When It Rains, They Sink

A heavy rainstorm has the potential to sink boats, but it doesn’t have to be that way

By Daniel Rutherford

Let me start with a few apparently false assumptions. The boats we use should be designed to float even when it rains. Bilge pump systems should be able to expel water from boats to keep them afloat when there is a hose failure or... even when it rains. Finally, designers and builders should design and build boats to handle the weather and to not sink... even when it rains.

Now, we all like to think that when we are out plying the waters of our rivers, bays, and oceans that our boats are well equipped to keep us afloat and safe, right? But what about when she (yes, I still call boats “she”) is left alone to fend for herself dockside? According to a study done by BoatU.S., the majority of boats (69 percent) sink dockside or while the vessel is moored. Such was the case on August 13, 2014, when a torrential rain with five-to-eight inches of the stuff hit several areas on the Jersey Coast in just a couple of hours. In the wake of the storm, dozens of boats were at the bottom or hanging from their lines dockside... But why?

Continued on page 4
James Coté responds:

Unfortunately, it's hard to reliably diagnose an event that occurred months or years ago, based solely on your recollection of events. That being said, were there storms in the area on the dates of loss? How closely did you examine the metals aloft for lightning entry points?

I have my doubts with respect to the first event being lightning-related, but the second has some of the earmarks of the boat grounding a dockside strike through the shorepower cord. Shorepower-system surge-protective devices may have prevented some or all of the damage.

It is likely that your DC circuit breakers are single-pole devices, so turning these off will not disconnect the negative [i.e. grounded] conductors. Again, surge-protective devices would provide additional protection.

I just read James Coté’s very interesting article, and a question came to mind. One thing that he did not address in describing recommended lightning protection for a sailboat is the issue of grounding a deck-stepped mast.

My question is this: How important is it that the connection between the deck-stepped mast and the grounding plate be in a straight line? I have often read that if it is not, then the charge may jump from the wire and go straight down through the hull.

John Nosach
Wickford, Rhode Island
laugh from the notion of installing a lightning down-conductor away from all other conductors and in as straight a line as possible; fully compliant aftermarket installations are nigh impossible, further amplifying the need for lightning surge protective devices.

The complication that is unique to sailboats is where to install the lightning grounding plate [the strip or point]. Whether installed port or starboard, a given plate may be fully submerged, at the waterline, or out of the water dependent on how the boat is heeled. In the perfect world, at least two plates should be installed and interconnected with the keel.

I disagree with the statement on page 4 of the January 2016 issue: “(Note that wiring inside of the mast will be protected due to the Faraday effect.)”

I once owned a Heritage Yachts (Charlie Morgan) West Indies 38. The aluminum mast rested on a steel step bolted to the exposed lead keel (not encapsulated). Perfect ground!

But the VHF antenna has to extend higher than the mast top to effectively transmit and receive. My boat was struck twice by lightning and both times it melted wiring inside the aluminum mast. The Faraday effect can’t prevent that.

Stuart, Florida

James Coté responds:
Thank you for your thoughtful response, but I believe that you are missing a few key points.

Aluminum in contact with steel and steel in contact with lead makes a good mechanical contact, but may not be a “perfect ground.” If any moisture comes between the metals, galvanic corrosion could introduce electrical resistance.

Also, I note that your VHF antenna is the highest point on the mast and therefore acting as your lightning rod — and sacrificial lamb! I am not surprised that lightning strike energy passing through a coaxial conductor would melt this and adjacent conductors.

The aluminum mast Faraday cage effect is dependent on a robust lightning rod (Franklin Rod) installed as the highest point on the mast, and a properly grounded mast step. All lightning energy passes through the mast, which did not occur with your VHF lightning rod.

This is additional proof that partially installed lightning-protection systems are often wholly ineffective.

Finally, communications is not my area of expertise, but I suspect lowering your VHF antenna 10 feet will not significantly reduce your range.

MORE ON LUBRICANTS
I recently received the latest issue of Seaworthy and noticed an error. Lubrication of bolt threads does not make “the reading on the torque wrench much lower than it actually was.” Simply put, a rusty bolt and nut will take lots of torque (twist) to develop the desired tension in the bolt — which translates to the “squeeze” between the pieces to be mated. Conversely, a well-lubricated bolt and nut, with clean threads, can quite readily be overtensioned, because it is so easy to overtighten the connection. So, the statement about “applying a lot more torque to a fastener,” due to lubricating the fastener, is not true. What one is doing is tensioning the bolt excessively, perhaps beyond its design strength, because the lubrication allows this to happen even though the torque applied is less than specified.

Sorry, I deal with this almost daily and couldn’t let this one pass.

Richard Weiland, PE
Madison, Wisconsin

Apparently the owners of some marinas (this one in Bayville, New York) don’t receive your magazine. It may be worth the postage to send them a free copy. This is just a small portion of boats blocked in a similar fashion there.

Joe
Lorton, Virginia

While we’ve written about this subject before and condemned these kinds of blocks, it turns out that the American Boat & Yacht Council (ABYC) doesn’t prohibit all blocks, just cinder blocks. Here’s the skinny from the ABYC: “… cinder blocks, and other masonry products not intended to bear weight should not be used for blocking. “ It’s hard to tell a cinder block from a concrete block, so we can’t tell you if this arrangement is prohibited or not.

Honestly, we’d much rather see wooden blocks used — there’s virtually no chance of failure.

I enjoy reading your magazine, and in the past I have been able to print a PDF copy. Am I missing the link on the page or has it been discontinued?

Jim Deady
Manalapan, New Jersey

PDFs are still available. Go to the Seaworthy homepage (www.boatus.com/seaworthy/), click on archives at the upper left, and you’ll see PDF versions available on the dropdown.
I was tasked to clean up the carnage. While handling the salvage operations and ensuing loss evaluations, I focused on both the damage and the “why” the boats sank. While not too surprising to me (I had 30+ years of handling damage claims under my belt), taking the time to document the findings in a detailed way left me wondering, “What could prevent these sinkings?”

In every case, the cockpit scuppers were overwhelmed and/or the deck drains, hatch covers, gutters and engine compartment lips failed to keep the water from draining into the bilge. The flooding became progressive in nature. This is nothing more than a practical application of Bernoulli’s principle of fluid dynamics. With more water in the bilge, the boat sat lower on her lines, and then even more water, at an ever increasing volume, down-flooded or back-flooded into the boat and bilge through the scupper or freeing ports in the hull. The result is a salvage job and often a constructive total loss.

**Example #1** – 25-foot sportfisher: The scuppers were below the waterline at the transom and just at the waterline in the cockpit. Directly forward of the port and starboard side scuppers were hatches that led to the bilge. The hatches were not dogged down, and the manufacturer had made no attempt to seal them. Water failed to drain out of the scupper system fast enough, and the boat began to take on water through the leaking hatches into the bilge, overwhelming the bilge pump. As the boat became heavier, the scuppers submerged under water, and that was that.

**Example #2** – 24-foot center console: Fitted directly ahead of the outboard in the engine well was a hatch for access to the bilge, pumps, and wiring. The hatch was originally fitted with a gasket, but the gasket was worn, and the hatch was not dogged down. The well scuppers allowed a constant flow of water into the outboard well, which drained into the bilge. Over time, the pump failed and the boat sank.

**Example #3** – 16-foot flats boat: The vessel was re-powered with a heavier four-stroke outboard that replaced the original two-stroke. The boat was floating, but right on the edge of disaster. Along came the rain, and down she went.

**Example #4** – 25-foot older walk-around cuddy: The boat had originally been designed as an inboard/
(I/O) model but was built, straight out of the factory, with an outboard on a bracket. The manufacturer replaced what should have been the sealed I/O engine cover with a regular deck hatch. The scuppers were just at the waterline. The hatch was not sealed or dogged down, so rainwater accumulated quickly and flooded the boat until she sank.

**FAILED BILGE PUMPS DON’T SINK BOATS**

I could go on and on because these sorts of scenarios repeated themselves again and again. That said, there were several consistencies throughout this event. Time and time I would hear that either the boat sunk because the bilge pump failed or simply that the rainwater could not drain out of the boat fast enough, or it was draining into the bilge — or a combination of the two.

Let me make one thing perfectly clear: Boats do not sink because bilge pumps fail. They sink because we fail to keep the water on the outside of the boat. So let’s not blame this on the bilge pumps. Bilge pumps are designed to remove nuisance water and minor leaks. They provide a short-term solution, not long-term maintenance relief.

So why do boats sink when it rains? Let’s look at some very common problems first, and then get into how boat owners can stop worrying when it begins raining.

The most common problem is simply hatch openings in decks that are not dogged down and are not fitted with proper gaskets to make them watertight. Many of these hatches (mostly plastic) are fitted right in front of the outboard well to facilitate access to the outboard mounting bolts, pumps, and hoses. Water backs up in the scuppers and drains directly into the bilge. The pump works and works, but eventually the battery to which it is connected becomes discharged, and down she goes.

Next is simply poor design in scupper or freeing port location. The American Boat & Yacht Council (ABYC) has recommended standards for the placement of scuppers, scupper sizes, and the minimum heights above the load waterline of scuppers both while the boat is static and at maximum heel. Time and time again, we see scuppers that are right at the waterline and often well below the waterline due to poor design, though sometimes this happens when boat owners put too much stuff in the stern. An immediate sign of a pending problem is a boat with float-ball-style scuppers to prevent back-flooding; if you’re considering such a boat to buy, don’t walk away from it — run. Cockpit decks are supposed to be designed to be a minimum of four inches above the waterline but aren’t always. Even when a slight amount of water drains into the bilge, the result is disaster because the boats may be designed on the edge with little safety margin. Throw in an anchor and some chain back there, and there’s no margin when that big rainstorm hits.

Repowering is a problem, too. Comparisons between two-stroke and four-stroke outboards show a weight difference of 10 to 20 percent — which could easily be a couple hundred pounds in a dual-engine installation. This weight is at the transom, the location of most scuppers, or even further aft if the engine is on a bracket. This changes the load waterline, and openings that were once perhaps well above the waterline are now just at or below the waterline, putting the boat at further risk of sinking.

Another pet peeve: Why do designers and builders of boats seem to put hoses and thru-hulls in the most inconvenient (and inaccessible) places? If you can’t inspect your hoses and fittings, you may not know your drains are leaking or your hoses are cracked until the sky unloads on your boat. Our fleet of recreational boats is aging. Hoses that were designed to last perhaps 10 years are now 15 or 20 years old. They are brittle, cracked and failing, yet we cannot see them, let alone service them. I have had occasions where the decks have had to be cut or inspection plates installed just to get to the junction of the thru-hull nipple, hose, and clamp.
Another favorite is the deck that appears to be self-bailing; I mean it has beautiful scuppers, nice hatches, is well above the load waterline, only to find out that the deck drains lead to hoses that drain into the bilge and not overboard. Disaster awaits. I fully understand that in the good old days, boats did not have self-bailing cockpits. Take for instance an old Herreshoff 12 ½ or your normal skiff where if the boat was not covered, it filled up with rainwater. But today, if a boat is designed with a fiberglass liner and a deck that completely covers the bilge and it has drains that look like they would drain overboard, it is just plain lazy and a poor design, in my humble opinion, to have them drain into the bilge. Sure, the bilge pump may keep her afloat for a time, but she will sink and it may not be dockside the next time — it may be 100 miles offshore.

Lastly, let’s take a look at normal and expected maintenance. Here are a few things that come up over and over. Outdrive universal joint and shift boot bellows: they should be inspected every year and replaced every third year, give or take. The rubber dries out and begins to crack and leak, which may be the difference between weathering the storm or not. The gimbal bearing and gimbal housing may leak water into the bilge. Plastic corrugated hoses: In my opinion, there is no place on a boat for these, unless well above the waterline. They are thin-walled and become brittle, crack, and fail. Livewell plumbing: I have seen livewells that drain into the bilge. These are often well below the water, and many have no seacock to shut off the flow of water into the well. The well fills up and, worst case, drains into the bilge or adds weight, bringing the load waterline down enough to cause flooding through the scupper. Again, think of these things as contributing to the reason so many boats sink due to rain. It might be the straw that broke the bilge pump’s back.

For most of the sinkings in Jersey that week, poor hatches were to blame. They were either badly built, poorly located, or unsealed — often collecting lots of clogging dirt. OK, let’s assume that I buy the need for the scuppers to be near the waterline. To be clear, I don’t buy it. Still, shouldn’t the hatches in the decks and all deck openings be impervious to leaking? Would you go down in a submarine with shoddy fiberglass hatches and no seal? Oh, we need them to look nice, you say? Well, my answer to that is that a nice aluminum hatch with a positive-locking system and gaskets that are waterproof look just ducky. If your deck hatches and inspection ports don’t have gaskets, install them. Make sure they can be dogged down, and do that when you leave the boat so that the next big rainstorm can be shrugged off.

In the end, I’ll say it again: A simple heavy rain should not sink a boat while floating dockside in calm water. If your boat is not equipped to handle rain at the dock, how safe are you at sea? 

Daniel K. Rutherford was a practicing marine surveyor and marine claims investigator for 35 years before recently joining Maritime Program Group out of Manchester, New Hampshire.
Preventing explosions aboard

Gasoline fumes are the major cause of boat explosions, and because they usually happen when someone is aboard, they often cause serious injuries. Here’s what you can do to make sure your boat is not a ticking time bomb

By Kenneth Weinbrecht

THE INCIDENT
The port engine on the 1996 37-foot flybridge motor yacht just wasn’t right; the gas engine was running rough and losing power, so the owner contacted a local marine mechanic. While the boat was at her dock, the mechanic partially tore down the engine and found damage to the valves and pistons from normal wear and tear. The engine, he said, would have to be removed to repair it, so the owner prepared the boat. A few days later, the mechanic and an assistant arrived to move the boat, using the starboard engine. About ten minutes after the engine started, the boat exploded, throwing both men into the water. Amazingly, neither was seriously injured. The intense fire that followed destroyed another boat as well as much of the dock. During the subsequent investigation, the owner said he had shut off the fuel lines as he prepared for the engine to be removed; he had no idea what happened.

The fire analysis took more than the usual amount of time because most of the flybridge had collapsed into the engine room during the explosion. I inspected the wreckage with a fire investigator and found that the port bypass fuel shutoff was not completely closed, probably because over the years it became stiff from lack of use.

CONCLUSION
When the technician started the starboard engine, fuel ran as normal though the manifold to the starboard engine. Unfortunately, the owner had failed to completely close the port bypass fuel feed. Fuel dripped into the engine room, where the line had been disconnected from the carburetor. Gasoline fumes built up and were ignited.

The lesson to remember is that no matter how it happens, if gasoline gets into the bilge, it’s simply a spark away from an explosion. Oddly, not all explosions result in fire; many are so strong that they will blow out the flames. But the injury to passengers and crew can be devastating, even without a fire.

WHAT YOU CAN DO
Fiberglass boats last a long time, and the aging systems need continuous preventive maintenance. Fuel fill lines, feed lines, and vent lines are mostly in the engine room and are subjected to heat and vibration. On many boats they’re difficult to access for inspection. Hoses become hard and brittle over time, causing them to leak. Fittings rust, and many fuel shutoffs are not opened and closed during the season, so they stick; owners tend to leave them open all
the time, even during winter storage. After a few years they don’t operate at all anymore. When you need to turn them off in an emergency, they might not work. (Question: Do you know where your shutoffs are?) As the above story illustrates, even an experienced owner can make a mistake that can cause an explosion. Fortunately, our experience has shown that if you pay attention to a few important things, you can avoid a catastrophe. For gasoline vapors to ignite, there must be a fuel leak somewhere, and something to ignite it. Remove both of these things, and you eliminate the potential for explosion. Proper refueling procedures are also critical to prevent a potential disaster.

FUEL LEAKS

Unless you’ve been hiding under a rock, you probably know that during last several years, ethanol has been added to gasoline. This can degrade older fuel lines much faster than anticipated. Even newer hoses don’t have quite the same lifespan. Degraded fuel lines get brittle and will eventually leak — and a leaking fuel line is a disaster waiting to happen. If your hoses are more than ten years old (proper USCG-approved hoses are date-stamped when they were made), bend them, squeeze them, and see if they move or rotate on the fuel fittings. If so, they’re loose enough to leak. Sometimes fuel hoses are accidentally stepped on and damaged during routine engine maintenance. Run your hand along the hose or use a clean white rag and see if you smell gasoline (or worse, see it). If so, replace the hose using approved fuel line. While there are different types for different purposes on a boat, I recommend using only USCG-approved A1-15 hose. This hose has passed rigorous testing and can withstand a 2.5-minute burn test, which is designed to be enough time to put out a fire or abandon ship before the hose begins leaking. Most fuel-line manufacturers suggest that their fuel lines should be replaced every 10 to 15 years even if there are no indications of leaks or damage. Proper fuel-lines are marked as shown, at left.

Other places gasoline can leak are where hoses connect to other fittings. Fuel-fill spuds, fuel-tank lines and gas-tank gaskets, as well as carburetor and fuel-pump fittings can leak. Use the clean dry-rag method for these areas too.

PREVENTING IGNITION

Gas fumes by themselves are relatively harmless. But the slightest spark can ignite the fumes with great power, enough to blow the deck off of a large boat or throw crew in the water. The other side of preventing explosions is to have no way to ignite gas fumes that may have built up. Any starters, alternators, or pumps — or any other electrical equipment — in your engine room or generator compartment must state that they are “Ignition Protected.” Ignition protection is a standard that makes a product, such as a starter or alternator, safe to be installed in an environment that could become explosive. It means it won’t spark, which is all that gas fumes need to ignite. Don’t listen to the kid at the auto parts store who says auto and marine parts are all the same — they’re not. It costs more to make marine ignition-protected parts, but they may just save your life. If you have any reservations about whether something is ignition protected, replace it.

Some pumps that you might consider safe because they’re installed on your boat are not necessarily ignition protected. Electric raw water pumps, for example, as well as some pumps used for pumping the bilge may not be ignition-protected. A previous owner could have installed a non-ignition-protected pump that could spark on startup. So check that all electrical parts that go on a gasoline engine (or in a gasoline engine space) have a label that says “Ignition Protected.” Note: even power tools used in a gasoline engine space can cause a spark sufficient to cause an explosion! Don’t take chances.
ENGINE ROOM BLOWERS AND THEIR HOSES
A purpose-built marine-engine room blower is ignition-protected and therefore safe, but this can still be a problem area. Have you ever inspected your blower duct hose going into the bilge? These deteriorate over time. Eventually they’ll look like Swiss cheese, which means they’re no longer capable of removing dangerous fumes from the bilge. Replace them if they have any cuts or breaks. Blower hoses should extend to the lower 1/3 of the engine room. (Gasoline vapors are heavier than air and will sink to the lower part of the bilge.) Sufficiently running the blower (about four to five minutes) before starting the engine should evacuate any fumes that might have developed. Note that a bilge blower will *not* rid the compartment of spilled fuel, which will continue to emit vapors. As an added safety feature, a marine vapor detector should be installed in the engine room. These have indicators, generally on the helm station, that will alert you of any vapors. The detectors have a limited lifespan; usually after five years the manufacturer says they must be replaced.

FUELING YOUR BOAT
When fueling, the electrical system on the vessel must be shut down. (Turn off battery switches.) All engines, including the generator, must be off. Close all hatches to prevent fumes from coming below. Remove all passengers. Make sure that the fuel-fill nozzle is in the fuel fill and not a rod holder or freshwater fill. Yep, that has happened many times. Before starting the engines, open hatches, and turn on the blower. After running it for four to five minutes, use your nose, and smell the bilge. If you smell gasoline, get off the boat and alert the dockmaster. If you find spilled gas in the bilge, call 911, and let the professionals deal with it. One more thing: Know where your fuel shutoffs are, and verify that they operate properly. Label them if necessary — some people even mark the location inside the boat so the crew or passengers easily see it.

PROPANE (LPG)
Many vessels today use propane cooking appliances. As builders have taken great pains over the years to make proper installations, explosions from them are fortunately rare. But especially on older boats, they still need regular inspections. Make sure that propane tanks are mounted in a compartment with a vent at the bottom to allow any propane that might leak from the tanks to go overboard. Shutoffs in the compartment can seize, and my experience with these tanks and valves is that they are rarely opened and closed; many are simply left open for convenience. Exercise them regularly, and close them when not in use. Consider this for a moment: I once saw a speaker installed with bare wires in the same compartment as the tanks. Don’t make this kind of dangerous mistake — nothing that could possibly make a spark can share space with a propane tank. Also, there should always be an electrical shutoff in the galley near the stove that closes a solenoid on the tank. You don’t want to have to clamber out of the galley to shut off the fuel supply in case there is a problem.

One of my pet peeves is that the hose or piping from the tank to the stove is sometimes not accessible and often hidden behind cabinets. The hose behind the stove also usually has limited access — you may have to dig a little to properly check the hoses. Inspect as much hose as possible, looking for cracks. You can use a leak-detection fluid (available at home-improvement stores or online) or a soapy solution along the hose, looking for bubbling fumes that might have developed. Note that a bilge blower

I HAVE NOTHING TO WORRY ABOUT. I HAVE A DIESEL ENGINE
Really? Well the explosive nature of diesel is certainly not like gasoline, but during a recent claim I handled, the starter on a small sailboat diesel engine hung up when the engine was started and became red hot. Just above the starter was a non-approved automotive fuel-feed line to the engine. It melted and sprayed diesel fuel onto the hot starter, causing a fire. While it wasn’t an explosion, it could have been devastating. Fortunately the owner had a fixed fire extinguishing system in the engine compartment that put out the fire. Over the years, I’ve seen gasoline cans for the dinghy’s outboard and small propane canisters stored in a diesel engine room. Remember, parts in a diesel engine room don’t have to be ignition-protected as they need to be in a gasoline engine room (and probably aren’t), so nothing explosive (gasoline, propane, flammable solvents, etc.) should be kept in a diesel engine room.

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HERE’S NO SHORTAGE of people who can do a good job slapping on a coat of paint or tuning up an engine. But based upon marine surveyor Frank Lanier’s experience inspecting boats, the pool of qualified folks with the skill level to make electrical repairs and installations gets a lot smaller. Hopefully, you won’t find any of these cringe-worthy mistakes on your boat.

JETHRO’S SURE-FIRE PATENTED E-LECTRICAL CONNECTION
Boaters are a creative lot when it comes to solving problems afloat. Not only is the homegrown junction splice used in the positive battery conductor at left nonstandard, it also leaves an energized bolt to arc and spark while bouncing around the engine compartment — a real fire hazard.

BONDING SYSTEM
Here we have a hose clamp being used to secure a bonding wire to a seacock, an installation that is as ineffective as it is unorthodox. While the pros and cons of having a bonding system installed are often debated, one thing is certain: if one is installed, all connections must be tight and corrosion-free for the system to work properly. One that’s improperly installed or maintained will provide the worst of both “to bond,” and “not to bond” worlds, and your thru-hulls won’t be protected.

STERNDRIVE CORROSION
Here’s proof that sterndrive owners are caring, giving folks. If your marina neighbors have grounding, bonding, or other such wiring issues, your aluminum drive will give of itself, acting like a huge sacrificial anode to protect their below-the-waterline metals. As aluminum is low on the galvanic pecking order (being less noble, it’s more likely to corrode than most other metals), always ensure your stern-drive’s sacrificial anodes or corrosion suppression systems are present and operational.

WIRING GONE AWRY
The only thing worse than dealing with an electrical issue is having to wade through a jumble of loose, unorganized wiring before even beginning the troubleshooting process. Unsupported wires and cables can bounce around while underway, causing plenty of electrical issues, ranging from broken connectors or wires (such as the brown wire shown in the center of the left photo) to gremlin-like intermittent problems that seem to magically appear and disappear with no rhyme or reason. Worse, they can chafe and cause a fire.

BATTERY BASICS
Industry standards call for batteries to be installed in liquid tight, acid-proof boxes or trays, be properly secured (movement no greater than one inch in any direction), and have all exposed positive terminals covered to prevent accidental shorting. All good recommendations, but sadly none of them are met in this particular installation. Another recommendation is that no battery cables...
and conductors 6 AWG and larger be connected to the battery with wing nuts. They’re difficult to properly torque and may work loose due to vessel movement. Use marine-grade nyloc nuts instead. Keep in mind that a battery is a really just box of electricity, and if it gets loose, sparks can fly and ignite something flammable nearby.

**HOMEMADE AC POWER CORD ADAPTOR**

Need AC power aboard but don’t want to fuss with those frilly, unnecessary add-ons like plugs, breaker panels, and permanent wiring? Don’t simply take a 30 to 15 amp adaptor, cut the end from a three plug extension cord, then tape the wires to the prongs at the 15 amp end. This is a fire or electric shock just waiting to happen.

**BATTERY SWITCHES (THE FINE PRINT)**

Yes, we all know that battery switches need to be mounted — but does that mean the structure the switch is mounted on has to be mounted as well? Isn’t the intent of the requirement met regardless? This is obviously the type of philosophical question this boat owner felt should be left up to someone else. The wires from the switch to the battery are guaranteed to come loose eventually, with the potential for sparks and a fire.

**AC PLUG INSTALLATION**

Many DIYers don’t know that residential style solid copper wiring (aka ROMEX) is not recommended for use on boats. Solid wire is susceptible to breakage due to vibration — the reason marine-grade wire is constructed of multi-stranded copper wire.

**CROWDED BATTERY TERMINAL POST**

How many wires can you connect to one battery post? More than you should, as this photo aptly illustrates. ABYC recommends that no more than four conductors be secured to any one terminal stud. Too many connections create the potential for heat or worse, arcing, that could start a fire. A better option here would be to relocate these connections to an appropriately protected fuse or breaker panel.

**FUSE PROTECTION**

DC-powered equipment installations always require fuse or breaker protection. In some cases it’s acceptable to power equipment via a connection directly to the battery, but always ensure a properly sized inline fuse is part of the installation. Without a fuse, the wire carrying current to the device can ignite if there is a short in the device.
AIRBNB FOR BOATS? 
BEWARE
The peer-to-peer sharing economy has recently hit the boating world, with the advent of Boatbound and Boatsetter, companies that help owners rent their boats to others. Other ways to share your boat are also cropping up, such as through Airbnb.com as a sort of floating hotel room. All of these programs offer a way to earn some money to offset maintenance and slip fees, but they are not without their risks.

If you’re thinking about renting your boat through one of these programs, be aware that nearly all recreational marine insurance policies, including BoatU.S. Marine Insurance, do not cover the boat during a rental period; that is considered to be commercial use that falls outside of a recreational boat policy. Some companies will not cover you and your boat at all if you participate in these programs, while others may just suspend the coverage during the rental period; make sure you have that conversation with your insurance company before signing up. If something happens to your boat, or worse, someone is injured on your boat, you may not have coverage under your personal recreational boat policy. The insurance provided through the peer-to-peer program really matters, then, if you and your boat are to be protected.

Make sure you understand what the insurance covers — and what it doesn’t — before deciding to list your boat in one of these programs. While Boatbound and Boatsetter both offer insurance options that cover the rental period (and the Boatbound rental insurance is provided by GEICO Marine Insurance through BoatU.S.), the provisions may be quite different than your normal policy. Airbnb provides a Host Protection program that includes liability coverage; still, you should carefully review the program coverage to ensure it will cover your boat as well as it would a land-based residence. If you want to rent your boat on a regular basis — even just as sleeping quarters — consider purchasing a commercial charter policy that covers your boat for this kind of use.

IMPELLER FAILS
Ever wonder what goes in inside your raw-water pump? We didn’t either. At least not until a surveyor sent us these pictures. The first shows a brand-new impeller. One thing you might notice is how squished the vanes are. When your boat’s not used much, say over winter, these poor things stay folded over for months. After a while, they take a “set,” which means they stay a little bent over like most of us would if we’d been hunched over for a whole season. This makes the pump a little less efficient, and every year, it pumps less water. The other picture shows what happens when you ignore your impeller too long. Those poor vanes finally gave up and broke off. Actually, you’d be fortunate if they just broke off; what usually happens is that they get carried downstream in the cooling system, where they can clog your heat exchanger, or if you don’t have one, clog the cooling passages in your engine. Either way, it can be a big job to retrieve them, and retrieve them you will — otherwise you’ll be fighting overheating problems forever. This spring, replace your impeller(s) if they’re over a couple of years old. It’s one less thing you’ll have to worry about.
OLD BELTS

V-belts are one of those things in your engine compartment that seem to just soldier on forever — until they don’t. V-belts drive raw-water pumps, alternators, power-steering pumps, and so on. Eventually, they age and get stiff and cracks form. Once that happens, it’s just a matter of time until they fail. You might think a busted V-belt is not really a big deal: what’s the worst that could happen? How about a fire? A V-belt on a 35-foot powerboat came apart as the boat was being run hard, which then caused the engine to overheat. The overheating caused the cooling system to spew coolant onto a hot manifold, which then ignited. (Coolant is made with a type of alcohol and can burn, given the right conditions.) Fortunately, the fire in the engine room was put out by the quick-thinking owner using a hand-held fire extinguisher before more serious damage could be done. The life of a V-belt varies, but all of them should be inspected at least every year, preferably at the beginning of the season. Look for excessively worn spots and cracks as you flex the belt, a sure sign the belt is overdue for replacement.

CHECK YOUR BEARINGS

Poor lowly boat trailers: their only purpose in life is to transport your pride and joy to the boat ramp, and then they’re ignored while you dote on your boat. But think of your trailer as a protective cradle with wheels for your favorite pastime, and maybe you’ll realize how important it is — and how important maintenance is for it. This spring before your first outing, reserve a couple of hours to inspect your trailer — especially the bearings. The BoatU.S. Marine claim files are rife with reports of wheels that smoke, lock up, and even fall off, often at the worst possible times. In one claim, a wheel caught fire in the middle of the San Francisco Bay Bridge during rush hour. The image from the news helicopter was very embarrassing. This picture is what a wheel bearing looks like when it hasn’t had the grease renewed for, well, ever. We know that not everyone services their bearings regularly; wheel bearing problems account for 21 percent of the service calls in the BoatU.S. Trailer Assist and Tow program. So before your first trip to the launch ramp this spring, check your bearings and service them if needed. For a neat video on how to do this, go to the BoatU.S. Youtube channel.

WAKEBOARD AND SKI BOATS ARE DIFFERENT

From the outside, it may not seem like boats you can ski behind and purpose-built ski and wakeboard boats are that much different. But there’s one crucial difference — propeller location. Because wakeboarders play much closer to the stern, wakeboarding behind a sterndrive or outboard-powered boat is far more dangerous than one built for the purpose, which are inboard-powered. As you can see from the illustration, a skier in the water is much safer with an inboard-powered boat because of how far under the boat the prop is. Regardless of where the prop is, any boat that’s picking up a skier should have the engine powered off, just in case.
THIS BEAUTIFUL BOAT is owned by long-time BoatU.S. member Ben Stavis. Ben inherited Astarte, a Rhodes Reliant, from his dad who bought it new in 1964. As you can see, Ben keeps the boat in Bristol shape. One of the things he’s done to upgrade Astarte is added a bullet-proof bilge pump system that’s worth mentioning. Ben installed a 12-volt belt-driven diaphragm pump in a dry place, out of the bilge and protected from seawater. (These pumps, he says, move a ton of water.) The intake hose from the pump leads to a strainer at the bottom of the bilge, and water is pumped overboard. The slick part is the use of pneumatic switches, also mounted near the pump to keep them dry. To activate the pump, Ben mounted a vertical one-inch PVC pipe in the bilge, and attached the ¼-inch pneumatic switch’s hose to it. When water enters the PVC pipe, the pressure triggers the switch, turning on the pump. A standard two-way bilge-pump switch at the power panel allows the system to be automatic or manual. A second pneumatic switch is attached to a counter that cycles every time the pump turns on and also illuminates an indicator light on the instrument panel. Another PVC pipe and switch operates a warning light and siren if bilge water gets too high. These switches, Ben says (available from Groco), have been ultra-reliable, and the entire system has been trouble-free for 35 years. Not too many people can say that about their bilge pumps.

FOR MANY PEOPLE, it’s hard to leave their boat, not knowing if it’s safe from prowling eyes. A new product, called Tend Secure, claims to give more peace of mind, in a unique way. It looks like a camera and is about the size of a smartphone. It’s makers claim that if a stranger boards your boat, it’ll send you a text message. Not too impressed? The company says that what sets it apart from other security notification systems is that it’s equipped with face-recognition software and will only alert you if an unrecognized individual is detected, which would certainly seem to reduce false alerts. Wife on board? Kids want to take out the boat? Mechanic shows up for maintenance? No problem. Prowler looking for an easy score? Alert! One thing: We’re not sure how well the system would stand up to the marine environment. (It’s designed for indoor use.) The manufacturer also says that because it doesn’t actually take or send photos, it can be used in private spaces, like sleeping areas. www.tendinsights.com.

HIKERS HAVE ALWAYS had cool apps for recording their hikes and sharing them with their friends and family, and now boaters do too. If you’ve got a smartphone (heck, you may even be reading this on one), you can download Sailing-log by BoatBook. This nifty app may not take the place of a paper log for the old-schoolers, but if you can’t be bothered keeping a logbook and pen around, the developers say that this app can automatically record each of your adventures, including the route, start and finish points, track history, speed, and direction. The company says that because it uses the phone’s GPS and doesn’t rely on cell service, it can be used anywhere in the world. Charter companies, such as Sunsail, are embracing the technology, too. Their customers can document their vacations and even use it to build a sailing resume that can open up new chartering grounds for them.
RECENTLY, TOWBOATU.S. Ft. Lauderdale’s 96-foot OSV Richard L. Becker was chartered to recover a NOAA weather buoy that was adrift hundreds of miles south of Jamaica. These guys do a lot more than tow errant boaters off of sandbars. The job specified recovering what was left of the buoy’s mooring system in order to investigate the cause of the failure. Once on scene, the crew hoisted the buoy on board using the vessel’s big boom crane. Once the buoy was onboard and secure, the mooring chain and line was recovered. The photo above is what the crew discovered at the bitter end of the line. A rare lancet fish had its fangs entangled in the thick nylon line and had likely lost its tail to a predator. Did the lancet-fish chew through the line and cause the failure, or did the fish become interested in the bitter end of the line mistaking it for his next meal? We may never know.

PROPANE (ALSO KNOWN as liquid petroleum gas or LPG) is the favored fuel for most galleys today. It burns hot and clean and lights easily. But the dark side of propane is that it’s heavier than air and seeks low places on a boat, like the bilge and engine compartment. A propane leak can find its way in an area that might have something capable of producing a spark, like a pump or light. The results are usually, to say the least, impressive. To keep propane where it’s supposed to be, boats should have a special locker for the tank. The locker must be vented overboard so any leaks won’t stay on the boat. Sadly, not everyone seems to know this, as you can see from the photo. A plastic bucket is no place for explosive gas containers, especially belowdecks. Even a proper propane locker can be dangerous if the vents clog, so take a look at yours and run some water through the vents to make sure they run free.

DAVID B. KACPROWICZ, a Certified Marine Investigator from Erie, Pennsylvania, sent in this picture of how not to attach a tow chain. Sharp-eyed readers will notice that if the trailer were to separate from the tow vehicle, the chains, rather than keep the two together (during a white-knuckle, spark-inducing slowdown), will simply pull the clip that holds the pin that keeps the receiver in. It should go without saying that chains should be attached to something substantial on the hitch — like the big cutout two inches from the pin. Also, if the chains are twisted around each other a couple of times, they’re less likely to drag but will still allow you to turn corners without binding.
NOT LONG AGO, we sent out a readership survey to find out what our readers like and want more of in Seaworthy. We like poking around with numbers almost as much as we like messing about in boats, and after crunching some of those numbers, we learned some useful facts. Thousands of you responded, and over two thirds of you said that you read all or most of each issue of Seaworthy; 80% of you want to receive it via print and email; and most of you enjoy articles about things like fires, collisions, and lightning, which is great because that’s just what we like mining our claim files for and writing about. Our feelings were hurt though, by the 1.4 percent who said they don’t want to receive Seaworthy at all. You might want to keep an eye out for these folks; they may be the ones whose boats are slowly sinking at the dock, have smoke coming from their electrical panel, or are stuck on the side of the road with a broken trailer bearing. If you see them, how about recommending they give us another try? After all, our goal is to keep everyone safe on the water.

Another thing we learned from the survey: our readers are vocal and not afraid to tell us what they want. Sample comments:

- Very informative and interesting, Keep up the informative articles, Seaworthy is the best magazine in boating! And a few more like this: I think it’s fine, no comment, and there’s too much about dogs! But most of you said you want even more articles on how to be a safer boater, how to prevent damage to your boat, and what makes boats come to grief. Good news! That’s just what we were planning to do, and we’ll continue to use our expertise and knowledge from our claims files.

And now, starting in October, we’re going to include Seaworthy magazine right inside BoatUS Magazine, which will extend our reach even farther and give you six issues a year instead of four. With the addition of Seaworthy in BoatUS Magazine, the nation’s largest and best boating publication, we think we can give everyone what they want. Even that 1.4 percent.

Stayed tuned for more details in the August issue!