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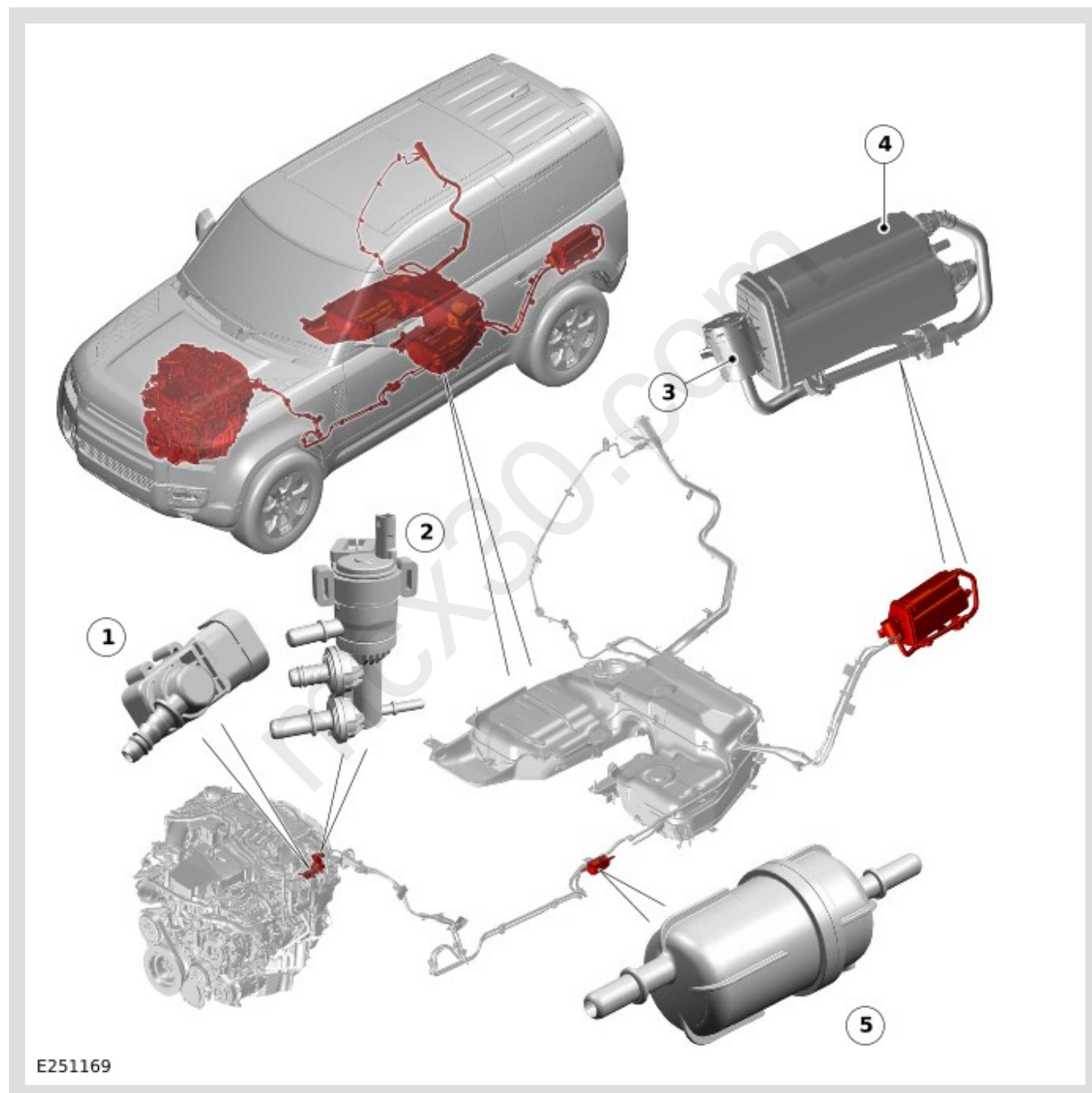
2020.0 DEFENDER (LE), 303-13B

EVAPORATIVE EMISSIONS - INGENIUM I6 3.0L PETROL (G2341958)

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COMPONENT LOCATION

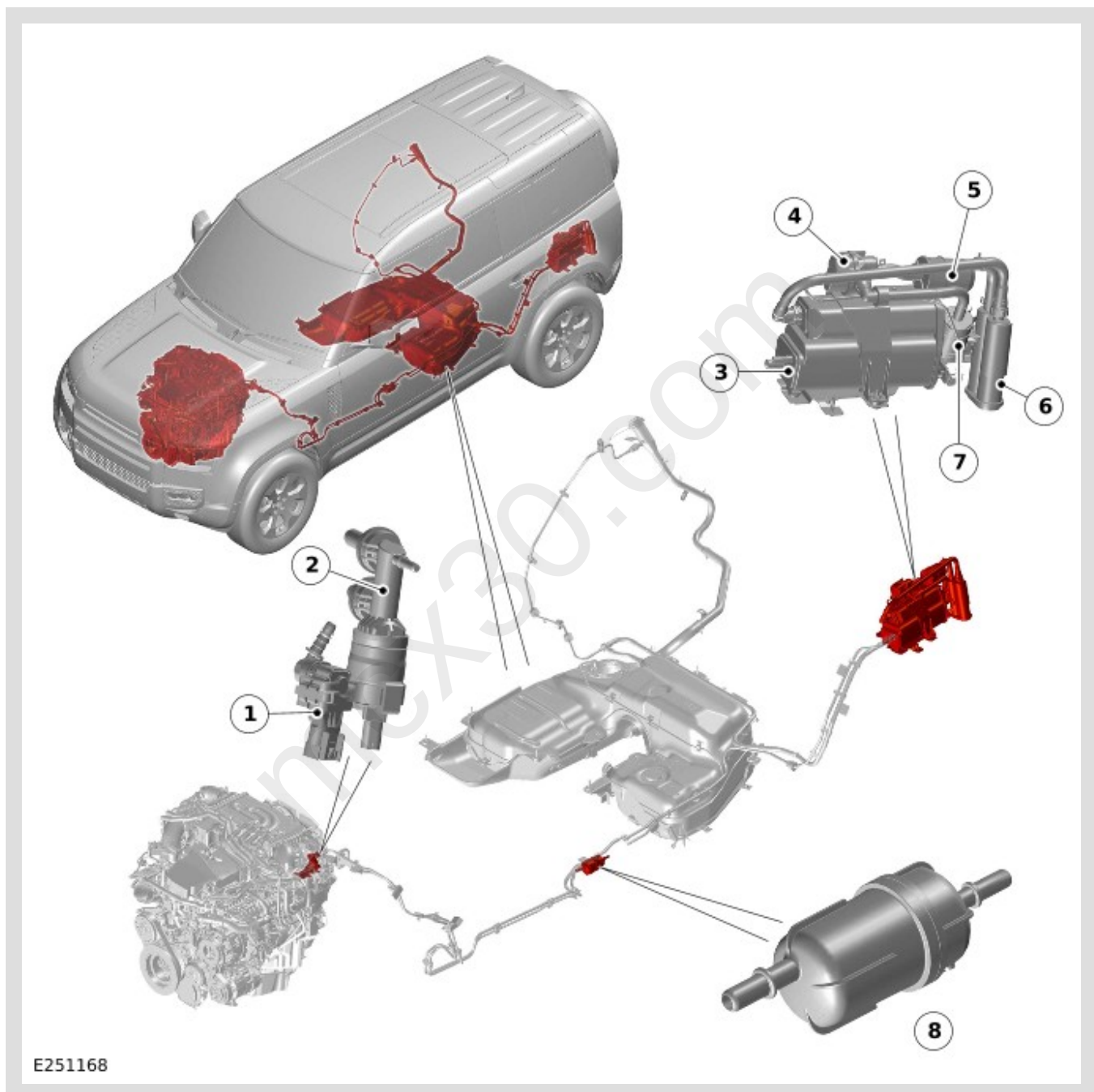
COMPONENT LOCATION - 1 OF 2 - REST OF WORLD



ITEM	DESCRIPTION
1	Canister Purge Valve (CPV) pressure sensor assembly
2	CPV assembly

ITEM	DESCRIPTION
3	Evaporative emission canister air filter
4	Evaporative emission canister
5	Purge line damper (expansion volume)

COMPONENT LOCATION - 1 OF 2 - NORTH AMERICAN SPECIFICATION AND CHINA



ITEM	DESCRIPTION
1	CPV pressure sensor assembly
2	CPV assembly
3	Evaporative emission canister

ITEM	DESCRIPTION
4	Diagnostic Module Tank Leakage (DMTL) pump
5	DMTL filter
6	Secondary evaporative emission canister
7	Evaporative emission canister air filter
8	Purge line damper (expansion volume)

OVERVIEW

The evaporative emission system reduces the level of hydrocarbons released into the atmosphere by fuel vapor venting from the fuel tank.

Fuel vapor is generated by the fuel in the fuel tank. The amount of fuel vapor produced increases as the fuel temperature rises. Another source of fuel vapor generation is the refueling process. Fuel vapor can flow without restriction to the evaporative emission canister through the tank venting system.

To prevent the charcoal becoming saturated, the fuel vapor is purged from the evaporative emission canister when the engine is running under certain operating conditions. The Powertrain Control Module (PCM) operates the canister purge valve at the correct times. This allows fuel vapor to be drawn from the evaporative emission canister and burnt in the engine.

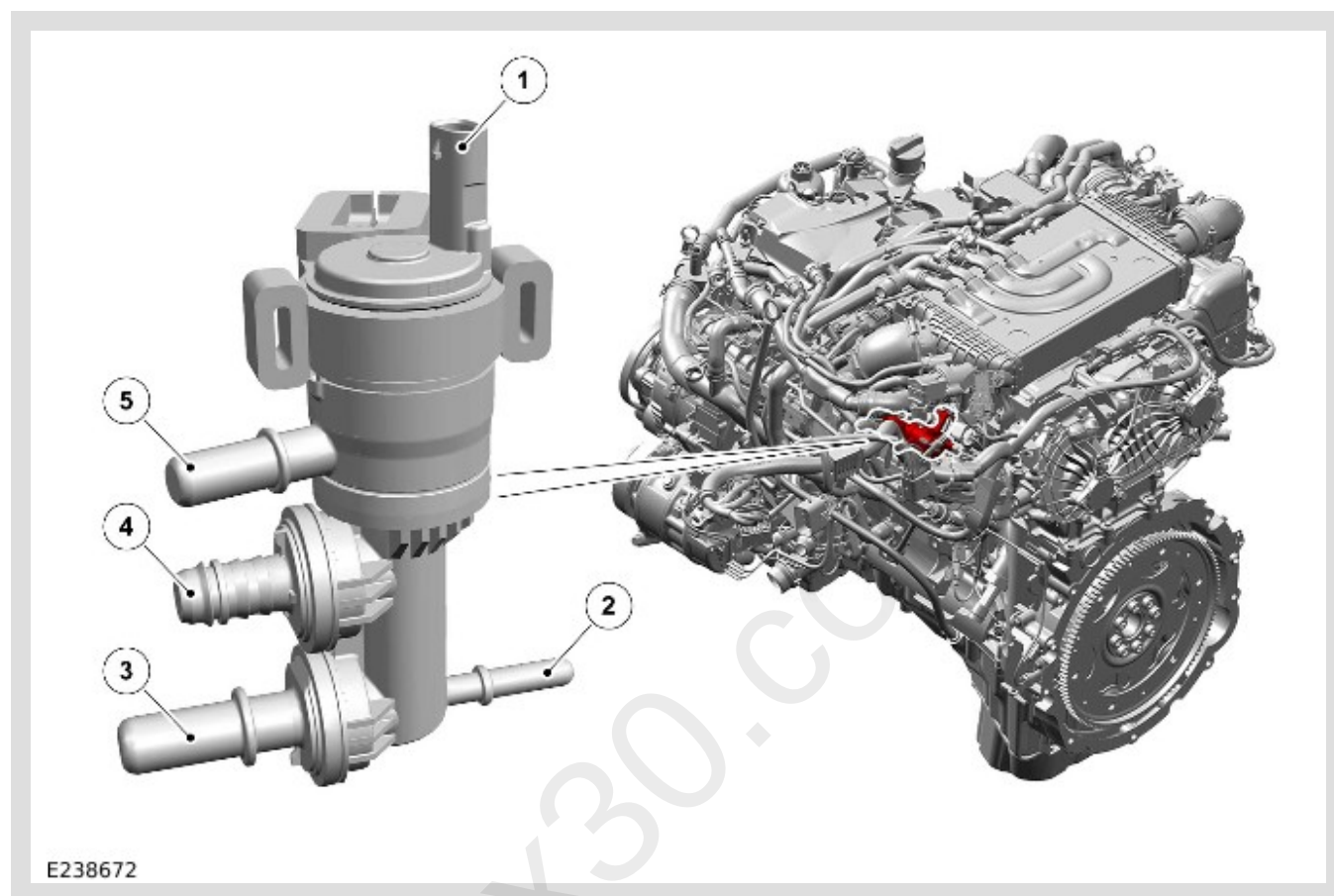
The evaporative emission system comprises:

- An evaporative emission canister
- A purge valve
- A purge valve pressure sensor
- Purge lines
- A purge line damper (expansion volume)
- A DMTL pump (if equipped)
- A DMTL filter (if equipped)
- A secondary evaporative emission canister (bleed emissions canister) - (if equipped)
- A vapor space within fuel tank
- A fuel filler
- A filler cap

On North American Specification and China market vehicles, there is an additional DMTL system. The DMTL system allows the fuel vapor system to be pressurized and therefore allows detection of a leak.

DESCRIPTION

CPV



ITEM	DESCRIPTION
1	Electrical connector - To engine harness
2	Pipe connector - To purge valve pressure sensor
3	Pipe connector - To clean air intake pipe (pre-compressor)
4	Pipe connector - To intake manifold
5	Pipe connector - Purge line from evaporative emission canister

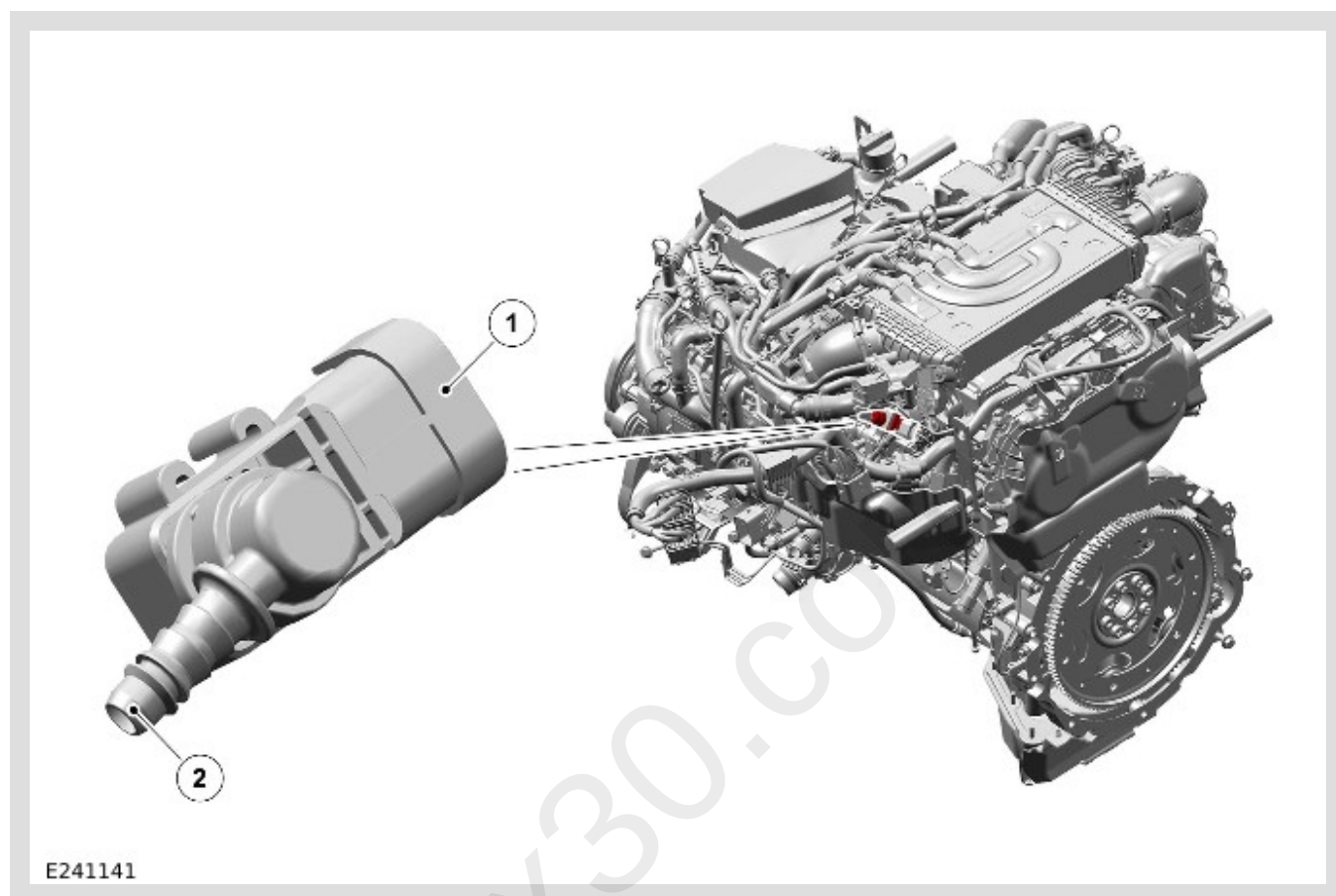
The CPV is located on the left side of the engine, mounted to the intake manifold through the purge valve bracket.

The CPV comprises the following components:

- The control solenoid
- A 1-way check valve for the intake manifold connection
- A 1-way check valve for the clean air intake pipe connection

The canister purge valve is closed when the solenoid is not energised. The purge valve receives a fused power supply from the Engine Junction Box (EJB) and a Pulse Width Modulated (PWM) signal at a calibrated frequency from the PCM.

PURGE VALVE PRESSURE SENSOR

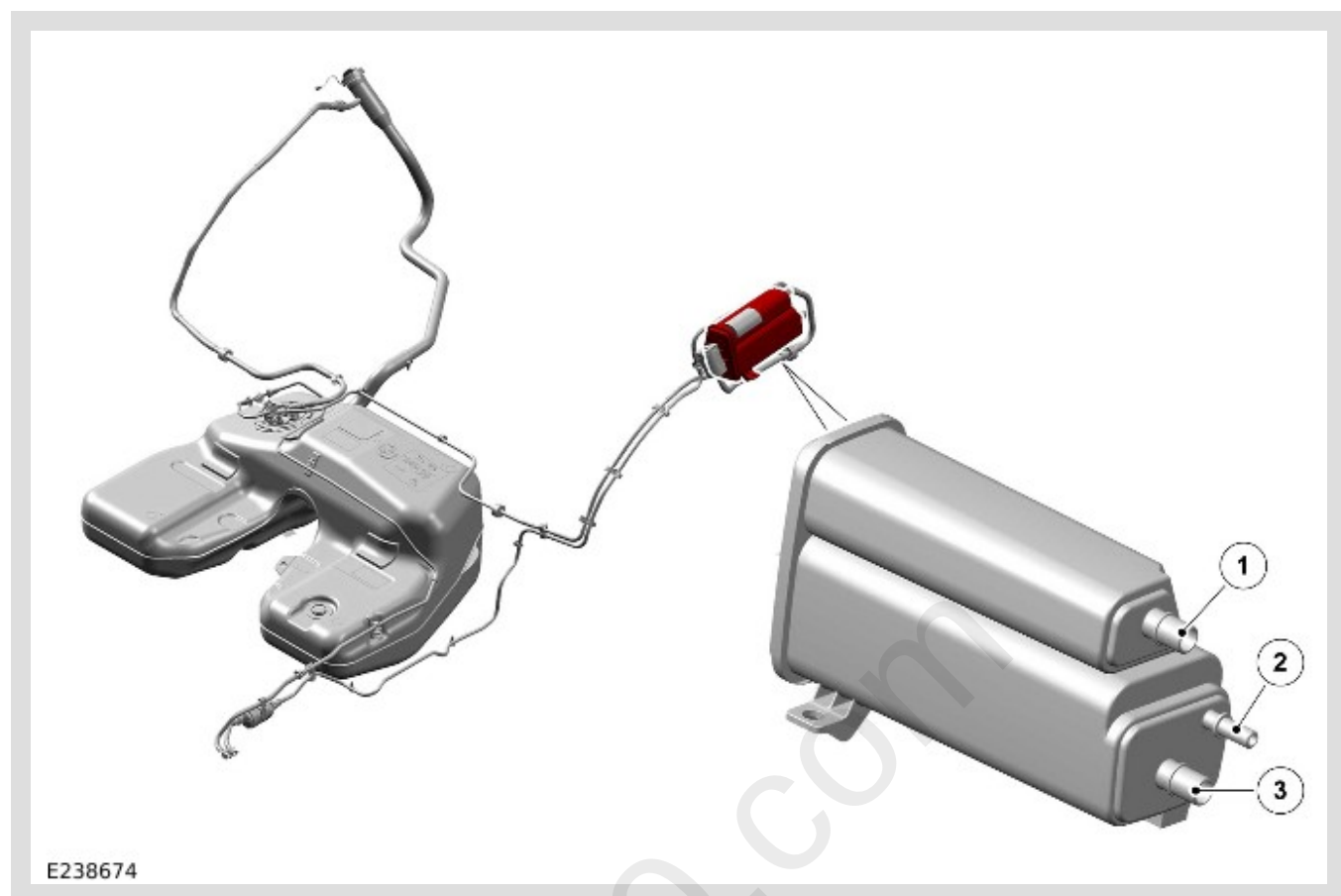


ITEM	DESCRIPTION
1	Electrical connector - To engine harness
2	Pipe connector - To purge valve

The purge valve pressure sensor is mounted to the purge valve. The purge valve pressure sensor connects to the purge valve through a rigid plastic pipe. The purge valve pressure sensor connects to the PCM through 3 wires, which provide 5V power supply, ground and signal return connections.

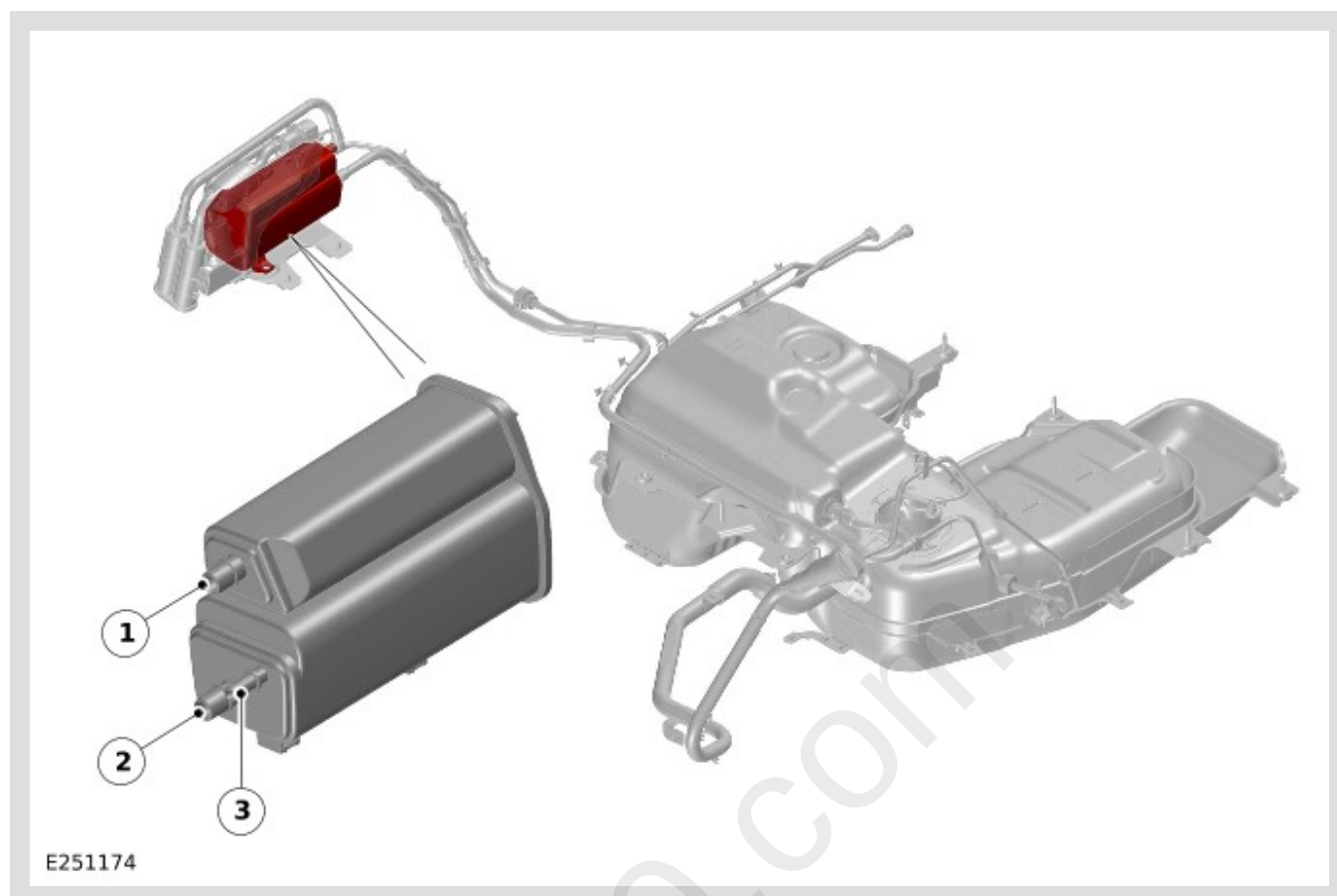
The purge valve pressure sensor monitors the pressure downstream of the purge valve continuously, to make sure of correct canister purge operation. The pressure signals from the purge valve pressure sensor are compared with the values predicted from the actuation of the valve within the PCM so it can determine if the canister purge is operating correctly.

EVAPORATIVE EMISSION CANISTER – REST OF WORLD



ITEM	DESCRIPTION
1	Pipe connector - To air filter
2	Pipe connector - To purge valve
3	Pipe connector - To fuel tank

EVAPORATIVE EMISSION CANISTER – NORTH AMERICAN SPECIFICATION AND CHINA



ITEM	DESCRIPTION
1	Pipe connector - To the secondary evaporative emission canister (bleed emissions canister)
2	Pipe connector - To the fuel tank/fuel filler pipe
3	Pipe connector - To the purge valve

The evaporative emission canister is located on the top of the rear left wheel arch.

The evaporative emission canister contains a bed of activated charcoal or carbon. The charcoal is produced using a special manufacturing technique to treat the charcoal with oxygen. The oxygen treatment opens up millions of pores between the carbon atoms, resulting in a highly porous charcoal with a very large effective surface area. This makes the charcoal capable of absorbing large quantities of fuel vapor. When treated, the charcoal is known as activated charcoal or carbon.

The connectors on the evaporative emission canister allow for the attachment of the fuel tank and the purge valve. An atmospheric vent is located on the underside of the evaporative emission canister and allows fresh air to be drawn into the canister.

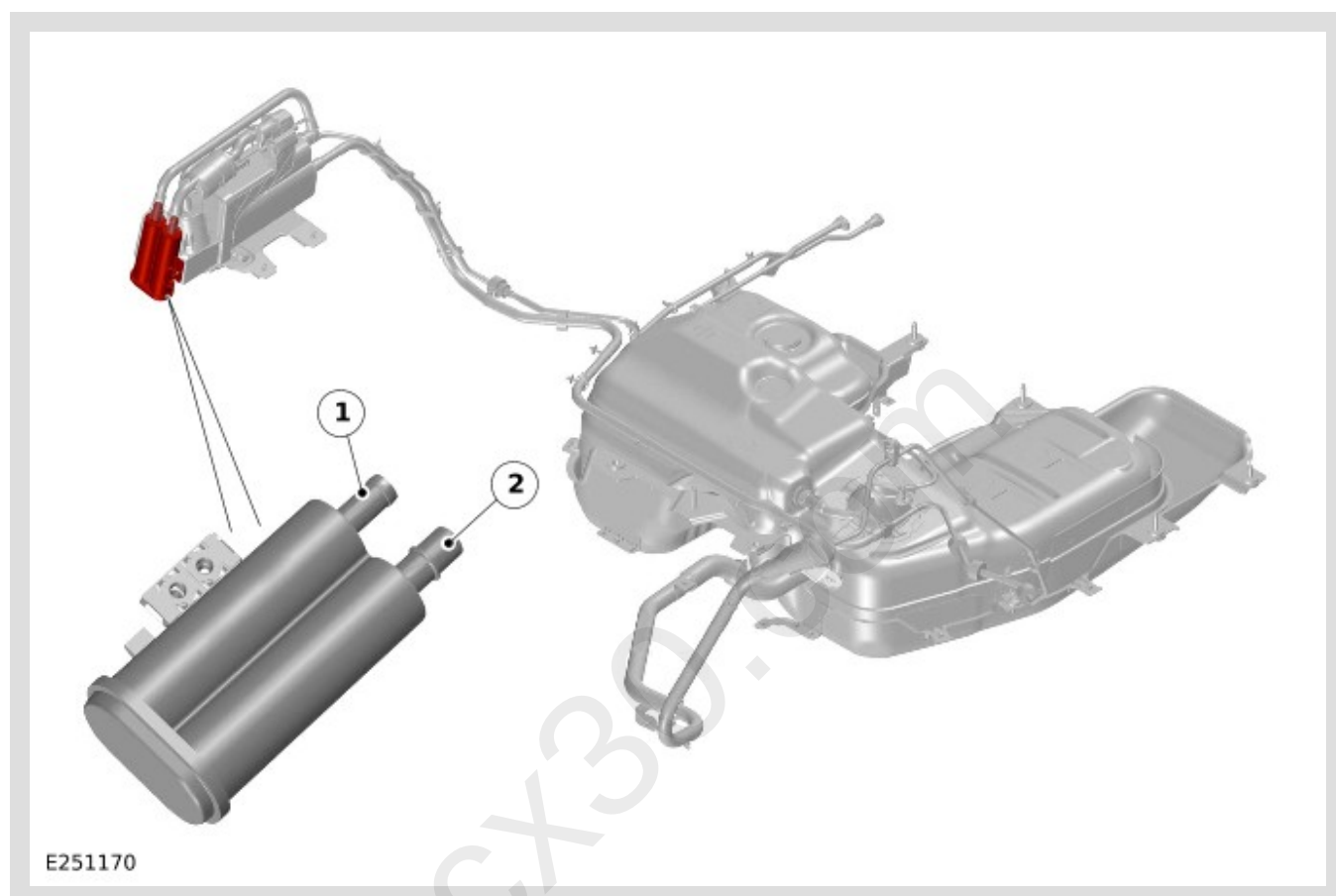
There are 3 connectors on the evaporative emission canister:

- The vapor pipe from the fuel tank

- The vapor pipe to the purge valve
- The DMTL pump (if fitted) and filter connection

The evaporative emission canister is not repairable but can be replaced if damaged.

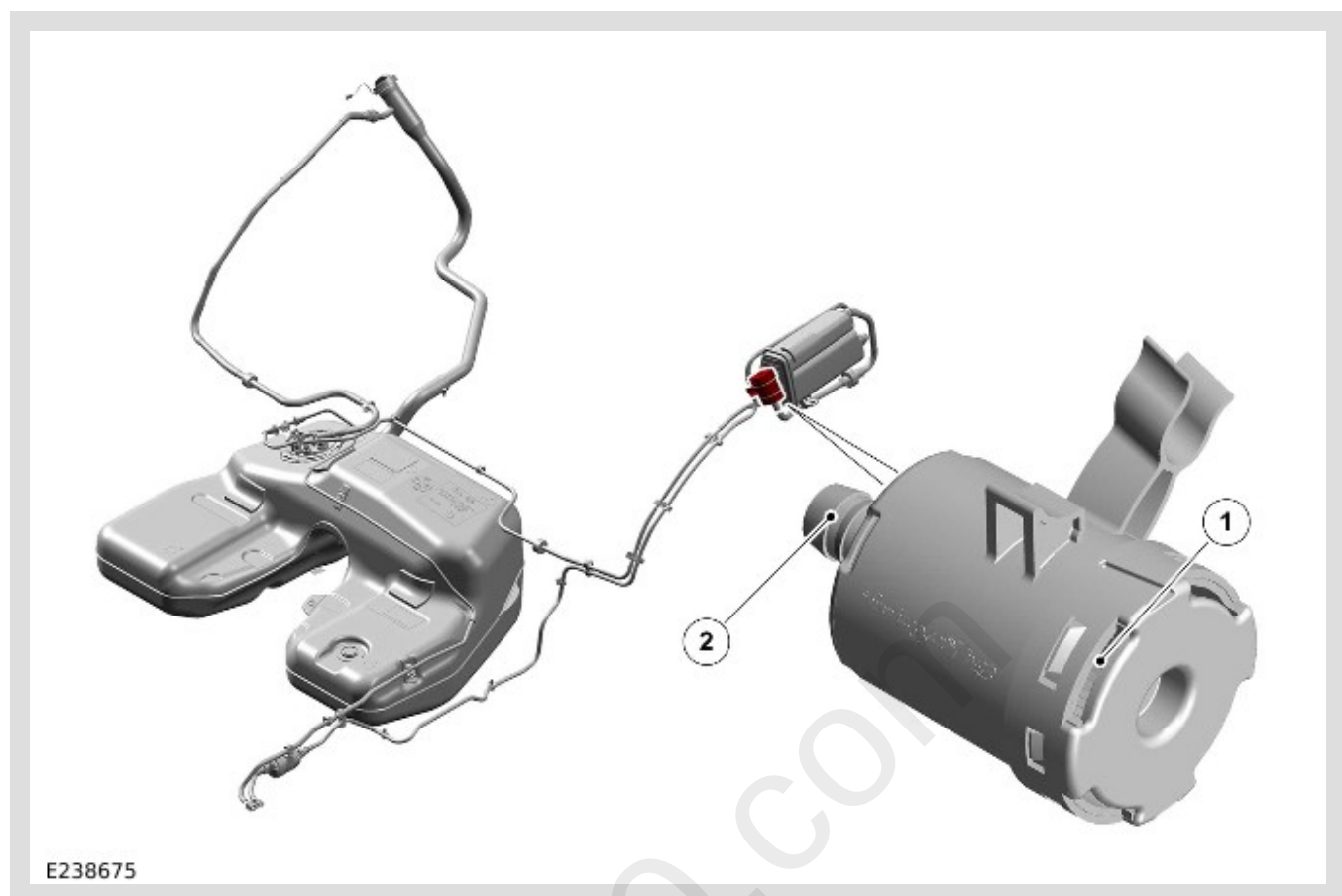
SECONDARY EVAPORATIVE EMISSION CANISTER (BLEED CANISTER) – NORTH AMERICAN SPECIFICATION AND CHINA



ITEM	DESCRIPTION
1	Pipe connector - DMTL pump
2	Pipe connector - Evaporative emission canister

The secondary evaporative emission canister (bleed canister) is installed at the rear side of the evaporative emission canister. The secondary evaporative emission canister (bleed canister) is connected in series with the evaporative emission canister to counteract the diffusion of hydrocarbons and their subsequent release.

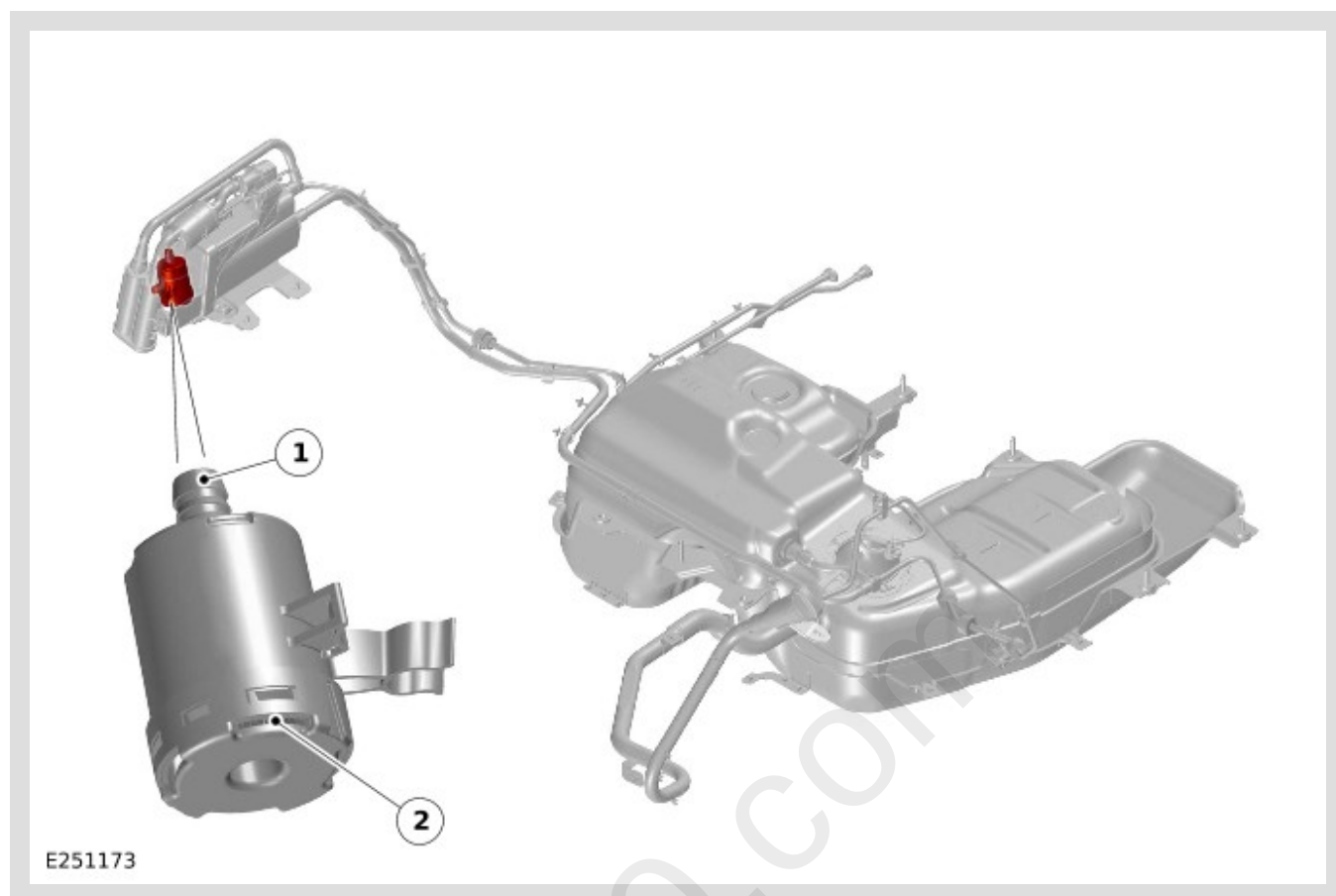
EVAPORATIVE EMISSION CANISTER AIR FILTER – REST OF WORLD



ITEM	DESCRIPTION
1	Air intake
2	Pipe connector to Evaporative emission canister (through DMTL pump on North American Specification/China variants)

The evaporative emission canister air filter is installed on the front side of the evaporative emission canister. The air flows into the evaporative emission canister through the air filter which filters any dust out of the air.

EVAPORATIVE EMISSION CANISTER AIR FILTER – NORTH AMERICAN SPECIFICATION AND CHINA

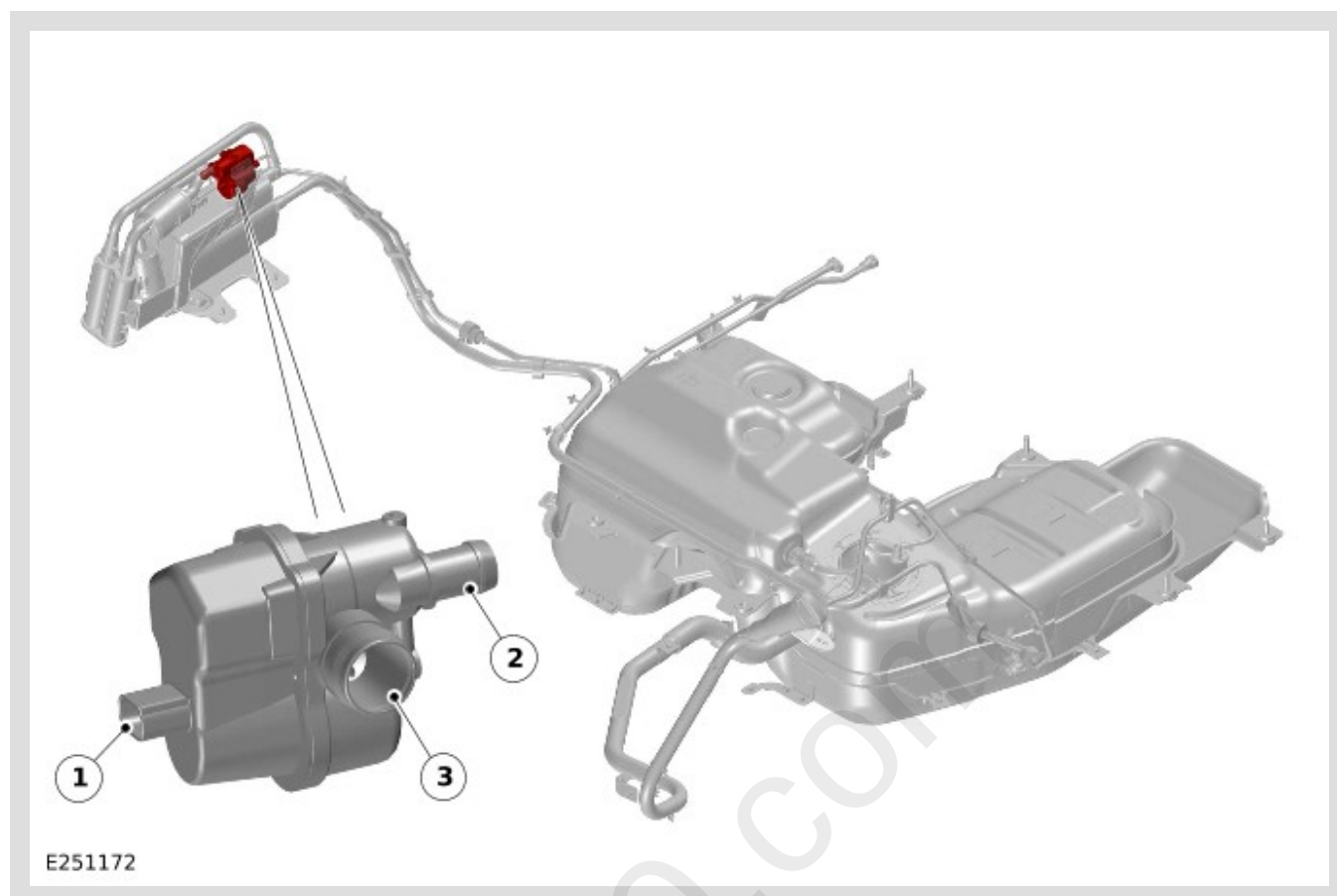


ITEM	DESCRIPTION
1	Pipe connector - DMTL pump
2	Air intake

The evaporative emission canister air filter is installed on the rear of the evaporative emission canister assembly.

The evaporative emission canister air filter is connected to the DMTL pump with a pipe. The evaporative emission canister air filter protects the DMTL pump from dust being drawn into the system when the pump is operating.

DIAGNOSTIC MODULE TANK LEAKAGE PUMP – NORTH AMERICAN SPECIFICATION AND CHINA



ITEM	DESCRIPTION
1	Electrical connector - To engine wiring harness
2	Pipe connector - DMTL filter
3	Pipe connector - Evaporative emission canister air filter

The DMTL pump periodically checks the evaporative emission system and the fuel tank for leaks when:

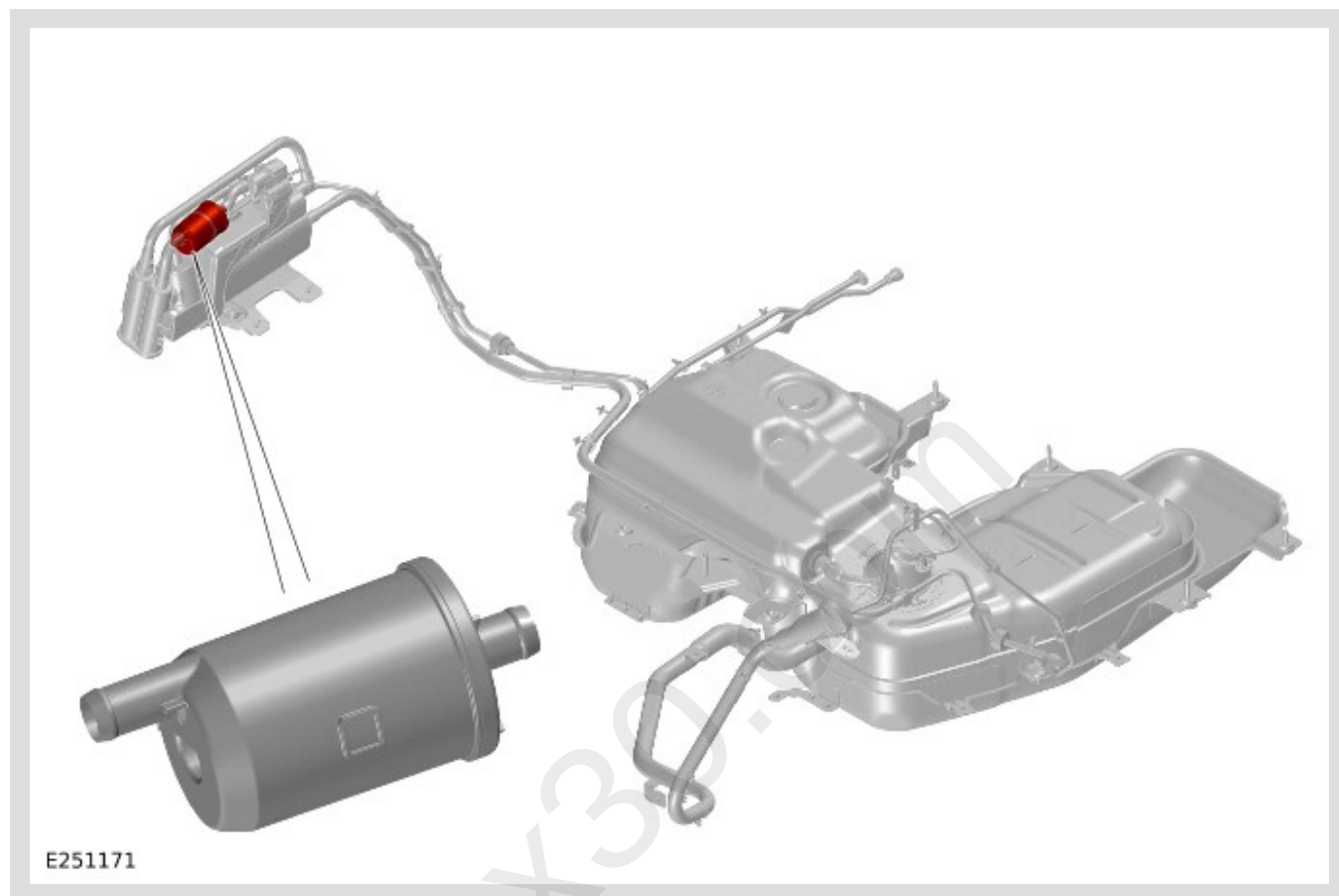
- The ignition is OFF
- In Power Mode 0 (vehicle locked and armed)

The DMTL pump comprises an electric air pump, a Positive Temperature Coefficient (PTC) heating element, a changeover valve and a reference orifice.

The DMTL pump is operated for leak detection when the ignition is OFF and is controlled by the PCM. The PCM also monitors the air pump operation and the changeover valve for faults.

The DMTL pump is operated to pressurize the evaporative emissions system. The PCM measures the current change with the changeover valve in different states. The PCM makes a comparison of the current draw in each state and any difference indicates the degree of any leakage. If a leak is detected, the PCM sets the appropriate Diagnostic Trouble Code(s) (DTC).

DIAGNOSTIC MODULE TANK LEAKAGE FILTER – NORTH AMERICAN SPECIFICATION AND CHINA ONLY



The DMTL filter is located on the top of the evaporative emission canister. The filter is installed between the DMTL pump and the bleed canister. The DMTL filter is used to increase the air cleaning within the evaporative emission system and protect the DMTL from charcoal dust.

OPERATION

CANISTER PURGE VALVE

During the purge valve operation the fuel vapor flows into the intake manifold or the clean air intake pipe (pre-compressor).

- Off-boost condition.
 - There is no additional pressure from the turbocharger (Naturally-aspirated condition).
 - The vacuum in the intake manifold draws the fuel vapor through the 1-way check valve in the purge valve assembly.
- On-boost condition.
 - There is additional air pressure from the turbocharger.

- The fuel vapor passes to the clean air vent through the 1-way check valve.

The clean air intake pipe houses a venturi, which has the following connections:

- A fuel vapor purge connection from the purge valve.
- A High Pressure (HP) charged air connection from the compressor outlet.

During the turbocharger operation, some HP air flow is diverted through the venturi, which generates additional depression through the venturi. The depression operates the check valve within the purge valve assembly and so the fuel vapor from the purge valve is diverted to the venturi. Then the fuel vapor is mixed with the fresh air in the clean air intake pipe.

The PCM waits until the engine coolant temperature rises above 40°C (104°F), with closed-loop fuelling operational, before canister purge activates. The purge valve duty (and resulting flow) is initially ramped slowly because the vapor concentration is unknown and a sudden increase in purge could cause the engine to stall or loss of air/fuel ratio control to occur.

The concentration of the canister purge vapor is then determined from the amount of adjustment that the fuelling requires, to achieve the target air/fuel ratio. After the concentration has been determined, the purge flow can be increased. The injected fuel can be adjusted to compensate for the known purge vapor and the target air/fuel ratio control is maintained.

When the purge process is active, fresh air is drawn into the evaporative emission canister through the air filter, located on the canister vent port.

DIAGNOSTIC MODULE TANK LEAK DETECTION DEVICE – NORTH AMERICAN SPECIFICATION AND CHINA MARKET VEHICLES ONLY

To check the fuel tank and the evaporative emission system for leaks, the DMTL pump monitors its current draw. Initially, the PCM establishes a reference current by pumping air through its reference orifice and back to atmosphere. When the reference current is determined, the PCM closes the changeover valve, which seals the evaporative emission system (the purge valve remains de-energized and is therefore closed). The output from the air pump is diverted from the reference orifice and into the evaporative emission system.

The DMTL pump begins to pressurize the evaporative emission system. The load and current draw of the air pump motor increases. By monitoring the rate and level of the current increase and comparing it to the reference value, the PCM can determine if there is a leak in the evaporative emission system. If a leak is detected, the PCM sets an appropriate DTC.

During normal vehicle operation, 15 seconds after the engine stop, the PCM energizes the heating element in the DMTL pump. This prevents condensation formation and possible incorrect readings. The heater remains energized even the vehicle is locked and armed (Power Mode 0) until the leak test is completed.

Leaks are classified as:

- Minor - Equivalent to a hole diameter of 0.5 mm to 1.0 mm (0.02 in to 0.04 in).

- Major - Equivalent to hole diameter of 1.0 mm (0.04 in) or greater.

**NOTE:**

A leak test can be done using the Jaguar Land Rover (JLR) approved diagnostic equipment.

The PCM does a check for minor leaks after every second major leak check. When the leak check is complete, the PCM stops the DMTL pump and opens (de-energizes) the changeover valve.

The PCM aborts the leak check if refueling is detected, by a sudden drop in the current draw or a rise in the fuel level.

If a leak is detected during the check, the PCM stores an appropriate DTC in its memory. If a leak is detected, the PCM illuminates the Malfunction Indicator Lamp (MIL) in the Instrument Panel Cluster Control Module (IPC) on the next drive cycle.

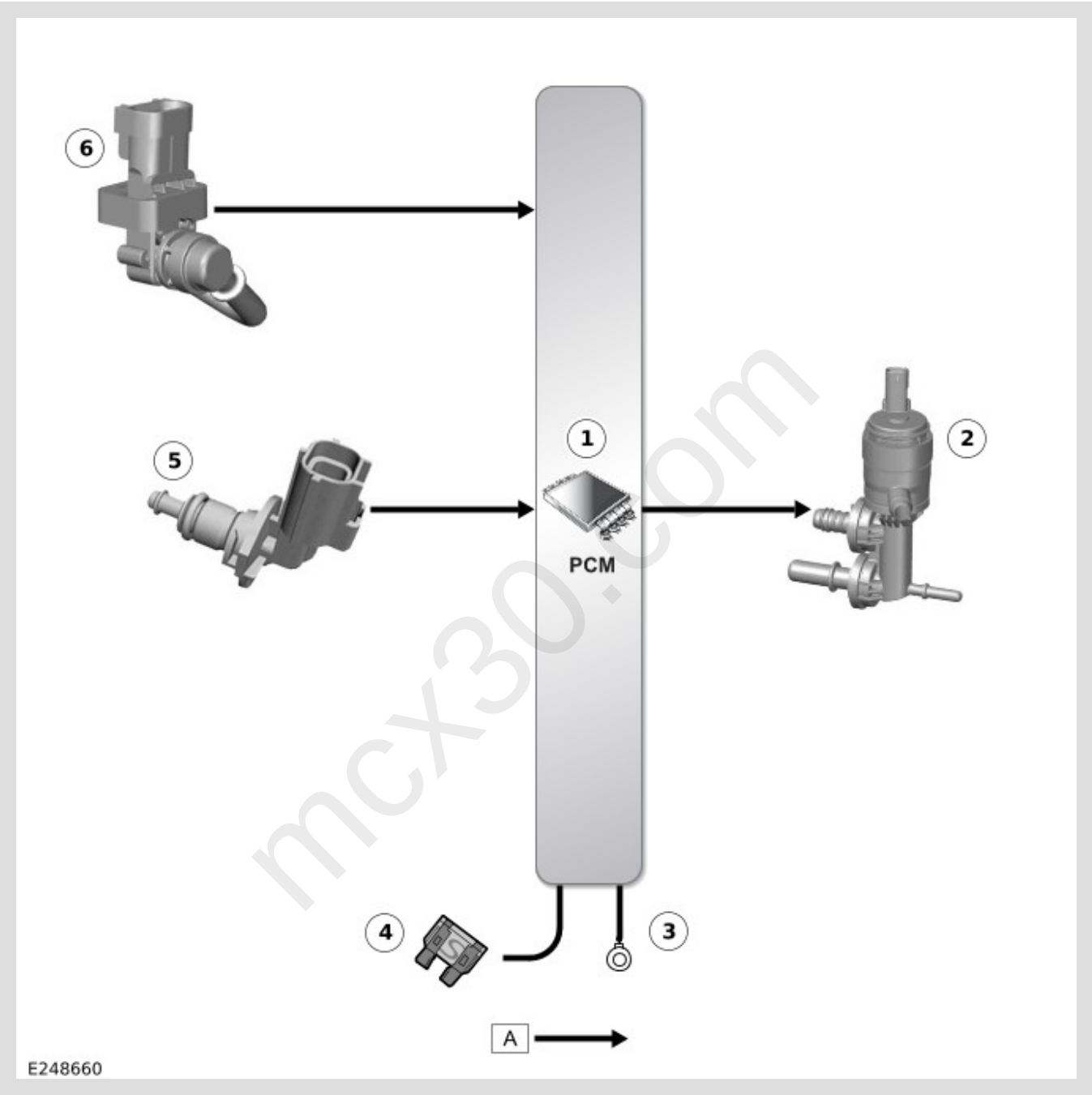
The duration of a leak check can be between 60 seconds and 900 seconds depending on fuel tank level and if or not a leak is present.

DIAGNOSTICS

The PCM records any DTC and related data. Read the DTC and related data with the JLR approved diagnostic equipment.

The JLR approved diagnostic equipment can read live data and activate certain components.

CONTROL DIAGRAM - 1 OF 2 - CANISTER PURGE VALVE

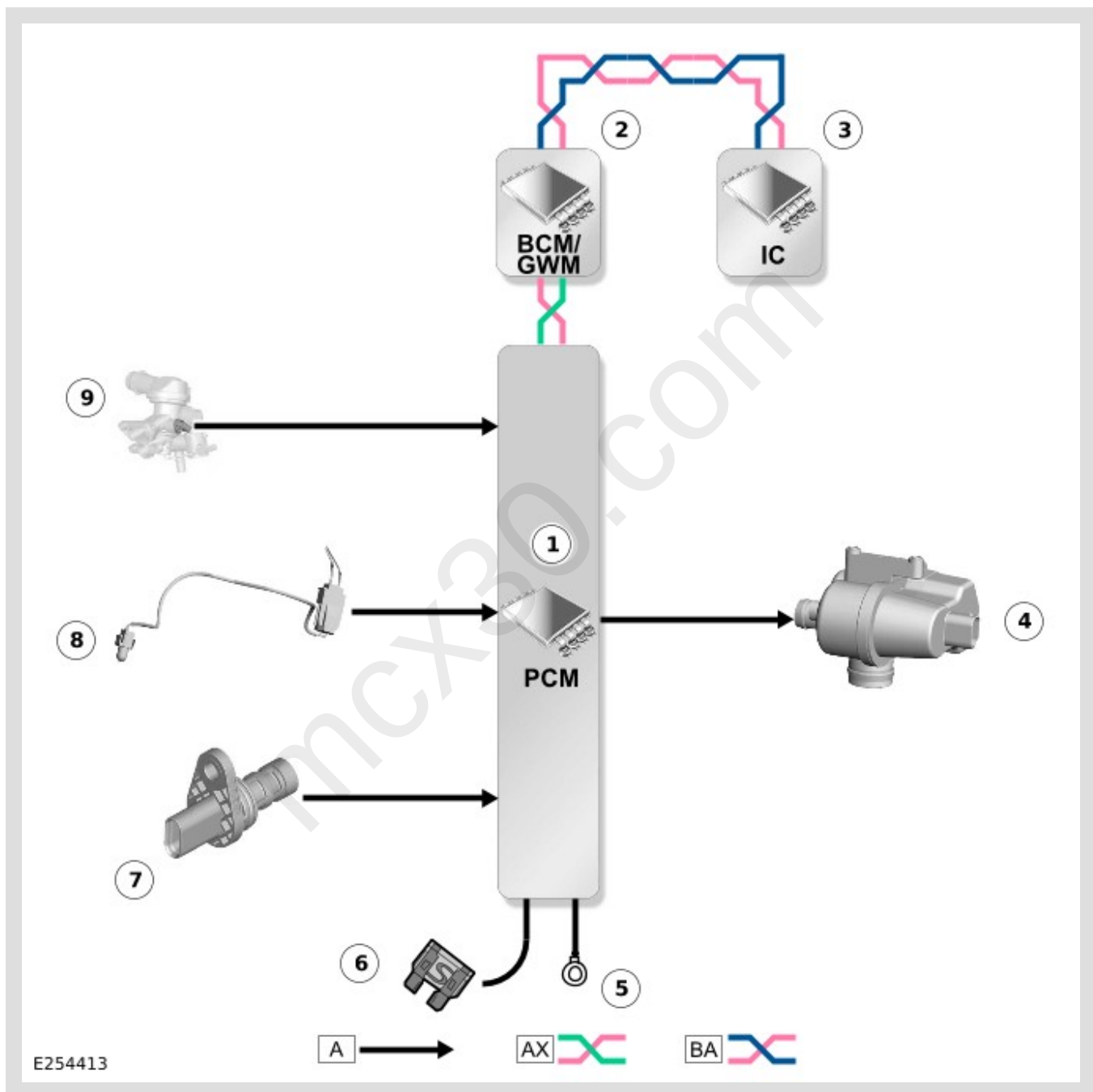


A = HARDWIRED.

ITEM	DESCRIPTION
1	PCM
2	CPV
3	Ground

ITEM	DESCRIPTION
4	Power supply
5	Engine coolant temperature sensor
6	Purge valve pressure sensor

CONTROL DIAGRAM - 2 OF 2 - DIAGNOSTIC MODULE TANK LEAKAGE PUMP



A = HARDWIRED: BA = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) HUMAN MACHINE INTERFACE (HMI) SYSTEMS BUS: AX = FLEXRAY.

ITEM	DESCRIPTION
1	PCM

ITEM	DESCRIPTION
2	Body Control Module (BCM)/ Gateway Module A (GWM)
3	IPC
4	DMTL pump
5	Ground
6	Power supply
7	Crankshaft Position Sensor (CKP) sensor
8	Ambient Air Temperature (AAT) sensor
9	Engine coolant temperature sensor

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