Electrical Wiring in Longboat Cruiser *Puffin* *(from an article written for the Drascombe Association News in 2017)*

Jolyon Wardle explains how he installed electrical wiring on a Longboat Cruiser on a shoestring.

My Longboat Cruiser *Puffin* now sports a solar panel and controller, supplying power to GPS chart plotter, depth sounder navigation lights and bilge pump. She also has a VHF radio and aerial. I fitted all the wiring myself, gleaning much of the information by trawling through the Drascombe Association website. The first part of this article shows the fitting of the solar panel and controller and the second part describes the VHF radio and aerial. I hope this summary of the process will assist others wishing to do the same.

Solar Panel and controller

I used double sided VHB tape to attach a 20W solar panel at the stern of the boat. The wiring, together with the stern lighting, I routed through silicone sealed conduit, as shown in Picture 1. The solar panel wiring in the plastic conduit then goes under the duckboards and bulkhead, to a 10A solar controller which has a couple of USB

sockets for phone charging etc. I also used silicone to attach the chart plotter's transducer directly to the hull just forward and to the side of the centre case.

In Picture 2, you can see the main plywood mounting board with the hinged swing out display for the companionway (the solar controller is top left and you can see the conduit emerging from the bilge). The second conduit is the VHF aerial and masthead wiring (see later) and running along with it is the transducer cable, which goes to the chart plotter. The connections I used were various - some spades, some rings. I used heat shrinking seals (can be shrunk with a hairdryer) and I discovered a liquid insulating tape/sealant that sets hard, which I used on the masthead wiring. I have included a list of sundry items that I used at the end of this article.

Picture 3 shows the swing-out display, with a toggle that goes through the eye to keep it in place. NOTE - the wiring to the instruments (radio, chart plotter and battery monitor) needs to be long enough to accommodate the panel swinging out across the companionway. You can see the solar controller on the top left of the picture, the switchboard below it (LED switch panel circuit breakers) with master switch and the battery containment (which now has threaded studs that take wing nuts, so that I can swap batteries easily on longer adventures). I used 'Oxford' metal shelving brackets to support the small gel battery and fixed it with a wood screw to stop movement. The battery is a small 17Ahr gel battery and I also have two 12Ahr batteries that I take along if needed.

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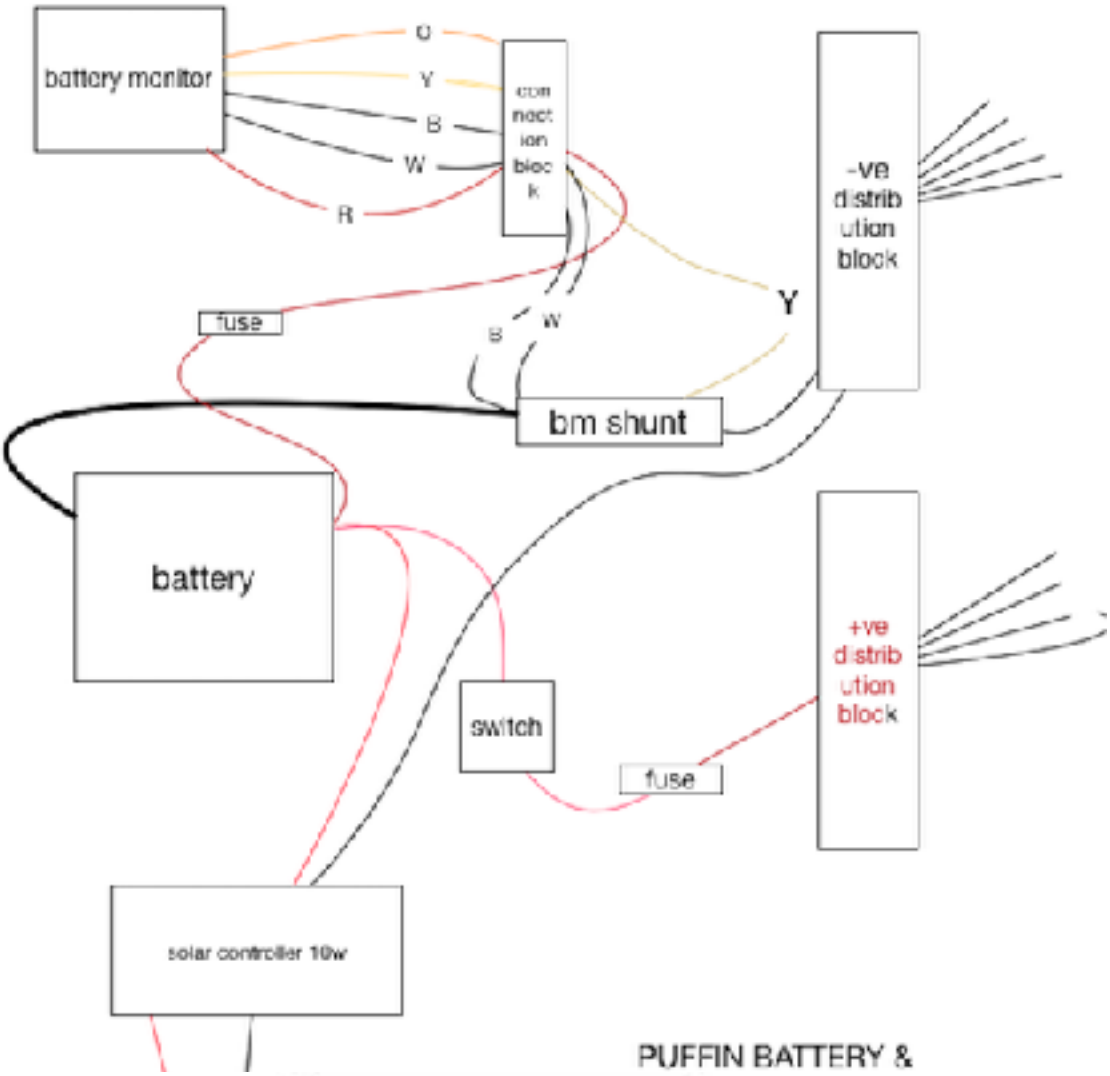
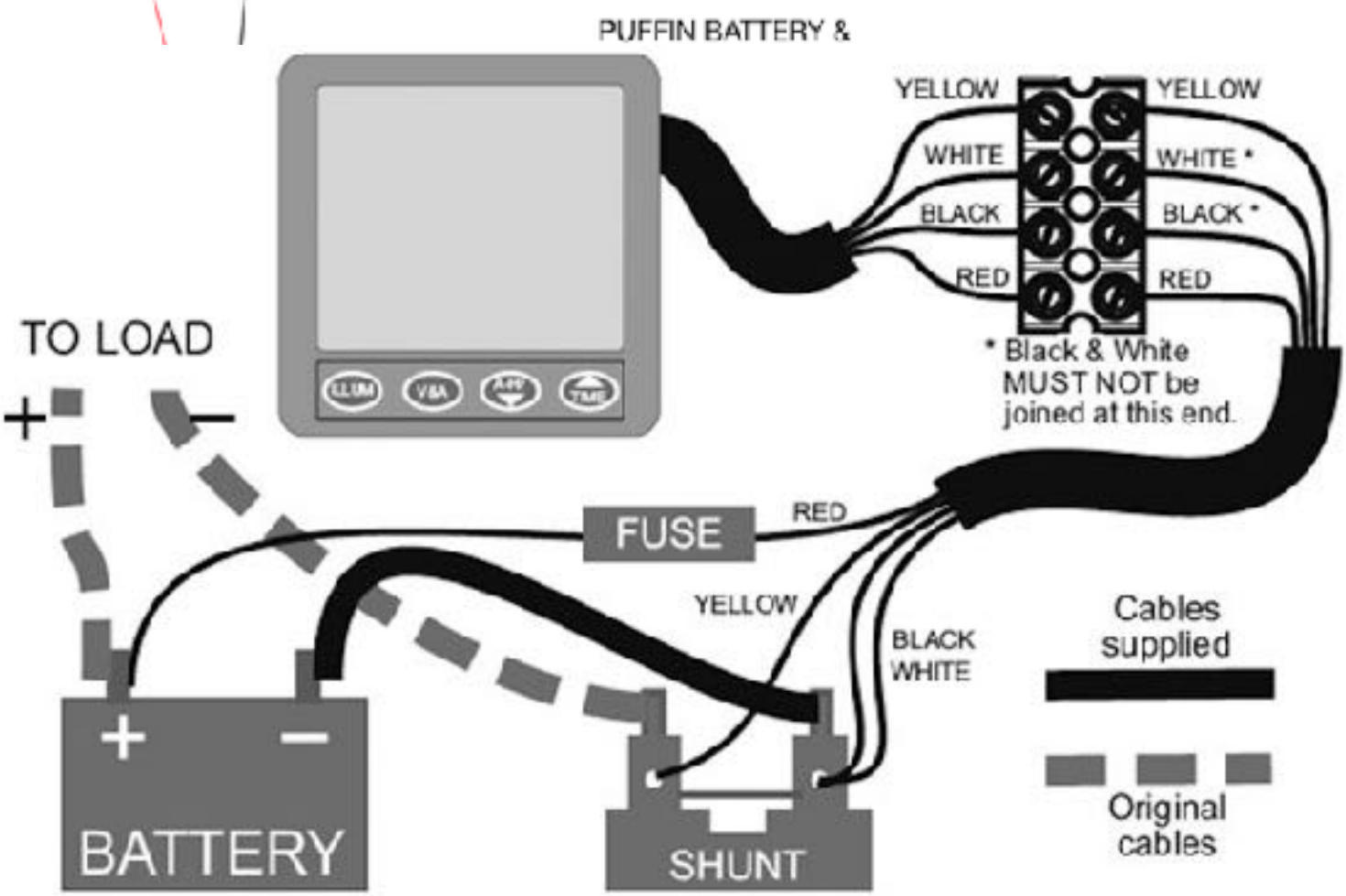


Picture 4 is an indicative diagram of the wiring system as a whole and the exact detail of the wiring through the connection block and the bm shunt are shown in Picture 5.



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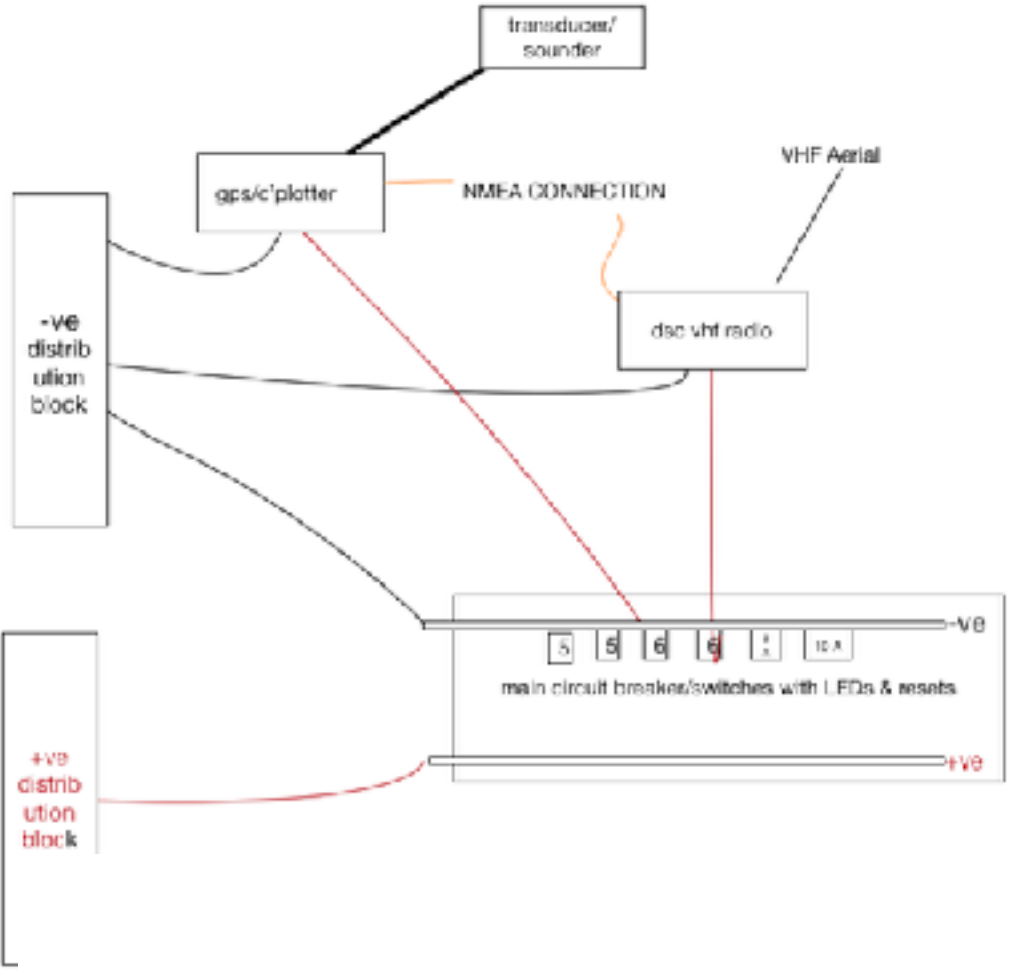
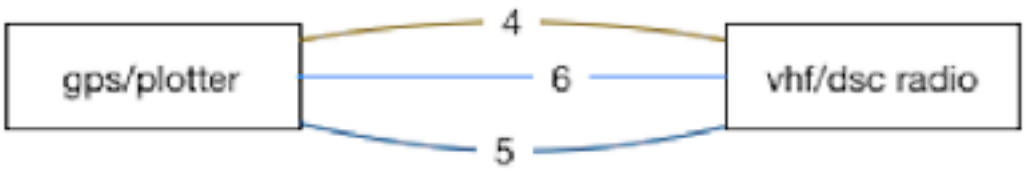
The wiring from the positive and negative distribution blocks to circuit breakers, radio and plotter is shown in Picture 6 and the wiring for the NMEA connection between the Garmin GPS and the Nexus radio is shown in Picture 7.



Garmin blue to pin 6; Garmin black to pin 5; Garmin brown to pin 4.
Then configure your Garmin's Port 1 to use standard NMEA.



nmea connection

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You can find yet more photos and text at http://www.soul-trade.com/puffinelectrics/ and also in some DA Forum threads.

In Picture 8, you can see the dowel holding the display in place on passage. When not in use it swings back inside and is held in place with a simple slotted short strip of mending plate with the end hole cut into twice, and filed to make a slot, with two screws. They are all atop the panels with no washers, which seems to have done the trick and it all folds away nicely and doesn't shake loose - yet!

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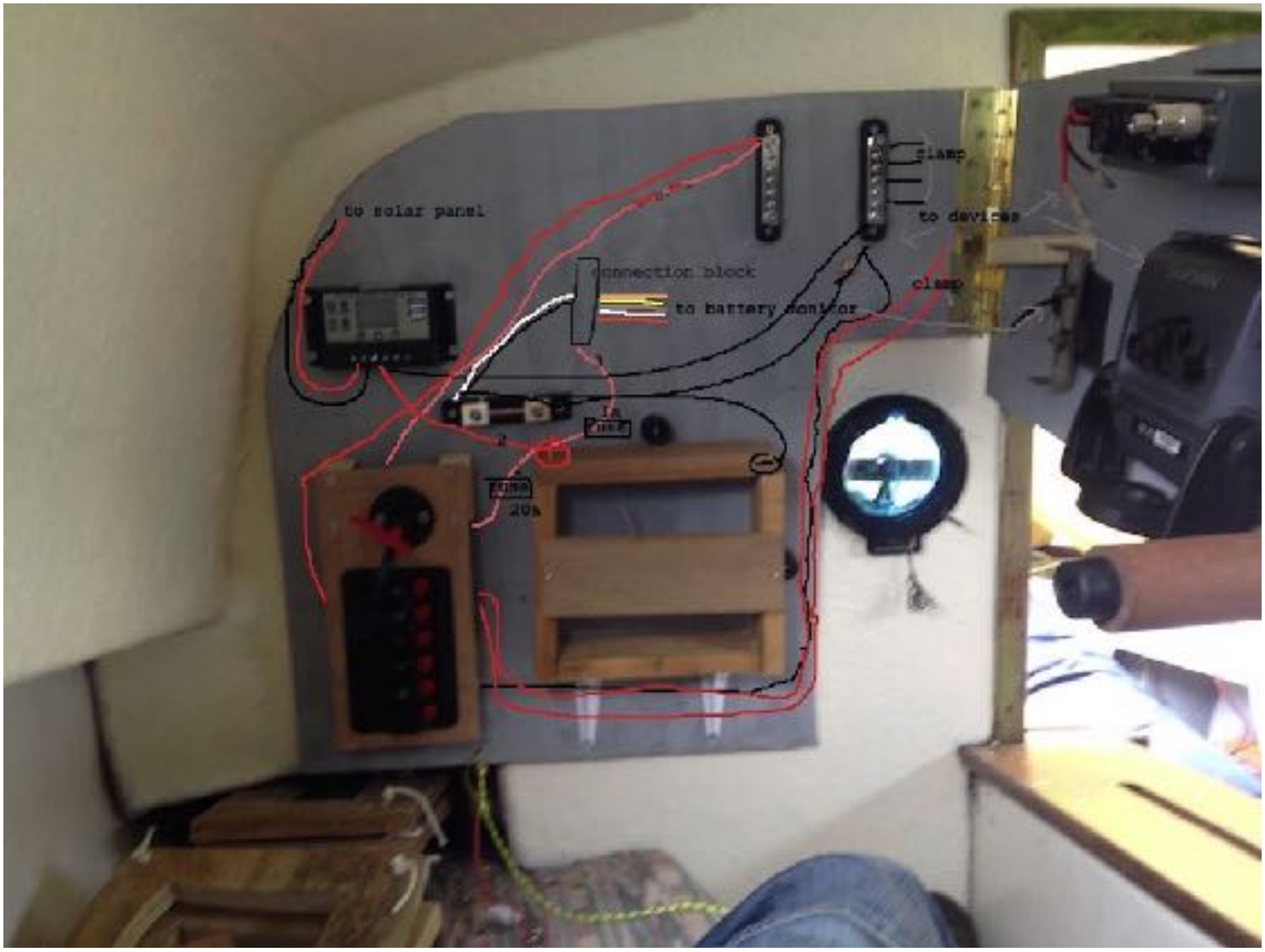

When putting it together it was useful to photograph the initial installations, and label the wiring as seen in Picture 9.

I used LED Lights for stern and masthead (single white atop that will double as an anchor light) and side fixing navigation lights that are wired to the switch with the stern light and compass light (ie the masthead is wired to a switch ‘anchor’ that can be used as a ‘steaming’ light). I have one other switch that I attached above the main switch and which is not within the main wiring and that is for a very small cabin LED stick on light (you can see it in Picture 2 just above the solar panel controller). It is identical to the stern light.

I am pleased with the result. The navigation light LEDs are bright, the Garmin 550 chart plotter is fun to play with and gives position, depth and course on one screen. The chart plotter also provides a depth alarm and the GPS for the Radio DSC, which is what I really wanted - the newer plotters have touch screens but are more expensive and use much more power than this kind of system can provide. The plotter also tracked the route I used going through a tight Scottish approach to the “Bridge over the Atlantic”, displaying it for us to follow when we returned the next day with the water higher and the route not as obvious.

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VHF Radio and aerial

I had a Nexus DSC VHF radio from a previous boat (the MMSI number was reset) and I bought a new whip aerial. After some deliberation, I ended up using a length of old hose pipe split longitudinally, and threaded over the shroud to protect the VHF cable and masthead wiring, which I brought down the starboard shroud (Picture 10), then threaded it through plastic conduit to the cabin.

All the wood, except mounting ply, was from a nearby skip, the radio and battery monitor were salvaged from *Pelican*, our now deceased gaff cutter. The chart plotter was a used eBay item and the sundry rest: wiring, connectors, breaker panel etc were almost all sourced online. The build time, if you were doing it full, time would be approx 2 weeks, allowing for delivery and fitting etc. The cost is dependent on the radio and plotter chosen, with solar panel, controller and batteries probably taking a minimum spend of £500-£600 if you use second hand plotter and radio.

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Picture 11 shows the navigation/instrumentation in use in Scotland, along with chart board for overall cover and backup.

LED switch panel circuit breakers with master switch — because they are so much better than fuse switches!

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Here is a list of the equipment I used. You can type (COPY/PASTE(the descriptions into eBay to get a similar item:

- White Plastic Wire Tie Rectangle Cable Mount Clip Clamp Self-adhesive (I often had to re-stick these with gorilla glue, but useful for keeping wiring or conduit in place)
- 9" Ratchet Crimper Plier Crimping Tool Cable Wire Electrical Terminals WX-03D
- Open & Closed Blind Blanking Hole Rubber Grommets Cable Wiring
- 2 Core Twin 0.65mm 5.75Amp 12v/24v Automotive Auto Cable Wire Marine Wiring Loom
- Self-adhesive stick on cable tie wire base mounts (these use small cable ties to tidy up wiring and I often had to re-stick them with gorilla glue)
- High Quality Black Plastic Nylon P-Clips
- 20mm White Flexible Electrical Corrugated Polypropylene Conduit
- 480pcs Insulated Assorted Electrical Wire Terminal Crimp Connector Spade Set Box
- LED boat cabin / chart table light 3 LED SL03-12-WW
- LED Boat Light - White - Interior, Exterior, Nav or Anchor Light - 12v - Project (stern light)
- Heat shrink red adhesive glue lined tubing waterproof 3:1 heatshrink tube
- Performix Liquid Electrical Insulating Tape (118ml, 4 oz.)
- 1100 GPH Seaflo Marine Water Bilge Pump Submersible Yacht Boat 12V 3Amp
- 3/10/20/30/50/100FT 4MM2 Solar Extension Cable Wire with Male Female MC4 Connector
- London bracket metal shelf support unit
- LED 12v Port & Starboard Quality Marine Navigation Light Yacht Sailing Boat SS21
- Marine Boat Yacht Light All Round 360 Degree White 12V LED Navigation Light
- 12V Amp Automotive Cable Wire Auto Wiring Loom Marine Boat
- 20AWG Flexible Soft Silicone Wire Tin Plated Copper RC Electronic Cable
- 1.5mm Thinwall Tinned Cable 21 Amp 21/0.30 Auto & Marine
- Auto & Marine 100A Power Distribution Bus Bar Terminal Block - 5x4mm Screws
- Marine Battery Isolation Cut Off Kill Switch - Single Pole 12v/24v
- 20A In-Line Standard Blade Type Fuse Holder With LED
- Heatshrink Butt Terminals Electrical Crimp Wire Auto Marine 3-1 Ratio
- 10A PWM LCD Solar panel Charger Controller with Dual 5V USB output 12v 24v battery
- Titan-Energy Flexible Solar Panels
- 3M VHB 4945 double sided tape
- Acrylic foam sheet white 100 x 100mm
- 2 x Leoch 12V 12AH Pride Apex and Pride Shoprider Replacement Batteries
- ABSAAR ATEK 4000 6V/12V 4A Smart Battery Charger Lead Acid, VRLA AGM GEL Battery (NB you do need a specialised charger for these batteries)
- 12 Volt Black round on/off rocker toggle switch 10A
- VHF Aerial antenna freq.156-163Mhz Stainless Steel whip
- Superior quality CB, taxi or ham radio microphone clip/hanger heavy duty cobra
- 6 Gang boat/yacht electrical LED switch panel circuit breakers 12V DC

ps

the orange wire in Picture 4 from the Battery Monitor goes to a starter (engine) battery in a big boat so is not used here!!