Instructions

to build up a Fastmusic Box Pro (FMB Pro)

Version 0.1

May 1st, 2021

1 Introduction

The document describes how you can build a Fastmusic Box Pro on your own. Be aware that it take a skilled hand to build the FMB Pro. Thus, if you do not feel comfortable, please order a prebuild FMB Pro from https://symonics.com/shop.

2 Prerequisites

Please ensure that you have the following items ready before build your FMB.

2.1 Bill of Material for the Fastmusic Box (FMB)

You need to have the following parts to build the FMB, which you should find easily on Amazon or other specialized online stores such as Berrybase.

Amount	Description	Link US	Link EU
1	Raspberry PI 4b with 2GB	https://amzn.to/31jDUiJ	https://www.berrybase.de/raspberry-pi/raspberry-pi-computer/boards/raspberry-pi-4-computer-modell-b-2gb-ram
1	Power Supply for Raspberry PI with 3A, 5.1V, and local power plug	https://amzn.to/2YqPk2v	https://www.berrybase.de/raspberry-pi/raspberry-pi-computer/stromversorgung/netzteile-fuer-die-steckdose/offizielles-raspberry-pi-usb-c-netzteil-5-1v/3-0a-eu-schwarz?c=351
1	MicroSD card 32GB, Class 10. (Please use a well-known brand such as SanDisk)	https://amzn.to/3hmjsDG	https://www.berrybase.de/raspberry-pi/raspberry-pi-computer/speicherkarten/sandisk-ultra-microsdhc-a1-120mb/s-class-10-speicherkarte-43-adapter-32gb
1	Raspberry PI Official 7” Touch Screen Display	https://amzn.to/3sS0oC9	https://www.berrybase.de/raspberry-pi/raspberry-pi-computer/displays/offizielles-raspberry-pi-7-display-mit-kapazitiven-touchscreen
1	Fan 30x30 mm² with Dupoint connector 5V	e.g., https://amzn.to/3tSenZU	https://www.berrybase.de/raspberry-pi/raspberry-pi-computer/kuehlkoerper-luefter/2-

			teiliges-k-252-hlk-246-rper-set-f-252-r-raspberry-pi-schwarz?c=2396
1	Headsink for Raspberry PI 4b		https://www.berrybase.de/raspberry-pi/raspberry-pi-computer/kuehlkoerper-luefter/2-teiliges-k-252-hlk-246-rper-set-f-252-r-raspberry-pi-schwarz?c=2396
1	Fastmusic Pro Soundcard and Enclosure	https://symonics.com/product/fmb-pro-diy /	
1	Fastmusic Box OS	https://symonics.com/product/fastmusic-os/	

Figure 1: Parts need for the FMB Pro

2.2 Tools needed

You will need a PC (Windows, macOS, or Linux) with a microSD card reader. Also, please have a small screwdriver and a scissor at hand.

Figure 2: Tools needed (soldering iron, leadless solder, hot-melt gun, scissors, tweezers, Phillips screwdriver)

2.3 Test equipment

To test (and use) the FMB, you will need

- a low latency (<10ms) USB soundcard. A list of approved soundcards is to be found here: https://symonics.com/tested-soundcards
- a microphone
- a headphone
- Internet via Ethernet (RJ45 cable), IP addresses provided via DHCP
- a screen/television with HDMI input

Figure 3: To use the FMB, you need a microphone, headphones, a low latency USB soundcard, RJ45 Ethernet connection, and optionally an HDMI screen

3 Flashing the microSD card

First, ensure that you have about 18 GByte free disc space. Plug your microSD card into your computer (Windows, macOS, or Linux).

After ordering, you will have received a download link. Please download the ZIP file. Unzip it on your computer. Be aware, it might stall at position 99% for some time. Do not worry. Just wait a bit more.

On a macOS computer, please do not use the system zip program. It does not support large zip files. Instead, use a program such as “The Unarchiver“ [https://apps.apple.com/fr/app/the-unarchiver/id425424353?mt=12].

Next, download the program “Raspberry Pi Imager“ [https://www.raspberrypi.org/downloads/].

Select first the fastmusic.img from the unzip directory, then the SD card, and finally write it to your micro SD card. All content on the microSD will be overwritten.

Writing the microSD card will take a couple of minutes. Having a fast SD card reader might help. We recommend the SanDisk ImageMate (https://amzn.to/2CQRvoo).

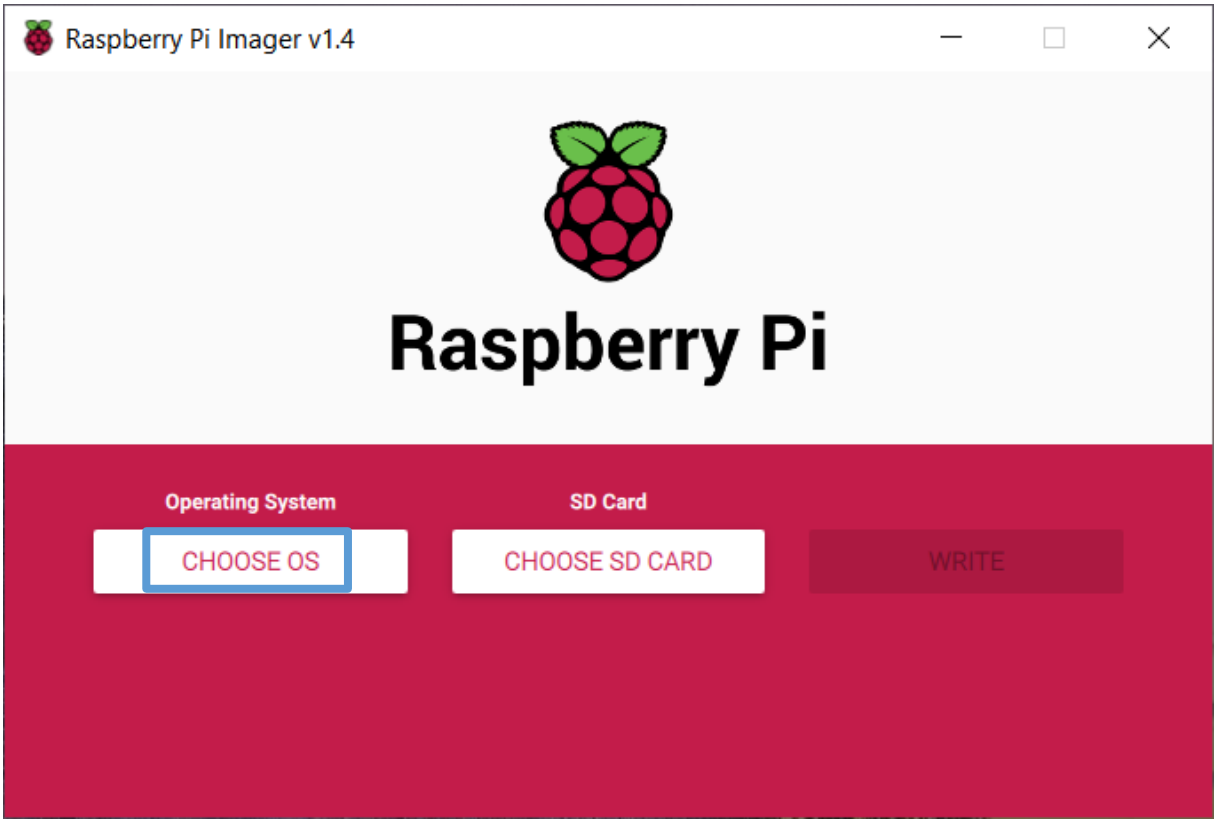

Figure 4: Raspberry PI Imager: First, choose OS

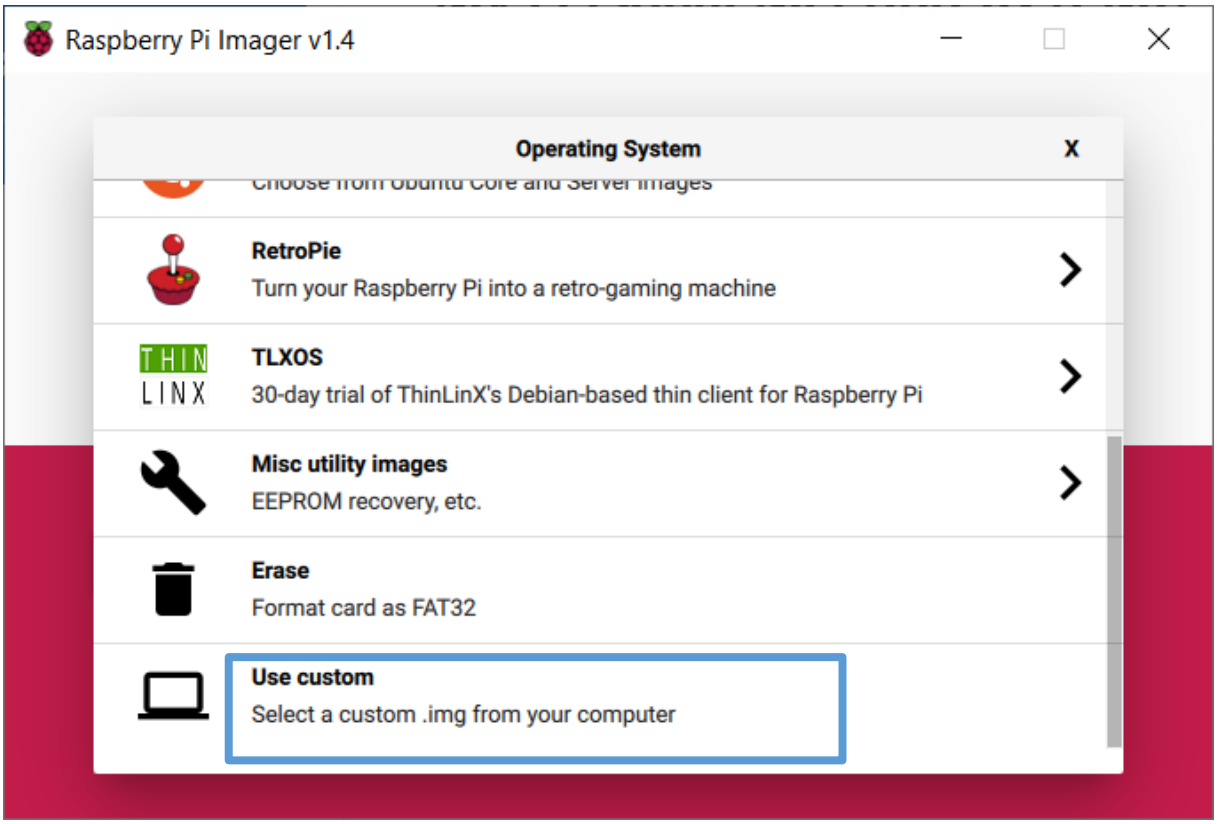

Figure 5: Raspberry PI Imager: Next press „Use custom“ and select fastmusic.img from the unzipped directory

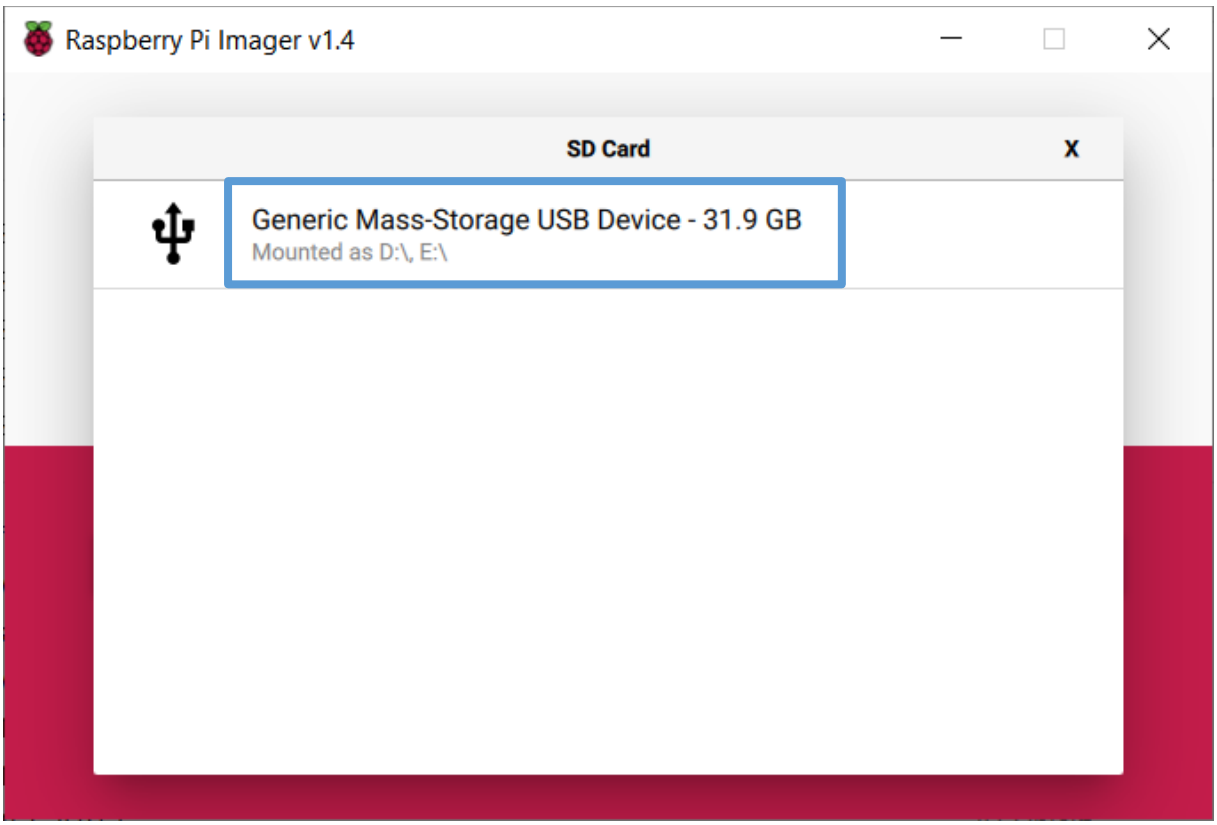

Figure 6: Raspberry PI Imager: Select the SD card.

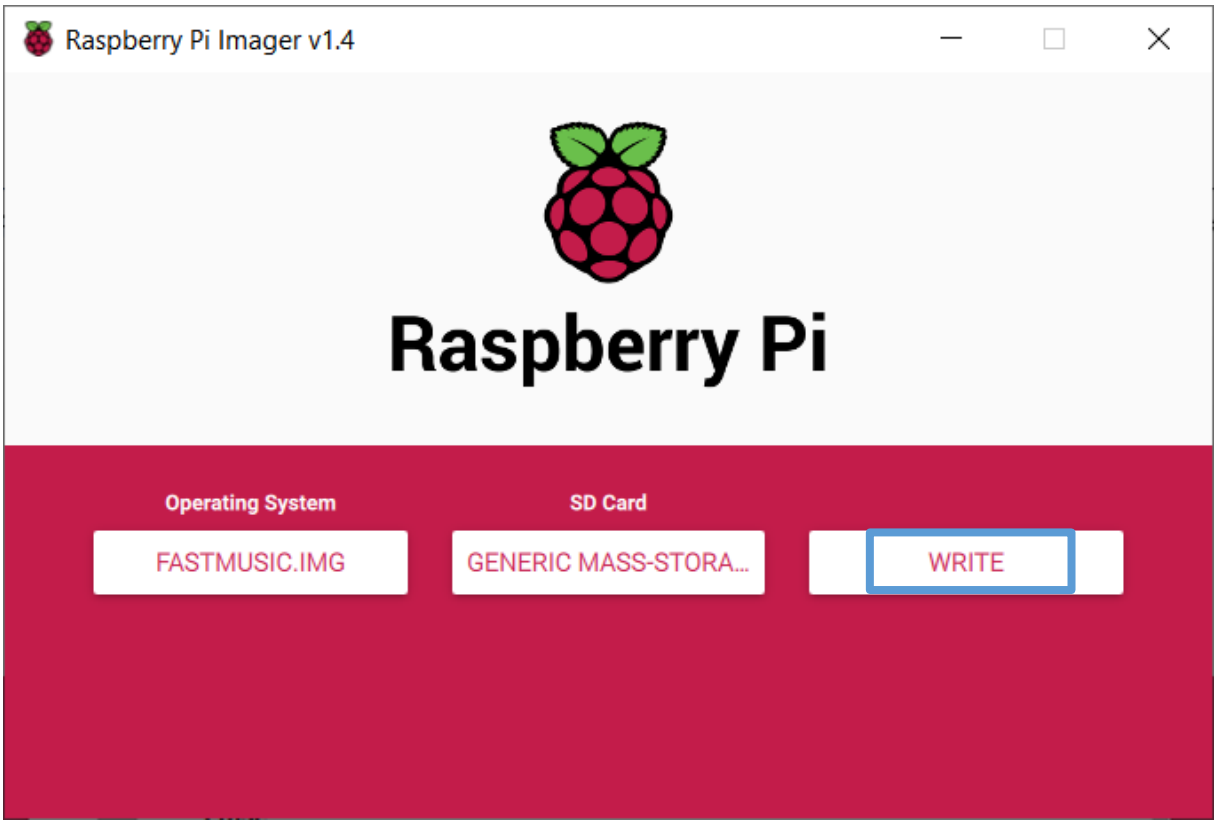

Figure 7: Raspberry PI Imager: Final press write

4 FMB Pro build steps

4.1 Prepare the Raspberry PI

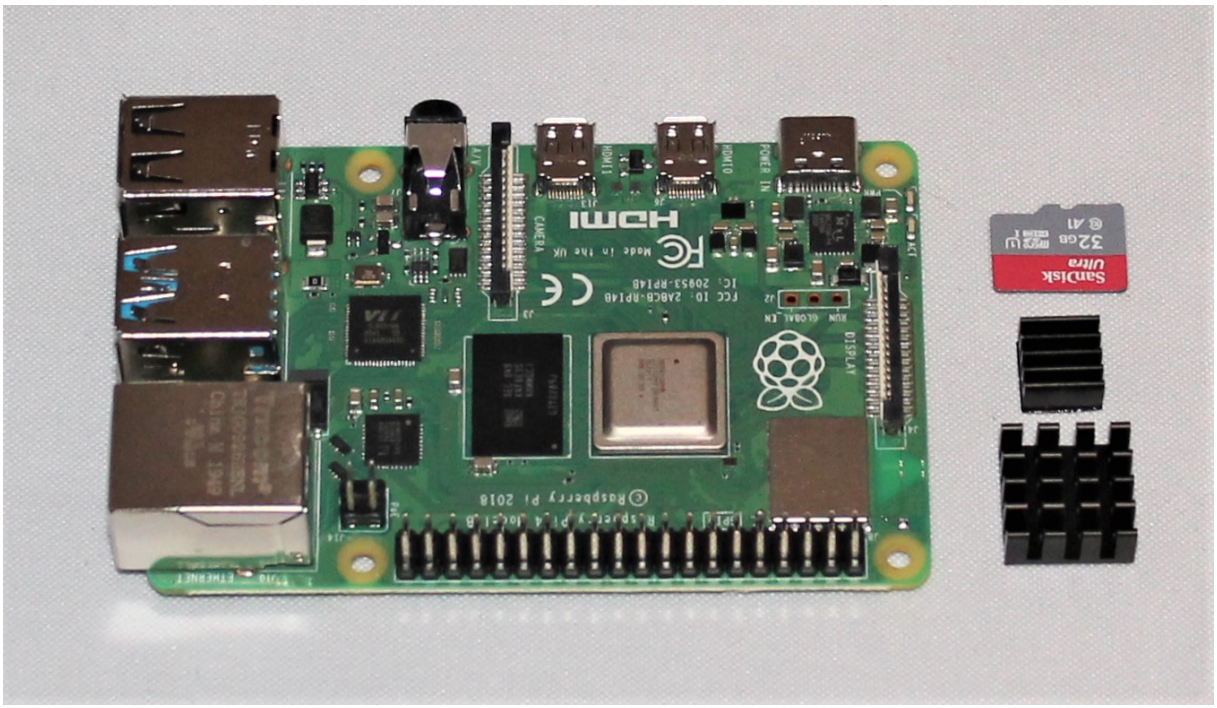

Figure 8: Unpack the Raspberry PI 4b, the heatsinks, and the micro SD card. Flash the micro SD card if not done already.

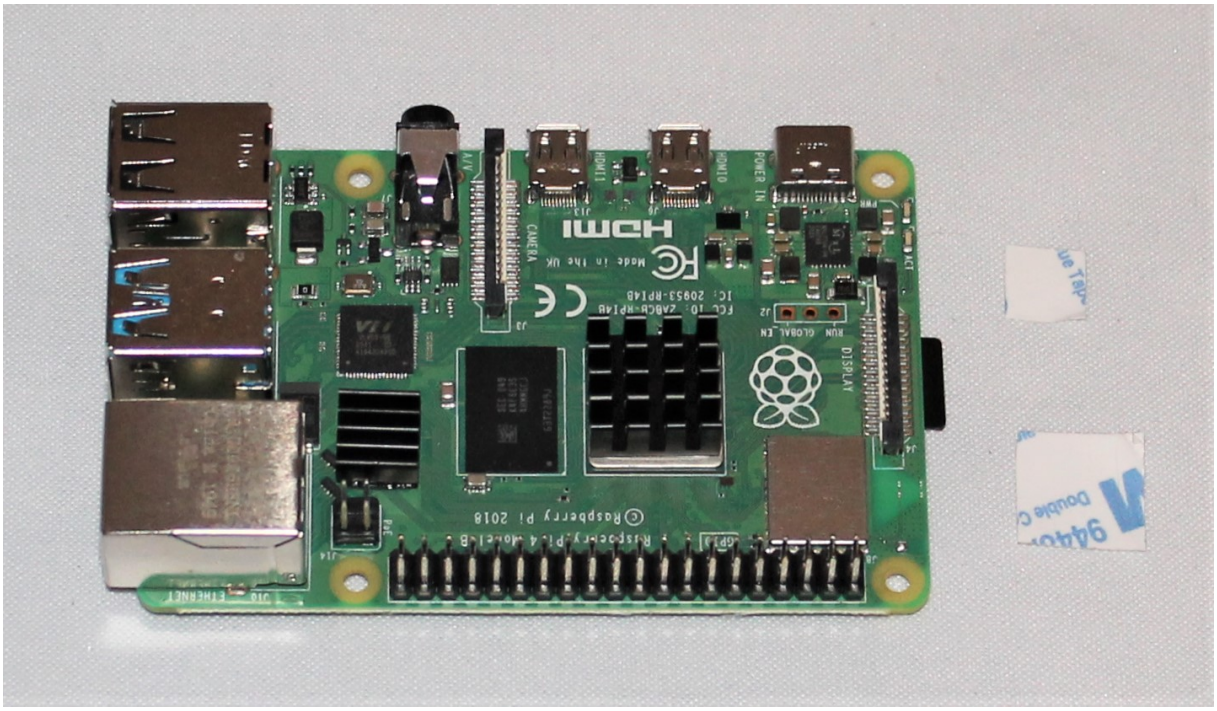

Figure 9: Remove the papers from the heatsink and place the large heatsink on the silver chip and the small one on the small black chip near the Ethernet connector. Insert the micro SD card on the right side into the micro SD slot.

4.2 Unpack the enclosure

Figure 10: Unpack the enclosure and check, whether all screws are available. The enclosure consists of the back of the enclosure, the profile with the Fastmusic logo, and the two holders.

Figure 11: Connect Raspberry PI4 to back of enclosure

4.3 Unpack the Hifiberry soundcard

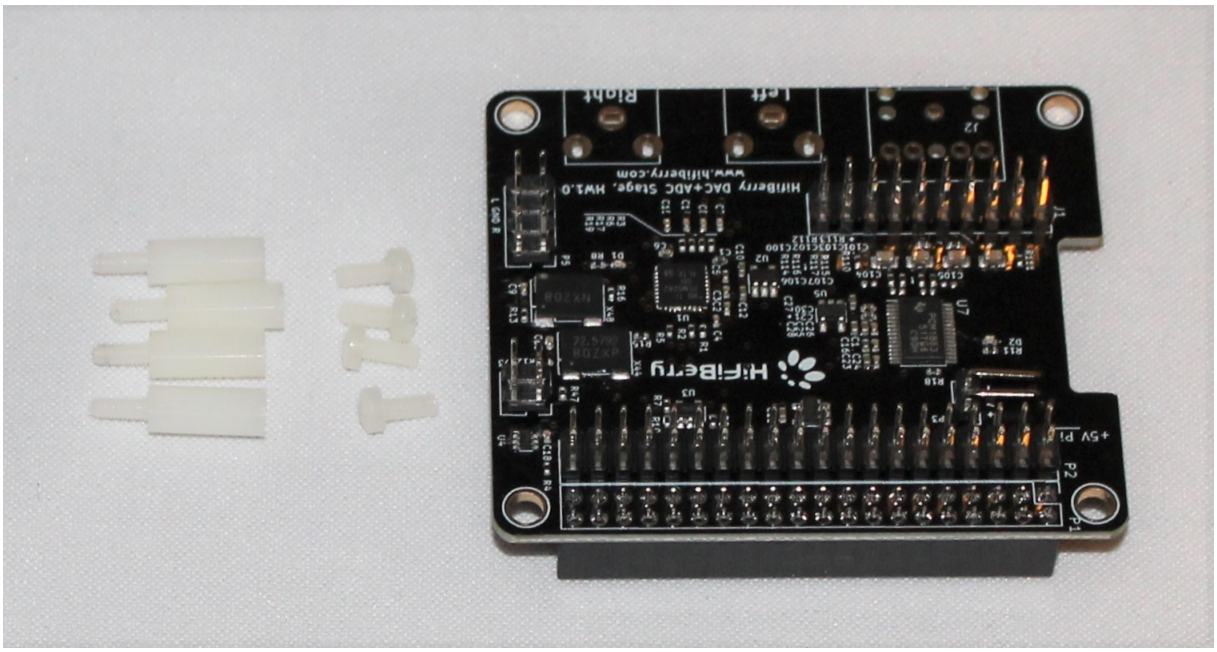

Figure 12: Unpack the Hifiberry soundcard. We will need the four screws and the four distance pins.

4.4 Combine the Raspberry PI and the enclosure

Figure 13: Use the four white distance pins to screw the Raspberry PI 4b to the enclosure back.

4.5 Combine the Raspberry PI and the enclosure

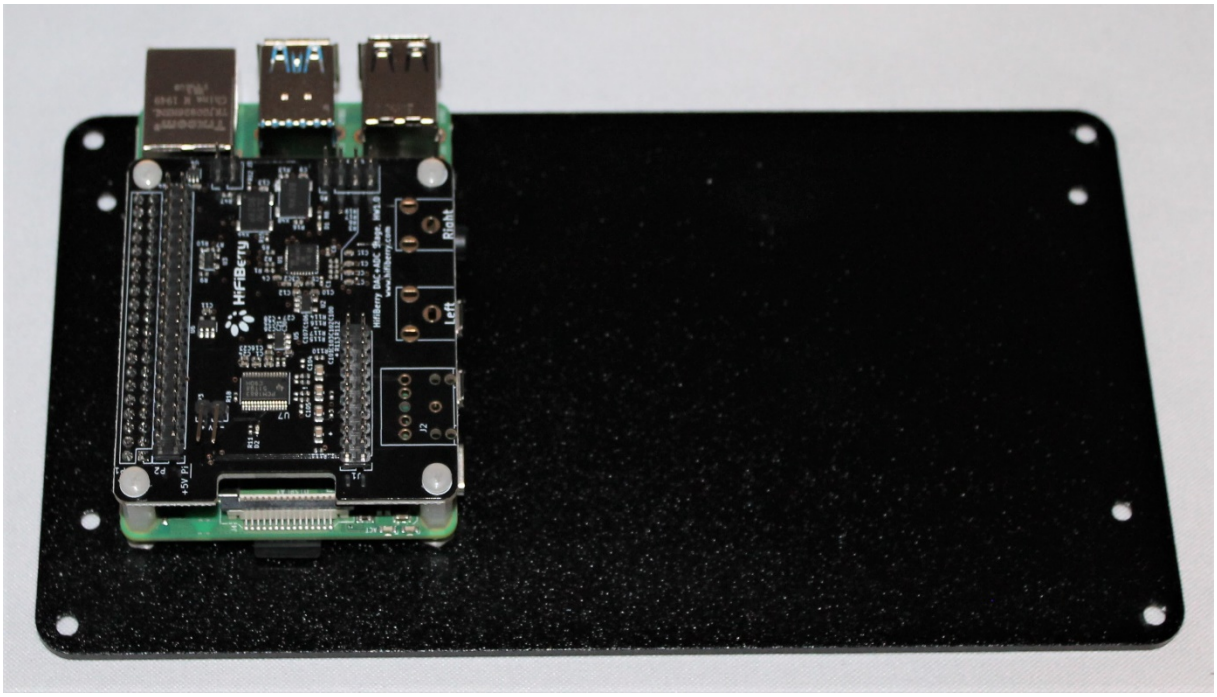

Figure 14: Combine Raspberry PI and Hifiberry soundcard carefully Then, use the four white screws to tighten Hifiberry soundcard with the Raspberry PI 4b

4.6 Unpack the XLR extension board

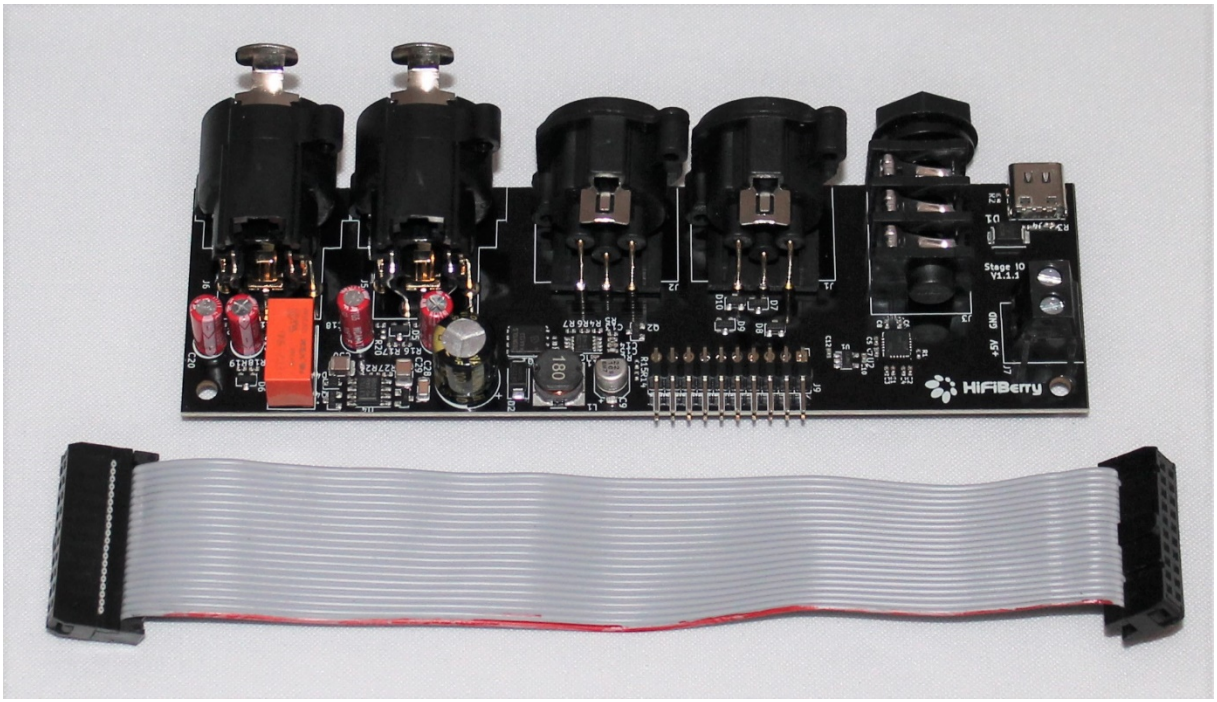

Figure 15: The XLR extension board comes with a ribbon cable.

4.7 Combine XLR extension board with enclosure profile

Figure 16: Remove the nut and the screw from the jack connector.
You will need for long screws from out of the enclosure package.

Figure 17: Use the screws to combine XLR adapter with the enclosure profile.

4.8 Connect the ribbon cable to the XLR adapter

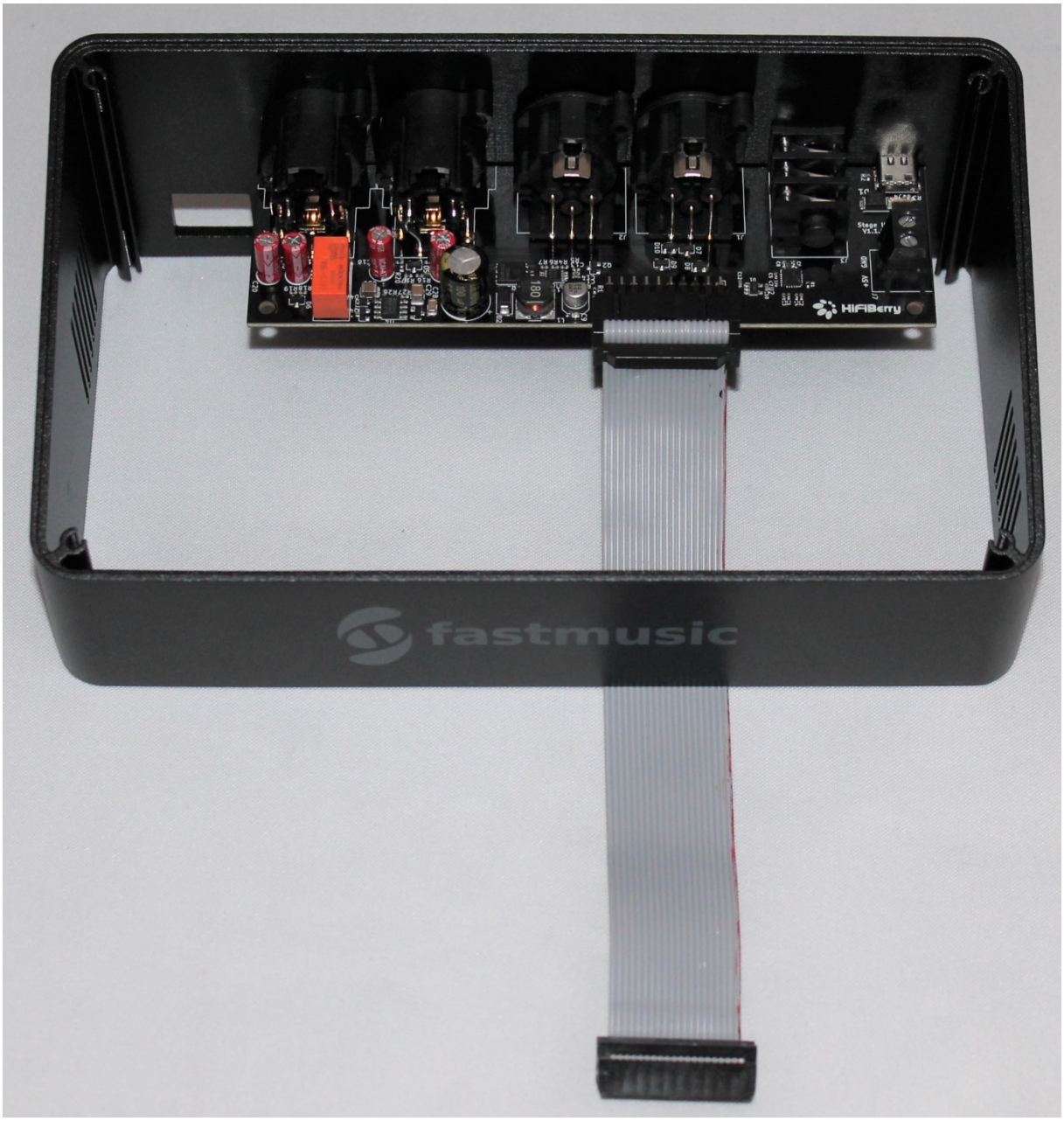

Figure 18: Connect the ribbon cable to the XLR adapter. Ensure that both pin rows are in the cable connect. Also, the cable marking has to be on the right side.

4.9 Unpack the display

Figure 19: Next, unpack the touchscreen display.

Figure 20: Remove all four screws on the golden distance pins. Use pliers to remove the bottom left distance pin near the micro USB connector.

Figure 21: Connect the black and red cable to the GND and 5V pin. Also, connect the flat cable to the display connector. Before doing this, pull the black plastic from the display connector 1mm out, add the cable with the silver up, and then push back the plastic.

4.10 Mount the fan

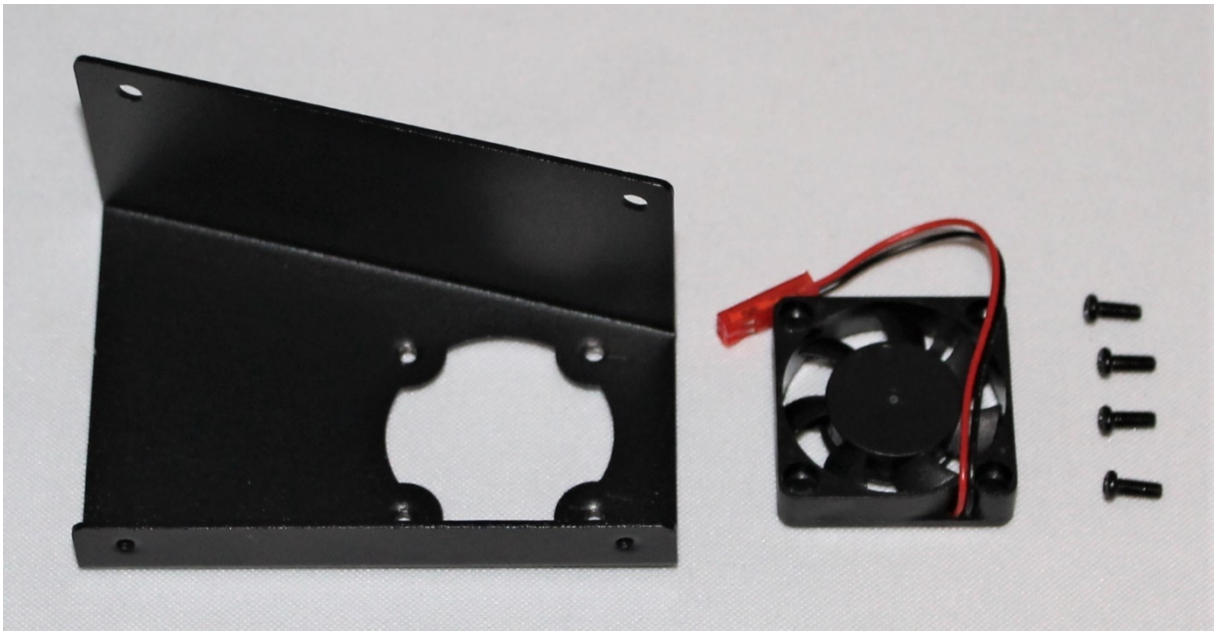

Figure 22: You need the fan holder, the fan, and four screws from the enclosure package.

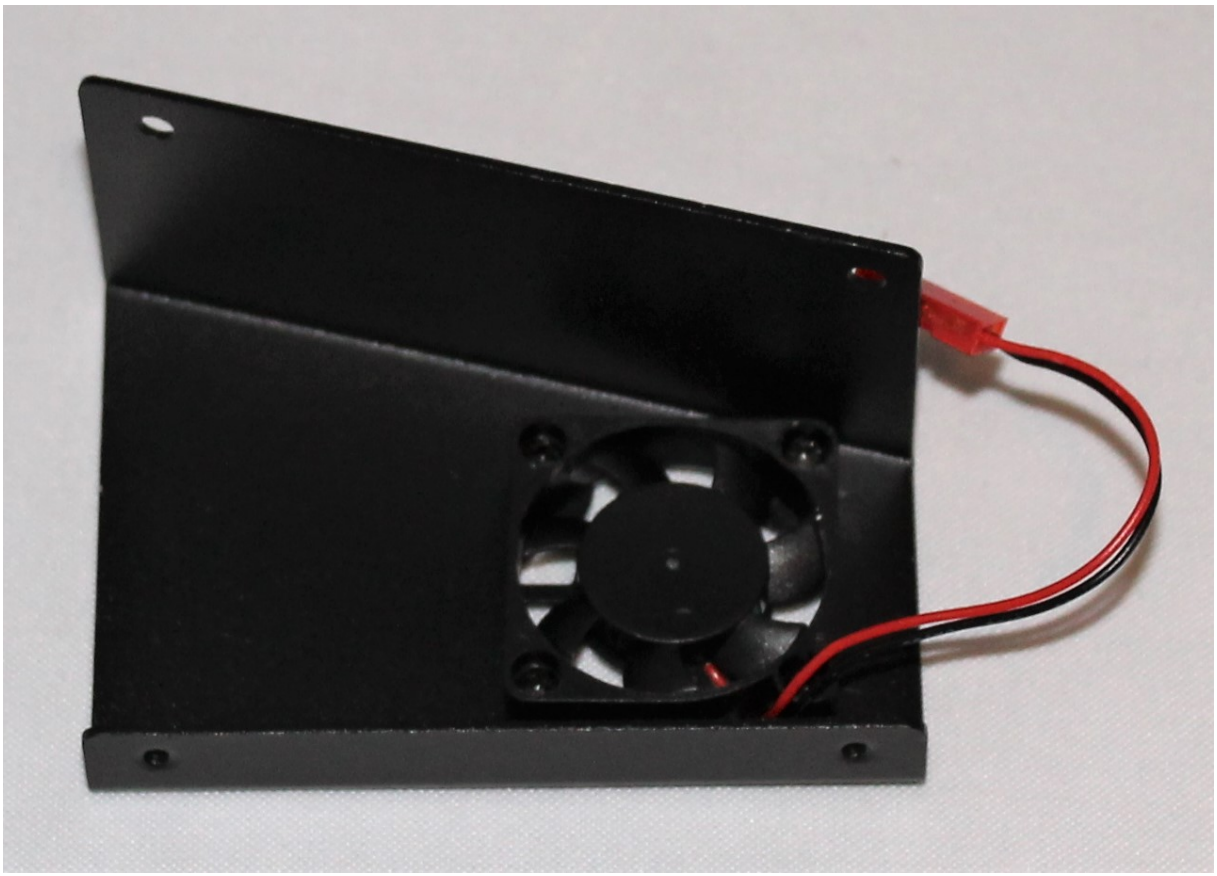

Figure 23: Connect the fan with the holder.

4.11 Fan wiring

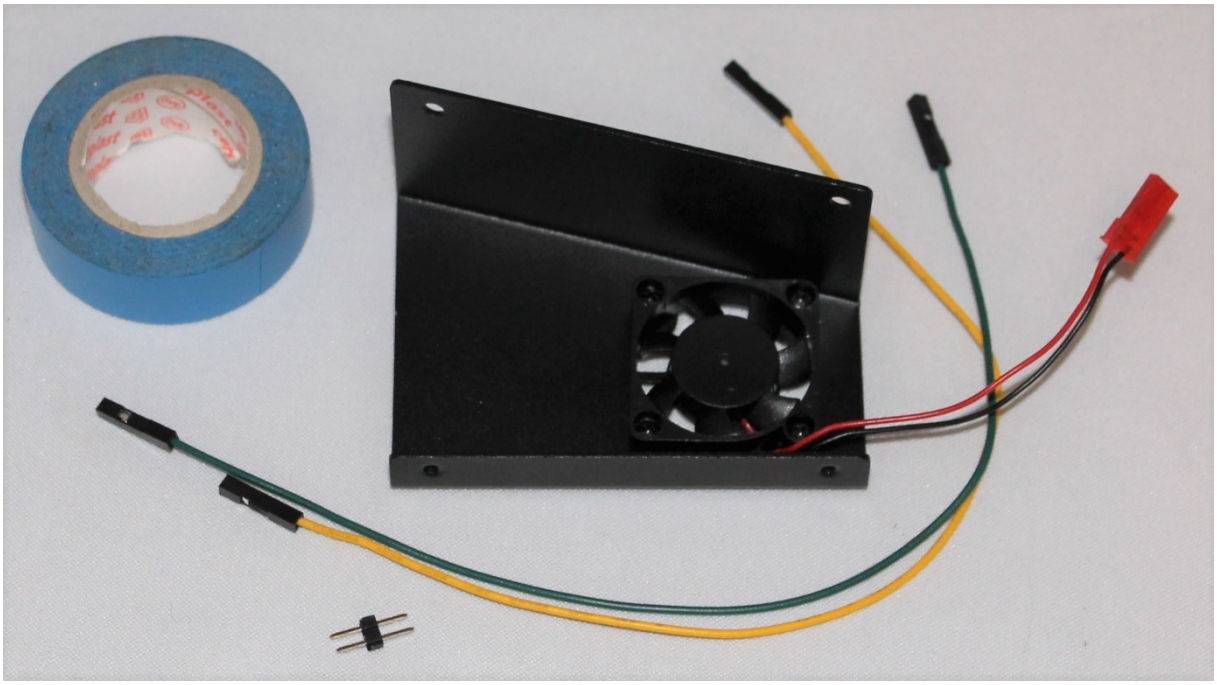

Figure 24: Next you need the tape, the jumper, the green and yellow cables from the display.

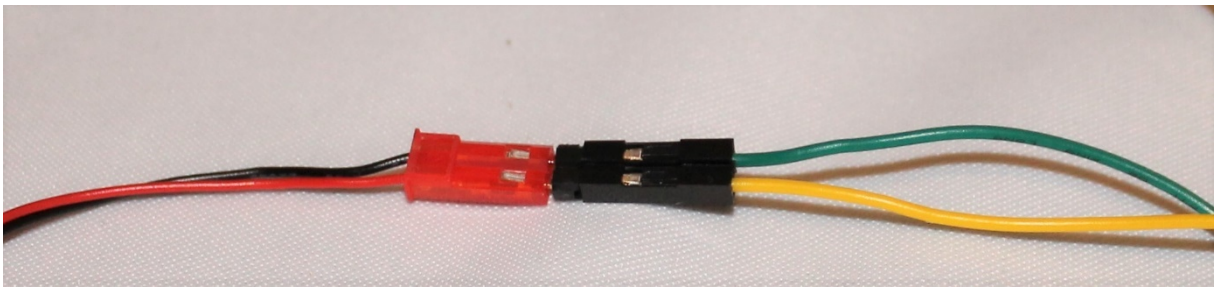

Figure 25: Connect the fan wires with the jumper and the jumper with the green and yellow cables.

4.12 Mount the holders to the display

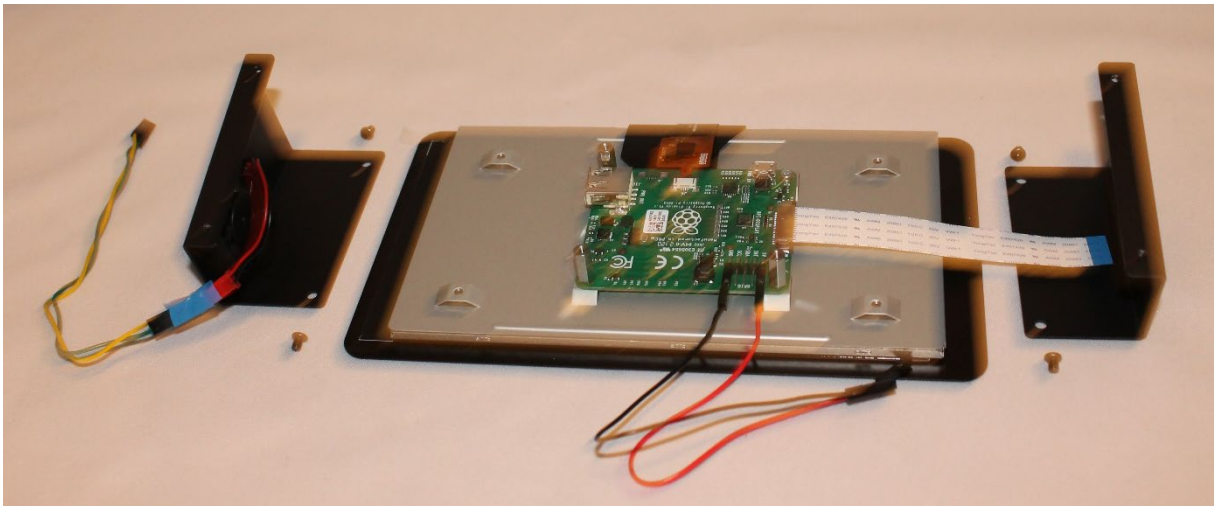

Figure 26: You need the two holders, the display, and four screws.

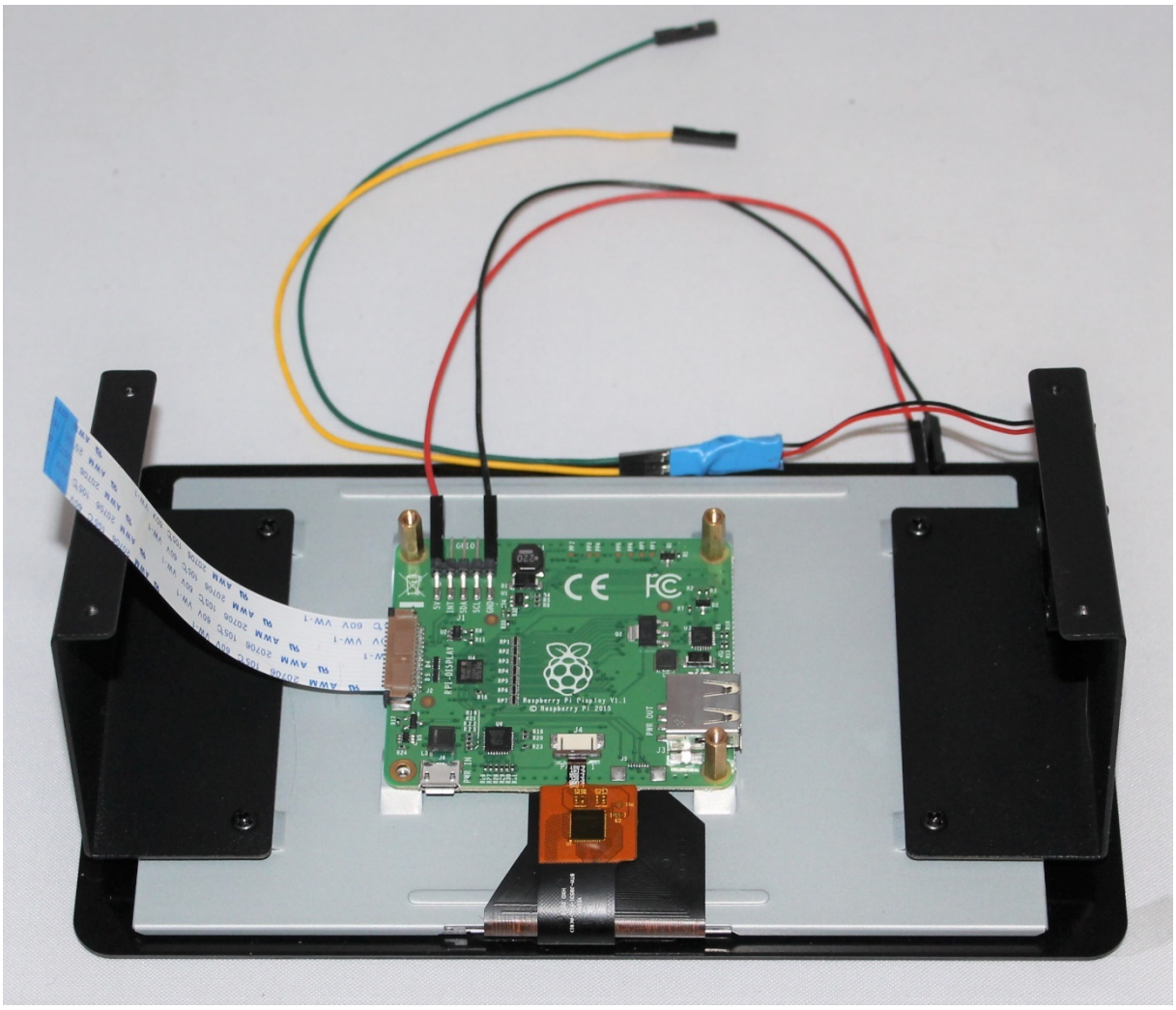

Figure 27: Mount the holder as to the displayed.

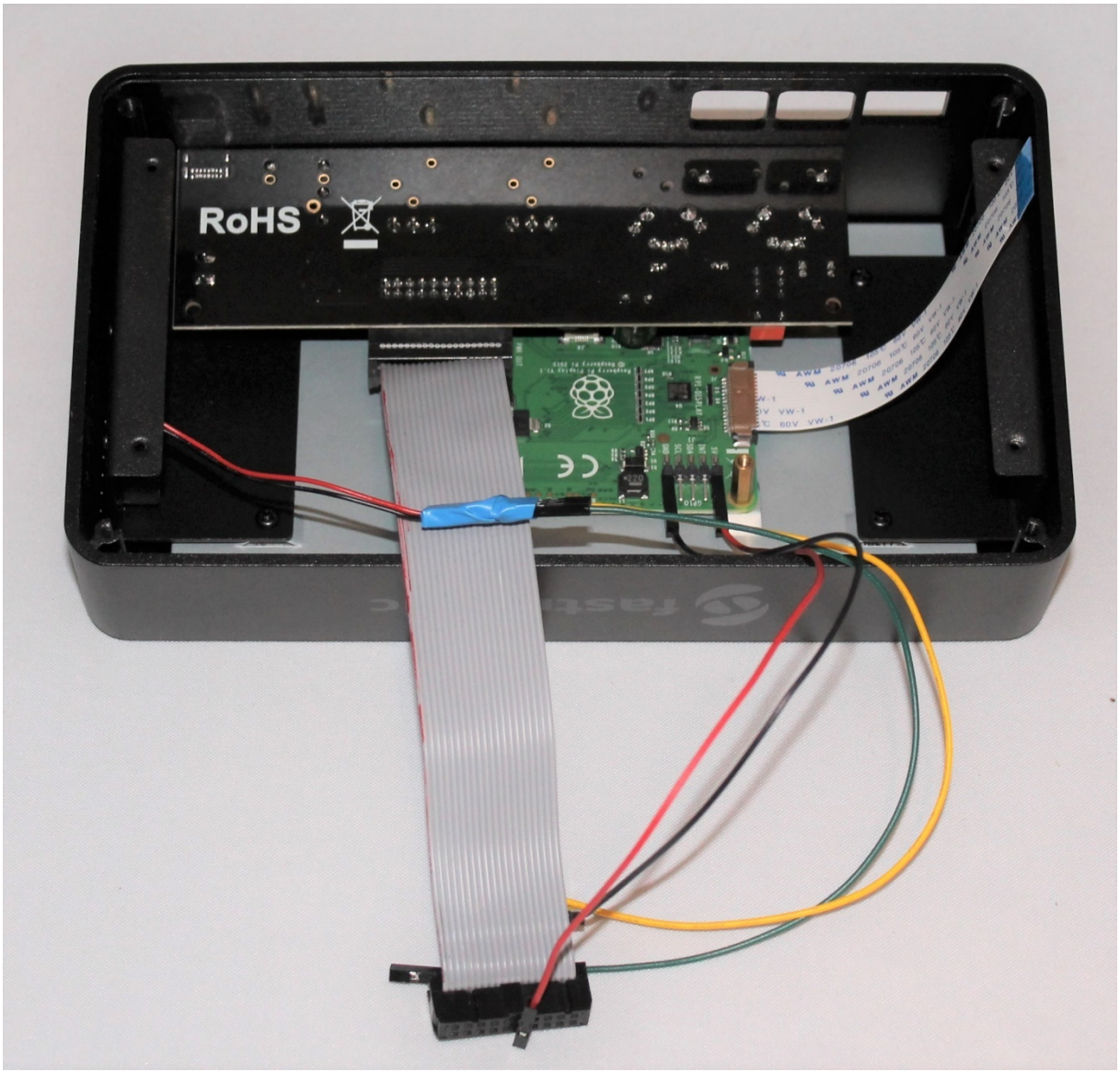

Figure 28: Display and holders need to be put together carefully

4.13 Step 12

Place the display into the enclosure profile.

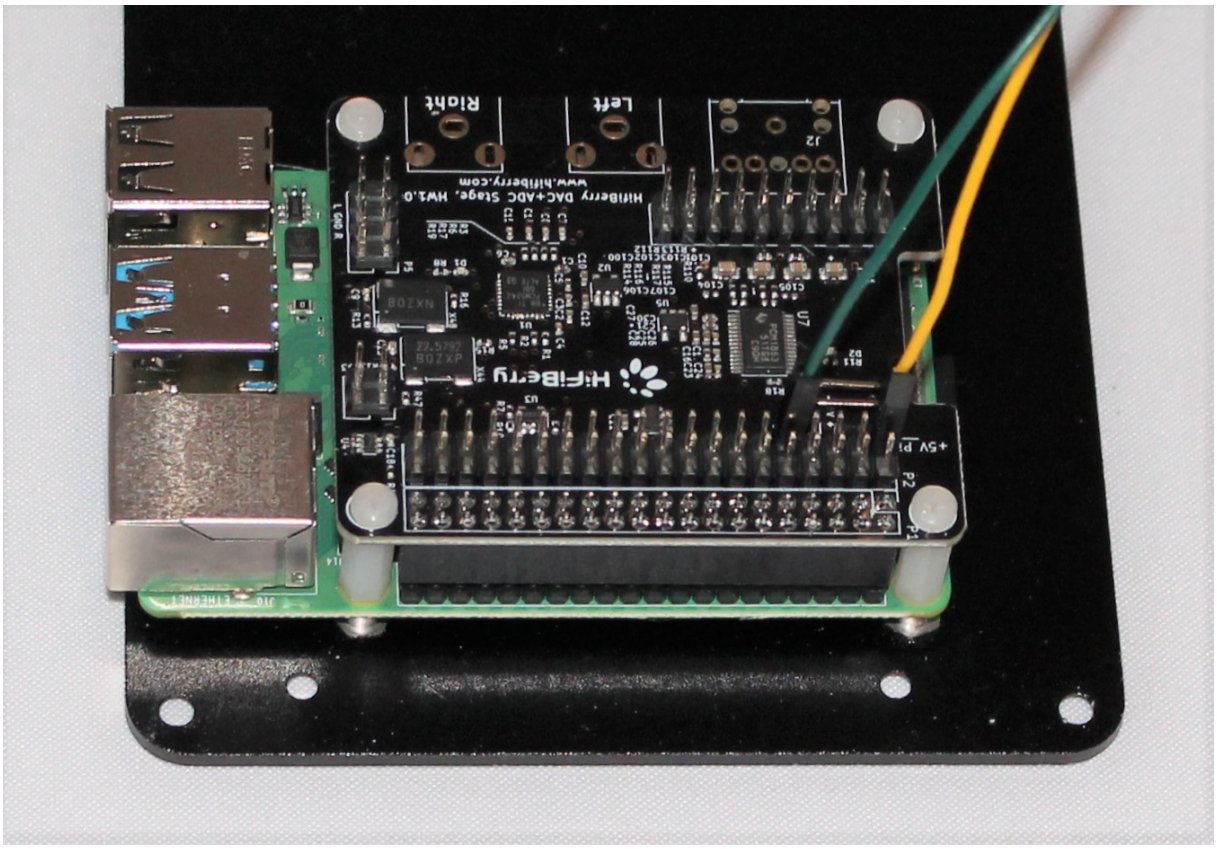

Figure 29: Connect the green and yellow cables with the soundcard. Three pins need to be left out between yellow and green.

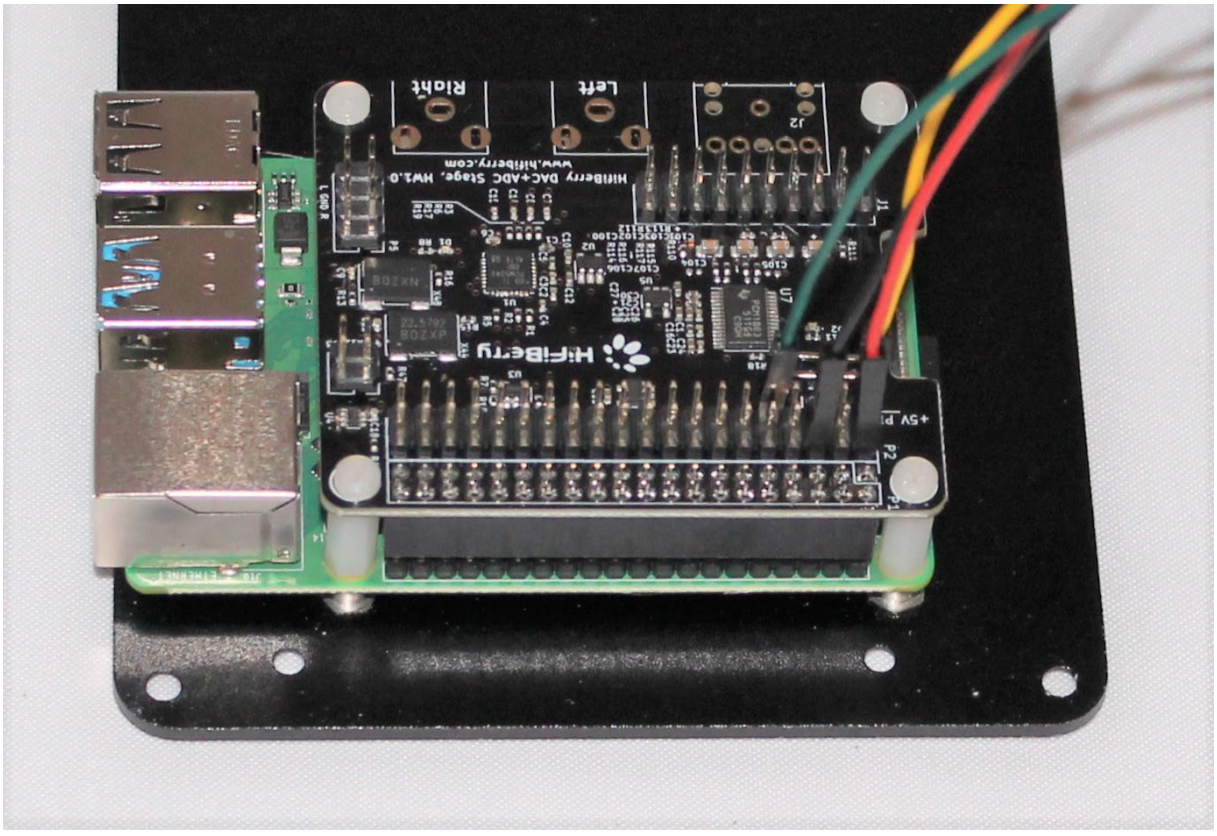

Figure 30: Connect the black and red cables with the soundcard. One pin needs to be left out between black and red.

4.14 Step 13

Connect XLR adapter and soundcard via the ribbon cable.

Figure 31: Connect the ribbon cable to the XLR adapter

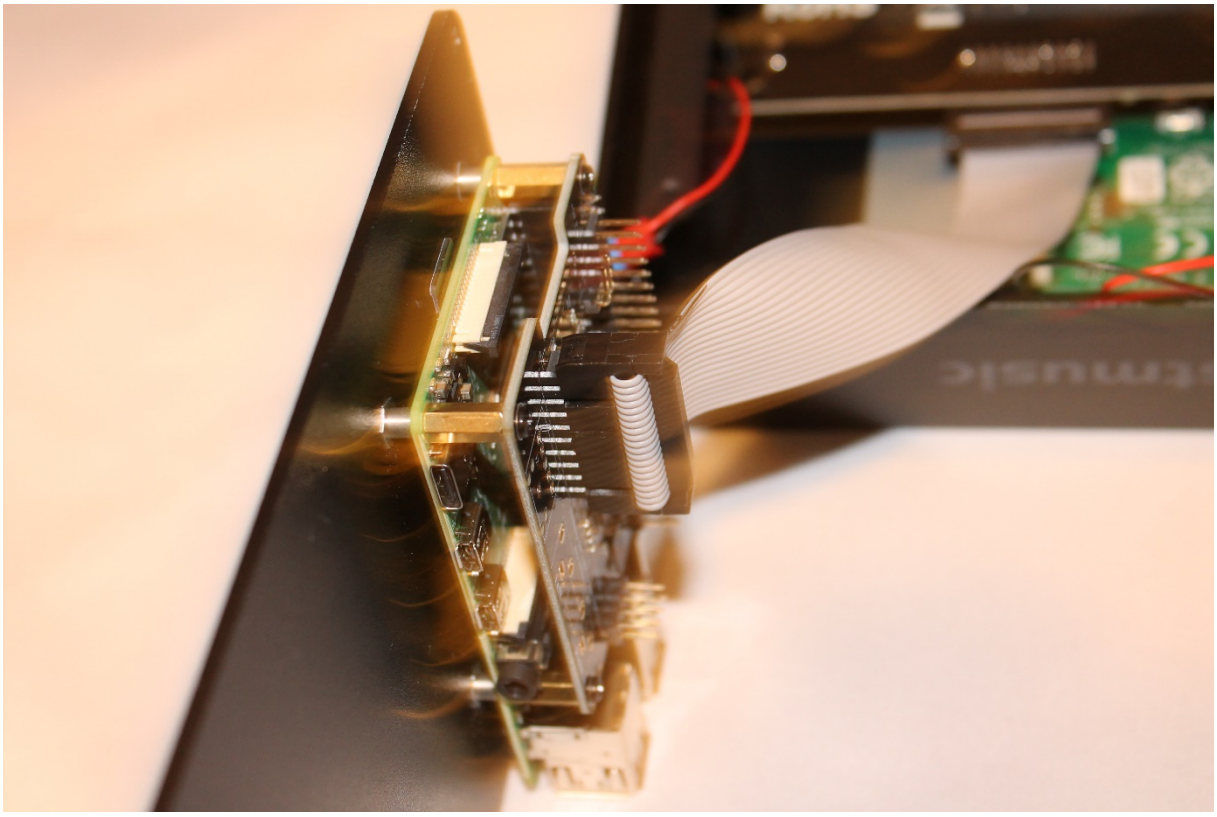

Figure 32: Connect the ribbon cable with the soundcard. Take care about the polarity.

4.15 Step 14

Connect cables with soundcard.

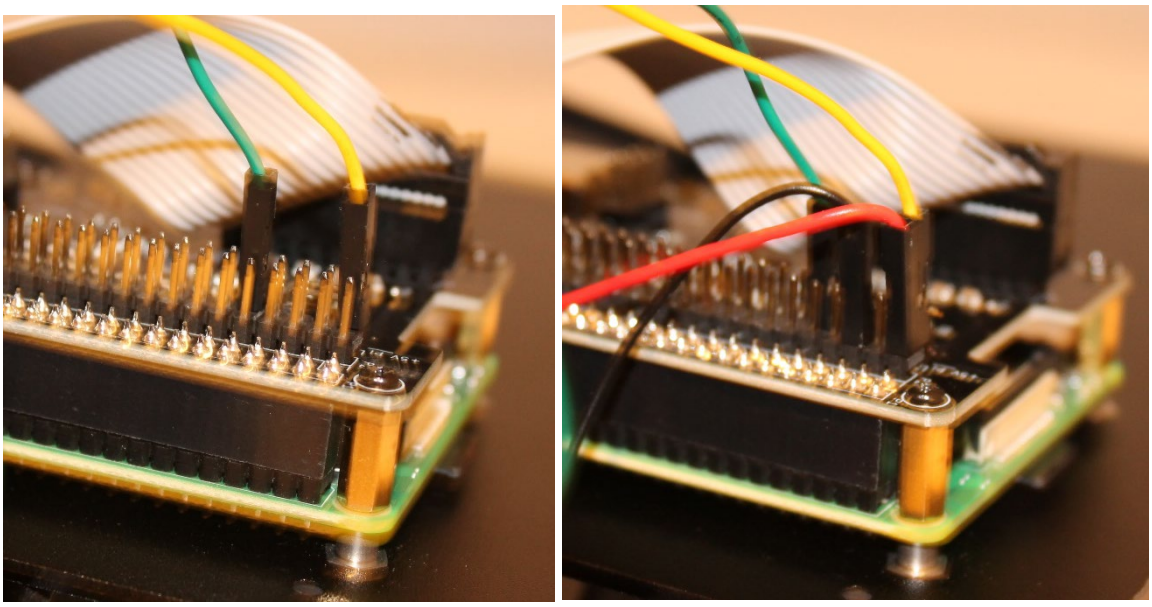

Figure 33: Connect the cables with the soundcard

4.16 Step 15

Connect display with Raspberry PI.

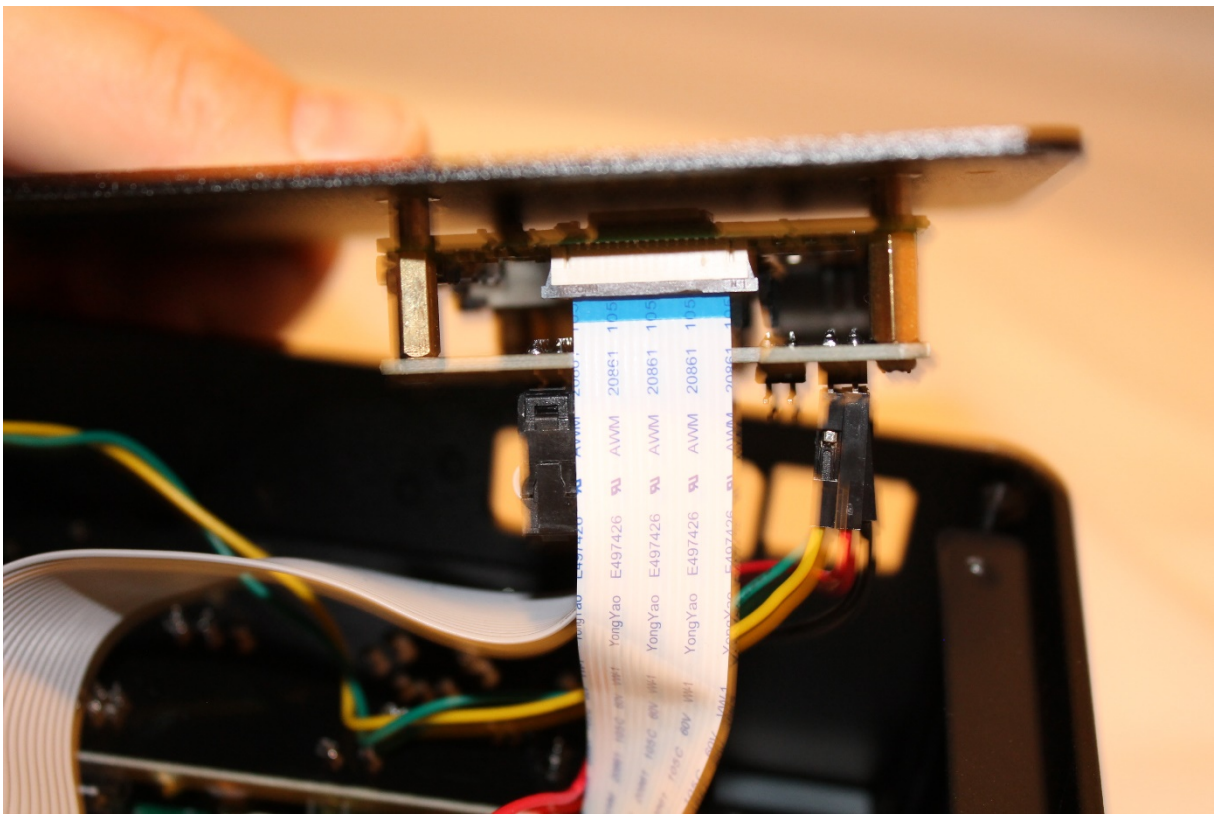

Figure 34: The flat cable must be connected to the Raspberry PI display port. Be aware, the cable is somewhat short.

4.17 Step 15

Close the device.

Figure 35: You need two times four screws and the plastic feed.

Figure 36: Close the enclosure.

Figure 37: Close the enclosure.

5 Testing

After finishing the building, you have to check whether the device works.

5.1 Power on test

Plugin the power cable.

If you have the power jumper on position 2-3, now on the front of the enclosure, you should see a red light.

If not, please press the button on the enclosure. Now, the red light shall be on.

5.2 SD card test

Use a screen and connect the HDMI cable to the screen and he left micro HDMI plug on the FMB. Power the device.

Now, you should see some strange images (a rainbow, four raspberries, then the Fastmusic logo, and finally, the fastmusic web page.

If it does not show any of these, please reflash your micro SD card.

5.3 Loudspeaker test

During the SD card test and if you have a speaker added to the FMB, then you should hear some quiet message, like „booting“.

If you hear nothing, the cabling might be broken.

5.4 Wifi test

After booting, search for a new Wifi SSID called fastmusicABCDEFGH, with ABCDEFGH being a unique hexadecimal number.

Using your smartphone, tablet, or notebook, please connect to this Wifi SSID and open the web page http://soundjack0.local/

If it does not open, please wait two minutes (especially after restart).

5.5 Soundjack test

Now, please go to https://soundjack.eu, login, and open the „stage“. On your computer, it shall find now the FMB.

Please connect your USB soundcard, microphone, and headset, and call either „localhost“ or a mirror server near you. Now, you should hear yourself with some delay, depending on your settings and the connection.

All is working? Well done!

Enjoy playing music over the Internet.

If you have any suggestions or need further help, do not hesitate to write the Symonics team at info@symonics.com.