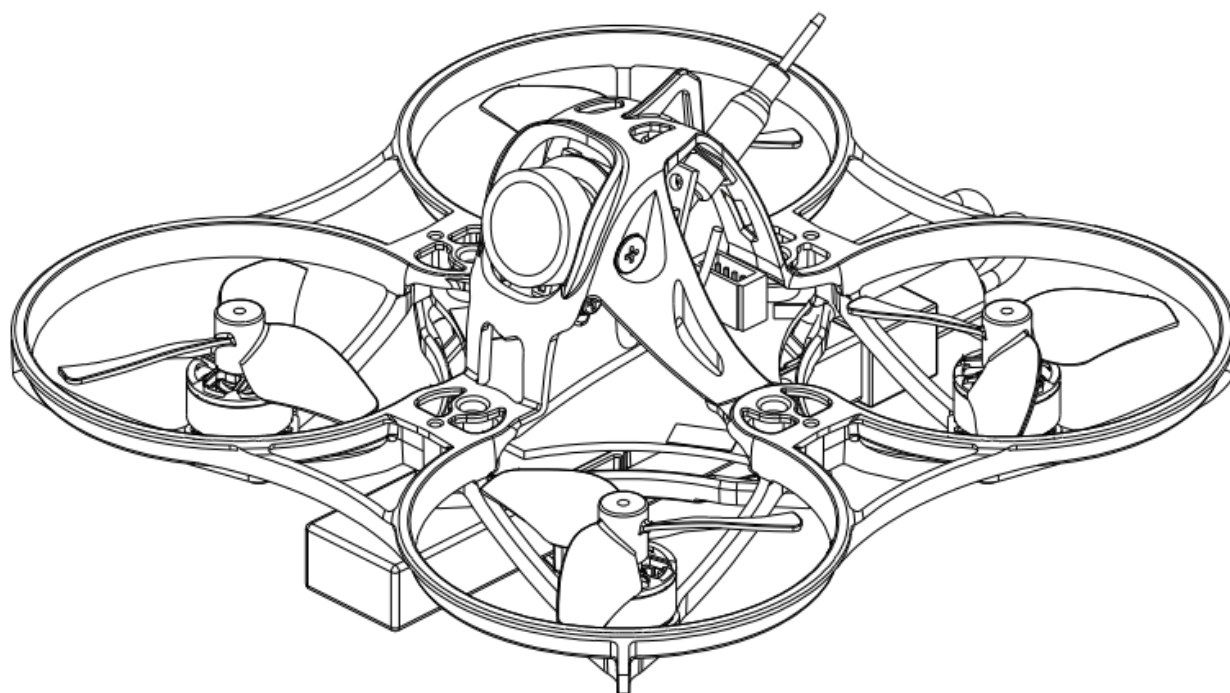




Thank you for purchasing the Tinyhawk Aero. Designed in California; made in China.

Congratulations—you are now a Tinyhawk Aero pilot.

From this moment on, you are entering the real world of FPV flight, not simply playing with an ordinary toy.

The Tinyhawk Aero is like a manual-transmission sports car—it will not make decisions for you or protect you from every mistake.

Control, judgment, and timing are entirely in your hands.

At first, it may make you nervous. You may make mistakes or even crash; but those very challenges will help you grow, step by step, into a true pilot.

Crashes are inevitable, and challenges will keep coming.

But the first time you glide smoothly through an obstacle and land precisely, you will understand the true thrill of FPV.

Keep practicing and embrace the challenge. You will discover a new world where speed, freedom, and excitement come together.

Welcome to FPV.

Now, take off.

Disclaimer

1. Please read this disclaimer carefully before using this product.
2. By using this product, you agree to this disclaimer and confirm that you have read the product documentation carefully.
3. This product is not suitable for persons under 14 years of age. Adult supervision is strongly recommended for users under 14.
4. Please read the user instructions and warnings carefully.
5. The Tinyhawk Aero is equipped with an open-source flight controller and electronic speed controller to meet FPV enthusiasts' quadcopter upgrade needs.
6. EMAX accepts no liability for damage or injury caused directly or indirectly by the use of this product.

Precautions

1. Assemble and operate this product correctly by following the instructions.
2. Before every flight, make sure the battery is sufficiently charged and all device connections are secure.
3. Fly only in a safe area away from people, animals, and objects.
4. Do not use this product in strong electromagnetic environments.
5. Do not use this product in adverse conditions such as strong wind, rain, lightning, or snow.
6. Do not use this product if you have a physical or mental illness, feel dizzy or fatigued, or are under the influence of alcohol or medication.
7. Strictly comply with local laws and regulations, and always fly safely.
8. Do not modify the product or use parts and accessories that are not approved by EMAX.

Usage Recommendations:

EMAX provides the Tinyhawk Aero BNF User Manual. To begin flying quickly, read Chapter 1, "Tinyhawk Aero Quick Start Guide." For complete product information, read the remaining chapters of this manual carefully.

Support

Visit emax-usa.com or emaxmodel.com for updates or technical support.

Table of Contents

Tinyhawk Aero BNF Product Specifications	6
Tinyhawk Aero Analog Freestyle BNF Package Contents	7
Tinyhawk Aero Analog Racing BNF Package Contents	7
Tinyhawk Aero Analog Performance BNF Package Contents	7
1. Tinyhawk Aero Quick Start Guide	7
1.1 Preparation	8
1.1.1 Charging the Devices	8
1.1.2 Selecting a Flying Site	8
1.2 Preparing to Fly (Learning the Equipment and Matching/Binding)	9
1.2.1 Flight Modes	9
1.2.2 FPV Flying Modes	9
1.2.3 Before Flight (Powering On the Equipment)	10
1.2.4 Matching the Drone and Goggles	11
1.2.5 Binding the Drone and Transmitter	12
1.3 Flight Controls	13
1.3.1 Arming the Motors	13
1.3.2 Flying with the Control Sticks	13
1.3.3 Landing and Powering Off	15
2. Tinyhawk Aero	16
2.1 Tinyhawk Aero Diagram	16
2.2 Tinyhawk Aero Propellers	16
2.3 Tinyhawk Aero Camera	17
2.4 Tinyhawk Aero AIO Flight Controller	17
2.4.1 UART ELRS (2.4 GHz) Receiver	18
2.4.2 Tinyhawk Aero VTX	18
2.5 LED Indicators	19
2.5.1 Flight Controller LED Status	19
2.5.2 VTX LED Status	19
3. Tinyhawk Aero Advanced Functions and Operations	20
3.1 Binding the Tinyhawk Aero to a Transmitter	21
3.1.1 Transmitter Binding Method	21
3.1.2 Other Tinyhawk Aero Binding Methods	21
3.2 Calibrating the Accelerometer	21
3.3 Introduction to the PID Profile	22
3.4 Adjusting Channel Settings	22
3.5 Changing OSD Settings	23
3.6 Changing VTX Settings	23
3.6.1 Setting the VTX in Betaflight Configurator	23
3.6.2 SmartAudio (Opening the OSD Menu with the Transmitter and Changing Settings)	24
3.7 Changing the Flight Controller Binding Phrase	25
3.8 Flashing Flight Controller Firmware	25
3.9 Loading Flight Controller Configuration	27
4. Battery Safety and Precautions	28
4.1 Inspection and Emergency Response	28
4.2 Charging Safety	28
4.3 Discharging and Use	28
4.4 Storage and Maintenance	28
5. Flight Safety	28
5.1 Preflight Preparation	29
5.2 Real-Time Monitoring During Flight	29
5.2.1 Battery Voltage	29
5.2.2 Safety Buffer	29
5.2.3 Signal Awareness	29
5.3 Landing and Inspection	29

Tinyhawk Aero BNF Product Specifications

The Tinyhawk Aero is available in three aircraft versions.

Analog Freestyle: Tinyhawk Aero Analog Freestyle	
Wheelbase	65mm
Maximum Overall Dimensions	LxWxH=85x85x40mm
Weight	Approx. 16.4 g (without battery)
Motor (Brushless)	0702B-27000KV (oil-impregnated bearings)
Propellers	HQProp 31 mm × 3 (1.2 × 1.1 × 3), translucent gray
AIO Flight Controller	5-in-1 AIO: G473 MCU, 4-in-1 6 A 8-bit ESC, UART ELRS 2.4 GHz receiver, and EMAX 32-bit 5.8 GHz 40-channel analog VTX (25/100/200/400 mW); 1S input.
Camera	E03
Battery	Recommended: 1S HV 320 mAh battery (EM2.0)

Analog Racing: Tinyhawk Aero Analog Racing	
Wheelbase	65mm
Maximum Overall Dimensions	LxWxH=85x85x40mm
Weight	Approx. 16.3 g (without battery)
Motor (Brushless)	0702B-30000KV (oil-impregnated bearings)
Propellers	HQProp 31 mm × 3 (1.2 × 0.9 × 3), translucent gray
AIO Flight Controller	5-in-1 AIO: G473 MCU, 4-in-1 6 A 8-bit ESC, UART ELRS 2.4 GHz receiver, and EMAX 32-bit 5.8 GHz 40-channel analog VTX (25/100/200/400 mW); 1S input.
Camera	E03
Battery	Recommended: 1S HV 320 mAh battery (EM2.0)

Analog Performance: Tinyhawk Aero Analog Performance	
Wheelbase	65mm
Maximum Overall Dimensions	LxWxH=85x85x40mm
Weight	Approx. 16.9 g (without battery)
Motor (Brushless)	0702-35000KV (ball bearings)
Propellers	HQProp 31 mm × 3 (1.2 × 0.9 × 3), translucent gray
AIO Flight Controller	5-in-1 AIO: G473 MCU, 4-in-1 6 A 8-bit ESC, UART ELRS 2.4 GHz receiver, and EMAX 32-bit 5.8 GHz 40-channel analog VTX (25/100/200/400 mW); 1S input.
Camera	E03
Battery	Recommended: 1S HV 320 mAh battery (EM2.0)

Tinyhawk Aero Analog Freestyle BNF Contents

1. Tinyhawk Aero Analog Freestyle aircraft × 1
2. Screw accessory pack × 1
3. Configuration adapter board and EM2.0 accessory pack × 1
4. Propeller accessory pack (2 × CW, 2 × CCW)
5. Printed cards, etc. × 1

Tinyhawk Aero Analog Racing BNF Contents

1. Tinyhawk Aero Analog Racing aircraft × 1
2. Screw accessory pack × 1
3. Configuration adapter board and EM2.0 accessory pack × 1
4. Propeller accessory pack (2 × CW, 2 × CCW)
5. Printed cards, etc. × 1

Tinyhawk Aero Performance BNF Contents

1. Tinyhawk Aero Analog Performance aircraft × 1
2. Screw accessory pack × 1
3. Configuration adapter board and EM2.0 accessory pack × 1
4. Propeller accessory pack (2 × CW, 2 × CCW)
5. Printed cards, etc. × 1

1. Tinyhawk Aero Quick Start Guide

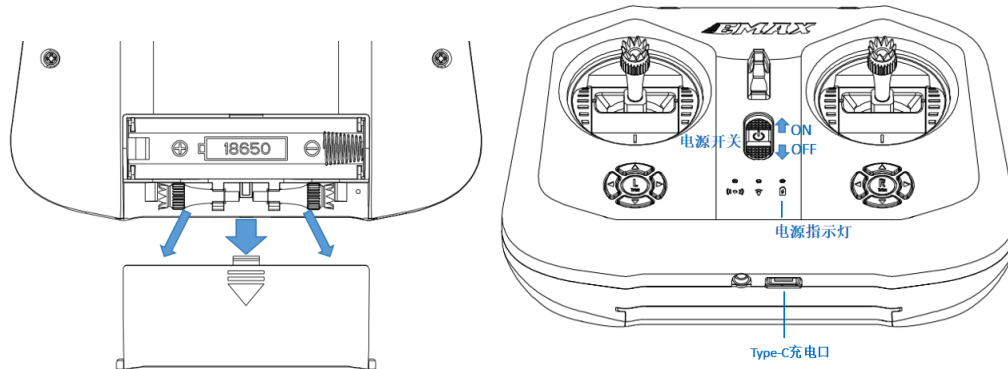
1.1 Preparation

The Tinyhawk Aero BNF version includes the drone only (no transmitter or goggles). To help users begin flying quickly, this chapter uses the E8 Transmitter III and Transporter II goggles as examples.

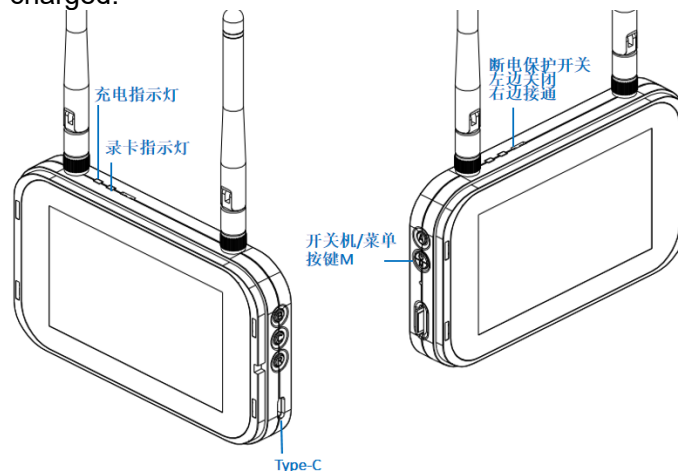
1.1.1 Charging the Devices

Fully charge the transmitter, goggles, and aircraft battery. This is the first step toward safe flight.

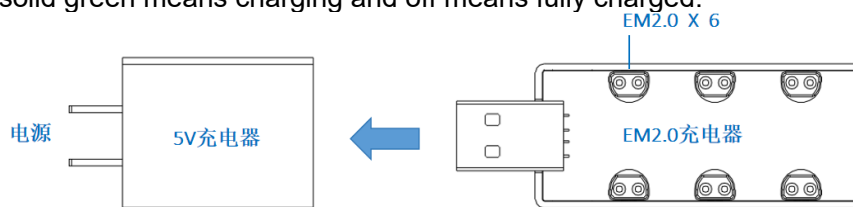
(1) Transmitter: Before first use, open the battery-compartment cover on the back of the transmitter, remove the metal stick ends, and screw them securely onto the left and right gimbals. Then connect a USB Type-C cable and a 5 V charger to charge the transmitter. Power LED: charging—flashing green; fully charged—solid green.



(2) Goggles: First move the power-protection switch to the right to connect power. Then use a USB Type-C cable and a 5 V charger. The charging LED is red while charging and green when fully charged.



(3) Battery (1S 320 mAh): A 1S 320 mAh battery is recommended for the Tinyhawk Aero. Connect the EM2.0 charger to a 5 V charger, then connect it to power. On the EM2.0 charger, solid green means charging and off means fully charged.



1.1.2 Selecting a Flying Site

Choose a spacious indoor area, or a calm, open outdoor area free of people. For the first flight, an indoor location is recommended.

1.2 Preparing to Fly (Learning the Equipment and Matching/Binding)

1.2.1 Flight Modes

On the E8 Transmitter III, the three-position AUX2 switch selects one of three flight modes.

(1) Angle Mode: Beginner-friendly ★★★★★ (safest)

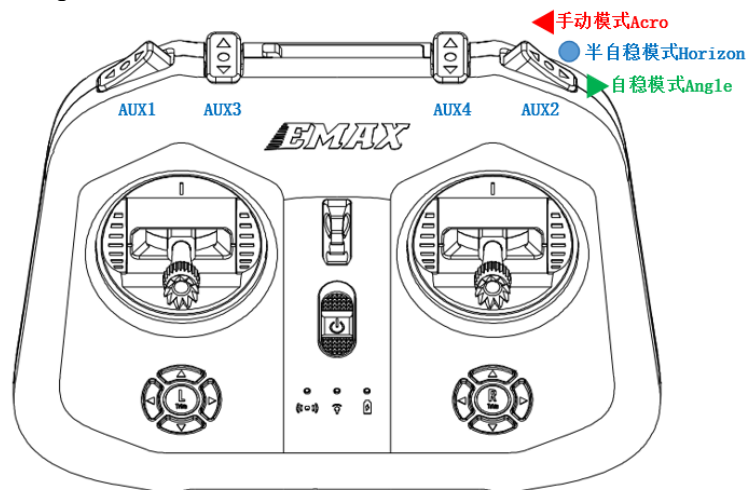
This is an easy flight-control mode. The drone's maximum tilt angle is limited to help control speed and make flying easier. When you release the sticks, the drone automatically levels itself and maintains a hover.

(2) Horizon Mode: Beginner-friendly ★★☆☆☆ (some unpredictability)

This mode combines Angle and Acro modes. With small stick inputs, the drone automatically levels itself. At full stick deflection, it transitions to Acro behavior and allows flips and rolls.

(3) Acro Mode: Beginner-friendly ★☆☆☆☆ (very high crash risk)

This mode gives you full control of the drone with no angle limit. When you release the sticks, the drone maintains its current attitude instead of leveling automatically, allowing a wide range of aerobatic maneuvers.



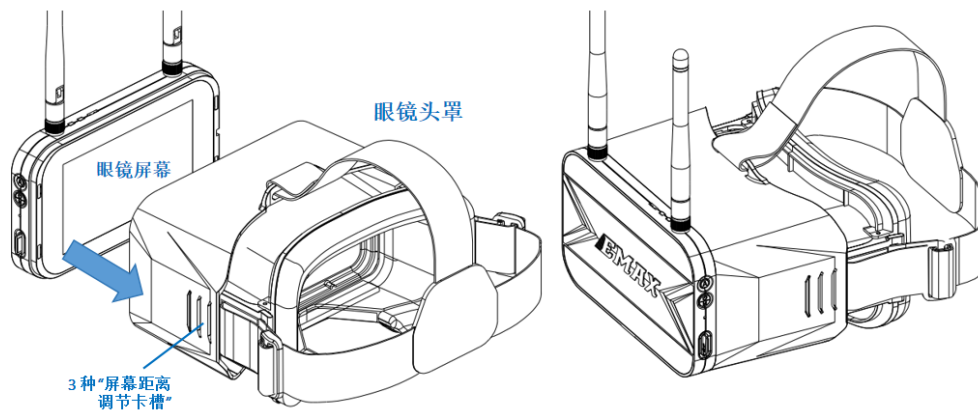
1.2.2 FPV Flying Modes

FPV means “first-person view.” Instead of standing on the ground and watching the drone directly, you “sit” in the cockpit of a sports car and fly using the live video sent from the front camera to the goggle display. The result is an immersive feeling of being one with the aircraft.

Using the Transporter II goggles as an example, there are two ways to fly: immersive FPV and standard FPV.

(1) Method 1: Immersive FPV

- ① Secure the goggle display to the headset using the strong magnets.
- ② Select matching display-distance slots on both sides.
- ③ Then put on the FPV goggles.

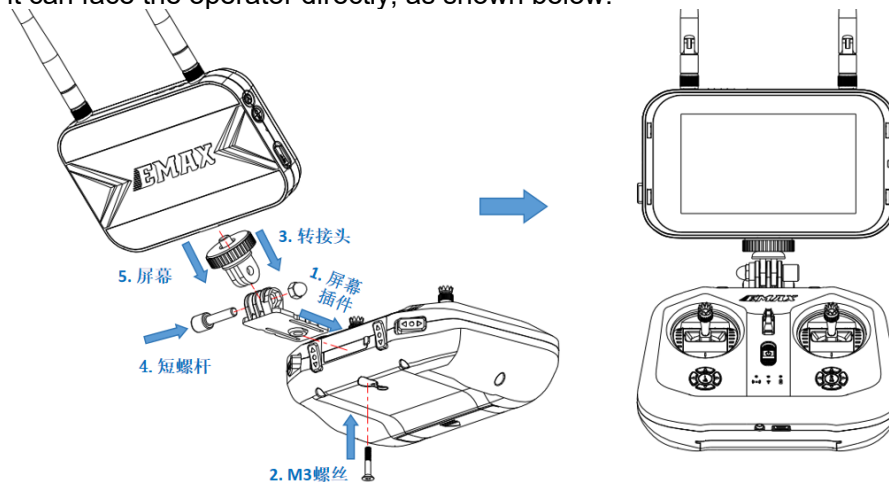


(2) Method 2: Standard FPV

Mount the goggle display on the transmitter so you can monitor both the display information and the drone itself.

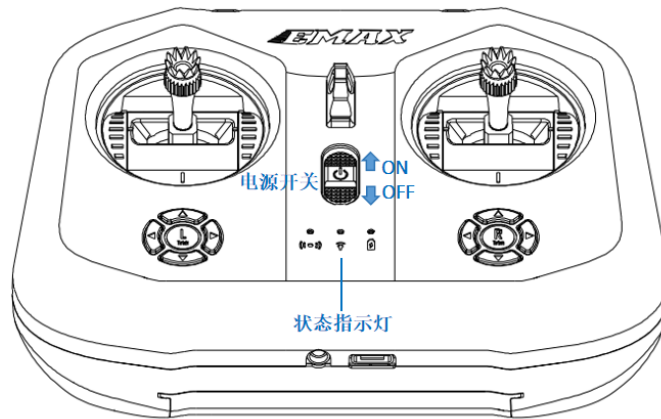
This method is beginner-friendly and may be preferable if you are prone to motion sickness, wear glasses, are new to flying, or find the headset uncomfortable.

- ① Firmly insert the display mount into the transmitter.
- ② Use the hex driver to tighten the M3 screw on the transmitter.
- ③ Insert the adapter into the display mount.
- ④ Use the short screw and nut to fasten the adapter to the display mount. Keep it just loose enough to adjust the display angle up and down.
- ⑤ Fasten the display to the adapter. The adapter knob adjusts the display left and right so it can face the operator directly, as shown below.



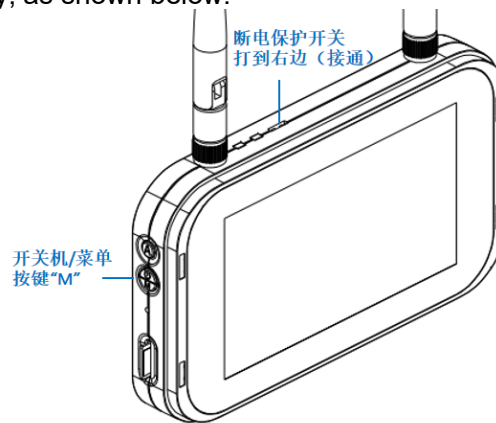
1.2.3 Before Flight (Powering On the Equipment)

(1) Starting the transmitter: Move the power switch up to ON. After one beep, the status LED changes from red to solid green, indicating that the transmitter has started successfully.



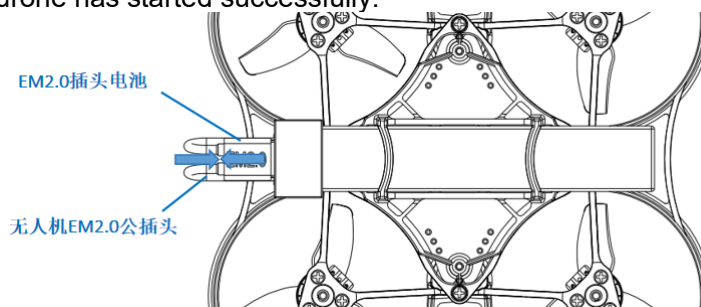
(2) Starting the goggles (Transporter II HD):

Move the power-protection switch to the right to connect power. Press and hold the Power/Menu button (M). When the screen turns on and displays “EMAX,” the goggles have started successfully, as shown below.



(3) Powering on the drone:

Connect the male and female EM2.0 plugs on the battery and drone. Place the drone on a level surface and allow it to complete its level self-test. When the LEDs illuminate, the drone has started successfully.



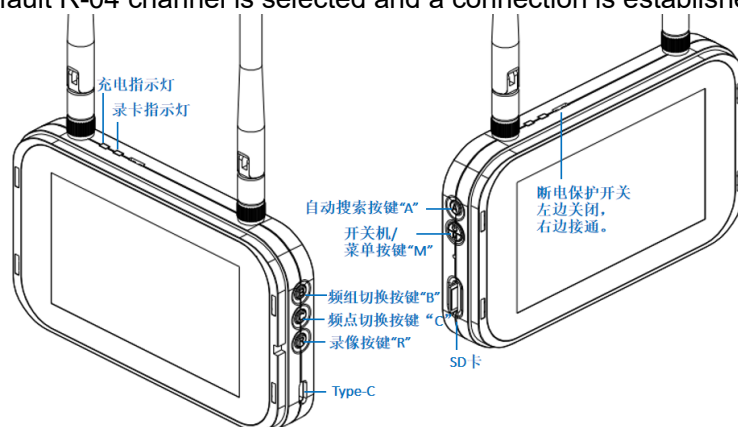
Note: If you are an advanced, licensed drone pilot with an amateur-radio license, you may hold the button on the drone's VTX while connecting the battery to legally unlock higher VTX output power. The button location and available power levels vary by model. You may also use stick commands to navigate Betaflight or the Betaflight OSD and adjust the VTX output level. See the drone user manual for further information.

1.2.4 Matching the Drone and Goggles

After power-on, the goggle display should show the camera's live view. If no live view appears, connect the devices as follows:

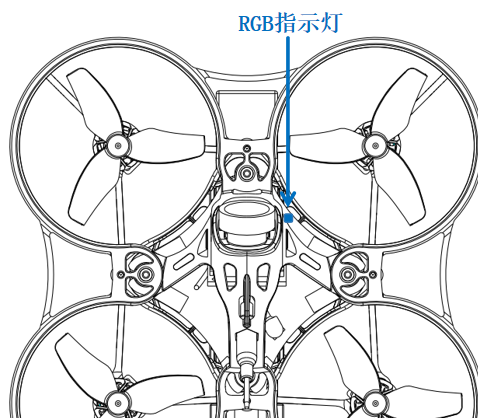
(1) Automatic matching: Briefly press the Auto Search button (A). The goggles automatically search for the powered-on drone on channel R-04 and establish a video connection. Check whether the drone and goggles are on the same channel. If not, match them manually.

(2) Manual matching: Briefly press the Band button (B) and Channel button (C) until the drone's default R-04 channel is selected and a connection is established.



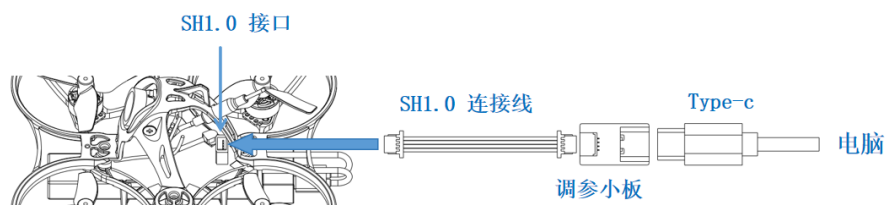
1.2.5 Binding the Drone and Transmitter

After power-on, a solid RGB LED on the flight controller indicates that binding was successful.



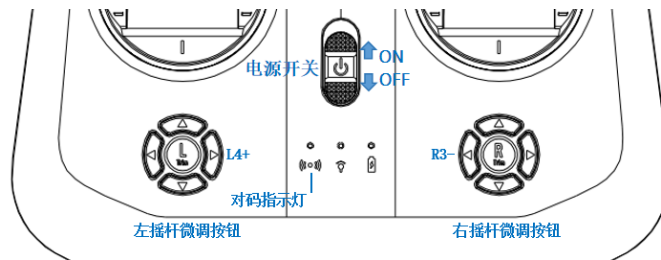
If the RGB LED on the flight controller keeps flashing, the drone and transmitter are not bound and must be bound manually.

(1) Connect the Tinyhawk Aero to the configuration adapter board, then use a USB Type-C data cable to connect it to Betaflight Configurator.



(2) Put the flight controller in binding mode: Power-cycle the Tinyhawk Aero three times in succession. When it starts in binding mode, the flight controller RGB LED changes from slow flashing to double flashing.

(3) Put the transmitter in binding mode: Move the power switch up to ON to start the transmitter, then press the “L4+” and “R3-” buttons simultaneously. The binding LED on the left alternates between green and red, indicating that the transmitter is in binding mode.



(4) Watch the RGB LED on the Tinyhawk Aero flight controller. When it changes from double flashing to solid blue, the drone and transmitter are successfully bound.

(5) If binding is unsuccessful, repeat steps (2), (3), and (4) until binding succeeds.

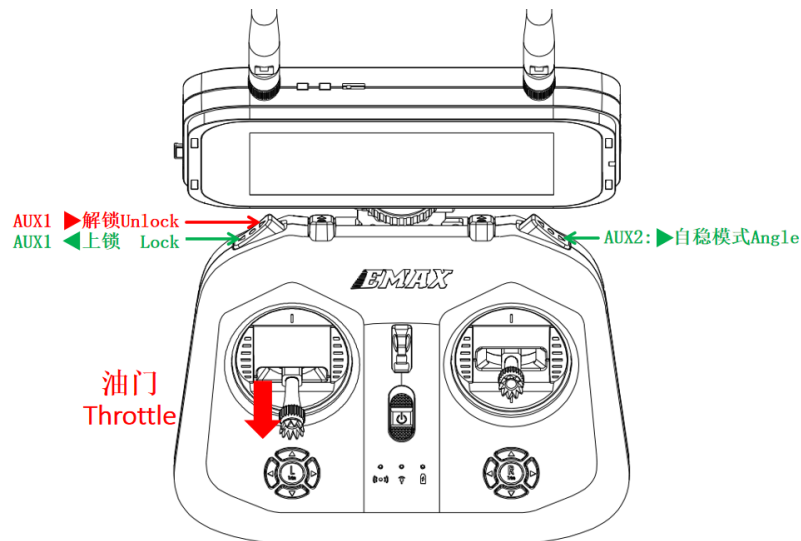
1.3 Flight Controls

After completing Sections 1.1 and 1.2, you are ready to fly. Select the flying method and flight mode best suited to you—for example, standard FPV in Angle mode.

1.3.1 Arming the Motors

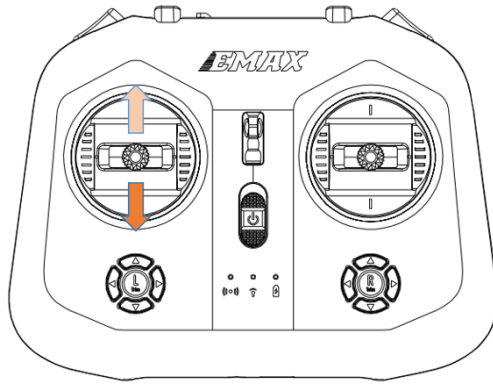
- (1) Place the drone on a level surface, such as the floor.
- (2) Make sure the throttle stick is at its lowest position.
- (3) Move the AUX1 arm switch from the far-left DISARM position to the far-right ARM position. You will hear a beep, and the motors will begin spinning slowly. The drone is now armed and the propellers are turning. Do not touch them with your hands!

Tip: Move AUX1 back to the green DISARM position to stop the motors and disarm the aircraft.

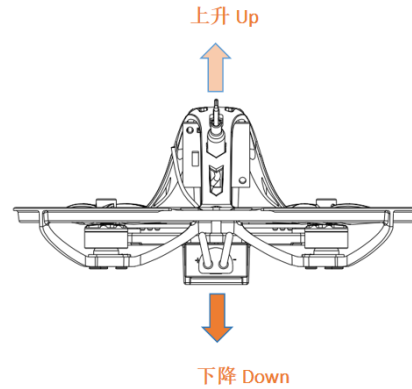


1.3.2 Flying with the Control Sticks

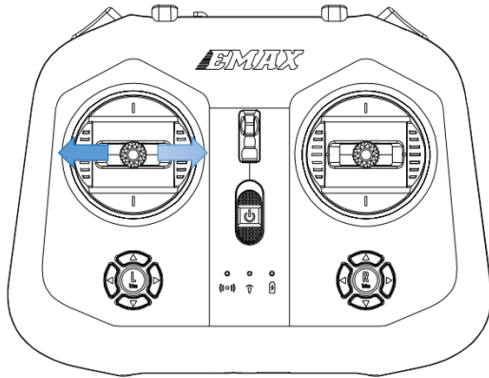
- (1) Push the throttle stick upward very slowly and the aircraft will gradually lift off. Move it downward slowly and the aircraft will descend. Try to hold the aircraft steady at about 1 m above the ground.



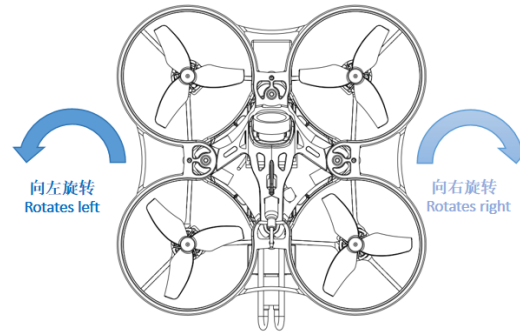
油门摇杆向上/向下
Throttle stick up/down



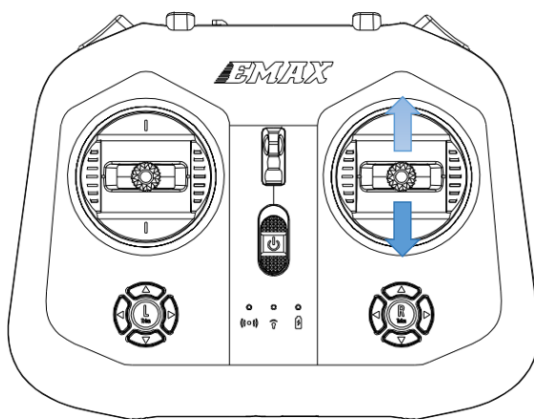
(2) Use small adjustments. Move the yaw stick left to rotate the drone left; move it right to rotate the drone right.



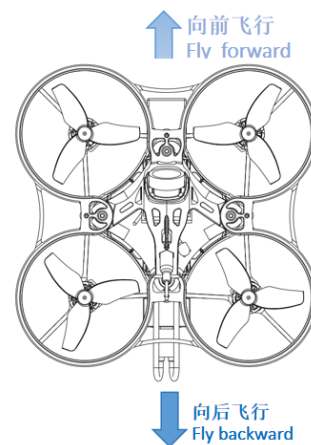
偏航摇杆 向左/向右
Yaw stick left/right



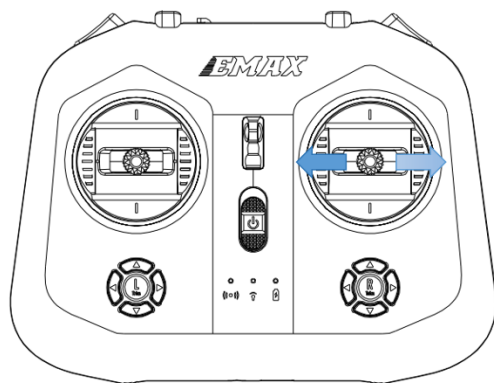
(3) Use small adjustments. Move the pitch stick up to fly forward; move it down to fly backward.



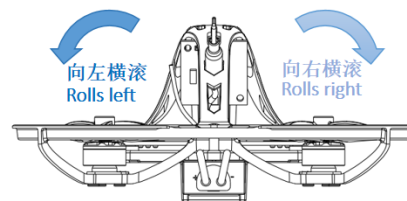
俯仰摇杆 向上/向下
Pitch stick up/down



(4) Use small adjustments. Move the roll stick left/right to roll the drone left/right.



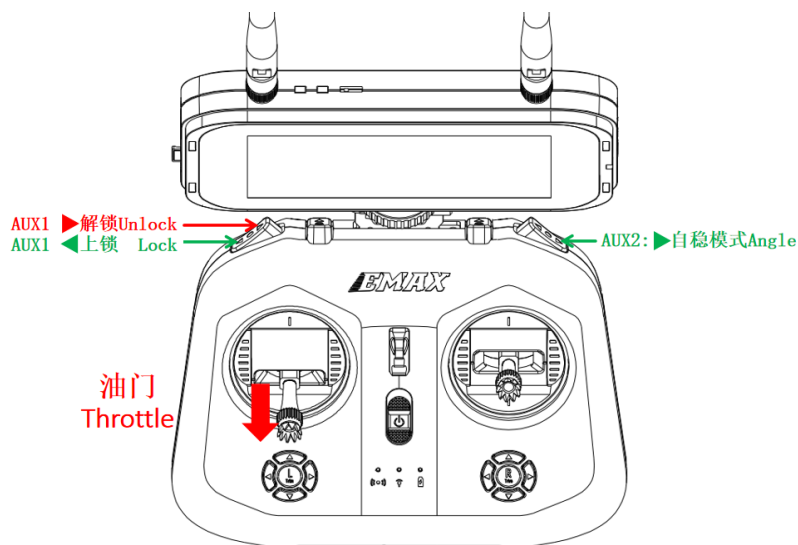
横滚摇杆 向左/向右
Roll stick left/right



1.3.3 Landing and Powering Off

When the goggle display shows a battery voltage of 3.3–3.5 V, little power remains. You will usually have about 30–60 seconds before the battery is depleted, so return to the takeoff point.

- (1) Slowly pull the throttle stick all the way down. The aircraft will descend and land.
- (2) Move the AUX1 arm switch to the left DISARM position. The motors stop and the aircraft is disarmed.

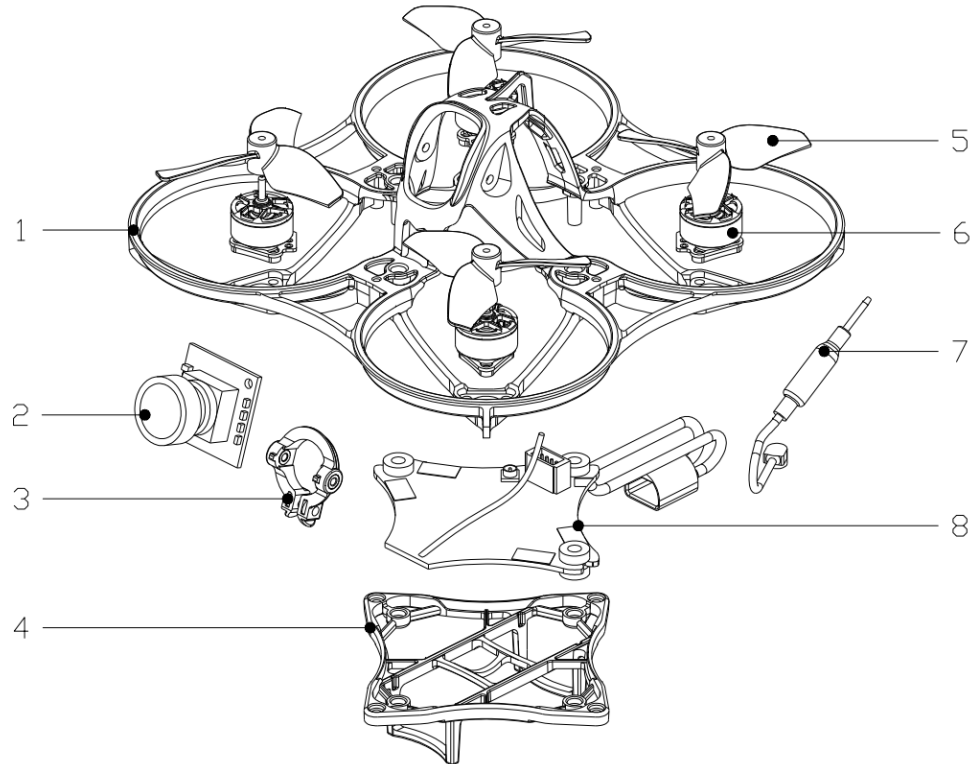


(3) Powering Off

- Disconnect and remove the battery from the drone.
- Press and hold the Power button on the goggle display until the screen turns off.
- Move the transmitter power switch down to OFF and wait for the status LED to turn off.

2. Tinyhawk Aero

2.1 Tinyhawk Aero Diagram



1. Frame
2. Camera
3. Camera Mount
4. Battery Tray
5. HQProp 31 mm Tri-Blade Propeller
6. 0702 Brushless Motor
7. Antenna
8. AIO Flight Controller

2.2 Tinyhawk Aero Propellers

Tinyhawk Aero propellers rotate in two directions: clockwise (CW) and counterclockwise (CCW). A complete set contains two CW and two CCW propellers. Each propeller rotates toward the blunt leading edge. Install the propellers in the correct orientation shown below.

1. Propeller Installation

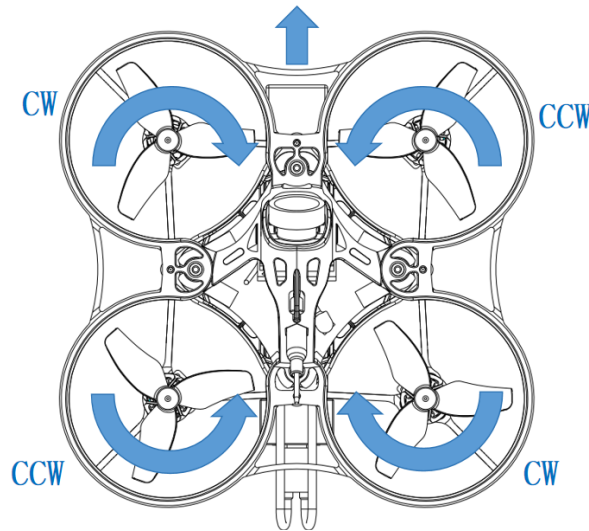
Align the propeller hole with the motor shaft. Support the back of the motor while pressing the propeller on by hand until it is flush with the motor shaft.

WARNING: Incorrectly installed propellers will prevent the Tinyhawk Aero from flying properly and may make it uncontrollable. Carefully verify each propeller's orientation. Failing to support the back of the motor may break the frame. Use caution when installing propellers!

2. Propeller Removal

Use a small tool, such as a propeller remover, to lift the propeller from the motor shaft; alternatively, hold the root of the propeller blades with your fingers and twist it off slowly. With your other hand, firmly hold the frame around the motor housing until the propeller is removed from the motor shaft.

WARNING: Remove a propeller only when replacing it. Use caution when removing propellers and when using tools!

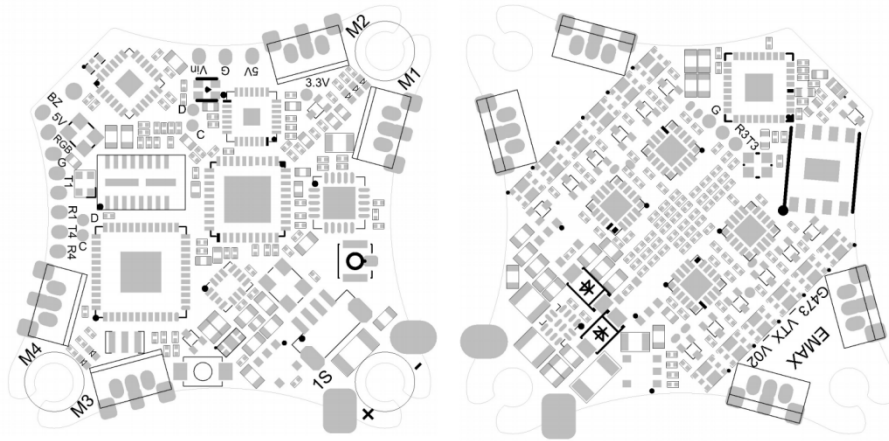


2.3 Tinyhawk Aero Camera

Model	E03
Input Voltage	3.3–6 V; 5 V recommended
Operating Current	128mA
Weight	1.6 g
Dimensions	14 mm (L) × 14 mm (W) × 13.4 mm (H)
Image Sensor	1/3-inch CMOS
Resolution	1280*720P @30fps
Lens	1920-M7
Field of View (FOV)	D: 160°; H: 120°; V: 100°
Video System	CVBS (NTSC)
Housing Material	ABS

2.4 Tinyhawk Aero AIO Flight Controller

The Tinyhawk Aero uses a 5-in-1 AIO flight controller integrating a G473 MCU, UART ELRS (2.4 GHz) receiver, OSD (AT7456E), 1S 6 A brushless ESC, and 5.8 GHz 40-channel VTX. Power input is 1S.



Specifications:

MCU: STM32G473CEU6; IMU: ICM42688; Blackbox memory: 16 MB; Sensors:
voltage and current; BEC: 5 V, 2 A maximum;
UART ELRS (2.4 GHz) receiver;
Supports OSD (AT7456E);
Integrated 4-in-1, 6 A, 8-bit ESC;
OPEN-VTX :
Output power: 25 mW/100 mW/200 mW/400 mW;
Frequency: 5.8 GHz, 40 channels; Raceband: 5658–5917 MHz;
Antenna connector: IPEX1/U.FL;
Power input: 1S;
USB interface: SH1.0 4-pin;
Four UARTs: UART1/UART4/UART3 (receiver)/UART2 (VTX).

2.4.1 UART ELRS (2.4 GHz) Receiver

The Tinyhawk Aero uses a UART ELRS (2.4 GHz) receiver with an SX1280 RF module and SPI communication. It has a 0.4 mm enameled-copper-wire antenna, operates at 2400–2480 MHz, uses the ExpressLRS protocol, and runs ELRS V3.6.3.

2.4.2 Tinyhawk Aero VTX

The Tinyhawk Aero has a 32-bit open-source analog VTX integrated with the AIO flight controller on a single board and paired with an E03 analog camera.

32-bit analog VTX specifications:

Frequency: 5.8 GHz, 40 channels:

RF output power: 25 mW/100 mW/200 mW/400 mW;

Power input: 5 V;

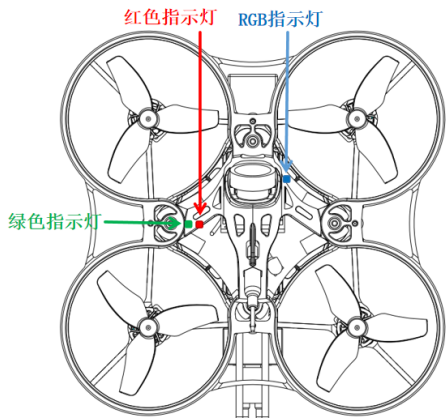
Other: Supports SmartAudio and VTX firmware updates through the flight controller.

2.5 LED Indicators

2.5.1 Flight Controller LED Status

The Tinyhawk Aero flight controller has blue, green, and red LEDs that indicate power-on, standby, preflight, and flight status, as shown below.

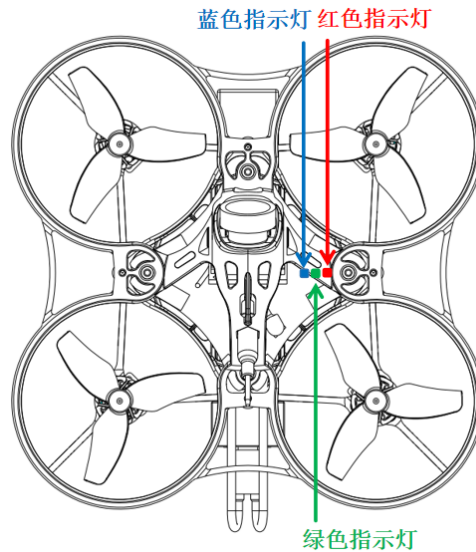
LED	State	TX Link	Status Description
RGB LED	On	Yes	The drone is receiving the transmitter signal; binding succeeded.
	2× Flash	No	The drone is in binding mode and searching for a transmitter signal.
	Slow	No	The drone is not receiving a transmitter signal.
Green LED	Slow	No	The drone is in normal standby.
		Yes	The throttle stick is not at its lowest position.
	Fast	—	When the drone powers on, the LED flashes rapidly three times to indicate s
		Yes	If the throttle stick is not at its lowest position and AUX1 is moved from DISA five times and the motors do not spin.
	Off	Yes	AUX1 is in the DISARM position and the throttle stick is at its lowest position.
	On	Yes	AUX1 is armed, the motors are spinning, and the drone is flying normally.
Red LED	On	—	Remains solid after the flight controller is powered on.



2.5.2 VTX LED Status

The Tinyhawk Aero flight-controller/VTX board also has blue, green, and red LEDs that indicate VTX status.

- (1) Red LED: In normal mode, the red LED turns on solid at startup and flashes when settings are saved.
- (2) Blue and green LEDs: These indicate the current operating status, including band, channel, and power.



Status can be displayed when using MSP (the VTX communication protocol), SmartAudio, or the VTX button. Because TRAMP does not use a fixed VTX table, a complete frequency table cannot be indicated in TRAMP mode. The indication logic is as follows:

- ◆ One green flash indicates band display mode. One to five blue flashes correspond to bands A, B, E, F, and R, respectively.
- ◆ Two green flashes indicate channel display mode. One to eight blue flashes correspond to channels 1 through 8, respectively.
- ◆ Three green flashes indicate transmit-power display mode. One to four blue flashes correspond to 25, 100, 200, and 400 mW (or custom power), respectively.

When using TRAMP, or when `LED_INDICATION_OF_VTX_MODE=0`, the red LED still turns on at startup and flashes when settings are saved. The green LED stays on after a protocol is detected—for example, after the flight controller successfully communicates with the device through TRAMP. The blue LED flashes once whenever a communication packet is received.

3. Tinyhawk Aero Advanced Functions and Operations

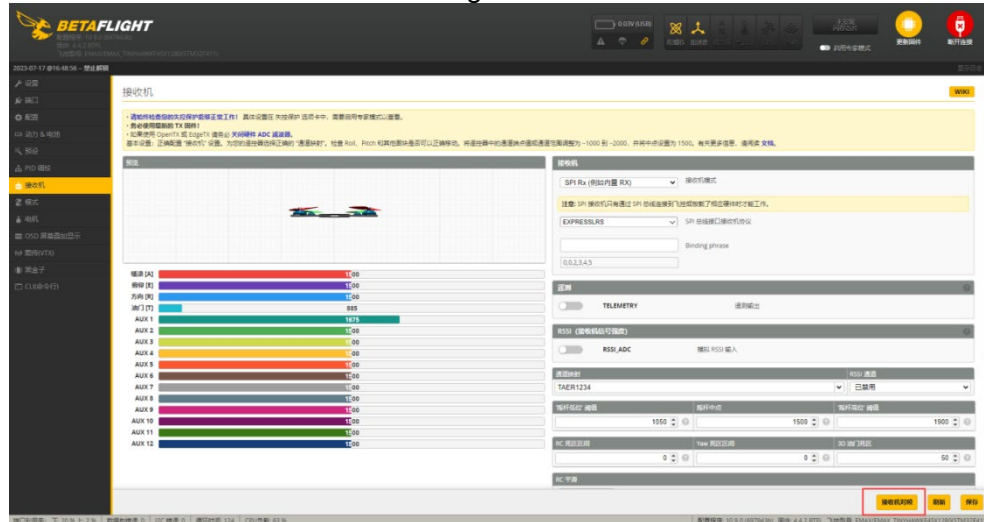
3.1 Binding the Tinyhawk Aero to a Transmitter

3.1.1 Transmitter Binding Method

Binding is the process of linking the drone's ELRS (2.4 GHz) receiver to a transmitter. A receiver can be bound to only one transmitter, while a transmitter can be bound to multiple receivers. See Section 1.2.5, "Binding the Drone and Transmitter."

3.1.2 Other Tinyhawk Aero Binding Methods

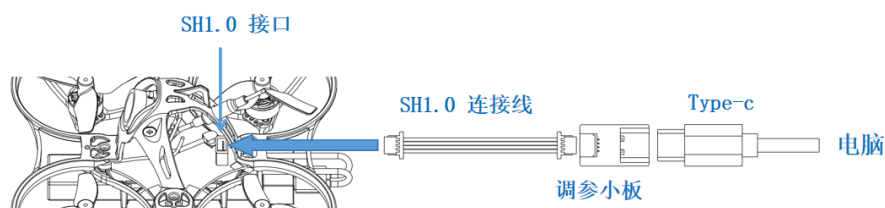
- (1) You can use a Betaflight Configurator command to put the receiver in binding mode. In the CLI tab, type `bind_rx` and press Enter. The receiver will enter binding mode.
- (2) You can also open Betaflight Configurator, go to the Receiver section, and click Bind Receiver. The receiver will enter binding mode.



3.2 Calibrating the Accelerometer

The Tinyhawk Aero accelerometer is calibrated at the factory. Recalibration is required if the drone cannot hover steadily in Angle or Horizon mode and always drifts slowly in one direction, or after replacing the flight controller or reflashing firmware.

- (1) Connect the Tinyhawk Aero to the configuration adapter board, then use a USB Type-C data cable to connect it to Betaflight Configurator.

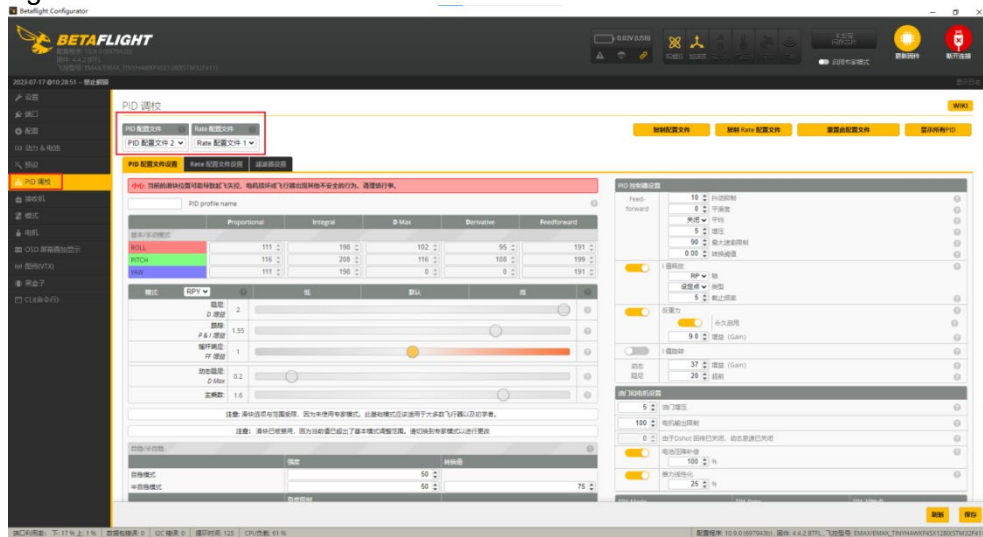


- (2) Place the Tinyhawk Aero on a level surface. Open the Setup menu in Betaflight Configurator and click Calibrate Accelerometer. Do not move the drone during calibration.



3.3 Introduction to the PID Profile

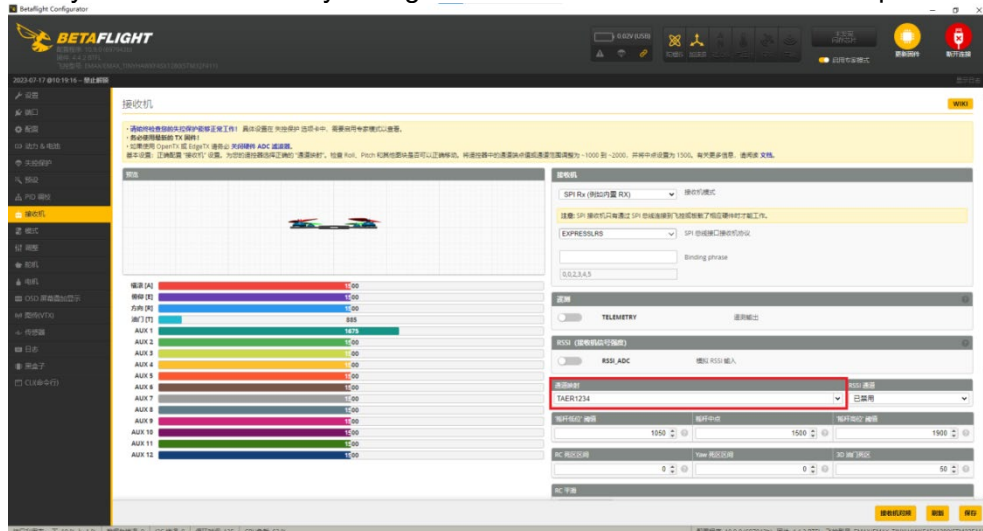
PID Profile 1 is tuned and optimized to provide the Tinyhawk Aero, with a 1S 320 mAh battery, with excellent indoor and outdoor flight control. This profile has been professionally tuned from multiple perspectives. EMAX strongly recommends that you do not change these values.



3.4 Adjusting Channel Settings

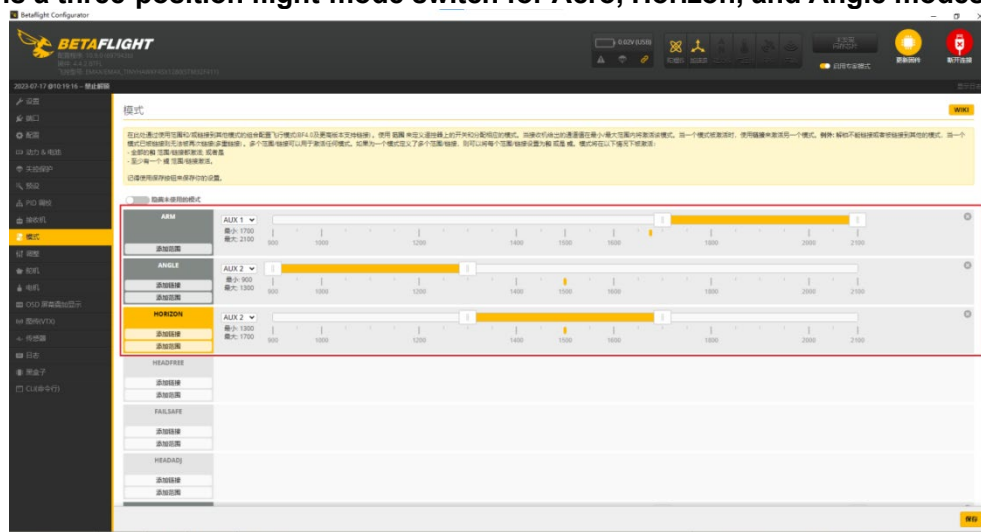
Betaflight Configurator can be used to change the Tinyhawk Aero's programmed settings. Betaflight Configurator and flight-controller firmware are available at <https://github.com/betaflight/>.

The Tinyhawk Aero is factory-configured with the TAER1234 channel map.



Using the E8 Transmitter III as an example: AUX1 is a three-position switch used for arming (ARM).

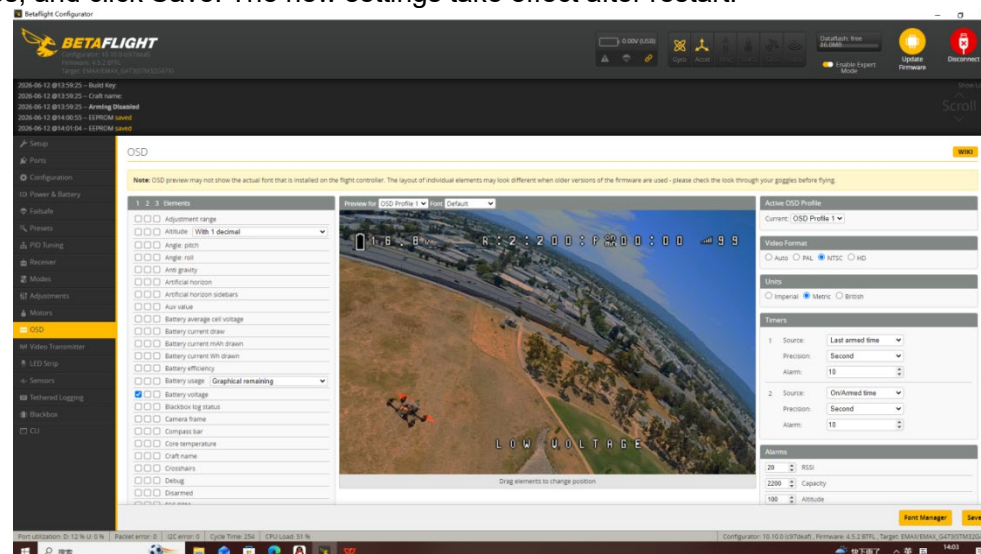
AUX2 is a three-position flight-mode switch for Acro, Horizon, and Angle modes.



Configure your transmitter as described above, or change these settings in Betaflight Configurator.

3.5 Changing OSD Settings

The Tinyhawk Aero OSD is configured at the factory. To change it, connect the Tinyhawk Aero to Betaflight Configurator using the configuration adapter board and a USB Type-C data cable. Open the OSD tab, arrange the items you want displayed in the goggles, and click Save. The new settings take effect after restart.



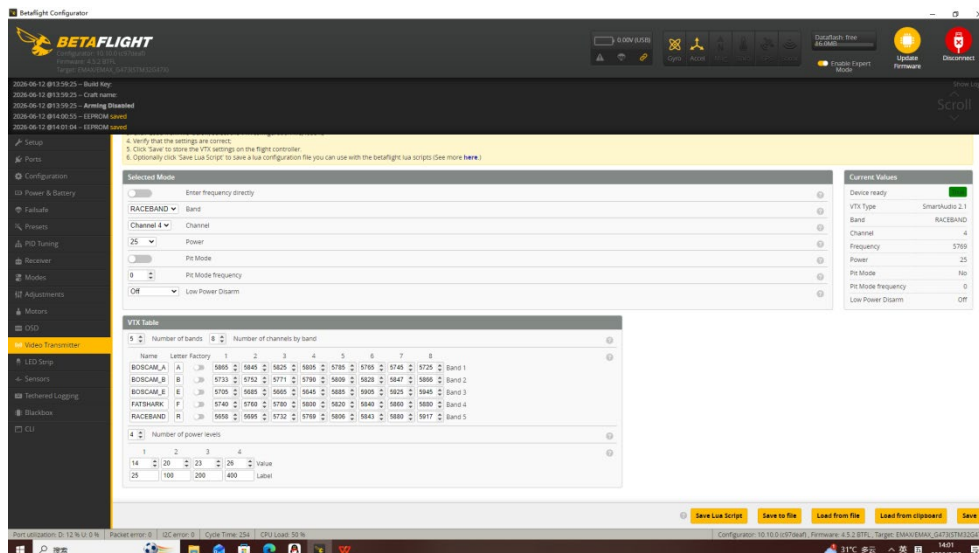
3.6 Changing VTX Settings

3.6.1 Setting the VTX in Betaflight Configurator

The Tinyhawk Aero VTX factory default is R:4:25 mW. To change it, follow these steps:

Open the Video Transmitter tab in Betaflight Configurator. Select the desired band, channel, power, and low-power-when-disarmed settings, then click Save. The new settings take effect after restart.

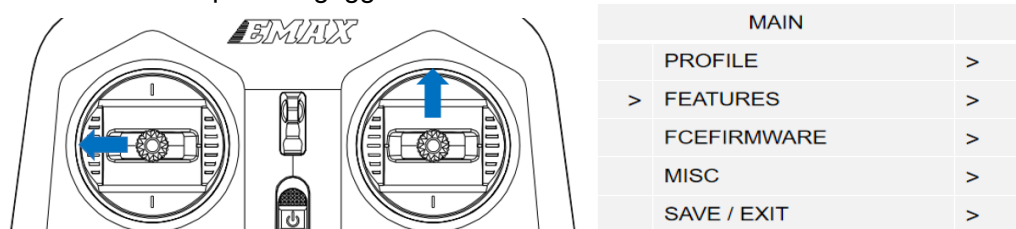
Note: Low power when disarmed makes the VTX operate at low power until the drone is armed, after which it operates at the configured power.



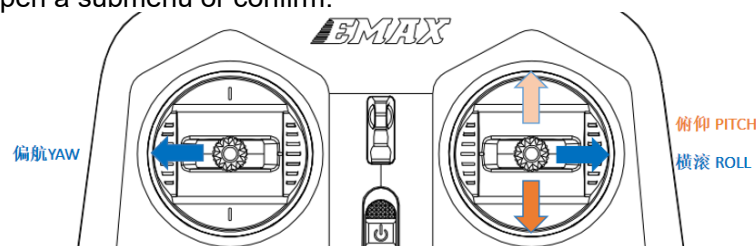
3.6.2 SmartAudio (Opening the OSD Menu with the Transmitter and Changing Settings)

The Tinyhawk Aero is equipped with preconfigured SmartAudio on UART2 TX. Using the transmitter sticks and the goggle OSD, you can adjust VTX band, channel, and power as well as other OSD parameters. The following example covers VTX settings.

- ◆ Power on the Tinyhawk Aero, goggles, and transmitter, and confirm that video matching and transmitter binding are successful.
- ◆ With the throttle centered, hold both sticks at THROTTLE MID + YAW LEFT + PITCH UP to open the goggle OSD menu.



- ◆ Use the goggle OSD menu as follows:
YAW left: return to the previous menu; PITCH up/down: move through menu options; ROLL right: open a submenu or confirm.



- ◆ Move the cursor to FEATURES and move ROLL right to open the FEATURES submenu. Move the cursor to VTX and move ROLL right. The VTX configuration menu (SMARTAUDIO) opens.

— FEATURES —			— SMARTAUDIO —		
>	VTX	>	F R4 5769 25		
	LED STRIP	>	> BAND		RACEBAND
	POWER	>	CHAN		4
	PERSISTENT STATS	>	(FREQ)		5769
	BACK		POWER		25
			PIT		OFF
			SAVE & EXIT		>
			CONFIG		>
			BACK		

In the VTX configuration menu (SMARTAUDIO), set BAND, CHAN, POWER, and other options as needed. When finished, select SAVE or EXIT to save and leave the menu.

WARNING: Select only power levels permitted by local laws and regulations!

3.7 Changing the Flight Controller Binding Phrase

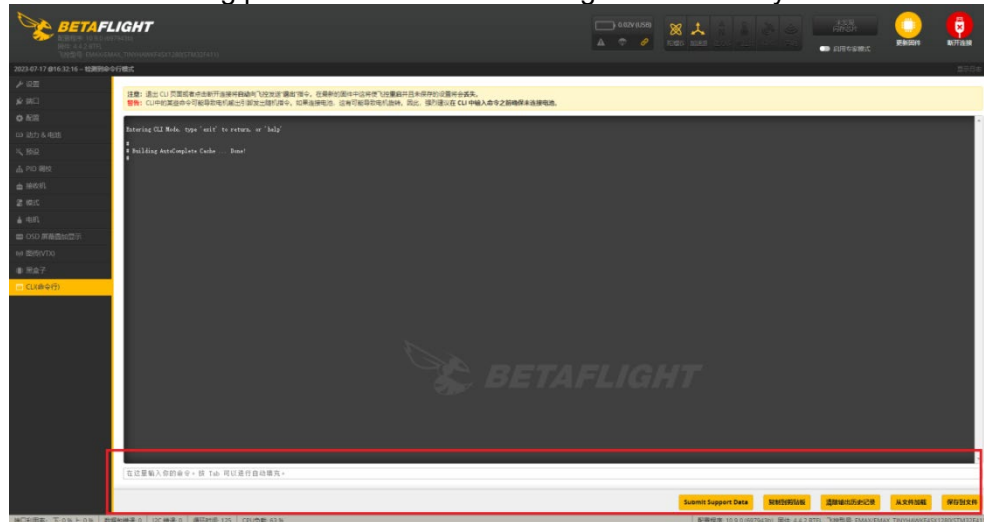
Use Betaflight Configurator and the EMAX Serial Update Tool to read the aircraft's and transmitter's current binding phrases. You can use the EMAX Serial Update Tool to write the aircraft's binding phrase to the transmitter, or use Betaflight Configurator to write the transmitter's binding phrase to the flight controller.

To change the flight controller binding phrase in Betaflight Configurator, first enter the following command in the CLI. The example below uses 0, 1, 2, 3, 4, and 5 as the key values.

```
set expresslrs_uid = 0,1,2,3,4,5
```

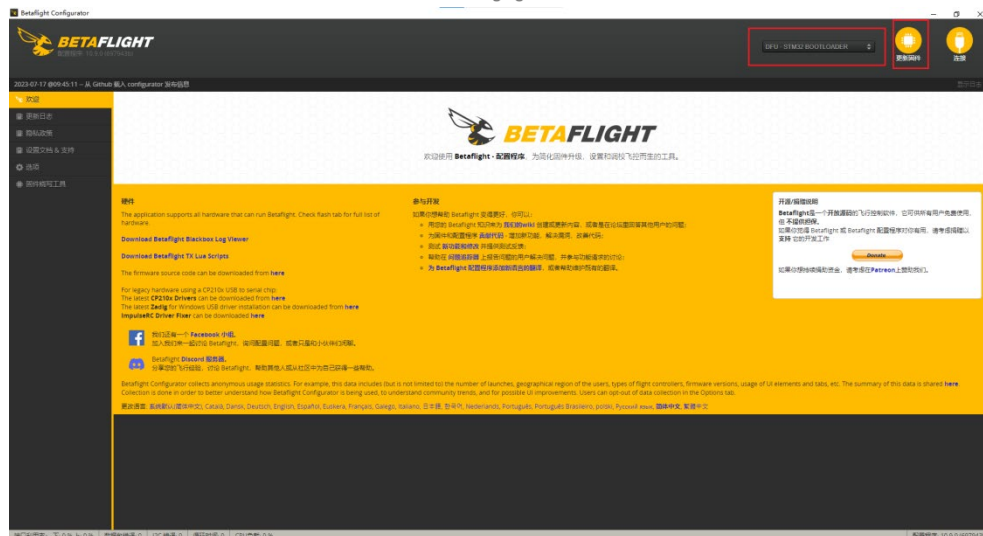
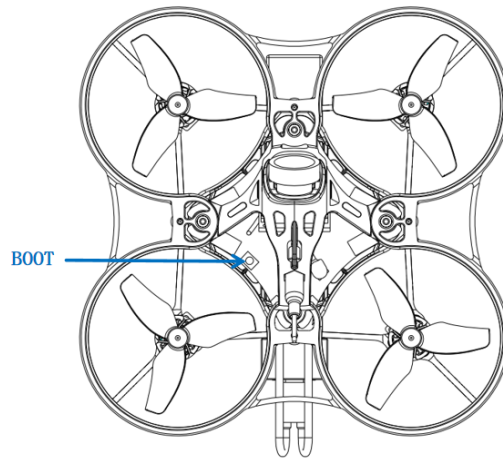
Save

Press Enter and wait for the flight controller to restart and reconnect to Betaflight Configurator. The binding phrase has now been changed successfully.



3.8 Flashing Flight Controller Firmware

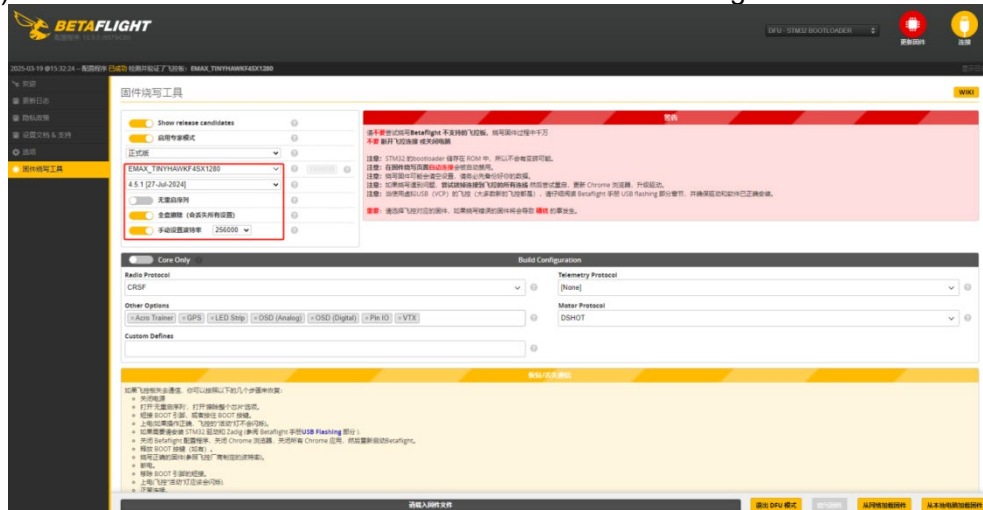
(1) Locate the BOOT button on the flight controller. Hold BOOT while connecting the flight controller with the configuration adapter board and a USB Type-C data cable to enter DFU mode, then click Update Firmware. If DFU mode cannot be entered, check the data cable and confirm that the required computer driver is installed.



(2) Select EMAX_G473 (STM32G47X) and firmware version 4.5.2. From the drop-down menu, select a manual baud rate of 256000.

(3) Choose Load Firmware [Online] or load firmware from the local computer, then wait for loading to complete.

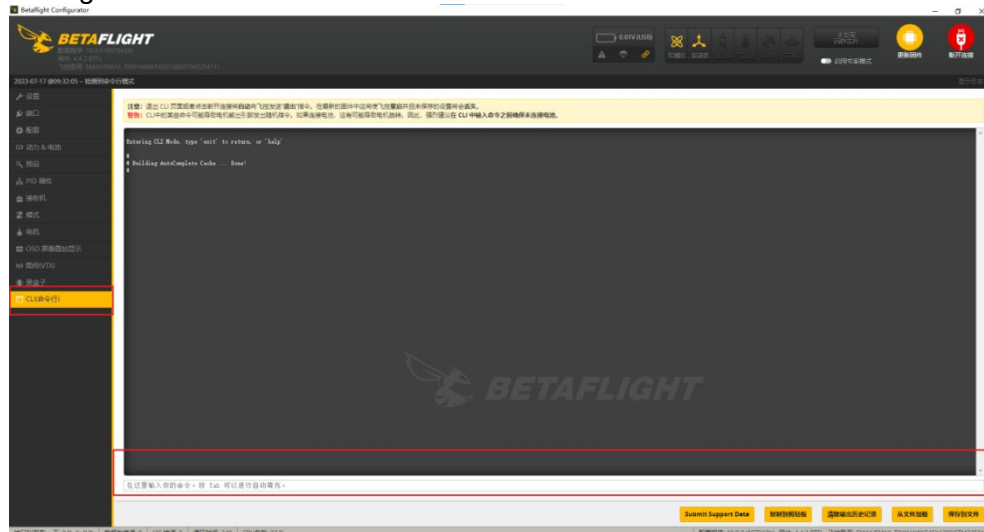
(4) Click Flash Firmware and wait several seconds for flashing to finish.



3.9 Loading Flight Controller Configuration

Download the latest CLI Dump file from <https://emax-usa.com/>. Open the CLI Dump in a text editor and copy all text. Paste the settings into the CLI command box and press Enter.

When complete, the Tinyhawk Aero will reconnect to Betaflight Configurator and its default settings will be restored.



Disclaimer:

The Tinyhawk Aero is tuned for optimal performance. Changing the PID values can affect flight time, overall speed, aircraft control, and internal motor temperature. We do not recommend changing any Tinyhawk Aero PID settings or upgrading the firmware to a newer version.

4. Battery Safety and Precautions

The recommended battery for the Tinyhawk Aero is a 1S 320 mAh high-voltage LiPo battery. Always use it safely!

4.1 Inspection and Emergency Response

(1) Inspect the battery before every use. If it shows any swelling, deformation, damage, or leakage, stop using it immediately and recycle it properly as hazardous waste. Never continue charging or flying with it.

(2) Never puncture, crush, drop, disassemble, or modify the battery.

(3) Keep the exposed EM2.0 plug of an unused battery away from metal objects to prevent short circuits.

(4) If the battery emits an unusual odor or smoke, becomes abnormally hot, or catches fire while charging or in use:

- ◆ Disconnect the power immediately!
- ◆ Small fire: Smother it with a large quantity of dry-chemical extinguishing agent, sand, or similar material.
- ◆ Large fire: Evacuate immediately and call the fire department.

4.2 Charging Safety

(1) The 1S 320 mAh battery is a high-voltage LiPo battery with a maximum fully charged voltage of 4.35 V. Charge it with an EM2.0 charger designed for 1S LiPo batteries or another charger that supports 1S high-voltage LiPo batteries.

(2) Always supervise charging. Never leave the battery charging unattended for an extended period.

(3) Charge at a suitable ambient temperature, such as 10–45 °C, in a safe, well-ventilated location on a hard, nonflammable surface such as tile or concrete. Remove combustible materials within 1 m of the battery.

(4) A battery is hot internally immediately after flight. Allow it to cool to room temperature, approximately 25 °C, before charging.

(5) Never reverse-charge the battery. Connect the positive and negative terminals correctly. Reversed polarity prevents charging and may cause odor, smoke, abnormal heating, a short circuit, or other serious problems.

4.3 Discharging and Use

(1) During flight, enable the goggle OSD voltage display or use a low-voltage buzzer to monitor voltage in real time. For FPV flight, a landing voltage of at least 3.2–3.3 V is recommended to protect the battery and prevent over-discharge. The minimum safe discharge limit for a 1S battery is 3.0 V; going below it causes irreversible battery damage.

(2) Avoid aggressive discharge. Sustained full-throttle flight draws high current, causing a sharp voltage drop and high temperature. This can damage the battery and may cause the aircraft to lose control because of insufficient voltage.

4.4 Storage and Maintenance

(1) Correct storage voltage: If you do not expect to fly for more than three days, charge or discharge the battery to a storage voltage of 3.7–3.9 V. Never store a fully charged battery for an extended period; doing so may cause swelling and capacity loss.

(2) Storage environment: Store the battery in a dry, cool, dark place between –20 and 35 °C. For long-term storage of more than three months, an environment of 23 ± 2 °C and $\leq 75\%$ RH is recommended. Preferably use a dedicated fire-resistant battery bag.

(3) Periodic maintenance: Even when the battery is not used for a long period, perform one complete charge/discharge cycle every three months, then return it to a storage voltage of 3.7–3.9 V to maintain battery activity.

5. Flight Safety

5.1 Preflight Preparation

- (1) Select a suitable flying site.
- (2) Inspect the equipment:

Tinyhawk Aero aircraft: The frame is not deformed; the propellers and motors are installed correctly and rotate smoothly; the VTX and antenna are securely connected; the battery is secured and sufficiently charged.

Transmitter: All buttons and sticks operate normally; the battery is sufficiently charged; the transmitter is correctly bound to the aircraft.

Goggles: All buttons operate normally; the battery is sufficiently charged; the goggles are matched to the aircraft; the goggle OSD information is normal, clear, and legible.

- (3) Confirm the flying method: immersive FPV or standard FPV.

- (4) Confirm the flight mode: Angle, Horizon, or Acro.

- (5) Confirm with a low hover: After arming, gently raise the throttle until the aircraft is about 1 m above the ground, then hover for 2–3 seconds.

Confirm that:

The aircraft is not vibrating abnormally. If it is, resolve the problem before flying.

The aircraft is not yawing abnormally. If it is, recalibrate the accelerometer.

5.2 Real-Time Monitoring During Flight

5.2.1 Battery Voltage

Continuously monitor the aircraft battery voltage on the goggle OSD.

- (1) Fully charged battery: 4.35 V (the actual voltage reading may be lower).

- (2) Battery warning threshold: Return when the in-flight voltage drops to about 3.3–3.5 V, depending on the aircraft's distance from the operator. A landing voltage of at least 3.2–3.3 V is recommended to protect the battery and prevent over-discharge. The minimum safe discharge limit for a 1S battery is 3.0 V; going below it causes irreversible battery damage.

5.2.2 Safety Buffer

Altitude: Beginners should practice below 10 m whenever possible, leaving sufficient recovery space.

Distance: Keep the aircraft near your visual line of sight, preferably within 200 m, or at least within the range where the goggle image is clear and the signal is stable.

Stay away from people: Keep well clear of crowds and never fly directly over anyone, even at high altitude, in case the aircraft suddenly loses control. If a crash is unavoidable, aim for grass or bare ground—not a road, vehicle roof, or crowd.

5.2.3 Signal Awareness

If the video becomes snowy because of interference, or the OSD displays “RXLOSS” (receiver signal lost), hover or descend immediately and do not continue forward. Try changing the antenna orientation or return to an area with a stronger signal.

5.3 Landing and Inspection

Land the aircraft on a level surface. Immediately disarm it with the AUX1 switch, then remove the aircraft battery and place it on a safe, heat-resistant surface to cool.

Inspect the motors and flight controller for a burnt odor, and make sure the motors rotate normally. If everything is normal, install another battery and continue flying, or power off the transmitter and goggles to end the flight session.

Thank you for purchasing our product. Enjoy your flight!



Warning:
Be aware of your surroundings. Not for use by persons under 14 years of age.
Contains small parts; keep away from children to prevent accidental swallowing.



MADE IN CHINA