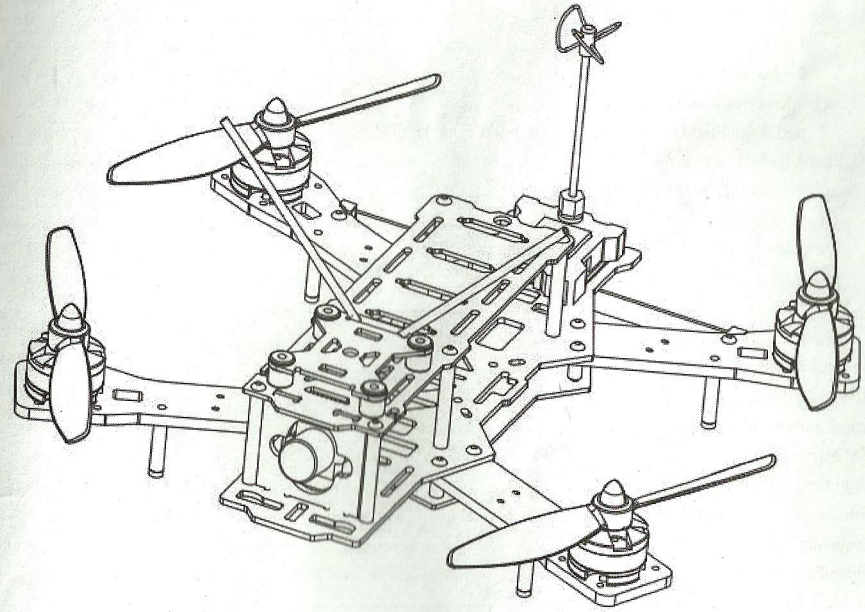
NIGHTHAWK PRO

Instruction Manual V1.3



EMAX

Thanks for purchased Nighthawk Pro. Please follow the instruction manual to install and configure your Nighthawk Pro. This instruction manual needs 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"

Index

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, FCC, RoHs.

Features Highlight

1. Independent designed solid, durable and stable frame, centroid and center of gravity are nearly the 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 switches 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 expanded. (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, tracker and other expansion.

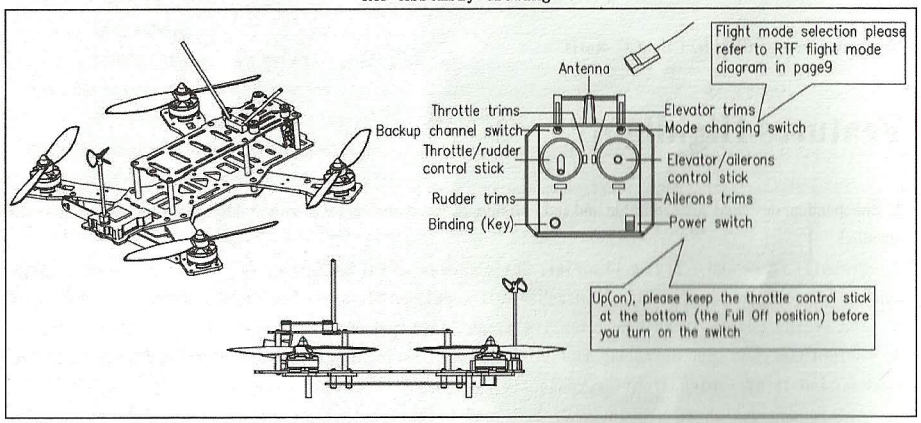
Specifications

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)	450g(Not included Battery)

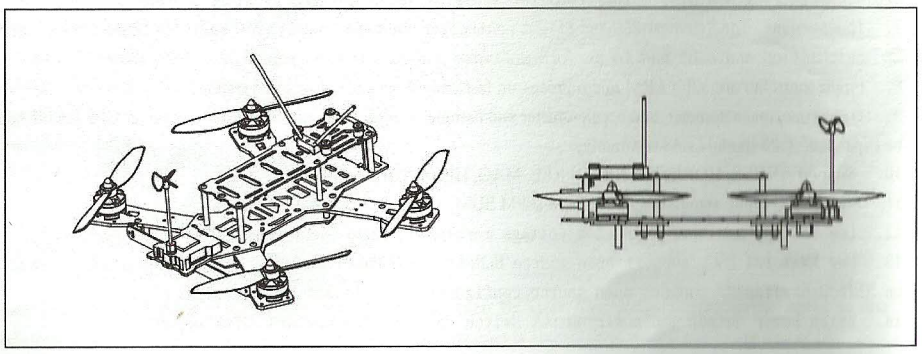
In the Box

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 (RTF preassembled)	1PC
C、Chassis Accessories		8Pin PVC Connector (RTF 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
H、Motor Accessories		Inclined motor mounting base	4PCS
		M2.5*8 screw	17PCS

RTF Accessories			ARF Accessories		
Accessories Type	Accessories Name	QTY	Accessories Type	Accessories Name	QTY
I、Camera Accessories	camera mounting plate	1PC	K、Camera Accessories	camera mounting plate	1PC
	M2.5*8 Nylon screw	5PCS		M2.3*6.5 Self tap screw	5PCS
	M2.5 Nylon nuts	5PCS	L、Accessories	M3*19 screw	1PC
J、Accessories	M3*19 screw	1PC		M3*10 screw	1PC
	M3*10 screw	1PC		M3*8 screw	1PC
	M3*8 screw	1PC		M3*6 screw	1PC
	M3*6 screw	1PC		M3*8 Self tap screw	1PC
	M3*8 Self tap screw	1PC		M3*6 Self tap screw	1PC
	M3*6 Self tap screw	1PC		M2.5*6 Self tap screw	1PC
	M2.5*6 Self tap screw	1PC		M3*7 steel screw	1PC
	M2.3*6.5 Self tap screw	1PC		M2.5*8 nylon screw	1PC
	M3*7 steel screw	1PC		M3*6 nylon screw	1PC
	M3 nyloc nut	1PC		M2.5 nylon nut	1PC
	M3*6 nylon screw	1PC		M3 nyloc nut	1PC

Note: Quadcopter with inclined motor mounting bases must choose flight mode, or the quadcopter cannot fly forward after taking off.

Required Tools and Equipments

1、Battery with XT60 connector (Suggested battery size: 3S 1300-2200mAH , 4S 1300-1800mAH 35C) For fly safety and main board power range, suggest 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

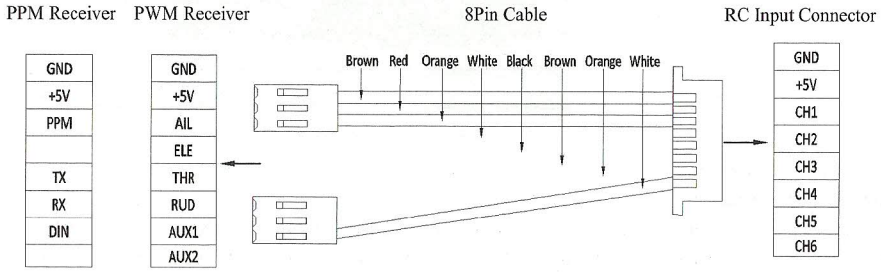
Please install the drive program to your computer if you donot have it already.
（1） Please choose the compatible driver for your computer, link http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpdrivers.aspx
（2） Install the drive program on your computer.
（3）Please switch the ESC switch to ON
（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 CleanFlight - Configurator.
（3）Add " CleanFlight - Configurator" App.
Note: Installing Baseflight Configurator is similar to Cleanflight Configurator, we will not discuss it in this manual

Step 3 Receiver Connection Diagram

Radio and Flight Controller Connection (ARF model ONLY)

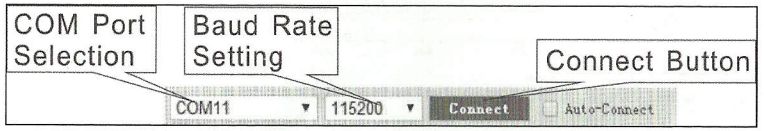


Step 4 How to use Cleanflight Configurator

Only Cleanflight Configurator will be discuss below. If customers use Baseflight components, please download Baseflight Configurator to configure you Baseflight controller.
Note: RTF version only need 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

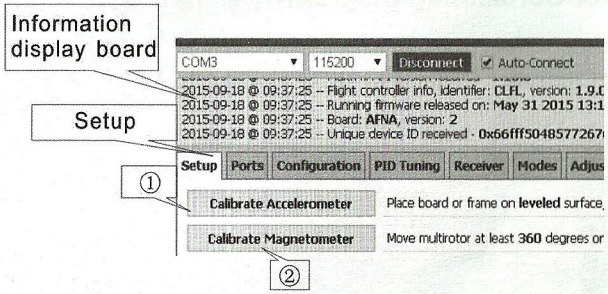
（1）Please switch the ESC switch to ON
（2）Connect flight controller to computer with Micro USB cable, blue light will lit on flight controller and start self checking. (Please refer to Appendix - Self checking light status)
（3）In Cleanflight Configurator App, select COM port and Baud Rate
（4）Click "Connect",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



2、Flight Controller Setting (Basic)

Accelerometer and Magnetometer Calibration

Please select "SETUP"



①Calibrate Accelerometer

②Calibrate Magnetometer

(1) Calibrate Accelerometer: Place board or frame on leveled surface, then select "Calibrate Accelerometer", once the accelerometer calibration is complete, date 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!

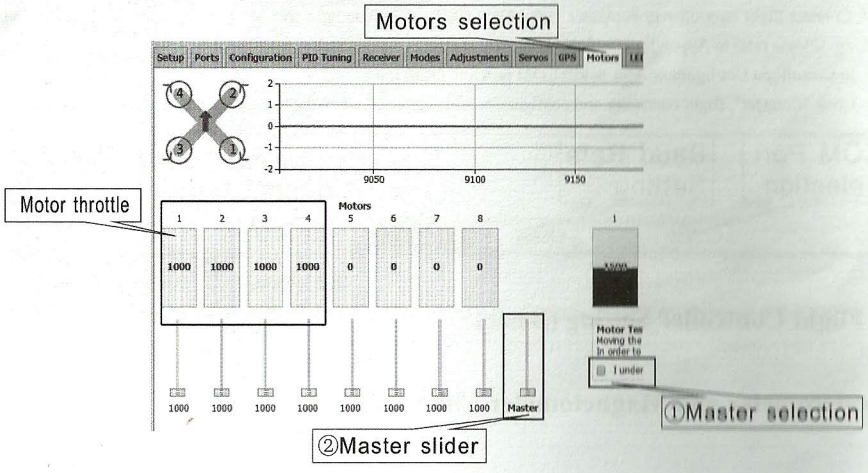
(1) Please select "**Configuration**", change Maximum Throttle to 2000 and save

(2) Please select "**Motors**"

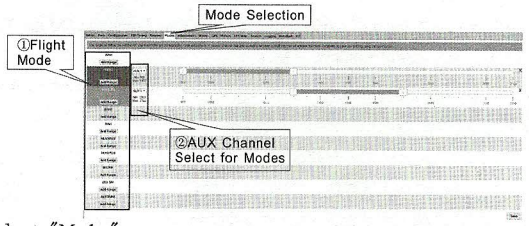
①Please check the box for Motor Test

②Move 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 "Modes"

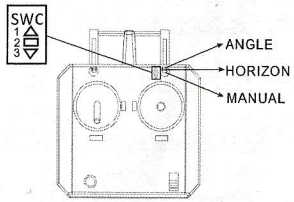
①Modes: ARM, ANGLE, HORIZON, MAG, HEADFREE, etc. If need to add another mode, please click "Add Range", Meanwhile, the right-hand of the channel selection drop-down box will open.

②AUX Channel Select for Modes.

(2) AUX Channel for Modes: Click the buttom "Add range" to add a Flight Mode. Meanwhile, select some channel as this flight mode channel in the right channel selection drop-down box, and select a range of settings by the slider, then click the lower right corner of the "Save" button. 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 indictor) will lit. Some mode need to be selected at the same time to function correctly. Some modes will only be shown when the corresponding sensors are connected, for example, the Baro mode will not appear if there is not a barometer connected. Some modes should be selected at the same time to be effective.

RTF mode selection diagram (ARF no need)

The radio in RTF version has the fail-safe function. SWC switch is flight mode selection switch. SWC switched to position 1 is ANGLE. Position 2 is HORIZON and 3 is MANUAL. Please refer to the diagram below.



Note: We suggest donot select MAG to avoid the big current interference to compass.

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

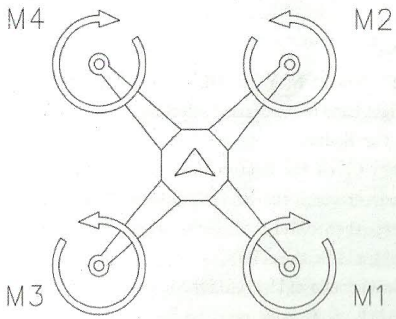
(6) Connect battery to power on the copter

(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)

（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 is 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.***

②This 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 micro USB 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.

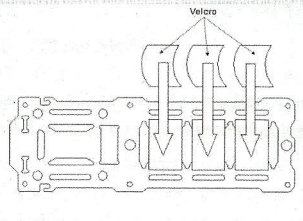


Fig 1

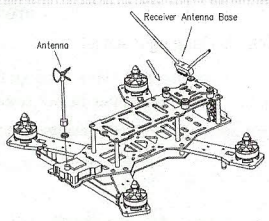


Fig 2

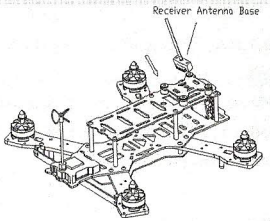


Fig 3

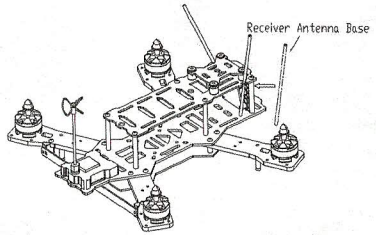


Fig 4

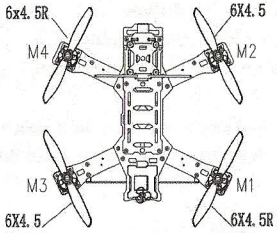
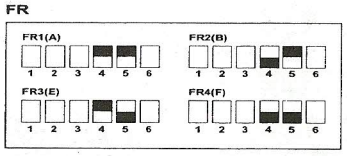
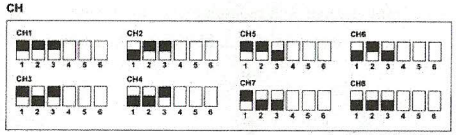


Fig 5

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. 20mw/200mw power switch is located at the side of FPV. Switching to copter head is 20mw and to tail is 200mw. The default is 20mw.





Frequency table								
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
FR1	5845MHz	5845MHz	5825MHz	5805MHz	5785MHz	5765MHz	5745MHz	5745MHz
FR2	5752MHz	5752MHz	5771MHz	5790MHz	5809MHz	5828MHz	5847MHz	5847MHz
FR3	5740MHz	5760MHz	5780MHz	5800MHz	5820MHz	5840MHz	5840MHz	5840MHz
FR4	5740MHz	5760MHz	5780MHz	5800MHz	5820MHz	5840MHz	5840MHz	5840MHz

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 aera, for the electromagnetism will influence the distance between radio and video transmitter.

Step 7 Upgrade Accessories Installation

Inclined Camera Mounting Plate Installation

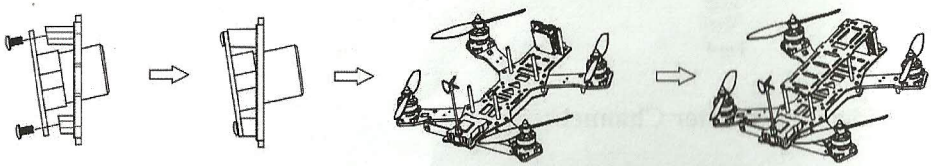
（1）Place camera to inclined camera mounting plate

（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

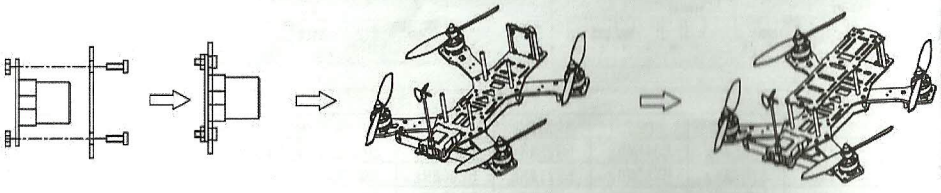
（1）Place camera to camera mounting plate

（2）Use M2.5X8.0mm nylon screws and M2.5 nylon nut to secure the camera.

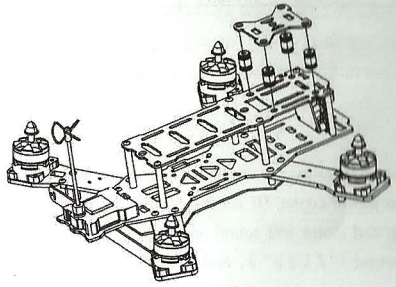
（3）Remove top board

（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

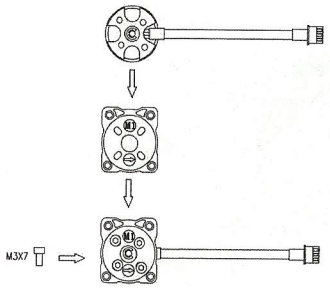
（1）Install motor to inclined motor mounting base. (Please install the M1-M4 motor to the corresponding position, M1-M4 is indicated at the motor base)

（2）Use M3x7mm steel screws to secure the motors

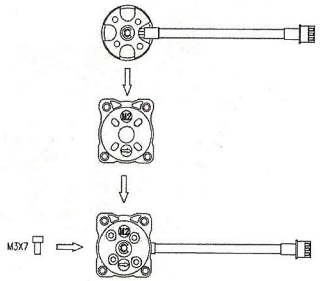
（3）Install inclined motor mounting plate to the motor arm plate.

（4）Use M2.5x8mm stainless steel screw to secure

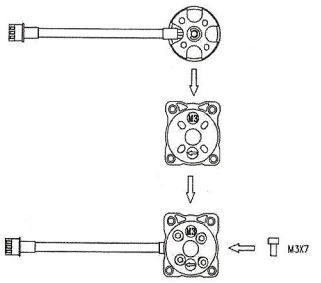
After installation completed, all motors should be inclined to the same angle. If any motor is not level, check motor and motor mount.



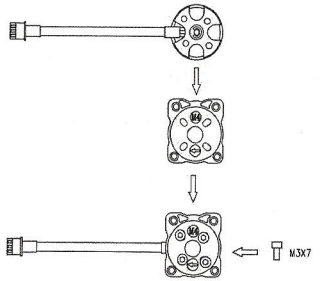
M1 Install Motor inclined mount



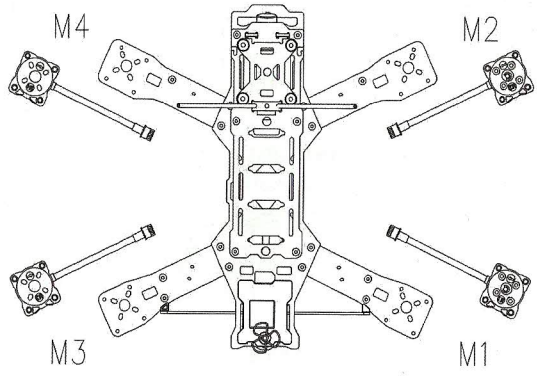
M2 Install Motor inclined mount



M3 Install Motor inclined mount

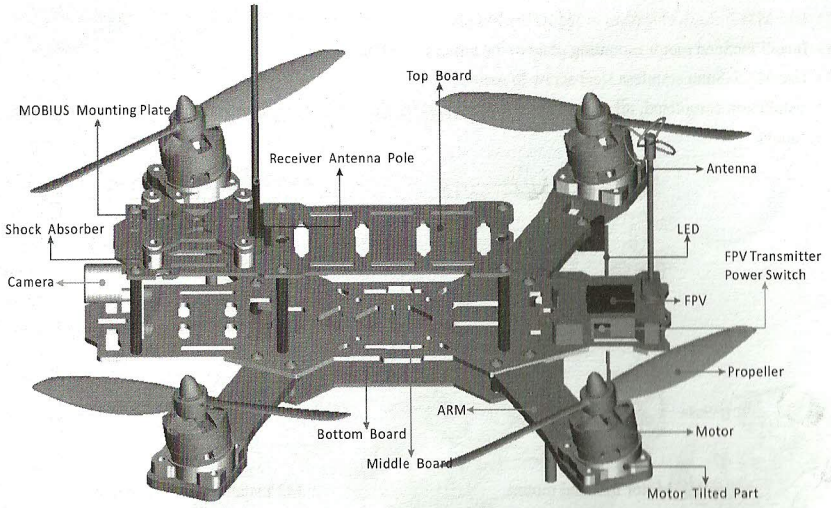


M4 Install Motor inclined mount

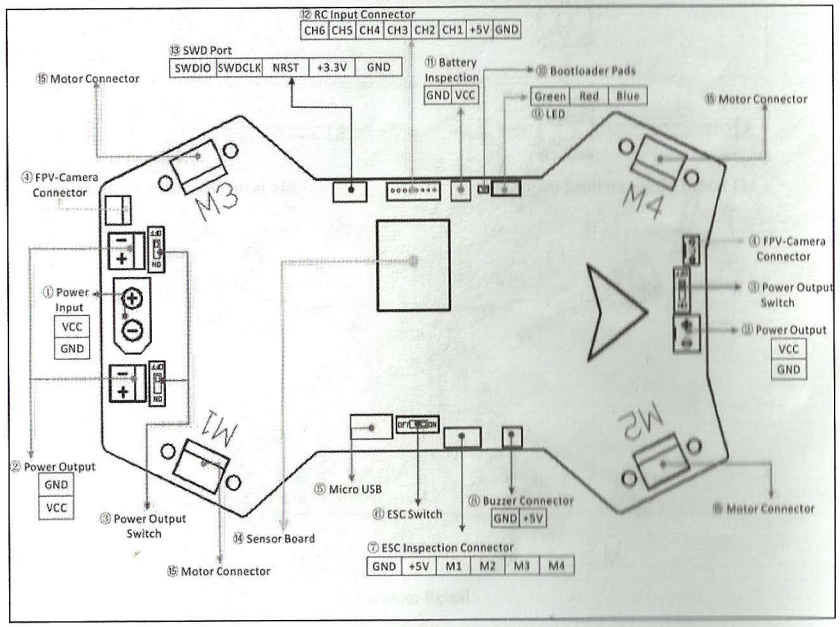


Install motors

Nighthawk Pro



Main Control Board



①Power Input. Support 2-4S Lipo battery (To ensure flight safety, use 5-6inches propellers for 3S battery and 5 inches propellers for 4S battery).

②Power Output. Supply external power for LED, Video TX, etc..

③Power Output Switch. Control power output and output voltage is the same as input voltage (Default set to OFF)

④FPV Camera Connector. Please use filter to reduce video signal noise when power and signal are connected.

⑤Micro USB Connector. Use micro USB cable to upgrade and configure flight controller.

⑥ESC Switch. When ESC switches to OFF, single ESC testing, calibration and program can be performed through ESC inspection connector. When ESC switches to ON, copter can flight normally. (Default set to ON)

⑦ESC Inspection Connector. Connector are set to GND, +5V, M1, M2, M3, M4 ESC signal. When ESC switches to OFF, single ESC testing, calibration and program can be performed through this connector. (Please refer to Appendix - ESC Calibration)

⑧Buzzer Connector. (Please refer to Appendix - Buzzer)

⑨LED Indicator. Starting from the right, Blue LED-Power Indicator, Red LED-Mode Indicator and Green LED-Status Indicator.

⑩Bootloader Pads. Bootloader pad is used for firmware update (Please refer to Appendix - Bootloader Mode).

⑪Battery Inspection Port. If buzzer is connected, buzzer will sound when minimum cell voltage is reach. (Please refer to Appendix - Low Cell Voltage Monitoring)

⑫RC Input Connector/GPS Connector. For PPM signal receiver, CH1 is PPM receiver signal pin. For PWM signal receiver, from right: GND, +5V, CH1(AIL), CH2(ELE), CH3(THR), CH4(RUD), CH5(AUX1), CH6(AUX2)
If GPS feature is enable, CH3 and CH4 are GPS Signal Pin (CH3: TX, CH4: RX). If using PPM signal receiver, CH5 is RGB light control pin. Other channels are not used. Connections please refer to the Receiver Connection Diagram. If using PWM signal receiver, CH1 (AIL), CH2 (ELE), CH5 (THR), CH6 (RUD).

⑬SWD Port.

⑭Sensor Board. Include gyro, compass and accelerometer expansion port.

⑮Motor 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.

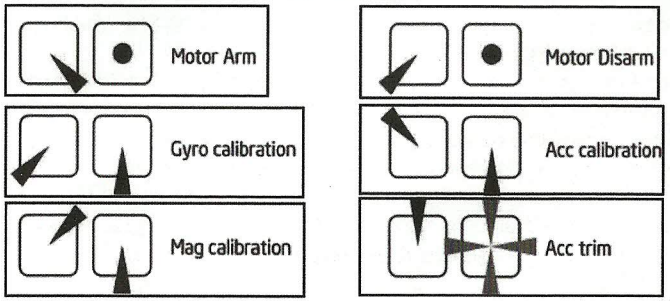
Note: To calibrate single ESC, make sure to switch ESC SWITCH to OFF (Please refer to Appendix - ESC Calibration)

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

①After power, flight controller indictor not lit on, but ESC indicator lit, please check if ESC switch is switch to ON

2 After connected micro USB 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 micro USB connection.

③If copter motor sound "beep-、beep-、beep-" after connected the battery, please redo ESC Calibration.

④If green LED light flashing and motor not able to arm, please redo Accelerometer Calibration

⑤If copter cannot lift off the ground, please check battery voltage.

⑥If motor arm but motor is not spinning, please check connection between motor and ESC.

⑦If 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.

⑧If LED light is not on, please check power output switch for LED light is switched to On and make sure connection are secured.

⑨If 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.

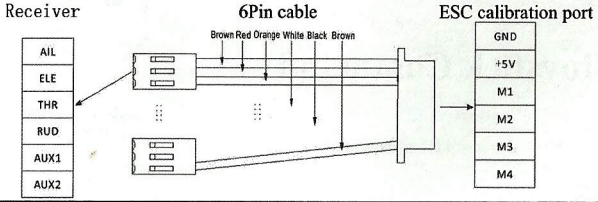
Appendix

ESC Calibration

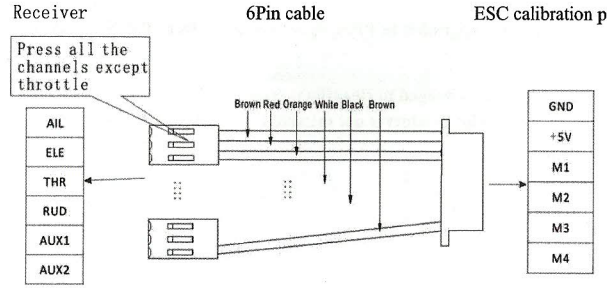
To calibrate single ESC:

①Switch ESC SWITCH to OFF position.

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:



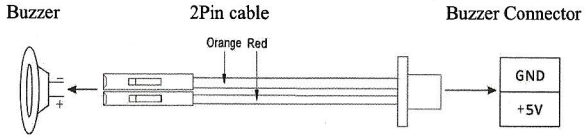
③Calibrate M2 ESC: Since M2 connector have no BEC, connect M2 connector directly into THR on receiver and connect M1 connector into other channels to supply power for receiver. Connector and Receiver connection see below:



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

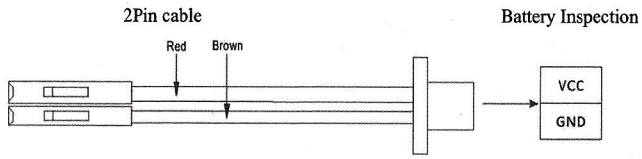
Buzzer

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.

Version Upgraded Note:

--Radio receivers in RTF version V1.2 are upgraded to PPM signal receivers from PWM signal receivers which have the failsafe function.

--The preloaded firmware on flight control is changed to cleanflight from baseflight.

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

Happy Flying!!