



BoatU.S.[®]
MARINE INSURANCE PROGRAM

Seaworthy

KEEPING YOU AND YOUR BOAT SAFE ON THE WATER

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Keeping Your Boat Afloat

An analysis of a year's worth of sinking files reveals the 10 most common reasons that boats end up under the water

by **Beth A. Leonard**

THREE DECADES AGO, Max Fletcher, then in his 20s, was getting ready to captain a Westsail 32 from New Zealand back to the East Coast of the United States by way of the Southern Ocean and Cape Horn. He happened to meet up with sailing legend Eric Hiscock who had completed three circumnavigations of the globe with his wife Susan, the first in the early 1950s. When Fletcher asked for advice about his upcoming voyage, Hiscock replied, "Keep the water out!"

Indeed, boats – and boaters – are in a constant battle with the water all around them, and more often than we would like, the water wins. Hurricanes aside, sinking is the costliest source of claims for the BoatU.S. Marine Insurance program, so we undertook a thorough analysis of a year's worth of claims to see what lessons we might find for our readers. Because we expanded our net to look at boats that sank as a result of some previous incident – a collision or grounding, for instance – our findings are somewhat different than in 2006 when we last took a hard look at sinking. But they are not inconsistent. As was the case then, more than one-third of sinkings happened when some small part, most often below the waterline, gave up its fight with the water due to age or fatigue.

Those sinkings might have been prevented with good maintenance, and another third might have been avoided with some care while underway and docking. Here's what you can do to reduce the odds that your boat will be part of a future sinking analysis.

Based on an analysis of a year of sinking claims, boats sink at the dock more than twice as often as they sink underway.

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Courtesy Dave Wiggins



MORE MOORINGS

I experienced a phenomenon with regard to mooring chains that you are perhaps not aware of. This occurred when moored at the St. Croix Yacht Club in Teague Bay on the Island of St. Croix, USVI. During periods of relative calm, when the chain was essentially hanging vertical, the slight rocking motion of the boat would cycle the chain up and down against the bottom, where the Virgin Islands sand would actually wear away the chain. Over a period of time, the chain right where it contacted the bottom would lose more than 50 percent of its diameter.

Gil Steinfort
Satellite Beach, FL

While sailing a charter sailboat near St. Martin, we went to Tintamarre Island off of the northeast coast and picked up a mooring in the early morning of our arrival. While snorkeling in the crystal clear water, I went to check out our mooring. As I followed the mooring line down, I found a section of the rope that was more than 50 percent worn through. In a heavy storm, depending upon the type of boat and windage, this could have truly tested the strength of the remaining rope. This experience caused me to think twice about the security of moorings. If you discover a worn line

and you are expecting heavy weather, you might want to consider relocating to another mooring.

Paul Bollinger
Alexandria, VA

As several of our readers wrote in to say, prudent mariners never trust an unknown mooring. Better to rely on your own ground tackle in a well-protected cove than a mooring whose construction and care you do not know. That said, there is a practical problem in some areas where anchoring is simply not allowed or the anchorage has been clogged with buoys. Diving and checking on the mooring is, wherever possible, a good precaution, as is staying on unfamiliar moorings only in calm, settled weather.

MORE HORRORS

While the author is correct about the right way to secure anchor swivels, experienced bluewater mariners studiously avoid swivels because their load capacity is well below that of the anchor chain's working load. That's true even for [most] stainless steel anchor swivels; in addition, the Allen screws used for the anchor attachment come undone too easily.

Peter Berman
Norwalk, CT

SIGNALING CLARIFICATIONS

When describing the cons of the PLB, you say that they have "half the battery life" of an EPIRB. Is this half the "shelf life" of the batteries of an EPIRB (5 years for an EPIRB, so 2½ years for a PLB)? Or is it half the signaling time of an EPIRB, which I think is about 48+ hours? I have an EPIRB, and I am told I cannot renew the battery again because the unit is older than 10 years, so I'm in the market for something new and was seriously considering the PLB. I don't mind buying batteries every three years, but I'm not sure I want a rescue device that only signals for about 24 hours.

Capt. Bill Cullen
Tampa, FL

EPIRBs are required to operate for a minimum of 48 hours, while PLBs are only required to operate for a minimum of 24 hours. But generally speaking, yes, an EPIRB will broadcast quite a bit longer than a PLB. Battery shelf life varies, with the EPIRB traditionally lasting a bit longer than PLBs (6 versus 5 years). However, with advances in battery technology, some manufacturers claim significantly longer life (up to 11 years on some newer units). Any unit you might decide to purchase should include information on battery life and broadcast time in the specifications.

Just wanted to flag an important error in the HF radio blurb on page 11. The author states, "... A license is required to operate a ham radio. No license is required to operate an SSB, but" Not true.

Yes, an amateur radio license is required to transmit on the ham bands. However, two licenses are required to transmit on a marine HF/SSB radio: (1) a commercial operator's permit ... at least the Restricted Radio-

telephone Operator Permit and (2) a station license for the boat, covering the SSB radio and other transmitting equipment. These are required even if the boat stays in domestic waters. They are issued by the FCC upon application and payment of the fees; no examination is required.

Bill Trayfors, WA6CCA

Washington, DC

Outgoing Commodore of the Waterway
Radio and Cruising Club
(www.waterwayradio.net)

Thanks for the correction. We should have said, "No exam is required to operate an SSB."

I'd like to address an error of omission in "Emergency Signaling Options." When discussing the cons of using an EPIRB, the author states that they cannot be taken from vessel to vessel. He goes on to state that they must be registered to a specific vessel and so one unit can't be legitimately used for multiple boats. What he doesn't say is that, while it is true that an EPIRB can't be registered to more than one craft simultaneously, you can change the registration at any time simply by updating it online. It is, therefore, permissible to change the registration from vessel to vessel. Also, the vessel doesn't necessarily have to be a boat; we register ours to our boat during the summer and to our aircraft when we fly to the Bahamas in the winter months.

Ann Sooby

Benton, KS

Great article on emergency response equipment. I have a VHF/DSC radio onboard my little 18-foot center-console boat. I don't venture out of sight of land, but have been caught in fog. I instruct anyone new onboard how to operate the radio to send a distress signal. My job as "the Captain" is the safety of everyone aboard. It took a little effort on my part

to obtain and input the MMSI number and to wire the GPS into the VHF radio, but I feel much safer and so do my fishing guests.

Johnny Bates

Hampton, VA

ETHANOL FREE



You mentioned in the April 2013 Mailboat that finding ethanol-free gasoline can be a matter of luck. That may be true, but your luck will be better if you are near an airport that services gasoline-powered aircraft. All avgas is alcohol-free. I have happily used Shell's Avgas for years. It is essentially their "V-100" automotive fuel without the alcohol.

Colin Ferenbachs

Royal Oak, MD

Avgas can be a good choice for many boaters, though there are two issues. First, avgas contains lead and cannot be used with many newer inboard and I/O engines that use catalytic converters to reduce pollution. It's likely that in a few years even outboards will employ catalytic converters. Second, avgas costs 50-100 percent more than

marina gas (at the Baltimore airport it's \$9.00 a gallon!). An alternative is to look for ethanol-free gasoline at local gas stations. A website – pure-gas.org – lists stations that sell it by state. Seaworthy would be interested to find out if the site is current, so if you use it, let us know.

IN DEFENSE OF PAPER

I am a BoatU.S. member since 2004, and also a U.S. Coast Guard-licensed Master Mariner. Please advise your readers that despite the fact that NOAA will no longer be printing charts, the USCG still requires paper chart navigation on all [commercial] vessels being operated by licensed officers. This is in part due to the potential failure of electronic navigation tools from a variety of causes, and partly to have a written record of a vessel's movements in case of an investigation.

As the push to license the recreational boater (something I abhor both as a pleasure boater and a professional mariner) increases, it behooves all of us who take to the water for enjoyment to maintain the highest standards of conduct in our boating. Paper charts are necessary, and their use will only increase our pleasure and safety on the water.

Capt. Mark A. Truscott, USMM

Hayes, VA

HITCHED AGAIN ... AGAIN

It should be noted that the writer of the letter in the January issue correcting the term "hitch" would not want to remove his receiver as the ball mount is much more easily removed. The glossary of trailer terms defines the part in this way: "BALL MOUNT: The part of a trailer hitch that slides into a receiver and fastens with a pin and clip to allow the attachment of a ball for towing a trailer."

Niel Pfundt

Bellingham, WA

When faced with a year's worth of sinking claims, the first question to answer is, "What exactly do we mean by sinking?" Is a trawler sinking when sitting at the dock with water leaking in through the stuffing box at a rate the bilge pump can keep up with? Is it sinking if the bilge pump can no longer keep up? Is it sinking if the bilge pump fails? How about a ski boat that gets swamped by waves? Or a boat with positive flotation awash to the gunwales?

From an insurance perspective, a boat is sinking if it must be actively pumped out to remain afloat and undamaged.

This definition highlights two key issues. First, a sinking boat is not watertight. There is always a source of water that must be located and stopped to keep the boat floating. The second is that well-designed boats do not sink due to failed bilge pumps. A boat should stay afloat in the conditions for which it was designed without water having to be pumped out of it – even in heavy rain and big seas (relative to the size of the boat).

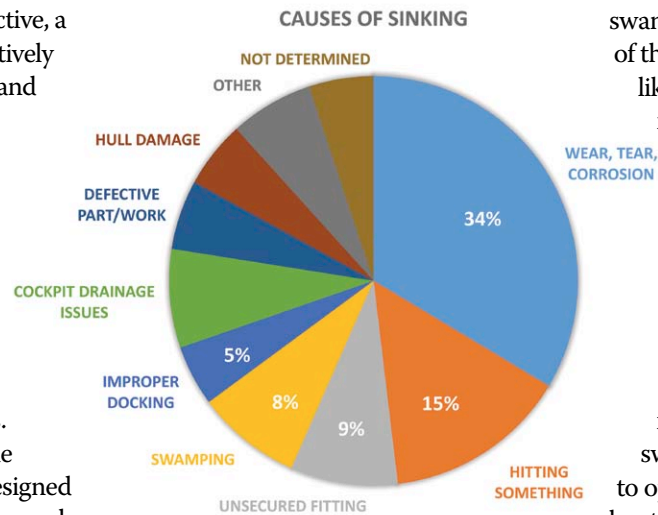
That's not to say that adequately sized, functioning bilge pumps are not important. In addition to removing nuisance water, they can keep your boat afloat long enough for you to find a leak and fix it. But that time should be mea-

sured in minutes and hours, not days and weeks. When it comes to gradual leaks due to slowly failing parts, too many of the boats in our claim files existed in a zombie state somewhere between floating and sinking, completely dependent upon the bilge pump to keep them on the water instead of below it. The bilge pump merely postponed the sinking until it failed, lost power, or was overwhelmed by the volume of water. Had someone fixed the leak in those

sank due to the gradual failure of a part below the waterline. This is the single most common reason boats sink at the dock. While failed parts also cause sinkings underway, it's much more common that they result from the boat hitting something, whether another boat, the bottom, or something floating in the water. Failing to secure an otherwise working fitting, such as a drain plug or a sea strainer, when the boat is in the water comes third on the list.

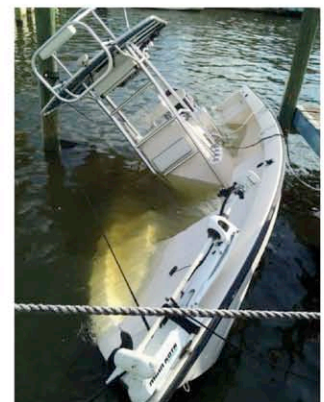
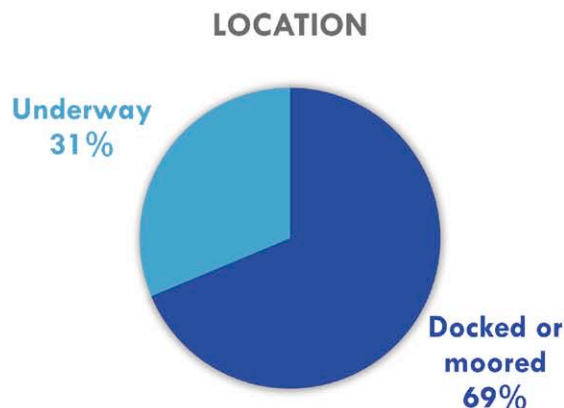
One big change we have seen is that swamping, responsible for eight percent of the sinkings in our files, is much less likely to occur underway than it was in 2006 when we last looked at our sinking claims. The low-cut transoms that were so common in the 1990s have largely been replaced by splashwells separated from the interior of the boat by a high transom. This time around, only one boat sank as a result of a wave swamping the boat from astern. Instead, boats were swamped at the dock when tied stern to open water in chop or waves raised by strong winds. Finally, as was the case in 2006, five percent of the boats that sank got caught under the dock by waves or tide due to problems with their dock line arrangements.

You can greatly reduce the chances of your boat sinking due to wear, tear, and corrosion by adhering to a regular maintenance schedule. While all main-



days, weeks, or months, that boat would not have become part of these statistics.

As the pie chart shows, more than two-thirds of the reasons why boats sank could be considered preventable. Half of those preventable claims, or one-third of the total, involved boats that



tenance is important, the first six items in the list below represent the most common maintenance-related failures that led to sinking in our claim files. The additional four items in the list could be considered good seamanship, and will help to prevent boats from sinking due to causes other than age and deterioration. These 10 items address the 10 most common causes of sinking in our year of claim files.

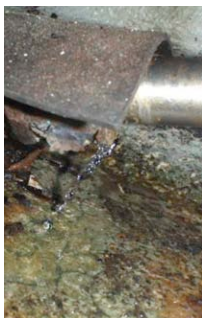
1 INSPECT YOUR STERNDRIVE BELLOWS ANNUALLY AND REPLACE THEM EVERY 3-5 YEARS. The bellows on sterndrives



are required to remain watertight for years while withstanding flexing and bending, exposure to water and marine growth, and extremes of temperature. Talk about a difficult job! The shift bellows is the smallest, which makes

it most susceptible to cracks that start in the folds. By tilting and turning the sterndrives, you can inspect the bellows, and this should be done annually. Marine growth can puncture the bellows, so remove any that you find. Replace the bellows if you see any sign of wear, but at least every five years. If one bellows is worn, chances are all of them are, so replace them as a set.

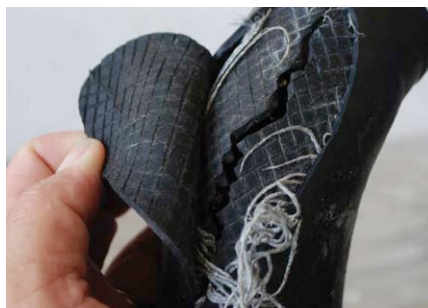
2 CHECK YOUR STUFFING BOX EVERY TIME YOU VISIT THE BOAT; RE-PACK EVERY SPRING. Stuffing boxes are one of the few thru-hull fittings designed to



allow some water into the boat, at least when the motor's in use. But it's way too

easy for that one to two drips a second to turn into a stream. The only way to prevent it is with diligent maintenance, repacking the stuffing box rather than simply tightening down the packing screw again and again, and possibly damaging your prop shaft in the process. And make sure to check your stuffing box every time you visit your boat. If the bilge pump is running regularly on an older boat with a stuffing box, you can almost bet that it will be the source of the water.

3 REPLACE YOUR ENGINE RAW-WATER HOSES AT THE FIRST SIGN OF WEAR.



A ruptured raw-water hose or one that has come off a fitting due to a corroded hose clamp or deterioration on the end of the hose can sink the boat at the dock if the problem is below the waterline. But even cooling hoses above the waterline can bring lots of water into the boat if the problem is downstream of the raw-water pump and the engine is running. Hoses should be replaced at the first sign of wear with the appropriate type and size. If your hoses are 10 years old or more, why not give your boat a spring treat and replace them before putting the boat back in the water?

4 REPLACE YOUR IMPELLER EVERY 2-3 YEARS. Your cooling system can sink

your boat without even springing a leak. If your impeller deteriorates due to age and wear, the amount of water it can move



through the water pump will decline and eventually it won't be pumping anything at all. Well before that point, your engine will overheat. If you don't shut it down right away, the hot gases can melt the hose, allowing water to enter the boat. Changing your impeller every few seasons – whether it needs to be or not – is cheap insurance indeed.

5 MAKE COCKPIT AND LIVE-WELL PLUMBING ACCESSIBLE AND INSPECT REGULARLY.

A large cockpit is nothing more than a bathtub when rain starts to fall. If the cockpit drains don't do their work, the



boat can be overwhelmed by a heavy downpour. Problems in the claim files include missing hose clamps, broken drain fittings, broken thru-hulls, and loose hoses. In several small powerboats, hoses were never fitted to drains when the boat was built. It pays to inspect everything from the drain to the waterline at the beginning of every season. And don't forget live-wells, bait wells, and fish boxes. Inundating suspect areas with a hose and seeing where the water goes will uncover any problems. Unfortunately, on many boats all of these drains, hoses, and thru-hulls can be difficult to get to. If that's the case on your boat, you'll have to create access and cover the openings with watertight deck hatches.

6 INSPECT ALL BELOW-WATERLINE FITTINGS AT THE BEGINNING OF EACH SEASON.



While you're at it, take a good look at all below-waterline thru-hulls, hoses and hose clamps inside the boat, paying particular attention to transducers and sensors. These

penetrate the hull well below the waterline, and unlike most below waterline fittings, they do not have a seacock. Any sort of a failure will bring water into the boat. If you see dampness around a transducer, use epoxy only for a temporary fix. Water may have intruded into the hull itself, resulting in saturation or delamination. Haul the boat and deal with the leak as soon as possible.

7 DON'T FORGET THE DRAIN PLUG.

OK, so it sounds like something you would never do.



But you can be fairly certain that's what the people who forgot to put in the drain plug before launching thought too — until they did it. We all make mistakes, some are just more embarrassing than others. The drain plug in the photo was found right where you see it when the boat was raised. To make sure you never have to 'fess up to sinking your own boat, figure out a way that will keep you from ever forgetting. One option is to keep the drain plug on your boat key ring or, better yet, on the stern tie-down strap.



8 KEEP A PROPER LOOK-OUT AND KNOW WHERE YOU ARE AT ALL TIMES WHEN UNDERWAY.

About 15 percent of the sinking claims in 2012 were the result of hitting something while underway. But in many cases, the sinking did not occur until later, in some cases hours, and in others, days. Stern-drives are particularly vulnerable to a minor grounding or to hitting something floating just below the surface of the water. If you have any doubt about whether your boat is still watertight after you hear a thud, bump, or crunch, do a short haul and check everything below the waterline. In most cases, your BoatU.S. insurance policy will cover it, but check in with the claims department first.

9 REMOVE TRAILERABLE BOATS FROM THE WATER WHEN STORMS ARE FORECAST.

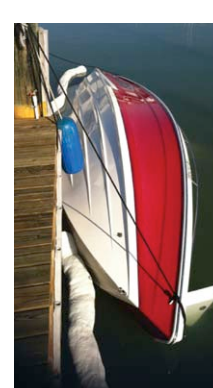
While a few boats



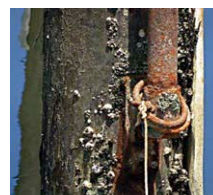
were swamped underway, usually by waves in shallow water, most cases involved trailerable boats left tied to a dock with the stern open to the fetch. If the forecast calls for strong winds and your dock is not well-protected, the best course of action is to put the boat on its trailer. If that's not feasible, then tie the boat with the bow facing open

water and put the cover on it. Make sure the batteries are charged and the bilge pump is working.


10 USE A LINE MANAGEMENT SYSTEM TO KEEP THE BOAT CENTERED IN ITS SLIP.



It seems like if there is a way for a boat to find its way under a dock, it will do so. When boats are refloated and no source of water intrusion can be found, investigators start looking for scratches and dinged gunwales,



indications the boat got wedged under the dock as the tide came back in. In several cases, one or more dock-lines were tied to

a ring meant to slide up and down a metal pole attached to a piling as the tide rose and fell. The ring got caught at the top or bottom of the pole, and the boat was left unable to move with the tide. A line management system like TideMinders can remedy this situation, allowing you to keep your lines relatively taut and letting the movement up and down the piling deal with the tide. Long spring lines can also help keep the boat centered while allowing it to rise and fall with changes in the water level. 

Lithium-Ion Batteries: Handle With Care

For most recreational boaters, the expense and risks still outweigh the benefits of this rapidly-evolving technology

By Charles Fort

WHO WOULDN'T WANT a battery one-quarter the weight and size of their current lead-acid battery but with comparable energy storage capacity? Most of us have grown comfortable with the lithium-ion (Li-ion) batteries in our smartphones and laptops, so it's natural to assume they will work in cars, on aircraft, and in our boats. Unfortunately, safely scaling up these compact, energy-dense batteries to the much larger sizes needed to meet heavy-duty energy demands is not straightforward. In addition, the technology is still developing, and there are already enough types of Li-ion batteries to tongue-tie a chemical engineer: lithium iron phosphate, lithium manganese oxide, and lithium nickel manganese cobalt, to name a few. Each has its own voltage, energy density, and safety characteristics. Before getting lost in the details of these competing chemistries, any boater considering installing Li-ion batteries on their vessel needs to understand the risks and the costs, not just the benefits.

LI-ION BATTERY CHALLENGES

Unlike conventional batteries, when Li-ion batteries fail, they can do so catastrophically. Here's the problem: When an individual Li-ion cell gets overcharged, it gets hot. This can initiate a process of self-heating that causes the cell temperature to continue to rise even if the cell is taken off charge – something known as thermal runaway. Once started, thermal runaway is difficult to stop. Depending on the battery chemistry, the cell may get hot enough to spontaneously catch fire.

It gets worse: If a single cell enters thermal runaway, it begins to overheat its neighbor, which overheats the next one, and so on. This can cause a cascading failure that results in the battery burning uncontrollably. Even if a cell that has entered thermal runaway does not get hot enough to catch fire, it can swell up and rupture, venting the flammable electrolyte.

The potential for thermal runaway with any Li-ion battery chemistry means that when installing them on boats, they aren't plug-and-play. They charge at different voltages than lead-acid batteries do, and simply connecting them to a conventional charger is asking for trouble. To keep their concentrated power in check, Li-ion batteries rely on a sophisticated *management* system that actually tracks and balances the voltage differences between each cell, unlike

the *monitoring* systems used with lead-acid batteries that simply show you what's going on. Among other things, proper management systems also contain over-voltage and short-circuit protection. Unfortunately, these management systems are vulnerable to lightning strikes or power surges, and any failure in the system can lead to a fire. While some Li-ion chemistries may be more resistant to thermal runaway than others, if you mismatch a charging system or choose the wrong battery management system, you could still find yourself with a charred hull. That's why the design and installation of Li-ion battery systems are best left to professionals.

If the potential dangers of Li-ion batteries are not enough to convince a hopeful early adopter to wait for the technology to mature, the price almost certainly will. A single replacement house battery will set you back around \$2,000, and that's before the battery management system and the upgrades to alternators, battery chargers, and voltage regulators.

THE FUTURE OF LI-ION BATTERIES

Li-ion batteries have a bit in common with propane tanks: They're a high-energy storage system that is potentially dangerous. Fortunately, with propane, we (usually) manage to avoid disaster. But propane systems have a complete set of American Boat and Yacht Council (ABYC) safety standards that govern their installation and use. While the ABYC is closely following developments, Li-ion batteries are an evolving technology, one that the aircraft and auto industries still haven't perfected. Until the market narrows down to one or two chemistries and reliable, robust battery management systems, it's all but impossible to develop standards for the safe installation and use of Li-ion batteries on boats.

While Li-ion batteries may just revolutionize heavy-duty energy storage someday, the costs and risks still outweigh the benefits for most recreational boats. Until more data exist on which type of Li-ion batteries work best for boats, and what unexpected issues may arise, *Seaworthy* recommends that most boaters steer clear of these compact, high-energy batteries. For the few boats where the benefits of Li-ion batteries might outweigh the expense and the risks, such as offshore racing sailboats and tournament bass boats, we recommend that the systems be professionally installed and professionally maintained. ⚠

What's Below Your Waterline?

Seacocks fall into the 'out of sight, out of mind' category for many boat owners ... until they are needed

By Steve D'Antonio

“THAT'S THE WAY we've always done it and it's never been a problem.” Those words, spoken by an experienced boatyard manager who'd overseen the replacement of all of the seacocks aboard a bluewater-capable sailing vessel belonging to one of my clients, are an unfortunate and all too common refrain where below-waterline installations are concerned. During my inspection of the vessel, I pointed out that none of these new valve assemblies met the requirements set forth by the American Boat and Yacht Council's (ABYC) Standard H-27 Seacocks, Thru-Hull Fittings and Drain Plugs. While they are technically voluntary, these standards offer an unbiased, third-party approach toward this all too vital installation. To be sure your below-waterline installations measure up, take a look at the standards – and what they mean – and then go check out what's below your waterline.

ABYC 27.4.4 Seacock - A type of valve used to control intake or discharge of water through the hull. It is operated by a lever type handle usually operating through a 90° arc, giving a clear indication of whether it is open or shut, and is typically of the two following types:

27.4.4.1 Flanged Sea Valve - A Seacock

with an integral flange used to individually and securely mount the device directly to the boat hull structure.

27.4.4.2 In Line Ball Valve - A Seacock designed to be supported entirely by the through-hull fitting.

ABYC H-27.5.4 Seacocks shall be designed and constructed to meet ANSI/UL 1121,

Marine Through-Hull Fittings and Sea-Valves.

An acceptable “seacock” under the standard is a sea valve or in-line ball valve with a handle that shows whether the valve is open or shut and that meets American National Standards Institute/Underwriters Laboratory (ANSI/UL) 1121. While suitable for household applications like washing machines and garden hose spigots, gate valves, those that have round handles that are rotated several times to open or close, are not ABYC compliant and they should not be used for raw water applications under any circumstances.

Note that ANSI/UL 1121 uses the words sea valve (another word for seacock) right in the title, and not simply valve. While there are hundreds, perhaps thousands, of UL-listed valves, which may be used for any number of purposes, there are precious few UL 1121-listed sea valves. The UL 1121 listing includes testing for thermal

extremes, mechanical deformation, moisture absorption, vibration endurance, as well as chemical and UV resistance. It's rigorous to be sure and thus, any seacock that is ANSI/UL 1121 listed, and thereby also ABYC H-27 compliant, is virtually guaranteed to be robust, reliable and of the highest quality. While other seacocks may be of high quality and reliable, without the ANSI/UL/ABYC approval it's tough to be sure just what you are getting. Remember, “UL Listed” does not mean it is specifically rated for use as a seacock; the valve needs to say, “UL 1121 Sea-Valve.”

ANSI/UL 1121.8.1 The components of a through-hull fitting or sea valve shall be formed of galvanically compatible materials having the strength and resistance to corrosion necessary to withstand intended and abnormal use to which they are likely to be subjected.

ANSI/UL 1121.8.3 A part made of drawn brass or machined from brass rod containing more than 15 percent zinc shall be subjected to the 10-Day Moist Ammonia-Air Stress Cracking Test.

The requirement for corrosion resistance limits the range of materials from which seacocks and their related components may be made. Only bronze, DZR brass, glass-reinforced

The Good

A proper seacock with reinforced plastic backing plate.



Marelon seacocks are a viable alternative to traditional bronze.

The Bad

This in-line ball valve uses a mild steel handle, which is rusting.



Anything attached to a seacock adds leverage, weakening it.



▶ ONLINE EXTRA

For a slide show of more good, bad, and ugly installations, go to this article at <http://www.boatus.com/seaworthy/magazine/2014/april/seacock-installation.asp>

plastic and, in some cases, stainless steel may be used. The terms “brass” and “bronze” encompass a wide range of copper alloys. The primary determining factor is zinc content. Zinc is an especially ignoble metal; it corrodes very easily when in the presence of other metals and an electrolyte, such as seawater, which is why it’s used in sacrificial anodes. Zinc, however, also imparts strength to copper, and mixing the two, often in about a 40-60 ratio respectively, results in a brass suitable for clocks, lamps and cabin hardware, but, with few exceptions, not for seawater plumbing.

Copper-zinc alloys used below the waterline undergo a process called dezincification whereby the zinc corrodes from the alloy, leaving behind a pink, porous and very fragile structure that’s almost certain to fail. For the most part, true bronze alloys are zinc-free, their primary elements being copper and tin. Other alloying elements include silicon and nickel (technically making them something other than bronze, but still acceptable for use in seawater plumbing). These are the best alloys for use below the waterline because they are not susceptible to dezincification.

Unfortunately, a huge range of alloys lies between true bronze with very little or no zinc and true brass which contains a high percentage of zinc. Two common alloys often used in marine applications are 85-5-5-5 and DZR. 85-5-5-5 contains 85 percent copper, 5 percent zinc, 5 percent lead and 5 percent silicon and can be used below the waterline. Some European

manufacturers use something called DZR brass, a dezincification-resistant brass alloy. This alloy has a higher zinc composition than many other copper alloys (30 percent or more), but it also includes trace amounts of other metals meant to retard zinc corrosion or leaching. The more zinc an alloy contains, the more prone it is to dezincification, therefore, alloys with little or no zinc content are more desirable, and typically more costly. Accordingly they can be an attractive, though inferior, alternative for cost-conscious builders or do-it-yourselfers.

So what’s on your boat? While there’s no definitive field test for alloy composition, there are a few things you can do to make a determination. Bronze tends to look more like copper, penny-like, darker and brownish, and it’s often rough cast rather than smooth machined. Polishing a section of the metal in question as well as a known piece of bronze and holding them next to each other can prove useful, if not definitive. Brass, on the other hand, is much yellower or gold in color. Any copper alloy that looks pink, a sign of dezincification, likely contains zinc and should be replaced.

Beware of nickel-plated brass. This will appear silver and is often mistaken for stainless steel. Aside from the potential for dezincification of the brass, many nickel-plated brass valves rely on mild steel or aluminum handles, which quickly rust or corrode in a damp bilge environment.

Ideally, to avoid dissimilar metal or galvanic corrosion issues, alloys used in direct contact with each other — seacock,

thru-hull fitting, and pipe-to-hose adapter — should be of the same composition, i.e. all bronze. Within seacocks themselves, more than one metal may be found — a bronze body and stainless steel ball — for instance. However, for seacocks to meet both UL and ABYC standards, these metals must be fully compatible and suited for raw-water use.

Stainless steel bears mentioning in this listing of seacock alloys. Contrary to popular belief, except in some metal vessel applications, it’s a less than ideal choice for seacocks. Generally speaking, stainless steel, at least the 316 variety, is highly corrosion resistant and exceptionally strong. However, stainless steel is susceptible to crevice corrosion, a malady that occurs when the metal is exposed to an oxygen-poor environment such as stagnant water, as is found inside seacocks and marine raw-water plumbing systems. Therefore, it is less than ideal for use in seacock applications aboard fiberglass or wood vessels.

Glass-reinforced nylon represents a viable and reliable alternative to bronze seacocks and thru-hull fittings. Marelon, a proprietary glass fiber-reinforced polymer that’s used by Forespar Products, the most popular manufacturer of non-metallic seacocks and seawater fittings is equal to and in some ways exceeds the reliability and durability

of bronze. Marelon’s chief attribute is its resistance to corrosion. Being non-metallic, it is entirely immune to both galvanic and stray-current corrosion, as well as lightning-induced discharge issues. Other plastics such as PVC, non-reinforced nylon, acetyl and polypropylene should

The Ugly



This brass pipe adapter crumbled after just a few seasons of use.



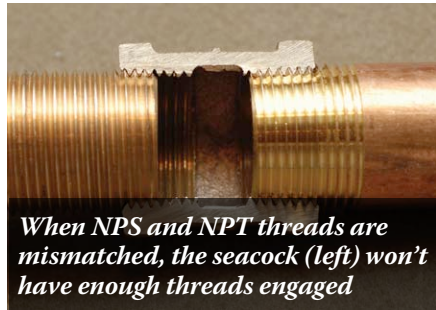
Brass threads in a raw-water discharge after only a year.



PVC has no place in seacock installations.

not be used in seacock or raw-water applications. All lack the necessary tensile strength and flexural modulus of Marelon.

H-27.6.1.2. Threads used in seacock installations shall be compatible (e.g., NPT to NPT, NPS to NPS).



When NPS and NPT threads are mismatched, the seacock (left) won't have enough threads engaged

Among the most important, most common, and most insidious deficiencies where seacock installations are concerned is the issue of thread compatibility, and this was the problem with the installation cited at the beginning of this article. Many boat builders, boatyards and do-it-yourselfers inadvertently, and likely unknowingly, select two components, such as a thru-hull fitting and in-line ball valve that are inherently incompatible. This arrangement is so ubiquitous that I'm tempted to refer to it as a tradition, albeit an undesirable one.

Thru-hull fittings typically utilize national pipe straight or NPS threads. These threads are parallel for the entire length of the fitting, not unlike those of a common machine screw. Nearly all in-line ball valves, however, rely on national pipe taper or NPT threads. As the name implies, these taper or are cone-shaped. NPS and NPT threads are entirely incompatible, and under no circumstances should they ever be mated together. In most cases, the thread engagement is no more than two threads, three at most, compared to a proper seacock's thread engagement, using NPS to NPS hardware, of eight or more threads.

A purpose made seacock or seawave's internal, female threads are NPS, and thus fully compatible with those of the thru-hull fitting. The two

engage completely and make for an exceptionally strong installation. Furthermore, nearly all seacocks incorporate a load-distributing flange into their design, enhancing their integrity. Not only do in-line ball valves not incorporate a flange, the sole means of retention to the vessel's hull is via a gossamer nut that's included with most thru-hull fittings; it typically is a scant three threads deep and is designed to retain the thru-hull fitting alone, not the added leverage of a valve as well, even one whose threads are compatible. Backing blocks further distribute load over an even greater area than the seacock flange itself, and, again, such load distribution is welcomed. Backing blocks are also used to adapt a hull's concave shape to the flat mounting surface of the seacock's flange.

Backing blocks should be roughly a minimum of 1.5 times the diameter of the seacock's flange. Suitable material includes epoxy-encapsulated, marine (void-free) plywood or a fiber-reinforced laminate such as GPO3 or G10. If the seacock's flange is equipped with fastener holes, they must be used, either with lag bolts that are screwed into the backing block alone or through bolts that pass completely through the hull. If the latter, the fasteners must be bronze rather than stainless steel.

If you are considering buying a vessel, new or used, carefully scrutinize all seacock installations for thread incompatibility. In many cases, I find the original builder's seacocks are correct, however, after-market installations, including air-conditioning or water makers on new vessels (these are often installed by dealers or subcontractors when a boat is sold), utilize incompatible threads. If your current vessel's fittings are installed with incompatible threads, you have a dilemma. I'm often asked by folks in this position, "Should I change all the seacocks?" The advice I provide my clients encourages their replacement, particularly in the case of

offshore-capable, oceangoing vessels. If you opt to leave them in place, you must do so knowing they are dangerously weak.

H-27.6.1 A seacock shall be securely mounted so that the assembly will withstand a 500 pound static force applied for 30 seconds to the inboard end of the assembly, without the assembly failing to stop the ingress of water.

H- 27.6.1 involves the durability of the seacock installation. This test will typically separate true seacocks from incompatible-thread thru-hull and in-line ball valve assemblies. The meager thread engagement of the former simply can't stand up to this sort of load. It's also worth noting that the weight for this test must be applied to the most inboard segment of the assembly, which means if the installer has rigidly plumbed a six-inch pipe nipple, a T-fitting and strainer directly to the seacock, the leverage imparted by these components is often enough to cause a failure at well under the specified test load of 500 pounds. Therefore, it is my strong recommendation that installers avoid directly plumbing anything to a seacock other than a pipe-to-hose adapter. Isolating the seacock from other hard plumbing with a suitable J2006-rated hose actually enhances its durability.

While it's easy and not uncommon for a yard or builder to say "That's the way we've always done it," if what they are doing fails to comply with this standard, they have little to fall back on in the event of a failure. From the boat owner's or buyer's perspective, insisting on this compliance is, in my opinion, not only wise, it's mandatory if you wish to have peace of mind regarding what's below your waterline. 🏠

A former full service yard manager and longtime technical writer, the author now works with boat builders, owners and others in the industry as, "Steve D'Antonio Marine Consulting Inc". (www.stevedmarineconsulting.com). His book on marine systems will be published by McGraw-Hill later this year.

ABYC's Boat System Check Reveals Five Common Issues

By Brian Goodwin

MANY PEOPLE ARE capable of doing some of the minor maintenance jobs onboard, but when it gets into the more complicated stuff, such as rewiring, repowering, or replacing a fuel tank, most of us are smart enough to hire a pro. But even the simple stuff, such as installing a new battery, can be dangerous if not done right. And the complicated things can really put your boat and crew in danger if it's not done to American Boat and Yacht Council (ABYC) safety standards.

But how do you know if things are up to snuff? Several lucky boat owners found out last May, when the ABYC conducted a free Boat System Check on a fleet of boats at the Port of Annapolis in Maryland. Local ABYC members, consisting of surveyors and ABYC-certified technicians, gave boat owners a quick once-over on the major systems on their boat and pointed out areas of concern. The fleet of boats ranged from a 1985 26-foot Nordic Tug to a 2010 Dufour 405 sailboat. Problems ranged from a simple lack of warning labels to a potentially deadly

leaking propane system. Here are the top five most common issues that were found:

1 FAULTY OR LACK OF GFCIS (GROUND FAULT CURRENT INTERRUPTERS). ABYC E-11 AC and DC Electrical Systems on Boats requires that AC outlets installed in heads, galleys, machinery spaces, or on weather decks be protected by a GFCI, either a breaker or a receptacle. Keep in mind typical GFCI receptacles are not ignition protected and should not be installed in gasoline fuel spaces. And don't forget to perform the self-test a few times a season to make sure they're working properly.

2 UNPROTECTED POSITIVE DC TERMINALS. ABYC E-11 requires any continuously energized part to be physically protected with boots, an enclosure or some other cover. These are usually at the batteries and the connections in the starting circuit. Whether it's a positive battery terminal or the positive starter post, if it's not protected by overcurrent protection (breaker or fuse), then it needs a boot or enclosure.

3 IMPROPERLY SECURED BATTERIES. Batteries are full of an acidic chemical cocktail and contain lots of power. It's extremely important to keep them where they are intended. ABYC E-10 Storage Batteries requires that batteries not move more

▶ ONLINE EXTRA

For more information on future free ABYC Boat System Checks, go to: www.abycinc.org/whyabyc/clinic.cfm. If you'd like to host a free ABYC Boat System Check, contact the ABYC at: nullrich@abycinc.org.

than one inch. Hold-downs or a properly secured battery box are the way to go.

4 FUEL SYSTEM GROUNDING. According to ABYC H-24 Gasoline Fuel Systems, each metallic fuel tank and metallic part of the fuel fill system must be grounded – and this actually applies to diesel fuel systems as well. The simple reason – to prevent potential sparks created by the buildup of static electricity. Typically, a green wire is used to ground the components. Even if you have a wire, check to make sure the connection is not corroded, a common problem.

5 SEAT LID/LOCKER RESTRAINTS. As boats bounce around, the ability to secure seat lids and prevent the admission of water, contain gear, and limit the potential of mangled fingers is critical, particularly in sailboats that often heel 30 degrees or more. ABYC H-3, which governs exterior openings on boats, requires all boats to have closures for cockpit seat lids.

So the next time you're on your boat, test the GFCIs, look for missing battery terminal boots, make sure the batteries won't shift if you tug on them, look for the green wire on the fuel tank, and make sure cockpit lockers can be latched. And when it's time for some major work, make sure it will be done to the most current safety standards and hire an ABYC certified technician. You can find them on the ABYC website at www.abycinc.org. Hopefully, when your boat gets a survey or a free boat system check by ABYC, it will pass with flying colors. 🚤

Brian Goodwin is ABYC's Technical Director.





EPIRB DISPOSAL

What do you do when your old Emergency Position Indicating Radio Beacon (EPIRB) needs to be retired? One thing you shouldn't do is simply throw it in the garbage.

Last year, the U.S. Coast Guard searched the New Smyrna Beach, Florida area for two hours before finding an EPIRB in a trash can at a marina. The owner had simply tossed the unit into the trash and once it got wet, it activated. Unfortunately, this was not the first time the Coast Guard has had to deal with this problem and old EPIRBs have been activated in dumpsters and landfills. These types of false alerts put Search and Rescue (SAR) crews at risk, make SAR assets less available for actual distress, and fatigue the SAR system. There were 178 cases in 2012 and the problem is increasing. As new EPIRBs come on the market with more features and lower price tags, and old units reach



the end of their lifespans, more and more boaters need to dispose of an old one. So how to do it properly?

First, notify NOAA that you're taking it out of service. Find out how here: www.beaconregistration.noaa.gov Next, remove the battery. Often the manual will have instructions. If not, call the manufacturer. Service facilities that replace batteries can also give

you guidance. The body of the EPIRB can then be disposed of at places that accept computers, TVs, and other electronic equipment, often sponsored by local counties. Be aware that the Coast Guard routinely refers cases involving the non-distress activation of an EPIRB to the Federal Communications Commission for possible prosecution.



NAV LIGHT CHECKUP

Imagine driving on a busy road at night with no taillights. Any driver coming from behind wouldn't see you and you could easily cause an accident. Navigation lights on boats are even more important in some ways – not only do they allow other boaters to see you, but depending on what lights they see, they also tell others if you're under sail or power, what direction you're traveling relative to them, and what action to take to avoid you. Pounding seas and saltwater can cause bulbs to fail and contacts and connections to corrode.

While your boat is easily accessible this spring, make sure all of your nav lights are working and nothing is obstructing the light in any of its arc. Boats under 39.4 feet must carry, at a minimum, an all-around white light visible from any direction and red and green sidelights each visible through an arc of 112.5 degrees. If the battery is in the boat, wait until it's dark, turn the lights on, and take a stroll around. Replacing any bulbs that have burned out and fixing any wiring problems may well keep you from getting an unexpected bump in the night.

MAKE SURE YOUR EPIRB WORKS WHEN YOU NEED IT

An EPIRB requires a certain amount of faith – how do you know you’ll be rescued once it’s activated? One way to put your mind at ease is to test it every month and at the beginning of an extended trip. Each manufacturer has a slightly different method, but all of them test the output of the transmitter, the internal circuitry and the strobe light. When activated in test mode, EPIRBs send a specially coded signal that’s ignored by the Search and Rescue satellite system. Here’s how to do it:

- Remove it from its bracket and place it with a clear view of the sky.
- Find the test switch; most EPIRBs have a well-marked test switch, often under a cover marked LIFT.

- Press the TEST switch for two or three seconds.
- Your unit should give an indication of a successful test, usually a couple of beeps and a flash of the strobe light. If you don’t get a signal that the test was successful, test it one more time and if it fails, take it in for service.

Note that some older models may not have a signal test feature and those with a single-use folded antenna usually can’t send a signal. Also, some models have an additional GPS test, but since they require a lot of power, they should only be performed once or twice over the life of the battery. For a fee, some newer EPIRBs from ACR can test the actual satellite reception.

Affordable weekly rentals are available from the BoatU.S. Foundation for Boating Safety and Clean Water (www.BoatUS.org)

SANDY HANGOVER



Superstorm Sandy may have come and gone a year-and-a-half ago, but her effects still linger. Many boats were out of commission for the season last year undergoing repairs, and many more sat unused as marinas rebuilt their infrastructure. As

a result, there is a lot of gasoline sitting in fuel tanks that’s now way past its shelf life. What’s worse is that many boats, even those that were not submerged, may have gotten water into their fuel tanks through vents due to the heavy rains. Most gas tanks in the area contain ethanol, and it’s possible that water in the tanks has phase separated from the gas, making it unusable. Even without ethanol, gasoline may have oxidized or become otherwise contaminated.

If your boat hasn’t been used since Sandy, don’t start your engine until you’ve had the gas removed. While it might be problematic to remove the gas, the alternative could be a damaged engine. Many marinas have facilities for disposing of small amounts of gas, but you’ll probably need to call a pro for larger volumes. You might be able to negotiate lower per gallon disposal prices if you can get several dockmates to negotiate together.

BEWARE OF YOUR BOAT LIFT

Boat lifts lead a hard life. Once a boat is back safely in its lift, boaters typically don’t give it a second thought, which is a bad idea. Lifts use cables, pulleys, shackles, wire, and other hardware that must work together, and the failure of the smallest part can bring the whole thing down.



During routine servicing of a boat lift in Florida, a sharp-eyed service technician noticed all four shackles had stress cracks. One was severely cracked, probably on the verge of failure. The lift was only 10 years old and though rated at 7,000 pounds, never had more than a 2,500-pound boat in it. The shackle was stamped “304 stainless” and had been made in China. 304 stainless is strong, but more susceptible to stress-crack corrosion; 316 stainless is a much better choice. If the boat’s weight was closer to the lift maximum, it’s likely the shackle would have failed, which could have caused serious injury to anyone who was in the boat when it let go.

Have your lift inspected annually by a qualified technician and make it a point to do your own once-over every time you use it.



WHEN IT COMES to potential problems while underway, most boaters are aware of the dangers of dirty fuel and clogged fuel lines. Many try to prevent the problem by using fuel additives to stabilize their gasoline or prevent bacterial growth in their diesel tanks. Michael Liebaert, who keeps his Gulfstar 50 in New Orleans, wrote in to warn others of a problem he experienced that came not from the additives themselves but from not being careful enough while pouring them into the tank.

Liebaert was taking his boat out for a sea trial and to program his new autopilot with Roy from Sintes Boatyard. The Gulfstar's engine died at the mouth of the harbor. "Roy is an experienced sailor, who held the wheel while I partially unfurled the jib," Liebaert wrote. "We maneuvered under sail into the outer harbor of the Municipal Marina and dropped anchor. After investigation, we discovered the fuel supply line was clogged. I eventually cut the bell off an air horn, taped it to the fuel line, and blew out the obstruction in the fuel tank. The experience exemplified the requirement of being able to get a sail out in a hurry, and to always have the anchor ready."

But Liebaert was not satisfied to leave it at that. "A couple of days later, we pumped out the fuel tank and discovered two small, round aluminum seals and two plastic seals from the top of fuel additive containers which also clogged the fuel pump-out tube," he said. "After 30 years of pouring additives in the fuel tank, four seals from

the additive containers broke off and dislodged in the tank, and clogged my fuel pickup tube. That taught me to use a funnel with a strainer from now on, and not to let anything fall into the fuel filler or the fuel tank."

So whether you're putting additives into your tank or oil into your engine, make sure the entire aluminum or plastic seal has been removed from the neck of the bottle before pouring, and use a funnel with a strainer to make sure nothing finds its way into the tank that might eventually bring your engine to a sudden stop.

SO WHAT'S A guy to do when he's on the Seattle waterfront and needs to get to West Seattle? Take the ferry, right? Well that's just



what Samuel McDonough did at 7:00 in the morning on December 1 of last year. But he didn't quite do it the way you or I would have. Instead of buying a ticket and boarding with a group of early morning commuters, McDonough climbed through a hole in a fence, found a way onto the berthed and empty *Victoria Clipper IV*, located the keys in the pilothouse, and managed to break away from the dock before realizing he didn't have the first idea of how to operate the 132-foot passenger ferry.

According to CBC News, when the Coast Guard spotted the high-speed catamaran drifting and apparently

unmanned 300 yards off Pier 69, they sent a tugboat crew out to retrieve it. The discovery that someone was aboard prompted a major mobilization by law enforcement. "Knowing that no one had permission to be on the boat, we used our marine unit, our bomb squad, we used our SWAT team and hostage negotiators, all in partnership with the Port of Seattle and the United States Coast Guard, to pretty much isolate the incident, contain the ship, and bring it to a peaceful resolution," said Seattle Police Sgt. Sean Whitcomb.

After a brief negotiation, the SWAT team boarded the vessel and took McDonough into custody. "[He] apparently wanted to take it across Elliott Bay to West Seattle," Whitcomb said,

"which is never recommended. There's plenty of other modes of transportation in order to meet those needs, and of course he's going to get booked into King County Jail after we're done

questioning him."

McDonough subsequently told police that he had taken the boat as a "birthday present to himself," and that he was a pirate and wanted to go to Victoria, British Columbia. Whatever his reason, it's going to be quite some time before he gets out on the water again – he pleaded guilty to burglary and theft charges on January 10, and he was sentenced to 2½ years in prison on January 24.

So when you take the ferry, we suggest you do it the conventional way and leave the driving to the captain. Oh, and please don't leave your keys in the pilothouse.

MANY READERS WROTE in to tell us that they enjoyed Capt. Frank Lanier's "Sea Chest of Horrors" in the January issue, and several included their own worst "horror." Winner of the most hair-raising story goes to David Nagorsen, who wants to make sure you check your fuel filler hoses. It seems that in 2001, he took his 1970 Cruisers Bonanza on its trailer to a local gas station to mix the winter fuel additive. "After putting in 20 or so gallons, I started on the trip home," he wrote. "After turning on a side street from the main highway, a vehicle passed me and slowed with its horn blaring. I pulled over and rolled down the window. The female passenger alerted me that the boat was leaking gasoline all over the highway. OMG!"

Upon investigating, Nagorsen found his 20 gallons of gasoline in the bilge draining out the partially blocked drain hole. After screwing in the drain fitting, he made his way home – very carefully.

(We have to interrupt this narrative to ask that if you ever find yourself in a similar situation, please call the claims department and ask them how best to proceed. This is what Fuel Spill Liability coverage is for ... We'd rather a professional dealt with it than risk the boat going boom while you're trying to get it home.)

A close inspection of the fuel system revealed that the filler hose had become detached from the filler opening on the deck. The "horrors" that led to Nagorsen leaking fuel all over the highway included:

- When his boat was made (1970), only one hose clamp was installed on each end of the fuel filler hose.
- The filler nozzle through the deck did not have any barbs to hold the hose.
- The hose between tank and deck had dry-rotted and cracked below the filler deck plate.

- The steel gas tank had also rusted through at the lowest area of the tank well because there were no drain holes to keep water from accumulating under the tank.

He corrected these problems by doing the following:

- Two hose clamps are now installed at each end of the fuel filler hose.
- The new filler deck plate has hose barbs.
- The hose is now replaced every 10 years, regardless of condition (twice since this happened).
- An aluminum tank has replaced the original steel tank.
- Drain holes were added to the tank well to allow rainwater to drain into the bilge.
- The tank was raised using 1/4-inch high-density polyethylene (HDPE) strips, allowing air to circulate around the tank and any moisture to evaporate.
- A cowl vent was added on the deck to allow air to vent the tank well by means of the bilge blower.

Nagorsen ended by saying, "This was a clear example of 'out of sight, out of mind.' I now check everything each and every spring. I use a mirror to see the hose/deck plate filler connection. Prior to every trip, I lift the floor cover and visually inspect the tank and its fittings. I lift the engine cover and smell for fumes. This will not happen again!"

IN THE LAST issue, *Seaworthy* wrote about GPS spoofing, but it turns out that more than just your GPS can be misled by bogus signals. Researchers with the computer security company Trend Micro demonstrated that AIS (Automatic Information System) can also be easily fooled. AIS transmits a radio signal with the ship's

location, course, speed, and other details, to be used by other vessels and port authorities to manage the traffic flow and prevent collisions. Passenger vessels and cargo ships over a certain size are required to carry AIS under international rules.

In this version of spoofing, Trend Micro researchers were able to intercept signals from nearby vessels and send out modified versions to make it appear the vessel was somewhere else. Using cheap radio equipment, they made fake vessels appear, real ones disappear, and even spelled out "pwned" across the Indian Ocean with the track of one vessel.

[Sad to say, the editors of *Seaworthy* had to look up "pwned" in the Urban Dictionary. Apparently, it comes from a typo in World of Warcraft, a video game, and basically means that you have been "owned" – completely dominated or outclassed by some godlike or computer-like force.] If you don't know what World of Warcraft is, sorry, we don't either.

The researchers made their point to prove that AIS, as a legacy system designed when security was not an issue, is vulnerable to hacking and could be used to hide ships' locations or to make it appear a hostile fleet is coming when it isn't. Most recreational vessels don't carry AIS, but for those that do, this is a reminder never to rely solely on a screen for navigation or collision avoidance. Especially if it says, "Pwned." 🏴‍☠️



Courtesy Trend Micro



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The Afterdeck: Best Laid Plans

AH, SPRING. AFTER the harsh winter in most of the country, who isn't looking forward to longer, warmer days, to pulling off boat covers, to polishing and prepping for the upcoming season? As part of your spring chores, don't forget to take a look at your insurance coverage. At *Seaworthy*, our goal is to keep you from ever having to file a claim. But we also know from long experience that even the best of us sometimes find ourselves with a damaged boat. It might be through one silly mistake, like forgetting to put that drain plug in on your first spring outing, or it might be something that happens despite every effort to do the right thing.

Jay Hersch from Lincoln, Massachusetts owns a trailerable Hunter 27 Edge called *Puffer Doodle* that he keeps in his driveway, 15 miles inland, during the winter. It was there when Sandy came through in October of 2012, and should have been quite safe. "Unfortunately, as the saying goes, the best laid plans of mice and men oft times go astray," he wrote. The neighbor's 80-foot pine tree split in half, "with the part that split off falling onto my house and boat."

"The tree completely impaled itself upon the Dutton Lain-



son screw jack on the tongue of the trailer," Hersch continued. "Although the jack's shaft bent 45 degrees just above the wheel, the mechanism itself worked once I cut it out of the tree! Note that in impaling itself on the jack, the trunk of the tree landed perhaps 6-8 feet forward of the bow of my boat. I can only imagine how much more damage would have been done had the trunk itself hit the boat." The branches of the tree caused enough carnage, including snapping spreaders and bending the mast, breaking a portlight, crushing the bow rail, and tearing out the bow roller. About \$2,000 in damage was done to Hersch's house and \$14,000 to *Puffer Doodle*, insured by BoatU.S. Marine Insurance.

"All of which only goes to show," wrote Hersch, "that even if you try to take reasonable precautions to protect your boat in a bad storm (say by moving it far inland), there are always things out of your control. At least now there are no more trees on my neighbor's property, which could damage my boat, and I keep a close eye on the condition of those on mine."

If Hersch hadn't moved his boat inland, it might well have been a total loss in Sandy's storm surge. The damage that did occur was covered, and he was out on the water last summer. So make sure your policy is up to date, and then go enjoy yourself. *Seaworthy* will give you advice on how to avoid having to make a claim. But you can rest easy knowing that BoatU.S. Marine Insurance will also be there if your best laid plans go awry.

Seaworthy

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THE BOATU.S. DAMAGE AVOIDANCE PROGRAM IS DEDICATED TO HELPING YOU ENJOY ACCIDENT-FREE BOATING. *Seaworthy* looks at real claims and how they might have been avoided. For permission to reprint articles, email Seaworthy@BoatUS.com

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