



Heating,Ventilation, Air Conditioning

General Information



SPECIFICATION

Air conditioner

Item		Specification
Compressor	Type	VS (Variable capacity)
	Oil type & Capacity	ND-OIL8 (PAG), 120 ± 10cc
	Pulley type	L5OS-TYPE
	Displacement	180cc/rev
Condenser	Heat rejection	14,000 ± 5% kcal/hr
Dual pressure switch	High [psi(kg/cm ²)]	ON: 370 ± 2.8 (26.0 ± 0.2) OFF: 455 ± 2.8 (32.0 ± 0.2)
	Low ([psi(kg/cm ²)]	ON : 28.6 ~ 36.3 (2.00 ~ 2.55) OFF : 28.4 ± 2.8 (2.0 ± 0.2)
Expansion valve	Type	Block
Refrigerant	Type	R-134a
	Capacity [oz.(g)]	28.21 ± 0.88 (800 ± 25)

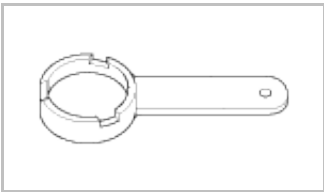
Blower unit

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

Heater and evaporator unit

Item		Specification
Heater	Type	Pin & Tube type
	Heating capacity	4,700 ± 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 : 2.3 ± 0.5 (36.14 ± 32.9) OFF: 1.3 ± 0.5 (34.34 ± 32.9)

**SPECIAL TOOLS**

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



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	See page
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. Dual pressure switch 6. A/C switch 7. Evaporator temperature sensor 8. Wire harness	
No cool comes out	1. Refrigerant capacity 2. Refrigerant pressure 3. Drive belt 4. Magnetic clutch 5. Compressor 6. Dual pressure switch 7. Evaporator temperature sensor 8. A/C switch 9. Heater control assembly 10. Wire harness	
Insufficient cooling	1. Refrigerant capacity 2. Drive belt 3. Magnetic clutch 4. Compressor 5. Condenser 6. Expansion valve 7. Evaporator 8. Refrigerant lines 9. Dual pressure switch 10. 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

Air Conditioning System



INSTRUCTIONS

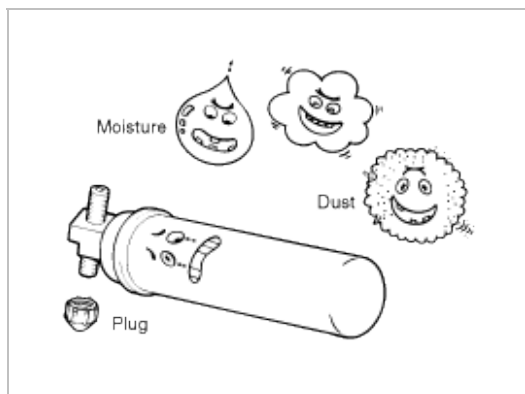
WHEN HANDLING REFRIGERANT

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 that the 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 the 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 immediately the components to prevent from the 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 resuming service.



WHEN REPLACING PARTS ON A/C SYSTEM

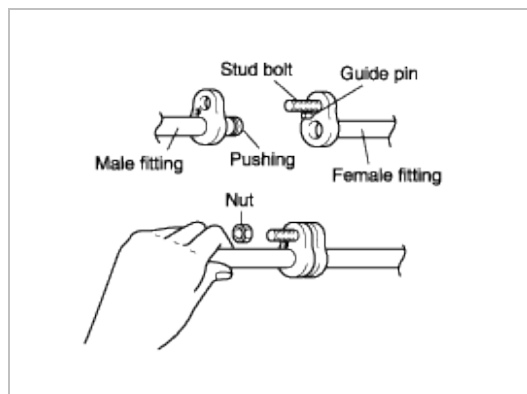
1. Never open or loosen a connection before discharging the system.
2. Seal the open fittings of components with a cap or plug immediately to prevent intrusion of moisture or dust.
3. Do not remove the sealing caps from a replacement component until it is ready to be installed.
4. Before connecting an 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 it 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)a
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)

HANDLING TUBING AND FITTINGS

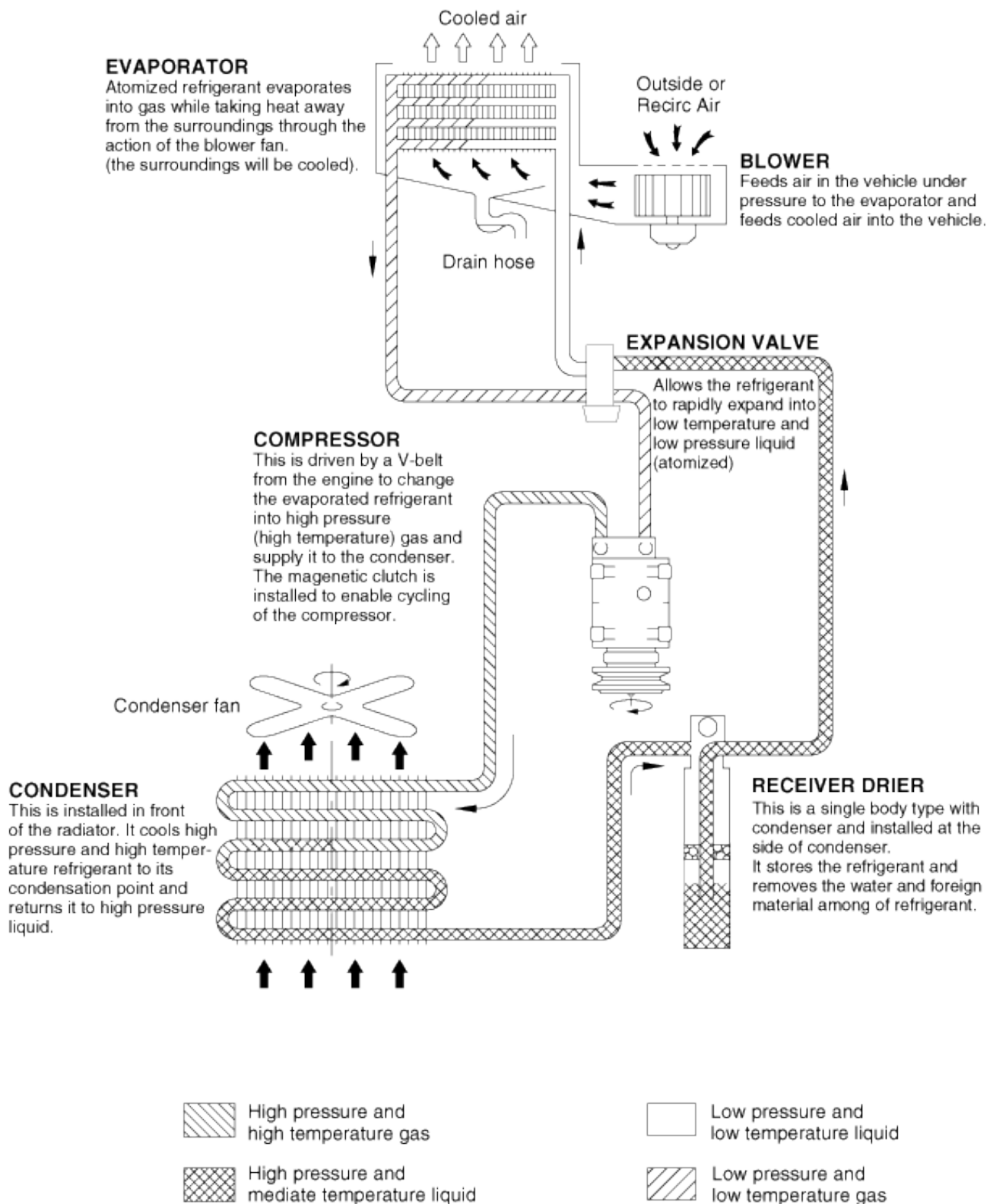
The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure moisture-free refrigerant and refrigerant oil are used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause problems or serious damage.

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.



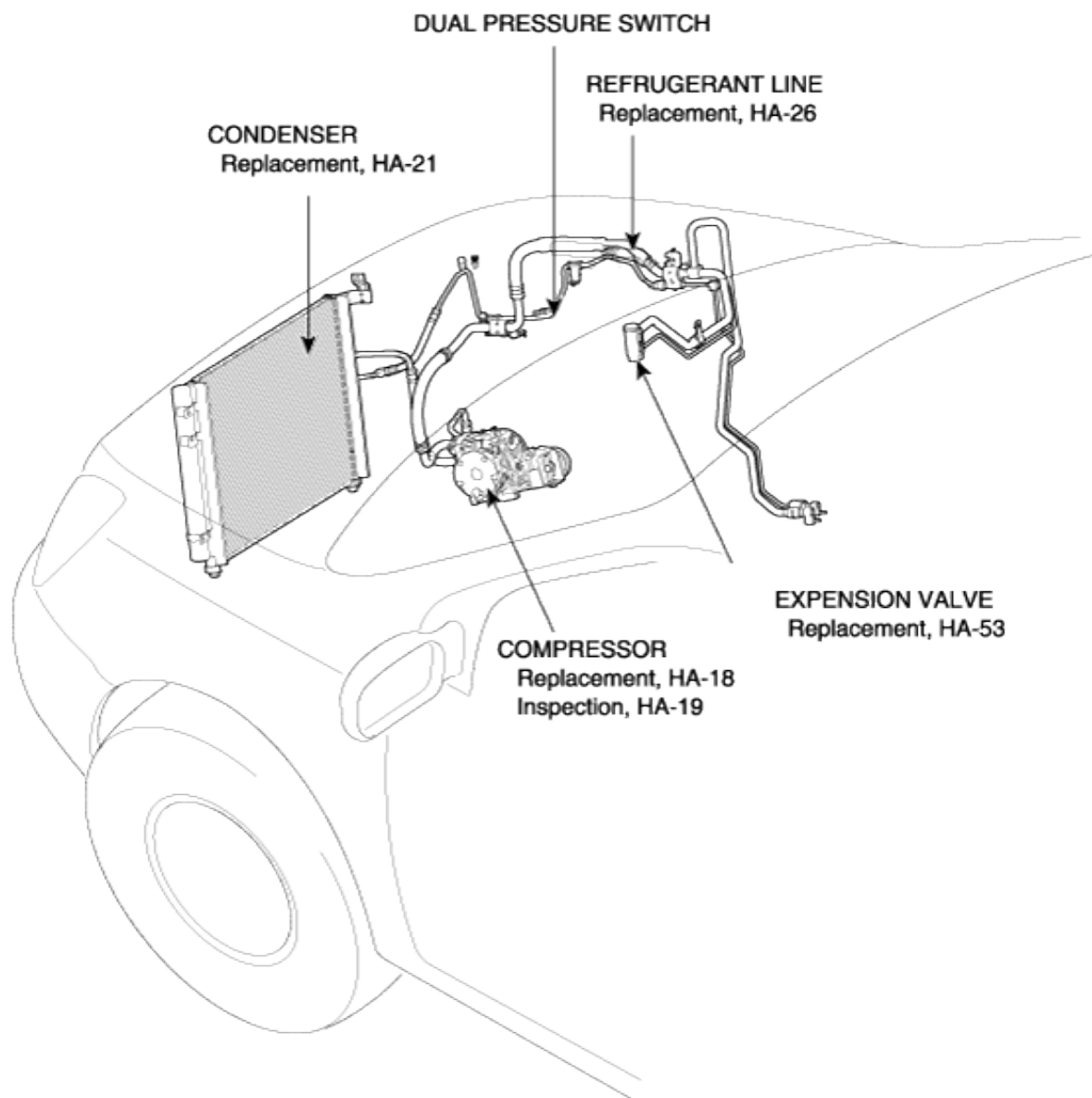
REFRIGERATION CYCLE





COMPONENT LOCATION INDEX

ENGINE ROOM



INTERIOR

HEATER UNIT

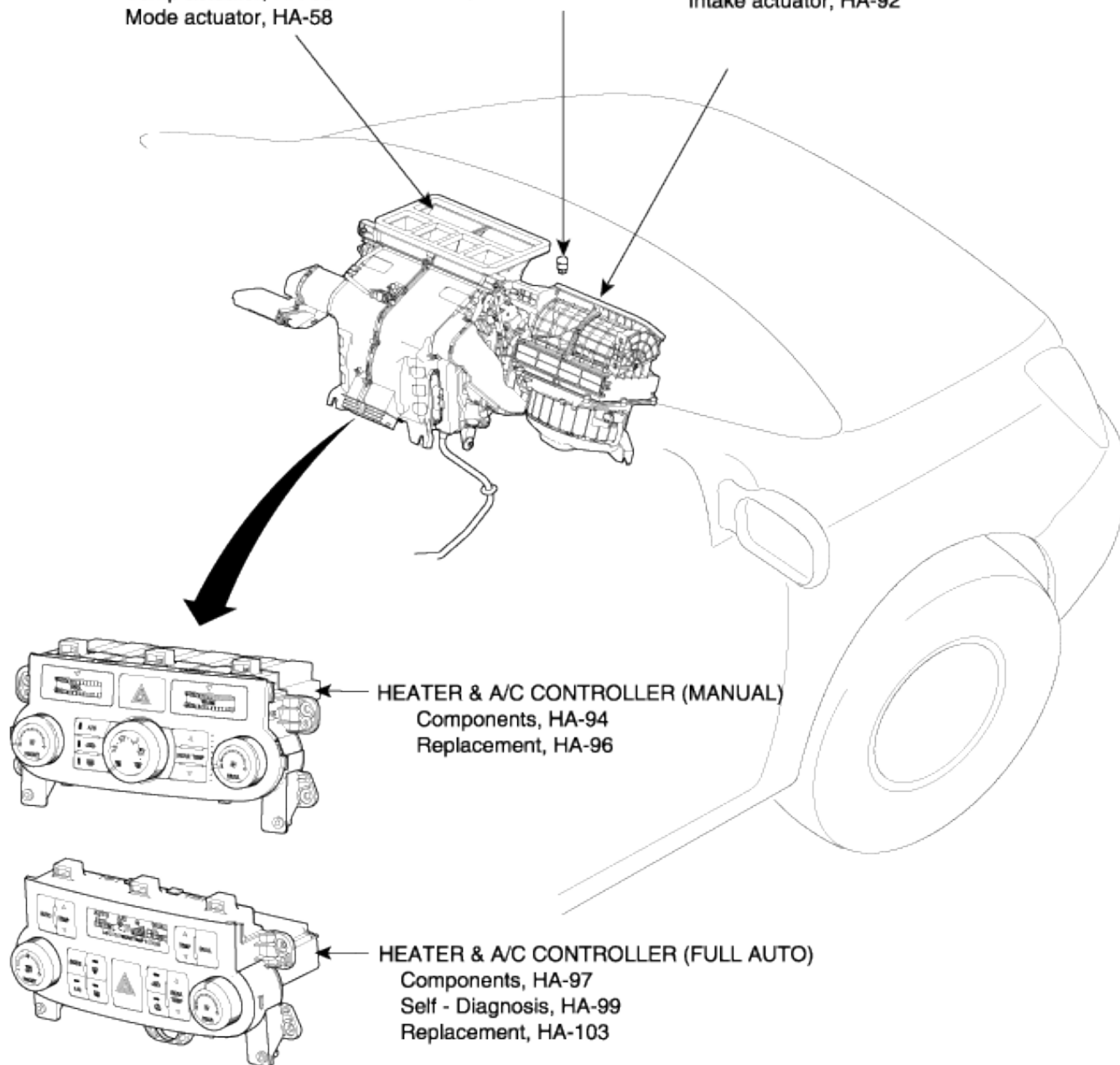
Replacement, HA-53
PTC heater, HA-68
Temp actuator, HA-55
Mode actuator, HA-58

PHOTO SENSOR

Replacement, HA-35
Inspection, HA-35

BLOWER UNIT

Replacement, HA-84
Power mosfet, HA-89
A/C air filter, HA-91
Intake actuator, HA-92





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

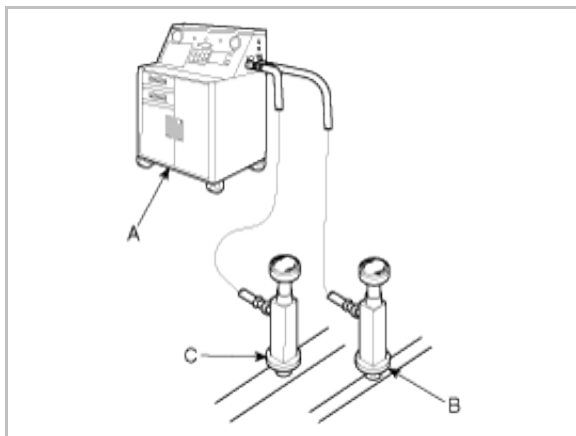
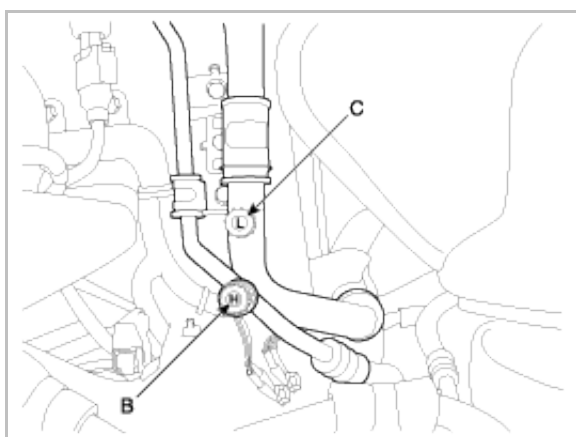
- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resuming 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.

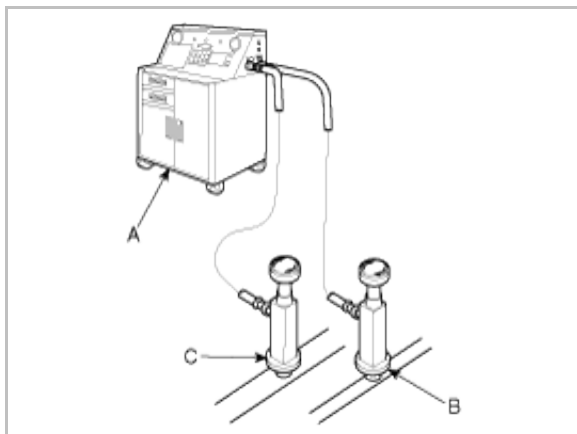
CAUTION

- 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 resuming 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.

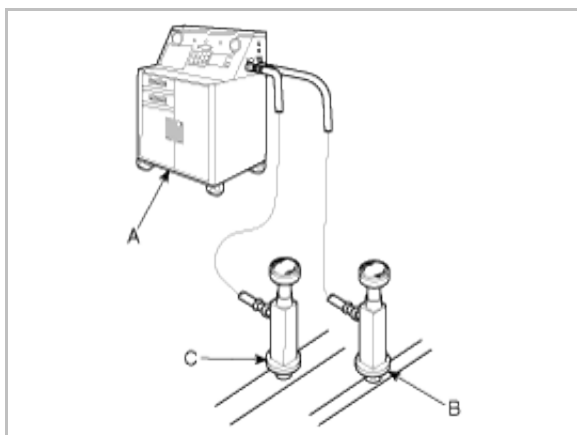
CAUTION

- 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 resuming 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 28.21 ± 0.88 oz. (800 ± 25 g) of R-134a refrigerant. Do not overcharge the system the compressor will be damaged.

REFRIGERANT LEAK TEST

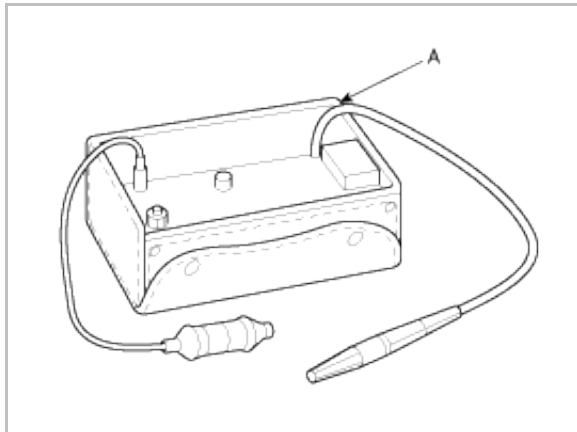
Always conduct a leak test with an electronic leak detector whenever leakage or refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening or connection fittings.

NOTICE

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.



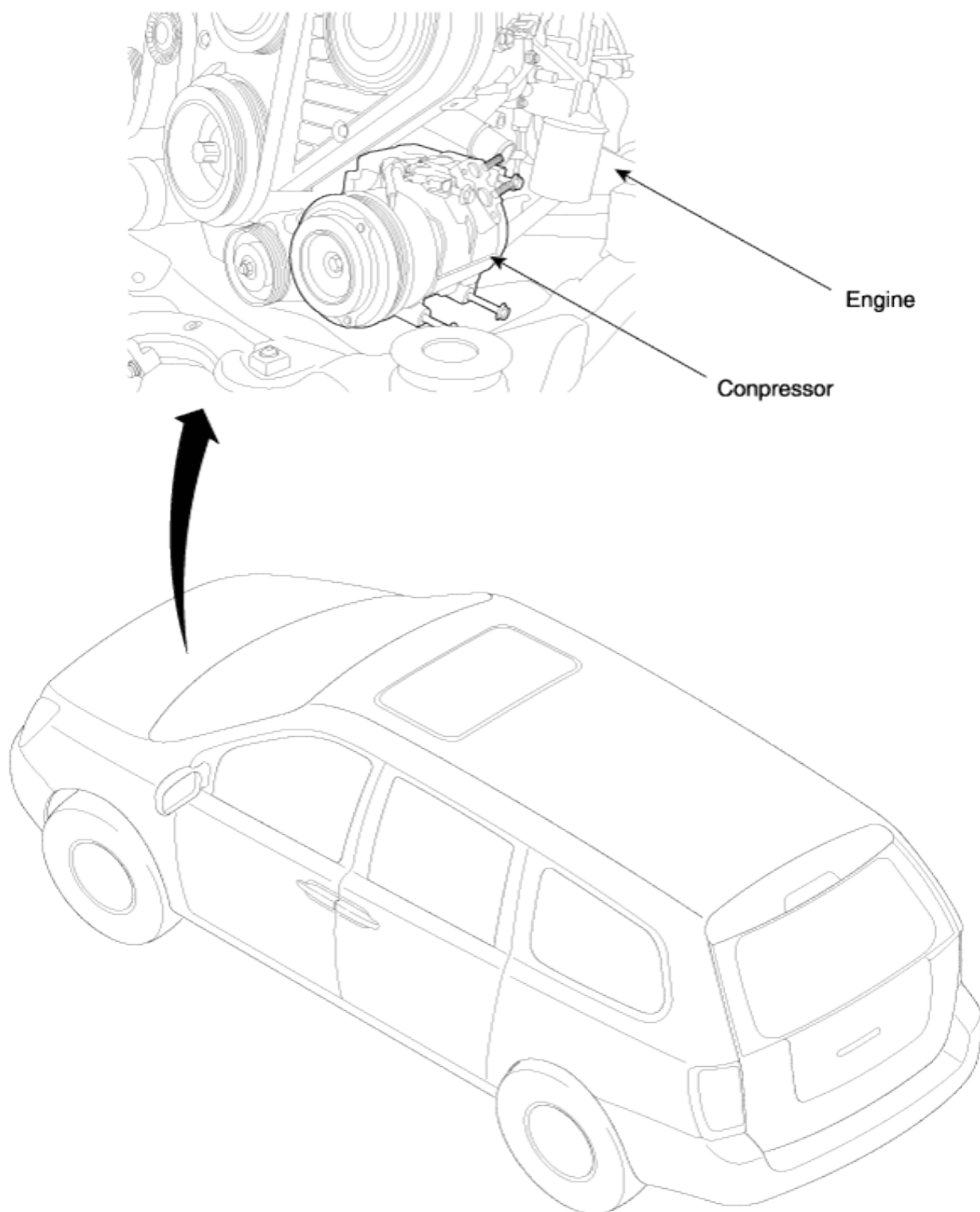


Heating, Ventilation, Air Conditioning

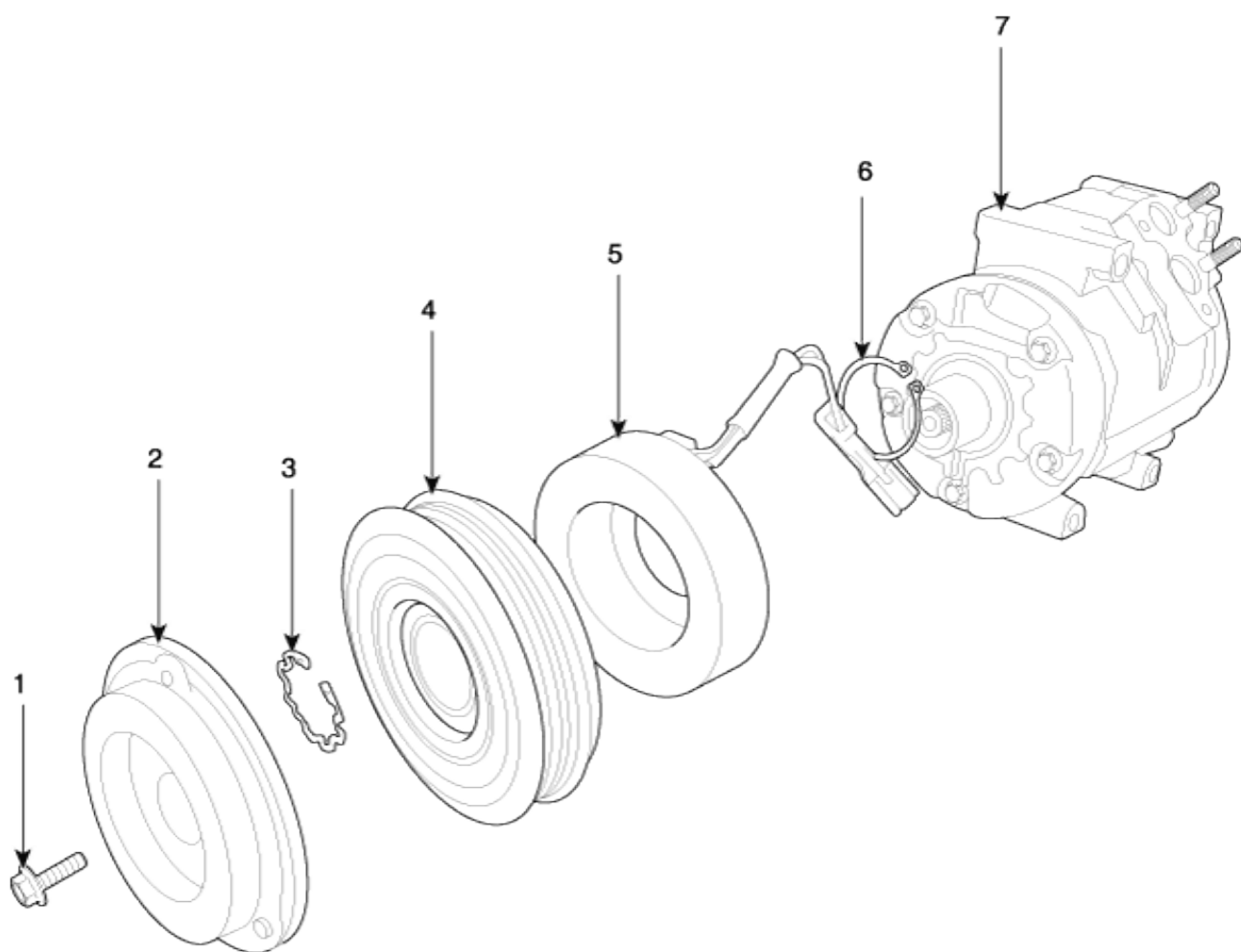
Air Conditioning System - Compressor



COMPONENT LOCATION



COMPONENTS



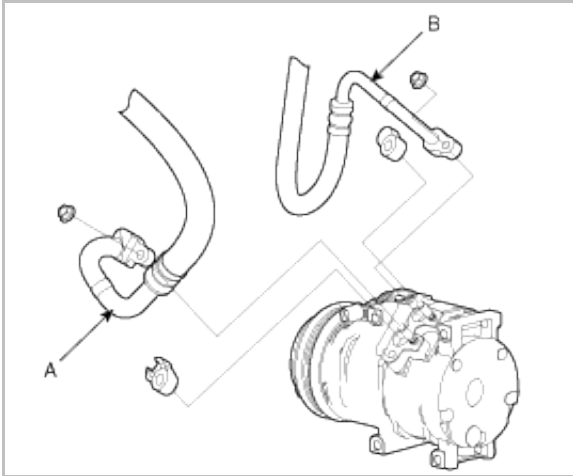
- 1. Bolt
- 2. Disc & hub assembly
- 3. Retainer ring (Pully)
- 4. Pully

- 5. Field coil
- 6. Retainer reing(Field coil)
- 7. Compressor assembly

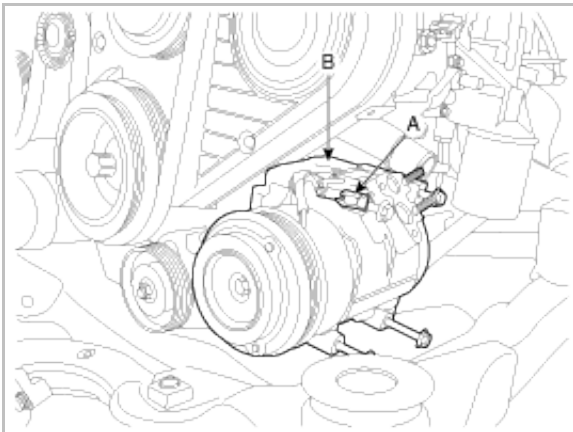


REMOVAL

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 (Refer to HA-8).
4. Loosen the drive belt (Refer to HA-14).
5. Remove the bolts, then disconnect the suction line (A) and discharge line (B) from the compressor. Plug (C) or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.

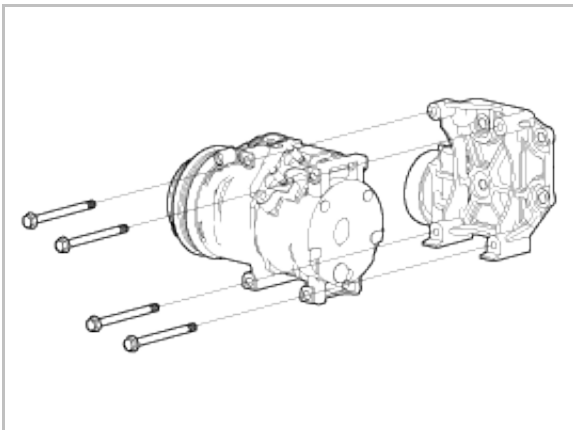


6. Disconnect the compressor clutch connector (A), and then remove 4 mounting bolts and the compressor.



INSTALLATION

1. Make sure of the length of compressor mounting bolts.



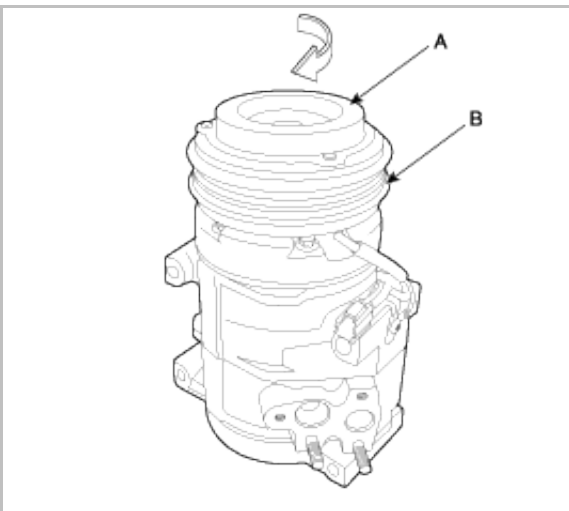
2. Install in the reverse order of removal, and note these items.
 - A. If you're installing a new compressor, drain all the refrigerant oil from the removed compressor, and measure its

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 (Refer to HA-14)
- G. Charge the system and test its performance. (Refer to HA-9)

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.

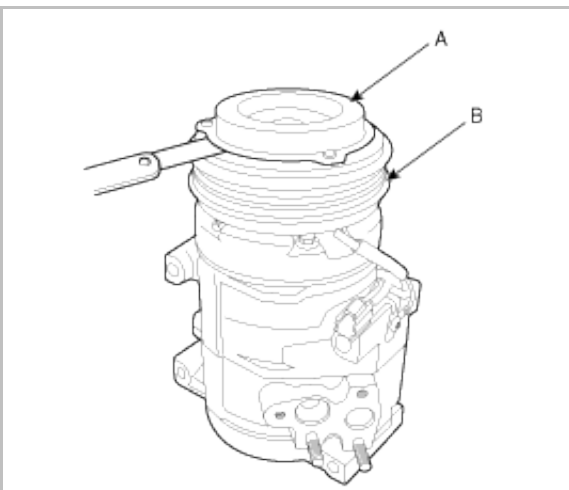


3. Measure the clearance between the pulley (B) and the disc & hub assembly (A) all the way around. If the clearance is not within specified limits, remove the disc & hub assembly and add or remove shim (gap washer) as needed to increase or decrease clearance.

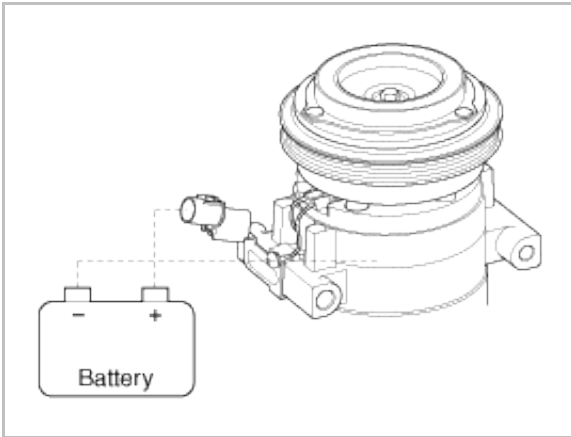
Clearance: $0.45 \pm 0.1\text{mm}$ ($0.018 \pm 0.004\text{ in.}$)

NOTICE

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



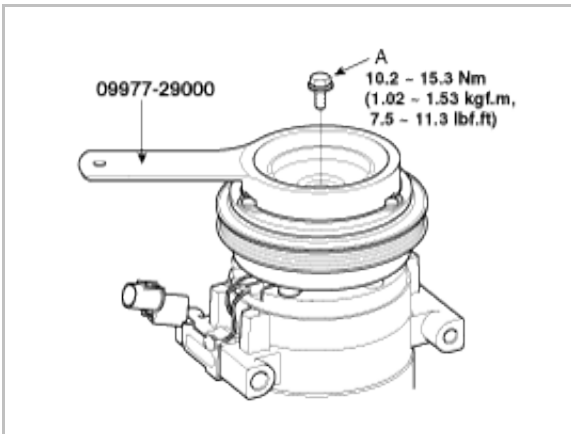
4. Check operation of the magnetic clutch. Connect the compressor side terminals to the battery (+) terminal and the ground battery (-) terminal to the compressor body. Check the magnetic clutch operating noise to determine the condition.



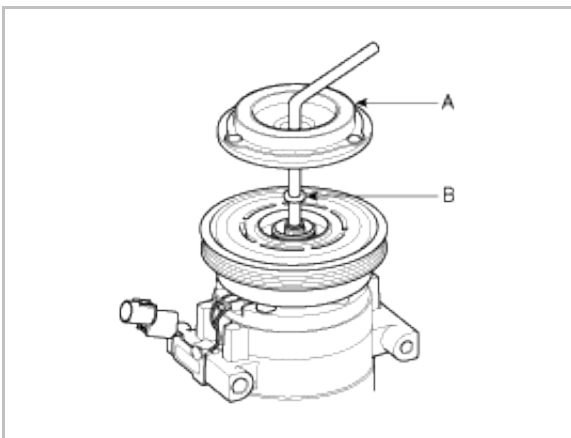
DISASSEMBLY

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)



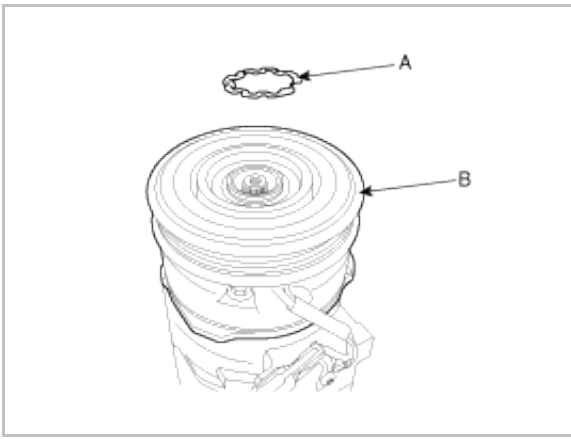
2. Remove the disc & hub assembly (A) and shim (gap washer) (B), taking care not to lose the shims. If the clutch needs adjustment, increase or decrease the number and thickness of shims as necessary, then reinstall the disc & hub assembly, and recheck its clearance (Refer to HA-19).



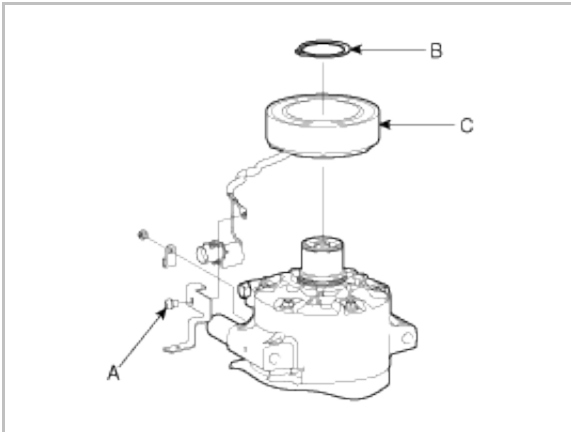
3. If you removal the field coil, remove retainer ring (A) with retainer ring pliers.

NOTICE

- 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. Clean the pulley and compressor sliding surfaces with non-petroleum solvent.
 - B. Install new retainer rings, and make sure they are fully seated in the groove.
 - C. Make sure that the pulley turns smoothly after its reassembled.



Heating, Ventilation, Air Conditioning

Air Conditioning System - Compressor Oil



INSPECTION

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

Handling of Oil

1. The oil should be free from moisture, dust, metal powder, etc.
2. Do not mix with other oil.
3. 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.)
4. 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:

120±10cc (4.05±0.34 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:

1. Open all the doors and the engine hood.
2. Start the engine and air conditioning switch to "ON" and set the blower motor control knob at its highest position.
3. Run the compressor for more than 20 minutes between 800 and 1,000 rpm in order to operate the system.
4. 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.

NOTICE

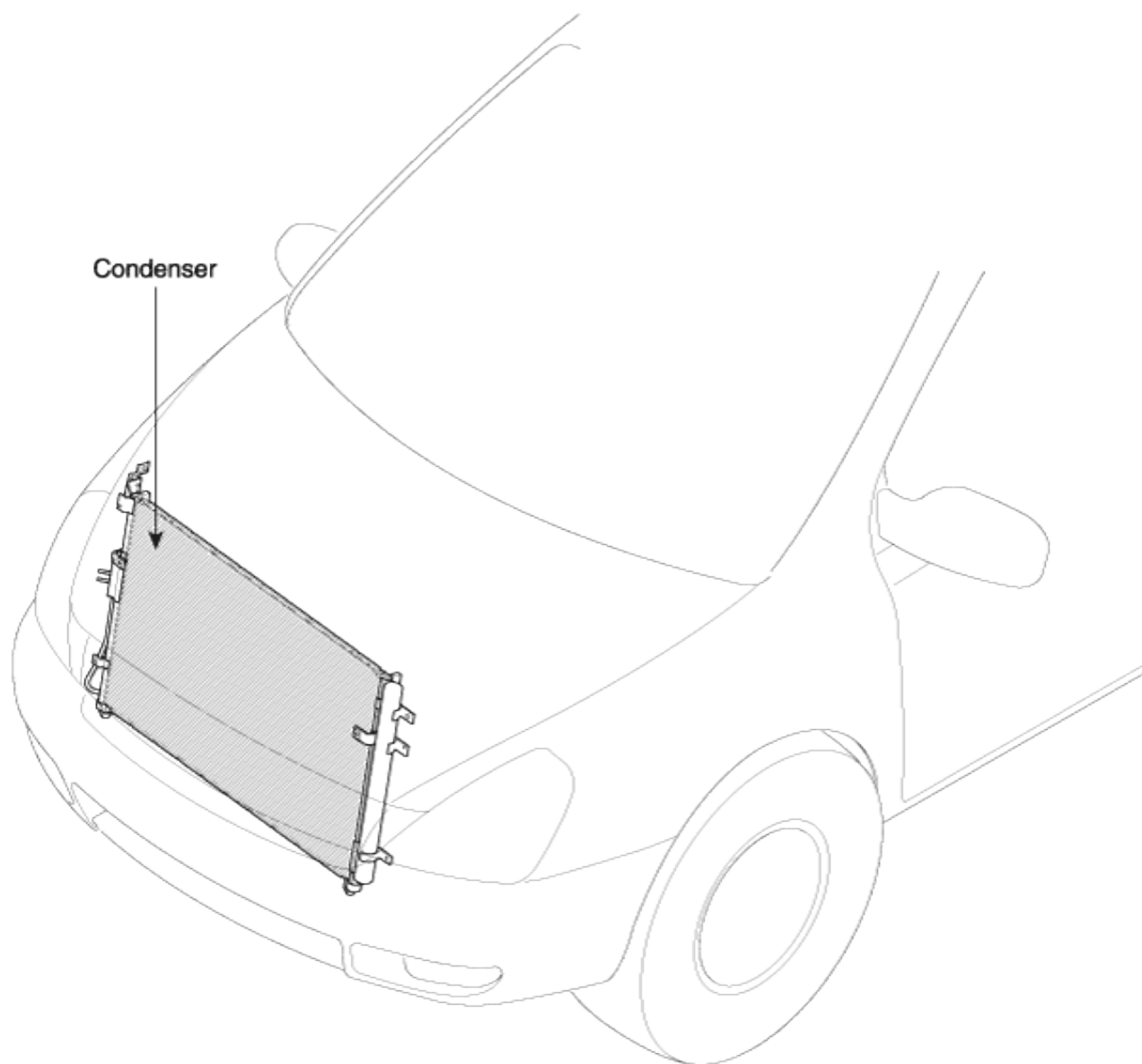
Even if no oil is drained from the removed compressor, don't drain more than 50cc from new compressor.



Heating, Ventilation, Air Conditioning

Air Conditioning System - Condenser

COMPONENT LOCATION





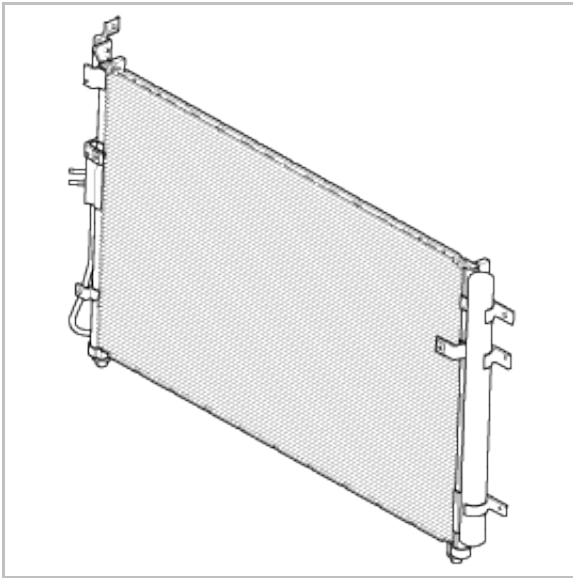
INSPECTION

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 (Refer to HA-8).
2. Disconnect the negative (-) battery terminal.
3. Remove the radiator. (Refer to EM group)
4. 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.

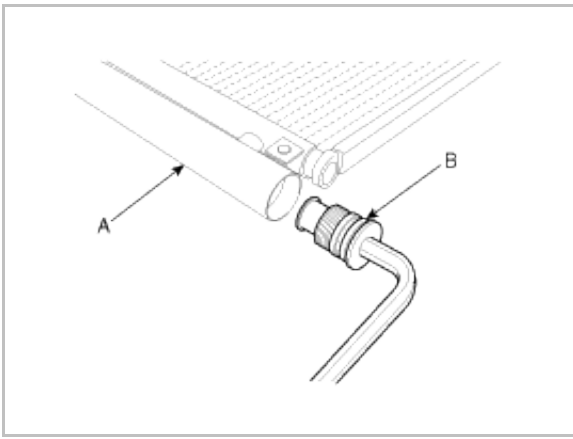


5. Install in the reverse order of removal, and note these items :
 - A. If you're installing a new condenser, add refrigerant oil ND-OIL8.
 - B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them.
Be sure to use the right O-rings for R-134a 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. (Refer to HA-9)

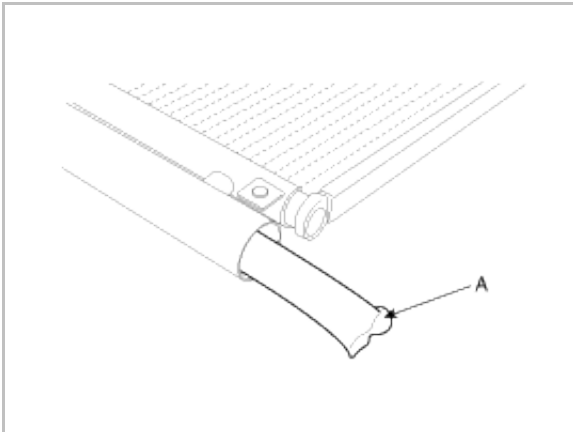
DESICCANT

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.

NOTICE

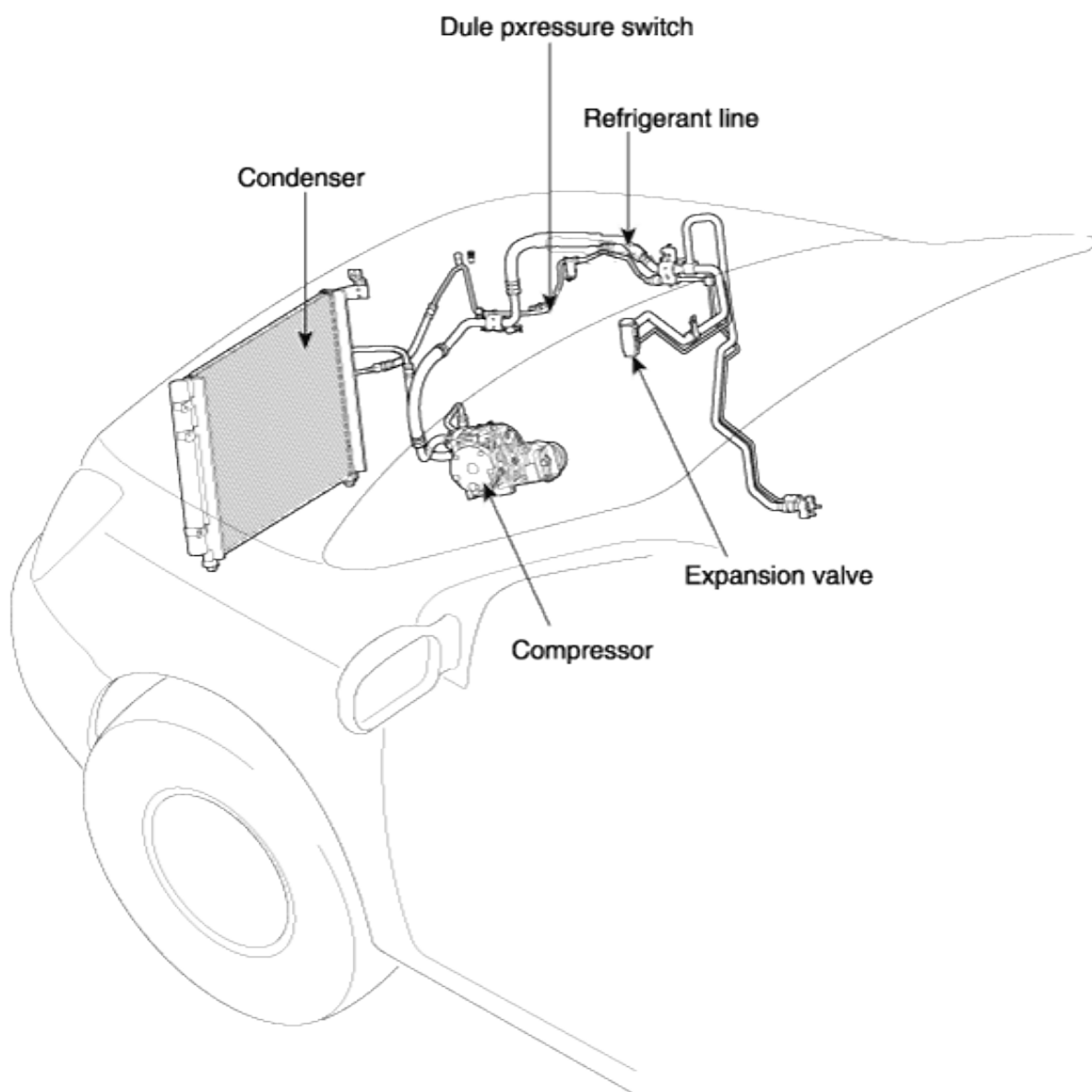
- Always replace the desiccant and bottom cap at the same time.
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
- Be careful not to damage the radiator and condenser fins 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. (Refer to HA-10)



Heating, Ventilation, Air Conditioning

Air Conditioning System - Refrigerant Line

COMPONENT LOCATION





REPLACEMENT

1. Discharge refrigerant from refrigeration system (Refer to HA-8).
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 x Discharge hose	8 ~ 12	0.8~1.2	5.8 ~ 8.7
Condenser x Liquid tube			
Compressor x Discharge hose			
Compressor x Suction hose			
Expansion valve x Evaporator			

4. Evacuate air in refrigeration system and charge system with refrigerant (Refer to HA-9).

Specified amount: 800 ± 25g

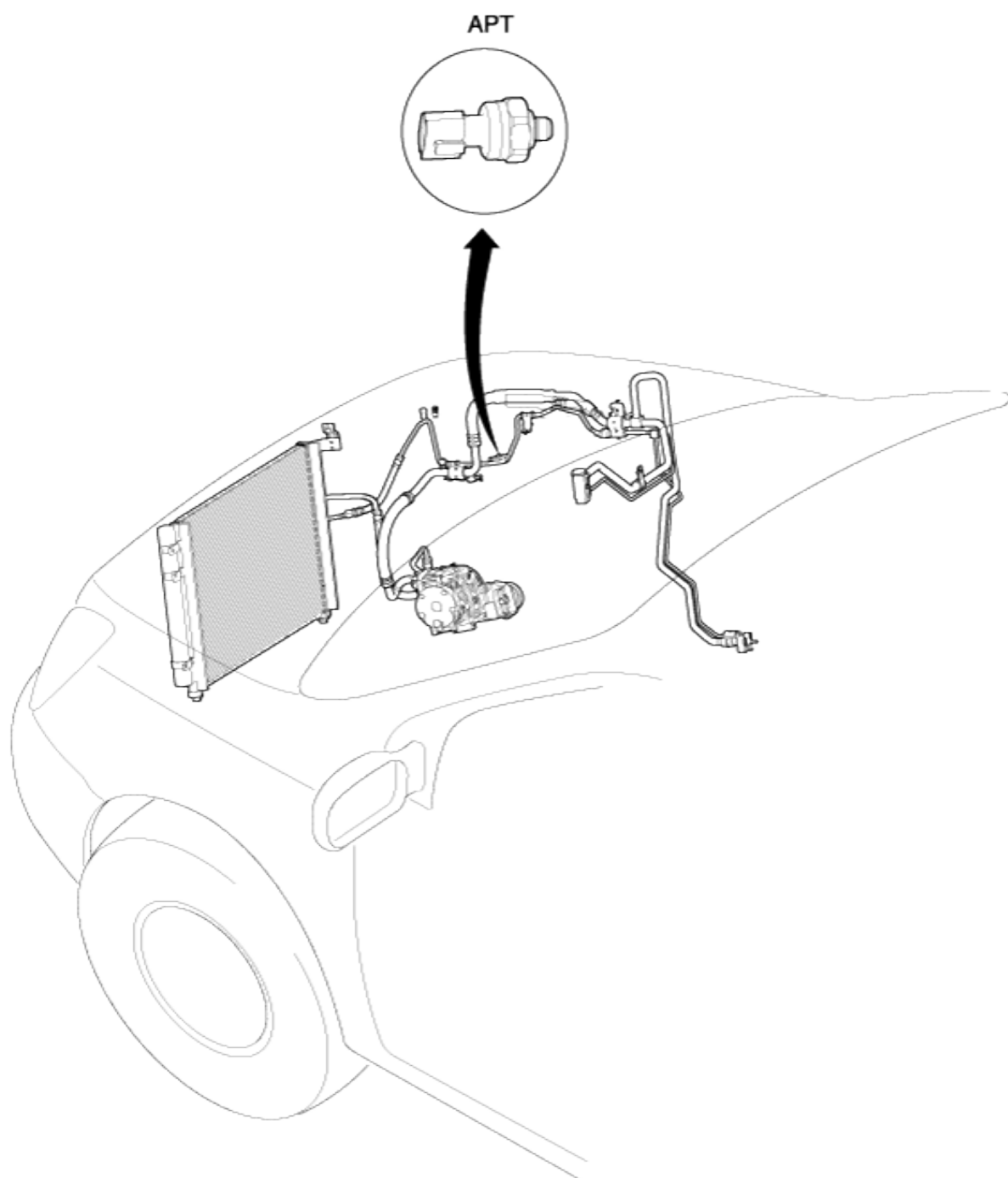
5. Inspect for leakage of refrigerant.
Using a gas leak detector, check for leakage of refrigerant (Refer to HA-9).
6. Inspect A/C operation.



Heating, Ventilation, Air Conditioning

Air Conditioning System - A/C Pressure Transducer

COMPONENT LOCATION





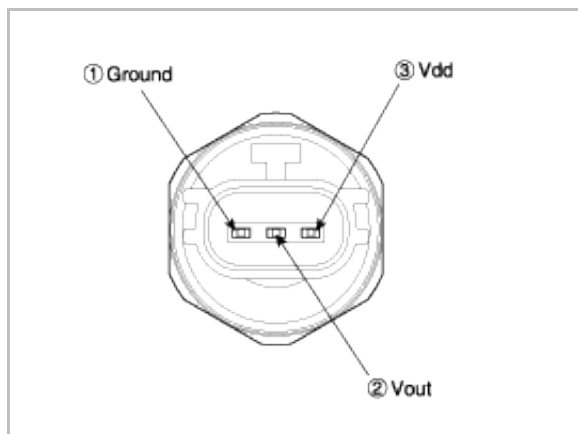
DESCRIPTION

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



INSPECTION

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



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

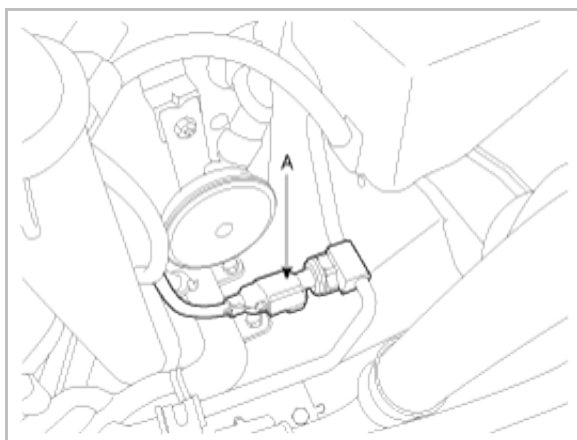
$$V_{out} = V_{dd}(0.025 * P + 0.1) \text{ [kgf/cm}^2\text{G]}$$

$$V_{out} = V_{dd}(0.001758 * P + 0.074162) \text{ [PSIA]}$$

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

REPLACEMENT

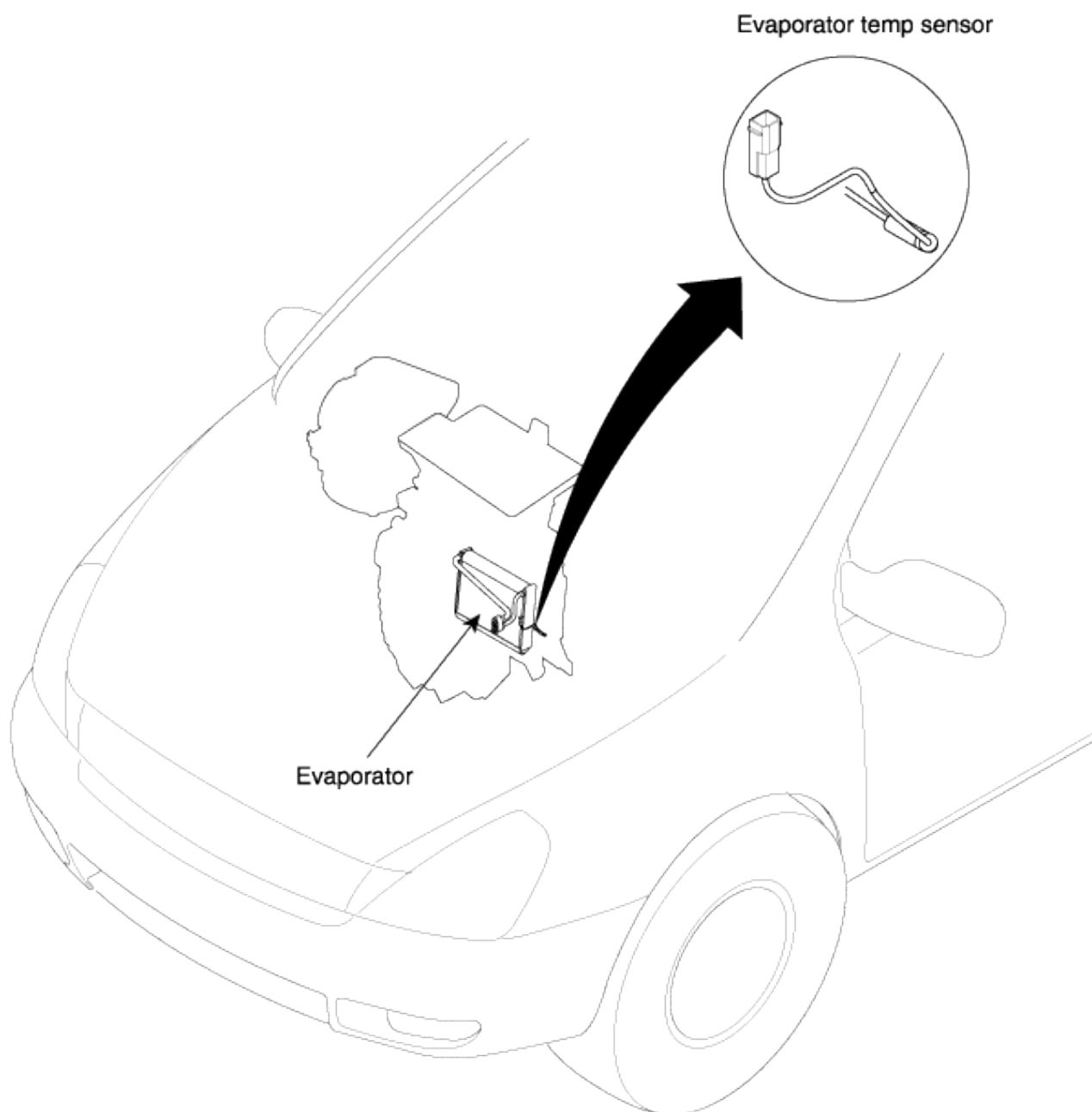
1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/charging station.
3. Disconnect A/C pressure transducer connector (3P) (A).



Heating, Ventilation, Air Conditioning

Air Conditioning System - Evaporator
Temperature Sensor

COMPONENT LOCATION





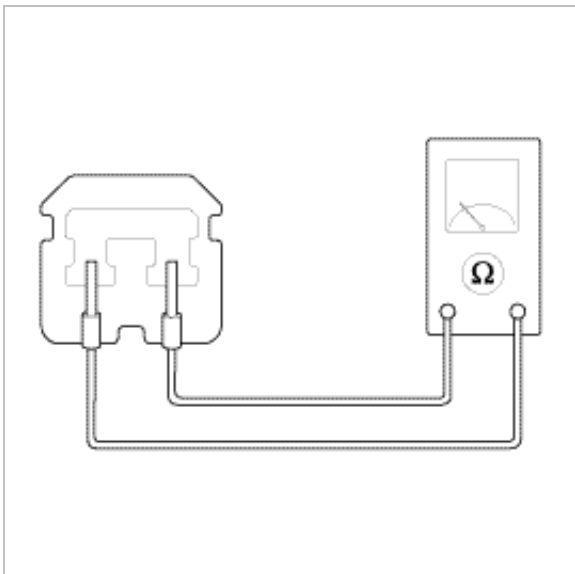
DESCRIPTION

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



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.



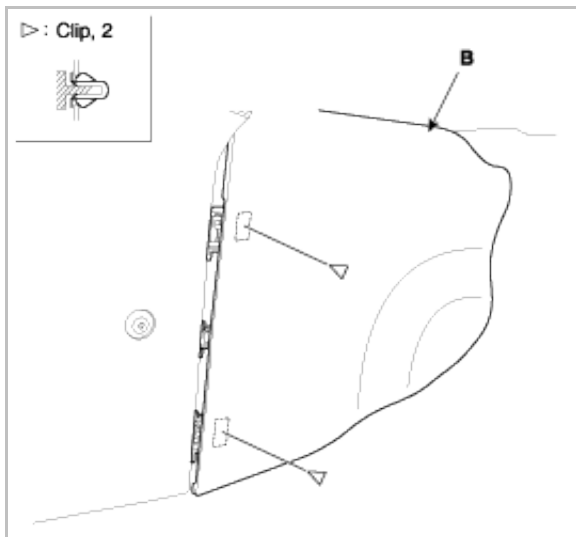
Specification

Evaporator core temperature [°C(°F)]	Resistance [kΩ]
-10(14)	13.6
0(32)	8
10(50)	4.9
15(59)	3.9
30(86)	2
40(104)	1.3
50(122)	0.9

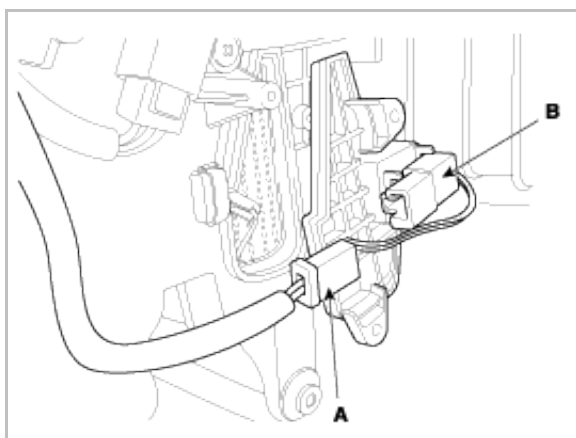
4. If the measured resistance is not specification, substitute with a known-good evaporator temperature sensor and check for proper operation.
5. If the problem is corrected, replace the evaporator temperature sensor.

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the center lower side cover(B).



3. Disconnect the evaporator sensor connector (A).
4. Loosen 2 screws and then remove the evaporator sensor cover(B).
5. Remove the evaporator sensor.



CAUTION

Take care that evaporator core pins are not bent.

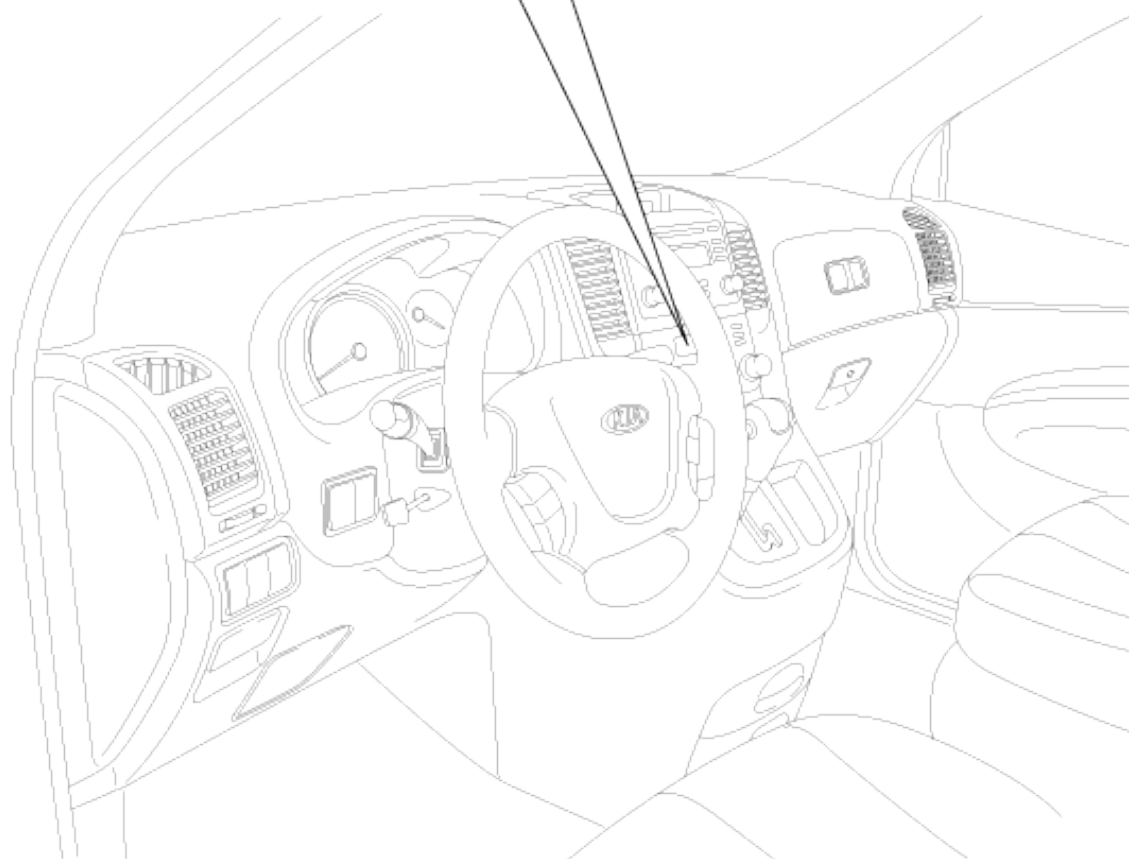
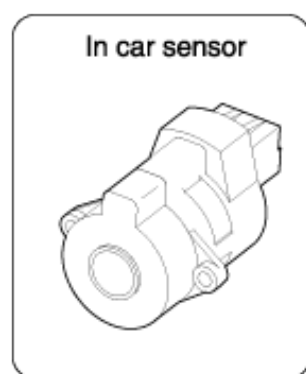
6. Installation is the reverse order of removal.



Heating, Ventilation, Air Conditioning

Air Conditioning System - In-car sensor

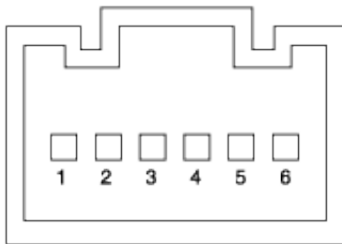
COMPONENT LOCATION





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.
3. It perceives the inside temperature, changes the resistance value, and enters the corresponding voltage into the automatic temperature control module.
4. It will used for discharge temperature control, sensor failsafe, temperature door control, blower motor level control, and A/C auto control.



- | | |
|---------------------------|-------------------------|
| 1. Motor (+) | 4. In-car sensor signal |
| 2. Sensor ground (-) | 5. Sensor power(+) |
| 3. Humidity sensor signal | 6. Motor(+) |



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

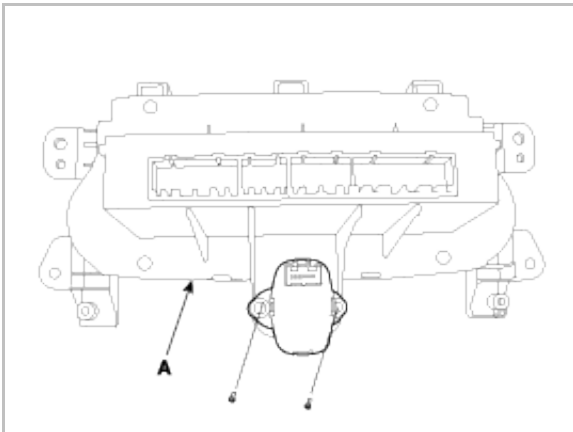
Temperature [°C(°F)]	Resistance between terminals 2 and 4 (kΩ)
0 (32)	97.83 ± 2.61%
15 (59)	47.12 ± 1.45%
25 (77)	30.00 ± 1.20%
35 (95)	19.60 ± 1.44%
50 (122)	10.82 ± 2.26%

NOTICE

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 A/C control panel. (Refer to BD group).
3. Disconnect the connector of in-car sensor (A). Loosen the mounting 2 screws and then remove the in-car sensor (B).



4. Installation is the reverse order of removal.

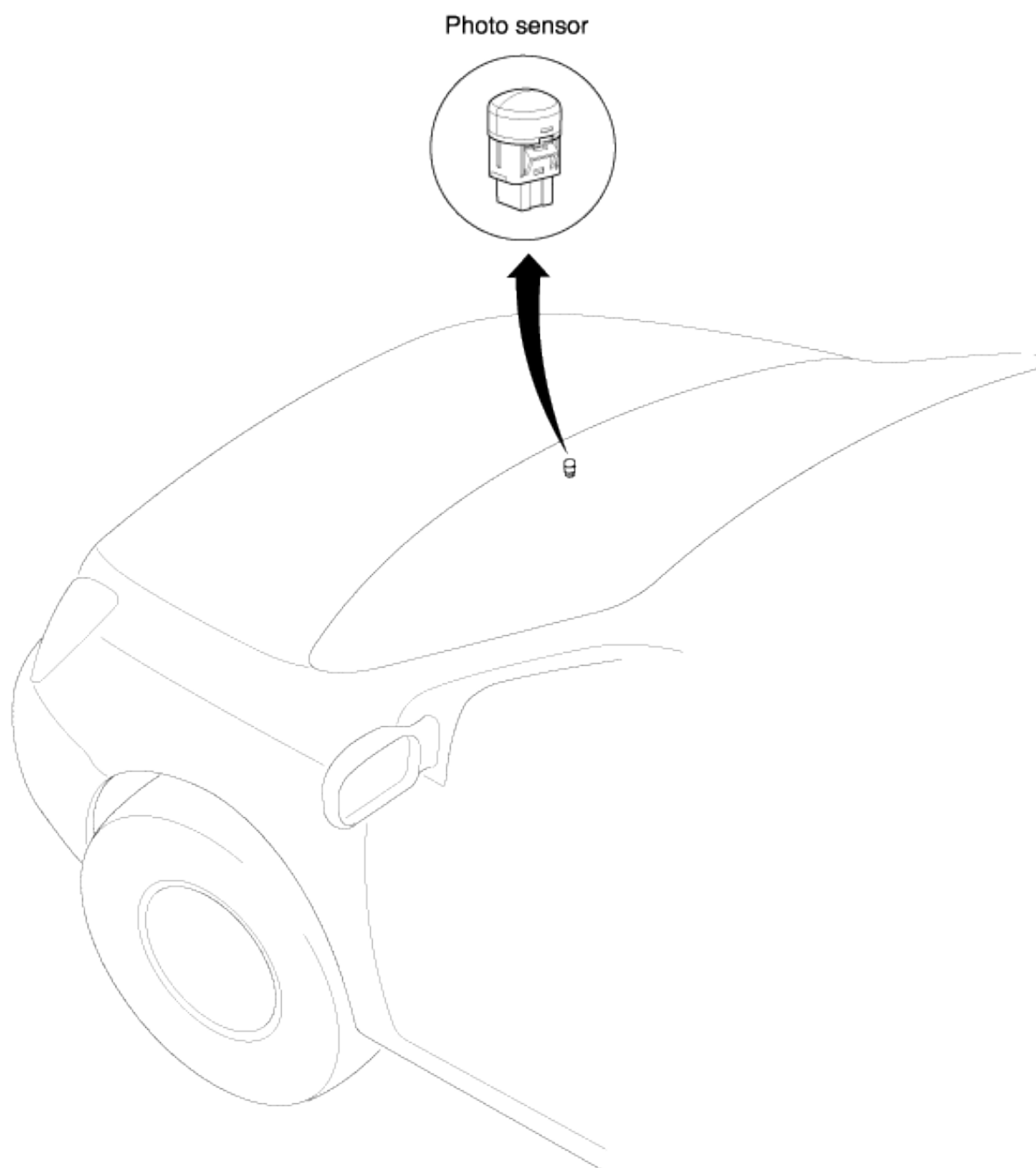


Heating,Ventilation, Air Conditioning

Air Conditioning System - Photo sensor



COMPONENT LOCATION





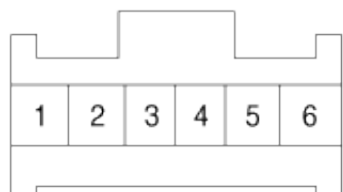
DESCRIPTION

1. The photo sensor (A) is located at the center of defrost nozzle.
2. 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.



INSPECTION

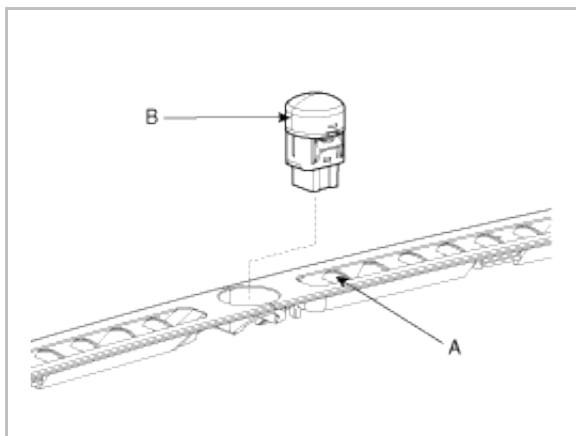
1. Ignition "ON"
2. Using the scan tool.
3. Emit intensive light toward photo sensor using a lamp, and check the output voltage change.
4. The voltage will rise with higher intensive light and reduce with lower intensive light.



- | | |
|-------------|--------------------|
| 1. Ground | 4. - |
| 2. 5V (Vcc) | 5. Photo sensor(+) |
| 3. Signal | 6. Photo sensor(-) |

REPLACEMENT

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



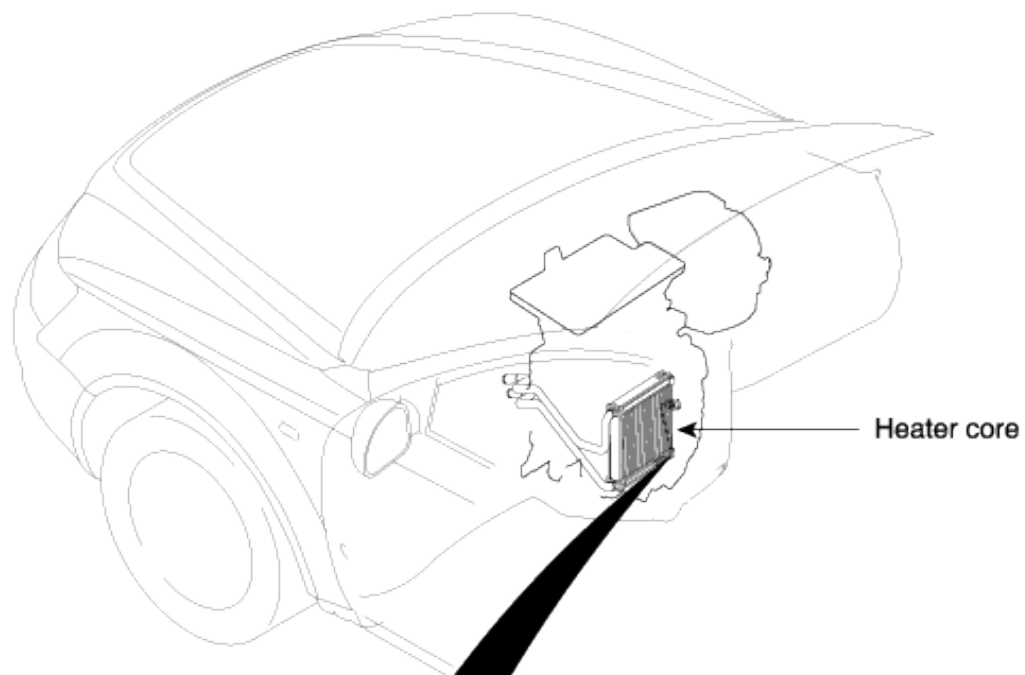
3. Install in the reverse order of removal.



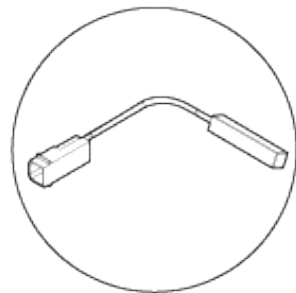
Heating, Ventilation, Air Conditioning

Air Conditioning System - Water
Temperature Sensor

COMPONENT LOCATION



Heater core

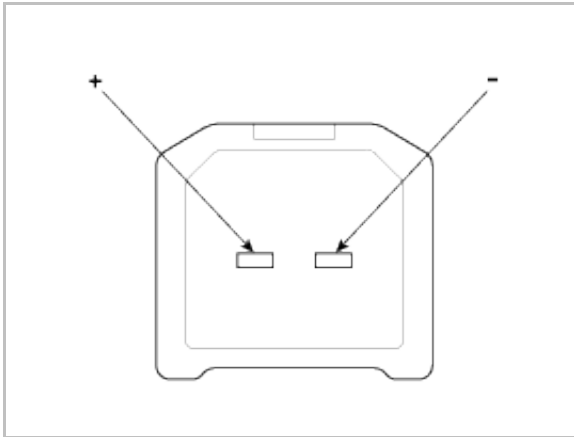


Water temperature sensor



DESCRIPTION

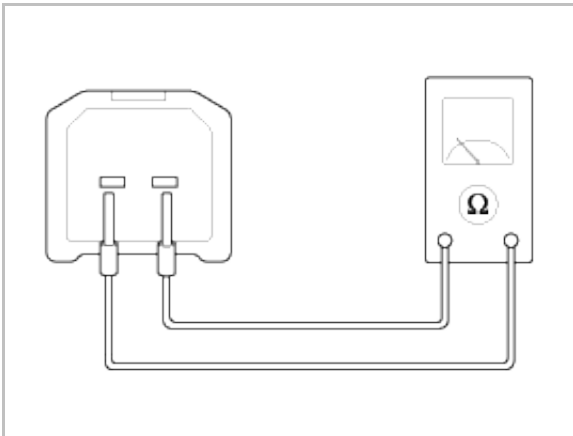
1. Water temperature sensor is located at the heater unit.
2. It detects coolant temperature. Its signal is used for cold engine lockout control. When the driver operates the heater before the engine is warmed up, the signal from sensor causes the heater control unit to reduce blower motor speed until coolant temperature reaches the threshold value.





INSPECTION

1. Ignition "ON"
2. Using the multi-tester, Measure resistance between terminal "1" and "2" of water temperature sensor.



Specification

Coolant temperature [°C(°F)]	Resistance (kΩ)	Voltage (V)
-10(14)	55.85 ± 3%	4.24 ± 3%
0(32)	32.91 ± 3%	3.83 ± 3%
10(50)	19.99 ± 3%	3.33 ± 3%
20(68)	12.51 ± 3%	2.78 ± 3%
30(86)	8.047 ± 3%	2.23 ± 3%
40(104)	5.311 ± 3%	1.73 ± 3%
50(122)	3.588 ± 3%	1.32 ± 3%
60(140)	2.476 ± 3%	0.99 ± 3%
70(158)	1.742 ± 3%	0.74 ± 3%
80(176)	1.246 ± 3%	0.55 ± 3%

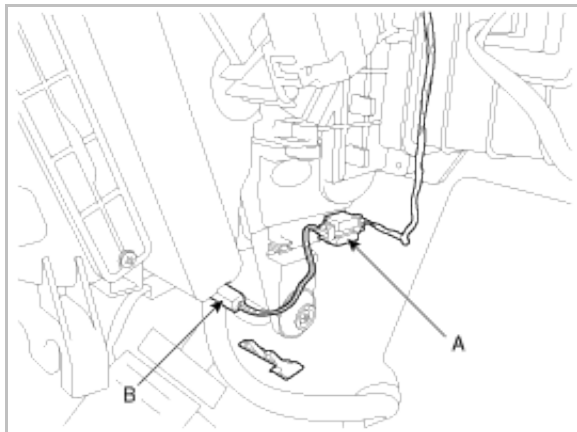
3. If the measured resistance is not specification, substitute with a known-good water temperature sensor and check for proper operation.
4. If the problem is corrected, replace the water temperature sensor.

NOTICE

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 grove box. (Refer to BD group)
3. Disconnect the connector (B) of water temperature sensor and then remove the water temperature sensor(A) by pulling out.



4. Installation is the reverse order of removal.

NOTICE

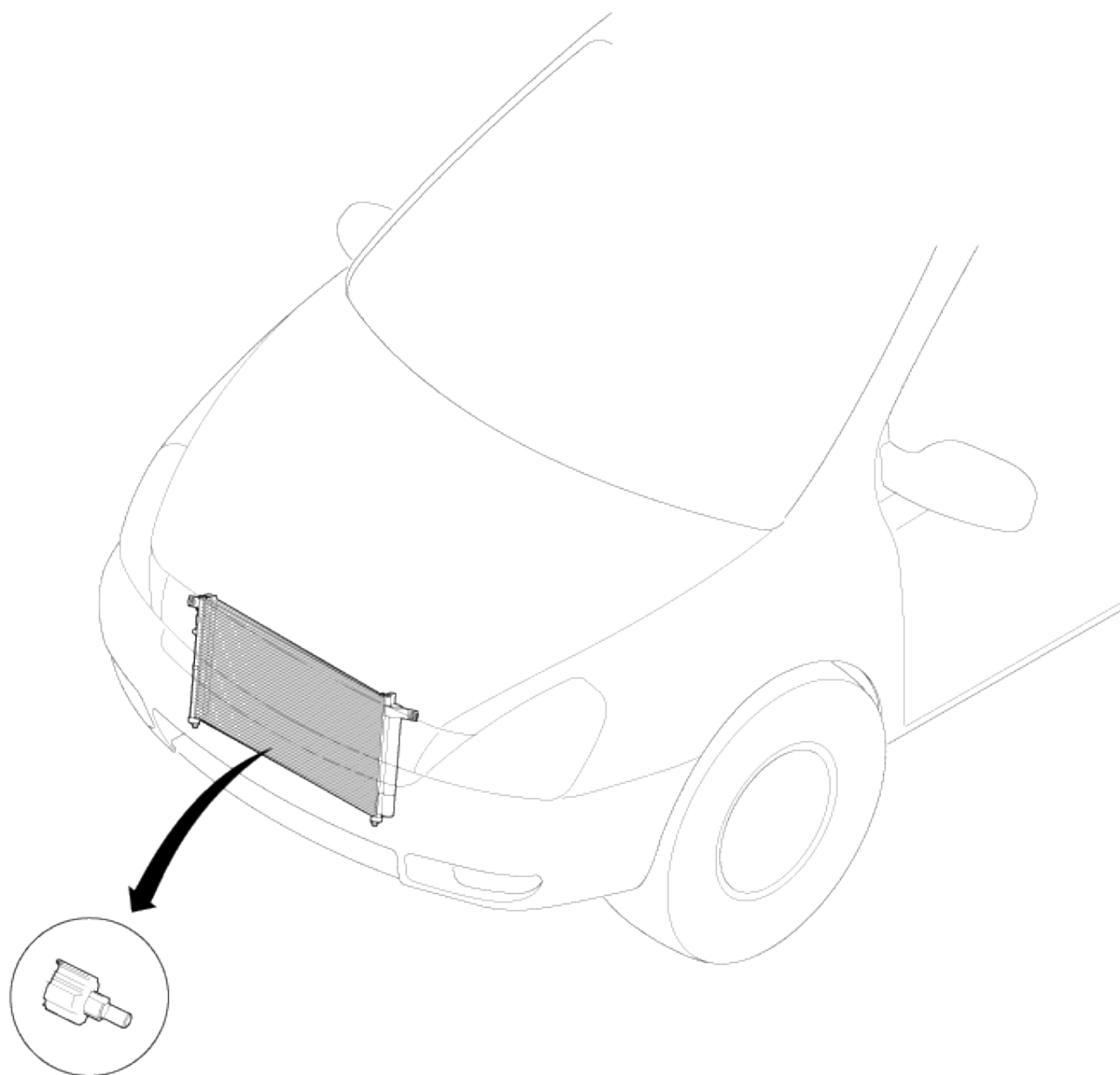
Take care that wire of water temperature sensor is not to be damaged



Heating,Ventilation, Air Conditioning

Air Conditioning System - Ambient sensor

COMPONENT LOCATION



Ambient sensor



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.

NOTICE

.....
If the ambient temperature is below -3°C (26.2°F), the A/C compressor will be stopped.
The compressor will be operated by manual operating.

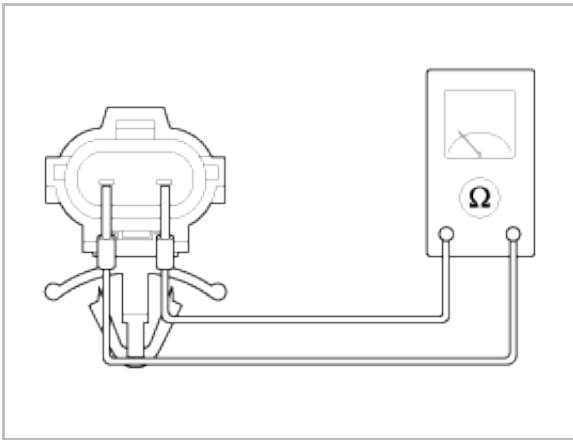


INSPECTION

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

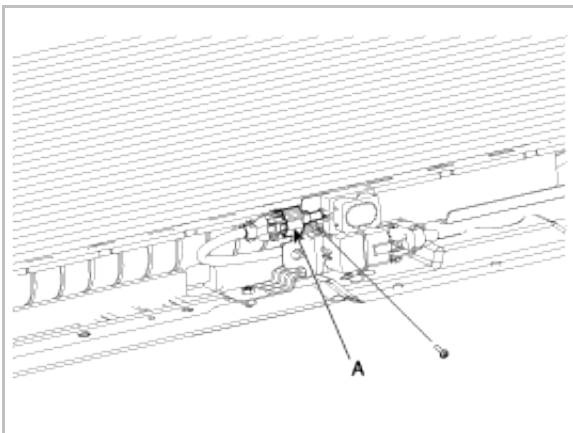
Ambient temperature [$^{\circ}\text{C}$ ($^{\circ}\text{F}$)]	Resistance between terminals 1 and 2 (k Ω)
-10(14)	$164 \pm 3\%$
0 (32)	$97.5 \pm 3\%$
10 (50)	$59.6 \pm 3\%$
20 (68)	$37.5 \pm 3\%$



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)
3. Remove the ambient temperature sensor (A).



4. Installation is the reverse order of removal.

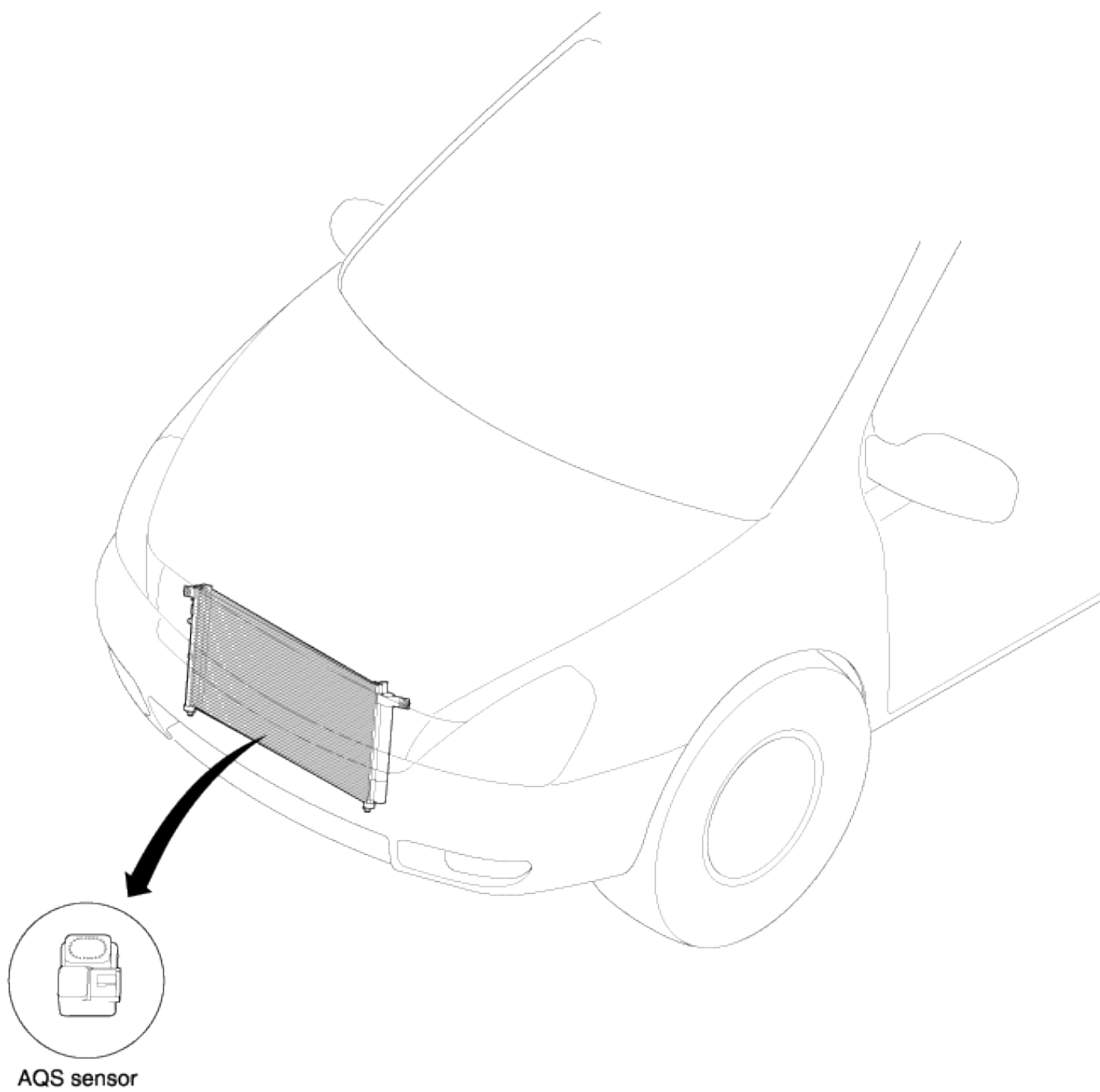


Heating,Ventilation, Air Conditioning

Air Conditioning System - Air Quality Sensor(AQS)



COMPONENT LOCATION





DESCRIPTION

1. A.Q.S is located at center support in front of the engine radiator, and detects hazardous elements in ambient air providing output signal to control.
2. It will detect sulfurous acid gas, carbon dioxide, carbon monoxide, hydrocarbon and allergen.

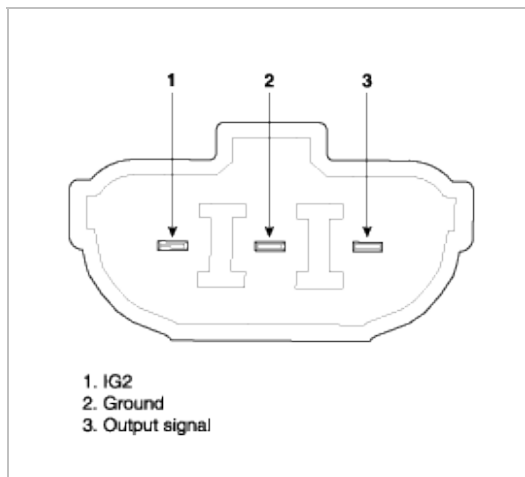


INSPECTION

1. Ignition "ON"
2. Using the scan tool.
3. Check the output voltage of AQS between terminals 2 and 3.

Specification

Condition	Output signal	Fresh/recirculation
Normal condition	4 ~ 5V	Fresh
Hazardous gas detection	0 ~ 1V	Recirculation



4. AQS diagnosis and fail safe

Detect the open of signal for 7 seconds without choosing the AQS switch when IG on.

If 2.5V or more is detected for 3.5 seconds or more among 7 seconds, be judged the open of AQS signal.

Operate as below fail safe function, while choosing AQS.

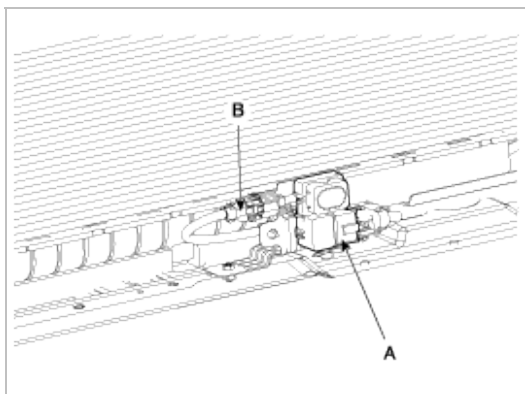
Fail safe: Release the AQS (AQS cannot be selected), Fresh/recirculation maintains previous situation of AQS selection.

NOTICE

When IG is turned ON, AQS heats for 34±5 seconds, it will output below 1.0 voltage during this time.

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper (Refer to BD group).
3. Remove the AQS (A) after loosening the mounting screws (B).



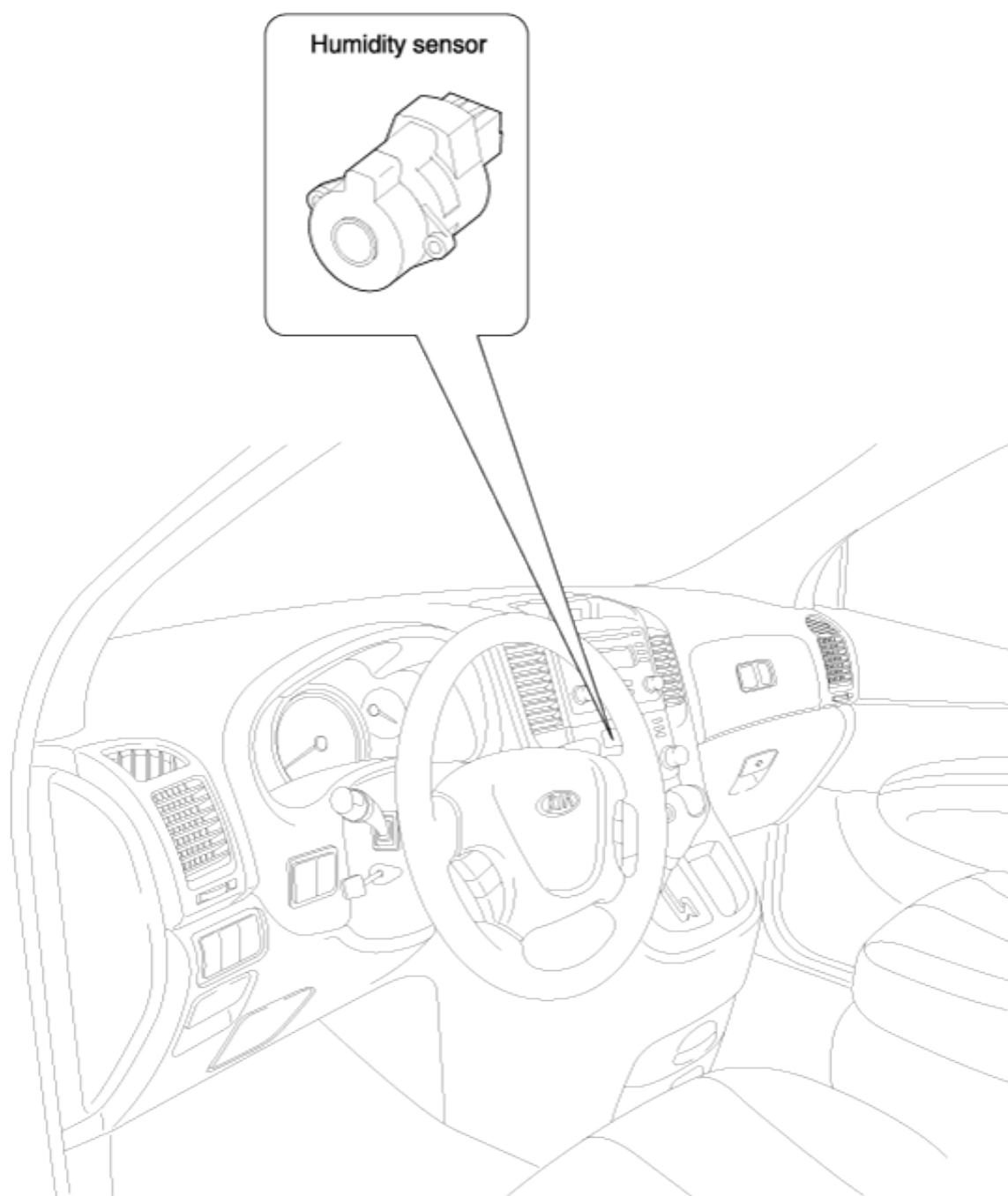
4. Installation is the reverse order of removal.



Heating,Ventilation, Air Conditioning

Air Conditioning System - Humidity Sensor

COMPONENT LOCATION

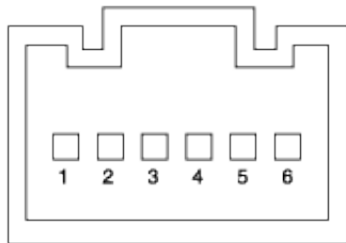




DESCRIPTION

1. Humidity sensor is located at the lower crush pad and detected in-car humidity for in-car humidity control.
2. If ambient air temperature or in-car humidity is outside certain range, it will turn on A/C to control in-car humidity preventing in car fogging.

Air conditioner operation depends on ambient temperature and humidity.



- | | |
|---------------------------|-------------------------|
| 1. Motor (+) | 4. In-car sensor signal |
| 2. Sensor ground (-) | 5. Sensor power(+) |
| 3. Humidity sensor signal | 6. Motor(+) |



INSPECTION

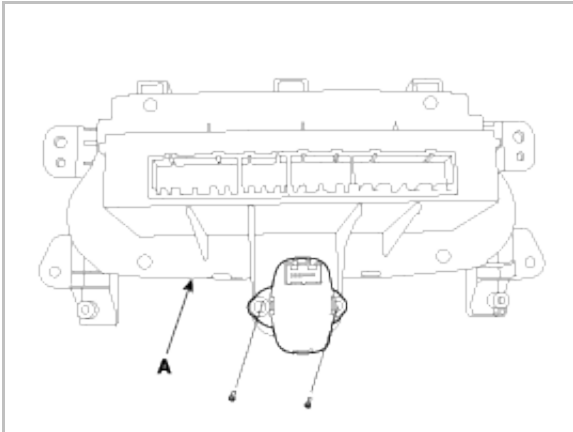
1. Ignition "ON"
2. Using the scan tool.
3. Check the frequency of humidity sensor between terminals 2 and 3.

Humidity (%)	Frequency between terminals 2 and 3 (Hz)
30	6976 $\pm$ 5%
50	6728 $\pm$ 5%
60	6600 $\pm$ 5%
70	6468 $\pm$ 5%
80	6330 $\pm$ 5%
90	6186 $\pm$ 5%

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

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the center facia lower panel (A). (Refer to BD group)
3. Disconnect the humidity sensor connector (A).
4. Loosen 2 screws and then remove the humidity sensor (B).



5. Installation is the reverse order of removal.

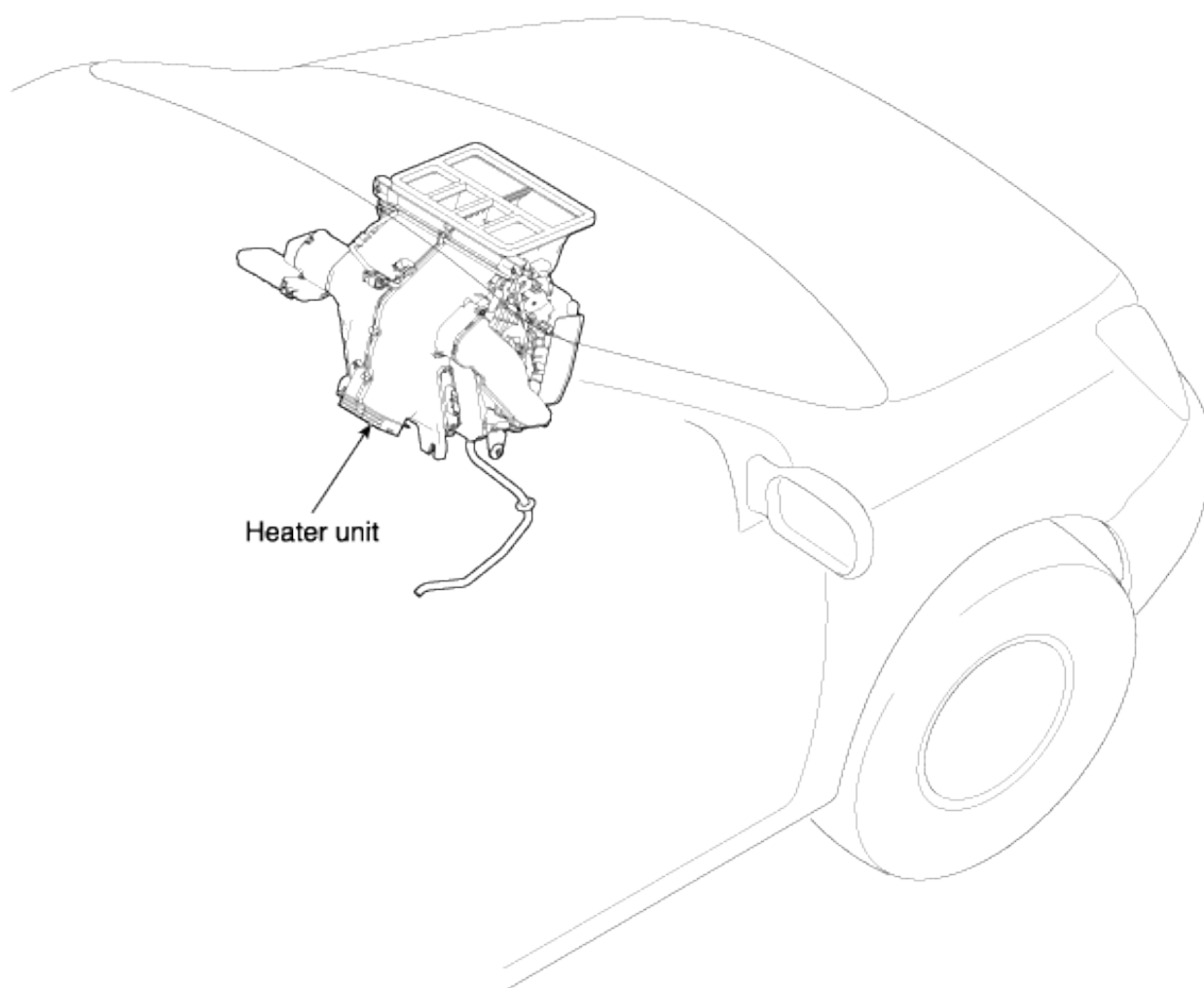


Heating,Ventilation, Air Conditioning

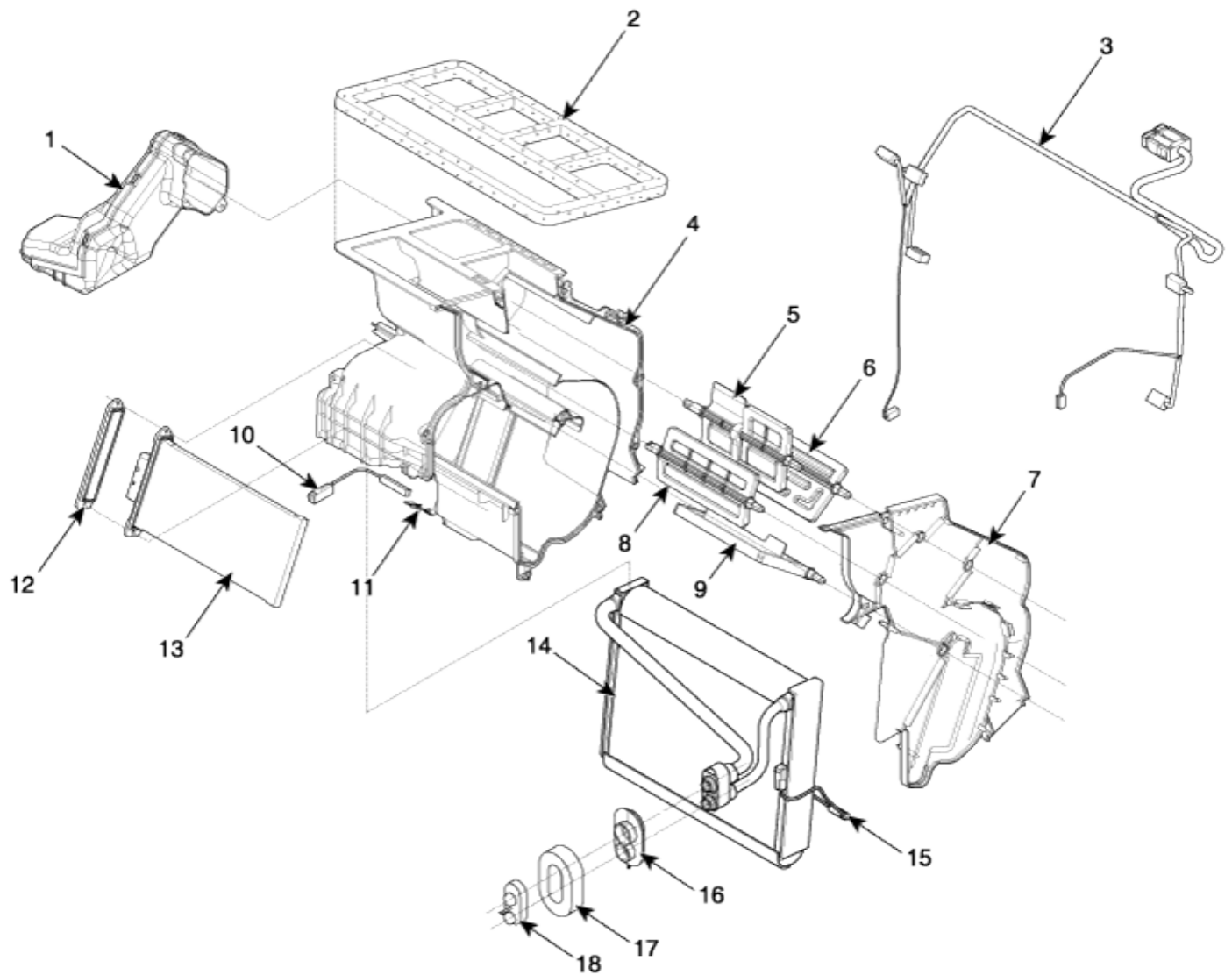
Heater - Heater Unit



COMPONENT LOCATION

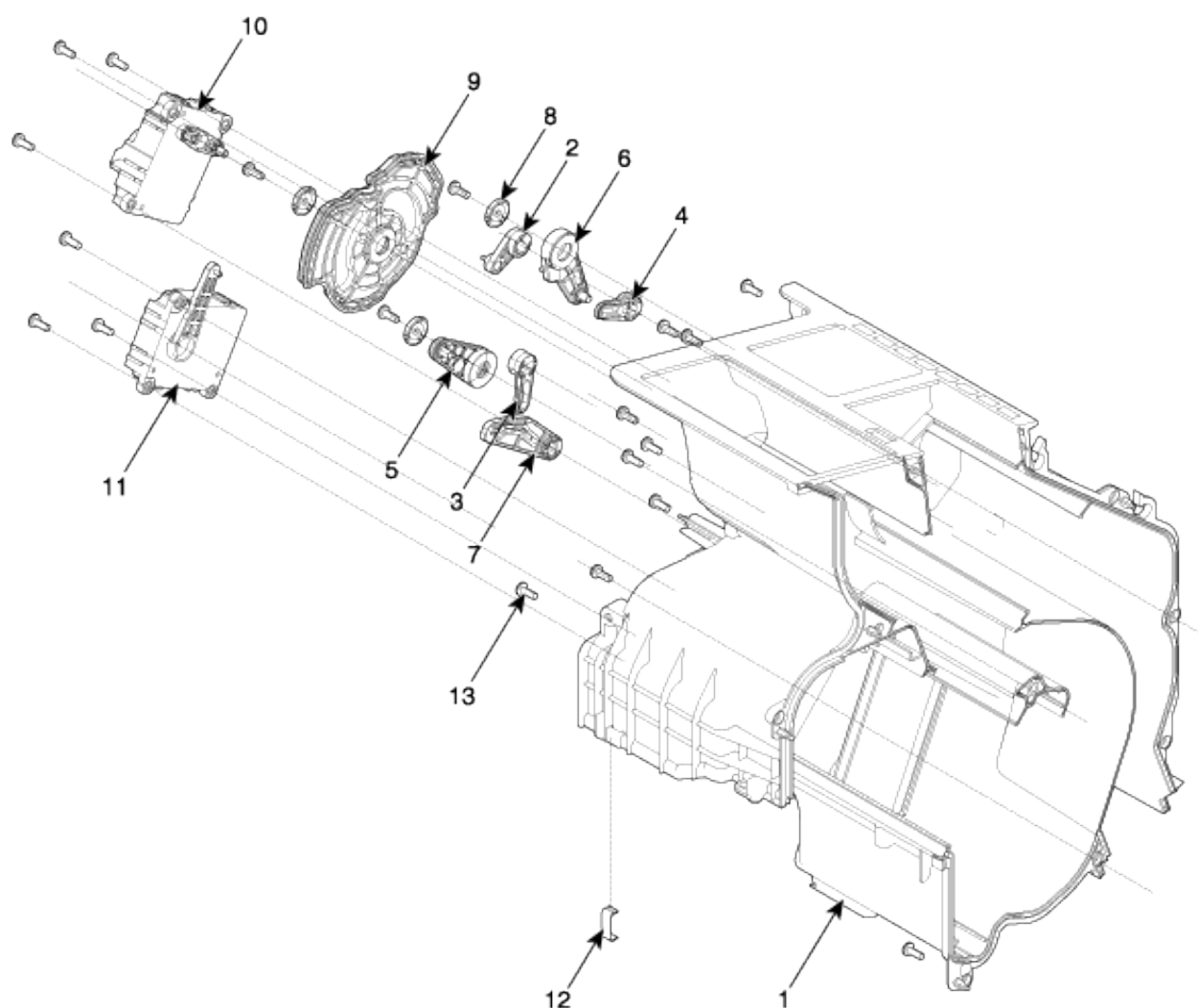


COMPONENTS



1. Shower duck(R)
2. Frame duct seal
3. Wire harness assembly
4. Heater case(R)
5. Vent door assembly(R)
6. Foot door assembly(R)
7. Blind case
8. DEF door assembly(R)
9. Mix door assembly(R)

10. Water temp sensor
11. Water temp sensor clip
12. PTC cover
13. PTC heater
14. Eva core assembly
15. Eva(duct) sensor
16. Eva flange cover
17. Flange seal
18. Flange cover



1. Heater case(R)

2. Vet mode lever

3. Pef mode lever

4. Foot mode lever

5. Def mode sub lever(R)

6. Foot mode sub lever(R)

7. Mix lever(R)

8. Tension washer

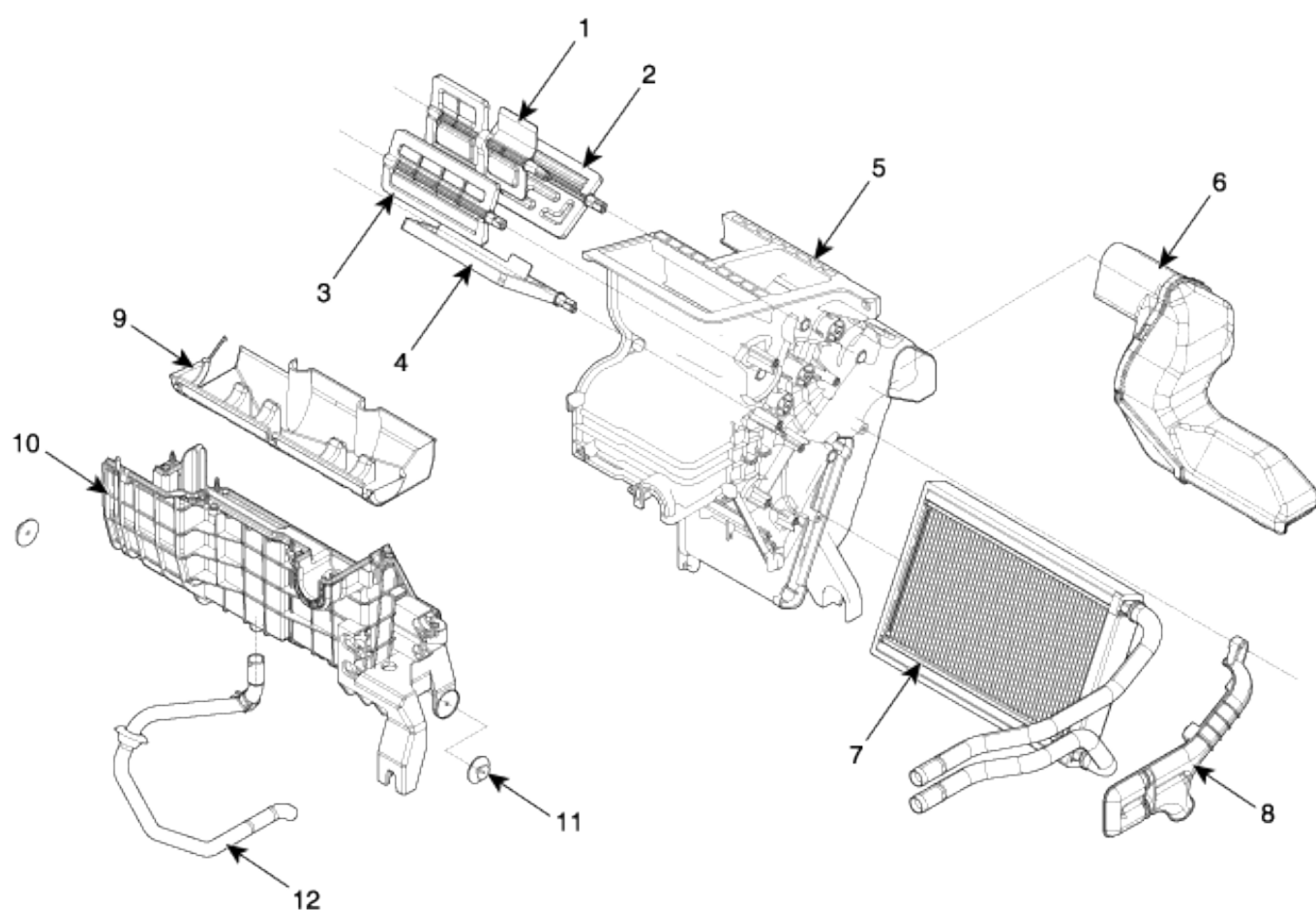
9. Mode main lever

10. Mode actuator assembly(R)

11. Mix actuator assembly(R)

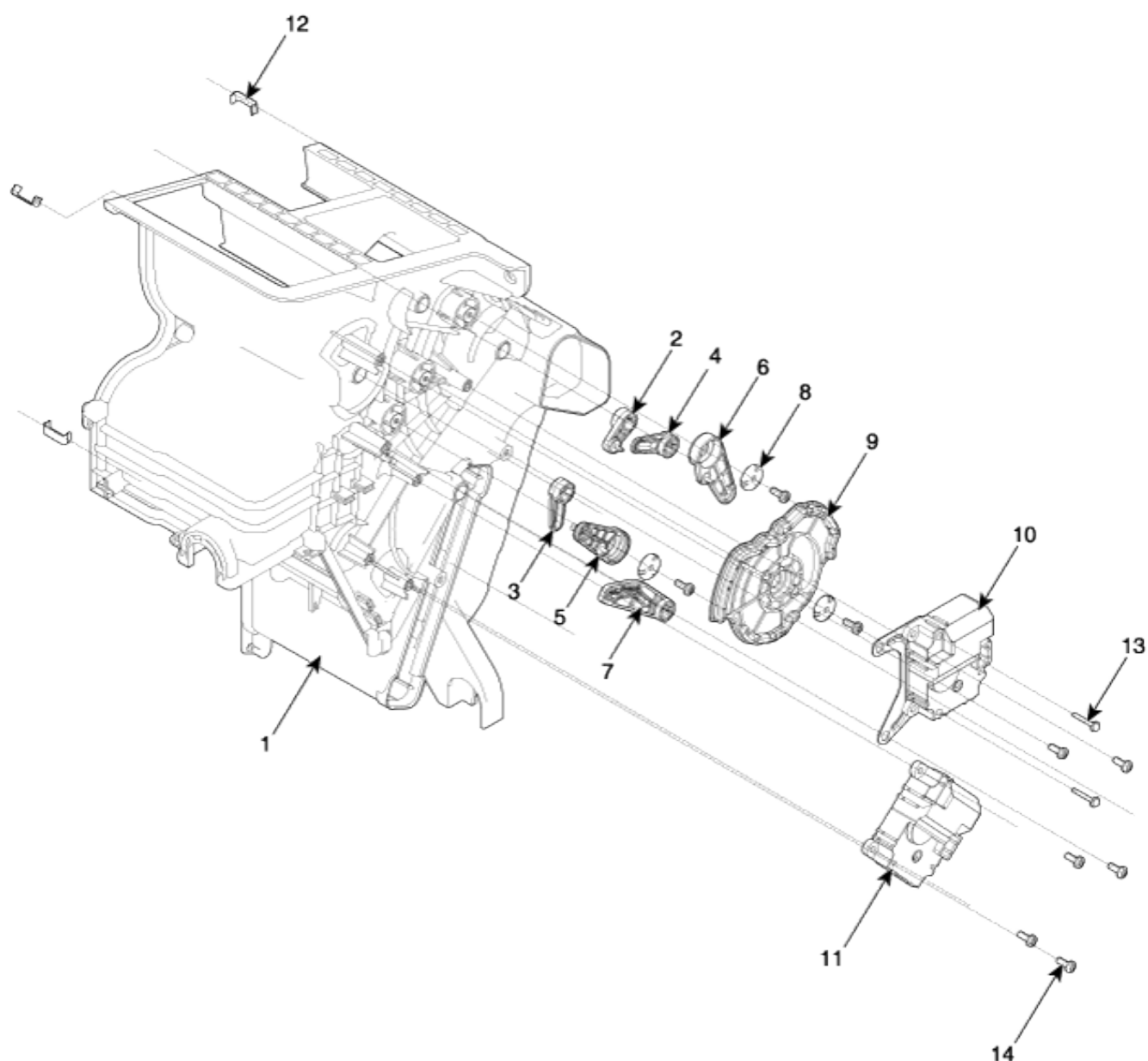
12. Case clip

13. Case screw



1. Vet door assembly(L)
2. Foot door assembly(L)
3. Fef door assembly(L)
4. Mix door assembly(L)
5. Heater case(L)
6. Shower duct(L)

7. Heater core assembly
8. Heater pipe cover
9. Lower case seal
10. Lower case
11. Bush
12. Drain hose assembly

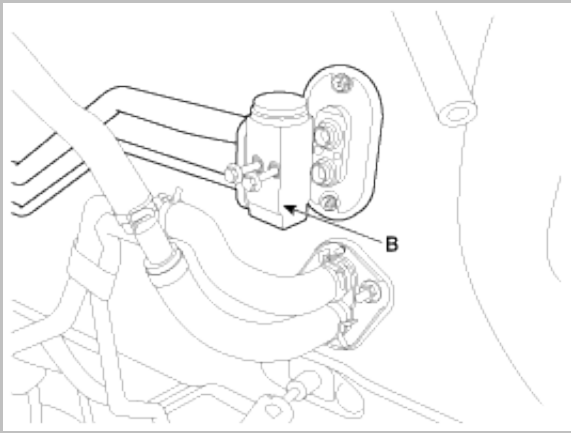


- | | |
|---------------------------|-------------------------------|
| 1. Heater case(L) | 8. Tension washer |
| 2. Vent mode lever | 9. Mode main lever |
| 3. Def mode lever | 10. mode actuator assembly(L) |
| 4. Foot mode lever | 11. Mix actuator assembly(L) |
| 5. Def mode sub lever(L) | 12. Case clip |
| 6. Foot mode sub lever(L) | 13. Screw with washer |
| 7. Mix lever(L) | 14. Case serew |

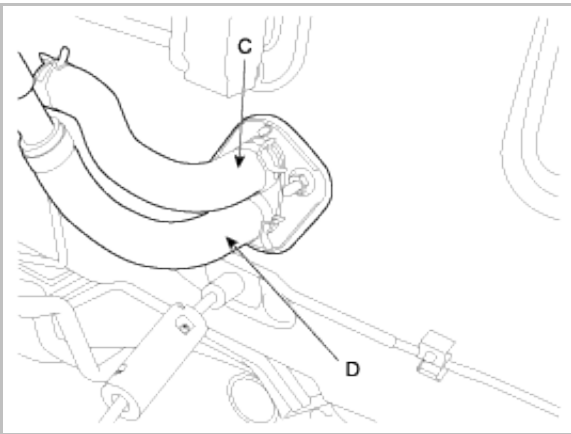


REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/ recycling/ charging station. (Refer to HA-8)
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.



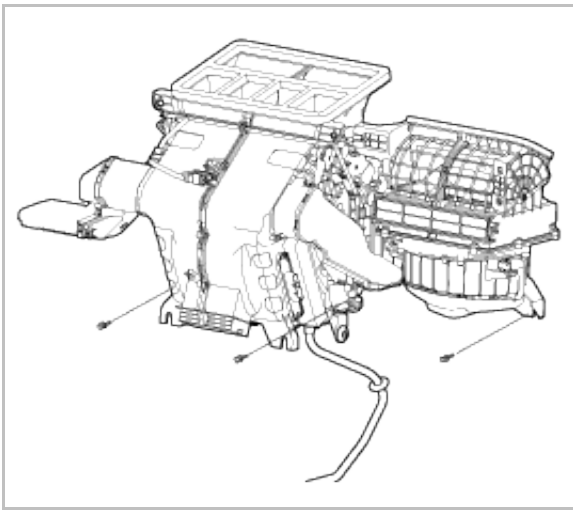
5. Disconnect the inlet (A) and outlet (B) heater hoses from the heater unit.



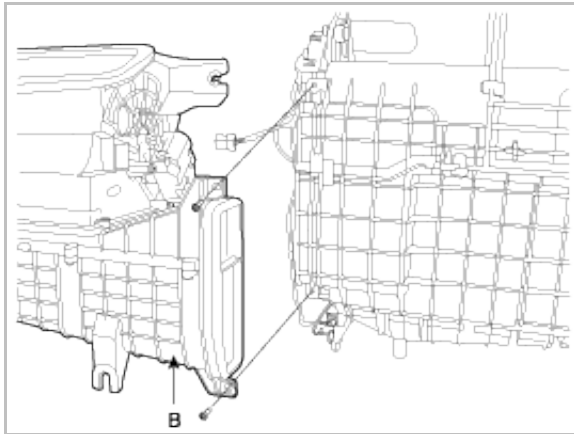
CAUTION

Engine coolant will run out 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.

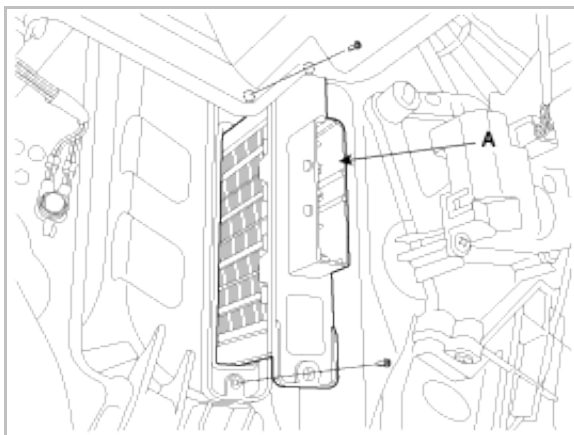
6. Remove the crash pad (Refer to BD group).
7. Remove the cowl cross bar assembly. (Refer to BD group)
8. Disconnect the connectors from the temperature control actuator, the mode control actuator and the evaporator temperature sensor.
9. Remove the heater & blower unit after loosening 3 mounting bolts.



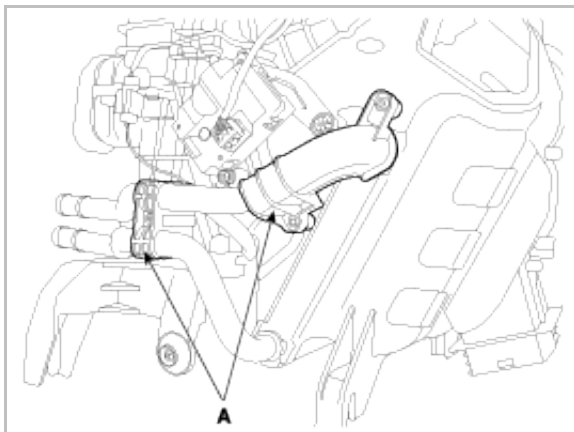
10. Remove the blower unit (B) from heater unit after loosening 2 screws.



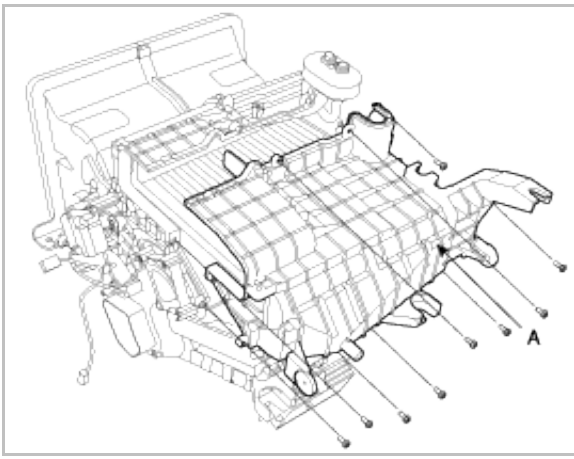
11. Remove the self-tapping screws (A) and remove the PTC heater unit (B) or cover. (In case of PTC heater)



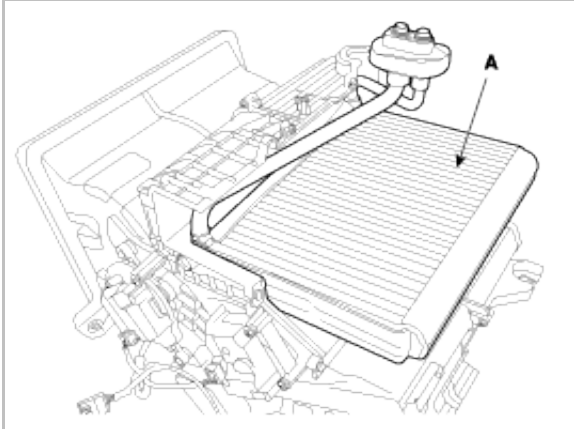
12. Remove the heater core (B) after remove the cover (A).



13. Loosen a screw and then remove the heater unit cover(A).



14. Remove the evaporator core(A).



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

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

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

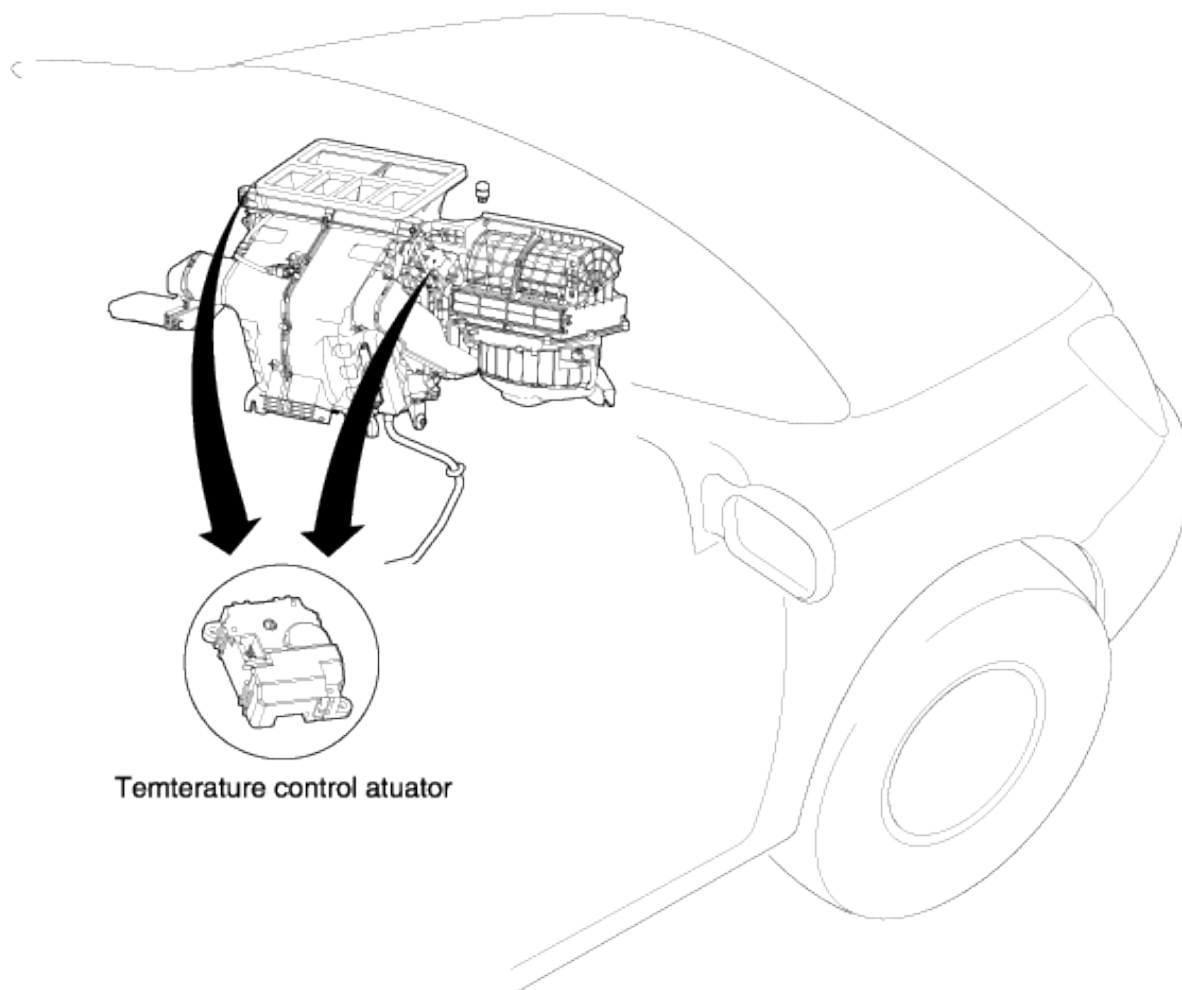
- A. If you're installing a new evaporator, add refrigerant oil (ND-OIL8).
- B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
- C. Immediately after using the oil, replace 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 the paint ; if the refrigerant oil contacts the paint, wash it 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

COMPONENT LOCATION



Temterature control atuator



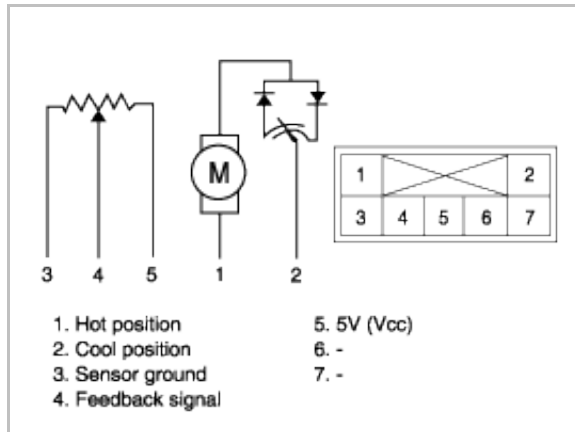
DESCRIPTION

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

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 1 and grounding terminal 2.
Verify that the temperature control actuator operates to the cool position when connecting in the reverse.

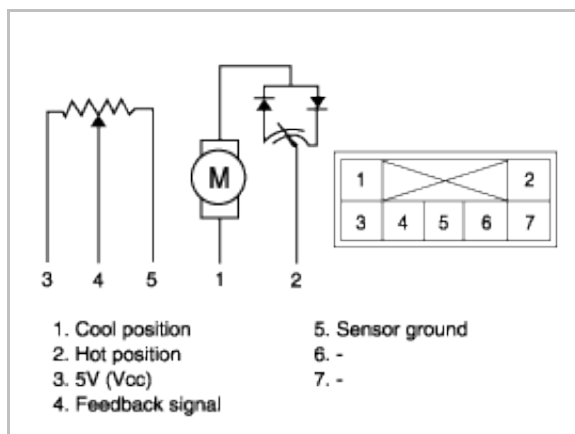
[PASSENGER]



Specification

Door position	Voltage (3-4)	Error detecting
Max. cooling	$0.4 \pm 0.15V$	Low voltage : 0.1V or less
Max. heating	$4.6 \pm 0.15V$	High voltage : 4.9V or more

[DRIVER]



Specification

Door position	Voltage (4-5)	Error detecting
Max. cooling	$0.4 \pm 0.15V$	Low voltage : 0.1V or less
Max. heating	$4.6 \pm 0.15V$	High voltage : 4.9V or more

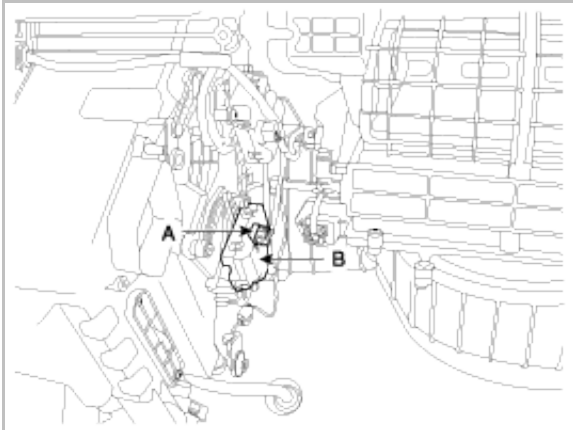
It will feedback current position of actuator to controls.

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

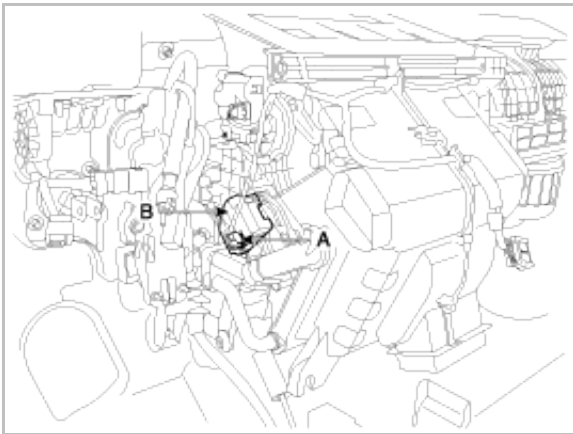
REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the driver's crush pad lower panel (Refer to BD group).
3. Disconnect the temperature control actuator connector (A) after removing the air duct.
4. Loosen the mounting screw and then remove the temperature control actuator (B).

[Passenger's]



[Driver's]



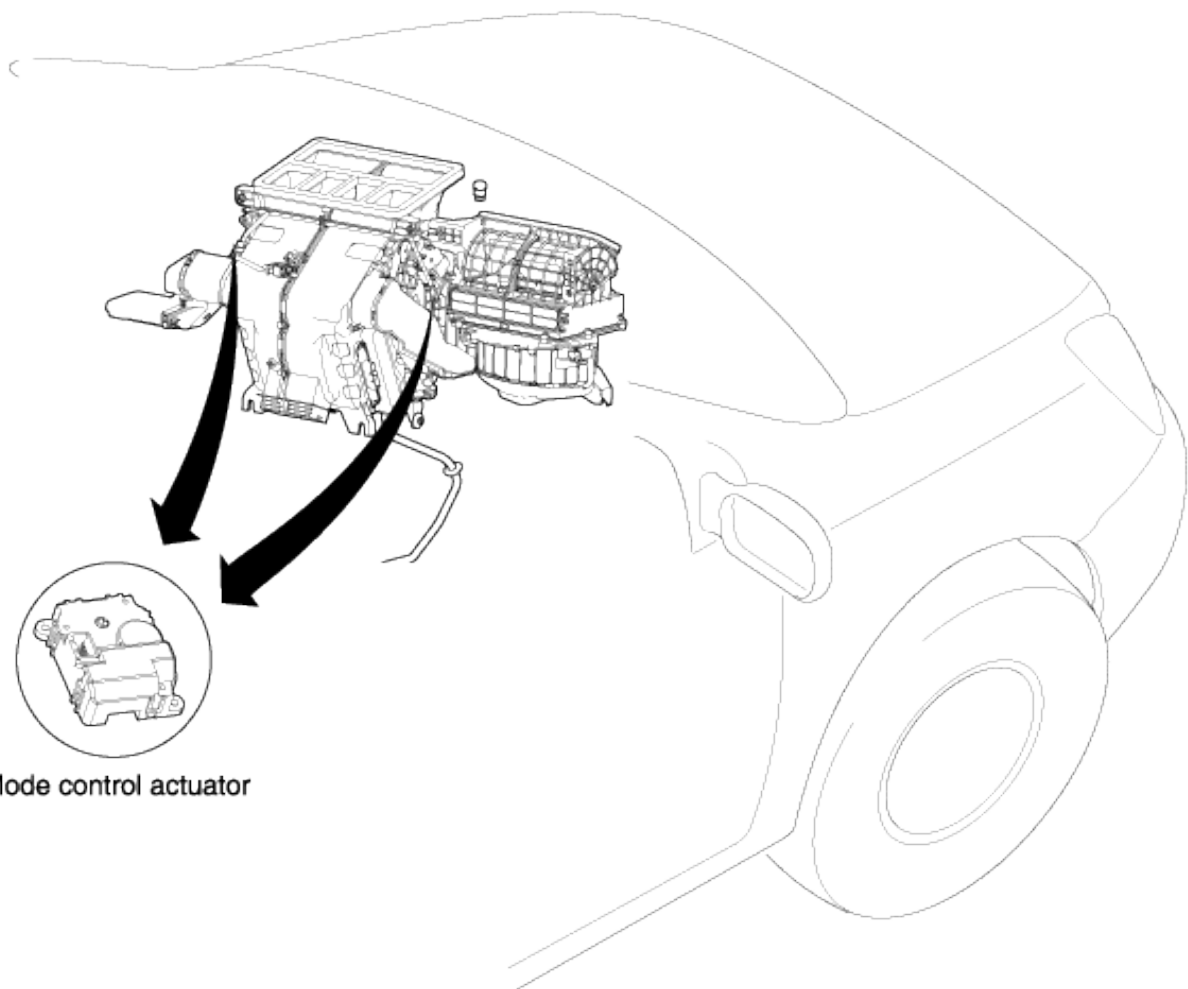
5. Installation is the reverse order of removal.



Heating,Ventilation, Air Conditioning

Heater - Mode Control Actuator

COMPONENT LOCATION



Mode control actuator



DESCRIPTION

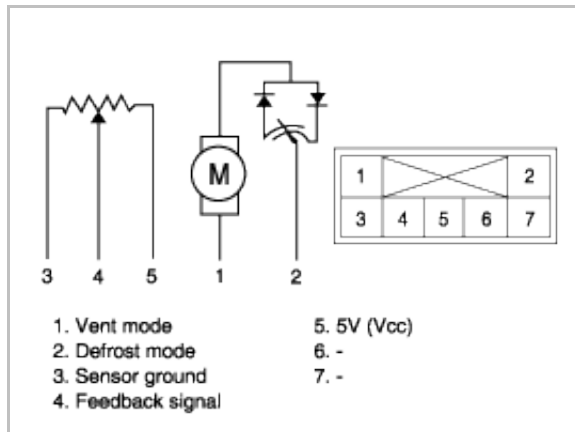
The mode control actuator is located at the heater unit.

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.

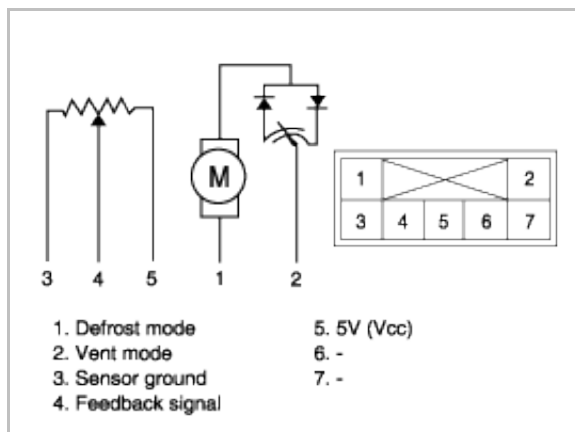
INSPECTION

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 1 and grounding terminal 2.
4. Verify that the mode control actuator operates to the vent mode when connecting in the reverse.

[DRIVER]



[PASSENGER]



5. Check the voltage between terminals 3 and 4.

Door position	Voltage (3-4)	Error detecting
Vent	$0.4 \pm 0.15V$	Low voltage :0.1V or less
Defrost	$4.6 \pm 0.15V$	High voltage :4.9V or more

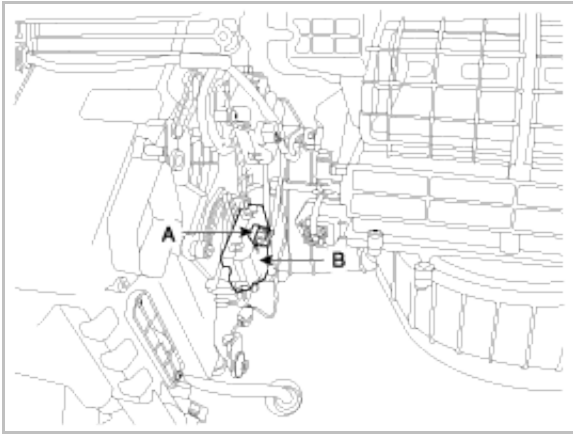
It will feedback current position of actuator to controls.

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

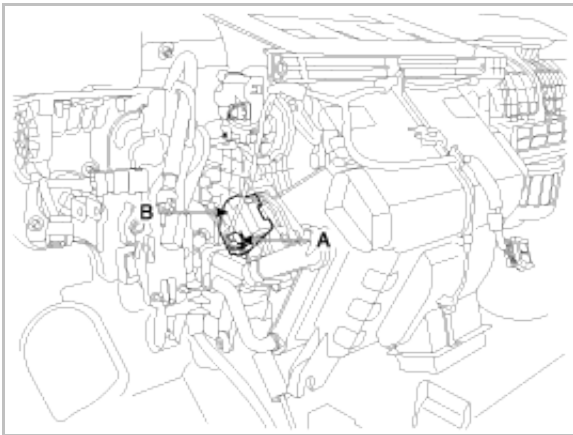
REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the driver's crush pad lower panel (Refer to BD group).
3. Disconnect the temperature control actuator connector (A) after removing the air duct.
4. Loosen the mounting screw and then remove the temperature control actuator (B).

[Passenger's]



[Driver's]



5. Installation is the reverse order of removal.

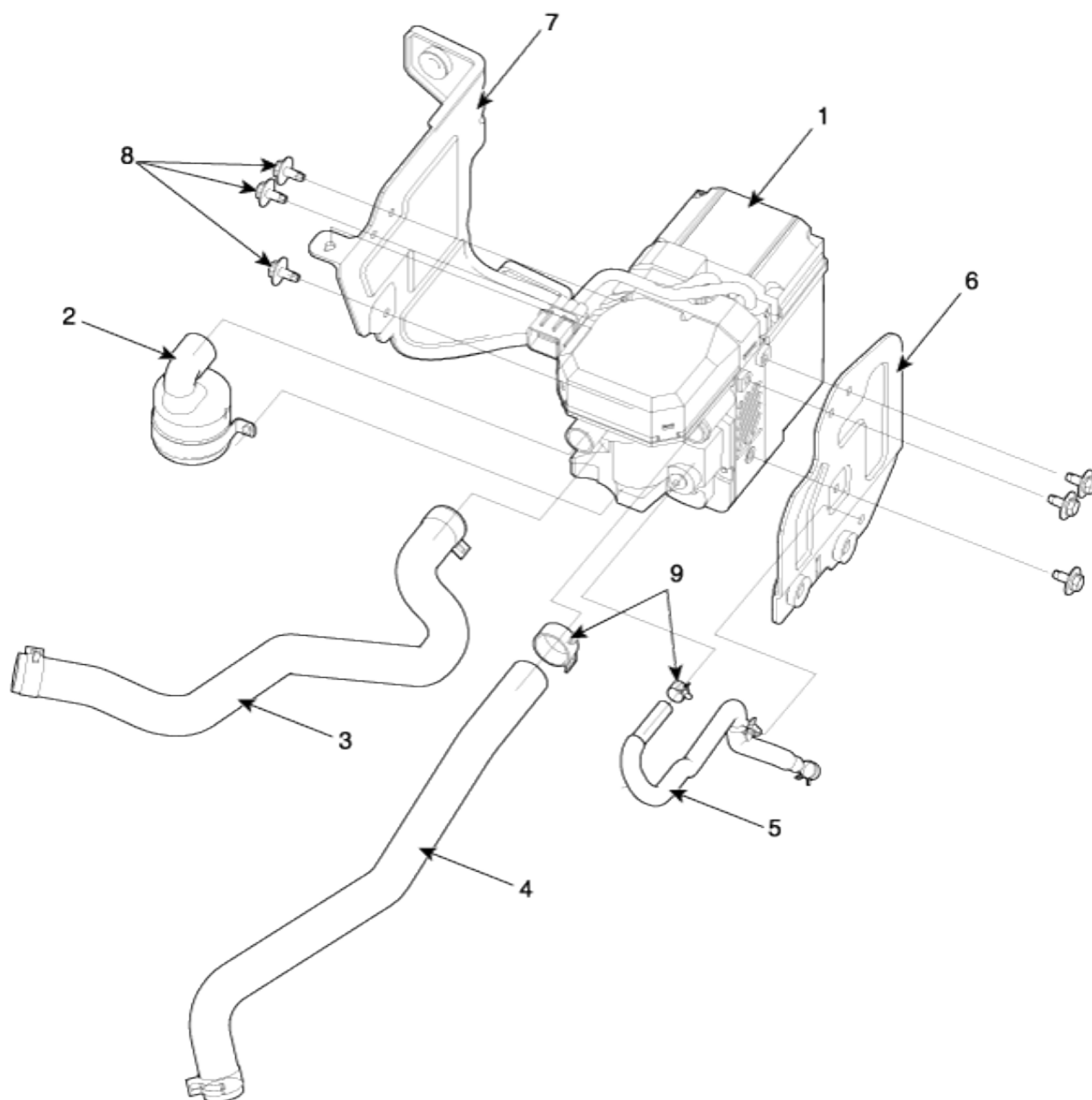


Heating, Ventilation, Air Conditioning

Heater - Fuel Fired Heater



COMPONENT LOCATION

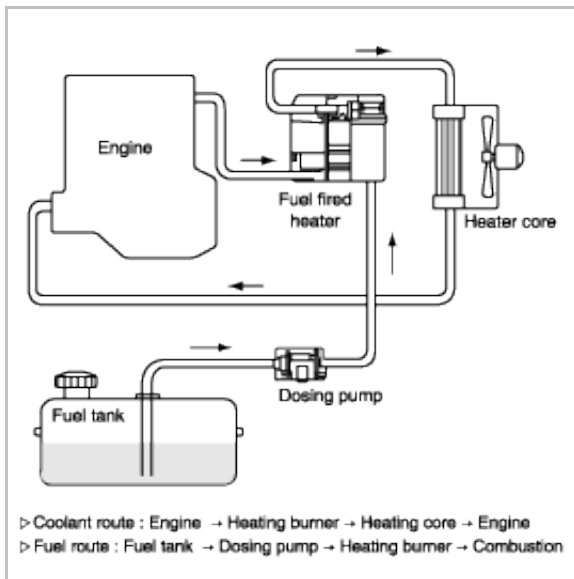


- 1. Fuel fired heater assembly
- 2. Intake air silencer
- 3. Water hose(Inlet)
- 4. Water hose(Outlet)
- 5. Fuel hose

- 6. Bracket(No.1)
- 7. Bracket(No.2)
- 8. Bolt
- 9. Clamp

DESCRIPTION

The fuel fired heater has been applied to the diesel engine (CRDi) to increase heating capability by using diesel only in cold weather



CAUTION

- Follow the procedures specified in this bulletin during service or it may cause personal injury.
- Be sure to turn the fuel fired heater off when refueling at station.
- The fuel fired heater must be mounted at designated position, never in the passenger compartment.
- The fuel fired heater must be kept below 120°C or a permanent failure on the components may occur.
- Operational principle : The following 3 conditions should be met at the same time for automatic operation of the fuel fired heater.
 - Engine runs.
 - Ambient temperature is lower than 2°C (Winter)
 - Coolant temperature is lower than 68°C
- Cleaning process
 - A cleaning process of the fuel fired heater will be performed automatically when the heater is not operated due to increase of coolant temperature and ignition off.
 - During cleaning process, supplied fuel in the heater will be burnt completely and any smoke will be expelled.

It is a necessary process for next operation and durability of the heater and takes about 3 minutes.

Others

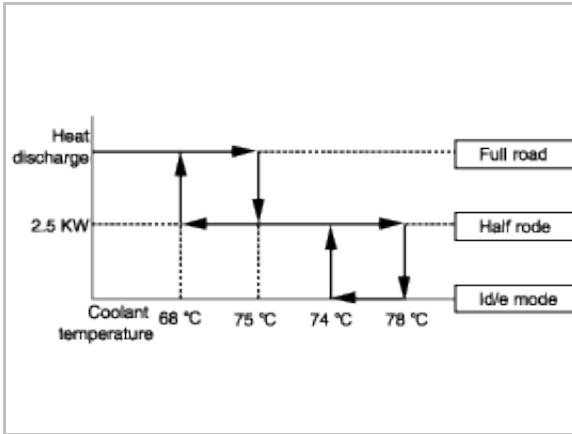
The following symptoms should be explained to customers or technicians as a normal occurrence.

- A white smoke may come out from the fuel fired heater exhaust pipe installed at the front side of the right front tire during operation of the heater.
This is not an exhaust fumes.
When moisture in the fuel and air is discharged from the heater and is met cold ambient air, it is condensed and looks like a white smoke however, when an excessive black smoke is discharged, the fuel fired heater should be inspected.
- A "buk-buk" noise from the heater is a noise to form flame for combustion. This is a normal operation.
- When the heater is operated at full load, a "Wooing" noise is occurred.
- When shutting off the engine during heater operation, a "Wing" noise is occurred to perform the cleaning process.

OVERVIEW

1. This fuel fired heater supplies additional heat to the interior compartment with a low fuel consumption to compensate the heat provided by engine alone.

2. The fuel fired heater has been adopted to warm up the interior compartment in a short time.
3. The two coolant temperature sensors are installed to the heater inner. The sensor valves determine heater operation.
4. One of the temperature sensors functions to prevent the heater from overheating.
If the sensor temperature valve exceeds 125°C, the fuel will be cut and the heater will be deactivated by the determination of the overheating of the heater.
The other temperature sensor determines the operation mode of the fuel fired heater. The temperature of this sensor enables to activate the heater at full load (5kw) or half load (2.5kw).
• The coolant temperature shown on the above Figure is the value of the inner sensor and the actual coolant temperature is higher about 5°C ~7°C than the above value.



OPERATION

Switch on/ Operation start

The fuel fired heater is operated when the coolant temperature is below 68°C and the ambient temperature is below 2°C after starting the engine.

At this time, the glow plug and combustion air fan are operated first and after 30 seconds, the dosing pump is operated with stopping the combustion fan for 3 seconds.

After that, the operation of the fan increases continuously until it approaches to full load within 56 seconds. If fuel supply reaches to full load the glow plug does not operate and the operation of the fan reaches to full load.

After that the glow plug monitors ignition condition as a flame sensor for 45 seconds.

The above operation procedure is done automatically and in case the ignition fails, the above operation will be done again automatically.

If the condition of ignition failure sustains continuously, fuel supply and fan operation will be stopped and error codes will be stored to find cause of failure.

Generally, the cause of ignition failure during combustion is caused by the automatic re-operation of the above procedure.

Operation for heating

The fuel fired heater operates at full load when the coolant temperature is below 68°C and the ambient temperature is below 2°C after starting the engine.

It operates at half load when the coolant temperature is 74°C and it operates at idle mode when the coolant temperature is 78°C.

The fuel fired heater during the transformation process does a cleaning function from the half mode to the idle mode. At idle mode, all components do not work.

The fuel fired heater operating at idle mode turns into the half load when the coolant temperature is 74°C. At this time, if the coolant temperature drops again below 68°C, the heater operates with full load and turns into the idle mode if the temperature is 78°C.

This serial operating process is performed automatically.

Key switch off / Operation stop

The fuel fired heater ECU stops the operation of the fuel pump and cuts fuel supply when shutting off the engine during the heater operation.

The heater conducts cleaning operation at this time.

This is a process of burning the fuel completely supplied in the heater inner.

In this process, the glow plug and combustion air fan are operated.

When the cleaning process is over, the operation of the heater is stopped.

The time for cleaning when the engine is turned off during the operation of the heater at full load is about 175 seconds.

About 100 seconds are required to conduct the cleaning of the heater at half load condition.

The operating sound of cleaning the heater is heard from the outside of the heater after turning the engine off and this is a normal process of operation



INSPECTION

OPERATION TEST

Fuel-fired heater operation test by force using Hi-Scan

1. Start the engine.
2. Connect the Hi-Scan to the vehicle.
3. Select "SORENTO" and then select "FUEL FIRED HEATER".
4. Select "04. ACTUATION TEST" mode.
5. Select "PREFILLING + HEATING" to conduct the performance test after replacing the fuel fired heater system. Fuel supply and heating will be initiated if the "F1 key STRT" is pressed. However, a repair or replacement of the components related to the fuel line system in the fuel-fired heater were not done, operate the component by force after selecting the appropriate item from the menu screen.

1.4 ACTUATOR TEST	
PREFILLING +HEATING	
DURATION	UNUIL STOP KET
METHOD	ACTIVATION
CONDITION	ENGINE RUNNING
	NO FUEL
PRESS [START] IF YOU ARE READY	
START	STOP

NOTICE

Do not operate the system by force with selecting the " PREFILLING + HEATING " option if no repair for the fuel line relating components has been done.

This means the fuel is in the fuel line.If an excessive fuel is supplied, it may cause smoke and abnormal "Banging" noise when the fuel is burned.

If the "F2 KEY STOP" is pressed, operation test is stopped.

For self-diagnosis test and sensors outputs during compulsory operation test, press "ESC KEY".

When a self-diagnosis test is completed, disconnect the self-diagnosis connector or press "F2 KEY STOP" from the "PREFILLING + HEATING" menu to stop the compulsory operation.

In case of selecting the individual part (ex. Combustion air fan, water pump,), press "ESC KEY" to stop the test.

In case of selecting the "PREFILLING + HEATING" option, about 2 minutes are required to conduct cleaning process after pressing the "F2 KEY STOP".

It is a normal process to burn the fuel left in the fuel line.

6. To conduct self diagnosis test, press "ESC" and then "01. DIAGNOSTIC TROUBLE CODES" option.

NO TROUBLE CODE	
NUMBER OF DTC : 0 ITEMS	
TIPS	ERAS
HELP	

7. Select "02. CURRENT DATA" to view the current status of the components.

1.2 CURENT DATA			
COOL TEMP. SENSOR	80	°C	▲
OPERATING VOLTAGE	0.0	V	■
UNDERVORTAGE THRESHOLD	0.0	V	
COMBUSTION AIR FAN ST	0	%	
DOSING PUMP STATUS	0	%	
GLOW PLUG STATUS	0	%	
COMBUSTION AIR FAN	OFF		
GROW PLUG	OFF		▼
FIX SCRN FULL TIPS GRPH RCRD			

Component test

1. Using the Hi-Scan, conduct component test after selecting "FUEL FIRED HEATER" and "ACTUATION TEST" mode.
2. After conducting component test, perform self-diagnosis test.
3. It is recommended to conduct the fuel fired heater system test after completing the component test.
4. Test values for glow plug.

Resistance : 0.324 W ~ 0.360 W

Current : < 5mA



TROUBLESHOOTING

SYMPTOM	REMEDY
Fuel smell	Check fuel system on vehicle.
	Check the fuel supply line in the fuel fired heater for fuel leaking and fuel hose for twisting or clogging.
	If none of above is affected, there is likelihood of fuel leaking from the heater inner. Repair the heater after removing it.
Heater does not work at full load	Repair the heater after removing it.
White smoke occurs continuously during operation	Repair the heater after removing it.
Shortage of coolant Smoke occurs during operation Excessive exhaust gas smell	Check coolant hose for leaking, twisting and hose clamp for looseness. If above items are normal, leaks from the heater inner may cause these symptoms. Repair the heater after removing it.
Loss of fuel	Check fuel system on vehicle.
	Check the fuel supply line in the fuel fired heater for fuel leaking and fuel hose for twisting or clogging.
	If above items are normal, there is likelihood of fuel leaking from the heater inner. Repair the heater after removing it.



SPECIFICATIONS

ITEM		OPERATION STATE	SPECIFICATION
Fuel fired heater body	Heater discharge	Full load	5.0kw
		Half load	2.5kw
	Full load		Diesel
	Fuel consumption	Full load	0.63 l/h
		Half load	0.32 l/h
	Rated voltage		12.0V
	Operation voltage range		9.5V~15.0V
	Power consumption	Full load	37w(Normal)
		Half load	13w(Normal)
	Permissible ambient temperature	At operation	-40°C~80°C
		At storage	-40°C~120°C
	Permissible operation pressure		0.4bar ~ 2.5bar
	Minimum coolant flow volume		250 l/h
	Permissible CO ₂ value		8~13 vol %

ITEM		SPECIFICATION
Dosing pump	Rated voltage	12.0V
	Operation voltage range	9.0V ~ 15.0V
	Maximum power consumption	4w(Normal)

ITEM		SPECIFICATION
Ambient switch	Rated voltage	12.0V
	Temperature of ON/OFF	ON : 2°C(Tolerance : + 3°C, -2°C)
		OFF : 8°C(Tolerance : + 2°C, -3°C)



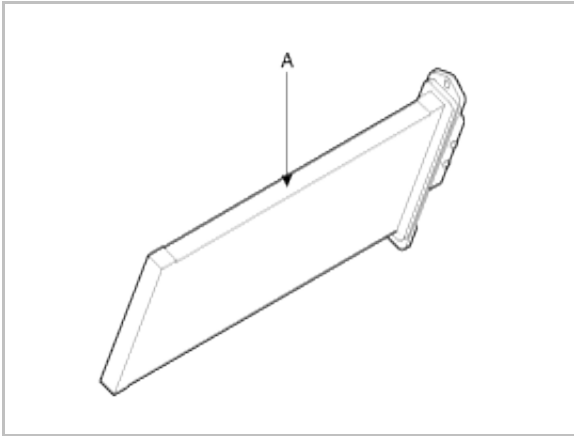
Heating, Ventilation, Air Conditioning

Heater - Positive Temperature (coefficient heater)



DESCRIPTION

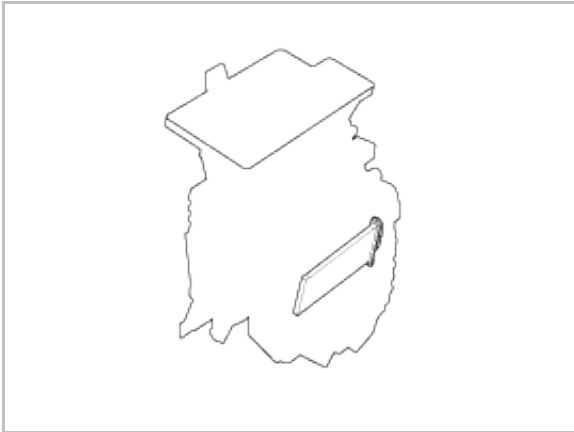
PTC (Positive Temperature Coefficient) heater (A) is an electric heater using a PTC element as an auxiliary heating device that supplements deficiency of interior heat source in highly effective diesel engine (U engine).



An electric heater heats up the interior by directly heating the air that passes through the heater.

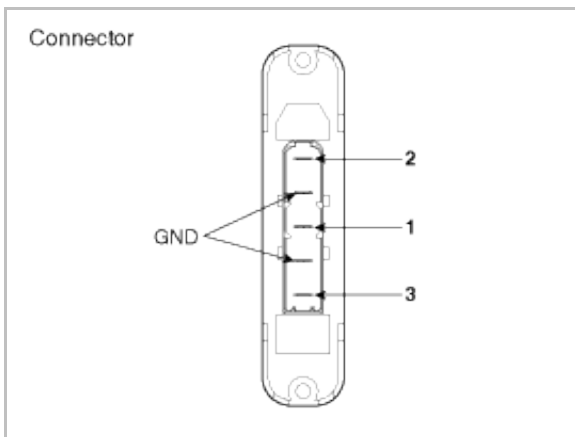
PTC = positive Temperature Coefficient

The name itself implies that the element has a proportional resistance change sensitive to temperature. PTC heater is installed at the exit or the backside of heater core.



OPERATION PRINCIPLE

ECM outputs a PTC on signal. Operate PTC from 1st setting to 3rd setting with an interval of 15 seconds. Heat up the air, which passes through a heater core.



OPERATION CONDITION

Judge the condition by ambient temperature is below 5°C, coolant temperature is below 70°C, and battery voltage is above 11V and engine RPM is above 700RPM.



INSPECTION

Inspect the PTC operation by confirmation logic as below.

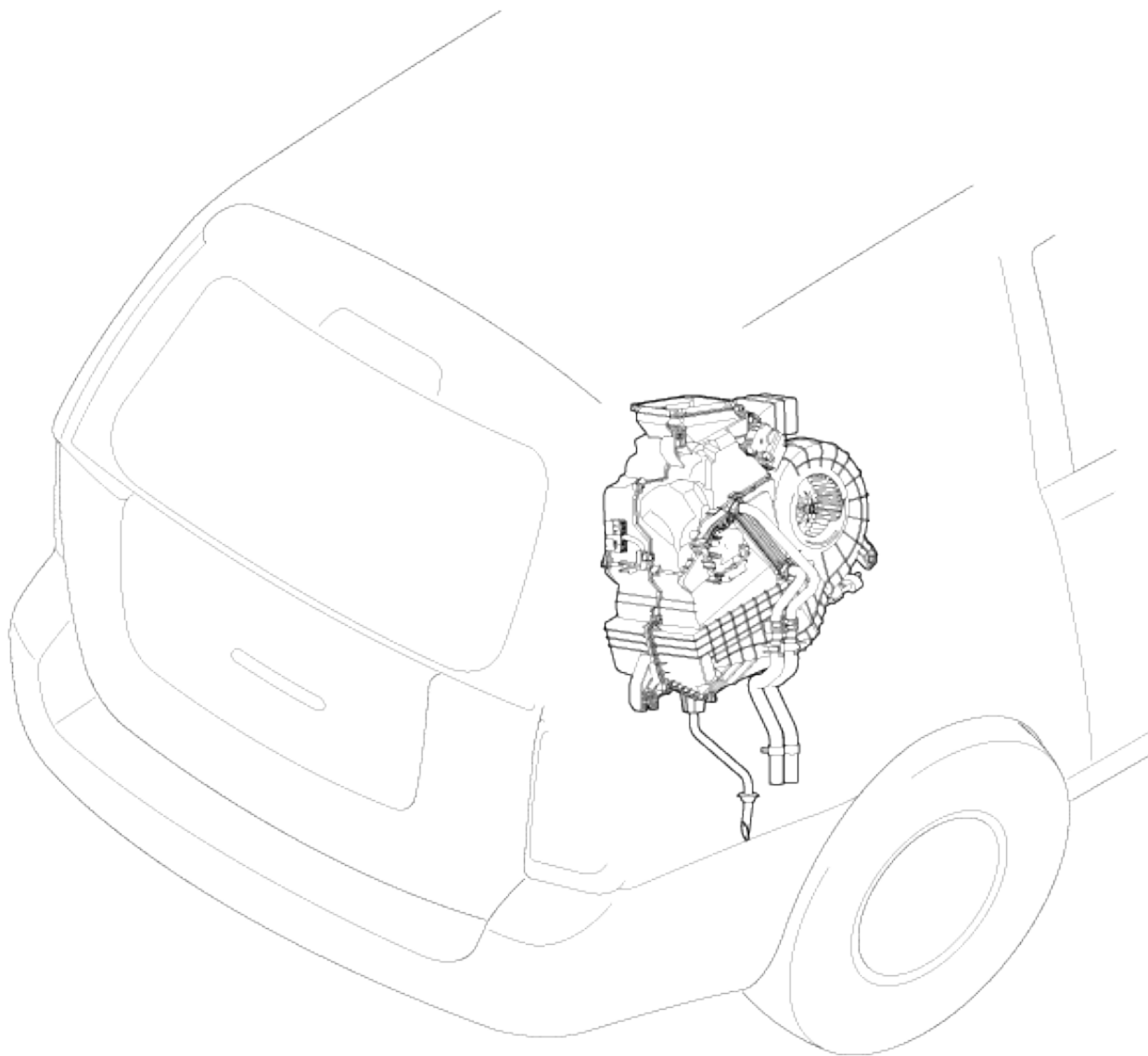
1. Entering method
 - (1) Set the floor mode, maximum heating
 - (2) Turn off the blower switch
 - (3) Press the intake button more than 5 times.
 - (4) Indicator of entire button is flashed with an interval of 0.5 seconds continuously (Manual).
Graphics of the entire LCD display switch on and off with an interval of 0.5 seconds continuously (Automatic)
 - (5) Confirm the PTC operation by operating the blower switch
Manual : 1~4 step, Automatic: 1~8step.
 - (6) Each PTC relay is operated with an interval of 3 seconds.
 - (7) Execute the PTC operation by confirmation logic for 30 seconds.
2. Cancellation method
 - (1) Select the A/C button or intake button.
 - (2) IG "OFF".
 - (3) Cancel the logic after 30 seconds automatically.
3. If the PTC operation is not operated, substitute with a known-good PTC and check for proper operation.
If the problem is corrected, replace the PTC.

Heating, Ventilation, Air Conditioning

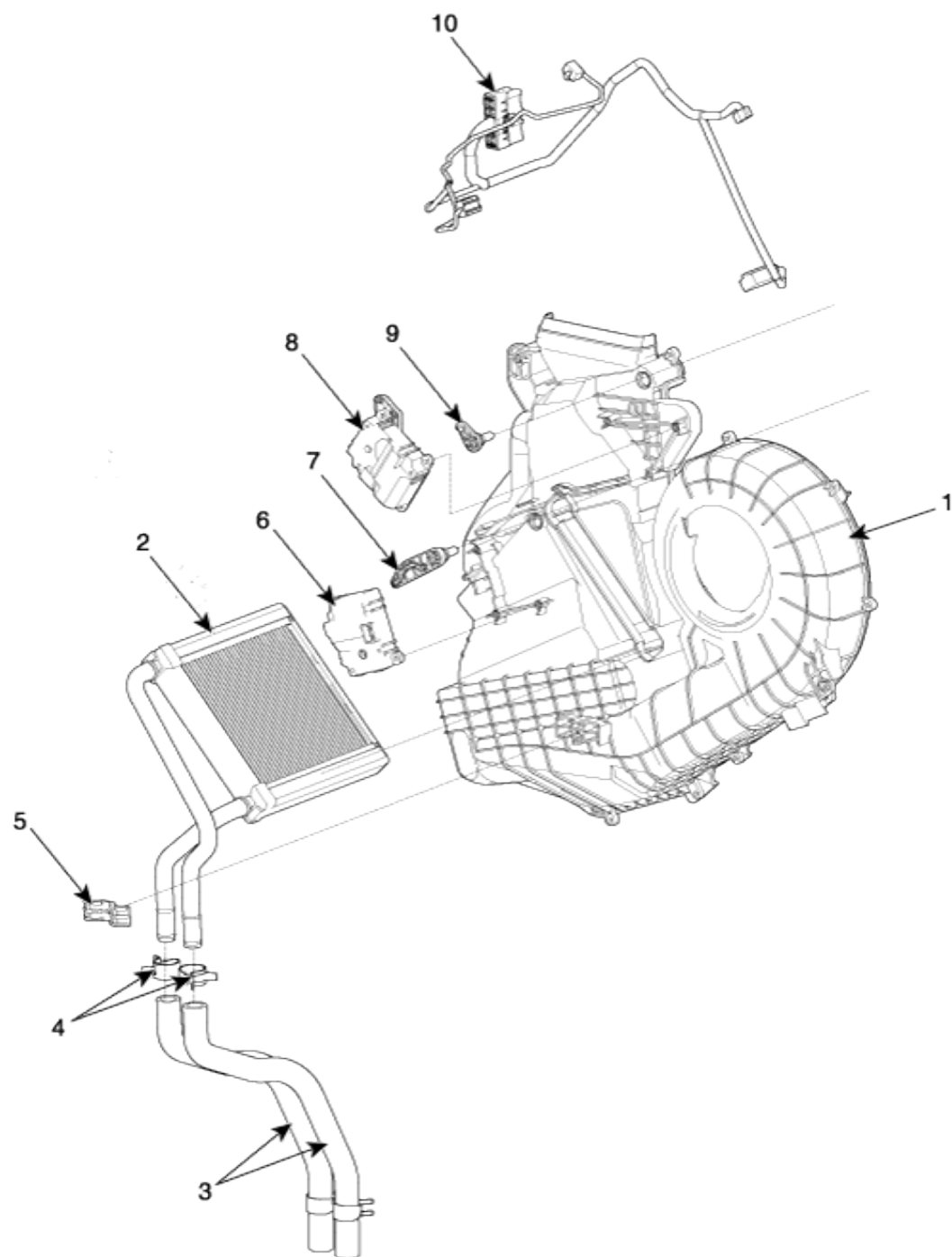
Rear Heater - Rear Heater Unit



COMPONENT LOCATION

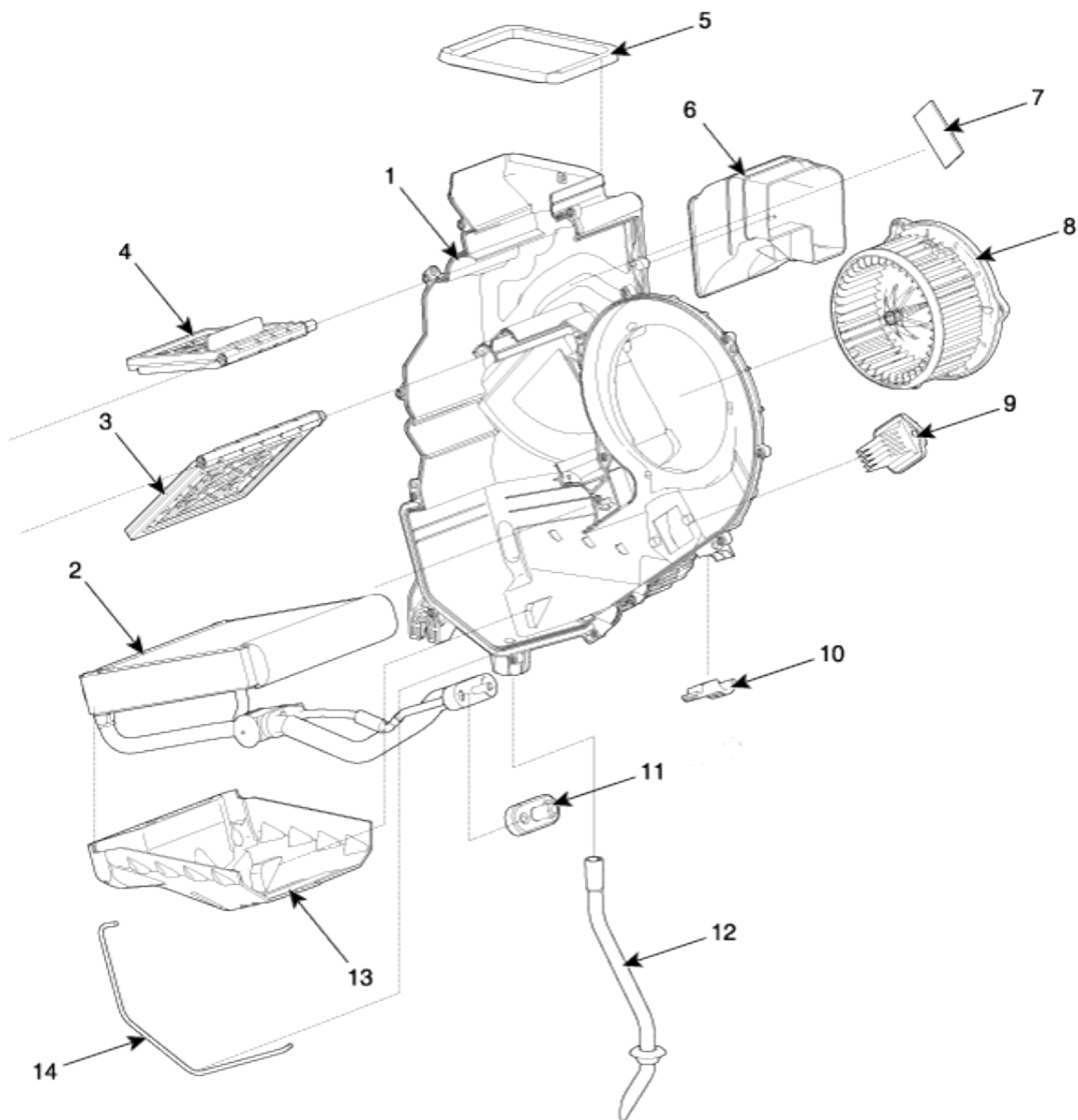


COMPONENTS



- 1. Heater case(R)
- 2. Heater core assembly
- 3. Heater hose assembly
- 4. Heater hose clip
- 5. Heater pipe clip

- 6. Temp control actuator
- 7. Mix door lever
- 8. Mode control actuator
- 9. Mode door lever
- 10. Wire harness



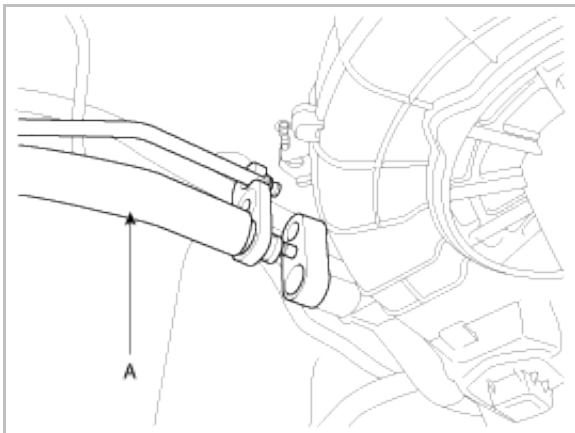
1. Heater case(L)
2. Eva core assembly
3. Mix door assembly
4. Mode door assembly
5. Vent seal
6. Foot duck
7. Wire

8. Blower motor assembly
9. Power mosfet
10. Eva pipe clip
11. Eva flange cover
12. Drain hose assembly
13. Lower case seal
14. Case insert seal

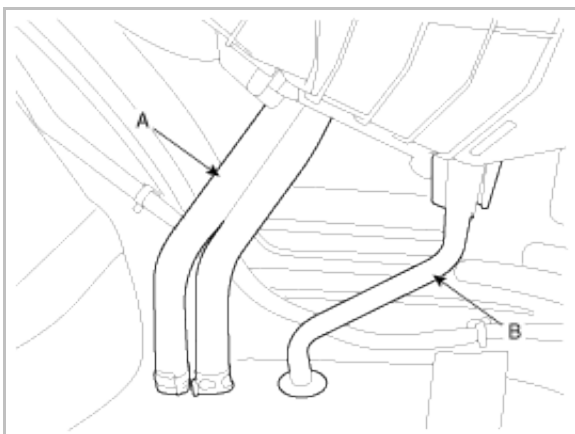


REPLACEMENT

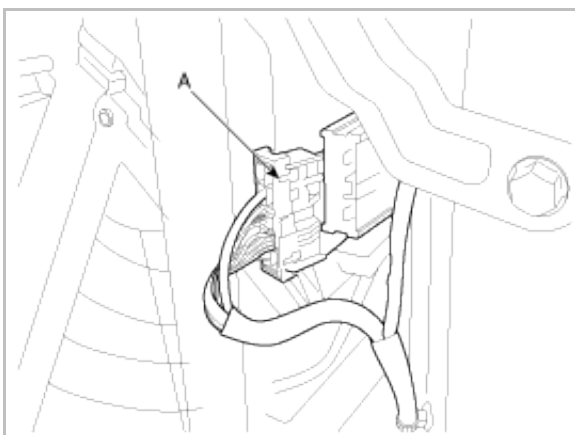
1. Disconnect the negative(-) battery terminal.
2. Recover the refrigerant with a recover/ recycling/ charging station.
3. When the engine is cool, drain the engine coolant from the radiator.
4. Remove luggage side trim(Refer to BD-).
5. Loosen the refrigerant line mounting bolts, and then remove the rear refrigerant line(A).



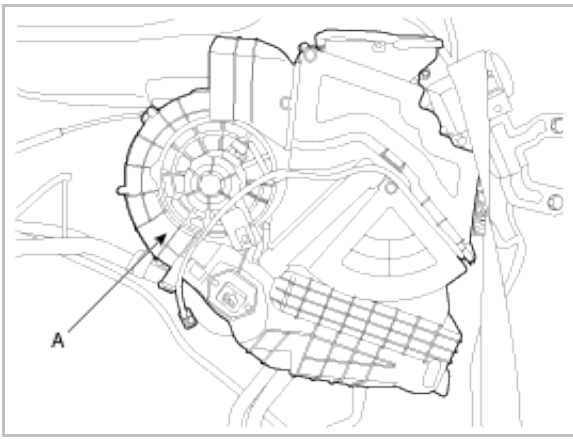
6. Remove the heater hose(A), drain hose(B).



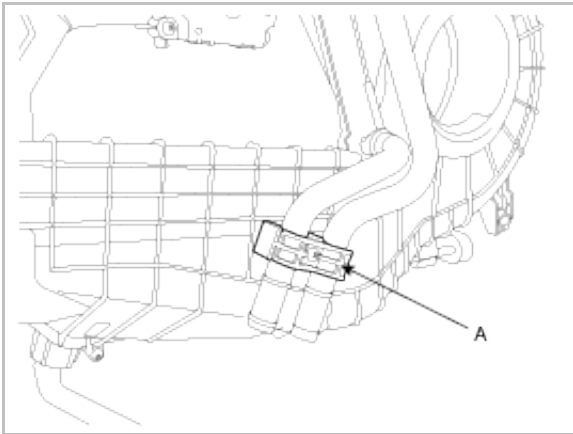
7. Remove the rear heater main connector(A).



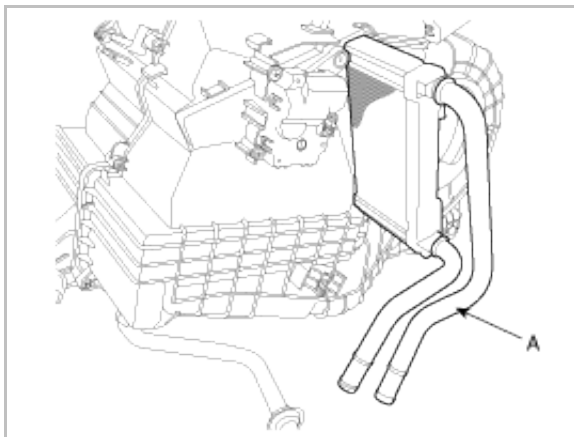
8. Loosen the rear heater mounting nuts, and then remove the rear heater unit(A).



9. Remove the heater core mounting cover(A), after loosening the screw.



10. Remove the heater core(A).



11. Installation is the reverse order of removal.

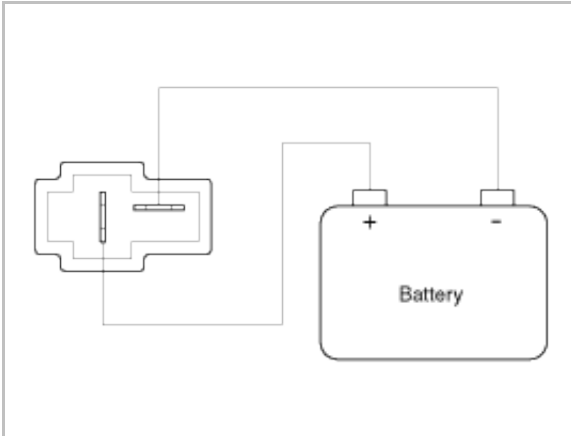
Heating, Ventilation, Air Conditioning

Rear Heater - Rear Blower Unit



INSPECTION

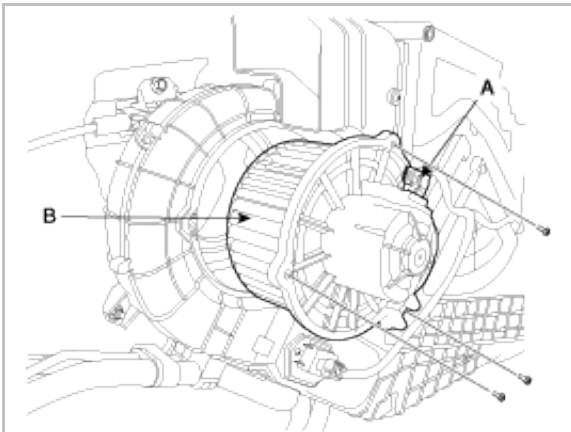
1. Connect the battery voltage and check the blower motor rotation.



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. Disconnect the connector (A) of the blower motor.
3. Remove the blower motor (A) after loosening the mounting screws.



4. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning

Rear Heater - Rear Temperature Control
Actuator



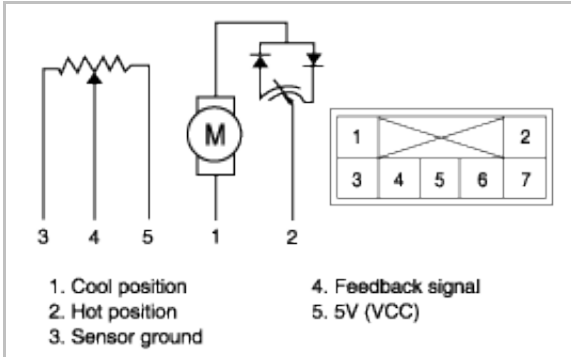
DESCRIPTION

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.



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 1 and grounding terminal 2.
Verify that the temperature control actuator operates to the cool position when connecting in the reverse.



4. Check the voltage between terminals 3 and 4.

Specification

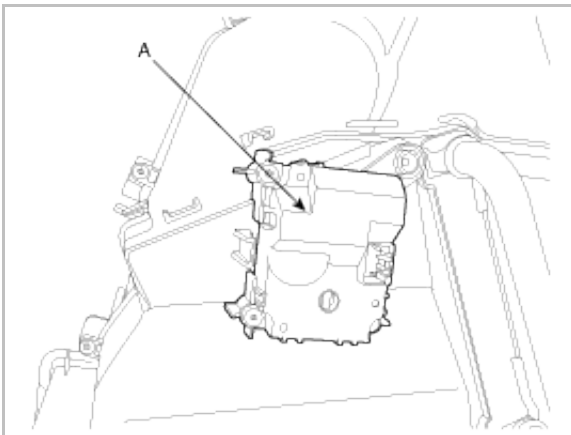
Door position	Voltage (3-4)	Error detecting
Max. cooling	$0.4 \pm 0.15V$	Low voltage : 0.1V or less
Max. heating	$4.6 \pm 0.15V$	High voltage : 4.9V or more

* It will feedback current position of actuator to controls.

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

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the luggage side trim (Refer to BD-).
3. Remove the rear heater unit (Refer to HA-).
4. Disconnect the temperature control actuator connector after removing the air duct.
5. Loosen the mounting screw and then remove the temperature control actuator (A).



6. Installation is the reverse order of removal.



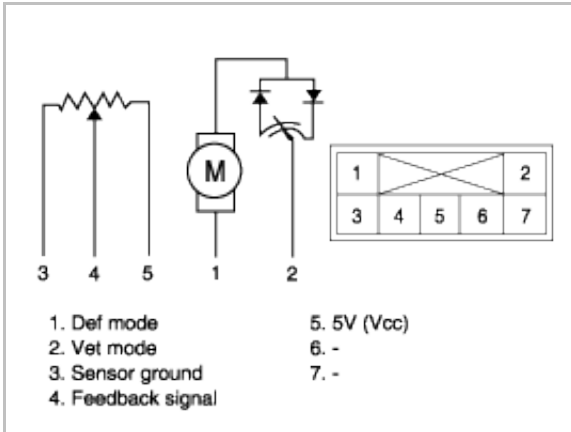
Heating, Ventilation, Air Conditioning

Rear Heater - Rear Mode Control Actuator



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 1 and grounding terminal 2.
4. Verify that the mode control actuator operates to the vent mode when connecting in the reverse.

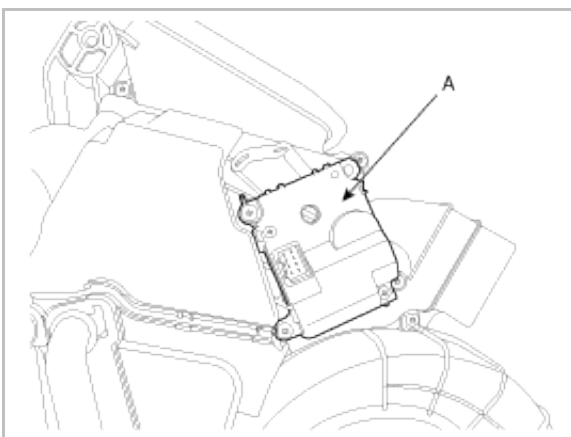


5. Check the voltage between terminals 3 and 4.

Door position	Voltage (3-4)	Error detecting
Vent	$0.4 \pm 0.15V$	Low voltage :0.1V or less
Defrost	$4.6 \pm 0.15V$	High voltage :4.9V or more

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the rear heater unit.
3. Disconnect the mode control actuator connector (A).
4. Loosen the mounting screws and then remove the mode control actuator (B).



5. Installation is the reverse order of removal.



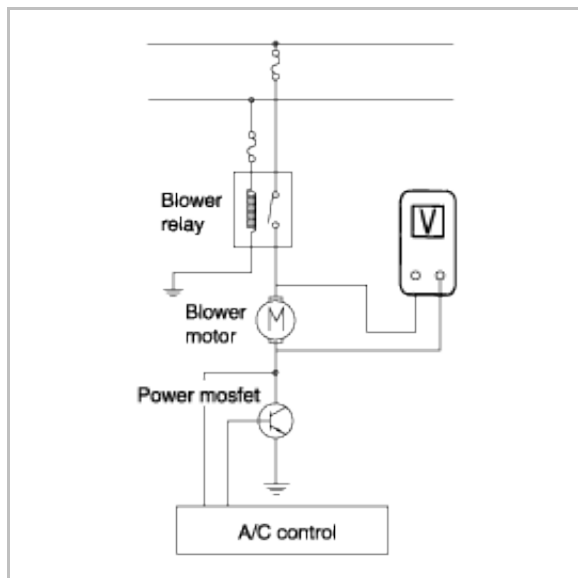
Heating, Ventilation, Air Conditioning

Rear Heater - Rear Power Mosfet



INSPECTION

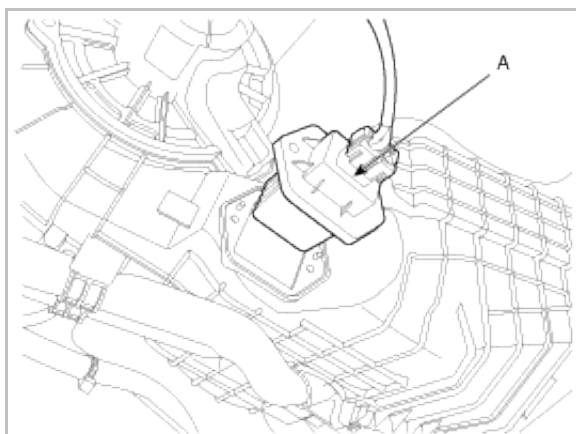
1. Ignition "ON".
2. Manually operate the control switch and measure the voltage of blower motor between pin 1 and 2.
3. Select the control switch to raise voltage until high speed.



Fan	Voltage
	Manual
1 STEP	$4.5 \pm 0.5V$
2 STEP	$5.7 \pm 0.5V$
3 STEP	$6.9 \pm 0.5V$
4 STEP	$8.1 \pm 0.5V$
5 STEP	$9.3 \pm 0.5V$
6 STEP	$10.3 \pm 0.5V$
7 STEP	Battery(+)

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the luggage side trim (Refer to BD-).
3. Disconnect the power mosfet connector (A).
4. Remove the power mosfet (B) after loosening the mounting screws.

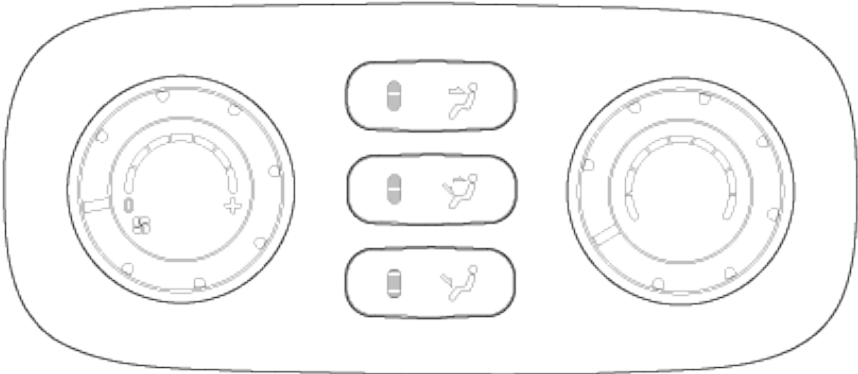
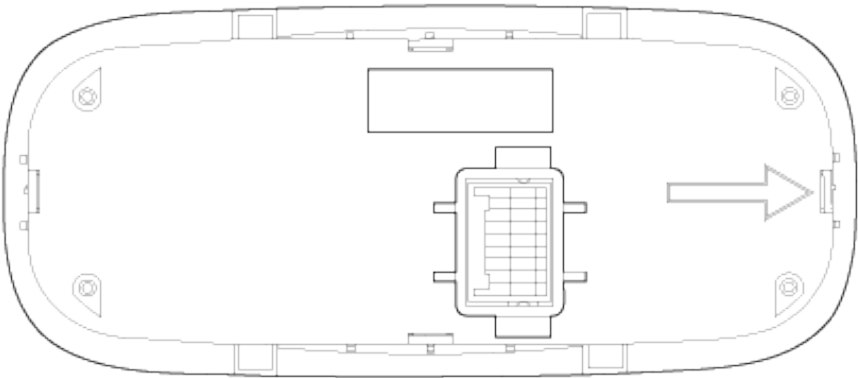


Heating, Ventilation, Air Conditioning

Rear Heater - Rear Control Panel



COMPONENT



★	7	6	5	4	3	2	1
16	15	14	13	12	11	10	9

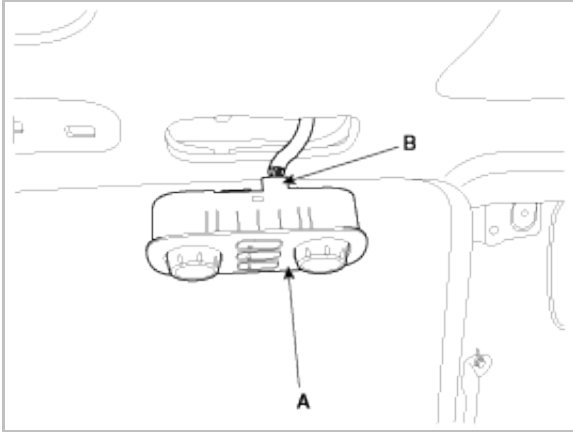
1	Tail lamp (ILL+)
2	IGN 2
3	Rear temp S/W
4	Rear temp S/W (VENT)
5	Rear temp S/W (B/L)

6	Rear temp S/W (FLOOR)
7	Rhostat (ILL-)
8	Sensor Ref (+5V)
9	Sensor ground
10	Rear mode IND (VENT)
11	Rear mode IND (B/L)
12	Rear mode IND (FLOOR)
13	GND
14	-
15	-
16	Rear blower S/W



REPLACEMENT

1. Remove the rear control panel(A) and then disconnect the rear control panel connector(B).

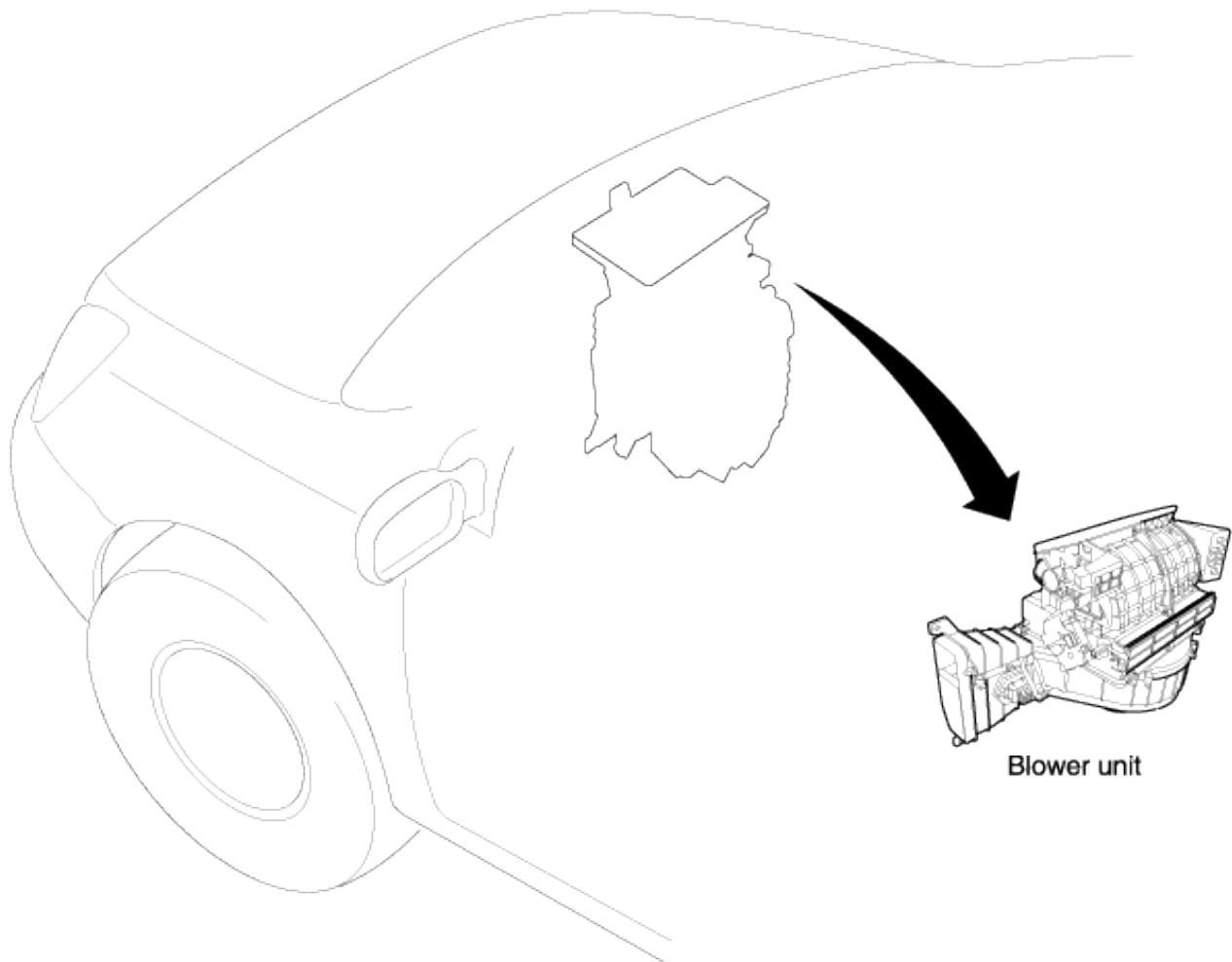


2. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning

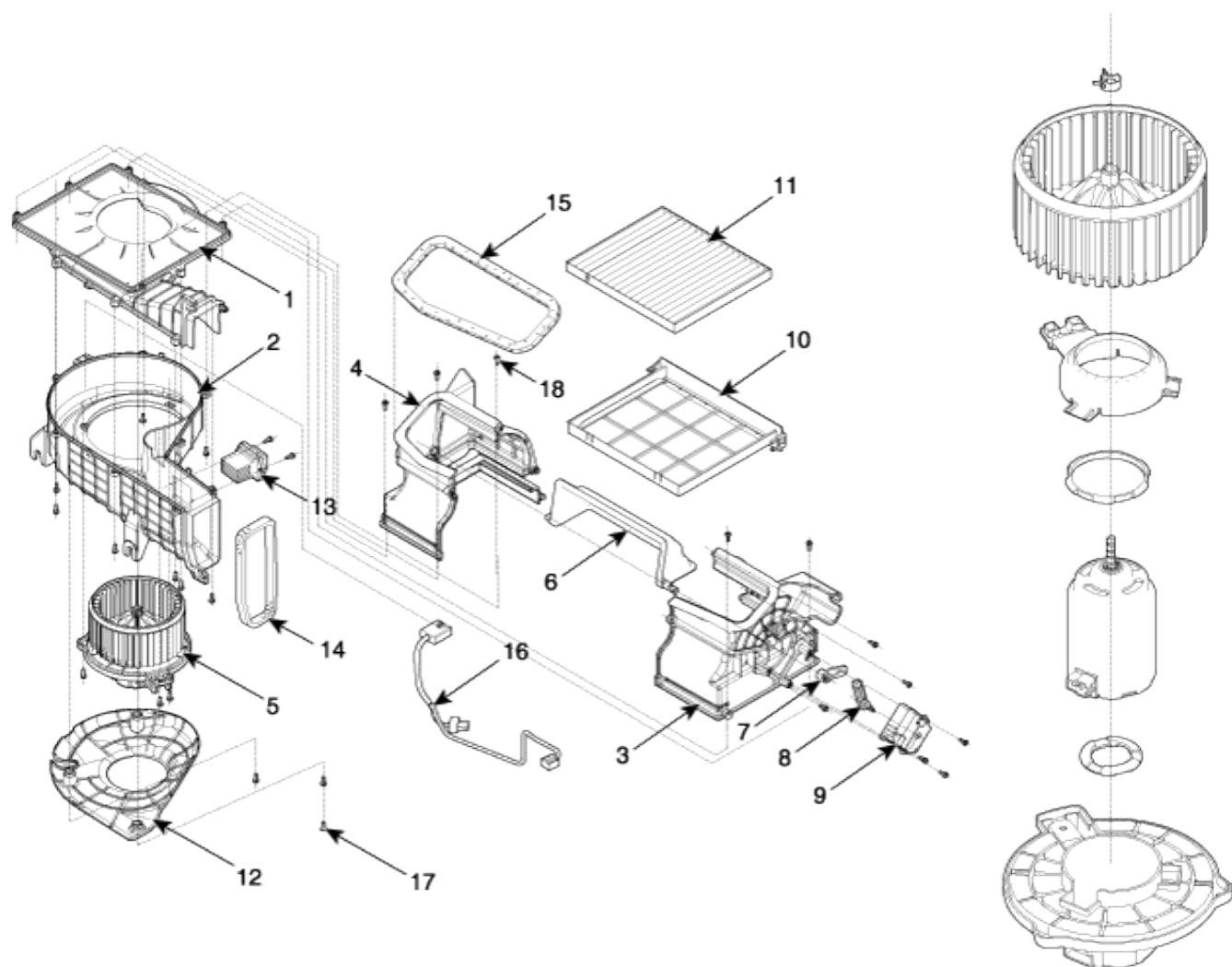
Blower - Blower Unit

COMPONENT LOCATION



Blower unit

COMPONENTS



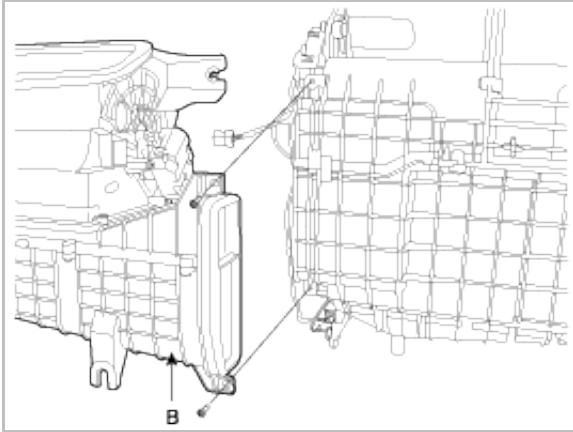
1. Upper case
2. Lower case
3. Intake case(L)
4. Intake case(R)
5. Blower motor assembly
6. Intake door
7. Intake door lever
8. Intake actuator lever
9. Intake actuator

10. Filter care
11. Filter
12. Blower motor cover
13. Power mosfet
14. Blower joint seal
15. Cowl seal
16. Wire harness
17. Blower motor screw
18. Case screw



REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the crush pad.(Refer to BD group)
3. Disconnect the connectors from the intake actuator, the blower motor and power mosfet.
4. Remove the cowl cross bar assembly.(Refer to BD group)
5. Remove the blower unit (A) from the heater unit after loosening a mounting bolt and 2 screws.



NOTICE

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

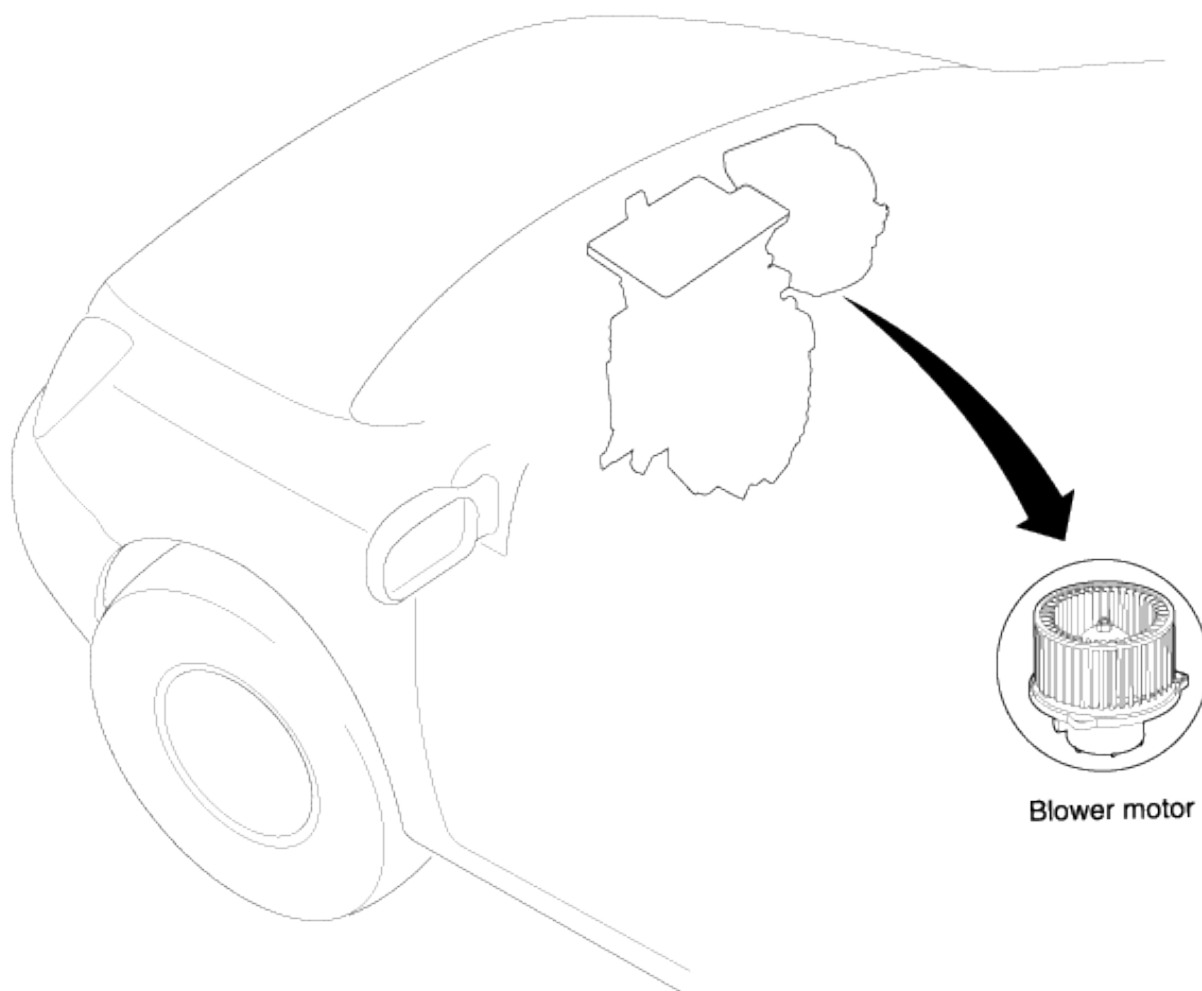
6. Installation is the reverse order of removal.



Heating, Ventilation, Air Conditioning

Blower - Blower Motor

COMPONENT LOCATION

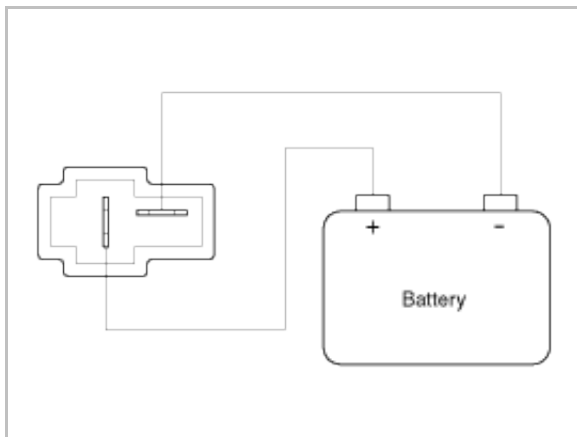


Blower motor



INSPECTION

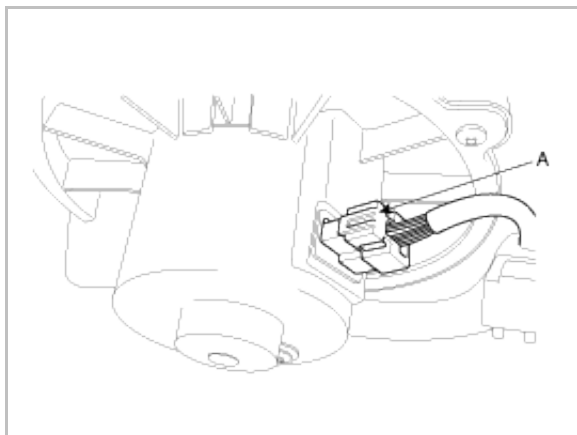
1. Connect the battery voltage and check the blower motor rotation.



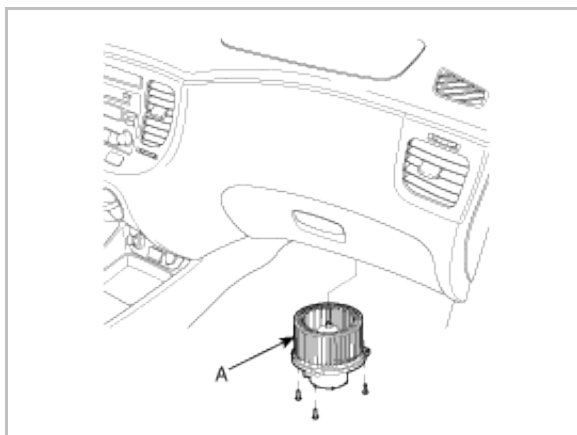
2. If the blower motor voltage is not operated well, substitute with a known-good blower motor and check for proper operation.
3. If the problem is corrected, replace the blower motor.

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Disconnect the connector (A) of the blower motor.



3. Remove the blower motor (A) after loosening the mounting screws.



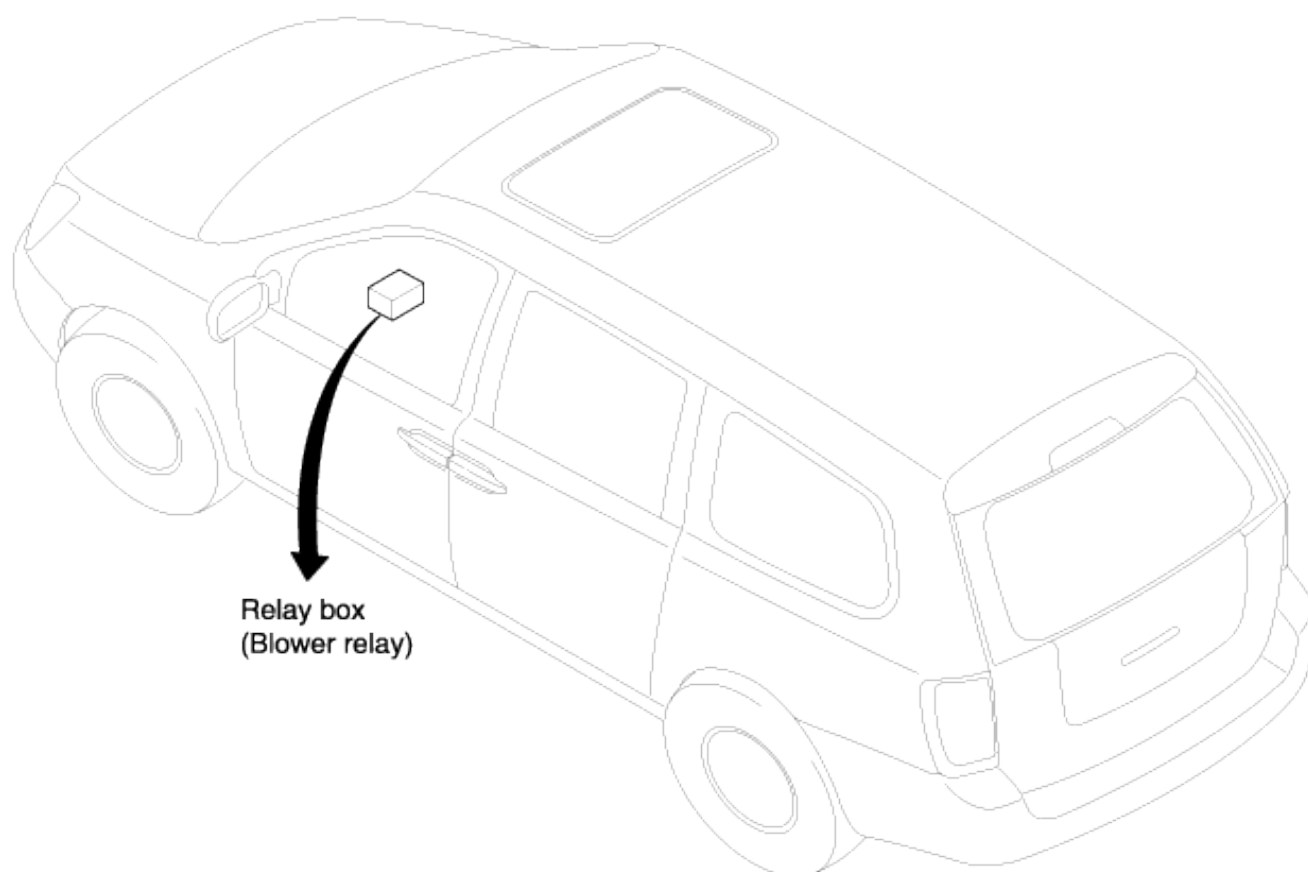
4. Installation is the reverse order of removal.



Heating, Ventilation, Air Conditioning

Blower - Blower Relay

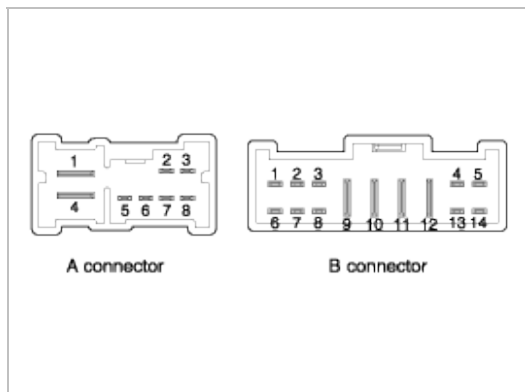
COMPONENT LOCATION





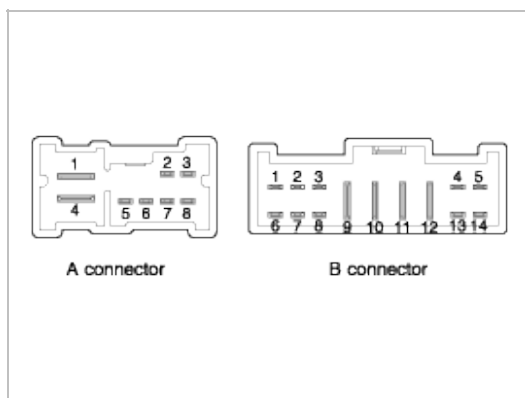
INSPECTION

1. There should be continuity between the NO.1 in the A and NO.10 in the B terminals when power and ground are connected to the NO.7 and NO.13 in the A terminals. (Passenger compartment relay box)
2. There should be to no continuity between the NO.1 in the A and NO.10 in the B terminals when power is disconnected.



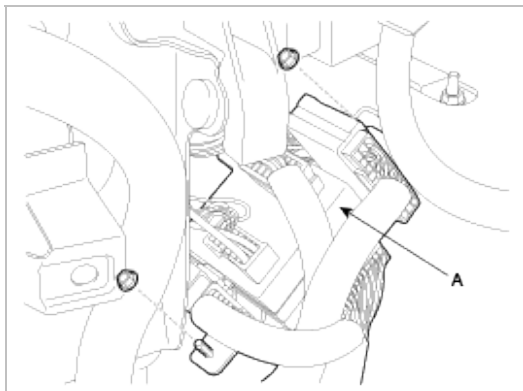
REAR BLOWER

1. There should be continuity between the NO.4in the A and NO.12n the B terminals when power and ground are connected to the NO.2and NO.14in the A terminals. (Passenger compartment relay box)
2. There should be to no continuity between the NO.4in the A and NO.12in the B terminals when power is disconnected.



REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center lower side cover. (Refer to BD group)
3. Loosen the relat box mounting nut, and then remove the relay box(A).

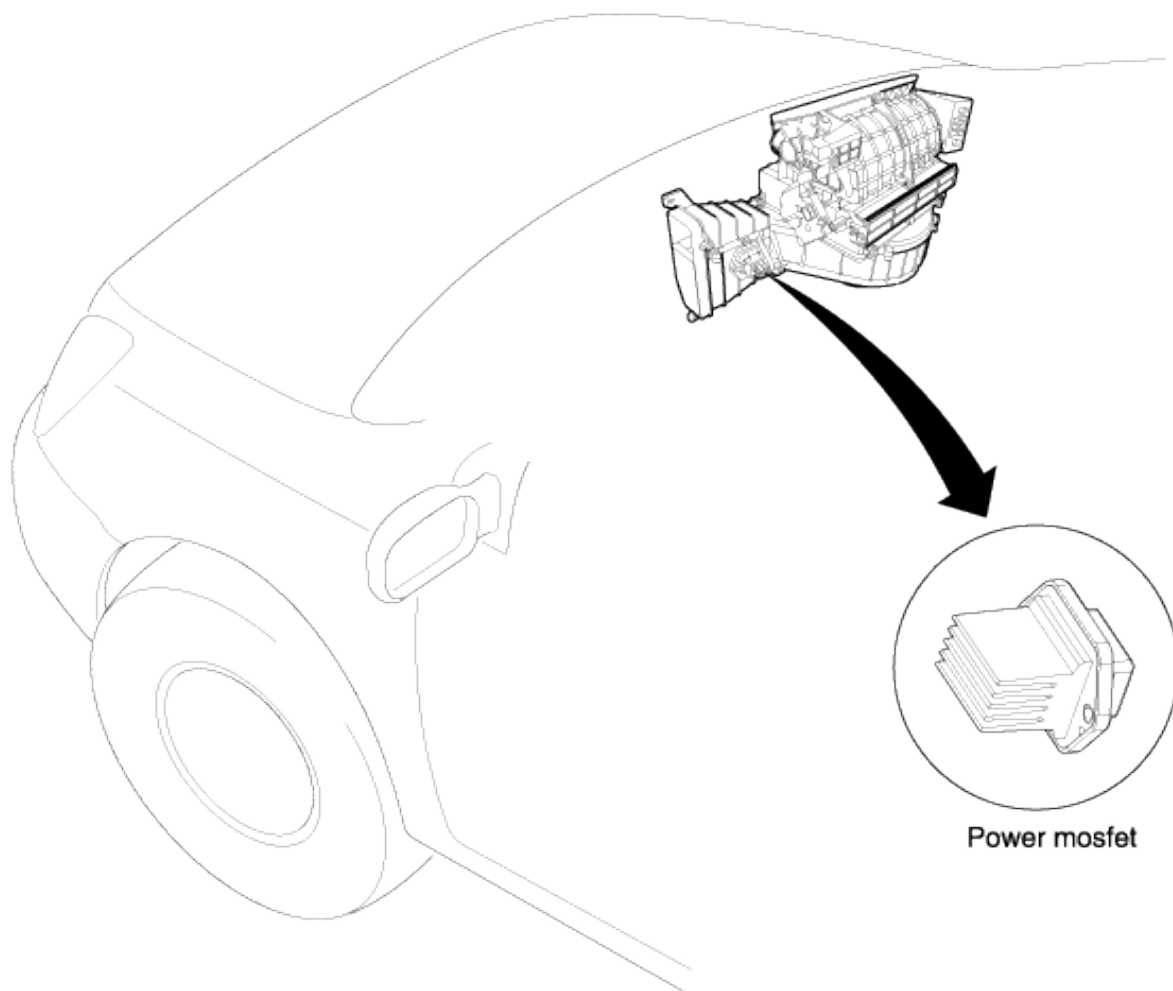


4. Install in the reverse order of removal.

Heating, Ventilation, Air Conditioning

Blower - Power Mosfet

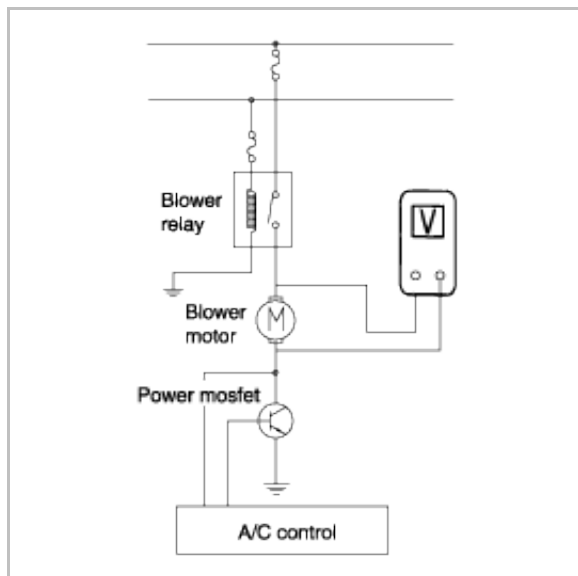
COMPONENT LOCATION





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	4.0 $\pm$ 0.5V
Second speed	5.1 $\pm$ 0.5V
Third speed	6.2 $\pm$ 0.5V
Fourth speed	7.3 $\pm$ 0.5V
Fifth speed	8.4 $\pm$ 0.5V
Sixth speed	9.5 $\pm$ 0.5V
Seventh speed	10.5 $\pm$ 0.5V
eighth speed	Battery(+)

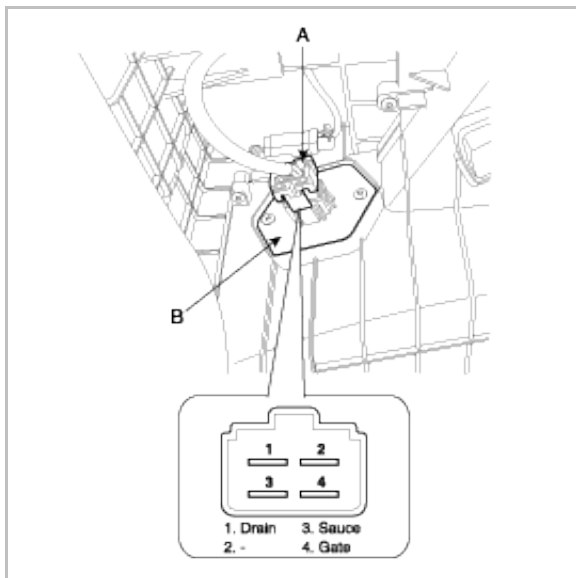
*AUTO COOLING: Auto speed (4.5V~B+)

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

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

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Disconnect the power mosfet connector (A) at the connecting part between heater and blower unit.
3. Remove the power mosfet (B) after loosening the mounting screws.



4. Installation is the reverse order of removal.

Heating, Ventilation, Air Conditioning

Blower - Climate Control Air Filter



DESCRIPTION

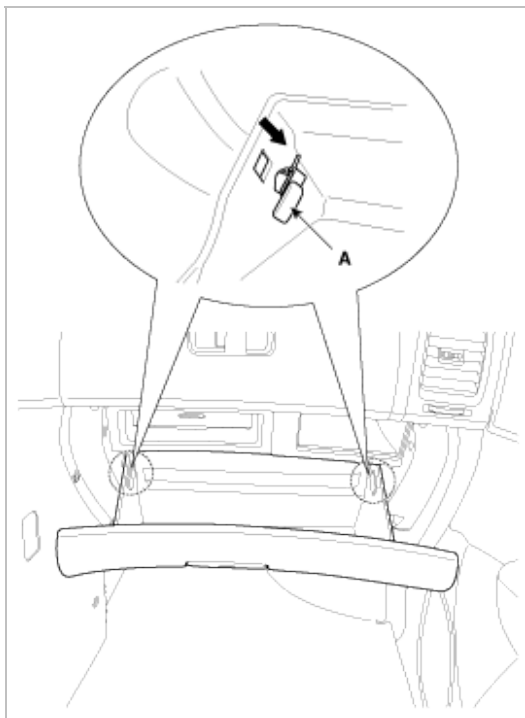
This has particle filter which eliminates foreign materials and odor. The particle filter includes odor filter as well as conventional dust filter to ensure comfortable interior environment.



REPLACEMENT

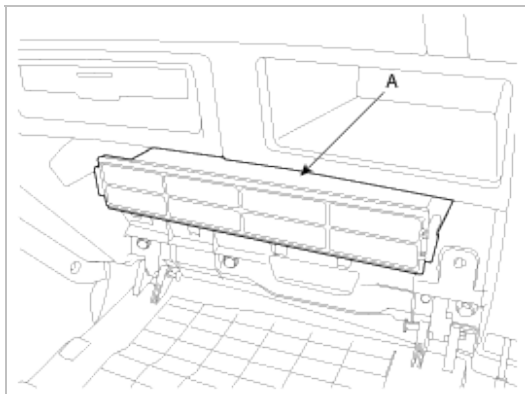
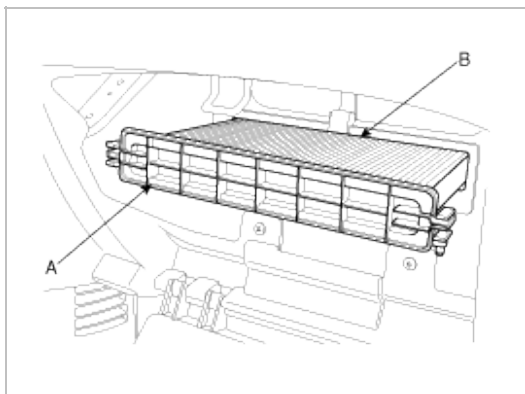
1. Open the glove box (B).

Lower the glove box down completely by removing the glove box stopper (A) to the glove box.



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

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



NOTICE

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

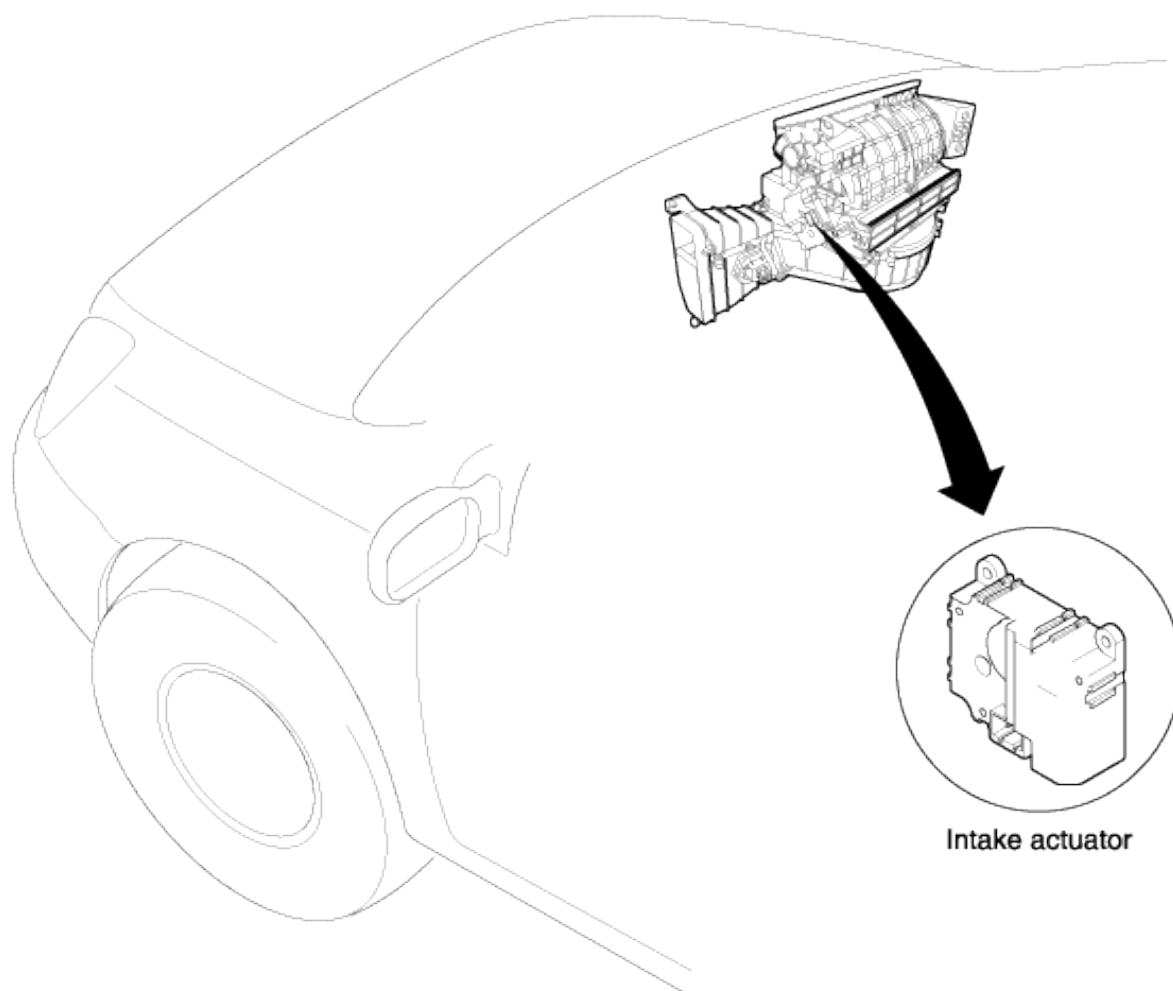
Replacement period: 15,000 km (9320 mile)



Heating, Ventilation, Air Conditioning

Blower - Intake Actuator

COMPONENT LOCATION



Intake actuator

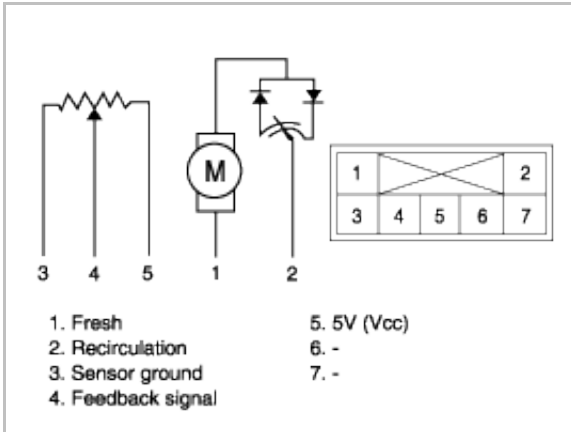


DESCRIPTION

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.

INSPECTION

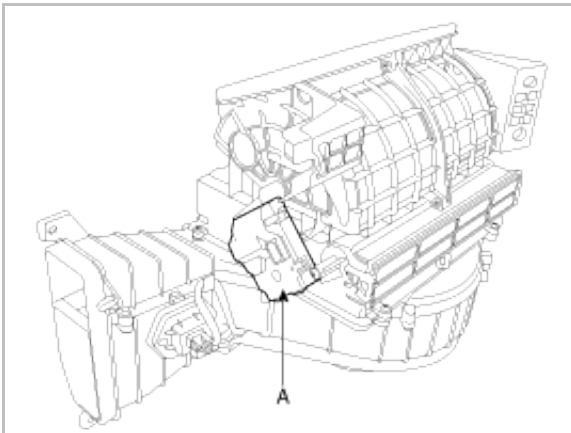
1. Ignition "OFF"
2. Disconnect the intake actuator connector.
3. Verify that the actuator operates to the recirculation position when connecting 12V to the terminal 3 and grounding terminal 4.
4. Verify that the intake actuator operates to the fresh position when connecting in the reverse.



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 glove box (Refer to BD group).
3. Disconnect the intake actuator connector.
4. Loosen the mounting screw and then remove the intake actuator (A) from the blower unit.



5. Installation is the reverse order of removal.

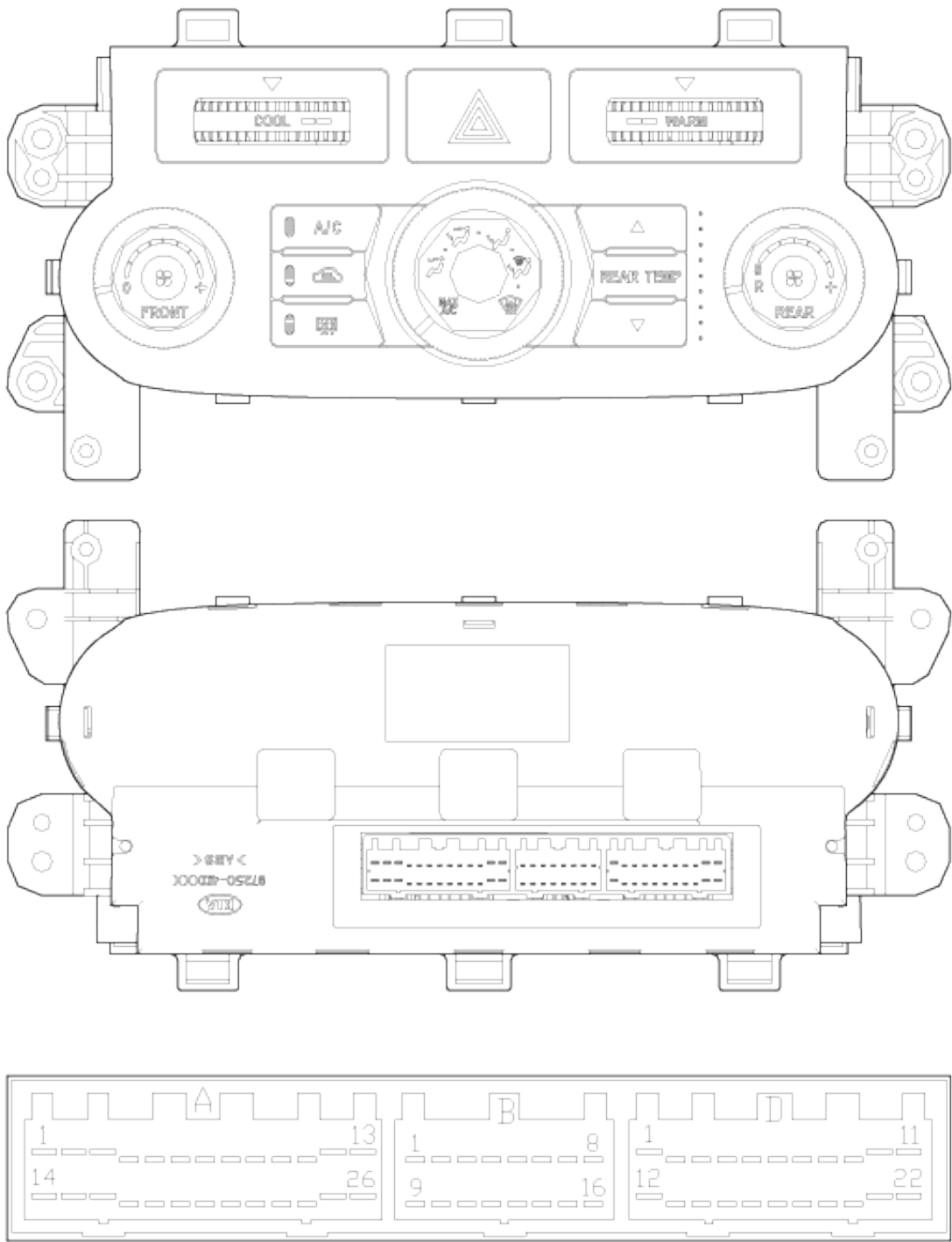


Heating, Ventilation, Air Conditioning

Controller - Heater & A/C Control Unit
(Manual)



COMPONENT



CONNECTOR PIN FUNCTION

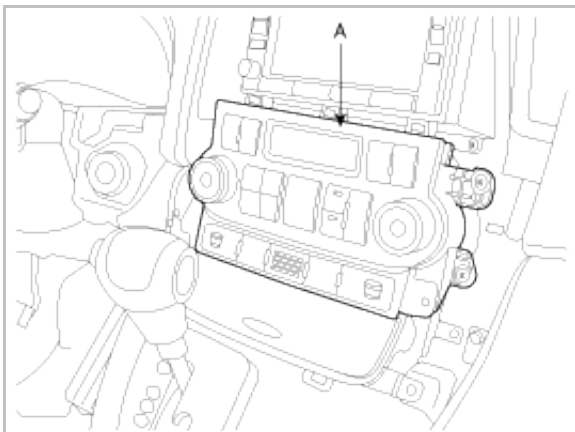
PIN NO.		Function	PIN NO.		Function
Connector A	1	BATTERY		7	-
	2	IGN 2		8	POWER MOSFET (GATE) - REAR

	3	TAIL LAMP (ILL+)	Connector B	9	POWER MOSFET (DRAIN) - REAR
	4	REAR TEMP ACTUATOR (COOL)		10	-
	5	REAR TEMP ACTUATOR (WARM)		11	SENSOR GND
	6	REAR TEMP ACTUATOR (F/B)		12	SENSOR POWER (+5V)
	7	REAR TEMP SWITCH		13	-
	8	REAR MODE ACTUATOR (VENT)		14	HAZARD SEIECT
	9	REAR MODE ACTUATOR (FLOOR)		15	-
	10	REAR MODE ACTUATOR (F/B)		16	-
	11	BLOWER MOTOR (+)	Connector C	1	DRIVE'S TEMP ACTUATOR (COOL)
	12	GROUND		2	DRIVE'S TEMP ACTUATOR (WARM)
	13	RHEOSTAT (ILL-)		3	DRIVE'S TEMP ACTUATOR (F/B)
	14	A/C SELECT SIGNAL		4	DRIVE'S MODE ACTUATOR (COOL)
	15	A/C OUTPUT		5	DRIVE'S MODE ACTUATOR (WARM)
	16	REAR DEFOGGER		6	DRIVE'S MODE ACTUATOR (F/B)
	17	REAR DEFOGGER SWITCH		7	INTAKE ACTUATOR (FRESH)
	18	-		8	INTAKE ACTUATOR (RECIRCULATION)
	19	REAR BLOWER SWITCH		9	INTAKE ACTUATOR (F/B)
	20	REAR MODE SWITCH (VENT)		10	PASSENGER'S TEMP ACTUATOR (COOL)
	21	REAR MODE SWITCH (B/L)		11	EVAPORATOR SENSOR (+)
		REAR MODE			

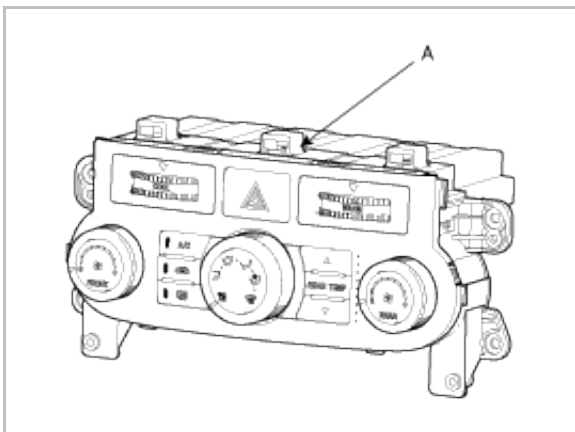
	22	REAR MODE SWITCH (FLOOR)		12	SENSOR POWER (+5V)
	23	REAR MODE GND (VENT)		13	PASSENGER'S TEMP ACTUATOR (WARM)
	24	REAR MODE GND (B/L)		14	PASSENGER'S TEMP ACTUATOR (F/B)
	25	REAR MODE GND (FLOOR)		15	-
	26	-		16	DATA PORT
Connector B	1	-		17	RESET PIN
	2	A/C OUTPUT		18	-
	3	PTC RELAY2		19	POWER MOSFET (GATE) - FRONT
	4	PTC RELAY3		20	POWER MOSFET (DRAIN) - FRONT
	5	BLOWER SELECT SIGNAL		21	SENSOR GND
	6	PTC ON SIGNAL		22	-

REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the center air vent. (Refer to BD group)
3. Remove the heater & A/C controller (A) after loosening 4 screws.



4. Remove the heater & A/C controller (A).



5. Installation is the reverse order of removal.

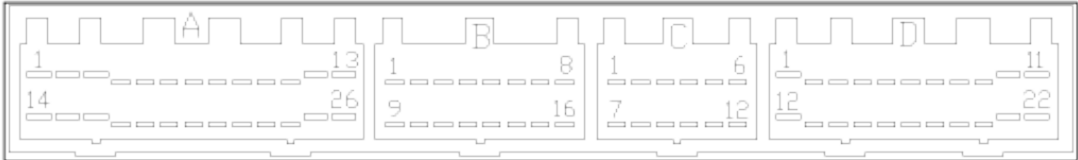
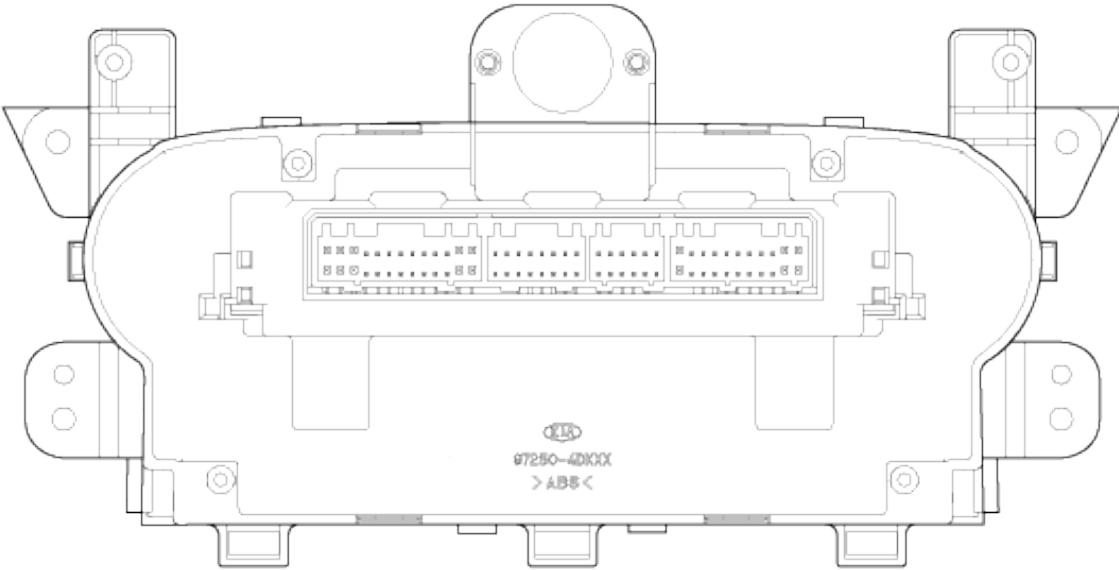
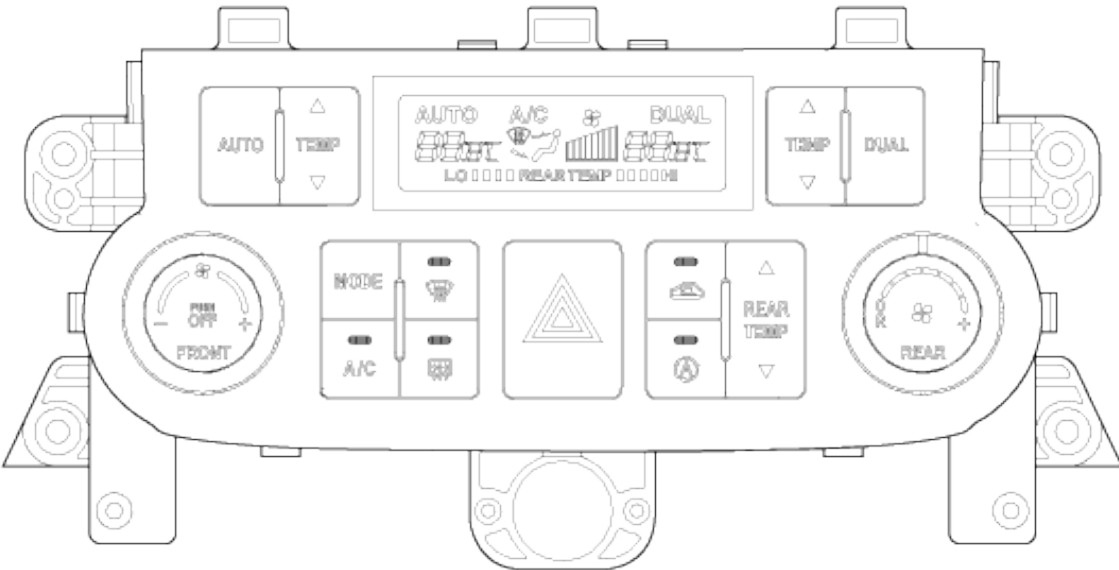


Heating, Ventilation, Air Conditioning

Controller - Heater & A/C Control Unit
(Full Automatic)



COMPONENT



CONNECTOR PIN FUNCTION

PIN NO.		Function	PIN NO.		Function
	1	Battery		1	-
	2	IGN 2		2	A/C Output (Thermo)
	3	Tail Lamp (ILL+)		3	-

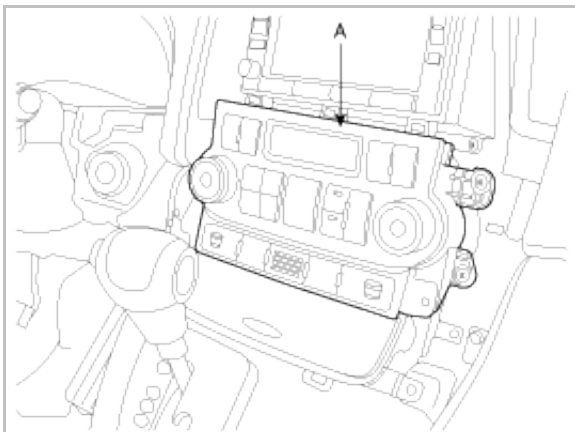
Connector A	4	REAR Temp Actuator (COOL)	Connector C	4	-
	5	REAR Temp Actuator (WARM)		5	FET (Gate) – REAR
	6	REAR Temp Actuator (F/B)		6	FET (Drain) – REAR
	7	REAR Temp Switch		7	Test Output
	8	REAR Mode Actuator (VENT)		8	Test Input
	9	REAR Mode Actuator (FLOOR)		9	PTC Relay (2) - Low
	10	REAR Mode Actuator (F/B)		10	PTC Relay (3) - Low
	11	Blower Motor (+)		11	Blower Select Signal
	12	GND		12	PTC ON Signal
	13	Rheostat (ILL-)	Connector D	1	DR Temp Actuator (COOL)
	14	A/C Select Signal		2	DR Temp Actuator (WARM)
	15	A/C Output		3	DR Temp Actuator (F/B)
	16	REAR Defogger		4	DR Mode Actuator (VENT)
	17	REAR Defogger Switch		5	DR Mode Actuator (DEF)
	18	-		6	DR MODE Actuator (F/B)
	19	REAR Blower Switch		7	Intake Actuator (FRESH)
	20	REAR Mode Switch (VENT)		8	Intake Actuator (RECIRCULATION)
	21	REAR Mode Switch (B/L)		9	Intake Actuator (F/B)
	22	REAR Mode Switch (FLOOR)		10	PS Temp Actuator (COOL)
	23	REAR Mode IND (VENT)		11	Evaporator Sensor (+)
	24	REAR Mode IND (B/L)		12	Sensor Power (+5V)
	25	REAR Mode IND (FLOOR)		13	PS Temp Actuator (WARM)
	26	-		14	PS Temp Actuator (F/B)
Connector B	1	DR Photo Sensor (-)		15	-
	2	PS Photo Sensor (-)		16	-
	3	Incar Sensor (+)		17	-
	4	Ambient Sensor (+)		18	-
	5	-		19	FET (Gate) – FRONT
	6	-		20	FET (Drain) - FRONT
	7	Incar Motor (+)		21	Sensor GND
	8	Water Temperature Signal from Cluster		22	Water Temperature Sensor (+)
	9	IG2			
	10	Vehicle Speed Signal-			
	11	Sensor GND			
	12	Sensor Power (+5V)			
	13	Hi - Scan			

	14	Hazard Select			
	15	Incar Motor (-)			
	16	GND			

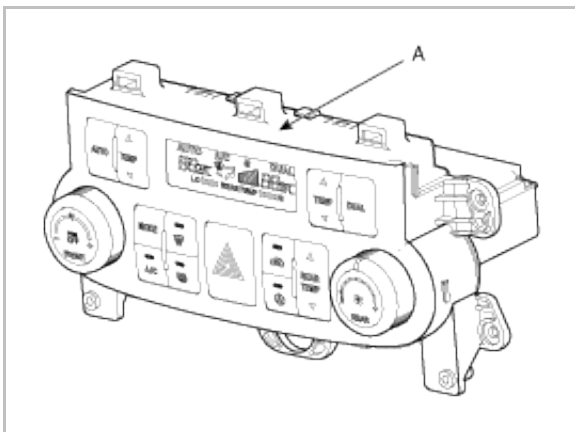


REPLACEMENT

1. Disconnect the negative (-) battery terminal.
2. Remove the center air vent. (Refer to BD group)
3. Remove the heater & A/C controller (A) after loosening 4 screws.



4. Remove the heater & A/C controller (A).

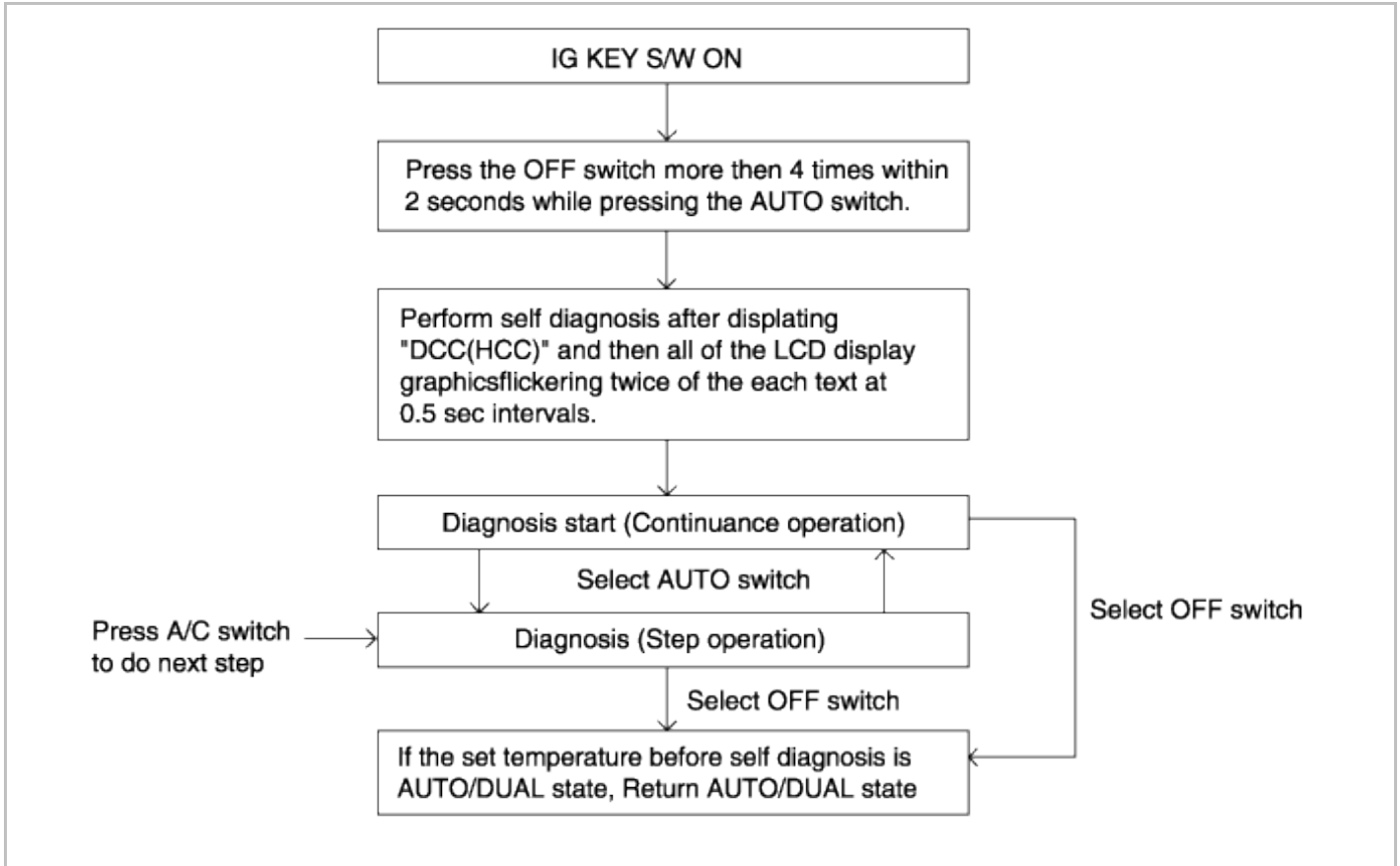


5. Installation is the reverse order of removal.



SELFDIAGNOSIS

1. Self-diagnosis process



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

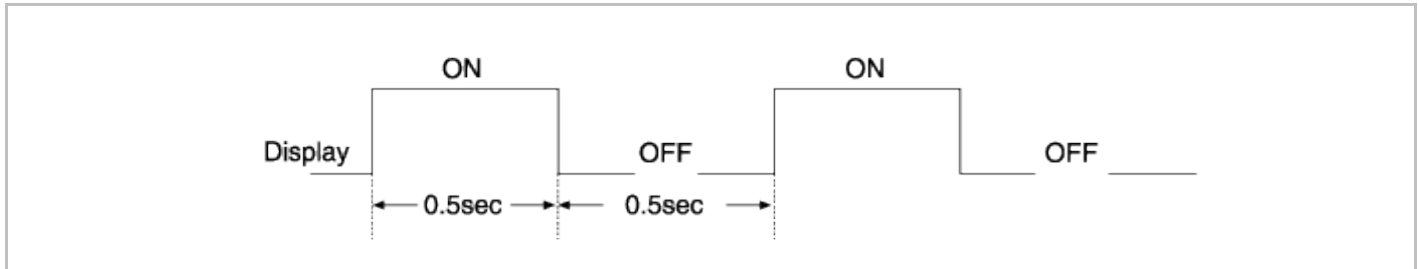
Fault code

Display	Fail description
00	NORMAL
11	IN CAR SENSOR OPEN (HIGH)
12	IN CAR SENSOR SHORT (LOW)
13	AMBIENT SENSOR OPEN (HIGH)
14	AMBIENT SENSOR SHORT (LOW)
15	WATER TEMP SENSOR OPEN (HIGH)
16	WATER TEMP SENSOR SHORT (LOW)
17	EVAP SENSOR OPEN (HIGH)
18	EVAP SENSOR SHORT (LOW)
19	TEMP DOOR POTENTIOMETER OPEN/SHORT (DR)
20	TEMP DOOR POTENTIOMETER FAULT
21	MODE DOOR POTENTIOMETER OPEN/SHORT (DR)
22	MODE DOOR POTENTIOMETER FAULT
23	HUMIDITY SENSOR OPEN (HIGH)
24	HUMIDITY SENSOR SHORT (LOW)
25	INTAKE DOOR POTENTIOMETER OPEN/SHORT
26	INTAKE DOOR POTENTIOMETER FAULT

32	TEMP DOOR POTENTIOMETER OPEN/SHORT (PA)
33	TEMP DOOR POTENTIOMETER FAULT (PA)
34	MODE DOOR POTENTIOMETER OPEN/SHORT (PA)
35	MODE DOOR POTENTIOMETER FAULT (PA)
36	TEMP DOOR POTENTIOMETER OPEN/SHORT (REAR)
37	TEMP DOOR POTENTIOMETER FAULT (REAR)
38	MODE DOOR POTENTIOMETER OPEN/SHORT (REAR)
39	MODE DOOR POTENTIOMETER FAULT (REAR)

3. Fault code display

(1) Continuance operation : DTC code is one.



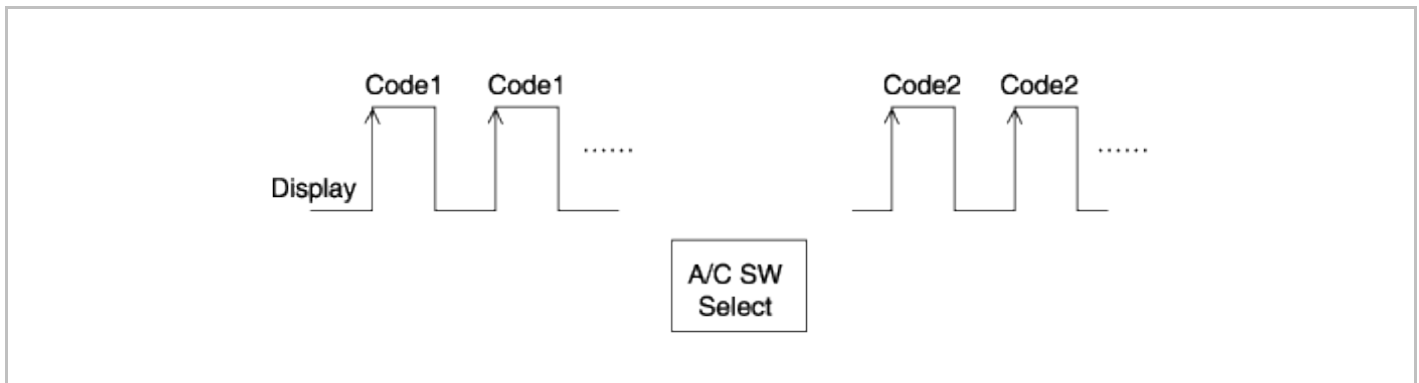
(2) Continuance operation : DTC code is more two.



(3) STEP operation

A. Nomal or one fault code is same as a continuance operation.

B. DTC code os more two.



4. Diagnostic procedure refer to DTC code.

5. Fail safe

(1) In-car temperature sensor: Control with the value of 25°C(77°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) Humidity sensor: Control with the value of 10%

(5) Temperature sensor : Control with the value of -2°C (28.4°F)

(6) 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.

- (7) Mode control actuator (Direction potentiometer):
 - Fix vent position, while selecting vent mode.
 - Fix defrost position, while selecting all except vent mode.
- (8) Intake control actuator :
 - Fix fresh position, while selecting fresh mode.
 - Fix recirculation position, while selecting recirculation mode.
- (9) AQS sensor : AQS operation OFF.
 - Intake position : The position before selecting AQS switch.