V12 thermostat fiasco explained

This is my findings, AND the solution to temperature gauge “floating syndrome”, that many people are frustrated by.

Remove both your thermostats.

Note the by-pass disc on the bottom, THIS IS THE MOST IMPORTANT PART OF THE THERMOSTAT.

Look up inside the housing you just removed the thermostat from, and note the ‘spigot hole” that is facing you. This is the by-pass port, and its face is prone to pitting. I have never seen a pitted one, but check it anyway.

Now comes the fun bit.

Measure the distance from the mounting face to that spigot face. It will be approx 41mm.

Test your thermostats, boil them, use a heat gun, whatever, you are going to replace them anyway, but do this just to humour yourself. My old units, Jaguar brand, only opened 39mm, YOU SURE, hell yes. Did it too many times, 39mm flat out. Now this is 2 mm at least too short to close that by-pass port 100%, and that port needs to be closed 100% for the cooling system to work anywhere near correctly.

Just to clarify what a thermostat does, I know, you know all this stuff, but just humour me for a few lines, PLEASE.

The thermostat has an opening temp, and a fully open temp, now anywhere in between these 2 temps is where the thermostat is constantly operating, it is constantly opening and closing, it is never satisfied, so in real terms, IT WORKS BLOODY HARD, and it wears out.

Just to clear up another “story” that persists out in mechanic land, the opening temp of a thermostat is in fact its “crack temperature”, meaning that is the temp at which the thermostat actually STARTS to open, hence the terminology known as the “crack temp”, and the thermostat is “fully open” 12degC above that. So, an 82c stat will crack open at 82c, and be fully open at 94c, follow, good, it is simple. Now if your cooling system does not do as it should, the engine temp can get above 94c, which causes

the stat to “fully open” and stay there, IT HAS NOW LOST CONTROL OF THE COOLING SYSTEM, and overheating is just up the road.

Further to that, the radiator is expected to lower the temp of the fluid by approx 12-15c, so the bottom hose temp is about 80c +/-, and that is why the temp switch on the HE in the bottom hose housing is set at 85c, and brings on the auxiliary fan to assist cooling the beast down. Bottom hose sensing is much more accurate than top hose sensing.

The thermostat/s are constantly opening and closing to keep the cooling system at a happy medium, which is usually around 90c +/-, and does a good job at it, BUT, yes there is a BUT, that by-pass port MUST be closed, or else about 30% of the coolant NEVER sees the radiator, do the maths, simple as.

I purchased 2 new Jaguar units, same thing, too short. I was employed as the Spare parts manager for a Jaguar dealer at the time, and raised this with Jaguar Australia. No idea was the response, maybe there is something wrong with your car, politician in the making hahaha. NO, this is the case with 5 cars I have at my disposal, so I reckon Jaguar have messed up somewhere.

I never got an answer, gave up, retired from the dealer.

I searched on my own, and found a Tridon cooling system catalogue, very informative, and found in their listings a 54mm diameter thermostat, which was 35mm “closed”, and 43mm “open”, perfect.

This is a Tridon No is TT228-180, Dayco No is DT18A, and fits Ford cars down here and some others. I have used this thermostat now in some 12 odd V12’s, both Pre HE, and HE, and the cooling system is so well behaved it is downright scary, and I mean that seriously.

NOTATION 31/8/2015: The Dayco website NOW lists this DT18A as the correct thermostat for the V12 engines. Maybe my emails finally got read, who knows.

I replace all my Jaguar thermostats every 3-5 years, coz as I said, they do work hard, they are cheap, and engines are NOT.

I have attached 4 pages from the Tridon paper I studied back then in my search for the correct unit, which explain the operation of the cooling system, and thermostat operation very simply. This is a general system

overview, and is NOT V12 specific, but the principles are the same no matter what badge is on the car.

Using the Correct Thermostat

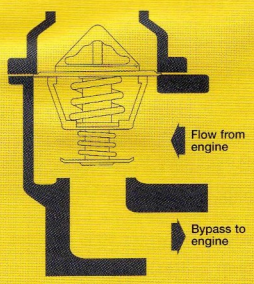

Figure 1 – Bypass Thermostat in correct position. On start up cold position restricts flow to radiator

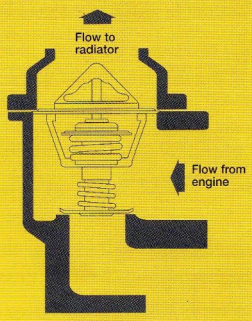

Figure 2 – Bypass Thermostat in correct position at normal operating temperature allows flow to radiator

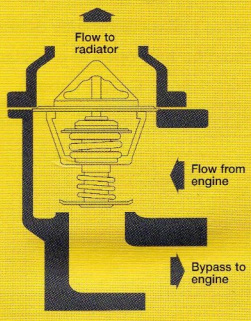

Figure 3 – Wrong Bypass Thermostat used engine runs hotter

Use the Correct Thermostat

For today's engines to operate at maximum efficiency in terms of performance, fuel economy and emission levels it is important for the engine to get to the correct operating temperature as soon as possible and ensure that temperature is maintained during all operating conditions.

In order to do this manufacturers have redesigned their engines to utilise what is called a reverse poppet or bypass style thermostat. This style of thermostat has two valves instead of the one valve that is seen on a non-bypass thermostat. The primary valve operates exactly the same as the non-bypass thermostat and opens allowing coolant to flow to the radiator when the engine is at normal operating temperature. The secondary valve allows coolant to be circulated back through the engine during its warmup stage. The temperature of the engine is able to rise more evenly, minimising hot and cold spots in the engine. The primary valve begins to open and the secondary valve closes when the engine temperature rises. All coolant is then directed through the primary valve to the radiator ensuring that the correct operating temperature is maintained.

A vehicle fitted with a bypass style thermostat must always have the correct bypass thermostat fitted. Vehicles fitted with non-bypass thermostats must always be fitted with the correct non-bypass thermostat. The fitting of an incorrect thermostat will cause the engine to run differently to how it was designed. Overheating and subsequent engine damage can be caused by using an incorrect thermostat.

Correct Bypass Thermostat in the Correct Application

Figure (1) shows the installation of the correct bypass style thermostat. When the engine is cold the primary valve is closed preventing the flow of coolant to the radiator. The secondary valve is open and directs the flow of coolant back through the engine allowing it to warm up faster. As the engine warms up the primary valve begins to open and the secondary valve begins to close. Figure (2) shows the secondary valve completely closed when the engine is up to proper operating temperature. The primary valve is then also completely open allowing full flow of coolant from the engine to the radiator.

Tridon page 2

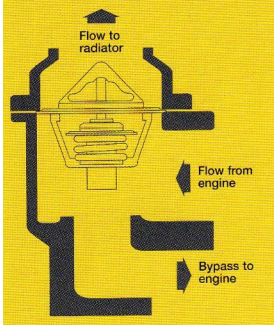

Figure 4 – Wrong Thermostat used in an engine requiring a Bypass Thermostat, Engine runs hotter

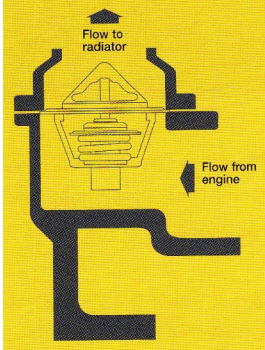

Figure 5 – Correct application for non Bypass Thermostat

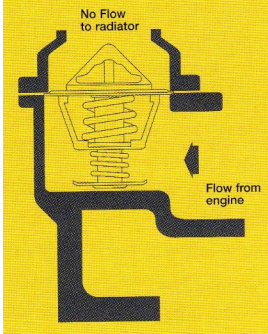

Figure 6 – Wrong application for Bypass Thermostat

Incorrect Bypass Thermostat in the Correct Application

Figure (3) shows the use of an incorrect bypass thermostat in a bypass application. If the secondary valve is incorrect it may not close completely and coolant continues to flow through the bypass port even though the primary valve is fully open. This will cause hot coolant to return to the engine before it has been cooled. The engine temperature will be hotter than required and may cause premature failure of other components in the cooling system.

Non-Bypass Thermostat in a Bypass Application

In this situation there is no secondary valve that will block off the bypass port when the engine warms up (Figure 4). This will cause hot coolant to continue to circulate through the engine without going to the radiator. The engine will run hotter than required and may cause a failure of other components in the cooling system.

Correct Non-Bypass Thermostat in the Correct Application

In engines with no bypass port a non-bypass thermostat must be used (Figure 5). No coolant flows until the thermostat opens. An incorrect non-bypass thermostat used in these applications will normally not physically fit or will be loose in the housing. Correct opening temperatures must also be used.

Bypass Thermostat in a Non-Bypass Thermostat Application

This is the worst possible combination as the secondary valve of the thermostat will hit the bottom of the housing (Figure 6) and prevent the thermostat from opening, as no coolant whatsoever will circulate and the engine will overheat and boil. Major engine damage may be caused as a result of this situation.

Selecting the Correct Thermostat

The best way to ensure that no problem occurs when fitting a new thermostat is to make sure that it is the same style as the one being replaced. The following should always be checked prior to installing a new thermostat.

- Thermostat style (Non-bypass or Bypass).
- Thermostat dimensions.
- Correct operating temperature.

All thermostats in this catalogue are correct for the vehicle applications listed in relation to operating temperature, thermostat style and dimensions. Please use the vehicle application guide in this catalogue to determine the correct thermostat for your vehicle.