

# FIRST BOAT

TUESDAY, NOVEMBER 15, 2011

## [Galvanic Corrosion – More Shocking](#)

*In this week's column, Vin Pica follows up on his column about [Electric Shock Drowning](#) with a related and more common issue - corrosion...*

Guest blog by [Vincent Pica](#)

Chief of Staff, First District, Southern Region (DISR)  
United States Coast Guard Auxiliary



Is your marina a "soup bowl" of corrosion? Photo © [Nautical Sites Media](#) PN4RMZDRRP52

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 Recipe**

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!

### **The Sacrifice**

Clearly, the best idea is to have your boat protected with zincs, the least noble metal available, so that the zinc is “sacrificed” at the expense of all other metals. Zincs 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 zincs 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, as pointed out in the [Drowning – Shocking](#) column points out, even as low as .01A, can paralyze a swimmer so you want it running to ground as efficiently as possible

### **In Summary...**

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

*BTW, if you are interested in being part of USCG Forces, email me at [JoinUSCGAux@aol.com](mailto:JoinUSCGAux@aol.com) or go direct to the DISR Human Resources department, who are in charge of new members matters, at [DSO-HR](#) and we will help you "get in this thing..."*

*Editor's note: You can find more boating safety and seamanship articles by Vincent Pica here on [the Daily Boater](#), or at his website, [AtlanticMaritimeAcademy.com](http://AtlanticMaritimeAcademy.com).*