

Climate Control System

 **WARNING:** Take the following precautions when repairing an air conditioning system containing R-134a:

- Always wear safety goggles.
- Avoid contact with liquid refrigerant R-134a. R-134a vaporizes at approximately -25°C (-13°F) under atmospheric pressure and will freeze skin tissue.
- Never allow refrigerant R-134a gas to escape in quantity in an occupied space. It will displace the oxygen needed to support life.
- Never use a torch in an atmosphere containing R-134a gas. R-134a is non-toxic at all normal conditions, but it decomposes when exposed to high temperatures such as a torch flame. During decomposition it releases irritating and toxic gasses (as described in the Material Safety Data Sheet from the manufacturer). Decomposition products are hydrofluoric acid, carbon dioxide and water.

Failure to follow these instructions may result in serious personal injury.

NOTICE: To avoid damaging the vehicle or Air Conditioning (A/C) components, the following precautions must be observed.

- The A/C refrigerant of all vehicles must be identified and analyzed prior to refrigerant charging. Failure to do so can contaminate the shop bulk refrigerant and other vehicles.
- Do not add R-12 refrigerant to an A/C system that requires the use of R-134a refrigerant. These 2 types of refrigerant must never be mixed. Doing so can damage the A/C system.
- Charge the A/C system with R-134a refrigerant gas while the engine is running only at the low-pressure side to prevent refrigerant slugging from damaging the A/C compressor.
- Use only R-134a refrigerant. Due to environmental concerns, when the A/C system is drained, the refrigerant must be collected using refrigerant recovery/recycling equipment. Federal, State/Provincial and/or local laws REQUIRE that R-134a be recovered into appropriate recovery equipment and the process be conducted by qualified technicians who have been certified by an approved organization, such as Automotive Service Excellence (ASE) or Mobile Air Conditioning Society (MACS) . Use of a recovery machine dedicated to R-134a is necessary to reduce the possibility of oil and refrigerant incompatibility concerns. Refer to the instructions provided by the equipment manufacturer when removing refrigerant from or charging the A/C system.
- Refrigerant R-134a must not be mixed with air for leak testing or used with air for any other purpose above atmospheric pressure. R-134a is combustible when mixed with high concentrations of air and higher pressures.
- A number of manufacturers are producing refrigerant products that are described as direct substitutes for refrigerant R-134a. The use of any unauthorized substitute refrigerant can severely damage the A/C components. If repair is required, use only new or recycled refrigerant R-134a.

NOTICE: To avoid contamination of the Air Conditioning (A/C) system, the following precautions must be observed.

- Never open or loosen a connection before recovering the refrigerant.
- When loosening a connection, if any residual pressure is evident, allow it to leak out before opening the fitting.
- Evacuate a system that has been opened to install a new component or one that has discharged through leakage before charging.
- Seal open fittings with a cap or plug immediately after disconnecting a component from the system.
- Clean the outside of the fittings thoroughly before disconnecting a component from the system.
- Do not remove the sealing caps from a new component until ready to install.
- Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open an oil container until ready to use and install the cap immediately after using. Store the oil in a clean, moisture-free container.
- Install a new O-ring seal before connecting an open fitting. Coat the fitting and O-ring seal with PAG oil before connecting.
- When installing a refrigerant line, avoid sharp bends. Position the line away from the exhaust or any sharp edges that can chafe the line.
- Tighten threaded fittings only to specifications. The steel and aluminum fittings used in the refrigerant system will not tolerate overtightening.
- When disconnecting a fitting, use a wrench on both halves of the fitting to prevent twisting of the refrigerant lines or tubes.
- Do not open a refrigerant system or uncap a new component unless it is as close as possible to room temperature. This will prevent condensation from forming inside a component that is cooler than the surrounding air.

The Electronic Manual Temperature Control (EMTC) system heats or cools the vehicle depending on the HVAC module — control panel selection.

- The control panel selections determine heating or cooling, air distribution and enables blower motor operation.

- The temperature control setting determines the air temperature.
- The blower motor switch varies the blower motor speed.
- During A/C operation, the system also reduces the relative humidity of the air.

The Dual Automatic Temperature Control (DATC) system maintains the selected vehicle interior temperature by heating and/or cooling the air.

- During A/C operation, the system also reduces the relative humidity of the air.
- The driver may override the automatic mode of operation.
- The temperature control setting determines the air temperature.
- The blower motor control override buttons vary the blower motor speed.
- The driver side and passenger side temperature settings can be individually controlled.

The system consists of the following components:

- A/C compressor
- A/C compressor clutch assembly
- A/C condenser core
- A/C evaporator core
- Receiver/drier
- Connecting refrigerant lines
- Thermostatic Expansion Valve (TXV)
- A/C pressure transducer
- Heater core and evaporator core housing
- HVAC module
- Front Controls Interface Module (FCIM)
- Audio Front Control Module (ACM) or Front Display Interface Module (FDIM)
- Temperature blend door actuators
- Panel/defrost mode door actuator
- Floor mode door actuator
- Air inlet mode door actuator
- Blower motor speed control
- Blower motor
- Ambient temperature sensor
- In-vehicle temperature sensor
- Sunload sensor
- Evaporator discharge air temperature sensor

Electronic Manual Temperature Control (EMTC) System

The HVAC system heats or cools the vehicle depending on the control panel selection.

- The control panel selections determine heating or cooling, air distribution and enables blower motor operation.
- The temperature control setting determines the air temperature.
- The blower motor switch varies the blower motor speed.
- During A/C operation the system also reduces the relative humidity of the air.

The HVAC system operation is determined by the settings on the climate controls. To control the various functions, the HVAC system is composed of the following:

- HVAC module
- Front Controls Interface Module (FCIM)
- Audio Front Control Module (ACM) or Front Display Interface Module (FDIM)
- Blower motor speed control
- Panel/defrost mode door actuator
- Floor mode door actuator
- Air inlet mode door actuator
- Temperature blend door actuator

The blower motor switch:

- sets the blower motor speed.
- is serviced only with the FCIM .

The A/C request button:

- can command the A/C compressor ON when the function selector switch is in PANEL, FLOOR/PANEL, FLOOR/DEFROST and FLOOR when the A/C request switch is pressed. Indicator illuminates when A/C request switch is toggled ON.
- will toggle indicator in DEFROST, but A/C compressor will always be commanded ON if ambient temperatures allow.

- indicator does not illuminate in OFF and cannot be toggled.
- indicator does not illuminate in DEFROST but can be toggled ON or OFF. The A/C compressor will operate regardless of indicator status if the outside air temperature is above 6°C (43°F).
- is serviced only with the FCIM .

The function selector:

- selects airflow direction.
- is serviced only with the FCIM .

The temperature selector:

- selects full warm and full cool as well as blended outlet temperatures.
- is serviced only with the FCIM .

The air recirculation button:

- selects either recirculated or outside air source.
- recirculates air in any mode except DEFROST, if requested.
- is disabled in DEFROST mode where outside air only is used.
- is serviced only with the FCIM .

Dual Automatic Temperature Control (DATC) System

The HVAC system maintains the selected vehicle interior temperature by heating and/or cooling the air.

- During A/C operation, the system also reduces the relative humidity of the air.
- The driver may override the automatic mode of operation.
- The temperature control setting determines the desired air temperature.
- The blower motor control override button varies the blower motor speed.
- The driver side and passenger side temperature settings can be individually controlled.

The HVAC system operation is determined by the settings on the climate controls. The HVAC system automatically maintains a selected temperature for vehicle interior comfort. To control the various functions, the HVAC system is composed of the following:

- HVAC module
- Front Controls Interface Module (FCIM)
- Audio Front Control Module (ACM) or Front Display Interface Module (FDIM)
- Blower motor speed control
- Panel/defrost mode door actuator
- Floor mode door actuator
- Air inlet mode door actuator
- Driver and passenger temperature blend door actuators
- In-vehicle temperature sensor
- Ambient temperature sensor
- Solar radiation sensor
- Evaporator temperature sensor

When the DATC system is set to AUTO:

- the air distribution direction, blower motor speed and A/C compressor operation are automatically controlled based on the temperature(s) selected.

The DATC system manual override settings:

- allow the air distribution direction to be manually selected.
- allow the blower motor speed to be manually selected.
- allow recirculation mode to be manually selected in all modes except DEFROST. The A/C request can be cancelled by pressing the A/C request switch, turning the indicator OFF.
- allow A/C compressor operation to be manually selected except in DEFROST.

External Temperature Display

While the actual external temperature can vary continuously, the value that is displayed will update at a specific rate depending on whether or not the engine is "hot" and whether or not the vehicle is moving.

When the external temperature is rising, the display will update slowly.

Updates (when the actual external temperature is higher than currently displayed value) will be limited to 0.6°C (1°F) every 20 seconds while the vehicle is moving at greater than 40 km/h (25 mph) for more than 90 seconds or 0.6°C (1°F) every 20 minutes if the vehicle is not moving at this speed. This is to prevent the heat from the engine compartment from affecting the accuracy of the display.

When the external temperature is dropping, the display will update quickly.

Updates (when the actual external temperature is lower than currently displayed value) will only be limited to 0.6°C (1°F) every 2 seconds (regardless of vehicle speed). Consequently the display will essentially follow the drop experienced by the external temperature thermistor.

System Airflow Description — Electronic Manual Temperature Control (EMTC)

Max A/C

When MAX A/C is selected:

- the air inlet door actuator closes off outside air and admits only recirculated air.
- the RECIRC button is disabled and the indicator is illuminated.
- the mode doors direct airflow to the instrument panel A/C registers.
- blended air temperature is available.
- the A/C request button is illuminated and will be disabled.
- the A/C compressor will operate if the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

PANEL

When PANEL is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the instrument panel A/C registers.
- blended air temperature is available.
- the A/C request button is enabled. The A/C compressor will operate and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

PANEL/FLOOR

When PANEL/FLOOR is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the floor duct and the instrument panel A/C registers. A small amount of airflow from the side window demisters and defrost duct will be present.
- blended air temperature is available.
- the A/C request button is enabled. The A/C compressor will operate and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

OFF

When OFF is selected:

- the air inlet door actuator closes off outside air and admits only recirculated air.
- the blower motor is OFF.

FLOOR

When FLOOR is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the floor duct. A small amount of airflow from the defroster duct and side window demisters will be present.
- blended air temperature is available.

- the A/C request button is enabled. The A/C compressor will operate and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

FLOOR/DEFROST

When the FLOOR/DEFROST is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the floor duct, the defroster duct and the side window demisters.
- blended air temperature is available.
- the A/C request button will indicate the last status and the indicator can be toggled. To reduce fogging, the A/C compressor will operate automatically, regardless of indicator status, if the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

DEFROST

When DEFROST is selected:

- the air inlet door actuator opens, admitting only outside air into the passenger compartment.
- the mode doors direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct will be present.
- blended air temperature is available.
- the A/C request button will indicate the last status and the indicator can be toggled. To reduce fogging, the A/C compressor will operate automatically, regardless of indicator status, if the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

System Airflow Description — Dual Automatic Temperature Control (DATC)

AUTO

When AUTO is selected:

- the temperature control setting is manually set to the desired setting.
- the air inlet door actuator is automatically controlled by the HVAC module, based on the temperature setting.
- the mode door actuators are automatically controlled by the HVAC module, based on the temperature setting.
- the A/C compressor is automatically controlled by the HVAC module, based on the temperature setting. The A/C compressor will not operate if the outside temperature is below approximately 6°C (43°F).
- the A/C request button or the RECIRC request button, if pressed, will transfer the system to semi-auto operation.
- the blower motor is ON. The blower motor speed is automatically controlled by the HVAC module, based on the temperature setting, but can be manually overridden.

OFF

When OFF is selected:

- the air inlet door actuator closes off outside air and admits only recirculated air.
- the A/C request button is disabled.
- the blower motor is OFF.

PANEL

When PANEL is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the instrument panel A/C registers.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C request button (indicator ON), can the airflow temperature be cooled below the outside air temperature.
- the A/C request button is enabled. The A/C compressor will operate and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

PANEL/FLOOR

When PANEL/FLOOR is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the floor duct and the instrument panel A/C registers. A small amount of airflow from the side window demisters and defrost duct will be present.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C request button (indicator ON), can the airflow temperature be cooled below the outside air temperature.
- the A/C request button is enabled. The A/C compressor will operate and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

FLOOR

When FLOOR is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the floor duct. A small amount of airflow from the defroster duct and side window demisters will be present.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C request button (indicator ON), can the airflow temperature be cooled below the outside air temperature.
- the A/C request button is enabled. The A/C compressor will operate and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

FLOOR/DEFROST

When the FLOOR/DEFROST is selected:

- the RECIRC request button is enabled. If the RECIRC request button is selected (indicator ON), the air inlet door actuator closes off outside air from entering the passenger compartment. If the RECIRC request button is not selected (indicator OFF), the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the floor duct, the defroster duct and the side window demisters.
- blended air temperature is available.
- the A/C request button is enabled. The A/C compressor will operate automatically and the indicator will illuminate if the A/C request button is selected and the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

DEFROST

When DEFROST is selected:

- the RECIRC request button and indicator are disabled. Regardless of button and indicator status, the air inlet door actuator admits only outside air into the passenger compartment.
- the mode doors direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct will be present.
- blended air temperature is available.
- the A/C request button will indicate the last status and the indicator can be toggled. To reduce fogging, the A/C compressor will operate automatically, regardless of indicator status, if the outside temperature is above approximately 6°C (43°F).
- the blower motor is ON.

