HEATING AND AIR CONDITIONING
13

CONTENTS

AUTOMATIC TEMPERATURE CONTROL

13

GENERAL INFORMATION

Description

All vehicles are equipped with a common Heating, Ventilation and Air Conditioning (HVAC) housing. The heating-A/C system combines A/C, heating, and ventilating capabilities in a single HVAC housing mounted within the passenger compartment beneath the instrument panel. The HVAC housing includes:

- A/C evaporator (A/C system only)
- Mode-air doors
- Recirculation-air door and actuator
- Particulate air filter
- Blower motor
- Heater core
- Evaporator temperature sensor (A/C system only)
- Blend-air door

Based upon the system mode selected, conditioned air can exit the standard heater-only or optional heater-A/C housing through one or a combination of the three main housing outlets: defrost, panel or floor. The defrost and panel outlets are located on the top of the HVAC air distribution housing and the floor outlets are located on each side of the distribution housing. Once the conditioned air exits the HVAC housing, it is further directed through molded plastic ducts to the various outlets within the vehicle interior. These outlets and their locations are as follows:

- Defroster Outlet - A single large defroster outlet is located in the center of the instrument panel, near the base of the windshield.
- Side Window Demister Outlets - There are two side window demister outlets on both sides of the instrument panel.
- Panel Outlets - There are four panel outlets in the instrument panel, two located at the side of the instrument panel and two located near the top of the instrument panel center bezel.
- Front Floor Outlets - There are two front floor outlets, one located on each side the floor panel center tunnel behind the instrument panel.
- Rear Floor Outlets - There is one rear floor outlet, located on the center console.

NOTE :
To maintain the performance level of the heating, ventilation and air conditioning (HVAC) system, the engine cooling system must be properly maintained. Any obstructions in front of the radiator or A/C condenser will reduce the performance of the A/C and engine cooling systems.

Operation

The Automatic Temperature Control (ATC) heating-A/C system is a blend-air type system. In a blend-air system, a blend-air door controls the amount of conditioned air that is allowed to flow through, or around, the heater core. The temperature control determines the discharge air temperature by operating the blend door cable, which moves the blend-air door. This design allows almost immediate control of output air temperature.

The heating-A/C system pulls outside (ambient) air through the fresh air intake located at the cowl panel at the base of the windshield and into the air inlet housing above the heating, ventilation and air conditioning (HVAC) housing. On models equipped with A/C, the air passes through the A/C evaporator. Air flow is then directed either through or around the heater core. This is done by adjusting the position of the blend-air door with the temperature control located on the A/C-heater control in the instrument panel. Air flow is then directed out the floor outlet, instrument panel outlet or the defroster outlet in various combinations by adjusting the position of the mode-air doors using the mode control located on the A/C-heater control. The mode control uses a control cable to operate the mode-air doors.

The velocity of the air flow out of the outlets can be adjusted with the blower speed control located on the A/C-heater control.

The fresh air intake can be shut off by pressing the Recirculation button on the A/C-heater control. This will operate the electrically actuated recirculation-air door, which closes off the fresh air intake. With the fresh air intake closed, the conditioned air within the vehicle is pulled back into the HVAC housing through the recirculation air intake located within the passenger compartment.

The A/C compressor can be engaged by pressing the A/C (snowflake) button on the A/C-heater control. It will automatically engage when the mode control is set in any Mix to Defrost position. This will remove heat and humidity from the air before it is directed through or around the heater core. The mode control on the A/C-heater control is used to direct the conditioned air to the selected system outlets.

The front and rear floor outlets receive airflow from the HVAC housing through the front and rear floor ducts. The front floor outlets are integral to the molded plastic front floor ducts, which are secured to each side of the HVAC

housing. One molded plastic rear seat ducts is attached to the molded plastic rear floor duct, which is secured to the rear of the HVAC housing. The rear seat duct directs airflow beneath the carpet to the outlets located near the rear seat foot well. None of the floor outlets can be adjusted.

The panel outlets receive airflow from the HVAC housing through the center air distribution duct and molded plastic panel outlet ducts. The airflow from each of the panel outlets is adjustable. A thumbwheel located at the bottom of each panel outlet grille is used to adjust a center diffuser that changes the airflow direction, and a knob on the outer edge of each panel outlet grille opens or closes a shutter to turn airflow on or off through that outlet.

The defroster outlet receives airflow from the HVAC housing through the molded plastic defroster duct, which is secured to the top of the instrument panel. The airflow from the defroster outlet is directed by fixed vanes in the defroster outlet grille and cannot be adjusted.

The side window demister outlets receive airflow from the HVAC housing through the defroster duct and molded plastic demister ducts. The airflow from the side window demister outlets is directed by fixed vanes in the demister outlet grilles and cannot be adjusted. The side window demister outlet grilles are integral to the instrument panel cover and direct air from the HVAC housing through the outlets on the top corners of the instrument panel. The demisters operate when the mode control is set in any Floor to Defrost position.

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
All General Service Screws	2
Evaporator Bolts	4
Expansion Valve Bolts	10
Pipeline Stent	4
Refrigerant Lines To A/C Accumulator	6
Condenser Nuts	6
Refrigerant Lines To A/C Compressor Bolt	30
Refrigerant Lines	10
Refrigerant Lines To A/C Evaporator Bolt	25

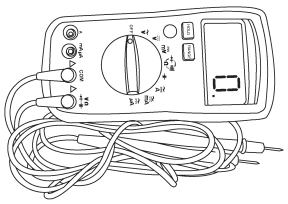
A/C Pressure Specifications

AMBIENT TEMPERATURE	A/C HIGH SIDE PRESSURE	A/C LOW SIDE PRESSURE
15.5˚C	8.4-11.9 kgf/cm2 120-170 psi	1.9-2.1 kgf/cm2 28-31 psi
21.1˚C	10.5-17.5 kgf/cm2 150-250 psi	1.9-2.1 kgf/cm2 28-31 psi
26.6˚C	12.6-19.3 kgf/cm2 180-275 psi	1.9-2.1 kgf/cm2 28-31 psi
32.2˚C	14.0-21.8 kgf/cm2 200-310 psi	1.9-2.1 kgf/cm2 28-31 psi
37.7˚C	16.1-23 kgf/cm2 230-330 psi	1.9-2.4 kgf/cm2 28-35 psi
43.3˚C	18.9-25.3 kgf/cm2 270-360 psi	1.9-2.6 kgf/cm2 28-38 psi

A/C Refrigerant Charge Specifications

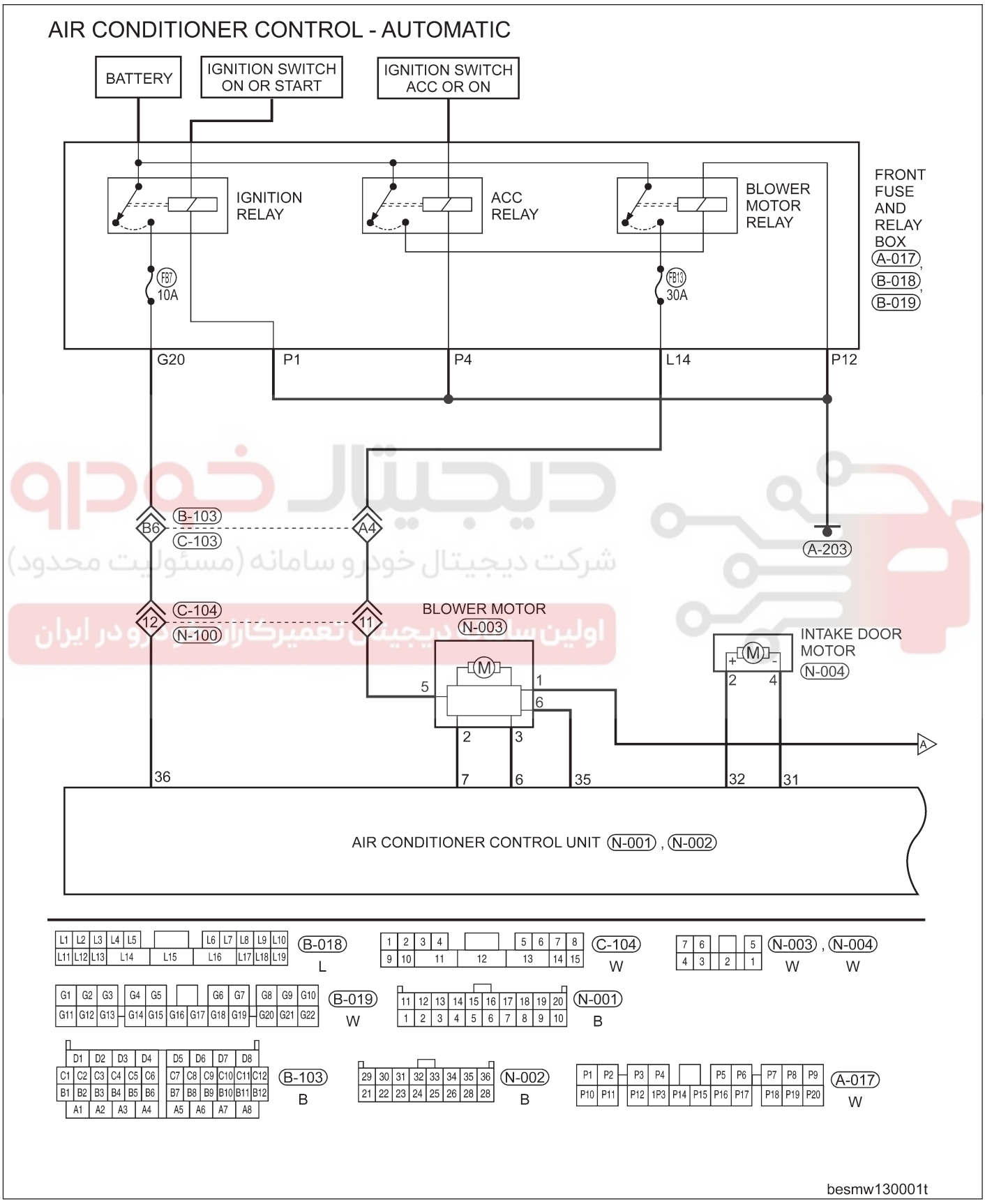
DESCRIPTION	CAPACITY (kg)
R-134a Refrigerant	0.725

Special Tools

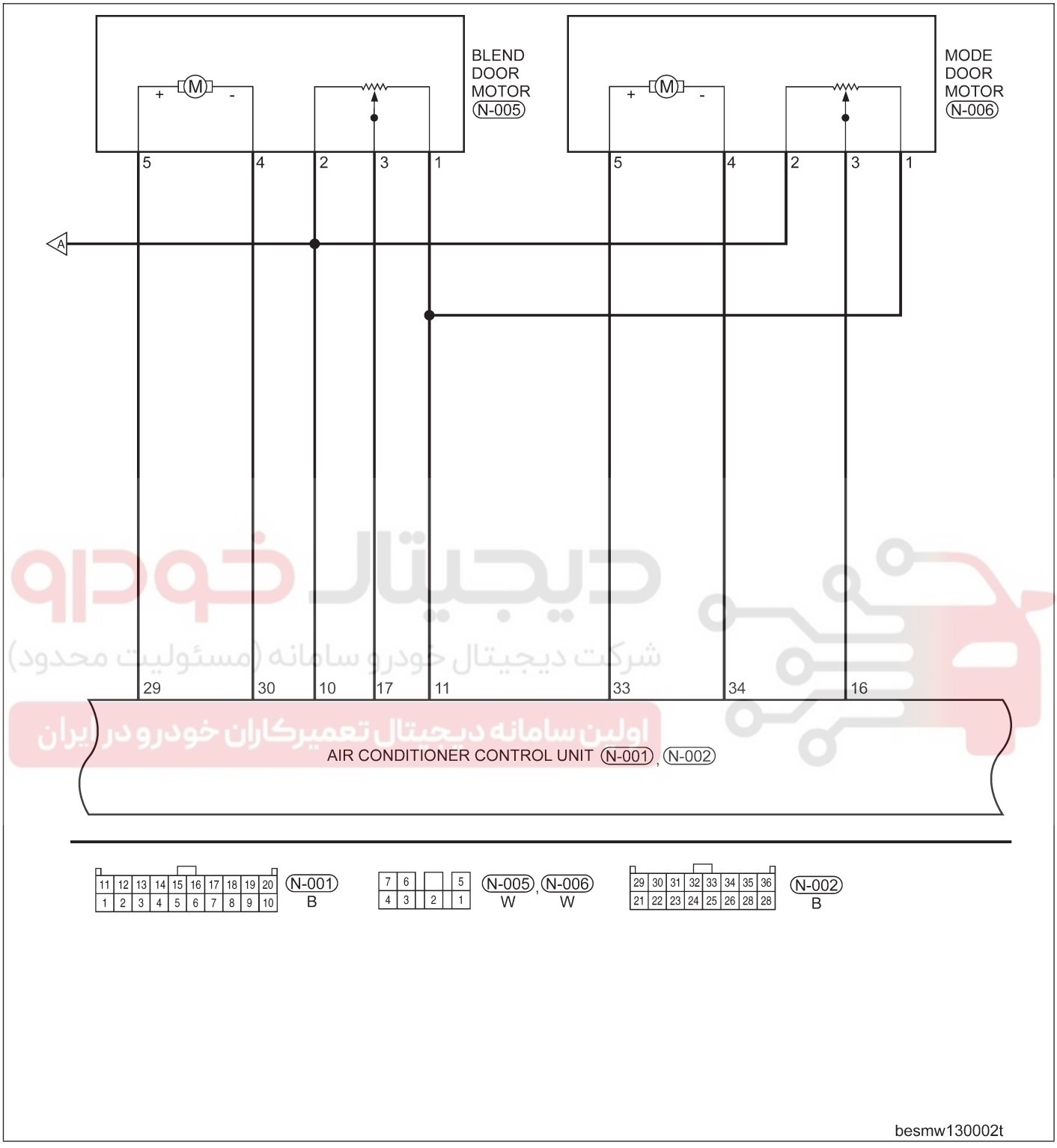
Digital Multimeter Fluke 15B & 17B	 besm030002

Electrical Schematics

Automatic Temperature Control System (Page 1 of 5)



Automatic Temperature Control System (Page 2 of 5)



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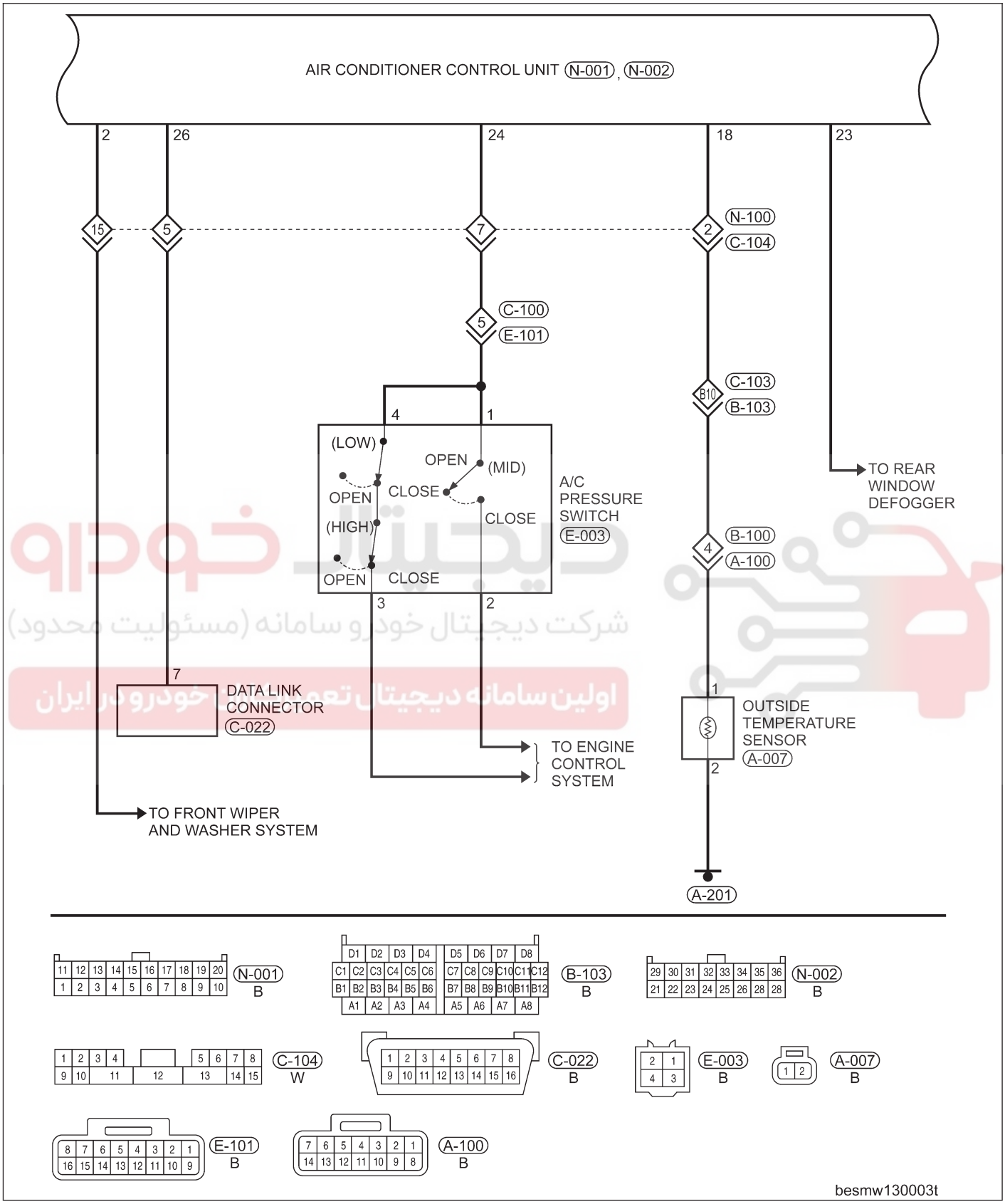
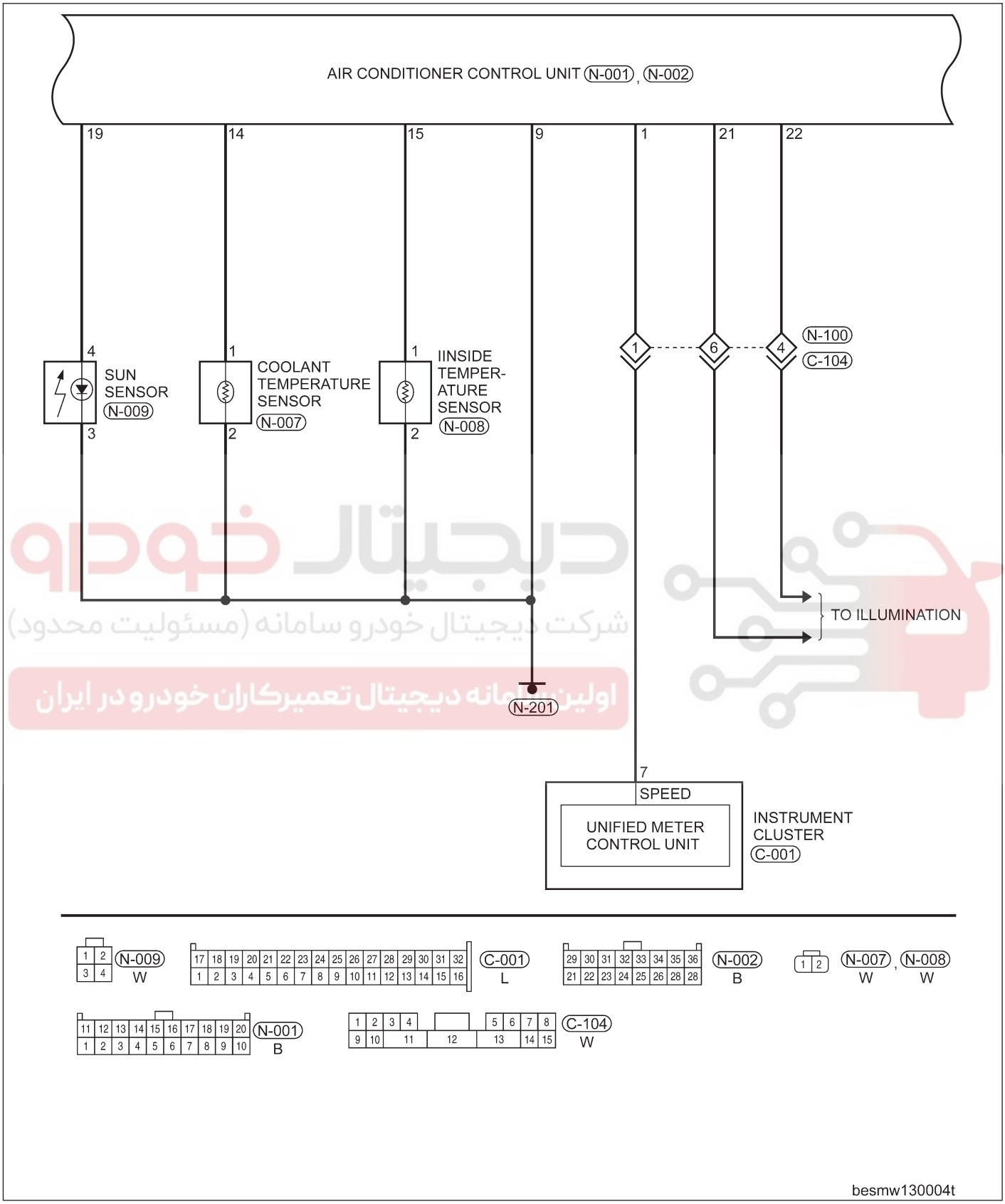


Automatic Temperature Control System (Page 4 of 5)



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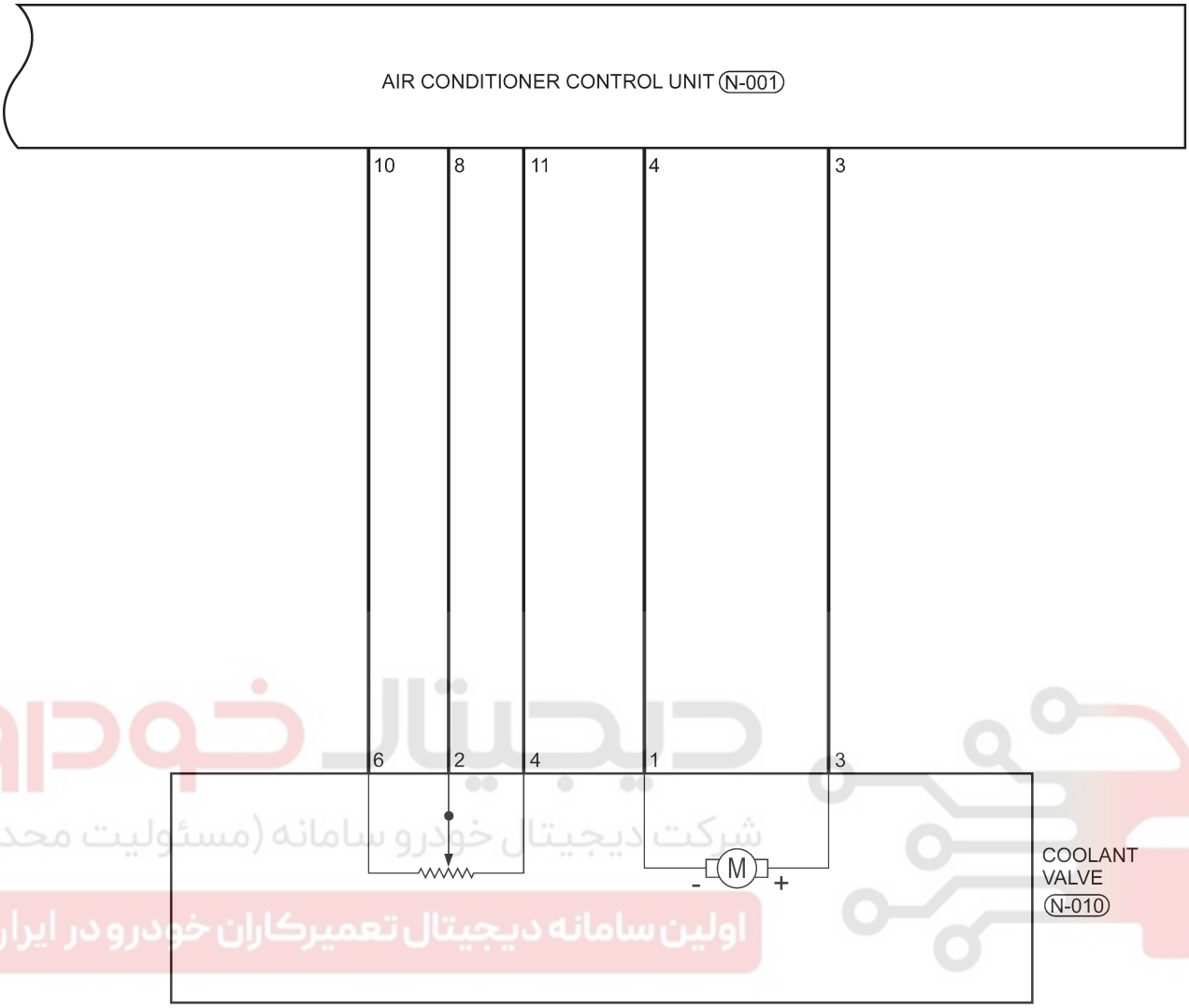

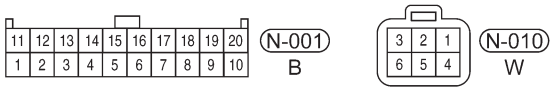

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DIAGNOSIS & TESTING

A/C System Performance

The ambient air temperature must be a minimum of 21° C for this test:

1. Connect a manifold gauge set.
2. Set the A/C Heater mode control switch knob in the Panel position, the temperature control knob in the full cool position, the A/C button in the On position, and the blower motor switch knob in the highest speed position.
3. Start the engine and hold the idle at 1,300 rpm with the compressor clutch engaged.
4. The engine should be at operating temperature. The doors and windows must be open.
5. Insert a thermometer in the driver side center A/C (panel) outlet. Operate the engine for five minutes.
6. The compressor clutch may cycle, depending upon the ambient temperature and humidity.
7. With the compressor clutch engaged, record the discharge air temperature and the compressor discharge pressure.
8. Compare the discharge air temperature to the performance temperature and pressure chart.

NOTE :
The discharge air temperatures will be lower if the humidity is less than the percentages shown.

TEMPERATURE AND PRESSURE					
Ambient Air Temperature and Humidity	21° C (80% humidity)	27° C (80% humidity)	32° C (80% humidity)	38° C (50% humidity)	43° C (20% humidity)
Air Temperature at Center Panel Outlet	10 to 13° C	14 to 17° C	15 to 18° C	17 to 20° C	14 to 17° C
Evaporator Inlet Pressure at Charge Port	241 to 276 kPa	262 to 290 kPa	269 to 296 kPa	275 to 303 kPa	262 to 290 kPa
Compressor Discharge Pressure	1241 to 1792 kPa	1380 to 1930 kPa	1380 to 1930 kPa	1655 to 2206 kPa	1567 to 2068 kPa

A/C System Troubleshooting Chart

CONDITION	POSSIBLE CAUSES	CORRECTION
Rapid Compressor Clutch Cycling (ten or more cycles per minute)	· Low refrigerant system charge.	· Test the A/C system for leaks. Repair, evacuate and charge the refrigerant system, if required.
Equal Pressures, But The Compressor Clutch Does Not Engage	· No refrigerant in the refrigerant system. · Faulty A/C compressor clutch coil. · Faulty A/C pressure transducer. · Faulty A/C heater control module.	· Test the A/C system for leaks. Repair, evacuate and charge the A/C, if required. · Test the compressor clutch coil and replace, if required. · Test the A/C high pressure transducer and replace, if required. · Test the A/C heater control module and replace, if required.

CONDITION	POSSIBLE CAUSES	CORRECTION
Normal Pressures, But A/C Performance Test Air Temperatures At Center Panel Outlet Are Too High	· Excessive refrigerant oil in system. · Blend door inoperative or sealing improperly. · Blend door actuator faulty or inoperative.	· Recover the refrigerant from the refrigerant system and inspect the refrigerant oil content. Restore the refrigerant oil to the proper level, if required. · Inspect the blend door for proper operation and sealing and correct, if required. · Replace if faulty.
The Low Side Pressure Is Normal Or Slightly Low, And The High Side Pressure Is Too Low	· Low refrigerant system charge. · Refrigerant flow through the accumulator is restricted. · Refrigerant flow through the evaporator is restricted. · Faulty compressor.	· Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. · Replace the restricted accumulator, if required. · Replace the restricted evaporator coil, if required. · Replace the compressor, if required.
The Low Side Pressure Is Normal Or Slightly High, And The High Side Pressure Is Too High	· Condenser air flow restricted. · Inoperative cooling fan. · Refrigerant system overcharged. · Air in the refrigerant system. · Engine overheating.	· Check the condenser for damaged fins, foreign objects obstructing air flow through the condenser fins, and missing or improperly installed air seals. Clean, repair, or replace components as required. · Test the cooling fan and replace, if required. · Recover the refrigerant from the refrigerant system. Charge the refrigerant system to the proper level, if required. · Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. · Test the cooling system and repair as necessary.
The Low Side Pressure Is Too High, And The High Side Pressure Is Too Low	· Accessory drive belt slipping. · Faulty compressor.	· Inspect the accessory drive belt condition and tension. Tighten or replace the accessory drive belt, if required. · Replace the compressor, if required.
The Low Side Pressure Is Too Low, And The High Side Pressure Is Too High.	· Restricted refrigerant flow through the refrigerant lines. · Restricted refrigerant flow through the A/C accumulator. · Restricted refrigerant flow through the condenser.	· Inspect the refrigerant lines for kinks, tight bends or improper routing. Correct the routing or replace the refrigerant line, if required. · Replace the accumulator if restricted. · Replace the restricted condenser, if required.

Heater Performance

Engine coolant is delivered to the heater core through heater hoses. With the engine idling at normal operating temperature, set the temperature control knob in the full hot position, the mode control switch knob in the floor heat position, and the blower motor switch knob in the highest speed position. Using a test thermometer, check the temperature of the air being discharged at the HVAC housing floor outlets. Compare the test thermometer reading to the heater performance chart.

HEATER PERFORMANCE				
Ambient Air Temperature	15.5° C (60° F)	21.1° C (70° F)	26.6° C (80° F)	32.2° C (90° F)
Minimum Air Temperature at Floor Outlet	62.2° C (144° F)	63.8° C (147° F)	65.5° C (150° F)	67.2° C (153° F)

Both of the heater hoses should be hot to the touch. The coolant return heater hose should be slightly cooler than the coolant supply heater hose. If the return hose is much cooler than the supply hose, locate and repair the engine coolant flow obstruction in the cooling system.

Obstructed Coolant Flow

Possible locations or causes of obstructed coolant flow:
- Pinched or kinked heater hoses.
- Improper heater hose routing.
- Plugged heater hoses or supply and return ports at the cooling system connections.
- A plugged heater core.

Mechanical Problems

Possible locations or causes of insufficient heat:
- An obstructed cowl air intake.
- Obstructed heater system outlets.
- A blend door not functioning properly.
- An air-bound system.

Temperature Control

If the heater outlet air temperature cannot be adjusted with the temperature control knob(s) on the A/C Heater control panel, the following could require service:
- The A/C heater control.
- The blend door actuator(s).
- The wire harness circuits for the A/C heater control or the blend door actuator(s).
- The blend door(s).
- Improper engine coolant temperature.

How To Enter HVAC Module Self Diagnostic Mode

The Automatic Temperature Control (ATC) module cannot be accessed with the X-431 scan tool. The following must be done in order to read the DTC information in the ATC module:

1. Push the up knob of the air volume, and push the mode control knob 3 times continuously.
2. The ATC display will now display any DTCs.

Diagnostic Help

1. Confirm that the malfunction is current and carry-out the diagnostic tests and repair procedures.
2. If the DTC cannot be deleted, it is a current fault.
3. Use only a digital multimeter to perform voltage readings on electronic systems.
4. Refer to any Technical Service Bulletins that may apply to the failure.
5. Visually inspect the related wiring harness.
6. Perform a voltage drop test on the related circuits between the suspected component and the ABS module.
7. Inspect and clean all ATC chassis grounds that are related to the most current DTC.
8. If numerous trouble codes were set, use a wiring schematic and look for any common ground circuits or voltage supply circuits that may apply to the DTC.

Intermittent DTC Troubleshooting

If the failure is intermittent perform the following:
- Check for loose connectors.
- Look for any chafed, pierced, pinched, or partially broken wires.
- Wiggle the related wiring harness and connectors while looking for an interrupted signal on the affected circuit.

- If possible, try to duplicate the conditions under which the DTC set.
- Look for broken, bent, pushed out or corroded terminals.
- Inspect the sensor and mounting area for any condition that would result in an incorrect signal, such as damage or foreign material.
- Remove the ATC module from the troubled vehicle and install in a new vehicle and test. If the DTC cannot be deleted, the ATC module is malfunctioning. If the DTC can be deleted, return the ATC module to the original vehicle and inspect the system again.

Diagnostic Tools

Digital Multimeter

Perform the following when using the digital multimeter:
- Troubleshoot electrical problems and wiring systems.
- Use a multimeter for basic fault finding and bench testing.
- Use a multimeter to measure voltage, current and resistance.

Automatic Temperature Control Module Connector Pin-Out Table

PIN	CIRCUIT IDENTIFICATION	PIN	CIRCUIT IDENTIFICATION
1	Speed Signal	19	Sun Sensor
2	Wiper Signal	20	—
3	Coolant Valve Motor (+)	21	To Illumination (night light)
4	Coolant Valve Motor (-)	22	—
5	—	23	Rear Window Defogger
6	Blower Motor Adjust Speed Signal	24	To ECM
7	Blower Motor Voltage Feedback	25	—
8	Coolant Valve Motor Feedback	26	K-Line
9	Sensor Signal GND	27	—
10	Motor Potentiometer Common GND	28	—
11	Air Mix Door Motor Potentiometer (+)	29	Air Mix Door Motor (+)
12	—	30	Air Mix Door Motor (-)
13	—	31	Intake Door Motor (±)
14	Coolant Temperature Sensor	32	Intake Door Motor (±)
15	In-Vehicle Sensor	33	Air Mix Door Motor (+)
16	Mode Door Motor Feedback	34	Air Mix Door Motor (-)
17	Air Mix Door Motor Voltage Feedback	35	Controller GND
18	Outside Temperature Sensor	36	IGN SIG

Diagnostic Trouble Code (DTC) List

Automatic Temperature Control System DTC List

DTC	DTC DEFINITION
01	Inside Temperature Sensor Fault
02	Outside Temperature Sensor Fault
03	Coolant Temperature Sensor Fault
04	Sun Sensor Fault
05	Blower Motor Fault
06	Blend Door Fault
07	Mode Door Fault
08	Coolant Valve Modulation Fault

Diagnostic Trouble Code (DTC) Tests

01: Inside Temperature Sensor Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the inside temperature sensor input voltage is out of range.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

While push the Upper air volume control knob switches, push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 01 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the inside temperature sensor electrical connector N-008.

NOTE :
Check connectors - Clean and repair as necessary.

Turn the ignition switch on.

Turn the ATC on.

Measure the reference voltage of the inside temperature sensor signal voltage circuit between the inside temperature sensor electrical connector N-008, pin 1 and pin 2.

Is the reference voltage normal?

Yes >> • Repair or replace the inside temperature sensor.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Disconnect the ATC module electrical connector N-001.

Measure the inside temperature sensor circuits for open, short to ground, shorted together or shorted to other circuits in the ATC module electrical connector.

Were there any problems found?

Yes >> • Repair or replace the inside temperature sensor circuits as necessary.

No >> • Go to the next step.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related inside temperature sensor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 01 present again?

Yes >> • Replace the ATC module.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

02: Outside Temperature Sensor Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the outside temperature sensor input voltage is out of range.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 02 present?

Yes >> • Go to the next step.

No >>
- The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the outside temperature sensor electrical connector A-007.

NOTE :
Check connectors - Clean and repair as necessary.
Turn the ignition switch on.
Turn the ATC on.
Measure the reference voltage of the outside temperature sensor signal voltage circuit between the outside temperature sensor electrical connector A-007, pin 1 and pin 2.

Is the reference voltage normal?

Yes >> • Repair or replace the outside temperature sensor.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Disconnect the ATC module electrical connector N-001.

Measure the outside temperature sensor circuits for open, short to ground, shorted together or shorted to other circuits in the ATC module electrical connector.

Were there any problems found?

Yes >> • Repair or replace the outside temperature sensor circuits as necessary.

No >> • Go to the next step.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related outside temperature sensor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 02 present again?

Yes >> • Replace the ATC module.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

03: Coolant Temperature Sensor Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the coolant temperature sensor input voltage is out of range.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 03 present?

Yes >> • Go to the next step.

No >>
- The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the coolant temperature sensor electrical connector N-007.

NOTE :
Check connectors - Clean and repair as necessary.
Turn the ignition switch on.
Turn the ATC on.
Measure the reference voltage of the coolant temperature sensor signal voltage circuit between the coolant temperature sensor electrical connector N-007, pin 1 and pin 2.

Is the reference voltage normal?

Yes >> • Repair or replace the coolant temperature sensor.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Disconnect the ATC module electrical connector N-001.

Measure the coolant temperature sensor circuits for open, short to ground, shorted together or shorted to other circuits in the ATC module electrical connector.

Were there any problems found?

Yes >> • Repair or replace the coolant temperature sensor circuits as necessary.

No >> • Go to the next step.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related coolant temperature sensor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 03 present again?

Yes >> • Replace the ATC module.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

04: Sun Sensor Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the sun sensor input voltage is out of range.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 04 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the sun sensor electrical connector N-009.

NOTE :
Check connectors - Clean and repair as necessary.
Turn the ignition switch on.
Turn the ATC on.
Measure the reference voltage of the sun sensor signal voltage circuit between the sun sensor electrical connector N-009, pin 3 and pin 4.

Is 12 volts present?

Yes >> • Repair or replace the sun sensor.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Disconnect the ATC module electrical connector N-001.

Measure the sun sensor circuits for open, short to ground, shorted together or shorted to other circuits in the ATC module electrical connector.

Were there any problems found?

Yes >> • Repair or replace the sun sensor circuits as necessary.

No >> • Go to the next step.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related sun sensor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 04 present again?

Yes >> • Replace the ATC module.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

05: Blower Motor Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the ATC module detects that the blower motor speed control pulse voltage does not match the feedback pulse voltage.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 05 present?

Yes >> • Go to the next step.

No >>
- The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the blower motor electrical connector N-003.

Disconnect the ATC module electrical connector N-001, N-002.

NOTE :

Check connectors - Clean and repair as necessary.

Turn the ignition switch on.

- Measure the voltage of the blower motor power supply circuit between electrical connector N-003, pin 5 and ground.

NOTE :

If fuse FB13 (30A) fails, repair the blower motor power supply circuit for a short to ground.

- Measure the resistance of the blower motor power supply circuit between electrical connector N-003, pin 1 and ground.
- Measure the resistance of the blower motor power supply circuit between electrical connector N-003, pin 6 and ground.
- Measure the blower motor speed control circuit and feedback circuit for an open, short to ground, shorted together with short to other circuits in the ATC module electrical connector.

Were there any problems found?

Yes >> • Repair or replace the blower motor circuits.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Connect the blower motor connector N-003.

Connect the ATC module electrical connector N-001 and N-002.

Turn the ignition switch on.

Turn the ATC on, set the ATC to the AUTO mode. Allow the blower motor to run.

- Perform a signal wave pattern measurement at the ATC module connector N-003 (using an oscilloscope).
- Or, replace the blower motor.

Is the result normal?

Yes >>
- If performing signal wave pattern measurement, and the signal wave pattern feedback matches the signal wave pattern of the speed control, go to step 5.
- If replacing the blower motor, go to the next step.

No >>
- If performing a signal wave pattern measurement, go to the next step.
- If replacing the blower motor, go to step 5.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related blower motor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 05 present again?

Yes >>
- Replace the blower motor.

No >>
- The system is now operating properly.
- Reassemble the vehicle and verify the customers complaint is repaired.

Step 5.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related HVAC module circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the Upper air volume control knob switches of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 05 present again?

Yes >>
- Replace the ATC module.

No >>
- The system is now operating properly.
- Reassemble the vehicle and verify the customers complaint is repaired.

06: Blend Door Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the ATC module detects that the blend door motor position sensor feedback actual voltage does not match the desired voltage.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 06 present?

Yes >> • Go to the next step.

No >> • The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the blend door motor electrical connector N-005.

Disconnect the ATC module electrical connector N-001, N-002.

NOTE :
Check connectors - Clean and repair as necessary.

Turn the ignition switch on.

- Measure the blend door motor power supply circuit and ground circuits for an open, short to ground, shorted together or short to other circuits in the blend door motor electrical connector N-005.
- Measure the blend door motor position sensor circuits for an open, short to ground, shorted together or short to other circuits in the blend door motor electrical connector N-005.

Were there any problems found?

Yes >> • Repair or replace the blend door motor circuits.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Connect the blend door motor connector N-005.

Connect the ATC module electrical connector N-001 and N-002.

Turn the ignition switch on.

Turn the ATC on, turn the temperature control knob. Allow the blend door motor to run.

- Perform signal feedback voltage measurement at ATC module connector N-001 (using a voltmeter).
- Or, replace the blend door motor.

Is the result normal?

Yes >> • If performing a signal feedback voltage measurement, the ATC panel view from ″LO″ to ″HI″, and the check result is normal, go to step 5.
- If replacing the blend motor, go to the next step.

No >> • If performing a signal feedback voltage measurement, go to the next step.
- If replacing the blend door motor, go to step 5.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related blend door motor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 06 present again?

Yes >> • Replace the blower motor.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

Step 5.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related ATC module circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 06 present again?

Yes >> • Replace the ATC module.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

07: Mode Door Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the ATC module detects that the mode door motor position sensor feedback actual voltage does not match the desired voltage.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 07 present?

Yes >> • Go to the next step.

No >>
- The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the mode door motor electrical connector N-006.

Disconnect the ATC module electrical connector N-001, N-002.

NOTE :
Check connectors - Clean and repair as necessary.

Turn the ignition switch on.

- Measure the mode door motor power supply circuit and ground circuits for an open, short to ground, shorted together or short to other circuits in the mode door motor electrical connector N-005.
- Measure the mode door motor position sensor circuits for an open, short to ground, shorted together or short to other circuits in the mode door motor electrical connector N-006.

Were there any problems found?

Yes >> • Repair or replace the mode door motor correlative circuits.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Connect the mode door motor connector N-006.

Connect the ATC module electrical connector N-001 and N-002.

Turn the ignition switch on.

Turn the ATC on, turn the mode control knob. Allow the mode door motor to run.

- Perform a signal feedback voltage measurement at ATC module connector N-001 (using a voltmeter).
- Or, replace the mode door motor.

Is the result normal?

Yes >> • If performing a signal feedback voltage measurement, the HVAC panel view from ″blow face″ to ″blow foot″ to ″blow foot and face″ to ″blow foot and defrost″, and the check result is normal, go to step 5.
• If replacing the mode motor, go to the next step.

No >> • If performing a signal feedback voltage measurement, go to the next step.
• If replacing the mode door motor, go to step 5.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related mode door motor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 06 present again?

Yes >> • Replace the blower motor.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

Step 5.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related ATC module circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 06 present again?

Yes >> • Replace the ATC module.

No >> • The system is now operating properly.
• Reassemble the vehicle and verify the customers complaint is repaired.

08: Coolant Valve Modulation Fault

- **When Monitored:** With the ignition switch on.
- **Set Condition:** The Automatic Temperature Control (ATC) module will set this fault if the ATC module detects that the coolant valve motor position sensor feedback actual voltage does not match the desired voltage.

Step 1.

Turn the ignition switch on.

Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Perform the following to place the ATC module in the Self-Check mode and read system DTCs:

- While pushing the upper air volume control knob switch, push the mode control knob 3 times continuously.

Is DTC 08 present?

Yes >> • Go to the next step.

No >>
- The conditions that caused this code to set are not present at this time.
- See Diagnostic Help in Section 13 Heating & Air Conditioning for more information on Intermittent DTC Troubleshooting.
- Erase all codes and test drive the vehicle to verify the repair is complete.

Step 2.

Turn the ignition switch off.

Disconnect the coolant valve motor electrical connector N-010.

Turn the ignition switch on. Turn the ATC on.

Verify the voltage of the coolant valve motor position control circuit is 5 volts.

Turn the ignition switch off. Disconnect the ATC module electrical connector N-001, N002.

NOTE :
Check connectors - Clean and repair as necessary.

Turn the ignition switch on.

- Measure if the coolant valve motor power supply circuit and ground circuits are open, shorted to ground, shorted together or shorted to other circuits in the coolant valve motor electrical connector N-010.
- Measure if the coolant valve motor position sensor circuits are open, shorted to ground, shorted together or shorted to other circuits in the coolant valve motor electrical connector N-010.

Were there any problems found?

Yes >> • Repair or replace the coolant valve motor circuits.

No >> • Go to the next step.

Step 3.

Turn the ATC off.

Turn the ignition switch off.

Connect the coolant valve motor connector N-010.

Connect the ATC module electrical connector N-001 and N-002.

Turn the ignition switch on.

Turn the ATC on, turn the temperature control knob. Allow the coolant valve motor to run.

- Perform a signal feedback voltage measurement at the ATC module connector N-010 (using a voltmeter).
- Or, replace the coolant valve motor.

Is the result normal?

Yes >>
- If performing a signal feedback voltage measurement, the ATC panel view from ″LO″ to ″HI″, and the check result is normal, go to step 5.
- If replacing the coolant valve motor, go to the next step.

No >>
- If performing a signal feedback voltage measurement, go to the next step.
- If replacing the coolant valve motor, go to step 5.

Step 4.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related coolant valve motor circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 06 present again?

Yes >>
- Replace the blower motor.

No >>
- The system is now operating properly.
- Reassemble the vehicle and verify the customers complaint is repaired.

Step 5.

Using the wiring schematic as a guide, inspect the related wiring and connectors for chaffed, pierced, pinched, and partially broken wires, and for broken, bent, pushed out, corroded, and contaminated terminals. Repair as necessary.

Reconnect all disconnected electrical connectors.

Turn the ignition switch on.

Wiggle the wiring harness and connectors of the related ATC module circuits.

Retest for any DTCs: Adjust the temperature control knob on the panel, set the temperature at 29.5°.

Push the up knob of the air volume, and push the mode control knob 3 times continuously. The control panel will enter the self-check mode.

Is DTC 06 present again?

Yes >>
- Replace the ATC module.

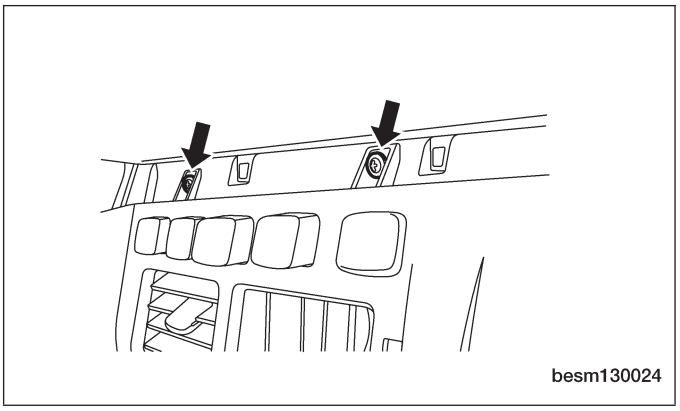
No >>
- The system is now operating properly.
- Reassemble the vehicle and verify the customers complaint is repaired.

ON-VEHICLE SERVICE

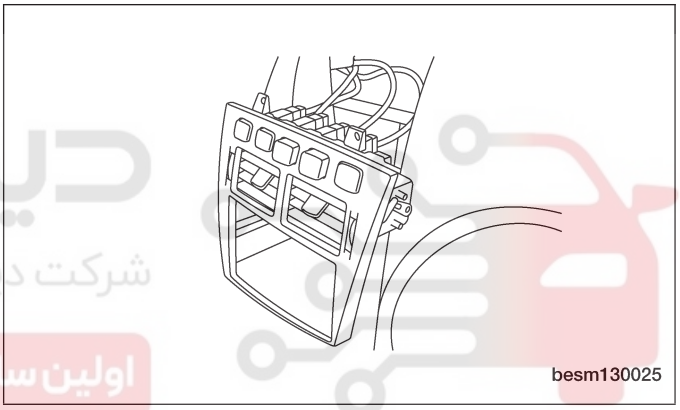
Automatic Temperature Control (ATC) Module

Removal & Installation

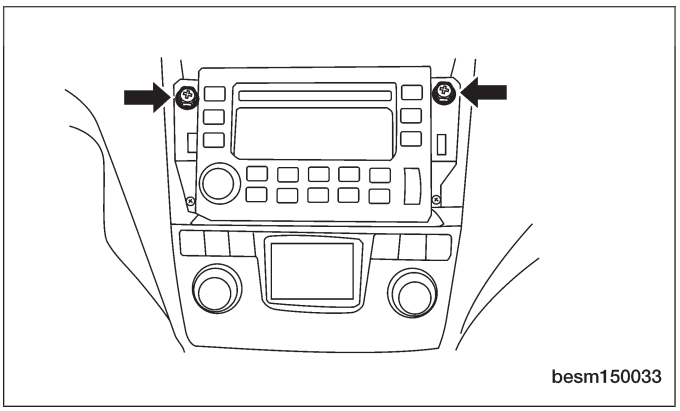
1. Remove the instrument panel retaining bolts.



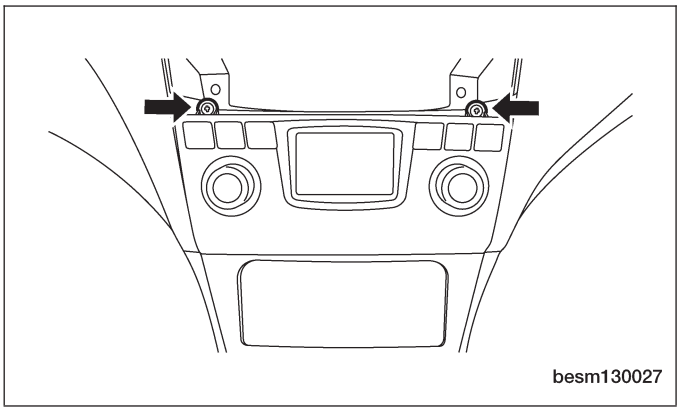
2. Remove the center control panel bezel.



3. Remove the CD player bolts and then disconnect the CD player electrical connectors.



4. Remove the retaining screws and remove the ATC module, then disconnect the ATC module electrical connectors.
5. Installation is in the reverse order of removal.



MANUAL TEMPERATURE CONTROL

GENERAL INFORMATION

Description

This vehicle is equipped with a common Heating, Ventilation and Air Conditioning (HVAC) housing assembly. The system combines air conditioning, heating, and ventilating capabilities in a single unit housing mounted under the instrument panel. The driver can choose the following functions from the HVAC control panel:

- The inside temperature
- The speed of the blower
- Five different modes of operation
- A/C compressor clutch operation
- Recirculation door position

NOTE :
To maintain the performance level of the HVAC system, the engine cooling system must be properly maintained. Any obstructions in front of the radiator or A/C condenser will reduce the performance of the A/C and engine cooling systems.

Operation

Outside fresh air enters the vehicle through the cowl top opening at the base of the windshield, and passes through a plenum chamber to the HVAC housing. Air flow can then be adjusted by the blower motor speed switch on the A/C heater control panel. The fresh air then travels through the evaporator and the heater core then out into the vehicle through the side and floor vents. It is also important to keep the air intake openings clear of debris because leaf particles and other debris that is small enough to pass through the cowl plenum screen can accumulate within the HVAC housing. The A/C compressor can be engaged by pressing the A/C (snowflake) button on the A/C-heater control. It will automatically engage when the mode control is set in any Mix to Defrost position. This will remove heat and humidity from the air before it is directed through or around the heater core. The mode control on the A/C-heater control is used to direct the conditioned air to the selected system outlets.

Specifications

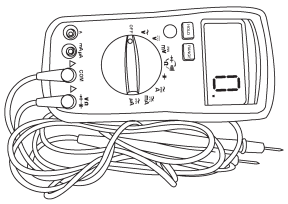
Torque Specifications

DESCRIPTION	TORQUE (N·m)
All General Service Screw	2
Evaporator Bolts	4
Expansion Valve Bolts	10
Pipeline Stent	4
Refrigerant Lines To A/C Accumulator	6
Condenser Bolts	6
Refrigerant Lines To A/C Compressor Bolt	30
Refrigerant Lines	10
Refrigerant Lines To A/C Evaporator Bolt	25

A/C Pressure Specifications

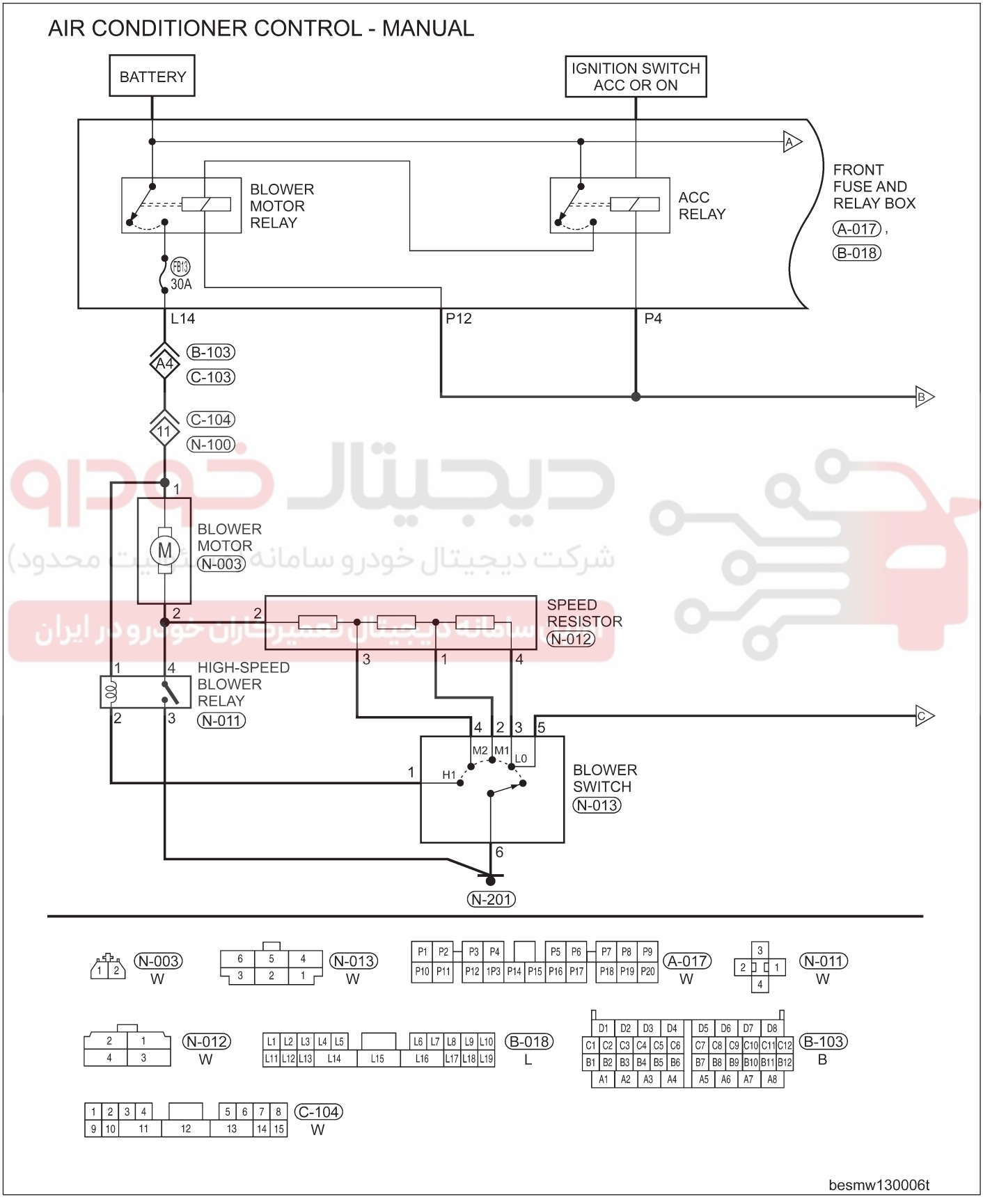
AMBIENT TEMPERATURE	A/C HIGH SIDE PRESSURE	A/C LOW SIDE PRESSURE
15.5˚C	8.4-11.9 kgf/cm2 120-170 psi	1.9-2.1 kgf/cm2 28-31 psi
21.1˚C	10.5-17.5 kgf/cm2 150-250 psi	1.9-2.1 kgf/cm2 28-31 psi
26.6˚C	12.6-19.3 kgf/cm2 180-275 psi	1.9-2.1 kgf/cm2 28-31 psi
32.2˚C	14.0-21.8 kgf/cm2 200-310 psi	1.9-2.1 kgf/cm2 28-31 psi
37.7˚C	16.1-23 kgf/cm2 230-330 psi	1.9-2.4 kgf/cm2 28-35 psi
43.3˚C	18.9-25.3 kgf/cm2 270-360 psi	1.9-2.6 kgf/cm2 28-38 psi

Special Tools

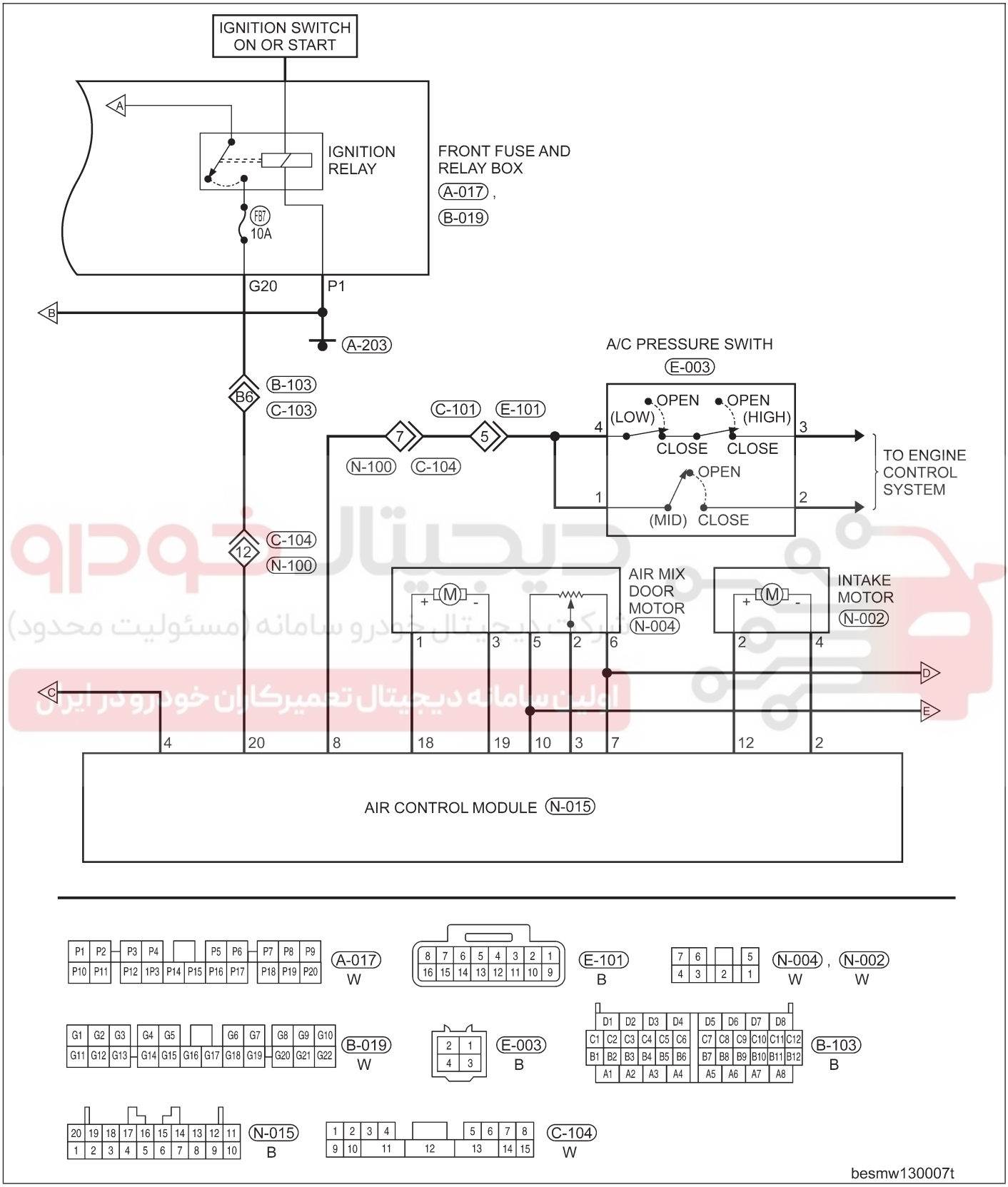
Digital Multimeter Fluke 15B & 17B	 besm030002

Electrical Schematics

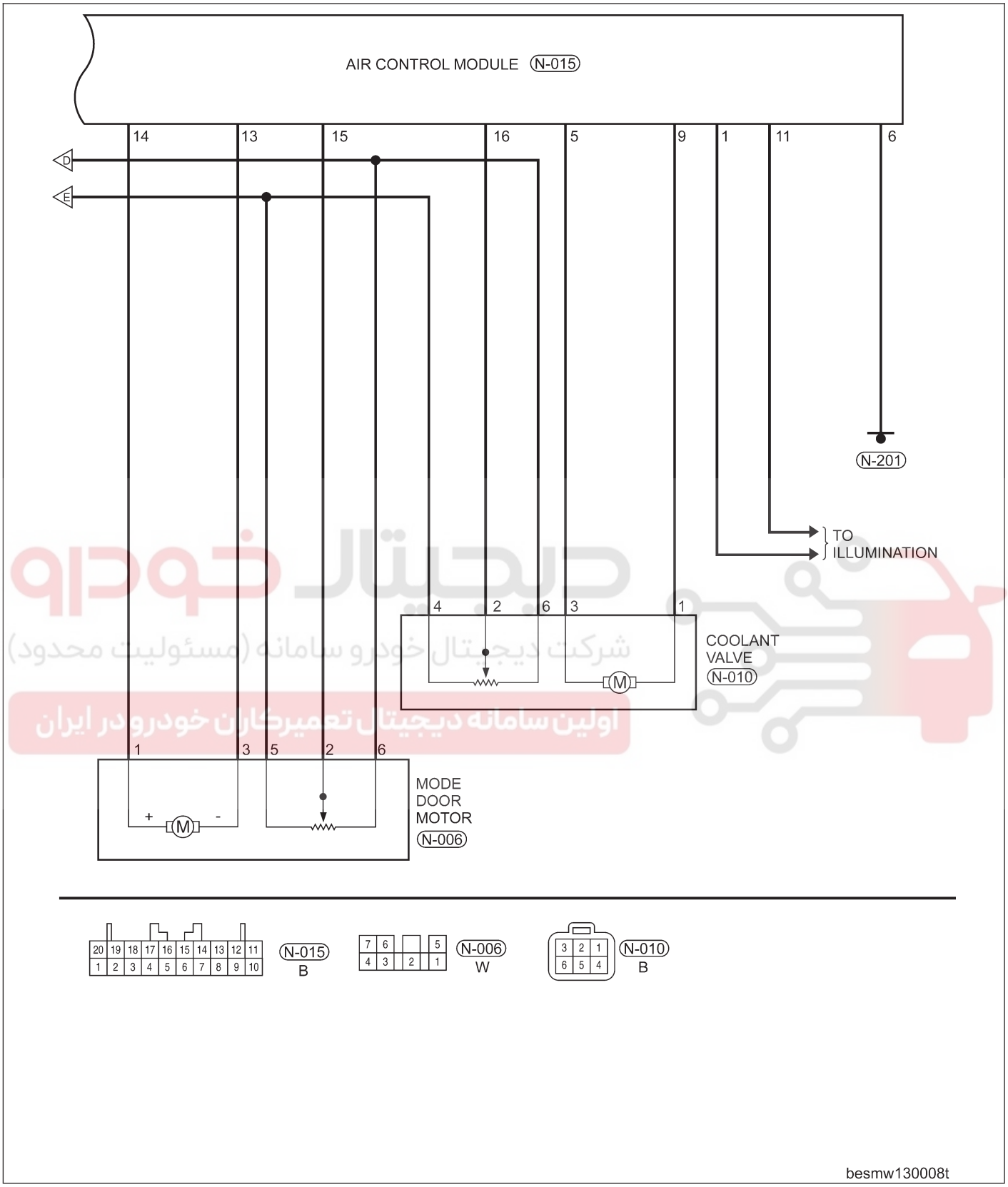
Manual Temperature Control System (Page 1 of 3)



Manual Temperature Control System (Page 2 of 3)



Manual Temperature Control System (Page 3 of 3)



DIAGNOSIS & TESTING

A/C System Performance

The ambient air temperature must be a minimum of 21° C for this test:

1. Connect a manifold gauge set.
2. Set the A/C Heater mode control switch knob in the Panel position, the temperature control knob in the full cool position, the A/C button in the On position, and the blower motor switch knob in the highest speed position.
3. Start the engine and hold the idle at 1,300 rpm with the compressor clutch engaged.
4. The engine should be at operating temperature. The doors and windows must be open.
5. Insert a thermometer in the driver side center A/C (panel) outlet. Operate the engine for five minutes.
6. The compressor clutch may cycle, depending upon the ambient temperature and humidity.
7. With the compressor clutch engaged, record the discharge air temperature and the compressor discharge pressure.
8. Compare the discharge air temperature to the performance temperature and pressure chart.

NOTE :
The discharge air temperatures will be lower if the humidity is less than the percentages shown.

TEMPERATURE AND PRESSURE					
Ambient Air Temperature and Humidity	21° C (80% humidity)	27° C (80% humidity)	32° C (80% humidity)	38° C (50% humidity)	43° C (20% humidity)
Air Temperature at Center Panel Outlet	10 to 13° C	14 to 17° C	15 to 18° C	17 to 20° C	14 to 17° C
Evaporator Inlet Pressure at Charge Port	241 to 276 kPa	262 to 290 kPa	269 to 296 kPa	275 to 303 kPa	262 to 290 kPa
Compressor Discharge Pressure	1241 to 1792 kPa	1380 to 1930 kPa	1380 to 1930 kPa	1655 to 2206 kPa	1567 to 2068 kPa

A/C System Troubleshooting Chart

CONDITION	POSSIBLE CAUSES	CORRECTION
Rapid Compressor Clutch Cycling (ten or more cycles per minute)	· Low refrigerant system charge.	· Test the A/C system for leaks. Repair, evacuate and charge the refrigerant system, if required.
Equal Pressures, But The Compressor Clutch Does Not Engage	· No refrigerant in the refrigerant system. · Faulty A/C compressor clutch coil. · Faulty A/C pressure transducer. · Faulty A/C heater control module.	· Test the A/C system for leaks. Repair, evacuate and charge the A/C, if required. · Test the compressor clutch coil and replace, if required. · Test the A/C high pressure transducer and replace, if required. · Test the A/C heater control module and replace, if required.

CONDITION	POSSIBLE CAUSES	CORRECTION
Normal Pressures, But A/C Performance Test Air Temperatures At Center Panel Outlet Are Too High	· Excessive refrigerant oil in system. · Blend door inoperative or sealing improperly. · Blend door actuator faulty or inoperative.	· Recover the refrigerant from the refrigerant system and inspect the refrigerant oil content. Restore the refrigerant oil to the proper level, if required. · Inspect the blend door for proper operation and sealing and correct, if required. · Replace if faulty.
The Low Side Pressure Is Normal Or Slightly Low, And The High Side Pressure Is Too Low	· Low refrigerant system charge. · Refrigerant flow through the accumulator is restricted. · Refrigerant flow through the evaporator is restricted. · Faulty compressor.	· Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. · Replace the restricted accumulator, if required. · Replace the restricted evaporator coil, if required. · Replace the compressor, if required.
The Low Side Pressure Is Normal Or Slightly High, And The High Side Pressure Is Too High	· Condenser air flow restricted. · Inoperative cooling fan. · Refrigerant system overcharged. · Air in the refrigerant system. · Engine overheating.	· Check the condenser for damaged fins, foreign objects obstructing air flow through the condenser fins, and missing or improperly installed air seals. Clean, repair, or replace components as required. · Test the cooling fan and replace, if required. · Recover the refrigerant from the refrigerant system. Charge the refrigerant system to the proper level, if required. · Test the refrigerant system for leaks. Repair, evacuate and charge the refrigerant system, if required. · Test the cooling system and repair as necessary.
The Low Side Pressure Is Too High, And The High Side Pressure Is Too Low	· Accessory drive belt slipping. · Faulty compressor.	· Inspect the accessory drive belt condition and tension. Tighten or replace the accessory drive belt, if required. · Replace the compressor, if required.
The Low Side Pressure Is Too Low, And The High Side Pressure Is Too High.	· Restricted refrigerant flow through the refrigerant lines. · Restricted refrigerant flow through the A/C accumulator. · Restricted refrigerant flow through the condenser.	· Inspect the refrigerant lines for kinks, tight bends or improper routing. Correct the routing or replace the refrigerant line, if required. · Replace the accumulator if restricted. · Replace the restricted condenser, if required.

Heater Performance

Engine coolant is delivered to the heater core through heater hoses. With the engine idling at normal operating temperature, set the temperature control knob in the full hot position, the mode control switch knob in the floor heat position, and the blower motor switch knob in the highest speed position. Using a test thermometer, check the temperature of the air being discharged at the HVAC housing floor outlets. Compare the test thermometer reading to the heater performance chart.

HEATER PERFORMANCE				
Ambient Air Temperature	15.5° C (60° F)	21.1° C (70° F)	26.6° C (80° F)	32.2° C (90° F)
Minimum Air Temperature at Floor Outlet	62.2° C (144° F)	63.8° C (147° F)	65.5° C (150° F)	67.2° C (153° F)

Both of the heater hoses should be hot to the touch. The coolant return heater hose should be slightly cooler than the coolant supply heater hose. If the return hose is much cooler than the supply hose, locate and repair the engine coolant flow obstruction in the cooling system.

Obstructed Coolant Flow

Possible locations or causes of obstructed coolant flow:
- Pinched or kinked heater hoses.
- Improper heater hose routing.
- Plugged heater hoses or supply and return ports at the cooling system connections.
- A plugged heater core.

Mechanical Problems

Possible locations or causes of insufficient heat:
- An obstructed cowl air intake.
- Obstructed heater system outlets.
- A blend door not functioning properly.
- An air-bound system.

Temperature Control

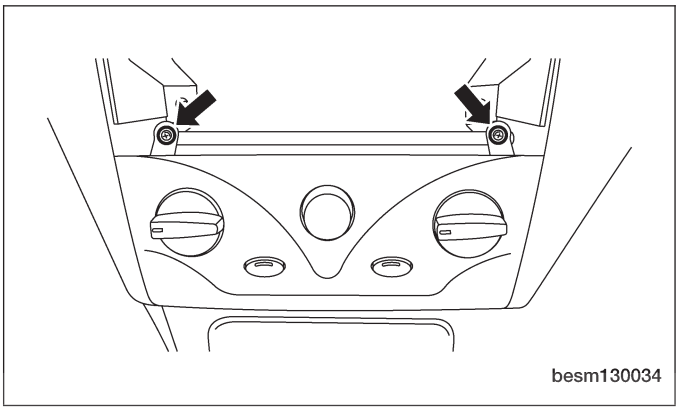
If the heater outlet air temperature cannot be adjusted with the temperature control knob(s) on the A/C Heater control panel, the following could require service:
- The A/C heater control.
- The blend door actuator(s).
- The wire harness circuits for the A/C heater control or the blend door actuator(s).
- The blend door(s).
- Improper engine coolant temperature.

ON-VEHICLE SERVICE

Manual Temperature Control Module

Removal & Installation

1. Disconnect the negative battery cable.
2. Remove the bezel of the central control panel.
3. Remove the bolts, and remove the CD player, and then disconnect the harness connectors.
4. Remove the screws and remove the manual temperature control module.
5. Disconnect the manual temperature control module electrical connector.
6. Installation is in the reverse order of removal.


besm130034

Blower Motor Resistor

Removal & Installation

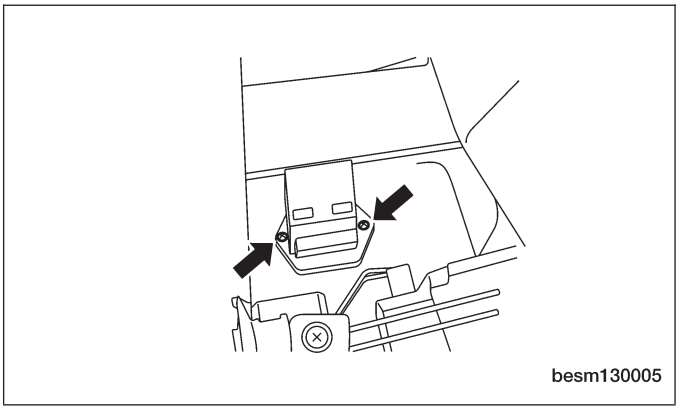
WARNING!

The blower motor resistor may get very hot during normal operation. If the blower motor was turned on prior to servicing the blower motor resistor, wait five minutes to allow the blower motor resistors to cool before performing diagnosis or service. Failure to take this precaution can result in possible personal injury.

CAUTION:

Do not operate the blower motor with the blower motor resistor removed from the circuit. Failure to take this precaution can result in vehicle damage.

1. Disconnect the negative battery cable.
2. Disconnect the blower motor resistor electrical connector.
3. Remove the screws attaching the blower motor resistor to the evaporator housing.
4. Remove the blower motor resistor.
5. Installation is in the reverse order of removal.


besm130005

SYSTEM CONTROLS

GENERAL INFORMATION

Description

The Heating, Ventilation and Air Conditioning (HVAC) system uses a combination of electrical, and vacuum controls. These controls provide the vehicle operator with a number of setting options to help control the climate and comfort within the vehicle. Refer to the owner's manual in the vehicle glove box for more information on the suggested operation and use of these controls.

Operation

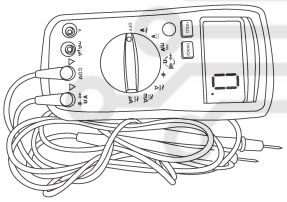
Both A/C heater control module panels are located on the instrument panel inboard of the steering column and above the radio. The A/C heater control panel contains two rotary-type temperature control knobs (2 and 5), a rotary-type mode control switch knob (1), a rotary-type blower motor speed switch knob (6) and an air conditioning compressor push button switch (3).

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
All General Service Screws	2

Special Tools

Digital Multimeter Fluke 15B & 17B	 besm030002

DIAGNOSIS & TESTING

Mechanical Problems

Possible locations or causes of insufficient heat:
- An obstructed cowl air intake.
- Obstructed heater system outlets.
- A blend door not functioning properly.
- An air-bound system.

Temperature Control

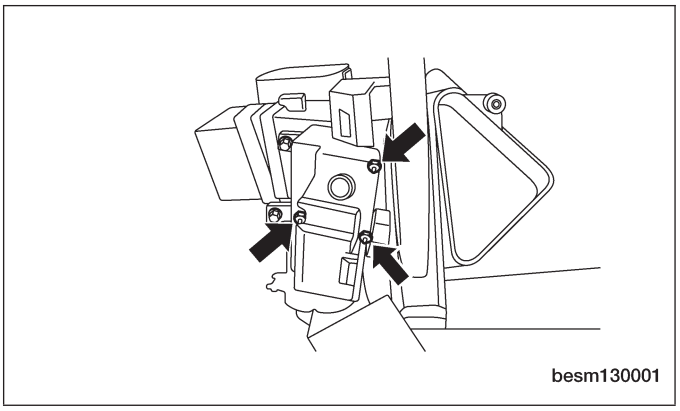
If the heater outlet air temperature cannot be adjusted with the temperature control knob(s) on the A/C Heater control panel, the following could require service:
- The A/C heater control.
- The blend door actuator(s).
- The wire harness circuits for the A/C heater control or the blend door actuator(s).
- The blend door(s).
- Improper engine coolant temperature.

ON-VEHICLE SERVICE

Blend Door Actuator

Removal & Installation

1. Remove the rod connected to the blend door actuator.
2. Remove the screws connecting the blend door actuator to the bracket.
   (Tighten: Blend door actuator screws to 2 N·m)
3. Installation is in the reverse order of removal.


besm130001

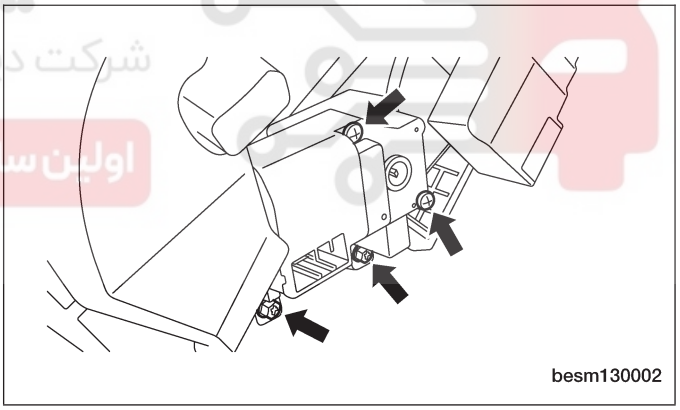
Installation Notes:

- Turn the ignition switch to the ACC position.
- Start the engine and turn on the air conditioner.
- Set the air conditioner temperature adjusting knob to HOTTEST or COLDEST.
- Close the air conditioner panel until the motor stops.
- Adjust the mixing damper manually to HOTTEST or COLDEST position according to the status.
- Adjust the rod to the proper position to connect to the actuator.

Mode Door Actuator

Removal & Installation

1. Remove the rod connected to the mode door actuator.
2. Remove the screws connecting the mode door actuator to the bracket.
   (Tighten: Mode door actuator screws to 2 N·m)
3. Installation is in the reverse order of removal.


besm130002

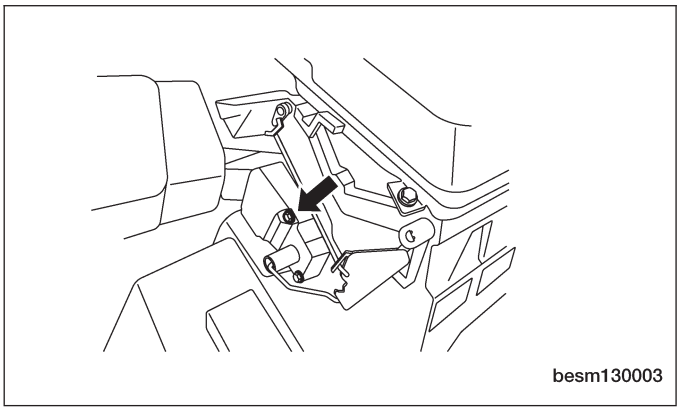
Installation Notes:

- Turn the ignition switch to the ACC position.
- Start the engine and turn on the air conditioner.
- Set the air conditioner temperature adjusting knob to HOTTEST or COLDEST.
- Close the air conditioner panel until the motor stops.
- Adjust the mixing damper manually to HOTTEST or COLDEST position according to the status.
- Adjust the rod to the proper position to connect to the actuator.

Recirculation Door Actuator

Removal & Installation

1. Remove the rod connected to the recirculation door actuator.
2. Remove the screws connecting the recirculation door actuator to the bracket.
   (Tighten: Recirculation door actuator screws to 2 N·m)
3. Installation is in the reverse order of removal.


besm130003

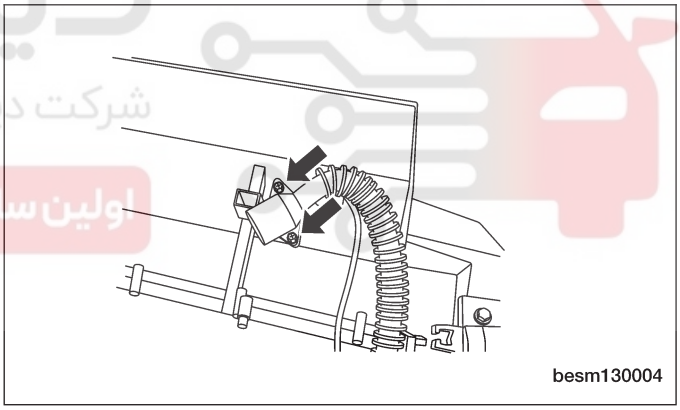
Installation Notes:

- Turn the ignition switch to the ACC position.
- Start the engine and turn on the air conditioner.
- Set the air conditioner temperature adjusting knob to HOTTEST or COLDEST.
- Close the air conditioner panel until the motor stops.
- Adjust the mixing damper manually to HOTTEST or COLDEST position according to the status.
- Adjust the rod to the proper position to connect to the actuator.

Evaporator Temperature Sensor

Removal & Installation

1. Disconnect the evaporator temperature sensor electrical sensor.
2. Remove the screw attaching the hose to the housing.
   (Tighten: Evaporator temperature sensor screws to 2 N·m)
3. Installation is in the reverse order of removal.


besm130004

AIR DISTRIBUTION

GENERAL INFORMATION

Description

All models are equipped with a common Heating, Ventilation and Air Conditioning (HVAC) housing assembly that combines A/C and heating capabilities into a single unit mounted within the passenger compartment. The HVAC housing assembly consists of three separate housings:

- HVAC housing — The HVAC housing is mounted to the dash panel behind the instrument panel and contains the A/C evaporator. The HVAC housing has mounting provisions for the air inlet housing, blower motor and the air distribution housing.
- Air distribution housing — The air distribution housing is mounted to the rear of the HVAC housing and contains the heater core, blend-air and mode-air doors and door linkage.
- Air inlet housing — The air inlet housing is mounted to the passenger side end of the HVAC housing. The air inlet housing contains the recirculation-air door and actuator.

Operation

The A/C system is designed for the use of a non-CFC, R-134a refrigerant and uses an A/C evaporator to cool and dehumidify the incoming air prior to blending it with the heated air. A temperature control determines the discharge air temperature by operating the temperature control cable, which moves the blend-air door. This allows an almost immediate control of the output air temperature of the system. The mode door cable operates the mode-air doors which direct the flow of the conditioned air out the various air outlets, depending on the mode selected. When equipped with A/C, the recirculation door actuator operates the recirculation-air door which closes off the fresh air intake and recirculates the air already inside the vehicle. The electric recirculation door actuator and the blower motor are connected to the vehicle electrical system by the instrument panel wire harness. The blower motor controls the velocity of air flowing through the HVAC housing assembly by spinning the blower wheel within the HVAC housing at the selected speed by use of the blower motor resistor, which is located in the dash panel in the engine compartment.

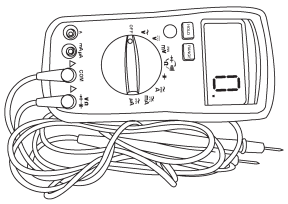
The air distribution housing must be removed from the HVAC housing and disassembled for service of the blend-air and mode-air doors. The air inlet housing must be removed from HVAC housing and disassembled for service of the recirculation-air door. The HVAC housing must be removed from the vehicle and disassembled for service of the A/C evaporator.

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
All General Service Screws	2
Evaporator Bolts	4
Expansion Valve Bolts	10
Pipeline Stent	4
Refrigerant Lines To A/C Accumulator	6
Condenser Nuts	6
Refrigerant Lines To A/C Compressor Bolt	30
Refrigerant Lines	10
Refrigerant Lines To A/C Evaporator Bolt	25

Special Tools

Digital Multimeter Fluke 15B & 17B	 besm030002

DIAGNOSIS & TESTING

Blower Motor Electrical Troubleshooting

To determine if an open condition exists within the blower motor circuit wiring, it is necessary to disconnect the negative battery cable and check for continuity within the blower motor circuits using an ohmmeter.

Possible causes of an inoperative blower motor include the following:
- Open fuse
- Inoperative blower motor switch
- Inoperative blower motor
- Inoperative blower motor circuit wiring or wiring harness electrical connectors

Blower Motor Noise

To determine if the blower motor is the source of the noise, simply switch the blower motor from Off to On. To verify that the blower motor is the source of the noise, unplug the blower motor wire harness connector and operate the heater-A/C system. If the noise goes away, possible causes include:
- Foreign material on fresh air inlet screen
- Foreign material in blower wheel
- Foreign material in HVAC housing
- Incorrect blower motor mounting
- Deformed or damaged blower wheel
- Worn blower motor bearings or brushes

Blower Motor Vibration

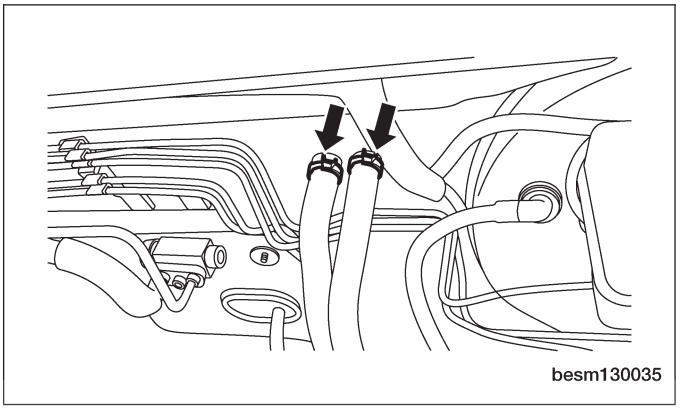
Possible causes of a blower motor vibration include:
- Incorrect blower motor mounting
- Foreign material in blower wheel
- Deformed or damaged blower wheel
- Worn blower motor bearings

ON-VEHICLE SERVICE

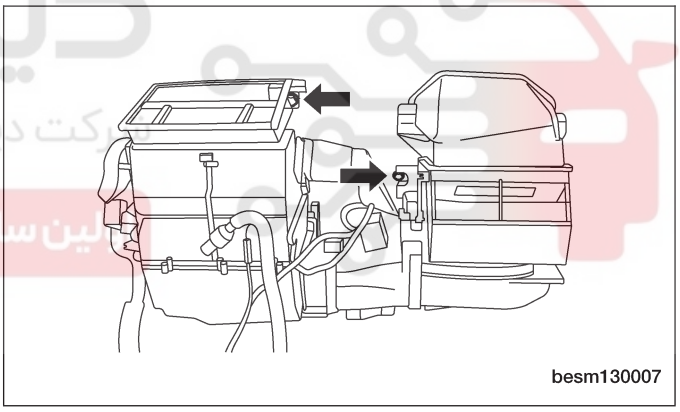
HVAC Housing

Removal & Installation

1. Evacuate the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
2. Remove the bolt on the accumulator and then remove the accumulator.
3. Disconnect heater hoses.


besm130035

4. Remove the instrument panel (See Instrument Panel Removal & Installation in Section 15 Body).
5. Remove the evaporator assembly retaining bolts and disconnect the electrical connectors. Remove the evaporator assembly.
6. Installation is in the reverse order of removal.


besm130007

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Blower Motor

Description

The blower motor is mounted in the HVAC housing. The following are blower motor functions:

- The blower motor will operate whenever the ignition switch is in the ON position and the blower motor control is in any position except Off.
- The blower motor can be accessed for service from underneath the instrument panel.
- The blower motor and blower motor wheel are factory balanced as an assembly and cannot be adjusted or repaired and must be replaced if found inoperative or damaged.

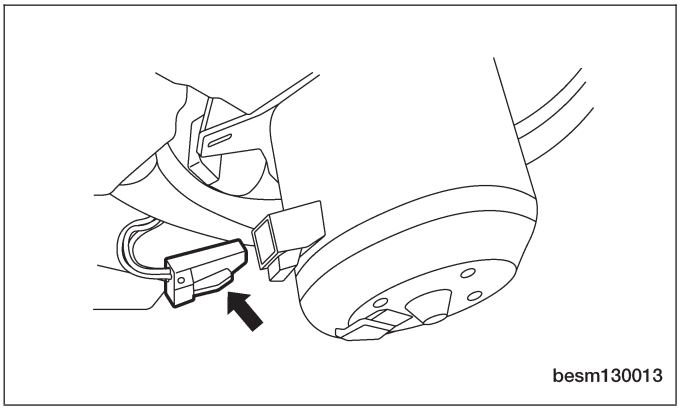
Operation

The blower motor is used to control the velocity of air moving through the HVAC housing by spinning the blower wheel within the HVAC air inlet housing at the selected speed. The blower motor is a 12-volt, direct current (DC) motor mounted within a plastic housing with an integral wire harness connector. The blower wheel is secured to the blower motor shaft and is positioned within the air inlet housing on the passenger side of the HVAC housing.

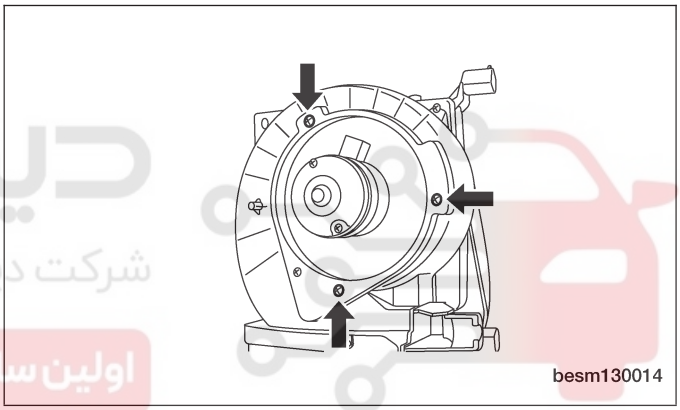
Removal & Installation

NOTE :
The blower motor is located on the bottom of the HVAC housing. The blower motor can be removed from the vehicle without having to remove the HVAC housing.

1. Disconnect the blower motor electrical connector.


besm130013

2. Remove the mounting bolts for the blower motor.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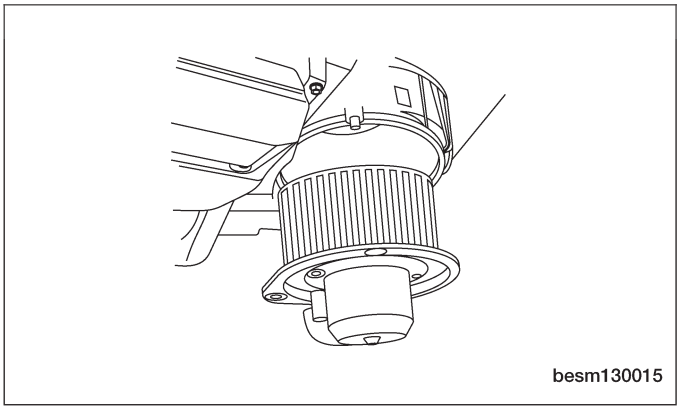
3. Remove the blower motor.
4. Installation is in the reverse order of removal.


besm130015

SYSTEM PLUMBING

GENERAL INFORMATION

Description

The A/C refrigerant lines and hoses are used to carry the refrigerant between the various A/C system components.

Any kinks or sharp bends in the refrigerant lines and hoses will reduce the capacity of the entire A/C system and can reduce the flow of refrigerant within the system.

Operation

High pressures are produced in a refrigerant system when the A/C compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all the flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed. Depending on the vehicle, model and market application, refrigerant lines are connected to each other or other A/C system components with block-type or quick-connect type fittings. To ensure the integrity of the refrigerant system, O-rings and/or gaskets may be used to seal the refrigerant system connections. The refrigerant lines and hoses cannot be repaired and must be replaced if leaking or damaged.

WARNING!

The A/C system contains refrigerant under high pressure. Repairs should only be performed by qualified service personnel. Serious or fatal injury may result from improper service procedures.

WARNING!

If accidental A/C system discharge occurs, ventilate the work area before resuming service. Large amounts of refrigerant released in a closed work area will displace the oxygen and cause suffocation and serious or fatal injury.

CAUTION:
Never add R-12 to a refrigerant system designed to use R-134a. Do not use R-12 equipment or parts on an R-134a A/C system. These refrigerants are not compatible and damage to the A/C system will result.

CAUTION:
Never use R-12 refrigerant oil in an A/C system designed to use R-134a refrigerant oil. These refrigerant oils are not compatible and damage to the A/C system will result.

CAUTION:
Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

CAUTION:
Do not overcharge the refrigerant system. Overcharging will cause excessive compressor head pressure and can cause compressor noise and A/C system failure.

Specifications

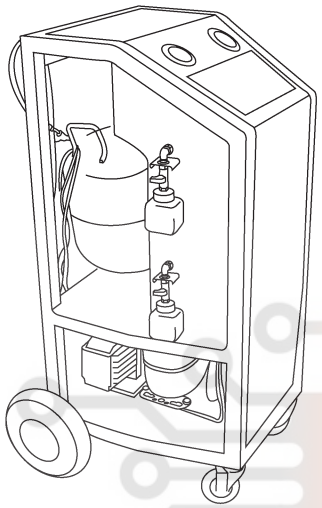
Torque Specifications

DESCRIPTION	TORQUE (N·m)
A/C Compressor Bracket Bolts	40
A/C Compressor Line Bolts	20

A/C Refrigerant Charge Specifications

DESCRIPTION	CAPACITY (kg)
R-134a Refrigerant	0.725

Special Tools

Refrigerant Recovery/Recycling Station	 ltsm130018

DIAGNOSIS & TESTING

A/C Compressor Noise Testing

When investigating an A/C system related noise, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, transaxle in gear or neutral, engine speed, engine temperature, and any other special conditions. Noises that develop during A/C operation can often be misleading. For example: what sounds like a failed bearing, may be caused by loose bolts, nuts, mounting brackets or a loose compressor assembly.

NOTE :
The A/C compressor must be replaced if any unusual noise is heard from the compressor itself.

NOTE :
Drive belts are speed sensitive. At different engine speeds and depending upon drive belt tension, drive belts can develop noises that are mistaken for an A/C compressor noise. Improper drive belt tension can cause a misleading noise when the compressor is operating at maximum displacement, which may not occur when the compressor is at minimum displacement.

1. Select a quiet area for testing.
2. Duplicate the complaint conditions as much as possible.
3. Turn the A/C system On and Off several times to clearly identify any compressor noise.
4. Listen to the A/C compressor while it is operating at maximum and minimum displacement.
5. Probe the A/C compressor with an engine stethoscope or a long screwdriver with the handle held to your ear to better localize the source of the noise.
6. To duplicate high-ambient temperature conditions (high head pressure), restrict the air flow through the A/C condenser. Install a manifold gauge set or a scan tool to be certain that the discharge pressure does not exceed 2600 kPa .
7. Check the condition of the accessory drive belt.
   NOTE: The A/C compressor must be replaced if the drive hub is broken or if the compressor shaft does not rotate smoothly.
8. Check the compressor hub and pulley and bearing assembly. Be certain that the hub and pulley are properly aligned and that the pulley bearing is mounted securely to the A/C compressor.
9. Check the refrigerant system plumbing for incorrect routing, rubbing or interference, which can cause unusual noises. Also check the refrigerant lines and hoses for kinks or sharp bends that will restrict refrigerant flow, which can cause noises.
10. Loosen all of the compressor mounting hardware and retighten.
    CAUTION:Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.
11. If the noise is from the opening and closing of the high pressure relief valve, recover, evacuate and recharge the refrigerant system. If the high pressure relief valve still does not seat properly, replace the A/C compressor.
12. If the noise is from liquid refrigerant slugging in the A/C suction line, replace the A/C accumulator and check the refrigerant oil level and the refrigerant system charge.
13. If a slugging condition still exists after replacing the A/C accumulator, then replace the A/C compressor.

Refrigerant System Leaks

WARNING!

R-134a service equipment or vehicle A/C system should not be pressure tested or leak tested with compressed air. Mixture of air and R-134a can be combustible at elevated pressures. These mixtures are potentially dangerous and may result in fire or explosion causing property damage, personal injury or death. Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved service equipment meeting SAE requirements to discharge an R-134a system. If accidental system discharge occurs, ventilate work area before resuming service.

NOTE :
If the A/C refrigerant system charge is empty or low, a leak in the A/C system is likely. Visually inspect all A/C lines, fittings and components for an oily residue. Oil residue can be an indicator of an A/C system leak location.

NOTE :
The only way to correctly determine if the refrigerant system is fully charged with R-134a is to completely evacuate and recharge the A/C system.

Refrigerant System Empty

1. Evacuate the refrigerant system to the lowest degree of vacuum possible . Determine if the system holds a vacuum for 15 minutes. If vacuum is held, a leak is probably not present. If system will not maintain vacuum level, proceed to STEP 2.
2. Prepare and dispense 0.3 kilograms of R-134a refrigerant into the evacuated refrigerant system and proceed to STEP 1 of the System Low procedure.

Refrigerant System Low

1. Position the vehicle in a wind-free work area. This will aid in detecting small leaks.
2. Operate the heating-A/C system with the engine at idle under the following conditions for at least 5 minutes. Doors or windows open transaxle in Park or Neutral with the parking brake set (depending on application) A/C-heater controls set to outside air, full cool, panel mode, high blower and with A/C compressor engaged.
3. Shut the vehicle Off and wait 2-7 minutes. Then use an electronic leak detector that is designed to detect R-134a refrigerant and search for leaks. Fittings, lines or components that appear to be oily usually indicate a refrigerant leak. To inspect the A/C evaporator for leaks, insert the leak detector probe into the drain tube opening or an air outlet. A dye for R-134a is available to aid in leak detection. Use only approved refrigerant dye.

CAUTION:
A leak detector only designed for R-12 refrigerant will not detect leaks in an R-134a refrigerant system.

ON-VEHICLE SERVICE

A/C System Evacuation and Recharge

Evacuation

CAUTION:
Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

NOTE :
Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the A/C compressor.

If the refrigerant system has been open to the atmosphere, it must be evacuated before the system can be filled. Moisture and air mixed with the refrigerant will raise the compressor high pressure above acceptable operating levels. This will reduce the performance of the A/C system and damage the A/C compressor. Moisture will boil at near room temperature when exposed to vacuum. To evacuate the refrigerant system:

NOTE :
When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

1. Recover the refrigerant system.
2. With the engine OFF, connect a suitable charging station, refrigerant recovery machine or a manifold gauge set with vacuum pump and refrigerant recovery equipment. Do not operate the engine with a vacuum on the A/C system.
3. Open the suction and discharge valves and start the vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to charge to eliminate all moisture in system. When the suction gauge reads to the lowest degree of vacuum possible for 30 minutes, close all valves and turn off the vacuum pump. If the system fails to reach specified vacuum, the refrigerant system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the suction and discharge valves. Then allow the system to evacuate an additional 10 minutes.
4. Close all valves. Turn off and disconnect the vacuum pump.
5. Charge the refrigerant system.

Recharge

After all refrigerant system leaks have been repaired and the refrigerant system has been evacuated, a refrigerant charge can be injected into the system.

CAUTION:
A small amount of refrigerant oil is removed from the A/C system each time the refrigerant system is recovered and evacuated. Before charging the A/C system, you MUST replenish any oil lost during the recovery process.

1. Evacuate the refrigerant system.
2. A manifold gauge set and an R-134a refrigerant recovery/recycling/charging station that meets SAE standard J2210 should be connected to the refrigerant system.
3. Open both the suction and discharge valves, then open the charge valve to allow the refrigerant to flow into the system.
4. When the transfer of refrigerant has stopped, close both the suction and discharge valves.
5. If all of the refrigerant charge did not transfer from the dispensing device, open all of the windows in the vehicle and set the heating-A/C system controls so that the A/C compressor is operating and the blower motor is running at its lowest speed setting. Run the engine at a steady high idle (about 1400 rpm).
6. Open the low-side valve to allow the remaining refrigerant to transfer to the refrigerant system.

WARNING!

Take care not to open the discharge (high pressure) valve at this time. Failure to follow this warning could result in possible personal injury or death.

7. Disconnect the charging station and manifold gauge set from the refrigerant system service ports.
8. Reinstall the caps onto the refrigerant system service ports.

Compressor

Description

The A/C system uses a SD7V16 clutch-less compressor. The compressor is a variable displacement compressor. The largest displacement is 161.3 ml/r, displacement range of 5% to 100%.

CAUTION:
Do NOT run the engine with a vacuum pump in operation or with a vacuum present within the A/C system. Failure to follow this caution will result in serious A/C compressor damage.

NOTE :
The compressor drive hub and the pulley and bearing assembly cannot be serviced separately from the A/C compressor. In the event of drive hub or pulley and bearing assembly damage or failure, the A/C compressor, drive hub and pulley and bearing must be replaced as an assembly.

Operation

The A/C compressor is controlled by the Engine Control Module (ECM), depending on engine application. The ECM calculates compressor displacement required by A/C system load and demand by monitoring vehicle speed, A/C high side pressure, engine speed, evaporator temperature, accelerator pedal position, ambient temperature and A/C-heater request signals. The ECM then sends a pulse width modulated signal to the A/C compressor control solenoid to increase or decrease refrigerant flow through an orifice located within the compressor housing. The amount of refrigerant allowed to pass through the orifice in the compressor determines the head pressure which controls the angle of the swash plate, which in turn, determines the amount of compressor displacement. When there is no demand for A/C, the swashplate is adjusted to nearly a zero degree angle, which removes compressor torque drag from the engine.

NOTE :
The A/C compressor cannot be repaired and it must be replaced if found inoperative or damaged. If an internal failure of the A/C compressor has occurred, the A/C accumulator and the A/C liquid line must also be replaced.

Removal & Installation

WARNING!

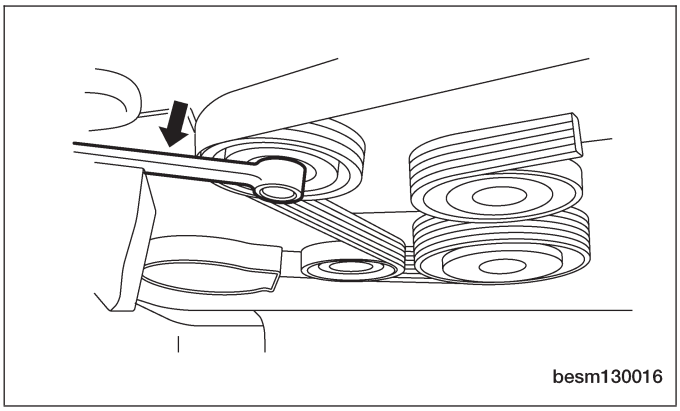
Review safety precautions and warnings in this group before performing this procedure. Failure to follow the warnings and cautions could result in possible personal injury or death.

CAUTION:
The A/C accumulator and the A/C liquid line must be replaced if an internal failure of the A/C compressor has occurred. Failure to replace the A/C accumulator and the A/C liquid line can cause serious damage to the replacement A/C compressor.

NOTE :
When replacing multiple A/C system components, determine how much oil should be removed from the new A/C compressor.

NOTE :
Replacement of the refrigerant line O-ring seals and gaskets is required anytime a refrigerant line is opened. Failure to replace the rubber O-ring seals and metal gaskets could result in a refrigerant system leak.

1. Evacuate the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
2. Disconnect the A/C compressor electrical connector.
3. Remove the engine drive belt (See Drive Belt Removal & Installation in Section 02 Engine).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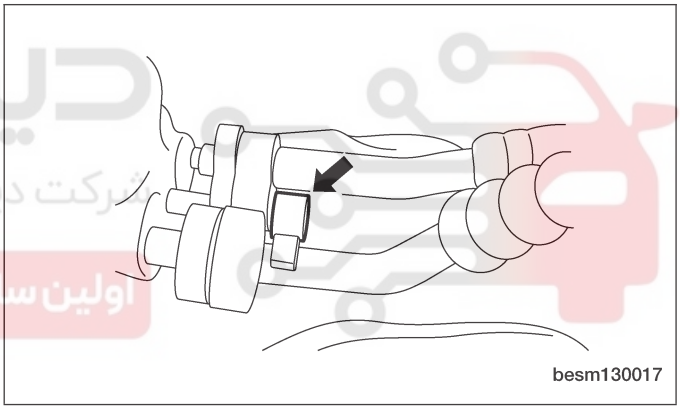
4. Remove the intake manifold (See Intake Manifold Removal & Installation in Section 02 Engine).
5. Remove the A/C compressor line bolts from the A/C compressor.
(Tighten: A/C compressor line bolts to 20 N·m)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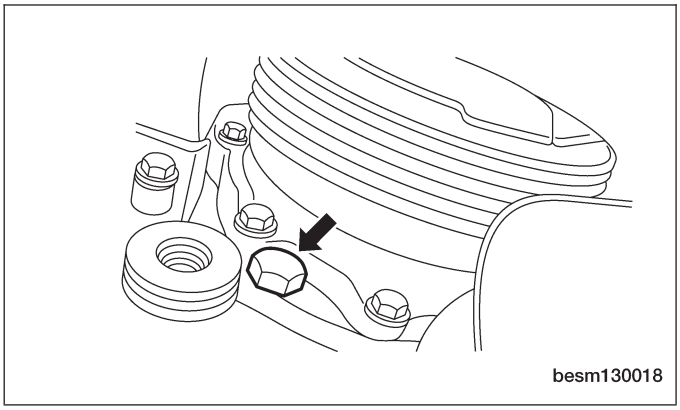
6. Loosen the A/C compressor bracket bolt (1) connecting the A/C compressor and bracket.
(Tighten: A/C compressor bracket bolt to 40 N·m)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7. Loosen the A/C compressor bracket bolt (2) connecting the A/C compressor and bracket.
(Tighten: A/C compressor bracket bolt to 40 N·m)

   NOTE: After removing the A/C lines, plug the A/C lines to prevent any debris from entering the A/C system.
8. Remove the four A/C compressor bracket bolts.
(Tighten: A/C compressor bracket bolts to 40 N·m)
9. Carefully remove the A/C compressor and bracket assembly.
10. Installation is in the reverse order of removal.

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Evaporator

Description

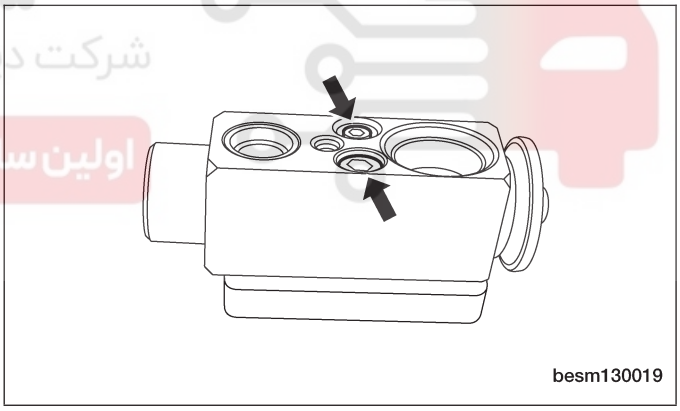
The evaporator coil is located in the HVAC housing, under the instrument panel. The evaporator coil is positioned in the HVAC housing so that all air that enters the housing must pass over the fins of the evaporator before it is distributed through the system ducts and outlets. However, air passing over the evaporator coil fins will only be conditioned when the compressor is engaged and circulating refrigerant through the evaporator coil tubes.

Operation

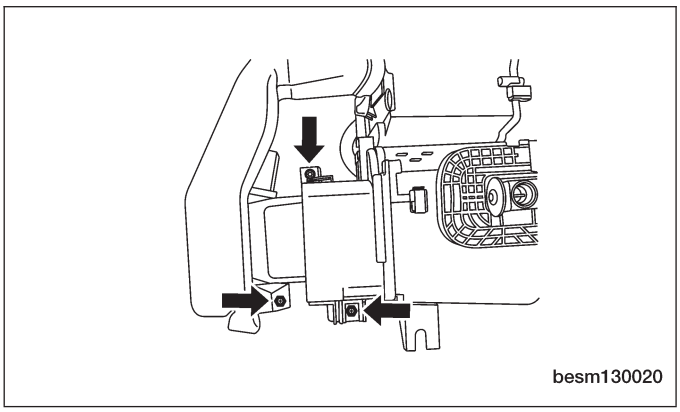
Refrigerant enters the evaporator from the orifice tube as a low-temperature, low-pressure liquid. As air flows over the fins of the evaporator, the humidity in the air condenses on the fins, and the heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to boil and vaporize. The refrigerant becomes a low-pressure gas before it leaves the evaporator. The evaporator core housing directs airflow from the blower motor through the evaporator core and heater core. All airflow from the blower motor passes through the evaporator core. The airflow is then directed through or around the heater core by the temperature blend door(s). An electric actuator-positioned temperature blend door to direct airflow through or around the heater core.

Removal & Installation

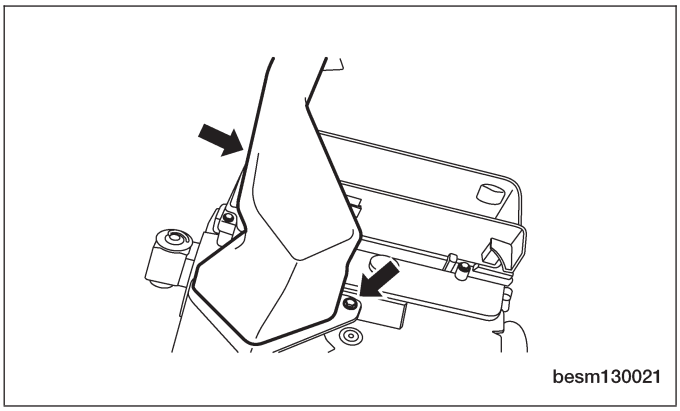
1. Evacuate the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
2. Remove the expansion valve and the evaporator core assembly with an Allen wrench.



3. Remove the three screws for the blower and the evaporator housing.



4. Remove the two screws on the rear vent air duct to remove the rear air duct.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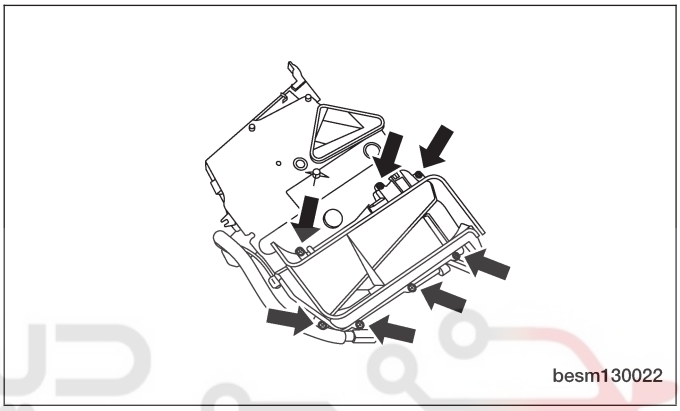
5. Remove the screws as shown in the figure.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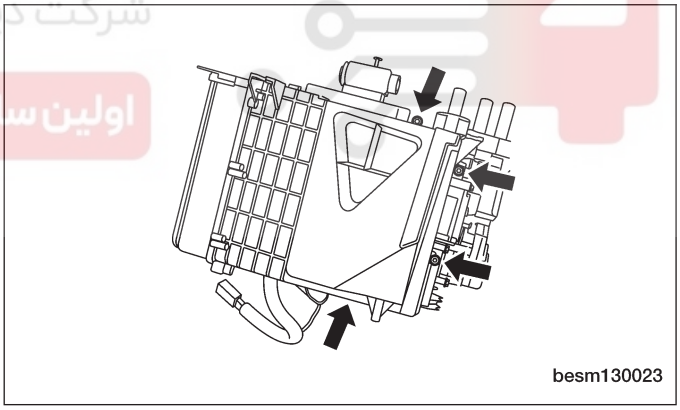
6. Remove the screws on the lid of the evaporator core assembly, and then remove the evaporator core assembly.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7. Installation is in the reverse order of removal.

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Condenser

Description

The condenser is located in the air flow in front of the engine cooling radiator. The condenser transforms the refrigerant from gaseous into liquid. It is attached to the vehicle with bolts and the A/C lines with fittings.

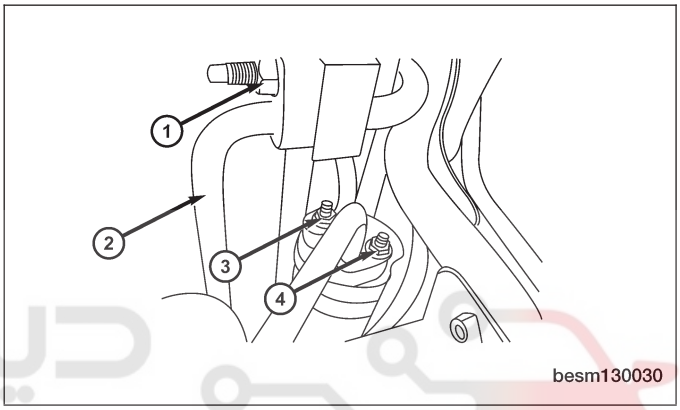
Operation

When the refrigerant gas gives up its heat, it condenses. When the refrigerant leaves the condenser, it has become a high-pressure liquid refrigerant. The volume of air flowing over the condenser fins is critical to the proper cooling performance of the air conditioning system. Therefore, it is important that there are no objects placed in front of the radiator grille openings in the front of the vehicle or foreign material on the condenser fins that might obstruct proper air flow. Also, any factory-installed air seals or shrouds must be properly reinstalled following radiator or condenser service.

Removal & Installation

1. Disconnect the negative battery cable.
2. Evacuate the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
3. Remove the front bumper (See Front Bumper Removal & Installation in section 15 Body).
4. Remove the nuts (1) that secure the A/C discharge line (2) to the right side of the A/C condenser. Remove and discard the O-ring seal and gasket.

   NOTE: After removing the A/C lines, plug the A/C lines to prevent any debris from entering the A/C system.
5. Remove the nuts (3) and (4) from the A/C liquid and suction lines to the accumulator.



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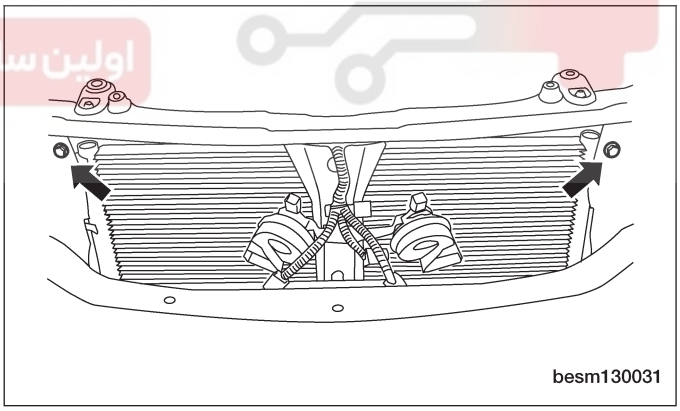
6. Disconnect the A/C liquid line. Remove and discard the O-ring seal and gasket.
7. Remove the two condenser mounting nuts.
   (Tighten: Condenser mounting nuts to 6 N·m)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8. Remove the cooling fan (See Cooling Fan Removal & Installation in Section 06 Cooling).
9. Remove the radiator (See Radiator Removal & Installation in Section 06 Cooling).
10. Remove the condenser from the engine compartment.
11. Installation is in the reverse order of removal.

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Accumulator

Description

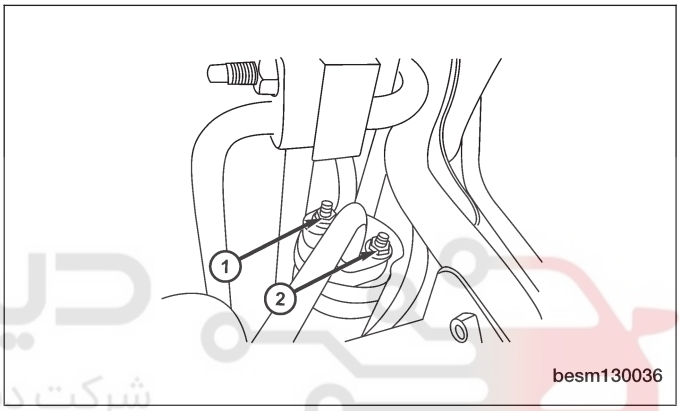
The accumulator is connected directly to the evaporator outlet and stores excess liquid refrigerant. Accumulators are used on systems that use an orifice tube to meter refrigerants into the evaporator.

Operation

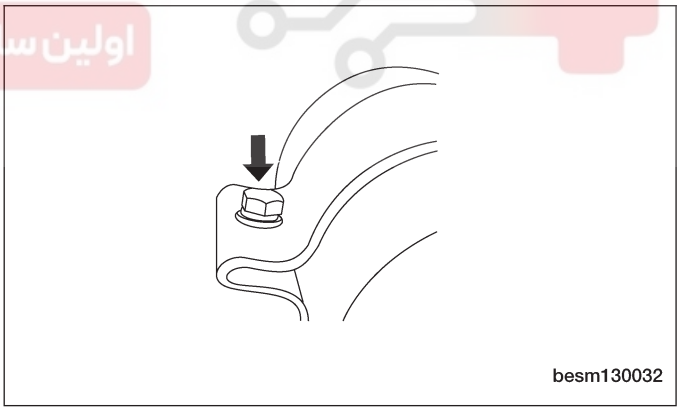
The primary function of the accumulator is to isolate the compressor from any damaging liquid refrigerant. The accumulator removes debris and moisture from the air conditioning system.

Removal & Installation

1. Disconnect the negative battery cable.
2. Evacuate the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
3. Remove the nuts (1) and (2) from the A/C liquid and suction lines to the accumulator.



4. Loosen the bolts.



5. Remove the accumulator. Remove and discard the O-ring seals and gaskets.
   NOTE: After removing the A/C lines, plug the A/C lines to prevent any debris from entering the A/C system.
6. Installation is in the reverse order of removal.

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Liquid Line

Description

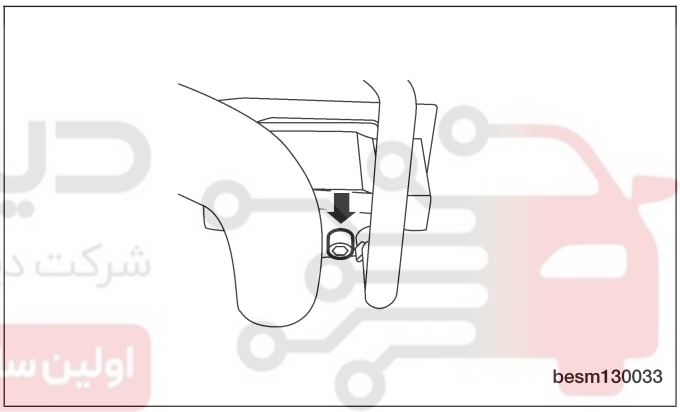
The A/C liquid line connects the A/C condenser to the A/C evaporator.

Operation

The high pressure A/C liquid line is the refrigerant line that carries refrigerant from the A/C condenser to the A/C accumulator. Air conditioning hoses are designed to control liquid and gas at high pressures and temperatures. The hoses are usually flexible and terminated with special metal fittings at the ends to prevent leaks and provide a sure seal and connection between components.

Removal & Installation

1. Disconnect and isolate the negative battery cable.
2. Evacuate the A/C system. (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
3. Remove the Power Steering Pump Reservoir (SEE Reservoir Removal & Installation in section 11 Steering) and the coolant container.
4. Remove the A/C accumulator (See Accumulator Removal & Installation in Section 13 Heating & Air Conditioning)
5. Remove the bolt that secures the A/C liquid and suction line assembly to the A/C evaporator.



6. Disconnect the A/C liquid and suction line assembly from the A/C evaporator and remove and discard the dual-plane seals.
7. Install plugs in the opened refrigerant line fittings and the evaporator ports to keep debris out of the refrigerant system.
8. Remove the A/C liquid line assembly from the engine compartment.
9. Installation is in the reverse order of removal.

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Suction Line

Description

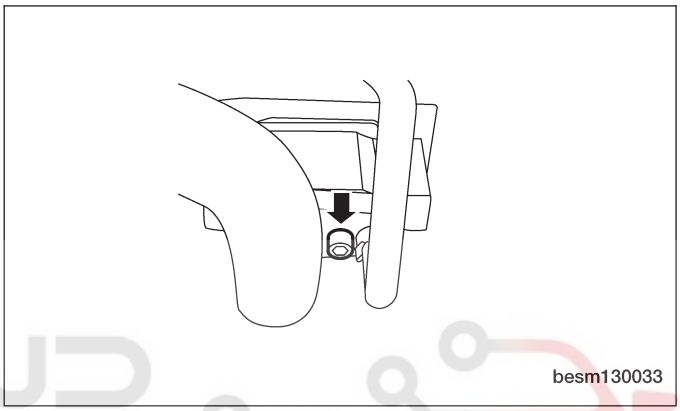
The A/C suction line connects the A/C compressor to the A/C accumulator.

Operation

The low pressure A/C suction line is the refrigerant line that carries refrigerant from the A/C accumulator to the A/C compressor. Air conditioning hoses are designed to control liquid and gas at high pressures and temperatures. The hoses are usually flexible and terminated with special metal fittings at the ends to prevent leaks and provide a sure seal and connection between components.

Removal & Installation

1. Disconnect and isolate the negative battery cable.
2. Evacuate the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).
3. Remove the Power Steering Pump Reservoir (See Reservoir Removal & Installation in Section 11 Steering) and the coolant container.
4. Remove the bolt that secures the A/C liquid and suction line assembly to the A/C evaporator.



5. Remove the bolt that connects the lines to the A/C compressor.
6. Install plugs in, or tape over the opened refrigerant line fittings and the evaporator ports.
7. Remove the A/C suction line assembly from the engine compartment.
8. Installation is in the reverse order of removal.

Installation Notes:

- Lubricate new rubber O-ring seals with clean refrigerant oil and install them and new gaskets onto the refrigerant line fittings.
- Use only the specified O-rings as they are made of a special material for the R-134a system.
- Use only refrigerant oil of the type recommended for the A/C compressor in the vehicle.
- Recharge the A/C system (See A/C System Evacuation and Recharge in Section 13 Heating and Air Conditioning).

Heater Core

Description

The heater core is located in the heater core and evaporator core housing.

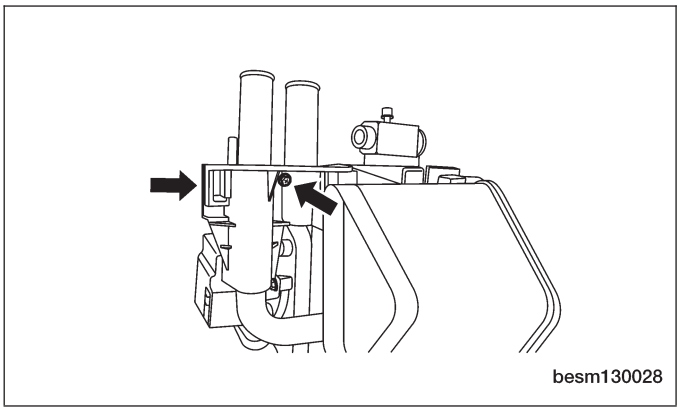
Operation

The heater core consists of fins and tubes arranged to extract heat from the engine coolant and transfer the heat to air passing through the heater core.

Removal & Installation

1. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
2. Remove the HVAC housing assembly and place it on a workbench. (See HVAC housing removal & installation in Section 13 Heating & Air Condition).

3. Remove the bolts and clips.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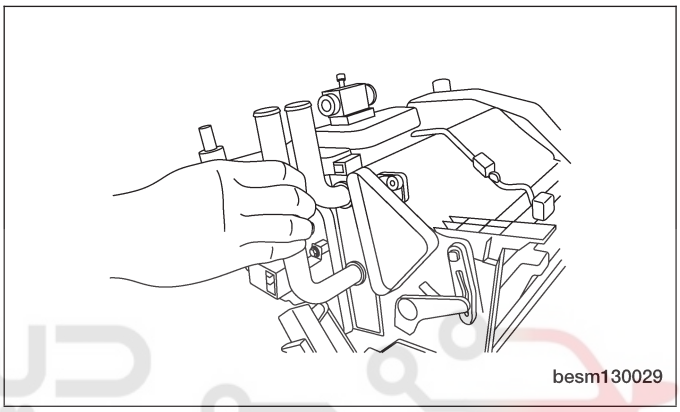
4. Pull out the heater water tank.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5. Installation is in the reverse order of removal.

Installation Notes:

- Verify the cooling system is filled to proper specifications.