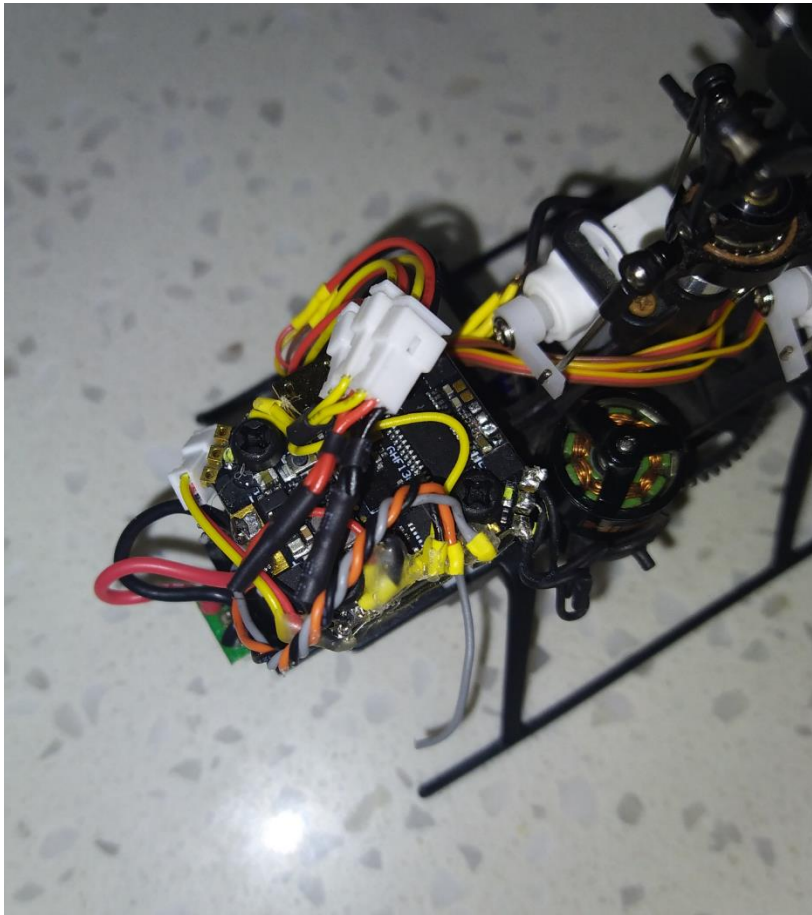


Set Up process for Heliflight-3d running on a JHEMCU GHF13AIO F4 Flight controller in a K120 helicopter. This flight controller is a 13A 4in1 ESC for 2-4s

Heliflight-3D is a betafight fork by RC groups member 'eqtrian' to be specifically for single rotor helicopters.

[https://www.rcgroups.com/forums/showthread.php?3535457-Introducing-the-Heliflight-3D-\(HF3D\)-open-source-Helicopter-flight-controller-\(FBL\)](https://www.rcgroups.com/forums/showthread.php?3535457-Introducing-the-Heliflight-3D-(HF3D)-open-source-Helicopter-flight-controller-(FBL))



## Size comparison between JHEMCU GHF13AIO, K120 battery and Tiny Talon F7

### Specification:

Name: JHEMCU GHF13AIO

Item Name: F4 OSD Flight Controller Built-in 13A 4in1 ESC

Size: 24.2\*28.1mm (M3)

Mounting Hole: 16\*16mm

Weight: 4.3g

CPU: STM32F411CE (100MHZ)

MPU: MPU6000 (SPI)

Firmware: Betaflight\_MATEKF411.HEX

Built-in Betaflight OSD (AT7456E)

BEC Output(two): 5V/2.5A

USART: UART1, UART2

Receiver: SBUS,IBUS,DSM2,DSMX,TBS (UART2-RX2)

Blackbox: NO

Built-in Current Sensor

Support WS2812 LED, BUZZER

Input Voltage: 2-4S Lipo

ESC Current: 13A

Firmware: BLHELI\_S G-H-30.HEX

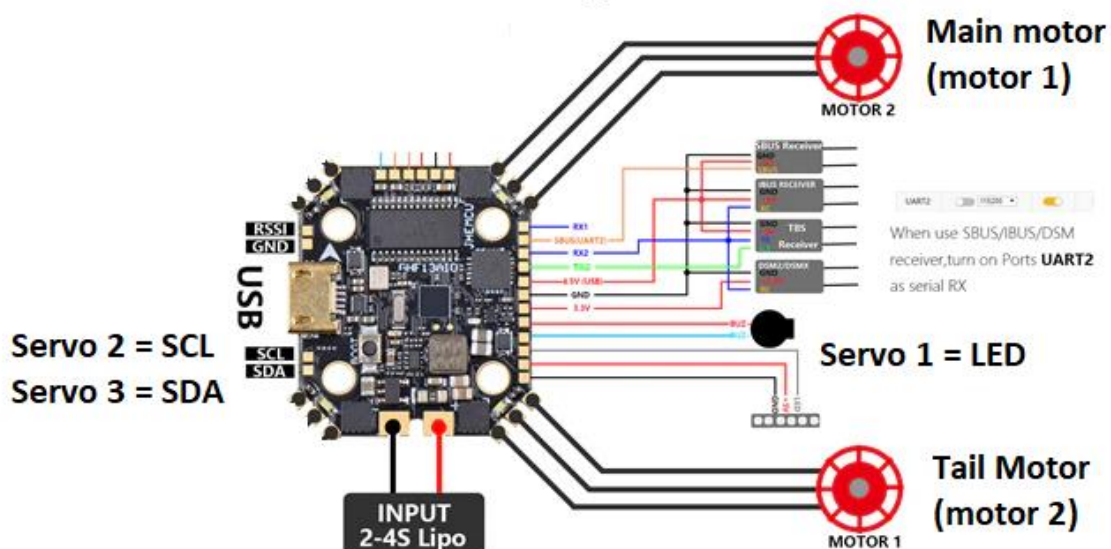
- Support PWM, Oneshot42/125, Multishot, Dshot150 /300/600



### Motor and Servo Wiring.

I used 3 Micro JST 1.25 plug connectors to suit the k120 servos. The signal wires of these sockets are connected to the pins shown below. The 5v and GND for each socket are wired together and attached to the 5v and GND.

Please note the Main Motor (assigned motor 1 in the code) is connected to the Motor 2 on the ESC and the Tail Motor (assigned motor 2 in the code) is connected to the motor 1 on the esc.

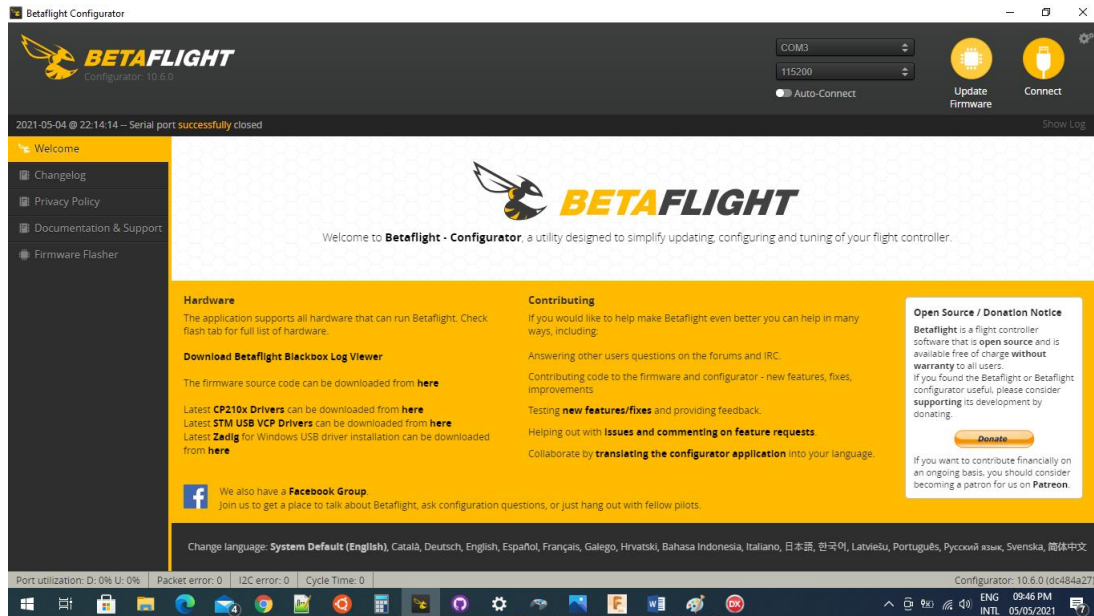


### RX wiring.

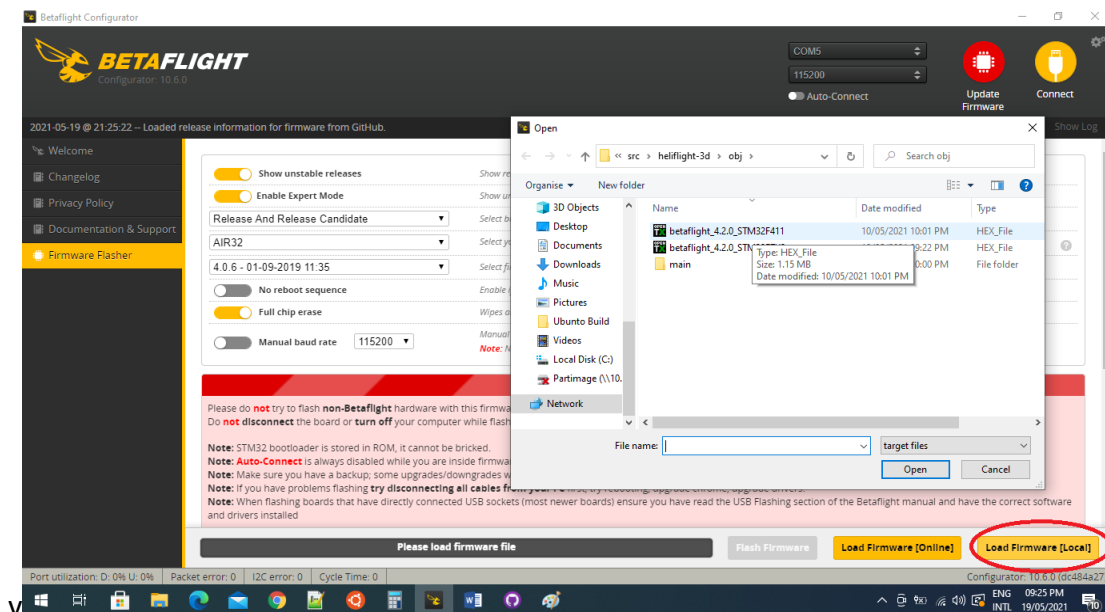
I'm using an Sbus RX so I wired it to UART2 as shown in the picture above.

## Configuration:

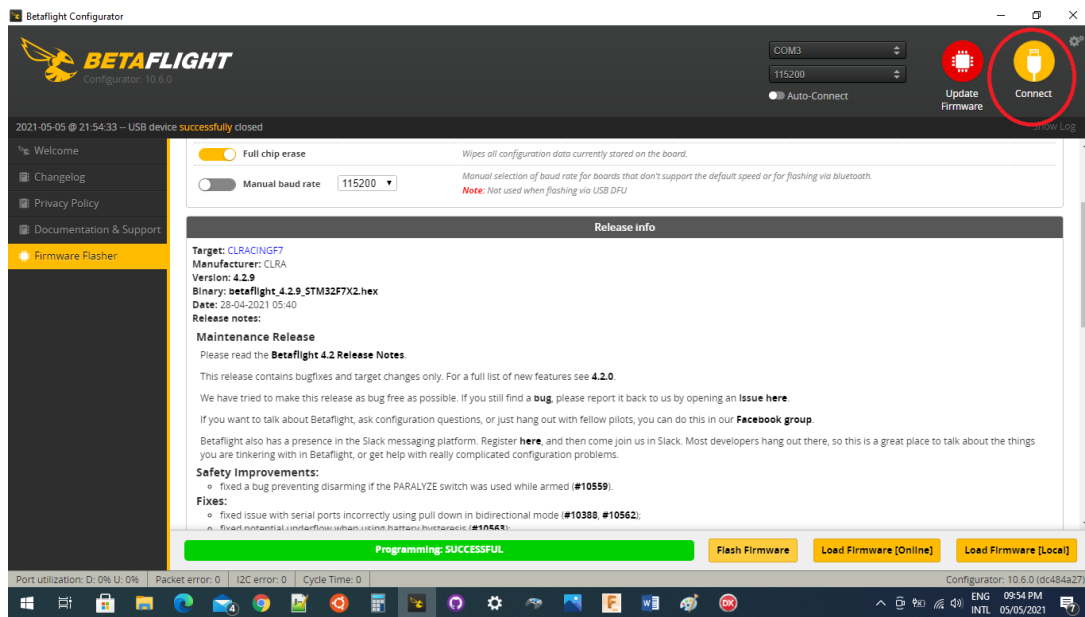
1. Download Betaflight. I'm using version 10.6.0
2. Open and select Update firmware



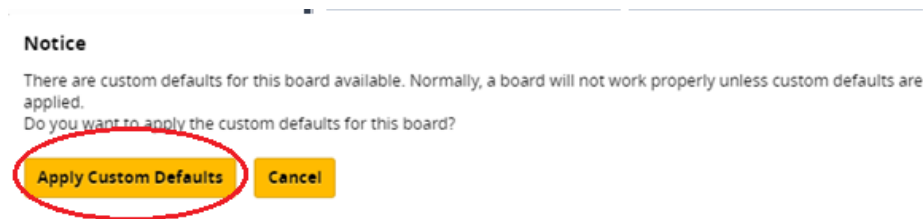
3. Load Firmware [LOCAL] and select the Hex file from the Zip files. This processor is the STM32F411 target. Set the "Full Chip Erase"



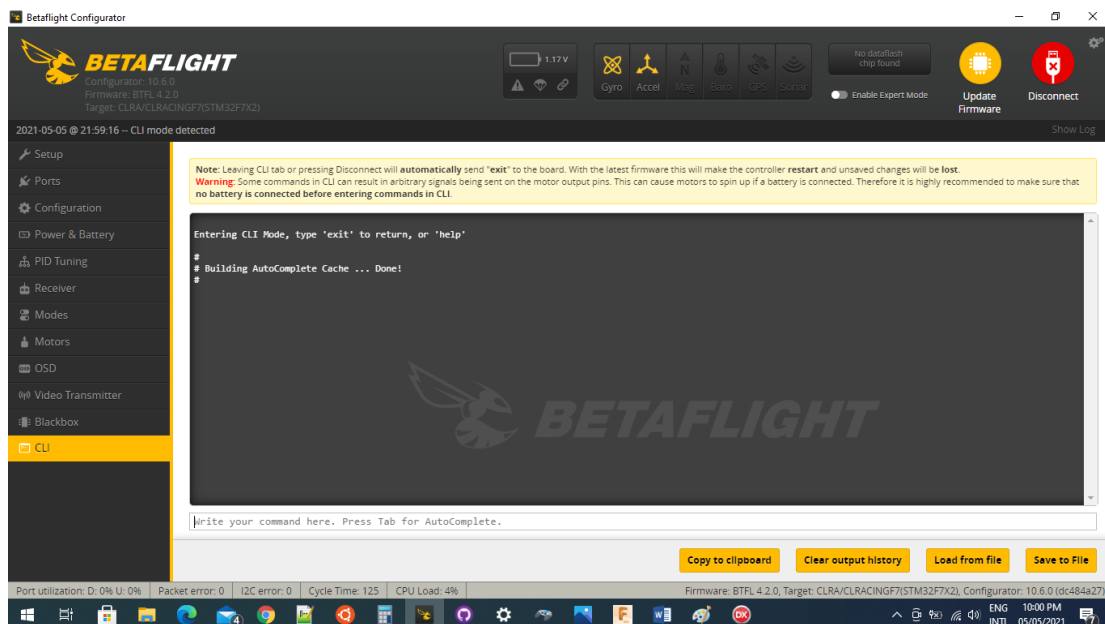
#### 4. Wait for the Programming Successful and click “Connect”



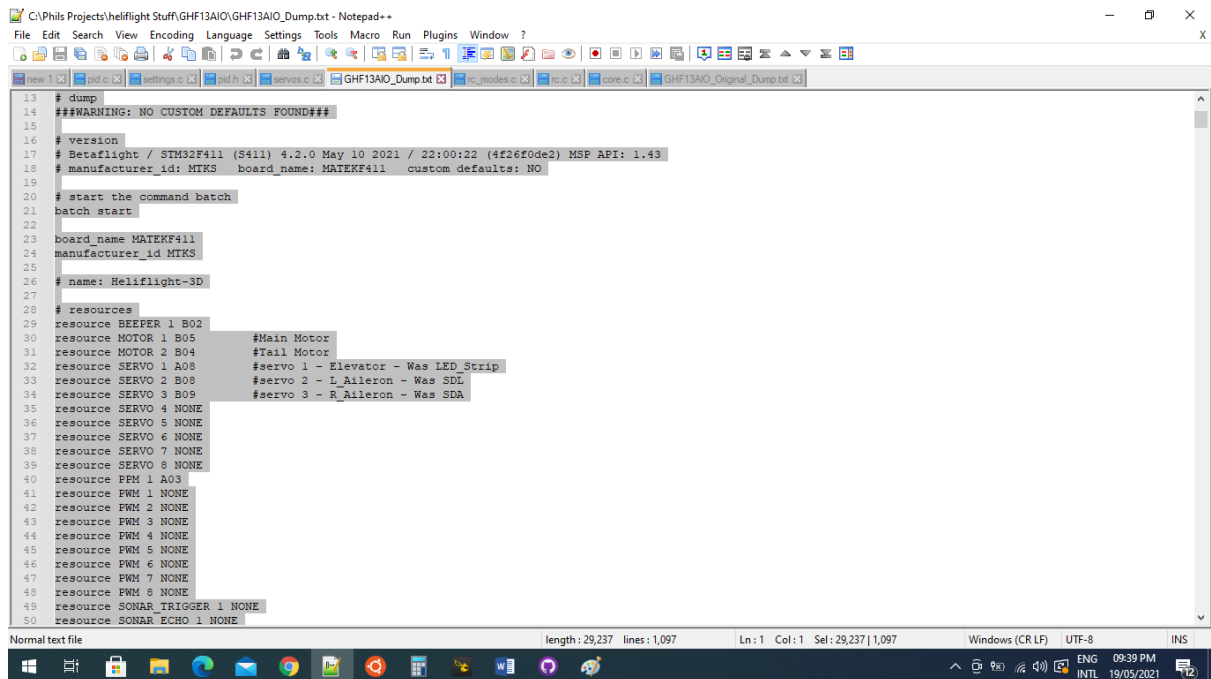
#### 5. Apply custom defaults (it will say there are none which is ok)



#### 6. Reconnect and select CLI

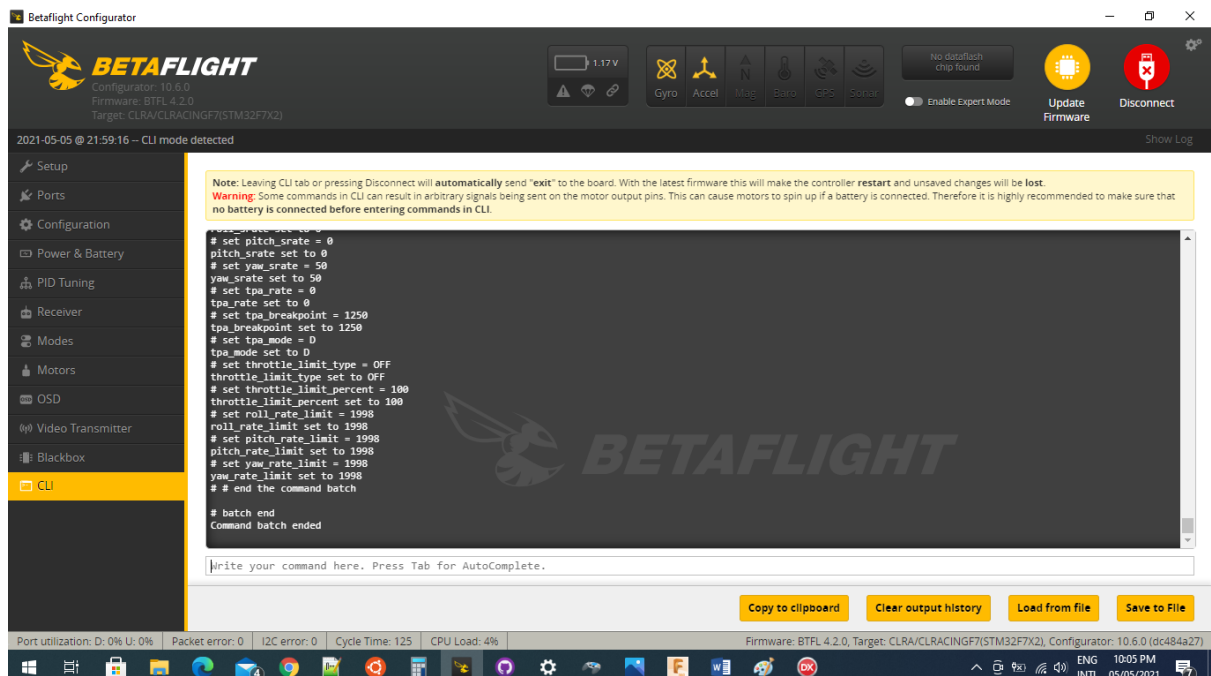


- Open the GHF13AIO\_Dump.txt file. Select all of the text in the file (ctrl A) and copy (ctrl C).



```
13 # dump
14
15 ###WARNING: NO CUSTOM DEFAULTS FOUND###
16
17 # version
18 # Betaflight / STM32F411 (S411) 4.2.0 May 10 2021 / 22:00:22 (4f26f0de2) MSP API: 1.43
19 # manufacturer_id: MTKS board_name: MATEKF411 custom defaults: NO
20
21 # start the command batch
22 batch start
23
24 board_name MATEKF411
25 manufacturer_id MTKS
26
27 # name: Heliflight-3D
28
29 # resources
30 resource BEEPER 1 B02
31 resource MOTOR 1 B05 #Main Motor
32 resource MOTOR 2 B04 #Tail Motor
33 resource SERVO 1 A03 #servo 1 - Elevator - Was LED Strip
34 resource SERVO 2 B08 #servo 2 - L_Aileron - Was SDL
35 resource SERVO 3 B09 #servo 3 - R_Aileron - Was SDA
36 resource SERVO 4 NONE
37 resource SERVO 5 NONE
38 resource SERVO 6 NONE
39 resource SERVO 7 NONE
40 resource SERVO 8 NONE
41 resource PWM 1 A03
42 resource PWM 2 NONE
43 resource PWM 3 NONE
44 resource PWM 4 NONE
45 resource PWM 5 NONE
46 resource PWM 6 NONE
47 resource PWM 7 NONE
48 resource PWM 8 NONE
49 resource SONAR_TRIGGER 1 NONE
50 resource SONAR_ECHO 1 NONE
```

- Paste this into the Betaflight CLI and click ENTER (down the bottom where it says write your command here). The settings will then be loaded.



```
2021-05-05 @ 21:59:16 -- CLI mode detected

Note: Leaving CLI tab or pressing Disconnect will automatically send "exit" to the board. With the latest firmware this will make the controller restart and unsaved changes will be lost.
Warning: Some commands in CLI can result in arbitrary signals being sent to the motor output pins. This can cause motors to spin up if a battery is connected. Therefore it is highly recommended to make sure that no battery is connected before entering commands in CLI.

# set pitch_rate = 0
pitch_rate set to 0
# set yaw_rate = 50
yaw_rate set to 50
# set tpa_rate = 0
tpa_rate set to 0
# set tpa_breakpoint = 1250
tpa_breakpoint set to 1250
# set tpa_mode = D
tpa_mode set to D
# set throttle_limit_type = OFF
throttle_limit_type set to OFF
# set throttle_limit_percent = 100
throttle_limit_percent set to 100
# set roll_rate_limit = 1998
roll_rate_limit set to 1998
# set pitch_rate_limit = 1998
pitch_rate_limit set to 1998
# set yaw_rate_limit = 1998
yaw_rate_limit set to 1998
# # end the command batch

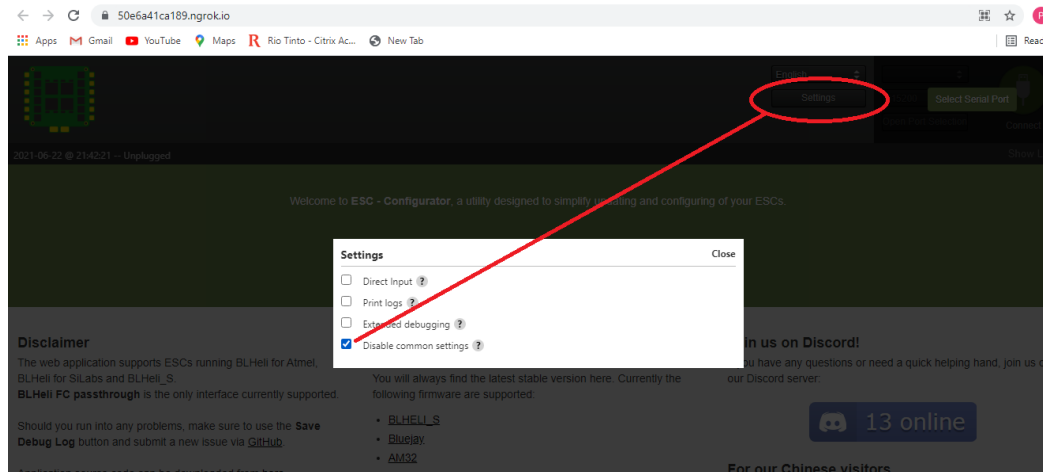
# batch end
Command batch ended

Write your command here. Press Tab for AutoComplete.
```

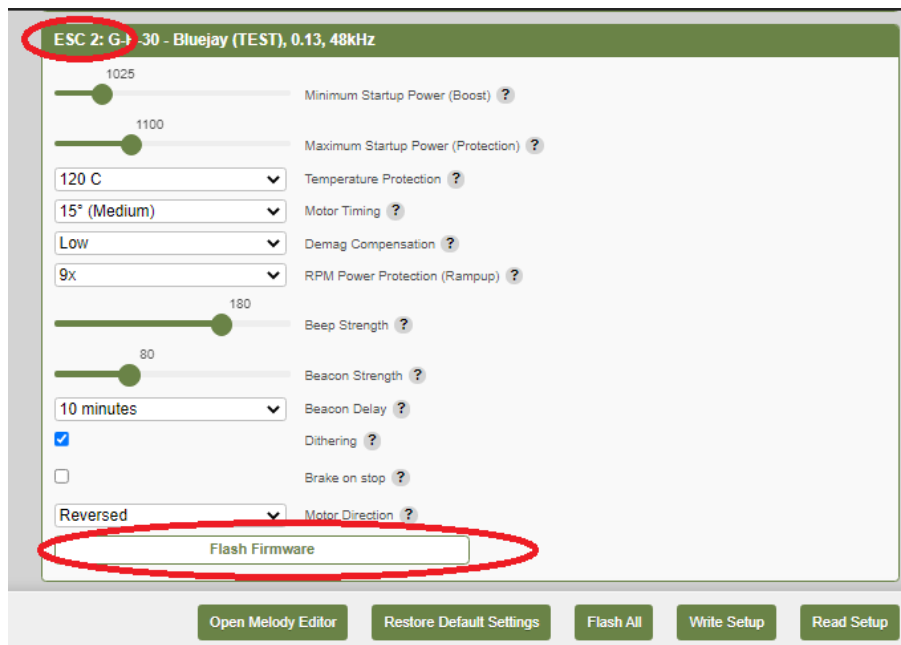
- Type "save" in the CLI and push ENTER (really important. Config won't be saved if you don't save....)

10. Now we need to set up the bi-directional Dshot so that the motor speed telemetry functions. This FC has BLHeli\_s ESC's which don't natively implement bi-directional Dshot. There are three options for this. JESC (paid), BLHeli\_M or Bluejay like I have used.....

Go to the Bluejay configurator. Please note this is a test version which enables each ESC to be loaded with different settings. <https://esc-configurator.com/>. Click on Settings and tick the disable common settings so you can load different settings for the tail and main motors.

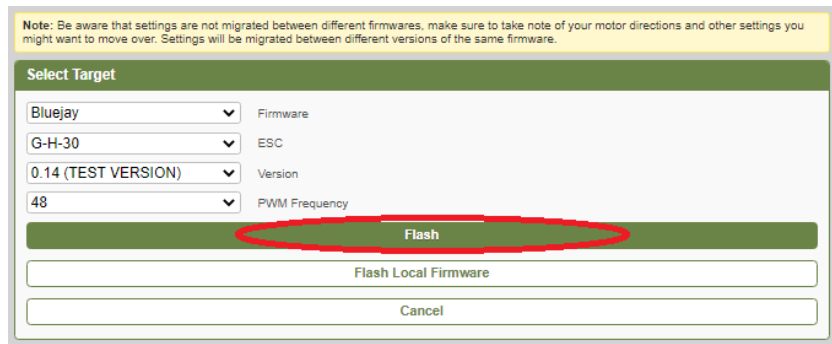


11. Connect and read setup. Scroll down to the ESC 2: Select Flash Firmware

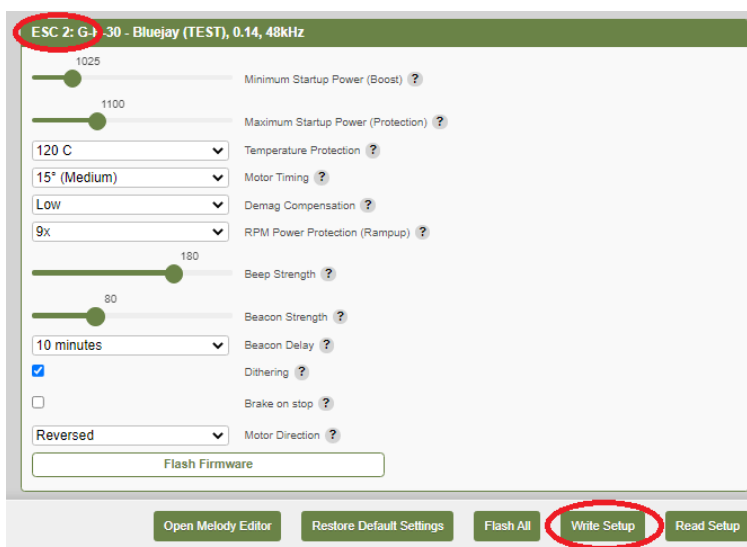




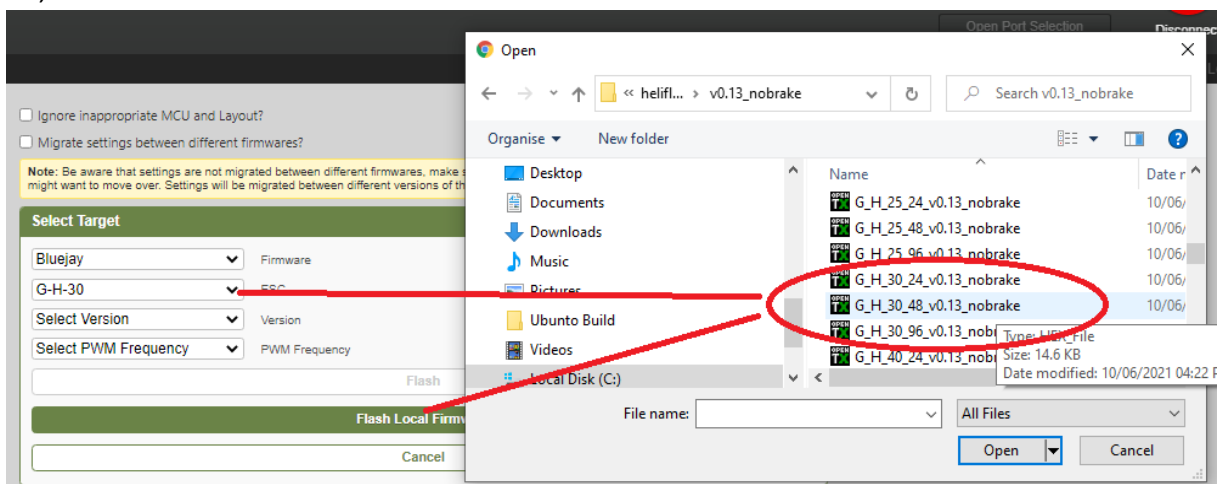
12. Select [Flash] as below. Version 0.13 or 0.14(TEST VERSION) implements the Bi-directional Dshot. I used the 48kHz for the tail.



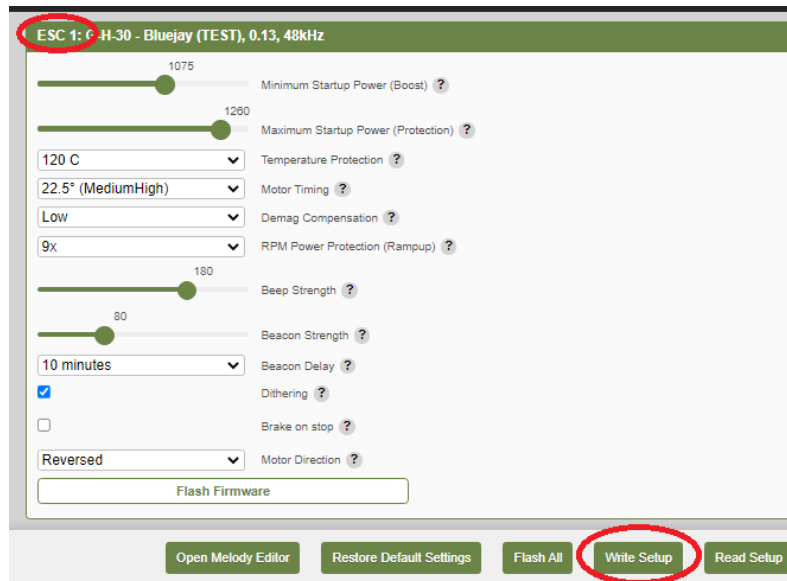
13. After flashing is complete. Set up parameters for the tail and write setup. These are what I have.



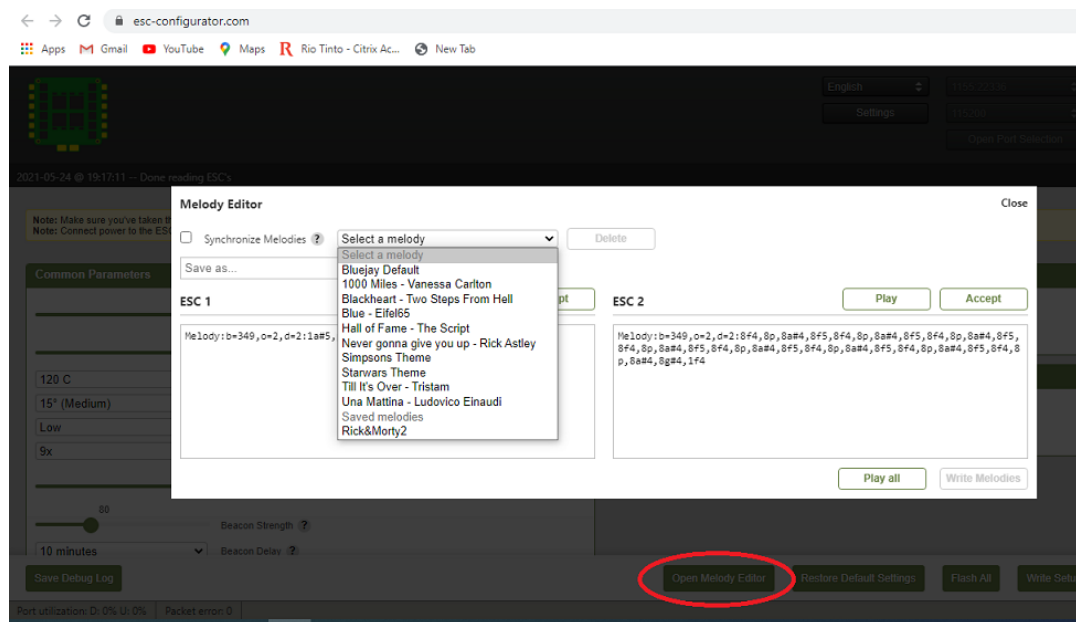
14. Scroll up to ESC 1: This ESC should be set up without damped-light mode. This is done by flashing the ESC firmware file as supplied in the zip file. Select either the 24, 48 or 96 kHz version. I used the 48kHz for the main.



15. After the firmware is downloaded set the configuration and [Write Setup]

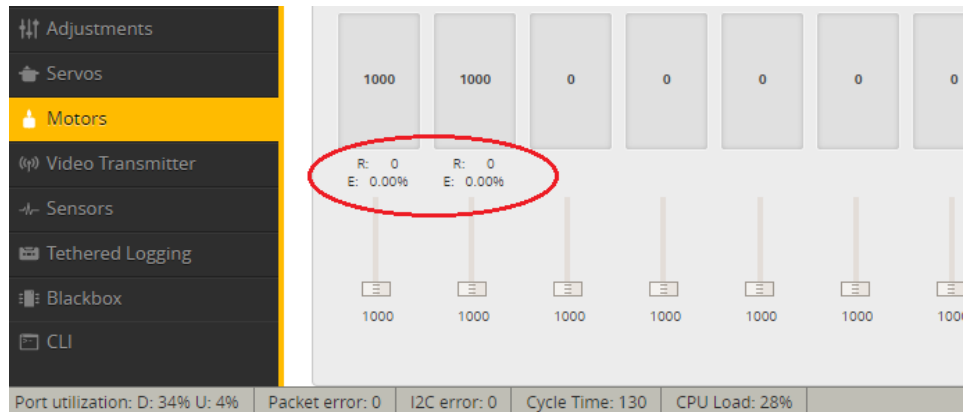


16. If you are particularly nerdy..... Give the melody editor a try. This changes the startup tone of the ESC's (seriously though you will be judged harshly if you chose the Rick Astley one)





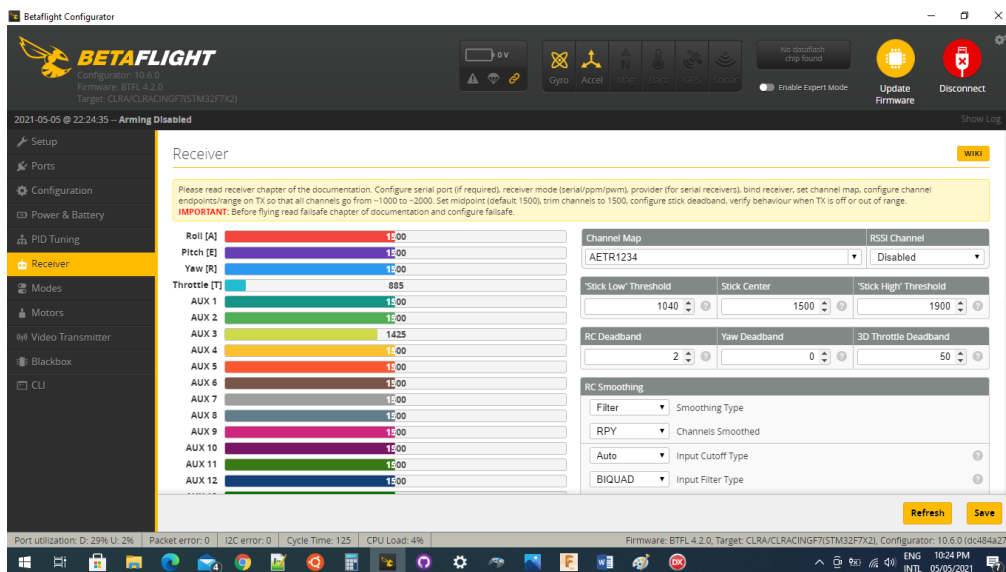
17. Open Betaflight again and connect. In the Configuration tab select the Motors tab. With the battery powered on, check the bi-directional Dshot is working. It should look like this (E: 0.00%). If it is (E: 100.0%) it is not working and you should review loading Bluejay.



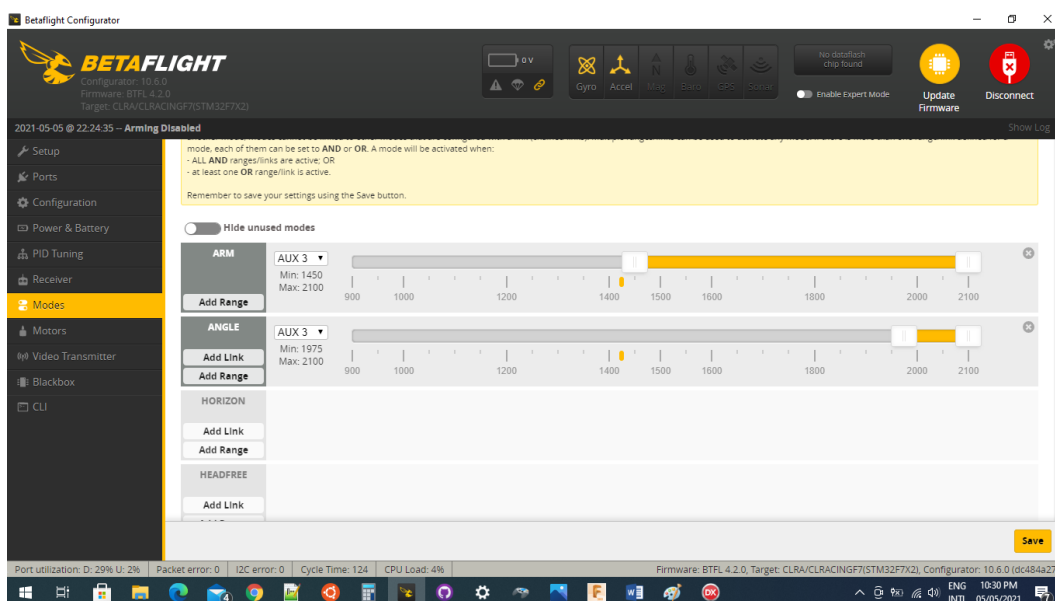
18. Configuration tab select your preferred receiver. Mine is SBUS so that's what is configured in the dump file.

19. Open the receiver tab and make sure your radio is set up to centres and operating correctly. The PITCH has to be on ch5. I have a FUTABA so pitch is natively CH6 so had to mix CH6 it to CH5. Your radio channel map needs to be AETR1234.

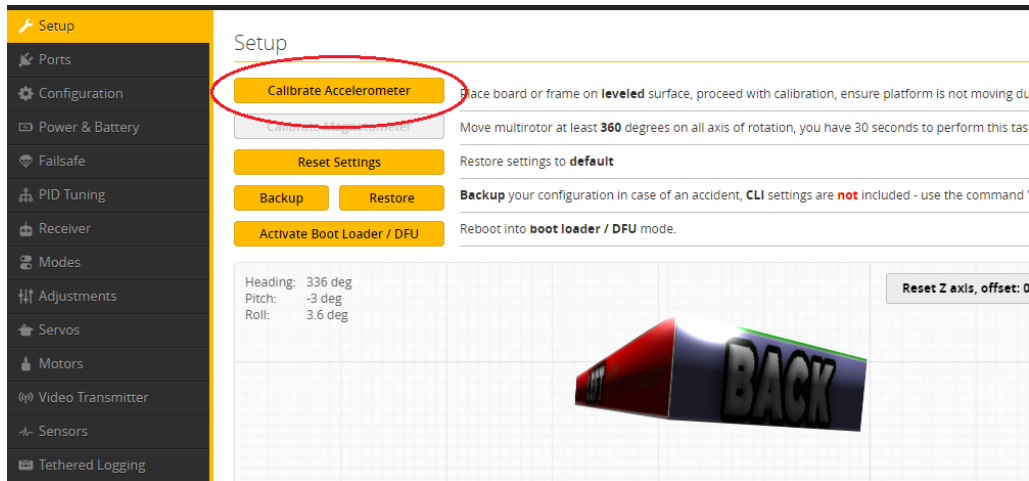
20. Adjust the stick centre and trims on your radio so they are the same and the FC does not see a stick input with the sticks at centre.



21. In the modes tab set up switches to operate the ARM and ANGLE modes. Selecting the ANGLE mode enables the rescue mode.

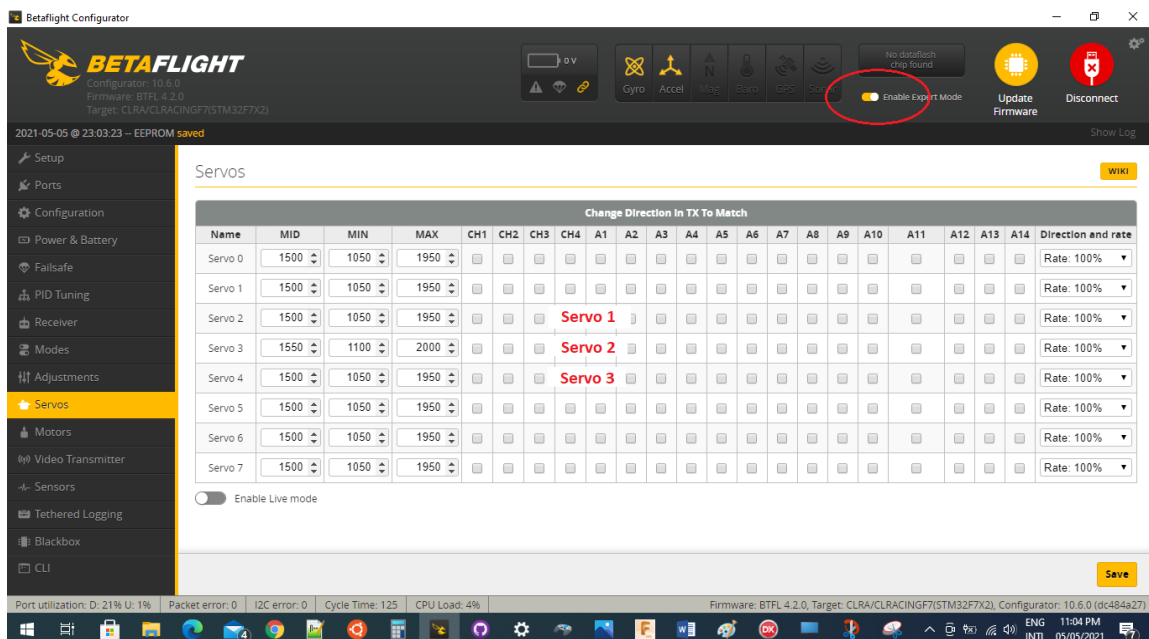


22. On the Setup tab calibrate the accelerometer. Make sure it is nice and level

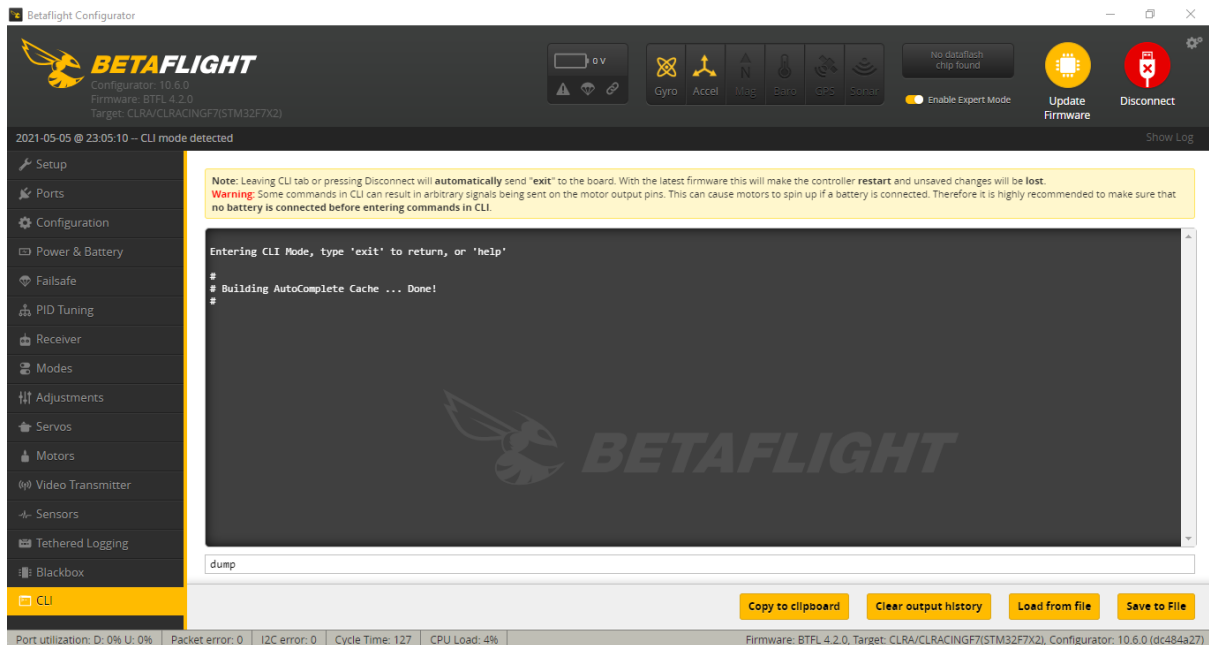


23. Setting up servos. Set the enable expert mode and click the servos tab. The servo numbering does not line up. Servo 1 is configured via Servo 2 etc shown in the pic below.

- Change the mid point until the servo horn is in the right position. [Save]
- Change the min and max to be equal values above and below the mid point. The range (difference between the min and max) for each servo can be changed so that the Blade angle positive and negative are the same depending on head geometries. I'm not that technical so I just make them the same. In the example below I shifted the servo 2 up by 50. [Save]
- Check the servos have full range of movement without binding. If not you will need to reduce the servo range.



24. Backup your files once you are done. Open the CLI and type: Dump [enter]. Select, copy and paste the entire output into a text file and save it. This is your dump file with all of your configuration. If you re-flash firmware or build another FC use your file at step 7.



That's it. Go fly.

## PID tuning

It should be quite flyable with the PID parameters as they are. If you want to change these settings you can do it through the PID tuning tab.

