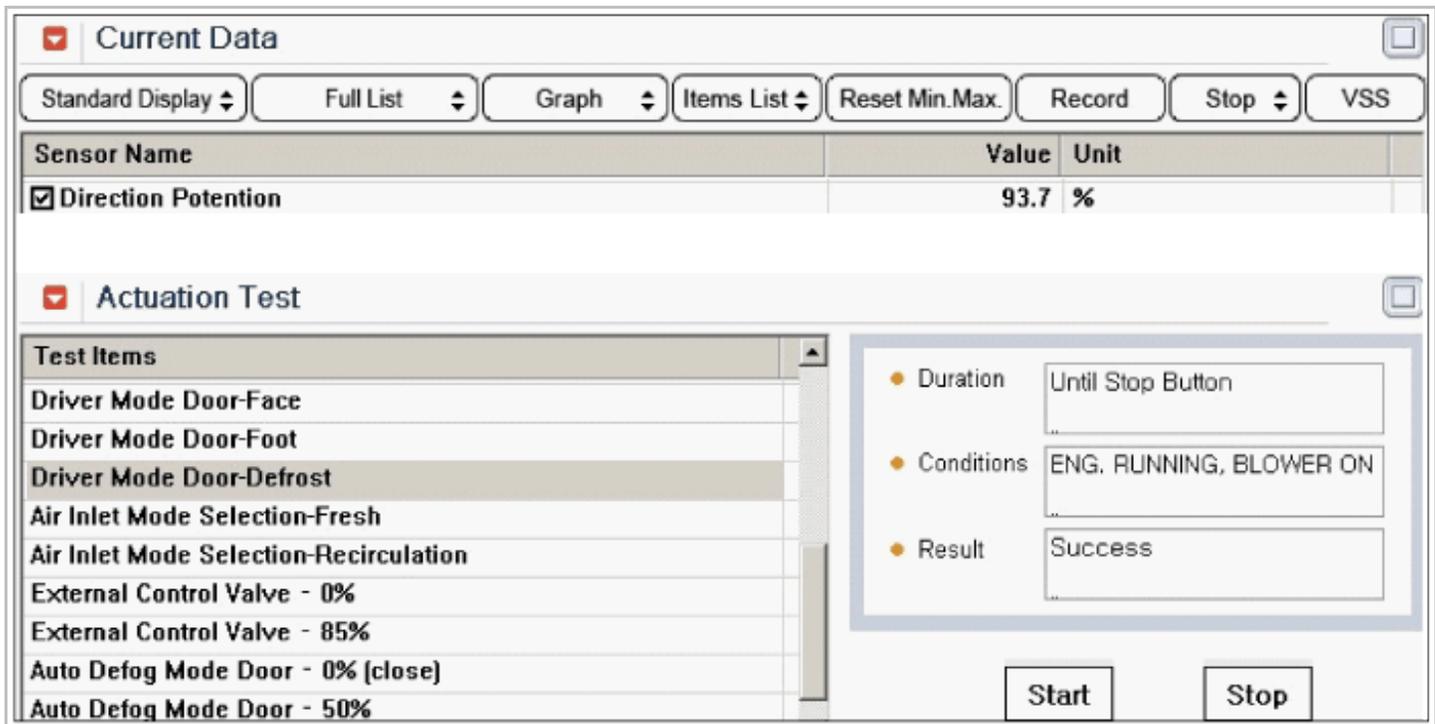


Monitor Scantool Data

■ Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Direction Potention" parameter on scantool.
4. Select and perform Actuation test Driver Mode Door - Face / Foot / Defrost in order.
5. Check that the value of all the parameters are changed when performing the actuation test.

Specification : Face - About below 10%, Foot : About 50%, Defrost : About 90%.



6. Are all the parameters changed when performing Actuation test ?

YES	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ Go to " Inspection and Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Signal Circuit Inspection

■ Check short to battery in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver Direction actuator harness connector and chassis ground.

Specification : 0V

5. Is the measured voltage within specification?

YES	▶ Go to "Ground circuit Inspection " procedure.
NO	▶ Check for short to battery in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Ground Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Measure resistance between Sensor ground(-) terminal of Driver Direction actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector.

Specification : 1Ω below

4. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Driver Direction actuator

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to WARM(+) of Driver Direction actuator and (-) terminal to COOL(-) .(Component side)
4. Verify that the temperature actuator operates to the cool position.
5. Verify that the temperature actuator operates to the warm position with reverse connecting.(WARM(+) and COOL(-)) .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	DEF (+)	VENT (-)	Door position
Battery terminal	12 V	Ground	VENT.Mode
	Ground	12 V	DEF.Mode

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Driver Direction actuator and check for proper operation. If the problem is corrected, replace Driver Direction actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Connect Driver Direction actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver Direction actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) * Voltage value of Direction potentiometer as a function of position of mode switch

Mode Door Position	Voltage
VENT	0.5±0.2V
BI-LEVEL	1.5±0.2V
FLOOR	2.6±0.3V
MIX	3.5±0.2V
DEF	4.5±0.2V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Driver Direction actuator and check for proper operation. If the problem is corrected, replace Driver Direction actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

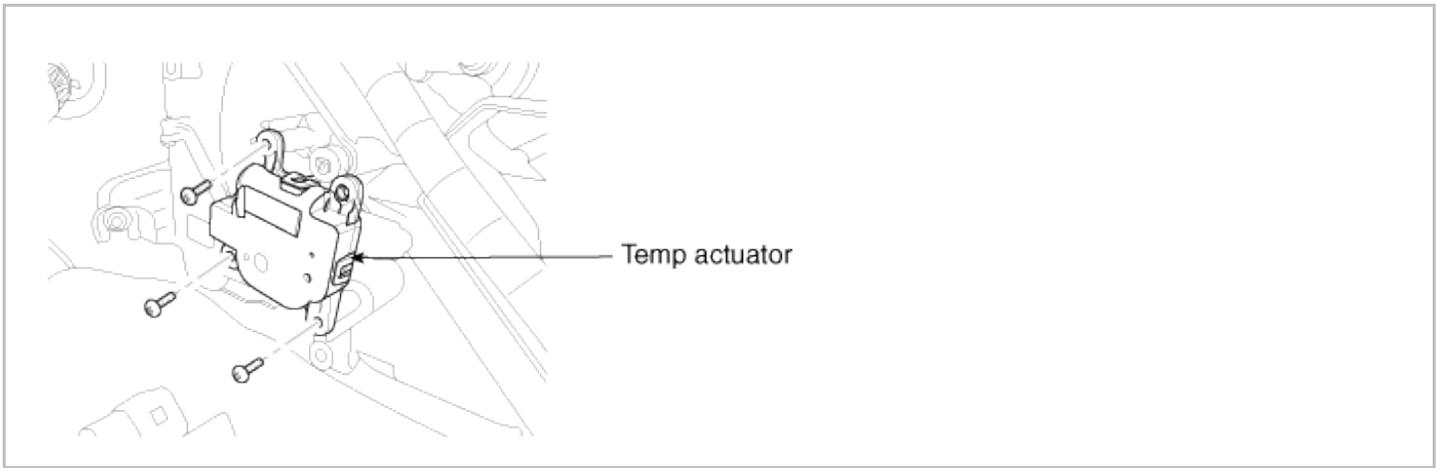
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and selet "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B2406 Air Mix Motor-Driver

Componet Location



General Description

It contains temp motor that changes temp door position and potentiometer that monitors position of temp door. Temperature control actuator regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp door by operating temp motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp door. In operation, potentiometer delivers temp door position transformed into voltage value to A/C ECU .

DTC Description

Air conditioner Control Module sets DTC B2406 if Driver air mix actuator has not been moved to the mode, where air condition control module controls, within 10 seconds.

DTC Detecting Condition

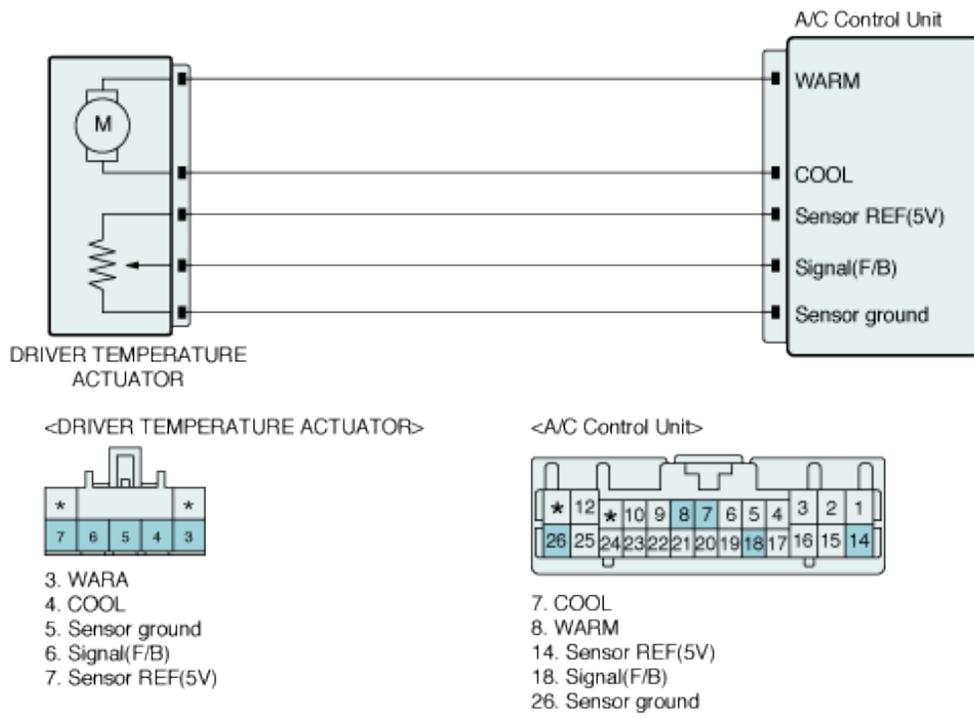
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Poor contact in harness • Open or short in motor power circuit • Faulty Driver air mix actuator • Faulty air conditioner control module
Enable Conditions	• IG KEY ON	
Threshold value	• No movement to controlled mode position for 10 seconds.	
Fail safe	• Fixed as current position	

Specification

※ Voltage value of Air Mix potentiometer as a function of temp door position.

Door position	Voltage
Max. cool	0.45V
Max.warm	4.55V

Diagnostic Circuit Diagram

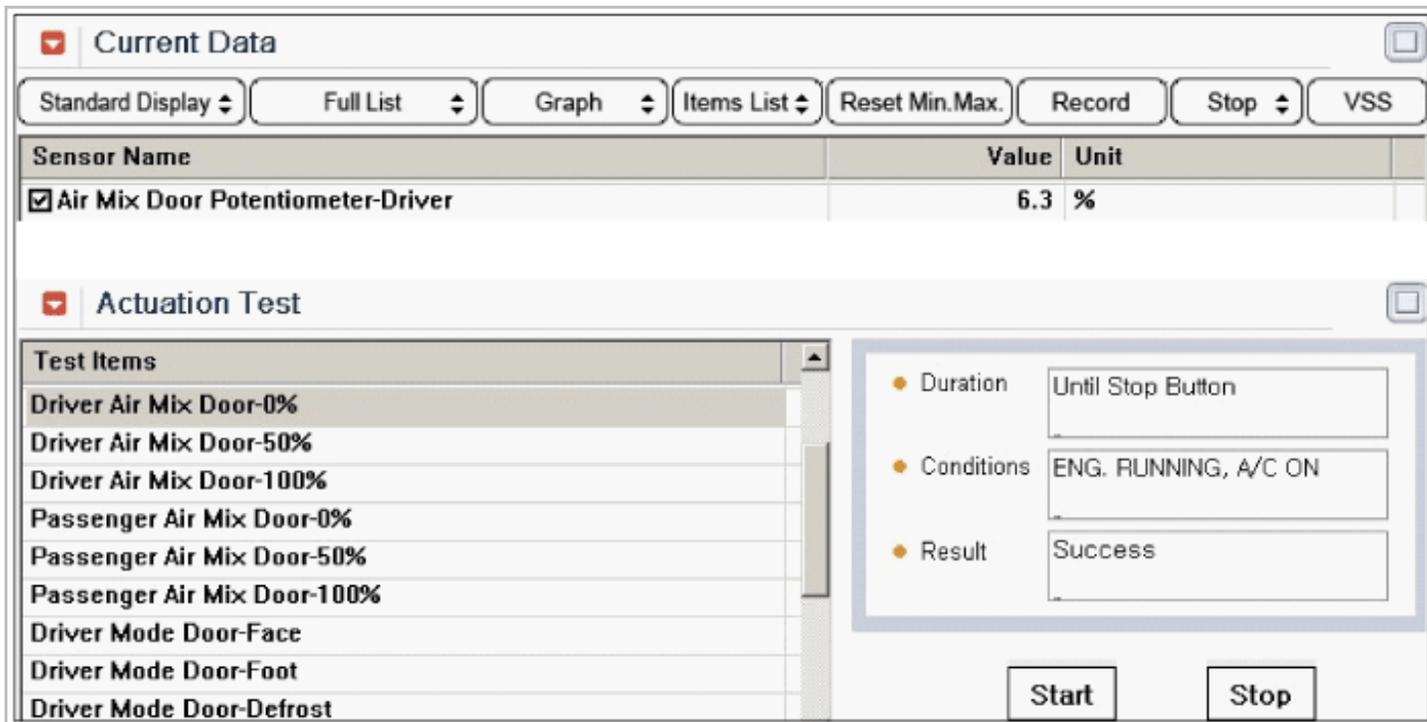


Monitor Scantool Data

■ Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Air Mix Door Potentiometer-Driver" parameter on scantool.
4. Select and perform Actuation test Air Mix Door Potentiometer-Driver - 0% / 50% / 100% in order.
5. Check that the value of all the parameters are changed when performing the actuation test.

Specification : Check that the value of Air Mix Door Potentiometer at current data should be close to the value of the actuation test .



6. Does the value of current data follow in accordance with the each actuation test ?

YES	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ Go to " Inspection and Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Control Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Measure resistance between WARM terminal of Driver air mix actuator harness connector and WARM terminal of A/C-ECU harness connector.
4. Measure resistance between COOL terminal of Driver air mix actuator harness connector and COOL terminal of A/C-ECU harness connector.

Specification : 1Ω below

5. Is the measured resistance within specification?

YES	▶ Go to "Check short to ground in harness" as follows.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Measure resistance between WARM terminal of Driver air mix actuator harness connector and chassis ground.
4. Measure resistance between COOL terminal of Driver air mix actuator harness connector and chassis ground.

Specification : Infinity

5. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure .
NO	▶ Check for short to ground in control harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check passenger air mix actuator

1. Ignition "OFF".
2. Disconnect Driver air mix actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to WARM(+) of Driver air mix actuator and (-) terminal to COOL(-) .(Component side)
4. Verify that the temperature actuator operates to the cool position.
5. Verify that the temperature actuator operates to the warm position with reverse connecting.(WARM(+) and COOL(-)) .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	WARM(+)	COOL(-)	Door position
Battery terminal	12 V	Ground	Max.warm
	Ground	12 V	Max.cool

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Driver air mix actuator and check for proper operation. If the problem is corrected, replace Driver air mix actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".

2. Connect Driver air mix actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver air mix actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) Voltage value of Air Mix potentiometer as a function of temp door position.

Door position	Voltage
Max. cool	0.45V
Max.warm	4.55V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Driver air mix actuator and check for proper operation. If the problem is corrected, replace Driver air mix actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

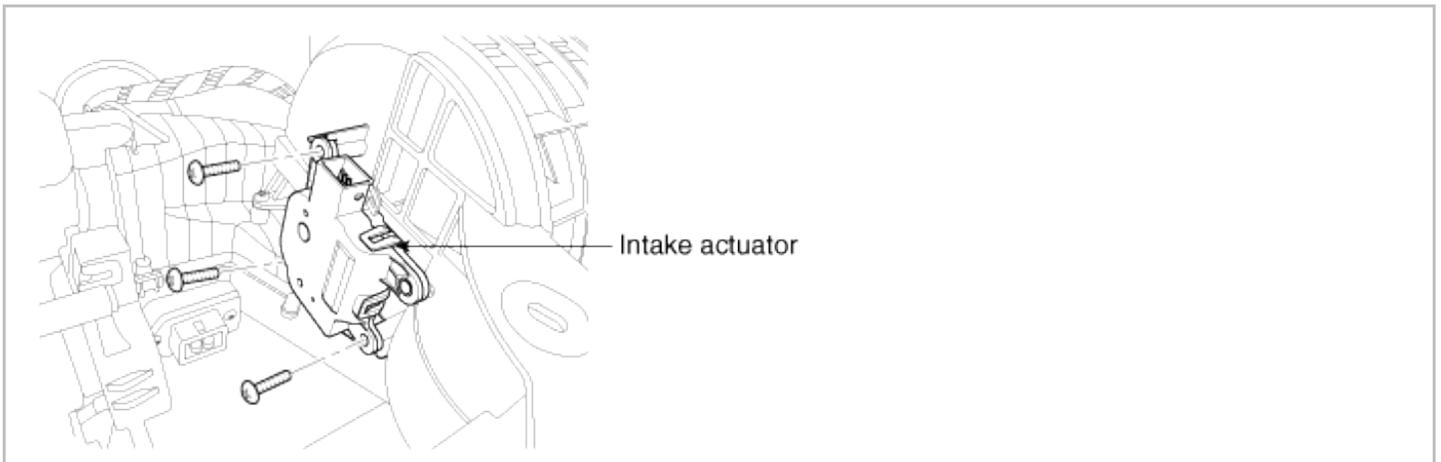
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and selet "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B2408 Intake Motor

Componet Location



General Description

It contains intake motor that changes intake door position and potentiometer that monitors position of intake door. When driver operates the intake switch, ECU receives mode signal from intake switch and operates intake door motor to turn intake door to intended position. (with FRE mode signal, intake door is closed and with REC mode signal, intake door is opened)

In operation, potentiometer delivers intake door position transformed into voltage value to A/C ECU.

DTC Description

Air conditioner Control Module sets DTC B2408 if Intake actuator has not been moved to the mode, where air conditioner control module controls, within 10 seconds.

DTC Detecting Condition

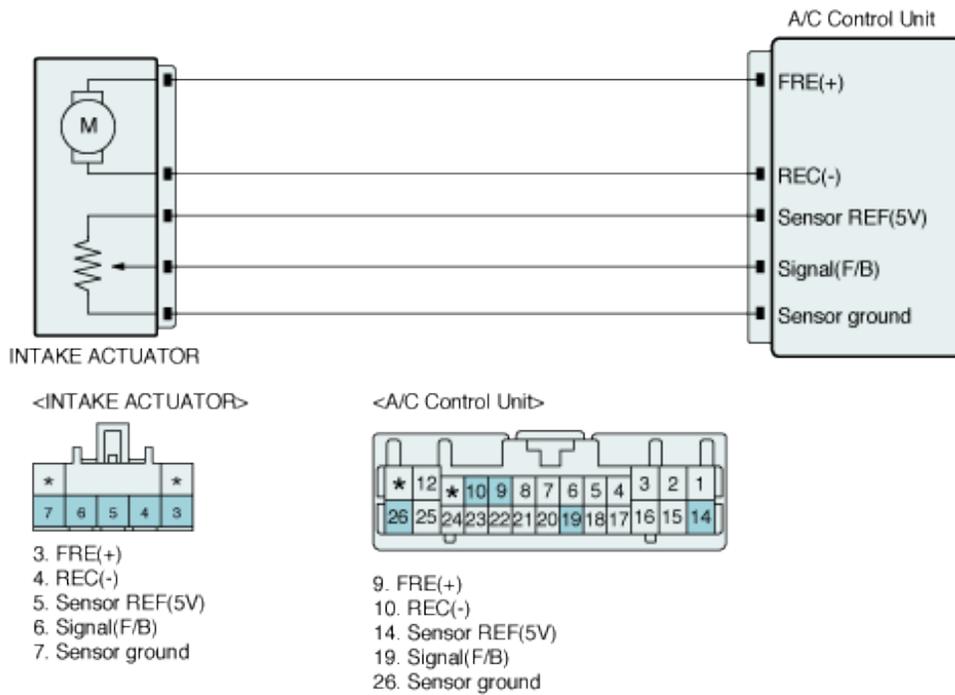
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	• Poor contact in harness • Open or short in motor power circuit • Faulty Intake actuator • Faulty air conditioner control module
Enable Conditions	• IG KEY ON	
Threshold value	• No movement to controlled mode position for 10 seconds	
Fail safe	• Fixed as current position	

Specification

※ Voltage value of Intake potentiometer as a function of position of Intake door

Door position	Voltage
FRE	0.45V
REC	4.55V

Diagnostic Circuit Diagram



Monitor Scantool Data

■ Check Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal temperature after engine start.
3. Select " Intake Potentiometer " parameter on the current data with scantool.
4. Perform Actuation Test for " Air Inlet Mode Selection - Reculation /Fresh in order.
5. With performing Actuation test, check that the value of each position sensors are changing.

Specification - Recirculation : About 90%, Fresh : About 10%.

Current Data

Standard Display | Full List | Graph | Items List | Reset Min.Max. | Record | Stop | VSS

Sensor Name	Value	Unit
<input checked="" type="checkbox"/> Intake Potentiometer	6.3	%

Actuation Test

Test Items	
Driver Mode Door-Foot	
Driver Mode Door-Defrost	
Air Inlet Mode Selection-Fresh	
Air Inlet Mode Selection-Recirculation	
External Control Valve - 0%	
External Control Valve - 85%	
Auto Defog Mode Door - 0% (close)	
Auto Defog Mode Door - 50%	
Auto Defog Mode Door - 100% (open)	

- Duration: Until Stop Button
- Conditions: ENG. RUNNING, A/C ON
- Result: Success

Start
Stop

6. Are the value of each position sensors changed when performing actuation test ?

YES	<ul style="list-style-type: none">▶ This is a intermittent problem caused by poor contact of component or Control Unit▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector.▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none">▶ Go to " Inspection/Repair " procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	<ul style="list-style-type: none">▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none">▶ Go to "W/Harness Inspection" procedure.

Control Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Measure resistance between FRE(+) terminal of Intake actuator harness connector and FRE(+) terminal of A/C-ECU harness connector.
4. Measure resistance between REC(-) terminal of Intake actuator harness connector and REC(-) terminal of A/C-ECU harness connector.

Specification : 1Ω below

5. Is the measured resistance within specification?

YES	<ul style="list-style-type: none">▶ Go to "Check short to ground in harness" as follows.
NO	<ul style="list-style-type: none">▶ Check for open in harness.▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Measure resistance between FRE(+) terminal of Intake actuator harness connector and chassis ground.
4. Measure resistance between REC(-) terminal of Intake actuator harness connector and chassis ground.

Specification : Infinity

5. Is the measured resistance within specification?

YES	<ul style="list-style-type: none">▶ Go to " Component inspection " procedure .
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NO

- ▶ Check for short to ground in control harness.
- ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Intake actuator

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to FRE(+) of intake actuator and (-) terminal to REC(-) .(Component side)
4. Verify that the actuator operates to the REC position.
5. Verify that the temperature actuator operates to the FRE position with reverse connecting.(REC(-) and FRE(+)) (Component side)

Specification : Refer the specifications in fig.1

FIG.1) ※ Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	FRE(+)	REC(-)	Door position
Battery terminal	12 V	Ground	FRE
	Ground	12 V	REC

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Intake actuator and check for proper operation. If the problem is corrected, replace Intake actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Disconnect Intake actuator and A/C control unit main harness connector.
3. Ignition "ON"(ENGINE "OFF").
4. Measure voltage between Signal(F/B) terminal of Intake actuator harness connector and chassis ground .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) Specifications : Voltage value of intake potentiometer as a function of intake door position.

Door position	Voltage
FRE	0.45V
REC	4.55V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Intake actuator and check for proper operation. If the problem is corrected, replace Intake actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

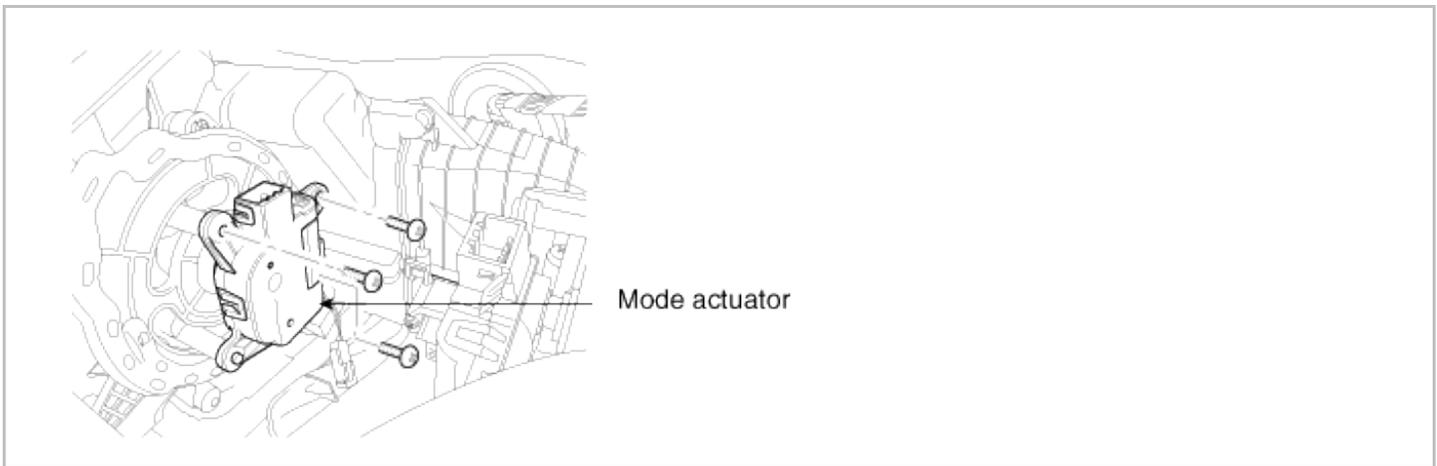
After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.

Heating,Ventilation, Air Conditioning > Controller > B2409 Direction Control Motor-Driver

Componet Location



General Description

The mode control actuator mounted on heater unit adjusts position of mode door by operating Direction Motor in accordance with signal of A/C control unit. Pressing mode select switch makes the mode control actuator shift in order of vent→ B/L → floor → mix.

DTC Description

Air conditioner Control Module sets DTC B2409 if Driver Direction actuator has not been moved to the mode,where air condition control module controls, within 10 seconds.

DTC Detecting Condition

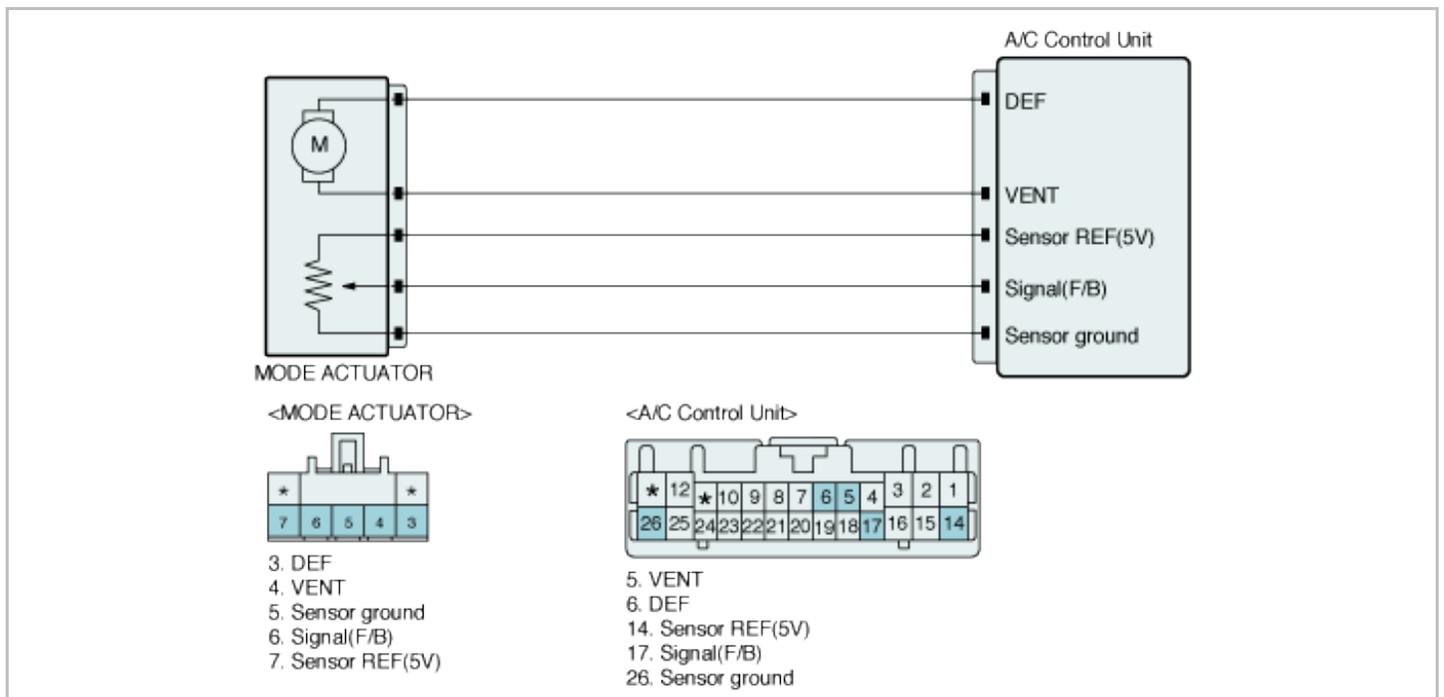
Item	Detecting Condition	Possible Cause
DTC Strategy	• Voltage check	<ul style="list-style-type: none"> • Poor contact in harness • Open or short in motor power circuit • Faulty Driver Direction actuator • Faulty air conditioner control module
Enable Conditions	• IG KEY ON	
Threshold value	• No movement to controlled mode position for 10 seconds	
Fail safe	• Fixed as current position	

Specification

※ Voltage value of potentiometer as a function of mode door position.

Mode Door Position	Voltage
VENT	0.5±0.2V
BI-LEVEL	1.5±0.2V
FLOOR	2.6±0.3V
MIX	3.5±0.2V
DEF	4.5±0.2V

Diagnostic Circuit Diagram

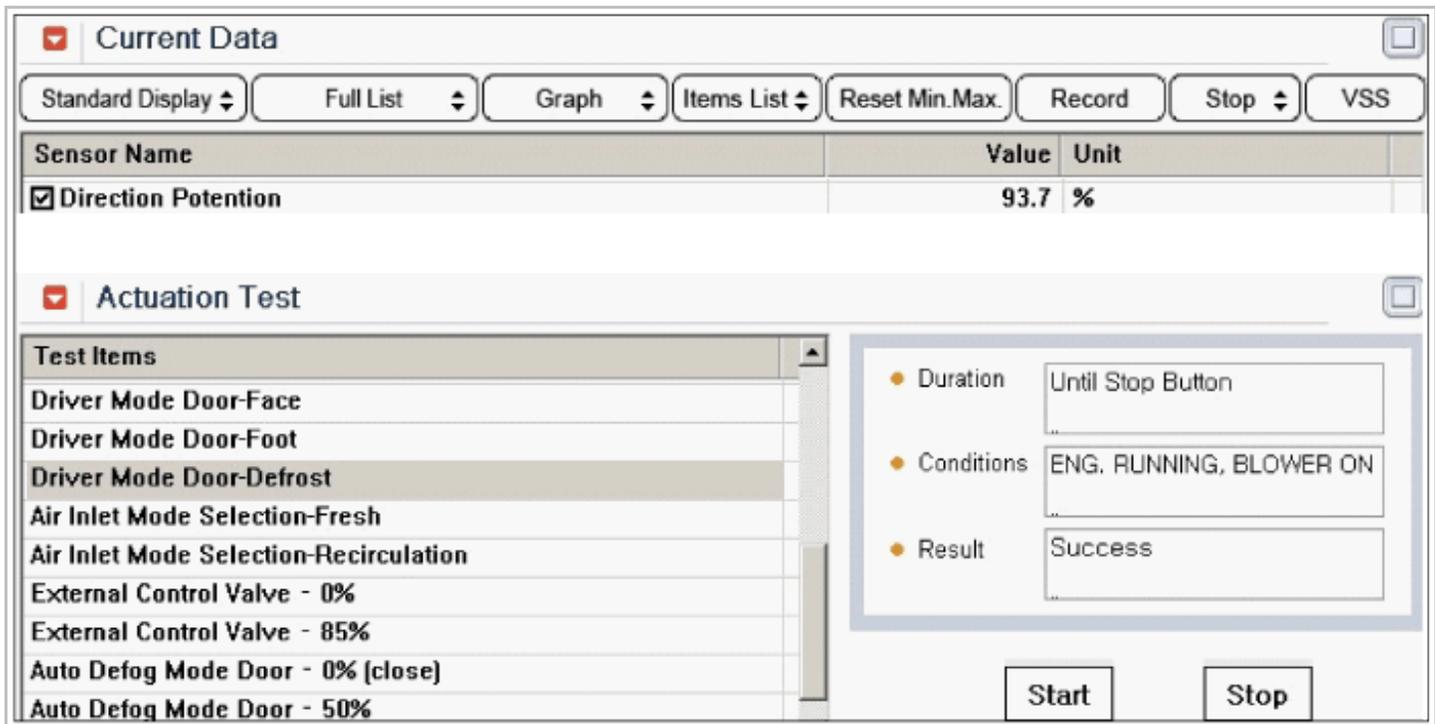


Monitor Scantool Data

■ Actuation Test

1. Connect scantool with diagnostic connector.
2. Warm up the engine to normal engine temperature after engine starts.
3. Select and monitor "Direction Potention" parameter on scantool.
4. Select and perform Actuation test Driver Mode Door - Face / Foot / Defrost in order.
5. Check that the value of all the parameters are changed when performing the actuation test.

Specification : Face - About below 10%, Foot : About 50%, Defrost : About 90%.



6. Are all the parameters changed when performing Actuation test ?

YES	<ul style="list-style-type: none"> ▶ This is a intermittent problem caused by poor contact of component or Control Unit ▶ Thoroughly check the looseness, poor connection, bent, corrosion, contamination, deformation or damage of connector. ▶ Repair or replace as necessary and then, go to "Verification of Vehicle Repair" procedure.
NO	<ul style="list-style-type: none"> ▶ Go to " Inspection and Repair" procedure.

Terminal & Connector Inspection

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES	▶ Repair as necessary and go to "Verification of Vehicle Repair" procedure.
NO	▶ Go to "W/Harness Inspection" procedure.

Control Circuit Inspection

■ Check for open in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Measure resistance between DEF terminal of Driver Direction actuator harness connector and DEF terminal of A/C-ECU harness connector.
4. Measure resistance between VENT terminal of Driver Direction actuator harness connector and VENT terminal of A/C-ECU harness connector.

Specification : 1Ω below

5. Is the measured resistance within specification?

YES	▶ Go to "Check short to ground in harness" as follows.
NO	▶ Check for open in harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

■ Check short to ground in harness

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Measure resistance between DEF terminal of Driver Direction actuator harness connector and chassis ground.
4. Measure resistance between VENT terminal of Driver Direction actuator harness connector and chassis ground.

Specification : Infinity

5. Is the measured resistance within specification?

YES	▶ Go to " Component inspection " procedure .
NO	▶ Check for short to ground in control harness. ▶ Repair as necessary and then go to "Verification of Vehicle Repair" procedure.

Component Inspection

■ Check Driver Direction actuator

1. Ignition "OFF".
2. Disconnect Driver Direction actuator and A/C control unit main harness connector.
3. Connect (+) terminal of battery to WARM(+) of Driver Direction actuator and (-) terminal to COOL(-) .(Component side)
4. Verify that the temperature actuator operates to the cool position.
5. Verify that the temperature actuator operates to the warm position with reverse connecting.(WARM(+) and COOL(-)) .(Component side)

Specification : Refer the specifications in fig.1

FIG.1) * Function of the actuator motor according to terminal connection type. (observe safety regulations)

Actuator harness	DEF (+)	VENT (-)	Door position
Battery terminal	12 V	Ground	VENT.Mode
	Ground	12 V	DEF.Mode

6. Is "Door position" display near the specified value?

YES	▶ Go to "Check potentiometer" procedure.
NO	▶ Substitute with a known-good Driver Direction actuator and check for proper operation. If the problem is corrected, replace Driver Direction actuator and then go to "Verification of Vehicle Repair" procedure.

■ Check potentiometer

1. Ignition "OFF".
2. Connect Driver Direction actuator and A/C control unit main harness connector.
3. Ignition "ON".
4. Measure voltage between Signal(F/B) terminal of Driver Direction actuator harness connector and Sensor ground(-) terminal of A/C-ECU harness connector .(Component side)

Specification : Refer the specifications in fig.2

FIG.2) * Voltage value of Direction potentiometer as a function of position of mode switch

Mode Door Position	Voltage
VENT	0.5±0.2V
BI-LEVEL	1.5±0.2V
FLOOR	2.6±0.3V
MIX	3.5±0.2V
DEF	4.5±0.2V

5. Is "voltage" display near the specified value?

YES	▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.
NO	▶ Substitute with a known-good Driver Direction actuator and check for proper operation. If the problem is corrected, replace Driver Direction actuator and then go to "Verification of Vehicle Repair" procedure.

Verification of Vehicle Repair

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode and then clear DTC.
2. Operate the vehicle and monitor the DTC on the scantool.
3. Are any DTCs present?

YES	▶ Go to the applicable troubleshooting procedure.
NO	▶ System is performing to specification at this time.