

PUBLISHED: 03-MAR-2020
2020.0 DEFENDER (LE), 303-04F

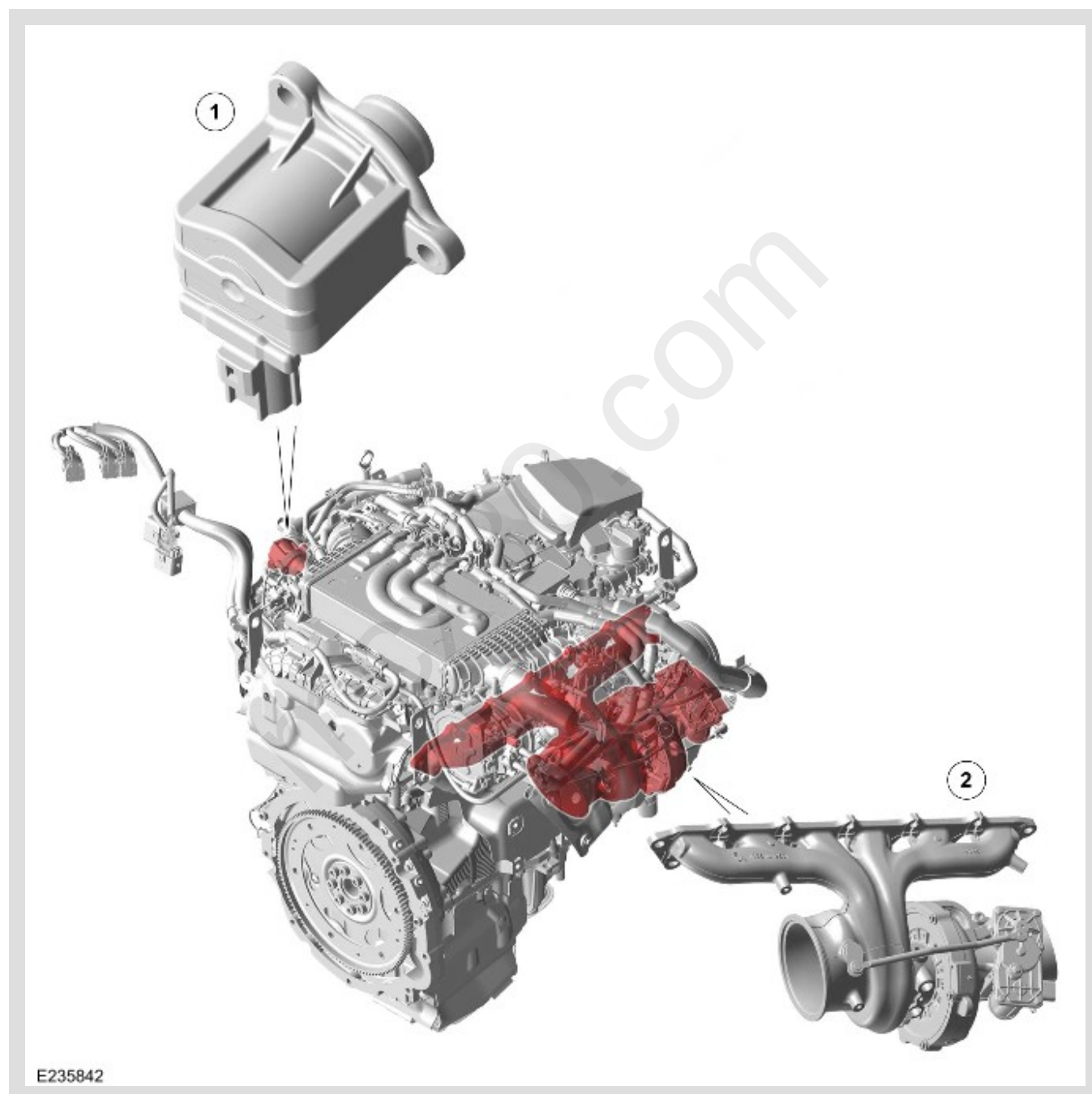
FUEL CHARGING AND CONTROLS - TURBOCHARGER - INGENIUM I6 3.0L PETROL

TURBOCHARGER (G2341936)

mcx30.com

COMPONENT LOCATION

COMPONENT LOCATION 1 OF 1



ITEM	DESCRIPTION
1	Compressor Recirculation Valve (CRV)
2	Turbocharger

OVERVIEW

The INGENIUM I6 3.0L Petrol engine is equipped with a twin scroll type turbocharger with an electronically operated wastegate actuator.

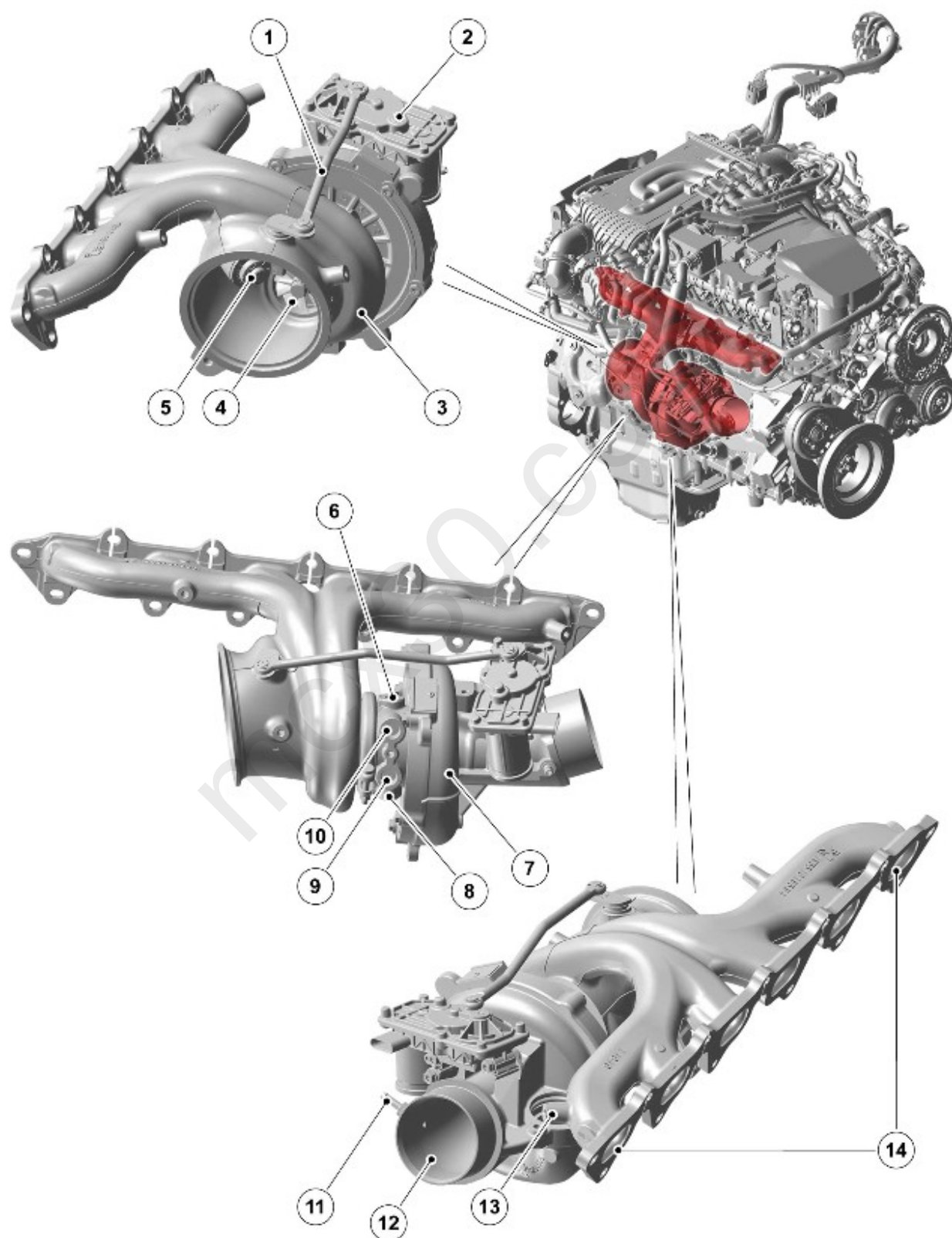
The turbocharger consists of 2 elements, the turbine and the compressor. The turbine and the compressor are enclosed separately and mounted on a common shaft.

The engine coolant cools the turbocharger, which allows the turbocharger to operate with increased exhaust gas temperature.

The turbocharger wastegate actuator and the Compressor Recirculation Valve (CRV) control the charge air pressure of the turbocharger.

mcx30.com

TURBOCHARGER



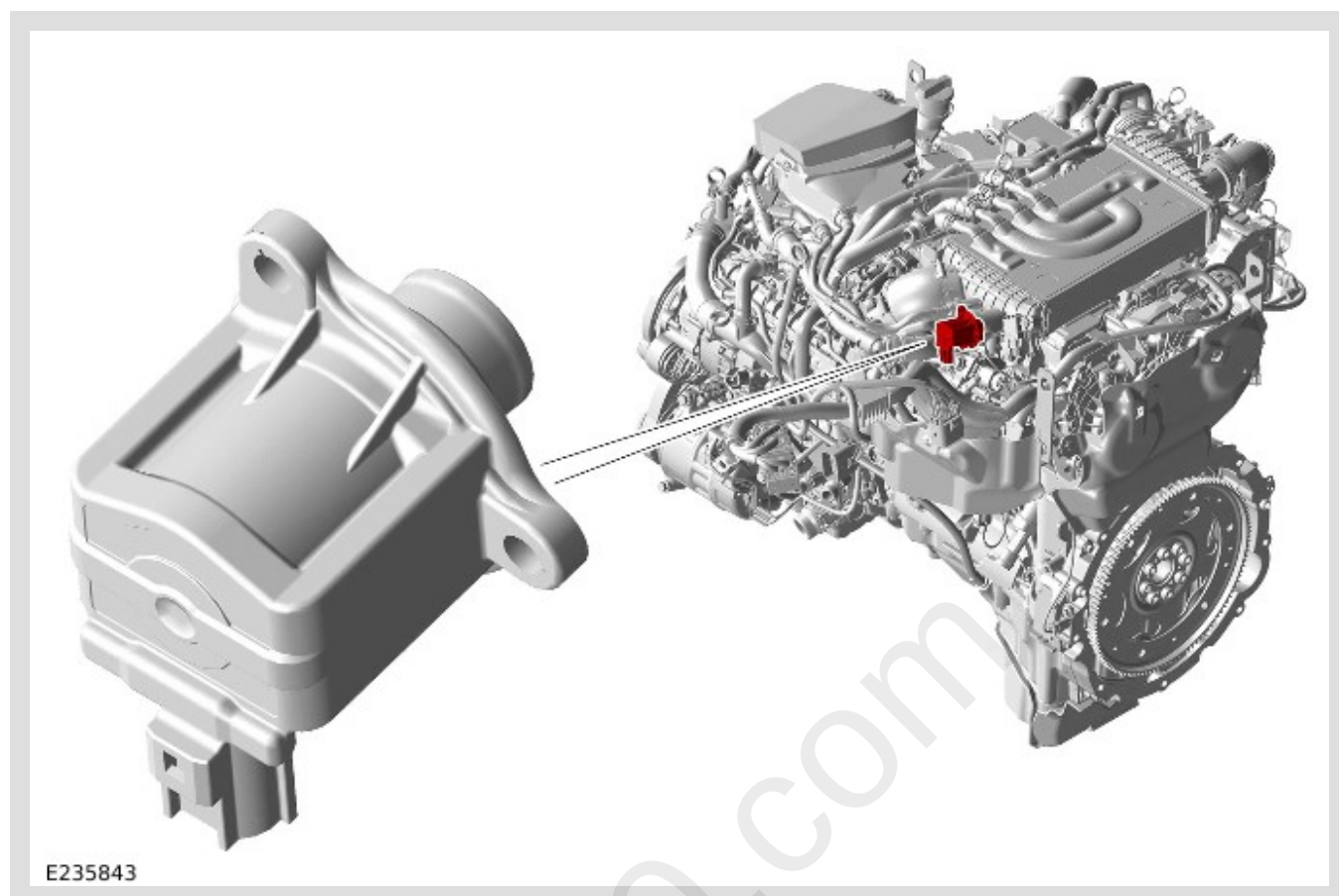
ITEM	DESCRIPTION
1	Connecting rod
2	Turbocharger wastegate actuator
3	Turbine housing
4	Turbine wheel
5	Turbine Bypass Valve (TBV)
6	Pipe connector - Oil supply pipe
7	Compressor housing
8	Pipe connector - Oil return pipe
9	Engine coolant outlet
10	Engine coolant inlet
11	Draining pipe - Supercharger
12	Charge air inlet
13	Charge air outlet
14	Exhaust manifold

The turbocharger is installed on the right side of the cylinder head. The turbocharger is sealed to the cylinder head with a gasket.

The turbine wheel is installed in the turbine housing and the compressor is installed in the compressor housing . The turbine wheel and the compressor are enclosed separately and mounted on a common shaft.

The turbocharger wastegate actuator is installed on the compressor housing with 3 bolts. The turbocharger wastegate actuator operates the Turbine Bypass Valve (TBV) and allows the exhaust gas to bypass the turbine wheel. The turbocharger wastegate actuator position sensor is integrated in the turbocharger wastegate actuator and measures the position of the turbocharger wastegate actuator. The Powertrain Control Module (PCM) controls the turbocharger wastegate actuator through Pulse Width Modulation (PWM) signal.

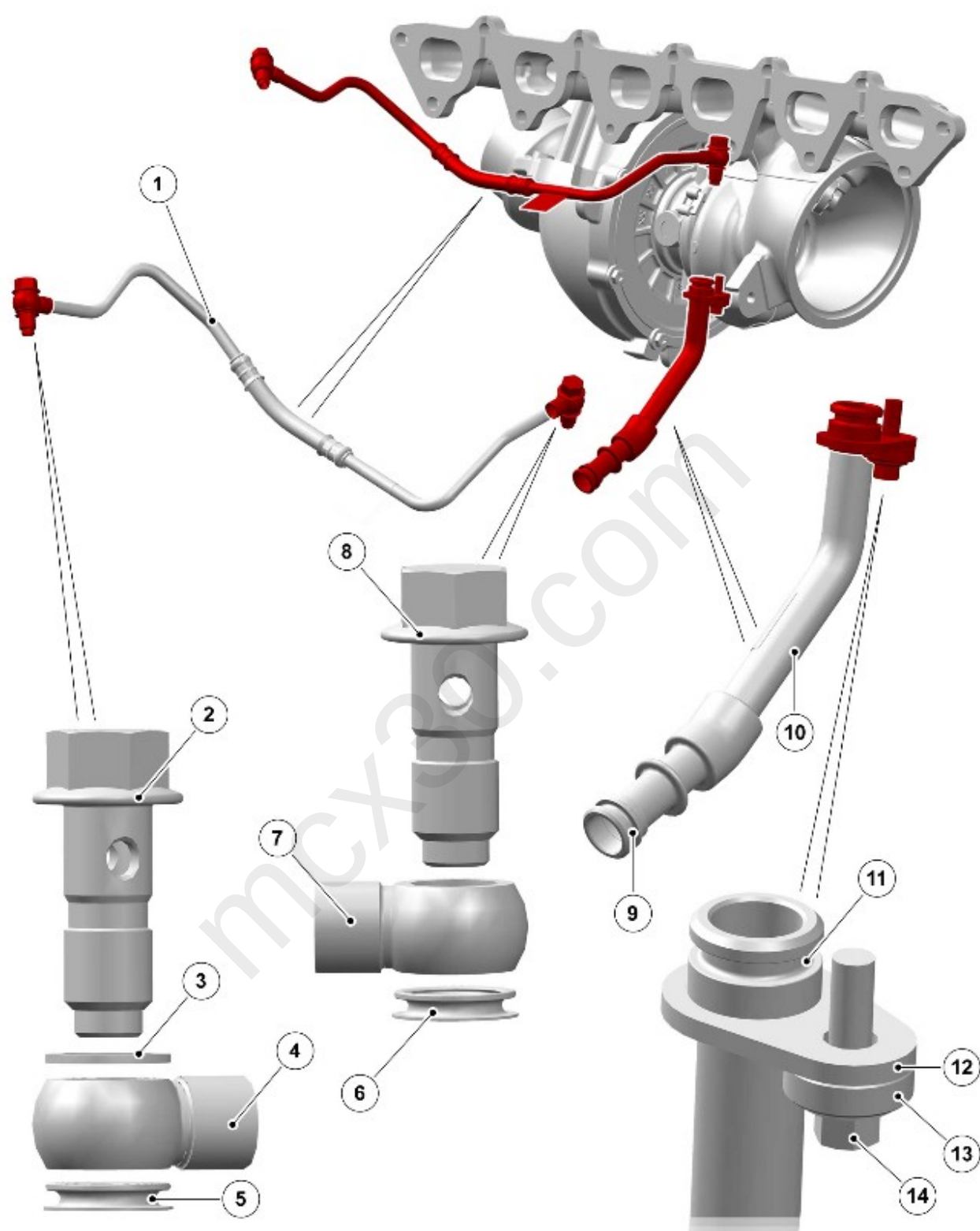
COMPRESSOR RECIRCULATION VALVE



The Compressor Recirculation Valve (CRV) is installed on the left side of the charge air cooler with 3 screws.

During a quick throttle closing event, the engine needs less charge air. The CRV allows the charge air to flow to the intake air pipe in case of creating High Pressure (HP) inside the charge air cooler. The Powertrain Control Module (PCM) controls the CRV through Pulse Width Modulation (PWM) signal.

TURBOCHARGER LUBRICATION



E235845

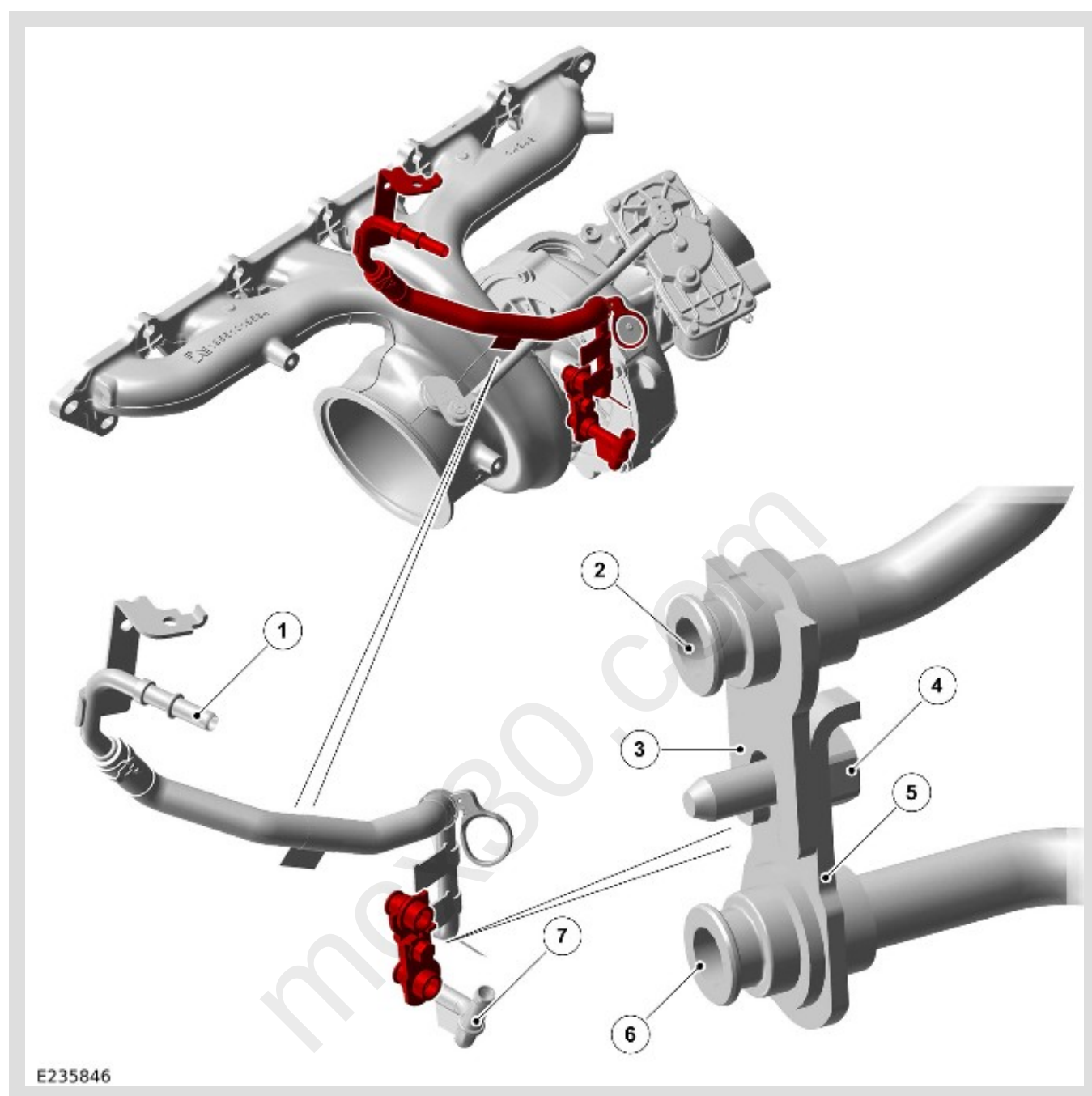
ITEM	DESCRIPTION
1	Oil supply pipe

ITEM	DESCRIPTION
2	Bolt
3	Washer
4	Banjo
5	Washer
6	Washer
7	Banjo
8	Bolt
9	Oil return pipe - To oil pan
10	Oil return pipe
11	Oil return pipe - To turbocharger
12	Flange
13	Washer
14	Bolt

When the engine is running, the turbine wheel shaft rotates at a high speed. It is essential to reduce the friction between the bearing and turbine wheel shaft.

The oil supply pipe transmits the engine oil from the oil filter housing to the turbocharger. The engine oil returns to the oil pan through the oil return pipe.

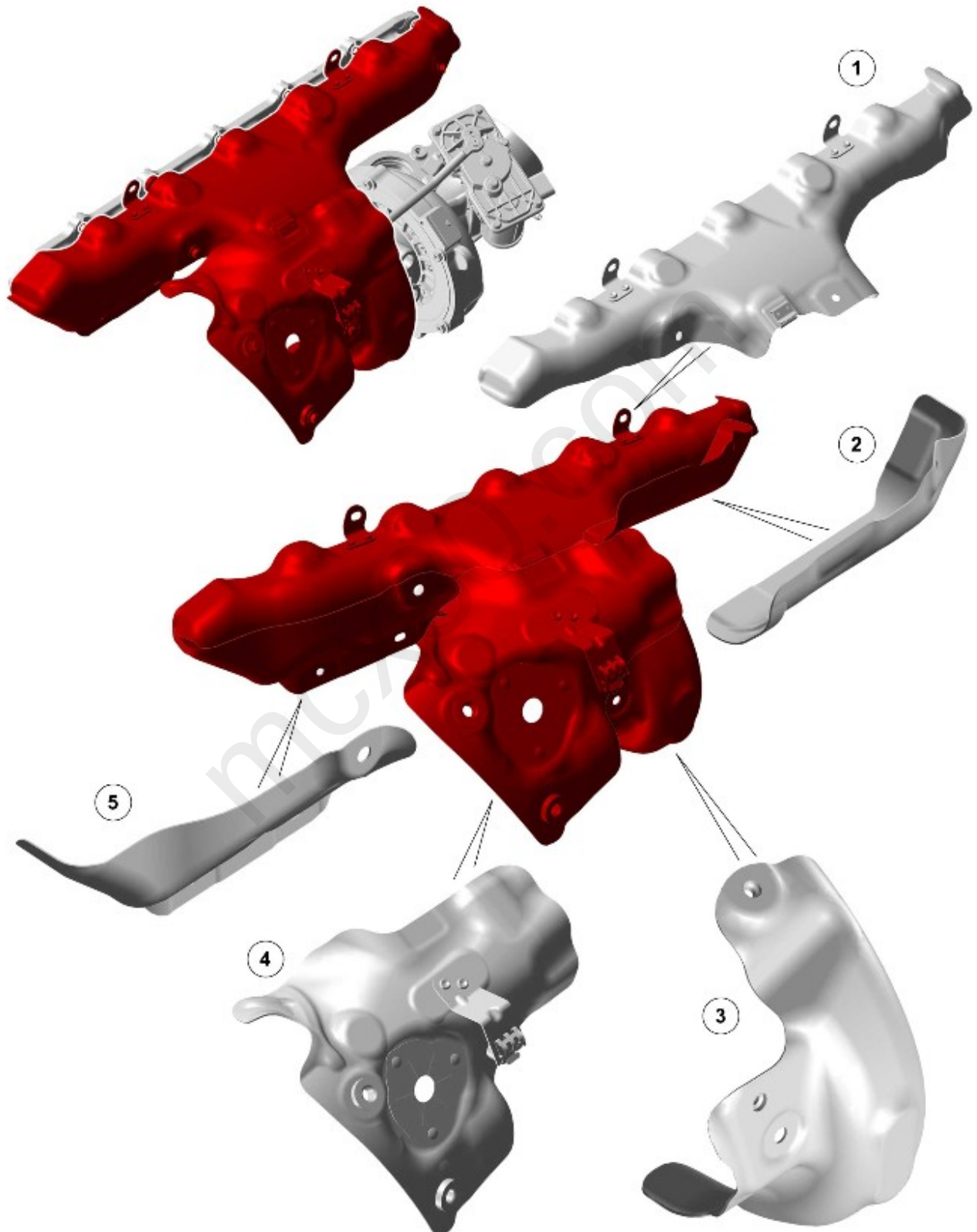
TURBOCHARGER COOLING



ITEM	DESCRIPTION
1	Engine coolant inlet
2	Engine coolant inlet - To turbocharger
3	Flange
4	Bolt
5	Flange
6	Engine coolant outlet - Turbocharger
7	Engine coolant outlet

The turbocharger also requires a supply from the engine cooling system to assist with the cooling due to the high loads on the turbocharger. The engine coolant flows into the turbocharger through engine coolant supply pipe. The engine coolant returns to the engine cooling system through engine coolant return pipe.

HEATSHIELDS



E235847

ITEM	DESCRIPTION
1	Exhaust manifold heatshield
2	Exhaust manifold right lower heatshield
3	Right heatshield - Turbocharger
4	Left heatshield - Turbocharger
5	Exhaust manifold left lower heatshield

The heatshields are installed over the turbocharger to protect the surrounding components from radiated heat. The heatshields also prevent accidental contact with the hot exhaust components.

OPERATION

The turbine wheel is installed in the turbine housing and the compressor is installed in the compressor housing . The turbine wheel and the compressor are enclosed separately and mounted on a common shaft. The exhaust gases from the exhaust manifold push the turbine wheel in the turbine housing. Then the compressor rotates in union in the compressor housing.

By turbocharging the intake air, the pressure and density of the intake air entering the cylinders is increased.

By turbocharging the intake air, the following benefits are enabled:

- Increased engine power output
- Improving fuel consumption through engine downsizing
- Ability to sustain power output at higher altitudes.

The turbocharger is interconnected by the charge air pipes of the intake air distribution and filtering system.

For additional information, refer to: [Intake Air Distribution and Filtering](#) (303-12C Intake Air Distribution and Filtering - INGENIUM I6 3.0L Petrol, Description and Operation).

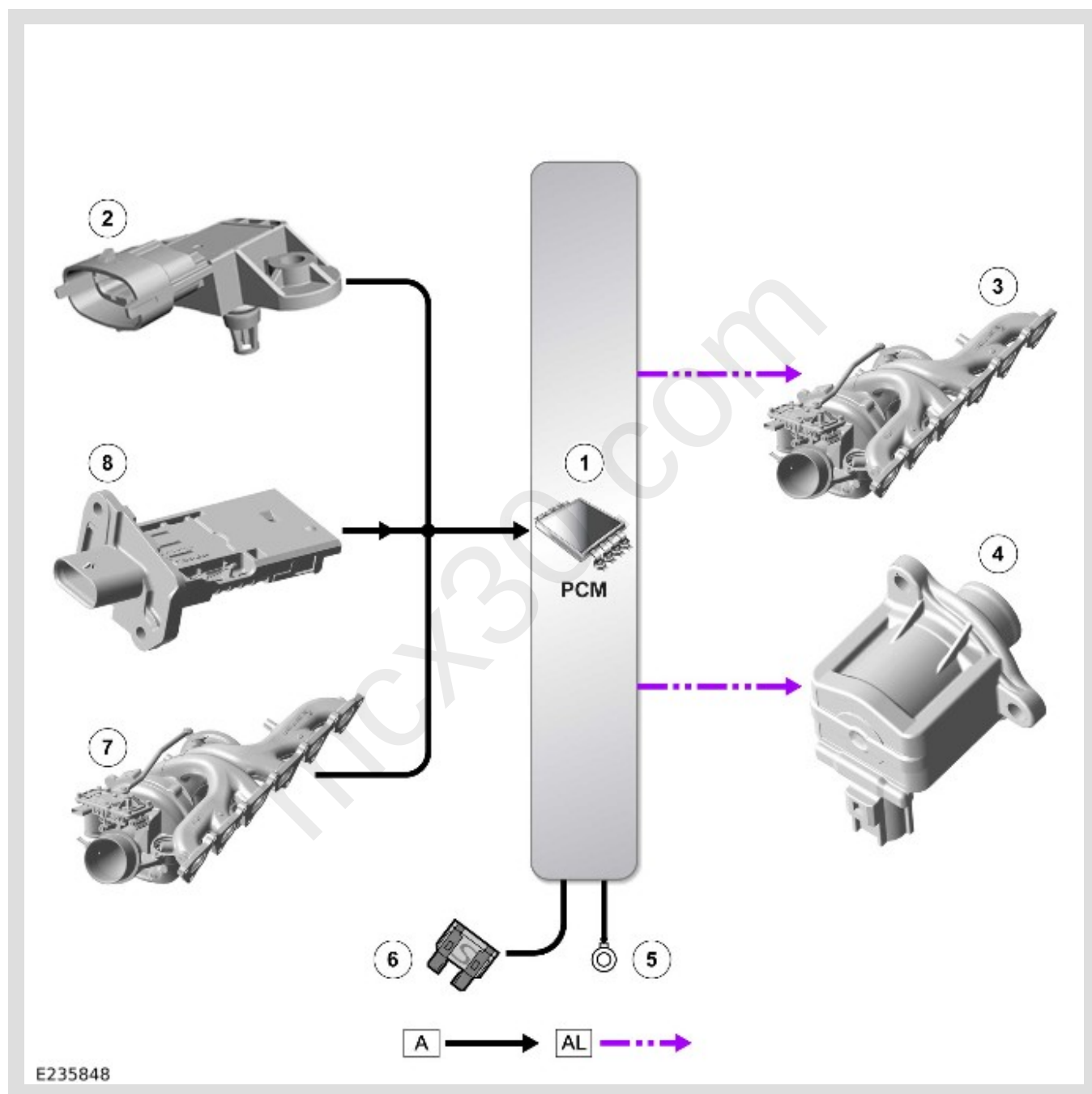
The charge air cooler cools the charge air from the turbocharger, which increases the density of the charge air. During a quick throttle closing event, the engine needs less charge air. The Compressor Recirculation Valve (CRV) allows the charge air to flow to the intake air pipe. Then the pressure inside the charge air cooler decreases. The Powertrain Control Module (PCM) controls the CRV through Pulse Width Modulation (PWM) signal.

The Powertrain Control Module (PCM) controls the operation of the turbocharger. When the engine is running at a high speed, the engine discharges more exhaust gases which rotate the turbine wheel at a high speed. The PCM controls the turbocharger wastegate actuator to open the Turbine Bypass Valve (TBV). The exhaust gases bypass the turbine wheel, which prevents the turbine wheel from high speed. The TBV is mechanically connected with the turbocharger wastegate actuator through a connecting rod.

DIAGNOSTICS

The Powertrain Control Module (PCM) records any Diagnostic Trouble Codes (DTCs) and related data. Read the DTCs and related data with the Jaguar Land Rover (JLR) approved diagnostic equipment. The JLR approved diagnostic equipment can read live data and activate certain components.

CONTROL DIAGRAM



A = HARDWIRED: AL = PULSE WIDTH MODULATION (PWM).

ITEM	DESCRIPTION
1	Powertrain Control Module (PCM)

ITEM	DESCRIPTION
2	Manifold Absolute Pressure and Temperature sensor (MAPT)
3	Turbocharger wastegate actuator
4	Compressor Recirculation Valve (CRV)
5	Ground
6	Power supply
7	Turbocharger wastegate actuator position sensor
8	Mass Air Flow and Temperature sensor (MAFT) (quantity 2)

cmjjaGFyZG1vbnRvdjisyMDIwLTASLTE2VDIxOjEzOjEzLjQ3M1o7OTAuMTk5LjE5MS4xMTc7

mcx30.com