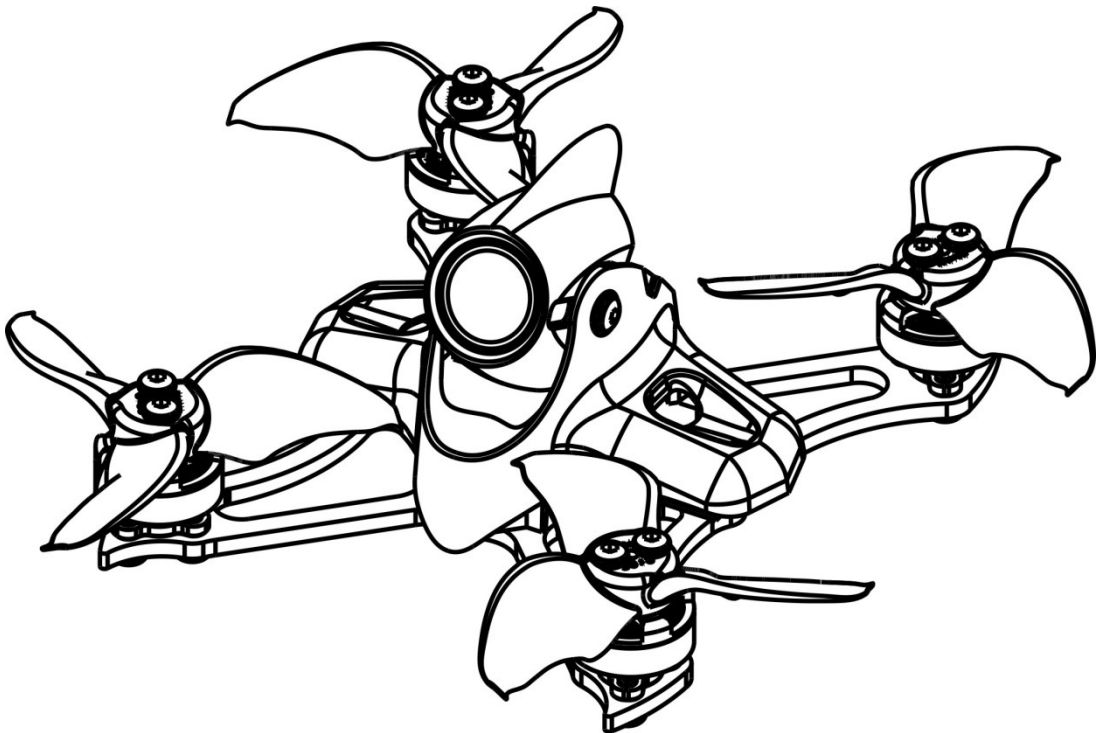Thanks for purchasing the Tinyhawk II Race. Designed in California, assembled in China.

Disclaimer

Please read the disclaimer carefully before using this product. By using this product, you hereby agree to this disclaimer and signify that you have read them carefully and completely. This product is not suitable for people under the age of 18. Adult supervision is highly recommended for kids under the age of 18.

Our Tinyhawk II Race features open-source flight controller and Electronic Speed Controllers to meet the FPV enthusiasts' need to upgrade their quad.

Please read the instruction manual and warnings carefully. Before every flight, make sure the battery is fully charged and power connections are secure. DO NOT fly around crowds, children, animals or objects. EMAX ACCEPTS NO LIABILITY FOR DAMAGE(S) OR INJURIES INCURRED DIRECTLY OR INDIRECTLY FROM THE USE OF THIS PRODUCT.

Precautions

Please follow the instructions to assemble and to operate this product in a proper way.

Pilots do not use this product if you have physical or mental illness, dizziness, fatigued, or use while under the influence of alcohol or drugs.

Please fly in a safe area away from people

Do not modify or use other parts and accessories not approved for the use of EMAX.

Do not use this product in harsh environments (such as winds, rain, lightning, snow, etc.).

 Do not use this product in a strong electromagnetic environment.

Support

Please visit **emax-usa.com** (North America Region) or **emaxmodel.com** (International) for any updates or support needs.

Table of Contents

Product specification

Tinyhawk II Race	**Parameter**
Diagonal wheelbase (without paddles)	90mm
Maximum size of the aircraft (without antenna, cable tie)	119*110*40(mm)
Aircraft weight (without battery)	47.5g
Motor	TH1103 7500KV
Propeller	Avan Blur 2 Inch Propeller
Main Flight Controller	F4（MATEKF411RX firmware） 4 in one 5A ESC SPI RX receiver（Compatible with Frsky D8 protocol）
Camera	RunCam Nano 2 Camera
Transmitter	0-25-100-200mW Adjustable frequency 37CH, Support SmartAudio
Battery	2x 1 Cell 450 mAh HV lipo battery

Product list
1. Tinyhawk II Race × 1
2. Emax 1s HV 450 mAh × 2
3. Charger × 1
4. Screwdriver x 1
5. Spare screws x 1
6. FC damper x 1

emax-usa.com

Tinyhawk II Race **Structure**

Camera Fixer

RunCam Nano 2 Camera

Upper shell

Avan Blur 2 Inch Propeller

Th1103 7500KV

VTX

Main Board

Frame

Non-slip Silione
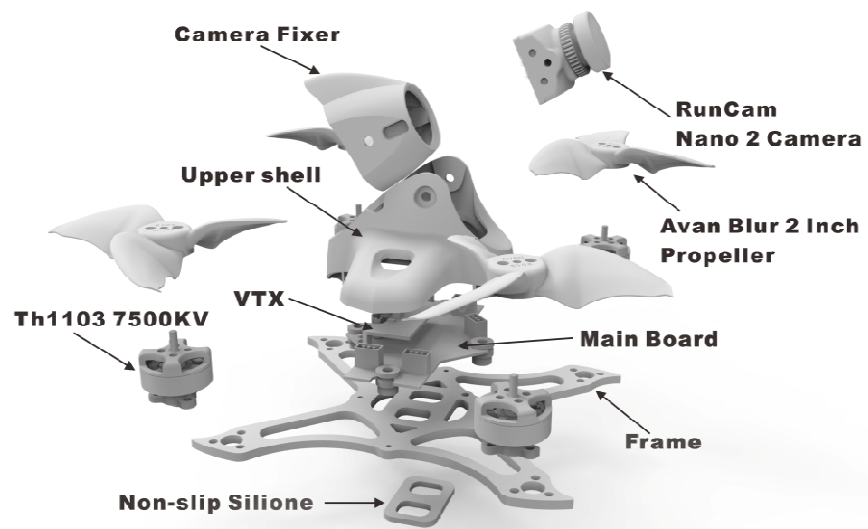
Tinyhawk II Race

Propeller Direction and Mounting

There are 2 spinning directions for Tinyhawk II Race propellers, Clockwise (CW) and Counter-Clockwise (CCW). When Buying a set of propellers, 2 CW and 2 CCW will be given. The blunt leading edge indicates the direction the propeller is suppose to rotate as compared to the sharp trailing edge. When mounting propellers please make sure the correct orientation shown in the diagram below.
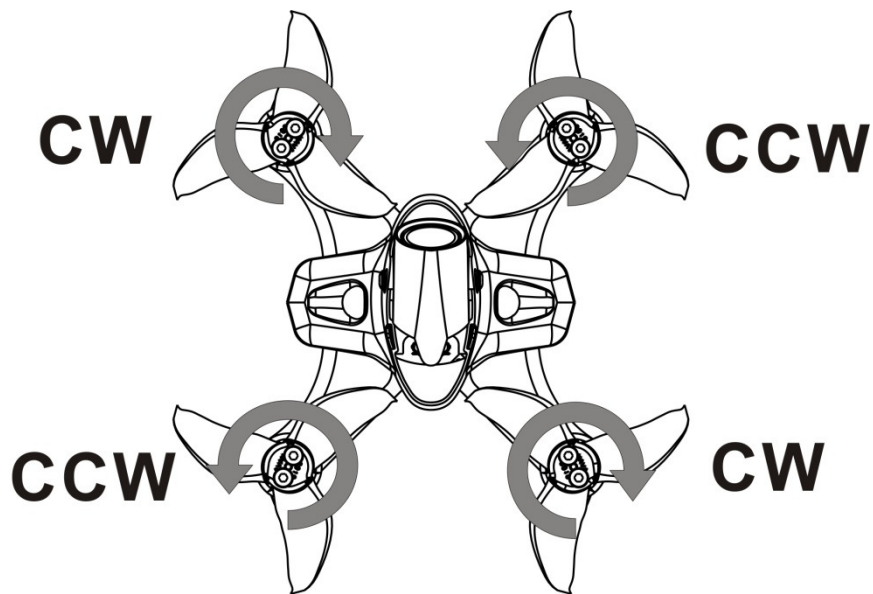

Caution: Failure to mount the propellers in the correct orientation will cause Tinyhawk II Race to not fly correctly and with no control. Please double check for the correct orientation.

1. Push the propeller down the motor
2. Tighten M2 screw and secure it.
3. Periodically check tightness to ensure it will stay tight during flight.

Tinyhawk II Race **VTX Settings**

NOTE: Under normal operating conditions, please use the Betaflight OSD function to change VTX (video transmitter) settings. Only use the VTX push button to unlock as allowed for under the FCC and HAM licensing requirements, see below. If using the VTX push button to change settings, please note that the settings will revert to the Betaflight OSD's settings once the drone is power-cycled.

VTX Schematic and Button Diagram
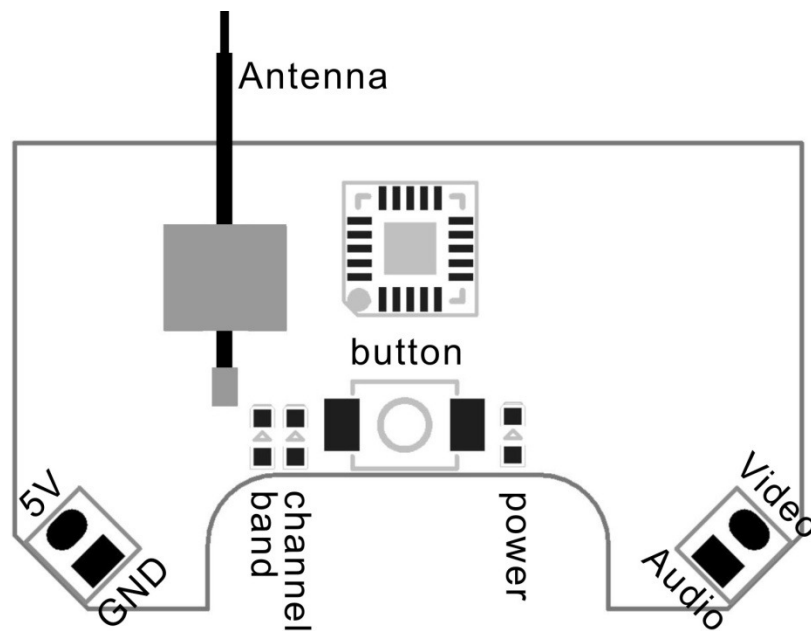
VTX Channel Settings with the Button

1. Normal display

 When powered on, the parameters of frequency group band, frequency point and power are displayed twice by LED cycle., then the LED is extinguished. To check frequency group band ,channel and power status click the button once quickly, and LED starts to indicate frequency band band , frequency channel and power. First indicate the frequency group band and then indicate the frequency channel, final indicative power. After all 2 rounds of LED display cycles, all LED will be off.

2. Menu Entry / Exit

 (1)Press the button and hold for 5s to enter the menu. After entering the menu, band LED lights up.

 (2)Press the button and hold for 5s again to save parameters and exit the menu. After saving and exiting the menu, all LED goes out.

3.Enter/Exit Band / Channel / Power option

 (1) After entering menu, short click button to switch frequency group band / frequency point / power, and the LED of the corresponding menu is lit.

 (2) Press the button and hold for 2s to enter frequency group band / channel / power option.

(3) Press the button and hold for 2s again to exit frequency group band / channel / power option and return to the menu.

4. Band / Channel / Power parameter change

After entering frequency group band / channel / power option, short click button to change the parameter.

Notice: If you change to an illegal channel using SmartAudio, there will be no image transmitting from Tinyhawk II Race. To switch back to a legal channel, press the button on the vtx and follow the vtx menu guide shown below.

Button Menu Diagram
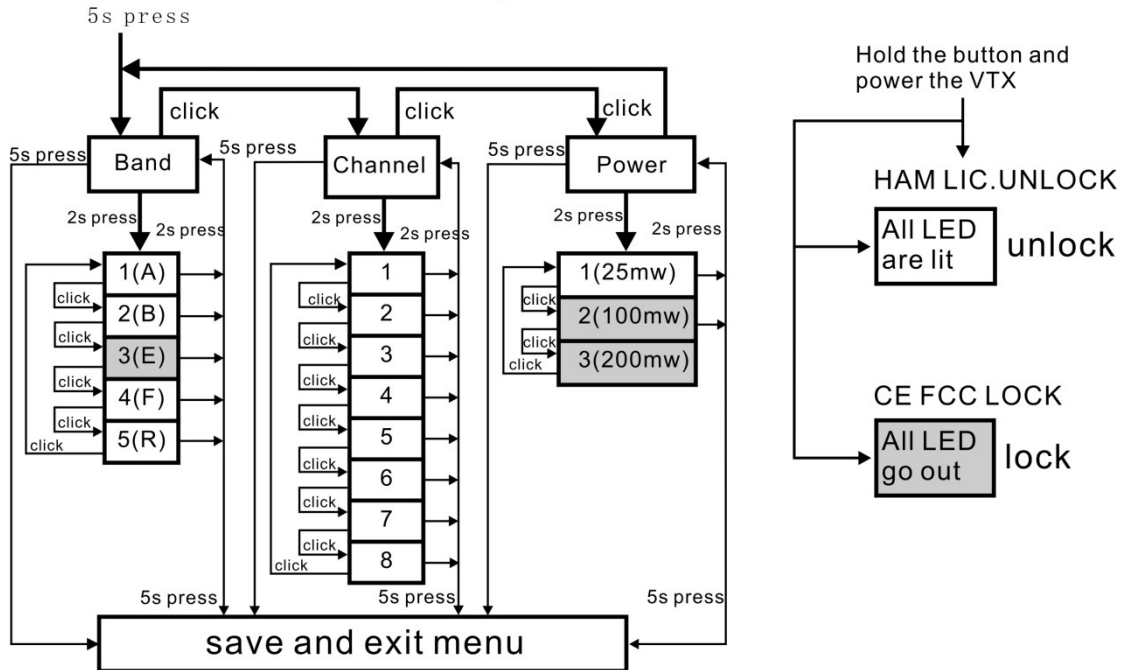
CE and FCC unlicensed user chart

FR \ CH	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	
A	5865	5845	5825	5805	5785	5765	5745	—	MHz
B	5733	5752	5771	5790	5809	5828	5847	5866	MHz
E	—	—	—	—	—	—	—	—	MHZ
F	5740	5760	5780	5800	5820	5840	5860	—	MHz
R	—	—	—	5769	5806	5843	—	—	MHz

Unlocked FCC HAM licensed user chart

FR \ CH	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	
A	5865	5845	5825	5805	5785	5765	5745	5725	MHz
B	5733	5752	5771	5790	5809	5828	5847	5866	MHz
E	5705	5685	5665	—	5885	5905	—	—	MHz
F	5740	5760	5780	5800	5820	5840	5860	5880	MHz
R	5658	5695	5732	5769	5806	5843	5880	5917	MHz

* From the factory this video transmitter is designed to operate within CE and FCC unlicensed users specifications. To use the unlocked features of this VTX the user is

required to have a HAM radio license or prior consent from the FCC.By purchasing this equipment, the user is agreeing that they understand these responsibilities and will operate the equipment legally. Emax cannot be held responsible for your actions if you purchase and/or use this product in violation of your government's regulations.

Changing VTX setting via Betaflight OSD

Tinyhawk II Race is equipped with SmartAudio and is already configured with stock settings. The SmartAudio line is operated on UART 2 TX.

1. Power on Tinyhawk II Race, goggles, and Controller.

2. Follow the tips on screen to enter the main settings menu: THROTTLE MID+ YAW LEFT+ PITCH UP to enter OSD parameter adjustment menu. as shown in Figure 1.

3. In the menu interface, switching PITCH up/down to choose menu option. Move the cursor to "FEATURES" and stir Roll stick right to enter next menu. as shown in Figure 2. Using PITCH stick to move cursor to "VTX SA", as shown in Figure 3.Then pull ROLL stick right to enter VTX configuration menu, as shown in Figure 4.
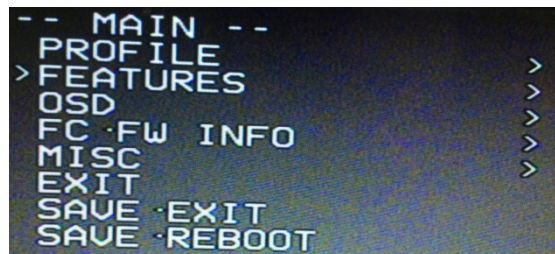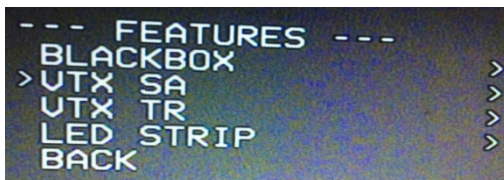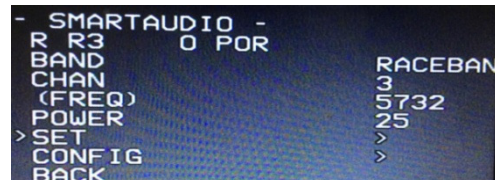

Figure 1

Figure 2

Figure 3

Figure 4

4. In the menu of VTX SA, we can configure the BAND, CHAN and POWER. Pulling the PITCH stick to move cursor up and down to choose VTX options that need setting. While pulling ROLL stick left and right to change the corresponding parameters.Once the parameters is set, moving the cursor to "SET", then turn ROLL stick right to enter "SET" and choose "YES" and turn ROLL stick right to save setting parameters, as shown in Figure 5.

5. In the menu of VTX SA, moving cursor to "CONFIG" to enter menu; While moving cursor to "PIT FMODE" and pulling ROLL stick right can turn off the VTX power, as shown in Figure 6.

NOTE: Because the VTX module offers power setting of 25mW / 100mW / 200mW

by default the Betaflight OSD displays 25mW, 200mW and 800mW as power options

If you wish to have the VTX at 100mW setting select > 200mW

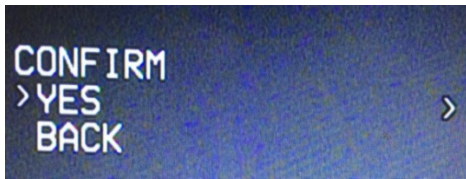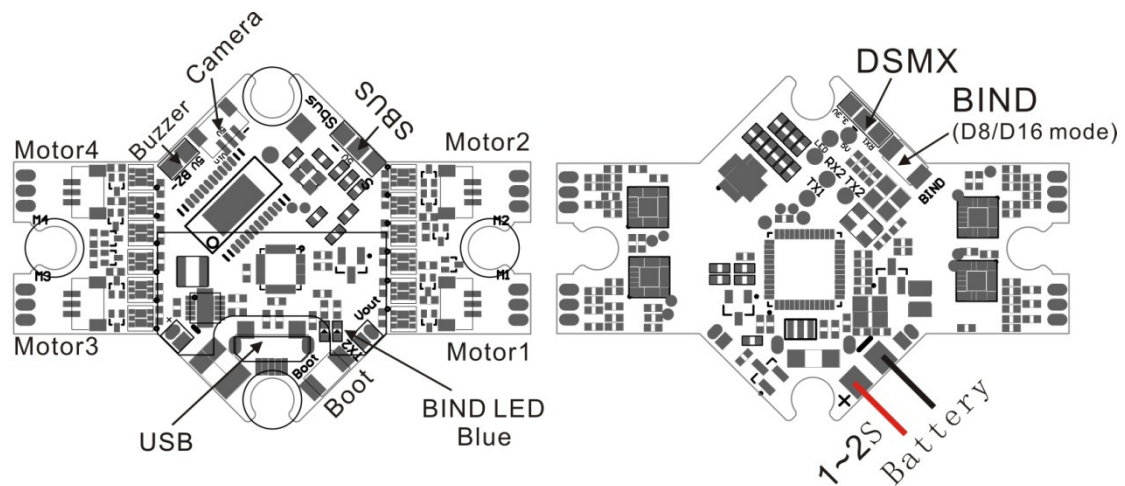If you wish to have the VTX at 200mW setting select > 800mW

Figure 5

Figure 6

# Tinyhawk II Race **All-in-One Flight Controller**

Tinyhawk II Race's main electronic board is shown above. This board contains a F4 flight controller with all 4 esc's and an 8CH receiver.

On-Board Receiver

The receiver is integrated into the main flight controller board and is set up via betaflight.

Number of Channels: 8CH

Compatibility: Receiver mode is SPI RX default protocol is FrSky_D (D8).
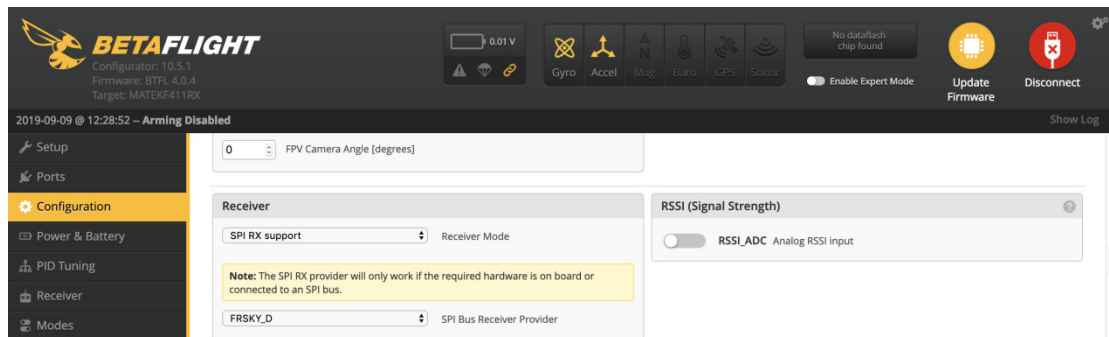
Binding Procedure

Binding is the process of uniquely associating a receiver to a transmitter module. A transmitter module can be bound to multiple receivers (not to be used simultaneously). A receiver can only be bound to one transmitter module.

1. Hold the bind button for 2 seconds while the flight controller is already on. When the RED LED is flashing, it means the receiver is in BIND MODE

2. Turn on the transmitter, make sure it is set to D8 mode, and then set it into bind mode. When the BLUE LED on the flight controller starts flashing, it means bind successful.

3. Power cycle the flight controller and take your radio out of bind mode.

Alternate Binding Method

It is possible to place the receiver into Bind Mode via the Betaflight configurator.

In the CLI tab type in this command: bind_rx

Hit enter and your receiver should be in bind mode. Follow steps 2-3 from above to complete the binding process.

Emax Tinyhawk II Race **Flight Controller (FC)**

This flight controller has a F4 MCU with a MPU6000 gyro. Tinyhawk II Race flight controller comes pre-programmed and properly tuned for optimal flight. The flight controller is programmed with Betaflight 4.1.0. For a full tune and configuration setting file (CLI dump file) please visit https://emax-usa.com/ for the CLI dump file.

Stock Flight Controller Settings

Tinyhawk II Race is configured to take a channel map of the TAER1234 convention. That is the channel map is in the respective order: throttle, aileron, elevator, rudder, AUX 1, AUX 2, AUX 3, and AUX 4. The arm switch on Tinyhawk II Race is set on AUX 1 and armed with the highest value. AUX 2 is configured for a 3 stage switch to select flight modes: Acro, Horizon, and Angle activating in an increasing order. AUX 3 is configured for the beeper. In a high state the motors will beep. AUX 4 is set to Flip Over After Crash mode (often referred to as turtle mode). Turtle mode is set when AUX 4 is in a high state. Please configure your radio as described above or change these settings in Betaflight Configurator.

Adjusting Software Settings (Betaflight Configurator)

Betaflight Configurator can be used to changed programmed settings on Tinyhawk II Race and to flash new firmware if desired. Betaflight Configurator and flight controller firmware can be downloaded at https://github.com/betaflight/. The hardware target for Tinyhawk II Race Flight Controller is MatekF411RX.

DISCLAIMER: We do not suggest changing any PID settings on Tinyhawk II Race or upgrading the firmware to new versions. Tinyhawk II Race comes stock with an optimal tune for superior flight performance. Changing this can affect flight time, overall speed, control of the aircraft, and excessive heat within the motors.

Reprogramming Tinyhawk II Race **Flight Controller**
1. Put the Flight Controller in DFU mode by pressing the BOOT button while plugging in the micro USB cable to a computer.
2. Select MATEKF411RX as the target and then select the firmware (4.1.0) or download the hex file from https://emax-usa.com/ . Select Manual Baud Rate with 256000 in the drop down menu
3. Select Load Firmware(Online) to download the firmware or Load Firmware (Local) if already downloaded the hex file.
4. Select Flash Firmware to program the flight controller
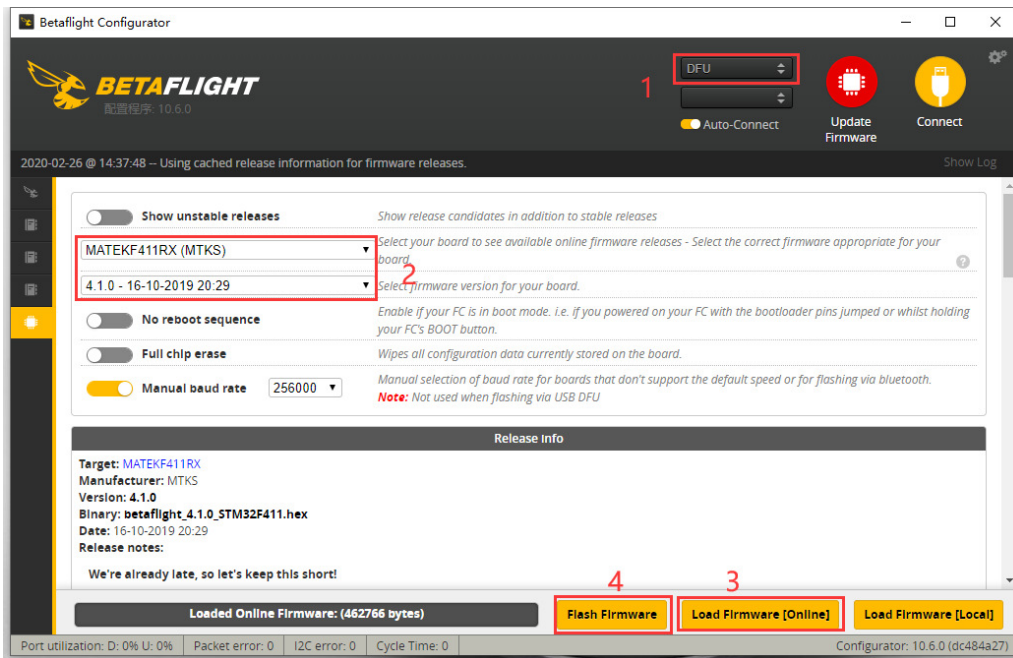
Restoring the Tinyhawk II Race default settings
1. Download the latest CLI Dump File from https://emax-usa.com/
2. Connect Tinyhawk II Race to Betaflight configurator and select the CLI tab
3. Open the CLI Dump File in a text editor and copy all the text.
4. Paste the settings into the command bar and press enter
5. Tinyhawk II Race will reconnect to Betaflight when completed
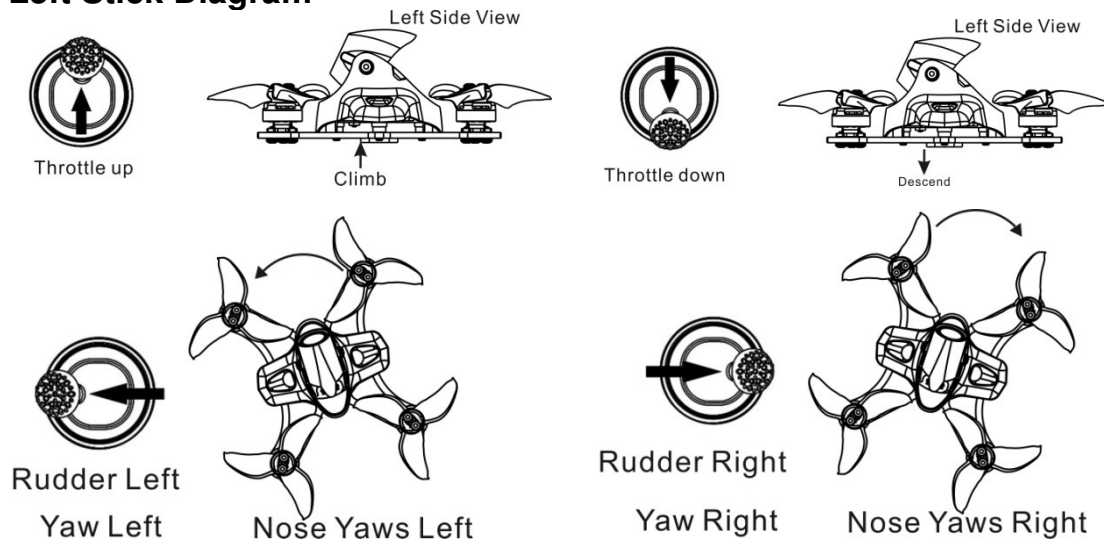
emax-usa.com
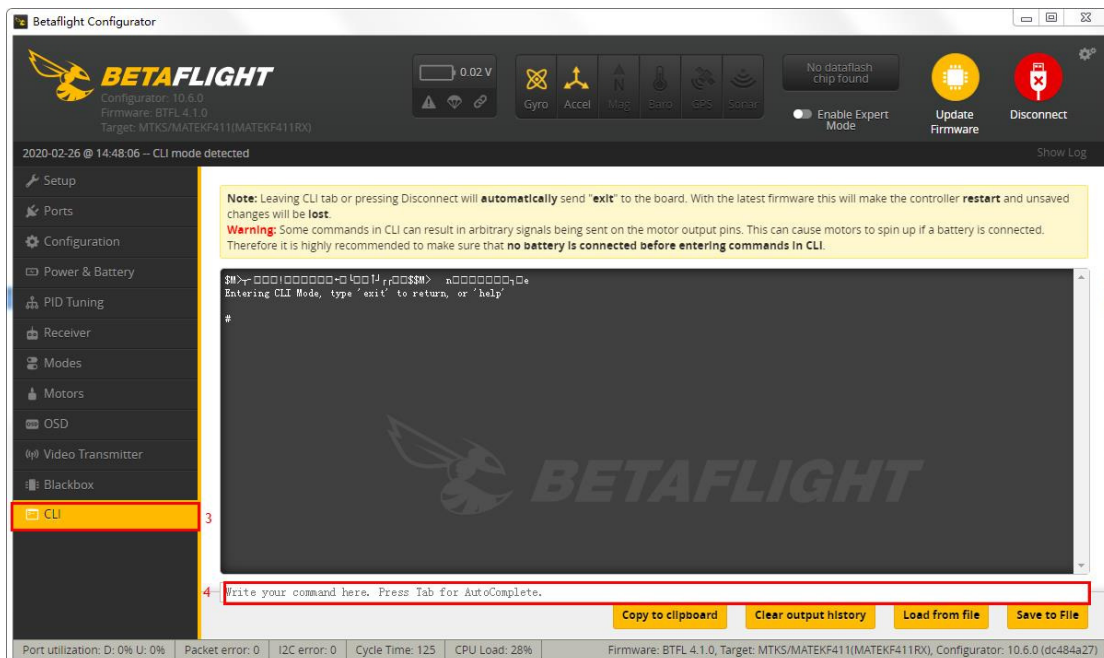
Flight

Always use caution when flying and operate in an open and controllable area. Please learn the flight controls first before powering on the aircraft to fly.
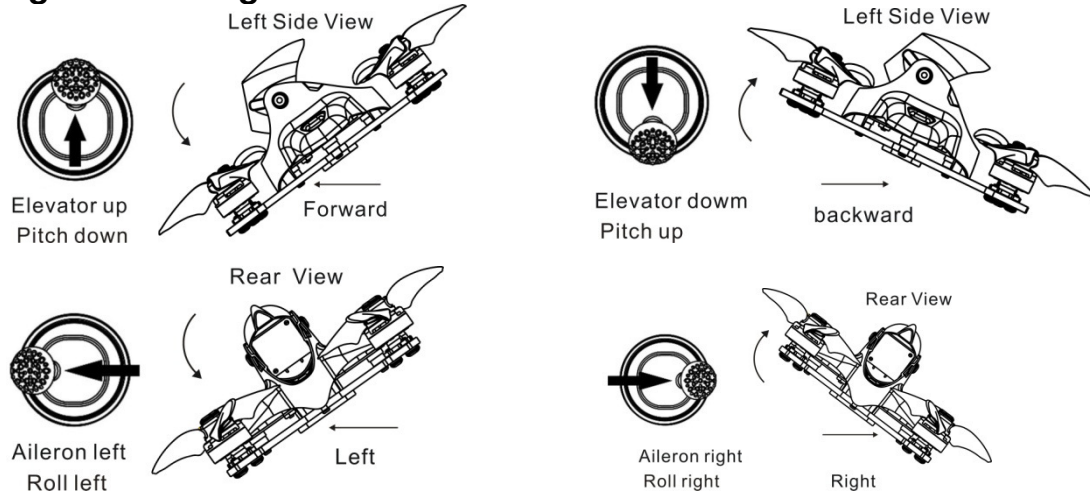
Radio Stick Controls

The left stick controls throttle and yaw direction of Tinyhawk II Race. The right stick controls pitch and roll of the aircraft.

Left Stick Diagram

Left Side View — Throttle up — Climb

Left Side View — Throttle down — Descend

Rudder Left / Yaw Left — Nose Yaws Left

Rudder Right / Yaw Right — Nose Yaws Right

Right Stick Diagram

Left Side View — Elevator up / Pitch down — Forward

Left Side View — Elevator dowm / Pitch up — backward

Rear View — Aileron left / Roll left — Left

Rear View — Aileron right / Roll right — Right

Fly Tinyhawk II Race

Start by powering on your Radio and Goggles. Tinyhawk II Race comes already bound to your radio and on the right video channel matched with your goggles. Power on Tinyhawk II Race by sliding the battery into the battery tray and plugging it in. Once the battery is plugged in, set Tinyhawk II Race on a stable surface so it can calibrate. Calibration takes a few seconds then Tinyhawk II Race is ready to fly. Tinyhawk II Race can fly for 4 minutes on a fully charged battery. Land Tinyhawk II Race when the battery reaches 3.2v; flying any longer can severely damage your battery and is not recommended.

Arming

Arming refers to setting Tinyhawk II Race to a fly ready state. When Tinyhawk II Race is powered on first it will not spin up the propellers until it is armed. Arm the aircraft by first moving throttle to the bottom position. Then move the left switch of the radio to its 3rd position upwards. You will see the propellers spinning when Tinyhawk II Race is successfully armed.

1. Throttle down   2. Switch to Arm Position
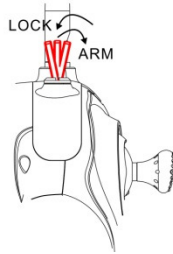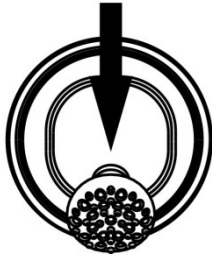
In the event of a crash always disarm immediately. Failure to disarm in a timely manner can damage Tinyhawk II Race.

Always disarm Tinyhawk II Race before handling it.

Flying Modes

Tinyhawk II Race comes stock set in rate mode. This is an advance mode where control sets the angular rate of the aircraft. The AUX 2 switch is set to change this mode on a 3 stage switch. When AUX 2 is in a high state, Tinyhawk II Race will be in angle mode where control sets the attitude of the aircraft. When the switch is in the middle state, Tinyhawk II Race will be in Horizon mode.

Line of Sight Flying

To learn how to fly Tinyhawk II Race start by flying it line of sight (no goggles yet). Power on Tinyhawk II Race and set it down in a cleared room. Arm Tinyhawk II Race then throttle up using the left stick to a hover position. Work on maintaining a constant altitude. Pitch and roll Tinyhawk II Race with the right thumb stick and yaw Tinyhawk II Race with the left thumb stick.

First Person View (FPV) Flying

Make sure Tinyhawk II Race and the goggles are on the same vtx channel and that you have a clear area to fly around in. Apply the same principals learned when flying Tinyhawk II Race line of sight except now work on flying in a forward direction while maintaining a controlled constant altitude. It is easier to learn flying FPV by always moving in a forward direction so always apply a slight amount of pitch using your right thumb stick. You can steer Tinyhawk II Race like a car using yaw on the left thumb stick.

There is an on screen display (OSD) overlaying the video feed from the camera of Tinyhawk II Race. The OSD displays important information such as flight time and battery voltage. Pay attention to these numbers during flight to know how much battery life is left. Tinyhawk II Race can fly for a maximum of 4 minutes. When the battery reaches 3.2v, land Tinyhawk II Race. Drawing the battery below 3.2v is not suggested and can damage the battery.

Thank you for purchasing our product! Enjoy Flying Tinyhawk II Race.

 Warning：

Please pay attention to your surroundings.

Not recommended for persons under 18 years of age.

emax-usa.com