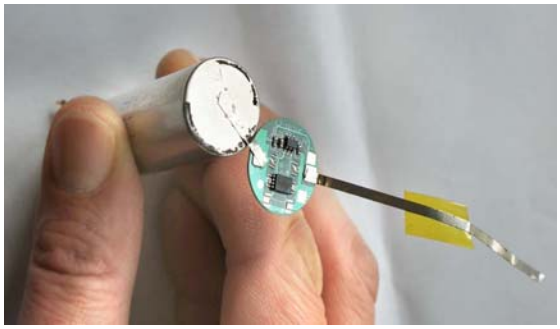
SOLDERING BATTERY LEADS

Obviously it is best if the battery has factory-fitted solder tags on both terminals. Here are a couple of 18650 size “Ultrafire” Lithium Ion batteries that I’ve had for perhaps 10 years in a drawer. One is now at 3.8 volts and the other at 4.0 volts so I guess they would still work in a circuit.

One cell is tagged and the other isn’t, but both are marked on their labels as having a built-in Battery Management System (BMS) circuit. But clearly only one of my pair has this safety circuit, which is the tagless battery. This is obvious by eye as the end marked “C” in the photo has a kind of coppery colour rather than the nickel-plated silvery colour that one would expect for a battery canister.

After removing the label from the tagless cell we can see a spot welded strip of metal going from the +ve to the -ve end on to a small thin circuit board. There is also some yellowish Sellotape to stop the strip touching the cell wall and causing a short circuit. Photo below right shows after cutting the strip to expose the PCB.



Clearly all we have to do to solder our own battery leads is to cut off the circuit board and throw it away, and shorten the spot-welded strips to form solder tags, or alternatively to leave the PCB in place and solder to the free tag.

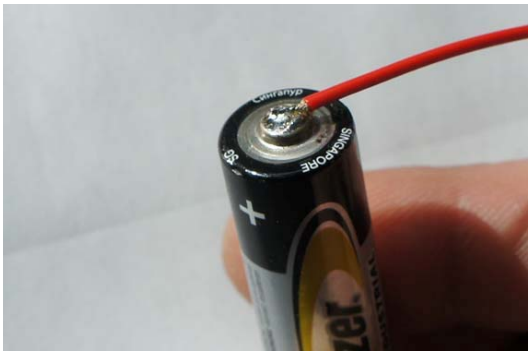
If you are faced with a battery with no solder tags or welded strips then you need to solder your wires direct to the battery case which is what’s described next. This involves knowing how to solder, the right materials and preparation.

First, the right solder is the lead (Pb alloy) type with a built-in flux and 0.7mm diameter. At the moment I am using 555-235 from RS Components for all “not lead-free hobby circuits”. Forget about using lead-free solder for personal projects. Don’t even think of using plumbing solder and any fluxes or pastes used for water pipes as they are totally unsuitable for electronics.

If you wish to use lead-free solder then be aware that most of them are very difficult to use and the bonds may be unreliable. The only one that is any good that I have found is called SN100C from DKL Metals Ltd. If you need extra flux, over and above what is built into the solder wire, then the best one comes from Warton Metals Ltd and is called Future 315 Low Residue No Clean Flux and it comes in 500ml bottles of liquid as it is dissolved in isopropyl alcohol.

For the purpose of a demonstration, I am now going to solder a wire to the positive end of an alkaline battery which looks like nickel plated steel. The first step is to put the battery in a vice and file the cap slightly where the solder will be applied to form a rough surface. Then you need a hot soldering iron (380deg C recommended) with a broad chisel shaped tip.

Then the battery cap needs to be fluxed and tinned with solder. One drop of the Warton flux is being applied using the end of the file and allowed to dry. Lead solder is at the ready and it takes only a couple of seconds to coat the battery cap all over with solder. Strip the wire you want to solder to the cap, twist the inner fibres on each other, and tin that, and finally trim the metal end of the wire to 3mm.



Clean the tip of your soldering iron with a damp sponge to remove all old solder blobs and then tin it with a tiny amount of fresh solder. Put the tinned wire in contact with the tinned cap. Quickly dab them with the tinned soldering iron for only a couple of seconds and the solder will flow together across the joint leaving a very tidy and strong joint in a process which has not subjected the battery itself to significant heating.

It goes without saying that your soldering iron bit needs to be bright and shiny in good condition and not burnt or pitted otherwise you are doomed at the outset.

Key points:

- Clean hot soldering iron
- Use 0.7mm leaded solder
- Only use a specialist flux designed for electronics
- Tin both surfaces to be jointed first
- Use the soldering iron to fuse the tinned surfaces together