

# SECTION 7A

## HEATING AND VENTILATION SYSTEM

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دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# SECTION 7B

## GENERAL HVAC (HEATING, VENTILATION AND AIR CONDITIONING) SYSTEM

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## DESCRIPTION AND OPERATION

### SPECIFICATIONS

Component	Application	Specifications	
Compressor	Model	V 5	V 7
	Type	Variable Displacement	←
	Displacement	9.8 - 151 cc/rev	9.8 - 179 cc/rev
	PCD	Ø130	←
	Cylinder	5	7
	Oil (Synthetic Oil)	265 ml	←
Condenser	Type	MFC (6-PASS)	
	Size	620 w x 479 h x 20 t	
Receiver-Dryer	Capacity	250 cc	
	Desiccant	XH-9 (35 g)	
	Pressure Switch	DSL : Dual Pressure, GSL: Triple Pressure	
Refrigerant	Type	R-134a	
	Refrigerant Capacity	Single: 850 ± 50 g, Dual: 1200 ± 50 g	

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## REPAIR INSTRUCTIONS

### Air Conditioning

Vehicle air conditioning is the cooling (refrigerant), heating and ventilation of the air in the passenger compartment. Refrigerant is accomplished by making practical use of the three laws of nature. These laws of nature and their practical application are as follows:

- Heat transfer
- Latent heat of vaporization
- Effect of pressure on boiling or condensation

### Heat Transfer

The principle of heat transfer are that the heat always flow from hot to cold, the rate of heat transfer will increase as the difference in temperature between two objects increases, and the mass of an object remains the same regardless of its heat contents.

### Latent Heat of Vaporization

Everything in the world is composed of matter and the matter exists in one of following states;

- Solid
- Liquid
- Vapor

When a liquid boils, it changes to vapor and absorbs heat without raising the temperature of the resulting vapor.

When the vapor condenses, it changes back to a liquid and gives off heat without lowering the temperature of the resulting liquid.

### Effect of Pressure on Boiling or Condensing

When the pressure on the liquid or vapor changes, the boiling point changes. Increasing the pressure increases the boiling point, while the boiling point decreased by decreasing the pressure on the liquid or vapor.

Another effect of the compression is an increase in temperature even through heat has not been added. For example, if you compress the refrigerant R-134a from 206kPa (30 psi) to 1206kPa (175 psi) the temperature of vapor will increase from 0 °C (32 °F) to 54 °C (130 °F) and boiling point increase. Condensing point also will increase.

### Testing the refrigerant system

1. Check the outer surfaces of the radiator and the condenser cores to be sure that the airflow is not blocked by dirt leaves or other foreign material. Check between the condenser and the radiator as well as all outer surfaces.
2. Check for any restrictions or kinks in the condenser core, the hoses and the pipes.

3. Check the operation of the blower fan.
4. Check all the air ducts for leaks or restrictions. Low airflow rate may indicate a restricted evaporator core.
5. Check for slippage of the compressor clutch.
6. Check the drive belt tension.

### Handling O-Ring

1. Even though O-rings may look identical, it is extremely important that only recommended service replacement air conditioning O-rings be used, or excessive leakage of the refrigerant may occur.
2. Always O-ring and installation area should be kept clean. Any foreign material and dust may result in excessive refrigerant leakage.
3. Before installation, verify that both O-ring and fittings have not been nicked or deformed. Deformed or nicked parts must be replaced.
4. Failure to use the proper service replacement parts and procedures may result in excessive refrigerant leakage.

### Handling Refrigerant

1. Always work in a well-ventilated area.
2. If you have difficulty breathing, seek medical attention immediately. If refrigerant comes in contact with any part of your body, flush the exposed area with water. If a rash or pain develops seek medical attention.

### Handling of Refrigerant Lines and Fittings

1. Using too low or too high a torque when tightening a fitting can result in loose joints or deformed joint parts.
2. Back up the opposing fitting to prevent the distortion of the connecting lines or the components. Back up both the swaged fitting on the flexible hose connections and the coupling to which it is attached two wrenches to prevent turning the fitting and damaging the ground seat.

### Maintaining Chemical Stability In the Refrigeration System

The efficient operation and life of the air conditioning system is dependent upon the chemical stability of the refrigeration system.

When foreign materials, such as dirt, air or moisture, contaminate the refrigeration system, they will change the stability of the refrigeration and the polyalkylene glycol (PAG) compressor oil. They will also affect the pressure-temperature relationship, reduce efficient operation and can possibly cause interior corrosion and abnormal wear of moving parts.



Observe the following practices to ensure chemical stability in the system:

1. Wipe away dirt or oil at and near any connection before opening that connection. This will reduce the chance of dirt entering the system.
2. Cap, plug or tape both sides of a connection as soon as possible after opening the connection. This will prevent the entry of dirt, foreign material and moisture.
3. Keep all tools clean and dry including the manifold gauge set and all replacement parts.
4. Use a clean and dry transfer device and container to add PAG refrigerant oil. This will ensure that the oil remains as moisture-free as possible.
5. When opening an A/C system, have everything needed to perform all operations ready. Do not leave the A/C system open any longer than necessary.
6. Evacuate and recharge any A/C system that has been opened.

دیجیتال خودرو

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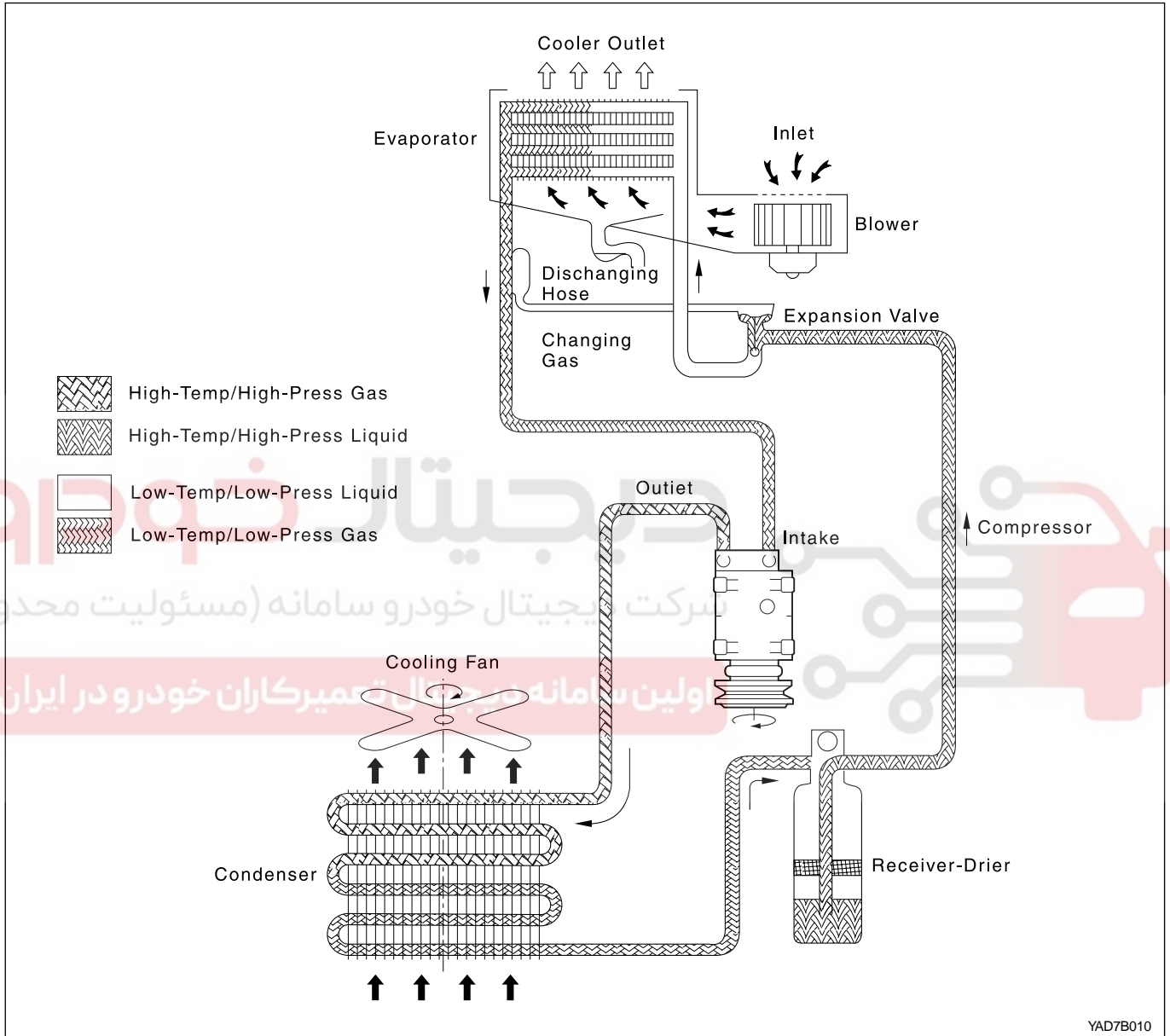
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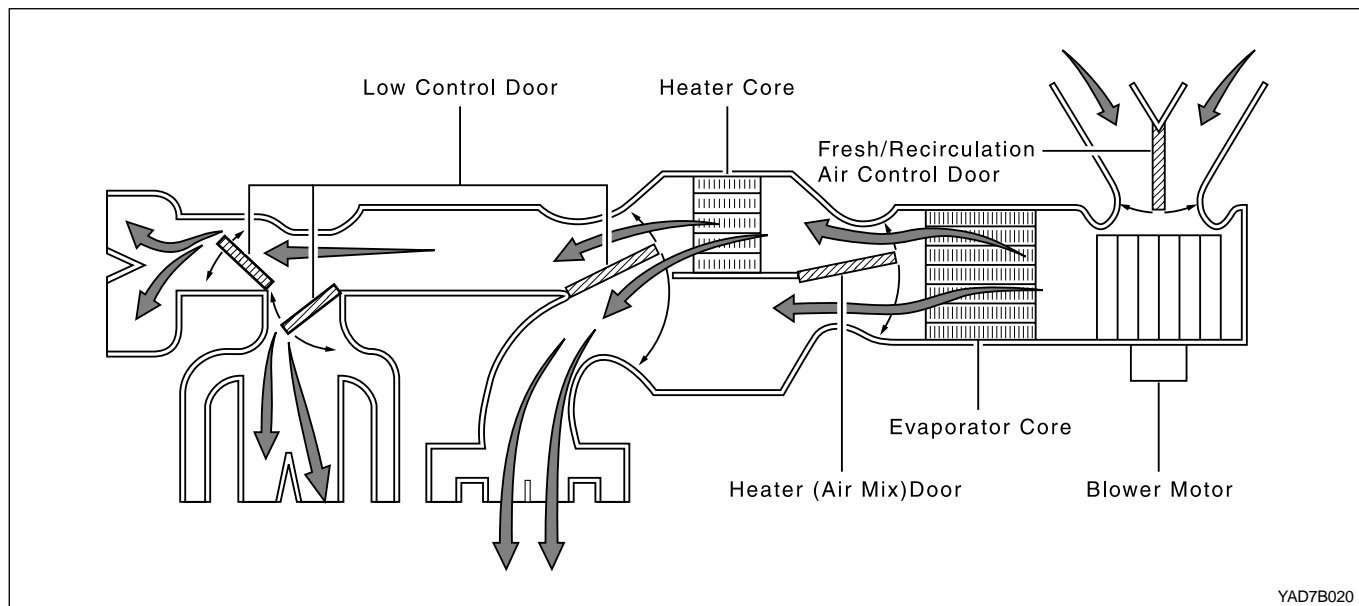
## BASIC A/C SYSTEM FUNCTION

A/C System consists of the following component basically.

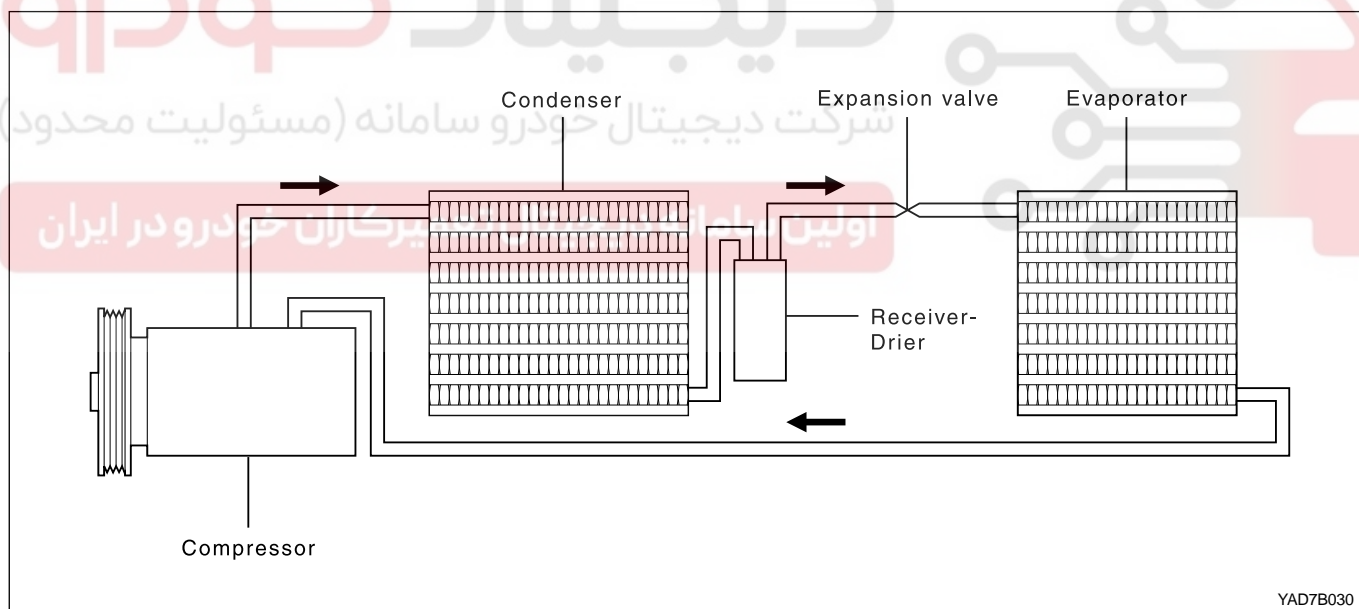
The refrigerant continues to change the phase, liquid  
→ gas → liquid to maximize the cooling effect.



### Airflow - Typical

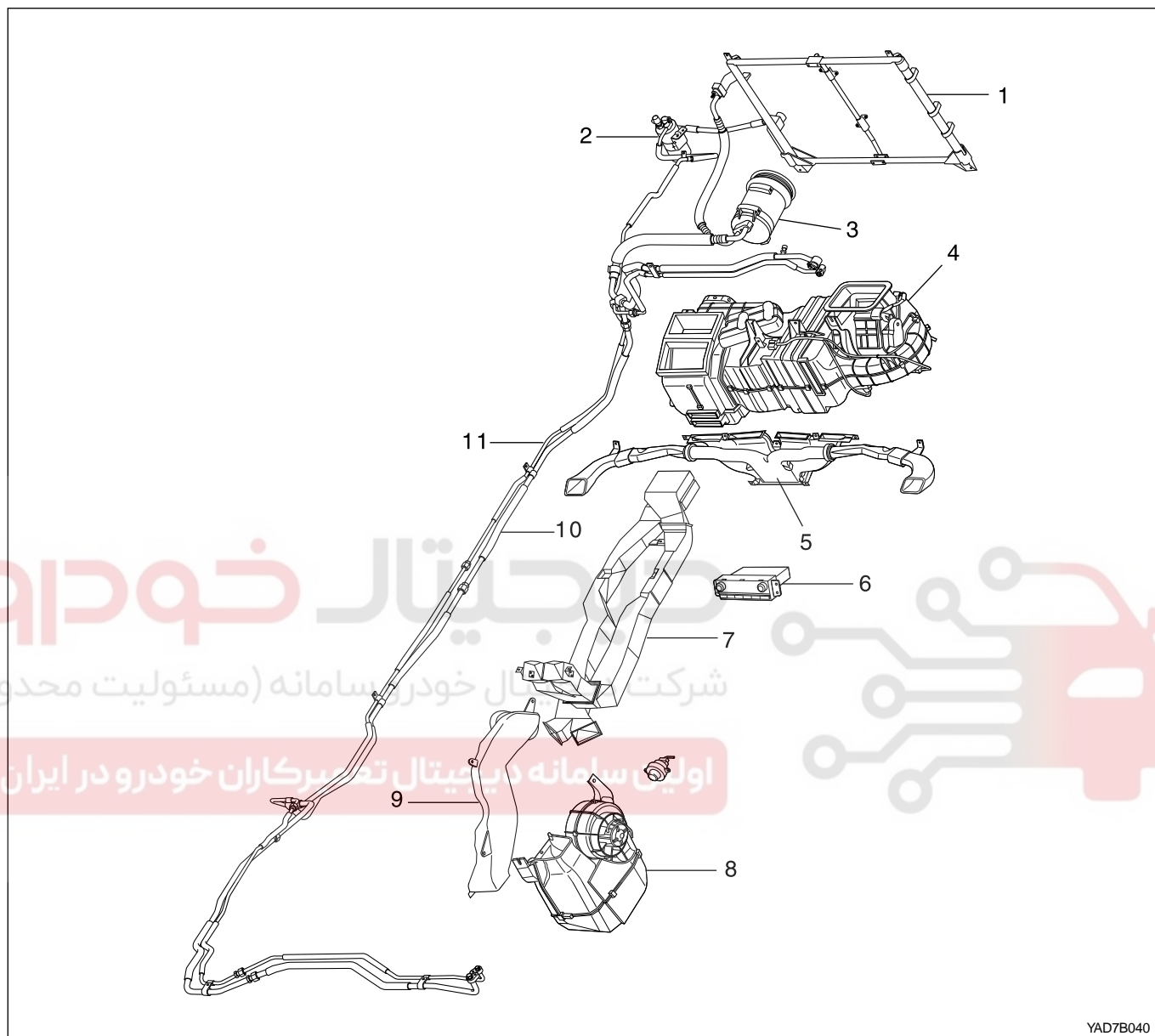


### A/C System - Typical



## COMPONENT LOCATOR

## A/C SYSTEM COMPONENT

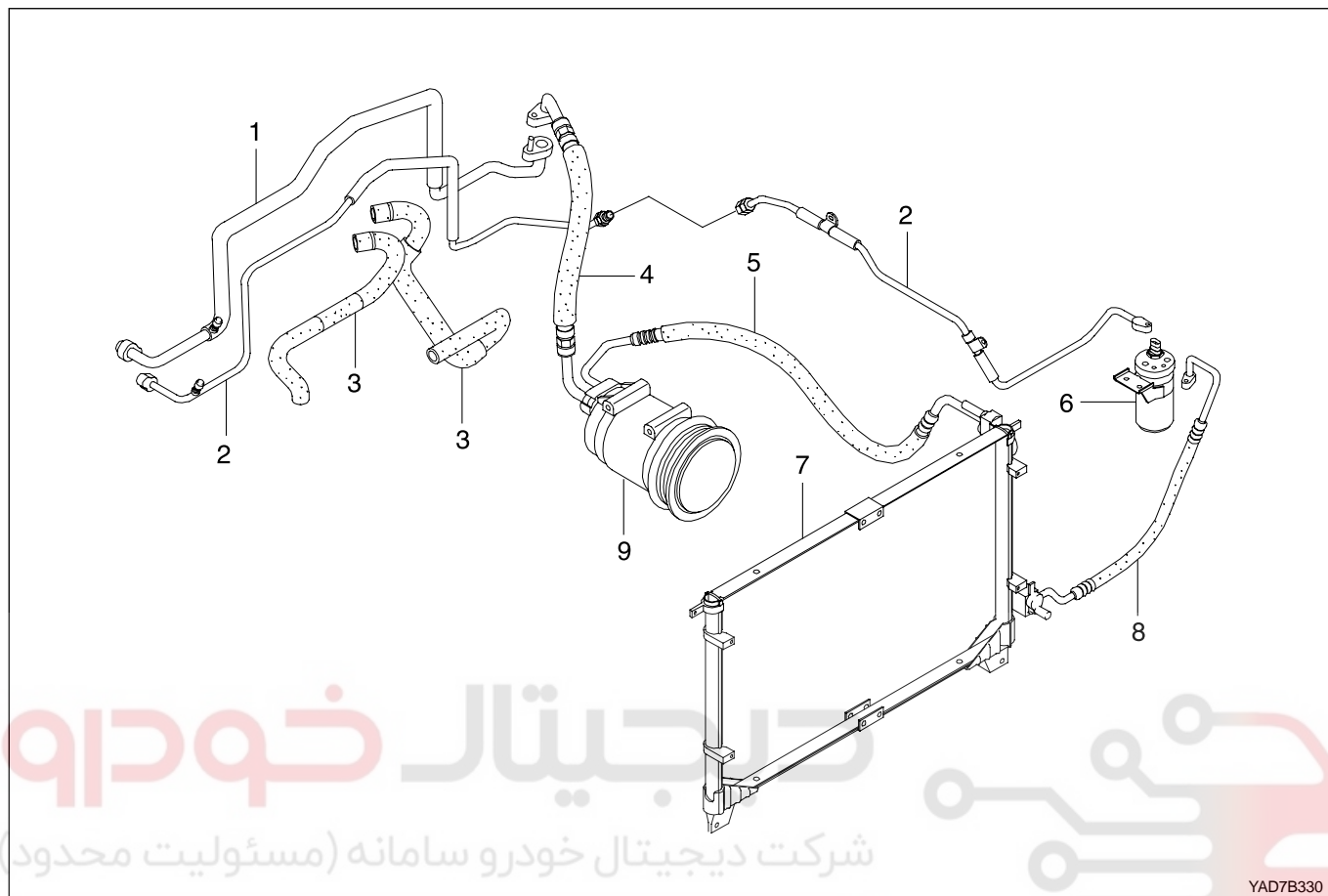


YAD7B040

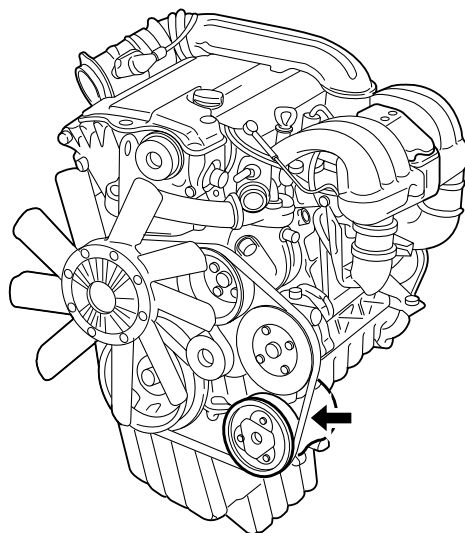
- 1 Condenser
- 2 Receiver-Drier
- 3 Compressor
- 4 A/C & Heater (Blower) Module
- 5 Defrost Nozzle/Duct
- 6 Front A/C Controller

- 7 Rear Duct
- 8 Rear Cooler Assembly
- 9 Rear Cooler Duct
- 10 Suction Rear Pipe Line
- 11 Liquid Rear Pipe Line
- 12 Rear Cooler Controller

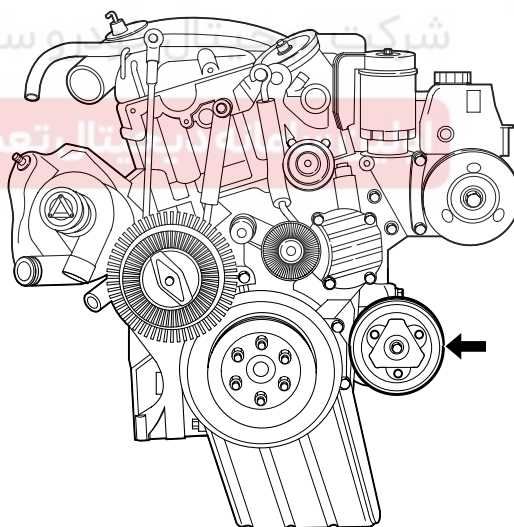
## A/C SYSTEM PIPE LINE



- |                               |                  |
|-------------------------------|------------------|
| 1 High Pressure Pipe          | 6 Receiver-Drier |
| 2 Low Pressure Pipe           | 7 Condenser      |
| 3 Heater Hose                 | 8 Liquid Hose    |
| 4 High Pressure Hose And Pipe | 9 Compressor     |
| 5 High Pressure Hose          |                  |

**COMPRESSOR LOCATION****Gasoline Engine**

YAD7B050

**Diesel Engine**

YAD7B060

# DIAGNOSTIC INFORMATION AND PROCEDURES

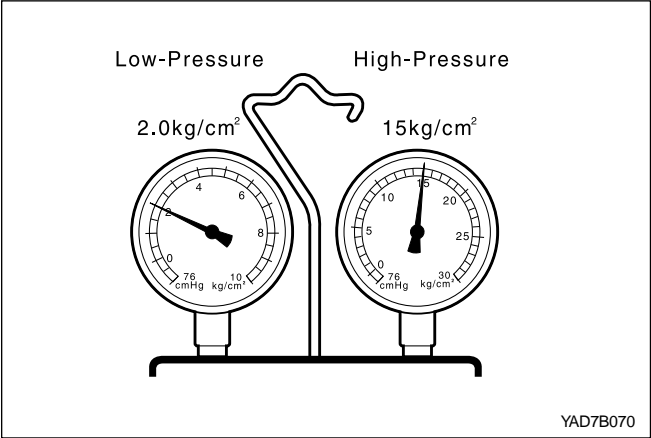
## GENERAL DIAGNOSIS

Symptom		Check	Action
Airflow not cold.	Magnetic clutch switch don't turn ON.	Check the fuse	Replace
		Check the A/C switch	Replace
		Check the triple switch (DSL: Dual switch)	Replace
		Check the thermo switch (GSL)	Replace
		Check the compressor relay	Replace
		Check the magnetic clutch	Replace
		Check the A/C control unit	Replace
	Insufficient refrigerant	Check the refrigerant capacity	Adding refrigerant
	Faulty receiver-drier	Check the receiver-drier	Replace
	Abnormal rotating of compressor	Check the drive belt's tension, slip of the compressor and clutch	Adjusting belt
Airflow is cold but insufficient.	Abnormal compression of compressor	Check the compressor	Replace
	Faulty expansion valve	Check the expansion valve	Replace
	Duct joint leak	Check the Duct joint	Replace
	Evaporator frozen	Check the intake air temperature switch	Replace
	Faulty blower motor	Check the blower motor	Replace
Airflow is not continuous.	Blower 1th - 3th inoperative, 4th operative	Check the resistor, connector	Replace
	There is air in the refrigerant	Measure the pressure	Evacuating and charging refrigerant
Insufficient cooling.	Faulty expansion valve	Check the expansion valve	Replace
	Insufficient refrigerant	Check the refrigerant capacity	Adding refrigerant
	Faulty receiver-drier	Check the receiver-drier	Replace
	Faulty condenser	Check the fin's surface and crack of the tube, tank	Cleaning surface, Replace
	Excessive refrigerant in the system	Check the refrigerant capacity (Verify the capacity higher than high pressure)	Recharging refrigerant
	Abnormal rotating of compressor	Check the drive belt's tension	Adjusting belt
	Insufficient compression of compressor	Check the compressor	Replace
	There is air in the unit.	Check the pressure	Evacuating and charging refrigerant
	Faulty expansion valve	Check the expansion valve	Replace

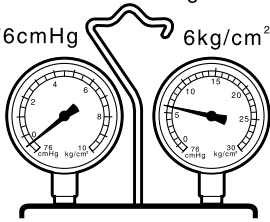
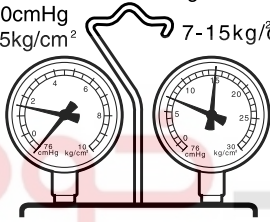
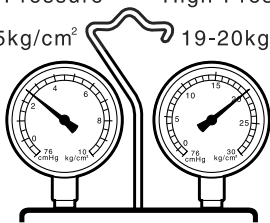
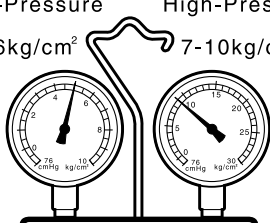


DIAGNOSIS USING THE MANIFOLD GAUGE

On normal operation during the cooling cycle, the manifold gauge must indicate approximately 1.5 - 2.0 kg/cm<sup>2</sup> at low pressure side and 14.5 - 15 kg/cm<sup>2</sup> at high pressure side, on condition that the temperature at the cooler inlet, 30 °C - 35 °C, 2,000 rpm of the engine rpm , full cold and maximum blower speed.



Symptom	Cause	Action
<div>1. High and low pressure are abnormally low.</div> <div>2. Air at cooler outlet is not cold.</div> <div><div>Low-Pressure      High-Pressure</div><div>0.8kg/cm<sup>2</sup>      8-9kg/cm<sup>2</sup></div><div></div><div>YAD7B080</div></div>	<ul style="list-style-type: none"><li>There is a gas leak in the cooling system.</li></ul>	<ul style="list-style-type: none"><li>Check the oil leak, repair</li><li>Add the refrigerant</li></ul>
<div>1. High and low pressure are abnormally high.</div> <div><div>Low-Pressure      High-Pressure</div><div>2.5kg/cm<sup>2</sup>      20kg/cm<sup>2</sup></div><div></div><div>YAD7B090</div></div>	<ul style="list-style-type: none"><li>Insufficient cooling and faulty condenser cooling by excessive refrigerant.</li></ul>	<ul style="list-style-type: none"><li>Keep the specified amount of the refrigerant, Clean the condenser</li><li>Repair the belt</li></ul>
<div>1. High and low pressure are abnormally high.</div> <div>2. Connection at the low pressure is not cold.</div> <div><div>Low-Pressure      High-Pressure</div><div>2.5kg/cm<sup>2</sup>      23kg/cm<sup>2</sup></div><div></div><div>YAD7B100</div></div>	<ul style="list-style-type: none"><li>Belt is slipped</li><li>There is an air in the cooling system</li></ul>	<ul style="list-style-type: none"><li>Clean and repair the receiver-drier</li><li>Check the oil contamination etc.</li></ul>

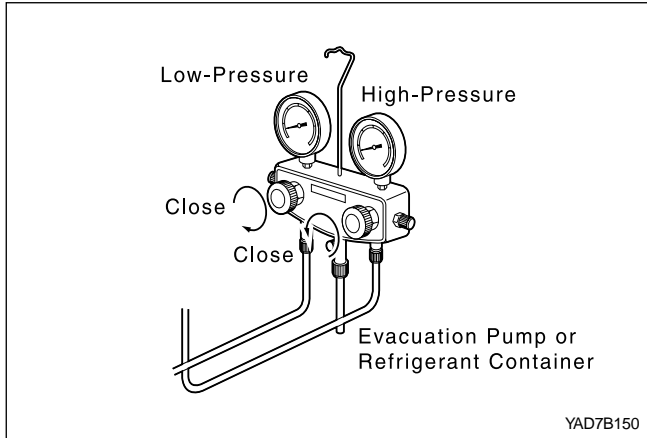
Symptom	Cause	Action
<p>1. The low-pressure side indicates excessive high and high-pressure indicates excessive low.</p> <p>2. There is a moisture in the connection of the receiver-drier and the front/back of the expansion valve.</p> <p>Low-Pressure      High-Pressure 76cmHg      6kg/cm<sup>2</sup></p>  <p>YAD7B110</p>	<ul style="list-style-type: none"> <li>The dust and moisture etc. are frozen at the expansion valve</li> <li>A gas leak in the heat reducer</li> </ul>	<ul style="list-style-type: none"> <li>Repair the receiver-drier</li> <li>Replace the expansion valve for the faulty heat reducer</li> </ul>
<p>1. The low-side pressure is high or normal intermittently.</p> <p>Low-Pressure      High-Pressure 50cmHg      7-15kg/cm<sup>2</sup> -1.5kg/cm<sup>2</sup></p>  <p>YAD7B120</p>	<ul style="list-style-type: none"> <li>The mixed moisture is frozen at the expansion valve</li> </ul>	<ul style="list-style-type: none"> <li>Repair the receiver-drier and perform the bleeding</li> </ul>
<p>1. The low-pressure and high-pressure are excessive high.</p> <p>2. There are a lot of moistures in the connection of the low-side pressure</p> <p>Low-Pressure      High-Pressure 2.5kg/cm<sup>2</sup>      19-20kg/cm<sup>2</sup></p>  <p>YAD7B130</p>	<ul style="list-style-type: none"> <li>The faulty expansion valve, the improper installation of the heat reducer</li> <li>Fail to control the flow rate</li> </ul>	<ul style="list-style-type: none"> <li>Repair the receiver-drier</li> <li>Check the oil contamination etc.</li> </ul>
<p>1. The low-pressure is excessive high and high-pressure is excessive low.</p> <p>Low-Pressure      High-Pressure 4-6kg/cm<sup>2</sup>      7-10kg/cm<sup>2</sup></p>  <p>YAD7B140</p>	<ul style="list-style-type: none"> <li>There is an oil leak in the compressor</li> </ul>	<ul style="list-style-type: none"> <li>Replace the compressor</li> </ul>

## MAINTENANCE AND REPAIR

### REFRIGERANT CHARGING

#### Installation of Manifold Gauge

1. Close both high/low pressure hand valves of manifold gauge before installation of gauge to the charging valve.
2. Both high/low pressure hand valves of manifold gauge connect the appropriate charging valve. Tighten the hose nuts by hand.
  - high pressure hand valve → high pressure charging valve
  - low pressure hand valve → low pressure charging valve

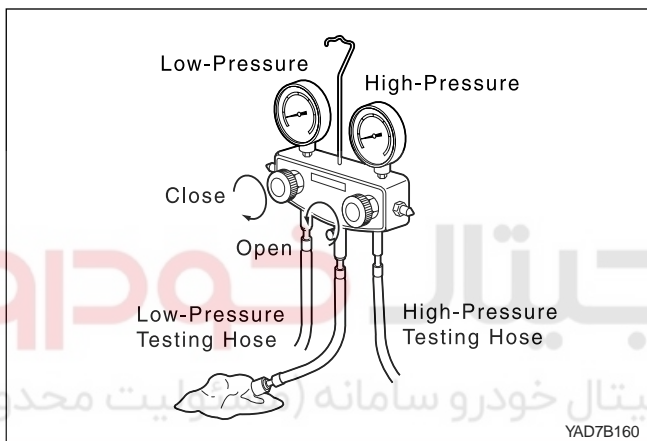


#### Discharging Refrigerant

1. Connect the manifold gauge to the charging valve.
2. Place the free end of the center hose in a shop towel.
3. Slowly open the high pressure hand valve and discharge refrigerant.

**Notice:** If refrigerant is allowed to escape too fast, compressor oil will be drawn out of the system.

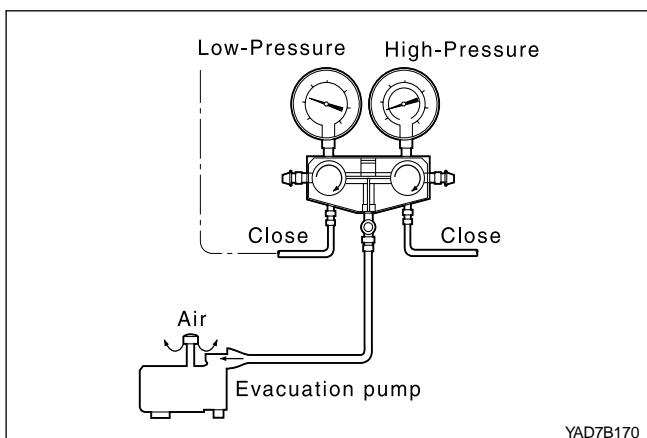
4. Check whether the shop towel gets wet in oil and if wet, close the hand valve.
5. After the high pressure gauge reading drops below  $3.5 \text{ kg/cm}^2$ , slowly open the low pressure valve.
6. When both high and low pressure gauges reading drops to  $0 \text{ kg/cm}^2$ , discharging is completed.

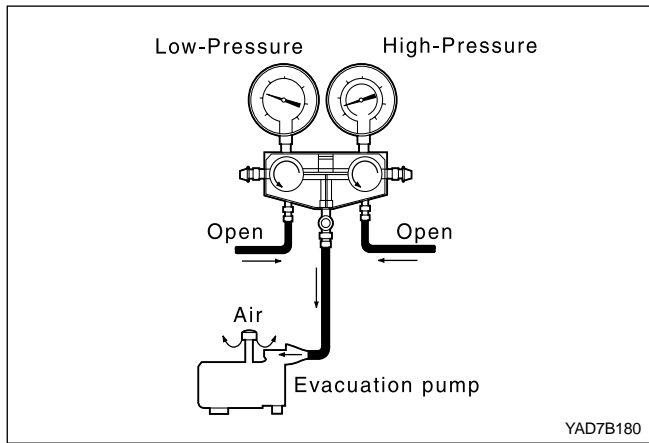


#### Evacuating Refrigeration System

**Notice:** The unit tank must contain a sufficient amount of R-134a refrigerant for charging. Check the amount of refrigerant in the tank. If there is less than 3.6 kg (8 pounds) of refrigerant, add new refrigerant to the tank.

1. Verify that the high-side and the low-side hoses are connected to the A/C system. Open both the high-side and the low-side valves on the unit's control panel.
2. Open both the gas and the liquid valves on the tank.





**Important:** Refer to the manufacturer's instructions for the charging station in use. It is necessary to evacuate the system before recharging it with new or recycled refrigerant.

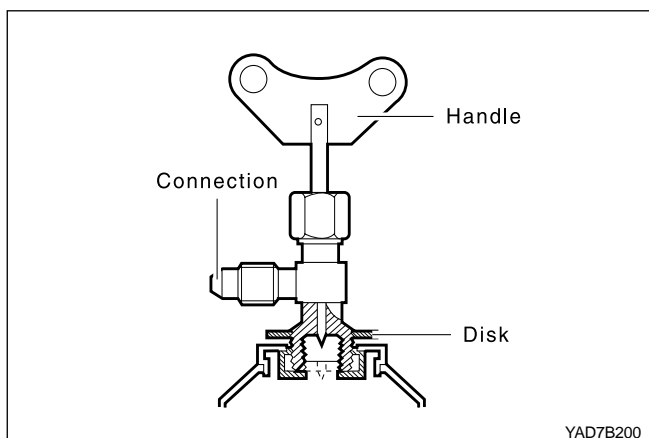
3. Start the vacuum pump and begin the evacuation process. Non-condensable gases (mostly air) are vented from the tank automatically during the recycling process. The pressure being released may be heard.
4. Check for leaks in the system. Refer to the manufacturer's instructions for the charging station in use.

**Important:** Change the vacuum pump oil frequently. Refer to the manufacturer's instructions for the charging station in use.



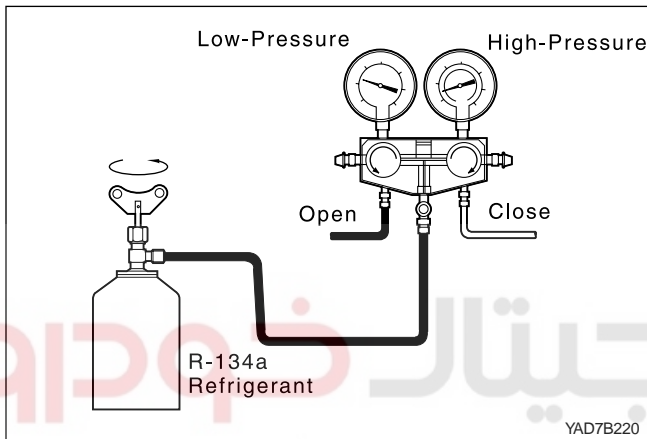
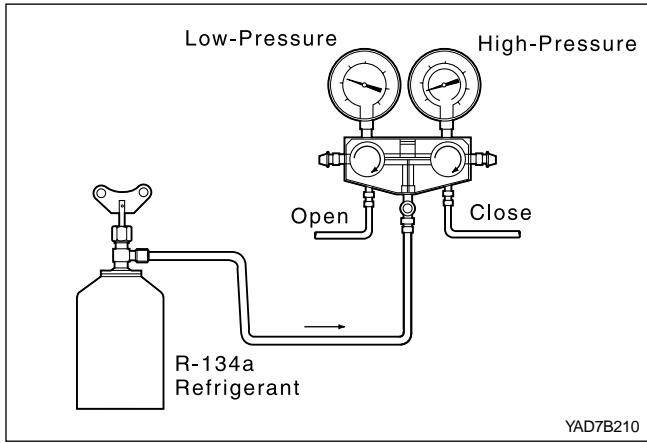
### Check for Refrigerant Leaks

1. Connect the center hose of the gauge to the refrigerant tank.
2. Open the high pressure valve of the gauge to charge with refrigerant gas.
3. Charge until the low pressure gauge reads 1.0 kg/cm<sup>2</sup> and close the valve.
4. Using a gas leak detector, check the system for leaks.
5. If any leak is found, replace O-ring or repair the faulty connection.



### How to Use the Tap Valve

1. Rotate the handle counterclockwise fully before connecting the valve to the refrigerant tank.
2. Rotate the disk counterclockwise fully.
3. Connect the center hose to the valve fitting and then rotate the disk clockwise fully by hand.
4. Rotate the handle clockwise to drill the sealed hole.
5. Remove the hose nut securing the center fitting of the manifold gauge and then tighten the nut again in a few seconds.



## Charging Refrigerant

### Charging for Gas

1. Connect the tap valve to the refrigerant tank.
2. Open the low pressure and adjust the low-side reading below  $4.2 \text{ kg/cm}^2$ .
3. Place the refrigerant tank in the warm water ( $40^\circ\text{C}$ ) and keep the gas pressure in the refrigerant tank higher than the gas pressure in the charging valve.
4. Run the engine at high speed and operate A/C system.

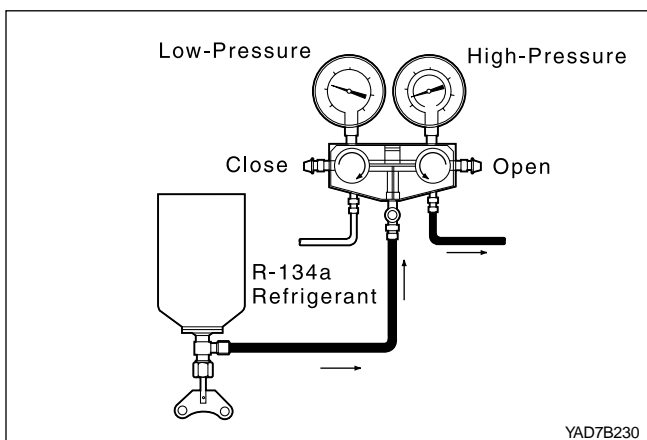
**Notice:** Place the refrigerant tank on the flat floor to protect the liquid refrigerant from coming through the suction inlet resulting in the compressor's damage.

5. Charge the specified amount to the charging valve and close the low pressure valve.

Specified amount	Single: $850 \pm 50 \text{ g}$
	Dual: $1200 \pm 50 \text{ g}$

### Notice:

- If the charging speed is low, it's more efficient to place the refrigerant tank in the warm water ( $40^\circ\text{C}$ ). But the temperature should keep below ( $52^\circ\text{C}$ ) at any situation.
- Be careful not to contact the heating device or material.

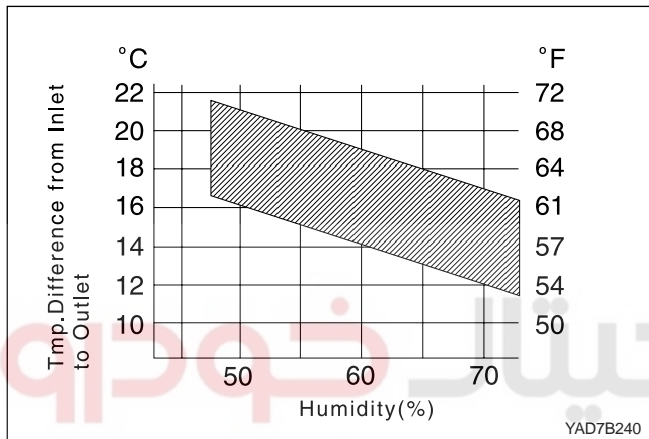


### Charging for Liquid

#### Notice:

- Do not operate when charging the system through the high-side pressure.
  - Do not open the low pressure valve when charging the system by the liquid refrigerant.
1. Tighten both high pressure and low pressure completely before evacuating the charging valve.
  2. Connect the tap valve of the refrigerant tank.
  3. Open the high pressure valve and turn the refrigerant tank upside down.

4. The discharging pressure increases when the charging valve charges excessively, so charge the charging valve to the specified amount with measuring the weight of the refrigerant before closing the high pressure valve.
5. Charge the specified amount of the refrigerant and then close the valve of the manifold gauge. Check the system for any leak.



### Operation Check

**Notice:** Operation Check is recommended before removing the manifold gauge.

1. Install the manifold gauge set.
2. Run the engine at 2,000 rpm and set the blower switch at 'HI' and A/C switch 'ON'. Set the temperature control lever at 'COOL'.
3. Keep opening all of the window and door.
4. Place a dry bulb thermometer to the front duct.
5. Place a psychrometer close to the inlet of the cooling unit.
6. Check the high pressure gauge reading within 14 - 16 kg/cm<sup>2</sup>.  
If the reading indicates high excessively, spray the water to the condenser.  
If the reading indicates low excessively, cover the condenser with the towel.
7. Check the temperature of air inlet within 25 - 35 °C.
8. Calculate the relative humidity from the psychrometric graph comparing the wet/dry temperature at the air inlet.
9. Measure the wet/dry temperature at the cold air outlet and calculate the temperature difference of the dry bulb between the inlet and the outlet.
10. Check the cross point of the relative humidity and check the temperature difference between the black line. If the cross point is located between the black line, the cooling performance is normal.



## COMPRESSOR OIL REPLACEMENT

### Before Oil Replacement

When any part is replaced or there are a lot of gas leaks in the A/C system, you should add the specified amount of the oil to keep the approval oil capacity because the oil for lubricating the compressor circulates through the A/C system during operating the compressor.

Total Oil Capacity	265 cc
--------------------	--------

### Handling Oil

- Be careful that moistures, dusts etc. must not flow into the oil.
- Do not mix with any other material.
- If the oil leaves outside for long time, it's possible to mix it with the moistures and so keep the oil sealed with a container.

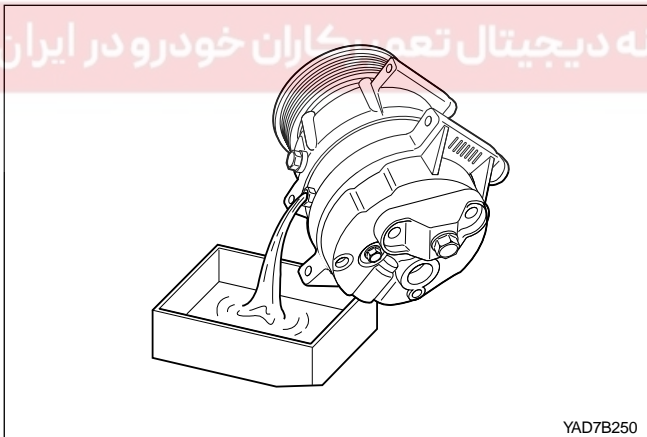
### Circulating Oil

For checking or adjusting the oil level, set the control unit to full cold and max blower speed with keeping the engine run at idle for 20 - 30 minutes in order to circulate the oil through the compressor.

### Replacement Oil

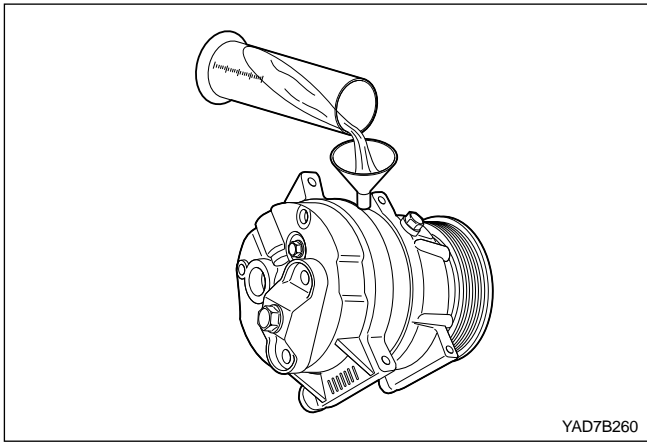
1. Perform the oil circulation and stop the engine. Remove the compressor on the vehicle.
2. Drain the oil at the position of the system line connection.

**Notice:** It may be difficult to discharge the oil when the compressor is cold. At this time warm the compressor (40 - 50 °C) before discharging the oil.



YAD7B250





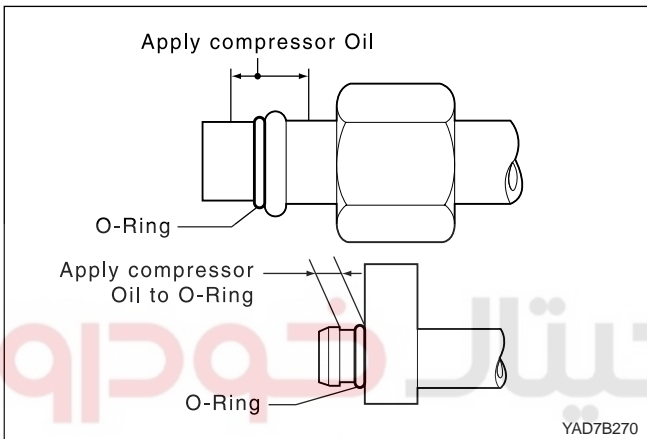
3. Measure the amount of the discharged oil. If the the amount of the discharged oil is below 70 cc, it means the oil leak. Check the connections of the system and repair or replace as needed.
4. Check the oil contamination and add the oil or adjust the oil level.

**Notice:** For contaminating the oil by the dust or the foreign material, charge the refrigerant in the system and clean the receiver-drier.

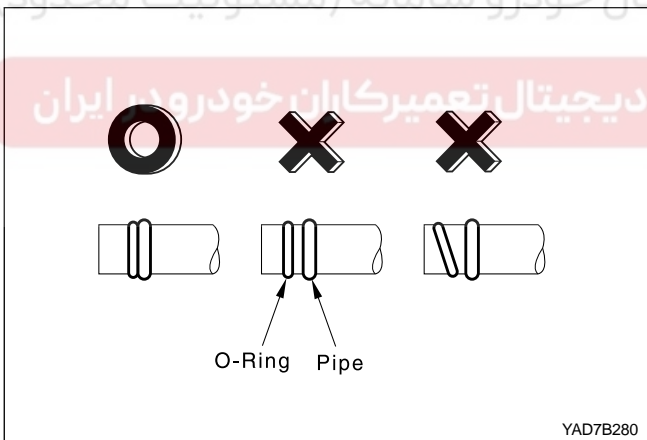
## REPLACEMENT OF REFRIGERANT CONNECTION

1. When connecting a O-ring type, apply compressor oil to portions shown in illustration. Be careful not to apply oil to threaded portion.

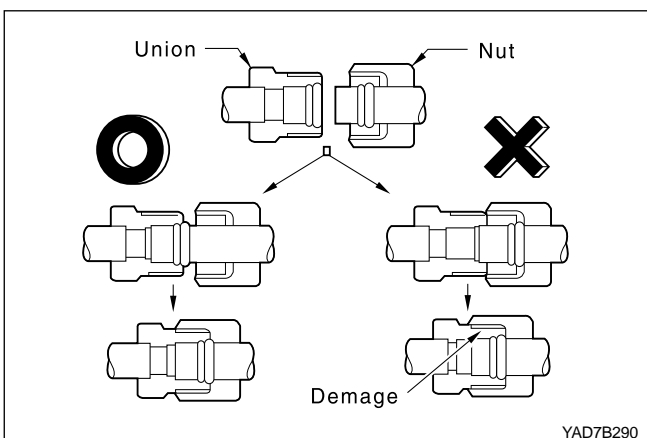
**Notice:** Use the approval compressor oil.



2. O-rings must be closely attached to inflated portion of pipe and always replace used O-rings.



3. After inserting the pipe to the union, tighten the nut by hand as much as possible and tighten the nut with the specified torque.



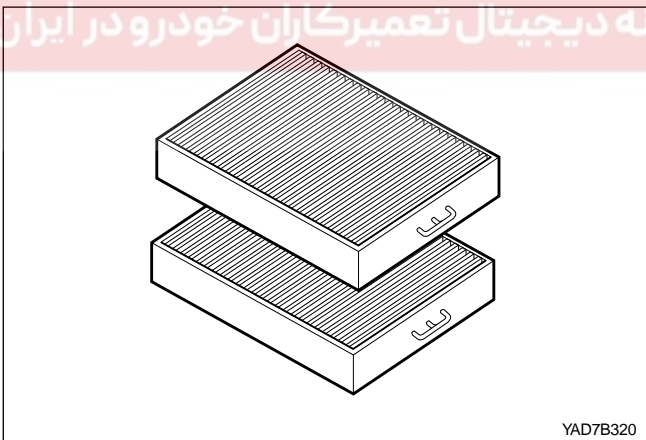
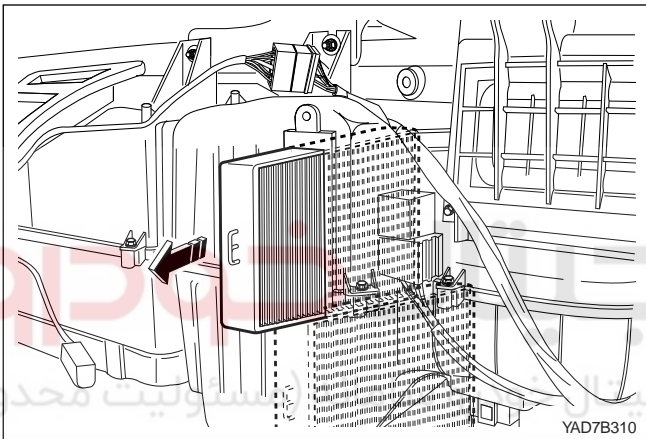
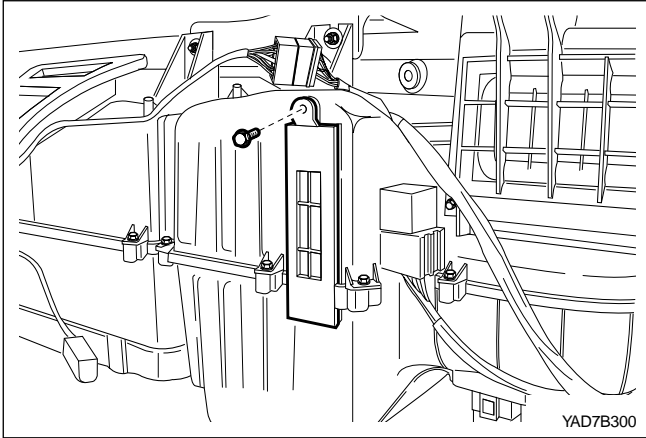
## REPAIR INSTRUCTIONS

### ON-VEHICLE SERVICE

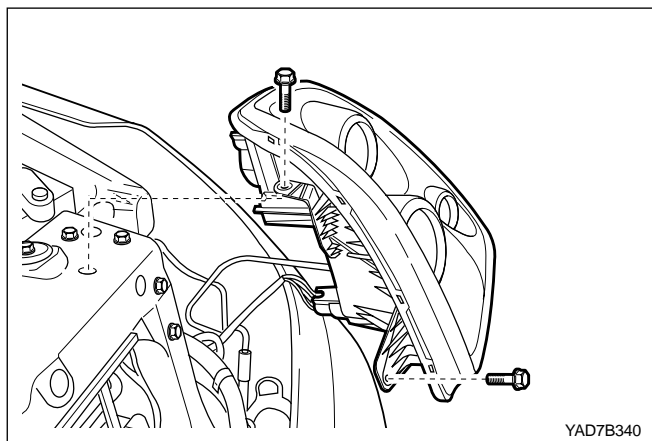
#### AIR FILTER (AUTO A/C)

##### Removal & Installation Procedure

1. Remove the glove box.
2. Remove the lower bracket of crash pad.
3. Remove the air filter.
4. For replacing the air filter, verify that the flowing direction mark of the air filter face toward the evaporator core.



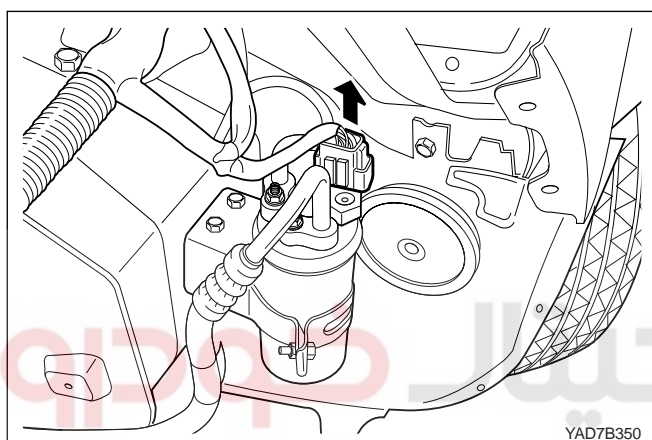
**Notice:** Installation should follow the removal procedure in the reverse order.



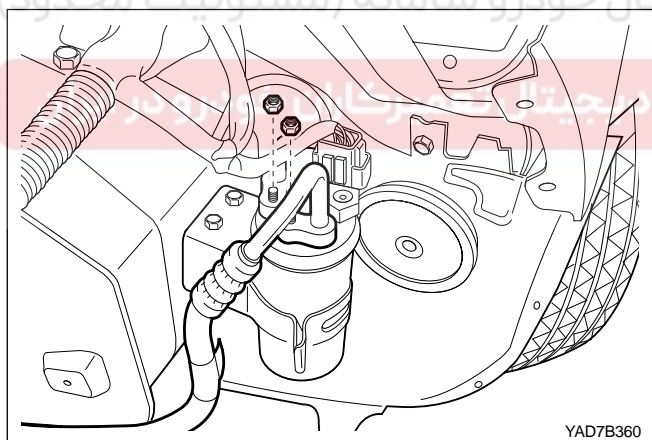
## RECEIVER-DRIER

### Removal & Installation Procedure

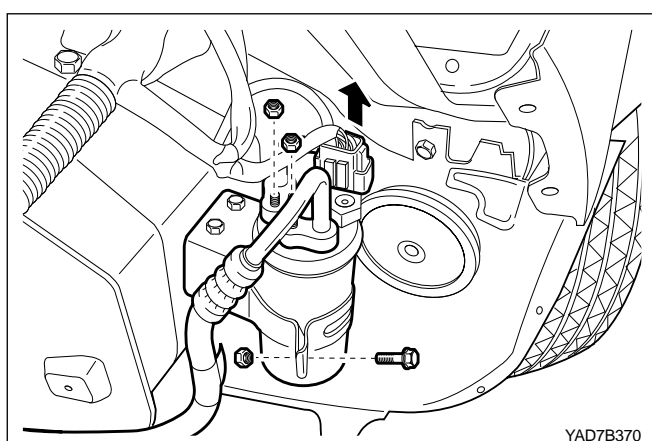
1. Discharge and recover the refrigerant from the system.
2. Remove the head lamp assembly.



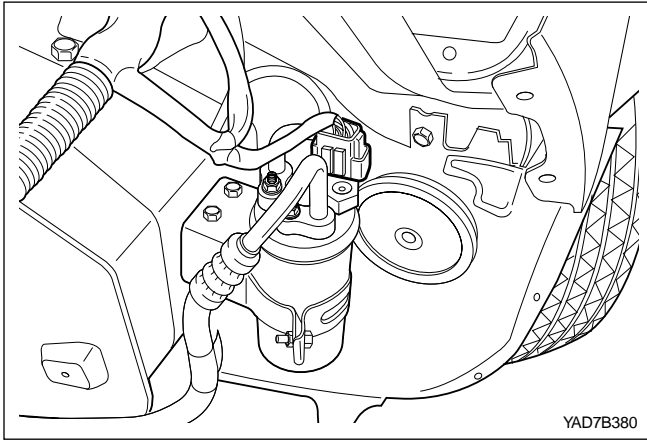
3. Disconnect refrigerant pressure sensor connector.



4. Remove the receiver-drier.
  - Remove two flange nuts.
  - Remove the O-ring



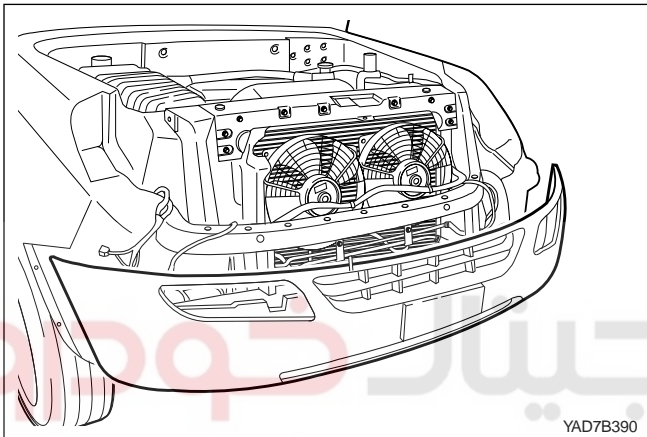
- Remove the bracket bolt retaining the receiver-drier and then remove the receiver-drier.



5. Installation should follow the removal procedure in the reverse order.

- Tighten the two flange nuts.
- Evacuate and recharge the A/C system.

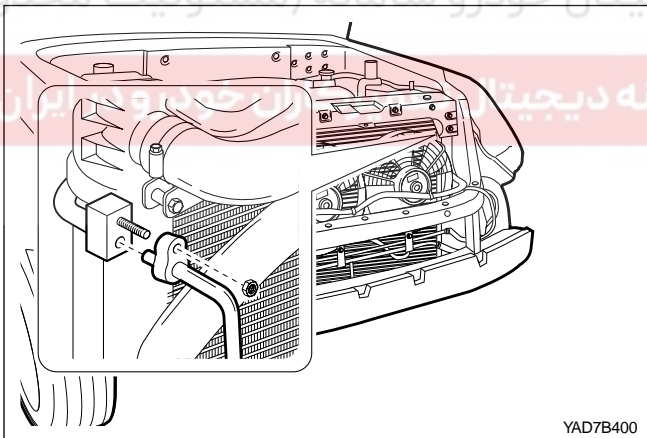
**Notice:** Before installing, check the O-ring and apply the compressor oil.



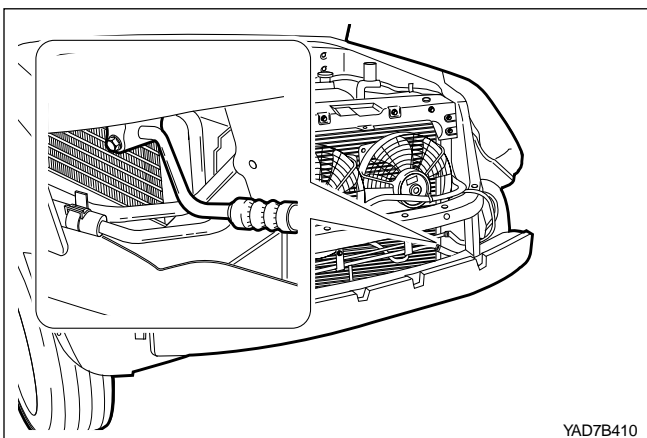
## CONDENSER

### Removal & Installation Procedure

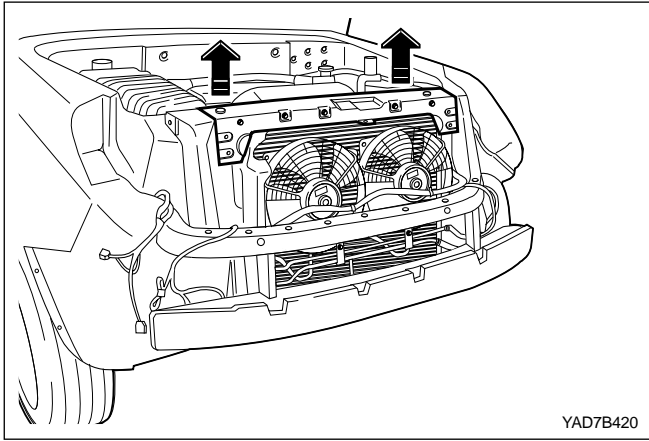
1. Discharge and recover the refrigerant from the system.
2. Remove the radiator grill and front bumper.



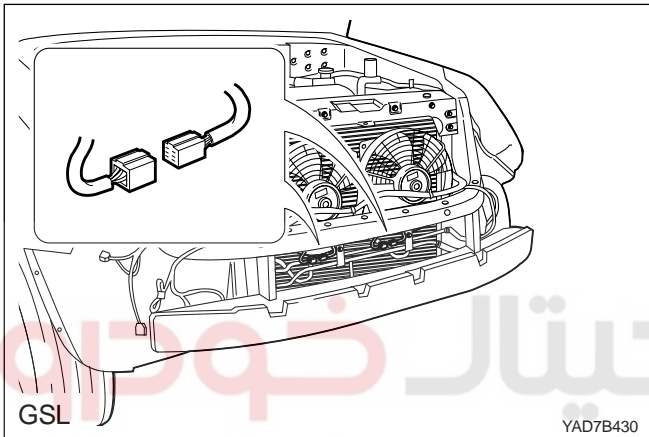
3. Remove the inlet pipe.  
Remove the O-ring at the same time.



4. Remove the outlet pipe (at the bottom side) with O-ring.

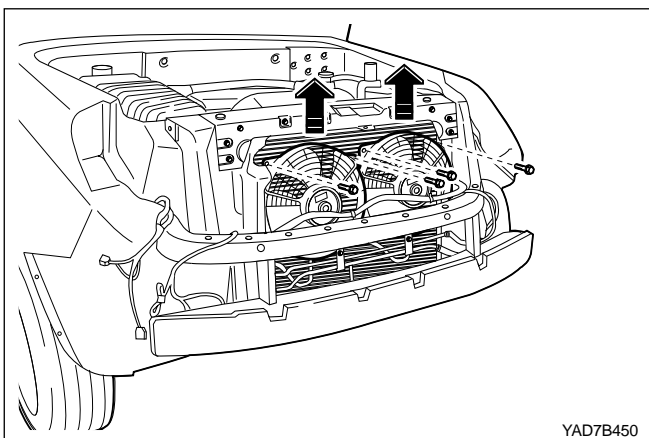
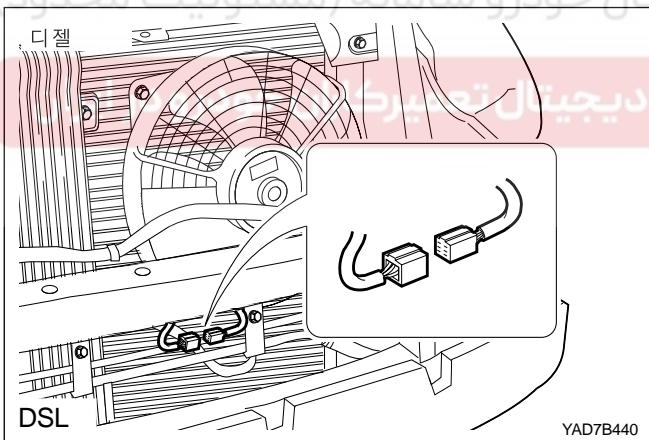


5. Remove the radiator grill plate.



6. Remove the fan bolts.

7. Disconnect the fan connector and then remove the condenser fan from the condenser.

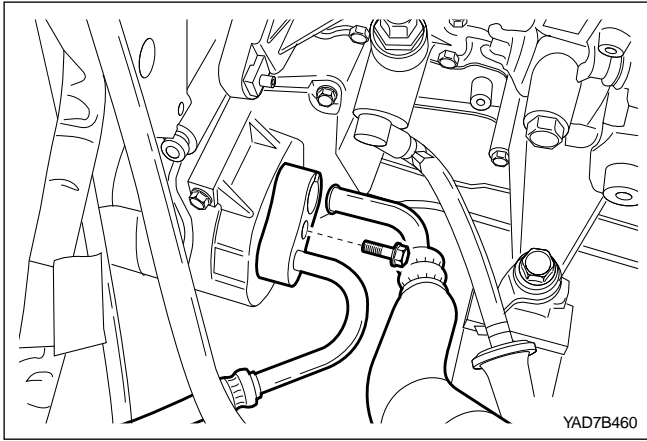


8. Remove the bolts and nuts retaining condenser and then remove the condenser from the vehicle.

9. Installation should follow the removal procedure in the reverse order.

**Notice:** The used O-ring must be replaced by the new part.

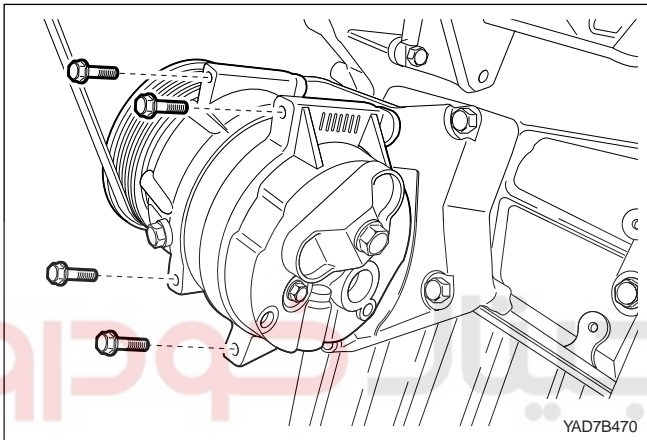




## COMPRESSOR

### Removal & Installation Procedure

1. Discharge and recover the refrigerant from the system.
2. Remove the fan belt.
3. Disconnect suction/discharge hose from the compressor.
  - Remove the flange bolt retaining the hoses.
  - Disconnect the hoses.
  - Remove two sealing washer.

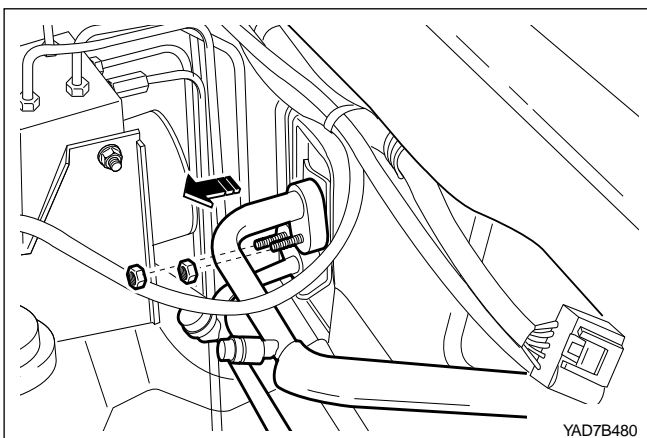


4. Lift the vehicle and support safely.
5. Remove the skid plate.
6. Remove the compressor.
  - Disconnect the connector of the compressor.
  - Remove three front bracket bolts retaining compressor.

**Notice:** Discard the used sealing washer.

7. Installation should follow the removal procedure in the reverse order.

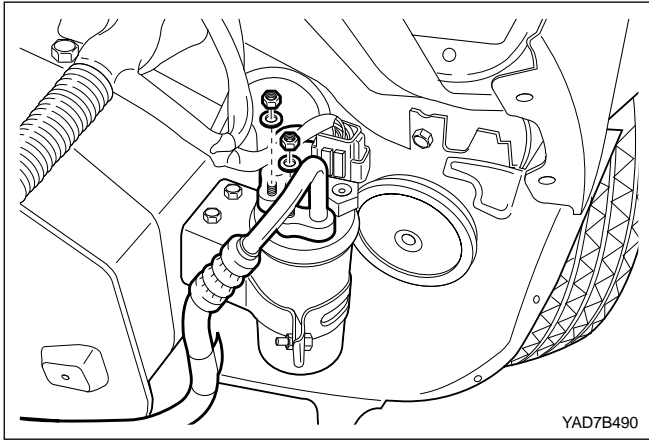
- ① Tighten the bolts with the specified torque.
- ② Evacuate and recharge the A/C system.



## A/C HIGH/LOW PRESSURE LINE

### Removal Procedure

1. Discharge and recover the refrigerant from the system.

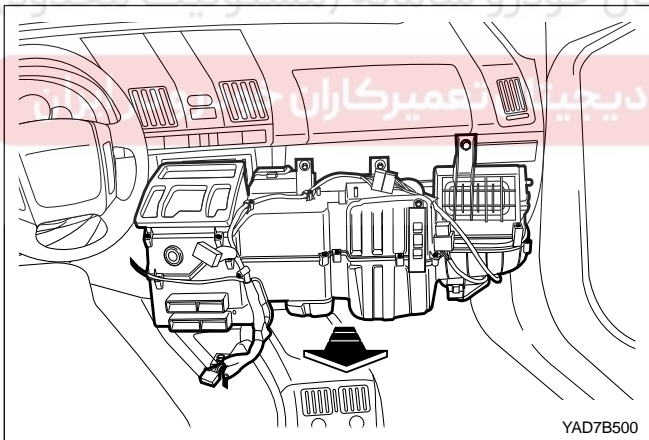


2. Remove the high/low pressure pipe lines.
3. Remove the high/low pressure pipe lines from the evaporator.

### Installation Procedure

**Notice:** Discard the used O-ring and sealing washer.

1. Installation should follow the removal procedure in the reverse order.
2. Tighten the flange nut securing the high pressure line with the specified torque.
  - flange nut at compressor
  - flange nut at evaporator
3. Evacuate and recharge the A/C system.



### A/C MODULE ASSEMBLY

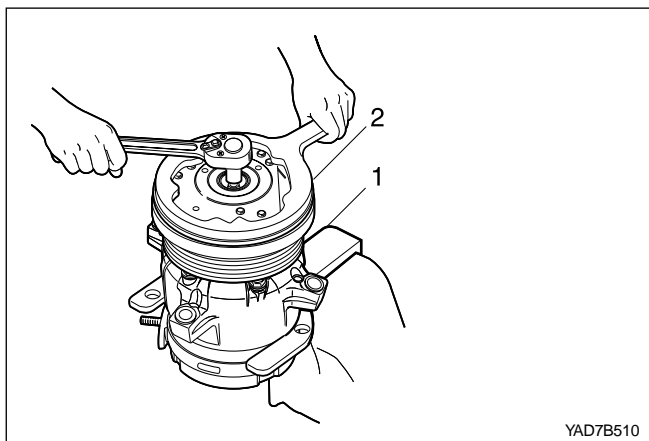
#### Removal Procedure

1. Discharge the coolant from the system.
2. Discharge and recover the refrigerant from the system.
3. Disconnect the inlet and outlet hose of the heater.
4. Disconnect the high/low pressure pipe from the evaporator core.
5. Remove five bolts securing the A/C module.
  - two bolts at evaporator
  - two bolts at heater core
  - a bolt at I/P
6. Remove the instrument panel.
7. Remove the fiber panel.
8. Remove the A/C module assembly.

#### Installation Procedure

1. Installation should follow the removal procedure in the reverse order.
2. Tighten five bolts securing A/C module with the specified torque.
3. Recharging the coolant.
4. Evacuate and recharge the A/C system.



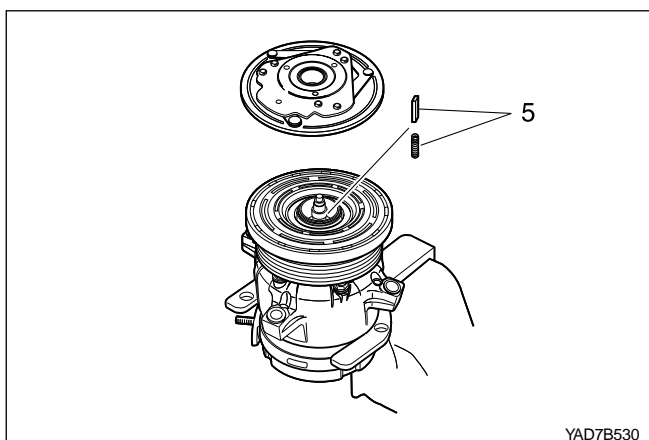
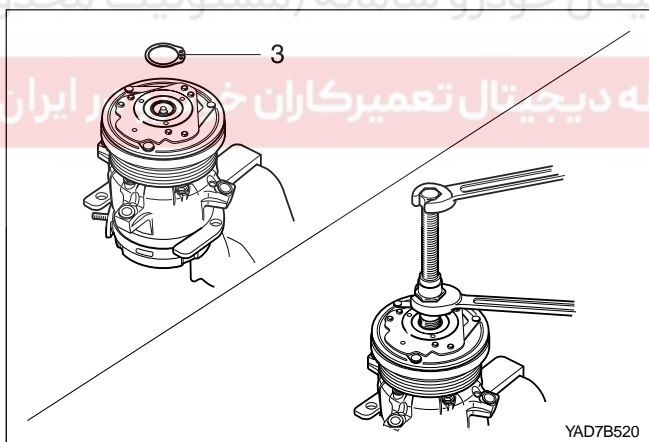


## UNIT REPAIR

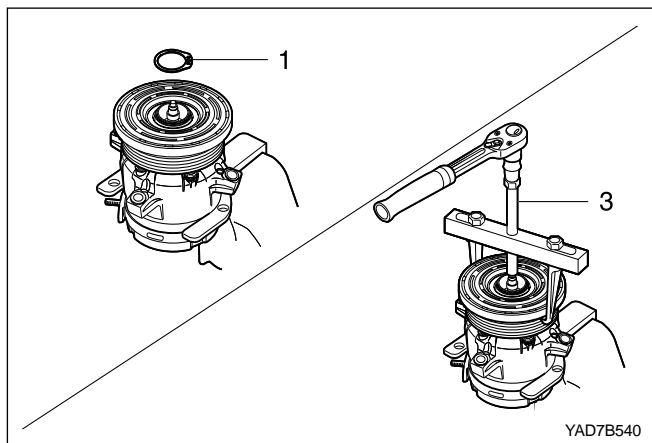
### COMPRESSOR

#### Disassembly and Assembly Procedure

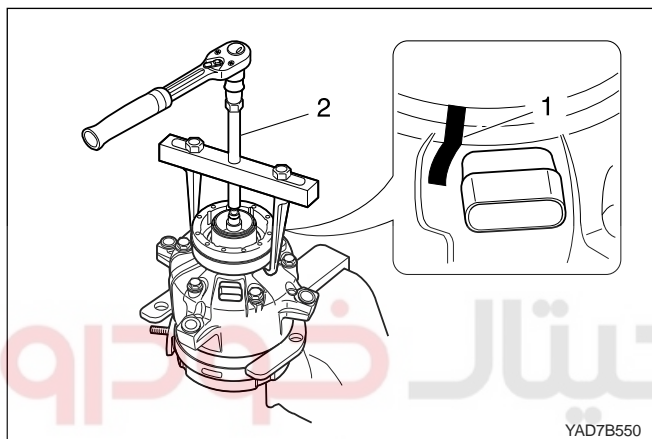
1. Remove the compressor.
2. Remove the clutch driver.
  - Install the compressor holding fixture to the compressor and hold the compressor holding fixture using a bench vise.
  - Use the clutch hub holding tool to keep the clutch drive plate and the hub assembly from turning to remove the shaft nut.
  - Remove the snap ring using the ring plier.
  - Remove the clutch drive using the special tool.



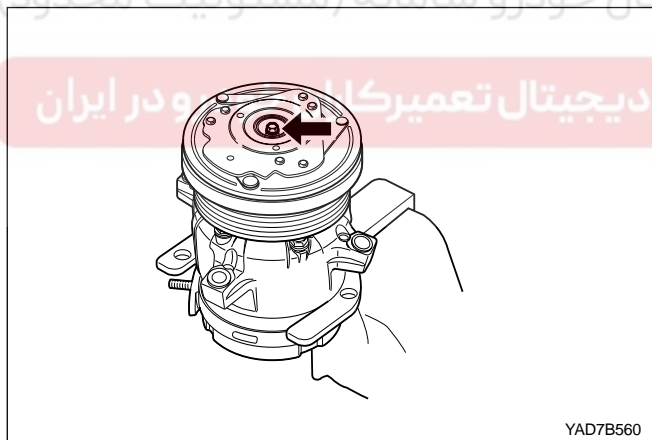
- Remove the clutch shaft key and spring.



3. Remove the compressor pulley.
  - Remove the snap ring using the ring plier.
  - Remove the compressor pulley using the special tool.



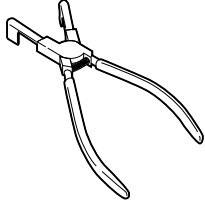
4. Remove the clutch coil.
  - Mark the location of the clutch coil connector at the clutch housing.
  - Remove the clutch coil using the special tool.



5. Assembly should follow the disassembly procedure in the reverse order.

## SPECIAL TOOLS AND EQUIPMENT

### SPECIAL TOOLS TABLE

 YAD7B570	<b>DW 100-010</b> <b>Spring Clamp</b> <b>Remover &amp; Installer</b>
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# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# SECTION 7C

## MANUAL CONTROL HEATING, VENTILATION AND AIR CONDITIONING SYSTEM

### TABLE OF CONTENTS

<b>Description and Operation</b> .....	<b>7C-2</b>	Abnormal Refrigerant Pressure .....	7C-7
System Components-Functional .....	7C-2	<b>Repair Instructions</b> .....	<b>7C-8</b>
Specifications .....	7C-4	On-Vehicle Service .....	7C-8
<b>Diagnostic Information and Procedures</b> .....	<b>7C-5</b>	Control Switch Assembly .....	7C-8
Insufficient Cooling Diagnosis .....	7C-5		

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

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## DESCRIPTION AND OPERATION

### SYSTEM COMPONENTS- FUNCTIONAL

#### Compressor

All compressor are belt-driven from the engine crankshaft through the compressor clutch pulley. The compressor pulley rotates without driving the compressor shaft until an electromagnetic clutch coil is energized. When voltage is applied to energize the clutch coil, the clutch plate and hub assembly is drawn rearward toward the pulley. The magnetic force locks the clutch plate and pulley together as one unit to drive the compressor shaft.

As the compressor shaft driven, it compresses the low pressure refrigerant vapor from evaporator into high pressure, high temperature vapor. The refrigerant oil that is used to lubricate the compressor is carried with the refrigerant.

#### Magnetic Clutch

The magnetic clutch is assembled in front of the compressor and controls to stop or operate the compressor.

The center piece is inserted to the compressor crankshaft and rotate the only the pulley when it doesn't operate the compressor. When the A/C switch is turned ON, the current flows into the wrapped coil of the stator and the stator is converted to the powerful electromagnet. Therefore, the compressor can rotate with the pulley together because the stator can pull the center piece tightly.

#### V-5 Compressor-General

##### Description

Vehicle using the V5 compressor may have differences between installations in the mounting brackets, the drive system, the pulleys, the connections and the system capacities. Basic overhaul procedures are similar between the compressors used on different vehicles.

When serving the compressor, keep dirt and foreign material from getting on or into the compressor parts and the system. Clean tools and a clean work area are important for proper service. The compressor connections and outside of the compressor should be cleaned before performance of any on-vehicle repairs and before removal of the compressor. The parts must be kept clean at all times and any parts that are to be reassembled should be cleaned with trichloroethane, naphtha, stoddard solvent, kerosene or equivalent solvents and dried with dry air. Use only lint-free cloths to wipe the parts.

The operations described are based on bench overhaul with the compressor removed from the vehicle, except as noted. They have been prepared in the order of accessibility of the components. When a compressor is removed from the vehicle for servicing, the amount of oil remaining the compressor should be drained, measured and recorded. This should then be discarded and new polyalkaline glycol (PAG) refrigerant oil added to the compressor.

**Important:** The oil drain plug must be removed and the oil drained through the plug opening to insure complete draining of oil from the compressor.

#### V-5 Compressor-Operation

The V5 is a variable displacement compressor that can match the automotive air conditioning demand under all conditions without cycling. The basic compressor mechanism is a variable angle wobble-plate with seven axially oriented cylinders. The center of the control of the compressor displacement is a billows-actuated control valve located in the rear head of the compressor that senses compressor suction pressure.

The wobble-plate angle and the compressor displacement are controlled by the crankcase suction pressure differential. When the A/C capacity demand is high, the suction pressure will be above the control point. The valve will maintain a bleed from crankcase to suction. With no crankcase suction pressure differential, the compressor will have maximum displacement.

When the A/C capacity demand is lower and the suction pressure reaches the control point, the valve will bleed discharge gas in the crankcase and close off a passage from the crankcase to suction plenum. The angle of the wobble-plate is controlled by a force balance of seven pistons. A slight elevation of the crankcase suction pressure differential creates total force on the piston resulting in a movement about the wobble-plate pivot pin that reduces the plate angle.

The compressor has a unique lubrication system. The crankcase suction bleed is routed through the rotating wobble-plate for lubrication of wobble-plate bearing.

The rotation acts as an oil separator that removes some of the oil from the crankcase where it can lubricate the compressor mechanism.

#### Condenser Core

The condenser assembly in front of the radiator consists of coils, which carry the refrigerant and cooling fins that provide the rapid transfer of heat. The air passing through the condenser cools the high-pressure refrigerant vapor and causes it to condense it to condense into a liquid.

### Receiver-Drier

The sealed receiver-drier assembly is connected between the condenser and evaporator. It acts as a refrigerant storing container, receiving liquid and some vapor and refrigerant oil from the condenser.

At the bottom of the receiver-drier is the desiccant, which acts as drying agent for the moisture that may have entered the system. An oil bleed hole is located near the bottom of the receiver-drier outlet pipe to provide an oil return path to the compressor. The receiver drier is serviceable as an assembly.

### Expansion Valve

The expansion valve can fall in three different positions: open, closed or restricted.

An expansion valve that fails in open position will result in a noisy A/C compressor or no cooling. The cause can be a broken spring, a broken ball or excessive moisture in the A/C system. If the spring or the ball are found to be defective, replace the expansion valve. If excessive moisture is found in the A/C system recycle the refrigerant.

A restricted expansion valve will result in low suction pressure and no cooling. This may be caused by debris in the refrigerant system. If debris is believed to be the cause, recycle the refrigerant, replace the expansion valve and replace the receiver-drier.

### Evaporator

The evaporator is a device which cools and dehumidifies the air before it enters the vehicle. High pressure liquid refrigerant flows through the expansion tube (orifice) and becomes a low pressure gas in the evaporator. The heat in the air passing through the evaporator core is transferred to the cooler surface or the core, which cools the air.

As the process of heat transfer from the air the evaporator core surface is taking place, any moisture (humidity) in the air condenses on the outside surface of the evaporator core and is drained off as water.

### Pressure Relief Valve

The compressor is equipped with a pressure relief valve which is placed in the system as a safety factor. Under certain conditions, the refrigerant on the discharge side may exceed the designed operating pressure at approximately at 3,171 to 4,137 kPa (460 to 600 psi) in an R-134a system. Conditions that might cause this valve to open, such as a defective pressure transducer, an inoperative cooling fan, etc., should be corrected. The refrigerant oil and the refrigerant should be replaced as necessary.

### Controller

The operation of the A/C system is controlled by the switches and knob on the control head. This console-mounted controller contains following control knobs.

#### Rotary Temperature Control Knob

- Actuates by cable.
- Raise the temperature of the air entering the vehicle by sliding to the right or the red portion of the knob.
- Varies the mix of the fresh air from outside the vehicle with the heated air from inside the vehicle to suit individual performance.

#### Rotary Mode Control Knob

- Actuates by cable.
- Regulates the air distribution between the windshield, the instrument panel and the floor vents.

#### Rotary Blower Control Knob

- Turn on to operate the blower motor at four speeds.
- Turn OFF to stop the blower.
- Operates completely independently from both the mode control knob and temperature control knob.
- Changes the fan speed in any mode and at any speed.



## SPECIFICATIONS

Component			Description	
Compressor		Type	Variable Displacement	
		Model	Single	V-5 Compressor
			Dual	V-7 Compressor
			Gasoline	10PAIRC
		Displacement	Single	9.8 - 151 cc/rev
			Dual	179 cc/rev
			Gasoline	170.5 cc/rev
Max. RPM		6,000 - 7,500 rpm		
Refrigerant		Type	R-134a	
		Capacity	Single	850 ± 50 g
			Dual	1200 ± 50 g
Oil		Type	Synthetic PAG Oil	
		Capacity	260 cc	
Receiver-Drier		Material	Aluminum	
		Capacity	260 cc	
A/C Condenser		Max. Capacity	11,400 Kcal/h	
Evaporator		Size	263.0 x 228.6 x 88.9 mm	
		Capacity	6,500 Kcal/h	
A/C Pressure Sensor	High Pressure	A/C ON/OFF	305/425 psi	
	Low Pressure	A/C ON/OFF	39/30 psi	
A/C Cutoff Pressure		High Pressure	32 Kgf/cm²	
		Low Pressure	4 Kgf/cm²	



## DIAGNOSTIC INFORMATION AND PROCEDURES

### INSUFFICIENT COOLING DIAGNOSIS

Step	Action	Yes	No
1	1. Check the A/C fuse. 2. Check the operation of the blower motor and cooling fan. 3. Check the accessory belt. 4. Check the A/C condenser for restricted air flow. 5. Check the engagement of the compressor clutch. 6. Check the discharge air temperature with the A/C turned ON. Are all above the operations normal?	System OK	Go to Step 2
2	1. Turn the ignition to LOCK. 2. Connect the high/low pressure gauges. Are both pressures within the specified value?	Go to Step 4	Go to Step 3
3	1. If it's above the specified value, discharge the refrigerant. 2. If it's below the specified value, add 0.45kg (1 pound) of the refrigerant and repair any leaks as needed. 3. Recover, evacuate and recharge the A/C system. Is the repair complete?	System OK	-
4	1. Start the engine and allow it to run at idle. 2. Turn the A/C switch to ON. 3. Set the blower motor switch to 4th. 4. Set the temperature control lever to full cold. Does the A/C compressor clutch engage?	Go to Step 8	Go to Step 5
5	1. Turn the ignition to LOCK. 2. Check the open or short in the compressor wiring. Is there any open or short in the wiring?	Go to Step 6	Go to Step 7
6	Repair the faulty wiring as needed. Is the repair complete?	System OK	-
7	Replace the compressor clutch coil. Is the replacement complete?	System OK	-
8	Check for a knocking noise from the A/C compressor. Cycle the A/C compressor ON and OFF in order to verify the source of the noise. Do you hear a loud knocking noise?	Go to Step 9	Go to Step 10
9	1. Recover the A/C system refrigerant. 2. Replace the A/C compressor. 3. Evacuate and recharge the A/C system. 4. Check the A/C system for leaks. Is the compressor running normally?	System OK	-
10	1. Close all of the windows and doors. 2. Set the A/C switch to ON position. 3. Set the intake air control switch to "Fresh Air". 4. Set the blower motor switch to 4th. 5. Set the temperature control switch to full cold. 6. Keep it to run at idle for 5 minutes. 7. Check the temperature at the inlet/outlet of the evaporator. Is there a noticeable difference in the temperature of the evaporator inlet/outlet pipes?	Go to Step 11	Go to Step 13

### Insufficient Cooling Diagnosis (Cont'd)

Step	Action	Yes	No
11	1. Recover the A/C system refrigerant. 2. Replace the expansion valve as needed. 3. Evacuate and recharge the A/C system. 4. Check the A/C system for leaks. 5. Operate the A/C system. Is the discharge temperature normal?	Go to Step 13	Go to Step 12
12	1. Recover the refrigerant of the A/C system. 2. Evacuate and recharge the A/C system. 3. Check the A/C system for leaks. Does the A/C system operate normally?	System OK	-
13	Feel the liquid pipe between the condenser and the expansion valve. Is the pipe cold?	Go to Step 15	Go to Step 14
14	1. Repair any restriction in high pressure side. 2. Check the A/C system for leaks. Does the A/C system operate normally?	System OK	-
15	1. Run the engine at 3,000 rpm. 2. Close all of the windows and doors. 3. Set the A/C switch to ON. 4. Set the blower motor switch to 4th. 5. Set the temperature control switch to full cold. 6. Turn the A/C switch ON and OFF every 20 seconds for 3 minutes. 7. Measure the compressor high and low pressure. Are both pressures within the specified value?	Go to Step 17	Go to Step 16
16	Add the specified amount of the refrigerant to the A/C system. Is the amount within the specified value?	System OK	-
17	1. Turn the ignition to LOCK. 2. Set the A/C switch to OFF position. Can you turn the compressor clutch freely by hand?	Go to Step 18	Go to Step 19
18	1. Check the A/C system for leaks. 2. Repair any leaks as needed. 3. Evacuate and recharge the A/C system. Does the A/C system operate normally?	System OK	-
19	1. Recover the refrigerant of the A/C system. 2. Evacuate and recharge the A/C system. 3. Check the A/C system for leaks. 4. Replace the compressor as needed. Is the repair complete?	System OK	-

**ABNORMAL REFRIGERANT PRESSURE**

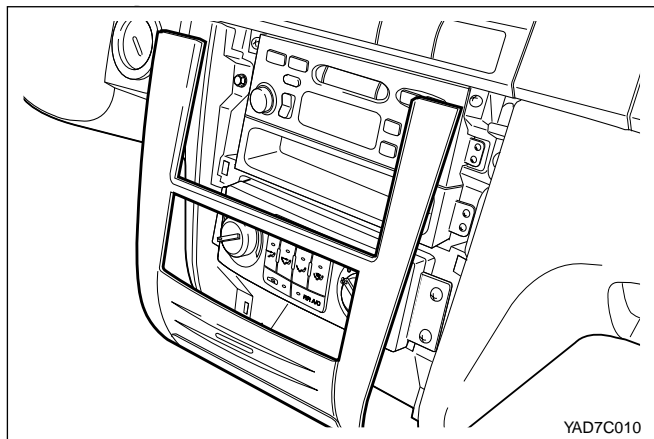
Step	Action	Yes	No
1	1. Verify whether airflow and excessive refrigerant. 2. Check any restriction at the condenser or radiator. 3. Check the condenser or cooling fan for proper operation. 4. Check any restriction of the refrigerant lines. Is the high-side refrigerant pressure high abnormally?	Go to Step 2	Go to Step 3
2	1. Recover, evacuate and recharge the A/C system according to the specified value. 2. Clean the condenser or radiator core. 3. Check the voltage, rpm, direction of the cooling fan. 4. Repair or replace the appropriate parts as needed. Is the high-side pressure within the specified value?	System OK	-
3	1. Check the amount of the refrigerant. 2. Check the internal faulty of the compressor. 3. Check the faulty of the expansion valve. 4. Check the moisture mix into the system. Is the high-side refrigerant pressure low abnormally?	Go to Step 4	Go to Step 5
4	1. Replace the compressor and the expansion valve as needed. 2. Recover, evacuate and recharge the A/C system according to the specified value. 3. Repair any leaks as needed. Is the repair complete?	System OK	-
5	1. Check the freezing/clogging of the expansion valve. 2. Check the clogging of the receiver-drier. 3. Check the amount of the refrigerant. Is the low-side refrigerant pressure low abnormally?	Go to Step 6	Go to Step 7
6	1. Clean the expansion valve and replace it as needed. 2. Replace the receiver-drier as needed. Is the repair complete?	System OK	-
7	1. Check the expansion valve and the compressor for any faulty. 2. Check the excessive amount of the refrigerant. Is the low-side refrigerant pressure high abnormally?	Go to Step 8	Go to Step 9
8	1. Replace the expansion valve and the compressor as needed. 2. Add the specified amount of the refrigerant. Is the repair complete?	System OK	-
9	1. Check the tightening condition of the refrigerant line coupling and bolts. 2. Check the faulty O-ring. 3. Check the faulty gasket or seal of the compressor. Is there any refrigerant leak?	Go to Step 10	System OK
10	1. Tighten the bolts. 2. Replace the faulty O-ring. 3. Replace the faulty compressor. Is the repair complete?	System OK	-

## REPAIR INSTRUCTIONS

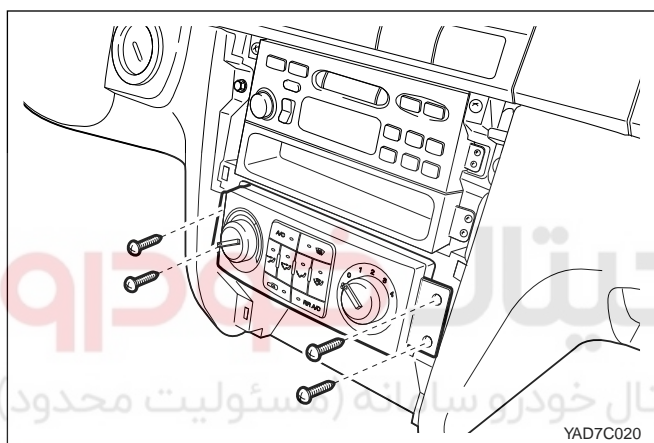
### ON-VEHICLE SERVICE

#### CONTROL SWITCH ASSEMBLY

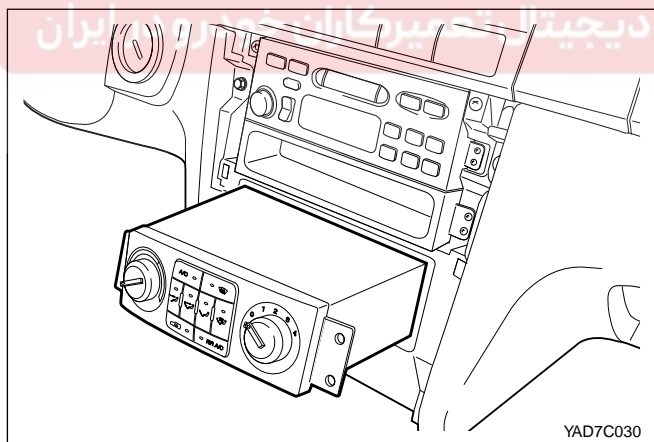
1. Remove the center instrument panel.

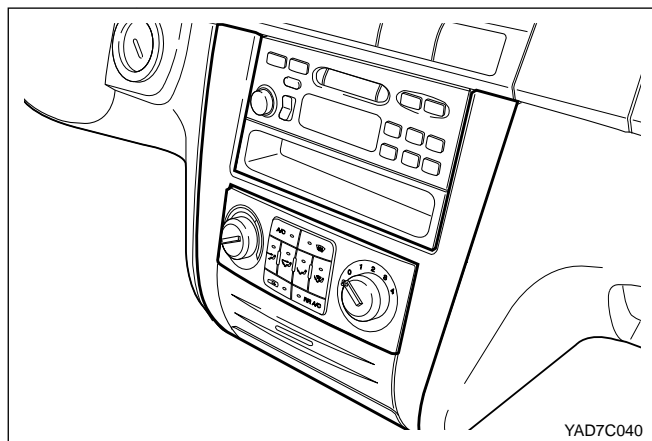


2. Remove four screws securing the A/C control switch assembly.



3. Remove the A/C control switch assembly from the instrument panel.





4. Installation should follow the removal procedure in the reverse order.

**Notice:** Insert connector to the switch and then assembly the

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# SECTION 7D

## AUTOMATIC CONTROL HEATING, VENTILATION AND AIR CONDITIONING SYSTEM

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## DESCRIPTION AND OPERATION

### GENERAL

#### THE V5 FULL AUTOMATIC TEMPERATURE CONTROL (FATC) SYSTEM

The full automatic temperature control (FATC) uses the integrated control panel as the driver's interface to the system. The FATC receives driver's input signal and various input signal from sensors and controls the actuators to maintain driver's desired room temperature.

Refer to Section 7B, Manual Control Heating, Ventilation, and Air Conditioning System for general Information details for the following:

- System Components – Functional.
- The V5 A/C System.
- V5 Compressor – Operation.
- V5 Compressor – General Description.

Vacuum Fluorescent Display panel provides system operating information for the driver. With the system in OFF mode, the outside temperature is displayed continuously.

The driver may display the current temperature setting by selecting any mode except OFF or adjusting the temperature control.

Also, it provides the convenience to the driver by indicating the ambient air temperature. If it occurs the faulty in the FATC system, the MICOM informs the driver or mechanics of the results of the self-diagnostic check and controls the system by

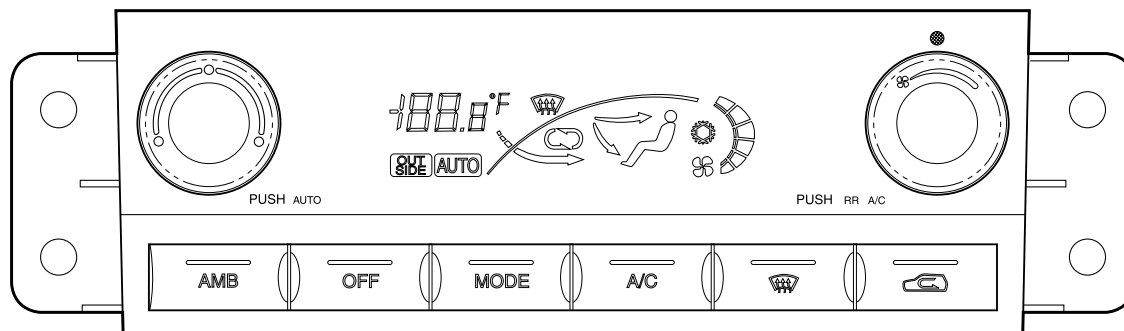
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## FATC CONTROL

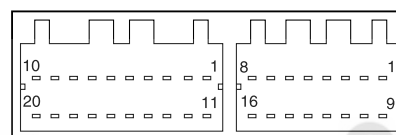


## PIN NO. ASSIGNMENT

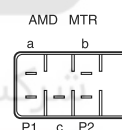
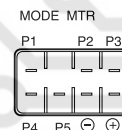
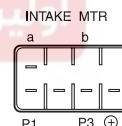
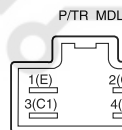
MOLEX 53874-3615 (CONTROLLER SIDE)

B

A

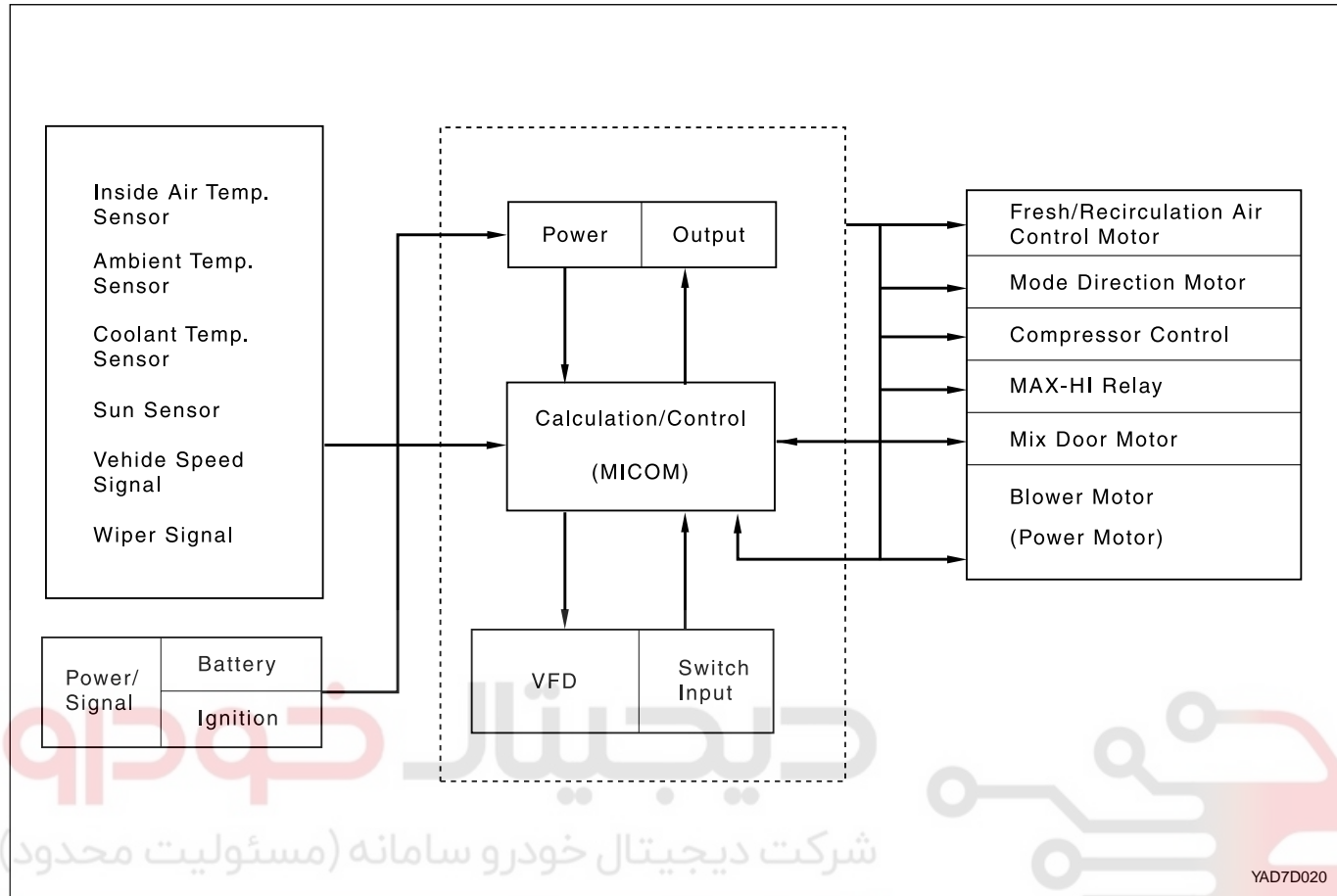


A1 : POWER GND	B1 : BLR CONTROL
A2 : AMD(C)	B2 : Vss
A3 : ILL(-)	B3 : RXD
A4 : ILL(+)	B4 : PBR(+5V)
A5 : IGNITION	B5 : PBR(SENSEING)
A6 : REAR BLOWER RLY	B6 : PBR(GND)
A7 : BLOWER REQ	B7 : WIPER SIGNAL Lo
A8 : AMD(H)	B8 : AMB SENSOR
A9 : TXD	B9 : WATER SENSOR
A10 : MAX HI RELAY	B10 : SUN SENSOR
A11 : A/C REQ. (GSL)	B11 : POWER GND
A12 : A/C REQ. (DSL)	B12 : BLR SENSING
A13 : SENSOR GND	B13 : FRE
A14 : BATTERY	B14 : REC
A15 : 1/3 FRE.	B15 : WIPER SIGNAL HI
A16 : INCAR SENSOR	B16 : MODE MOTOR(P5)
	B17 : MODE MOTOR(P4)
	B18 : MODE MOTOR(P3)
	B19 : MODE MOTOR(P2)
	B20 : MODE MOTOR(P1)

MG 610203  
MTR SIDEMG 610203  
MTR SIDEMG 610203  
MTR SIDEMG 610269  
PTR SIDE

YAD7D010

## FATC INPUT/OUTPUT ROUTING DIAGRAM



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## FATC SYSTEM CHARACTERISTIC

### Display Performance Enhancement

It allows VFD (Vacuum Fluorescent Display) to develop the effect of the visible.

### Airflow Control Enhancement

It allows MICOM to control the temperature and perform the control automatically of the heating operation, the cooling operation and the Mild operation. Also, MICOM enable to control the amount of the airflow and the direction of the vent outlet in order to keep the inside air fresh.

### Self-Diagnostic Circuit Check

The full automatic temperature control (FATC) air conditioning controller contains a self-diagnosis function to aid in finding any problem with the system. If the FATC detects some errors it will blink the temperature display screen for 5 seconds when the ignition switch is ON.

To enter the diagnostic mode, perform the following procedure.

1. Turn the ignition switch ON.
2. Set the temperature control to 26 °C (79 °F).
3. Within 3 seconds, push the AUTO and the OFF switches simultaneously, more than three times.
4. Check the diagnostic trouble code (DTC) in the temperature indicator screen blinks. If there are no diagnostic trouble code (DTC) set, the screen will display 00.
5. When the FATC controller indicates a DTC, proceed to the table for the DTC.
6. Push the OFF switch to return the controller to its normal function.

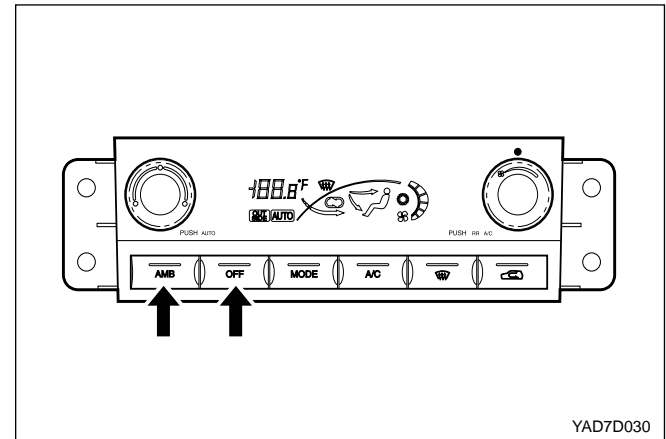
DTC	Description
0	Normal (No Error)
1	Inside Air Temperature Sensor Error
2	Ambient Air Temperature Sensor
3	Error
4	Coolant Temperature Sensor Error
5	Air Mix Door Error
6	Sun Sensor Error
7	Power Transistor Error

### Action Taken When the Faulty Occurred

When any faulty is occurred in the automatic temperature control system, it's sign is informed to the driver by flashing the set temperature display for 5 seconds at initial starting.

### How to Verify Faulty Code

When the temperature is set to 26 °C and then within 3 second, push the AMB switch and the OFF switch simultaneously at three times, the FATC controller temperature display indicates the faulty code after performing the self-diagnosis by MICOM.



YAD7D030

### Condition For Clearing the Faulty Code

1. When the vehicle restarts
2. When push the OFF switch after indicating the faulty code
3. When pass over 32 seconds after indicating the faulty code

### Fault Safety Function

FATC air conditioner not only performs self-diagnosis but also has safety function against faults. If there is open or short in the sensors or potentiometer of temperature door some specific value will be substitute.

Error	Fault Safety Function
Inside air Sensor Error	25 °C will be substituted as temperature of inside of vehicle.
Ambient Temperature Sensor Error	25 °C will be substituted as ambient temperature.
Coolant Temperature Sensor Error	Sensor ON. 50 °C will be substituted as coolant temperature.
Sun Sensor Error	Zero (0) will be substituted as sun load.

SYSTEM BASIC FUNCTION

Set Temperature Control

When you set the setting temperature using the temperature control switch, the FATC receives the various input signals from sensors including the information of inside air temperature, ambient temperature, coolant temperature and sun loads etc.. The FATC uses this signals to control automatically the A/C compressor, the mode door, the I/A door, air mix door and blower motor etc.

Airflow Control

For setting at Full AUTO, it is possible to control the blower motor operation both manually and automatically in order to adjust the airflow according to the set temperature.

Manual Control

When you push the blower switch, you can control the blower motor manually and it increases or decreases each step by moving the switch to HI/LO. (with the ignition ON)

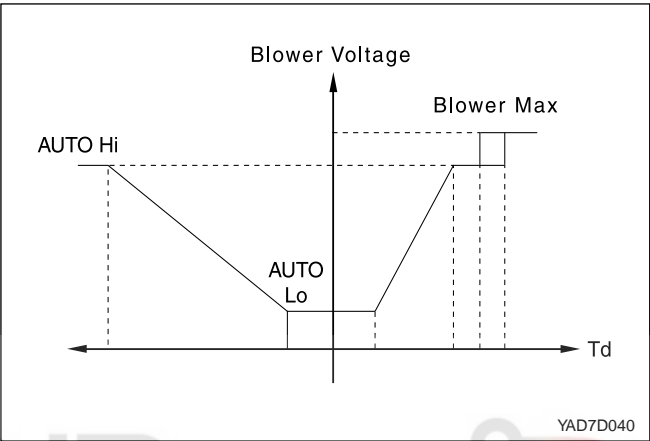
Step	Blower Voltage
1	4.5 V
2	6.0 V
3	7.5 V
4	9.0 V
5	11.0 V
6	Max Hi

\* The voltage of the blower motor may increase or decrease (0.5 V) according to power voltage.

Automatic Control

Td value can be determined by the set temperature value and Td value is set to the target voltage of the blower motor simultaneously. The blower motor can shift without step.

**Abbreviation: Td (Thermal Demand) : Td value is the default for automatic control of the automatic temperature control and allows it to control the set temperature calculating the differences between inside air temperature and ambient temperature.**



Blower Step	Blower Motor Voltage
1	4.0 - 5.5 V
2	5.5 - 7.5 V
3	7.5 - 8.5 V
4	8.5 - 9.5 V
5	9.5 - 10.5 V
6	10.5 - 13.5 V

Vent Rate Control By Heating Operation

When the temperature of the engine coolant is low or it's difficult to obtain the desired hot air in winter, the system controls to prevent the cold airflow from the outlet due to the cold air give a negative effect to the heating performance.

Therefore vent step is fixed 1st on blower AUTO step until the coolant sensor detects above 20 °C and also the blower step increases gradually according to going up the coolant temperature. When the coolant temperature goes up above 40 °C, the heating operation stops.

Vent Rate Control By Cooling Operation

When the air inside the resonance duct is hot in summer, after the system keeps the low vent rate (1st) operating for 5 seconds and discharges the hot air to the windshield side (Def Mode), the system starts to control normally in order to avoid for the passengers contacting the hot air.

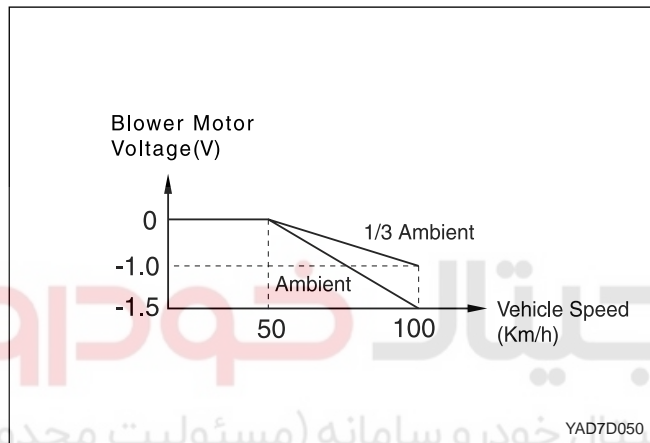
### Defroster Calibration

On the blower AUTO step, when the passenger sets to Defroster (Def), the system increases the blower voltage by 2 V for some intervals comparing AUTO voltage. But it is excluded the condition when the blower voltage is above 11.0 V. Also, the voltage increasing by defroster calibration is limited up to 10.5 V.

### Vehicle Speed Calibration

On the Ambient or the 1/3 Ambient and the blower AUTO, the blower decreases the voltage with the vehicle speed 100 Km/h such as 1.5 V for the Ambient, 1.0 V for the 1/3 Ambient.

But it is the exception for the blower max.



### Ambient Temperature Display

It indicates the ambient temperature as 0.5 °C increment in the set temperature digit by ambient temperature sensor.

- When you push the AMB key it indicates the ambient temperature for 5 seconds and return back the set temperature.
- If you push the AMB key again during indicating in 5 seconds, it returns back.
- The ambient temperature sensor is securing in the front of radiator and may be influenced easily to the heat of the engine compartment in parking. Therefore the ambient temperature sensor indicates the ambient temperature accurately on the condition of above 40 km/h running.

### Delivery Condition

For the initial installation (the initial current draw), the initial mode follows;

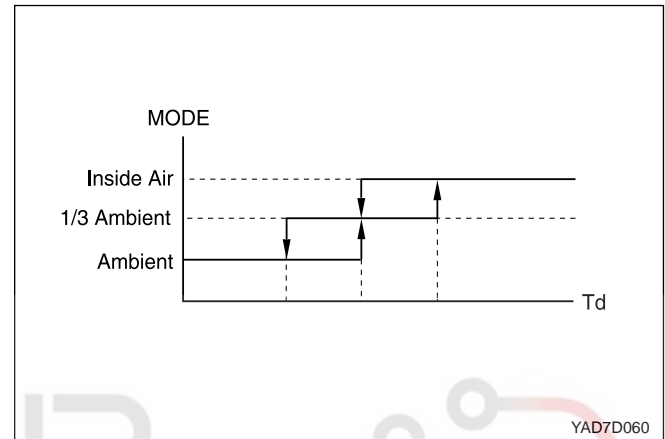
Actuator	Mode	Suction Air	A/C	Blower	Mix
Condition	FOOT/DEF	FRESH	OFF	OFF	Td Basic Control

### Vent inlet Control

#### Manual Control

When you push the I/A control switch, you can control the I/A door manually and the I/A door changes between the recirculation air and the fresh air flow alternately by the control switch. For changing the fresh air step (FRE) to the recirculation air step (REC), the blower voltage decrease 15% and for changing the recirculation air step (REC) to the fresh air step (FRE), the blower voltage return back.

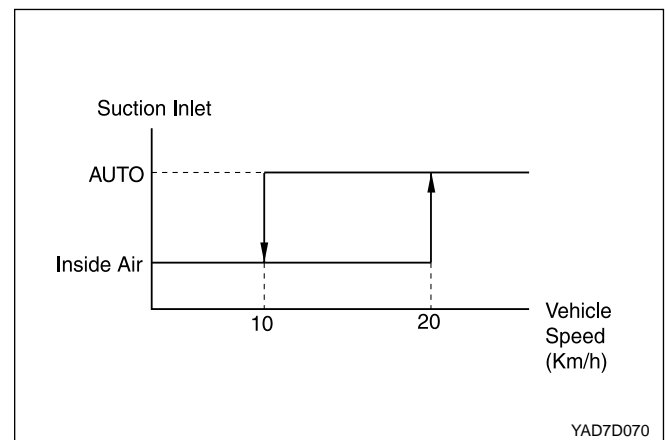
#### AUTO Control



#### Control by the Vehicle Speed

The system controls the vent inlet according to the vehicle speed in order to prevent the exhaust gas of the preceding vehicle from flowing inside with the vehicle stopping or driving at low speed. The operation and control condition is following as;

1. When the vent inlet mode is AUTO and the A/C "ON".
2. When the vehicle keeps to drive at below 10 km/h for 10 seconds and changes the REC mode at stop.
3. If 10 minutes passes after changing the REC mode, it returns back to the AUTO mode.

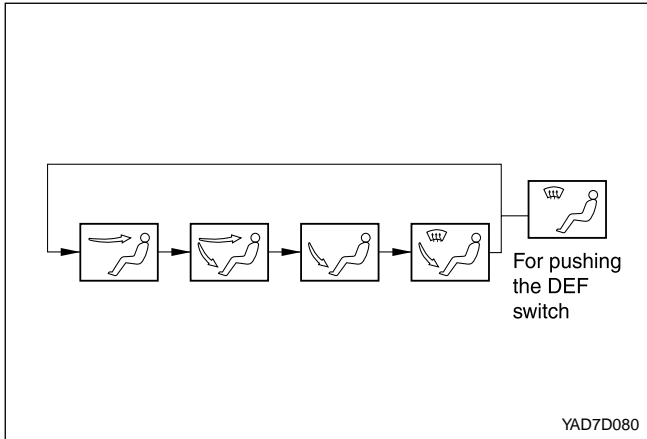




## Vent outlet Control

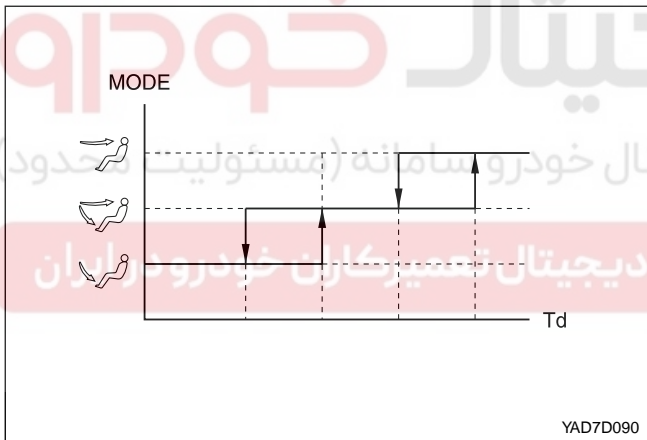
### Manual Control

For pushing the mode switch of AUTO temperature control, you can select four type of the vent outlets.



When you push the Def switch, it keeps to change to the defroster mode regardless of the sequence.

### AUTO Control



## A/C Control

### Manual Control

When you pushed the A/C switch "ON" or the Def switch "ON", A/C starts to operate.

### AUTO Control

Basic Control: A/C "ON" has the priority for the initial operation.

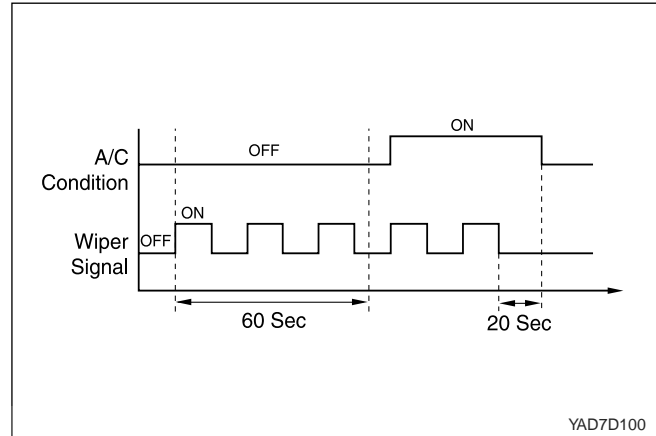
### Full Cold/Hot Control

When you sets the set temperature to full cold (LO) or full hot (HI), the system controls the temperature to full cold or full hot regardless of sensor's detection. For LO, it becomes A/C "ON", front vent mode, recirculation air, max blower speed, air mix door close and for HI, A/C "OFF", floor vent mode, ambient mode, air mix door open.

## Wiper Calibration Control

It is possible to generate the frost on the windshield in the rainy days. At this time, FATC controller allows the mode to change the AUTO defroster mode.

- Operation Condition: When the passenger operates the wiper on AUTO mode, the system controls the wiper on the A/C AUTO mode after sending the wiper signal and controlling the delay for 1 minutes.



## FATC Controller Illumination Control

When the tail lamp is ON, ATC Controller illumination lamp turns on.

## SYSTEM COMPONENTS - CONTROL

### Controller Assembly

The operation of the A/C system is controlled by the switched on the control head. This console-mounted controller consist of control knobs and a vacuum fluorescent display (VFD) indicating the status of the control settings selected.

### Sensors and Motors

- Inside air sensor, ambient sensor, coolant temperature and sun sensor
- Door mode motor, intake air control door motor, air mix door motor

### Inside Air Sensor

Inside air sensor located in left side of full automatic temperature control (FATC) controller, is a sensor that detects the interior air temperature and a thermistor that decreases its resistance when temperature up and increases when temperature down. If there is open or short in the sensors, 25 °C (77 °F) will be substitute.

### Inspection

When the inside air temperature sensor error displays, check the followings;

1. Remove the inside air temperature sensor and measure the resistance between the sensor connectors.  
(approximately 2.2 K $\Omega$  at 25 °C) Replace the inside air temperature sensor when the resistance value is excessive low or high.
2. Replace the inside air temperature sensor for outside the specified value and check the followings for within the specified value;
3. Turn the ignition ON.
4. Measure the voltage between A13 and A16 terminal of the AUTO temperature control connector.  
(approximately 2.2 V at 25 °C)
5. Verify the open circuit of the wiring harness when you can not measure the voltage value and replace the AUTO temperature control when it's normal.

### Ambient Sensor

Ambient sensor is a thermistor (NTC resistance) that decreases its resistance when temperature up and increases when temperature down and it detects ambient air temperature. If there is open or short in the sensors, 25 °C (77 °F) will be substitute. The sensor is located in the left back side of front bumper.

#### Inspection

When the ambient temperature sensor error displays, check the followings;

1. Remove the ambient temperature sensor and then measure the resistance between the sensor connectors.  
(approximately 2.2 K $\Omega$  at 25 °C) Replace the ambient temperature sensor when the resistance value is excessive low or high.
2. Replace the ambient temperature sensor for outside the specified value and check the followings for within the specified value;
3. Turn the ignition ON.
4. Measure the voltage between A13 and B8 terminal of the AUTO temperature control connector.  
(approximately 2.2 V at 25 °C)
5. Verify the open circuit of the wiring harness when you can not measure the voltage value and replace the AUTO temperature control when it's normal.

### Coolant Temperature Sensor

Coolant temperature sensor is a thermistor that decreases its resistance when temperature up and increases when temperature down. It detects coolant temperature to operate the blower speed at low when the coolant temperature is less than 50 °C (122 °F). If the coolant temperature sensor is open or short, 100 °C (212 °F) will be substitute.

#### Inspection

When the coolant temperature sensor error displays, check the followings;

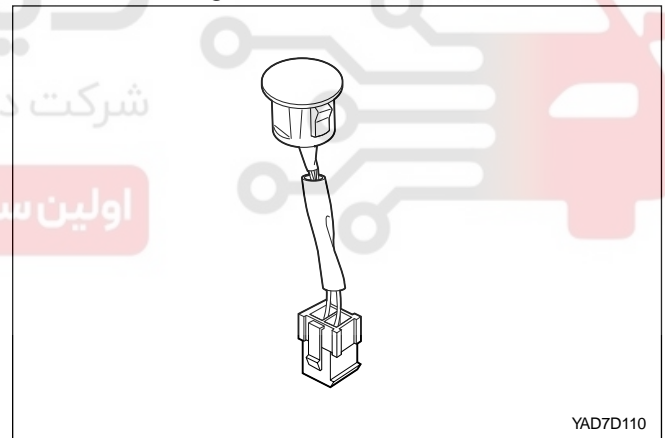
1. Measure the resistance between the sensor connectors. (approximately 2.2 K $\Omega$  at 25 °C)
2. Replace the coolant temperature sensor for outside the specified value and check the followings for within the specified value;
3. Turn the ignition ON.
4. Measure the voltage between A13 and B9 terminal of the AUTO temperature control connector.  
(approximately 2.2 V at 25 °C)
5. Verify the open circuit of the wiring harness when you can not measure the voltage value and replace the AUTO temperature control when it's normal.

### Sun Sensor

Sun sensor is a photo diode that detects lights. Resistance of the diode can be measured as current by using voltmeter according to increasing sun loads. If the sun sensor is error, no sun load will be substitute.

#### Photo Diode

It is used to the circuit converting the sun light loads to the electric signals.



#### Inspection

When the sun sensor error displays, check the followings;

1. Remove the sensor to place it under the sun light and measure the current between the connector terminals.
2. Place the sun sensor under the shadow place and measure the current between the connector terminals. If the value is lower than the value under the sun light, it's normal.
3. Turn the ignition ON.
4. Measure the voltage between A13 and B10 terminal of the AUTO temperature control connector. (Sun light; 2.5 V, Shadow; 4.8 V)
5. Verify the open circuit of the wiring harness when you can not measure the voltage value and replace the AUTO temperature control when it's normal.

## Intake Control Door Motor

The mode motor set the I/A mode by the control signal of the AUTO temperature control.

When the mode displayed in the AUTO temperature control is different from the actual mode, check the followings;

- Turn the ignition ON.
- Measure the voltage between the (+) terminals at each mode and verify that changes from 0V before the mode selection to 12V after the mode selection.
- If the value is the specified value, check the open or short circuit.
- If the wiring is normal, replace the AUTO temperature control.
- If the voltage value is outside the specified value, replace the I/A mode motor.
- Check the motor operation connecting the (+) terminal to No.4 of the motor connector and connecting No.5 and No.7 to (-) terminal sequentially using 12 V power.

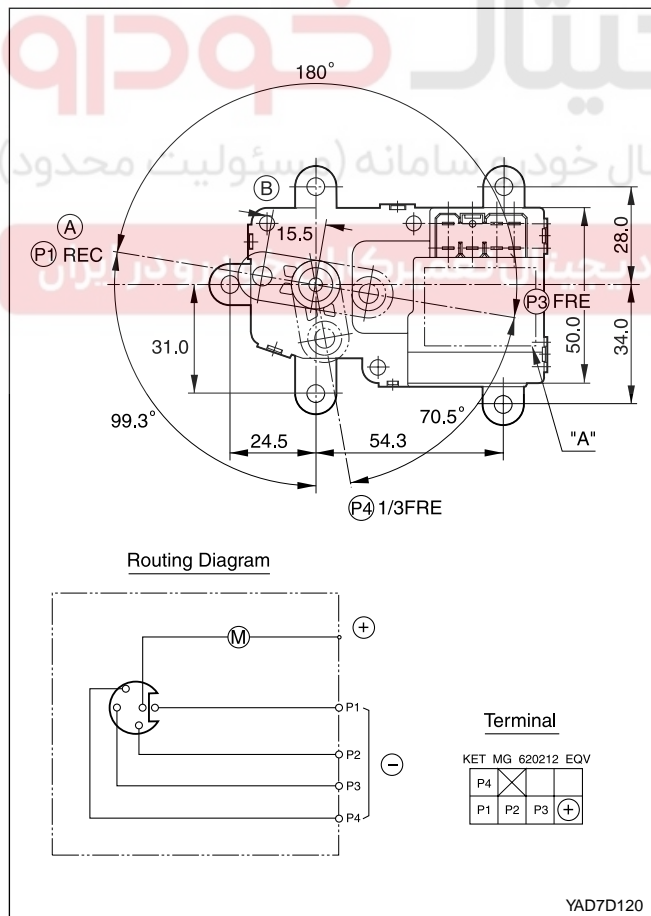
## Inspection

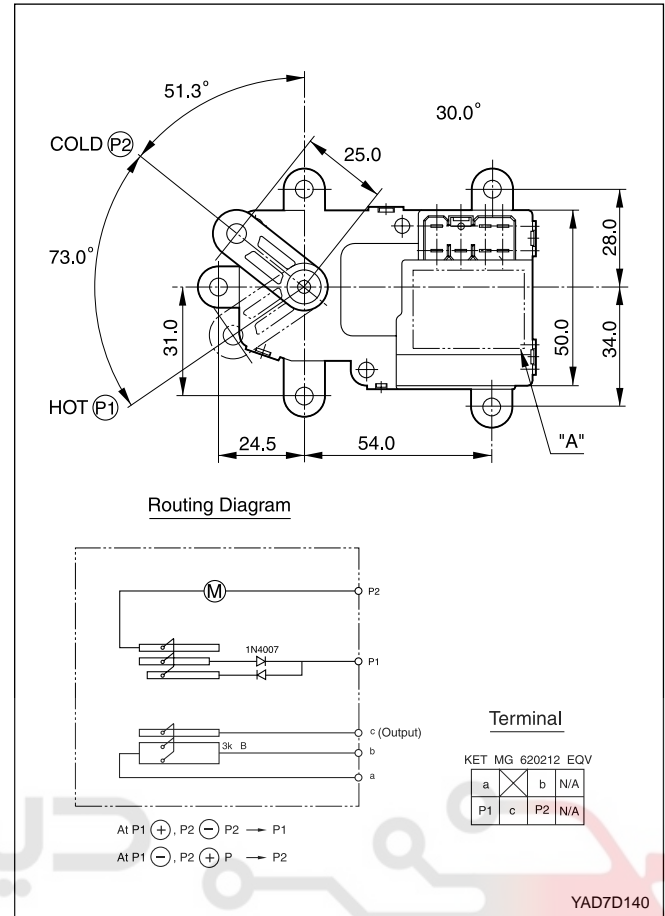
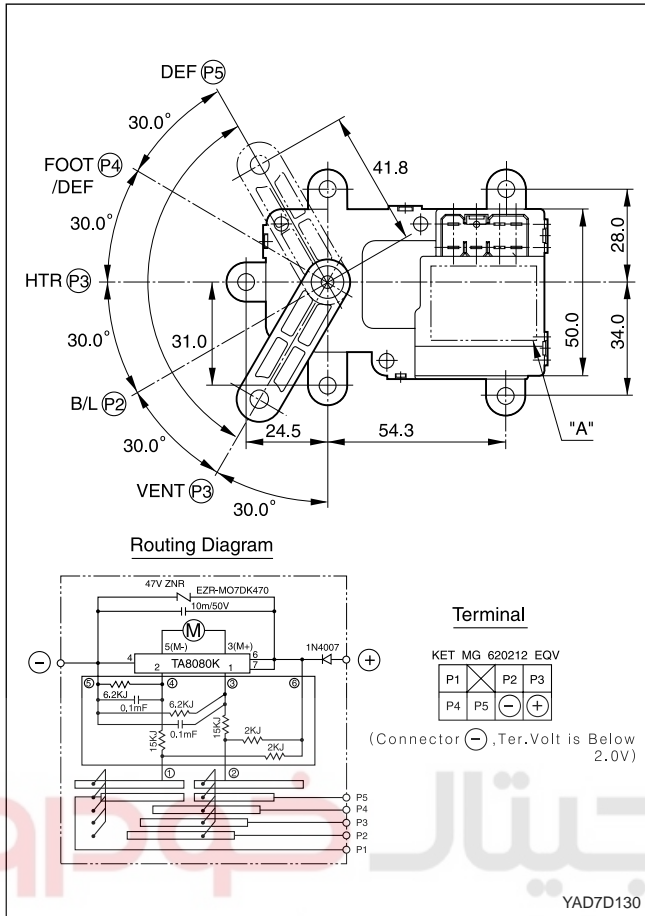
When the vent inlet mode displayed in the AUTO temperature control is different from the actual mode, check the followings;

1. Turn the ignition ON.
2. Measure the voltage between positive terminal and negative terminal of the Mtr-Act, AI connector. (Specified value; 12 V)
3. Measure the voltage between P1, P2, P3 and (+) terminal. (If it changes from 0V before the mode selection to 12 V after the mode selection, it's normal)
4. If the value is outside the specified value, check the open or short circuit.
5. If the wiring is normal, replace the AUTO temperature control.
6. If the value is the specified value, replace the Mtr-Act, AI.
7. Check the motor operation connecting the (+) terminal to No.4 of the motor connector and connecting No.5 and No.7 to (-) terminal sequentially using 12 V power.

## Mode Control Motor

The control motor sets the mode of Vent, Bi-level, Foot, Foot/Def or Def by opening/closing the outlet damper at the outlet of Vent, Foot or Def according to control signal of the AUTO temperature control.





### Inspection

When the vent inlet mode displayed in the AUTO temperature control is different from the actual mode, check the followings;

1. Turn the ignition ON.
2. Measure the voltage between P1 - P5 and (+) terminal. (If it changes from 0V before the mode selection to 12 V after the mode selection, it's normal)
3. If the value is outside the specified value, check the open or short circuit.
4. If the wiring is normal, replace the AUTO temperature control.
5. If the value is the specified value, replace the Mtr-Act, AI.
6. Check the motor operation connecting the (+) (-) terminal to the Mtr-Act mode and each terminal P1 - P5 to (-) terminal sequentially using 12 V power.

### Air Mix Door Motor

The air mix door motor is located on left side of heater module. The air mix door motor controls the exhaust air temperature by the signal of the FATC.

### Inspection

When the air mix door motor error displays, check the followings;

1. Turn the ignition ON.
2. Measure the voltage within P1, P2 terminals (specified value; 12 V) and a,b (specified value; 5).
3. If the value is outside the specified value, check the open or short circuit.
4. If the wiring is normal, replace the Mtr-Act, Temp.
5. If the (+) (-) terminal connects to P1 and P2 of the Mtr-Act, Temp alternately, the output by the each mode is following;

AMD	Mode	Bc Resistance
Cool	P1 (-), P2 (+)	Below 300 Ω
Hot	P1 (+), P2 (-)	Above 2.4 KΩ

### Power Transistor

Power transistor controls the blower airflow and it receives the airflow control signal from the AUTO temperature control in order to for blower motor to shift the speed without step by adding the current to the power transistor basic current.

### Inspection

When the power transistor error displays, check the followings.

1. Turn the ignition ON.
2. Measure the voltage between blower connectors by changing the step from 1st to 6th.
3. The voltage value by each step is the followings; (specified value; 0.5)
4. If the value is outside the specified value, check the open or short circuit.

1st	2nd	3rd	4th	5th	6th
4.5 V	6.0 V	7.5 V	9.0 V	11.0 V	RelayHi

5. When there is no problem in the wiring harness, replace the power transistor.

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## SPECIFICATIONS

Component			Description
Compressor		Type	Variable Displacement
		Model	V-5 Compressor
		Displacement	9.8 - 151 cc/rev
		Max. RPM	6,000 - 6,500 rpm
Receiver-Drier		Material	AL R/DRIER
		Capacity	210 cc
Refrigerant		Type	R-134a
		Capacity	750 ± 20 g
Oil		Type	Synthetic PAG Oil
		Capacity	220 cc
Condenser		Max. Capacity	11,400 Kcal/h
A/C Pressure Sensor	High (Gauge Pressure)	A/C ON	305 psi
		A/C OFF	425 psi
	Low (Gauge Pressure)	A/C ON	39 psi
		A/C OFF	30 psi
Blower Motor		Max. Capacity	7,475 - 9,075 Kcal/h
Heater Core		Fin Pitch	1.52 mm
		Size	200.5 x 168.2 x 25.0 mm
		Capacity	8,250 Kcal/h

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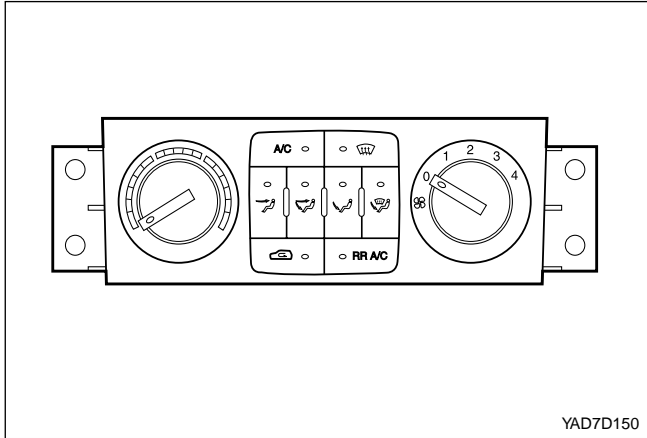
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## DIAGNOSTIC INFORMATION AND PROCEDURES

### GENERAL DIAGNOSIS

The full automatic temperature control (FATC) air conditioning controller contains a self-diagnosis function to aid in finding any problem with the system.



If the FATC detects some errors it will blink the temperature display screen for 5 seconds when the ignition switch is ON.

When there are some errors in the automatic temperature control system without displaying the faulty code, perform the diagnostic test using the applicable table.

### General A/C Diagnosis

Refer to Section 7B, Manual Control Heating, Ventilation, and Air Conditioning System for details of the following procedures:

- A/C Performance Test.
- Insufficient Cooling "Quick Check" Procedure.
- Insufficient Cooling Diagnosis.
- Leaking Testing the Refrigerant System.
- Low-and High-Side Pressure Relationship Chart.
- Pressure-Temperature Relationship of R-134a.
- Testing the refrigerant system.
- Pressure Test Chart (R-134a System).



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## INSUFFICIENT COOLING DIAGNOSIS

Step	Action	Yes	No
1	1. Check the A/C fuse. 2. Check the operation of the blower motor and cooling fan. 3. Check the accessory belt. 4. Check the A/C condenser for restricted air flow. 5. Check the engagement of the compressor clutch. 6. Check the discharge air temperature with the A/C turned ON. Are all above the operations normal?	System OK	Go to Step 2
2	1. Turn the ignition to LOCK. 2. Connect the high/low pressure gauges. Are both pressures within the specified value?	Go to Step 4	Go to Step 3
3	1. If it's above the specified value, discharge the refrigerant. 2. If it's below the specified value, add 0.45 kg (1 pound) of the refrigerant and repair any leaks as needed. 3. Recover, evacuate and recharge the A/C system. Is the repair complete?	System OK	-
4	1. Start the engine and allow it to run at idle. 2. Turn the A/C switch to ON. 3. Set the blower motor switch to 4th. 4. Set the temperature control lever to full cold. Does the A/C compressor clutch engage?	Go to Step 8	Go to Step 5
5	1. Turn the ignition to LOCK. 2. Check the open or short in the compressor wiring. Is there any open or short in the wiring?	Go to Step 6	Go to Step 7
6	Repair the faulty wiring as needed. Is the repair complete?	System OK	-
7	Replace the compressor clutch coil. Is the replacement complete?	System OK	-
8	Check for a knocking noise from the A/C compressor. Cycle the A/C compressor ON and OFF in order to verify the source of the noise. Do you hear a loud knocking noise?	Go to Step 9	Go to Step 10
9	1. Recover the A/C system refrigerant. 2. Replace the A/C compressor. 3. Evacuate and recharge the A/C system. 4. Check the A/C system for leaks. Is the compressor running normally?	System OK	-
10	1. Close all of the windows and doors. 2. Set the A/C switch to ON position. 3. Set the intake air control switch to "Fresh Air". 4. Set the blower motor switch to 4th. 5. Set the temperature control switch to full cold. 6. Keep it to run at idle for 5 minutes. 7. Check the temperature at the inlet/outlet of the evaporator. Is there a noticeable difference in the temperature of the evaporator inlet/outlet pipes?	Go to Step 11	Go to Step 13

## Insufficient Cooling Diagnosis (Cont'd)

Step	Action	Yes	No
11	1. Recover the A/C system refrigerant. 2. Replace the expansion valve as needed. 3. Evacuate and recharge the A/C system. 4. Check the A/C system for leaks. 5. Operate the A/C system. Is the discharge temperature normal?	Go to Step 13	Go to Step 12
12	1. Recover the refrigerant of the A/C system. 2. Evacuate and recharge the A/C system. 3. Check the A/C system for leaks. Does the A/C system operate normally?	System OK	-
13	Feel the liquid pipe between the condenser and the expansion valve. Is the pipe cold?	Go to Step 15	Go to Step 14
14	1. Repair any restriction in high pressure side. 2. Check the A/C system for leaks. Does the A/C system operate normally?	System OK	-
15	1. Run the engine at 3,000 rpm. 2. Close all of the windows and doors. 3. Set the A/C switch to ON. 4. Set the blower motor switch to 4th. 5. Set the temperature control switch to full cold. 6. Turn the A/C switch ON and OFF every 20 seconds for 3 minutes. 7. Measure the compressor high and low pressure. Are both pressures within the specified value?	Go to Step 17	Go to Step 16
16	Add the specified amount of the refrigerant to the A/C system. Is the amount within the specified value?	System OK	-
17	1. Turn the ignition to LOCK. 2. Set the A/C switch to OFF position. Can you turn the compressor clutch freely by hand?	Go to Step 18	Go to Step 19
18	1. Check the A/C system for leaks. 2. Repair any leaks as needed. 3. Evacuate and recharge the A/C system. Does the A/C system operate normally?	System OK	-
19	1. Recover the refrigerant of the A/C system. 2. Evacuate and recharge the A/C system. 3. Check the A/C system for leaks. 4. Replace the compressor as needed. Is the repair complete?	System OK	-

## FULL AUTOMATIC TEMPERATURE CONTROL (FATC) DOES NOT OPERATE WHEN THE IGNITION IS ON

Step	Action	Yes	No
1	Check the fuse F18. Are the fuses blown?	Go to Step 3	Go to Step 2
2	Replace the fuse. Is the repair complete?	System OK	-
3	1. Remove the controller with connecting ATC wiring connector. 2. Turn the ignition switch to ON. 3. Measure the voltage between terminal A1 and A5 of the connectors Is the voltage within specified value?	Go to Step 15 11 - 14 V	Go to Step 4
4	Replace the controller. Is the repair complete?	System OK	-
5	Measure the voltage between terminal A5 of the connector and ground. Is the voltage within specified value?	Go to Step 6	Go to Step 7
6	Repair the faulty circuit between fuse F18 and terminal A5 of the ATC wiring connector. Is the repair complete?	System OK	-
7	Repair the faulty circuit between the ground G203 and terminal A1 of the ATC wiring connector. Is the repair complete?	System OK	-

## CONTROLLER DOES NOT ILLUMINATE WHEN LIGHT SWITCH IS ON

Step	Action	Yes	No
1	1. Remove the controller with connecting ATC wiring connector. 2. Turn the ignition switch to ON. 3. Measure the voltage between terminal A4 and A3 of the controller. Is the voltage within the specified value?	Go to Step 3 11 V - 14 V	Go to Step 2
2	Repair the wiring harness between splice S206 and terminal A3 of the controller connector or between splice S206 and terminal A4 of the controller connector. Is the repair complete?	System OK	-
3	Check the illumination bulb. Is the bulb burned out?	Go to Step 4	Go to Step 5
4	Check the illumination bulb. Is the repair complete?	System OK	-
5	Replace the controller. Is the repair complete?	System OK	-

## NO HOT AIR FROM BLOWER

Step	Action	Yes	No
1	Check the coolant level. Is the coolant level within the specified value?	Go to Step 3	Go to Step 2
2	Add coolant as needed. Is the repair complete?	System OK	-
3	1. Turn the ignition to ON. 2. Observe the temperature indication screen of the controller. Does the digit flash?	Go to Step 6	Go to Step 4
4	Observe the blower motor operation. Is the blower motor functioning at all?	Go to Step 5	Go to "Blower Motor Does Not Run At All"
5	Use the blower push switch to cycle the blower through its different speeds. Does the motor function at different speeds?	Go to Step 7	Go to "the Applicable Diagnostic Table"
6	Run a self diagnosis circuit check. Does the display indicate a defect code?	Go to Step 7	Go to "the Applicable Diagnostic Table"
7	Check the airflow of the ducts at each mode. Is the airflow normal?	Go to Step 9	Go to Step 8
8	Check inside the heater duct for obstructions and repair as needed. Is the repair complete?	System OK	-
9	Observe the air mix door motor while changing the temperature setting from LO to HI and then from HI to LO. Is the air mix door actuator functioning properly?	Go to Step 10	Go to "the Applicable Diagnostic Table"
10	Check the coolant hoses for leaks or kinks. Are the coolant hoses in good condition?	Go to Step 12	Go to Step 11
11	Replace the coolant hoses. Is the repair complete?	System OK	-
12	Check the coolant reservoir cap. Is the coolant tank cap in hood condition?	Go to Step 14	Go to Step 13
13	Replace the coolant reservoir cap. Is the repair complete?	System OK	-
14	1. Turn the A/C switch to ON. 2. Set the temperature control to full hot (HI). 3. Set the blower motor speed to full high. 4. Remove the coolant reservoir cap (all segments illuminated on the display). 5. Start the vehicle and run the engine at idles. 6. Watch for the flow of the coolant when the thermostat opens. Does the coolant flow normally?	Go to Step 16	Go to Step 15
15	1. Check for <ul style="list-style-type: none"> <li>• faulty thermostat.</li> <li>• failed coolant pump impeller.</li> <li>• restriction in the cooling system.</li> </ul> 2. Make repairs, as needed. Is the repair complete?	System OK	-

**No Hot Air From Blower (Cont'd)**

Step	Action	Yes	No
16	Check the temperature of the heater inlet and outlet hoses by feel. Is the heater inlet hose hot and the outlet hose warm?	Go to Step 18	Go to Step 17
17	Back flush or replace the heater core. Is the repair complete?	System OK	-
18	Check the vehicle for cold air leaks the <ul style="list-style-type: none"> <li>• Dash.</li> <li>• Heater cases.</li> <li>• Vents.</li> </ul> Are any leaks found?	Go to Step 20	Go to Step 19
19	Repair any cold air leaks. Is the repair complete?	System OK	-
20	Check the coolant temperature sensor using the tests in "DTC Coolant Temperature Sensor Error." Is there a problem indicated in the sensor, the sensor wiring or the controller?	Go to Step 21	Go to Step 22
21	Repair, or replace the sensor, the wiring, or the controller as required. Is the repair complete?	System OK	-
22	Replace the controller. Is the repair complete?	System OK	-

**BLOWER MOTOR DOES NOT RUN AT ALL**

Step	Action	Yes	No
1	1. Turn the ignition switch to ON. 2. Observe the temperature indication screen of the controller. Dose the digit on and off?	Go to "the Applicable Diagnostic Table"	Go to Step 2
2	Check the fuses. Are the fuses blown?	Go to Step 3	Go to Step 4
3	Replace the fuse. Is the repair complete?	System OK	-
4	1. Turn the ignition switch to ON. 2. Measure the voltage between ground and terminal 87 of blower relay. Is the voltage within the specified value?	Go to Step 7 11 - 14 V	Go to Step 5
5	1. Measure the voltage between ground and terminal 86 of blower relay. Is the voltage within the specified value?	Go to Step 9 11 - 14 V	Go to Step 6
6	1. Check the circuit between terminal 86 of the blower relay and fuse SB7 in the I/P fuse block. 2. Repair any problem found in the wiring or terminals at the relay socket or connectors. Is the repair complete?	System OK	-
7	1. Turn the ignition to OFF. 2. Disconnect the wiring connector of the blower motor. 3. Turn the ignition to ON. 4. Measure voltage between the wiring connector of the blower motor and ground. Is the voltage within the specified value?	Go to Step 11 11 - 14 V	Go to Step 10



**Blower Motor Does Not Run At All (Cont'd)**

Step	Action	Yes	No
8	Repair the faulty circuit between the wiring connector of the blower relay, wiring, blower motor, connector C203, C107. Is the repair complete?	System OK	-
9	Measure voltage between terminal 30 of the blower relay and ground. Is the voltage within the specified value?	Go to Step 9 11 - 14 V	Go to Step 10
10	1. Repair the circuit between terminal 86 of the blower relay and fuse SB7 in the I/P fuse block. 2. Repair the wiring connector of the blower relay, wiring, blower motor, connector C203, C107. Is the repair complete?	System OK	-
11	1. Turn the ignition switch to OFF. 2. Using an ohmmeter, measure the resistance between terminal 85 of the blower relay and ground. Does the measured resistance indicate 0 $\Omega$ ?	Go to Step 13	Go to Step 12
12	Repair the faulty circuit between terminal 85 of the blower relay, C104 and ground G101. Is the repair complete?	System OK	-
13	Replace the blower motor relay. Is the repair complete?	System OK	-
14	Measure the resistance of the blower motor. Does the measured resistance indicate 0.5 $\Omega$ ?	Go to Step 15	Go to Step 16
15	Replace the blower motor. Is the repair complete?	System OK	-
16	Measure the open or short of the circuit between terminal 1 of the blower connector and terminal 30 of the blower high relay and terminal 6 of the power transistor. Is there any open or short circuit?	Go to Step 17	Go to Step 18
17	Repair the problem in the circuit. Is the repair complete?	System OK	-
18	Measure the resistance of the circuit from terminal 3 of the power transistor connector and ground. Does the measured resistance indicate 0 $\Omega$ ?	Go to Step 19	Go to Step 20
19	Replace the controller. Is the repair complete?	System OK	-
20	1. Repair the faulty circuit from terminal 3 of the power transistor connector and terminal 87 of the high blower relay to ground. 2. Repair the faulty in the wiring, connector, C109, C209, C104 or ground G104. Is the repair complete?	System OK	-

**NO COOL AIR FROM BLOWER**

Step	Action	Yes	No
1	1. Turn the ignition switch to ON. 2. Observe the temperature indication screen of the controller. Does the digit flash?	Go to Step 2	Go to Step 3
2	Run a self-diagnosis circuit check. Does the display indicate a defect code?	Go to "the Applicable Diagnostic Table"	Go to Step 4
3	Observe the blower motor operation. Is the blower motor functioning at all?	Go to Step 4	Go to "Blower Motor Does Not Run At All"
4	Use the blower push switch to cycle the blower through its different speeds. Does the motor function at different speeds?	Go to Step 5	Go to "the Applicable Diagnostic Table"
5	Check the airflow of the ducts at each mode. Is the airflow normal?	Go to Step 8	Go to Step 6
6	Check inside the heater duct for obstructions and repair as needed. Is the repair complete?	System OK	-
7	Observe the air mix door motor while changing the temperature setting from LO to HI and then from HI to LO. Is the air mix door actuator functioning properly?	Go to Step 8	Go to "the Applicable Diagnostic Table"
8	Perform the checks found in "Insufficient Cooling Diagnosis." Is the system operating normally now?	System OK	Go to Step 9
9	Place the controller in the AUTO mode. Is smoke taken into the intake port of the inside air sensor?	Go to Step 11	Go to Step 10
10	Replace the intake hose. Is the repair complete?	System OK	-
11	Check the each sensor and sensor wiring using the Diagnostic Table. Is there a problem indicated in the sensor, the sensor wiring or the controller?	Go to Step 12	Go to Step 13
12	Repair, or replace the sensor, the wiring, or the controller as required. Is the repair complete?	System OK	-
13	Replace the controller. Is the repair complete?	System OK	-

**MODE CONTROLS DOES NOT WORK**

Step	Action	Yes	No
1	Measure the voltage between terminal 4 of the blower motor and mode door motor ground. Is the voltage within the specified value?	Go to Step 3 11 - 14 V	Go to Step 17
2	Repair the connector and the circuit for any wiring or terminal problems. Is the repair complete?	System OK	-
3	1. Using the Motor Control Table, measure the voltages at the specified terminals of the specified motor connectors. 2. Change the mode settings and observe the voltage changes. Is the voltage within the specified value?	Go to Step 5	Go to Step 4
4	Repair or replace the wiring harness or the defective terminal. Is the repair complete?	System OK	-
5	1. Measure the voltages of the connector terminal. 2. Change the mode settings and observe the voltage changes. Is the voltage within the specified value?	Go to Step 7	Go to Step 6
6	Replace the fuel filter or the fuel line.	System OK	-
7	Check the connector at the controller. Is there a defective terminal?	Go to Step 8	Go to Step 9
8	Repair the terminal and replace as needed. Is the repair complete?	System OK	-
9	Replace the controller. Is the repair complete?	System OK	-

**MODE CONTROLS DOES NOT WORK**

Step	Action	Yes	No
1	Measure the voltage between terminal 4 of the intake control door motor and ground. Is the voltage within the specified value?	Go to Step 3 11 - 14 V	Go to Step 2
2	Repair the connector and the circuit for any wiring or terminal problems. Is the repair complete?	System OK	-
3	1. Measure the voltages at the specified terminals of the specified motor connectors. 2. Change the mode settings and observe the voltage changes Is the voltage within the specified value?	Go to Step 5	Go to Step 4
4	1. Repair the wiring harness or the defective terminal. 2. Replace the fuel filter or the fuel line as needed. Is the repair complete?	System OK	-
5	Check the connector at the controller. Is there a defective terminal?	Go to Step 6	Go to Step 7
6	Repair the terminal and replace as needed. Is the repair complete?	System OK	-
7	Replace the controller. Is the repair complete?	System OK	-

**ABNORMAL REFRIGERANT PRESSURE**

Step	Action	Yes	No
1	1. Verify whether airflow and excessive refrigerant. 2. Check any restriction at the condenser or radiator. 3. Check the condenser or cooling fan for proper operation. 4. Check any restriction of the refrigerant lines. Is the high-side refrigerant pressure high abnormally?	Go to Step 2	Go to Step 3
2	1. Recover, evacuate and recharge the A/C system according to the specified value. 2. Clean the condenser or radiator core. 3. Check the voltage, rpm, direction of the cooling fan. 4. Repair or replace the applicable parts as needed. Is the high-side pressure within the specified value?	System OK	-
3	1. Check the amount of the refrigerant. 2. Check the internal faulty of the compressor. 3. Check the faulty of the expansion valve. 4. Check the moisture mix into the system. Is the high-side refrigerant pressure low abnormally?	Go to Step 4	Go to Step 5
4	1. Replace the compressor and the expansion valve as needed. 2. Recover, evacuate and recharge the A/C system according to the specified value. 3. Repair any leaks as needed. Is the repair complete?	System OK	-
5	1. Check the freezing/clogging of the expansion valve 2. Check the clogging of the receiver-drier. 3. Check the amount of the refrigerant. Is the low-side refrigerant pressure low abnormally?	Go to Step 6	Go to Step 7
6	1. Clean the expansion valve and replace it as needed. 2. Replace the receiver-drier as needed. Is the repair complete?	System OK	-
7	1. Check the expansion valve and the compressor for any faulty. 2. Check the excessive amount of the refrigerant. Is the low-side refrigerant pressure high abnormally?	Go to Step 8	Go to Step 9
8	1. Replace the expansion valve and the compressor as needed. 2. Add the specified amount of the refrigerant. Is the repair complete?	System OK	-
9	1. Check the tightening condition of the refrigerant line coupling and bolts. 2. Check the faulty O-ring. 3. Check the faulty gasket or seal of the compressor. Is there any refrigerant leak?	Go to Step 10	System OK
10	1. Tighten the bolts. 2. Replace the faulty O-ring. 3. Replace the faulty compressor. Is the repair complete?	System OK	-

**COMPRESSOR MAGNETIC CLUTCH DOES NOT ENGAGE**

Step	Action	Yes	No
1	1. Remove the controller with connecting the connector. 2. Turn the ignition switch to ON. 3. Set the A/C switch to ON. 4. Measure the voltage between the controller connector A12 (or all for GSL) and the ground. Is the voltage within the specified value?	Go to "Insufficient Cooling Diagnosis" 11 - 14 V	Go to Step 2
2	Replace the defective motor. Is the repair complete?	System OK	-

**INSIDE AIR TEMPERATURE SENSOR ERROR**

Step	Action	Yes	No
1	1. Put the smoke of the cigarette near the air inlet and verify that the smoke come into the air inlet properly. 2. Remove the controller with connecting the connector. 3. Turn the ignition switch to ON. 4. Measure the voltage between the connector terminals of the inside air sensor. Does the measured voltage indicate 2 - 3 V at 25 °C?	Go to Step 3	Go to Step 2
2	Repair the open or short of the wiring harness. Is the repair complete?	System OK	-
3	1. Remove the inside air temperature sensor. 2. Measure the resistance between the inside air sensor connector terminals. Does the measured resistance indicate 2.2 kΩ at 25 °C?	Go to Step 5	Go to Step 4
4	Replace the inside air sensor. Is the repair complete?	System OK	-
5	Replace the controller. Is the repair complete?	System OK	-

**AMBIENT AIR TEMPERATURE SENSOR ERROR**

Step	Action	Yes	No
1	1. Remove the ambient air temperature sensor. 2. Measure the resistance between the ambient air temperature sensor connector terminals. Does the measured resistance indicate 2.2 kΩ at 25 °C?	Go to Step 3	Go to Step 2
2	Replace the ambient air temperature sensor. Is the repair complete?	System OK	-
3	1. Remove the controller with connecting the connector. 2. Turn the ignition switch to ON. 3. Measure the voltage between terminal B8 and connector A13. Does the measured voltage indicate 2.2 V at 25 °C?	Go to Step 5	Go to Step 4
4	Repair the open or short of the wiring harness. Is the repair complete?	System OK	-
5	Replace the controller. Is the repair complete?	System OK	-

**COOLANT TEMPERATURE SENSOR ERROR**

Step	Action	Yes	No
1	1. Disconnect the coolant temperature sensor connector from the FATC harness. 2. Measure the resistance between the coolant temperature sensor connector terminals.. Does the measured resistance indicate 2.2 kΩ at 25 °C?	Go to Step 3	Go to Step 2
2	Replace the coolant temperature sensor. Is the repair complete?	System OK	-
3	1. Remove the controller with connecting the connector. 2. Turn the ignition switch to ON. 3. Measure the voltage between terminal B9 and connector A13. Does the measured voltage indicate 2.2 V at 25 °C?	Go to Step 5	Go to Step 4
4	Repair the open or short of the wiring harness. Is the repair complete?	System OK	-
5	Replace the controller. Is the repair complete?	System OK	-

**AIR MIX DOOR ERROR**

Step	Action	Yes	No
1	1. Disconnect the I/P wiring harness connector form the air mix door motor. 2. Use an ohmmeter to measure the resistance between terminals 5 and 7 on the air mix door motor. Is the resistance within the specified value?	Go to step 3 open : ∞ short : 0 Ω	Go to Step 2
2	Replace the air mix door motor. Is the repair complete?	System OK	-
3	Use an ohmmeter to measure the resistance between terminals 2 and 3 on the air mix door motor. Does the measured resistance indicate approximately 3 kΩ?	Go to Step 5	Go to Step 4
4	Replace the air mix door motor. Is the repair complete?	System OK	-
5	Use an ohmmeter to measure the resistance between terminals 6 and 3, 6 and 2 on the air mix door motor. Does the measured resistance indicate approximately 3 kΩ?	Go to Step 7	Go to Step 6
6	Replace the air mix door motor. Is the repair complete?	System OK	-
7	Check the connector terminals at the air mix door motor and the wiring in the FATC harness. Is there a problem with any terminal on either the harness connector or the motor connector or the wiring?	Go to Step 9	Go to Step 8
8	1. Remove the FATC controller from the instrument panel. 2. Disconnect the harness connectors of the controller. 3. Examine the connector terminals on the harness connectors and the controller connectors and the harness wiring. Is there a problem with any of these connectors or the wiring?	Go to Step 9	Go to Step 10
9	Repair the problem found with a connector terminal or wiring. Is the repair complete?	System OK	-



## Air Mix Door Error (Cont'd)

Step	Action	Yes	No
10	Check continuity in the harness between the controller connectors and the air mix door motor connector. Is there a problem with the wiring?	Go to Step 11	Go to Step 12
11	Repair the problem found with the wiring and replace as needed. Is the repair complete?	System OK	-
12	1. Reconnect the FATC harness connectors to the controller. 2. Reconnect the air mix door motor to the FATC harness. 3. Turn the ignition to ON. 4. Measure the voltage between ground and terminal B5 at the controller by backprobing the connector. Is the voltage within the specified value?	Go to Step 14 0 - 5 V	Go to Step 13
13	Repair the problem found between the controller connector wiring and air mix door connector wiring. Is the repair complete?	System OK	-
14	1. Set the temperature controller to LO. 2. Measure the voltage between ground and terminal A15 at the controller by backprobing the connector. (Specified voltage : 12 V) 3. Raise the temperature setting on the controller to HI and measure the voltage. (Turn to 0V) 4. Measure the voltage between ground and terminal A9 at the controller. (Specified voltage : 12 V) 5. Change the temperature setting on the controller to LO and measure the voltage. (0 V) Is the voltage within the specified value?	Go to Step 15	Go to Step 17
15	Recheck all wiring circuits between the controller and the air mix door motor with changing the temperature setting. Does the air mix door operate normally?	System OK	Go to Step 6
16	Replace the air mix door motor. Is the repair complete?	System OK	-
17	Recheck all wiring circuits between the controller and the air mix door motor. Is there a problem in the wiring or the connectors?	Go to Step 18	Go to Step 19
18	Repair the problem in the wiring between the FATC controller and the air mix door motor. Is the repair complete?	System OK	-
19	Recheck the air mix door motor. Is there a problem in the air mix door motor?	Go to Step 16	Go to Step 21
20	Replace the air mix door motor. Is the repair complete?	System OK	-
21	1. Install the components. 2. Perform the diagnostic test of the controller. Does the DTC reset?	Go to Step 16	System OK

**SUN SENSOR ERROR**

Step	Action	Yes	No
1	1. Disconnect the Sun sensor connector. 2. Place the sun sensor under the sun light and measure the current between the connector terminals. 3. Place the sun sensor under the shadow place and measure the current between the connector terminals. Is the measured current lower at the shadow place?	Go to Step 3	Go to Step 2
2	replace the sun sensor. Is the repair complete?	System OK	-
3	1. Remove the controller with connecting the connectors. 2. Turn the ignition switch to ON. 3. Measure the voltage terminal A13 and B10 by backprobing the connectors. (Sun light: 2.5 V, Shadow: 4.8 V) Is the voltage equal to the specified value?	Go to Step 5	Go to Step 4
4	Repair open or short circuit. Is the repair complete?	System OK	-
5	Replace the FATC controller. Is the repair complete?	System OK	-

**POWER TRANSISTOR ERROR**

Step	Action	Yes	No
1	1. Remove the controller and disconnect the controller connector. 2. Disconnect power transistor connector. 3. Examine the open or short circuit between controller connector and power transistor connector. Is there a problem in the wiring or the connectors?	Go to Step 2	Go to Step 3
2	Repair the faulty wiring and replace as needed. Is the repair complete?	System OK	-
3	1. Reconnect power transistor connector and FATC connectors. 2. Turn the ignition switch to ON. 3. Measure the voltage between ground and terminal B12 of the FATC controller while changing the blower speed from 1 to 6 manually. 1st : 4.5 V    4th : 9.0 V 2rd : 6.0 V    5th : 11.0 V 3th : 7.5 V    6th : 12.5 V Is the resistance equal to the specified value?	Go to Step 5	Go to Step 4
4	Replace the power transistor. Is the repair complete?	System OK	-
5	Replace the FATC controller. Is the repair complete?	System OK	-

**MAX-HIGH RELAY ERROR**

Step	Action	Yes	No
1	1. Remove the controller with connecting the connectors. 2. Turn the ignition switch to ON. 3. Set the blower speed for 5th speed manually. 4. Measure the voltage at terminal A10 and ground. Does the measured voltage indicate 0V?	Go to Step 3	Go to Step 2
2	Replace the FATC controller. Is the repair complete?	System OK	-
3	1. Check the wiring harness associated with blower high relay and terminals. 2. Repair any defects found. 3. Install the component. Is DTC retrieved as a current DTC?	Go to Step 4	System OK
4	Replace blower high relay. Is the repair complete?	System OK	-

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

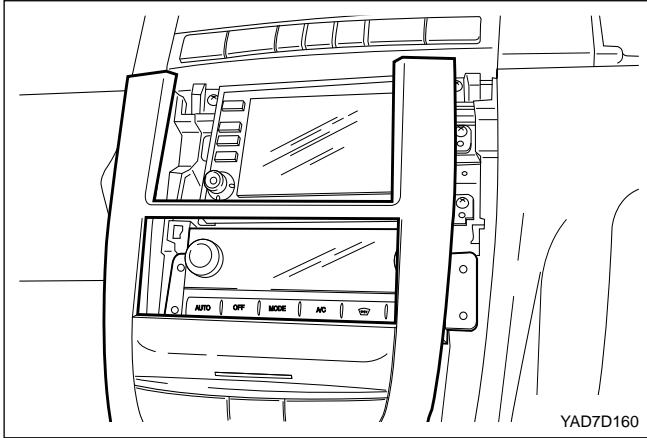


## REPAIR INSTRUCTIONS

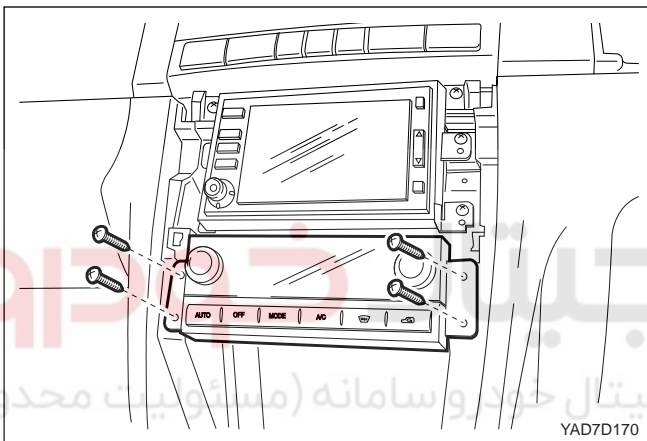
### ON-VEHICLE SERVICE

#### CONTROL SWITCH ASSEMBLY

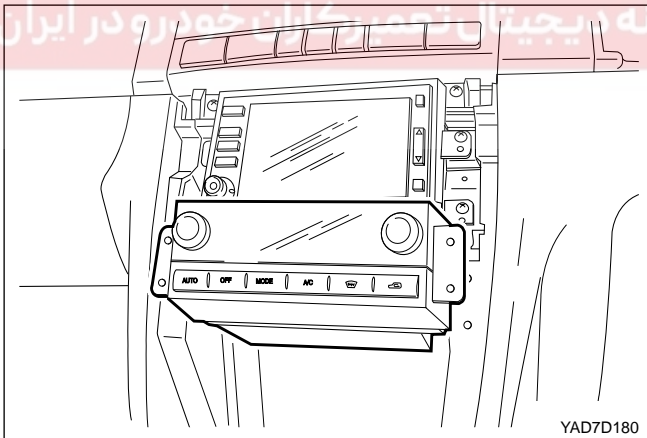
1. Remove the center instrument panel.

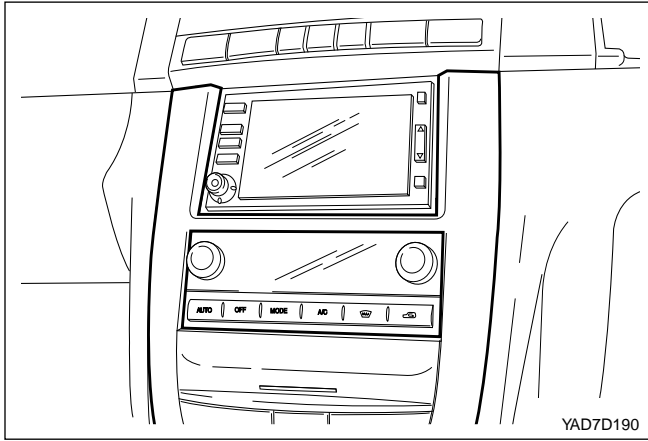


2. Remove the four screws securing the control switch assembly.



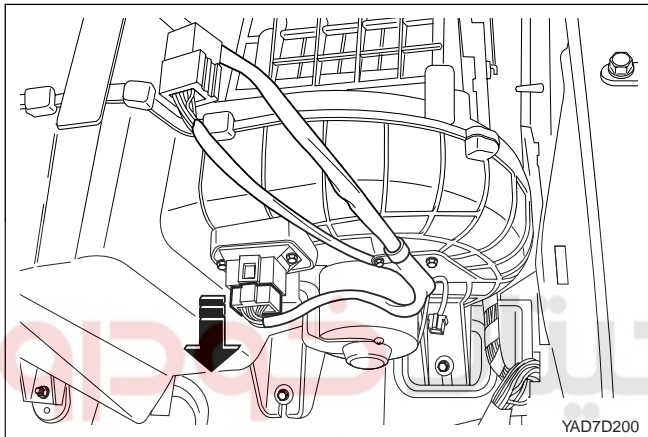
3. Remove the control switch assembly from the instrument panel.





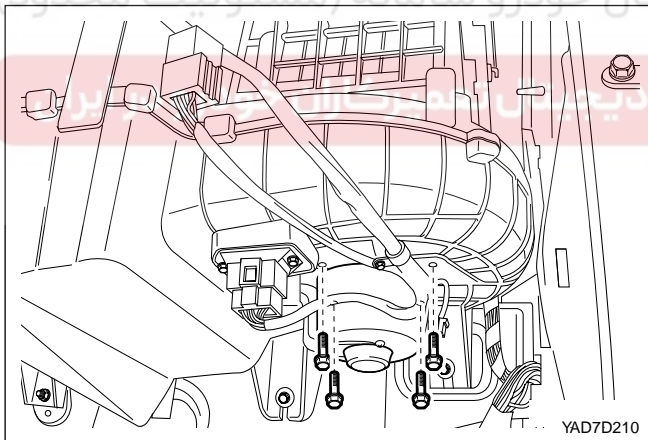
4. Installation should follow the removal procedure in the reverse order.

**Notice:** Insert the connectors to the switch and then assemble the control switch completely.

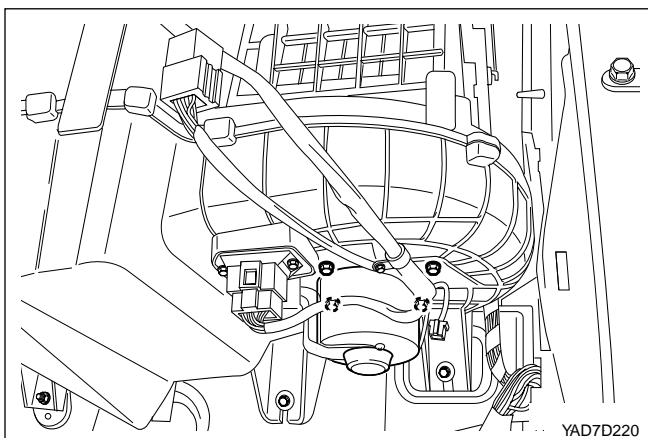


## BLOWER MOTOR

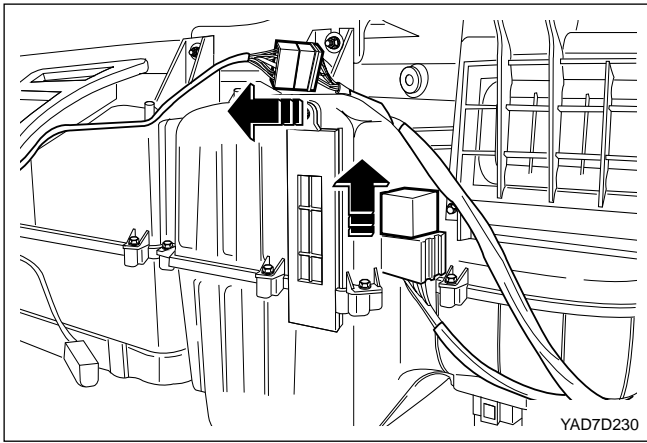
1. Remove the glove box and put the floor mat aside.
2. Disconnect the connectors connecting the blower motor.



3. Remove four bolts securing the blower motor and remove the motor assembly.

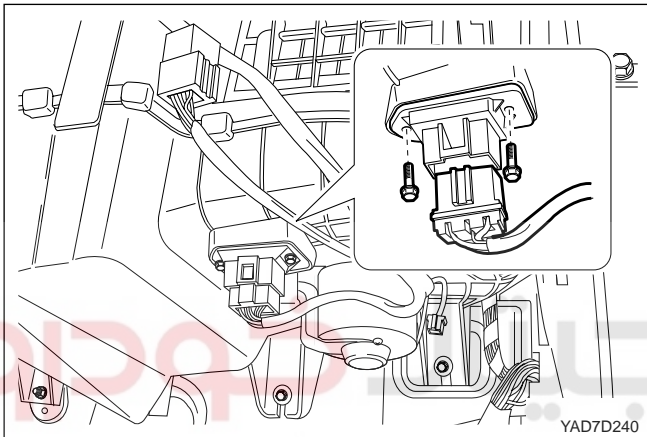


4. Installation should follow the removal procedure in the reverse order.



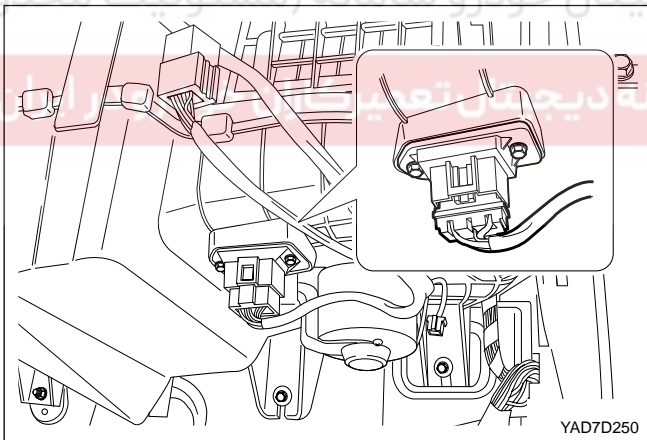
## HIGH BLOWER RELAY

1. Remove the high relay connector of the blower motor.
2. Remove the bolt securing the high relay.
3. Installation should follow the removal procedure in the reverse order.



## BLOWER MOTOR RESISTANCE (POWER TRANSISTOR)

1. Remove the connector of the power transistor.
2. Remove two bolts securing the power transistor.
3. Remove the power transistor assembly.

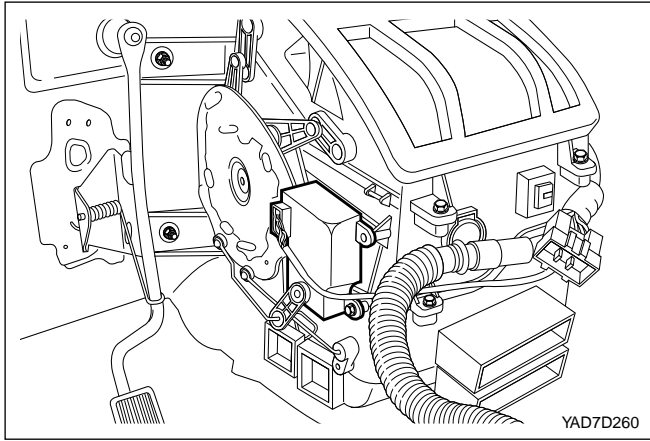


4. Installation should follow the removal procedure in the reverse order.

## AIR MIX DOOR ACTUATOR

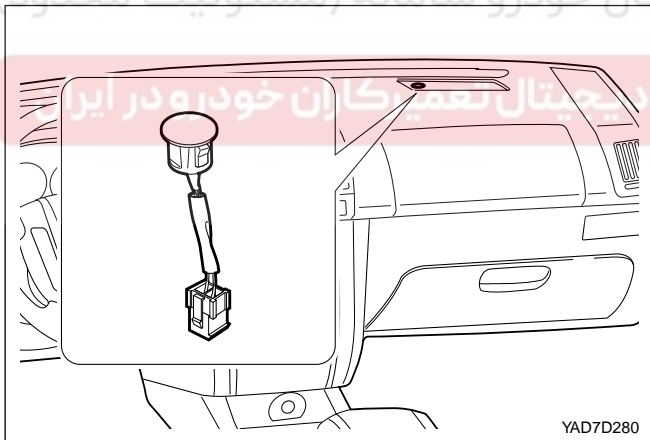
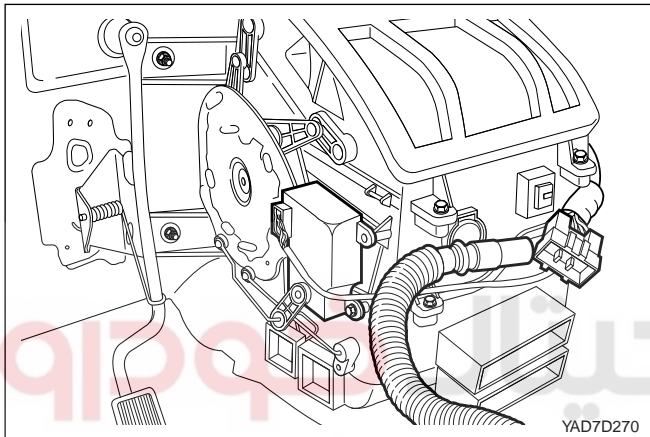
1. Disconnect the negative battery cable.
2. Remove the glove box.
3. Disconnect the connectors of the air mix door actuator.
4. Remove three screws securing the mode control door actuator and heater/air distributor case.
5. Remove the mode control actuator slowly and then remove the air mix door actuator.
6. Installation should follow the removal procedure in the reverse order.





## MODE CONTROL DOOR ACTUATOR

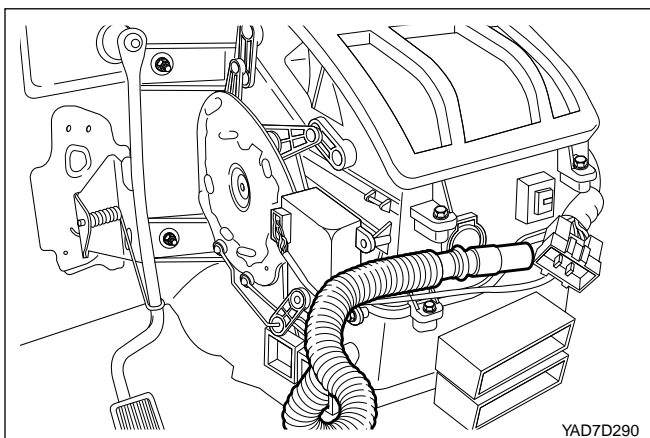
1. Disconnect the negative battery cable.
2. Remove the driver's knee bolster or lower cover.
3. Disconnect the connector to mode control door actuator.
4. Remove three screws securing the mode control door actuator and heater/air distributor case.
5. Remove the mode control actuator slowly and then remove the mode control door actuator.
6. Installation should follow the removal procedure in the reverse order.



## SUN SENSOR

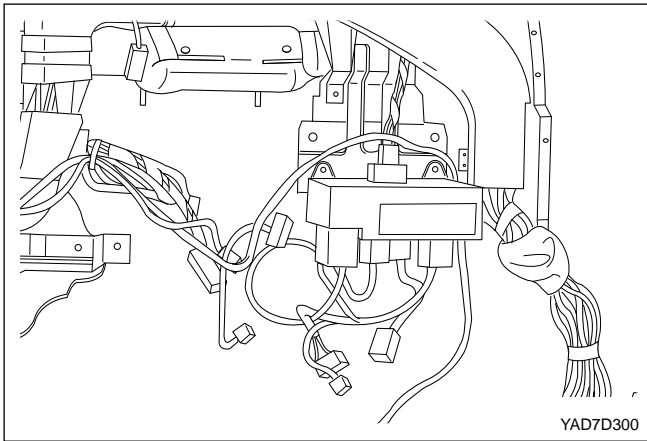
1. Remove the sun sensor from the instrument panel.
2. Disconnect the sensor connector and remove the sun sensor.
3. Installation should follow the removal procedure in the reverse order.

**Notice:** For disconnecting the connector from the sun sensor, be careful that the wiring must not come into the instrument panel.

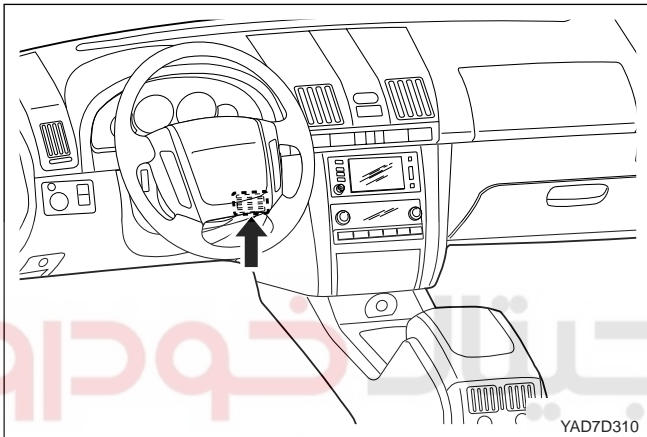


## INSIDE AIR TEMPERATURE SENSOR

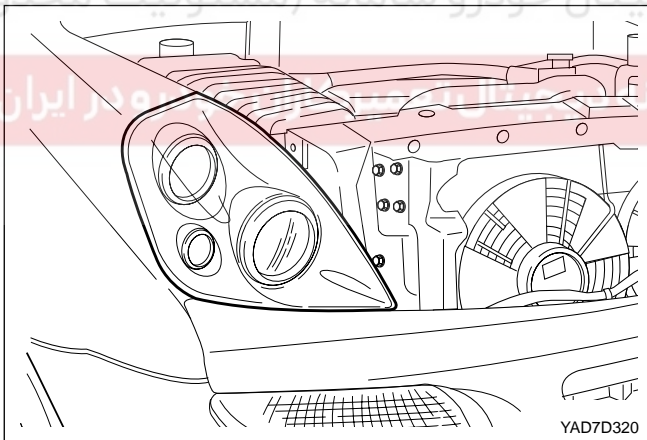
1. Remove the instrument panel.
2. Disconnect the sensor connector, remove the inside air temperature sensor with the tube.



3. Remove the inside air temperature sensor sub from the instrument panel.

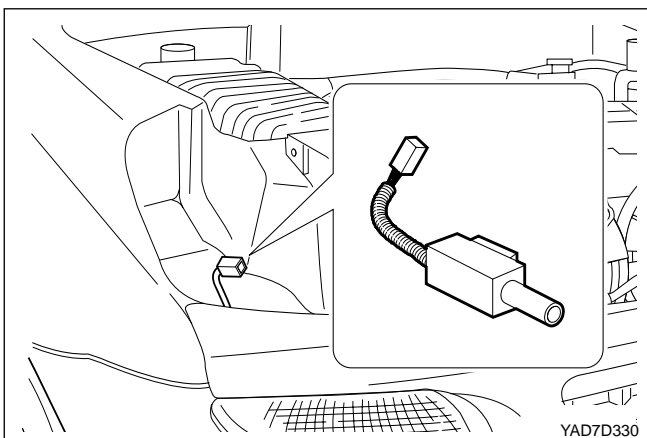


4. Installation should follow the removal procedure in the reverse order.

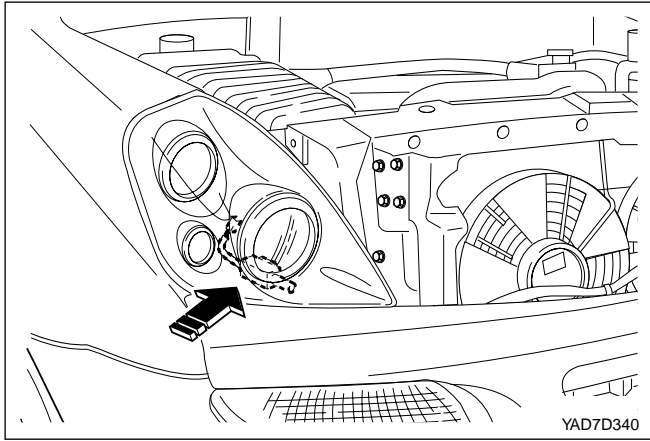


## AMBIENT AIR TEMPERATURE SENSOR

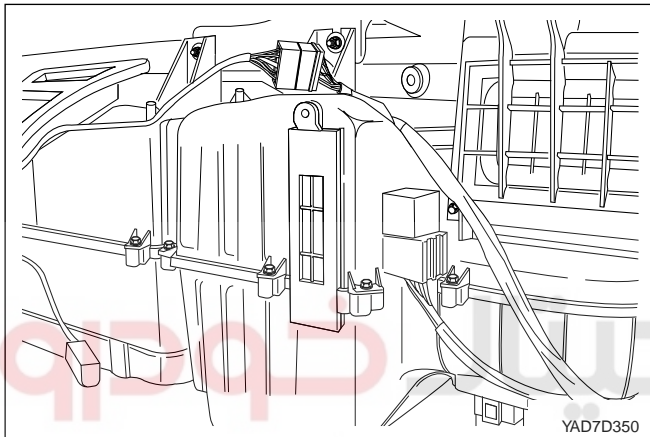
1. Remove the left headlamp assembly.



2. Disconnect the ambient air temperature sensor at the clip hole of the headlamp support outer panel and then disconnect the connector.



3. Installation should follow the removal procedure in the reverse order.



## COOLANT TEMPERATURE SENSOR

1. Disconnect the coolant temperature sensor at the side of the heater core (at left bottom of the glove box).
2. Installation should follow the removal procedure in the reverse order.

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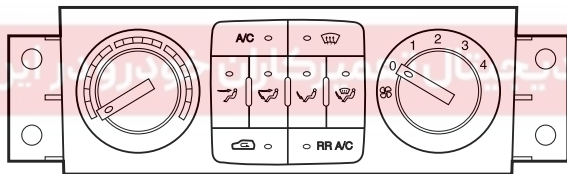
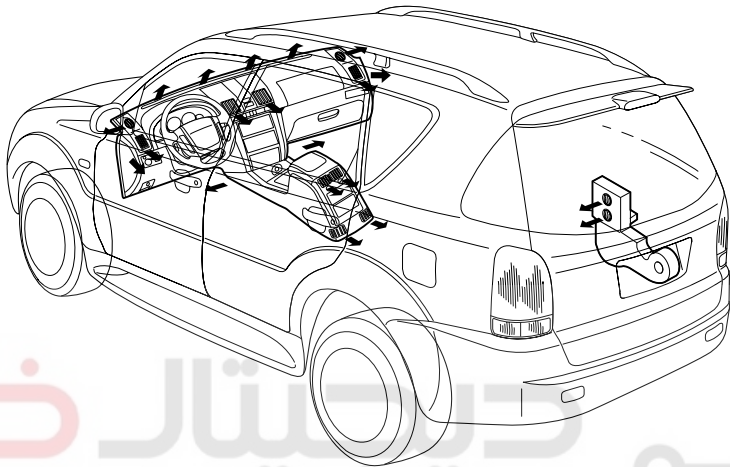


DESCRIPTION AND OPERATION

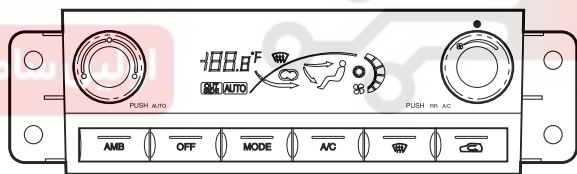
GENERAL

Heater is the system that circulate the suction air through the heater core to deliver the heat of engine coolant to the suction air and designed for heating and defrosting in the passenger room.

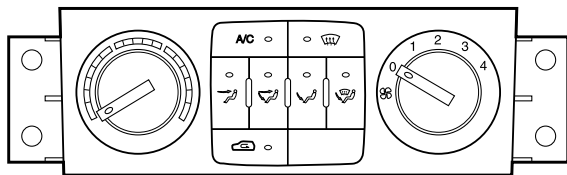
Heater system is consist of heater hose, heater module, blower motor and adjustment system.  
The control switch assembly (adjustment system) equipped with the instrument panel can control the temperature, the amount and the direction of the outlet. Also this system can use the suction air as separation between ambient air and intake air on the vehicle.



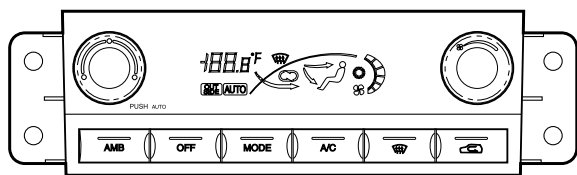
Manual Switch (Option)



Auto Switch (Option)



Manual Switch (Standard)



Auto Switch (Standard)

YAD7A010

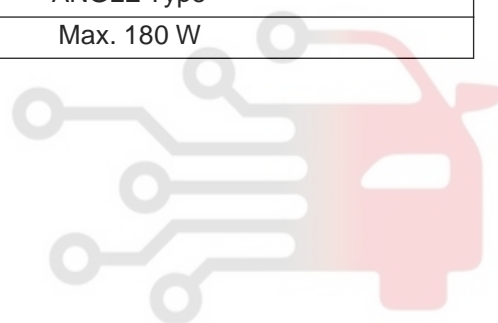
## SPECIFICATIONS

Engine Type		GSL	GSL
Blower Motor	Max. Capacity	7.425 - 9.075 kcal/h	←
Heater Core	Fin Pitch	1.52 mm	←
	Size (L x H x W)	194.6 x180 x 35 mm	←
	Heating Capacity	8,250 (Min. 4,700) kcal/h	←
Blower Motor Resistance	1st Mode	3.25 Ω	←
	2nd Mode	1.45 Ω	←
	3rd Mode	0.35 Ω	←
	4th Mode	Ω	←
Front A/C and Heater Unit	Type	Heater+Evaporator and Blower (2 pieces)	
	Heating Capacity	Min. 4600 kcal/h (5.5 m³/Min)	
	Cooling Capacity	Min. 4700 kcal/h (7.5 m³/Min)	
	Expansion Valve	Block Type	
	Input Power	Max. 250 W	
Rear Cooler	Type	Evaporator and Blower (only Cooler)	
	Cooling Capacity	Min. 2700 kcal/h (5 m³/Min)	
	Expansion Valve	ANGLE Type	
	Input Power	Max. 180 W	

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## AIR DELIVERY AND FUNCTION

### Mode Door Motor

#### Installation Location

It's located at the left side of heater case.

#### Function

It controls the open/close of the outlet at Vent, Foot or Def by the control command of automatic temperature control and then can set up the outlet mode of Vent, Bi-level, Foot, Foot/Def or Def.

### Intake Door Motor

#### Installation Location

It's located at the upper and right side of blower housing.

#### Function

It operates ambient/intake door motor by the control command of automatic temperature control to set up the inlet mode of ambient/intake door.

### Air Mix Door Motor

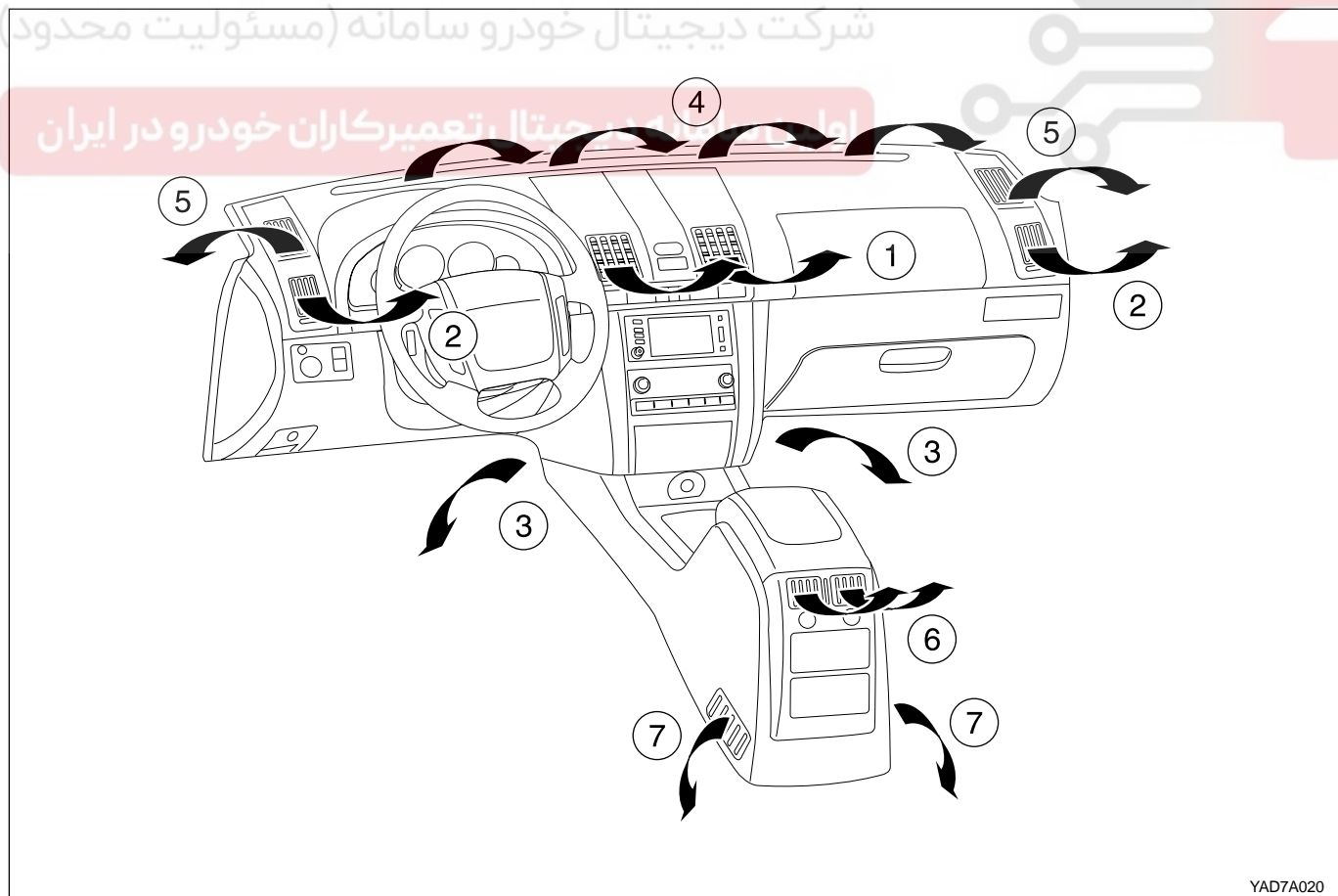
#### Installation Location

It's located at the lower side of heater housing

#### Function






It controls the open/close of damper by the control command of automatic temperature control to adjust the temperature of outlet air.

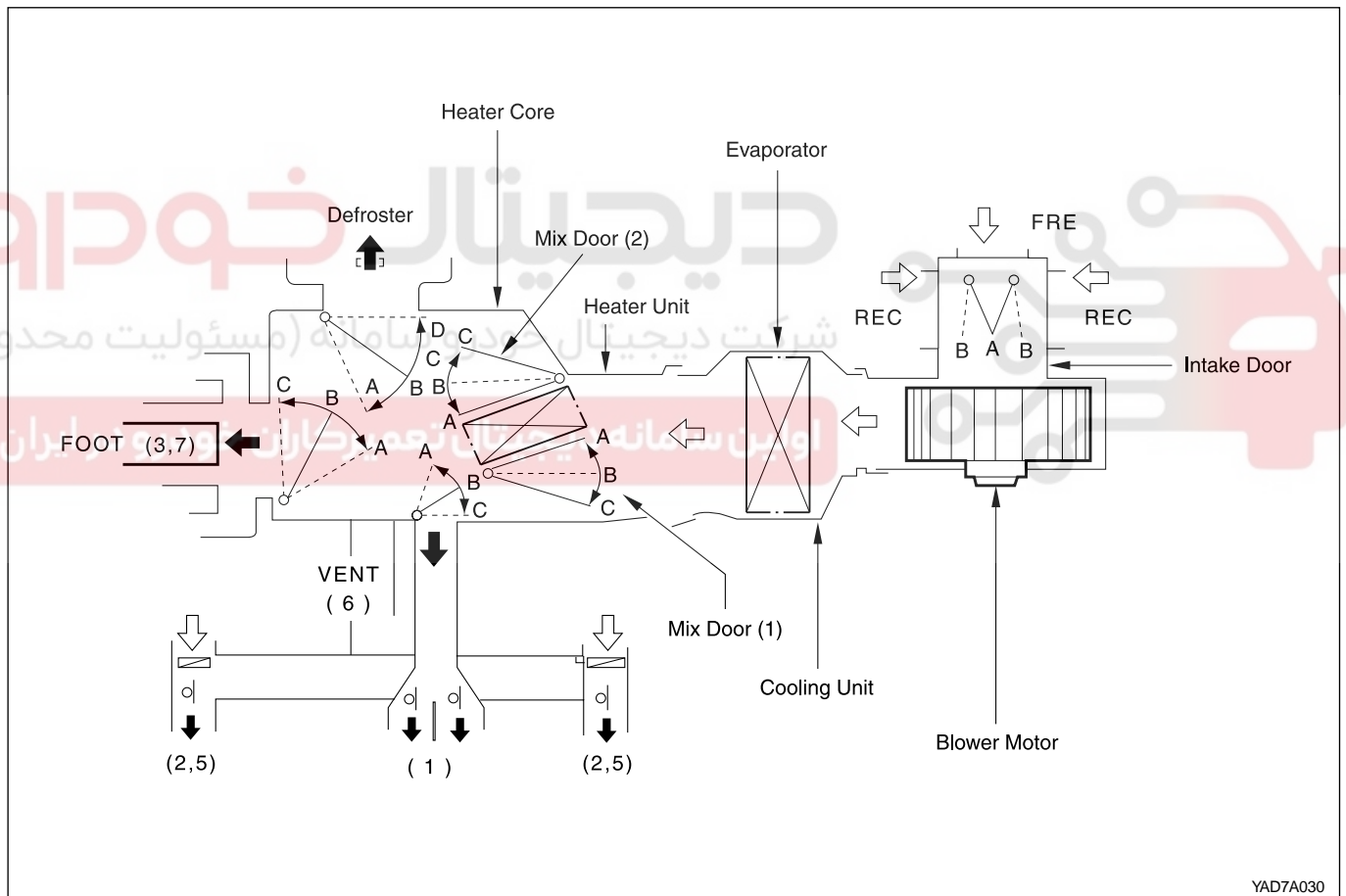
### Airflow Through Vents



YAD7A020

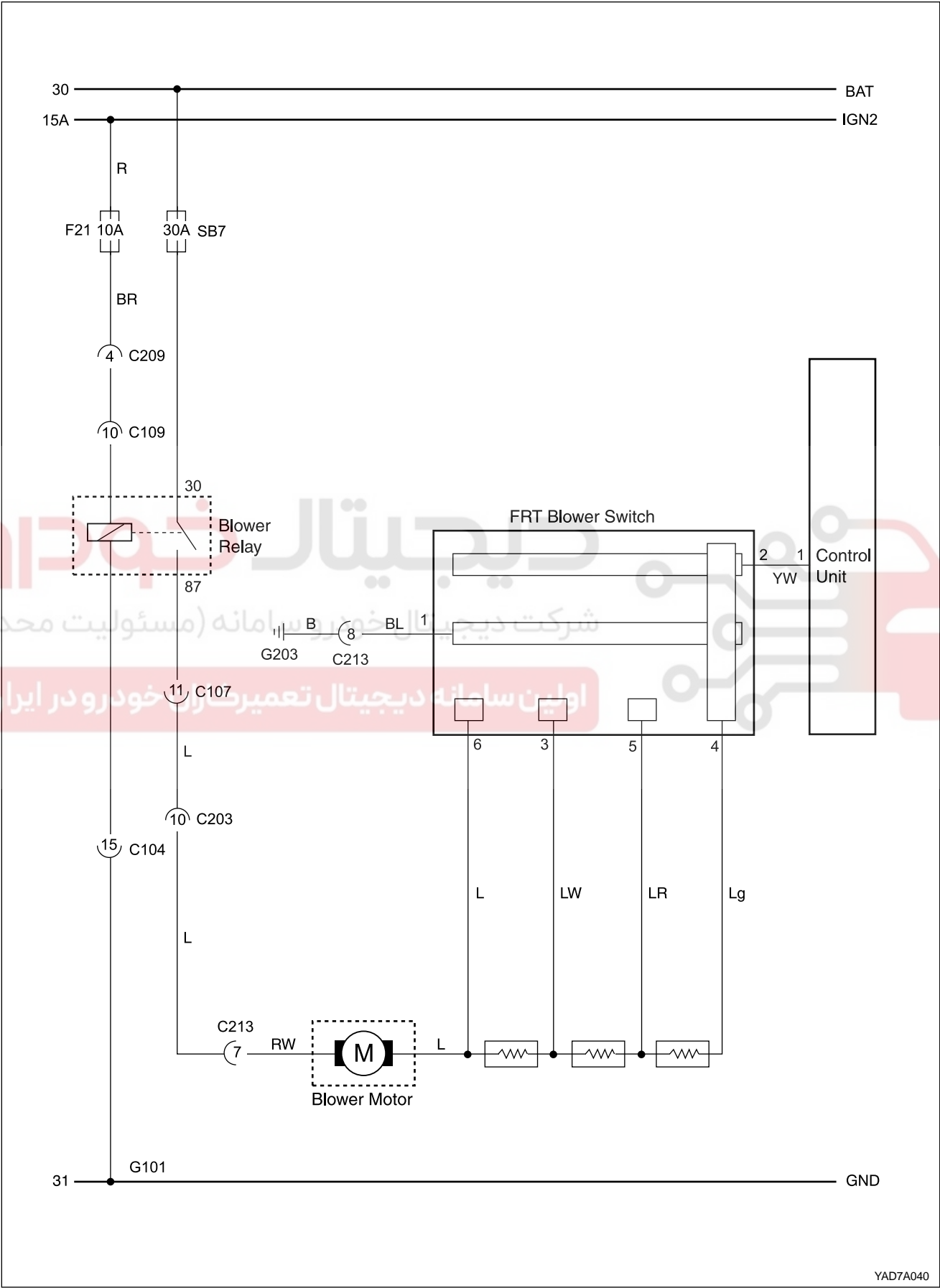


MODE		VENT	BI-LEVEL	FOOT	FOOT/DEF	DEF	Recirculation Switch		Temperature Control Lever
							REC	FRE	
Front	CENTER VENT (1)	A	B	—	—	—	—	—	—
	SIDE VENT (2)	A	B	B	B	B	—	—	—
	FOOT (3)	—	C	B	C	—	—	—	—
	DEFROSTER (4)	—	—	D	C	B	—	—	—
	SIDE DEF (5)	—	—	D	D	C	—	—	—
Rear	VENT* (6)	B	C	—	—	—	—	—	—
	FOOT (7)	—	C	B	D	—	—	—	—
INTAKE Door							(A)	(B)	—
AIR MIX Door							—	—	A B C



SCHEMATIC & ROUTING DIAGRAM

BLOWER MOTOR DIAGRAM



# DIAGNOSTIC INFORMATION AND PROCEDURES

## INSUFFICIENT HEATING OR DEFROSTING

Step	Action	Yes	No
1	Check the coolant level, the serpentine accessory drive belt for tension or damage, coolant hoses for leaks or kinks, coolant reservoir cap. Is the repair complete?	System OK	Go to Step 2
2	1. Set the temperature control switch to full hot. 2. Set the blower motor switch on 4. 3. Turn the ignition ON. 4. Check for the airflow from the vent outlet. Is there a heavy airflow from the vent outlet?	Go to Step 4	Go to Step 3
3	Recheck the Heater system and then repair as needed. Does the system operate properly?	System OK	Go to Step 7
4	Check for change in the airflow at various blower speeds. Does the blower speed increase as the switch is turned from 1 to 4?	Go to Step 5	Go to "Blower Electrical"
5	With the engine idle, remove the coolant reservoir cap and watch the flow of the coolant. Is the coolant flow visible?	Go to Step 6	Go to Step 8
6	1. Check for a restriction in the cooling system, failed water pump impeller, faulty thermostat. 2. Make repairs to the cooling system, as needed. Is the repairs complete?	System OK	-
7	Check the airflow from the Defrost and vent outlets. Is there a heavy airflow from there?	System OK	Go to Step 9
8	1. Check the vehicle for cold air leaks at the Instrument panel, Heater case and Vents. 2. Repair and replace any leaks or obstructions. Are the repairs complete?	System OK	Go to Step 15
9	Set all the selection switches to Defrost. Is there a heavy airflow from any step?	Go to Step 10	Go to Step 11
10	Check the vent outlets and repair as needed. Is the repair complete?	System OK	-
11	Check for change in the airflow at various blower speeds and then repair as needed. Is the repair complete?	Go to Step 12	Go to "Blower Electrical"
12	Check for obstructions in the system at the blower inlet and repair as needed. Is the repair complete?	System OK	Go to Step 13
13	1. Set the blower motor switch on 4. 2. Slide the temperature control knob from full hot to full cold. 3. Listen for an airflow change. Does the airflow change?	Go to Step 14	Go to Step 19
14	1. Repair the temperature door travel, cables and linkage as required. 2. Verify the accuracy of the temperature controls at full hot. Is the repair complete?	System OK	-
15	1. Turn the ignition "LOCK". 2. Turn the temperature control knob to full cold, then rapidly to full hot. 3. Listen for the sound of the temperature door slam. Did the door slam?	Go to Step 16	Go to Step 20

## Insufficient Heating or Defrosting (Cont'd)

Step	Action	Yes	No
16	1. Set the temperature switch to full hot. 2. Start the vehicle. 3. Check the temperature of the heater inlet and outlet hose by feel. Is the heater inlet hose hot and the heater outlet hose warm?	Go to Step 17	Go to Step 21
17	Inspection the heater inlet and outlet hose for proper installation. Are the heater inlet and outlet hose reserved?	Go to Step 18	Go to Step 22
18	1. Back flush the heater core. 2. Drain the cooling system. 3. Replace the coolant. 4. Warm the engine to an average operating temperature. 5. Feel the heater inlet and outlet hose. Is the heater inlet hose hot and outlet hose warm?	System OK	Go to Step 23
19	Check the system for any obstruction between blower, heater case and airflow delivery outlet and then repair or replace as required. Is the repair complete?	System OK	-
20	1. Repair the temperature door travel, cables and linkage as required. 2. Verify the accuracy of the temperature control at full hot and full cold, and then repair as required. Is the repair complete?	System OK	-
21	Check thermostat and then repair or replace as required. Is the repair complete?	System OK	-
22	Reinstall heater hose properly. Is the replace complete?	System OK	-
23	Replace heater core. Is the replace complete?	System OK	-

**BLOWER ELECTRICAL**

Step	Action	Yes	No
1	1. Disconnect the power connector from the blower motor. 2. Check the resistance between the 2 terminal of the blower motor connector and each step with the blower switch place each position. Is the resistance within the specified value?	Go to Step 2	Go to Step 3
2	Replace the blower motor. Is the repair complete?	System OK	-
3	Check the fuse SB7 (30A) in the engine compartment fuse block. Is the fuse blown?	Go to Step 4	Go to Step 5
4	Replace the fuse. Is the repair complete?	System OK	-
5	1. Turn the ignition ON. 2. Use the short detector to locate the following possible short: From the fuse SB7 (30A) in engine compartment fuse block to the blower motor. From the blower motor to the blower resistor block. From the blower resistor block to the blower speed switch. Is there any short in the above positions?	Go to Step 6	Go to Step 7
6	Repair any short. Is the repair complete?	System OK	-
7	1. Disconnect the power connector from the blower motor. 2. Use the test lamp to locate a possible short between the terminal 1 of the blower switch connectors and the terminals 6, 3, 5, 4 of the blower switch connectors sequentially. Does the test lamp light on at any terminal?	Go to Step 8	Go to Step 9
8	Replace the A/C controller switch. Is the repair complete?	System OK	-
9	Replace the blower resistor. Is the repair complete?	System OK	Go to Step 10
10	Check the ground of the blower motor and then repair as needed. Is the repair complete?	System OK	-

## IMPROPER AIR DELIVERY OR NO MODE SHIFT

This procedure provides a test of all functions of the heater/defroster unit.

1. Warm the vehicle and keep the engine running.
2. Perform the following diagnostic procedure.

Check		Action	
Check connection and the attachment of the door cable	Is the cable connected and retained properly?	Yes	Check the range of the door travel and the effort required to move it.
		No	Connect and attach the cable properly. Check the operation of the temperature control switch.
	Does the door operate properly?	Yes	If required, repair.
		No	Recheck the system using "Control setting/Correct Results" test.
	Is there a problem with the temperature control switch or wiring?	Yes	Repair or replace the temperature control switch or the cable.
		No	System OK
	Is the system OK after the repair complete?	Yes	Check the airflow from the defroster or the vent outlets.
		No	System OK
	Is the heavy airflow?	Yes	Switch the mode knob to defrost.
		No	Remove the heater outlet and then remove any obstructions in the heater outlet.
	Is the airflow proper?	Yes	Check the blower speed for change in the airflow as the control is turned 1 to 4.
		No	Repair or replace any obstructions at heater and air delivery case.
	Does the blower motor speed increase?	Yes	Go to "Blower Electrical"
		No	System OK
	Is the system OK after the repair complete?	Yes	Set the blower switch to 4th. Rotate the temperature control from full cold to full hot.
		No	Listen to an airflow change.
	Does the airflow change?	Yes	Repair or replace any obstruction between the blower and the system outlets.
		No	Check and repair the door adjustments, the cables, the linkage and the control.



## TOO MUCH HEAT

Check		Action	
Mode switch to the floor position	Is there too much heat when the mode switch is in the floor position?	Yes	Set the temperature control switch to defrost position.
		No	Set the mode switch to the vent position.
	Is the airflow proper?	Yes	Set the blower speed to 4th. Set the temperature control switch to full hot. Turn the ignition "ON". Check the airflow and attachment at the floor outlet.
		No	Check the door travel, the cables, the controls and the linkage for the defrost position and then repair or replace as needed.
	Is the heavy airflow?	Yes	Check the door travel, the cables, the controls and the linkage for the full hot, full cold position and then adjust as needed.
		No	Check for a change in the airflow at different blower speed. Check the change.
	Does the airflow change?	Yes	System OK
		No	Go to "Blower Electrical"
	Is the airflow proper?	Yes	Turn the ignition "OFF". Turn the temperature control knob to full hot, then rapidly to full cold.
		No	Check the system case for leaks and check the floor outlet attachment.
	Can you hear the sound of the temperature door slam?	Yes	Adjust the vent door to vent mode.
		No	Check the door travel, the cables, the controls and the linkage for the full hot, full cold position and then adjust as needed.

## HEATER CONTROLS

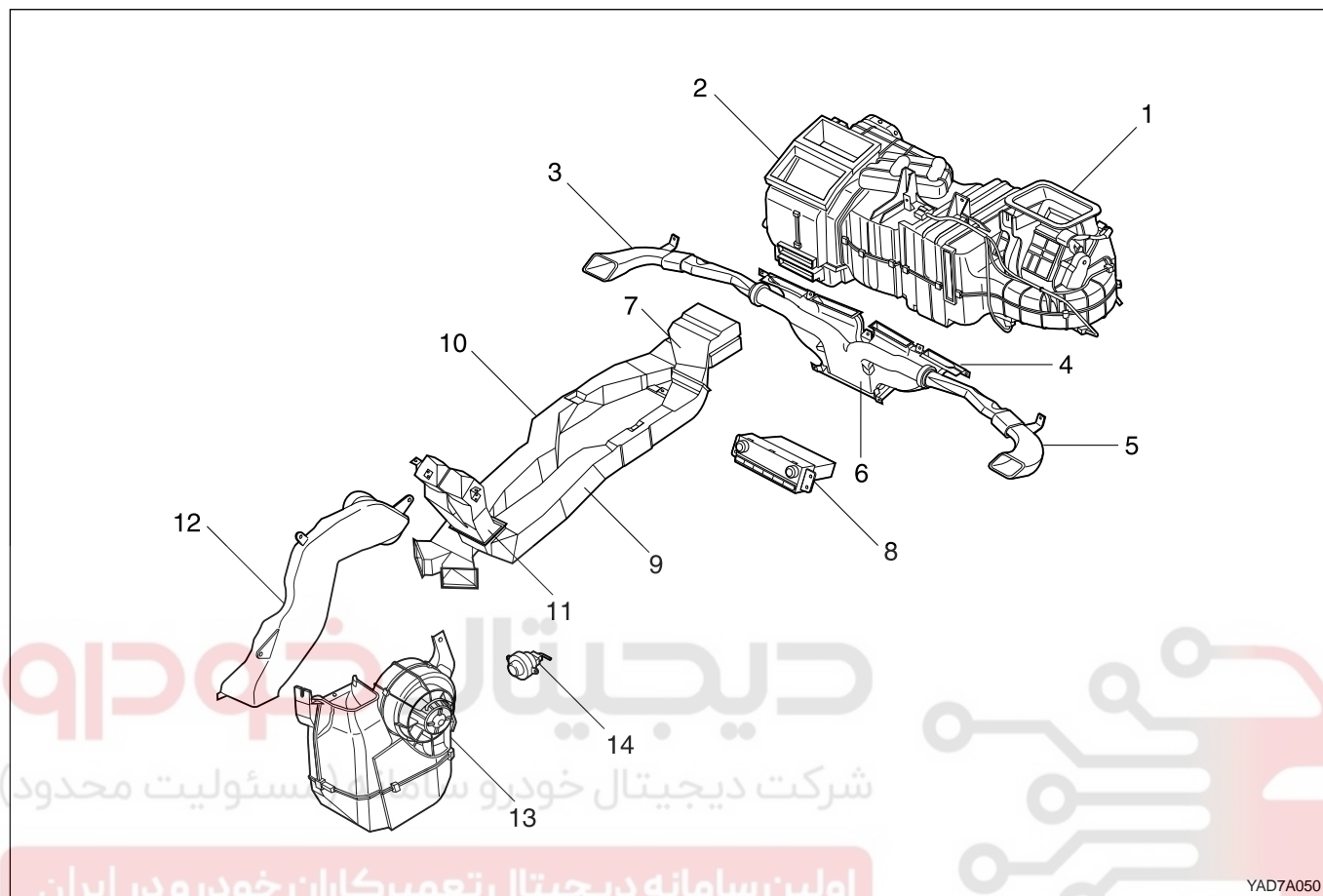
Check		Action	
Turn the temperature control switch	Is excessive effort required to move the control?	Yes	Check the cable for improper routing, kinks, wiring interference or other instrument panel interference.
		No	Set the blower switch to 4th. Repeat to turn the temperature control knob to full hot, then rapidly to full cold
	Does the control operate properly?	Yes	Remove the cable from any door that binds on the cable. Cycle the door manually. Check the door binding.
		No	Repair or replace the problem.
	Is there any door binding?	Yes	Check the door seal for proper installation.
		No	Check the control for binding.
	Does the control bind?	Yes	Reinstall the cable to the door. Repair the instrument panel interference with the cable.
		No	Remove the cable from the control. Check the control for binding.
	Does the control bind?	Yes	Replace the control switch.
		No	Replace the cable.
	Is excessive effort required to move the control?	Yes	Remove the cable from the control. Operate the control switch.
		No	System OK
	Does the control operate properly without any interference?	Yes	System OK
		No	Replace the control switch.
	Is the installation good condition?	Yes	Check a binding door for the shaft alignment, a bent shaft, a bent door or warped case and then repair as needed.
		No	Repair the door seal or replace as needed.

**BLOWER NOISE**

<b>Check</b>		<b>Action</b>	
Cycle through the blower speeds, the modes and the temperature settings in order to find the noise. -Close all of the doors and windows. -Turn the ignition "ON". -Set the blower switch to 4th. -Set the control switch to full hot position.	Is the blower noise constant at high blower speeds or certain modes, but absent at lower speeds or in other modes?	Yes	Remove any obstruction or foreign material of the duct. Check floor/defroster door seals. Repair or replace as needed.
		No	Check for the vibration from the blower motor and fan assembly at each blower speed by feeling the blower motor housing. Check for the foreign materials at the opening of the blower inlet.
	Did you find the excessive vibration and any foreign material?	Yes	Remove all foreign materials and repair or replace the blower motor and fan assembly.
		No	Set the blower switch to 4th. Check any noise from full hot to full cold temperature positions in the defroster, floor and vent modes.
	Is the noise constant?	Yes	Remove any obstruction or foreign material of the duct. Check the floor/defroster door seals. Repair or replace as needed.
		No	Check any noise in the floor mode.
	Is the noise constant?	Yes	Remove any obstruction or foreign material of the duct. Check the floor/defroster door seals. Repair or replace as needed.
		No	Check any noise in the vent mode.
	Is the noise constant?	Yes	Remove any obstruction or foreign material of the duct. Check the vent door seals. Repair or replace as needed.
	Is the blower noise constant at any modes but absent at all modes of temperature control lever?	Yes	Check the temperature door seals
		No	Check the system for obstructions, foreign materials between the fan and the temperature door and then repair or replace the fan as required.

## COMPONENT LOCATOR

### AIRFLOW THROUGH VENTS WITH REAR HEATING DUCT



YAD7A050

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| 1 Blower and Evaporator Assembly | 8 A/C Controller                  |
| 2 Heater Assembly                | 9 Console Middle Ventilation Duct |
| 3 Side Defroster Duct (LH)       | 10 Console FOOT Duct              |
| 4 Main Defroster Nozzle          | 11 Console Rear Ventilation Duct  |
| 5 Side Defroster Duct (RH)       | 12 Rear cooler Duct               |
| 6 Side Defroster Joint           | 13 Rear cooler Assembly           |
| 7 Console Front Ventilation Duct | 14 Rear cooler Controller         |

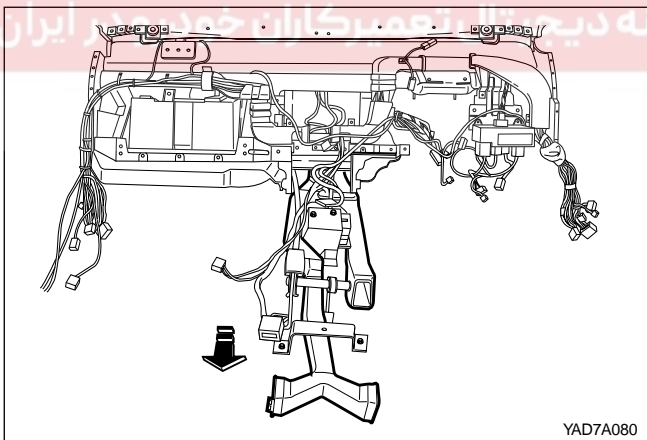
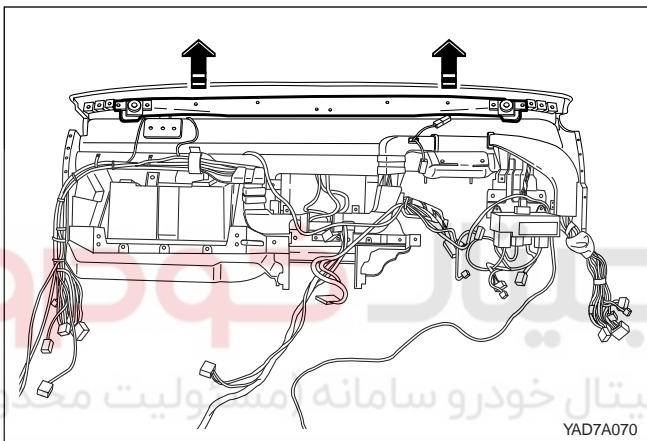
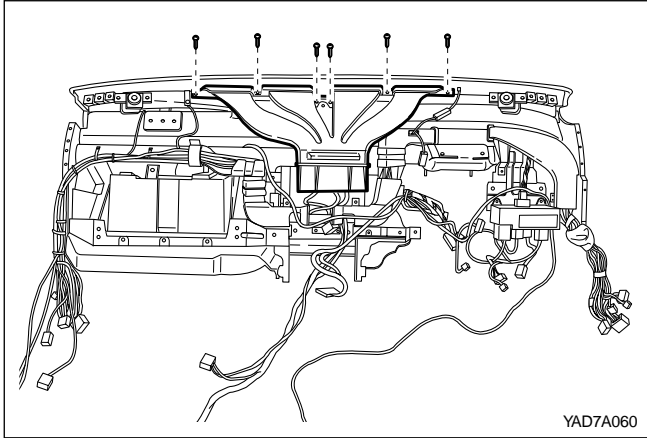
## REPAIR INSTRUCTIONS

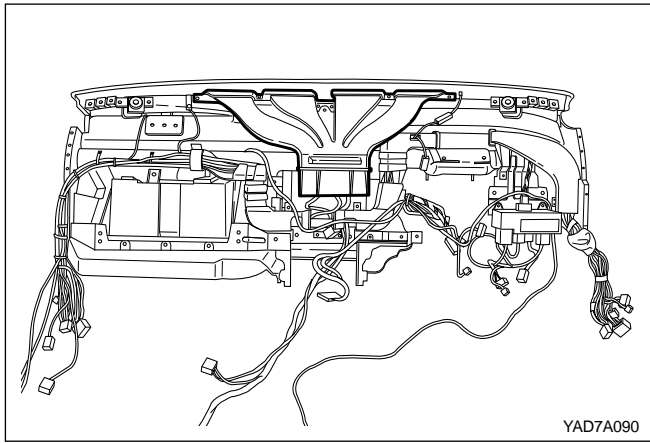
### ON-VEHICLE SERVICE

#### AIR DUCT ASSEMBLY

##### Removal & Installation Procedure

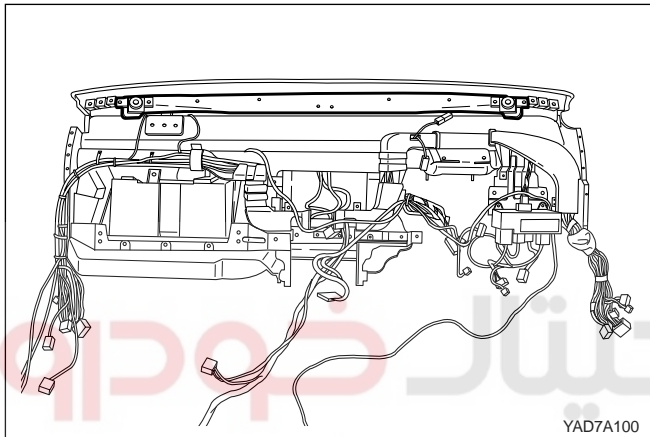
1. Remove the instrument assembly.
2. Remove the defroster nozzle retaining screws and the defroster nozzle assembly.
3. Remove the ventilation duct.
4. Remove the air distributor at console side.
  - Remove the center console.
  - Remove the parking brake lever assembly.
  - Remove the middle duct retaining bolt.
5. Remove the middle duct and the lower duct.



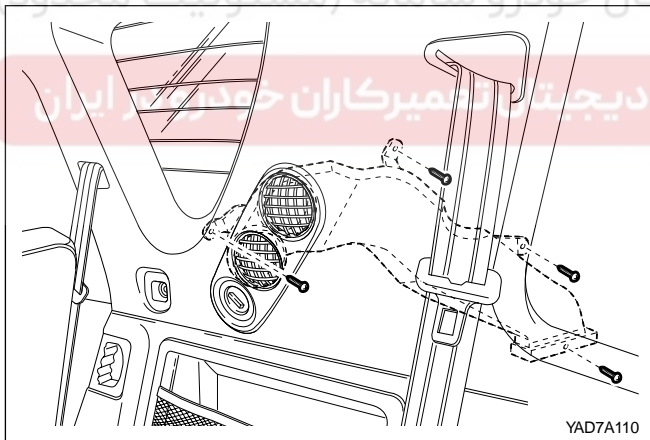


6. Installation should follow the removal procedure in the reverse order.

- Install the nozzle and the ventilation duct to the instrument panel.



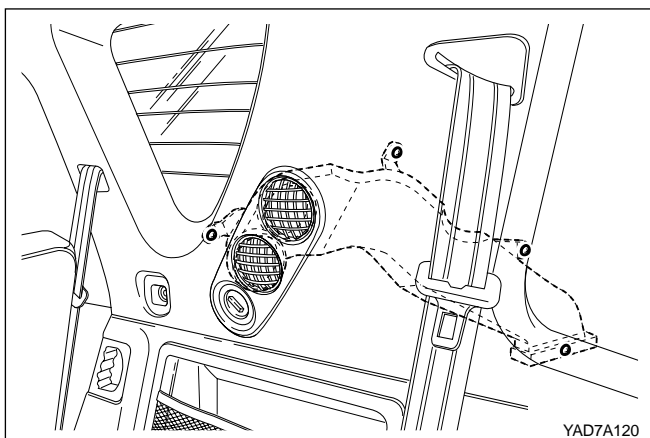
- Install the duct at console side with air duct.



## REAR COOLER DUCT

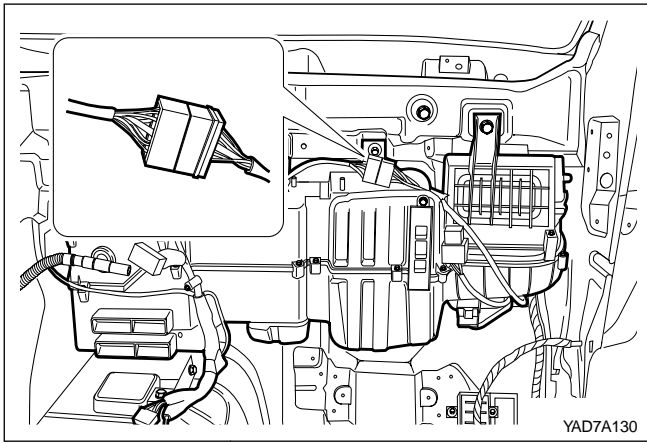
### Removal & Installation Procedure

1. Remove the rear quarter inner panel.
2. Remove the tapping screw and hex screw at the duct.
3. Remove the duct.



4. Installation should follow the removal procedure in the reverse order.

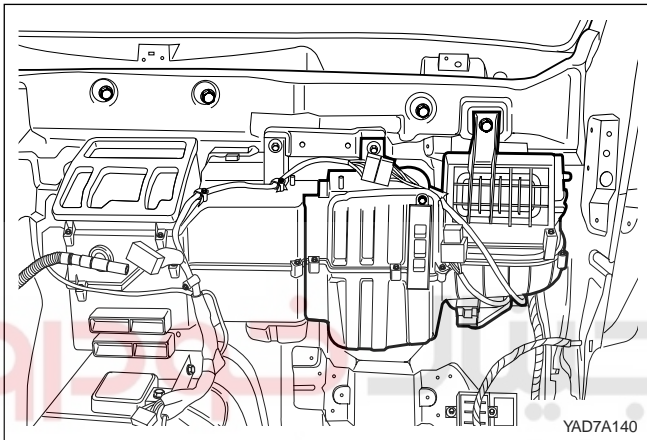




## HEATER AND BLOWER MODULE ASSEMBLY

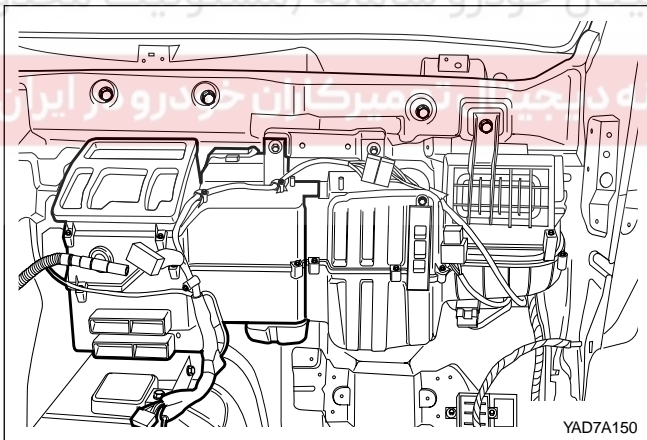
### Removal & Installation Procedure

1. Disconnect the blower motor connector.



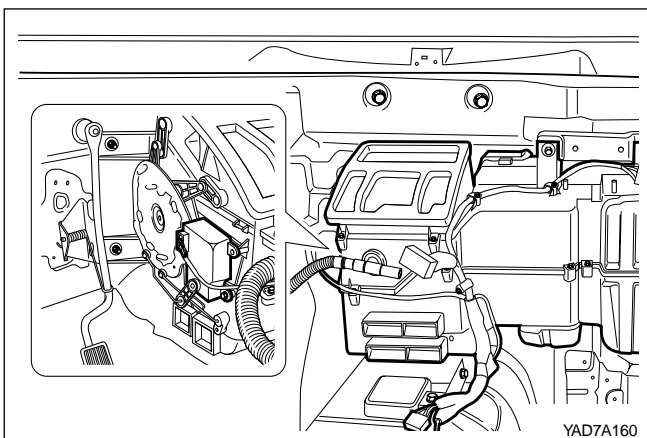
2. Remove the retaining bolts of the blower module and evaporator and then remove the blower module.

**Notice:** A/C pipe should be removed previously.



3. Remove the heater module retaining bolts and heater module assembly.

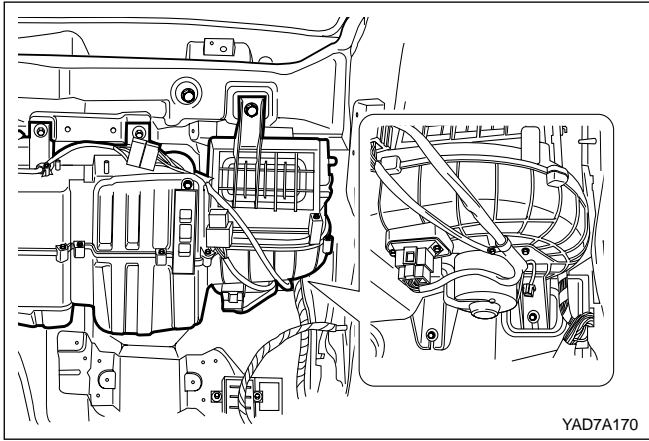
**Notice:** Note that it is possible to remove the heater module only when you remove the heater hose previously.



4. Installation should follow the removal procedure in the reverse order.

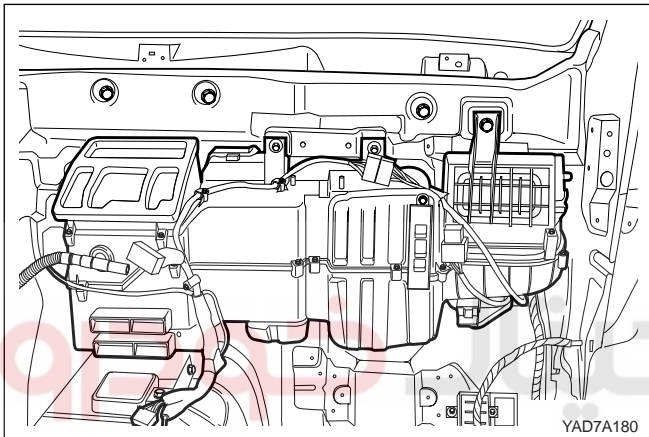
- Tighten the heater module with the retaining bolts.

Retaining Bolt	5 N•m (44 lb-in)
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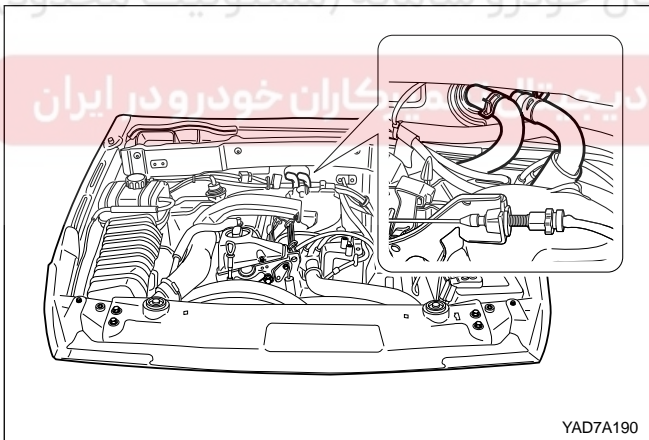


- Tighten the blower module assembly with retaining nuts.

Retaining Bolt	5 N•m (44 lb-in)
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- Connect the blower motor connector and install the heater hose and A/C pipe.



## HEATER SUCTION AND DISCHARGE HOSE

### Removal & Installation Procedure

1. Drain the coolant.
2. Remove the clips and push back the suction heater hose clamp near the fire wall.
3. Twist the hose slowly from the left side to the right side to loosen the connection between the hose and the tube.
4. Remove the hose end from the tube.
5. Remove the clip and push back the heater suction hose at engine block side.
6. Remove the heater suction hose and discharge hose on the vehicle.
7. Installation should follow the removal procedure in the reverse order.

