

### CASE STUDY

#### Engine Overheating - updated 08 July 2020 from original of August 2018

There are many reasons a boat engine, such as the 'Sea Tiger' in a Birchwood 25, to overheat. The obvious one is weed and other detritus in, or to, the Vetus filter (shown here ⇒) stopping the flow of river or sea water into and around the engine block and heat exchanger. But there are other causes.

When his boat had this problem John Pridmore checked the usual areas of concern. The water intake filter was clear down to the sea-cock. (In the past he had to clear both the pipe which was clogged with weed and also the point of entry of water, the sea-cock. He closed the sea-cock and then undid the circlip securing the pipe, pushed a rod (stick) down the sea-cock as it was slowly opened and pushed out weed and silt. Quickly closing the sea-cock as the rod was removed. None of these was the problem in this case so he then checked and changed the impeller. But the problem persisted. A marine engineer\* suggested the thermostat needed changing. John actually put one in as there was not one there before! The one recommended by a local boatyard opened at 88°. Having read up on WaterMota engines John did query this but was advised it was the one.



Apparently it is not unusual that direct cooled engines, particularly the earlier models, do not have a thermostat. However, the FAQ page on Freeman Cruisers website states that "on an engine that has not previously been fitted with a thermostat it is important not only to fit the correct thermostat, but that there is a bypass and that it is operational." It also says that WaterMota petrol engines should be fitted with a low temperature thermostat (up to 75°). (NB The Service Manual stipulates that the original thermostat - where fitted - is set to open at 60°C /140°F.

Normal car thermostats break at a too high temperature. The sudden contrast in temperature between the cold river water and the temp at which the thermostat breaks can seriously damage the engine. The reasoning is simple. A car has a circulating pump, a boat has a full pressure pump. The pressure pump sucks the water constantly from the river and passes it around the engine and the heat exchanger, then through the exhaust out of the boat. When the thermostat is closed, while the engine heats the water, unless there is a bypass the constantly running pump builds up pressure and something has to give!

Referring to the Freeman website again, it states that the build-up of calcium in the head can also restrict the true water flow. At this stage John was convinced that this could be the 'something' that was stopping, or reducing, the cooling water flow. John decided that a descaling intervention would not harm and turned to his trusty car mechanic (and son-in-law) Tony.

Tony arrived and suggested that he first blow-out the cooling system with a high pressure airline. He connected his line to the onboard compressor in his van and proceeded to move logically through the system. ⇒

He disconnected each removable pipe as he went around the block and heat exchanger and blasted out all the cr\*\*. A lot came out! He also removed and discarded the thermostat!

After re-connecting all the hoses and pipes and securing the circlips, he filled the heat exchanger with coolant and started the engine.

After a run of over two hours the temperature gauge had not moved over the 70° it had been running at for the last 26 years! Also, the heat exchanger required very little topping-up.

In addition the bilges are dry after a run. It is assumed that we had had this problem for some time and that the bilge water was due to the pressure build up and the water exiting through the overflow pipe.

It is worthwhile purchasing the Service Manual for the Sea Tiger/Sea Wolf/Sea Leopard from Sheridan Marine as this not only has diagrams showing the water circuit on these engines but also describes the cooling system. There is also a section on the water pump which tells how to remove and change the impeller.



Thanks to [freemancruisers.com](http://freemancruisers.com), [jonesboatyard.com](http://jonesboatyard.com), [sheridanmarine.com](http://sheridanmarine.com), [vetus.com](http://vetus.com) and [WaterMota](http://watermota.com) for advice and information.  
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