E-RAVE How and why?

TO EXPLAIN THE REASONS WHY ROTAX HAVE SWITCHED TO AN ELECTRONICALLY CONTROLLED EXHAUST PORT TIMING SYSTEM (E-RAVE), THERE NEEDS TO BE A CLEAR UNDERSTANDING OF SOME BASIC 2 STROKE ENGINE CHARACTERISTICS.

The performance of a 2-stroke engine is driven by the interaction of the ignition timing and the shape of the tuned exhaust system but also on the exhaust port timing.

At low rpm a low exhaust port timing will provide best performance, at high rpm a high exhaust port timing will provide best performance.

A 6-speed shifter engine is designed with a high exhaust port timing as with the 6 speed the engines can be always kept in a small power band at high rpm.

A single speed engine requires a broad power band. A fixed exhaust port timing can provide a compromise only.

Actually, with the electronically controlled exhaust port timing system (E-RAVE), you have two engines in one! With the E-RAVE in a closed position, the engine has good torque at low rpm. When the rpm of the engine increases, the E-RAVE opens, altering the exhaust port timing to give the engine a good peak performance for the long straights and faster sections of the track.

With the pneumatic timed RAVE system, the position of the exhaust valve is determined by the pressure in the tuned pipe. Below 7,500 rpm, at low or part throttle, the pressure in the tuned pipe is less and therefore the exhaust valve is closed.

Above 7,500 rpm and with full throttle, the pressure in the tuned pipe builds, opening the exhaust valve.

The pneumatic timed RAVE system has its technical limits. There is a lag effect which occurred under acceleration, if you had to lift off the throttle slightly for a corner of high rpm and speed. The RAVE tended to move towards the closing position due to the lack of pressure in the exhaust system and lifting off the throttle, which was not corresponding to the high engine rpm, and therefore, the tune of the engine is out of sequence. This then is taking some time for the RAVE to re-open again.

The pneumatic RAVE system also requires more maintenance and set up to achieve correct operating procedures.

The E-RAVE system does not require any specific maintenance and therefore supports the ease of use approach.

E-RAVE OPERATING DETAILS

On the Rotax MAX evo engines, the ECU (electronic control unit) is timing the magneto valve (solenoid). **(Pic_1)**

The E-RAVE system is connected by means of hoses with the magneto valve and further on with the crankcase. **(Pic_2)**

From 0 - 2,000 rpm, there is no signal from the ECU to the magneto valve, the magneto valve is open, the positive pressure of the crankcase can enter the E-RAVE system which keeps the exhaust valve in open position. **(Pic_3)**

NOTE: Starting the engine with exhaust valve open will provide less compression and lower energy consumption of the E-starter and battery, to start the engine.

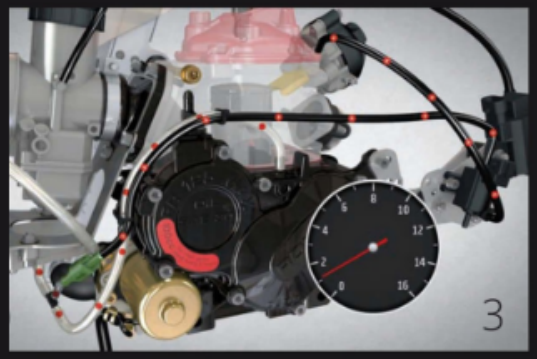
From 2,000-7,600/7,900 rpm (MAX evo), the ECU sends a signal to the magneto valve and it interrupts the positive pressure from the crankcase. The tension of the external spring in the E-RAVE system is pushing the exhaust valve into closed position. **(Pic_4)**

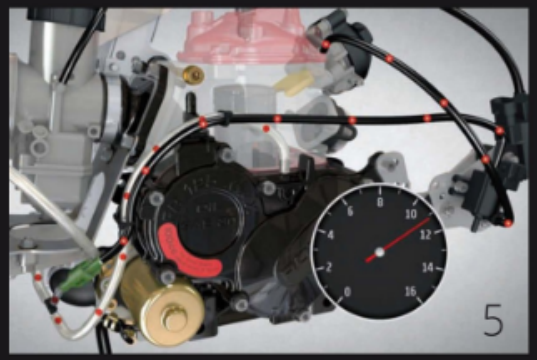
Above 7,600/7,900 rpm (MAX evo), the ECU stops the signal to the magneto valve, which opens and allows the positive pressure from the crankcase to E-RAVE system which is then moving the exhaust valve into open position. **(Pic_5)**

NOTE: The procedure for the electronic timing of the exhaust valve is designed to minimize energy consumption as the average duration of the exhaust valve in the open position is much longer compared to position closed.

To have the opportunity to adjust the E-Rave system to your driving style, your selected gear ratio and to the track conditions, Rotax provides 2 choices of engine rpm to select from where the E-RAVE is changing its opening position. For the Rotax 125 MAX engine the rpm range is 7,600 or 7,900 rpm. For the Rotax 125 MAX DD2 engine the rpm range is 8,800 or 9,100 rpm

This is done by grounding the respective cable on the wiring loom to achieve an opening of the E-RAVE at the lower rpm, or removing the respective cable from a ground connection to achieve an opening of the E-RAVE at the higher rpm.





Since the launch of the Rotax 125 MAX Evo engine series in 2014, the E-Rave (Electronically timed exhaust valve) is available.