Kobo Touch With Bluefly Notes - www.50k-or-bust.com

These notes relate to the use of a Kobo Touch N905B or N905C ebook reader modified to run XCSoar. They are my best shot at the time of writing. I cannot guarantee they are correct or represent ideal solutions but will correct and update them as and 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

N.B. Since originally writing this I have become aware of the V.Kel VK2828U7G5LF GNSS module which I consider to be an improvement on the GMS-G9. Application of the V.Kel module with the Kobo Touch is described in:

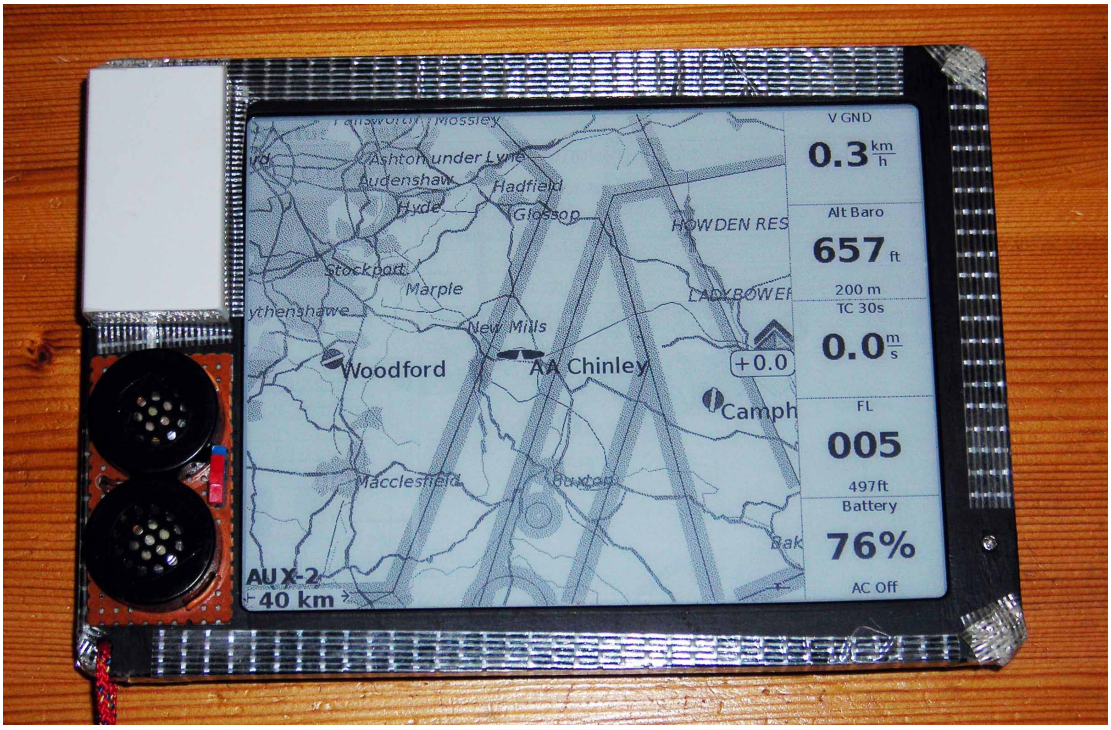
http://www.50k-or-bust.com/Kobo XCSoar/Kobo XCSoar VKel Module Notes 01.pdf

Electostatic Precautions

Modern electronics can be susceptible to damage from electrostatic electricity. When two materials are rubbed together they can become charged with electricity to hundreds of volts, and if this charge finds its' way to the connections of sensitive electronic devices it can damage or destroy them. Many electronic devices have protection against electrostatic discharge (ESD) built into them but in environments where people work on electronic equipment special precautions are often taken. I do not take specific precautions but I am reasonably careful and have had no problems with Kobos I have worked on myself. However I have had problems with Kobos which have been tinkered with by other pilots, notably the larger Touch and I am beginning to suspect that the Touch may be particularly sensitive to ESD. If you intend to work on a Kobo Touch I suggest you have a browse online about ESD precautions before you do.

Having used the GPS only Mini alongside my Braunger Competino vario my next objective was to make a complete Nav/Alti/Vario combination. Trials with a Kobo Mini showed the Bluefly vario module was not loud enough for me without external speaker(s) fitted. The converted Mini described elsewhere was OK, but I felt I wanted the larger screen of the Kobo Touch. I also wanted to keep within the “footprint” of the Kobo and there was not enough space on the front of the Kobo for both the speakers and the Bluefly module. However, I knew the Touch had a higher power consumption than the Mini and already planned to fit the larger battery modification described elsewhere which that left some free space where the original battery had been. My solution was to fit a Bluefly module without a GPS module in this space, and the GPS module on the front of the unit. Originally I fitted a Globaltop GMS-G6 GPS/Glonass

module but eventually changed this to the larger GMS-G9 which works better. The GMS-G9 is a bit large for the Mini but OK with the Touch.



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Removing The Back Cover Of The Touch

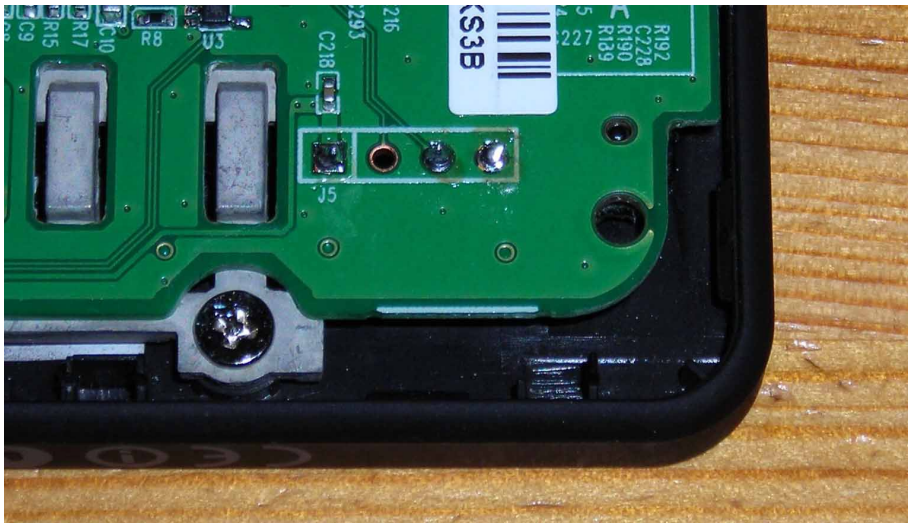
Avoiding the area adjacent to the On/Off slide switch use a thin screwdriver to carefully pry the back off. There is no internal back cover as with the Kobo Mini.

Micro SD Card Removal

If the micro SD card has a metal cover slide the cover to the right (viewed from the back of the Kobo) and it will flip open.

Serial Port

There are several serial ports on the Kobo Touch motherboard. The one to use is the one at the bottom right (viewed from the back of the Kobo). Note the connections are a mirror image of those on the Kobo Mini. (See schematic).

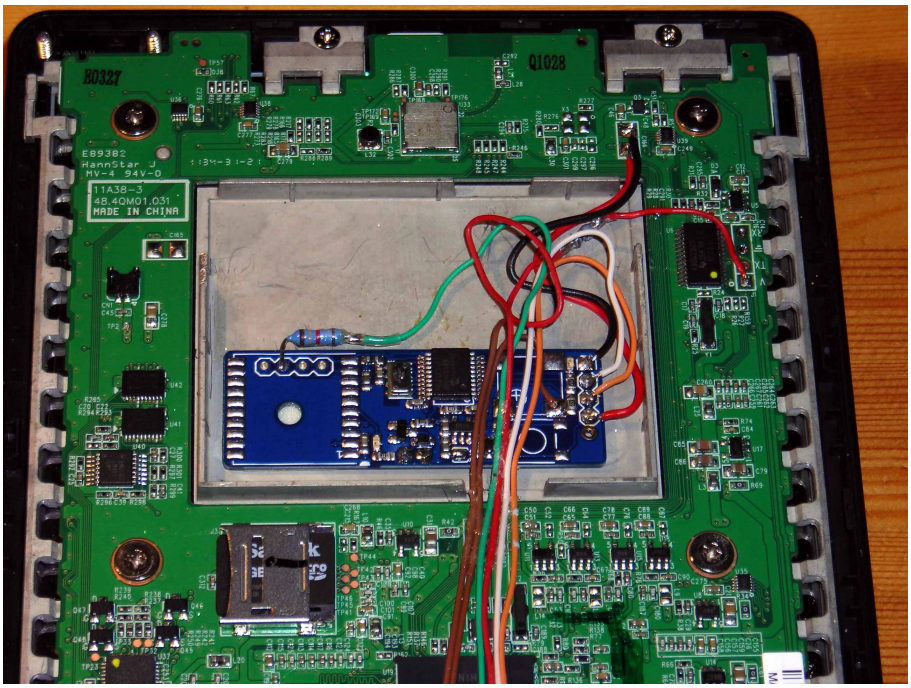


Bluefly Vario Module

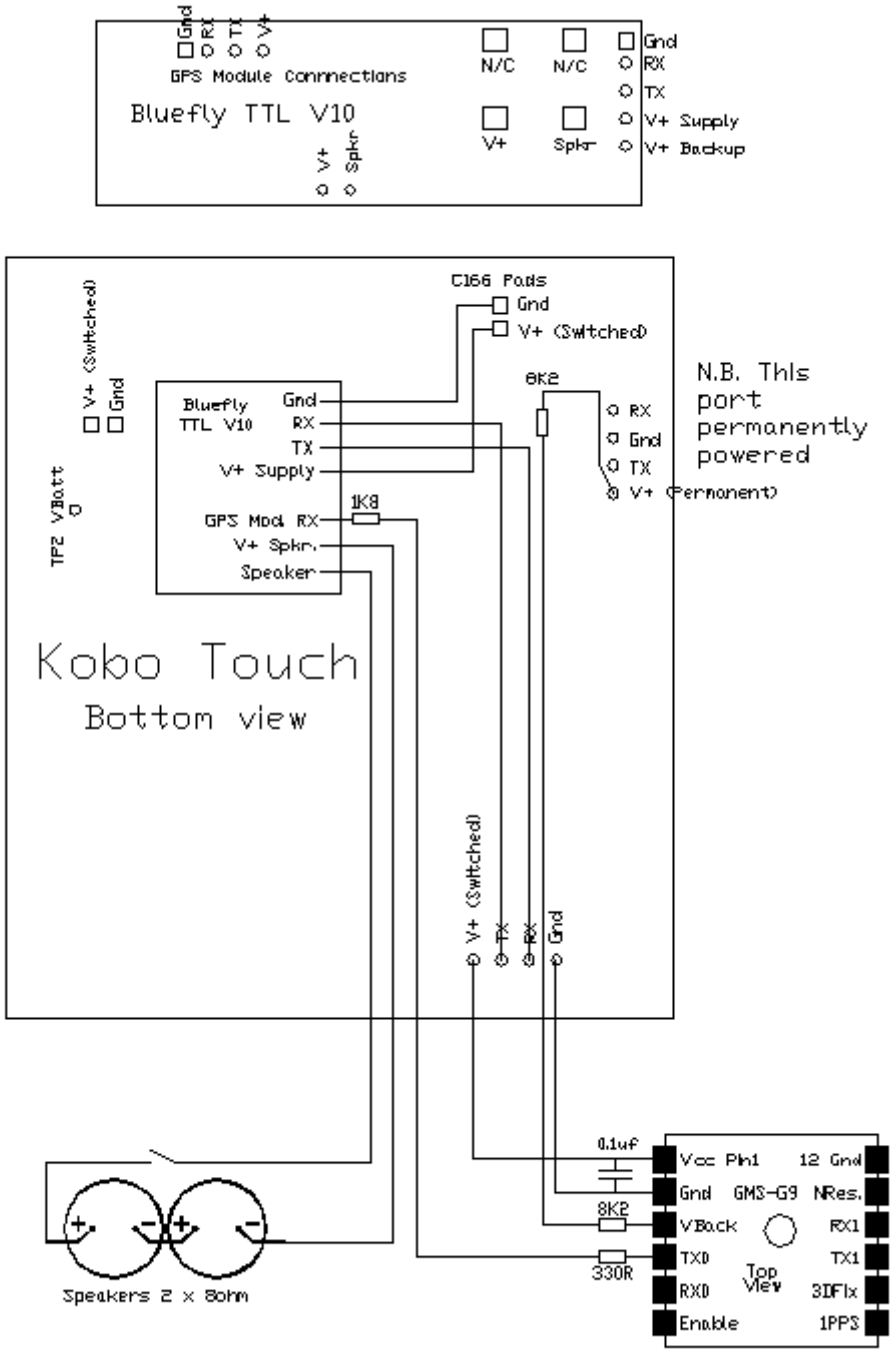
The original unit used a Bluefly V8 which does not have a GPS module onboard but has has separate connections for it. The Bluefly V10 has the GPS module on the board and to make this unit Al at Bluefly kindly supplied me with a V10 without a GPS module, audio transducer or push button fitted.

The V10 has a link which, for this build was shorted keep the unit permanently powered up. Having removed the installed battery from the Kobo the Bluefly module was fitted using double sided foam tape.

The V10 also has pads for an external speaker, but I connected mine to the pads intended for the onboard audio transducer which are larger.

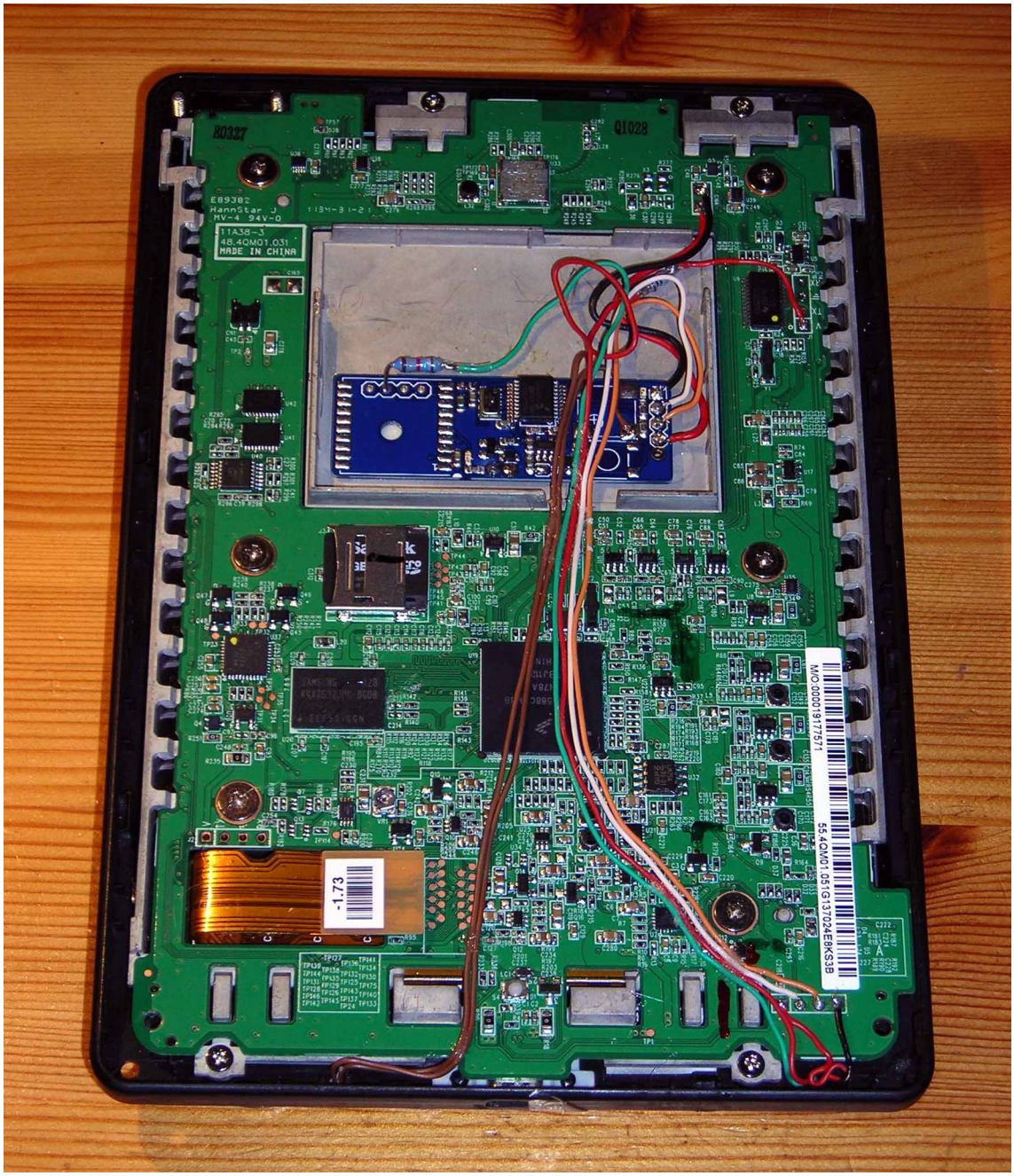


Schematic



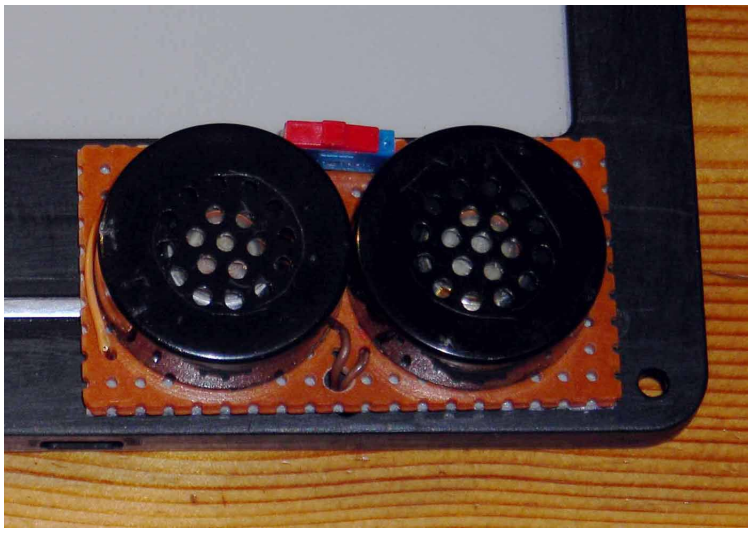
It is immediately obvious that the wiring is more complicated than with a conventionally constructed unit. It has been organised in this way to minimise the number of wires running across the Kobo motherboard. Note that the backup supply is taken from a port at the right of the motherboard which is permanently powered. The pad on this port is larger and more easily soldered to than the TP2 near the battery connector. The space under the back cover is very limited in this area so the protection resistor was moved into the ex-battery space with the other wiring. Two unused capacitor pads (C166) were used to supply the Bluefly module. As the GPS module was not supplied through the Bluefly module I decided to fit a 1K8 resistor in the wire from the GPS TX to the module RX. With the 330R already in place adjacent

to the GPS module this makes a total of 2k2 which is the value Al at Bluefly had determined would prevent unwanted power up of the Bluefly through the RX line if it was not properly supplied.

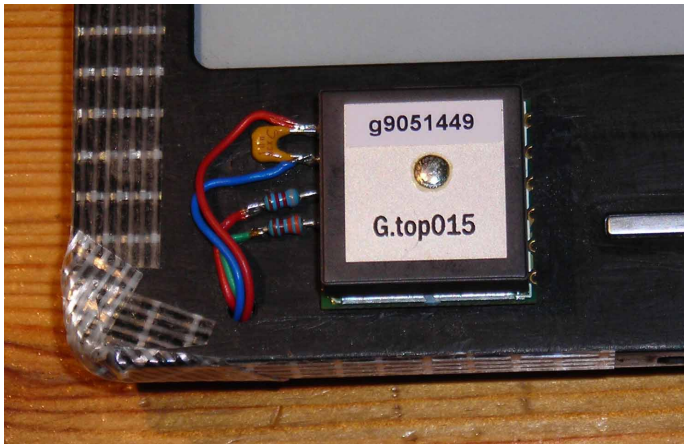


To ensure the wires were not crushed the wires had to be very carefully routed and webbing strategically removed from the inside of the back case. Inside the back case the surface was thinned a little near the micro USB connector to prevent the (brown) speaker wires being crushed where they go over the edge of the motherboard.

The two two miniature loudspeakers type IMO 41.MS37P008W (Visaton K 23 PC appears interchangeable) each of 8 ohms were connected in series to give 16 ohms. They are mounted on a piece of stripboard fixed to the front of the Kobo with double sided foam tape.



At the top of the board a small slide switch which was mounted on the stripboard to cut the speakers can be seen. It is not intended to be used in flight but I wanted to be able to cut the audio when using the unit on the ground for retrieve or rescue purposes.

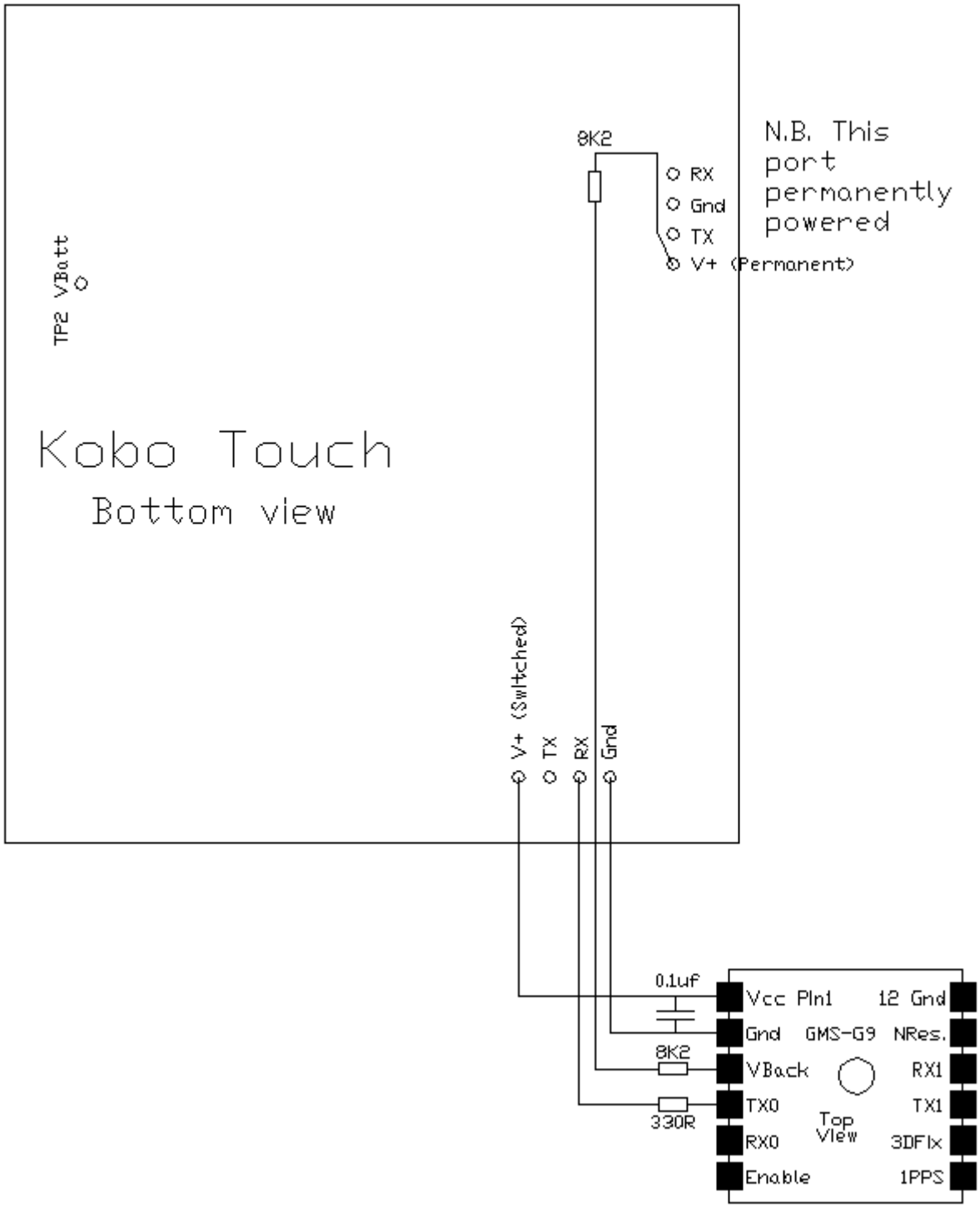


In this picture a 0.1uF ceramic capacitor can be seen across the ground and +Vcc connections of the GMS-G9 module. When constructing this unit I originally thought I would have to have long supply wires to the module and this capacitor was to provide some decoupling. Such decoupling is good practice and capacitors are very cheap so I felt it worth doing even though I don't think it actually does anything very useful in this installation with the supply wires being so short. The unit is fitted with a Globaltop GMS-G9 GPS/Glonass module. The Bluefly V10 had a bug in the firmware which caused some problems with the GPS/Glonass module which should be fixed on all new Blueflies. The GPS/Glonass module was originally covered with PVC channel as described in the “Hardware Notes” using channel 1 inch wide. I have since embedded GMS-G9 modules in Sugru (also in Hardware Notes”) and they work fine. I consider Sugru to be the optimum method for mounting.

GPS/Glonass Only Version

A GPS/Glonass only version of the Touch can be made in a similar way leaving out the Bluefly module and speakers and connecting the module TX line to the RX of the Kobo port.

Schematic GPS/Glonass Only Version



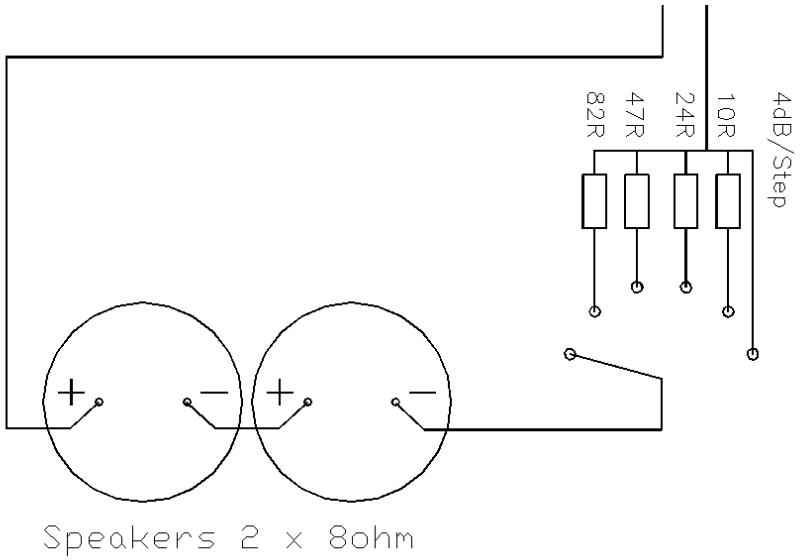
Adjustable Volume Version

At the time this document was originally written there was no practical means of adjusting the volume of the Bluefly audio either on the hill or in flight. However the “XCSoar Integration” system is now available which allows adjustment of audio parameters, including volume, through a menu. Details are on:

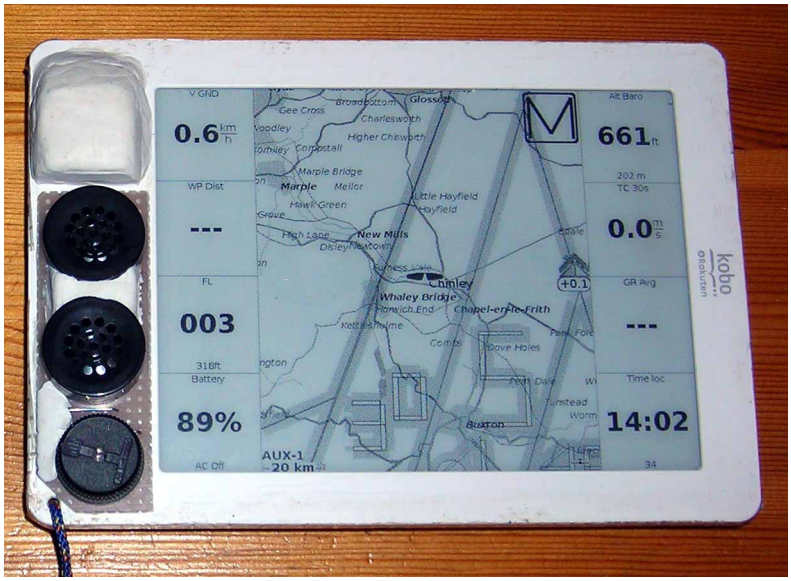
http://www.50k-or-bust.com/Kobo XCSoar/BlueFly XCSoar Audio Menu.pdf

This .xci menu effectively makes this hardware volume control system redundant but I will leave it here for reference. It also adapts well for radio headsets.

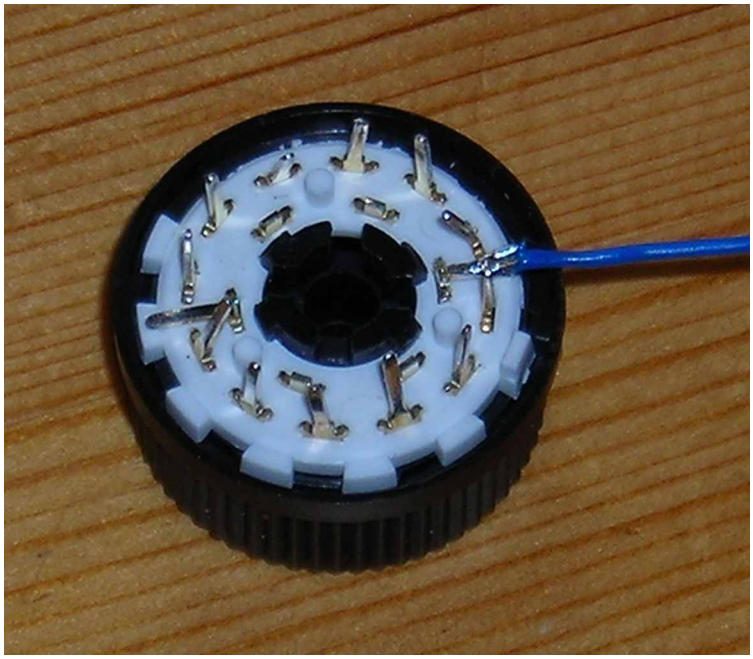
Volume control can be achieved by a variable resistor in series with the loudspeakers. Although quite simple electrically, finding a suitable variable resistor is very difficult. I use a six position switch with fixed resistors.



The switch I use is a 2 pole 6 way PCB mounting switch AB 417 Conrad part No. 705683-62 . The resistor values in the diagram give a change of volume of about 4dB per step with a 16 ohm speaker. The bottom position is completely off.



The switch, resistors and miniature speakers are mounted on a piece of stripboard fixed to the front of the Kobo using double sided foam tape. In the unit shown the resistors are embedded in Sugru as is the GPS module. The pin with common connection to the switch is bent sideways and connected to a short piece of wire before fitting to the board.



Four of the pins are bent slightly inwards to make the circular pattern fit the stripboard, and the switch carefully aligned to get the required function. This system is surprisingly robust and I have used one taped to my helmet to adjust the volume of a radio headset. It can easily be operated with fairly thick flying gloves and clicked to a specific volume setting even at when no transmission can be being heard.