

The Club's Driver and Technical manuals do not include discussion of several aspects of the Roadster cooling system. Although the water pump is covered in detail, there is little mention of the thermostat or the temperature gauge, so the purpose of this article is to discuss some aspects of the Roadster engine cooling system that may be helpful to current drivers. PDF scans of the Standard Vanguard Series I & II Service Instruction Manual is readily available online at no cost (<http://www.vitessesteve.co.uk/ServiceManuals.htm>). The chapter on the Vanguard Cooling System is highly relevant to the 2000 Roadster cooling system.

The original thermostat and housing are different in the 1800 and 2000 models and thus not interchangeable. In both types, the thermostat is an integral part of the housing and cannot easily be



2000 bottom view



1800 bottom view



2000 top view



1800 top view

separated so should be removed as a single unit for testing. New replacement original-type thermostats are no longer available although may occasionally be found in the second-hand market.

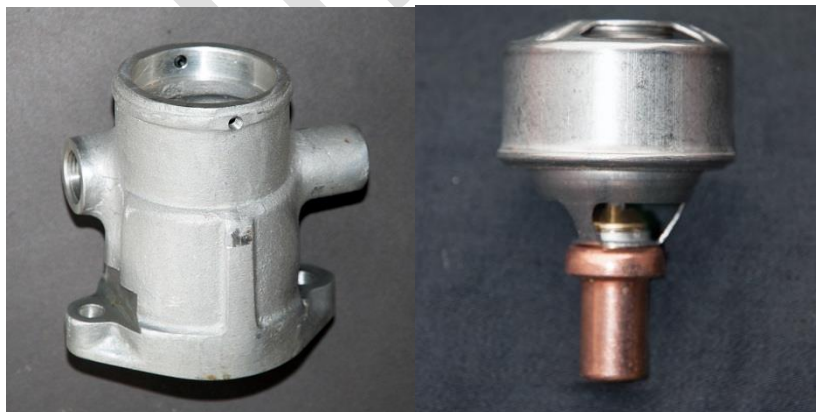
If you suspect problems with your thermostat, remove the housing with

the thermostat intact. It can be tested by placing the entire assembly in water and gradually heating the water while monitoring the temperature. It is recommended that you do not try to remove the thermostat from the housing as it needs to be correctly mounted in the housing for proper testing. The thermostat should open at a particular temperature, usually between 75 and 85 degrees Centigrade. These original thermostats are of the bypass design, so when the main valve of the thermostat is closed to prevent water from moving to the radiator, a bypass channel is opened so that water can circulate through the engine. This allows the engine to warm up more quickly and evenly, avoiding large temperature differences on the engine side of the cooling system. Conversely, when the main valve of

the thermostat opens, the bypass channel is about 80% closed and water mainly circulates through the radiator and back to the engine. This is explained with several clear illustrations in the Standard Vanguard Service Manual. It is not a good idea to run the Roadster without a thermostat as the engine will not warm up properly.



Because of the limited availability of original-type thermostats for both the 1800 and 2000 models, the TRC began offering replacement housings in 1998 that utilize a more conventional and removable thermostat. The Club housings for the 1800 and 2000 differ, but the thermostat is the same. This thermostat does not control the bypass function of the original thermostat but seems to work well, although it has been suggested that the bypass circuit be partially blocked by inserting a plug with an 8-10 mm opening, as in the later model TR4 thermostat housing. This is to minimize coolant bypassing the radiator when the thermostat is open. The Club thermostat is rated to open at 75 degrees. Although most users have been satisfied with the Club thermostat housing, a very few have noted excessive corrosion of the aluminum housing over time, possibly having to do with the amount the car is used, the coolant type, temperature, or even electrical grounding faults. It should be noted that the original roadster thermostat housings were also aluminum.



The temperature gauge is the mechanical type. A copper probe (bulb) is mounted in the thermostat housing and is connected via a small diameter copper tube (capillary) to the temperature gauge in the instrument console. Usually there is a protective spring-like wire wound around the capillary. The bulb is simply a reservoir of ether and the gauge is a Bourdon tube mechanism which is essentially a coiled thin-walled copper tube, with one end closed and the other connected to the capillary that connects to the bulb. As the bulb in the thermostat housing warms up, the ether expands, raising the vapor pressure through the capillary to the Bourdon tube, causing the coiled tubing at the instrument gauge to partially straighten out. This moves the temperature gauge needle. Because this is a mechanical system that must remain entirely sealed at all times, it is important to avoid cutting or damaging the bulb or capillary. The bulb is not designed to be detached from the capillary as this releases the ether. The most common problem with mechanical temperature gauges is a leak in the system.

In order to test the accuracy of the gauge, one should carefully remove the probe from the thermostat housing without damaging or disconnecting it from the capillary. Place the probe in water of a known temperature (e.g. boiling = 100 degrees) and compare to the instrument gauge reading. Do not heat the probe directly with a heat gun or heat source other than boiling water, because if the solder joint that connects the probe to the copper tubing melts, the ether will escape and the gauge will require repair. If your gauge does not work, there are several options. One is to disconnect the gauge from the instrument cluster and send the intact assembly (gauge, capillary and probe) to a professional instrument repair facility. There are some interesting home remedies that can be found on the internet. One involves purchasing a modern mechanical temperature gauge (which operates on the same principle), immersing its probe in dry ice or an ice-saltwater bath to condense all of the ether and keep it



Engine Guardian mounted below the driver's side glove box

in the probe, and then carefully splice the capillary of the donor gauge to your roadster's capillary by soldering a slightly larger copper tube sleeve over the joint. Ether is extremely flammable so this must be done very carefully and is not recommended for the faint-hearted. Another option is to replace the mechanical gauge with an electric

gauge, which requires fitting an electric sender into the thermostat housing and replacing the mechanical temperature gauge within the instrument cluster with an electric one. In a pinch there are some small digital temperature gauges available that can be mounted inconspicuously under the dash or in a glove box (e.g. Engine Guardian, Engine Watchdog). They use a probe that can simply be bolted to the thermostat housing or onto any other engine bolt. In addition to the digital readout, they can be set to sound an audio alarm if the temperature surpasses a preset value.

There has been a lot written about appropriate coolant for vintage cars. The most common recommendation is to use only Inorganic Acid Technology (IAT) coolant that uses ethylene glycol such as Bluecol 2 year coolant. Avoid using Organic Acid Technology (propylene glycol) and Hybrid Organic Acid Technology (HOAT) such as Bluecol 5 yr coolant. Coolants using OAT and HOAT are designed for newer cars and have ingredients that can damage solder seals in copper radiators and engine bearings containing lead. They may also damage certain kinds of gaskets and gasket sealants. A new kind of coolant that contains no water (Evans Waterless Coolant) has been developed that has been promoted for classic cars as being particularly non-corrosive with a much higher boiling point than traditional coolants.

Many club members live in warmer climates than the UK and experience overheating problems. A common modification has been to add an auxiliary electric fan in front of the radiator (refer to TRC Newsletter article) that pushes air from the front of the car through the radiator, assisting the original mechanical fan. This is particularly useful when idling at traffic signals on hot days. These fans are available in several sizes and it appears a 14 inch fan matches the width of the radiator although 12 inch fans are commonly installed. The fan should be controlled by a relay and many come with a temperature probe and thermostat to automatically switch the fan on when needed. These auxiliary fans can draw 9-12 amps. Be aware that the heavy duty 14 inch electric fans designed to replace mechanical fans can draw well over 20 amps, so it is important to know the expected amperage draw of the fan you intend to install and make sure that your electrical system has the appropriate capacity. The stock C39 generator found in Roadsters has a capacity of less than 18 amps so in some cases it may be necessary to install an alternator or dynamo with a higher capacity such as the Dynalite.

There are a number of resources available to help diagnose cooling problems, but generally there are a few main things to look for:

1. Thermostat is opening at the appropriate temperature

2. There is sufficient clean coolant in the system
3. Hoses are intact and there are no leaks in the system
4. Water pump is working properly
5. The radiator is clear of insects and other debris
6. The internal tubes of the radiator are clear
7. There is not excessive corrosion in the engine causing a blockage

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