

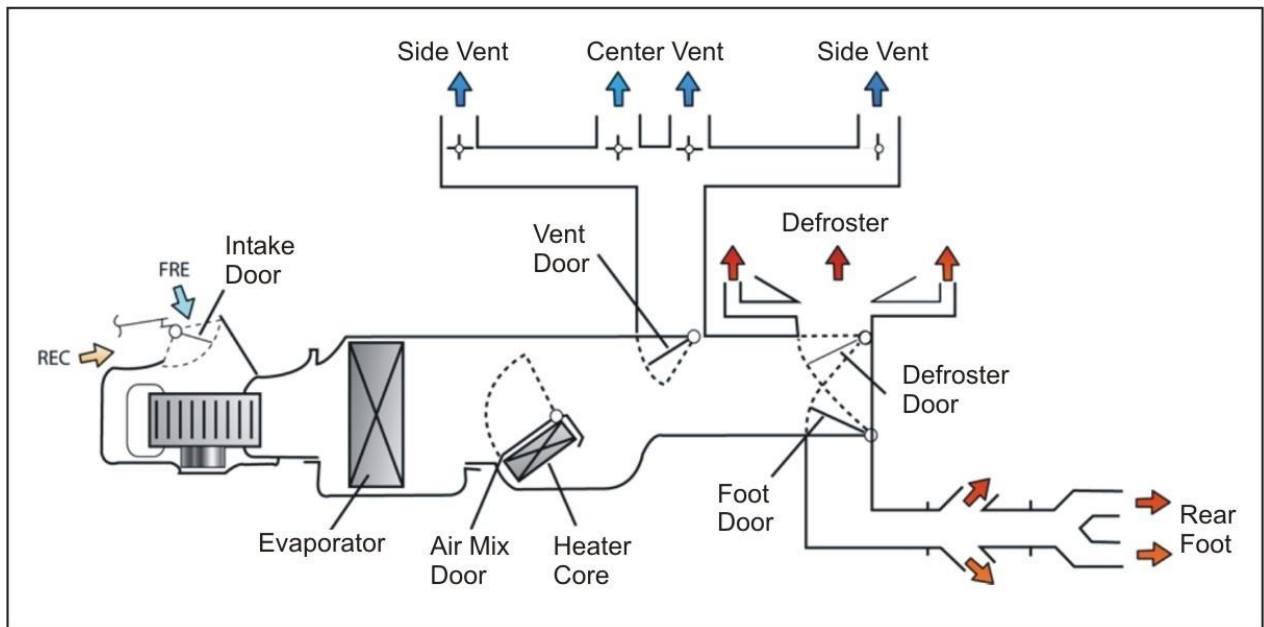
UNIT 2 : VEHICLE AIRCONDITIONING AND HEATER SYSTEMS

Automatic Temperature Control (ATC)

Over the past decade, ATC has progressed from being a luxury item offered only on high-end models to an option available on nearly all models. The Automatic Temperature Control (ATC) system is designed to act much like a home thermostat for central heating. It keeps the interior of the vehicle at a set temperature without the customer monitoring the controls or changing the fan speed. In addition to keeping a constant temperature, the system tries to reach the set temperature in the most comfortable manner for the vehicle occupants.

The basic operation of the ATC system is the same for all vehicles. Briefly, the auto amplifier sends signals to the actuators to control the positions of the air distribution doors and the speed of the blowers, based on input from the temperature sensors.

The five major types of components of the ATC system are blowers, air distribution doors, temperature sensors, microprocessors, and actuators.



If the air mix door is stuck in the cold air position there will be no heating and possibly cold air blowing.

If the air mix door is stuck in the hot air position, there would be no cooling and most likely hot or warm air blowing instead.

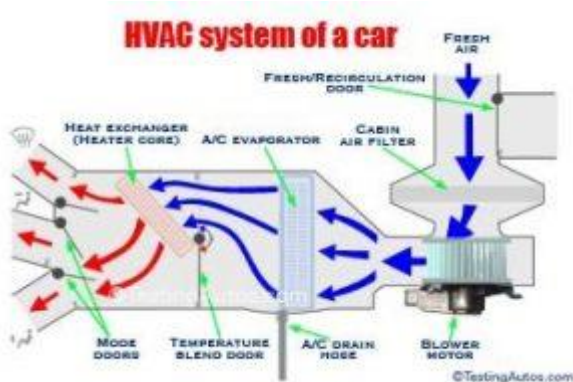
If the door is stuck midway, the air will always be warm rather than hot or cold as appropriate.

If the air mix is stuck on hot, the mode is stuck on defrost, and the intake is stuck on fresh air, check the unified meter and auto amplifier.

Without the heating system in vehicles, we would all freeze while driving to our destinations in the winter months. Most of us take this system for granted because if it breaks, we would be miserable driving without it! Let's take a look at how the heating system works to keep us comfortable in the cold weather.

There are a few basic components to the heating system; the heater core, blower motor/fan, heater hoses, heater control valve, and the HVAC (heating, ventilation, air conditioning) control panel inside the cabin. The cooling system components that interact with the heating system are the coolant, thermostat, radiator, and water pump.

The heating system is connected to the engine cooling system and uses heat from the engine to warm up the vehicle. The heater core acts like a small radiator that is connected to the engine cooling system. The cooling system is filled with liquid coolant that circulates between the engine and the main vehicle radiator. The thermostat valve blocks the circulation through the main radiator when the engine is cold; it opens when the engine reaches the specified temperature. Once the vehicle gets to operating temperature the thermostat opens and allows the coolant from the cooling system to circulate through the engine passages removing the heat from the engine sending it into the radiator.



Airflow in the HVAC system of a car.

The blower motor of the HVAC system creates the airflow. The air flows through the A/C evaporator and then through the heater core (see diagram above). A fan is positioned in front of the heater core to blow cold outside air over the fins. Various ducts and doors inside the HVAC system distribute the warm air to the vents and into the cabin of the vehicle. The temperature blend door is the door that controls the mix of warm and cold air.

If the Air is Not Hot Enough it May be Because of One of These Common Problems:

If the air blowing from the vents is not hot enough, the first thing to check is the coolant level in the overflow bottle. If it's low, the coolant must be topped up and the cooling system must be checked for leaks. You will know there is a leak in your vehicle's heater core if you can smell the sweet aroma of coolant when your heater is on. Leaks can cause a cabin full of white steam that can fog your windows.

If the heater core becomes clogged with rust or sludge, you will no longer have heat as well. From time to time the A/C system needs to be recharged to bring it back up to maximum efficiency.

A thermostat that is stuck open can also cause long warm-up times, however, in most cars, the Check Engine light comes on if the thermostat is stuck open. A symptom of a stuck-open thermostat is when the engine temperature drops below normal when driving on a highway.

In some cars, if the temperature blend door inside the HVAC system is not functioning correctly, it can also cause a lack of heat from the vents. Often, parts of the cable mechanism in the HVAC system wear out, causing the blend door not to close off the cold air completely. You can tell this is the issue because it may feel like the hot/cold knob is jamming and not moving all the way to "Hot".

If there is a lack of airflow from the vents even at full blower motor speed, the cabin filter must be checked. A dirty cabin filter can restrict the airflow in the HVAC system. Normally, once the engine is fully warmed up, the air from the vents should be very warm at any speed or when the car is stopped at a red light.

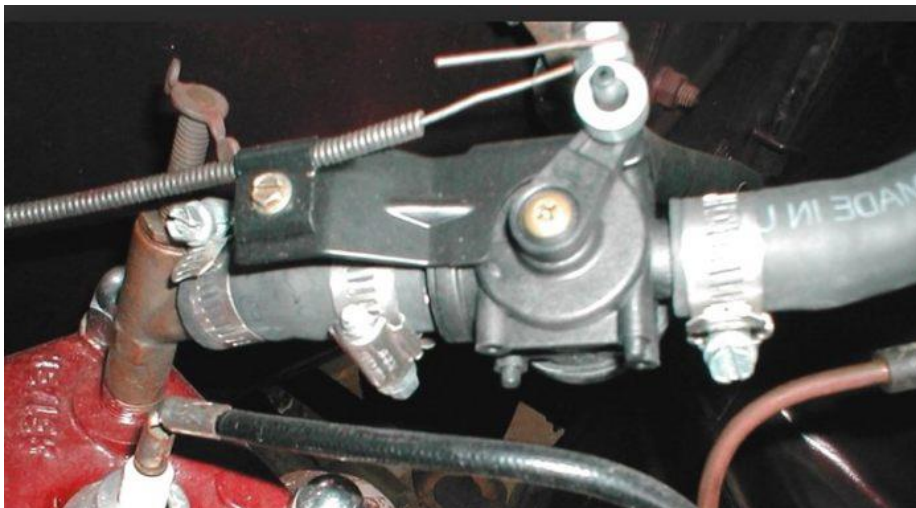
The heating system in your vehicle is designed to keep you warm while the temperatures outside are cold. Properly maintaining the cooling system is key for the heating system of your vehicle to work efficiently. Having the coolant in your engine flushed regularly and refilled with the clean coolant/water mix is very important along with getting any leaks repaired.



Malfunctioning Controls

These controls are absolutely fine when the car is new. With time, these controls are subjected to excessive use which might lead to the controls getting jammed or malfunction. If you cannot spot any of the above three issues with your car heater, you might have to get your control buttons/knobs checked. Although there is a very less chance of these controls malfunctioning, you can still give it a try and get them checked.

Heater Control Valve



Heater control valve

The car heater valve is responsible for controlling the temperature of air blowing inside your car's cabin. This valve controls the amount of coolant that flows inside the heater core according to the heater temperature requested by you. If this valve gets jammed or becomes faulty, the heater core will not be able to adjust according to your needs until you get this valve fixed or replaced. You know where to get this done!

WHAT IS CLIMATE CONTROL?

Climate Control refers to the systems in a vehicle that allow customers to adjust air temperature, humidity, and direction of discharged air. Although we usually think of climate control as just a comfort feature, the defroster is a safety feature. Air conditioning also improves the air quality, which may benefit people with certain health problems, by dehumidifying and cleaning the air as its cooled passing over the evaporator fins.

All the components of the Climate Control system work together as a complete system. Understanding the relationship between these components will help you accurately verify and diagnose complaints. For example, when a customer selects Defrost, the system opens the fresh air intake door, activates the heater core and refrigerant loop, directs air over the evaporator and the heater core, and blows this warm, dry air through the defroster ducts on the dashboard. If any one of these components isn't working properly, the customer will have concerns about poor defroster performance. Similarly, a customer may have concerns with poor air conditioner performance if the Sunload sensor has failed and the ATC is no longer accounting for the heating caused by sunlight on the vehicle.

HEATING

The heating system is extremely simple. Hot engine coolant circulates through the heater core; air is blown across the heater core and into the passenger compartment. ATC systems control both the blower speed and the amount of directed through the heater core. Heater Core Operation The heater core is like a small secondary radiator that transfers heat from the engine cooling system into the passenger compartment when warm air is desired. Just like a radiator, it has tubes and fins to transfer heat to the air from the hot engine coolant flowing inside. Malfunctions Optimum heater performance depends on good cooling system performance. If any components of the cooling system are malfunctioning, the operation of the heating system will be affected as well.