

# BumbleBee BumbleBlog - HD DJI Setup Guide

*or how to get your Bumblebee in the air without stings by Pat Byars*



This is an ongoing blog sharing how to setup and enjoy iFlight's BumbleBee HD BNF HD 😊. It does not cover flight skills or basic knowledge but is instead a guide to the pieces needed to get it working and some experience or study is needed prior. First some do's and don'ts:

- Do not work on the quad with the props attached, even though it is ducted.
  - Do not power the quad ever without the antennas attached.
  - Do know your switches and controls like how to arm and disarm.
  - Do review your setup in betaflight before flight. maybe save a "diff" file in the CLI as a backup point. Do not use dump all or diff all as the resource / config file is part of the target firmware (loads after flashing on first connection).
- 

I received my BumbleBee HD from iFlight recently and am excited to share my steps to setting it up including changes that I personally make (not necessarily needed to get started but always good to know how to do kind of stuff).

First steps I took when I opened my bumblebee box up. I inventoried what I had received noting several interesting items including a much needed L shaped USB-C adapter as the ducts are in the way (true for all quads of this type). Taking a look at the electronics stack I note another different USB-C adapter is already in place to connect up and activate



the air unit. That is definitely one of the first orders of business that we will take care of soon along with a quick “pre-flight review” of settings and any needed personal changes like what switch does what and the OSD info and where it goes on the screen. There are also in the box parts to install a long range receiver like the TBS crossfire or FrSky R9. Plus extra strap, props and other parts like replacement cables and screws (nice 😊). I also put 3-1 shrink sleeving over the thin DJI antenna shafts (this is totally optional but I’m good a breaking stuffs) to make them more rugged and to automatically return to center when bent (vs stay bent). I had done these prior, and there are great pre built antennas like the ones from TrueRC of Canada and many others if you want to upgrade but are not a DIY’er. More on this on a later bumble-blog update.



Next is activation and binding. There are great videos on how to do this from DJI and others, here (<https://www.dji.com/fpv/info#downloads>) is a link to the DJI page, a new pilot should watch all of these (they are pretty straightforward to understand). But I'll show also you the steps, as it's really pretty simple: Activate. Power up Quad, Goggles and DJI controller. use the clip and press the link button in the center of the air unit



above the sd card slot that should be lit green (if not wait till it is). Press and note it has turned red. Go to goggles and find the recessed red button under where the battery cable connects



to the goggles and press once, wait to hear beeps, hear air unit respond with beeps and note the goggles now have video. You are almost done... go to air unit again, the led should have turned green again. Press again with paperclip or blunt not sharp and point tool, and get the red light. Got to the transmitter (controller) and do the “three finger salute” (my words not DJI or iFlight) by pressing once these three buttons



once at the same time - Record button on left side of transmitter plus the unlabeled big silver button next to the power button and the Click Wheel (like a PC mouse click-wheel) all together. Unit will make beeps, air unit will make beeps and then a happy beep beep that its ok and linked.

How to arm, and what switches do what on your transmitter out of the box:  
Out of the box the switches are set very basic, SwA is the arm switch. SwB is set to angle for all switch positions (flight modes), the other switches are undefined.

I recommend this configuration for the switches once you're comfortable using the Betaflight configuration tool:

SwA is the Arm switch. Move all the way down to arm.

SwB is Flight modes with up being Angle mode (seasoned pilots may prefer a different order, this is for newer pilots), middle is acro/trainer mode, all the way down is acro with air mode for freestyle.

SwC is “Turtle Arming Mode” or crash recovery arm mode,

SwD is buzzer (motors or beeper). Here are my aux settings, cut & paste into the CLI (command line in betaflight) hit enter, stuff will scroll, hit save and enter.

Betaflight reboots, go modes and note new settings.

```
# aux
aux 0 0 0 1700 2100 0 0
aux 1 1 1 900 1300 0 0
aux 2 13 3 1700 2100 0 0
aux 3 35 2 1700 2100 0 0
aux 4 47 1 1300 1700 0 0
```

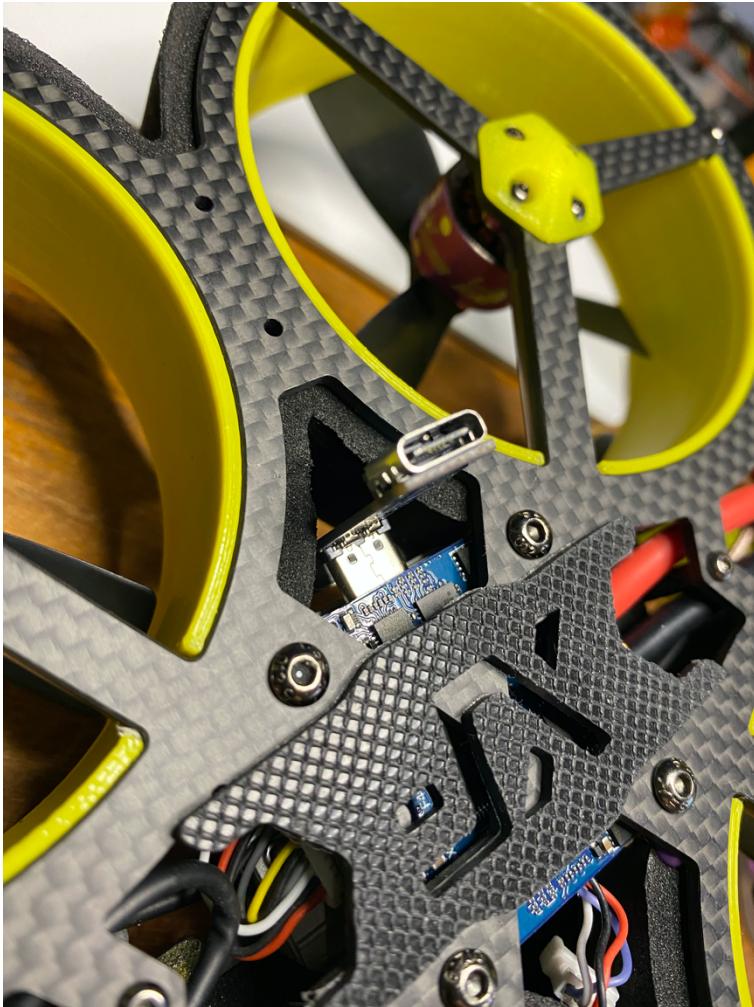
with props off (especially this part) power up BumbleBee and your transmitter and if you go to the modes tab you can see the switches in action. Verify everything is in order. You can also go to the receiver tab and note that throttle, yaw, pitch and roll respond correctly and the switches and their channels.

Next up is the configuration tab/page. Settings are good but a few changes will make them better and enable stuff like a buzzer. Here I want you to find the elements you need to change using the gui. First is Motor Stop, I recommend for beginners that motor stop be enabled so that at zero throttle the props stop vs keep spinning/idle. Another important thing to note is prop spin direction. It is reversed as it is for all whoops and many other (I reverse all of mine, better to push out when in branches than pull in). Reverse direction means motor1 has ccw, 2 cw, 3 cw, 4 ccw props on. (insert pic below). I like to put a craft name in, it helps to see what is what when you backup your settings in the CLI. For beginners I strongly recommend turning off air mode (it is still available as the middle switch position of SwB) that makes air mode permanently on.

Do turn on Rx Set and Rx Lost switches under the air mode switch. I turn off the Armed and USB switches - too much beeping re the next section. Review all other settings but don't forget to hit the Save and Reboot button before moving off the config page. Save and it reboots. Test that SwD makes the motors make a beeping sound.

How to plug in the L shaped USB-C up/down adapter:

Turn over the Bumblebee and note the AIO FC and the USB-C connector. You will need to press (gently and lined up with the usb port) into the foam so that you can slide it down so that it is positioned in front of the port. Do not insert sideways and be gentle the adapter is thin.



(replace pic with batt pad removed, makes confusing; focus is USB-C)

So you did all this and went to test fly and... it wouldn't arm.

Like mine just did. Luckily I've seen this many times and there are things like the first screen in betaflight that tells you the arming status flags (reason to not arm) and it says strongly "Throttle"...

Well remember the receiver tab? We need to go there and verify that when we move the throttle that it responds and not something else. Probably the issue is that it doesn't say AEFR1234.

Change to that and verify that throttle, yaw, pitch and roll all work correctly. Don't forget to hit save at the bottom of the page too.

**BETAFLIGHT**  
Configurator: 10.6.0  
Firmware: BTFL 4.1.3  
Target: IFRC/IFF7\_TWIN\_G\_D(STM32F7X2)

2020-02-27 @ 20:57:29 – Arming Disabled

Setup Ports Configuration Power & Battery PID Tuning Receiver Modes OSD Video Transmitter LED Strip Blackbox CLI

Receiver

Please read receiver chapter of the documentation. Configure serial port (if required), receiver mode (serial/ppm/pwm), provider (for serial receivers), bind receiver, set channel map, configure channel endpoints/range on TX so that all channels go from ~1000 to ~2000. Set midpoint (default 1500), trim channels to 1500, configure stick deadband, verify behaviour when TX is off or out of range.

**IMPORTANT:** Before flying read failsafe chapter of documentation and configure failsafe.

Roll [A]	1501
Pitch [E]	1493
Yaw [R]	1498
Throttle [T]	1003
AUX 1	1000
AUX 2	1000
AUX 3	1000
AUX 4	1000
AUX 5	1000
AUX 6	1000
AUX 7	1000
AUX 8	1000
AUX 9	1000
AUX 10	1000
AUX 11	1000
AUX 12	1000
AUX 13	988
AUX 14	988

Channel Map	RSSI Channel
AETR1234	AUX 1

'Stick Low' Threshold	Stick Center	'Stick High' Threshold
1050	1500	1900

RC Deadband	Yaw Deadband	3D Throttle Deadband
0	0	50

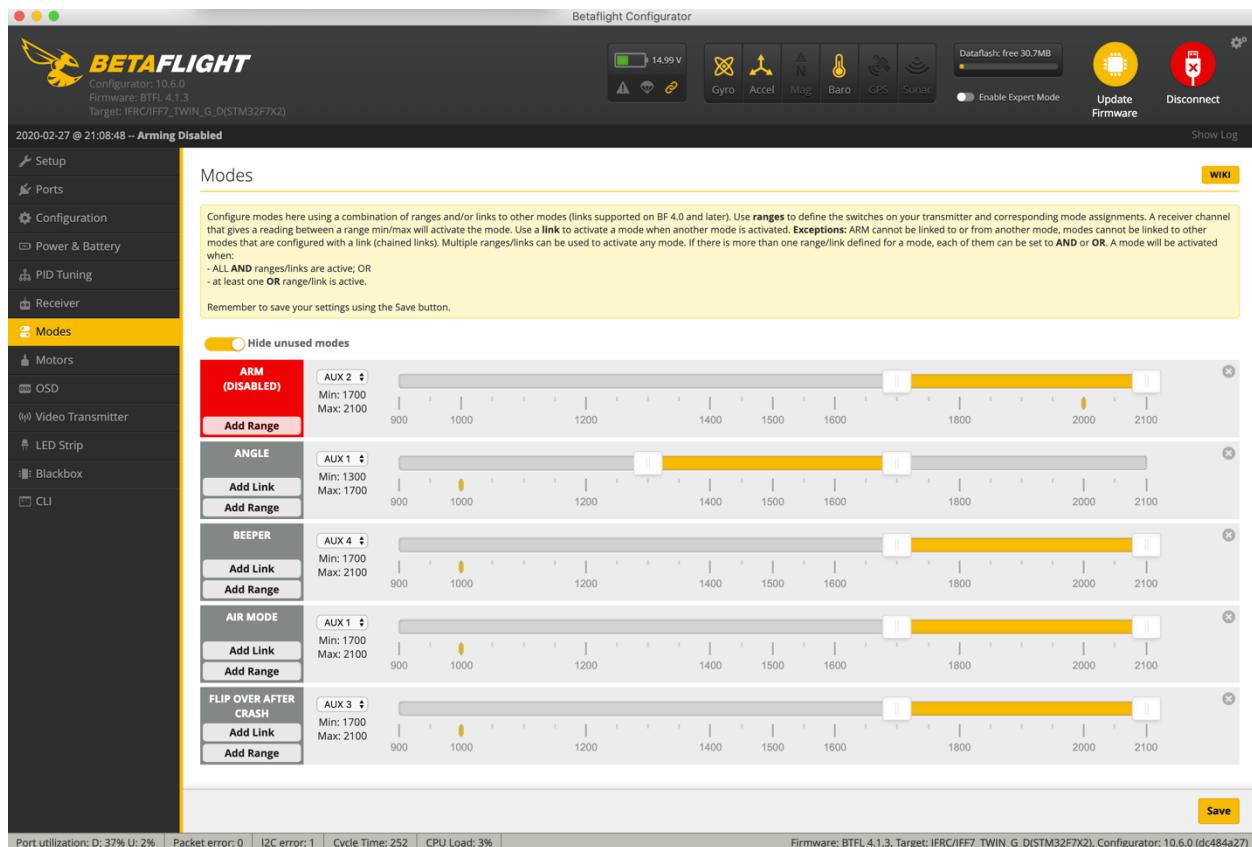
RC Smoothing	
Filter	Smoothing Type
RPYT	Channels Smoothed
Auto	Input Cutoff Type
BIQUAD	Input Filter Type
Auto	Derivative Cutoff Type
BIQUAD	Derivative Filter Type
10	Auto Smoothness

Preview

Refresh Save

Port utilization: D: 40% U: 3% | Packet error: 0 | I2C error: 1 | Cycle Time: 246 | CPU Load: 3% | Firmware: BTFL 4.1.3, Target: IFRC/IFF7\_TWIN\_G\_D(STM32F7X2), Configurator: 10.6.0 (dc484a27)

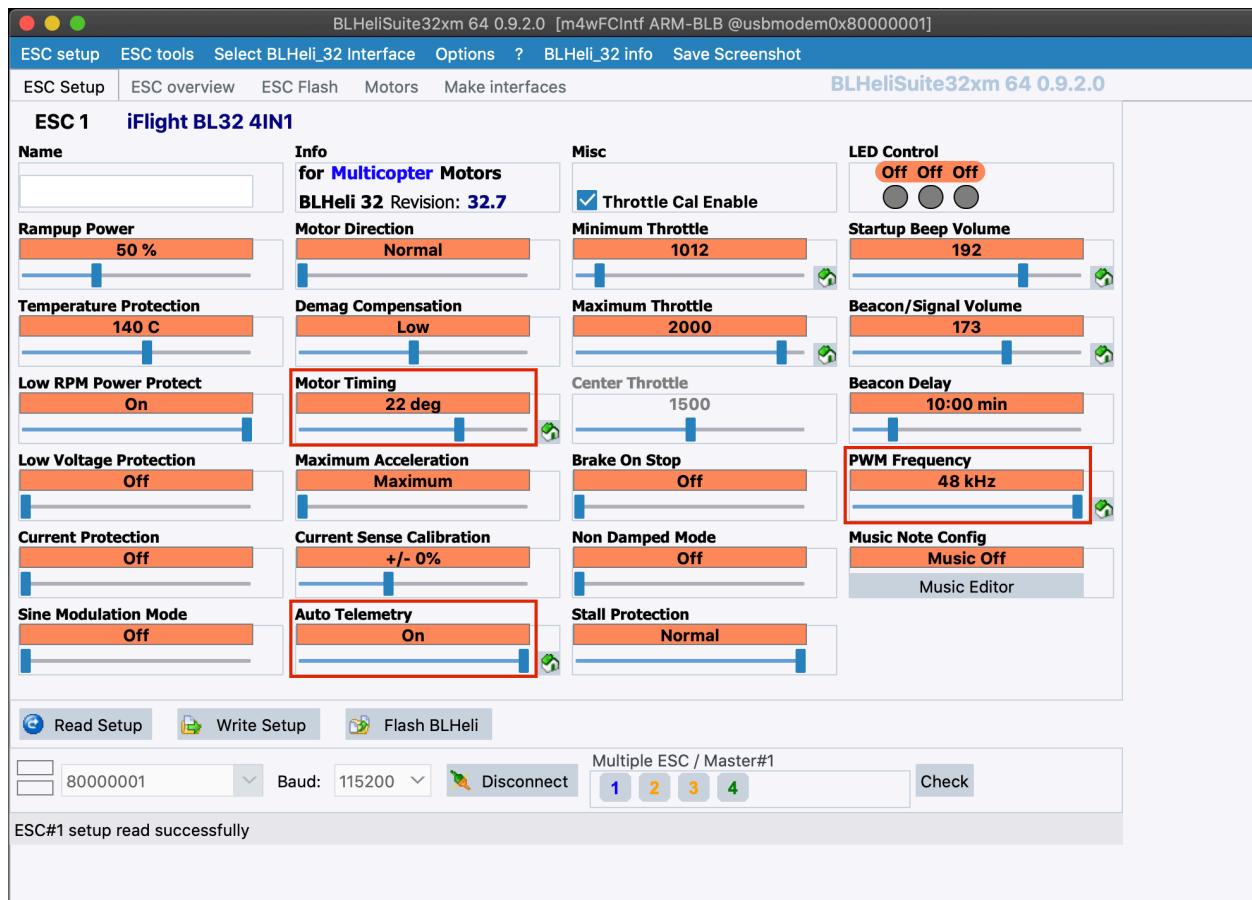
**Now it will arm.** Verify this by going to the modes tab and flipping arm switch, value should go to the arm block that has turned red saying armed.



Time to #SendIt 😊 **BUT NOT JUST YET**, we need to setup the ESCs and configure to run RPM filtering.

The following is from Oscar Liang's excellent guide.

Do the ESC setup first the Betaflight after. Personally I had a issue that I thought was the gyros but it wasn't it was tuning. After performing these steps my only Bumblebee issue is resolved and bonus, motors don't get hot and its super smooth now.



In **BLHeli32 configurator** (connect then read all 4 escs) configure these items

- **PWM Frequency: 48KHz for freestyle;** Default (or higher) for racing
- **Motor Timing: 22 or Auto for freestyle;** 25 (or higher) for racing

You must **Flash update your BLHeli\_32 ESCs to version 32.7 or newer** in order to use bidirectional DShot & RPM Filtering.

**If you need to update to Betaflight 4.1.x (4.1.4 as of this update) please see section at the end “How to Update BF”**

**Update your FC to Betaflight 4.1 or newer**

**Use 4KHz gyro sampling rate and 4KHz looptime.**

With faster looptime (e.g. 8K) you could get jitters, 4K is a safer option and most people probably won't notice the difference anyway.

## System configuration

**Note:** Make sure your FC is able to operate at these speeds! Check CPU and cycletime stability. Changing this may require PID re-tuning.  
**TIP:** Disable Accelerometer and other sensors to gain more performance.

**Note about 32 kHz gyro sampling mode:** Support for 32 kHz gyro sampling mode was added to Betaflight as an experimental feature. In the years that it was available, it has never shown that it has any advantage over 8 kHz gyro sampling mode, due to its susceptibility to vibrations, and its high noise level which require aggressive filtering, causing delays in the control loop. For this reason, **support for 32 kHz gyro sampling mode has been dropped in Betaflight 4.0.**

4 kHz ▾

Gyro update frequency

4 kHz ▾

PID loop frequency



Accelerometer



Barometer (if supported)



Magnetometer (if supported)



OscarLiang.com

For 4K looptime, **DShot300** ESC Protocol is fast enough. You only have to use DShot600 if you are using 8K looptime. Enable “**Bidirectional DShot**”, and set **Motor poles**.

## ESC/Motor Features

DSHOT300

ESC/Motor protocol



**MOTOR\_STOP** Don't spin the motors when armed



**ESC\_SENSOR** Use KISS/BLHeli\_32 ESC telemetry over a separate wire



Bidirectional DShot (requires supported ESC firmware)

14



Motor poles (number of magnets on the motor bell)

5.5



Motor Idle Throttle Value [percent]



Simply count how many magnets you have in the motor bell, that's the number you have to enter in **Motor Poles**. If you put the wrong number in, filtering is not going to work properly. As a general guideline:

- 14 poles in 22XX, 23XX, 24XX motors
- 12 poles in 08XX, 11XX, 12XX motors

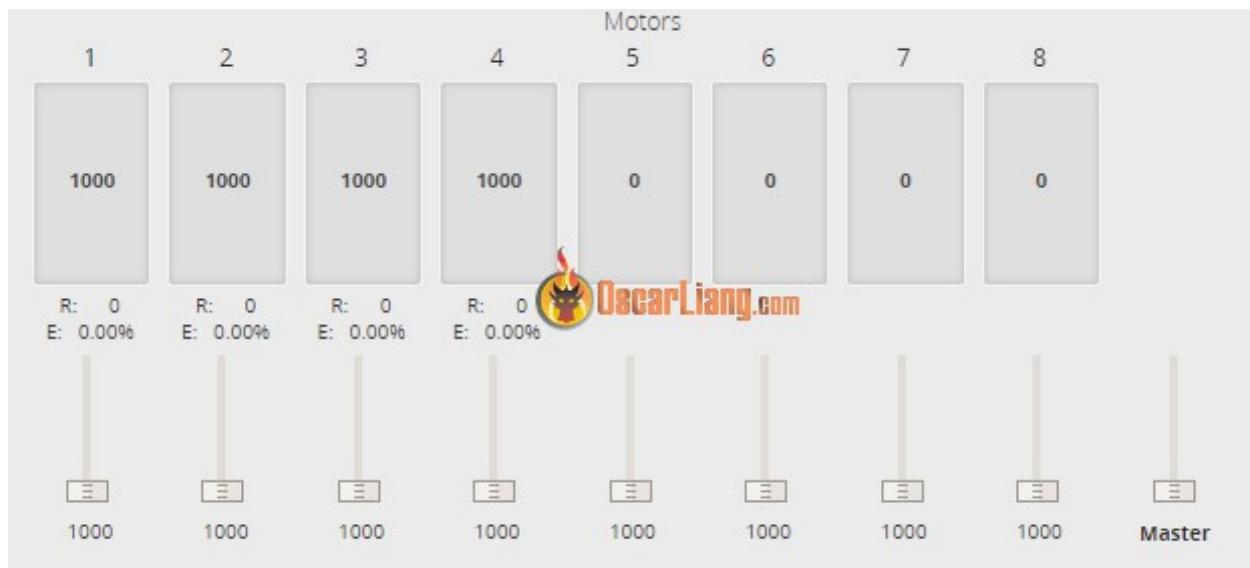


OscarLiang.com

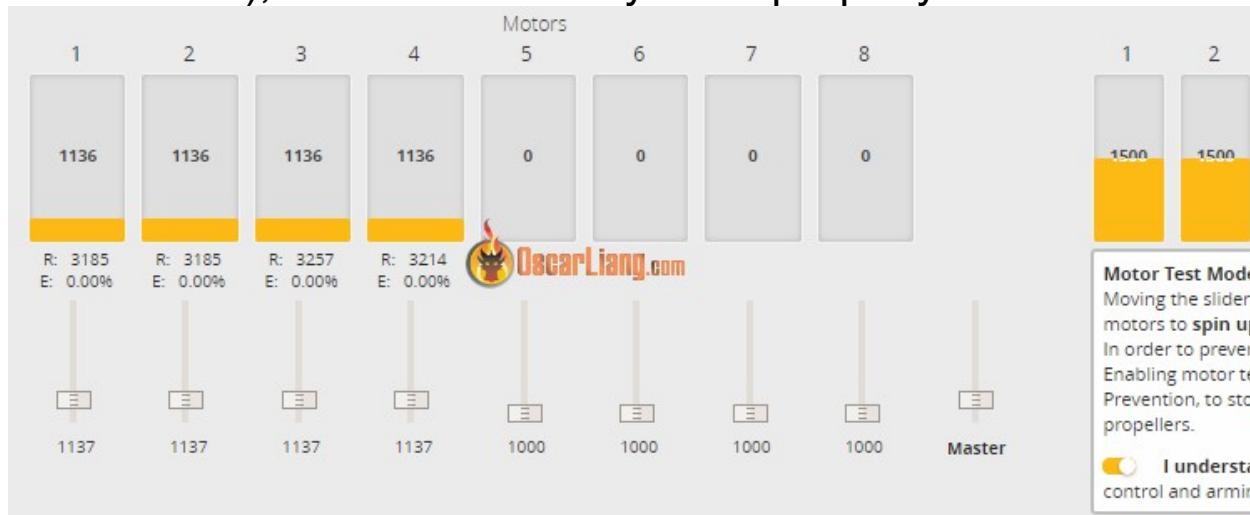
Now go to the motors tab, on top of the sliders, you might see DShot Error at “E:100%”.



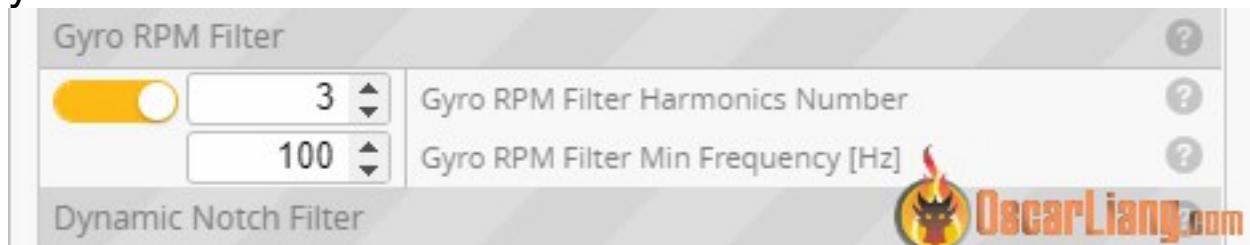
As soon as you plug in the battery, they should all go to 0%. If they don't, something is wrong. You might want to use a slower looptime if you are running 8K/8K.



You can now spin the motors up with the sliders (apply just a little throttle), to make sure they work properly.



Now go to the PID tuning page, under Filter Setting, enable “**Gyro RPM Filter**“. Just leave the two settings at default. By default, RPM filter is set to target 3 harmonics for each motor (4 motors), on each axis (pitch, roll, yaw), so it gives you a total of 36 notch filters!



After your flight controller reboots, go to the CLI and enter tasks

Check if the value of “**Gyro/PID rate/hz**” is close to your looptime. For example, For 4K/4K it should read around 4000. It doesn’t have to be exactly the same, but the difference should be less than 1%, otherwise you should lower looptime until it is. (as recommended by Betaflight devs)

#	# tasks	Task list	rate/hz	max/us	avg/us	maxload	avgload	total/ms
00	-	( SYSTEM)	9	4	0	0.5%	0.0%	0
01	-	( SYSTEM)	999	316	1	32.0%	0.5%	68
02	-	( GYRO/PID)	4000	80	67	32.5%	27.3%	1164
03	-	( ACC)	998	17	12	2.1%	1.6%	66
04	-	( ATTITUDE)	99	10	7	0.5%	0.5%	3
05	-	( RX)	32	34	19	0.6%	0.5%	3
06	-	( SERIAL)	99	176881	4	1751.6%	0.5%	335
07	-	( DISPATCH)	998	2	0	0.6%	0.0%	2
08	-	( BATTERY_VOLTAGE)	49	3	1	0.5%	0.5%	0
09	-	( BATTERY_CURRENT)	4	4	2	0.5%	0.5%	0
10	-	( BATTERY_ALERTS)	3	1	0.5%	0.5%	0.5%	0
11	-	( BEEPER)	99	5	1	0.5%	0.5%	0
21	-	( OSD)	59	476	11	3.3%	0.5%	4
23	-	( CMS)	59	3	0	0.5%	0.0%	0
24	-	( VTXCTRL)	6	1	0	0.5%	0.0%	0
25	-	( CAMCTRL)	6	1	0	0.5%	0.0%	0
27	-	( ADCINTERNAL)	4	3	0	0.5%	0.0%	0
28	-	( PINIOBOX)	18	2	0	0.5%	0.0%	0
RX Check Function				2	1			0
Total (excluding SERIAL)						76.6%	32.9%	

Write your command here. Press Tab for AutoComplete.

Now go out and fly your quad, it should feel pretty good. But we are not quite done yet, you can still tweak the filtering settings to get more performance out of it.

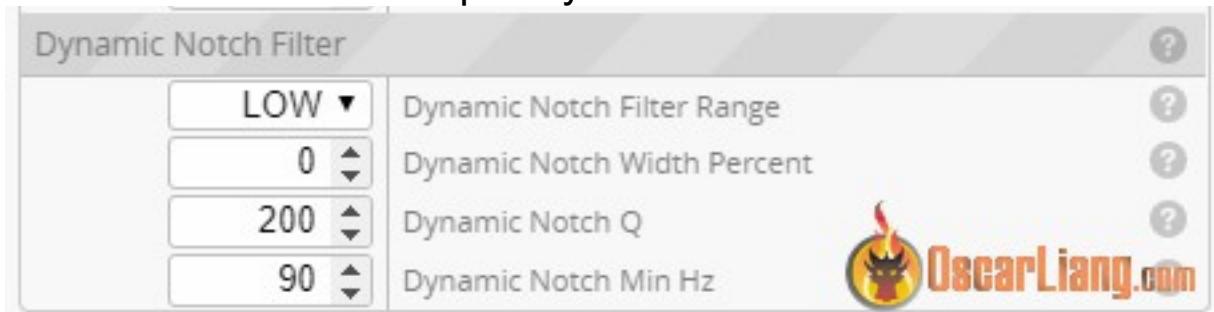
## Removing Default Filtering

Simply adding RPM filters will certainly make your quad fly smoother and the motors cooler, but we should take advantage of the excellent noise rejection from RPM filter, and try to minimize the default filtering delay.

This is the part that actually makes your quad fly so good without propwash :)

### Under **Dynamic Notch Filter**:

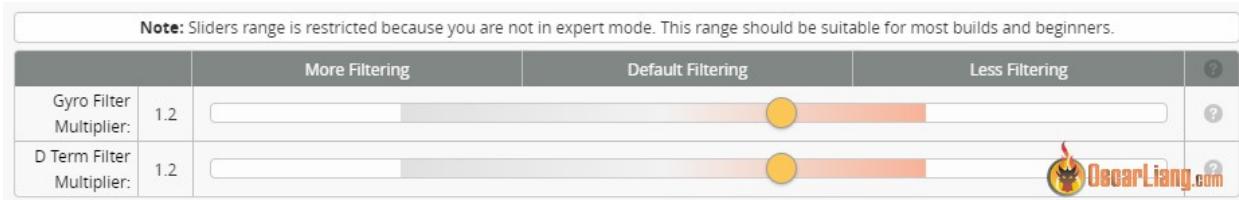
- **change range to LOW**
- **change percent to 0** (setting this to zero will remove one of the two dynamic filters and decrease latency)
- **Q factor to 200** or even 250 – for a narrower filter
- **set minimum frequency to 90** as there is less high frequency noise now thanks to RPM filter, and we want to focus on lower frequency



Test your quad again, I suggest doing this with used propellers as it will give you more objective results.

If the motors are cool, it probably means you can reduce filtering further. But this time we will use the two sliders on the top of the filter tab – **Gyro Filter Multiplier** and **D term filter multiplier**.

You don't have to change any of the check-boxes or numbers under the sliders. These adjust themselves as you move the sliders left and right.



Try dragging both of the sliders to the right for less filtering, just a tiny bit every time you test fly the quad. Check motor temperature and assess if you can reduce filtering further. Note that even if the motors don't get hot, without enough filtering, your quad can actually perform worse, so keep that in mind, motor temperature is not the only thing! Learn something in this tutorial? Sharing it with your friends is the best way to support me!

Parts and tools needed :

\_PC or Mac with USB-C cable, and DJI Assistant 2 SW installed to activate and upgrade units if needed.

\_Paperclip or iPhone sim card removal tool (yes there is a paperclip like thing in those thin white papers that came with your iphone lol a hidden gem).

\_USB-C L shape angle adapter(s). USB-C to USB-C that are included with BumbleBee HD BNF.

\_Prop wrench or other wrench like a crescent wrench to remove props prior to working on the quad.

\_Optional items, 3-1 shrink sleeving, heat shrink gun for antennas (be careful to not damage the PC plastic shell with DJI label that is the "active" part of the antenna).

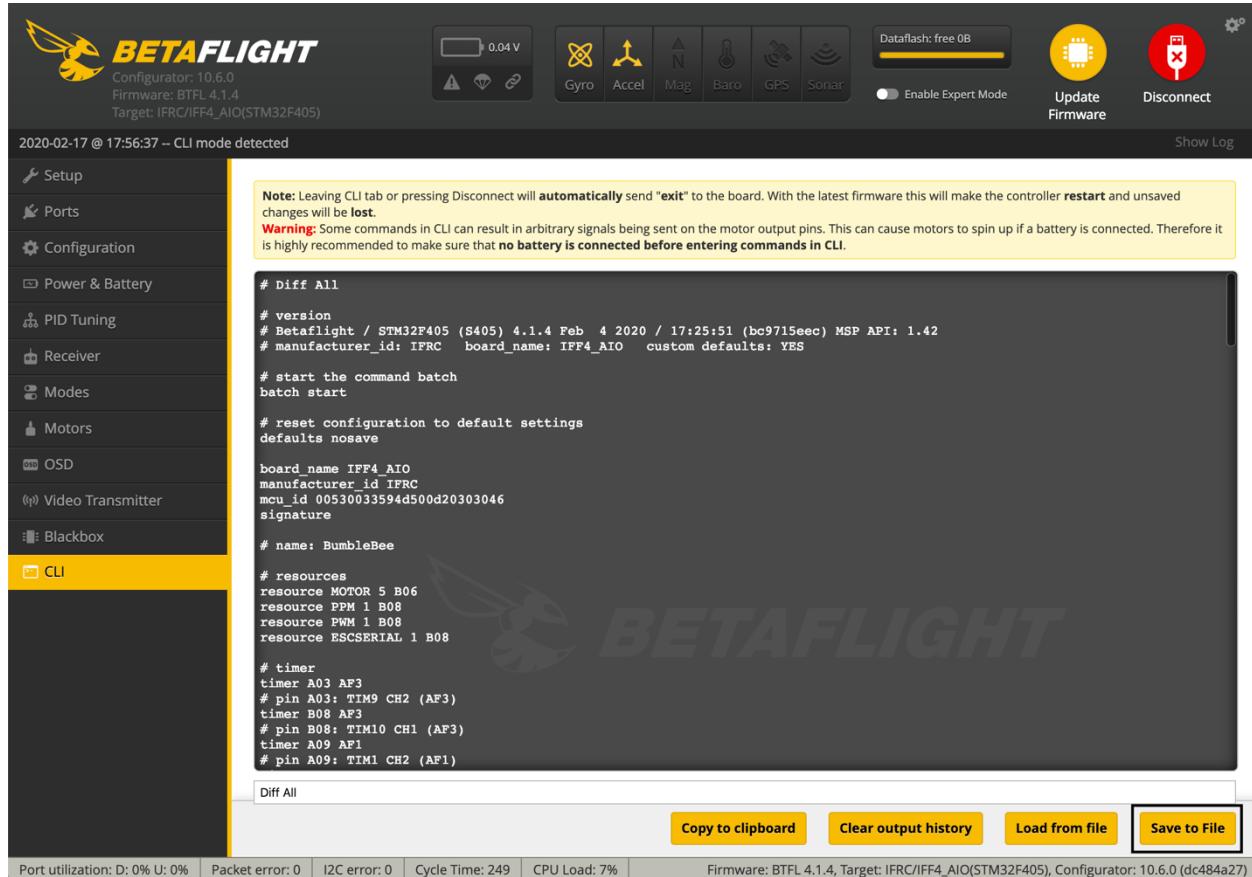
Resources - DJI getting started videos:

<https://www.dji.com/fpv/info#downloads>

On the downloads page note the tutorial videos at the top of the page (intro, activate, link, camera settings). These are a must watch.

**"How to Update BF"**

First go to the the CLI and clear the screen and then type Diff All and enter. Note the button at bottom right to save to file. Save your diff all where you can find it again.



Then click update firmware (red circle spot near top of screen) and select The iFlight Target for the F4 AIO board

!



Configurator: 10.6.0

/dev/tty.usbmodem0x80000001  
115200  
Auto-Connect

Update Firmware  
Connect  
Show Log

2020-02-17 @ 17:34:16 -- Loaded release information for firmware from GitHub.

Welcome  
Changelog  
Privacy Policy  
Documentation & Support  
Firmware Flasher

Show unstable releases Show release candidates in addition to stable releases

IFF4\_AIO (IFRC) Select your board to see available online firmware releases - Select the correct firmware appropriate for your board.

4.1.4 - 14-02-2020 17:36 Select firmware version for your board.

No reboot sequence Enable if your FC is in boot mode. i.e. if you powered on your FC with the bootloader pins jumped or whilst holding your FC's BOOT button.

Full chip erase Wipes all configuration data currently stored on the board.

Manual baud rate 256000 Manual selection of baud rate for boards that don't support the default speed or for flashing via bluetooth.  
**Note:** Not used when flashing via USB DFU

**Warning**  
Please do **not** try to flash **non-Betaflight** hardware with this firmware flasher.  
Do **not** disconnect the board or **turn off** your computer while flashing.  
  
**Note:** STM32 bootloader is stored in ROM, it cannot be bricked.  
**Note:** **Auto-Connect** is always disabled while you are inside firmware flasher.  
**Note:** Make sure you have a backup; some upgrades/downgrades will wipe your configuration.  
**Note:** If you have problems flashing **try disconnecting all cables from your FC** first, try rebooting, upgrade chrome, upgrade drivers.  
**Note:** When flashing boards that have directly connected USB sockets (most newer boards) ensure you have read the USB Flashing section of the Betaflight manual and have the correct software and drivers installed  
  
**IMPORTANT:** Ensure you flash a file appropriate for your target. Flashing a binary for the wrong target can cause **bad** things to happen.

**Recovery / Lost communication**  
If you have lost communication with your board follow these steps to restore communication:  
○ Power off

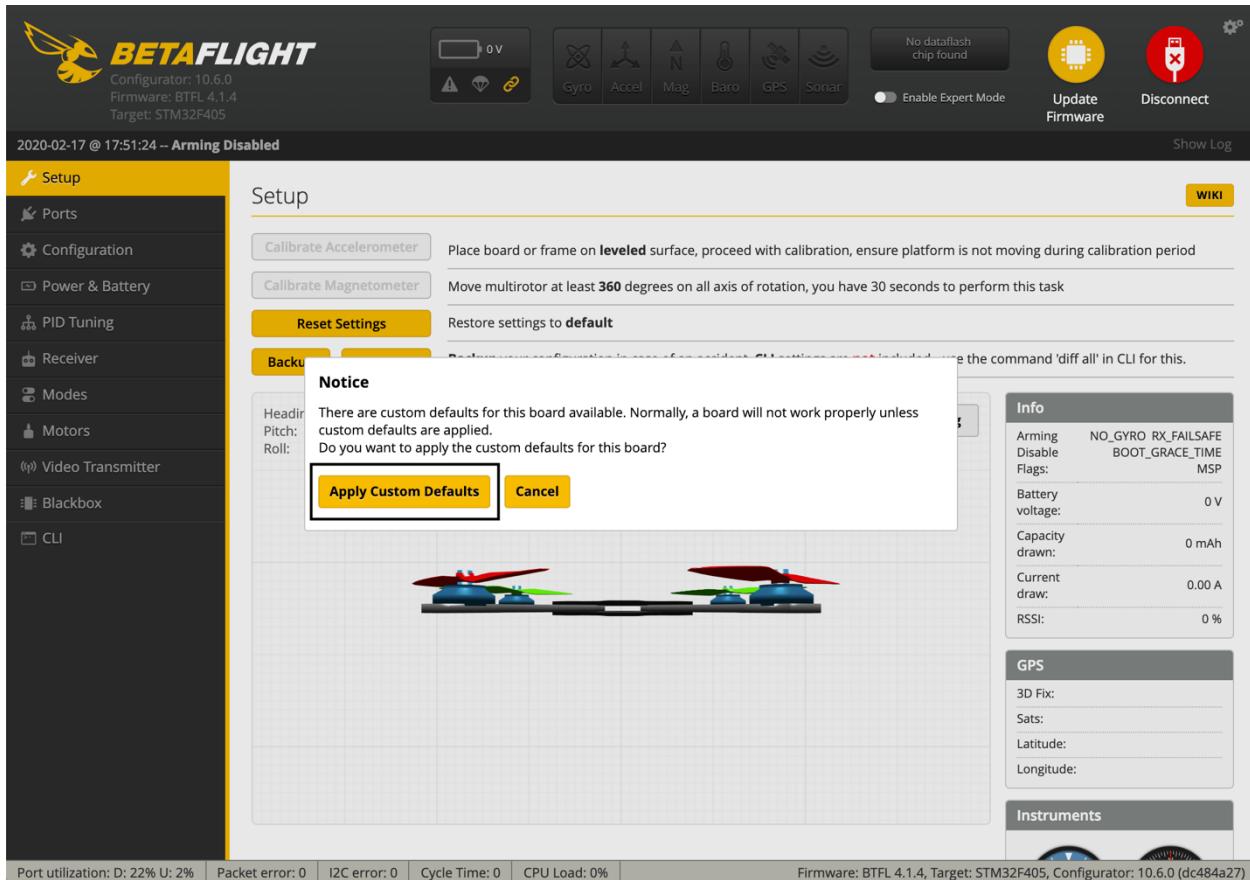
Please load firmware file Flash Firmware Load Firmware [Online] Load Firmware [Local]

Port utilization: D: 0% U: 0% Packet error: 0 I2C error: 0 Cycle Time: 0 Configurator: 10.6.0 (dc484a27)

When this finishes click the connect button. When Betaflight starts it will ask if you want to load the config files - Yes You do

When this finishes it will reboot. Note you have Gyro's etc. Go to the CLI and paste that Diff All that you save. and hit enter. Be sure to do save if the script

doesn't do it for you. You reboot and your just about ready to go. You should



still review all the pages - is it setup they way you want?

Don't have a backup? 😊 Here is a diff all of my current setup as of 4/1/20:

# Prerequisite is BL Heli32 MT = 22 PWM = 48 using BLHELI32 Configurator

Here is a Diff of my current setup as of 4/1/20. To use paste intp the CLI after you have applied the custom configuration option after connecting post firmware update. The don't forget to type Save and then hit enter.

```
# name: BUMBLEBEE HD
```

```
# timer
timer B08 AF3
# pin B08: TIM10 CH1 (AF3)
timer A09 AF1
# pin A09: TIM1 CH2 (AF1)
```

```
timer A10 AF1
# pin A10: TIM1 CH3 (AF1)
timer A02 AF2
# pin A02: TIM5 CH3 (AF2)
timer B10 AF1
# pin B10: TIM2 CH3 (AF1)
timer B11 AF1
# pin B11: TIM2 CH4 (AF1)

# dma
dma pin A09 0
# pin A09: DMA2 Stream 6 Channel 0
dma pin A10 0
# pin A10: DMA2 Stream 6 Channel 0
dma pin A02 0
# pin A02: DMA1 Stream 0 Channel 6
dma pin B10 0
# pin B10: DMA1 Stream 1 Channel 3
dma pin B11 0
# pin B11: DMA1 Stream 7 Channel 3

# feature
feature -LED_STRIP
feature -DISPLAY
feature -AIRMODE
feature MOTOR_STOP
feature ESC_SENSOR

# beeper
beeper -ARMED
beeper -ON_USB

# beacon
beacon RX_SET

# serial
serial 0 1 115200 57600 0 115200
serial 3 1024 115200 57600 0 115200

# led
led 0 6,6::ATO:0
led 1 7,6::ATO:0
led 2 6,7::ATO:0
led 3 7,7::ATO:0

# mode_color
mode_color 6 0 4
mode_color 6 1 2
```

```
# aux
aux 0 0 0 1700 2100 0 0
aux 1 1 1 900 1300 0 0
aux 2 13 3 1700 2100 0 0
aux 3 35 2 1700 2100 0 0
aux 4 47 1 1300 1700 0 0

# master
set gyro_sync_denom = 2
set gyro_lowpass2_hz = 325
set dyn_notch_range = LOW
set dyn_notch_width_percent = 0
set dyn_notch_q = 200
set dyn_notch_min_hz = 90
set dyn_lpf_gyro_min_hz = 260
set dyn_lpf_gyro_max_hz = 650
set acc_calibration = 108,-36,-66
set mag_hardware = NONE
set baro_hardware = NONE
set rssi_channel = 12
set rc_smoothing_derivative_hz = 20
set rc_smoothing_derivative_type = PT1
set sbus_baud_fast = ON
set dshot_idle_value = 600
set dshot_bidir = ON
set motor_pwm_protocol = DSHOT300
set failsafe_delay = 3
set failsafe_off_delay = 15
set failsafe_throttle = 1650
set failsafe_procedure = AUTO-LAND
set vbat_max_cell_voltage = 450
set ibata_scale = 100
set beeper_dshot_beacon_tone = 2
set yaw_motors_reversed = ON
set small_angle = 180
set osd_warn_rssi = ON
set osd_warn_link_quality = ON
set osd_vbat_pos = 6432
set osd_rssi_pos = 6368
set osd_link_quality_pos = 343
set osd_rssi_dbm_pos = 119
set osd_tim_1_pos = 439
set osd_tim_2_pos = 4288
set osd_flymode_pos = 4480
set osd_throttle_pos = 343
set osd_vtx_channel_pos = 52
set osd_current_pos = 6496
set osd_mah_drawn_pos = 6464
set osd_craft_name_pos = 6154
```

```
set osd_warnings_pos = 329
set osd_avg_cell_voltage_pos = 4352
set osd_disarmed_pos = 6346
set osd_esc_tmp_pos = 4512
set osd_flip_arrow_pos = 4476
set osd_stat_endbatt = ON
set osd_stat_battery = ON
set osd_stat_total_time = ON
set max7456_spi_bus = 0
set name = BUMBLEBEE HD
```

profile 0

```
# profile 0
set dyn_lpf_dterm_min_hz = 91
set dyn_lpf_dterm_max_hz = 221
set dterm_lowpass2_hz = 195
set vbat_pid_gain = ON
set iterm_relax_type = GYRO
set iterm_relax_cutoff = 10
set pidsum_limit = 1000
set pidsum_limit_yaw = 1000
set p_pitch = 60
set i_pitch = 80
set d_pitch = 60
set f_pitch = 150
set p_roll = 65
set i_roll = 80
set d_roll = 65
set f_roll = 150
set p_yaw = 100
set i_yaw = 100
set f_yaw = 125
set d_min_roll = 45
set d_min_pitch = 45
set d_min_boost_gain = 30
set d_min_advance = 0
```

rateprofile 0

```
# rateprofile 0
set tpa_breakpoint = 1650
set throttle_limit_type = SCALE
set throttle_limit_percent = 80
```