

MGB Technical Tips - Engine Cooling (Part 3):

Due to this in-depth investigation into the multiple areas of consideration in the MGB, and other car's cooling systems, this Technical Tips report is presented over the course of three magazine issues. As always, it's best to start with the basics, so refer to the previous Technical Tips article published in the previous months' magazines before enjoying this report.

In this instalment I'll be focussing on cooling modifications for performance-tuned or racing MGB engines. This information won't apply to many of you but I hope that you still find it interesting to read.

I've already mentioned and shown a photo in Part 1), of how I secure the core plugs into the block with metal straps, just as the Factory racing MGs had. Now I'll discuss other modifications to assist MGBs to deal with extreme conditions.

Aluminium radiators:

It can be argued that while Aluminium dissipates heat very readily, which is a good thing for a radiator, Copper does this task even better. However, Copper & Brass radiators are made from an alloy containing Zinc, as used in standard MGB radiators, and this reduces the heat transfer effectiveness of the radiator.

Unfortunately, the original radiators are painted which slightly reduces their ability to lose heat. The price for a new, standard MGB radiator is quite reasonable for what the product is, whereas an aluminium radiator will be at least double or triple the cost. Don't make the mistake of thinking that an expensive aluminium radiator will always be well made. There are good ones on the market but there also some tragically poor quality units made in the usual "Developing Countries".

Aluminium radiators should almost be considered compulsory for a competition MGB which is trying to be as light as possible, because the Copper/Brass ones are much heavier, but a new, standard radiator is more than sufficient for a "street" MGB.

I'm yet to find a manufacturer who makes MGB radiators with aluminium cores and plastic tanks like those found in Moderns. It's the owners choice on this one; shiny, or original.

Radiator hoses:

Standard MGB radiator hoses might not be up to the task of coping with demands of a performance engine.

Fortunately, you can purchase Kevlar reinforced hoses or a wire coil in the lower radiator hose to prevent it collapsing from water pump suction. Under certain conditions, the action of a water pump spinning at high RPM can create a partial vacuum which can cause an inferior lower radiator hose to squeeze tight and reduce the flow of coolant through the hose.

I use an Austin 1800 water pump pulley to slow down the rotation of the water pump, to avoid cavitation of the coolant when the water pump is rotating very rapidly, particularly on high RPM racing engines, this also reduces the possibility of collapsing the lower radiator hose.

Thermostat:

While having an appropriate temperature setting thermostat is crucial in a street MGB, it becomes an impediment to coolant flow in a performance engine.

If one is fitted, make sure that your thermostat has a small bleed hole in it to allow trapped air to pass through when the thermostat is closed.

Note that the temperature rating on thermostat denotes the point that they begin to open. For example, an 88°C rated, winter thermostat starts to open at this temperature, but doesn't become fully open until close to the Boiling Point of unpressurised water. This point refers back to my earlier article about an unnecessarily concerned MGB owner who was worried about the "high" 100°C temperature reading on his gauge.

For decades I used a thermostat blanking sleeve instead of the thermostat. The blanking sleeve is effectively a short tube that fits into the cylinder head, under the thermostat housing, to make sure that coolant is directly through the water-jacket correctly. Never just remove the thermostat without using a device such as this.

My research for this article revealed that several people have seen better results by using a large flat washer that sit in the cylinder head, where the thermostat would normally go, with a large hole in the middle which reduces the coolant flow to optimum levels. I'll be trying this in future. The idea is to slow down the flow of coolant to allow it to have slightly more time to absorb heat from the engine as the coolant passes through the water-jacket.

Engine machining:

I've previously mentioned how THOROUGH engine cleaning is essential when building a performance engine that will stand a chance of not overheating, and that getting it hot-tanked at a machine shop just isn't enough, but it is a good start to cleaning the block properly. It's very important to remove all of the rust flakes clinging to the outside of the cylinder liners, etc., because the rust insulates the block and reduces heat transference to the coolant.

The MGB Special Tuning manual recommends drilling out the rear two coolant holes in the cylinder head to 9/16" diameter, to match the gasket and engine block, to aid the flow of coolant through to cylinder No. 4.

Later head castings deliberately restricted coolant flow to make the combustion chambers as hot as safely possible to assist in meeting the emissions limits in California. This is not conducive for a decent life expectancy of a race-prepped MGB.

I also put a chamfer on the coolant passage holes to aid the transfer of coolant between the Head and Block. (I also chamfer the cylinder stud holes to avoid the top of the thread being pulled up under heavy loads and damaging the head gasket).

Oil cooler:

To keep the oil temperature in the sump at acceptable levels, I use a larger 19-row oil cooler instead of the standard factory-fitted 13-row unit.

Until the engine gets to its correct operating temperature, the oil cooler is doing everything it can to prevent this, which is a real problem.

Engine coolant temperature is important but engine oil temperature is even more important for the long life of your engine. Cold oil is thick and sluggish, despite the excellent work done by oil manufacturers, and this makes the oil more resistant to flowing around the inside of your engine. Notice the oil pressure reading on your MGB's gauge when the oil is hot, compared to when it's cold.

Apart from the viscosity of oil when it's cold, until the oil reaches the correct operating temperature, it also holds moisture from the combustion process until it gets hot enough for the water to evaporate out of the system.

An oil cooler on a street or on a race MGB is a real problem in getting heat into the engine from a cold start.

I use an oil thermostat on my car, which is fitted into the oil cooler hoses so that the engine oil is diverted straight back to the engine, bypassing the oil cooler, until the oil temperature reaches 80°C. At this point the thermostat gradually opens to allow more and more oil to pass through the oil cooler, thus keeping the temperature above 80°C.

A simple and effective way of getting your engine oil hot enough on a winter's day is to blank off the oil cooler with a cover to prevent air from passing through it. I've found a source for covers which simply clip on and off the face of Chrome Bumper oil coolers in winter and in summer, so get in touch with me if you're interested in getting one. Or, you could fabricate something for yourself from cardboard and tape, so long as you can keep it from coming off at speed.

While on the subject of oil, I use deeper and baffled, cast alloy engine sumps on my engines. Not only do these prevent oil surge during race conditions, they also allow the engine oil to be cooled more effectively by heat radiating through the alloy with cooling fins cast into it, but also because these sumps have a greater oil capacity.

A possibly cheaper way of keeping the engine oil cool on a high performance, late model 18V MGB engine, is to swap the factory sump from an earlier 5-bearing engine onto the 18V block. If you can find a spare one that is.

The earlier sumps had about a 50% larger oil capacity than the 18V sumps, which means that there's more engine oil available to dissipate engine heat. Be aware that you can't fit 18V sumps onto earlier engines due to the oil passages that drain oil back to the sump in earlier engines.

As always with my Technical Tips articles, the views expressed are opinions based on my own extensive knowledge of MGBs, racing an MGB and my research into the subject.

Nick Phillips