



BGL-M1
Multi-rotor Controller Manual

Disclaimer

- > This product is not a toy, but the expertise of machinery, electronics, aerodynamics, and high-frequency transmitter, etc. into one precision sports and leisure product. Users should have the appropriate operating techniques and safety rules and should require proper installation in order to avoid accidents. The holder must use the product in a safe manner to operate; any improper operation may cause serious personal injury or property damage. We assume no responsibility.
- > This product is a remote control model aircraft, please strictly observe safety operation specification on aerial model and follow steps illustrated in the manual to install and calibrate the product. We take no responsibility for any direct or indirect damage(s) or injuries caused by improper installation, calibration and operation.
- > This product is applicable for the experienced of model aircraft. This product is suitable for people over the age of 12.
- > Flight venues must be legitimate remote control model flying site.
- > Once buying the products, please use the product within the scope allowed by local laws and regulations, we will not be liable for any personal improper or illegal use
- > In case of use, operation, maintenance and other issues, we commissioned dealers to provide technical support and after-sales service, please contact your local dealer.

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I Specification and Parameter:

■ Dimension and Weight

1. Main Control L*W*H 58*35*15
Weight 20g
2. GPS and Compass module
Diameter 52mm, Height 14mm
Weight 28g

■ Technical parameters

1. Support 4 axis, 6 axis, "+" and "X"
2. Build-in IMU, contains 9 axis AHRS
3. PWM output frequency: 400HZ
4. The attitude calibration frequency of main control increased to 1Khz, improved the control stability.
5. Support PPM, PCM, S_BUS and normal receiver mode.
6. Support 2S-6S power supply
7. Support PC assistant software and USB upgrade

■ Flight Characteristics

Hover accuracy: vertical direction $\pm 0.5M$
horizontal direction $\pm 1M$
Return accuracy: less than 2.5m

II Spare Parts

■ The BGL Main Control




◆ Port 1

	1	2	3	4	5	6	7	8	9	10	11
	AIL	EL E	TH R	RU DD	SE L	CH 6	OSD -G	OSD -W	GPS -G	GPS -W	S- BUS
+	+5 V	+5 V	+5 V	+5 V	+5 V	+5 V	+5V	+5V	+5V	+5V	+5V
-	GN D	G N D	G N D	GN D	G N D	G N D	GND	GND	GND	GND	GND

◆ Port 2

1	10	9	8	7	6	5	4	3	2	1	
---	----	---	---	---	---	---	---	---	---	---	--

1											
M1	M2	M3	M4	M5	M6	NU LL	NU LL	NU LL	GREEN\LED	power	
NU LL	NU LL	NU LL	NU LL	NU LL	NU LL	NU LL	NU LL	+5 V	RED\LED	+5v	+
GN D	GN D	GN D	GN D	GN D	GN D	GN D	GN D	NU LL	BLUE\LED	GND	-

◆Port 1 connection

Ports 1-4 are connected to receiver channel of aileron, elevator, throttle, and rudder.

Ports 5 and 6, connected transmitter with a 3-position switch and a 2-position switch respectively, channel 5 switches between manual mode, hovering mode and return home mode. Channel 6 is open or closed headless mode.

Ports 7 and 8 are data interface, can be connected to OSD, data radio, or other communications equipment.

Ports 9 and 10 are port for connecting GPS compass module (note: the white line and blue line upward).

Port 11 is an interface for connecting receiver S-BUS, support S-BUS receiver (when using the S-BUS, Channel 1-6 ports without connection)

◆ Port 2 connection

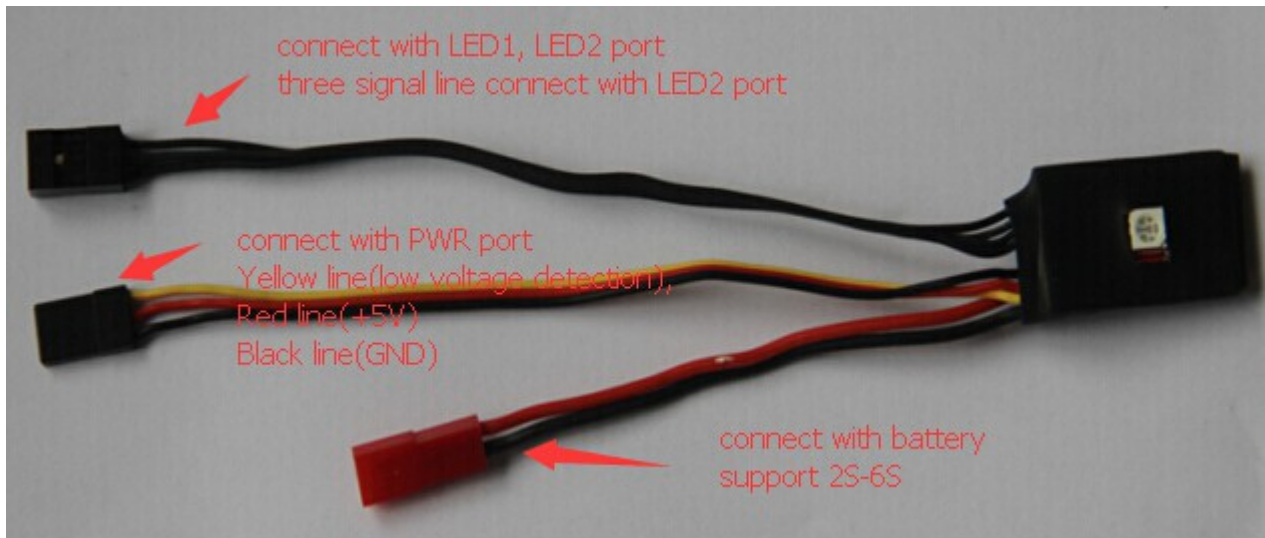
Port 1 is the interface to connect UBEC power output, the yellow line is for battery voltage detection.

Port 2 and 3 is LED status display interface, for connecting UBEC's 6PIN port. (**Note: Port 2 should connect the three signal lines**).

Port 6-11 is signal input control interface, to connect multi-axis ESC.

The BGL Main Control internal IMU contains a 3-axis accelerometer, 3-axis gyroscope and barometer, it must be connected with the GPS module successfully, then unlock and start to work. **(Direction of the arrow is the direction of multi rotor's front side)**

■ Multifunctional Power Module



Stable 5V UBEC power module support 2S-6S battery voltage input, and provides stable power supply for flight control, GPS and receiver. The power module integrates multi-color high-brightness LED; it can also be a clear indication of flight conditions even during the day.

■ GPS Compass Module



The GPS Compass Module is a necessary equipment to achieve high precision hover. After connecting compass module with GPS module, the aircraft can achieve high-precision fixed-point hovering, automatic return and other driving functions. (Direction of the arrow is the direction of multi rotor's front side)

Note: If you install GPS compass with a wrong direction, it will affect the system to perform hovering mode and auto return to launch mode. May lead to a more dangerous consequence.

III Installation

1. The Flight Control Installation

◆ Installation direction: Try to keep the main control at the center position of the aircraft during installation. Please ensure that **the side which flight control and receiver connected, (AIL,ELE,THRO side), is consistent with the multi rotor's front side.**

◆ Transmitter Setting:

Ensure the BEC, receiver, GPS module, ESC and flight control connect correctly, set up and check the

transmitter channel if is reverse, close all mix-function. Make all ESC's throttle travel to a consistent calibration.

The following figure 1- Figure 4 is rotating direction schematic diagram for the four rotor, six rotor, X type, and + type.

- ◆ Please refer to the Four X font installation instructions in Figure 1 as below:

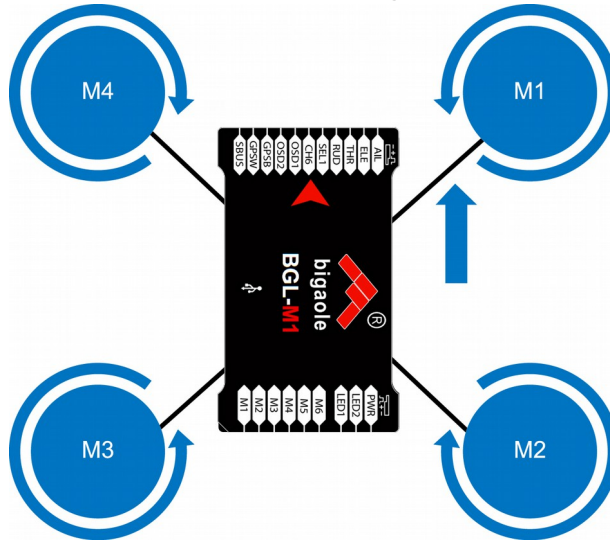


Figure 1: Four X font installation

- ◆ Four X + font installation instructions in Figure 2 as below:

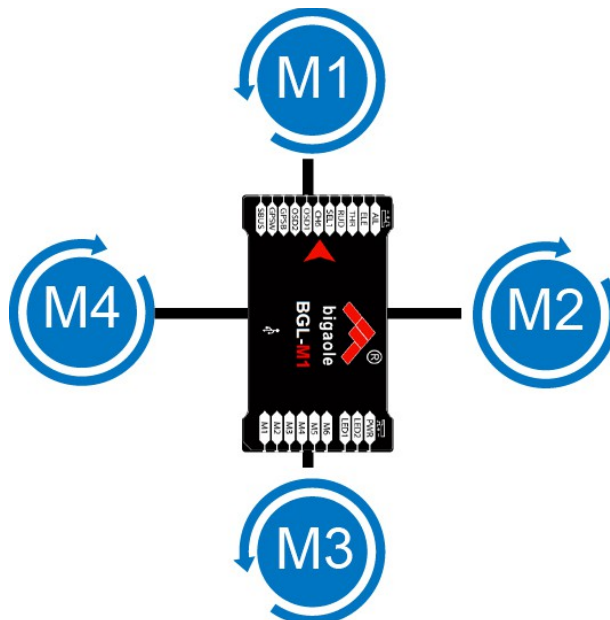


Figure 2: Four X + font installation

- ◆ Six X font installation instructions in Figure 3 as below:

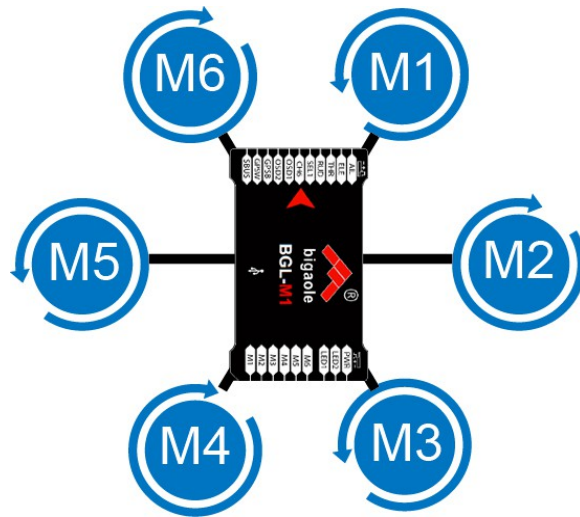


Figure 3: Six X font installation

- ◆ Six X+ font installation instructions in Figure 4 as below:

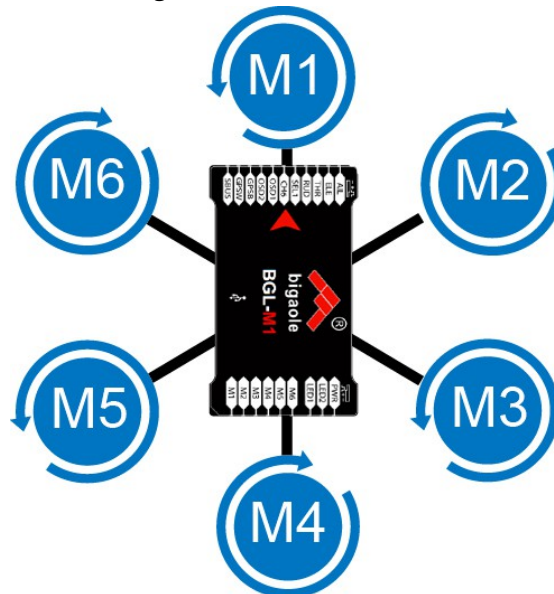


Figure 4: Six X+ font installation

2. Connection schematic diagram for Flight control and FUTABA, JP\spektrum receiver.

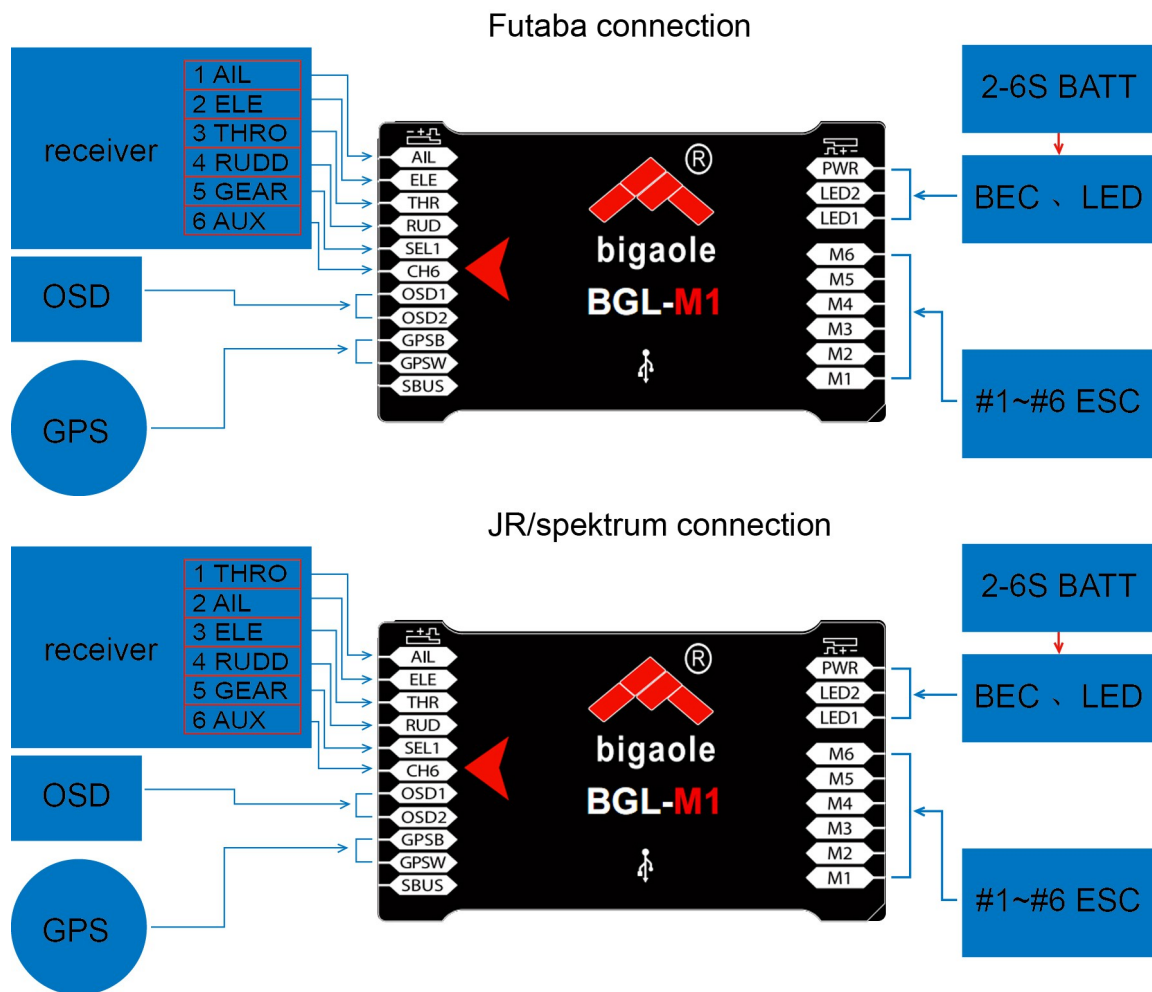


Figure 5: wiring diagram

3. Install flight control and GPS module

- ◆ Insert GPS signal line to port of GPSB, GPSW, white line and blue line upward.
- ◆ When fixing the GPS module, please ensure that the GPS arrow direction and multi rotor front side direction are same.
- ◆ Keep GPS module as far as possible from the high current and strong magnetic field environment, which produced by ESC when it working.

IV Remote Control Related Settings

a) Channels Setting

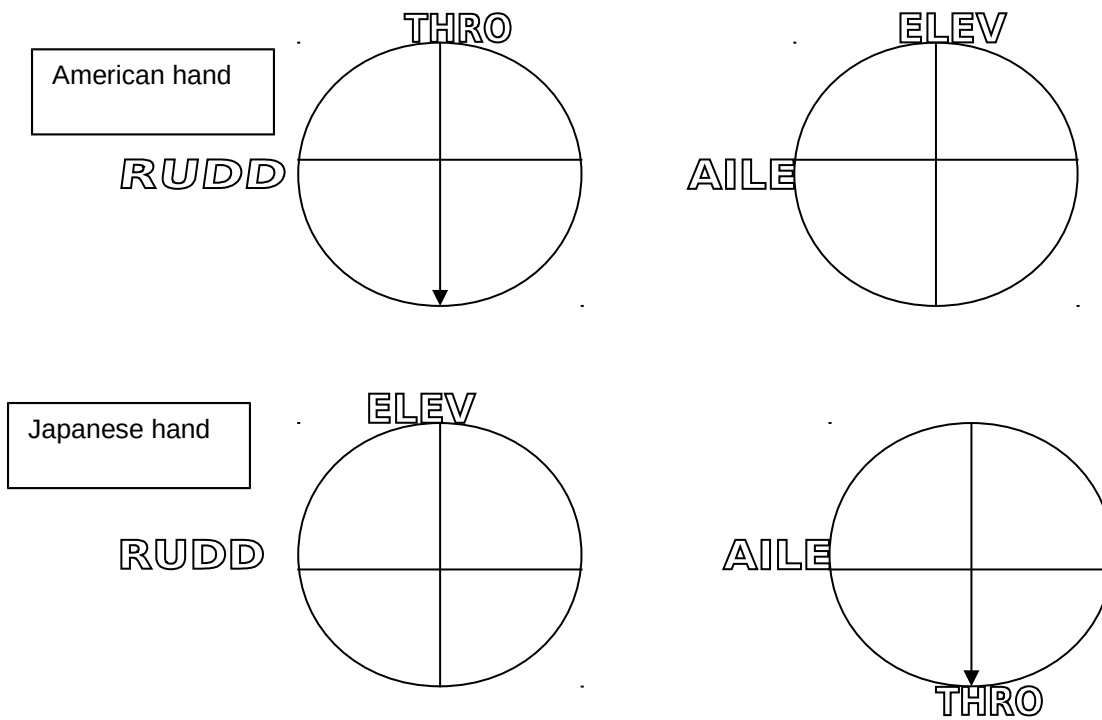


Figure 6

American and Japanese hand transmitter of the following conditions is NORM state, otherwise REV state.

AILE value from left to Right; ranging from 900US to 2100US NORM



ELEV value from top to lower; ranging from 900US to 2100US NORM



RUDD value from left to Right; ranging from 900US to 2100US NORM



b) SEL Channel Range (For example in CH5)

900US < SEL < 1200US : Manual mode



1200US <SEL <1800US: GPS hovering mode

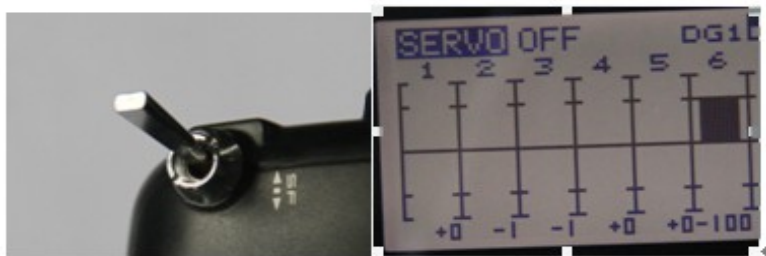


1800US <SEL <2100: Return home mode

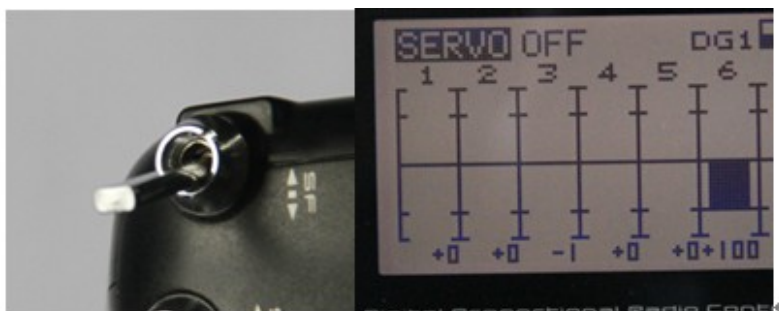


c) SEL2 (CH6) Channel Range

In hovering mode: 900US < CH6 < 1520US Head mode



1520US < CH6 < 2100: Headless mode



d) Close All Transmitter Mix-function.

V Working Mode

Flight controller supports four modes: manual mode, hovering mode, return home mode and headless mode. The manual mode, return home mode and hovering mode can be distinguished via LED status.

1) SET, CH6 channel switch instructions:

SEL1 Mode setting state

Position	1	2	3
SEL1	900~1190 μ s	1200 μ s~1790 μ s	1800 μ s ~2100 μ s
Function	Manual Mode	GPS hovering mode	Auto return home mode

SEL2 Headless setting state

Position	1	2
SEL2	900 μ s~1520 μ s	1530 μ s~2100 μ s
Function	Close headless mode	Open headless mode

2) Four Modes Statement

a) Manual Mode

◆ In this mode, the aircraft can only keep auto-stability, but cannot keep the hovering altitude. You still need to control the aircraft by sticks operation, to keep balance and altitude.

◆ Characteristics: more sensitive throttle response, the action changes quickly, do not have brake function, suitable for experienced RC pilot.

b) GPS Hovering Mode

◆ When the throttle stick stays in the middle (50%±5), the aircraft automatically maintains hovering; Any increase or decrease the throttle will lead the aircraft to rise or fall at a constant speed on this basis.

◆ It needs open area to use hovering mode, in case of any high buildings affect the accuracy.

◆ In hovering mode, the aircraft enables point hovering, impel the throttle stick moving, release the throttle stick hovering, return home and other automatic functions.

◆ The aircraft needs 5 or more GPS satellites to keep hovering, otherwise the aircraft only keep the altitude.

◆ GPS accuracy is better at the altitude of more than 2 meters.

Pitch stick: push this stick forward will lead the aircraft fly forward, backward pushing will lead backwards flying, release the pitch stick immediately will achieve hovering.

Roll stick: push this stick to the left will lead the aircraft fly left, to the right pushing will lead right direction flying, release the pitch stick immediately will achieve hovering.

Characteristics: throttle response is relatively slow, the action changes slowly, release throttle stick can realize high precision hovering; the braking effect is good, suitable for primary pilot. In the case of wind flying, multi rotor will have a certain degree of swing to modify the attitude, this is normal. AIL, ELE, RUDD three directional stability augmentation sensitivity increased, the wind resistant ability will strengthen under hovering, and multi rotor swinging amplitude would increase.

c) Return Home Mode

In this mode, the aircraft will automatically backtrack and to the unlock take-off point within 2.5m range. Ensure to set the GPS positioning before take-off. (Red led flashes 3 times.)

In GPS positioning, the aircraft return home region is within a 2.5m radius of the take-off point.

When multi rotor distance from the home point is less than 20m, no matter how high it is, the multi rotor lock the current altitude and return directly.

When multi rotor distance from the home point is more than 20m, the aircraft will keep the current altitude and automatic return when it is higher than 20 meters; otherwise, the aircraft will firstly climb to 20 meters and then return.

Aircraft will automatically turn off the motors close to the ground after reaching the top of home point and automatic falling.

Note that since there is GPS positioning accuracy deviation, thus returning point deviation will range about 2.5 meters.

Characteristics: the transmitter stick will lose function during return process, operate stick does not affect the return status.




d) Headless Mode:

Do not need to identify the multi rotor's nose or tail direction, no matter in which direction the multi rotor nose is, Pull back (ELE) rod, the aircraft will fly back, push (ELE) rod, the aircraft will fly away. This fly back/fly away direction is according to the forward/backward direction when the aircraft take-off.





Characteristics: it will be more convenient and reliable for pilot operation, when the multi rotor fly very far and can not identify its nose or tails.

VI LED Indication

Flying Mode and LED

Flying Mode	LED flash	Remarks
Manual Mode		Green led single flash, only provide gyro stability
Hovering Mode		Green led double flash, maintain flight attitude automatically (GPS satellites are 5 or more)
Auto Return Home Mode		Green led triple flash, lock altitude automatically and returns home.

Flying condition and LED

Condition	LED flashing times	Remarks
Searching GPS satellite		GPS Signal is poor, keep searching
5 GPS satellites or more		GPS Signal is good to GPS flying
8 GPS satellites or more		GPS Signal is very well for precision pointing
Low voltage alarm		The battery voltage is lower than setting value; LED flashes quickly, LED steady on, and began to descending rapidly.

VII Start up

Unlock aircraft

It will not start up the aircraft by pushing the throttle sticks directly, as the flying mode can only be achieved under the manual mode or hovering mode. Please follow the steps below:

- ◆ Pull the throttle stick to the lowest;
- ◆ Operate AIL, ELE, RUDD channel stick can unlock the aircraft in the following four ways.

1



2



3



4



Lock Aircraft

The aircraft will be automatically locked after motionless throttle stick at the lowest position for 5 seconds on the ground.

Note: If the throttle of transmitter in the FS is set to 50%, multi rotor may get out of control if turn off the transmitter within five seconds after it landed on the ground. So in any case, first pull out multi rotor battery, and then turn off the transmitter power.

VIII Ready to Fly

- ◆ Calibration transmitter and confirm the direction of all the channels are correct;
- ◆ Turn on the transmitter;
- ◆ Keep the aircraft on the ground and then connect the battery;
- ◆ The red led flashes 3 times. (GPS positioning success)
- ◆ Switch the flying mode to manual mode and unlock the aircraft;
- ◆ After unlocking, press the aircraft by hand and slowly increase the throttle;
- ◆ Push the transmitter sticks and check the aircraft condition; please pay attention to your safety.
- ◆ If the multi rotor rotating in the right direction, you can try low-altitude taking-off

IX Gyroscope and Compass Calibration

1) Gyro Calibration

Because of the temperature changes, vibration or other external factors, it will cause gyro midpoint drifting, which will lead to the following appearances:

- 1) After start up, the aircraft white LED steady on for 3 seconds;

2) The aircraft leans to one side when flying; you can reset the gyro midpoint by the following methods:

- ◆ The aircraft must be placed on level ground and remain stationary
- ◆ Power on the aircraft.
- ◆ Switch the 3 position switch between manual flight mode and hovering mode for four times, then the white LED steady on.
- ◆ Wait for white LED disappear.
- ◆ Gyro reset is completed. Note: the gyro initialization process needs to maintain the aircraft stationary

2) Compass Calibration

Metal components on multi-rotor or magnetic fields near the aircraft will affect the correction of the compass, which reduces the stability of the aircraft or even engender failure. The compass needs to be calibrated to lessen these affects to minimum.

You need to calibrate the compass in following situations:

- ◆ First time to use the GPS;
- ◆ GPS installation position has been changed;
- ◆ The hovering performance is not good, as the aircraft keep on rotating around the hovering point in hovering mode.

Note:

1. **Do not calibrate the compass in strong magnetic field**
2. **During the process of calibrating, please remove the magnets such as keys, mobile phone and other metals.**

Two ways to calibrate the compass:

◆ On the Ground Calibration

Place the aircraft on level ground and connect to power. And then, start up the aircraft for clockwise or unclockwise rotation paralleling to the horizontal ground for 3 or 4 loops, in this way the aircraft will complete the calibration. After calibration is completed, switch SEL channel stick 3 or 4 times, then we can save the calibration of magnetic field and gyro.

◆ Calibration in the Air

When multi rotor is flying, use the transmitter to control the aircraft rotating 3 or 4 laps clockwise or unclockwise, paralleling to the horizontal as far as possible, this will complete the calibration.

Caution: After the calibration in the air, you must not switch SET channel stick to save data; this will make the multi rotor out of control.

X Security Protections

1) Low Voltage Automatic Falling

- ◆ The aircraft with low voltage automatic falling feature will bring better flight safety.
- ◆ When the multi rotor battery voltage drops below the set voltage, the red led will flash rapidly, and will steady on one minute later (time will be different depends on battery new or old), aircraft itself will vertical drop from current point. In the process of decline, AIL, ELE, THRO channel loss control, only RUDD channel can control descent direction.
- ◆ Note: The aircraft internal protection voltage is 3S, 10.8V.

2) Out of Controlled Return

◆ Automatic return when transmitter out of control: In the transmitter FS state, set the CH6 channel value is over 1800US. The multi rotor take off after red led flashes 3 times and positioning successfully. If remote control signal can not be detected or shut down the power of transmitter, multi rotor will perform return task, and return to the home point.

◆ Setting method for out of control return point:

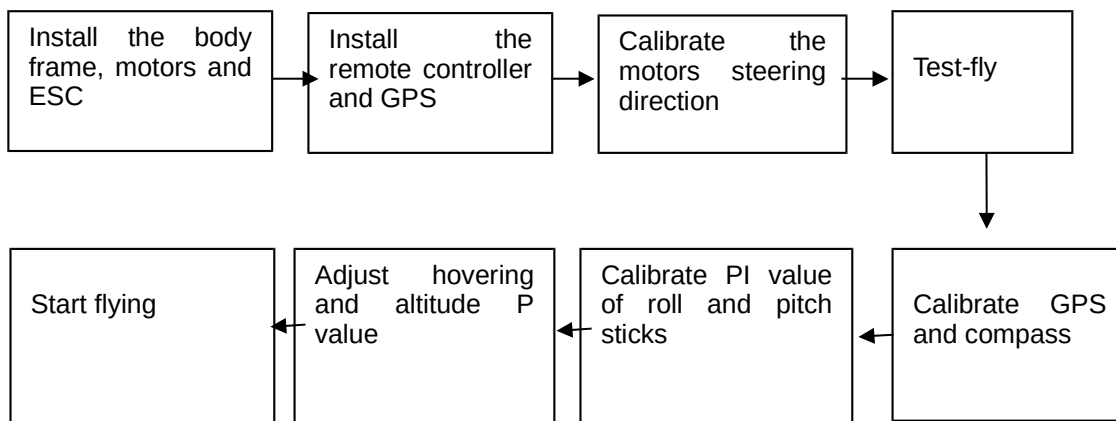
a.) Open the transmitter, find Fail Safe menu,

b.) Setting AIL, ELE, THRO, RUDD, GEAR value,

Below an example of FUTABA T8FG, related setting as shown below,



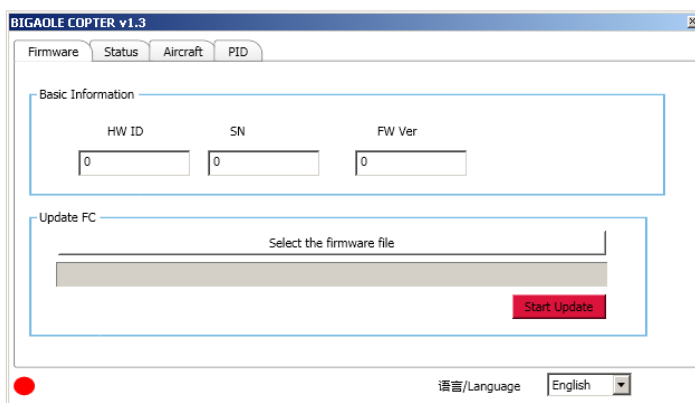
XI Procedure of Usage



XII Usage of assistant software

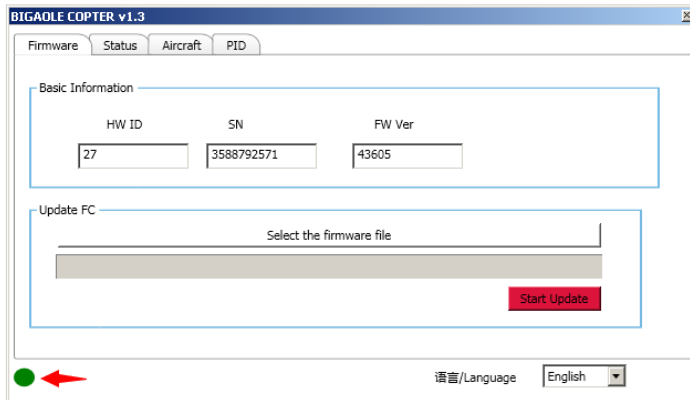
1. Open COPTER V1.3, interface is as follows,

Menu-→ firmware



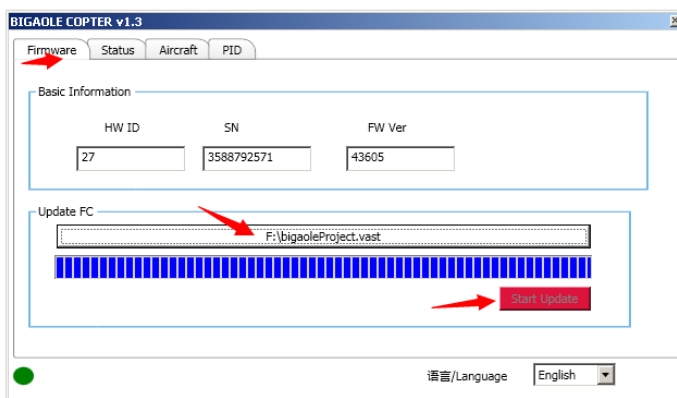
2. Connect flight control, GPS with PC, the lower left corner red led turns green, select the appropriate

language.



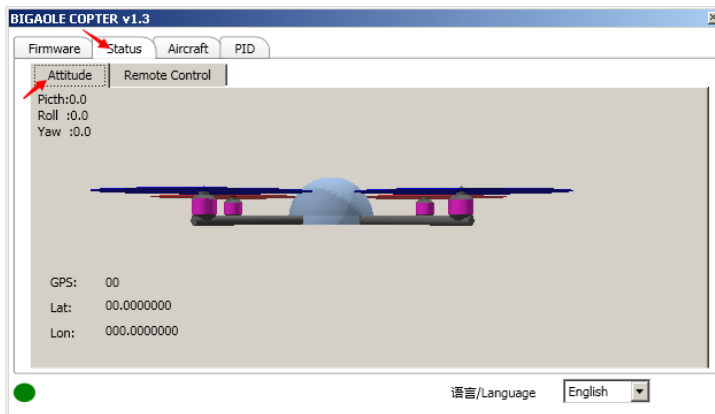
3. Menu→Firmware→Select Firmware→Start

During firmware download process, the lower left corner yellow led flashes.



4. Menu→State

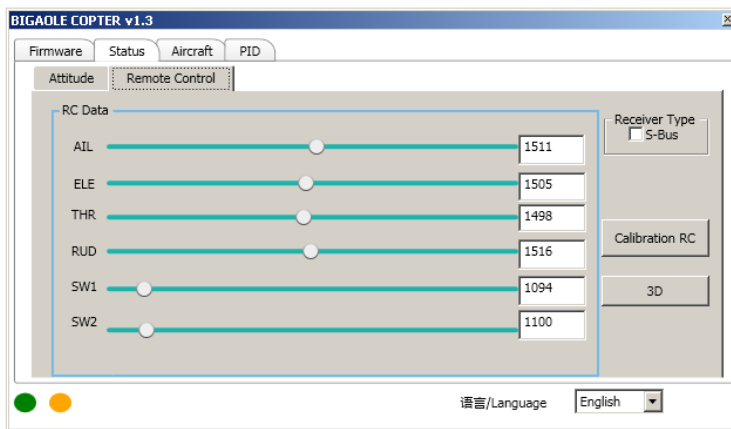
a. Menu→State→Attitude



Rotate multi rotor to three direction according to aileron(ROLL), elevator(PITCH), rudder(RAW), animation display correction direction of the multi-rotor gyroscope's three axes.

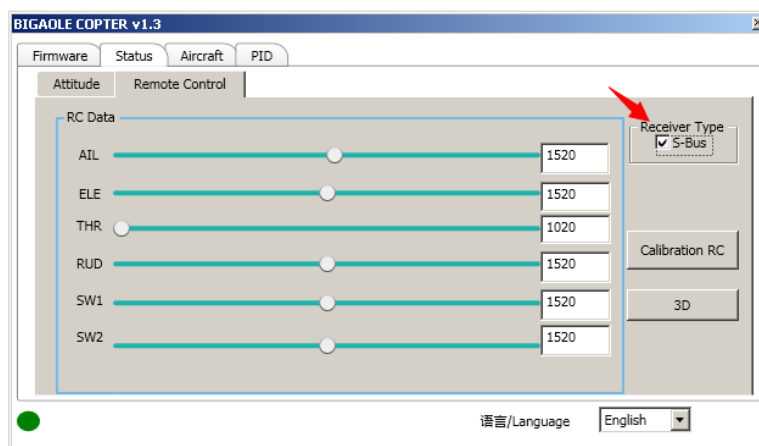
b. Transmitter→Receiver type (normal receiver type)

◆ Normal type



Note: when select the receiver work method with normal mode, flight control and receiver should connect in accordance with normal mode.

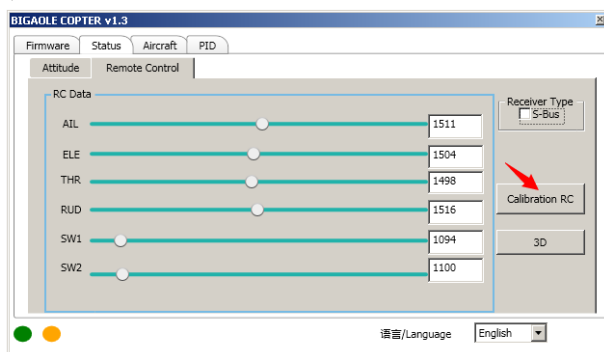
◆ S-BUS type



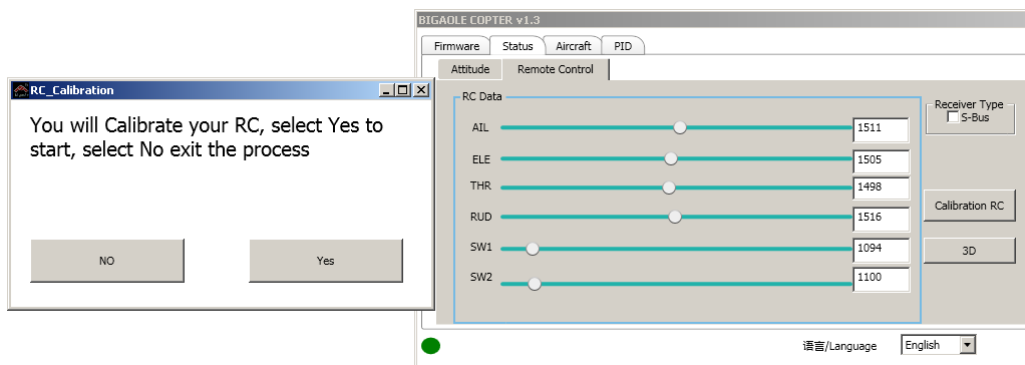
Note: when select the receiver work method with S-bus type, flight control and receiver should connect in accordance with S-BUS type.

c. Transmitter-→ Calibration button

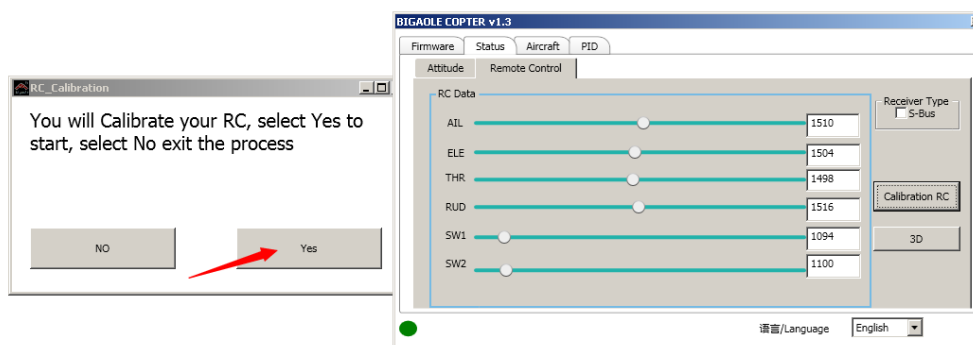
◆ Transmitter calibration method



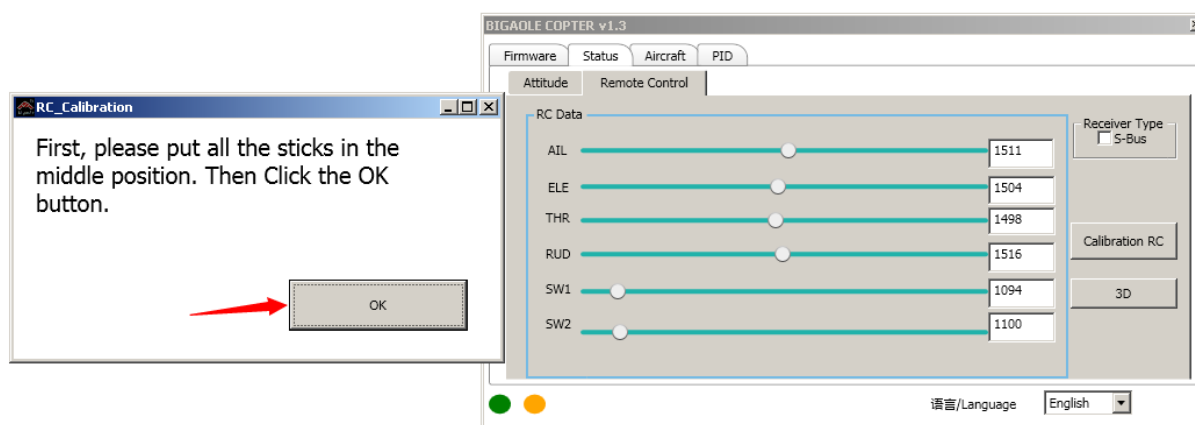
◆ After press the calibration button as shown below,



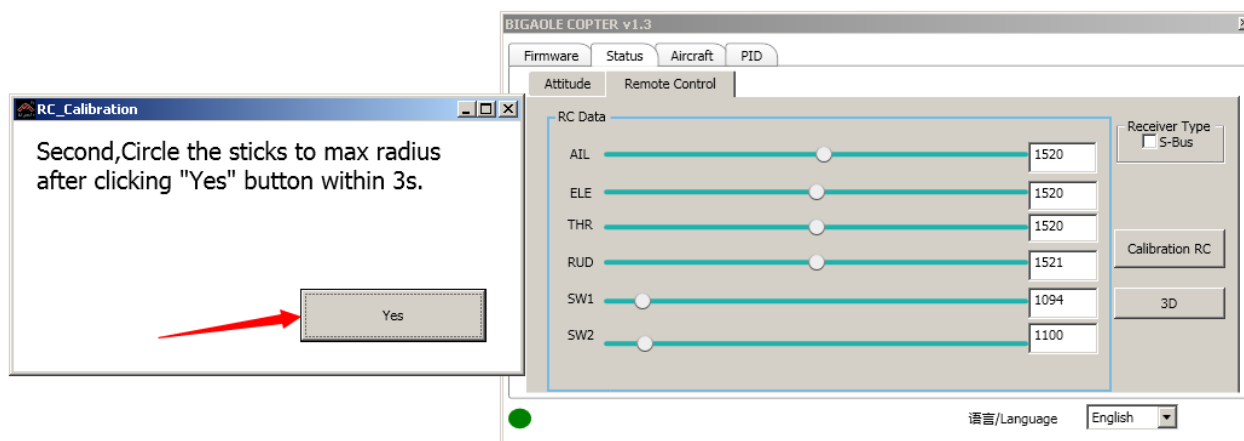
◆ Press the ok button



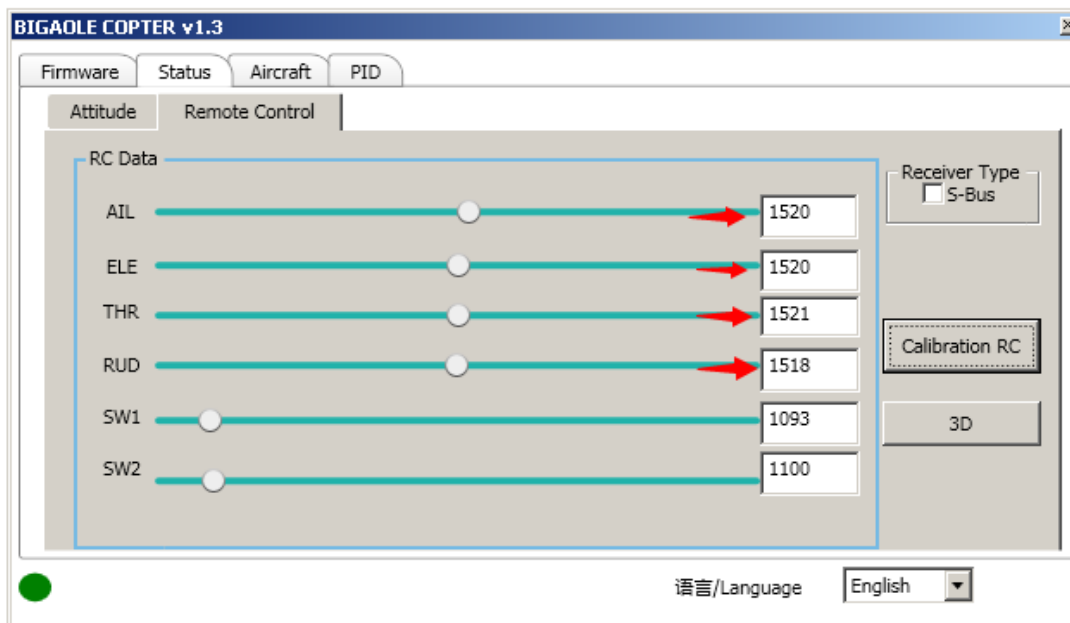
◆ Press the ok button



◆ Press the ok button

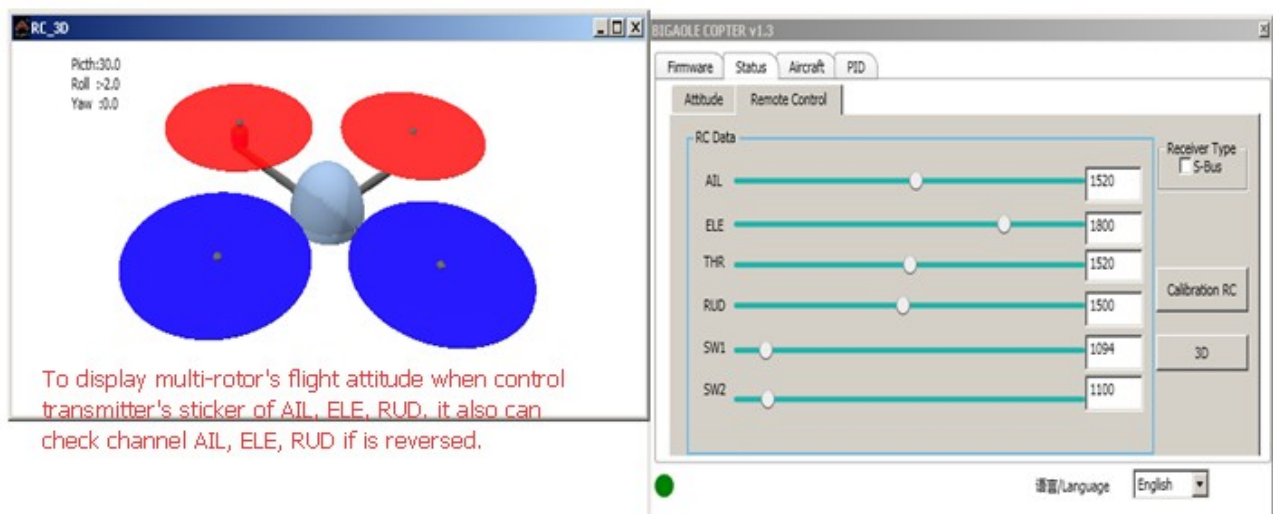


◆ Calibration result as shown below,

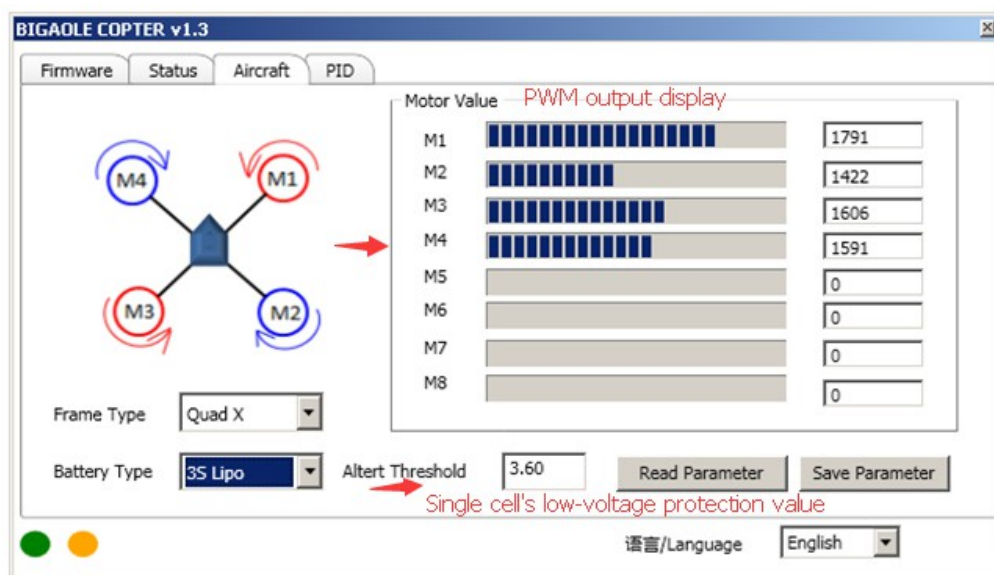


AIL, ELE, THRO, and RUD values are in the range of about 1520, up and down a few errors. Otherwise, please recalibrate.

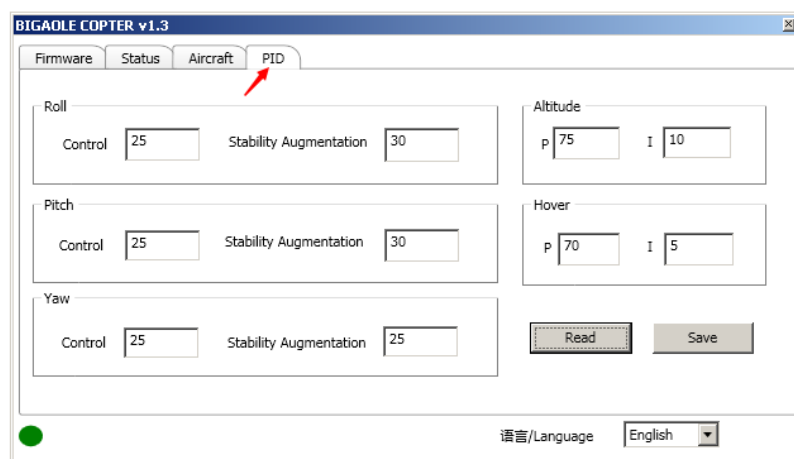
d. Transmitter-→3D button



5. Menu-→Installation



6. Menu-→Control



◆ P (aileron, elevator, rudder) change speed adjustment

P values (aileron, elevator, rudder) directly corresponds to the respond speed of multi-rotor to perform an action when control stick, the larger P value, the faster response action; the smaller P value, the slower response action. Too slow gain can lead to softer effect of aircraft control.

BIGAOLE COPTER v1.3

Firmware Status Aircraft **PID**

Roll
Control Stability Augmentation

Pitch
Control Stability Augmentation

Yaw
Control Stability Augmentation

Altitude
P I

Hover
P I

Read Save

语言/Language English

◆ Aileron, elevator, and rudder augmentation gain

Augmentation gain is used to maintain stable parameters automatically during the multi-rotor flying.

Augmentation gain: During Multi-rotor flying, if aileron, elevator, rudder which direction automatically revert to a balanced state responded more flexible, you can increase the augmentation gain in this direction accordingly, increased 2 each time on the basis of factory default parameters. Otherwise, it should be reduced. If augmentation gain value in a certain direction is too large, the vibration is more powerful in this direction accordingly, but the brake effect is much better in this direction. Please observe carefully during adjustment, adjust each direction until satisfied.

BIGAOLE COPTER v1.3

Firmware Status Aircraft **PID**

Roll
Control Stability Augmentation

Pitch
Control Stability Augmentation

Yaw
Control Stability Augmentation

Altitude
P I

Hover
P I

Read Save

语言/Language English

◆ Height control gain

In the fixed-height mode, if the height range is relatively large, and the speed return to the lock height is very slow, increase height control parameters on the basis of the factory default parameters; if there has been shaking up and down very frequently, then reduce the height control gain.

Adjust up/down speed and Amplitude changes

Do not adjust in general

◆ Hover parameter control

Hover parameter control is aircraft self-locking hover point when it hovering in GPS hovering mode.

Hover parameter: In GPS hovering mode, if the multi-rotor appears that the radius of swing around in the horizontal direction is relatively large, and then increase 5 each time on the basis of the factory default parameter. If the swing radius is small, but no rule shaking, then reduce this parameter.

Adjust shaking radius in horizontal direction

Do not adjust in general

Note: After each parameter adjustment, be sure to press the Save button.

BIGAOLE COPTER v1.3

Firmware Status Aircraft PID

Roll

Control Stability Augmentation

Pitch

Control Stability Augmentation

Yaw

Control Stability Augmentation

Altitude

p I

Hover

p I

Read Save

Press the save button to store

语言/Language

XIII Common Faults and Treatment

- ◆ Blue led teady on, slide the transmitter stick does not get any respond. Please check GPS cable to be plugged in, or GPS line is broken.
- ◆ When just started, multi-rotor turning always happened, please check the receiver signal cable is properly connected and the remote control is set correctly.
- ◆ Four motor speed are different. Please initialize the ESC's throttle travel range.
- ◆ The aircraft only shows red LED flashes, no green or blue LED flashes during the startup process. Please check whether the battery voltage is too low.