



长安汽车  
CHANGAN

# EADO Workshop Manual

## Heating, Ventilation and Air Conditioning

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# 4.1 Heating, Ventilation and Air Conditioning

## 2012 EADO

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## Specifications

### Material Specifications

Item	Specification	Capacity
Refrigerant oil	RFL - 100X	ml
Refrigerant	R134a	510~530 g

### General Specifications

Compressor	Specification
Model	JSS - 120
Type	Rotary vane
Displacement	120 ml/r
Clutch type	6-slot multi-wedge
Refrigeration capability (2,400 rpm)	Equal to or more than 2,350 W
Refrigerant air volume (13.5 V)	-
Clutch power consumption	Less than 42 W (20 °C )

### Torque Specifications

Item	Nm	lb-ft	lb-in
Condenser bracket and radiator positioning bolt	10	-	89
HVAC assembly retaining screw	10	-	89
HVAC assembly retaining nut	10	-	89
HVAC assembly retaining bolt	10	-	89
Compressor retaining bolt	25	18	-
Refrigerant pipe and compressor connection bolt	10	-	89
Refrigerant pipe and thermostatic expansion valve connection bolt	10	-	89
Refrigerant pipe and condenser assembly connection bolt	23	17	-
Air conditioner low and high pressure pipe retaining bolt	10	-	89
Air conditioner control panel retaining screw	5	-	44
Blower speed control module retaining screw	5	-	44
Blower retaining screw	5	-	44

## Description and Operation

### System Overview

Air Conditioning (air conditioning) system is designed to provide passengers with comfortable ride conditions regardless of the weather. The system can control the ventilation of the passenger compartment by actuating the following functions:

- Cooling
- Dehumidification
- Heating
- Circulation

Fresh air goes from the air inlet housing through the pollen filter, the HVAC assembly, the air passage to each vent and finally into the interior space. The air conditioning consists of the following main components:

- Refrigeration system
- Heating system
- Air distribution system
- Air conditioning system

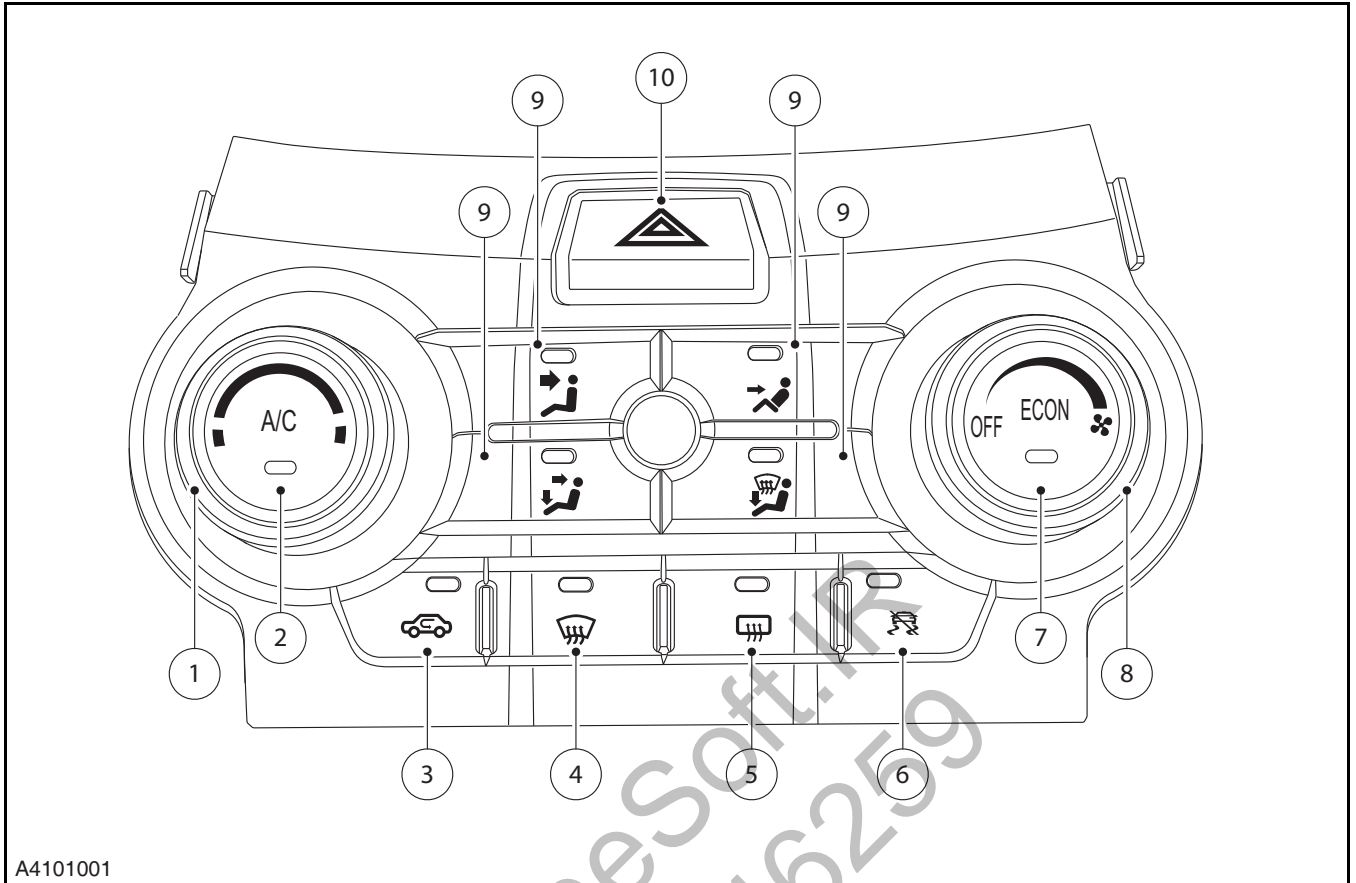
The air conditioning has the following characteristics:

- Comfortable dry fresh air
- Power ventilation
- Front and rear windshield defroster

Drivers can select any of the following functions on the control panel:

- Inside temperature
- Blower speed
- Air inlet and outlet position

**Air Conditioning Control Panel Function Description**



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Item	Description	Item	Description
1	Temperature control knob	6	EPS switch
2	A/C switch	7	Economic mode switch
3	Interior-exterior circulation switch	8	Air volume control knob
4	Front defroster switch	9	Ventilation mode selection knob
5	Rear defroster switch	10	Hazard warning lamp switch

### Temperature Set

The temperature control knob is used to set the inside temperature and control the air temperature at the vent. Rotate anticlockwise the refrigeration channel to enlarge it gradually and rotate clockwise the heating channel to enlarge it gradually to meet the requirements of the normal work of the air conditioning system.

### Warm and Cold Vent Servomotor Inspection Standard:

Location	Feedback Voltage
Fully cool	4.457 ~4.657 V
Partition 1	4.0 ~4.2 V
Partition 2	3.5 ~3.7 V
Partition 3	3.1 ~ 3.3 V
Partition 4	2.5 ~ 2.7 V
Partition 5	2.1~2.3 V
Partition 6	1.7 ~ 1.9 V
Partition 7	1.4~1.6 V
Partition 8	0.9~1.1 V
Partition 9	0.6~ 0.8 V
Fully warm	0.251 ~0.451 V

### Air Volume Set:

Air volume control knob is used to manually set the blower speed. Rotate the knob to control the outlet air volume. There are 8 gears for the air volume control knob, rotating the knob clockwise one after another from Gear 1 to 8 can increase the blower speed gradually to meet the requirements of the normal work of the air conditioning system.

### Blower Terminal Voltage Inspection Standard:

Gear	Blower Terminal Voltage
OFF	0
1	4.3 ~ 4.5 V
2	5.1 ~5.3 V
3	5.7 ~5.9 V
4	6.3 ~6.5 V
5	7.1 ~ 7.3 V
6	8.1~8.3 V

Gear	Blower Terminal Voltage
7	9.4 ~ 9.6 V
8	Fully open

### Ventilation Mode

The ventilation mode control knob is used to control the ventilation mode by adjusting the vent of the center vents/footwell/windshield and get the expected air flow. The temperature distribution range will be affected by the interior space size.

5 ventilation modes can be selected at manual state.

1. Center vents
2. Center vents and footwell
3. Footwell
4. Footwell and defrost
5. Defroster

### Mode Servomotor Inspection Standard:

Location	Feedback Voltage
Center vents	0.39 ~ 0.59 V
Center vents /footwell	1.30 ~ 1.50 V
Footwell	2.33~ 2.53 V
Footwell/defrost	3.46 ~ 3.66 V
Defroster	4.35 ~4.55 V



### ON-OFF Mode

The system ON/OFF control is realized by the A/C switch. Press the switch to send request the signal of ON/OFF.

When the air volume control knob is not at "OFF", press the A/C switch, the indicator will light up (ON) or shut down (OFF).

#### A/C Switch Signal Logic Inspection:

A/C Switch	Blower Switch	Evaporator Temperature	A/C Signal
OFF	-	-	OFF
ON	ON	Higher than 4 °C	ON
ON	OFF	-	OFF
ON	ON	lower than 2 °C	OFF

### Memory Function

When ignition off, the current working state will be saved. The air conditioning control module will automatically recover to the previous state when the ignition switch is turned on. If the air conditioning control module is "ON", it will be turned on when the ignition is on. If the air conditioning is "OFF", it will remain off when ignition on.

### Interior and Exterior Circulation Control

The user can select the interior or exterior circulation mode:

1. In the exterior circulation mode, the exterior circulation vent is open and the interior vent is closed.
2. In the interior circulation mode, the interior circulation vent is open and the exterior vent is closed.

With the air exterior circulation switch, drivers can select the air interior or exterior circulation mode. When the indicator on the knob is on, the air conditioning is in the interior recirculation mode. Otherwise, the air conditioning is in the exterior recirculation mode.

### Rear Defroster Control

The rear defroster button is used to activate the rear windshield defrosting.

Press the button, the indicator is on and the rear windshield heater starts; press the button again, the indicator is off and the rear defroster stops. If the button is not pressed for the second time, the body control module will automatically set a time to end the rear defrosting.

### Economic Operation Mode

Press the economic mode button (ECON), the air conditioning will work in the economic operation mode, and the air conditioning control module will control the compressor work in less time according to the signal of the interior temperature sensor, or even will keep the set temperature under the condition out of work.

## Component Description

### Compressor

The air conditioning compressor is driven by the compressor clutch belt pulley, which is driven through the belt by the engine crankshaft. Before the solenoid clutch coil is energized, the compressor belt pulley rotates freely and do not drive the compressor shaft; after the coil is energized, the clutch plate and the clutch hub will be pushed to the belt pulley, then the clutch plate and the belt pulley is locked as one to drive the compressor shaft.

The compressor will be closed under the following conditions:

1. Throttle fully open
2. Low idle speed
3. Low ambient temperature
4. Too high coolant temperature
5. Refrigerant pressure higher than 3.0~ 3.4 MPa or lower than 0.18~ 0.22 MPa

### Condenser, Reservoir Drier

The high-pressure and temperature refrigerant vapor from the compressor goes into the condenser. The condenser is consisted of aluminium pipes and cooling fins which allow the high-pressure and temperature vapor to carry on the quick heat transmission. The cooling fins coagulate the high pressure and high temperature refrigerant vapor to the high pressure and middle temperature fluid by radiating. The reservoir drier is located at the left side of the condenser. It is designed to make sure that the high pressure and temperature gas-liquid mixture refrigerant entering the drier becomes the liquid refrigerant with the high pressure and middle temperature when it comes out from the drier. There is the desiccant in the drier to absorb the water in the refrigerant system. The desiccant can not be used repeatedly.

### HVAC Assembly

The HVAC assembly is located in the console and consists of the blower motor, the blower motor control module, the pollen filter, the heater, the

evaporator, the expansion valve, the warm and cold vent control motor and various air passages, ducts and control doors.

### Refrigerant R-134a and Refrigeration Oil

The refrigerant in the air conditioning has the following functions:

- Absorb heat
- Carry heat
- Release heat

Vehicles use the R-134a refrigerant, which is non-poisonous, fire-retardant, transparent, non tinted liquefied gas.

Make sure following the steps in manual when carrying the following repairs:

- Refrigerant recovery and regenerating
- Fill the refrigerant oil.
- Drain the refrigeration system.
- Refill the refrigerant.

### Air Conditioning Pressure Switch

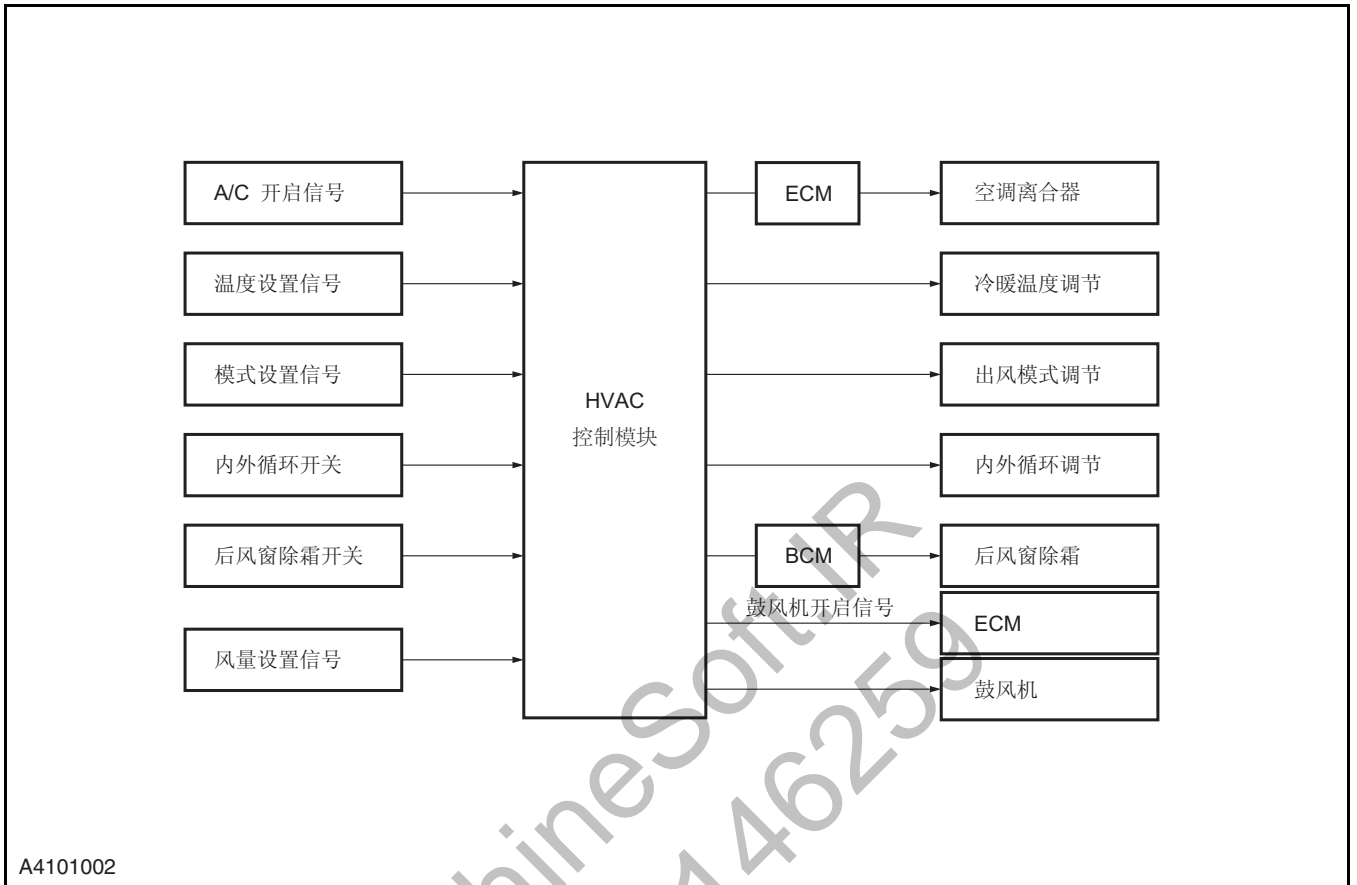
The air conditioning pressure is a tri-state pressure switch to transfer the air conditioning pressure signal.

#### Pressure Switch Value

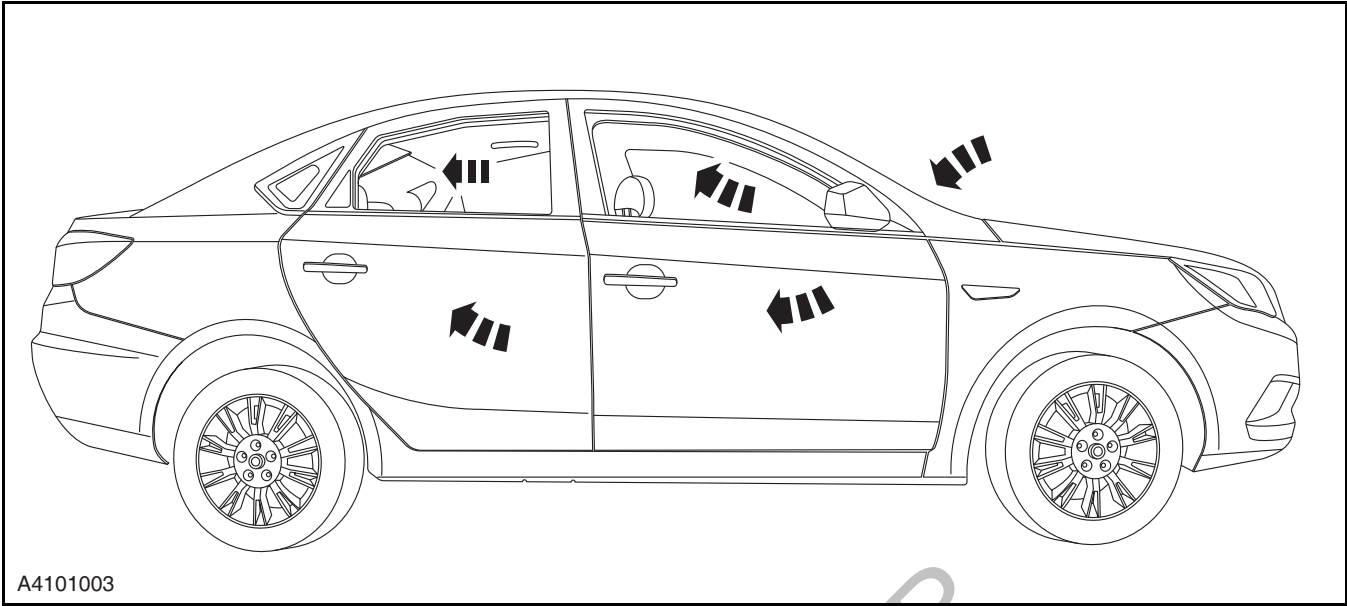
Item	Pressure Value	Signal Value
High pressure switch	More than 3.0 ~ 3.4 Mpa	Cut off
	Less than or equal to 2.4~2.8 Mpa	Recovery
Low pressure switch	Less than 0.18 ~ 0.22 Mpa	Cut off
	More than or equal to 0.21~0.25 Mpa	Recovery
High-speed cooling fan	More than or equal to 1.51~1.53 Mpa	Switch on
	Less than 1.24~1.26 Mpa	Disconnection

### System Principle

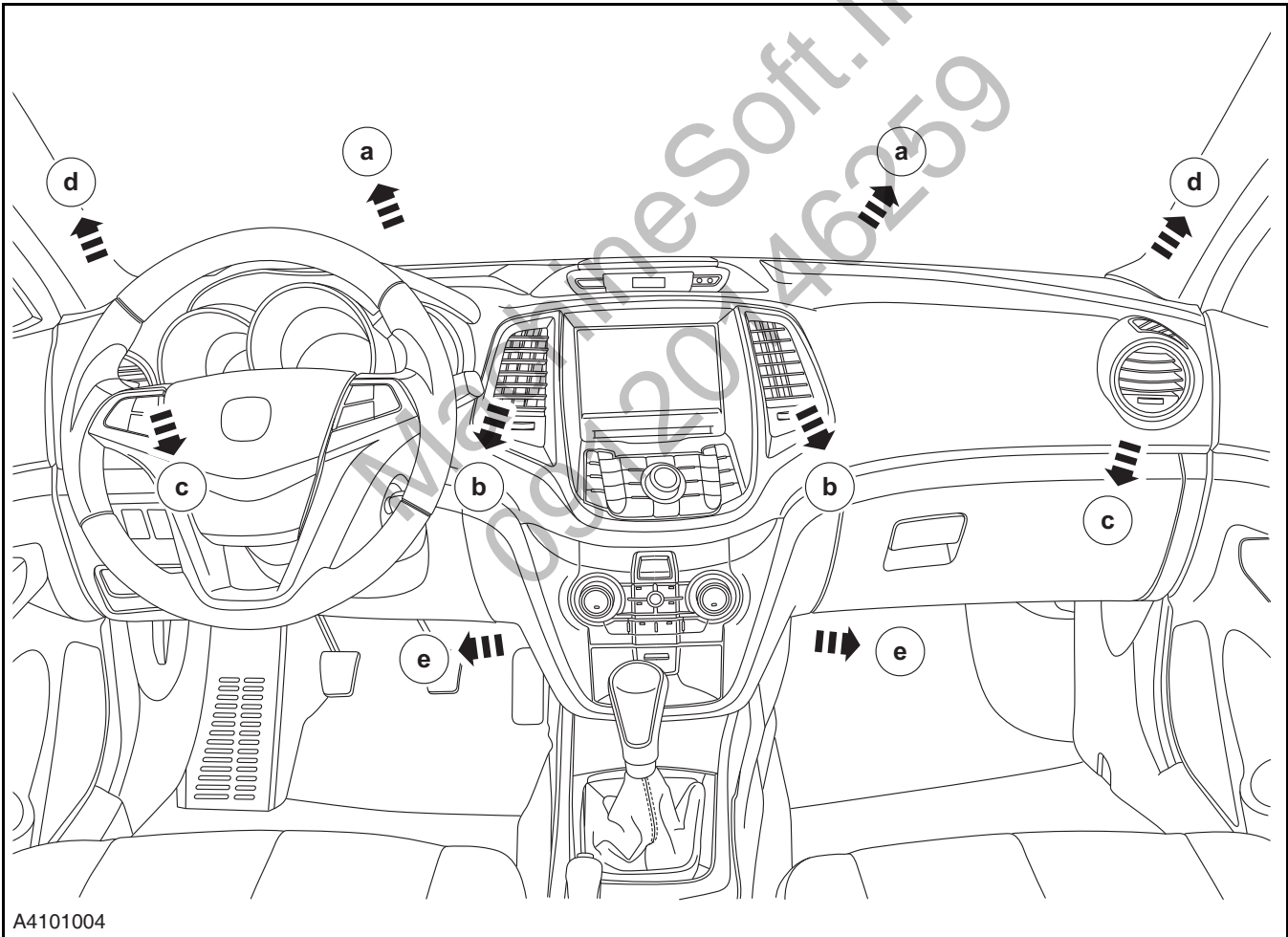
#### System Working Principle



Ventilation



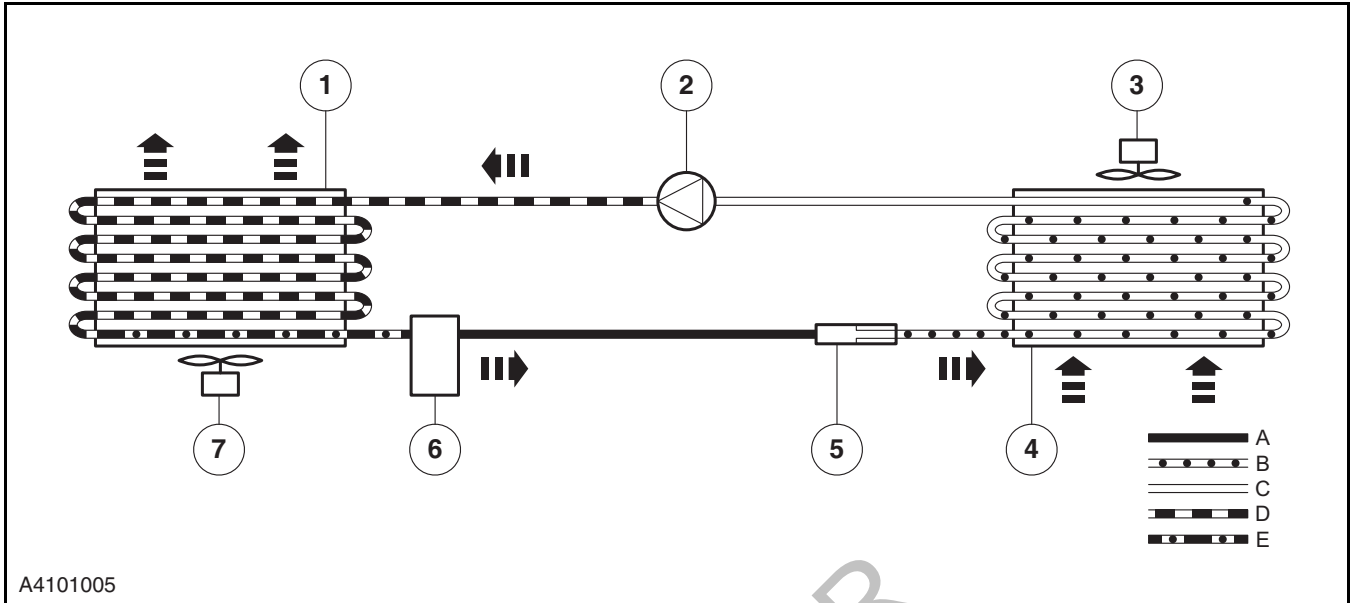
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Item	Description	Item	Description
a	Windshield defroster vent	d	Side defroster vent
b	Center vent	e	Front footwell vent
c	Side window vent	f	Rear footwell vent

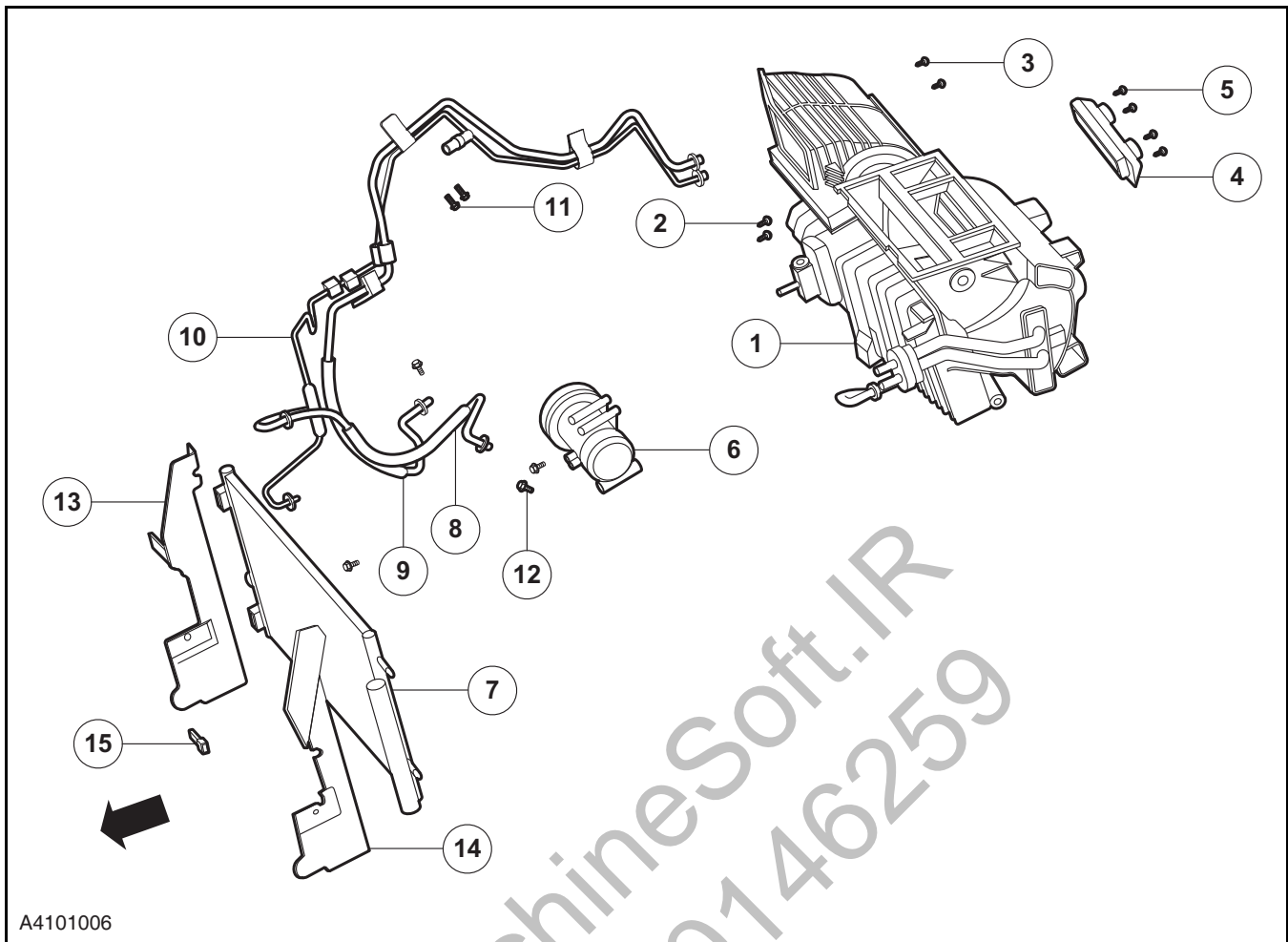
Refrigeration System Principle



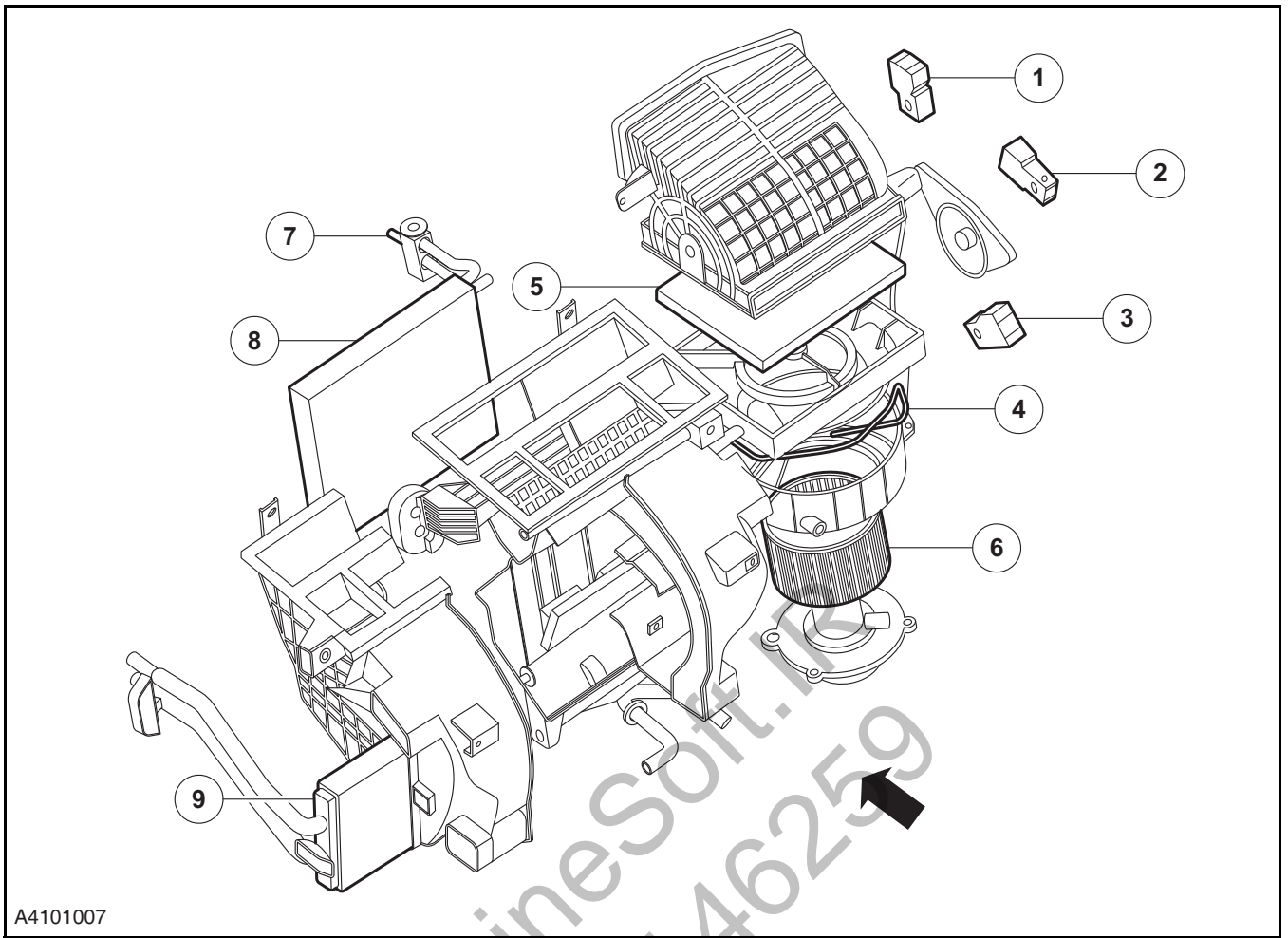
Item	Description	Item	Description
1	Condenser	7	Condenser fan
2	Compressor	A	High pressure, middle temperature and liquid state
3	Blower	B	Low pressure, low temperature and liquid state
4	Evaporator	C	Low pressure, low temperature and gas state
5	Expansion valve	D	High pressure, high temperature and gas state
6	Reservoir drier	E	High pressure, high temperature and gas-liquid mixture state

The gas state refrigerant is sucked into the compressor entrance and then compressed. The refrigerant is heated to 70°C ~ 110°C. The compressor pumps the gas state refrigerant into the condenser. The condenser is consisted of many radiating fins for the air to flow though. The compressed air is fully cooled down by the outside air and the air sucked in by the condenser fans. The cooled refrigerant is reserved in the drier. When the liquid state refrigerant from the drier goes though the expansion valve, the pressure and temperature drops quickly, and the refrigerant is completely evaporated in the evaporator. The passing air is be also cooled down because the evaporator is cold. Finally, the gas state refrigerant is absorbed again by the air conditioning compressor.

## Location View



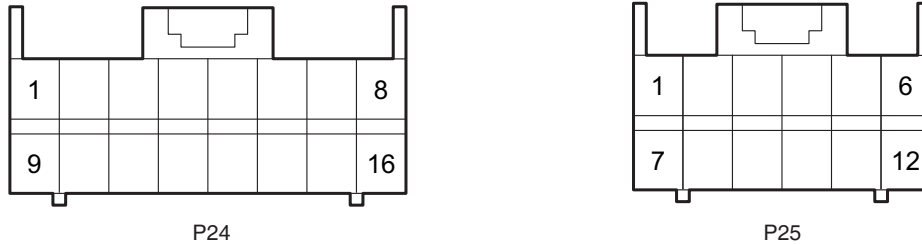
Item	Description	Sequence number	Description
1	HVAC assembly	9	No.1 suction pipe assembly
2	Nut with washer	10	Evaporator connection pipe assembly
3	Cross recessed hexagon screw	11	Cross recessed hexagon screw
4	Air conditioning control module	12	Hexagon bolt with flange
5	Cross recessed pan head tapping screw	13	Condenser left air deflector
6	Compressor assembly	14	Condenser right air deflector
7	Condenser assembly	15	Outside temperature sensor
8	No.1 drain pipe assembly		



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Item	Description	Item	Description
1	Interior and exterior circulation vent actuator	6	Blower assembly
2	Mode vent actuator	7	Expansion valve
3	Warm and cold vent actuator	8	Evaporator assembly
4	HVAC wiring harness	9	Heater core body assembly
5	Air inlet filter		

## Air Conditioning Control Module Terminal



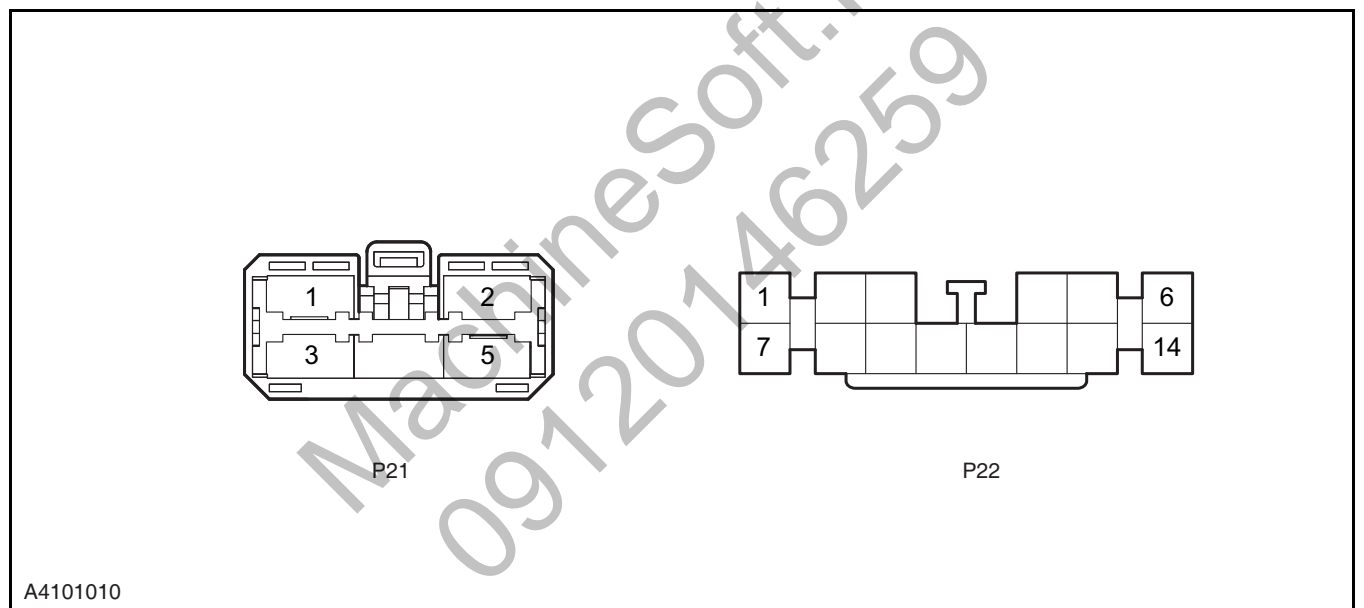
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Terminal No.	Description	Connection	Terminal Description	Remark
P24-1	FET-G	0.5 BN	Blower speed control signal	Low-level validity
P24-2	FET-D	0.2 BU	Blower voltage feedback signal	-
P24-3	-	0.5 GN/WH	Vehicle speed signal	-
P24-4	-	-	-	-
P24-5	FRE	0.5 GN/BK	Exterior circulation CCW+	-
P24-6	REC	0.5 BU/BK	Interior circulation CCW-	-
P24-7	FACE	0.5 GN/YE	Center vent CCW+	-
P24-8	DEFROST	0.5 BU/YE	Front defroster CCW-	-
P24-9	VREF(5V)	0.5 WH/BK	Potentiometer positive power supply	-
P24-10	S-GND	0.5 BK	Signal grounding	-
P24-11	EVA-SENSOR	0.5 GY	Evaporator temperature signal	-
P24-12	-	-	-	-
P24-13	MODE-F/B	0.5 BK	Mode vent position feedback signal	-
P24-14	TEMP-F/B	0.5 GN/RD	Warm and cold vent position feedback signal	-
P24-15	-	0.5 OG/YE	Request signal ESP OFF	-
P24-16	-	0.5 WH/OG	Feedback signal ESP OFF	-
P25-1	COOL	0.5 PK	Cooler CCW-	-
P25-2	HOT	0.5 YE/BK	Warmer CCW+	-
P25-3	PEDEF-SW	0.5 GN/OG	Rear defroster output	Low-level validity



Terminal No.	Description	Connection	Terminal Description	Remark
P25-4	ILL+	0.5 GN/OG	Lighting power supply +	-
P25-5	-	0.3 YE/OG	Emergency alarm switch	Low-level validity
P25-6	IGN	0.85 YE/OG	Ignition voltage	-
P25-7	A/C SIGNAL	0.5 GN	Request signal A/C	Low-level validity
P25-8	BLOWER ON	0.5 OG/BK	Blower open signal	Low-level validity
P25-9	PRDEF-INDICATOR	0.5 VT	Rear defroster input	High-level validity
P25-10	S-GND	0.5 BK	Signal grounding	-
P25-11	-	0.5 YE	BAT+ (Spare)	-
P25-12	-	0.5 BK-	Ground	-

### HVAC Assembly Terminal



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Terminal No.	Description	Connection	Terminal Description	Status
P21-1	Grounding (speed control module)	3.0 BK	GD205	-
P21-2	-	-	-	-
P21-3	Blower power supply +	3.0 RD	Blower motor (+)	-
P21-4	-	-	-	-
P21-5	-	-	-	-
P22-1	-	-	-	-
P22-2	Air volume adjustment control signal	0.5 BN	Mode position +5V	-
P22-3	Warm and cold vent drive signal	0.5 PK	Mode motor feedback	-


Terminal No.	Description	Connection	Terminal Description	Status
P22-4	Mode vent position feedback signal	0.5 BK	Warm and cold vent motor power supply	-
P22-5	5V power supply +	0.5 WH/BK	Speed module control	-
P22-6	Circulation vent drive signal	-	-	-
P22-7	Evaporator temperature signal	0.5 GY	Fresh air motor power supply	-
P22-8	Blower feedback signal	0.5 BU	Mode position negative	-
P22-9	Warm and cold vent drive signal	0.5 YE/BK	Warm and cold vent motor feedback	-
P22-10	Mode vent drive signal	0.5 OG/YE	Mode motor power supply	-
P22-11	Mode vent drive signal	0.5 BU/YE	Mode motor power supply	-
P22-12	Warm and cold vent position feedback signal	0.5 GN/RD	Warm and cold vent motor power supply	-
P22-13	5V power supply -	-	-	-
P22-14	Circulation vent drive signal	00.5 BU/BK	Evaporator temperature sensor	-


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## General Procedures

### General Equipment


Digital Multimeter
Refrigerant Recovery Filling Machine


 **WARNING:** Make sure disconnect the battery negative cable before repairing the electrical system. Do not weld or vapor clean on or near a vehicle with air conditioning pipes or components.

 **CAUTION:** Do not clean the air conditioning system with water, caustic solvent or inflammable or explosive solvent. It is recommended to use the R-14b and heptane.

The operational efficiency and service life of the air-conditioner (A/C) system depend on the chemical stability of the refrigeration system. When the refrigeration system is contaminated by foreign matters (such as dust, air or moisture), the matters change the stability of the refrigerant and RFL-100X compression machine oil. Besides, the relationship between the pressure and the temperature is affected to reduce the work efficiency and cause interior corrosion and abnormal wear of the components. Inspect by the approaches as follows:

1. Clean the oil on and around the joint before opening it in order to reduce the possibility of the oil entering the system.
2. Seal the both ends of the joint with caps, plugs or adhesive tapes immediately after the joint breaks to prevent the oil, the foreign matters and the moisture from entering the system.
3. Keep all the tools including manifold pressure gauge components and all the replacement components clean and dry.
4. Add RFL-100X refrigerant oil with clean and dry conveyer device and container to prevent the refrigerant oil from being affected by moisture.
5. Shorten the exposure time of the air conditioning system in the air.
6. Drain and fill the air conditioning system again after its interior is exposed to the air. All the service components are dried and sealed before leaving factory. The sealed components should not be opened until the installation soon starts. All the components should be at the room temperature before unsealed to prevent the water in the air condensing on the components and entering the system. Seal the components again as fast as possible.

 **CAUTION:** Air conditioning refrigerant- forbidden operation: a. Do NOT store the refrigerant in sun or at places with heat source; b. Do NOT let out the refrigerant into the air in any case; c. Do NOT use different refrigerants at the same time, such as R134a (Tetrafluoroethane) and R12 (Freon).

 **CAUTION:** Refrigeration oil- operations which should be noticed: Use the refrigerant oil with designated type and grade of the compressor factory. Never use the refrigerant oil of different types and grades together, or the compressor will be damaged. The refrigerant oil has a extremely high water absorption, so shorten the exposure time of the refrigerant oil in the air as much as possible.

### Refrigeration System Test

Inspect the following items when the air conditioning system may have problems:

1. Inspect the outside surface of the radiator and the condenser core to ensure that the air flow is not blocked by the dust, leaves and other foreign matters. Inspect the joint surface between the condenser and the radiator and all the outside surface.
2. Inspect the condenser core, the hose and the connecting pipes and see if they are blocked or twisted.
3. Inspect the operation of the blower fan.
4. Inspect all the air pipes and see if they have leakage or block. A small air flow may mean that the evaporator core is blocked.
5. Inspect the compressor clutch and see if it slips.
6. Inspect the tension of the accessory driving belt.

### Insufficient Cooling Quick Inspection

Execute the following "hand feeling" program and see if the quantity of the refrigerant R134a is appropriate. The air temperature must be higher than 21 °C in all the modes.

1. Preheat the engine. Run the engine at idle speed.
2. Open the engine hood and all the vehicle doors.
3. Switch on the air conditioning.
4. Set the temperature control knob at "coldest".
5. Set the blower at maximum speed.
6. Use a hand to feel the temperature at the outlet pipe of the evaporator. It should be cool.
7. Inspect other faults.
8. Inspect if there is a leak in the system. If so, drain the system and do necessary repair. Drain the system and fill refrigerant again after repair.
9. If it does not have a leakage.

Refer to: Symptom Chart (4.1.1 Heating, Ventilation and Air Conditioning, Diagnosis and Testing).

### Refrigeration System Pressure Inspection

1. Park the vehicle indoors or in shade.
2. Open the windows to ventilate.
3. If the air conditioning system is working, keep it working for about 2 min.
4. Turn off the ignition switch.
5. Install the air conditioning detecting and repairing device and connect the high and low pressure pipes to the high and low pressure pipes of the air conditioning system respectively.
6. Measure the pressure reading of the high-pressure and low-pressure pipes of the air conditioning system.

Pressure Standard Values Is As Follows:

	Standard Value 1	Standard Value 2	Standard Value 3
<b>Ambient Temperature</b>	Higher than 16 °C	Higher than 24 °C	Higher than 33 °C
<b>Pressure</b>	345 kPa	483 kPa	690 kPa

7. Start the engine and keep it working for 5 min.
8. Press down the A/C switch of the air conditioning and keep it working for 2 min.
9. Keep the engine speed at 2,000 rpm, and measure the pressure reading of the high-pressure and low-pressure pipes of the air conditioning system.

Pressure Standard Values Is As Follows:

Item	High-pressure	Low-pressure
Standard	1.4 ~ 1.75 MPa	0.25 ~ 0.35 MPa

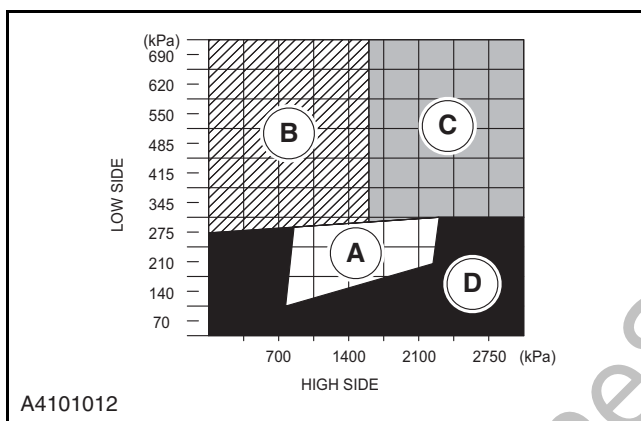
### Refrigeration System Pressure Chart

Pressure area A: The high-pressure and low-pressure may be normal or slightly lower than normal value.

Pressure area B: The low-pressure is higher than normal while the high-pressure is lower than normal.

Pressure area C: The low-pressure and high-pressure are both higher than normal.

Pressure area D: The low-pressure is lower than normal while the high-pressure is higher than normal.



### Air Conditioning System Performance Test

Test instructions

This test measures the work efficiency of the AC system at the following conditions:

- Current ambient temperature
- Current relative humidity
- Air conditioning system high-pressure
- Air conditioning system low-pressure
- Air temperature at the instrument cluster vent



**CAUTION: The ambient temperature should be at least 16 °C . Do NOT let extra the air flow in front of the vehicle during the test.**

## Air Conditioning Performance List

Relative Humidity(%)	Environmental Air Temperature	Low-Pressure	Engine Speed(rp m)	Center Vent	High-Pressure
	°C	kPa		°C	kPa
20	21	179	2000	7	1103
	27	165		8	1462
	32	179		9	1910
	38	228		14	2296
30	21	179	2000	7	1103
	27	165		8	1517
	32	186		10	1951
	38	234		15	2406
40	21	179	2000	8	1117
	27	179		9	1565
	32	200		11	2034
	38	255		17	2510
50	21	179	2000	8	1117
	27	179		9	1620
	32	221		13	2096
	38	490		19	2620
60	21	186	2000	8	1138
	27	179		9	1696
	32	234		15	2234
	38	303		22	2710
70	21	186	2000	9	1179
	27	193		10	1793
	32	248		18	2275
	38	324		24	2765
80	21	186	2000	9	1227
	27	207		12	1834
	32	255		17	2337
90	21	186	2000	9	1227
	27	207		12	1875
	32	262		18	2344

Test conditions: open the doors and the engine hood; turn the air conditioning on, select the interior recirculation mode at the coldest temperature and the highest blower speed, no sunshine, the wind speed lower than 8 km/h.

## R-134a Pressure and Temperature Relationship List

Temperature °C	Pressure kPa	Temperature °C	Pressure kPa
-8	113.1	9	296.2
-7	121.5	10	309.6
-6	130.2	15	383.7
-5	139.1	20	467.7
-4	148.4	25	567.5
-3	157.9	30	667.8
-2	167.6	35	785.6
-1	177.8	40	916.4
0	188.2	45	1062.2
1	198.8	50	1222.1
2	209.9	55	1398.2
3	221.2	60	1589.6
4	232.9	65	1799.0
5	245.0	70	2026.6
6	257.4	75	2272.2
7	269.8	80	2544.0
8	282.9	-	-

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### Refrigeration System Leakage Test

If you doubt that the system has a refrigerant leakage, test if so. You should make a leakage test when your repair affects the pipes or the joints. Leakage usually occurs at the joints or the interfaces. The faults leading to a leakage is usually as follows:

- The torque is not appropriate.
- The seal ring is damaged.
- The O-ring has dust or fiber on it.

### General Test Method

1. Inspect along the entire line of the refrigerant system using the electronic leak detector.

**⚠ CAUTION: The electronic leak detector is sensitive to the front windscreen glass washing liquid, solvent, cleaning agent and some vehicle adhesives. The surface must be cleaned to ensure correct reading. Make sure that all the surfaces are dry to avoid damaging the leak detector.**

2. Inspect all around the joints moving at a speed of 25 ~ 50 mm / s.
3. The detector tip is less than 6 mm from the surface.
4. Do not block the gas inlet.
5. If the leakage is detected, the alarm changes to the continuous alarm instead of 1~2 times per second. Adjust the balance control to keep the alarm at 1 ~ 2 times per second.
6. Inspect the following items even if one leakage is detected:
  - Inlet and outlet of the evaporator
  - Inlet and outlet of the reservoir drier
  - Inlet and outlet of the condenser
  - Brazing and electric welding parts
  - Damaged components
  - Hose plug
  - Front and rear covers of the compressor
  - All the plugs and joints
  - Test the access ports/valves

The access ports are protected by the seal cap. Make sure that all the caps are not lost or loose. Every port have to use the correct cap.

### Evaporator Core Test

A leakage of the evaporator core is hard to detect. Test the evaporator core according to the following program:

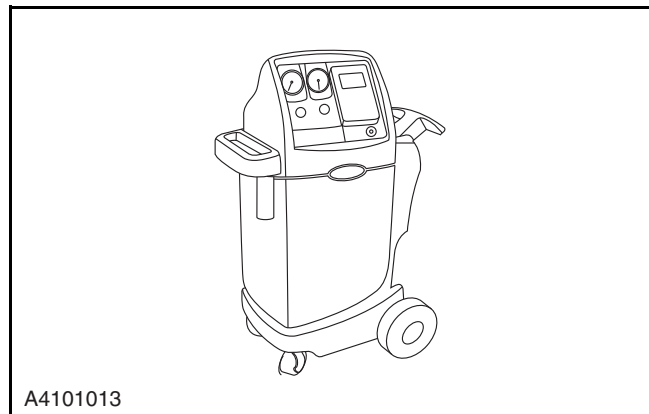
1. Set the blower speed at the highest and keep it working for 15 min.
2. Turn off the blower.
3. Wait for 10 min.
4. Remove the blower motor speed speed control module.
5. Put in the leak detector as near the evaporator core as possible. The leak detector will give a continuous alarm when it detects a leakage.

### Compressor Shaft Seal Test

1. Use the shop compressed air to blow the rear part and the front part of the compressor clutch/belt pulley for at least 15s.
2. Wait for 1 ~ 2 min.
3. Detect the front part of the belt pulley. The leak detector will give a continuous alarm when it detects a leakage.

### AC Refrigerant Recovery and Filling

The refrigerant recovery filling machine can accomplish the discharge, drain and filling of the air conditioning system at one connection. Filter the refrigerant during the recovery and draining to keep the refrigerant filling in the air conditioning system clean and dry.



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**⚠ WARNING: Do refrigeration relative work in a drafty environment and do not inhale in refrigerant vapor. Avoid sucking in the air conditioning refrigerant 134a (Tetrafluoroethane) and the refrigerant oil vapor or smog. The eyes, nose and pharyngeal will be irritated if getting in touch with them. Do work in a drafty area. Use repair device (R-134a regeneration device) authenticated to meet the need of the SAE (Society of Automotive Engineers) J 2210. Ventilate the working area before the maintenance if accidental discharging occurs in the system. Further information about the health and safety can be acquired from the refrigerant and refrigerant oil manufactures.**

### Refrigerant Recovery


1. Connect the high side hose with quick coupling to the high-pressure side connector of the vehicle AC system.
2. Open the high-pressure side connector valve.
3. Connect the low side hose with quick coupling to the low-pressure side connector of the vehicle AC system.
4. Open the low-pressure side connector valve.
5. Inspect the manometer on the high-pressure side and low-pressure side in the control panel of the refrigerant recovery filling machine. If there is no pressure, there is no refrigerant recyclable in the system.
6. Open the valve of the high-pressure side connector and the low-pressure side connector.
7. Connect the refrigerant recovery filling machine to a suitable power outlet.
8. Connect to the main power switch.
9. Start the recovery process. Please refer to the instruction for use from the manufacturer, try to have a detailed knowledge of how to use the refrigerant recovery filling machine.
10. Inspect the manometer in the low-pressure side of the control panel. If the pressure in the AC system is 0, it means the recovery process is finished.
11. If the pressure indicated by the manometer in the low-pressure side is not 0, it means there is still refrigerant remained. Continue to recovery the refrigerant remained. Repeat this process until pressure of the system maintain 0 for 2 min.

### Emptying

The refrigerant tank in the refrigerant recovery filling machine has to contain enough R-134a refrigerant so as to fill. Inspect the quantity of refrigerant inside the tank. If there is less than 2 kg refrigerant, fill new refrigerant to the refrigerant tank. More details are included in the instruction for use of the refrigerant recovery filling machine to learn more about how to add the refrigerant.


1. Inspect if the high-pressure side hose and low-pressure side hose are connected to the AC system, open the valve of the high-pressure side and low-pressure side in the control panel of the refrigerant recovery filling machine.
2. Operate according to the operating process of the refrigerant recovery filling machine, start the vacuum pump and begin the evacuation procedures.
3. Inspect if there is a leak in the system. Please refer to the instruction for use from the manufacturer, try to have a detailed knowledge of how to use the refrigerant recovery filling machine.

### Air Conditioning Refrigerant Oil Filling and Adding

 **CAUTION: Make sure add the refrigerant oil drained from the air conditioning system during the recovery.**

1. Use the refrigerant oil which is specialized for the R-134a system.
2. Please refer to the instruction for use from the manufacturer, try to have a detailed knowledge of how to use the refrigerant recovery filling machine, fill the specialized refrigerant oil to the vehicle air conditioning system.
3. When the oil quantity meets the requirement, close the valve.

### Filling

 **CAUTION: Empty the air conditioning system before the filling.**

1. Open the low-pressure side valve on the control panel.
2. Open the high-pressure side valve on the control panel.
3. Please refer to the instruction for use from the manufacturer, try to have a detailed knowledge of how to use the refrigerant recovery filling machine.
4. Fill the stated amount of the refrigerant to the AC, and make sure the measuring unit is right (kilogram or pound).
5. Start the filling.

After finish refrigerant filling, execute the steps below:

1. Close the valve of the high-pressure side and low-pressure side of the refrigerant recovery filling machine. Remember to close both.
2. Start the vehicle AC system.
3. Keep the engine working, until the readings on the manometer of both the high-pressure side and low-pressure side remain stable.
4. Compare the readings with system specification.

5. Inspect the temperature of the evaporator outlet, make sure that the air conditioning operation meets to the system requirements.
6. Turn off the air conditioning system.
7. Disconnect the high-pressure and low-pressure side hose of the refrigerant recovery filling machine from the vehicle.
8. Execute the cleaning operation according to the instruction for use of the refrigerant recovery filling machine.

## Symptom Diagnosis and Testing

### General Equipment

Digital Multimeter
Changan Auto Special Diagnostic Tool

## Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical damage or electric damage.

### Visual Inspection Chart

Mechanical	Electric
<ul style="list-style-type: none"> <li>•Fans wind gather cover</li> <li>•Compressor</li> <li>•Air conditioning high and low pressure pipe</li> <li>•Condenser</li> <li>•Evaporator</li> <li>•Air channel</li> </ul>	<ul style="list-style-type: none"> <li>•Circuit</li> <li>• Air conditioning pressure switch</li> <li>•Digital fan</li> <li>•Blower and speed control module</li> <li>•Warm and cold vent motor</li> <li>•Mode vent motor</li> <li>•Interior and exterior circulation vent motor</li> <li>•Air conditioning control module</li> <li>•Outside temperature sensor</li> <li>•ECM circuit</li> <li>• ECM</li> </ul>

3. Inspect the air conditioning system circuit which is easy to see or visible, to see if there is a leak in the air conditioning system.
4. If an obvious cause for an observed or reported concern is found, correct the cause before proceeding to the next step.
5. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

## Symptom Chart

If there is a symptom but no diagnosis trouble code (DTC) is stored in control module and can not confirm symptom reasons in basic inspect, it is necessary to diagnosis and eliminate the symptoms in the following chart.

Symptom	Possible Sources	Solutions
Insufficient refrigeration of the air conditioner	<ul style="list-style-type: none"> <li>•Insufficient refrigerant filling</li> <li>•Accessories drive belt skids</li> <li>•Clutch slippage</li> <li>•Pipeline leak</li> <li>•Blower fault</li> <li>•Warm and cold valve fault</li> <li>•Vent blocked or leak</li> <li>•Compressor wear</li> </ul>	Refer to: <a href="#">Insufficient Cooling Diagnosis ( 4.1.1 Heating, Ventilation and Air Conditioning, Symptom Diagnosis and Testing)</a> .
Insufficient heating of the air conditioner	<ul style="list-style-type: none"> <li>•Heater pipe fault</li> <li>•Heater water tank fault</li> <li>•Blower fault</li> <li>•Warm and cold valve fault</li> <li>•Vent blocked or leak</li> <li>•Engine fault</li> </ul>	Refer to: <a href="#">Insufficient Heating Diagnosis (4.1.1 Heating, Ventilation and Air Conditioning, Symptom Diagnosis and Testing)</a> .
Blower fault	<ul style="list-style-type: none"> <li>•Circuit</li> <li>•Blower speed control module</li> <li>•Air volume control switch</li> <li>•Blower</li> </ul>	Refer to: <a href="#">Blower Inoperative Diagnosis (4.1.1 Heating, Ventilation and Air Conditioning, Symptom Diagnosis and Testing)</a> .
Air conditioning compressor clutch fault	<ul style="list-style-type: none"> <li>•Circuit</li> <li>•Pipe</li> <li>•Air conditioning pressure switch</li> <li>•Compressor temperature sensor</li> <li>• ECM fault</li> </ul>	Refer to: <a href="#">Air Conditioning Compressor Clutch Inoperative Diagnosis (4.1.1 Heating, Ventilation and Air Conditioning, Symptom Diagnosis and Testing)</a> .
Air conditioning pressure switch signal abnormal	<ul style="list-style-type: none"> <li>•Air conditioning pressure switch indicates a signal which means the pressure in the AC doesn't meet the standard value.</li> <li>•Air conditioning pressure switch circuit fault</li> <li>• ECM fault</li> </ul>	<ul style="list-style-type: none"> <li>•Repair the air conditioning pressure switch wiring harness.</li> <li>•Replace the air conditioning pressure switch.</li> <li>•Inspect and repair the ECM, replace it when necessary.</li> </ul>

Symptom	Possible Sources	Solutions
Refrigerant pressure abnormal	<ul style="list-style-type: none"> <li>The high pressure of the AC is over 3.2MPa.</li> </ul>	<ul style="list-style-type: none"> <li>Release the excessive refrigerant.</li> <li>Repair the fault of the poor vehicle radiating.</li> <li>Repair the engine fault.</li> <li>Inspect and repair the fault of the pipeline block inside the air conditioning system.</li> </ul>
	<ul style="list-style-type: none"> <li>The low pressure of the AC is over 0.2MPa.</li> </ul>	<ul style="list-style-type: none"> <li>Supplement and fill the refrigerant.</li> <li>Inspect and repair the fault of the air conditioning leak.</li> <li>Inspect and repair the fault of the pipeline block inside the air conditioning system.</li> </ul>
Water leak from the AC	<ul style="list-style-type: none"> <li>Connection fault between the drainpipe and HVAC assembly</li> <li>Connection fault between the drainpipe and the car body</li> <li>Drainpipe blocked</li> </ul>	<ul style="list-style-type: none"> <li>Inspect and repair the drainpipe.</li> <li>Replace the drainpipe.</li> </ul>
The blower can't send the air out under a high temperature, and can recover after lowering the temperature.	<ul style="list-style-type: none"> <li>Thermal protection of speed control module</li> </ul>	<ul style="list-style-type: none"> <li>Replace the speed control module for the blower.</li> </ul>

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## Insufficient Cooling Diagnosis

Test Conditions	Details/Results/Actions
1. Inspect the temperature of the air outlet in the AC instrument cluster	<p>A. Start the engine at a 2000 rpm rotate speed, then measure the temperature of the instrument cluster vent in the AC.</p> <p>Is the temperature of the air outlet in the AC instrument cluster over-high?</p> <p><b>Y</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Switch to the interior circulation.</li> <li>• Move the vehicle to a shade.</li> <li>• Adjust the interior and exterior circulation vent mechanism, replace the interior and exterior circulation vent adjusting gear and control motor when necessary.</li> <li>• Inspect and repair the warm and cold vent control motor and replace it when necessary.</li> <li>• Repair the air conditioning control module, replace it when necessary.</li> </ul> <p><b>N</b></p> <p>Go to step 2.</p>

Test Conditions	Details/Results/Actions
2. Inspect the air volume of the instrument cluster vent in the AC	<p>A. Inspect the air volume state of the instrument cluster vent in the AC.</p> <p>Is the air volume of the instrument cluster vent in the AC too small?</p> <p><b>Y</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Clean and repair the instrument cluster vent, replace it when necessary.</li> <li>• Replace the refrigerant which meets the standards of the manufacturer.</li> <li>• Inspect and repair the circuit.</li> <li>• Inspect and repair the wind direction control system, replace it when necessary.</li> <li>• Inspect and repair the blower motor, replace it when necessary.</li> <li>• Replace the blower speed control module.</li> <li>• Replace the expansion valve.</li> <li>• Repair the air conditioning control module, replace it when necessary.</li> </ul> <p><b>N</b></p> <p>Go to step 3.</p>

Test Conditions	Details/Results/Actions
3. Inspect the air conditioning pressure	<p>A. Connect to the air conditioning manometer section and start the engine at a speed of 2000 rpm, then measure the high pressure and low pressure of the air conditioning system.</p> <p><b>Standard Value:</b></p> <p><b>High pressure 1.4 ~ 1.75 MPa</b></p> <p><b>Low pressure 0.25 ~ 0.35 MPa</b></p> <p>Does the pressure in refrigerant meet the standard?</p> <p><b>Yes</b></p> <p>Go to step 4.</p> <p><b>N</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• If both the high pressure and low pressure in the AC are high, inspect and repair the sealing of the refrigerant system circuit and refill the refrigerant. Release the excessive refrigerant and the refrigerant oil, replace the expansion valve.</li> <li>• If the high pressure is high but the low pressure is low, then clean and replace the blocked high-pressure pipe, replace the expansion valve.</li> <li>• If the high pressure is low but the low pressure is high, then supplement the refrigerant oil, inspect and repair or replace the compressor.</li> <li>• If the high pressure is over-low but the low pressure is over-low, then inspect and repair, replace the leaked system components, fill the refrigerant according to the instructions from the manufacturer.</li> <li>• If the high pressure is low but the low pressure is vacuum, then replace the reservoir drier and the expansion valve. clean or replace the blocked low-pressure pipe, extend the system vacuumizing time, fill the refrigerant required by the manufacturer, replace the evaporator temperature sensor.</li> </ul>



Test Conditions	Details/Results/Actions
4. Inspect the compressor function state	
	<p>A. Inspect the items below:</p> <ul style="list-style-type: none"> <li>• Compressor belt working state.</li> <li>• Compressor clutch working state.</li> <li>• Compressor working state.</li> </ul> <p>Is the system working normal?</p> <p><b>Yes</b></p> <p>Go to step 5.</p> <p><b>N</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Adjust the tension of the compressor belt, replace it when necessary.</li> <li>• Inspect the refrigerant, the refrigerant oil quantity and supplement them when necessary.</li> <li>• Inspect and repair the compressor clutch circuit.</li> <li>• Inspect and repair the compressor clutch, replace it when necessary.</li> <li>• Inspect and repair the refrigerant pressure switch, replace it when necessary.</li> <li>• Inspect and repair the AC temperature sensor, replace it when necessary.</li> <li>• Inspect and repair the compressor, replace it when necessary.</li> <li>• Repair the air conditioning control module, replace it when necessary.</li> <li>• Inspect and repair the engine control module, replace it when necessary.</li> </ul>
5. Inspect the temperature in the condenser	
	<p>A. Inspect the radiating state of the condenser.</p> <p>Is the system working normal?</p> <p><b>Yes</b></p> <p>Go to step 6.</p> <p><b>N</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <p>Inspect, repair and clean the condenser, replace it when necessary.</p>

Test Conditions	Details/Results/Actions
6. Inspect the engine coolant temperature	<p>A. Inspect the items below:</p> <ul style="list-style-type: none"> <li>• Engine idle running time.</li> <li>• Engine operation time with heavy load.</li> <li>• Coolant filling quantity.</li> <li>• Coolant performance.</li> <li>• Thermostat performance.</li> <li>• Engine working state.</li> <li>• Cooling fan working state.</li> <li>• Radiating state of the water tank.</li> <li>• Cooling fan wind-gathering cover state.</li> </ul> <p>Inspect and adjust as below, make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Decrease the engine idle running time.</li> <li>• Decrease the engine operation time with heavy load.</li> <li>• Inspect and repair the coolant leaking situation, fill the coolant to the standard value.</li> <li>• Replace the coolant which meet the manufacturer's requirements.</li> <li>• Inspect and repair the cooling fan wind-gathering cover, replace it when necessary.</li> <li>• Inspect and repair, clean the cooling water tank, replace it when necessary.</li> <li>• Inspect and repair the cooling fan motor and its circuit, replace it when necessary.</li> <li>• Replace the thermostat.</li> <li>• Inspect and repair the engine cooling system.</li> <li>• Inspect and repair the engine working state.</li> </ul>

## Insufficient Heating of the Air Conditioning Diagnosis

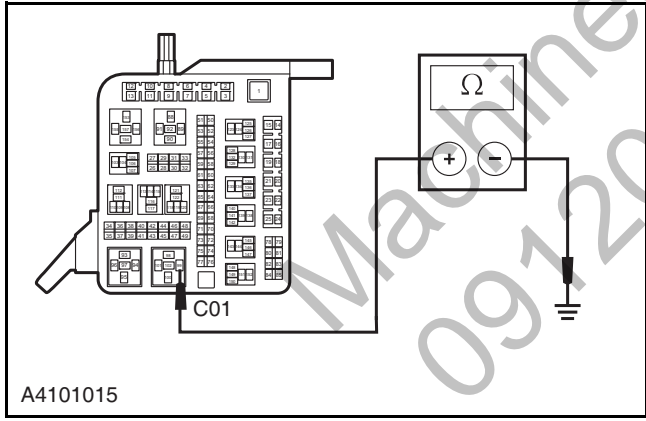
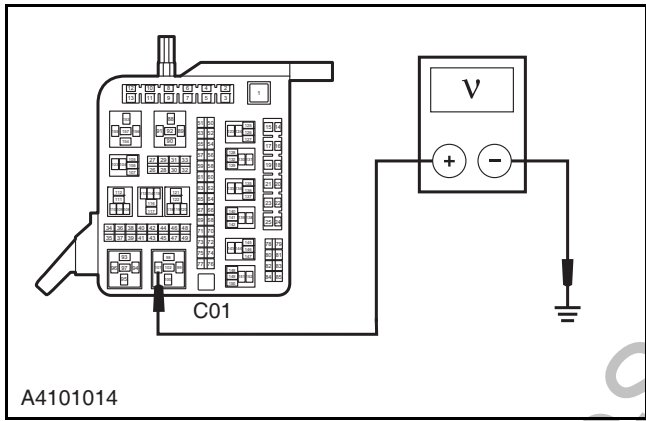
Test Conditions	Details/Results/Actions
1. Inspect the engine coolant temperature	<p>A. Inspect the engine coolant temperature.</p> <p>Is the engine coolant temperature higher than 82 °C ?</p> <p><b>Y</b></p> <p>Go to step 2.</p> <p><b>N</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Prolong the engine running time.</li> <li>• Bleed the cooling system.</li> <li>• Repair or replace the thermostat.</li> <li>• Repair and adjust the engine working conditions.</li> </ul>
2. Inspect the warm and cold vent working condition	<p>A. Inspect the working condition of the warm and cold vent.</p> <p>Is the working condition of the warm and cold vent normal?</p> <p><b>Y</b></p> <p>Go to step 3.</p> <p><b>N</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Adjust the warm and cold vent mechanism, and replace the control motor and adjusting gear when necessary.</li> <li>• Inspect air channel, repair or replace the leaking air channel.</li> <li>• Inspect and repair the air conditioning control module, replace it when necessary.</li> </ul>

Test Conditions	Details/Results/Actions
3. Inspect the working condition of the interior and exterior circulation vent	<p>A. Inspect the working condition of the AC interior and exterior circulation vent.</p> <p>Is the interior and exterior circulation vent working normal?</p> <p><b>Yes</b></p> <p>Make sure the system is normal.</p> <p><b>No</b></p> <p>Repair and adjust as below and make sure the system is normal.</p> <ul style="list-style-type: none"> <li>• Switch to the interior circulation mode.</li> <li>• Adjust the interior and exterior circulation vent mechanism.</li> <li>• Repair or replace the interior and exterior circulation control motor and adjusting gear.</li> <li>• Repair air conditioning control module, replace it when necessary.</li> </ul>

## Blower Inoperative Diagnosis

Test Conditions	Details/Results/Actions
1. General Procedures	<p>A. Inspect whether the wiring harness connectors of the air conditioning control module, the HVAC assembly wiring harness and the blower are damaged, loose, weathered or poor contacted.</p> <p>Is it normal?</p> <p><b>Y</b></p> <p>Go to step 2.</p> <p><b>N</b></p> <p>Repair the fault.</p>
2. Inspect the fuse	<p>A. Inspect the blower fuse SB06 and IF12.</p> <p><b>Fuse Rated Capacity: 30A(SB06),10A (IF12)</b></p> <p>Is the fuse normal?</p> <p><b>Y</b></p> <p>Go to step 3.</p> <p><b>N</b></p> <p>Repair the fuse circuit, replace the fuse in rated capacity.</p>

Test Conditions	Details/Results/Actions
<p>3. Inspect the blower relay ER08</p>	<p>A. Replace a new relay, turn the ignition switch to position "ON", turn on the air control switch .</p> <p>Is the blower working normal?</p> <p><b>Y</b></p> <p>Replace the new blower relay.</p> <p><b>N</b></p> <p>Go to step 4.</p>
<p>4. Inspect the blower relay ER08 coil circuit</p>	<p>A. Turn the ignition switch to position "ON". Use a multimeter to measure the voltage value of the terminal 101 of the power supply circuit C01 of the blower relay ER08 coil.</p> <p><b>Standard Value: 11 ~ 14 V</b></p> <p>B. Turn the ignition switch to position "LOCK". Use a multimeter to measure the resistance value of the terminal 99 of the grounding circuit C01 of the blower relay ER08 coil and the grounding point GD102.</p> <p><b>Standard Value: less than 5 Ω</b></p> <p>Is the circuit normal?</p> <p><b>Yes</b></p> <p>Go to step 5.</p> <p><b>N</b></p> <p>Inspect and repair the blower relay ER08 coil circuit.</p>



Test Conditions	Details/Results/Actions
<p>5. Inspect the blower power supply circuit</p> <div data-bbox="100 293 746 707"> <p>A4101016</p> </div> <div data-bbox="100 712 746 1126"> <p>A4101017</p> </div>	<p>A. Turn the ignition switch to "ON" position, turn the air control switch. Use a multimeter to measure the voltage value of the terminal 3 of the HVAC assembly wiring harness connector P21.</p> <p><b>Standard Value: 11 ~ 14 V</b></p> <p>B. Turn off the air control switch, turn the ignition switch to position "LOCK". Use a multimeter to inspect the grounding resistance value of the terminal 1 of the HVAC assembly wiring harness connector P21.</p> <p><b>Standard Value: less than 5 Ω</b></p> <p>Is the resistance value normal?</p> <p><b>Y</b></p> <p>Go to step 6.</p> <p><b>N</b></p> <p>Repair the blower power supply circuit.</p>
<p>6. Inspect the circuit between the blower to the air conditioning control module</p> <div data-bbox="100 1205 746 1619"> <p>A4101058</p> </div>	<p>A. Turn the ignition switch to position "LOCK".</p> <p>B. Disconnect the wiring harness connector P22 of the HVAC assembly and the wiring harness connector P24 of the air conditioning control module.</p> <p>C. Measure the resistance between the Terminal 2 and 8 of the wiring harness connector P22 of the HVAC assembly and the Terminal 1 and 2 of the wiring harness connector P24 of the air conditioning control module respectively.</p> <p><b>Standard Value: less than 5 Ω</b></p> <p>Is the resistance value normal?</p> <p><b>Y</b></p> <p>Go to step 7.</p> <p><b>N</b></p> <p>Repair the circuit fault of the circuit between the Terminal 2 and 8 of the wiring harness connector P22 of the HVAC assembly and the Terminal 1 and 2 of the wiring harness connector P24 of the air conditioning control module respectively.</p>

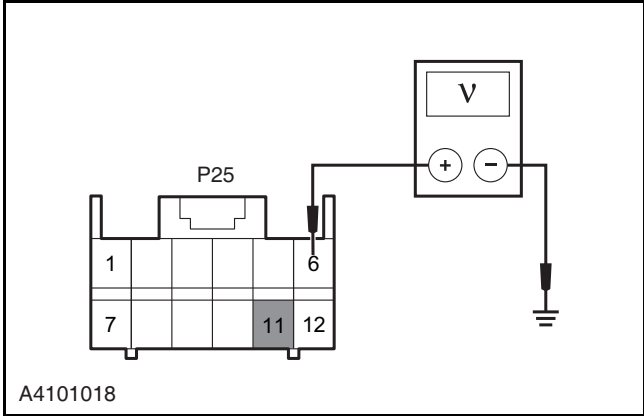
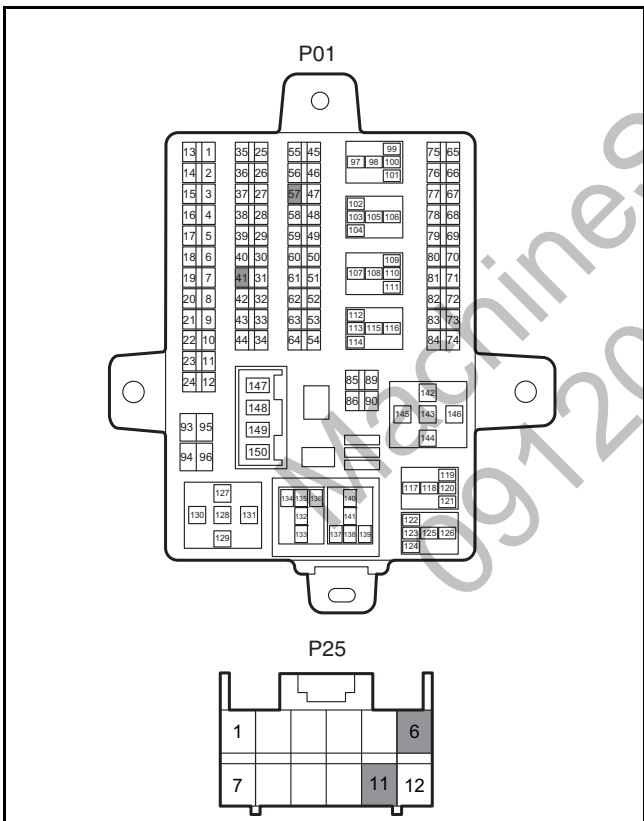
Test Conditions	Details/Results/Actions
7. Replace the blower assembly	
	<p>A. Replace the blower assembly.</p> <p><b>Refer to: Blower Motor (4.1.1 Heating, Ventilation and Air Conditioning System, Removal and Installation).</b></p> <p>Is the blower working normal?</p> <p><b>Y</b></p> <p>Replace the blower assembly and make sure the system is normal.</p> <p><b>N</b></p> <p>Go to step 8.</p>
8. Replace the air conditioning control module	
	<p>A. Replace the air conditioning control module.</p> <p><b>Refer to: Air Conditioner Control Module (4.1.1 Heating, Ventilation and Air Conditioning System, Removal and Installation).</b></p> <p>Verify the system is normal.</p>

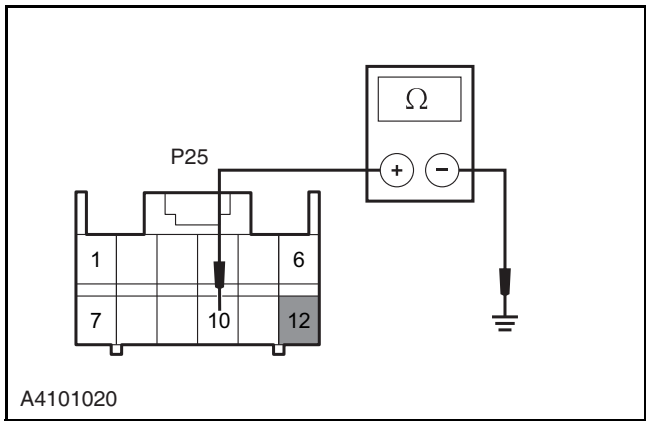
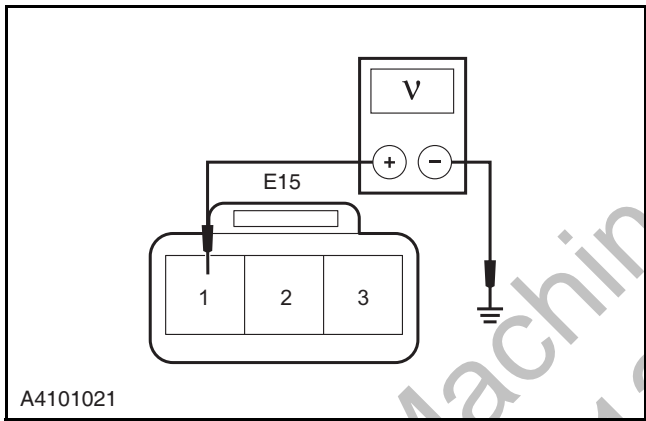
### Air Conditioning Compressor Clutch Inoperative Diagnosis

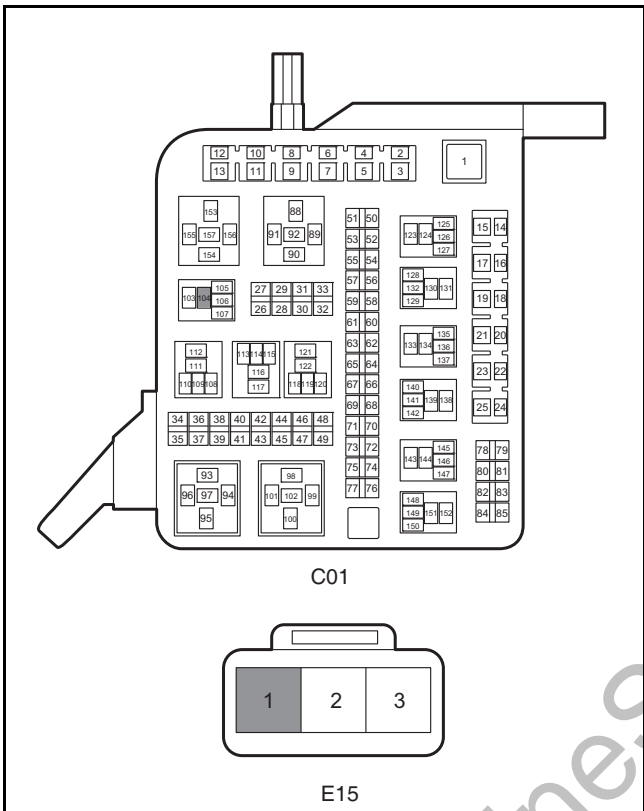
Test Conditions	Details/Results/Actions
1. General Procedures	
	<p>A. Remove the air conditioner compressor belt.</p> <p><b>Refer to: Accessory Drive Belt Inspection (3.1.2 Mechanical System, General Procedures).</b></p> <p>B. Inspect whether the wiring harness connectors of the air condition control module, the refrigerant pressure switch and the air condition clutch are broken, loose, weathered or have poor contact.</p> <p>Is it normal?</p> <p><b>Y</b></p> <p>Go to step 2.</p> <p><b>N</b></p> <p>Repair the fault.</p>

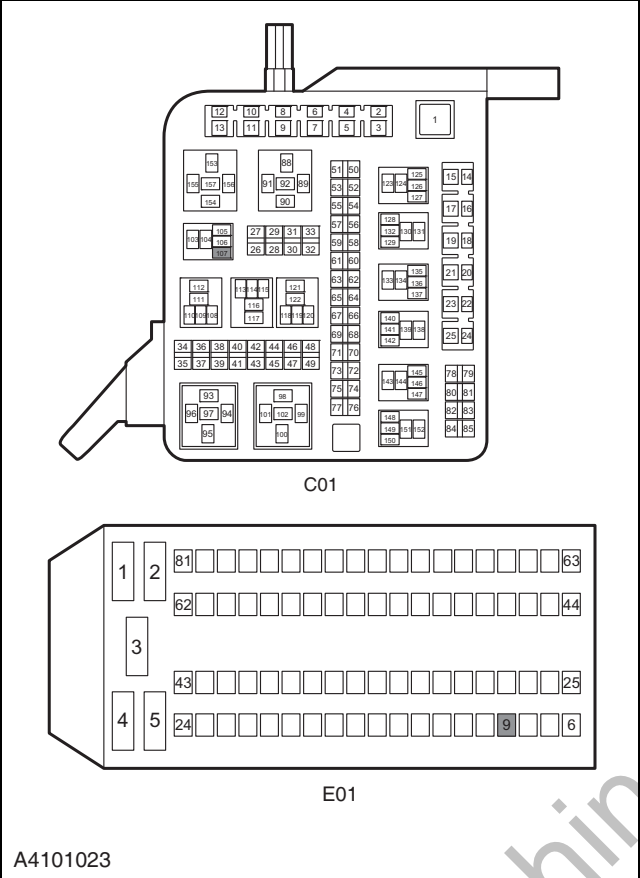
Test Conditions	Details/Results/Actions
2. Inspect the fuse	<p>A. Inspect the air conditioning clutch fuse EF16, EF03, EF22, SB12.</p> <p><b>Fuse Rated Capacity: 10A (EF22, EF16), 15A (EF03), 30A (SB12).</b></p> <p>Is the fuse normal?</p> <p><b>Y</b></p> <p>Go to step 3.</p> <p><b>N</b></p> <p>Repair the circuit, replace the fuse in rated capacity.</p>
3. Inspect the refrigerant pressure in the AC system	<p>A. Connect the air conditioning refrigerant manometer to the air conditioning high and low pressure pipes, and measure the air conditioning refrigerant pressure at room temperature under normal conditions.</p> <p><b>Standard Value: 0.7MPa</b></p> <p>Is the fuel pressure normal?</p> <p><b>Y</b></p> <p>Go to step 4.</p> <p><b>N</b></p> <p>Inspect the air conditioning refrigerant pressure pipes and fill appropriate amount of the refrigerant.</p> <p><b>Refer to: Refrigeration System Pressure Inspection (4.1.1 Heating, Ventilation and Air Conditioning System, General Procedures).</b></p>
4. Inspect the air conditioning clutch relay ER03	<p>A. Turn the ignition switch to position "LOCK".</p> <p>B. Replace a new air conditioning clutch relay ER03.</p> <p>C. Start the Engine.</p> <p>D. Press the A/C switch, and set the air conditioning under the refrigeration and operation state.</p> <p>E. Inspect whether the air conditioning clutch picks up or not.</p> <p>Does the air conditioning clutch pick up?</p> <p><b>Y</b></p> <p>Replace the air conditioning clutch relay.</p> <p><b>N</b></p> <p>Go to step 5.</p>

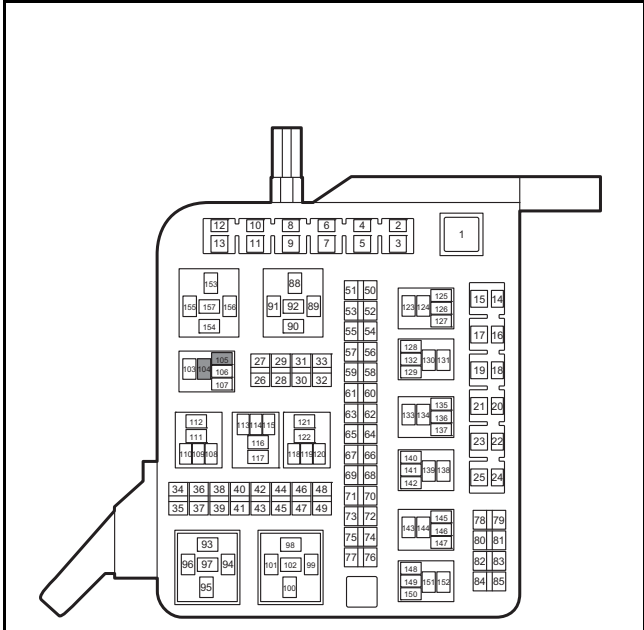
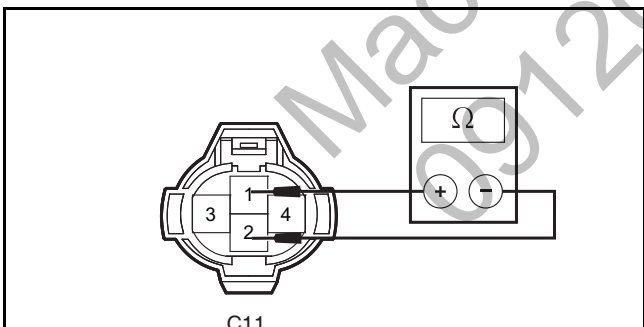


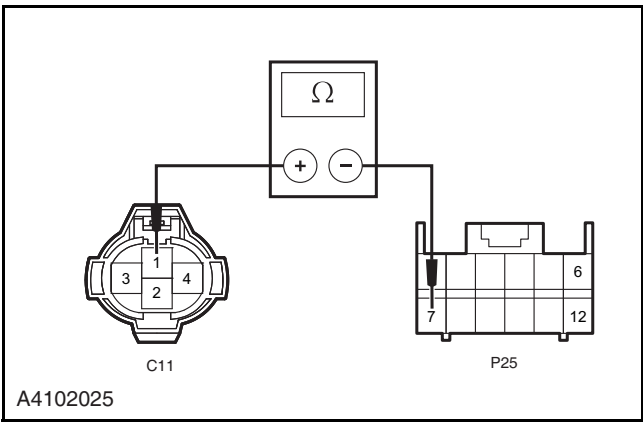
Test Conditions	Details/Results/Actions
<p>5. Inspect the power supply of the air conditioning control module</p>  <p>A4101018</p>	<p>A. Turn the ignition switch to position "LOCK".            B. Disconnect the air conditioning control module wiring harness connector P25.            C. Turn the ignition switch to position "ON".            D. Measure the voltage between the terminal 6 and 11 of the air conditioning control module wiring harness connector P25 and the reliable ground.</p> <p><b>Standard Value: 11 ~ 14 V</b></p> <p>Is voltage normal?  <b>Y</b>            Go to step 8.  <b>N</b>            Go to step 6.</p>
<p>6. Inspect the power supply circuit of the air conditioning control module.</p>  <p>A4101019</p>	<p>A. Turn the ignition switch to position "LOCK".            B. Disconnect the air conditioning control module wiring harness connector P25.            C. Maintain the resistance between the terminal 6 of the air conditioning control module wiring harness connector P25 and the terminal 41 of the interior electrical center P01.            D. Maintain the resistance between the terminal 11 of the air conditioning control module wiring harness connector P25 and the terminal 57 of the fuse IF19 of the interior electrical center P01.</p> <p><b>Standard Resistance Value: less than 5Ω</b></p> <p>Is the resistance value normal?  <b>Y</b>            Go to step 7.  <b>N</b>            Repair or replace the related wiring harnesses.</p>

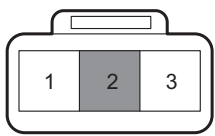
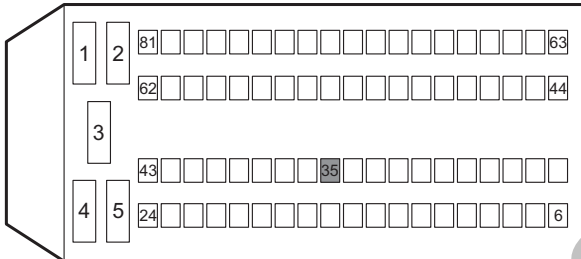
Test Conditions	Details/Results/Actions
<p data-bbox="97 232 951 264">7. Inspect the ground circuit of the air conditioning control module</p>  <p data-bbox="113 674 217 696">A4101020</p>	<p data-bbox="778 282 1362 349">A. Turn the ignition switch to position "LOCK" and disconnect the battery negative cable.</p> <p data-bbox="778 360 1358 427">B. Disconnect the air conditioning control module wiring harness connector P25.</p> <p data-bbox="778 439 1417 562">C. Measure the resistance between the terminal 10 and 12 of the air conditioning control module wiring harness connector P25 and the grounding point GD 203.</p> <p data-bbox="810 573 1331 607"><b>Standard Resistance Value: less than 5Ω</b></p> <p data-bbox="810 618 1182 651">Is the resistance value normal?</p> <p data-bbox="810 663 836 696"><b>Y</b></p> <p data-bbox="810 707 963 741">Go to step 8.</p> <p data-bbox="810 752 836 786"><b>N</b></p> <p data-bbox="810 797 1366 831">Repair or replace the related wiring harnesses.</p>
<p data-bbox="97 842 831 875">8. Inspect the power supply of the air conditioning clutch</p>  <p data-bbox="113 1285 217 1308">A4101021</p>	<p data-bbox="778 898 1315 931">A. Turn the ignition switch to position "LOCK".</p> <p data-bbox="778 943 1326 1010">B. Disconnect the air conditioning clutch wiring harness connector E15.</p> <p data-bbox="778 1021 1002 1055">C. Start the Engine.</p> <p data-bbox="778 1066 1390 1133">D. Press the A/C switch, and set the air conditioning under the refrigeration and operation state.</p> <p data-bbox="778 1144 1401 1211">E. Measure the voltage of the terminal 1 of the air conditioning clutch wiring harness connector E15.</p> <p data-bbox="810 1223 1134 1256"><b>Standard Value: 11 ~ 14 V</b></p> <p data-bbox="810 1267 1070 1301">Is the voltage normal?</p> <p data-bbox="810 1312 836 1346"><b>Y</b></p> <p data-bbox="810 1357 1225 1391">Replace the air conditioning clutch.</p> <p data-bbox="831 1402 1426 1503"><b>Refer to: Compressor (4.1.1 Heating, Ventilation and Air-Conditioning System, Removal and Installation).</b></p> <p data-bbox="810 1536 836 1570"><b>N</b></p> <p data-bbox="810 1581 963 1615">Go to step 9.</p>

Test Conditions	Details/Results/Actions
<p>9. Inspect the circuit between the terminal 104 of the wiring harness connector C01 and the terminal 1 of the wiring harness connector E15.</p>	
 <p>A4101022</p>	<p>A. Turn the ignition switch to position "LOCK".</p> <p>B. Disconnect the wiring harness connector C01 of the engine compartment electrical center.</p> <p>C. Disconnect the AC compressor wiring harness connector E15.</p> <p>D. Measure the resistance value between the terminal 104 of the wiring harness connector C01 of the engine compartment electrical center and the terminal 1 of the air conditioning compressor wiring harness connector E15.</p> <p><b>Standard Resistance Value: less than 5Ω</b></p> <p>Is the resistance value normal?</p> <p><b>Yes</b></p> <p>Go to step 10.</p> <p><b>N</b></p> <p>Repair the circuit fault of the circuit between the terminal 104 of the wiring harness connector C01 of the engine compartment electrical center and the terminal 1 of the air conditioning compressor wiring harness connector E15.</p>

Test Conditions	Details/Results/Actions
<p>10. Inspect the circuit between the air conditioning clutch relay ER03 and the engine control module wiring harness connector E01</p>  <p>A4101023</p>	<p>A. Turn the ignition switch to position "LOCK" and disconnect the battery negative cable.</p> <p>B. Disconnect the engine control module wiring harness connector E01.</p> <p>C. Measure the resistance between the terminal 9 of the engine control module wiring harness connector E01 and the terminal 107 of the engine compartment electrical center C01.</p> <p><b>Standard Resistance Value: less than 5Ω</b></p> <p>Is the resistance value normal?</p> <p><b>Y</b></p> <p>Go to step 11.</p> <p><b>N</b></p> <p>Repair or replace the related wiring harnesses.</p>

Test Conditions	Details/Results/Actions
<p>11. Inspect the power supply of the air conditioning compressor clutch relay ER03</p>  <p style="text-align: center;">C01</p> <p>A4101057</p>	<p>A. Measure the voltage of the terminal 104 and 105 of the engine compartment electrical center C01 with a multimeter.</p> <p><b>Standard Value: 11 ~ 14 V</b></p> <p>Is voltage normal?</p> <p><b>Y</b></p> <p>Go to step 12.</p> <p><b>N</b></p> <p>Inspect and repair the power supply circuit wiring harness of the air conditioning compressor clutch relay ER03.</p>
<p>12. Inspect the A/C pressure switch at room temperature under normal conditions.</p>  <p style="text-align: center;">C11</p> <p>A4101025</p>	<p>A. Turn the ignition switch to position "LOCK".</p> <p>B. Disconnect the A/C pressure switch wiring harness connector C11.</p> <p>C. Measure the resistance between the terminal 1 of the A/C pressure switch wiring harness C11 and the terminal 2.</p> <p>D. The refrigerant pressure of the air conditioning system is 0.7MPa at room temperature under normal conditions.</p> <p><b>Standard Resistance Value: less than 1 <math>\Omega</math></b></p> <p>Is the resistance value normal?</p> <p><b>Y</b></p> <p>Go to step 13.</p> <p><b>N</b></p> <p>Replace the A/C pressure switch.</p> <p><b>Refer to: A/C Pressure Switch (4.1.1 Heating, Ventilation and Air Conditioning System, Removal and Installation).</b></p>

Test Conditions	Details/Results/Actions
<p data-bbox="100 230 1332 264">13. Inspect the circuit between the A/C pressure switch and the air conditioning control module</p> 	<p data-bbox="778 280 1404 600">A. Turn the ignition switch to position "LOCK".  B. Disconnect the wiring harness connector C11 of the A/C pressure switch.  C. Disconnect the air conditioning control module wiring harness connector P25.  D. Measure the resistance between the terminal 1 of the A/C pressure switch wiring harness connector C11 and the terminal 7 of the air conditioning control module wiring harness connector P25.</p> <p data-bbox="810 611 1332 645"><b>Standard Resistance Value: less than 5Ω</b></p> <p data-bbox="810 656 1181 689">Is the resistance value normal?</p> <p data-bbox="810 701 829 734"><b>Y</b></p> <p data-bbox="810 745 981 779">Go to step 14.</p> <p data-bbox="810 790 829 824"><b>N</b></p> <p data-bbox="810 835 1364 869">Repair or replace the related wiring harnesses.</p>
<p data-bbox="100 880 702 913">14. Inspect the air conditioning control module</p>	<p data-bbox="778 929 1364 963">A. Replace a new air conditioning control module.</p> <p data-bbox="778 974 1053 1008">B. Open the A/C switch.</p> <p data-bbox="810 1019 1372 1052">Does the air conditioning clutch work normally?</p> <p data-bbox="810 1064 829 1097"><b>Y</b></p> <p data-bbox="810 1108 1244 1142">Confirm the maintenance is finished.</p> <p data-bbox="810 1153 829 1187"><b>N</b></p> <p data-bbox="810 1198 981 1232">Go to step 15.</p>
<p data-bbox="100 1238 1420 1317">15. Inspect the refrigerant pressure switch C11, terminal 2 and the protection switch wiring harness connector E15, terminal 3 circuit</p>	<p data-bbox="778 1332 1316 1366">A. Turn the ignition switch to position "LOCK".</p> <p data-bbox="778 1377 1412 1444">B. Disconnect the wiring harness connector C11 of the refrigerant pressure switch.</p> <p data-bbox="778 1456 1372 1523">C. Disconnect the protection switch wiring harness connector E15.</p> <p data-bbox="778 1534 1404 1657">D. Measure the resistance between the terminal 2 of the refrigerant pressure switch wiring harness connector C11 and the terminal 3 of the protection switch wiring harness connector E15.</p> <p data-bbox="810 1668 1332 1702"><b>Standard Resistance Value: less than 5Ω</b></p> <p data-bbox="810 1713 1181 1747">Is the resistance value normal?</p> <p data-bbox="810 1758 829 1792"><b>Y</b></p> <p data-bbox="810 1803 981 1836">Go to step 16.</p> <p data-bbox="810 1848 829 1881"><b>N</b></p> <p data-bbox="810 1892 1364 1926">Repair or replace the related wiring harnesses.</p>

Test Conditions	Details/Results/Actions
<p>16. Inspect the engine control module wiring harness connector E01, terminal 35 and the protection switch wiring harness connector E15, terminal 2 circuit</p>  <p style="text-align: center;">E15</p>  <p style="text-align: center;">E01</p> <p>A4101027</p>	<p>A. Turn the ignition switch to position "LOCK" and disconnect the battery negative cable.</p> <p>B. Disconnect the engine module wiring harness connector E01.</p> <p>C. Disconnect the protection switch wiring harness connector E15.</p> <p>D. Measure the resistance between the terminal 35 of the engine module wiring harness connector E01 and the terminal 2 of the protection switch wiring harness connector E15.</p> <p><b>Standard Resistance Value: less than 5Ω</b></p> <p>Is the resistance value normal?</p> <p><b>Y</b></p> <p>Step 17.</p> <p><b>N</b></p> <p>Repair or replace the related wiring harnesses.</p>
<p>17. Replace the engine control module</p>	<p>A. Turn the ignition switch to position "LOCK" and disconnect the battery negative cable.</p> <p>B. Replace the engine control module.</p> <p><b>Refer to: Engine Control Module(3.1.13 Electrical Control System-MT22.1, Removal and Installation).</b></p> <p>Verify the system is normal.</p>

## Removal and Installation

### Compressor Belt

Refer to: [Accessory Drive Belt \(3.1.2 Mechanical System, Removal and Installation\)](#).

### Compressor

#### Removal

1. Disconnect the battery negative cable.

Refer to: [Battery Inspection \(3.1.10 Charging System, General Procedures\)](#).

2. Recycle the refrigerant.

Refer to: [Air Conditioning Refrigerant Recycle and Filling \(4.1.1 Heating, Ventilation and Air Conditioning, General Procedures\)](#).

3. Remove the compressor drive belt.

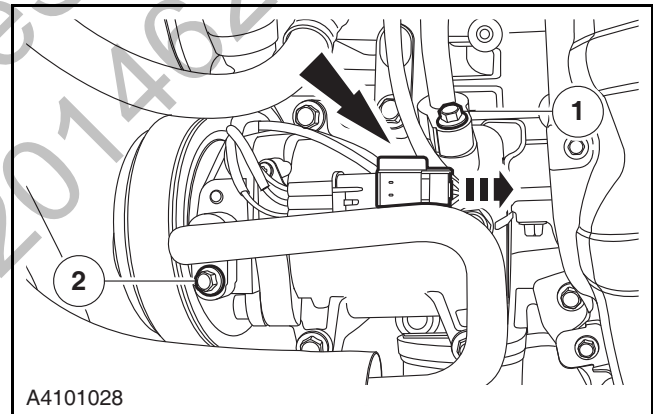
Refer to: [Accessory Drive Belt \(3.1.2 Mechanical system, Removal and Installation\)](#).

4. Remove the high and low-pressure connecting pipe of the compressor.

1. Remove the connection bolts of the high-pressure pipe of the compressor.

2. Remove the connection bolts of the low-pressure pipe of the compressor.

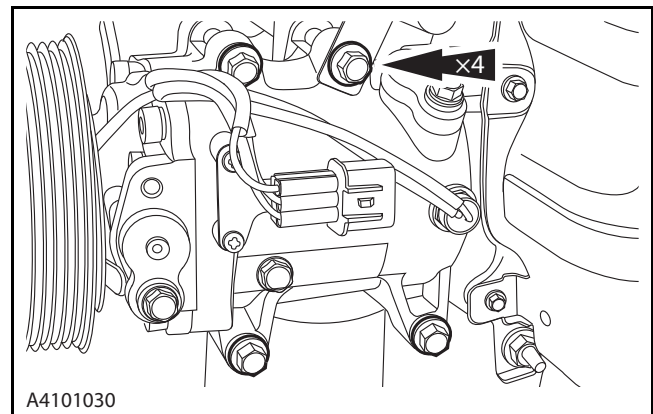
5. Disconnect the compressor wiring harness connector.



6. Remove the 4 retaining bolts of the compressor.

Torque: 23 Nm

7. Take out the compressor from the vehicle bottom.



#### Installation

1. To install, reverse the removal procedure.



## Condenser

### Removal

1. Disconnect the battery negative cable.

Refer to: [Battery Inspection \(3.1.10 Charging System, General Procedures\)](#).

2. Recycle the refrigerant.

Refer to: [Air Conditioning Refrigerant Recycle and Filling \(4.1.1 Heating, Ventilation and Air Conditioning, General Procedures\)](#).

3. Remove the front bumper.

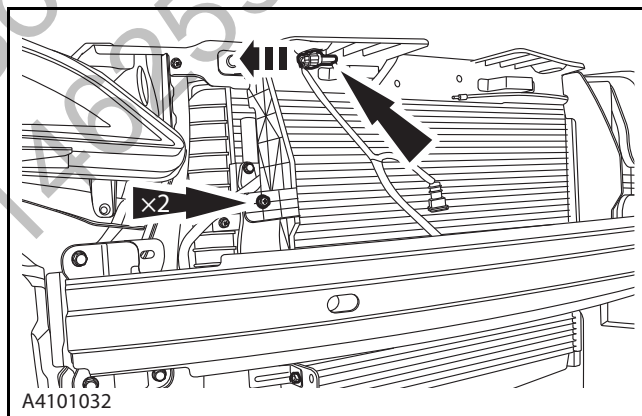
Refer to: [Front Bumper \(5.1.7 Bumper, Removal and Installation\)](#).

4. Remove the horn.

Refer to: [Horn \(4.3.3 Horn, Removal and Installation\)](#).

5. Remove the air deflector on the left and right sides of the condenser.

6. Disconnect the wiring harness connector of the engine hood lock buckle.



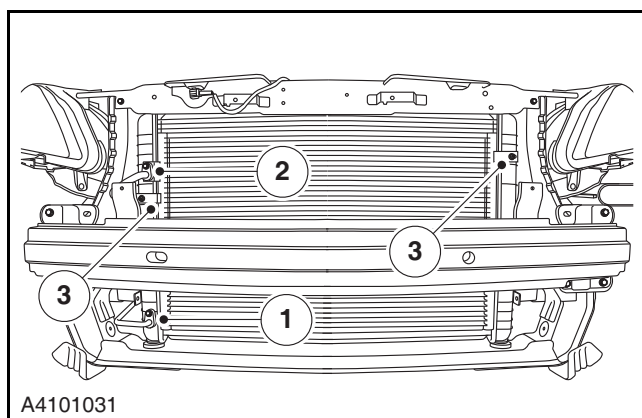
7. Remove the retaining bolts of the connection pipe of the condenser and air-condition.
  1. Remove the connection bolt between the high-pressure pipe connector and the condenser.
  2. Remove the connection bolt between the low-pressure pipe connector and the condenser.
  3. Remove the connection bolt between the condenser and the radiator.

1. Remove the connection bolt between the high-pressure pipe connector and the condenser.

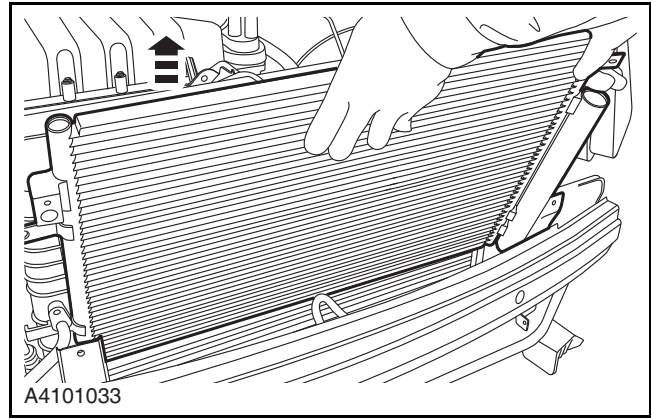
2. Remove the connection bolt between the low-pressure pipe connector and the condenser.

3. Remove the connection bolt between the condenser and the radiator.

Torque: 10 Nm



8. Take the condenser upward.



### Installation

1. To install, reverse the removal procedure.
2. Note to place the condenser slot in the middle of the radiator in place.

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## A/C Pressure Switch

### Removal

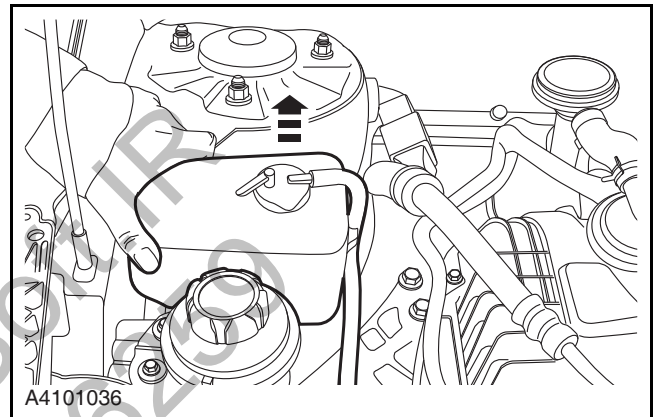
1. Disconnect the battery negative cable.

Refer to: [Battery Inspection \(3.1.10 Charging System, General Procedures\)](#).

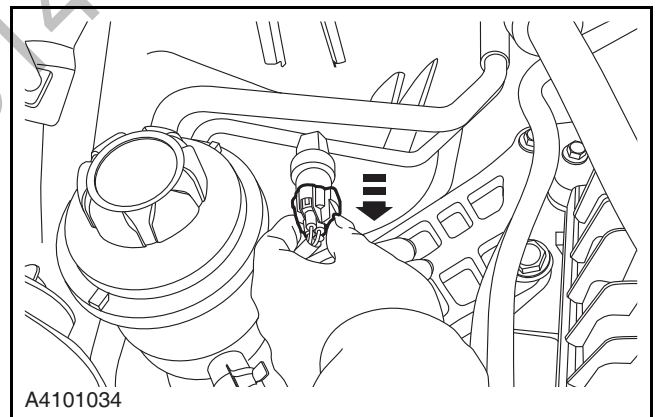
2. Recycle the refrigerant.

Refer to: [Air Conditioning Refrigerant Recycle and Filling \(4.1.1 Heating, Ventilation and Air Conditioning, General Procedures\)](#).

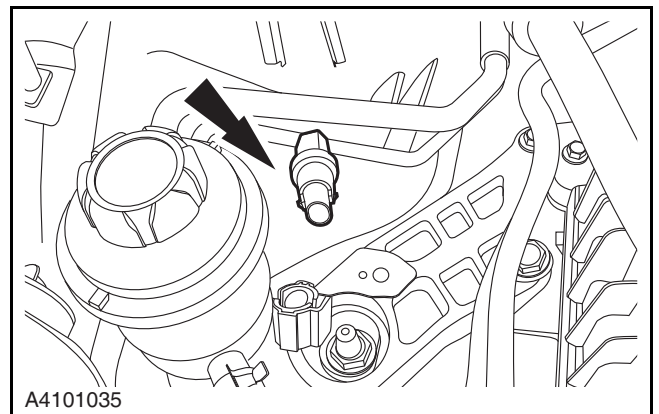
3. Remove the expansion water bottle.



4. Disconnect the wiring harness connector of the air conditioning pressure switch.



5. Remove the A/C pressure switch.



## Installation

1. Inspect the seal ring state of the A/C pressure switch, replace it if necessary.
2. To install, reverse the removal procedure.

## Thermostatic Expansion Valve

### Removal

1. Disconnect the battery negative cable.

**Refer to: Battery Inspection (3.1.10 Charging System, General Procedures).**

2. Recycle the refrigerant.

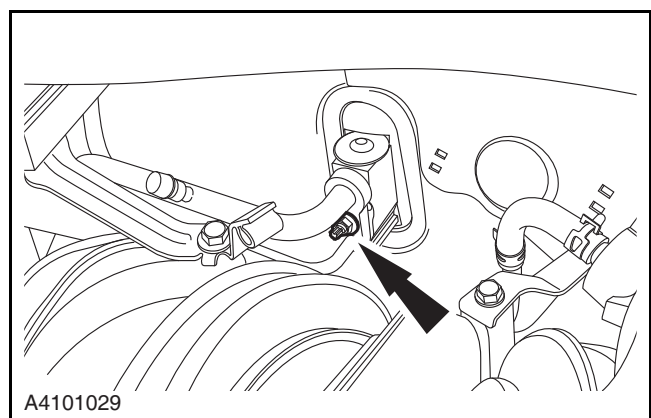
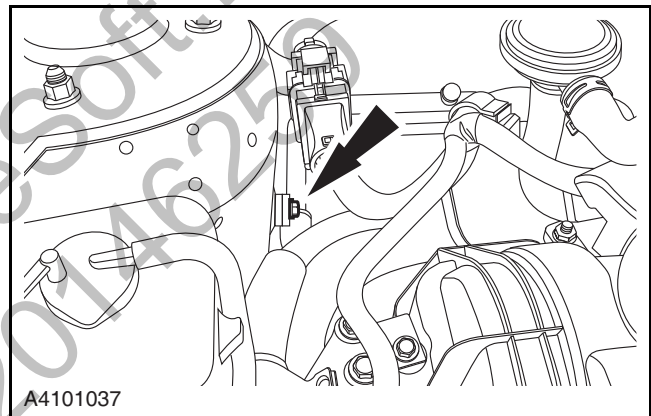
**Refer to: Air Conditioning Refrigerant Recycle and Filling (4.1.1 Heating, Ventilation and Air Conditioning System, General Procedures).**

3. Remove the connection nut between the high and low-pressure pipe and the vehicle.

Torque: 10 Nm

4. Remove the retaining bolts of the connection pipe of the high and low-pressure pipe and the expansion valve.

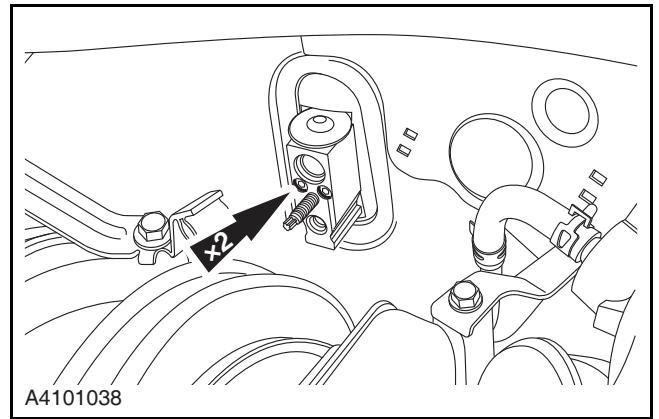
Torque: 10 Nm



5. Remove the retaining bolts of the expansion valve.

Torque: 8 Nm

6. Remove the expansion valve.



### Installation

1. Inspect and clean the sealed ring of AC pipe. When necessary, replace one.
2. To install, reverse the removal procedure.

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## A/C Pipe

### Removal

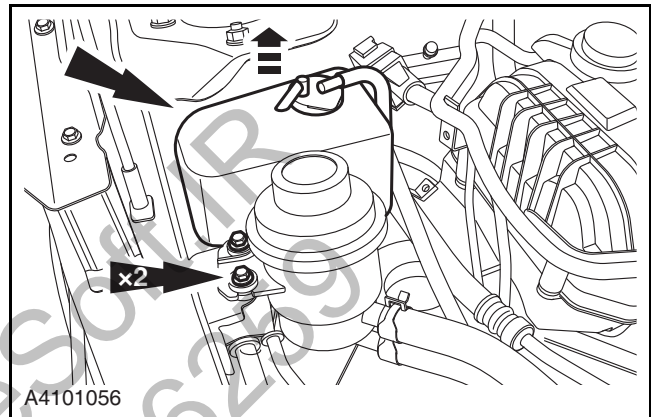
1. Disconnect the battery negative cable.

**Refer to: Battery Inspection (3.1.10 Charging System, General Procedures).**

2. Recycle the refrigerant.

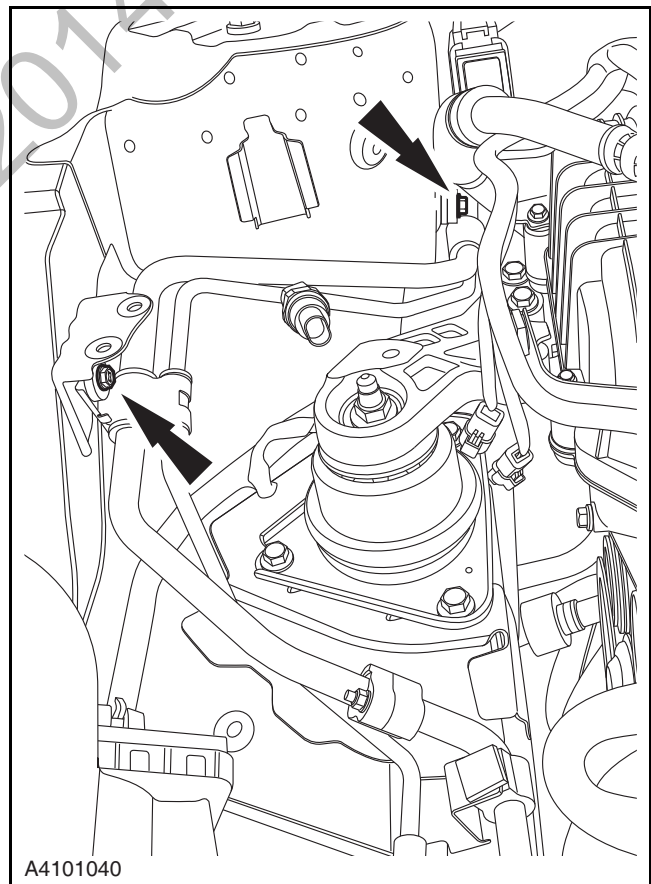
**Refer to: Air Conditioning Refrigerant Recycle and Filling (4.1.1 Heating, Ventilation and Air Conditioning, General Procedures).**

3. Remove the expansion water bottle.
4. Remove the 2 retaining bolts of steering oil reservoir.



5. Remove the 3 retaining bolts of the condenser high and low-pressure pipe.
6. Remove the front bumper.

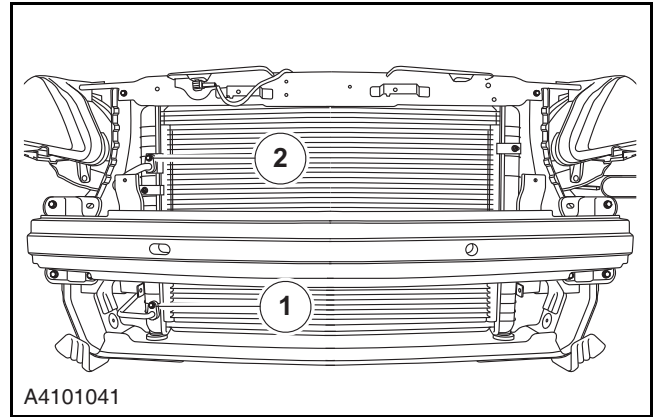
**Refer to: Front Bumper (5.1.7 Bumper, Removal and Installation).**



7. Remove the retaining bolts of the connection pipe of the condenser and the air-condition.

1. Remove the connection bolt between the high-pressure pipe connector and the condenser.

2. Remove the connection bolt between the low-pressure pipe connector and the condenser.

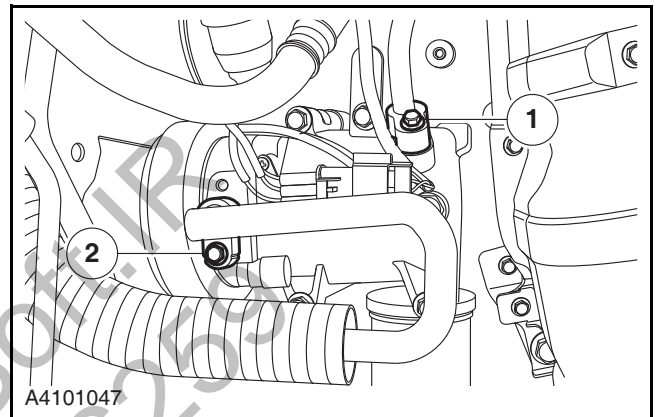


8. Remove the high and low-pressure connecting pipe of the compressor.

1. Remove connection bolts of the high-pressure connection pipe of the compressor.

2. Remove the connection bolts of the low-pressure pipe of the compressor.

9. Remove the A/C high and low-pressure pipe.



### Installation

1. Inspect the seal rings of all the air conditioning pipes; install new components as necessary.
2. To install, reverse the removal procedure.

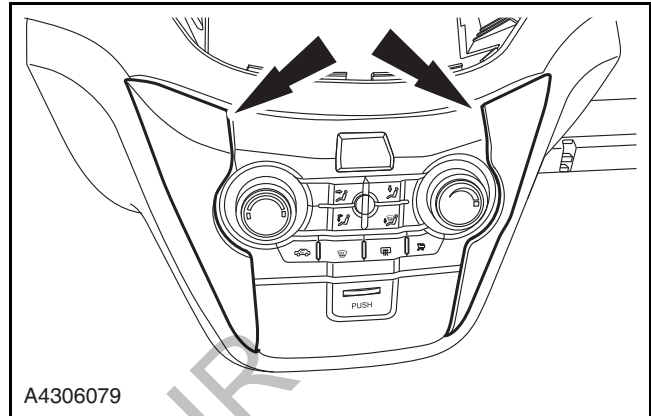
## A/C Control Module

### Removal

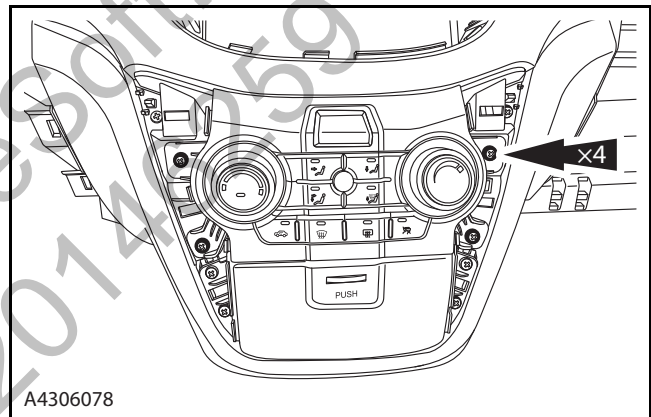
1. Disconnect the battery negative cable.

**Refer to: Battery Inspection (3.1.10 Charging System, General Procedures).**

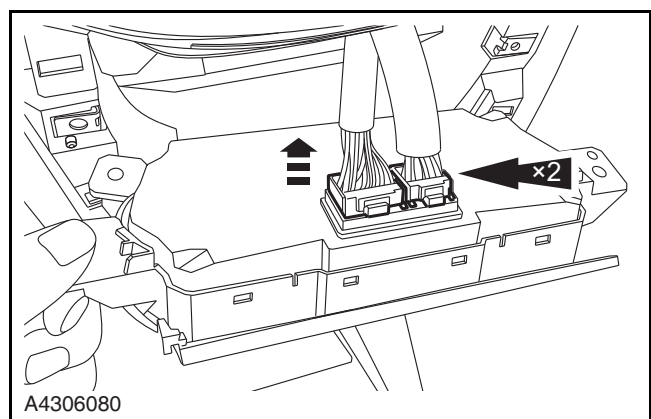
2. Use a proper tool to remove the decorative strip of the air conditioner control module.



3. Remove the 4 retaining screws of the air conditioner control module.



4. Remove the air conditioner control module.
5. Disconnect the air conditioner control module wiring harness connector.



### Installation

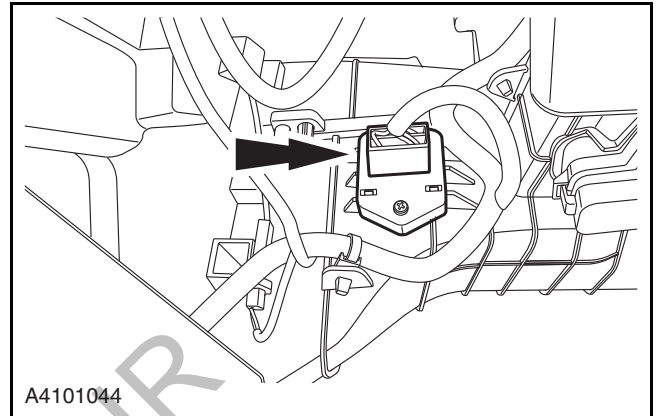
1. To install, reverse the removal procedure.



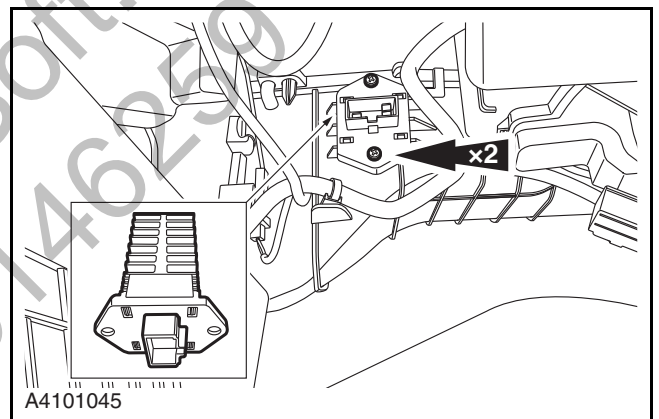
## Speed Control Module

### Removal

1. Disconnect the battery negative cable.  
[Refer to: Battery Inspection \(3.1.10 Charging System, General Procedures\).](#)
2. Disconnect the wiring harness connector of the speed control module.



3. Remove the 2 retaining bolts of the speed control module.



### Installation

1. To install, reverse the removal procedure.

## Heating, Ventilation and Air Conditioning (HVAC) Assembly

### Removal

1. Recycle the refrigerant.

Refer to: [Air Conditioning Refrigerant Recycle and Filling \(4.1.1 Manual Air Conditioning System, General Procedures\)](#).

2. Drain the engine coolant.

Refer to: [Coolant Draining and Filling \(3.1.4 Cooling System, General Procedures\)](#).

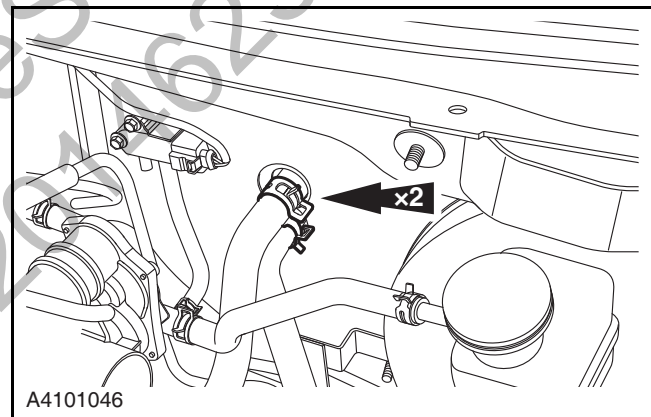
3. Disconnect the battery negative cable.

Refer to: [Battery Inspection \(3.1.10 Charging System, General Procedures\)](#).

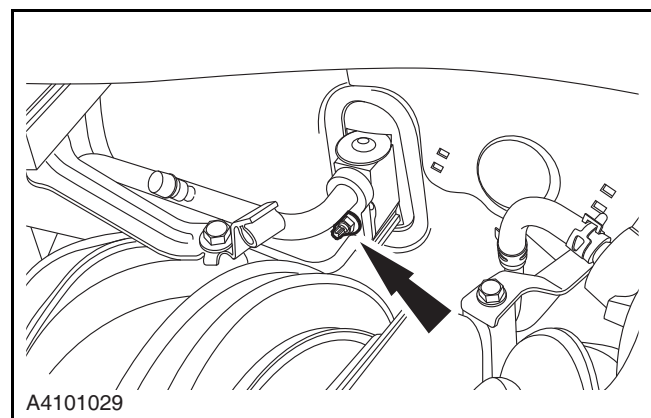
4. Remove the instrument cluster.

Refer to: [Instrument Cluster \(5.1.6 Instrument Cluster and Console, Removal and Installation\)](#).

5. Remove the heater water hose.

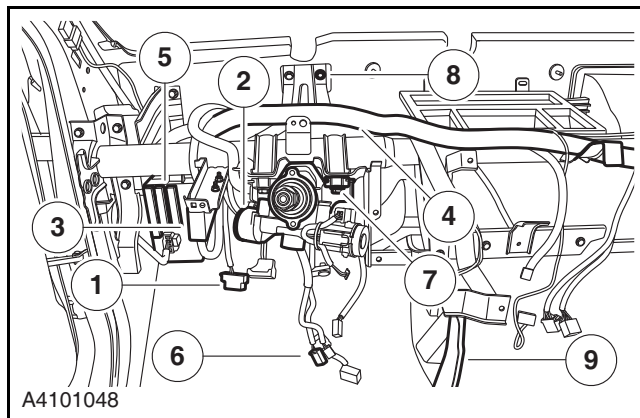


6. Remove the connection bolt between the expansion valve and the high and low-pressure pipe.



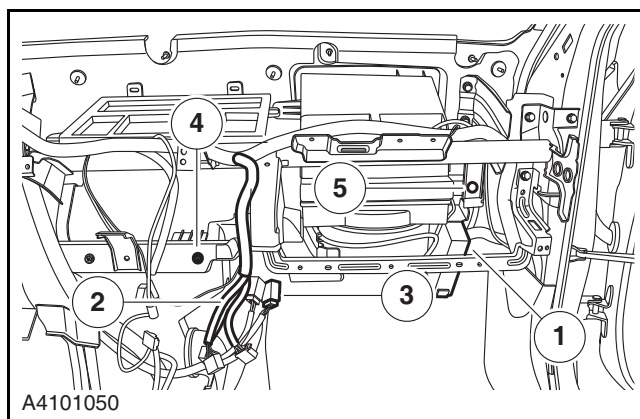
7. Remove the connection between the left instrument cluster inner frame and the accessories.

1. Disconnect the connection between the diagnosis interface and the inner frame.
2. Disconnect the ignition switch wiring harness connector.
3. Disconnect the lighting control module wiring harness connector.
4. Disconnect the reverse radar module wiring harness connector.
5. Remove the connection bolt between the indoor fuse box and the inner frame.
6. Disconnect the connection between the combination switch wiring harness and the inner frame.
7. Remove the connection bolt between the steering column and the inner frame.
8. Remove the 2 connection bolts between the inner frame and the body connection board.
9. Remove the 2 connection bolts on the middle of the inner frame.

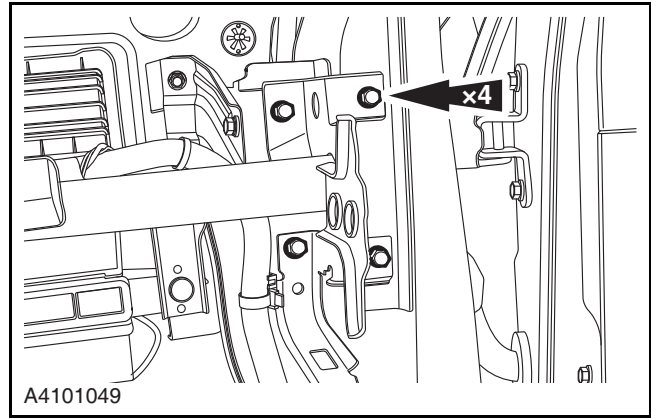


8. Remove the connection between the right instrument cluster inner frame and the accessories.

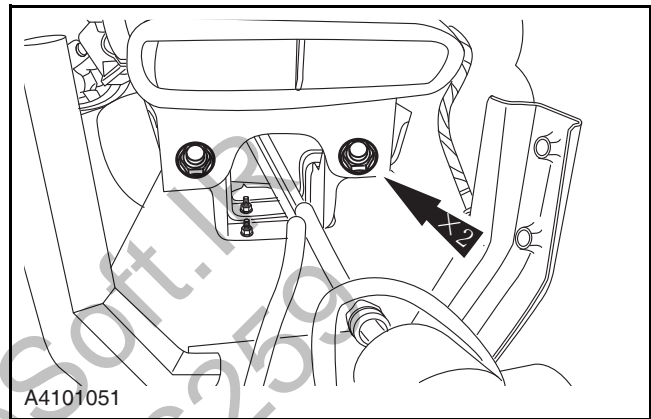
1. Remove the connection bolt between the body control module and the inner frame.
2. Disconnect the connection between the air conditioning control module wiring harness and the inner frame.
3. Disconnect the 2 wiring harness connectors of the lower HVAC assembly.
4. Remove the 2 retaining bolts on the left side of the HVAC assembly.
5. Remove the retaining nut on the right side of HVAC assembly.



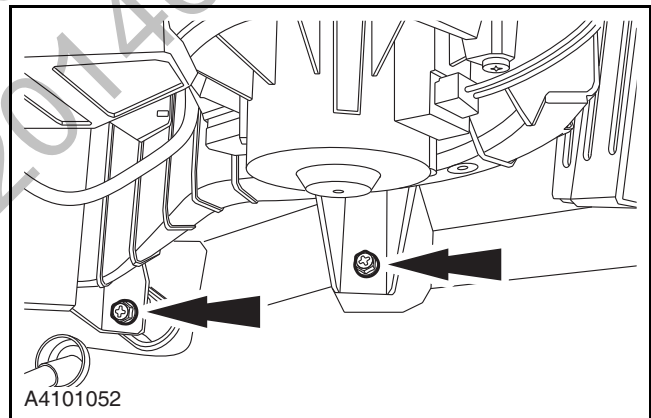
9. Remove the 4 retaining bolts on the left and right sides of the inner frame.



10. Remove the 2 retaining bolts on the central channel of the lower HVAC.



11. Remove the 2 retaining bolts on the right side of the lower HVAC.
12. Remove the HVAC assembly.



## Installation

1. Install the AC drain pipe.
2. To install, reverse the removal procedure.

## Blower Motor

### Removal

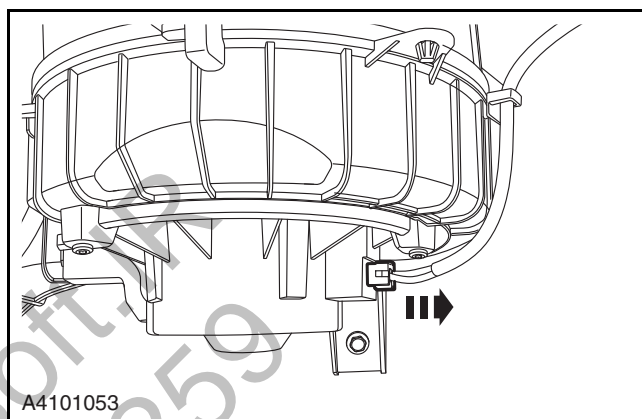
1. Disconnect the battery negative cable.

Refer to: [Battery Inspection \(3.1.10 Charging System, General Procedures\)](#).

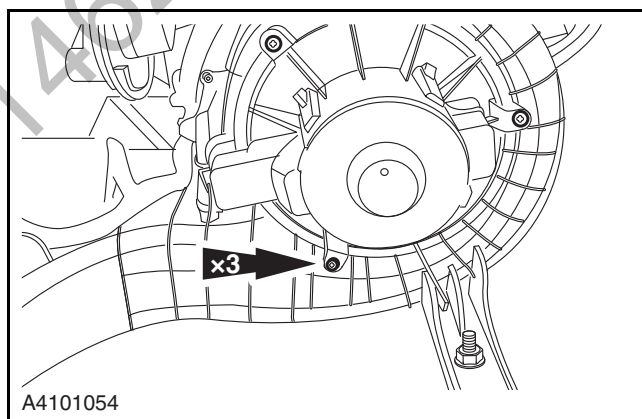
2. Remove the passenger side glove box.

Refer to: [Instrument Cluster \(5.1.6 Instrument Cluster and Console, Removal and Installation\)](#).

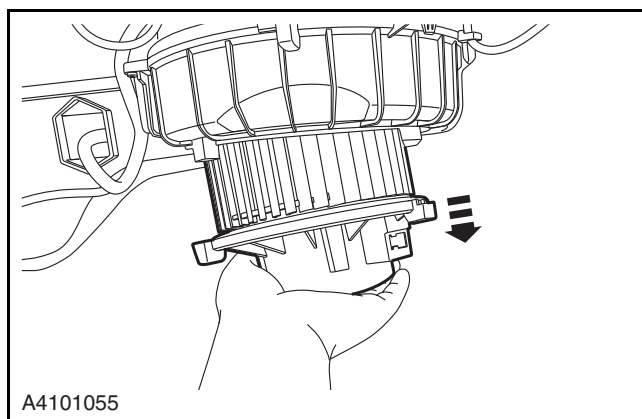
3. Disconnect the wiring harness connector of the blower motor.



4. Remove the 3 retaining screws of the blower motor.



5. Take out the blower motor assembly.



### Installation

1. To install, reverse the removal procedure.

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