



SKI-DOO Rave Preventative

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Summary:

RAVE preventative cleaning intervals explained.

Type:

General

TST Detail:

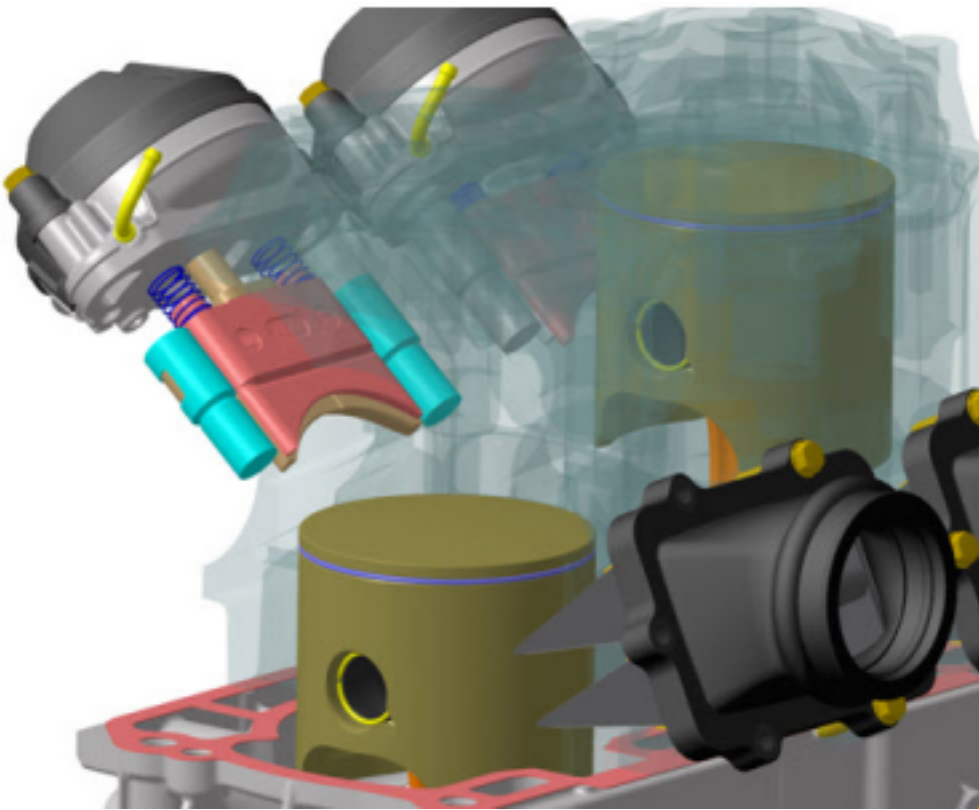
Through the years RAVE valves have changed, oils have changed, and our recommended maintenance has changed.

Below is a brief history of the RAVE's, and why preventative maintenance is required.

The 1989 Mach 1 was the first production Ski Doo to use a variable exhaust. It was known as RAVE, an acronym for Rotax Adjustable Variable Exhaust. These early RAVE's had a total travel of approximately 4 mm.

They consisted of a single guillotine and were activated by exhaust gas pressure. This simple design was either open or closed when the engine was running and required little in the way of maintenance other than an annual cleaning.

Fast forward 20 years and with the introduction of the 600 H.O. E-TEC engine a new 3D RAVE system was introduced. This system consisted of 4 moving elements and had the ability to completely close the auxiliary exhaust ports and move through 3 distinct positions.

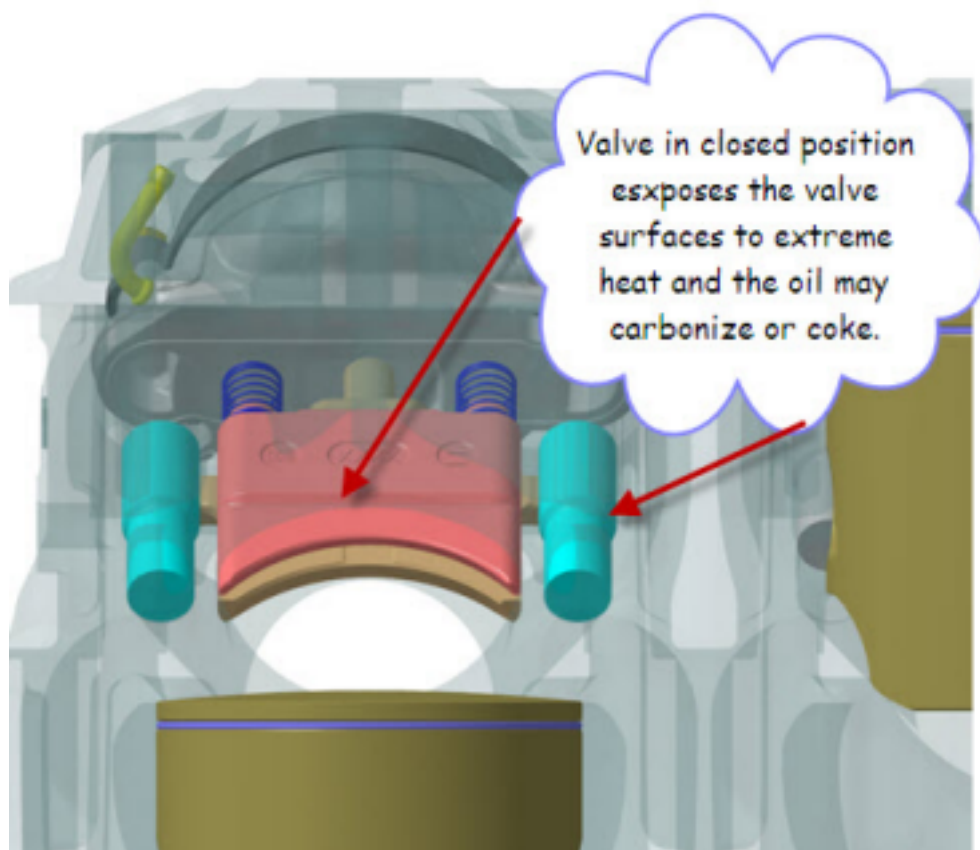


This change in technology was brought about by an on going emphasis for more low end [corner to corner] torque, and improved fuel economy.

The longer the RAVE valves are closed the more torque the engine produces, and at the same time fuel economy is improved,

This is why the valves are in the closed position until approximately 6500 RPM, and do not fully open until approximately 7500 RPM.

RAVE CLOSE position



Since the valves are closed at relatively high RPM's [<6500], the exposed parts are subject to extreme heat from the exhaust gases. The extreme heat on the sliding parts of the valve required specific lubrication to be directed directly onto the moving parts.

Rotax and Valcourt worked with a well known oil supplier to develop a high quality, low ash, semi synthetic, and later an even better, full synthetic oil specifically for the E-TEC engines.

With the valves being held closed far longer than the 89 Mach RAVE's were, the chance of carbon build up is greater, even while using our top of the line XPS full synthetic oil. Depending on the riding style as noted by the RPM profile in BUDS periodic cleaning of the valves may be required.

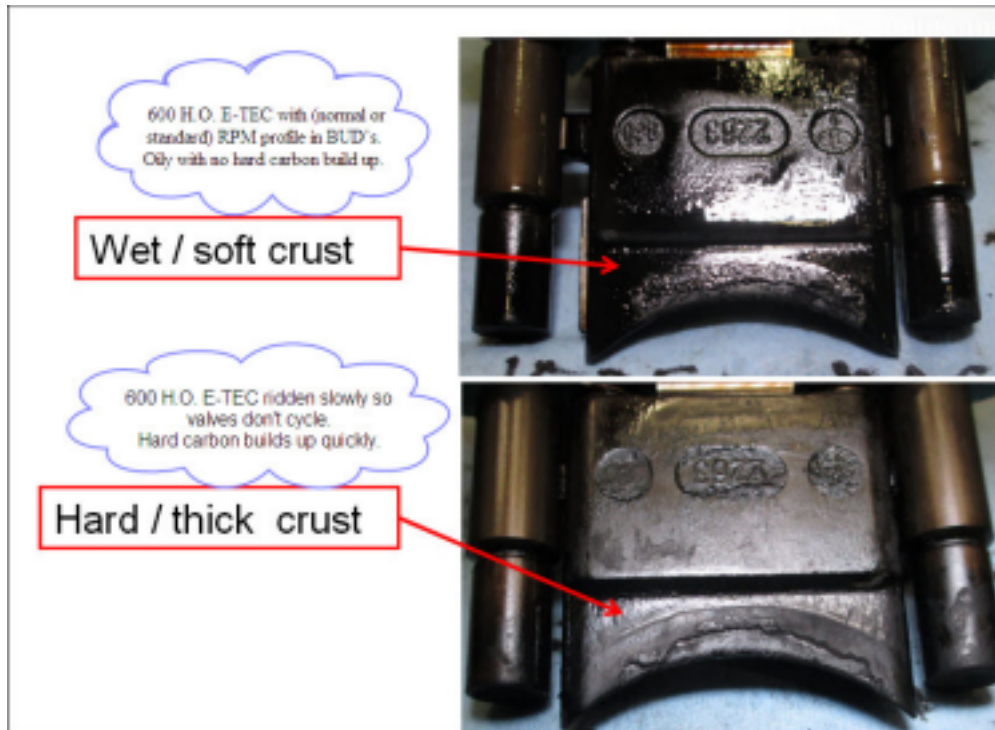
Hopefully the information below will help everyone understand why.

When running at lower speeds and RPM's the RAVE's are often times fully closed. When in the closed position the valve is being heated by the hot exhaust gases constantly. Since oil is injected directly onto the valves to aid in lubrication the oil may overheat and carbon develops.

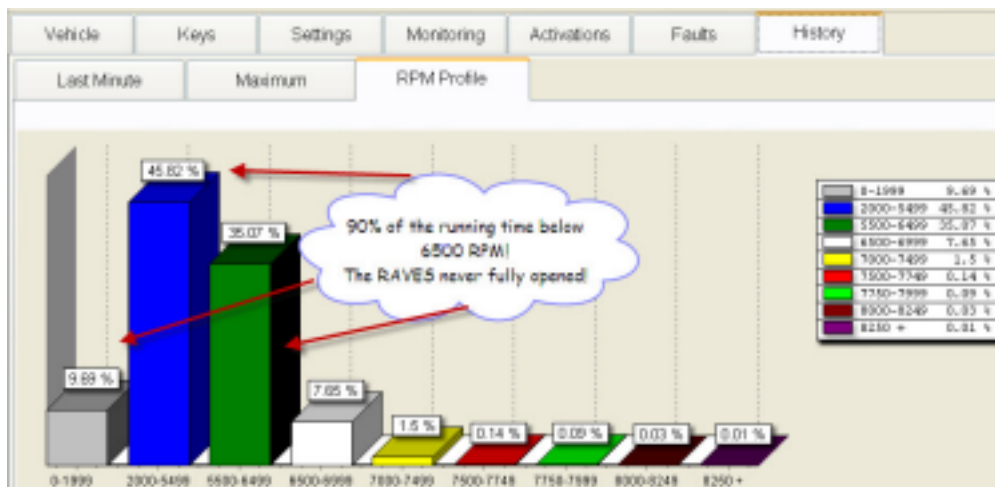
However if the engine speed is varied and from time to time and the RPM's increased to at least 7500, the valves cycle fully open and self clean. In addition when fully open they are out of the flow of the hot exhaust gases. This is very helpful in reducing the need

for periodic cleaning of the valves.

The results of slow speed and [normal] riding profiles are depicted below.



Actual 800R E-TEC RPM profile from BUDS



Note that the engine RPM over 7500 was less than 1%!

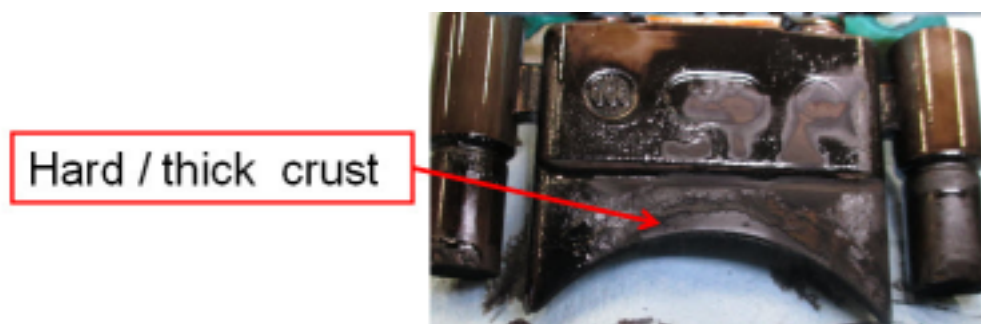
For this type of riding it will be beneficial to clean the RAVES at least every 100 hours.

Vehicle	Keys	Settings	Monitoring	Activations	Faults	History
Summary						
Code	State	Module	Count	Total Time	Description	
**P1477	Occurred	ECM	1	0046h51	RAVE valve close position not reached	

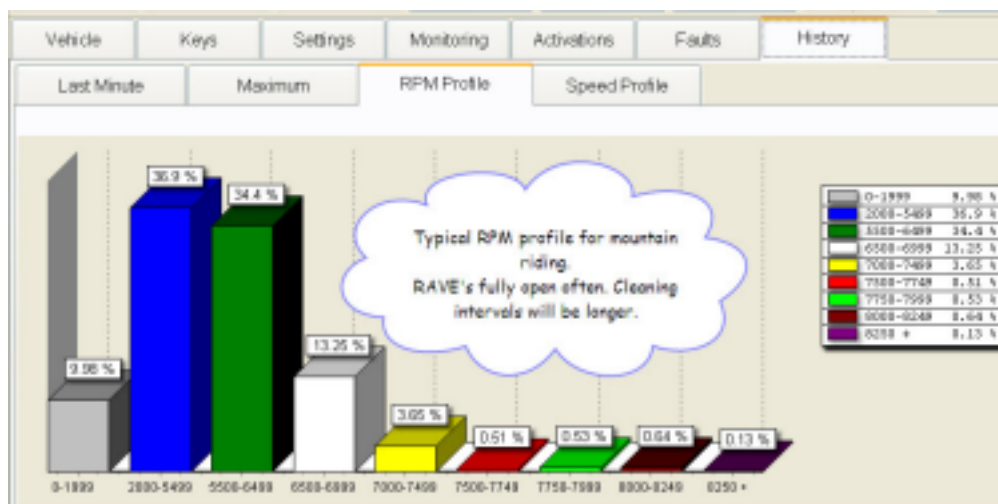
As noted in the faults page of BUDS the RAVE valves were not reaching the fully closed position P1477 .

For this type of low speed riding it will be beneficial to clean the RAVE regularly.

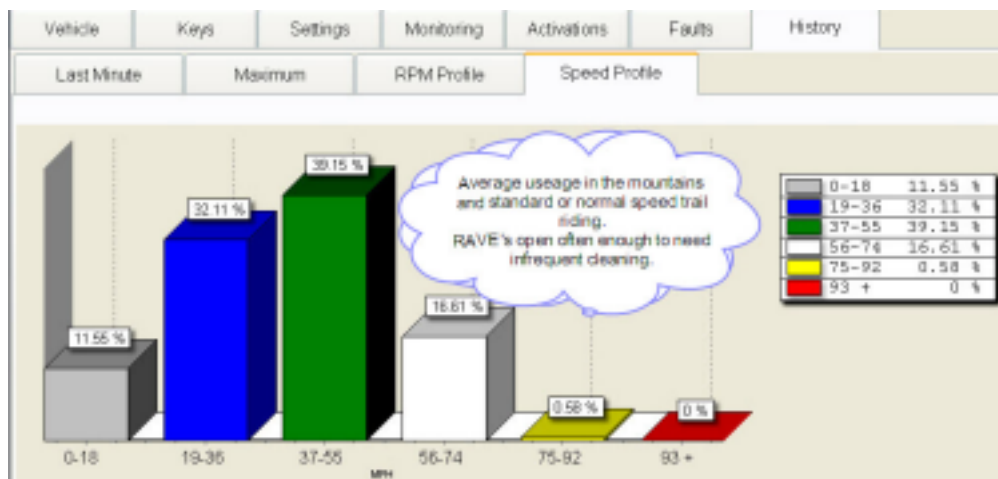
Here is a photo of the above engines RAVE valve that was sticking due to very hard carbon build up.



Here is an example of a mountain rider's RPM, and speed profiles in BUDS.

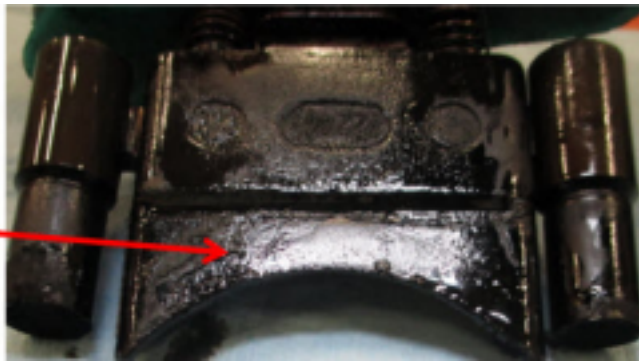


This type of riding often cycles the valve fully open [7500 RPM +], keeping them out of the hot exhaust flow and cleaning them. So carbon is less prone to build up and cleaning intervals are greatly extended.



Even though the speeds aren't great the valves are open often creating less chance for hard carbon to develop.

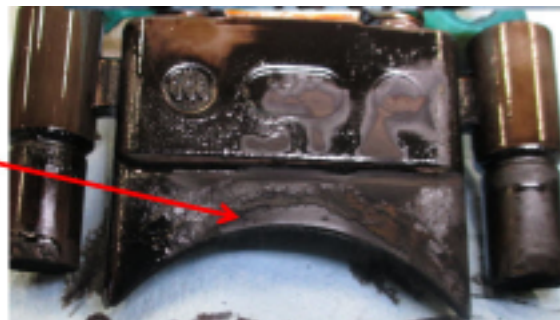
Higher RPM profile results in this look. visible soft carbon and oily appearance.



Here is an example of a Summit 800R E-TEC valve showing normal soft oily carbon on it.

Here is an example of a valve that was sticking due to hard carbon deposits caused by slower riding speeds and low RPM.

Hard / thick crust



For riders with low RPM profiles in BUD's, preventive RAVE cleaning should be done no less than every 100 hours of use or annually.

Note: XPS full synthetic is the recommended oil to use in all E-TEC engines, and is used on the factory assembly line.

No other oil that we have tested to date can surpass the lubrication, heat resistance, and wear qualities of XPS full synthetic.

No TCW3 oils are recommended due their ashless designation, as they are designed to be used in low specific output, low RPM applications that do not have variable exhausts to be concerned with.

Attachment:

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