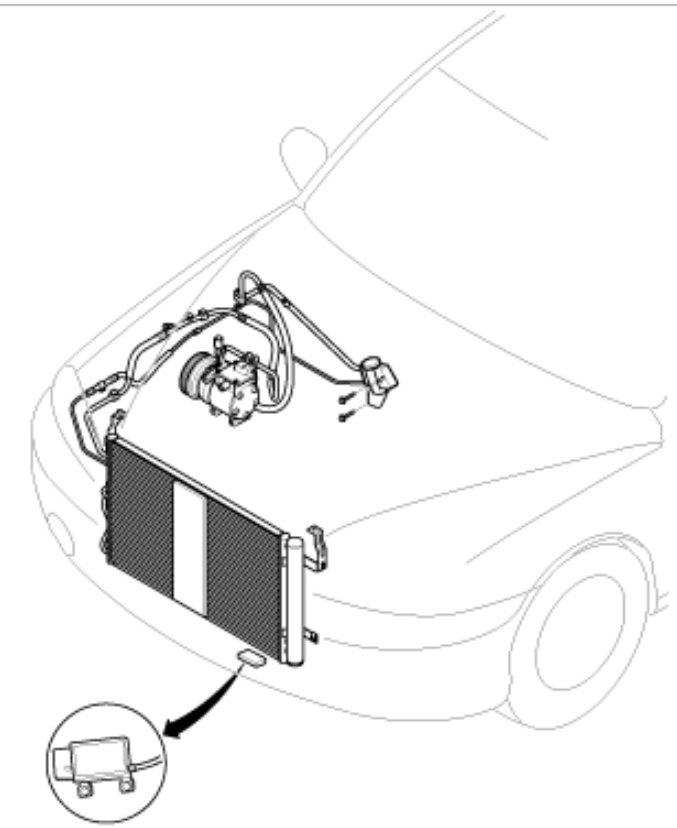
HYUNDAI

Elantra

Workshop Manual
2001 - 2006

COMPONENT LOCATION



DESCRIPTION

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
   A. Sensitivity at NO2 0.3PPM : more than 2.8
   B. Sensitivity at gasoline 10PPM : less than 0.45
4. Delay time
   A. ON time (on) : 5sec.
   B. OFF time (off) : 0sec.

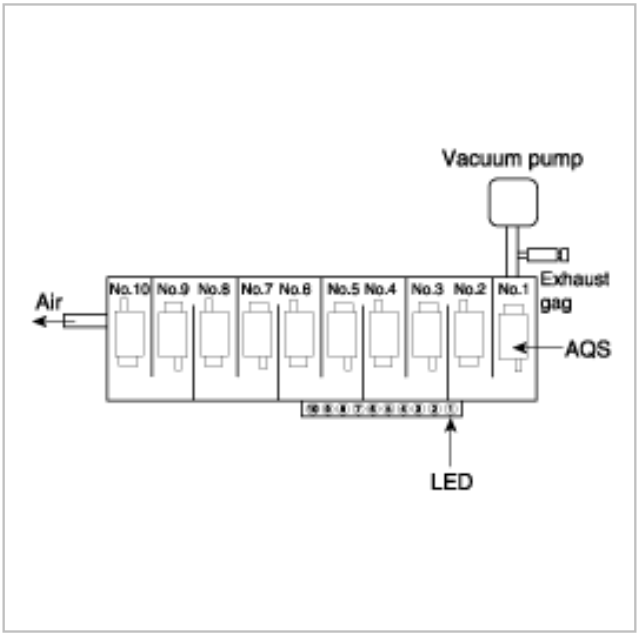
SENSOR OUTPUT

Condition	Resistance
Normal condition	5V
Hazardous gas detection	0V

INSPECTION

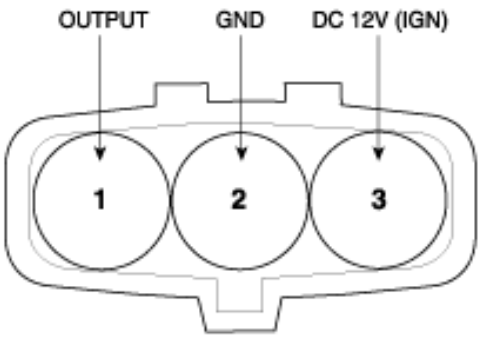
CHECKING METHOD OF GAS DETECTING BENCH

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.

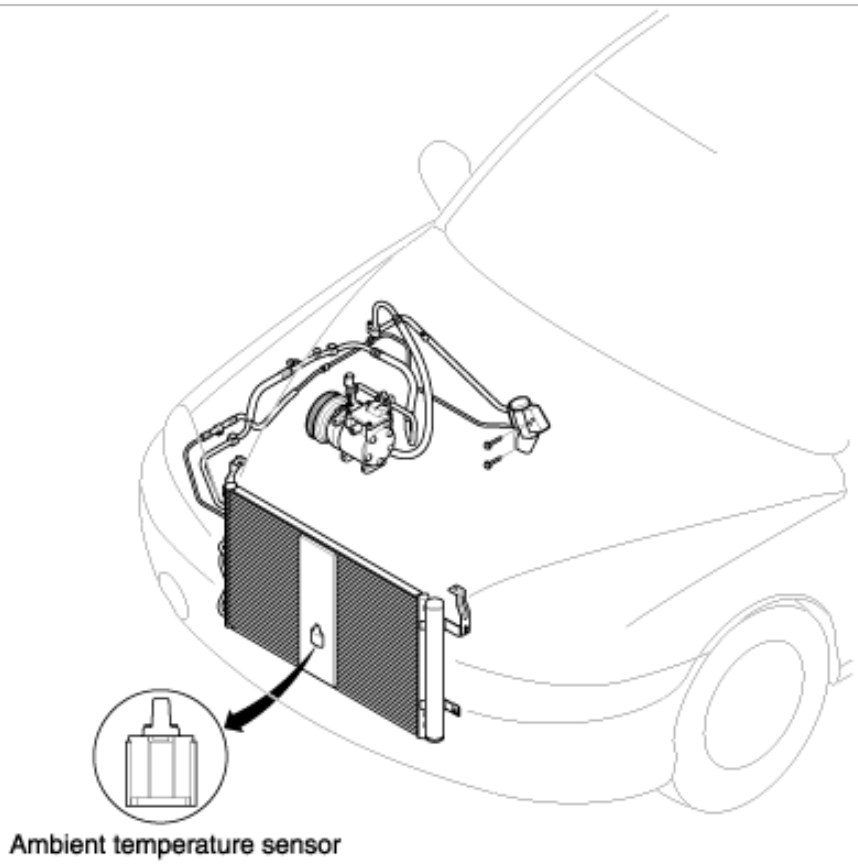


5. Turn on the power of vacuum pump.
6. Supply the power to the AQS. (DC 12V)
7. LED of AQS is kept "ON" for the first 35 ± 2 seconds after supplying the power.
8. Wait until all of the LEDs are "OFF". Put the diesel engine exhaust gas into the chamber. Then check the LEDs of number 1 to 10 are "ON".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

CONNECTOR



COMPONENT LOCATION



DESCRIPTION

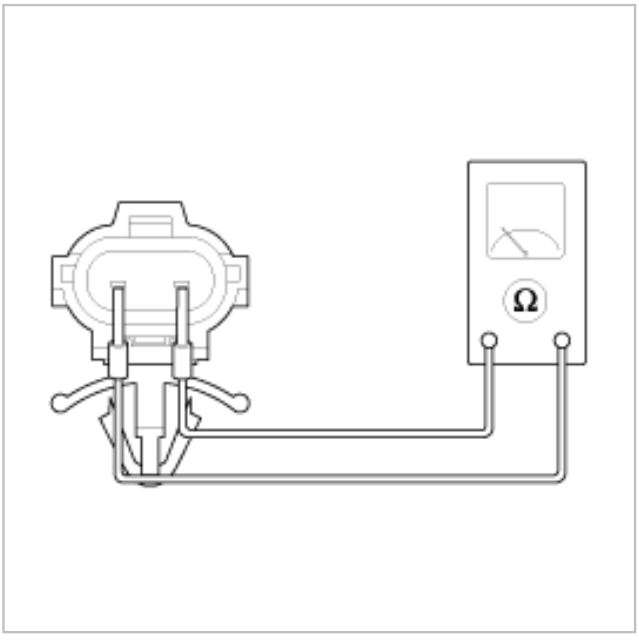
1. The air temperature sensor, located at the front of the engine radiator, detects ambient air temperature. It is a negative type thermistor; resistance will increase with lower temperatures, and decrease with higher temperatures.
2. The sensor output will be used for discharge temperature sensor, sensor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

INSPECTION

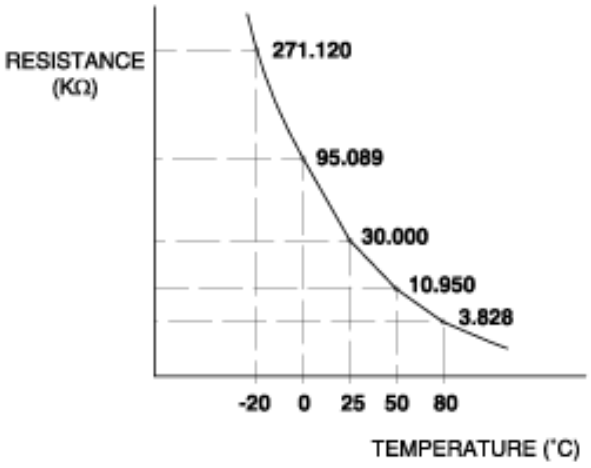
Measure the resistance.

RESISTANCE-TEMP. CHARACTERISIC 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

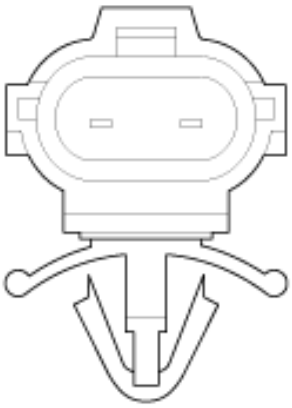


CHARACTERISTICS



Ebay User ID: reveleus1

CONNECTOR



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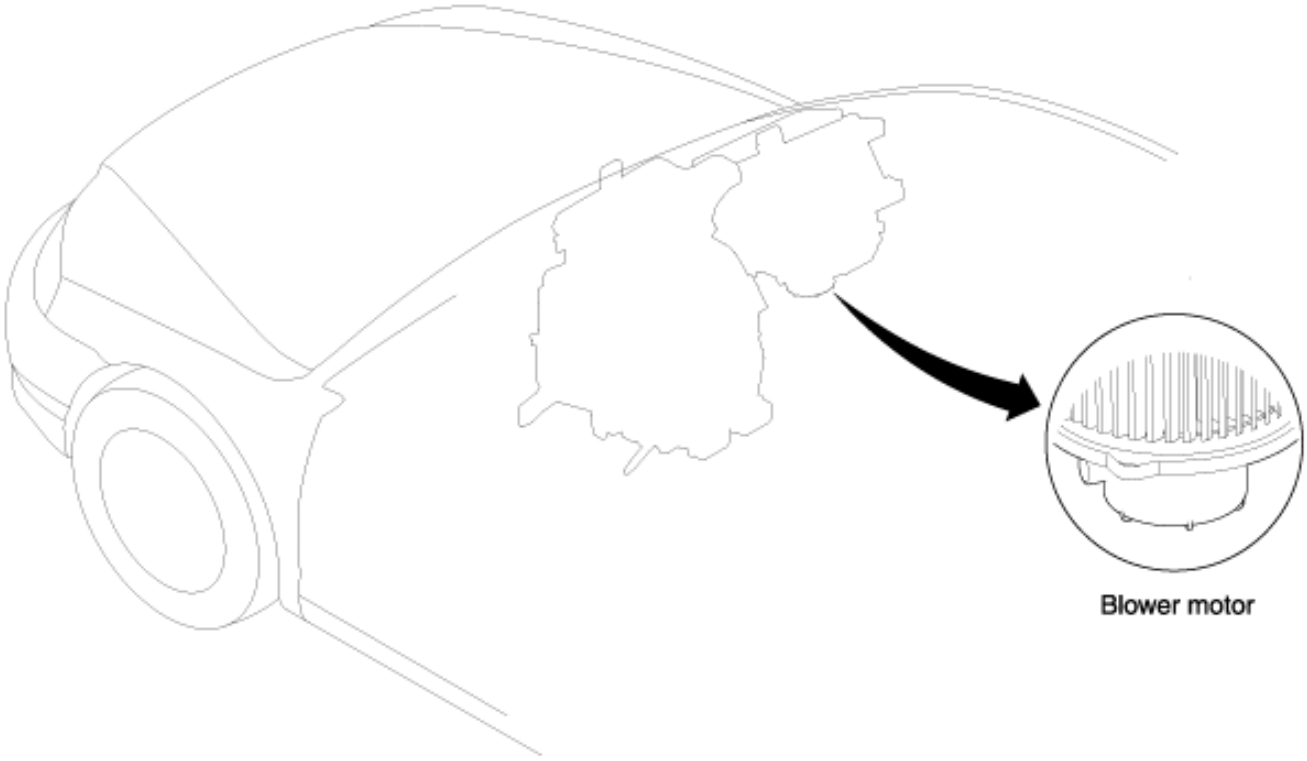


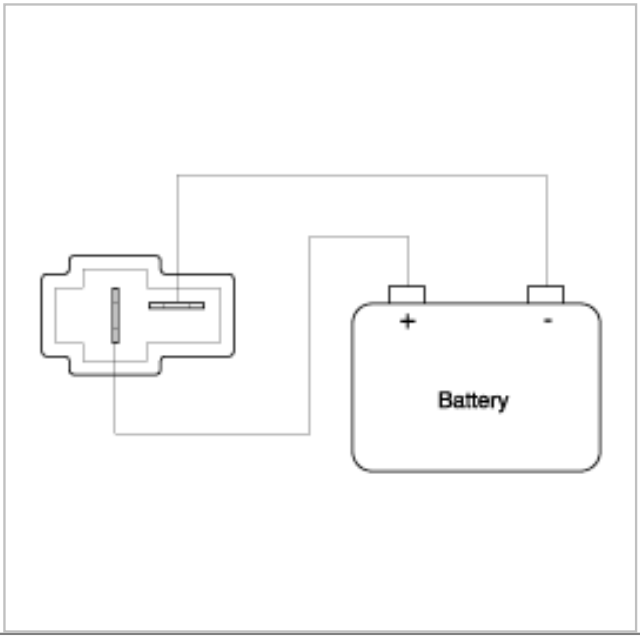
DESCRIPTION

Moter : Magnet ø70

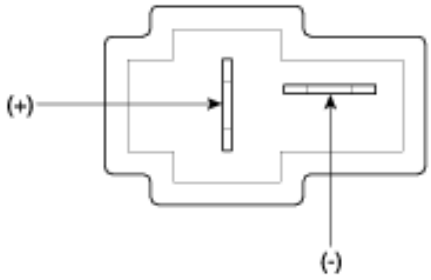
Item	Speccifications	
Type	DC ferrite	20°C or 68°F
Rated voltage	DC 12 volts	
No load speed	Min. 3300rpm	
No load current	Max. 3.0A	
Rated load	5.0kgf·cm	
Speed in rated load	2900 ± 250rpm	
Current in rated load	Continuous	
Insulation resistance	Min. 1MΩ	
Rotation direction viewed from output (Mtr. shaft)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

INSPECTION

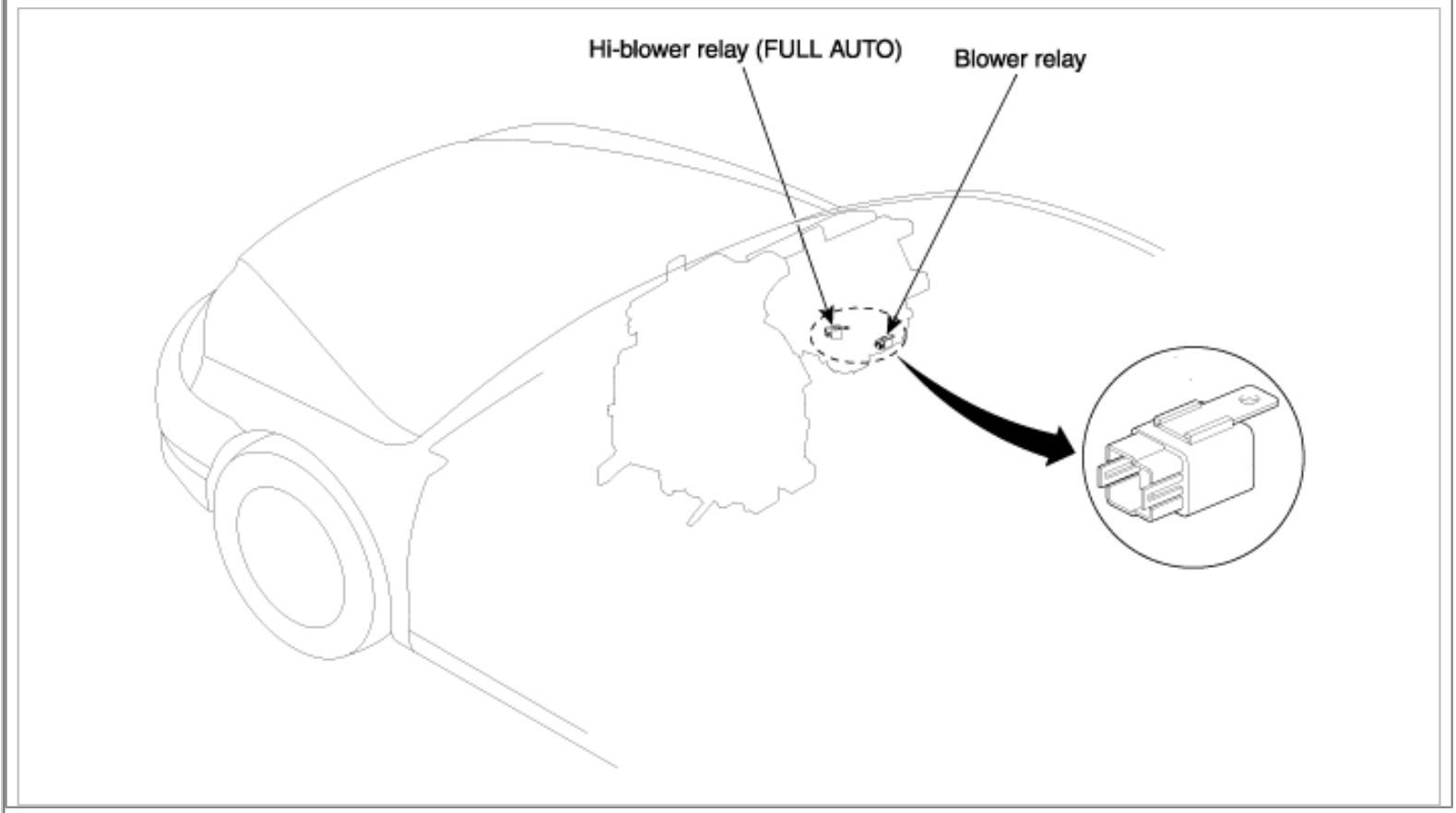
Connect the battery voltage and check the blower motor rotation.



CONNECTOR



COMPONENT LOCATION

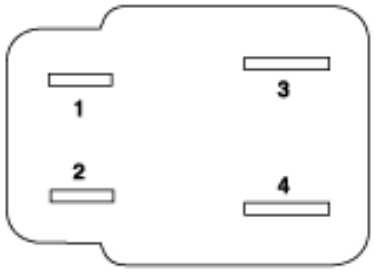


DESCRIPTION

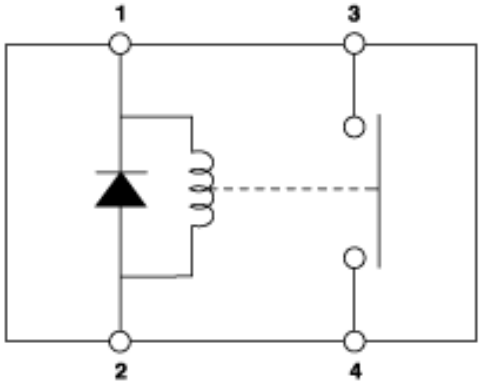
There should be continuity between No.3 and No.4 terminals when power and ground are connected to the No.1 and No.2 terminals, and there should be no continuity when power is disconnected.

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

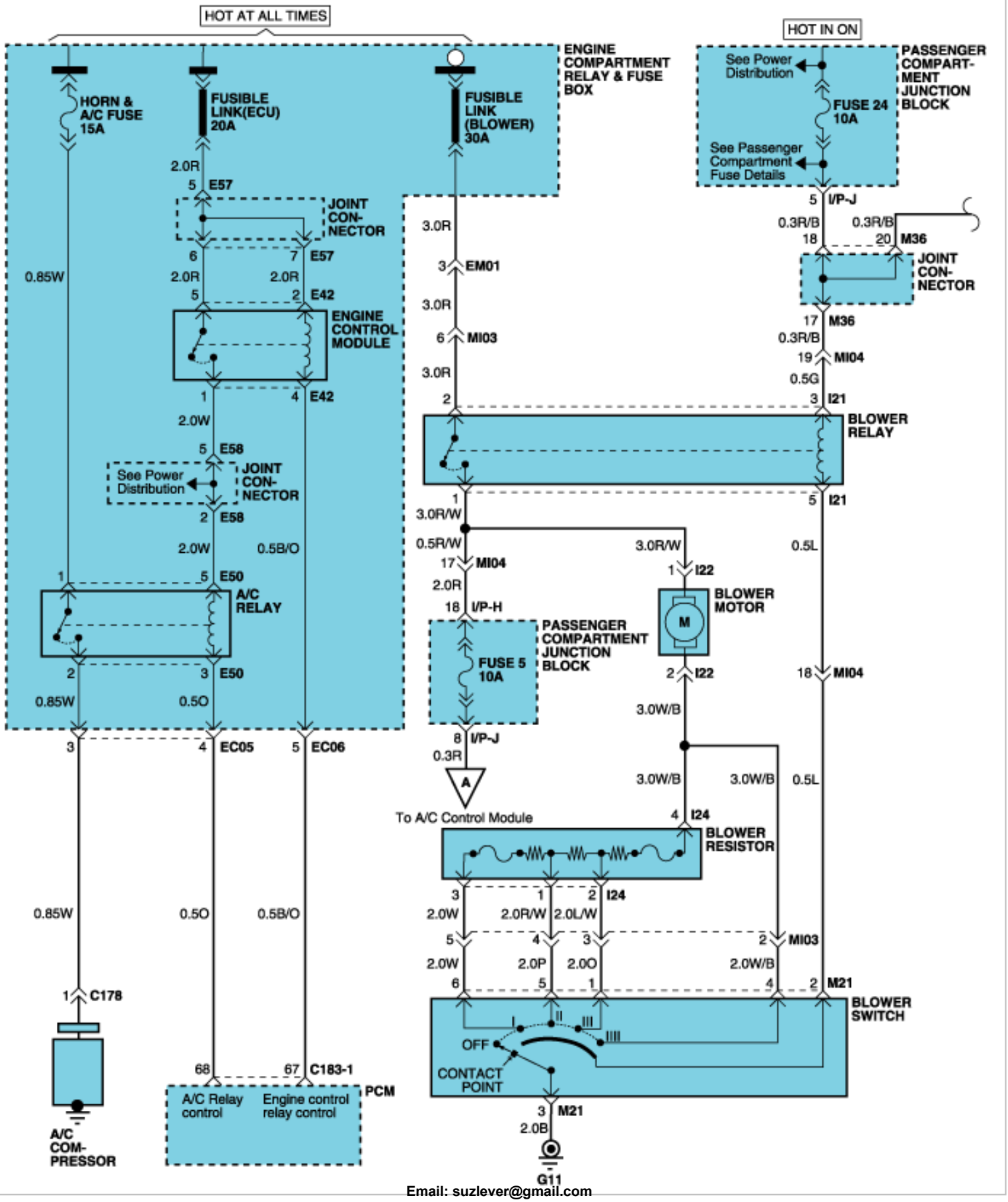
CONNECTOR

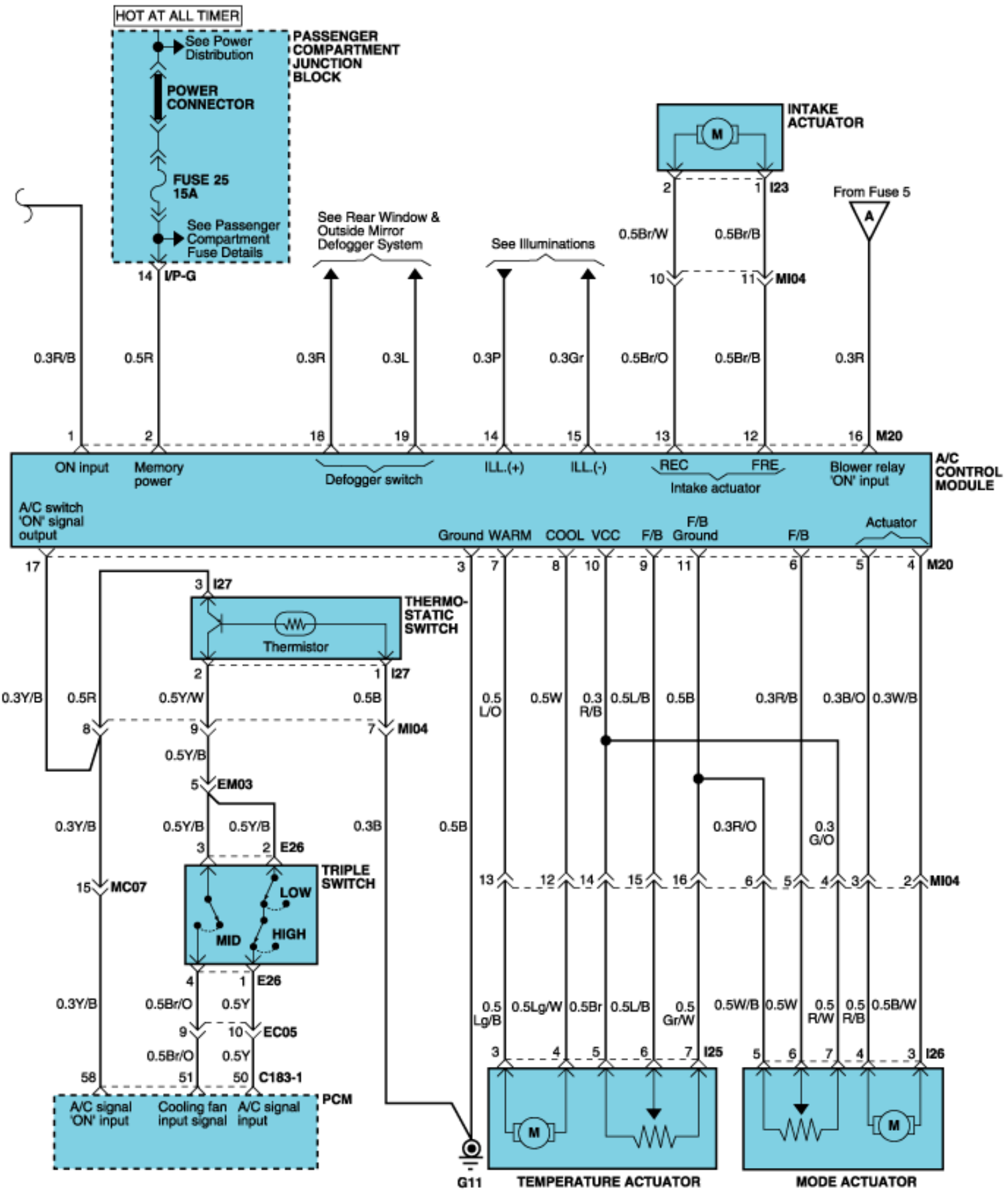


CIRCUIT DIAGRAM



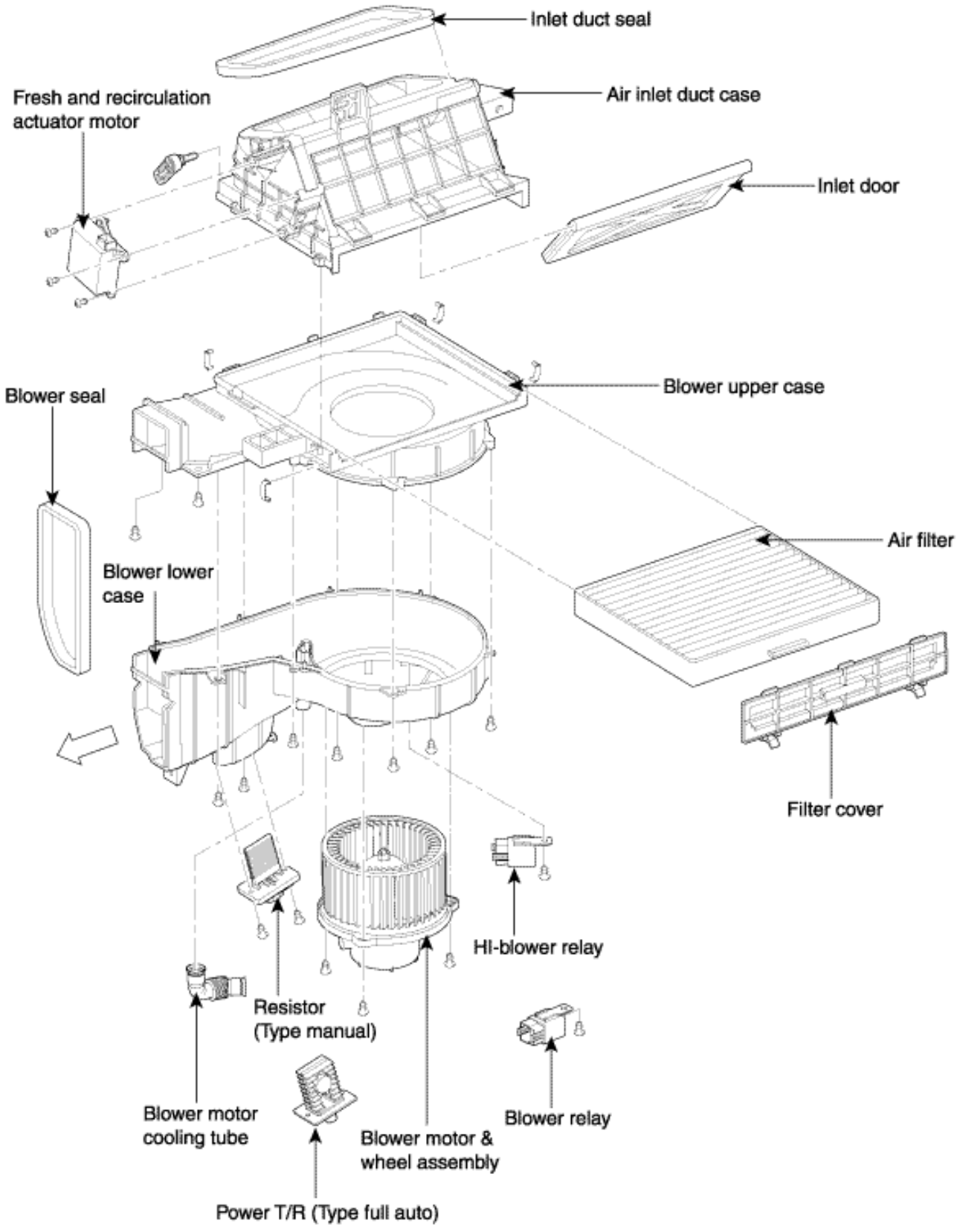
CIRCUIT DIAGRAM





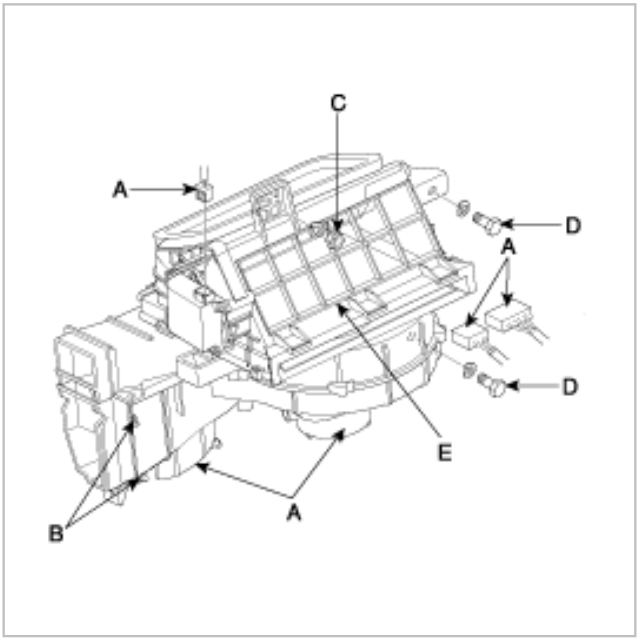
COMPONENT LOCATION

COMPONENTS


Inlet duct seal
Air inlet duct case
Fresh and recirculation actuator motor
Inlet door
Blower upper case
Blower seal
Air filter
Blower lower case
Filter cover
HI-blower relay
Resistor (Type manual)
Blower motor cooling tube
Blower relay
Blower motor & wheel assembly
Power T/R (Type full auto)

REMOVAL

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).

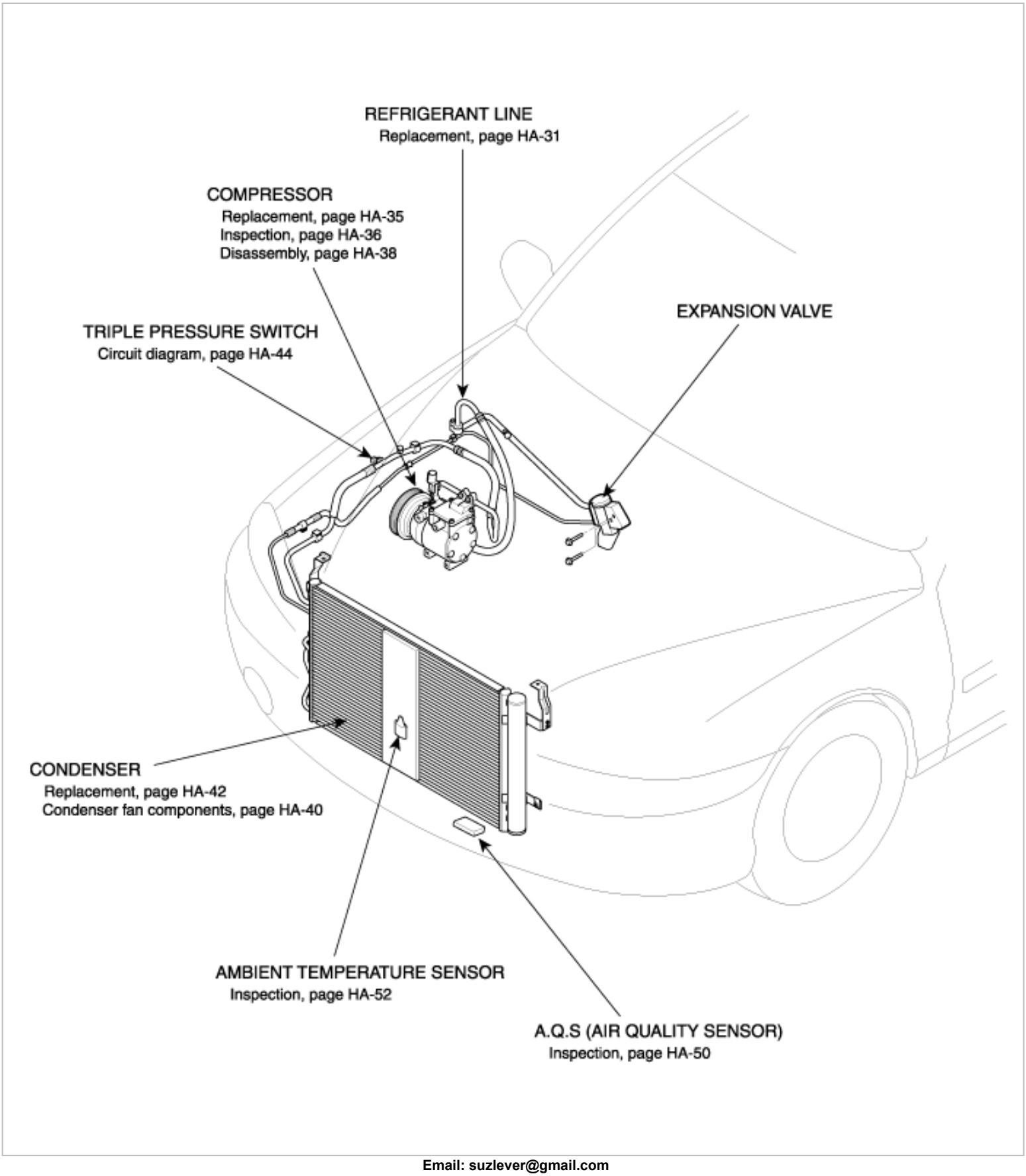


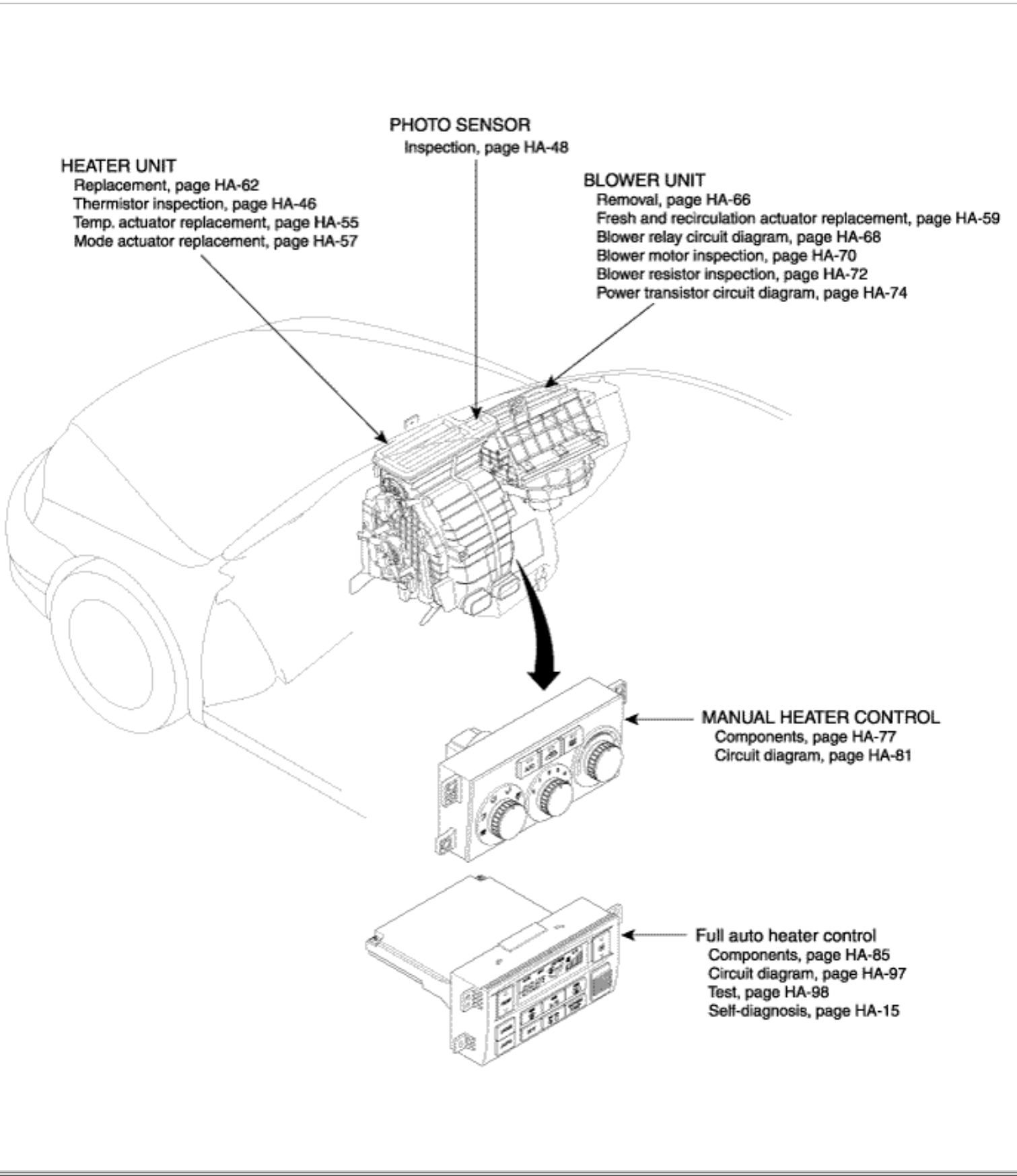
NOTE

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

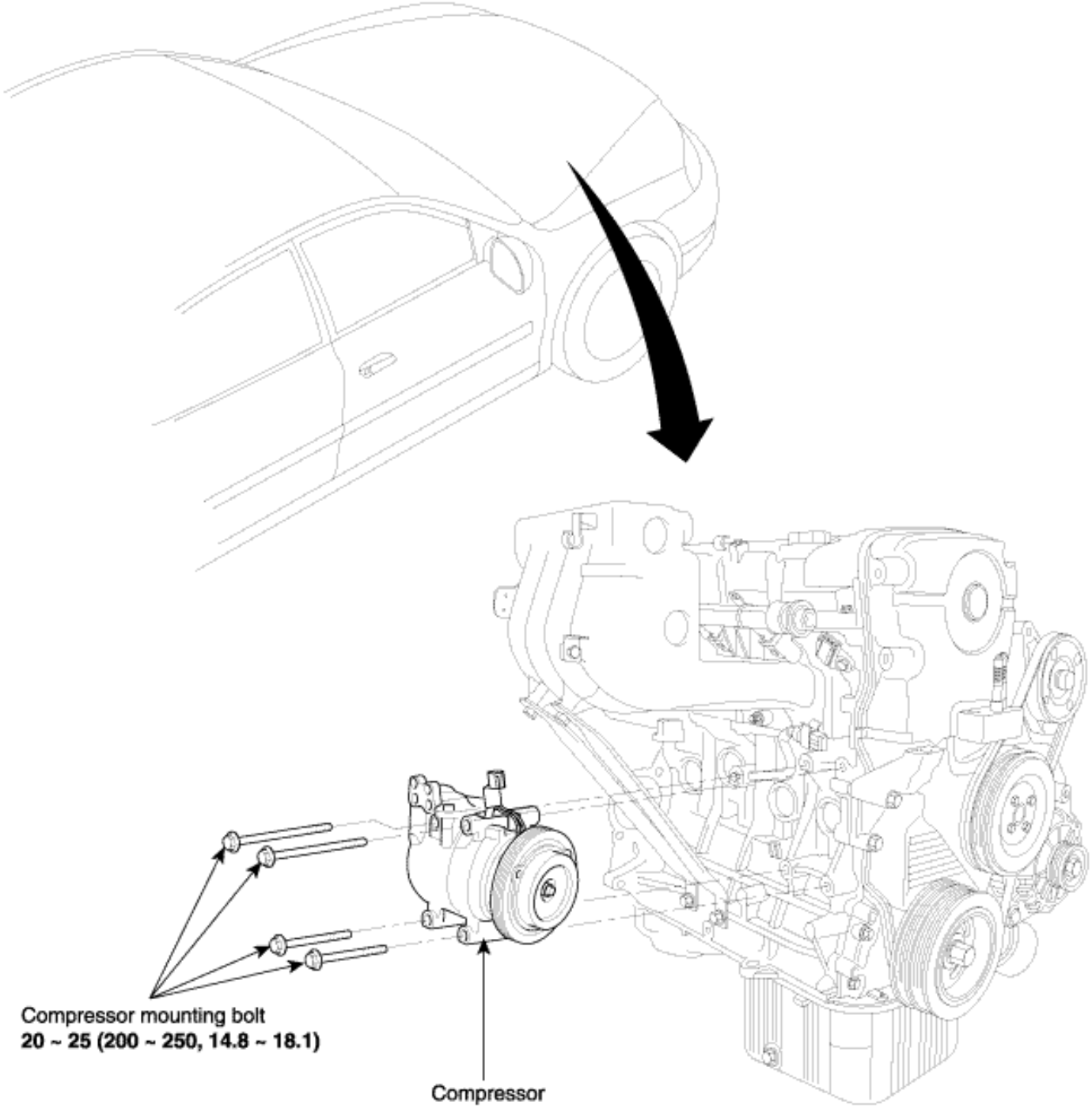
COMPONENT LOCATION INDEX

ENGINE ROOM



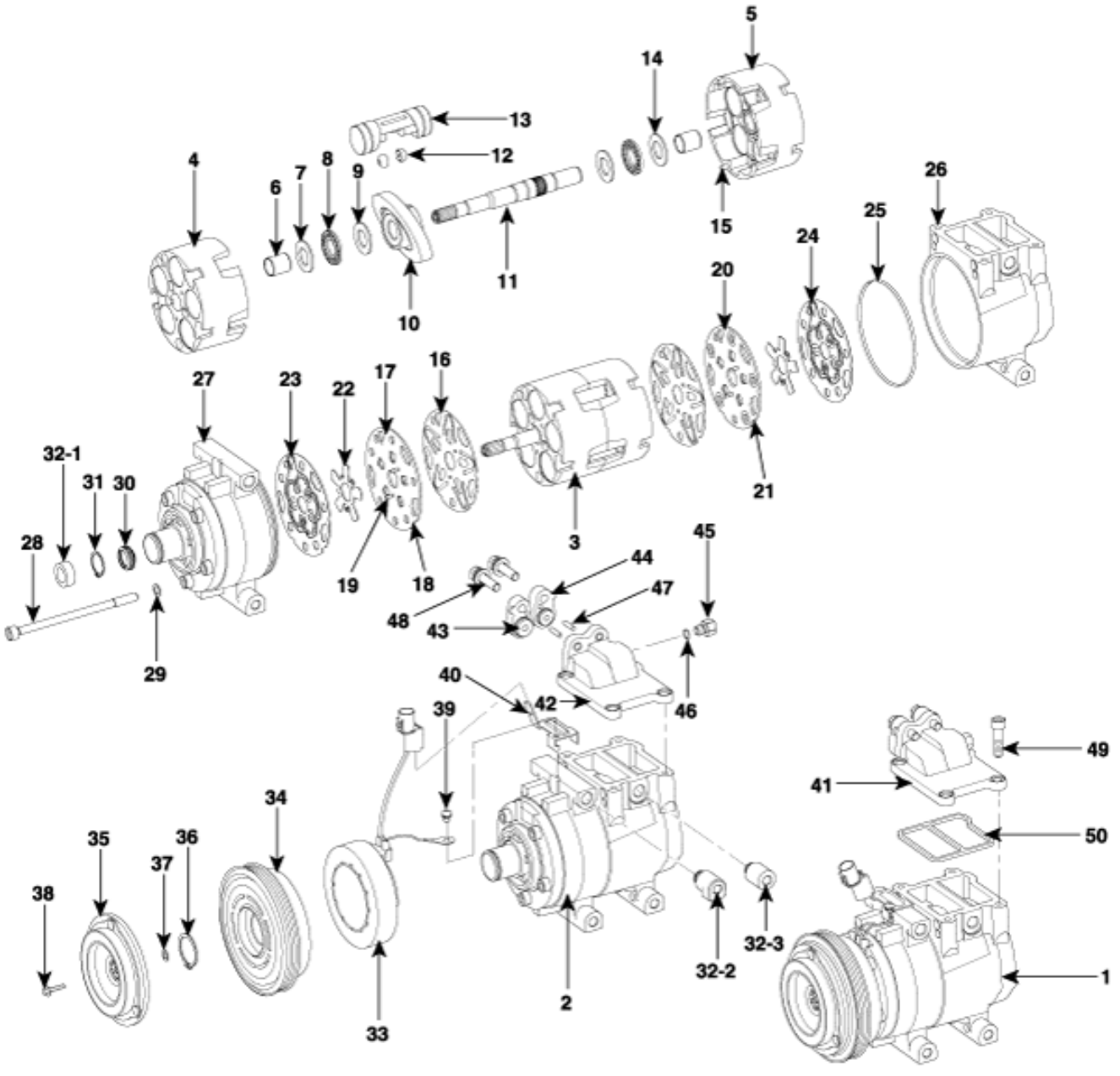


COMPONENT LOCATION



TORQUE : Nm (kgf·cm, lbf·ft)

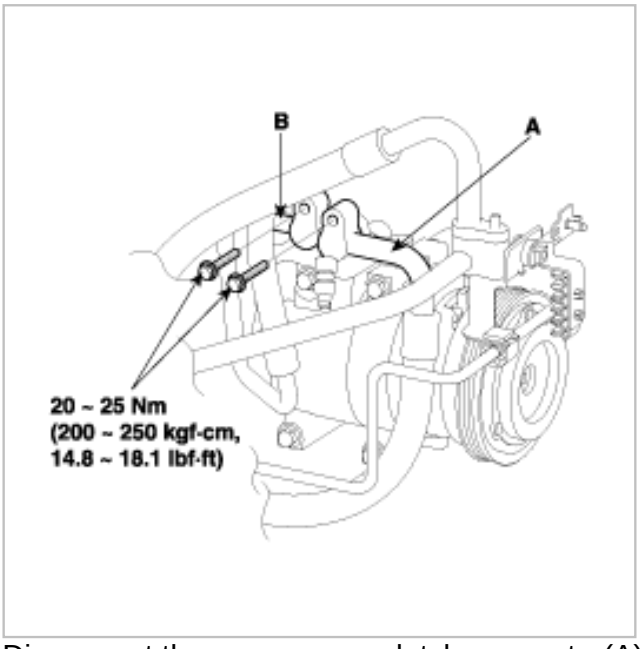
COMPONENTS



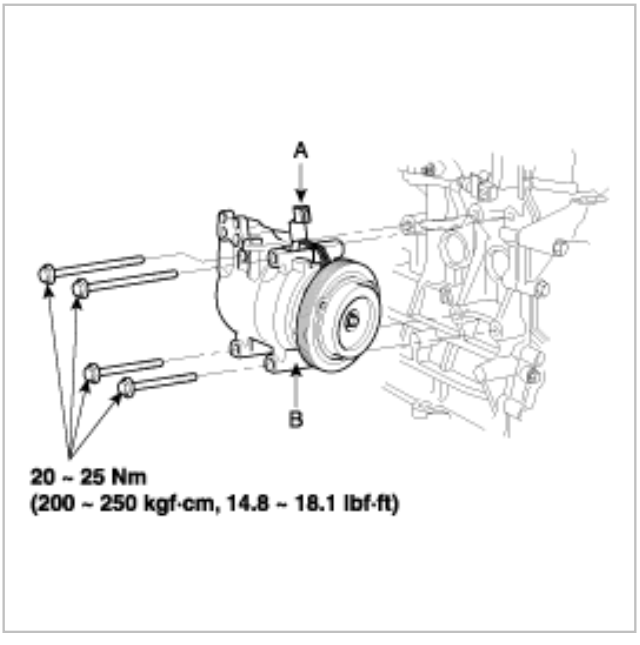
1. Compressor & clutch assembly
2. Compressor assembly
3. Cylinder & shaft assembly
4. Front cylinder
5. Rear cylinder
6. Bushing
7. Thrust bearing race A~K
8. Thrust bearing
9. Thrust bearing race L
10. Swash plate
11. Shaft
12. Shoe
13. Piston
14. Thrust bearing race E
15. Pin spring
16. Inlet reed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

REPLACEMENT

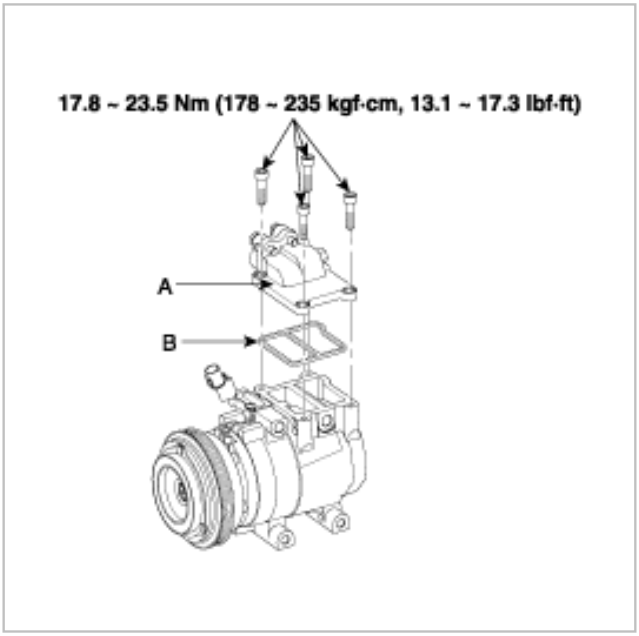
1. If the compressor is marginally operable, run the engine at idle speed, and let the air conditioning work for a few minutes, then shut the engine off.
2. Disconnect the negative cable from the battery.
3. Recover the refrigerant with a recovery/charging station (see page HA-27).
4. Loosen the drive belt (see page HA-30)
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.



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



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

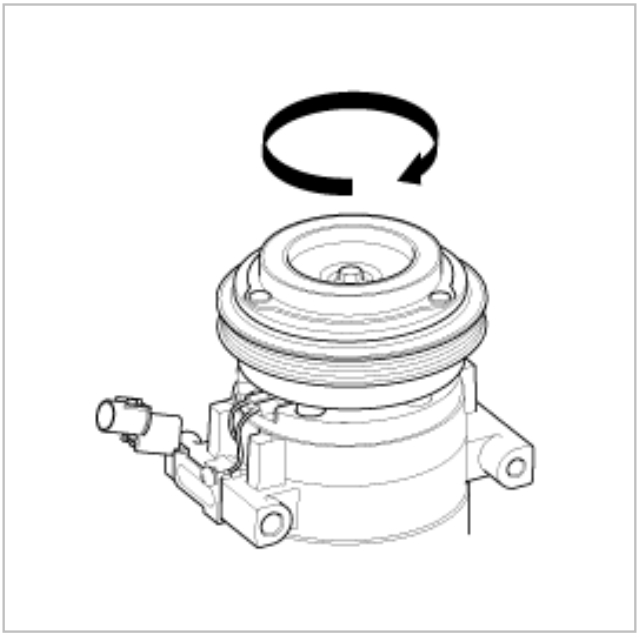


8. Install in the reverse order of removal, and note these items.
   A. If you're installing a new compressor, drain all the refrigerant oil from the removed compressor, and measure its volume, Subtract the volume of drained oil from 150ml the result is the amount of oil you should drain from the new compressor (through the suction fitting).
   B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
   C. To avoid contamination, do not return the oil to the container once dispensed, and never mix it with other refrigerant oils.
   D. Immediately after using the oil, replace the cap on the container and seal it to avoid moisture absorption.
   E. Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint, wash it off immediately.
   F. Adjust the drive belt (see page HA-30).
   G. Charge the system (see page HA-28), and test its performance (see page HA-26).

INSPECTION

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.

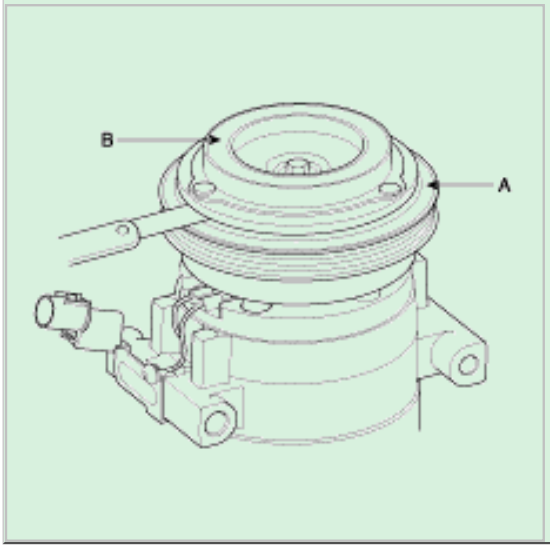


3. Measure the clearance between the pulley (A) and the pressure plate (B) all the way around. If the clearance is not within specified limits, remove the pressure plate (see page HA-38) and add or remove shims as needed to increase or decrease clearance.

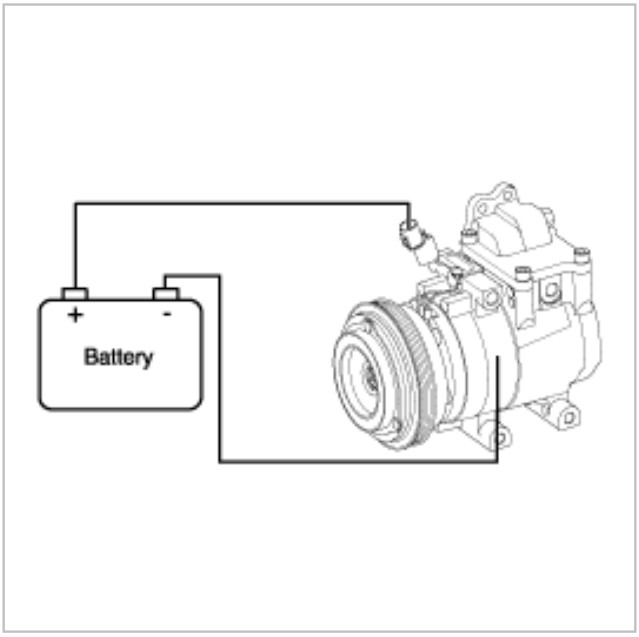
Clearance : 0.5 ± 0.15mm (0.020 ± 0.006 in.)

NOTE

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

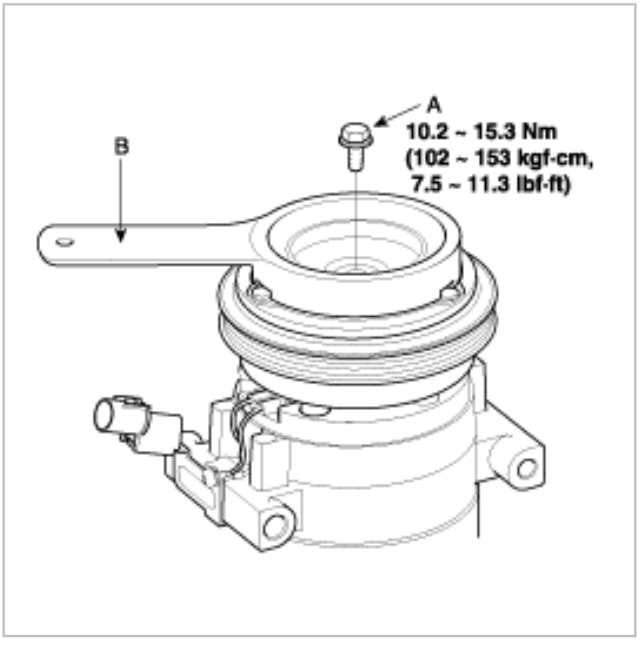


4. Check operating of the magnetic clutch.
   Connect the compressor side terminals to the battery (+) terminal and the ground battery (-) terminal to the compressor body.
   Check the magnetic clutch operating noise to determine the condition.

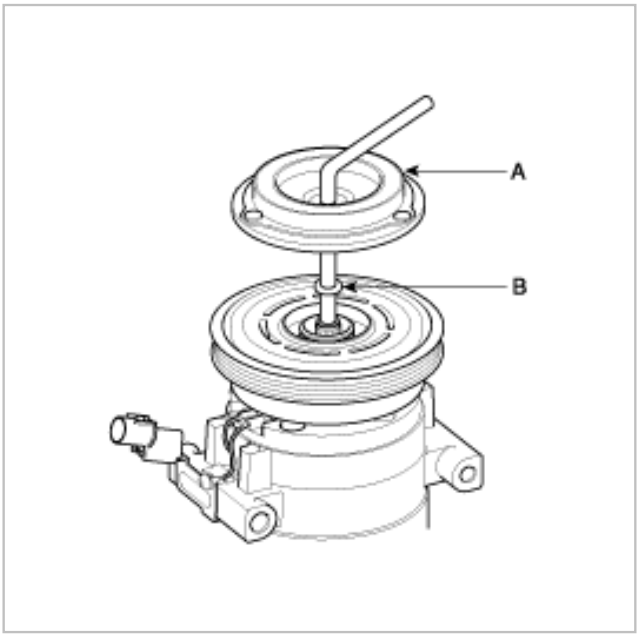


DISASSEMBLY

1. Remove the center bolt (A) while holding the pressure plate with a commercially available pressure plate bolt remover (B); Special tool number 09977-29000.



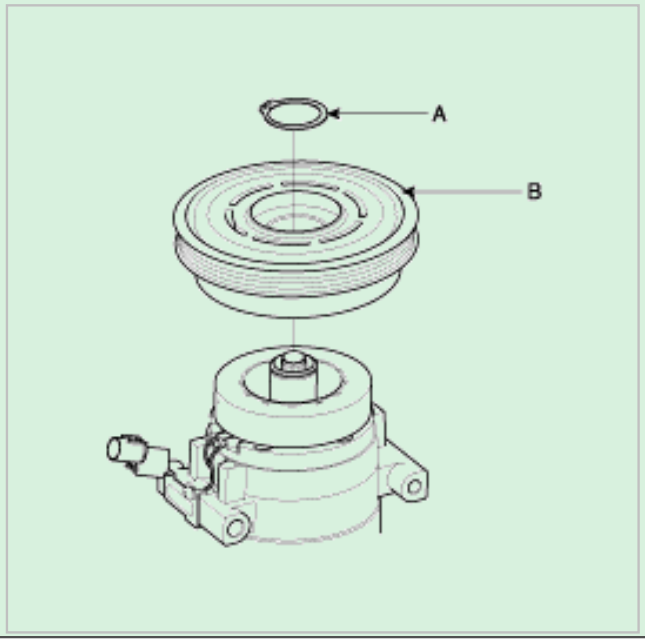
2. Remove the pressure plate (A) and shim (B), taking care not to lose the shims. If the clutch needs adjustment, increase or decrease the number and thickness of shims as necessary, then reinstall the pressure plate, and recheck its clearance (see page HA-37).



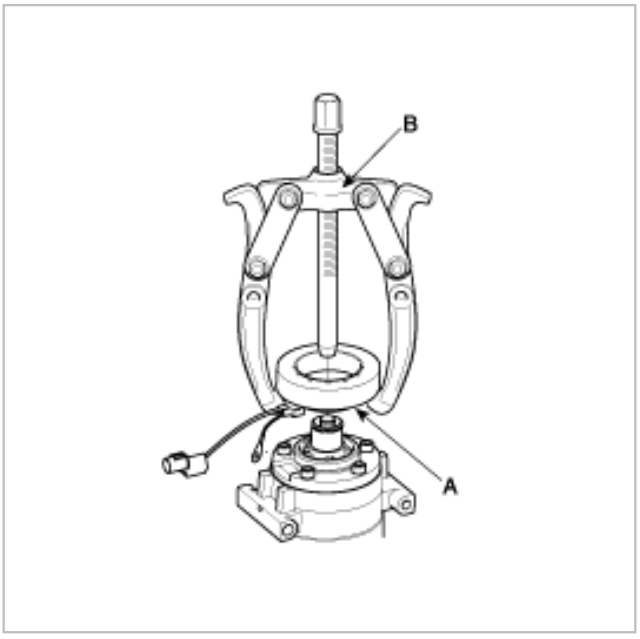
3. If you replacing the field coil, remove snap ring (A) with snap ring pliers.

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.

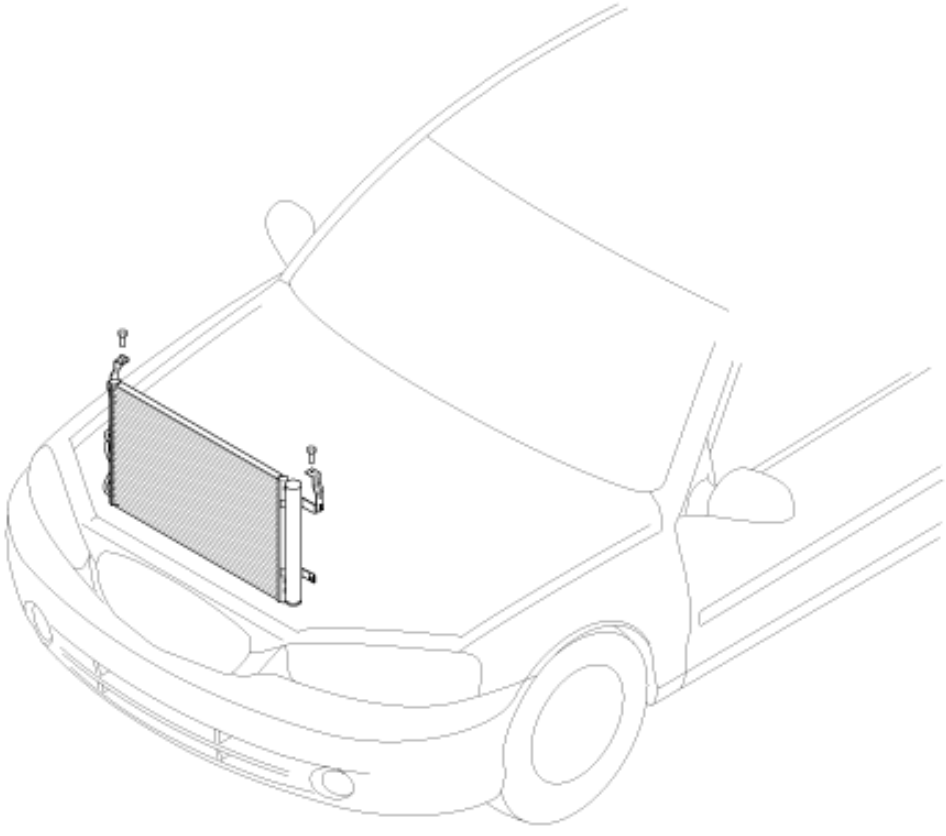


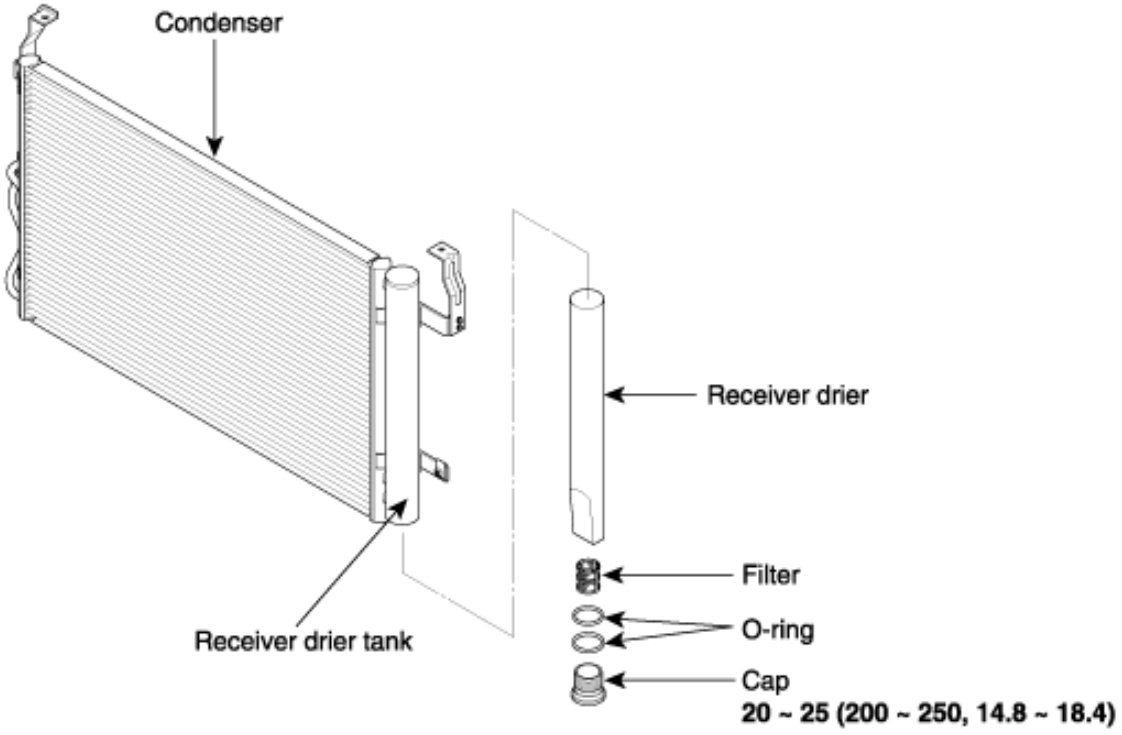
4. Remove the screw from the field coil ground terminal.
   Remove the field coil (A) from the shaft with a puller (B). Be careful not to damage the coil and compressor.



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

COMPONENTS

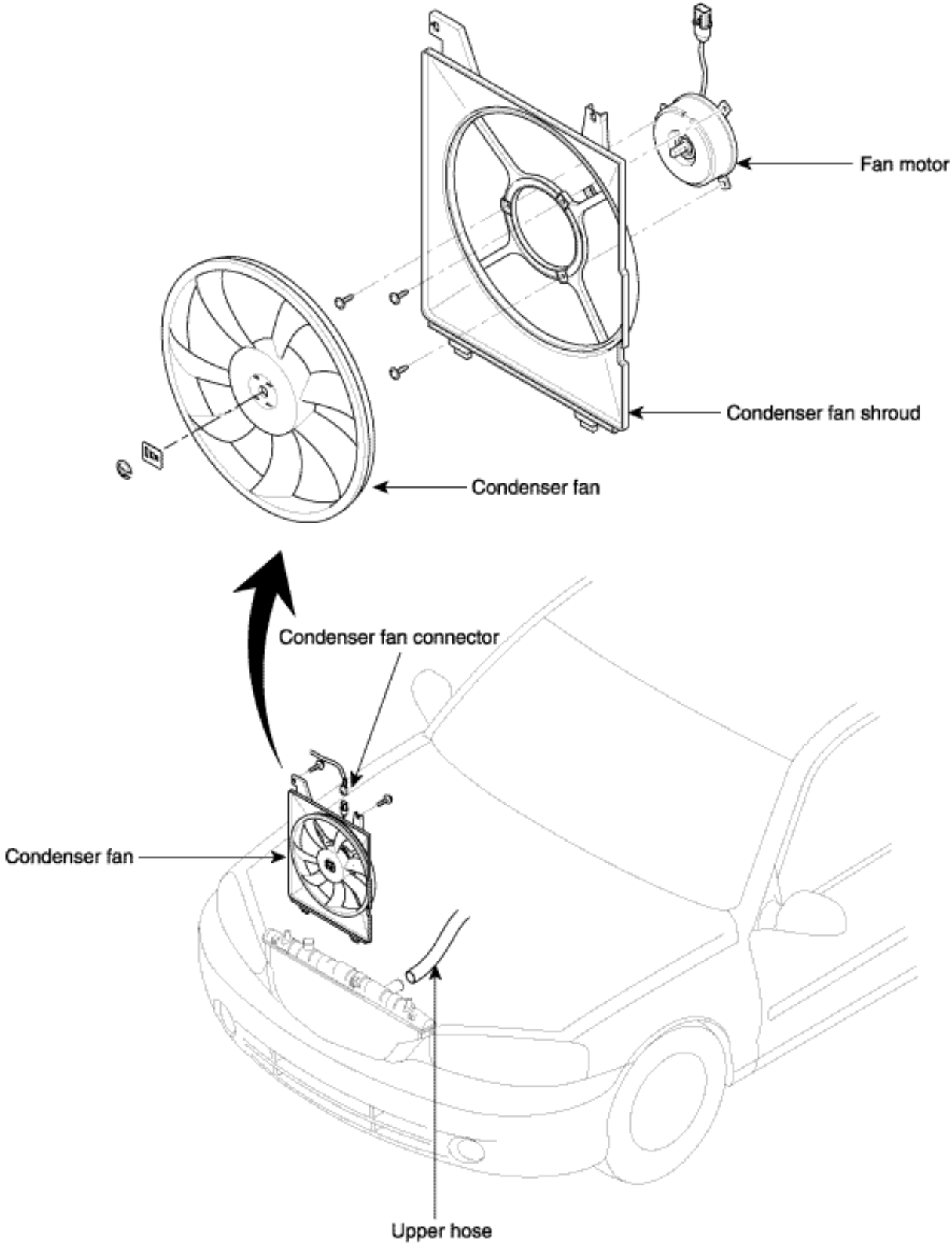




TORQUE : Nm (kgf·cm, lbf·ft)

Email: suzlever@gmail.com

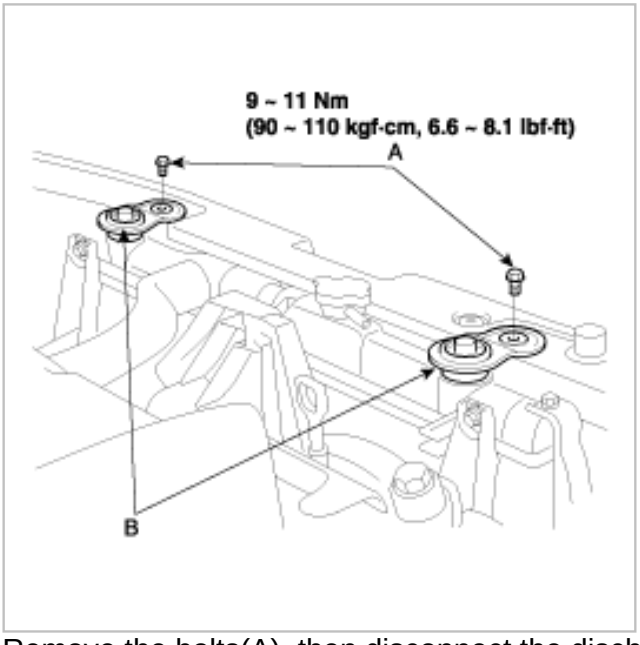
COMPONENTS


Fan motor
Condenser fan shroud
Condenser fan
Condenser fan connector
Condenser fan
Upper hose

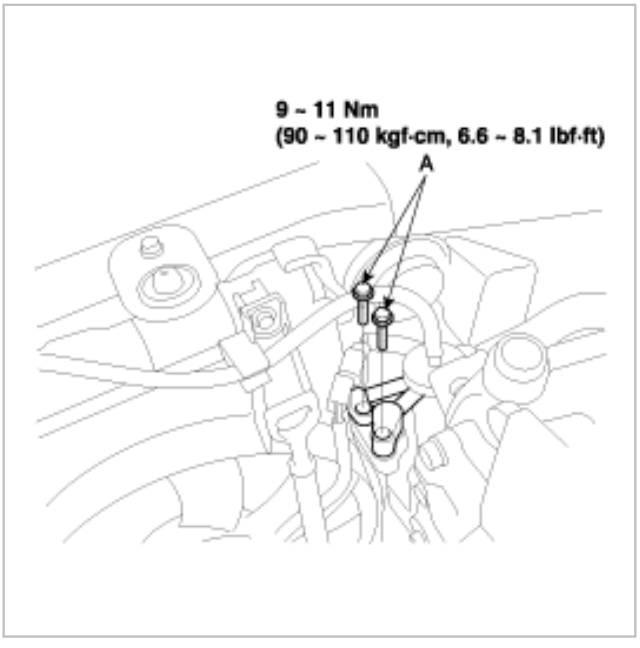
Email: suzlever@gmail.com

REPLACEMENT

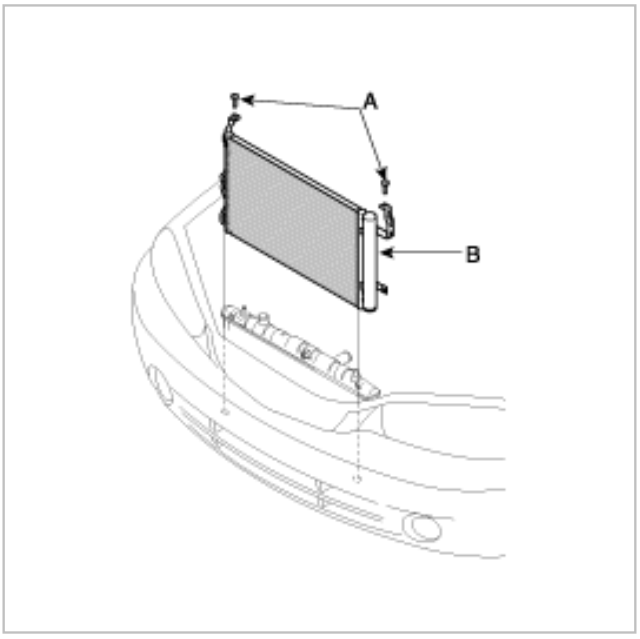
1. Recover the refrigerant with a recovery/recycling/charging station (see page HA-27).
2. Remove the coolant reservoir, but do not disconnect the reservoir hose from the coolant reservoir and the radiator.
3. Remove the bolts(A), then remove the upper mount brackets(B) from the radiator.



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.

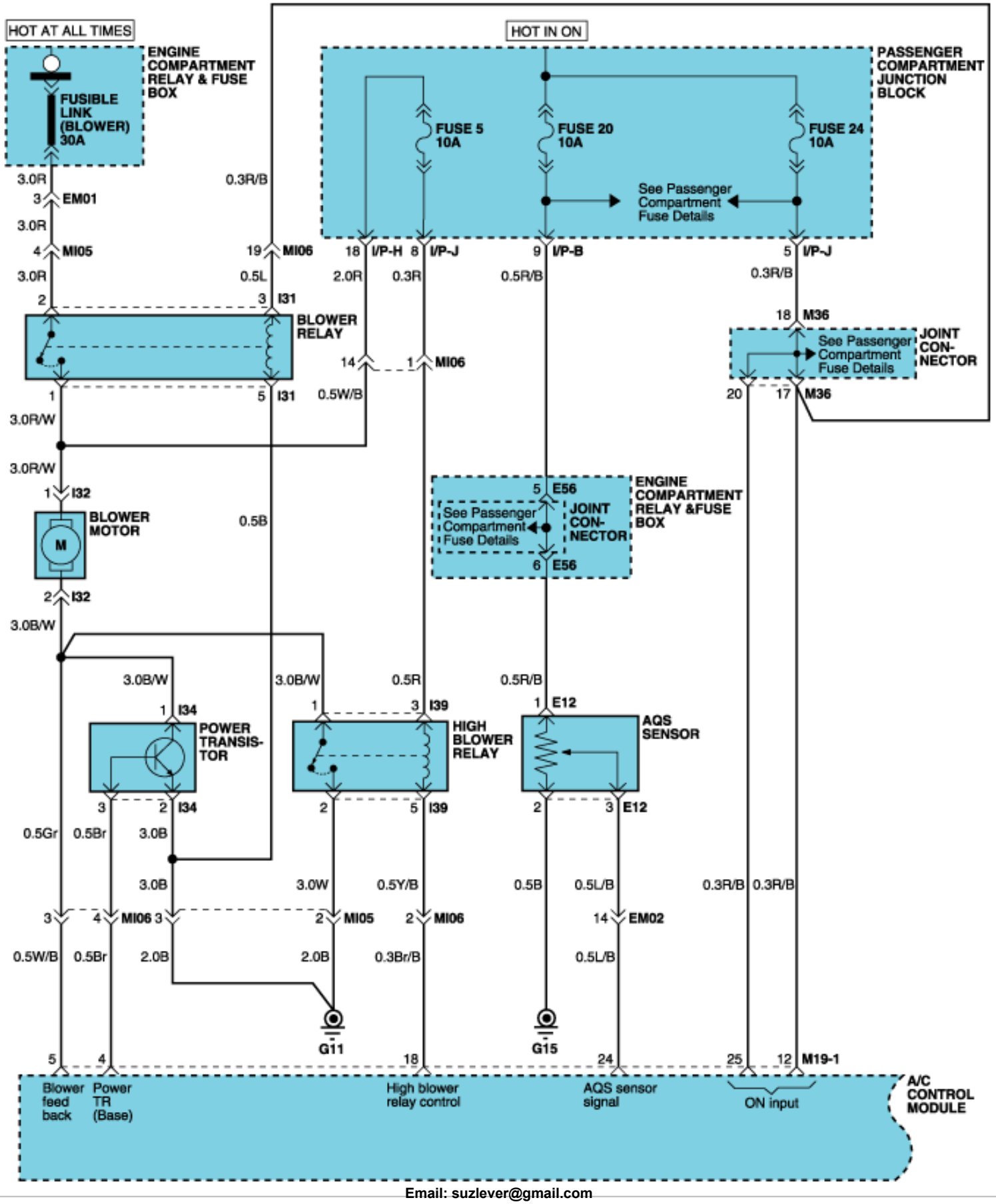


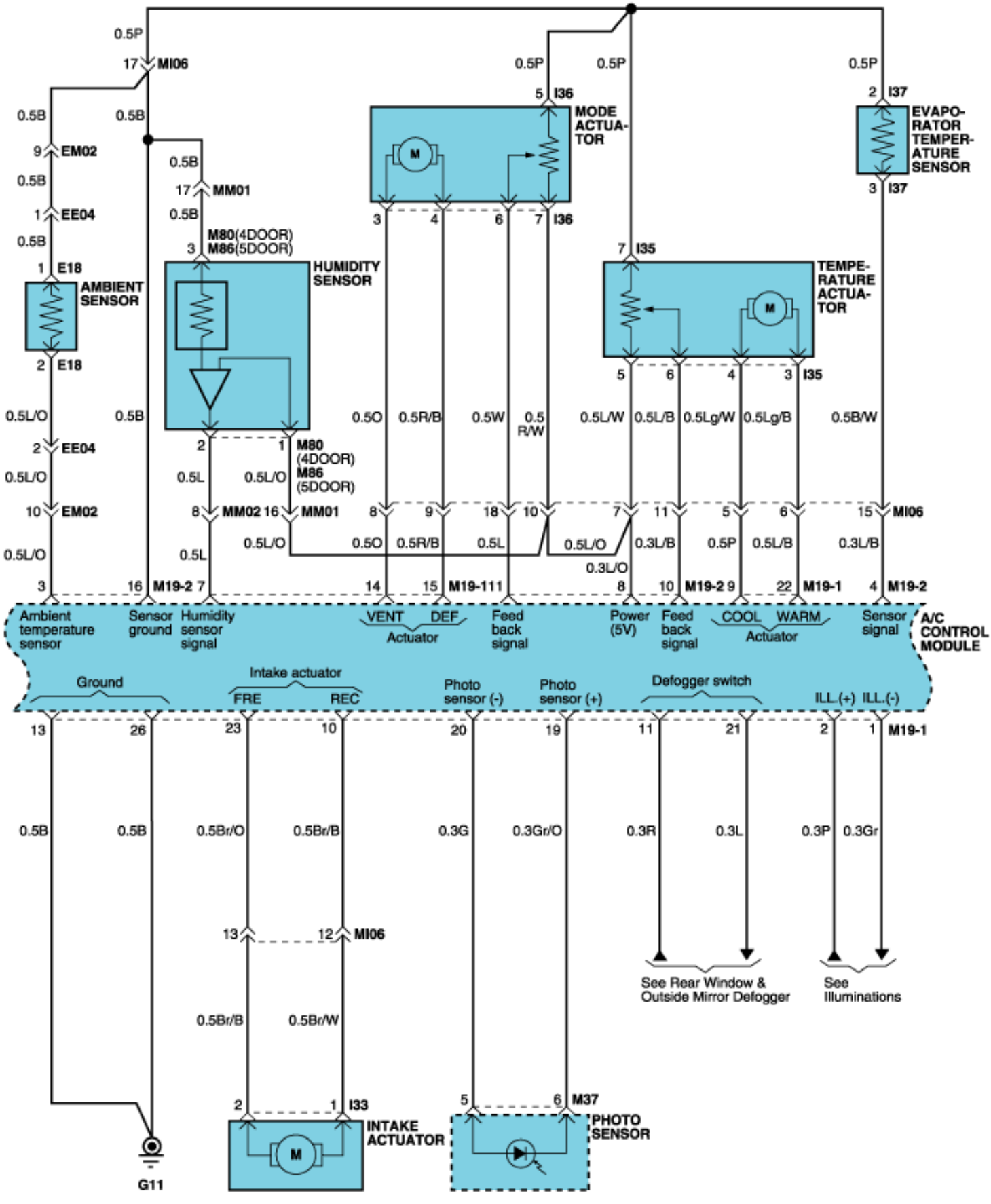
5. Remove the bolts(A), then remove the condenser (B) by lifting it up. Be careful not to damage the radiator and condenser fins when removing the condenser.

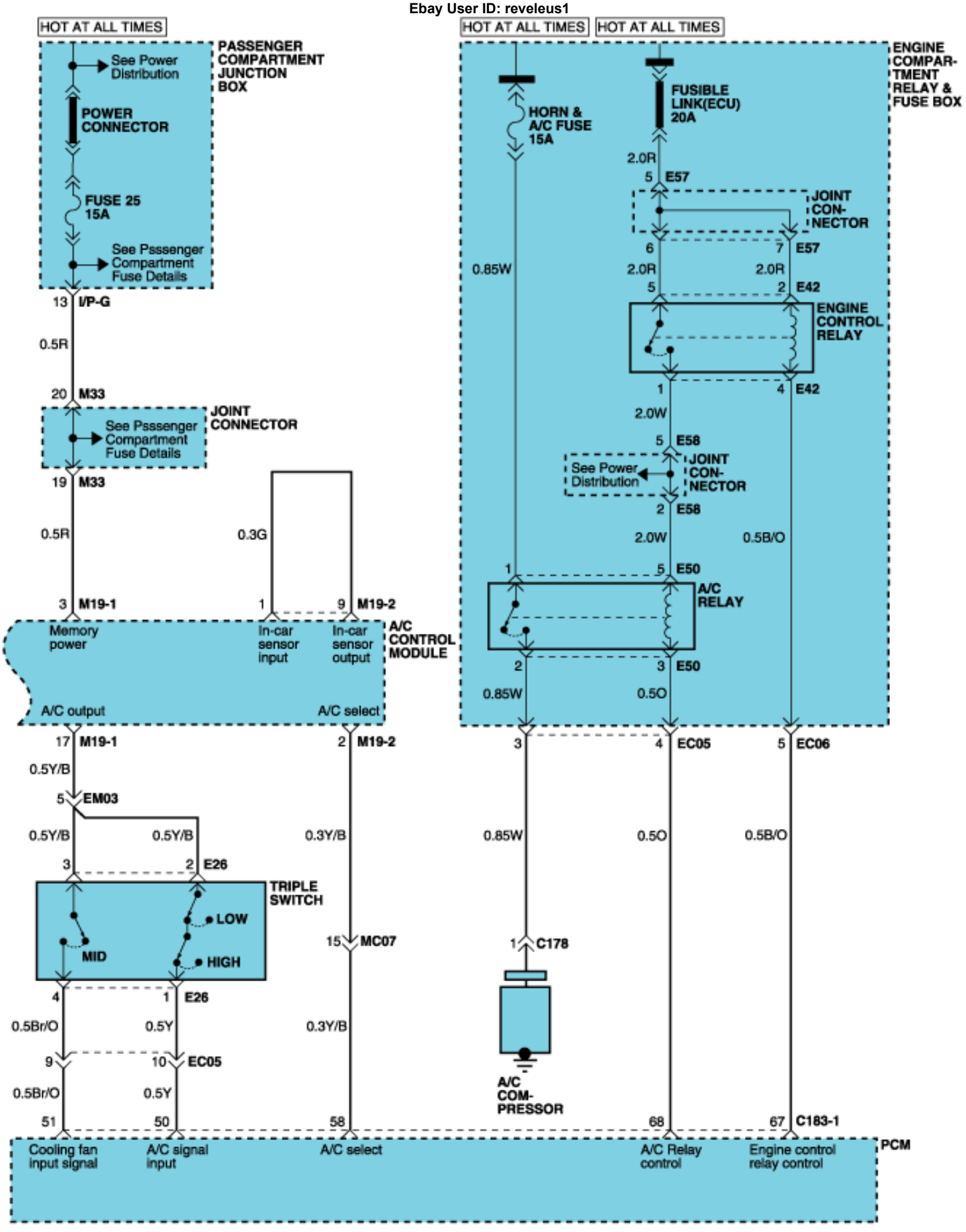


6. Install in the reverse order of removal, and note these items :
   A. If you're installing a new condenser, add refrigerant oil FD46XG.
   B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
   C. Be careful not to damage the radiator and condenser fins when installing the condenser.
   D. Be sure to install the lower mount cushions of condenser securely into the holes.
   E. Charge the system (see page HA-28), and test its performance (see page HA-26).

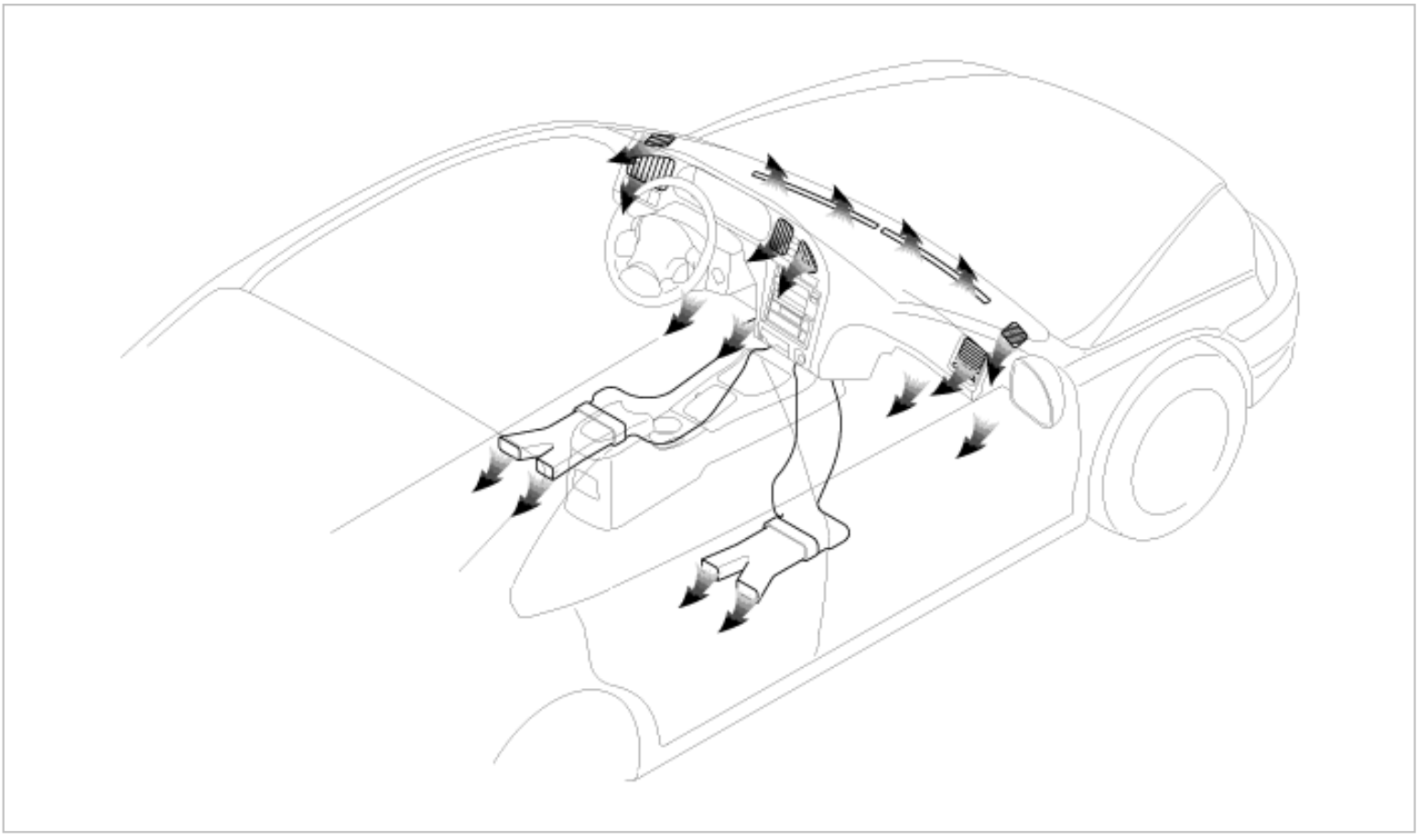
CIRCUIT DIAGRAM



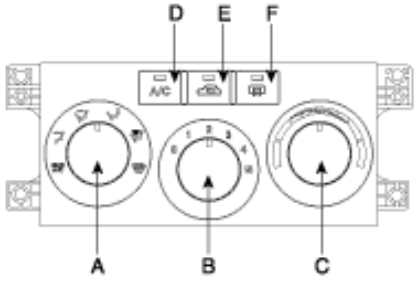

0.5P
17 MI06
0.5B
9 EM02
1 EE04
1 E18
AMBIENT SENSOR
2 E18
0.5L/O
2 EE04
10 EM02
3 M19-2
Ambient temperature sensor
Sensor ground
Humidity sensor signal
M80(4DOOR) M86(5DOOR)
HUMIDITY SENSOR
MM01
MM02
M80 (4DOOR) M86 (5DOOR)
0.5L
0.5L/O
5 I36
MODE ACTUA-TOR
3 4 6 7 I36
0.5O
0.5R/B
0.5W
0.5 R/W
VENT DEF
Actuator
Feed back signal
M19-111
7 I35
TEMPE-RATURE ACTUA-TOR
5 6 4 3 I35
0.5L/W
0.5L/B
0.5Lg/W
0.5Lg/B
0.3L/O
0.3L/B
0.5P
Power (5V)
Feed back signal
COOL WARM
Actuator
M19-2
M19-1
2 I37
EVAPO-RATOR TEMPER-ATURE SENSOR
3 I37
0.5B/W
Sensor signal
M19-2
A/C CONTROL MODULE
Ground
Intake actuator
FRE REC
Photo sensor (-)
Photo sensor (+)
Defogger switch
ILL.(+) ILL.(-)
13 26 23 10 20 19 11 21 2 1 M19-1
0.5B
0.5Br/O
0.5Br/B
0.3G
0.3Gr/O
0.3R
0.3L
0.3P
0.3Gr
13 12 MI06
0.5Br/B
0.5Br/W
2 1 I33
INTAKE ACTUATOR
5 6 M37
PHOTO SENSOR
G11
See Rear Window & Outside Mirror Defogger
See Illuminations


HOT AT ALL TIMES
PASSENGER COMPARTMENT JUNCTION BOX
See Power Distribution
POWER CONNECTOR
FUSE 25 15A
See Psssenger Compartment Fuse Details
13 I/P-G
0.5R
20 M33
JOINT CONNECTOR
See Psssenger Compartment Fuse Details
19 M33
0.5R
3 M19-1
0.3G
1
9 M19-2
Memory power
In-car sensor input
In-car sensor output
A/C CONTROL MODULE
A/C output
A/C select
17 M19-1
0.5Y/B
5 EM03
0.5Y/B
0.5Y/B
3
2 E26
TRIPLE SWITCH
LOW
MID
HIGH
4
1 E26
0.5Br/O
0.5Y
9
10 EC05
0.5Br/O
0.5Y
51
50
2 M19-2
0.3Y/B
15 MC07
0.3Y/B
58
HOT AT ALL TIMES
HOT AT ALL TIMES
ENGINE COMPAR-TMENT RELAY & FUSE BOX
HORN & A/C FUSE 15A
FUSIBLE LINK(ECU) 20A
2.0R
5 E57
JOINT CON-NECTOR
6
7 E57
0.85W
2.0R
2.0R
5
2 E42
ENGINE CONTROL RELAY
1
4 E42
2.0W
5 E58
See Power Distribution
JOINT CON-NECTOR
2 E58
2.0W
0.5B/O
1
5 E50
A/C RELAY
2
3 E50
0.85W
0.5O
3
4 EC05
5 EC06
0.85W
0.5O
0.5B/O
1 C178
A/C COM-PRESSOR
68
67 C183-1
PCM
Cooling fan input signal
A/C signal input
A/C select
A/C Relay control
Engine control relay control

AIR FLOW DESCRIPTION



MANUAL AIR CONDITION CONTROL PANEL

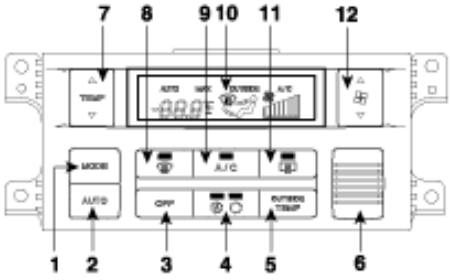


A. Mode knob
B. Blower knob
C. Temperature knob
D. Air conditioner switch
E. Intake switch
F. Rear defogger switch

AUTOMATIC AIR CONDITION CONTROL PANEL

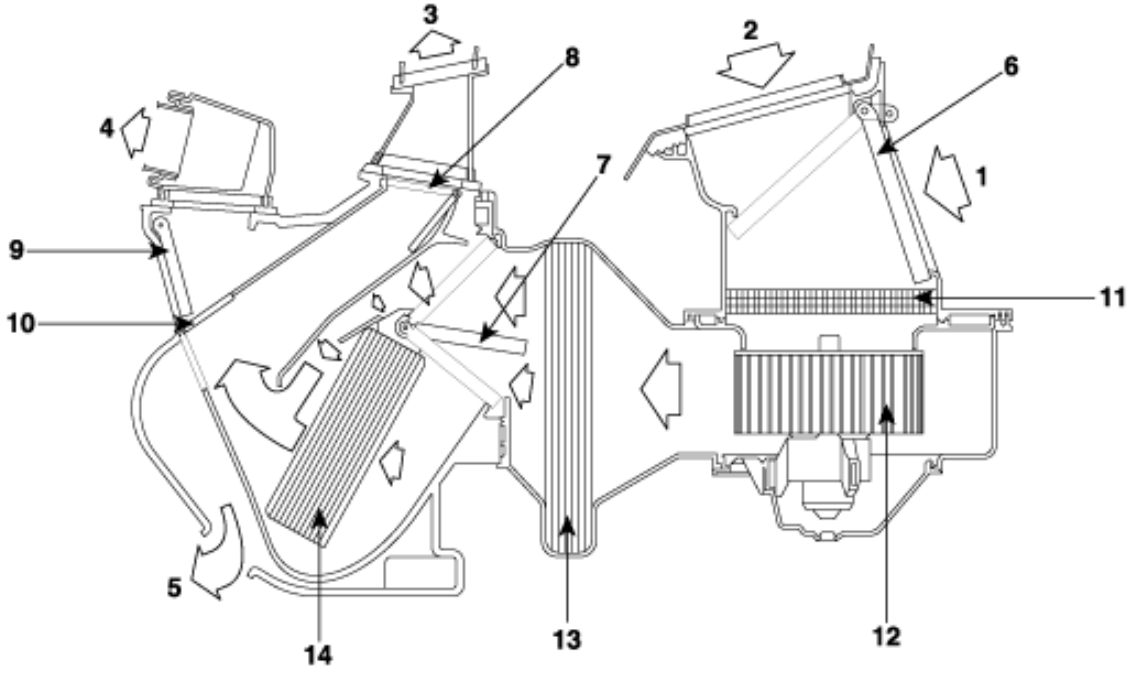
Purchased
from Ebay seller
Reveleus1

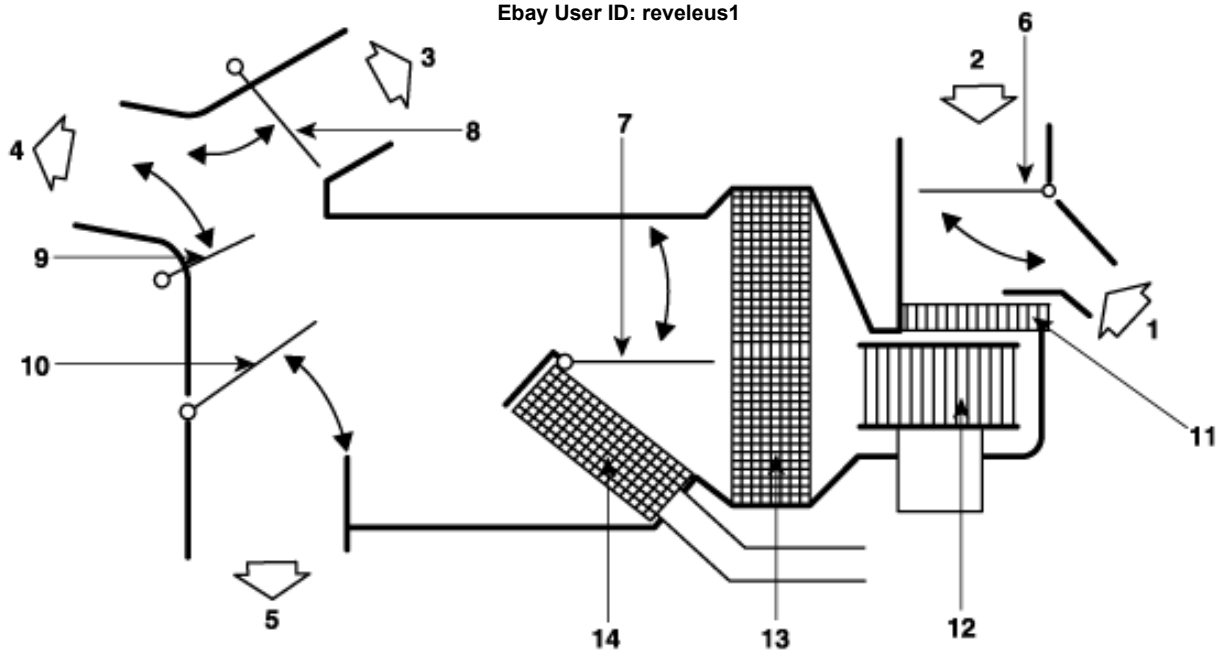
Thank-you for purchasing from me, it is much appreciated.
To contact me please email
suzlever@gmail.com



1. Mode switch
2. Auto switch
3. System off switch
4. A.Q.S. switch
5. Outside temp. switch
6. In-car sensor
7. Temp. switch
8. Defogger switch
9. Air conditioner switch
10. Display
11. Rear defogger switch
12. Blower switch

COMPONENT SCHEMATIC

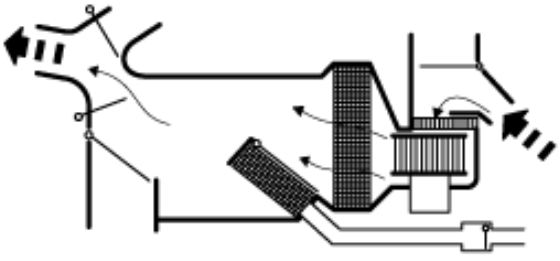




Item	Description	Item	Description
1	Recirculating air port	8	Defrost airflow door
2	Outside air port	9	Panel airflow door
3	Defrost air vent	10	Floor airflow door
4	Panel air vent	11	Air filter
5	Floor air vent	12	Blower unit
6	Air inlet blend door	13	Evaporator core
7	Air temperature control door	14	Heater core

SYSTEM AIR FLOW DESCRIPTION

MAX A/C

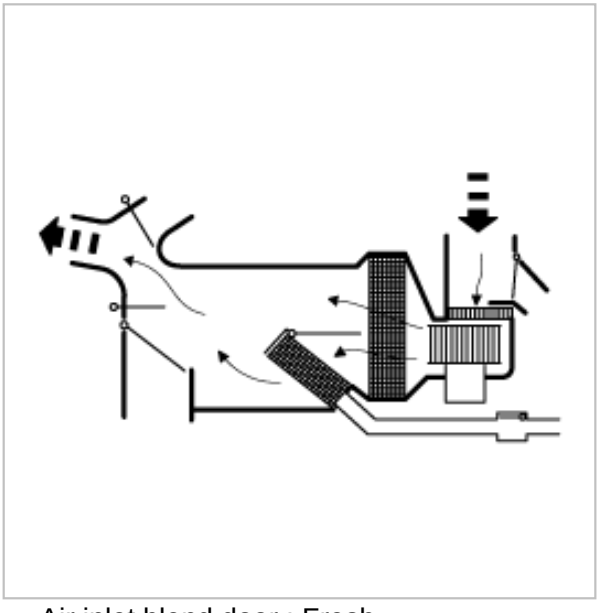


- Air inlet blend door : Recirc
- Air temperature control door : Max. cold
- Defrost airflow door : Close
- Panel airflow door : Open
- Floor airflow door : Close
- A/C compressor : ON
- Blower motor : ON

NOTE

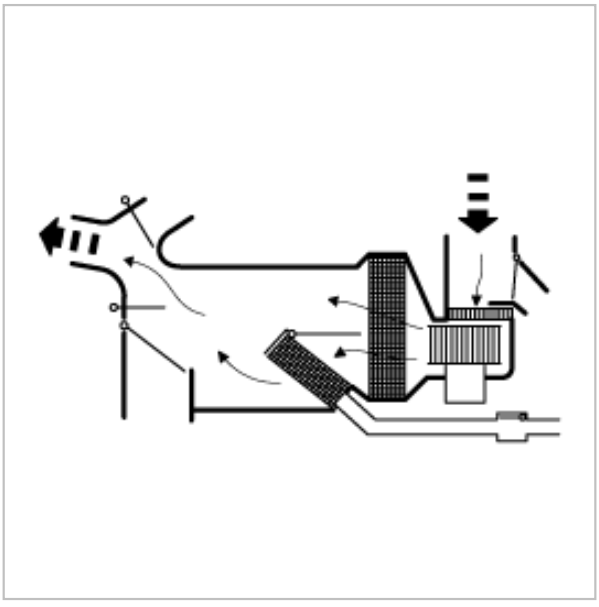
No override allowed to A/C OFF and recirc.
(Manual A/C only)

A/C



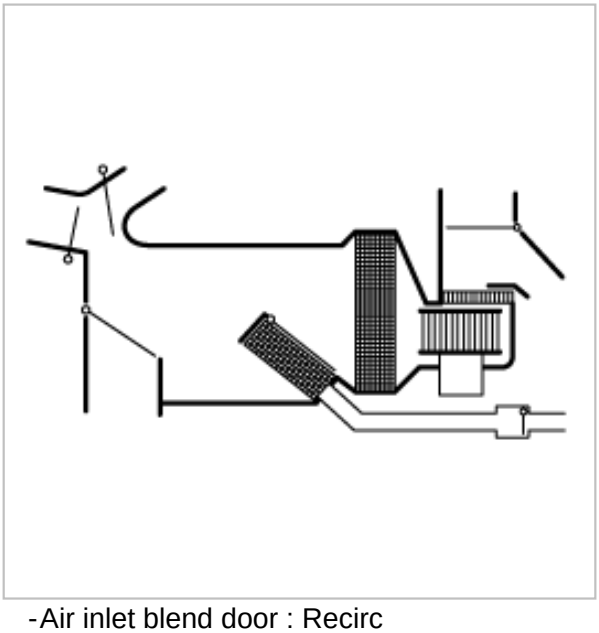
- Air inlet blend door : Fresh
- Air temperature control door : Enable to select
- Defrost airflow door : Enable to select
- Panel airflow door : Enable to select
- Floor airflow door : Enable to select
- A/C compressor : ON
- Blower motor : ON

PANEL



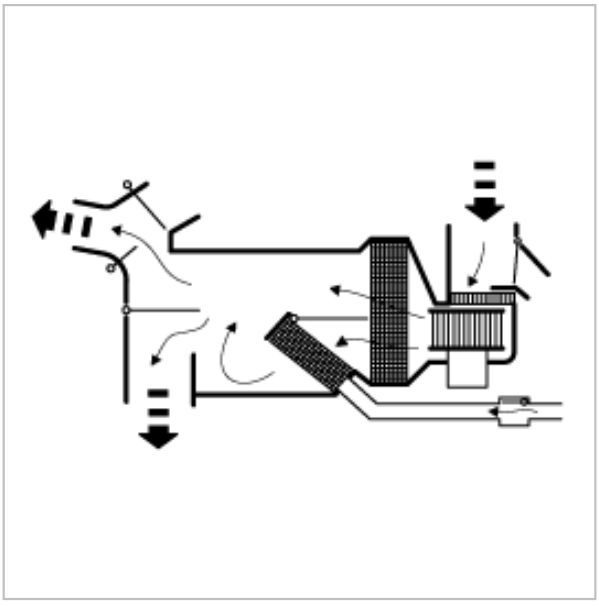
- Air inlet blend door : Fresh
- Air temperature control door : Enable to select
- Defrost airflow door : Close
- Panel airflow door : Open
- Floor airflow door : Close
- A/C compressor : Enable to select
- Blower motor : ON

OFF



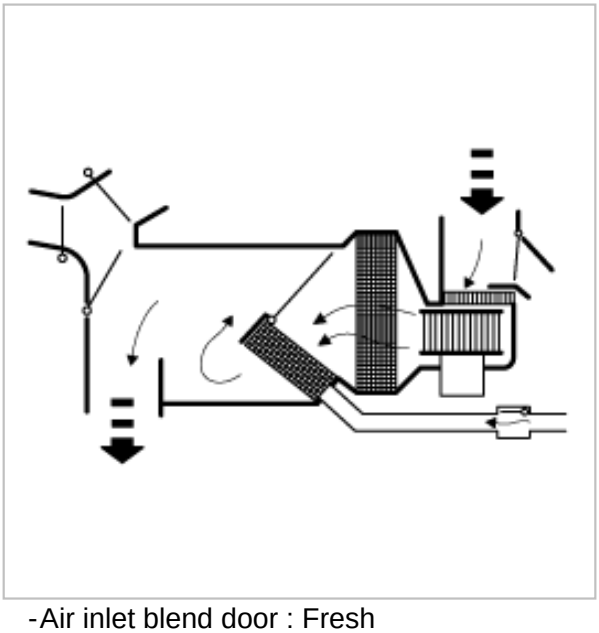
- Air inlet blend door : Recirc
- Air temperature control door : Enable to select
- Defrost airflow door : Open
- Panel airflow door : Close
- Floor airflow door : Close
- A/C compressor : OFF
- Blower motor : OFF

PANEL/FLOOR



- Air inlet blend door : Fresh
- Air temperature control door : Enable to select
- Defrost airflow door : Close
- Panel airflow door : Open
- Floor airflow door : Open
- A/C compressor : Enable to select
- Blower motor : ON

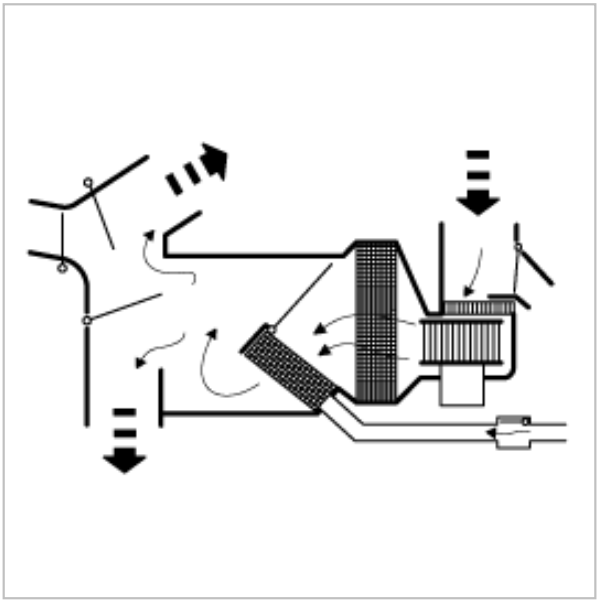
FLOOR



- Air inlet blend door : Fresh
- Air temperature control door : Enable to select
- Defrost airflow door : Close
- Panel airflow door : Close
- Floor airflow door : Open
- A/C compressor : Enable to select

- Blower motor : ON

FLOOR/DEFROST

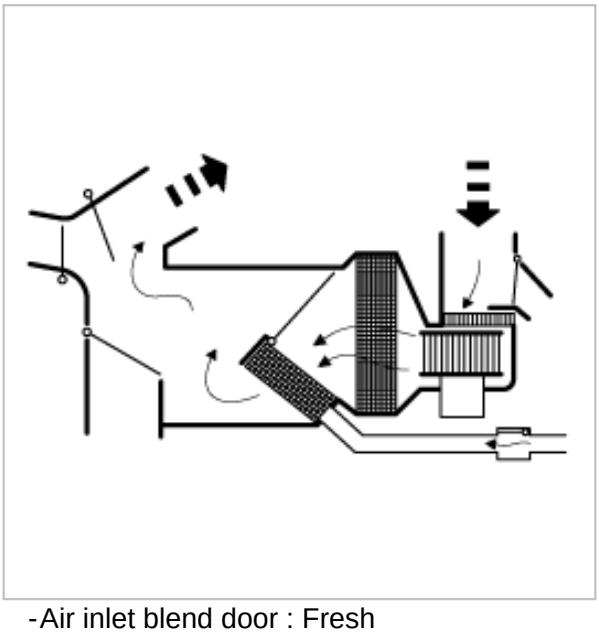


- Air inlet blend door : Fresh
- Air temperature control door : Enable to select
- Defrost airflow door : Open
- Panel airflow door : Close
- Floor airflow door : Open
- A/C compressor : ON
- Blower motor : ON

NOTE

The A/C compressor shall be always ON at FLOOR/DEFROST mode.
but, A/C indicator can be turned ON/OFF.

DEFROST



- Air inlet blend door : Fresh

- Air temperature control door : Enable to select
- Defrost airflow door : Open
- Panel airflow door : Close
- Floor airflow door : Close
- A/C compressor : ON
- Blower motor : ON

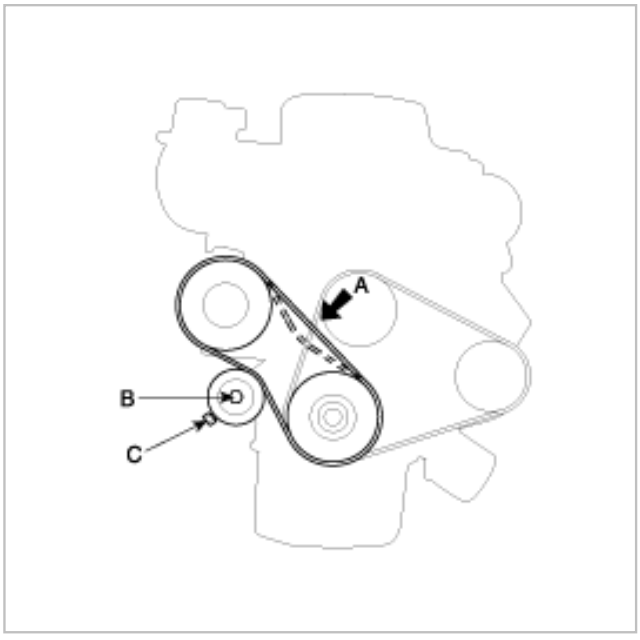
NOTE

The A/C compressor shall be always ON at DEFROST mode.
but, A/C indicator can be turned ON/OFF.

ADJUSTMENT

INSPECTION

Deflection :
Used belt : 6.0~7.0mm (0.24~0.28 in.)
New belt : 5.0~5.5mm (0.20~0.22 in.)



NOTE

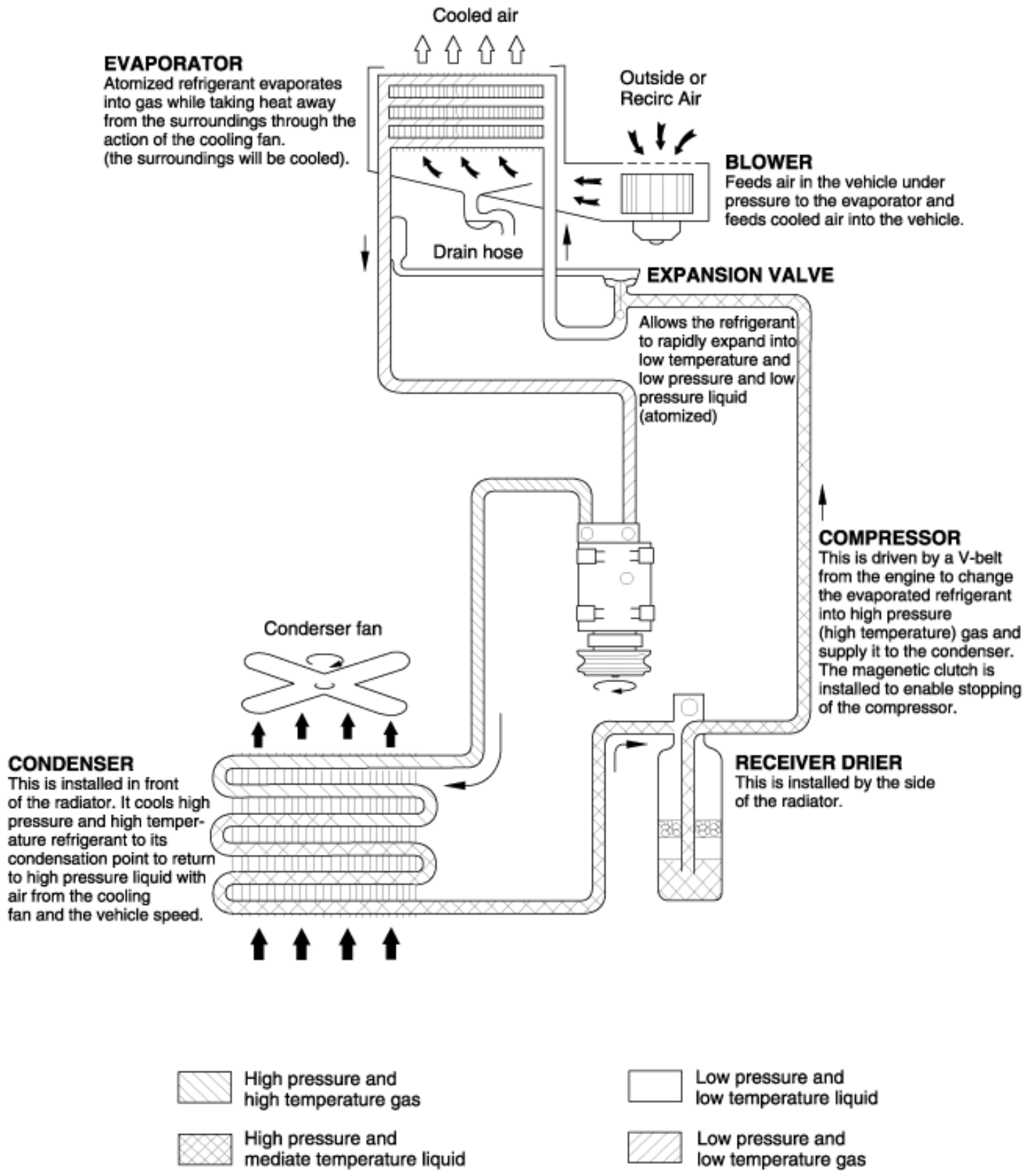
These items when adjusting belt tension :

- If there are cracks or any damage evident on the belt, replace it with a new one.
- "Used belt" means a belt which has been used for five minutes or more.
- "New belt" means a belt which has been used for less than five minutes.

ADJUSTMENT

1. Loosen the tension mounting bolt(B).
2. Turn the adjusting bolt(C) to obtain the proper belt tension, then retighten the mounting bolt.
3. Recheck the deflection of the drive belt.

REFRIGERATION CYCLE



Email: suzlever@gmail.com

PRECAUTIONS

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.

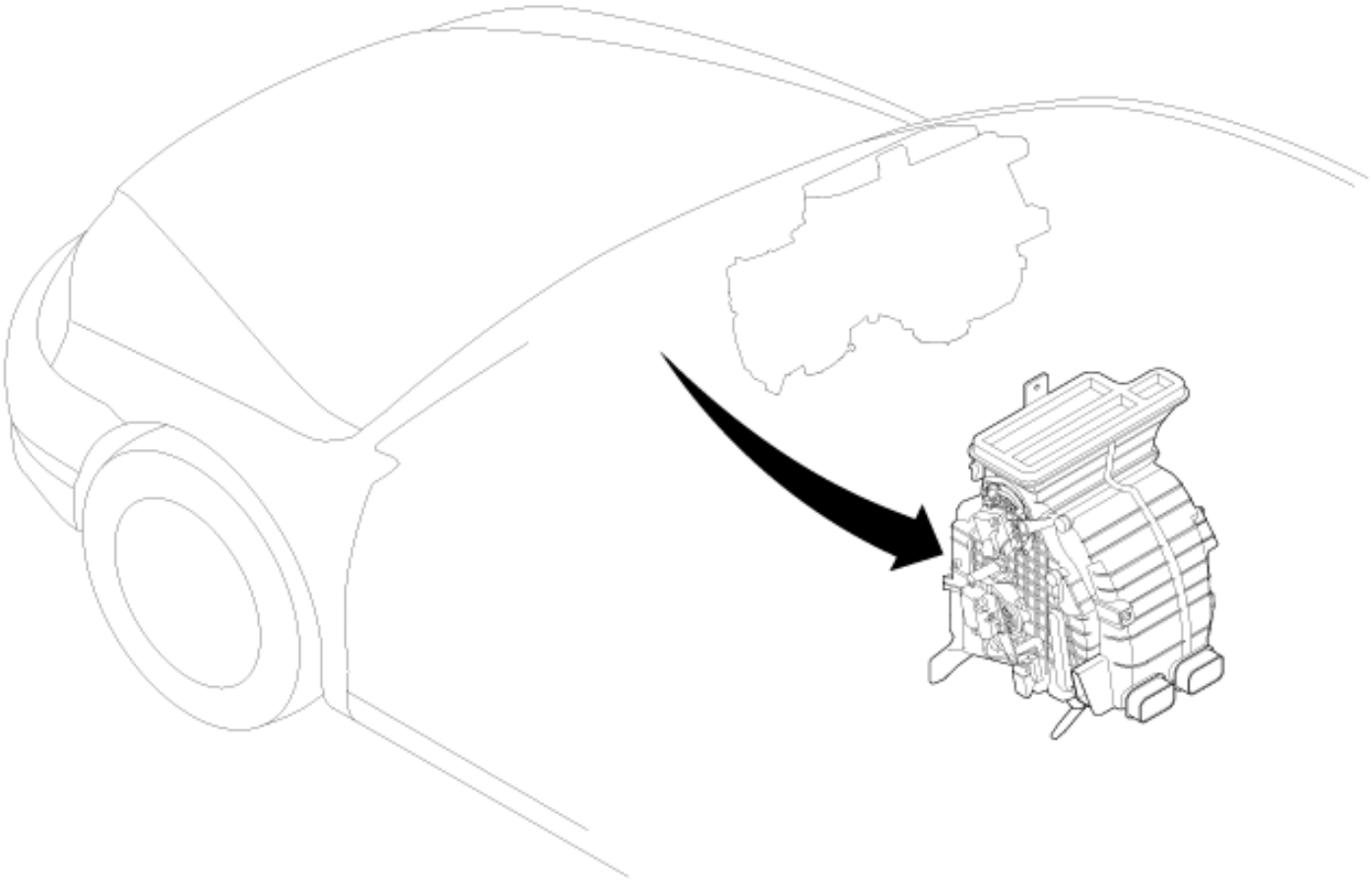
If accidental system discharge occurs, ventilate work area before resuming service.
R-134a service equipment or vehicle air conditioning systems should not be pressure tested or leak tested with compressed air.

WARNING

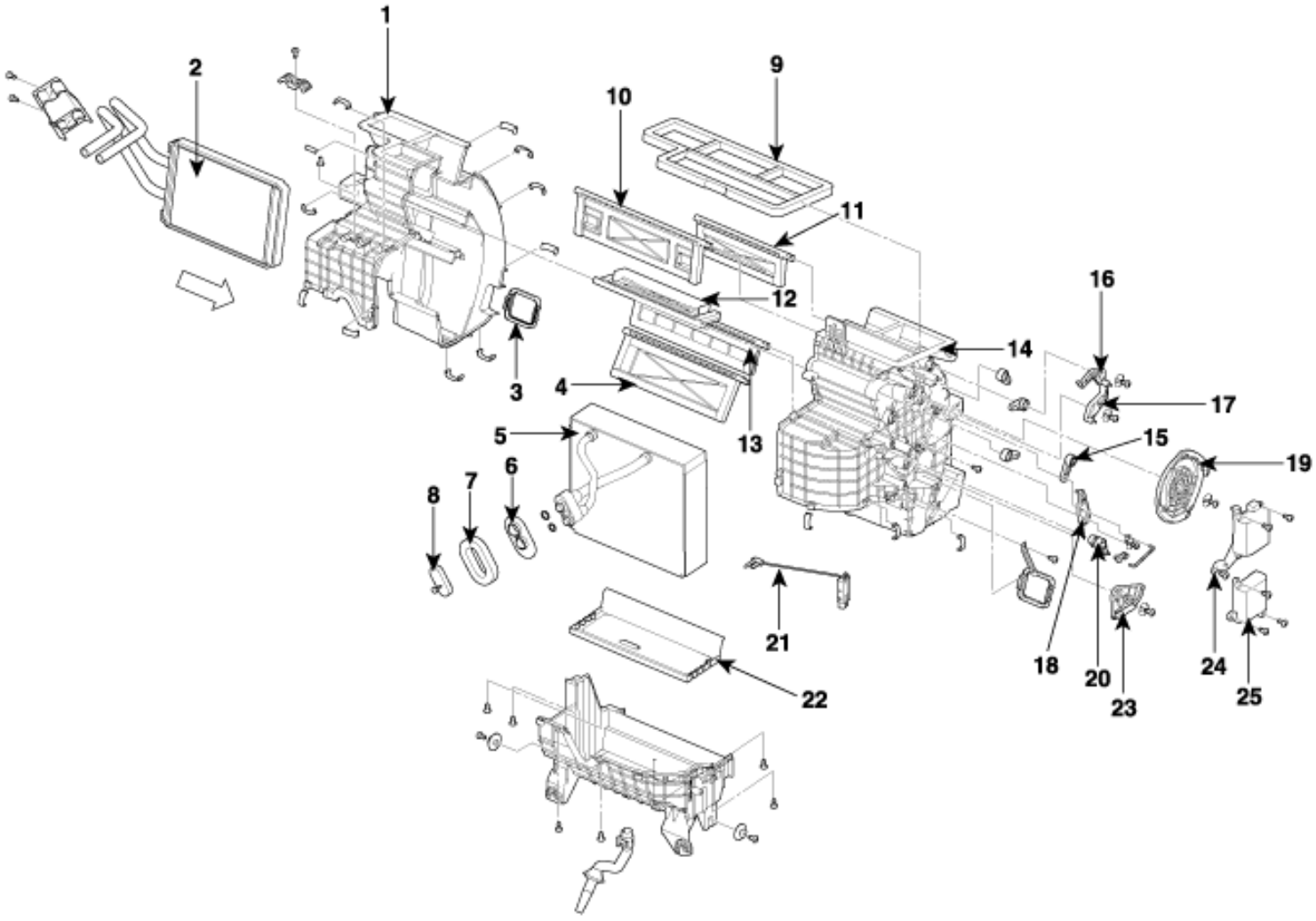
- Compressed air mixed with R-134a forms a combustible vapor.
- The vapor can burn or explode causing serious injury.
- Never use compressed air to pressure test R-134a service equipment or vehicle air conditioning systems.

- 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.

COMPONENT LOCATION



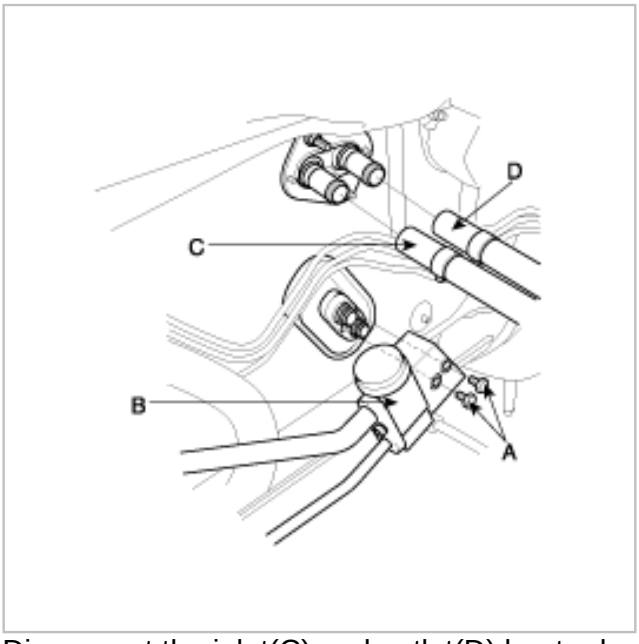
COMPONENTS



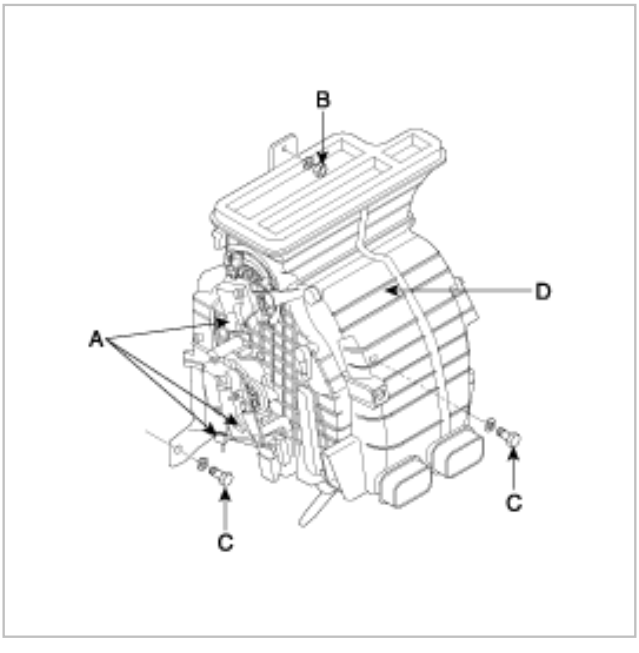
1. Heater & evaporator case
2. Heater core
3. Floor cover
4. Temp. door
5. Evaporator core
6. Bracket
7. Seal
8. Joint flange cap
9. Seal
10. Vent door
11. Blower door
12. Defrost door
13. Temp.(A) door
14. Heater & evaporator case
15. Temp.(A) door arm
16. Vent door lever
17. Blower door lever
18. Defrost door lever
19. Mode cam
20. Temp. door arm
21. Thermistor
22. Insulation
23. Temp. door lever
24. Mode actuator
25. Temp. actuator

REPLACEMENT

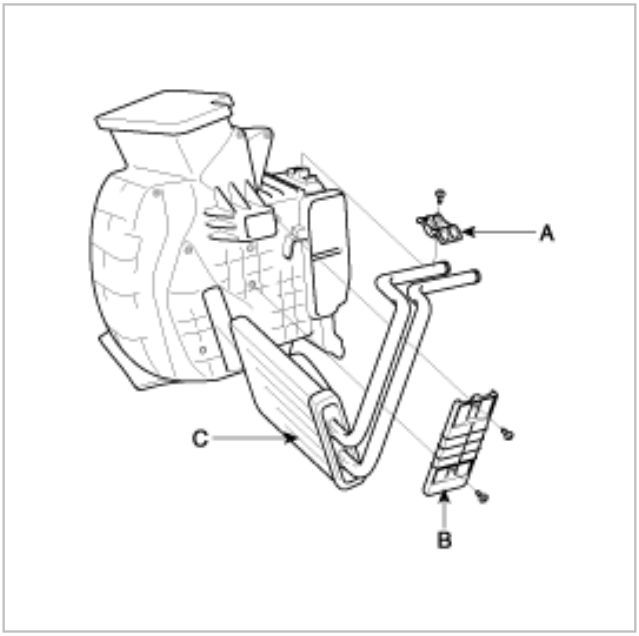
1. Recover the refrigerant with a recovery/recycling/charging station (see page HA-27).
2. When the engine is cool, drain the engine coolant from the radiator.
3. Disconnect the negative cable from the battery.
4. Remove the bolts(A) and the expansion valve(B) from the evaporator core.
   Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.



5. Disconnect the inlet(C) and outlet(D) heater hoses from the heater unit.
   Engine coolant will run out when the hoses are disconnected ; drain it into a clean drip pan. Be sure not to let coolant spill on electrical parts or painted surfaces. If any coolant spills, rinse it off immediately.
6. Remove the crash pad (see BD group - crash pad).
7. Disconnect the connectors (A) from the temp. actuator, the mode actuator and the thermistor, then remove the mounting nut(B), the mounting bolts(C) and heater & evaporator unit(D).

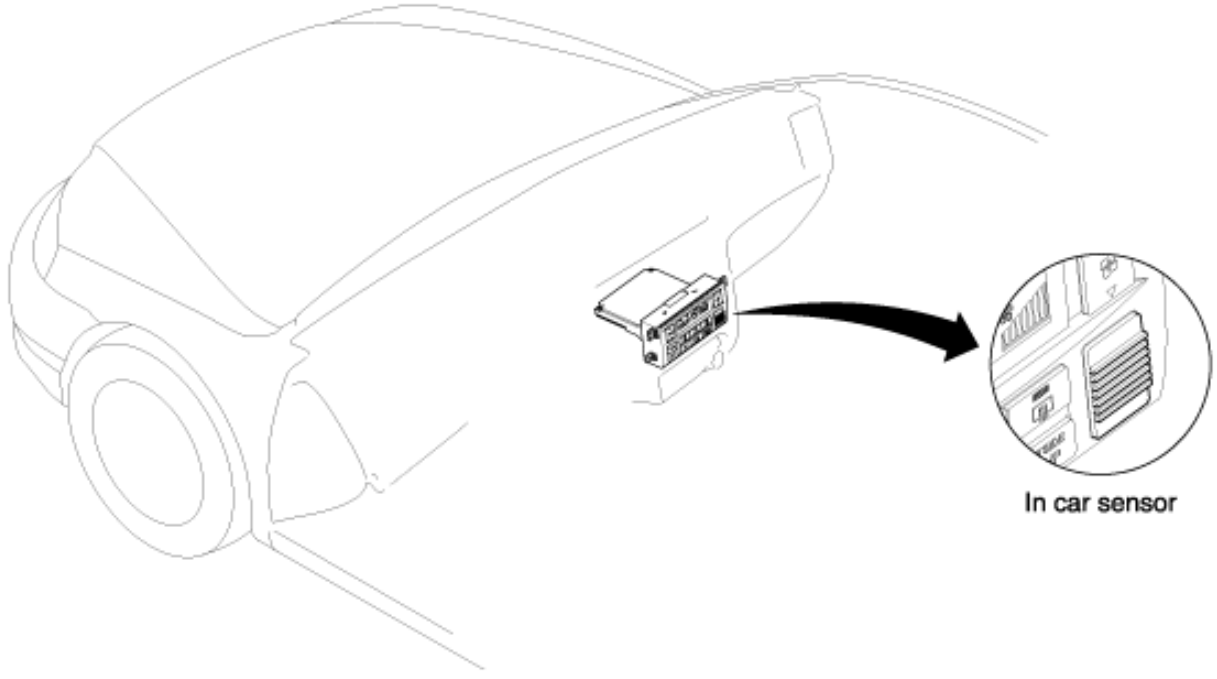


8. Remove the self-tapping screws and the upper bracket(A), the side bracket(B).
   Be careful not to bend the inlet and outlet pipes during heater core(C) removal, and pull out the heater core.



9. Install the heater core in the reverse order of removal.
10. Install in the reverse order of removal, and note these items :
    A. If you're installing a new evaporator, add refrigerant oil (FD46XG).
    B. Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
    C. Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
    D. Do not spill the refrigerant oil on the vehicle ; it may damage the paint ; if the refrigerant oil contacts the paint, wash it off immediately.
    E. Apply sealant to the grommets.
    F. Make sure that there is no air leakage.
    G. Charge the system (see page HA-28), and test its performance (see page HA-26).
    H. Do not interchange the inlet and outlet heater hoses and install the hose clamps securely.
    I. Refill the cooling system with engine coolant.

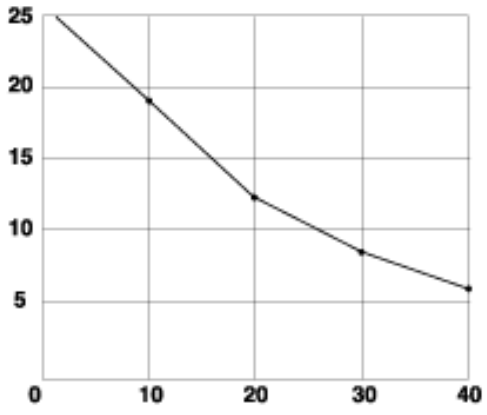
COMPONENT LOCATION



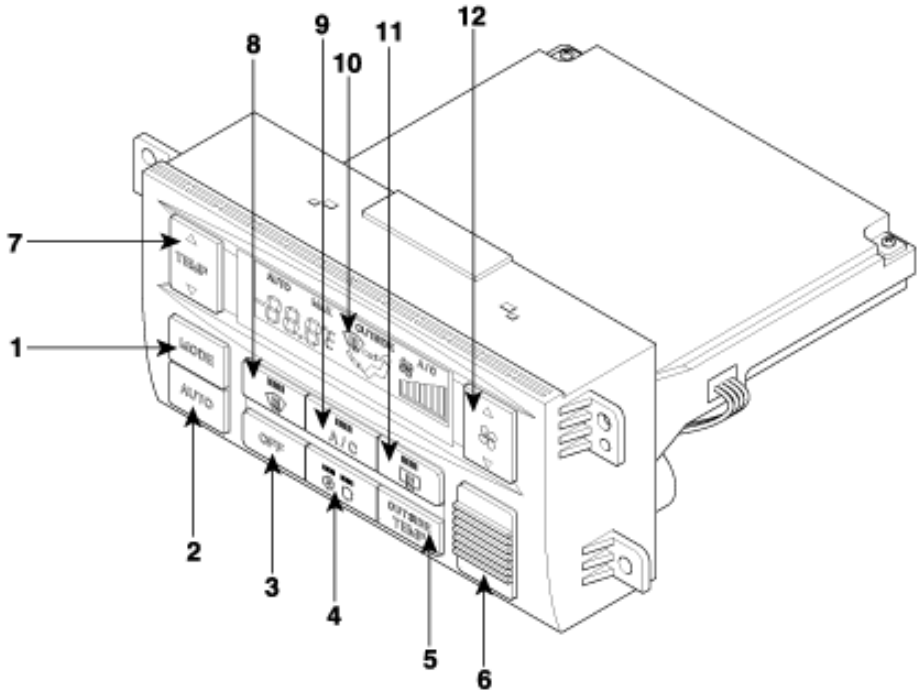
DESCRIPTION

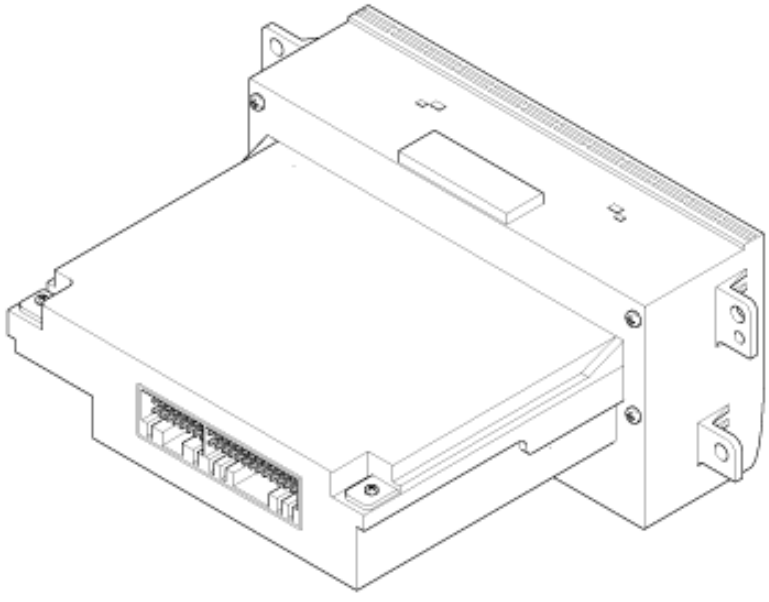
It will detect interior temperature, which will be used for discharge temperature control, sensor failsafe, temperature door control, blower motor level control, and A/C auto control.

CHARACTERISTICS



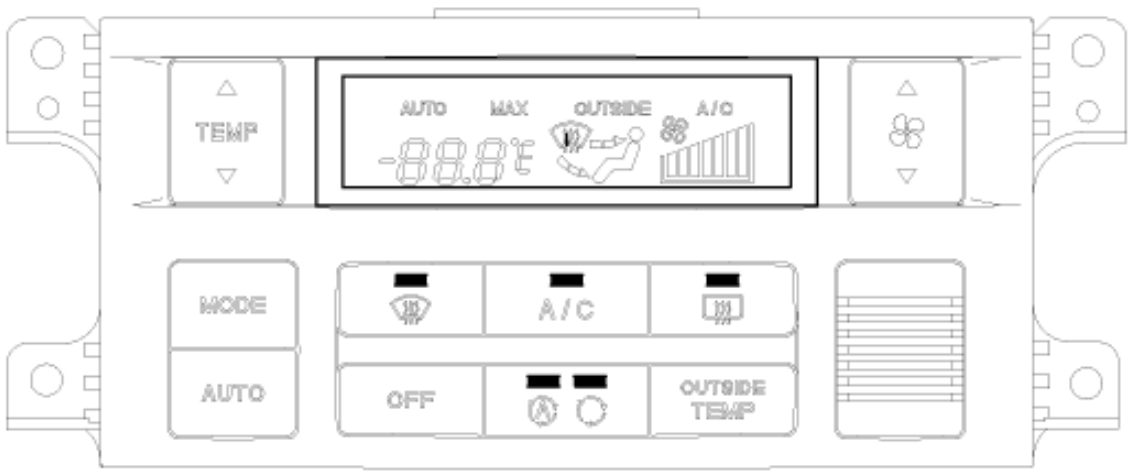
COMPONENTS





1. Mode switch
2. Auto switch
3. System off switch
4. A.Q.S. switch
5. Outside temp. switch
6. In-car sensor
7. Temp. switch
8. Defogger switch
9. Air conditioner switch
10. Display
11. Rear defogger switch
12. Blower switch

DESCRIPTION



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	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.
				OFF SW AND SYSTEM OPERATION -OFF: SYSTEM OFF -TEMP: SET TEMPERATURE UP/DOWN
2	AUTO	AUTO CONTROL	"AUTO": Display	1. Automatically control the following items corresponding to theset temperature. •TEMP DOOR •MODE DOOR •INTAKE DOOR •BLOWER FAN SPEED •A/C 2. When the AUTO mode is off, the word AUTO should not appear. 3. After off the AUTO mode, the system is automatically controlled except for the manually selected SW.
				OFF SW AND SYSTEM OPERATION -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	•"AMB": Display •Ambient temperature: Display •The other signals: OFF	1. System is operated as the same before the AMB SW turned on. 2. When the AMB SW is pushed, the other signals are not appearedbut the word AMB and the ambient temperature are displayed for 5 sec., andthen the display become the same as the AMB SW is not pushed.
				OFF SW AND SYSTEM OPERATION -AMB: If the AMB SW is pushed once more when the ambient temperatureis displayed, the ambient temperature does not appear and the display becomethe same as the AMB SW is not pushed. -OTHER SWITCHES: If the other switch is pushed except for REARDEF and in-car & ambient /AQS, ambient temperature does not appear and the pushed switch is displayed.
4	A/C	A/C ON/ OFF CONTROL	•"A": Display/ OFF •"AUTO": OFF	1. A/C ON/OFF

				OFF SW AND SYSTEM OPERATION -A/C: A/C ON/OFF MANUAL CONTROL -OFF: SYSTEM OFF -AUTO: AUTO MODE AUTOMATIC CONTROL
5	MODE	MODE DOOR CONTROL •VENT •B/L •FOOL •MIX	•"MODE": Display/OFF •"AUTO": Off	1. Fix the MODE DOOR to one among VENT, B/L, FLOOR and MIX. 2. MODE SW MANUAL CONTROL ORDER : VENT → B/L → FLOOR → MIX → VENT → ... 3. At MIX MODE: MIX LOGIC (MIX, FRE., A/C ON)
				OFF SW AND SYSTEM OPERATION -DEF: DEF MODE MANUAL CONTROL -MODE: VENT, B/L, FLOOR & MIX (repeat the order) -AUTO: AUTO MODE AUTOMATIC CONTROL
6	DEF	DEF MODE	•"DEF": ON •"A/C": Display •REC. IND: OFF •"AUTO": OFF	1. MODE DOOR: Fix to "DEF" 2. INTAKE DOOR: Fix to "FRE." (REC. can be selected) 3. A/C: ON •A/C OUTPUT ON/OFF control: Corresponding to the detected temperatureby 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.
				OFF SW AND SYSTEM OPERATION -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
7	OFF	SYSTEM OFF	LCD: ON	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) -Shift to FRE. MODE -REC. INDICATOR ON -LCD OFF -OTHERS: OFF 7. After "OFF", at FRE, FRE. S/W ON (NON-AQS type)

				-Shift to FRE. MODE -REC. INDICATOR ON -LCD OFF -OTHERS: OFF 8. After "OFF", at AQS, AQS/REC. S/W ON (AQS type) -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 -OFF: The word "AMB" & ambient temperature displays for 5 sec. and then off.
				OFF SW AND SYSTEM OPERATION •AUTO: AUTO MODE AUTOMATIC CONTROL •BLOWER -SPEED: Return to MANUAL LOW -OTHERS: Return to the mode before OFF •A/C -A/C ON -OTHERS: Return to the mode before OFF •MODE -MODE: The mode before OFF -OTHERS: Return to the mode before OFF •DEF -MODE: DEF -A/C ON -INTAKE: FRE. -OTHERS: Return to the mode before OFF •TEMP -TEMP: The mode before OFF -OTHERS: Return to the mode before OFF
8	REC. (NON-AQS type)	REC. MODE	•IND ON •"AUTO" display	1. When operating the REC. S/W from FRE. MODE, fix the INTAKE DOORto REC. MODE or when operating the REC. S/W from REC., fix the INTAKE DOORto FRE. MODE.
		FRE. MODE	•IND OFF •"AUTO" display	OFF SW AND SYSTEM OPERATION -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 variationof the POWER TRANSISTOR. 2. At AUTO MODE, if FAN is operated UP/DOWN, the FAN SPEED is UP/DOWNon 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 •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 iscontinually 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 soundis intervally made each 0.15 sec.
				OFF SW AND SYSTEM OPERATION -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 -DEFOG: Push the second DEFOG SW, DEFOG function is off.

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 temperaturesensor, 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 duringthe A/C on condition.

CONTROL SPECIFICATION

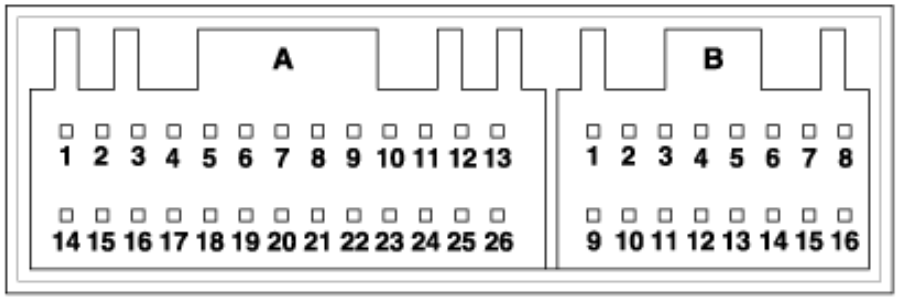
Control item	Control features	Remarks
Required discharge temperature	Required temperature determined by the set temperature and the inputted sensor value.	
Auto control	Required discharge temperature is determined by the set temperature and the inputted sensor value. The feature will use the required 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/m²)/1min delay -350 → 1000(W/m²)/5min delay
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.)	-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)	-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 defogged.)	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.	-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.	-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.	-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.	
MAX HOT	When selecting the set temperature 32°C at AUTO mode, MAX HOT will be performed. It will prevail over MIX mode control.	- 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.	- 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 willeffect the electromotive heating control to prevent outside cold air from flowing toward the feet of passengers.	- Blower speed: Controlled at AUTO LOW (0.5V)
	As the coolant temperature rises, the MODE door will shift to DEF → MIX → AUTO.	**Operation release** •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 detectionis 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 enteringthe 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.	
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 willoutput 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 ± 5seconds.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 toprevent 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. (Storethe 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 systemwill 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 willoperate at the previous before the ignition off.

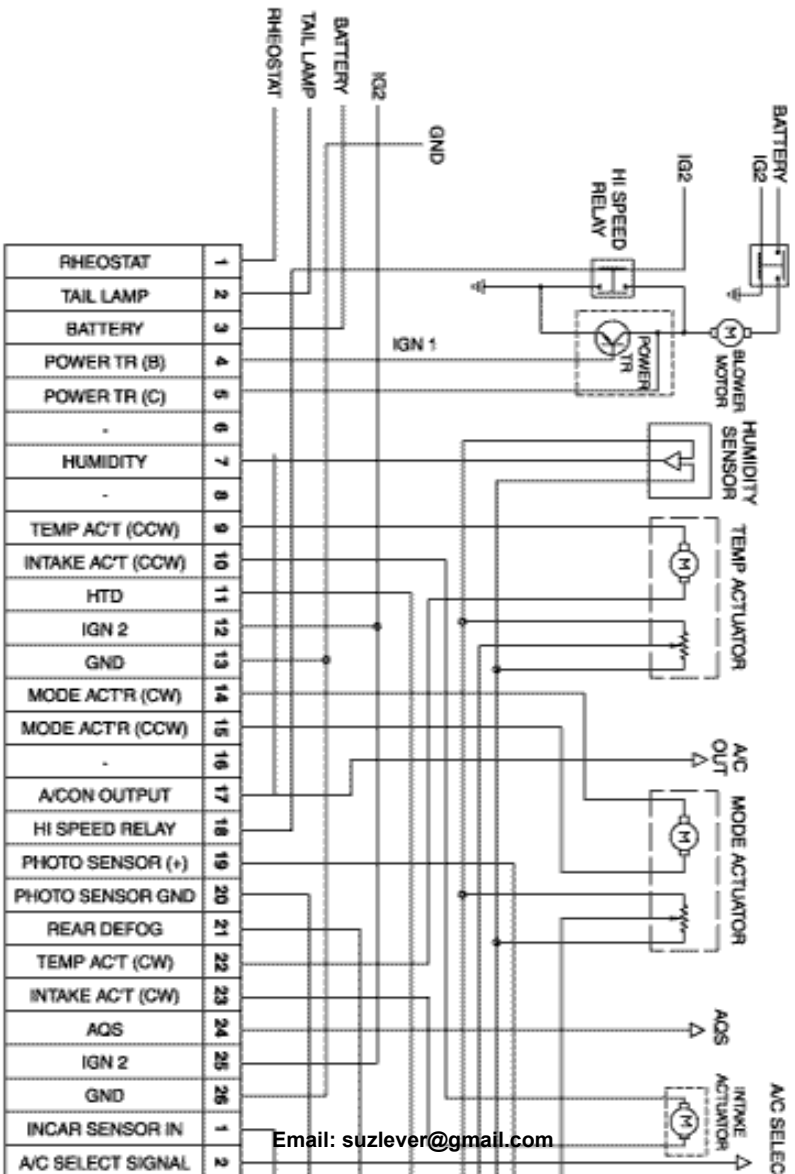
CONNECTOR CONFIGURATION

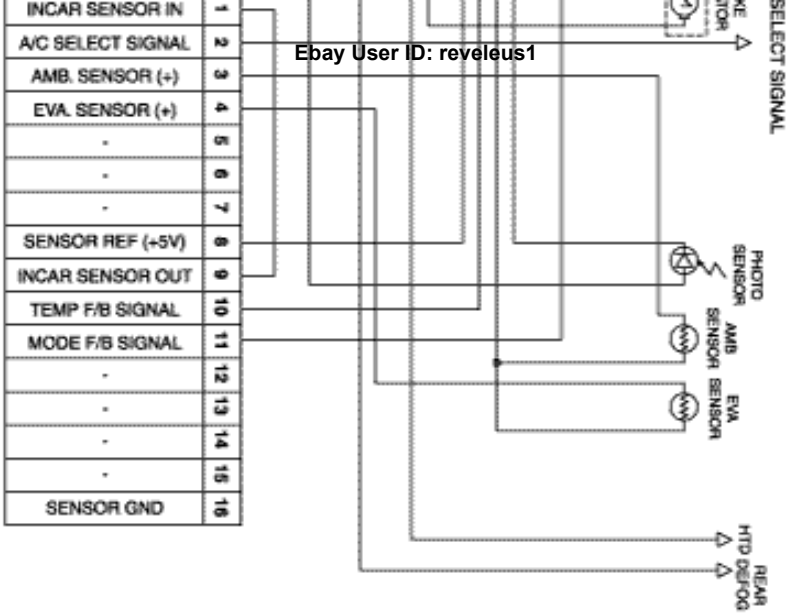


I/NO	USE	CONNECTOR & HOUSING SPEC.	TMNL NO.	CIRCUIT	REMARK
A	FATC COMPONENT	AMP 175446	1	RHEOSTAT	
			2	TAIL LAMP	
			3	BATTERY	
			4	POWER TR(B)	
			5	POWER TR(C)	
			6	-	
			7	HUMDITY	
			8	-	
			9	TEMP ACT'R (CCW)	
			10	INTAKE ACT'R (CCW)	
			11	HTD	COOL
			12	IGN 2	FRESH
			13	GND	VENT
			14	MODE ACT'R (CW)	DEF
			15	MODE ACT'R (CCW)	WARM
			16	-	REC
			17	A/CON OUTPUT	
			18	HI SPEED RELAY	
			19	PHOTO SENSOR (+)	
			20	PHOTO SENSOR (GND)	
			21	REAR DEFOG	
			22	TEMP ACT'R (CW)	
			23	INTAKE ACT'R (CW)	
			24	AWS	
			25	IGN 2	
			26	GND	

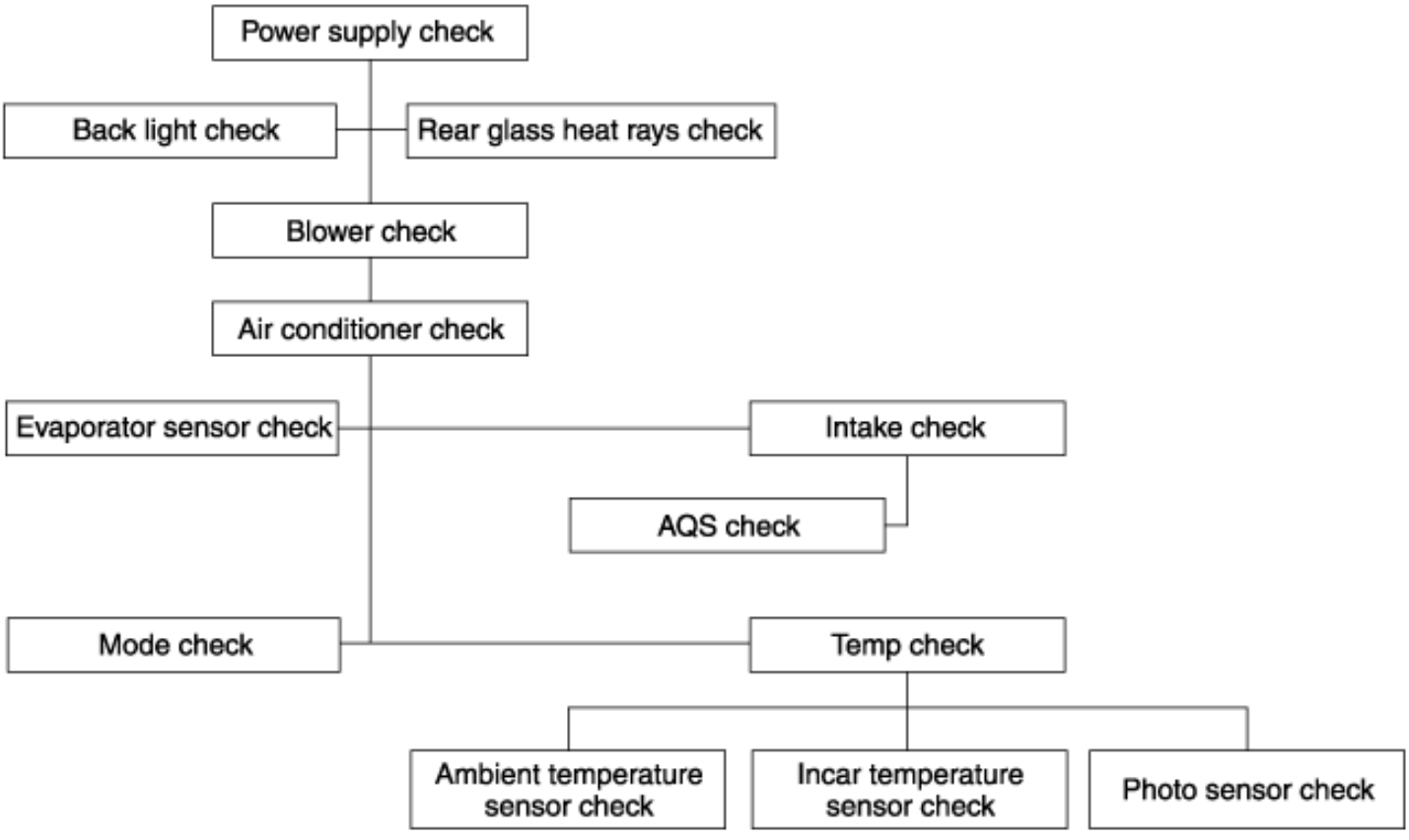
B	FATC COMPONENT	AMP 175446	1	REAR SENSOR IN
			2	A/C SELECT
			3	AMB SENSOR (+)
			4	EVA. SENSOR (+)
			5	W/TEMP SENSOR (+)
			6	-
			7	-
			8	SENSOR REF (+5V)
			9	INCAR SENSOR OUT
			10	TEMP F/B SIGNAL
			11	MODE F/B SIGNAL
			12	-
			13	-
			14	-
			15	-
			16	SENSOR GND

CIRCUIT DIAGRAM





CONTROL PANEL TESTS



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

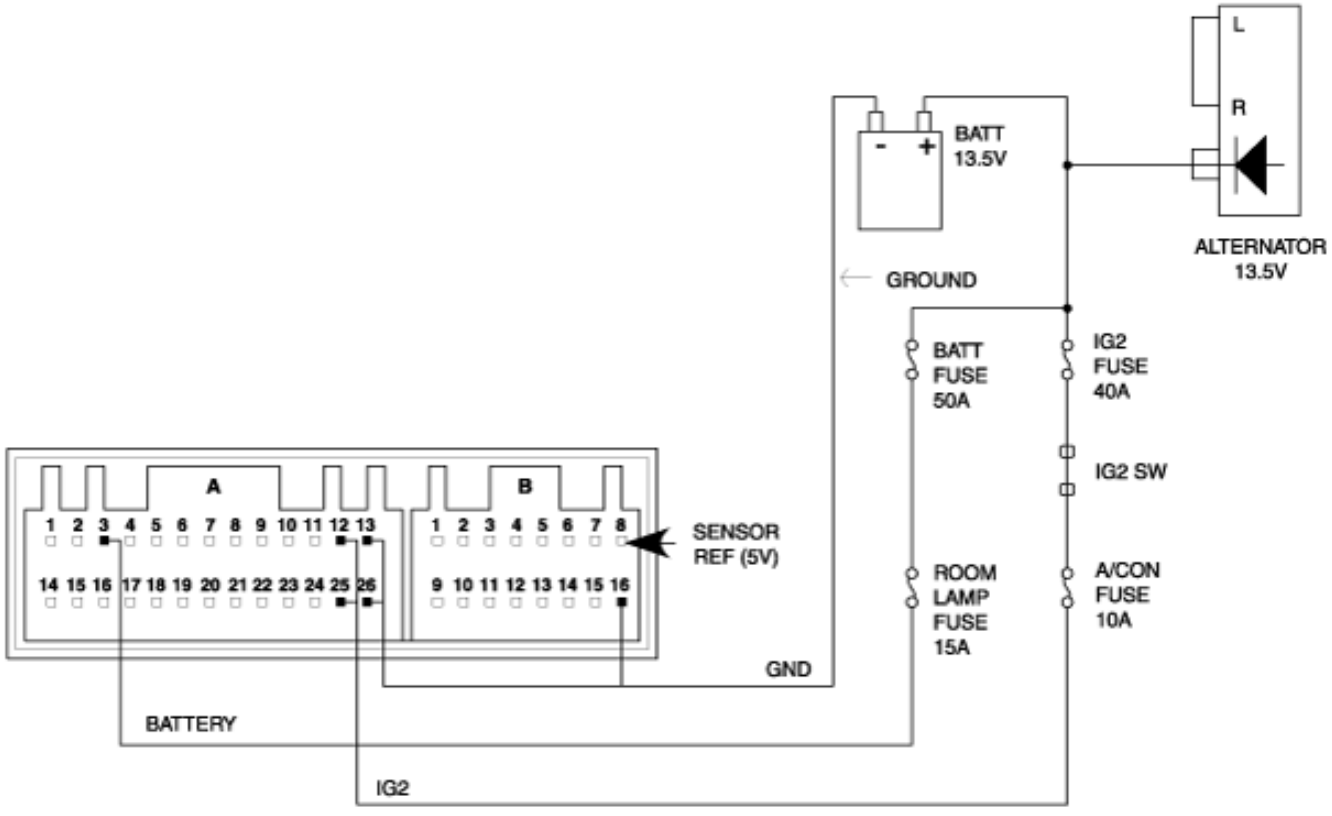
POWER SUPPLY CHECK

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 Ebay User ID: reveleus1	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.



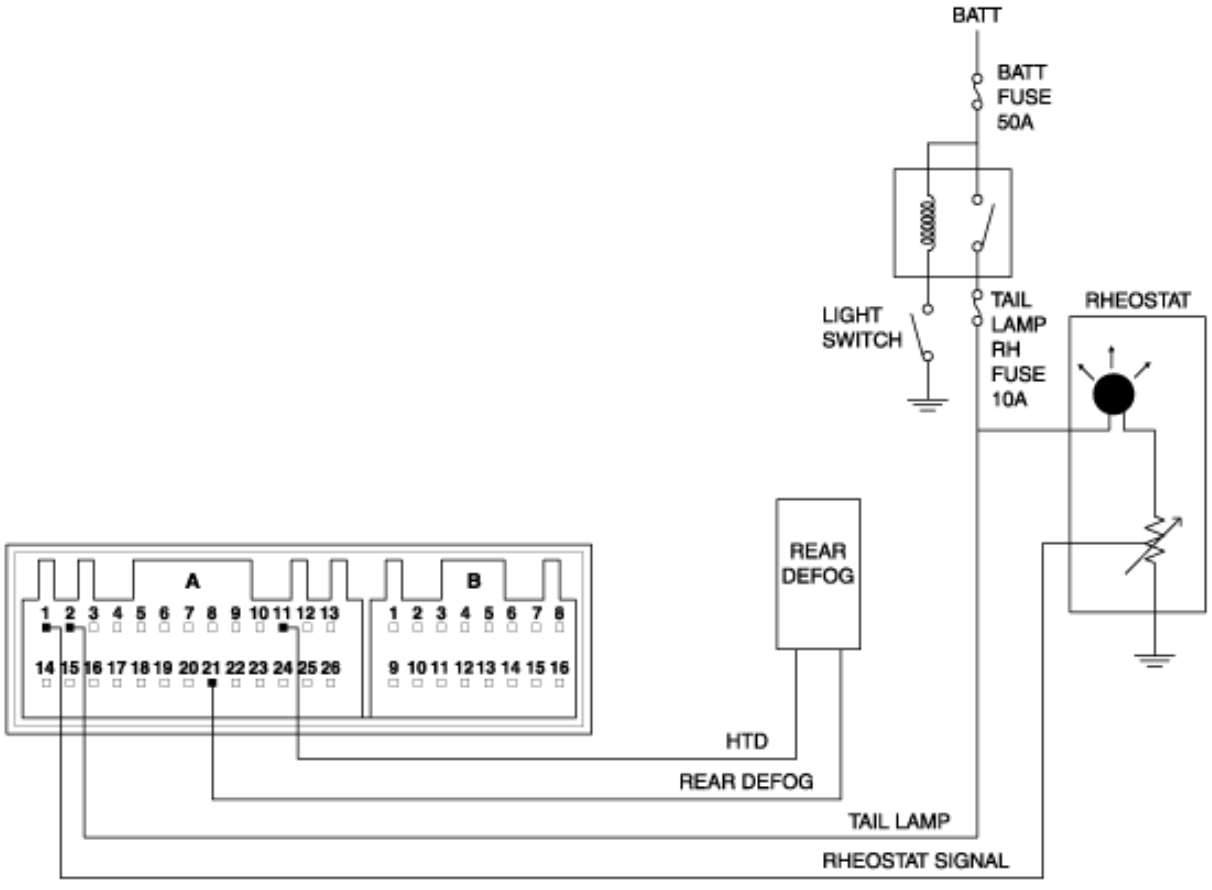
BACK LIGHT AND REAR GLASS HEAT RAYS CHECK

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 reostart as shown in the above figure. The brightness is adjusted according to resistance value of reostart.

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 reostart shown in the above figure. If 8V and more, check reostart wiring and reostart.

		If tail light is below 1V, check tail light wiring.

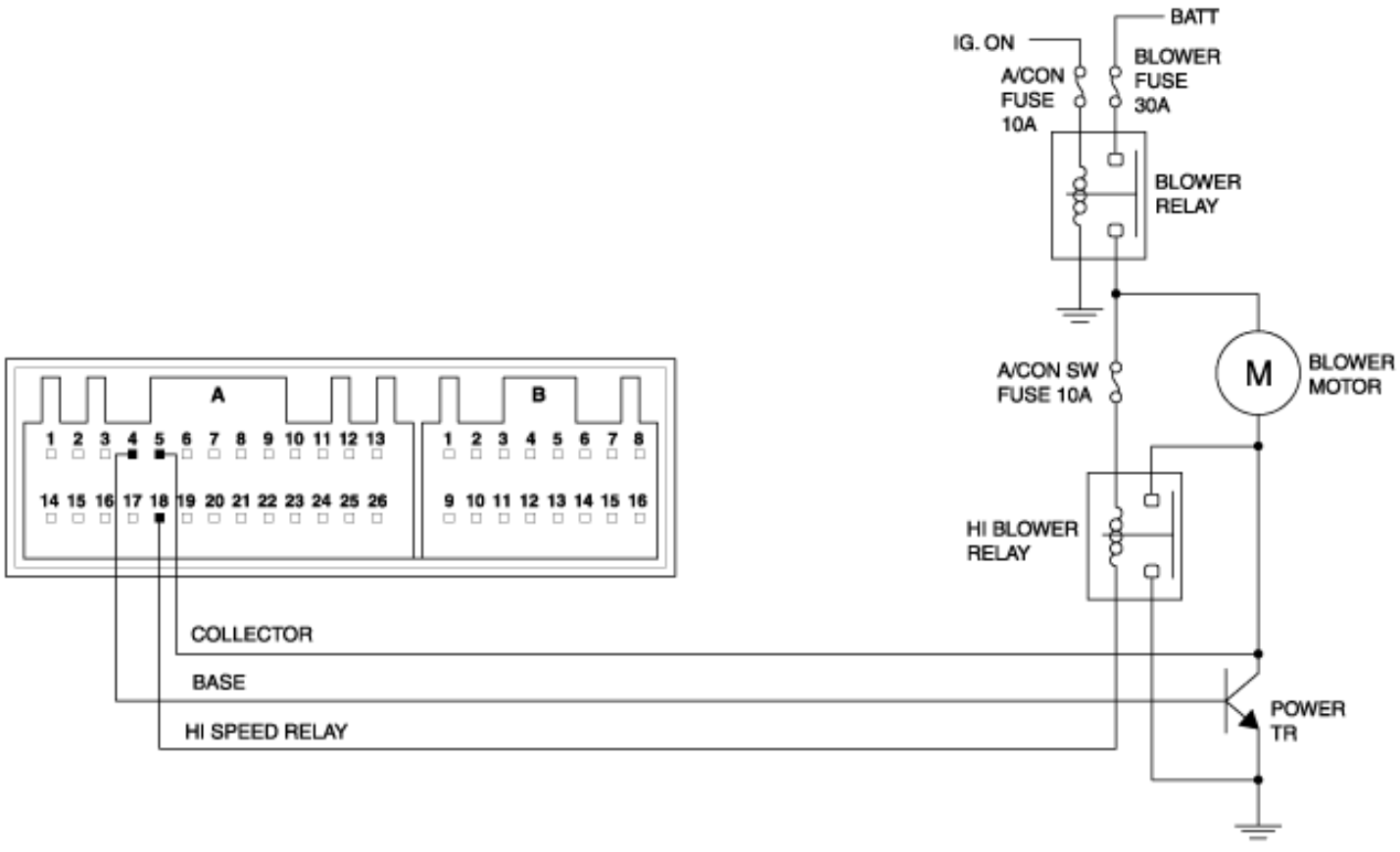


BLOWER CHECK

Perform the blower check in manual blower running state because it is difficult to check blower at automatic control. Blower is controlled from level l 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 connectorA-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



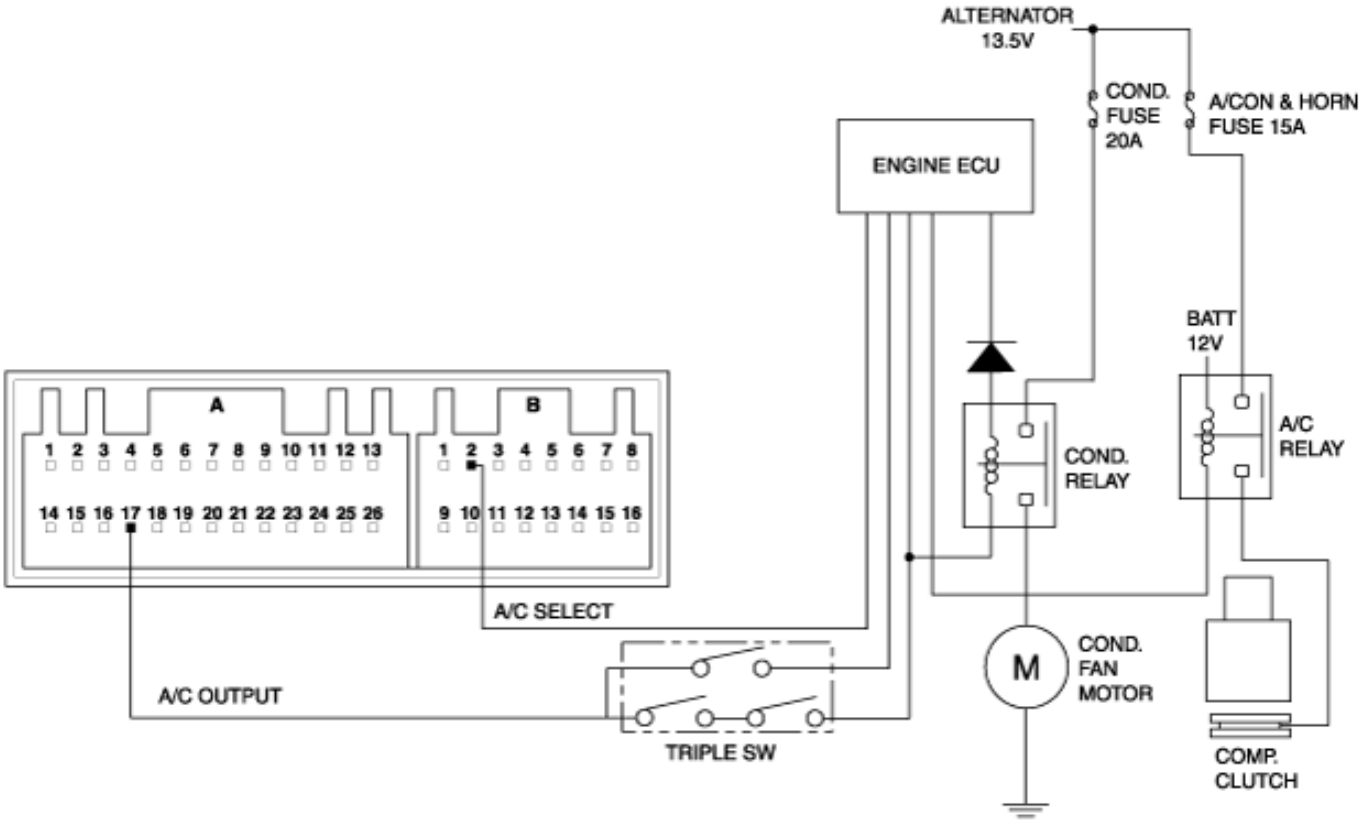
AIR CONDITIONER CHECK

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 conditioneris 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 signalof 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

	Ebay User ID: reveleus1	conditioner relay and ECM.
		Switch on air conditioner and measure voltage of FATC connector A-17 terminal as shown in the above figure. If 1V and less, check input value ofevaporator sensor.
	Input error of evaporator sensor	If evaporator sensor is disconnected or short or voltage of its inputsource 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 terminaland motor works in direction of outdoor. In selecting indoor mode with indoorswitch, 12V is outputted from FATC connector A-10 terminal, 0V is supplied for A-23 terminal and motor works in direction of indoor.

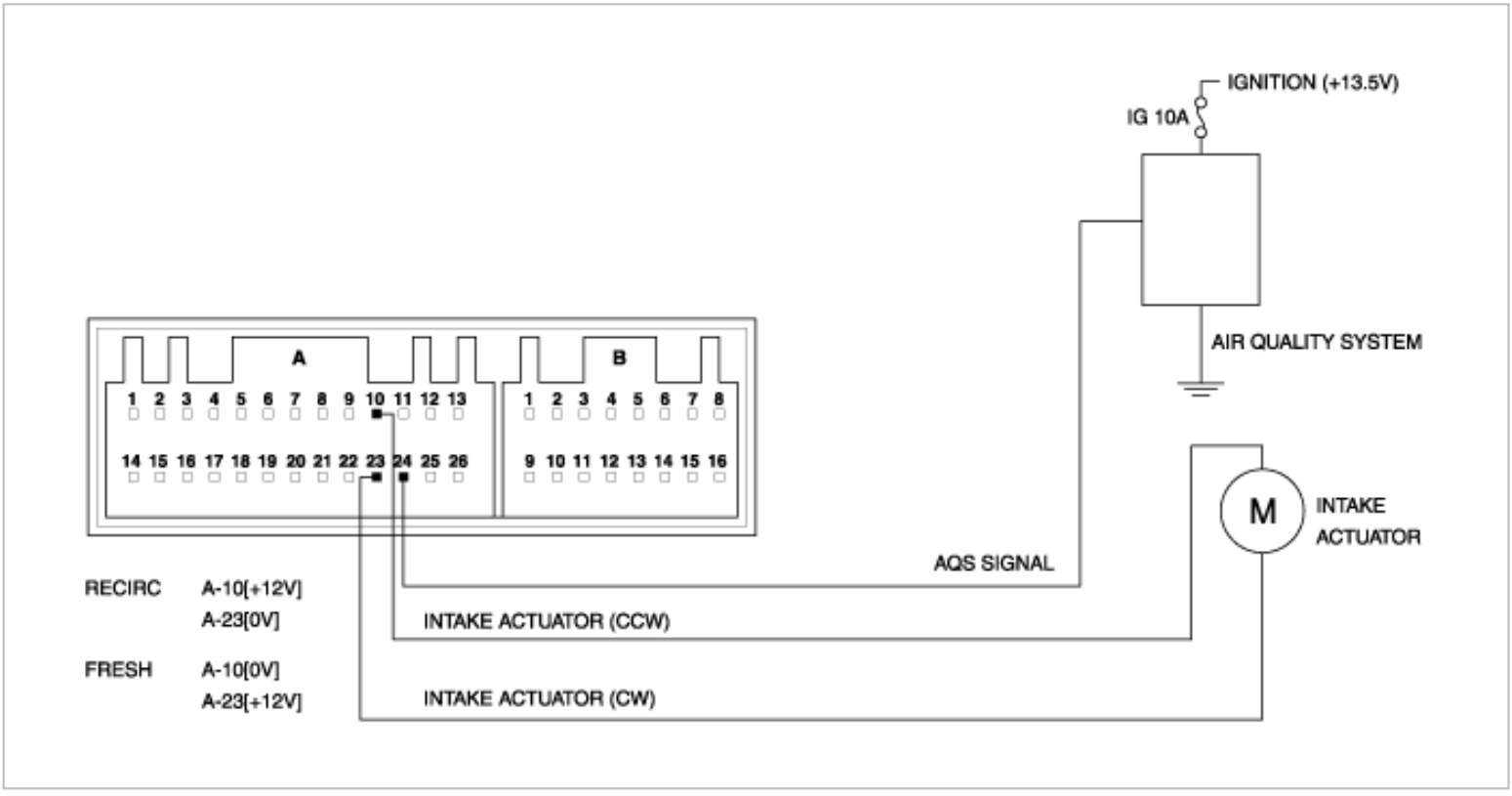
ERROR DIAGNOSTICS

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 andless, check the inside of controller

Purchased
from Ebay seller
Reveleus1

Thank-you for purchasing from me, it is much appreciated.
To contact me please email
suzlever@gmail.com

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.



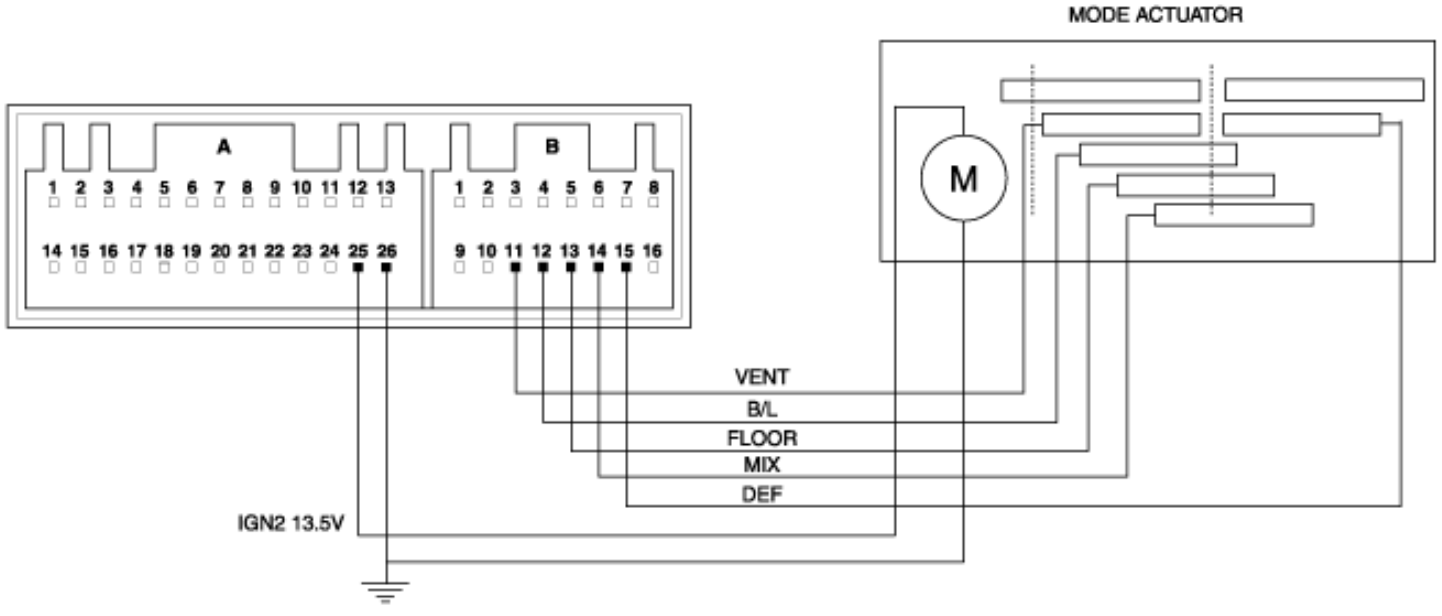
MODE CHECK

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 B-11(Vent) terminal. Voltage of 9V and more is set in the rest terminals B-12, B-13, B-14, B-15 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 themethod 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	Ebay User ID: reveleus1	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 failureof mode actuator.



TEMP CHECK

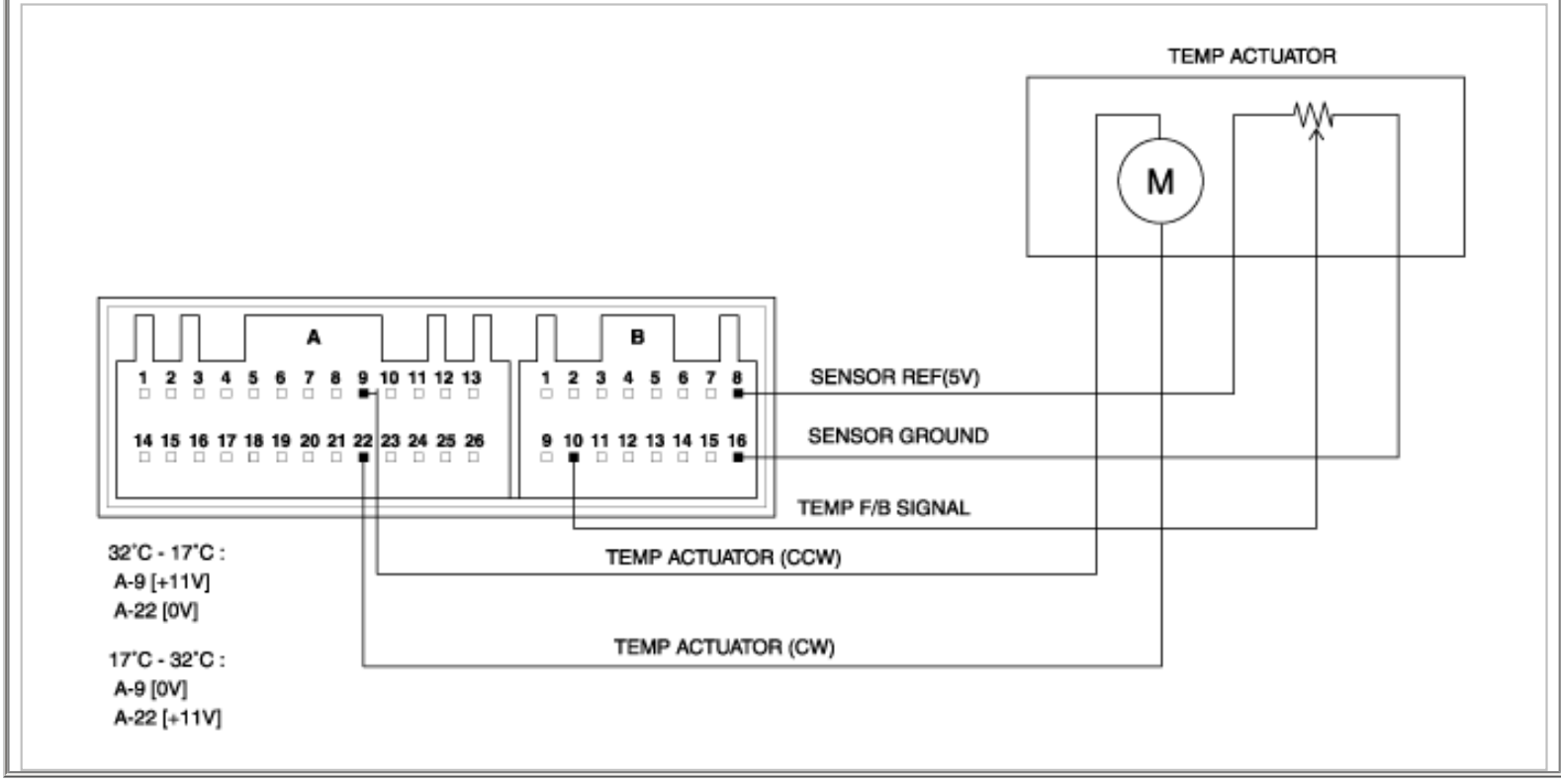
In adjusting temp switch from 32°C to 17°C, 11V is outputted from FATC connector A-9 terminal, 0V is supplied for A-22 terminal and temp motor works in direction of COOL. In adjusting temp switch from 17°C to 32°C, 11V is outputted from FATC connector A-22 terminal, 0V is supplied for A-9 terminal and 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

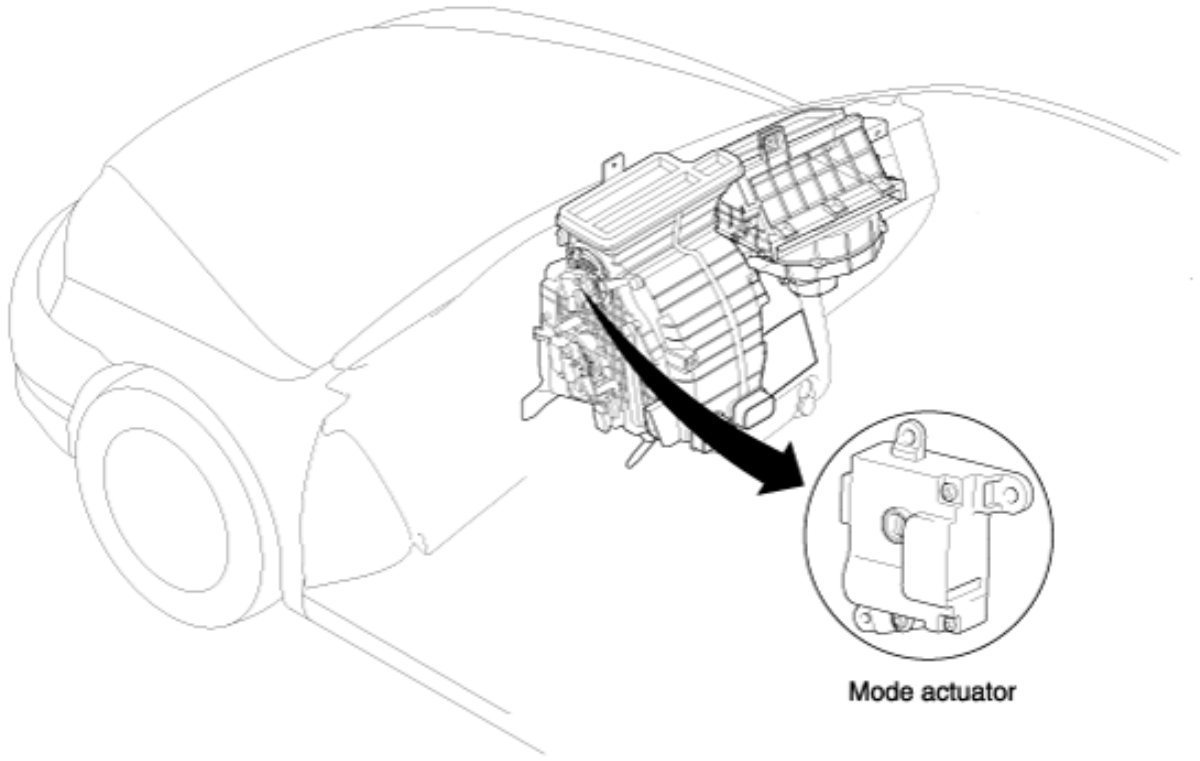
Temp actuator running error	Ebay User ID: reveleus1	Power supply error in temp actuator	After altering 17°C to 32°C and adversely, measure voltage ofA-22 terminal. If Both of them are 9V and more, check temp actuator and peripheral wiring state and if one or both of them are 5V and less, its cause is 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 actuatordriver.



Email: suzlever@gmail.com

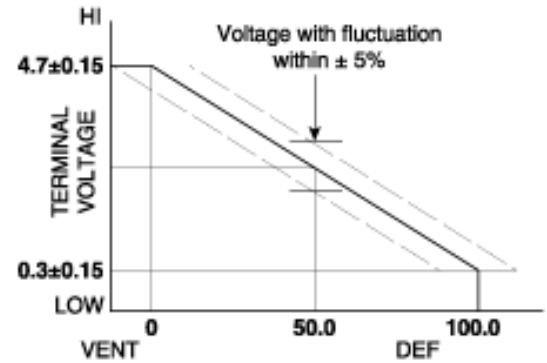
COMPONENT LOCATION

[MANUAL, FULL AUTO]



DESCRIPTION

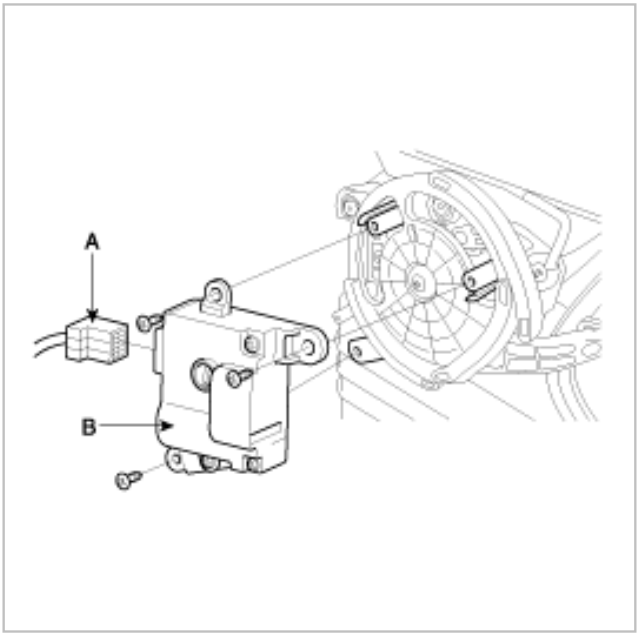
- Operating temp. : -30°C ~ +80°C
- Operating voltage : DC 9V ~ 16V
- Rated voltage : DC 12V
- Rated load : 4kgf/cm
- Rated voltage : DC 12V
- Rated watt. : 0.25W (at 40°C)
- Opration volt : DC 5V ± 0.5V
- Total resistance : 5kΩ ± 10%
- Output lock torque : Min 1.76Nm (18kgf/cm) (at DC 12V)
- Rated AMP. : Max 150mA
- Lock vol. : Max. 400mA
- Characteristics



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

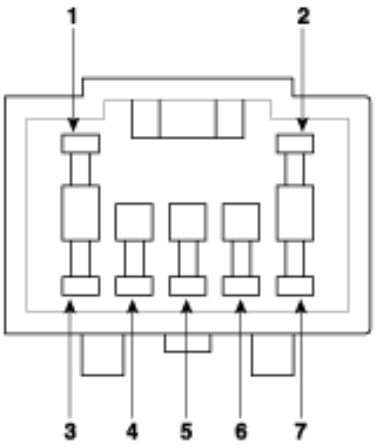
REPLACEMENT

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



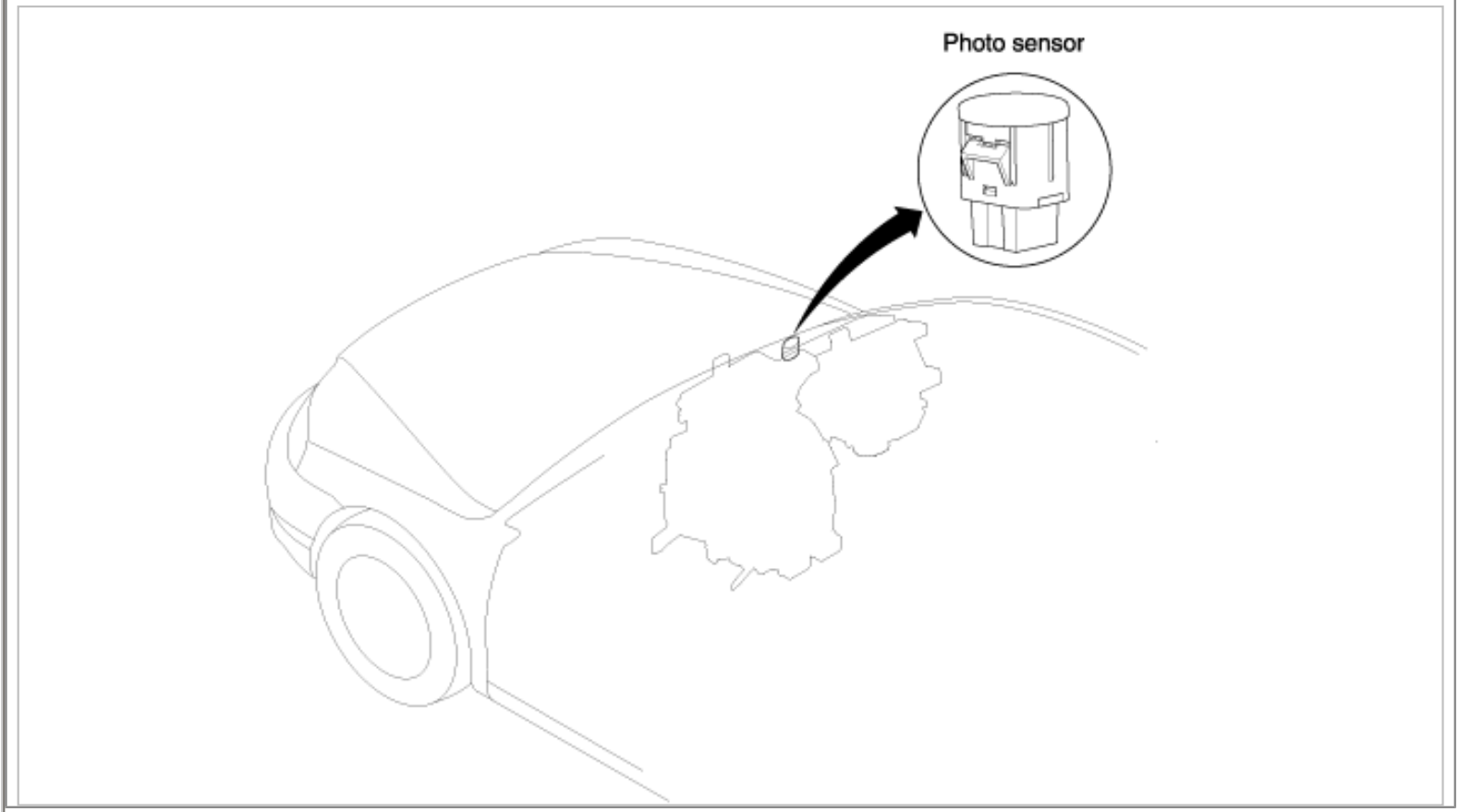
2. Install in the reverse order of removal. After installation, make sure the mode actuator runs smoothly.

CONNECTOR



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

COMPONENT LOCATION

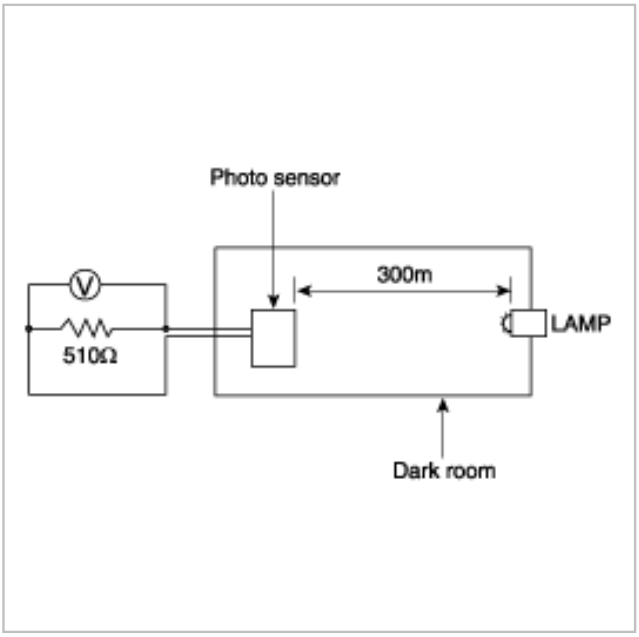


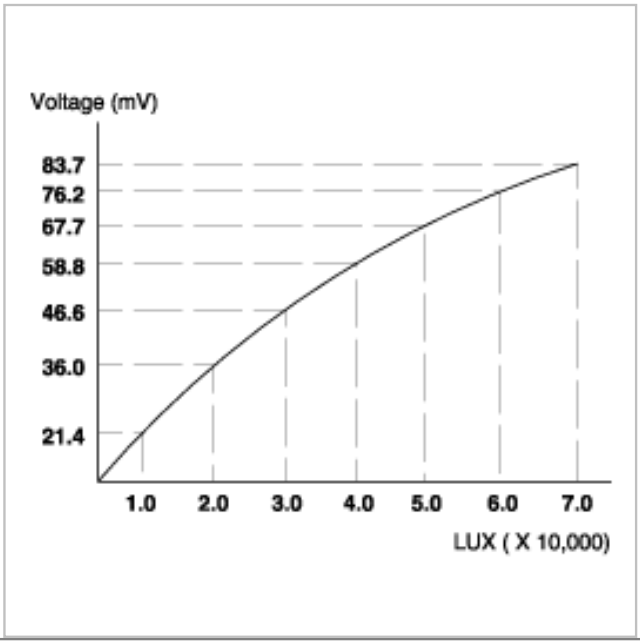
DESCRIPTION

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.

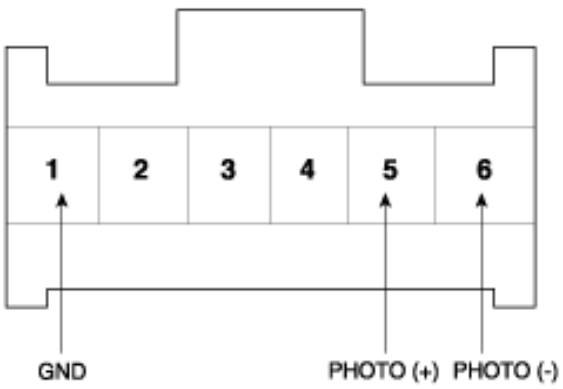
INSPECTION

Install the lamp and the photo sensor in the dark room.
Then measure the output current.

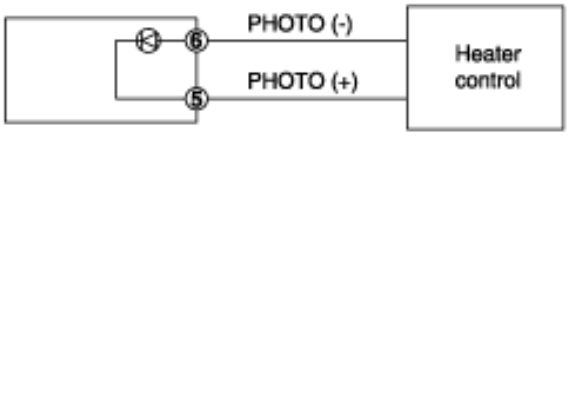




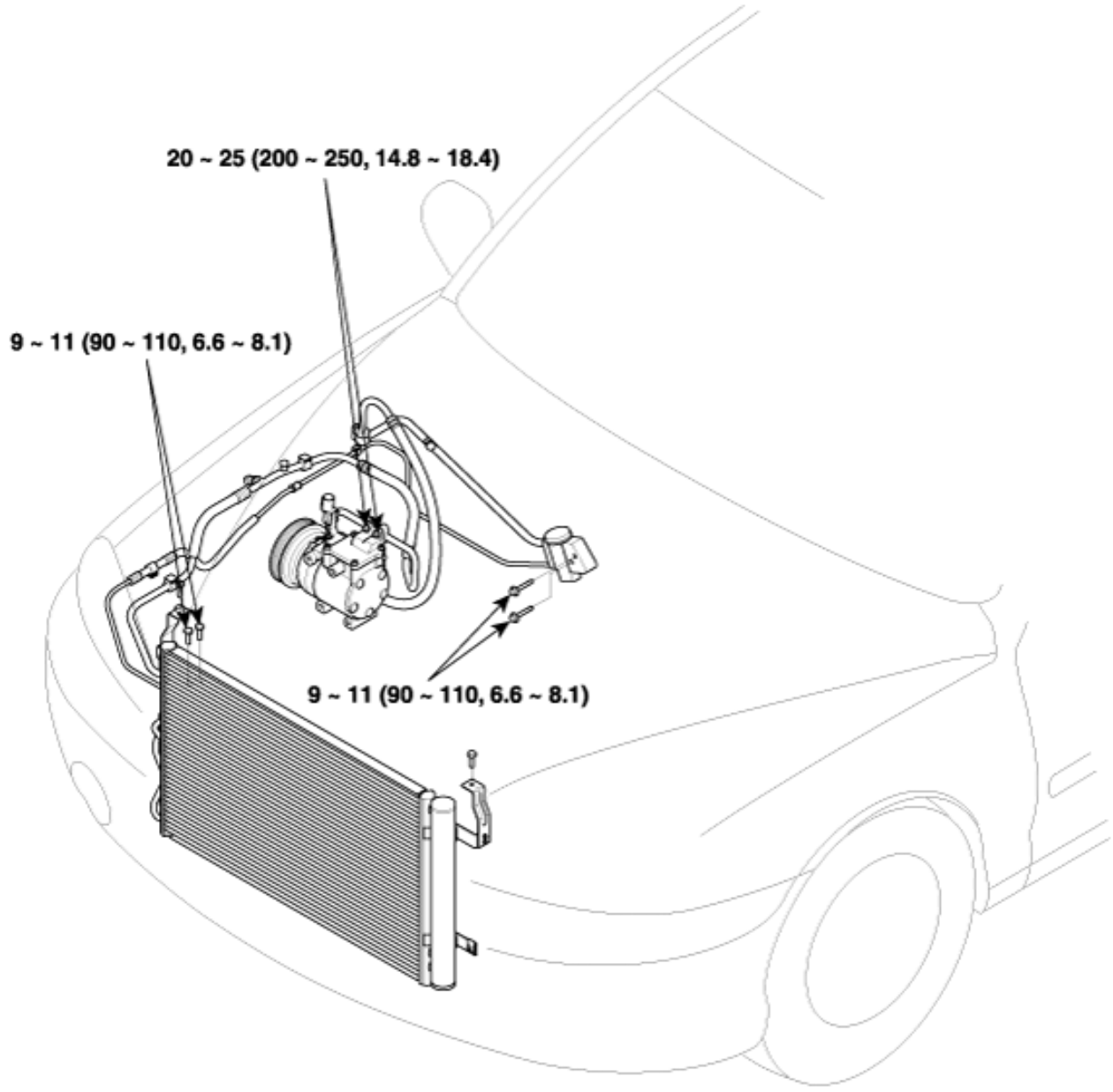
CONNECTOR



CIRCUIT DIAGRAM



COMPONENT LOCATION



TORQUE : Nm (kgf·cm, lbf·ft)

REPLACEMENT

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

> **CAUTION**
>
> Cap the open fittings immediately to keep moisture or dirt out of the system.

3. Tighten joint of bolt or nut to specified torque

> **CAUTION**
>
> Connections should no be torqued tighter than the specified torqued.

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

> Specified amount : 680 ± 25g

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

Part tightened	N·m	kgf·cm	lbf·ft
Condenser x Discharge hose	9 ~ 11	90 ~ 110	6.6 ~ 8.1
Condenser x Liquid tube	9 ~ 11	90 ~ 110	6.6 ~ 8.1
Compressor x Discharge hose	20 ~ 25	200 ~ 250	14.8 ~ 18.4
Compressor x Suction hose	20 ~ 25	200 ~ 250	14.8 ~ 18.4
Expansion valve x Evaporator	9 ~ 11	90 ~ 110	6.6 ~ 8.1

ON-VEHICLE INSPECTION

This is a method in which the trouble is located by using a gauge set. Read the gauge pressure when these conditions are established.

TEST CONDITIONS

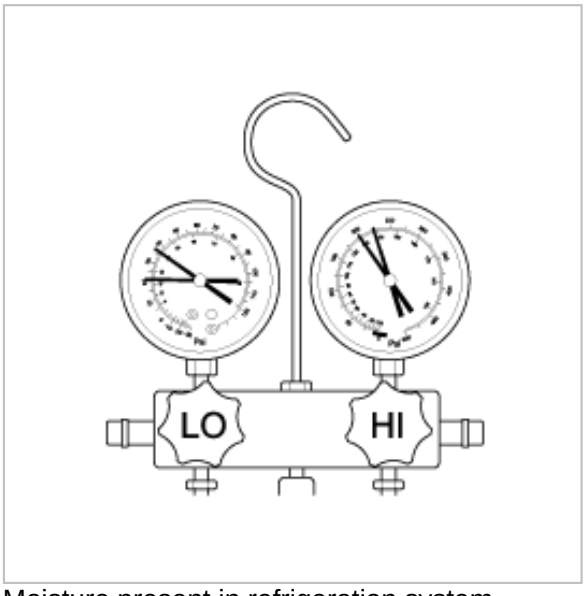
- Temperature at the air inlet with the switch set at RECIRC is 30~35°C (86~95°F)
- Engine running at 1,500rpm
- Blower speed control knob on "4" position
- Temperature control knob on "COOL" position

NOTE

It should be noted that the gauge indications may vary slightly due to ambient temperature conditions

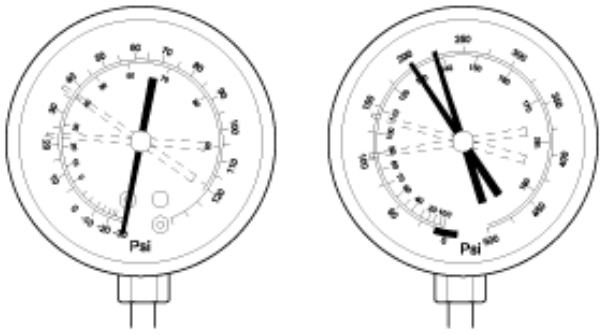
1. Normally functioning refrigeration system.

Gauge reading :
Low pressure side :
0.15~0.25 MPa (21.8~36.3 psi, 1.5~2.5 kgf/cm²)
High pressure side :
1.37~1.57 MPa (199~228 psi, 14~16 kgf/cm²)



2. Moisture present in refrigeration system.

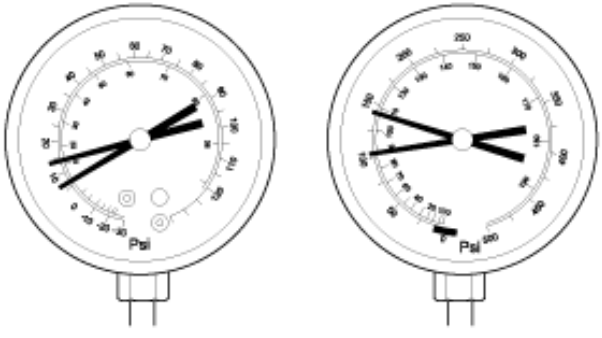
Condition : Periodically cools and then fails to cool **Ebay User ID: reveleus1**



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side sometimes become a vacuum and sometime normal	Moisture entered in refrigeration system freezes at expansion valve orifice and temporarily stops cycle, but normal state is restored after a time when the ice melts	• Drier in oversaturated state • Moisture in refrigeration system freezes at expansion valve orifice and block circulation of refrigerant	- Raplace drier - Remove moisture in cycle through repeatedly evacuating air - Charge proper amount of new refrigerant

3. Insufficient cooling

Condition : Insufficient cooling

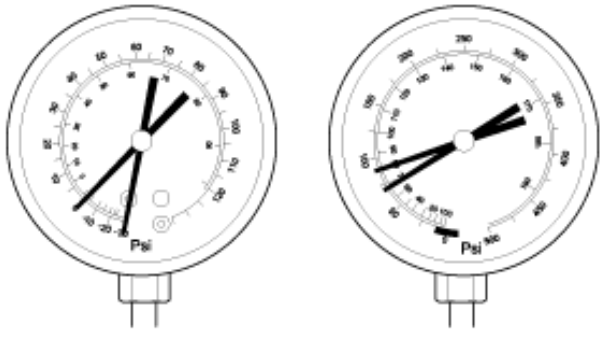


Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy

•Pressure low on both low and high pressure sides •Insufficient cooling performance	Gas leakage at some place in refrigeration system	•Insufficient refrigerant in system •Refrigerant leaking	-Check for gas leakage with gas leak detector and repair if necessary -Charge proper amount of refrigerant -If indicated pressure value is near 0 when connected to gauge, create the vacuum after inspecting and repairing the location of the leak

4. Poor circulation of refrigerant

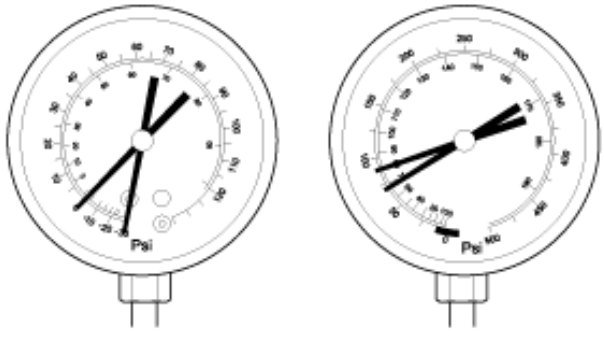
Condition : Insufficient cooling



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
•Pressure low in both low and high pressure sides •Frost on tube from receiver to unit	Refrigerant flow obstructed by dirt in drier	Condenser clogged	Replace drier

5. Refrigerant does not circulate

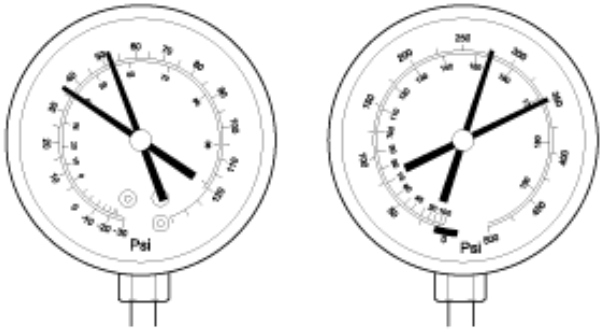
Condition : Does not cool (Cools from time to time in some cases)



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
•Vacuum indicated on low pressure side, very low pressure indicated on high pressure side •Frost or dew seen on piping before and after receiver/drier or expansion valve	•Refrigerant flow obstructed by moisture or dirt in refrigeration system •Refrigerant flow obstructed by gas leakage from expansion valve	Refrigerant does not circulate	-Check expansion valve -Clean out dirt in expansion valve by blowing with air -Replace drier -Evacuate air and charge new refrigerant to proper amount -For gas leakage from expansion valve, replace expansion valve

6. Refrigerant overcharged or insufficient cooling of condenser

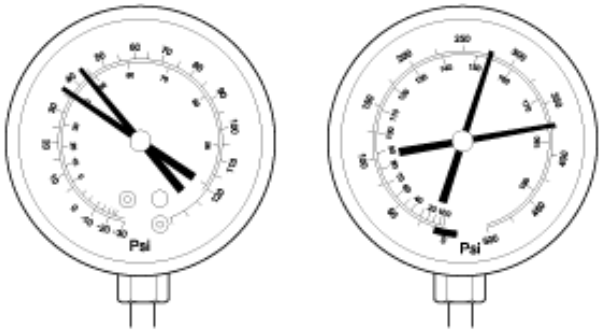
Condition : Insufficient cooling



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
Pressure too high on both low and high pressure sides	•Unable to develop sufficient performance due to excessive •Insufficient cooling of condenser	•Excessive refrigerant in cycle → refrigerant overcharged •Condenser cooling → condenser fins clogged or condenser fan faulty	-(1) Clean condenser -(2) Check cooling fan with fluid coupling operation. -(3) If (1) and (2) are in normal state, check amount of refrigerant Charge proper amount of refrigerant

7. Air present in refrigeration system

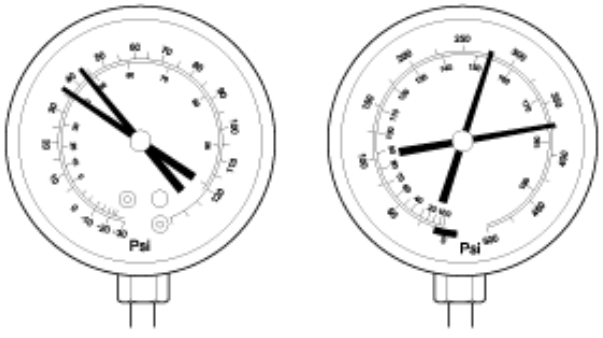
Condition : Insufficient cooling



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
•Pressure too high on both low and high pressure sides •The low pressure piping hot to the touch	Air entered in refrigeration system	•Air present in refrigeration system •Insufficient vacuum purging	-Check compressor oil to see if it is see if it is dirty or insufficient -Evacuate air and charge new refrigerant

8. Expansion valve improperly

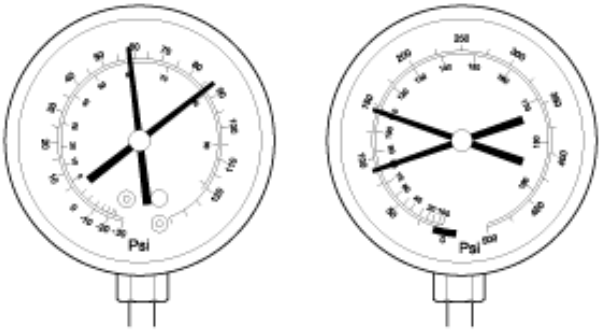
Condition : Insufficient cooling



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
•Pressure too high on both low and high pressure sides •Frost or large amount of dew on piping on low pressure side	Trouble in expansion valve	•Excessive refrigerant in low pressure piping •Expansion valve opened too wide	-Check expansion valve -Replace if defective

9. Defective compression compressor

Condition : Does not cool



Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
•Pressure too high on low and high pressure sides •Pressure too low to on high pressure side	Internal leak in compressor	•Compression defective •Valve leaking or broken sliding parts	Repair or replace compressor

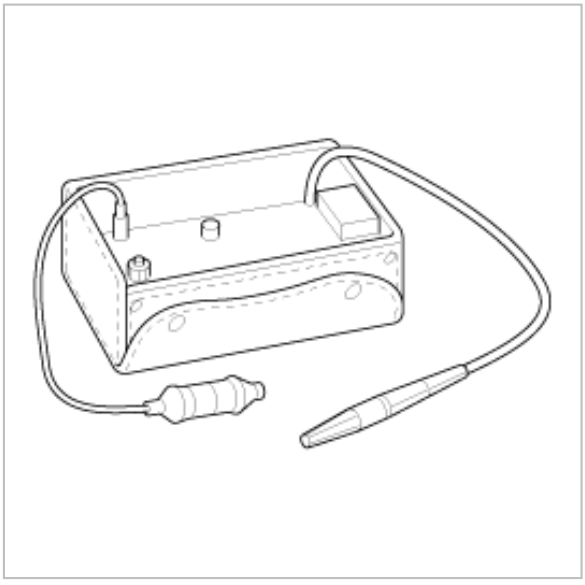
INSPECT FOR LEAKAGE OF REFRIGERANT

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.

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.



A/C SYSTEM TESTS

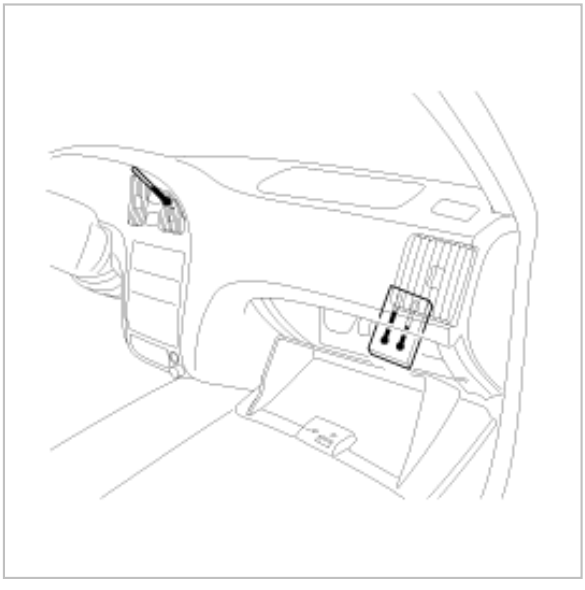
CAUTION

- 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.

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.

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.



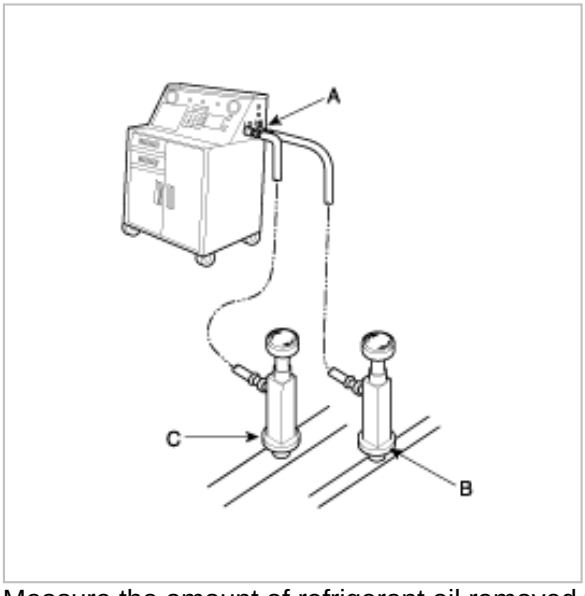
3. Test conditions :
   A. Avoid direct sunlight.
   B. Open the hood.
   C. Open the front doors.
   D. Set the temperature control dial on MAX COOL, the mode control switch on VENT and the recirculation control switch on RECIRCULATE.
   E. Turn the A/C switch on and the fan switch on MAX.
   F. Run the engine at 1,500 rpm.
   G. 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.

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.

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.



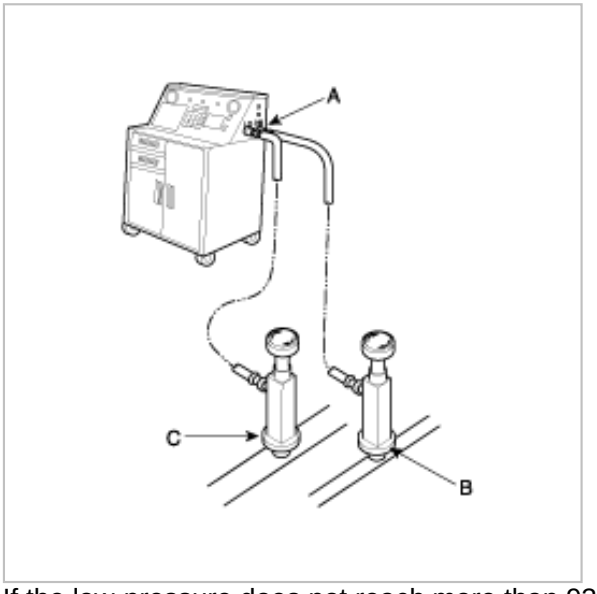
2. Measure the amount of refrigerant oil removed from the A/C system after the recovery process is completed. Be sure to put the same amount of new refrigerant oil back into the A/C system before charging.

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.

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.



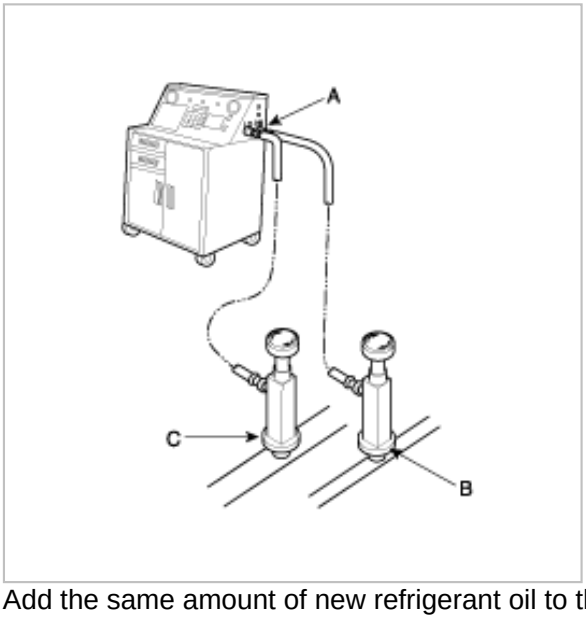
3. If the low-pressure does not reach more than 93.3 kPa (700 mmHg, 27.6 in.Hg) in 15 minutes, there is probably a leak in the system. Partially charge the system (see page HA-28), and check for leaks (see page HA-26).

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.

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 manufacture's instructions.

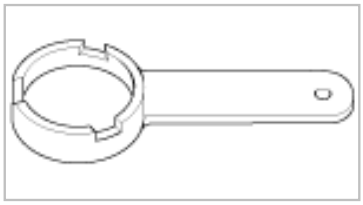


2. Add the same amount of new refrigerant oil to the system that was removed during recovery. Use only FD46XG (PAG) refrigerant oil.

3. Charge the system with the specified amount of R-134a refrigerant. Do not overcharge the system; the compressor will be damaged.

Refrigerant capacity :
Select the appropriate units of measure for your charging station : 680 ± 25g

SPECIAL TOOLS

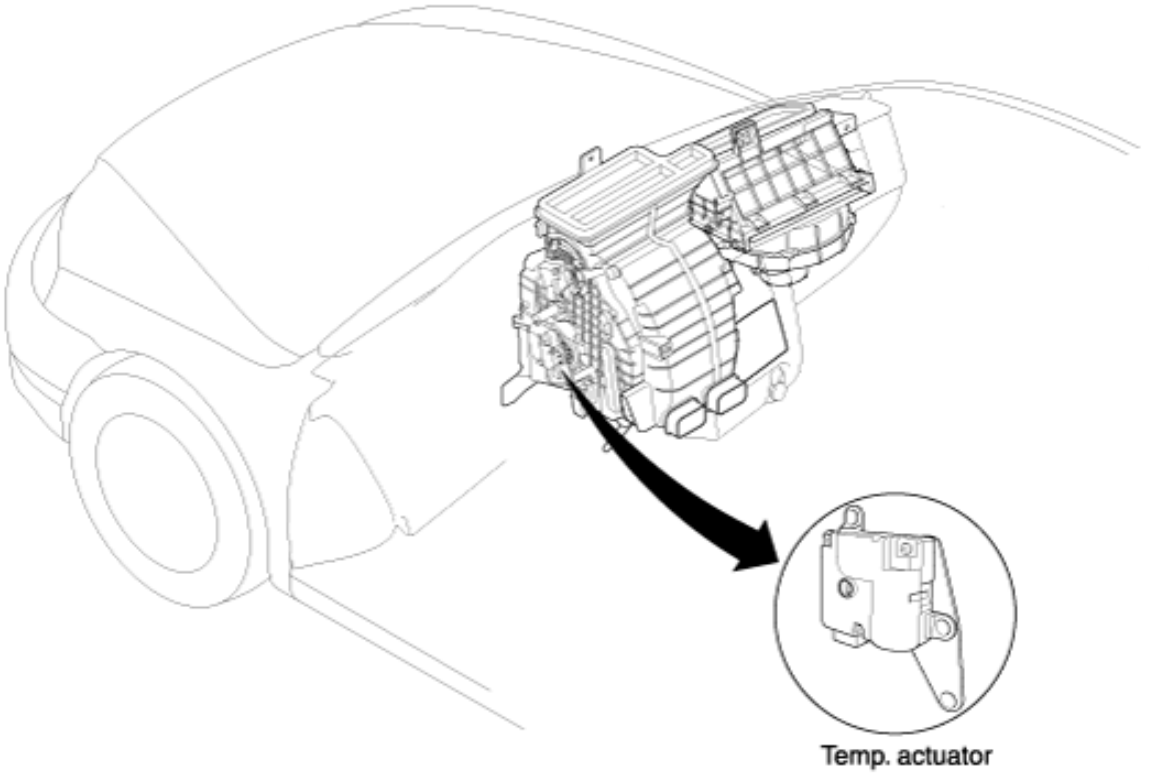
Tool (Number and name)	Illustration	Use
09977-29000 Pressure plate bolt remover		Removal and installation of pressure plate

SPECIFICATIONS

Item		Specification
Heating	**Heater** Type Capacity	Air mix type 4,600 ± 10% kcal/hr
Air conditioning	**Evaporator** Cooling capacity	4,400 ± 10% kcal/hr
	Compressor Type Lubricating oil Oil capacity Displacement Pressure relief valve	Swash plate (HS-15) FD46XG (PAG) 150 ± 10cc 154cc/rev Working pressure : 35.0 ~ 42.2kg/cm² Resealed pressure : Min. 28.1kg/cm²
	Magnetic clutch Pulley pitch dia. Voltage & wattage Torque	ø125 D.C 12.8V, Max. 54W Min. 4.4kg·m
	Refrigerant & capacity	R-134a (680 ± 25g)
	Triple pressure switch	**High pressure** ON 32.0 ± 2.0kg/cm² OFF 26.0 ± 2.0kg/cm² **Middle pressure** ON 15.5 ± 0.8kg/cm² OFF 11.5 ± 1.2kg/cm² **Low pressure** ON 2.0 ± 0.2kg/cm² OFF 2.3 + 0.25, - 0.29kg/cm²
	Expansion value Super heat value	1.6 kgf/cm² at 0°C 2.65kgf/cm² at 10°C
	Thermistor (Manual A/C)	DIF 2.5 ± 0.5°C OFF 0.8 ± 0.4°C
Heater control assembly		MANUAL Type, AUTOMATIC Type

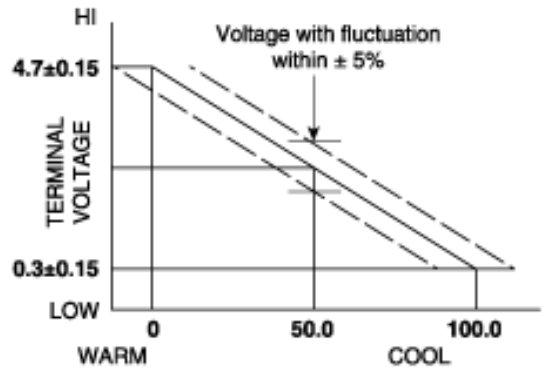
COMPONENT LOCATION

[MANUAL, FULL AUTO]



DESCRIPTION

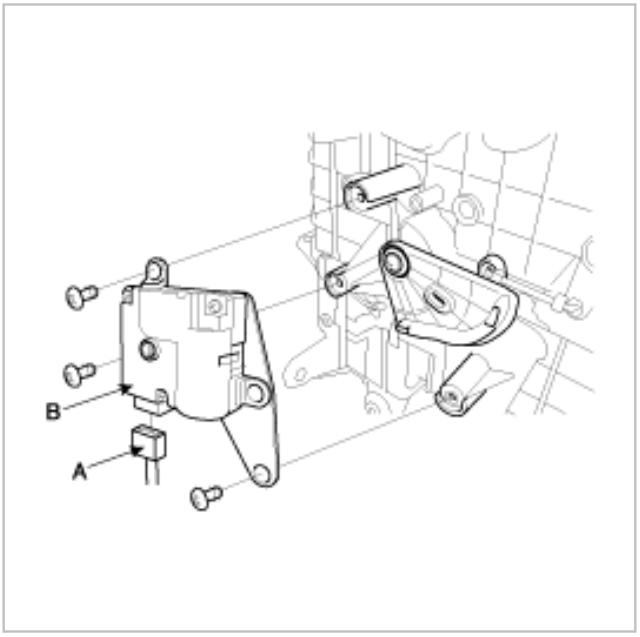
- Operating temp. : -30°C ~ +80°C
- Operating voltage : DC 9V ~ 16V
- Rated voltage : DC 12V
- Rated load : 4kgf/cm
- Rated voltage : DC 12V
- Rated watt. : 0.25W (at 40°C)
- Opration volt : DC 5V ± 0.5V
- Total resistance : 5kΩ ± 10%
- Output lock torque : Min 1.76Nm (18kgf/cm) (at DC 12V)
- Rated AMP : Max. 150mA
- Lock vol. : Max. 400ma
- Characteristics



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

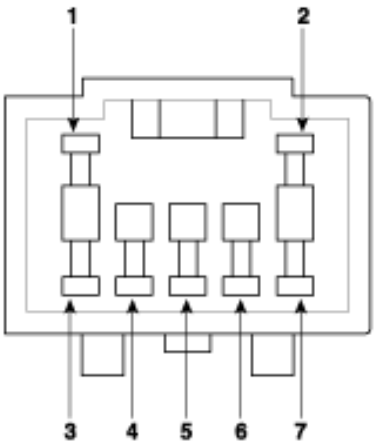
REPLACEMENT

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



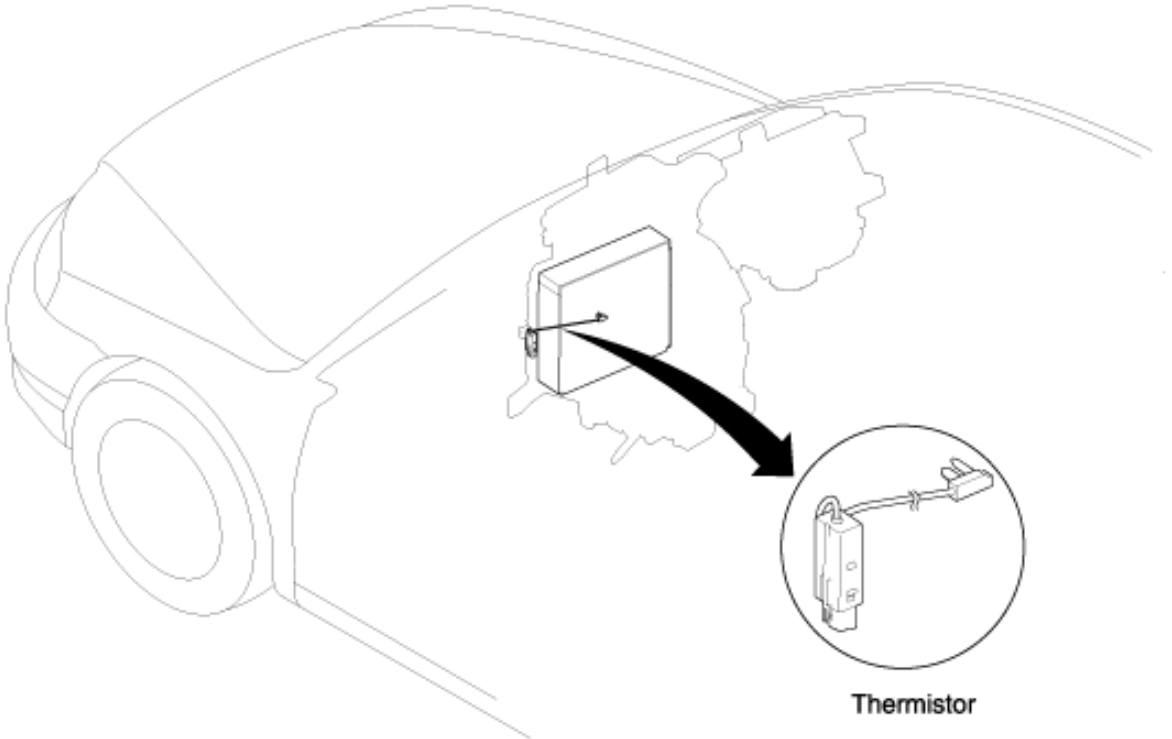
2. Install in the reverse order of removal. After installation, make sure temp. actuator runs smoothly.

CONNECTOR



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

COMPONENT LOCATION



DESCRIPTION

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

The thermistor will use the thermal negative characteristic.

- Rated voltage : DC 12V
- Operating voltage : 9V ~ 16V
- Operating temp. : -20 ~ +70DEG
- Electric load : ECU

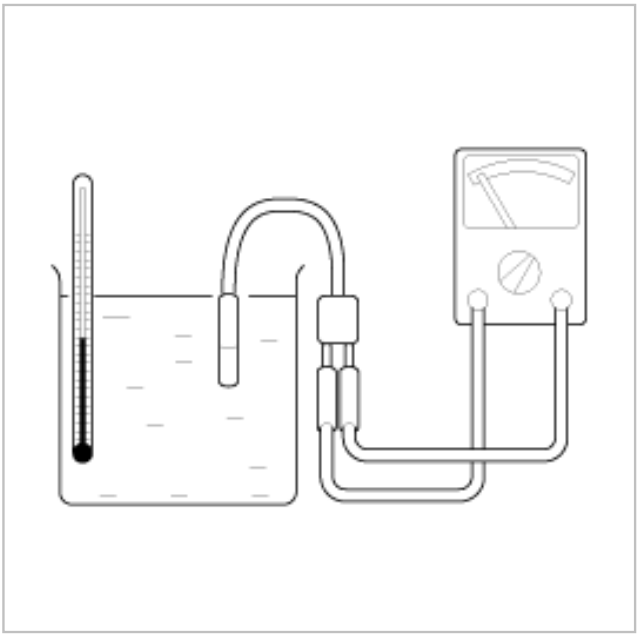
ELECTRIC CHARACTERISTICS ACCORDING TO TEMP (MANUAL A/C)

Thermistor	Operating temperature
DIF	2.5 ± 0.5°C
OFF	0.8 ± 0.4°C

RESISTANCE-TEMP. CHARACTERISIC TABLE (AUTO A/C)

Temp (°C)	Rmin (kΩ)	R (kΩ)	Rmax (kΩ)
-10°C	17.67	17.93	18.19
0°C	11.25	11.36	11.47
0.5°C	11.0	11.11	11.22
3.0°C	9.851	9.960	10.07
10°C	7.292	7.396	7.50
20°C	4.847	4.935	5.025
30°C	3.296	3.369	3.443
40°C	2.289	2.348	2.048

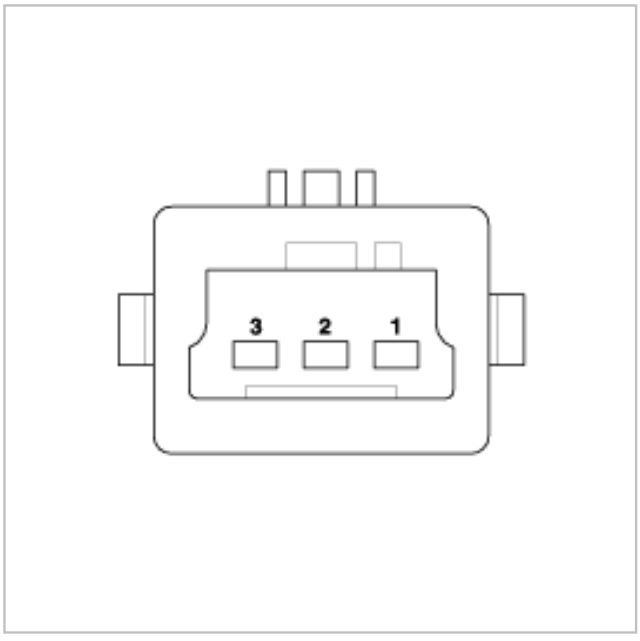
INSPECTION (AUTO A/C)



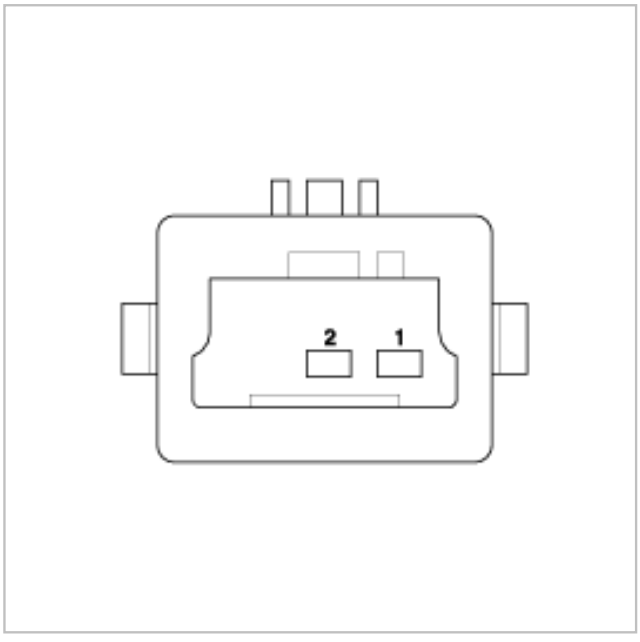
Check the resistance between terminals 1 and 2 of thermistor connector at each temperature.

CONNECTOR

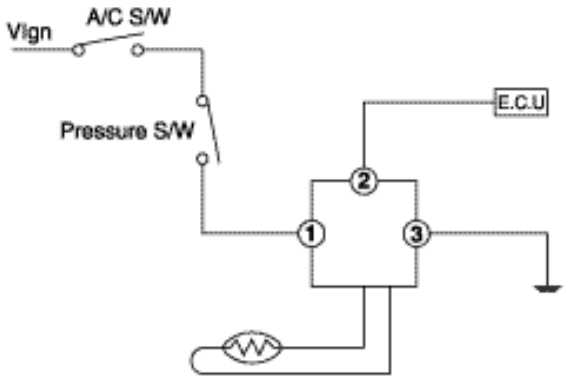
MANUAL A/C



AUTO A/C



THERMO AMP EXTERNAL CIRCUIT DIAGRAM OF THERMO AMP (MANUAL A/C)



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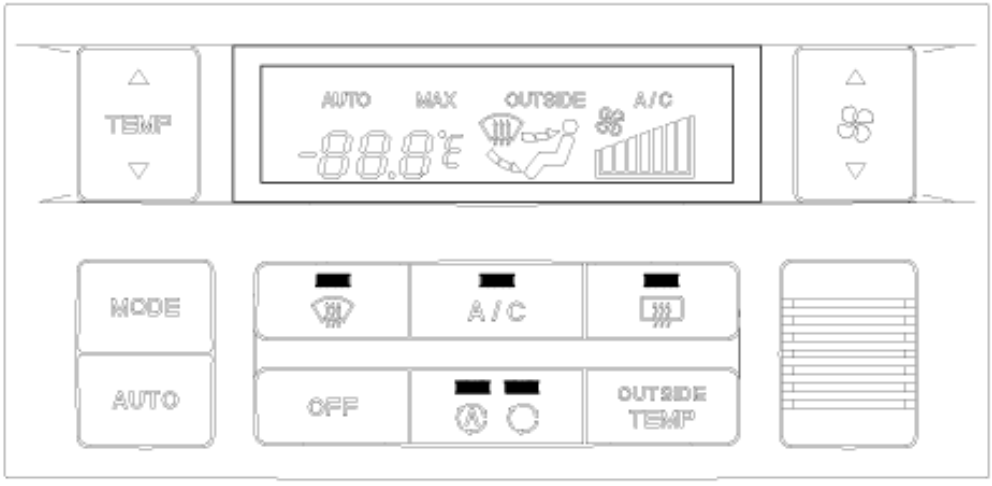
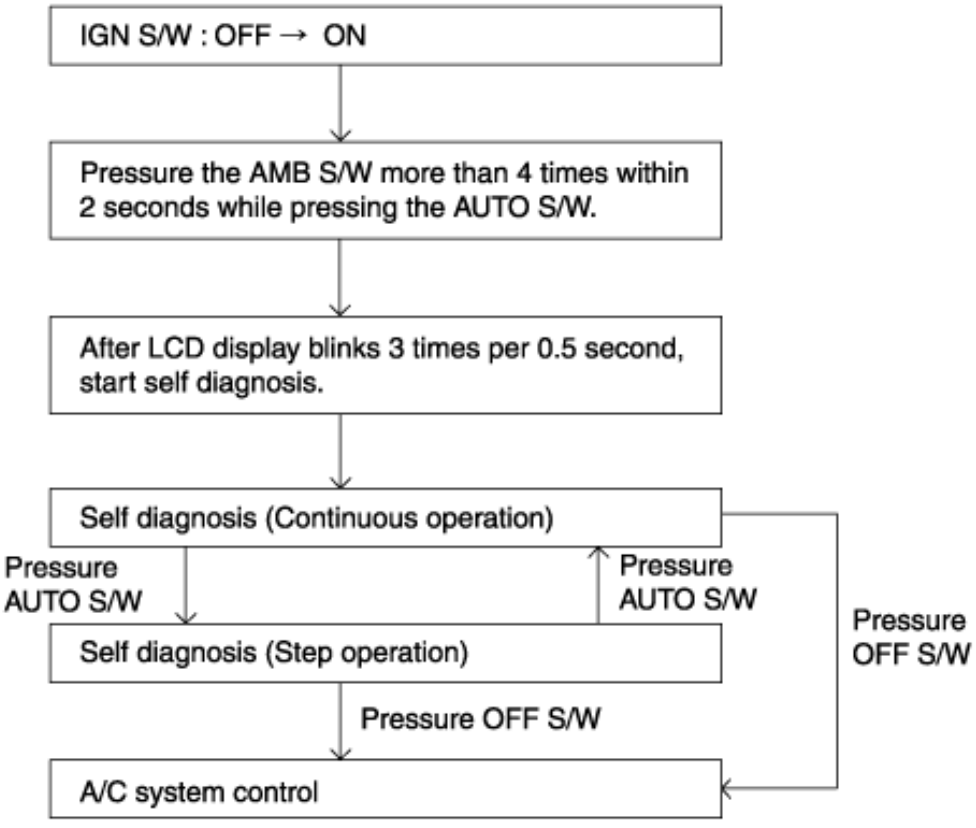
SELF-DIAGNOSIS

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

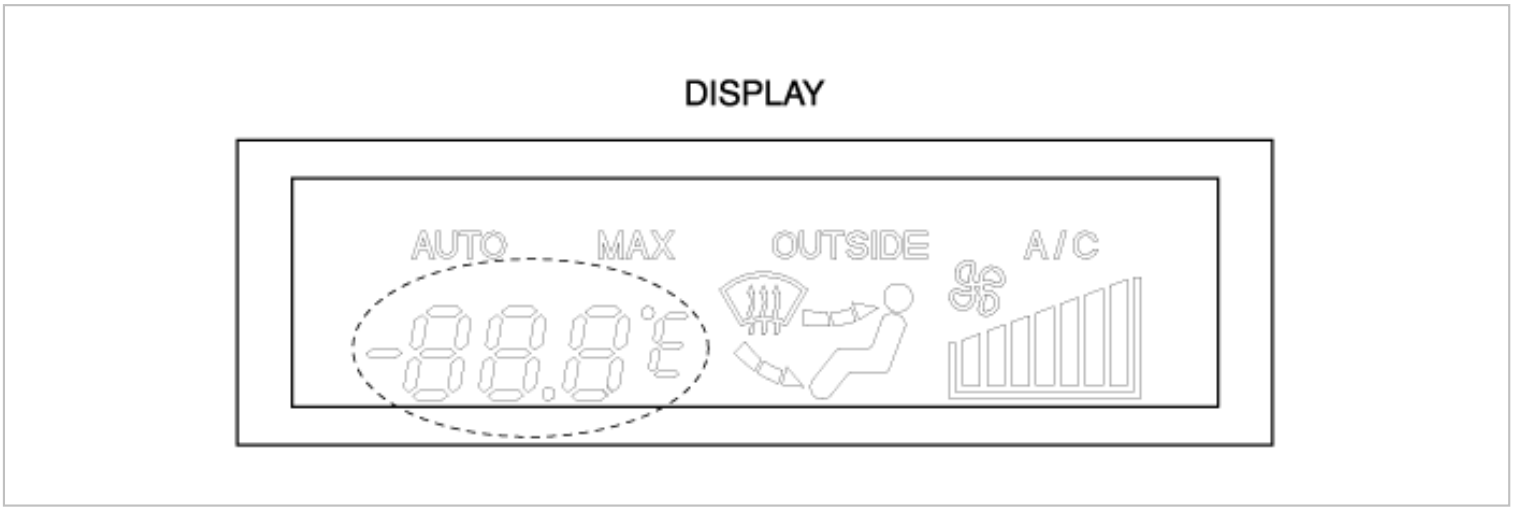


SELF-DIAGNOSIS METHOD



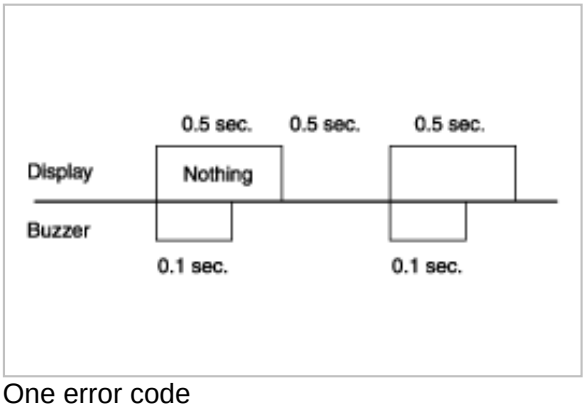
HOW TO READ SELF-DIAGNOSTIC CODE

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.

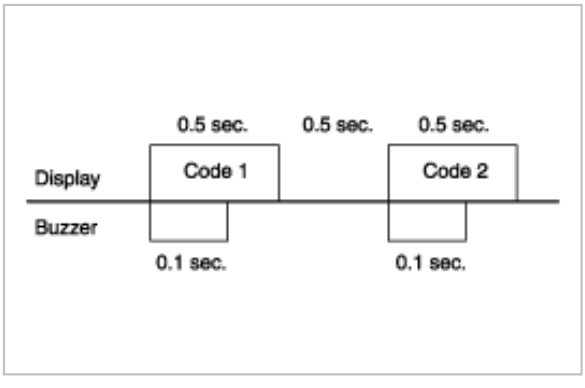


FAULT CODE DISPLAY

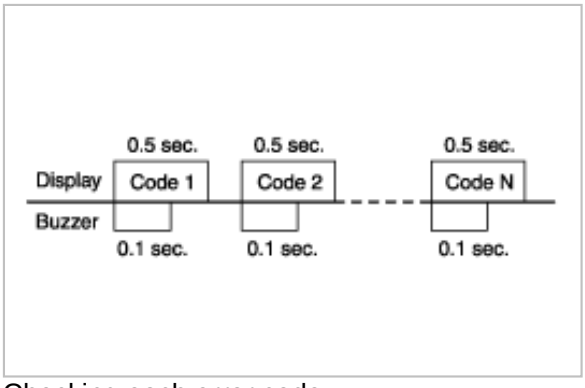
1. Normal



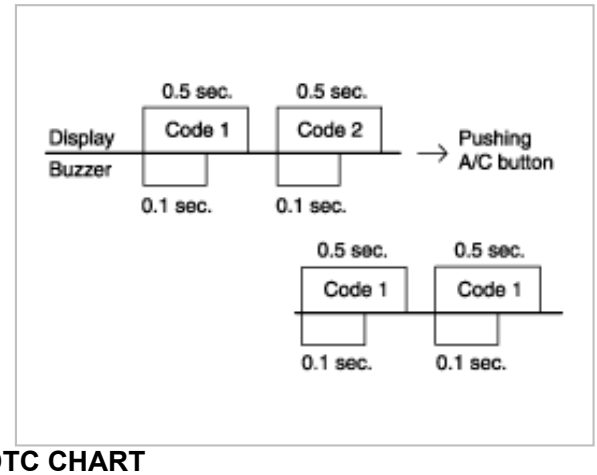
2. One error code



3. More error codes than two



4. Checking each error code



DTC CHART

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

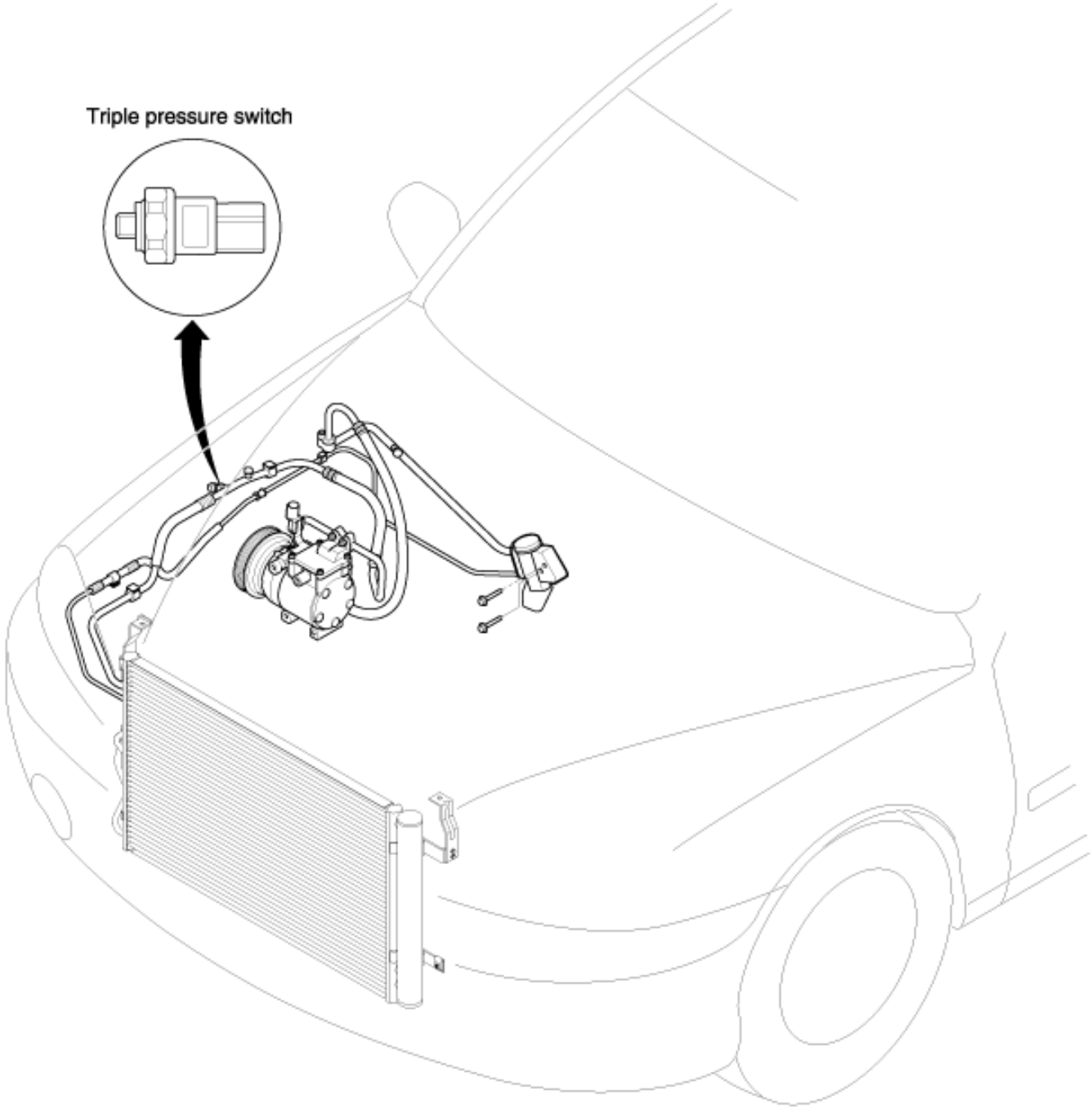
DTC code	Detection item	Trouble area
00	Normal	-
11	Open INCAR Sensor circuit	•Incar sensor •Harness or connector between incar sensor and A/C control assembly •A/C control assembly
12	Shorted INCAR Sensor circuit	
13	Open Ambient sensor circuit	•Ambient sensor •Harness or connector between ambient sensor and A/C control assembly •A/C control assembly
14	Shorted Ambient sensor circuit	
15	Open water temp. sensor	•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	•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	•Harness or connector between temp. door potentiometer and A/C control assembly
20	Defective temp. door potentiometer	•Temp. door potentiometer
21	Open or shorted mode door potentiometer	•Harness or connector between mode door potentiometer and A/C control assembly
22	Defective mode door potentiometer	•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 potentimeter	Open/Short setup mode	Vent mode, at vent mode Def mode, at except vent mode

COMPONENT LOCATION



Purchased
from Ebay seller
Reveleus1

Thank-you for purchasing from me, it is much appreciated.
To contact me please email
suzlever@gmail.com

Email: suzlever@gmail.com

DESCRIPTION

-Rating load : Inductive loacl DC 12V, 10~250mA

-Applicable voltage range : DC 8V ~ DC 16V

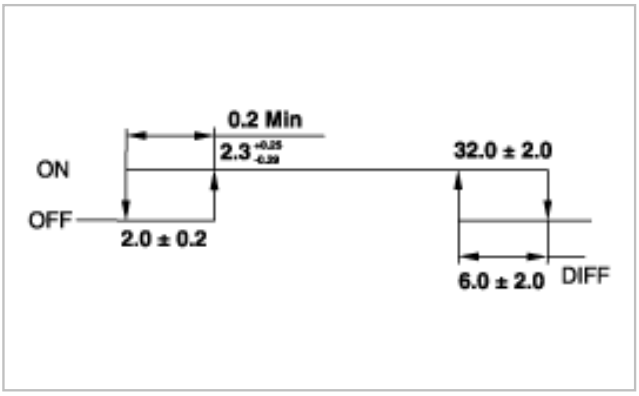
-Applicable temperature range : -30°C ~ 120°C

-Applicable refrigerant : R-134a

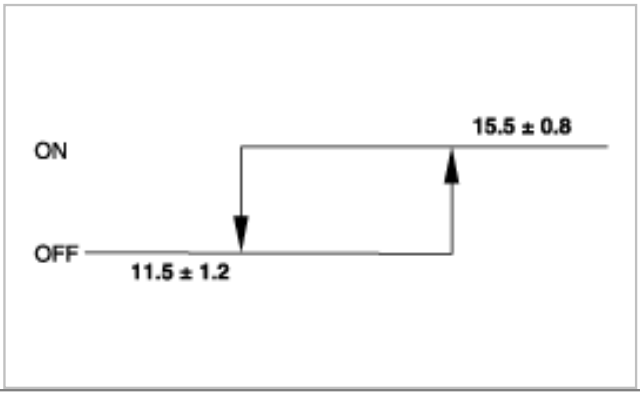
-Insulation resistance : Min. 100MΩ at DC 500V

Pressure	ON	OFF
High	32.0 ± 2.0	26.0 ± 2.0
Low	2.3 + 0.25 / -0.29	2.0 ± 0.2
Medium	15.5 ± 0.8	11.5 ± 1.2

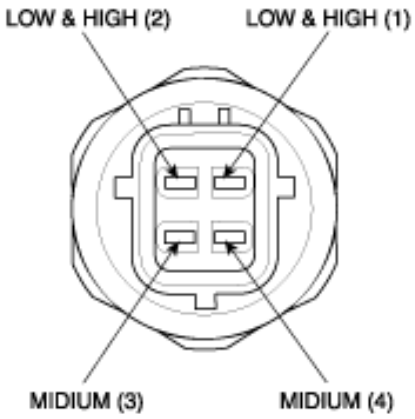
LOW & HIGH



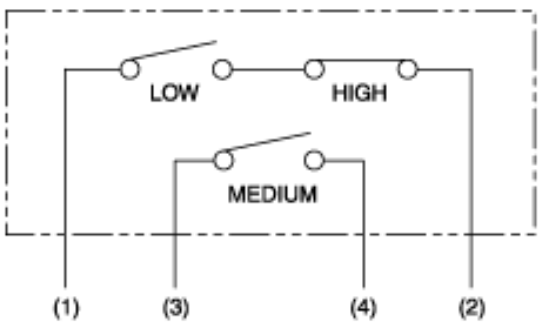
MEDIUM



CONNECTOR



CIRCUIT DIAGRAM



TROUBLESHOOTING

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

STANDARD:

Symptom	Suspect Area	See page
No blower operation	1. HTR Fuse 2. Blower relay 3. Blower motor 4. Blower resistor 5. Blower speed control switch 6. Wire harness	- HA-67 HA-69 HA-71 HA-77 -
No air temperature control	1. Engine coolant capacity 2. Heater control assembly	- HA-77
No compressor operation	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	HA-3, 28 - HA-36 HA-33 HA-43 HA-77, 85 HA-45 -
No cool comes out	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	HA-3, 28 HA-18 HA-30 HA-36 HA-33 HA-43 HA-45 HA-77, 85 HA-77, 85 -

Insufficient cooling	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	HA-3, 28 HA-30 HA-36 HA-33 HA-41 HA-13 HA-60 HA-31 HA-43 HA-60
No engine idle-up when A/C switch ON	1. Engine (and ECT) ECU 2. Wire harness	- -
No air inlet control	Heater control assembly	HA-77, 85, 58
No mode control	Heater control assembly	HA-77, 85, 56
No condenser fan operation	1. ECU-IG Fuse 2. Fan motor 3. Engine (and ECT) ECU 4. Wire harness	- HA-40 - -