

Heating, Ventilation and Air Conditioning

GENERAL

AIR CONDITIONING SYSTEM

COMPRESSOR OIL

A/C COMPRESSOR CONTROLS (MANUAL)

COMPRESSOR
CONDENSER
APT(A/C PRESSURE TRANSDUCER)
REFRIGERANT LINE
EVAPORATOR TEMPERATURE SENSOR

A/C COMPRESSOR CONTROLS (FULL AUTO)

IN CAR SENSOR
PHOTO SENSOR
WATER TEMPERATURE SENSOR
AMBIENT TEMPERATURE SENSOR
A.Q.S (AIR QUALITY SENSOR)
HUMIDITY SENSOR

HEATER

HEATER UNIT
TEMPERATURE CONTROL ACTUATOR
MODE CONTROL ACTUATOR

FUEL FIRED HEATER
PTC (POSITIVE TEMPERATURE COEFFICIENT)
HEATER

REAR HEATER

REAR HEATER UNIT
REAR BLOWER UNIT
REAR TEMPERATURE CONTROL ACTUATOR
REAR MODE CONTROL ACTUATOR
REAR POWER MOSFET
REAR CONTROL PANEL

BLOWER CONTROLS

BLOWER UNIT
BLOWER MOTOR
BLOWER RELAY
POWER MOSFET
A/C AIR FILTER
INTAKE ACTUATOR

BLOWER AND A/C CONTROLS (MANUAL) CONTROL PANEL

BLOWER AND A/C CONTROLS (AUTO- MATIC) CONTROL PANEL

GENERAL

SPECIFICATION E79BEAFC

AIR CONDITIONER

Item		Specification
		λ 3.8
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)

TROUBLESHOOTING E907DB5D

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:

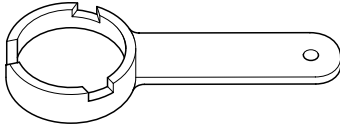
Symptom	Suspect Area	See page
No blower operation	1. Blower fuse 2. Blower relay 3. Blower motor 4. Power mosfet 5. Blower speed control switch 6. Wire harness	- HA-87 HA-85 HA-89 HA-94, 97 -
No air temperature control	1. Engine coolant capacity 2. Heater control assembly	- HA-94, 97
No compressor operation	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	HA-3 - HA-17 HA-17 HA-24 - HA-28 -
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	HA-3 HA-3 - HA-17 HA-17 HA-24 HA-28 - HA-94, 97 -
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	HA-3 - HA-17 HA-17 HA-21 HA-53 HA-26 HA-24 HA-94, 97
No engine idle-up when A/C switch ON	1. Engine ECM 2. Wire harness	- -
No air inlet control	1. Heater control assembly	HA-94, 97

GENERAL

HA -5

Symptom	Suspect Area	See page
No mode control	1. Heater control assembly 2. Mode actuator	HA-94, 97 HA-58
No cooling fan operation	1. Cooling fan fuse 2. Fan motor 3. Engine ECM 4. Wire harness	- Refer to the group “ EM ” - -

SPECIAL TOOLS E527C2E1

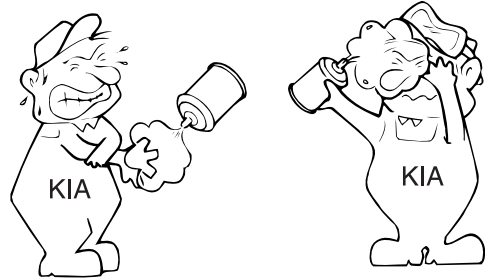
Tool (Number and name)	Illustration	Use
09977-29000 Disc & hub assembly bolt remover	 EQA9002A	Removal and installation of the disc & hub assembly bolt

AIR CONDITIONING SYSTEM

INSTRUCTIONS E3BA7FFA

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:
 - When removing refrigerant components from a vehicle, cap immediately the components to prevent from the entry of moisture.
 - When installing refrigerant components to a vehicle, do not remove the cap until just before connecting the components.
 - Complete the connection of all refrigerant tubes and hoses without delay to prevent the A/C system from taking on moisture.
 - 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.



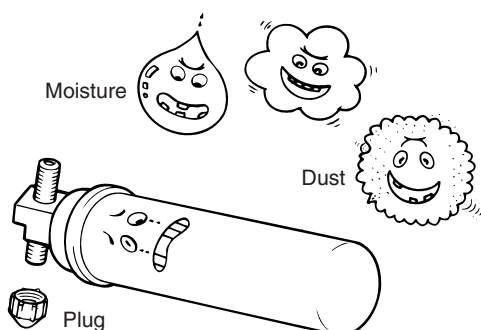
LQAC003A

AIR CONDITIONING SYSTEM

HA -7

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.

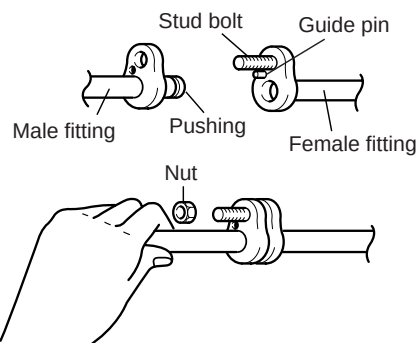


LQAC003B

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.



LQJF003C

Size	Tightening torque [N.m (kg.m, lbf.ft)]	
	General bolt, nut	
	4T	7T
M6	5-6 (0.5 - 0.6, 3.6 - 4.3)	9-11 (0.9 - 1.1, 6.5 - 7.9)
M8	12-14 (1.2 - 1.4, 8.7 - 10)	20 - 26 (2.0 - 2.6, 14 - 18)
M10	25 - 28 (2.5 - 2.8, 18 - 20)	45 - 55 (4.5 - 5.5, 32 - 39)
Size	Flange bolt, nut	
	4T	7T
	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)

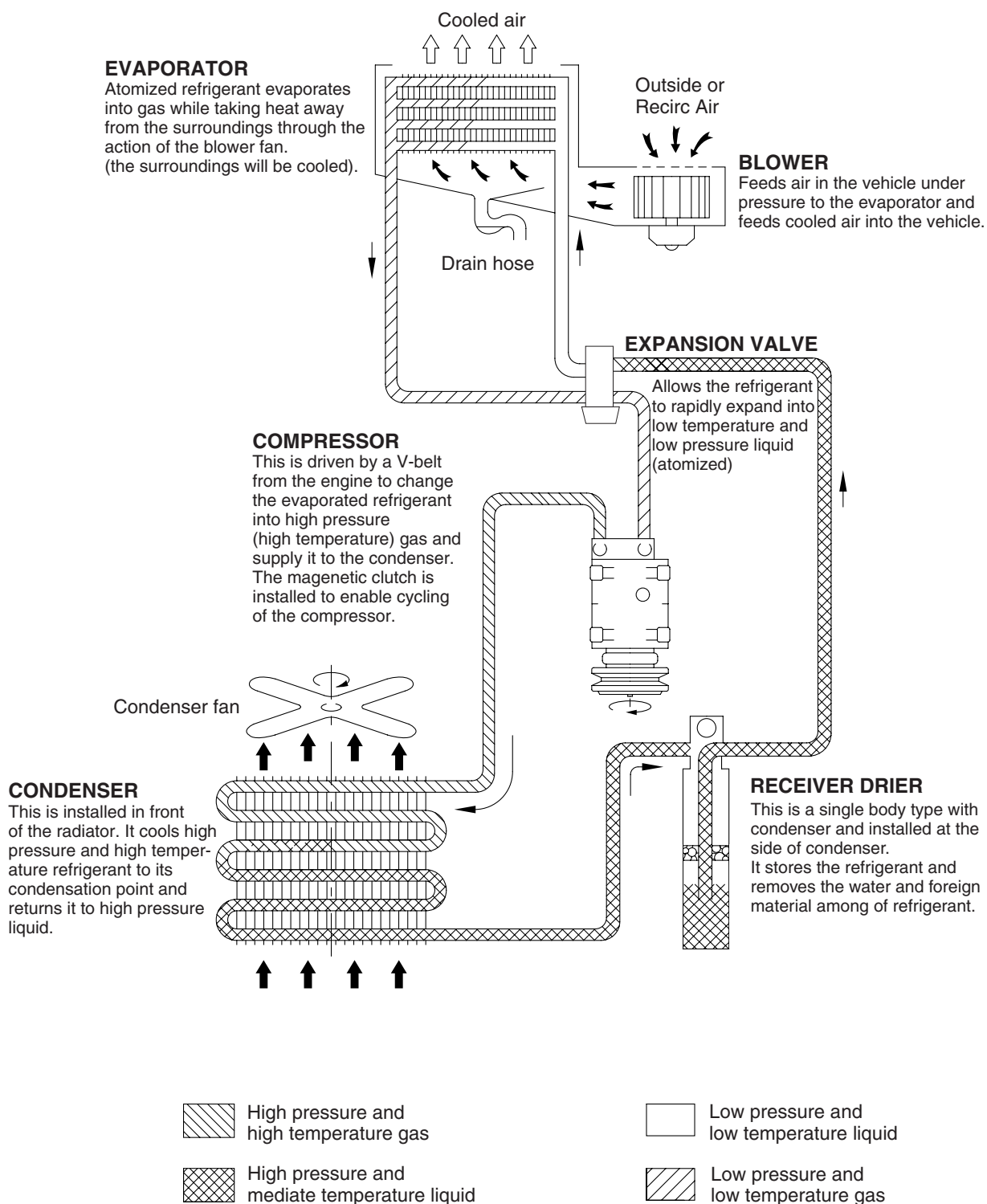
HANDLING TUBING AND FITTINGS

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 EA6E42C2



EQR004A

REFRIGERANT SYSTEM SERVICE

BASICS

ECE8B818

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.



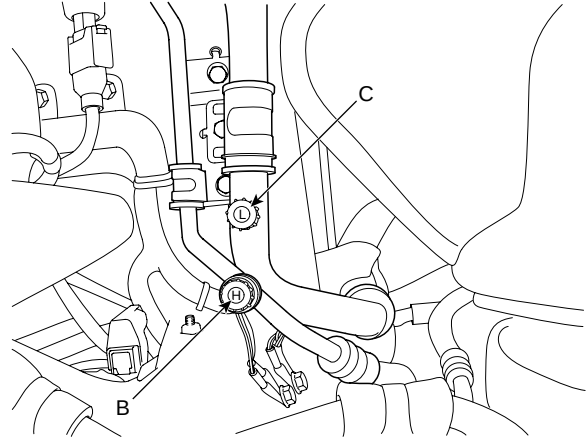
CAUTION

- **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.**

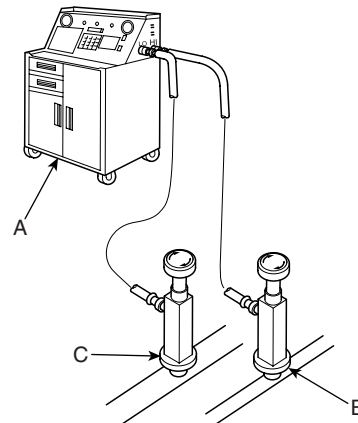
If accidental system discharge occurs, ventilate work area before resuming service.

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.



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EQKE004A

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.

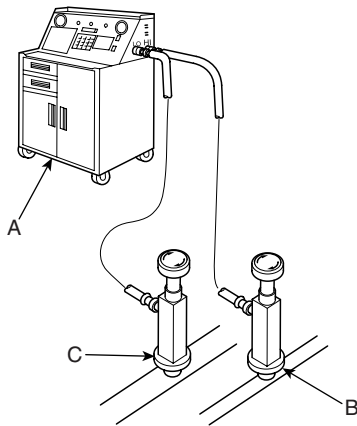
 CAUTION

- **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.



EQKE004A

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.

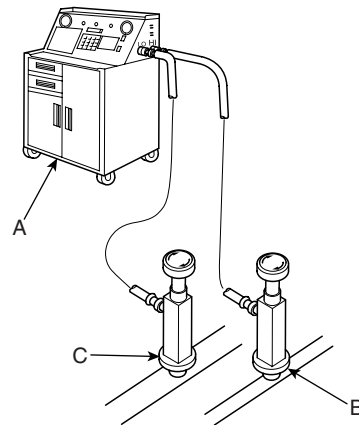
 CAUTION

- **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.



EQKE004A

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.

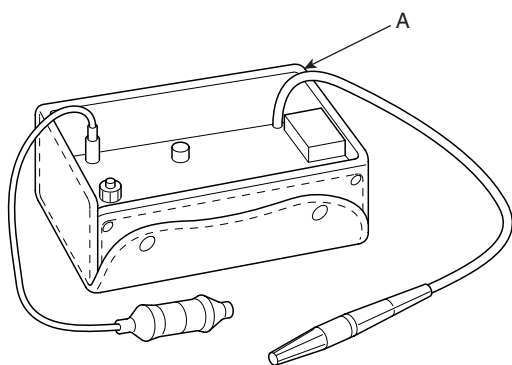


NOTE

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

If a gas leak is detected, proceed as follows:

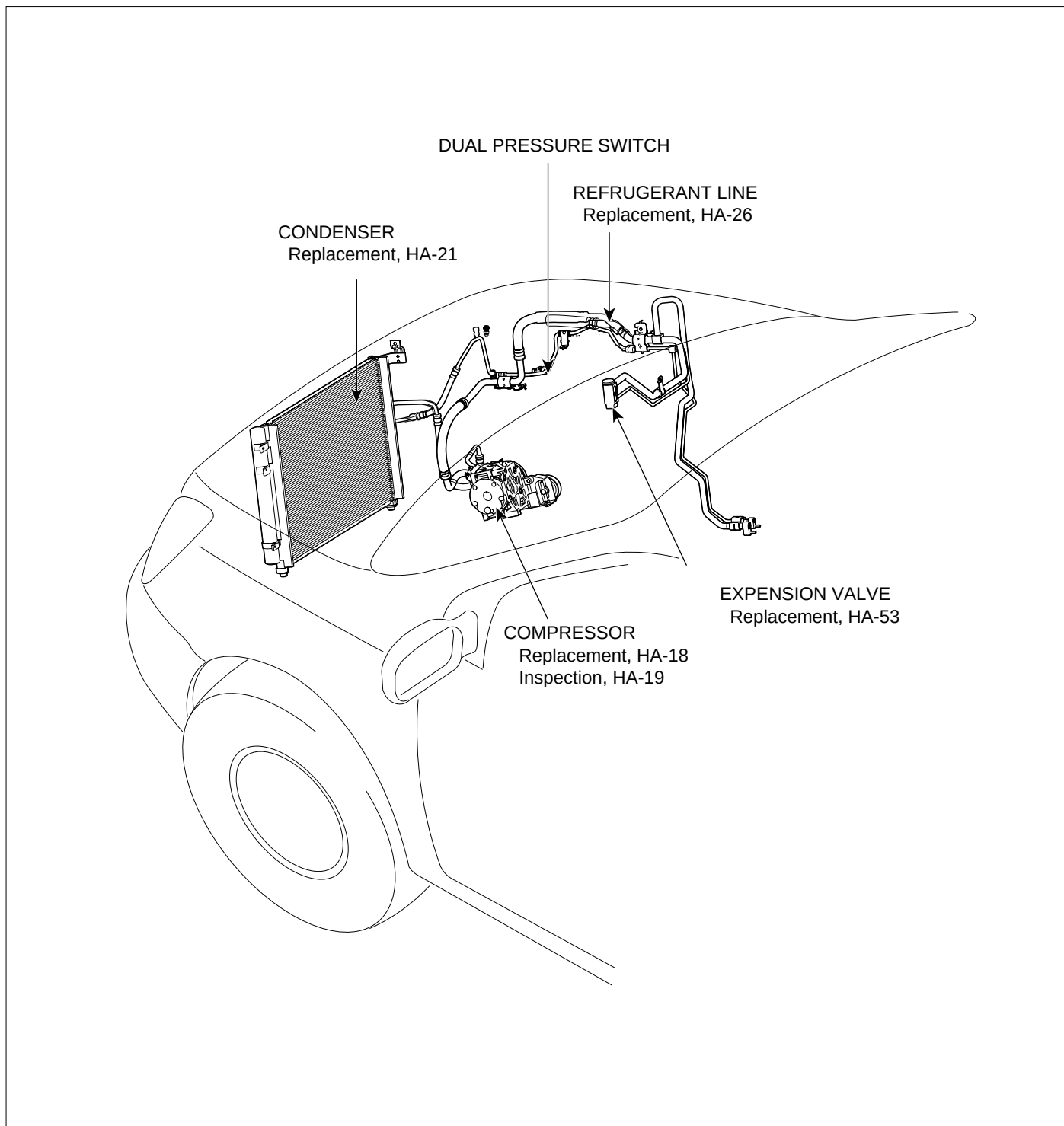
1. Check the torque on the connection fittings and, if too loose, tighten to the proper torque. Check for gas leakage with a leak detector (A).
2. If leakage continues even after the fitting has been tightened, discharge the refrigerant from the system, disconnect the fittings, and check their seating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



EQKE007A

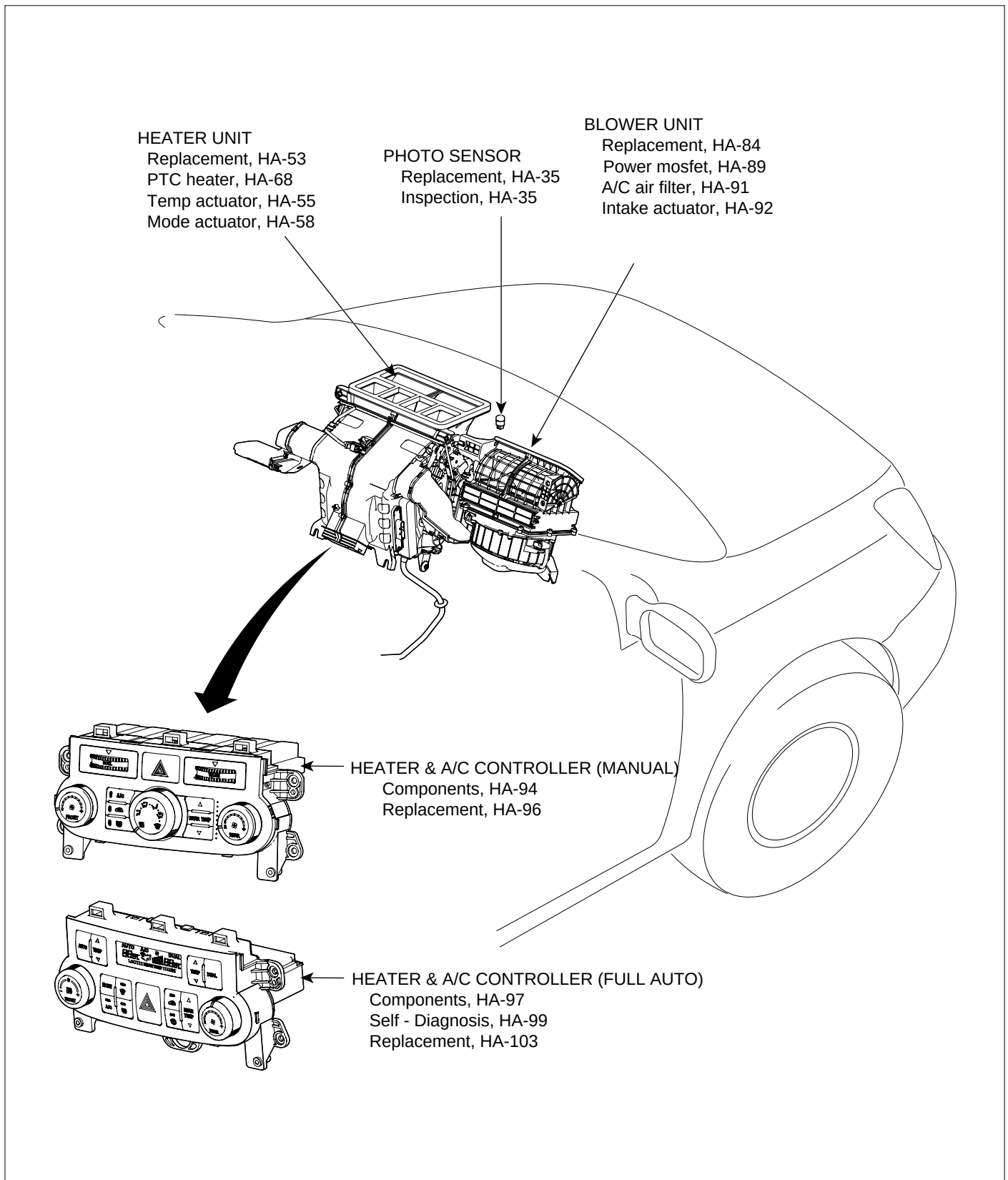
COMPONENT LOCATION INDEX EEDE67DE

ENGINE ROOM



LQKG001A

INTERIOR



LQKG001B

COMPRESSOR OIL

INSPECTION E5FC3B3D

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.



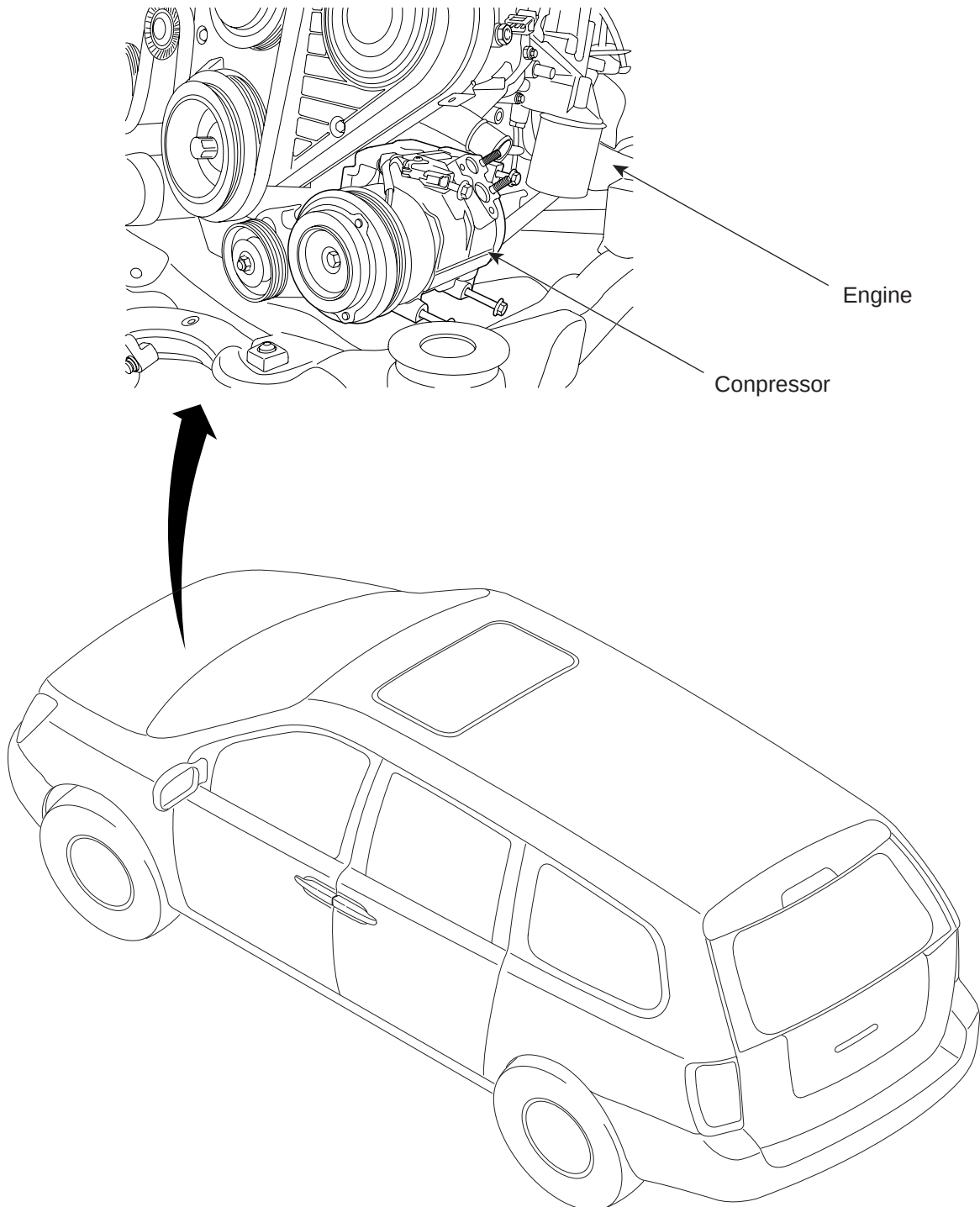
NOTE

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

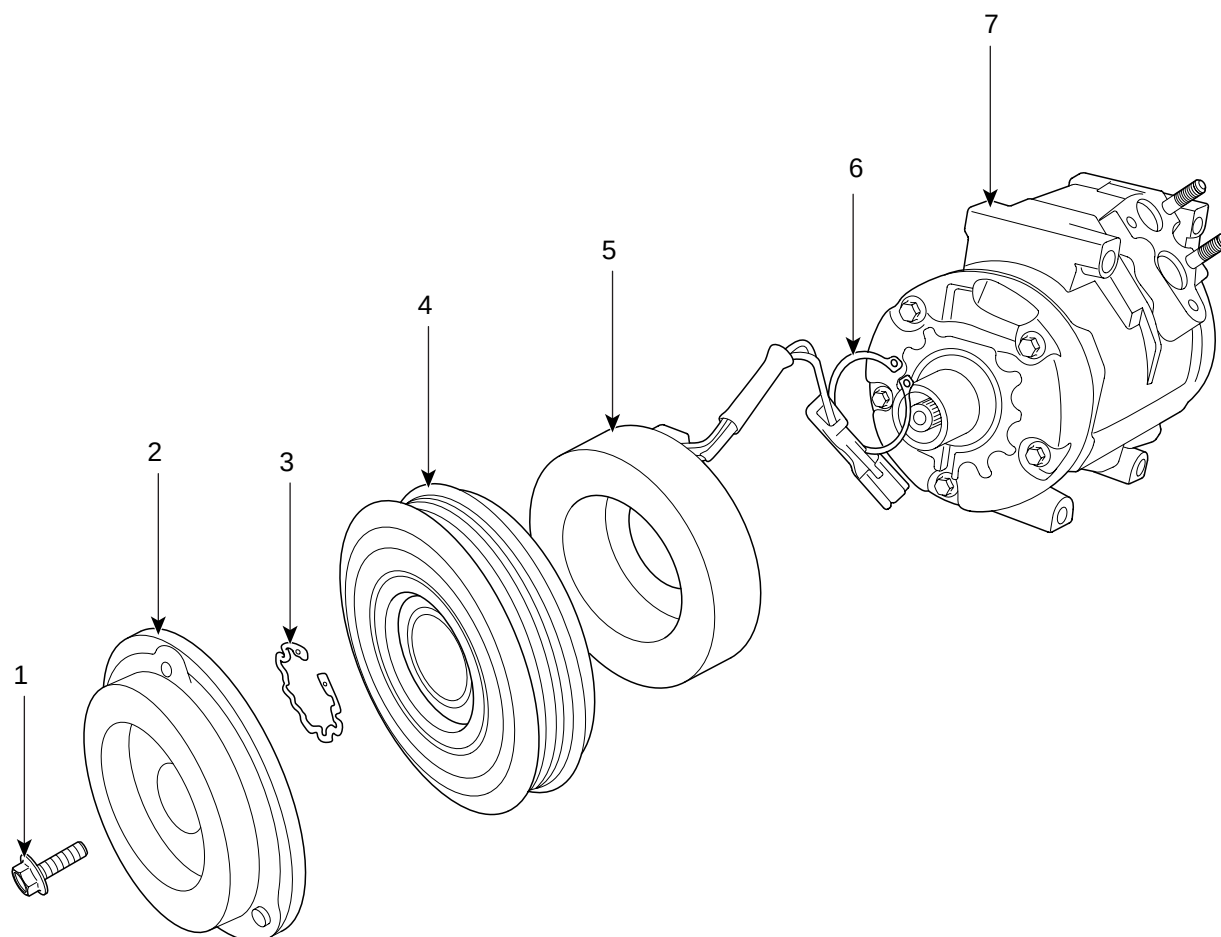
A/C COMPRESSOR CONTROLS (MANUAL)

COMPRESSOR

COMPONENT LOCATION EB6BAC26



COMPONENTS EE9B0AFF



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

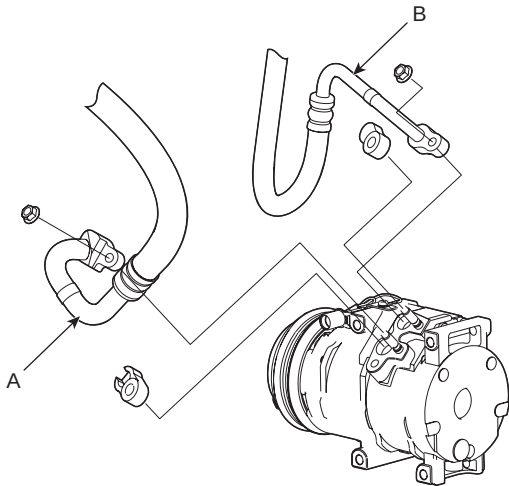
5. Field coil
6. Retainer reing(Field coil)
7. Compressor assembly

LQKG105B

REMOVAL

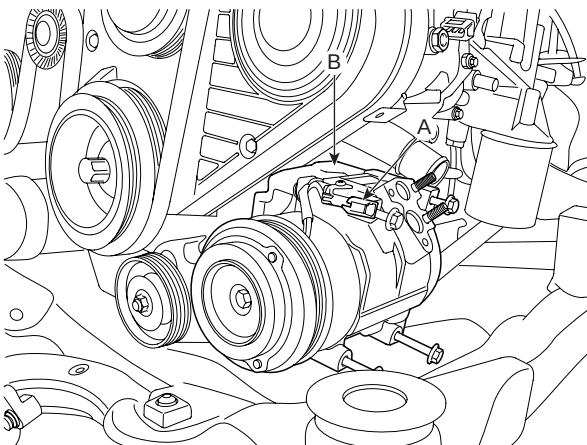
E6183B77

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.



AQKF105C

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

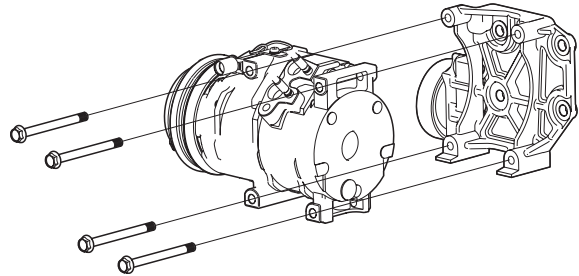


AQKF105D

INSTALLATION

EC9BDAD4

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



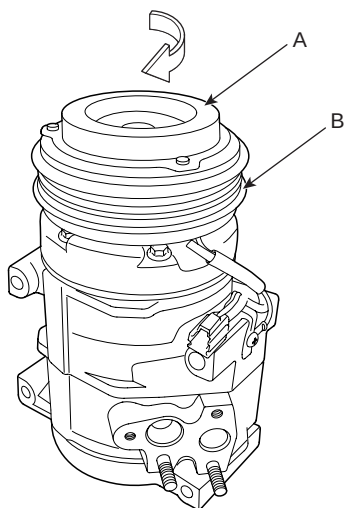
AQKF105E

2. Install in the reverse order of removal, and note these items.
 - 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).
 - 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.
 - To avoid contamination, do not return the oil to the container once dispensed, and never mix it with other refrigerant oils.
 - Immediately after using the oil, replace the cap on the container and seal it to avoid moisture absorption.
 - Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint, wash it off immediately.
 - Adjust the drive belt (Refer to HA-14)
 - Charge the system and test its performance. (Refer to HA-9)

INSPECTION

EBD55AB1

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.



LQKG106A

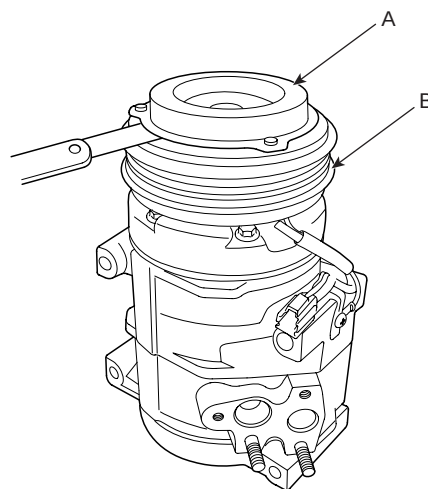
3. Measure the clearance between the pulley (B) and the disc & hub assembly (A) all the way around. If the clearance is not within specified limits, remove the disc & hub assembly and add or remove shim (gap washer) as needed to increase or decrease clearance.

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



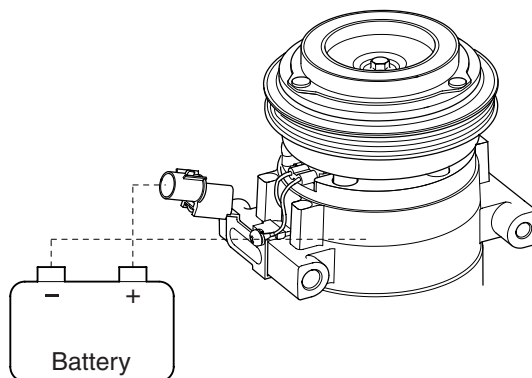
NOTE

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



AQKF106B

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.



EQBF105H

DISASSEMBLY

EA365562

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.

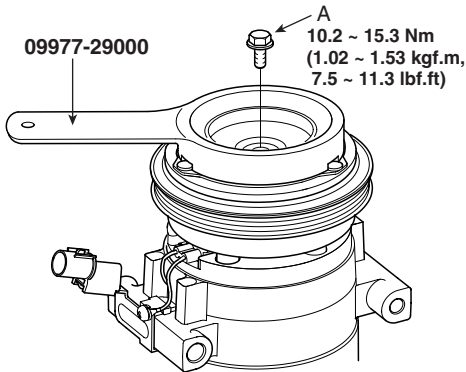
TORQUE: 10~15N.m (1.02~1.53kgf.m, 7.37~11lbf.ft)

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



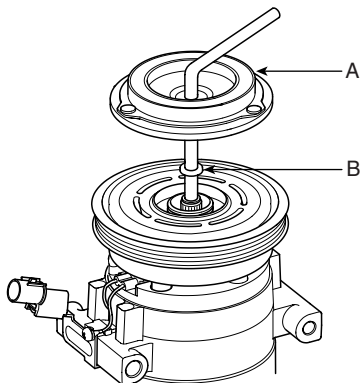
NOTE

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

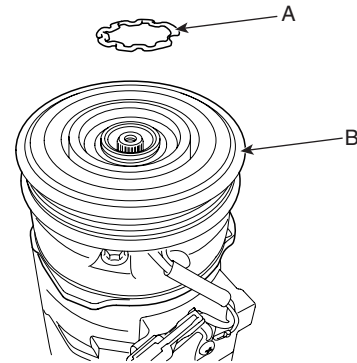


AQJF106D

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 re-install the disc & hub assembly, and recheck its clearance (Refer to HA-19).

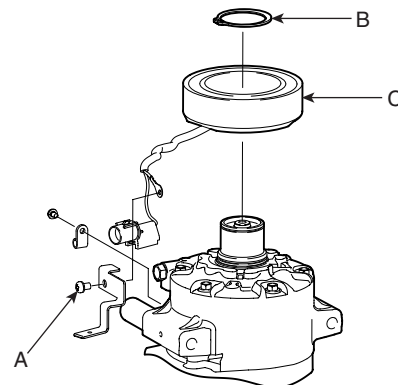


AQJF106E



AQKF105K

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.



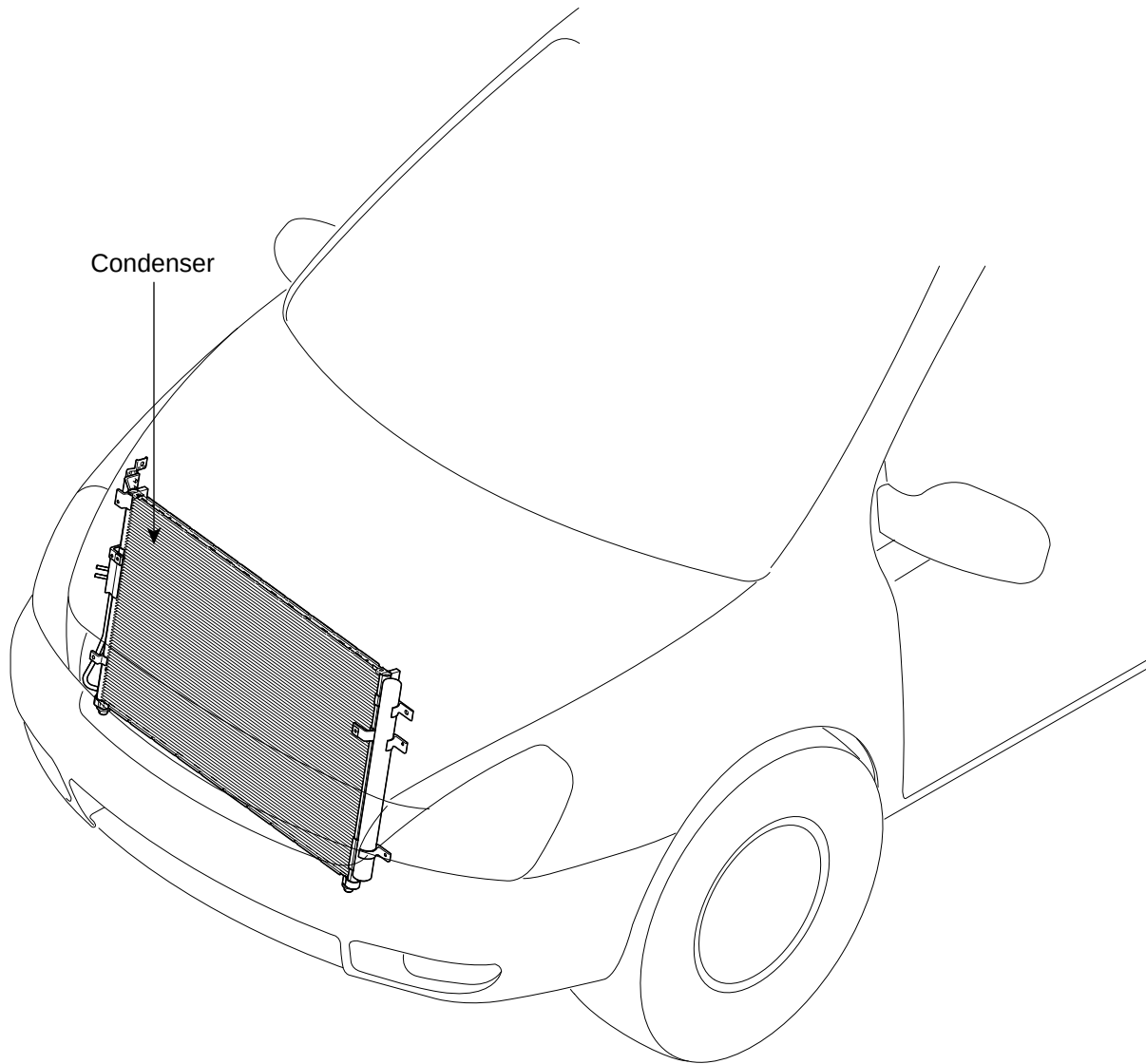
AQJF106G

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

CONDENSER

COMPONENT LOCATION

E786D4B5



LQKG108A

INSPECTION

E1D4D1C2

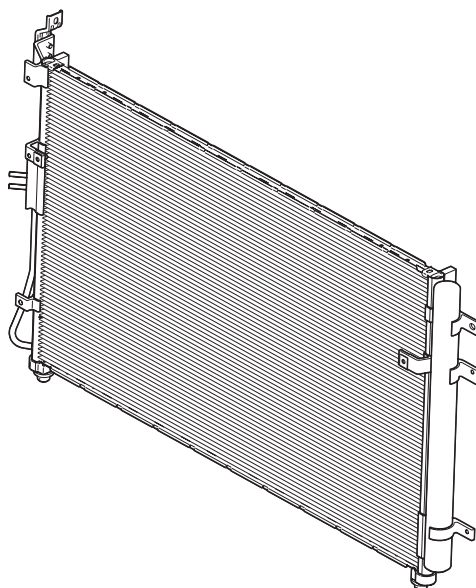
1. Check the condenser fins for clogging and damage. If clogged, clean them with water, and blow them with compressed air. If bent, gently bend them using a screwdriver or pliers.
2. Check the condenser connections for leakage, and repair or replace it, if required.

REPLACEMENT

EE89F4B4

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.



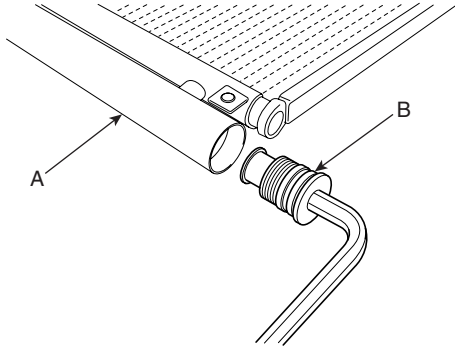
AQKF108C

5. Install in the reverse order of removal, and note these items :
 - If you're installing a new condenser, add refrigerant oil ND-OIL8.
 - 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-9)

DESICCANT

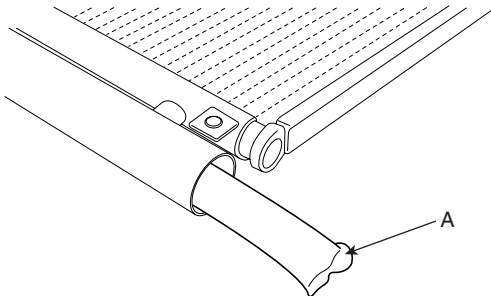
1. Remove the condenser, and then remove the bottom cap (B) with L wrench (A) from the condenser.

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



KQRE108D

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



KQRE108E

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

5. Install the new bottom cap to the condenser.

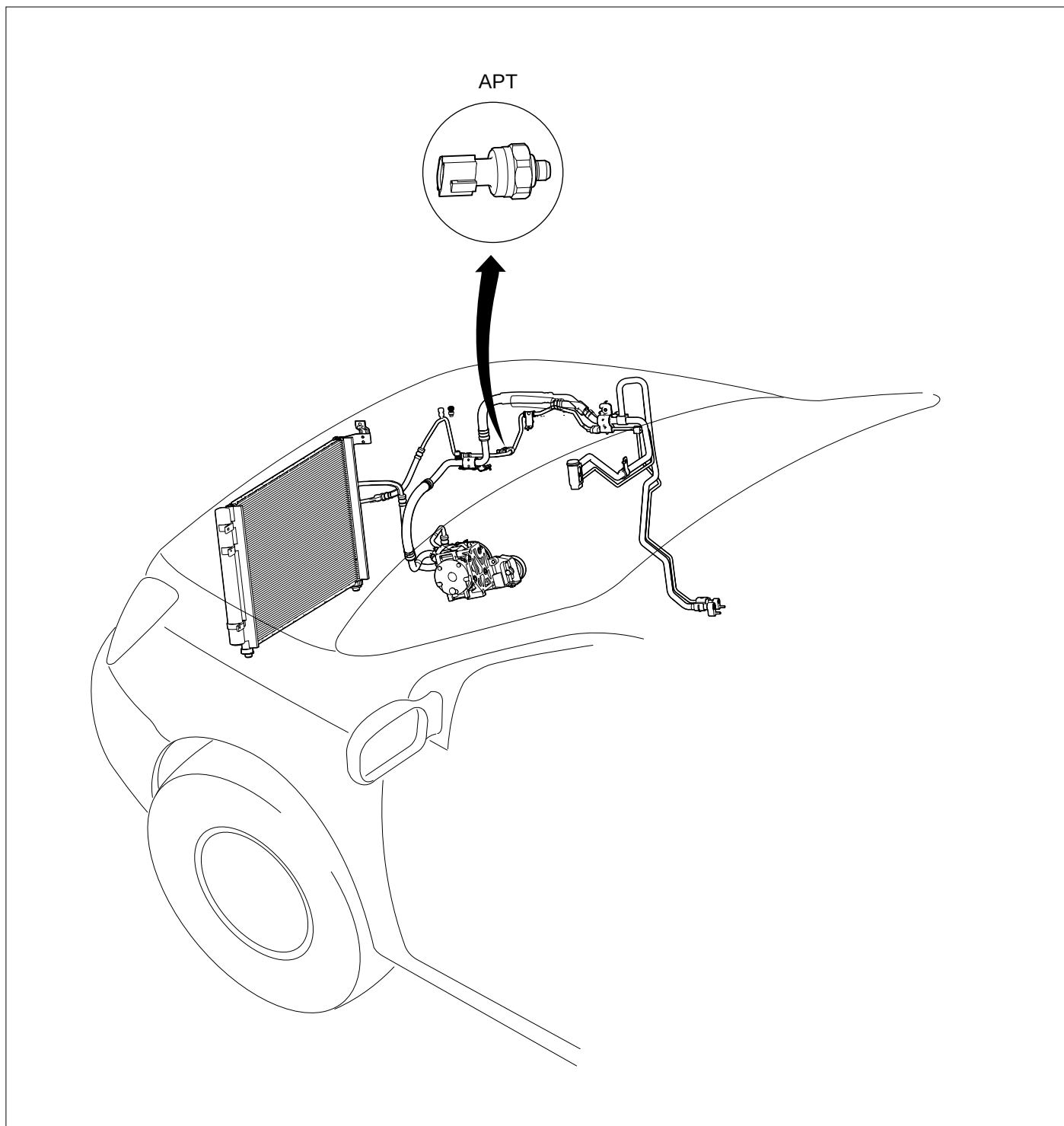


NOTE

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

APT(A/C PRESSURE TRANSDUCER)

COMPONENT LOCATION EED5D294



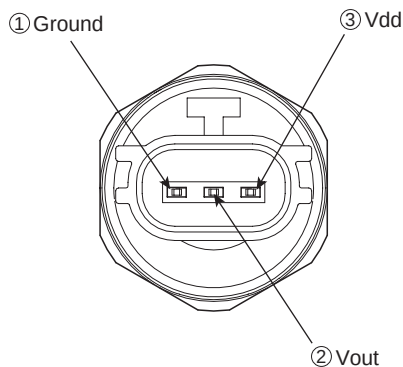
LQKG116A

DESCRIPTION EFD5CCE4

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 EFD5CCE5

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



LQKG116B

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

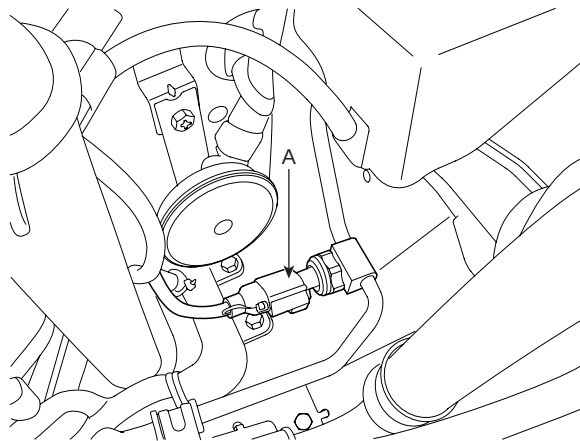
$$V_{out} = V_{dd}(0.025 * P + 0.1) \text{ [kgf/cm}^2\text{G]}$$

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

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

REPLACEMENT ED2BBE5B

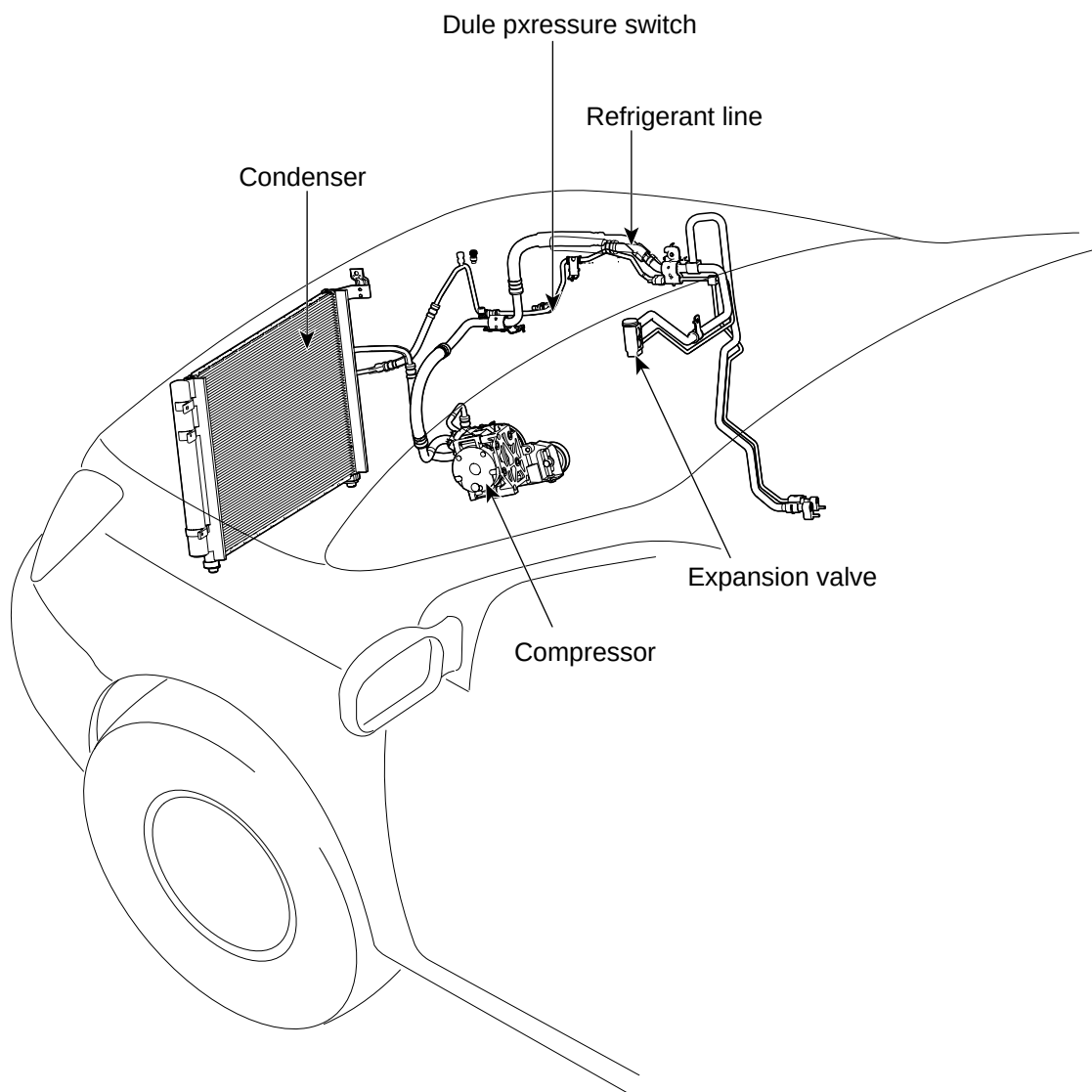
1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/charging station. (Refer to HA-8)
3. Disconnect A/C pressure transducer connector (3P) (A).



AQKF116C

REFRIGERANT LINE

COMPONENT LOCATION EA7DBABA



LQKG104A

REPLACEMENT EB1FF0FD

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			

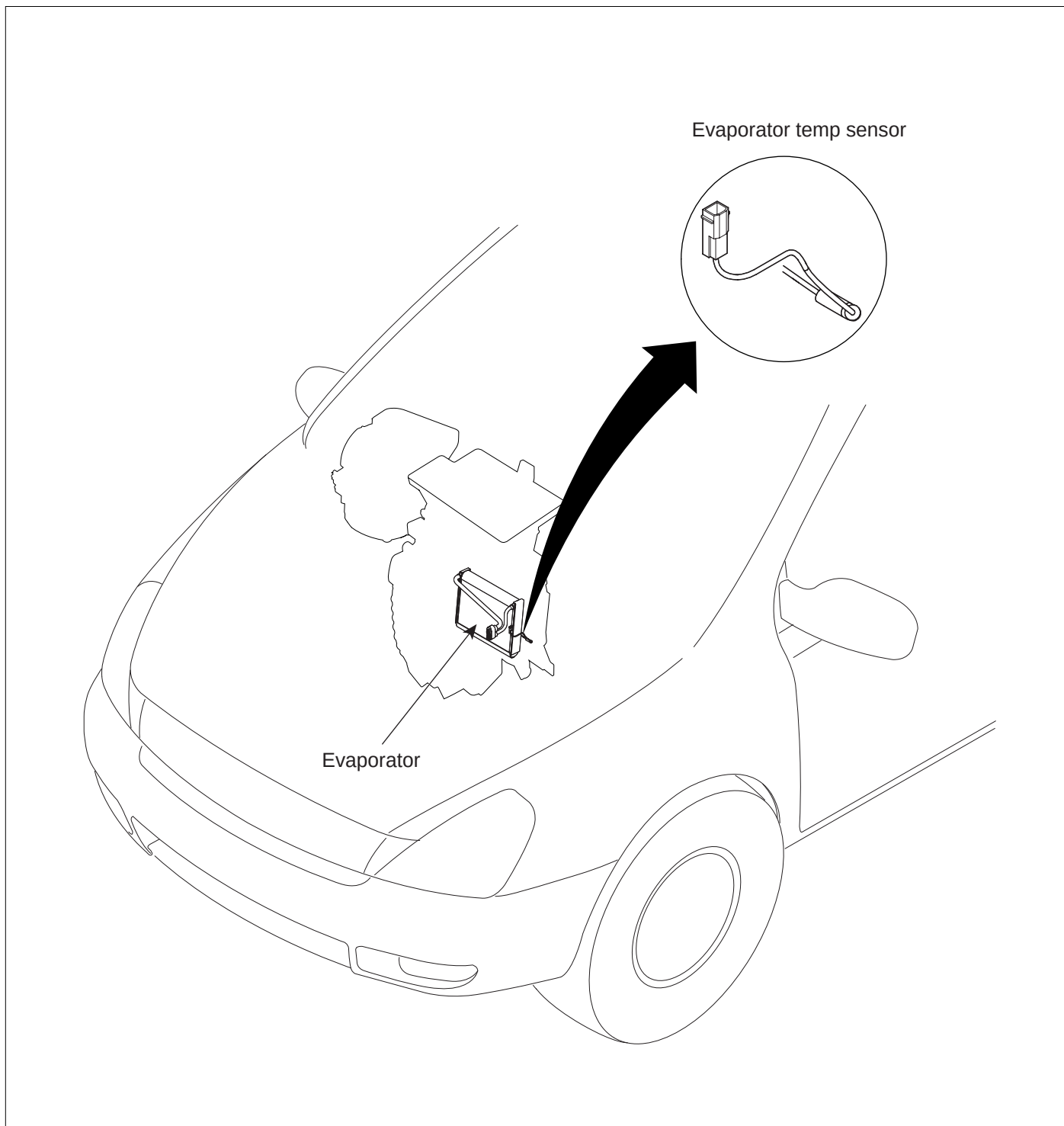
4. Evacuate air in refrigeration system and charge system with refrigerant (Refer to HA-9).

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.

EVAPORATOR TEMPERATURE SENSOR

COMPONENT LOCATION E5540B31



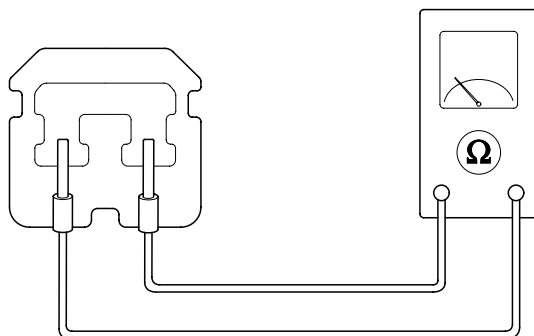
LQKG206F

DESCRIPTION E5F1BCCF

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 E05C43ED

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



KQQE280B

SPECIFICATION

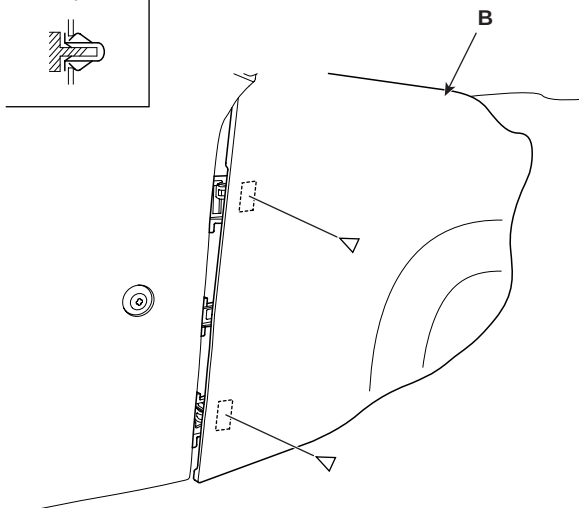
Evaporator core temperature [°C(°F)]	Resistance [kΩ]
-10(14)	13.6
0(32)	8
10(50)	4.9
15(59)	3.9
30(86)	2
40(104)	1.3
50(122)	0.9

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 E0EEFB9A

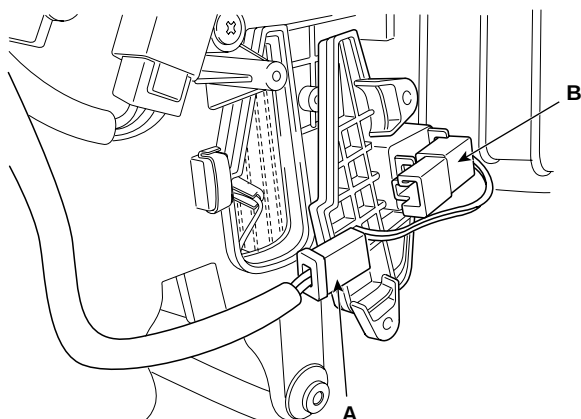
1. Disconnect the negative (-) battery terminal.
2. Remove the center lower side cover(B).

▷ : Clip, 2



LQKG161C

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



LQKG161B



CAUTION

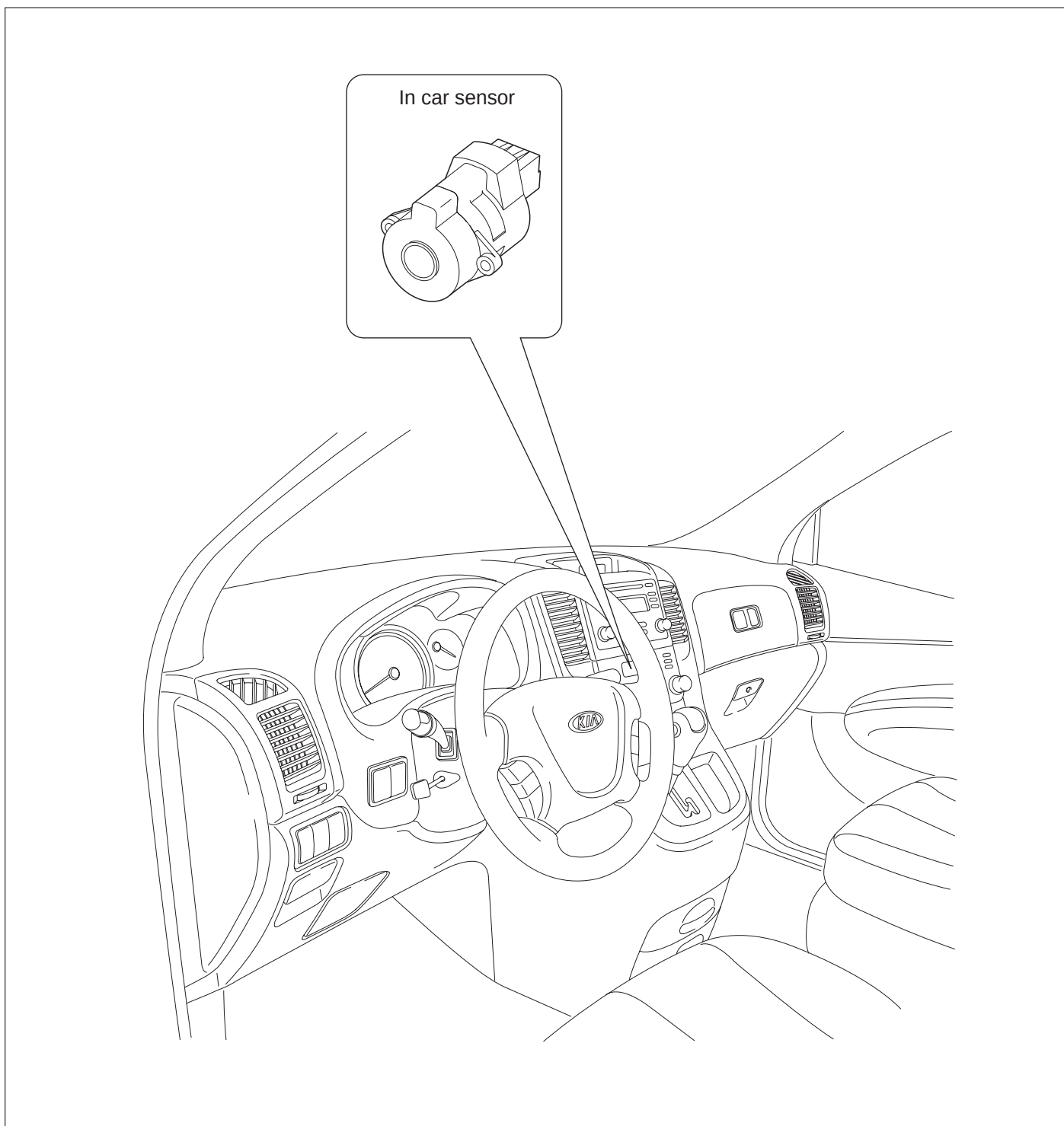
Take care that evaporator core pins are not bent.

6. Installation is the reverse order of removal.

A/C COMPRESSOR CONTROLS (FULL AUTO)

IN CAR SENSOR

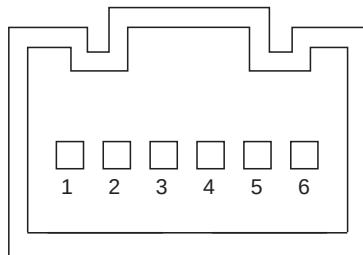
COMPONENT LOCATION EE1F070B



DESCRIPTION

EC707BB8

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(+) |

LQKG201B

INSPECTION

EFF90998

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

SPECIFICATION

Temperature [°C (°F)]	Resistance between terminals 2and 4 (kΩ)
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%

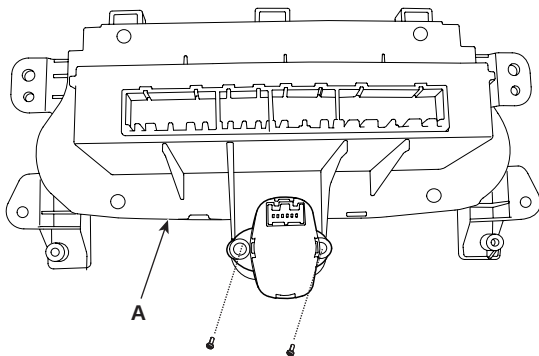


NOTE

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

REPLACEMENT EA7F2D51

1. Disconnect the negative (-) battery terminal.
2. Remove the A/C control pannel. (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).

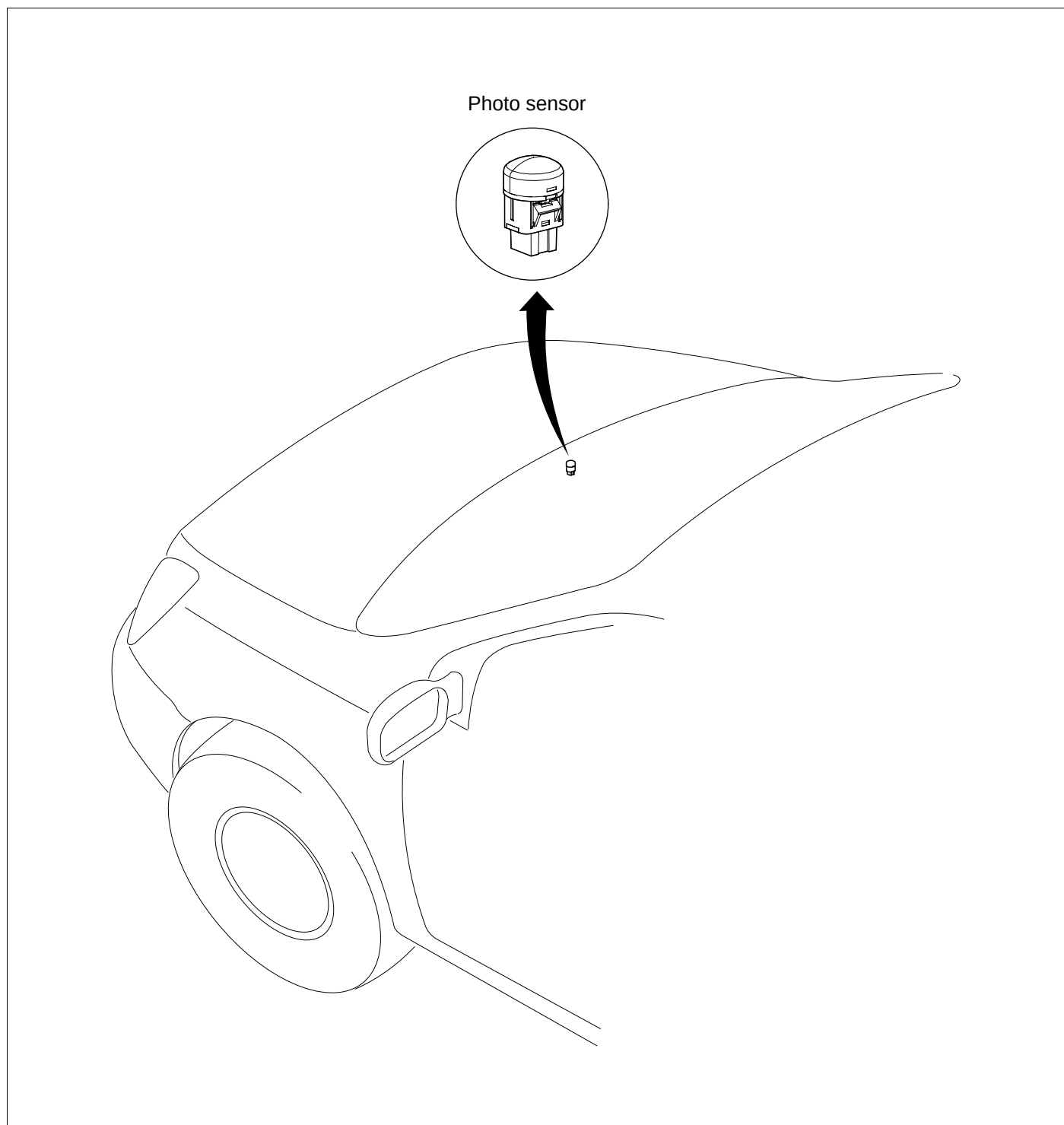


AQKF201C

4. Installation is the reverse order of removal.

PHOTO SENSOR

COMPONENT LOCATION EF23C30B



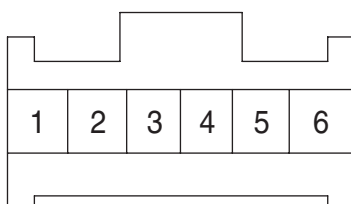
LQKG202A

DESCRIPTION E9E29167

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 E3DC5DB8

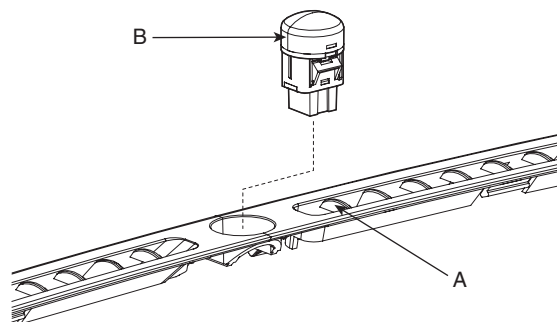
1. Ignition "ON"
2. Using the scan tool.
3. Emit intensive light toward photo sensor using a lamp, and check the output voltage change.
4. The voltage will rise with higher intensive light and reduce with lower intensive light.



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

REPLACEMENT E6DB0564

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



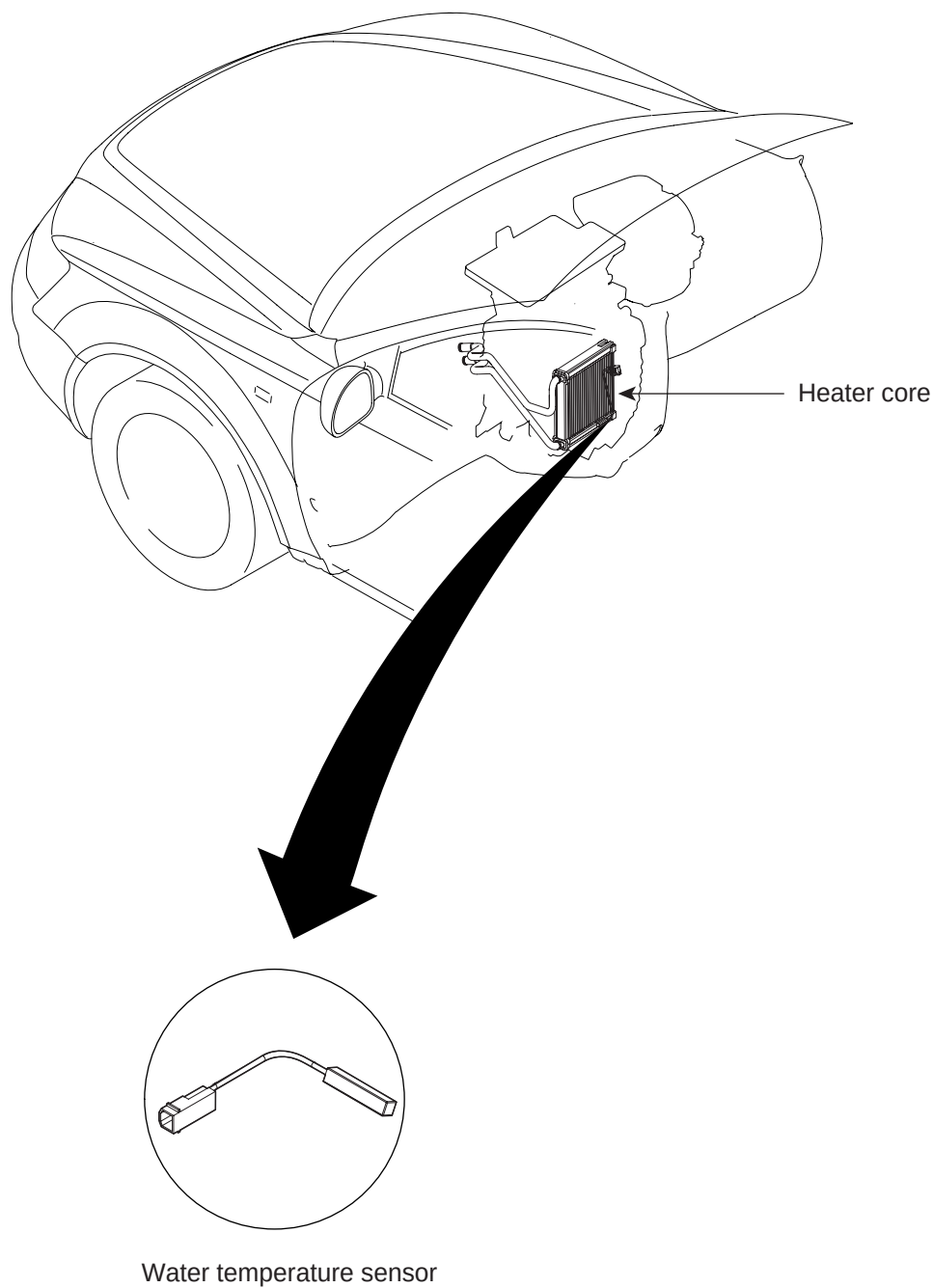
AQKF202C

3. Install in the reverse order of removal.

LQJF202B

WATER TEMPERATURE SENSOR

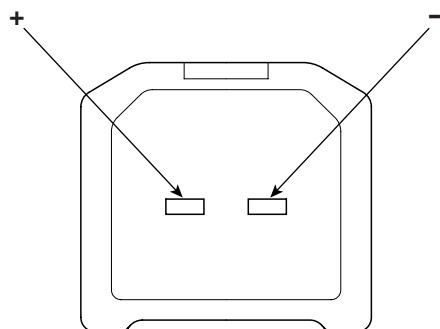
COMPONENT LOCATION E4BFEDE4



LQKG203A

DESCRIPTION EF9C5A75

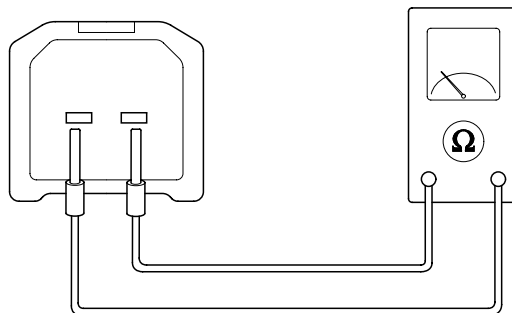
1. Water temperature sensor is located at the heater unit.
2. It detects coolant temperature. Its signal is used for cold engine lockout control. When the driver operates the heater before the engine is warmed up, the signal from sensor causes the heater control unit to reduce blower motor speed until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



AQIE203C

INSPECTION EFC0971F

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



AQIE203D

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.

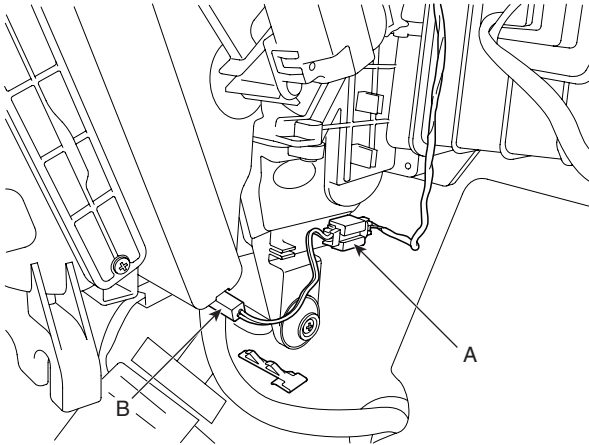


NOTE

Negative type thermistor that resistance will rise with lower temperature, and reduce with higher temperature.

REPLACEMENT E22FAC9F

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



AQKF203E

4. Installation is the reverse order of removal.

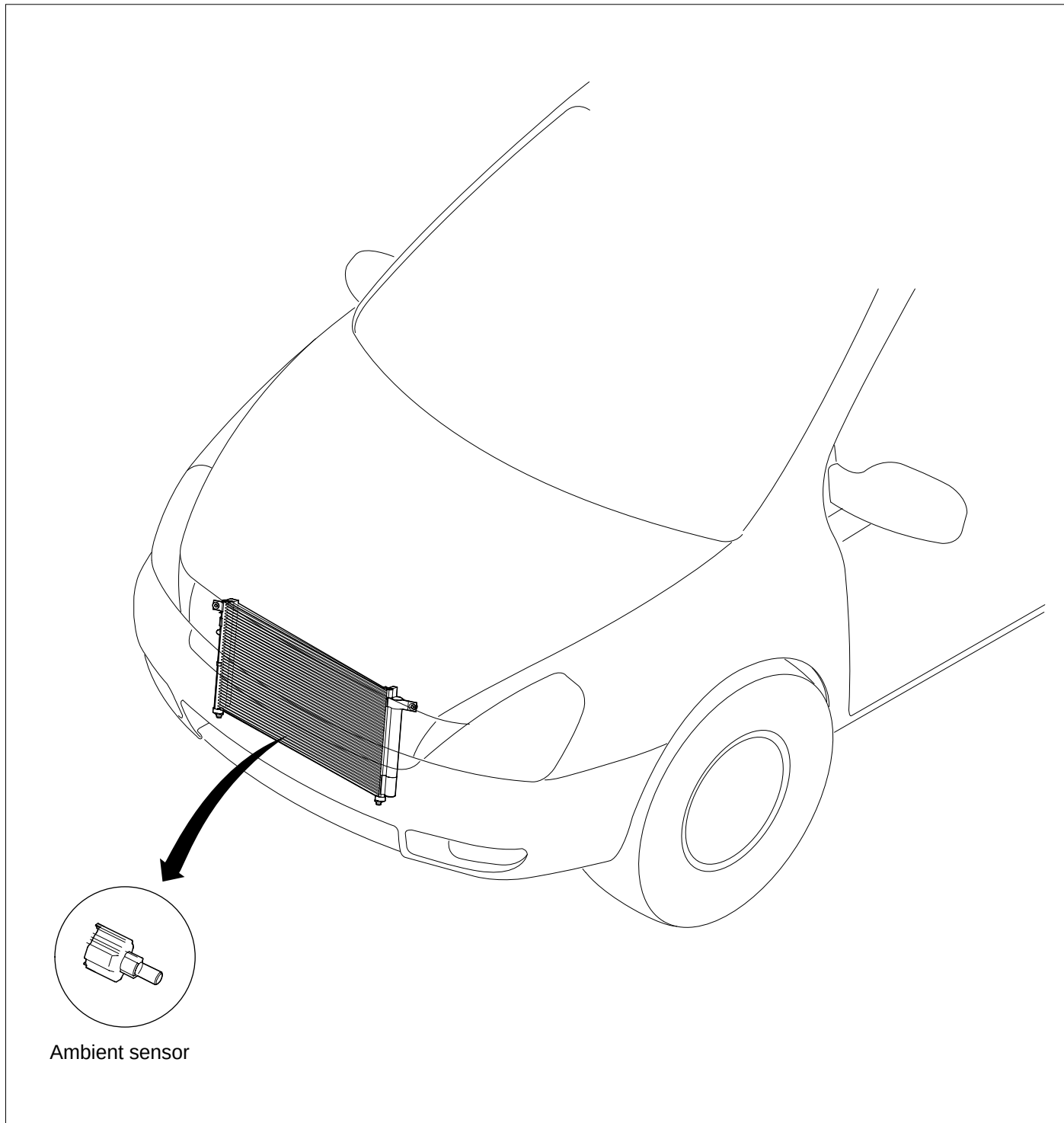


NOTE

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

AMBIENT TEMPERATURE SENSOR

COMPONENT LOCATION E63BA10B



LQKG204A

DESCRIPTION

EE9AFC97

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



NOTE

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

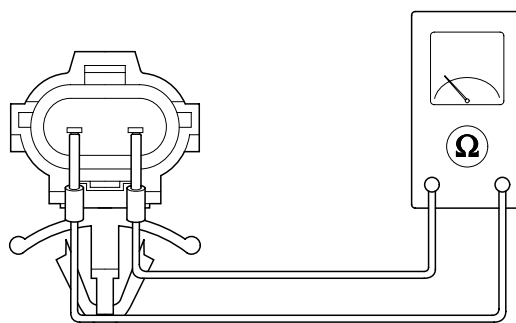
INSPECTION

EBCCA26E

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 ($\text{k}\Omega$)
-10(14)	$164 \pm 3\%$
0 (32)	$97.5 \pm 3\%$
10 (50)	$59.6 \pm 3\%$
20 (68)	$37.5 \pm 3\%$



AQJF204B

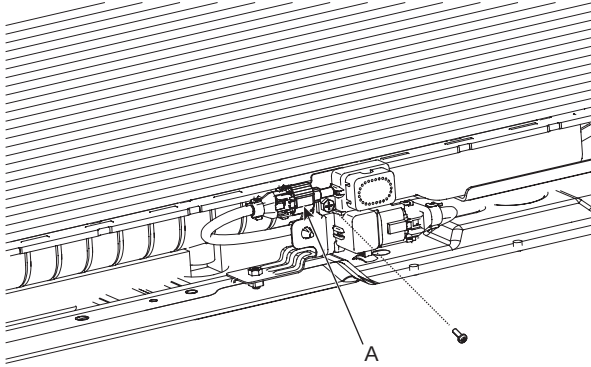
4. If the measured resistance is not specification, substitute with a known-good ambient temperature sensor and check for proper operation.
5. If the problem is corrected, replace the ambient temperature sensor.

A/C COMPRESSOR CONTROLS (FULL AUTO)

HA -41

REPLACEMENT EE84B2FD

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

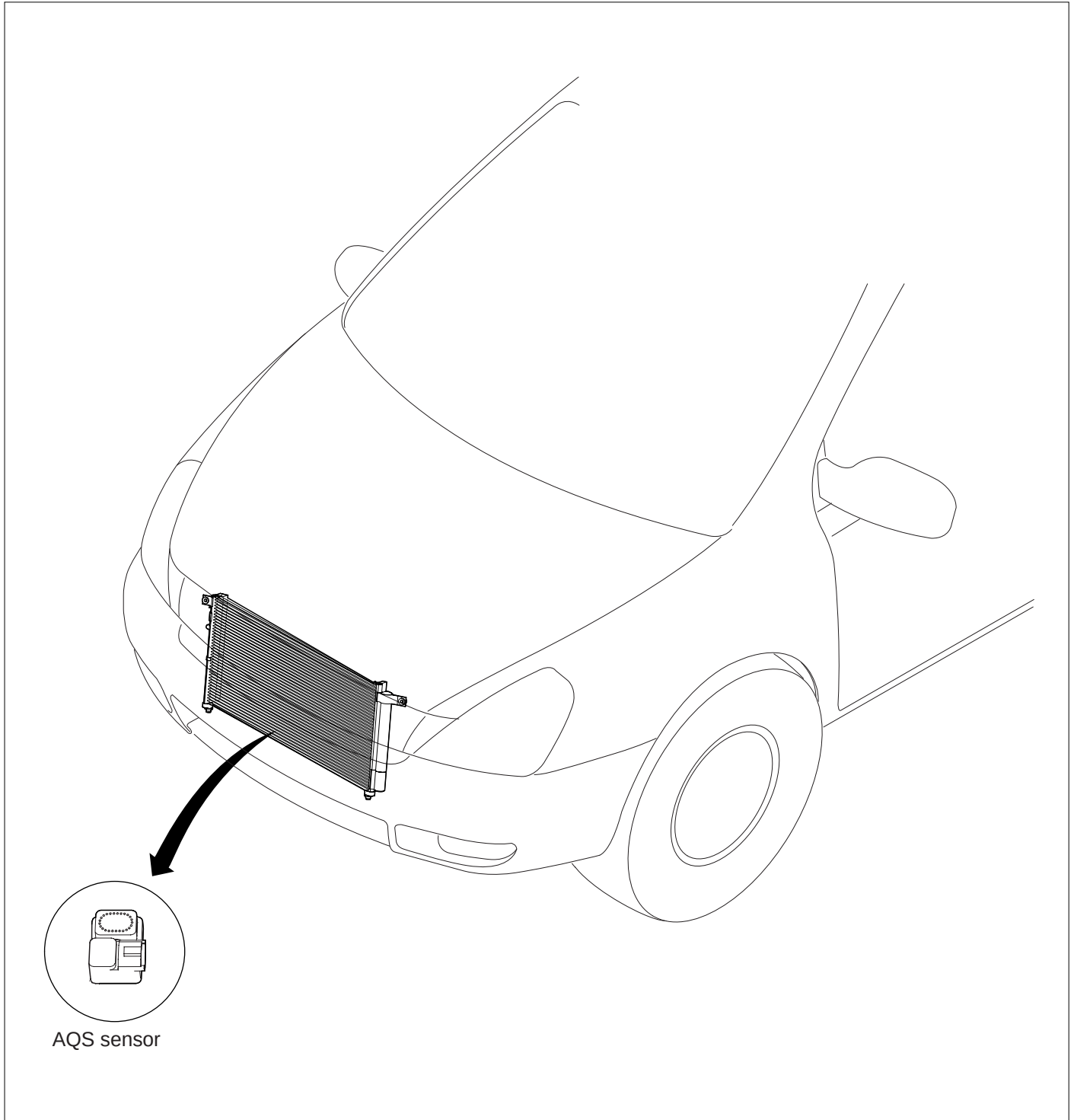


AQKF204E

4. Installation is the reverse order of removal.

A.Q.S (AIR QUALITY SENSOR)

COMPONENT LOCATION EF783C43



LQKG207A

A/C COMPRESSOR CONTROLS (FULL AUTO)

HA -43

DESCRIPTION E122A2FC

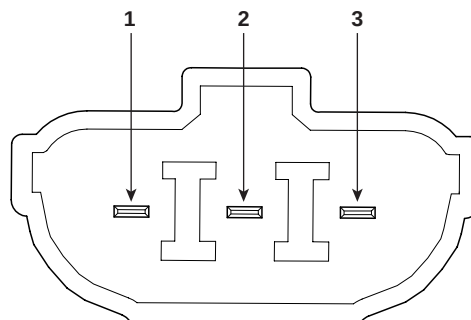
1. A.Q.S is located at center support in front of the engine radiator, and detects hazardous elements in ambient air providing output signal to control.
2. It will detect sulfurous acid gas, carbon dioxide, carbon monoxide, hydrocarbon and allergen.

INSPECTION EF4C1E6B

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



1. IG2
2. Ground
3. Output signal

BQKF207B

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.

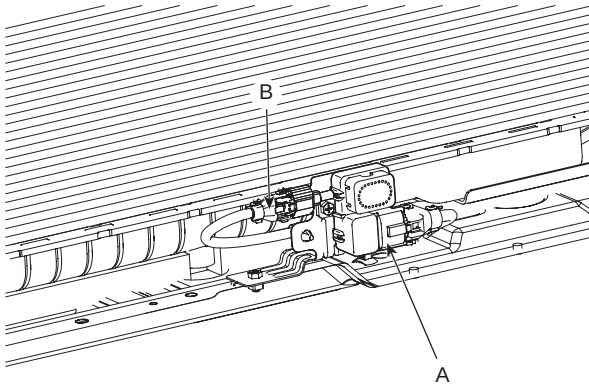


NOTE

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

REPLACEMENT E4CD857C

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).



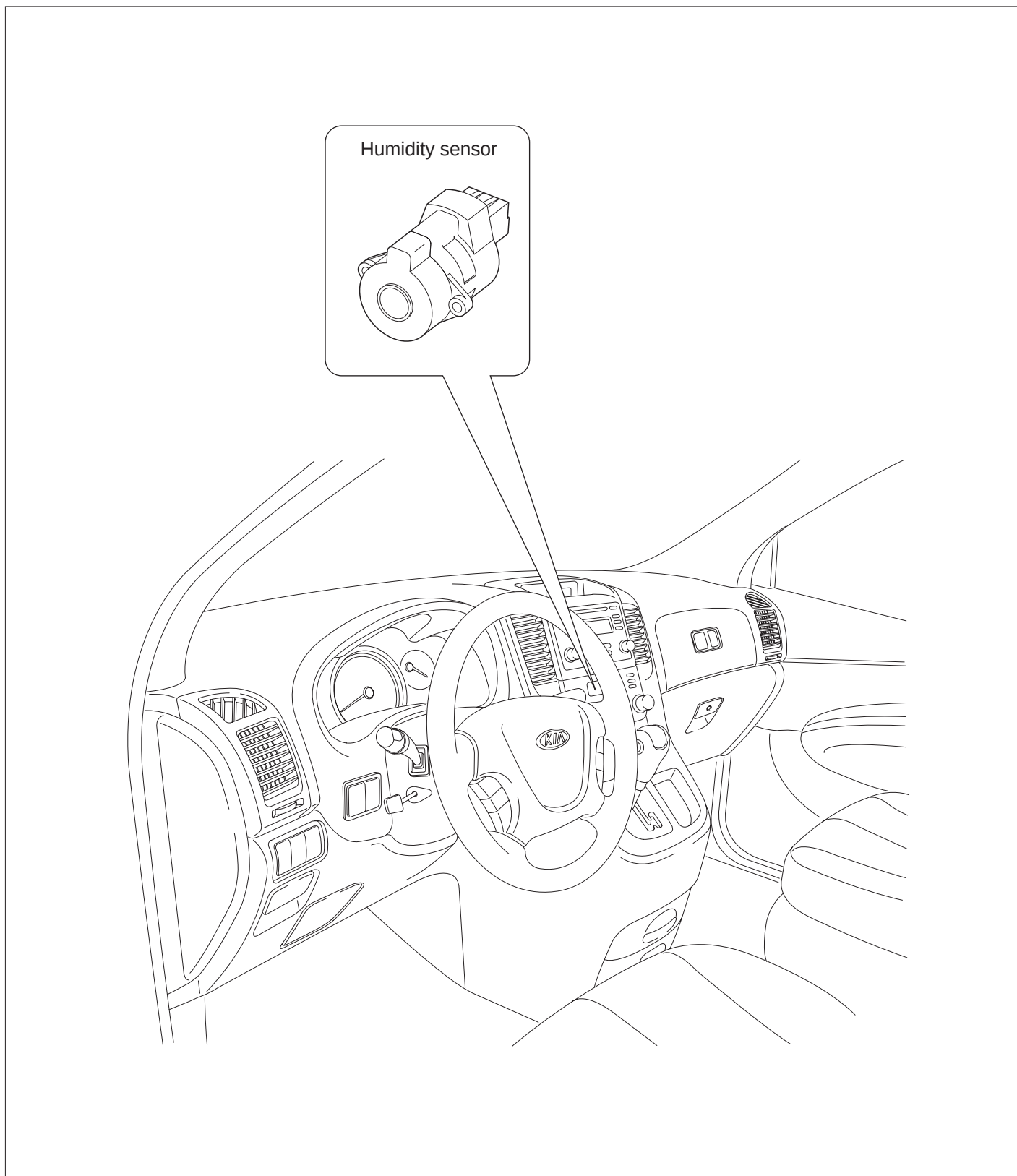
LQKF204D

4. Installation is the reverse order of removal.

HUMIDITY SENSOR

COMPONENT LOCATION

ED4862C0

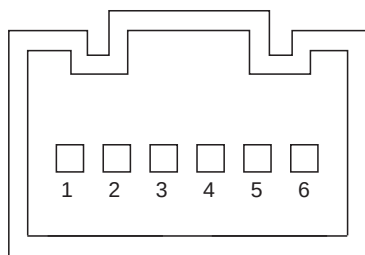


LQKG561A

DESCRIPTION

E4A63763

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

LQKG201B

INSPECTION

ED2CFA50

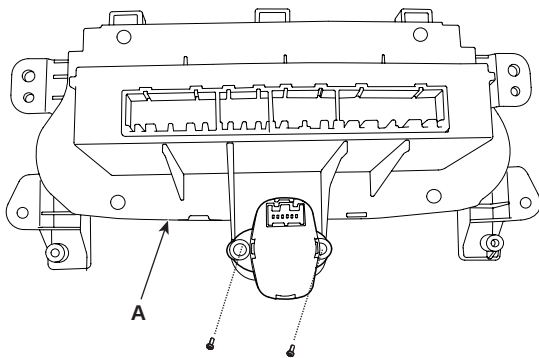
1. Ignition "ON"
2. Using the scan tool.
3. Check the frequency of humidity sensor between terminals 2 and 3.

Humidity (%)	Frequency between terminals 2and 3 (Hz)
30	6976 ± 5%
50	6728 ± 5%
60	6600 ± 5%
70	6468 ± 5%
80	6330 ± 5%
90	6186 ± 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 EF181EBC

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).



AQKF201C

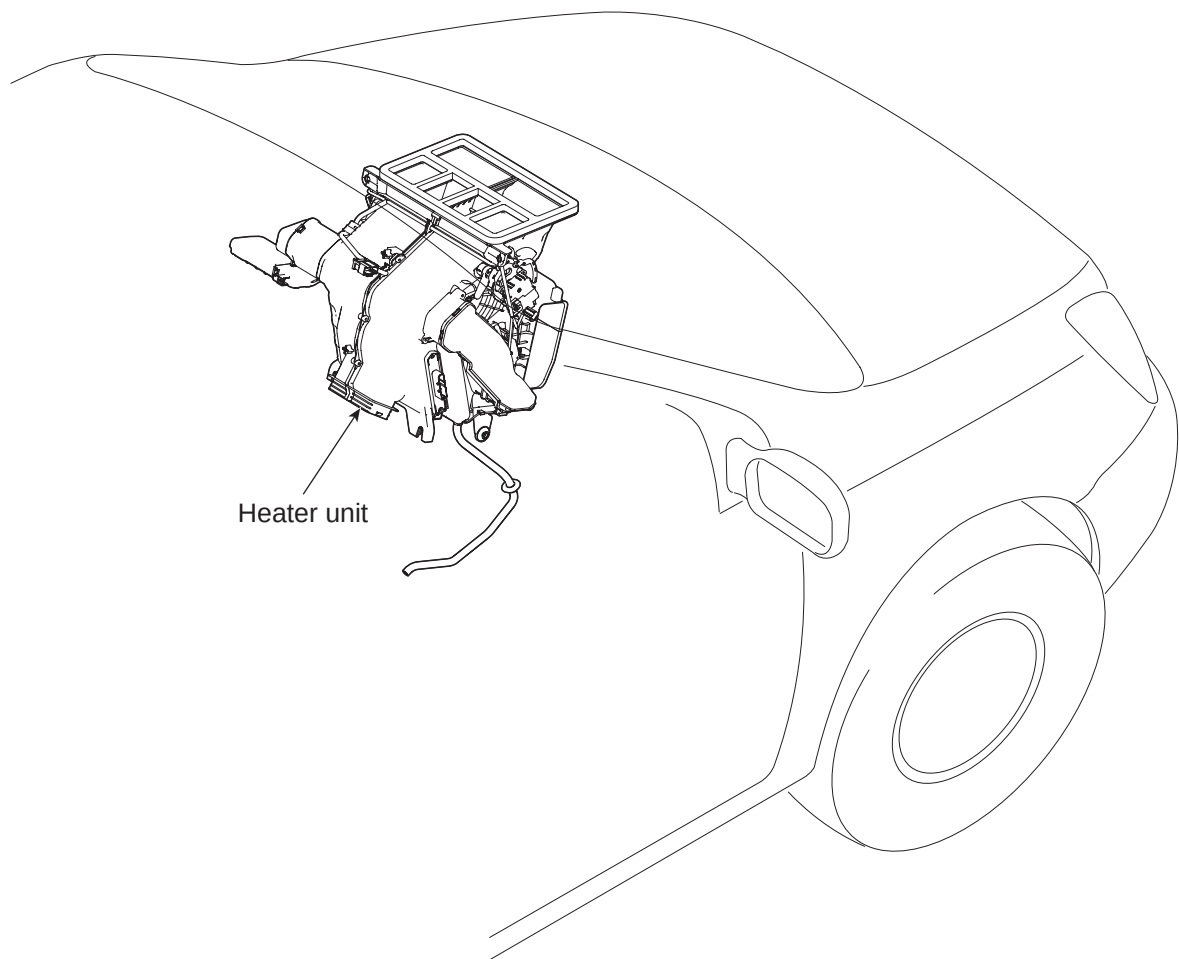
5. Installation is the reverse order of removal.

HEATER

HEATER UNIT

COMPONENT LOCATION

EDABBA22

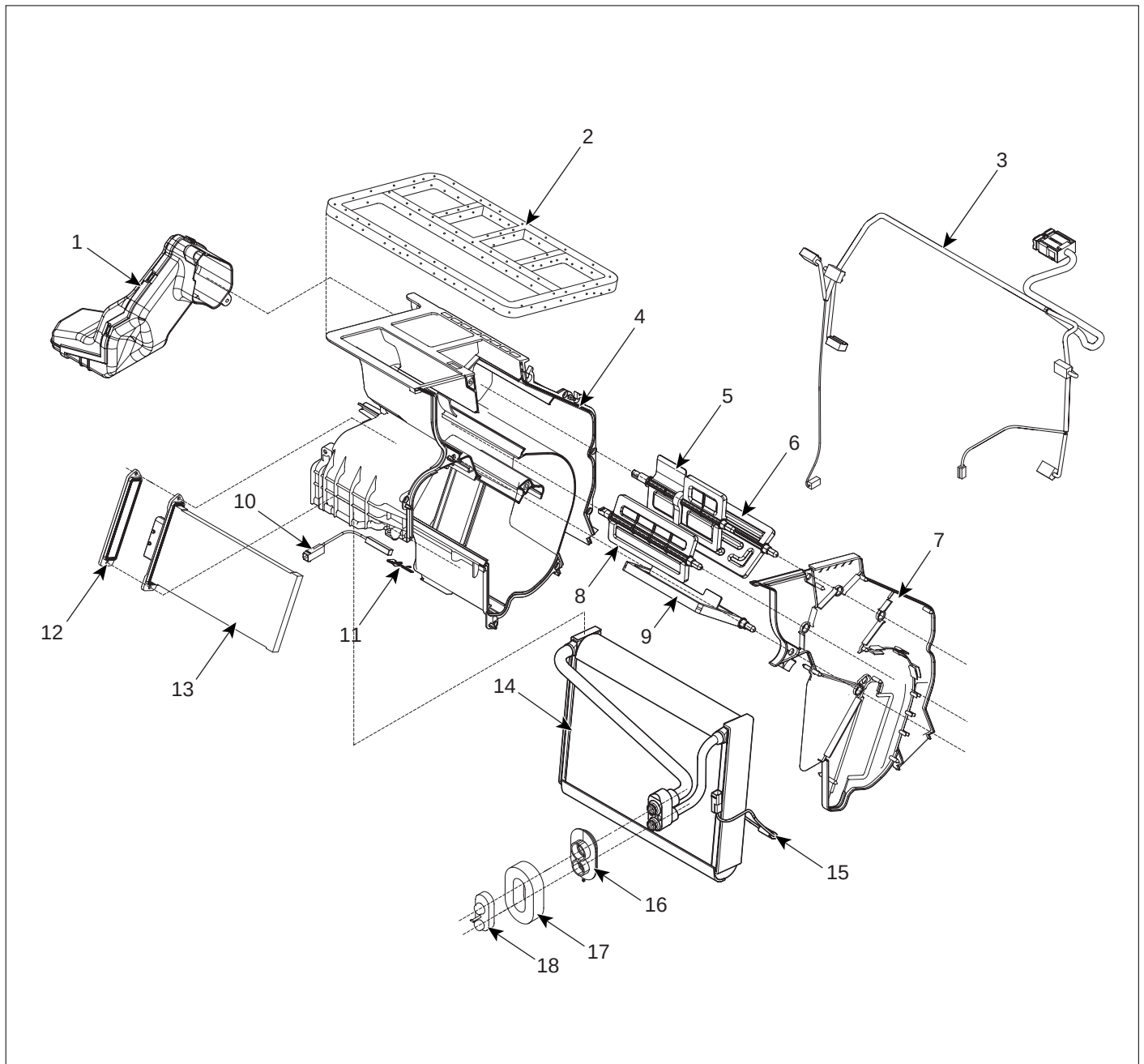


LQKG300A

HEATER

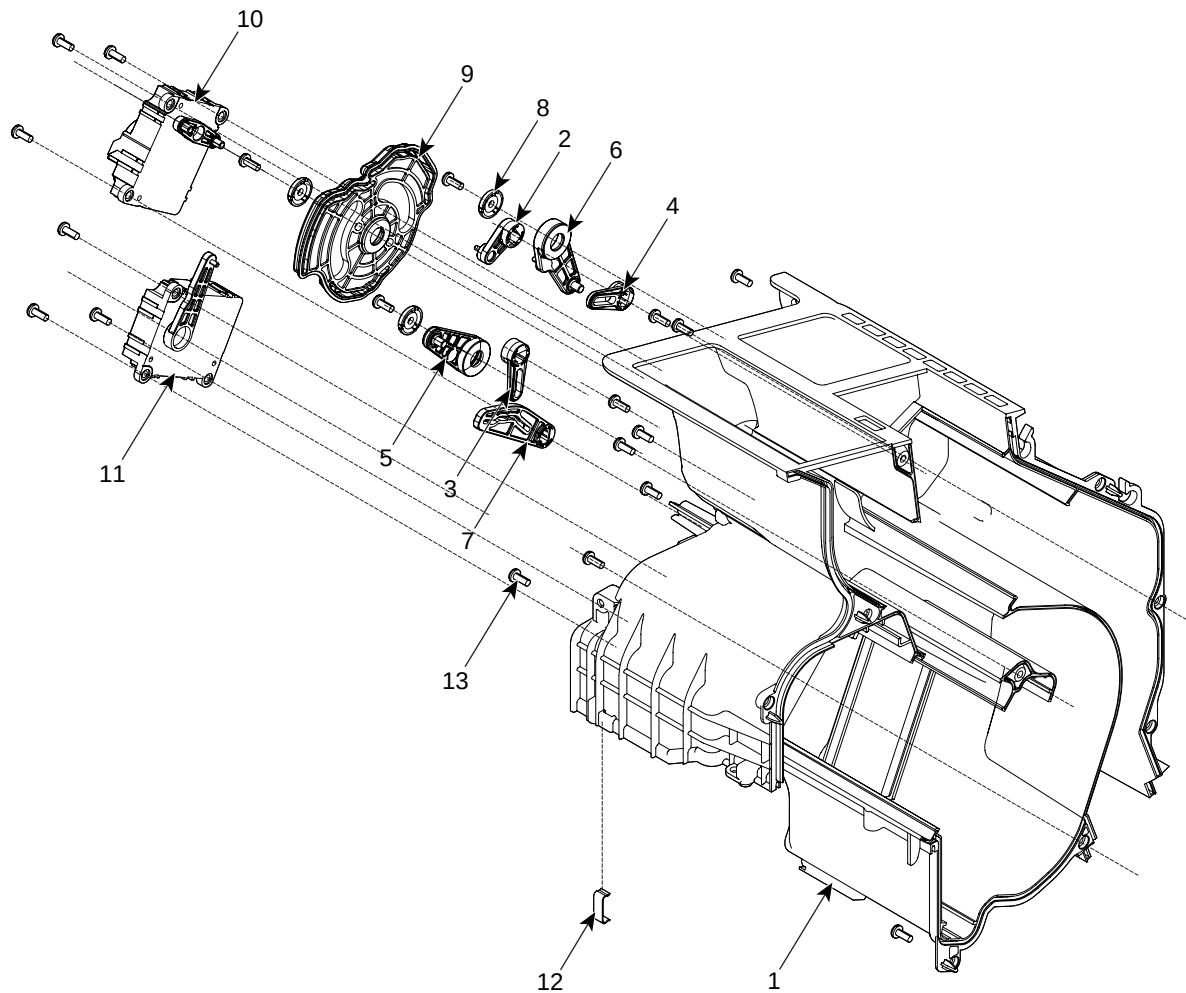
HA -49

COMPONENTS E057B840



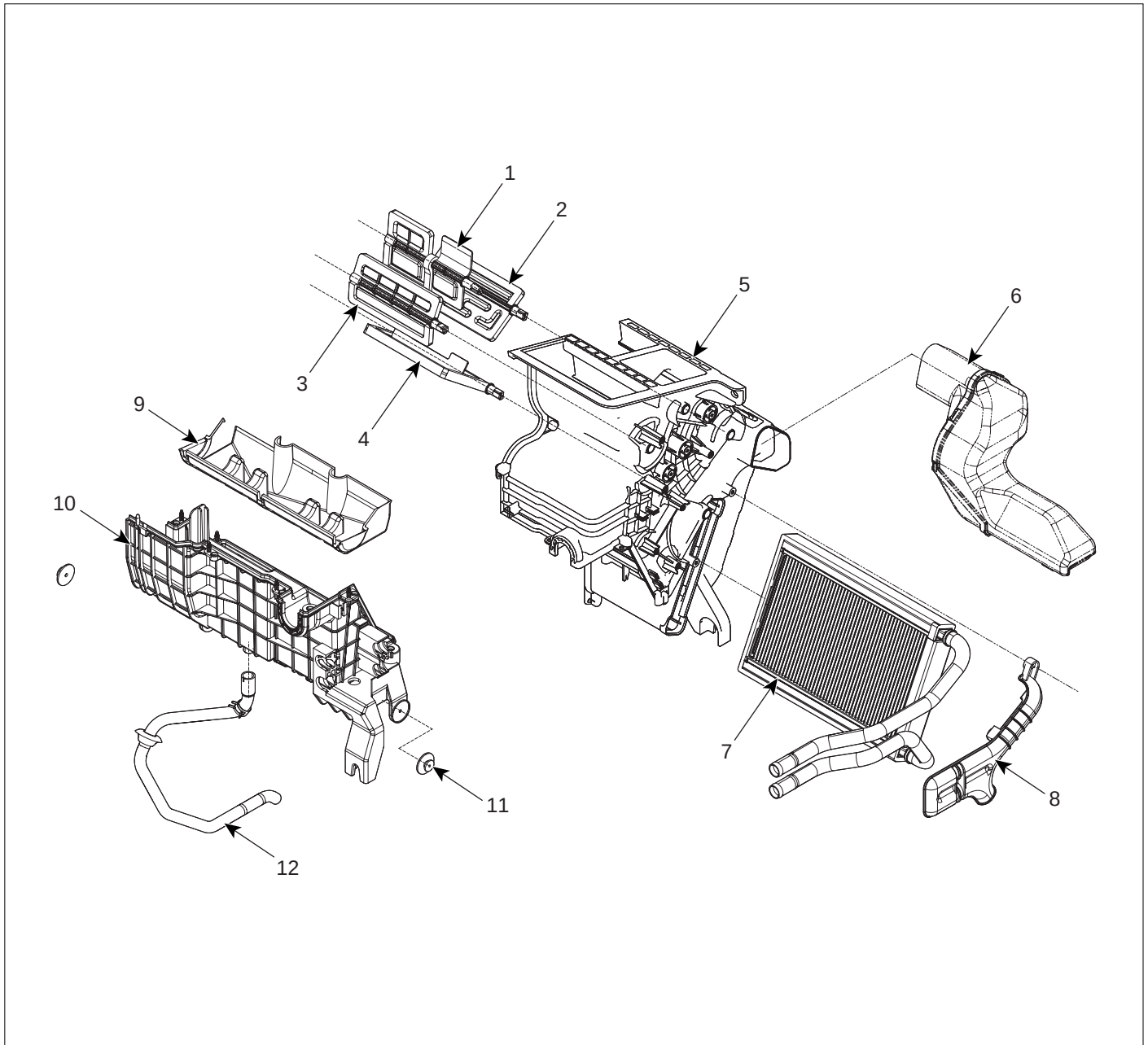
- | | |
|--------------------------|----------------------------|
| 1. Shower duck(R) | 10. Water temp sensor |
| 2. Frame duct seal | 11. Water temp sensor clip |
| 3. Wire harness assembly | 12. PTC cover |
| 4. Heater case(R) | 13. PTC heater |
| 5. Vent door assembly(R) | 14. Eva core assembly |
| 6. Foot door assembly(R) | 15. Eva(duct) sensor |
| 7. Blind case | 16. Eva flange cover |
| 8. DEF door assembly(R) | 17. Flange seal |
| 9. Mix door assembly(R) | 18. Flange cover |

LQKG300B



- | | |
|---------------------------|-------------------------------|
| 1. Heater case(R) | 8. Tension washer |
| 2. Vet mode lever | 9. Mode main lever |
| 3. Pef mode lever | 10. Mode actuator assembly(R) |
| 4. Foot mode lever | 11. Mix actuator assembly(R) |
| 5. Def mode sub lever(R) | 12. Case clip |
| 6. Foot mode sub lever(R) | 13. Case screw |
| 7. Mix lever(R) | |

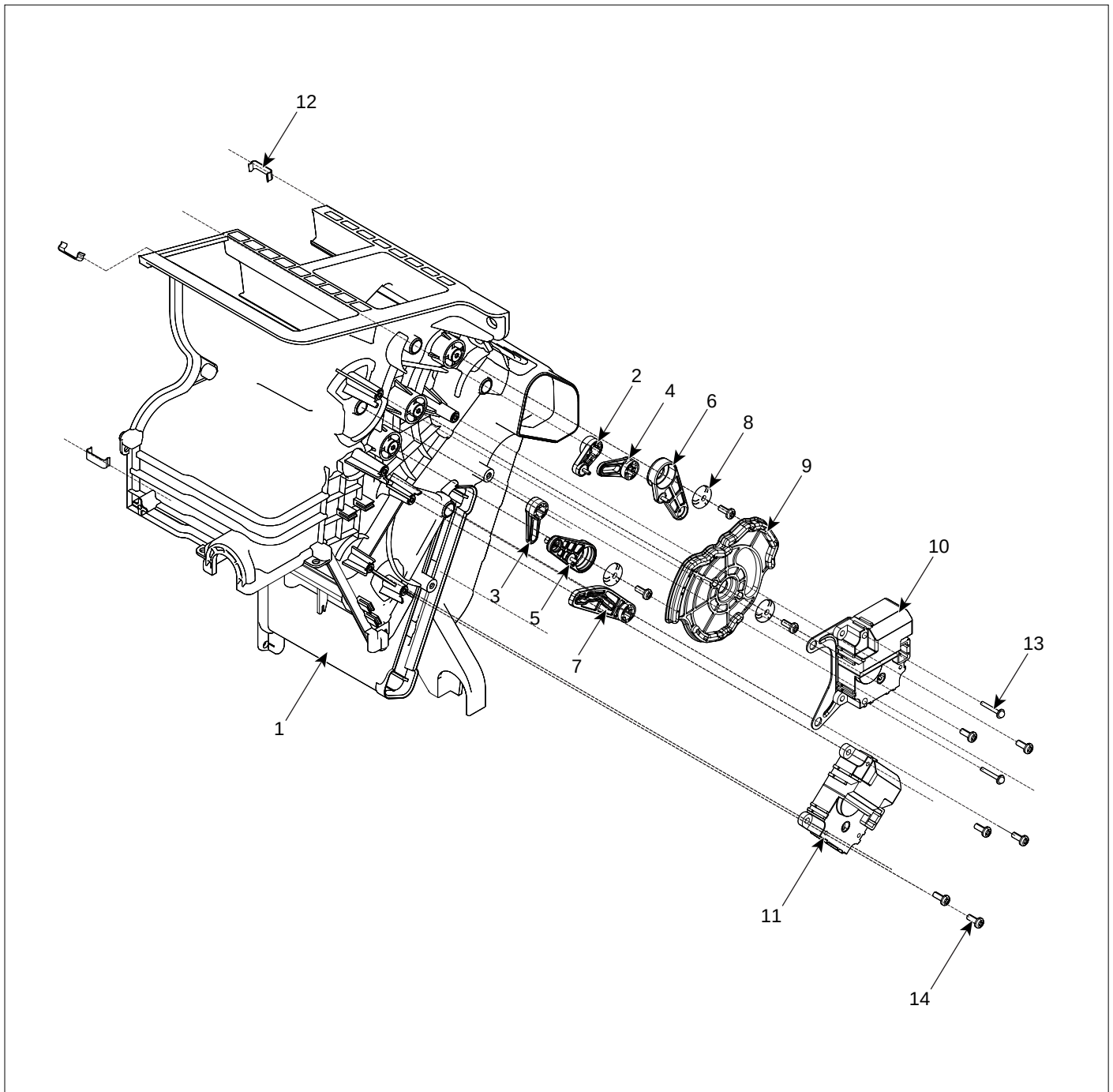
LQKG333D



- 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

LQKG333B



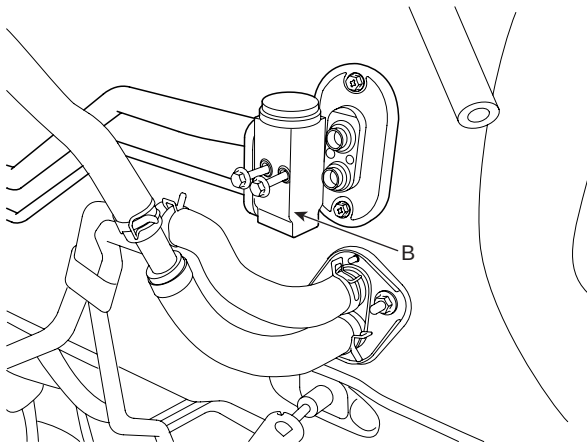
1. Heater case(L)
2. Vent mode lever
3. Def mode lever
4. Foot mode lever
5. Def mode sub lever(L)
6. Foot mode sub lever(L)
7. Mix lever(L)

8. Tension washer
9. Mode main lever
10. mode actuator assembly(L)
11. Mix actuator assembly(L)
12. Case clip
13. Screw with washer
14. Case screw

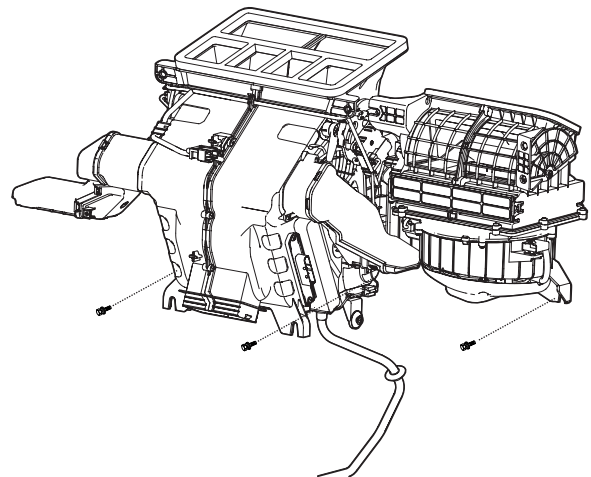
LQKG300C

REPLACEMENT EBA719FC

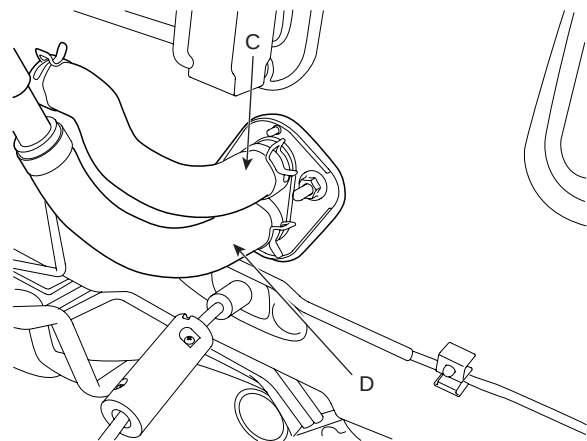
1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/ recycling/ charging station. (Refer to HA-8)
3. When the engine is cool, drain the engine coolant from the radiator.
4. Remove the bolts (A) and the expansion valve (B) from the evaporator core. Plug or cap the 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.
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.



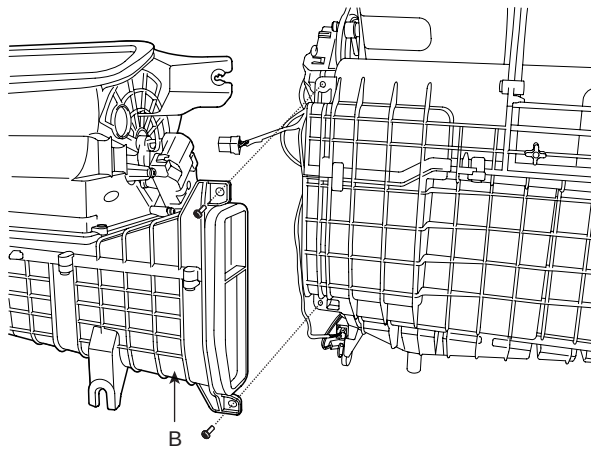
AQKF300D



AQKF300F



AQKF300E

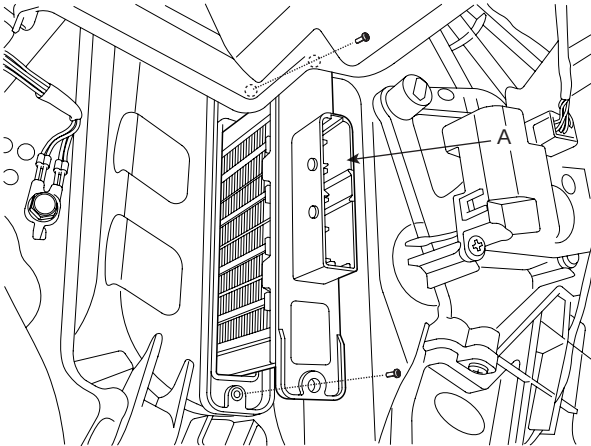


AQKF350C

! CAUTION

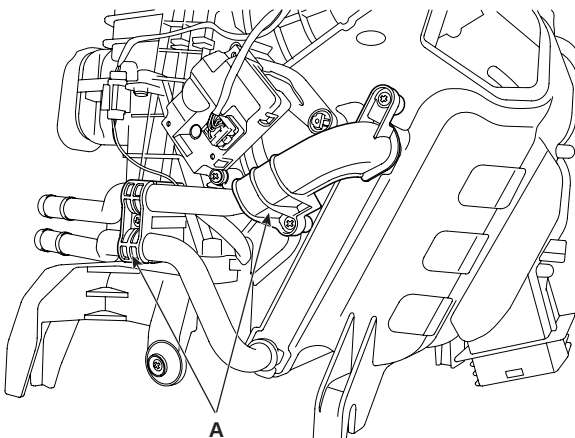
Engine coolant will run out when the hoses are disconnected; drain it into a clean drip pan. Be sure not to let coolant spill on electrical parts or painted surfaces. If any coolant spills, rinse it off immediately.

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



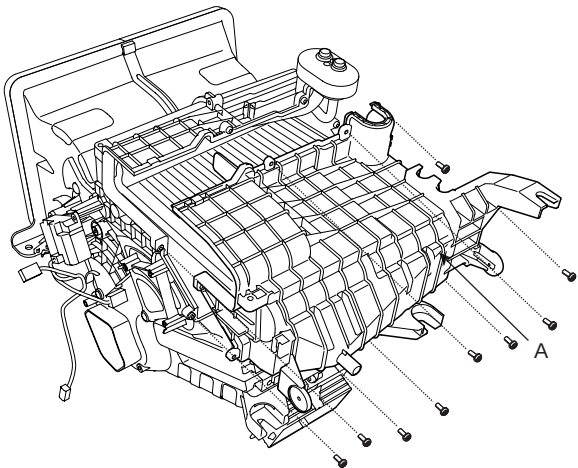
AQKF301E

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



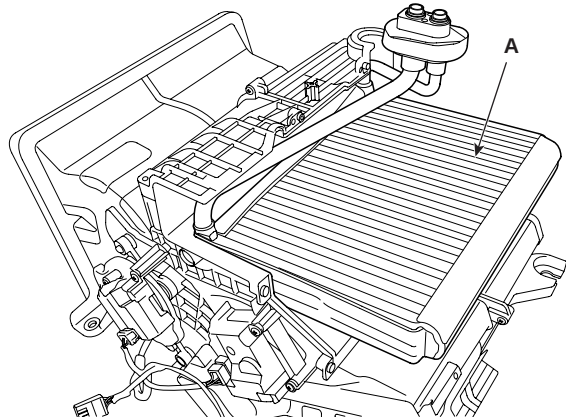
AQKF300I

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



AQKF300K

14. Remove the evaporator core(A).

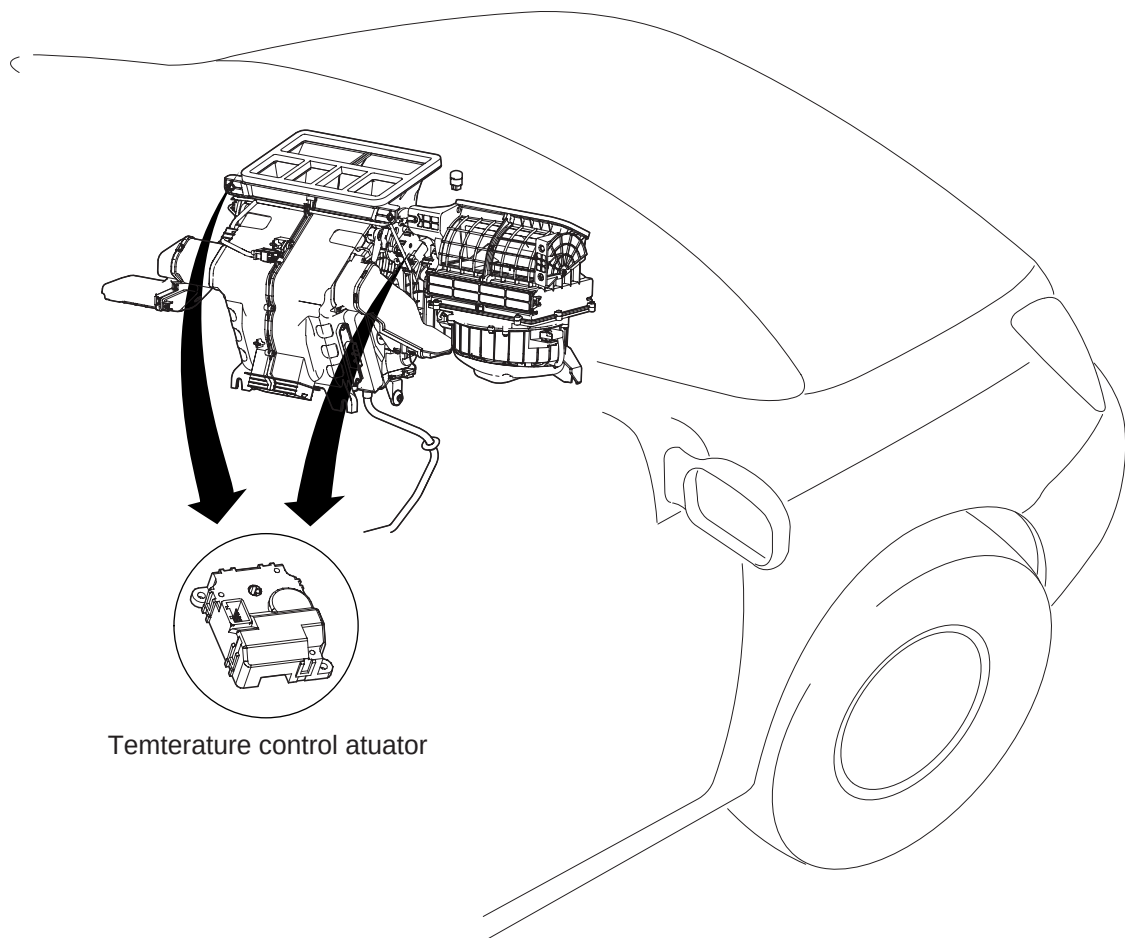


AQKF300L

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 :
- If you're installing a new evaporator, add refrigerant oil (ND-OIL8).
 - 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.
 - Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
 - Do not spill the refrigerant oil on the vehicle ; it may damage the paint ; if the refrigerant oil contacts the paint, wash it off immediately
 - Apply sealant to the grommets.
 - Make sure that there is no air leakage.
 - Charge the system and test its performance.
 - Do not interchange the inlet and outlet heater hoses and install the hose clamps securely.
 - Refill the cooling system with engine coolant.

TEMPERATURE CONTROL ACTUATOR

COMPONENT LOCATION EFC61DF9

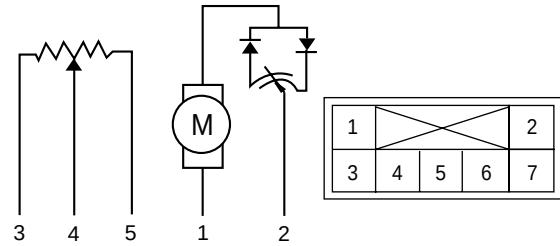


DESCRIPTION

EEB86C0E

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

[DRIVER]



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

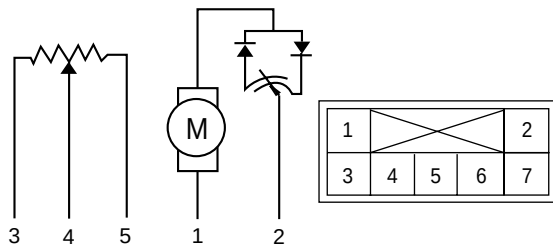
LQKF315C

INSPECTION

EAE4CBCC

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]



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

LQKF315B

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

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.

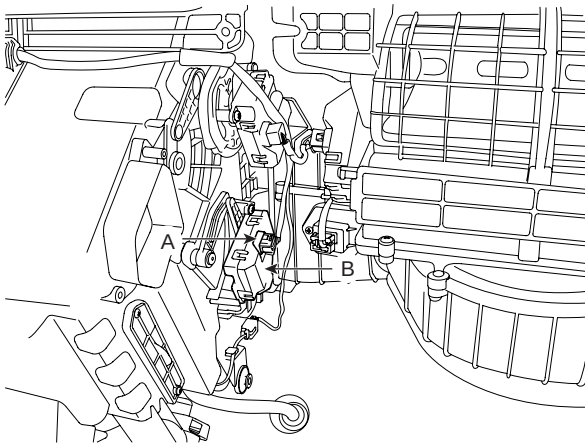
HEATER

HA -57

REPLACEMENT E8AEACEC

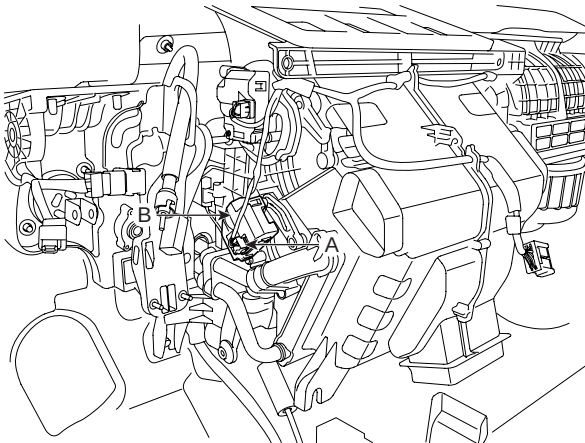
1. Disconnect the negative (-) battery terminal.
2. Remove the driver' s crush pad lower panel (Refer to BD group).
3. Disconnect the temperature control actuator connector (A) after removing the air duct.
4. Loosen the mounting screw and then remove the temperature control actuator (B).

[PASSENGER'S]



AQKF316C

[DRIVER'S]

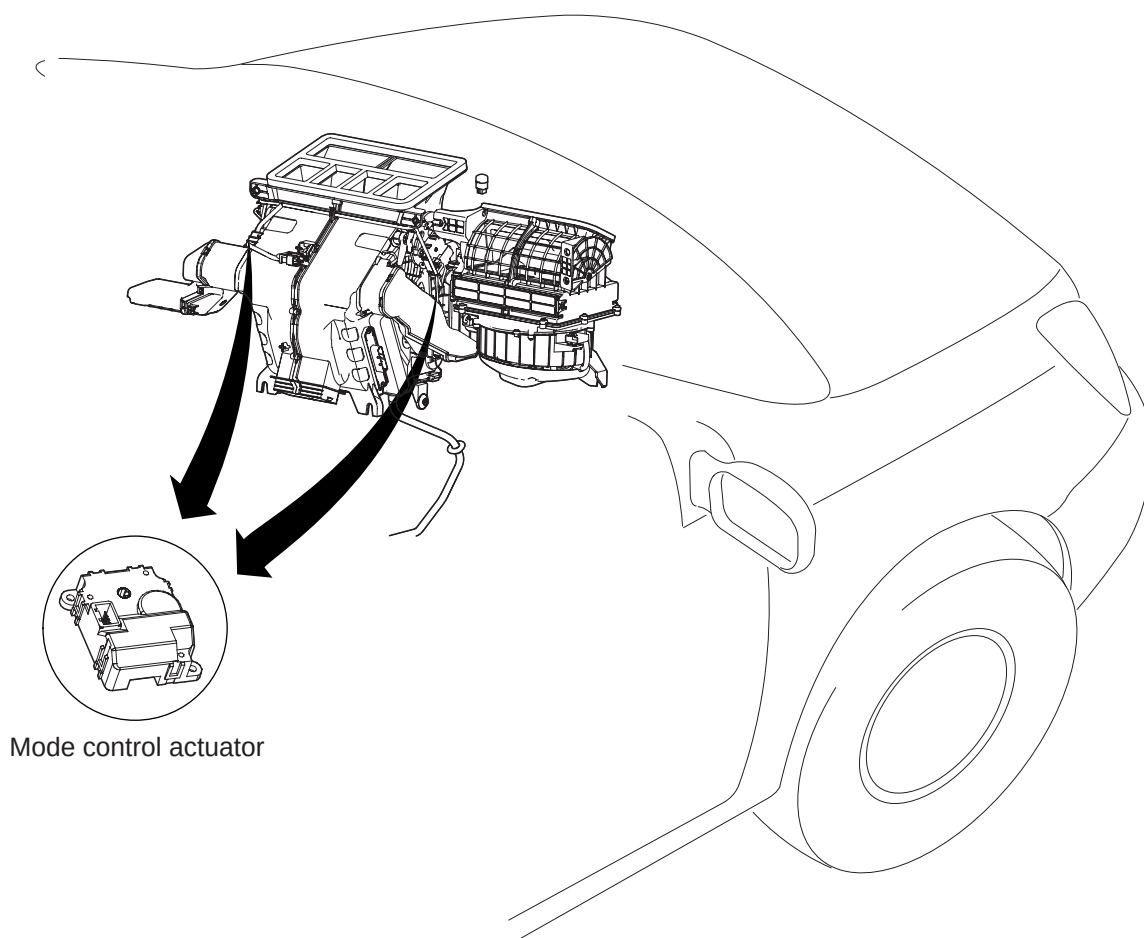


AQKF315D

5. Installation is the reverse order of removal.

MODE CONTROL ACTUATOR

COMPONENT LOCATION E8FDCBD7



LQKG316A

HEATER

HA -59

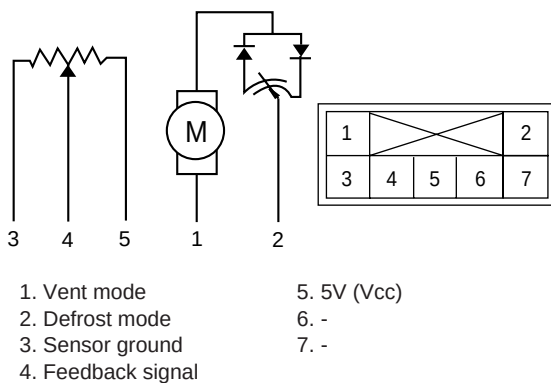
DESCRIPTION E6DBF81F

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 EBFACAE1

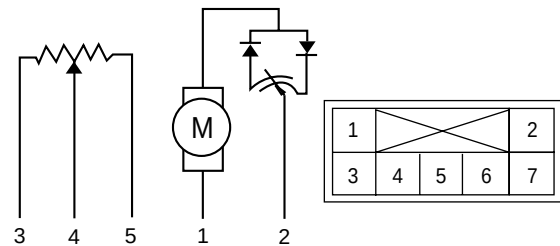
1. Ignition "OFF"
2. Disconnect the connector of mode control actuator.
3. Verify that the mode control actuator operates to the defrost mode when connecting 12V to the terminal 1 and grounding terminal 2.
4. Verify that the mode control actuator operates to the vent mode when connecting in the reverse.

[DRIVER]



LQKF315D

[PASSENGER]



LQKF315E

5. 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

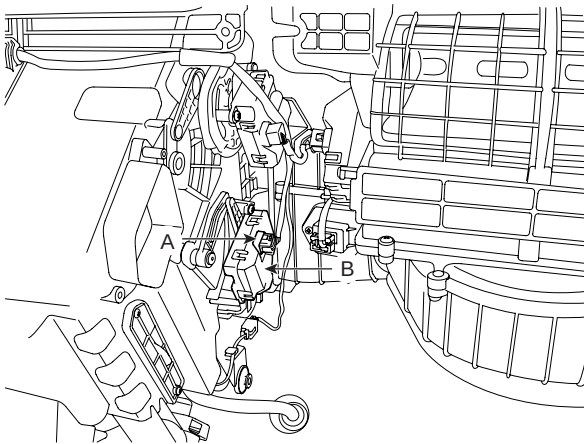
It will feedback current position of actuator to controls.

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 EA2DAD4F

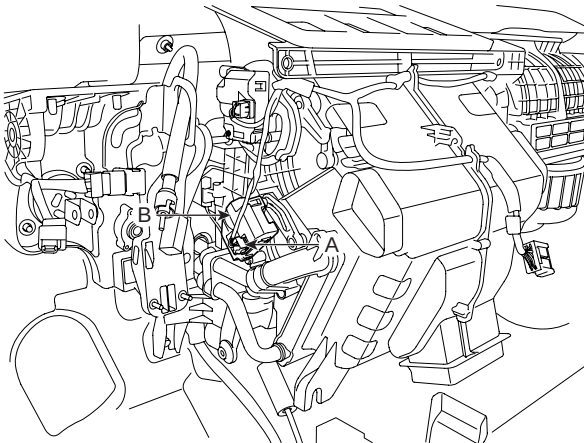
1. Disconnect the negative (-) battery terminal.
2. Remove the driver' s crush pad lower panel (Refer to BD group).
3. Disconnect the temperature control actuator connector (A) after removing the air duct.
4. Loosen the mounting screw and then remove the temperature control actuator (B).

[PASSENGER'S]



AQKF316C

[DRIVER'S]

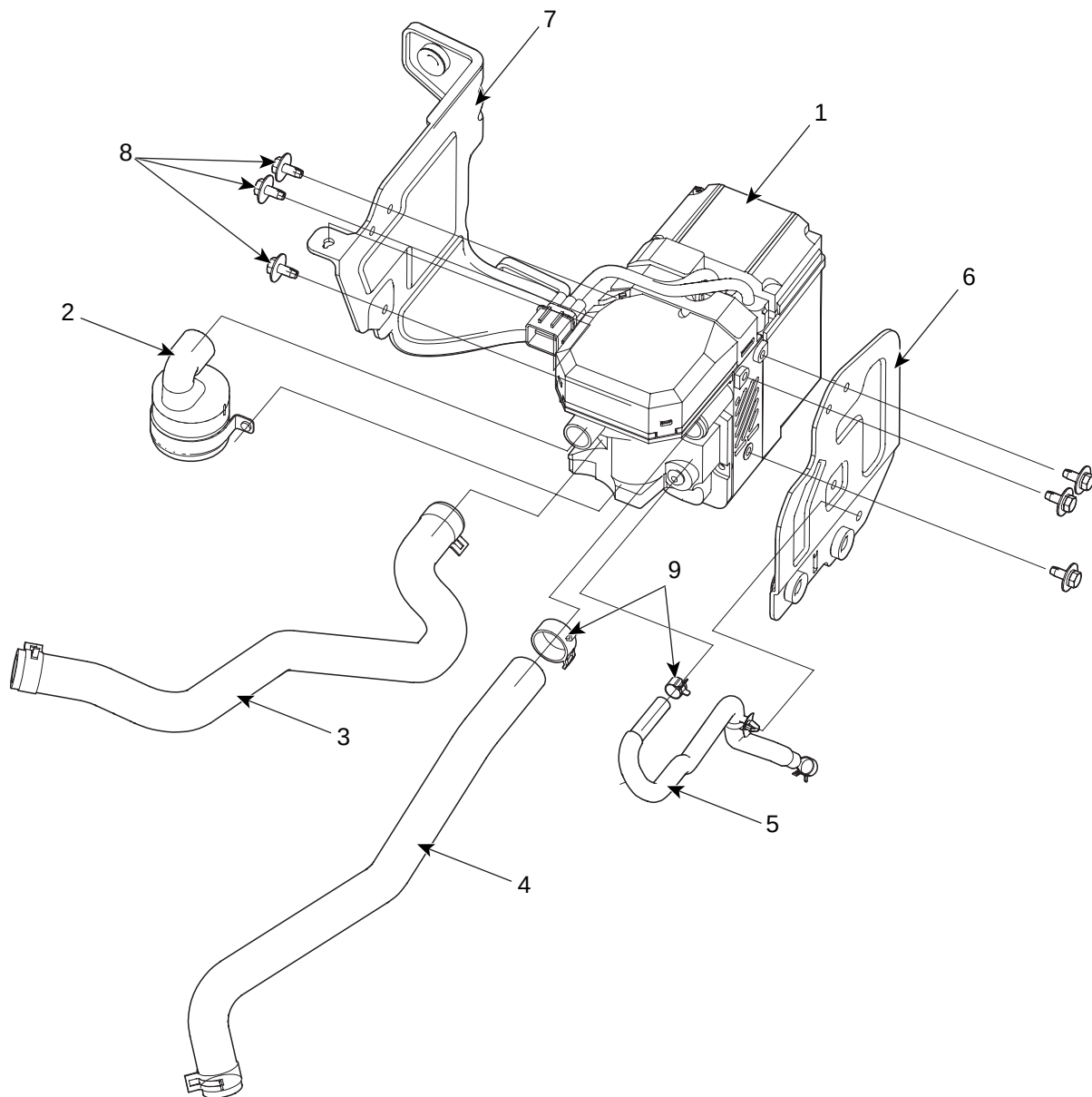


AQKF315D

5. Installation is the reverse order of removal.

FUEL FIRED HEATER

COMPONENT LOCATION E083543E



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

HA -62

HEATING, VENTILATION AND AIR CONDITIONING

SPECIFICATIONS

EF36CCFA

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)

HEATER

HA -63

TROUBLESHOOTING

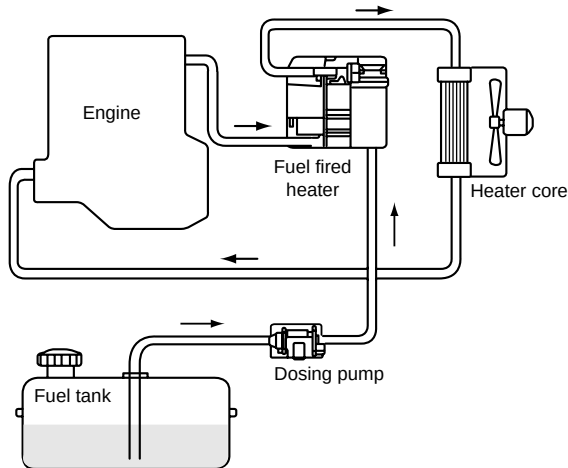
E1A88EFA

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.

DESCRIPTION

EE7979E6

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



▷ Coolant route : Engine → Heating burner → Heating core → Engine
▷ Fuel route : Fuel tank → Dosing pump → Heating burner → Combustion

LQKG051N



CAUTION

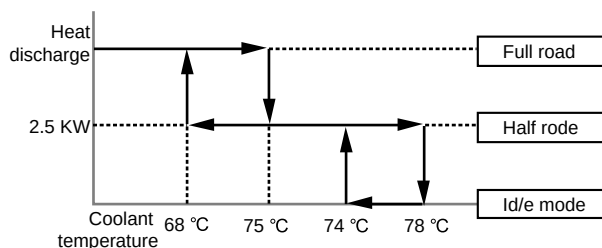
- Follow the procedures specified in this bulletin during service or it may cause personal injury.
- Be sure to turn the fuel fired heater off when refueling at station.
- The fuel fired heater must be mounted at designated position, never in the passenger compartment.
- The fuel fired heater must be 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 $5^{\circ}\text{C} \sim 7^{\circ}\text{C}$ than the above value.



LQKG051B

OPERATION

ED56CBA7

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 EA7A7BBC

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

LQKG051L



NOTE

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.

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

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

LQKG0510

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	

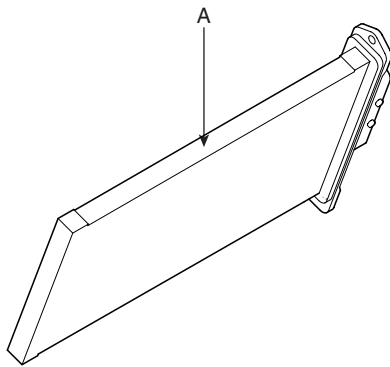
FIX	SCRN	FULL	TIPS	GRPH	RCRD
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LQKG051P

PTC (POSITIVE TEMPERATURE COEFFICIENT) HEATER

DESCRIPTION EC3EA1C9

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).

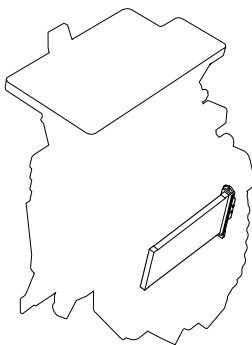


LQJF301B

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.

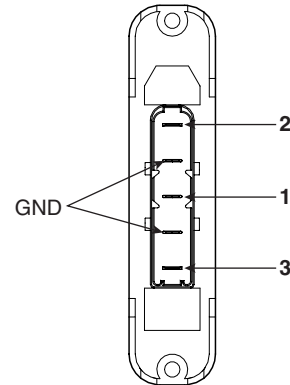


AQJF301A

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.

Connector



LQJF301C

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 EBEBB6AB

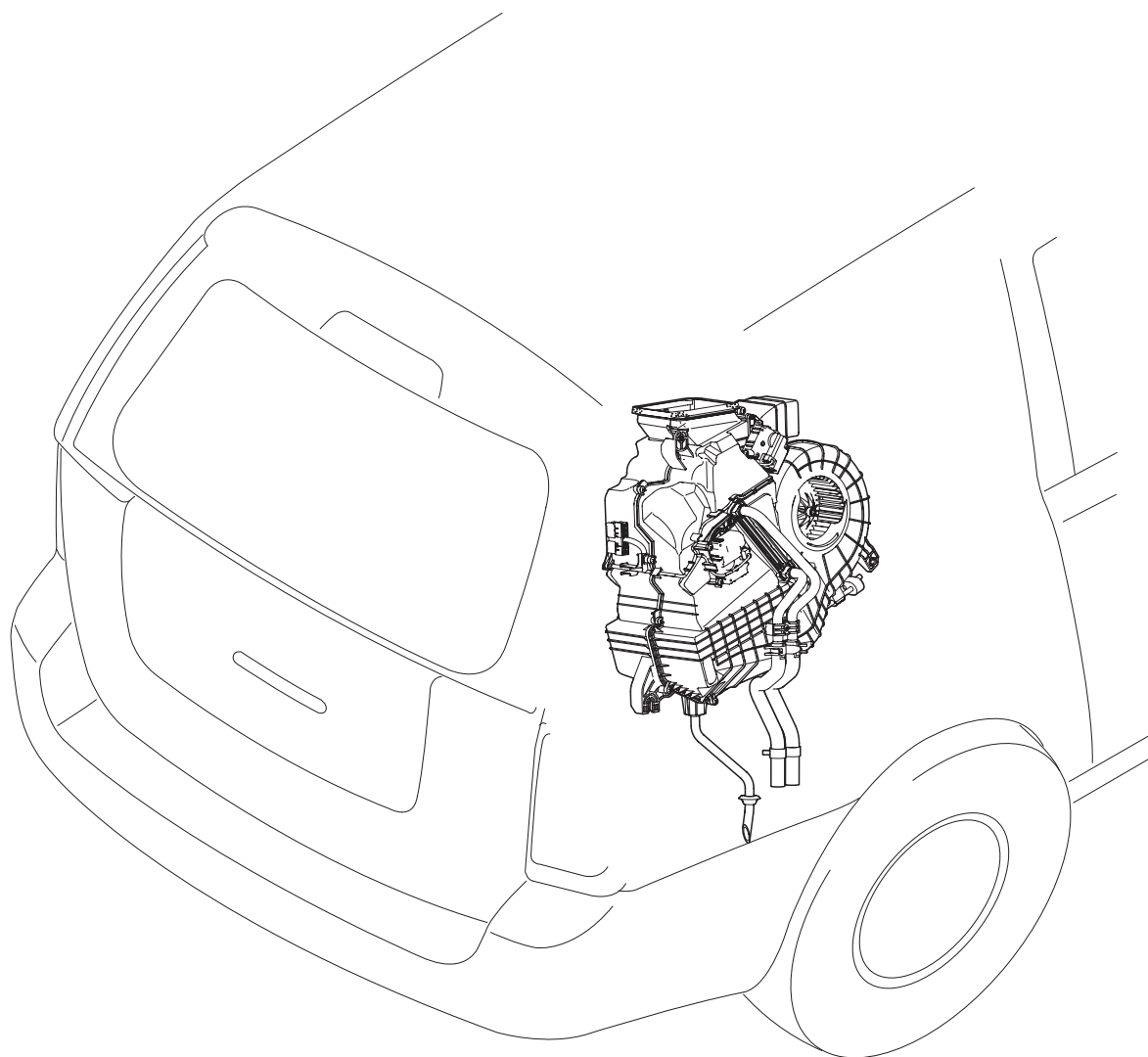
Inspect the PTC operation by confirmation logic as below.

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.

REAR HEATER

REAR HEATER UNIT

COMPONENT LOCATION E2D30DFC

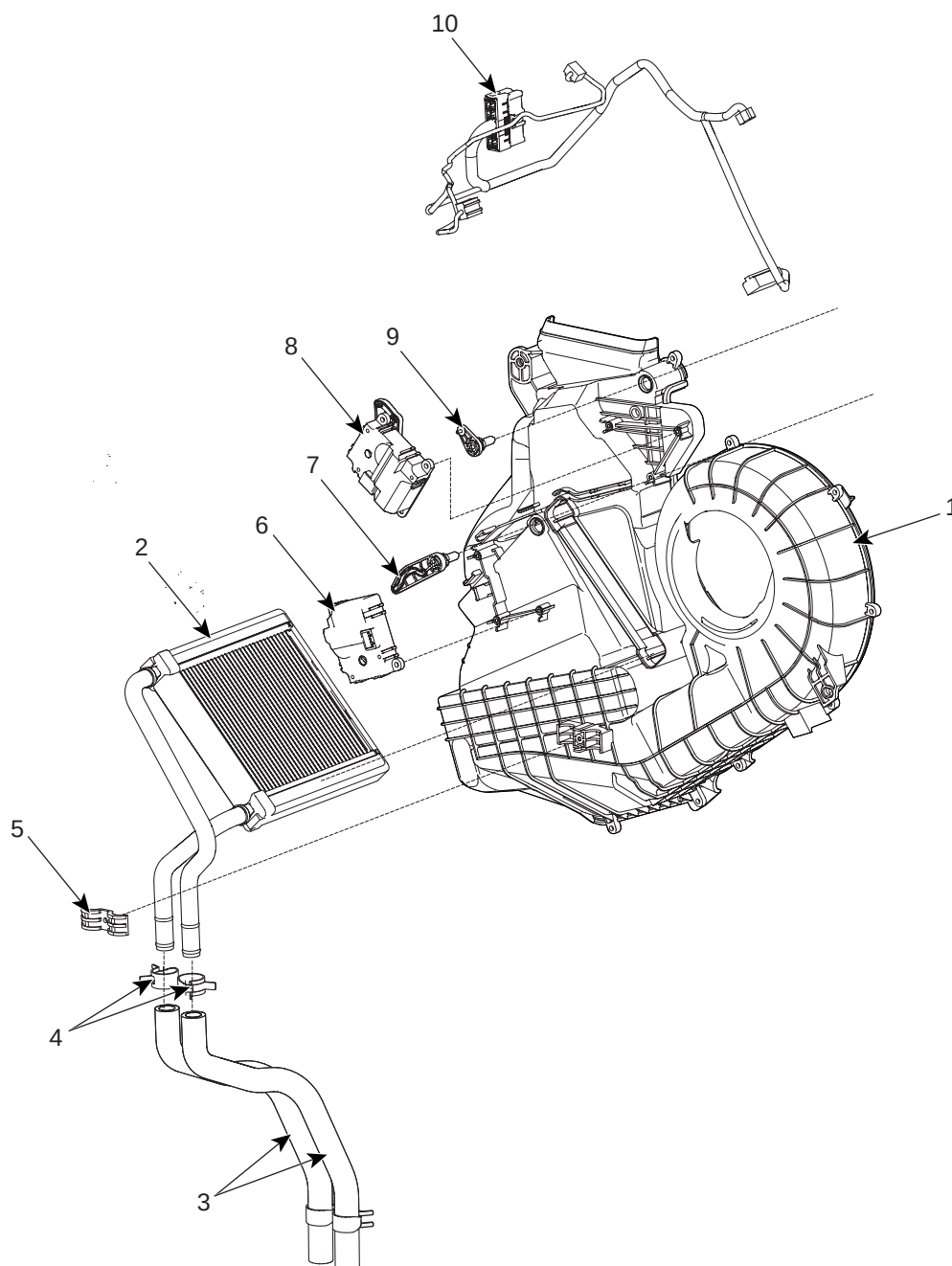


LQKG310A

REAR HEATER

HA -71

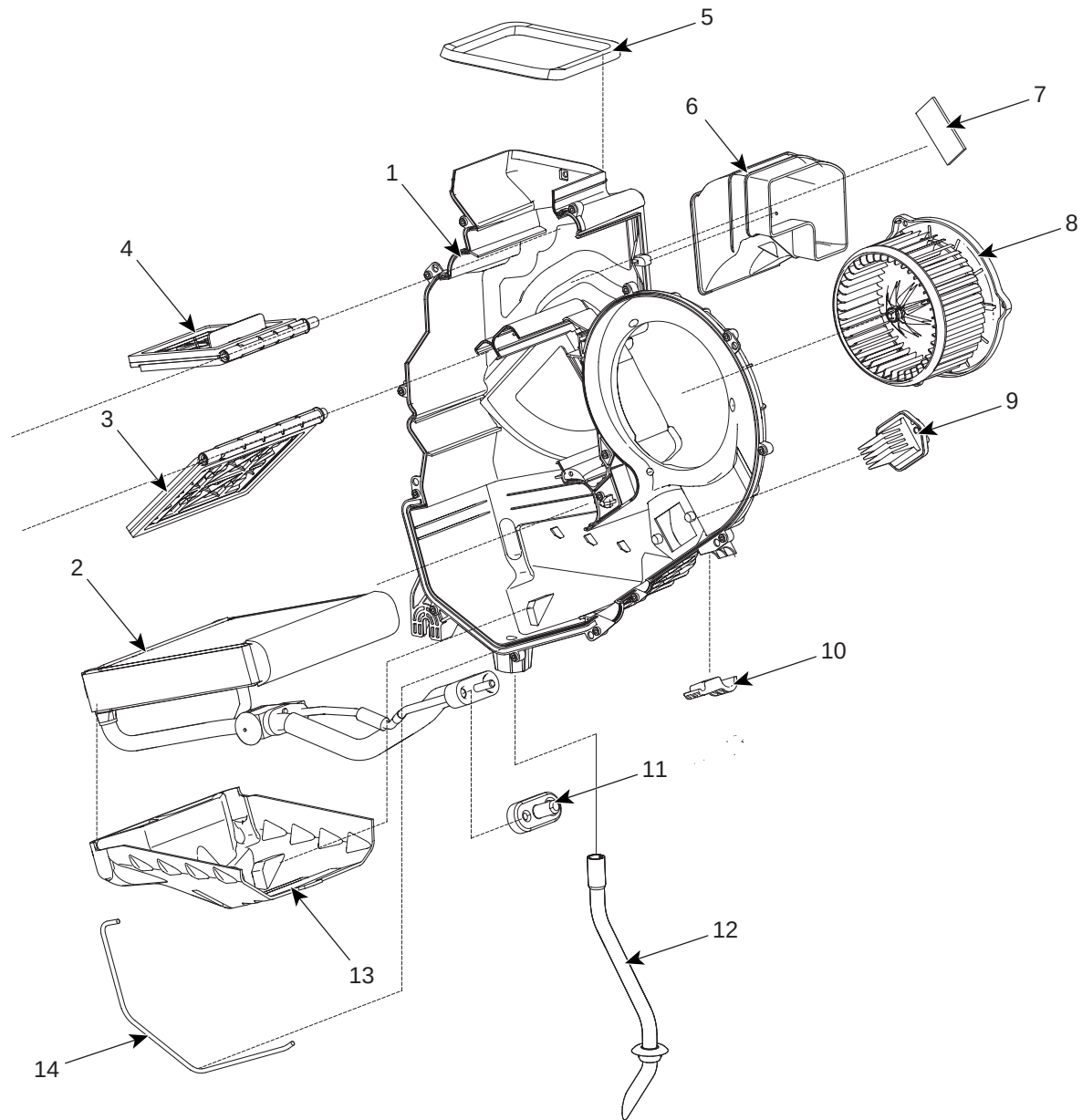
COMPONENTS E7CCAEEB



- 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

LQKG310B



- 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

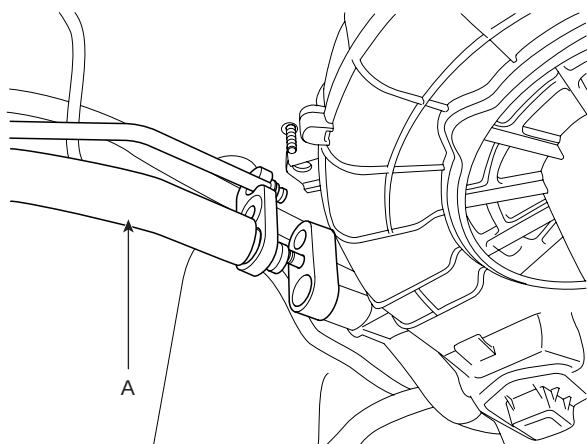
LQKG333H

REAR HEATER

HA -73

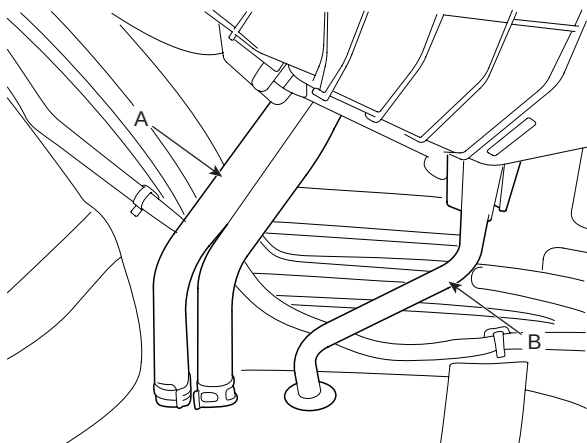
REPLACEMENT EE2F6D5B

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).



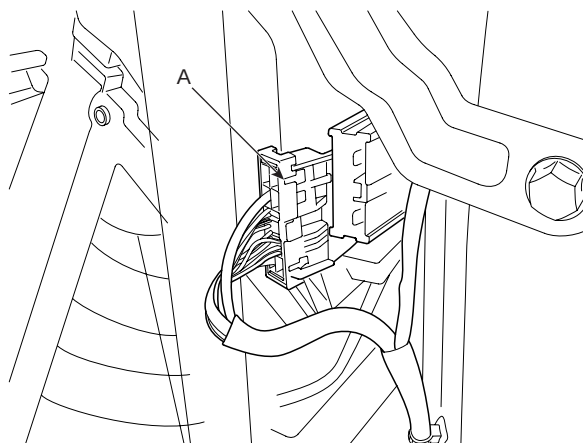
AQKF310C

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



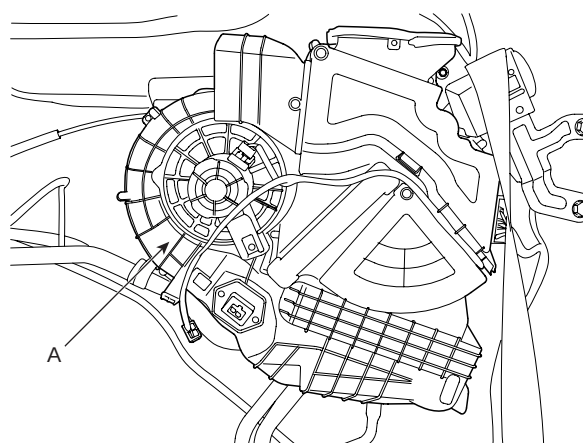
AQKF310D

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



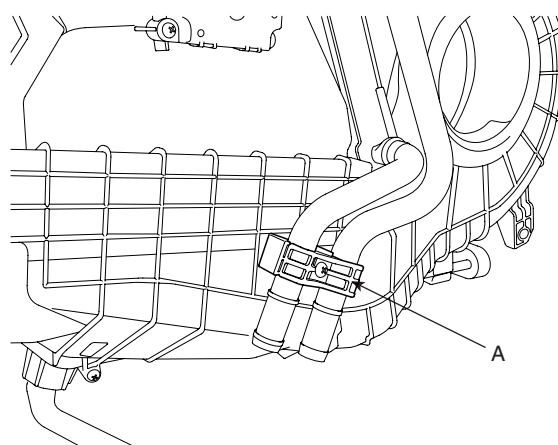
AQKF310F

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



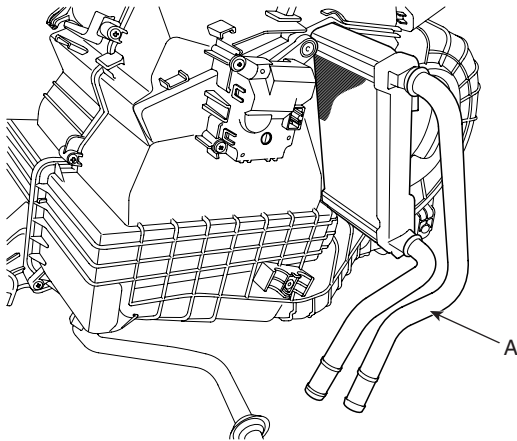
AQKF310G

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



AQKF310H

10. Remove the heater core(A).



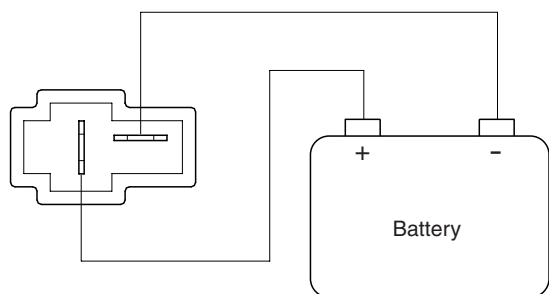
AQKF310I

11. Installation is the reverse order of removal.

REAR BLOWER UNIT

INSPECTION EDCD35CC

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

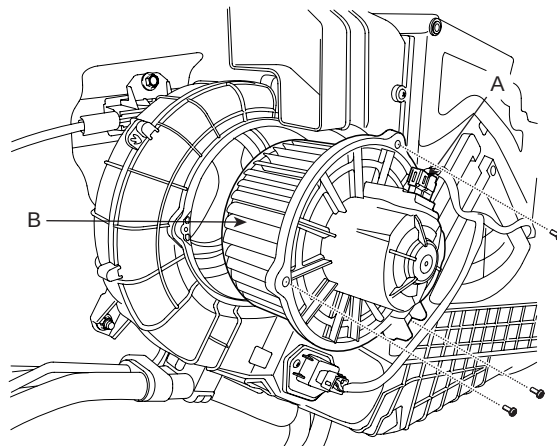


AQIE352C

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 EE4249A8

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.



AQKF311A

4. Installation is the reverse order of removal.

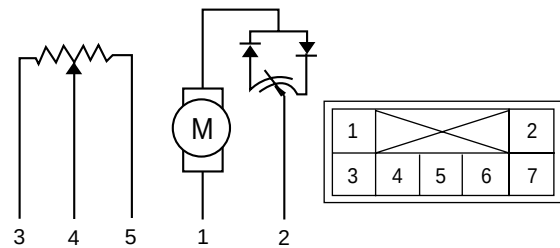
REAR TEMPERATURE CONTROL ACTUATOR

DESCRIPTION E05FDD19

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 EEF8F5F4

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.



1. Cool position
2. Hot position
3. Sensor ground
4. Feedback signal
5. 5V (VCC)

LQKG333E

4. Check the voltage between terminals 3 and 4.

SPECIFICATION

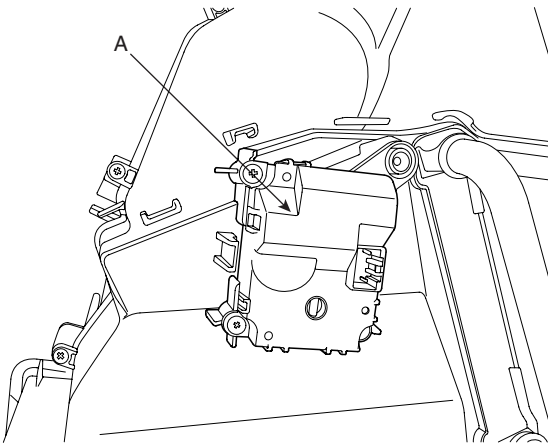
Door position	Voltage (3-4)	Error detecting
Max. cooling	$0.4 \pm 0.15V$	Low voltage : 0.1V or less
Max. heating	$4.6 \pm 0.15V$	High voltage : 4.9V or more

* 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 EB810E5A

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).



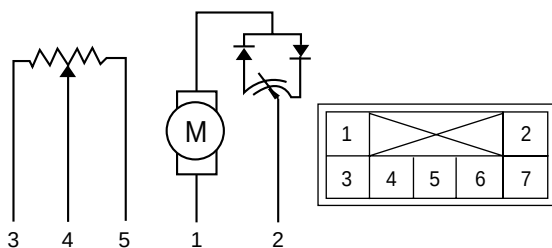
AQKF312B

6. Installation is the reverse order of removal.

REAR MODE CONTROL ACTUATOR

INSPECTION E1C2CFD8

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.



1. Def mode
2. Vet mode
3. Sensor ground
4. Feedback signal
5. 5V (Vcc)
6. -
7. -

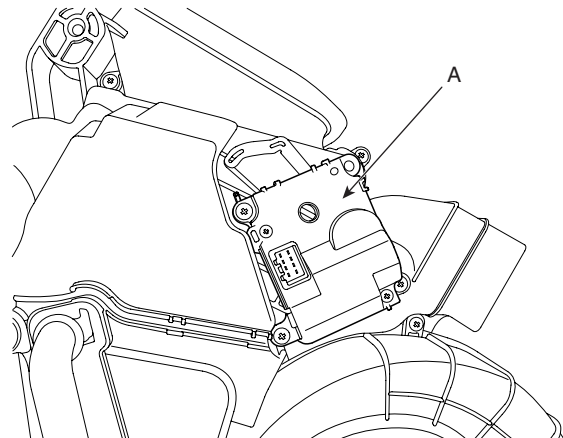
LQKG315C

5. Check the voltage between terminals 3 and 4.

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

REPLACEMENT EB6FDE2D

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).



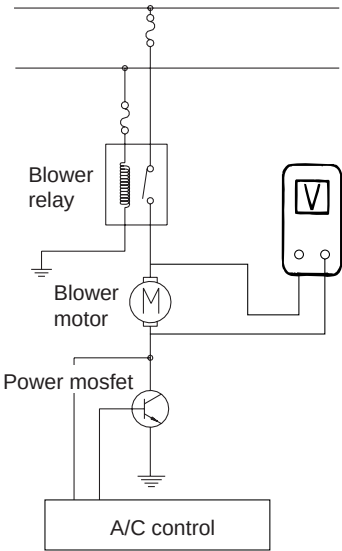
AQKF312C

5. Installation is the reverse order of removal.

REAR POWER MOSFET

INSPECTION E8FCA46A

- 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.

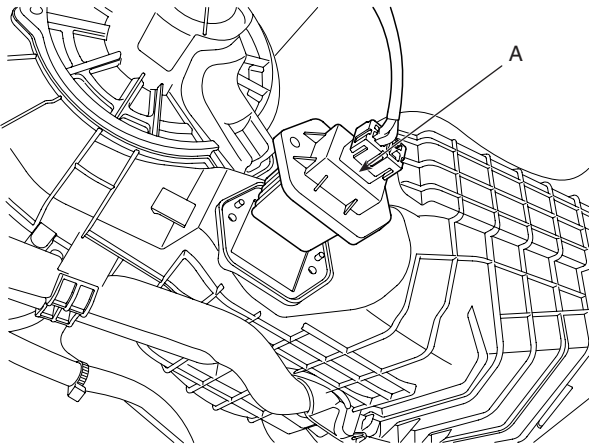


BQKF355B

Fan	Voltage
	Manual
1 STEP	4.5 ± 0.5V
2 STEP	5.7 ± 0.5V
3 STEP	6.9 ± 0.5V
4 STEP	8.1 ± 0.5V
5 STEP	9.3 ± 0.5V
6 STEP	10.5 ± 0.5V
7 STEP	Battery(+)

REPLACEMENT E2718A38

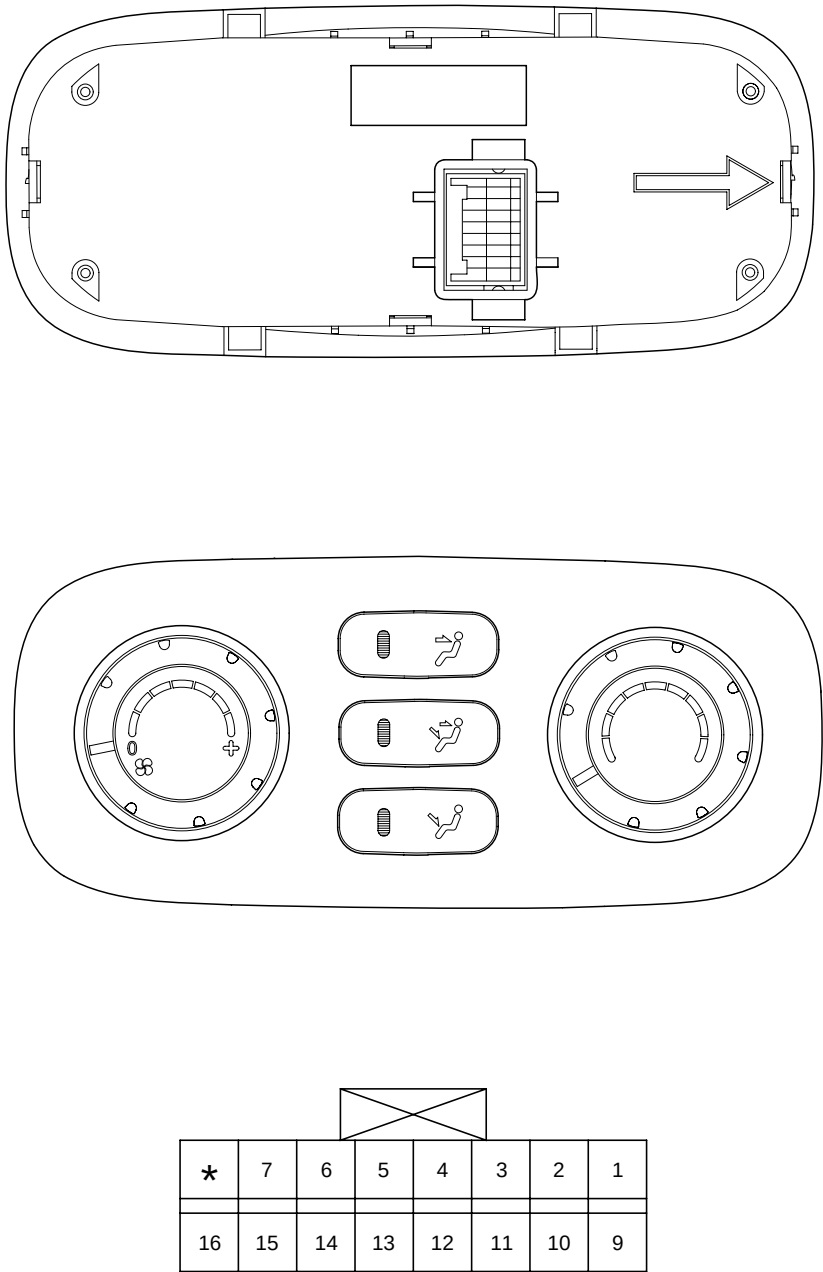
- 1. Disconnect the negative (-) battery terminal.
- 2. Remove the luggage side trim (Refer to BD-).
- 3. Disconnect the power mosfet connector (A).
- 4. Remove the power mosfet (B) after loosening the mounting screws.



AQKF314B

REAR CONTROL PANEL

COMPONENT E2FE2D31



AQKF550A

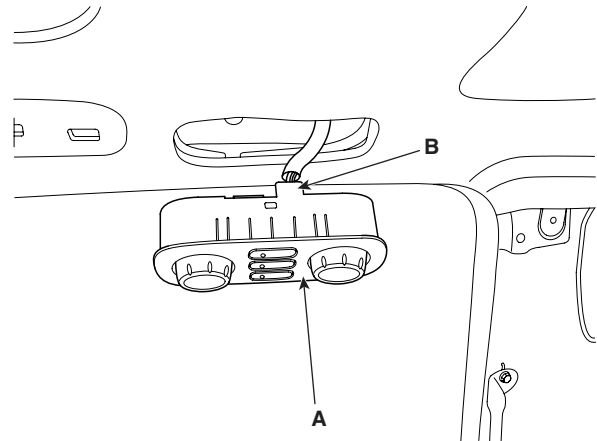
REAR HEATER

HA -81

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 ECF276C1

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



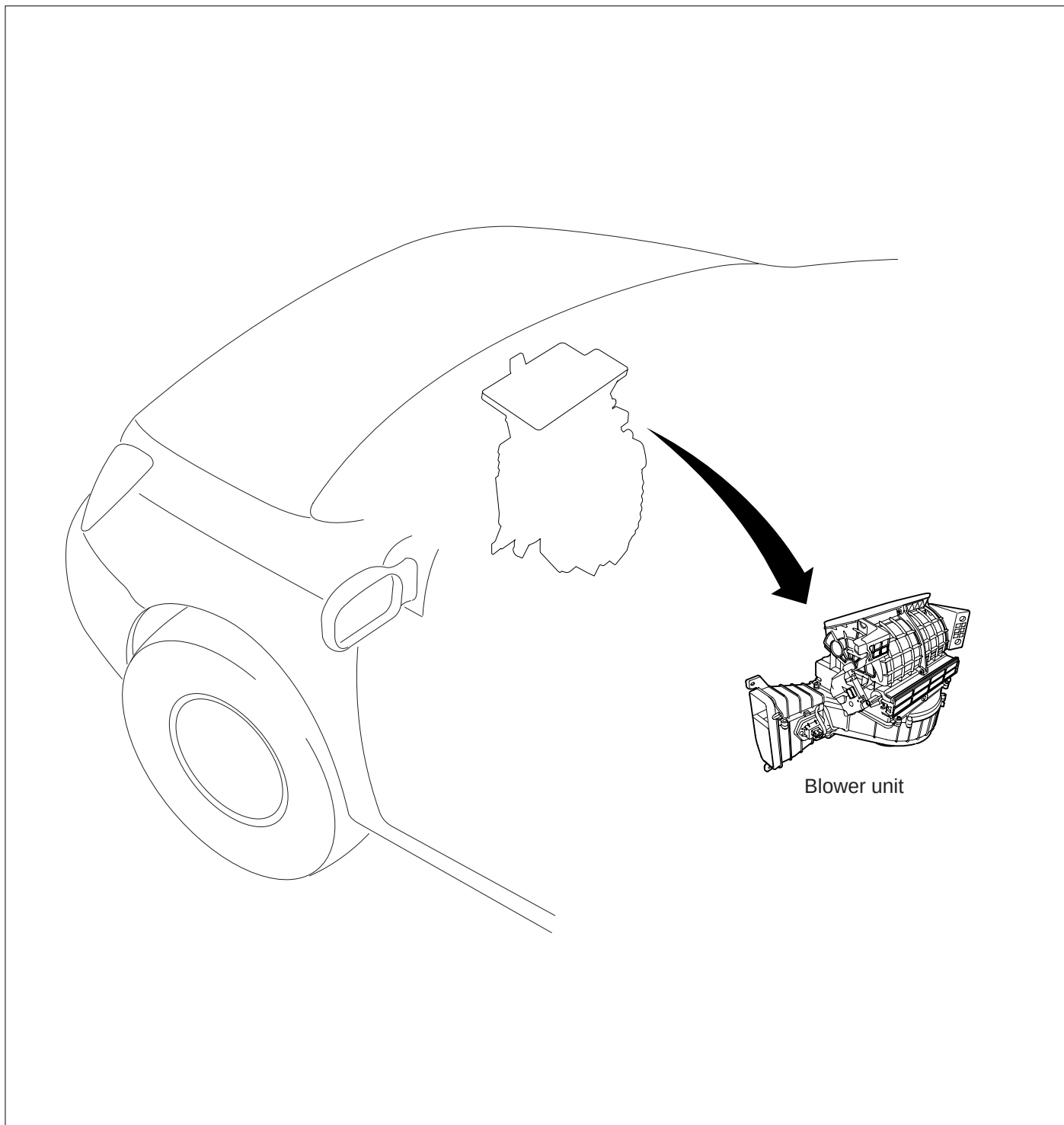
ASKF200E

2. Installation is the reverse order of removal.

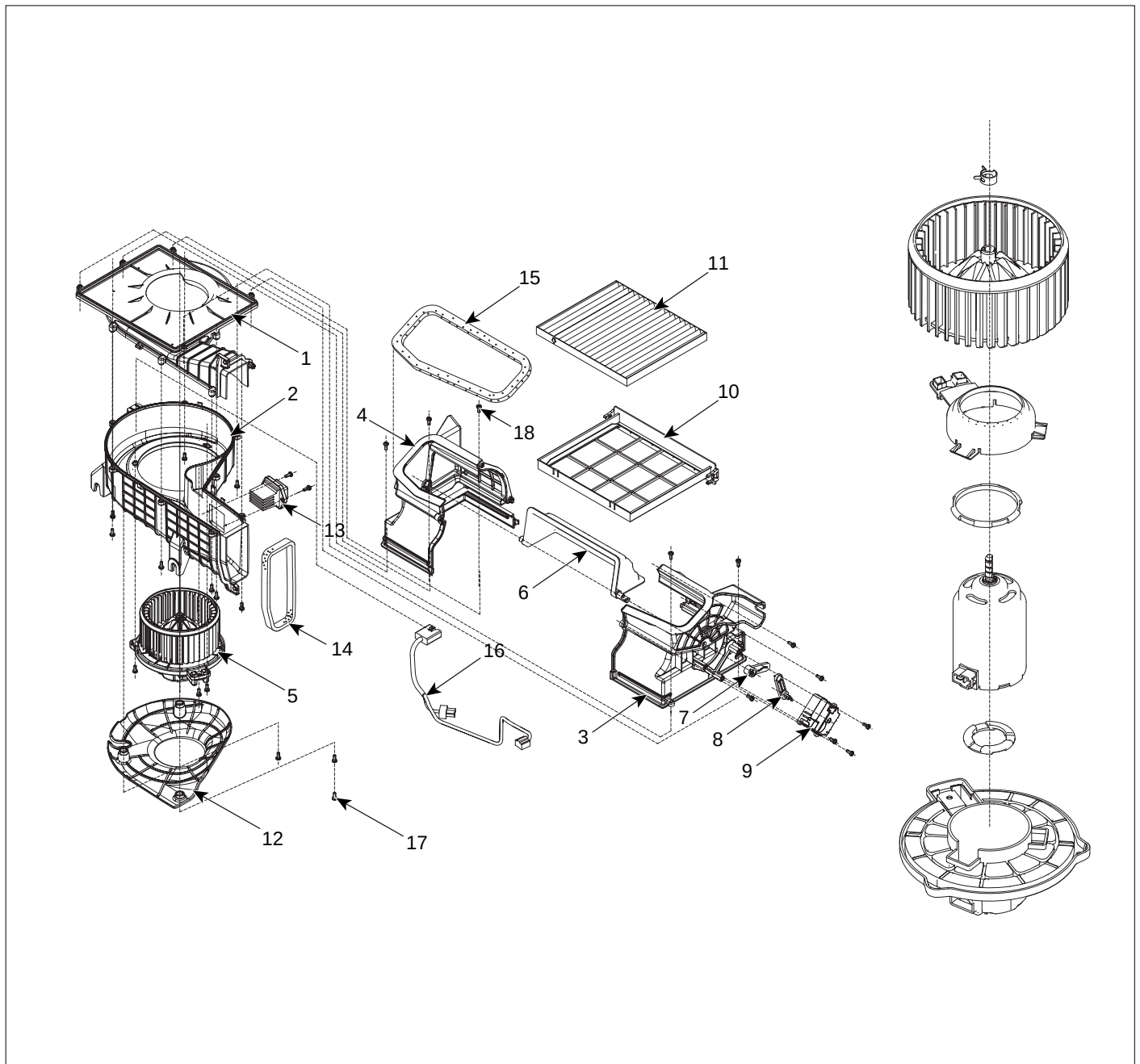
BLOWER CONTROLS

BLOWER UNIT

COMPONENT LOCATION E59E4ACA



COMPONENTS E28B595E

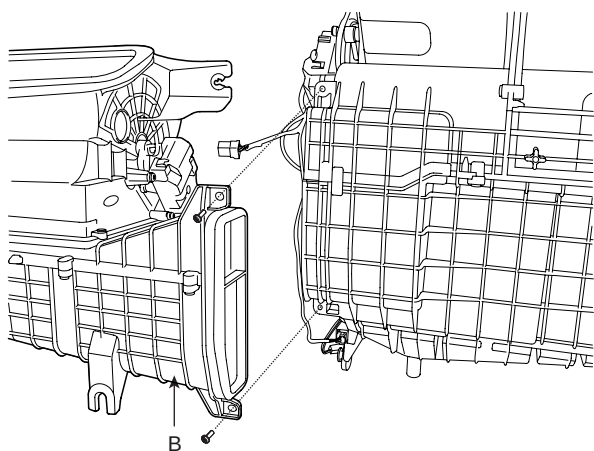


- | | |
|--------------------------|------------------------|
| 1. Upper case | 10. Filter care |
| 2. Lower case | 11. Filter |
| 3. Intake case(L) | 12. Blower motor cover |
| 4. Intake case(R) | 13. Power mosfet |
| 5. Blower motor assembly | 14. Blower joint seal |
| 6. Intake door | 15. Cowl seal |
| 7. Intake door lever | 16. Wire harness |
| 8. Intake actuator lever | 17. Blower motor screw |
| 9. Intake actuator | 18. Case screw |

LQKG350B

REPLACEMENT E6B3309E

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.



AQKF350C



NOTE

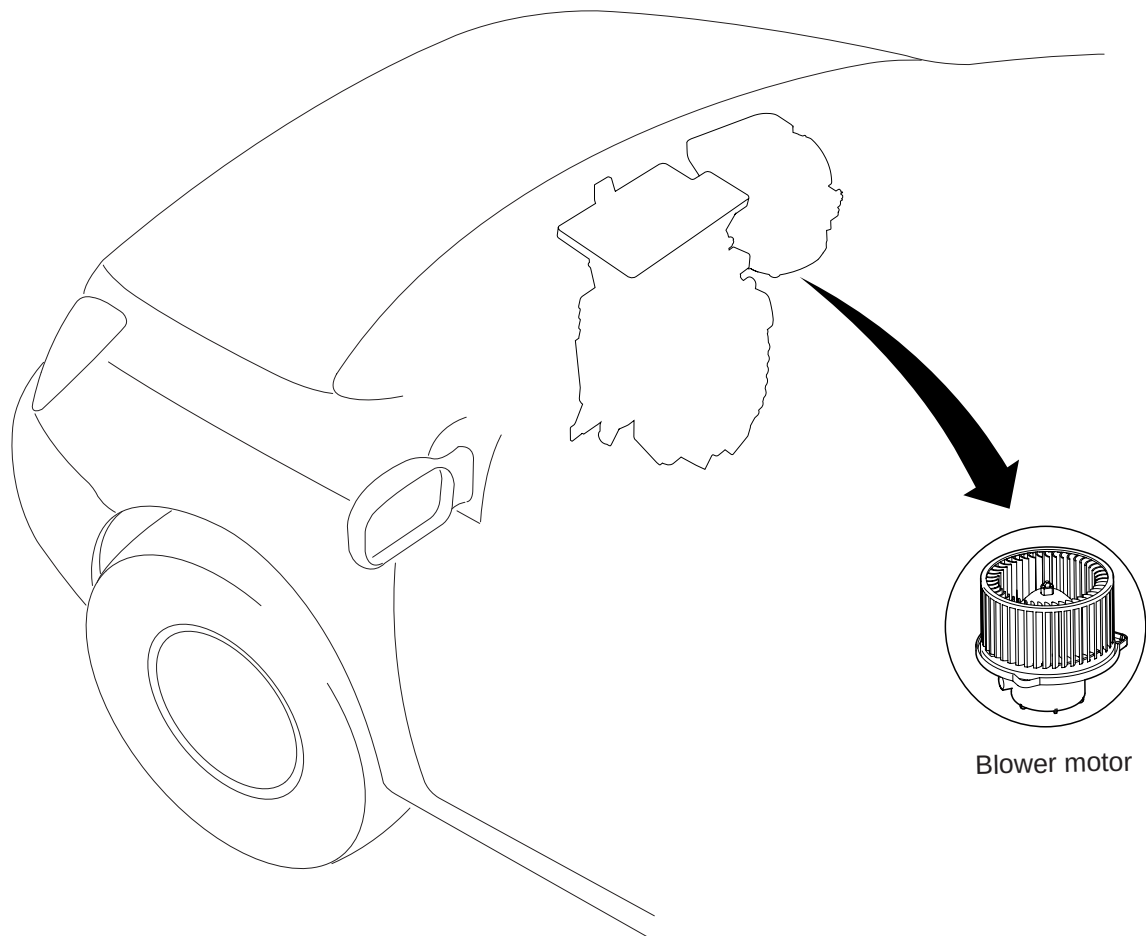
Make sure that there is no air leaking out of the blower and duct joints.

6. Installation is the reverse order of removal.

BLOWER MOTOR

COMPONENT LOCATION

E379A6B5

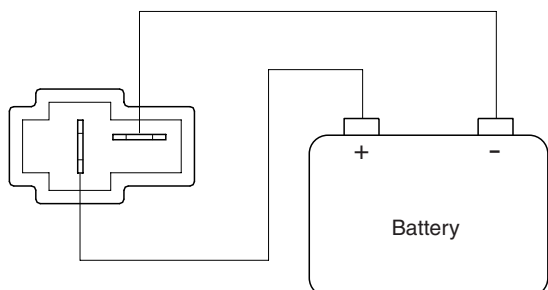


LQKG352A

INSPECTION

EBECCB8E

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



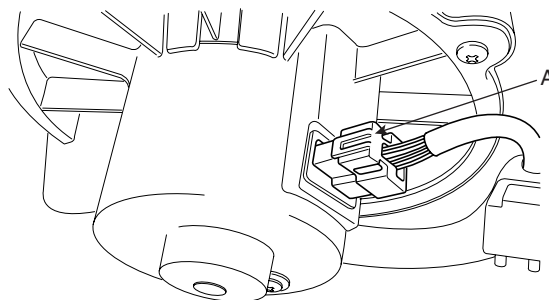
AQIE352C

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

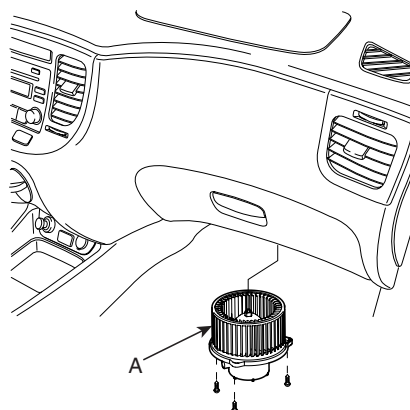
E826820A

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



AQJF352D

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



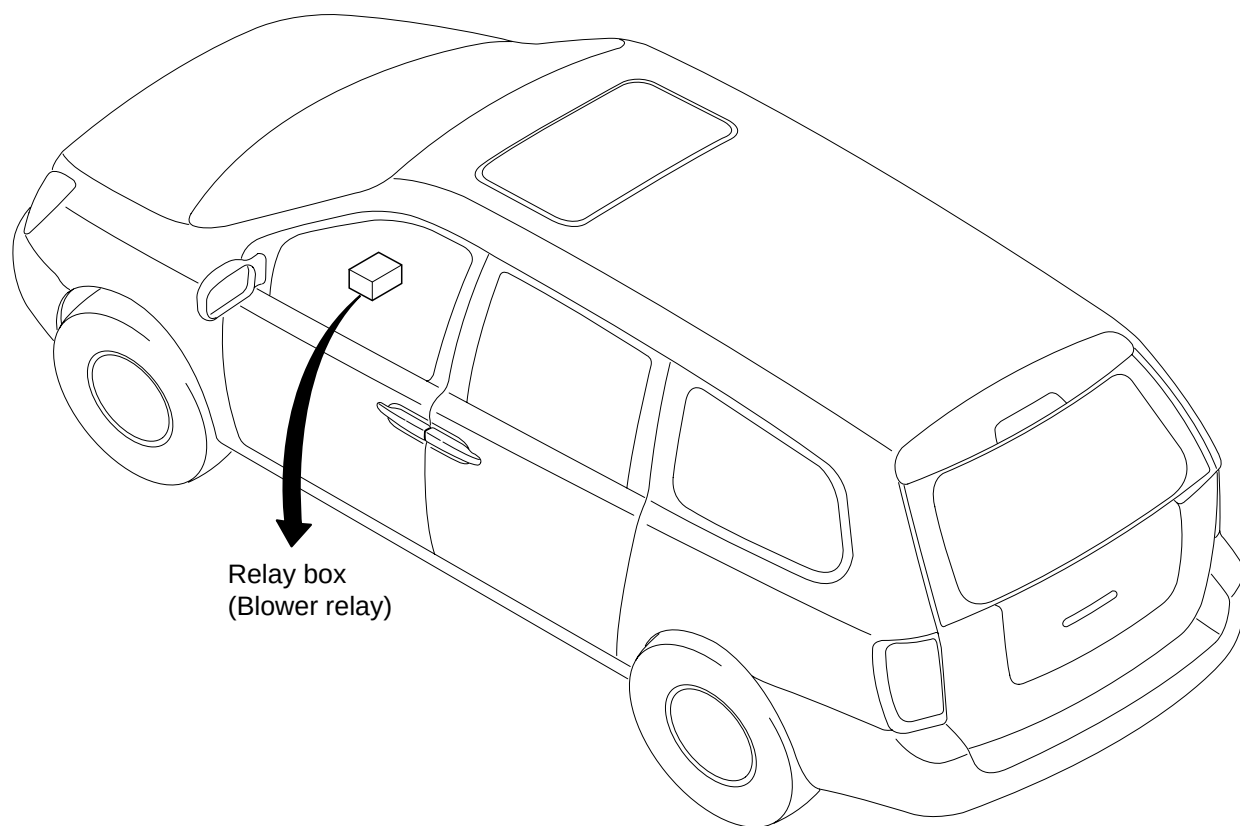
AQJF352B

4. Installation is the reverse order of removal.

BLOWER RELAY

COMPONENT LOCATION

E217DB4E



LQKG353A

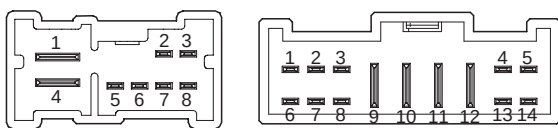
HA -88

HEATING, VENTILATION AND AIR CONDITIONING

INSPECTION

E5C82BE0

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.



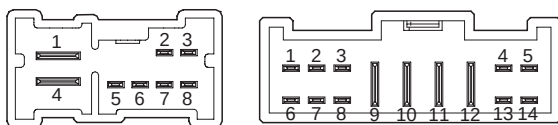
A connector

B connector

LQKG353B

REAR BLOWER

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



A connector

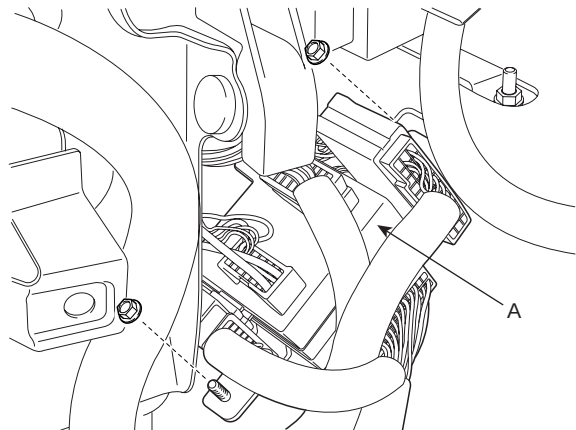
B connector

LQKG353D

REPLACEMENT

EDF4C010

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).



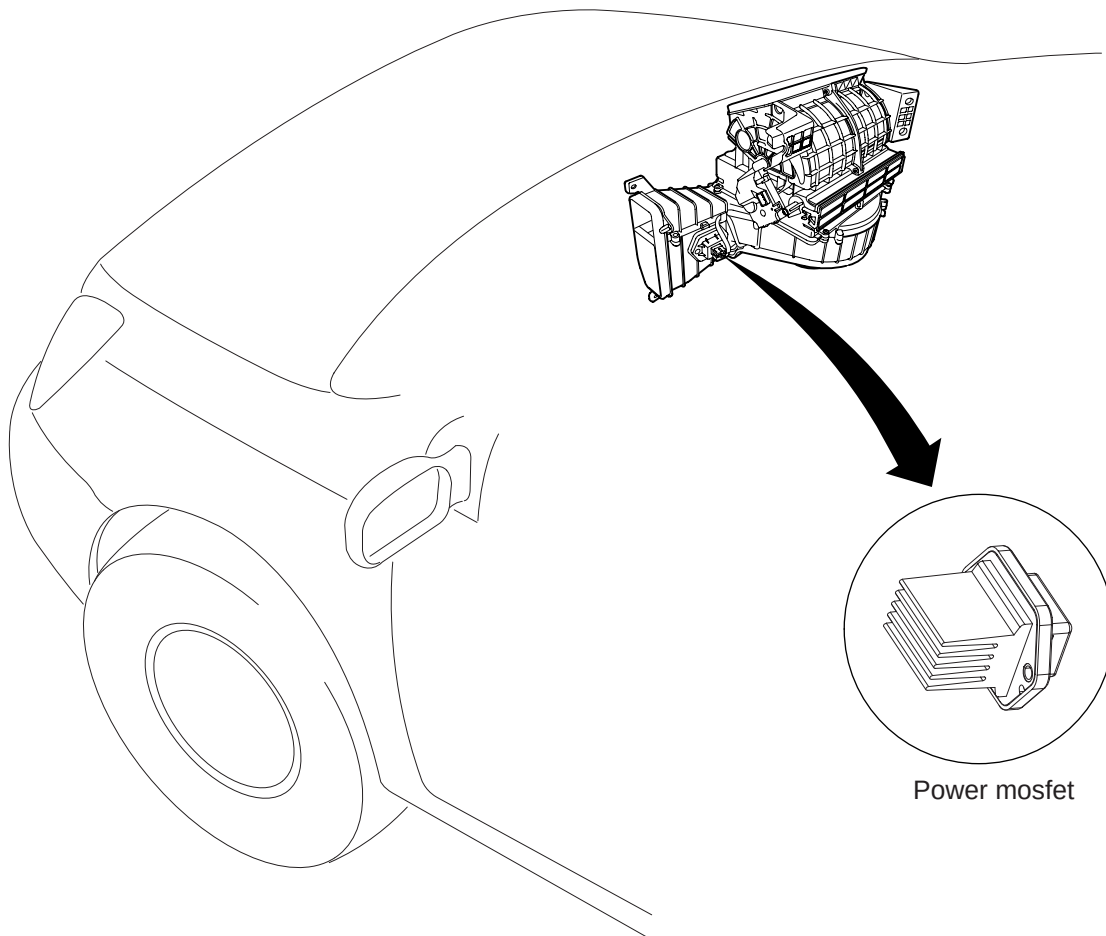
AQKF353F

4. Install in the reverse order of removal.

POWER MOSFET

COMPONENT LOCATION

EDC3B9AF



Power mosfet

LQKG355A

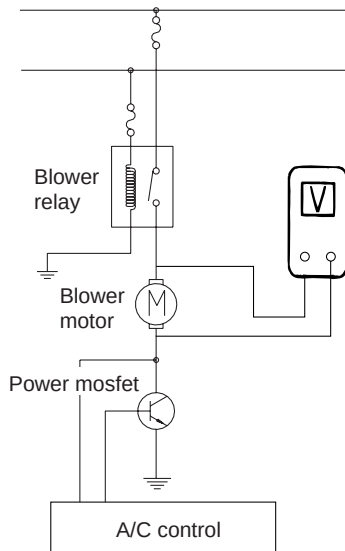
HA -90

HEATING, VENTILATION AND AIR CONDITIONING

INSPECTION

ED451E2C

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.

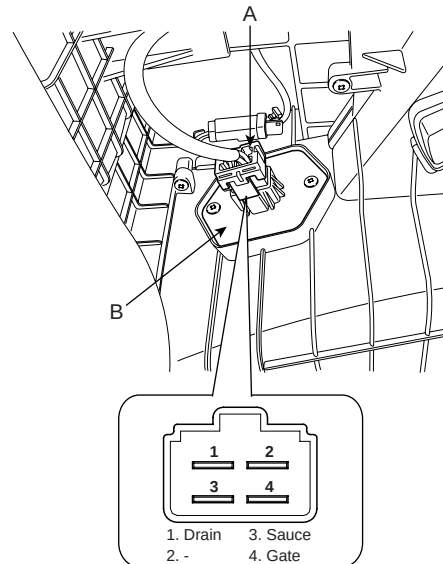


BQKF355B

REPLACEMENT

E03D0D31

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.



BQKF355C

SPECIFICATION

Fan	Motor Voltage
	Manual
First speed	4.0 ±0.5V
Second speed	5.1 ±0.5V
Third speed	6.2 ±0.5V
Fourth speed	7.3 ±0.5V
Fifth speed	8.4 ±0.5V
Sixth speed	9.5 ±0.5V
Seventh speed	10.5 ±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.

4. Installation is the reverse order of removal.

BLOWER CONTROLS

HA -91

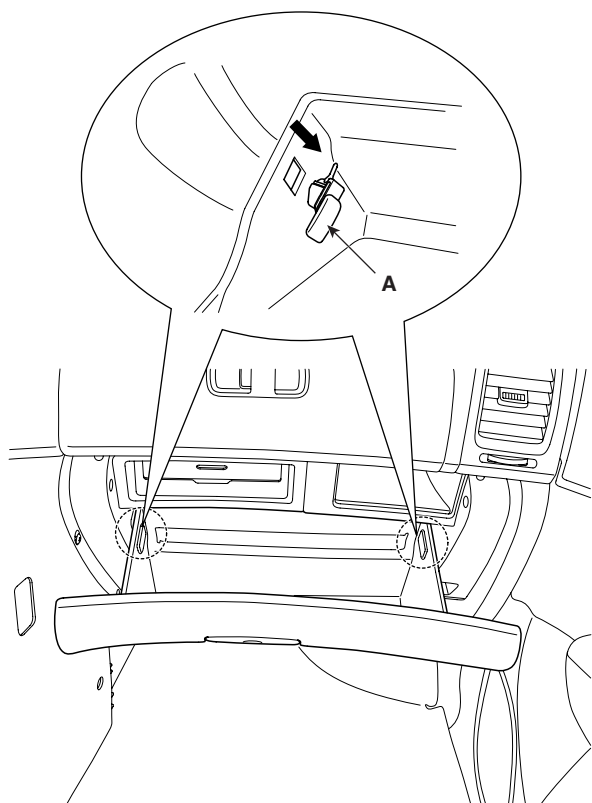
A/C AIR FILTER

DESCRIPTION E5670FD2

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.

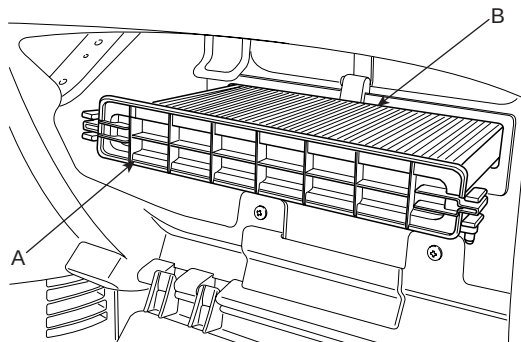
REPLACEMENT EA9B8207

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

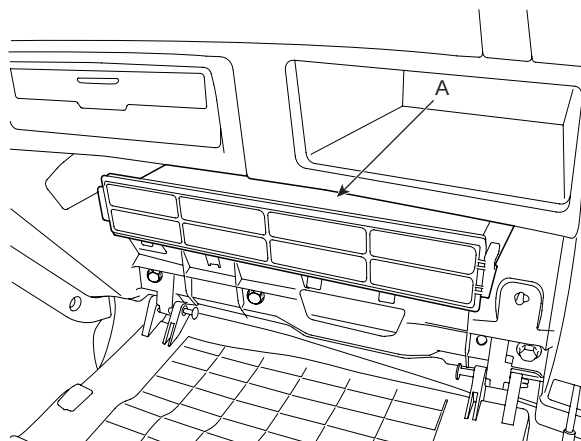


ASKF0170

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.



AQJF359B



AQKF359B

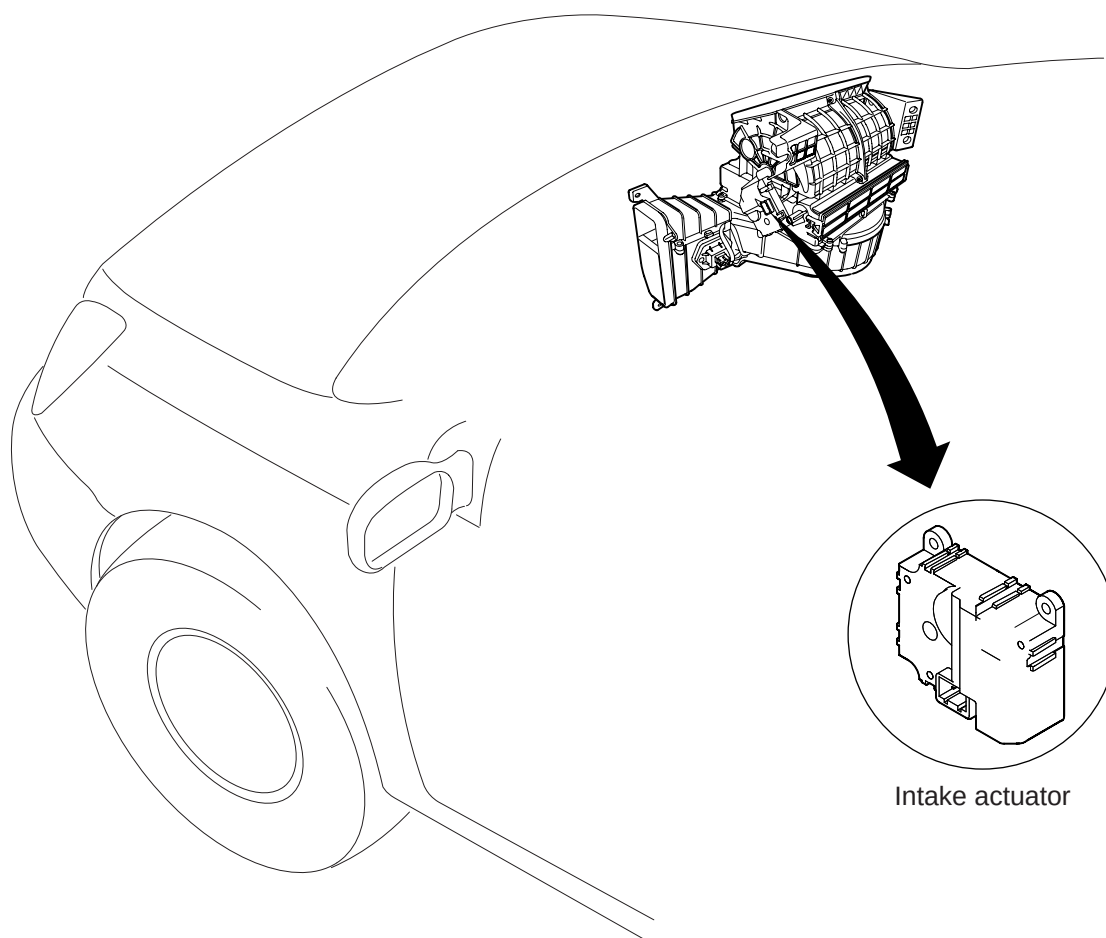
NOTE

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)

INTAKE ACTUATOR

COMPONENT LOCATION E0BBA06D



Intake actuator

BLOWER CONTROLS

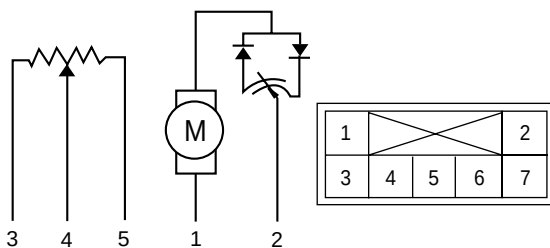
HA -93

DESCRIPTION EF5C8F9E

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 EFB0F6A4

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.



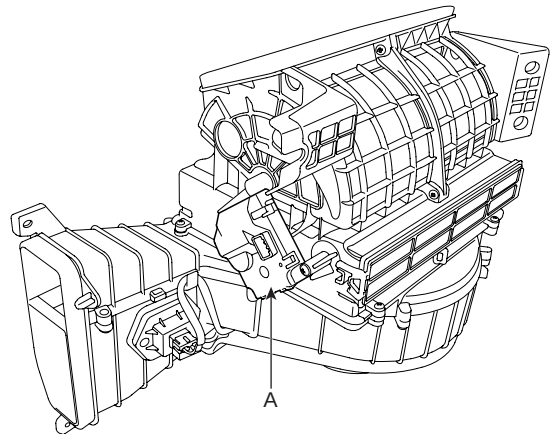
- | | |
|--------------------|-------------|
| 1. Fresh | 5. 5V (Vcc) |
| 2. Recirculation | 6. - |
| 3. Sensor ground | 7. - |
| 4. Feedback signal | |

LQKG315D

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 ED7D1260

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.



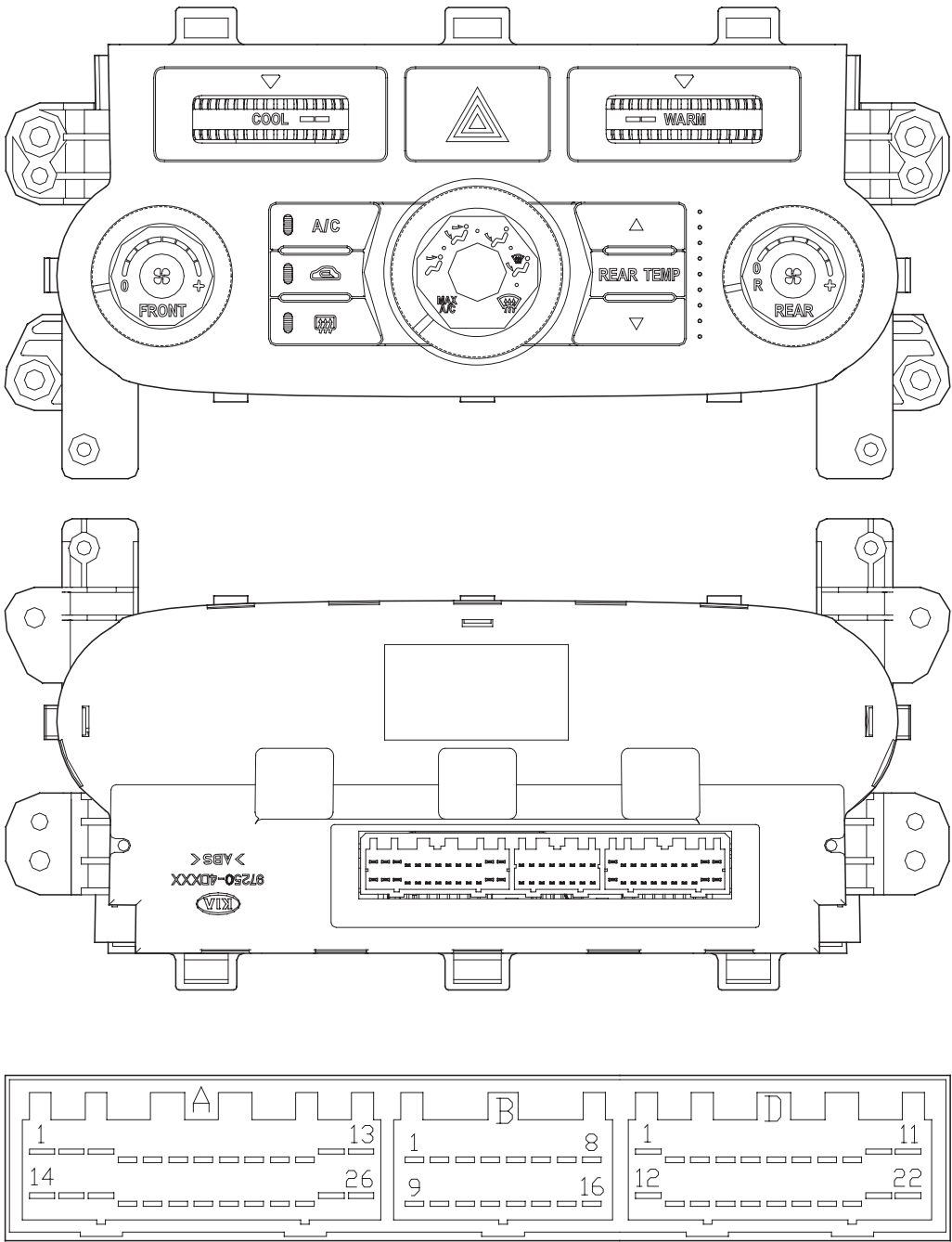
AQKF351C

5. Installation is the reverse order of removal.

BLOWER AND A/C
CONTROLS (MANUAL)

CONTROL PANEL

COMPONENT EF62D2E9



BLOWER AND A/C CONTROLS (MANUAL)

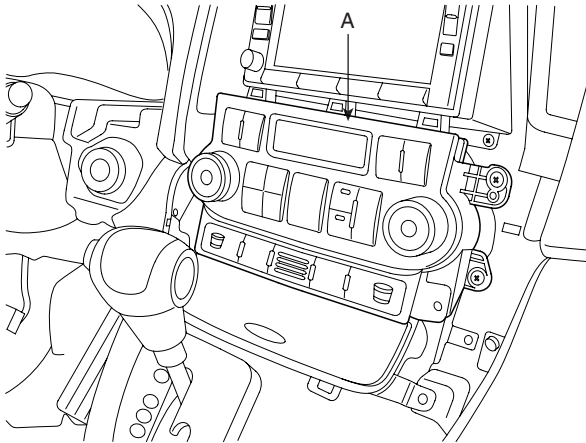
HA -95

CONNECTOR PIN FUNCTION

PIN NO.		Function	PIN NO.		Function
Con- nec- tor A	1	BATTERY	Con- nec- tor B	7	-
	2	IGN 2		8	POWER MOSFET (GATE) - REAR
	3	TAIL LAMP (ILL+)		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 SELECT
	9	REAR MODE ACTUATOR (FLOOR)		15	-
	10	REAR MODE ACTUATOR (F/B)		16	-
	11	BLOWER MOTOR (+)	Con- nec- tor 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 (+)
	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
Con- nec- tor 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	-

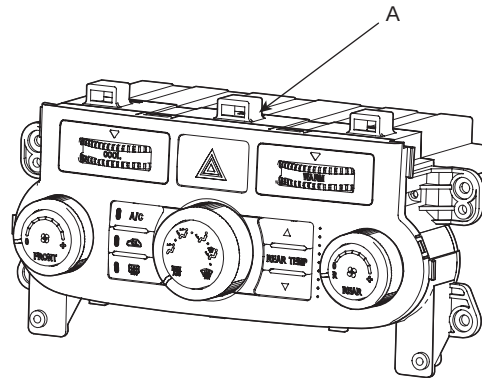
REPLACEMENT E9AF6DF1

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.



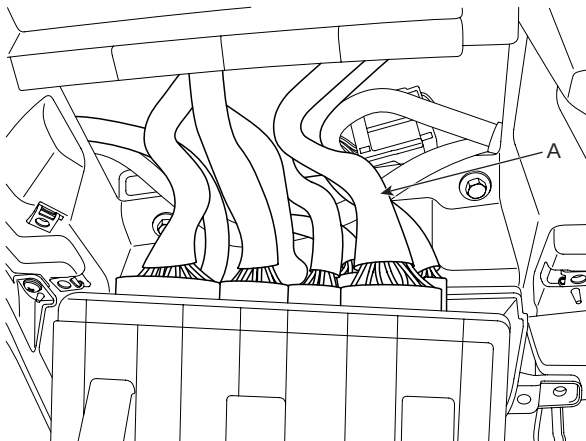
AQKF450D

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



AQKF500E

5. Installation is the reverse order of removal.

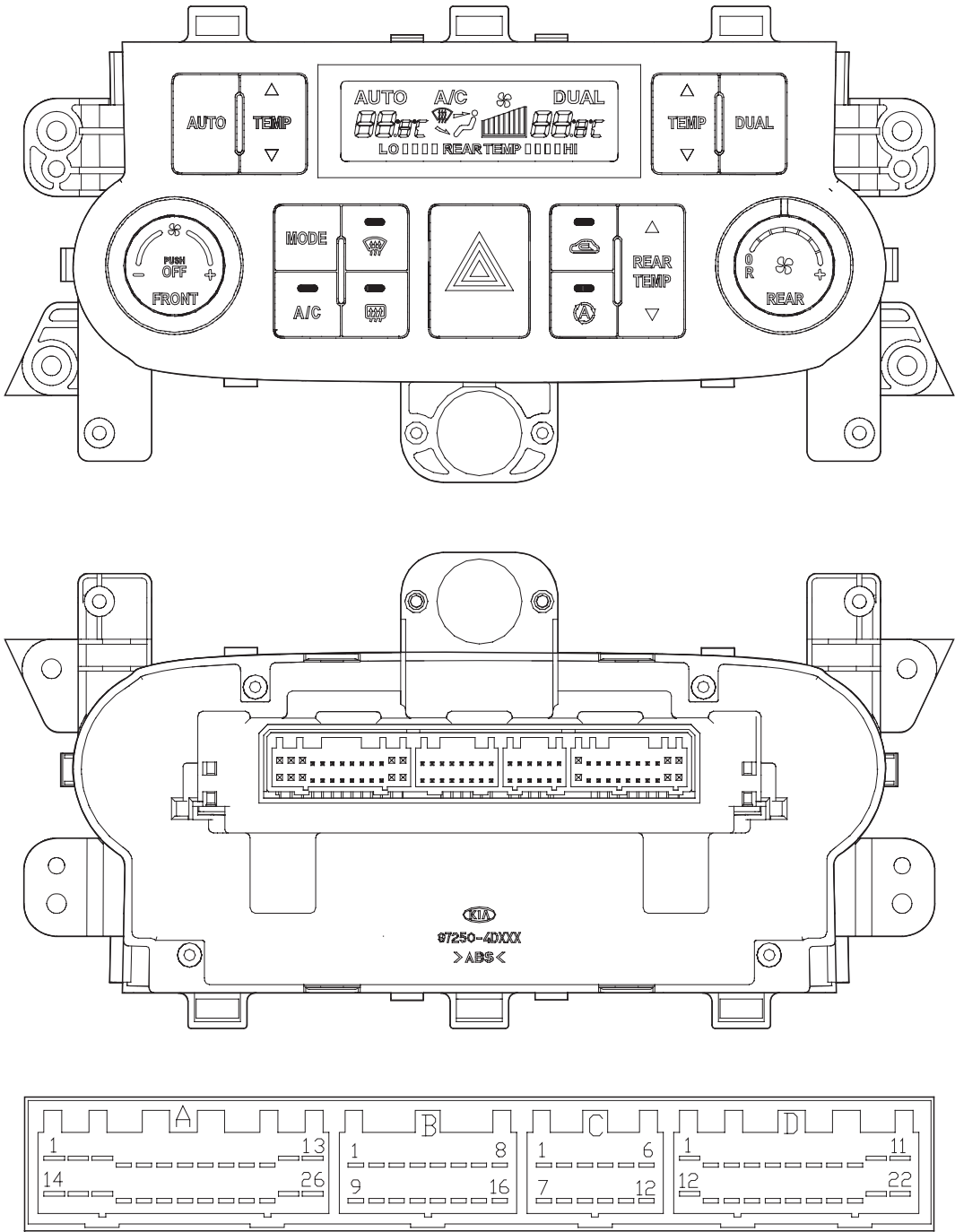


AQKF450E

BLOWER AND A/C
CONTROLS (AUTOMATIC)

CONTROL PANEL

COMPONENT EC2C9DBE



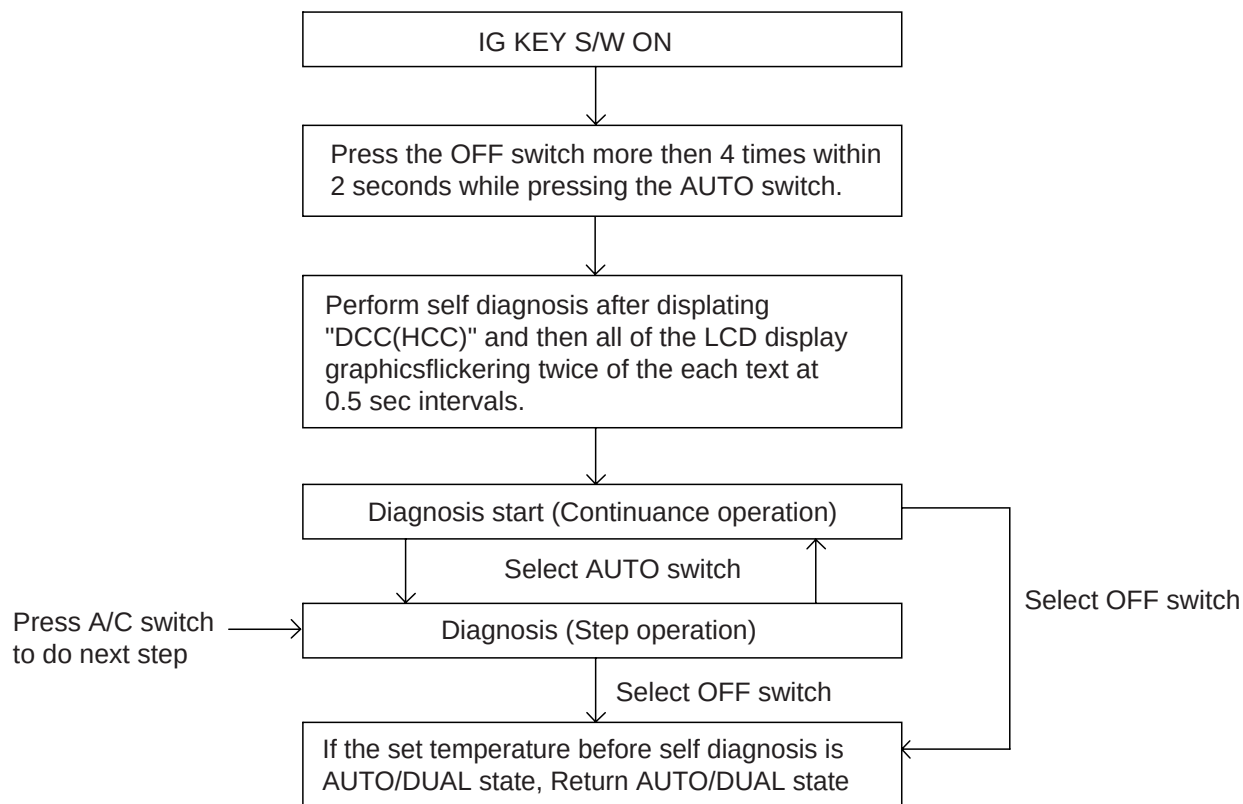
CONNECTOR PIN FUNCTION

PIN NO. Function			PIN NO. Function		
Con- nec- tor A	1	BATTERY	Con- nec- tor B	7	-
	2	IGN 2		8	POWER MOSFET (GATE) - REAR
	3	TAIL LAMP (ILL+)		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 (+)	Con- nec- tor 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 (+)
	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
Con- nec- tor 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	-

SELFDIAGNOSIS

EC1C2BC5

1. Self-diagnosis process



LQKG001D

HA -100

HEATING, VENTILATION AND AIR CONDITIONING

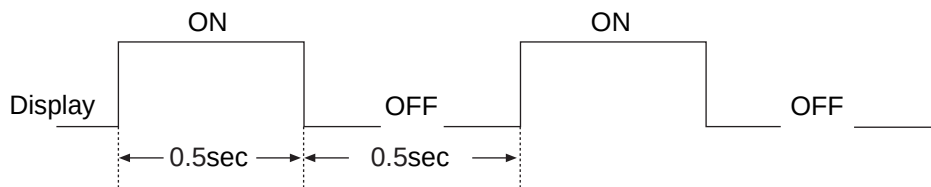
2. How to read self-diagnostic code
After the display panel flickers three times every 0.5 second, the corresponding fault code flickers on the setup temperature display panel every 0.5 second and will show two figures. Codes are displayed in numerical format

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.



BQKF500C

2) Continuance operation : DTC code is more two.

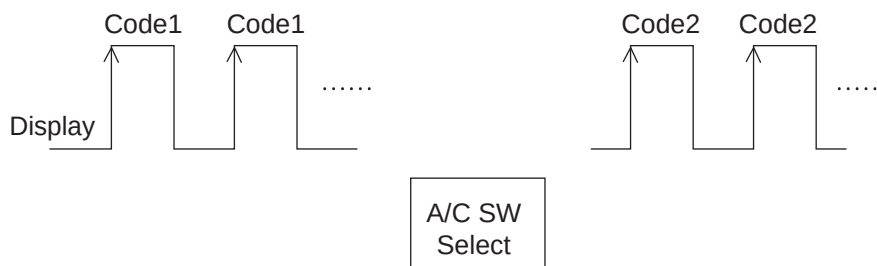


BQKF500D

3) STEP operation

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

B. DTC code os more two.



BQKF500E

4. Diagnostic procedure refer to DTC code.

5. Fail safe

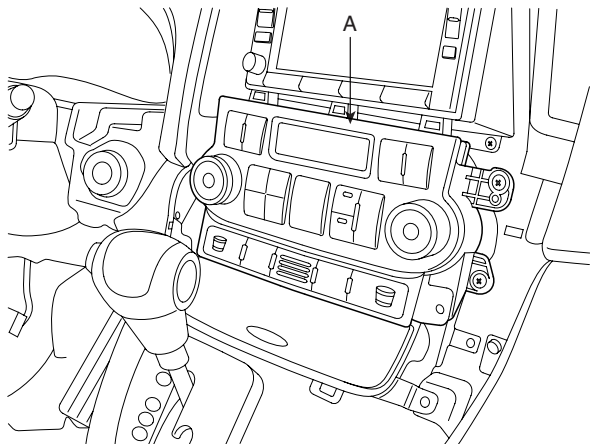
- 1) In-car temperature sensor: Control with the value of 25°C(77°F)
- 2) Ambient temperature sensor: Control with the value of 20°C(67°F)
- 3) Evaporator temperature sensor: Control with the value of -2°C(28.4°F)
- 4) Humidity sensor: Control with the value of 10%
- 5) Temperature sensor : Control with 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.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -103

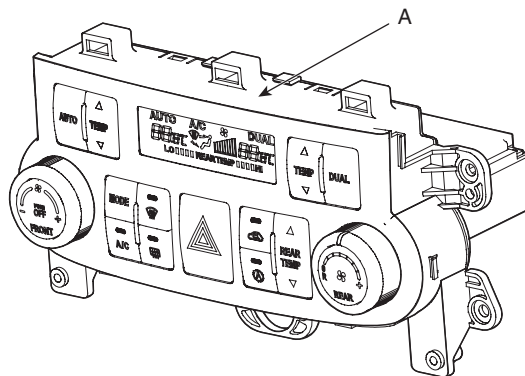
REPLACEMENT EEA8B2D2

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.



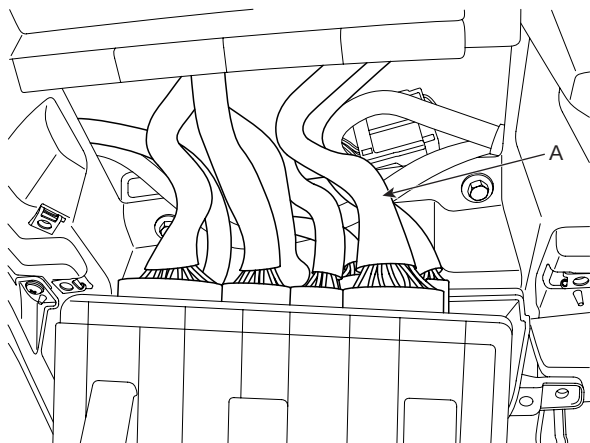
AQKF450D

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



AQKF450F

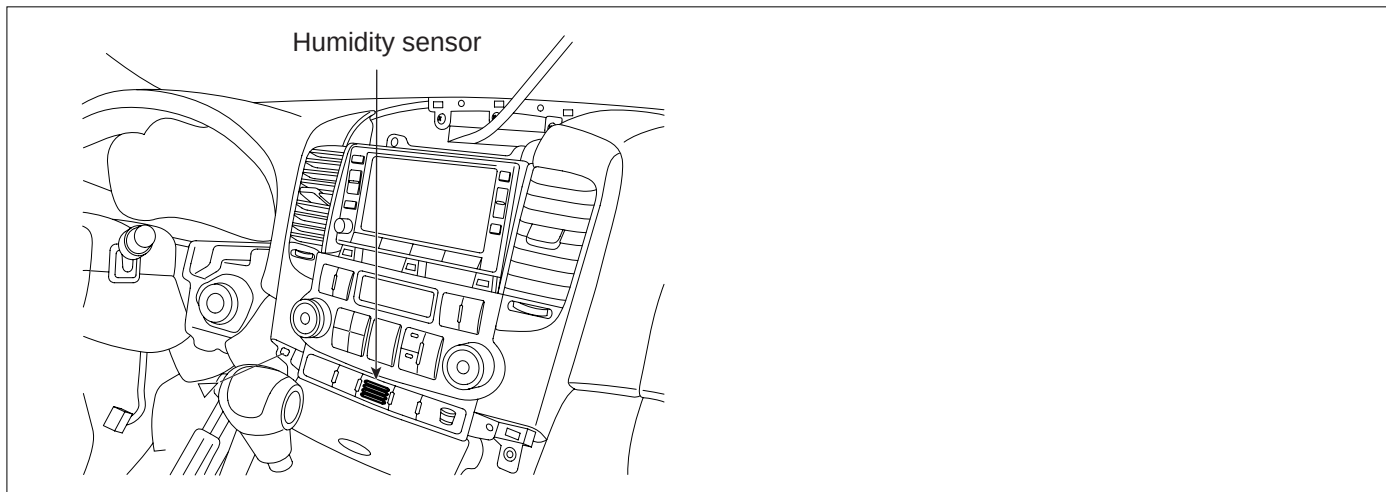
5. Installation is the reverse order of removal.



AQKF450E

DTC B1200 HUMIDITY SENSOR OPEN (HIGH)

COMPONENT LOCATION E55A86D0



LQKG510A

GENERAL DESCRIPTION E813CFB8

Humidity sensor located at crush pad, detects in-car humidity for in-car humidity control. If ambient air temperature or in-car humidity is outside certain range, it will turn on A/C to control in-car humidity for preventing in-car fogging. Air conditioner operation depends on ambient temperature and humidity.

DTC DESCRIPTION E26F8FC5

The A/C controller sets DTC B1200 if there is an open circuit in humidity sensor signal harness or the measured frequency value of sensor is more than threshold value(about 7,100Hz)

DTC DETECTING CONDITION E609B0DF

Item	Detecting Condition	Possible cause
DTC Strategy	• Frequency check	• Open Circuit in signal harness • Faulty Humidity Sensor • Faulty A/C control unit
Threshold value	• > 7,100 Hz	
Detecting time	• 0.01 sec	
FAIL SAFE	• Control with the value of 100%	

SPECIFICATION EF7B8179

Relative humidity(%)	Frequency(Hz)	Relative humidity(%)	Frequency(Hz)
50	6,728	95	6,110

MONITOR SCANTOOL DATA EA55BAF5

1. Connect scantool to data link connector(DLC).
2. Engine "ON"

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -105

3. Monitor the "Humidity Sensor" Parameter on the Scantool while drying the humidity sensor with a hair drier or heat gun adjusted to a low heat setting.

1.2 CURRENT DATA	
HUMIDITY SENSOR	10 %
HEATER WATER TEMP.SNSR	12.0 °C
IN-CAR TEMP.SENSOR	11.0 °C
AMBIENT AIR TEMP.SNS	11.5 °C
EVAPORATIVE SENSOR	12.5 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POPENIO. (DR.)	91.75 %
DIRECTION POTENIO. DR.	89.79 %

Fig 1

1.1 DIAGNOSTIC TROUBLE CODES	
B1200 HUMIDITY SENSOR - OPEN(HIGH)	
NUMBER OF DTC : 1 ITEMS	

Fig 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1200.

LQIE510B

4. Are the DTC B1200 present and is parameter of "Humidity Sensor" fixed?
※ Parameter of "Humidity Sensor" will be fixed at 10%, if there is any fault in Humidity Sensor.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION

E5F388B6

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

NO

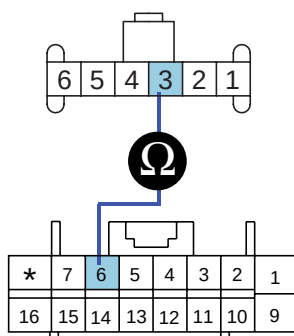
Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION

EE9EA63F

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Humidity Sensor.
 - 3) Measure resistance between terminal "3" of Humidity Sensor and terminal "6" of A/C Control Unit.

Specification : Approx. 0 Ω



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

LQKG510C

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection " procedure.

NO

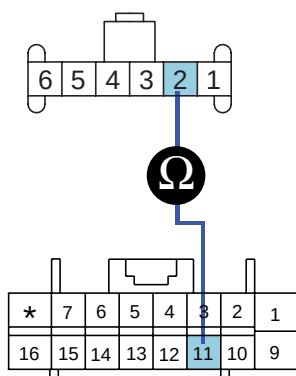
Check for open in harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION

E607AF32

1. Check for open in ground harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Humidity Sensor.
 - 3) Measure resistance between terminal "2" of Humidity Sensor and terminal "11" of A/C Control Unit.

Specification :Approx. 0 Ω



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

LQKG510D

4) Is the measured resistance within specifications?

YES

Go to "Component Inspection " procedure.

NO

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

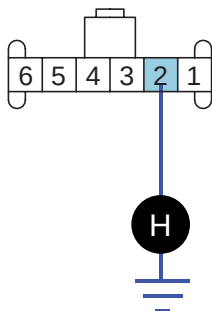
COMPONENT INSPECTION

E3A920B6

1. Check Humidity Sensor.

- 1) Engine "ON"
- 2) Connect Humidity Sensor.
- 3) Measure Frequency between terminal 2 of Humidity sensor and chassis ground.

Specification : Refer the specifications in fig 5.



1. Motor(-)
2. Sensor ground
3. Humidity sensor signal
4. In-car sensor temp. signal
5. Sensor power (5V)
6. IGN 2

LQKG510E

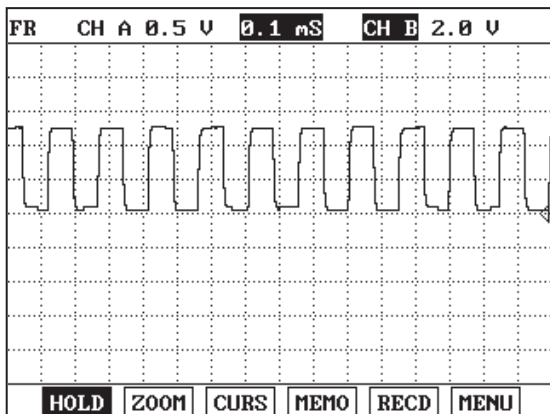


Fig 3

Fig 3 : Signal waveform of Humidity sensor.

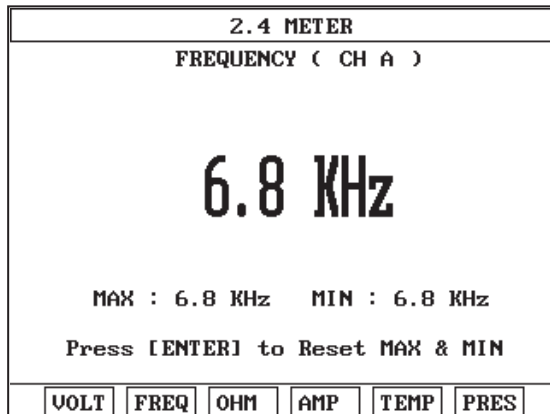


Fig 4

Fig 4 : Frequency of Humidity sensor Measured by scantool.

LQIE510F

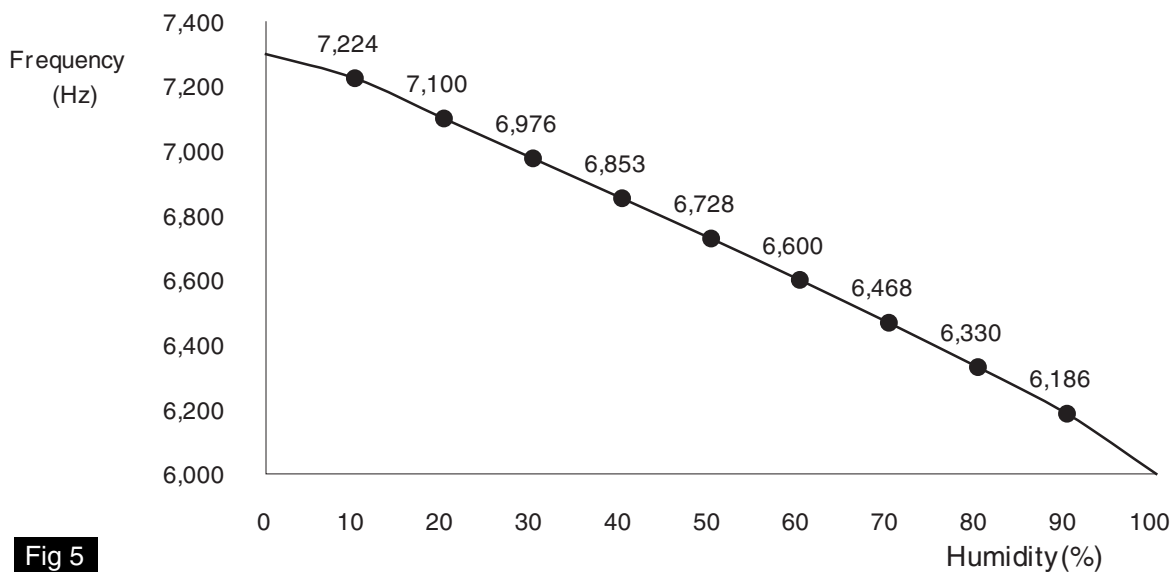


Fig 5

Fig 5) Specifications : Frequency value of humidity sensor as a function of Relative humidity.

LQIE510Q

- 4) Is the measured frequency within specifications in fig 5? (tolerance limits $\pm 5\%$)

YES

Go to "Check A/C Control Unit" procedure.

NO

Substitute with a known-good Humidity sensor and check for proper operation.

If the problem is corrected, replace Humidity sensor and then go to "Verification of Vehicle Repair" procedure.

2. Check A/C Control Unit

- 1) Engine "ON"

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -109

- 2) Disconnect Humidity Sensor.
- 3) Measure voltage value between terminal "6" of A/C control unit and chassis ground.

Specification : 5V



LQKG510G

- 4) Is the measured voltage within specification?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known-good A/C Control Unit and check for proper operation.

If the problem is corrected, replace A/C Control Unit and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E0FE9B19

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

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

YES

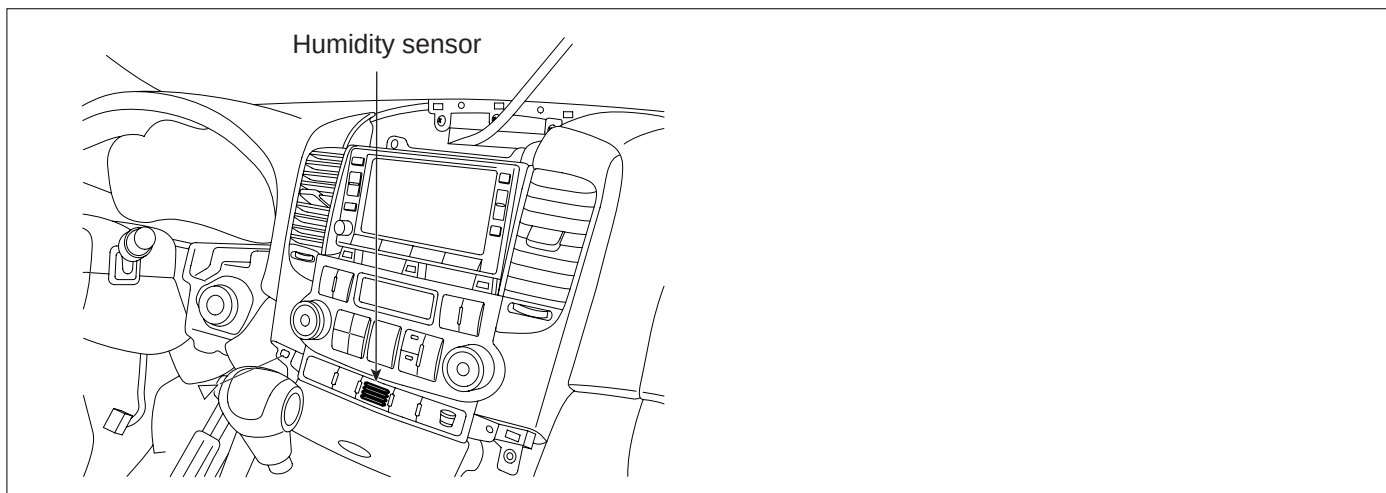
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1201 HUMIDITY SENSOR SHORT (LOW)

COMPONENT LOCATION E7DBA350



LQKG510A

GENERAL DESCRIPTION E40CCE08

Refer to DTC B1200.

DTC DESCRIPTION ED9AB2BE

The A/C controller sets DTC B1201 if there is a short circuit in humidity sensor signal harness or the measured frequency value of sensor is less than threshold value(about 6,186Hz)

DTC DETECTING CONDITION ED9D02C4

Item	Detecting Condition	Possible cause
DTC Strategy	Frequency check	- Open Circuit in power harness - Short Circuit in signal harness - Faulty Humidity Sensor - Faulty A/C control unit
Threshold value	< 6,186 Hz	
Detecting time	10msec	
FAIL SAFE	Control with the value of 0%	

SPECIFICATION E39EABFF

Refer to DTC B1200.

MONITOR SCANTOOL DATA E1282110

1. Connect scantool to data link connector(DLC).
2. Engine "ON"
3. Monitor the "Humidity Sensor" Parameter on the Scantool while drying the humidity sensor with a hair drier or heat gun adjusted to a low heat setting.

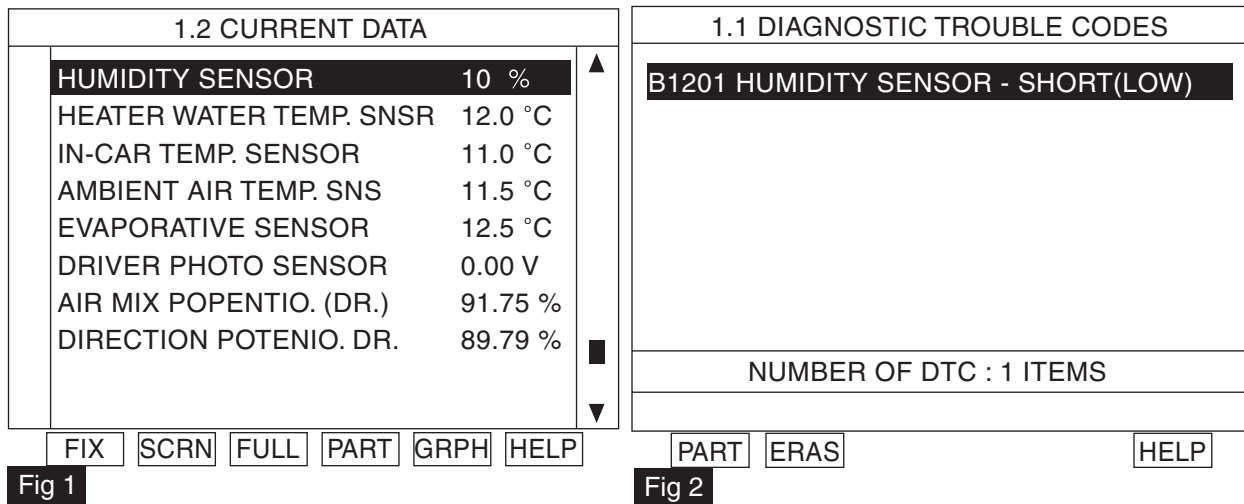


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1201.

LQIES11A

4. Are the DTC B1201 present and is parameter of "Humidity Sensor" fixed?
※ Parameter of "Humidity Sensor" will be fixed at 10%, if there is any fault in Humidity Sensor.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION

E46CEF9E

Refer to DTC B1200.

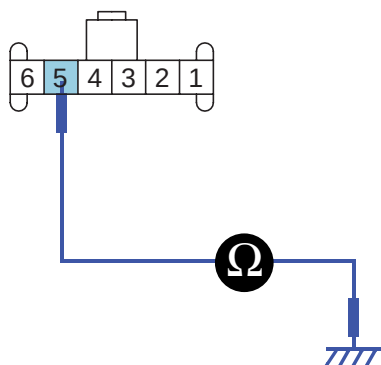
1.

SIGNAL CIRCUIT INSPECTION

ECC3D1A0

1. Check for short to ground in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Humidity Sensor.
 - 3) Measure resistance between terminal "5" of Humidity Sensor and chassis ground.

Specification : Approx. $\infty \Omega$



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

LQKG511B

4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection " procedure.

NO

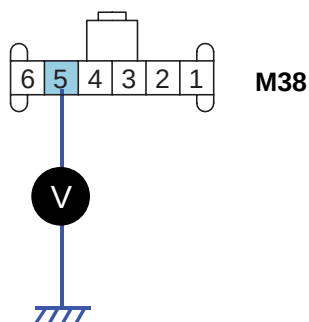
Check for short to ground in harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

POWER SUPPLY CIRCUIT INSPECTION ED180193

1. Check for open in power harness.

- 1) Ignition "ON"
- 2) Disconnect Humidity Sensor.
- 3) Measure voltage value between terminal "5" of Humidity Sensor and chassis ground.

Specification : 5V



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

LQKG511C

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -113

- 4) Is the measured voltage within specifications?

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION E21ABF1E

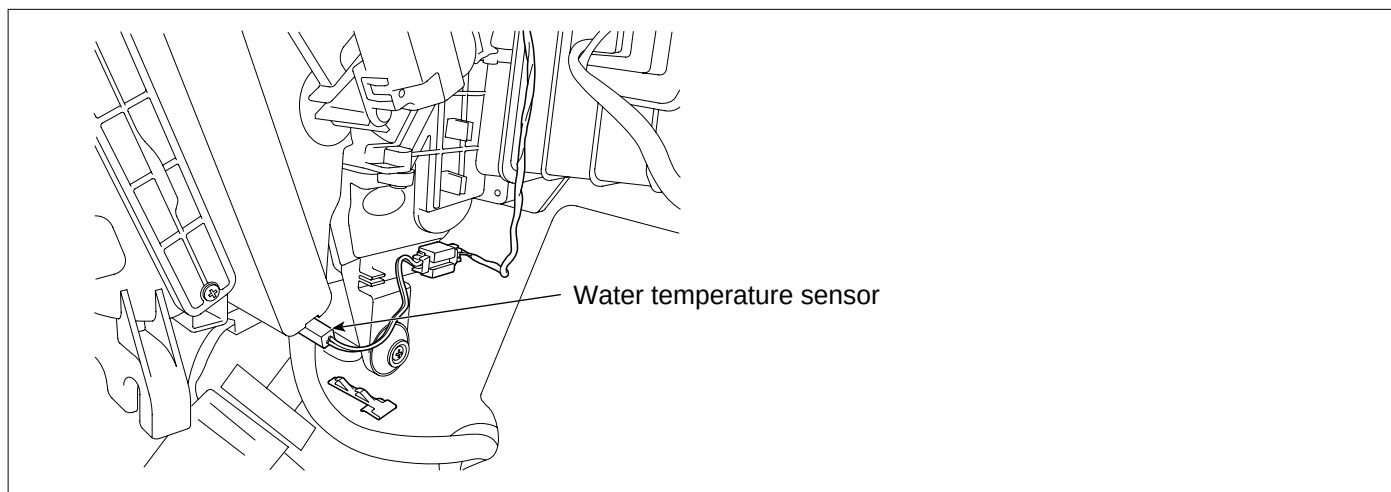
Refer to DTC B1200.

VERIFICATION OF VEHICLE REPAIR ECEB8038

Refer to DTC B1200.

DTC B1202 WATER TEMPERATURE SENSOR OPEN (HIGH)

COMPONENT LOCATION ECDA84B4



LQKG512A

GENERAL DESCRIPTION E79C5561

A water temp. sensor located at heater unit, 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.

DTC DESCRIPTION EFAC8202

The A/C controller sets DTC B1202 if there is an open circuit in water temp. sensor signal harness or the measured resistance value of the sensor is more than the threshold value(about 176.3k Ω)

DTC DETECTING CONDITION EDDA37B8

Item	Detecting Condition	Possible cause
DTC Strategy	Resistance check	- Open Circuit in harness - Faulty water temp. Sensor - Faulty A/C control unit
Threshold value	> 176.3 kΩ	
Detecting time	0.3 sec	
FAIL SAFE	Control with the value of 85°C(185°F)	

SPECIFICATION EEDFF0BB

Temperature[°C(°F)]	Resistance(k Ω)	Temperature[°C(°F)]	Resistance(k Ω)
5(41)	641.4	65(149)	130.8
20(68.0)	491.4	80(176.0)	70.1
35(95.0)	341.4	95(203.0)	41.7
50(122.0)	191.4	110(230.0)	25.4

MONITOR SCANTOOL DATA E23A4490

1. Connect scantool to data link connector(DLC).
2. Engine "ON"
3. Monitor the "WATER TEMP. SENSOR" Parameter on the Scantool.

1.2 CURRENT DATA

HEATER WATER TEMP. SNSR

-2 °C

IN-CAR TEMP. SENSOR

12.0 °C

AMBIENT AIR TEMP. SNS

11.5 °C

EVAPORATIVE SENSOR

12.5 °C

DRIVER PHOTO SENSOR

0.00 V

AIR MIX POPEMIO. (DR.)

91.75 %

DIRECTION POTEMIO. DR.

54.89 %

PASSENGER PHOTO SENSOR

255

▲
■
▼

1.1 DIAGNOSTIC TROUBLE CODES

B1202 WATER TEMP. SENS - OPEN(HIGH)

NUMBER OF DTC : 1 ITEMS

FIX

SCRN

FULL

PART

GRPH

HELP

PART

ERAS

HELP

Fig 1

Fig 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1202.

EORE512B

4. Are the DTC B1202 present and is parameter of "WATER TEMP. SENSOR" fixed?
 ※ Parameter of "WATER TEMP. SENSOR" will be fixed at -2°C(28.4°F), if there is any fault in WATER TEMP. SENSOR.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

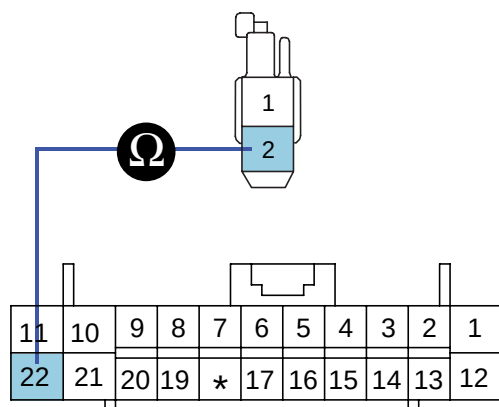
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EE5CF56F

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect water temp. sensor.
 - 3) Measure resistance between terminal "2" of water temp. sensor and terminal "22" of A/C Control Unit.

Specification : Approx. 0 Ω



1. Sensor ground
2. Water temp. sensor signal

LQKG512C

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection " procedure.

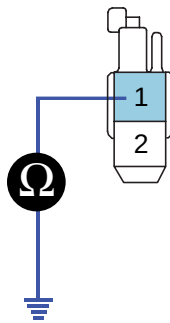
NO

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

GROUND CIRCUIT INSPECTION E20A6934

1. Check for open in ground harness.
 - 1) Ignition "OFF"
 - 2) Disconnect water temp. sensor.
 - 3) Measure resistance between terminal "1" of water temp. sensor and chassis ground.

Specification : Approx. 0 Ω



- 1. Sensor ground
- 2. Water temp. sensor signal

LQKG512D

4) Is the measured resistance within specifications?

YES

Go to "Component Inspection " procedure.

NO

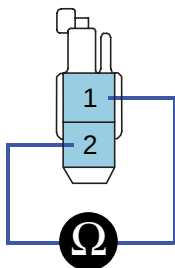
Check for open in ground harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

E8B1ACAD

1. Check water temp. sensor.
 - 1) Ignition "OFF"
 - 2) Disconnect water temp. sensor.
 - 3) Measure resistance between terminal "1" and "2" of water temp. sensor.

Specification : Refer the specifications in fig 3.



- 1. Sensor ground
- 2. Water temp. sensor signal

LQKG512E

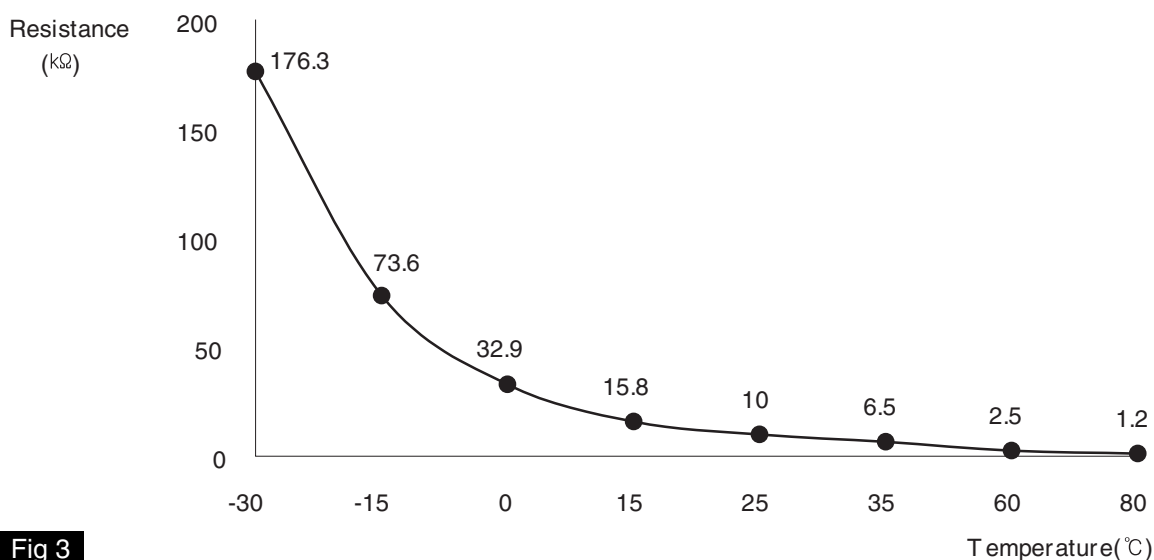


Fig 3

Fig 3) Specifications : Resistance value of water temp. sensor as a function of temperature.

LQIE512G

- 4) Is the measured resistance within specifications in fig 3)? (tolerance limits $\pm 3\%$)

YES

Go to "Check A/C Control Unit" procedure.

NO

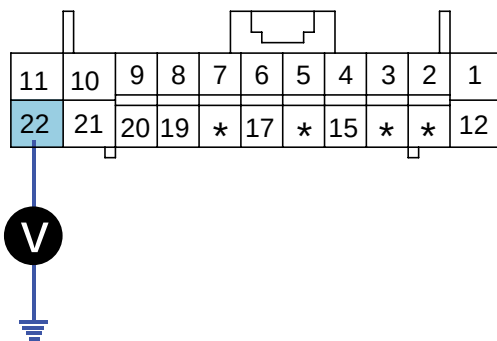
Substitute with a known-good water temp. sensor and check for proper operation.

If the problem is corrected, replace water temp. sensor and then go to "Verification of Vehicle Repair" procedure.

2. Check A/C Control Unit

- 1) Engine "ON"
- 2) Disconnect water temp. sensor.
- 3) Measure Voltage between terminal "22" of A/C Control Unit and chassis ground.

Specification : Approx. 5V



22. Water temp. sensor signal

LQKG512F

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E60A09C9

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

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

YES

Go to the applicable troubleshooting procedure.

NO

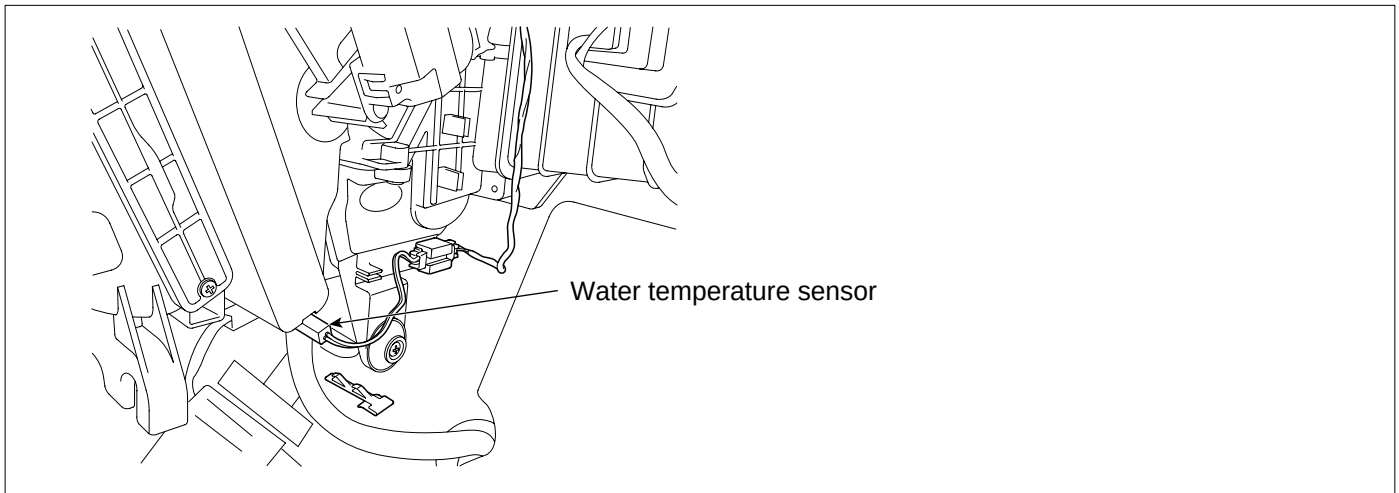
System is performing to specification at this time.

HA -120

HEATING, VENTILATION AND AIR CONDITIONING

DTC B1203 WATER TEMPERATURE SENSOR SHORT (LOW)

COMPONENT LOCATION E0E2BC32



LQKG512A

GENERAL DESCRIPTION EFE4C535

Refer to DTC B1202.

DTC DESCRIPTION EA17C85B

The A/C controller sets DTC B1203 if there is a short circuit in water temp. sensor signal harness or the measured resistance value of sensor is less than threshold value(about 1.2k Ω)

DTC DETECTING CONDITION EF2E3145

Item	Detecting Condition	Possible cause
DTC Strategy	Resistance check	- Short circuit in harness - Faulty water temp. Sensor - Faulty A/C control unit
Threshold value	< 1.2 kΩ	
Detecting time	0.3 sec	
FAIL SAFE	Control with the value of 85°C(185°F)	

SPECIFICATION E6B0F9BF

Refer to DTC B1202.

MONITOR SCANTOOL DATA EADCD72B

1. Connect scantool to data link connector(DLC).
2. Engine "ON"
3. Monitor the "WATER TEMP. SENSOR" Parameter on the Scantool.

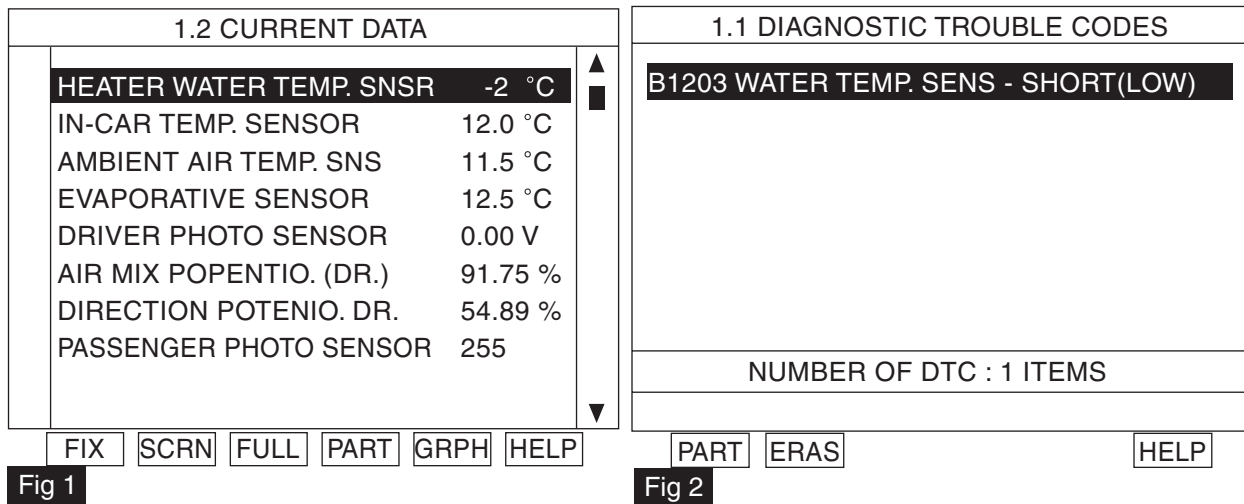


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1203.

EQRE513A

4. Are the DTC B1203 present and is parameter of "WATER TEMP. SENSOR" fixed?
※ Parameter of "WATER TEMP. SENSOR" will be fixed at -2°C(28.4°F), if there is any fault in WATER TEMP. SENSOR.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION

E4A5AB7F

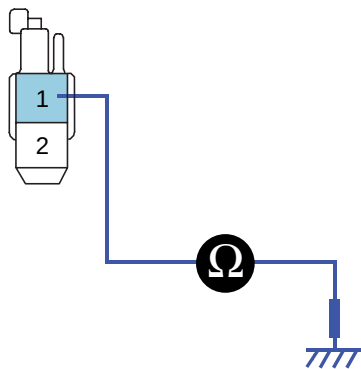
Refer to DTC B1202.

SIGNAL CIRCUIT INSPECTION

E5290ACF

1. Check for short to ground in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect water temp. sensor.
 - 3) Measure resistance between terminal "1" of water temp. sensor and chassis ground.

Specification : Approx. $\infty \Omega$



- 1. Sensor ground
- 2. Water temp. sensor signal

LQKG513B

4) Is the measured resistance within specifications?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E688EEF4

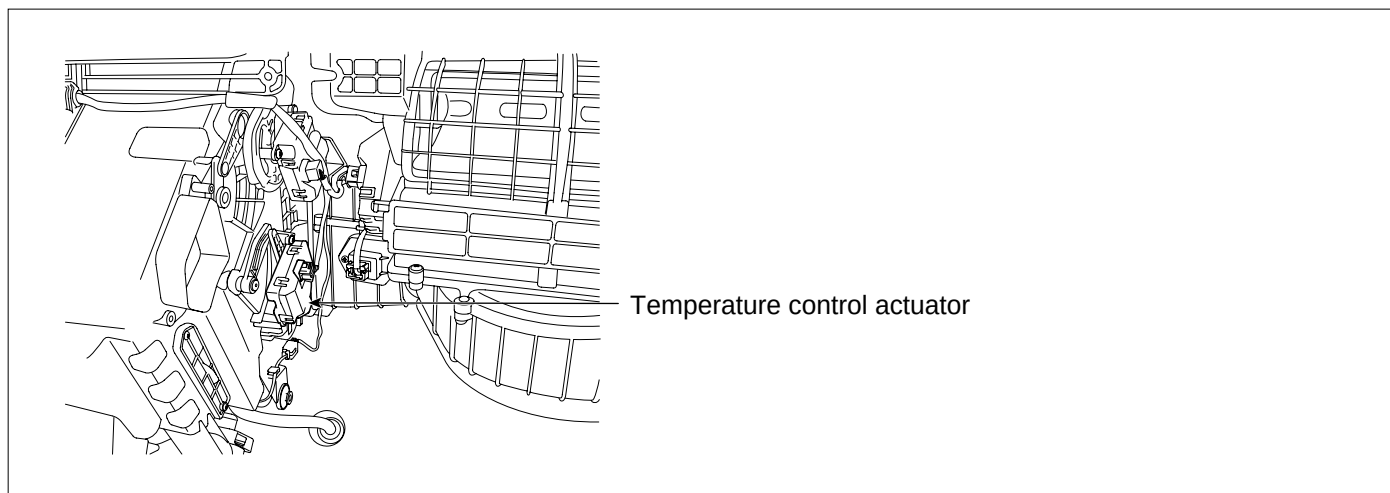
Refer to DTC B1202.

VERIFICATION OF VEHICLE REPAIR ED6AB445

Refer to DTC B1202.

DTC B1204 AIR MIX POTENTIOMETER OPEN (LOW)-PASSENGER'S

COMPONENT LOCATION E0BB0CFD



LQKG521A

GENERAL DESCRIPTION E6FDAF92

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

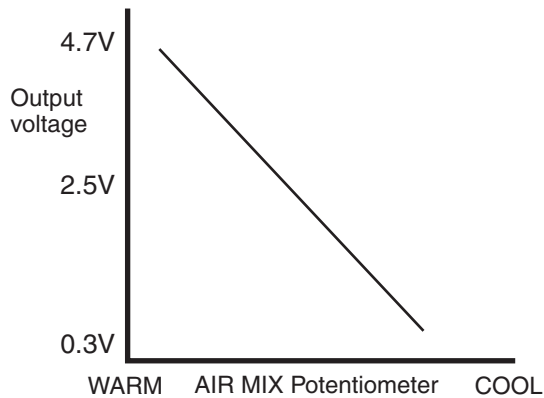
DTC DESCRIPTION E4F166A6

The A/C controller sets DTC B1204 if there is an open circuit or poor connection in the air mix potentiometer.

DTC DETECTING CONDITION E8DA37FC

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Poor connection of connected part - Open circuit in harness - Short circuit in harness - Faulty driver Air Mix potentiometer
Threshold value	< 0.1V	
Detecting time	0.3 sec	
FAIL SAFE	- If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. - If temperature setting 25~32°C(77~90°F) fix at max. heating position.	

SPECIFICATION E927FFAF



EQBF521B

MONITOR SCANTOOL DATA EF8DAA6E

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Passenger's Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	13.0 °C	▲
IN-CAR TEMP.SENSOR	12.0 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	12.5 °C	■
DRIVER PHOTO SENSOR	0.00 V	
AIR MIX POPENTIO.(PA.)	5.9 %	
DIRECTION POTENIO.DR.	90.18 %	
PASSENGER PHOTO SENSOR	255	▼
FIX SCRN FULL PART GRPH HELP		

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES		
B1204 AIR MIX P. - LOW INPUT		
NUMBER OF DTC : 1 ITEMS		
PART	ERAS	HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1204.

EQBF521K

4. Are the DTC B1204 present and is parameter of "Passenger's Air Mix Potentiometer" fixed?
※ Parameter of "Passenger's Air Mix Potentiometer" will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Passenger's Air Mix potentiometer.

YES

Go to "Inspection" procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -125

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E27080F9

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

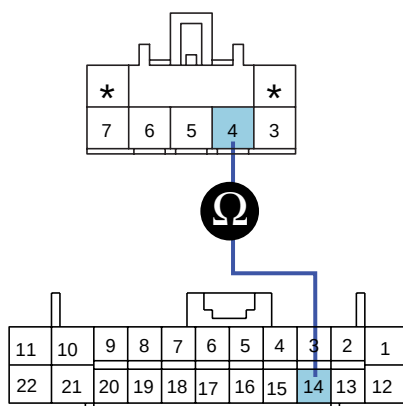
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EEC01ECA

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Passenger's Air Mix potentiometer.
 - 3) Measure resistance between terminal "4" of Passenger's Air Mix Potentiometer and terminal "14" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521L

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

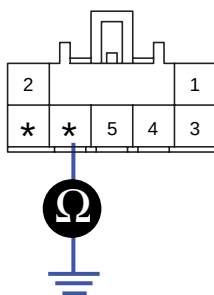
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Passenger's Air Mix potentiometer.
- 3) Measure resistance between terminal "4" of Passenger's Air Mix Potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521M

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

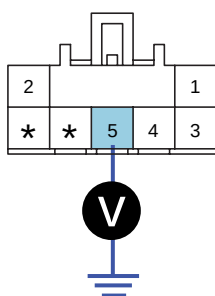
Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

POWER SUPPLY CIRCUIT INSPECTION EED3C936

1. Check for short or open in harness.

- 1) Ignition "ON"
- 2) Connect Passenger's Air Mix Potentiometer.
- 3) Measure voltage between terminal "7" of Passenger's Air Mix Potentiometer and chassis ground.

Specification : Approx. 5V



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521N

- 4) Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

NO

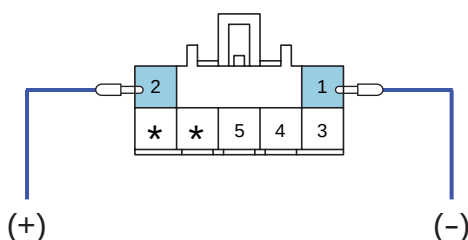
Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

E3EE5ADD

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Passenger's Air Mix Potentiometer.
- 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521O

- 5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

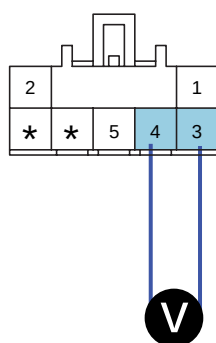
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Passenger's Air Mix potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Passenger's Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521P

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

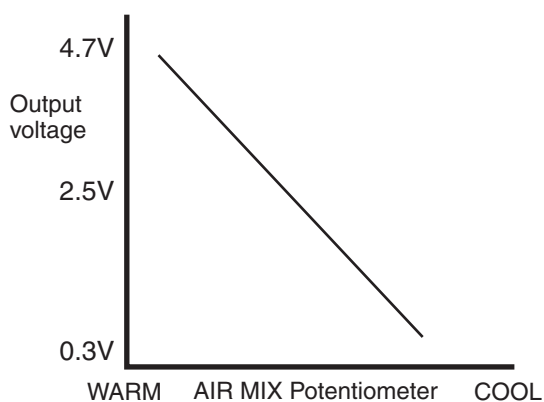


Fig. 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

EQBF521J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E960BEB C

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

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

YES

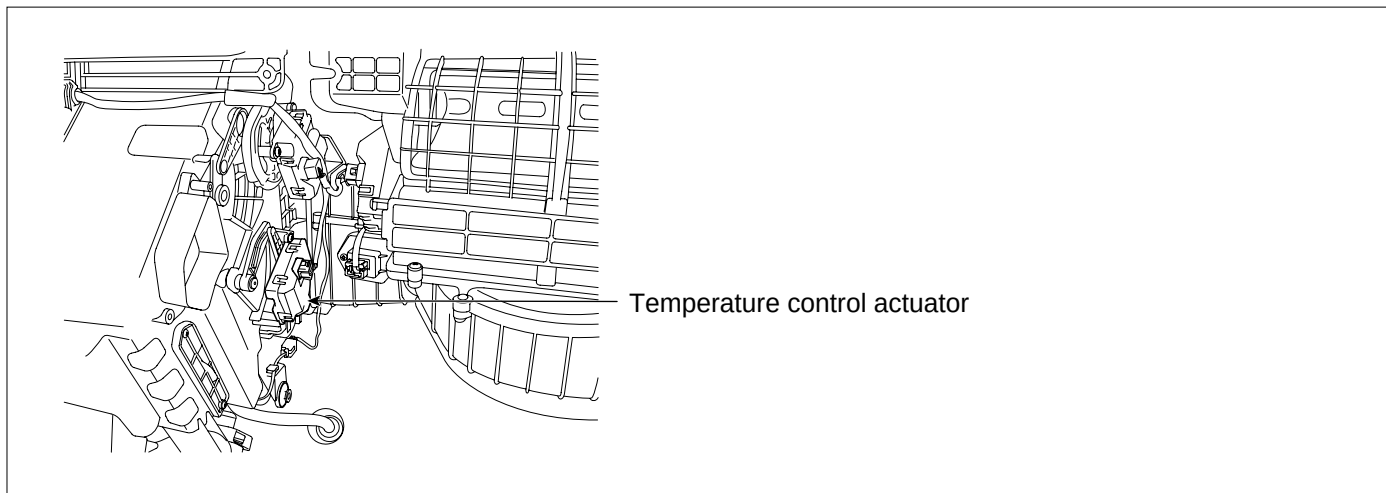
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1205 AIR MIX POTENTIOMETER SHORT (HIGH)-PASSENGER'S

COMPONENT LOCATION EBEAB47E



LQKG521A

GENERAL DESCRIPTION EBBBA148

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

DTC DESCRIPTION EEFEA86B

The A/C controller sets DTC B1205 if there is a short to power in the air mix potentiometer.

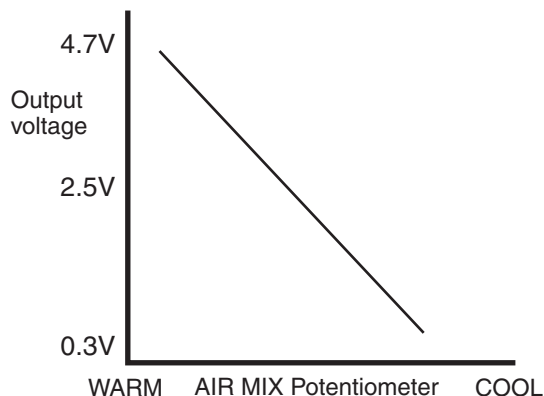
DTC DETECTING CONDITION E0C85E40

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Short circuit in harness - Faulty driver Air Mix potentiometer
Threshold value	> 4.9V	
Detecting time	0.3 sec	
FAIL SAFE	- If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. - If temperature setting 25~32°C(77~90°F) fix at max. heating position.	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -131

SPECIFICATION EE47778F



EQBF521B

MONITOR SCANTOOL DATA E7CFD25C

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Passenger's Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	13.0 °C	▲
IN-CAR TEMP.SENSOR	12.0 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	■
EVAPORATIVE SENSOR	12.5 °C	
DRIVER PHOTO SENSOR	0.00 V	▼
AIR MIX POPENTIO.(PA.)	91.75 %	
DIRECTION POTENIO.DR.	90.18 %	
PASSENGER PHOTO SENSOR	255	
FIX SCRN FULL PART GRPH HELP		

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES		
B1205 AIR MIX P. - HIGH INPUT		

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1205.

EQBF522F

4. Are the DTC B1205 present and is parameter of "Passenger's Air Mix potentiometer" fixed?
※ Parameter of "Passenger's Air Mix potentiometer" will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Passenger's Air Mix potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E283B9EA

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

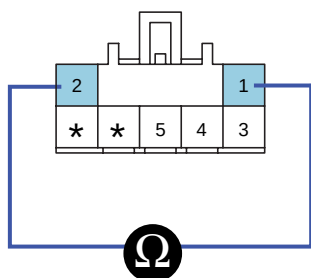
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E5E91EAA

1. Check for short in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Passenger's Air Mix potentiometer.
 - 3) Measure resistance between terminal "1" and "2" of Passenger's Air Mix potentiometer.

Specification : Approx. $\infty \Omega$



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG522G

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection" procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -133

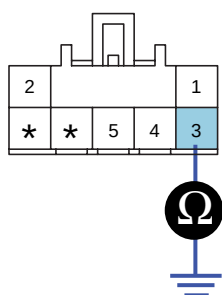
NO

Check for short to power harness in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION EE38C85A

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Passenger's Air Mix Potentiometer.
 - 3) Measure resistance between terminal "3" of Passenger's Air Mix Potentiometer and chassis ground.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG522H

- 4) Is the measured resistance within specifications?

YES

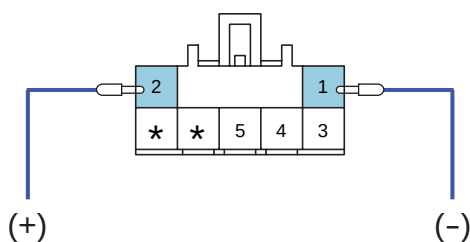
Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EE9D88DB

1. Check actuator motor.
 - 1) Ignition "OFF"
 - 2) Disconnect Passenger's Air Mix Potentiometer.
 - 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
 - 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521O

5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

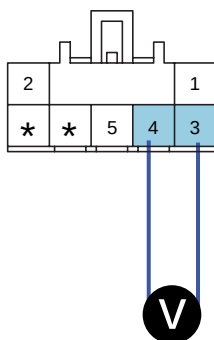
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Passenger's Air Mix potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Passenger's Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521P

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

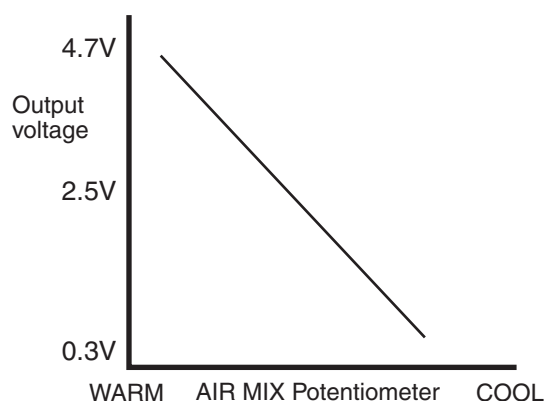


Fig. 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

EQBF521J

4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR ECF5DABA

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

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

YES

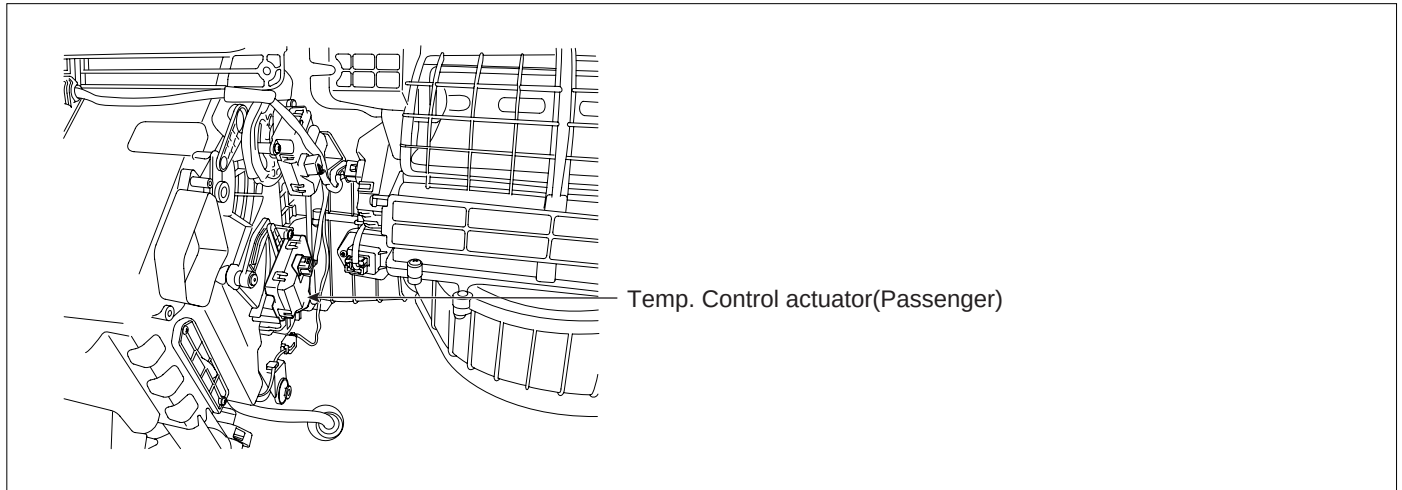
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1206 DIRECTION POTENTIOMETER OPEN (LOW) - PASSENGER

COMPONENT LOCATION EE1EFD4F



LQKG523A

GENERAL DESCRIPTION E04D3B49

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

DTC DESCRIPTION E609A095

The A/C controller sets DTC B1249 if there is an open circuit or poor connection in the Direction potentiometer.

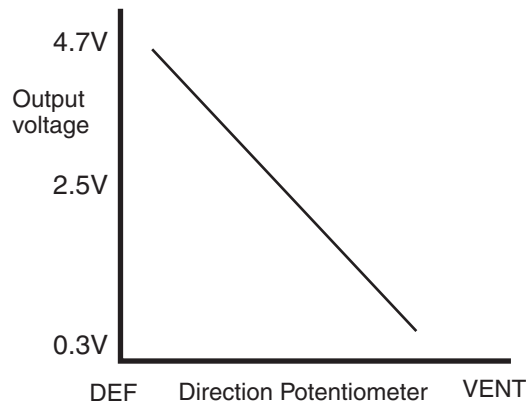
DTC DETECTING CONDITION EDF3DF5B

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver direction potentiometer
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	• Fix vent position, while selecting vent mode. • Fix defrost position while selecting except vent mode.	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -137

SPECIFICATION ED5817D7



EQBF523B

MONITOR SCANTOOL DATA E43E3AD4

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "DR. DIRECTION POTENTIO." parameter on the scantool while operating mode switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	13.0 °C	▲
IN-CAR TEMP.SENSOR	11.5 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	13.0 °C	■
DRIVER PHOTO SENSOR	0.00 V	
AIR MIX POPENTIO.(DR.)	92.54 %	
DIRECTION POTENIO.DR.	1.96 %	
PASSENGER PHOTO SENSOR	255	▼
FIX SCRN FULL PART GRPH HELP		

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES
B1249 DIRECTION P. - LOW INPUT
NUMBER OF DTC : 1 ITEMS
PART ERAS HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1249.

EQBF523C

4. Are the DTC B1249 present and is parameter of "DR. DIRECTION POTENTIO." fixed?
 ※ Parameter of "DR. DIRECTION POTENTIO." will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Driver Direction potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION EEA42FB4

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

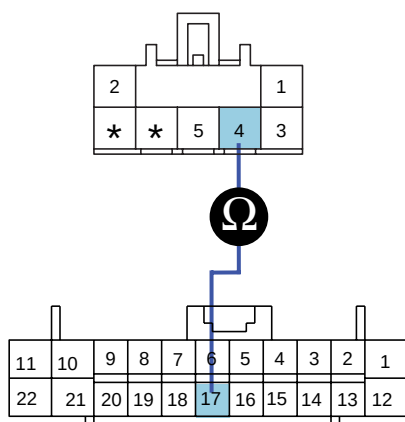
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E800C316

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver mode Actuator.
 - 3) Measure resistance between terminal "4" of Driver Direction potentiometer and terminal "17" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -139

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

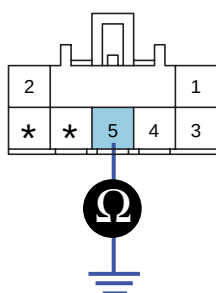
NO

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

2. Check for short to ground in harness.

- 1) Ignition "ON"
- 2) Disconnect Driver mode Actuator.
- 3) Measure resistance between terminal "5" of Driver Direction potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823E

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

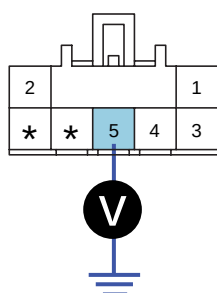
POWER SUPPLY CIRCUIT INSPECTION

E6B67647

1. Check for short or short in harness.

- 1) Ignition "ON"
- 2) Connect Driver Direction potentiometer.
- 3) Measure voltage between terminal "5" of Driver Direction potentiometer and chassis ground.

Specification : Approx. 5V



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823F

- 4) Is the measured voltage within specifications?

YES

Go to "Component Inspection" procedure.

NO

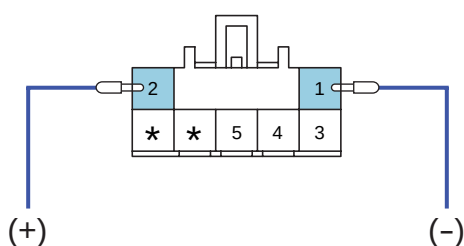
Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

E4817480

1. Check actuator.

- 1) Ignition "OFF"
- 2) Disconnect Driver Direction potentiometer.
- 3) Verify that the mode actuator operates to the vent mode when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the mode actuator operates to the def mode when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823H

- 5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

NO

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

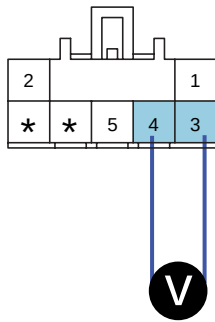
BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -141

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Driver Direction potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Driver Direction potentiometer as the mode switch is operated.

Specification : Refer the specifications in fig 3



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (3-4)	Error detecting
VENT	$0.3 \pm 0.15V$	Under voltage : 0.08V or less Over voltage : 4.92V or more
BI-LEVEL(1)	$1.35 \pm 0.4V$	
BI-LEVEL(2)	$2.25 \pm 0.4V$	
FLOOR	$3.0 \pm 0.4V$	
MIX	$3.6 \pm 0.4V$	
DEF	$4.7 \pm 0.15V$	

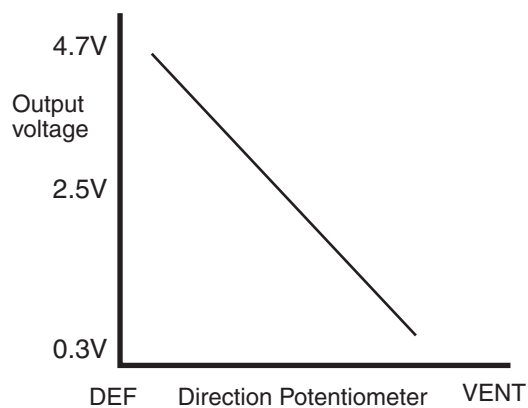


Fig. 3

Fig 3) Specifications : Voltage value as a function of position of direction potentiometer.

EQBF523J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR

EF7E9A90

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

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

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

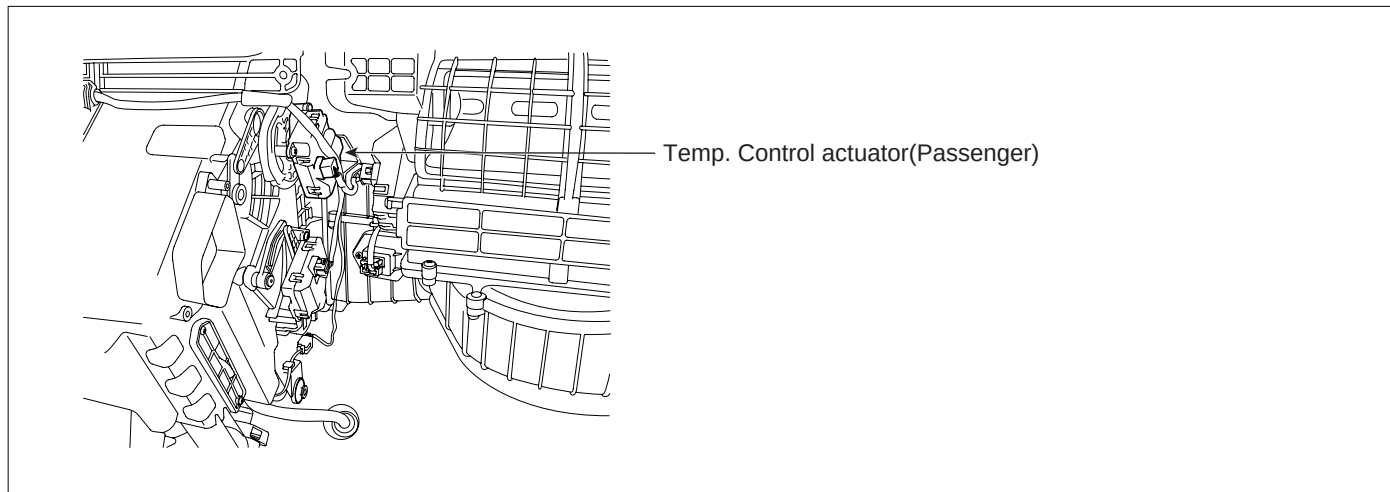
BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -143

DTC B1207 DIRECTION POTENTIOMETER SHORT (HIGH) - PASSENGER

COMPONENT LOCATION

ED4ADF8F



LQKG757A

GENERAL DESCRIPTION

E3BF43D2

Refer to DTC B1206.

DTC DESCRIPTION

E5926EB1

The A/C controller sets DTC B1207 if there is a short to power in the Direction potentiometer.

DTC DETECTING CONDITION

E7928F7D

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Short circuit in harness • Faulty driver direction potentiometer • Open circuit in harness
Threshold value	• > 4.9V	
Detecting time	• 0.3 sec	
FAIL SAFE	• Fix vent position	

SPECIFICATION

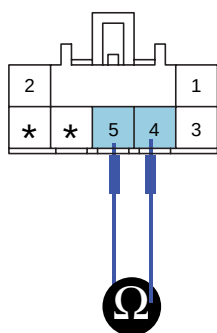
E985515B

Refer to DTC B1206.

MONITOR SCANTOOL DATA

EA8681EB

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "DR. DIRECTION POTENTIO." parameter on the scantool while operating mode switch.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG524B

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit inspection" procedure.

NO

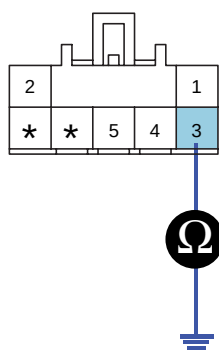
Check for open in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION

E4F4EE2B

1. Check for open in ground harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver mode Actuator.
 - 3) Measure resistance between terminal "3" of evaporator sensor and chassis ground.

Specification :Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523G

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION EE485422

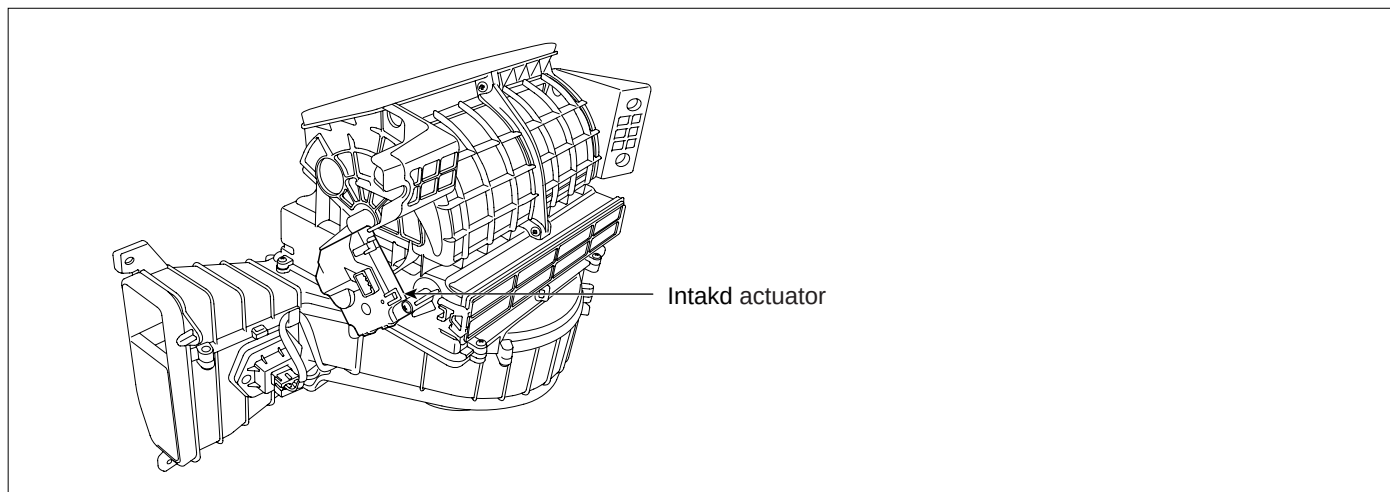
Refer to DTC B1206.

VERIFICATION OF VEHICLE REPAIR E72F36B6

Refer to DTC B1206.

DTC B1208 INTAKE POTENTIOMETER OPEN

COMPONENT LOCATION EF749215



LQKG527A

GENERAL DESCRIPTION EA50D8D5

Intake door located at heater unit controls the inlet of car. When driver operates the intake switch, A/C controller recirculation mode signal from intake switch and operates intake door actuator to turn intake door to intended position. (with fresh mode signal, intake door is closed and with fresh mode signal, intake door is opened).

DTC DESCRIPTION E6782025

The A/C controller sets DTC B1208 if there is an open circuit or poor connection in the intake potentiometer.

DTC DETECTING CONDITION E0CD3E1C

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Poor connection of connected part - Open circuit in harness - Short circuit in harness - Faulty driver intake potentiometer
Threshold value	< 0.1V	
Detecting time	0.3 sec	
FAIL SAFE	- If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. - Fix at fresh	

SPECIFICATION E6D66101

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

Door position	Voltage	Threshold value
Fresh	0.3±0.15V	Voltage value &< 0.08V
Recirculation	4.7±0.15V	Voltage value &> 4.9V

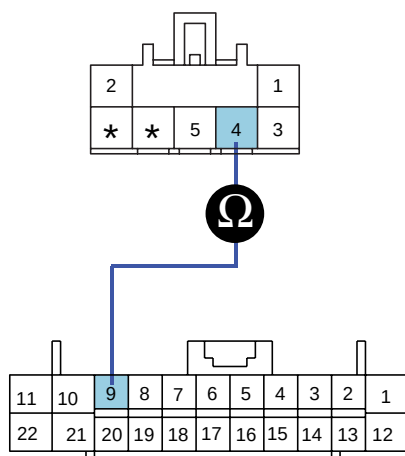
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E9A2AB82

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Intake potentiometer.
 - 3) Measure resistance between terminal "4" of Intake Potentiometer and terminal "9" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG527D

- 4) Is the measured resistance within specifications?

YES

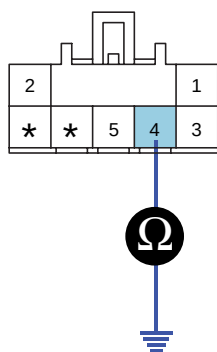
Go to "Check for short to ground in harness" procedure.

NO

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

2. Check for short to ground in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Intake potentiometer.
 - 3) Measure resistance between terminal "4" of Intake Potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG527E

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

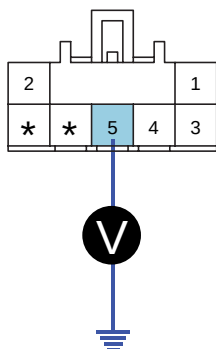
POWER SUPPLY CIRCUIT INSPECTION

E638022A

1. Check for short or short in harness.

- 1) Ignition "ON"
- 2) Connect Intake Potentiometer.
- 3) Measure voltage between terminal "5" of Intake Potentiometer and chassis ground.

Specification : Approx. ∞ V



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG527F

- 4) Is the measured voltage within specifications?

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -151

YES

Go to "Component inspection" procedure.

NO

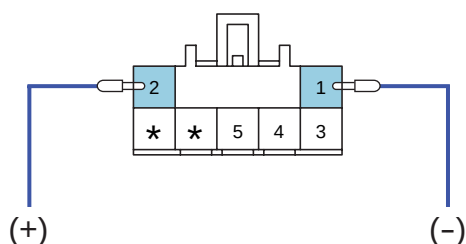
Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

E4DCDE12

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Intake Potentiometer.
- 3) Verify that the temperature actuator operates to the fresh position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the recirculation position when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823H

5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

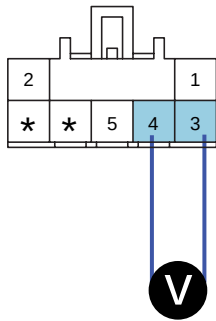
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Intake potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Intake potentiometer while operating Intake switch.

Specification : Refer to the specifications



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (5-6)	Error detecting
Fresh	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
Recirculation	$4.7 \pm 0.15V$	High voltage : 4.9V or more

Specifications : Voltage value of Intake potentiometer as a function of position of Intake.

- 4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E5797203

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

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

YES

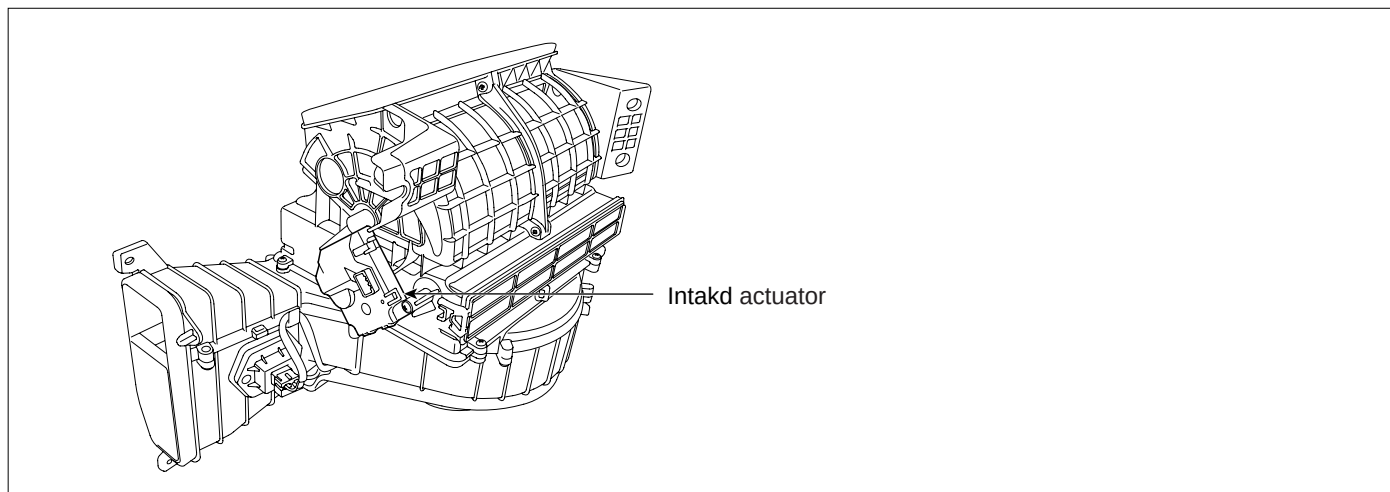
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1209 INTAKE POTENTIOMETER SHORT

COMPONENT LOCATION E093235F



LQKG527A

GENERAL DESCRIPTION EE9BD028

Refer to DTC B1208.

DTC DESCRIPTION E2770B43

The A/C controller sets DTC B1209 if there is a short to power in the Intake potentiometer.

DTC DETECTING CONDITION EEE85217

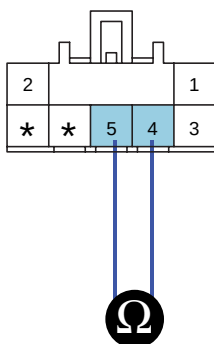
Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Short circuit in harness • Faulty Intake potentiometer • Open circuit in harness
Threshold value	• > 4.9V	
Detecting time	• 0.3 sec	
FAIL SAFE	• Fix at fresh	

SPECIFICATION E39D5040

Refer to DTC B1208.

MONITOR SCANTOOL DATA E43084A0

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Intake Potentiometer" Parameter on the Scantool while operating Intake switch.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG528B

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection" procedure.

NO

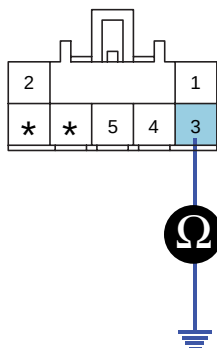
Check for short to power harness in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION

E226B4E7

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Intake Potentiometer.
 - 3) Measure resistance between terminal "3" of Intake Potentiometer and chassis ground.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG527G

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION EF55F62B

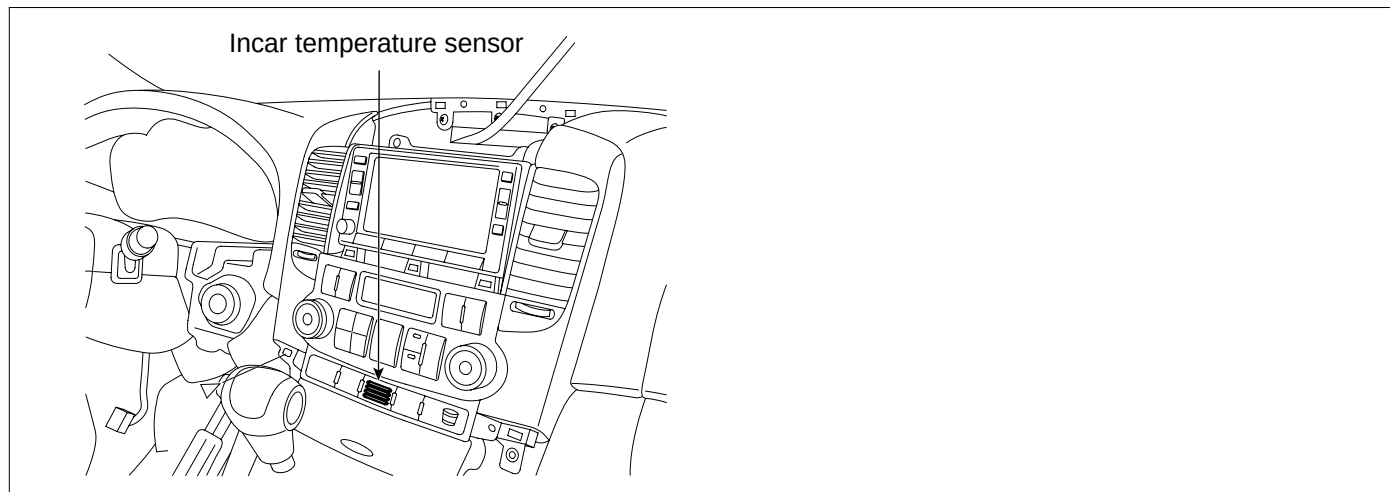
Refer to DTC B1208.

VERIFICATION OF VEHICLE REPAIR E43701D1

Refer to DTC B1208.

DTC B1233 IN-CAR TEMPERATURE SENSOR SHORT (LOW)

COMPONENT LOCATION EB57D004



LQKG514E

GENERAL DESCRIPTION EC43DDF5

The incar temperature sensor located at crush pad, control unit 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.

DTC DESCRIPTION EB63EFE3

The A/C controller sets DTC B1233 if there is a short circuit in incar temp. sensor signal harness or the measured resistance value of sensor is less than threshold value(about 7.46k Ω)

DTC DETECTING CONDITION E1046384

Item	Detecting Condition	Possible cause
DTC Strategy	• Resistance check	• Short circuit in harness • Faulty incar temp. Sensor • Faulty A/C control unit
Threshold value	• < 7.46 k Ω	
Detecting time	• 0.3 sec	
FAIL SAFE	• Control with the value of 25°C(77°F)	

SPECIFICATION E4823648

Temperature[°C(°F)]	Resistance(k Ω)	Temperature[°C(°F)]	Resistance(k Ω)
-30(-22)	509.57	25(77)	30
-15(5)	216.07	35(95)	15.59
0(32)	97.71	50(122)	10.81
15(59)	47.13	60(140)	7.46

MONITOR SCANTOOL DATA E2472961

1. Connect scantool to data link connector(DLC).
2. Engine "ON"
3. Monitor the "INCAR TEMP. SENSOR" Parameter on the Scantool.

1.2 CURRENT DATA	
HEATER WATER TEMP. SNSR	13.0 °C
IN-CAR TEMP. SENSOR	25.0 °C
AMBIENT AIR TEMP. SNS	11.5 °C
EVAPORATIVE SENSOR	12.5 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POPENTIO. (DR.)	75.68 %
DIRECTION POTENIO. DR.	89.79 %
PASSENGER PHOTO SENSOR	255

Fig 1

1.1 DIAGNOSTIC TROUBLE CODES	
B1233 IN-CAR TEMP. SNSR LOW	
NUMBER OF DTC : 1 ITEMS	

Fig 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1233.

EQRE514A

4. Are the DTC B1233 present and is parameter of "INCAR TEMP. SENSOR" fixed?
※ Parameter of "INCAR TEMP. SENSOR" will be fixed at 25°C(77°F), if there is any fault in INCAR TEMP. SENSOR.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION EB821E5B

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -159

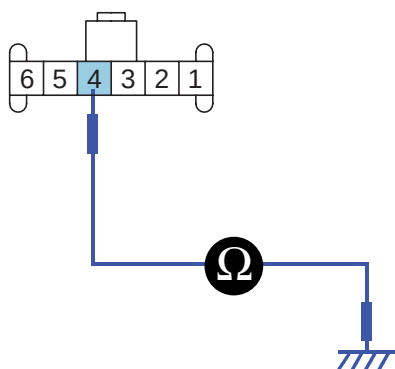
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EBF88FB5

1. Check for short to ground in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect incar sensor.
 - 3) Measure resistance between terminal "4" of incar sensor and chassis ground.

Specification : Approx. $\infty \Omega$



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

LQKG514B

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection" procedure.

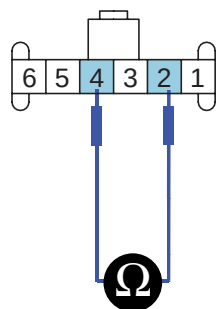
NO

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

COMPONENT INSPECTION E6BB9B31

1. Check incar temp. sensor.
 - 1) Ignition "OFF"
 - 2) Disconnect incar sensor.
 - 3) Measure resistance between terminal "4" and "2" of incar sensor.

Specification : Refer the specifications in fig 3.



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

LQKG514F

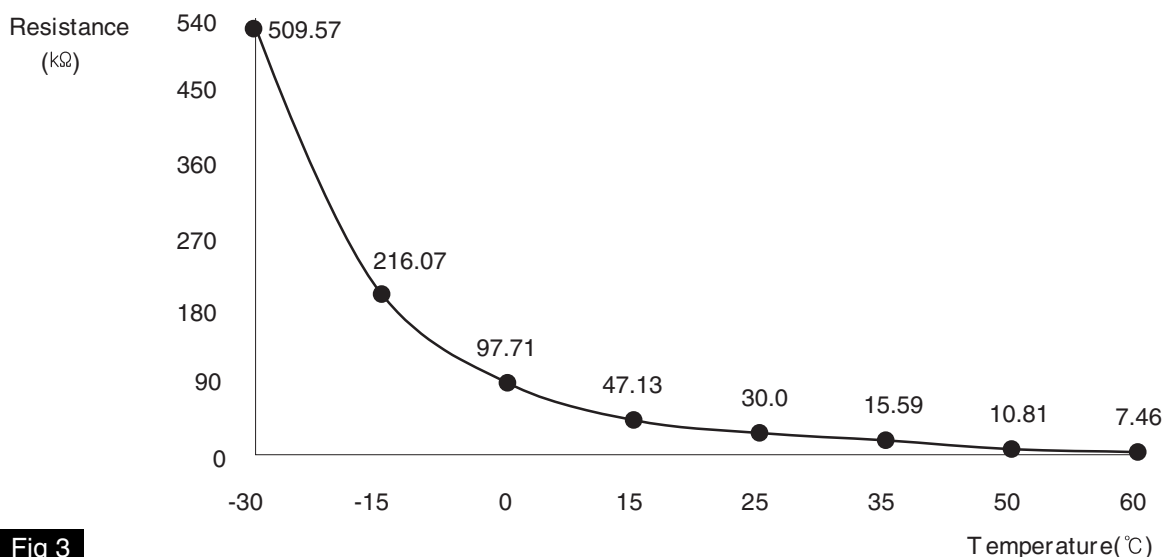


Fig 3

Fig 3) Specifications : Resistance value of incar temp. sensor as a function of temperature.

EQRE514G

- 4) Is the measured resistance within specifications in fig3? (tolerance limits $\pm 3\%$)

YES

Go to "Check A/C Control Unit" procedure.

NO

Substitute with a known-good incar sensor and check for proper operation.

If the problem is corrected, replace incar sensor and then go to "Verification of Vehicle Repair" procedure.

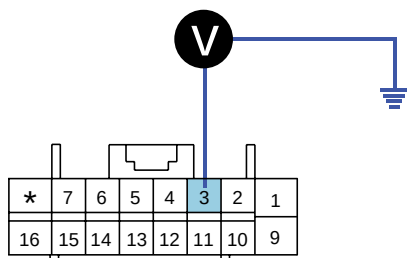
2. Check A/C Control Unit

- 1) Engine "ON"
- 2) Disconnect incar sensor.
- 3) Measure Voltage between terminal "3" of A/C Control Unit and chassis ground.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -161

Specification : Approx. 5V



3. Incar sensor temp. signal

LQKG514C

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known-good A/C Control Unit and check for proper operation.

If the problem is corrected, replace A/C Control Unit and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E5F6DCB4

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

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

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

HA -162

HEATING, VENTILATION AND AIR CONDITIONING

DTC B1234 IN-CAR TEMPERATURE SENSOR OPEN (HIGH)

COMPONENT LOCATION EE9B6B17

Refer to DTC B1233.

GENERAL DESCRIPTION E9F794B3

The incar temperature sensor located at crush pad, control unit 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.

DTC DESCRIPTION E11DE569

The A/C controller sets DTC B1234 if there is an open circuit in incar temp. sensor signal harness or the measured resistance value of sensor is more than threshold value(about 509.57k Ω)

DTC DETECTING CONDITION E854B0E4

Item	Detecting Condition	Possible cause
DTC Strategy	Resistance check	- Open Circuit in harness - Faulty incar temp. Sensor - Faulty A/C control unit
Threshold value	> 509.57 kΩ	
Detecting time	0.3 sec	
FAIL SAFE	Control with the value of 25°C(77°F)	

SPECIFICATION E1AB1CCB

Refer to DTC B1233.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -163

MONITOR SCANTOOL DATA E60EDB2F

1. Connect scantool to data link connector(DLC).
2. Engine "ON"
3. Monitor the "INCAR TEMP. SENSOR" Parameter on the Scantool.

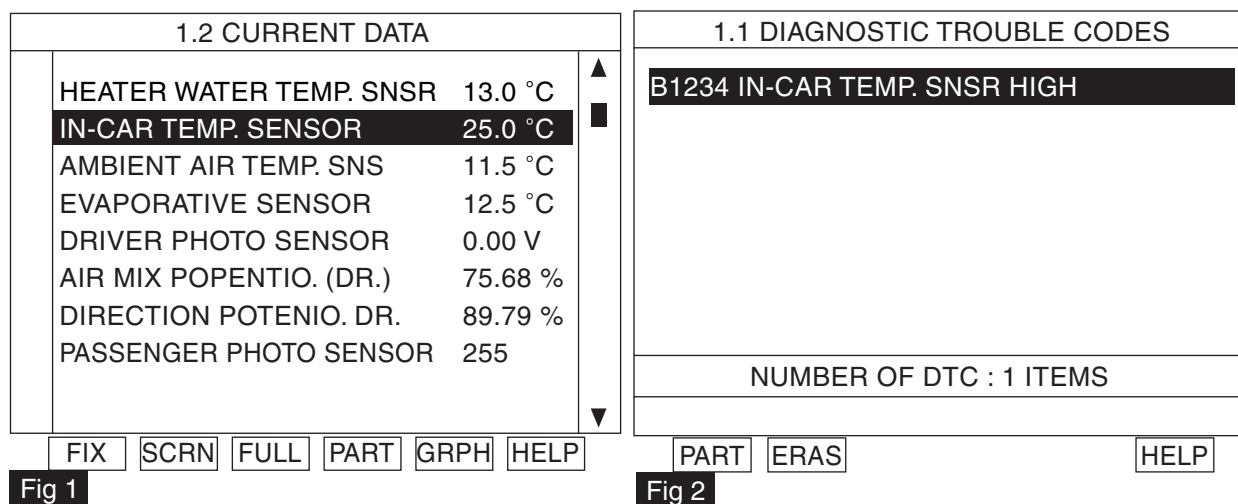


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1234.

EQRE515A

4. Are the DTC B1234 present and is parameter of "INCAR TEMP. SENSOR" fixed?
※ Parameter of "INCAR TEMP. SENSOR" will be fixed at 25°C (77°F), if there is any fault in INCAR TEMP. SENSOR.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

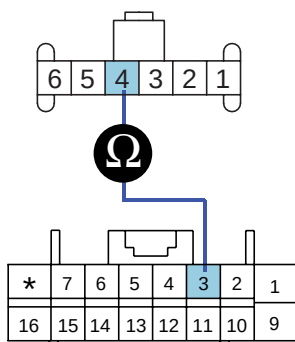
TERMINAL AND CONNECTOR INSPECTION E941866C

Refer to DTC B1233.

SIGNAL CIRCUIT INSPECTION E1781154

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect incar temp. sensor.
 - 3) Measure resistance between terminal "4" of incar temp. sensor and terminal "3" of A/C Control Unit..

Specification : Approx. 0 Ω



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

LQKG515B

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection " procedure.

NO

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

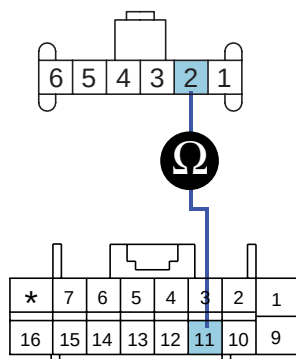
GROUND CIRCUIT INSPECTION

EF779270

1. Check for open in ground harness.

- 1) Ignition "OFF"
- 2) Disconnect incar temp. sensor.
- 3) Measure resistance between terminal "2" of incar temp. sensor and terminal "11" of A/C Control Unit.

Specification : Approx. 0 Ω



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

LQKG515C

- 4) Is the measured resistance within specifications?

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -165

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION EB9720FD

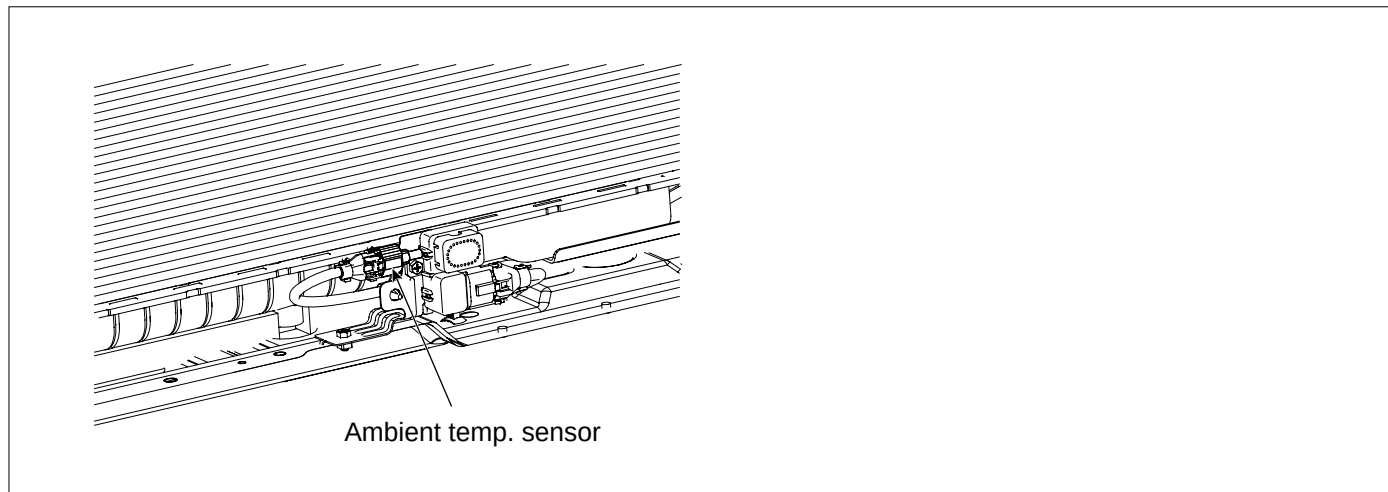
Refer to DTC B1233.

VERIFICATION OF VEHICLE REPAIR E10F3C2D

Refer to DTC B1233.

DTC B1237 AMBIENT TEMPERATURE SENSOR SHORT (LOW)

COMPONENT LOCATION ED485BBE



LQKG516A

GENERAL DESCRIPTION E2ABCF83

The ambient temperature sensor located at the center stay of the condenser, detects ambient air temperature. It is a negative type thermistor whose resistance is inversely proportional to temperature. Its output is used for discharge temperature sensor, sensor fail-safe, temperature regulation door lock, blower motor level control, mix mode control and in-car humidity control.

DTC DESCRIPTION EF007347

The A/C controller sets DTC B1237 if there is a short circuit in ambient temp. sensor signal harness or the measured resistance value of sensor is less than threshold value (about 7.48k Ω)

DTC DETECTING CONDITION E76C2039

Item	Detecting Condition	Possible cause
DTC Strategy	Resistance check	- Short circuit in harness - Faulty ambient temp. Sensor - Faulty A/C control unit
Threshold value	< 7.48kΩ	
Detecting time	0.3 sec	
FAIL SAFE	Control with the value of 20°C(68°F)	

SPECIFICATION EA51C1AC

Temperature[°C(°F)]	Resistance(k Ω)	Temperature[°C(°F)]	Resistance(k Ω)
-30(-22)	527.99	25(77)	30
-15(5)	218.21	35(95)	19.6
0(32)	97.83	50(122)	10.82
15(59)	47.12	60(140)	7.48

MONITOR SCANTOOL DATA E30FCFE7

1. Connect scantool to data link connector(DLC).
2. Engine "ON"
3. Monitor the "AMBIENT TEMP. SENSOR" Parameter on the Scantool.
※ Parameter of "AMBIENT TEMP. SENSOR" will be fixed at 20°C, if there is any fault in AMBIENT TEMP. SENSOR.

1.2 CURRENT DATA	
HEATER WATER TEMP. SNSR	17.0 °C
IN-CAR TEMP. SENSOR	12.0 °C
AMBIENT AIR TEMP. SNS	20.0 °C
EVAPORATIVE SENSOR	13.0 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POPENATIO. (DR.)	91.75 %
DIRECTION POTENIO. DR.	90.18 %
PASSENGER PHOTO SENSOR	255

Fig 1

Fig 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1237.

LOIE516B

4. Are the DTC B1237 present and is parameter of "AMBIENT TEMP. SENSOR" fixed?

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E20274CA

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

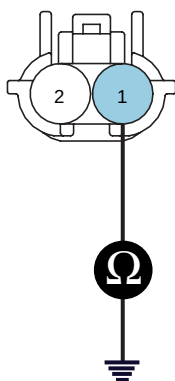
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EC50D358

1. Check for short to ground in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect ambient temp. sensor.
 - 3) Measure resistance between terminal "1" of ambient temp. sensor and chassis ground.

Specification : Approx. $\infty \Omega$



1. Ambient temp. sensor signal(+)
2. Ambient temp. sensor ground

LQKG516C

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection" procedure.

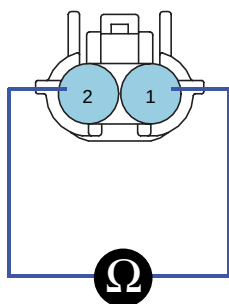
NO

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

COMPONENT INSPECTION E3B39A1B

1. Check Ambient temp. sensor.
 - 1) Ignition "OFF"
 - 2) Disconnect ambient temp. sensor.
 - 3) Measure resistance between terminal "1" and "2" of ambient temp. sensor.

Specification : Refer the specifications in fig 3.



- 1. Ambient temp. sensor signal
- 2. Ambient temp. sensor ground

LQKG516D

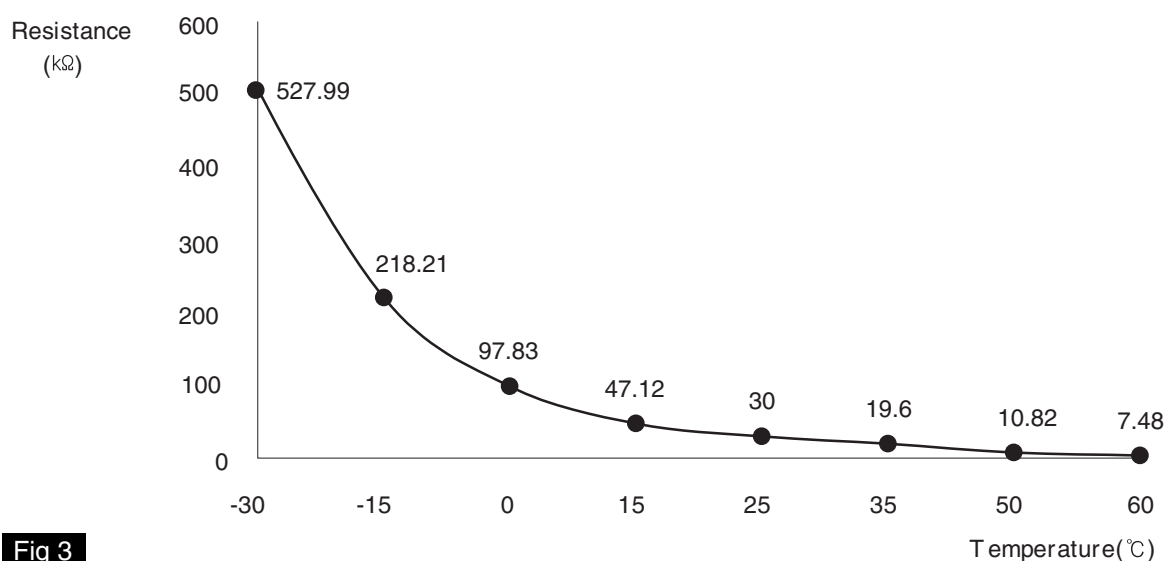


Fig 3

Fig 3) Specifications : Resistance value of ambient temp. sensor as a function of temperature.

EQRE516F

- 4) Is the measured resistance within specifications in fig3? (tolerance limits $\pm 3\%$)

YES

Go to "Check A/C Control Unit" procedure.

NO

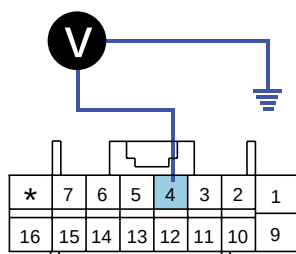
Substitute with a known-good ambient temp. sensor and check for proper operation.

If the problem is corrected, replace ambient temp. sensor and then go to "Verification of Vehicle Repair" procedure.

2. Check A/C Control Unit

- 1) Engine "ON"
- 2) Disconnect ambient temp. sensor.
- 3) Measure voltage between terminal "4" of A/C Control Unit and chassis ground.

Specification : Approx. 5V



4. Ambient temp. sensor signal

LQKG516E

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EC81091E

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

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

YES

Go to the applicable troubleshooting procedure.

NO

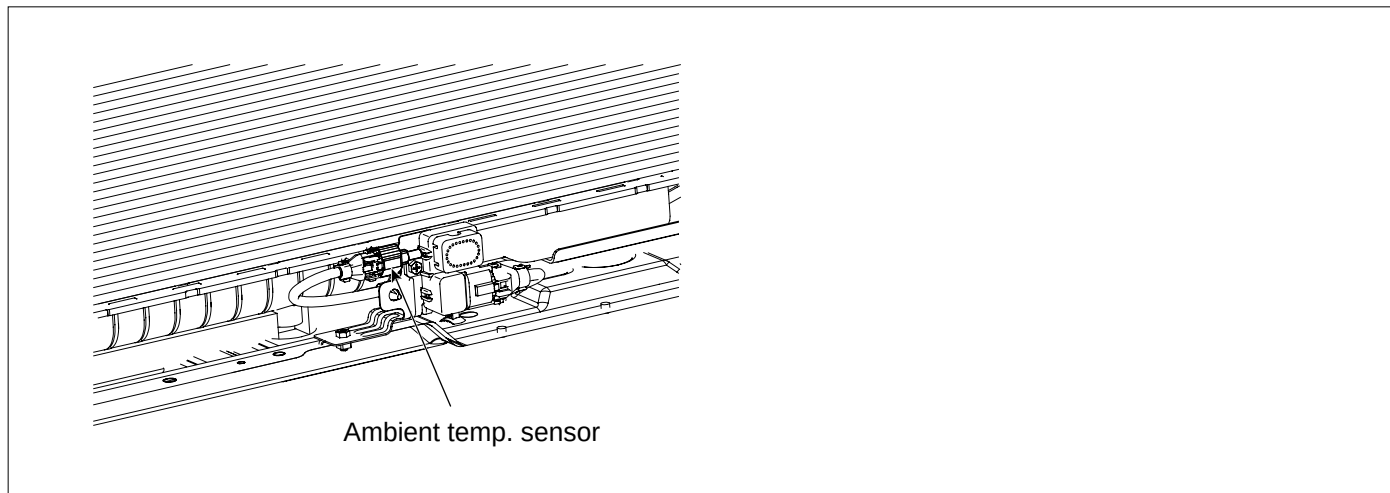
System is performing to specification at this time.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -171

DTC B1238 AMBIENT TEMPERATURE SENSOR OPEN (HIGH)

COMPONENT LOCATION EDF1649A



LQKG516A

GENERAL DESCRIPTION E4951473

Refer to DTC B1237.

DTC DESCRIPTION EB EAF741

The A/C controller sets DTC B1238 if there is an open circuit in ambient temp. sensor signal harness or the measured resistance value of sensor is more than threshold value (about 527k Ω)

DTC DETECTING CONDITION ECC7468F

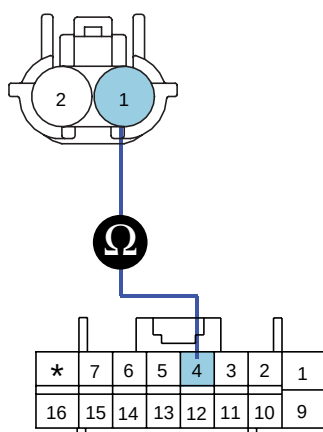
Item	Detecting Condition	Possible cause
DTC Strategy	Resistance check	- Open Circuit in harness - Faulty ambient temp. Sensor - Faulty A/C control unit
Threshold value	> 527kΩ	
Detecting time	0.3 sec	
FAIL SAFE	Control with the value of 20°C(67°F)	

SPECIFICATION E611C585

Refer to DTC B1237.

MONITOR SCANTOOL DATA E1C87A66

- Connect scantool to Data Link Connector(DLC).
- Engine "ON"
- Monitor the "AMBIENT TEMP. SENSOR" Parameter on the Scantool.
※ Parameter of "AMBIENT TEMP. SENSOR" will be fixed at 20°C(67°F), if there is any fault in AMBIENT TEMP. SENSOR.



1. Ambient temp. sensor signal(+)

2. Ambient temp. sensor ground

LQKG518A

4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection " procedure.

NO

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

GROUND CIRCUIT INSPECTION

EA9F4A89

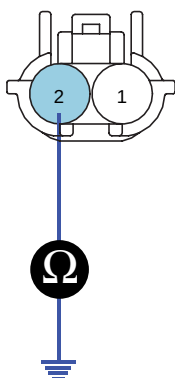
1. Check for open in ground harness.

1) Ignition "OFF"

2) Disconnect ambient temp. sensor.

3) Measure resistance between terminal "2" of ambient temp. sensor and chassis ground.

Specification : Approx. 0 Ω



1. Ambient temp. sensor signal(+)

2. Ambient temp. sensor ground

LQKG518B

4) Is the measured resistance within specifications?

HA -174

HEATING, VENTILATION AND AIR CONDITIONING

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION E513CAB3

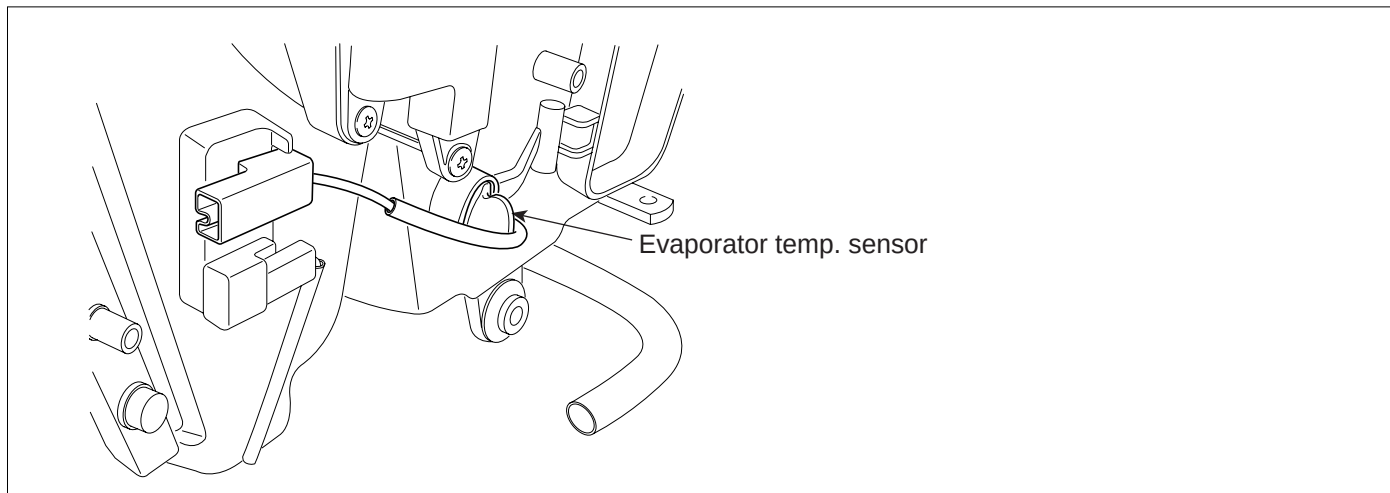
Refer to DTC B1237.

VERIFICATION OF VEHICLE REPAIR E58CEDF6

Refer to DTC B1237.

DTC B1241 EVAPORATOR TEMPERATURE SENSOR SHORT (LOW)

COMPONENT LOCATION E486BCF6



LQKG519A

GENERAL DESCRIPTION E8813265

The Evaporator temperature sensor located on heater unit, detects the core temperature and interrupts compressor relay power, in order to prevent evaporator freezing by excessive cooling. It is a negative type thermistor whose resistance is inversely proportional to temperature.

DTC DESCRIPTION E059C248

The A/C controller sets DTC B1241 if there is a short circuit in evaporator temp. sensor signal harness or the measured resistance value of sensor is less than threshold value(about 0.9k Ω)

DTC DETECTING CONDITION E71F012F

Item	Detecting Condition	Possible cause
DTC Strategy	• Resistance check	• Short circuit in harness • Faulty Evaporator temp. Sensor • Faulty A/C control unit
Threshold value	• < 0.9k Ω	
Detecting time	• 0.3 sec	
FAIL SAFE	• Control with the value of -2°C(28.4°F)	

SPECIFICATION E8C0ABD9

※ Resistance value of evaporator sensor as a function of temperature.

Temperature[°C(°F)]	Resistance(k Ω)	Temperature[°C(°F)]	Resistance(k Ω)
-10(14)	18.01	15(59)	5.99
0(32)	11.36	30(86)	3.33
5(41)	9.27	40(104)	2.31
10(50)	7.37	50(122)	1.61

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -177

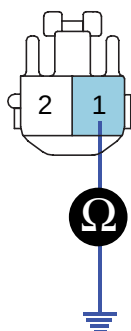
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EAF42A6E

1. Check for short to ground in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect evaporator temp. sensor.
 - 3) Measure resistance between terminal "1" of evaporator temp. sensor and chassis ground.

Specification : Approx. $\infty \Omega$



1. Evaporator temp. sensor signal

2. Evaporator temp. sensor ground

LQKG519C

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection" procedure.

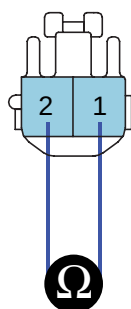
NO

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

COMPONENT INSPECTION EB45B875

1. Check evaporator temp. sensor.
 - 1) Ignition "OFF"
 - 2) Disconnect evaporator temp. sensor.
 - 3) Measure resistance between terminal "1" and "2" of evaporator temp. sensor.

Specification : Refer the specifications in fig 3.



- 1. Evaporator temp. sensor signal
- 2. Evaporator temp. sensor ground

LQKG519D

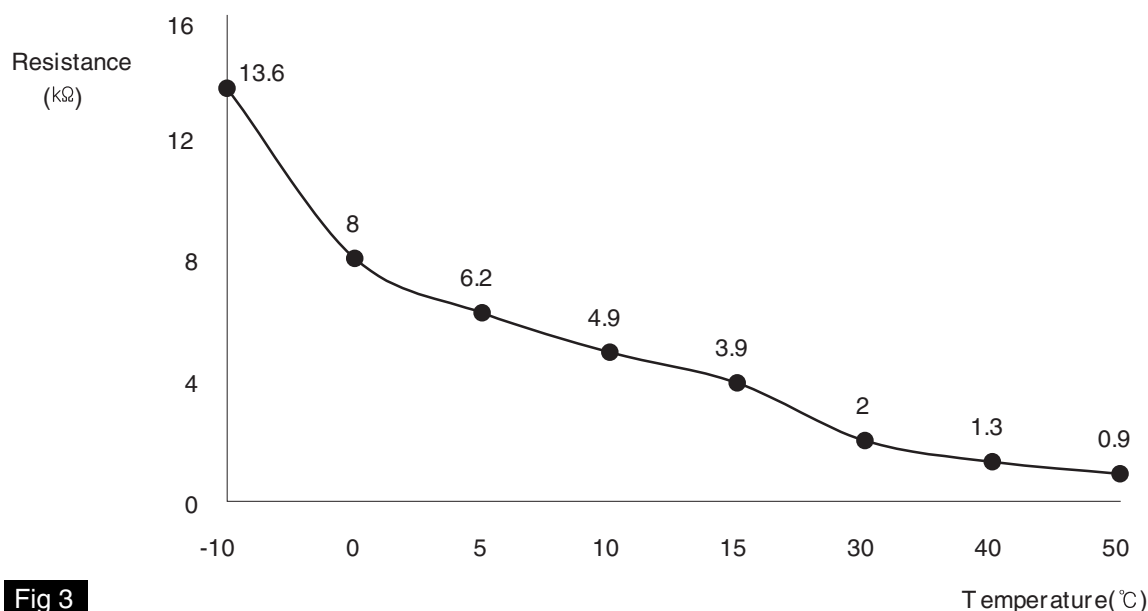


Fig 3

Fig 3) Specifications : Resistance value of evaporator temp. sensor as a function of temperature.

LQIE519F

- 4) Is the measured resistance within specifications in fig3? (tolerance limits $\pm 3\%$)

YES

Go to "Check A/C Control Unit" procedure.

NO

Substitute with a known-good evaporator temp. sensor and check for proper operation.

If the problem is corrected, replace evaporator temp. sensor and then go to "Verification of Vehicle Repair" procedure.

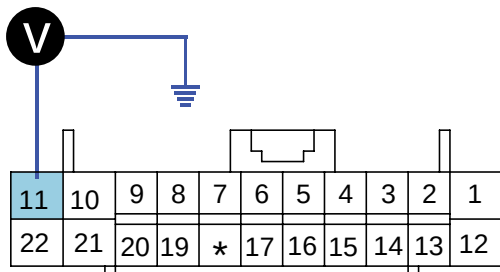
2. Check A/C Control Unit

- 1) Engine "ON"
- 2) Disconnect evaporator temp. sensor.
- 3) Measure voltage between terminal "11" of A/C Control Unit and chassis ground.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -179

Specification : Approx. 5V



11. Evaporator temp. sensor signal

LQKG519E

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known-good A/C Control Unit and check for proper operation.

If the problem is corrected, replace A/C Control Unit and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E32624E3

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

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

YES

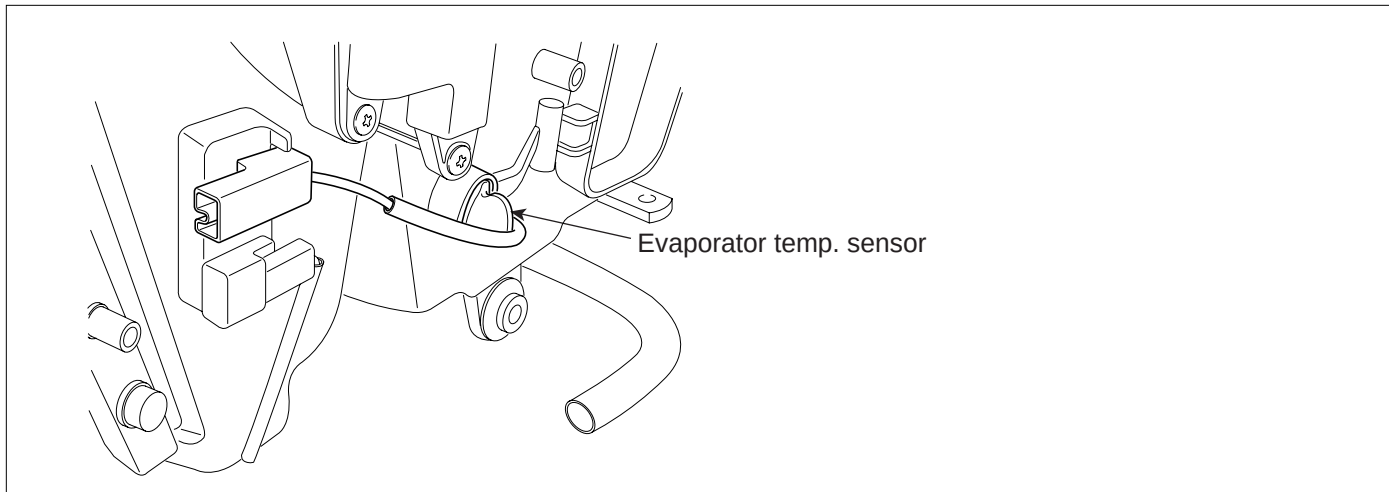
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1242 EVAPORATOR TEMPERATURE SENSOR OPEN (HIGH)

COMPONENT LOCATION EB9F7C1F



LQKG519A

GENERAL DESCRIPTION E073E679

Refer to DTC B1241.

DTC DESCRIPTION E9354B2A

The A/C controller sets DTC B1242 if there is an open circuit in evaporator temp. sensor signal harness or the measured resistance value of sensor is more than threshold value(about 13.6k Ω)

DTC DETECTING CONDITION E61B9B78

Item	Detecting Condition	Possible cause
DTC Strategy	Resistance check	- Open Circuit in harness - Faulty Evaporator temp. Sensor - Faulty A/C control unit
Threshold value	> 13.6kΩ	
Detecting time	0.3 sec	
FAIL SAFE	Control with the value of -2°C(28.4°F)	

SPECIFICATION E70F7716

Refer to DTC B1241.

MONITOR SCANTOOL DATA E1C7971C

- Connect scantool to Data Link Connector(DLC).
- Engine "ON"
- Monitor the "EVAPORATIVE SENSOR" Parameter on the Scantool.

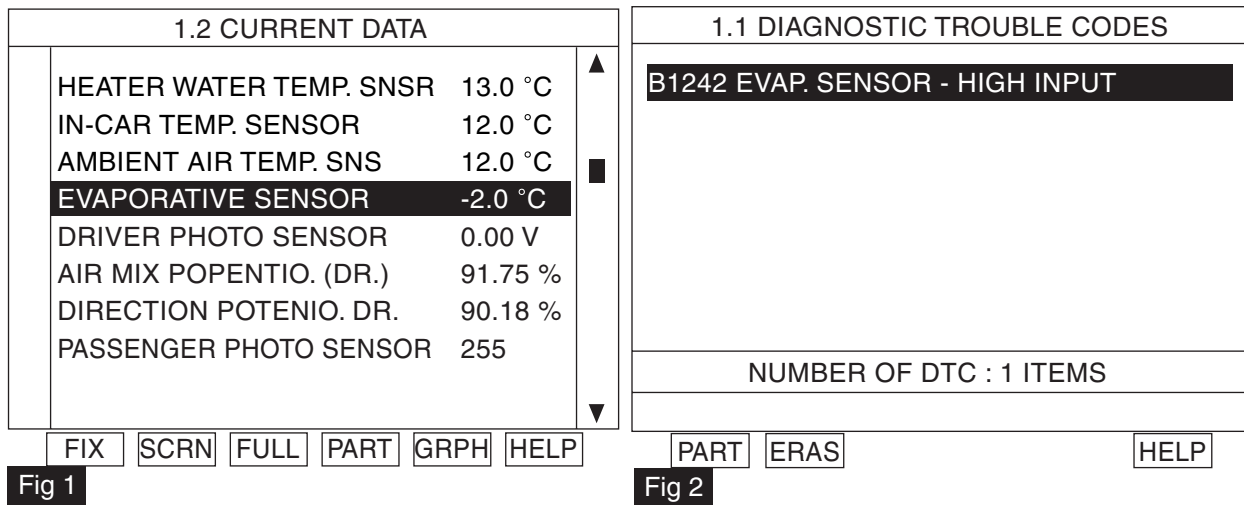


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1242.

LQIE520A

4. Are the DTC B1242 present and is parameter of "EVAPORATIVE SENSOR" fixed?
※ Parameter of "EVAPORATIVE SENSOR" will be fixed at -2°C (28.4°F), if there is any fault in EVAPORATIVE SENSOR.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION

E2790250

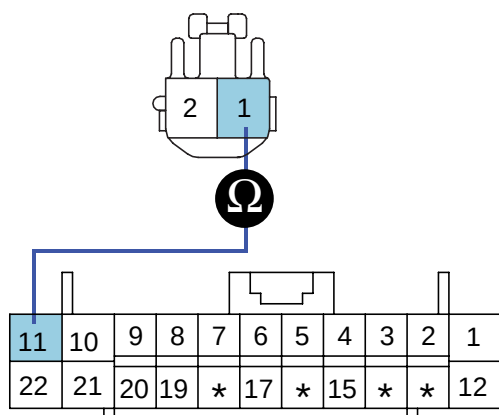
Refer to DTC B1241.

SIGNAL CIRCUIT INSPECTION

EE8145E7

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect evaporator temp. sensor.
 - 3) Measure resistance between terminal "1" of evaporator temp. sensor and terminal "11" of A/C Control Unit.

Specification : Approx. 0 Ω



1. Evaporator temp. sensor signal

2. Evaporator temp. sensor ground

LQKG520B

4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection " procedure.

NO

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

GROUND CIRCUIT INSPECTION

ED7ACE72

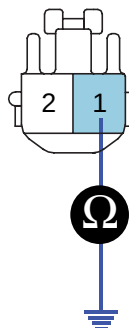
1. Check for open in ground harness.

1) Ignition "OFF"

2) Disconnect evaporator temp. sensor.

3) Measure resistance between terminal "1" of evaporator temp. sensor and chassis ground.

Specification : Approx. 0 Ω



1. Evaporator temp. sensor signal

2. Evaporator temp. sensor ground

LQKG520C

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -183

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION

EAB63ADA

Refer to DTC B1241.

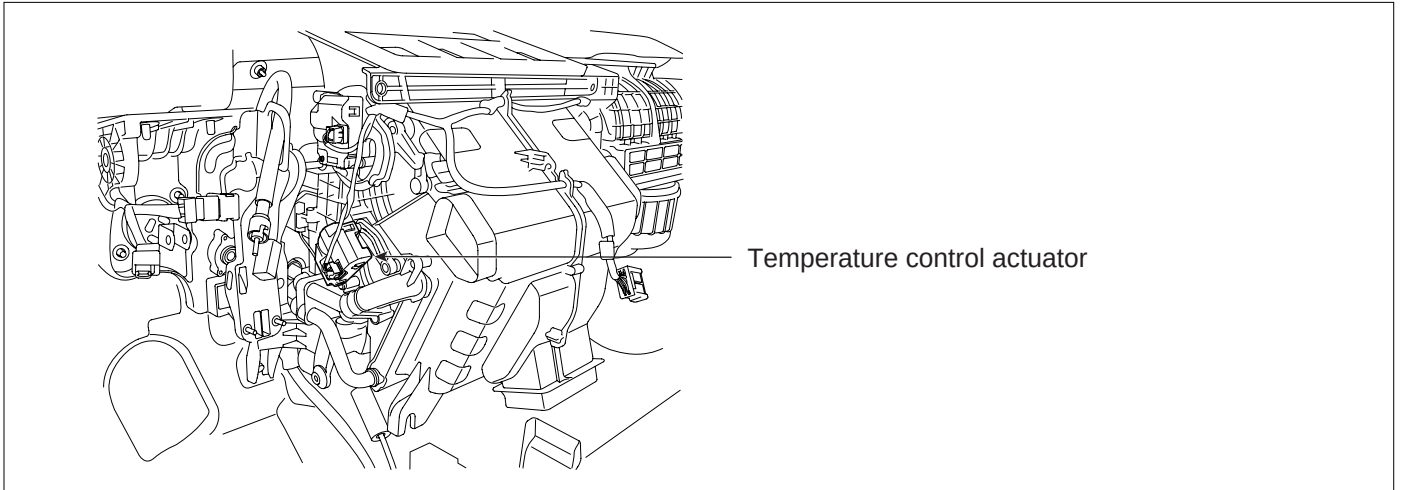
VERIFICATION OF VEHICLE REPAIR

E70127E7

Refer to DTC B1241.

DTC B1245 AIR MIX POTENTIOMETER OPEN (LOW) - DRIVER

COMPONENT LOCATION E719A3CD



LQKG680A

GENERAL DESCRIPTION EA93BB84

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

DTC DESCRIPTION E26F4722

The A/C controller sets DTC B1245 if there is an open circuit or poor connection in the air mix potentiometer.

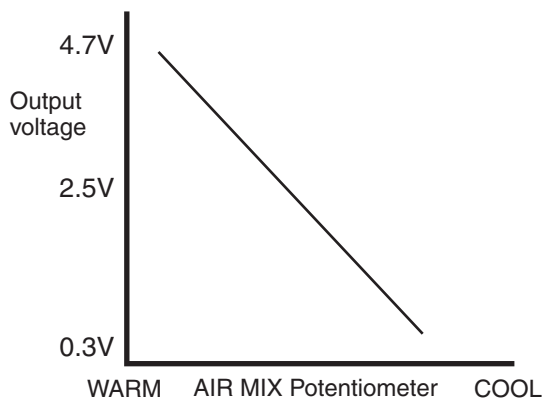
DTC DETECTING CONDITION E21A2812

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver Air Mix potentiometer
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	• If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. • If temperature setting 25~32°C(77~90°F) fix at max. heating position.	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -185

SPECIFICATION E7068E49



LQIE521B

MONITOR SCANTOOL DATA E0F8FBE9

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Driver Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

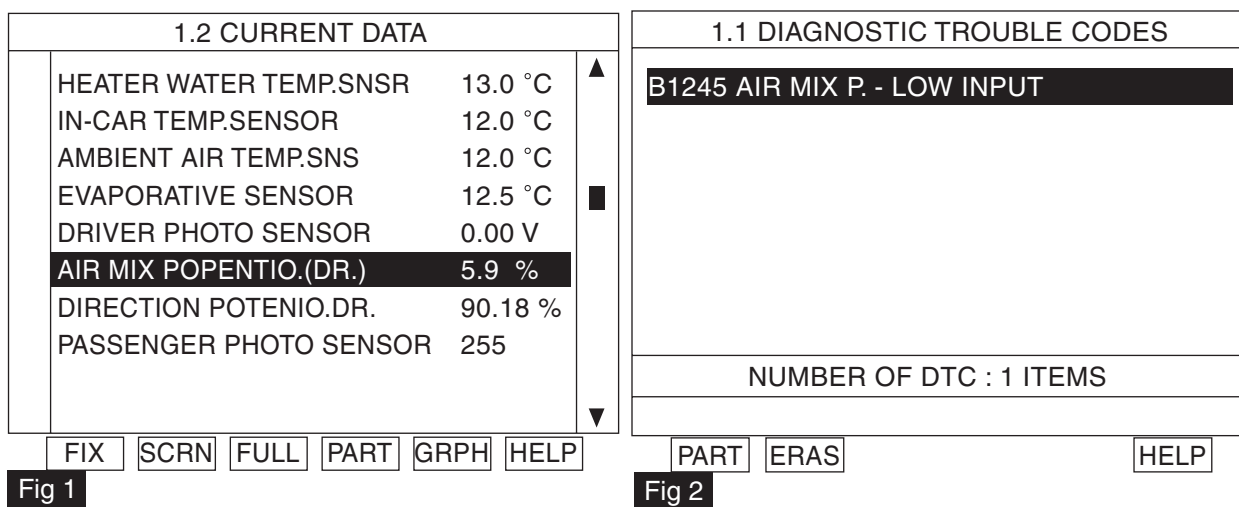


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1245.

LQIE521C

4. Are the DTC B1245 present and is parameter of "Driver Air Mix Potentiometer" fixed?
 ※ Parameter of "Driver Air Mix Potentiometer" will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Driver Air Mix potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION EFF8A3F5

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

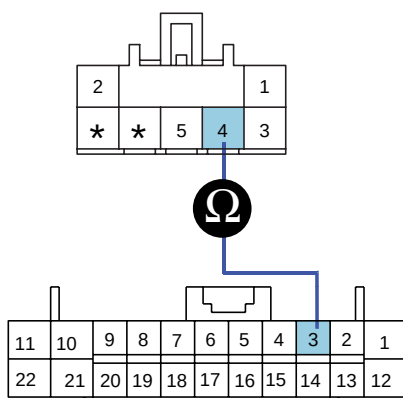
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E37B4A7B

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver Air Mix potentiometer.
 - 3) Measure resistance between terminal "4" of Driver Air Mix Potentiometer and terminal "3" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -187

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

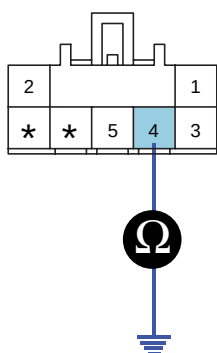
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Driver Air Mix potentiometer.
- 3) Measure resistance between terminal "4" of Driver Air Mix Potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521E

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

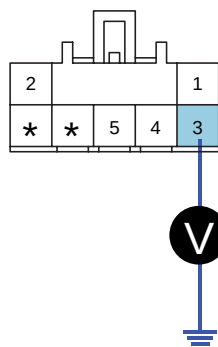
POWER SUPPLY CIRCUIT INSPECTION

E5B4D90A

1. Check for short or open in harness.

- 1) Ignition "ON"
- 2) Connect Driver Air Mix Potentiometer.
- 3) Measure voltage between terminal "3" of Driver Air Mix Potentiometer and chassis ground.

Specification : Approx. 5V



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521F

- 4) Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

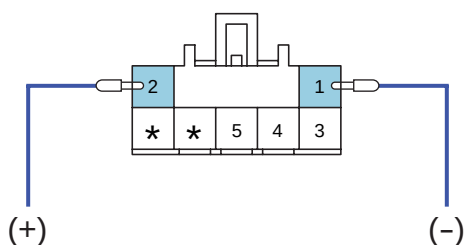
NO

Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EAB26D7C

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Driver Air Mix Potentiometer.
- 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521H

- 5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

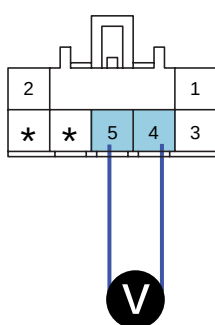
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Driver Air Mix potentiometer.
- 3) Measure voltage between terminal "4" and "5" of Driver Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521I

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

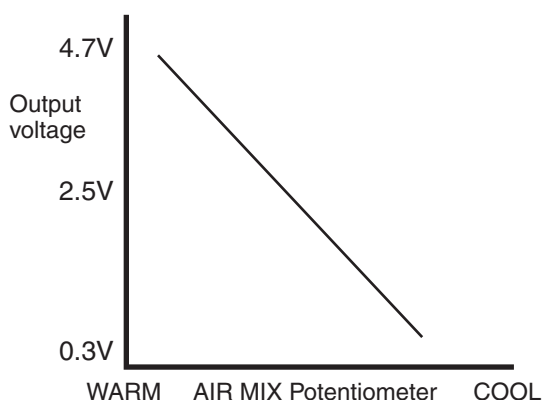


Fig 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

LQIE521J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E3E12E94

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

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

YES

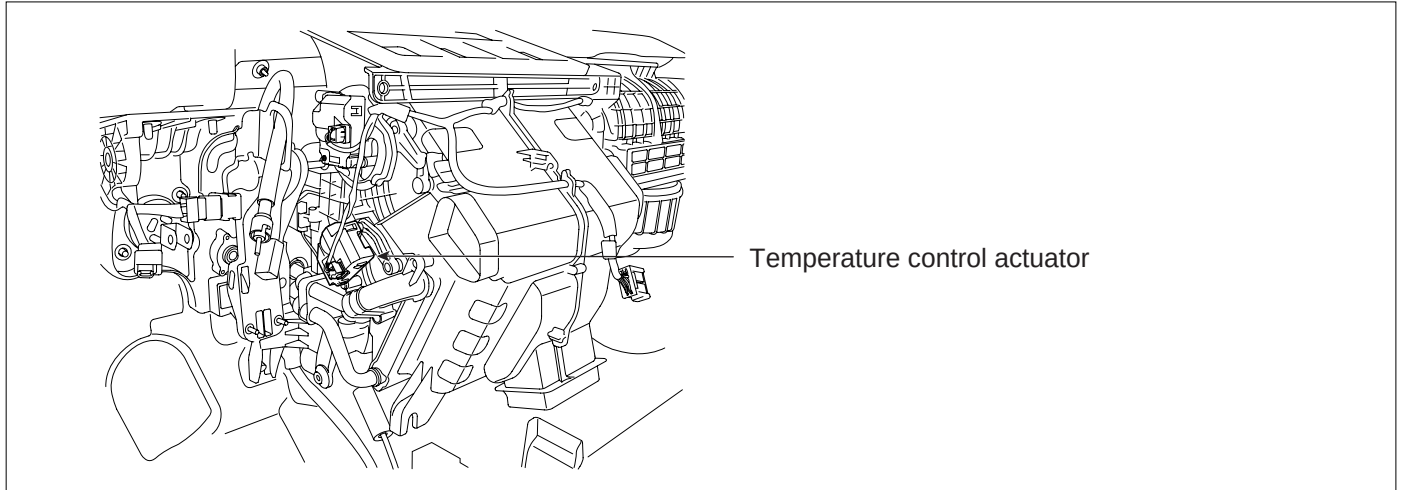
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1246 AIR MIX POTENTIOMETER SHORT (HIGH) - DRIVER

COMPONENT LOCATION E3948C9B



LQKG680A

GENERAL DESCRIPTION E8AF0D22

Refer to DTC B1245.

DTC DESCRIPTION E815CF4D

The A/C controller sets DTC B1246 if there is a short to power in the air mix potentiometer.

DTC DETECTING CONDITION E4E8952D

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Short circuit in harness - Faulty driver Air Mix potentiometer
Threshold value	> 4.9V	
Detecting time	0.3 sec	
FAIL SAFE	- If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. - If temperature setting 25~32°C(77~90°F) fix at max. heating position.	

SPECIFICATION E6C9EC3C

Refer to DTC B1245.

MONITOR SCANTOOL DATA EAC82AAF

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Driver Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA		1.1 DIAGNOSTIC TROUBLE CODES	
HEATER WATER TEMP.SNSR	13.0 °C	B1246 AIR MIX P. - HIGH INPUT	
IN-CAR TEMP.SENSOR	12.0 °C		
AMBIENT AIR TEMP.SNS	12.0 °C		
EVAPORATIVE SENSOR	12.5 °C		
DRIVER PHOTO SENSOR	0.00 V		
AIR MIX POPENIO.(DR.)	91.75 %		
DIRECTION POTENIO.DR.	90.18 %		
PASSENGER PHOTO SENSOR	255		
		NUMBER OF DTC : 1 ITEMS	
FIX SCRN FULL PART GRPH HELP Fig 1		PART ERAS HELP Fig 2	

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1246.

LQIE522A

- Are the DTC B1246 present and is parameter of "Driver Air Mix potentiometer" fixed?
 ※ Parameter of "Driver Air Mix potentiometer" will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Driver Air Mix potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

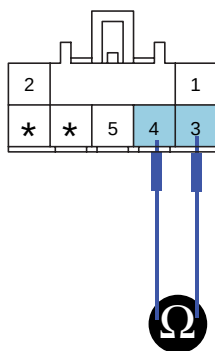
TERMINAL AND CONNECTOR INSPECTION E78C9723

Refer to DTC B1245.

SIGNAL CIRCUIT INSPECTION EA4D52C0

- Check for short in harness.
 - Ignition "OFF"
 - Disconnect Driver Air Mix potentiometer.
 - Measure resistance between terminal "3" and "4" of Driver Air Mix potentiometer.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG522B

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection" procedure.

NO

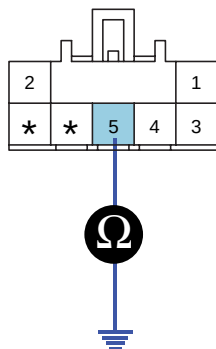
Check for short to power harness in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION

E022F725

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver Air Mix Potentiometer.
 - 3) Measure resistance between terminal "5" of Driver Air Mix Potentiometer and chassis ground.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521G

- 4) Is the measured resistance within specifications?

HA -194

HEATING, VENTILATION AND AIR CONDITIONING

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E5666BE0

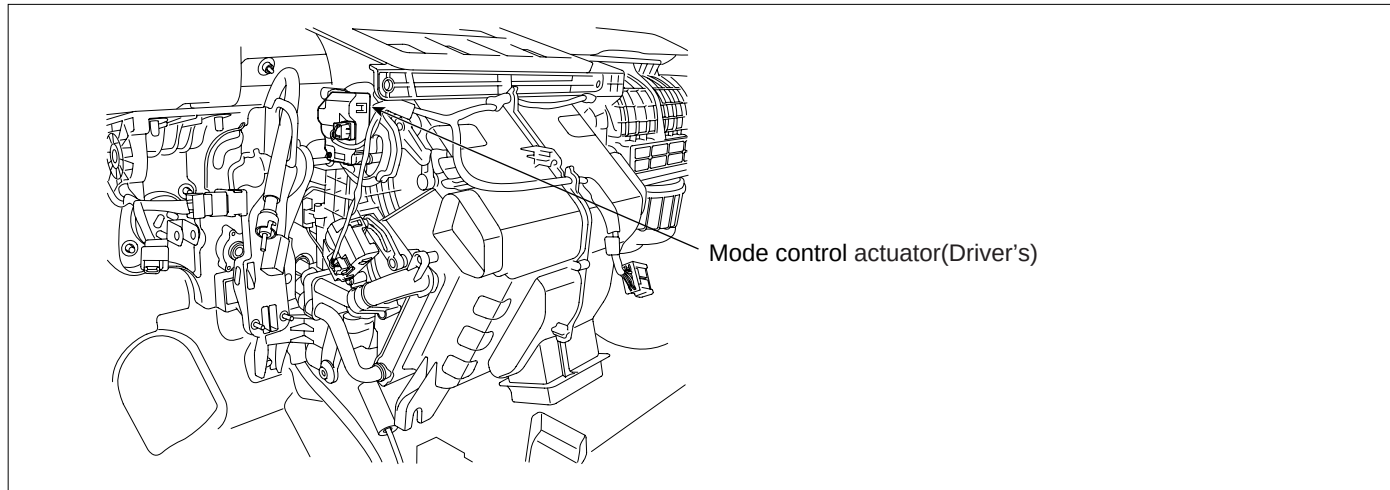
Refer to DTC B1245.

VERIFICATION OF VEHICLE REPAIR EDCD9FEC

Refer to DTC B1245.

DTC B1249 DIRECTION POTENTIOMETER OPEN (LOW) - DRIVER

COMPONENT LOCATION E1A16B4D



LQKG683A

GENERAL DESCRIPTION EBA97B29

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

DTC DESCRIPTION E665403D

The A/C controller sets DTC B1249 if there is an open circuit or poor connection in the Direction potentiometer.

DTC DETECTING CONDITION ED02A698

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver direction potentiometer
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	• Fix vent position, while selecting vent mode. • Fix defrost position while selecting except vent mode.	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -197

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E4B45DB9

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

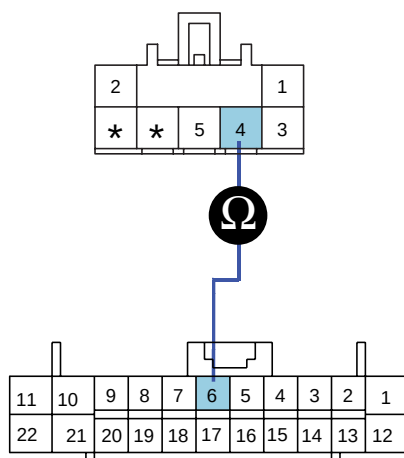
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EF152E8E

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver mode Actuator.
 - 3) Measure resistance between terminal "4" of Driver Direction potentiometer and terminal "6" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523D

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

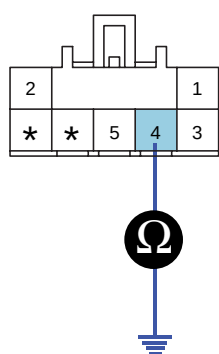
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Driver mode Actuator.
- 3) Measure resistance between terminal "4" of Driver Direction potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523E

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

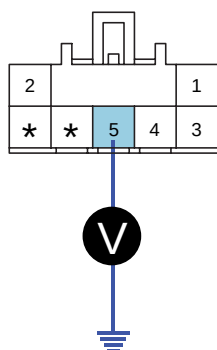
Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

POWER SUPPLY CIRCUIT INSPECTION EE002C9D

1. Check for short or open in harness.

- 1) Ignition "ON"
- 2) Connect Driver Direction potentiometer.
- 3) Measure voltage between terminal "5" of Driver Direction potentiometer and chassis ground.

Specification : Approx. 5V



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523F

- 4) Is the measured voltage within specifications?

YES

Go to "Component Inspection" procedure.

NO

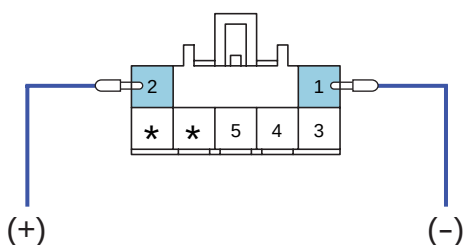
Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EE2575B1

1. Check actuator.

- 1) Ignition "OFF"
- 2) Disconnect Driver Direction potentiometer.
- 3) Verify that the mode actuator operates to the vent mode when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the mode actuator operates to the def mode when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823H

- 5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

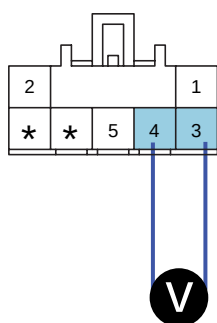
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Driver Direction potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Driver Direction potentiometer as the mode switch is operated.

Specification : Refer the specifications in fig 3



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (3-4)	Error detecting
VENT	$0.3 \pm 0.15V$	Under voltage : 0.08V or less Over voltage : 4.92V or more
BI-LEVEL(1)	$1.35 \pm 0.4V$	
BI-LEVEL(2)	$2.25 \pm 0.4V$	
FLOOR	$3.0 \pm 0.4V$	
MIX	$3.6 \pm 0.4V$	
DEF	$4.7 \pm 0.15V$	

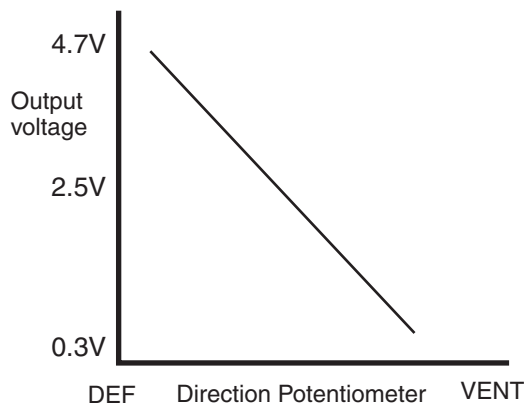


Fig 3

Fig 3) Specifications : Voltage value as a function of position of direction potentiometer.

LQIE523J

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -201

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E91467DF

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

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

YES

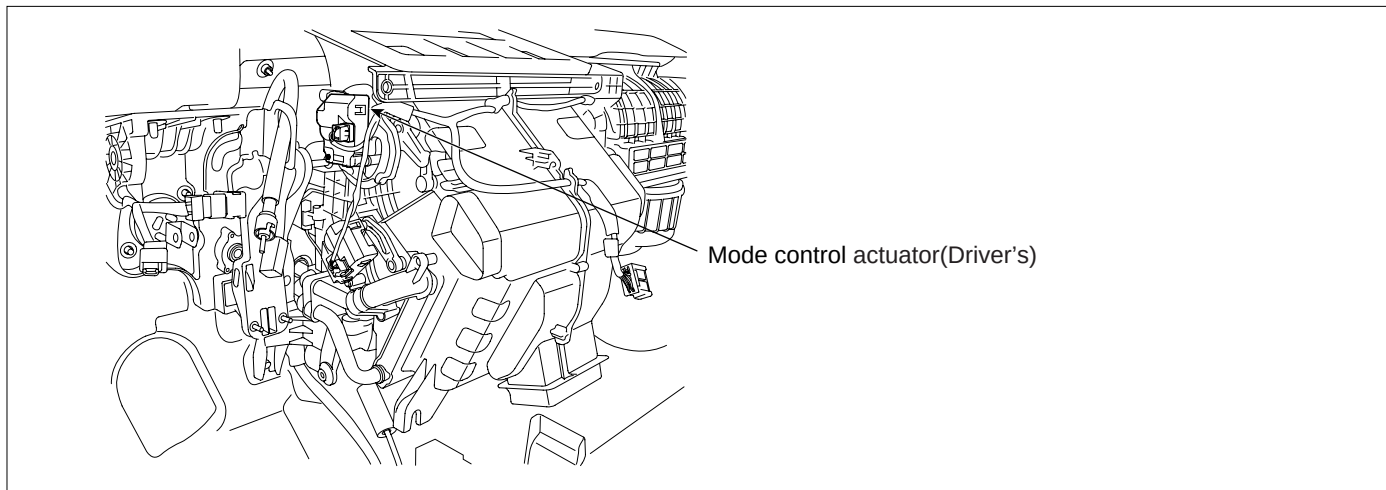
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B1250 DIRECTION POTENTIOMETER SHORT (HIGH) - DRIVER

COMPONENT LOCATION EAAF06F7



LQKG683A

GENERAL DESCRIPTION EFF51040

Refer to DTC B1249.

DTC DESCRIPTION E7165A71

The A/C controller sets DTC B1250 if there is a short to power in the Direction potentiometer.

DTC DETECTING CONDITION EB80C5E2

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Short circuit in harness • Faulty driver direction potentiometer • Open circuit in harness
Threshold value	• > 4.9V	
Detecting time	• 0.3 sec	
FAIL SAFE	• Fix vent position	

SPECIFICATION E9D32086

Refer to DTC B1249.

MONITOR SCANTOOL DATA EC6E29FF

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "DR. DIRECTION POTENTIO." parameter on the scantool while operating mode switch.

1.2 CURRENT DATA

HEATER WATER TEMP.SNSR	13.0 °C
IN-CAR TEMP.SENSOR	11.5 °C
AMBIENT AIR TEMP.SNS	12.0 °C
EVAPORATIVE SENSOR	13.0 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POVENTIO.(DR.)	92.54 %
DIRECTION POTENIO.DR.	100 %
PASSENGER PHOTO SENSOR	255

Navigation buttons: FIX, SCRIN, FULL, PART, GRPH, HELP

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1250.

LOIE524A

4. Are the DTC B1250 present and is parameter of "DR. DIRECTION POTENTIO." fixed?
 ※ Parameter of "DR. DIRECTION POTENTIO." will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Driver Direction potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

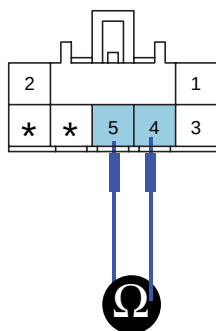
TERMINAL AND CONNECTOR INSPECTION

Refer to DTC B1249.

SIGNAL CIRCUIT INSPECTION E6AEFA86

1. Check for short in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver mode Actuator.
 - 3) Measure resistance between terminal "4" and "5" of Driver Direction potentiometer.

Specification : Approx. ∞ Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG524B

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit inspection" procedure.

NO

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

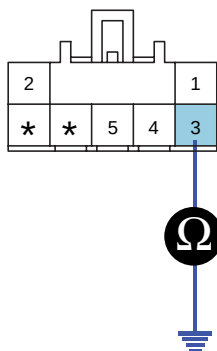
GROUND CIRCUIT INSPECTION

EACE16BC

1. Check for open in ground harness.

- 1) Ignition "OFF"
- 2) Disconnect Driver mode Actuator.
- 3) Measure resistance between terminal "3" of evaporator sensor and chassis ground.

Specification :Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523G

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection " procedure.

NO

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

COMPONENT INSPECTION E7EF0619

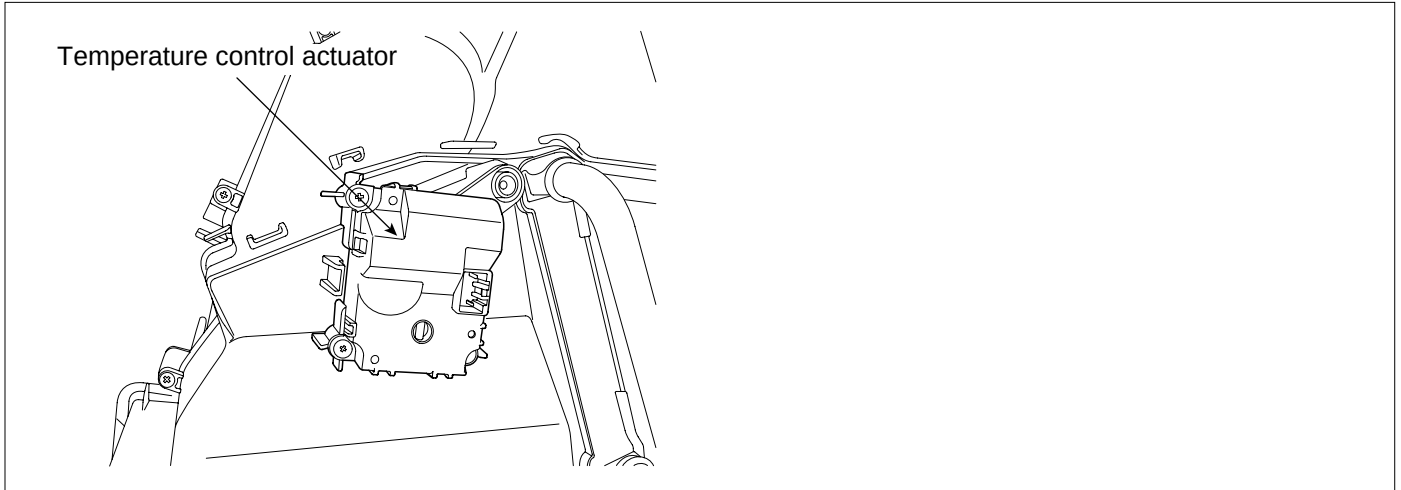
Refer to DTC B1249.

VERIFICATION OF VEHICLE REPAIR EC873A38

Refer to DTC B1249.

DTC B1260 AIR POTENTIOMETER OPEN (LOW) - REAR

COMPONENT LOCATION E5A061E7



LQKG716A

GENERAL DESCRIPTION E1E9D85D

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

DTC DESCRIPTION E6CA6DB0

The A/C controller sets DTC B1260 if there is an open circuit or poor connection in the air mix potentiometer.

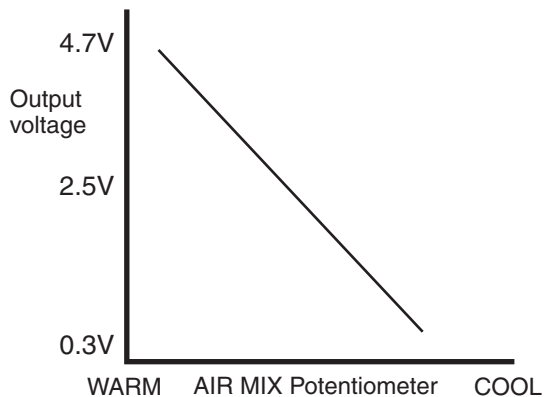
DTC DETECTING CONDITION E4FD1E00

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver Air Mix potentiometer
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	• If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. • If temperature setting 25~32°C(77~90°F) fix at max. heating position.	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -207

SPECIFICATION EBD0952E



LQIE521B

MONITOR SCANTOOL DATA E0A7C7FA

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Rear Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA	
HEATER WATER TEMP.SNSR	13.0 °C
IN-CAR TEMP.SENSOR	12.0 °C
AMBIENT AIR TEMP.SNS	12.0 °C
EVAPORATIVE SENSOR	12.5 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POPENTIO.(REAR.)	5.9 %
DIRECTION POTENIO.DR.	90.18 %
PASSENGER PHOTO SENSOR	255

1.1 DIAGNOSTIC TROUBLE CODES	
B1260 AIR MIX P. - LOW INPUT	
NUMBER OF DTC : 1 ITEMS	

Fig 1

Fig 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1260.

LQKG990A

4. Are the DTC B1260 present and is parameter of "Rear Air Mix Potentiometer" fixed?
※ Parameter of "Rear Air Mix Potentiometer" will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Rear Air Mix potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E2CC09CB

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

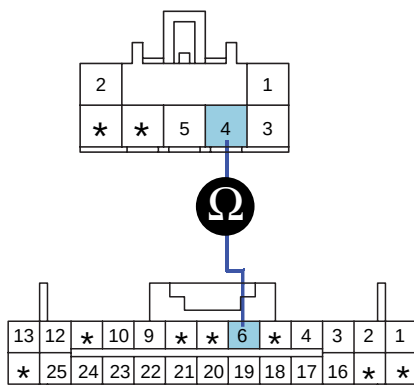
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EA788F3A

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Rear Air Mix potentiometer.
 - 3) Measure resistance between terminal "4" of Rear Air Mix Potentiometer and terminal "6" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -209

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

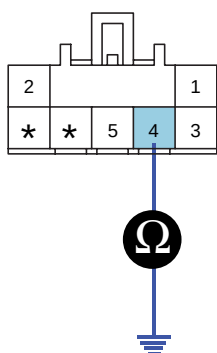
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Rear Air Mix potentiometer.
- 3) Measure resistance between terminal "4" of Rear Air Mix Potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521E

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

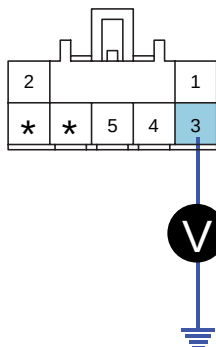
POWER SUPPLY CIRCUIT INSPECTION

E684952B

1. Check for short or open in harness.

- 1) Ignition "ON"
- 2) Connect Rear Air Mix Potentiometer.
- 3) Measure voltage between terminal "3" of Rear Air Mix Potentiometer and chassis ground.

Specification : Approx. 5V



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521F

- 4) Is the measured voltage within specifications?

YES

Go to "Component inspection" procedure.

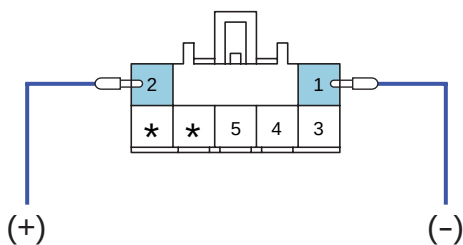
NO

Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EF2EE96D

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Rear Air Mix Potentiometer.
- 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521H

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -211

5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

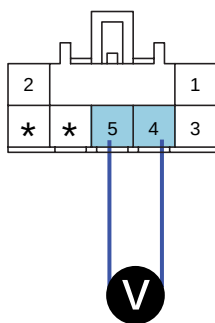
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Rear Air Mix potentiometer.
- 3) Measure voltage between terminal "4" and "5" of Rear Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521I

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

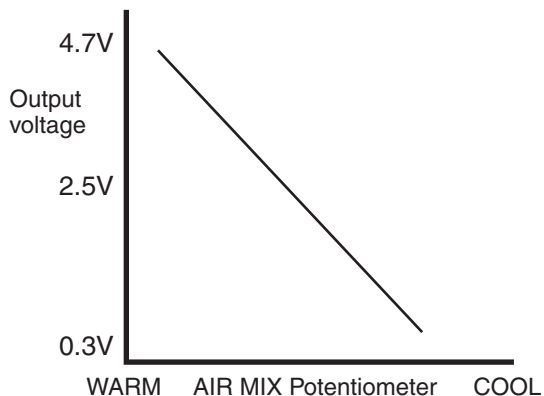


Fig 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

LQIE521J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR EA8827C7

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

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

YES

Go to the applicable troubleshooting procedure.

NO

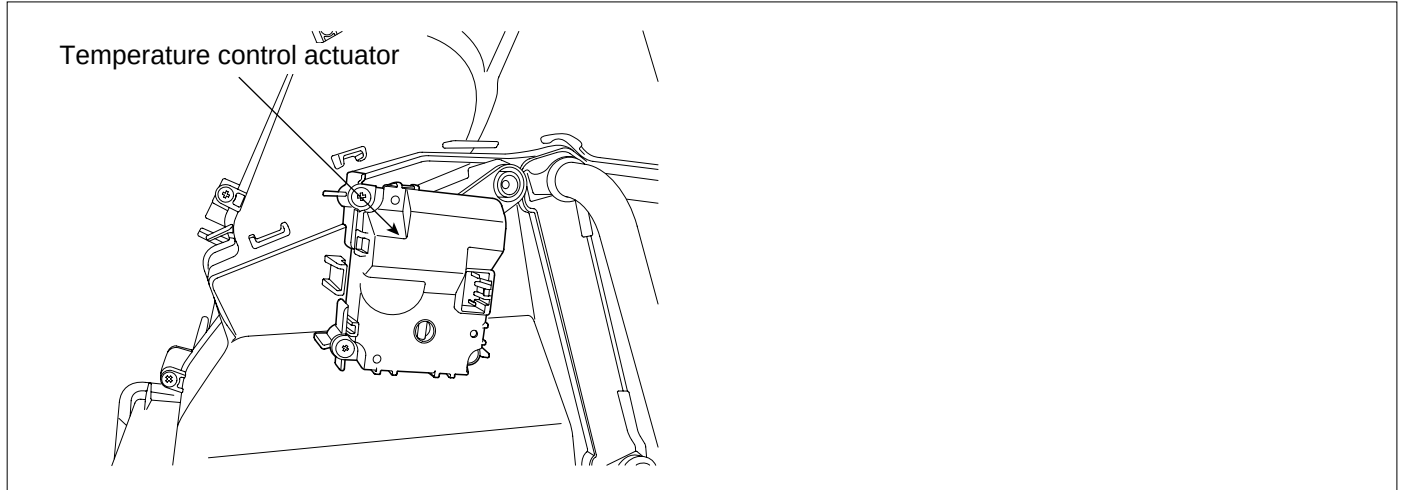
System is performing to specification at this time.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -213

DTC B1261 AIR POTENTIOMETER SHORT (HIGH) - REAR

COMPONENT LOCATION E92B0A57



LQKG716A

GENERAL DESCRIPTION E34E2DBD

Refer to DTC B1260.

DTC DESCRIPTION EB07A910

The A/C controller sets DTC B1261 if there is a short to power in the air mix potentiometer.

DTC DETECTING CONDITION E58E5664

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Short circuit in harness - Faulty driver Air Mix potentiometer
Threshold value	> 4.9V	
Detecting time	0.3 sec	
FAIL SAFE	- If temperature setting 17~24.5°C(63~76°F) fix at max. cooling position. - If temperature setting 25~32°C(77~90°F) fix at max. heating position.	

SPECIFICATION EC11B0F8

Refer to DTC B1260.

MONITOR SCANTOOL DATA E2B835E6

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Rear Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

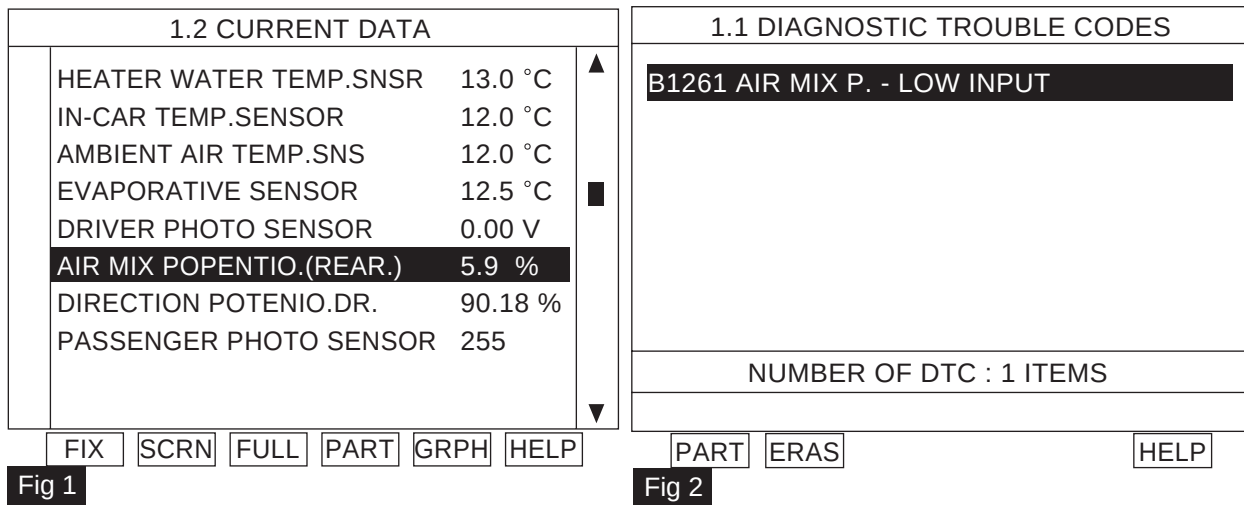


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1261.

LQKG990C

4. Are the DTC B1261 present and is parameter of "Rear Air Mix potentiometer" fixed?
※ Parameter of "Rear Air Mix potentiometer" will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Rear Air Mix potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E97C97D8

Refer to DTC B1260.

>

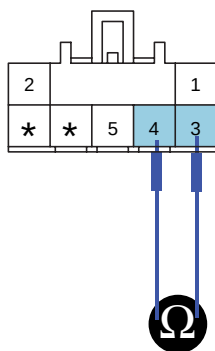
SIGNAL CIRCUIT INSPECTION E365A00B

- Check for short in harness.
 - Ignition "OFF"
 - Disconnect Rear Air Mix potentiometer.
 - Measure resistance between terminal "3" and "4" of Rear Air Mix potentiometer.

Specification : Approx. ∞ Ω

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -215



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG990D

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit Inspection" procedure.

NO

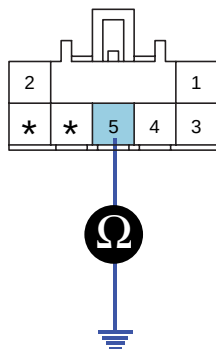
Check for short to power harness in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION

E4734615

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Rear Air Mix Potentiometer.
 - 3) Measure resistance between terminal "5" of Rear Air Mix Potentiometer and chassis ground.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG990E

- 4) Is the measured resistance within specifications?

HA -216

HEATING, VENTILATION AND AIR CONDITIONING

YES

Go to "Component Inspection" procedure.

NO

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

COMPONENT INSPECTION E170DBEC

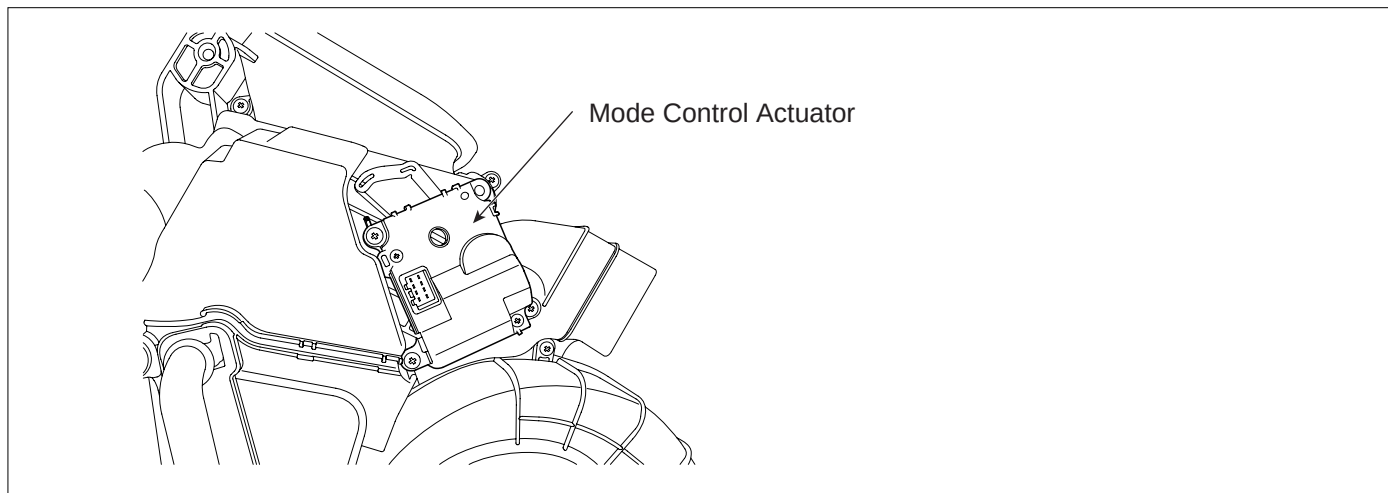
Refer to DTC B1260.

VERIFICATION OF VEHICLE REPAIR EAD48544

Refer to DTC B1260.

DTC B1262 DIRECTION POTENTIOMETER OPEN (LOW) - REAR

COMPONENT LOCATION E0102C09



LQKG729A

GENERAL DESCRIPTION ECB3BDBC

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

DTC DESCRIPTION ED7C965B

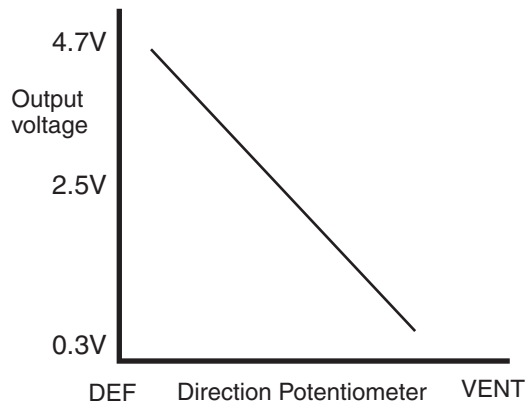
The A/C controller sets DTC B1262 if there is an open circuit or poor connection in the Direction potentiometer.

DTC DETECTING CONDITION E280D223

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Poor connection of connected part - Open circuit in harness - Short circuit in harness - Faulty driver direction potentiometer
Threshold value	< 0.1V	
Detecting time	0.3 sec	
FAIL SAFE	- Fix vent position, while selecting vent mode. - Fix defrost position while selecting except vent mode.	

SPECIFICATION

E3CD0433



EQBF523B

MONITOR SCANTOOL DATA

E86437AB

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "DIRECTION POTENTIO." parameter on the scantool while operating mode switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	13.0 °C	▲
IN-CAR TEMP.SENSOR	11.5 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	13.0 °C	■
DRIVER PHOTO SENSOR	0.00 V	
AIR MIX POPENTIO.(REAR.)	92.54 %	
DIRECTION POTENIO.REAR.	1.96 %	
PASSENGER PHOTO SENSOR	255	▼
FIX	SCRN	FULL
PART	GRPH	HELP

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES		
B1262 DIRECTION P. - LOW INPUT		
NUMBER OF DTC : 1 ITEMS		
PART	ERAS	HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1262.

LQKG523C

4. Are the DTC B1262 present and is parameter of "DIRECTION POTENTIO." fixed?
 ※ Parameter of "DR. DIRECTION POTENTIO." will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Driver Direction potentiometer.

YES

Go to "Inspection" procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -219

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E96E7CF9

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

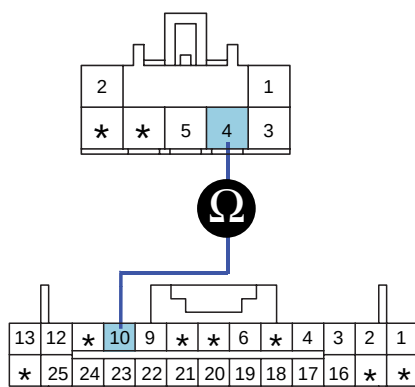
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E085C44A

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Rear mode Actuator.
 - 3) Measure resistance between terminal "4" of Rear Direction potentiometer and terminal "10" of A/C control unit.

Specification : Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG990F

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

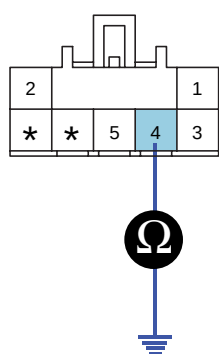
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Rear mode Actuator.
- 3) Measure resistance between terminal "4" of Rear Direction potentiometer and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523E

- 4) Is the measured resistance within specifications?

YES

Go to "Power circuit Inspection" procedure.

NO

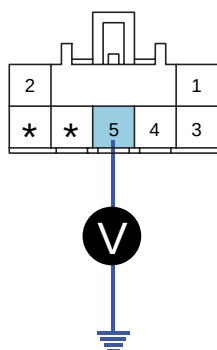
Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

POWER SUPPLY CIRCUIT INSPECTION E97250C5

1. Check for short or open in harness.

- 1) Ignition "ON"
- 2) Connect Rear Direction potentiometer.
- 3) Measure voltage between terminal "5" of Rear Direction potentiometer and chassis ground.

Specification : Approx. 5V



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523F

- 4) Is the measured voltage within specifications?

YES

Go to "Component Inspection" procedure.

NO

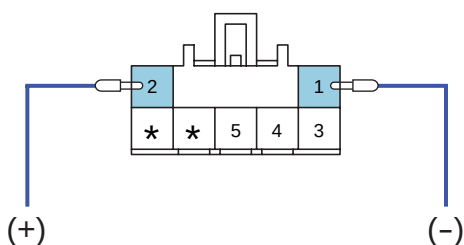
Check for short or open in power harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EBFBD7E0

1. Check actuator.

- 1) Ignition "OFF"
- 2) Disconnect Rear Direction potentiometer.
- 3) Verify that the mode actuator operates to the vent mode when connecting 12V to the terminal "1" and grounding terminal "2"
- 4) Verify that the mode actuator operates to the def mode when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823H

- 5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

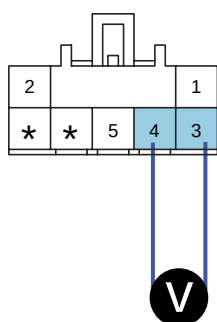
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Rear Direction potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Rear Direction potentiometer as the mode switch is operated.

Specification : Refer the specifications in fig 3



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (3-4)	Error detecting
VENT	$0.3 \pm 0.15V$	Under voltage : 0.08V or less Over voltage : 4.92V or more
BI-LEVEL(1)	$1.35 \pm 0.4V$	
BI-LEVEL(2)	$2.25 \pm 0.4V$	
FLOOR	$3.0 \pm 0.4V$	
MIX	$3.6 \pm 0.4V$	
DEF	$4.7 \pm 0.15V$	

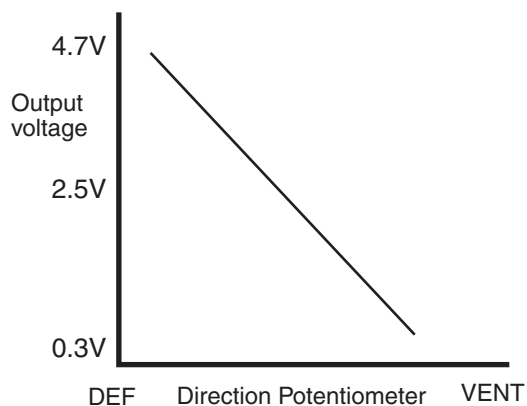


Fig. 3

Fig 3) Specifications : Voltage value as a function of position of direction potentiometer.

EQBF523J

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -223

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR E342D2C8

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

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

YES

Go to the applicable troubleshooting procedure.

NO

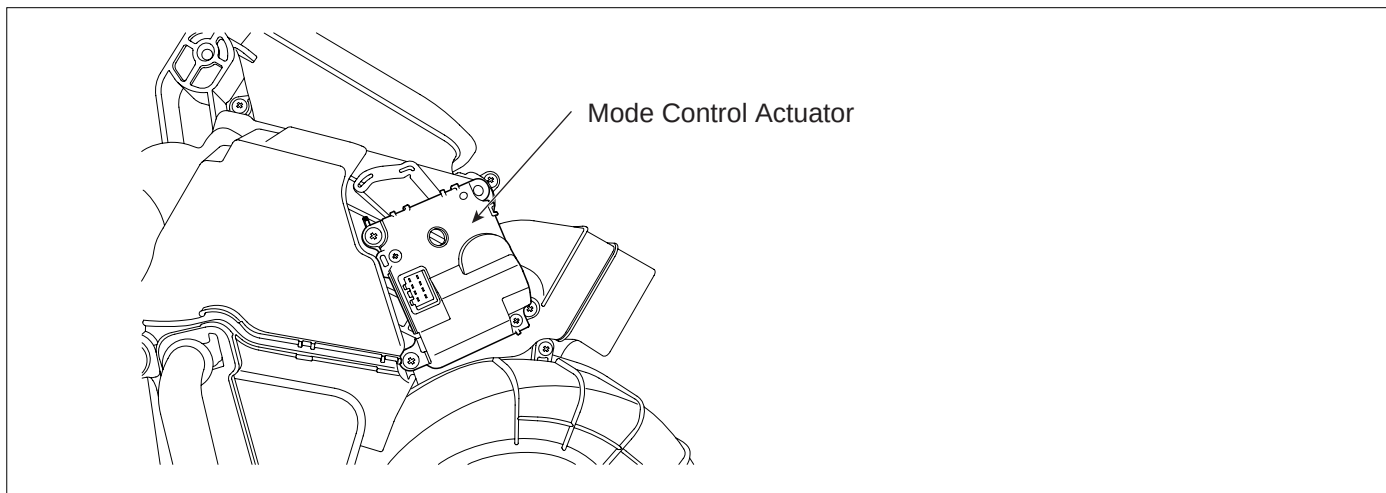
System is performing to specification at this time.

HA -224

HEATING, VENTILATION AND AIR CONDITIONING

DTC B1263 DIRECTION POTENTIOMETER SHORT (HIGH) - REAR

COMPONENT LOCATION E1B2AAC7



LQKG729A

GENERAL DESCRIPTION E192A486

Refer to DTC B1262.

DTC DESCRIPTION E56DF3CC

The A/C controller sets DTC B1263 if there is a short to power in the Direction potentiometer.

DTC DETECTING CONDITION E14A4925

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Short circuit in harness - Faulty driver direction potentiometer - Open circuit in harness
Threshold value	> 4.9V	
Detecting time	0.3 sec	
FAIL SAFE	Fix vent position	

SPECIFICATION E01E819A

Refer to DTC B1262.

MONITOR SCANTOOL DATA E1236BA6

- Connect scantool to Data Link Connector(DLC).
- Engine "ON"
- Monitor the "DR. DIRECTION POTENTIO." parameter on the scantool while operating mode switch.

1.2 CURRENT DATA			
HEATER WATER TEMP.SNSR	13.0 °C		▲
IN-CAR TEMP.SENSOR	11.5 °C		
AMBIENT AIR TEMP.SNS	12.0 °C		
EVAPORATIVE SENSOR	13.0 °C		■
DRIVER PHOTO SENSOR	0.00 V		
AIR MIX POSENTIO.(REAR.)	92.54 %		
DIRECTION POTENIO.REAR.	100 %		
PASSENGER PHOTO SENSOR	255		▼
FIX			SCRN
FULL			PART
GRPH			HELP

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES		
B1263 DIRECTION P. - HIGH INPUT		
NUMBER OF DTC : 1 ITEMS		
PART	ERAS	HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B1263.

LQKG990G

- Are the DTC B1263 present and is parameter of "DIRECTION POTENTIO." fixed?
 ※ Parameter of "DIRECTION POTENTIO." will be fixed at 100%(or any value above 90%), or 0% (or any value below 10%), if there is any fault in Driver Direction potentiometer.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

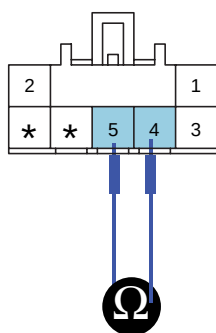
TERMINAL AND CONNECTOR INSPECTION EC435659

Refer to DTC B1262.

SIGNAL CIRCUIT INSPECTION E3173B0C

- Check for short in harness.
 - Ignition "OFF"
 - Disconnect Rear mode Actuator.
 - Measure resistance between terminal "4" and "5" of Rear Direction potentiometer.

Specification : Approx. $\infty \Omega$



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG524B

- 4) Is the measured resistance within specifications?

YES

Go to "Ground circuit inspection" procedure.

NO

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

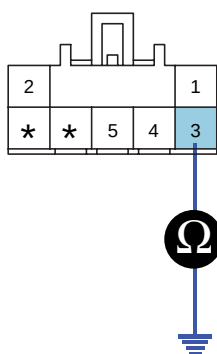
GROUND CIRCUIT INSPECTION

E2B77277

1. Check for open in ground harness.

- 1) Ignition "OFF"
- 2) Disconnect Rear mode Actuator.
- 3) Measure resistance between terminal "3" of evaporator sensor and chassis ground.

Specification :Approx. 0 Ω



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG523G

- 4) Is the measured resistance within specifications?

YES

Go to "Component Inspection " procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -227

NO

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

COMPONENT INSPECTION E97DF4F0

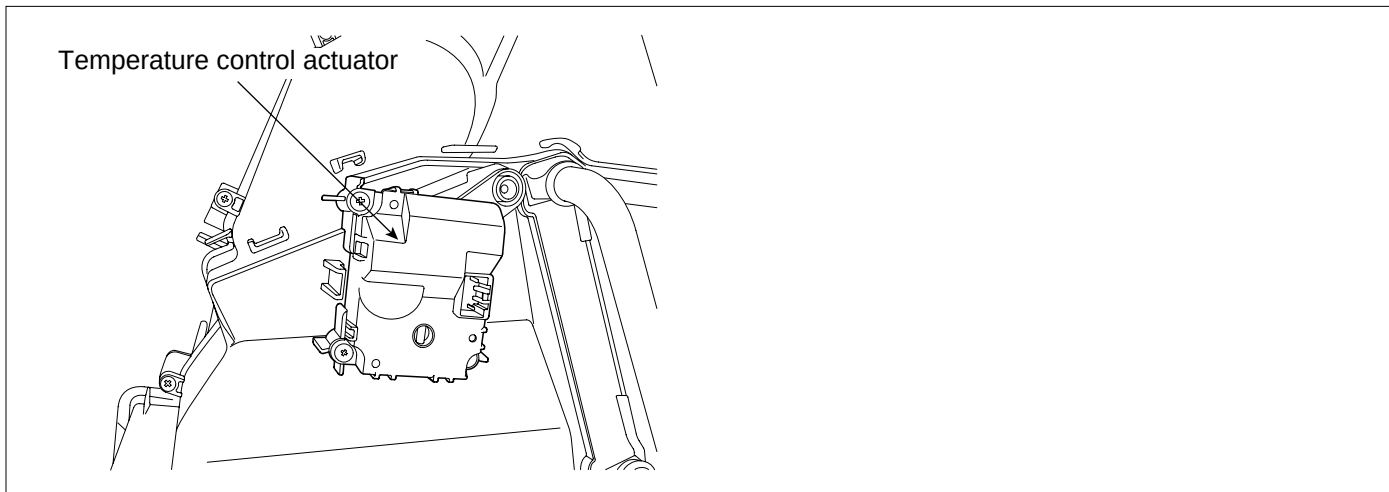
Refer to DTC B1262.

VERIFICATION OF VEHICLE REPAIR EB55DF41

Refer to DTC B1262.

DTC B2405 AIR MIX MOTOR (REAR)

COMPONENT LOCATION EA3DC094



LQKG716A

GENERAL DESCRIPTION EE2FBB66

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

DTC DESCRIPTION E493ABA4

The A/C controller sets DTC B2405 if the air mix actuator doesn't move to intended position within 40sec (In this case, A/C controller try to move temp. door for 2sec. 3 times, every 20 sec. before setting DTC).

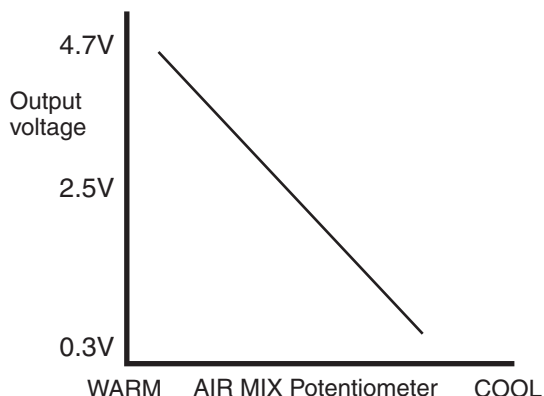
DTC DETECTING CONDITION EBDC7CBA

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Poor connection of connected part - Open circuit in harness - Short circuit in harness - Faulty driver Air Mix potentiometer - Fault A/C Control Unit
Threshold value	< 0.1V	
Detecting time	0.3 sec	
FAIL SAFE	-	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -229

SPECIFICATION EB84FAA9



LQIE521B

MONITOR SCANTOOL DATA EFAD269B

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Rear Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA	
HEATER WATER TEMP.SNSR	14.0 °C
IN-CAR TEMP.SENSOR	12.0 °C
AMBIENT AIR TEMP.SNS	12.0 °C
EVAPORATIVE SENSOR	13.0 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POPENTIO.(REAR.)	22.7 %
DIRECTION POTENIO.DR.	51.76 %
PASSENGER PHOTO SENSOR	255

1.1 DIAGNOSTIC TROUBLE CODES	
B2405 DRIVER AIR MIX MOTOR	
NUMBER OF DTC : 1 ITEMS	

Fig 1

Fig 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2405.

LQKG525A

4. Are the DTC B2405 present and is parameter of "Rear AIR MIX Potentiometer" fixed?
※ There is any fault in Rear AIR MIX Motor. If the parameter of "Driver AIR MIX DOOR" is 30% or less when the actuator operates to the hot position, or If the parameter is 60% and more when the actuator operates to the cold position.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E80AE3A8

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

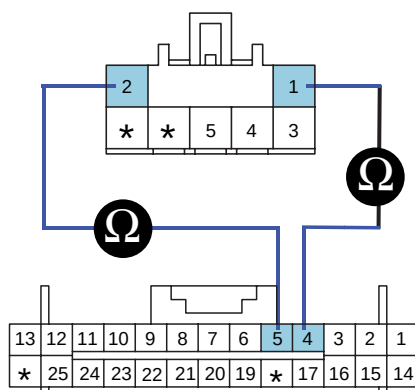
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E85A4AC2

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Rear Air Mix potentiometer.
 - 3) Measure resistance between terminal "1,2" of Rear Air Mix Motor and terminal "4,5" of A/C control unit.

Specification : Approx. 0 Ω



BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -231

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

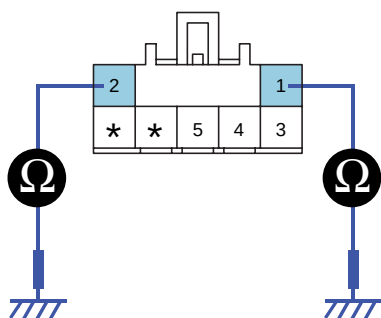
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Rear Air Mix Actuator.
- 3) Measure resistance between terminal "1,2" of Rear Air Mix Motor and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor

2. Motor

3. Sensor reference voltage(+5V)

4. Potentiometer signal

5. Potentiometer ground

LQKG525C

- 4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

E5733503

1. Check actuator.
 - ※ Check if Rear Air Mix Actuator works properly through ACTUATION TEST.
- 1) Ignition : ON
- 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
REAR AIR MIX DOOR - DRIVE 50%	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
[STRT]	[STOP]

Fig 3

Fig 3 : Selecting "ACTUATION TEST" mode.

LQKG999D

- 3) Does Driver Air Mix Actuator work properly?

YES

Go to "Component Inspection" procedure.

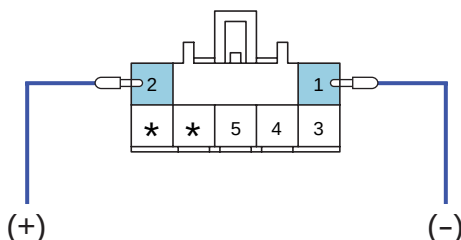
NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E2CD7C2E

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Rear Air Mix Potentiometer.
- 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521H

- 5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

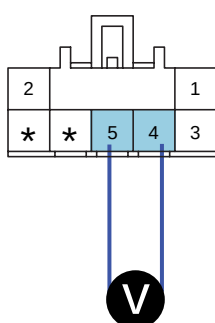
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Rear Air Mix potentiometer.
- 3) Measure voltage between terminal "4" and "5" of Rear Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG521I

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

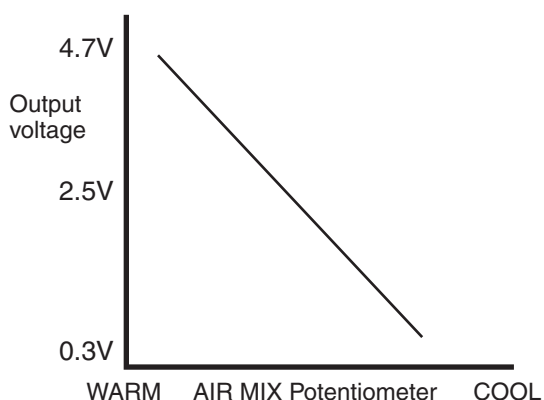


Fig 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

LQIE521J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

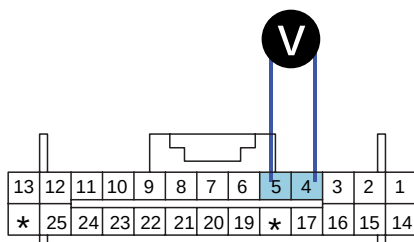
NO

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

3. Check A/C Control Unit.

- 1) Engine "ON"
- 2) Connect A/C Control Unit.
- 3) Measure voltage between terminal "4" and "5" of A/C Control Unit while operating the temp. switch.

Specification :Approx. 12V



4. Motor

5. Motor

LQKG525E

- 4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -235

VERIFICATION OF VEHICLE REPAIR E800876C

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

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

YES

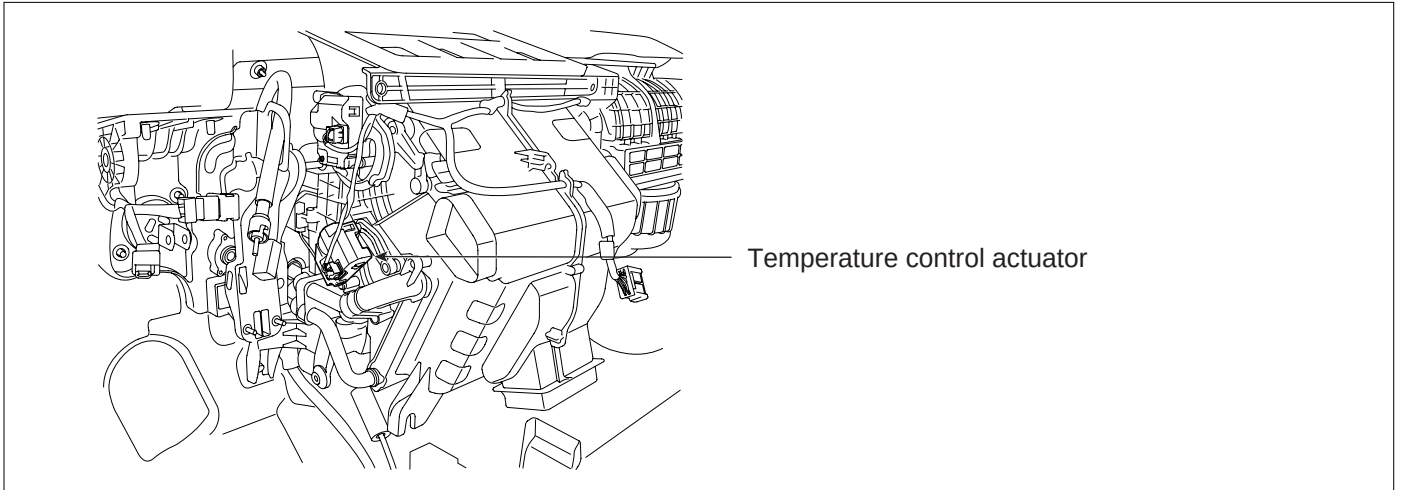
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B2406 AIR MIX MOTOR (DRIVER)

COMPONENT LOCATION EFE0376F



LQKG680A

GENERAL DESCRIPTION E75F6D6A

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

DTC DESCRIPTION E541ED3E

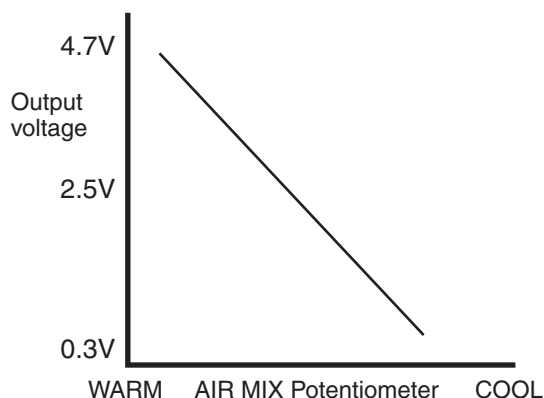
The A/C controller sets DTC B2406 if the air mix actuator doesn't move to intended position within 40sec (In this case, A/C controller try to move temp. door for 2sec. 3 times, every 20 sec. before setting DTC).

DTC DETECTING CONDITION ECDEEBFB

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver Air Mix potentiometer • Fault A/C Control Unit
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	-	

SPECIFICATION

F941A631



EOBF521B

MONITOR SCANTOOL DATA

E514CDC7

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Driver Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	14.0 °C	▲ ■ ▼
IN-CAR TEMP.SENSOR	12.0 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	13.0 °C	
DRIVER PHOTO SENSOR	0.00 V	
AIR MIX POPENTIO.(DR.)	22.7 %	
DIRECTION POTENIO.DR.	51.76 %	
PASSENGER PHOTO SENSOR	255	

FIX

SCRN

FULL

PART

GRPH

HELP

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES			
B2406 DRIVER AIR MIX MOTOR			
NUMBER OF DTC : 1 ITEMS			
PART	ERAS	HELP	

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2406.

EQBF525A

4. Are the DTC B2406 present and is parameter of "Driver AIR MIX Potentiometer" fixed?
 ※ There is any fault in Driver AIR MIX Motor. If the parameter of "Driver AIR MIX DOOR" is 30% or less when the actuator operates to the hot position, or If the parameter is 60% and more when the actuator operates to the cold position.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E5D77EFA

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

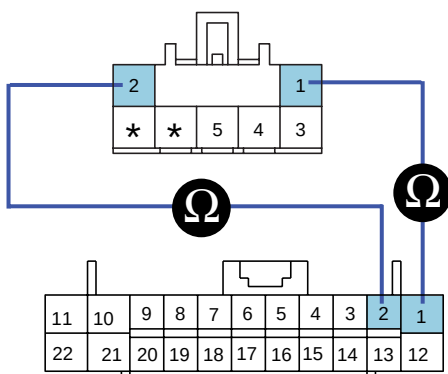
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION ECD3FC90

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver Air Mix potentiometer.
 - 3) Measure resistance between terminal "1,2" of Driver Air Mix Motor and terminal "1,2" of A/C control unit.

Specification : Approx. 0 Ω



- 1. Motor
- 2. Motor
- 3. Sensor reference voltage(+5V)
- 4. Potentiometer signal
- 5. Potentiometer ground

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -239

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

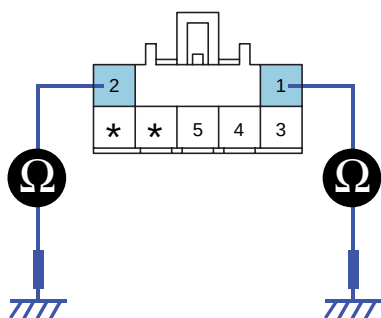
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Driver Air Mix Actuator.
- 3) Measure resistance between terminal "1,2" of Driver Air Mix Motor and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor

2. Motor

3. Sensor reference voltage(+5V)

4. Potentiometer signal

5. Potentiometer ground

LQKG525C

- 4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

E32E7A93

1. Check actuator.
 - ※ Check if Driver Air Mix Actuator works properly through ACTUATION TEST.
- 1) Ignition : ON
- 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
DRIVER AIR MIX DOOR - DRIVE 50%	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
STRT	STOP

Fig. 3

Fig 3 : Selecting "ACTUATION TEST" mode.

EQBF525D

3) Does Driver Air Mix Actuator work properly?

YES

Go to "Component Inspection" procedure.

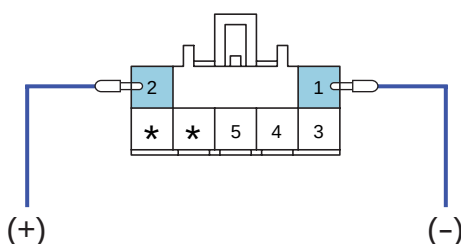
NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E5A4009B

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Driver Air Mix Potentiometer.
- 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG821H

5) Does the actuator work properly?

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -241

YES

Go to "Check potentiometer" procedure.

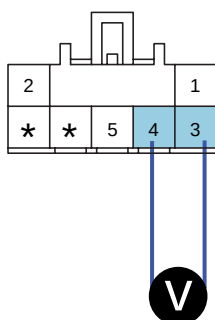
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Driver Air Mix potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Driver Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Sensor reference voltage(+5V)
4. Potentiometer signal
5. Potentiometer ground

LQKG821J

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

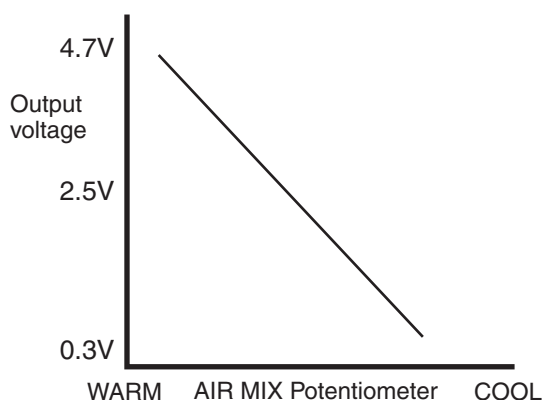


Fig. 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

EQBF521J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

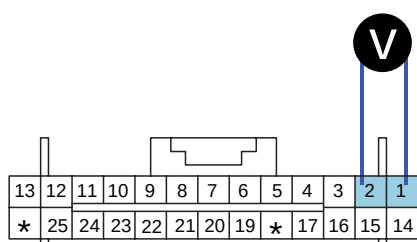
NO

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

3. Check A/C Control Unit.

- 1) Engine "ON"
- 2) Connect A/C Control Unit.
- 3) Measure voltage between terminal "1" and "2" of A/C Control Unit while operating the temp. switch.

Specification :Approx. 12V



LQKG990H

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -243

VERIFICATION OF VEHICLE REPAIR EBAD7A4F

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

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

YES

Go to the applicable troubleshooting procedure.

NO

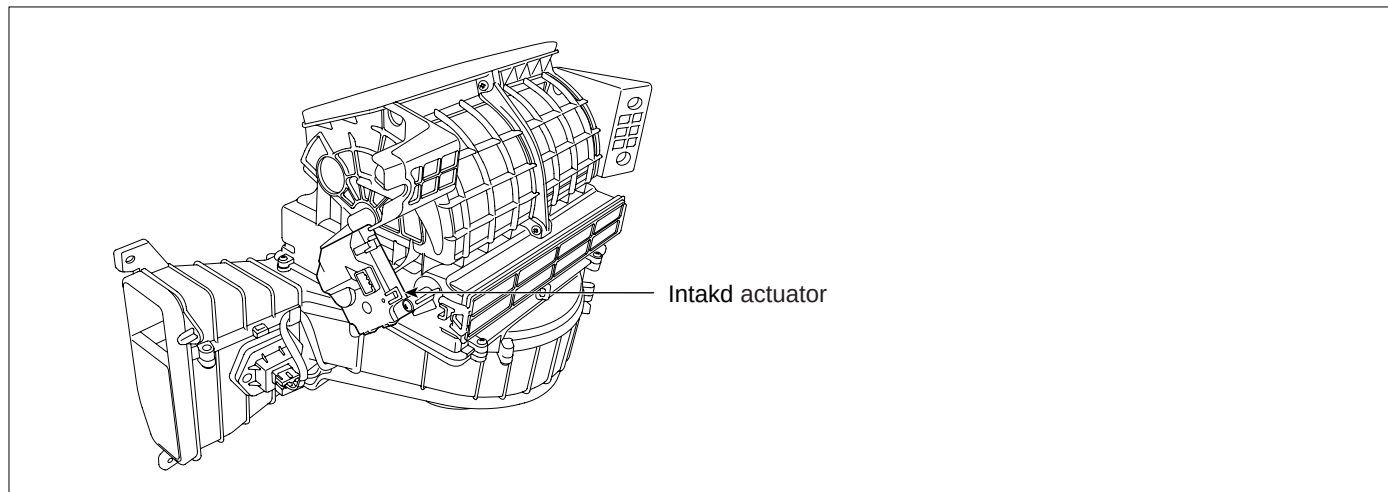
System is performing to specification at this time.

HA -244

HEATING, VENTILATION AND AIR CONDITIONING

DTC B2408 INTAKE MOTOR FAILURE

COMPONENT LOCATION EF1AEBEF



LQKG527A

GENERAL DESCRIPTION EBF43D13

Refer to DTC B1208.

DTC DESCRIPTION EDEFA576

The A/C controller sets DTC B2408 if the intake motor Doesn't move to intended position within 40sec(The A/C controller attempts to move the intake door for a 2 second duration at a frequency of 3 times every 20 seconds before storing a DTC.)

DTC DETECTING CONDITION E70DC6B0

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Poor connection of connected part - Open circuit in harness - Short circuit in harness - Faulty Intake potentiometer
Threshold value	< 0.1V	
Detecting time	0.3 sec	
FAIL SAFE	-	

SPECIFICATION E6B3190E

Refer to DTC B1208.

MONITOR SCANTOOL DATA E73BFCC6

- Connect scantool to Data Link Connector(DLC).
- Engine "ON"
- Monitor the "Intake Potentiometer" Parameter on the Scantool while operating Intake switch.

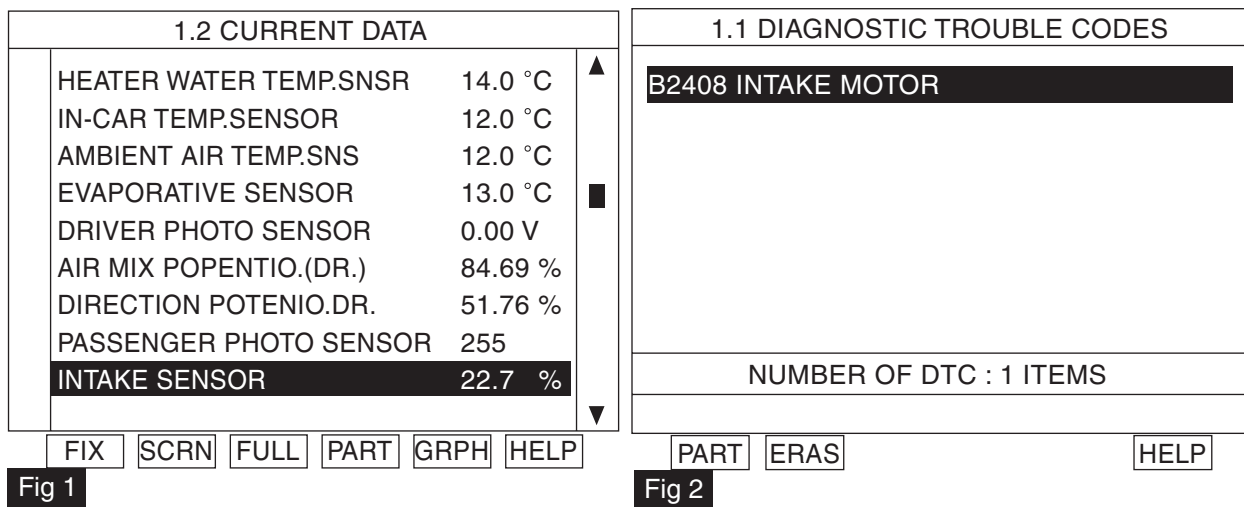


Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2408.

EQRE529A

4. Are the DTC B2408 present and is parameter of "Intake Potentiometer" fixed?
- ※ There is any fault in Intake potentiometer. If the parameter of "Intake potentiometer" is 30% or less when the actuator operates to the fresh position, or If the parameter is 60% and more when the actuator operates to the recirculation position.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION

E0CEF15E

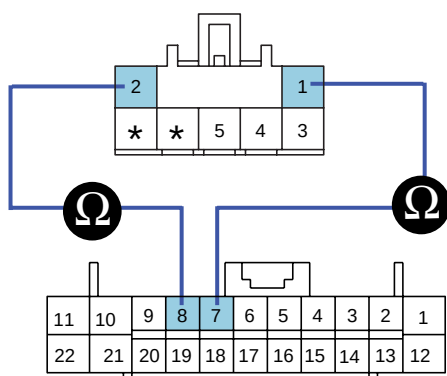
Refer to DTC B1208.

SIGNAL CIRCUIT INSPECTION

E0DD314B

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Intake potentiometer.
 - 3) Measure resistance between terminal "1,2" of Intake potentiometer and terminal "7,8" of A/C control unit.

Specification : Approx. 0 Ω



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG529B

4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

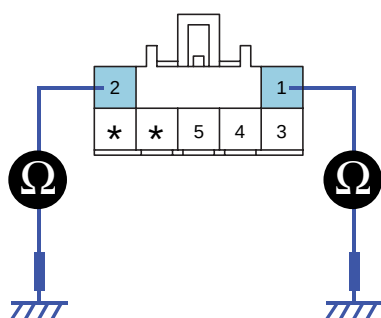
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Driver Air Mix Actuator.
- 3) Measure resistance between terminal "1,2" of Driver Air Mix Motor and chassis ground.

Specification : Approx. $\infty \Omega$



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG529C

4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -247

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

E43EAB6A

1. Check actuator.
 - ※ Check if Driver Air Mix Actuator works properly through ACTUATION TEST.
- 1) Ignition : ON
- 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
DRIVER AIR OUTLET MODE - DRIVE FOOT	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
STRT	STOP

Fig 3

Fig 3 : Selecting "ACTUATION TEST" mode.

EQRE525D

- 3) Does Intake Actuator work properly?

YES

Go to "Component Inspection" procedure.

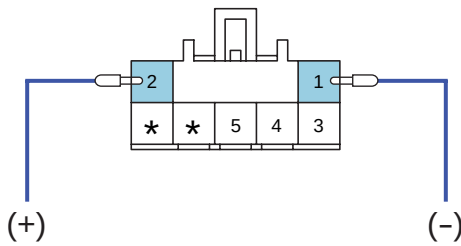
NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EC3D4A88

1. Check actuator motor.
 - 1) Ignition "OFF"
 - 2) Disconnect Intake Potentiometer.
 - 3) Verify that the temperature actuator operates to the fresh position when connecting 12V to the terminal "1" and grounding terminal "2".
 - 4) Verify that the temperature actuator operates to the recirculation position when the connections are reversed.



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG823H

5) Does the actuator work properly?

YES

Go to "Check potentiometer" procedure.

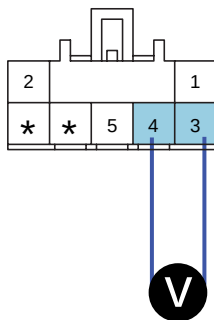
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Intake potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Intake potentiometer while operating Intake switch.

Specification : Refer the specifications



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (5-6)	Error detecting
Fresh	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
Recirculation	$4.7 \pm 0.15V$	High voltage : 4.9V or more

Specifications : Voltage value of Intake potentiometer as a function of position of Intake.

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -249

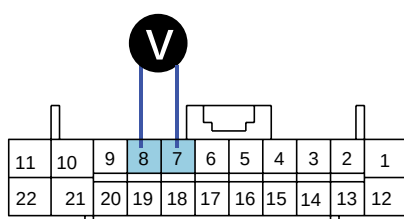
NO

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

3. Check A/C Control Unit.

- 1) Engine "ON"
- 2) Connect A/C Control Unit.
- 3) Measure voltage between terminal "7" and "8" of A/C Control Unit while operating the Intake switch.

Specification :Approx. 12V



7. Motor

8. Motor

LQKG529E

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

Substitute with a known-good A/C Control Unit and check for proper operation.

If the problem is corrected, replace A/C Control Unit and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR

E0DD17DE

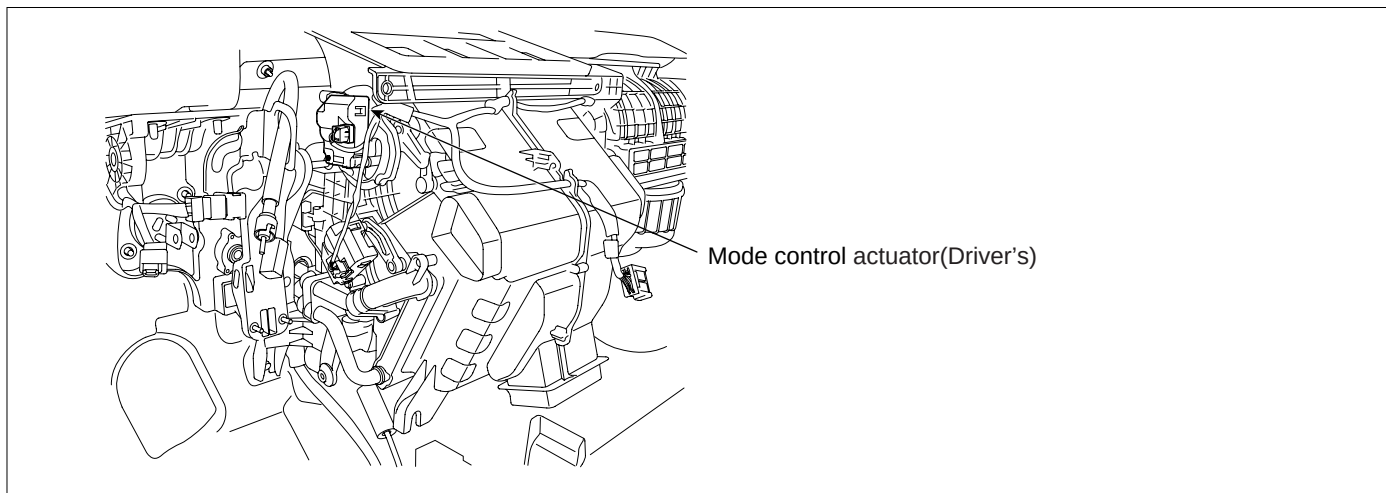
Refer to DTC B1208.

HA -250

HEATING, VENTILATION AND AIR CONDITIONING

DTC B2409 DIRECTION CONTROL MOTOR (DRIVER)

COMPONENT LOCATION E106240B



LQKG683A

GENERAL DESCRIPTION E42F32DF

Refer to DTC B1249.

DTC DESCRIPTION E842897E

The A/C controller sets DTC B2409 if the direction motor doesn't move to intended position within 40sec(In this case, A/C controller try to move mode door for 2sec. 3 times, every 20 sec. before setting DTC).

DTC DETECTING CONDITION EEF3F56C

Item	Detecting Condition	Possible cause
DTC Strategy	Voltage check	- Poor connection of connected part - Open circuit in harness - Short circuit in harness - Faulty driver direction potentiometer - Fault A/C Control Unit.
Threshold value	< 0.1V	
Detecting time	0.3 sec	
FAIL SAFE	-	

SPECIFICATION EFC66FF1

Refer to DTC B1249.

MONITOR SCANTOOL DATA E5274229

- Connect scantool to Data Link Connector(DLC).
- Engine "ON"
- Monitor the "DR DIRECTION POTENTIO" parameter on the scantool while operating mode switch.

1.2 CURRENT DATA	
HEATER WATER TEMP.SNSR	14.0 °C
IN-CAR TEMP.SENSOR	12.0 °C
AMBIENT AIR TEMP.SNS	12.0 °C
EVAPORATIVE SENSOR	13.0 °C
DRIVER PHOTO SENSOR	0.00 V
AIR MIX POVENTIO.(DR.)	84.69 %
DIRECTION POTENIO.DR.	32.5 %
PASSENGER PHOTO SENSOR	255

1.1 DIAGNOSTIC TROUBLE CODES	
B2409 DRIVER DIRECTION MOTOR	
NUMBER OF DTC : 1 ITEMS	

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2409.

LOIE526A

4. Are the DTC B2409 present and is parameter of "Driver DIRECTION POTENTIO." fixed?
 ※ There is any fault in Driver Direction Motor. If the parameter of "Driver DIRECTION POTENTIO." is 10% or less on "VENT" mode, or If the parameter is 90% or more on "DEF" mode.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

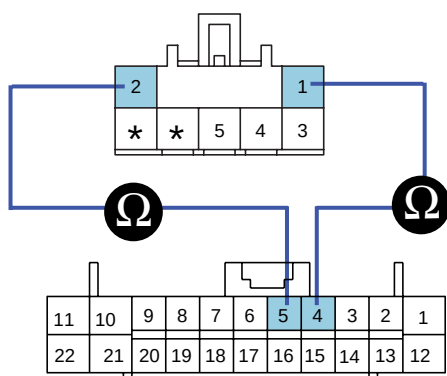
TERMINAL AND CONNECTOR INSPECTION

Refer to DTC B1249.

SIGNAL CIRCUIT INSPECTION EBE2C0ED

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Driver mode Actuator.
 - 3) Measure resistance between terminal "1,2" of Driver Direction Motor and terminal "4,5" of A/C control unit.

Specification : Approx. 0 Ω



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG526B

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

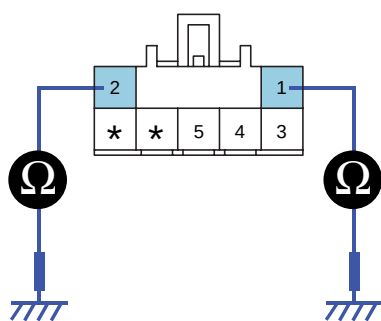
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Driver mode Actuator.
- 3) Measure resistance between terminal "1,2" of Driver Direction Motor and chassis ground.

Specification : Approx. $\infty \Omega$



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG529C

- 4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -253

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

ECA92423

1. Check actuator.
 - ※ Check if Driver Direction Actuator works properly through ACTUATION TEST.
 - 1) Ignition : ON
 - 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
DRIVER AIR OUTLET MODE-DRIVE FOOT	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
STRT	STOP

Fig 3

Fig 3 : Selecting "ACTUATION TEST" mode.

LQIE526D

- 3) Does Driver Direction Actuator work properly?

YES

Go to "Component Inspection" procedure.

NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION

EFC36697

Refer to DTC B1249.

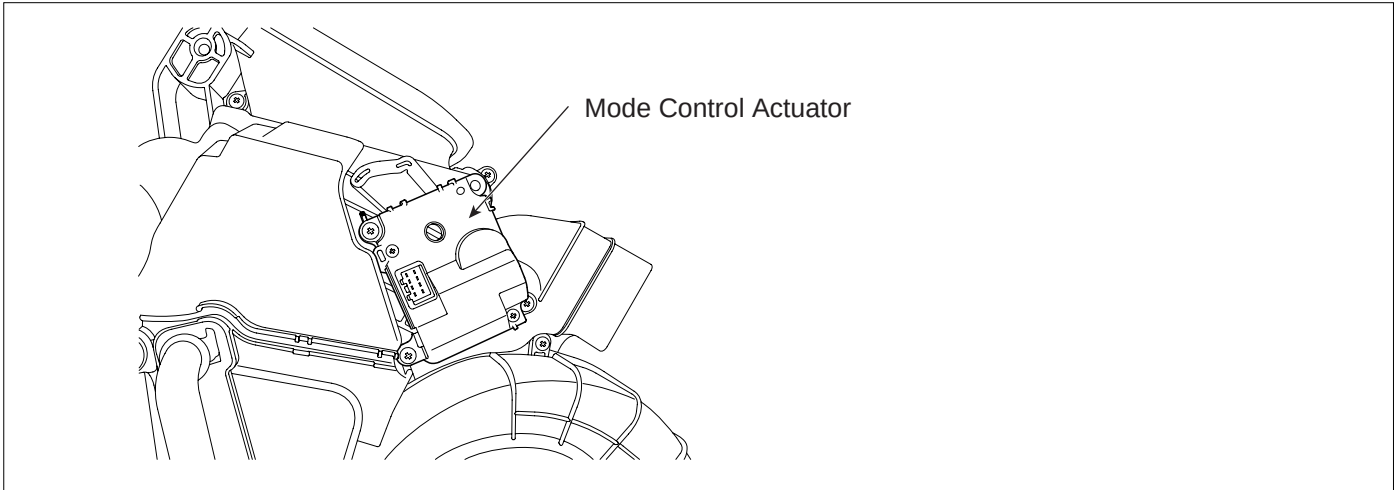
VERIFICATION OF VEHICLE REPAIR

E90CE672

Refer to DTC B1249.

DTC B2411 DIRECTION CONTROL MOTOR (REAR)

COMPONENT LOCATION E76DFD97



LQKG729A

GENERAL DESCRIPTION E3768039

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

DTC DESCRIPTION E3F76BDC

The A/C controller sets DTC B2411 if the direction motor doesn't move to intended position within 40sec(In this case, A/C controller try to move mode door for 2sec. 3 times, every 20 sec. before setting DTC).

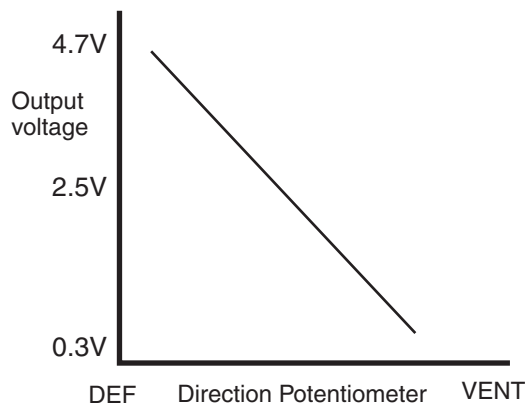
DTC DETECTING CONDITION E7AA0963

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver direction potentiometer • Fault A/C Control Unit.
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	-	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -255

SPECIFICATION E37AD0CD



EQBF523B

MONITOR SCANTOOL DATA E5CDEC17

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "DIRECTION POTENTIO" parameter on the scantool while operating mode switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	14.0 °C	▲
IN-CAR TEMP.SENSOR	12.0 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	13.0 °C	
DRIVER PHOTO SENSOR	0.00 V	■
AIR MIX POPTENTIO.(REAR.)	84.69 %	
DIRECTION POTENIO.REAR.	32.5 %	
PASSENGER PHOTO SENSOR	255	▼
FIX	SCRN	FULL
PART	GRPH	HELP

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES		
B2411 REAR DIRECTION MOTOR		
NUMBER OF DTC : 1 ITEMS		
PART	ERAS	HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2411.

LQKG526A

4. Are the DTC B2411 present and is parameter of "Rear DIRECTION POTENTIO." fixed?
 ※ There is any fault in Rear Direction Motor. If the parameter of "Rear DIRECTION POTENTIO." is 10% or less on "VENT" mode, or If the parameter is 90% or more on "DEF" mode.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E53E98F9

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

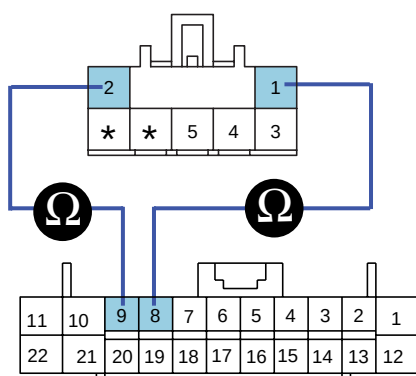
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E30BEAB0

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Rear mode Actuator.
 - 3) Measure resistance between terminal "1,2" of Rear Direction Motor and terminal "8,9" of A/C control unit.

Specification : Approx. 0 Ω



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -257

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

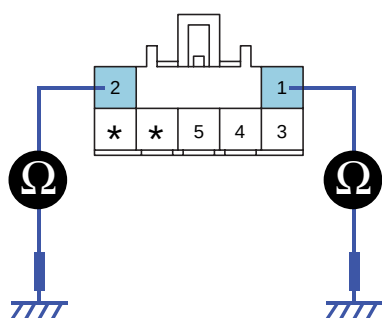
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Rear mode Actuator.
- 3) Measure resistance between terminal "1,2" of Rear Direction Motor and chassis ground.

Specification : Approx. $\infty \Omega$



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG529C

- 4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

EC17CB6E

1. Check actuator.
 - ※ Check if Rear Direction Actuator works properly through ACTUATION TEST.
- 1) Ignition : ON
- 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
REAR AIR OUTLET MODE-REAR FOOT	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
[STRT]	[STOP]

Fig. 3

Fig 3 : Selecting "ACTUATION TEST" mode.

LQKG526D

3) Does Rear Direction Actuator work properly?

YES

Go to "Component Inspection" procedure.

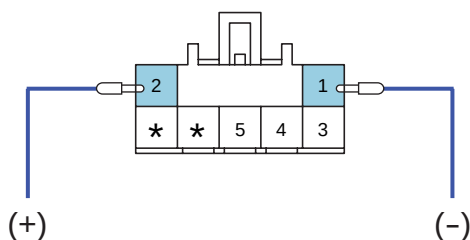
NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION EEC687F0

1. Check actuator.

- 1) Ignition "OFF"
- 2) Disconnect Rear Direction potentiometer.
- 3) Verify that the mode actuator operates to the vent mode when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the mode actuator operates to the def mode when the connections are reversed.



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG521O

5) Does the actuator work properly?

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -259

YES

Go to "Check potentiometer" procedure.

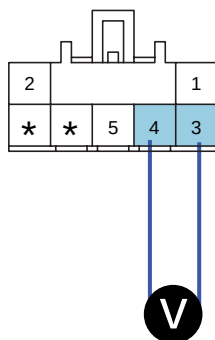
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Rear Direction potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Rear Direction potentiometer as the mode switch is operated.

Specification : Refer the specifications in fig 3



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG521P

Door position	Voltage (3-4)	Error detecting
VENT	$0.3 \pm 0.15V$	Under voltage : 0.08V or less Over voltage : 4.92V or more
BI-LEVEL(1)	$1.35 \pm 0.4V$	
BI-LEVEL(2)	$2.25 \pm 0.4V$	
FLOOR	$3.0 \pm 0.4V$	
MIX	$3.6 \pm 0.4V$	
DEF	$4.7 \pm 0.15V$	

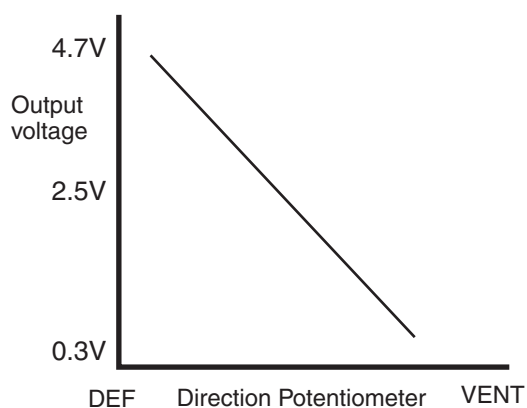


Fig. 3

Fig 3) Specifications : Voltage value as a function of position of direction potentiometer.

EQBF523J

4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

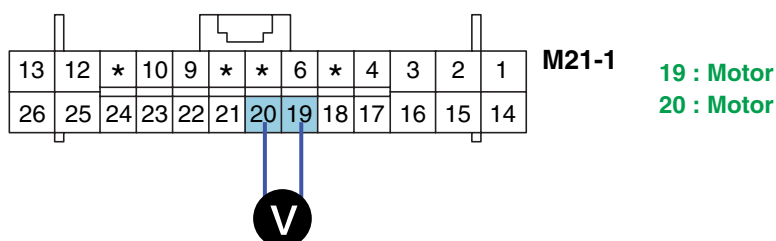
3. Check A/C Control Unit.

1) Engine : "ON"

2) Connect A/C Control Unit.

3) Measure voltage between terminal "19" and "20" of A/C Control Unit while operating the mode switch.

Specification :Approx. 12V



LQKG990I

4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -261

NO

Substitute with a known-good A/C Control Unit and check for proper operation.

If the problem is corrected, replace A/C Control Unit and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EA850E71

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

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

YES

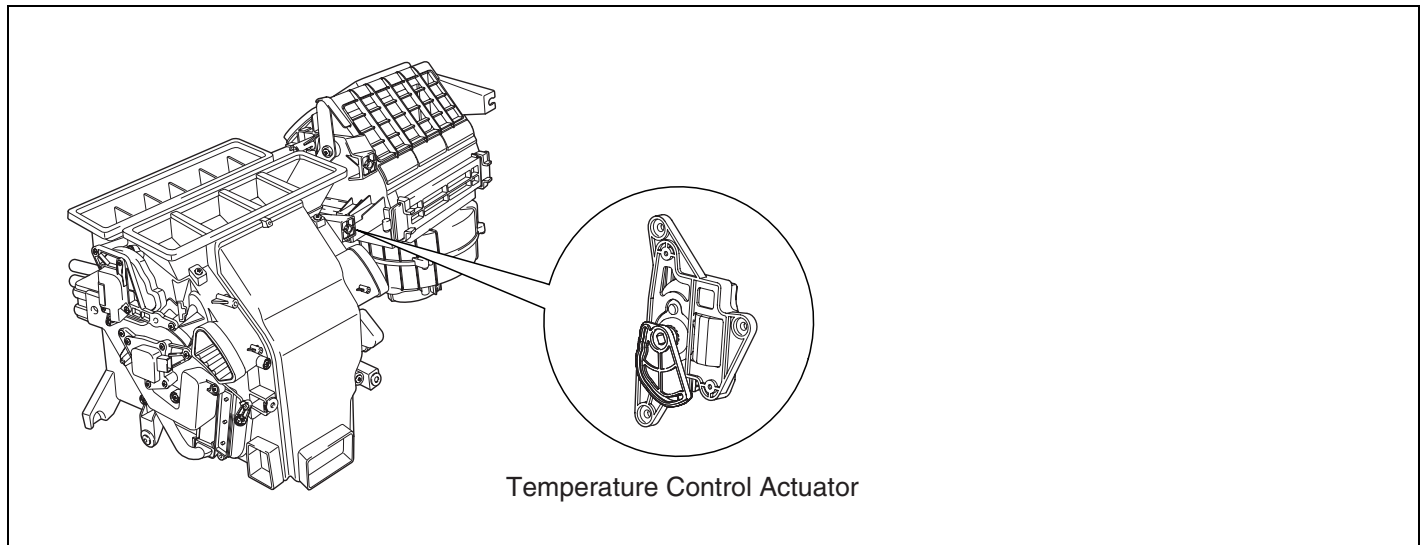
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B2415 AIR MIX MOTOR (PASSENGER)

COMPONENT LOCATION E51E69DA



EQBF521A

GENERAL DESCRIPTION E64AC948

Temperature control actuator located at heater unit, regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temp. door by operating temp. motor and then temperature will be regulated by the hot/cold air ratio decided by position of temp. door.

DTC DESCRIPTION E2ABFEF5

The A/C controller sets DTC B2415 if the air mix actuator doesn't move to intended position within 40sec (In this case, A/C controller try to move temp. door for 2sec. 3 times, every 20 sec. before setting DTC).

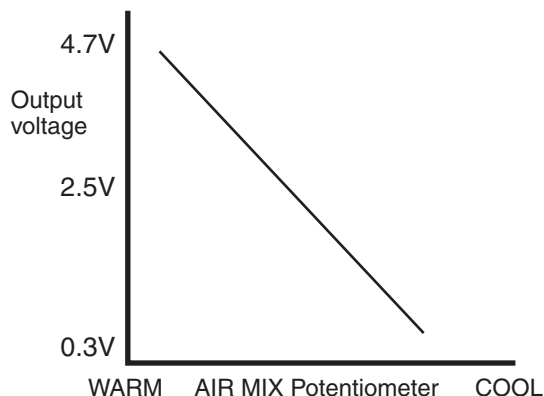
DTC DETECTING CONDITION EA8F2B90

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver Air Mix potentiometer • Fault A/C Control Unit
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	-	

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -263

SPECIFICATION EC47D91F



EQBF521B

MONITOR SCANTOOL DATA E41751B0

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "Passenger Air Mix Potentiometer" Parameter on the Scantool while operating temp. switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	14.0 °C	▲
IN-CAR TEMP.SENSOR	12.0 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	13.0 °C	■
DRIVER PHOTO SENSOR	0.00 V	
AIR MIX POPENTIO.(PA.)	22.7 %	
DIRECTION POTENIO.DR.	51.76 %	
PASSENGER PHOTO SENSOR	255	▼
FIX SCRN FULL PART GRPH HELP		

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES
B2415 PASSENGER AIR MIX MOTOR
NUMBER OF DTC : 1 ITEMS
PART ERAS HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2415.

LQKG990J

4. Are the DTC B2415 present and is parameter of "Passenger AIR MIX Potentiometer" fixed?
 - ※ There is any fault in Passenger AIR MIX Motor. If the parameter of "Passenger AIR MIX DOOR" is 30% or less when the actuator operates to the hot position, or If the parameter is 60% and more when the actuator operates to the cold position.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E7F42C7B

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

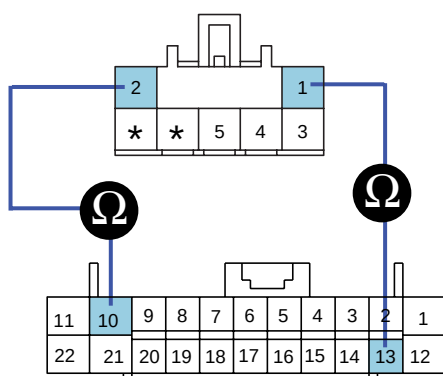
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EAE92A03

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Passenger Air Mix potentiometer.
 - 3) Measure resistance between terminal "1,2" of Passenger Air Mix Motor and terminal "10,13" of A/C control unit.

Specification : Approx. 0 Ω



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -265

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

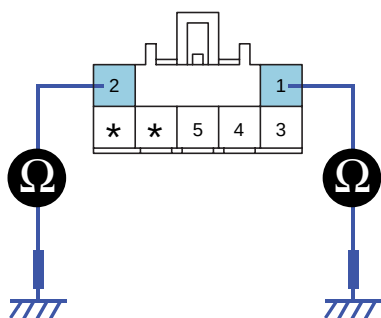
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Passenger Air Mix Actuator.
- 3) Measure resistance between terminal "1,2" of Passenger Air Mix Motor and chassis ground.

Specification : Approx. $\infty \Omega$



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

LQKG529C

- 4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

E991C1F7

1. Check actuator.
 - ※ Check if Passenger Air Mix Actuator works properly through ACTUATION TEST.
- 1) Ignition : ON
- 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
PASSENGER AIR MIX DOOR - PASSENGER 50%	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
[STRT]	[STOP]

Fig. 3

Fig 3 : Selecting "ACTUATION TEST" mode.

LQKG525D

3) Does Passenger Air Mix Actuator work properly?

YES

Go to "Component Inspection" procedure.

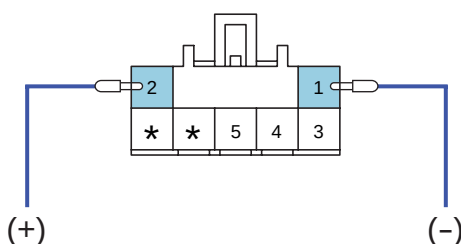
NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E076DD0D

1. Check actuator motor.

- 1) Ignition "OFF"
- 2) Disconnect Passenger Air Mix Potentiometer.
- 3) Verify that the temperature actuator operates to the hot position when connecting 12V to the terminal "1" and grounding terminal "2".
- 4) Verify that the temperature actuator operates to the cool position when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823H

5) Does the actuator work properly?

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -267

YES

Go to "Check potentiometer" procedure.

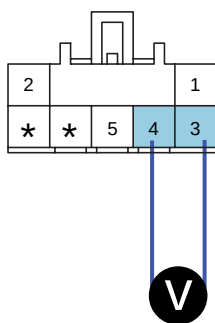
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Passenger Air Mix potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Passenger Air Mix potentiometer while operating the temp. switch.

Specification : Refer the specifications in fig 3)



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (3-4)	Error detecting
MAX. Cooling	$0.3 \pm 0.15V$	Low voltage : 0.08V or less
MAX. Heating	$4.7 \pm 0.15V$	High voltage : 4.9V or more

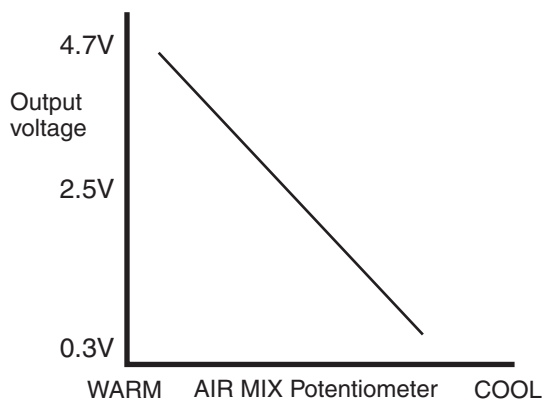


Fig. 3

Fig 3) Specifications : Voltage value of air mix potentiometer as a function of position of setting temperature.

EQBF521J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

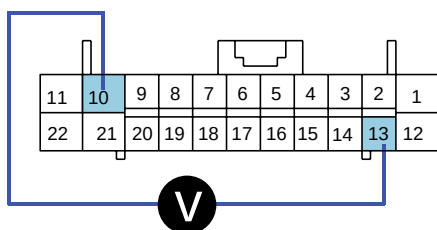
NO

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

3. Check A/C Control Unit.

- 1) Engine "ON"
- 2) Connect A/C Control Unit.
- 3) Measure voltage between terminal "10" and "13" of A/C Control Unit while operating the temp. switch.

Specification :Approx. 12V



10. Motor
13. Motor

LQKG990L

- 4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -269

VERIFICATION OF VEHICLE REPAIR E9F02EC4

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

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

YES

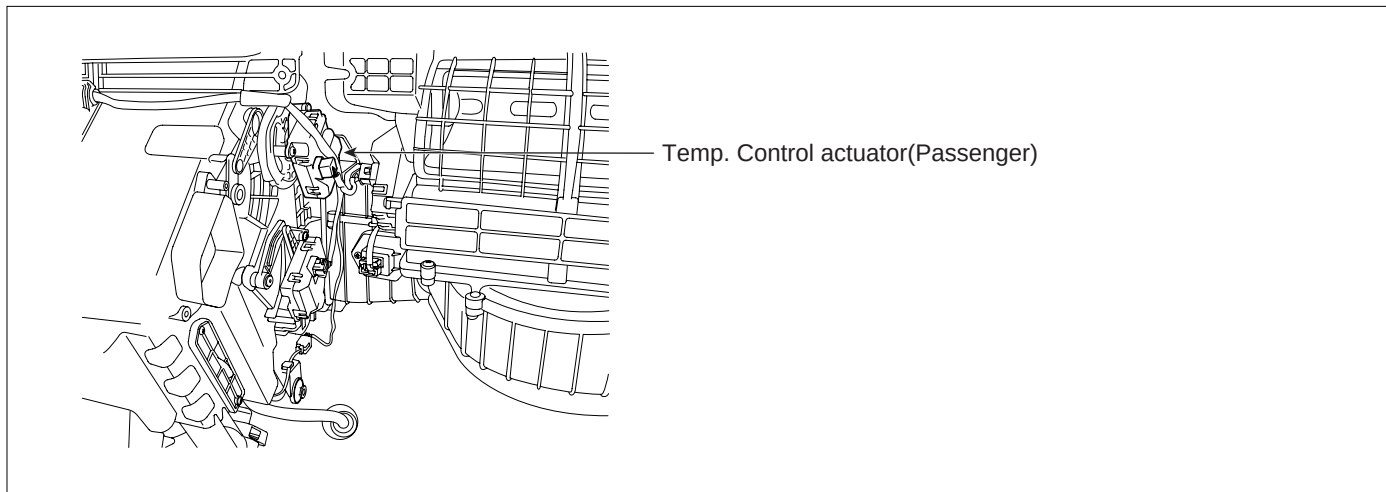
Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.

DTC B2416 DIRECTION CONTROL MOTOR (PASSENGER)

COMPONENT LOCATION EFA56A35



LQKG757A

GENERAL DESCRIPTION EF5781CF

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

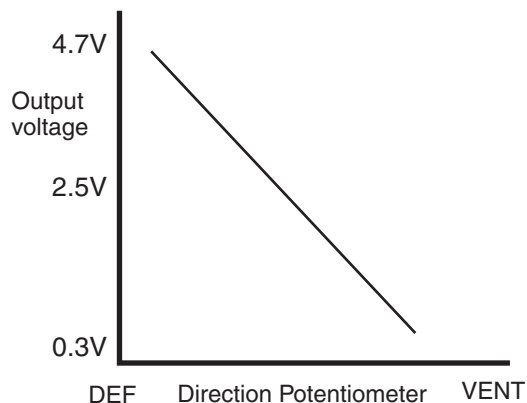
DTC DESCRIPTION EC2E4DF8

The A/C controller sets DTC B2416 if the direction motor doesn't move to intended position within 40sec(In this case, A/C controller try to move mode door for 2sec. 3 times, every 20 sec. before setting DTC).

DTC DETECTING CONDITION EC90DC02

Item	Detecting Condition	Possible cause
DTC Strategy	• Voltage check	• Poor connection of connected part • Open circuit in harness • Short circuit in harness • Faulty driver direction potentiometer • Fault A/C Control Unit.
Threshold value	• < 0.1V	
Detecting time	• 0.3 sec	
FAIL SAFE	-	

SPECIFICATION E463272E



EQBF523B

MONITOR SCANTOOL DATA E65417DD

1. Connect scantool to Data Link Connector(DLC).
2. Engine "ON"
3. Monitor the "PA DIRECTION POTENTIO" parameter on the scantool while operating mode switch.

1.2 CURRENT DATA		
HEATER WATER TEMP.SNSR	14.0 °C	▲ ■ ▼
IN-CAR TEMP.SENSOR	12.0 °C	
AMBIENT AIR TEMP.SNS	12.0 °C	
EVAPORATIVE SENSOR	13.0 °C	
DRIVER PHOTO SENSOR	0.00 V	
AIR MIX POPENTIO.(DR.)	84.69 %	
DIRECTION POTENIO.PA.	32.5 %	
PASSENGER PHOTO SENSOR	255	
FIX	SCRN	FULL
PART	GRPH	HELP

Fig. 1

1.1 DIAGNOSTIC TROUBLE CODES		
B2416 PASSENGER DIRECTION MOTOR		
NUMBER OF DTC : 1 ITEMS		
PART	ERAS	HELP

Fig. 2

Fig 1 : The current data in abnormal state.

Fig 2 : DTC B2416.

LQKG990M

4. Are the DTC B2416 present and is parameter of "Passenger DIRECTION POTENTIO." fixed?
※ There is any fault in Passenger Direction Motor. If the parameter of "Passenger DIRECTION POTENTIO." is 10% or less on "VENT" mode, or If the parameter is 90% or more on "DEF" mode.

YES

Go to "Inspection" procedure.

NO

Fault is intermittent caused by poor contact in the sensor's and/or A/C controller's connector or was repaired and A/C controller memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

TERMINAL AND CONNECTOR INSPECTION E445635C

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

YES

Repair as necessary and go to "Verification of Vehicle Repair" procedure.

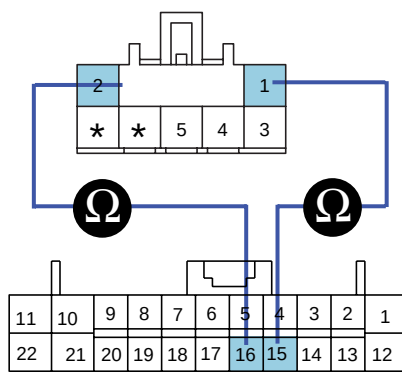
NO

Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION E1953B5C

1. Check for open in harness.
 - 1) Ignition "OFF"
 - 2) Disconnect Passenger mode Actuator.
 - 3) Measure resistance between terminal "1,2" of Passenger Direction Motor and terminal "15,16" of A/C control unit.

Specification : Approx. 0 Ω



- 1. Motor
- 2. Motor
- 3. Potentiometer ground
- 4. Potentiometer signal
- 5. Sensor reference voltage(+5V)

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -273

- 4) Is the measured resistance within specifications?

YES

Go to "Check for short to ground in harness" procedure.

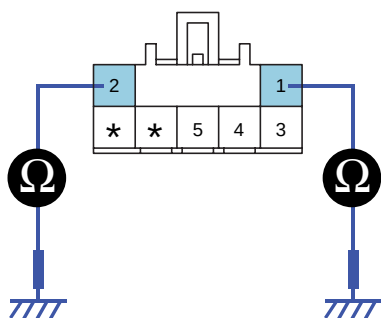
NO

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

2. Check for short to ground in harness.

- 1) Ignition "OFF"
- 2) Disconnect Passenger mode Actuator.
- 3) Measure resistance between terminal "1,2" of Passenger Direction Motor and chassis ground.

Specification : Approx. $\infty \Omega$



1. Motor

2. Motor

3. Potentiometer ground

4. Potentiometer signal

5. Sensor reference voltage(+5V)

LQKG529C

- 4) Is the measured resistance within specifications?

YES

Go to "Visual/Physical Inspection " procedure.

NO

Check for short to ground in signal harness. Repair as necessary and go to "Verification of Vehicle Repair" procedure.

VISUAL/PHYSICAL INSPECTION

E50E56B6

1. Check actuator.
 - ※ Check if Passenger Direction Actuator works properly through ACTUATION TEST.
- 1) Ignition : ON
- 2) Connect Scantool and select " ACTUATION TEST" mode and press [F1]

1.3 ACTUATION TEST	
PASSENGER AIR OUTLET MODE-PASSENGER FOOT	
DURATION	UNTIL STOP KEY
METHOD	ACTIVATION
CONDITION	IG. KEY ON ENGINE RUNNING
PRESS [STRT], IF YOU ARE READY!	
[STRT]	[STOP]

Fig. 3

Fig 3 : Selecting "ACTUATION TEST" mode.

LQKG9900

3) Does Passenger Direction Actuator work properly?

YES

Go to "Component Inspection" procedure.

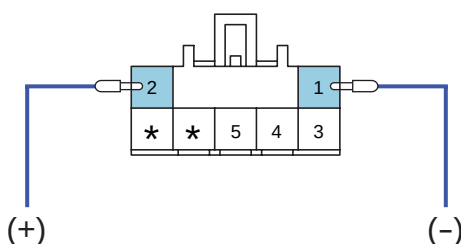
NO

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E2354556

1. Check actuator.

- 1) Ignition "OFF"
- 2) Disconnect Passenger Direction potentiometer.
- 3) Verify that the mode actuator operates to the vent mode when connecting 12V to the terminal "1 and grounding terminal "2.
- 4) Verify that the mode actuator operates to the def mode when the connections are reversed.



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823H

5) Does the actuator work properly?

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -275

YES

Go to "Check potentiometer" procedure.

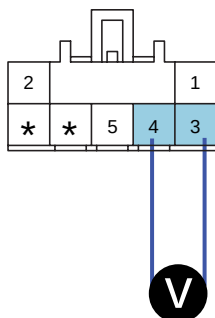
NO

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

2. Check potentiometer

- 1) Ignition "ON"
- 2) Connect Passenger Direction potentiometer.
- 3) Measure voltage between terminal "3" and "4" of Passenger Direction potentiometer as the mode switch is operated.

Specification : Refer the specifications in fig 3



1. Motor
2. Motor
3. Potentiometer ground
4. Potentiometer signal
5. Sensor reference voltage(+5V)

LQKG823I

Door position	Voltage (3-4)	Error detecting
VENT	$0.3 \pm 0.15V$	Under voltage : 0.08V or less Over voltage : 4.92V or more
BI-LEVEL(1)	$1.35 \pm 0.4V$	
BI-LEVEL(2)	$2.25 \pm 0.4V$	
FLOOR	$3.0 \pm 0.4V$	
MIX	$3.6 \pm 0.4V$	
DEF	$4.7 \pm 0.15V$	

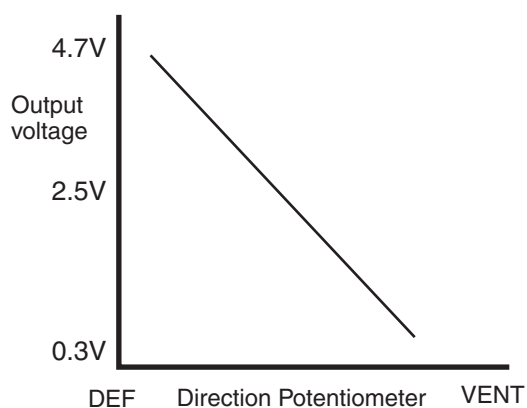


Fig. 3

Fig 3) Specifications : Voltage value as a function of position of direction potentiometer.

EQBF523J

- 4) Is the measured voltage within specifications in fig3?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

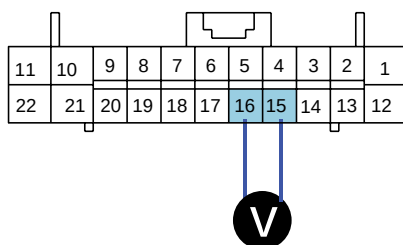
NO

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

3. Check A/C Control Unit.

- 1) Engine : "ON"
- 2) Connect A/C Control Unit.
- 3) Measure voltage between terminal "15" and "16" of A/C Control Unit while operating the mode switch.

Specification :Approx. 12V



15. Motor

16. Motor

LQKG990P

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -277

- 4) Is the measured voltage within specifications?

YES

Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

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

VERIFICATION OF VEHICLE REPAIR

ED389E33

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

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

YES

Go to the applicable troubleshooting procedure.

NO

System is performing to specification at this time.