

SKYLINE32 Instruction Manual V1.3

- Feature..... 1
- Hardware And Connection..... 2
- Motor Connection 5
- Aircraft assembly 5
- Parameter Adjustment Installation 5
 - 1.Program driver installation:..... 5
 - 2. Install Configuration Software..... 6
- Parameter adjustment 6
 - Cleanflight-Configurator Parameter adjustment 6
 - 1. Parameter adjustment and FC connection..... 6
 - 2. Acc & Compass calibration..... 6
 - 3. ESC Calibration 7
 - 4. Select Mode..... 7
 - Baseflight-Configurator Introduction..... 8
 - 1. Flight Controller and Configurator 8
 - 2. Accelerometer and Magnetometer Calibration..... 8
 - 3. ESC Calibration 9
 - 4. Mode Selections 9
- Transmitter Stick Command 10
- Firmware update 10
- Troubleshooting 10

Feature

1. Dimensions: SKYline32(35mm×35mm×5mm) (1378mil×1378mil×197mil))
 2. Weight: SKYline32 (Acro 4.8g, Advanced 5.4g) (Acro 0.169oz, Advanced 0.190oz) . (Wires are not included) 。
 3. 32-bit ARM micro processor running at 3.3V/72MHz.
 4. With gyro, Magnetometer, and space reserved for Barometer and outer flash(used for recording data)
- Note: Barometer and compass included only for Advanced version.**
5. Support Manual mode(not select any flight mode), Angle mode (Angle) , Horizon mode (Horizon) , Heading hold mode (Headadj) , Head-free mode (Headfree) , Altitude hold flight mode (Baro).
- Note: Altitude hold flight mode (Baro) only for SKYline32 Advanced**
6. Support Quad-, Tri-, Hex-, Octo-, various multirotors
 7. Support RC input - Standard, CPPM (PPM Sum),and Spektrum.,etc.
 - 8.Battery voltage monitoring and low voltage alarm.
 9. Built-in FrSky telemetry converter
 - 10.Integrated OSD module. **Note:Only for SKYline32 + OSD**
 - 11.Support OLED input
 12. Onboard Micro-USB for setup and configuration.
 - 13.Cleanflight configuration and Baseflight configuration GUI

14. GPS position hold / return to home

Note: SKYLINE32 hardware is compatible with NAZE32 firmware, including Baseflight and Cleanflight. Below are the links to the source codes:

<https://github.com/cleanflight/cleanflight>

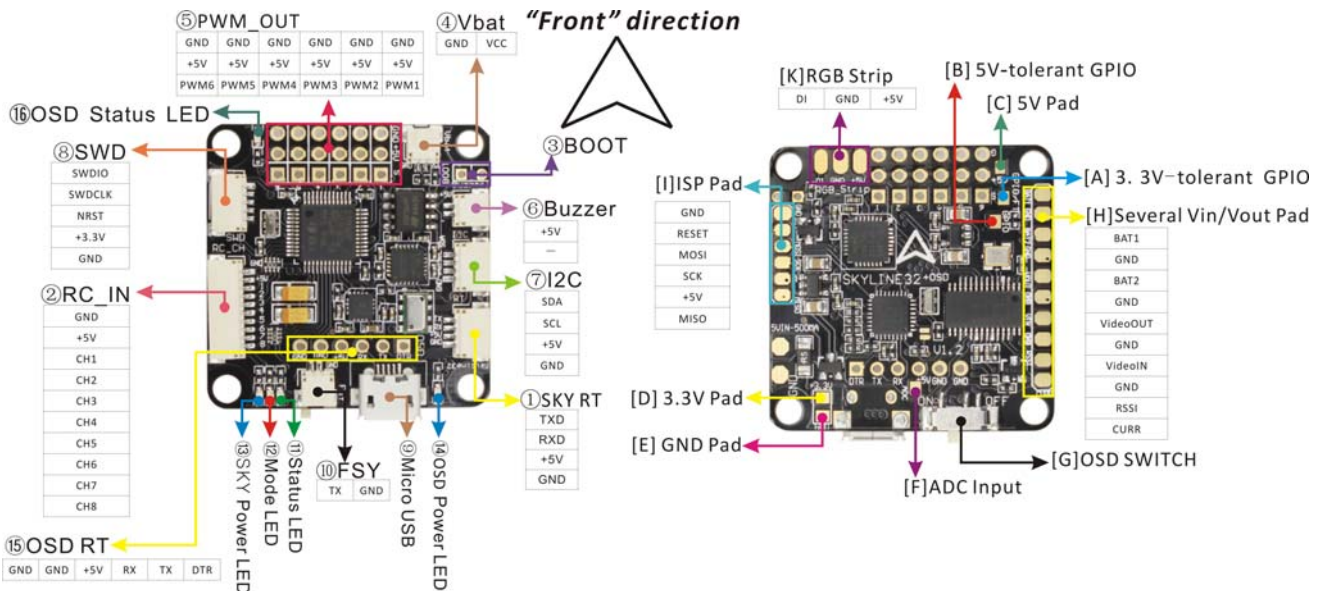
<https://github.com/multiwii/baseflight>

SKYLINE32 is loaded with Cleanflight-Configurator. The Cleanflight-Configurator GUI must be downloaded from the Chrome Extension store. Baseflight is another firmware option and requires the Baseflight GUI, also available from the Chrome Extension Store. This manual will introduce basic instruction for these parameter adjusting software. For more, kindly check "<http://yinyanmodel.com/En/DownView.asp?ID=40>"

Note: with firmware and configuration based on "MultiWii" software, the processor used is not Atmel AVR, and can not be compiled via Arduino or other AVR tools. Below is some information about STM32 development:

<http://code.google.com/p/afrodevices/wiki/STM32Development>

Hardware And Connection

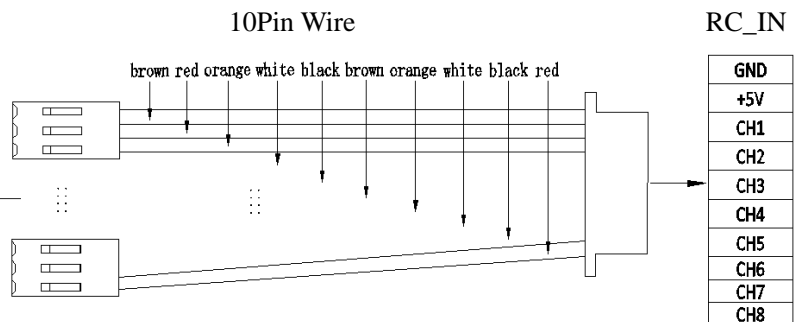


① Serial communication connector. Used for external serial communication, such as OSD module with serial communication.

② RC Input (PWM/CPPM) / Servo Output / GPS connector.

Default pins order is (from top to bottom): GND, +5V, CH1-CH8. CH1-CH8 for channels: AIL, ELE, THR, RUD, AUX1...AUX4.

PPM Connection	GPS Connection	Standard Connection
GND	GND	GND
+5V	+5V	+5V
PPM	AIL	AIL
	ELE	ELE
TX	TX	THR
RX	RX	RUD
DIN	THR	AUX1
	RUD	AUX2
TRIG	AUX1	AUX3
ECHO	AUX2	AUX4



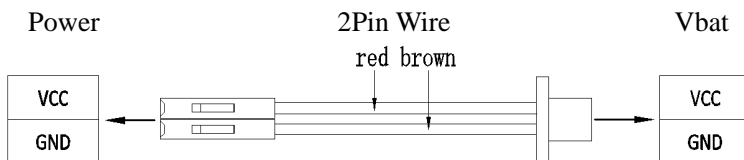
When GPS feature is enabled, CH3 and CH4 are used for GPS connection.(CH3:TX, CH4:RX). When using PPM receiver, these are normally unused, with standard receiver, connect AIL to 1, ELE to CH2, THR to CH5, RUD to CH6, and AUX1/2 to CH7 and CH8.

When using PPM receiver, CH5 to CH8 can also be used as motor or servo outputs, depending on frame type and configuration.

③Bootloader pads: ***** ONLY USE IF GUI CAN NOT CONNECT TO SKYLINE32. This is not required for normal firmware updates.** When upgrading firmware, use tweezers to short pads together and power SKYLINE32 on by USB cable. After power LED indicator turns blue, then remove the short. Firmware updated tool can then be used to reload firmware.

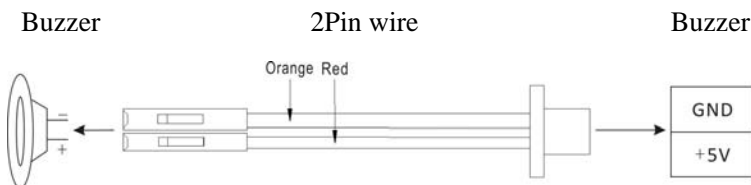
Download source: <http://yinyanmodel.com/En/DownView.asp?ID=39>

④Battery Voltage Monitor: connect this header to battery or power distribution board to enable battery voltage monitoring. Supports Up to 6S LiPo battery. No reverse polarity protection - connecting battery in reverse will instantly destroy the hardware.



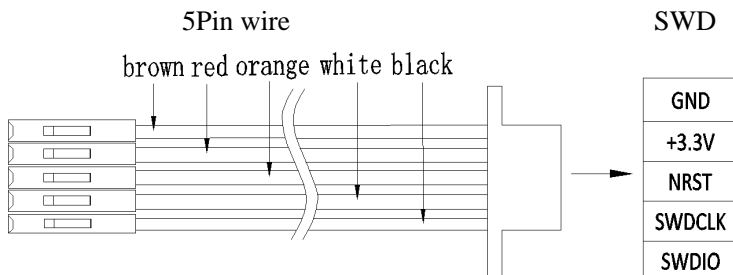
⑤ESC / Servo Headers: From right to left: GND, +5V, PWM1- PWM6. Standard mode: PWM1-PWM6 for ESC input M1-M6; Servo mode: PWM1-PWM6 for servo input S1, S2 and ESC input M1-M4.

⑥Buzzer: connect a buzzer here while battery voltage monitor is enabled, buzzer used for a low voltage alarm. Setting battery voltage in Configuration of Parameter adjustment, kindly refer to <http://yinyanmodel.com/En/DownView.asp?ID=40>



⑦I2 Connector:Used for outer I2C communication equipment, such as OLED module.

⑧SWD port: for software modification during software development period.



⑨Micro-USB port: For firmware upgrade and configuration.

⑩FSY connector: FrSky output, Connect this connector with RDX in FrSky receiver telemetry port

⑪Status LED (Green)

⑫Mode LED (Red): The LED will be on for the corresponding mode chosen.

⑬Power LED (Blue): LED on when the board is power on.

[A]Withstand voltage 3.3VGPIO port, This pad connected with the STM32 PB5 pin. Can not be connected to 5V voltage, otherwise it will burn the parts **Note: MINI version without such pads.**

[B] Withstand voltage 5V GPIO port, this pad connected with the STM32 PB5. Can be connected to 5V IO port.

[C] 5V extended pad, this pad used for RC input & ESC connector, convenient for supply power for other 5v parts.

[D] 3.3V extended pad. It offer power supply for other low voltage parts, such as spectrum, satellite RC or bluetooth module, etc.

[E] **Ground pad.** when use 5V and 3.3V extended power for out parts, the out parts could occupy same space with flight controller.

[F] 3.3V ADC input pad, it is connected with PA5 of STM32 (ADC12_IN5) . **Note: This pad with 3.3V, 5V couldn't be connected.** *Note: Right connection, avoid parts damage.*

⑭ OSD Module power indicator (Blue) . **Note: Only SKYline32+OSD Version**

⑮ OSD module serial port: this is used to update the firmware and interface setting for OSD module.

Note: Only SKYline32+OSD . Because USB and OSD sharing this port, so please turn off the OSD when updating the FC firmware and OSD firmware. (Switch OSD power to OFF), avoid any conflict that caused by using FC and OSD, FC and USB meanwhile that couldn't connected with computer.

⑯ OSD module status indicator. It can be judged by the indicator whether OSD module is under working condition.

Note: Only SKYline32 + OSD version.

[A] 3.3V voltage-resistant GPIO port, this pad connected with the STM32 PB5 pin. This pad can not be connected to 5V voltage, otherwise it will burn the device.

[B] 5V voltage-resistant GPIO port, this pad connected to the STM32 PA15 pin . Can be connected to the IO port of 5V.

[C] 5V expansion pads. This pad, RC input interface and 5V power with the same source, convenient to power other 5V outer equipment up.

[D] 3.3V expansion pad. This pad supply power for equipment with low power, such as Spektrum satellite receiver or Bluetooth module.

[E] Ground pad. When using 5V or 3.3V power supply to power outer equipment up, connect this pad could enable outer equipment and flight control system with common ground.

[F] 3.3V ADC input pads. This pad is connected to the STM32 PA5 (ADC12_IN5), access to pad as the signal strength .

Note: This pad only limited within 3.3V pressure, couldn't be connected with 5V.press.

[G] OSD power switch. **Note: Only for SKYline32 + OSD version.**

As USB and serial OSD share the serial port, so please switch it to OFF when update the firmware of flight control and OSD , to avoid serial ports conflicts when use flight control and OSD simultaneously, so that cause flight control and USB can not connected with computer.

[H] OSD module connected to peripheral input / output pads. BAT1 / BAT2 are two battery test pads, VideoIN connected camera signal, VideoOUT is connected with camera signal, RSSI is detection pad of signal strength , CURR detection pad of current. NOTE: Only SKYline32 + OSD version valid. Camera, FPV and flight control must share GND, which can be connected to soldering panel of the flight control.

[I] OSD module ISP communication pad used for download of OSD module boot code .

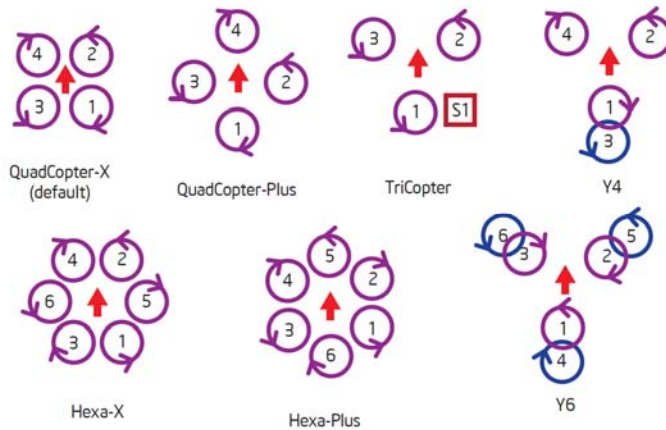
Note: Only SKYline32 + OSD version valid.

[K] RGB light pads. DI pads connected with CH5, can be used as RGB input.

Caution: Please note that all the wires connecting direction of wiring, if reversed that may burn flight control board or external device for access.

Motor Connection

Figures below show motor position and rotation:



In the above figure, the front of red arrow points to the head of the multirotor. The arrows in the small circles point to the direction of motor rotation. Motor numbers are marked inside the circles and S1 stands for servo. Purple motors are top, and blue circle are bottom.

Note: Configurations with more than 6 motors require CPPM receiver.

Aircraft assembly

Please install flight controller and ESC on your aircraft. Please refer to the instructions above for proper connection of the SKYLINE32 to the ESC's and receiver. Anti shock, anti-vibration mounting is recommended, preferably with soft double-sided adhesive to increase the damping effect. Avoid vibration of gyro, to increase flight stability.

Parameter Adjustment Installation

1.Program driver installation:

Please install the driver program to your computer if you do not have it already.

- (1) Please choose the compatible driver for your computer, link <http://www.silabs.com/products/mcu/pages/usbtouartbridgevcpcdrivers.aspx>
- (2) Install the driver 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

Parameter adjustment

Note: Due to share serial port of USB sand OSD, so when flash firmware of SKYline32 + OSD version flight control ,another case is when update the firmware of OSD and setting its module interface, (switch OSD to the OFF position), to avoid any conflict that caused by using FC and OSD,FC and USB meanwhile that couldn't connected with computer.

Cleanflight-Configurator Parameter adjustment

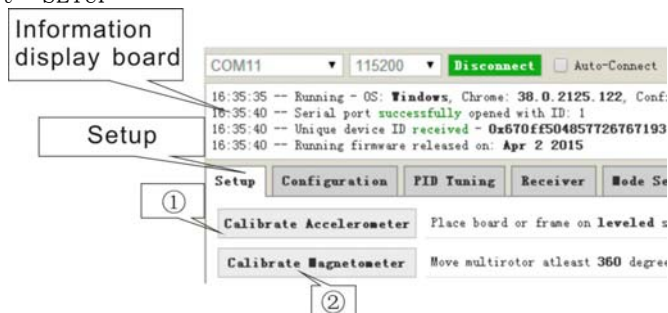
1. Parameter adjustment and FC connection

- (1) Connect flight controller to computer with Micro USB cable.
- (2) In Cleanflight Configurator App, select the COM port that displays when you connect the Skyline 32.
Baud Rate should be 115200
- (3) Click "Connect", flight controller and configurator and connected when the button change to green.



2. Acc & Compass calibration

Please select "SETUP"



① Calibrate Accelerometer

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

②Calibrate Magnetometer

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 show in the message display.

3. ESC Calibration

Please make sure to REMOVE PROPELLERS before perform ESC Calibration !

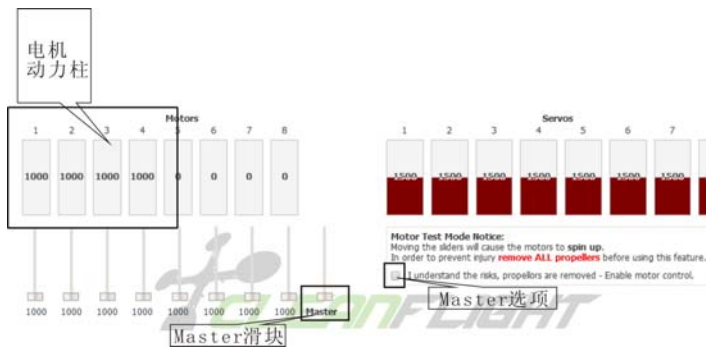
(1) Please select "Configuration", change Maximum Throttle to 2000 and save

(2) Please select "Motor Testing"

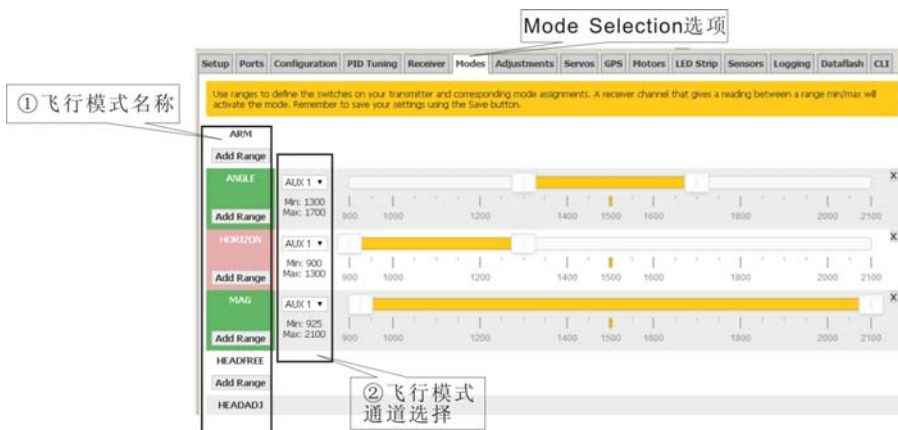
①Please check the box for Motor Test

②Move the "Master" slider to MAXIMUM

Apply power to your ship so that all ESC's are powered. When your ESC's play their intital tune, move throttle "Master" quickly to the bottom. You will then hear a confirmation tune. When the tune ends the ESC calibration is completed. If an ESC continues to beep, unplug the power and start over.



4. Select Mode



Switching interface into Mode selection.

①Modes: ARM, ANGLE, HORIZON, MAG, HEADFREE, etc. To add a mode click "Add Range" and then assign channel. AUX1 is channel 6 and AUX2 is channel 7.

②Channel Select for Modes.

Click "Add Range" button under any mode to add flight mode. Then select a channel in the drop-down box as channel for that mode. Then check the box and save the setting by click "SAVE" at right bottom corner. If the corresponding flight mode of selected channel is active. Then when switching to the

channels, flight Modes Options screen will be highlighted green. Other will highlighted red on the screen. Red LED also indicates whether the it is active or not (red light means that the selected flight mode is not active). Some models will be based on hardware sensors access situation to decide whether to display. For example, with hardware without a barometer module ,Altitude hold will not be available. Some modes need to be selected at the same time to function correctly.

Baseflight-Configurator Introduction

1. Flight Controller and Configurator

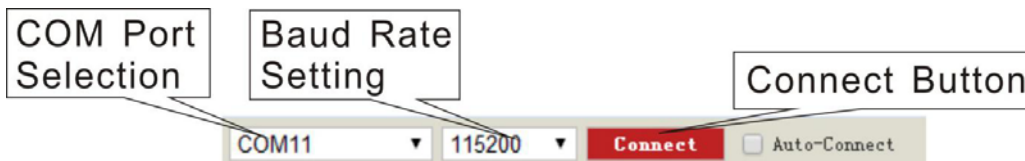
(1) Connect flight controller to computer with Micro USB cable, When blue indicator of FC is on,FC start to test it self simultaneously.

Self test as bellows:

Red green led flashes fast→red led flashes fast→green led off→red led off,green led then flashes a few times then off (if at this time the red light is constantly green after it is off , indicating some kind of flight mode has been selected and valid)→ self check completed

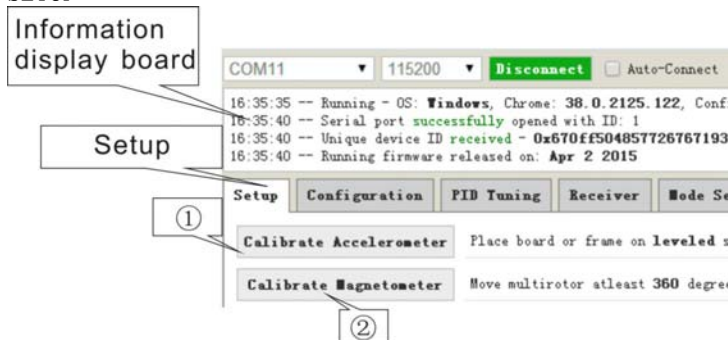
(2) In Baseflight Configurator App, select COM port and Baud Rate

(3) Click "Connect", flight controller and configurator and connected when the button change to green.



2. Accelerometer and Magnetometer Calibration

Please select "SETUP"



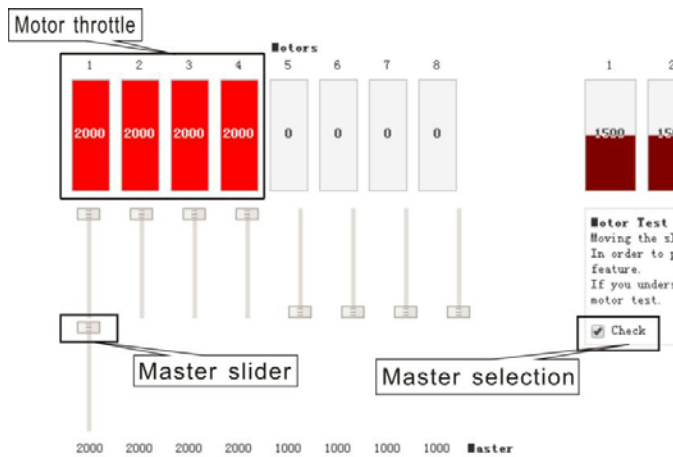
① Calibrate Accelerometer

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 show in the message display. (Make sure not to move the board or frame during calibration).

② Calibrate Magnetometer

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 show in the message display.

3. ESC Calibration

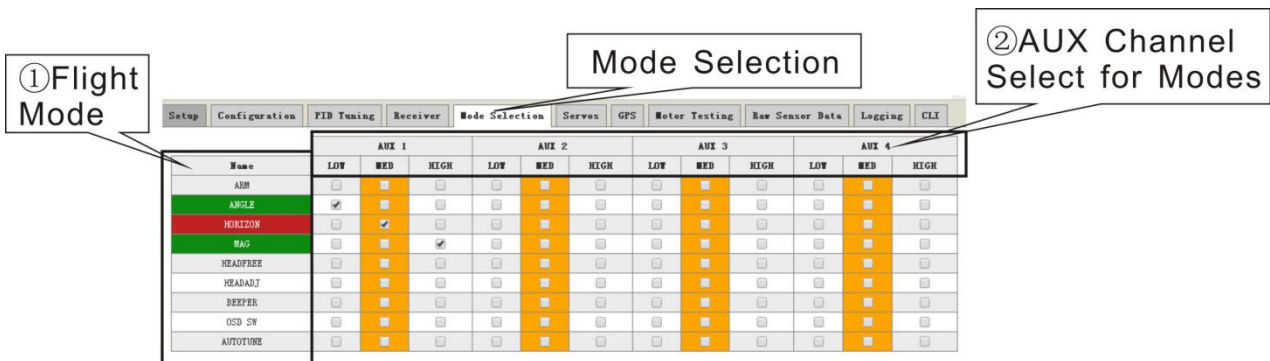


Please make sure to REMOVE PROPELLERS before perform ESC Calibration !

- (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

Apply power to your ship so that all ESC's are powered. When your ESC's play their initial tune, move throttle "Master" quickly to the bottom. You will then hear a confirmation tune. When the tune ends the ESC calibration is completed. If an ESC continues to beep, unplug the power and start over.

4. Mode Selections



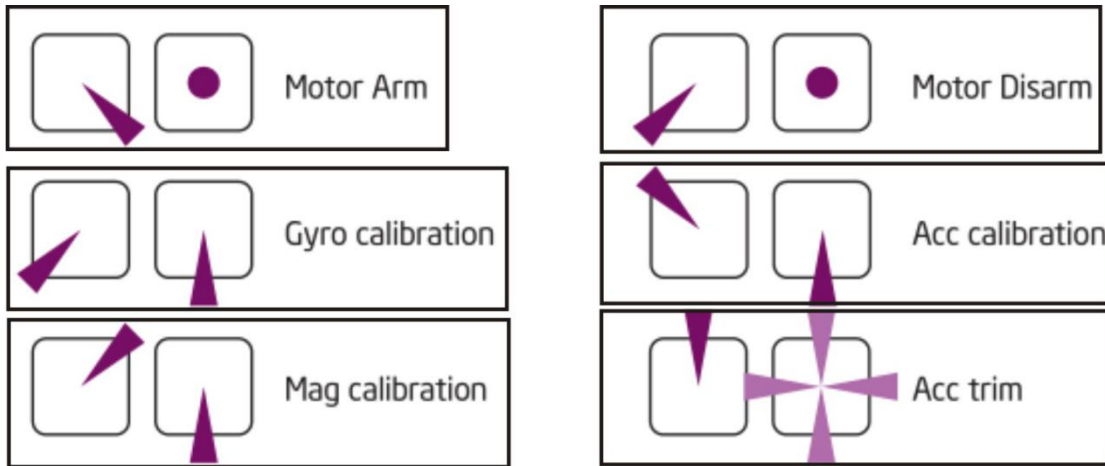
Please select "Mode Selection"

- 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.

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 the mode is selected and the switch is activated selected mode name will highlight green. Non selected modes will highlight red on the screen. Some modes need to be selected at the same time to function correctly.

Transmitter Stick Command

The below chart is stick order of left hand throttle transmitter



If using right hand transmitter, move the stick to the bottom when disarm it, and then move the Yaw axis (direction axis) to max. Move the stick to bottom before locking, then move the Yaw axis to minimum.

Firmware update

For introduction of firmware update, kindly check <http://yinyanmodel.com/En/DownView.asp?ID=39>

Troubleshooting

1. Roll and pitch drifting
 - Recalibrate Acc
 - Using Acc Trim stick
2. Course shift
 - Recalibrate ESC
 - Calibrate compass (mag) .
 - Selecting MAG flight mode.

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.

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.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.