
Arkbird Hummingbird BNF Version Airplane

User Manual



Caution



- 1) Please abide by relevant laws: No flying in populated area, no flying in airport clearance area (10km away from both sides of the runway, 20km ahead and behind the runway), no flying in unauthorized area (government offices, scientific research unit, classified area and controlled area), no flying in area of 2km away from railway.
- 2) No propeller before configuring the plane.
- 3) Teenagers should use the airplane under guidance of adults and please carefully read the user manual or under guidance of an experienced person if you are a new user.
- 4) Please plug off the GPS to configure the airplane before using it for the first time.
- 5) Please ensure there is no child or any viewers while configure the airplane, otherwise it may hurt others;
- 6) Please keep the airplane stored in dry and ventilated place if it is not used for a few days;
- 7) Please keep the battery charged to 11.1v or keep every single battery cell charged to 3.7v and stored in place away from high temperature, if they are not used for a few days;
- 8) Please carefully read the user manual to avoid unnecessary damages which are not warranted.

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1. Introduction:

Arkbird Hummingbird is a compact flying wing FPV airplane. It is a BNF version airplane which is researched, designed and produced by Arkbird FPV. This small plane is for novice and experienced users as well.

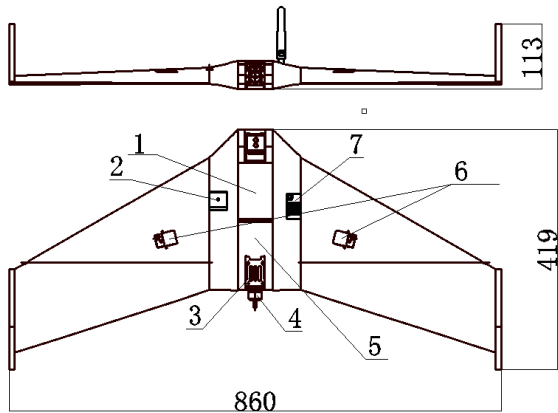
Features:

- Dimensions: 860mm*420mm*10mm. It can be easily carried in your bag.
- The airplane can continuously fly over 45 minutes. The flight speed can range between 45-80km/h.
- With the onboard Arkbird lite autopilot, you can operate all the functions of Arkbird 2.0.
- The optimized autopilot support Balance, Fence, Waypoint, Launch Assist, RTH, Cruise way point, Gyro Mode etc.
- Integrated Arkbird 433UHF receiver.
- 5.8G 500MW Transmitter. Transmission distance can reach to 1.5km with stable signal. If matching with Arkbird 5.8G directional panel antenna or Arkbird mini AAT, the transmission distance can reach up to 5km.
- The EPP material is applied to the whole body of the airplane. Carbon fiber material is also added for strengthen in the process of producing. It is not easy to break in a crash due to its high anti-impact strength.
- The airplane is semi-finished before it is packaged. ONLY a few minutes are needed to finish the remaining installment and configuration of relevant parameters.
- If the BNF version airplane is operated with 433UHF transmitter, it is compatible to nearly every radio of over 6 channels. The airplane can also be matched with most of other similar transmitters offered in the market.

Technical data:

- ✧ Take-off weight: 420g+-5
- ✧ Wingspan: 860mm
- ✧ Full length: 419mm
- ✧ Flight speed: > 45km/h
- ✧ Flight time: > 45 minutes
- ✧ Wing area: 16dm²
- ✧ Wing load: 26gdm²
- ✧ Radio frequency: 433MHz
- ✧ Transmitter frequency: 5.8GHz

Profile Map:



Size: Unit mm

1. Battery: 3S1P 18650 (2700-3000mah 15A)
2. GPS
3. ESC 15A
4. Motor 1806 2208kv (patched 5045 propeller)
5. Flight controller and Receiver (arkbird433)
6. Servo (9g)
7. Transmitter (5.8 500mW 40CH)

Pcaking List:

- Plane Kit x 1
- Motor (EMAX MT1806/KV2280) x1
- ESC (15A) x1
- Propeller (5045) x 2
- Servo(EMAX ES08A II) x2
- Arkbird optimized autopilot x1
- Antenna of Arkbird 5.8GHz Transmitter (500mW 40CH) x1
- Arkbird GPS x1
- Arkbird 433UHF receiver x1
- Arkbird 433UHF transmitter x1(selective)

The following items should be provided by the buyer:

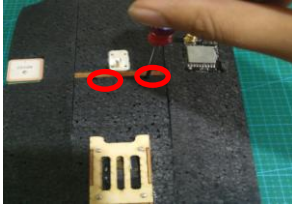
- ✚ Glue x1
- ✚ Battery x 1

2. Initial Preparation

Step 1: The airframe

1. Ensure no accessories are short according to the package list.
2. Locate the fuselage and a pair of wings and winglets;

- a) Screw off the screws and open the electronics hatch;



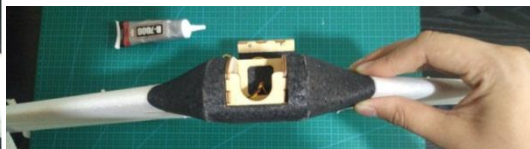
- b) Route the servo lines through the hole of the fuselage (see picture below);



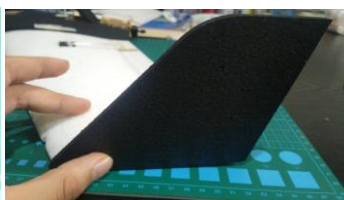
- c) Servo lines should be connected to the ports on both sides. Beware the brown line should be connected to negative port;



- d) Glue the wings to both sides of the fuselage. Beware the wings should be aligned with the edge. Pins or toothpicks are recommended to align them;

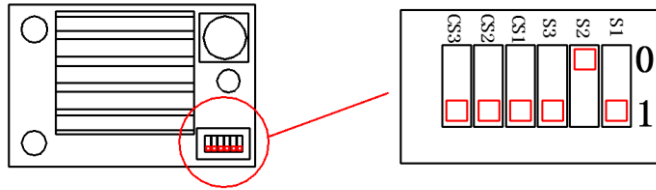


- e) Glue winglets. Beware they should be aligned with the edge. The front surface should not be glued. Pins or toothpicks are recommended to align them.



Step 2: Choose your Video Frequency

The 5.8 G 0.5w 40CH transmitter has a dip-switch. The frequency is as per:



0, 1 indicates the position of the switch, X indicates the switch can be located in any position.

Frequency	CS3	CS2	CS1	S3	S2	S1	Frequency	CS3	CS2	CS1	S3	S2	S1	Frequency	CS3	CS2	CS1	S3	S2	S1
5740	0	0	0	1	1	1	5865	0	0	0	1	0	0	5705	0	0	0	1	0	1
5760	0	0	1	1	1	1	5845	0	0	1	1	0	0	5685	0	0	1	1	0	1
5780	0	1	0	1	1	1	5825	0	1	0	1	0	0	5665	0	1	0	1	0	1
5800	0	1	1	1	1	1	5805	0	1	1	1	0	0	5645	0	1	1	1	0	1
5820	1	0	0	1	1	1	5785	1	0	0	1	0	0	5885	1	0	0	1	0	1
5840	1	0	1	1	1	1	5765	1	0	1	1	0	0	5905	1	0	1	1	0	1
5860	1	1	0	1	1	1	5745	1	1	0	1	0	0	5925	1	1	0	1	0	1
5880	1	1	1	1	1	1	5725	1	1	1	1	0	0	5945	1	1	1	1	0	1
5733	0	0	0	1	1	0	5658	0	0	0	0	X	X							
5752	0	0	1	1	1	0	5695	0	0	1	0	X	X							
5771	0	1	0	1	1	0	5732	0	1	0	0	X	X							
5790	0	1	1	1	1	0	5769	0	1	1	0	X	X							
5809	1	0	0	1	1	0	5806	1	0	0	0	X	X							
5828	1	0	1	1	1	0	5843	1	0	1	0	X	X							
5847	1	1	0	1	1	0	5880	1	1	0	0	X	X							
5866	1	1	1	1	1	0	5917	1	1	1	0	X	X							

Step 3: Powered on test

- 1) Install antenna 5.8G to transmitter;



- 2) Get the battery;



3) Power on. Beware the plug is xt30 and there is a difference between position and negative pole;



4) After powering on the motor then check its condition:

- The motor will continuously beep;
- Power LED of transmitter (blue) will be constant on;
- LED of GPS (blue) will be constant on;
- The LED (yellow) of 433 receiver in the cabin will slowly or fast flash;
- If the monitor and 5.8G receiver has been matched already, at first, the frequency of the transmitter and the receiver should be the same. And then, connecting the monitor and receiver.

Upon they are connected, the OSD will display following parameters:

If GPS has been installed, the motor will slowly beep every 1 second.



Or if the GPS has not been installed, the OSD will display parameters as follows:

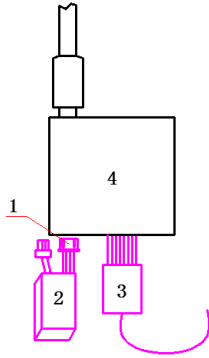


***Please ensure that all data about monitor, autopilot, transmitter and 433 receiver is reasonably correct. Then power off the airplane.**

Step 4: Prepare PWM of 433 UHF

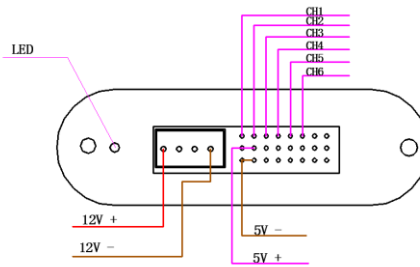
1. The wire connection of 433 transmitter (sold separately) and radio receiver

The 433 transmitter is a separated part of the 433 system, and should be purchased. Please make sure that CH5 and CH6 can be controlled by at least two or more switches on your radio. Please see the following picture:



As per the photo:

- 1 Balancing head of 3s battery;
- 2 Receiver of radio
- 3 3s battery;
- 4 Arkbird 433 transmitter



As per the chart:

- 1). Beware negative pole and positive pole of the battery 12v+ and 12v- for the power supply of the 433 transmitter;
- 2). Beware negative pole and positive pole of the output portal of transmitter 5v+ and 5v- for the power supply of the radio receiver.
- 3). Channel mapping:

No.	433 transmitter	Receiver of radio (user supply)
1	CH1	For aileron (roll)
2	CH2	For going up and down (pitch)
3	CH3	For throttle (motor)
4	CH4	For direction (track)
5	CH5	For switches of 2/3 control flaps (excluding CH1-CH4)
6	CH6	For switches of 3 control flaps (excluding CH1-CH5)

- 4). Please make sure that each part is connected correctly before powering on.

If the 433 transmitter works well, the LED (yellow) will flash fast. If the 433 transmitter does not receive signal from receiver of radio, the same light will flash slowly.

2. Binding the 433 System.

- ◆ Power off the 433 transmitter, then power on airplane;
- ◆ Constantly press the button (as per the photo) for about 6-10 seconds till the LED light flashes 1 time every second;



- ◆ Power on 433 transmitter, then LED will fast flash ;
- ◆ Binding is finished;

Step 5: Final check

1. Check voltage of the batteries and ensure they are not excessively discharged. The lowest voltage of batteries for airplane should not be lower than 9.6v. Otherwise, battery cells are likely to be damaged.
2. Make sure the inner part of the airplane is clear;

3. Testing the airplane

Step 1: Preparation

Before proceeding the next steps, please ensure the 433 transmitter and receiver are correctly connected and bound, then:

1. Take off the propeller
To prevent yourself and bystanders from being hurt.
2. Plug off GPS
Otherwise the flight control will automatically search for satellites, which may cause failure of entering OSD.
All operations hereunder are done without GPS. It could be located as per the photo below:



Step 2: Requirement of radio




The functions of radio are varied from different brands. Please refer to relevant instructions on your radio's manual.

1. Number of total channels should be equal to or over 6;
2. Create a new model on your radio.;
3. No mix mode, disable any mixing options.
4. One switch of 2 positions is needed. CH5 is the best port for it (as per aforesaid photo about wiring of 433 transmitter)
5. One switch of 3 positions is needed. CH6 is the best port for it (as per aforesaid photo about wiring of 433 transmitter)
6. Values of each channel should be equal to or over 100%. The value of channel for throttle should be -110% or less.


Step 3: Choose one mode

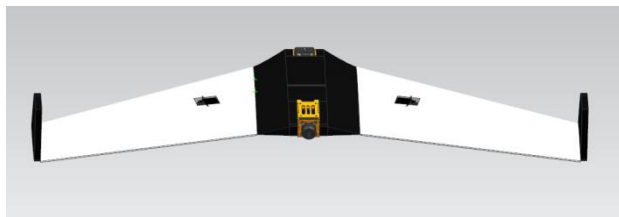
Feel free to move the switches (as aforesaid). Beware the mode the AP is in, checking this icon on the OSD. The mode will vary when you move ch5 and ch6 switches . Please remember the position which is important in the next steps.



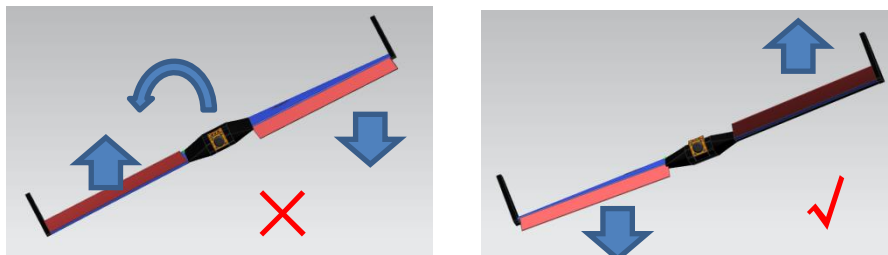
- The flag  in the red square stands for Manual Mode
- The flag  in the red square stands for Balance Mode;
- The flag  in the red square stands for Return to Home Mode;

Step 4: Check elevons movements

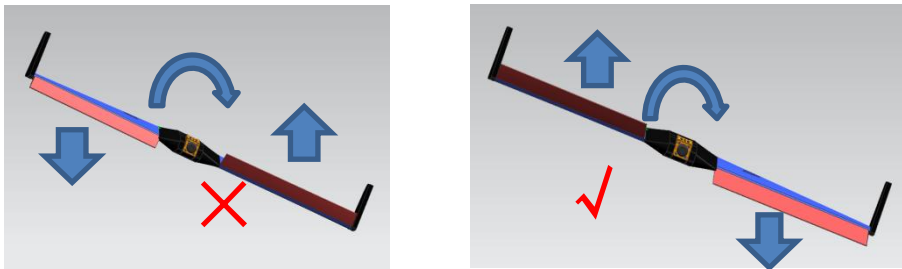
Keep the airplane in Balance Mode (the icon will be  in the OSD). Then the airplane should be put in front of your eyes as per the following photo (the head of airplane is facing you). The orientation of the elevons surface will change while it is moved up and down, left and right.



- Swing the airplane from right to left, elevon on the right side should face up, the one on the left side should face down.

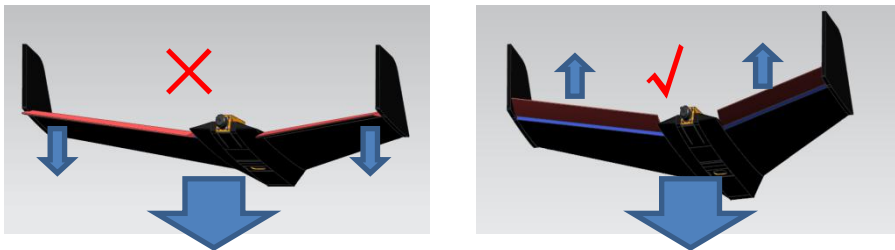


Swing the airplane from left to right, elevon surface on the right side should face down, its left side should face up.

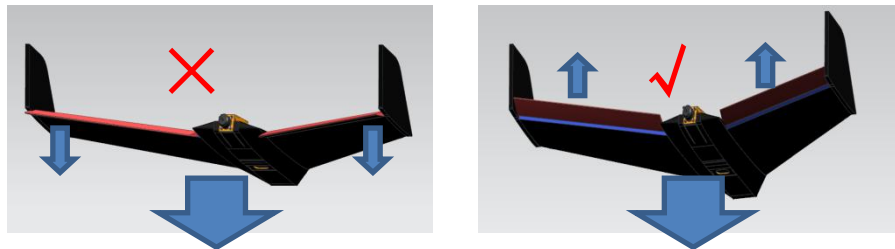


If the orientation of elevon surface is not right, please note it and change negative and positive value of roll in OSD.

2. Nosing down the airplane, then both the left and right elevon surfaces should face up, as per:



Nosing up the airplane, then both the left and right elevon surfaces should face down, as per:



If the orientation of elevon surface is not right, please note it and change negative and positive value of pitch in OSD.

Step 5: Further configuration

After completion of Step 4, Set the switches so Manual Mode should be the flight mode and throttle value should be the lowest. Then move your aileron stick to the rightmost or leftmost. Don't touch anything else until the OSD shows the following:



* If the OSD cannot display menus as the photo, please refer to Q&A attached to the user instruction.

The mark in red square is cursor. It functions as:

- a. Controller for going up and down (pitch) to increase and decrease values. Moving up to increase value and moving down to decrease value.
- b. Controller for aileron (roll) to confirm entrance or exit of submenus in the OSD;

Please check:

The control of your aileron in your radio should move the menu left or right matching your movements, if not, the channel to control aileron (roll) of radio needs to be reset. Under the same condition, the control of your elevator in your radio should move the menu up or down matching your movements, if not, the channel to control elevator (pitch) of radio needs to be reset.

Step 6: Setting parameters

1. Set the type of airplane and orientation of elevon surface:

To enter submenu (see photo at the right), the stick for going up and down (pitch) needs to be moved down to FLIGHT/MIX/GIMBAL (see photo at the left), then rocker of aileron (roll) needs to be moved to right.

The parameter of ROLL needs to be accordingly changed, if orientation of elevon surface is wrong as aforesaid test. (To turn NORM to INVERS or INVERS to NORM, the stick for roll needs to be moved right and the stick for pitch needs to be moved down). The way to adjust the parameter of going up and down (pitch) is the same.

The parameter of MIX should be FWING, otherwise it needs to be changed to the following aforesaid method.



2. Exit menu

Return to main menu of OSD by swinging aileron stick to the left. Then move the 2/3 positions switches till the OSD go back to the flight interface as foresaid.

3. Check elevon surface again.
4. Repeat aforesaid steps to adjust parameters.
5. Following values are very important, other parameters do not need to be changed (default value is applicable for the BNF version airplane before it is packaged)

ROLL CTL20
 PITCH CTL13
 YAW CTL140

LAUCH ASSIST ON

CUSTOM MODE HOVER MODE is not recommended, otherwise the airplane will be out of control.

*Other parameters can be altered according to arkbird lite user instruction (if better flight experience is expected by users)



Step 7: Check radio

Ensure the radio is workable:

1. If the aileron stick is moved to left, the left elevon surface should face up and the right one should face down.
2. If the rocker of pitch is moved down, both sides of elevon surface should face up.

Step 8: Mechanical elevon value

In Manual Mode the value of radio and assistant controller should be reset to zero. Please ensure the back edge of elevon surface is aligned with the back edge of airplane, otherwise the position needs to be adjusted by moving the elevon plate.



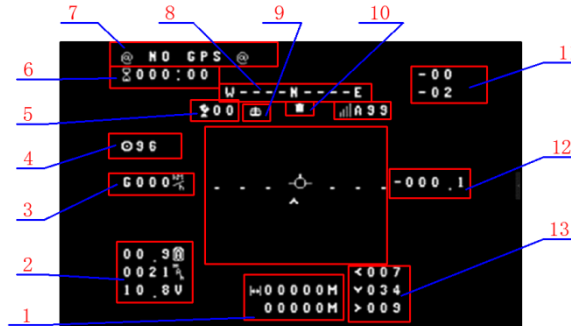
Step 9: GPS Search

1. When all aforesaid steps are done, GPS can be plugged in back again to the autopilot. Then the cabin can be closed with all lines correctly connected.
2. Upon the airplane is powered on again, it will automatically search GPS. At that time, the airplane needs to be set in Return Home Mode by swinging the switches of ch5 and ch6. This method is used when the airplane is indoors. If the airplane is used outdoors, to search GPS must be done.

At this point you should be ready to fly, please contact our Customer Support for further references.

4. User Instruction

1. Introduction of OSD in flight mode:



Definitions:

1. The reference of distance away from home (up) and current full range (down)
2. The reference of current (not used), current battery level (power storage) and voltage of battery.
3. The reference of relative speed between airplane and ground.
4. The reference of health value of autopilot, please ensure it is over 70 while the airplane is the air.
5. The reference of number of satellites connected by GPS receiver, if it is less than 7, please do not fly the airplane.
6. The reference of flight duration, this value will not change unless the throttle is opened.
7. The reference of GPS alert or longitude and latitude (it can be hidden in OSD)
8. The reference of orientation of the airplane (electronic compass)
9. The reference of Flight Mode
10. The reference of orientation of airplane. It is the flying direction of a person in the airplane from one place to HOME.
11. The reference of current roll and pitch value;
12. The reference of current altitude relate to HOME;
13. The reference of control value

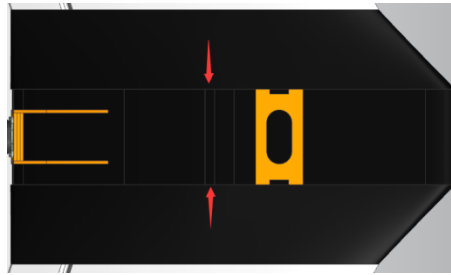
The dotted lines indicate horizon. It is like the ground showed in the eyes of a person in the airplane.

The relative location between the airplane and HOME can be defined in the map of the central part. It is subject to absolute coordinate system in which upside indicates North and right side indicates East.

The origin stands for HOME and the arrow stands for airplane. The orientation of the arrow means the orientation of the airplane. In the photo, the airplane is located at 10 degree of Southwest of HOME and it is flying to North.

2. Adjust gravity center

There is a groove in the belly of the airplane as area indicated by the arrows. There is a wider wood plate in its front side and narrower wood plate in its back side. The area between the two wood plates is the location of gravity center. For new users it is recommended to make the central part thereof as gravity center, which is better for stability. Please check its location before flying. **The gravity center can be changed by adjusting location of batteries or increasing weight.**



3. Failsafe

(1) Failsafe of 433 receiver

All accessories should be turned on and flight mode should be turned to Return Home Mode. Then the button of 433 receiver should be long pressed till the flash light fast flashes. At this time, if the 433 transmitter is powered off, the airplane will automatically switch to Return Home Mode.

(2) Lost-control protection of radio

Please refer to specific instruction of your radio. The primary requirement is that the airplane should be in Return Home Mode upon the radio is powered off whatever the brand is. (The values of CH5, CH6 will be changed by radio. Upon powering off the radio, the autopilot will automatically turn the mode to Return Home Mode due to the change of values of CH5 and CH6 input into the receiver.)

(3) Test:

1. The default mode should be Balance Mode. Upon powering off the radio, the mode should automatically turn to be Return Home Mode as displayed in OSD. If this process cannot done within 5 seconds, it may be caused by failure of lost-control protection. Both radio and transmitter need to be reset.
2. The default mode should be Balance Mode. Upon powering off the radio, the mode should automatically turn to be Return Home Mode as displayed in OSD. If this process cannot be done within 5 seconds, aforesaid step needs to be done again.

Reminds before and after the airplane takes off

Before the airplane takes off

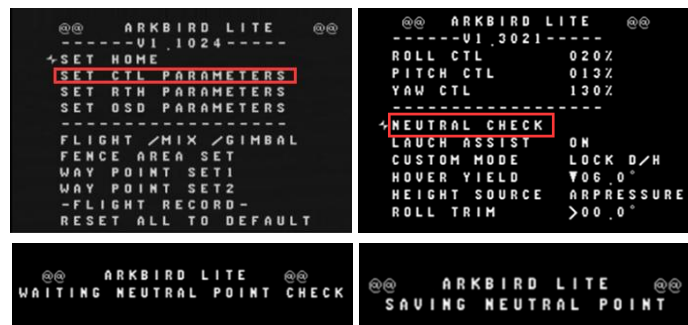
All preparations have almost been completed, the next step is to fly the airplane in exterior place.

Please keep in mind:

1. The airplane should fly in area where is not populated and away from buildings and airport, railways and sensitive regions. Those places are not recommended.
2. Please wait the airplane to search for satellites after it is powered on it. The duration will vary from place to place. The maximum duration will not exceed 10 minutes.
3. Please calibrate the airplane after searching satellites.

Steps:

- (1) Put the airplane horizontally on the ground.
- (2) Enter menus of OSD (see aforesaid instruction)
- (3) Enter the menu SET CTL PARAMETERS (Up left photo)
- (4) Enter the menu NEUTRAL CHECK (Up right photo)
- (5) Swing the input of aileron from left to right for a few times to wait for neutral point check (Left below photo)
- (6) Saving neutral point and automatically return to main menus (Right below photo)
- (7) Exit main menus
- (8) Return to the OSD for flight control
- (9) Complete calibration



4. Take off

The airplane will save the location of HOME after searching satellites. Launch assistant mode and safe throttle will be workable. Within 30m radius of the HOME, the throttle will not start unless the airplane is in Manual Mode.

Steps:

- (1) Turn the mode to be Balance Mode;
- (2) Accelerate the throttle to the highest level;
- (3) Hold the airplane in hand and run a few meters;
- (4) Wait the throttle automatically starts;
- (5) Horizontally throw the airplane into air when the throttle is on;
- (6) The airplane will automatically climb up;
- (7) The airplane will be under control of radio;

After the airplane takes off

1. The lowest speed >45km/h
2. Do not choose Manual Mode unless it is needed.
3. Do not use trims in Balance Mode. If the airplane noses up or down, it can be configured by radio.
4. The power of transmitter is 500mw. The farthest receivable distance is 2.5km
5. If the airplane will fly a long distance, the height and orientation can be preset.
6. Keep an eye on value of battery voltage.