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Chapter 5: Electric

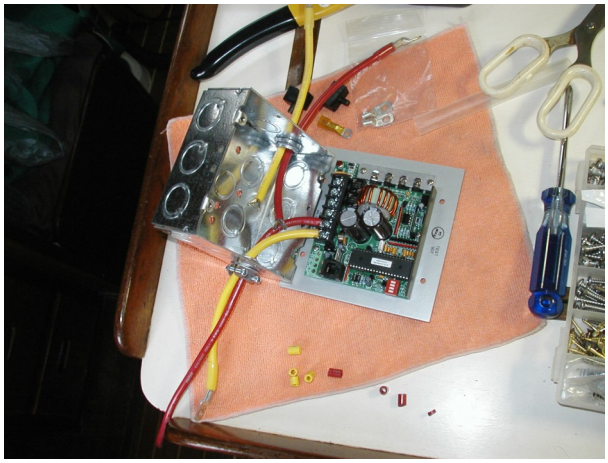
Section 1: Solar Panels for a Tartan 37

Court Crosby # 249 Dragonfly

I decided to add solar power to my boat to keep the batteries charged while it sits idle in the slip, and to reduce the need to run the engine every day when we are using refrigeration. To provide power, I bought two 145 watt, 18 volt solar panels; a 25 amp, 12 volt MPPT controller; #6 wire and connectors; a 25 amp fuse; and a 100 amp circuit breaker for a disconnect. To hold the panels I designed a simple frame made of 1" stainless tube and a bunch of connectors.

The tubing came in 24 foot lengths, so I had to have them delivered to a friends commercial address because the truck line wouldn't deliver to a residence. I bought 4 pieces and the gross weight was only 85 pounds, but the length was a bit unwieldly to carry on a small car. I made some initial cuts at home before transporting them to the boat for final fabrication.

The controller could only handle a maximum of 28 volts, so the panels had to be wired in parallel and I needed to use #6 wire instead of #10. The controller was designed for use with #10 wire, and though I could make the connection work with #6, it wouldn't bend in a tight enough radius to fit through a knock-out in the box for the controller. #8 wires were barely flexible enough, so I spliced #8 ends on the wires to and from the controller. I thought I was going to have to use #10 ends, so I used eyes joined with a machine screw and nylock nut and covered with heat shrink insulation, rather than a reducing butt splice. With the panels above the cockpit and the batteries under the quarter berth, I decided to mount the controller on the bulkhead at the foot of the quarter berth (next to the autopilot computer).



I couldn't find a reasonably priced deck gland for #6 wire (Defender has a $25 minimum), so I decided to use some fender washers with holes drilled in them to screw them down over a countersunk ring of butyl sealant. To minimize the wire length and keep the entrance out of the water on deck, I decided to put the new holes in the cockpit combing next to the AC power entrance.

By removing the engine instrument panel, I was able to feed and secure the wires without the dreaded climb over the water heater.

My intent was to make a frame above the lifelines to support the panels. This required replacing the top lifeline aft of the gate with a stainless steel tube. I had pre measured this length and knew they had to be 10'-0" long, so I pre cut them in the process of making my tubing more transportable.

One of the eyes in the end of the pushpit would not come out – I ended up cutting it off, so the precut tubes needed to be 10'-1"!!! I reused the eyes at the gates, though this one was kind of bunged up once I cut it free.

With just a little bit of grinding, a ⅞” tube fits inside the 1” tube for a clean splice.

The frame was two simple arches made of straight sections of 1” x .065, 304 tube and assorted Ts, Ls, and other fittings. The tube was drilled and tapped at all critical fittings for a ¼” x 28 tpi machine screw in single shear at those locations. As it stands it is rigid enough fore and aft, but the forward arch needs transverse stiffening. I hope a fairly short 60 degree diagonal in the top corners will be sufficient. It didn't move in 25kt. winds at the dock, but I'm concerned about the inertia of two 26 pound panels in a seaway, and I really don't want any shear loads in the glass panels. Worst case, I will install diagonals to the dodger,- or have a real arch made.

The panels are fastened to the frame with galvanized pipe hangers and a ⅜” bolt with fender washers and frp washers. When I slid them to their final location, I wrapped the tube with electrical tape under the hanger. If these don't weather well, I will replace them with something more suitable.

I had intended to cut the plugs off of the panels and crimp eyes on to attach to my #6 wire with machine screws. I was warned that cutting the plugs would void the warranty, so I bought paralleling plugs and a short splice cable. I cut the ends off of the splice cable and spliced them to my #6 wires. I tried a #6 butt splice on the #10 wire and it held, so I didn't have to use bolted eyes (another lesson learned).

Lessons learned: buy a controller that can handle high voltage so the panels can be wired in series with standard #10 solar wire with MC4 plugs, don't cut until the actual space parts go in can be measured. $50 more for the controller could have saved about $150 in wire and connectors.