CATALINA 350 INTERNATIONAL ASSOCIATION



C350 Association Technical Editor Scott Monroe

This quarter's submission comes from Catalina 350's own Association Editor and Webmaster Bruce Whyte. As Bruce discusses, no mechanical problem ever occurs without a warning, just need to learn to listen. But first, we also have a quick update from Michael & Maureen about a story submitted last quarter. **–Scott Monroe,** scott_monroe@verizon.net

UPDATE: SV Journey - C350 #275 Heat Exchanger (HX) Relocation Follow-up After Sea Trials:

As of this writing, we have taken SV Journey on several places around the Chesapeake Bay motoring and sailing about equally totaling several weeks. Ending our HX relocation article in a previous Mainsheet issue with "sea trials pending" we want to report complete success!!!

Overall the completed cooling system with the HX relocation adds an extra gallon of coolant to the previous factory setup. This is understandable given the extend hose lengths leading to the relocated HX. These results however were not without a few extra challenges. First of these was removing air pockets out of the cooling loop. This involved several stages, filling exhaust manifold, running the engine up to temp, and burping air out again and again all the while experiencing crazy temp swings. It wasn't until another boat owner told us to completely remove the coolant cap (no half turns or barely on caps) that most of the air was able to quickly exit the engine. Thanks Frank! Also, there is a bleed valve at the thermostat, which we mistakenly did not leave it open long enough to remove all the air. We also ran an appropriate bonding wire from the HX to the chassis of the engine to allow the zinc to do its job.

We could not be happier as our faith in our engine has been fully restored. Total cost for our C350 HX Relocation was about $600 on a DIY basis. **–Michael & Maureen**, SV Journey

Shafted by Seal and Transmission

By Bruce Whyte • *Aussie Mate*

A friend and I had planned, on fairly short notice, a trip from Oriental, NC to Deltaville, VA to be followed by a week's cruising in the lower Chesapeake Bay. At the end of the first day, once tied up at the marina, we found a rug in the aft cabin soaked with clear, odorless and tasteless fluid (yes, I tasted it, cannot rely on crew to do the dirty work!). With no sign of any leaks from the ports nor any drips from the ceiling, and only minimal signs of water in the engine compartment, we decided to just watch it.

Several days later, while motoring we found the rug was again soaked. Again, no sign of leaks around ports, ceiling or anywhere else. With renewed concern I lifted the aft cover over the transmission (you know that one under the two half mattresses!) and was surprised to find water spraying in 360 degrees like a hose faucet on full spray. It appeared to be coming from the front end of the prop shaft or the aft end of the PSS seal. If we reduced the rpm, the spray also reduced. Fortunately, the bilge pump had no problem keeping up with the ingress of the water. This helped our choice among three options.

The options then were:

1. do we consider this an upcoming emergency and issue a Pan Pan; or
2. do we head into the closest port maybe 10 nM away to the west; or
3. do we continue to Deltaville, only about 20 nM away to the north?

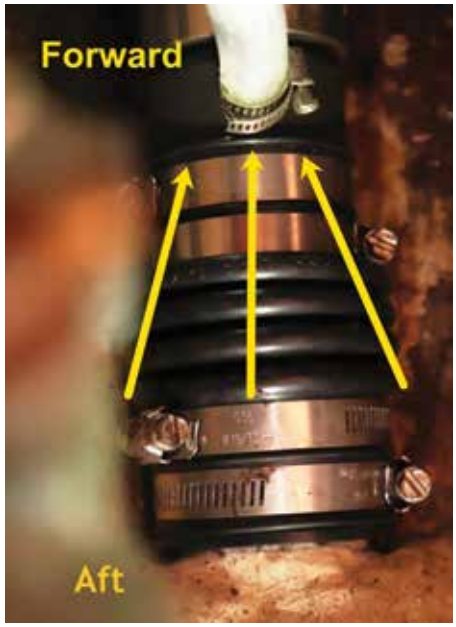


Image of PSS Drip-less shaft seal, arrows point where water was spraying from

We opted for Deltaville, but, as dictated by Murphy's Law, we arrived late on a Friday and nothing was open. We called Chesapeake Cove Marina, who had helped us in the past and had done such a sterling job over and above the expected, but they were full with boats on the hard and recommended we go to Sting Ray Point Boat Works next door. Fortunately, they had space and suggested we come first thing Monday morning, unless we had uncontrolled leaking from the seal. Since we didn't, we waited.

On the Monday morning, my 500-yard trip to the Boat Works next door, nearly became a trip to Neptune. On that short trip I lost power 3 times with each gear change clanging noisily and we managed a slow coast onto the dock.



Image of new and old shaft coupler, arrows point to sheered key

Once hauled, external examination found no damage to the propeller nor any obvious damage on the shaft. The mechanics could not wait to get into the boat. We ripped out all the mattresses, pillows, blankets, paper work and other stored gear (we all use that as our storage shed, right?) and into the guts of the power train. First thing the mechanics found was a huge difficulty turning the shaft and coupler separately.

It took several hours to free up the coupler from the shaft. When removed, it was found to have sheared the key inside, half of which had been all but welded onto the key space of the coupler. The other half of the key just fell out when the coupler was unattached. The shaft keyway also showed extreme damage as might be expected. With both the shaft and shaft coupler damaged there was no way the two components could work together and power the boat. They kept vibrating and slipping.



Upper image shows damaged dimple for coupler set screw, right image shows warn keyway in shaft

There are two bolts on the coupler, one of which is seen on the first picture. These screw through into two dimples on the shaft to secure the two pieces together. These dimples are pyramidal in shape with the apices deepest into the shaft. As can be seen here, our dimples were a mangled mess.

It was also noticed that the rubber bellows on the PSS seal were not expanding when under no pressure and had lost their elasticity.

So, at the end of this first day it appeared that we needed a new propeller shaft, a new coupler with aligning bolts, new lock washers, new set bolts, new PSS seal, bellows, O-Rings and hose clamps.

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Zinc collar positioned too close to cutlass bearing

There was some good news. The stainless-steel shaft seal rotor and the graphite stator plate were sound and undamaged. They could be used in the new installation. The cutlass bearing was also deemed undamaged and not in need of replacement. While at it, the external zincs were close to needing replacement, so we did that also.

Interestingly, there was a shaft mounted zinc collar between the cutlass bearing and the propeller, which was considered an overkill by the mechanics. Because shaft mounted zinc was so close to the cutlass bearing there was a concern that it could have hindered the water lubrication of the bearing. Fortunately, there was no evidence that this occurred.

Once the new shaft arrived (5 days) the coupler, stainless steel and graphite plates, seal, shaft and other bits and pieces were installed. Next day was splashing day at last.

The boat was splashed first thing in the morning and the engine tested. First thing we heard was an irregularity in the rpm. When put into forward gear, the clunk was very very audible, slightly less so in reverse. So, the engine was shut down and checked, only to find oil and water in the pan under the forward part

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of the engine. The immediate thoughts turned to the transmission, which was dripping fluid noticeably.

So hey, this is easy. Call back the crane (included in the estimate, right?) and lift the boat back onto its previous stands (that had not even had the time to be moved). A new transmission was ordered and expected in 2 working days. Well 3 days later and a wrong delivery address the transmission finally arrived. Eight days on the hard. Y'all know how much fun that is!!

Next day the transmission was installed, and all the previously installed and uninstalled parts were reinstalled. We splashed the boat then ran it against its lines for an hour. No problems. Quieter than previously, cooler (by 7-10 degrees) and vibration free. So off to the next marina to refuel and head back to our new and temporary summer base for 2019.

Oh, and did I mention the fact that I replaced the hot water hoses but forgot to bleed the lines so we of course, overheated on the way back to the dock. Just a minor panic ensued. Thank heavens the Admiral was still at home.

Lessons learned from this experience were multiple:

1. Learn more about your engine;
   a. Listen to your engine;
   b. Check engine alignment often (some suggest it should be realigned after each "shock" such as being hauled out of the water or after hitting submerged objects);

2. Do not wait;
   a. Don't wait to see if anything else happens, act on it when it does. We should have acted on the first day and hunted down the problem. Mind you if we had, we would have been stuck in a marina that did not have any mechanical access nor haul out facilities, but that is easy to look at in retrospect;
   b. How easy would it have been for the PSS Seal to totally give way? Then what? I have been told that is the scenario for total disaster. OK.

3. Go with your gut!
   a. We had wondered for years about the idling noises made by the engine when we were on Lake Lanier, one of the mildest sailing climates in the SE. We assumed they were normal. But the vibrations back then just may have been the harbingers of what happened years later.

I must add and put the following into perspective. We have a 2005 C350 (Aussie Mate) that we purchased in January 2006. It now has an enormous 779 hours on the engine. So, this is lightly used by any definition. Of those 779 hours, about 250 had been on Lake Lanier for the previous 8 years and 529 have been in saltwater over the last 4 years.

Now we are heading north to join the Catalina cruise out of Rock Hall, assuming we have put everything back together correctly. **–Bruce Whyte**, Aussie Mate