

DESCRIPTION AND OPERATION

AUTOMATIC TEMPERATURE CONTROL (ATC) – COMFORT

DESCRIPTION

General

The 'Comfort' Automatic Temperature Control (ATC) system is controlled by the ATC ECU, which is located behind the centre console. In addition to the features included on the low line system, the 'Comfort' ATC system also features a second coolant valve, a pollution sensor, and a rear blower unit.

The 'Comfort' ATC system is fully automatic, with separate temperature settings for the LH and RH sides of the passenger compartment. Manual override is available for blower speed, air recirculation, and air distribution.

A Fuel Burning Heater (FBH) is fitted as standard on Td6 vehicles, and as an option on V8 vehicles. For more information on FBH operation, refer to the relevant ***Fuel Burning Heater (FBH)*** section of this manual.

 **FUEL BURNING HEATER – Td6.**

 **FUEL BURNING HEATER – V8.**

For more details on ATC operation, refer to the ***Air Conditioning*** section of the System Description and Operation Workshop manual.

OPERATION

Power Distribution

Feed from the positive battery terminal (C0192) is supplied to the following on an R wire:

- Fusible link 5.
- Maxi fuse 61.
- Maxi fuse 64.
- Fuse 12.
- Fuse 53.

All are located in the passenger compartment fuse box (C0632). Maxi fuse 61 (C0581) provides a constant battery feed to the cooling fan control unit (C0005) on an RU wire. Maxi fuse 64 (C0580) provides a constant battery feed to the front blower motor control unit (C2281) on an RU then YG wire.

Fuse 12 (C0586) provides a constant battery feed to the ATC ECU (C1630) on an RP wire. The ATC ECU (C1630) is earthed on an N wire.

Fuse 53 (C0583) is connected to the ignition switch (C0099 on Td6 vehicles, C0028 on V8 vehicles) by an R wire. When the ignition switch is turned to the 'ignition' position, current flows across the switch (C0099 on Td6 vehicles, C0028 on V8 vehicles) to fuse 34 and fuse 2 of the passenger compartment fuse box (C0585) on a G wire. Fuse 34 (C0587) provides an ignition feed to the ATC ECU (C1629) on a GY wire.

Fuse 2 (C0587) provides an ignition feed to the rear blower relay coil (C2022) on a GY wire. The rear blower relay is located in the rear fuse box (C2021) and is earthed on an N wire.

Fusible link 5 of the passenger compartment fuse box (C0588) provides a constant battery feed to fuse 12R in the rear fuse box (C2024) on an R wire. Fuse 12R is connected to the rear blower relay switch. When the relay is energised, current flows across the closed switch contacts (C2021) to the rear blower motor control unit (C2282) on a GU then SUY then UG wire.

Compressor

When compressor operation is required, the ATC ECU (C1629) sends a message to the Engine Control Module (ECM) via the K bus on a WRY wire. Provided there are no engine management constraints, the ECM (C0331) responds by increasing throttle angle and fuelling and returns a signal granting operation of the compressor to the ATC ECU (C1629) on a BG wire. The ATC ECU (C1630) then provides a feed to the compressor clutch (C0182) on a BS wire.

For more details of compressor operation, refer to the **Air Conditioning** section of the System Description and Operation Workshop manual.

Refrigerant Pressure Sensor

The refrigerant pressure sensor provides the ATC ECU with a pressure input from the high pressure side of the refrigerant system. The ATC ECU (C1629) provides a 5 V reference feed to the pressure sensor (C1610) on a GY wire. The pressure sensor (C1610) returns a signal voltage of between 0 V and 5 V, depending upon system pressure, to the ATC ECU (C1629) on a BS wire. The ATC ECU (C1629) provides an earth path for the pressure sensor (C1610) on an NB wire.

Evaporator Temperature Sensor

The evaporator temperature sensor is a Negative Temperature Coefficient (NTC) sensor. The ATC ECU (C0923) provides a feed to the evaporator temperature sensor (C0417) on an NB wire. By measuring the voltage returned on a YB wire, the ATC ECU (C0923) can determine evaporator temperature.

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Sunlight Sensor

The sunlight sensor consists of a LH and a RH photoelectric cell that provide the ATC ECU with inputs of light intensity. These are used by the ATC to adjust blower speed, temperature, and air distribution. The ATC ECU (C1629) provides a feed to the sunlight sensor (C0790) on a YB wire. The LH photoelectric cell (C0790) returns a signal back to the ATC ECU (C1629) on a YR wire. The RH photoelectric cell (C0790) returns a signal back to the ATC ECU (C1629) on a YG wire. The ATC ECU (C1629) provides an earth path for the sensor (C0790) on a YN wire.

Pollution Sensor

The pollution sensor allows the ATC ECU to monitor the ambient air for the level of hydrocarbons and oxidized gases. The ATC (C1629) provides two feeds to the sensor (C1548). The first is on a U wire, and is used to heat the sensor. A second feed is provided on a Y wire. This is a 5 V reference voltage to the sensor itself. A signal voltage of between 0 V and 5 V is returned from pin 3 of the sensor (C1548) to the ATC ECU (C1629) on an N wire. The ATC ECU (C1629) provides an earth path for the sensor (C1548) on a second N wire (pin 1 of the sensor connector).

Front Blower Motor

Operation of the front blower motor is controlled by the ATC ECU via the front blower motor control unit. To control front blower motor speed, the ATC ECU (C0923) provides a stepped voltage of between 0 V and 8 V to the control unit (C2281) on a UR wire. This is used by the control unit to regulate the supply voltage from maxi fuse 64 of the passenger compartment fuse box to the front blower motor (C0056) on BG and RG wires.

The front blower motor control unit (C2281) is earthed on an N wire.

Rear Blower Motor

Operation of the rear blower motor is controlled by the ATC ECU via the rear blower motor control unit. The ATC ECU (C0923) receives an input voltage of between 1.25 V (blower off) and 5 V (maximum blower speed) from the rear blower motor thumbwheel (C0846) on an RB wire. The thumbwheel is a potentiometer located in the rear ATC control unit. The ATC ECU (C0923) determines the blower speed requested from the voltage received from the thumbwheel and provides a stepped voltage of between 0 V and 5 V to the control unit (C2282) on a B then R wire. This is used by the control unit to regulate the supply voltage from the rear blower relay (C2021) to the rear blower motor (C2279) on GY and N wires.

The rear blower motor control unit (C2282) is earthed on an N wire.

Air Distribution Motors

Unless manually overridden, operation of the air distribution motor is controlled automatically by the ATC ECU. The ATC ECU (C2295) provides a feed to the following on BW wires:

- The face level air distribution motor (C2133).
- The screen air distribution motor (C2134).
- The footwell air distribution motor (C2135).

The ATC ECU (C2295) provides an earth path for all three motors on B wires.

Air Recirculation Motor

Unless manually overridden, operation of the recirculation motor is controlled automatically by the ATC ECU, using inputs from the pollution sensor and/or if rapid passenger compartment cooling is required. The ATC ECU (C2295) provides a feed to the recirculated air motor (C0006) on a BW wire. The ATC ECU (C2295) provides an earth path for the motor (C0006) on a B wire.

Heater Coolant Temperature Sensors

Two heater coolant temperature sensors are fitted on 'Comfort' ATC systems; on RH one LH. Both sensors are Negative Temperature Coefficient (NTC) sensors. The ATC ECU (C0923) provides a feed to the RH (C2296) and LH (C0416) temperature sensors on a pair of NB wires. By measuring the voltage returned on a YU (RH) and YR (LH) wire, the ATC ECU (C0923) can determine the temperature of the air exiting both sides of the heater matrix.

Coolant Valves

Two coolant valves are fitted to 'Comfort' ATC systems to control coolant flow to each side of the heater matrix. Both are controlled by Pulse Width Modulated (PWM) signals from the ATC ECU (C1629) on YN (LH) and YP (RH) wires.

Auxiliary Coolant Pump

The auxiliary coolant pump is used to ensure a satisfactory flow rate through the heater matrix at low engine speeds. The ATC ECU (C1629) provides a feed to the pump (C2035) on a UG wire. The pump (C2035) is earthed on an N wire.

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Cooling Fan

Operation of the cooling fan is controlled by the ECM. When the compressor is engaged, the ATC ECU (C1629) informs the ECM (C0331) via the K bus on a WRY wire that cooling fan operation is required. The ATC ECU also informs the ECM of the speed at which the fan should be driven.

The ECM also monitors Engine Coolant Temperature (ECT) to determine fan speed. The ECM (C0606) provides a feed to the ECT sensor (C0169) on an SU (Td6) or YG (V8) wire. The ECT sensor is a Negative Temperature Coefficient (NTC) sensor. By measuring the voltage returned on an NG (Td6) or NO (V8) wire, the ECM can determine engine coolant temperature.

The ECM (C0331) now provides a feed to the cooling fan control unit (C0005) on a BG wire. This is used by the control unit to regulate the supply voltage from maxi fuse 61 of the passenger compartment fuse box (C0581) on an RU wire.