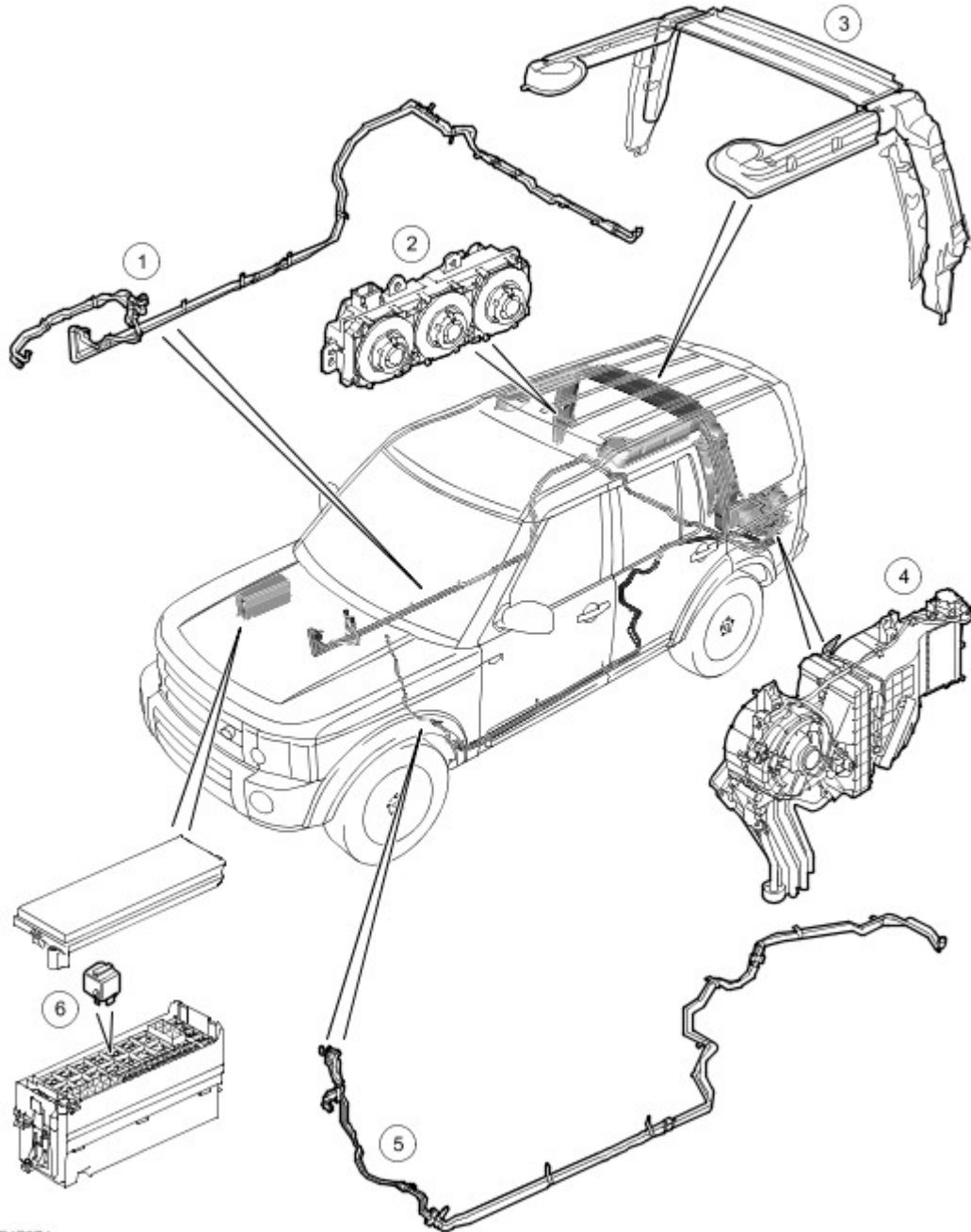




# Auxiliary Climate Control

## COMPONENT LOCATIONS



E47874

Item	Part Number	Description
1	-	Heater lines
2	-	Auxiliary climate control module
3	-	Air distribution ducts
4	-	Auxiliary climate control assembly

5	-	Refrigerant lines
6	-	Rear blower relay

## GENERAL

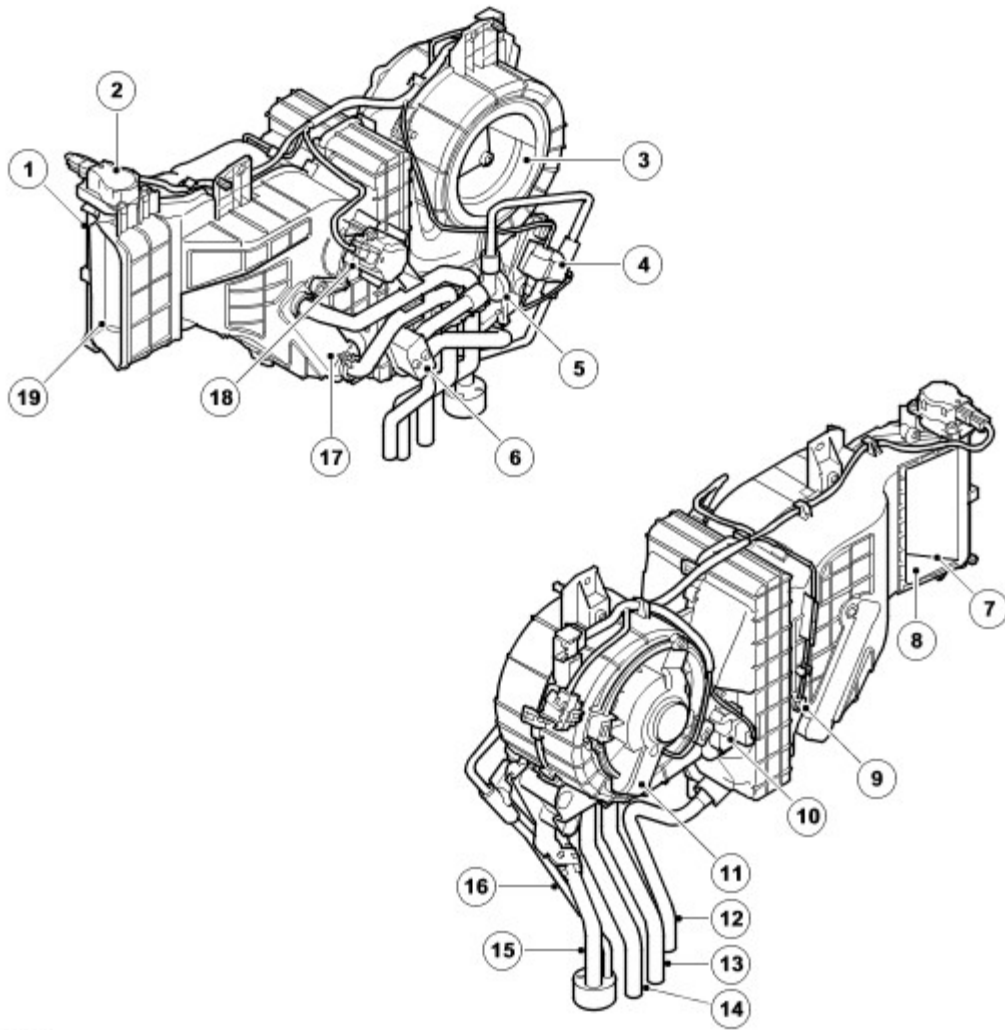
The auxiliary climate control system provides additional air conditioning for the second and third row seat occupants. The auxiliary climate control system consists of:

- An auxiliary climate control assembly.
- A refrigerant circuit.
- A heating circuit.
- A distribution system.
- An Auxiliary Climate Control Module (ACCM).

The Automatic Temperature Control Module (ATCM), of the main air conditioning system, is also used in the control of the auxiliary climate control system. For additional information, refer to [Control Components](#) (412-04 Control Components)

Cabin air is recirculated through the auxiliary climate control assembly, where the air is temperature regulated and then directed through the distribution system to registers in the roof, on the C pillars and on the left side of the loadspace. The volume, temperature and distribution of the air from the auxiliary climate control assembly can be manually controlled by the ACCM or automatically controlled by the ATCM.

## AUXILIARY CLIMATE CONTROL ASSEMBLY



E47875

Item	Part Number	Description
1	-	Casing
2	-	Distribution door motor
3	-	Blower inlet
4	-	Solenoid valve
5	-	Thermostatic expansion valve
6	-	Evaporator connector block
7	-	Distribution door
8	-	Footwell outlet
9	-	Evaporator temperature sensor
10	-	Blower control module
11	-	Blower
12	-	Evaporator drain tube
13	-	Heater core inlet pipe
14	-	Heater core outlet pipe
15	-	Evaporator outlet pipe
16	-	Evaporator inlet pipe
17	-	Heater core

18	-	Temperature blend door motor
19	-	Face level outlet

The auxiliary climate control assembly is a reheat unit, which cools the air to a constant value then reheats it as necessary to produce the required temperature. The assembly is installed on the left side of the loadspace, behind the rear quarter panel. A grille in the rear quarter panel allows air to flow from the loadspace into the auxiliary climate control assembly.

The auxiliary climate control assembly consists of a casing, formed from a series of plastic molding, which contains:

- A blower
- A blower control module
- An evaporator
- A heater core
- A temperature blend door
- A distribution door
- An evaporator temperature sensor.

Refrigerant and coolant lines from the engine compartment are connected to pipes from the evaporator and the heater core immediately below the loadspace floor. Where the pipes, and the evaporator drain tube, pass through the loadspace floor, the aperture is sealed by a seal plate.

Internal passages, integrated into the casing of the auxiliary climate control assembly, guide the air from the blower through the evaporator and heater core to the distribution outlets.

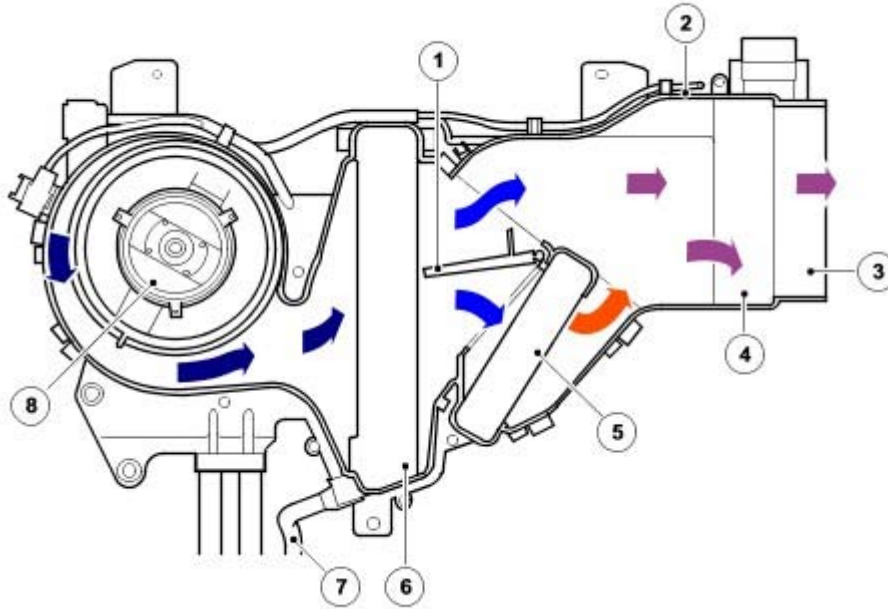
The temperature blend door regulates the flow of air through the heater core to control the temperature of the air leaving the auxiliary climate control assembly. A stepper motor installed on the rear of the casing operates the temperature blend door.

The distribution door regulates the flow of air through the face level outlet and the foot level outlet. A stepper motor installed on the top of the casing operates the distribution door.

The temperature blend stepper motor and the distribution stepper motor are both connected to a Local Interconnect (LIN) bus, which also connects the ACCM with the ATCM. Each stepper motor incorporates a microprocessor which operates the motor in response to LIN bus messages from the ACCM. The stepper motors are powered by a feed from the ATCM, and share a ground connection with the rear blower control module.

The ACCM determines the positions of the distribution and temperature blend doors by using either their closed or open position as a datum and memorizing the steps that it drives the individual stepper motors. Each time the ACCM is activated by the ATCM, it checks the memorized position of the stepper motors against fixed values for the current distribution and temperature settings on the control panel. If there is an error, the ACCM calibrates the applicable stepper motor, to re-establish the datums, by driving them fully closed or open before re-setting them to their nominal selected position. A calibration run can also be invoked using T4.

## **Air Flow Through Auxiliary Climate Control Assembly**

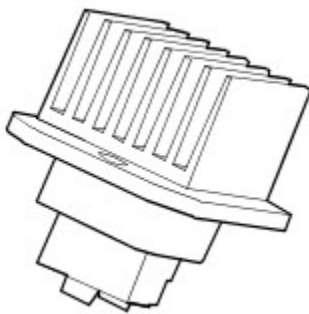


E47876

Item	Part Number	Description
1	-	Temperature blend door
2	-	Auxiliary climate control assembly casing
3	-	Face level outlet
4	-	Distribution door
5	-	Heater core
6	-	Evaporator
7	-	Evaporator drain tube
8	-	Blower

The blower is in the air inlet of the auxiliary climate control assembly, and consists of an open hub, centrifugal fan powered by an electric motor. Operation of the blower is controlled by the ACCM, using the rear blower relay in the Battery Junction Box (BJB) and the blower control module. The blower control module is installed in the auxiliary climate control assembly downstream of the blower, where any heat generated during operation is dissipated by the air flow. A wiring harness on the auxiliary climate control assembly connects the blend door motor, distribution door motor, blower and blower control module to the vehicle wiring.

### Blower Control Module

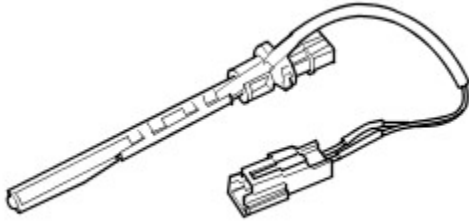


E47886

When the blower is required, the ACCM energizes the coil of the rear blower relay. The energized rear blower relay supplies battery power to the blower motor, which is connected to ground through the blower control module. The speed

of the blower is controlled by the blower control module, which regulates the blower motor voltage in response to a Pulse Width Modulated (PWM) signal from the ACCM. To vary the blower motor voltage the ACCM varies the duty cycle of the PWM signal.

### Evaporator Temperature Sensor



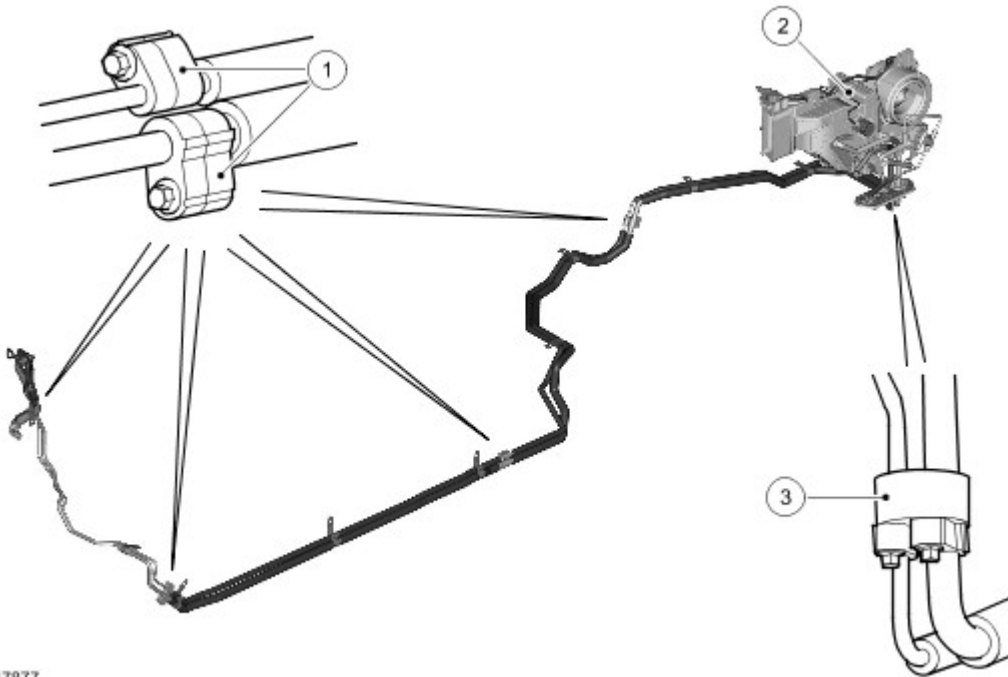
E47884

The evaporator temperature sensor is a Negative Temperature Coefficient (NTC) thermistor installed in the auxiliary climate control assembly on the downstream side of the evaporator. The evaporator temperature sensor supplies a temperature signal to the ACCM.

### REFRIGERANT CIRCUIT

Two refrigerant lines, low pressure and high pressure, connect the evaporator in the auxiliary climate control assembly to the front A/C refrigerant system. On the auxiliary climate control assembly, a solenoid valve and a thermostatic expansion valve control the flow of refrigerant through the evaporator.

### Refrigerant Lines



E47877

Item	Part Number	Description
1	-	In-line connections
2	-	Auxiliary climate control assembly

3 - Connections to auxiliary climate control assembly

The refrigerant lines are routed around the left rear wheel arch and along the LH underside of the vehicle, and connected to the front A/C refrigerant system at the rear of the engine compartment. The refrigerant lines consist of sections of aluminum alloy pipes. All except the front section of the pipes are insulated with foam rubber sleeving.

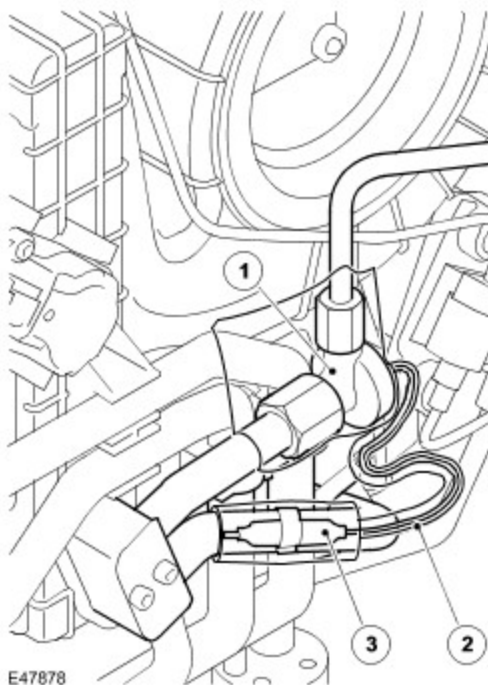
**Solenoid Valve**



E47885

The solenoid valve allows the auxiliary climate control assembly to be isolated from the front A/C refrigerant system. Operation of the solenoid valve is controlled by the ACCM switching a ground.

**Thermostatic Expansion Valve**



E47878

Item	Part Number	Description
1	-	Thermostatic expansion valve
2	-	Capillary tube
3	-	Temperature bulb

The thermostatic expansion valve meters the flow of refrigerant into the evaporator, to match the heat load of the air passing through the auxiliary climate control assembly.

The thermostatic expansion valve is installed in the inlet line to the evaporator. Liquid refrigerant flows through the valve

to the evaporator. The restriction across the valve reduces the pressure and temperature of the refrigerant and changes it to a fine spray, which improves the evaporation process. Valve opening is controlled by the pressure in a capillary tube containing a temperature sensitive fluid. One end of the capillary tube is connected to a diaphragm housing on the thermostatic expansion valve, the other end of the capillary tube is sealed and attached to the refrigerant outlet line of the evaporator. As the temperature of the refrigerant leaving the evaporator changes, a corresponding change of capillary tube pressure and valve opening are produced. The warmer the refrigerant leaving the evaporator becomes, the greater the volume of refrigerant allowed through the valve.

## **Evaporator**

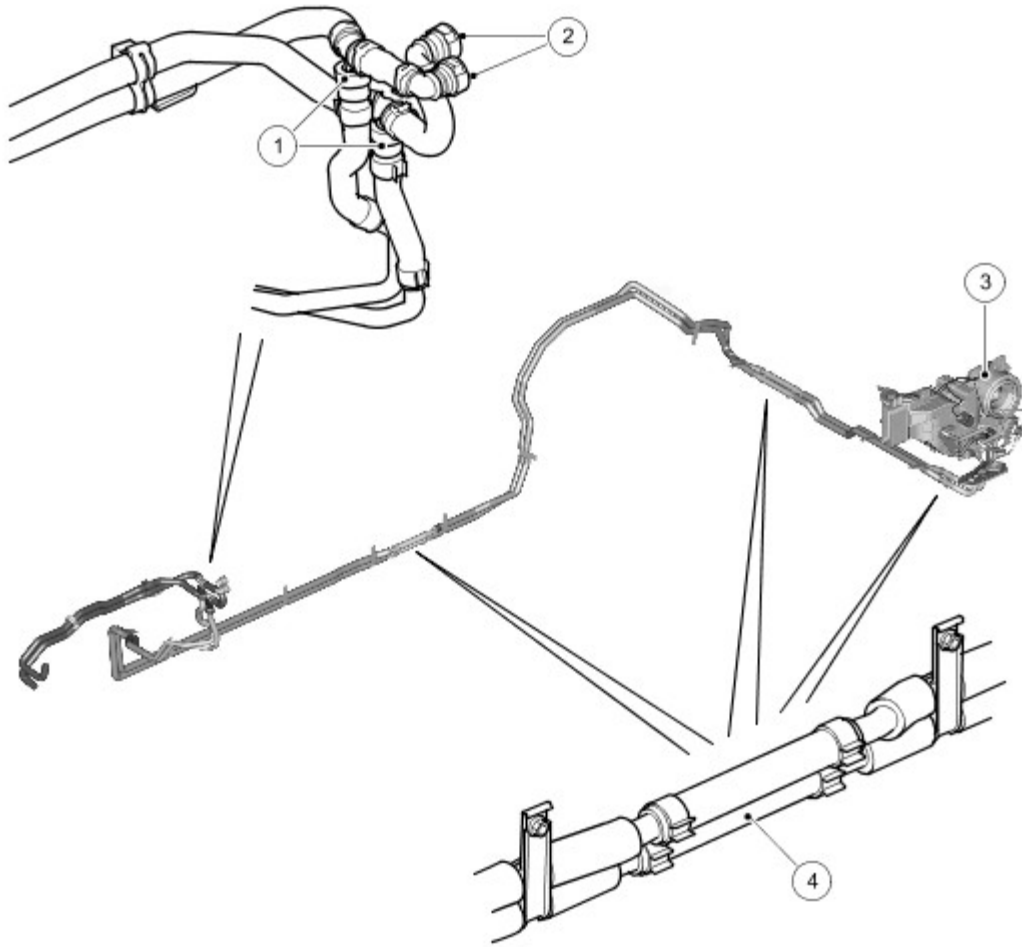
The evaporator is installed in the auxiliary climate control assembly between the blower and the heater matrix, to absorb heat from the recirculated air. Low pressure, low temperature refrigerant changes from liquid to vapor in the evaporator, absorbing large quantities of heat as it changes state. Most of the moisture in the air passing through the evaporator condenses into water, which drains out of the auxiliary climate control assembly through the evaporator drain tube.

## **HEATING CIRCUIT**

Two heater lines, supply and return, connect the heater core in the auxiliary climate control assembly to the engine cooling system. The heater lines are routed along the rear crossmember, around the right rear wheel arch and along the RH underside of the vehicle. The heater lines are connected to the engine cooling system at the rear of the engine compartment. The heater lines consist of sections of aluminum alloy pipes, insulated with foam rubber, which are connected together with rubber hose joints. Quick release fittings connect the heater lines to the engine cooling system.

## **Heater Lines**

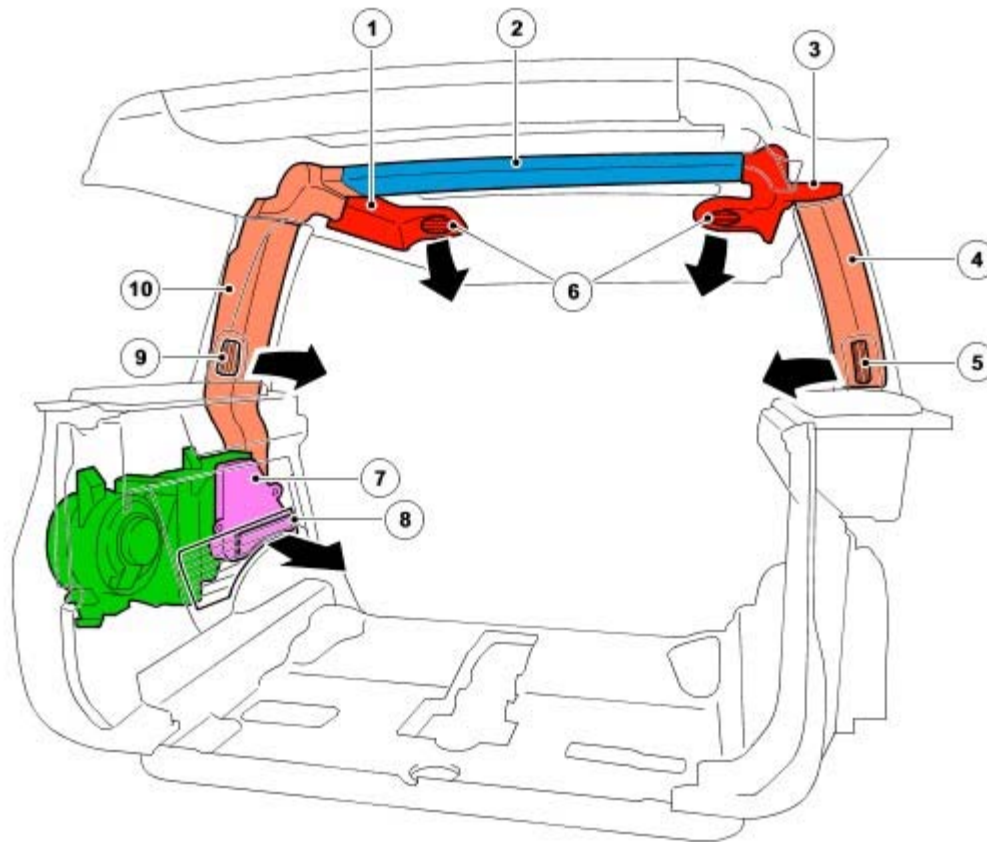




E47879

Item	Part Number	Description
1	-	Quick release connections to engine cooling system
2	-	Quick release connections to main heater
3	-	Auxiliary climate control assembly
4	-	In-line connections

## DISTRIBUTION SYSTEM



E47880

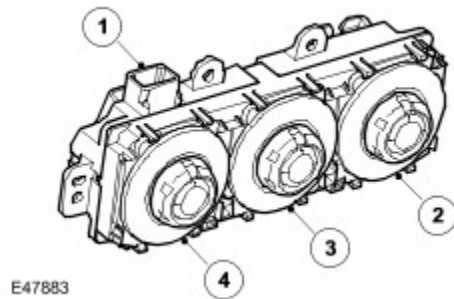
Item	Part Number	Description
1	-	Second row left face level air duct
2	-	Cross-car air duct
3	-	Second row right face level air duct
4	-	Right C pillar air duct
5	-	Third row right face level register
6	-	Second row face level registers
7	-	Third row foot level air duct
8	-	Third row foot level registers
9	-	Third row left face level register
10	-	Left C pillar air duct

The distribution system consists of a network of air ducts that supply air from the outlets of the auxiliary climate control assembly to registers installed in:

- The headliner, to the left and right of the second row interior lamp, to provide face level ventilation for second row seat occupants
- The left and right C pillar finishers, to provide face level ventilation for third row seat occupants
- The loadspace left side molding, to provide foot level ventilation for third row passengers.

The registers can all be adjusted to control the direction and volume of the air flow.

## ACCM



Item	Part Number	Description
1	-	Electrical connector
2	-	Blower switch
3	-	Distribution switch
4	-	Temperature switch

The ACCM allows manual adjustment of the output from the auxiliary climate control assembly. The ACCM is installed in the headliner immediately behind the row 2 interior lamp. An integral control panel contains separate rotary switches for temperature, distribution and blower speed. When the ACCM is in manual mode, amber LED's in the switch surrounds illuminate to indicate the current settings of the system and function symbols in the switch surrounds are illuminated when the side lamps or headlamps are on.

Details of the switches on the ACCM control panel are as follows:

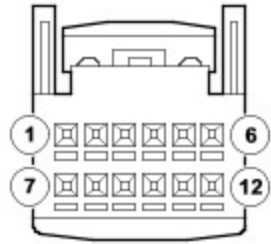
- **Temperature Switch:** The switch can rotate through 240°, from full cold to full hot. Minor detents allow fine adjustment of the switch.
- **Distribution Control Switch:** The switch can rotate through 120°. 5 primary detents define the distribution settings of: Feet only; 3 face/feet; face only.
- **Blower Switch:** The switch can rotate through 240°, from off to maximum speed. Eight primary detents define the off position and seven blower speeds.

The ACCM is disabled when the auxiliary climate control switch on the ATCM is selected off. When the auxiliary climate control switch is selected to automatic or manual, the ACCM is enabled by the connection of a power feed from the ATCM. The same power feed also supplies the stepper motors in the auxiliary climate control assembly.

When it is enabled, the ACCM operates as a slave unit to the ATCM. The ACCM sends status signals on the LIN bus to the ATCM, which replies with command signals of the required temperature, distribution and blower settings. The ACCM then outputs the necessary drive signals to the auxiliary climate control assembly.

- In the automatic mode, the command signals are derived from the comfort strategy in the ATCM. The temperature setting is calculated from the mean of the two temperature settings on the ATCM.
- In the manual mode, the command signals reflect the temperature, distribution and blower speed set by the switches on the ACCM control panel. Temperature control by the auxiliary climate control system may be compromised if the temperature settings on the ATCM are set to maximum hot or cold.

## ACCM Harness Connector C0695



E47930

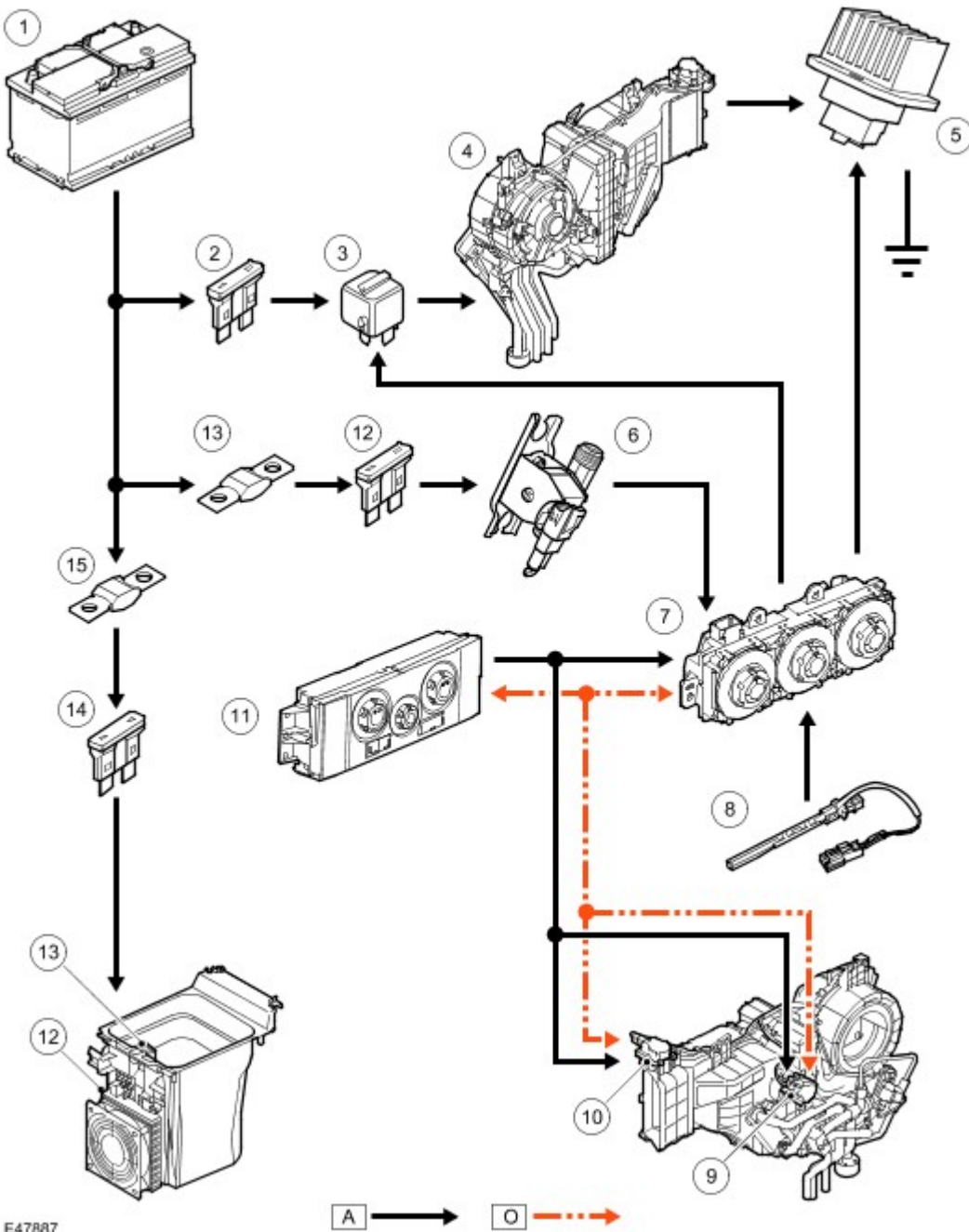
### ACCM Harness Connector C0695 Pin Details

Pin No.	Description	Input/Output
1	Power supply from ATCM	Input
2	LIN bus	Input/Output
3	Ground	Output
4	Rear blower module power drive	Output
5	Blower motor voltage sense	Input
6	Cabin temperature sensor signal	Input
7 and 8	Not used	-
9	Sensor ground	Output
10	Rear blower relay coil drive	Output
11	Solenoid valve drive	Output
12	Evaporator temperature sensor signal	Input

### AUXILIARY CLIMATE CONTROL DIAGRAM

**NOTE :**

A = Hardwired connection; O = LIN bus



E47887

Item	Part Number	Description
1	-	Battery
2	-	Fuse 22B, CJB
3	-	Rear blower relay
4	-	Rear blower
5	-	Rear blower control module
6	-	Solenoid valve
7	-	ACCM
8	-	Evaporator temperature sensor
9	-	Temperature blend door motor
10	-	Distribution door motor

11	-	ATCM
12		Fuse 51P, CJB
13		Fusible link, 17E, BJB