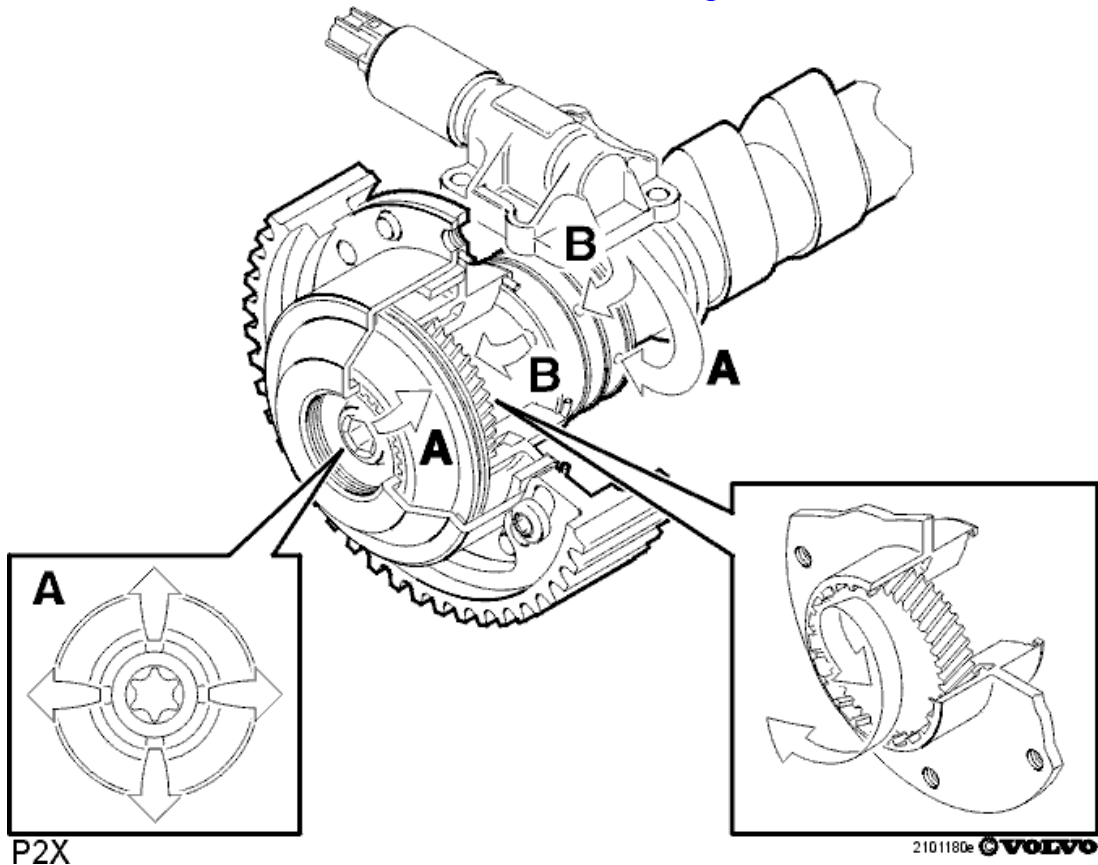


Continuous Variable Valve Timing (CVVT)



General

The engine control module (ECM) continuously controls the Continuous Variable Valve Timing valve which in turn controls the CVVT unit with engine oil pressure.

The Continuous Variable Valve Timing unit is mounted on the exhaust camshaft and is installed on all B52X4T engines. The control has 15 camshaft degrees (30 crankshaft degrees) between its outer positions.

The variable camshaft is hydraulically controlled by the engine oil. The camshaft rotation takes place by the engine oil, using the Continuous Variable Valve Timing valve, transferring to either the Continuous Variable Valve Timing unit front (A) or rear (B) chambers. The chambers are divided by a piston which is fixed in the camshaft. When oil presses on the piston it results in a rotating motion in the piston because it is installed in the Continuous Variable Valve Timing unit cover with splines. The pulse wheel for the timing belt is located on the Continuous Variable Valve Timing unit outer cover.

The control is very fast and exact, it only takes approximately 500 ms to transfer between the

outer positions.

The Continuous Variable Valve Timing valve has very fine channels, for exact control and is therefore very sensitive to impurities.

The variable camshaft main task is to minimize exhaust emissions, mainly at cold start, but also gives an improved idling quality.

Before the engine starts an internal check occurs as follows:

1. When the when the ignition is switched on an electrical check is carried out on the signal cable, the power supply cable and the solenoid. The check is carried out for a short-circuit to supply voltage/ground and open-circuit.
2. The camshaft checks if it is in the correct position compared to the flywheel, when the camshaft is in its 0-position (mechanical resting position). This can be done by comparing the signals from the camshaft position (CMP) sensor and the engine speed (RPM)/position sensor.

If the deviations are too large between these the Continuous Variable Valve Timing valve does not activate and the diagnostic trouble code (DTC) is stored.

3. In case of larger controlled deviations at the variable camshaft the time taken to regulate to the control value is measured. This time is used partially to determine how long it takes to alter the camshaft angle and partially to switch off the variable camshaft if the time exceeds a certain maximum time. The camshaft uses the engine oil and oil pressure to turn. The rotation time depends on engine speed (RPM), oil pressure, viscosity etc. which in turn depends on oil temperature and quality etc.
4. To check that the camshaft position (CMP) sensor is correct it is compared to the signal from the engine speed (RPM)/position sensor when the engine turns. When the engine has started the check is interrupted. If the check gives faulty values a diagnostic trouble code (DTC) is stored and Continuous Variable Valve Timing control ceases.