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BATTERY CHARGING - INGENIUM I6 3.0L PETROL, [+] MHEV

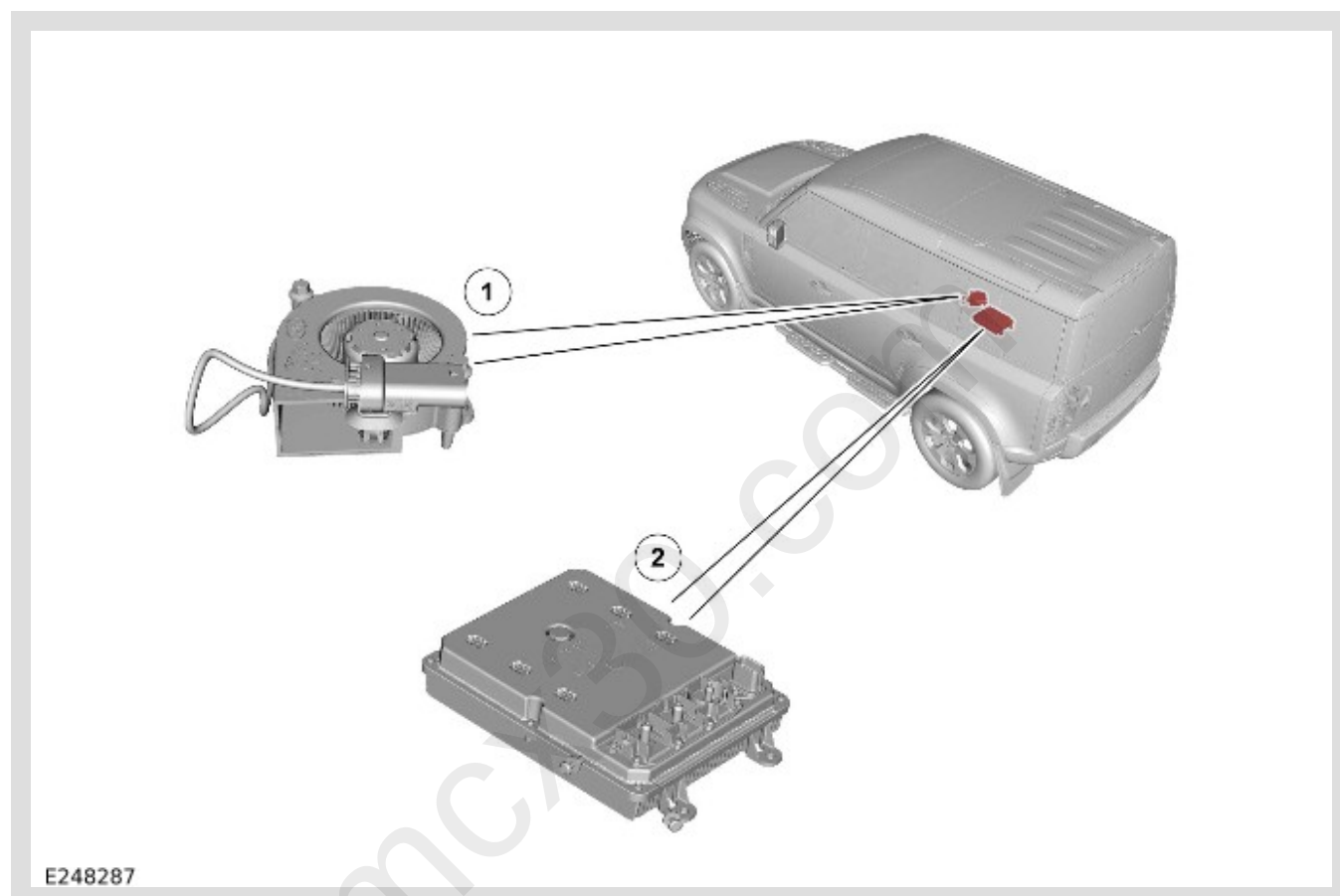
DIRECT CURRENT TO DIRECT CURRENT CONVERTER [G2391071]

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DESCRIPTION AND OPERATION

COMPONENT LOCATION

COMPONENT LOCATION - 1 OF 1



ITEM	DESCRIPTION
1	Direct Current to Direct Current converter (DC/DC) electric cooling fan
2	DC/DC

OVERVIEW

The DC/DC changes the 48V Direct Current (DC) of Mild Hybrid Electric Vehicle (MHEV) battery to the 12V for the vehicle electrical systems.

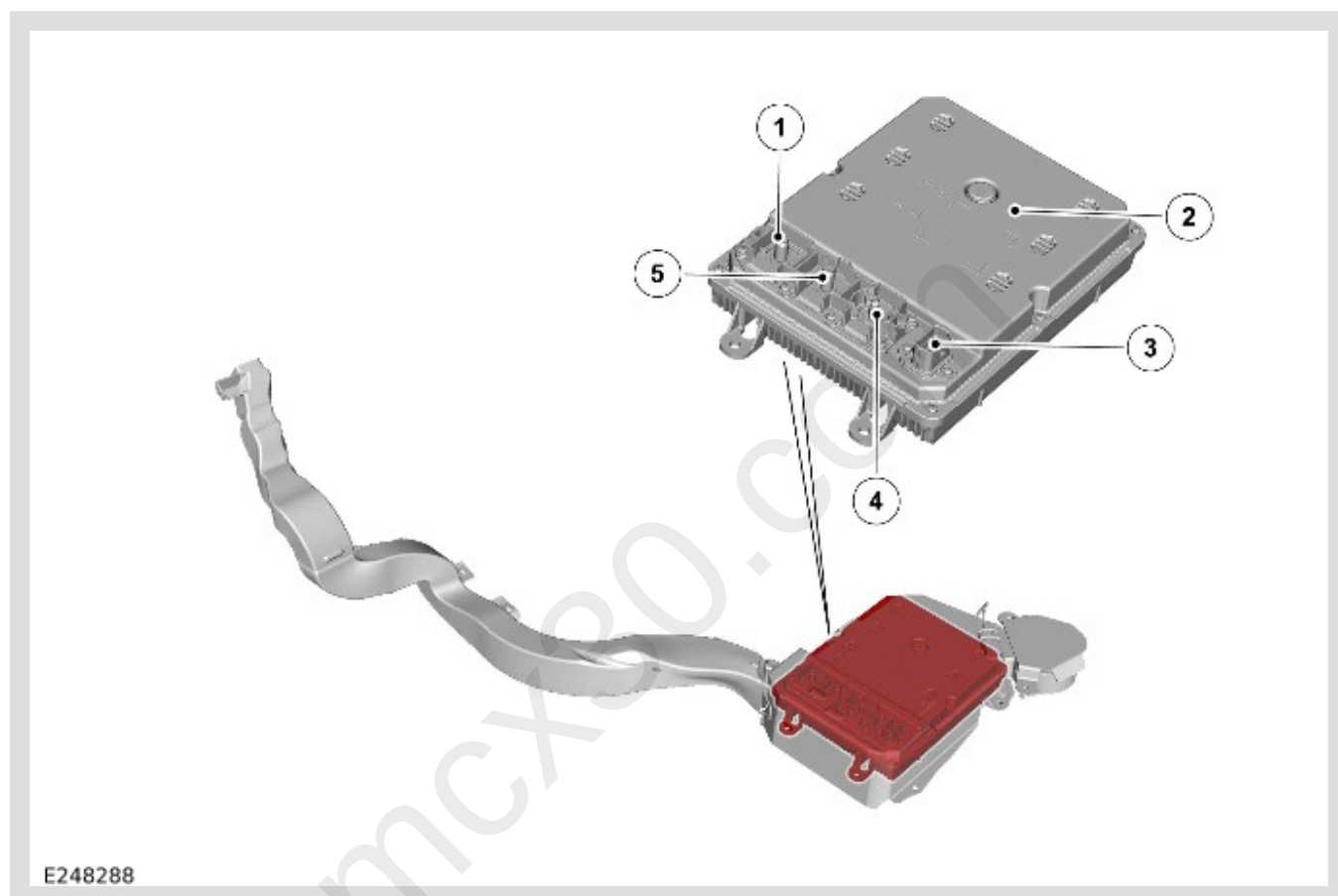
For additional information, refer to: [MHEV Battery and Cables](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).

The DC/DC supplies all the current for the 12V systems and to charge the startup battery.

For additional information, refer to: [Startup Battery and Cables - INGENIUM I6 3.0L Petrol](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).

DESCRIPTION

DC/DC



ITEM	DESCRIPTION
1	Startup battery cable terminal
2	DC/DC
3	Wiring harness connector
4	MHEV battery cable terminal
5	Ground cable terminal

The DC/DC is located in the DC/DC housing. The DC/DC is secured on 3 studs to the lower DC/DC housing with 3 nuts.

The DC/DC is supplied with power from the MHEV battery. The DC/DC converts the MHEV battery voltage from approximately 48V DC to the 12V DC for the following:

- All the vehicles 12V systems.
- The startup battery.

The output from the DC/DC charges the startup battery and provides all the electrical power for all the 12V components. The output from the DC/DC is approximately 14V.

The DC/DC supplies all the power for the startup battery. The DC/DC power for all the vehicle 12V systems in all Power Modes except in Power Mode 0 (vehicle locked and armed).

For additional information, refer to: [Startup Battery and Cables - INGENIUM I6 3.0L Petrol](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).

The DC/DC has 4 electrical connections for the following:

- MHEV battery cable terminal from the MHEV battery junction box.
 - For additional information, refer to: [Startup Battery and Cables - INGENIUM I6 3.0L Petrol](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).
- Ground cable terminal from the MHEV battery junction box.
 - For additional information, refer to: [Startup Battery and Cables - INGENIUM I6 3.0L Petrol](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).
- The 12V DC output to the BJB for the startup battery and the vehicle 12V systems.
 - For additional information, refer to: [Startup Battery and Cables - INGENIUM I6 3.0L Petrol](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).
- Wiring harness connector with 10-pin connections for the following:
 - Power supply from the Body Control Module (BCM)/ Gateway Control Module (GWM).
 - Power supply to the DC/DC electric cooling fan.
 - Ground for the DC/DC electric cooling fan.
 - Pulse Width Modulation (PWM) signal to the DC/DC electric cooling fan.
 - High Speed (HS) Controller Area Network (CAN) power mode zero systems bus (quantity 2).
 - A ground connection.

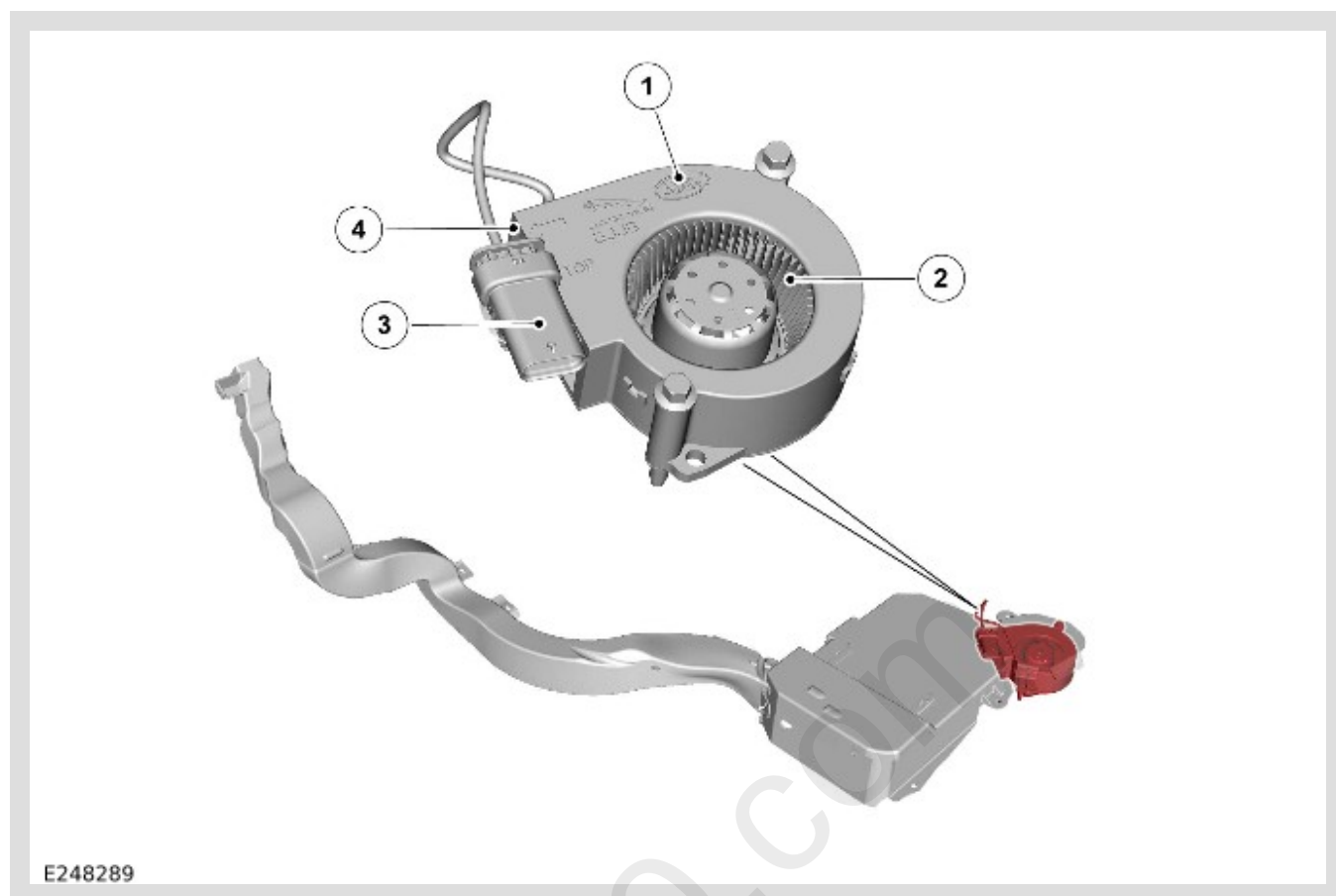


NOTE:

Not all the connection pins in the wiring harness connector are used.

The DC/DC controls the DC/DC electric cooling fan with a PWM signal.

DC/DC ELECTRIC COOLING FAN



ITEM	DESCRIPTION
1	DC/DC electric cooling fan
2	Cooling air inlet
3	Wiring harness connector
4	Cooling air outlet

The DC/DC electric cooling fan is located in the DC/DC housing. The DC/DC electric cooling fan is attached to the lower DC/DC housing with 2 bolts.

The DC/DC electric cooling fan is hardwired to the DC/DC. The DC/DC electric cooling fan has a 3-pin wiring harness connector on a fly lead. The 4-pin connector has the following electrical connections:

- Power supply from the DC/DC.
- A PWM signal from the DC/DC.
- A ground through the DC/DC.

NOTE:

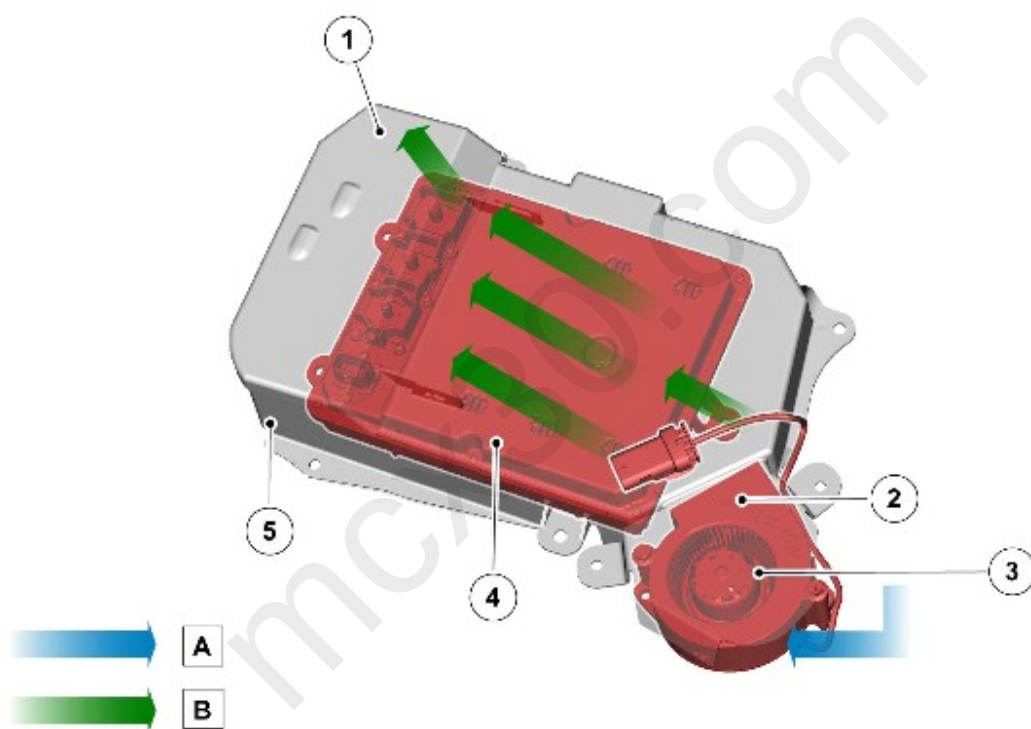
Not all the connection pins in the wiring harness connector are used.

The DC/DC controls the speed of the DC/DC electric cooling fan depending on cooling requirements. The DC/DC uses a PWM signal to control the DC/DC electric cooling fan speed.

Air Ducts

CAUTION:

Make sure that the air duct inlet below the rear right second row seat is not obstructed.



E248290

ITEM	DESCRIPTION
A	Inlet air
B	Outlet air
1	Outlet air duct of the DC/DC
2	Outlet air duct from the DC/DC electric cooling fan to the DC/DC
3	DC/DC electric cooling fan
4	DC/DC

ITEM	DESCRIPTION
5	DC/DC housing

The inlet air duct directs the air from the passenger compartment to the DC/DC electric cooling fan.

The outlet air duct directs the air from the DC/DC electric cooling fan to cool the DC/DC when required. After cooling the DC/DC, the air exits the DC/DC housing.

OPERATION

The DC/DC converts the MHEV battery DC voltage of approximately 48V DC to 12V DC.

The DC/DC supplies all the vehicle 12V systems and charges the startup battery. The DC/DC communicates with the BCM/ GWM. The DC/DC communicates through the HS CAN power mode zero systems bus. The BCM/ GWM sends charging load requests and the DC/DC produces the correct output voltage and current to match the vehicle electrical load requests.

The electrical systems are powered from the DC/DC in all modes except in Power Mode 0 (vehicle locked and armed). The DC/DC also charges the startup battery through the BJB.

For additional information, refer to: [Startup Battery and Cables - INGENIUM I6 3.0L Petrol](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).

For additional information, refer to: [MHEV Battery and Cables](#) (414-01B Battery, Mounting and Cables - Vehicles With: MHEV, Description and Operation).

The HS CAN power mode zero systems bus is also connected to the following:

- The Battery Energy Control Module (BECM) in the MHEV battery.
- The Powertrain Control Module (PCM).
- The BCM/ GWM.

DC/DC TEMPERATURE CONTROL

The DC/DC is cooled by the DC/DC electric cooling fan. Operation of the DC/DC electric cooling fan is controlled by the DC/DC. The DC/DC has temperature sensors within the housing to monitor the internal temperatures. The DC/DC reports the internal temperature data to the PCM. The signal is sent through the HS CAN power mode zero systems bus.

The operation and speed of the DC/DC electric cooling fan is determined by the PCM, using internal temperature data and a computer model. Then the PCM sends the fan speed control signal back to the DC/DC. The DC/DC generates a PWM to control the DC/DC electric cooling fan speed. The lower DC/DC housing is finned to increase the surface area for the air to cool the DC/DC.

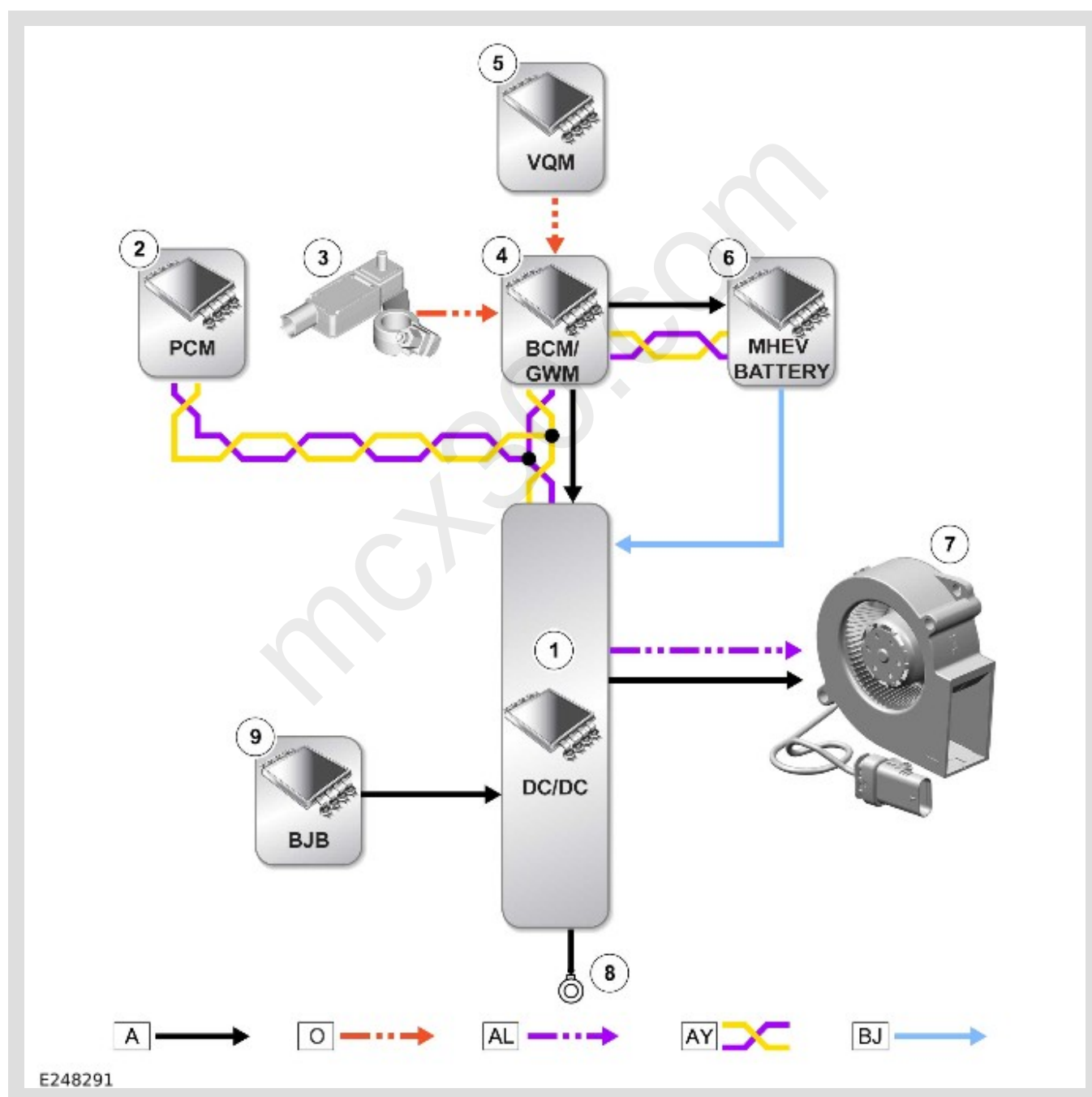
DIAGNOSTICS

The BCM/ GWM records any Diagnostic Trouble Code (DTC) and related data. The DTC and related data are read using the Jaguar Land Rover (JLR) approved diagnostic equipment.

The JLR approved diagnostic equipment enables certain components to be activated and also read live data.

CONTROL DIAGRAM

CONTROL DIAGRAM - 1 OF 1



A = HARDWIRED: O = LOCAL INTERCONNECT NETWORK (LIN): AL = PWM: AY = HS CAN POWER MODE ZERO
SYSTEMS BUS: BJ = MHEV BATTERY CABLE.

ITEM	DESCRIPTION
1	DC/DC
2	PCM
3	Battery Monitoring System (BMS) control module
4	BCM/ GWM
5	Voltage Quality Module (VQM)
6	MHEV battery
7	DC/DC electric cooling fan
8	Ground
9	BJB

cmIjaGFyZG1vcnRvbjsyMDIwLTASLTE4VDA5OjMxOjUwLjI2MVo7OTUuNDAuMTg5LjUzOw==