Formbot Voron 2.4 R2 Pro+

Prep, Build, Wiring & Software setup

Crys' Livingroom Workbench
Discord: https://discord.gg/jDxTmpphtq

Intro

- The whole build is on video. Sometimes I learn later on in the build that something else should be different, so use this guide and the videos in parallel https://www.youtube.com/watch?v=lysE0Ywv53w&list=PL1fjlNqlUKnUwgfOdnnUz_YEgj1KIZx8G&index=12
- Config & printed parts: https://github.com/crysxd/Voron2.4-Config

Parts

Parts

- Formbot 2.4 R2 Pro+ Kit
  - BTT M8P v2 mainboard
  - BTT SB2209 RP2040 toolhead board
  - BTT 5” Klipper Screen
- Extra parts from hardware store:
  - 3x Wago 221-415 5-way distribution block
  - An old electrical wire as donor (extension cord or similar)
  - Cable lungs crimps in U shape (red size)

Printed parts

Printed Parts

- Selection of all printed parts I used is here:
  https://github.com/crysxd/Voron2.4-Config/tree/main/_Printed Parts
- Organized to be printed on Voron 0, open files with Orca Slicer
- Includes Voron 2.4 parts
  - Skirts are for 300 build!
  - I used magnetic panel clips, not the stock ones
  - Every part is included as often as you need it. Print every plate and you have all parts
- Includes extra parts you need:
  Screen, umbilical, …

Printed Parts

- All printed files are organized in Orca projects here: https://github.com/crysxd/Voron2.4-Config
- Voron 2.4 parts https://github.com/VoronDesign/Voron-2/tree/Voron2.4/STLs
- +1mm Z belt tensioners (if your Z loops are not tight with the stock ones) https://www.printables.com/model/356388-voron-v24-z-belt-loop-tensioners-1mm
- Voron Tap https://github.com/VoronDesign/Voron-Tap/tree/main/STLs

Printed Parts

- My simpler Nevermore cartridge https://www.printables.com/model/1230986-nevermore-v6-carbon-filter-easy-lid-remix-with-mag
- SB2209 cable bridge with PG7 https://www.printables.com/model/964357-sb2209-sb2240-cw2-cable-bridge-pg7
- PG7 Y-Endstop mount https://www.printables.com/model/527499-voron-v24-pg7-umbilical-y-endstop-relocation-with-

Printed Parts

- SB2209 StealthBurner parts
  https://github.com/bigtreetech/EBB/tree/master/EBB%20SB2240_2209%20CAN/STL

- Optional Magnetic panels (need 100 6x3 Magnets extra)
  https://www.printables.com/model/1263663-magnetic-panel-clip-for-voron-24-remix
  https://www.printables.com/model/84734-magnetic-panel-clip-for-voron-24
  https://www.printables.com/model/849168-voron-24-bottom-panel-magnetic-clips

- Nevermore v5 or v6 (recommended, but you need 2x WAGO extra)
  https://github.com/nevermore3d/Nevermore_Micro

Printed Parts

- Skirts inserts (purely visual)
  https://www.printables.com/model/648945-voron-24-skirt-insert

- Nozzle Brush
  https://www.printables.com/model/828296-voron-24-nozzle-brush-with-removable-purge-bucket

- BTT HDMI5 mount (doesn’t look like on the image, STL is different for some reason)
  https://www.printables.com/model/926845-btt-hdmi5-v12-display-mount-voron/files

Build

Frame

Voron 2.4 manual, page 12-21

- Before building the frame double check all extrusions are exactly the same length, just to be sure
- Make sure to properly tighten the screws, but be aware this can rotate the extrusion
- Build on a flat surface: Glass cooktop, stone worktop/table. IKEA paper wood is also very flat in my experience (Lack table etc). You can also use the print bed in a pinch
- Take your time. This is the base of everything else you do.

Z Drives

Voron 2.4 manual, page 22-51

- Page 25: The rails must be 3mm off the bottom extrusion. That was very tight for me, do 4mm
- Page 29: The DIN rails are rotated 90º for the 300 build. This is also how my wiring is later laid out. For the 250 and 350 you can use the orientation in the manual (350 shouldn't matter, but not 100% sure)
- Page 43: The levers didn't fully mention my belts, they had a lot of slop. I swapped them with these: https://www.printables.com/model/356388-voron-v24-z-belt-loop-tensioners-1mm
- I rotated the Z2 and Z3 motor 180º so the connector points out. You can easily do this later during wiring as well

Print bed

Voron 2.4 manual, page 52-61

- Don’t install the bed just yet. It makes the machine very heavy and you need to flip and rotate it a lot
- Prepare the bed as in the manual, but put it aside for now and install it all at the end during wiring
- I already installed the Nevermore, you can do that or do it with the bed at the end

A/B Drives

Voron 2.4 manual, page 62-81

- Nothing special here, follow the manual
- Be careful with the stacks, don’t forget a washer.

Gantry

Voron 2.4 manual, page 82-107

- Page 84, 104: The kit only uses a cable chain for the Z motion, not for XY. Don’t install any chain mounts
- Page 104: Instead of the chain mount install the little end stop adjusting part
- Page 106: The end stop for X is located on the toolhead later, Y is on the back of the machine. You can install all bolts

Gantry

Voron 2.4 manual, page 82-107

- Adjust the screws
  (Source: https://github.com/Zev-se/Formbot-voron-2.4-build-guide/blob/main/guide.md)

Z axis

Voron 2.4 manual, page 108-123

- Page 115: These bolts must not be too tight. There should be no movement in Z direction (so must be snug) but a bit of shift in XY is ok if you push

AB belts

Voron 2.4 manual, page 124-145

- Page 129: Follow the TAP installation https://github.com/VoronDesign/Voron-Tap/blob/main/Manual/Assembly_Manual_Tap.pdf

- Page 143: We use Tap

Stealthburner

Voron 2.4 manual, page 146-147

- SB manual page 14: Use the modified arm: https://www.printables.com/model/964357-sb2209-sb2240-cw2-cable-bridge-pg7
- SB manual page 68: We don’t use the ACXL
- Install also the SB2209: https://github.com/bigtreetech/EBB/blob/master/EBB%20SB2209%20CAN%20(RP2040)/Build%20Guide/EBB%20SB2209%20CAN%20V1.0%EF%BC%88RP2040%EF%BC%89Build%20Guide_20250508.pdf
- Remember to place the X-Endstop on the Tap mount

Electronics

Voron 2.4 manual, page 148-173

- Follow this section loosely as we have a different electronics setup
- See my layout for a 300 build on the side
- The Formbot kit comes with 3-6 board, but we use the same WAGO as the Voron manual

Electronics

Voron 2.4 manual, page 148-173

- Page 158-161: Skip, we use Tap
- Page 162-164: Install the Y-Endstop at the end of the machine using the custom part. Also a good time to run the CAN cable! The X-Endstop is located on the toolhead board
- The CAN cable should use the piano wire to make it stiffer. Use a bit of electrical tape on each end to connect it to the wire. The end of the piano wire should be inside the PG-7 connector

Electronics

Voron 2.4 manual, page 148-173

- Page 168: Skip
- Page 170: Skip
- Page 172-173: Skip

Controller board / Wiring

Voron 2.4 manual, page 174-193

- We use a different board. Check the Wiring section later in this presentation

Cable chains

Voron 2.4 manual, page 194-209

- Only install the Z chain, we don’t use X and Y chains
- Most of this chapter can thus be ignored

Skirts

Voron 2.4 manual, page 210-237

- Smooth sailing :)
- We use a different screen, so all instructions regarding the screen are not correct
- Page 232: I use a magnetic bottom panel…but the stock one is fine too

Skirts

Voron 2.4 manual, page 210-237

- Smooth sailing :)
- We use a different screen, so all instructions regarding the screen are not correct
- Page 232: I use a magnetic bottom panel…but the stock one is fine too
- Page 234: These took me some patience, hard to place if the rails are too low

Panels

Voron 2.4 manual, page 210-

- The kit also comes with a chamber light. Install it before adding the panels
- I used magnetic panel clips, but the stock ones are fine too. You can change those later at any point
- Page 258: The Bowden tube in the kit is too short for this loop
- The door is a bit iffy, take your time to adjust it and file some edges on printed parts if the doors get stuck

Wiring

Wiring Formbot 2.4

This is a 300 build. Wire routing for 250 and 350 will differ a bit

I do not use the 3-6 board of the kit but the “stock” setup of the Voron 2.4 with 3 WAGO 221-415 distribution blocks. You can get these at most hardware stores

Custom cables

These cables are not part of the kit. Use an old extension or power cable or similar to extract some wiring and crimp a cable lung at one end, remove 11mm isolation at the other (e.g. with a knife). The side with the isolation removed goes into the WAGO

Protective Earth

1. Connect to frame with a M3 T-nut. Make sure the screw digs into the frame so it has a good electrical connection

2. To the bed through hole. Make sure to have some slack on the cable so you can adjust the bed position

Load

1. To the bed. Make sure to have some slack on the cable so you can adjust the bed position

Neutral

1. To the bed. Make sure to have some slack on the cable so you can adjust the bed position

220/110V

Double check the 110/220V setting on your PSU. Little red switch on the side.

Use a Multimeter to check for shorts between Load, Neutral and PE

Turn the machine on to test

24V

1. To toolhead board via CAN cable

Shorten the CAN cable as needed and crimp cable lungs at the end for a secure connection to the PSU

You can remove the black isolation of the CAN cable where it enters the electronics bay and run the bare wires. Be careful to not damage the wires.

SSR

Polarity matters! If your bed doesn’t heat check if you swapped the cables

Motor B

1. To motor via chain

Left motor looking from front

Motor A

1. To motor via chain

Right motor looking from front

Motor Z0

Cable runs under PSU

Note: Motor plug faces outwards

Motor Z1

Note: Motor plug faces outwards

Motor Z2

Motor Z3

CAN

1. To toolhead board via umbilical

Y Endstop

1. To endstop via chain

Bed thermistor

1. To bed via hole

Nevermore

1. To bed via hole

Exhaust fan

1. To fan via extrusions

Cooling fans

Chamber light

1. To light via extrusions

CB1 Setup

Flash CB1

Downloads

- Download latest firmware with “Klipper” in name and .xz format https://github.com/bigtreetech/CB1/releases
- Download Pi Imager https://www.raspberrypi.com/software/

V3.0.0 Latest

Image

Changelog

- mainline Armbian build + mainline Linux kernel LTS 6.6 + mainline u-boot-v2025.01-rc4 + Debian12(Bookworm)
- Update all services to the latest version in 2024.12.20 for Klipper OS image.

Known issues

- When playing audio through HDMI, there will be no audio output for the first 1-2 seconds, It will be normal after 1-2 seconds

▾ Assets 6

CB1_Debian12_Klipper_kernel6.6_20241219.img.sha256	65 Bytes	Dec 20, 2024
CB1_Debian12_Klipper_kernel6.6_20241219.img.xz	1.32 GB	Dec 20, 2024
CB1_Debian12_minimal_kernel6.6_20241219.img.sha256	65 Bytes	Dec 20, 2024
CB1_Debian12_minimal_kernel6.6_20241219.img.xz	457 MB	Dec 20, 2024
Source code (zip)		Mar 22, 2024
Source code (tar.gz)		Mar 22, 2024

8 23 1 2 33 people reacted

Flash CB1

Write OS

- Open Pi Imager and inset the SD card into your computer
- 1. Choose OS: Use Custom, select .xz file
- 2. Choose SD card
- 3. Next

Flash CB1

Write OS

- Select “No” for custom settings
- Remove and re-insert the SD card
- A “boot” drive will show up on your PC
- If the boot drive doesn’t show up on macOS, follow the next two slides. Else skip.

macOS not mounting boot

Ignore this if you see a boot drive after inserting the SD again

- Open Terminal and run “diskutil list” (without quotes)
- Look for your SD card based on the size (e.g. around 64GB) Mine is /dev/disk6.
- Look for the partition with a few hundred MB, usually the first. For me disk6s1

```
/dev/disk6 (internal, physical):
   #:                       TYPE NAME                    SIZE       IDENTIFIER
   0:      FDisk_partition_scheme                       *63.8 GB    disk6
   1:                        0xEA                         268.4 MB   disk6s1
   2:                       Linux                         5.6 GB     disk6s2
                     (free space)                        58.0 GB    -
```

macOS not mounting boot

Ignore this if you see a boot drive after inserting the SD again

- Run “sudo mkdir -p /Volumes/CB1” (without quotes, enter password)
- Run “sudo mount -t msdos /dev/disk6s1 /Volumes/CB1” (without quotes)
- Run “open /Volumes/CB1”. A Finder window opens, you are back on track

Edit system.cfg

- Open the BOOT drive and then system.cfg. Ideally with a good editor like Visual Studio code!
- Change the file to match the next slide
- Enter your WiFi credentials
- Change the hostname if you want, e.g “voron”. The device then later will be available at http://voron.local
- Save and the safely eject the SD card

Edit system.cfg

system.cfg

Volumes > RaspberryPi-Boot > system.cfg

```
#----------------------------------------#
check_interval=5        # Cycle to detect whether wifi is connected, time 5s

eth=end0        # Ethernet card device number
wlan=wlan0      # Wireless NIC device number

hostname="BIGTREETECH-CB1"

##########################################
# System time zone setting, default Time zone: Etc/UTC (UTC, +0000)
# More settable time zones can be viewed by running the command: timedatectl list-timezones
#TimeZone="Asia/Shanghai"

##########################################
## klipperScreen Target Screen
## ks_src: "HDMI-1", "TFT35"
ks_src="HDMI-1"

## ks_angle: Rotation angle
##       normal: 0; inverted: 180;
##       left: 90; right: 270;
ks_angle="normal"

##########################################
## wifi name
WIFI_SSID="ZYIPTest"
## wifi password
WIFI_PASSWD="12345678"

##########################################
# BTT-PAD7 (ON/OFF)
BTT_PAD7="OFF"
# touch vibration effects
TOUCH_VIBRATION="OFF"
# touch sound effects
TOUCH_SOUND="OFF"
# Automatic brightness adjustment
AUTO_BRIGHTNESS="OFF"
##########################################
```

Install CB1

Place the CB1 on the connectors and firmly press down when aligned. You should hear two clicks (left + right).

Add heatsink

Insert SD card

Use the port at the side of the board, under the CB1

First start

- Start the printer
- The first start can take long, wait up to 10 minutes
- Connect to the web interface
- Should be http://voron.local if you changed the hostname to voron in the system.cfg
- Help to find the machine: https://docs.vorondesign.com/build/software/ssh.html#finding-a-devices-ip-address

What’s already there

- CB1 comes with the following installed:
  - Klipper
  - KIAUH
  - Katapult
  - KlipperScreen
  - Mainsail

Getting ready to flash

- Find your printer’s IP address & connect via SSH: https://docs.vorondesign.com/build/software/ssh.html
- Username: biqu
- Password: biqu
- Open the web interface and install all updates

Flash M8P

- The next slides are an extract of the Esoterical guide and might be outdated when you use this guide. The original is here: https://canbus.esoterical.online/mainboard_flashing.html
- Board specific settings can be found here: https://canbus.esoterical.online/mainboard_flashing/common_hardware/BigTreeTech%20Manta%20M8P%20v2.0/README.html
- The M8P is STM32 based
- The CAN network is already set up on the CB1
- **For troubleshooting go to the original guide**

Flash M8P

Put into DFU mode

- Press the “BOOT” and “RESET” button on the M8P, release “RESET” and a second later “BOOT”
- Run **lsusb** and verify you see the board in DFU mode

```
Bus 001 Device 005: ID 0483:df11 STMicroelectronics STM Device in DFU Mode
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Flash M8P

Flash Katapult

- Run **cd ~/katapult**
- Run **make menuconfig**
- Enter EXACTLY the values as below, triple check, then press Q and save

```
                                                    Katapult Configuration v0.0.1-75-g90eb71b
    Micro-controller Architecture (STMicroelectronics STM32)  --->
    Processor model (STM32H723)  --->
    Build Katapult deployment application (128KiB bootloader (SKR SE BX v2.0))  --->
    Clock Reference (25 MHz crystal)  --->
    Communication interface (USB (on PA11/PA12))  --->
    Application start offset (128KiB offset)  --->
    USB ids  --->
()  GPIO pins to set on bootloader entry
[*] Support bootloader entry on rapid double click of reset button
[ ] Enable bootloader entry on button (or gpio) state
[*] Enable Status LED
(PC3)   Status LED GPIO Pin
```

Flash M8P

Flash Katapult

- Run **make clean**
- Run **make**
- Run **lsusb**
- Run **sudo dfu-util -R -a 0 -s 0x08000000:leave -D ~/katapult/out/katapult.bin -d 0483:df11**
  - Replace **0483:df11** with the value shown in the **lsusb** output (red box)
  - This might show an error, if it says “File downloaded successfully” it’s ok

```
Bus 001 Device 005: ID 0483:df11 STMicroelectronics STM Device in DFU Mode
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Flash M8P

Verify Katapult

- Double click the “RESET” button on the board. A LED might start blinking if you got it right.
- Run **ls /dev/serial/by-id**
- You should see usb-katapult now
- If this is not the case, start over as you might have made a mistake
- If the board shows up as “usb-klipper” you might have not gotten the double click timing correct. You can retry the double click

```
pi@lab:~$ ls /dev/serial/by-id
usb-katapult_rp2040_E66138935F5D7224-if00
pi@lab:~$ cd klipp
```

Flash M8P

Build Klipper

- Run **cd ~/klipper**
- Run **make menucofig**
- Enter the values EXACTLY as below, double check, press Q and save
  Note: the boot loader offset only says “128KiB” in newer versions

```
                                    Klipper Firmware Configuration
[*] Enable extra low-level configuration options
    Micro-controller Architecture (STMicroelectronics STM32)  --->
    Processor model (STM32H723)  --->
    Bootloader offset (128KiB bootloader (SKR SE BX v2.0))  --->
    Clock Reference (25 MHz crystal)  --->
    Communication interface (USB to CAN bus bridge (USB on PA11/PA12))  --->
    CAN bus interface (CAN bus (on PD0/PD1))  --->
    USB ids  --->
(1000000) CAN bus speed
()  GPIO pins to set at micro-controller startup
```

Flash M8P

Flash Klipper

- Run **make clean**
- Run **make**
- Run **sudo service klipper stop**
- Run **ls /dev/serial/by-id/** and verify you see katapult. If not, double press the “RESET” button on the M8P
- Run **python3 ~/katapult/scripts/flashtool.py -f ~/klipper/out/klipper.bin -d /dev/serial/by-id/usb-katapult_your_board_id**
  - Replace **usb-katapult_your_board_id** with the id shown in the **ls /dev/serial/by-id/** command

Flash M8P

Verify Klipper

- Run **lsusb**
- Verify you see the CAN adapter (image below)
- Shut the machine down with **sudo shutdown -n** then wait 5s and then cut power to the machine, turn power back on after 5s. Log back in to SSH.
- Check the can network is up by running **ip -s -d link show can0**
- Run **~/klippy-env/bin/python ~/klipper/scripts/canbus_query.py can0** and note down the UUID (**make a screenshot**) so you later know which board is which

```
pi@trident:~ $ lsusb
Bus 001 Device 005: ID 046d:0825 Logitech, Inc. Webcam C270
Bus 001 Device 036: ID 1d50:606f OpenMoko, Inc. Geschwister Schneider CAN adapter
Bus 001 Device 003: ID 0424:ec00 Microchip Technology, Inc. (formerly SMSC) SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514 Microchip Technology, Inc. (formerly SMSC) SMC9514 Hub
```

Flash SB2209 (RP2040)

- The next slides are an extract of the Esoterical guide and might be outdated when you use this guide. The original is here: https://canbus.esoterical.online/toolhead_flashing.html
- Board specific settings can be found here: https://canbus.esoterical.online/toolhead_flashing/common_hardware/BigTreeTech%20SB2209%20(RP2040)/README.html
- The SB2209 is RP2040 based
- Make sure to disconnect the CAN cable with 24V before flashing and remember to remove the USB power jumper after flashing before installing the 24V cable again! :)

Flash SB2209 (RP2040)

Prepare board

- **Turn the machine off** (Use **sudo shutdown now** to gracefully shut down)
- Place the 120 Ohm jumper on the purple circle
- Place the USB power jumper (yellow) and disconnect the CAN cable form the SB2209 (there must be no 24V power on it!)
- Connect a USB cable from the SB2209 to the M8P (this cable doesn't come with the kit, any USB cable will do)

Flash SB2209 (RP2040)

Put into BOOT mode

- Turn the machine on and connect SSH
- On the SB2209, press BOOT and RESET. Then release RESET first and BOOT after a second
- Run **lsusb** and verify you see the board in boot mode

```
@trident:~/klipper $ lsusb
s 001 Device 060: ID 046d:0825 Logitech, Inc. Webcam C270
s 001 Device 061: ID 2e8a:0003 Raspberry Pi RP2 Boot
s 001 Device 003: ID 0424:ec00 Microchip Technology, Inc. (formerly SMSC
s 001 Device 002: ID 0424:9514 Microchip Technology, Inc. (formerly SMSC
s 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
@trident:~/klipper $ make menuconfig
```

Flash SB2209 (RP2040)

Build Katapult

- Run **cd ~/katapult**
- Run **make menuconfig** and enter the values EXACTLY as below. Double check, then press Q and save

```
                    Katapult Configuration v0.0.1-61-gec4df2e
    Micro-controller Architecture (Raspberry Pi RP2040)  --->
    Flash chip (W25Q080 with CLKDIV 2)  --->
    Build Katapult deployment application (16KiB bootloader)  --->
    Communication interface (CAN bus)  --->
(4) CAN RX gpio number (NEW)
(5) CAN TX gpio number (NEW)
(1000000) CAN bus speed
()  GPIO pins to set on bootloader entry
[*] Support bootloader entry on rapid double click of reset button
[ ] Enable bootloader entry on button (or gpio) state
[*] Enable Status LED
(gpio26) Status LED GPIO Pin
```

Flash SB2209 (RP2040)

Flash Katapult

- Run **make clean**
- Run **make**
- Run **lsusb** and double check the device is still in boot mode
- Run **cd ~/katapult**
- Run **make flash FLASH_DEVICE=0000:0000** with the device replaced with the value from lsusb

```
@trident:~/klipper $ lsusb
s 001 Device 060: ID 046d:0825 Logitech, Inc. Webcam C270
s 001 Device 061: ID 2e8a:0003 Raspberry Pi RP2 Boot
s 001 Device 003: ID 0424:ec00 Microchip Technology, Inc. (formerly SMSC
s 001 Device 002: ID 0424:9514 Microchip Technology, Inc. (formerly SMSC
```

Flash SB2209 (RP2040)

Prepare board

- **Turn the machine off** (Use **sudo shutdown now** to gracefully shut down)
- **Remove the USB jumper** (yellow) but keep the other one in place (important!)
- Connect the CAN cable again (so the board has 24V and CAN connection)
- Turn the machine on and connect SSH

Flash SB2209 (RP2040)

Verify Katapult

- Run **python3 ~/katapult/scripts/flashtool.py -i can0 -q**
- You should find the board with Katapult running
- If you see Klipper instead of Katapult double press the reset button (same as M8P before)

```
pi@raspberrypi:~ $ python3 ~/katapult/scripts/flashtool.py -i can0 -q
Resetting all bootloader node IDs...
Checking for Katapult nodes...
Detected UUID: 66f03f24c715, Application: Katapult
```

Flash SB2209 (RP2040)

Build Klipper

- Run **cd ~/klipper**
- Run **make menuconfig** and enter the values EXACTLY as below. Double check, then press Q and save

```
(Top)
                                    Klipper Firmware Configuration
[*] Enable extra low-level configuration options
    Micro-controller Architecture (Raspberry Pi RP2040)  --->
    Bootloader offset (16KiB bootloader)  --->
    Communication interface (CAN bus)  --->
(4) CAN RX gpio number (NEW)
(5) CAN TX gpio number (NEW)
(1000000) CAN bus speed
(gpio26) GPIO pins to set at micro-controller startup
```

Flash SB2209 (RP2040)

Flash Klipper

- Run **make clean**
- Run **make**
- Run **sudo service klipper stop**
- Run **python3 ~/katapult/scripts/flashtool.py -i can0 -q**
- Run **python3 ~/katapult/scripts/flashtool.py -i can0 -f ~/klipper/out/klipper.bin -u youruuid**
- Replace **youruuid** with the id shown in the previous command

```
pi@raspberrypi:~ $ python3 ~/katapult/scripts/flashtool.py -i can0 -q
Resetting all bootloader node IDs...
Checking for Katapult nodes...
Detected UUID: 66f03f24c715, Application: Katapult
```

Flash SB2209 (RP2040)

Verify Klipper

- Run **~/klippy-env/bin/python ~/klipper/scripts/canbus_query.py can0**
- You should now see two boards\
- Note down both UUIDs
  - One should be the same you took a screenshot of before -> M8P
  - One is new -> SB2209
- If you don’t see two, press the RESET button on each board once and check again

Config

- Download following files from my config (https://github.com/crysxd/Voron2.4-Config)
  - printer.cfg
  - macros.cfg
  - moonraker.conf

Config

- Upload the files in the config section of the web interface
- This config assumes:
  - You followed my wiring guide
  - Nozzle brush is installed in the back left corner
  - You have a 300 build
  - You have the tmc autotune plugin installed (next slide)

Config

TMC autotune

- This improves the motor characteristics (noise, speed, strength): https://github.com/andrewmcgr/klipper_tmc_autotune
- Open SSH and run **wget -O - https://raw.githubusercontent.com/andrewmcgr/klipper_tmc_autotune/main/install.sh | bash**

Adjust Config

printer.cfg

- Open printer.cfg
- In **[mcu]** and **[mcu ebb]** replace the canbus_uuid with the value you noted down before (make sure it’s not the wrong one)
- In **[stepper_x]** and **[stepper_y]** adjust for your size, remove # to uncomment sections, remove what’s not applicable
- In **[quad_gantry_level]** and **[bed_mesh]** sections adjust for your build size
- If you have a Dragon hotend, update the **max_temp** in **[extruder]**
- If you installed the TMC autotune plugin, uncomment the TMC autotune section

First movements

- Follow the Voron initial startup guide: https://docs.vorondesign.com/build/startup/
- When you are testing motion, what I like to do is
  - Use **STEPPER_BUZZ stepper=stepper_x** in the command box (stepper_y, stepper_z, stepper_z1, stepper_z2, stepper_z3) to check each stepper
  - Then move the toolhead by hand to the center of the bed and 10cm up
  - Then use **SET_KINEMATIC_POSITION x=100 y=100 z=40** now you can use the printer controls to move 1mm in different directions to see if the motion is correct. Don't move large distances at first!
  - If the printer doesn't move in the right direction see the startup guide on how to solve

First movements

- When you can home the machine, break your tap in by tapping 100x. Run in the command box: PROBE_ACCURACY SAMPLES=100
- Follow Ellis' tuning guide for extruder calibration: https://ellis3dp.com/Print-Tuning-Guide/articles/extruder_calibration.html

Slicer setup

- I recommend Orca slicer
- Create a new 2.4 printer with the default config
- Change the “Machine Start Gcode” to be (3 lines in total, BED_TEMP is in line 3):
  M190 S0
  M109 S0
  PRINT_START EXTRUDER_TEMP=[first_layer_temperature[initial_tool]]
  BED_TEMP=[first_layer_bed_temperature]

First print

- In Orca, configure the address of your printer
- Print something :) But be ready to emergency stop!

Tuning

- Now you see your first print. Time to troubleshoot :)
- Follow Ellis' guide: https://ellis3dp.com/Print-Tuning-Guide/articles/index_tuning.html
- Ask for help in our Discord: https://discord.gg/jDxTmpphtq