June 8, 2018 Lightning Strike on Congrio

It was around 0815 hours on June 8, 10 miles north of the Abacos, Bahamas. We observed a thunderstorm ahead visually and on radar and kept it on our port side. Both of us were standing up in the pilothouse. We thought we were well past it and in sunlight when a simultaneous bang flash surprised us. I said immediately, "We've been hit."

Looking at our navigation screens confirmed that CONGRIO was not only hit but had sustained damage. We were momentarily stunned while everything happening at once; alarms, faults, computer screens flashing different signals. It was confusing. It was obvious that the autopilot was no longer steering the boat. I pulled back the throttle to neutral. I switched from autopilot to the full follow-up (FFU) lever but got no response. Fortunately, the engine was still running.

"Well, shit," I said to Patty, "this is not good. We've lost our steering."

The computer screens were still operating, and things calmed down a bit. I tried shutting off power to the steering and all the navigation systems and then restarted everything hoping a reboot would bring everything back to life. No luck.

We made a quick assessment of what was and what was not working. The satellite GPS compass, the AIS, and the autopilot, parts of our primary Simrad navigation system, were not working. The depth sounder, the radar, and both of our dash VHF radios were working. That gave us some hope that things might not be too bad.

We have an independent navigation system that is a solid state Dell micro computer with its own GPS antenna and Rose Point Coastal Navigator software. It was still working. Tucked safely away are a laptop navigation system with a USB hockey puck GPS antenna, and yet another hand held Garmin GPS chart plotter so there are plenty of backups. It makes navigation easy to have GPS but I am not worried about losing it all since we used to sail all over the place back in the 70's with a compass, sextant and charts. I still have the sextant and had practiced taking some sun lines while we were in the Bahamas. The satellite phone was still working. Our primary steering was dead.

The most important thing to do at this point was to get the steering working. The source of electrical power for the primary steering is our house battery bank. The hydraulics are pressured up by a transmission driven PTO pump connected to a directional solenoid valve. Our backup steering system is powered by the main engine battery bank with hydraulic pressure provided by a continuous 24VDC electric Accusteer

HPU pump with its own directional solenoid valve actuated by a jog lever in the pilothouse. I switched off the power to our primary steering, shut off the hydraulic valves from the PTO and primary solenoid, opened the hydraulic valves from the electric pump, turned on the pump, and the switch on the power supply to the backup steering. Moving the jog lever should have moved the rudder but we could see no movement on the rudder angle indicator. Shit again.

I handed Patty a hand held VHF radio and said, "Go back to the lazarette and watch the tiller as I engage the jog lever." When she was in place I moved the jog and she reported with a lot of relief in her voice that the rudder was moving. The rudder angle indicator was not working but at least we could move the rudder. I put the engine in forward gear and the boat started to move. I could control the boat direction by moving the rudder with the jog lever, but it took some practice to steer blindly with a lever that does nothing but move the rudder slowly in the direction that you push the lever. We timed the rudder swing from full 35 degrees port to full 35 degrees starboard at 18 seconds. That is a long time to count and estimate without significant error where the rudder might be.

The next step was to make a plan. We obviously needed to get somewhere where we could make repairs. We decided that our best bet was to go to Palm Beach. We laid a course along the north side of the Little Bahama Bank and headed for Palm Beach. We calculated that we would reach Palm Beach entrance by about 0300 the next morning, not including currents. It was not an appealing prospect to steer manually and blindly with a jog lever all night so we decided to go as far west along the Bank as we could and still find a safe anchorage for the night. We anchored for the night west of Grand Cay. I turned on the anchor light but it did not work. Hmmm, it was working before today.

Saturday morning we cleared the anchorage by 0600 and headed for Palm Beach. The north side of the Little Bahama Bank is far north of Palm Beach so we had to fight the northerly current of the Gulf Stream. It held us back all the way to Palm Beach where we entered the channel after midnight.

Coming into the main channel at Lake Worth was extremely exciting. Our bad luck continued. As we entered an exceptionally large ship was coming out towards us. I tried to maneuver Congrio over to the side of the channel. With adrenalin pumping it is easy to over steer the big rudder we have. I must have appeared drunk. We were going very slow so rudder response is minimal. The boat was swinging back and forth wildly as I tried to find direction without knowing where the rudder actually was. The pilot boat ahead of the ship blasted its horn at us. We managed to move to the red side of the entrance channel and get into neutral just as the ship reached us. In the darkness both the big ship and the breakwater looked awfully close.

Just as I saying to Patty, "I have a serious case of cotton mouth, would you please get me some water," blue lights started flashing on our port side. Patty took a quick look

and there was a Coast Guard patrol boat asking us to stop. She tried to explain that we were hit by lightning and have little steering control but they probably have heard lots of excuses and were determined to climb aboard anyway. One Coastie came up to the pilothouse and listened very politely as I explained my steering problems. He replied, "Carry on and we won't take too much time." He added, "Your wife seems a little agitated." "Do ya think?" was all I could say. They inspected the entire boat, asked Patty if she used medicinal marijuana, she said nothing but gave the guy the harry eyeball, "Sorry," he said, "I have to ask." They called in our passport numbers and vessel document number, and finally left us to creep our way to the north end of Lake Worth to anchor for what little was left of the night. They were good guys doing their job but I had to mention to them that they would have been more welcome on a different night. After anchoring we passed around shots of tequila and got a little rest.

The next morning we returned to Jupiter and maneuvered into our old slip using our bow thruster. The backup electric hydraulic pump had worked for over 24 hours and proved its durability to us. It is worth mentioning that the backup electric hydraulic pump is our second line of defense against steering failures. Third is a manual helm pump with wheel in the lazarette and fourth, if all else fails, we would disconnect the hydraulic cylinders and insert a very large stainless steel tiller through a removable deck plate into a coupling at the top of the rudder stock. This last resort together with a mainsail and gennaker we also carry is part of our get home plan in case of complete electrical mechanical failure.

The task of assessing the damage and making repairs commenced with visits by the steering and navigation techs. Just prior to their arrival Patty cranked me up to the top of the mast where I removed a vaporized anchor light. This is where the lightning entered the boat. Both the steering and navigation rudder feedback units attached to the primary steering tiller sustained over current damage. I speculate that the current traveled down the aluminum mast through the steel bulkhead immediately below it to the hull. Lightning current typically seeks to exit a boat at the water surface. It likely spread through the steel hull where it came into contact with the metal housing of the rudder feedback units that are secured to steel structure welded to the hull. A circuit board in the steering feedback unit had to be replaced, the entire Simrad feedback unit replaced. Both of the full follow-up steering levers suffered damage and had to be rebuilt. One of the circuit boards in the steering system replaced.

The satellite GPS compass, the AIS transponder, and the Simrad OP50 remote controller had to be replaced. The cables appear to be sound but they are all connected by a network. I am guessing that a side current traveled from the top of the mast down the headstay and jumped over the satellite compass antenna. The damage could have been a lot worse.

To prevent the same extensive damage in a future lightning strike I added insolation material between the rudder feedback units and the hull and replaced the stainless I I

I added insolation material between the rudder feedback units and the hull and replaced the stainless steel fasteners with nylon fasteners. I also added an aluminum lightning rod, taller than the anchor light, to the top of the mast. The say there is little you can do to avoid a lightning strike and so the best you can hope for is to minimize the damage it causes.

Enduring and finally overcoming this major obstacle in our cruising plans reminds us of our shared determination, common purpose, and the constant encouragement that Patty and I give each other. We prepared well and only have to occasionally test our endurance and patience.