YACHT TIPS

240v Shore Support

Do it yourself shore support

Guidance notes on installing a DIY mains shore support system on a small vessel

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Materials Needed

1. **Shore line lead**

These can be either made up by yourself or purchased as ready-made leads. The lead must be rated for 16-amps for the length of cable you require. Remember the longer the cable the larger the cross diameter of cable you require. 1.5mm 3 core cable should be suitable for leads up to 15meters for most boats.

Connect the coloured cables to the following terminals in the plugs and sockets

UK & EU- colour coded cable	**US - colour coded cable**
Brown = Live (L)	Black = Live (L)
Blue = Neutral (N)	White = Neutral (N)
Green/Yellow = Earth	Green = Earth



Tip: *Always make sure that one end of the lead has a male fitting the other a female fitting. I have come across several cases where the lead had two male fittings which is very dangerous as if you happen to plug in the lead to shore mains first the male terminals at the other end of the lead are live and exposed!!*

2. **Shore line Connection Socket**

The choice of shore line connection really depends on the location of the connection. If the connection is inside a locker and protected directly from the weather then the most common connection socket is the plastic commando types however if you are placing the connection point on the outside of the vessel then only use the purpose made weather resistant inlets similar to the ones made by Victron or Marinco however even these should be placed in a protected position.




Female Plugs Male Sockets

Tip: If using Commando style sockets only fit male type sockets on the boat. I have come across numerous cases of the female sockets being used which means that the shore line connector is male and the exposed connectors would be live if the lead was plugged into the mains connection first.

3. **Residue Circuit Device (RCD)**

An RCD is a life-saving device which is designed to prevent you from getting a fatal electric shock if you touch something live, such as a bare wire. It can also provide some protection against electrical fires in faulty mains devices. It constantly monitors the live and neutral wires for any connection to earth and automatically isolates the electrical supply. Whilst RCD devices are fitted to most shore supply boxes these cannot be relied upon and it is essential that one is also fitted to protect your onboard circuits. Whilst separate RCD units can be purchased and installed separately from the circuit fuses it is most commonly included within a small garage type consumer unit or fuse box.

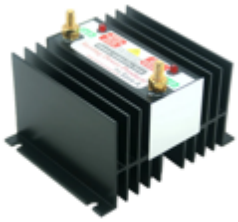


Consumer unit type *Plug in type* *Wire in type*

Tip: RCDs are mostly designed for the domestic market and are normally installed in a dry humid free environment. When installing in a boat make sure that it is located in a position that is dry and well ventilated. Even so in a marine environment there is always a higher humidity and as a result it is not uncommon for the RCD trips to start to seize up, it is therefore very important to always test the trip switch every time you connect the shore support line to the boat to see that is working correctly and to exercise the unit so it remains free.

4. Galvanic Isolation

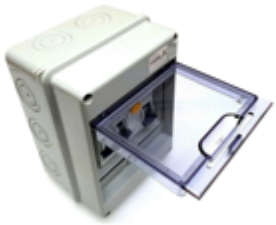
Galvanic isolation is only an important issue if you leave your boat more or less permanently plugged into the mains at a marina. Because earth bonding creates a circuit between neighbouring boats and other earthed metal in the marina small currents can circulate in the water around the boat which can cause zinc anodes to be eroded very rapidly and once these have been wasted away then the anode moves to the next least noble metal in the galvanic table which is likely to be your stern gear.
A galvanic isolator should be fitted on the incoming earth feed from the shore supply and NOT in bonding with your anode.




Wired in types Plug In type

5. Consumer Unit (Fuse Box)

The most common arrangement on small craft is to fit a small garage IP65 rated consumer unit which contains an RCD and two miniature Circuit Breaker Fuses 16amp, 6amp (MCB's). The 16amp distributes power to a number of conventional 13-amp sockets whilst the second provides a power circuit feed to a battery charger unit. However, you could use a separate RCD and then run the supply to a switch panel and use breaker switch fuses to supply the circuits which is the method favoured by most professional boat builders.



MCB Fuse

Tip: Consumer units for houses now require the casing to be metal this obviously isn't suitable in a marine environment so look for IP65 rated Garage units which have plastic covers and seals around the window face.

6. On Board Wiring

Unlike your house wiring on a boat is subject to vibration and movement and solid core copper cable commonly known as twin & earth must never be used on a boat as the vibration and movement is likely to cause the wire to break. Instead, all wiring should be in multi-stand, flexible 3 core cable, which has been tinned to prevent moisture oxidising the copper wire. Standard untinned multi-strand wire can be used but you must hermetically seal the terminations to prevent the salt damp air getting to the copper. 1.5mm/16AWG 3 core Oceanflex Tinned thin wall cable 21amp rated is ideal and can be purchased by the meter from most online electrical whole sellers.

All mains wiring fitted to the boat should run as high practical possible and well above the waterline and should be protected against abrasion, heat or damage where the wire passes though locker spaces or wood and GRP panels. Mains wire should never be routed with or near gas supply lines or and its best to avoid also running then with instrumentation data cables. All wire must be securely supported at last every 300mm unless fitted inside conduit. In an ideal situation the wiring should be running inside flexible conduit throughout the vessel.

When installing mains wiring make sure the all the exposed wire ends are pushed into the terminal connection holes so that insulated section of the wire butts right up to the termina hole and there is no exposed wire or loose strands left sticking out. Also make sure the clamp screws are tightened up hard onto the wire. Always double check this and give the wires a good pull to see that they are clamped securely.

7. Sockets

Whilst domestic 13-amp sockets can be used I personally would steer away from these for a number of reasons. Firstly, they are big an ugly and secondly are not designed for fitting into boats. There are plenty of small and easily to fit units on the market that come in various colours to match your boats interior finish. Google: - Berker or C-line switches & sockets. Please remember if you are flush mounting the sockets the rear must be fitted with a backing cover.

8. Earth Bonding

Whilst your onboard 240v circuits should be earthed via your shoreline it is also essential that the boat has its own independent earth. This is by far the most important safety feature both on a boat and in the home and it is no coincidence that it is mandatory under the UK mains electrical regulations. The principal of earth bonding is to ensure that all extraneous metal objects are at the same electrical potential thereby eliminating the possibility of a person catching hold of two objects at different electrical potential and thereby getting an electric shock across the chest. Earth bonding requires the mains earth inside the boat to be connected to ground.

Generally, all other metal objects e.g., in-board engine, fuel tank, rudder stock and stern gear will already be bonded back to a zinc anode. Connecting the incoming mains earth to this point will therefore suffice but better still would be to fit it to a grounding plate.

SMALL BOAT 240v LAYOUT DIAGRAM