HOW TO ...

... Upgrade Magneto X to:

- **Raspberry Pi from scratch**
- **Use Kalico instead of Klipper**
- **Use Nitehawk36 (USB) instead of original CAN-Toolboard**
- **Use BTT eddy instead of load cell (load cell is no more working after upgrade)**
- **CAUTION: I have some other modification on my machine like 0.9° motors, different lead screw, BoxTurtle, so my config is modded and I don't offer it here**
- **Requirement: You need a working magneto and a good configs before upgrading**

! USE AT YOUR OWN RISK !
! MACHINE'S WARRANTY MAY BE VOID !
! DOING IT WRONG CAN DAMAGE YOUR PRINTER !
! I AM NOT RESPONSIBLE FOR ANYTHING YOU DO !

Copy and safe your config!
/home/pi/printer_data/config

Copy and safe Magneto specific files:
/home/pi/klipper/klippy/extras/gcode_shell_command.py
home/pi/klipper/klippy/extras/magneto_load_cell.py
/home/pi/auto-uuid
(can be found as well in github repo: https://github.com/mypeopoly/Klipper/tree/master)

Steps to install Operating System
use Raspberry Pi imager
Select Raspberry Pi OS other --> Raspberry Pi OS lite (64-bit or 32-bit)
Set network and SSH using pi and raspberry
Install KIAUH (https://github.com/dw-0/kiauh)
Use V6 !!!
Change repository to kalico (see https://github.com/KalicoCrew/kalico), `bleeding-edge-v2` as the new branch name
Install klipper, mainsail, klipperscreen, crowsnest via KIAUH
Install timelapse
https://github.com/mainsail-crew/moonraker-timelapse

Install your personal add ons (TMC autotune, Sonar, shaketune, ...)
https://github.com/ArmoredTurtle/AFC-Klipper-Add-On
https://github.com/julianschill/klipper-led_effect
https://github.com/andrewmcgr/klipper_tmc_autotune
https://github.com/mainsail-crew/sonar
https://github.com/RichardMidnight/pi-safe

To install Beacon
cd ~
git clone https://github.com/beacon3d/beacon_klipper.git
./beacon_klipper/install.sh
Then copy update config to moonraker.conf
[update_manager beacon]
type: git_repo
channel: dev
path: ~/beacon_klipper
origin: https://github.com/beacon3d/beacon_klipper.git
env: ~/klippy-env/bin/python
requirements: requirements.txt
install_script: install.sh
is_system_service: False
managed_services: klipper
info_tags:
 desc=Beacon Surface Scanner

Steps to install magneto service and other files needed
Copy back to Raspberry Pi:
/home/pi/klipper/klippy/extras/gcode_shell_command.py
home/pi/klipper/klippy/extras/magneto_load_cell.py
/home/pi/auto-uuid
home/pi/printer_data/config

Create the magneto service file
sudo nano /etc/systemd/system/magneto.service
Copy and paste the text below into the nano editor
[Unit]
Description=Magneto Manager Service
After=network.target

[Service]
Type=simple

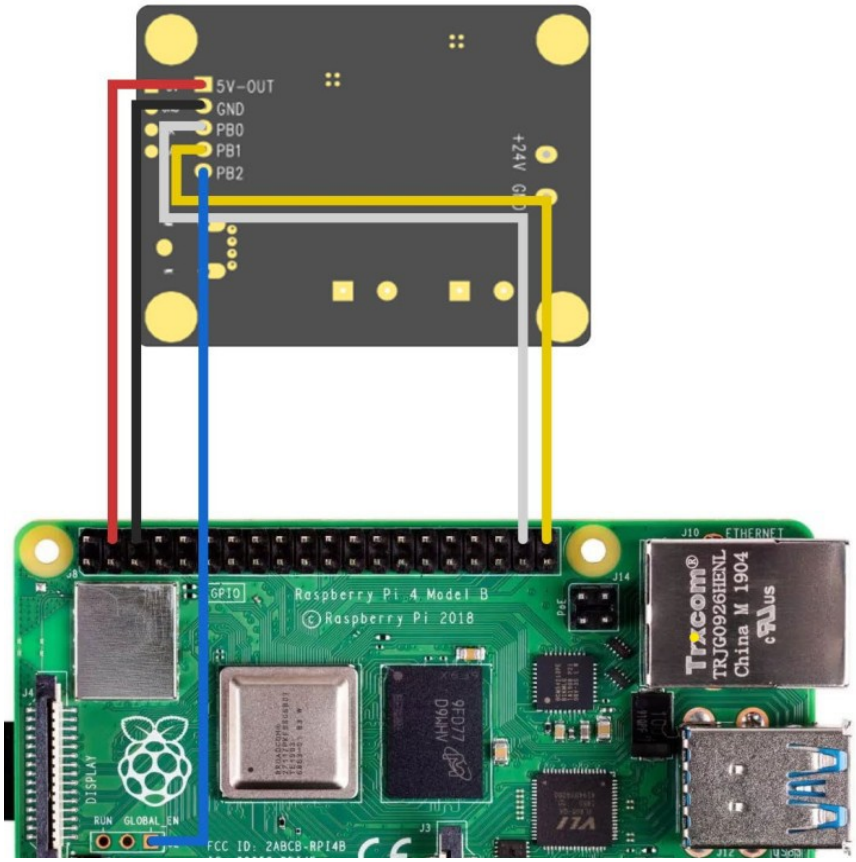
User=root
ExecStart=/bin/bash /home/pi/auto-uuid/magneto-run.sh

[Install]
WantedBy=multi-user.target
Install Python-3, Serial and Flask for the service
sudo apt-get install python3-pip
~~sudo pip install flask~~
sudo apt install python3-flask
~~sudo pip install pyserial~~
sudo apt install python3-serial
Change file permissions
Now, we need to change the file permissions to make it readable by all by typing
sudo chmod 644 /etc/systemd/system/magneto.service
As the last step, you need to tell the system that you have added this file and want to enable this service so that it starts at boot.
sudo systemctl daemon-reload
sudo systemctl enable magneto.service

change can config (if using CAN):
sudo nano /etc/network/interfaces.d/can0

----paste this
allow-hotplug can0
iface can0 can static
 bitrate 250000
 up ifconfig $IFACE txqueuelen 1024
 pre-up ip link set can0 type can bitrate 250000
 pre-up ip link set can0 txqueuelen 1024

For using BTT SKSM:
https://github.com/bigtreetech/SKSM
Insert the Micro SD card with the OS image into the computer. Add the following line to the config.txt file: dtoverlay=gpio-shutdown,gpio_pin=21. Then save and exit.
Wiring PB2 is not necessary



BTT Octopus firmware (necessary to flash for Kalico):
→ make menuconfig:

STMicroelectronics
STM32H723
128 kiB Bootloader
25 MHz crystal clock
communication interface (USB (on PA11/PA12))
(x) high precision stepping support

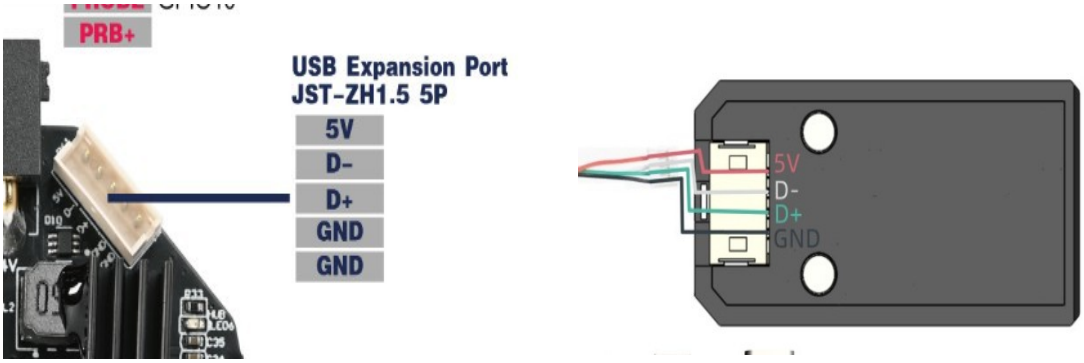
```
(Top)

[*] Enable extra low-level configuration options
    Micro-controller Architecture (STMicroelectronics STM32)  --->
    Processor model (STM32H723)  --->
    Bootloader offset (128KiB bootloader)  --->
    Clock Reference (25 MHz crystal)  --->
    Communication interface (USB (on PA11/PA12))  --->
    USB ids  --->
()  GPIO pins to set at micro-controller startup
[*] High-precision stepping support (slow)
```

→ safe and close
→make clean
→make
Firmware is in output directory ~/klipper/out.

copy klipper.bin to SD card, rename it to firmware.bin, power off, insert card, power on, wait 1 minute, power off, take out SD card, check if file is renamed to firmware.cur

Install BTT eddy and flash the devide according to:
https://github.com/bigtreetech/Eddy

Wiring USB connection from nitehawk36 to eddy USB:
I used the original eddy cable, cut it and soldered it to the nitehawk36 USB extension cable.



Check and update all mcu serial with either
ls /dev/serial/by-id/*
or
ls /dev/serial/by-path/*
(by Path can help to avoid timeout / lost communications)

Config hotend temperatuire

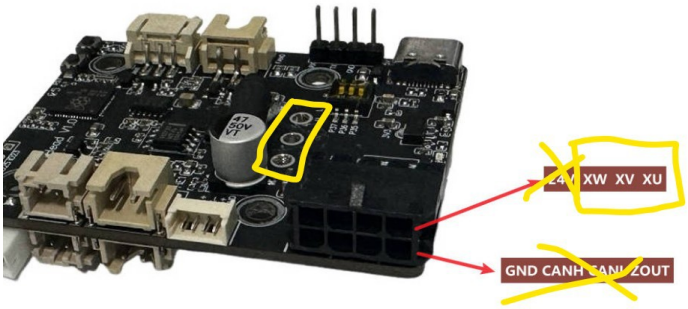
Make sure the <pullup_resistor> in [extruder] section is set to 2200 (nitehawk36)

```
[extruder]
step_pin: nhk:gpio23
dir_pin: nhk:gpio24
enable_pin: !nhk:gpio25
rotation_distance: 4.637
microsteps: 16
full_steps_per_rotation: 200
nozzle_diameter: 0.400
filament_diameter: 1.75
heater_pin: nhk:gpio9
sensor_pin: nhk:gpio29
sensor_type: magneto_adc
max_extrude_only_distance: 200.0
max_extrude_cross_section: 45.0
pullup_resistor: 2200 #4700
max_temp: 310
max_power: 0.80
min_extrude_temp: 160
pressure_advance: 0.02
pressure_advance_smooth_time: 0.040
#control: pid
#pid_kp: 18.737 #11.745 #8.961
#pid_ki: 1.081 #0.535 #0.286
#pid_kd: 81.161 #64.473 #.276
```

Magneto toolhead board

Now we can take out the toolhead board as well. We only need the U, V, W to be connected to the mover board. I soldered the wires directly to the top of the mover board and make a new plug for easier remove. Now 2 cables can be removed from the printer.

Take care for the wiring and double check it.



IMPORTANT

After doing this mod it is necessary to re-rum the Linear motor host software to re-adjust the controller settings!!!!!

Filament sensor

nitehwak36	Magneto runout sensor
RGB Port 5V	VCC
RGB Port GND	GND
Filament sensor +	Sensor

Danger_Options

Create a new file “danger_options.cfg”
Open it and copy/paste the danger options from
https://docs.kalico.gg/Config_Reference.html#danger-options

Read carefully thorugh the options and set whatever you need, e.g.
`#multi_mcu_trsync_timeout: 0.025` is maybe too small and need to set to e.g. 0.040.
Save
Open printer.cfg and include the new file
[include danger_options.cfg]

New PID routine

I am happy with my bed OID but not that much with extruder PID. It overshoots at about 8 to 10°C. Now with KALICO we can use another PID
change as follows

[extruder]
control = pid_v
pid_kp = 17.089
pid_ki = 1.238
pid_kd = 58.960

an re-calibrate with:
PID_CALIBRATE HEATER=extruder TARGET=250 WRITE_FILE=1 TOLERANCE=0.05

SPECIAL THANKS TO:

Jetguy
mikebcbc
Arsoth
Deathzo.

and all others on discord who figured out how the basics work

For all the work which make this possible :-)

- - - - - - - TO BE CONTINUED - - - - - - -

Version 2.0
February, 8th 2025
Schmudi