

# Electronics Preamplifier “ALPA MII”

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Analog PCB Version 2.1, Digital PCB Version W377971SN17



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The ledpoweractive module enables pin 23 to low. The purpose of this program is to indicate that the Raspberry Pi is up and running. Copy files from  
'Preamplifier\SoftwareRaspberry\LedPowerActive' in the archive to folder '/opt/ledpoweractive' and follow the instructions..... 24

CDControl..... 24

Rear view



Missing yet: text for inputs and outputs

## Introduction

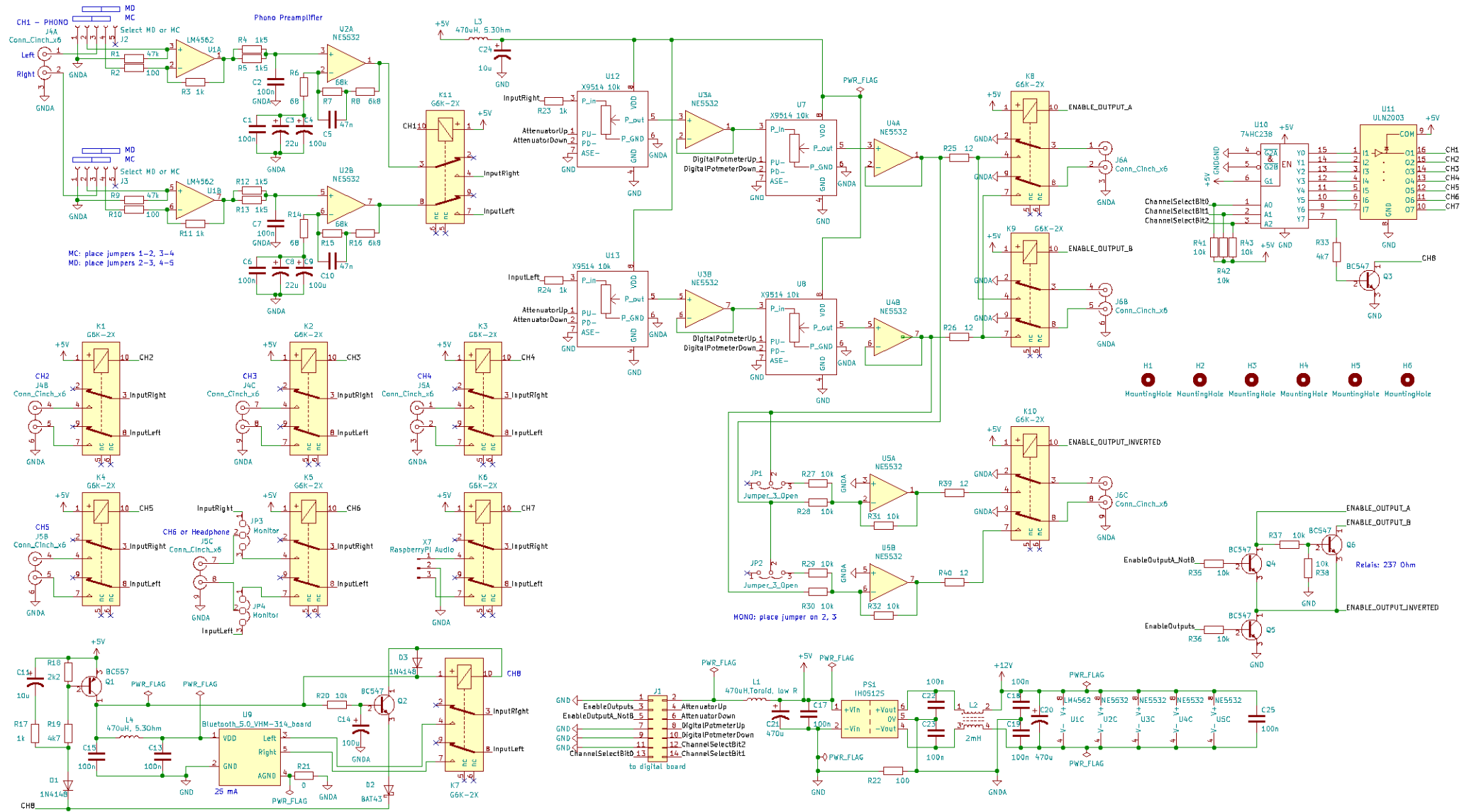
Loudspeakers that have built-in amplifiers may need a preamplifier when there are multiple music sources.

## Overview

- 8 input channels (relay switched):
  - Channel 1: phono input for MD or MC elements (selectable by jumpers)
  - Channel 2-6: auxiliary inputs
  - Channel 6 can be configured (by jumper) as pre-out for a headphone amplifier
  - Channel 7: connected to internal Bluetooth receiver
  - Channel 8: connected to internal media server (Raspberry Pi)
- Each input channel can have a preconfigured attenuation (via Raspberry Pi).
- 3 outputs (relay switched):
  - Channel A or B selectable via InfraRed commands (default channel A is selected)
  - Channel C: always available (e.g. for subwoofer). Can be set to mono by jumpers
- Channel selection by push button on front panel or via InfraRed commands
- Support for various InfraRed remote controls, e.g. Philips, Sony, NEC.
- Volume and attenuation control using XICOR X9514 digital potentiometer with 32 steps
- Volume control by rotary encoder or via InfraRed commands
- Volume indicator by NeoPixel LED ring (24 LEDs). Volume and channel LED's are turned off after one minute of inactivity.
- Built-in media server (Raspberry Pi):
  - Logitech Media Server software
  - HifiBerry DAC Pro or DSP board; power supply modified to achieve high-end performance
  - Music files stored on internal SD card and/or external USB memory stick
  - Spotify support using Spotty plugin
  - Plugin to allow streaming from Spotify app on smartphone or tablet
  - Internet radio
  - CD player controlled by Logitech Media Server plugin
  - A LED on the front panel indicates if Raspberry Pi has started
- No tone or balance control
- Power supply by 5V/3A net adapter

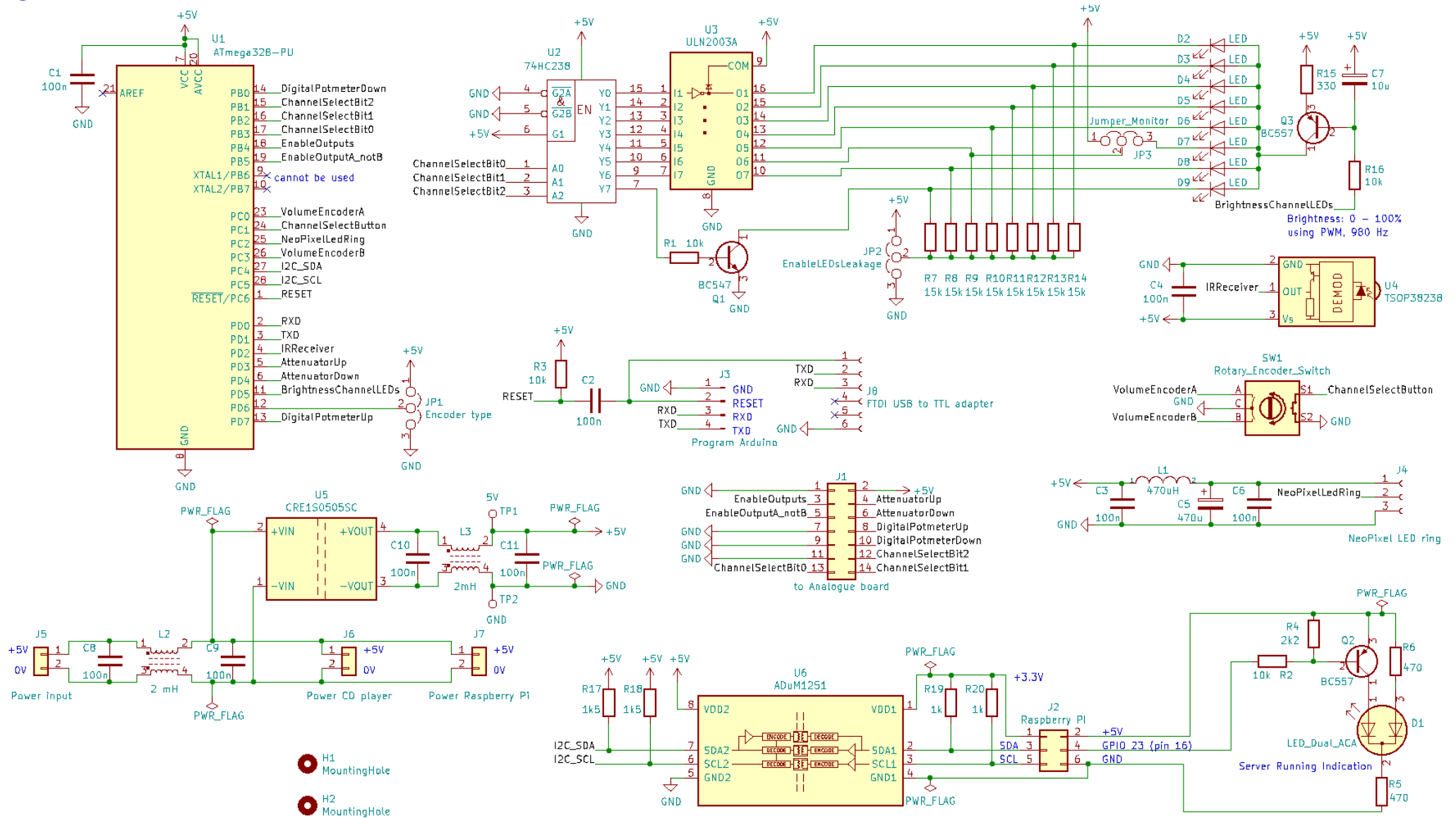
## Schematics

## Analog board schematics



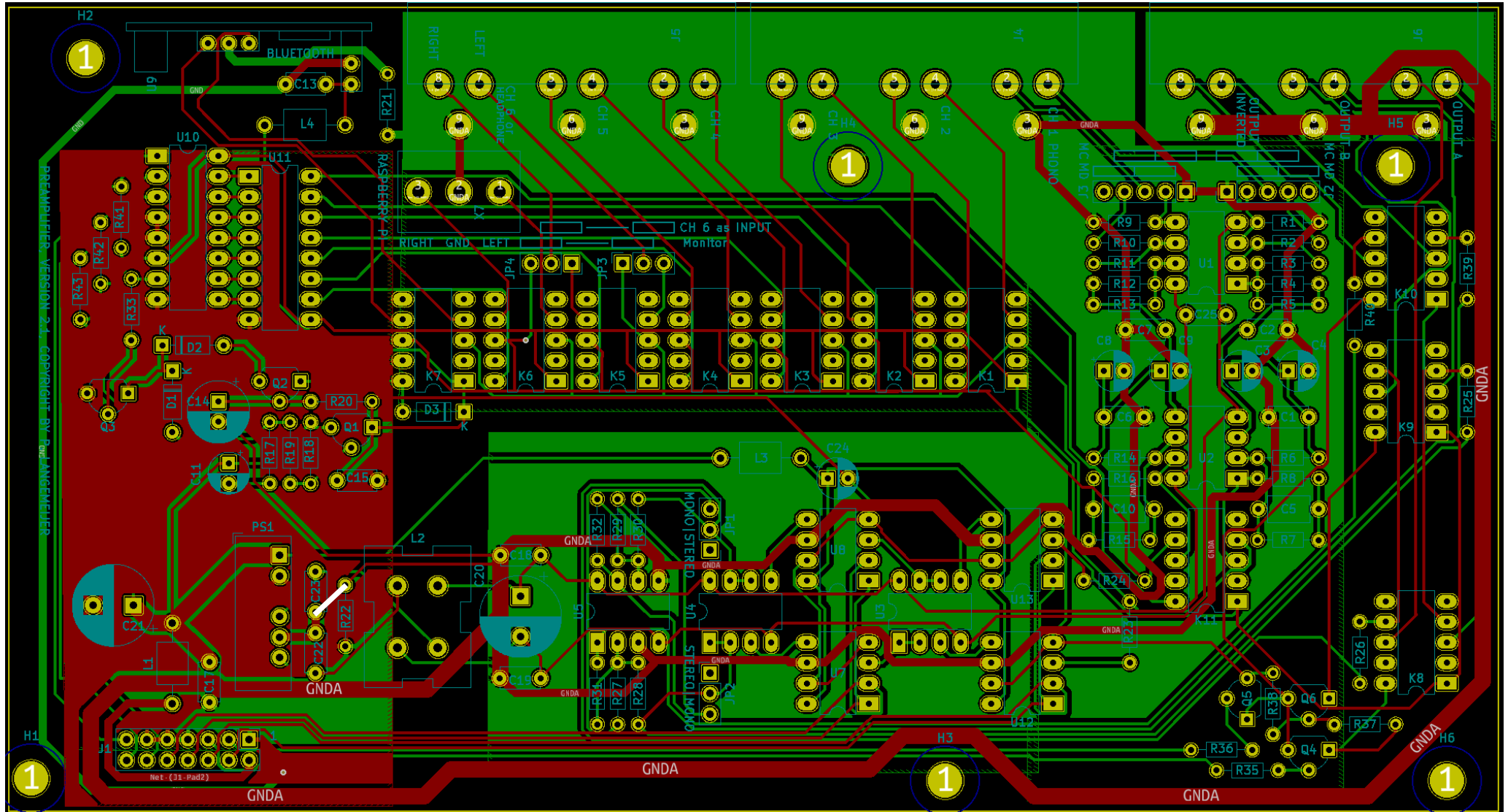


## Digital board schematics



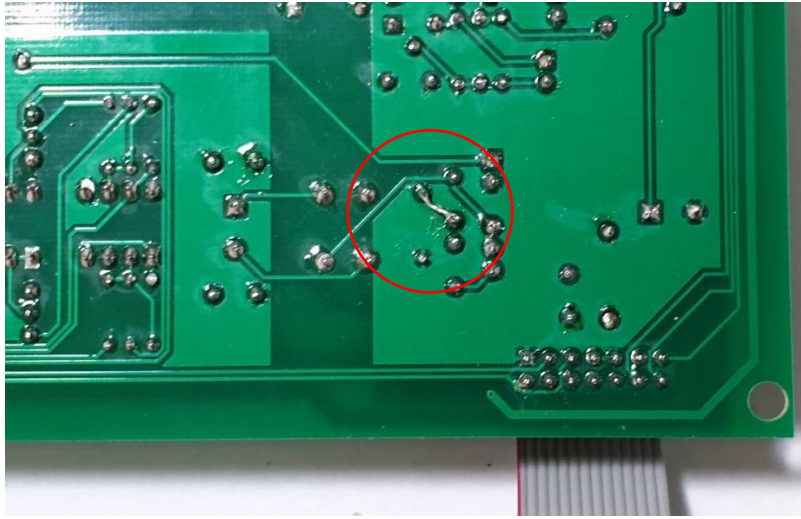






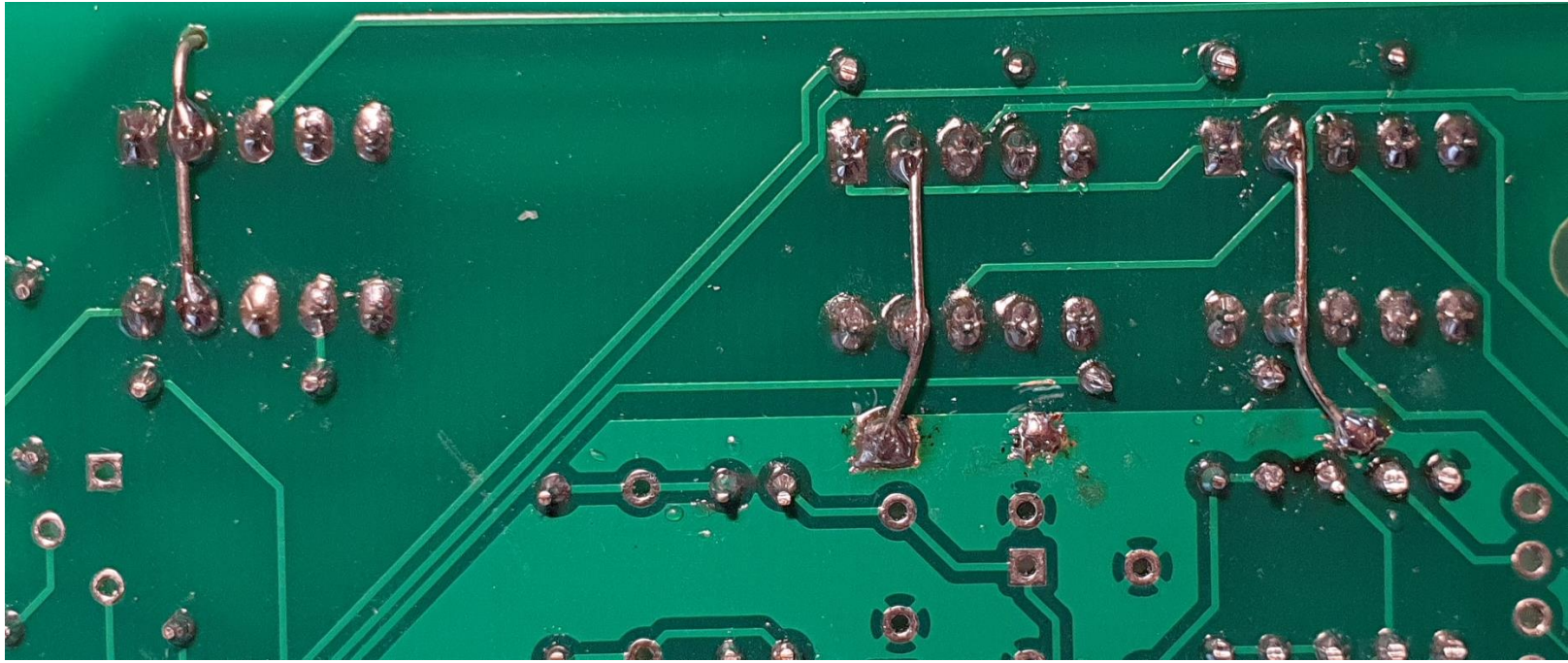
Required changes on PCB for version 2.1:

- wire (white line) needed (missing on PCB in this version).
- Pin 2 and 9 of K8, K9 and K10 connected to GND A



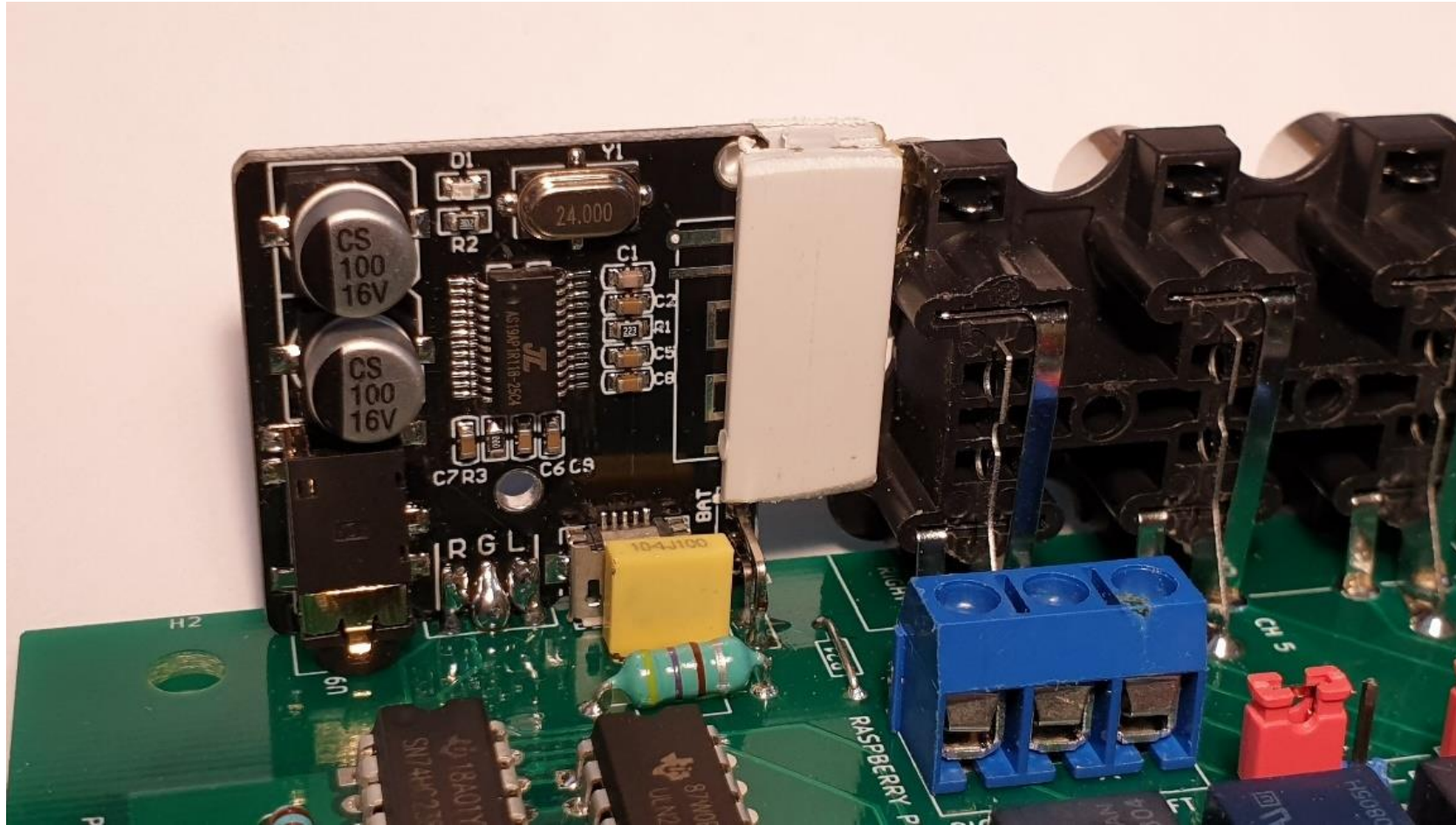
Extra wire needed (C22, C23 connection to ground).

Ground pins 2 and 9 of K8, K9 and K10:

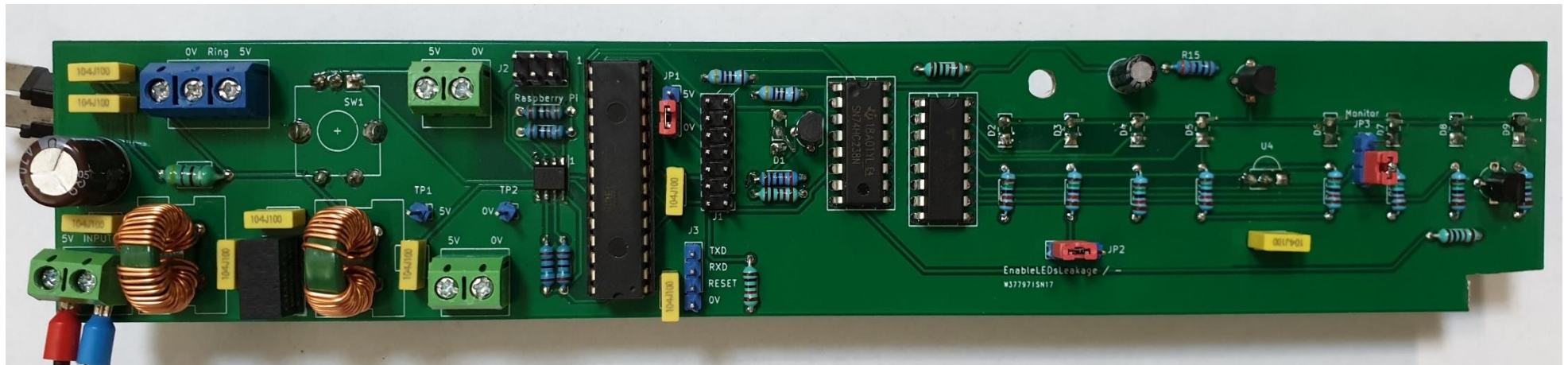
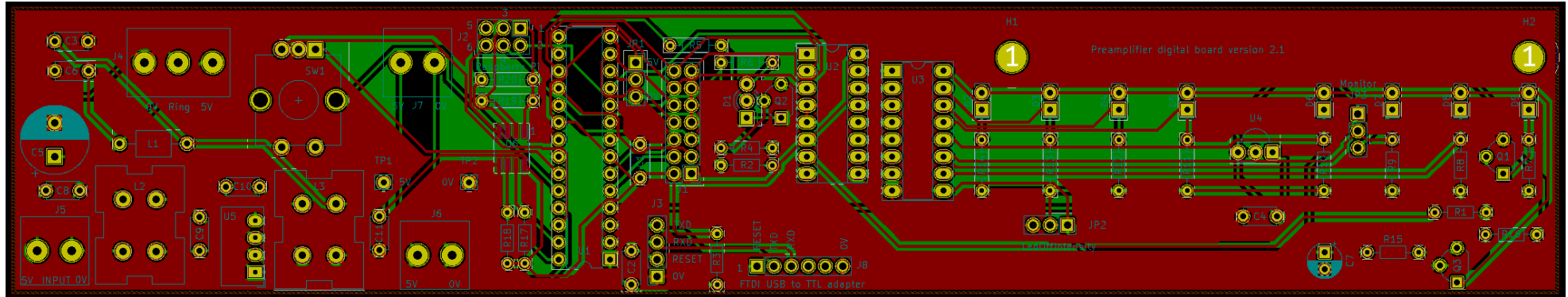




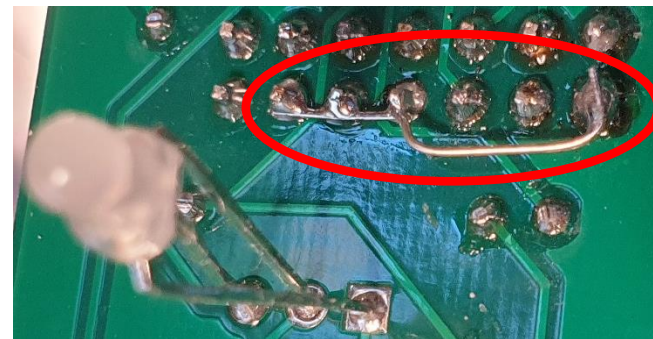
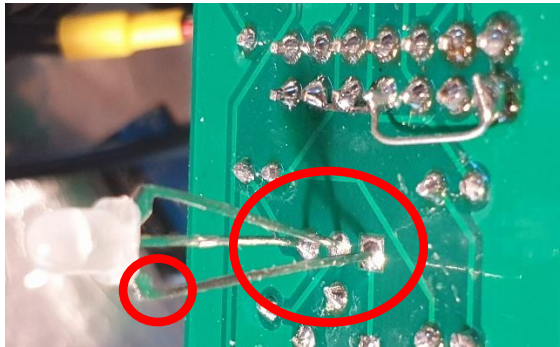
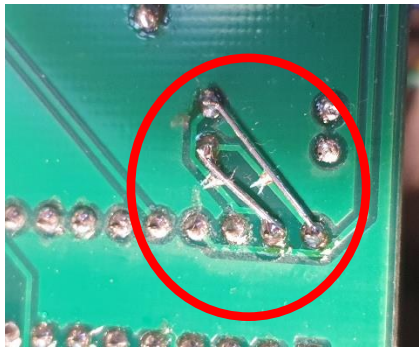
How the Bluetooth board is mounted



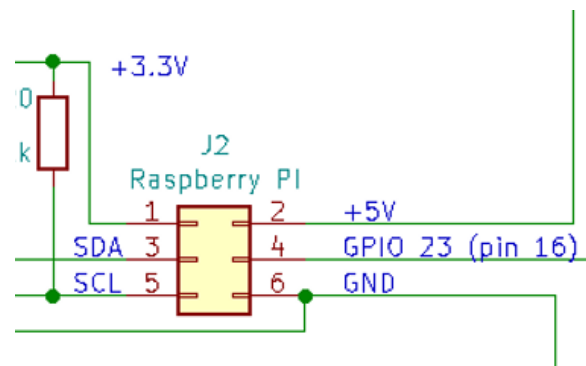
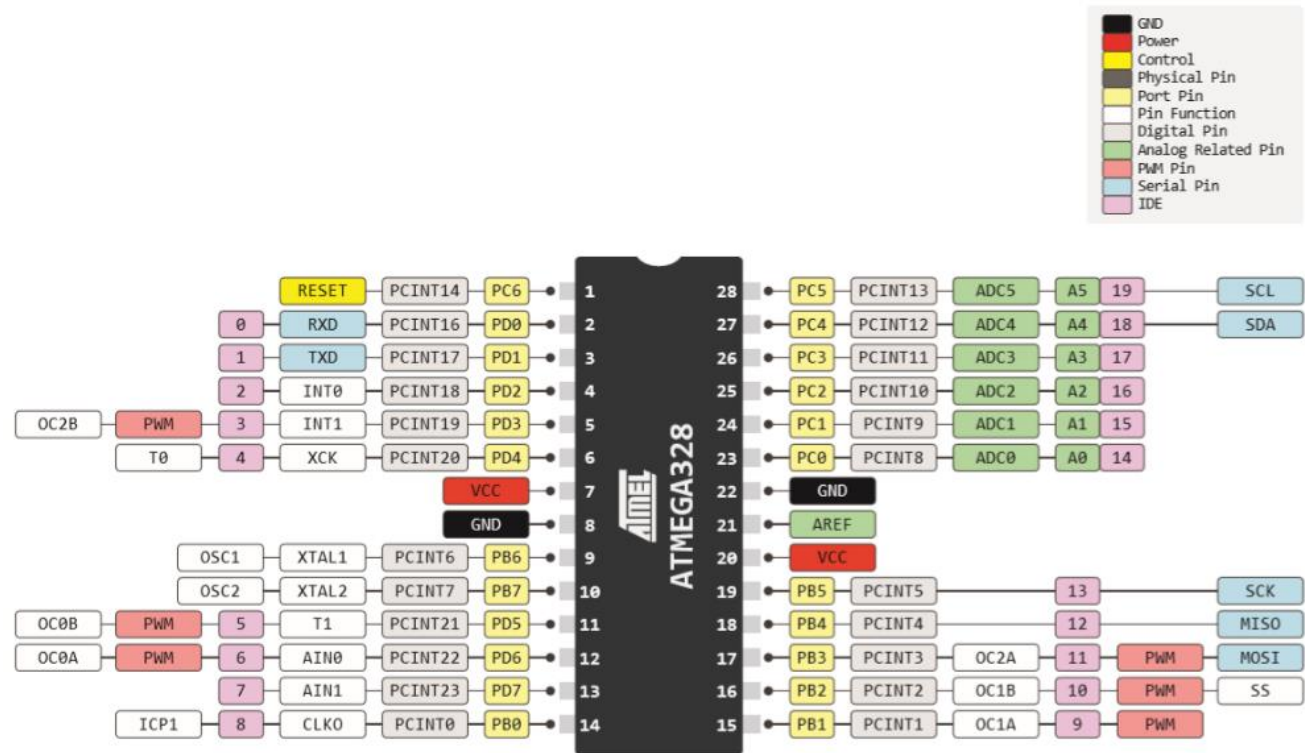
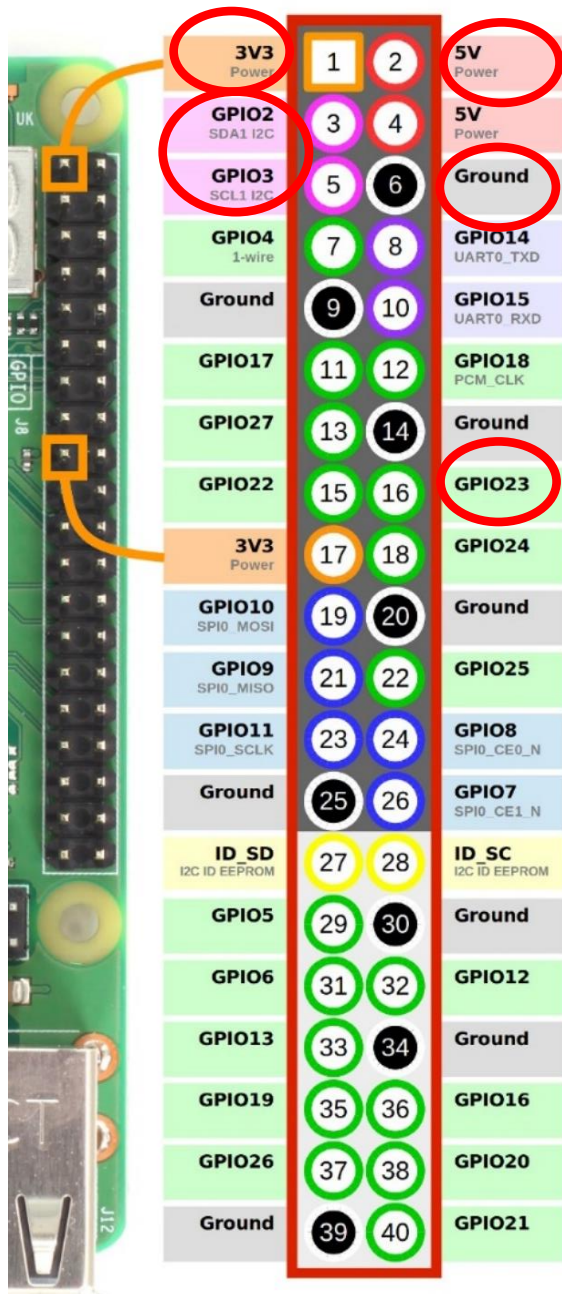
## Digital PCB



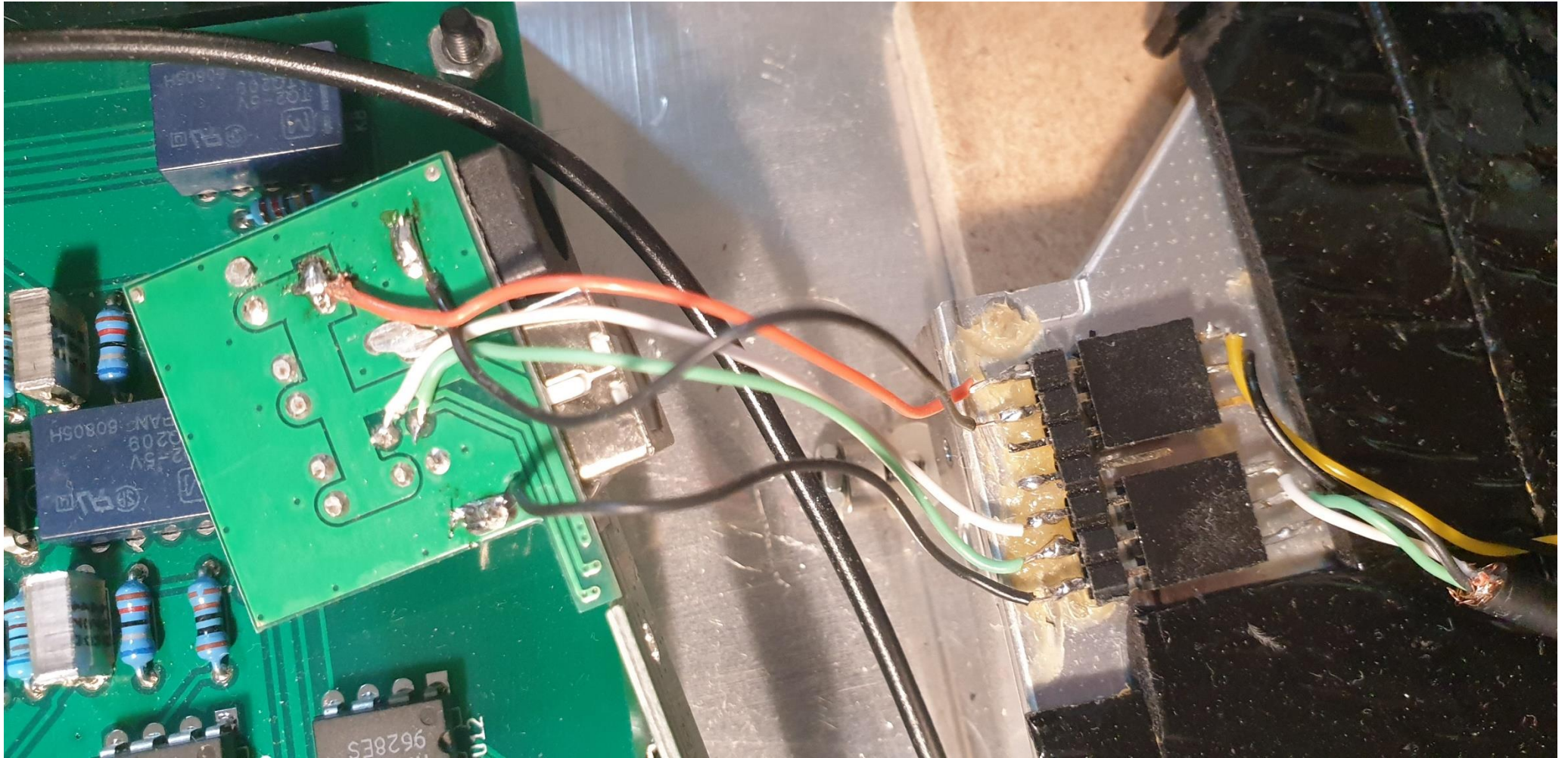
This version (W3779715N17) of the PCB needed some manual fixing.







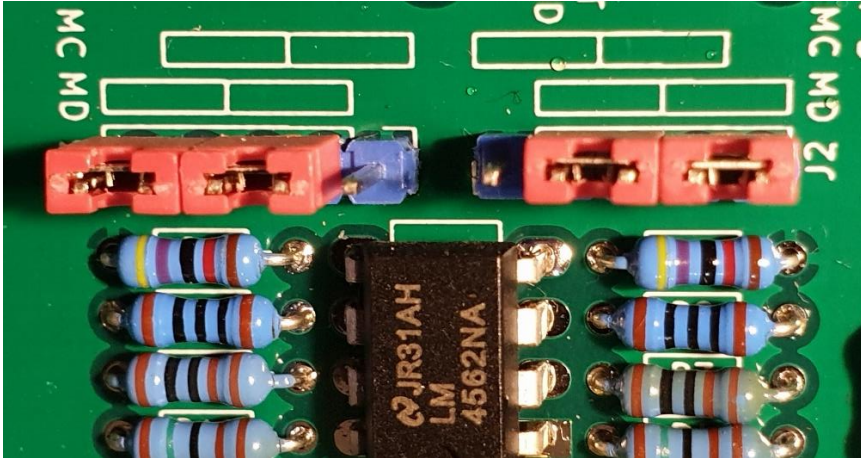
CD player connection





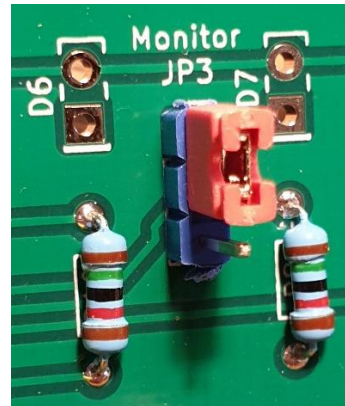
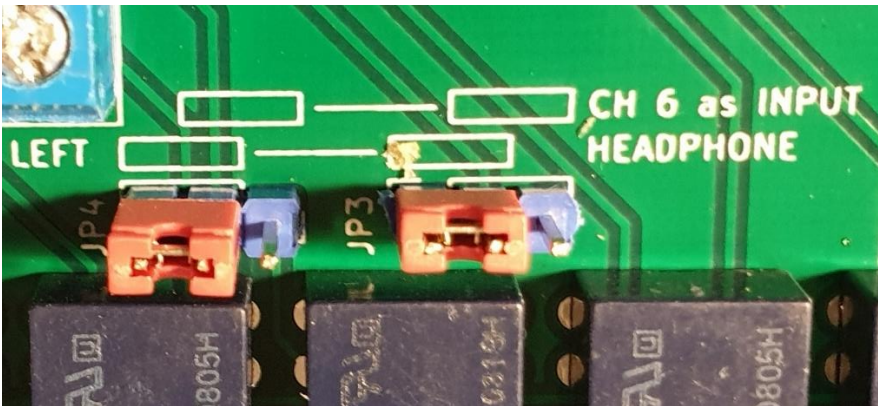
## Jumpers

Selecting phono input: MD (magnetic dynamic) or MC (moving coil)



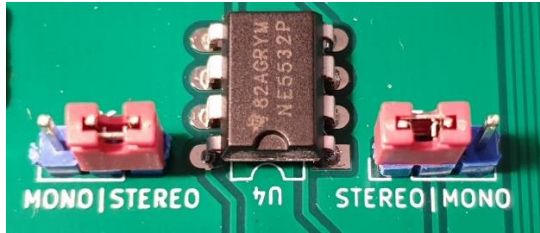
MD is selected in the picture.

Selecting channel 6 as output for headphone



Set jumpers to HEADPHONE and set jumper Monitor on digital board to disable LED channel 6

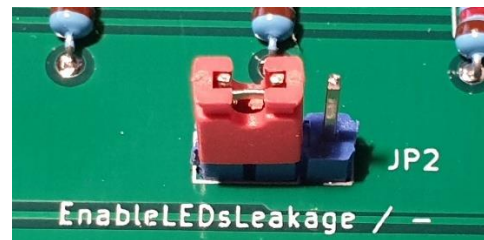
Selecting stereo or mono output



Select stereo or mono for output “Inverted”. This output is always active and is meant to be used by a stereo or mono subwoofer.

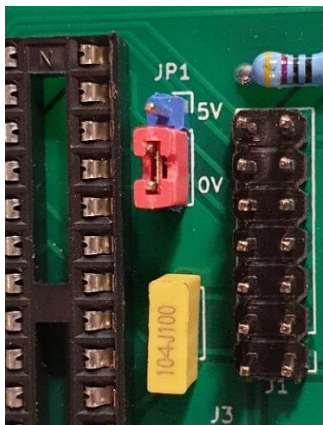
Control channel LEDs off state

With JP2 you can control if the channel LEDs are always on with a very low intensity

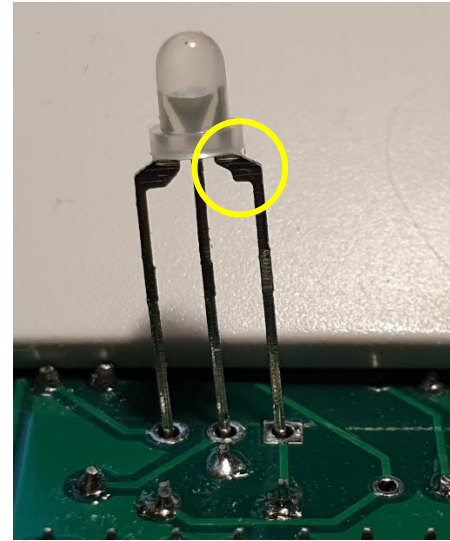
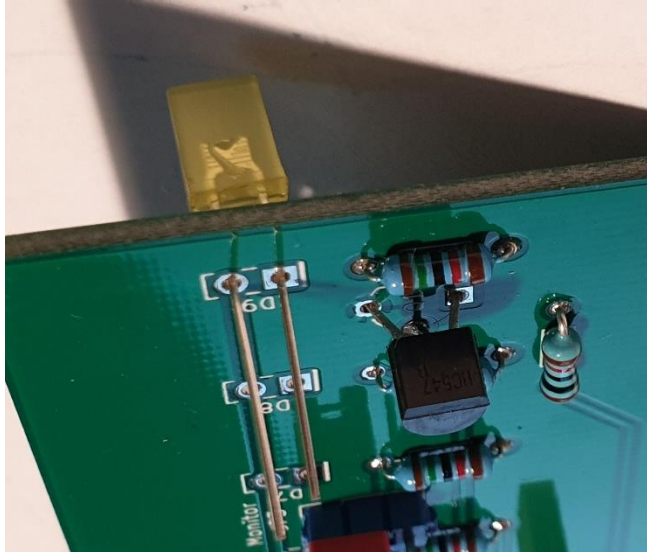


Controlling the type of volume encoder

Note: there are two kinds of rotary encoders. The difference is axis length and also the direction. The direction can be reversed with jumper J1.



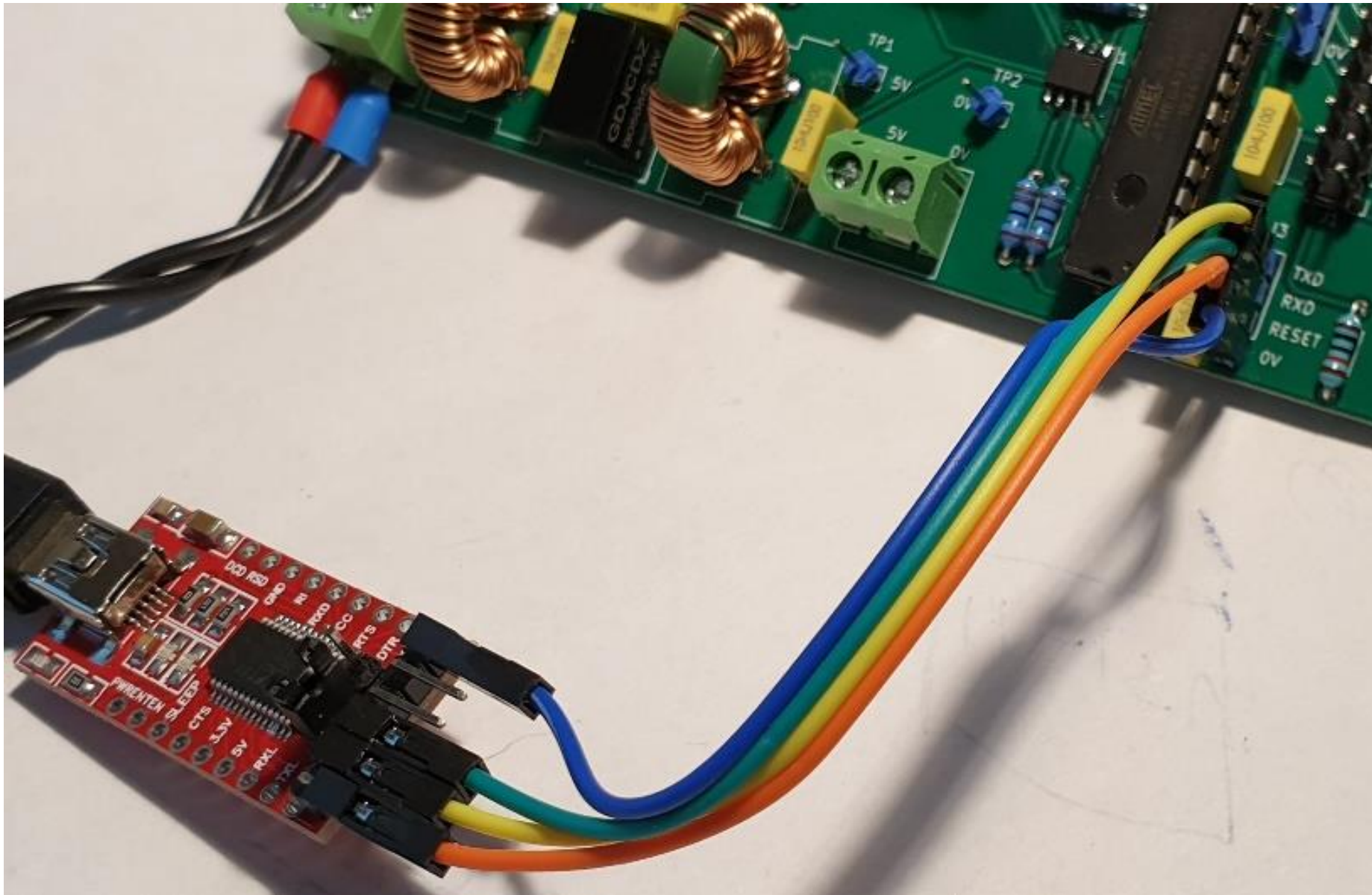
How the LED's are mounted



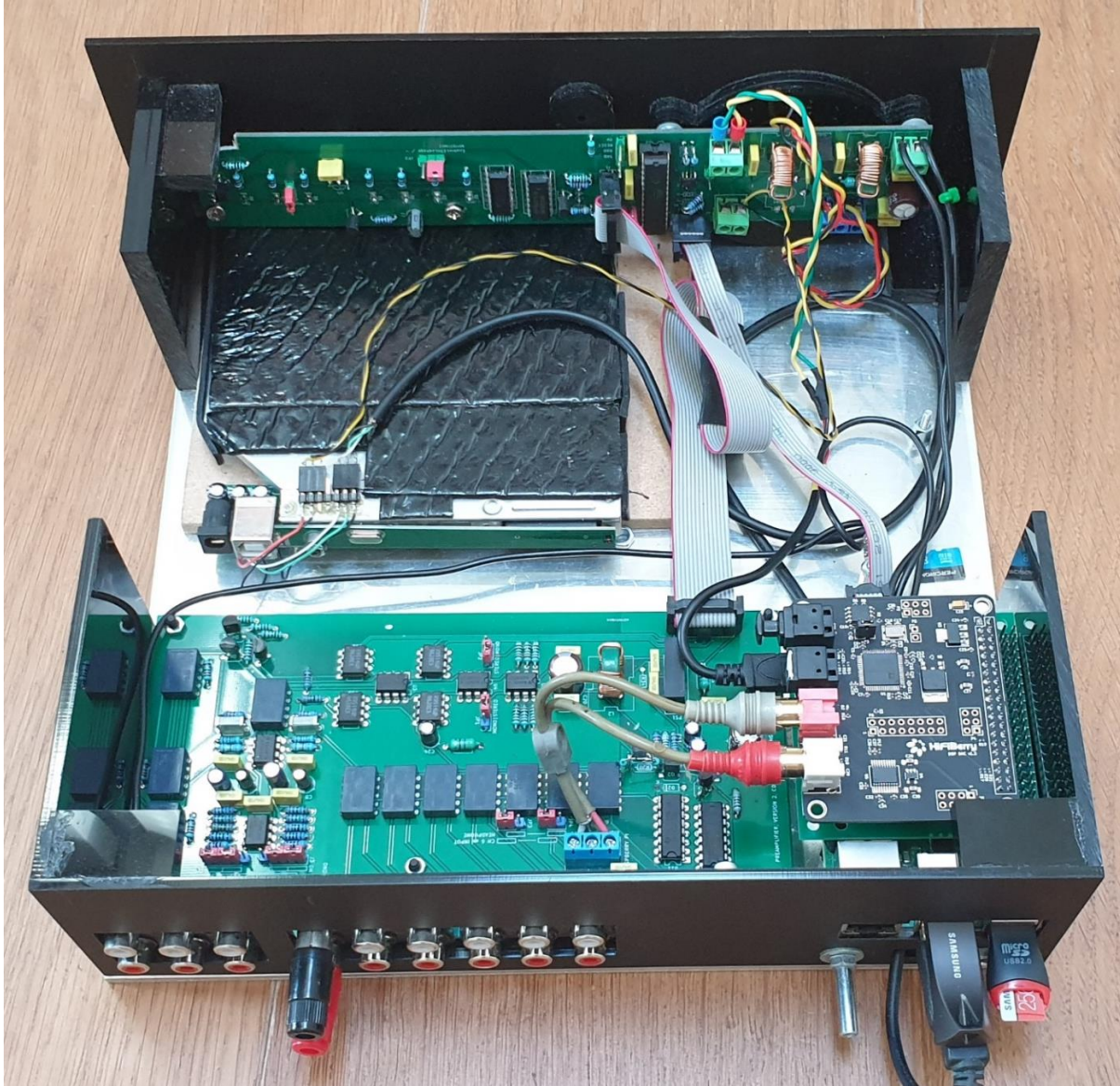


## Programming the Arduino

Use a FTDI USB to TTL adapter to program the Arduino.

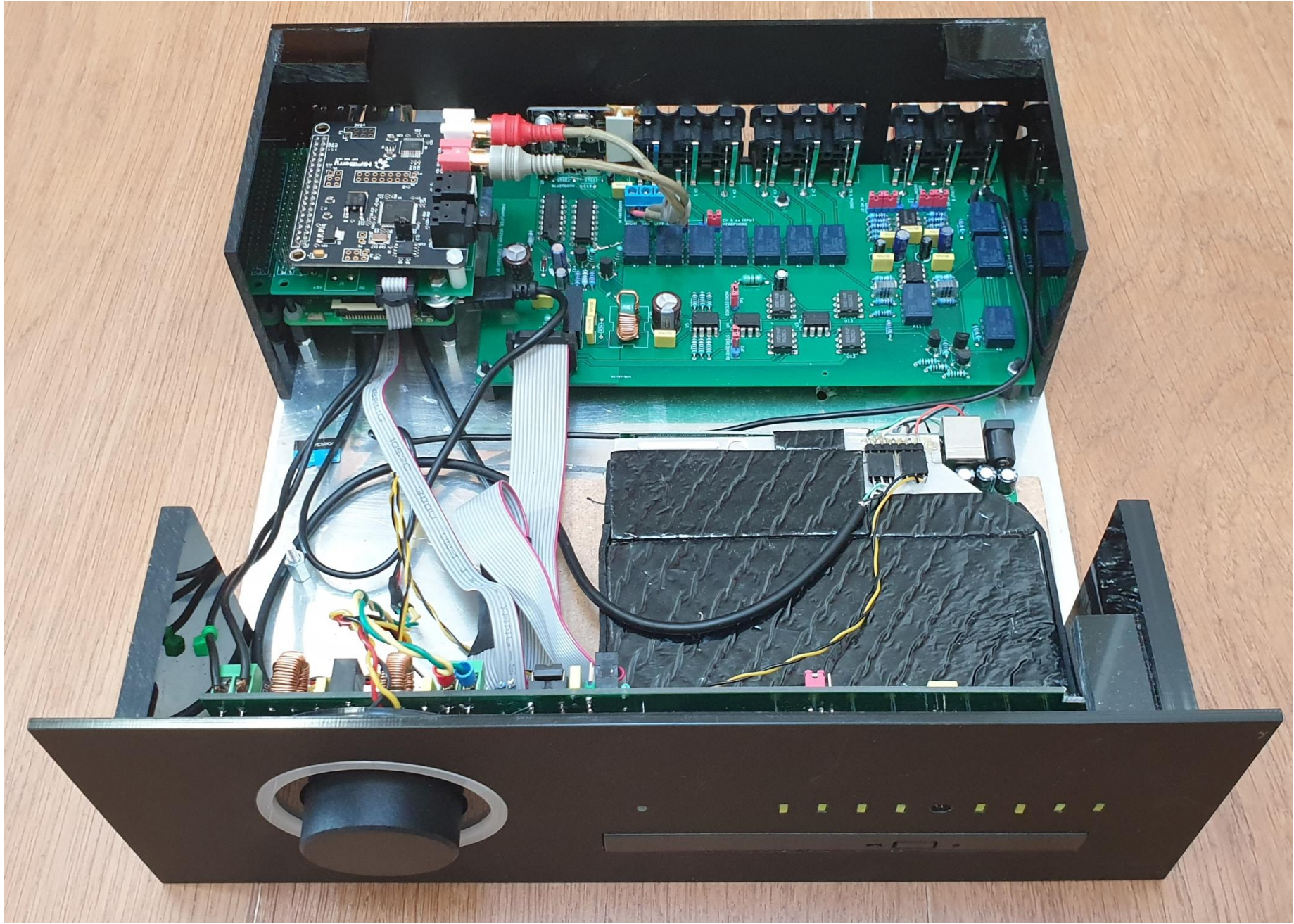


Inside the cabinet



On the CD player, damping material (as used in cars) is used to reduce noise.





## Volume control and display

Note: there are two kinds of rotary encoders. The difference is axis length and also the direction. The direction can be reversed with jumper J1.

MCIGICM 5pcs Rotary encoder, code schakelaar/EC11/audio digitale potentiometer, met schakelaar, 5Pin, handvat lengte 15mm

<https://nl.aliexpress.com/item/32798669185.html?spm=a2g0s.9042311.0.0.27424c4dwQCOCd>



NeoPixel Ring - 24 x WS2812 5050 RGB LED

Diymore WS2812 5050 Rgb Led Ring Lamp Licht Met Geïntegreerde Drivers 24 Bit Rgb Led Voor Arduino

<https://nl.aliexpress.com/item/32900076753.html?spm=a2g0s.9042311.0.0.27424c4dPdstOj>

Select outer diameter: 66 mm!





## Power supply modification DAC

The quality of a DAC depends upon the stability of the clock (low jitter) and stability of the power supply.

The 5V power coming from the Raspberry Pi is far from noise free.

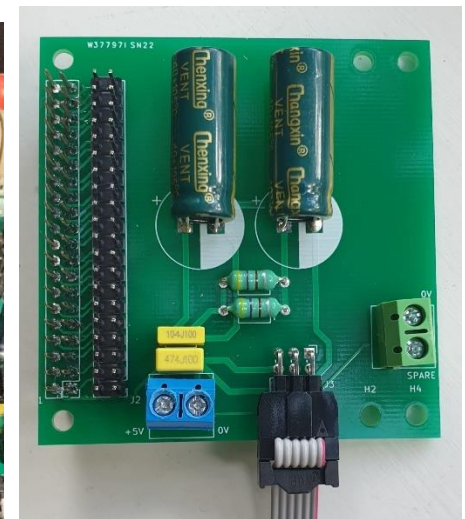
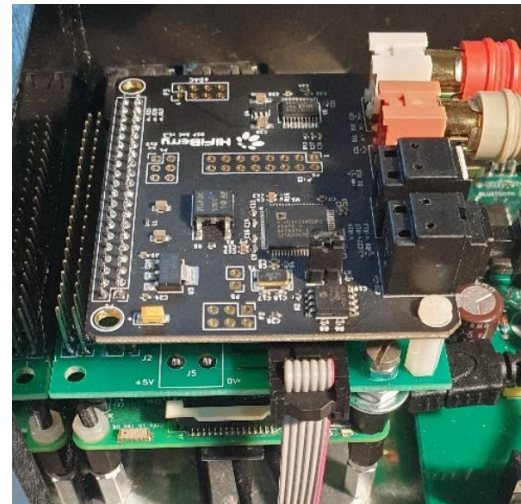
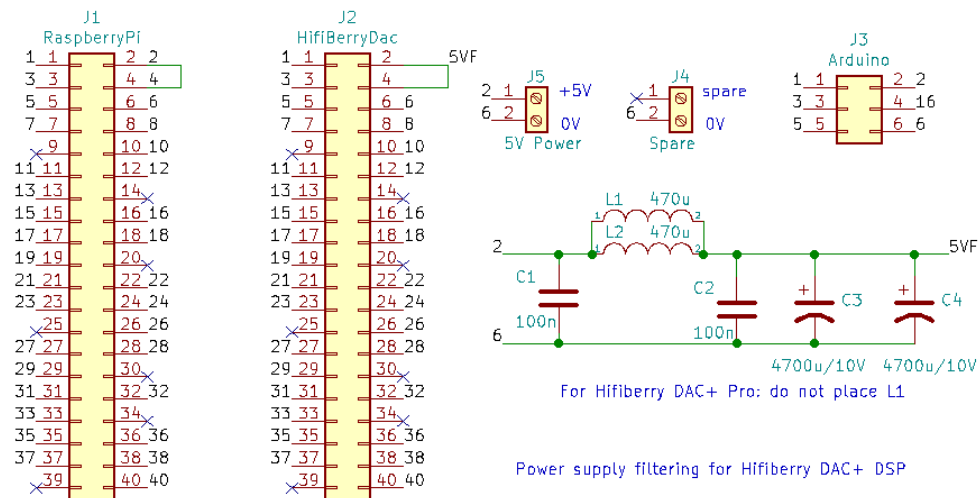
Although the Hifiberry DAC board has a voltage regulator, this voltage regulator does not suppress high frequency noise very well.

Therefore it makes sense to filter the 5V power before feeding it to the DAC board. This really improves the stereo image.

The PCB can be mounted between the Raspberry Pi and the Hifiberry DAC.

This board also has a connector J3 to connector J2 on the digital PCB.

Optionally you can use J5 to power the Raspberry Pi.





## Software installation and configuration

### Arduino

The Aduino software (“Preamplifier.ino”) can be installed using the Arduino IDE or Visual Code with Arduino plugin.

### Raspberry Pi

#### Logitech Media Server

The Logitech Media Server software can be installed following the instructions on: <https://www.scratchart.nl/mediaserver>

The hostname of the Raspberry Pi must be renamed to “streamer”.

The Samba shares have been defined in: /etc/samba/smb.conf

The shares that have been added can be found in the archive: Preamplifier\SoftwareRaspberry\SambaShares.txt

The folders must exist and must be writable for any user.

#### Node-Red

After the previous step, Node-Red has been installed when you follow the instructions for configuring the HifiBerry DAC+ DSP board.

In addition you must install node “I2C” (see: <https://nodered.org/docs/user-guide/runtime/adding-nodes>).

Install ‘abcde’ (A Better CD Encoder) tool: `sudo apt-get install abcde`

Next you can copy “Preamplifier\NodeRED\flows\_streamer.json” (from the archive) to /home/pi/.node-red.

#### LedPowerActive

The ledpoweractive module enables pin 23 to low. The purpose of this program is to indicate that the Raspberry Pi is up and running.

Copy files from ‘Preamplifier\SoftwareRaspberry\LedPowerActive’ in the archive to folder ‘/opt/ledpoweractive’ and follow the instructions.

#### CDControl

The cdcontrol package is a python implementation for controlling a cd player for Audio purposes.

It automatically detects if a CD is inserted, starts auto play if needed and keeps the spinning speed low.

Copy files from ‘Preamplifier\SoftwareRaspberry\cdcontrol’ in the archive to folder ‘/opt/cdcontrol’ and follow the instructions.

Also install ‘setcd’: `sudo apt-get install setcd`