



Climate Control System

Principles of Operation

For a detailed description of climate control operation, refer to the relevant Description and Operation section of the workshop manual.

Inspection and Verification

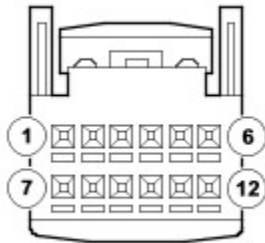
- 1 . Verify the customer concern.
- 2 . Visually inspect for obvious signs of mechanical or electrical damage.
- 3 . If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
- 4 . If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

Connector Circuit Reference

Auxiliary Climate Control Module (ACCM) - C0695

NOTE :

Discovery 3 vehicles with rear climate control only

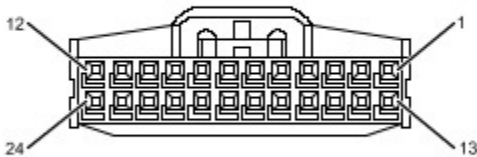


E47930

Cavity	Description	Typical Condition - No fault	DTC	PID	Symptom	Input/Output	Possible Cause
1	Power supply from ATC module	Battery voltage when ignition on. 0V when ATC module in sleep mode	B1B7015	99A2	Rear A/C control panel inoperative	Input	Open circuit, short circuit to ground
1	Power supply from ATC module	Battery voltage when ignition on. 0V when ATC module in sleep mode	B1B7311	99A2	Rear A/C control panel inoperative	Input	Short circuit to ground
2	LIN bus	9600 bps signal when ATC module panel on. Average signal approximately 9V, depending on battery voltage	B1B7088	None	Rear A/C control panel inoperative	Input/Output	Open circuit
3	Ground	Information not available	B1B7088	None	Rear A/C control panel inoperative. Fuse may blow.	Input	Open circuit, short circuit to battery voltage
4	Rear blower module power	Between 1.5V and 2.8V depending on blower motor	None	999C	Information not	Output	Information not

	drive	setting			available		available
5	Blower motor voltage sense	Voltage variation observed as blower motor setting changes	None	999C	Information not available	Input	Information not available
6	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
7	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
8	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
9	Sensor ground	Information not available	B1B8115	None	Rear A/C doesn't get cold	Output	Open circuit
10	Rear blower relay coil drive	0V to switch rear blower relay on when rear A/C is on	None	99A2	Information not available	Output	Information not available
11	Solenoid valve drive	0V to switch valve on when rear A/C is on	None	99A2	Information not available	Output	Information not available
12	Evaporator temperature sensor signal	Resistance at 25° is 1.5k ohms. Pull up resistance is 5.62k ohms	B1B8111	999B	Lack of cooling from rear A/C	Input	Short circuit to ground
12	Evaporator temperature sensor signal	Resistance at 25° is 1.5k ohms. Pull up resistance is 5.62k ohms	B1B8115	999B	Lack of cooling from rear A/C	Input	Open circuit

Automatic Temperature Control (ATC) Module - C1629



E59868

Cavity	Description	Typical Condition - No fault	DTC	PID	Symptom	Input/Output	Possible Cause
1	Sensor 5V supply	5V ± 0.25V (C2655-13)	B1A5911	9969	A/C system does not cool cabin	Input	Open circuit, short circuit to ground
2	Pollution sensor Nox signal - Japanese specification vehicles only	0.4V to 4.7V, rises in a Nox pollution event	B1B6211	99A9	Inlet flap does not close in response to pollution event. May lead to bad air quality in cabin	Input	Short circuit to ground
3	In-vehicle temperature sensor signal	1.7k ohms. Pull up resistance 4.4k ohms at 25°C	B1A6115	9927	Poor cabin temperature control	Input	Open circuit, short circuit to 12V
3	In-vehicle temperature sensor signal	1.7k ohms. Pull up resistance 4.4k ohms at 25°C	B1A6111	9927	Poor cabin temperature control	Input	Short circuit to ground
4	Refrigerant pressure sensor signal	0.5V at zero pressure rising to 4.8V at approximately 3.2MPa when 5V seen at C2655-1	B1A6215	9990	Compressor not running, no cooling available	Input	Open circuit, short circuit to 12V

4	Refrigerant pressure sensor signal	0.5V at zero pressure rising to 4.8V at approximately 3.2MPa when 5V seen at C2655-1	B1A6211	9990	Compressor not running, no cooling available	Input	Short circuit to ground
5	RH sunlight sensor signal	0V in darkness/low light rising to 5V in bright sunlight. Should never exceed 5V (C1629-13)	None	9962	No solar compensation, customer too hot in sunlight	Input	Open circuit, short circuit to ground
5	RH sunlight sensor signal	0V in darkness/low light rising to 5V in bright sunlight. Should never exceed 5V (C1629-13)	B1A6312	9962	Maximum solar compensation, blower level too high	Input	Short circuit to 5V
6	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
7	Blower relay coil	<1V with ignition and ATC module panel on	None	99A2	Blower runs continuously	Output	Short circuit to ground
7	Blower relay coil	<1V with ignition and ATC module panel on	None	99A2	Blower inoperative	Output	Open circuit, short to 12V
8	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
9	Medium speed CAN bus low	n/a	U1A1449	9959, see Note below	ATC module does not work	Input	CAN initialisation failure - open circuit
9	Medium speed CAN bus low	n/a	U030055	9959, see Note below	ATC module does not work	Input	CAN configuration failure - short circuit to ground
9	Medium speed CAN bus low	n/a	U007388	9959, see Note below	ATC module does not work	Input	CAN bus off - short circuit to 12V
10	Medium speed CAN bus high	n/a	U1A1449	9959, see Note below	ATC module does not work	Input	CAN initialisation failure - open circuit
10	Medium speed CAN bus high	n/a	U030055	9959, see Note below	ATC module does not work	Input	CAN configuration failure - short circuit to ground
10	Medium speed CAN bus high	n/a	U007388	9959, see Note below	ATC module does not work	Input	CAN bus off - short circuit to 12V
11	Pollution sensor supply	Battery voltage when rear A/C control panel on. 0V when panel in sleep mode	B1B7015	99A2	Pollution sensor and rear A/C control panel inoperative (Discovery 3 only)	Output	Open circuit
11	Pollution sensor supply	Battery voltage when rear A/C control panel on. 0V when panel in sleep mode	B1B7311	99A2	Pollution sensor and rear A/C control panel inoperative (Discovery 3 only)	Output	Short circuit to ground

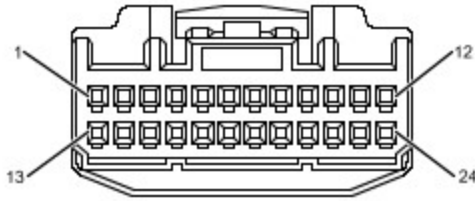
11	Pollution sensor supply	Battery voltage when rear A/C control panel on. 0V when panel in sleep mode	B1B8200, B1B8300, B1B7088	99A2	Pollution sensor and rear A/C control panel inoperative (Discovery 3 only)	Output	Short circuit to 12V
13	Sensor ground	DC voltage similar to that measured on C2655-3	B1B6313	None	Poor cabin temperature control	Output	Open circuit
14	Pollution sensor HC/CO signal - Japanese specification vehicles only	0.4V to 4.7V, falling on HC pollution event	B1B6111	99AA	Inlet flap does not close in response to pollution event. May lead to bad air quality in cabin	Input	Short circuit to ground
15	Ambient air temperature sensor signal	1.7k ohms. Pull up resistance 2.15k ohms	B1A6811	9924	Incorrect ambient temperature displayed	Input	Short circuit to ground
15	Ambient air temperature sensor signal	1.7k ohms. Pull up resistance 2.15k ohms	B1A6815	9924	Incorrect ambient temperature displayed	Input	Open circuit, short circuit to 5V
16	Humidity sensor signal	0.7V at 10%, rising to 3V at 90%	B1A6915	9972	Misted screen in wet/humid weather conditions	Input	Open circuit, short circuit to battery voltage
16	Humidity sensor signal	0.7V at 10%, rising to 3V at 90%	B1A6911	9972	Misted screen in wet/humid weather conditions	Input	Short circuit to ground
17	LH sunlight sensor signal	0V in darkness/low light rising to 5V in bright sunlight. Should never exceed 5V (C1629-13)	B1A6412	9961	Maximum solar compensation, blower level too high	Input	Short circuit to 5V
17	LH sunlight sensor signal	0V in darkness/low light rising to 5V in bright sunlight. Should never exceed 5V (C1629-13)	None	9961	No solar compensation, customer too hot in sunlight	Input	Open circuit, short circuit to ground
18	Windshield heater relay	0V when relay on, battery voltage when relay off	None	99A2	Possible battery loss of charge	Output	Short circuit to ground
18	Windshield heater relay	0V when relay on, battery voltage when relay off	None	99A2	Windshield may mist up	Output	Open circuit
19	Washer jets/exterior mirrors heater relay	0V when relay on, battery voltage when relay off	None	99A2	None	Output	Short circuit to ground
19	Washer jets/exterior mirrors heater relay	0V when relay on, battery voltage when relay off	None	99A2	Mirrors remain frosted and washer jets inoperative in freezing conditions	Output	Open circuit
20	LIN bus	9600 bps signal when ATC module panel on. Average signal approximately 9V, depending on battery voltage	None	99A2	Faulty air distribution and temperature control from rear A/C control panel (Discovery 3 only)	Input/Output	Open circuit
20	LIN bus	9600 bps signal when ATC module panel on. Average signal approximately	None	99A2	Faulty air distribution and temperature control from rear A/C	Input/Output	Short circuit to ground

		9V, depending on battery voltage			control panel (Discovery 3 only)		
20	LIN bus	9600 bps signal when ATC module panel on. Average signal approximately 9V, depending on battery voltage	None	99A2	Faulty air distribution and temperature control from rear A/C control panel (Discovery 3 only)	Input/Output	Short circuit to 12V
21	Medium speed CAN bus low	n/a	U1A1449	9959, see Note below	ATC module inoperative	Output	CAN initialisation failure - open circuit
21	Medium speed CAN bus low	n/a	U030055	9959, see Note below	ATC module inoperative	Output	CAN configuration failure - short circuit to ground
21	Medium speed CAN bus low	n/a	U007388	9959, see Note below	ATC module inoperative	Output	CAN bus off - short circuit to 12V
22	Medium speed CAN bus high	n/a	U1A1449	9959, see Note below	ATC module inoperative	Output	CAN initialisation failure - open circuit
22	Medium speed CAN bus high	n/a	U030055	9959, see Note below	ATC module inoperative	Output	CAN configuration failure - short circuit to ground
22	Medium speed CAN bus high	n/a	U007388	9959, see Note below	ATC module inoperative	Output	CAN bus off - short circuit to 12V
23	Compressor solenoid valve -	0.75A at maximum compressor displacement generating a voltage of 0.25V at this point	None	None	Poor climate control, reduced air flow into cabin, possible engine mis-fire	Output	Compressor solenoid or wiring fault can cause incorrect signal
24	Compressor solenoid valve +	400Hz PWM signal switching to battery voltage	B1A7001	99AB	Poor climate control, reduced air flow into cabin, possible engine mis-fire	Output	Short circuit to ground

NOTE :

PID 9959 is an illumination PWM value that is read as a CAN signal.

Automatic Temperature Control (ATC) Module - C1630



E59869

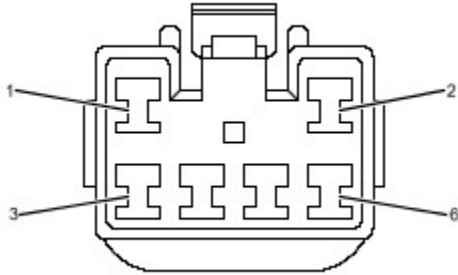
Cavity	Description	Typical Condition - No fault	DTC	PID	Symptom	Input/Output	Possible Cause
1	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
2	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
3	Recirculation motor power/ground	0V, switches to battery voltage while motor drives flap to recirculated air	B1B6801	9976	Air intake flap cannot be adjusted	Input/Output	Recirculation motor fault, wiring short circuit or open circuit. Also see Note below
4	Recirculation motor power/ground	0V, switches to battery voltage while motor drives flap to fresh air	B1B6801	9976	Air intake flap cannot be adjusted	Input/Output	Recirculation motor fault, wiring short circuit or open circuit. Also see Note below
5	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
6	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
7	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
8	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
9	Recirculation motor signal	Approximately 1V when flap in fresh air position, 4V when flap in recirculation position	B1B6711	9958	Air intake flap cannot be adjusted	Input	Short circuit to ground. Also see Note below
9	Recirculation motor signal	Approximately 1V when flap in fresh air position, 4V when flap in recirculation position	B1B6715	9958	Air intake flap cannot be adjusted	Input	Open circuit, short circuit high
10	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
11	Motor ground	Voltage should be similar to that seen on C2655-3	None	None	Most motors inoperative. Very poor A/C performance	Output	Open circuit
12	Sensor ground	Voltage should be similar to that seen on C2655-3	B1B6313	None	No cooling. Air intake flap cannot be adjusted	Output	Open circuit, short circuit to 12V
13	Distribution and temperature blend motor power	Battery voltage when CAN bus is awake	B1B7400, B1B7500, B1B7600, B1B7700	99A2	Most actuators don't work. Poor A/C operation	Input	Short circuit to ground, open circuit
13	Distribution and temperature blend motor	Battery voltage when CAN bus is	None	99A2	Current consumption abnormally high	Input	Short circuit to 12V

	power	awake			in sleep mode		
14	LIN bus	9600 bps signal when ATC module panel on. Average signal approximately 9V, depending on battery voltage	B1B7400, B1B7500, B1B7600, B1B7700	9991, 9992, 9993, 9994	Most actuators don't work, rear A/C control panel inoperative (Discovery 3 only)	Input/Output	Open circuit
14	LIN bus	9600 bps signal when ATC module panel on. Average signal approximately 9V, depending on battery voltage	B1B7400, B1B7500, B1B7600, B1B7700, B1B8200, B1B8300, B1B7088	9991, 9992, 9993, 9994	Most actuators don't work, rear A/C control panel inoperative (Discovery 3 only)	Input/Output	Short circuit to ground
15	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
16	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
17	Blower motor power	Varies between 1.5V and 2.8V according to blower setting	None	9938	Blower motor inoperative	Output	Short circuit to ground, open circuit
17	Blower motor power	Varies between 1.5V and 2.8V according to blower setting	None	9938	Blower motor always running at max. speed when A/C switched on	Output	Short circuit high
18	Blower motor voltage sense	Blower setting 2 will give 6.3V, setting 4 will give 3.3V when battery voltage is 13.5V	None	9938	Blower motor inoperative	Input	Short circuit to ground
18	Blower motor voltage sense	Blower setting 2 will give 6.3V, setting 4 will give 3.3V when battery voltage is 13.5V	None	9938	Blower motor always running at max. speed when A/C switched on	Input	Open circuit, short circuit high
19	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
20	Evaporator temperature sensor signal	Sensor resistance at 25°C is 1.5k ohms. Pull up resistance is 5.62k ohms	B1B7111	995A	A/C inoperative. Possible engine misfire	Input	Short circuit to ground
20	Evaporator temperature sensor signal	Sensor resistance at 25°C is 1.5k ohms. Pull up resistance is 5.62k ohms	B1B7115	995A	A/C inoperative. Possible engine misfire	Input	Open circuit, short circuit high
21	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
22	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
23	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
24	Sensor supply	5V ± 0.25V (C2655-12)	B1A5911	None	Air intake stuck in one position. A/C system inoperative	Output	Short circuit to ground
24	Sensor supply	5V ± 0.25V (C2655-12)	B1B6013	None	Air intake stuck in one position	Output	Open circuit

NOTE :

Also check for mechanical causes of flap malfunction.

Automatic Temperature Control (ATC) Module - C2295

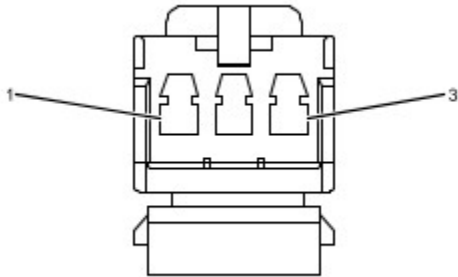


E59870

Cavity	Description	Typical Condition - No fault	DTC	PID	Symptom	Input/Output	Possible Cause
1	Power supply to ATC module - LH seat	Battery voltage via fuse 7	None	None	None	Input	Short circuit high
1	Power supply to ATC module - LH seat	Battery voltage via fuse 7	None	None	LH seat heater inoperative	Input	Open circuit (fuse blows) or short circuit to ground
2	Power supply to ATC module - RH seat	Battery voltage via fuse 7	None	None	None	Input	Short circuit high
2	Power supply to ATC module - RH seat	Battery voltage via fuse 7	None	None	RH seat heater inoperative	Input	Open circuit (fuse blows) or short circuit to ground
3	Power supply to LH seat heater	Ignition switch feed	B1A7318	99A2, 99A6	LH seat heater inoperative	Output	Open circuit (fuse blows), short circuit to ground
3	Power supply to LH seat heater	Ignition switch feed	None	99A2, 99A6	LH seat heater runs continuously	Output	Short circuit high
4	LH seat temperature signal	Resistance at 43° is 2.26k ohms. Pull up resistance is 5.62k ohms	B1B6511	998E	LH seat heater inoperative	Input	Short circuit to ground
4	LH seat temperature signal	Resistance at 43° is 2.26k ohms. Pull up resistance is 5.62k ohms	B1B6515	998E	LH seat heater inoperative	Input	Open circuit, short circuit high
5	RH seat temperature signal	Resistance at 43° is 2.26k ohms. Pull up resistance is 5.62k ohms	B1B6611	998F	RH seat heater inoperative	Input	Short circuit to ground
5	RH seat temperature signal	Resistance at 43° is 2.26k ohms. Pull up resistance is 5.62k ohms	B1B6615	998F	RH seat heater inoperative	Input	Open circuit, short circuit high
6	Power supply to RH seat	Ignition switch feed	B1B6615	99A2, 99A7	RH seat heater inoperative	Output	Short circuit to ground, open circuit (fuse blows)
6	Power supply to	Ignition switch feed	None	99A2,	RH seat heater runs	Output	Short circuit high

RH seat			99A7	continuously		
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Automatic Temperature Control (ATC) Module - C2655



E59871

Cavity	Description	Typical Condition - No fault	DTC	PID	Symptom	Input/Output	Possible Cause
1	Battery power	Battery voltage	None	None	Control panel inoperative	Input	Short circuit high
2	Cavity not used	n/a	n/a	n/a	n/a	n/a	n/a
3	Ground	Information not available	None	None	Control panel inoperative	Input	Open circuit or short circuit high