

Engine overheating checklist:

Symptoms:

- Temp above normal, 194/195 deg F is normal, above 200 deg F hot (D1-30 engines)
- Steam coming out of exhaust

1. Thru hole valve open?

Yes: go to 2

No: open it

2. Fluid level normal

Yes: go to 3.

No: go to 5.

3. Water coming out of exhaust with no or very little steam?

yes: go to 4.

no:

- open strainer top. Water should gush out the top. If no flow or slow flow check for obstruction

- obstruction can be in the filter basket or inlet hose or inlet valve.

- if the basket is clear the obstruction is in the hose or valve. Easy fix is remove inlet hose at strainer, insert firmly into air horn and blow back through the inlet hose and inlet valve. If this doesn't work take the hose loose at the thru-hole valve to isolate the blockage and remove it. If you ran the engine very long with blocked raw water flow it can cause impeller damage so check it before you restart.

- If blades are missing and unaccounted for in the pump then they probably are in the heat exchanger. If there are enough to cause over-heating you'll need to check the exchanger. Go to #6. Before you restart replace the impeller with a good one. To make this easier use a zip tie to compress the blades so it's just smaller than the pump cavity and slide it into place. When all the blades are started inside the pump slide the impeller in and remove the zip tie along the outside edge as you do.

- check exhaust elbow. It's behind the heat exchanger with a small hose that connects to the exhaust elbow bolted to the rear of the engine and has the large black exhaust hose connected to it. Usually it's easier to remove the air filter assembly first. Check for obstruction by removing the small black hose that connects from rear of heat exchanger to the exhaust elbow. CAREFULLY pry the small 90 deg hose that connects the heat exchanger outlet to the exhaust elbow. On many engines the connection at the heat exchanger is plastic.

4. Verify you are really overheating. One way to do this is with an IR temperature gauge (around \$30 at Harbor Freight or Northern Tool).

Yes: go to 5

No: check connections and sensor.

5. Check thermostat. If the thermostat isn't opening you can see a temp difference from the housing to the line leaving the thermostat. If you suspect this is the problem remove the thermostat and run the engine with no thermostat. If this solves the problem you can run it this way but this is not recommended for long durations since it will cause the engine to operate well below normal temperatures.

6. Check exchanger.

- this is fairly rare and a pain so only do this if you've checked the above at least twice.

- fill the reservoir to normal level and operate the engine for a while and see if you are gaining or losing fluid. A little gain in level within the markings on the tank is normal as coolant expands. If you're over-flowing you have a salt water leak into the freshwater system through a seal leak in the exchanger or a hole in one of the tubes. Remove the bundle check the seals for leaks (more common) and check the tubes for leaks (rare). You may need a good radiator shop that can rig a pressure test on the tubes. Repair and/or replace as appropriate. Loss of coolant more commonly is due to a faulty pressure cap or a leak in the tank or hoses but it can also be due to a leak in the exchanger.

- if your coolant level isn't fluctuating you may have tubes plugged. To check this remove the exchanger inlet hose and check for bits of impeller. If you're certain you got most of the pieces try putting the hose back and running the engine. If not remove the exchanger head and check for plugged tubes. Sometimes they are in the hose into the exchanger and fall down to the pump when the engine isn't running.

- heat exchangers work by providing surface area around the outside and inside of tubes in exchanger tube bundle to exchange heat from the anti-freeze solution flowing on the outside of the tube with the sea water that is flowing through them. There aren't that many tubes and each one that is plugged takes a lot of area out of the heat transfer. So it doesn't take too many to cause overheating especially at high work loads on the engine.

Other rare cooling problems

7. Least likely is the coolant circulation pump. This pump is belt driven and usually lasts for thousands of hours. A pump manufacturing defect in some early D1-30 engines caused a water leak at the seal. This is characterized by coolant with anti-freeze dripping from the weep hole and eventually a black colored gunk line down the side of the pump where the leak runs. Usually the leak is slow and not an immediate problem and it does get worse over time. Best solution is to get

the pump rebuilt at a reputable shop. Replacements are available but very expensive (over \$400) and they can have the same defect. You can also order the Perkins pump which is much cheaper (about \$100). The Perkins part number is 145010040. I've bought this pump and know first-hand that it's identical to the Volvo pump. This also means it could have the same defect but will give you a pump to use at a reasonable price while your other is being rebuilt. It is available from Marine Parts Express and Torrenson Marine for less than \$100 as of Jan 2012. For rebuild contact Commercial Water Pump Rebuilders 1151 West 22nd Street Houston, Texas 77008. E-Mail: waterpump01@yahoo.com. Phone: 713 864 5199. Rebuild including all new internals and shipping to US locations is about \$150 as of 2011. I've used this shop for several of Volvo pump rebuilds and many other. This is a top-notch shop.

Hope this helps.

Chris
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Sometimes strange wording courtesy of Apple auto-correct