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**RS4
SPECIAL**



e-tron 2 = R4?



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RS4 engine problems

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THIS MONTH I am going to focus on the 2.7 biturbo engine which was fitted to the B5 series RS4, a unit for which I have a great deal of admiration. This engine, in my opinion, still delivers amazing levels of power and, more especially, torque, a combination which creates an exciting driving experience which is difficult to match, even now. This unit was, in its time, very advanced and had a huge specific output for its size, a whopping 380 PS and 440Nm from just 2.7 litres. It was based on the S4's 265 PS engine which had the same 30-valve Biturbo configuration, but benefitted from Cosworth Technology's advanced casting abilities. The turbo sizes were increased, along with the injectors and the intercoolers, and both the engine ECU and the heads were significantly re-worked to give that amazing output.

What's even more impressive is the engine's potential for tuning. A mere Stage 1 remap will see this engine, in completely standard mechanical form, deliver around 450 PS.

This was one of the first engines to achieve a very wide spread of power, something which has become common with Audi's engines these days. The standard maximum torque of 440 Nm was available all the way from 2500-6000 rpm. The standard biturbo unit of the S4 had a few problems, mainly concerned with keeping it cool during early development, and that's why Cosworth got involved: when the output was so impressively hiked up, these issues would be magnified. For this reason, many alterations were made to the crank assembly and, most notably, the cylinder head castings were entirely new.

This is where the most expensive issues can arise. Due to the incredible heat and very high combustion pressure (around 115 bar), the combustion chambers are subjected to intense conditions and this can cause problems over time. This may result in the cylinder heads themselves cracking, or even damage to the valves. Repair is costly, and this is why you can buy a high-mileage RS4 at such a reasonable price!

Due to the advanced control systems, the engine is very good at hiding any internal problems from the driver until the damage is so great that normal combustion becomes impossible. It can vary fuelling, ignition timing, boost and inlet cam timing to keep all cylinders running as they should be, even when there is a fair degree of damage. A cold compression test is the simplest way to detect any cracks allowing pressure loss within the engine. Any RS4 with low compression should be viewed as a possibly costly project, rather than a cheap way into a super-estate. The exhaust valves are sodium-filled to aid cooling and, if they have split, replacement is expensive. The cylinder heads of an RS4 should not be taken off with the engine in the car, as full removal is required to gain proper access, and that's before you have paid out for valves at over £100 each! If the heads are cracked, then replacement is the only safe solution and a pair of heads will cost £3000!

Other components to suffer are the brace of turbos. These units are similar in size to the units fitted to the TT 225 and early S3. They have a hard job supplying the engine's enormous demand for air, but can be very reliable if properly cared for. Many RS4s have

been driven very hard and, coupled with incorrect servicing, this can strain the turbos beyond their limits. Worn turbochargers will result in reduced power and excessive oil consumption and, if they get very bad, they can even make harsh noises under load. A pair of turbos will cost £1,400 and, once again, due to the very tight space constraints of the engine bay, the engine must be removed to change them. Turbos on the RS4 should only ever be replaced as a matched pair; any variation in delivery, or mixing a new one with an original, can cause failure.

Boost pressure is probably the cheapest and most easily remedied fault to deal with on these engines. They are prone to air leaks in the breather system and boost leaks on the pressure side. Both of these scenarios alter the air mass which the engine is receiving and, as the engine is unaware of the leaks, the fuelling and boost control is adversely affected. This is most obvious when driving under load: the engine can feel as though it is hesitating, giving boost then taking it away again. This is because it struggles to compare the air mass signal it receives with the conflicting information supplied by the lambda system.

The engine has an appetite for spark plugs too! Audi supply platinum-tipped plugs which are said to last 40,000 miles but, in reality, they can break down at anything from 20-30,000, depending on the car's use. Once again, this will give the impression of a less than smooth power delivery and, thankfully, is simple to rectify.

The choice of oil is paramount with this engine. Although they were supplied on the long-life regime I always suggest that RS4s have a service every 10,000 miles, refilling with the fully synthetic 5w30 engine oil from Audi. Use of incorrect oil, and extended change intervals, causes carbon build up in the oil as a certain amount of combustion gas escapes past the piston rings into the sump. This carbon can build up in oil ways and reduce the efficiency of the lubrication system. The main side effect of this is low oil supply to the cam shafts, and the lobes can wear badly enough to reduce valve lift. This gives a rough idle and a drop in performance, especially at low boost, and you will also notice increased turbo lag. The head design of this engine, along with many Audi units, requires the camshaft bearings to be line-bored when they are manufactured, matching them to the camshafts. This means that new camshafts cannot be obtained and so any damage to the cams or their running bearings means, you guessed it, new heads!

This engine is a great unit, but it must be remembered that it has a power output in relation to its size which is getting on for racing car levels. Although the vehicle has the look and benefits of a practical, family car, this means that certain precautions must be taken to ensure that it doesn't cost the earth. Careful, proper maintenance, use of good quality high octane fuel and thoughtful use, will have the engine comfortably lasting 150-200,000 miles but, if you ignore the engine's requirements, the costs can be huge.

