CONTENT

This user manual is for Lite brushed V2 board. If you have the original black board, please use the other manual in our website.

1. INTRODUCTION

BETAFPV Lite brushed V2 FC is a brushed flight controller with Silverware firmware. It is with build-in Bayang protocol receiver, and it also supports external receiver with SBUS protocol and DSMX protocol. For fans of Silverware firmware, now you could try it with brushled drone like Beta65S. The stock firmware is based on NFE_Silverware, which is used on popular ZER0 board. With an ingenious design of build-in OSD, it's convenient for users to observe the flying status and change the configuration like PID, rate etc. Also, the board build in 25mW VTX. You could change the VTX channels via OSD menu. In one word, this is a high integrated brushed FC board for both FPV newbees and experts.

2.SPECIFICATION

Adopting updated and improved LiteSilverware_f042_1S_brushed_V1.0 firmware.
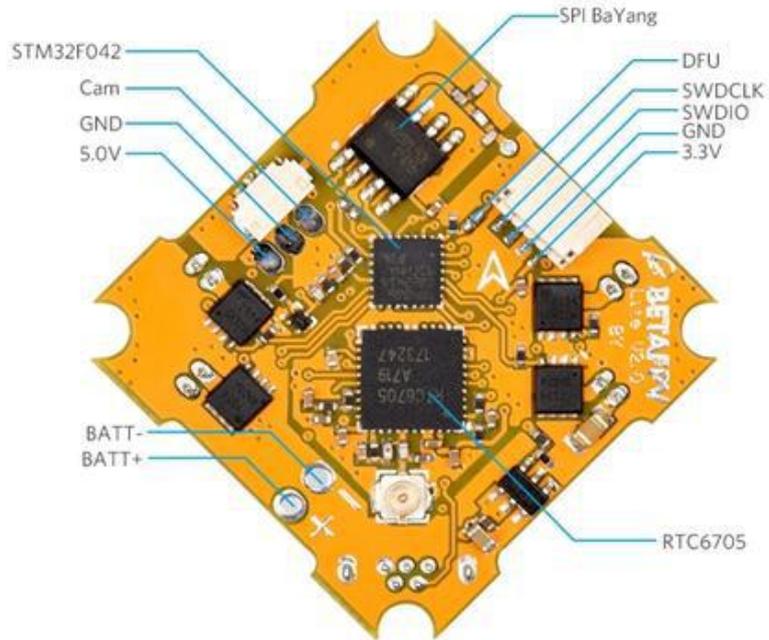
SPECIFICATIONS OF FC

- CPU: STM32F042G6U6

- Six-Axis: MPU6050

- Size: 26mm x 26mm, whoop mounting pattern

- OSD：BETAFPV LiteOSD

- OSD firmware：LiteOSD_f042_1s_brushed_v1.0.HEX

- Build-in Receiver: Bayang protocol

- Supported Receiver:SBUS protocol or DSMX protocol

- USB Port for firmware upgrade in DFU mode

- 2 controllable RGB LEDs

- Integrate an altitude sensor (altitude hold function is NOT available now)

- FC Firmware：LiteSilverware_f042_1s_brushed_v1.0.HEX

SPECIFICATIONS OF VTX

- Built-in 25mW video transmitter

- Controllable via OSD menu to change the brand and channels

- Camera connector JST0.8, comapitable with C01 Pro camera or Newbeedrone camera.

3.DIAGRAM

TOP FRONT ⬆

- SPI BaYang
- STM32F042
- Cam
- GND
- 5.0V
- DFU
- SWDCLK
- SWDIO
- GND
- 3.3V
- BATT-
- BATT+
- RTC6705

BOTTOM FRONT ⬆

- FC KEY
- GND
- RX1(SBUS/DSMX)
- TX1
- 5V
- Power LED(Red)
- Receiver LED(Blue)
- Motor 2
- Motor 4
- RGB LED
- RGB LED
- Motor 1
- Motor 3
- VTX LED(Pink)
- US/EU VTX switch pad
- USB Port

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4.BASIC FUNCTION

- Bulit-in 25mW video transmitter and just plug in a camera and play

- Includes the OSD menu. Supports PID or Rate tuning, vtx frequency changing via OSD menu

- Build-in receiver with Bayang protocol and support for external receiver with SBUS protocol or DSMX protocol

- Supports various flying mode: Acromode / Levelmode / Racemode_Angle / Racemode_Horizon / Horizonmode

- Supports firmaware upgrade via USB port in DFU mode. Easy for pilot to update the new firmware

- Change the color of 2 RBG LEDs via OSD menu, make your drone to be colorful

5.RECEIVER CONNECTION AND BINDING METHOD

The FC integrates with Bayang protocol receiver, and also supports external receivers both SBUS and DSMX protocol. Users could switch receiver communication protocol directly via FC button.The status is indicated with 3 LED flashes. Receiver communication protocol will be saved automatically when you power off, it will keep the same when you power up again.

For more details, kindly check the picture below.

LED	Status	Description
Power LED (Red)	Solid	Power On
Receiver LED (Blue)	Flash quickly	Binding status
	Off	Binded and connected success
	Flash slow	Connection discontinue

5. 1 Bulit-in Bayang Receiver

Lite 1S brushed FC is with build-in Bayang protocol receiver. The communication protocol should be set as Bayang protocol when using built-in Bayang receiver, as follows:

- Press the FC key on the bottom of the FC and plug the battery at the same time
- Release the FC key after 4 seconds
- Once "Bayang" shown on OSD information interface, FC will receive the built-in Bayang receiver data

How to bind:

- Please ensure that the the receiver communication protocol is in Bayang protocol
- Power on the FC board and the Built-in Bayang receiver will enter binding status auto
- Make your radio transmitter enter bind status
- Once binding successfully, receiver LED will off

5. 2 SBUS Protocol

Supports SBUS protocol, including Frsky XM/ XM+ receiver, Futaba receiver. Here is the diagram with SBUS protocol receiver:

The communication protocol should be set as SBUS protocol when using the external SBUS protocol receiver, as follows:

- Press the FC button on the bottom of the FC and plug the battery at the same time
- Release the button and press the FC button again within 4 seconds
- Once "SBUS" shown on OSD information interface, FC will receive the external receiver data via SBUS protocol

5. 3 DSMX Protocol

Supports DSMX protocol. Here is the diagram with DSMX protocol receiver:

The communication protocol should be set as DSMX protocol when using DSMX receiver, as follows:

- Press the FC button on the bottom of the FC and plug the battery at the same time

- Release the button and press the FC button TWICE within 4 seconds

- Once "DSMX" shown on OSD information interface, FC will receive the external receiver data via DSMX protocol

6.OSD MENU

AETR is the default channel mapping of Lite brushed FC.

6.1 How to Enter OSD Menu

The method of entering OSD Menu on Lite Brushed FC is same as Betaflight. Make sure the drone is disarmed when entering OSD Menu on Lite 1S Brushless FC.

-Use Mode 2 (American Mode) as example-

Note: The left throttle stick should be at the middle position and then pull left.

Note: AETR is the default channel mapping of Lite FC. If you can not enter the OSD menu, it might cause by unmatched channel mapping.

If you use a toy transmitter like LiteRadio 1, and also active the TOY_TX option in the OSD menu. You could enter the OSD menu when the throttle stick in the lowest positon.

6.2 How to Operate OSD Menu

By moving the cursor, you can enter sub-menu of PID, MOTO, RECEIVER and SMARTSUDIO to change the related parameters.

If the parameters are changed, you can choose the SAVE option, and then select EXIT to return, so that they will be saved and take effect.
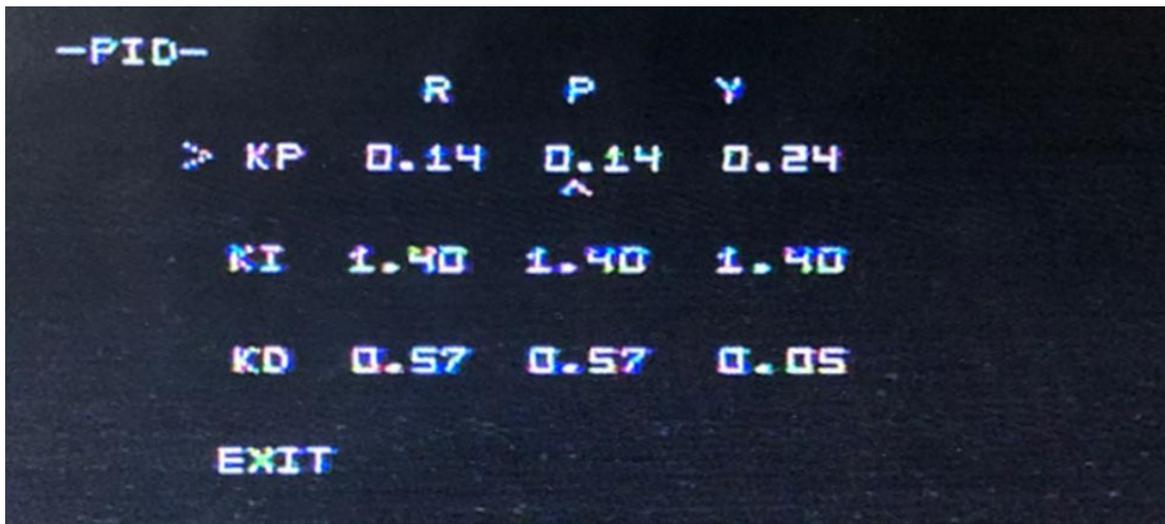

-Use Mode 2 (American Mode) as example-

6. 3 How to Tune PID

Here is the method of PID tuning

- Enter OSD menu

- Move the cursor to PID option and enter PID sub-menu, the PID for ROLL, PITCH and YAW is available for tuning.

- If you want to change the PID parameters, please choose the EXIT option to exit from PID sub-menu, then back to the OSD menu to select SAVE option, so that the parameters you changed will be saved and take effect.
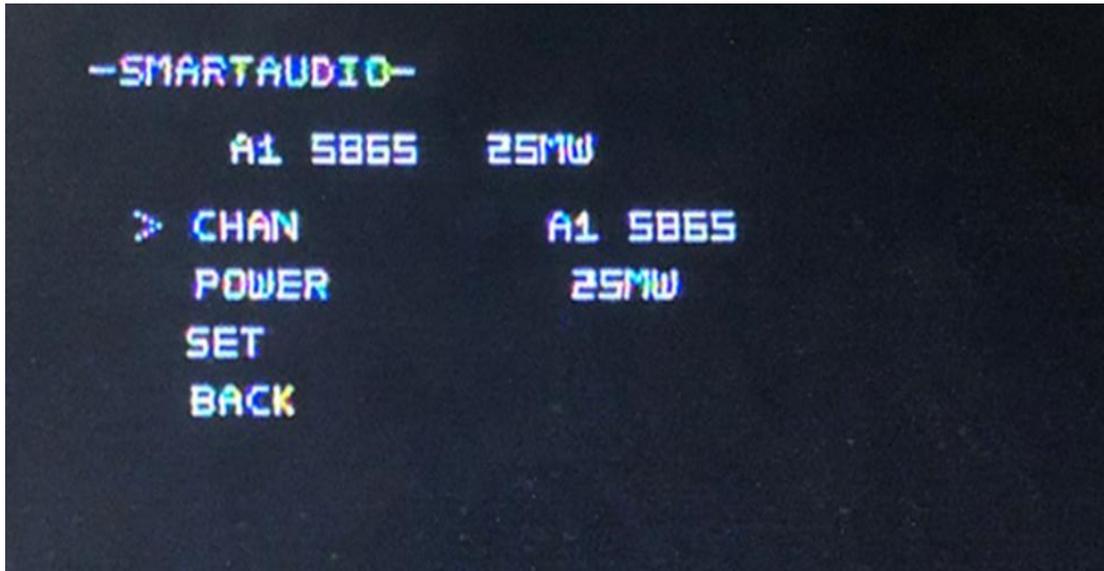

-PID menu interface-

-Use Mode two (American Mode) as example-

6.4 How to Change Frequency and Power of VTX

Lite FC built-in VTX supports 48CH frequency, from A1: 5865 to E8: 5917.

How to change:

• Enter OSD menu

• Move the cursor to SMARTAUDIO option and enter SMARTAUDIO sub-menu

• Move the cursor to CHAN to change frequency or move the cursor to POWER to change vtx power.

• When changed the parameter, SET and BACK. The changes will be saved and take effect.

-SMARTAUDIO menu interface-

-Use Mode two (American Mode) as example-

6.5 How to Change the Display Position of OSD Info on Screen

There are 32 rows on the screen, OSD info can be set to any of the 32 rows.
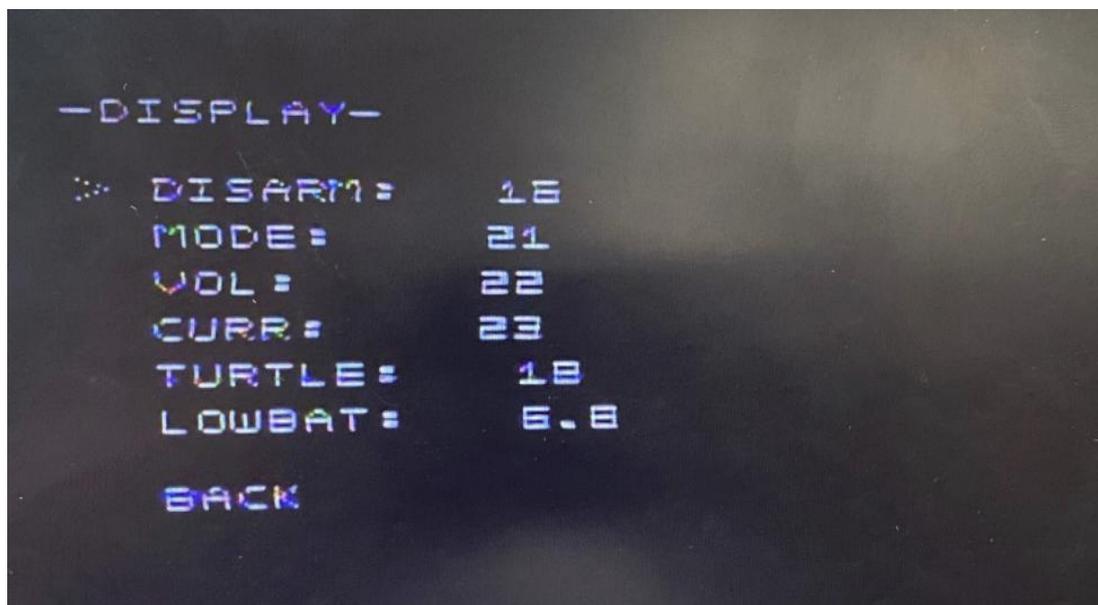
How to change the position:

• Enter Display Menu, the value in the screen refers to the position of the OSD info. For example, DISARM: 13 means that "DISARM" shows in Row 13.

• Change the value by stick. For example, if ''DISARM: 13'' is changed to ''DISARM: 14'', "DISARM" will show in Row 14. If the value is changed to 0, the text will not show on the screen.

Please note that there is an option :LOWBAT, it is for setting low voltage alarm, when the voltage is below the setting value, ''Low Voltage'' will show on the screen. This function is same with the low voltage alarm function on Betaflight.
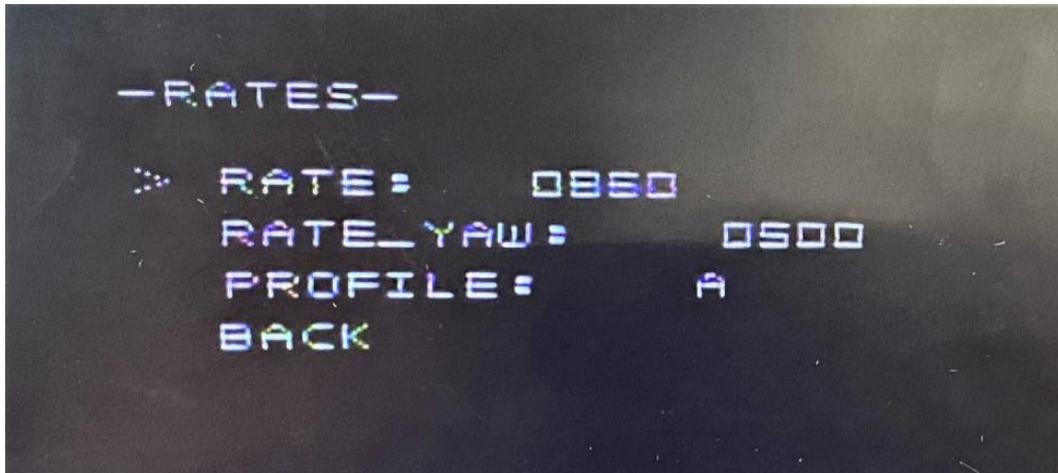
| Row 1 |
| Row2 |
| ..... |
| Row31 |
| Row32 |

6.6 How to Set Rate

The default Rate is suitable for most users, but if it is not suitable for yours, it can be changed by using Rates menu, so that you could find the most suitable Rate according

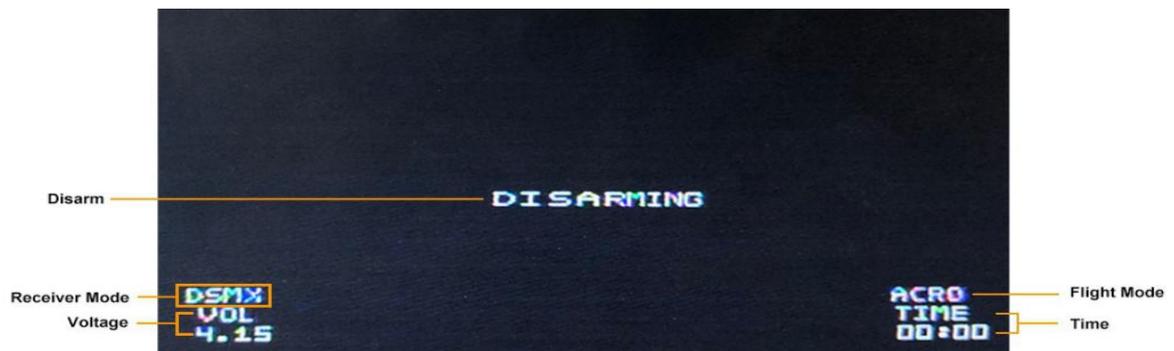to your flying habit. Please note that PROFILE is used to set the ratio of Setpoint Weight and Transition.

7.ARM & SWITCH FLIGHT MODE

7. 1 OSD Illustration

There are six parts in OSD info interface: (Use OSD info in the pic as example)

• Arm or disarm: "DISARMING" mean that the drone is disarmed. The OSD info interface will display "ARMINO" when the drone is armed.

• Receiver mode: "DSMX" refers to the receiver mode you have choosed. If you choosed the SBUS mode, "SBUS" will show on OSD info interface.

• Voltage: "VOL 4.15" refers to the voltage.

• Flight mode: "ACRO" refers to the flight mode you have choosed. If you choosed the Levelmode, the OSD info interface will display "LEVEL".

•Time: "TIME 00:00" refers to the flight time. If the drone fly about 30 seconds, the OSD info page will display "TIME 00:30"
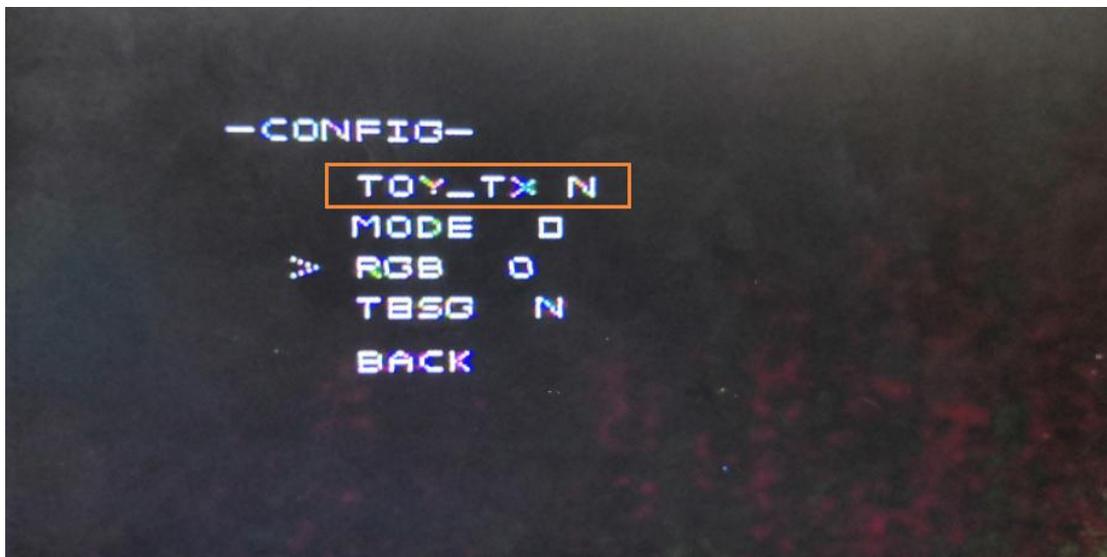

-OSD info interface-

7.2 Armed & Disarm

If you use a radio transmitter with full 7 channels, you could use the default channel 5 to arm and disarm the drone. It is the same as Betaflight firmware.

If you use a toy radio transmitter like LiteRadio 1 below, there is no additional channels. So you could active the toy transmitter status. No arming needed, just throttle up and the motors spin.

Enter the OSD menu and go to the Config page. Set the TOY_TX to Y. Do not forget to save the config.

7.3 Flight Mode

Lite Brushed FC V2 still uses the channel combination to arm and switch flight mode.

- Disarm: CH5 is AUX Low

- Arm: CH5 is AUX High

- Turtle：CH6 is AUX Low, CH7 is AUX High

- Acromode：CH6 is AUX Low, CH7 is AUX Low

- Levelmode：CH6 is AUX High, CH7 is AUX Low，CH8 is AUX Low

- Racemode_angle：CH6 is AUX High, CH7 is AUX High, CH8 is AUX LOW

- Racemode_horizon: CH6 is AUX High, CH7 is AUX High, CH8 is AUX High

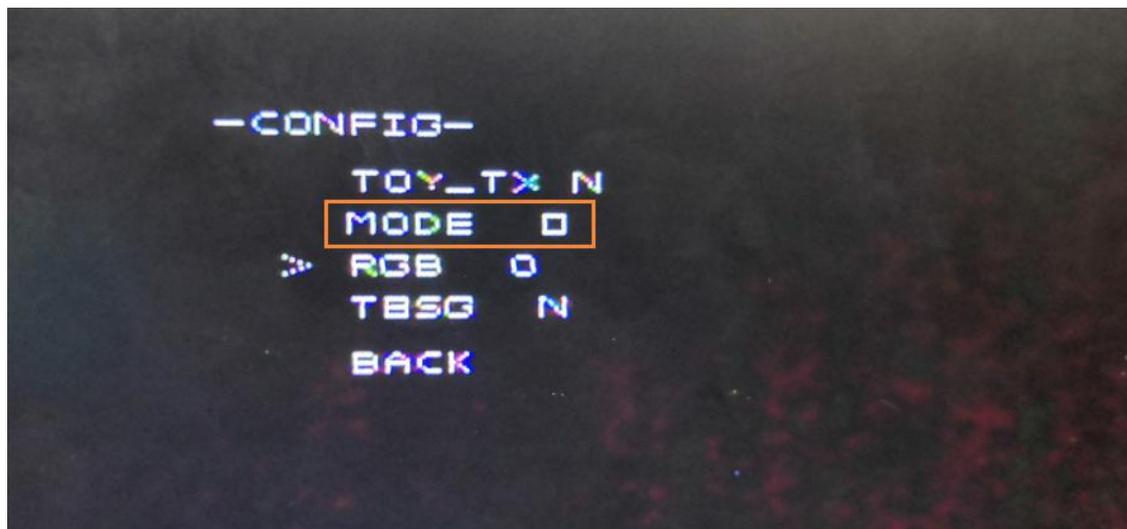- Horizonmode：CH6 is AUX Hight,CH7 is AUX Low，CH8 is AUX High

	CH5	CH6	CH7	CH8
Disarm	🟩			
arm	🟥			
Turtle		🟩	🟥	
Acromode		🟩	🟩	
Levelmode		🟥	🟩	🟩
Racemode_angle		🟥	🟥	🟩
Racemode_horizon		🟥	🟥	🟥
Horizonmode		🟥	🟩	🟥

AUX High	🟥	AUX Low	🟩	

If you use a toy radio transmitter like LiteRadio 1, there is NO additional channel 5-8, you could use the OSD menu to switch flight mode.

Enter the OSD menu and go to the Config page. Change the MODE. Do not forget to save the config.

Note: If you use a hobby radio transmitter with full channels, the changes in the OSD menu will be invalid. The FC board will follow the swithes combination above.

Value	Flight Mode
0	acro
1	level
2	race_a (racemode with angle behavior on roll ais)
3	race_h (racemode with horizon behavior on roll axis)
4	horizon

7.4 Features of Different Flight Mode

- Disarm: The motors are disabled and will not be allowed to run.

- Arm: The motors and controls are enabled, and props will be spinning at an idle speed.

- Turtle: Used to turn the drone over when the aircraft is inverted

- Acromode: A flight mode without auto-leveling, and stick deflection corresponds to a rotational rate around input axis.

- Levelmode: A flight mode in which the maximum tilt angle is limited to 65 degrees.

- Racemode_Angle: A flight mode with levelmode behavior on roll axis and acromode behavior on pitch axis.

- Racemode_Horizon: A flight mode with horizonmode behavior on roll axis and acromode behavior on pitch axis.

- Horizonmode: A flight mode with leveling near center stick but the ability to roll or flip at full stick deflection

8.ASSEMBLY GUIDE

8.1 Recommendation

There are varied frames for building a quad with Lite brushed FC. But we highly recommend you to assemble the Lite brushed FC on Beta65S frame.

It must be installed as "props in" in default.

9.DEVELOPMENT

Contribution of bug fixes and new features is encouraged. All the source code for the flight controller and OSD is open in Github. ；

Source code of the flight controller: https://github.com/BETAFPV/LiteSilverware

Source code of the OSD: https://github.com/BETAFPV/LiteOSD

The programmer ports for the FC MCU STM32F042G6U6 and OSD MCU EFM8BB21 are showed as below.

STM32F042 is the processor of FC and a STM32 programmer is needed to flash the firmware through the SWD port (CLK, SWDIO) of the controller. We would recommend the ST-LINK or BeeLink USB Flasher.

EFM8BB21 is the processor of OSD. You need a efm8 programmer to upload the firmware through the C2 port (C2CK, C2D) of the controller. We would recommend the Silicon Lab debug adapter.