ARKBIRD-Tiny Product Features:

ARKBIRD System is a high-accuracy autopilot designed for fixed-wing, which has capability of auto-balancing to ease the manipulation while flying. At the same time controls the balance, the return and many other maneuvers of your aircraft with high precision.

The perfect auto-stabilization system and a plug-and-play design free you from worries and inconveniences and enjoy the beauty of FPV in an instant.

1. Function all in one broad, on broad IMU (Inertial measurement unit).
2. Plug & Play design, no need to weld any wire.
3. Intelligent PID controller. Easy to adjust, support delta-wing.
4. One button auto-leveling, semi-automatic flying; lock angle 45°with max sticks, auto-leveling after releasing sticks.
5. One button auto-leveling, one button RTH (return-to-home), lost radio signal return-home.
6. Gyro 3D balance.
7. Fence mode（Auto Switching to Return-to-Home Mode while flying out of the rectangle area specified.）
8. One button hover mode. regard the hover position as balance position

Please read below step carefully before use:
please power up after a wire check. Forcible satellite search interface will be entered (incontrollable) every time you power up. You can pop-up manually and adjust rudder angle in Manual Mode and auxiliary control in Balance Mode. A Neutral Point Check for the sensor is

necessary. Also, you need a fail-safe protection for the receiver in case your autopilot loses control when returning home. Then you can take off.

If GPS positioning is valid, GPS status LED will flash fast.

For the first flight, we suggest take off with "Manual Mode". Check if the aircraft flies normally after switching to "Balance Mode" in a level flight. Then switch to "RTH Mode" and check the plane whether have hovering at 80M height overhead.

When the maiden flight test is done, Balance Mode can be used freely for taking off the autopilot. Since there is no OSD module displays the flight status, our suggestion is before flying please double check RTH mode whether is properly for each flight. If works fine, you can use extended functions such as RTH or fence mode.

If without accessing GPS module, You can switch between Manual, Balance, Gryo and Hover mode.

NOTE: Goods delivered before Oct, 2015 were not upgraded to 2.10 firmware, so Fence and RTH mode can't be properly used. Under this firmware, GPS status light flash fast, please register and upgrade your firmware referring our update instruction then you can use GPS function.

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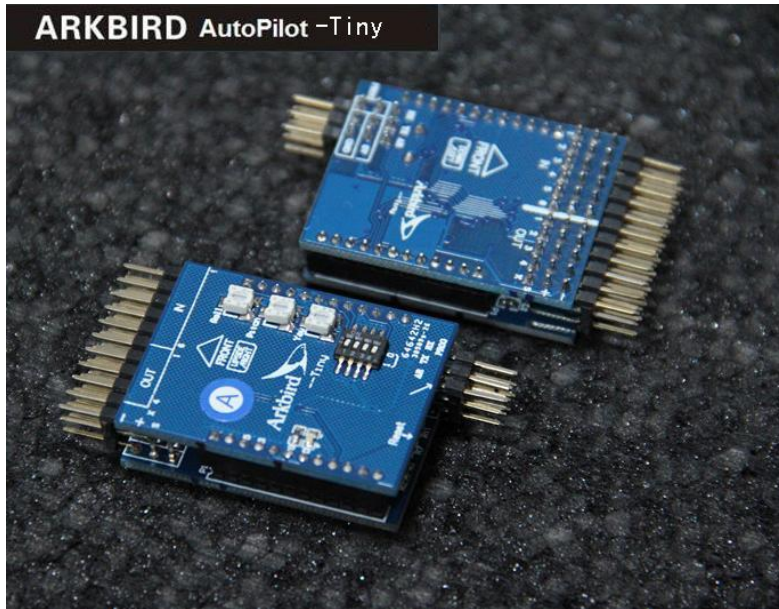
Warning: Read this manual carefully before use! Pay attention to important detail and parameters!

**Use "ctrl+F" to search this document to locate information, eg. "neutral check".**

1. Wiring

Note:This Side facing UP or Right Wing

（Check carefully before power on, incorrect wiring will damage the autopilot permanently!）

1. When installing GPS module, its side of sticker shall be face to sky direction.

2. If without plugged in GPS module , GPS indicator light flash slow ;

If plugged in GPS module but positioning is invalid, GPS indicator light double flash ;

If plugged in GPS module and positioning is valid ,GPS indicator light flash fast.

3. The pins of RX in & Servo out shall stay forward (toward flying direction), the side with 4P dip switch shall be upward or vertical installed toward right wing.（Default is level installation）

4. Put on heat-shrink tubing, fix by sponge and cable tie. Please keep away from motor to avoid vibration and reducing the accuracy of sensor.

5. Please don't fixed in advance, because after that need to DIP and confirm the auxiliary positive and negative.

6. While using on flying wing, connect channel 1 output to right servo and connect channel 2 output to left servo. DISABLE the mix function from transmitter, switch Dip switch 4 to "0" to enable flying wing mix.

7.While using on 3-channel plane, connect channel 1 output to rudder to steering.
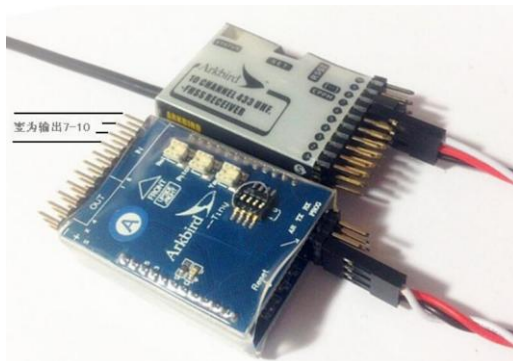
If using Arkbird UHF, Make a short circuit between the Channel 8's signal to the 5V (in the middle row) using jumper cap. Then channel 7 will output composite PPM signal.

PPM can be connected to Arkbird Tiny's AR port, and make single-wire transfer of the 10 channels and RSSI value.
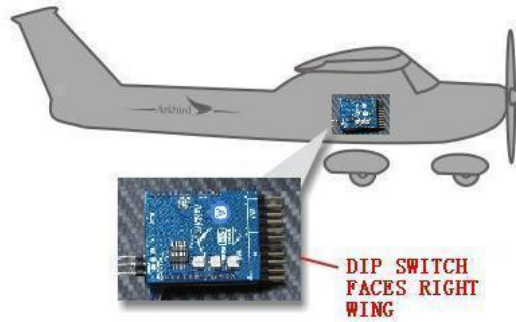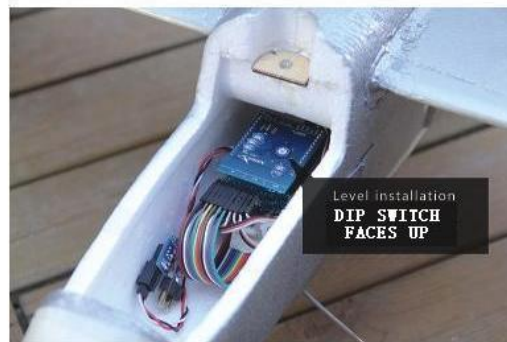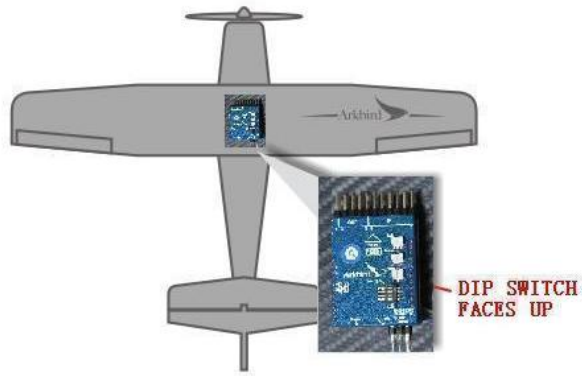
2 ways of installation

Vertical   installation

2. Switch Modes through CH5 and CH6:

Use CH5 and CH6 to switch flight mode. If without accessing GPS module, You can switch between Manual, Balance, Gryo and Hover mode.

1) While CH5 is less than 50%, it switches to Manual Mode;
2) While CH5 is more than 50% and CH6 is less than 30%, it switches to Balance Mode;
3) While CH5 is more than 50% and CH6 is between 30% -70%, it switches to Gyro Compensation Mode; it will only do compensation when unintentional attitude changes.
4) While CH5 is more than 50% and CH6 is more than 70%, it switches to Hover Mode; it will hold the plane balanced hover attitude.

$$\left\{ \begin{array}{l} CH5 < 50\% -------- \text{Manual Mode} \\ CH5 > 50\% \left\{ \begin{array}{l} CH6 < 30\% - \quad \text{Balance Mode} \\ CH6 > 30\% - \quad \text{Gyro Mode} \\ CH6 > 70\% - \quad \text{Hover Mode} \end{array} \right. \end{array} \right.$$

After access GPS module, you can switch to Manual, Balance, Fence mode and RTH mode

1. While CH5 < 50%, it switches to Manual Mode
2. While CH5 > 50% and CH6 < 30%, it switches to Balance Mode.
   While 30% < CH6 < 70%, it switches to fence Mode(within fence area and above safe height it is Balance Mode, otherwise it switches to RTH mode).
   CH6> 70%, it switches to RTH Mode. (Departure point and 80M height as the RTH flight coordinate)

$$\left\{ \begin{array}{l} CH5 < 50\% -------- \text{Manule mode} \\ CH5 > 50\% \left\{ \begin{array}{l} CH6 < 30\% - \quad \text{Banlance mode} \\ CH6 > 30\% - \quad \text{Fence mode} \\ CH6 > 70\% - \quad \text{Return to home mode} \end{array} \right. \end{array} \right.$$
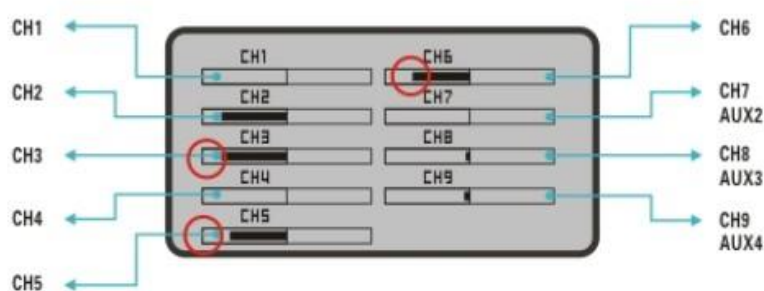
Fence Area

Square area centered take-off point, with side length 300 meters. Safe height is 25 meters; beyond flying area or below safe altitude will trigger RTH.

Note: Check CH5 and CH6 reverse through radio monitor：

push throttle, CH5 and CH6 to 0%, the CH3, CH5, and CH6 status shown on radio shall be like picture below (Or check through servo).

3. Neutral Check

Neutral point alignment needed under first installation, changing of Vertical/Level installation, not using for weeks, or temperature variation is more than 10 degrees.

Pushing CH5 and CH6 to minus (0%) and moving CH1 stick to left or right side within 3 seconds after power on can enable neutral point check.

Aileron all the way to the right means it is waiting autopilot be put down,

Put the autopilot paralleled to the ground (Please prop up if there is a landing gear), and move CH1 left and right to do 3-seconds neutral point check.

Aileron will be back to center once finished.

4. Manual Mode

Radio Stick and SUB-TRIM back to center, set radio travel range as 100%.

Switching to Manual Mode, Arkbird will not participate control, set manual control's reverse through radio, adjust plane's CG and travel angle.

5. Reverse Balance Mode assistant Control

Switching to Balance Mode, by pushing CH5 to 100% and CH6 to 0%, if the neutral point is

correct, rudder, aileron and elevator shall be at the neutral position, otherwise please check the neutral point again.

When switched to balanced mode, compared to manual mode, the elevator will lift up a bit which means the plane will rise a bit in a level flight to ensure a level route.

1.   **Aileron**: When rolling the plane to right, aileron shall produce a left compensation automatically, make plane go back horizontal. On the contrary, when rolling to left, aileron will produce a right compensation. Please see as below:
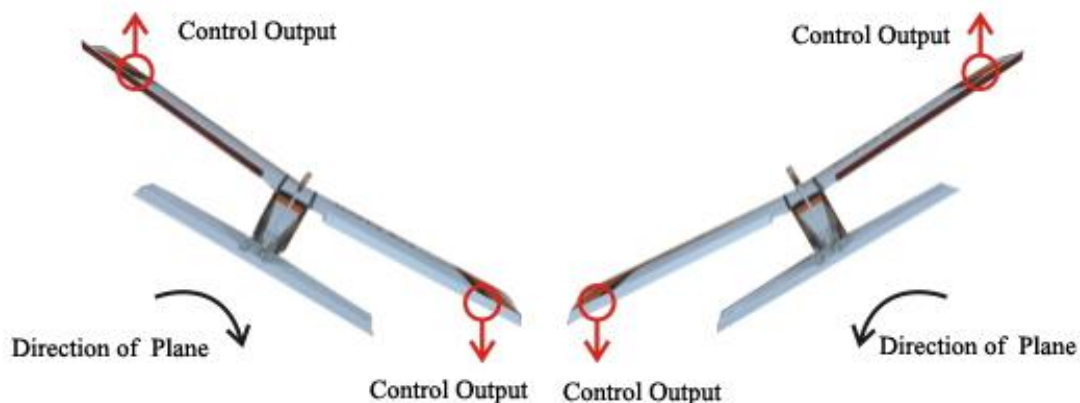
If the compensation direction is not correct, please move the Dip switch 1 to the other side.

2.   **Elevator**:When pitching up the plane, elevator shall produce a down compensation automatically.   On the contrary, when pitching down, elevator will produce an up compensation. Please see as below:
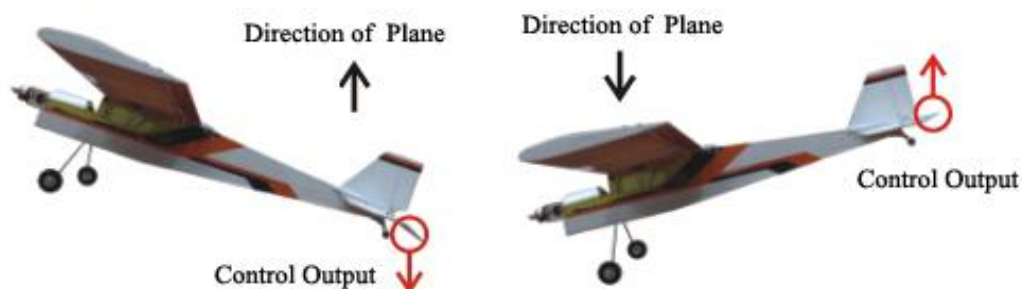
If the compensation direction is not correct, please move the Dip switch 2 to the other side.

3.   **Rudder**: When yawing the plane to right, rudder shall produce a left compensation automatically.   On the contrary, when yawing to left, rudder will produce a right compensation.

If the compensation direction is not correct, please move the Dip switch 3 to the other side.

6. Adjust output travel range：

Please setup stick angle volume on RC Transmitter as 100%, fine tuning back to middle, and change stick volume by adjusting Roll/Pitch/Yaw Potentiometer knobs or plane's control surface.

Increase the travel range of control surface

Over compensation
Decrease the travel range of control surface
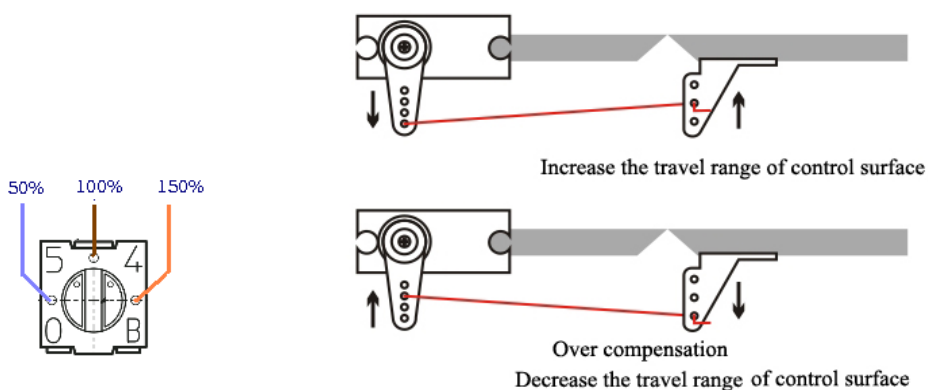
Please increase control value when the stability not good enough under Balance Mode (drift even stick back to center), turn the Potentiometer knob clockwise

Decrease control value when the plane swings, turn the Potentiometer knob anticlockwise.

Please fly under Manual Mode while the first flight, switching to Balance Mode at safe height, turning back to Manual Mode and landing on any unexpected situation.

7.GPS and Return to Home Instruction

After power on, Arkbird will start to search GPS satellite and save the first valid position as Home. During searching, the elevator will be up and any manipulation of radio stick is invalid. If need to skip the searching, please push CH6 more than 75% and push CH1 to left or right side for 1 second.

Once skipped the searching, it CANNOT switch to RTH mode, and the LED will flash slowly.

While switching to RTH Mode (CH5 to 100% and CH6 to 100%), it will adjust the flying height to safe height to go home.

Considering throttle safe, when height and distance is within 30m, there will be no any throttle output, to avoid any hacking while adjusting.

During RTH mode throttle will increase if altitude is low, or speed is slow, decrease if altitude is high, or speed is faster than set safe speed.

Once lost GPS satellite, switching to RTH, the plane will go home automatically based on the home angle of last position before out of signal. Within radio range, please switch to Balance Mode and land.

8.Fail-Safe to RTH mode

Fail-Safe is a receiver's function to preset position when receiver is out of signal. Some receivers can set in the radio menu, and some save the current position through receiver

(probably through a button).

Please refer to the manual of receiver. Set the fail-safe position the same as Return-to-Home Mode through CH5 and CH6 (CH5>50%,CH6 > 70%). And then turn off the radio to check if it switches to Return-to-Home Mode

（Note: No need to set fail-safe from channel 1 to channel 4 as these four channels are controlled by autopilot under Return-to-Home Mode, which is not relevant to receiver.）

9.FAQ

Q：Cannot locate home, Unable to control the plane

A： The elevator lifts up a bit, unable to control the plane, and waiting for positioning proves GPS wiring is OK, otherwise, please check GPS wiring.

GPS's white antenna shall face up; keep GPS away from Video TX and Camera. Some inferior Video TX's antenna will affect GPS, too. You can try to remove the casing of GPS, or put a layer of tin foil paper under GPS to enhance the performance.

GPS can only work Outdoors, First time about 5-10 minutes, next power on of the same day it would take less than 10seconds to locate.

Q：Plane tilts under Balance Mode / Manual Mode, can I adjust the radio TRIM

A： First time installation, do a neutral point alignment. Radio stick and SUB-TRIM back to center, adjust plane's CG and travel angle to make plane balanced.

Arkbird can produce compensation when CG & travel angle is not appropriate, but it is not mechanical stable, there would be hidden trouble under RTH mode. So firstly make sure plane can fly stably in horizontal under Manual Mode.

Q：Inaccurate Return-To-Home

A： Adjust remote control rudder angle to 100% and sub-trim back to center. Check carefully in reference to the "Debugging Skills for Balance and RTH Mode" chapter of our instructions.

Make ground video recordings. When switching to RTH or other autonomous flight modes, Roll/ Pitch inclination value and throttle control value will be shown at the bottom right corner of OSD. These data will tell you if the control values are proper and will help you judge which parameter needs to be sub-trimmed.

Attention：

Please read through carefully:

1. The design purpose of autopilot is to keep balance of flight, it is not able to manipulate plane or prevent stall. You must have sufficient experiences of fixed wing to control the flight.

2. The autopilot is only for small-scale RC model. For safety concern, please do not install in plane for aerial photography which might fly over crowd.

3. Please install the autopilot depends on your demands and check the condition before flying every time.

4. Any equipments and electric products on the plane couldn't be completely reliable, please using this system following the instruction. The system provider is not responsible for any direct

or indirect loss and consequence caused by using this product.

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Revision Information：

12.12.14First Release