Saab Automatic Climate Control

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The Saab automatic climate control or ACC was designed to regulate cabin temperature and ventilation by just setting one adjustment, the temperature. The ACC system is then to take in account outdoor temperature, sun intensity and cabin temperature to fulfill the driver's request. The ACC can also be run in a ECON mode this selection simply keeps the A/C compressor from running saving on fuel. On the early 9000 1986-89 we had a two button system or ACC1 with no off switch this was not a popular design and Saab has used a system utilizing a off button since 1990 called ACC2. Both systems have self diagnosis, although the ACC2 system needs a Tech2 for code retrieval. The ACC1 fault codes can be retrieved simply by simultaneously pressing the Auto and Vent buttons. We will completely go over this self diagnostic procedure. Over the years the theory of operation has been similar, only sensors and software have been improved. On the 9-3 and 9-5 we find the same basic operation just with better software technology to improve performance.

ACC1 system- 1986-1989 2-button control
ACC2 system- 1990- 3-button control w/off

First I will explain how it works. I will break this system into 3 categories; sensors, control, and components.
1. The first group includes a mixed air sensor, a solar sensor, and an ambient (outside) air temp sensor.
2. The control would be the temperature/vent flaps, the Flap actuating motors, and ACC panel. (The ACC panel is where the micro processor is housed.)
3. The components would include a Fan motor, Fan speed control unit, A/C compressor, rear window and side view mirror defrost grid.

ACC Sensors and Location:
Cabin temp sensor - Located in center of dash fascia just left of the ACC panel
Mixed air sensor - Behind ACC control panel inserted into the heater housing vent
Ambient air temp sensor -ACC1 on fan housing / ACC2 Located behind front bumper extension to the driver side
Solar sensor - in dash top center ACC2 / in right dash speaker grill ACC1

Inside the cabin/indoor Sensor there is a small fan that is used to draw air across a thermistor that is of the NTC type. A thermistor is simply a resistor that changes resistance according to its temperature, and an NTC thermistor specifies that the resistance goes down or closer to 0 the hotter the temperature. One common problem with the cabin sensor is that a ball of lint can build on the thermistor acting as insulation and giving inaccurate temperature results. You can snap the cover off the front of this sensor and clean this away very easily. To test the

thermistor you can unplug it and check it's resistance against the current temperature. This can be done across pins 3 and 2 on the back of the Cabin sensor with an OMH meter.

Cabin/indoor temp sensor specifications

Temperature	Kilo ohm value
32°F ---0°C	30K-34.8K
50°F---10°C	18.5K-21.1K
68°F---20°C	11.7K-13.1K
77°F---25°C	9.5K-10.5K
86°F---30°C	7.6K-8.5K
104°F---40°C	4.9K5.6K

Mixed air sensor and Ambient air temp sensor these sensors are both thermistors. The mixed air sensor is of the NTC type and measurers the air temp as it leaves the AC evaporator and heater core before it enters the Heater ducting. The ambient air temp sensor is of the PTC type and its resistance goes up with higher temperature. On the ACC1 system the ambient air temp sensor sits on the outside of the fan blower housing this way it can measure the air just before it enters the heater/ fan housing. The ambient air temp sensor of the ACC1 is of the PTC type so its resistance goes up with higher temperature. On ACC2 the ambient air temp sensor is a NTC type and is shared with the in dash EDU temperature read out.

Solar Sensor on the ACC1 is a single photo cell that sends back a voltage to the control unit indicating sun intensity. The control unit in returns changes the fan speed to compensate. ACC2 has a more complex sensor it is made up of 5 solar cells and a microprocessor. It can determine sun intensity and angle of the sun. It transmits this information back to the control unit with a digital signal. It is also fitted with a filtered lens cap that only allows infrared light to penetrate.

The Saab ACC control panel reads all the sensors and then regulates the cabin temperature to your desired setting. It does this by the means of a flap located inside the AC/heater housing. This flap regulates the balance of air flow through the heater core and AC evaporator. The ACC control panel can move this flap using an actuating motor. This actuating motor is connected to the temperature flap by a wire cable. With this system the older style heater valve is eliminated so the heater core has a constant flow of hot coolant. This gives faster reaction time and less chance of corroded parts. All ACC control units have a self diagnostic capability. The ACC1 system's diagnostics can be utilized without any special tools. On the ACC2 you must have a scan tool.

Heater/Vent Flaps on ACC1 are operated by DC motors that have an internal potentiometer to allow the ACC1 control unit to know the position of the motors shaft. It is important when replacing one of these actuating motors not to bench

test or power up the motor that is not installed and connected. The mounting has stops that keep the motor from making a complete rotation and destroying the potentiometer. When ever you replace these motors you should follow your Saab's manual completely. They state before removing the actuating motor run the system at HI for at least 1 minute or until the system has driven the heater flap to the full heat position. Then turn the car off and remove the negative battery cable before removing motor.

ACC2 uses a similar system that uses stepper motors when ever these motors are replaced you should perform a calibration of the system by pressing the Auto and Vent button simultaneously.

ACC control unit back lighting. The ACC1 unit has 3 bulbs that can be accessed from the back of the unit. The ACC2 control panel has 4 replaceable lighting bulbs located inside the rear of the unit. By removing the rear of the unit 4 small light bulbs can be accessed for service.

The ACC2 control unit can be self calibrated and should be when ever the power has been disconnected or any part of the system has been replaced. It is also advisable to do if you have had questionable operation. This can be done by pressing the Auto and Vent button simultaneously.

The ACC2 control panel is programmable. The user can set start up temperature and mode.

Erasing programming:
When programming the unit it is a good idea to erase any pervious programming this can be done by simultaneously pressing and releasing the Auto and Off button. After erasing the ACC will start up in the temperature and mode it was last left.

Programming:
Set desired temperature and mode, or leave the unit off if that is how you want it when you start your car. Then simultaneously press the defrost button and the center vent button. You should see the temperature display flash to confirm the programming. Now when ever the car is started after being off for more than 5 minutes the ACC will start in your programmed mode.

ACC2 Programing

ACC1 Self diagnostic test can be performed by simultaneously pressing the Auto and Vent buttons. You will then see the number 88 flashing in the temperature display. It will do this for about 1 minute as it performs self checks. Once this is completed the display will give you a number this is the number of faults. If you get a 0 everything checks OK. If you get a number of faults press the Vent button once to see the first fault. After you have noted this code press the Vent button again until you have read all fault codes. To leave diagnostics press the Auto button to resume normal operation.

Fault codes:

Code	Item	Type of fault
1C	Inside air temp sensor	Short circuit
1U	Inside air temp sensor	Open circuit
2C	Outside Temp sensor	Short circuit
2U	Outside Temp sensor	Open circuit
3C	Mixed air temp sensor	Short circuit
3U	Mixed air temp sensor	Open circuit
5C	Actuating motor for temp flap	Jammed or binding motor
5U	Actuating motor for temp flap	Open circuit
6C	Actuating motor for air distribution flap	Jammed or binding motor
6U	Actuating motor for air distribution flap	Open circuit
7C	Actuating motor for air recalculation flap	Jammed or internal Short circuit
7U	Actuating motor for air recalculation flap	Open circuit
AC	Fan Motor	Short circuit
AU	Fan Motor	break in circuit or motor failure
EU	ACC control unit	Internal Fault

The control panel, which is also the microprocessor, takes in information from the ACC system's sensors and user temperature input to operate the following components.

AC compressor
Ventilation Fan Speed
Air Recalculation flap
Rear window and side view mirror defrost

The Ventilation Fan speed is decided by the logic in the ACC control unit but a power transistor unit referred to as the fan speed control unit is used. This allows the ACC unit to use a small amperage signal to control the large amperage required to run the fan.