

# Titan DC2 HD

## *Quick Start and Setup Guide*



by Patrick Byars



## Disclaimer and Safety Guidelines

1. Store the flight battery in a dry and ventilated place away from direct sunlight to prevent the battery from overheating.
2. To avoid possible injury and damage, please fly in good weather conditions and in a safe environment.
3. Please return as soon as possible when there is low battery or strong wind conditions.
4. Please ensure that the power system or other electronic components are soldered correctly, that the power supply works normally and the various components are not damaged before flying, otherwise it may cause the equipment to burn out and other losses or damage to equipment or property.
5. Make sure to operate the aircraft in an open space. Tall steel buildings, mountains, rocks, trees, etc. may interfere with the transmitter signal on the aircraft.
6. To prevent the remote controller from interfering with other wireless equipment, please turn off other WiFi devices.
7. Do not fly near sources of electromagnetic or radio interference. Sources of interference include, but are not limited too, WiFi hotspots, routers, Bluetooth devices, high voltage power lines, high voltage power stations, mobile phone base stations, and television broadcast towers. Otherwise, the wireless transmission performance of the aircraft may be affected by interference and cannot fly normally.
8. Please charge/discharge the battery to a storage voltage of about 3.85V when the battery is not in use.

### Caution:

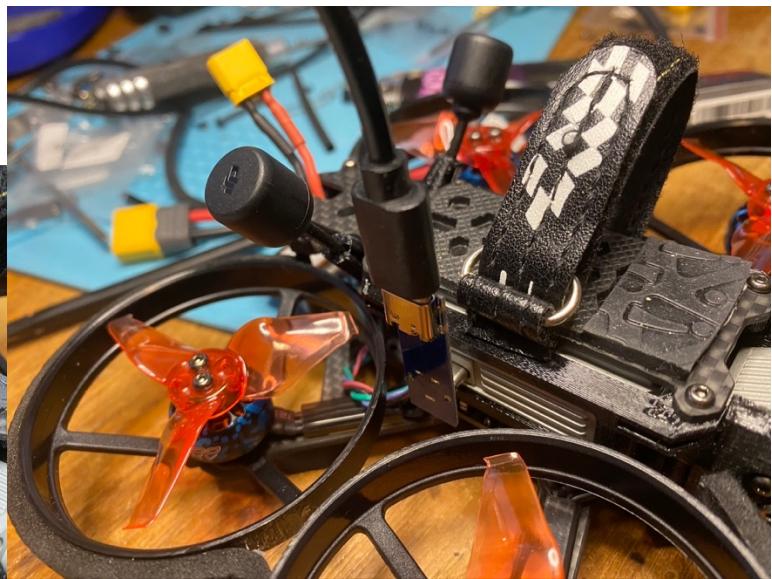
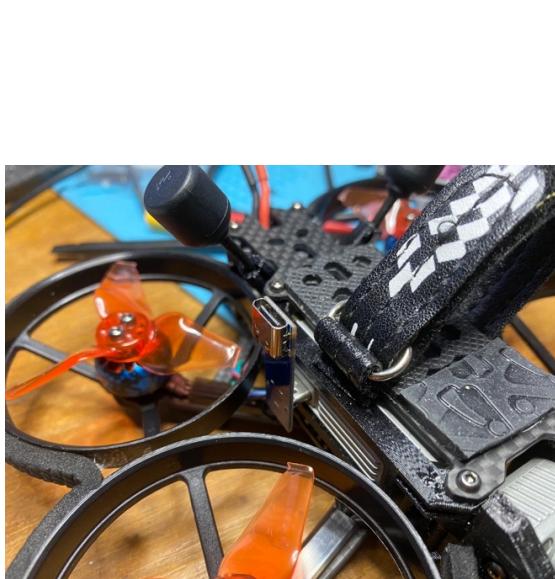
1. Users should ensure that they have a sufficient level of understanding of the aircraft and are aware of all emergency response measures.
2. Users should have a flight plan and do not be reckless, impromptu to fly the aircraft.
3. Please respect the privacy of others when you use aircraft to record video.
4. Stay away from the rotating propellers and motors.
5. After landing, first stop the motor, then turn off the flight battery, and then turn off the remote controller.
6. Turn off power or take off the propellers to prevent motors from high-speed rotation before setting the remote controller channels, upgrading firmware, and setting parameters.

# Quick Start



- ❖ The Titan DC2 HD comes preconfigured and tuned with rates and PIDs and more.
- ❖ Only a few steps need to be performed to prepare for your maiden flight.
- ❖ Bind DJI Goggles and Transmitter to your Titan DC2 HD.
- ❖ Understanding how your switches are setup.
- ❖ Arm and fly...
- ❖ Following the Quick Start chapter is a full setup guide including how to back up your settings, update the firmware, configure the ESCs with BLHeli32 Configurator, and in betaflight setup all pages including mode switches, rates, PIDs and RPM filtering and more.

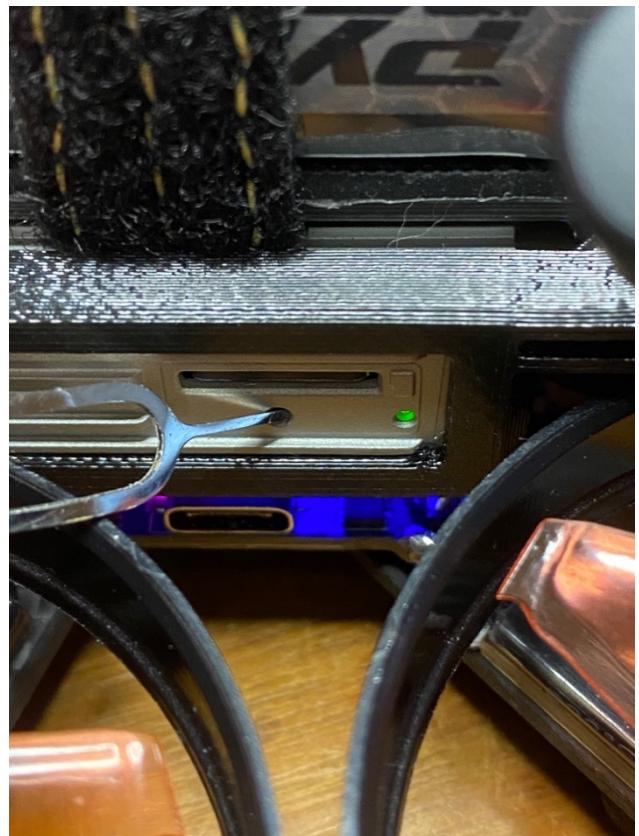
# Accessing the F4 AIO and the Air Unit's USB-C to update Betaflight and the DJI Air Unit firmware



Support the 90deg angle adapter from below as you guide it straight in.  
These are exposed connectors and care must be used when inserting.  
Do not insert at an angle.

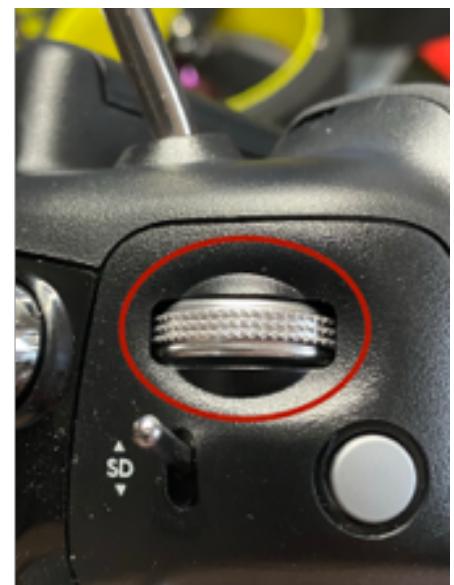
# How to bind your goggles and DJI transmitter to your new Titan DC2 HD

- ❖ You will need your goggles and its power cable, your charged transmitter, and a lipo battery with a XT30 that is fully charged, the Titan DC2 HD and a battery that is charged for it. Also a paperclip or blunt tool to push a recessed button.
- ❖ I recommend the iFlight Fullsend 450 mah 4S, and up to 800mah, with at least a 50C rating but the more C the better
- ❖ I recommend using a B6 or newer smart charger (best).
- ❖ If you will not be flying the next day or so, only charge your batteries to the **Storage level** (see your charger's instructions) or always do this - it will serve you well) and place in a fire safe place. Before flight, charge (or balance charge) to full taking care to adjust if LiHV or LiPo along with number of cells and mAh etc.
- ❖ Power up Transmitter, Goggles and Titan DC2 HD.
- ❖ On your Titan DC2 HD press the bind button with a paper clip (or like) after it has turned **green**. It will then turn **red**.

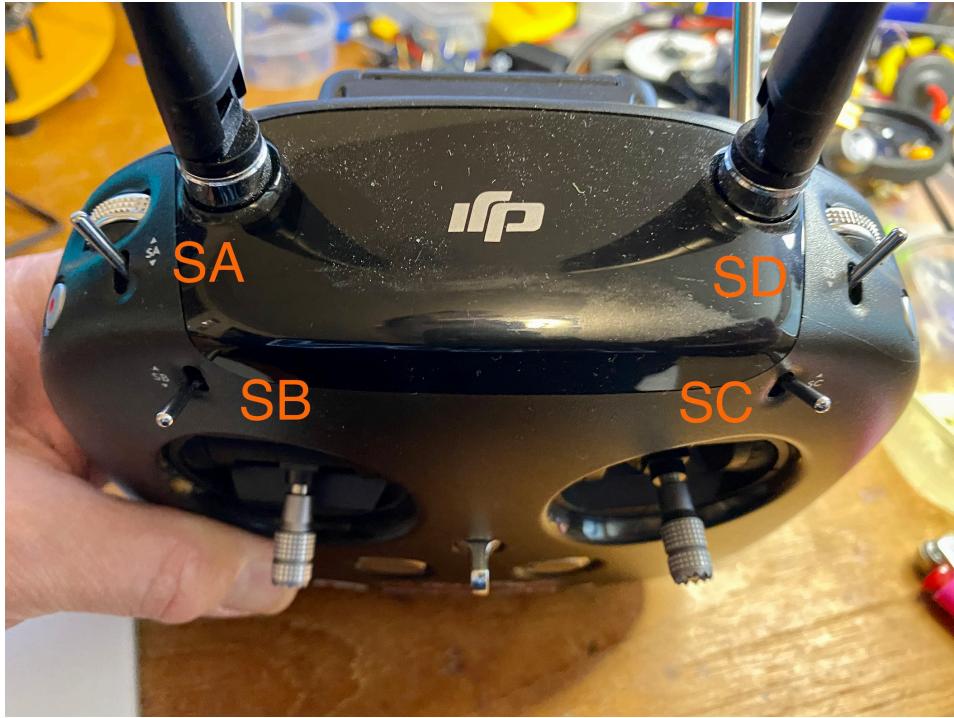


# How to bind your goggles and DJI transmitter to your new Titan DC2 HD (continued)

- ❖ Once the Air Unit Status LED is **red**, go to your DJI FPV goggles and find the recessed red button under where the battery cable connects to the goggles and press once, wait to hear beeps, then you will hear the air unit respond with beeps and note that the goggles now have video.
- ❖ Next we need to bind the transmitter but if you are using a different transmitter and receiver like FrSky or TBS Crossfire, follow that products instructions to bind instead of this next part.
- ❖ almost done... go to Air Unit again, the LED should have turned **green** again. Press again with paperclip or blunt not sharp tool, and get the **red** light. Go to the transmitter (controller) and do the “three finger salute” by pressing once these three buttons all at the same time. It will start to beep and then you will hear the confirming beeps. Your done and bound!



# After Binding: Your DJI Transmitter



- ❖ Go to your goggles and set protocol correctly. On goggles, find the 5 way button/joystick Menu button. Press it, then choose Settings, then Device, and then Protocol. Make sure it says "**SBUS BAUD FAST**". Next back up a menu or two to the settings menu and go to Display, OSD settings make sure **Custom OSD** settings is on.
- ❖ Standard convention for transmitters is all switches should be in up or the forward position which is off when you power off and on the transmitter, this is sometimes called the safe position.
- ❖ Your DC2 probably came configured with just one control that you can use (arm on SA) and set to Angle Mode on always.

# After binding...



- ❖ Do not leave your Titan DC2 running for a long time prior to take off. let it cool down first if needed.
- ❖ Once ready to fly, Power your transmitter and safe all switches in the up or off position. Check that the throttle is in fact at zero.
- ❖ SA is your Arm switch, move it all the way down to arm.
- ❖ If you don't have your goggles on put them on (unless just flying line of sight (LOS)) and move SA to the down or on position. To take off raise the throttle slowly but not too slowly, you want a smooth take off so give it some gas.
- ❖ To land locate the spot you want to land and come in slow and in steady forward and downward motion. Land and move throttle to zero and disarm by moving switch SA to up or off position, Congratulations! Don't forget to disconnect battery from quad, unplug goggles and turn off transmitter once done flying.
- ❖ Following the Quick Start guide is the full Setup Guide including how to back up your settings, update the firmware, configure the ESCs with BLHeli32 Configurator, and in betaflight setup all pages including mode switches, rates, PIDs and RPM filtering and more but you don't need any of that for now, go fly! #SendIt

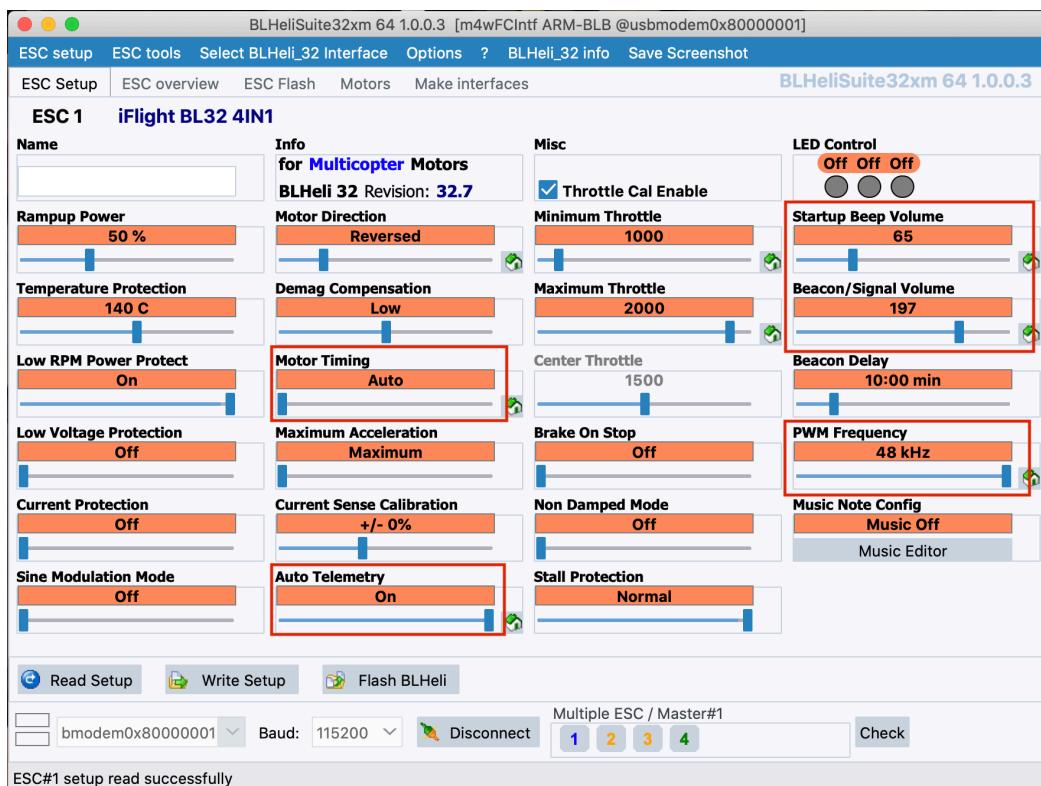
# Updating your DJI Air Unit



✉ | 📺

- ❖ Download the DJI Assistant 2 (DJI FPV Series) and install on to your computer (if not already done).
- ❖ The Air Unit can overheat quickly without airflow from flight, prepare everything and load the DJI Assistant 2 and then power up your Titan DC2 HD, and lastly plug in the USB-C and when the Air Unit is discovered, click it and follow the instructions to update firmware if necessary. When finished, unplug the battery, and unplug the USB-C and let the AU cool down now that you have the latest DJI FPV firmware for your Air Unit before moving on to the Flight Controller. I put a small desk fan in front of my quads when working with the powered (props off always).
- ❖ Note: If the version downloaded does not match the version in your goggles and or transmitter, you should update those also so that all are on the same version.

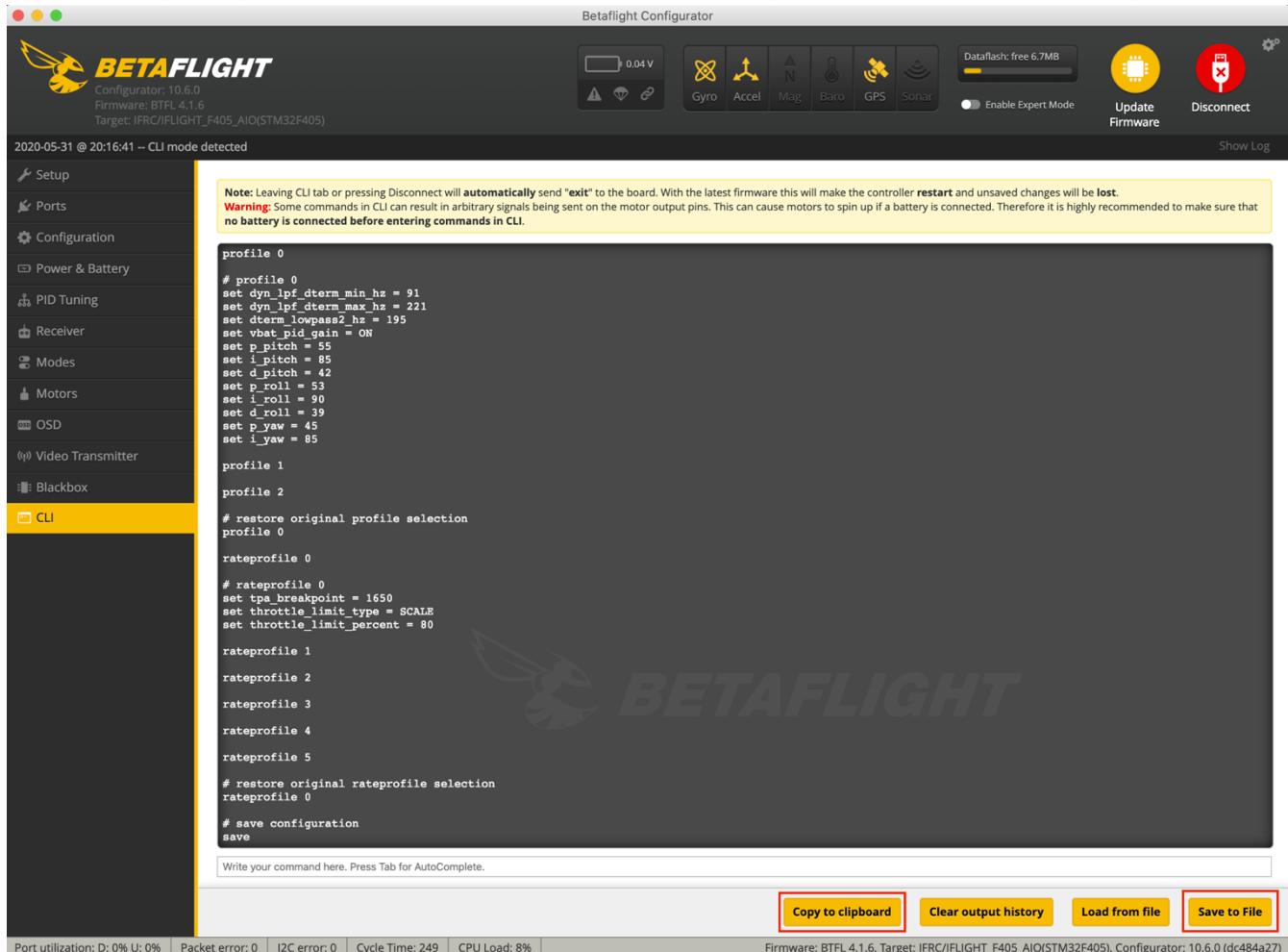
# Updating Betaflight to the latest version and setting up RPM filtering and Bidirectional Dshot.



First we should check the BLHELI32 ESC settings with BLHeliSuite32 configurator app)

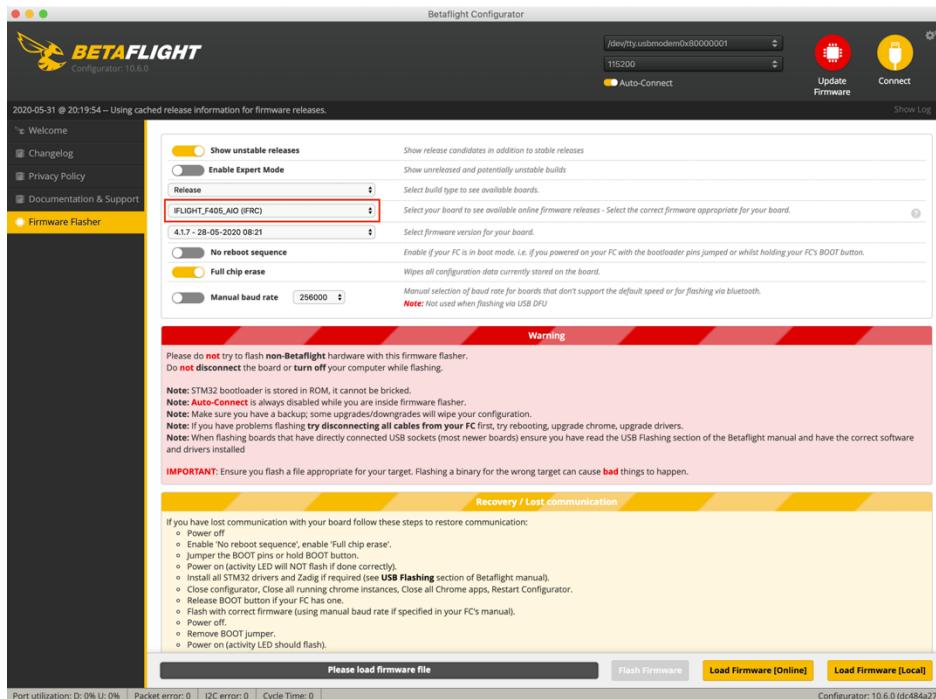
- ❖ We want to have BLHeli32 setup for BiDirectional DShot which requires ver 32.7 or later. Let's check the settings (and these need to be set for new parts) in BLHELI32 (from Oscar Liang's excellent guide on this subject FYI).
- ❖ Auto Telemetry is optional as is the beep and signal volume for startup and lost craft recovery settings.
- ❖ PWM Frequency: 48KHz for freestyle; Default (or higher) for racing.
- ❖ Motor Timing: Auto (or 20-22) for freestyle.
- ❖ This is also where you can change the motor direction, instead of swapping wires at the motor.

# Updating Betaflight to the latest version and complete setup including RPM filtering continued...



- ❖ Next let's save all your settings that are different than the default values with the DIFF command in the CLI.
- ❖ Clear the screen with the button "Clear output history" and type "**DIFF ALL**" and then enter. The command executes (this can be done with the gui now too) then click the button "**copy to clipboard**". Also click **save to file** button and save where you can find it again later. But the clipboard is what we need right now.
- ❖ Next Click the **Update Firmware** round yellow button in the top right.

# Updating Betaflight to the latest version continued...

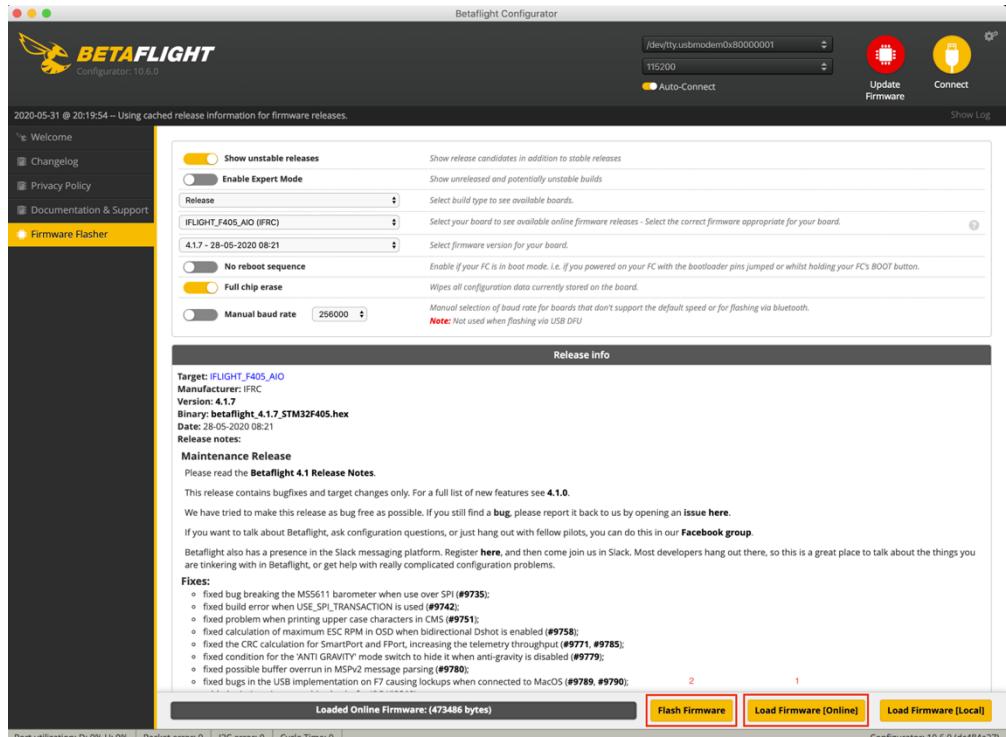


❖ You should be in the Firmware Flasher section.

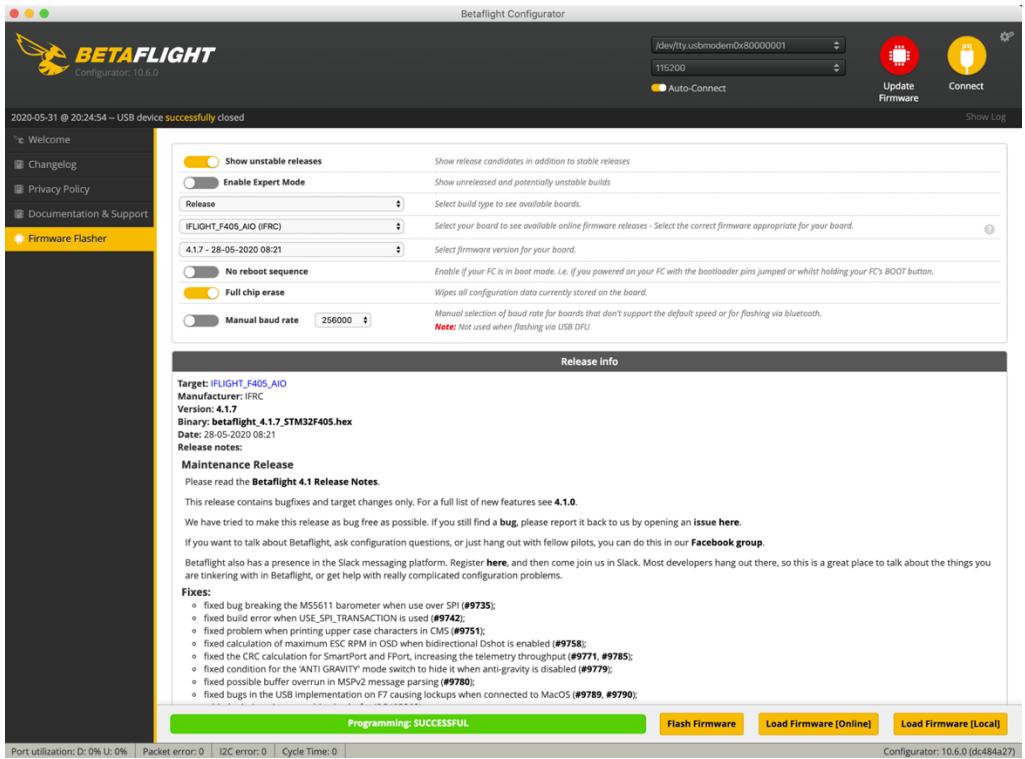
❖ Select the FLIGHT\_F405\_AIO (IFRC) target and the latest betaflight (as of today 4.1.5).

❖ Click “Load Firmware online” button.

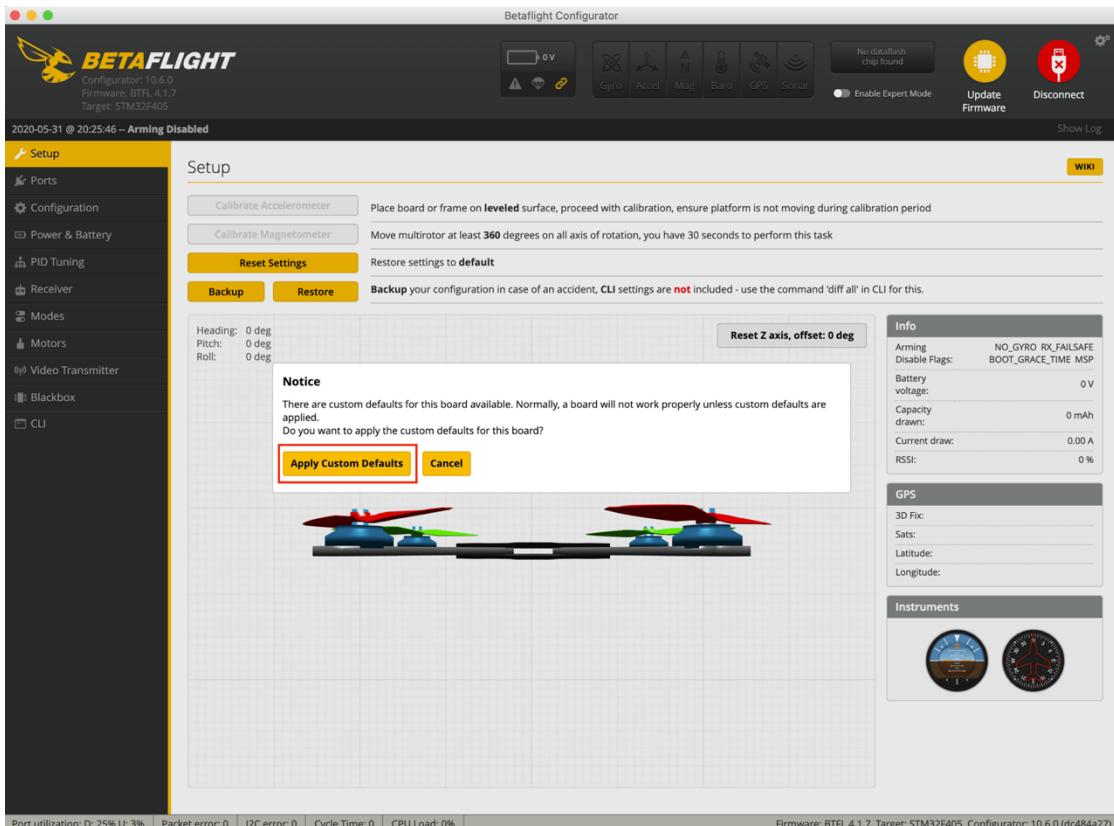
❖ Click the Flash Firmware button.



# Updating Betaflight to the latest version continued...



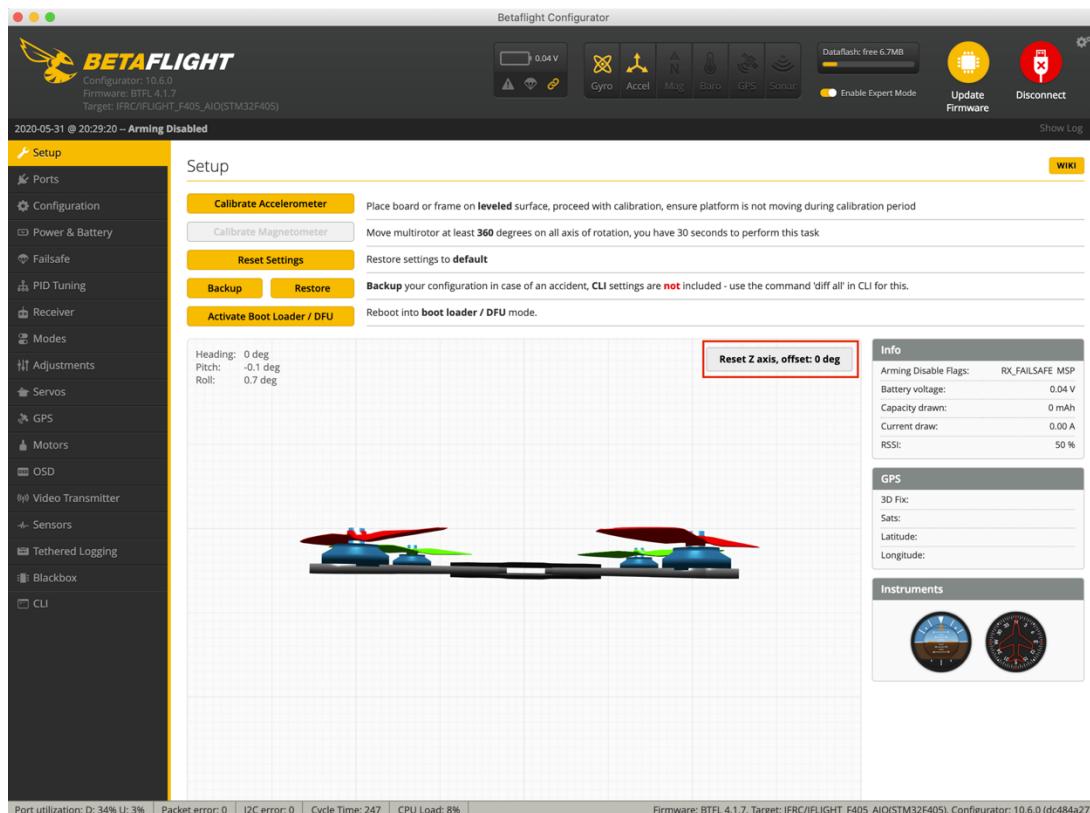
You are not done yet....



Be sure to click the “Apply Custom Defaults” button

# Betaflight setup for Titan DC2 HD (Setup page)

- ❖ Let's review each page in Betaflight to see if correctly setup. Everyone is different and setups vary. For this guide I am using my current settings for my personal Titan DC2 HD.
- ❖ Setup page: This is probably the most useful and overlooked screens in Betaflight. for example if you cannot figure out why it won't arm, come here while connected and check the "Arming Disable Flags" on the right here. But right now we have two important tasks to perform.
- ❖ First, Use the Reset the Z axis button and tilt etc the quad, does it move the same way on screen as in real life? If not we will later at the Config BF screen need to set the Yaw axis value (hint might need -90).
- ❖ Second, is it level? If it is and looking good stop here, but if not you will need to find the most level spot near your PC. Use a level gauge or a smartphone app to find the best spot and put your quad there. Then hit the calibrate Accelerometer button.

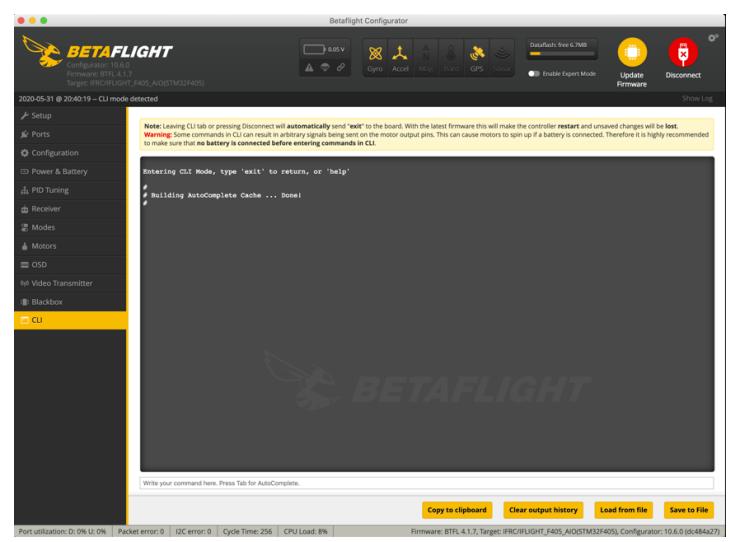
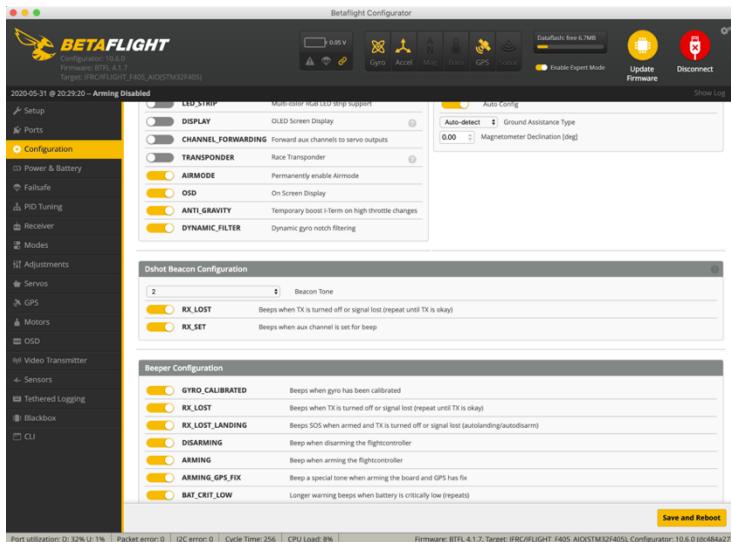
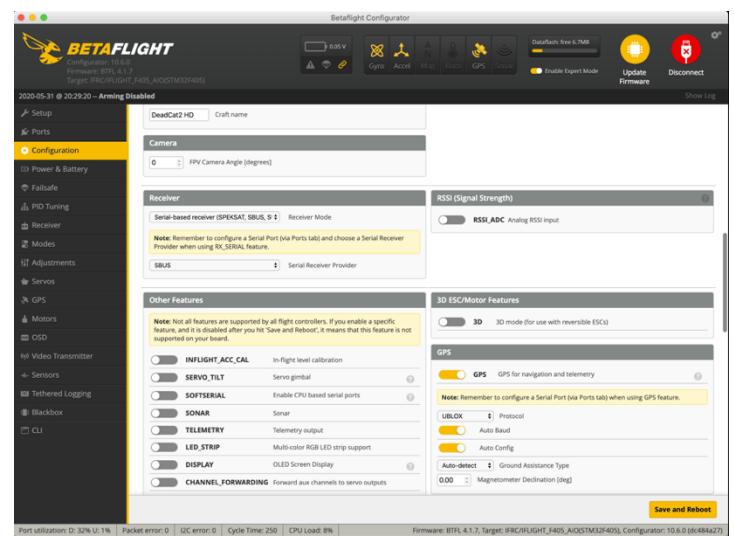
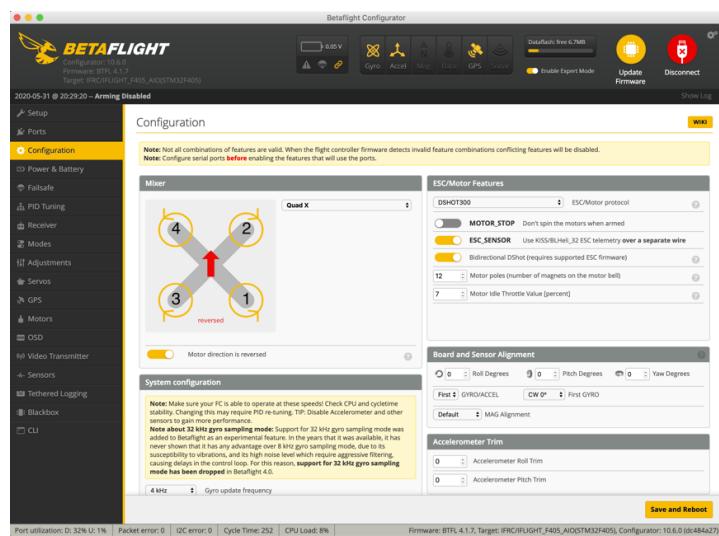


# Betaflight setup for Titan DC2 HD (Ports page)

Identifier	Configuration/MSP	Serial Rx	Telemetry Output	Sensor Input	Peripherals
USB VCP	115200	Off	Disabled	Disabled	Disabled
UART1	115200	Off	Disabled	Disabled	Disabled
UART2	115200	On	Disabled	Disabled	Disabled
UART3	115200	Off	Disabled	Disabled	Disabled
UART4	115200	Off	Disabled	ESC	Disabled
UART6	115200	Off	Disabled	GPS	Disabled

- ❖ Verify you are setup like this if using the DJI transmitter:
- ❖ Serial Rx switch is set for **UART1**.
- ❖ MSP switch is set for **UART2** (serial connection to Air Unit but as a master serial Port or MSP).
- ❖ ESC Sensor Input can set for **UART4** (optional).

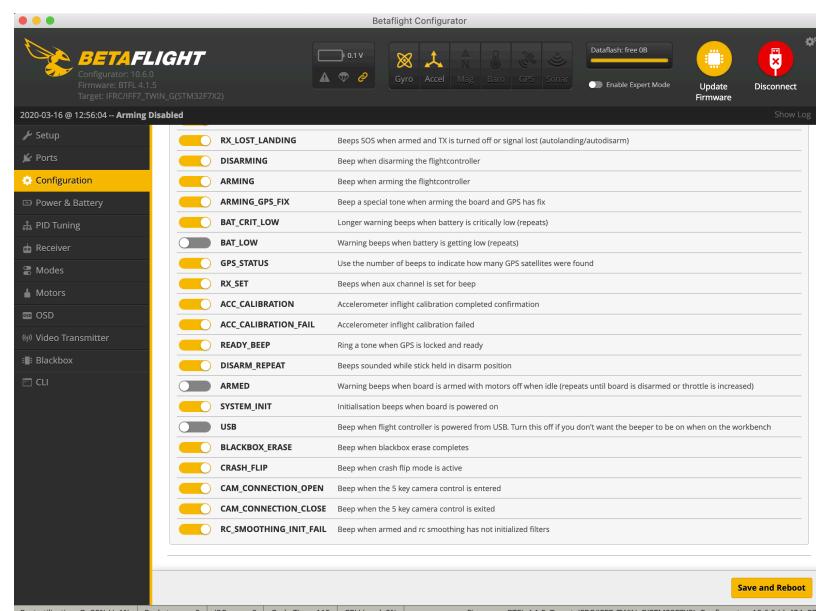
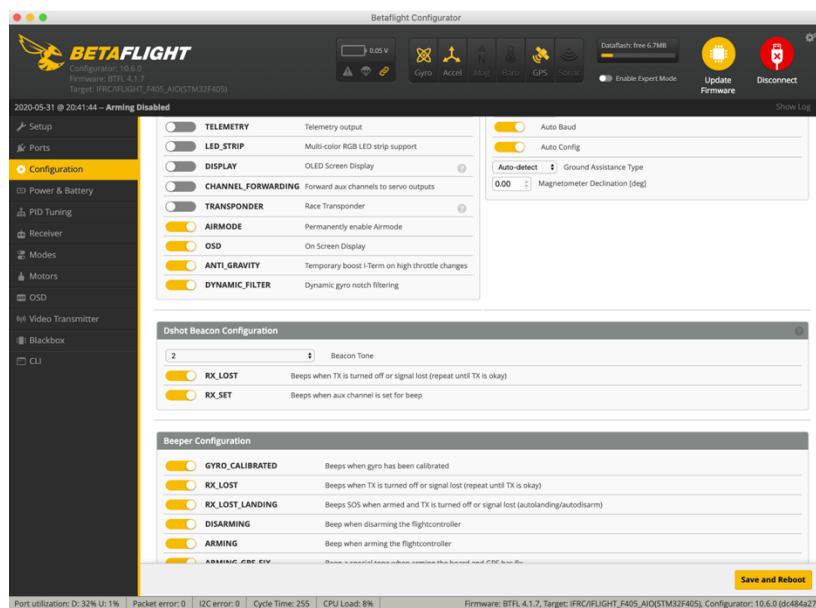
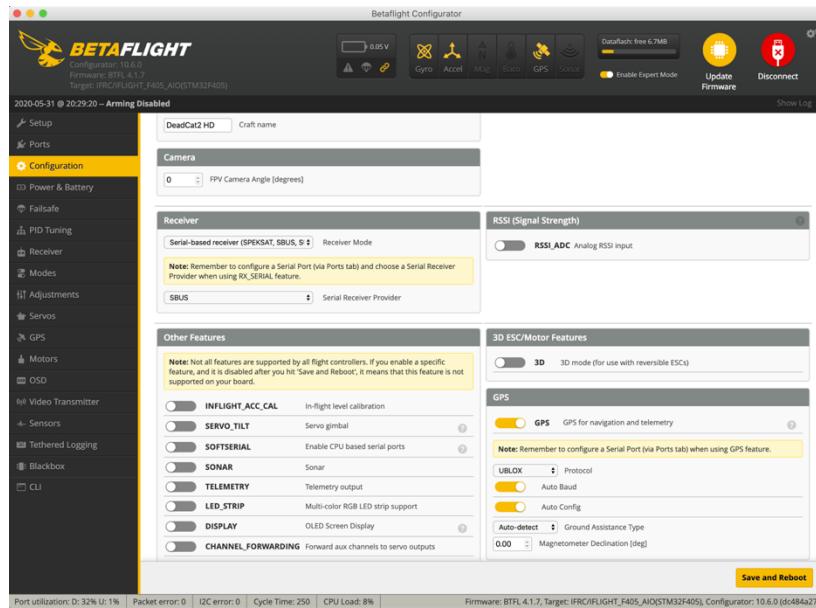
# Betaflight setup for Titan DC2 HD (Config page(s))



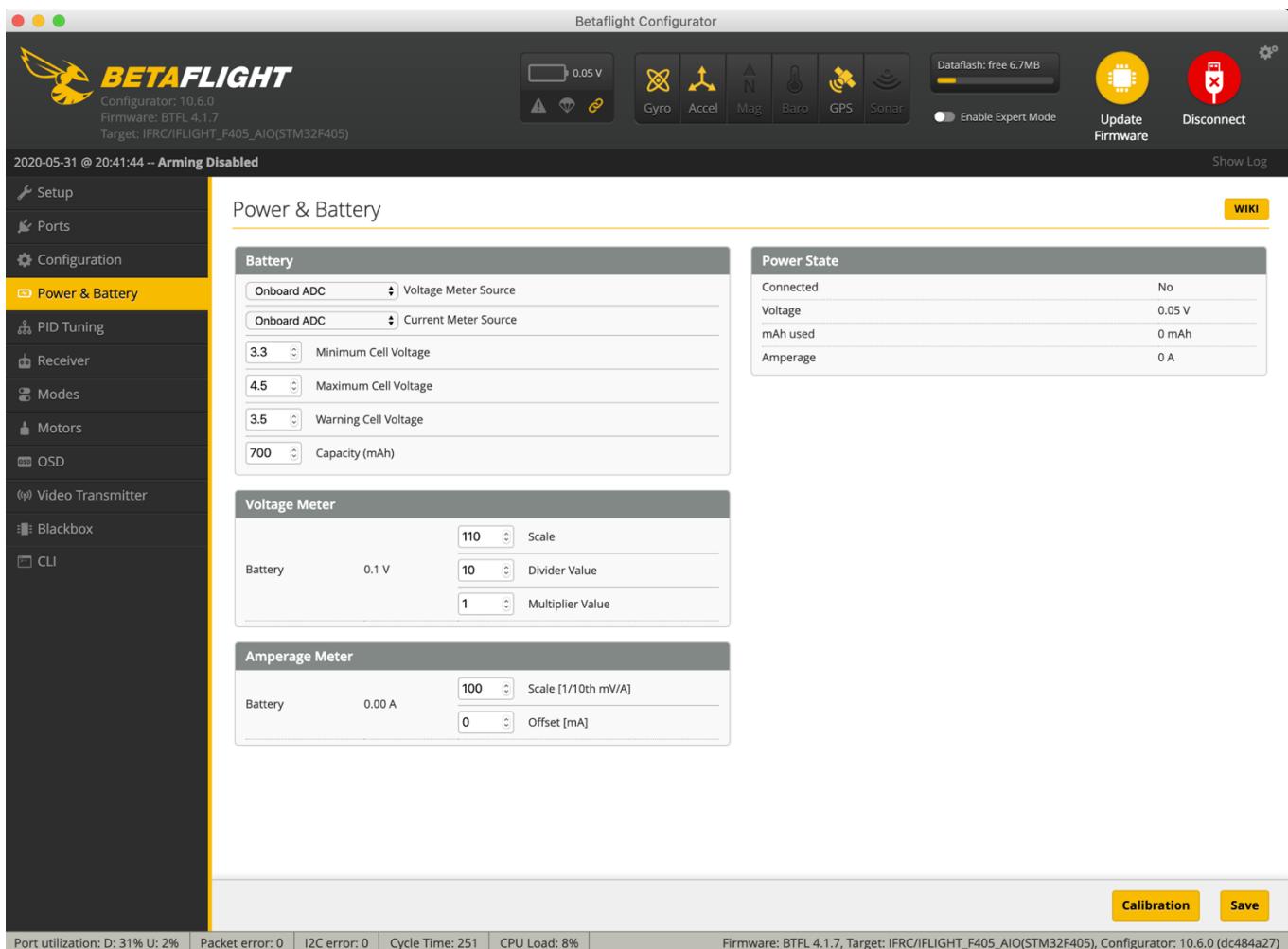
- ❖ Lot's of stuff here: check that the motor direction switch is set to **Reversed**.
- ❖ ESC Motor Features: **DSHOT300** is selected, **ESC Sensor** and **BiDirectional Dshot** switches are all set to On. Motor poles should be set to **12**.
- ❖ If on the setup page the quad didn't tilt the same way moved it, you can adjust it here (set **Yaw Degrees**).
- ❖ As part of the config page when I get to the Sbus setting, for now, a CLI command must be set, got othe CLI page, “**Set sbus\_baud\_fast = on**”. And then “**save**”.
- ❖ Later you should check to see if protocol is set right in your Goggles. On goggles, Go to **Menu, Settings, Device, Protocol**. Make sure it says “**SBUS BAUD FAST**”.

# Betaflight setup for Titan DC2 HD (Config pages continued)

- ❖ Turn off soft serial if it is set
- ❖ RX\_Lost is optional.
- ❖ But set switch RX\_Set to on, we have Dshot so we can use the motors to provide a beep. Useful to tell if transmitter is communicating (make it beep, better than the arm switch) and in lost craft recovery.
- ❖ I turn off Bat Low, as you cannot hear it while flying. Bat Critical is on so if after landing the battery is very low and needs a charge soon so it doesn't go below the voltage one can recharge from.

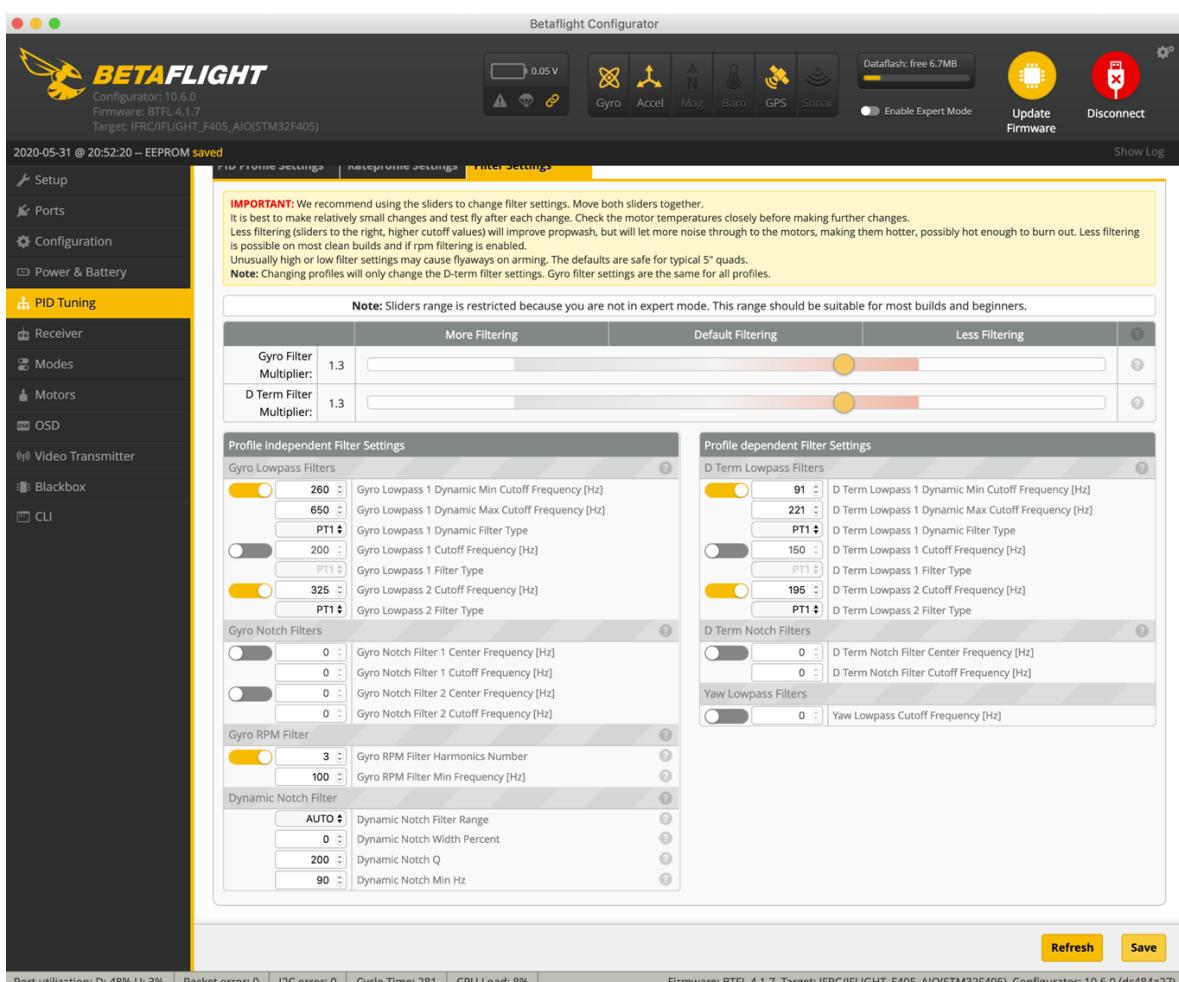
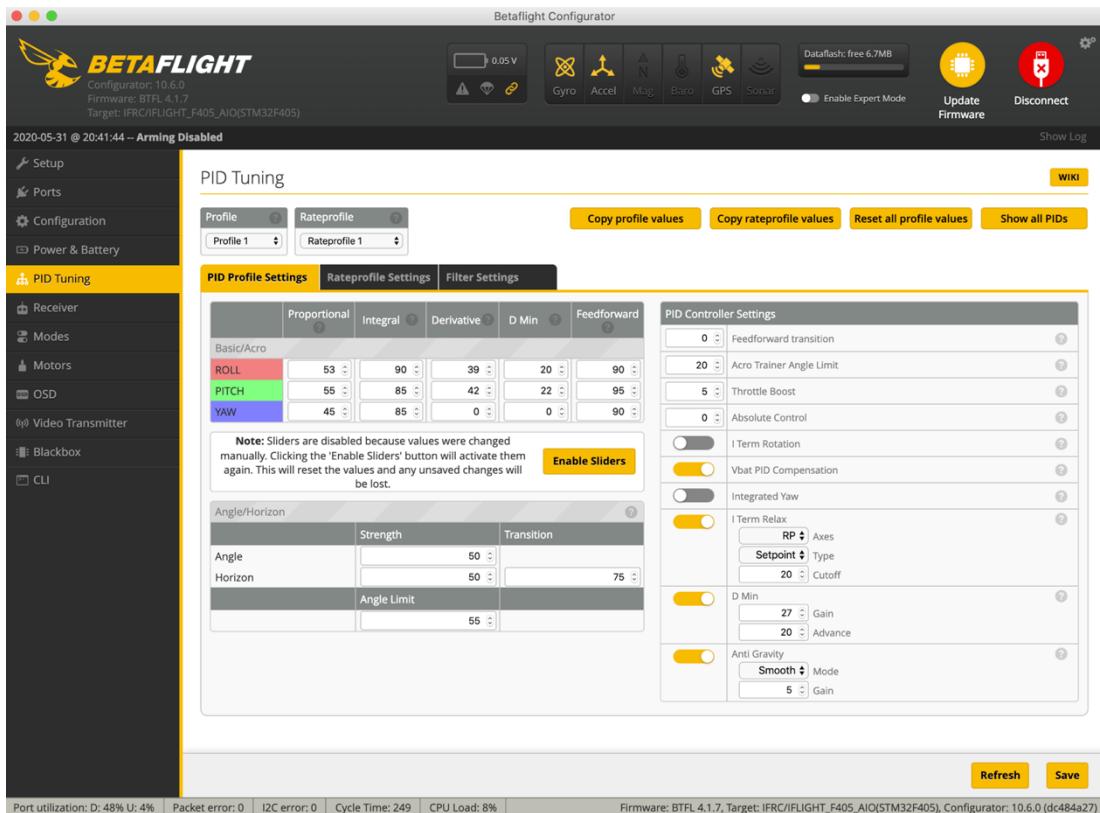


# Betaflight setup for Titan DC2 HD (Power & Battery page)



- ❖ Defaults are fine for the Titan DC2 HD.
- ❖ You can now calibrate your power (need Digital Multimeter) but for now ignore unless there is a problem.

# Betaflight setup for Titan DC2 HD (PID Tuning page)



# Betaflight setup for Titan DC2 HD (Receiver page)

The screenshot shows the Betaflight Configurator interface for the Receiver page. The left sidebar includes links for Setup, Ports, Configuration, Power & Battery, PID Tuning, Receiver (which is selected and highlighted in yellow), Modes, Motors, OSD, Video Transmitter, Blackbox, and CLI. The top bar displays battery level (11.57 V), sensor status (Gyro, Accel, Mag, Baro, GPS, Sonar), Dataflash usage (free 0B), and connection status (Update Firmware, Disconnect). A message at the top states "2020-03-16 @ 15:07:44 -- Arming Disabled".

The main content area is titled "Receiver" and contains a note about reading the receiver chapter of the documentation. It also includes an "IMPORTANT" section about failsafe configuration. Below this, there are two main sections: "Channel Map" and "RSSI Channel". The "Channel Map" section shows the current mapping of channels, with "AETR1234" assigned to the first channel. The "RSSI Channel" section shows the RSSI threshold settings for stick low and high. The "RC Deadband" section shows the deadband values for roll, pitch, yaw, and 3D throttle. The "RC Smoothing" section allows configuration of filter type, channels smoothed, input cutoff, and derivative types. At the bottom right are "Refresh" and "Save" buttons.

Roll [A]	1501
Pitch [E]	1492
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

Port utilization: D: 39% U: 3% | Packet error: 0 | I2C error: 0 | Cycle Time: 129 | CPU Load: 12% | Firmware: BTFL 4.1.5, Target: IFRC/IFF7\_TWIN\_G(STM32F7X2), Configurator: 10.6.0 (dc484a27)

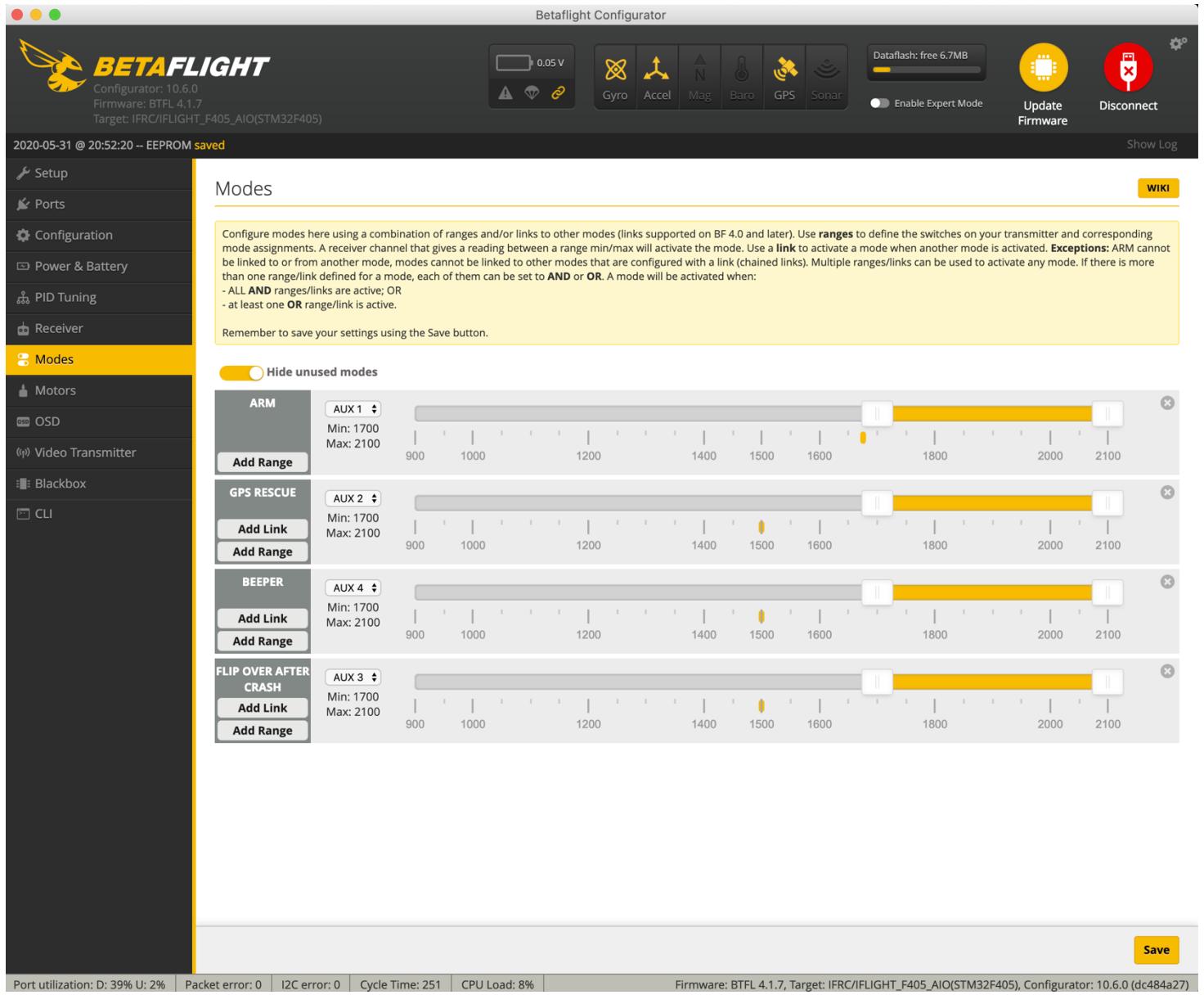
- ❖ Connect your Titan DC2 HD to battery, power up your goggles and DJI Transmitter.
- ❖ With props off the Titan DC2 HD and connected to transmitter as well as betaflight, verify the controls. Does the throttle work the correct control? Same for the rest and do the switches function and move the correct bars?
- ❖ If the controls do not respond correctly you may need to change the setting that shows something different to “**AETR1234**” if using the DJI transmitter (Jumper T16 as well).

# Betaflight setup for Titan DC2 HD (Modes page)



- ❖ Your Titan DC2 HD probably came configured with just one control that you can use (arm on SA). Here I show a much more useful setup for the Modes (Aux Switches SA-SD). First is what switch does what and following that is the modes screen and the #aux settings that you can paste and run in the CLI (don't forget to save) from my settings shown here
- ❖ Standard convention for transmitters is all switches should be in up or the forward position which is off when you power on (or off) the transmitter, this is sometimes called the safe position.
- ❖ Your three position switches SA, SB, SC, SD respond to their settings in the betaflight firmware in your Titan DC2 HD which has been set as follows:
- ❖ Switch A (**SA**) is your **Arm switch**, move to the bottom position to arm the Cinbee. Props will spin if in Air mode at this point.
- ❖ Switch B (**SB**) is GPS Recovery (will add instructions on adding GPS)
- ❖ Switch C (**SC**) is **Crash Recovery Arming mode** (a mouthful so its also known as turtle mode or turtle recovery mode. To use you must first disarm (SB is all the way up) then arm the Turtle (SC all the way down). Use your sticks to flip back over (see youtube videos on this subject to learn to use properly). Disarm Turtle Mode (SC all the way up). Now arm your DC2 (SB all the way up) and fly home 😊 .
- ❖ Switch D (**SD**) is your **Beeper** that you enabled on the Config page, move switch SD down to the bottom position to use the motors to make sounds. Useful to confirm your transmitter is live as well as aid in lost craft recovery. Status beeps too.

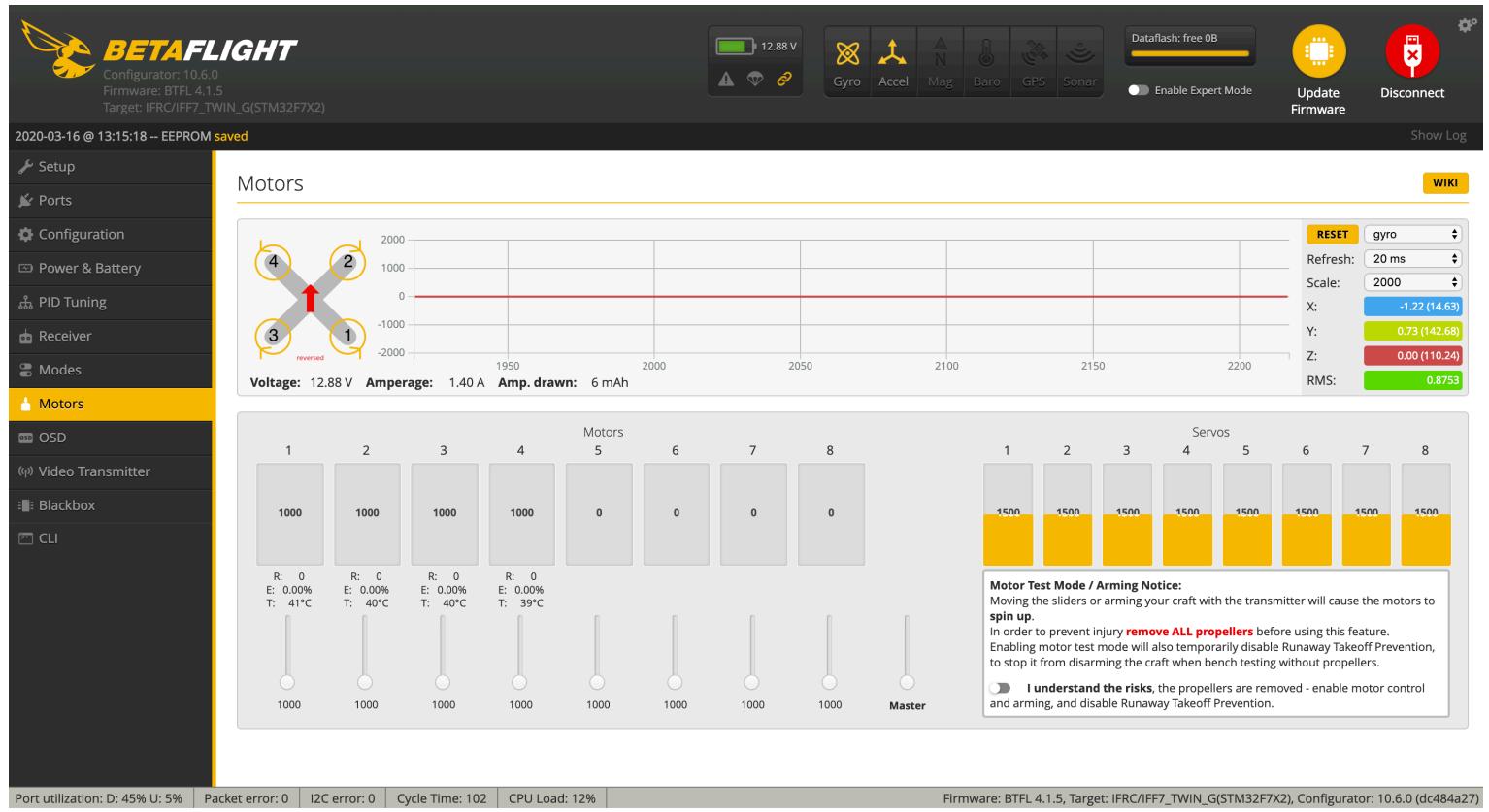
# Betaflight setup for Titan DC2 HD (Modes page continued)



- ❖ Copy and paste the following #Aux settings to set the modes this way, paste into the CLI, hit enter and don't forget to click **save** button after.
- ❖ Or just use the Betaflight GUI 😊 to setup.

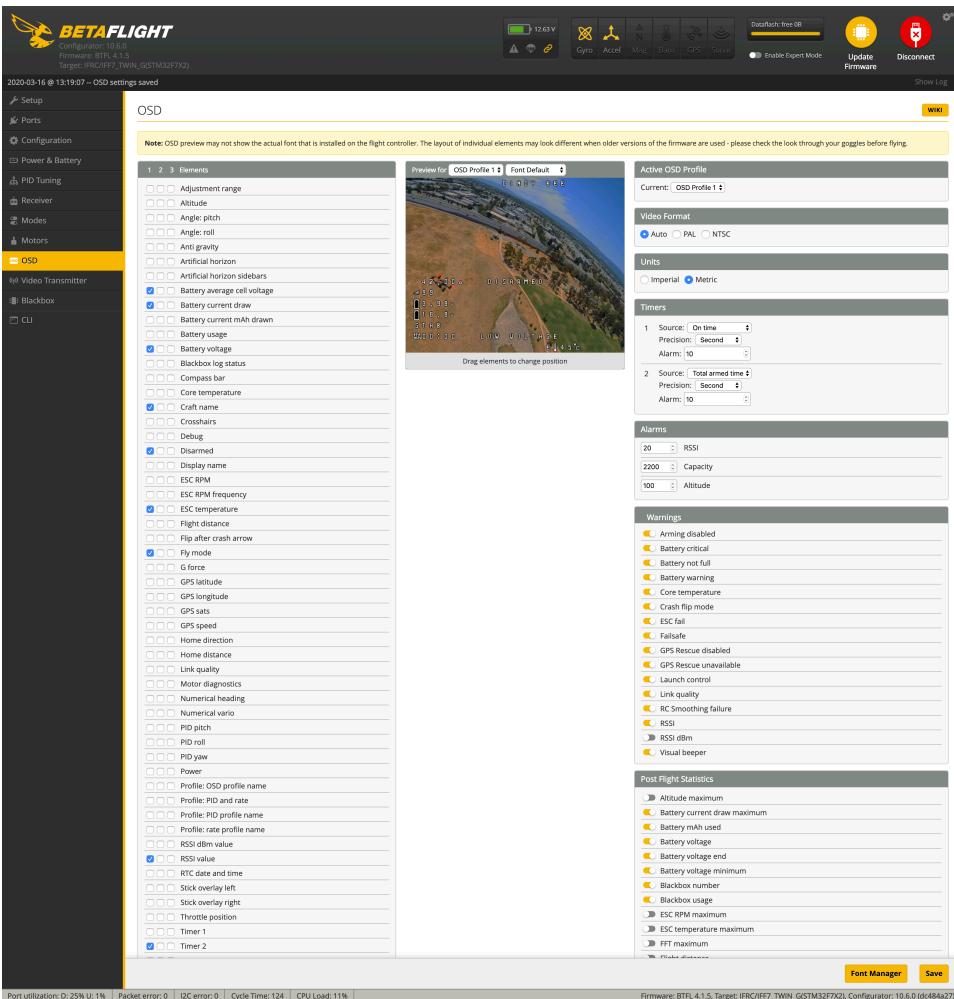
```
# aux
aux 0 0 0 1700 2100 0 0
aux 1 46 1 1700 2100 0 0
aux 2 13 3 1700 2100 0 0
aux 3 35 2 1700 2100 0 0
```

# Betaflight setup for Titan DC2 HD (Motors page)



- ❖ **Props off!** or *Fingers off!* You have been warned lol. That's why the big message and a switch on this page. (flip that when stuck in MSP arming flag issue too)
- ❖ Note the direction shown for the motors and spin them slowly (just enough to spin) and verify each motor is spinning in the correct direction. If not, go back to BLHeli32 and correct (remember that setting?) then return here and test to verify.
- ❖ **DO NOT REV THE MOTORS!** Do not run up above 10-20% as you do NOT have the resistance from the props and the motors will quickly overheat and burn up.

# Betaflight setup for Titan DC2 HD (OSD page)



- ❖ Cut & Paste these to the CLI and then Save to quickly bring up these settings. Then edit and move around to your liking.

```
set osd_warn_rssi = ON
set osd_warn_link_quality = ON
set osd_vbat_pos = 2240
set osd_rssi_pos = 2400
set osd_link_quality_pos = 2272
set osd_rssi_dbm_pos = 119
set osd_tim_1_pos = 439
set osd_tim_2_pos = 2176
set osd_flymode_pos = 2304
set osd_throttle_pos = 342
set osd_vtx_channel_pos = 309
set osd_current_pos = 2368
set osd_mah_drawn_pos = 2336
set osd_craft_name_pos = 2060
set osd_gps_speed_pos = 2080
set osd_gps_lon_pos = 2464
set osd_gps_lat_pos = 2432
set osd_gps_sats_pos = 2048
set osd_home_dir_pos = 2094
set osd_home_dist_pos = 2144
set osd_altitude_pos = 2112
set osd_warnings_pos = 14794
set osd_avg_cell_voltage_pos = 2208
set osd_battery_usage_pos = 2537
set osd_disarmed_pos = 2346
set osd_esc_tmp_pos = 352
set osd_stat_endbatt = ON
set osd_stat_battery = ON
set osd_stat_min_rssi = OFF
set osd_stat_total_time = ON
```

## Titan DC2 HD setup - wrap up

- ❖ Go back to the CLI in Betaflight and do a Diff again (you will thank me later).
- ❖ Save that Diff to a file! It is your new recovery point, give it a unique name.
- ❖ This guide is a living document and will be updated over time...



## Diff All of the Titan DC2 HD used in this guide:

```
# name: DeadCat2 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 -TELEMETRY
feature -LED_STRIP
feature -DISPLAY
feature GPS
feature ESC_SENSOR

# beeper
beeper -ARMED
beeper -ON_USB

# beacon
beacon RX_LOST
beacon RX_SET

# serial
serial 0 1 115200 57600 0 115200
serial 3 1024 115200 57600 0 115200
serial 5 2 115200 57600 0 115200

# aux
aux 0 0 0 1700 2100 0 0
```

```
aux 1 46 1 1700 2100 0 0
aux 2 13 3 1700 2100 0 0
aux 3 35 2 1700 2100 0 0

# master
set gyro_sync_denom = 2
set gyro_lowpass2_hz = 325
set dyn_notch_range = AUTO
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 = 82,-59,-684
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 airmode_start_throttle_percent = 20
set dshot_idle_value = 700
set dshot_bidir = ON
set motor_pwm_protocol = DSHOT300
set motor_poles = 12
set failsafe_delay = 3
set failsafe_off_delay = 15
set failsafe_throttle = 1650
set failsafe_procedure = AUTO-LAND
set bat_capacity = 700
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 gps_provider = UBLOX
set gps_auto_baud = ON
set gps_rescue_allow_arming_without_fix = ON
set osd_warn_rssi = ON
set osd_warn_link_quality = ON
set osd_vbat_pos = 2240
set osd_rssi_pos = 2400
set osd_link_quality_pos = 2272
set osd_rssi_dbm_pos = 119
set osd_tim_1_pos = 439
set osd_tim_2_pos = 2176
set osd_flymode_pos = 2304
set osd_throttle_pos = 342
set osd_vtx_channel_pos = 309
set osd_current_pos = 2368
set osd_mah_drawn_pos = 2336
set osd_craft_name_pos = 2060
```

```
set osd_gps_speed_pos = 2080
set osd_gps_lon_pos = 2464
set osd_gps_lat_pos = 2432
set osd_gps_sats_pos = 2048
set osd_home_dir_pos = 2094
set osd_home_dist_pos = 2144
set osd_altitude_pos = 2112
set osd_warnings_pos = 14794
set osd_avg_cell_voltage_pos = 2208
set osd_battery_usage_pos = 2537
set osd_disarmed_pos = 2346
set osd_esc_tmp_pos = 352
set osd_stat_endbatt = ON
set osd_stat_battery = ON
set osd_stat_min_rssi = OFF
set osd_stat_total_time = ON
set max7456_spi_bus = 0
set name = DeadCat2 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 p_pitch = 55
set i_pitch = 85
set d_pitch = 42
set p_roll = 53
set i_roll = 90
set d_roll = 39
set p_yaw = 45
set i_yaw = 85
```

rateprofile 0

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