LAP 17 — KEEP YOUR COOL

One of the best things you can do for your Mustang is keep it cool. This is especially important during the summer as we take advantage of the opportunities to get out on the track and enjoy our cars. I just returned from an event where ambient temperatures exceeded 100 degrees every day and I suffered an unusual mechanical failure. The connection between the upper radiator hose and the thermostat housing completely slipped off during a race and ruined my day. The hose clamp wasn't loose, it was so hot that when combined with internal pressure and the stress of racing RPM it just slid right off the neck of the thermostat housing. In fact, temperatures were so high that when we removed the fiberglass hood off the Shelby it flopped around and wiggled like a wet noodle before setting it on the ground. Now that's hot.

Maximizing the performance of your Mustang's cooling system will go a long way toward making your track time more enjoyable. You may remember on Lap #3 we discussed some common considerations to make when preparing your Mustang for the track and in particular the importance of removing excess air from the cooling system using the expansion reservoir. In summary, when your engine runs, the coolant warms along with any trapped air. As it warms the trapped air expands and system pressure rises until stabilizing at a pressure lower than the relief pressure of the radiator cap. Your engine is carrying tremendous heat when you exit the track and when it's shut off the lack of coolant circulation creates local hot spots in the engine that cause pressures to rise even further. This build up of pressure can exceed the relief pressure of the radiator cap thus releasing coolant and trapped air into the catch can. Here's the trick, make sure there is sufficient fluid in the catch can to keep the tip of the vent hose submerged so that when the engine cools and the air contracts the slight vacuum will draw fluid back from the catch can into the radiator leaving the air behind. Over time, the cycle repeats and the majority of trapped air is expelled from the system which reduces the pressure rise as temperature increases. The key thing is to make sure you have a vacuum seal at both the radiator cap and in the vent hose. A slight vacuum leak will allow the system to draw air, not fluid back into the radiator and the cycle will repeat.

The Mustang cooling system is very good. So good in fact that many race cars save horsepower by not running fans, allowing the airflow created by forward motion to cool the radiator. In a race at 1,000-foot altitude, with a properly working cooling system on a 95-degree day, it is common to see water temperatures of only 190F° and oil of 210F°. Most race cars run thermostats because they assist in two areas, warming the engine and improving cooling performance. A common misconception is removing a properly working thermostat will improve cooling by allowing coolant to flow at a higher rate through the radiator. The fact are this will not improve cooling because the coolant needs some time to transfer the heat it is carrying into the radiator core and likewise for the engine block to transfer combustion heat into the coolant. A properly designed cooling system takes this into account and slows the coolant flow to the proper rate for maximum efficiency. If your Mustang runs cooler on the track without the thermostat installed it's likely you have another issue with your cooling system.

Coolant selection is a subject of much discussion since there are many additives that manufacturers claim will increase system performance. On the track, it's not a good idea to run anti-freeze or other additives in your coolant. Anti-freeze is slippery and a hazard to other drivers and most additives have the same effect. Most racers run straight water since it works great and provides no real hazard to others if spilled. My incident last month dumped several gallons of water right in the braking zone of a high speed corner but it caused no adverse effects for other cars. If you want the ultimate in protection, distilled water is a great idea since it essentially contains nothing but hydrogen and oxygen molecules and no additional minerals to contaminate your cooling system. When you later drain the coolant during maintenance there is no reason not to save the coolant and reuse it since it doesn't wear out. You can filter it when pouring it back into the radiator by using a funnel with a paper paint filter laid inside.

There is more to keeping cool than just the coolant system. If you're not running an external oil cooler you should be. The degree of temperature control achieved when running an external oil cooler should not be underestimated. Over time, you'll start to develop a "feel" for the relationship between your oil and water temperatures that will become great diagnostic aids. You can regulate oil temperature and thus engine temperature by varying the amount of air flowing through the oil cooler using tape and cardboard. It's not uncommon to entirely block off the oil cooler on colder days and still not reach a minimum operating temperature of 160F°. Speaking of temperature monitoring try using mechanical gauges, electrical gauges are for street cars and shouldn't be trusted on your track car. Yes, mechanical gauges are slightly more difficult to install, but the confidence gained in knowing you have a very reliable indicator in your dash just might be the difference between making that last pass for position or not.

You're already cool because you drive a Mustang. Now get it out on the track and "Keep Your Cool"!

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