

Heating, Ventilation and Air Conditioning

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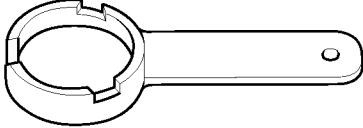
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GENERAL**SPECIFICATIONS** E19CDBDD

Item		Specification
Heater assembly	Heater Type	Air mix type
	Capacity	4,500 ± 10% kcal/hr
Evaporator	Cooling capacity	4,100 ± 10% kcal/hr
Cmpressor	Type	Swash plate (HS-15)
	Oil capacity	R140~160cc
	Pressure relief valve	Operating pressure : 35~42.2kg/cm ²
	Voltage	D.C 12.8 ± 0.2V
Magnetic clutch	Voltage & wattage	D.C 12.8 ± 0.2V, Max. 54W
	Torque	Min. 4.4kg.m
Refrigerant	Capacity	R-134a (600 ± 25g)
Triple pressure switch	High pressure	ON : 32.0 ± 2.0 kg/cm ² OFF : 26.0 ± 2.0 kg/cm ²
	Middle pressure	ON : 18.0 ± 0.8 kg/cm ² OFF : 14.0 ± 1.2 kg/cm ²
	Low pressure	ON : 2.3 ± 0.25 kg/cm ² OFF : 2.0 ± 0.2 kg/cm ²
Thermistor	A/C ON/OFF	ON : 3.0 ± 0.6 °C OFF : 1.5 ± 0.6 °C
Heater control assembly		MANUAL Type, AUTOMATIC Type

SPECIAL TOOLS E4CAE058

Tool (Number and name)	Illustration	Use
09977-29000 Pressure plate bolt remover	 <p>EQA9002A</p>	Removal and installation of pressure plate

PRECAUTIONS E3A2FE60

The air conditioning system uses R-134a refrigerant and FD46XG (PAG) refrigerant oil, which are not compatible with R-12 refrigerant and mineral oil. Do not use R-12 refrigerant or mineral oil in this system, and do not attempt to use R-12 servicing equipment; damage to the air conditioning system or your servicing equipment will result.

**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.

R-134a service equipment or vehicle air conditioning systems should not be pressure tested or leak tested with compressed air.

**WARNING**

- **Compressed air mixed with R-134a forms a combustible vapor.**
- **The vapor can burn or explode causing serious injury.**
- **Never use compressed air to pressure test R-134a service equipment or vehicle air conditioning systems.**

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

- Always disconnect the negative cable from the battery whenever replacing air conditioning parts.
- Keep moisture and dirt out of the system. When disconnecting any lines, plug or cap the fittings immediately; don't remove the caps or plugs until just before you reconnect each line.
- Before connecting any hose or line, apply a few drops of refrigerant oil to the O-ring.
- When tightening or loosening a fitting, use a second wrench to support the matching fitting.
- When discharging the system, use a R-134a refrigerant recovery/recycling/charging station; don't release refrigerant into the atmosphere.

TROUBLESHOOTING E8AB3D75

of the problem. Check each part in order. If necessary, replace these parts

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause

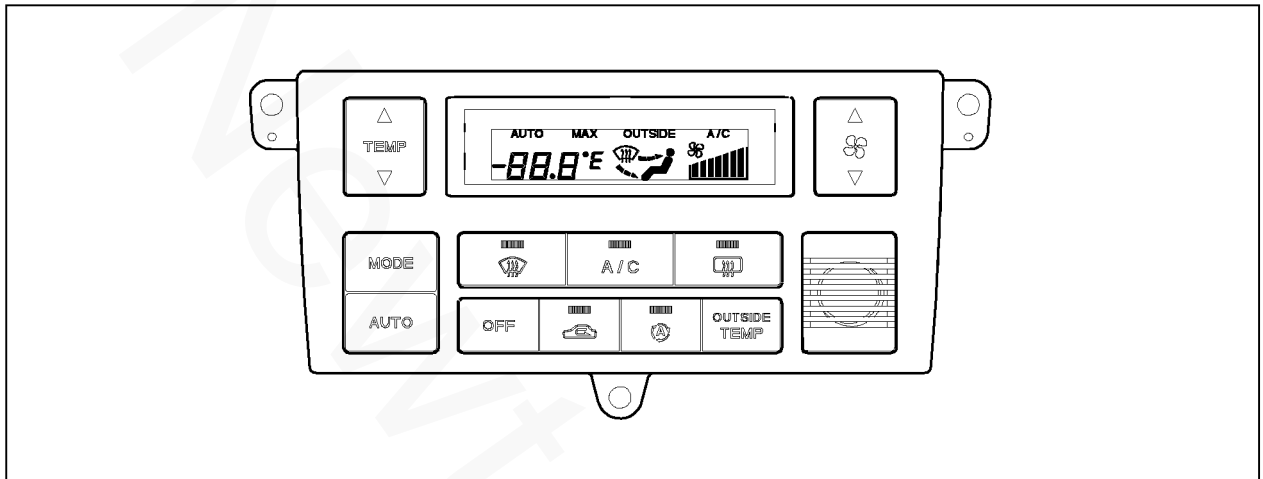
STANDARD

Symptom	Suspect Area	Remedy
No blower operation	<ol style="list-style-type: none"> 1. HTR Fuse 2. Blower relay 3. Blower motor 4. Blower resistor 5. Blower speed control switch 6. Wire harness 	Replace Replace Replace Replace Replace Replace
No air temperature control	<ol style="list-style-type: none"> 1. Engine coolant capacity 2. Heater control assembly 	Add coolant Replace
No compressor operation	<ol style="list-style-type: none"> 1. Refrigerant capacity 2. A/C Fuse 3. Magnetic clutch 4. Compressor 5. Triple pressure switch 6. A/C switch 7. Thermistor 8. Wire harness 	Add refrigerant Replace Replace Replace Replace Replace Replace Replace
No cool comes out	<ol style="list-style-type: none"> 1. Refrigerant capacity 2. Refrigerant pressure 3. Drive belt 4. Magnetic clutch 5. Compressor 6. Triple pressure switch 7. Thermistor 8. A/C switch 9. Heater control assembly 10. Wire harness 	Add refrigerant Apply a vacuum and add refrigerant Adjust Replace Replace Replace Replace Replace Replace Replace
Insufficient cooling	<ol style="list-style-type: none"> 1. Refrigerant capacity 2. Drive belt 3. Magnetic clutch 4. Compressor 5. Condenser 6. Expansion valve 7. Evaporator 8. Refrigerant lines 9. Triple pressure switch 10. Heater control assembly 	Add refrigerant Adjust Replace Replace Replace Replace Replace Replace Replace Replace
No engine idle-up when A/C switch ON	<ol style="list-style-type: none"> 1. Engine (and ECT) ECU 2. Wire harness 	- Replace
No air inlet control	Heater control assembly, cable, door	Replace
No mode control	Heater control assembly, cable, door	Replace
No condenser fan operation	<ol style="list-style-type: none"> 1. ECU-IG Fuse 2. Fan motor 3. Engine (and ECT) ECU 4. Wire harness 	Replace Replace - Replace

SELF-DIAGNOSIS E0E2CC72

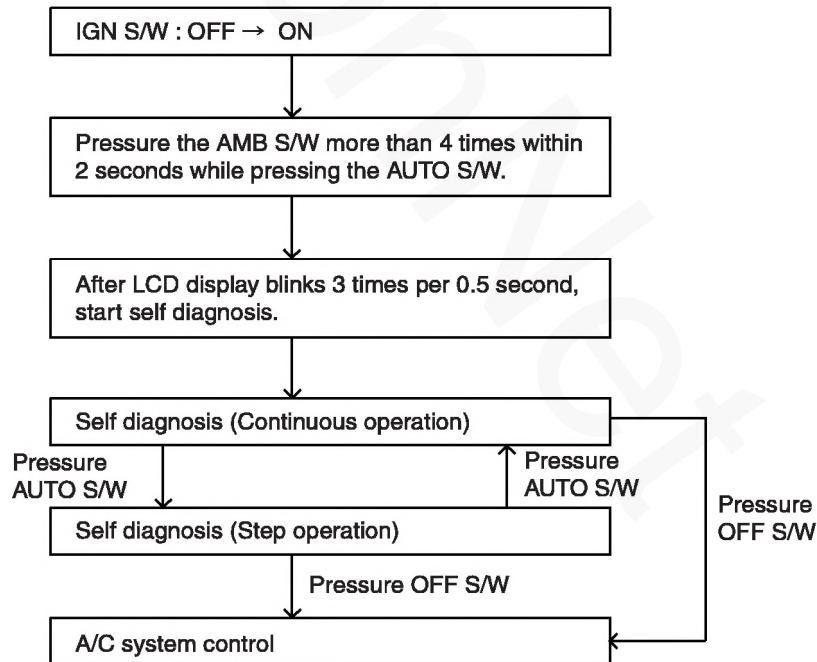
The Full Automatic Temperature Control (F.A.T.C) module self test feature will detect electrical malfunctions and provide error code for system components with suspected failures.

CONTROL PANEL



EQOE001C

SELF-DIAGNOSIS HETHOD

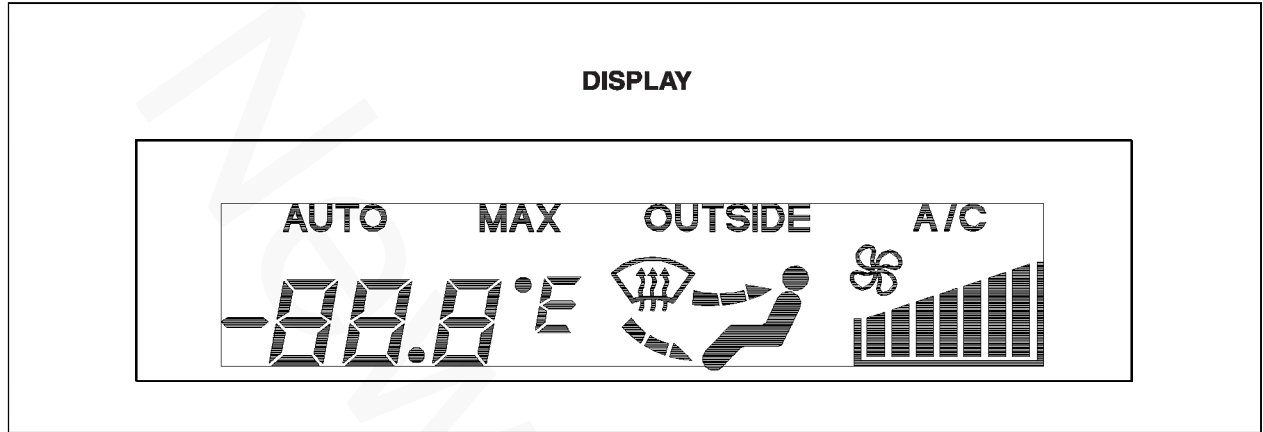


EQKE002A

HOW TO READ SELF-DIAGNOSTIC CODE

1. After the display panel flickers three times every 0.5 second, the corresponding error code flickers on the setup temperature display panel every 0.5 second and will show two figures.

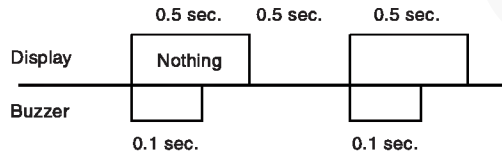
2. If error code is more than two, each code flicker 2 times in sequence.



EQKE001D

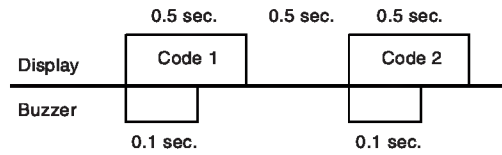
FAULT CODE DISPLAY

1. Normal



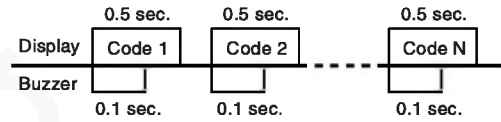
EQKE002B

2. One error code



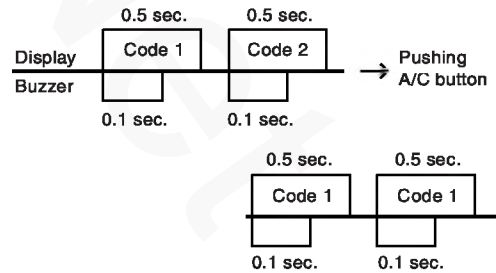
EQKE002C

3. More error codes than two



EQKE002D

4. Checking each error code



EQKE002E

DTC CHART

If malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below.

DTC code	Detection item	Trouble area
00	Normal	-
11	Open INCAR Sensor circuit	<ul style="list-style-type: none"> • Incar sensor • Harness or connector between incar sensor and A/C control assembly • A/C control assembly
12	Shorted INCAR Sensor circuit	
13	Open Ambient sensor circuit	<ul style="list-style-type: none"> • Ambient sensor • Harness or connector between ambient sensor and A/C control assembly • A/C control assembly
14	Shorted Ambient sensor circuit	
15	Open water temp. sensor	<ul style="list-style-type: none"> • Water temp. sensor • Harness or connector between water temp. sensor and A/C control assembly • A/C control assembly
16	Shorted water temp. sensor	
17	Open thermistor	<ul style="list-style-type: none"> • Pin thermistor • Harness or connector between evap. sensor and A/C control assembly • A/C control assembly
18	Shorted thermistor	
19	Open or shorted temp. door potentiometer	<ul style="list-style-type: none"> • Harness or connector between temp. door potentiometer and A/C control assembly
20	Defective temp. door potentiometer	<ul style="list-style-type: none"> • Temp. door potentiometer
21	Open or shorted mode door potentiometer	<ul style="list-style-type: none"> • Harness or connector between mode door potentiometer and A/C control assembly
22	Defective mode door potentiometer	<ul style="list-style-type: none"> • Mode door potentiometer

FAIL SAFE FUNCTION

No.	Item	Failure	FAIL SAFE Function
1	IN-CAR temperature sensor	Open/Short	25°C alternate value control
2	Ambient temperature sensor	Open/Short	20°C alternate value control
3	Thermistor sensor	Open/Short	-2°C alternate value control
4	Water temperature sensor	Open/Short	-20°C alternate value control
5	Temperature door potentiometer	Open/Short setup temperature	For 17°C to 24.5°C, set to maximum cooling position. For 25°C to 32°C, set to maximum heating position.
6	Mode door potentiometer	Open/Short setup mode	Vent mode, at vent mode Def mode, at except vent mode

INSPECT FOR LEAKAGE OF REFRIGERANT

EE5E2AFF

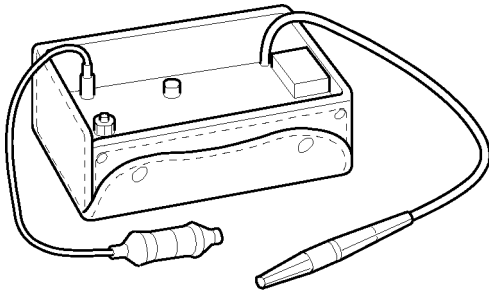
Always conduct a leak test with an electronic leak detector whenever leakage or refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening or connection fittings.

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.
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

A/C SYSTEM TESTS

PERFORMANCE TEST

The performance test will help determine if the air conditioner system is operating within specifications.

CAUTION

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- **Be careful when connecting service equipment.**
- **Do not breathe refrigerant or vapor.**

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

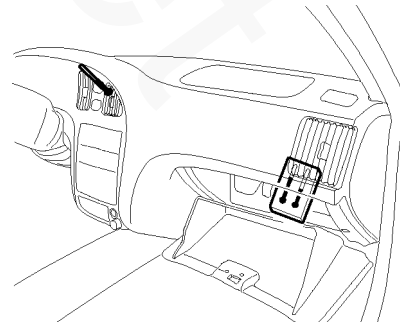
R-134a service equipment or vehicle air conditioning systems should not be pressure tested or leak tested with compressed air.

WARNING

- **Compressed air mixed with R-134a forms a combustible vapor.**
- **The vapor can burn or explode causing serious injury.**
- **Never use compressed air to pressure test R-134a service equipment or vehicle air conditioning systems.**

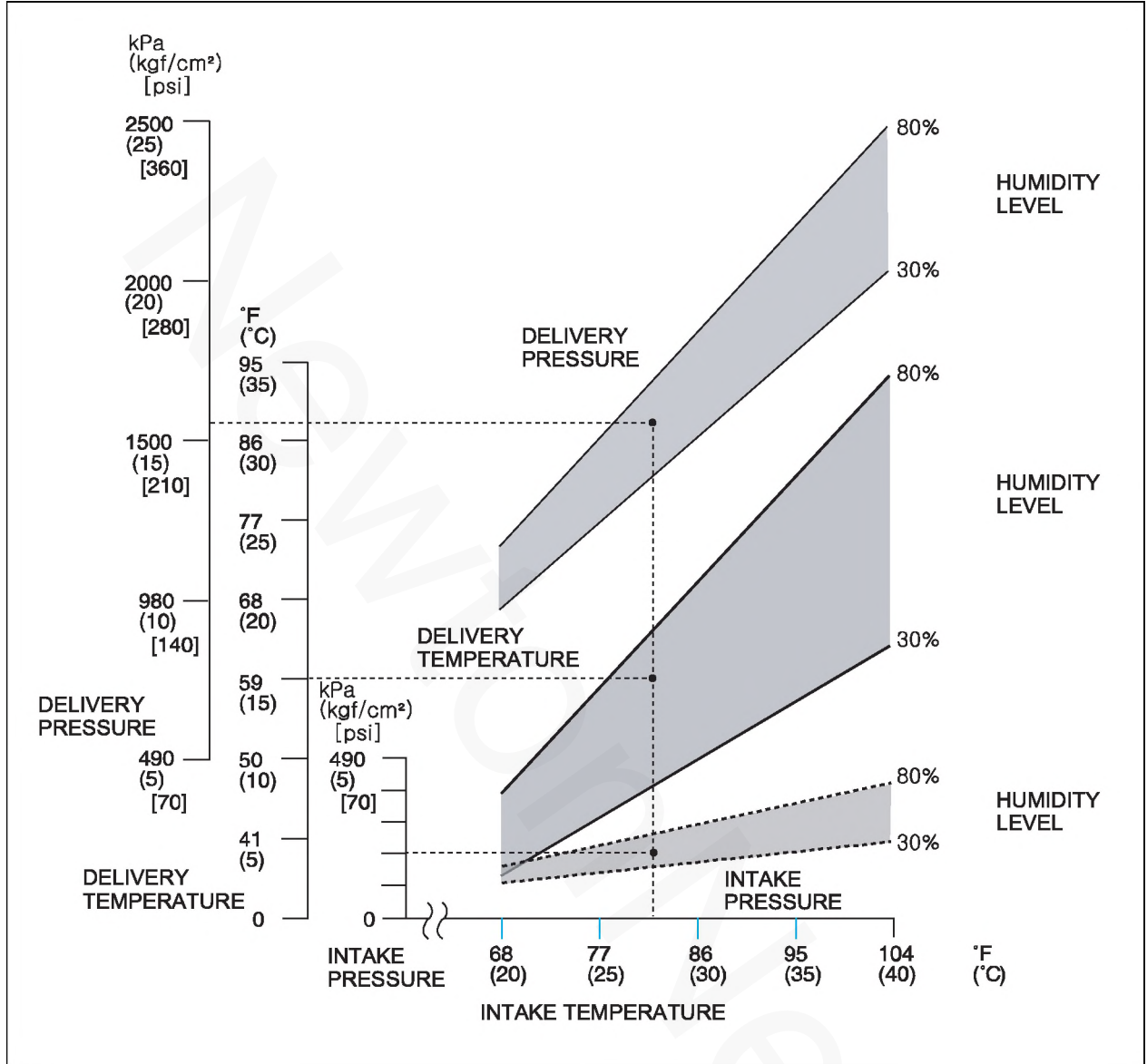
Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect a R-134a refrigerant recover/recycling/charging station to the high-pressure service port and the low-pressure service port, following the equipment manufacturer's instructions.
2. Insert a thermometer in the center vent. Determine the relative humidity and air temperature.



EQKE003A

3. Test conditions :
 - Avoid direct sunlight.
 - Open the hood.
 - Open the front doors.
 - Set the temperature control dial on MAX COOL, the mode control switch on VENT and the recirculation control switch on RE-CIRCULATE.
 - Turn the A/C switch on and the fan switch on MAX.
 - Run the engine at 1,500 rpm.
 - No driver or passengers in vehicle.
4. After running the air conditioning for 10 minutes under the above test conditions, read the delivery temperature from the thermometer in the dash vent, the intake temperature near the blower unit behind the glove box and the high and low system pressure from the A/C gauges.
5. To complete the chart
 - Mark the delivery temperature along the vertical line
 - Mark the intake temperature along the bottom line
 - Draw a line straight up from the air temperature to the humidity
 - Mark a point 10% above and 10% below the humidity level
 - From each point
 - Draw a horizontal line across the delivery temperature
 - The delivery temperature should fall between the two lines
 - Complete the low side pressure test and high side pressure test in the same way
 - Any measurements outside the line may indicate the need for more further inspection



REFRIGERANT RECOVERY

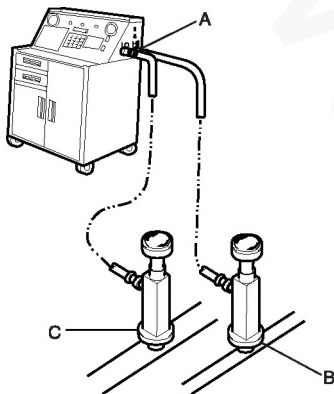
CAUTION

- **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 a R-134a refrigerant recovery/recycling/charging station(A) to the high-pressure service port(B) and the low-pressure service port(C), as shown, following the equipment manufacturer's instruction.



EQKE004A

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

SYSTEM EVACUATION

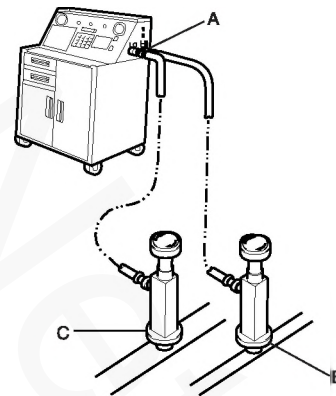
CAUTION

- **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 a R-134a refrigerant recover/recycling/charging station (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 a R-134a refrigerant recovery/recycling/charging station(A) to the high-pressure service port(B) and the low-pressure service port(C), as shown, following the equipment manufacturer's instruction. Evacuate the system.



EQKE004A

3. If the low-pressure does not reach more than 93.3 kPa (700 mmHg, 27.6 in.Hg) in 15 minutes, there is probably a leak in the system. Partially charge the system, and check for leaks.

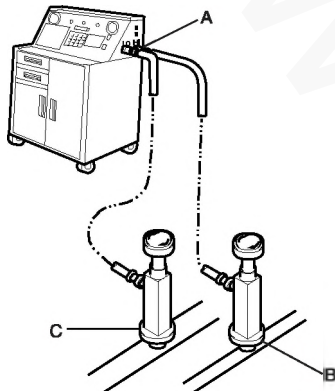
SYSTEM CHARGING

 **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 a R-134a refrigerant recover/recycling/charging station(A) to the high-pressure service port(B) and the low-pressure service port(C), as shown, following the equipment manufacturer's instructions.

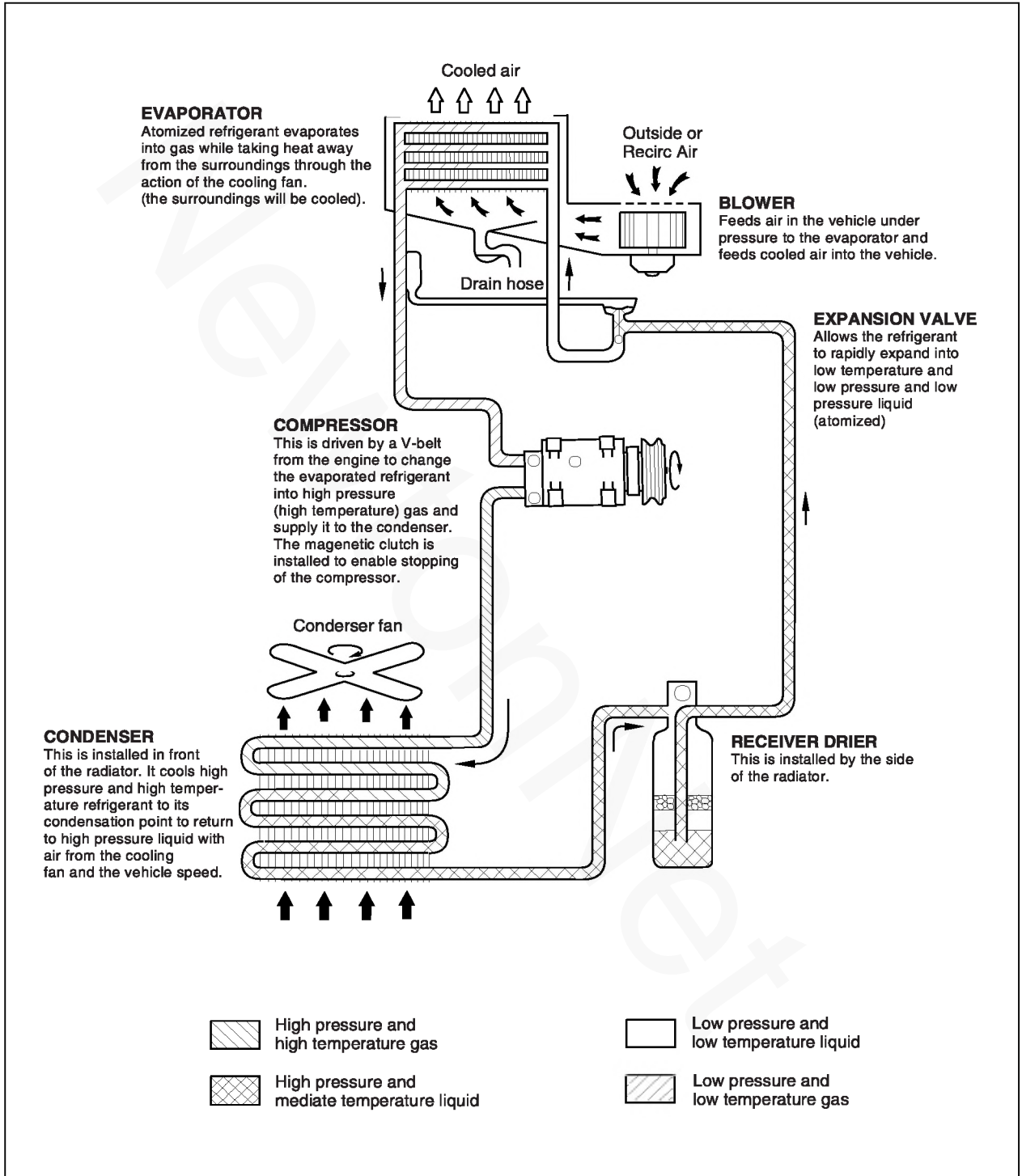


EQKE004A

2. Add the same amount of new refrigerant oil to the system that was removed during recovery. Use only FD46XG (PAG) refrigerant oil
3. Charge the system with the specified amount of R-134a refrigerant. Do not overcharge the system; the compressor will be damaged.

Refrigerant capacity : 600 ± 25g

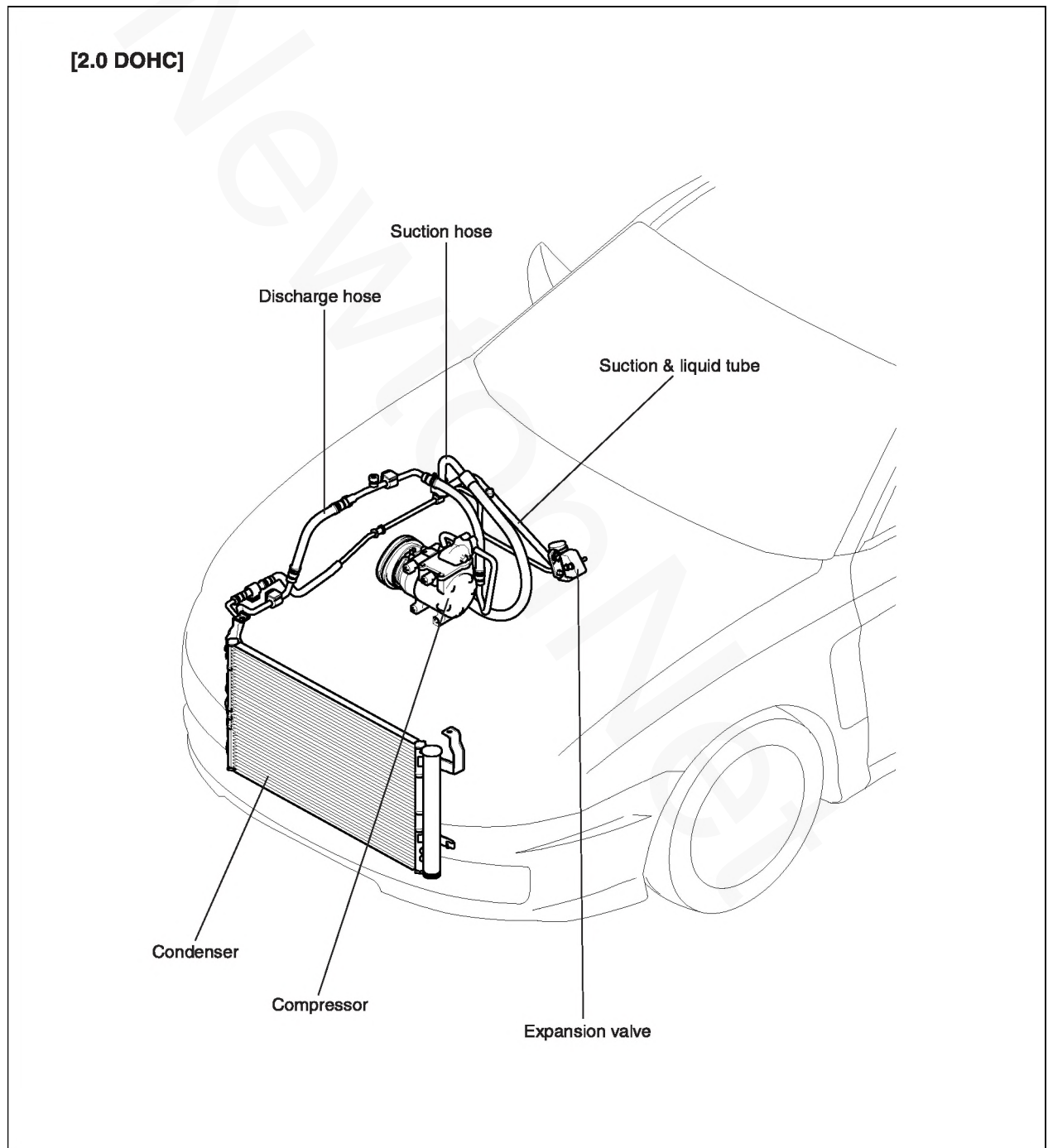
REFRIGERATION CYCLE E18AD8FE



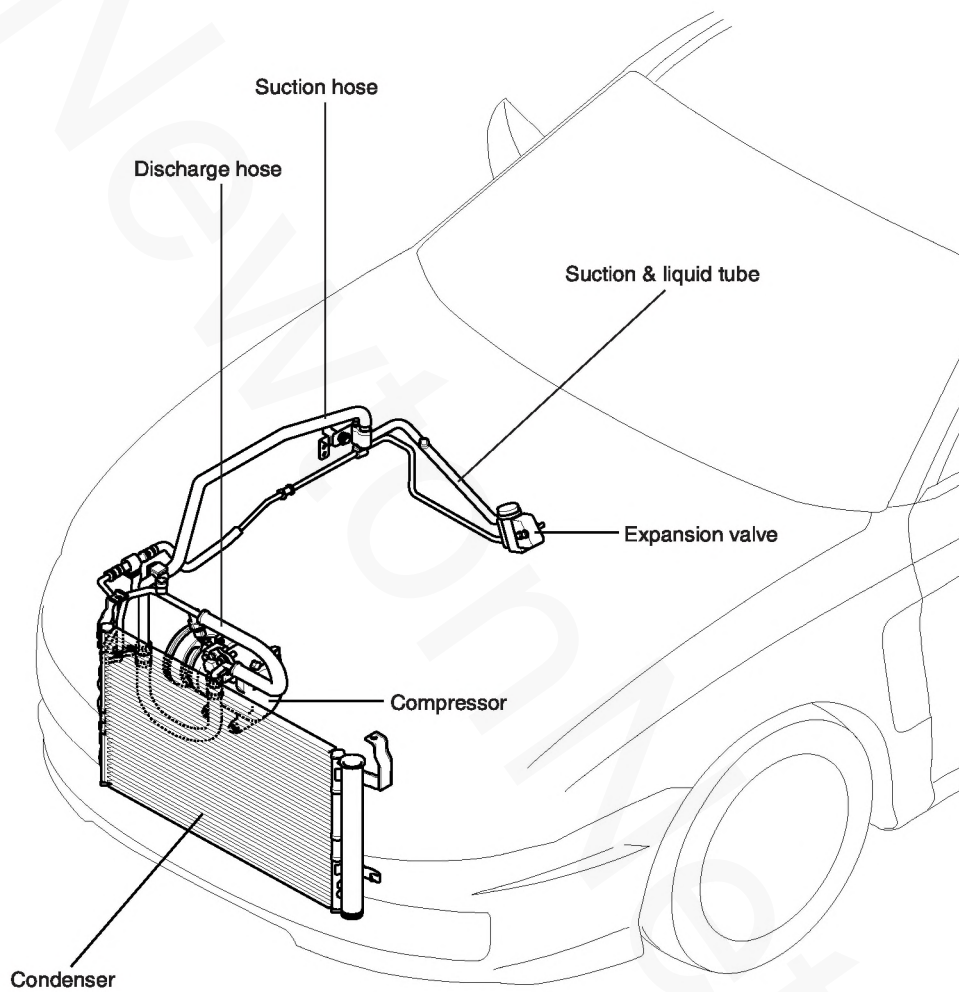
A/C COMPRESSOR CONTROLS (MANUAL)

REFRIGERANT LINE

COMPONENT LOCATION E6F0AD9B

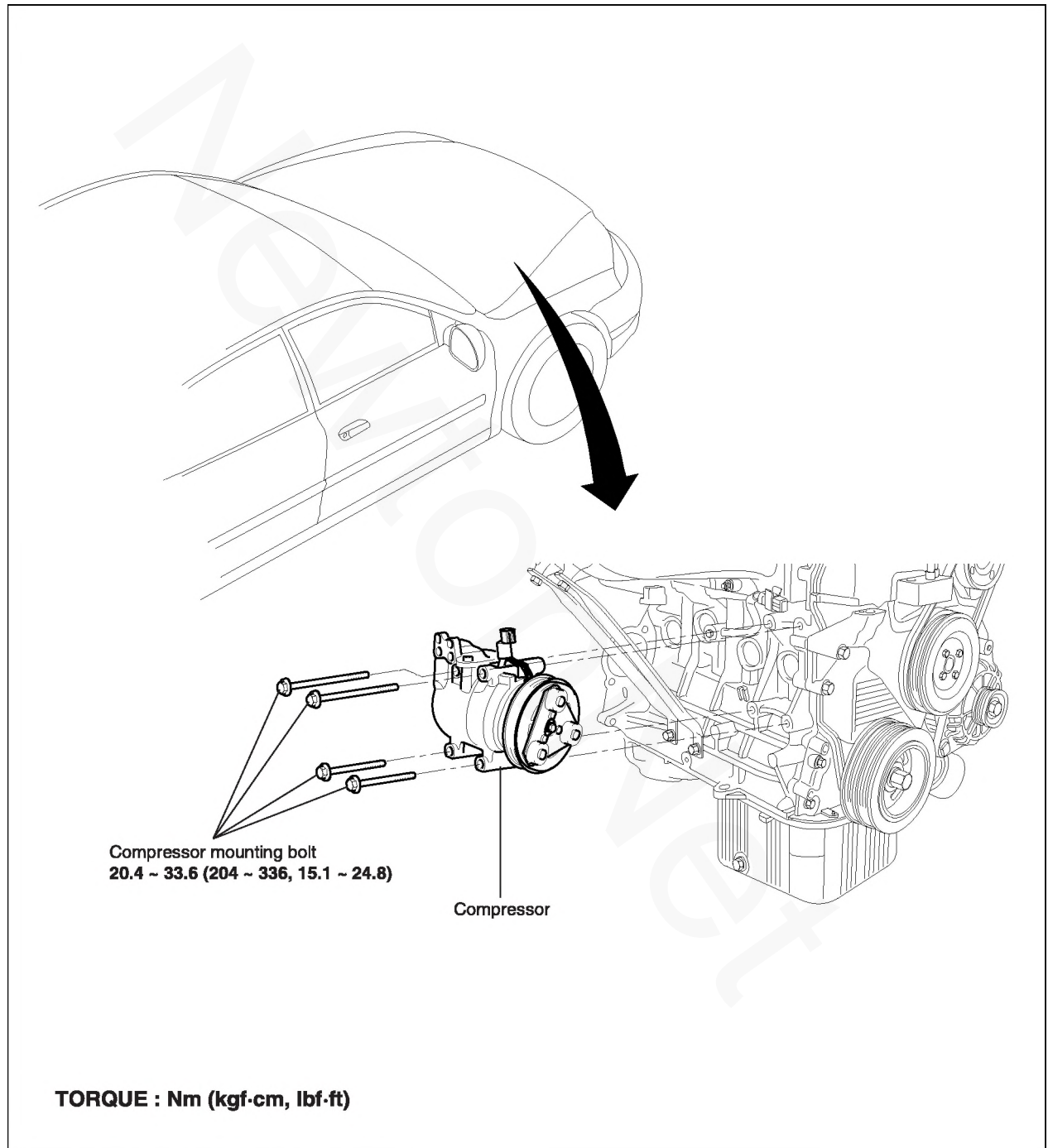


[2.7 DOHC]



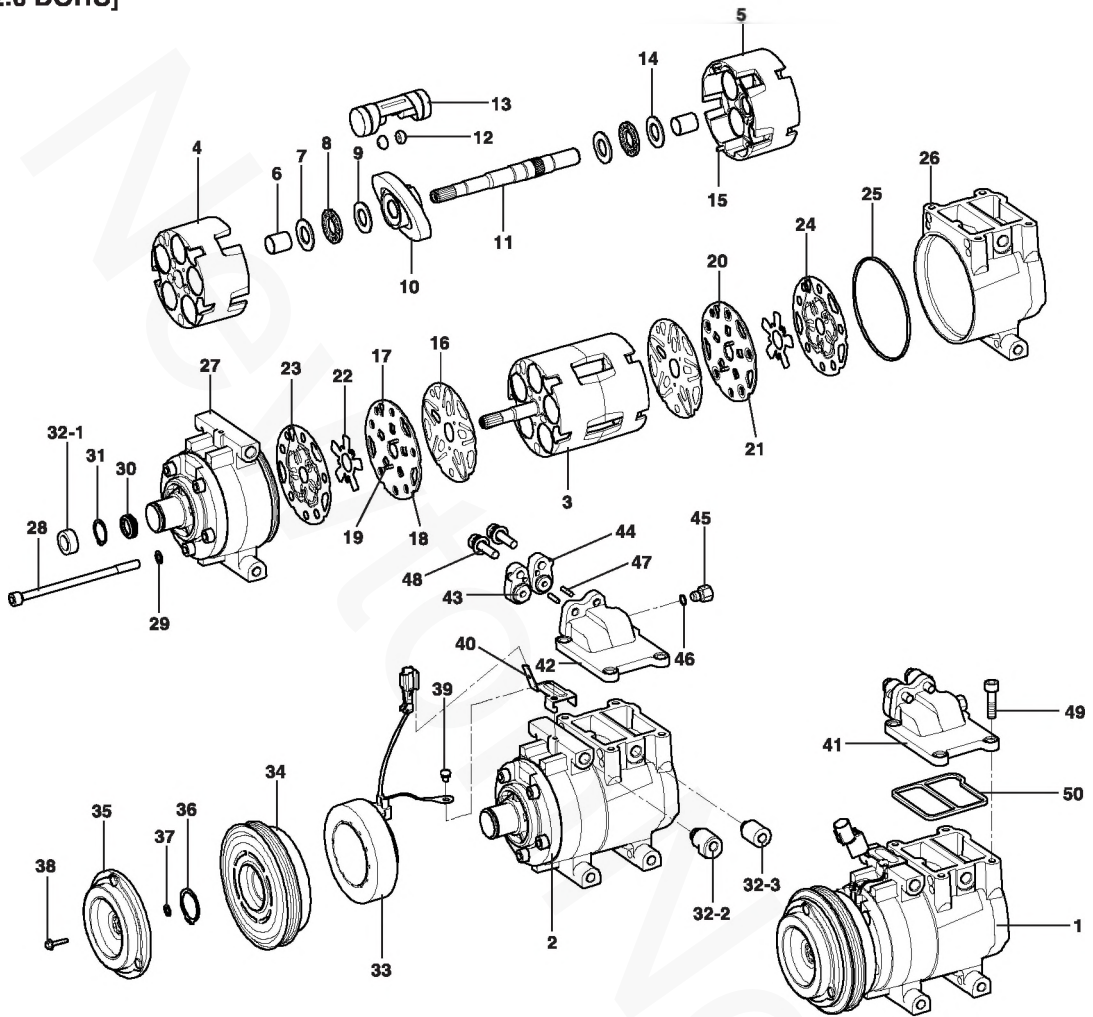
COMPRESSOR

COMPONENT LOCATION EBF8E2A3



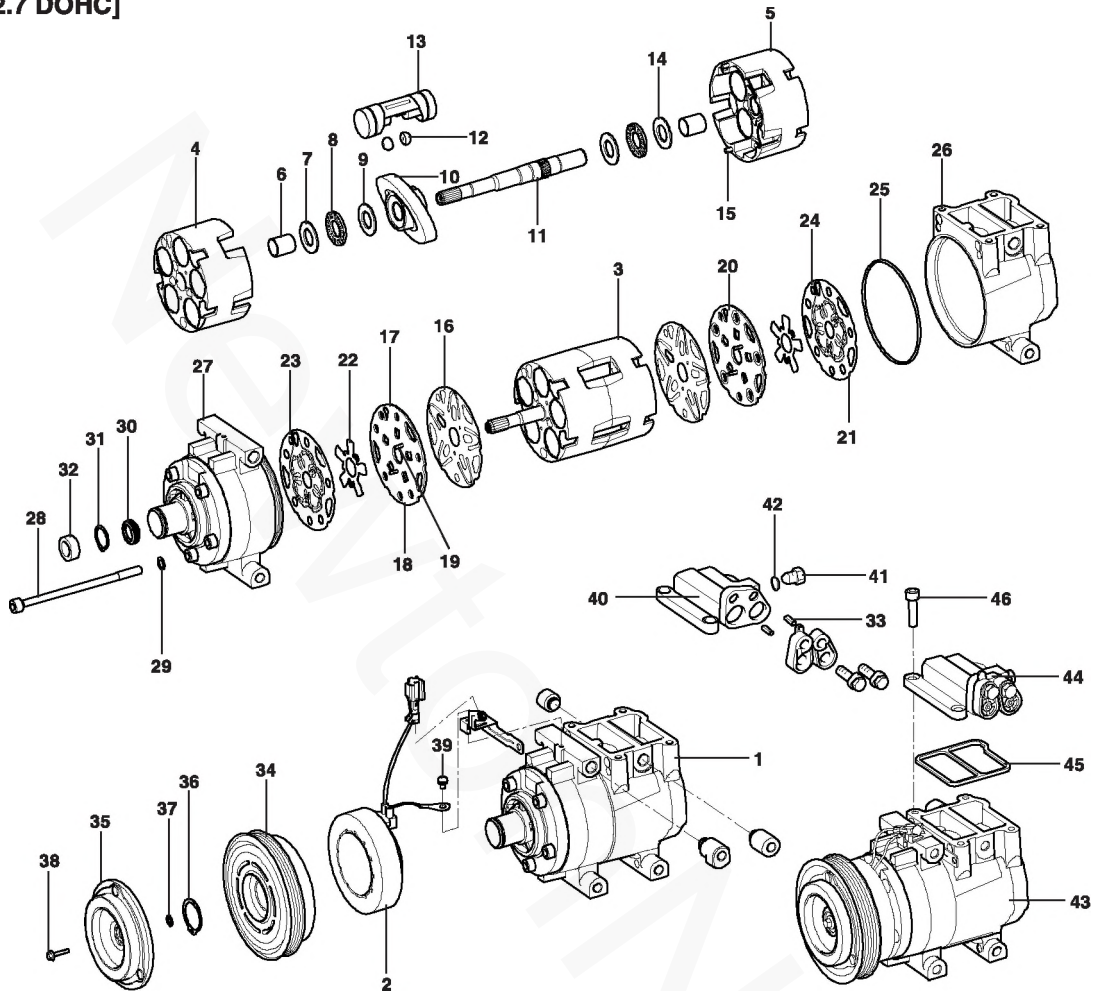
COMPONENTS E5C4FA06

[2.0 DOHC]



- | | | | |
|---------------------------------|---------------------------|------------------------|-----------------------|
| 1. Compressor & clutch assembly | 14. Thrust bearing race E | 27. Front head | 38. Bolt |
| 2. Compressor assembly | 15. Pin spring | 28. Bolt | 39. Screw |
| 3. Cylinder & shaft assembly | 16. Inlet reed | 29. Flat washer | 40. Connector bracket |
| 4. Front cylinder | 17. Front plate assembly | 30. Shaft seal | 41. Manifold assembly |
| 5. Rear cylinder | 18. Front plate | 31. Retainer ring | 42. Manifold |
| 6. Bushing | 19. Pin | 32-1 . Seal felt | 43. Suction cap |
| 7. Thrust bearing race A-K | 20. Rear plate assembly | 32-2 . Mounting spacer | 44. Discharge cap |
| 8. Thrust bearing | 21. Rear plate | 32-3 . Mounting spacer | 45. Relief valve |
| 9. Thrust bearing race L | 22. Discharge reed | 33. Field coil | 46. O-ring |
| 10. Swash plate | 23. Front gasket | 34. Pulley | 47. Pin knurling |
| 11. Shaft | 24. Rear gasket | 35. Disc & hub | 48. Flange head bolt |
| 12. Shoe | 25. O-ring | 36. Retainer ring | 49. Bolt wrench |
| 13. Piston | 26. Rear head | 37. Spacer | 50. Gasket |

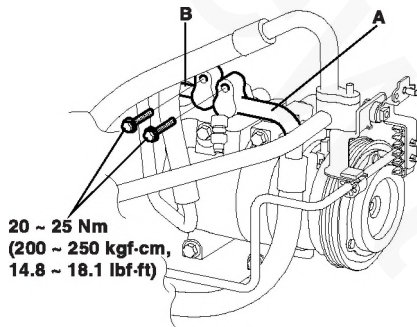
[2.7 DOHC]



- | | | |
|------------------------------|--------------------------|----------------------------------|
| 1. Compressor assembly | 16. Inlet reed | 31. Retainer ring |
| 2. Field coil | 17. Front plate assembly | 32. Seal felt |
| 3. Cylinder & shaft assembly | 18. Front plate | 33. Pin knurling |
| 4. Front cylinder | 19. Pin | 34. Pulley |
| 5. Rear cylinder | 20. Rear plate assembly | 35. Disc & hub |
| 6. Bushing | 21. Rear plate | 36. Retainer ring |
| 7. Thrust bearing race A-K | 22. Discharge reed | 37. Spacer |
| 8. Thrust bearing | 23. Front gasket | 38. Bolt |
| 9. Thrust bearing race L | 24. Rear gasket | 39. Screw |
| 10. Swash plate | 25. O-ring | 40. Manifold |
| 11. Shaft | 26. Rear head | 41. Relief valve |
| 12. Shoe | 27. Front head | 42. O-ring |
| 13. Piston | 28. Bolt | 43. Compressor & clutch assembly |
| 14. Thrust bearing race E | 29. Flat washer | 44. Manifold assembly |
| 15. Pin spring | 30. Shaft seal | 45. Gasket |
| | | 46. Bolt wrench |

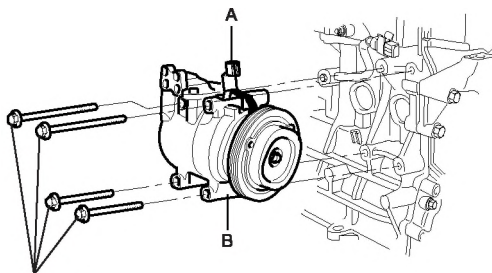
REPLACEMENT ECF5FE1F

1. If the compressor is marginally operable, run the engine at idle speed, and let the air conditioning work for a few minutes, then shut the engine off.
2. Disconnect the negative cable from the battery.
3. Recover the refrigerant with a recovery/charging station.
4. Loosen the drive belt.
5. Remove the nuts, then disconnect the suction line(A) and discharge(B) line from the compressor. Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.



EQKE101A

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

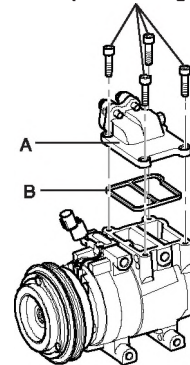


20 ~ 25 Nm
(200 ~ 250 kgf-cm, 14.8 ~ 18.1 lbf-ft)

EQKE101F

7. Using a hexagon wrench(6mm) remove the bolts, the manifold assembly(A) and the gasket(B) from the compressor.

17.8 ~ 23.5 Nm (178 ~ 235 kgf-cm, 13.1 ~ 17.3 lbf-ft)



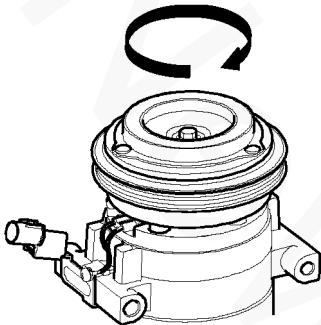
EQKE101C

8. 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 150ml 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.
- Charge the system, and test its performance.

INSPECTION EF06C5B3

1. Check the plated parts of the pressure plate for color changes, peeling or other damage. If there is damage, replace the clutch set.
2. Check the pulley 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.



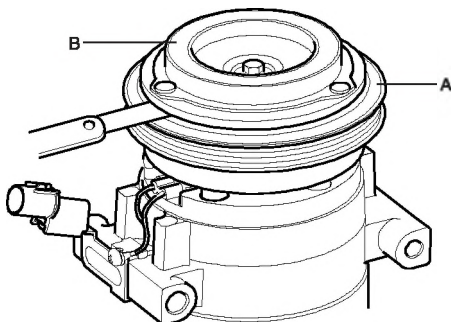
EQKE102A

3. Measure the clearance between the pulley(A) and the pressure plate(B) all the way around. If the clearance is not within specified limits, remove the pressure plate and add or remove shims as needed to increase or decrease clearance.

Clearance : $0.5 \pm 0.15\text{mm}$ (0.020 ± 0.006 in.)

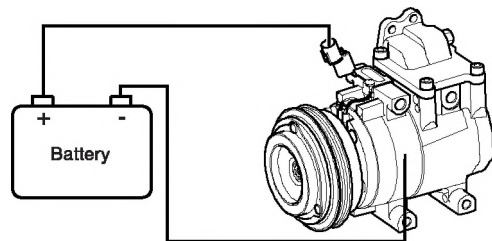
NOTE

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



EQKE102B

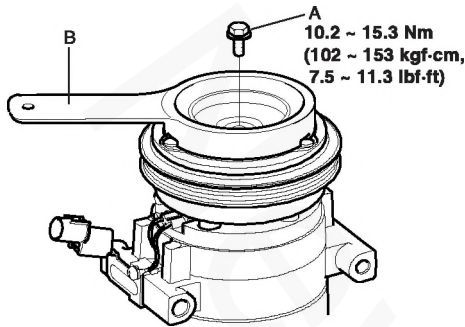
4. Check operating of the magnetic clutch.
Connect the compressor side terminals to the battery (+) terminal and the ground battery (-) terminal to the compressor body.
Check the magnetic clutch operating noise to determine the condition.



EQKE102C

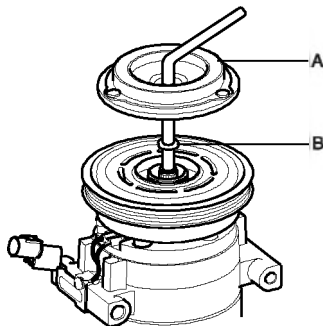
DISASSEMBLY EA6D4BBA

1. Remove the center bolt(A) while holding the pressure plate with a commercially available pressure plate bolt remover(B); Special tool number 09977-2900.



EQKE103A

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

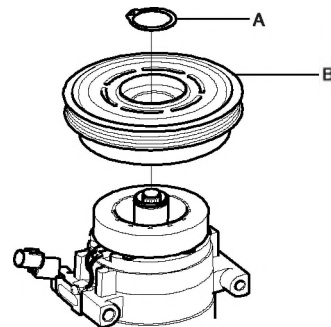


EQKE103B

3. If you replacing the field coil, remove snap ring(A) with snap ring pliers.

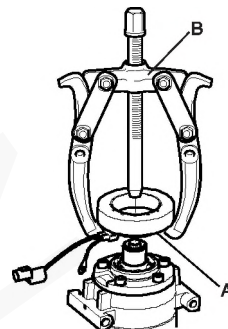
NOTE

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



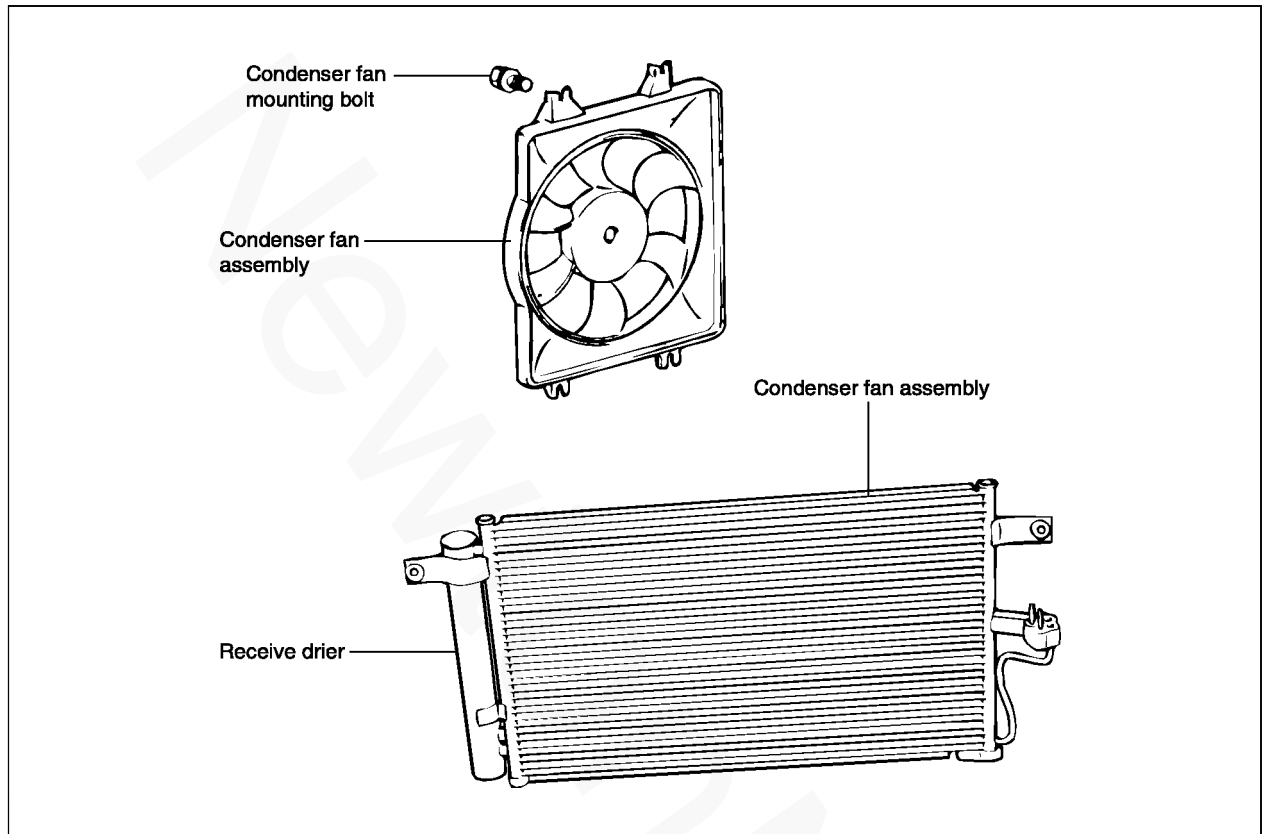
EQKE103C

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



EQKE103D

5. Reassemble the compressor clutch in the reverse order of disassembly, and note these items :
 - Install the field coil with the wire side facing down, and align the boss on the coil with the hole in the compressor.
 - Clean the pulley and compressor sliding surfaces with non-petroleum solvent.
 - Install new snap rings, and make sure they are fully seated in the groove.
 - Make sure that the pulley turns smoothly after it's reassembled.
 - Route and clamp the wires properly or they can be damaged by the pulley.

CONDENSER FAN AND RELAY**COMPONENTS** E7C0BA37

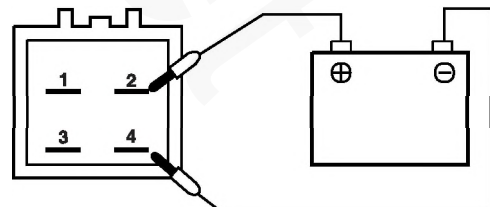
EQDA029A

CHECKING E17C6EC6**CONDENSER**

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

CONDENSER FAN

1. Check the connector for connection condition.
2. Check the condenser fan motor using battery voltage.

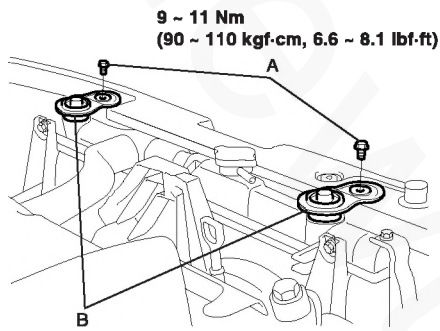


EQKA140A

CONDENSER

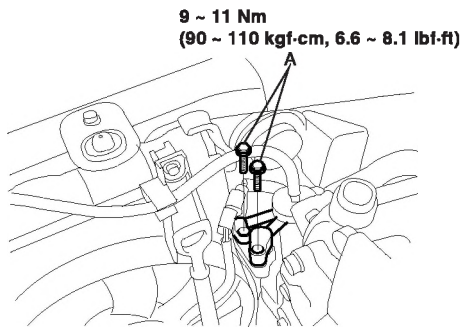
REPLACEMENT E6FCAD40

1. Recover the refrigerant with a recovery/recycling/charging station.
2. Remove the coolant reservoir, but do not disconnect the reservoir hose from the coolant reservoir and the radiator.
3. Remove the bolts(A), then remove the upper mount brackets(B) from the radiator.



EQKE121A

4. Remove the bolts(A), then disconnect the discharge line and condenser line from the condenser. Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.



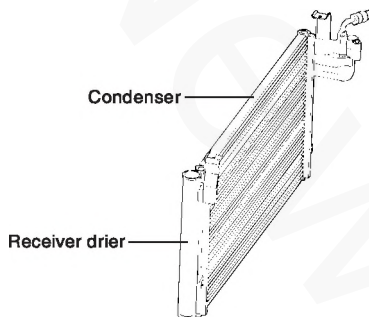
EQKE121B

5. Remove the bolts, then remove the condenser by lifting it up. Be careful not to damage the radiator and condenser fins when removing the condenser.
6. Install in the reverse order of removal, and note these items :
 - If you're installing a new condenser, add refrigerant oil FD46XG.
 - 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.

RECEIVER / DRIER

INSPECTION E5D28DEE

1. Check the fusible plug and the fittings for leakage, using a leak detector.
2. Run the engine at fast idle with the air conditioning "ON", and check both the inlet and outlet temperatures. If the difference in temperatures between the inlet and outlet is large, replace the receiver-drier.



EQHA201A

NOTE

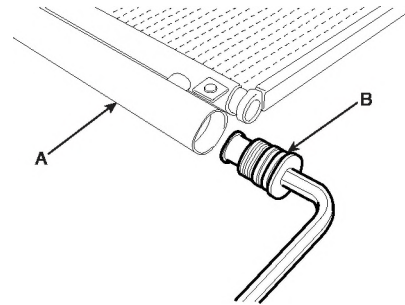
- Plug all the open fittings immediately to keep moisture out of the system.
- Do not remove plugs until ready for connection.
- If the receiver-drier is replaced with a new unit, add 40cc of compressor oil to the compressor.
- Evacuate, charge and test the refrigeration system.

3. Remove the condenser, and then remove the bottom cap (B) from the receiver/drier tank (A).

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

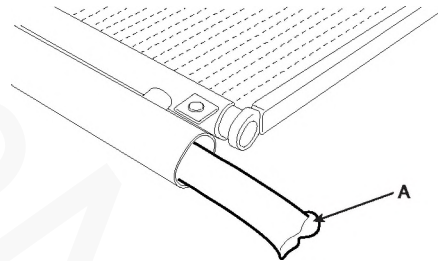
WARNING

Use of impact wrench may cause cracking on the receiver/drier tank connecting pipe to the condenser.



KQRE108D

4. Remove the desiccant (A) from the receiver/drier tank using a long nose plier.



KQRE108E

5. Check for crumbled desiccant and clogged bottom cap filter.
6. Apply air conditioning compressor oil along the O-rings and threads of the new bottom cap.
7. Insert the new desiccant into the receiver drier tank. The desiccant must be sealed in vacuum before it is exposed to air for use.
8. Install the new bottom cap to the receiver drier tank.

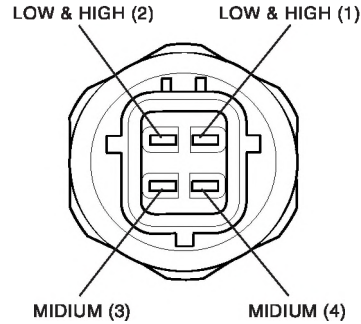
TRIPLE PRESSURE SWITCH

CONNECTOR ED2EFADC

DESCRIPTION E2E1F25A

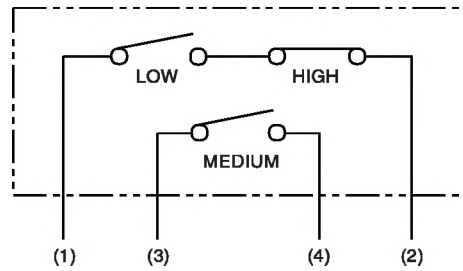
The triple switch is a combination of a medium switch as well as conventional low pressure and high pressure switches. The low pressure switch will turn off to stop compressor operation if refrigerant pressure is low. The high pressure switch will turn off to stop compressor operation if refrigerant pressure is too high. The medium switch will it turn on at a medium level pressure to determine the A/C system is overheating. It will cool the A/C system by operating the radiator fan and the condenser fan at high speed.

- Rating load : Inductive load DC 12V, 10~250mA
- Applicable voltage range : DC 8V ~ DC 16V
- Applicable temperature range : -30°C ~ 120°C
- Applicable refrigerant : R-134a
- Insulation resistance : Min. 100MΩ at DC 500V



EQKE130D

CIRCUIT DIAGRAM E051386C

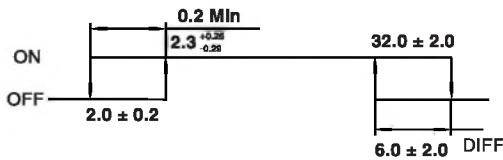


EQKE130E

Operating characteristics (kg/cm²)

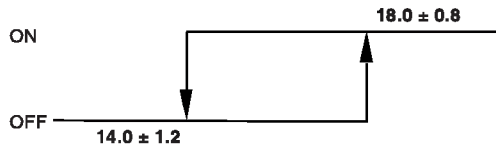
Pressure	ON	OFF
High	32.0 ± 2.0	26.0 ± 2.0
Low	2.3 + 0.25 / -0.29	2.0 ± 0.2
Medium	18.0 ± 0.8	14.0 ± 1.2

LOW & HIGH



EQKE130B

MEDIUM



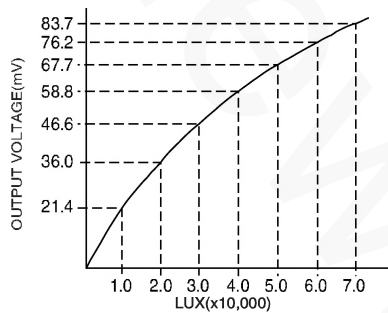
EQOE130C

A/C COMPRESSOR CONTROLS (FULL AUTO)

PHOTO SENSOR

DESCRIPTION EA4DCEA1

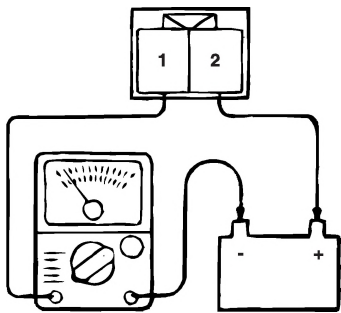
The photo sensor is located by the driver side defrost nozzle. In response to the photo intensity level in the vehicle, the sensor will send signals to control module to control the blower level and discharge temperature.



KFWD028A

NOTE

Emit intensive light toward driver side and passenger side using a lamp and check the current change between terminals 1 & 2.



S6HA030C

A.Q.S (AIR QUALITY SENSOR)

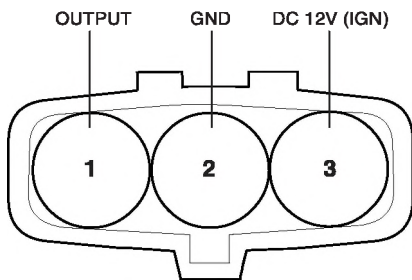
DESCRIPTION EDD9D16

1. The A.Q.S. sensor, located at the center support in front of the engine radiator, detects hazardous elements in ambient air and provides output signals to the control module.
2. It will detect sulfurous acid gas, carbon dioxide, carbon monoxide, hydrocarbon and allergen.
3. Sensitivity of used gas sensor
 - Sensitivity at NO2 0.3PPM : more than 2.8
 - Sensitivity at gasoline 10PPM : less than 0.45
4. Delay time
 - ON time (on) : 5sec.
 - OFF time (off) : 0sec.

SENSOR OUTPUT

Condition	Resistance
Normal condition	5V
Hazardous gas detection	0V

CONNECTOR E1D3D32D

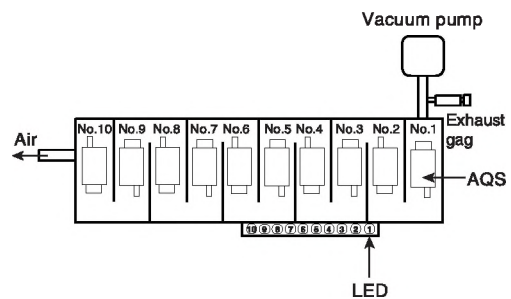


EQKE208B

INSPECTION EFBE40C3

CHECKING METHOD OF GAS DETECTING BENCH

1. Put the sensor part of AQS toward the air inflow (intake) direction.
2. Connect all of the power supply line and output line to AQS.
3. Close the chamber lid after putting the lines in order.
4. Connect the air outlet part of vacuum pump with the air inlet door of chamber by using air hose.



EQKE208C

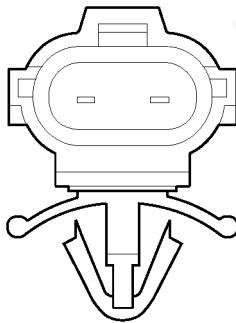
5. Turn on the power of vacuum pump.
6. Supply the power to the AQS. (DC 12V)
7. LED of AQS is kept "ON" for the first 35 ± 2 seconds after supplying the power.
8. Wait until all of the LEDs are "OFF". Put the diesel engine exhaust gas into the chamber. Then check the LEDs of number 1 to 10 are "ON".
9. After check LEDs are "ON". Put the clean air into the chamber. Then check LEDs are "OFF".
10. Wait until all of the LEDs are "OFF".
11. And then put the gasoline engine exhaust gas into the chamber, then check the LEDs of number 1 to 10 are "ON".
12. After check LEDs are "ON". Put the clean air into the chamber. Then check LEDs are "OFF".

AMBIENT TEMPERATURE SENSOR

DESCRIPTION E6B19A2F

1. The air temperature sensor, located at the front of the engine radiator, detects ambient air temperature. It is a negative type thermistor; resistance will increase with lower temperatures, and decrease with higher temperatures.
2. The sensor output will be used for discharge temperature sensor, sensor fail-safe, temperature regulation door control, blower motor level control, mix mode control and in-car humidity control.
 - R25°C : 30KΩ ± 3%
 - B(0/25) : 3754K ± 2%
 - Operation Temp. range : -30°C ~ 80°C

CONNECTOR E301CD3A



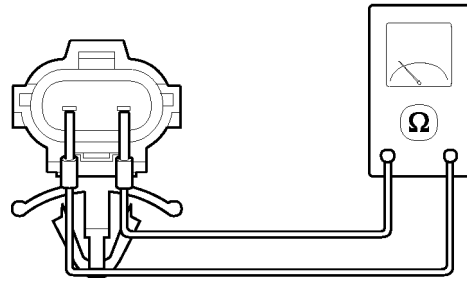
EQKE209C

INSPECTION E14B4E23

Measure the resistance.

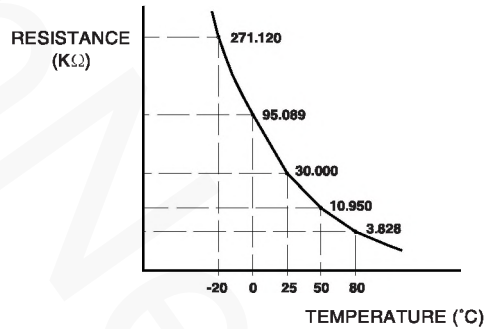
RESISTANCE-TEMP. CHARACTERISTIC TABLE

Temp (°C)	Rmin (kΩ)	R (kΩ)	Rmax (kΩ)
-20	261.090	271.120	281.150
0	92.617	95.089	97.656
25	29.550	30.000	30.450
50	10.676	10.950	11.224
80	3.964	3.828	3.366



EQKE209D

CHARACTERISTICS



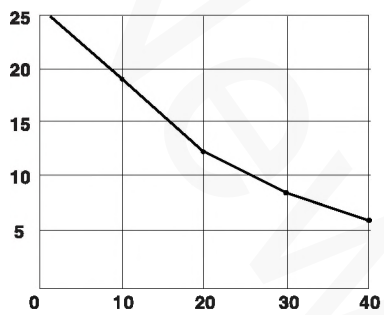
EQKE209F

IN CAR SENSOR

DESCRIPTION EA8D2BC7

It will detect interior temperature, which will be used for discharge temperature control, sensor failsafe, temperature door control, blower motor level control, and A/C auto control.

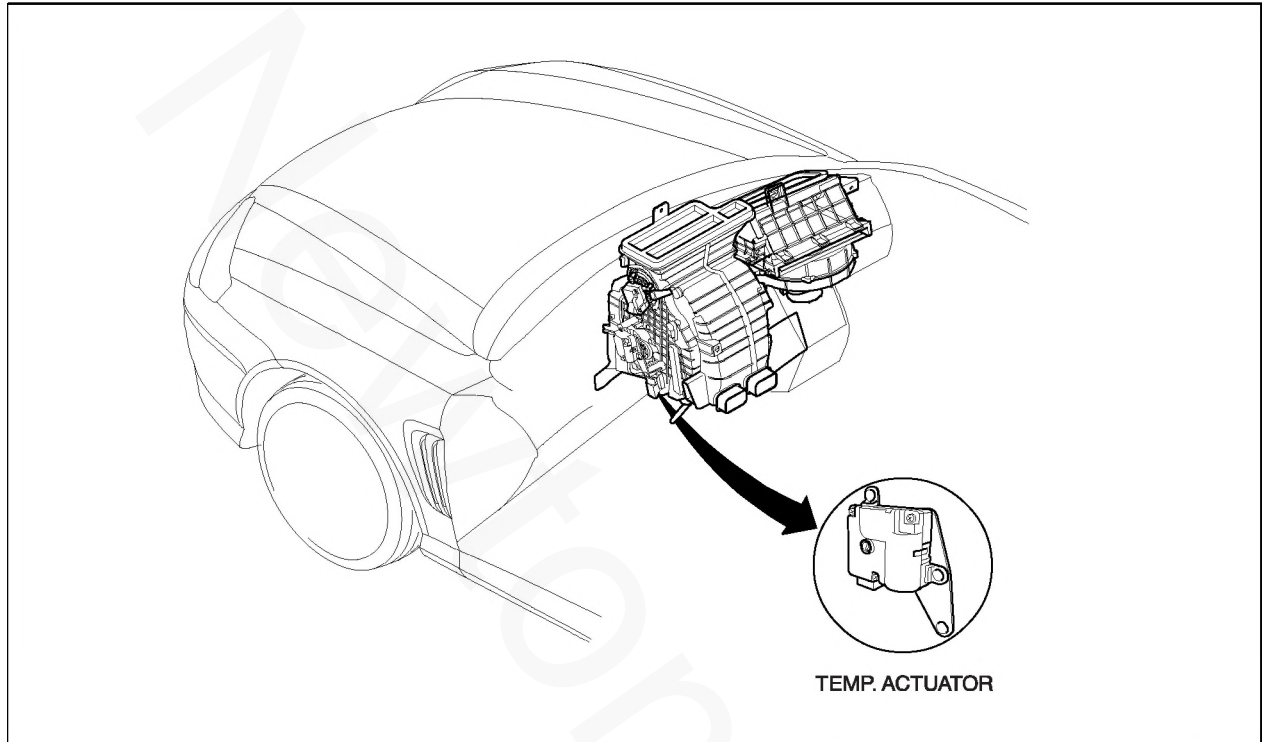
CHARACTERISTICS



EQKE210B

TEMP. ACTUATOR POTENTIOMETER

COMPONENT LOCATION E8649C6C



EQQE213A

DESCRIPTION EC1FD0C6

General performance

- Operating temp. : $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$
- Operating voltage : DC 9V ~ 16V
- Rated voltage : DC 12V
- Rated load : 4kgf/cm

Potentiometer specification

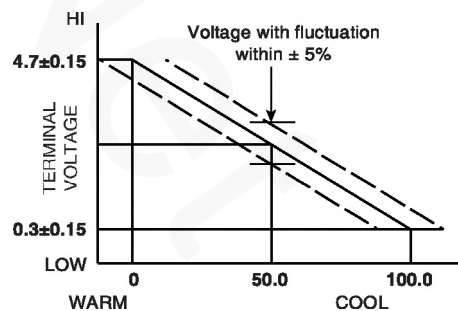
- Rated voltage : DC 12V
- Rated watt. : 0.25W (at 40°C)
- Operation volt : DC $5\text{V} \pm 0.5\text{V}$
- Total resistance : $5\text{k}\Omega \pm 10\%$

Basic performance

- Output lock torque : Min 1.76Nm (18kgf/cm) (at DC 12V)
- Rated AMP : Max. 150mA
- Lock vol. : Max. 400ma

Potentiometer

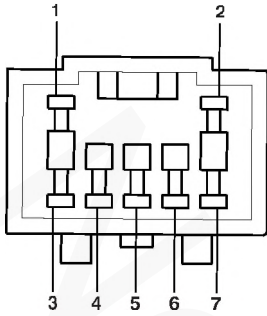
- Characteristics



The rotation direction is "WARM" when "+" applied at No.3 terminal in the view of output axis.

EQQE213B

CONNECTOR EFB91F5A

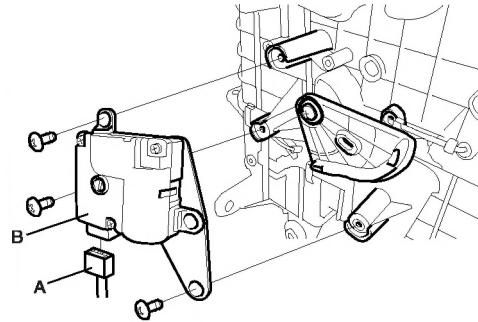


EQKE211C

Terminal No.	1	2	3	4	5	6	7
Mode	X	X	WARM	COOL	VCC (+)	F/B	SENSOR GND(-)

REPLACEMENT EDB785DA

1. Disconnect the 7P connector (A) from the temp. actuator (B). Remove the self-tapping screws and the temp. actuator from the heater unit.

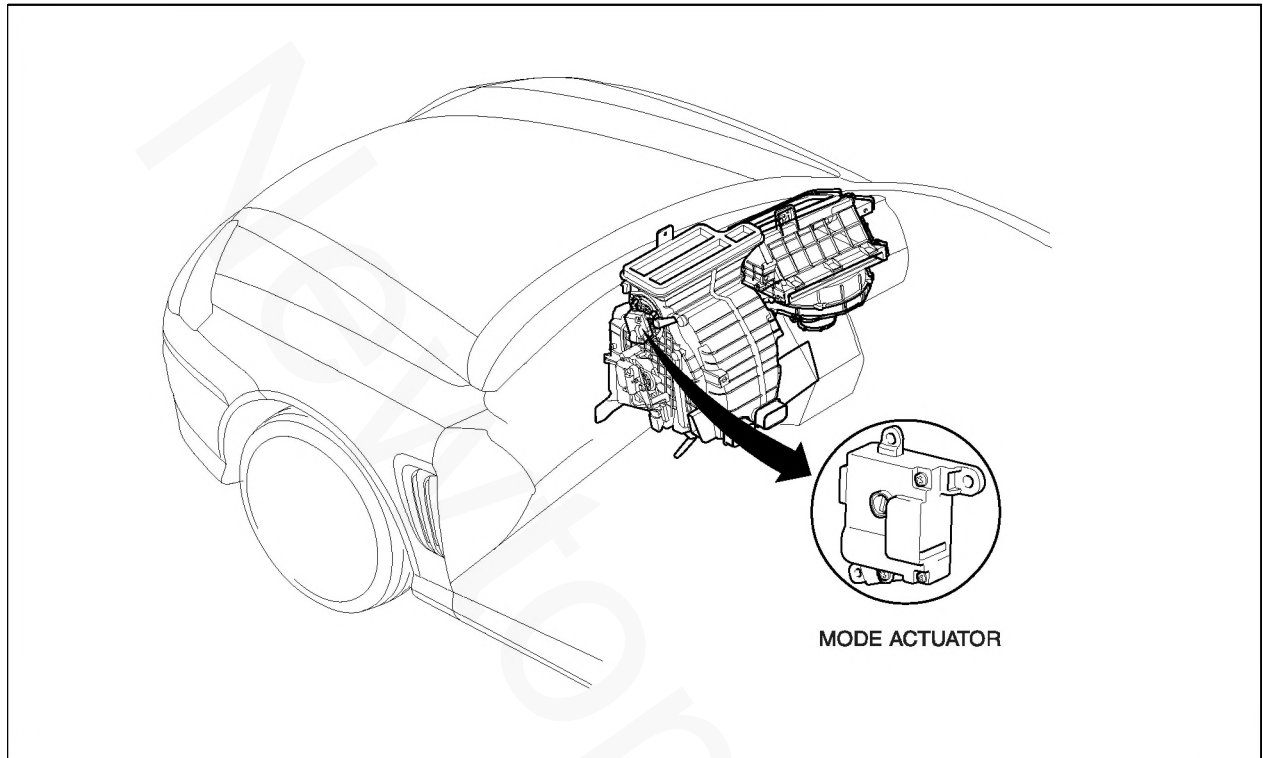


EQKE212C

2. Install in the reverse order of removal. After installation, make sure temp. actuator runs smoothly.

MODE CONTROL ACTUATOR

COMPONENT LOCATION E7BC0A7E



EQQE211A

DESCRIPTION EB3558EA

General performance

- Operating temp. : $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$
- Operating voltage : DC 9V ~ 16V
- Rated voltage : DC 12V
- Rated load : 4kgf/cm

Potentiometer specification

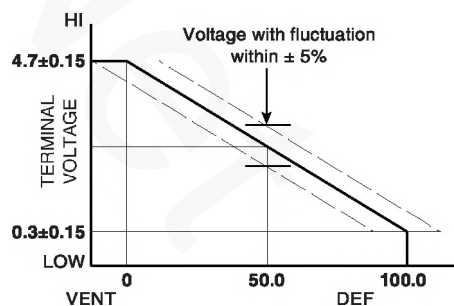
- Rated voltage : DC 12V
- Rated watt. : 0.25W (at 40°C)
- Operation volt : DC $5\text{V} \pm 0.5\text{V}$
- Total resistance : $5\text{k}\Omega \pm 10\%$

Basic performance

- Output lock torque : Min 1.76Nm (18kgf/cm) (at DC 12V)
- Rated AMP. : Max 150mA
- Lock vol. : Max. 400mA

Potentiometer

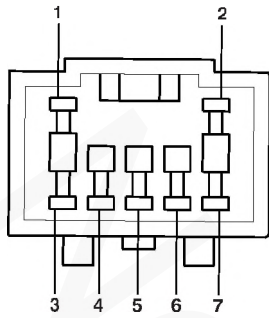
- Characteristics



The rotation direction is "VENT" when "+" applied at No.3 terminal in the view of output axis.

EQQE211B

CONNECTOR EC9DCDE8

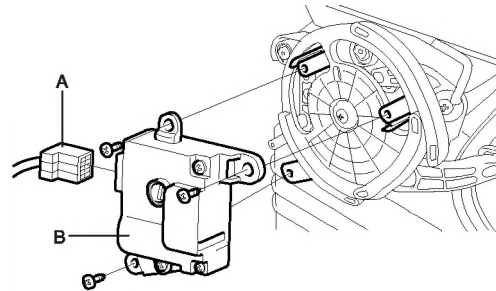


EQKE211C

Terminal No.	1	2	3	4	5	6	7
Mode	X	X	VENT	DEF	VCC (+)	F/B	SENSOR GND(-)

REPLACEMENT EAE93B9D

1. Remove the 7P connector (A) from the mode actuator (B). Remove the self-tapping screws and the mode actuator from the heater unit.

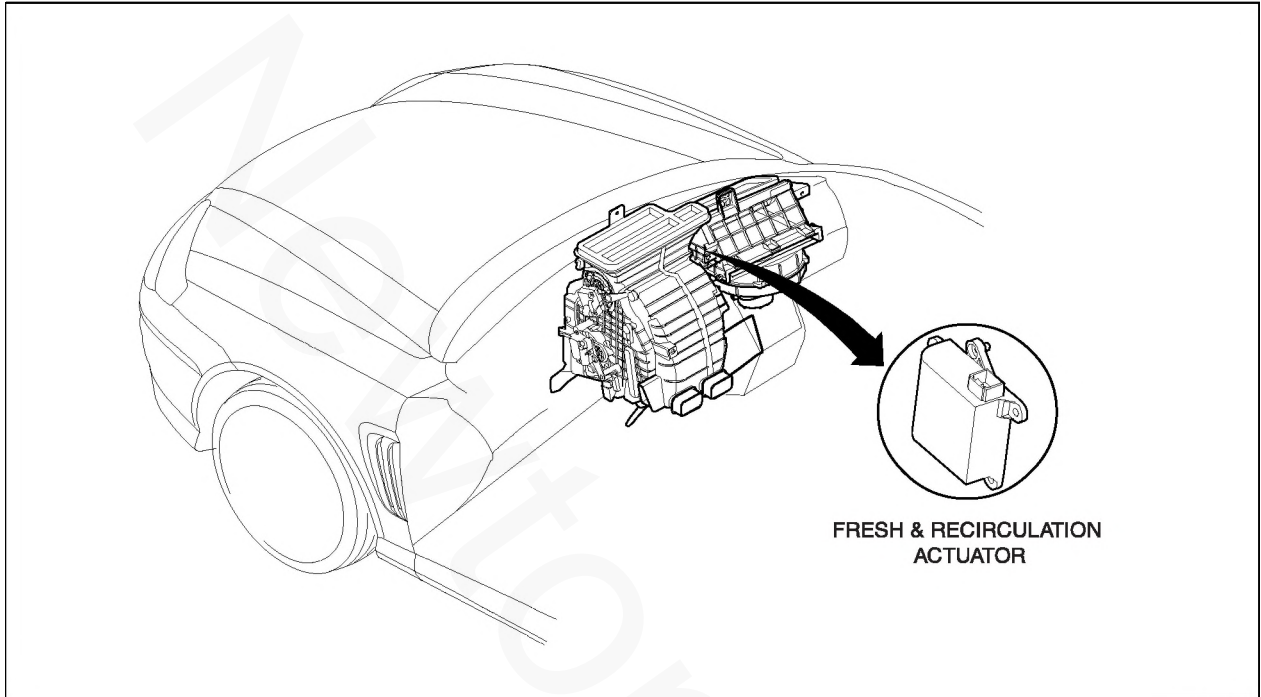


EQKE213C

2. Install in the reverse order of removal. After installation, make sure the mode actuator runs smoothly.

FRESH AND RECIRCULATION ACTUATOR

COMPONENT LOCATION E5A2EAFC



FRESH & RECIRCULATION ACTUATOR

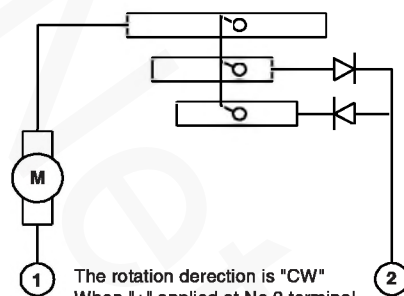
EQOE214A

DESCRIPTION E0ACBE08

General performance

- Operating temp. : -30°C ~ +80°C
- Operating voltage : DC 9V ~ 16V
- Rated voltage : DC 12V
- Rated load : 4kgf/cm

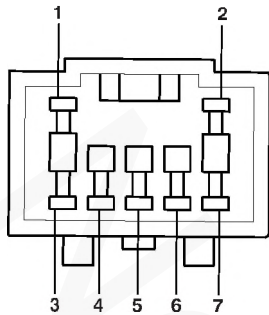
CIRCUIT DIAGRAM EF5EACA2



The rotation direction is "CW"
When "+" applied at No.2 terminal
in the view of output axis.

EQKE214B

CONNECTOR E6AAF50F

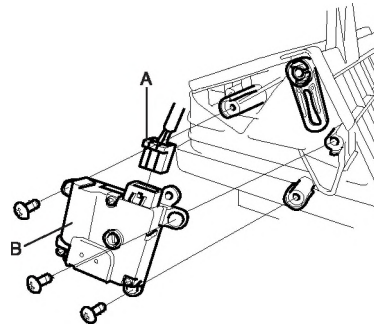


EQKE211C

Terminal No.	1	2	3	4	5	6	7
Mode	FRE	REC	X	X	X	X	X

REPLACEMENT E38A3111

1. Disconnect the 7P connector (A) from the inlet actuator (B). Remove the self-tapping screws and the inlet actuator from the blower unit.



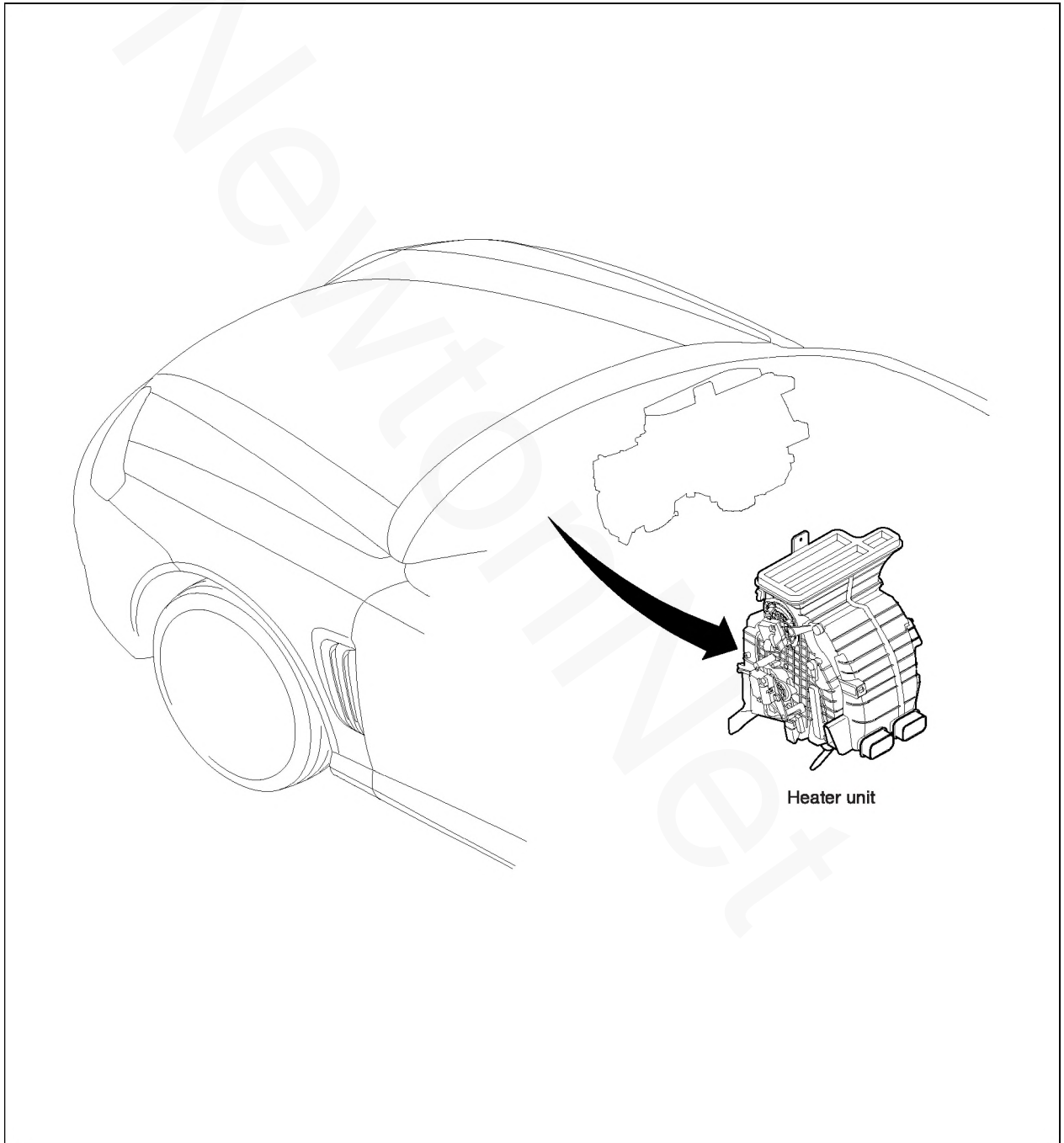
EQKE214C

2. Install in the reverse order of removal. After installation, make sure the inlet actuator runs smoothly.

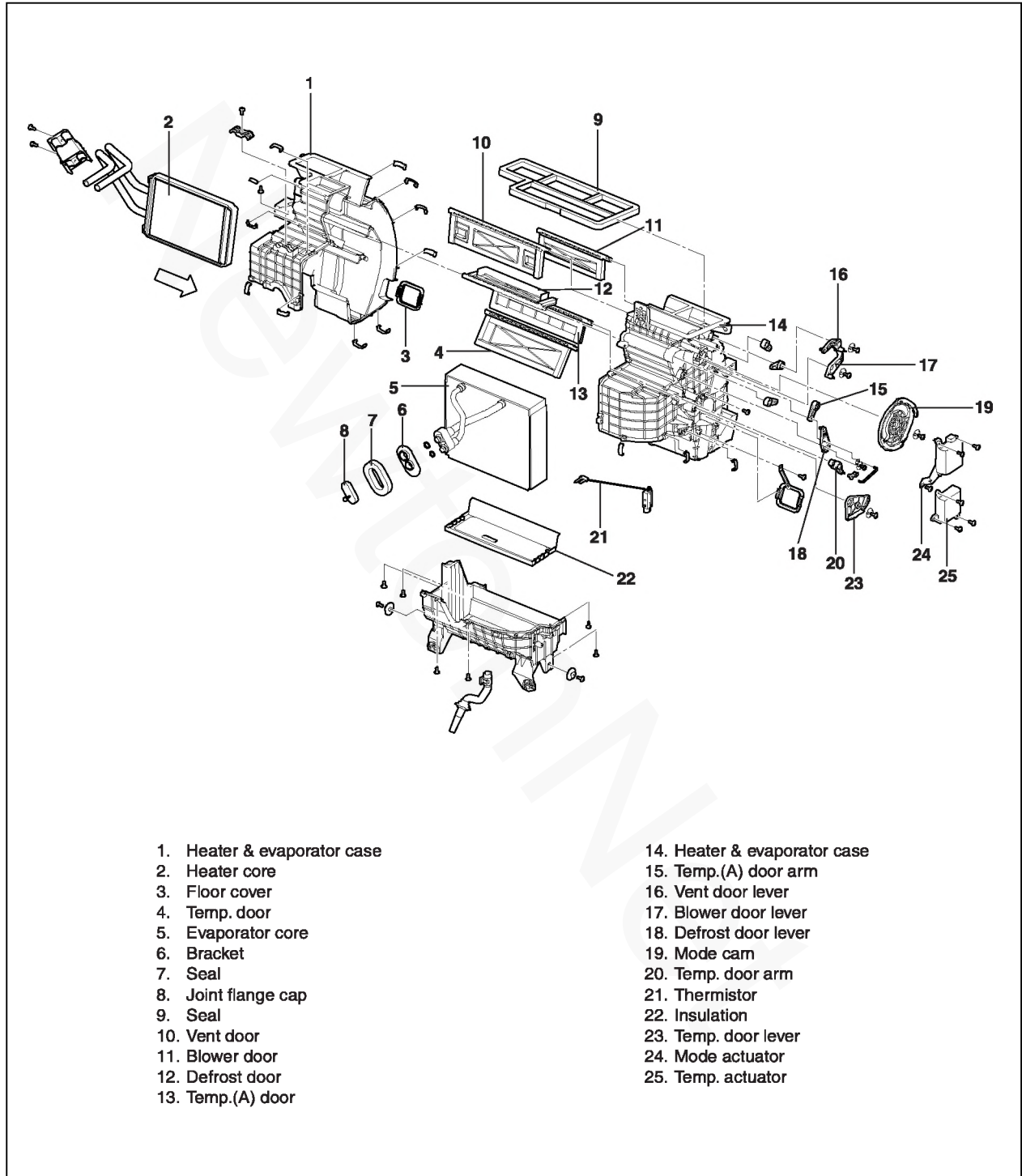
HEATER

HEATER UNIT

COMPONENT LOCATION E0C0ACDA



COMPONENTS E4744AEF

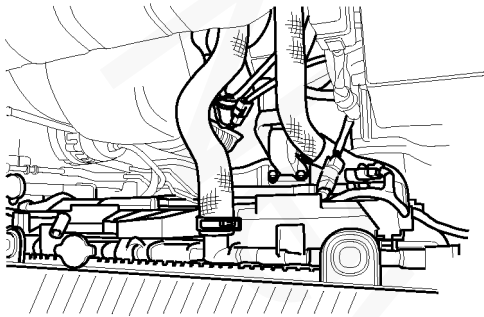


- 1. Heater & evaporator case
- 2. Heater core
- 3. Floor cover
- 4. Temp. door
- 5. Evaporator core
- 6. Bracket
- 7. Seal
- 8. Joint flange cap
- 9. Seal
- 10. Vent door
- 11. Blower door
- 12. Defrost door
- 13. Temp.(A) door

- 14. Heater & evaporator case
- 15. Temp.(A) door arm
- 16. Vent door lever
- 17. Blower door lever
- 18. Defrost door lever
- 19. Mode cam
- 20. Temp. door arm
- 21. Thermistor
- 22. Insulation
- 23. Temp. door lever
- 24. Mode actuator
- 25. Temp. actuator

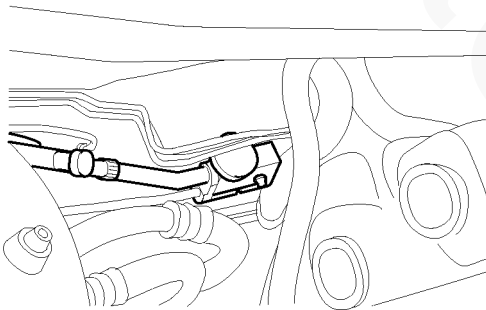
REMOVAL E9FC9F74

1. Disconnect the negative (-) battery terminal.
2. Drain the cooling water of the radiator.
3. Remove the heater hose and the drain hose.



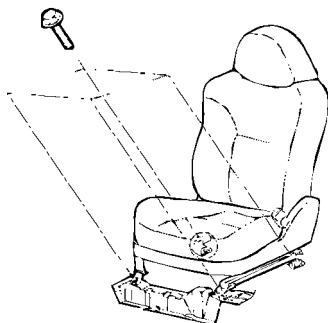
KQOB161A

4. Drain the refrigerant.
5. Disconnect the air conditioning suction hose and the liquid tube.



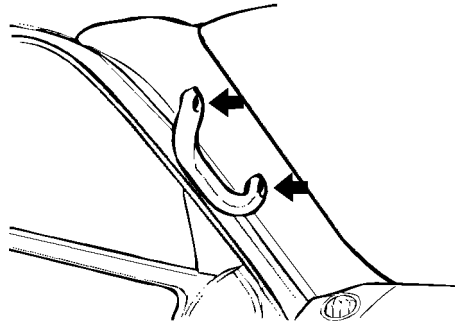
KQOB161B

6. Remove the driver's seat and the passenger's seat.



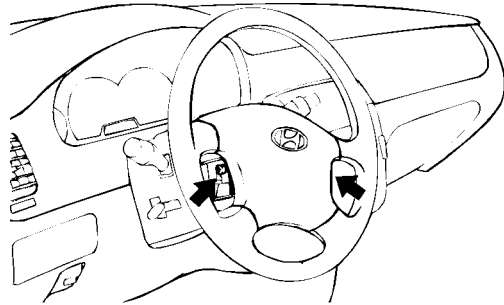
KSMB008G

7. Remove the cowl side trim and the front pillar trim.



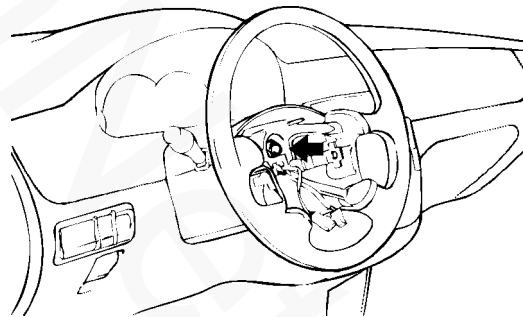
KSMB008H

8. Remove the air bag module.



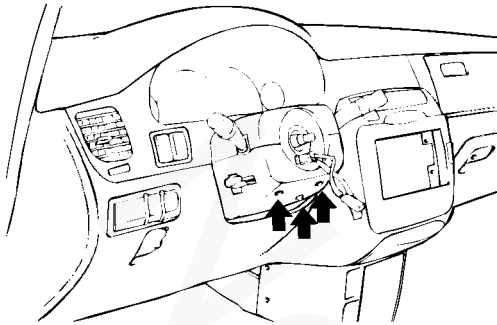
ESHA040M

9. Remove the steering wheel.



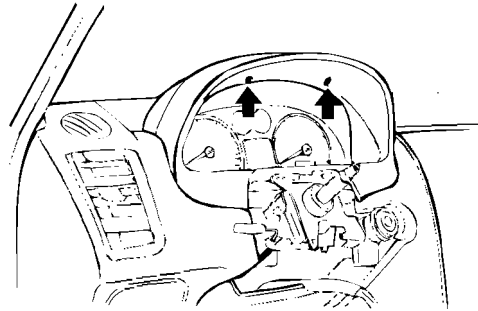
ESHA040N

10. Remove the steering lower and upper shroud.



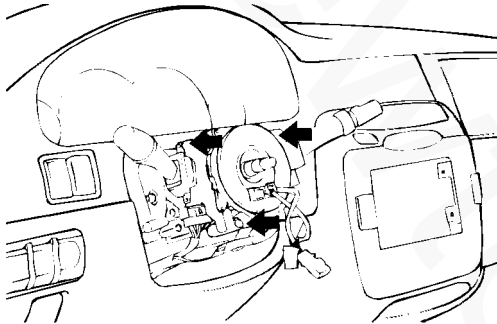
ESHA0400

13. Remove the cluster housing.



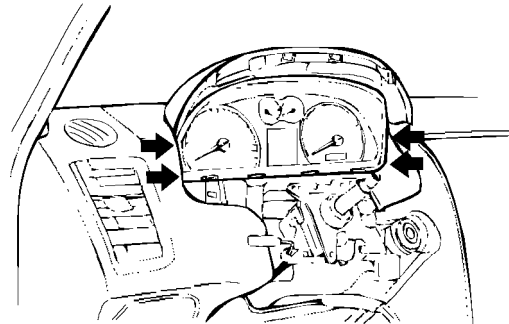
KSMB008I

11. Remove the multi-function switch.



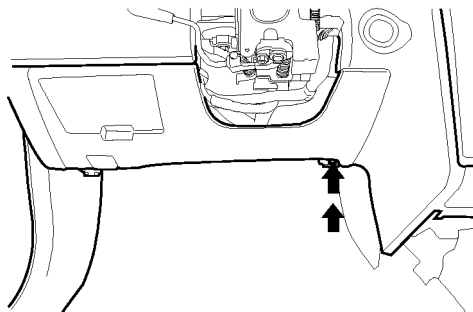
ESHA040P

14. Remove the cluster.



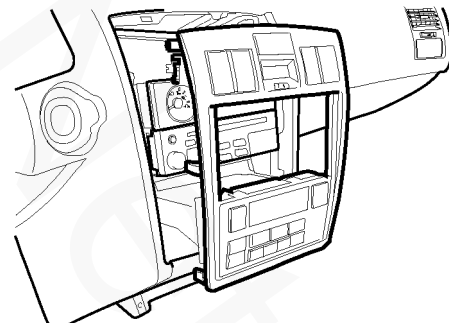
KSMB008J

12. Remove the crash pad under cover for the driver side.



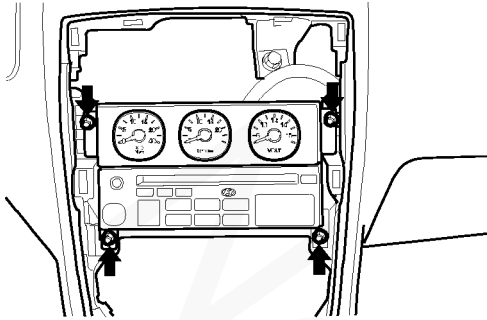
KSOB150A

15. After removing the center facia panel, disconnect the connectors.



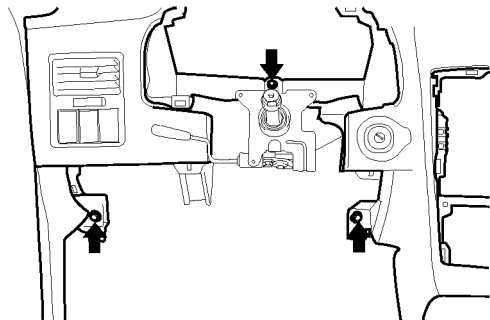
KSOB150B

16. Remove the audio.



KSOB150C

21. Remove the main crash pad mounting bolt.

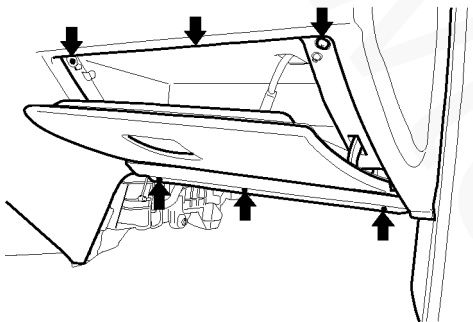


KSOB150F

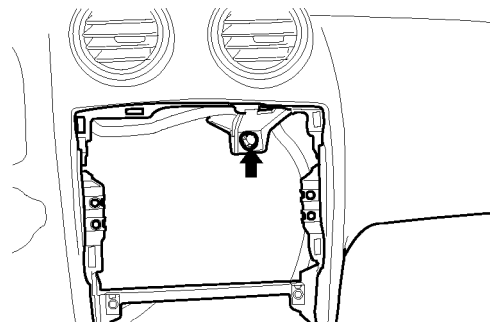
17. Remove the floor console upper cover.

18. Remove the floor console.

19. Remove the glove box.

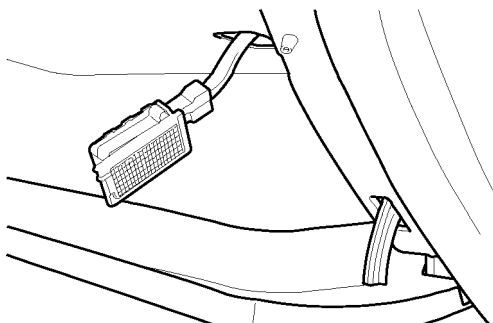


KSOB150D

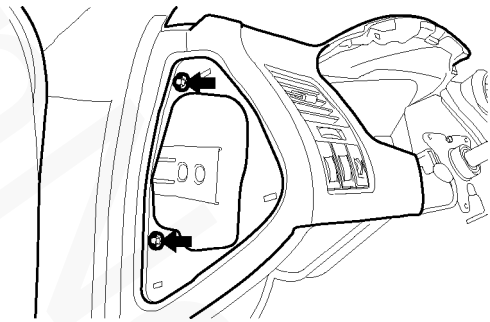


KSOB150G

20. Remove the glove box lamp connector and the lamp.



KSOB150E

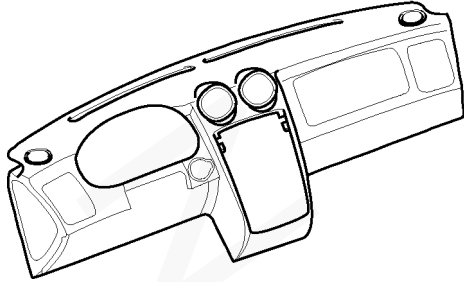


KSOB150I

22. Remove the main crash pad.

INSTALLATION E5E2658C

Installation is the reverse of the removal.



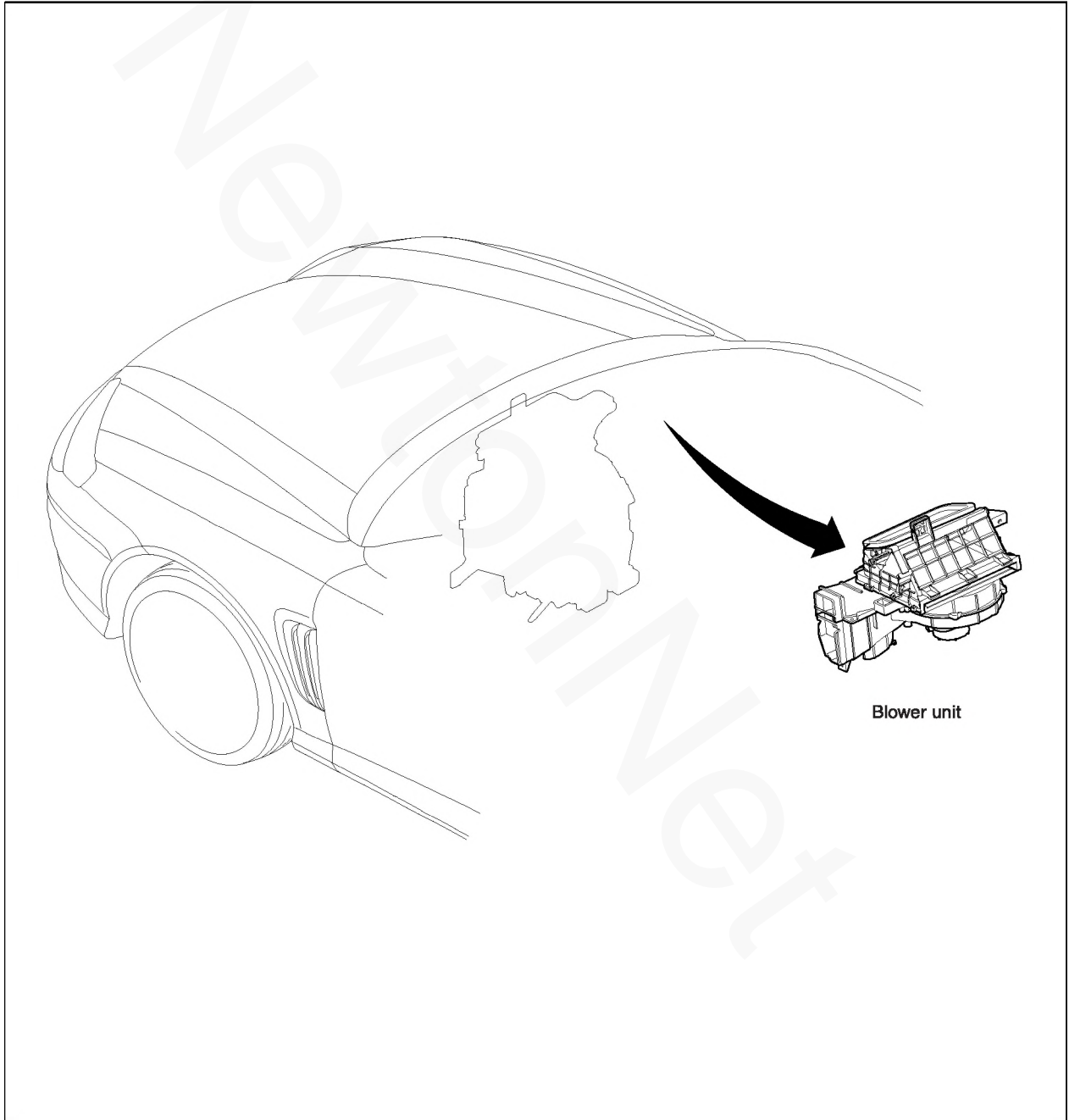
KSOB150J

23. Remove the heater unit mounting nut.
24. Remove the heater unit.

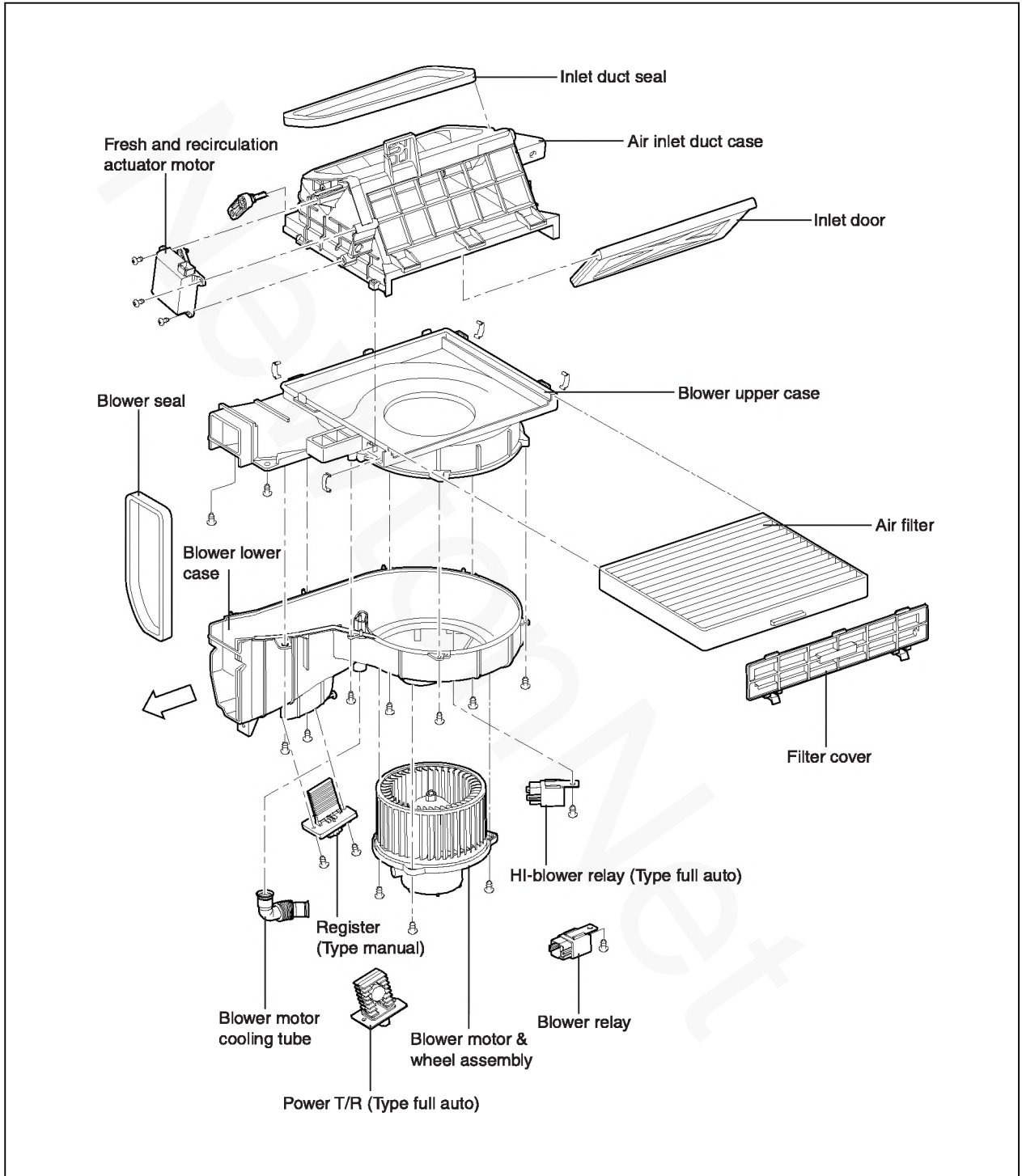
BLOWER CONTROLS

BLOWER UNIT

COMPONENT LOCATION EB5DD2F1

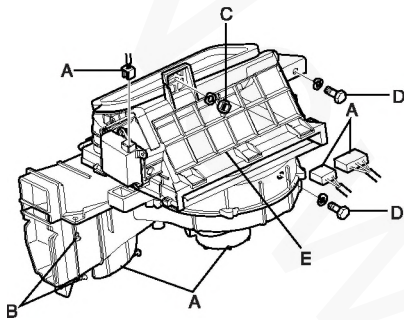


COMPONENTS ED8F8099



REMOVAL E19AC8A4

1. Disconnect the negative cable from the battery.
2. Remove the crash pad (see BD group - crash pad).
3. Disconnect the connectors(A) from the blower relay the blower motor, the blower resistor (or power transistor) and the fresh and recirculation actuator. Remove the self-tapping screws(B), the mounting nut(C), the mounting bolts(D) and the blower unit(E).

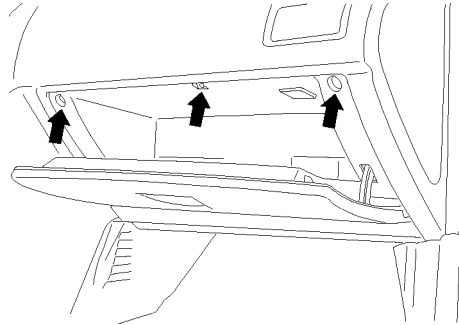


EQKE401A

NOTE

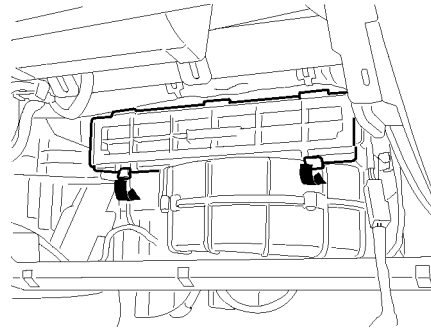
Make sure that there is no air leaking out of the blower and duct joints.

2. Open the glove box and remove the mounting screws on the upside of the glove box.



EQOE450B

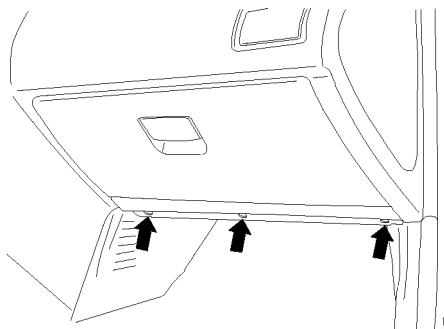
3. Remove the filter cover.



EQOE450C

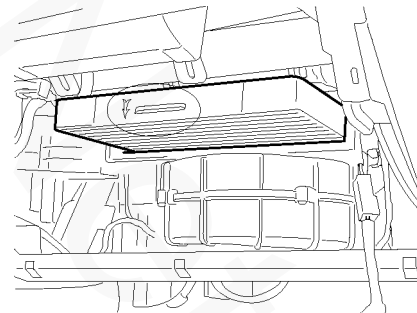
AIR FILTER REPLACEMENT EE970DAD

1. Remove the mounting screws on the downside of the glove box.



EQOE450A

4. Replace the air filter with a new one.

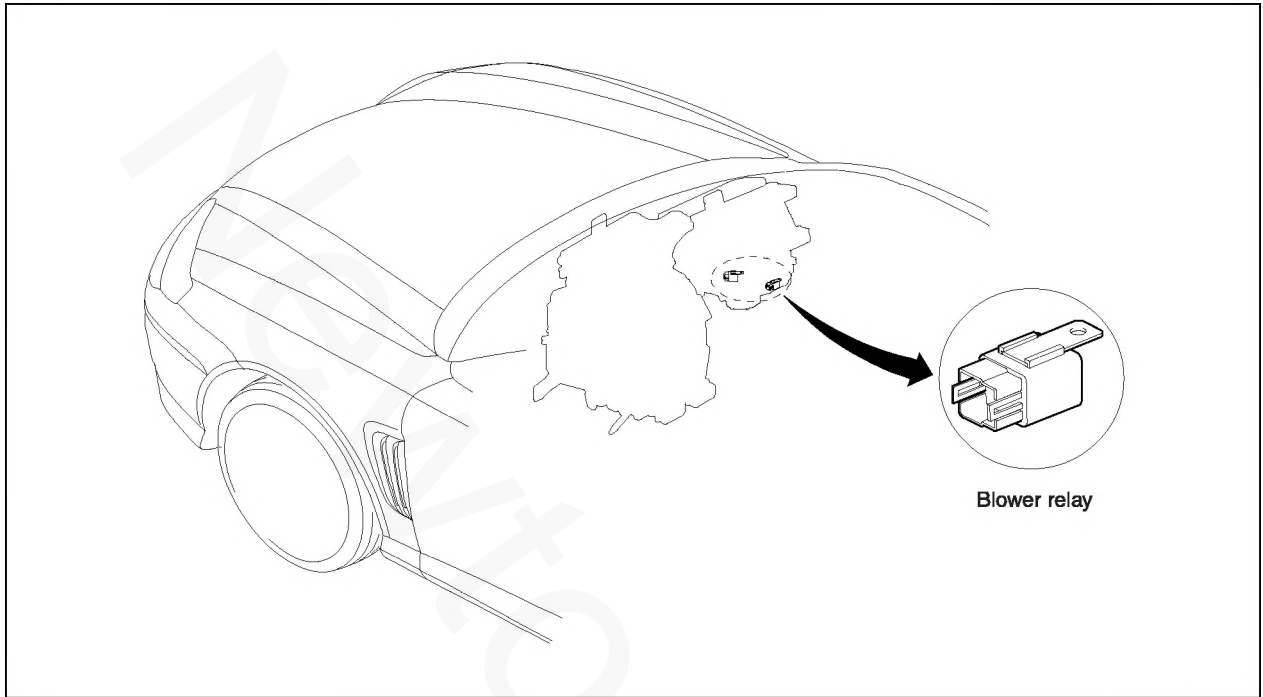


EQOE450D

5. Installation is the reverse of the removal.

BLOWER RELAY

COMPONENT LOCATION E0C4231F



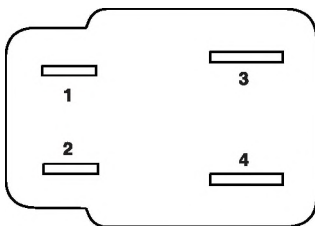
EQQE201A

DESCRIPTION ECD75A1E

There should be continuity between No.3 and No.4 terminals when power and ground are connected to the No.1 and No.2 terminals, and there should be no continuity when power is disconnected.

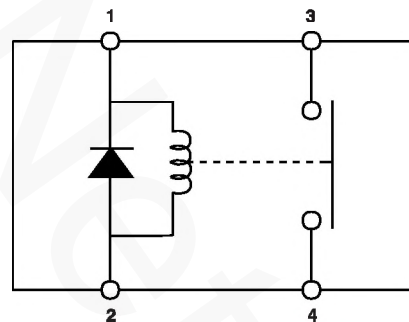
- Rated voltage : DC 12V
- Operation voltage range : DC 10V ~ DC 15V
- Rated load current : DC 12V, 25A (Motor load)

CONNECTOR EF78082B



EQKE201B

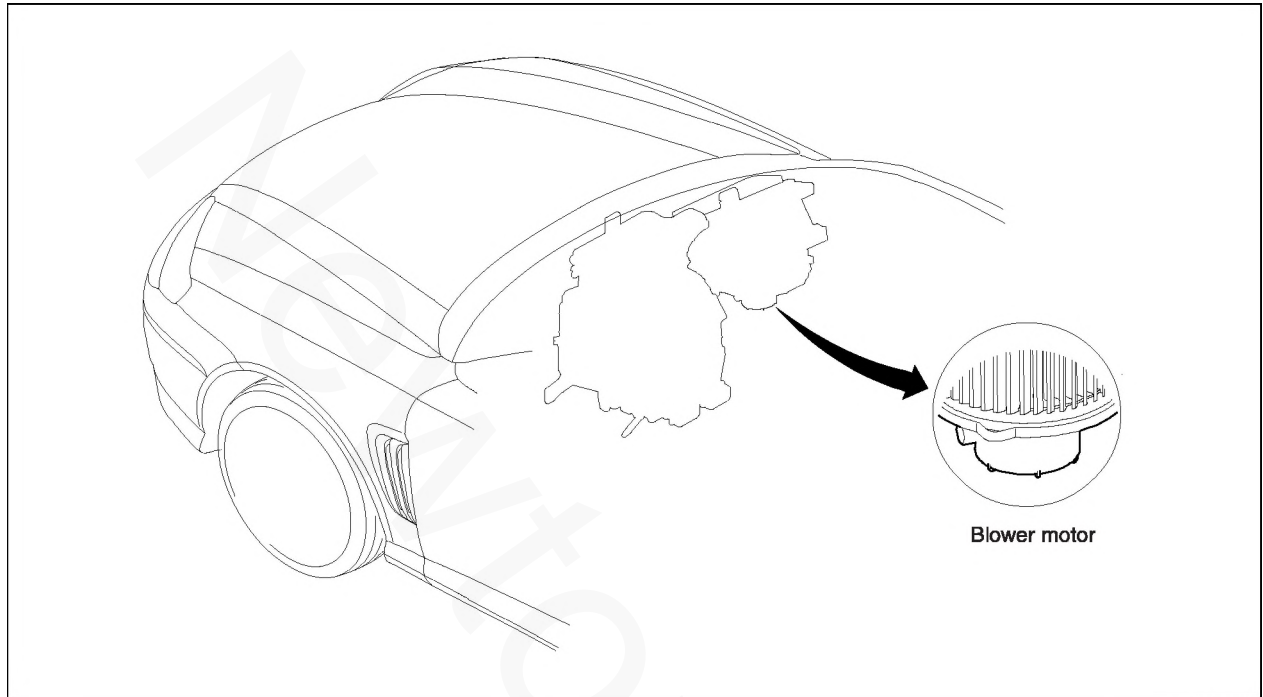
CIRCUIT DIAGRAM EDED7D32



EQKE201C

BLOWER MOTOR

COMPONENT LOCATION E81B9CCD



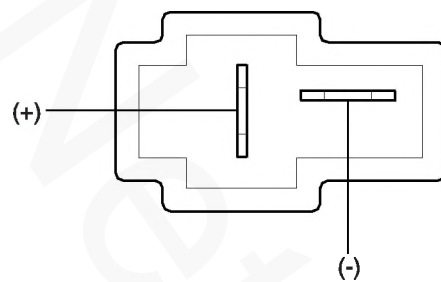
EQQE202A

DESCRIPTION E67390CE

Moter : Magnet ø70

Item	Specifications	
Type	DC ferrite	20°C or 68°F
Rated voltage	DC 12 volts	
No load speed	Min. 3300rpm	
No load current	Max. 3.0A	
Rated load	5.0kgf·cm	
Speed in rated load	2900 ± 250rpm	
Current in rated load	Continuous	
Insulation resistance	Min. 1MΩ	
Rotation direction viewed from output (Mtr. shaft)	CCW	
Operation temp. range	-30° ~ +80°	

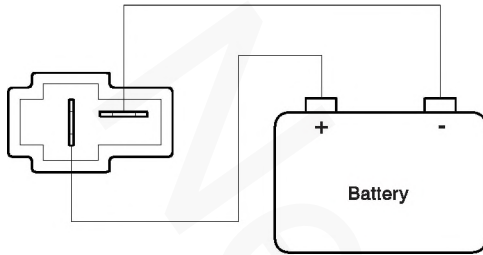
CONNECTOR E1F3485B



EQKE202B

INSPECTION E3D3C6DF

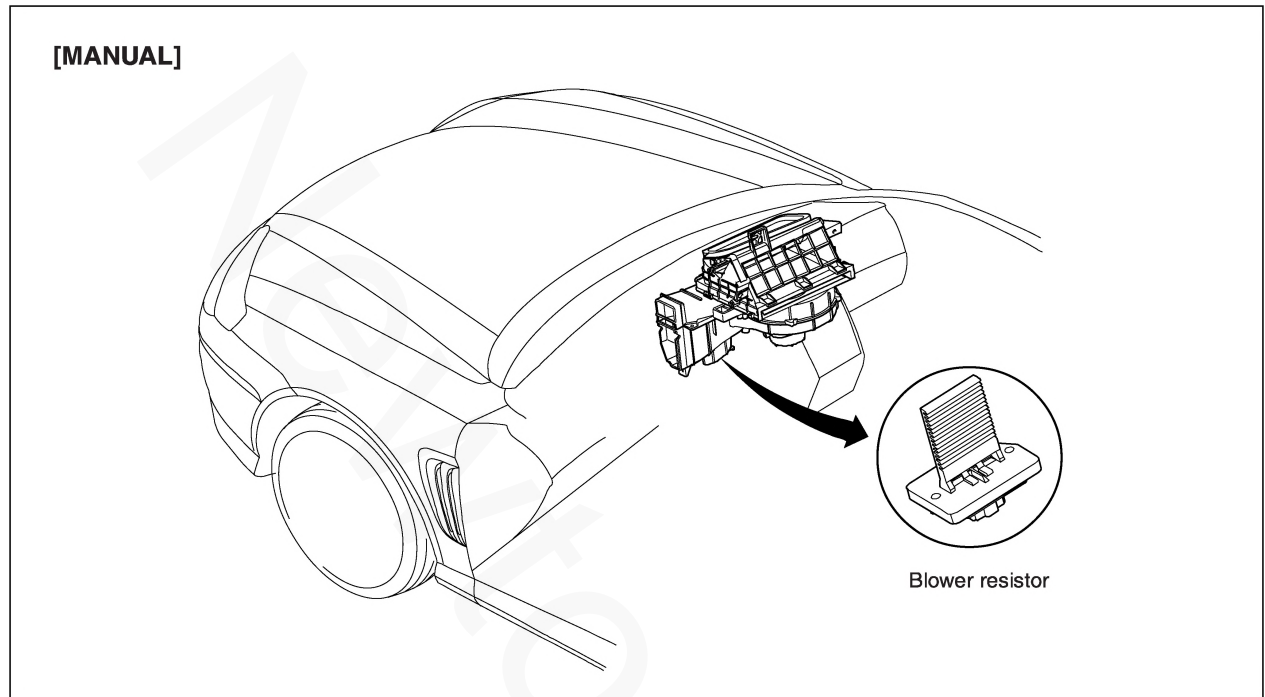
Connect the battery voltage and check the blower motor rotation.



EQKE202C

BLOWER RESISTOR

COMPONENT LOCATION EABE3366



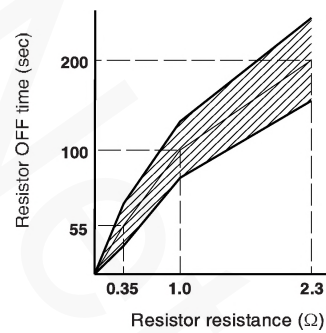
EQQE204A

DESCRIPTION E6DAD075

- Rated voltage : DC 12V
- Rated load : Blower motor
- Standard test Temp. : 20DEG
- Operation Temp. : -30DEG ~ +70DEG
- Resistor off - Time requirement for blower motor locking

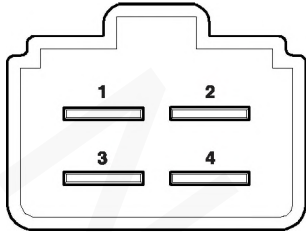
Mode	Resistor off time (sec)
1	200 ± 30
2	100 ± 20
3	55 ± 15

CHARACTERISTICS



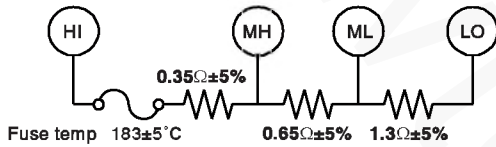
EQKE204B

CONNECTOR E06B18E9



EQKE204C

CIRCUIT DIAGRAM ED68FDFA



EQKE204D

INSPECTION E2CE84BB

Measure terminal-to-terminal resistance of the blower resistor. If measured resistance is not within specification, the blower resistor must be replaced. (After removing the resistor)

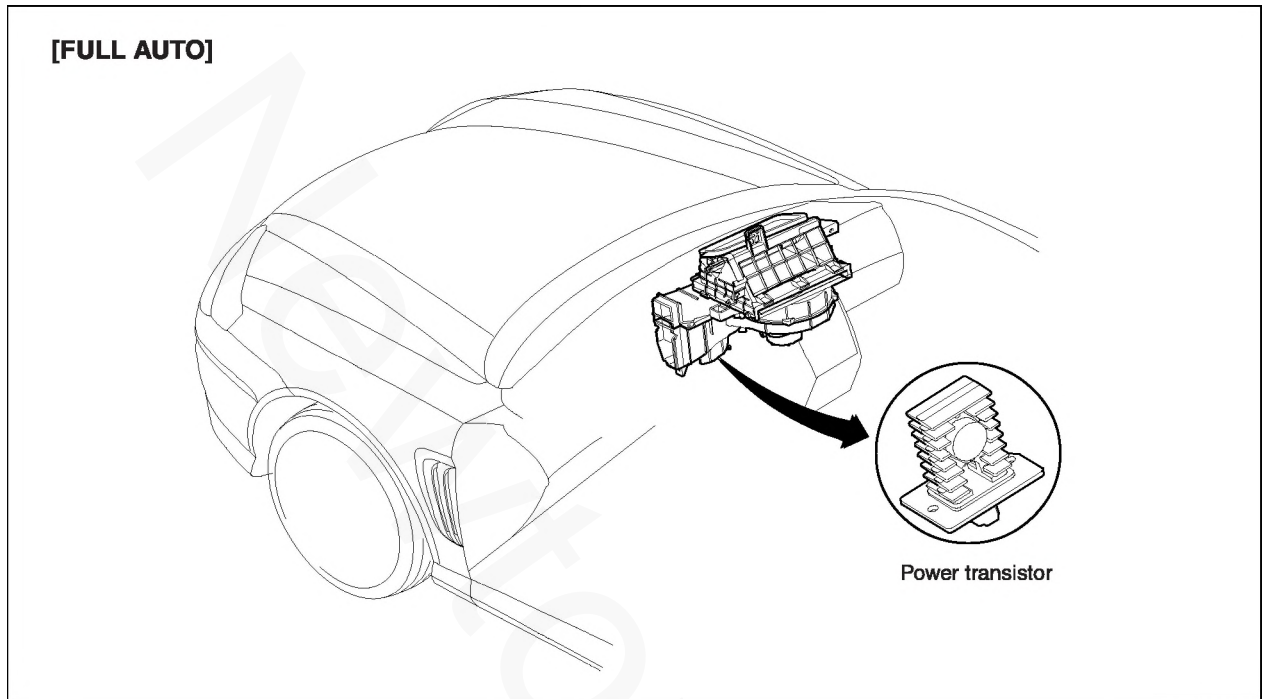
Terminal Ohmmeter Speed indication	1	2	3	4	Resistance (Ω)
	ML	MH	LO	HI	
Continuity is indicated			○—○	○—○	$2.3 \pm 15\%$
	○—	○—	○—	○—	$1.0 \pm 10\%$
		○—	○—	○—	$0.35 \pm 5\%$

Note
○—○ : Indicates that there is continuity between points.

EQKE204H

POWER TRANSISTOR

COMPONENT LOCATION E00891CC

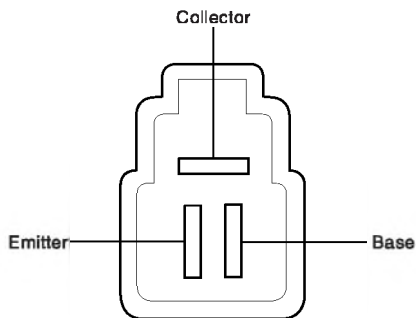


EQKE206A

DESCRIPTION E5A8C9CF

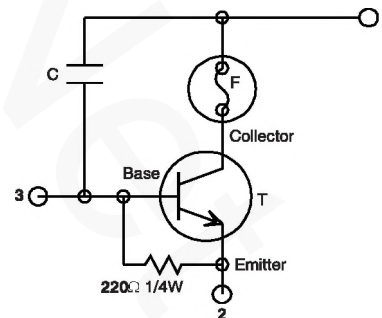
- Rated voltage : DC 12V
- Power consumption : Max. 240W
- Operating assurance range : -30°C ~ +70°C, 10 ~ 15V
- Performance assurance range : -30°C ~ +60°C, 10 ~ 15V

CONNECTOR E7E837C6



EQKE206C

CIRCUIT DIAGRAM AND IMPORTANT PERFORMANCE OF PARTS COMPOSED CIRCUIT EC5B2453

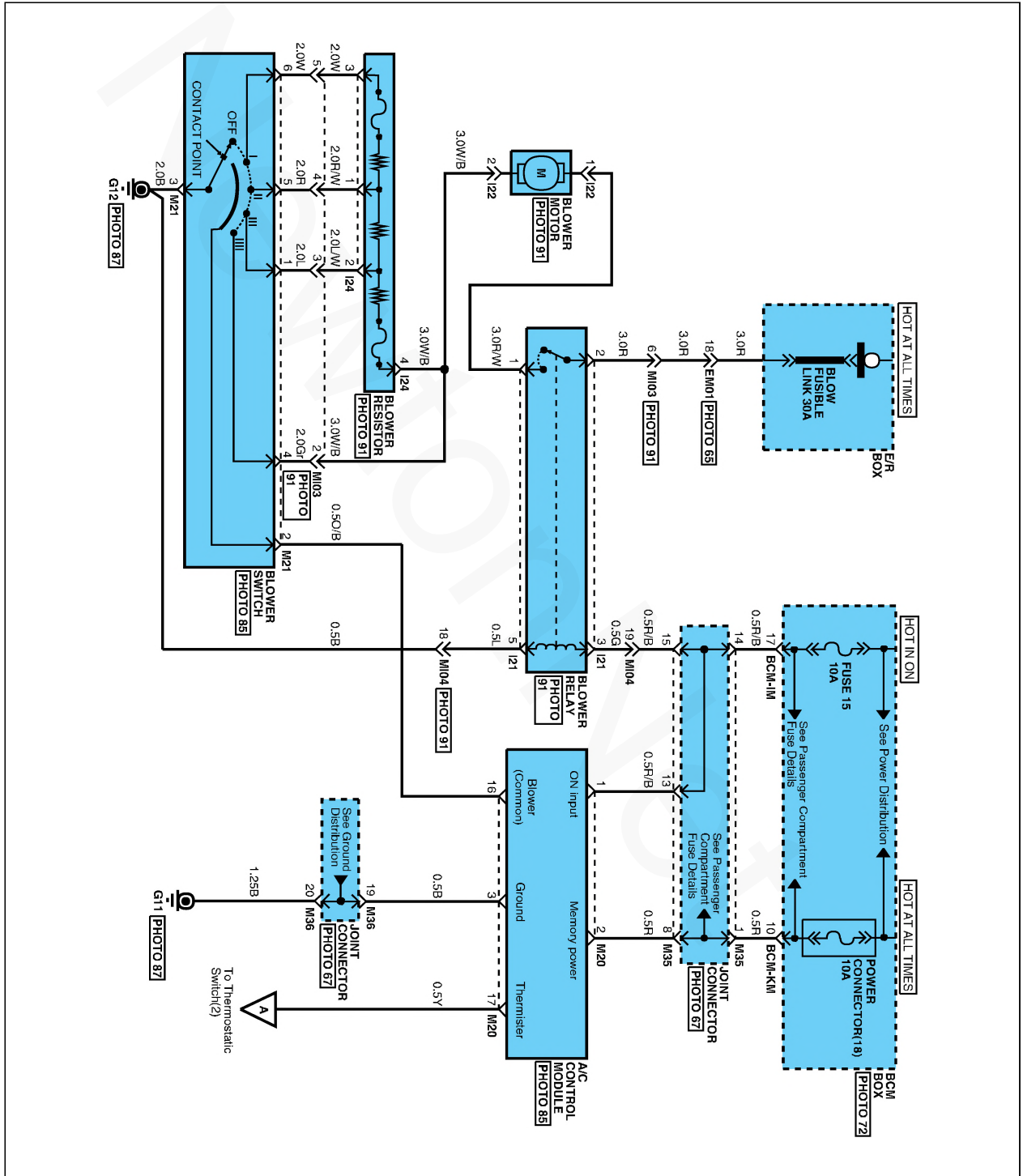


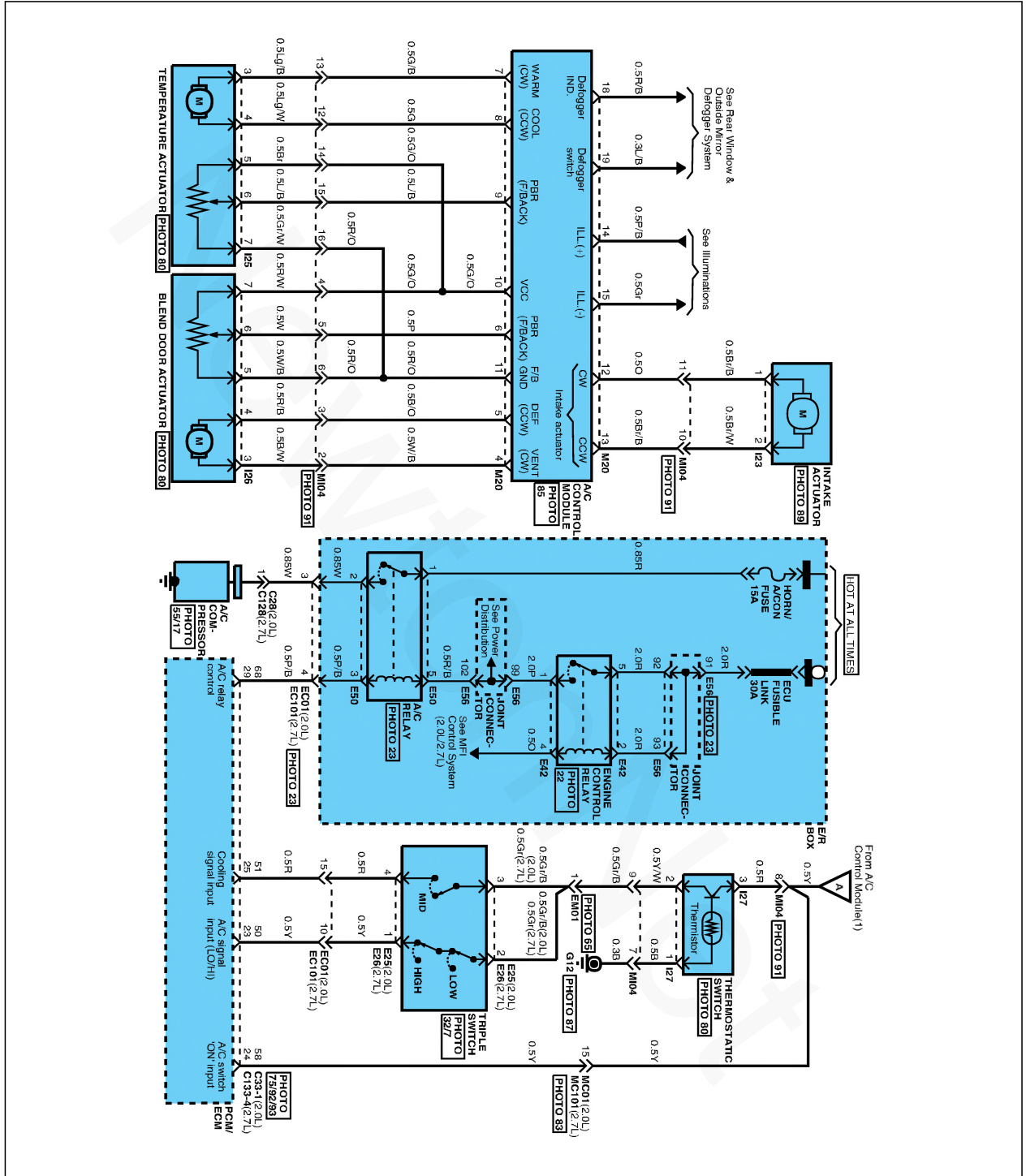
EQKE206B

- A. Power transistor :
Equivalent to MOTOROLA MJ11032 (Pc = 300W, Ic = 50A)
- B. Fuse : 250V, 15A, 128°C
Condenser : 0.22μF, 50V

BLOWER AND A/C CONTROLS (MANUAL)

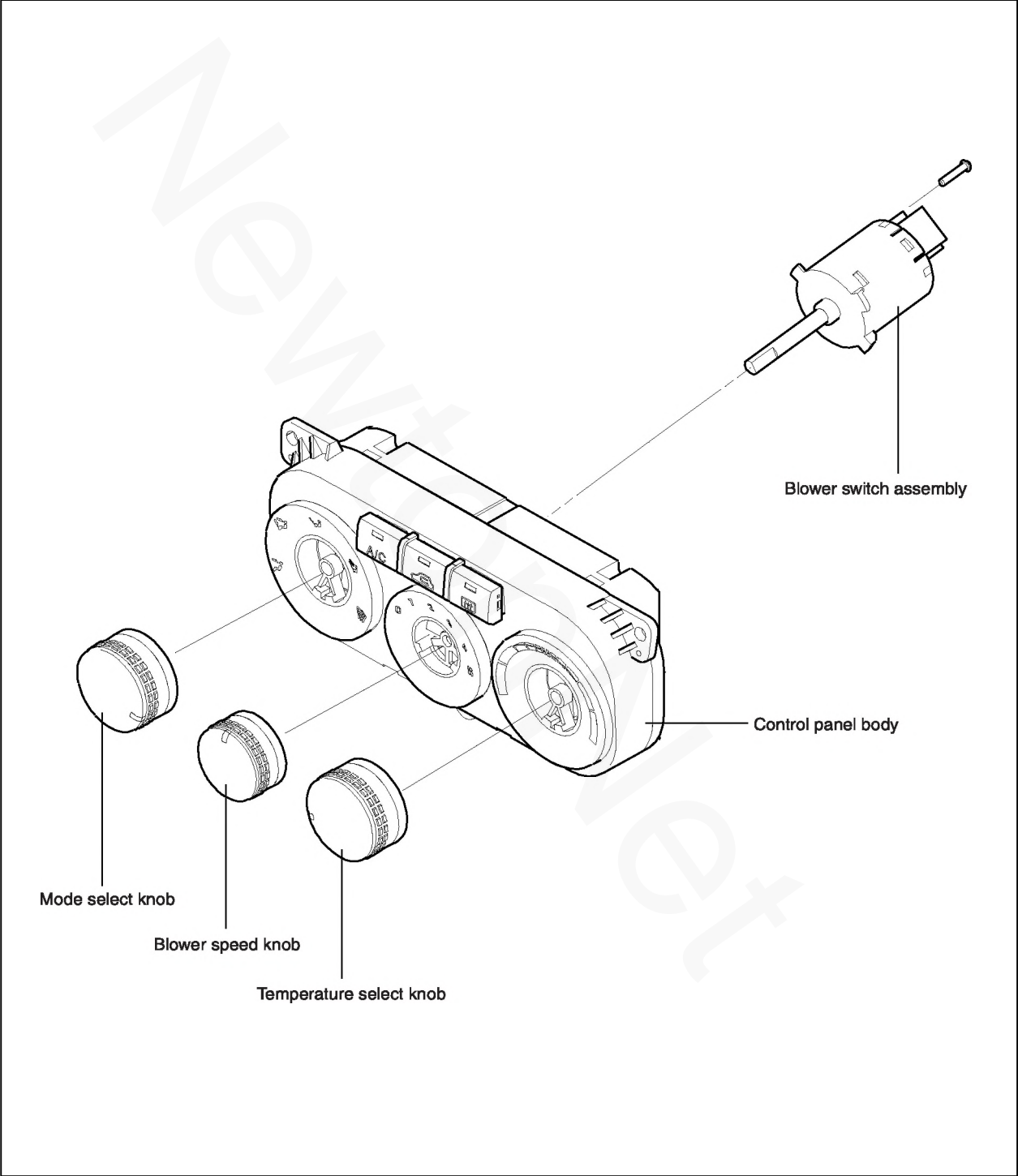
CIRCUIT DIAGRAM E60CFD67



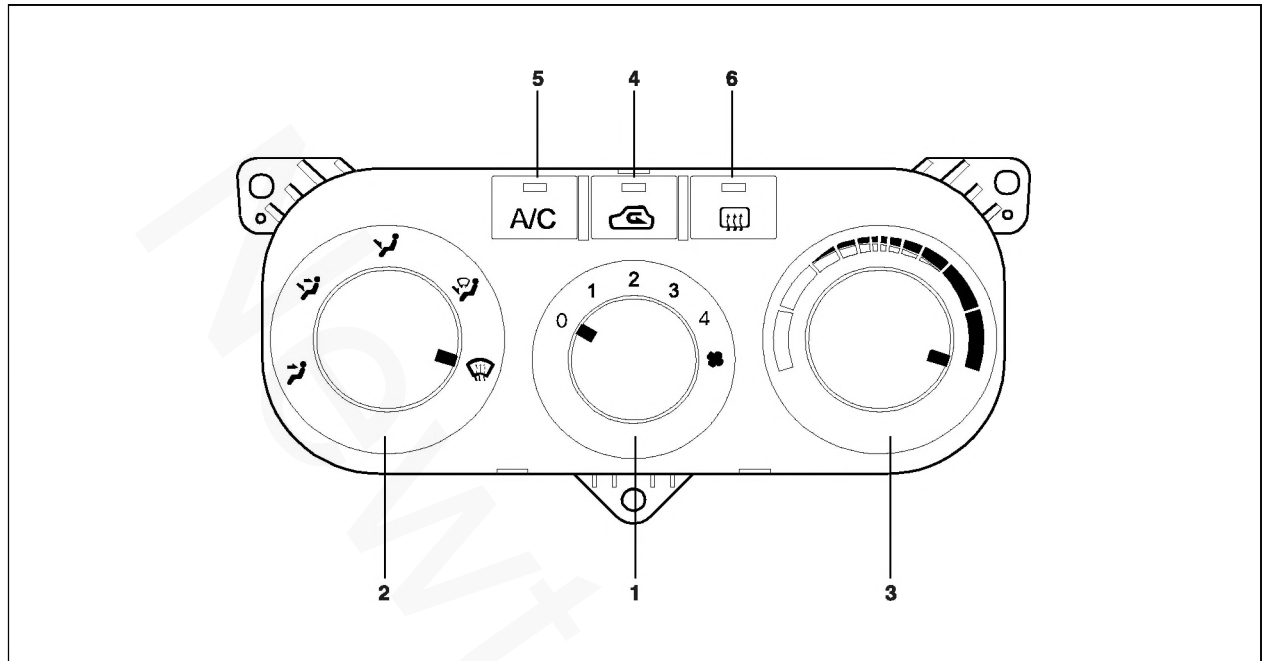


CONTROL PANEL

COMPONENTS EDF6EA4B



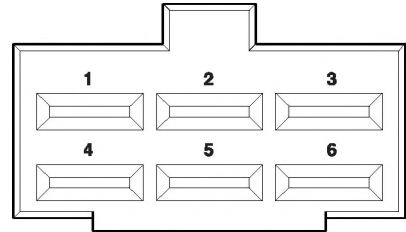
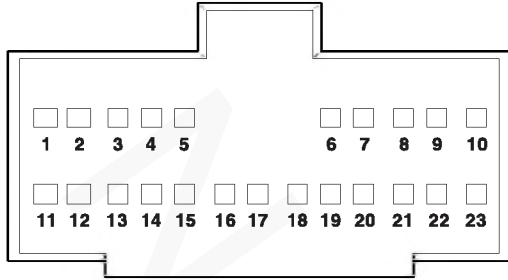
DESCRIPTION EA06B8DE



KQOB001B

1. **BLOWER SWITCH**
The blower switch controls the blowing level of the air conditioning system by controlling blower motor speed. The switch has an electrical circuit containing a resistor that will regulate blower motor input voltage to control the motor speed.
2. **MODE SWITCH**
The mode switch controls air conditioning system discharge location. The switch contains an electrical circuit to control an actuator that is connected to the mode door for discharge control.
3. **TEMPERATURE SWITCH**
The temperature switch controls the temperature door position that will be used to regulate the air conditioning system's discharge air temperature. The switch includes a rack & pinion and a cable.
4. **INTAKE SWITCH**
The intake switch controls the intake door used to regulate the intake air flow of the air conditioning system. The switch contains an electrical circuit used to control the actuator that is connected to the intake door.
5. **AIR CONDITIONING SWITCH**
The air conditioning switch controls the on/off position of the air conditioning system compressor. The switch contains an electrical circuit that will switch on/off the power supply to the relay that is connected to the compressor.
6. **REAR DEFOGGER SWITCH**
The rear defogger switch is used to defog the rear glass. Switching the switch on, ETACS will output a signal to operate the rear glass heat wire.

CONNECTOR CONFIGURATIONS E8F1FFBD

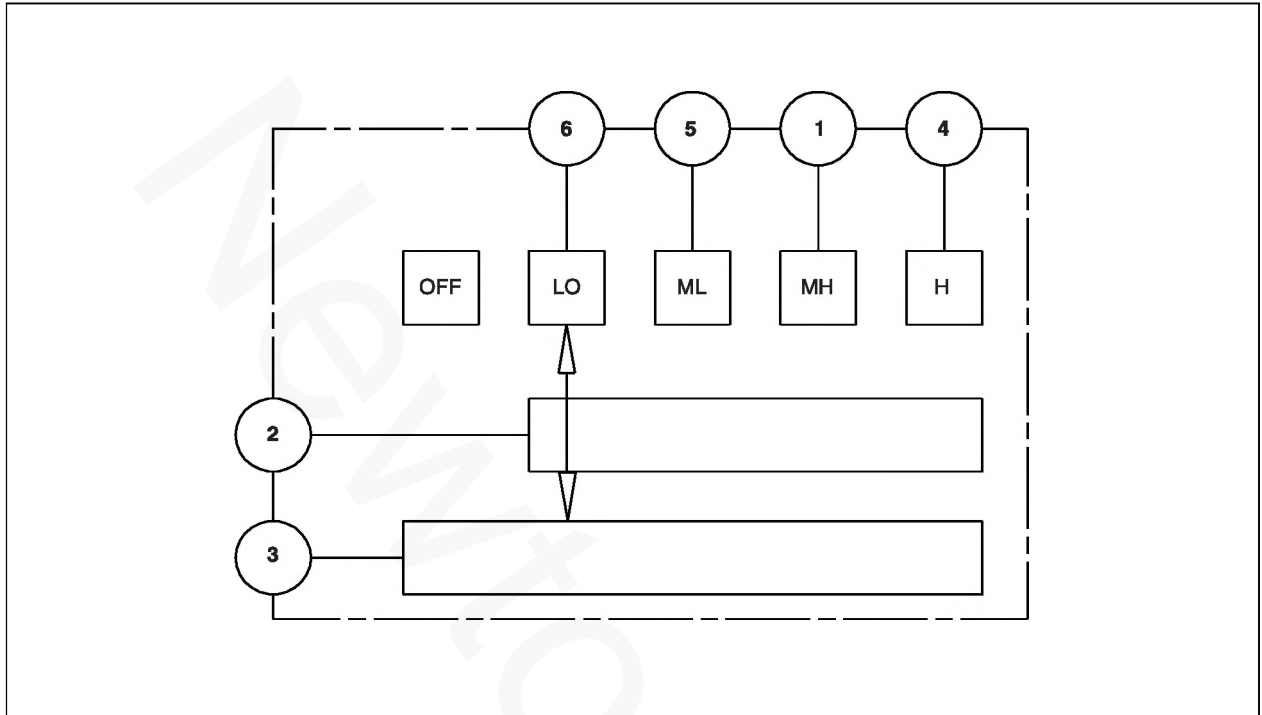


EQOE501B

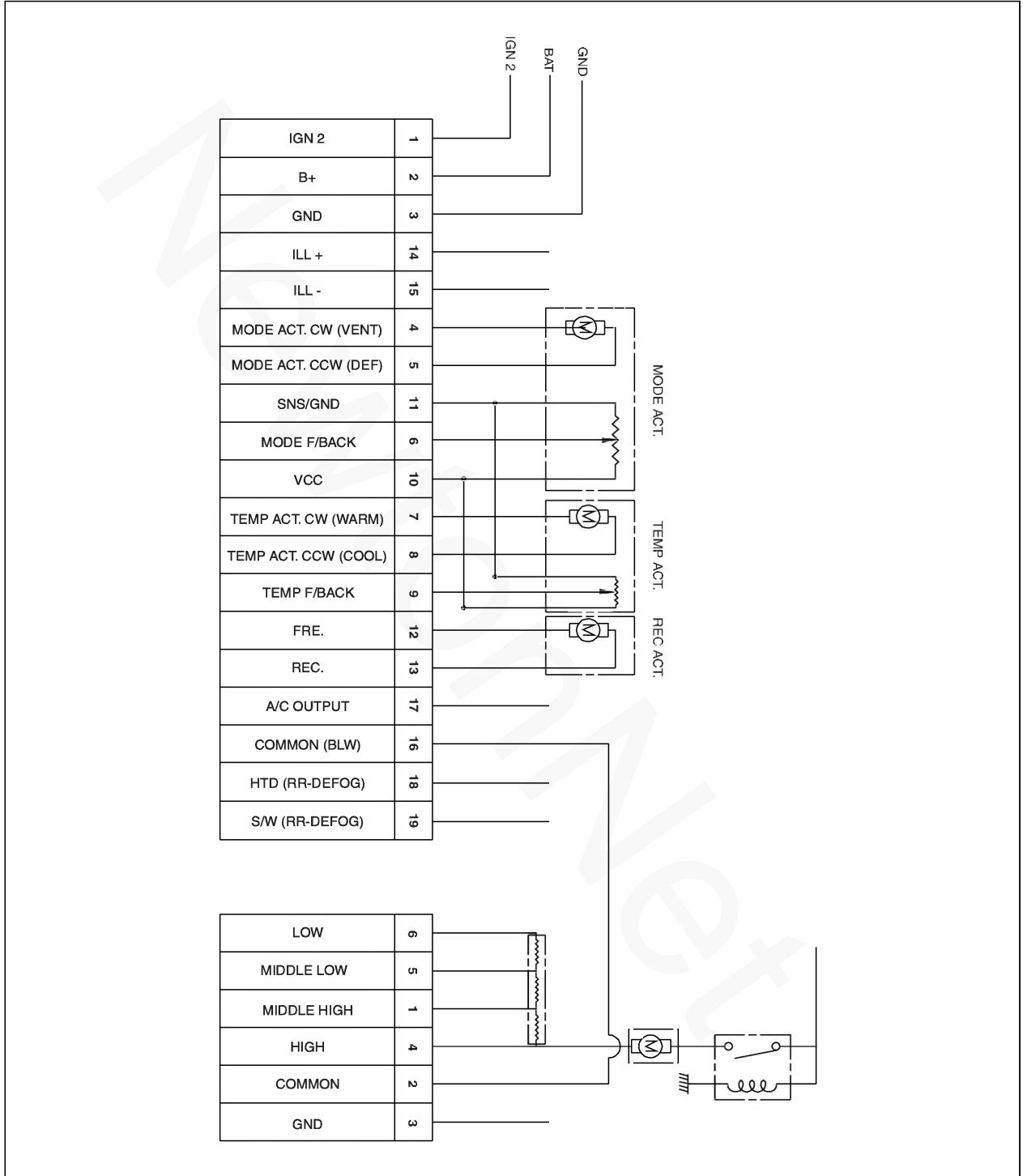
Connector	Pin No.	Name	Connector	Pin No.	Name
Blower switch	1	MIDDLE HIGH	Main switch	11	SENSOR GROUND
	2	COMMON		12	FRE.
	3	GROUND		13	REC.
	4	HIGH		14	ILL+
	5	MIDDLE LOW		15	ILL-
	6	LOW		16	COMMON (BLOWER)
Main switch	1	IGN2		17	A/C OUTPUT
	2	B+		18	HUMIDITY (Rear defogger)
	3	GROUND		19	S/W (Rear defogger)
	4	MODE ACT. (VENT)		20	-
	5	MODE ACT. (DEF)		21	-
	6	MODE F/B		22	-
	7	TEMP ACT. (WARM)		23	-
	8	TEMP ACT. (COOL)			
	9	TEMP F/B			
	10	VCC			

SCHEMATIC DIAGRAM ECF8558E

BLOWER S/W

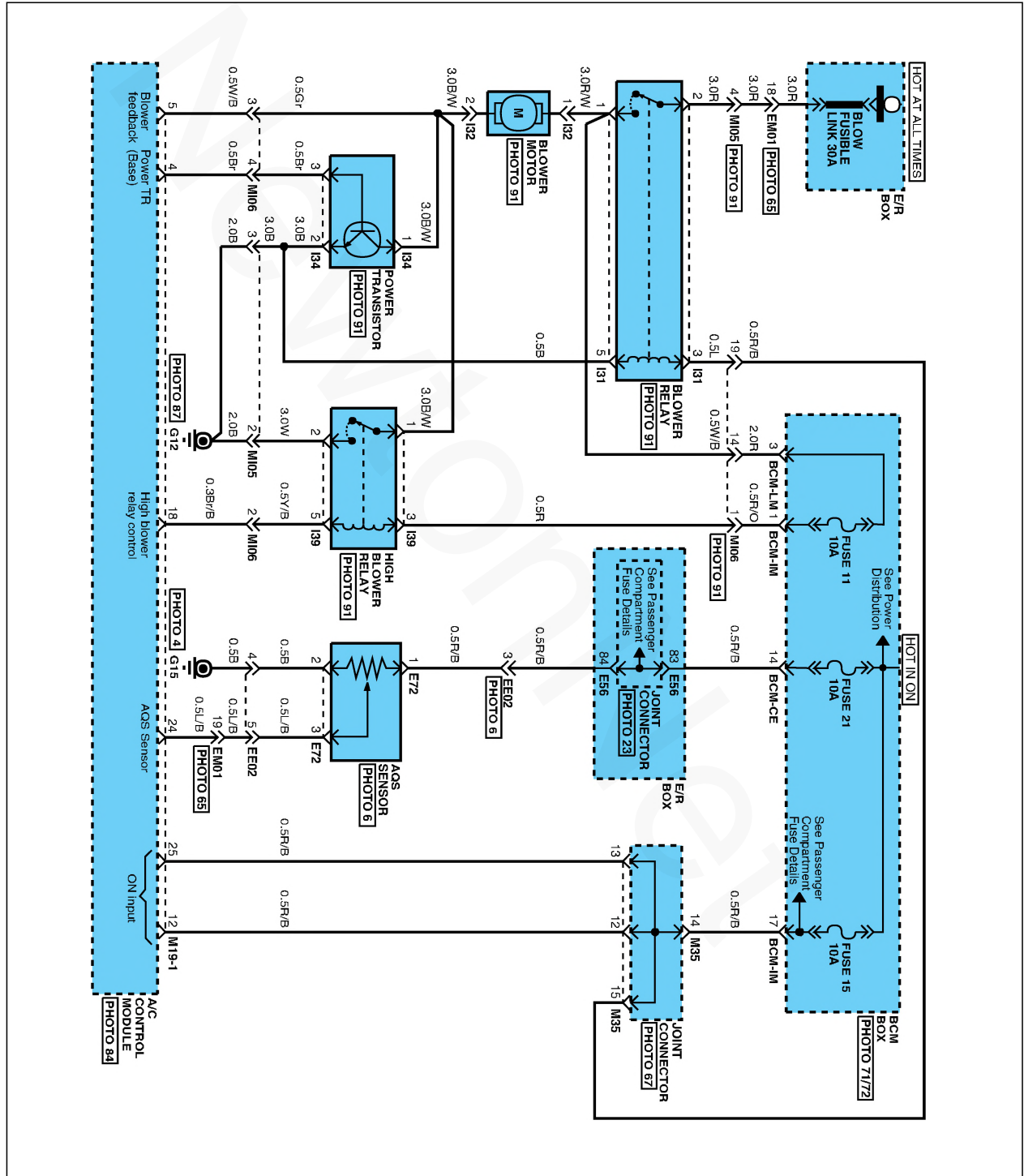


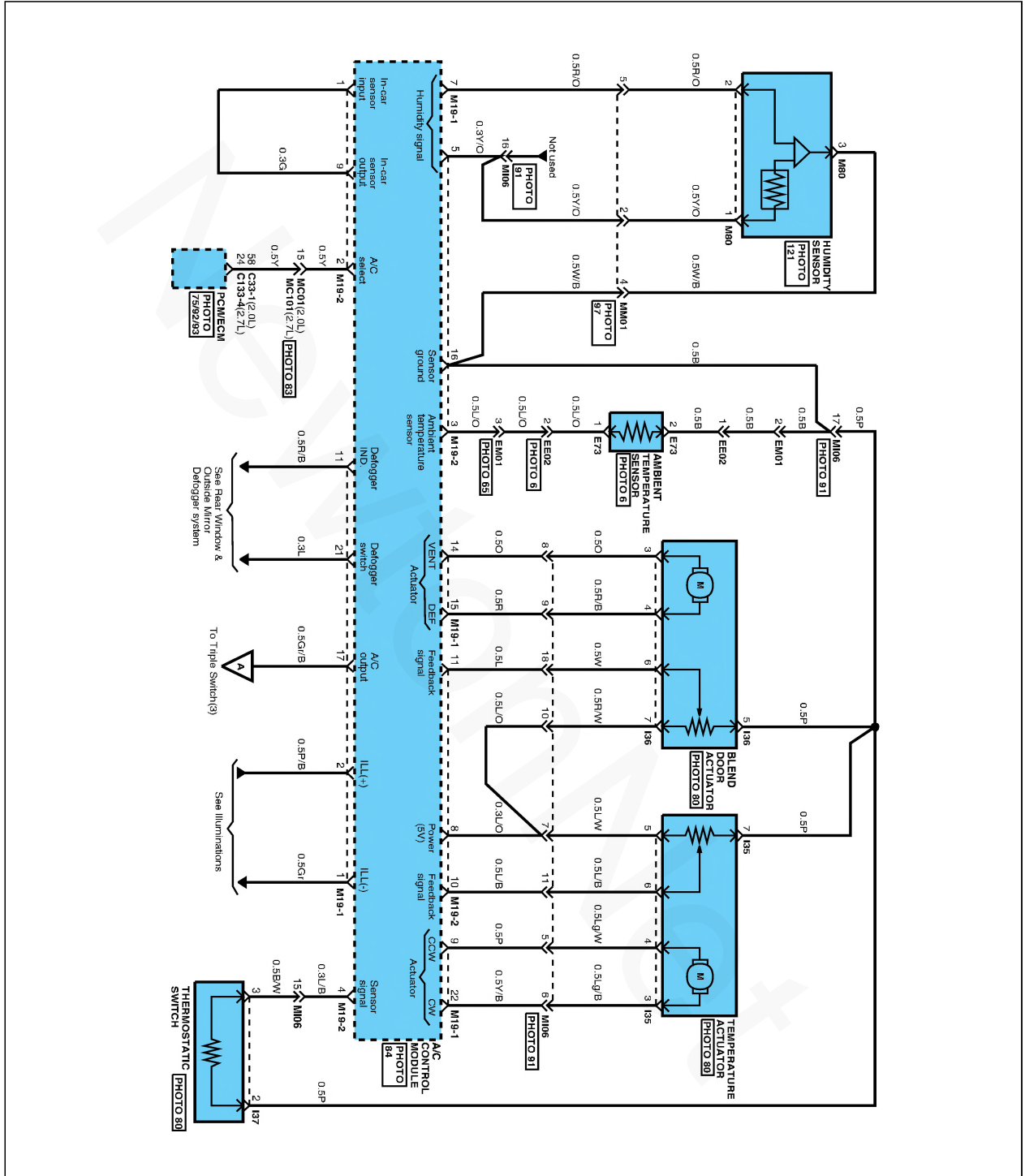
WIRING DIAGRAM E1DBC34B



BLOWER AND A/C CONTROLS (AUTOMATIC)

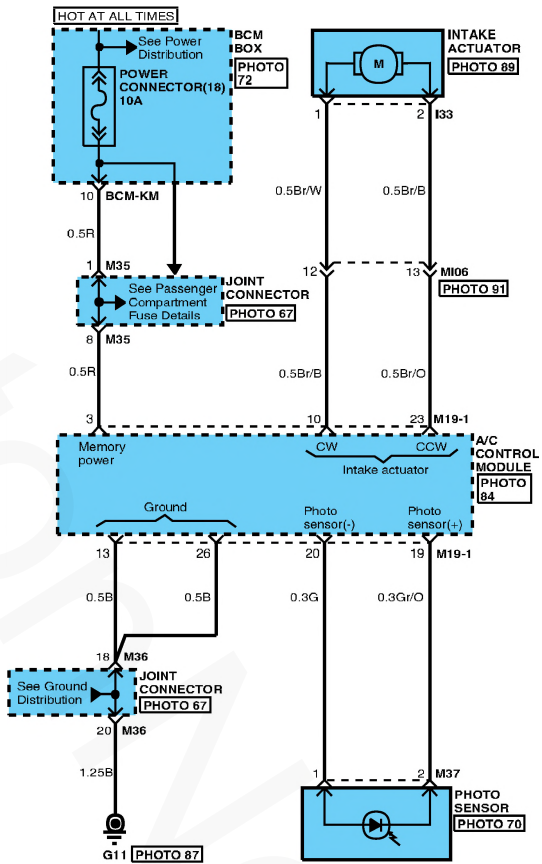
CIRCUIT DIAGRAM E61B0AA2

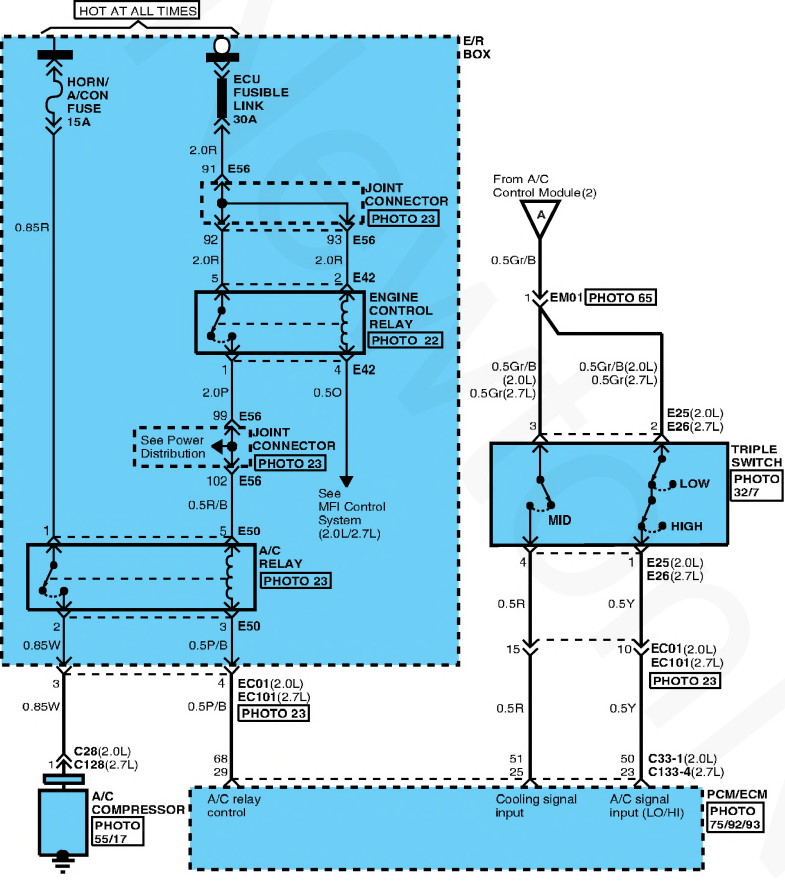




HEATING, VENTILATION AND AIR CONDITIONING

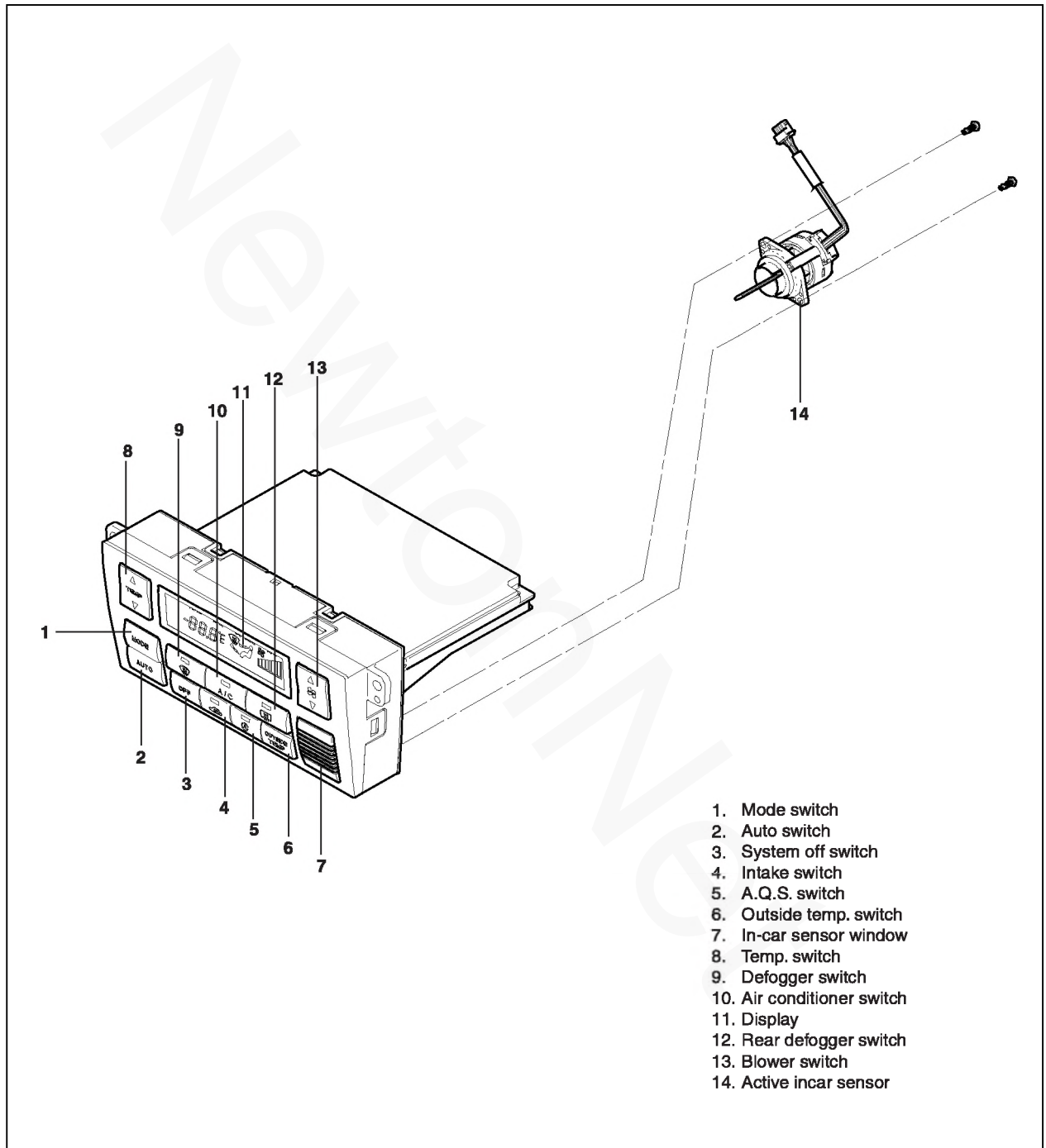
HA -62



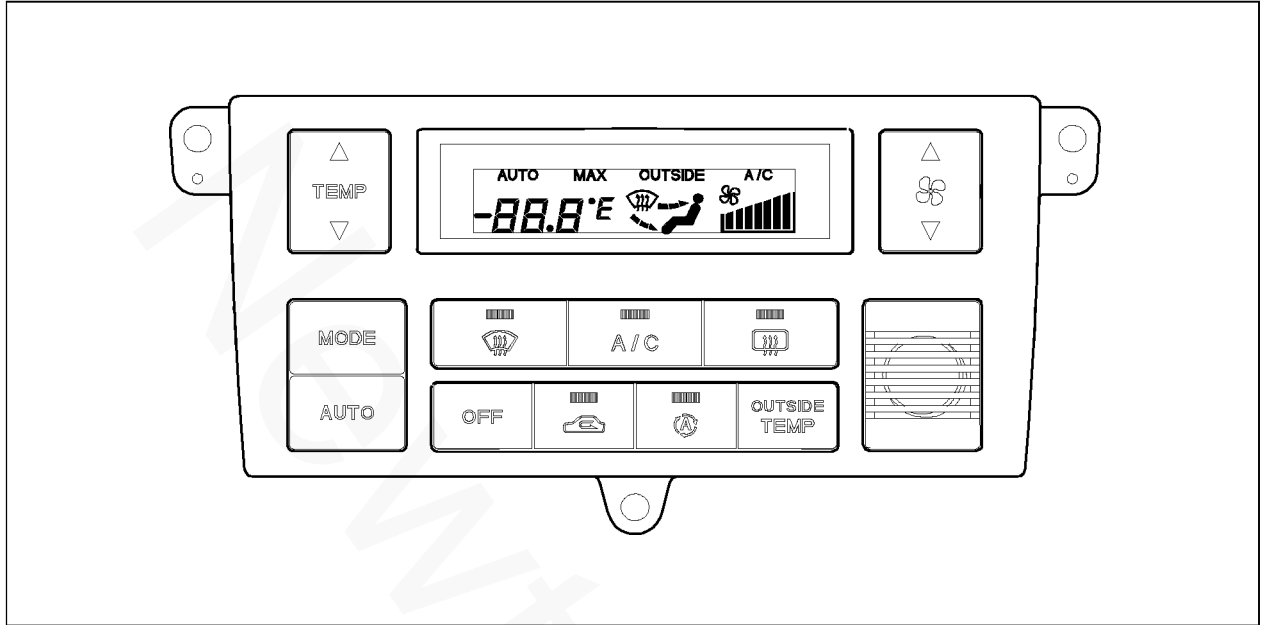


CONTROL PANEL

COMPONENTS E8C3C08D



DESCRIPTION EA6F53E8



EQOE601A

BUTTON CONTROL AND OPERATION LOGIC

1. All buttons should be back-up.

2. Push the button, then the operation sound is made for 0.1 sec. When a S/W is selected, and operation sound is made as well).

NO	BUTTON	BUTTON FUNCTION	DISPLAY	SYSTEM OPERATION
1	TEMP	TEMP UP/DOWN	Set temperature: Display	<ol style="list-style-type: none"> 1. Control the discharge air temperature by adjusting the mixture ratio of cold & hot air with the TEMP DOOR. 2. Whenever press the SWITCH, temperature is changed 0.5°C up/down each time. (Each time the operation sound is made for 0.1 sec.) 3. Set 17°C (62°F) as MAX COOL, 32°C (90°F) as MAX HOT. 4. When the switch is turned ON from OFF, the set temperature is displayed as the same before OFF. 5. When changing the set temperature from 17.5°C to 17°C or from 31.5°C to 32°C, the operation sound is made. 6. At 17°C, if the temperature is set below than 17°C or at 32°C, if it is above than 32°C, the operation sound is made 5times at an interval of 0.15 sec. 7. When pushing the TEMP button several times, the set temperature is shifted to another step at an interval of 0.7sec., When engaging the button continuously (keep pushing), only the first shift takes 0.7 sec. but the next shifts take 0.3 sec. <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> - OFF: SYSTEM OFF - TEMP: SET TEMPERATURE UP/DOWN

BLOWER AND A/C CONTROLS (AUTOMATIC)

HA -65

NO	BUTTON	BUTTON FUNCTION	DISPLAY	SYSTEM OPERATION
2	AUTO	AUTO CONTROL	"AUTO": Display	<ol style="list-style-type: none"> Automatically control the following items corresponding to the set temperature. <ul style="list-style-type: none"> TEMP DOOR MODE DOOR INTAKE DOOR BLOWER FAN SPEED A/C When the AUTO mode is off, the word AUTO should not appear. After off the AUTO mode, the system is automatically controlled except for the manually selected SW. <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> OFF: SYSTEM OFF FAN UP/DOWN: BLOWER FAN SPEED MANUAL CONTROL MODE: DISCHARGE MODE MANUAL CONTROL A/C: A/C ON/OFF MANUAL CONTROL FRE.: FRE. MODE MANUAL CONTROL REC.: REC. MODE MANUAL CONTROL DEF.: DEF. MODE MANUAL CONTROL, A/C ON, FRE.
3	AMB	Ambient temperature display	<ul style="list-style-type: none"> "AMB": Display Ambient temperature: Display The other signals: OFF 	<ol style="list-style-type: none"> System is operated as the same before the AMB SW turned on. When the AMB SW is pushed, the other signals are not appeared but the word AMB and the ambient temperature are displayed for 5 sec., and then the display become the same as the AMB SW is not pushed. <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> AMB: If the AMB SW is pushed once more when the ambient temperature is displayed, the ambient temperature does not appear and the display become the same as the AMB SW is not pushed. OTHER SWITCHES: If the other switch is pushed except for REAR DEF and in-car & ambient /AQS, ambient temperature does not appear and the pushed switch is displayed.
4	A/C	A/C ON/OFF CONTROL	<ul style="list-style-type: none"> "A": Display/OFF "AUTO": OFF 	<ol style="list-style-type: none"> A/C ON/OFF <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> A/C: A/C ON/OFF MANUAL CONTROL OFF: SYSTEM OFF AUTO: AUTO MODE AUTOMATIC CONTROL
5	MODE	MODE DOOR CONTROL <ul style="list-style-type: none"> VENT B/L FOOL MIX 	<ul style="list-style-type: none"> "MODE": Display/OFF "AUTO": Off 	<ol style="list-style-type: none"> Fix the MODE DOOR to one among VENT, B/L, FLOOR and MIX. MODE SW MANUAL CONTROL ORDER : VENT → B/L → FLOOR → MIX → VENT → ... At MIX MODE: MIX LOGIC (MIX, FRE., A/C ON) <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> DEF: DEF MODE MANUAL CONTROL MODE: VENT, B/L, FLOOR & MIX (repeat the order) AUTO: AUTO MODE AUTOMATIC CONTROL

NO	BUTTON	BUTTON FUNCTION	DISPLAY	SYSTEM OPERATION
6	DEF	DEF MODE	<ul style="list-style-type: none"> • "DEF": ON • "A/C": Display • REC. IND: OFF • "AUTO": OFF 	<ol style="list-style-type: none"> 1. MODE DOOR: Fix to "DEF" 2. INTAKE DOOR: Fix to "FRE." (REC. can be selected) 3. A/C: ON <ul style="list-style-type: none"> • A/C OUTPUT ON/OFF control: Corresponding to the detected temperature by EVAP SENSOR. • A/C output should be cut off at 3.5°C or below (ambient temperature). (DISPLAY OFF, A/C SELECT SIGNAL OFF) 4. DEF is prior to "MAX HOT/COOL" function. 5. DEF is prior to "MIX MODE" control. <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> - AUTO: ALL SYSTEM AUTOMATIC CONTROL - MODE: DISCHARGE MODE MANUAL CONTROL (DEF Function off) - A/C: A/C ON/OFF MANUAL CONTROL - DEF: Return to the mode before the DEF S/W selection

NO	BUTTON	BUTTON FUNCTION	DISPLAY	SYSTEM OPERATION
7	OFF	SYSTEM OFF	LCD: ON	<ol style="list-style-type: none"> 1. BLOWER FAN SPEED OFF 2. A/C OFF 3. TEMP. DOOR: Fix to the mode before OFF 4. MODE DOOR: Fix to the mode before OFF 5. INTAKE CONTROL: Fix to the mode before OFF 6. After "OFF", at REC, REC. S/W ON (NON-AQS type) <ul style="list-style-type: none"> - Shift to FRE. MODE - REC. INDICATOR ON - LCD OFF - OTHERS: OFF 7. After "OFF", at FRE, FRE. S/W ON (NON-AQS type) <ul style="list-style-type: none"> - Shift to FRE. MODE - REC. INDICATOR ON - LCD OFF - OTHERS: OFF 8. After "OFF", at AQS, AQS/REC. S/W ON (AQS type) <ul style="list-style-type: none"> - Shift to REC. MODE - AQS OFF - REC. INDICATOR ON - LCD OFF - OTHERS: OFF 9. After "OFF", AQS ON → AQS LOGIC 10. After "OFF", AMB S/W ON <ul style="list-style-type: none"> - OFF: The word "AMB" & ambient temperature displays for 5 sec. and then off. <p>OFF SW AND SYSTEM OPERATION</p> <ul style="list-style-type: none"> • AUTO: AUTO MODE AUTOMATIC CONTROL • BLOWER <ul style="list-style-type: none"> - SPEED: Return to MANUAL LOW - OTHERS: Return to the mode before OFF • A/C <ul style="list-style-type: none"> - A/C ON - OTHERS: Return to the mode before OFF • MODE <ul style="list-style-type: none"> - MODE: The mode before OFF - OTHERS: Return to the mode before OFF • DEF <ul style="list-style-type: none"> - MODE: DEF - A/C ON - INTAKE: FRE. - OTHERS: Return to the mode before OFF • TEMP <ul style="list-style-type: none"> - TEMP: The mode before OFF - OTHERS: Return to the mode before OFF

NO	BUTTON	BUTTON FUNCTION	DISPLAY	SYSTEM OPERATION
8	REC. (NON-AQS type)	REC. MODE	<ul style="list-style-type: none"> • IND ON • "AUTO" display 	1. When operating the REC. S/W from FRE. MODE, fix the INTAKE DOOR to REC. MODE or when operating the REC. S/W from REC., fix the INTAKE DOOR to FRE. MODE.
		FRE. MODE	<ul style="list-style-type: none"> • IND OFF • "AUTO" display 	OFF SW AND SYSTEM OPERATION <ul style="list-style-type: none"> - REC.: FRE./REC. MODE CONTROL - OFF SW: ALL MODES (POSSIBLE TO MANUALLY SELECT) - AUTO: AUTOMATIC CONTROL (FRE. or REC.)
9	FAN UP/DOWN	BLOWER FAN SPEED UP/DOWN	FAN IND ON/OFF	1. BLOWER MOTOR's rotation speed is controlled by the current variation of the POWER TRANSISTOR. 2. At AUTO MODE, if FAN is operated UP/DOWN, the FAN SPEED is UP/DOWN on the basis of the present FAN LEVEL. 3. At OFF, if the other SW except for "FAN" is turned ON, the FAN SPEED is gradually increased from LOW to TARGET SPEED 4. Fan speed level and voltage <ul style="list-style-type: none"> • AUTO AIR CONDITIONER: No level (4.5V - B+) • AUTO HEATER: No level (4.5V - B+) • MANUAL FAN SPEED: 7th level (3.8V - B+) 5. The first shift to another step takes 0.7 sec. If the button is continually engaged, the first shift takes 0.7 sec. And then the next ones take 0.3 sec per each. The operation sound is made for 0.1 sec. 6. At MANUAL 7th level when the UP SW is pushed or at MANUAL 1st level when the DOWN SW is pushed, the operation sound is made 5 times at an interval of 0.15 sec. 7. When shifting 6 to 7 level, or 2 to 1 level, the operation sound is intervally made each 0.15 sec.
				OFF SW AND SYSTEM OPERATION <ul style="list-style-type: none"> - AUTO: AUTO MODE AUTOMATIC CONTROL - OFF: SYSTEM OFF - FAN UP/DOWN: BLOWER FAN SPEED MANUAL CONTROL
10	DEFOG	Rear glass defogger	DEFOG IND ON/OFF	1. If the DEFOG SW is pushed, the rear glass defogger operation signal is output to the ETACS and the ETACS turns the DEFOG IND on by the HTD input. 2. While operating the rear glass defogger, if DEFOG SW is pushed, ETACS stops operating the rear glass defogger and turns the DEFOG IND off. 3. After operating the rear glass defogger for 15 minutes by EATCS, DEFOG function is automatically off.
				OFF SW AND SYSTEM OPERATION <ul style="list-style-type: none"> - DEFOG: Push the second DEFOG SW, DEFOG function is off.

BLOWER AND A/C CONTROLS (AUTOMATIC)

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SYSTEM CONTROL FEATURES**SIGNAL I/O FOR EACH CONTROL FEATURE**

Control item	Input	Output	Remarks
Required discharge temperature control	Auto SW, A/C SW, TEMP SW, INCAR sensor, AMB sensor, Photo sensor, Water temperature sensor, thermo sensor, TEMP actuator.	TEMP actuator	
Mode control	AUTO SW, MODE SW, TEMP SW, DEF SW, Blower SW, OFF SW, INCAR sensor, AMB sensor, Photo sensor, Water temperature sensor, thermo sensor, Power TR.	Blower motor Power TR HI-blower relay	Blower Switch Manual selection Control in priority
Mode door control	AUTO SW, MODE SW, DEF SW, Blower SW, OFF SW, TEMP SW, INCAR sensor, AMB sensor, Photo sensor.	Mode actuator	
Intake control	AUTO SW, A/C SW, DEF SW, TEMP SW, OFF SW, Intake SW, INCAR sensor, AMB sensor, Photo sensor, Power TR.	Mode actuator	
Compressor control	AUTO SW, A/C SW, DEF SW, TEMP SW, OFF SW, IN-CAR sensor, AMB sensor, Photo sensor.	Compressor relay	

During mode control, the A/C may operate during DEF or MIX mode. In order to enable dehumidification, the driver may select A/C OFF during the A/C on condition.

CONTROL SPECIFICATION

Control item	Control features	Remarks
Required discharge temperature	Required temperature determined by the set temperature and the inputted sensor value.	
Auto control	Required discharge temperature is determined by the set temperature and the inputted sensor value. The feature will use the required discharge temperature to perform the auto control of temp. actuator, mode actuator, intake actuator, blower motor and compressor, and maintain the set temperature stably.	
IN-CAR temperature correction	Upon detecting rapid changes of temperature from the INCAR sensor, it will gradually correct the incar temperature value.	- 1°C UP/4sec delay - 1°C DOWN/4sec delay
AMB temperature correction	Upon detecting rapid changes of temperature from the AMB sensor, it will gradually correct the ambient temperature value.	- 1°C UP/3min delay - 1°C DOWN/4sec delay
Photo correction	Upon detecting rapid changes of photo intensity from the PHOTO sensor, it will gradually correct the photo intensity value.	- 350 → 1000(W/m ²)/1min delay - 350 → 1000(W/m ²)/5min delay

Control Item	Control features	Remarks
TEMP door control	It does the automatic control to maintain the optimum TEMP door opening (0%-100%).It will be computed by the temperature set and the input signal from each sensor.	The set temperature range 17°C → 32°C, 0.5°C step (62°F → 90°F, 1°F step)
Blower speed	Automatic control of the blower speed. The target value will be computed by the set temperature and the input signal from each sensor. (7 levels may be selected in case of manual selection.)	<ul style="list-style-type: none"> - Auto mode blower low voltage (Manual low voltage: 3.8) - Auto mode heater blower HI speed: 10.6V
Electro-motive mode control	During auto control, it will raise the permitted voltage of blower motor gradually in order to improve comfortability.	6 seconds for shifting LO → MAX
Photo compensation	During auto control, it will compensate the blower level and the discharge temperature according to the photo intensity detected from the PHOTO sensor at VENT or B/L mode. PHOTO compensation will begin after 5 seconds when ignition on.	
Mode door control	Automatic control of air discharge based on the required discharge temperature. It will be computed by the temperature setting and the input signal from each sensor. VENT → B/L → FLOOR → VENT) In case of manual selection (VENT → B/L → FLOOR → MIX → VENT)	<ul style="list-style-type: none"> - At OFF in AUTO mode, MODE door will maintain the AUTO controlcondition. - At OFF in manual mode, MODE door will maintain the manual controlcondition.
MIX mode control (in auto control)	If the ambient temperature is -13°C or less in AUTO mode, discharge mode will be controlled at MIX. (When front window glass is fogged.)	Entering MIX mode, A/C will operate.
INTAKE door control	Auto control of intake mode based on the required discharge temperature that will be computed by the temperature setting and the input signal from each sensor.	<ul style="list-style-type: none"> - Shift to REC when selecting REC button at FRE condition (LED on). - Shift to FRE when selecting FRE button at REC condition (LED off).
INTAKE control at OFF	The intake door will shift to the REC position when switching the system off in auto-condition, and maintain the previous condition at OFF at manual condition.	<ul style="list-style-type: none"> - FRE./REC. manual selection will be enabled at OFF. - REC indicator will come on at OFF at AUTO mode.
Compressor auto control	Control automatically the compressor on/off state corresponding to the set temperatureand the input signal from each sensor.	<ul style="list-style-type: none"> - When selection the AUTO SW, the compressor is controlled to ON/OFF. - When selection the DEF SW, the compressor is controlled to "ON".
Compressor clutch on/off control based on refrigerant temperature	If EVAP sensor temperature is below than 0.5°C, the compressor will be ON and the temperature is 3°C, or higher, with the compressor OFF.	

BLOWER AND A/C CONTROLS (AUTOMATIC)

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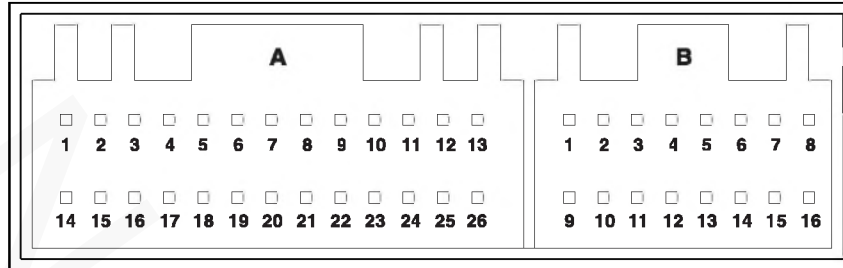
Control Item	Control features	Remarks
MAX HOT	When selecting the set temperature 32°C at AUTO mode, MAX HOT will be performed. It will prevail over MIX mode control.	<ul style="list-style-type: none"> - TEMP door: MAX HOT - MODE door: FLOOR mode - INTAKE door: FRE mode - Compressor: OFF - Blower speed: AUTO HI (10.6V)
MAX COOL	When selecting the set temperature 17°C at AUTO mode, MAX COOL will be performed.	<ul style="list-style-type: none"> - TEMP door: MAX COOL - MODE door: FLOOR mode - INTAKE door: REC mode - Compressor: ON - Blower speed: MAX HI
Electromotive heating control	If the set temperature > the in-car temperature by 3°C at B/L or FLOOR in AUTO mode, and the water temperature sensor input is 58°C or less, it will effect the electromotive heating control to prevent outside cold air from flowing toward the feet of passengers.	<ul style="list-style-type: none"> - Blower speed: Controlled at AUTO LOW (0.5V)
	As the coolant temperature rises, the MODE door will shift to DEF → MIX → AUTO.	<p>OPERATION RELEASE</p> <ul style="list-style-type: none"> • 10 minutes after ignition on(In case of temperature sensor fail,it will apply the substitute value, 20°C). • After pressing blower switch when water temperature sensor detection is 58°C or higher • In pressing MODE switch. • In Upon pressing DEF switch.
	MODE: Manual selection is enabled. INTAKE door: At AUTO control or at manual selection mode.	
	Blower speed: Manual selection is enabled (No re-entry).	
Electromotive cooling control	In order to prevent hot air from the VENT or B/L in AUTO mode (A/C on mode), the blower speed will be operated at LOW for approx. 9 seconds before entering the AUTO control if the EVAP sensor detection is temperature 30°C or higher.	
MAX HOT	If the above condition is satisfied, electromotive cooling control will operate at any time.	

Control Item	Control features	Remarks
Air Quality System (AQS)	The AQS system will detect the hazardous elements and odors contained in the air. If the harmful element concentration is higher than standard, the system will output a LOW signal (0V) to the FATC.	- When the initial battery connection and ignition is ON, it will operate at AUTO mode. (AQS will not operate).
	If the concentration is within the standard value, the system will output a HI signal(3V) the FATC.	- When IGN 2 ON, the AQS assembly will be preheated for 34.5 ± 5 seconds. During the preheating, AQS will output 0V (ground). (REC mode)
	Corresponding to the signal from the AQS, it will control the INTAKE door as follows to prevent the inflow of harmful gas in FATC :	- IGN 2 ON: It will check circuit break on the AQS assembly's signal line for approx. 7 seconds during the preheating, irrespective to the AQS switch condition.
	Condition : INTAKE door position	- When AQS is selected prior to IGN2 OFF and IGN2 is turned OFF → ON: AQS indicator will come on, and the system will operate at AQS mode. (Store the previous condition before IGN 2 OFF)
	LOW : REC	
HI : FRE		
Initialization Upon battery-on	When supplying the initial power, it will operate in the initial condition.	- When the initial ignition ON after battery connection, the system will operate at the set temperature 25°C and at AUTO mode.
Memory	When removing the ignition key, it will store FATC's operating condition.	- When IGN ON after IGN OFF during FATC operation, the system will operate at the previous before the ignition off.

BLOWER AND A/C CONTROLS (AUTOMATIC)

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CONNECTOR CONFIGURATIONS EBD77E9C

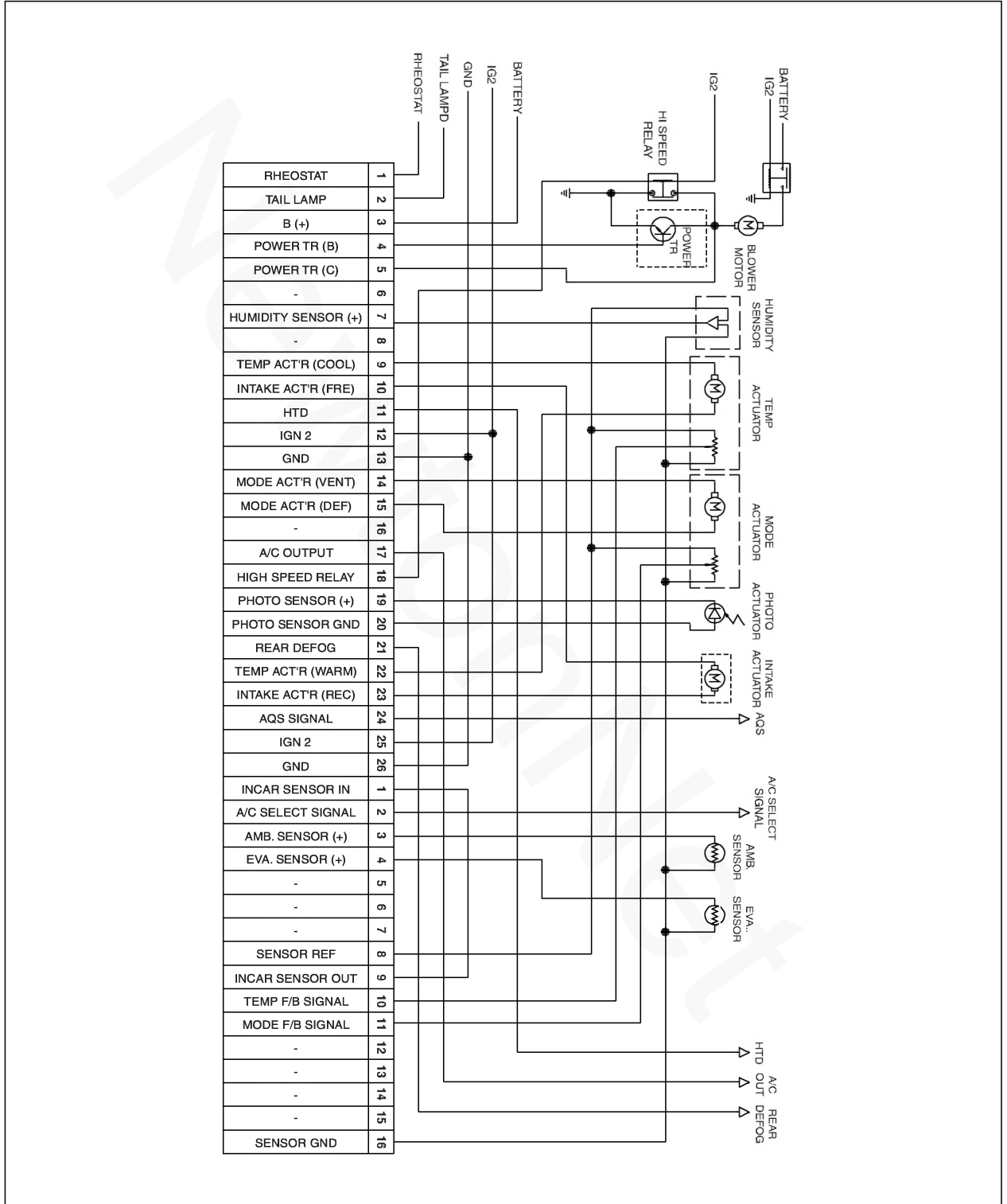


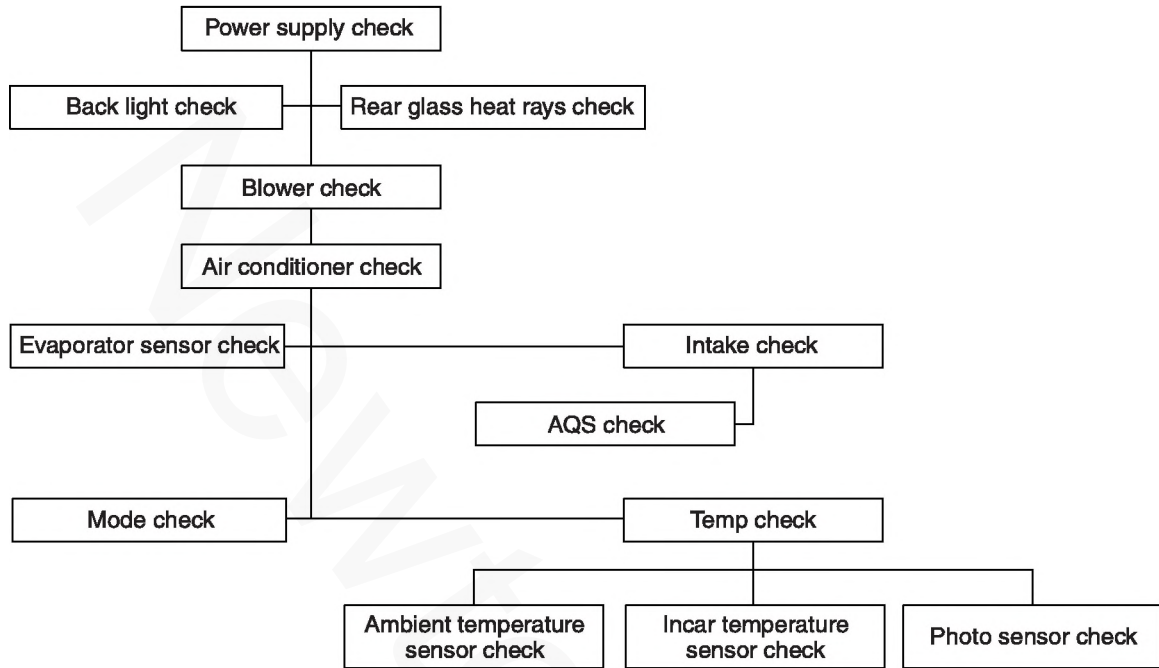
EQOE602A

I/NO	PIN	CIRCUIT	REMARK	I/NO	PIN	CIRCUIT	REMARK
A	1	RHEOSTAT	ILL (-)	B	1	INCAR SENSOR IN	
	2	TAIL LAMP	ILL (+)		2	A/C SELECT	HI OUTPUT
	3	BATTERY			3	AMB SENSOR (+)	
	4	POWER TR(B)			4	EVA. SENSOR (+)	
	5	POWER TR(C)			5	-	
	6	-			6	-	
	7	HUMDITY			7	-	
	8	-			8	SENSOR REF (+5V)	
	9	TEMP ACT'R (CCW)	COOL		9	INCAR SENSOR OUT	
	10	INTAKE ACT'R (CCW)	FRESH		10	TEMP F/B SIGNAL	
	11	HTD			11	MODE F/B SIGNAL	
	12	IGN 2			12	-	
	13	GND			13	-	
	14	MODE ACT'R (CW)	VENT		14	-	
	15	MODE ACT'R (CCW)	OFF		15	-	
	16	-			16	SENSOR GND	
	17	A/CON OUTPUT	HI OUTPUT				
	18	HI SPEED RELAY	LOW OUTPUT				
	19	PHOTO SENSOR (+)					
	20	PHOTO SENSOR (GND)					
	21	REAR DEFOG	LOW OUTPUT				
	22	TEMP ACT'R (CW)	WARM				
	23	INTAKE ACT'R (CW)	REC				
	24	AQS SIGNAL					
	25	IGN 2					
	26	GND					

WIRING DIAGRAM

EE7725F8



CONTROL PANEL TESTS E3EC9BA9

EQKE605A

Since FATC controller is complicated in functions as shown in the above chart, it is impossible to conclude its reason at the occurrence of failure. All possibilities of failure shall be considered for the purpose of efficient. How to check.

1. Power supply check
2. Back light and Rear glass heat rays check
3. Blower check
4. Air conditioner check
5. Intake check and AQS check
6. Mode check
7. Temp check

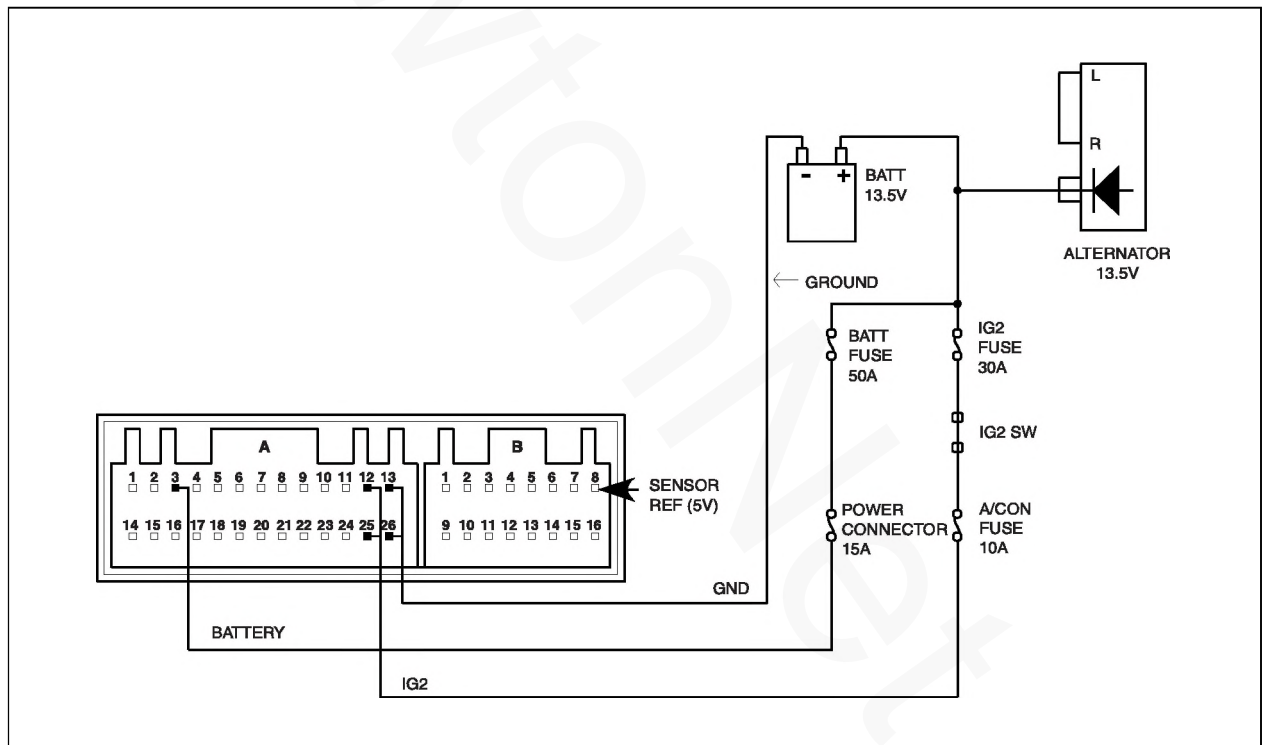
POWER SUPPLY CHECK

In turning off IGN, battery supplies power for ordinary power, FATC connector A-3 through battery fuse. FATC performs memory function by means of battery power supplied as described above. In turning on IGN, alternator

is driven. At this time, IG2 power generated in alternator FATC connector A-12 and A-25 terminal through IG1 fuse and air conditioner fuse (10A). FAT carried out actual system operation by means of IG2 power supplied as described above.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
When IG is ON, memory function error occurs	Battery power supply error	Check voltage of battery after turning off IG. If 10V and more, check FATC connector and if no problem, check the inside of controller. If 10V and less, check fuse or wiring state of battery power source.
When IG is ON, system running error occurs	IG2 power supply error	Check voltage of IG2 after turning on IG. If 10V and more, check FATC connector and if no problem, check the inside of controller. If 10V and less, check fuse or wiring state of IG2 power source.



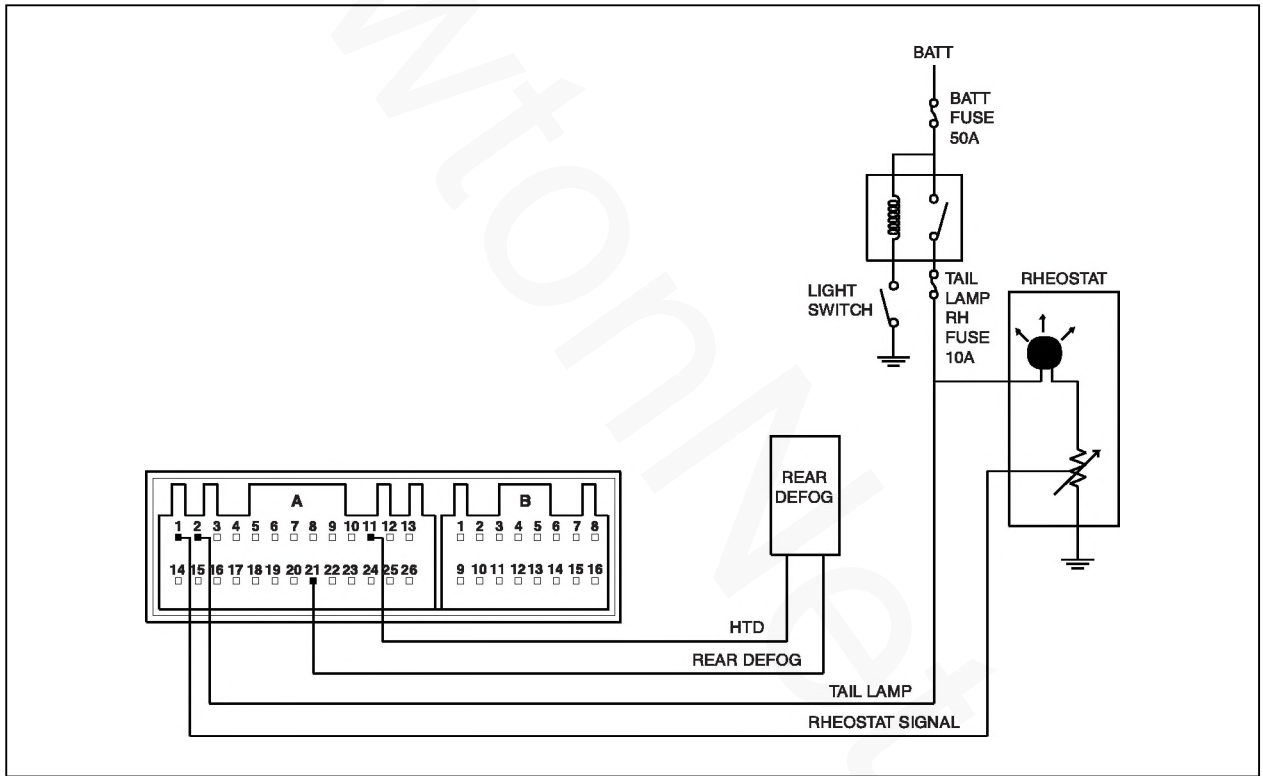
BACK LIGHT AND REAR GLASS HEAT RAYS CHECK

In turning on IG and then light switch, battery power is supplied for FATC connector A-2 terminal through wiring. The

supplied power passes connector A-1 terminal through light bulb in FATC and flows into reostat as shown in the above figure. The brightness is adjusted according to resistance value of reostat.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
When light switch is ON, partial error occurs in back light	Light bulb lighting error in FATC	
When light switch is ON, entire error occurs in back light	Light power supply error	Measure voltage of tail light shown in the above figure after switching on light. If 10V and more, check FATC connector and if no problem, measure signal voltage of reostat shown in the above figure. If 8V and more, check reostat wiring and reostat. If tail light is below 1V, check tail light wiring.



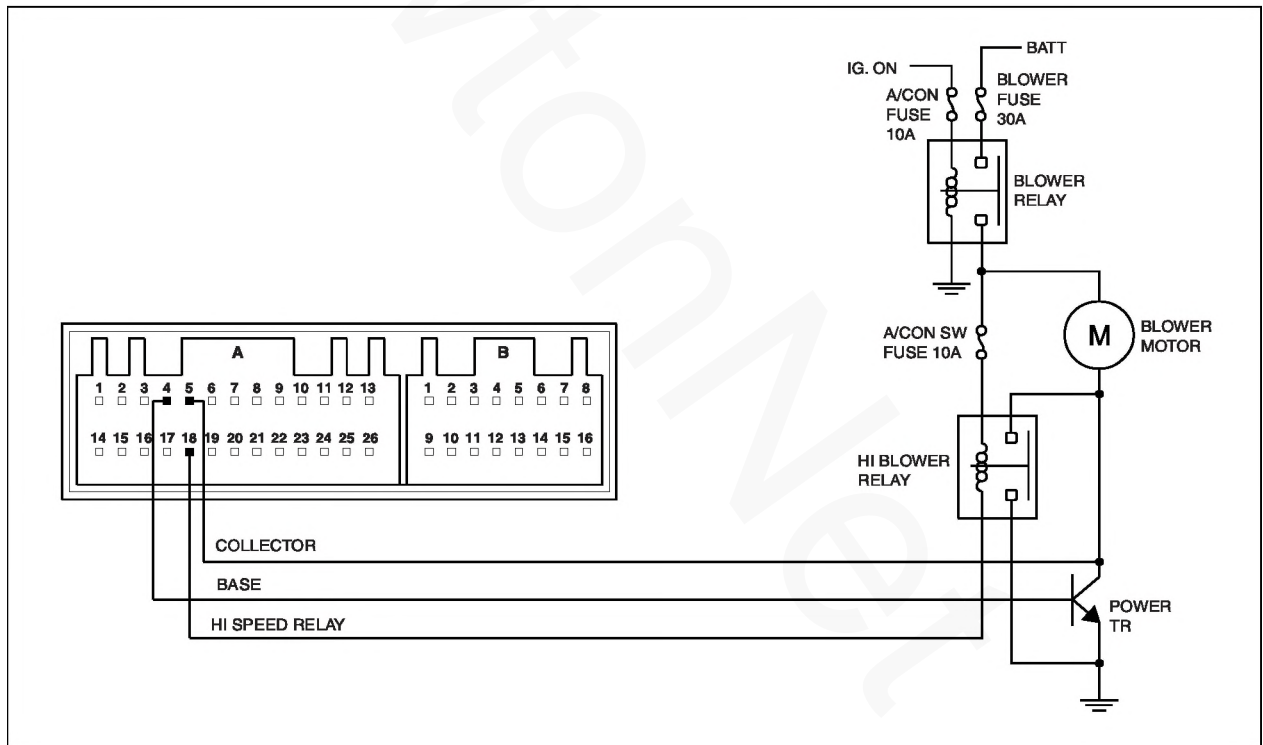
BLOWER CHECK

Perform the blower check in manual blower running state because it is difficult to check blower at automatic control. Blower is controlled from level 1 to level 7 equally as in button operation and running logic. In turning on IG, blower relay is ON and voltage of 0.1 to 1.4V is transferred from FATC connector A-4 terminal to base source of power TR

according to FATC control (selectable from level 1 to level 7). At this time, voltage of blower motor's both ends is determined according to collector voltage of FATC connector A-5 terminal. If FATC is controlled in level 7, GND(0V) is supplied for FATC connector A-18 terminal and high blower relay is driven.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
Amount of wind is wrong at manual selection of blower	Power TR error	Check voltage of blower motor's both ends. (Level 1: 3.8V, Level 2: 5.2V, Level 3: 6.5V, Level 4: 7.9V, Level 5: 9.2V, Level 6: 10.6V, Level 7: 13.5V [high-relay operation]) Measure voltage of each terminal and if there is difference more than ±0.6V, check power TR.
Blower wind is discharged despite pressing OFF switch	Power TR error	Power TR change



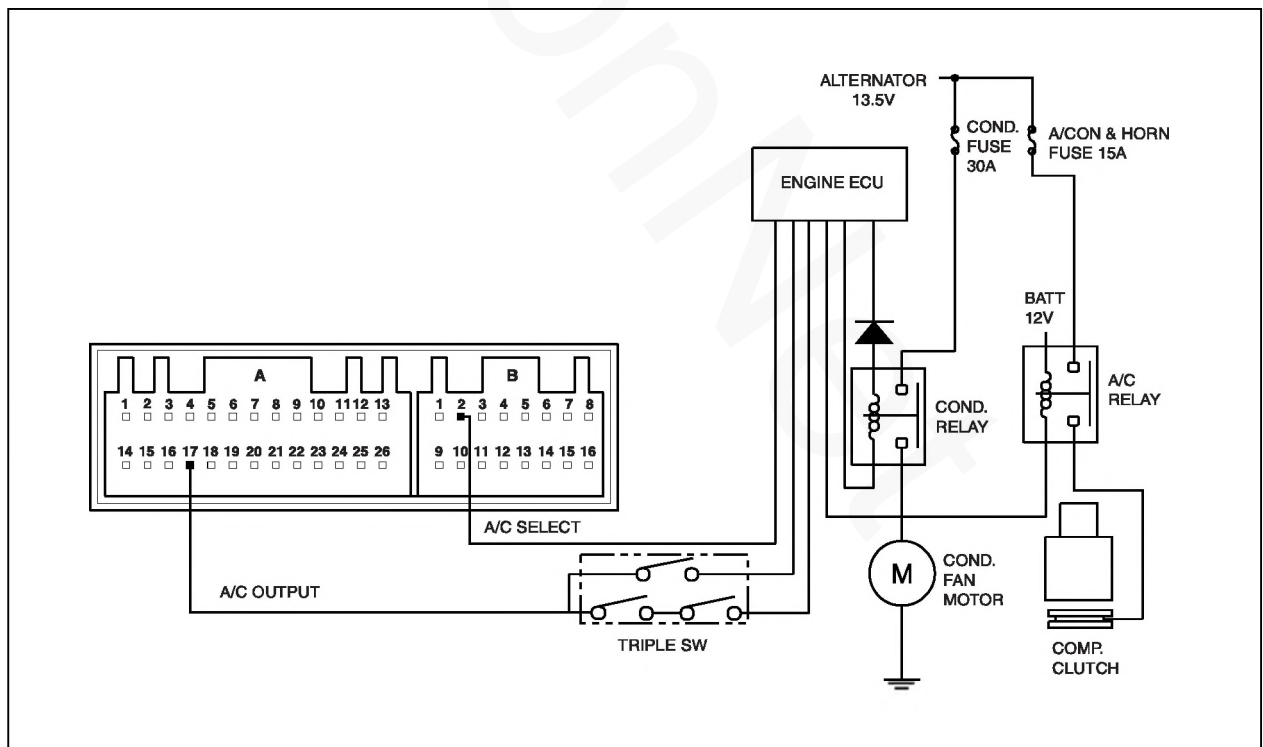
AIR CONDITIONER CHECK

11V is outputted from connector A-17 terminal in turning on INSULATING and pressing air conditioner switch. However, although 11V is outputted from FATC connector A-17 terminal, compressor clutch isn't driven. Wind of air conditioner is discharged if only compressor clutch works. Output signal from air conditioner is inputted in engine computer through triple switch. Then, the engine computer considers several conditions and when output of air conditioner is judged to be practical, it gives GND to signal

terminal of air conditioner relay. Accordingly, relay of air conditioner is ON and compressor clutch works. Triple switch checks pressure of refrigerant flowing through pipe and turnson/off switches in it according to standard. So, it controls that output signal of air conditioner outputted from FATC is inputted into engine computer, and also speed of condenser fan according to pressure level. (For high pressure, high-speed and for low pressure, low-speed.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
Wind of air conditioner isn't discharged into vehicle despite switching on air conditioner.	Signal output error of air conditioner	Switch on air conditioner and measure voltage of FATC connector A-17 terminal as shown in the above figure. If 9V and more, check triple switch, air conditioner relay and ECM.
	Input error of evaporator sensor	If evaporator sensor is disconnected or short or voltage of its input source is more than 3.0V (below 0.5°C), output of air conditioner isn't made.



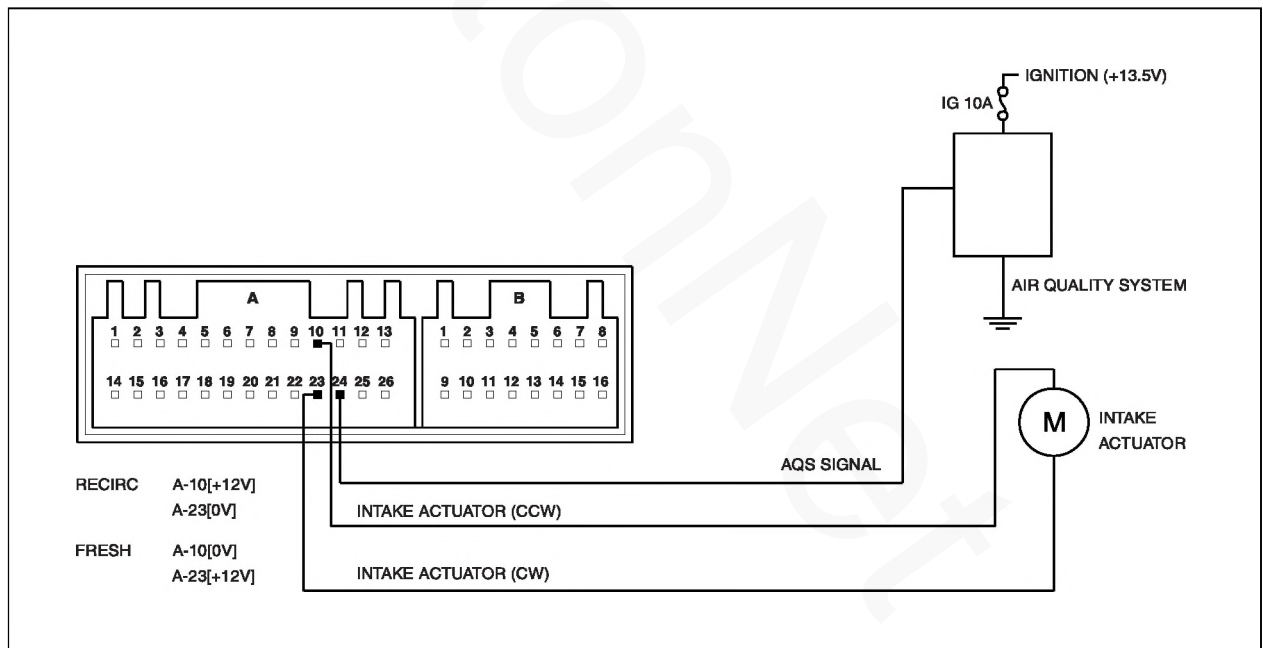
INTAKE AND AQS CHECK

In turning on IG and selecting outdoor mode with indoor switch, 12V is outputted from FATC connector A-23 terminal, 0V is supplied for A-10 terminal and motor works in

direction of outdoor. In selecting indoor mode with indoor-switch, 12V is outputted from FATC connector A-10 terminal, 0V is supplied for A-23 terminal and motor works in direction of indoor.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
Outdoor mode running error	Power supply error in actuator	Separate connector linked with actuator, select outdoor mode with indoor switch and measure voltage of FATC connector A-23 terminal. If 8V and more, check actuator or wiring state and if 9V and less, check the inside of controller.
Indoor mode running error	Power supply error in actuator	Select indoor mode in the above method and measure voltage of FATC connector A-10 terminal. If 8V and more, check actuator or wiring state and if 9V and less, check the inside of controller
Fixed in outdoor or indoor mode at AQS selection	AQS signal terminal output error	Select AQS switch and measure AQS signal terminal as shown in the above figure. If there is no change of voltage over 10 min, check AQS.



BLOWER AND A/C CONTROLS (AUTOMATIC)

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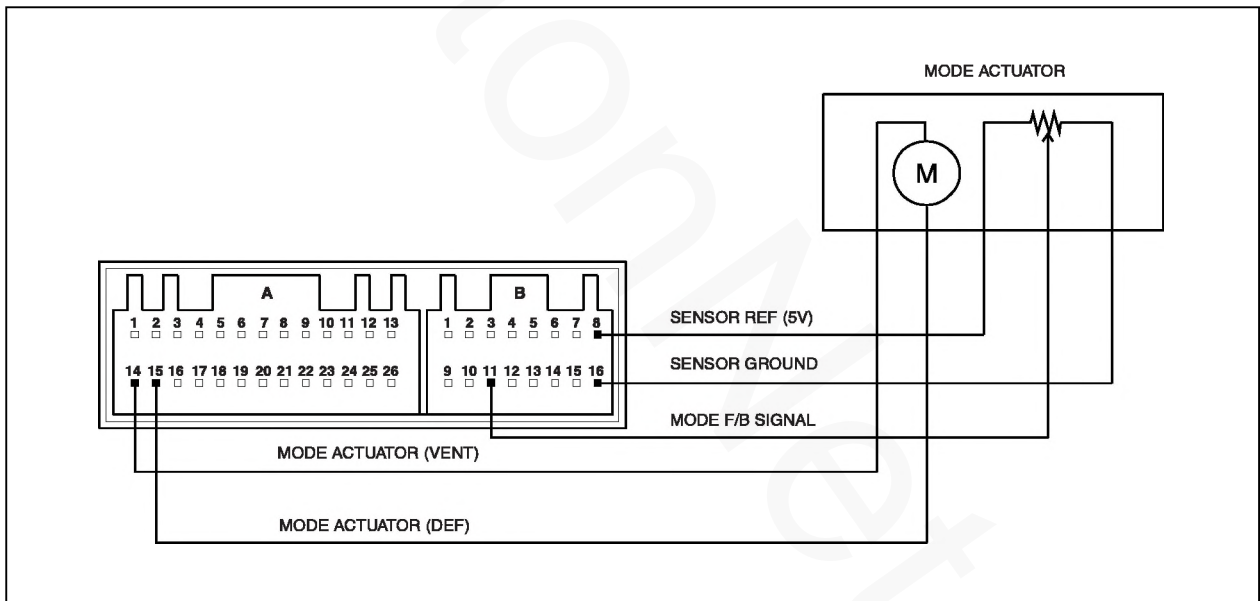
MODE CHECK

In turning on IG and selecting mode switch, sequential operation begins in order of Vent → Bi-level → Blower → Mix. DIP mode works regardless of order at selecting it. In selecting Vent mode as mode switch, GND(0V) is supplied

for FATC connector A-14(Vent) terminal. Voltage of 9V and more is set in the rest terminal A-15(DEF) and motor drive IG in mode actuator which receives the signal, works in direction of vent mode setup. Vent, Built-in-level, Blower, Mix and Defrost mode can be selected in the method described above.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
Specific mode isn't selected.	Signal transmission error of selected mode	Measure voltage of selected mode wiring without separating connector linked with actuator. If 8V and more, check the inside of controller.
	Mode actuator running error	If 1V and less at measuring in the above method, check mode actuator and wiring state.
Mode selection is impossible	Internal error of mode actuator	If motor driver IG built in mode actuator is bad, mode selection is impossible. When mode isn't selected though GND(0V) is supplied for selected mode wiring after selecting mode in controller, its cause is internal failure of mode actuator.



EQOE650F

TEMP CHECK

In adjusting temp switch from 32°C to 17°C, 11V is outputted from FATC connector A-9 terminal, 0V is supplied for A-22 terminal and temp motor works in direction of COOL. In adjusting temp switch from 17°C to 32°C, 11V is outputted from FATC connector A-22 terminal, 0V is supplied for A-9 terminal and temp motor works in direction of WARM. When temp actuator has to move to a certain location for its automatic control, temp feedback signal terminal moves equally in temp actuator and informs controller of location of temp actuator through FATC connector B-10

terminal. Comparing original value with inputted value, it works until they are same. If 4.9V and more is inputted in B-10 terminal, it is regarded as disconnection. If 0.1V and less is inputted in B-10 terminal, it is regarded as short-circuit. In the case of disconnection or short-circuit as a result of self-diagnostic, substitute control is carried out as follows.

- If setup temperature is 17°C to 24.5°C, set to MAX COOL.
- If setup temperature is 25°C to 32.0°C, set to MAX WARM.

ERROR DIAGNOSTICS

Symptoms	Causes	How to check
Temp actuator running error	Power supply error in temp actuator	After altering 17°C to 32°C and adversely, measure voltage of A-22 terminal. If Both of them are 9V and more, check temp actuator and peripheral wiring state and if one or both of them are 5V and less, its cause is internal failure of FATC.
	Sensor (+5) power supply error	If automatic control isn't operated smoothly, measure voltage of FATC connector B- 8 terminal. If under 4.8V or over 5.2V, its cause is internal failure of FATC.
	Driver error of temp actuator	If No. 20 is outputted as a result of self-diagnostic, check temp actuator driver.

