

YACHT TIPS

Installing additional 12v Batteries

How to wire 12v batteries in Parallel

Guidance on how to correctly wire 12v batteries together for extra capacity on a small vessel

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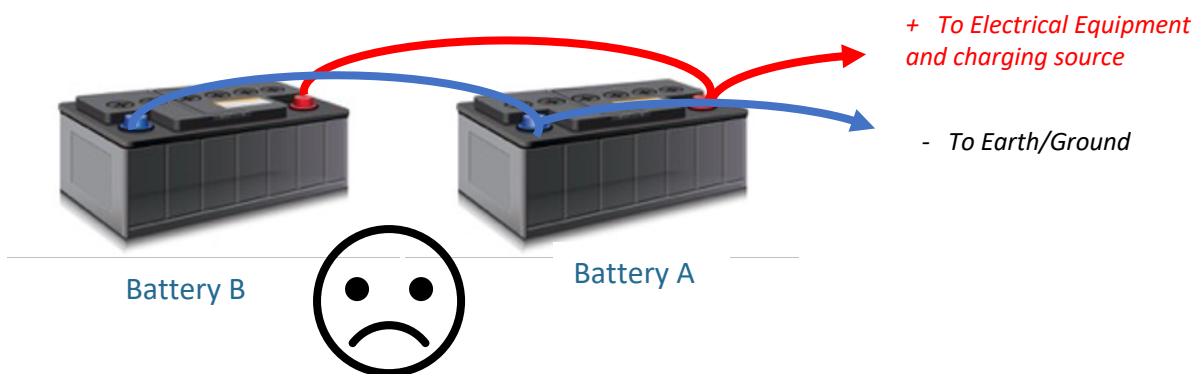
YACHT TIP ON INSTALLING ADDITIONAL 12v BATTERIES

HOW TO WIRE 12v BATTERIES TOGETHER FOR EXTRA CAPACITY

Firstly, this is known as connecting batteries in Parallel, where the voltage remains the same but the amp hour rating (Ah) increases. To do this the terminals of the batteries are connected positive (**red, +**) to positive (**red, +**) and Negative (**Black, -**) to Negative (**Black, -**). There is a right way and a wrong way of doing this, so here is a quick “How To” guide with some explanations on the right way and the wrong way of doing this.

Most people who want to connect two batteries together are trying to expand the battery capacity of an existing setup. One thing to remember, if you are going to install a second battery, you are going to have to start with two new, identical batteries of the same make, type and Amp hour (Ah) rating and age. Connecting batteries with different Ah ratings or from different manufactures is not a good idea as it can/will lead to one battery trying to charge the other due to the internal forward and reverse resistance being different between manufactures designs and this can lead to all sorts of other problems.

Assuming you have assembled **two new identical batteries**, how do you go about connecting the two batteries together? Well, the most obvious is to simply connecting one battery to the other like Diagram one below.



(This will work however it is not correct and the following is an explanation why.)

In this example **BATTERY (A)** is the primary battery and **BATTERY (B)** is the newly installed secondary battery. Now when we put the whole system on load... starting the engine for instance, there will be a slight voltage drop across the two cables linking the two batteries together... let's say it's 0.5 volts on each link or bridge cable, that's **ONE VOLT** in total. So, **BATTERY (A)** will always supply more power than **BATTERY (B)** as battery B's apparent voltage is always less than **BATTERY (A)** because of the volt drop. Now over a period of time, **BATTERY (A)** will always be 'used' slightly more than **BATTERY (B)** so at some point **BATTERY (A)** will have cycled more and be 'aging' faster than **BATTERY (B)** and it will eventually lead to this being in need replacing before **BATTERY (B)**. But remember what was said earlier, you should always use batteries from the same manufacturer with the same rating and manufacture date... well that still applies and so you end up having to replace both batteries.

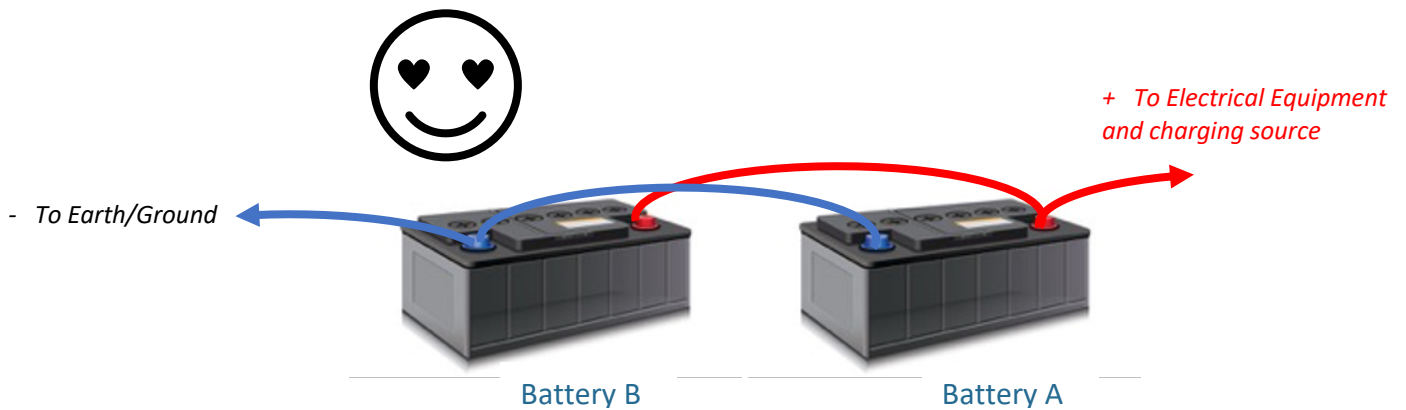
The same principle will apply to charging. You will still have the voltage drop – although it will be smaller as the charging current is a lot less than the cranking current for starting your engine, let's call it 1/4 volt (0.25 volts) on each cable, so now the engine is running and the batteries are charging, but **BATTERY (A)** gets the full charging voltage – 13.5 volts for example but **BATTERY (B)** only gets 13.0 volts, so not really enough. So now we are in a situation where **BATTERY (A)** is doing more work and **BATTERY (B)** is not getting charged properly.

SEE PAGE TWO FOR THE SOLUTION !

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WIRING BATTERIES IN PARARELL

The correct method of wiring batteries in Parallel is to take the feed form the opposite end of the battery bank which then evens up 'Battery bank' electrically.



When we start our engine now, **BATTERY (A)** has no volt drop to earth and 0.5 volts to the output.... and **BATTERY (B)** has 0.5 volt drop to earth and no volt drop to the output. So simply by moving one connection it has evened out the volt drop to both batteries. The same happens in reverse when charging in that **BATTERY (A)** has a volt drop on the +Ve side and **BATTERY (B)** has a volt drop on the -Ve side. Both batteries are therefore being charged identically.

Below are a few tips on best practices when installing a second battery

- Always use identical batteries – same age, make, type and Ah rating.
- Before installing the batteries, take the time to charge them up individually using a smart charger so that when you link them together, they will both have identical charges – This will ensure that you get most out of your batteries.
- Check to see if your old battery cables have the capacity to carry the increased loadings and always try to use identical sizes cables though out the system.
- Always try to keep the link or bridge cables the same length between each battery added
- NEVER connect the batteries negative terminal independently to the boat's negative connection. Only ever link them to each other in a daisy chain and have ONE connection to the boat's negative connection.
- All installations are different. It may be that instead of moving the positive lead to the new battery (B) is better to leave that where it is and move the negative (earth) to the new battery instead. Just remember one lead from one battery, the other lead from the other battery. Take time to plan before committing to anything
- NEVER cut a few of the strands off the cable to try to get two heavy-duty cables in a battery terminal designed for one cable. There are specialist battery terminals designed to take two cables so use these.
- As you are probably doing this because you need more capacity, it is worth checking if anything else needs upgrading too at the same time. I often find owners have added extra batteries but haven't consisted if their charging system can cope with the additional battery. (See Yacht Note on Converting a single battery to a multiple battery installation.

BE SAFE

There is a huge amount of energy stored in batteries, if you short them out it could go BANG... if you connect two together the wrong way... it still goes BANG but a lot LOUDER! Seriously, if you have any doubts, get a qualified electrician to do it. Getting it wrong could seriously hurt you.