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## Wiring an eZee Bike for Parallel Battery Operation

### IMPORTANT WARNING – Please Read First!

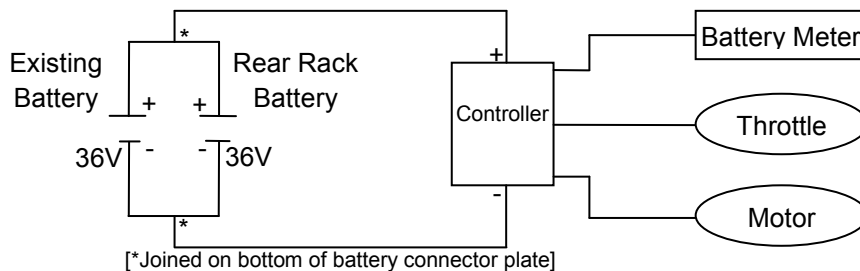
The batteries and electrical wiring on these bikes carry 44 Volts and can deliver up to 30 Amps. If the wiring is incorrect there will be sparks, wires melting and damage to components. At worst the batteries could explode causing fire and personal injury. Do NOT attempt any modifications unless you are competent to do so and you understand exactly what you are doing. Modifications should only be attempted by suitable qualified and trained engineers. All modifications are performed at your own risk and will invalidate any warranty.

### Why parallel wire two batteries?

The principle of this modification is to join two or more batteries in parallel so that the “load” or current draw from each battery is halved. This will give longer range, greater battery life and less voltage drop on hills.

This only works with Li-Pol (Lithium Polymer) batteries that have a built in BMS (Battery Management System) that includes diode action on the output. It will NOT work with Ni-Mh (Nickel Metal Hydride) batteries!

If in doubt, you will need to include Schottky diodes to current share and prevent “back charging”.



### Parallel wiring the batteries:

This is easiest to do with the bike clamped to a work-stand or possibly lay on its back, taking care not to damage any handlebar components. It's also easier if you remove the chain guard and take the chain off the chain wheel.

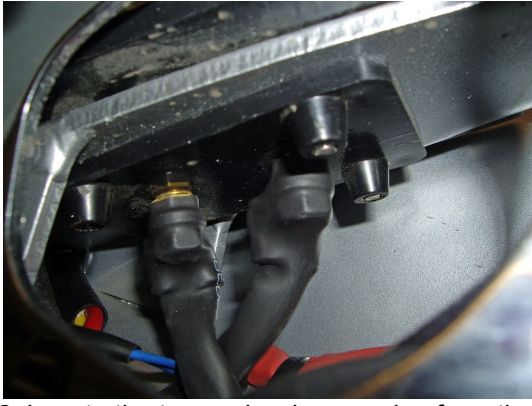
If you have the correct tools (crank puller etc) it's even easier if you remove the chain wheel too!

**Always remove the battery before starting any work! It will make the bike lighter and avoid electrical shorts!**

### Follow the steps below:



1. Carefully cut away the cable ties holding the wires together under the battery / rear of the bottom bracket and free the wires from being tucked away between the rear frame stays.

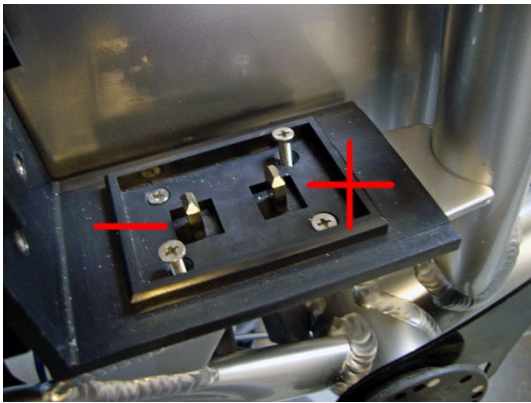


2. Locate the two main wires coming from the battery connector plate and about 5 to 10 cm away from the connector plate are two bullet connectors covered with heat-shrink and secured with cable ties.

Very carefully cut away the black heat-shrink insulation to expose the bullet connectors – you may need to cut away any cable ties securing the insulation around these connectors too - take care not to cut into the wires themselves.

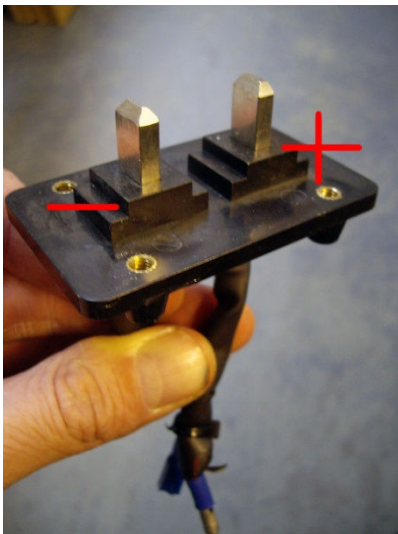
Once this is done, carefully pull apart the two bullet connectors taking care not to pull the wires out of the connectors – only pull on the connectors themselves; never the wires going into them.

If the wire does come out of the connector, fit a new one or solder the directly back onto the existing connector.



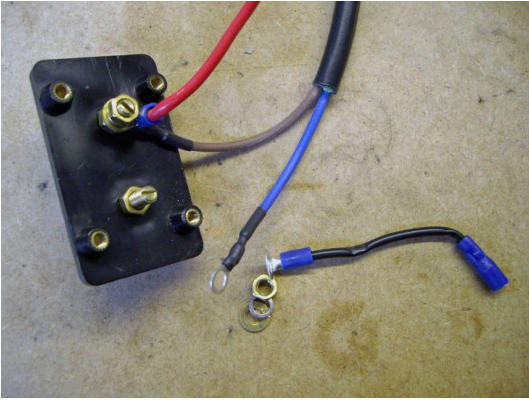
4. Undo the four screws holding in the battery connector plate as shown above.

(For you reference, positive and negative have been marked)



5. The connector plate should now come out as shown above.

It's a good idea to mark the plate with + / - using a marker pen in several places, as the insulation covers the coloured wires when replacing this symmetrical connector plate.



6. Remove the remaining insulation and unscrew the wires from the plate – It's best done one at a time. Using a meter length of good electrical cable (mains cable has been used in this example), strip back about 10cm of insulation and ideally attach (and solder) electrical eyelets to both conductors and insulate with heat-shrink or good insulation / PVC tape.

Replace the original wire and attach the new wire to the terminal post and replace washers and nut.

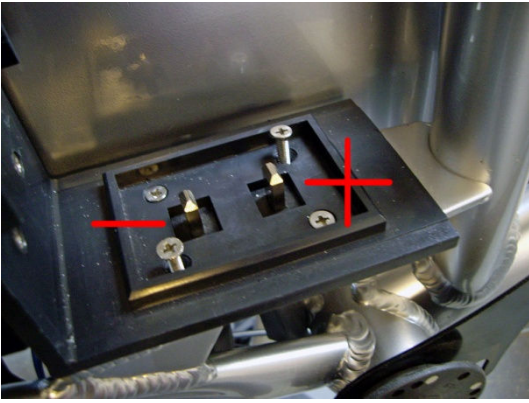
**BE CAREFUL NOT TO OVER-TIGHTEN THE NUTS – THE TERMINAL POST WILL SNAP!!!**



7. Slip heat-shrink / insulation over all wires and terminal posts as shown.



8. Slip heat-shrink over the main two wires and firmly re-attach the bullet connectors to the terminal plate. Shrink insulation or tape up around the connectors if no heat-shrink is available.



8. Replace the connector plate ENSURING IT GOES IN THE CORRECT WAY ROUND!!!

Replace the four screws and route the new parallel cable as desired. Do not over-tighten these screws; it can damage the bushes and warp the bracket.



9. eZee often use a couple of shims at the back of the battery bracket – make sure these are in place as shown.



10. When you are finished, it should look something like this.

Replace the wires back into this cavity and use cable ties to secure the wires from hanging down or getting caught in any moving parts. Route the new parallel cable neatly up to the rear rack using cable ties to secure it to the frame – it's often best to follow the routing of the ignition cable and dog-leg it around and over the controller.

Replace any components removed (chain wheel, chain guard, chain etc) and double check everything is secure.

**Please note the end of the new cable with be LIVE when the bike is next turned on!  
Thoroughly insulate or attached a desired connector / connector plate to the end of the cable first!**

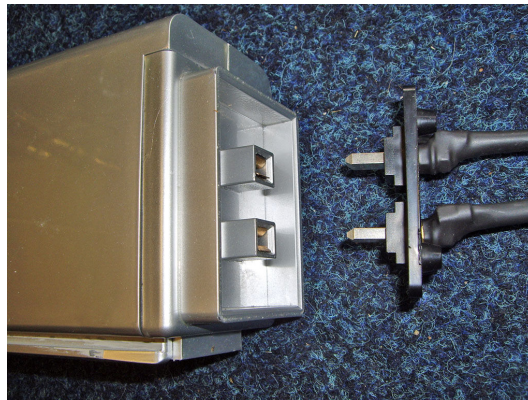
## Secondary Battery Options

You can either use the side battery bag that fits onto an existing rack and can house a standard eZee Li-Pol battery or you can use the eZee battery integrated rear rack - see pictures below.



There are two ways of connecting a second standard eZee battery

**Method one** is to use a normal (unmodified) battery - this will mean using a battery connector plate as shown:



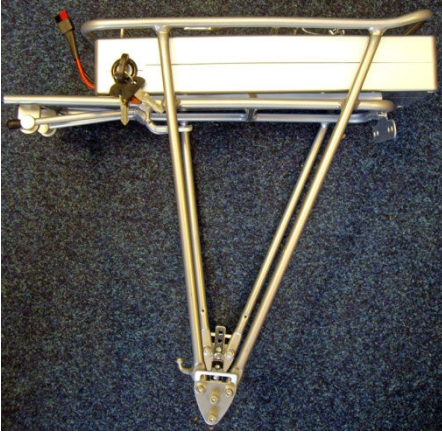
Warning there is no polarisation on these connectors or the battery, so you will have to insure the battery cannot be plugged in backwards! If you use this, it is best to leave the plate plugged into the battery and then wire to an Anderson (power pole) type connector.



**Method two** is to add a battery terminated with an Anderson power pole connector already. These are available from OnBike - Contact: [info@onbike.co.uk](mailto:info@onbike.co.uk).

Whichever termination you choose, do insure that there is adequate water proofing.

**Alternatively you can use a purpose built eZee battery rack system and batteries pre-wired with Powerpoles**



You also have two choices of rack battery:

10Ah Li-Pol (Lithium Ion Polymer) – The same as a current standard eZee 10Ah; just in a different style case.

8Ah LiFePO4 (Lithium Iron Phosphate) – Slightly heavier than the 10Ah Li-Pol [+650g] but manufacturer reports they are good for twice as many charge cycles and costs the same as the 10Ah.

**Cost:**

10Ah Li-Pol (Lithium Ion Polymer) £400

8Ah LiFePO4 (Lithium Iron Phosphate) £400

eZee Battery Rack to fit either battery £40

Parallel wiring and battery rack fitting at OnBike £100

**Contact OnBike for further information**

**[www.onbike.co.uk](http://www.onbike.co.uk)**

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