MGA Hot Running Issues:
Circumstances, causes and (some) solutions:

Preamble:

What follows is just one person's (i.e. my) observations and thoughts on this widely discussed topic.

Having run a 1965 MGB for over forty years, with for many years the "B" serving as my daily driver in all types of weather and conditions, the occasional glance at the water temperature gauge always confirmed temperatures to be well within the "comfort zone". I was rather surprised therefore to discover that my newly purchased and apparently sound MGA tended to run somewhat hotter than my (absolutely stock standard, though well maintained) MGB, and to also find a considerably greater degree of "heat soak" into the MGA cabin.

This was surprising given the relatively similar mechanicals under the bonnet. Both models run the B-series BMC engine (in varying capacities from 1500cc to 1800cc) with similar coolant capacities, dimensionally essentially identical radiators, with an engine driven fan. The MGB water pump does have a slightly higher output, but the MGB also runs a higher engine capacity and a higher compression ratio than the (Australian assembled) OHV MGA (8.8:1 vs. 8.3:1).

Why should this be?

It also bears mentioning that when the MGA was in current production there was little discussion in the press reports or elsewhere of the MGA being prone to running at high engine temperatures. I suspect this is not entirely to do with the journalists and the public of the era being more tolerant of such failings in their vehicles, and I'll return to this point later.

I'll omit the cabin heat soak issues from this particular discussion, and confine myself to engine temperature issues.

Note also that the boiling point of the coolant (presuming a usual 50/50 mix of glycol based "antifreeze" and water, and a 7lb/sq in cap) is 245F (118C), not 212F (100C).

Types and manifestations of hot running in an MGA:

1) Rising water temperatures at idle in higher ambient temperatures.
2) Float bowl fuel vaporisation and resultant irregular running in similar circumstances to "1)"
3) Rising water temperatures at continual high road speeds (>100 km/hr) in higher ambient temperatures.
4) Rising water temperatures on long continual steep climbs, again mainly in higher ambient temperatures.

The Proposed Causes

Obviously the ability of a water-cooled engine to maintain a stable operating temperature relies on both circulating and adequately cooling the cooling medium (water +/- coolant). We've already established that the MGA and the MGB are fitted with virtually identical cooling systems. What else does such a system require? The ability to pass the cooling air to, through and then away from "the heat exchanger", the radiator. It is this function that I propose is fundamentally impaired in an MGA compared to an MGB.

Getting the air to the radiator:

Surprisingly, the MGA grille has a LARGER cross sectional aperture area than an MGB! Looks clearly can deceive! A chrome bumper/chrome grille MGB has a grille aperture of 83cm x 12cm (Cross sectional area: 996 sq cm).
An MGA grille aperture measures 53cm x 20cm (Area: 1060 sq cm!!!)
So what else is going on? Firstly, I'd suggest that the shape of the grille blades, (broader and partly angled against the

oncoming air), especially in the 1500 and 1600 MGA, tends to at least partly deflect the airflow up and over the bonnet, rather than through the grille to the radiator. The 1600 Mk2 grille, with its recessed vertical grille bars would likely capture the air flow better, but better yet is the MGB with its vertical AND narrow cross section bars facing the oncoming air, which would tend to pass virtually all the oncoming air flow through to the radiator (+/- oil cooler) behind.

Getting the air THROUGH and away from the radiator:

It is at this point that I'd suggest that the MGA and the MGB differ significantly. When the MGB was under development, BMC was developing a series of Lancia-inspired narrow angle V4 engines intended to ultimately supersede the B-series engines. It was presumed that these V4 engines were to be fitted to the MGB, and as a result the MGB was endowed at the design stage with a wide and spacious engine bay. (Obviously this made the subsequent V8 transplant a readily practical proposition, but I digress!) The V4s however never made it into production, particularly because they manifested difficult to overcome vibration issues. However, as result, the installation of the now continued compact B-series engine leaves a massive amount of vacant volume in the engine bay, both allowing easy transfer of air through the radiator core, and away "to waste", and also lowering the retained heat in the under-bonnet area. In contrast, an MGA engine bay is a very cramped space indeed!

Proposed Solutions:

General Considerations:
Given the confined engine bay, it is important to reduce engine bay air pressure behind the radiator as much as possible, to encourage free flow of cooling air through the radiator core. For this reason, it is advisable to retain (or re-

install) the factory measures of the felt block air dam secured to the under-surface of the bonnet, above the radiator top tank and to block off the heater air intake duct (unless of course your car has a heater fitted, in which case the heater essentially performs the same function). Ideally one would prefer to block the carburettor fresh air duct for the same reason, but given the fuel vaporisation issues, this is clearly not practical, and is no doubt why the factory fitted this in the first place.
(Interestingly, those very neat looking oval shroud air vents either side of the bonnet do release hot under-bonnet air, but only to about 25mph (40km/hr), when the air flow through them REVERSES, and actually forces more air INTO the engine bay!!)
While in this line of discussion, it bears discussing bonnet louvres, a frequent modification seen. They appear a sensible course for those who are happy to make visible external panel modifications. Unfortunately however, the louvres are almost universally fitted towards the rear of the bonnet! This is a "high pressure area" (which is why most modern cars have their cabin fresh air intake at the base of the front of the windscreen). Those cool-looking rearward bonnet louvers are almost certainly counterproductive, and are actually PRESSURIZING the engine bay, forcing air into the engine bay, even at modest road speeds, rather than letting air out! (For such louvres to be effective they need to terminate 150% of the height of the windscreen forward of the windscreen base.) Similar comments would apply to those who raise the trailing edge of their bonnets in their competition cars hoping to assist under-bonnet air to escape. They almost certainly are accomplishing the exact opposite to their intention!
(A better solution to ducting air away from the engine bay is to exit into a low-pressure zone, such as the wheel arches, precisely as the factory did with the Twin Cam.)

Under-trays:

Wind tunnel testing has shown that while MGA engine bay air pressure at speed is negative, helping to draw air through the radiator core, there remains a restriction to expel this hot air to waste. An under-tray to create a low-pressure area below and behind the engine bay at such speeds has been found to be of great benefit in the Plus 8 Morgan. Some preliminary trials of such a device on the writer's MGA has been of less convincing benefit, but work is continuing to assess this further.

Blanking Sleeve:

The MGA was originally designed to run with a deeper thermostat (and radiator cap for that matter) than more modern ones. A shallow thermostat will leave the bypass port in the head uncovered when the thermostat is open, resulting in some coolant bypassing the radiator. A "blanking sleeve" is available from most MG parts suppliers to counteract this. It's a little fiddly, but it IS possible to fit the blanking sleeve AND a thermostat.

Coolant Recovery System:

The MGA radiator filler neck and top tank is such that it is impossible to see the radiator water level. One therefore continually refills the radiator, only to experience the inevitable (and attention generating) coolant dump onto the ground of the now expanded circulating fluid volume after switching off after reaching normal operating temperatures. While in the MGB the system seems "to find its own level", my impression is that an MGA tends to continue to dump that little bit more. Most modern cars are fitted with a closed "coolant recovery system", whereby the expanded water overflows into a separate tank. As the water cools, it is drawn back into the radiator. It is possible to tailor such a system for the MGA.


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Whether you're talking power or cooling, "There Aint No Substitute For Cubic (or Square) Inches" Department:

One line of thought consists of simply forcing a greater volume of air through the MGA's frontal aperture. One way of achieving this is by “opening up” the surface area afforded by the standard grille, as done by Ian Cowan in Queensland, Australia. By creating an intake below the front bumper bar, and angling down the normally horizontal duct panel to collect this additional captured air, Ian has been able to achieve satisfactory operating temperatures, despite also fitting an air conditioning condenser. Most owners however would presumably prefer not to visibly modify their MGA to accommodate such “radical surgery”.

To continue the above referred-to induction volume analogy, an alternative to increasing the intake frontal surface area is “forced induction”, in the form of an electric fan, usually as a “pusher fan” mounted in front of the radiator, generally mounted in tandem with the standard engine driven fan. This arrangement can be of great assistance in standing and slow speed situations, but the benefit of an electric auxiliary fan tends to become negligible once the forward road speeds become adequate to generate air flow equal to or in excess of that generated by the fan/fans.

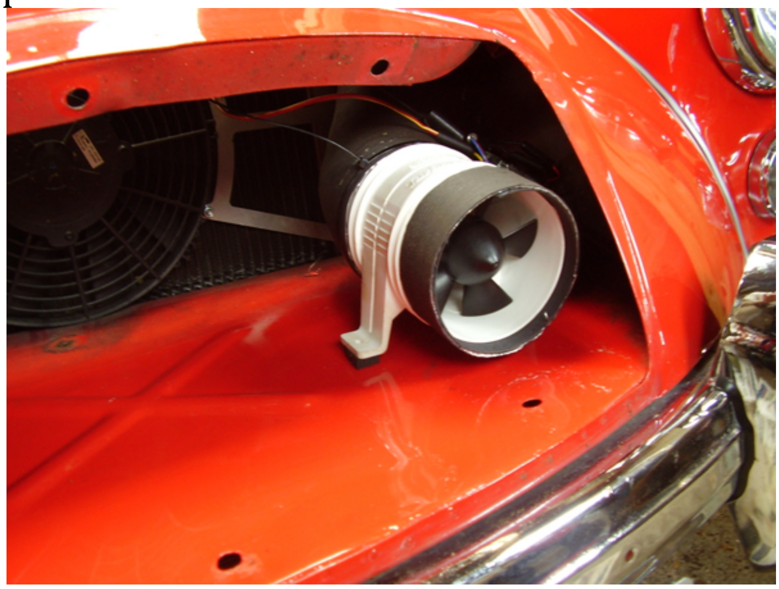
Now, onto other, specific solutions:

1) **Rising Water Temperatures when idling**:

It is very neatly possible to maximise the engine driven cooling fan's ability to draw air through the radiator core by fitting a radiator shroud. (Virtually all modern cars have these fitted). The shroud ensures that the fan can "suck" fresh air across the entire core surface, not just as far as the (circular) blade arc covers the (rectangular) radiator, thereby missing the four corners of the core. The close fit of the shroud also stops air "rolling off" the blade ends and going round again, and also stops stray hot engine bay air getting between the fan and the radiator's back surface, getting wastefully drawn back again. Speaking from personal experience, a shroud makes for a dramatic improvement in hot idling conditions. One can very obviously feel and hear the additional volume of air being sucked through the core when one of these is fitted. VERY HIGHLY RECOMMENDED.
One note of caution in the use of radiator shrouds needs to be made. It is ESSENTIAL for full benefit that all GAPS between the shroud and the radiator be ELIMINATED. It is much "easier" for the fan to suck through such a gap (or gaps) than through the radiator core. Even a small gap or two can lead to a dramatic diminution in the potential benefits that a shroud can provide in stationary conditions. A radiator shroud however does not appear to confer any cooling benefit once the airflow derived as a result of the vehicle's forward motion exceeds that generated by the fan. This probably occurs by the time the car's speed exceeds around 25mph (40km/hr).

2) Fuel Vaporisation:

The rather basic low tech, non-cross-flow (but surprisingly effective) B-series head has, by virtue of its layout the hottest part of the engine, the exhaust manifold, running directly below the carburettors. As a result there is an unavoidable tendency for radiant heat to directly heat the incoming fuel in the bowls. With the additional issue of high under-bonnet temperatures, cramped airspace and poor airflow in hot idling conditions, the fuel can tend to vaporise in the fuel bowls. This problem can be further exacerbated nowadays by the requirement in many countries that at least 10% of fuel be ethanol based. For this reason it is imperative that the heat shield be fitted, and lined with insulating material. Many have experimented with different insulating materials, dual parallel heat shields, and even, fitted a fan, (such as a 4" diameter marine application bilge blower fan) into the carburettor cool air duct, to turn on manually, in provocative conditions.



Lindsay Sampford's "bilge blower fan" (UK)

Radiators

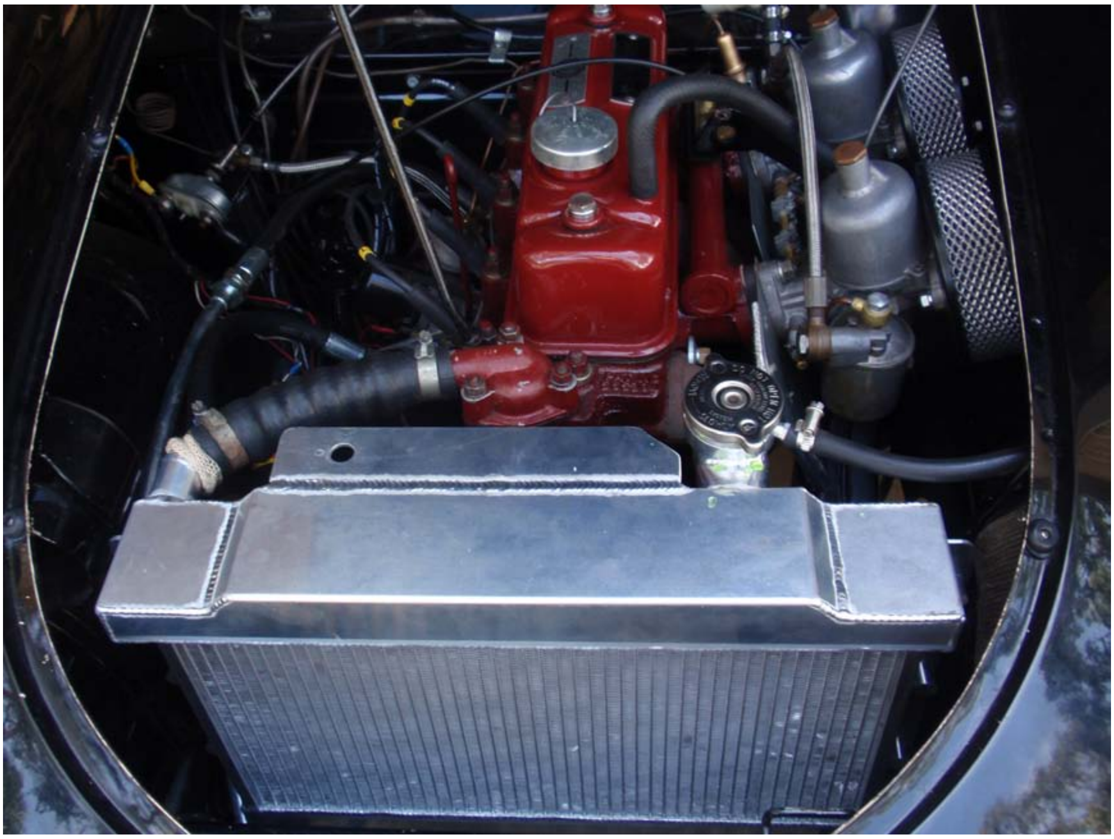
Conventional Three, Four (and Five!) core radiators:

When the MGA was in production, the fitted radiator was a "V-cell" core design. These cores were an intrinsically more "open weave" design, and less restrictive to air flow-through.

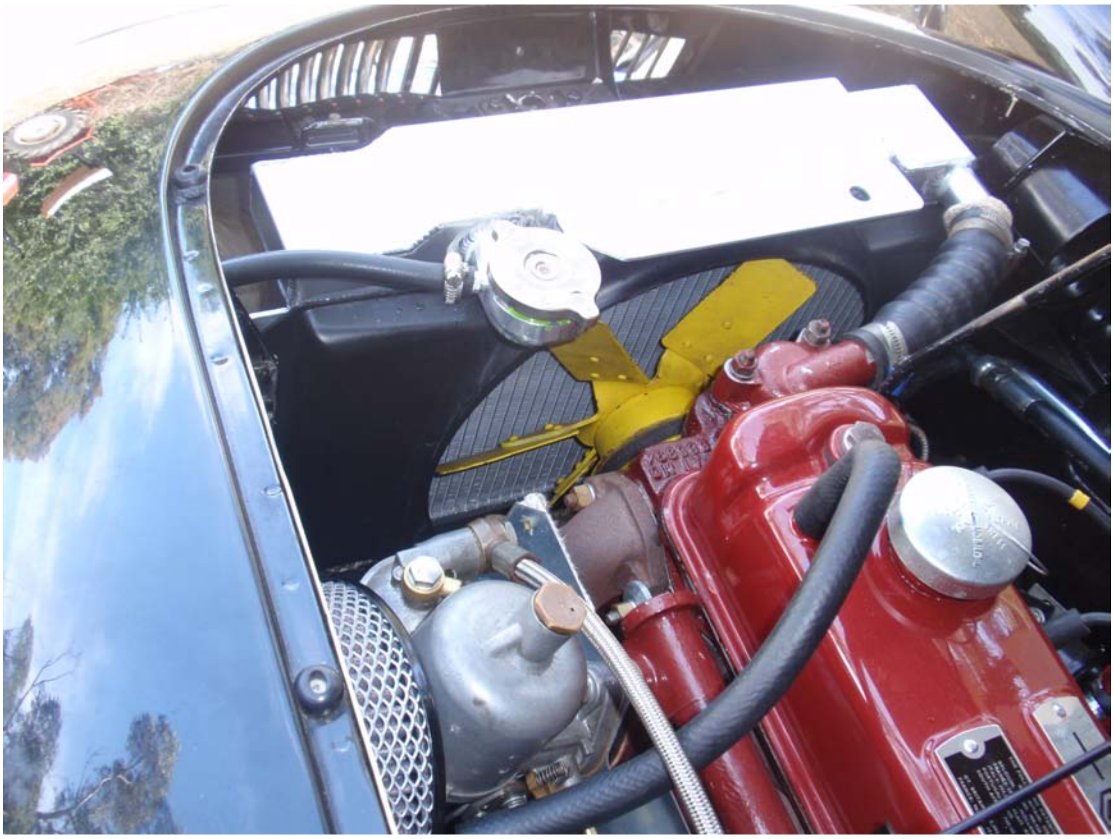
Such cores are no longer available (to the writer's knowledge). However their design probably suited the crowded engine bay of the MGA better, and may at least partly explain why running temperatures in an MGA appears to be a more recent issue. More modern conventional cored radiators have a denser matrix.
As for such modern conventional radiators, whilst logic would suggest "the more rows the better", as is so often the case, things are not always as simple as they might first appear. Certainly a four-row instead of a three-row radiator will hold 33% more coolant in the core. As a result, one would imagine it would consequently "cool" 33% "better". However, each subsequent radiator row will receive progressively hotter air, making each row less effective at heat dissipation. Additionally, with a typical staggered row radiator, each row adds further restriction to the passage of the cooling air through the core. To take things to a ridiculous, but illustrative extreme, a twenty row radiator would likely be completely useless! It appears that getting air THROUGH and away from the radiator is the problem in an MGA. In fact, Bob West, a highly respected West Yorkshire MGA specialist, advocates a three-row non-staggered tube radiator! Those who've fitted his radiator claim excellent results. Such reports however are all thus far confined to the UK, and unfortunately I suspect our British counterparts can't even begin to imagine just how hot conditions in other parts of the globe can be.

Aluminium Radiators:

A source of much debate and argument has been the potential benefits of aluminium radiators of more modern design as an alternative to the traditional types. Some argue that copper conducts heat better than aluminium. However, the construction of radiators in aluminium allows for finer fin thickness, yielding potentially a greater surface area for heat dissipation by allowing for more but thinner fins in the same area. Other more recent radiator design concepts, such as a “three pass” design (overcoming the tendency for more sluggish water flow at the lateral edges of the radiator, though at the cost of greater water flow resistance) and dimple tubes (which maximise water contact with the tube sides) further enhance the ability of the core to dump heat from the coolant in a radiator of the same physical size. Based on the writer’s recent personal experiences having fitted a 42mm dimple tube single pass core aluminium radiator to his own car, the cooling benefits over a standard three-row core radiator have proven to be **massive (**up to 30F cooler water temperatures!) in all but “traffic jam” conditions in high ambient temperatures, (30-35C; 85-95F) with no alteration other than to change over the radiators. (The original radiator had been dismantled and confirmed to be clear by a local radiator works). In the above mentioned traffic jams in hot weather, the aluminium radiator still at least matched, but more likely further improved on the conventional radiator’s performance, but with less dramatic differences than those seen in all other driving circumstances. (I’ve not fitted an electric fan to my MGA)



Note: Having completed trialling this aluminium radiator, my intention is to paint it black to enable the substituted radiator to appear less obvious.



Summary:

The MGA does manifest engine cooling issues in warmer ambient temperatures, as a cursory perusal of most MGA forums amply demonstrates, with current conventional radiators. This does appear to a large part to be due to the relatively cramped MGA engine bay, and the absence of measures such as ducting and fan shrouds that modern cars benefit from. It however is possible to compensate for this deficiency, relatively inexpensively by

1) Substituting a more efficient radiator
2) Fitting (carefully) a fan shroud
3) For those likely to spend longer periods in heavy city traffic in warmer weather, (very few MGA owners these days I'd suggest) an electric fan can supplement core airflow in such circumstances.