How to Install Klipper Firmware

From Scratch on a Raspberry Pi!

WARNING the commands listed here are powerful & if misused or misappropriated can cause harm, use with care! Any results are on you & you alone. Best efforts have been made to make sure they work & are good for your Rpi & printer.

These commands can & will work on a clone pi, like the BTT one & even the new Sovol SV07, but you will have a different initial image install process! Refer to your manual there. Also the extra features might be different too.

I have also included some additional files to help you. The demon_essentials.cfg is some extra function automation to add to your new system. Plus I have included boot-image.png for you to use with your custom boot screen as described in a link later in this document.

Ready, set, GO….!

Download Pi Imager
https://www.raspberrypi.com/software/
Click the cog & set network & location options & save
Select Raspberry Pi OS (Other)
Install Raspberry Pi OS Lite (64bit) image to your sd card

Install the sd card into your Pi & boot.

CLONE PI USERS START HERE!!!!

Follow your clone Pi's manual for OS image install…

Your Router…

Login to your wifi router & look at “Attached Devices” for your RPi, note down its IP address & then use the router’s web interface to reserve that IP especially for your Pi. Your router’s manual will tell you how to do that.

SSH - Remote Pi control via terminal!

Use a suitable SSH app on your computer
Then to login send…

EXAMPLE ADDRESS: ssh pi@192.168.x.xx

(Pi being the chosen user name & 192.168.x.x being the unique IP address you wrote down for your own RPi)

Enter the password you chose - it will not be displayed but will work. Press enter.

Then follow these steps….

CLONE PI USERS SKIP THIS SECTION, go down to “Log Back In’
sudo raspi-config
Interface options, enable spi & i2c
Advanced options, expand file system
Exit & reboot now

Now log in again & run

sudo apt-get update
sudo apt-get upgrade

THIS IS OUTDATED NOW see next section. udev-fix.sh RUN COMMAND ON NEXT PAGE

https://github.com/mainsail-crew/MainsailOS/tree/develop/patches?fbclid=IwAR0uje9zPx9g6koES77u5qwlIkIVdqUCIxFMmzII3NQaOCFDFk-sI7VixDY#udev-fixsh
This is intended to patch udev rules which has a Bug in udev package (version: 247.3-7+deb11u2 or 247.3-7+rpi1+deb11u2). Which does not create /dev/serial/by-id symlinks for your MCU.
For further details see:
https://bugs.debian.org/cgi-bin/bugreport.cgi?bug=1035094

This is fixed by: systemd/systemd#25246
What we do:

- ~~Running apt-get update.~~ (DONE already above)
- ~~Running apt-get upgrade --yes~~ (DONE already above)
- curling the patched rule file from systemd repo
- Copying to desired location in /etc/udev/rules.d/60-serial.rules

This overwrites behaviour in the default configuration. Since this is the version of the master branch of systemd/udev there is no further need to intervention even on updates.
NOTE: DO NOT RUN THIS PATCH IF YOU ARE PRINTING!!!

Run Patch Command:

curl -sSL https://raw.githubusercontent.com/mainsail-crew/MainsailOS/develop/patches/udev-fix.sh | bash

This will ask you for sudo password! !!!!A reboot is essential!!!!!

sudo reboot now

NEW FIX

A bug has been introduced in Debian Bullseye (which includes current MainsailOS), which prevents the symlinks in /dev/serial/by-id/ from being created. If your printer can't connect to the MCU anymore after a system update, you can check if it is caused by that bug by checking the installed version of udev with apt show udev

If your version is 247.3-7+deb11u2 or 247.3-7+rpi1+deb11u2 you have the broken package installed and should use one of the fixes below. Take special care about the last number ("u2").

As of May 20, this bug has spread to PiOS based systems as well.
Option A. Replace the corrupted udev file with one from upstream systemd

backup the existing rules file (just in case)
sudo cp /usr/lib/udev/rules.d/60-serial.rules /usr/lib/udev/rules.d/60-serial.old

download the rule from the systemd main repo.
sudo wget -O /usr/lib/udev/rules.d/60-serial.rules https://raw.githubusercontent.com/systemd/systemd/main/rules.d/60-serial.rules

Reboot
sudo reboot

IF THIS DOESN'T WORK TRY THIS THREAD:

https://klipper.discourse.group/t/debian-bullseye-bug-causing-klipper-to-no-longer-find-the-printer-board/8231

Log Back In….

sudo apt-get install git -y
sudo apt-get install git ffmpeg -y
sudo reboot now

cd ~ && git clone https://github.com/th33xitus/kiauh.git

To use Kiauh type this command…

./kiauh/kiauh.sh

Link.. https://github.com/th33xitus/kiauh

If your image is clean & empty, or if items are already installed you can manage & add more, or remove unwanted items.

Install:
Klipper
Moonraker
Mainsail
Any others you need

Use Kiauh to build your Klipper MCU firmware

Select option 4 “Advanced Options”

Then select option 2 “Build Only”

Now choose the correct options for your printer’s control board. They should be stated in the board’s manual, GitHub page or found online.

Use a FTP client like Cyber Duck to access the built firmware file on your Pi
Search how to use this software if needed.

The printer firmware file is found in: /home/pi/klipper/out
It will be called klipper.bin

Copy it to your computer & rename it firmware.bin

Then copy that to your printer’s sd card & flash your board.
Connect your Pi to your powered printer.

Use Kiauh options to get your MCU ID!

Option 4 “Advanced Options
Option 5 “Get MCU ID”

Option 1 “USB”

Copy the blue text next to “MCU 1” & paste it onto the end of the line in your printer.cfg

What you need will start “usb-Klipper_” then have a load of letters & numbers

In your printer.cfg look for…

[mcu]
serial: /dev/serial/by-id/ <<<(PASTE HERE)

Camera setup in Crowsnest

This should be no longer required, but just incase…

The latest update made changes so this step is now required for cameras.

https://crowsnest.mainsail.xyz/faq-trouble-shoot/how-to-setup-a-raspicam

…However as of version 4 Crowsnest no longer supports CSI cameras so try to use a USB camera here.

For Klipperscreen…..

If your touchscreen doesn’t recognise any touches do this…..

sudo nano /boot/config.txt

Scroll most of the way down in the now displayed text file, find & edit…
Change:
dtoverlay=vc4-kms-v3d

To:
dtoverlay=vc4-fkms-v3d

Save & exit - commands for this at bottom of the screen

Adding ADXL345 to GPIO pins

https://www.ifixit.com/Guide/Adding+ADXL345+Accelerometer/147745

https://www.klipper3d.org/Measuring_Resonances.html

~/klippy-env/bin/pip install -v numpy
sudo apt update
sudo apt install python3-numpy python3-matplotlib -y

Make sure this is done…. …we did it earlier.
sudo raspi-config
#3 Interface Options > P4 SPI > Yes > OK > Finish

If using The FYSETC USB C Portable Input Shaper do this….

https://github.com/FYSETC/FYSETC-PortableInputShaper

Adding Host GPIO Pin Control

https://github.com/Klipper3d/klipper/blob/master/docs/RPi_microcontroller.md

cd ~/klipper/
sudo cp ./scripts/klipper-mcu.service /etc/systemd/system/
sudo systemctl enable klipper-mcu.service

To compile the Klipper micro-controller code, start by configuring it for the "Linux process":

cd ~/klipper/
make menuconfig

In the menu, set "Microcontroller Architecture" to "Linux process," then save and exit.

sudo service klipper stop
make flash
sudo service klipper start

If klippy.log reports a "Permission denied" error when attempting to connect to /tmp/klipper_host_mcu then you need to add your user to the tty group. The following command will add the "pi" user to the tty group:

sudo usermod -a -G tty pi

Make sure the Linux I2C driver is enabled by running sudo raspi-config and enabling I2C under the "Interfacing options" menu. If planning to use I2C for the MPU accelerometer, it is also required to set the baud rate to 400000 by: adding/uncommenting dtparam=i2c_arm=on,i2c_arm_baudrate=400000 in /boot/config.txt (or /boot/firmware/config.txt in some distros).

Custom Boot Screen Image on Klipperscreen follow this guide….

https://docs.vorondesign.com/community/howto/samwiseg0/voron_rpi_bootscreen.html

Adding BME/BMP280 Sensor

They are great environmental sensors the BME280 measures temperature, air pressure & humidity. Whereas the BMP280 can only measure temperature & air pressure.

Connect the sensor to the correct GPIO pins on your Pi, they should be…
3v3 Power
BCM 2 (SDA)
BCM 3 (SCL)
Ground

Search RPi Pinout to find correct pinout.

Enable I2C as we did before & add the below section to your printer.cfg

[mcu host]

```
serial: /tmp/klipper_host_mcu

[temperature_sensor enclosure_temp]
sensor_type: BME280
i2c_address: 118
i2c_mcu: host
i2c_bus: i2c.1

[gcode_macro QUERY_BME280]
gcode:
    {% set sensor = printer["bme280 enclosure_temp"] %}
    {action_respond_info(
        "Temperature: %.2f C\n"
        "Pressure: %.2f hPa\n"
        "Humidity: %.2f%%" % (
            sensor.temperature,
            sensor.pressure,
            sensor.humidity))}
```

Im not expecting any payment for putting this together, nor would I ask for any, but as people have requested a means to give a small gift or gratuity as a thank you I've included a links below. Please feel free to use them or don't, send any amount you feel is appropriate, if you so wish. Anything you send will be gratefully received & appreciated.

Thank you, & I hope this guide helps you!

https://www.buymeacoffee.com/3dprintdemon

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