Supplemental Information for Overheating Triumph TR2-4A

Gauge Accuracy

If the instrument is not accurate, you may be chasing a ghost. Use a separate mechanical temp gauge, or one of the new infrared temperature sensors. (see Moss 386-265)

What is too hot?

185-195º F is fine. Going up a steep grade, the temperature will climb, approaching 200°F or better. Again, it is not a problem. It will come down once you start downhill. Engine coolant temps 220°F and above are too hot because engine oil additive packages start to break down above 220°F.

When does it overheat?

As a general rule of thumb, a car with all the correct parts and in good running order that overheats standing still but runs fine at speed has an air flow problem- the air flow through the core is not adequate. A car that maintains a stable temperature at idle but the temperature increases with increasing speed may have a core that is not adequate for the heat generated or the coolant is moving too quickly through the core and the heat is not being dumped. The coolant gets hot and stays hot.

Sudden Case of Overheating

If the temperature starts to rise for no obvious reason, you may have a mechanical problem.
The fan belt may be loose (or broken). If the generator warning light comes on at the same time, it is almost surely the belt. A failed hose or hose connection will also cause the temperature to rise quickly. You may also have a blown head gasket. That can be checked by testing for combustion by products in the radiator top tank, or by checking the oil for water contamination. Note: When you shut the engine off, the water is no longer circulating, and the block will continue to dump heat into the coolant. The temperature gauge is going to show the rise. This is normal, and does not indicate a problem.

Fan Rotation

Easy to check and see – is it pulling air through the core?

Vacuum Advance

At 3000 RPM, you should see 36 degrees advance
If the timing is off, car can run hot.

Thermostat

I assume you have one! The water flows too quickly through the core without one; the water does not cool off. The faster you drive the hotter it gets. All things being equal, you would expect the thermostat to "cycle". A 185°F degree thermostat opens at about 185°F, and the coolant temperature will drop. The thermostat closes (perhaps not all the way), coolant temp comes up, the thermostat opens, and so on. My BJ8 with a 195°F thermostat does that at idle on a hot day and when cruising I see the same pattern on the gauge. If you run a 160°F degree Thermostat, it won't work that way- the car warms up to 160°F, the thermostat opens and it will stay open all the time because the coolant never gets back to 160°F. If you have any doubts about the thermostat, make sure it's working properly-test it in a pan of hot water with a cooking thermometer so you can determine when the thermostat actually opens.

Thermostat by-pass

The Triumph thermostat housing has a by-pass which is open when the thermostat is closed. The water come out of the head, into the housing, and then direct back to pump. This design keeps the water circulating, which prevents hot spots from forming in the cylinder head. It also helps the engine warm up more quickly. Original thermostats had a sleeve that moved to block off this by-pass as the thermostat opens. With the by-pass blocked off, virtually all the water in the block goes through the radiator. If you don't block off the bypass, some water will not go through the radiator, and the engine may run hotter as a result. The original sleeved type thermostat is therefore more effective than the general replacement type thermostat, because it prevents the coolant from bypassing the radiator. It also costs more.

434-156 Thermostat, Bellows Type, 160°F

For the TR2, 3, 4, 4A. This is a Moss reproduction of the OE type bellows thermostat, with a sleeve to block off by-pass when thermostat opens. Suitable for systems using 4-7 lbs/sq in radiator caps as original. For systems over 7 lbs/sq. in, use 454-155, a wax capsule thermostat which also has a sleeve to block off the bypass. The reason that you cannot use a 434-165 bellows type thermostat with a cap rated over 7 lbs/sq in is the pressure in the system collapses the bellows, opening the bypass, causing increased operating temperatures and possibly, overheating.

434-155 Thermostat, Wax Capsule Type, 160°F

This is a wax capsule type thermostat with a sleeve to block off by-pass. It is suitable for systems with higher than stock pressures (over 7lbs/sq. in). The wax capsule design is not affected by the higher pressure. For 4-7 lb systems you can use the 434-165 thermostat. This thermostat is designed to fail "open" instead of closed. The sleeve is in the full raised position when cold, nearly touching the top mounting flange. The closure to block fluid flow is between the inner cylindrical body and the top flange. As this unit approaches the preset operating temperature and begins to open, the sleeve moves downward (along with the cylindrical body) to block the bypass port.
Thermostat (A) was supplied up to January 2007,after that, thermostat (B).

It's possible to use a modern non-sleeved thermostat if you partially block the by-pass. This will reduce the amount of coolant that by-passes the core, but it is open all the time. If you do that, drill a few small holes in the rim of the thermostat to allow some coolant to flow through even though it is closed; this warms up the thermostat more quickly. There is lots of room for experimentation but I don't know of a set procedure. Any doubts about the thermostat, make sure it's working properly-test it in a pan of hot water.

Removing the Thermostat

A conventional thermostat can fail "closed" which will quickly lead to overheating. If the thermostat has failed, let the engine cool off. Remove the thermostat and punch out the middle, leaving the outer ring. Reinstall this outer ring. It will act as a restrictor, slowing the water down enough for the radiator to be effective. It will get you home. If you take the thermostat out altogether, the coolant will pass through the radiator too quickly, and you will probably overheat.
Side note: BMC competition cars did not use a thermostat; they fitted a brass restrictor plate which looks like a large flat washer. It restricted the rate of flow through the radiator, allowing the water to dump heat to the atmosphere.

Radiator Caps

For the TR2 through 3B, the original cap was 4 pounds per square inch (lbs/sq in). Many 4 pound caps have been replaced with a 7 lb/psi cap, which raises the boiling point 7-10 degrees. The TR4 and 4A had 7 pound caps. The 7 pounds pressure effectively raises the boiling point and will prevent air bubbles from forming in the cylinder head which instantly creates hot spots. Make sure the seal on the cap reaches down inside the neck far enough to actually seal. Original TR radiator necks are 1" deep and many modern caps (even those listed for your car) don't go that far, most being made for the modern ¾" deep neck.

Open vs. Closed Coolant Systems

The cooling systems in the TR 2-4A are open, meaning that when the pressure inside the system exceeds the pressure exerted by the spring on the radiator cap, the radiator vents through an overflow tube to the atmosphere. For this reason, you need to leave room in the radiator top tank for expansion. Check you coolant level- it should be about 1" below the sealing surface in the filler neck. If you overfill the system, the expansion of the coolant will force coolant out past the radiator cap, through the overflow tube and out onto the ground. Modern coolant systems incorporate a recovery tank. A special pressure cap is fitted, which allows fluid (and air) to be forced into the recovery tank when the coolant heats up and expands. When it cools down, the coolant contracts, and pure coolant (no air) is drawn into the top of the radiator. This type of system is more efficient, and you can use a higher pressure cap, up to 12 or 14 pounds. To make this conversion, it is necessary to have the filler neck on the radiator top tank replaced with a modern ¾" deep neck so a modern coolant recovery type cap can be fitted. A word of caution: as you increase the pressure in the cooling system, you may discover problems that were not there at lower pressure, like leaks. Moss does not offer a coolant recovery system for the TR, so you will have to do some improvisation. This kind of project is why we encourage every British Car owner to join a club- you can find out more in 10 minutes talking to someone who has done it than you can all day on the Internet.

Radiator Core

When was it flushed?
If the core has tubes that are partially blocked it won't work very well. The radiator may need to be overhauled by a specialist. They will de-solder the top & bottom tank, and run a metal rod through each of the coolant tubes to clean out any foreign material. This process is also known as "rodding out".

Flushing the Block

A 1/16" layer of calcium carbonate build-up on an engine is equal to 4" of solid cast iron in heat transfer. Cleaning out the water passages in the block can be very important. There are limits to what can be done with the engine in the car, but a radiator shop should be able to assist you.

Shroud or Air Ducting

Another factor for the early TRs is the air duct; if that's missing the air will tend to flow around the radiator instead of through the core. This would tend to be worse at speed than standing still, but it will reduce the cooling ability of the radiator. While standing still, air drawn through the core will be forced down, and it is possible for this hot air to be drawn back up and through the radiator again.

Coolant

Run a good quality anti-freeze and water, with 50% to 60% antifreeze. Generally speaking increasing the percentage of anti-freeze ***reduces*** the efficiency of heat transfer. That's why you never run 100% anti freeze-it does not transfer heat as well as the 50/50 mix, and it will freeze before a 50-50 mix of antifreeze will.

Coolant Additives

Redline Water Wetter really works. It is a unique wetting agent for cooling systems which reduces coolant temperatures. Wetting agents are chemical substances that increases the spreading and penetrating properties of a liquid by lowering its surface tension—that is, the tendency of its molecules to adhere to each other. Customers of ours have reports 10-12 ºF drops. For racing, it is mixed with plain water, and it provides rust and corrosion protection. It has much better heat transfer properties than a water and glycol-based antifreeze mixture. For the street, it can be added to new or used antifreeze to improve the heat transfer of ethylene and propylene glycol coolant. It will not harm aluminum, cast iron, copper, brass or bronze. It also has anti-foaming properties. Moss offers it under Moss # 220-115.

Fan Shrouds

A fan move air by creating a low pressure area behind the radiator. Measuring the air flow through a radiator core will show that there is not much air movement through the core except the area swept by the blades. This means the radiator is not as effective as it could be. There is no doubt that a fan shroud will greatly improve the efficiency of any fan. A fan shroud is just a box lid that is secured to the back of the radiator. There is a big hole in the shroud for the fan. When the fan rotates, it creates a low pressure area behind the whole radiator core, and air then flows through the entire core. It can make a huge difference in the temperature in traffic, or idling on a warm day. Again, Moss doesn't offer a shroud, but I have seen several cars with shrouds that were made by the owner and there's no reason you couldn't make one.

Excellent source of nearly universal information on cooling/overheating.
It is about MGAs, but the issues with the TR3 are similar.
http://mgaguru.com/mgtech/cooling/cool_101.htm

Forum on web discussing TR3 Overheating
http://www.britishcarforum.com/ubbthreads/showflat.php?Cat=0&Number=94345&an=0&page=10

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If you prefer, you may call our Technical Services Department at 805-681-3411. So many people call us for help that we are often not able to answer the calls as fast as we'd like, and you may be asked to leave a message. We apologize in advance for the inconvenience. We will get back to you within 2 business days.

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