

Ask Steve – December 2015

Hi Steve

I have a pair of Cat 3208, 1984, 300hp engines in my Jersey 40. They are well cared for and I pulled the heat exchangers on both and had them cleaned in an auto radiator shop and had the thermostats replaced while it was apart. This is the second time I have had it done in five years and they are clean when I take them out and cleaner when I put them back. Here is the problem, the port engine runs around 180/185 and the starboard is running around 190/195, I checked the temp at the exchangers with a thermal gun and the starboard exchanger is hotter at the outlet side. The shaft logs are cool, and the rest of the engine is fine. I just changed the impellers and the raw water pumps are fine. Is it possible that one prop is pitched more and loading the engine? The props were tuned and balanced two years ago by a very qualified shop. The engines are supposed to run at 2800 rpm max, they run at 2650 now and I know they have to be retuned next time they need to go into the prop shop. I have run out of things to fix and it still runs hot, I run the engines at 2500 to 2550 which is 10% of the max (2800).

One more question before I attack the harder to test stuff, do you think that the south bay strainers are too restrictive on that engine? The intake hoses are 1 5/8 inches in diameter but the south bay strainers have a lot of small holes. I drilled the holes a little larger but I wonder if they are still too restrictive. Not sure they are since they are about the same for both engines and only one engine is running hotter?

Any suggestions would be very welcome

Jerry Marmer

Jerry:

Thanks for sharing this problem, it's an interesting one to be sure. Frequently, when I face readings on instruments between two engines I ask myself these questions, "Are the readings within the manufacturer's specifications?", and "Would I be worrying about this if it were a single screw?". I think in this case the answers are yes and no respectively. For this engine the normal range is 175-210F. It should be able to run at wide open throttle, assuming all other parameters are within specification and the engine is in good tune, for five minutes without exceeding 210F. Ideally, it should stabilize between 185F and 195F. When it exceeds 200F it's typically an indication that there is an issue with the raw water circuit.

Assuming it fails the above tests, there are a few things you can check. Start with the easy items, such as, try swapping senders from one engine to the other and see if the readings flip flop. If they do then one of the senders is the culprit. Try the same with the gauges themselves as well. Remove the exhaust hoses and make sure the risers are not clogged with rust and make sure the risers are equipped with the proper diffuser rings (I find these are missing on some 3208s). Are the wet exhaust hoses running hot, over 150F at any rpm (especially low rpm)? If so water flow may be impeded, which will lead to running at a higher temperature.

The engines are slightly overloaded, which is undesirable (I don't think this is the cause of the higher temp), in that they are not turning up to the rated rpm. However, before the props are adjusted make sure the engines are in perfect tune, i.e. injectors are clean and working properly, valve adjustment has been checked and confirm that the back pressure is within Caterpillar's specification (maximum of 40" of water). Once those items have been confirmed, then perform a wide open throttle test and measure the maximum rated rpm achieved using a strobe tach, with full fuel and water. If the engine is not making a full 2800 rpm then the props should be adjusted. Once they are adjusted carry out another WOT

test and see if either engine exceeds the manufacturer's rated temp. If not, it's unlikely there is a problem.

I'm no fan of the small hole style external "south bay" strainer (been a while since I heard that term, I'm from Long Island where it originated). They could be restrictive, that restriction could be measured by plumbing a vacuum gauge to the internal strainer. I'm not certain about Cat, however, I do know that some other engine manufacturers, including Cummins, provide a maximum intake restriction standard for raw water pumps.

In my experience, the scoop shape of the strainer (is it wedge shaped?) can be beneficial, providing a ram effect, however, depending upon the strainer's design, overall size, size of holes, and occlusion of holes by anti-fouling paint etc, they could provide a net loss of water flow. At the very least, I'd confirm that the collective size of the holes in the strainer are equal to (and preferably greater than) the cross section of the hose, and then some. You can get this information from the strainer manufacturer.

Hi Steve,

I thought you would like to know how the hot running problem on my Cat 3208 was solved since it probably comes under the cartoon of the non-working computer with the plug out of the wall. A few days ago I noticed a black streak on the battery box near the water pump on the engine, four years ago I replaced the pulley on the pump because it cracked off the hub. After seeing the streak I started up the engine and noticed that the pulley was wobbling again. This time I removed the water pump and while it was not leaking it was apparent that the bearing was very worn and causing the pulley to wobble. I ordered a refurbished pump and installed it, using a new pulley as well as the new pump. Took the boat out for a test run and it ran perfectly, correct engine temperature under load and even at full throttle. Prior to

this the engine was looked at by two mechanics and they never tested the output of the raw water pump at speed. Apparently as the pump turned faster it wobbled more and became less efficient.

Problem solved for now!

Jerry

Jerry:

Thanks for the update. It reinforces the notion that I've held for a very long time, the better you get to know your vessel, the more you will benefit. If you hadn't been in the engine room looking around, and if you hadn't noticed the streak on the battery box, this problem would have gone unsolved and almost certainly gotten worse, a wobbling pulley is a pulley that's destined to separate from its shaft.

Hi Steve,

I'll appreciate your comments re: my San Juan 48. We are presently cruising the Down East Circle route. Per your suggestion, I replaced my fuel gauges (atop my Racor 750 manifold) with the ones you recommend. The problem is that these gauges have not yet moved from zero, even after about 50 hours of cruising. Also, I note my old gauges registered positive and vacuum pressures. The new ones only show vacuum. Thanks much for your comments.

Best Regards,

Mike Davis

Mike:

It's not unusual at all for the gauges to not move from zero

after just 50 hours of run time. In fact, if the fuel is clean they shouldn't move for much longer than that. My rule of thumb is, if you need to change filters more often than every 1,000 gallons of fuel use, then you have a tank contamination issue. Filter replacement would be indicated by any vacuum in excess of 7" Hg.

If you want to confirm the gauges are working, and you should, you can do so by slowly closing the fuel supply (not the return valve if there is one) valve to the engine while it's idling in neutral, you should see the needle begin to rise, confirming it is reading the induced vacuum.

You say you replaced existing gauges, and they were pressure/vacuum, I assume these were in the middle of tandem Racor assemblies? That's where these gauges are typically found, rather than on top of the filter housing itself. While you could get compound pressure and vacuum gauges from Wika/FN Cuthbert, they aren't necessary, your system should never "see" pressure. If you were to purchase stand-alone vacuum gauge kits from Parker/Racor, they would be pure vacuum alone.

Hello Steve,

I have a question about flax size...

The front end of my stuffing box is bored 2" and I use a 1 1/2" shaft. Should I use 1/4" or 5/16" flax?

The 1/4 seems just a little loose, while the 5/16 looks just a little tight.

Thank you so much,

Gilles Philippin

Gilles:

While there are some exceptions, packing for conventional stuffing boxes is typically sized relative to shaft diameter. If your shaft is 2" in diameter, it calls for 3/8" packing material. If 5/16" seems too big, then 3/8" will be even tighter, however, I'd give it a try. The most effective way to determine if a stuffing box is packed properly is by monitoring its temperature using an infrared pyrometer. The temperature should never exceed 30°F above ambient water temperature, and of course it shouldn't leak too much. Using this temperature method, it's often possible to get stuffing boxes to leak very little, while still remaining cool.

Make sure you use no more than three wraps, "lap" the joints of each wrap so they overlap rather than abut each other squarely, and offset them by 120°. You can also grease them to aid installation.

If your stuffing box won't accept the 3/8" packing, the largest size that fits should be used, as under-size packing tends to be "ingested" into the void between the stuffing box and shaft.