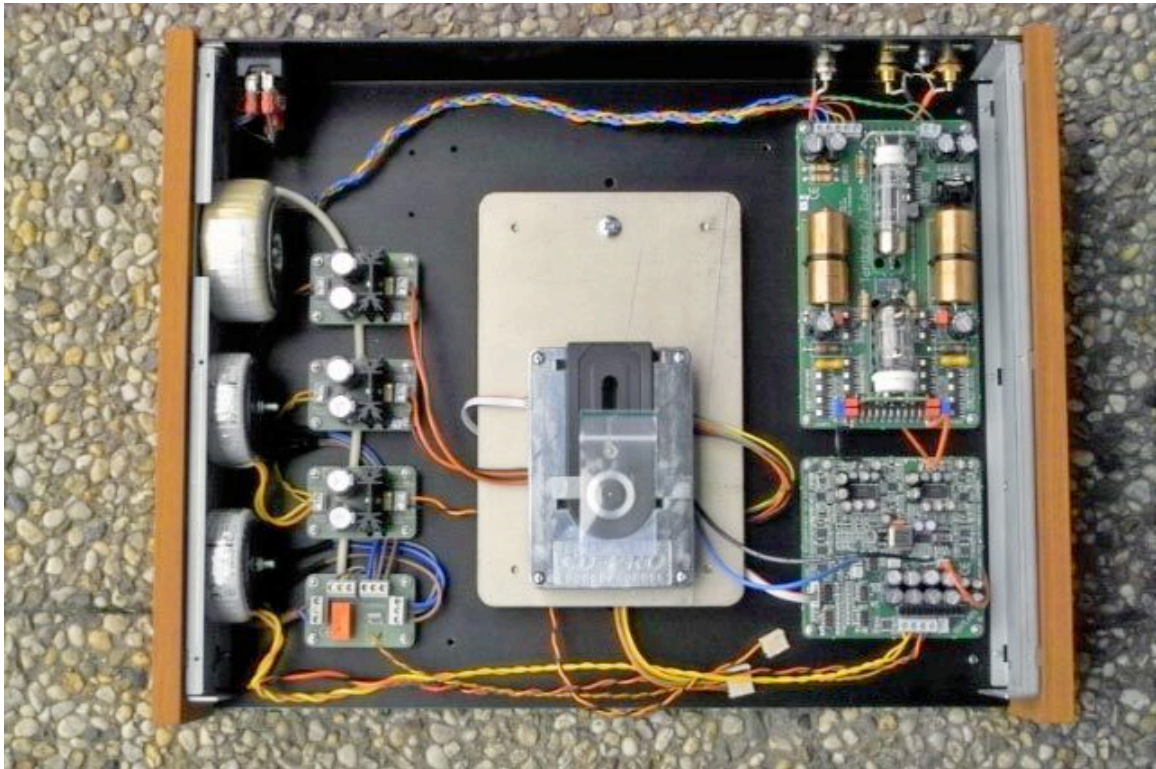# TentLabs DIY CD player
Assembly manual – V1.2

# Disclaimer

### Electrical safety
Within the equipment, during building and surely when finished, AC mains voltages and high DC voltages exist. Care should be taken as long as the cabinet is not closed and the equipment is been connected to the mains. The user remains responsible for his own and others' safety and damage of the equipment. Following the instructions however will avoid hazard and electrical shock.

### Mechanically
Assembling the kit you will be handling metal parts that may cause injuries if not handled carefully. Moreover you will use tools. Be aware of this.

### Warrantee
The content of this kit has been assembled with great care. All modules and parts have been tested prior to shipping. If assembled according these instructions, the equipment will work.

The warrantee on the modules is as following

CDpro drive:       No warrantee. Philips requires the CDpro to be mounted in a professional environment, which isn't the case with DIY

Tentlabs modules:  5 year assumed built in according instruction

Mechanical parts:  5 years assumed built in according instructions

Exceptions:        Tubes, these carry 6 months warrantee.
                   Moving parts, these carry 1 year warrantee.

## Liability
Tentlabs accepts no liability at all from any potential damage or injury that may occur when assembling, connecting or using the CD player or any of its sub parts and assemblies.

# 1. Preparation
You bought you a kit that will give you a great satisfaction because of the excellent performance, when finished. Assembling the DIY-kit is great fun if you are prepared to the job. Therefore some words in advance:

Assure that the place to work will be large enough and sufficiently lightened. The table you will be working on should be covered with a soft cloth to avoid scratches on the case parts of the equipment.
To avoid parts scattering around during assemblage, it is a good habit to use some fist-sized (plastic) boxes to temporarily store the components from each bag of the kit. (Make sure not to mix the parts)

To keep a good overview, assure another place to display all the kit parts and tools to be used. Make sure you will not be disturbed by others who have no idea of what you are doing. Keep them away for their and your safety, especially children!

Finally, first read the total instructions in this manual, until the last page. This will give you a good idea of the expected building phases.

**Missing parts**
In case you miss some parts, please do not hesitate to contact me. The kit has been prepared with great care, but errors are only human.

**Maintenance**
The kit requires little maintenance. The metal parts can be cleaned with a soft cloth. The wooden side panels can be oiled using "any" regular furniture maintenance oil. We used to ship this with the kit, but international regulations have changed and since the oil is flammable…..

The IV stage input offset can be checked every year, using the procedure described at page 70.

We do not include a mains power chord as:
- Plugs differ from country to country
- You usually have a few lying around
- Most customers prefer some special audio cable of their own preference

## 1.1. Required tools

Depending on your experience and your tool-kit, you will be able to assemble this DIY kit within four to eight hours. The following tools are needed:

1. A crosshead screwdriver PH1 and/or PZ1
2. A crosshead screwdriver PH2 and/or PZ1
3. A flathead screwdriver size 2
4. Set of metric wrenches (8, 10, 11, 12 and 13)
5. A soldering iron (50 watt, small tip)
6. Solder (0,5 to 1 mm, with flux)
7. A pair of tweezers
8. A small wire cutter
9. Some wire stripper
10. Straight nose pliers
11. Socket spanners (metric 5 and 5,5 mm)
12. A cheap multi meter for AC and DC voltages.
13. Contact adhesive, based on synthetic rubber.

## 1.2. How a nearly assembled player will look like

It is convenient to know where to end, before one begins. For this purpose, below picture is inserted. This is the kit built up to the stage of mounting the front panel and the sledge support bridge.



## 1.3. General instructions

Never use excessive force to get things in place or when tightening nuts or bolts. If things do not fit easily, something must be wrong. Check connections when made and double check them prior to the first operation. Ask someone else to check all wiring using the photographs and pictures in this depiction as a reference.

In doubt, contact us using info@tentlabs.com or +31-40 2130 186

**Have fun!**

December 2007, Guido Tent.

## 2. Base Plate (Labels)

Prior to mounting any module or part, the labels on the back need to be put on.

These labels are aluminum foil, and need to be put exactly in place.

As of March 20, these labels are not yet available but will be shipped later. This shipment includes instructions for use.

## 2. Base Plate (Chassis)

Take the **base plate** and **bag 2.** Put the contents of the bag in a box.

Put the base plate **on its rear side**.
Use the three transformers to stabilize the setting.

Fix 24 studs with 24 M3*6 mm chrome crosshead bolts using the 5,5 mm socket spanner and or the crosshead screwdriver. Be aware that there are more holes than studs. Watch the pictures beside.

Put **the rest** of the components **back in bag 2** or set the box aside if you use more than one temporary box.
Put the chassis at its bottom.

Take **bag 1** and put the contents in a box. Take the red and black RCA connectors and mount these as shown in the picture beside. Use the colored insulators at the correct position (The red connector is fixed at the right, seen from the inside) and assure that the solder tags point towards each other.

Mount the BNC connector in the next flattened hole using the large **washer between the chassis and the tag** with the large hole.

Take the 3 mm solder tag, an M3*6 mm bolt, a toothed washer out of the box and an M3 nut (from bag 2). Fix the tag to the 3 mm hole over the RCA connectors; **The toothed washer shall be between the tag and the chassis.**

The tag "should point to about five o'clock".

Take the 100 nF capacitor; bend and cut the wires before soldering. See the picture
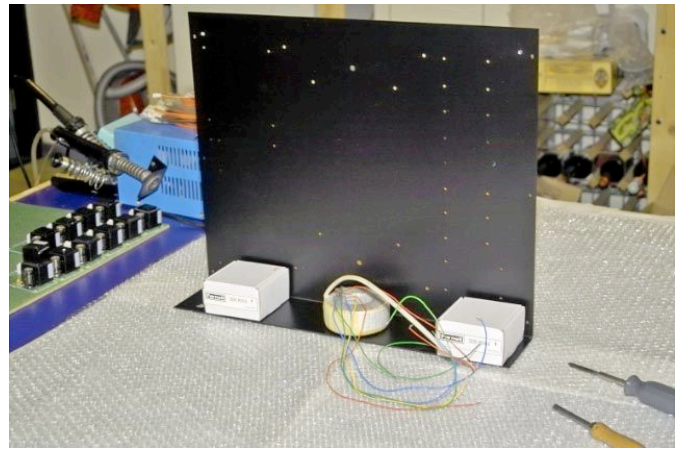
Take the mains entry, remove the fuse holder and mount two fuses into the mains entry. (One fuse is spare.)

Fuse values are:

**115V** mains      **630mA** slow blow

**230V** mains      **315mA** slow blow
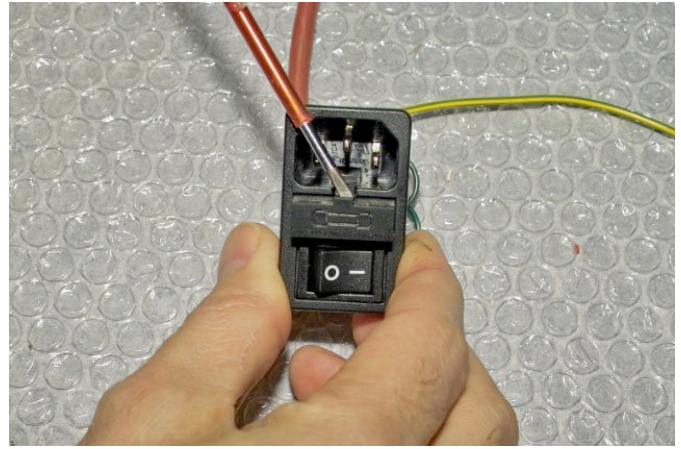




Mount the pre-assembled IEC mains entry to the base plate chassis with the switch upwards. Press it tightly until it snaps into. Check with an IEC connector that the entry does not hatch if pulled out.
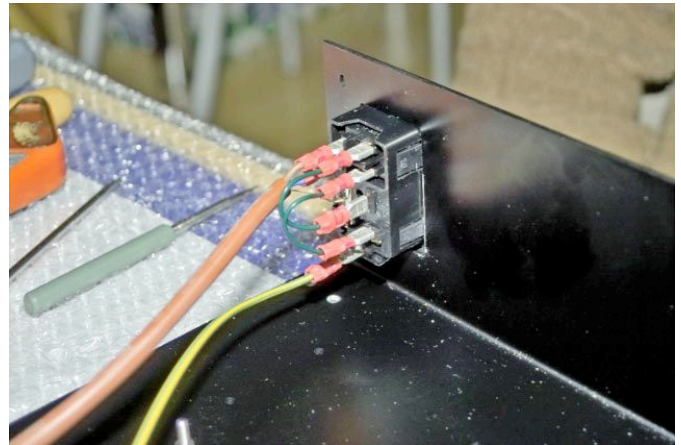


Take the 4 rubber feet and 4 M4*8 black bolts. Fix the feet to the bottom of the chassis. **Do it gently** because of the soft rubber and the thread in the aluminum chassis. Of course you could fit alternative feet if required.

**Bag 1 should be empty now.**
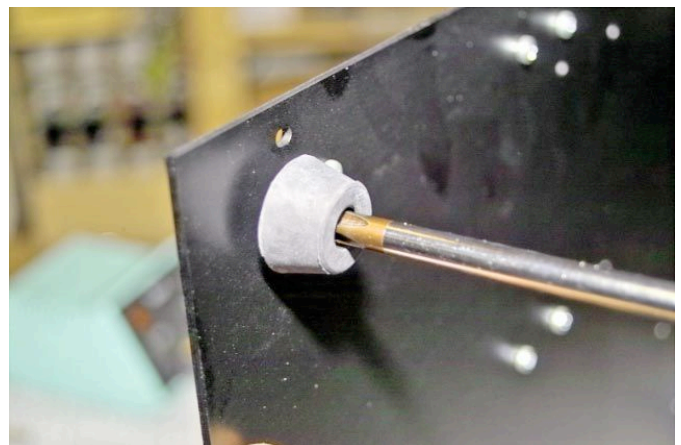
## 3. Preparing the Sides

The sides are built up of metal parts covered with wood. The sides are each other's mirror image, and packed as such so be careful not to mix them.

Take **the metal sides and wooden panels, the three transformers and bag #4.**
Take the parts out of the bag and put them in a box. Take the transformers:
TR1 = box #13
TR2 = box #12
TR3 = box #14

Out their boxes, and open the small bags from boxes #12 and #13. These contain bolts, neoprene washers and metal disks. Open these bags and also take out two M5*40 bolts and two M5 nuts.

Take the metal side with the three large centered holes.
Fix all three bolts and nuts firmly with the 8 mm wrench (see picture).

Put the three washers (one larger than the other two) over the just fixed bolts.
Mind that the larger washer corresponds with the cutouts.

Place the three transformers such that transformer #14 corresponds with the larger washer (see picture) and keep the rotation of them as in the pictures (all wiring to the same direction). The other 2 transformers are equal; the one with the shorter wiring goes in the middle.

Fix on top of the transformers respectively a neoprene washer, a disc and an M5 locknut (out of the bag #4). Do not tighten the locknuts too much because of precise alignment of the transformers later on, but make sure the wiring more or less points to the right referred to the picture on the right.
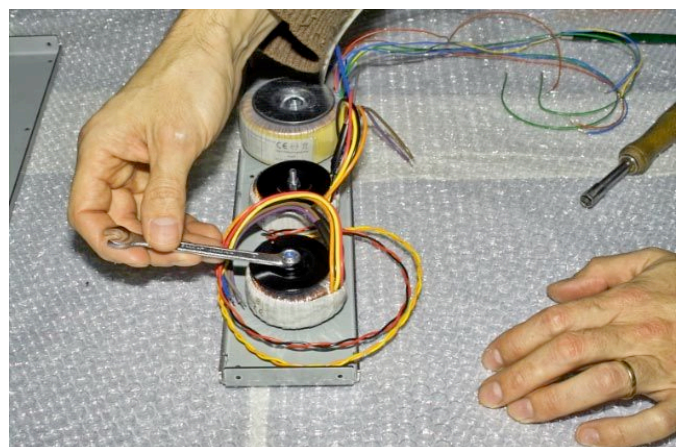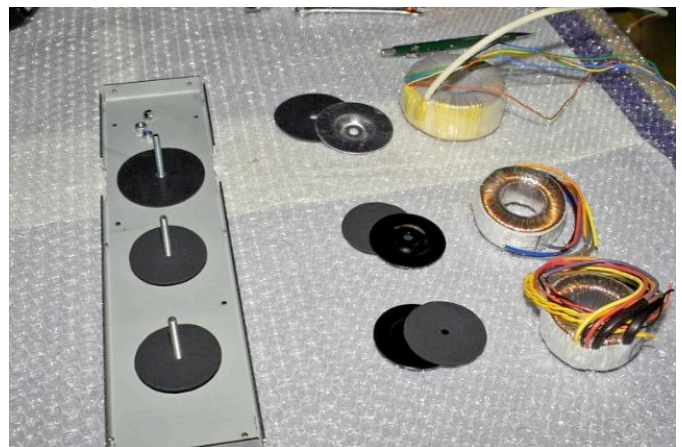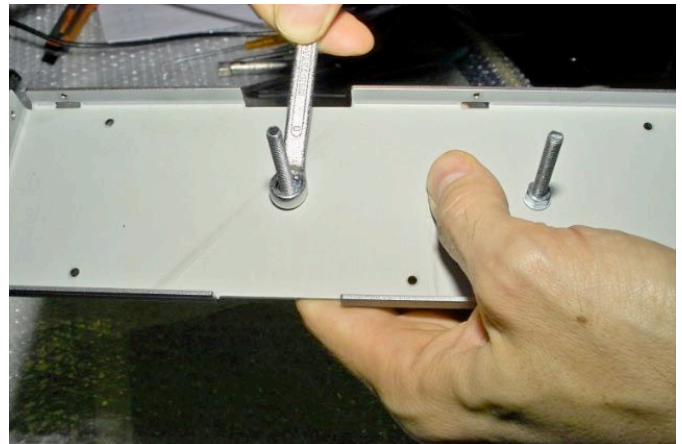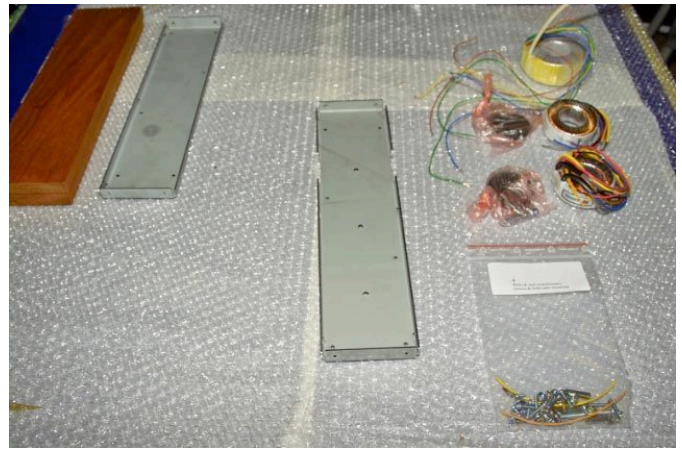
Mount this assembled metal side on the corresponding wooden side. Both metal and wood are mirror matched so mind the small holes in the wood: they should correspond with the holes in the metal side. Take care not to clasp the transformer's wiring between the metal and the wood.
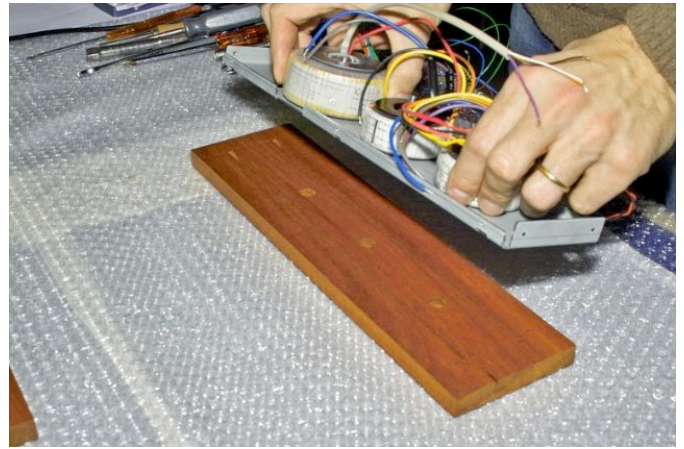


Bag #4 contains 12 screws to fix the metal to the wooden sides.
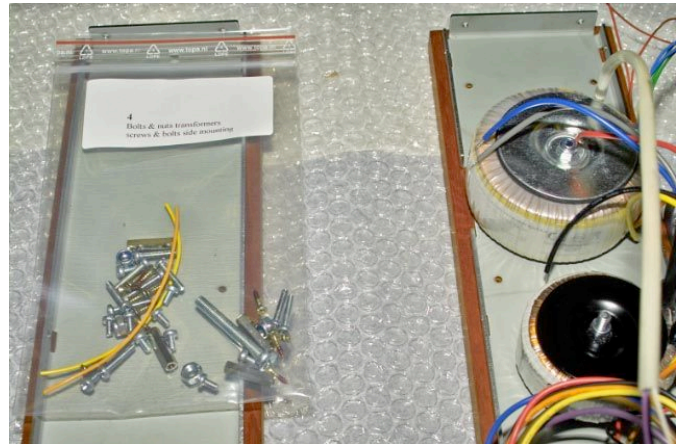


Do not use excessive force when mounting these screws.
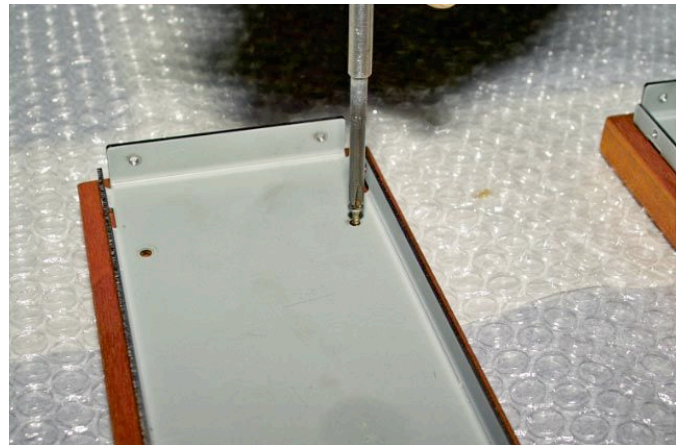
# 4. Mains- and Regulator PCB's

Take box #5 containing three pre-assembled modules and a bag with a bare PCB and parts. The modules are voltage regulator boards and the bare one becomes the so called 'mains PCB'.

## 4.1. Mains PCB

You will first assemble this mains PCB. The parts will be placed at the text side of the PCB.

Put the small (grey) block capacitor in position C1, turn the PCB, solder C1 and cut the remaining wires.

Repeat for the diode. The black ring on the diode shall correspond with the ring of D1, as marked on the PCB and the layout shown right. Next, place the orange relay on position K1 turn the board and solder.

Mount the 4 PCB connectors at J1, J2, J3 and J4 with their entries pointing outwards. Press them firmly to the board during soldering. Mount the 2 pole connector at J5, in a similar way.
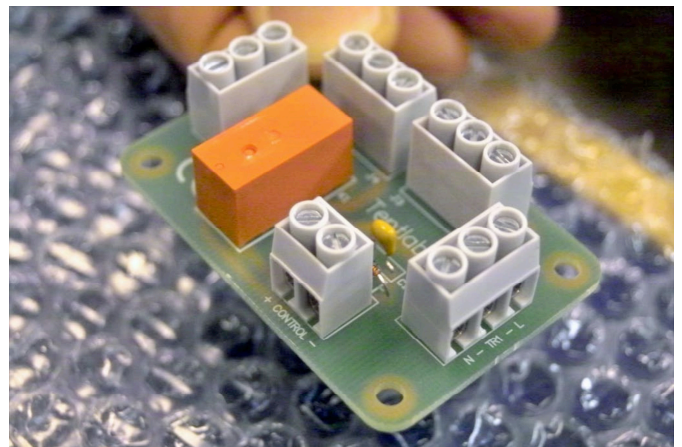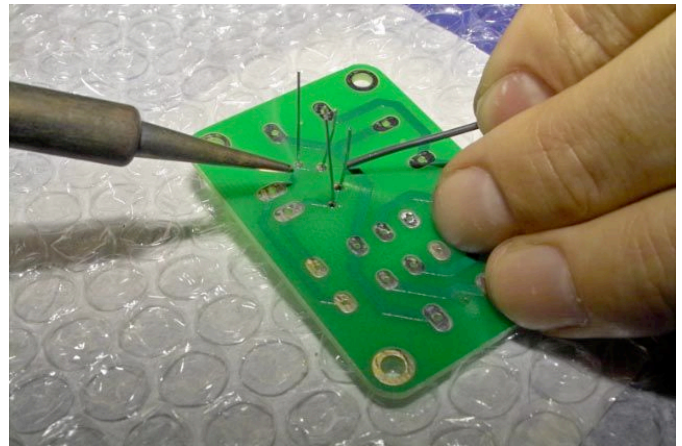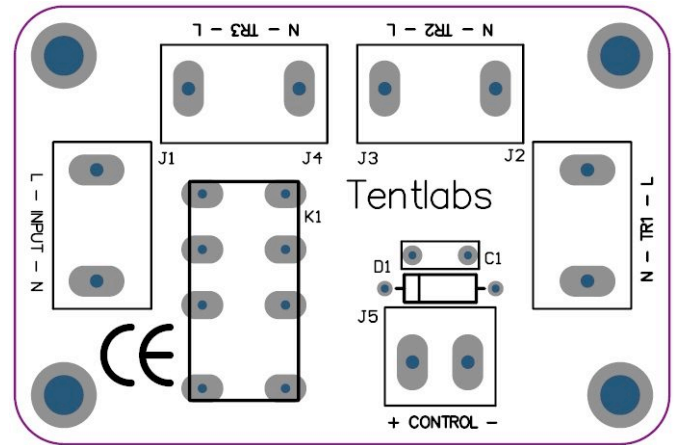
## 4.2. Fixing the regulators and mains PCB's to the chassis

Temporarily place the PCB's on the studs on the chassis as in the picture:

- **The mains PCB at the front side** and the regulators in sequence 5 V, 9 V and 5 V.
- **Watch the rotation of all modules**, as on the picture right

You can recognize the regulators by the hand written inscription at the top of the PCB.

Secure all modules with one nut each (out of bag #2).
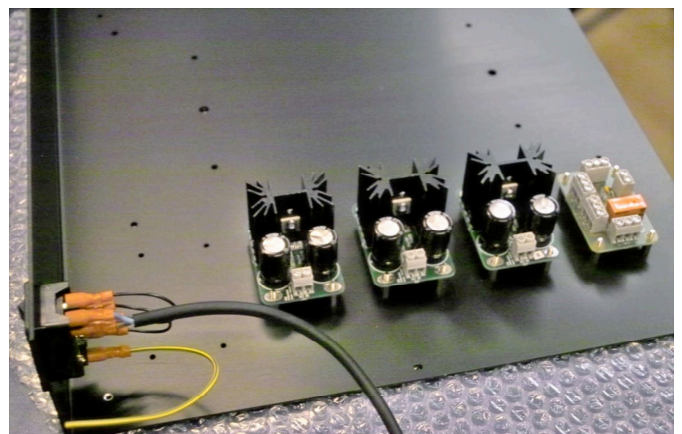
## 5. Mounting the left side

Take the assembled left side and put it next to the left of the chassis with the big transformer to the rear. In the box are still the remaining parts of bag 4.

Take 4 bolts M3*6 and one bolt M3*16 from bag #4.

Carefully put the side in place on the chassis without scratching it. It would be nice if the supple brown mains cord passed through the little space between the big transformer, the side and the chassis. The cut-away allows this. Take care not to clasp any wiring.
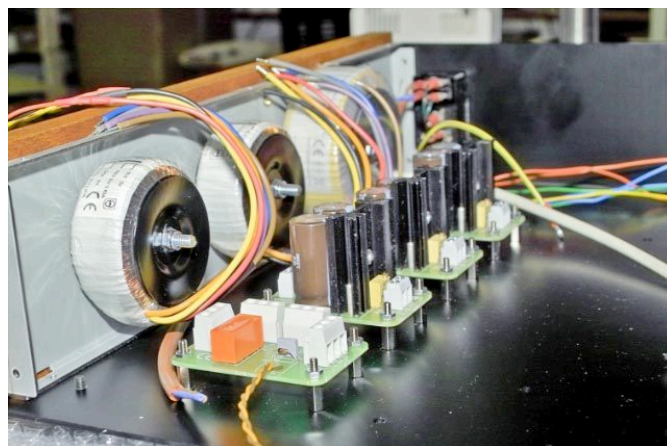
Take the M3*16 bolt and fix it loosely in the upper position in the rear side, as shown right. This bolt is longer, on purpose, as to mount the safety earth tag later, from the inside.

Next fit another bolt (M3*6) into the rear. Lastly, fix (still loosely) the three M3*6 bolts from the base side.

If everything fits correct, and no wiring is squeezed between side and base panel, gently fasten the bolts starting at the top of the rear up to the front of the chassis.
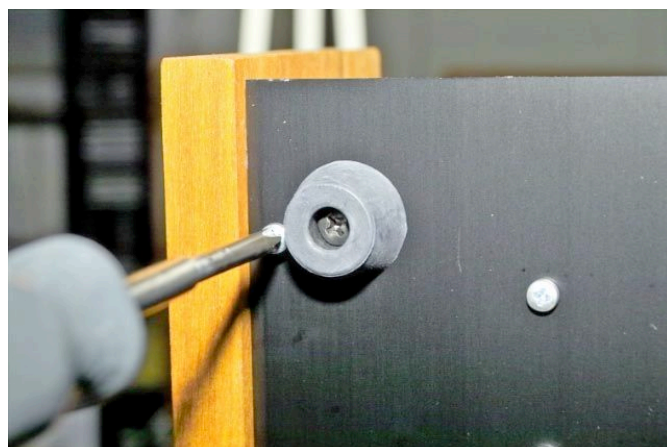
# 6. Wiring the Mains Connections

## 6.1. Mains entry

Strip the mains cord from the entry (brown sleeve).

Strip about 6 mm, twist the bare wiring firmly, fold the ends and fit them to the input of the mains PCB. The order (blue/brown) is of no importance.

For the ease of connection, the mains PCB could be taken from its studs after loosing the nut.
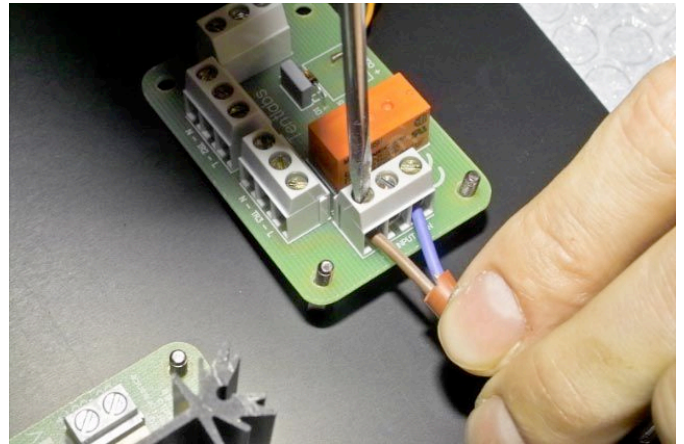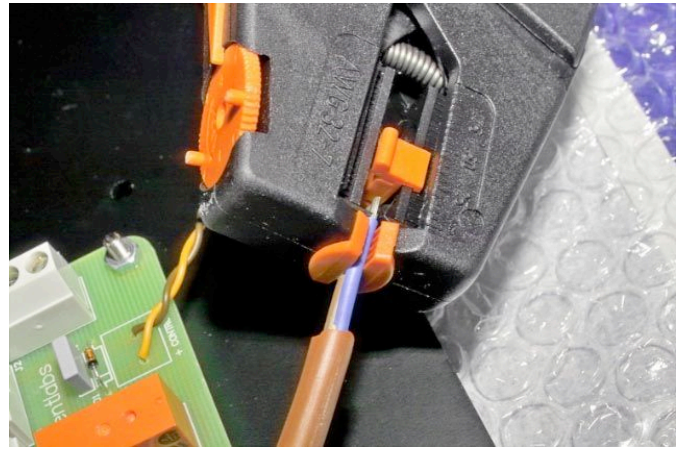
## 6.2. Safety earth tag

Strip 5 mm the outer end of the **yellow** / **green** earth cable from the mains entry, and pre-tin that wire

Take the M3 tag, and solder it to the tag.

Put a toothed M3 washer on the M3*16 bolt (from the inside).

Fix the **yellow** / **green** mixed wire with its tag to the M3*16 bolt, add an M3 nut and tighten it well.
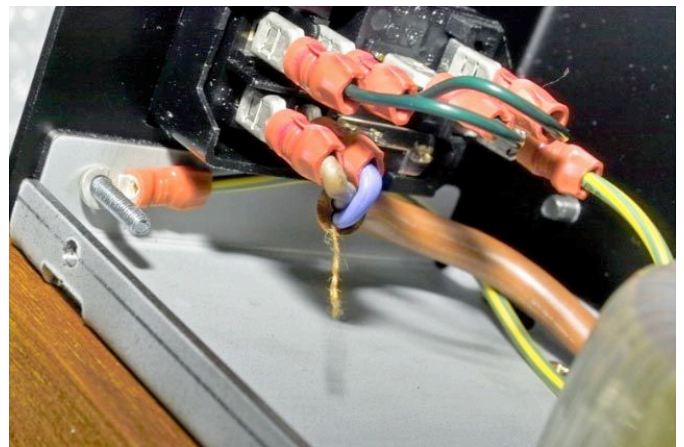
## 6.3. Wiring the primary connections of the transformers

To correctly wire the transformers, you must know the mains voltage your CD player will be connected with.

  210 to 240 Vac   =>   wire for 230 volt,
  105 to 120 Vac   =>   wire for 115 volt.

Prepare by cutting off the soldered ends of all the leads of transformers TR1 & TR2
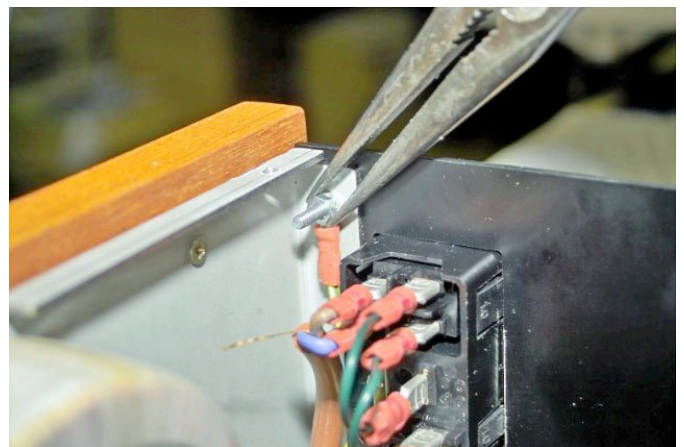
### 6.3.1 Wiring Transformers for <span style="color:red">230 V</span>

Lead the primary cords between the studs of the (to be mounted) regulator PCB's as much as possible for the look of the things. Also the position (rotation) of the transformers will be helpful. Of course this is a question of taste, it is up to you. Take your chance!



### TR3
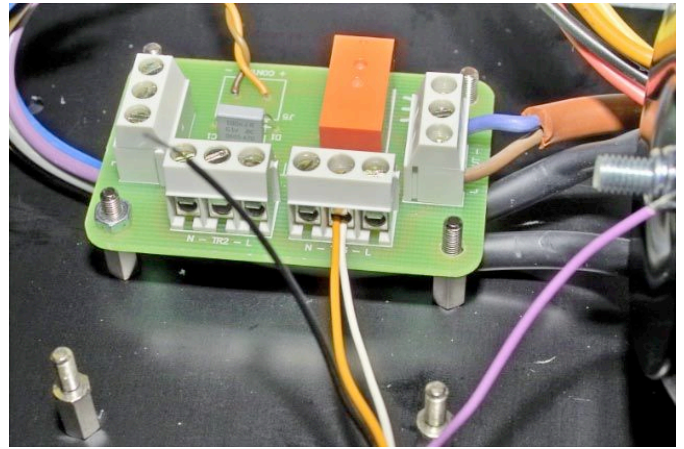
Grasp the four primary wires in the white sleeve and twist the bare ends of the white and orange wires firmly together, fold them double and connect this to the **middle** contact of connector labeled as 'TR3' on the mains PCB.
The remaining wires are firmly twisted, folded double and connected to the outside connections of connector 'TR3'.
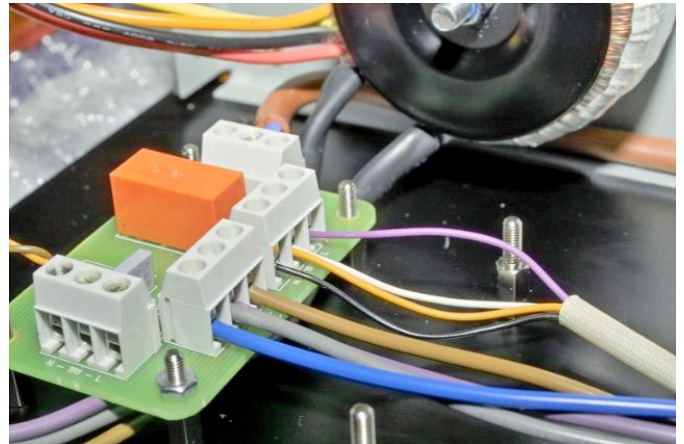


### TR2 (middle transformer)

Grasp the four primary wires in their black socks.
Twist purple **and** grey **together** (as depicted above) and fix them into **the middle** of connector 'TR2' on the mains PCB.
Connect the blue and brown wires to the outside connections of connector 'TR2' on the mains PCB.
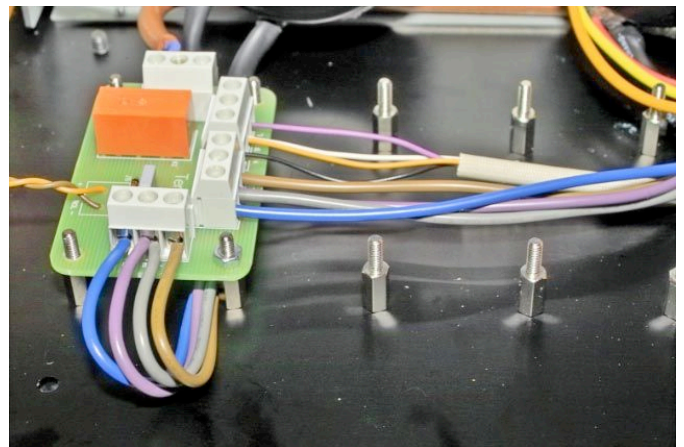


### TR1

Grasp the four primary wires in the black socks.
Twist purple and grey together (as depicted above) and fix them into the **middle** of connector 'TR1' on the mains PCB.
Connect the blue and brown wires to the outside connections of connector 'TR1' on the mains PCB.

### 6.3.2 Wiring Transformers for <span style="color:red">115 V</span>

Lead the primary cords between the studs of the (to be mounted) regulator PCB's as much as possible for the look of things. Also the rotation of the transformers will help.

### TR3

Grasp the four primary wires in the white socks. Twist the bare ends of the **purple** and **orange** wires firmly together, fold them double and connect this to **one of the outside** contacts of connector labeled as 'TR3' on the mains PCB.

The remaining wires **(black and white)** are firmly twisted together, folded double and connected to the other outside connection of conductor 'TR3'.

### TR2 (middle transformer)

Grasp the four primary wires in the black socks.

Twist **brown** and **grey** together (as depicted above) and fix them to **one of the outside** contacts of connector 'TR2' on the mains PCB.

Twist the **blue** and **purple** wires firmly together and connect them to the other outside contact of connector 'TR2' on the mains PCB.

### TR1

Grasp the four primary wires in the black socks. Twist **brown** and **grey** together (as depicted above) and fix them to **one of the outside** contacts of connector 'TR1' on the mains PCB.

Twist the **blue** and **purple** wires firmly together and connect them to the other outside connections of connector 'TR1' on the mains PCB.

Fix the mains PCB with4 nuts out of bag #2.

**Note:** the middle contacts of the connectors TR1, TR2 and TR3 should stay empty!

**Note:** This just executed wiring is very important due to damage to the transformers, so examine the connections
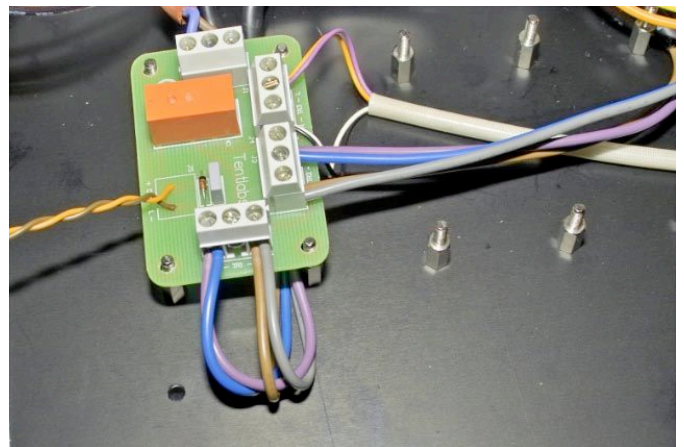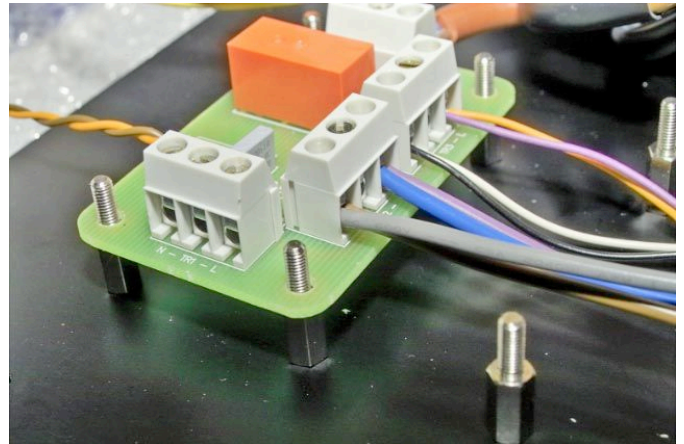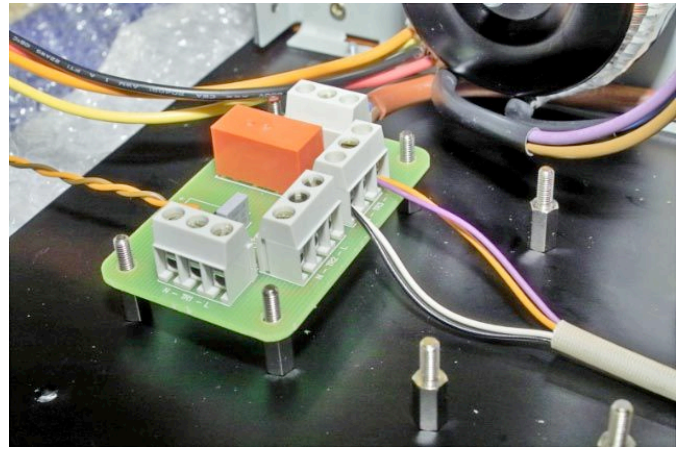
# 7. Wiring the Regulators' Inputs

All regulators have an input and an output. The AC input of all three regulators should point towards the transformers.
As shown earlier, the sequence of the regulators is: 5V - 9V - 5 V. Both 5V regulators are equal.

First place one of the 5 V regulators on the studs opposite the big transformer TR3. The position shown right is not final, but facilitates wiring.
Grasp the **black** and **red** wire of the middle transformer (TR2) and connect them to the AC input.

Cut about 6 cm from the remaining (orange and yellow) wires of the middle transformer (TR2) and strip these about 6 mm.

Take the twisted pair (**orange / yellow**) out of the bag #4 and strip the wires on both sides.

Twist the bare ends of the twisted pair firmly with the shortened **orange** and **yellow** wires of TR2.

Now place the remaining 5 volt regulator on the studs near the mains PCB and connect these **orange / yellow** pairs with the AC input.

The other ends of the **orange / yellow** wiring go to the 9V regulator.

17
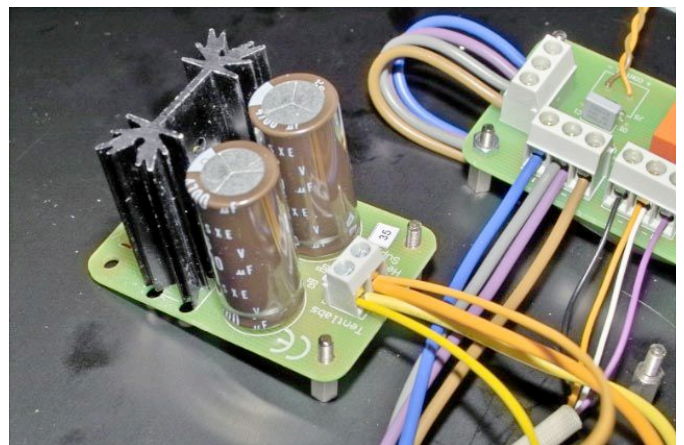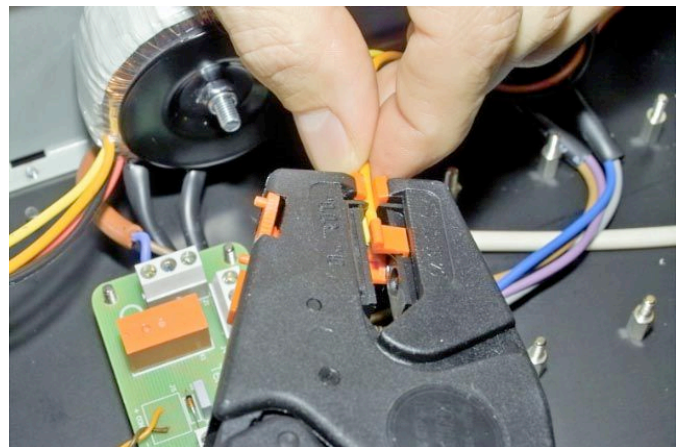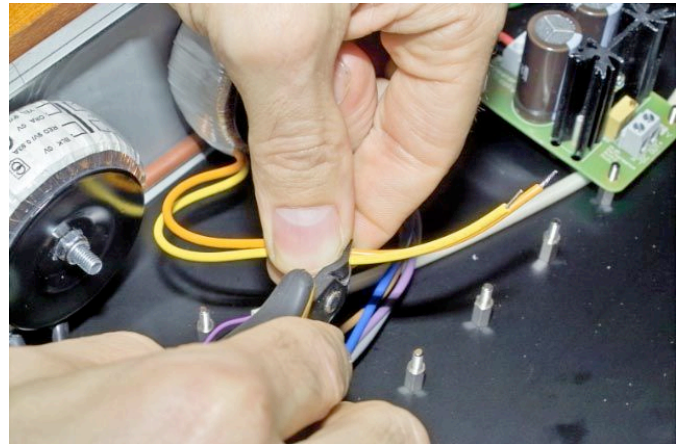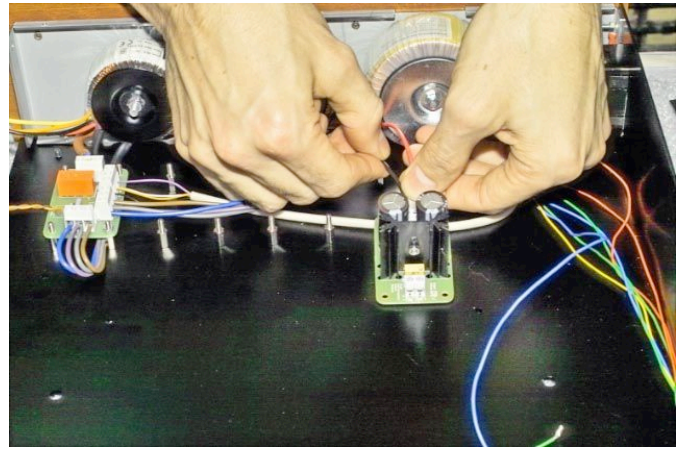
Now take the 9 volt regulator, put it on two studs between the two 5 volt regulators, as shown right. Connect both remaining **orange** / **yellow** wires to the AC input
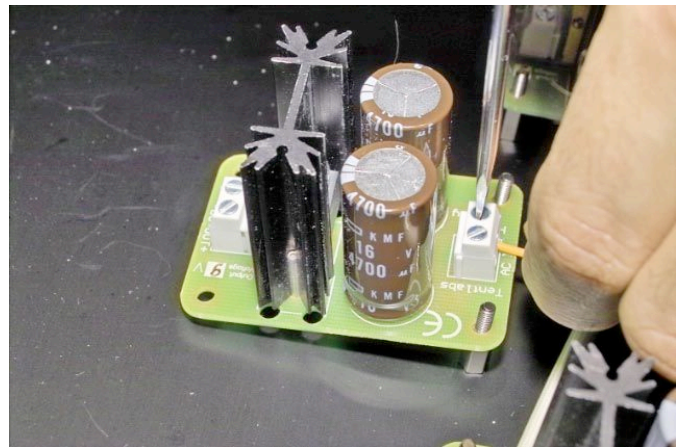


Place the 3 regulators at their final position and fix them with 12 nuts M3 out of bag #2. Arrange the wiring to your taste.
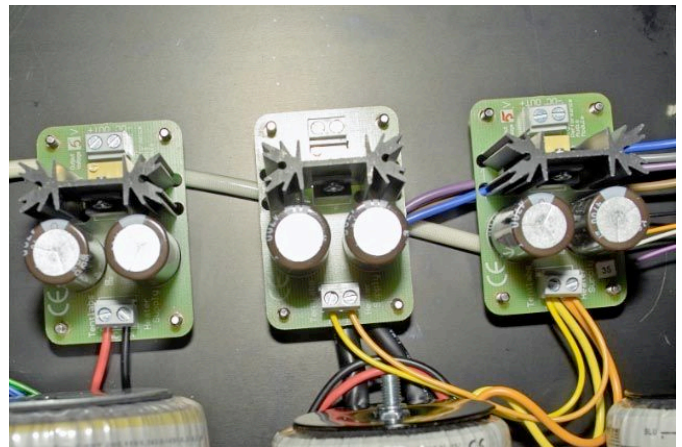


The DC outputs of the regulators will be connected later
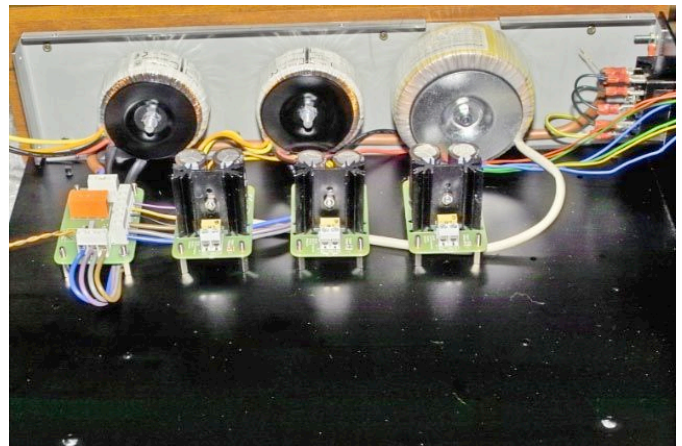
# 8. Wiring the IV converter
## 8.1 Prepare the outputs
Take the SPDIF and Analogue output coaxial cables out of **bag 6.**

The **SPDIF** cable is a **40 cm** long **red** cable with a small white **connector** at one end.

The two **Analogue** output cables are **red** and **black,** each **24 cm** long.

Tin the inner- and outer (tab) connections of the BNC connecter you fixed into the rear of the chassis before (see paragraph 2).

Take the SPDIF cable and solder it onto the B&C connector: the core to the inner connection and the coax-braid to the earth tab (see beside).

**Warning:** Do not heat the ends of the coax cable too long at the penalty of melting the isolation between core and braid.





Solder the coax-screen to the earth tab of the BNC
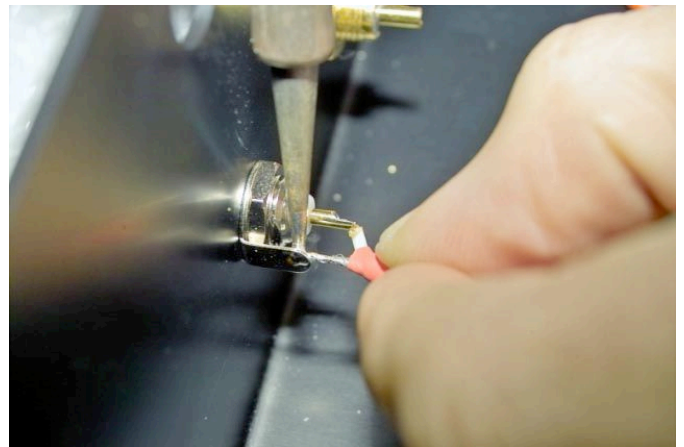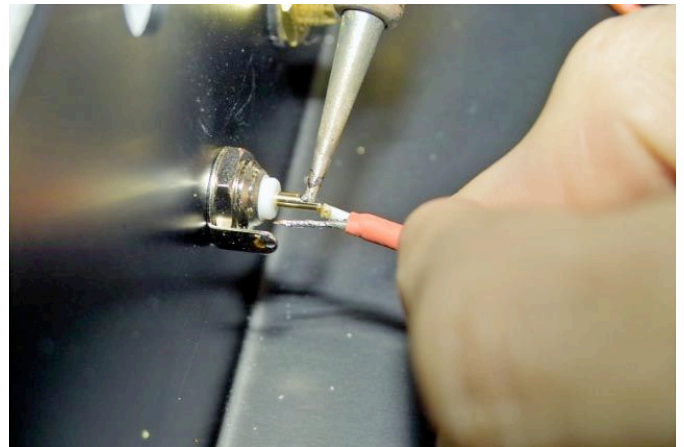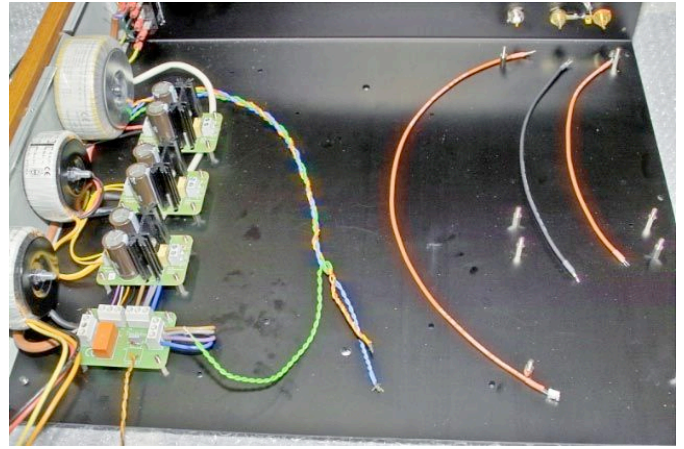
Tin the inner contacts of the two RCA connectors you fixed into the rear of the chassis before (see paragraph 2).
Do not heat them too much because also the isolation of these connectors is not heat resistant!
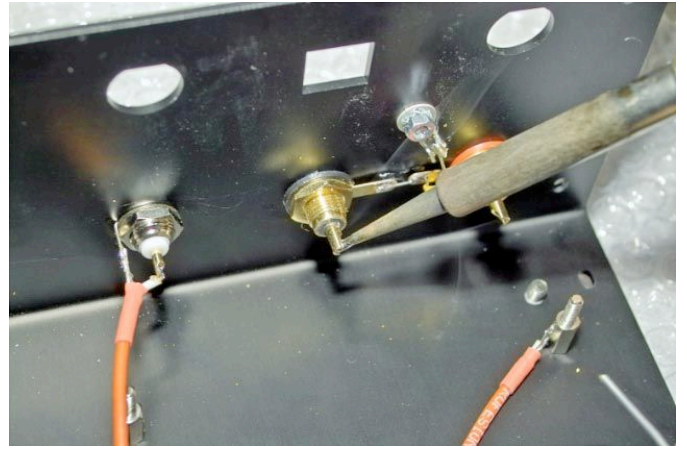
Solder the analogue coax cables onto the RCA-connectors: the **red** cable to the **red**, and the **black** cable to the **black** one; the braids go to the tags with the already fixed capacitor.
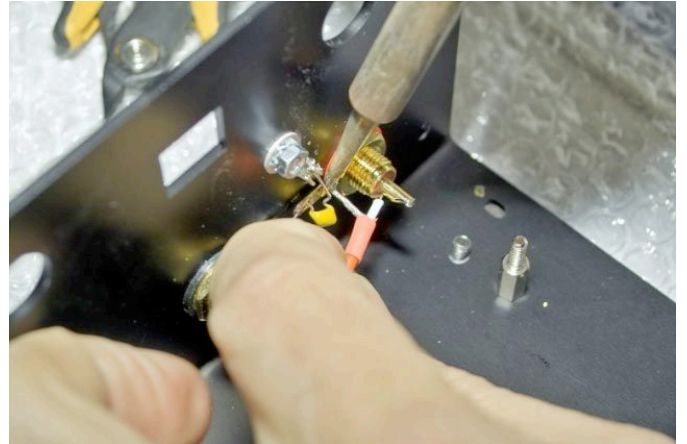
# 8. Placing the IV converter
## 8.2 Connect TR3
Twist the loose cords of the biggest transformer (TR3):

- the two **green** cords
- the two **blue** ones, and
- the **red** and **yellow** cords together.

Then braid the three twisted pairs as shown beside.

Do not twist nor braid too tight.

Rotate TR3 so that these cords point towards the corner of the chassis. Tighten the nut of the transformer.

Train the braided cords along the rear corner of the chassis. In the final position it will stay there, in-between the back and the bridge that supports the hatch.

Take the IV converter from box #7; it is the biggest module, containing tubes.

Place the IV converter PCB it in the middle of the chassis, supported by a piece of foam or a soft cloth to avoid scratching the chassis.

Connect the wiring on the PCB-terminals. Mind the color codes are indicated on the PCB.
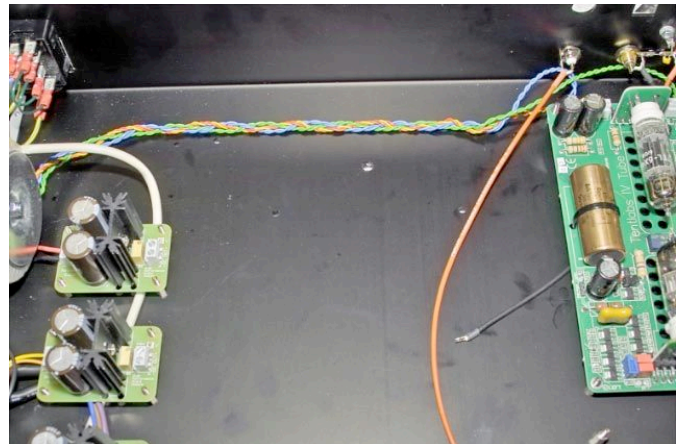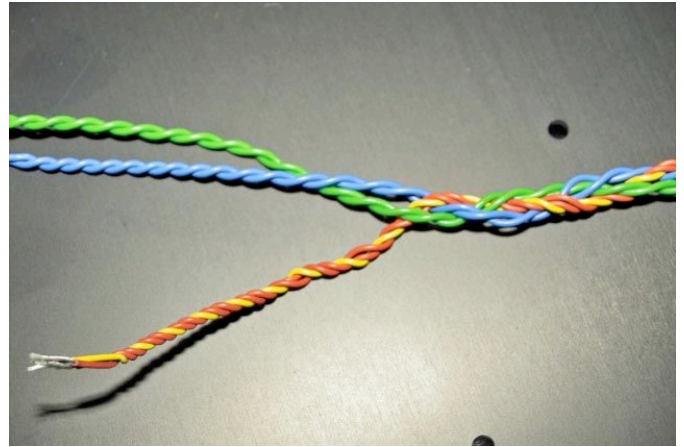
# 8. Placing the IV converter
## 8.3. Preparing the wiring
Train the SPDIF and analogue output cables between the studs for the time being.
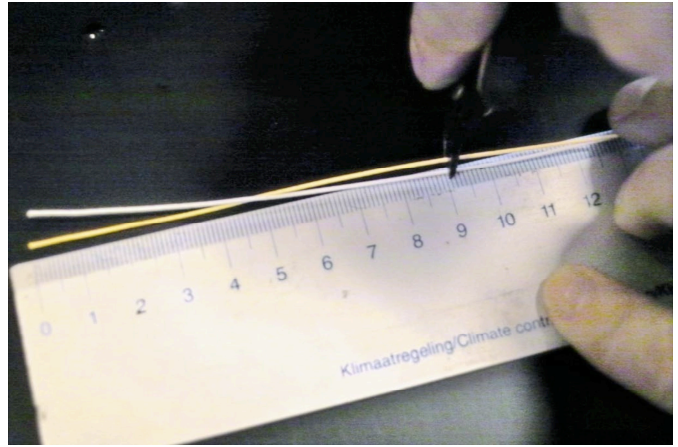


**The analogue outputs**
Silver wire is provided for the audio signals. This wire (yellow & white) needs to be cut to length, stripped and twisted.
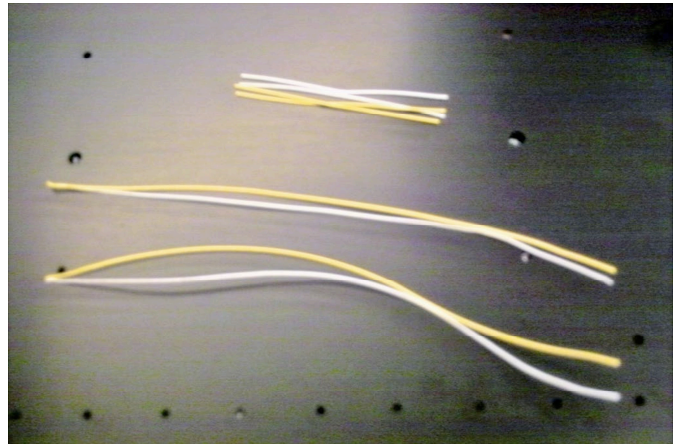


Cut 2 pieces of each color at 9 cm, and 2 pieces of each color at 24 cm.



The teflon isolation is hard to strip, but a trick does the job. Crunch the isolation

# 8. Placing the IV converter
## 8.4. Connect the outputs to the I/V converter

Once crushed, the Teflon ends can be easily cut away.

Twist the wires loosely, such that 4 pairs appear.

First connect the 24cm pairs to the analog outputs, be consistent in the use of **white** for ground, and **yellow** for signal

Repeat for other channel.

Place the PCB on its studs, training the coaxial cables between the studs as much as possible.

Fix the PCB to the studs with 4 nuts from bag 2.
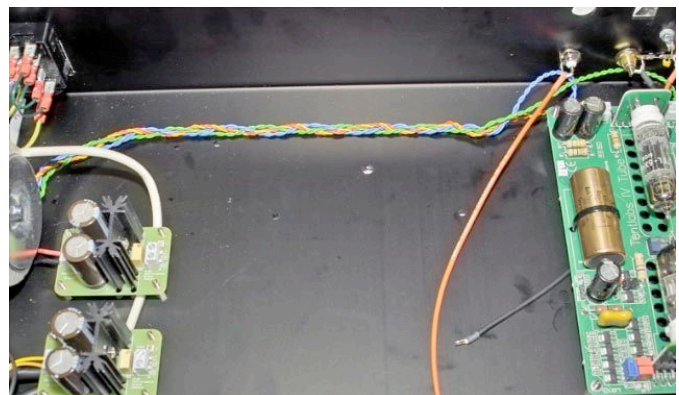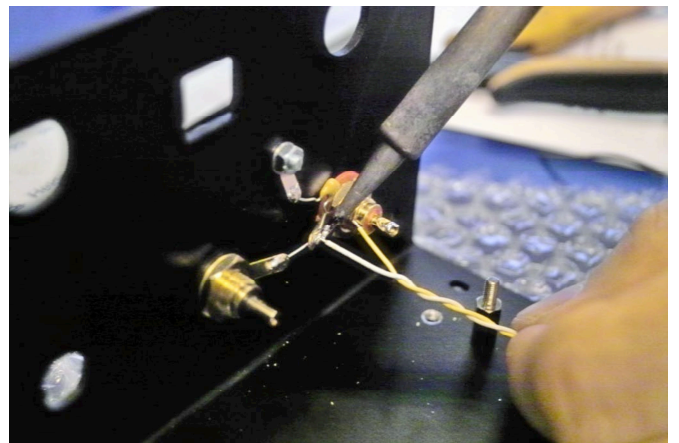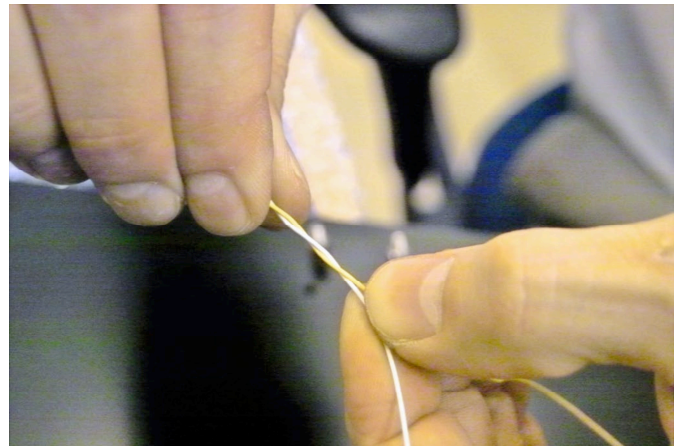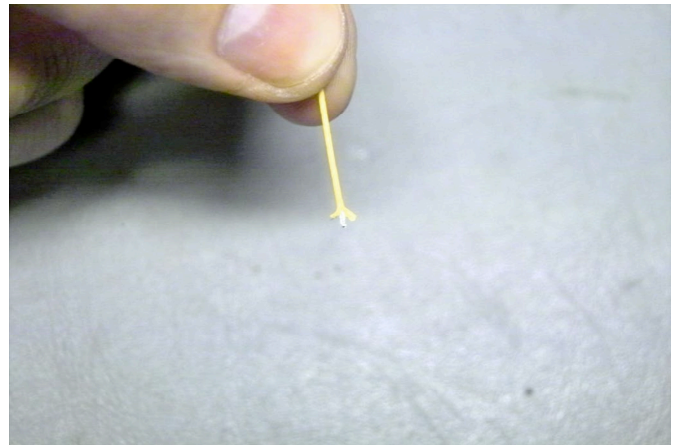
## 8. Placing the IV converter
**Analogue outputs**
Connect the output wiring to the IV converter outputs, left and right, next to the jumper positions. Mind the colors, white for ground, and yellow for signal.

Repeat for other signal
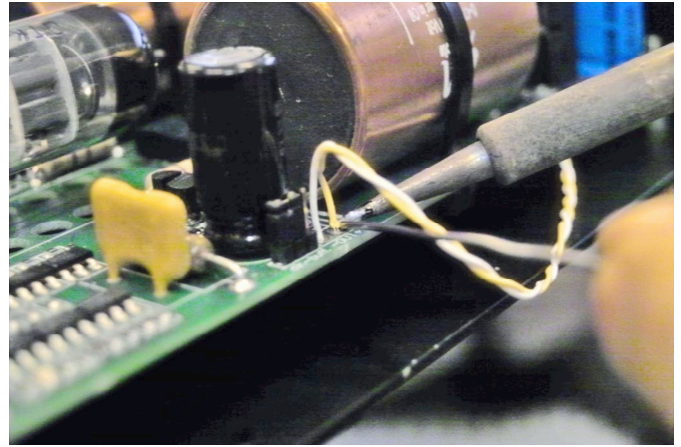


You will find the analogue inputs of the I/V converter PCB, at the other short side of the rectangular board, pointing to 'the front'. One is marked 'RIGHT', the other 'LEFT'.

Train the red coaxial SPDIF cable (with the small connector) to the right between the 4 studs in front of the I/V converter PCB (see beside).
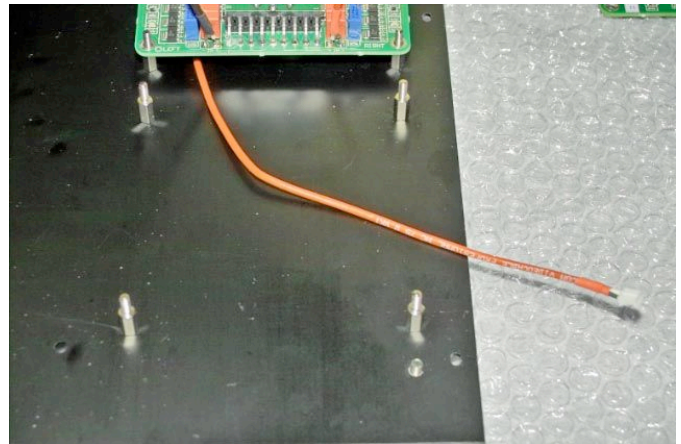
## 9. Placing the DAC board

The DAC Board is the square PCB from box #7. Put it on the studs with its (analogue) outputs pointing to the inputs of the I/V converter PCB.

Fix the DAC board with 4 nuts out of bag 2.
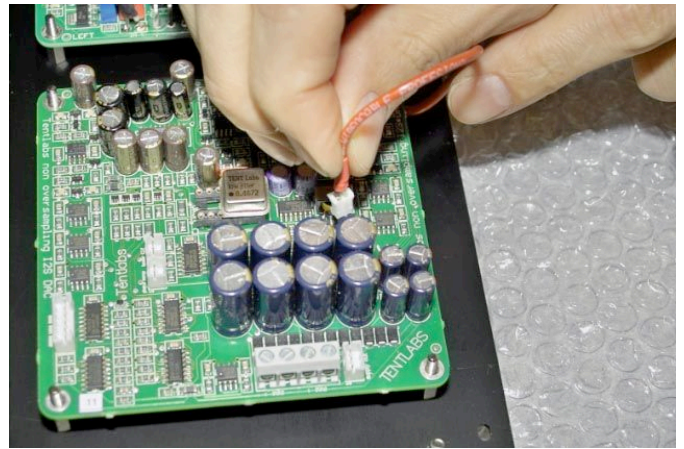


### Connect DAC Board to SPDIF

The red SPDIF Output coax cable should be trained between the two studs supporting the DAC Board at the right side.

Snap the SPDIF output cable connector to "SPDIF out" header in the middle of the DAC Board. Mind the other connectors on the board, see the photo right

**Note**: only one orientation fits.



### Connect DAC Board to I/V Converter

Place the IV converter on the remaining 4 studs, with their outputs pointing towards the IV converter (as shown on next photograph)

Take the remaining twisted wiring (two pieces twisted cables, 9cm each) and place these between the DAC outputs and IV converter inputs, again, mind the colors.

Solder all 8 contacts
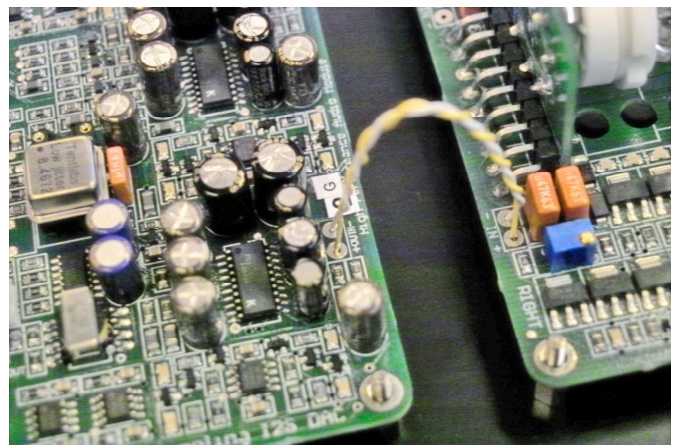
## 9. Placing the DAC board
### Connecting TR1 to the DAC Board

Loosely twist the 4 cords of the TR1. Twist
**Yellow** / **Orange** & **Red** / **Black** separately

They will be fixed to the screw terminals on the DAC module. The correct order of this wiring is, from left to right:

**Yellow – Orange – Red – Black**

Fold the bare (tinned) ends and fold these ends before insertion into the terminals.

Inspect the connections: no little copper wire parts should stick out of the terminals at the penalty of shortcuts.

Verify the order of the colors (again)
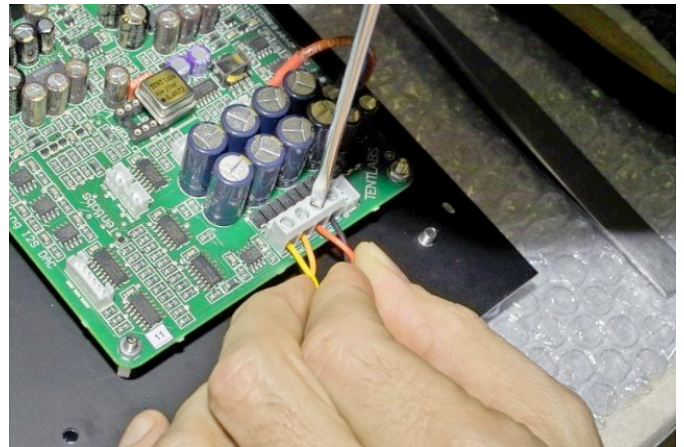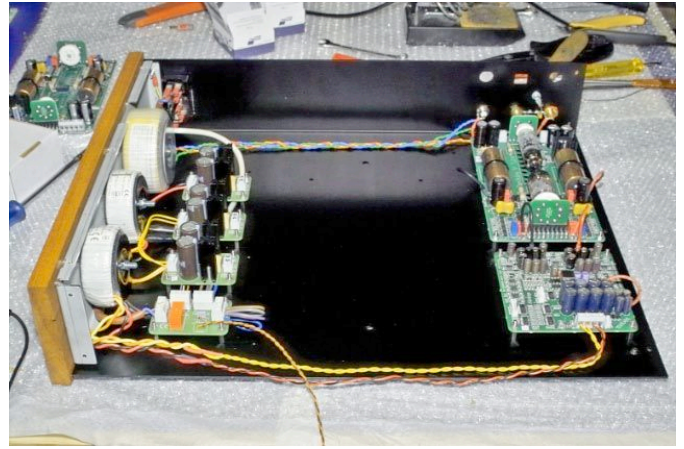
## 10. Mounting the base plate

The CDpro drive will be mounted on a rubber suspended heavy base plate.

First we will mount that base plate, packed in envelope #8

Take the M6 screws and hexagonal spacers from the plastic bag inside envelope #8. The spacers will serve as a transport-lock system, once the player needs to be moved in a car or shipped. The spacers have 2 different sides; one end enables easy access for the screws. The other end shall be used (left on the photo)

Take the 2 longer M6 screws, and mount the spacers to the metal base. Tighten them very well, using wrench size 10

Then take 4 pieces M3 spacers (20mm), and 4 pieces M3*16mm screws. Mount the spacers at the other end.

The result should look like similar to the base shown right.
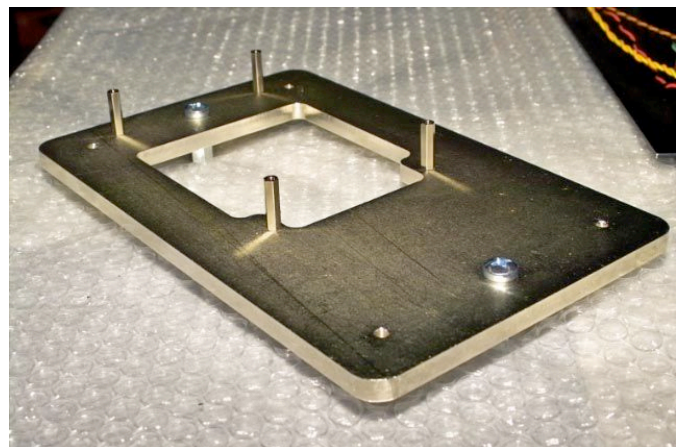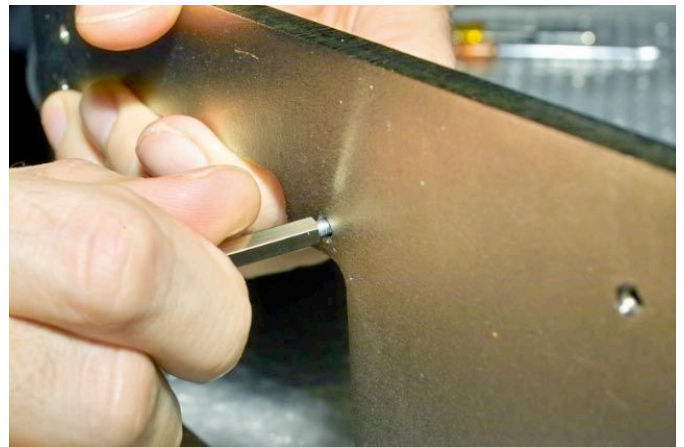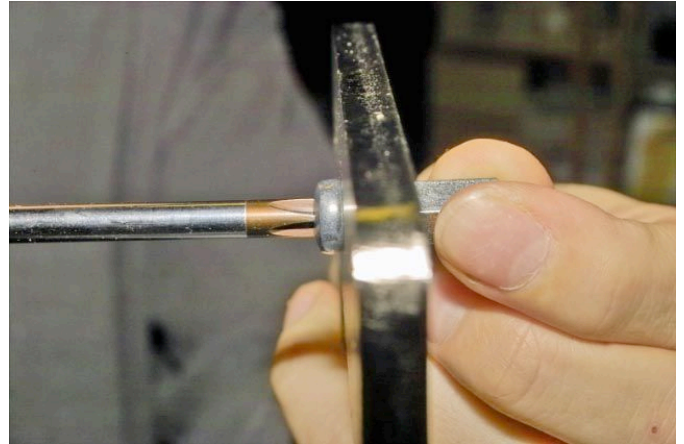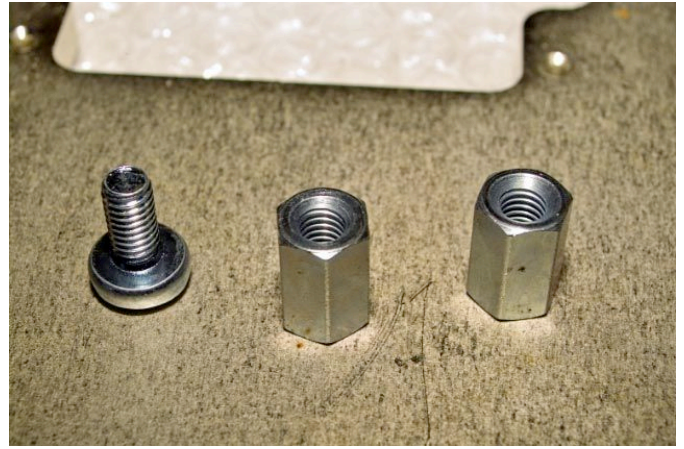
## Mounting the base plate

Next take the 4 rubber dampers and the 8 pieces plastic spacers. Mount the dampers on the base, at the same size as the 2 hexagonal spacers are located.

Use 1 spacer for each damper. Do not use excessive force, but mount and tighten them by hand only.
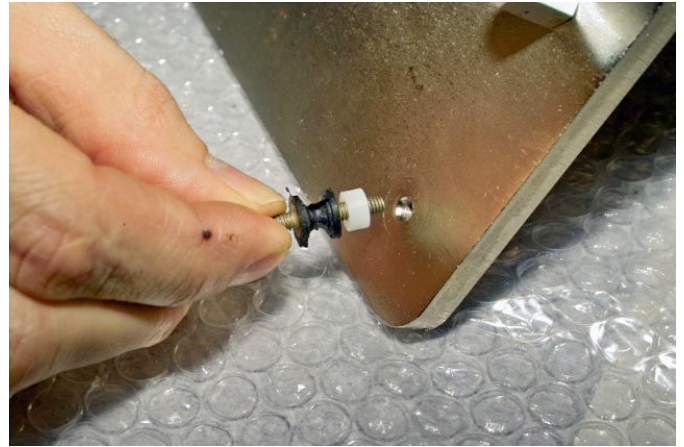


Put the base plate on the table, and put 4 spacers on the other ends of the dampers.
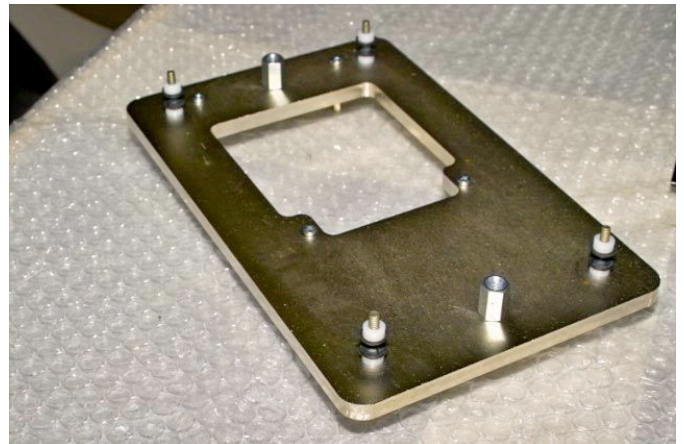


Put the CD player on its side; ask someone else to stabilize it.

Place the base plate in the 4 remaining holes on the CD player chassis. This should be done with the player standing vertically, to prevent the spacers from dropping of the dampers.
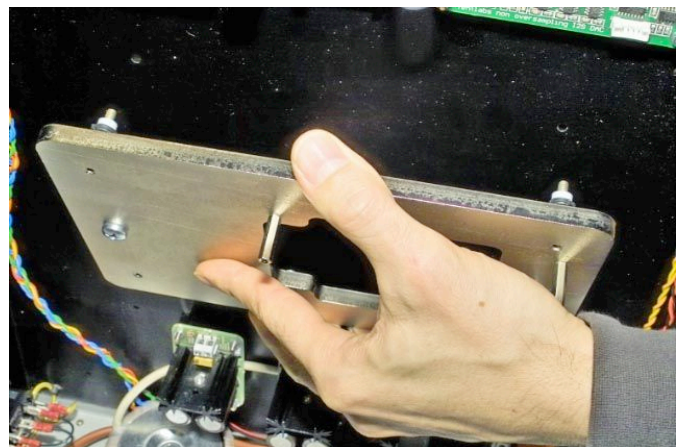


Fix the base plate by mounting the 4 pieces M4 nut, do not tighten them too much.

## 11. Unpacking the CD-pro drive

With the base plate mounted, all should look like the photo right.

The drive will be mounted on the spacers on the base.

Carefully unpack the CD-pro drive from the white package

**Warning !**
Do not touch the lens by hand. It is protected by a plastic seal. Leave the seal in place.

**Warning !**
Do not place the drive upside down as that will damage the spindle motor bearings

**Warning !**
Always hold the drive by the aluminum housing, avoiding contacts with the electronics.

Remove the original bolts and springs from the drive as we do not use these here.
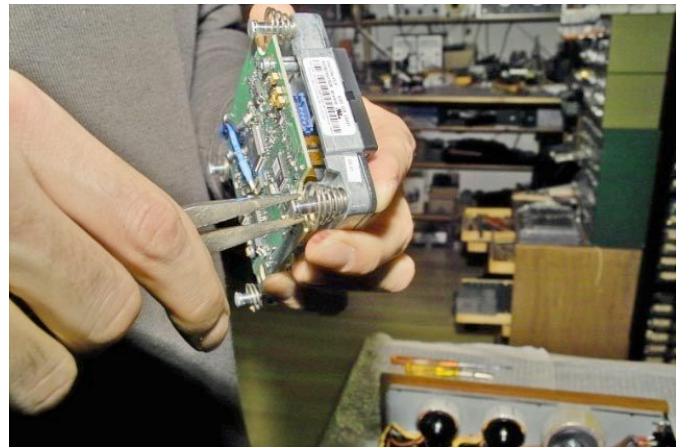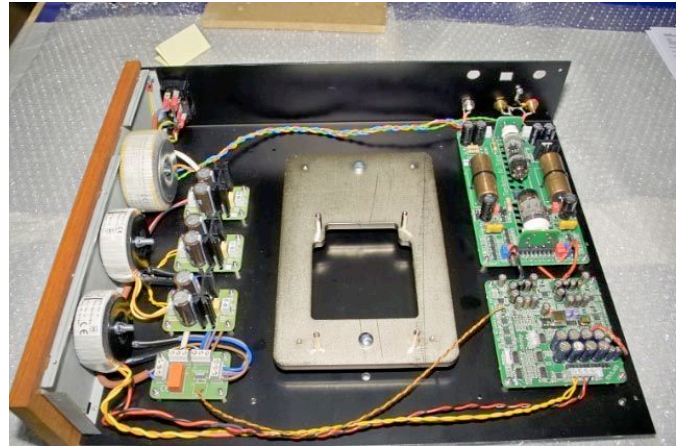
## 11. Mounting the CDpro drive

Carefully place the drive on the 4 studs.

Both **blue** and **black** coaxial wire should stick out to the right, pointing towards the DAC board, as shown right.
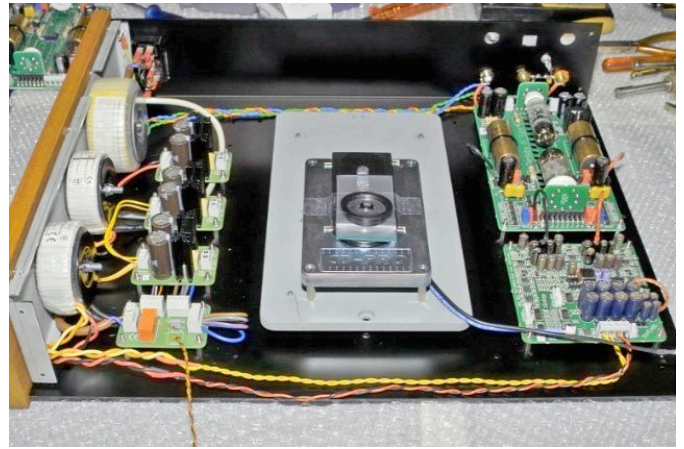


Secure the drive with 4 pieces M3*16 bolts, from bag #2
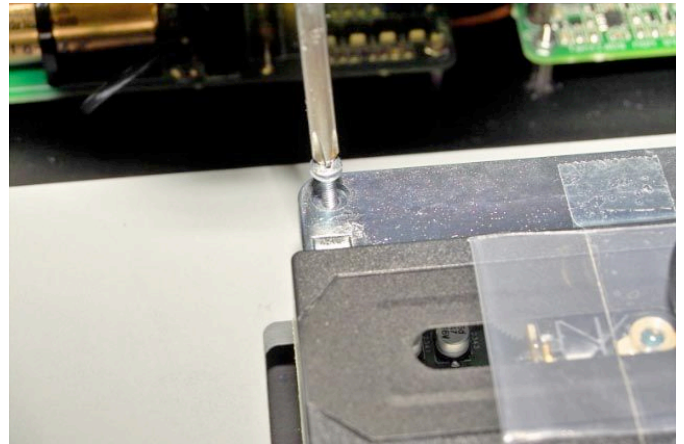


Connect the **blue** coax with connector

*"loader CLK"*
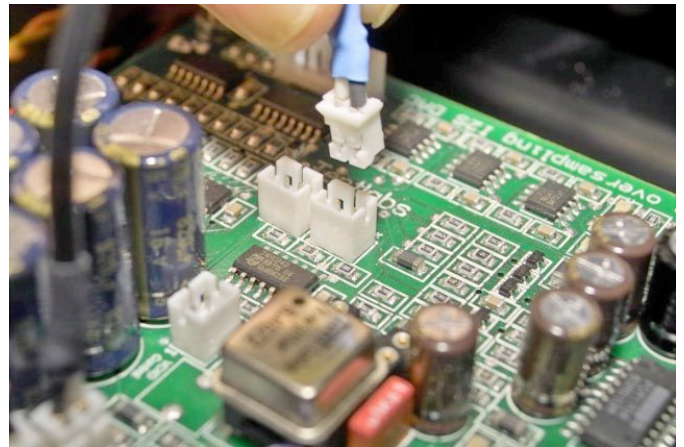


Connect the **black** coax with connector

*"SPDIF from loader"*
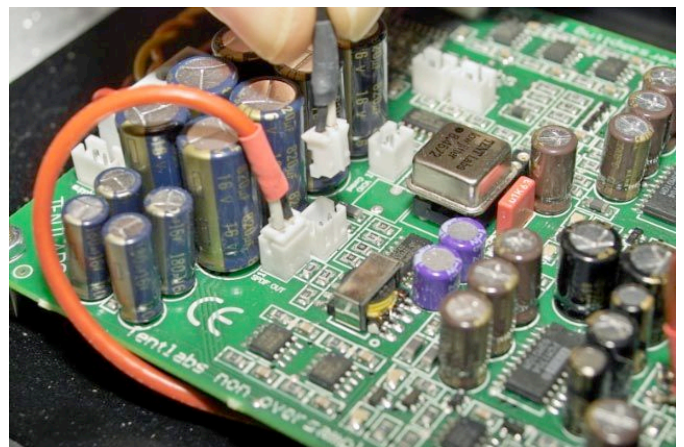
## 12. Mounting the right side panel

We now are ready to mount the remaining side panel.
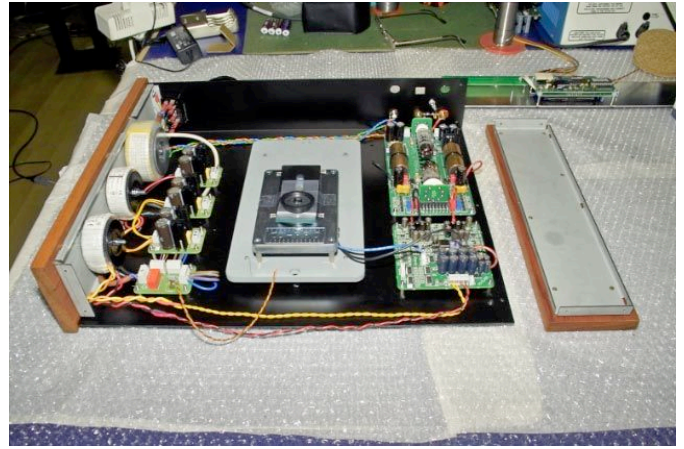
Put the CD player vertically, make sure it is stable or ask someone to assist you.

Place the right side panel.
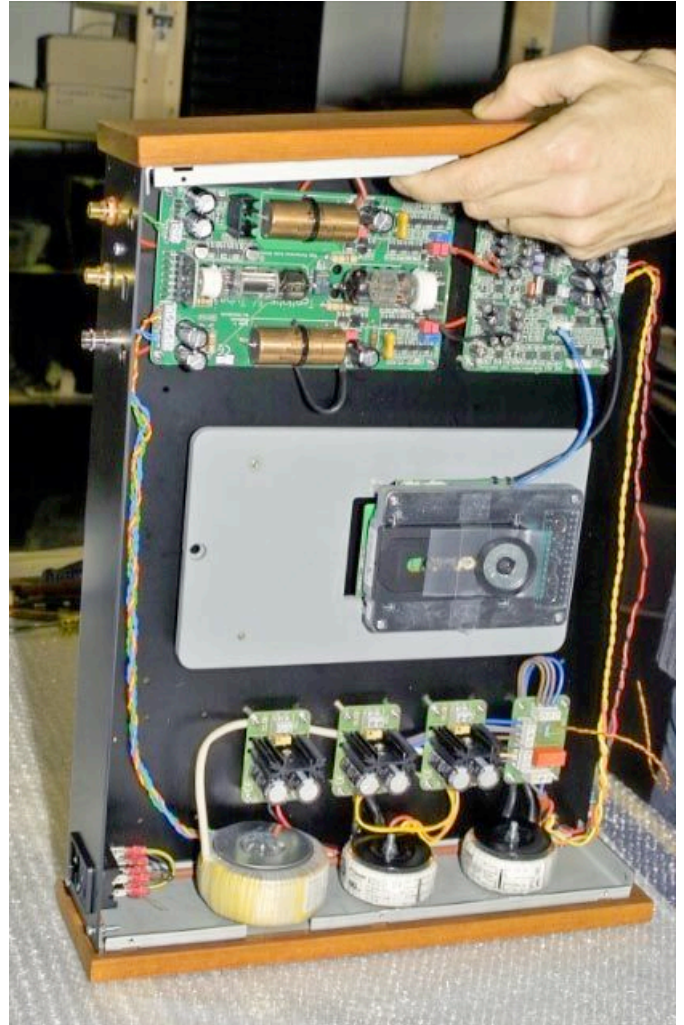
Fix the panel with M3*6 bolts
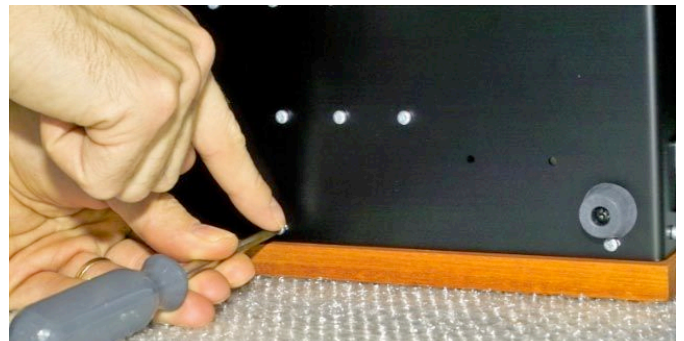
## 13. Preparing button PCB

We now leave the cabinet to rest and focus on building the front panel.

The parts required can be found in bag #3

The button PCB needs to be stuffed with the switches, and the control wiring towards the Display PCB needs to be connected.



Carefully place the 5 switches; no excessive force should be required. It may help a bit to straighten the legs from the switches.
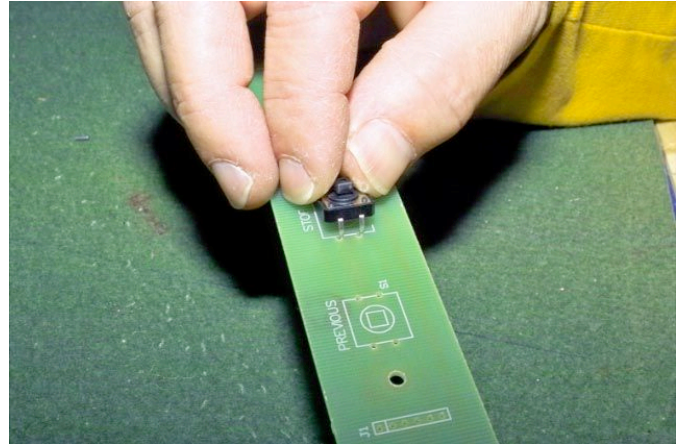


The board should look like this
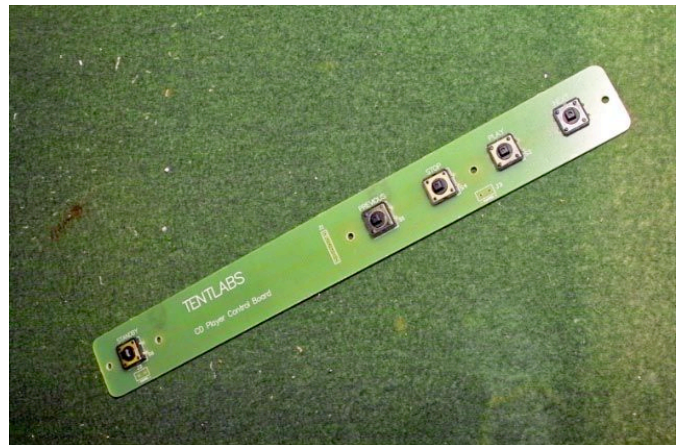


Reverse it and solder all 20 joints

## 13. Preparing button PCB
Once all switches are soldered, the wiring can be prepared.
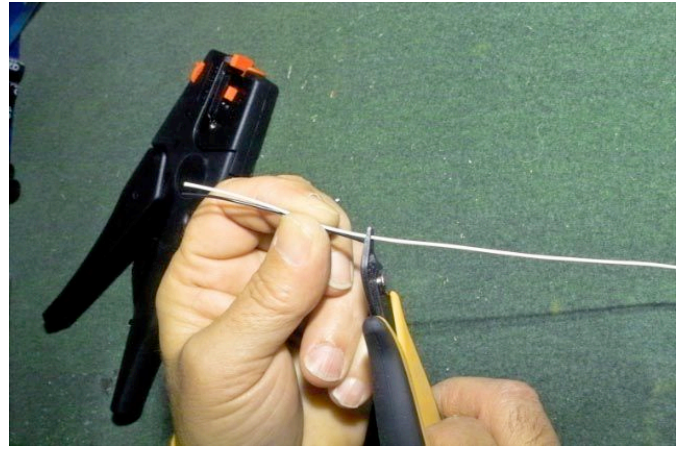


Take the **black** and white wires and cut 5 pieces white wires and 1 piece **black** wire, all become 8cm. Strip both ends about 1 mm (or a bit less, if you dare)
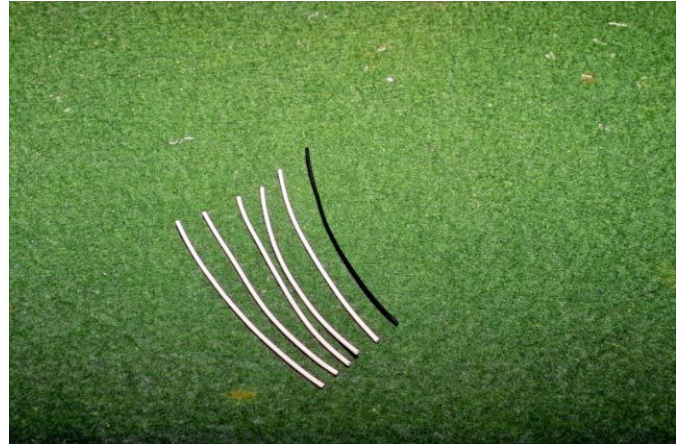


Pre tin all ends
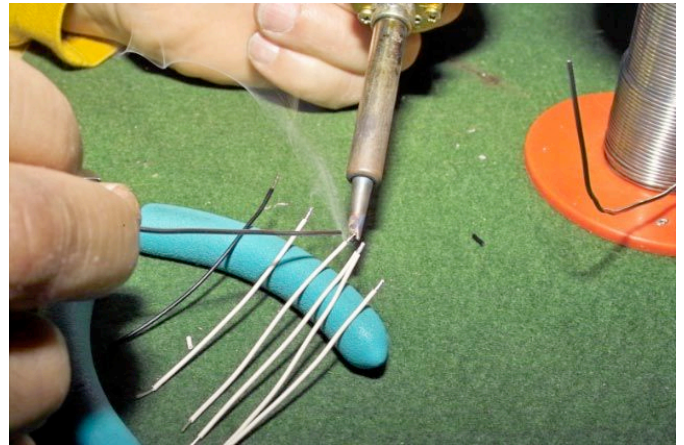
## 13. Preparing the button PCB

Reverse the PCB, and put the **black** wire in the hole with the square pad

**Note**: The supplied button PCB is a bit smaller than on the photo
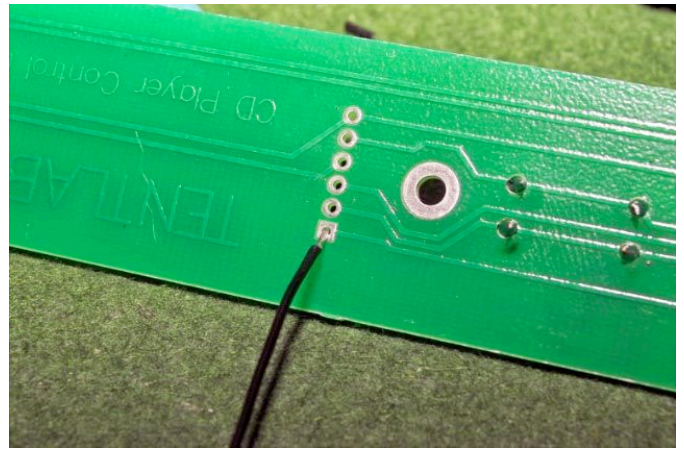


Solder the wire and repeat for the other 5 white wires
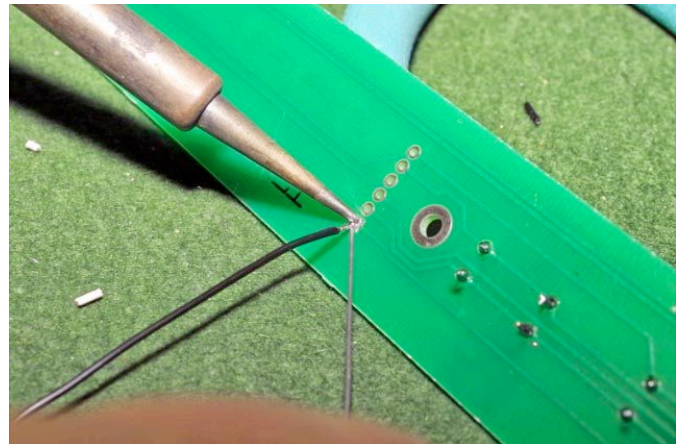


**Note:** The board is reversed, the order of colors may confuse you.
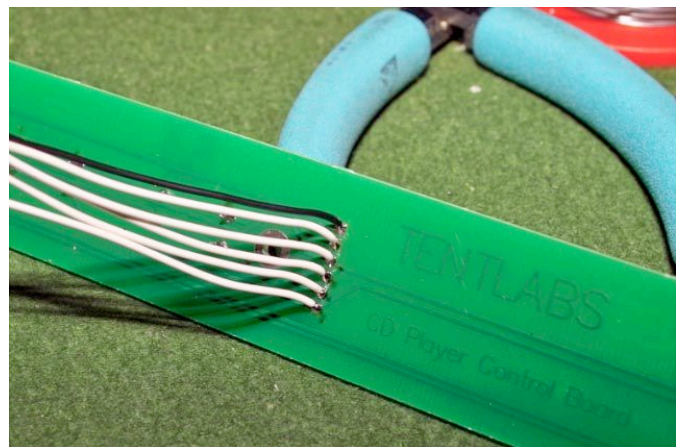


When the board is rotated, it should look like this. Cut away remaining wires, if any
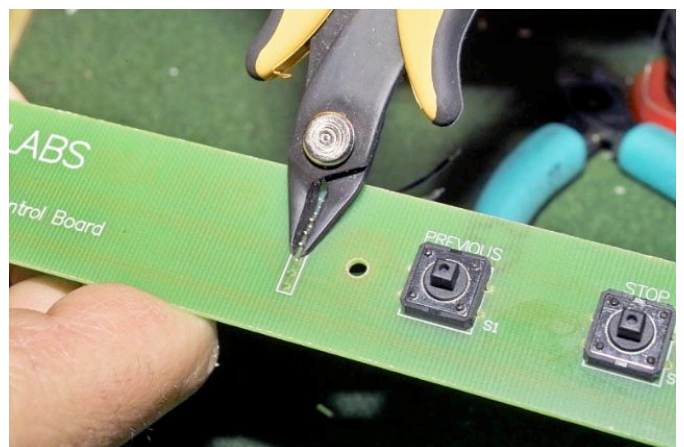
## 14 Mounting the button PCB

Carefully unpack the front panel and lay it down on a clean cloth or bubble foil.

**Warning!**
The front panel is sensitive to scratches.

On the photo, the blue display is already put in place. The blue display has protection foils on both ends. Leave these in place while working.

The Display should be gently pressed in place from front to back. Secure it with 4 small drops of glue, put in the inner corners (not shown on any photo).

Put 5 pieces M3 nuts on the studs that are in the row with the 5 big holes. Mount these such that about 3 mm of thread remains

Unpack the 5 buttons, and gently put them in place (don't force them, they fit in one orientation only).
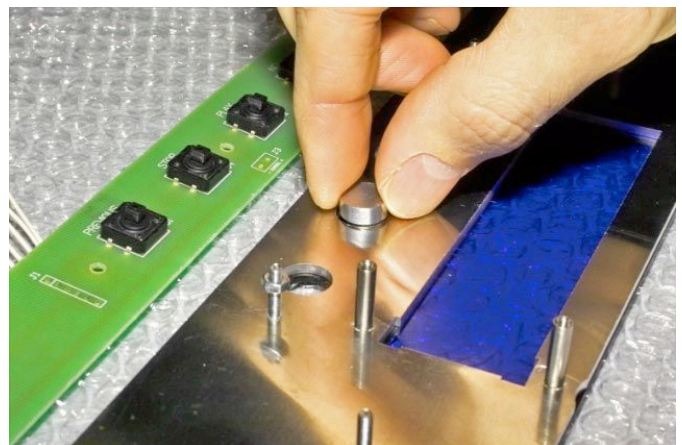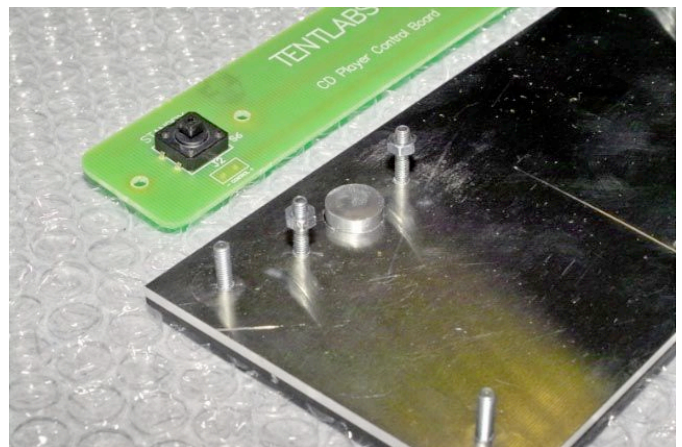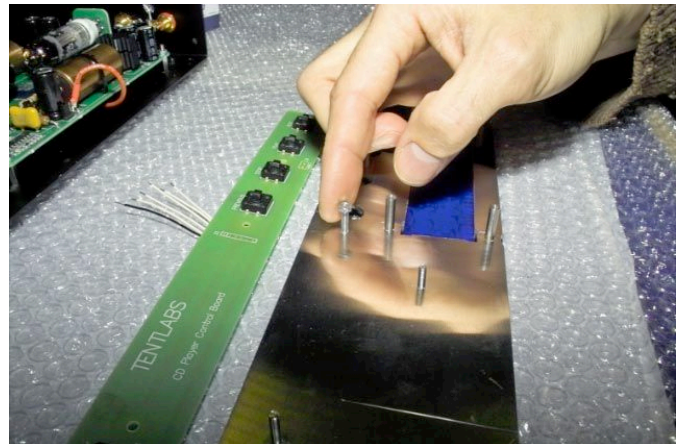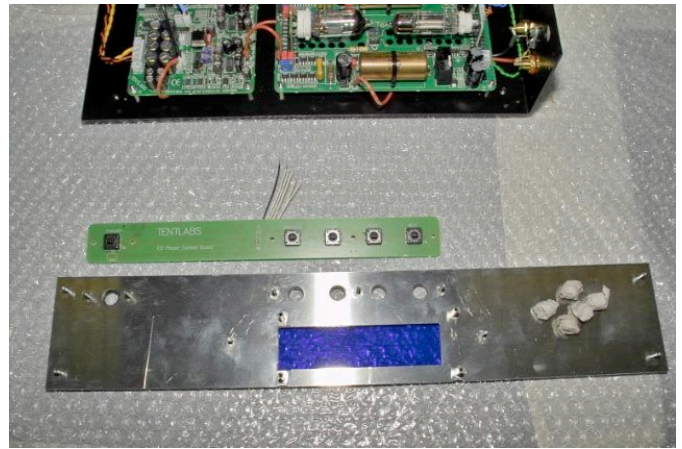
## 14. Mounting the button PCB

Take the prepared button PCB, and put it in place, on top of the threads sticking out.
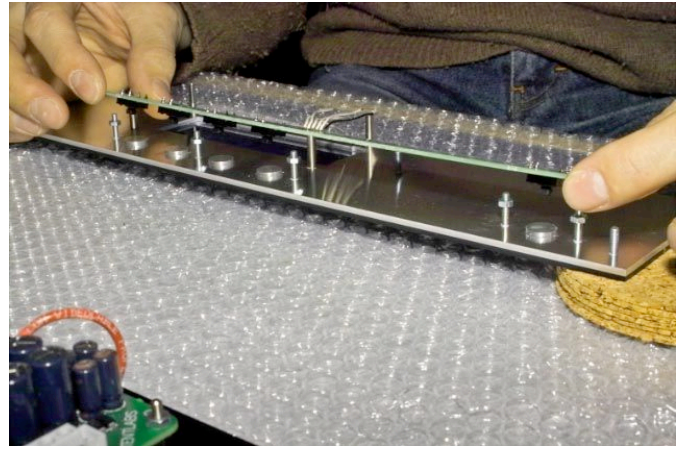
Now see to it that the switch "just touches" the button

Using the pair of tweezers, the M3 nuts can be adjusted to assure the switch touches the button; there should always be a slight amount of tension between switch and button, to avoid the knob hanging loose in the frame.

However, too much tension will push the button continuously, which should be avoided.

Once this is secured, one can put another M3 nut in place and secure the button PCB. Do this switch by switch, and check the button / switch each time. It should gently click when actuated. Check this before continuing, as it is a lot of hassle to correct for this later.
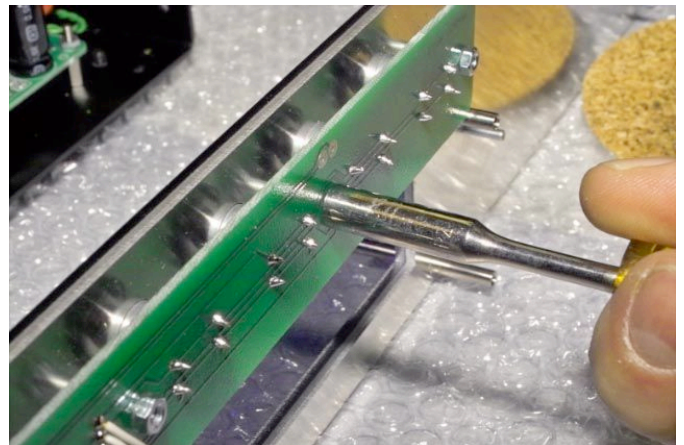
## 15. Mounting the Display PCB

Now it is time to mount the Display PCB.

Place the 11-pin header at he the solder side of the display section, with the short pins down.
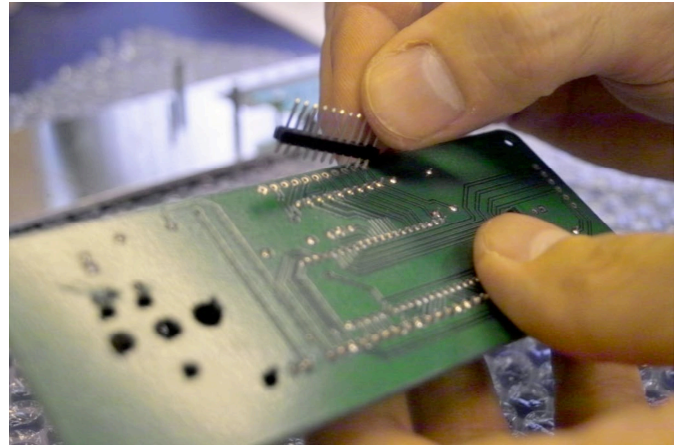


Reverse the board and solder the 11 pins as shown on the right.

**Important!**
Carefully remove the protective foil from the blue acrylic display (inside).
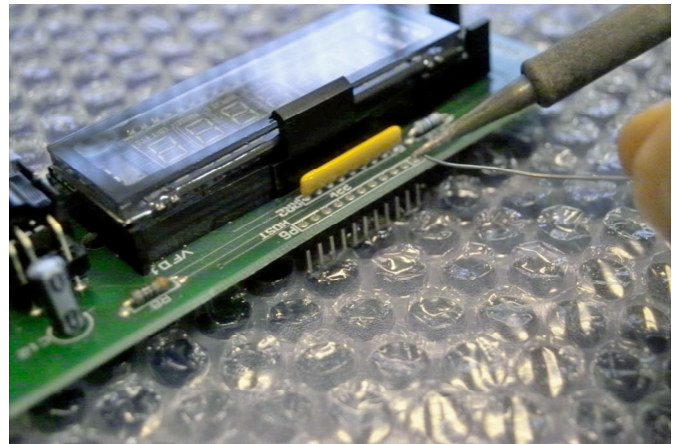


Place the PCB (containing the Display) on the supports, as shown right, with the display pointing down. Assure the correct rotation.

Temporarily secure it with 2 pieces M3*16 bolt, do not tighten these.
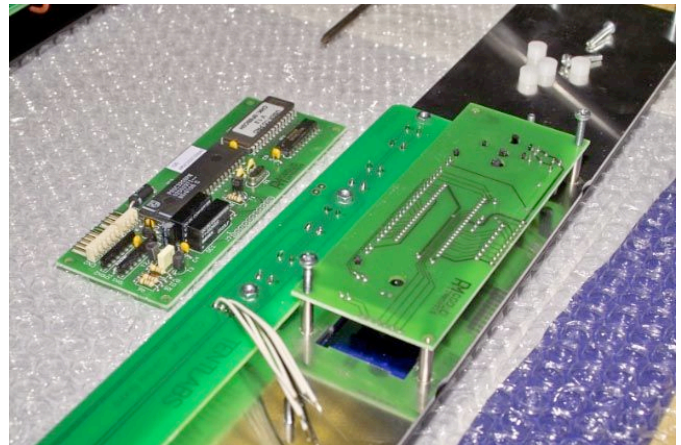


Solder the black wire to the lowest contact of this board

## 15. Mounting the display PCB

Solder the remaining 5 pieces white wire, remove the 2 temporarily placed bolts and place 4 pieces plastic M3 spacers on the corners of the board.
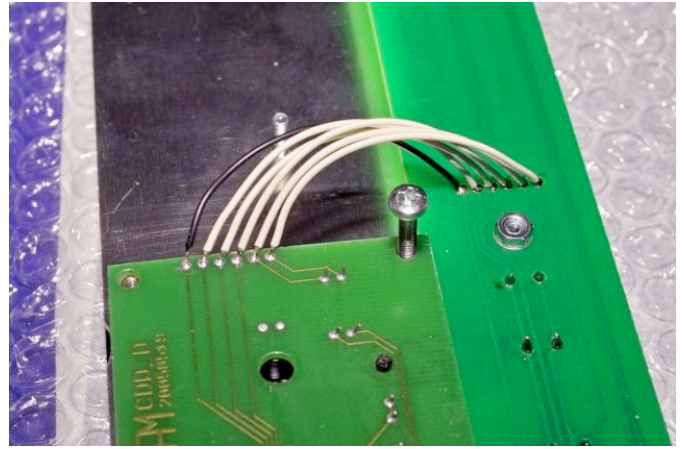
Carefully place the other PCB of the Display section on top of the spacers, watch the orientation, the 11-pin header should coincide with the 11 holes in the other board.
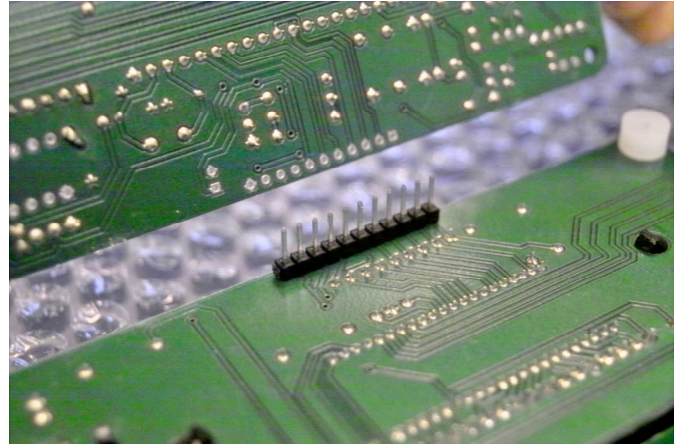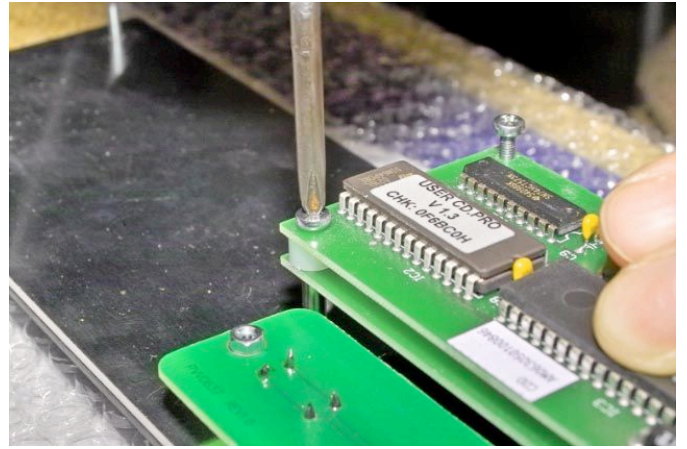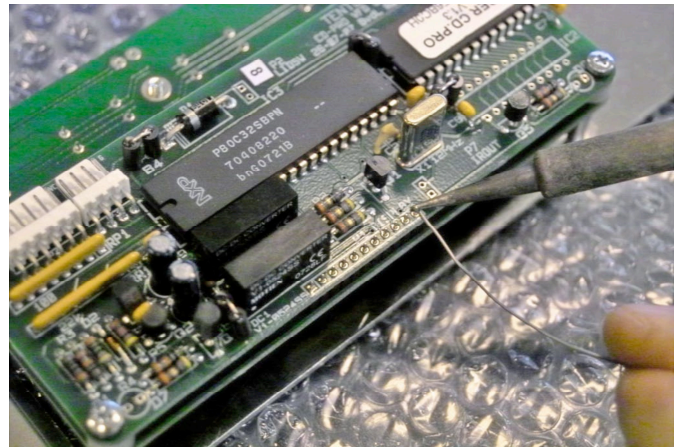
Secure both boards with 4 pieces M3*16 bolts
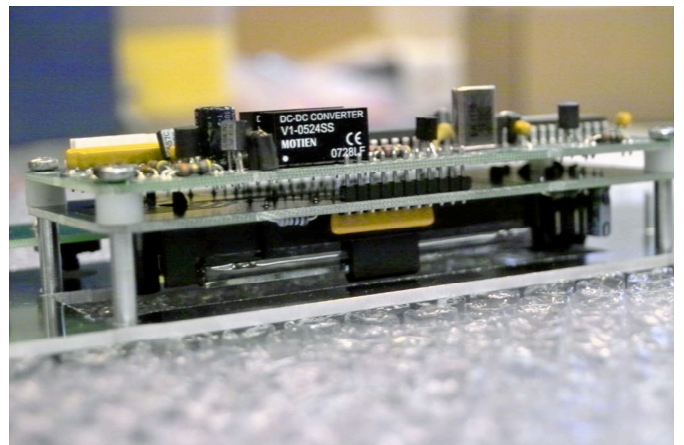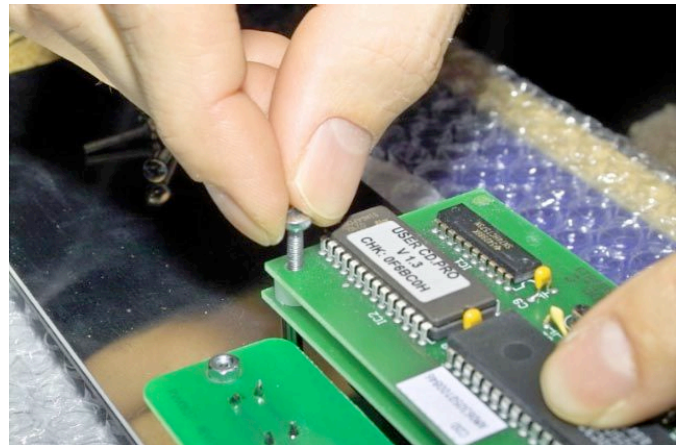
## 15. Connecting the display PCB
Fix the 4 bolts on the corners.



Solder all 11 contacts.

## 16. Connecting wiring
### +5V Display / DSA interface

Take the Display wiring from bag #6. Take the wire set with 2 pairs **orange** / **black** wire with the connector on one end, and twist the
- inner pair of **yellow** / **brown** wires
- outer pair of **orange** / **black** wires

The inner pair shall be connected to the 2 pole connector of the mains PCB. The photo right shows soldered connections, but now a screw terminal is used. Respect the order, **yellow** goes to "**+**", **brown** goes to "**-**"

Now take the outer pair of **orange** / **black** wire and connect the **orange** wire to the "+" connection of the 5V regulator next to the mains PCB. The **black** wire goes to "-".

Route this wire below the base towards the front, with the connector sticking out to the middle: It will power the display PCB.

Take the 6-pole wiring (**black to green**), and train the biggest connector below the base, towards the middle of the front panel: This wire will interface the display with the CDpro.

The other connector should stick out at the right side of the drive.

Connect this connector to the CDpro "DSA" connection. Watch out, only one orientation fits. Do not use excessive force here.
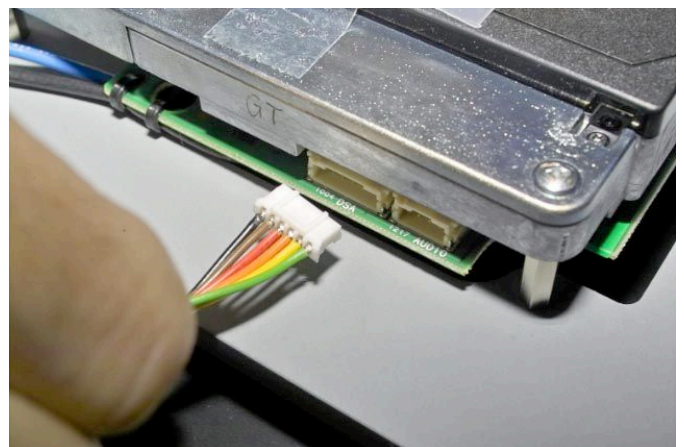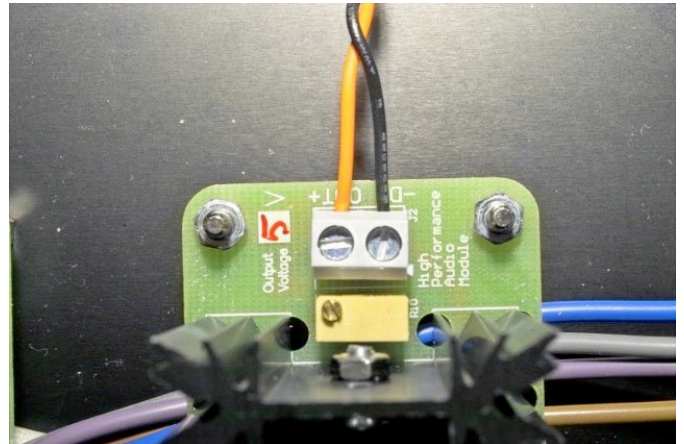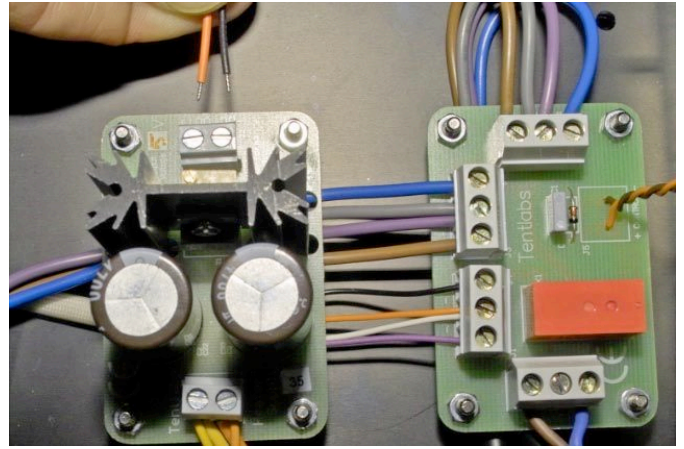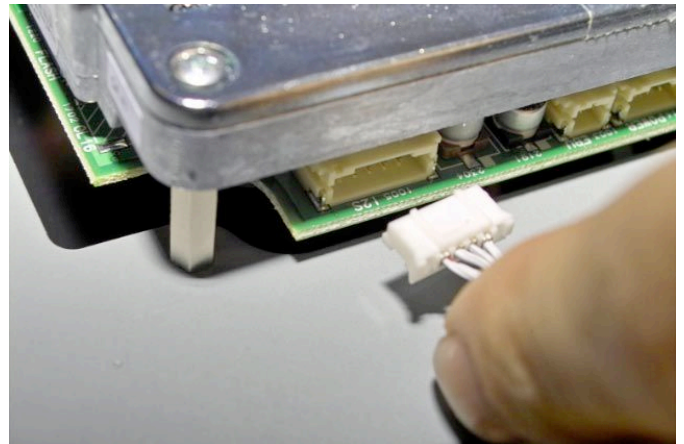
## 17. Connecting wiring
### I2S interface

Look in bag #6 for the **black** to <span style="color:orange">**orange**</span> cable (4 wires, with equal 6-pole white connectors on both ends), and route the cable below the base.
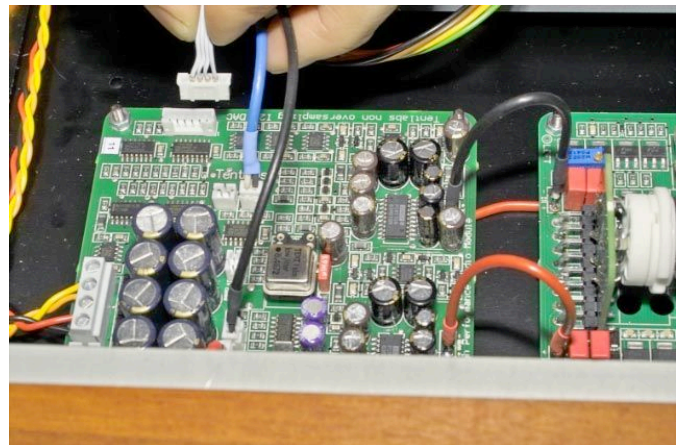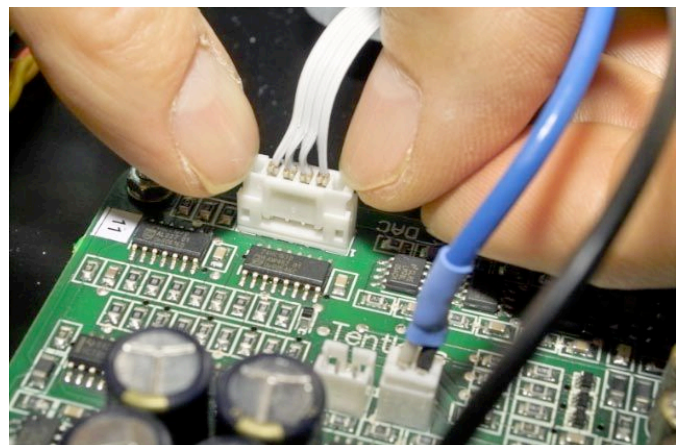
**Note:** The photo shows a grey cable
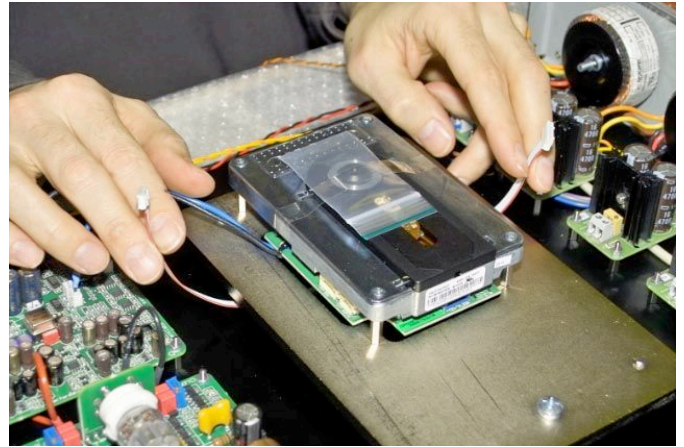


Connect one end to the CDpro connection "I2S", the cable stays below the heavy base on which the drive is mounted



The other end goes to the DAC PCB, connect to the I2S input.
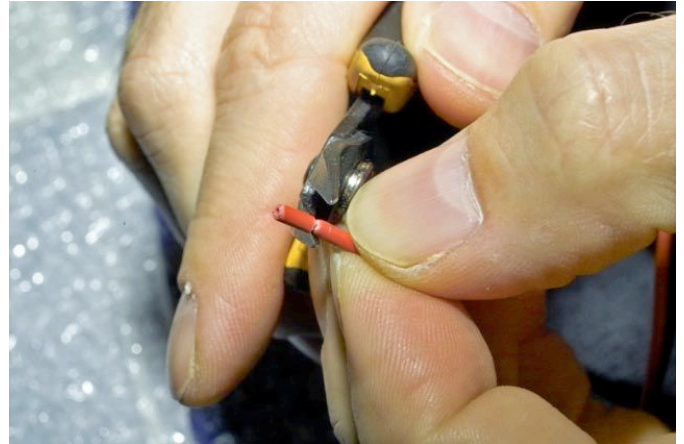


Also here, only one orientation fits……

## 18. Preparing wiring
**+5V and +9V to CDpro drive**

Find the cable with bare ends on one side, and a 4 pole connector on the other.

Strip all ends using a stripper

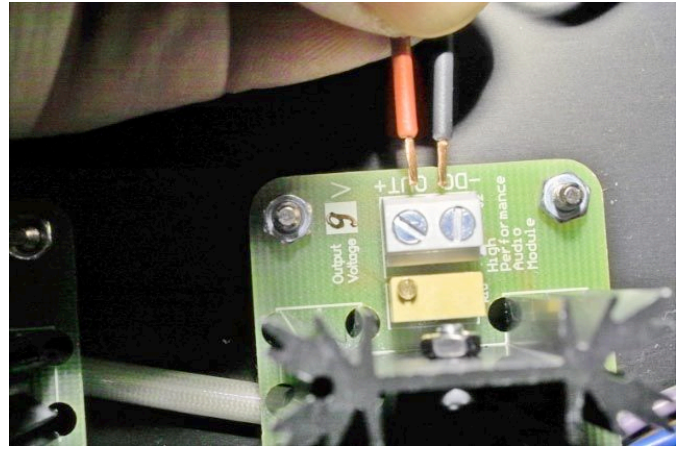or a cutter. The latter requires more practice, but try it if you dare !
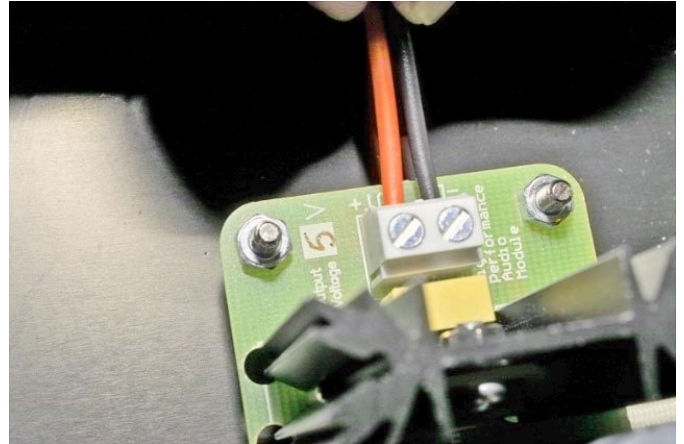
Strip about 6 mm of all ends.

## 18. Connecting wiring
### +5V and +9V to CDpro drive

Find the shortest pair of wires, these go to the 9V regulator in the middle. Connect the **red** wire to "+" and the **black** wire to "-"
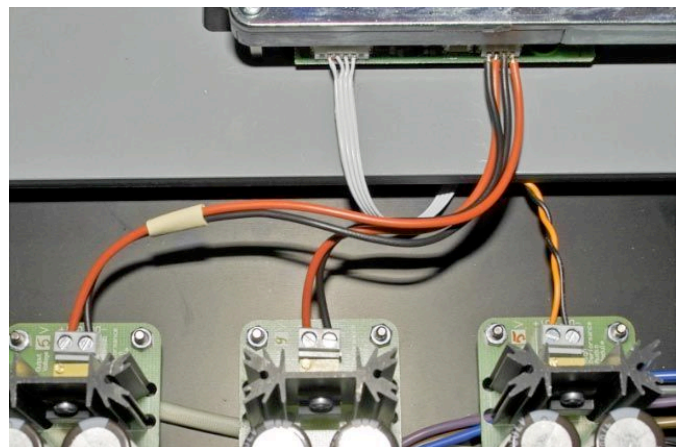
The remaining pair of wires, the longer ones, go to the 5V regulator. Connect the **red** wire to "+" and the **black** wire to "-"

Finally, fit the power connector to the CDpro "power" connection.

In the end, the configuration looks like this.

## 20. Building the bridge

After a lot of electrical work, we now switch to mechanics.

Unpack the carrier support brackets and the drive cover (parts 9, 10 & 11). The parts may contain some sharp edges, so take care when handling.

**Note**:
Inside the package, also a shaft is present. Gently remove it, and put it away in a safe place.

First, the left side (#9) and the cover should be put together. A snap fit construction will connect the parts. Stick the 2 tabs in the slots.
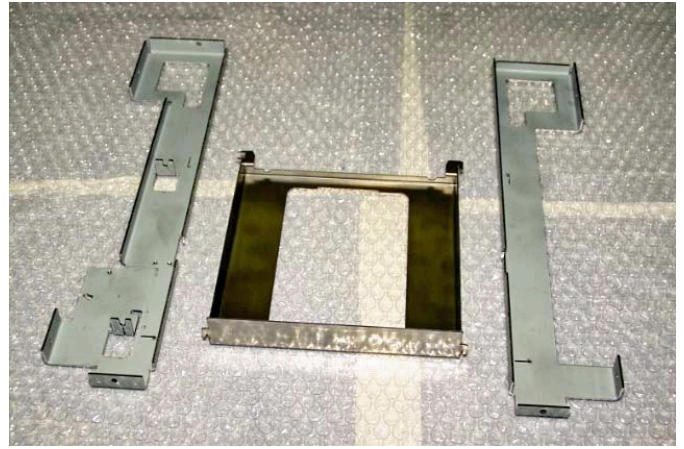






See to it that the part fully fits in.

## 20. Building the bridge

Now reverse, and at the other side it should look like this.

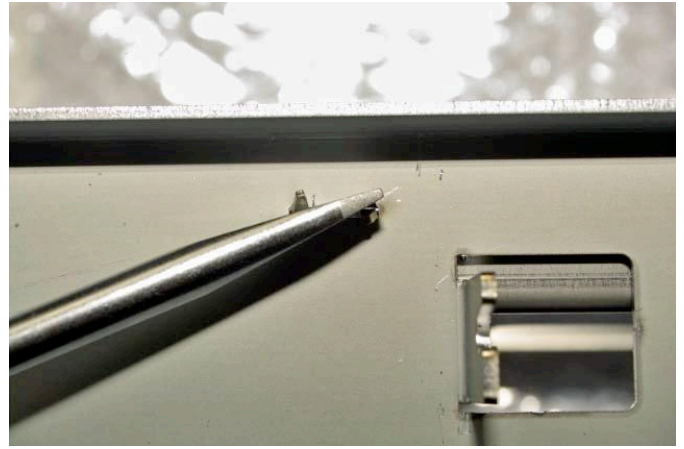With a flat nose plier, the tab sticking out shall be slightly bent.

The result should look like this

## 20. Building the bridge

The other tab consists of 2 points sticking through. These should be forced outside, using a screwdriver.

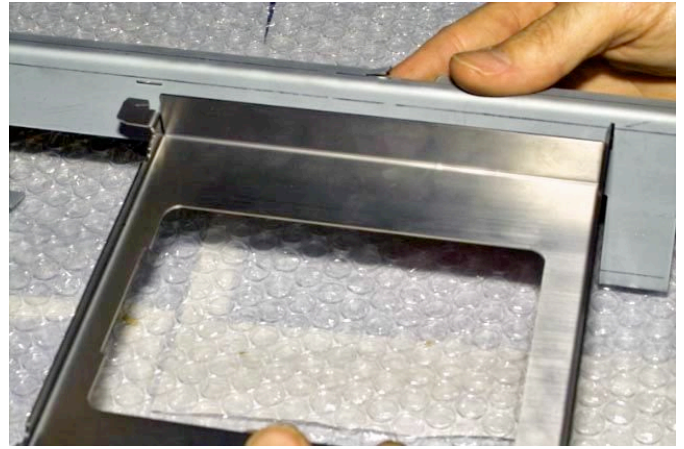Use a hammer to carefully flatten these points
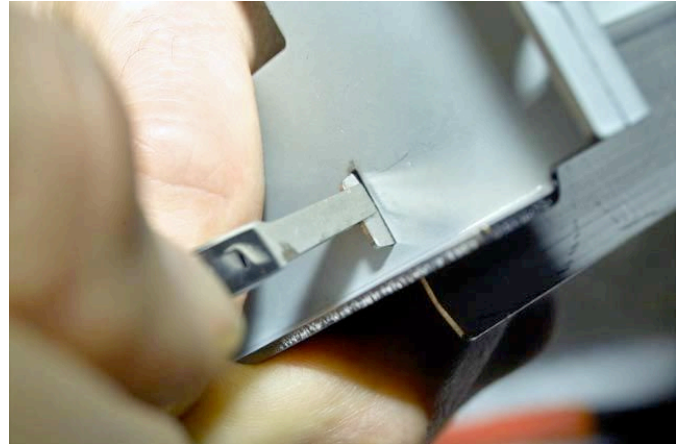
The result should look like this

## 20. Building the bridge

The other side (#10) follows. Carefully bring the tabs in place, and rotate to the other end.

Check that these parts fit well together.



With a flat nose plier, the metal tab sticking out shall be slightly bent.
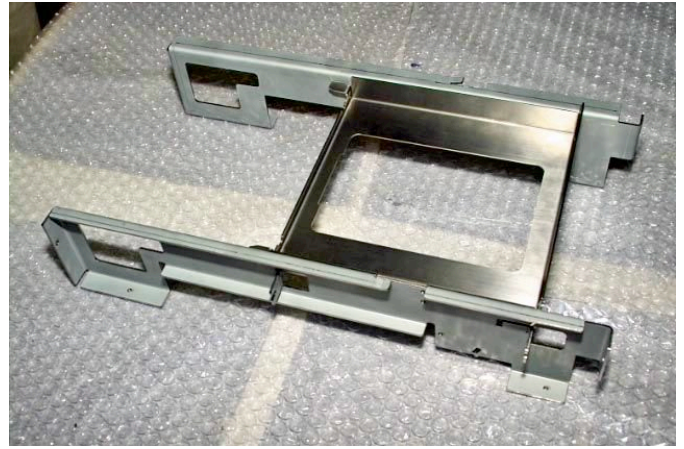


Do not bend further than shown right

.



Repeat for the last tab sticking out of the slot. Again, check that both parts are pressed well together prior to bending the tab.

## 20. Building the bridge
The fully mounted bridge should look like.
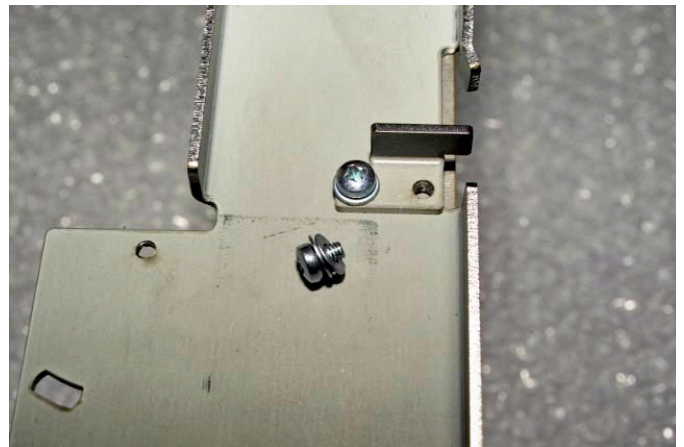Take the plastic bag inside envelop #9



Lay all small parts down



Mount positional bracket (#20) using M3*4 screws (#21) and 2 rivets below each screw.

Put the bridge away for a while.



Take the drawer parts (#12, #13, #14, #15)

## 20. Building the bridge

**Notes:**
- Use threadlock or alternatively nail polish on all pivot holes to be mounted
- Apply to inner threads only, see picture on the right

Start with the right leaver. Find this part (see second photo on this page), and position leaver 1 (#13) as on the photo right. Note that the leaver is bent outwards.

Apply some nail polish, and mount it, using an M3*4 screw and a black pivot washer.

**Warning**:
Do not tighten, but mount until a bit force is needed, at this point you should stop, and check if the lever easily rotates.

Give the nail polish some minutes to harden, and then repeat for the other side.

## 20. Building the bridge

Now take part #15 (hatch support), and position it as on the photo.

**Note**: This hatch contains 2 trim-screws; these will be used later on.
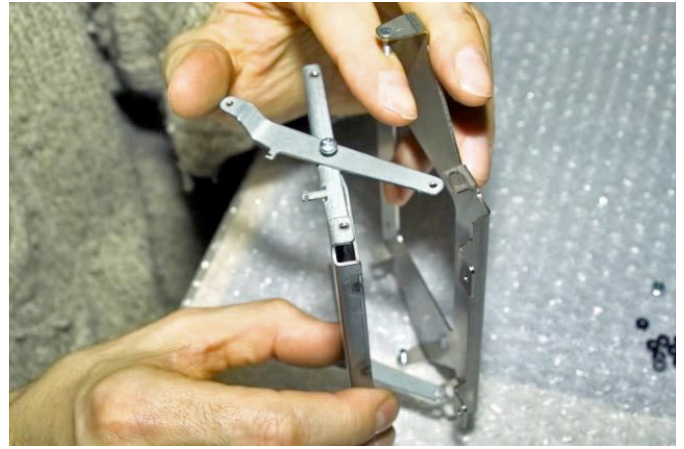
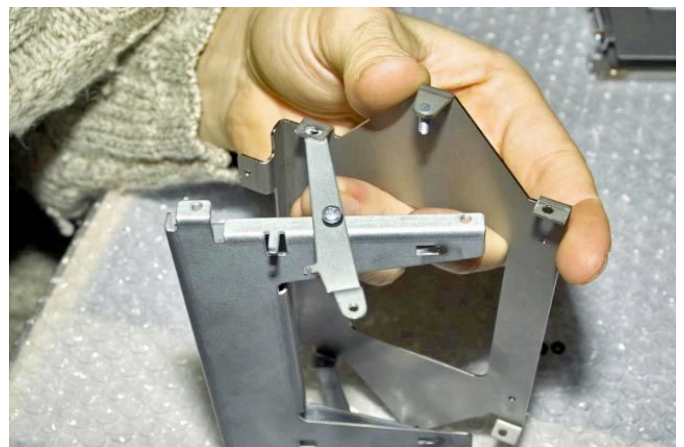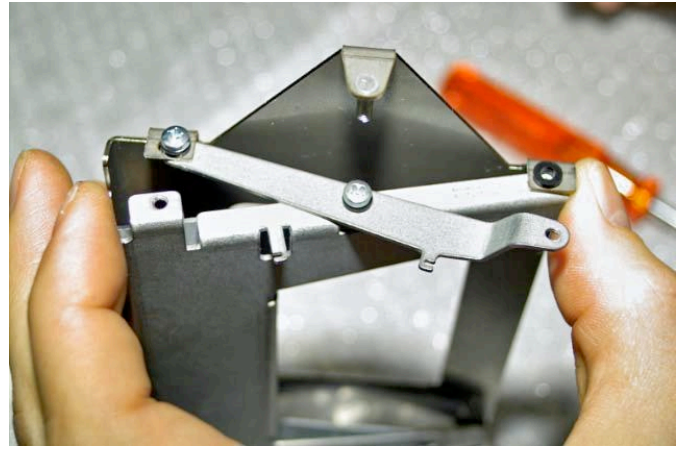Apply some nail polish, and mount the next, again using an M3*4 screw and a black pivot washer.

**Warning**:
Do not tighten, but mount until a tiny bit force is needed, at this point you should stop, and check if the lever easily rotates.

Reverse, and repeat the other side. Remember to use nail polish…..

.

## 20. Building the bridge
Now the third screw can be mounted.

Also here, use nail polish on the thread, take an M3*4 screw and black pivot washer

Give the nail polish some minutes to harden, then repeat for the other side.

## 20. Building the bridge
Now 6 screws are mounted.

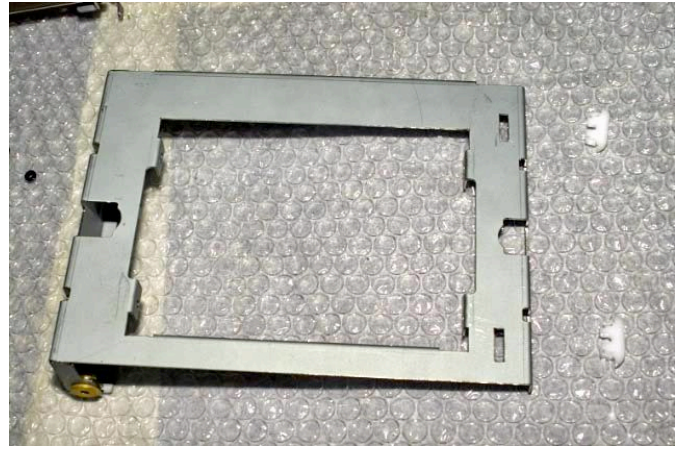Find the 2 springs, and fix these as shown on the photos.
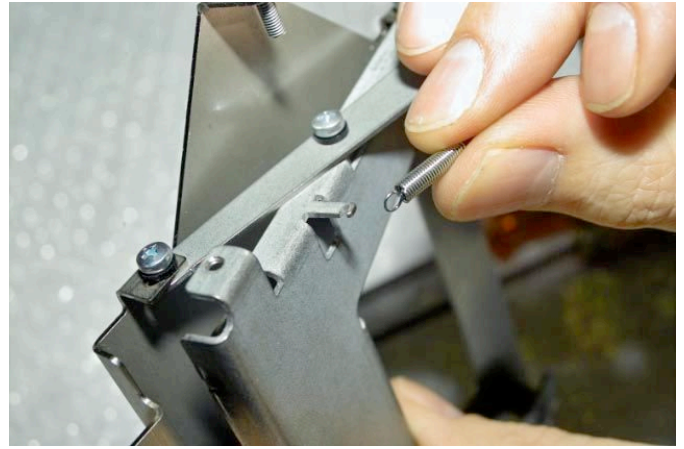


Once these are fixed, the movement of the whole can be verified. It should move smoothly.

Congratulations, you have finished one of the very tricky constructions of your CD player !

## 21. Assembling the Carrier
Carefully unwrap the carrier. Handle this part with care, as the angled shape should be maintained.



Take the 2 gliders (#19) and snap them in the 2 rectangular holes (from inside to outside).
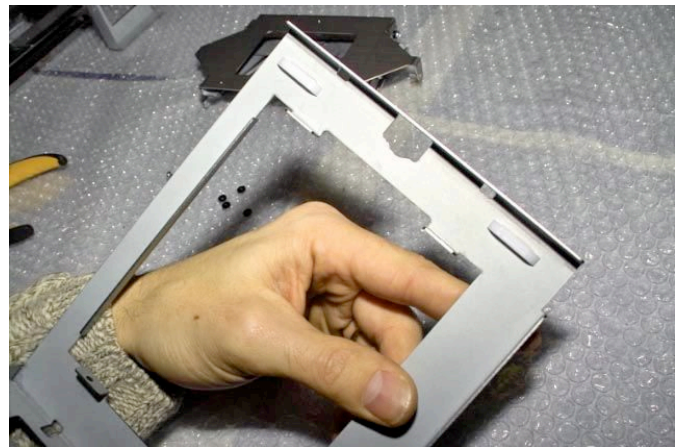




Prior to mounting the carrier, the bearings should be checked. Clean the shaft (#18) with white spirit, and carefully stick the shaft through the bearings. Gently move it 20 times back and forth.
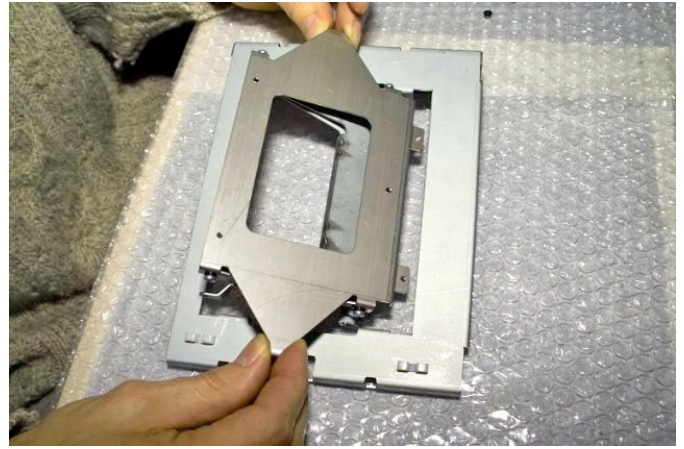
When holding the carrier under an angle of about 20°, the shaft should slowly slide downwards.



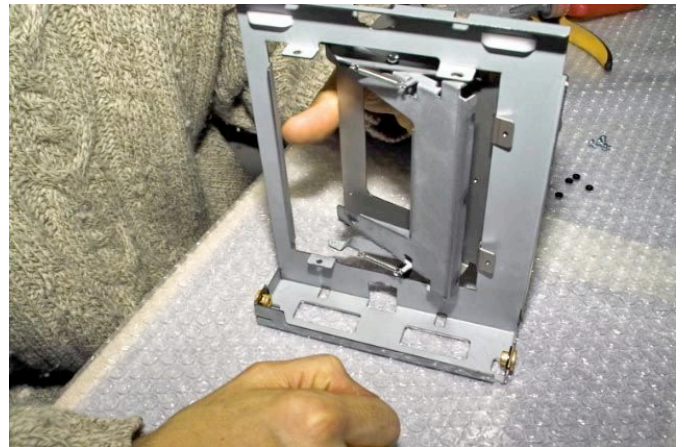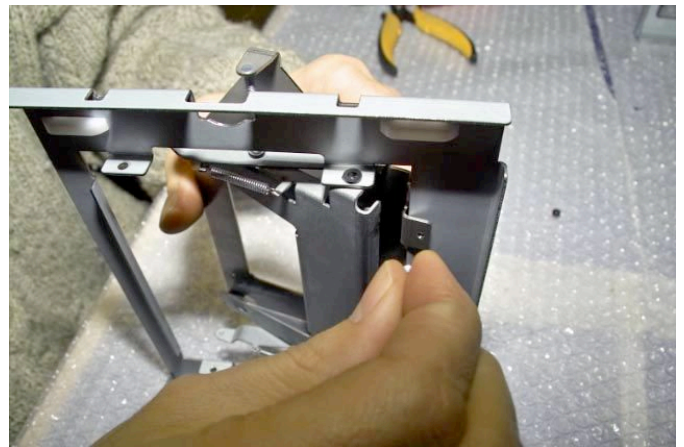Remove the shaft, and put it away on a clean cloth.
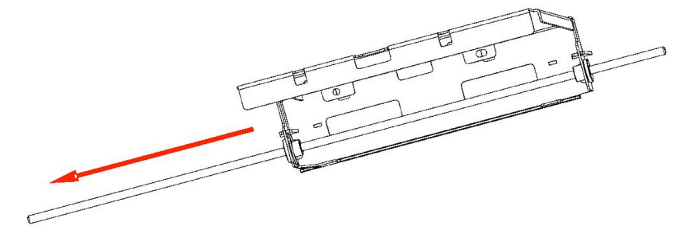
## 21. Assembling the carrier

Take the pre-assembled bridge, and carefully position it in the carrier.

Put it on its side, and maneuver it such that an M3 screw can mounted. Remember to use nail polish on the thread.

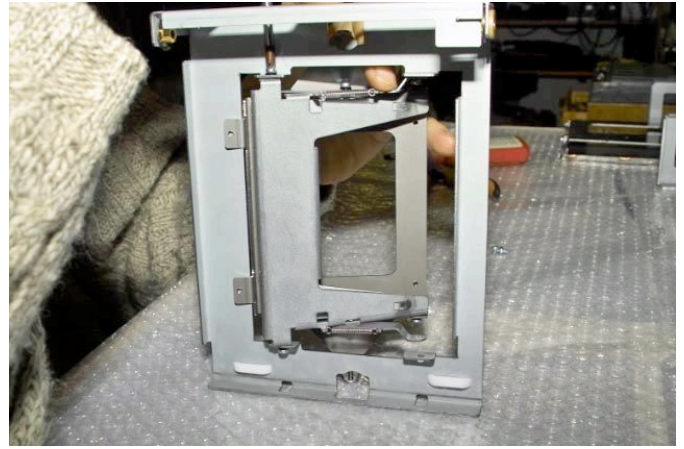Prior to that, place a pivot washer.

Did you use the nail polish? If so, mount the screw, the screwdriver fits in through the cutout.

Do not use force, but gently tighten, and check for smooth movement. Let it dry for a few minutes.
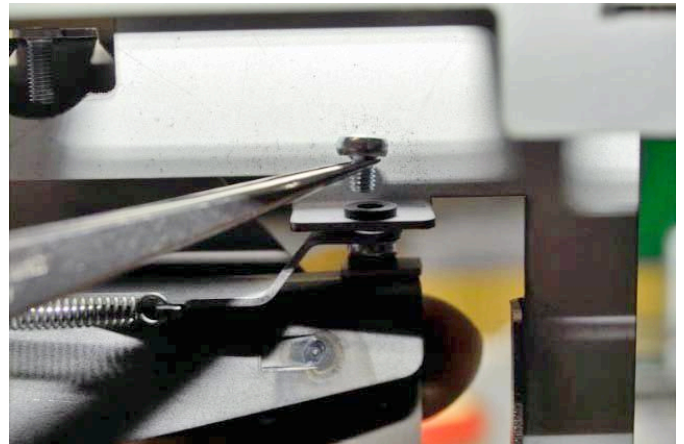
## 21. Assembling the carrier

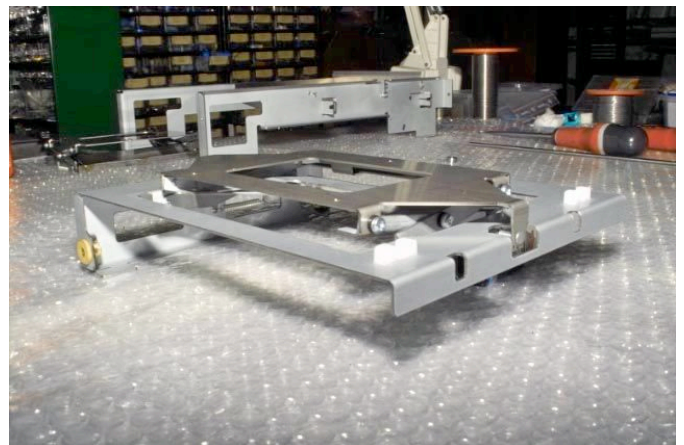Now reverse the unit, and mount the other washer and screw. Put nail polish in the thread first.

Repeat until all 4 screws are fixed

The result is depicted on the right. Now you can check for smooth movement.

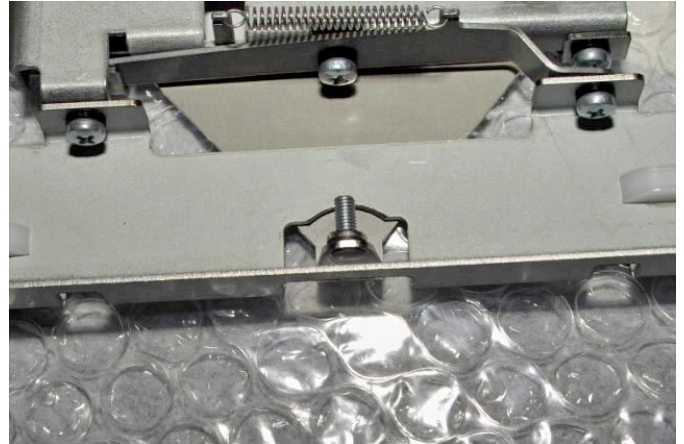Finally, put it upside down as preparation for the next step.

## 21. Assembling the carrier

If all is OK, the parts shown right should remain.



Put the special (thick) M3 rivet on the bolt.

**Note:** This ring is not anymore supplied
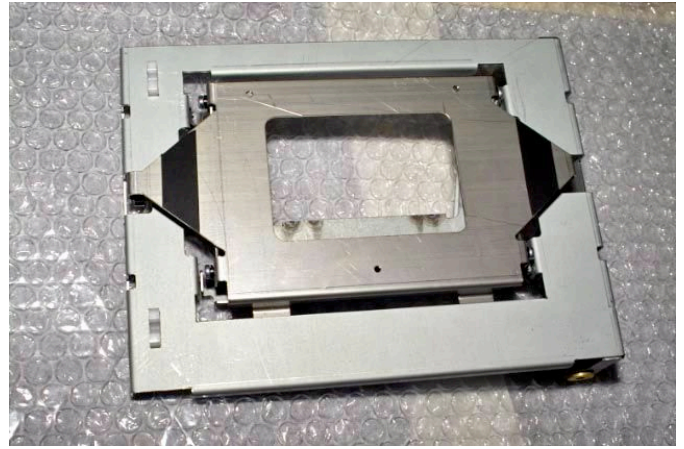


then comes the ball bearing,



and finally an M3 nut to fasten the bearing. Check if it runs smoothly, after tightening the nut.
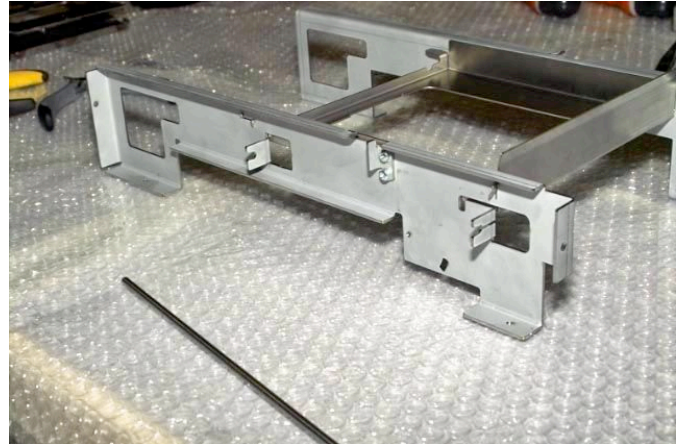
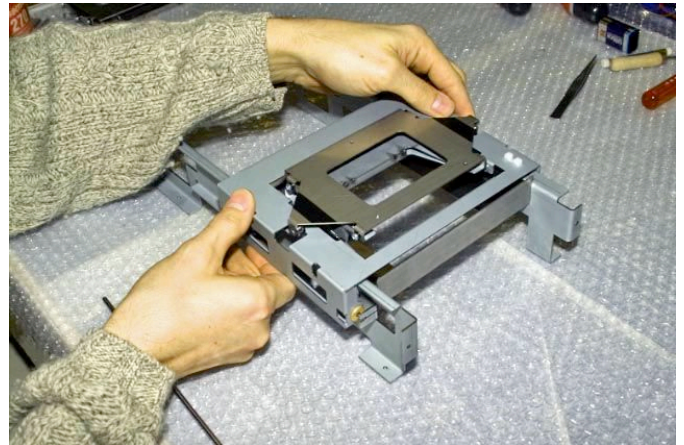## 22. Mounting the drawer in the bridge

Since both sub-assemblies are ready, they can be fixed together.
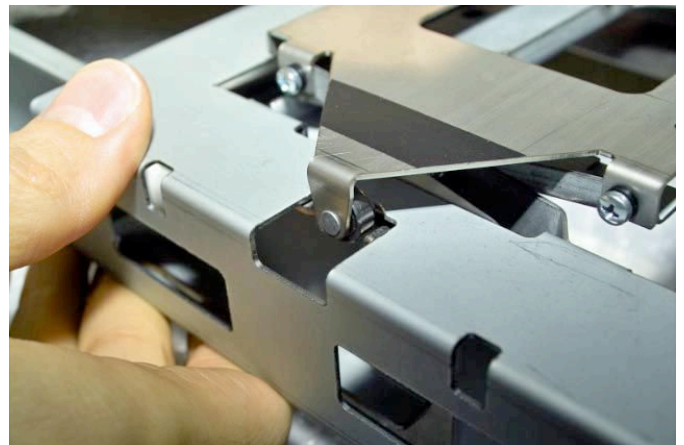


Place the bridge on the table.



Carefully bring the drawer in place



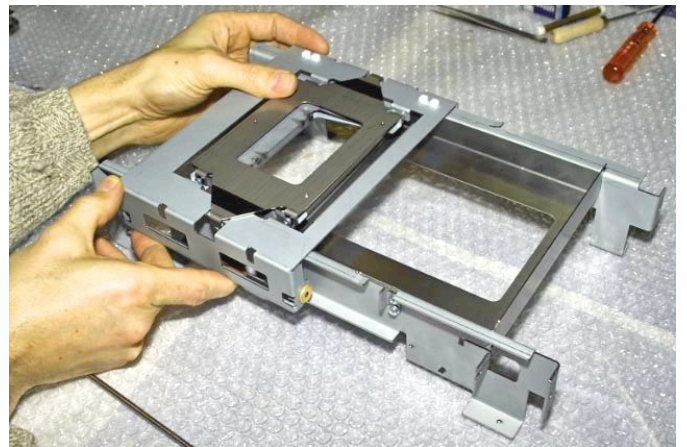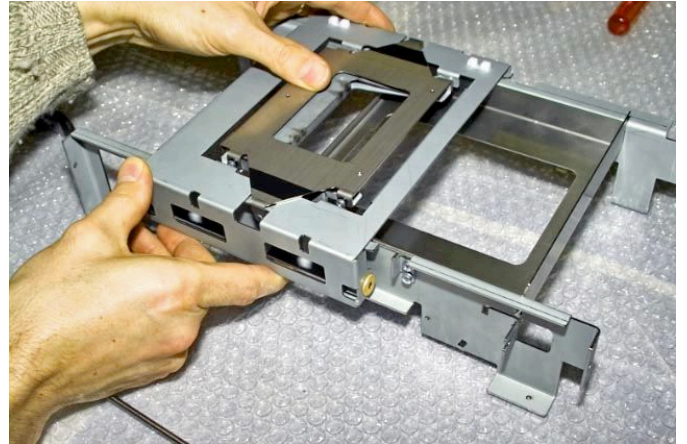Find the space where the ball bearings are going to fit in

## 22. Building the bridge

Press down the hatch support

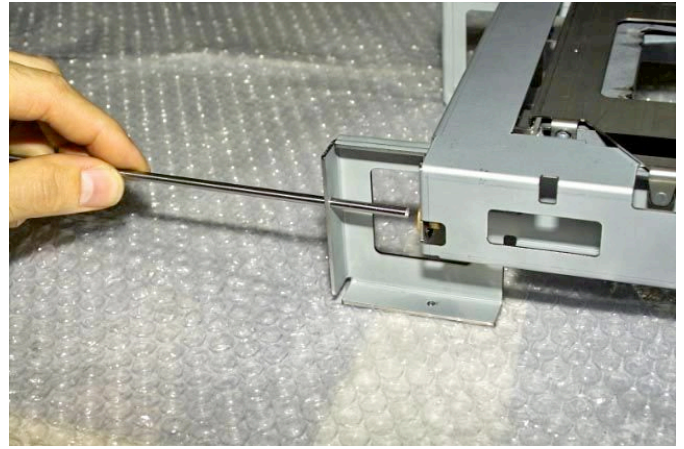And carefully slide the drawer to the back of the bridge.
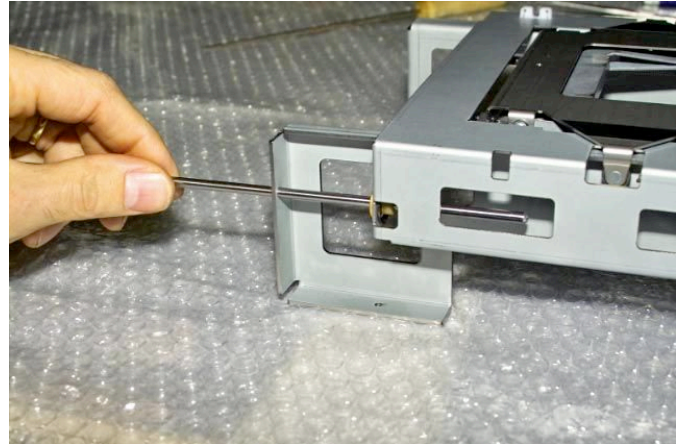
## 22. Building the bridge

**Warning:**
This is a tricky phase. Do not use force as it may cause damage.

Now take the shaft and stick it through from the back,
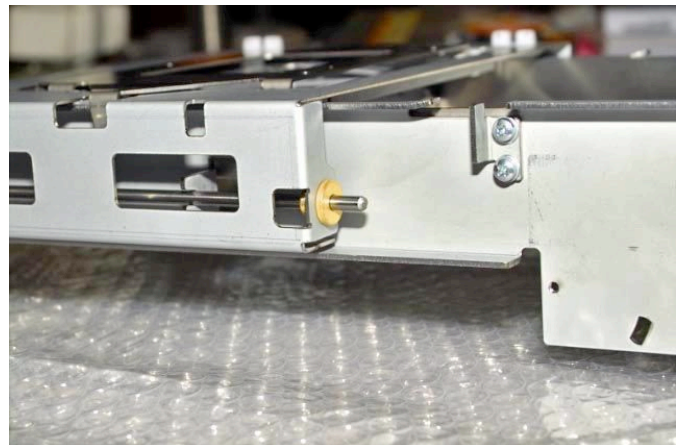


Through the first slide bearing



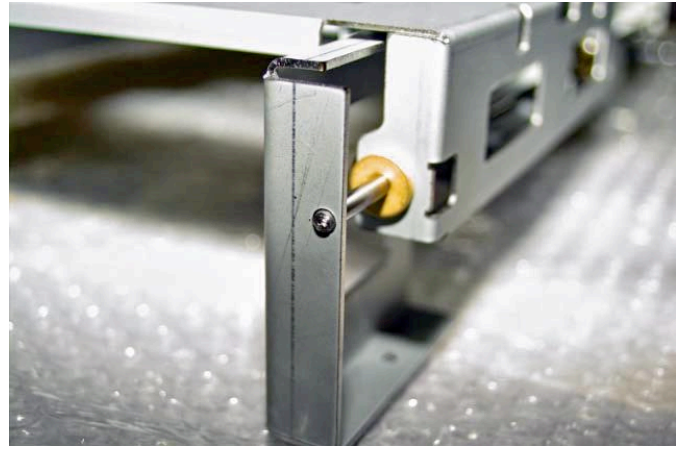And carefully continue through the support to



Then through the second slide bearing. Stick the shaft through a bit more, and see next page for instruction.

## 22. Building the bridge

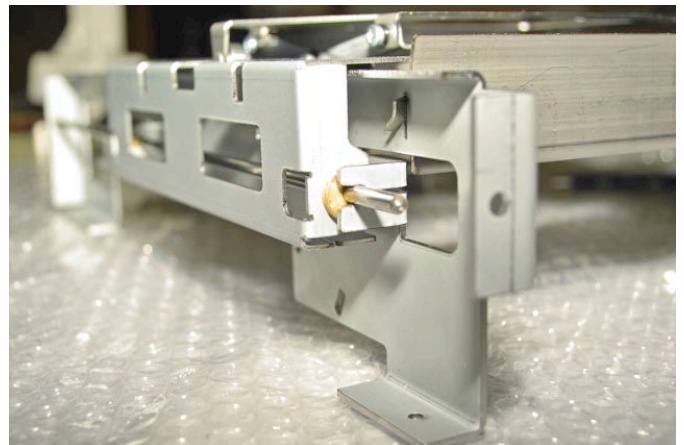Check that the shaft "just" sticks through at the back, no more than 1 mm is allowed

Once the shaft is in place, gently push the shaft in. This should click-fit. Check that the shaft cannot slide anymore in radial direction.
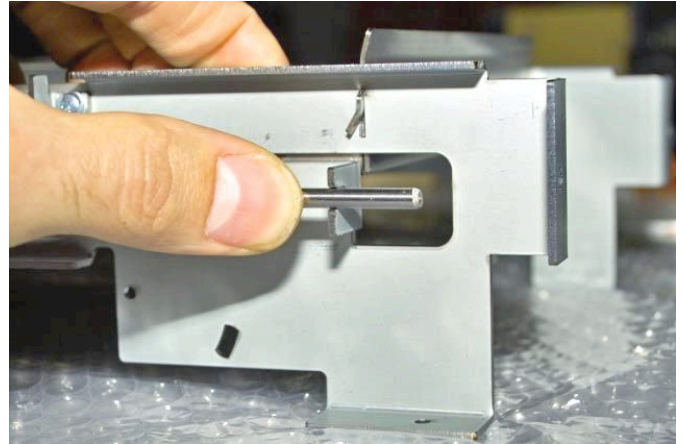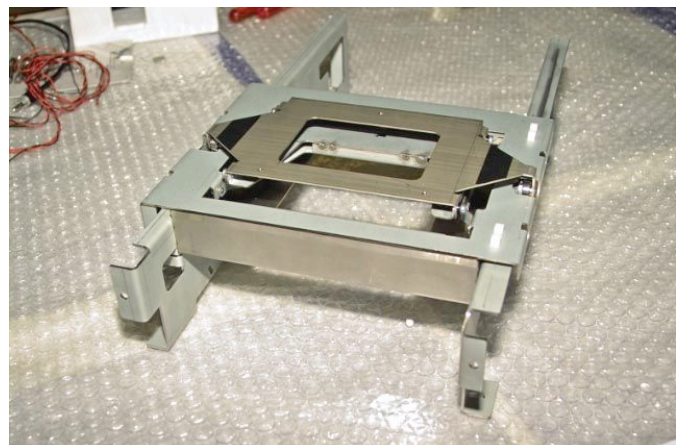
Now the drawer can slide along the bearing. Check the whole movement, carefully.

You now have successfully assembled the bridge.

Remove any remaining protective plastic, covering sensitive metal parts.

## 22. Building the bridge

Placing the micro switch.

Bag #6 contains this switch. Take 2 bolts M3*16, and 1 nut M3.

The switch signals to the CDpro control board that the drawer is closed. If so, the disc will start spinning to read in the table of contents.

If the switch isn't mounted, adjusted or wired correctly, the disc will not spin.

**Warning:**
The switch also switches the laser on, hence is a safety instrument which never may be bypassed, otherwise IR light may enter the eyes of the user.

Mount the switch as shown right. Do not fully tighten the bolt.

Then mount the second bolt, using the nut. This bolt enables fine adjustment of the switch.

Check if the switch opens and closes, with the drawer moving by, a gentle click should be heard.

Adjust the position of the switch, and then tighten both bolts. Do not use force, as the body of the switch is made of plastic. Check again the switching functions again, eventually re-adjusting the switch.
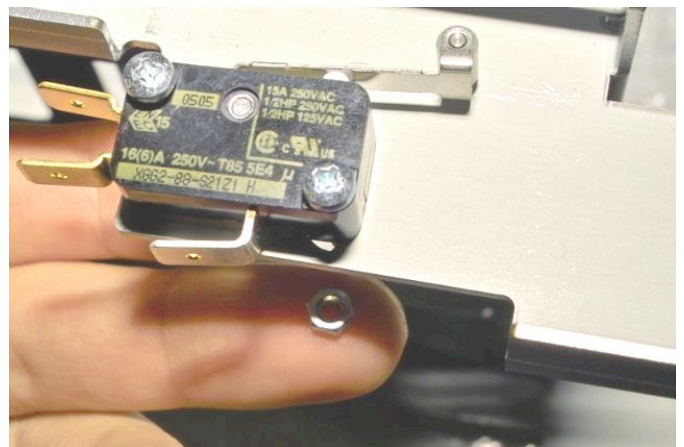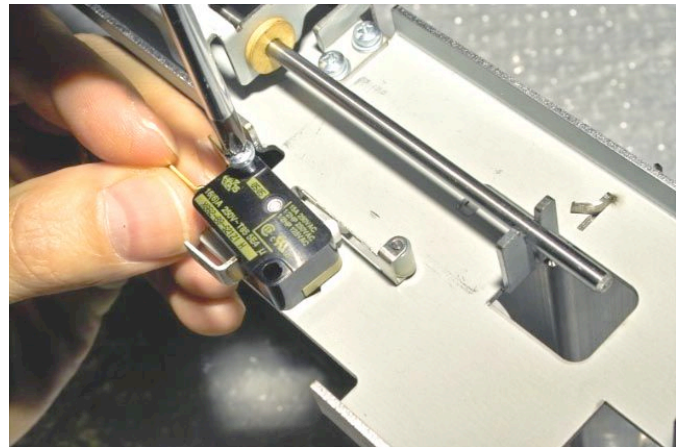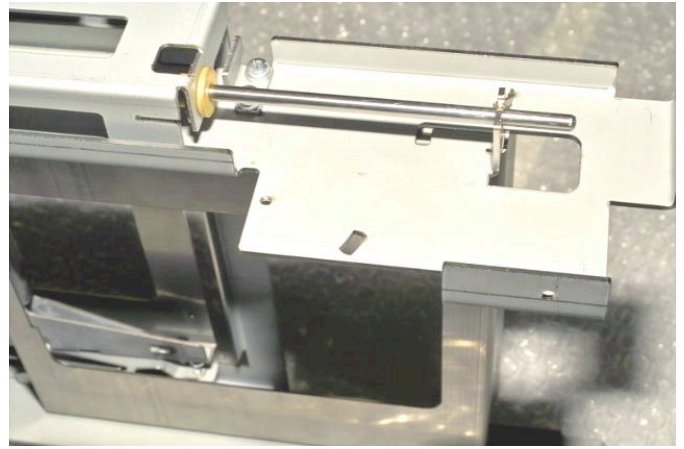
## 22. Building the bridge
Wiring the micro switch.

Take the yellow wiring from bag #6 and strip and tin the ends (2mm)
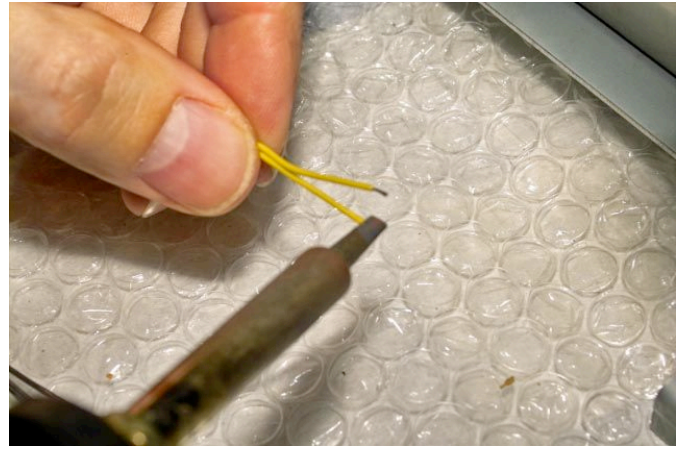


Pre tin the outer contacts of the switch. Do not overheat the contacts!

The middle contact remains unused.



Solder both yellow wires to the outer contacts; the order is of no importance.
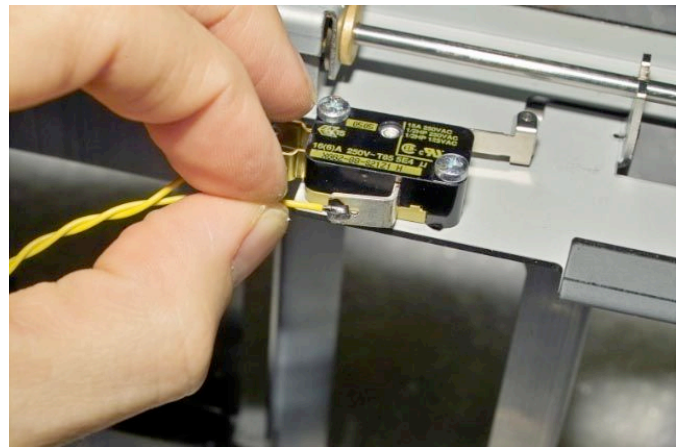


Now this stage is finished.
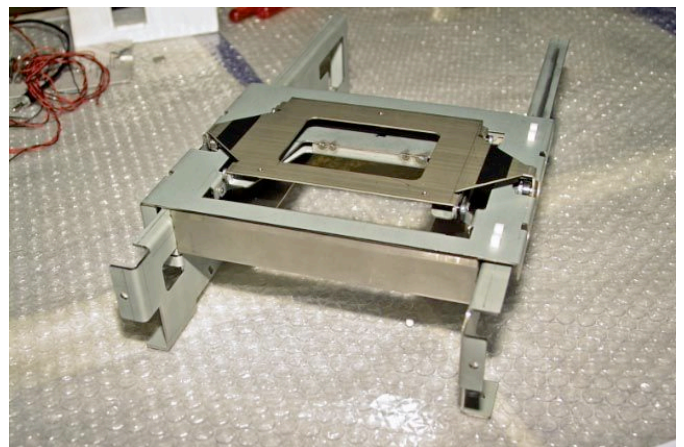
## 23. Connecting the Front PCB

Prior to placing the bridge, we are going to connect the front, and see if the player works.

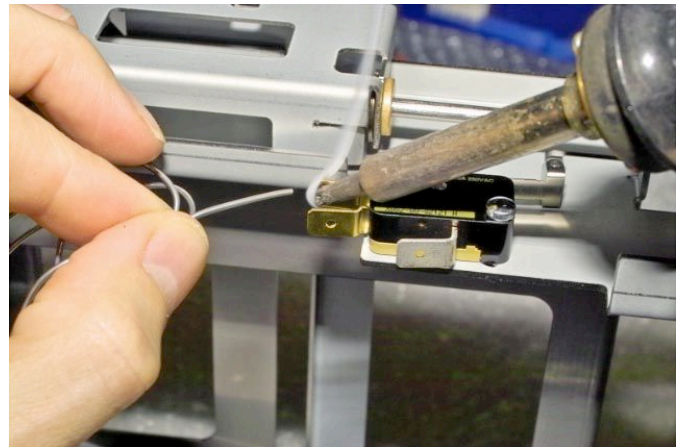First take the 2 biggest connectors, and fit them to the Display PCB. There is only one orientation possible for both connectors.



Contrary to what the photo suggests, the 4-pole connector now includes 4 wires.



Then, the yellow wire from the bridge-switch, with small 2 pole connector, should be connected to the small 2-pole header connector, close to the black diode.

The orientation is of no importance.

## 24. Testing the CD player

Now, an exciting moment has arrived: You are about to test the CD player you have assembled. Prior to connecting the mains cord, check

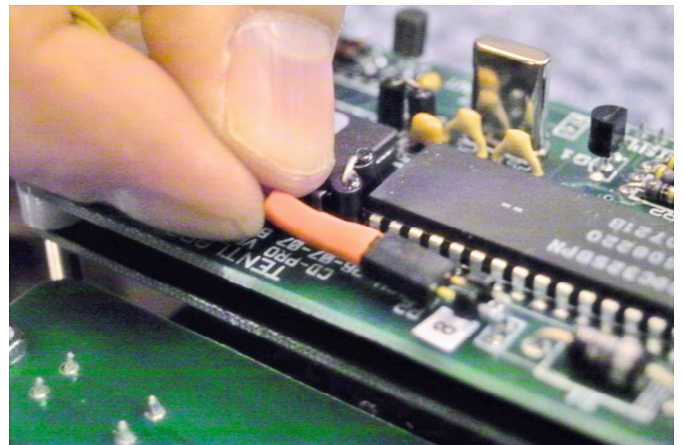- Mains voltage and mains connection (115V or 230V)

- DC outputs of all 3 regulators. All **black** / **brown** wires should be connected to "-"

- Loose parts in the player (like wires, or pieces of solder, or even tweezers – yes, I've been there)

- Connectors to CDpro. On the left the power and I2S should be connected, on the right the DSA interface

- Coaxial wires from CDpro to the DAC board. Especially check the **blue** coaxial cable; this should go to "loader CLK on the DAC board"

Once you are sure all is according the instructions, you may want to ask someone else to double check.

Once this is done, remove the plastic seal from the CDpro lens, put a disc on the CDpro and place the clamp. Connect the player to the mains, and switch the machine on.

A lot of green LEDs on the DAC should start glowing, and after some 15s, green LEDs at the tube board start glowing too.

In the mean time the disc should have started spinning, and the Display may give the status.....

After about 30 to 40s a gentle click should be heard; the relay has released the analogue outputs. Now connect the outputs of the CD player to your amplifier and play some fine music for a moment: time to proceed with mounting the bridge.....
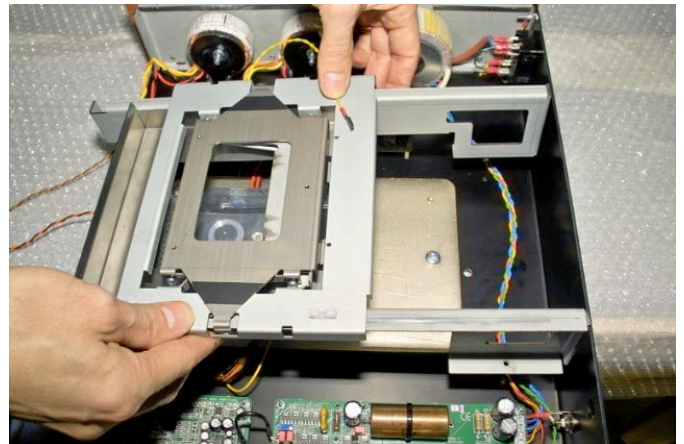




64
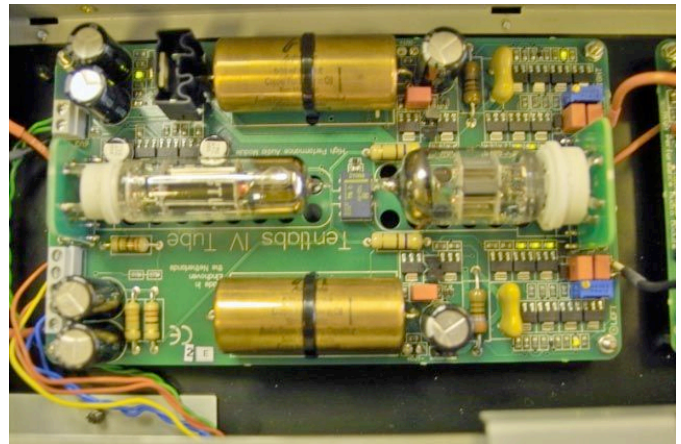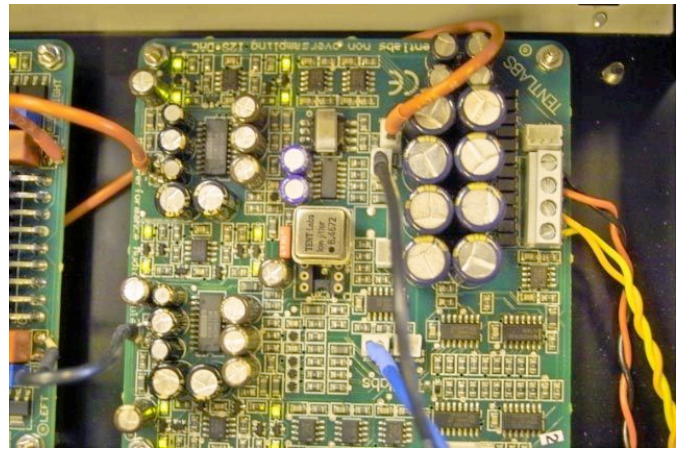
## 25. Placing the bridge

Prior to placing the bridge, we remove the front panel. Release the 3 connectors, and de-solder 2 wires (<span style="color:orange">orange</span> **/ black)**

The player should then look like shown right.
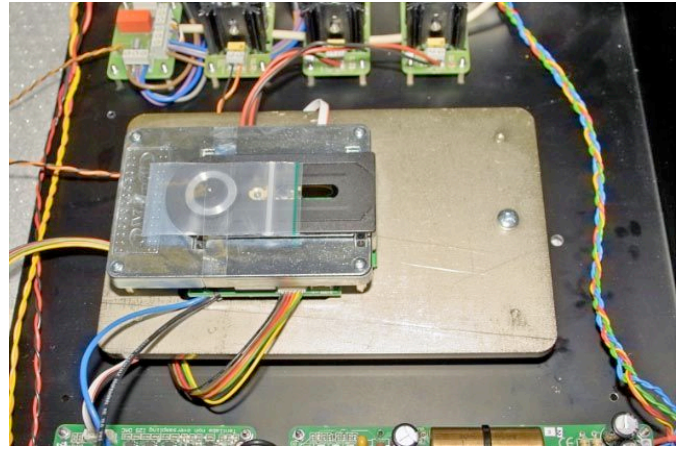


Carefully place the full bridge in the player



Make sure no wires get stuck between the bridge and the CD player base. The wiring from TR1 to the DAC board should be put away in front of the bridge.
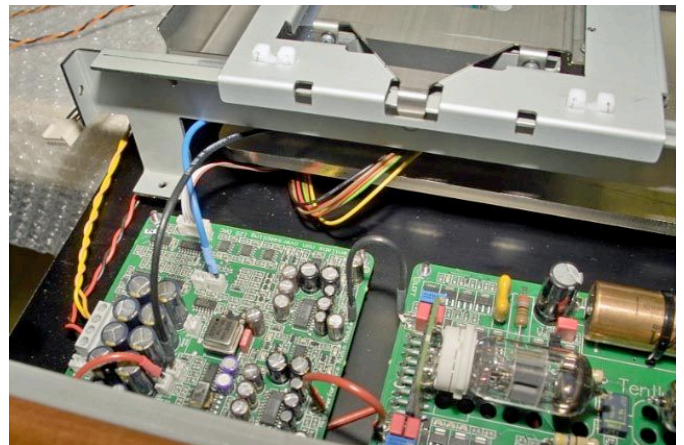


The wiring from TR3 to the IV converter should be trained away as on the photo.

Finally, the bridge should be placed such that the 4 mounting holes coincide with the holes in the base plate.
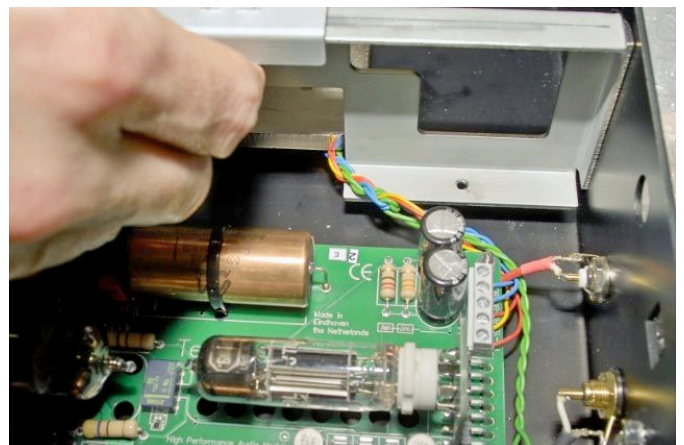
## 25. Placing the bridge

Place the player on the edge of the table, such that the 2 right mounting holes of the bridge are accessible from below.

Make sure the player remains stable, otherwise ask someone to assist.
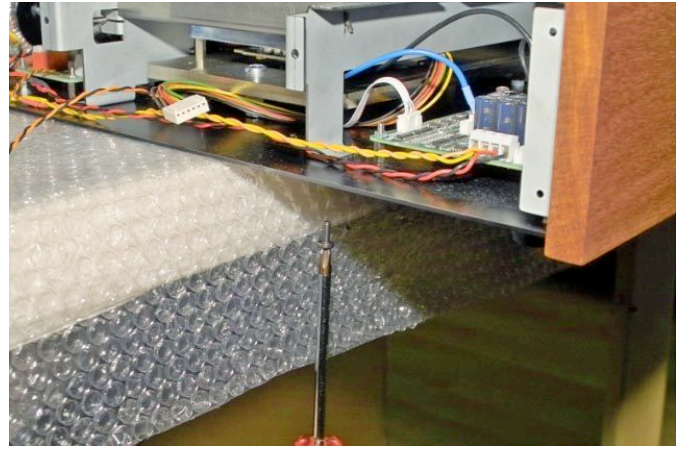


Take 4 pieces M4*10mm black screws from bag #9, and mount 2 of them from below.
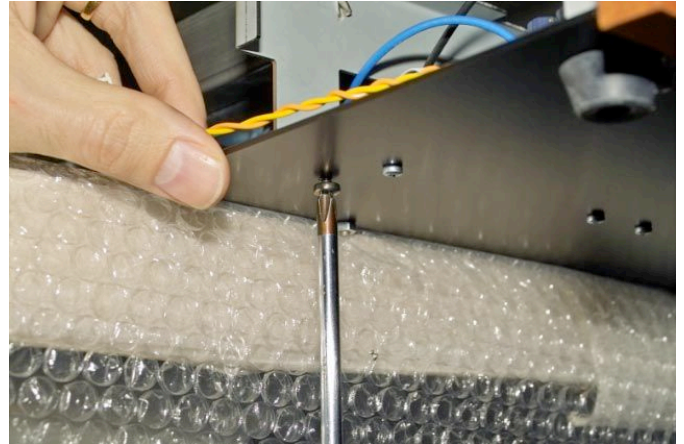


Now turn the player such that the other side hangs over the table.

Keep supporting the player, and mount the other 2 screws.

Now this stage is finished.
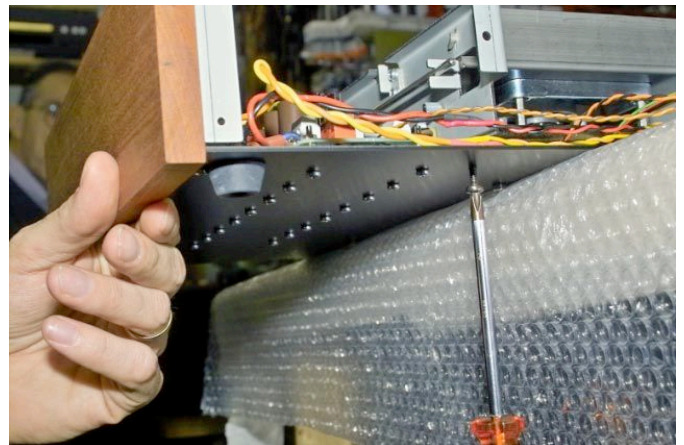
## 26. Building the bridge
Preparing the top cover

Once the CD player assembled, a small gap between the hatch and the top cover remains visible. To prevent the metal shining through, we use black tape. A black marker may be used instead. Take the hatch to indicate where to put the tape.
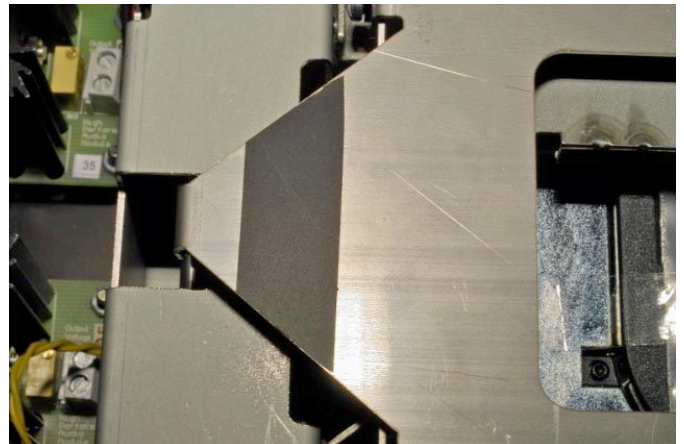




Mount the 3 (very) small M3 hexagonal screws in the hatch support. These screws will be used to adjust the top cover height with respect to the CD player cover.



The hatch is now prepared.

## 27. Fixing the front panel
Preparing the cabinet

To avoid damage to the cabinet when mounting the front, first release the base from both side panels by unscrewing the 3 screws at each side.
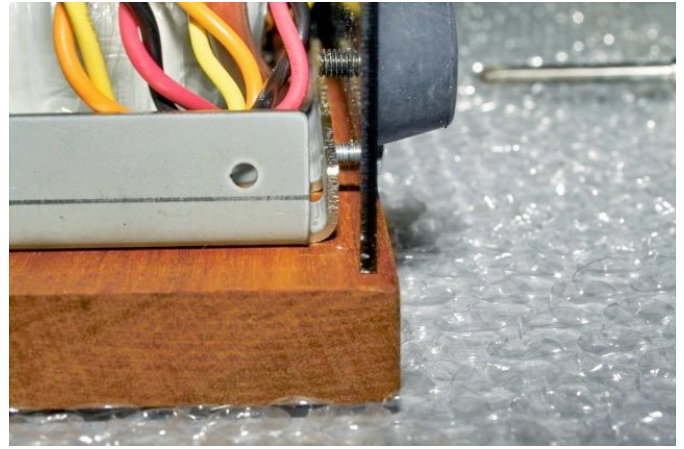


Do not fully remove them, but release them until 2 pieces of carton can be fixed between the cabinet base and the cabinet brackets.
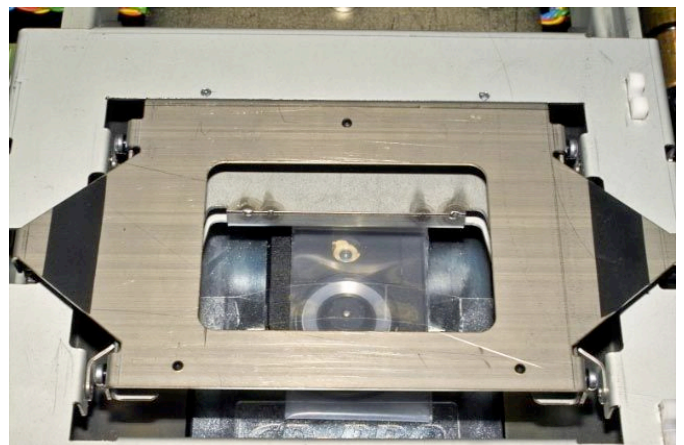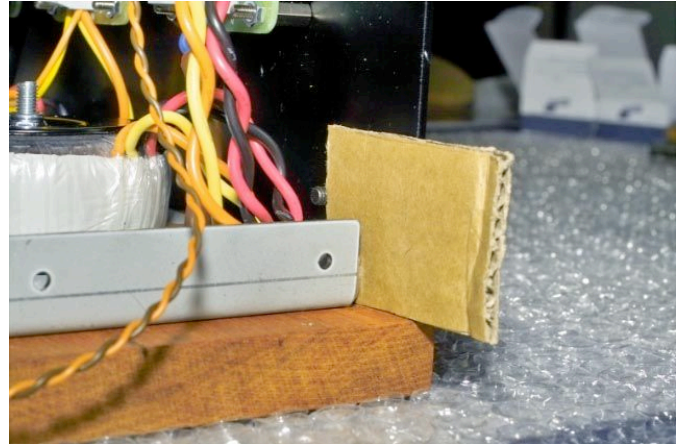


The pieces of carton will support the front panel, and will be removed later

Connect the display PCB again, using instructions in section 23.
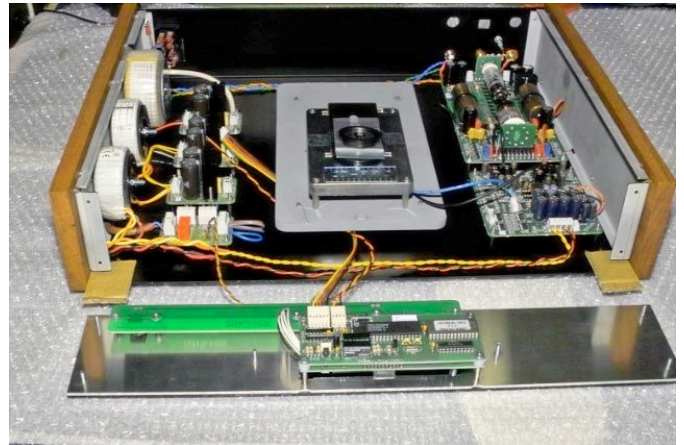
## 27. Fixing the front panel
Carefully put the front panel in front of the player
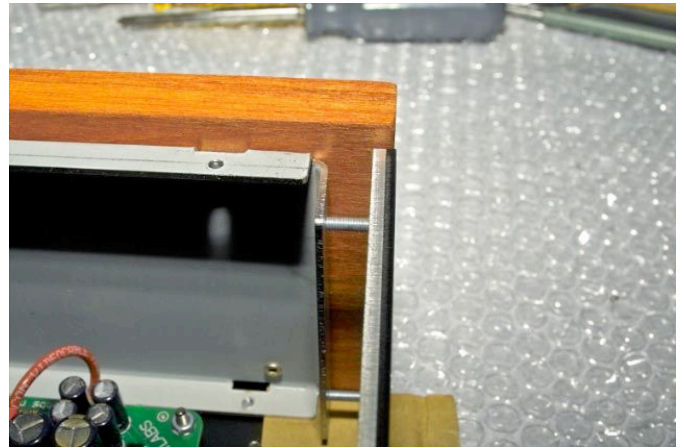
The threaded studs should match the holes at the side bracket. Put M3 nuts in place, but don't tighten them yet
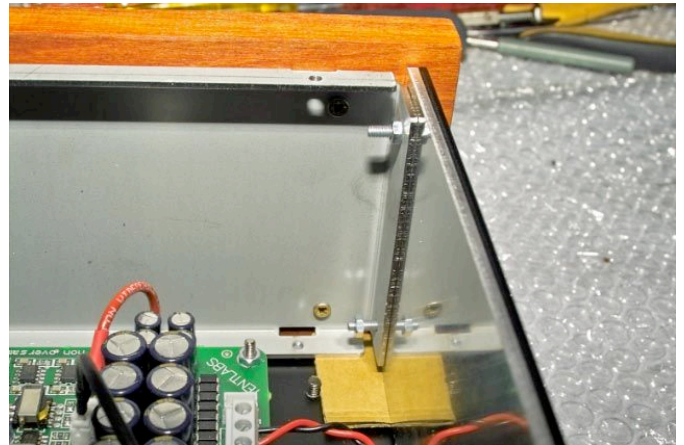
This thread is a bit difficult to reach, but hey, who told you building CD players is easy ?
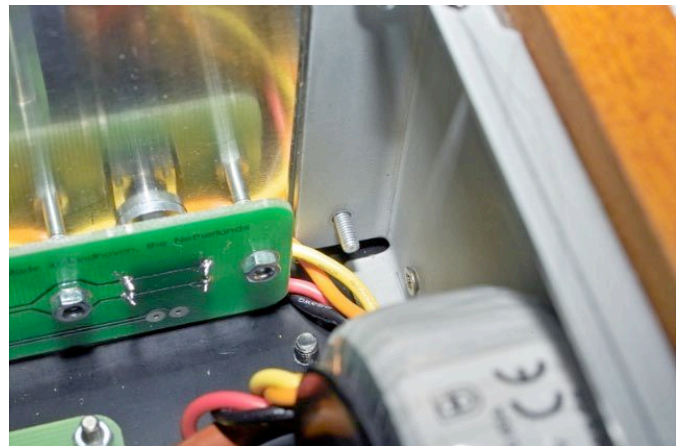
Put the nut in place, using the pair of tweezers
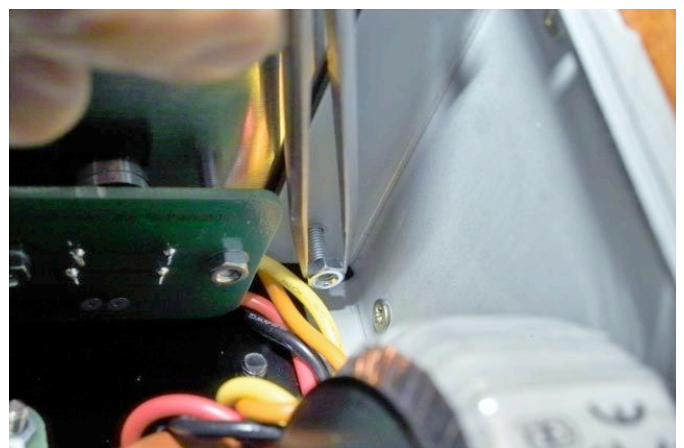
## 27. Fixing the front panel

Secure the nut with one finger
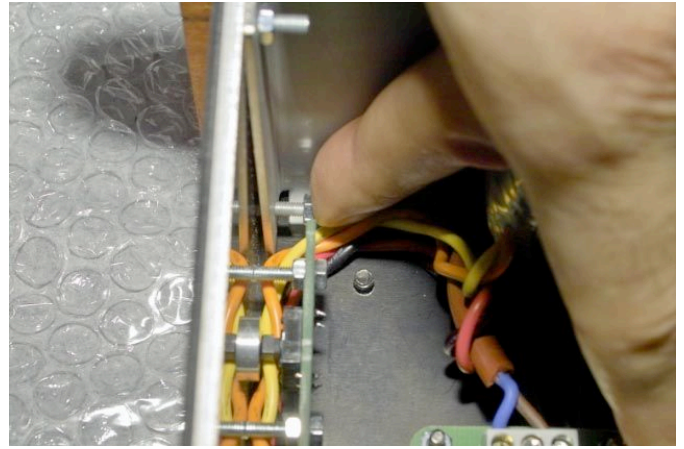
And use the tweezers to rotate the nut such that it finds its place on the thread
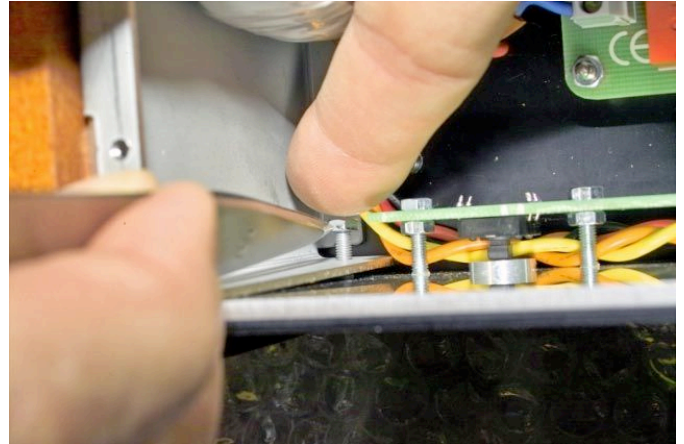
Once the nuts are placed, they can be tightened

Then place 2 nuts on the threads securing the front with the base (no photo available).

Do not tighten these nuts yet, but remove both cartons carefully, and fix the 6 bolts that connect the base plate with the side brackets.
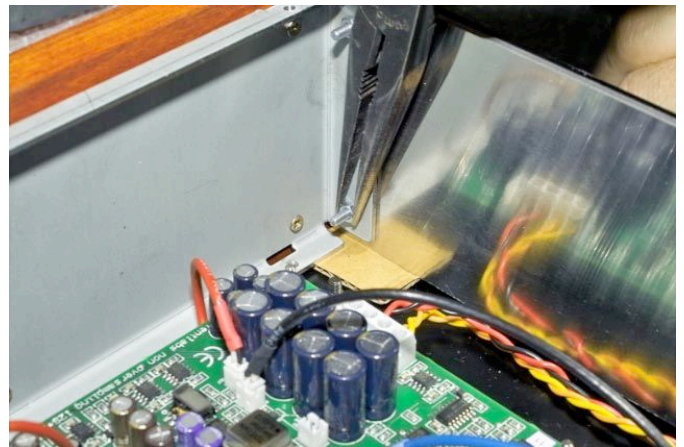
Once this is done, the 2 remaining M3 nuts can be secured. These finally connect the base with the front. Make sure no gap appears between base and front, when tightening these nuts.
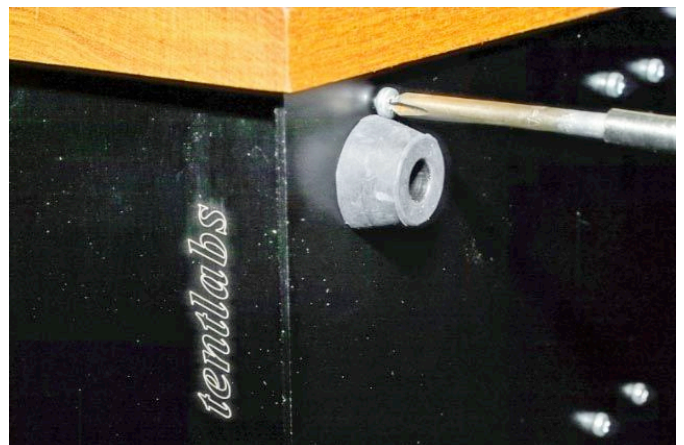
## 28. Adjusting the IV converter

The I/V stage has 2 blue adjustment potentiometers. These adjust the input offset for the I/V converter, and should be within +/- 25 mVdc.

At testing and verification the modules have been adjusted at Tentlabs, but a check is still required as the tubes age a bit when new.

Set the multimeter to 100 or 200mVdc. Connect the black probe to the ground, e.g. the screen of the analogue output.

Switch the CD player on, and let it stabilize for 10 minutes. Make sure no disc is playing (stop mode).

Then measure the input voltage of the I/V converter (e.g. the "+" where the inner core of the coax is connected) with the red probe.

Adjust the value as close as possible to 0V, but always within +/- 25mVdc.

Use a small trimmer to adjust the respective potentiometer. Turning it clockwise will increase the input offset.

Repeat for other channel. This stage is finalized now.

It is worth the trouble to check this adjustment 1 month after the adjustment of new tubes, and each year after that.

We could have designed a servo to save you this work, but it is very hard if not impossible to make servo's so that the IV stage stays transparent in terms of sonical properties.
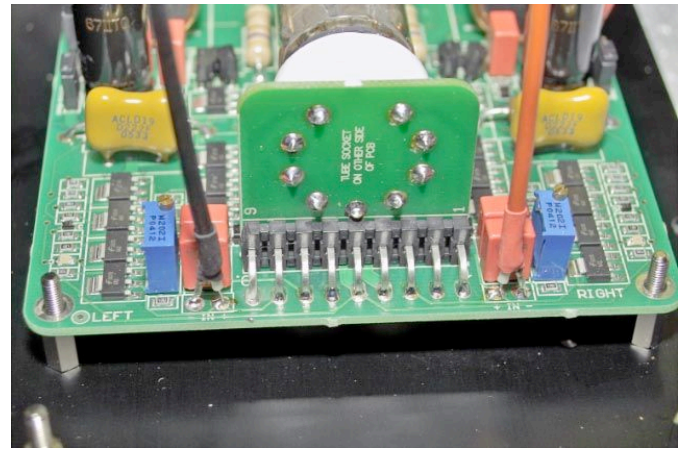
## 29. Fixing the top panel

Place the top cover on the player, and secure it with 2 screws (bag #2, M3*8, black), 1 at each side, in the middle. Make sure the top is centered well, and gently tighten these 2 screws

Pressing the hatch downwards, and gently moving it backwards, opens the player.

Open the player, and close it. When closing, the hatch goes up. See that it just does not touch the top cover when fully up.

In case it touches the top, 2 screws can be adjusted. Remove the cover, and look for 2 holes in the carier (just behind the hatch). 2 screwsare in the hatch, releasing them will lower the hatch when in highest position. Place the top cover back, and check again.



When that is OK, place the hatch, and see how it is positioned in height



Adjust the height to your preferences, using the 3 hexagonal screws.

A hatch sticking out about 0.5 to1 mm is preferred. Mounting the hatch at equal height as the cover is a bit tricky, as small differences are immediately seen.

Place the hatch back, and check if the adjustment is satisfies your requirements.
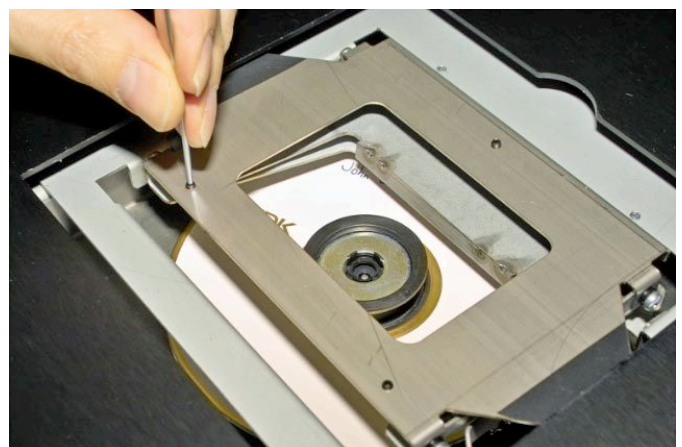
## 30. Fixing the top panel

Put sufficient glue on the 3 hex screws. Glue like Bison kit will do. This glue is based on synthetical rubber; it is not supplied with the CDP kit

**Warning!**
Don't use super fast glue as it won't allow you to accurately centre the hatch in the few seconds…..



Place the hatch and take it off again, now the glue has made 3 spots on the hatch.

Assure no glue gets spilled over other parts…..



add some more glue,



And place the hatch, and assure it is centered well. Fit the 4 remaining screws to secure the top cover.

Leave it to rest the next 24 hours.

Congratulations, you have finished building your own CD player !!.
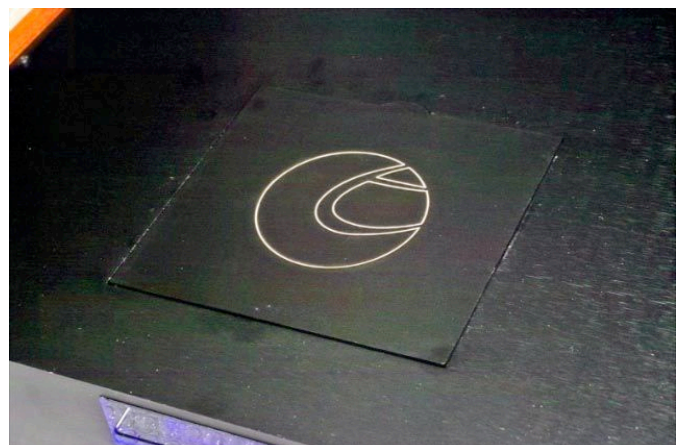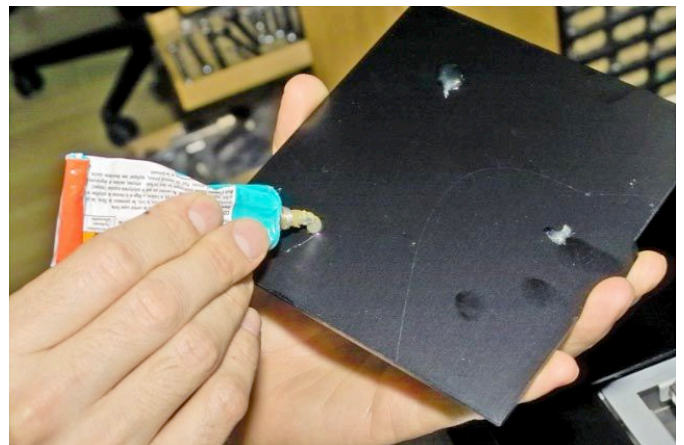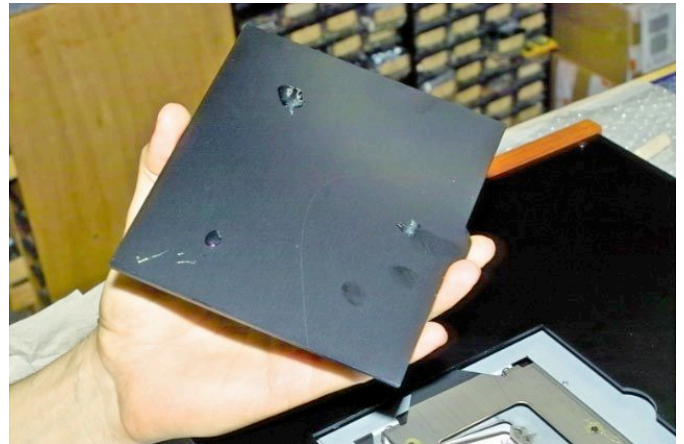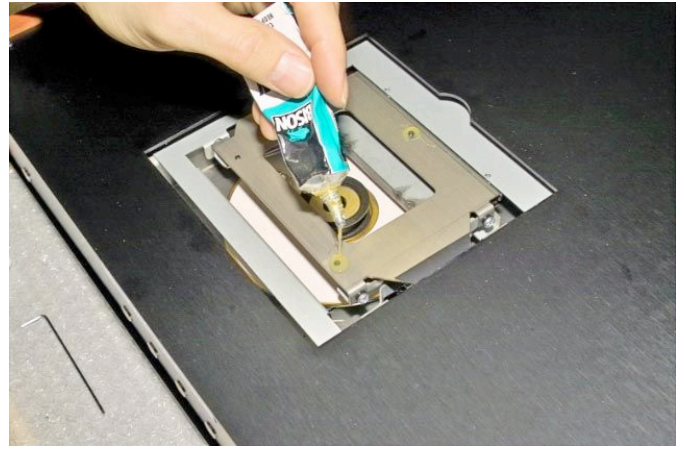
Annex 1: Overview of metal parts

| | | |
|---|---|---|
| 1.  | 2.  | 3.  |
| 4.  | 5.  | 6.  |
| 7.  | 8.  | |
| 9.  | 10.  | 11.  |
| 12.  | 13.  | 14.  |
| 15.  | 16.  | 17.  |
| 18.  | 19.  | 20.  |
| 21.  | 22.  | 23.  |

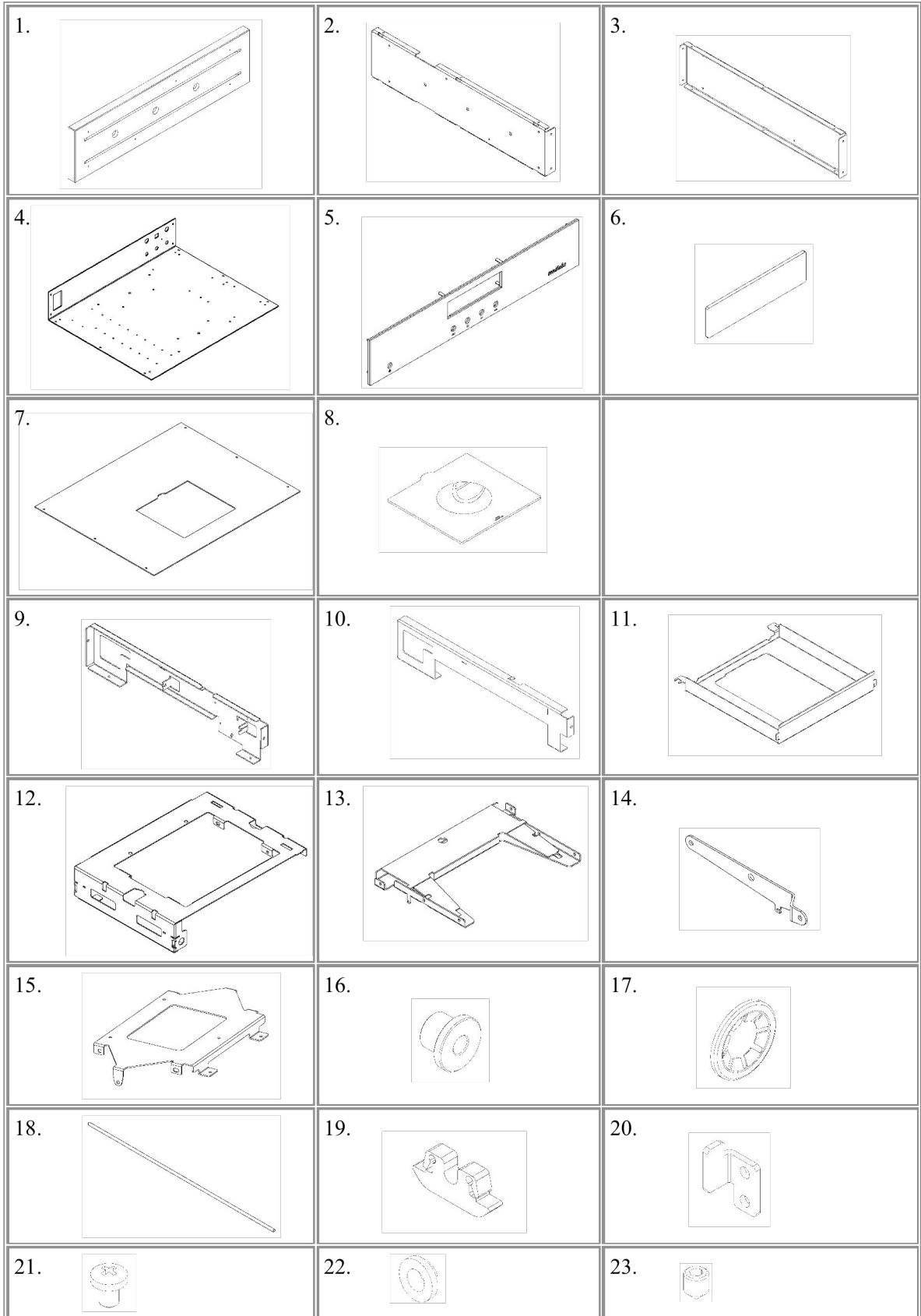| No. | Discription | Part number | Material | Piece/assembly |
|-----|-------------|-------------|----------|----------------|
| 1 | Cabinet side panel | 0040016 | Wood | 1x left<br>1x right |
| 2 | Cabinet bracket left | 0040007 | Steel galvanised DC01 ZE25/25 | 1x |
| 3 | Cabinet bracket right | 0040008 | Steel galvanised DC01 ZE25/25 | 1x |
| 4 | Cabinet base | 0040014 | Aluminium anodized | 1x |
| 5 | Front (pre-assembled) | 0040015, 0040019 | Aluminium, anodized | 1x |
| 6 | Display window | 0040025 | Bleu acrylic (PMMA) | 1x |
| 7 | Top cover | 0040017 | Aluminium anodized | 1x |
| 8 | Hatch | 0040020 | Aluminium anodized | 1x |
| 9 | Carrier support bracket left | 0040001 | Steel galvanised DC01 ZE25/25 | 1x |
| 10 | Carrier support bracket right | 0040002 | Steel galvanised DC01 ZE25/25 | 1x |
| 11 | Drive cover | 0040003 | Stainless steel  1.4301 | 1x |
| 12 | Carrier | 0040004 | Stainless steel  1.4301 | 1x |
| 13 | Leaver 1 | 0040005 | Stainless steel  1.4301 | 1x |
| 14 | Leaver 2 | 0040006 | Stainless steel  1.4301 | 1x L, 1xR |
| 15 | Hatch support | 0040009 | Stainless steel  1.4301 | 1x |
| 16 | Slide bearing (pre-assembled) | 0040011 | CuSnPb | 2x |
| 17 | Fast lock washer (pre-assembled) | 0040013 | Spring steel | 2x |
| 18 | Shaft | 0040010 | 115Cr V3   1.2210 | 1x |
| 19 | Glide | 0040012 | POM | 2x |
| 20 | Positional bracket | 0040023 | Steel galvanised DC01 ZE25/25 | 1x |
| 21 | Philips screw M3x4 | | Steel galvanized | 14x |
| 22 | Pivot washer | | Glass fibre filled PA6 | 10x |
| 23 | Socket set screw M3x4 | | Steel blackened | 3x |