# July 2025 Newsletter – Risers and Siphon-Breaks

## Photo Essay: The Perils of an Unvented Loop

Vented loops, also known as anti-siphon valves or siphon-breaks, have served mariners for many years.  Their mission is a noble one, prevent a siphon from occurring, which could cause flooding and sinking.  The siphon phenomenon is one that is sometimes difficult to visualize (drawing a diagram sometimes helps), even for experienced professionals.  It seemingly and counterintuitively allows water to flow uphill.  In some cases, without a siphon-break, the only thing standing between the sea and a vessel's bilges is a lone raw water pump impeller, or a flap inside a diaphragm pump.

It's important to understand where a vented loop must be used, and it's just as important to understand where it will have no effect in preventing flooding.   The first and most criterion is, does the component associated with an overboard discharge have an opening *inside* the vessel?  Items that fall into this category include bilge pumps, engines and generators, which may, depending on their location relative to the waterline, require a siphon-break.  An air conditioning system, hydraulic system cooler, or water maker, on the other hand, does not normally have an opening in its raw water systems into the vessel, and thus they do not require a siphon-break.

The image shown here is a riser, which elevates the discharge above the (ideally dynamic) waterline, with no siphon-break.  This is designed to prevent flooding.  If this is for a closed system, a chiller raw water discharge, for instance, it would not require a siphon-break (or a riser for that matter).  In this case, however, the discharge is associated with a high-capacity bilge pump, and thus it should be equipped with a siphon-break. If this discharge were to become submerged, if the vessel heeled for instance, during a grounding, and the pump cycled on, and then off, a siphon could be established, which in turn could result in flooding.

For more on siphon-breaks see this article. For more on the difference between siphons and flooding, see this article.

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# Ask Steve

**Hello Steve,**

I read your articles with much interest.

Having acquired a Wauquiez Centurion 40 last year, built 1993, I discovered that nothing is bonded.

My question to you is, after having read your articles related to bonding and anodes, what to bond? Obviously, the seacocks and engine, but also the bow-thruster, water and diesel tanks, keel studs, rudder shaft, etc.?

Many thanks,

Frans Botman

**Frans:**

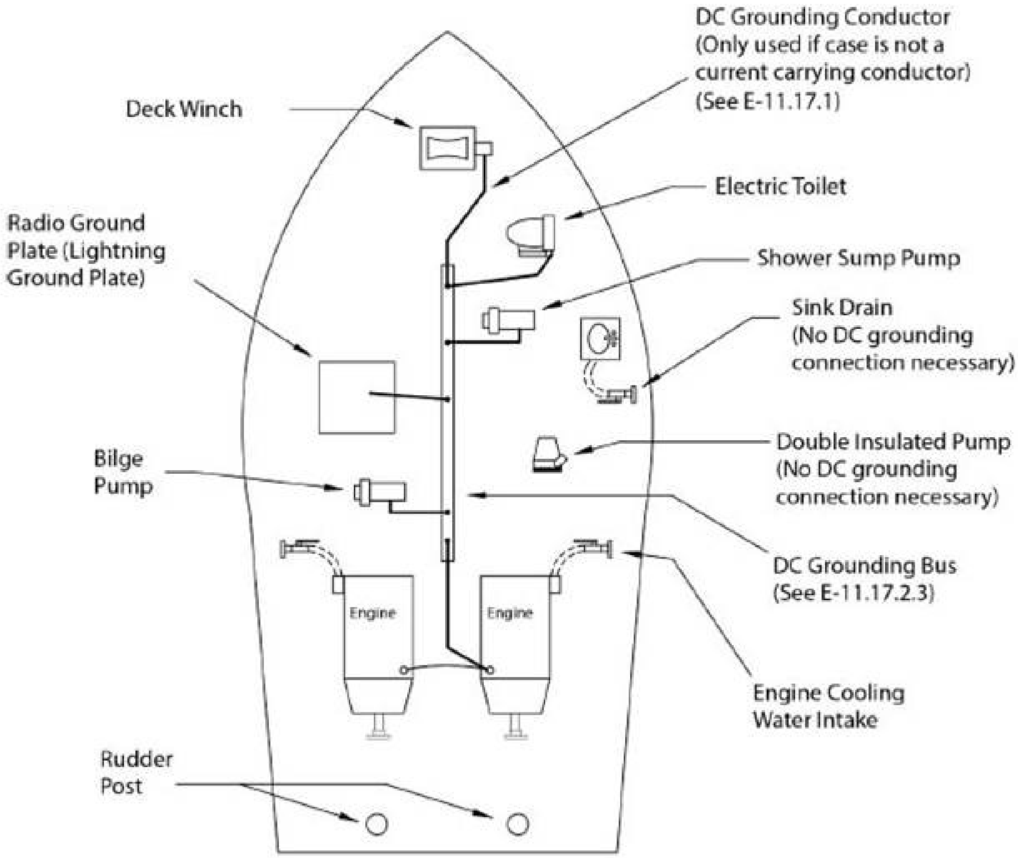
Bonding is optional, at least as far as the American Boat and Yacht Council is concerned. Having said that, in my opinion, the reasons to bond far outweigh the reasons why one may choose to not bond a vessel’s underwater metals and interior metallic components.

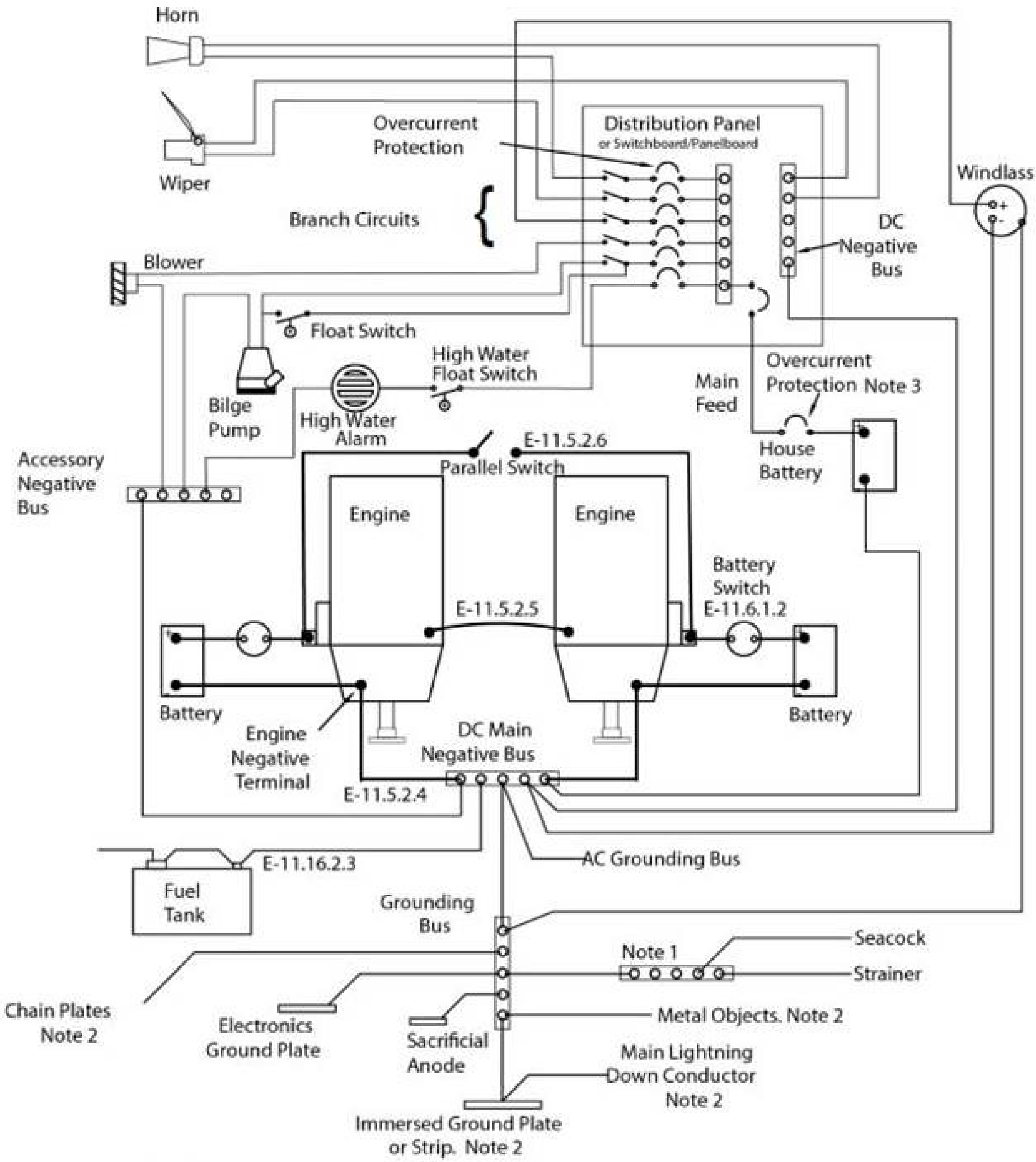
Internal components like tanks, chassis grounds, windlasses, stanchions etc. can be “grounded”, while underwater metals are “bonded”, however, the bonding and grounding systems are essentially one in the same and are connected.  Metallic tanks, and keel bolts should be bonded.  All submerged metals should be bonded, including struts, stuffing boxes and metallic shaft logs.  Some bow thruster manufacturers, Sidepower/Sleipner for instance, prohibit bonding of their thrusters.  If there is no manufacturer prohibition, then they benefit from bonding, however, see the linked article regarding bonding wire size for bow thrusters and other high current components.  Unless it is an especially ignoble metal, like aluminum, then the rudder shaft also benefits from bonding.

For a longer treatment on bonding see here and here.

These diagrams below from ABYC illustrate some of these connections.

**FIGURE 11** - DC Grounding System






*NOTES:*

1. *Cathodic bonding - refer to ABYC E-2, Cathodic Protection.*
2. *Lightning bonding - refer to ABYC TE-4, Lightning Protection.*
3. *For the location of the overcurrent protection device, see E-11.10.1.*
4. *See E-11.6.1.2.1 for battery switch requirements.*
5. *This diagram does not illustrate a complete system. Refer to the appropriate text.*

**Steve,**

Our boat has been in and out of the water four times the past four weeks. We initially went in for bottom paint, and new bellows for the PSS shaft seals. While out, we decided to change cutless bearings. While there was no vibration and the shaft did not move, the boat is a 2016 and I figured it was time to do preventive maintenance.

In order to change the bellows, we needed to remove the flange on the prop shaft. It took mechanics two days and lots of heat, sweat and pounding to get the first one off. After one day of fruitless effort on the second motor, the mechanic decided to slide the engine forward and bring the shaft inside the boat so that the flange could be removed outside, allowing longer handles on the wrenches.

Fast forward, the boat is reassembled, we go on a sea trial and the boat now has a significant vibration, between 1400 rpm and 1900. It seems to disappear at 2000 and returns at 2400. I didn't run it faster.

Mechanics checked alignment, pronounced it good, but the vibration did not go away. One mechanic blamed bad engine mounts. I checked them visually and other than some rust, the rubber appeared intact, supple, and the mounts standing straight.

In the meantime, we put on new props (I had an extra set aboard), and the yard had the flanges and prop shafts checked for straightness and fit. One flange had to be resurfaced and another rebuilt because of the abuse they took while removing.

After a new sea trial, we still had the same vibration. Back out of the water, shafts and flanges were sent again to a machine shop for inspection. Everything checks out good. Another mechanic checked alignment and pronounces it dead on, both engines… sea trial showed no improvement in vibration.

When making the alignment, the mechanics put two halves of a cutlass bearing in the shaft log, to ensure it was centered. I wonder how they know it is supposed to be exactly center, perhaps a couple mm one side of the other would better align with the strut.

The yard insists engine mounts are bad.  I ordered eight new.  Two of the mounts were removed and they still looked good to me.

What might we be missing?

The boat is a FP MY37 power cat with two Volvo 220 hp motors.  Shaft length is about four feet and has a 45mm diameter.  Boat is located in Croatia.

Thanks in advance.

Gordon

**Gordon:**

Because it is a constant, rather than an eccentric, engine to shaft coupling, and shaft to bearing misalignment, almost never causes vibration.  Vibration is typically caused by irregular motion and harmonic resonance.  Therefore, misalignment, while problematic, is very unlikely to be the culprit.  More on engine and shaft alignment here and here.

Ideally, in order for your face seal stuffing box to work properly, the shaft must be centered in and parallel with the shaft log.  More on that here.  If the original alignment of the shaft from the builder was correct, this *should* result in the shaft also passing through the center of the strut bore.  However, and once again, even if the shaft was misaligned with the strut, while that will result in shaft and bearing wear, it should not cause a vibration.

Were the props installed using the protocol, including ensuring they are not binding on the keys, described here?  A prop that is not properly engaged with a shaft taper will cause a vibration.

The fact that the yard used blunt force to remove couplings is very disconcerting, hammers have no place in this removal process, and I'm not surprised this resulted in damage.  Even though these have been checked, I remain suspicious. Couplings can be separated from shafts using extended grade 8 bolts and a drift to press the shaft out of the coupling, with no blunt force required. Or, if available, a hydraulic ram can be used, both can be used in situ. Has shaft run out been checked using a dial indicator, with the shaft couplings mated up to marine gear's output couplings? If not, this should be checked, a coupling that is not centered in its pilot bore, because it has been damaged, will cause a vibration. More on couplings here.

Is the vibration evident on both engines equally, when running on one engine at a time?

While defective, collapsed or worn motor mounts can lead to vibration, for mounts of this vintage, all of those scenarios are, while possible, unlikely. It is more likely that the mounts are imbalanced, causing the engine to "teeter" on two mounts diagonally. If the mounts are not evenly loaded (some mounts include load indicators for this reason, here's an example), then this can and often does cause vibration, especially at an rpm that causes a harmonic resonance, which appears to be what is occurring. More on this subject here.

**Steve,**

Have you heard of this WPT packing stuff? I just ran across it while I was looking up flax packing for 5006 Nordhavn. Do you recommend it? It is supposed to make it dripless and you put it between two pieces of flax packing.

Also, do you recommend Teflon packing? I have the stuffing box out of the boat and have cleaned it so it looks new… do you recommend painting it (i.e. Petit prop coat or something along those lines) or leave it natural?

Thank You,

Nicholas DeRaimo

**Nick:**

I am familiar with the WPT product (and others similar to it), however, I'm afraid I have no firsthand experience with the product. I have used Teflon packing, a single ring interspersed between rings of conventional packing. That approach works well to create a dripless or nearly dripless conventional stuffing box. Use caution with these second-generation packing materials, they can work too well, which can lead to shaft scoring. Monitor stuffing box temperature after repacking and adjust as necessary, you should not see more than about a 30-40 F increase over seawater temperature.

Other than for cosmetic reasons, there is no need to paint a bronze stuffing box, the green 'verdigris' patina it will develop is not harmful. Paint could clog the adjustment threads; I'd leave it natural.

You might find this article helpful as you carry out the refit.

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# Announcements

**Return Engagement**


We're proud to introduce the first digital edition of Professional BoatBuilder magazine under its new ownership as an IBEX Technical Journal. This transition reunites two of the industry's most trusted brands, reinforcing our shared mission: to support and advance the professional boatbuilding community. With this issue, all subscribers join the one-third who already enjoy the magazine in its digital format. This marks a new chapter as we transition Professional BoatBuilder to a fully digital periodical. A special print edition will still be released annually, distributed at IBEX and METSTRADE.

https://www.proboat.com/current-issue/

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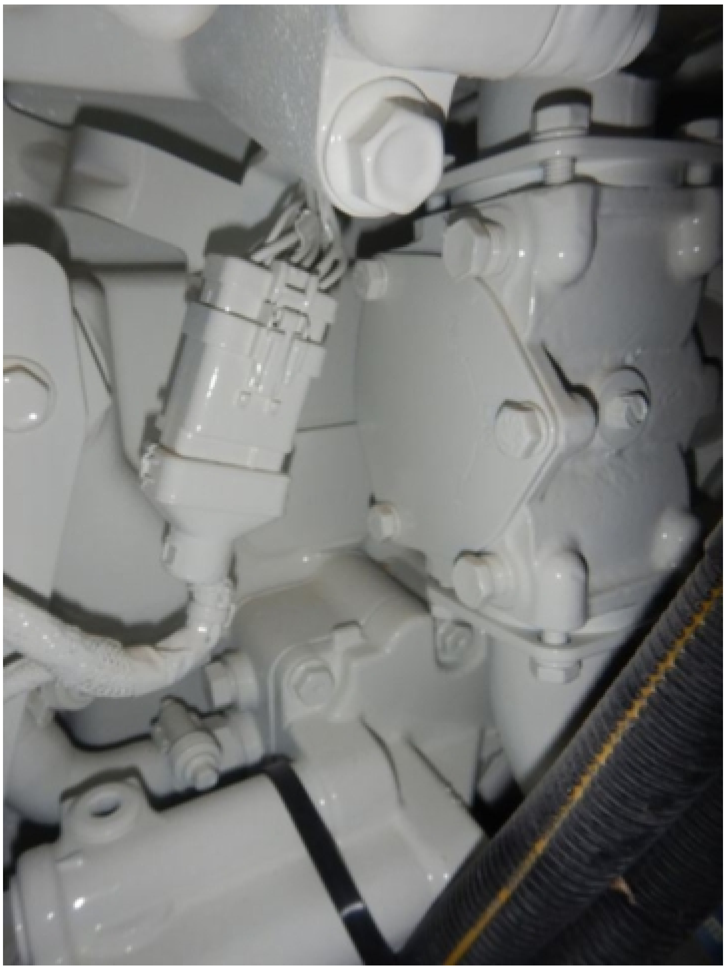
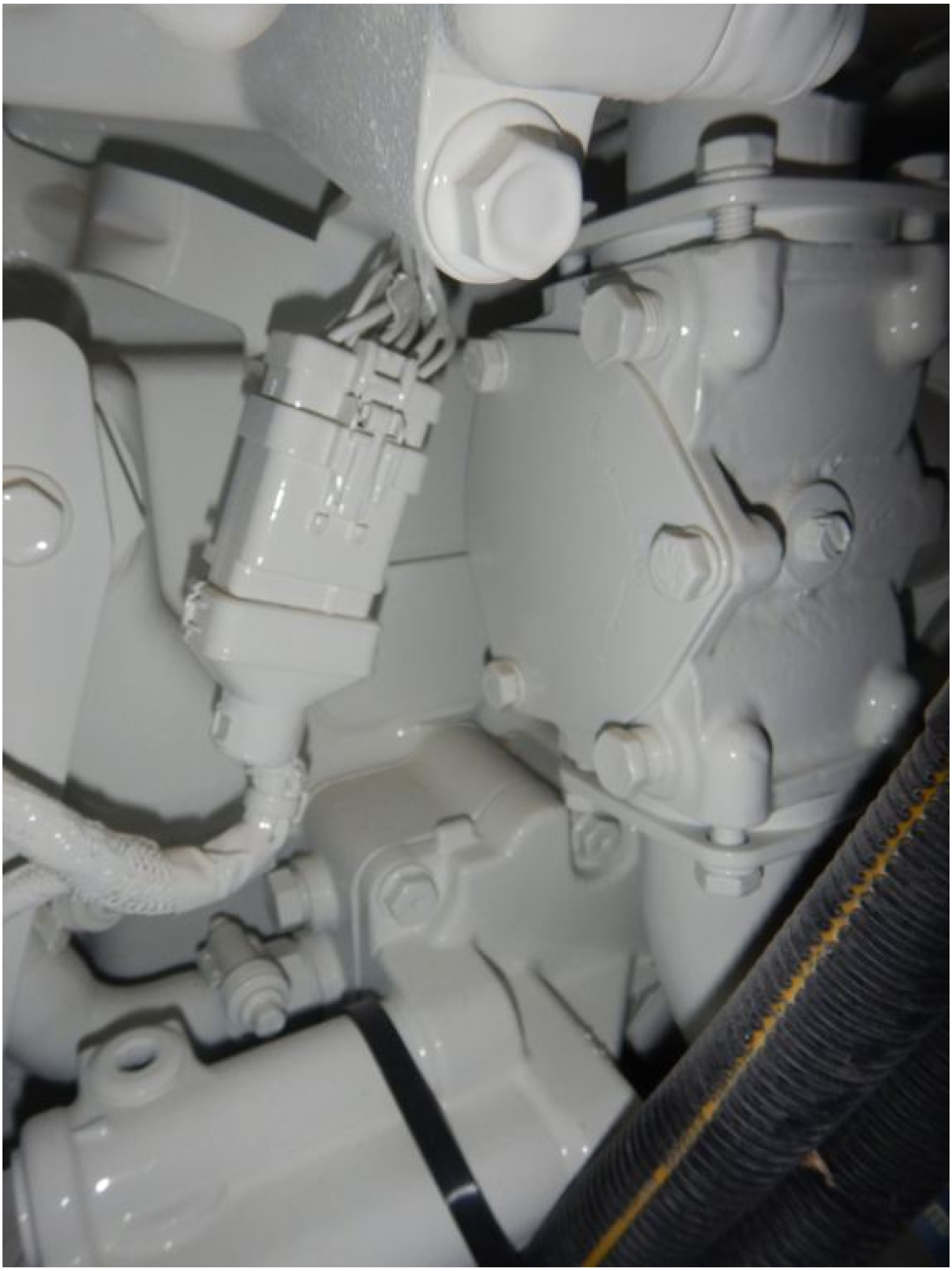
**Raw water pump cam screw failures**





I’ve now encountered three such failures of the screw that secures the pump’s cam in about the last 12 months, and I have heard about others, all on low hour engines. When this occurs, the pump stops pumping and a stream of water squirts from the hole left by the broken screw. One of those shown here occurred on a vessel that is less than a year old, in the other case the engine had less than 300 hrs. (a wing engine on a trawler).

Thus far I have only seen this on Sherwood pumps.

In my opinion, under normal conditions this screw should never break, it is not under much of a load. I have taken this up with Sherwood/Pentair in an attempt to determine the cause.

My recommendation is to inspect your screw regularly, although I’m not sure if you would be able to see signs of an impending failure; have a replacement cam and screw on hand, and potentially change yours preemptively (cams should be replaced about every third impeller change, or if wear/corrosion is evident). If you opt to change, closely inspect the cam to make sure it is properly seated inside the pump, and be sure to follow the installation instructions, a sample of which are included here (yours may be different, so check based on model number).

More on raw water pumps here.