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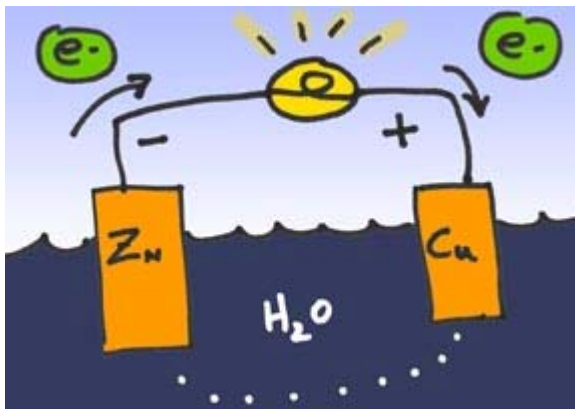
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Galvanic Corrosion — More Shocking!

By Vincent Pica

When we wrote about Electric Shock Drowning, we were also setting the table for a related and more common problem – what is called Galvanic Corrosion. The same elemental forces that could translate into ESD will definitely create an environment whereby your boat's metals can "melt away"...

What Is Galvanic Corrosion?



When two dissimilar metals are in contact with each other, the base requirement for galvanic corrosion is in place. What does dissimilar mean? Well, how about a bronze propeller and a stainless steel drive shaft? Or stainless steel screws holding an aluminum trim tab in place? Or just the grounding strap on a boat, connecting all the various metals? But more than contact is required. An "electrolyte" has to be present too – a substance to conduct electricity (the flow of ions) between the two dissimilar metals. And an excellent electrolyte is seawater. What happens is that the more "noble" metal (bronze, for example) destroys the less noble metal (aluminum, for example) by

dissolving it, ion by ion, in favor of itself. This is galvanic corrosion.

The marina provides a primordial "soup" for all the boats via the shore power ground. Every boat is connected to the green AC grounding wire of the marina and to their own boat grounding system, engine and underwater running gear. The water of the marina completes the circuit from all boats to all boats!

Clearly, the best idea to have your boat protected with zinc, the least noble metal available, so that the zinc is "sacrificed" at the expense of all other metals. Zinc should be placed on the running gear struts, on the transom (in the water) and on any internal part that is in contact with seawater – like a raw water-cooling system. However, if you have plenty of zinc and the boat next to yours doesn't, physics will require that your zincs protect both boats simultaneously (and without your knowledge) until they "melt" away – exposing you and your less diligent neighbor to the full onslaught of galvanic corrosion.

What Can I Do?

Well, you could disconnect the AC green ground wire from the boat's ground point. This will break the circuit and fully halt the corrosion cycle. However, this is a very dangerous condition. Electricity can "jump" from your AC system to your DC system simply by the wires of the two systems being in proximity to each other. Out through your engine block to your running gear and into the water. See column on "Drowning – Shocking!" Clearly, that danger is far higher than worrying about a prop dissolving before your eyes.

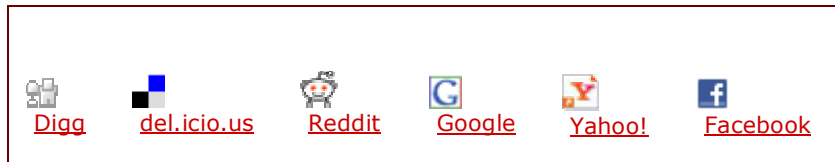
So, a Galvanic Isolator would do very nicely! It sits connected to the green ground wire, close to the shore-power inlet. It blocks, quite simply, the flow of ions between your boat and everybody else's. The Galvanic Isolator also has a "trip" system (via something called a diode) that stops the low-voltage galvanic action from occurring but will allow dangerous AC power build-up to get to the ground, if any.

The better Galvanic Isolators have something called capacitors built in. They allow even low levels of AC to pass through. Stray AC current, even as low as .01A can paralyze a swimmer, so you want it running to ground as efficiently as possible.

Don't go swimming at the marina, and maintain that green grounding wire in good condition. The life you save may be your own.

About the Author: *Vincent Pica is a coxswain and the Commander of Flotilla 18-06 East Moriches. He was a navigator in a brown-water and blue-water sailboat racing crew for eight seasons. From the "iron sails" side, he is a licensed US Coast Guard Master of Steam and Diesel Powered Vessels, carries a Radar Observer endorsement, Unlimited, on his license and is certified in Marine Diesel Engine Operation and Maintenance.*

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