

Cool Running – Keep your engine cool.

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My neighbors were out fishing in the gulf one sunny afternoon and as the wind kicked up they decided to head back to the dock. The waves were beginning to build and their twenty-one foot Pursuit plowed through the waves smartly. Then they heard a beeping sound, obviously an alarm of some sort, but they did not recognize the sound or know what was in alarm. They quickly found out, however, when their engine shut down. It had been the over-temperature alarm for the motor. They radioed Sea-Tow and were towed back to safety.

Your boat engine cooling system is designed to keep your engine from overheating. There are some differences in the cooling systems for inboard and outboard engines, but the general concept is the same. The engine temperature is reduced by passing cooler water from outside of the boat through the engine to act as a heat exchanger. Much the same as your car cooling system extracts heat from your car's engine. On outboard engines, the raw water is generally passed through the engine and then discharged. Some inboards include a closed system within the engine that uses a liquid coolant. The raw sea water is used to lower the temperature of that coolant in a heat exchanger. One benefit with this arrangement is that it prevents salt water from circulating inside the engine.

Sounds pretty simple and yet it is a system that needs your attention. Engine cooling systems are designed with a water inlet, a pump and impeller to pressurize and circulate the water, a thermostat, pathways through the engine and exhaust, and an outlet. Any one of these can fail and cause overheating. As the boat owner, you need to think about these separate parts and make sure they are maintained.

Let's look at each one and see what needs to be done to keep them working efficiently. First, we'll look at the water inlet. On outboards these are located on the lower unit below the waterline. On inboard systems there is usually a through-hull fitting that leads to a debris trap or filter. Obviously, the maintenance issue here is keeping the flow of water into the rest of the cooling system. Fishing or riding your boat in shallow or weeded areas has the potential to suck more than water into the inlet. That is less of a problem offshore, but you can achieve the same type of clogging from seaweed or floating garbage such as plastic bags. Keep a close eye on the condition of the inlets and remove any obstructions. One particularly difficult inlet blocker to find is marine life, especially if your boat sits in the water when docked. Larval barnacles can invade the fittings and as they grow they will reduce the water flow.

For outboards, be sure to keep a small cleaning probe on your boat to clean out the inlets. This can be a thin piece of wire or heavy monofilament. For inboards it is a good practice to check your strainer after each use to make sure you are not accumulating material that will reduce the flow.

Now that we have water flowing into the system the next component is usually some form of water pump and an impeller. They are there to push the water up and through the engine. Maintenance here should be replacement of the pump and impeller during your regular engine service. Impellers are a star-shaped plastic piece that spins and forces the water to circulate. They wear out more quickly than the water pumps mainly because of the material used in their manufacture. Traveling in shallow sandy areas and sucking sand into the system and will accelerate the abrasion to these parts. Check your engine manual for the suggested replacement intervals.

When the engine first starts, it is cool and the water pumps have no way to know that, so they pump water at the same rate as when your engine warms up. But there is a thermostat in the cooling system that will direct water out of the loop. As the engine heats up the thermostat will act like a switch and open to allow water to perform its cooling role before exiting. The thermostat, therefore, is another critical piece in your cooling system. It also should be inspected and replaced, as needed, during normal maintenance. Remember, it is a corrosive environment for the systems that use raw water for cooling and these parts deteriorate over time.

With the thermostat open and cooling water flowing through the engine, the water begins to warm and removes heat from the motor. The narrow passageways through which the water travels are designed to keep the water flowing efficiently. The effect of salt water on these channels is to build up salt deposits, both from evaporation and chemical reaction with the metal. As deposits build up the water flow will become degraded. A simple preventative maintenance action you can take is to flush your engines after every use in salt water. Your service manual will provide you with a recommended duration, but I like to rinse my engines for at least twenty minutes. I also highly recommend a final rinse with one of the commercial rinses designed to counteract salt buildup.

Properly maintained, the cooling system for your boat's motor should discharge warm to mildly hot water and your engine should run cool. If, however, the discharge stream is weak, sputtering or steaming, you are not cooling the engine sufficiently. Shut down the engine and check for debris at the intake and remove it. If that does not resolve the problem, then there is an internal issue and unless you are a skilled mechanic and have spare parts on board you will not be able to repair the cooling system. Call for a tow home and have the engine professionally inspected. Do not run an engine with signs of failed cooling as that can cook your engine.

For more information about **USCG Auxiliary Flotilla 95** or **Safe Boating Courses** contact Doug Johnson (239) 207-5608.

For a **FREE** vessel safety inspection, contact John Moyer (239) 248-7078.
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Photo courtesy of Keith Wohltman - boat courtesy of Bert Hoell!