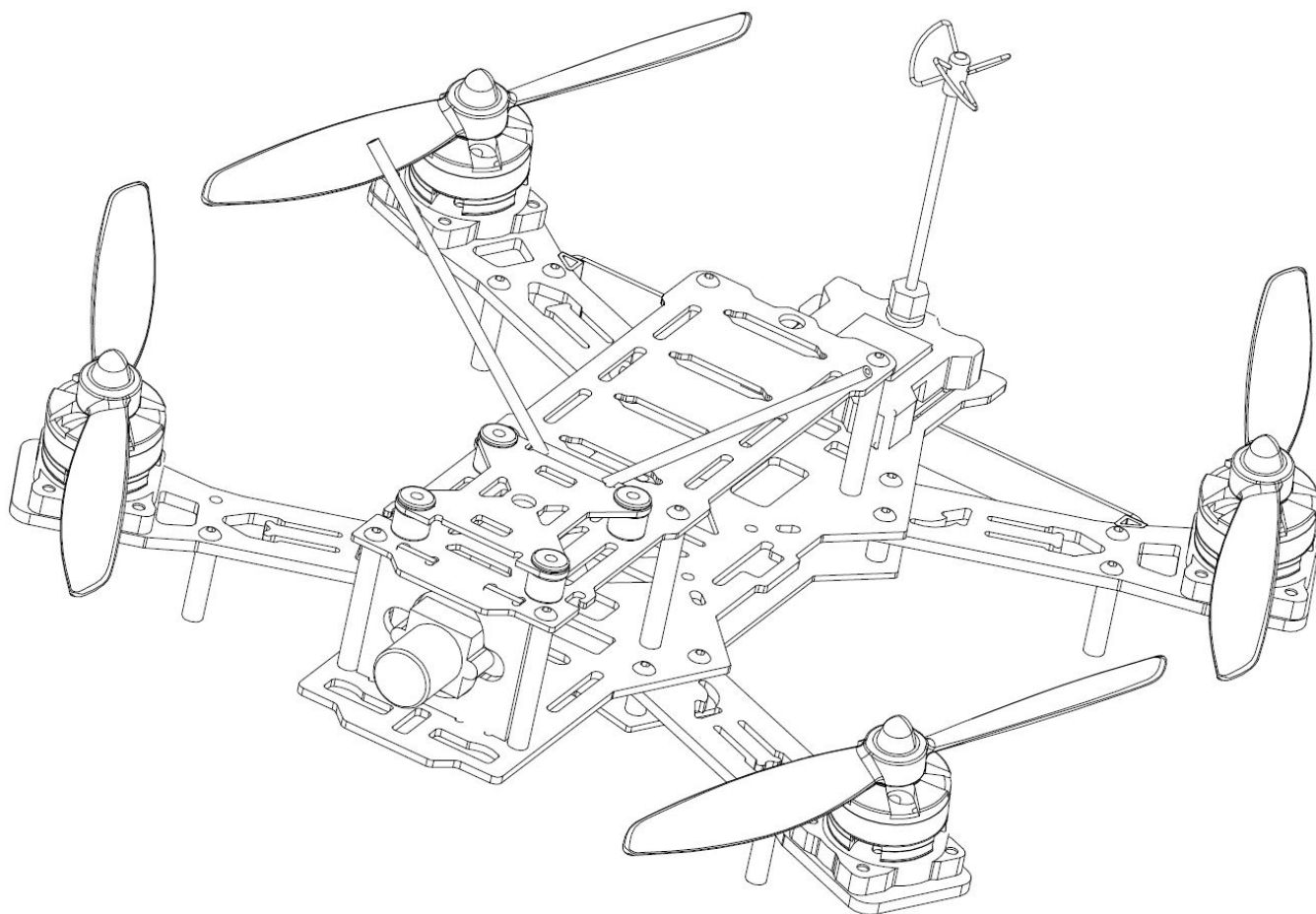


RTF

NIGHT HAWK PRO

Instruction Manual V1.0



Thanks for purchased Nighthawk Pro. Please follow the instruction manual to install and configure your Nighthawk Pro. This instruction manual need to complement with configuration software user instruction to configure Nighthawk Pro. Please refer to this link to learn more. “<http://www.yinyanmodel.com/en/DownList.asp>”

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Disclaimer

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

Our product is design for FPV enthusiasts, with open source flight controller and open source electronic speed

controller, to satisfy the constant update and upgrade with FPV enthusiasts' need.

Please read the instruction manual and warnings carefully, make sure battery charged and power connections are good during flights. 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.

Warnings

- 1、 Please following the instruction manual to install and operate Nighthawk Pro
- 2、 Do NOT use Nighthawk Pro while drunk, taking drugs, dizziness, fatigues, nausea and any other conditions no matter physically or mentally that could impair your ability.
- 3、 Must fly in safe zone (Area larger than 2500 square meter)
- 4、 Do NOT modify or overload the system with inappropriate parts or accessories.
- 5、 Do NOT fly at severe weather conditions (Such as wind speeds exceeding 10m/s, snow, rain, thunder and fog)
- 6、 Do NOT fly in high-electromagnetic environment.

Certifications

Nighthawk have certified by CE, RoHs.

Features Highlight

1. Independent designed solid, durable and stable frame, centroid and center of gravity are same even battery installed
2. Prebuilt frame and extra accessories, Built with powerful EMAX power system and open source flight controller to ensure power and customizable (RTF model can fly after battery and propellers installed)
3. The sturdy copter frame has extensive flight test and endurance test.
4. Bright COB rear LED, different LED color can use distinguish copters when group flying (LED power consumption is 4W, which might decrease flying times.)
5. All in one design to combine ESC, BEC, and flight controller for easy installation and easy replacement. Plug and play motor, easy for swapping motor and no soldering needed.
7. Independent. Independent ESC and flight controller and power supply. ESC switch to perform single ESC calibration and boot pad to perform software and firmware upgrade.
8. Flight controller use 32bit ARM micro processor, fast process speed to ensure fast respond
9. Gyroscope, magnetometer, and accelerometer and barometer expansion port. With CPPM receiver GPS feature can be enable. (GPS module sold separately)
10. Support ANGLE, HORIZON, HEADFREE, MAG, HEADADJ ...etc modes.
11. Support RC Input: standard signal, CPPM (PPM SUM) signal, PWM singal.
12. Low voltage monitoring and low voltage warning. (Buzzer sold separately)
13. Use EMAX 12A ESC, support open source BLHeli and ONESHOT feature; flight controller is based on NAZE32 Skyline32, support open source configurator Baseflight and Cleanflight
14. Extra power output and power output switch for LED expansion.

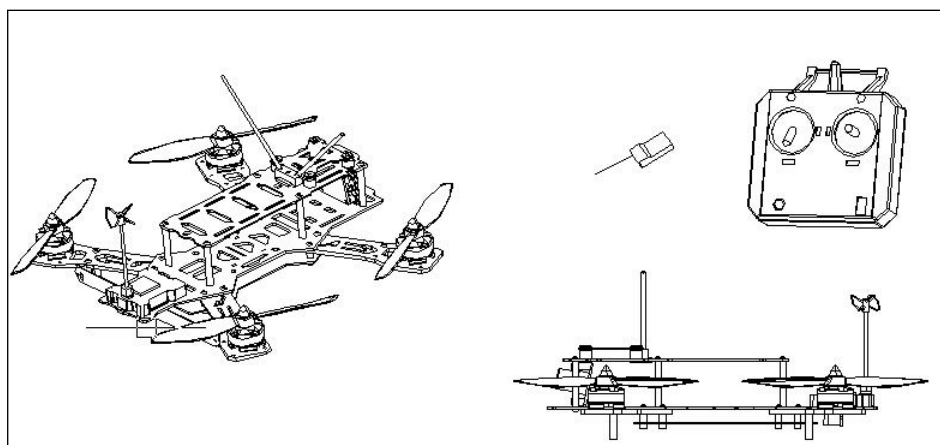
Specifications

Model Size & Weight	ARF	RTF
Package (L*W*H)	310*300*100 (mm)	470*300*100 (mm)
Nighthawk (L*W*H)	252mm*260mm*75mm	252mm*260mm*75mm
Weight (g)	Outer packing box: 295g, Inner holder: 180g	Outer packing box: 445g, inner holder: 240g
Flight weight (g)	440g (Not included Battery)	420g(Not included Battery)

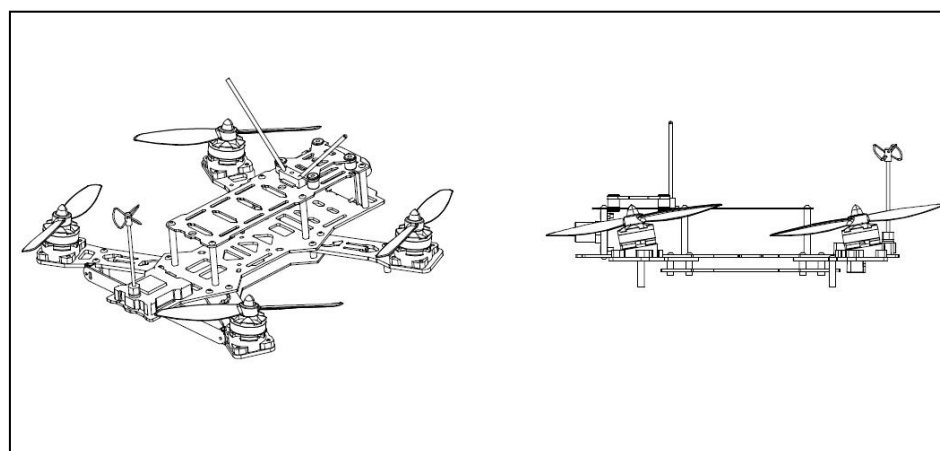
In the Box

1. User Manual
2. Nighthawk Pro

RTF Assembly drawing



ARF Assembly drawing



3. Accessories

Accessories ARF and RTF both included							
Accessories Type		Accessories Name		QTY			
A、Propeller		CW Propellers		2PCS			
		CCW Propellers		2PCS			
B、Battery & wire accessories	Battery accessories	Battery Strap		1PC			
		Velcro		1PC			
	Receiver wire accessories	Receiver wire mesh (ARF preassembled)		1PC			
C、Chassis Accessories		8Pin PVC Connector (ARF preassembled)		1PC			
		6 Pin PVC Connector		1PC			
		5 Pin PVC Connector		1PC			
		2Pin PVC Connector (Red & Brown)		1PC			
		2Pin PVC Connector (Orange & Red)		1PC			
D、Video accessories		Antenna		1PC			
E、Flight controller accessories		Cable		1PC			
F、Receiver Accessories		Receiver antenna base		1PC			
G、MOBIUS accessories		MOBIUS Plate		1PC			
		Shock absorber		5PCS			
RTF Accessories			ARF Accessories				
Accessories Type	Accessories Name		QTY	Accessories Type	Accessories Name		QTY
H、Motor Accessories	Inclined motor mounting base		4PCS	K、Camera Accessories	camera mounting plate		1PCS
	M2.5*8 screw		17PCS		M2.3*6.5 Self tap screw		5PCS
I、Camera Accessories	camera mounting plate		1PC	L、Accessories	M3*18 screw		1PC
	M2.5*8 Nylon screw		5PCS		M3*10 screw		1PC
	M2.5 Nylon nuts		5PCS		M3*8 screw		1PC
J.Accessories	M3*18 screw		1PC		M3*6 screw		1PC
	M3*10 screw		1PC		M2.5*8 screw		1PC
	M3*8 screw		1PC		M3*8 Self tap screw		1PC
	M3*6 screw		1PC		M3*6 Self tap screw		1PC
	M3*8 Self tap screw		1PC		M2.5*6 Self tap screw		1PC
	M3*6 Self tap screw		1PC		M3*6 steel screw		1PC
	M2.5*6 Self tap screw		1PC		M2.5*8 nylon screw		1PC
	M2.3*6.5 Self tap screw		1PC		M3*6 nylon screw		1PC
	M3*6 steel screw		1PC		M2.5 nylon nut		1PC
	M3 nyloc nut		1PC		M3 nyloc nut		1PC
	M3*6 nylon screw		1PC				

Required Tools and Equipments

- 1、 Battery with XT60 connector (Suggested battery size: 3-4S 1300-2200mah 35C) For fly safety and main board power range, please use propellers 5-6inches under 3S and propellers 5inches under 4S.
- 2、 1.5MM, 2.0MM, 2.5MM hex driver, tweezers, needle nose pliers, scissors, etc...
- 3、 Computer or Laptop
- 4、 Monitor and/or goggles.
- 5、 Transmitter (ARF model ONLY)

Installation Steps

Step 1 Preparation

Take out the frame from the package and put it on a horizontal plane (like table). Plug it to computer by USB cable.

Step 2 Driver and Configuration Software Installation

1、 Install Driver

Please install the the drive program to your computer if you donot have it already.

- (1) Please choose the compatible driver for your computer, link
<http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx>
- (2) Install the drive program on your computer.
- (3) Please switch the ESC switch to ON
- (4) Connect flight controller to computer with Micro USB cable
- (5) Follow steps to install the driver.

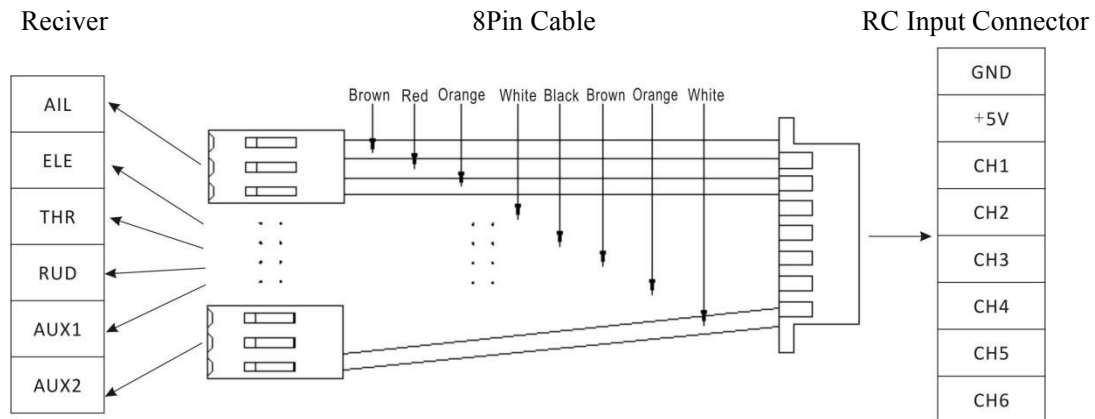
2、 Install Configuration Software

- (1) Please install Google chrome web browser.
- (2) Open Google Chrome web browser, go to "Chrome Web Store" and search BaseFlight - Configurator.
- (3) Add " BaseFlight - Configurator" App.

Note: Installing Cleanflight Configurator is similar to Baseflight Configurator, we will not discuss it in this manual

Step 3 Receiver Connection

Receiver and Flight Controller Connection (ARF model ONLY)



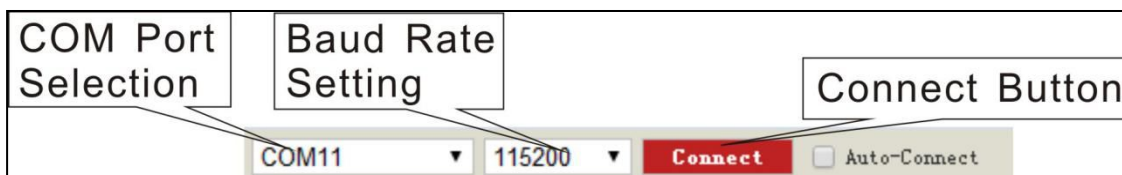
Step 4 How to use Baseflight Configurator

Only Baseflight Configurator will be discussed below. If a customer uses Cleanflight components, please download the Cleanflight configurator to configure your Cleanflight controller.

Note: RTF version only needs to follow the accelerometer and magnetometer calibration and ESC calibration. ARF will need to follow the accelerometer and magnetometer calibration, ESC calibration, Mode selection and transmitter calibration.

1、Flight Controller and Configurator

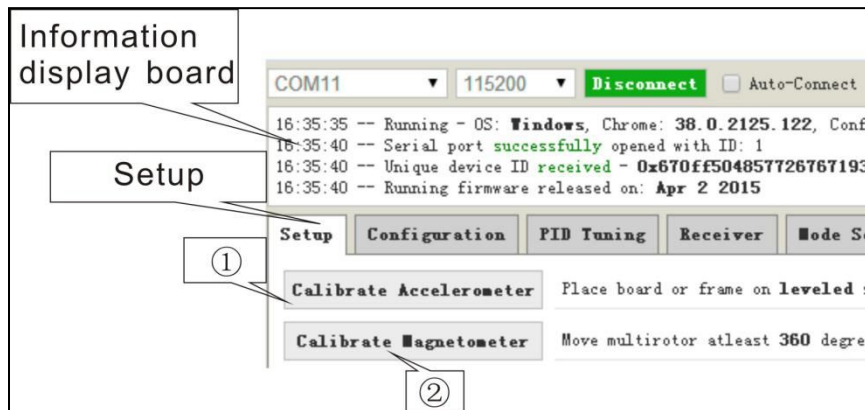
- (1) Please switch the ESC switch to ON
- (2) Connect flight controller to computer with Micro USB cable, blue light will light on flight controller and start self-checking. (Please refer to Appendix - Self-checking light status)
- (3) In Baseflight Configurator App, select COM port and Baud Rate
- (4) Click "Connect", flight controller and configurator are connected when the button changes to green.



2、Flight Controller Setting (Basic)

Accelerometer and Magnetometer Calibration

Please select "SETUP"



① Calibrate Accelerometer

② Calibrate Magnetometer

(1) Calibrate Accelerometer: Place board or frame on leveled surface, then select "Calibrate Accelerometer", once the accelerometer calibration is complete, data will be save automatically. Note: Starting or ending accelerometer calibration will be shown in the message display. (Make sure not to move the board or frame during calibration)

(2) Calibrate Magnetometer: Select "Calibrate Magnetometer", make sure to rotate the board or frame 360 degree in all axis within 30sec (rotate axis included: Roll axis, pitch axis and yaw axis). Note: Starting or ending magnetometer calibration will be shown in the message display.

ESC Calibration

Please make sure to REMOVE PROPELLERS before perform ESC Calibration !

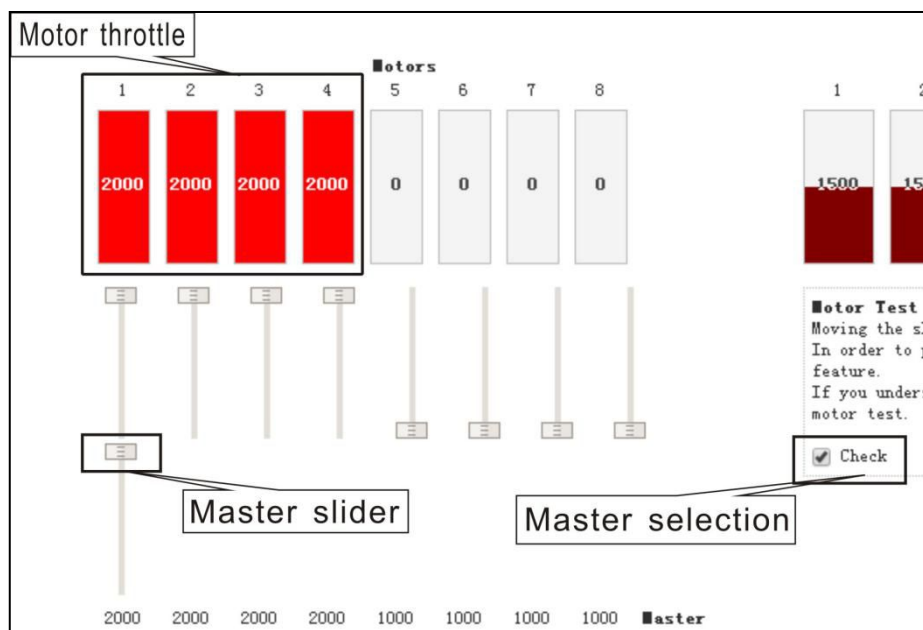
(1) Please select "Configuration", change Maximum Throttle to 2000 and save

(2) Please select "Motor Testing"

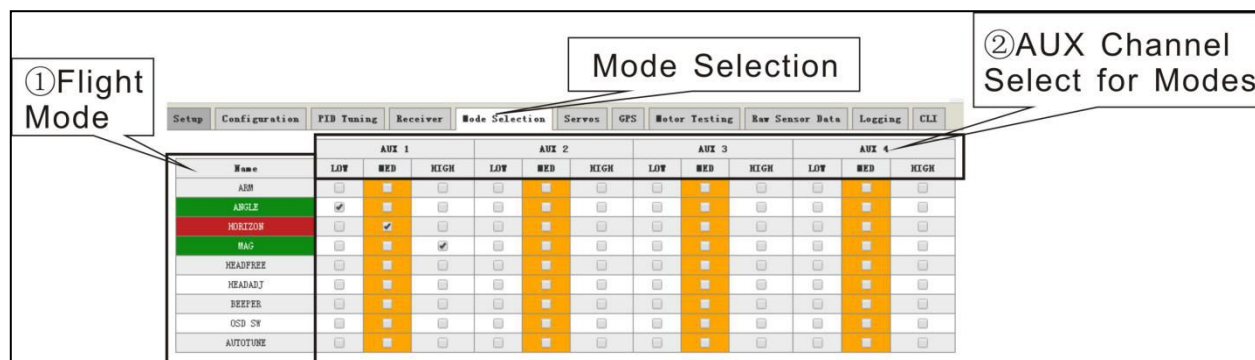
① Please check the box for Motor Test

② Move the master slider to MAXIMUM

(3) Power the unit, after the MAXIMUM throttle confirmation sound (BEEP- BEEP-) move the slider to minimum and wait for the MINIMUM throttle confirmation sound (long BEEP---), then you will hear the confirmation of battery cell (if you using 3 cell battery it will (BEEP-, BEEP-,BEEP), once the unit is ready confirmation sound ("♪ 1 2 3"). ESC calibration is completed.



Mode Selections



(1) Please select "Mode Selection"

① Modes: ARM, ANGLE, HORIZON, MAG, HEADFREE, HEADADJ, BEEPER, OSD SW, etc... Some modes will not appear unless sensor is connected. Ex: If barometer is not connected to the flight controller, the altitude mode will not display in the list.

② AUX Channel Select for Modes.

(2) AUX Channel for Modes: Select desired AUX channel for mode, then check the box and save the setting by click the "SAVE" at right bottom corner. When mode is selected by switch the AUX channel, selected mode name will highlighted green, other will highlighted red on the screen.

Red LED (Mode indicator) will lit. Some mode need to be select at the same time to function correctly.

Copter Testing

Please make sure to REMOVE PROPELLERS before perform ESC Calibration !

(1) Connect receiver and flight controller

(2) Please select "Raw Sensor Data"

(3) Rotate copter to check all sensor are correct (sensor data should change according to copter rotation)

(4) Please select "Motor Testing"

(5) Turn on transmitter

(6) Connect battery to power on the copter

(7) Use transmitter to arm motor, flight controller light indicator will turn green. Arm and disarm motor are shown below (Mode 2 transmitter as example below)



Motor Arm

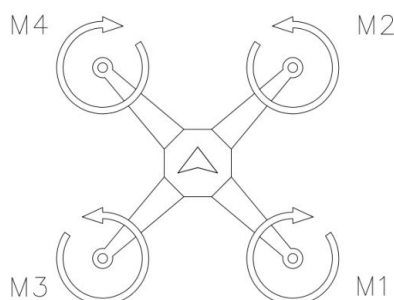


Motor Disarm

(8) Move throttle stick up

(9) Use transmitter stick to control pitch, roll and yaw, observe the motor power bar under "Motor Testing". Make sure the motor power bar are change according to transmitter stick.

(10) Test motor direction: Use a piece of paper to touch the motor to check the motor direction (Motor direction should be the same as figure shown below) Please be careful and only move the motor little by little while checking motor direction.



Step 5 Installation

Caution:

- ① Because the power cannot transmit in time, to avoid video transmitter burnt out, please install the antenna before power on when testing and using video transmitter.
- ② This light is high-heating to ensure the brightness. Please donot touch when using it or may be scalded. Caution high temperature!

After all testing completed, disconnect microUSB and disconnect battery.

- (1) Place velcro to frame (about center of gravity of the frame, depend on battery size, battery can be placed inside the copter frame or above the copter frame) See Fig 1.
- (2) Place receiver behind the camera on the middle board, stay away from the video transmission antenna.
- (3) Place receiver antenna into receiver antenna base, and install receiver antenna base to the frame. (There are 2 ways to install the receiver antenna, customer can choose the best way depend on receiver size) See Fig2, Fig3 and Fig4.
- (4) Please install video transmitter antenna to video transmitter. See Fig 2.
- (5) Please install propeller to motors (Beware of the CW and CCW propellers) M1 and M4 are CCW propellers, M2 and M3 are CW propellers.
- (6) Please remove camera cover and turn on monitor and/or power goggle.
- (7) Connect battery to power copter, and switch the video transmitter power to ON and check video feed from monitor and/or goggle.
- (8) Please adjust camera lens focus to best image quality.

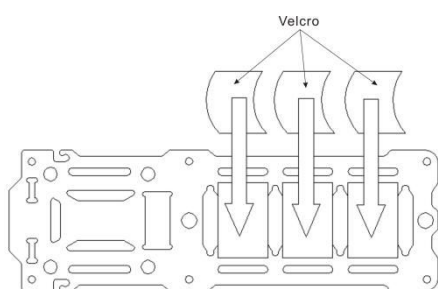


Fig 1

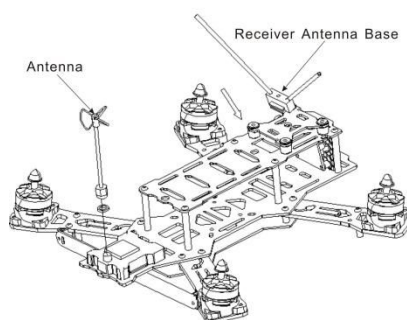


Fig 2

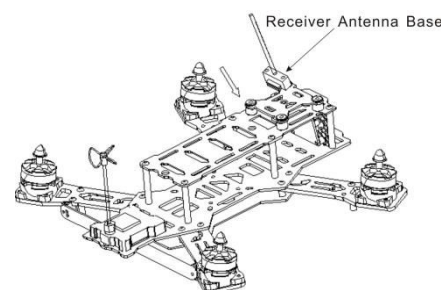


Fig 3

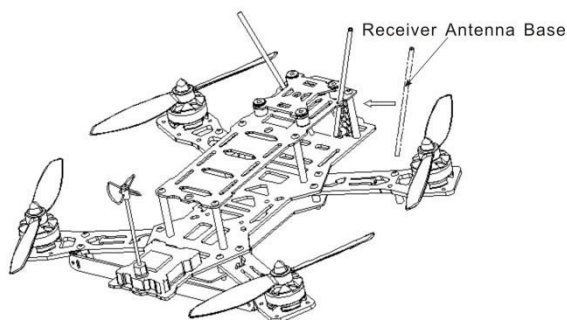


Fig 4

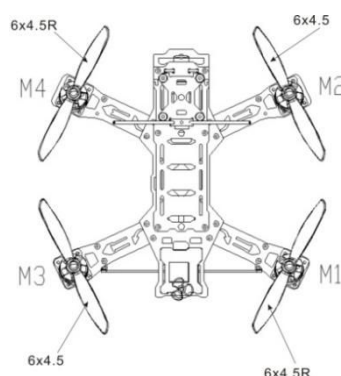
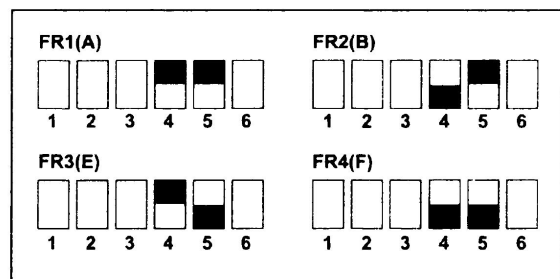


Fig 5

Video Transmitter Channel

Video transmitter channel switches are located at the bottom and rear of the copter, channel can be change to corresponding channel to monitor and/or goggle.

FR



CH



FR	CH	CH			
		CH1	CH2	CH3	CH4
FR	FR1(A)	5865M	5845M	5825M	5805M
	FR2(B)	5733M	5752M	5771M	5790M
	FR3(E)	5705M	5685M	5665M	5645M
	FR4(F)	5740M	5760M	5780M	5800M
FR	CH	CH			
		CH5	CH6	CH7	CH8
FR	FR1(A)	5785M	5765M	5745M	5725M
	FR2(B)	5809M	5828M	5847M	5866M
	FR3(E)	5885M	5905M	5925M	5945M
	FR4(F)	5820M	5840M	5860M	5880M

Step 6 Test flight

After completion of copter installation and testing, please place copter in the center of the test flight field, turn on transmitter then connect the battery to power copter. (If needed, switch the LED power to ON to power LED) Flight controller light will turn to solid blue, and motor will sound one long "beep----", then short "beep-" (number of short "beep" depends on battery cell), then sound ("♪ 1 2 3"), and wait for copter self checking to complete. After copter self checking completed, please make sure nothing around the copter within 5m before arming motors. (Please refer to Appendix - Self checking light status)

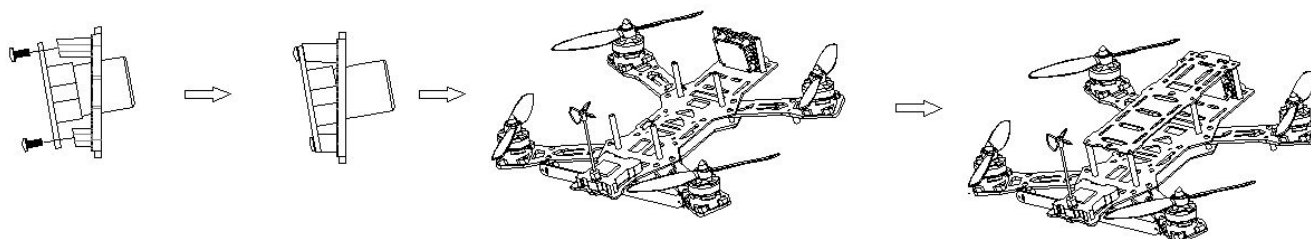
Note:

Please test the distance between radio and video transmitter before testing to make sure the actual distance between radio and video transmitter in your flight area, for the electromagnetism will influence the distance between radio and video transmitter.

Step 7 Upgrade Accessories Installation

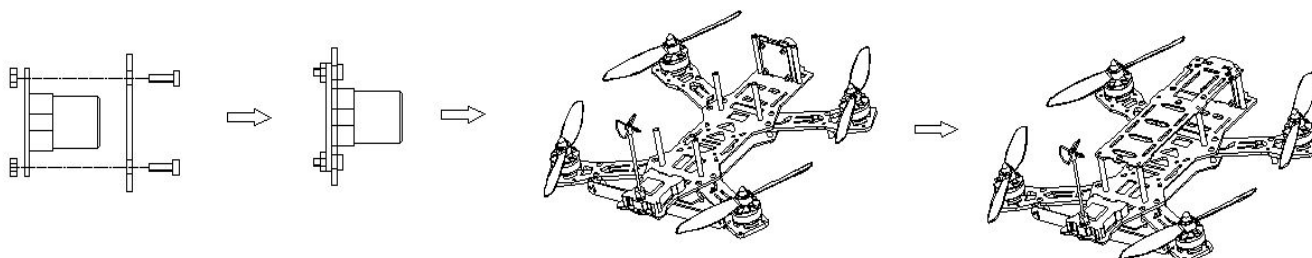
Inclined Camera Mounting Plate Installation

- (1) Place camera to inclined camera mounting plate
- (2) Use M2.3X6.5mm self tap screw to secure the camera
- (3) Remove top board
- (4) Insert camera with inclined mounting plate to the middle board
- (5) Install the top board with M3.0X6.0mm screw with hex driver.

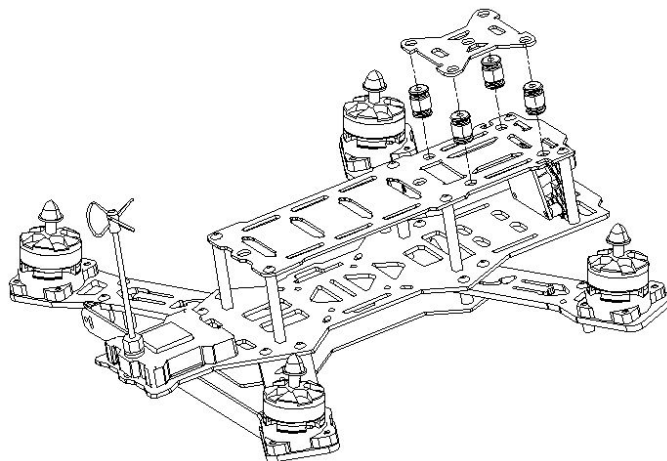


Camera Mounting Plate Installation

- (1) Place camera to camera mounting plate
- (2) Use M2.5X8.0mm nylon screws and M2.5 nylon nut to secure the camera.
- (3) Remove top board
- (4) Insert camera with mounting plate to the middle board
- (5) Install the top board with M3.0X6.0mm screw with hex driver.



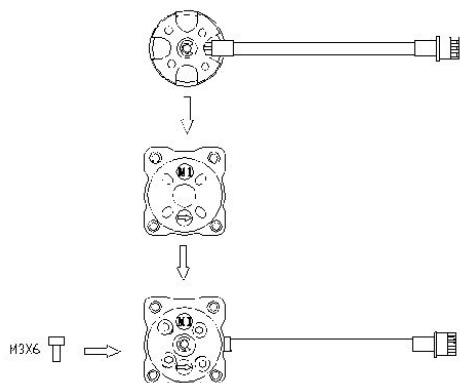
MOBIUS Accessories Installation



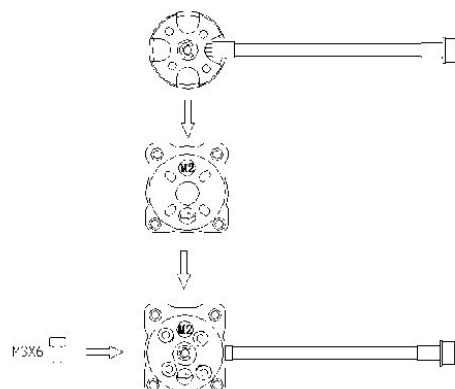
Inclined Motor Mounting Base

- (1) Install motor to inclined motor mounting base. (Please install the M1-M4 motor to the corresponding position, M1-M4 is indicated at the motor base)
- (2) Use M3x6mm steel screws to secure the motors
- (3) Install inclined motor mounting plate to the motor arm plate.
- (4) Use M2.5x8mm stainless steel screw to secure

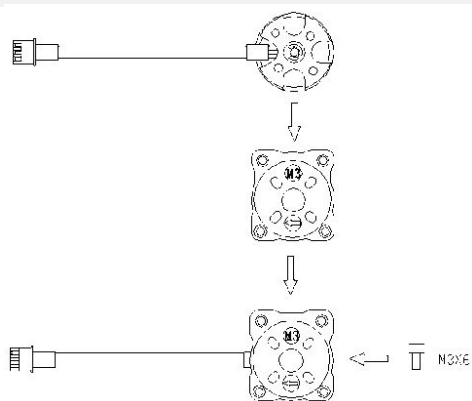
After installation completed, all motors should be inclined to the same angle. If any motor is not level, check motor and motor mount.



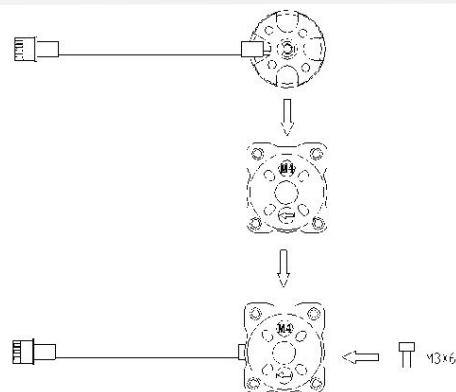
M1 Install Motor inclined mount



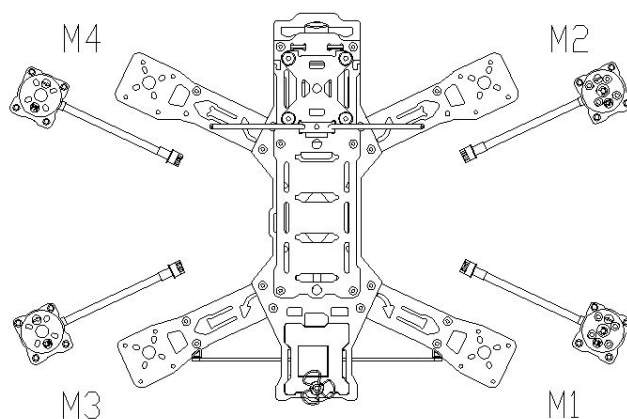
M2 Install Motor inclined mount



M3 Install Motor inclined mout

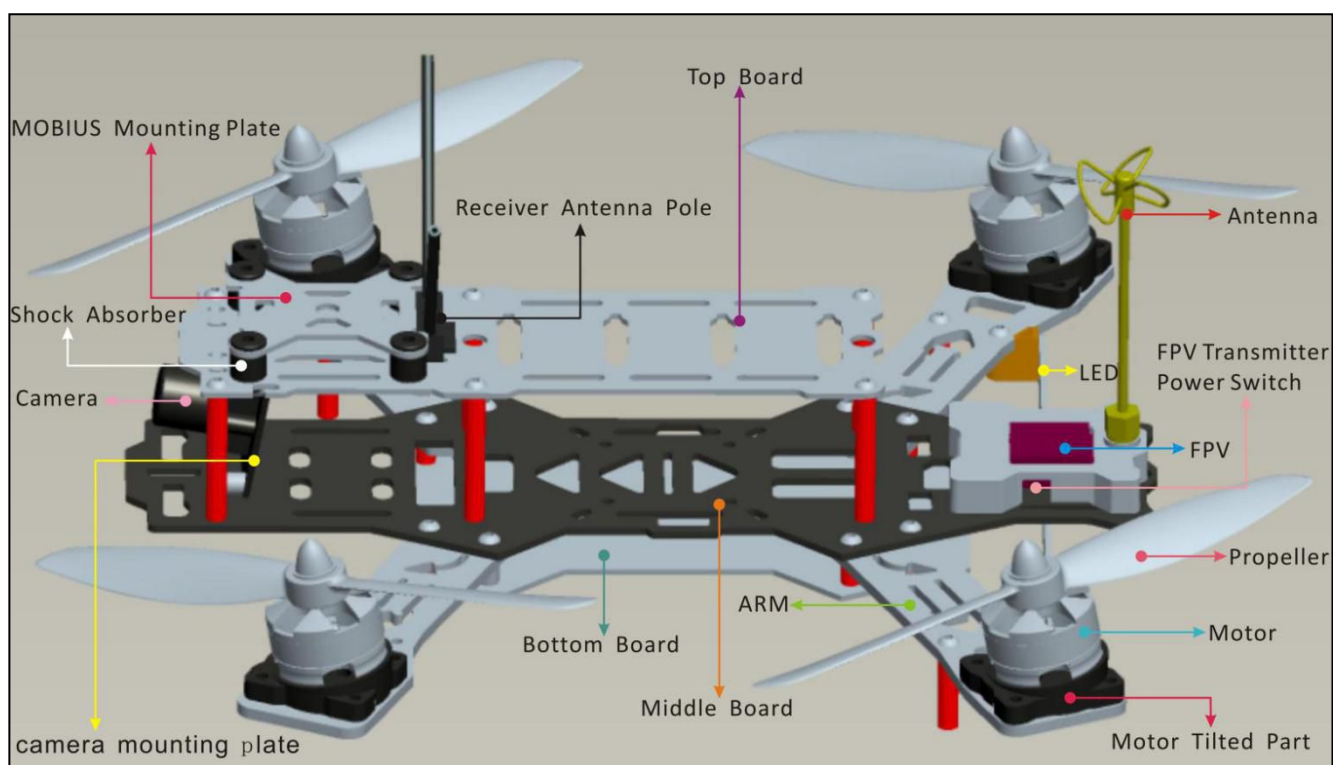


M4 Install Motor inclined mout

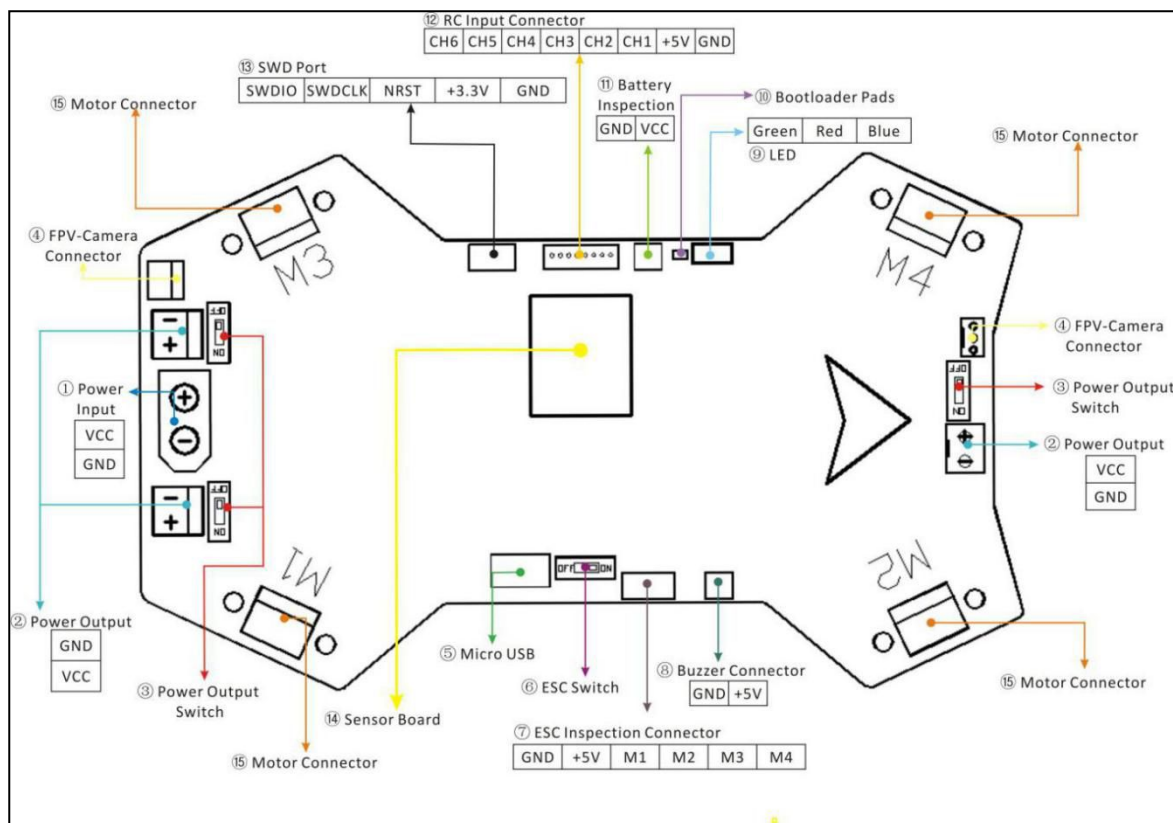


Install motors

Nighthawk Pro



Main Control Board



- ① Power Input. Support 2-4S Lipo battery (To ensure flight safety, use 5-6inches propellers for 3S battery and 5 inches propellers for 4S battery).
- ② Power Output. Supply external power for LED, Video TX, etc..
- ③ Power Output Switch. Control power output and output voltage is the same as input voltage (Default set to OFF)
- ④ FPV Camera Connector. Please use filter to reduce video signal noise when power and signal are connected.
- ⑤ MicroUSB Connector. Use microUSB cable to upgrade and configure flight controller.
- ⑥ ESC Switch. When ESC switches to OFF, single ESC testing and calibration can be performed through ESC inspection connector. When ESC switches to ON, copter can flight normally. (Default set to ON)
- ⑦ ESC Inspection Connector. Connector are set to GND, +5V, M1, M2, M3, M4 ESC signal. (Please refer to Appendix - ESC Calibration)
- ⑧ Buzzer Connector. (Please refer to Appendix - Buzzer)
- ⑨ LED Indicator. Starting from the right, Blue LED-Power Indicator, Red LED-Mode Indicator and Green LED-Status Indicator.
- ⑩ Bootloader Pads. Bootloader pad is used for firmware update (Please refer to Appendix - Bootloader Mode).
- ⑪ Battery Inspection Port. If buzzer is connected, buzzer will sound when minimum cell voltage is reached. (Please refer to Appendix - Low Cell Voltage Monitoring)
- ⑫ RC Input Connector/GPS Connector. For CPPM receiver, CH1 is CPPM receiver signal pin. From right: GND, +5V, CH1(AIL), CH2(ELE), CH3(THR), CH4(RUD), CH5(AUX1), CH6(AUX2)
If GPS feature is enabled, CH3 and CH4 are GPS Signal Pin (CH3: TX, CH4: RX). If use CPPM receiver, CH5 and CH6 are not used. If use standard receiver, CH1(AIL), CH2(ELE), CH3(THR), CH4(RUD).
- ⑬ SWD Port.
- ⑭ Sensor Board. Included gyro, compass and accelerometer expansion port.
- ⑮ Motor Connector. M1 - M4 Motor Connector

ESC Instruction

Nighthawk Pro is using EMAX 12A All in one ESC. For more info, please visit "<http://www.yinyanmodel.com/en/DownList.asp>" to download manual.

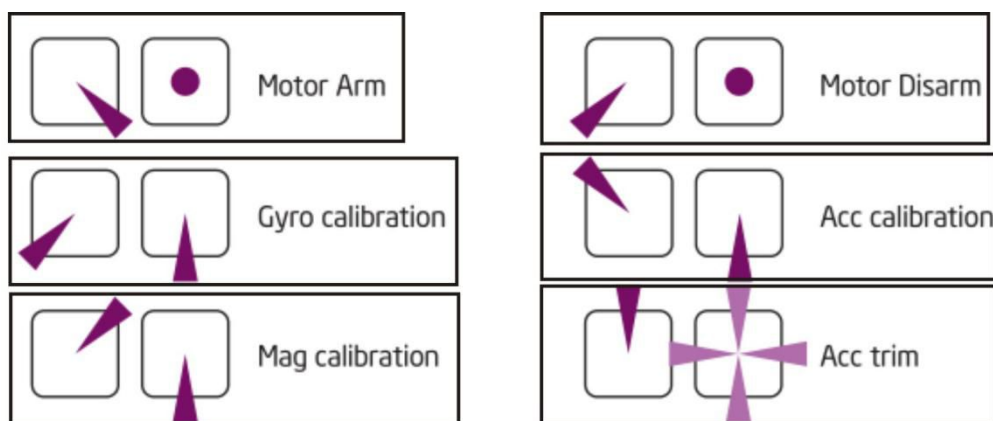
Note: To calibrate single ESC, make sure to switch ESC SWITCH to OFF (Please refer to Appendix - ESC Calibration)

Flight Controller Instruction

Nighthawk Pro flight controller is based on NAZE Skyline32 hardware. For more info, please visit "<http://www.yinyanmodel.com/en/DownList.asp>" to download manual or search NAZE flight controller on the web.

Transmitter Joystick Command

Transmitter Joystick Command (Mode 2 transmitter as example below)



Frequently Asked Questions

- ② After power, flight controller indicator not lit on, but ESC indicator lit, please check if ESC switch is switch to ON
- ② After connected microUSB to computer and flight controller, if the flight controller LED light are not on, please check if the computer has installed the driver, check ESC SWITCH is switched to ON position and check if microUSB connection.
- ③ If copter motor sound “beep-、 beep-、 beep-” after connected the battery, please redo ESC Calibration.
- ④ If green LED light flashing and motor not able to arm, please redo Accelerometer Calibration
- ⑤ If copter cannot lift off the ground, please check battery voltage.
- ⑥ If motor arm but motor is not spinning, please check connection between motor and ESC.
- ⑦ If no video feed on monitor or goggle, please check video transmitter and receiver channel are tuned to the same channel and power output switch for video transmitter to switch to ON.
- ⑧ If LED light is not on, please check power output switch for LED light is switched to On and make sure connection are secured.
- ⑨ If copter is drifting in roll and/or pitch axis, please redo Accelerometer Calibration or use Acc

Trim Sticks command to tune accelerometer.

⑩If copter is not moving in correct direction, please redo Magnetometer Calibration.

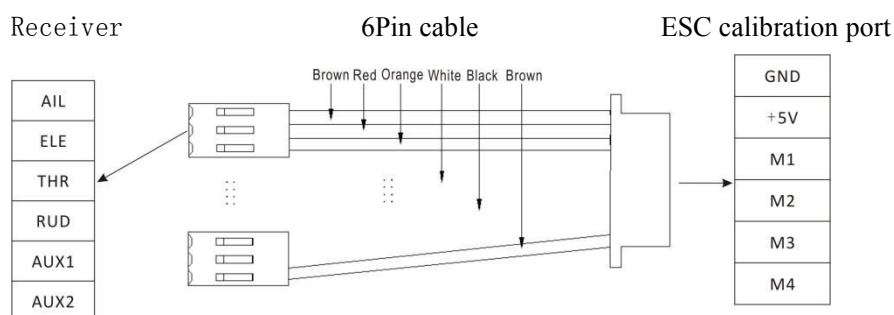
Appendix

ESC Calibration

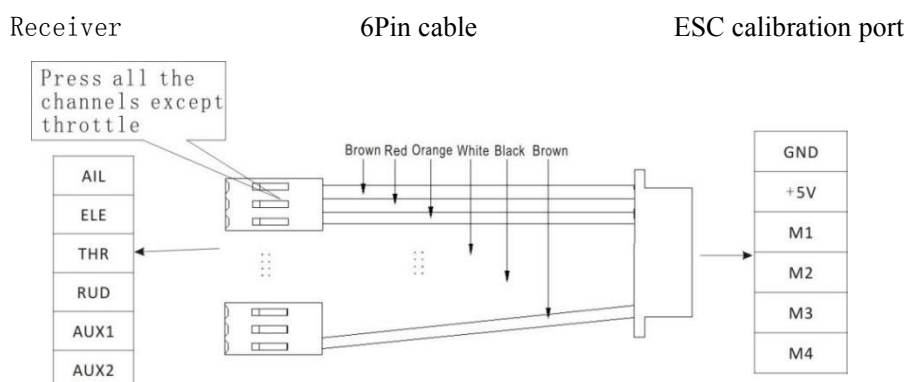
To calibrate single ESC:

①Switch ESC SWITCH to OFF positon.

②Calibrate M1 ESC: Since 3pin connector of M1 have BEC, connect M1 connector directly into THR on the receiver. Connector and Receiver connection see below:



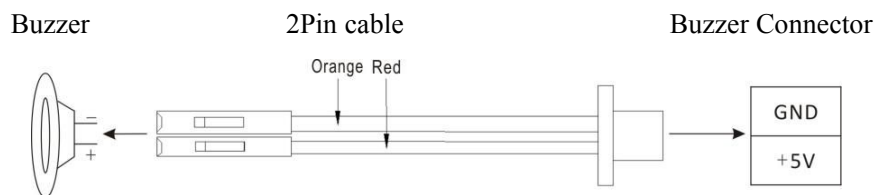
③Calibrate M2 ESC: Since M2 connector have no BEC, connect M2 connector directly into THR on receiver and connect M1 connector into other channels to supply power for receiver. Connector and Receiver connection see below:



④Calibrate M3 and M4 ESC: Same as Calibrate M2 ESC (instead of M2 use M3 and M4)

Buzzer

To ensure buzzer to sound while battery voltage is low, connect buzzer and buzzer connector then make sure battery inspection connector is connected with battery and enable buzzer and battery voltage monitoring in the "Configuration". Buzzer connection see below:



Battery Voltage Monitoring

To enable battery voltage monitoring, connect battery with battery inspection connector then enable battery voltage monitoring in the "Configuration" Please make sure positive and negative connection, otherwise reverse polarity will

damage the main controller board. Battery inspection connection see below:



Self Checking Light Status

Red LED and Green LED flashing ->Red LED flashing, Green LED off->Red LED off, Green LED flash couple time then off (if Red LED off then solid, mean flight mode is engaged) ->Self Checking Completed.

Bootloader Mode

Entering Bootloader Mode:

- (1) Using a tweezers or metal tool to short connect the “BOOT” pad on the control board.
- (2) Power the control board by USB, only POWER light will on at this time. Then disconnect the “BOOT” pad. If during this period the other 2 lights lit or cannot continue to the next step, please repeat the operation.
- (3) Next perform firmware update.

Safety first, make sure to fly in safe zone ! This product is not suitable for people under age of 18.

Happy Flying!!

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.