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CLIMATE CONTROL SYSTEM – GENERAL INFORMATION

CABIN COMFORT CLIMATE CONTROL SYSTEM (G2458955)

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PRINCIPLES OF OPERATION

For a detailed description of the Climate Control System, refer to the relevant Description and Operation section in the workshop manual. REFER to:(412-01 Climate Control)

[Air Distribution and Filtering](#) (Description and Operation),

[Heating and Ventilation](#) (Description and Operation),

[Air Conditioning](#) (Description and Operation),

[Control Components](#) (Description and Operation).

INSPECTION AND VERIFICATION

 WARNING:

Servicing must be completed by personnel familiar with both vehicle system and the charging and testing equipment. All operations must be completed in a well ventilated area away from open flame and heat sources.

 CAUTION:

Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

 NOTES:

- If a control module or a component at fault and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval program is in operation, prior to the installation of a new module/component.
- When performing voltage or resistance tests, always use a digital multimeter that has the resolution ability to view 3 decimal places. For example, on the 2 volts range can measure 1mV or 2 K Ohm range can measure 1 Ohm. When testing resistance always take the resistance of the digital multimeter leads into account.
- Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern

2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

MECHANICAL	ELECTRICAL
■ Coolant level ■ Hoses ■ Coolant pump ■ Pollen filter ■ Air conditioning condenser ■ Refrigerant pipes ■ Fuel fired booster heater ■ Fuel fired booster heater fuel pump ■ Fuel fired booster heater fuel pipes ■ HVAC Control Module (HVAC) door range of movement	■ Fuses ■ Wiring harnesses and connectors ■ Blower ■ Air conditioning compressor electronic control valve ■ Electric cooling fan ■ HVAC control module ■ Refrigerant pressure sensor ■ In vehicle temperature sensor ■ Sunload sensor ■ Duct air temperature sensors

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Code(s) and refer to the Diagnostic Trouble Code(s) (DTC) Index

5. Check the JLR claims submission system for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and complete the recommendations as required

HVAC CONTROL SYSTEM SENSOR RESISTANCE VALUES

SENSOR TYPE	RESISTANCE VALUE	AMBIENT TEMPERATURE
Front Evaporator Temperature Sensor	1.6 K ohms	22°C
Rear Evaporator Temperature Sensor	1.6 K ohms	22°C
Duct Air Temperature Sensor	3 K ohms	22°C
In Car Temperature Sensor (measured at pins 3 and 5)	9 K ohms	22°C
Compressor Solenoid Sensor	10 ohms	22°C
Compressor Clutch Sensor	4.3 ohms	22°C

SYMPTOM CHART - AUTO CLIMATE CONTROL

SYMPTOM	POSSIBLE CAUSES	ACTION
Passenger compartment slow to cool		

SYMPTOM	POSSIBLE CAUSES	ACTION
	- Compressor run-in routine not complete - Refrigerant system fault - Passenger compartment temperature sensor airflow obstructed - Condensor airflow obstructed - Evaporator temperature sensor fault (front /rear or both) - Temperature blend motor not fully operating or damaged - Face duct air temperature sensors not installed/located correctly - HVAC recirculation inlet door position incorrect or damaged	- Perform compressor/ refrigerant system diagnostics. Refer to the relevant section of the workshop manual REFER to: Climate Control System (412-00 Climate Control System - General Information, Diagnosis and Testing). - Make sure the passenger compartment temperature sensor airflow is free from obstructions, correctly located and mounted securely. GO to Pinpoint Test A. - Make sure the condensor airflow is free from obstructions and mounted securely - Using the Jaguar Land Rover approved diagnostic equipment, check live data signal - Evaporator Temperature (0x995A). Check if the evaporator temperature is as expected when using the "MAX-AC" function. From static to operating the expected temperature is 2°C. - Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index - Visually inspect the face duct air temperature sensors to make sure they are correctly installed and located. GO to Pinpoint Test B. - Visually inspect the HVAC recirculation blend door and linkage for correct positioning or damage and rectify as necessary
Passenger compartment slow to warm	- Engine cooling system fault - Passenger compartment temperature sensor airflow obstructed - Heater core obstructed - Heater core valve operation - Heater temperature sensor fault (front /rear or both) - Temperature blend motor not fully operating or damaged - Duct air temperature	- Perform engine cooling system diagnostics, make sure there are no air locks and that the coolant system is flowing as expected - Make sure the passenger compartment temperature sensor airflow is free from obstructions, correctly located and mounted securely. GO to Pinpoint Test A. - Make sure the heater core airflow is free from obstructions and mounted securely - Using the Jaguar Land Rover approved diagnostic equipment, check the heater core temperature is as expected when in operation. The expected temperature is 80-100°C from static to full operation - Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index - Visually inspect the duct air temperature sensors (foot) to make sure they are correctly installed and located. GO to Pinpoint Test B. - Visually inspect the HVAC recirculation blend door and linkage for correct positioning or damage and rectify as necessary

SYMPTOM	POSSIBLE CAUSES	ACTION
	sensors (foot)not installed/located correctly HVAC recirculation inlet door position incorrect or damaged	
Driver side to passenger side temperature differences when using the same temperature setting in auto and sync	- Stepper motor lost it's reference point - Duct air temperature sensors (face/foot) installed correctly but incorrect wiring harness connector connected - Duct air temperature sensors (face/foot) incorrectly installed - Vents closed	- Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index - Visually inspect the duct air temperature sensors (face/foot) to make sure they are correctly installed and connected to the correct wiring harness connector. GO to Pinpoint Test B. - Visually inspect the duct air temperature sensors (face/foot) to make sure they are correctly installed and located. GO to Pinpoint Test B. - Open all vents and recheck
Poor visibility (fogging) through the front windshield so that the vehicle cannot be driven safely	- Inlet door incorrect operation - Air conditioning not working - Water ingress or moisture in the passenger compartment - Incorrect defrost operation	- GO to Pinpoint Test C. - Perform compressor/refrigerant system diagnostics. Refer to the relevant section of the workshop manual REFER to: Climate Control System (412-00 Climate Control System - General Information, Diagnosis and Testing). - Make sure the drain tube is correctly installed and free from obstruction, inspect for any evidence of water ingress into the passenger compartment including the load space area. For example wet or water stained carpets. If there is evidence of water ingress, rectify as necessary and retest - Select "MAX-DEFROST" and set air to screen only
Passenger compartment gets too warm when in direct sunlight	- Face vents closed off at thumb wheel - Blower speed set to "LOW" in climate menu - Sunload sensor damaged or obstructed	- Open face vents using the thumb wheel and retest - Set blower speed to "BALANCED" in climate menu - Visually inspect the sunload sensor for damage or obstruction and rectify as necessary
System unresponsive to temperature changes on either one or both sides	Temperature blend motor door /linkage not fully operating or damaged	Visually inspect the operation of the blend door and linkage and check for any damage, rectify as necessary

SYMPTOM	POSSIBLE CAUSES	ACTION
Odor enters the passenger compartment during start up	- Air conditioning compressor not engaging - Passenger compartment air inlet door position incorrect - Pollen filter dirty - Passenger compartment inlet door position incorrect - Evaporator temperature too high	- Perform compressor/refrigerant system diagnostics. Refer to the relevant section of the workshop manual REFER to: Climate Control System (412-00 Climate Control System - General Information, Diagnosis and Testing). - Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index - Check the condition of the pollen filter and replace as necessary - GO to Pinpoint Test C. - Using the Jaguar Land Rover approved diagnostic equipment, check live data signal - Evaporator Temperature (0x995A). With the vehicle running and the air conditioning switched on, make sure the evaporator temperature is no higher than 5°C - If the odor persists after completing all diagnostics, raise a Technical Assistance (TA) and report all of your findings
Customer cannot set a constant comfortable temperature, the air blowing through rear air vents is at a noticeably different temperature than air blowing through other vents	Customer subjective experience, feature operating as intended	Refer to the "Front to Rear HVAC system Vent Imbalance Test" below

SYMPTOM CHART - MANUAL CLIMATE CONTROL

SYMPTOM	POSSIBLE CAUSES	ACTION
Climate control system unresponsive to distribution changes	Distribution door motors /linkages not fully operating or damaged	Visually inspect the operation of the distribution door, motors and linkages. Check for damage and rectify as necessary
System unresponsive to temperature changes on either one or both sides	Temperature blend motor door/linkage not fully operating or damaged	Visually inspect the operation of the blend door and linkage and check for any damage, rectify as necessary
Passenger compartment slow to cool	- Compressor run-in routine not complete - Refrigerant system fault	- Perform compressor/ refrigerant system diagnostics. Refer to the relevant section of the workshop manual REFER to: Climate Control System (412-00 Climate Control System - General Information, Diagnosis and Testing). - Make sure the condensor airflow is free from obstructions and mounted securely

SYMPTOM	POSSIBLE CAUSES	ACTION
	■ Condensor airflow obstructed ■ Evaporator temperature sensor fault (front/rear or both) ■ Temperature blend motor not fully operating or damaged ■ Passenger compartment inlet door position incorrect or damaged	■ Using the Jaguar Land Rover approved diagnostic equipment, check live data signal - Evaporator Temperature (0x995A). Check if the evaporator temperature is as expected when using the "MAX-AC" function. From static to operating the expected temperature is 2°C. ■ Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index ■ Visually inspect the passenger compartment blend door and linkage for correct positioning or damage and rectify as necessary
Passenger compartment slow to warm	■ Engine cooling system fault ■ Heater core obstructed ■ Heater core valve operation ■ Heater temperature sensor fault (front/rear or both) ■ Temperature blend motor not fully operating or damaged ■ Passenger compartment inlet door position incorrect or damaged	■ Perform engine cooling system diagnostics, make sure there are no air locks and that the coolant system is flowing as expected ■ Make sure the heater core airflow is free from obstructions and mounted securely ■ Using the Jaguar Land Rover approved diagnostic equipment, check the heater core temperature is as expected when in operation. The expected temperature is 80-100°C from static to full operation ■ Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index ■ Visually inspect the passenger compartment blend door and linkage for correct positioning or damage and rectify as necessary
Poor visibility (fogging) through the front windshield so that the vehicle cannot be driven safely	■ Inlet door incorrect operation ■ Air conditioning not working ■ Water ingress or moisture in	■ GO to Pinpoint Test C. ■ Perform compressor/refrigerant system diagnostics. Refer to the relevant section of the workshop manual REFER to: Climate Control System (412-00 Climate Control System - General Information, Diagnosis and Testing). ■ Make sure the drain tube is correctly installed and free from obstruction, inspect for any evidence of water ingress into the passenger compartment including the load space area. For example wet or water stained carpets. If there is evidence of water ingress, rectify as necessary and retest

SYMPTOM	POSSIBLE CAUSES	ACTION
	the passenger compartment Incorrect defrost operation	Select "MAX-DEFROST" and set air to screen only
Passenger compartment gets too warm when in direct sunlight	- Face vents closed off at thumb wheel - Blower speed set to "LOW" in climate menu - Sunload sensor damaged or obstructed	- Open face vents using the thumb wheel and retest - Set blower speed to "BALANCED" in climate menu - Visually inspect the sunload sensor for damage or obstruction and rectify as necessary
Odor enters the passenger compartment during start up	- Air conditioning compressor not engaging - Passenger compartment air inlet door position incorrect - Pollen filter dirty - Passenger compartment inlet door position incorrect - Evaporator temperature too high	- Perform compressor/refrigerant system diagnostics. Refer to the relevant section of the workshop manual REFER to: Climate Control System (412-00 Climate Control System - General Information, Diagnosis and Testing). - Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Run end stop detection on damper motors (0x9006). Read the Diagnostic Trouble Code(s) and check for Bxxxx-77 "Commanded Position Not Reachable" Diagnostic Trouble Code(s) and refer to the relevant DTC index - Check the condition of the pollen filter and replace as necessary - GO to Pinpoint Test C. - Using the Jaguar Land Rover approved diagnostic equipment, check live data signal - Evaporator Temperature (0x995A). With the vehicle running and the air conditioning switched on, make sure the evaporator temperature is no higher than 5°C. - If the odor persists after completing all diagnostics, raise a TA and report all of your findings

PINPOINT TESTS

PINPOINT TEST A : PASSENGER COMPARTMENT TEMPERATURE SENSOR CHECKS	
A1: PASSENGER COMPARTMENT TEMPERATURE SENSOR AIRFLOW CHECK	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Gain access to the in vehicle temperature sensor.
	2 Make sure that the in vehicle temperature sensor is correctly mounted and is free from obstruction.

PINPOINT TEST A : PASSENGER COMPARTMENT TEMPERATURE SENSOR CHECKS	
A1: PASSENGER COMPARTMENT TEMPERATURE SENSOR AIRFLOW CHECK	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	Is the in vehicle temperature sensor correctly mounted and free from obstruction? Yes GO to A2. No Rectify as necessary and retest the system for correct operation.
A2: PASSENGER COMPARTMENT TEMPERATURE SENSOR AIRFLOW CHECK	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Inspect the aspirator fan and make sure it is operating correctly and free from obstruction, switch the ignition on and off with the HVAC switched on, you should visibly be able to see the aspirator fan stop/start.
	Is the aspirator fan operating correctly and free from obstruction? Yes GO to Pinpoint Test B. No Clear the obstruction or install a new aspirator fan as necessary. Retest the system for correct operation.

PINPOINT TESTS

PINPOINT TEST B : DUCT AIR TEMPERATURE SENSOR CHECKS	
B1: DUCT AIR TEMPERATURE SENSOR INSTALLATION AND LOCATION CHECKS	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Gain access to the duct air temperature sensors, face or foot depending on the failure type.
	2 Make sure that the duct air temperature sensors are correctly installed, located and free from obstruction.
	Are the duct air temperature sensors correctly installed, located and free from obstruction? Yes No further action required, return to the symptom chart and continue with diagnosis. No Rectify as necessary and retest the system for correct operation.

PINPOINT TESTS

PINPOINT TEST C : RECIRCULATION INLET DOOR POSITION	
C1: RECIRCULATION INLET DOOR POSITION TEST	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Start the vehicle, turn on the climate system and set to "Lo-Lo"
	2 Visually check the HVAC and confirm that the inlet door position is in recirculation mode.
	3 Set the climate system to "Hi-Hi"

PINPOINT TEST C : RECIRCULATION INLET DOOR POSITION	
C1: RECIRCULATION INLET DOOR POSITION TEST	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	4 Visually check the HVAC and confirm that the inlet door position is in fresh mode.
	Did the inlet door operate correctly for both settings? Yes No further action required, return to the symptom chart and continue with diagnosis. No GO to C2.
C2: RECIRCULATION INLET DOOR POSITION TEST	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Visually inspect the inlet door and linkages for any obstructions or damage.
	Is there any obstruction or damage to the inlet door? Yes Rectify as necessary and retest the system for correct operation. No No further action required, return to the symptom chart and continue with diagnosis.

FRONT TO REAR HVAC SYSTEM VENT IMBALANCE TEST

Diagnostic Procedure

Vent temperature difference test



NOTES:

- If the customer cannot set a constant comfortable temperature and the air blowing through the rear air vents is noticeably hotter than air blowing through other vents, continue with this diagnostic procedure
- **DO NOT** place the temperature sensor inside the vent as this can give a false reading

1. Make sure the vehicle is in a workshop environment and not in direct sunlight
2. Start the engine and run the vehicle at idle with all windows and doors closed for 30 minutes to allow the temperature to stabilize
3. Set the climate control to MANUAL and FOOT and FACE distribution



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4. Confirm the driver and passenger temperatures are set to 22°C
5. Place the temperature sensor (Electronic Thermometer RA43230) directly in front and in the centre (not above or below), 5-10 cm away from the front centre vent and measure, make a note of the temperature
 1. Wait for 60 seconds

NOTE:

The temperature probe must be held directly in front and in the centre (not above or below) of the vent 5-10 cm away, incorrect positioning of the probe can cause up to a 4°C temperature difference



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6. Place the temperature sensor (Electronic Thermometer RA43230) directly in front and in the centre (not above or below), 5-10 cm away from the rear centre face vent and measure, make a note of the temperature

7. If the temperature difference is between 10°C and 14°C refer to the symptom chart and continue with diagnostics
8. If the temperature difference is greater than 14°C, please raise a TA case for further guidance

DTC INDEX

For a list of Diagnostic Trouble Code(s) that could be set on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code Index - DTC: HVAC Control Module \(HVAC\)](#) (100-00 General Information, Description and Operation).

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