

# How to build a winebox D-LEV



This document is a collection of tips that I applied to build my enclosure for the D-LEV kit I received from Eric Wallin.

It is not a step by step instruction manual.

You are free to take and use any idea from this document. These ideas are not exclusively mine.

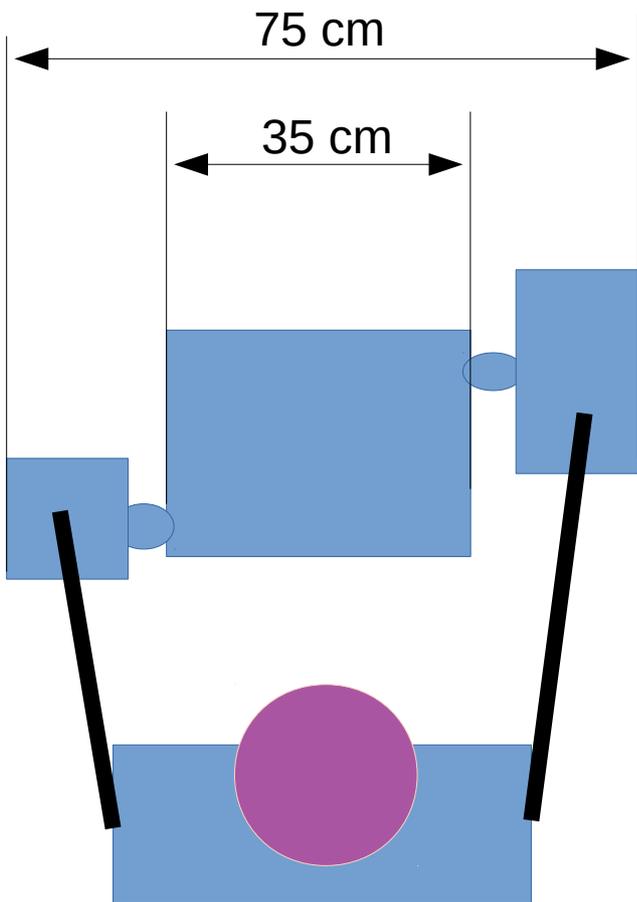
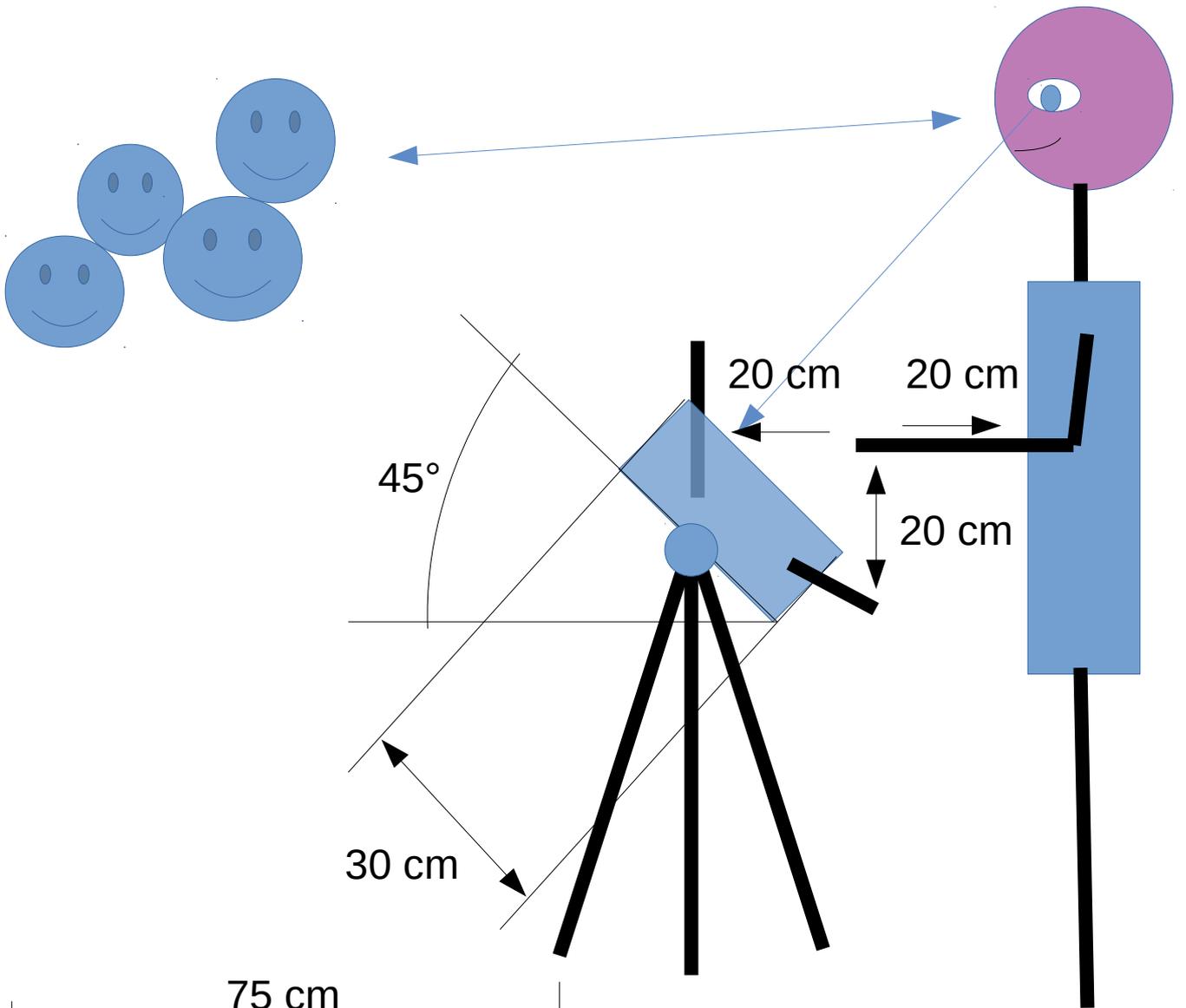
Thanks to Eric Wallin and Benjamin Drasin for his valuable feedback on this document.

Vincent Dhamelincourt

## Main concept

As an average theremin player I want that my instrument have the following features:

- Stands on a quick-lock photo tripod
- Orientable plate antennas
- Buttons, screen, tuner, plates at the right place to look or manipulate without creating any pain.
- Portable compact design
- No cable permanently tied to the box.
- Complete panel mount connections (MIDI, USB, Toslink, SPDIF, Ground, Antenna).
- Digital (as opposite to analogue) cable transport of sound to the amplifier. (deported DAC).
- Powered by USB
- MUTE and ACAL Button
- Average (as opposite to expert) soldering skill needed
- Uses of most of the pieces from the D-Lev kit.
- Not destructive for any part of the D-Lev kit
- No inside cable torsion when opening the box
- Right handed (for me) but one may reverse the design as convenient.
- Doesn't hide the player from the audience and other musicians in the band
- Nice to look at



## shopping list

- Needless to say that you need a D-Lev Theremin kit ;-)
- A wooden winebox, 35\*30\*10 cm (strict minimum dimensions)



- Two camera hot-shoes. I use the screw and the nut in a specific way.



- Some plywood 3mm sheets.
- Neutrik NAUSB-W Reversible A-B Male/Female USB feed through.



- Toslink female/female feed through



- 2 Normally open push buttons (without external metal parts)



- 2 Panel mount RCA connectors.
- Some Dupont connector splittable ribbon cable, 30 cm minimum with at least one female connector at one end. It will avoid need of some specific tool to mount the Dupont connectors.



- Some thick aluminium sheet, I recycled some aluminium food container:



- 2 male banana connectors for antennas
- One banana female connector (Ground)
- Several Soldering lugs
- A 5 pin female DIN connector for MIDI interface
- Some cables of different colour
- M3 countersunk screws, washers and nuts
- 3 mm countersunk wood screws
- Epoxy bi-component modelling paste



# TOOLS

This is the approximative list of tools that I used. I don't particularly recommend having all these ones. They just come from 20 years of accumulation. Some of them helped me a lot some and other were rather optional. Some other may have done better job.

- A workbench and a set of clamps could be useful to stabilize a thing or two when drilling, sawing, mounting,...



- A corded drill that can be held in rotation and a vertical drill stand



- All sorts of drill bits:



- A not so magic chamfering tool



- A cheap Jigsaw with a fine tooth blade.



- Wood and metal handsaw



- Some sand paper with different grain size



- Measurement tools: a ruler, a caliper, a tape measure, a drawing compass,...



- The junk from my toolbox



Credit: it looks like but this is not my toolbox (the image is from a French movie that had a relative international success at the beginning of 2000s, I let you guess which one).

- A soldering kit.

# Build instructions

## Stands on a quicklock photo tripod

I want that the theremin stands on my quiclock photo tripod. But I don't want to use the 1/4" BSW nut. It is not easy to find, often confused with UNC nut and feeling not strong enough.

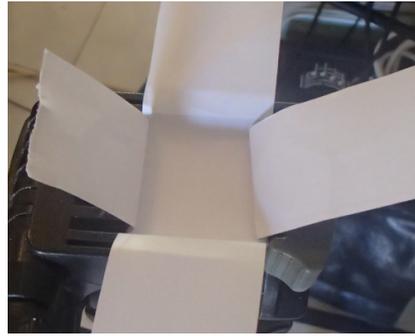
A molded quiclock adapter is much more convenient and strong:



1. Remove the existing adapter



2. Protect the plastic with some paper stripes

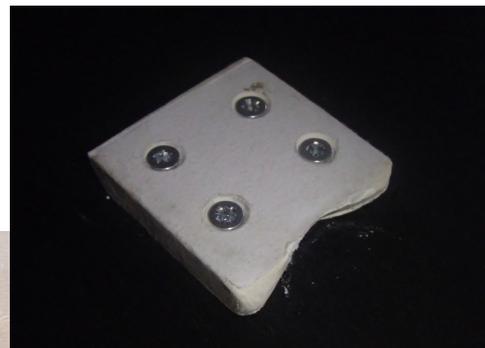
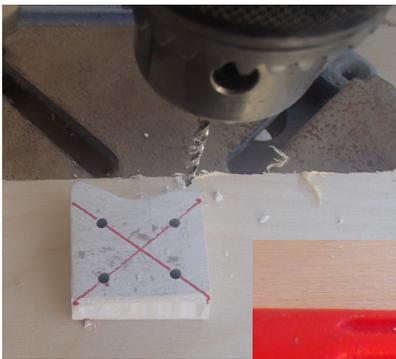


3. Use epoxy bi-component modelling paste to create an adapter



4. Wait 24 hours that the paste becomes solid

5. Peel the paper stripes. Drill 3mm holes and chamfer them at 45° and mount the adapter with countersunk screws

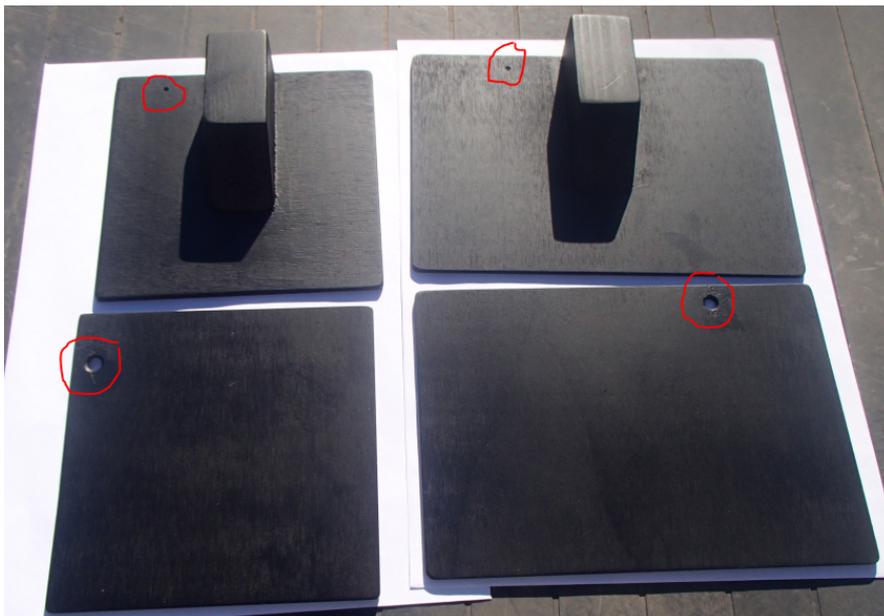


## Plate antennas

They are made of an aluminium sheet between two plywood sheet.

Dimension are the same as in the kit, 15 cm\*15 cm (Volume) and 15 cm\*20 cm (Pitch).

(All with new pieces, I did not destroy the plates from the kit)



Notice the hole, the connection, the solder lug, the use of heat shrink, screw, washers...

For the aluminium sheet, I recycled some aluminium food container. I flattened them pushing with the back of my nail.



You might not want to use aluminium paper, it is too thin, but I am sure you can find some thick and slick aluminium sheet.

All is assembled with neoprene glue (wood on aluminium) and wood glue (wood on wood)

# Orientable plate antennas

General concept:

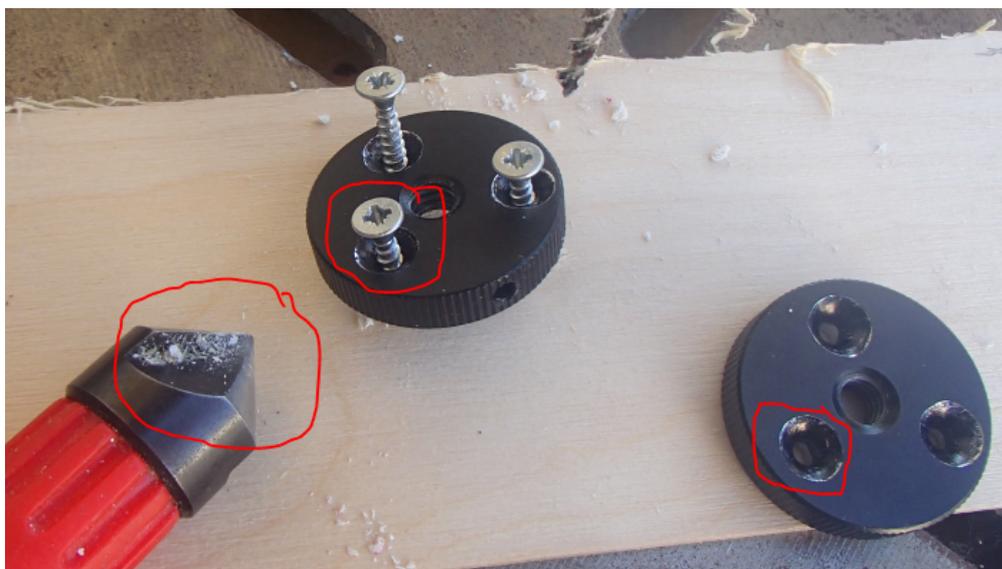


Credit: this idea is not really mine, I think that I saw a similar use of spherical joint on one of the prototype from Eric.

Drill 3 mm holes in the nut:



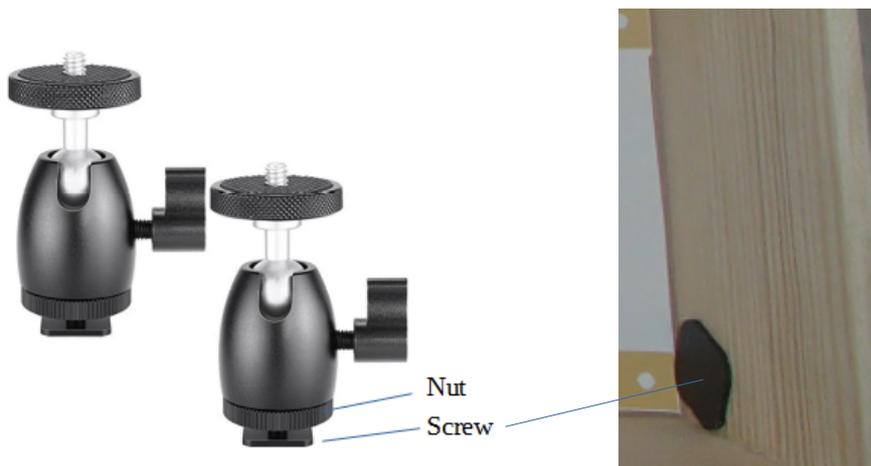
Chamfer them at 45° for the 3 mm countersunk wood screws. (I used this red tool and get a painful tendinitis – Rather use a chamfering drill)



Mount the nut on the antenna:



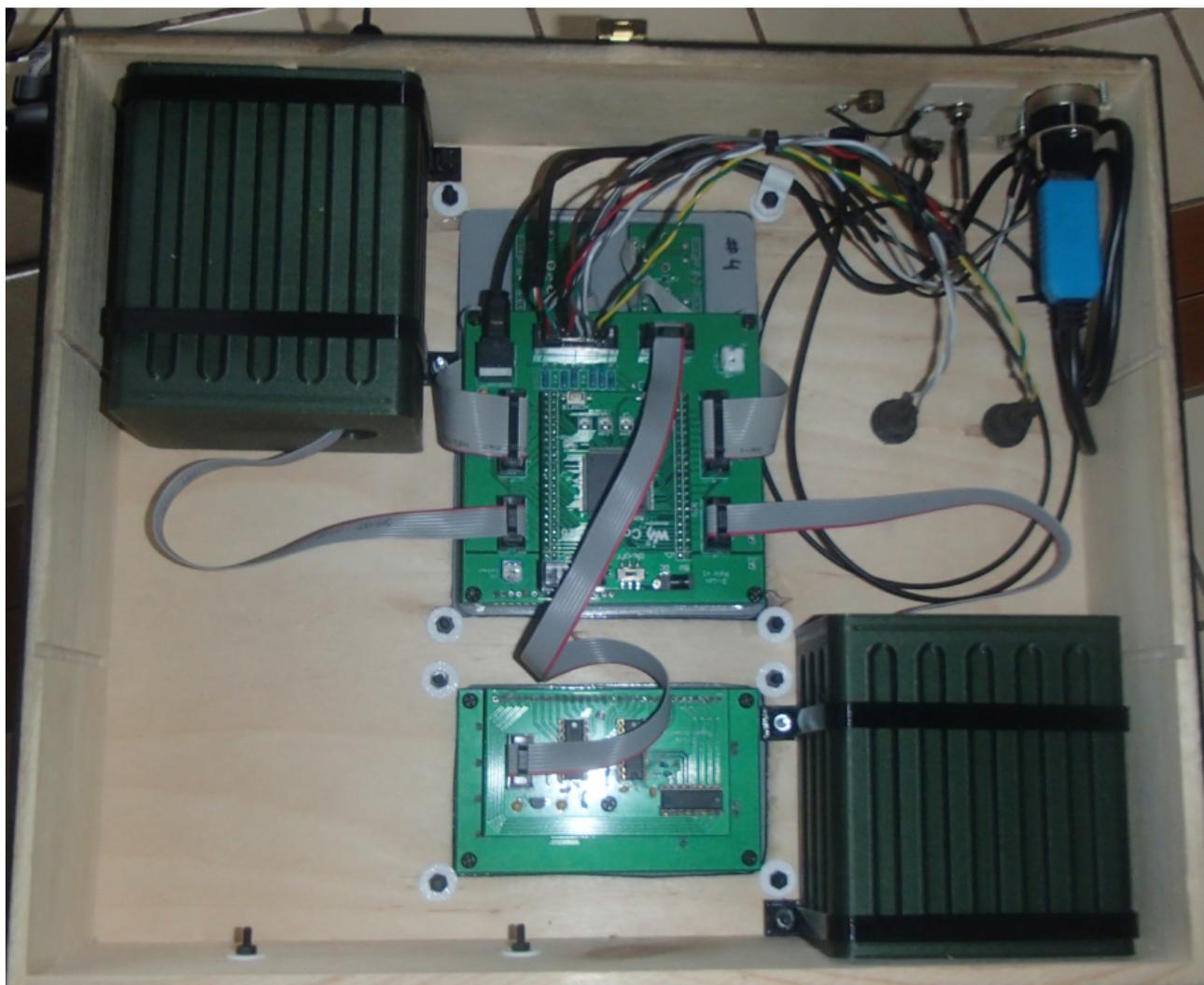
The screw is used to mount the hot shoe on the box:



The screw is 15 mm long, the wood wall are 8 mm thick, it leaves 7mm for the threading of the hot-shoe.



## Box and use of the pieces from the D-Lev Kit



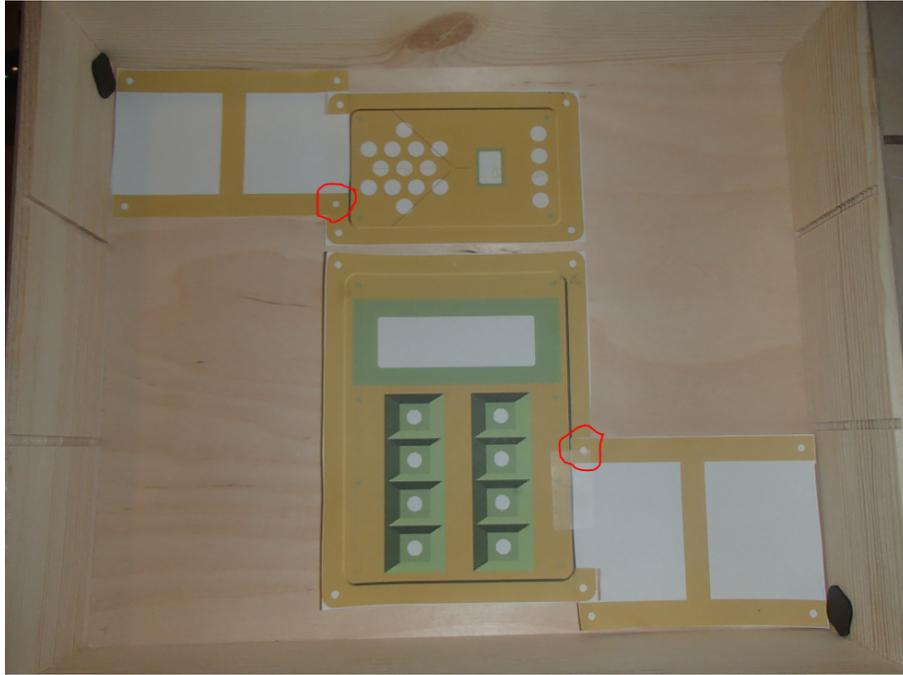
Notice that 35 cm \*30 cm \*10 cm gives a surface of 33.4 cm \* 28.4 cm which is just enough place for everything.

I used the box upside down and installed everything in the deep part of the box to avoid cable going from one articulated part to another.



The plate is for the audience

I used printed drilling template to localise holes, holes for the corners of the cutouts, etc...



As you can see there is not so much place. Note the overlap of the AFE box support with the edge of the front panel elements and the hidden countersunk screws.

**The picture above is a bit misleading. Some holes in the corners cannot be drilled from inside. You will have to spot and drill them from the outside. Perhaps an external drilling template may have done a better job (Take into account the walls if you chose this alternative method).**

Cut, drill everything very carefully (the front wood plate is very thin and fragile). Learn how to drill and saw without splintering before or get help from someone.



## Connections.

- Complete input output connection set on the lower right corner.
- Digital (as opposite to analogue) cable transport of sound to the amplifier (deported DAC).
- Panel mount with no cable tied to the box.



Note the use of feed-through for USB and Toslink



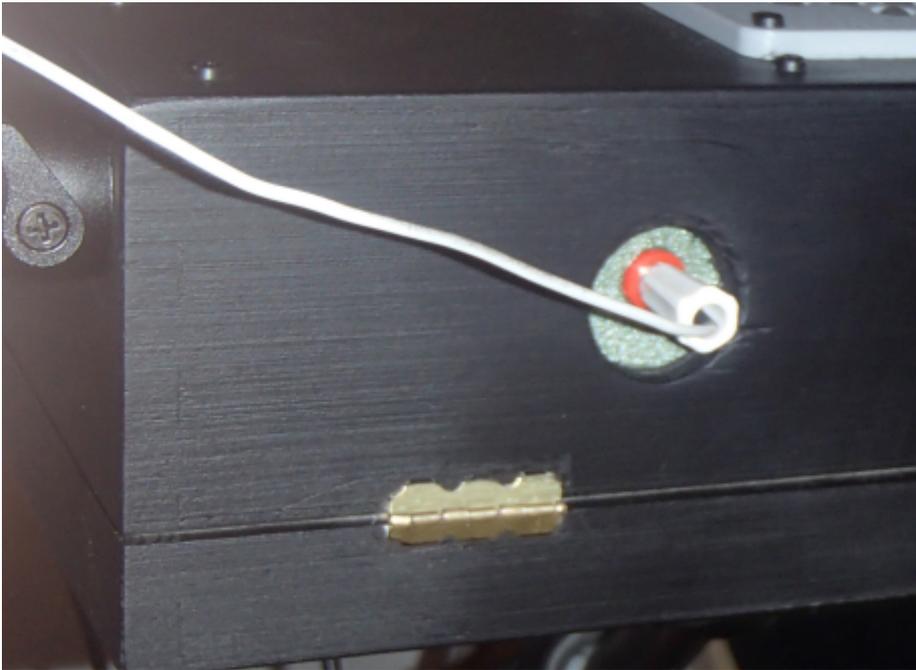
Pay attention to the fact that the blue USB dongle has some electronic inside. You need to use it or to implement its electronic by yourself. (I chose 1<sup>st</sup> solution...)

Cable are made with Dupont cable from the shopping list, pre-cabled element can be ordered from the web to avoid you some soldering.

Use heat-shrink tube to make everything clean and nice.

Refer to the manual for connection to the main board.

Antenna are directly connected to AFE box (25 mm hole in the wood)



## MUTE and ACAL Button

Buttons are on the right side:



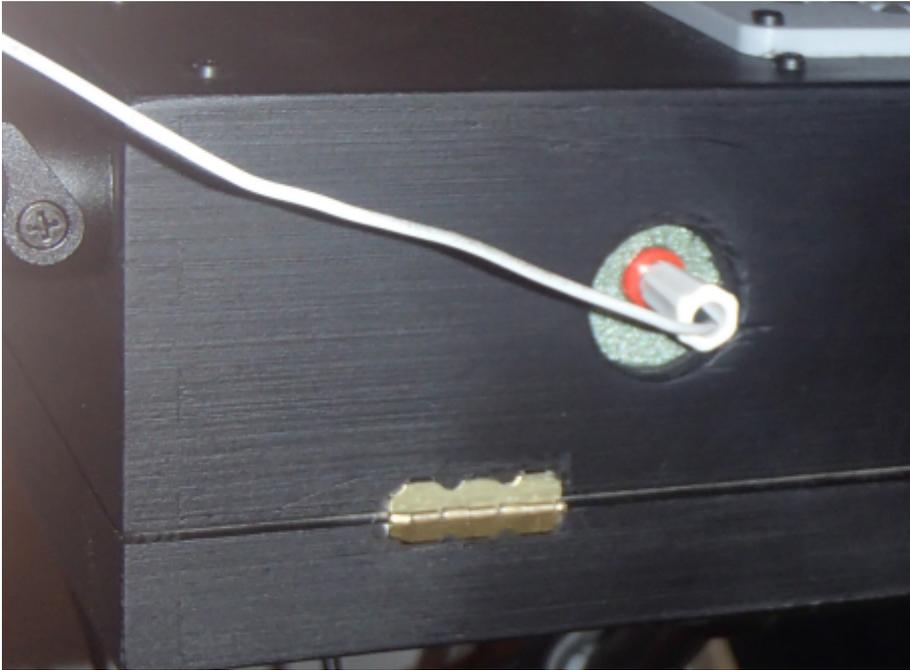
I initially chose cheap buttons with metal part. As advised by Eric, I finally decided for some plastic button to avoid ESD being driven to any I/O. They are nicer too.

The blue button (Mute) is more visible than the black one (ACAL)

A mute diode just above could indicate even more clearly its function.

## Robustness

You may have noticed that the hinges are stapled:



It doesn't feel solid and I don't want that everything collapse if they fail. That's why I inserted two nails that lock the whole thing together when the box is closed. See below:

