



**MG Car Club**  
Washington, D.C. Centre

---

## Keeping Your Cool: Radiator Tech

by Dave Michel

With the arrival of warmer weather, the subject of cooling our MGs becomes an item of recurring interest. Will the cooling system survive the hot, humid, traffic clogged, streets of the DC metro area without losing its cool? And what do I need to consider to help my MG to remain cool as the temperatures rise? And what about the largest item in the cooling system - **the radiator?**

Technically, the basic idea of a cooling system is to match the thermal load, the heat energy generated by the combustion process in the engine, to the thermal dissipation capacity of the radiator. Recall that the basic design of the MG cooling system, including the radiator, was based on steady 25-65 mph forward motion of the car through air of 40-70° F ambient temperature. Therefore, it should come as no surprise that MGs struggle to keep their cool in stop-and-go metro traffic in 75-95° F humid heat. So, *is there anything that we can do about the problem?*

First, tune-up your engine (a lean gas-fuel mixture burns hotter than a correct 14:1 mixture). Second, flush your cooling system and refill with quality coolant. Third, check all your hoses, clamps and connections for leaks. Fourth, inspect your radiator cap to be certain that it is of the correct pressure for your car and is not defective in any way. Fifth, check the fan in your car to be certain that it is functional. Finally, inspect your radiator for leaks, etc. Okay, so you have done all of the above and your engine still gets too hot. What else to do? Now is the time to attack the primary heat dissipation component - **the radiator.**

Although a radiator works by conduction, convection and radiation, the two primary processes at work are conduction and convection. *It also radiates, too, because it is after all a radiator,* but that is a bit of a misnomer in the context of the 'modern' car. The conduction problem is addressed in three ways. First, by using fluid additives (like water wetter) to reduce the surface tension between the coolant and the surface of the radiator tubes to increase the surface wetting thereby enabling increased heat transfer. Second, by re-coring the radiator to include more tubes and fins in the same physical space thereby providing increased surface area of the radiator (i.e., a high efficiency core) to promote increased heat transfer from the flowing coolant to the air. And, third, by changing the construction material of the radiator to produce increased heat conduction.

Did you know that **SILVER is the best heat conductor known to man?** How many have ever seen a SILVER radiator (*maybe only on a Rolls Royce!*). The **second best material is COPPER**, but copper is not easily formed into top and bottom tanks, so **brass, the fourth best heat conductor**, is used for this purpose. To connect the brass and the copper, lead-based solder, a very poor thermal conductor, is commonly used. This leads to an acceptable heat-conducting radiator at an economically reasonable price. The copper and brass radiator is most commonly found in our MG's because it does the best job for the least money! A better constructed, but more expensive radiator could be built using SILVER SOLDER in place of lead-based solder.

So what about the **third best heat conductor, aluminum?** Aluminum is an ideal radiator material and its usage has rapidly become commonplace in the worldwide automotive arena during the past decade. Most new cars now have aluminum radiators as standard equipment! Aluminum is lighter than copper and brass and is less hazardous to fabricate because it does not use lead-based solder. The primary problem is that **aluminum radiators are EXPENSIVE** to build and they are not readily available for MGs. So, if you really wish to improve the heat conduction of the radiator in your MG, you may wish to consider purchasing an aluminum radiator.

Once the heat has been conducted out of the radiator via the coolant via the radiator's tubes and fins, convective cooling occurs as the thermal energy is transferred to the air flowing through the radiator. As long as the car is moving, this cooling method works just fine. But when you stop or travel slowly, it is likely that insufficient air is flowing through your radiator to remove all the heat transferred from the coolant. At this point, it becomes necessary to consider adding an electric fan to aid the cooling airflow.

As the ambient air temperature rises above 60° F (as is frequently the case in the DC metro area), an electric fan becomes even more important because **the rate of heat transfer decreases as the air temperature rises**. If your MG is of the rubber-bumper variety, two electric fans were factory-installed in an attempt to accomplish the required cooling; they don't do this job very well. The earlier cars use an engine-driven fan which is woefully inadequate to cool the engine at any ambient air temperature above about 60° F. **The best solution?** Fit a high air flow (2000-3000 cubic feet per minute) electric fan to your MG at the radiator, preferably to pull air through the radiator, which is controlled by a sensor that detects the coolant temperature.

Bottom line: your MG will run cool in the hottest DC weather with a high efficiency radiator, perhaps even aluminum, aided by a high air flow volume electric fan. And, although it is not 'factory installed', sometimes even the factory can use a little help. *Safety faster!!*