

Climate Control System

NOTE: Specific climate control features will vary depending on both vehicle and market specification.

The climate control system provides filtered air to the passenger compartment from a fully automatic, temperature controlled system.

A 2-zone system is installed as standard and provides dual automatic distribution as a default, where:

- Driver and front passenger can independently control the passenger-compartment air temperature for their individual comfort.
- Mode selections such as face, face/floor, floor and defrost are automatic and also independent from side-to-side.

NOTE: The automatic mode selection reflects the temperature set (Tset) from side-to-side.

- Default operation for the Tset is: the passenger side Tset follows the driver Tset. The 'Dual' operation indicator remains extinguished.
- Changes to the passenger Tset will illuminate the 'Dual' indicator, confirming the Tset for each side can be chosen independently.
- Should the passenger Tset be different to the driver Tset and that situation is no longer desirable (the passenger has vacated the vehicle), selecting 'Dual' extinguishes the indicator and synchronizes the passenger side temperature with the driver side Tset (returns the operation of the system to the default).

A 4-zone system is available as an optional installation. The additional two zones, refers to the passenger compartment area behind the front seats.

Independent control of the temperature in the two rear zones can be achieved using the rear climate control panel or using the touch-screen (where fitted); refer to **Rear Climate Control System**.

NOTE: The climate control system will also respond to spoken commands if the optional voice control system is fitted; refer to **Voice Activated Control System**.

The system is designed to provide efficient regulation of the vehicle environment without intervention from the occupant(s). Sensors inside the vehicle, monitor temperature, humidity and direct sunlight. In response, the electronic control system automatically adjusts the heat input, blower speed, air intake and air flow distribution to reduce misting and maintain the selected temperature(s).

NOTE: All windows and the closing roof panel should be closed before automatic operation is selected, in order to provide optimum comfort under most driving conditions.

Major Differences

When compared to the previous XJ range of vehicles, the new XJ has the following major differences:

- No water control valve;
- Re-introduction of air blend doors;
- Side-to-side automatic temperature control;
- Side-to-side air flow distribution;
- Variable displacement compressor (no magnetic clutch);
- Condenser with integral receiver-drier.
- Air intake filter;
- Single blower.

Display and User Controls

Control Panel With LCD

The climate control functions are selected by push buttons and a rotary control. When a function button is pressed, selection is confirmed by a 'beep' and illumination of the tell-tale LED.

NOTE: In manual mode, the LCD uses graphic symbols to provide confirmation of the system status.

The LCD in figure **Fig. 81** shows a range of symbols and messages that could be displayed; it is for guidance only.

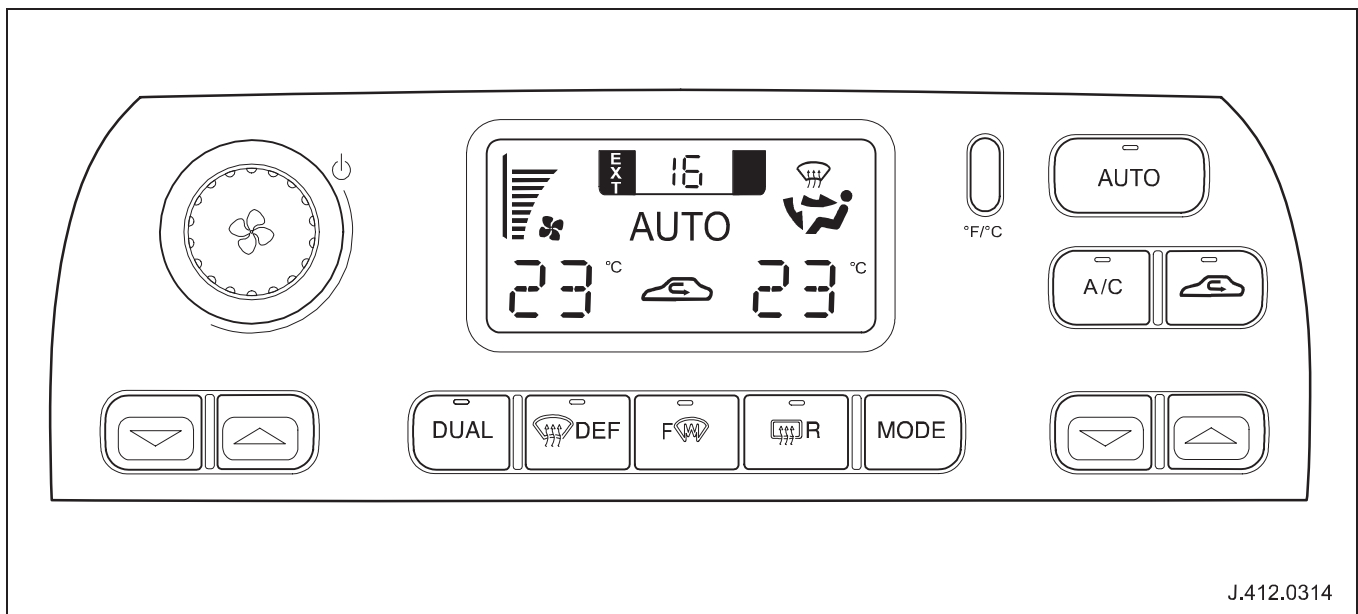


Fig. 75 Control panel with LCD (heated front screen option)

Control Panel with Touch-screen

The control panel with touch-screen is a multifunction touch-screen console which comprises on-screen simulated buttons (soft buttons) and perimeter buttons (hard buttons); refer to **Telematics** for further information.

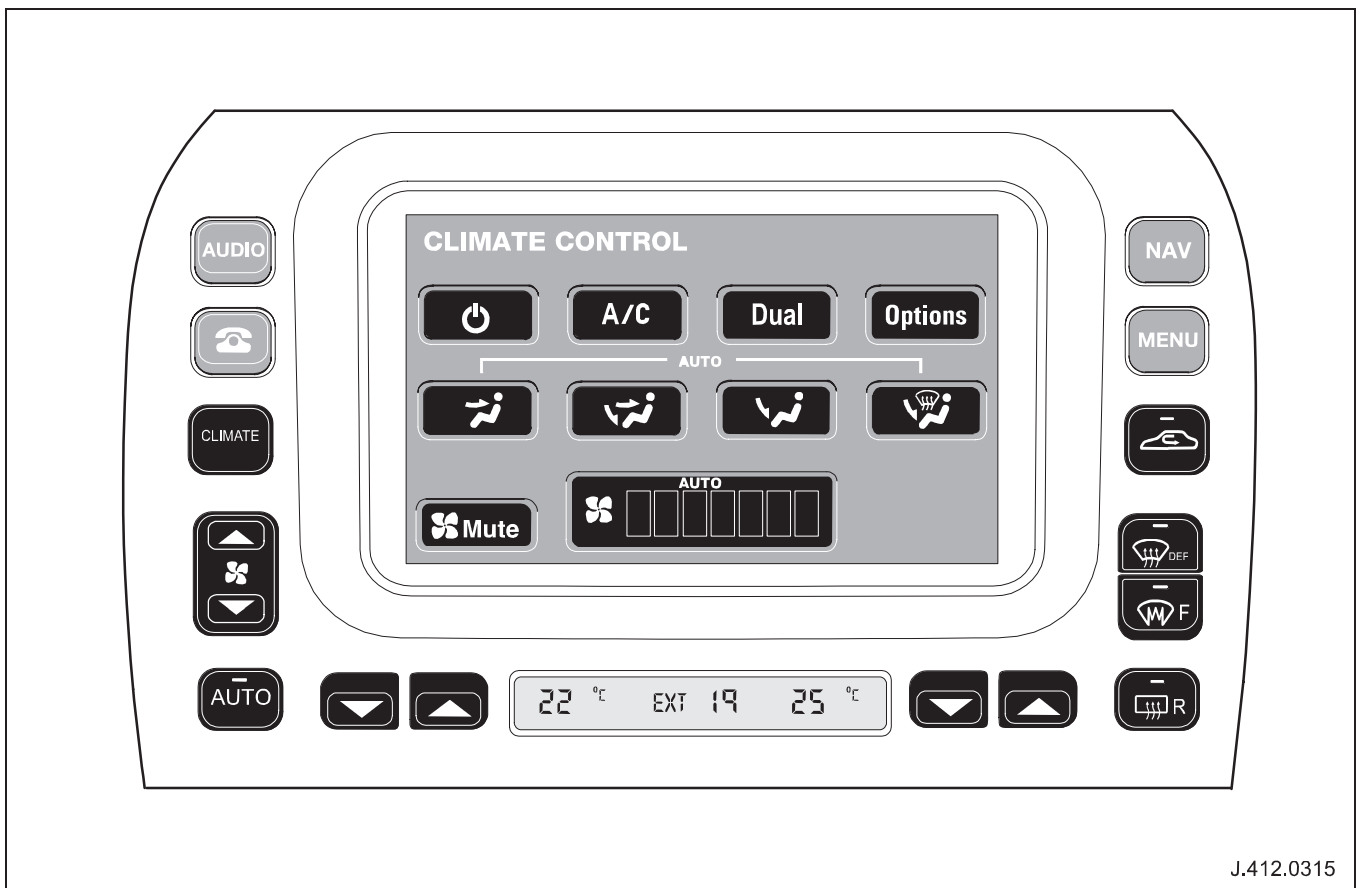
Selecting 'Options' will cause a different screen to be displayed. From the available options, front seat occupants (subject to market and vehicle specification) may choose:

- 'Adjust settings' for the rear climate control system.
- 'Match' the rear system settings to those chosen by the driver.
- 'Lock' the rear control panel so that rear seat occupants are unable to change any settings.
- °C or °F as default unit of measurement.
- Smog sensitivity level (where applicable).

Temperature LCD

When the climate control system is operational, the small, integral LCD, located below the touch-screen, provides confirmation of:

- external (EXT) ambient temperature;
- required interior temperature (selected by the driver);
- required interior temperature (selected by the passenger).



J.412.0315

Fig. 76 Climate control buttons

Automatic Climate Control

The automatic climate control system comprises:

- Control panel with LCD or touch-screen control panel (telematics display module).
- Climate control assembly; refer to **Heating and Ventilation**.
- Air conditioning components; refer to **Air Conditioning**.
- Discrete sensors; refer to **Control Components**.
- Climate control module; refer to **Control Components**.

System Features

Following reconnection of the battery and with the ignition key at position 'II', the climate control system will default to 'OFF' but with a stored value of 23°C.

In circumstances when the display shows either 'HI' or 'LO' instead of a value, the default value can be established by 'pressing and holding' the 'AUTO' button for 2 seconds.

When the ignition key is turned to position '0' or removed from the ignition, the system (depending on conditions) may set the air distribution doors to a predetermined configuration after 120 seconds.

Defrost

Selecting defrost 'DEF' automatically selects 'A/C' and:

- deactivates timed or latched air-recirculation (a condition which cannot be reversed while the system is in this mode);

NOTE: Selecting 'AUTO' or 'DEF' cancels the condition.

- Activates heated front and rear screens (where fitted).

Recirculated and fresh air

NOTE: Timed or latched recirculation are not available when 'DEF' has been selected.

When automatic control (AUTO) is selected, as part of a complex strategy to prevent window-misting and improve occupant comfort, the fresh-air intake door is controlled automatically. In addition, the intake door can also be controlled manually in the following manner:

Timed air-recirculation

'Briefly pressing' the recirculation button engages the recirculation feature for a period of time that will vary depending on climatic conditions and is specifically designed to prevent 'misting'.

- The tell-tale LED will remain illuminated and extinguish after the time-out period has elapsed.

NOTE: The telematics screen (where fitted) confirms the status by displaying a timed recirculation symbol.

Latched air-recirculation

'Pressing and holding' the recirculation button for 2 seconds, latches the recirculation feature (does not time-out). Latched air-recirculation is confirmed by:

- a screen symbol;
- an audible 'double beep'.

NOTE: When latched recirculation has been selected, to reduce condensation, the air conditioning will operate automatically.

Latched fresh air

Pressing the recirculation button when the recirculation LED is illuminated, closes the recirculation door and sends the system to the latched fresh-air condition.

NOTE: Smog sensor operation (where applicable) is automatically cancelled.

Pressing the 'AUTO' button returns the recirculation door to normal, automatic operation.

NOTE: Timed recirculation, latched recirculation and latched fresh air modes are cancelled when the ignition key is turned to position '0'.

Electrical Connections

Refer to **New XJ Range Electrical Guide** for detailed connection information between climate control components

Diagnostics

The climate control system:

- constantly monitors the status of the system;
- where appropriate, stores a DTC within the climate control module for analysis using WDS.

Air Distribution and Filtering

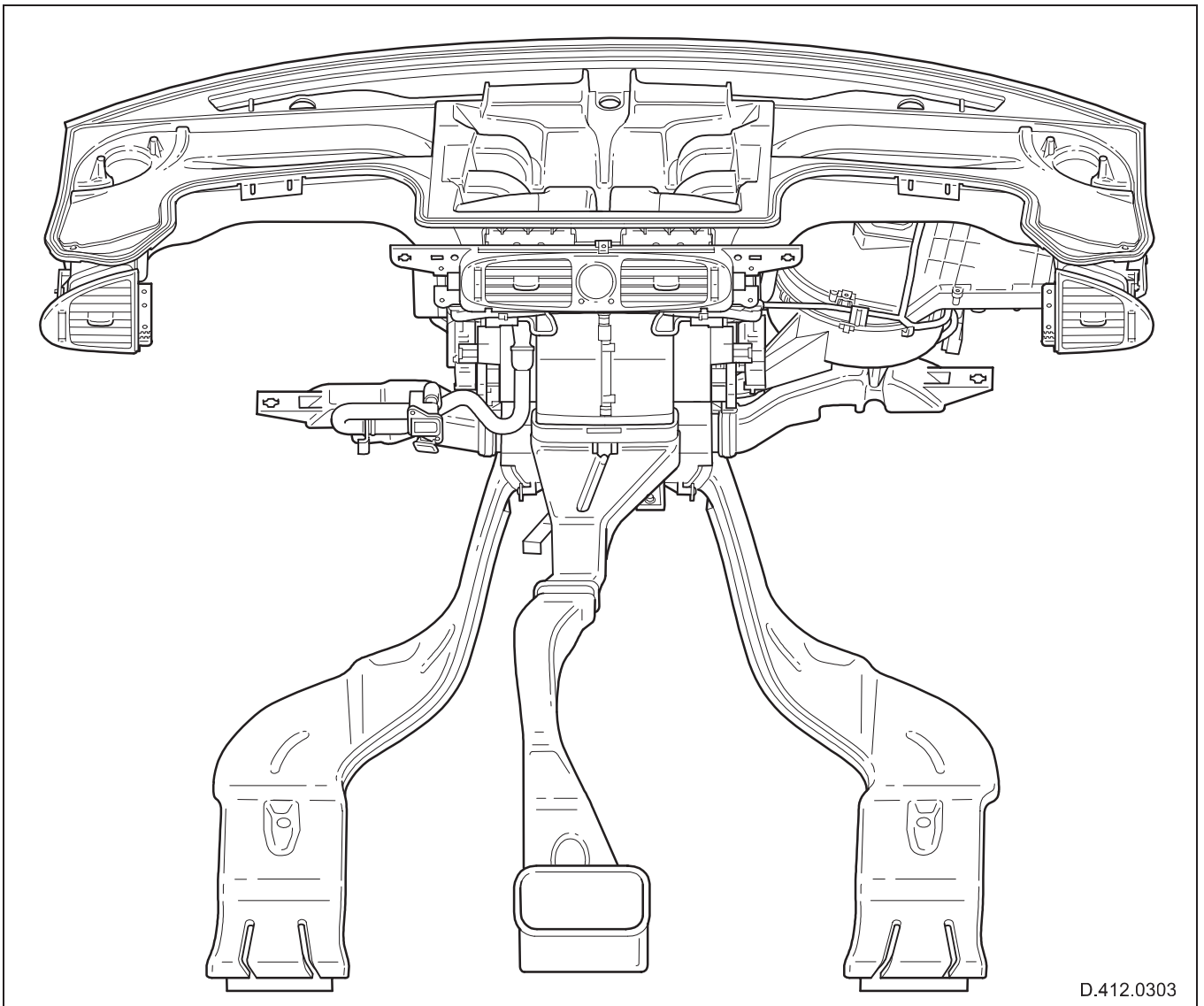
Air distribution and filtering is achieved using the following:

- Combination filter.
- Instrument panel registers.
- Footwell ducting.
- Defrost ducting.
- Defrost and cool-air bypass doors (driver and passenger).
- Floor/face doors (driver and passenger).
- Temperature blend doors (driver and passenger).
- Recirculation door.

- Rear floor-ducting.
- Rear face-ducting.

NOTE: Vehicles installed with the rear climate control system (RCCS) do not utilize the rear face-ducting, which is terminated at the climate control assembly. The RCCS uses direct ducting; refer to **Floor Console**.

The combination filter provides particle filtration and in addition minimizes odors entering the vehicle via the air distribution system.



D.412.0303

Fig. 77 Air distribution and filtering (2-zone)

Heating and Ventilation

Heating and ventilation is determined by the climate control assembly which comprises the following:

- Evaporator core; refer to **Air Conditioning**.
- Heater core.
- Auxiliary coolant pump (not installed for V6 2-zone climate control variant).

- Blower and blower speed module.
- Door actuators; refer to **Control Components**.
- Airflow doors; refer to **Air Distribution and Filtering**.
- Evaporator and discharge sensors; refer to **Control Components**.

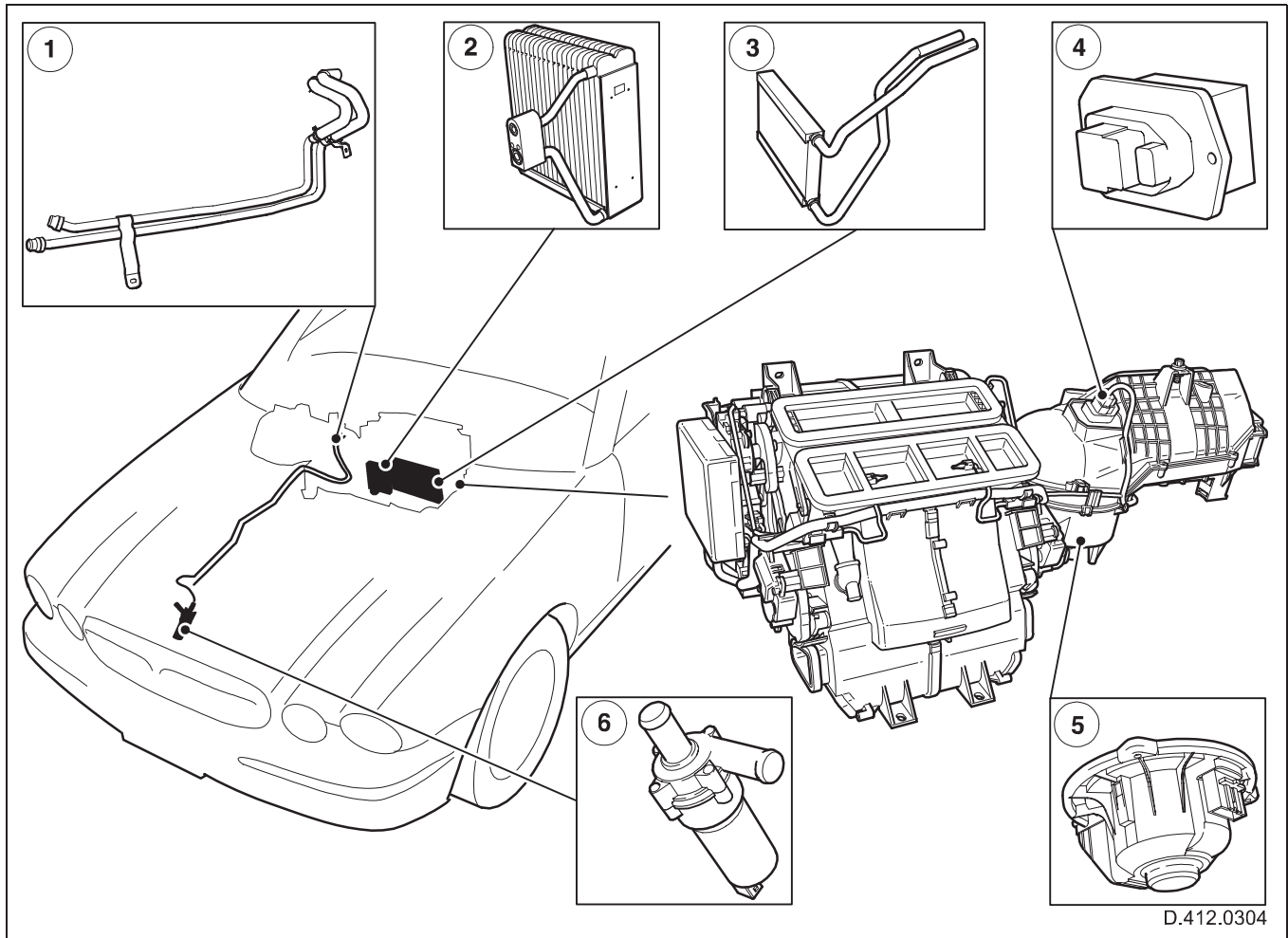


Fig. 78 Heating and ventilation components

- | | |
|-------------------------|---|
| 1. Heater hose assembly | 4. Blower speed module |
| 2. Evaporator core | 5. Blower motor |
| 3. Heater core | 6. Auxiliary coolant pump (not V6 2-zone) |

Heater Core

The single heater core is located within the climate control assembly and connected via the heater pipes to the engine cooling system; refer to **Powertrain, Engine Cooling**.

Auxiliary Coolant Pump

Also part of the engine cooling system, the auxiliary coolant pump is located at the radiator and cooling fan assembly and controlled via the blower motor relay, by the CCM.

Blower

The blower is driven by a d.c. motor. The motor receives battery voltage via the blower motor relay, as determined by the CCM. The motor speed is determined by the blower speed module.

Blower Speed Module

The blower speed module determines the blower motor speed depending on the signal received from the CCM. If 'AUTO' mode is selected, the speed module responds to the CCM, by selecting an appropriate output voltage. The difference between that voltage and the battery voltage determines the voltage across the motor and hence its speed. One of up to 32 different voltage levels can be chosen by the module.

The motor speed (which can also be controlled manually) is visually indicated by display segments:

- 1 to 11 for the climate control panel with LCD.
- 1 to 7 for the telematics display version.

NOTE: Until the engine coolant temperature has reached a predetermined level, the auto-blower control will only operate at low speed.

Heated Screens and Mirrors

Heater functionality is constantly monitored by the electrical load management system (ELMS); refer to **Electrical Load Management System**. The ELMS dictates that in circumstances where the generated electrical power is less than the electrical consumption, selected systems may be temporarily inhibited or operated for a reduced period of time if necessary.

NOTE: Tell-tale LEDs remain illuminated so that any corrective action is not apparent to the driver.

Heated front screen

Depending on vehicle specification, the heated front screen (HFS) may incorporate a fine-wire electrical grid for total heating, or a small grid in the area where the wipers park, only.

NOTE: The total heating option comprises two independent grids, one for the driver's side and one for the passenger side.

On receipt of a ground signal from the CCM, battery voltage is switched via separate relays to both sides of the screen. The heater elements will only be activated after data has been exchanged between the climate control module (CCM) and the engine control module (ECM):

- CCM sends request to ECM.
- ECM confirms or denies request.
- CCM activates the appropriate relay, provided the request has been confirmed.

As part of the continuous demisting strategy, when the ambient temperature is low, providing the power consumption is less than the generated power, the ELMS will permit the activation of the heated front screen to prevent the possibility of misting.

NOTE: The tell-tale LED will not illuminate so that the action is not apparent to the driver.

The heated front screen (where fitted) is automatically selected when the engine is 'running' and the ambient temperature falls below 5°C.

NOTE: The tell-tale LED will illuminate.

Electrical

Heated rear screen

On receipt of a ground signal from the CCM, battery voltage is switched via a relay, to the heated rear screen (HRS).

NOTE: The strategy for activating the heated rear screen is identical to the strategy for the HFS.

Heated exterior mirrors

The heated exterior mirrors are activated by the same relay as the heated rear screen but are separately fused.

Basic functionality

NOTE: Both heated screens will be activated automatically at temperatures below predetermined levels.

The heated rear screen and both exterior mirror heaters will operate when selected, provided the engine is running; operation will halt after 21 minutes or can be manually halted.

The heated front screen (if fitted), will operate when selected, provided the engine is running; operation will halt after 6.5 minutes or can be manually halted.

Heated Steering Wheel

The steering wheel heater, where installed, is activated when the driver's seat heater switch is operated. The switch provides an input to the front electronic module (FEM), which responds by supplying an output signal via the clockspring contacts to the heated steering wheel (HSW) electronics. The HSW electronics receives supply voltage via the power coupling and slip rings.

The HSW power coupling, which attaches to the clockspring, comprises two spring contacts that interface with the HSW electronics, to ensure power and ground connections are maintained.

The HSW electronics, controls the operation of the HSW element when appropriate, maintaining a surface temperature of approximately 30°C (86°F).

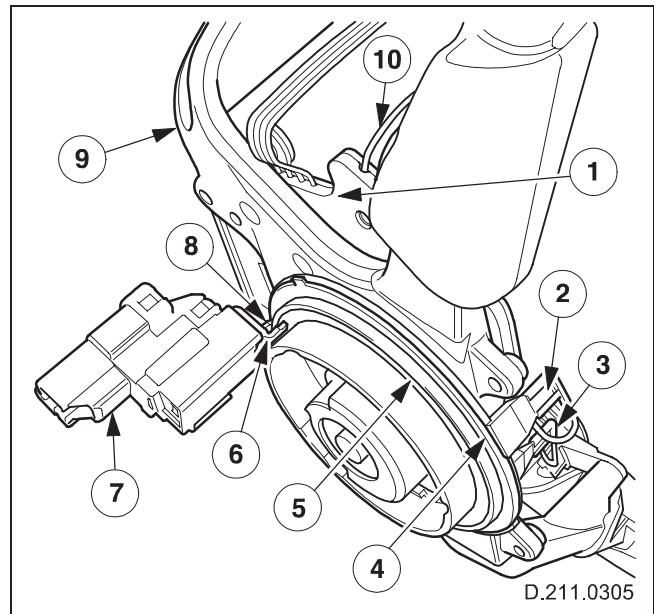


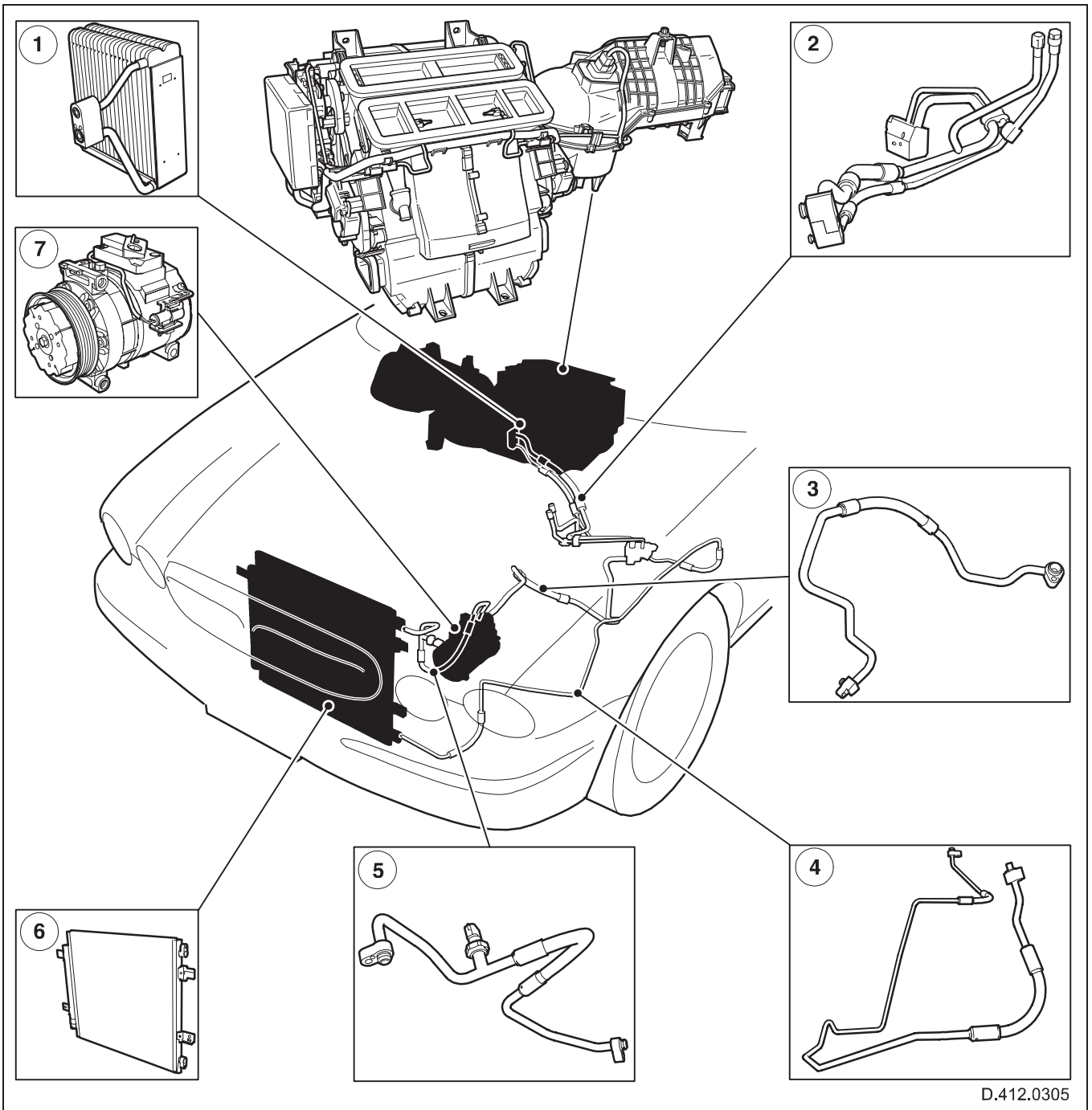
Fig. 79 Heated steering wheel connections

1. HSW electronics
2. Spade connector (positive)
3. Spade connector (negative)
4. Slip ring (positive)
5. Slip ring (negative)
6. Spring contact (negative)
7. Power coupling
8. Spring contact (positive)
9. Steering wheel armature
10. To HSW heater element

Air Conditioning

Air conditioning comprises the following system components:

- Evaporator core and thermal expansion valve.
- Compressor inlet line.
- Compressor.
- Condenser with integral receiver-drier.
- Condenser outlet line.
- Pressure transducer (part of compressor outlet line but serviceable separately).
- Combined evaporator intake/discharge line assembly with integral service ports.
- Compressor outlet line.



D.412.0305

Fig. 80 Air conditioning components

- | | |
|--|-----------------------------|
| 1. Evaporator core and thermal expansion valve | 5. Compressor outlet line |
| 2. Evaporator intake/discharge line assembly | 6. Condenser/receiver-drier |
| 3. Compressor inlet line | 7. Compressor |
| 4. Condenser outlet line | |

Electrical

Operation

With reference to Fig. 81:

- The compressor (6) is mounted directly to the engine and driven by the accessory drive belt. The compressor, compresses the low-pressure, gaseous refrigerant received from the evaporator core. The refrigerant is discharged from the compressor to the condenser/receiver-drier (4) as a high-pressure, high-temperature vapor.

NOTE: The manifold block of the compressor tube assembly incorporates a pressure relief valve.

- The condenser converts the high-pressure vapor to a liquid by utilizing the cooling effect of the air flowing over the condenser. The high-pressure warm liquid leaves the

condenser, travels along the liquid line and enters the thermal expansion valve (2).

- The thermal expansion valve regulates the flow of refrigerant and causes a pressure reduction as it enters the evaporator core (1).
- The resultant reduction in pressures, causes the refrigerant to boil and removes heat and moisture from the air passing through the evaporator core into the passenger compartment. The heat transfer results in cool refrigerant vapor leaving the evaporator and returning to the compressor.

NOTE: Moisture from the atmosphere condenses on the fins of the evaporator before draining to the outside of the vehicle via the single, integrated condensate drain-tube.

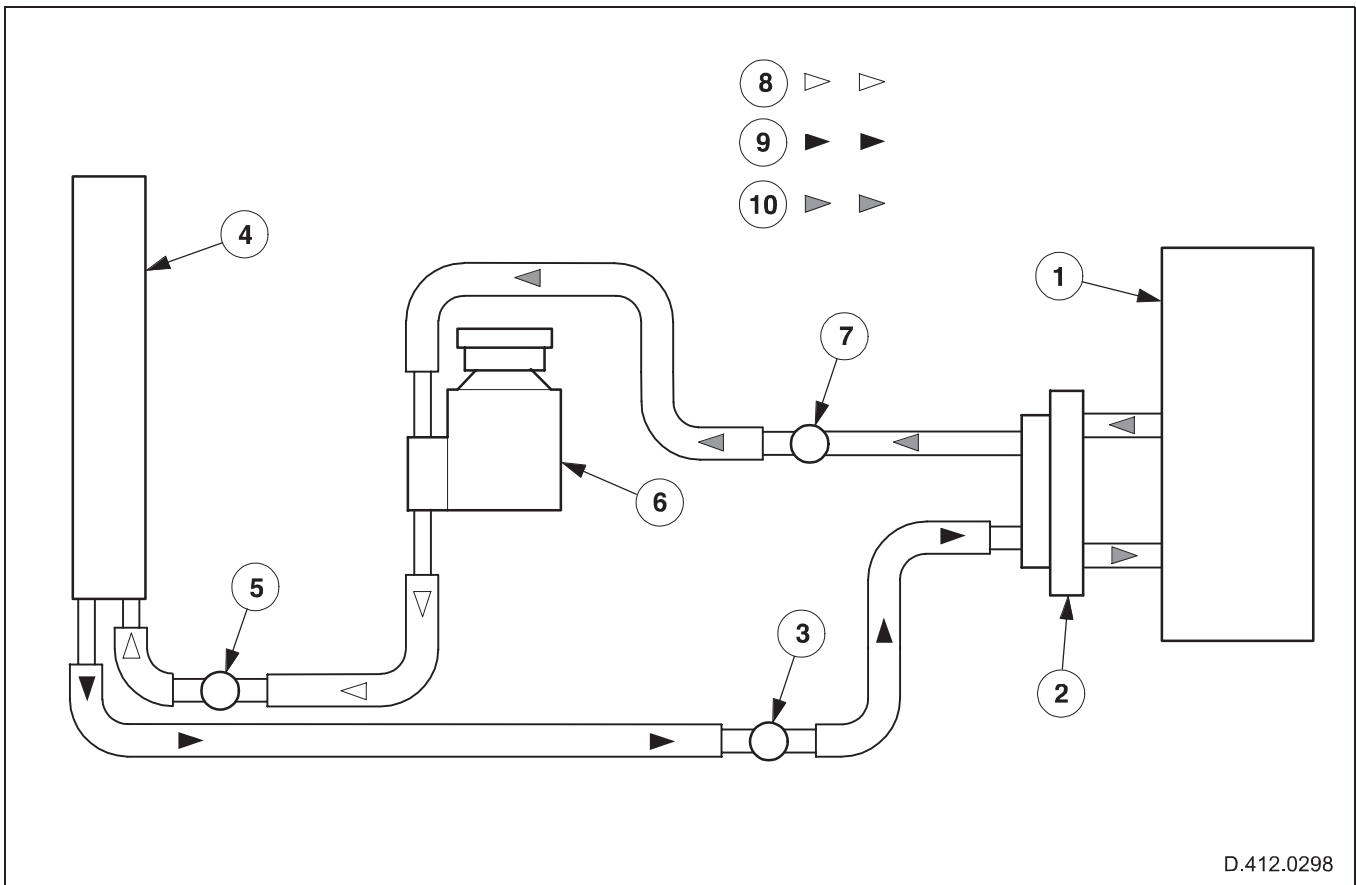


Fig. 81 Air-conditioning refrigerant flow (2-zone)

- | | |
|---------------------------------|--|
| 1. Evaporator core | 6. Compressor |
| 2. Thermostatic expansion valve | 7. Low-side charge port |
| 3. High-side charge port | 8. High-pressure refrigerant (gaseous and hot) |
| 4. Condenser/receiver-drier | 9. High-pressure refrigerant (liquid and warm) |
| 5. Pressure transducer | 10. Low-pressure refrigerant (gaseous/liquid) |

Compressor

The compressor installed is uniquely designed to suit the engine configuration and whether a 2-zone or a 4-zone climate control system is installed. The compressor does not have a magnetic clutch, instead, operation is continuous in response to a PWM signal supplied directly from the CCM to the compressor solenoid. Since there is no clutch cycling, the operation of the compressor is significantly quieter and more efficient as far as engine load is concerned. This type of compressor is capable of responding to smaller changes in system demands to accommodate requirements such as providing a 'chilling' effect without causing 'icing' of the evaporator.

Evaporator temperature

As part of an advanced automatic, evaporator temperature control, the evaporator temperature is controlled and varied by the CCM in response to parameters which include:

- Length of time the vehicle has been running.
- Ambient temperature.
- Passenger compartment temperature.
- Passenger compartment humidity.

NOTE: Selecting defrost automatically selects the air conditioning a condition which cannot be overridden while the system is in this mode.

Condenser/receiver-drier

The condenser and receiver-drier are integrated into a single unit, which incorporates a serviceable desiccant-sack.

Service ports

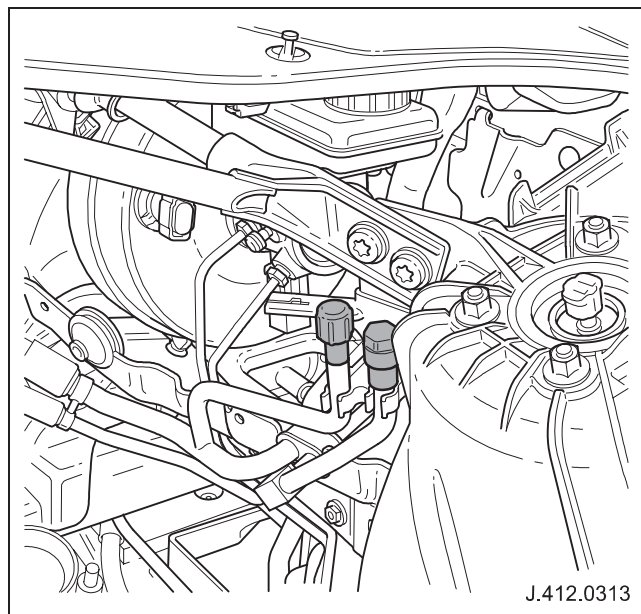


Fig. 82 Location of service ports

Control Components

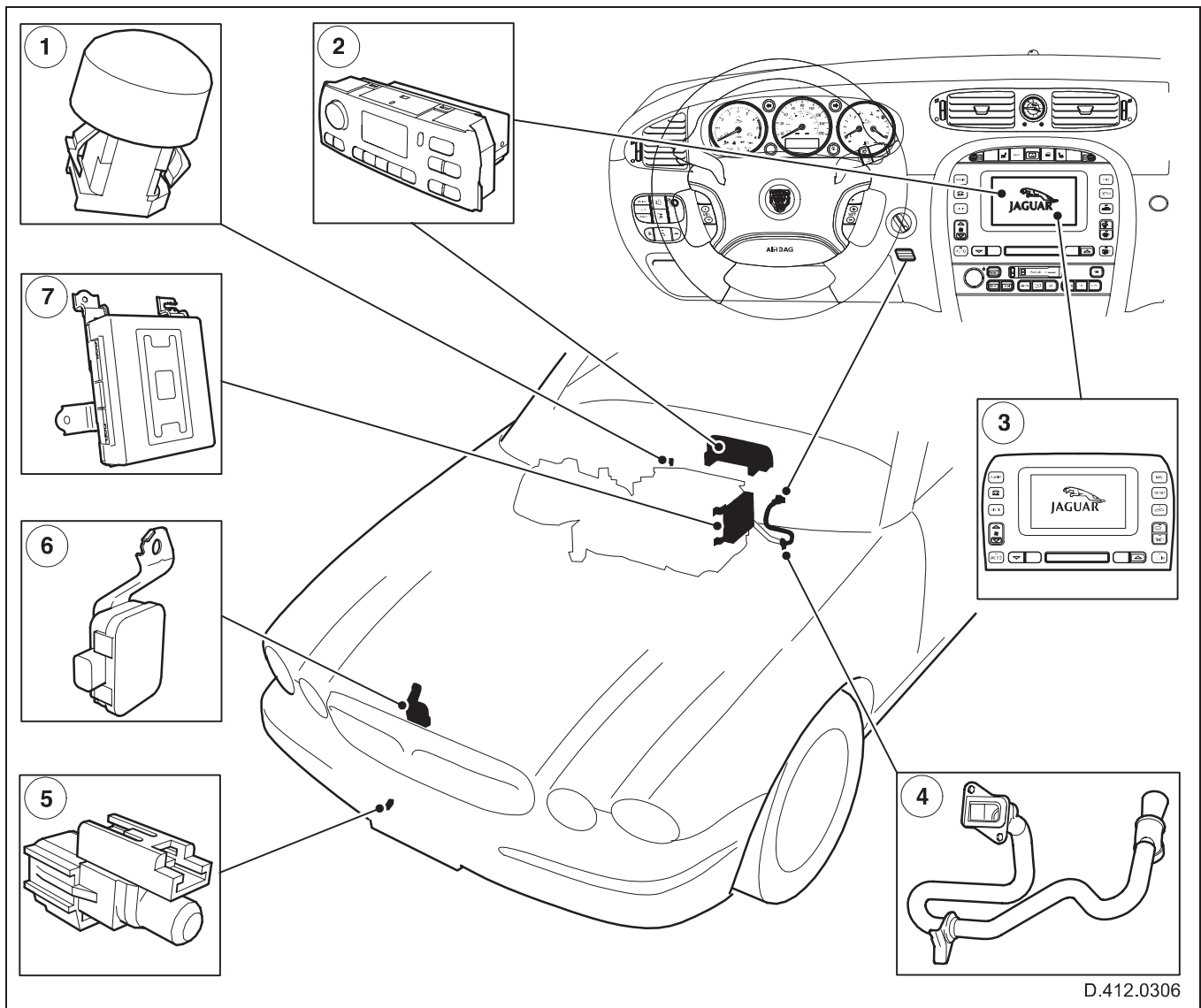


Fig. 83 Automatic climate control components

- | | |
|--|-----------------------------------|
| 1. Dual sunload-sensor | 5. Ambient air temperature sensor |
| 2. Control panel with LCD | 6. Air quality (smog) sensor |
| 3. Telematics display module (optional installation) | 7. Climate control module |
| 4. In-vehicle temperature and humidity sensor | |