

These notes relate to the modification of Kobo Mini and Touch ebook readers by fitting a GPS chip (technically a GPS module) for navigation only or an altivario module such as the Bluefly. The notes are my best shot at the time of writing. I cannot guarantee they are correct or represent ideal solutions but I will correct and update them when I can. Please inform me of any errors or better solutions you may find. The index for other Kobo/XCSoar notes can be found at:

http://www.50k-or-bust.com/Kobo_XCSoar/Kobo_XCSoar.htm

Warning

The large battery modifications I have done so far have all been on white Kobos. Black ones have a matt coating of what appears to be silicone rubber. Adhesive tapes do not stick as well to this coating as to the plastic surface of the white Kobos so make sure you are satisfied with the adhesion of any tape you intend to use before you try a modification. It is possible to scrape the rubber coating off but it is very hard work.

Adhesive Tapes

The units shown here have mainly been made using glass reinforced “crossweave” packing tape. This tape is very strong but is degraded by UV radiation. It should be OK for most UK pilots but will deteriorate significantly after extensive flying in alpine or other high UV conditions. However, recently I have switched to using “Ultratape All Weather Tape” which works very well and is much more resistant to UV and probably the optimum. 3M 8671 Polyurethane Protective Tape also works well but is intended for permanent outdoor use and very expensive.

Fitting A Bigger Battery

This is a method I have used to fit a 3000mAh battery (technically a cell) to the Kobo Mini and a 4000mAh cell to a Kobo Touch. This should give a run time three times longer than the standard cell for the Mini and four times for the Touch, at least 20 hours of flight time. It will take three or four times longer to charge from empty but in normal use it should not become as deeply discharged as a standard cell and charging times should not be abnormal. Fitting the larger cell increases the thickness of the unit by about 4mm. It also increases the weight by about 40g for the Mini and 60g for the Touch if the standard battery is removed or by about 60g and 80g if it is left in. Using cells this big may seem like overkill, but it is really a question of what fits mechanically. This modification works with Kobo/XCSoar Bluefly vario

units.

The 3Ah lithium cell I used for the Mini has the designation 4070100 signifying dimensions 4mm thick by 70 mm by 100mm and is sold as a spare for ipads, tablets etc. at a cost of about £10 online. It is stuck to the outside of the inner back cover of the Kobo and an outer cover made of thin plastic is taped on.

For the Touch the 4Ah cell is 4073120 (4 x 73 x 120mm).

Removing The Standard Battery (Optional)

The standard cell is fixed to the metal chassis of the Kobo with double sided tape. It is up to you whether you remove the it and it should be OK to leave it in, but on no account be tempted to connect it in parallel with the new battery in the hope of achieving a higher overall capacity. Unless they are specially matched, lithium ion cells connected in parallel may suffer from to current passing to and fro between them as electrical and temperature conditions change. This should not be hazardous where cells have protective circuits fitted but it will degrade the performance of the cells.

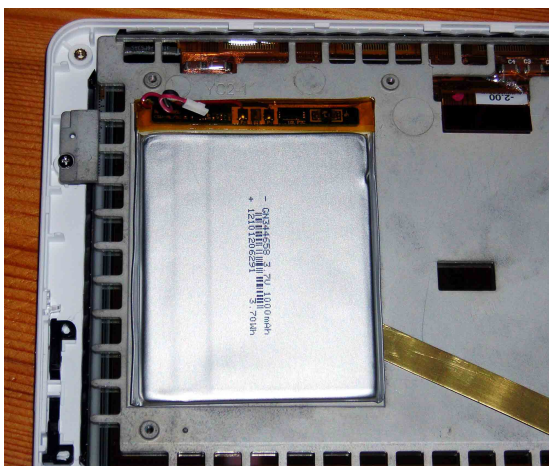
There are two hazards in removing the original cell. One is that you may damage it whilst removing it which may cause it to heat up badly. The other is that, in the the Mini, the cell sits in a hole in the Kobo circuit board making it easy to damage the board whilst trying to remove the cell. The board can be detached from the chassis of the Mini which makes removing the cell easier.

- 1) Power down the Mini and unplug the cell from the circuit board.
- 2) Disconnect the flexible PCB ribbon to the display. This is done by hinging up a brown “flap” on the motherboard connector which allows the flexible PCB to be withdrawn.



- 3) Remove the four screws securing the board to the chassis and lift the board out.

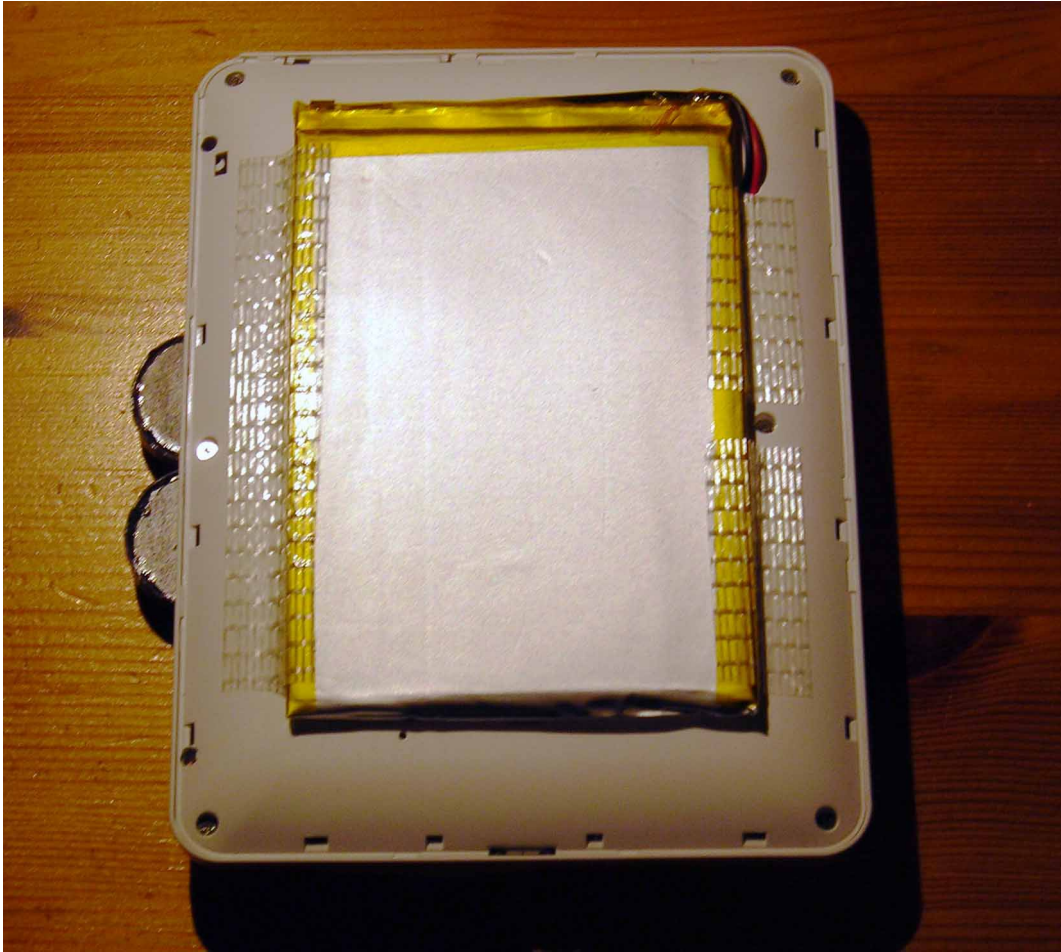
4) Prise the cell from the chassis whilst bearing in mind the hazards outlined above. I use a thin piece of brass strip.



For the Touch the cell is surrounded by a metal wall making it easier to avoid damaging the motherboard, but the motherboard may still be removed if desired although the technique is slightly different from the Mini.

Fitting The Larger Cell

The larger cell is fixed with strips of double sided adhesive tape to the outside of the Mini inner back cover. Rather than using double sided tape over the whole area of the cell I think it is better to use just two strips which are probably adequate. However for a “belt and braces” fixing the a few strips of single sided adhesive tape can be added to the edges of the cell. If it becomes necessary to remove the cell this should make the job much easier.



On the Mini the cell needs to be positioned slightly towards the top so that the reset button hole is not obscured, with the wires to the top right. A hole is then drilled in the inner cover for the battery wires to pass inside.

On the Touch there is no inner cover so the cell is similarly attached to the outside casing. Unlike the Mini it is placed centrally with the wires at the top left. Make sure the hole in the back cover is placed so that the wires can be routed inside without being squashed onto components or by the reinforcement webs inside the back case.

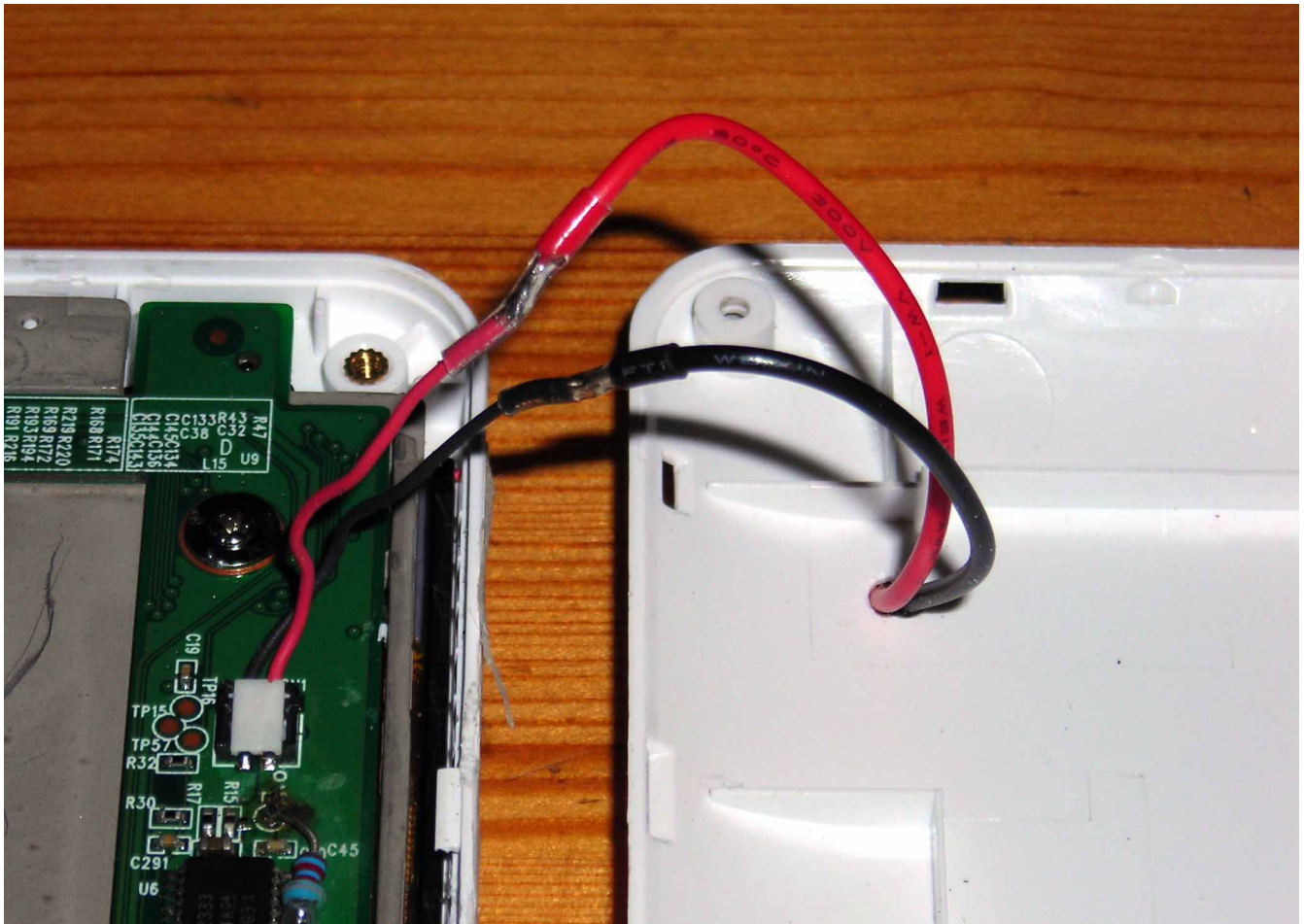


N.B. These wires must not be shorted together at any time.

Unlike the example shown above a longer loop can be left in the battery wires which can be tucked into the outside casing. If there are any problems the wires in the loop can be cut to access the cell connections. One cell I had was supplied in a very low state of charge and would not power the Kobo sufficiently to enable the charging circuits to activate. I had to disconnect the cell and charge it using a li-ion charger which limits charge voltage and current to safe values.

The connector must be removed from the original battery. To do this cut one wire and insulate the battery end. Then cut the other and insulate it. Cutting and insulating them one at a time reduces the chances of shorting the cell. It is a good idea to leave enough wire on the battery to be able to re-connect it in the future if you decide you no longer want the larger cell.

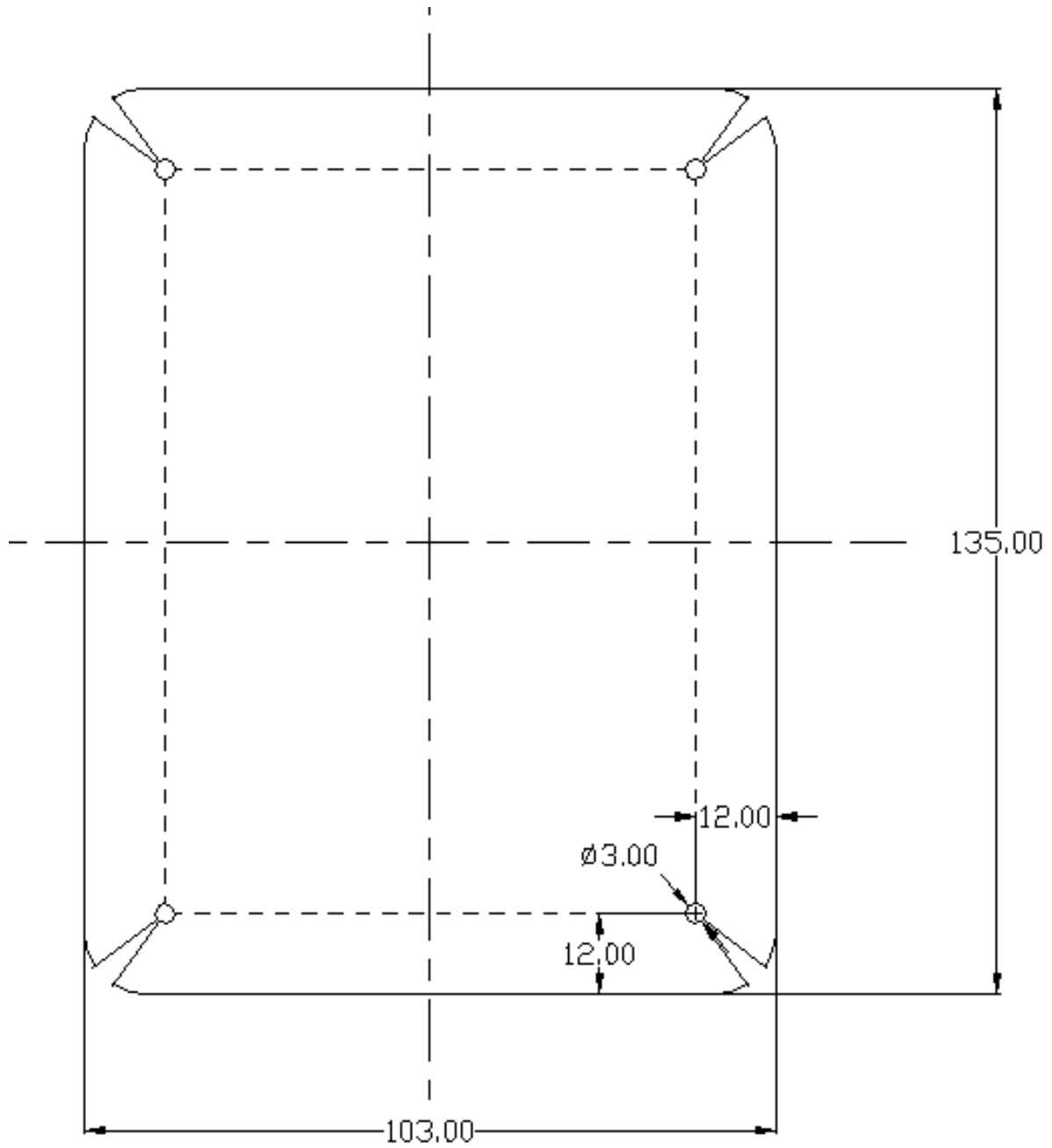
Connect the new battery wires to the wires on the connector one at a time first slipping on a piece of heat shrink sleeving to insulate the joint.



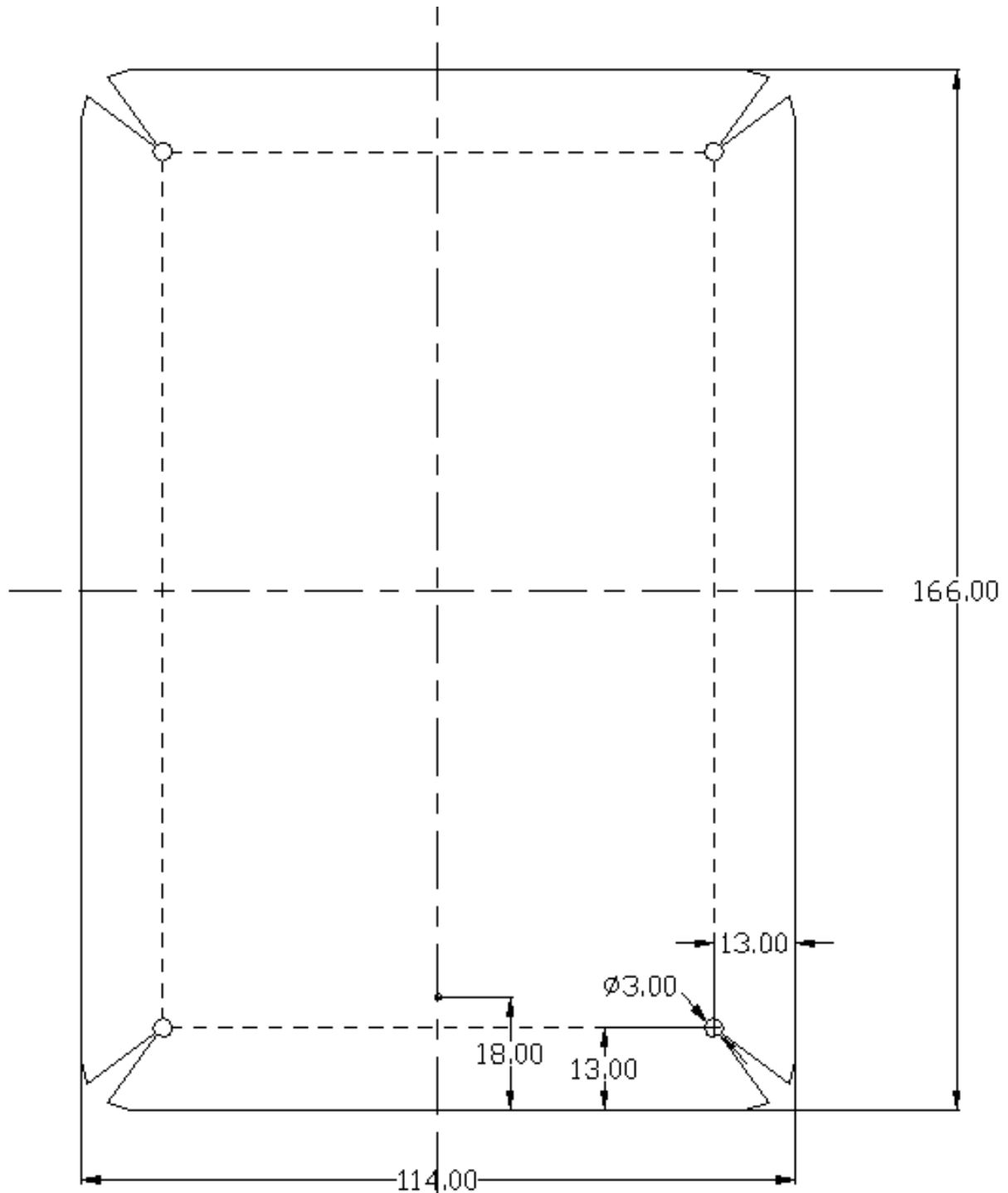
The connector can now be plugged in to the Kobo motherboard and the unit tested. When you are happy with the function close the inner back cover making sure the battery wires are not pinched against components or the webbing of the inner back cover. If you have removed the original cell there will be plenty of room to position the wires in the space it previously occupied otherwise be very careful indeed.

Making The Outer Back Cover

I made the back cover from high impact polystyrene (HIPS) sheet 0.75mm thick which can be cut with good scissors, but other plastics could be used. Various plastics can be obtained in small quantities on Ebay. The HIPS tends to crack a little along the folds. A different material may well be better for the back so please let me know if you find one.



Pattern For Mini



Pattern for Touch

The patterns should print at correct full size on an A4 sheet but check the printed dimensions. It may be a good idea to make a practice one from cardboard first and see how that fits.

- 1) Cut a rectangle the size of the outside dimensions.
- 2) Measure and mark the centres of the 3mm holes.

3) Drill the holes starting with a drill about 1mm and carefully open it out to 3mm. The plastic tends to rip and make the centre shift. Remove any burrs on the holes.

4) Using the pattern cut the darts in the corners and the radii.

5) Make the folds are made along the dotted lines. Sharp folds may crack the plastic. To help prevent cracking it can be folded around a steel rod about 2 or 3 mm diameter (I use a piece of wire cut from a substantial wire coat hanger). Lay the rod across the centres of the holes and pull the edges upward with the fingers.

Hopefully it will now look a bit like this:



It may need a little trimming. On the Mini the edges should fit just inside the rim of the front casing.

Note the hole to access the reset button. It can be quite difficult to get the hole in the right place. When the unit is finished this hole can be covered with tape to discourage dirt from entering.

The new back is now fitted using 25mm tape (I slit pieces of 50mm tape down the middle). This is very strong indeed. It will not tear and needs to be cut with sharp scissors or a modelling knife. As you stick it down pull tension

across the tape to pull the cover tight onto the back of the Kobo.



Make sure you leave gaps for the slide switch and the micro USB socket. Apply a piece of tape at each corner as shown to cover any gaps.

If it is necessary to open the back at any time the tape is easily removed and any adhesive left on the surface can be cleaned using either methylated spirit or petrol depending on the type of tape.

The process of making and fitting the back is quite tricky, or at least I think so! Don't be surprised if you need more than one attempt to get it right. Although the result looks a bit messy it is quite robust.

Another Option For The Kobo Mini

If you do not like the scissors and sticky tape method above, a 3D model for a spacer for the Mini which creates a space inside the inside back cover can be found at <http://www.thingiverse.com/thing:163778> . This, with the addition of some long screws (M1.6 x 8), enable a 3.2 Ah battery to be fitted. I have not tried it myself but am informed that care needs to be taken not to overtighten the screws which can cause problems. This is probably because the original

Kobo back has spacer pillars to control how the screws apply force to the chassis and PCB which are not present on the 3D cover.

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