

SLA-1

User Manual



Specifications

Wing span: 2000mm

Length: 1400mm

RC: 8-Channels

Motor: 2820(920kv)

Esc: 60A UBEC

Battery: 4S 6000-20000mAh 18650

Servo: 1x15g digital metal-gear 2x28g digital metal-gear

Propeller: 12x6

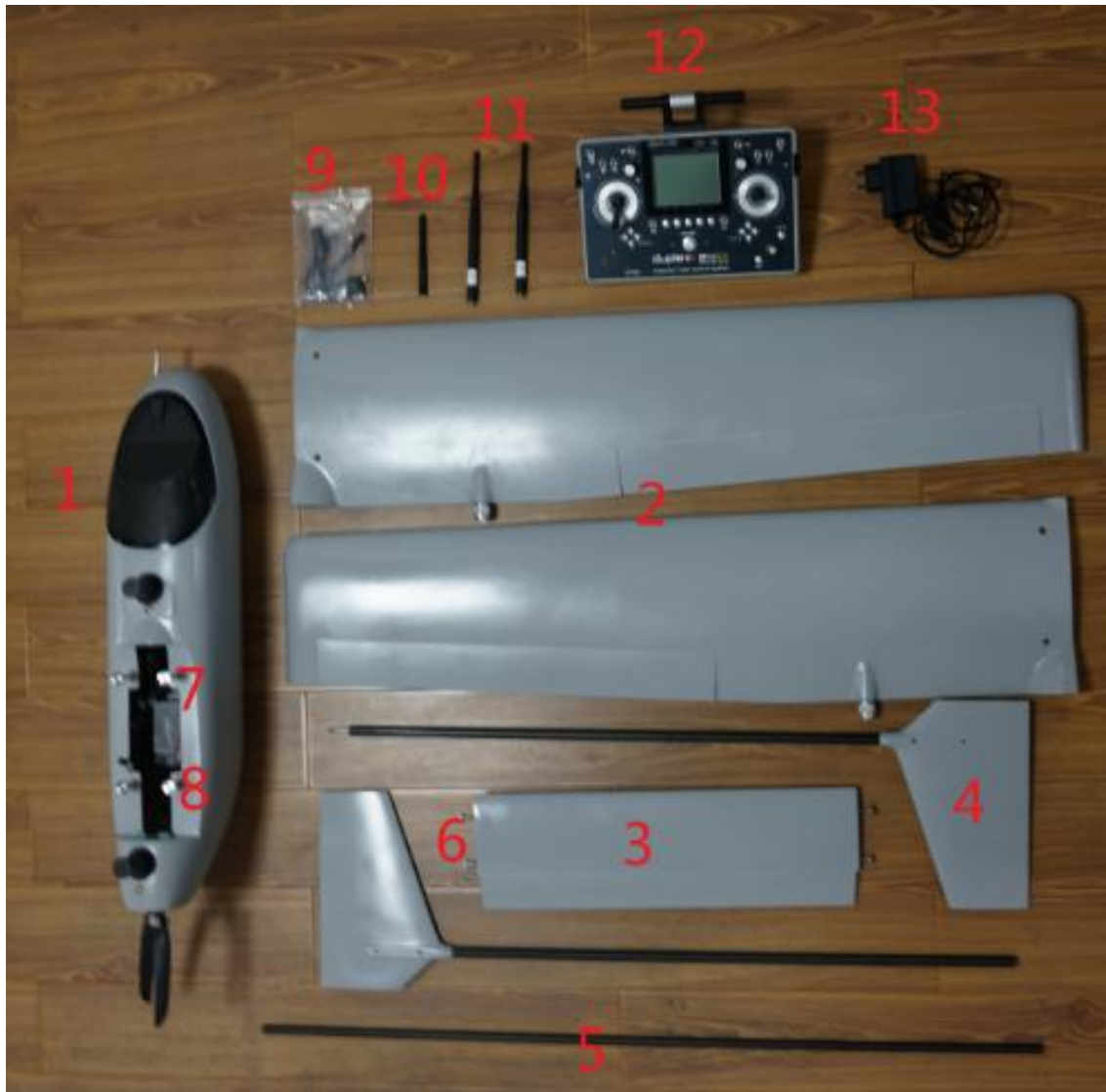
Payload: 1-2kg

Flight time: 40-100mins

Cruising speed: 19m/s

Wind resistance: 8m/s

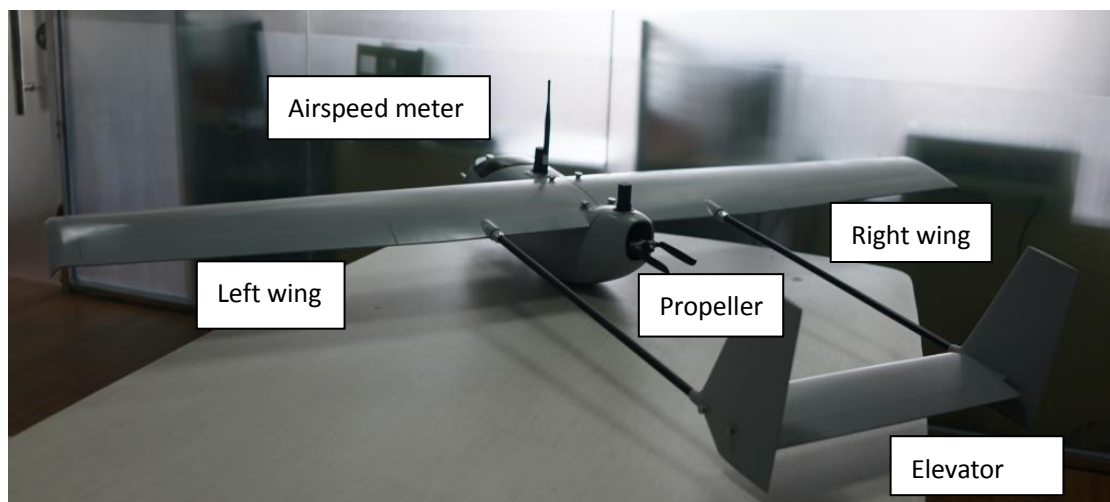
CONTENTS

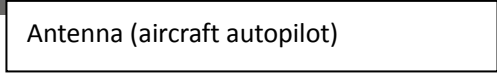
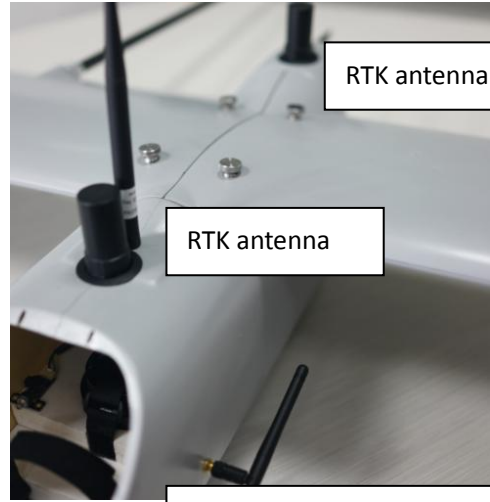
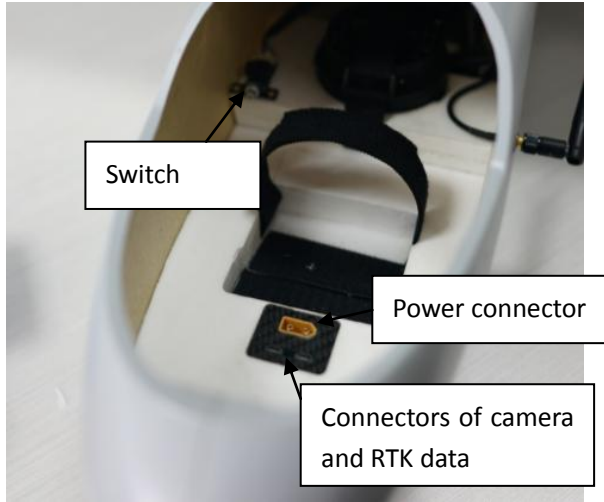


1. Fuselage
2. Wing
3. Horizontal stabilizer
4. vertical stabilizer (fin)
5. Wing joiner tube ϕ 12x1200mm
6. Tail screw M4x25
7. Wing screw M5x40 (Front)
8. Wing screw M5x30 (back)
9. Data link (ground station)
10. Antenna (aircraft autopilot)
11. Antenna of RTK data radio
12. Remote controller (RC)
13. Charger of RC

Name of the components

Warning: Please stay away from the propeller after powering up the airplane. You shall take full responsibility for the injury caused by personal reasons.





Assembly

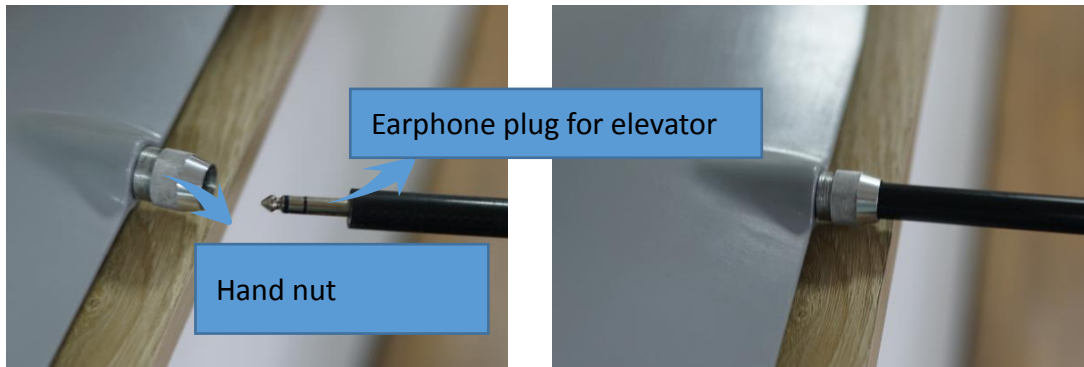
Step 1. Assemble the wing

Assemble the wing with the joiner tube $\phi 12 \times 1200 \text{mm}$.



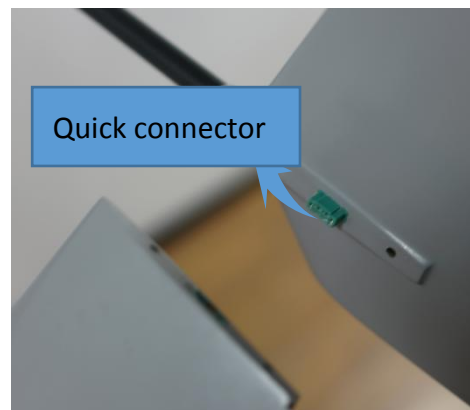
Step 2. Assemble the fin

Loosen the nut (if necessary) on the wing, insert the fin into wing in place. Please note that the fin with earphone plug shall be on the right (shown as below) and installed in place.



Step 3. Assemble the vertical stabilizer

Remove the four tail screws, and connect the quick connector. And install the tail the four tail screws. Adjust the tail assembly to be parallel with wing, and tighten the nut on the wing to fix the tail assembly.

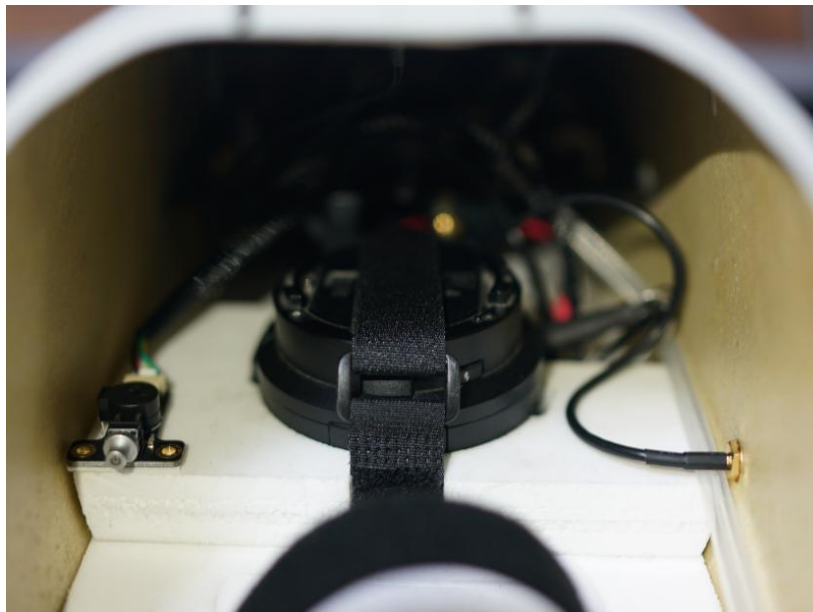
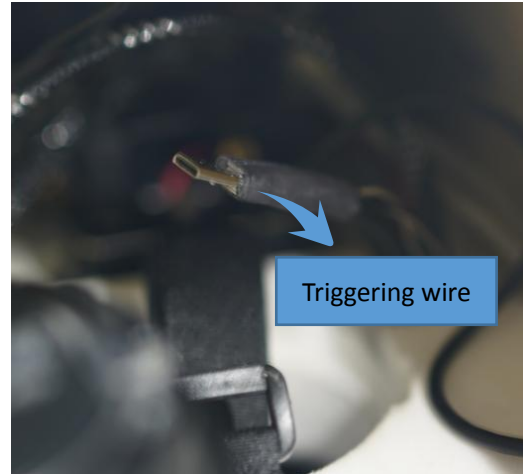




Tighten the nut lastly

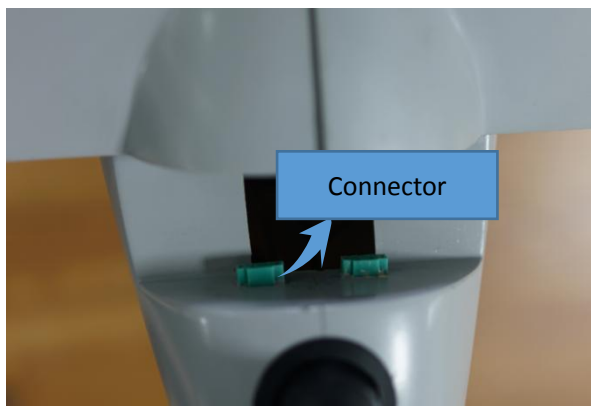
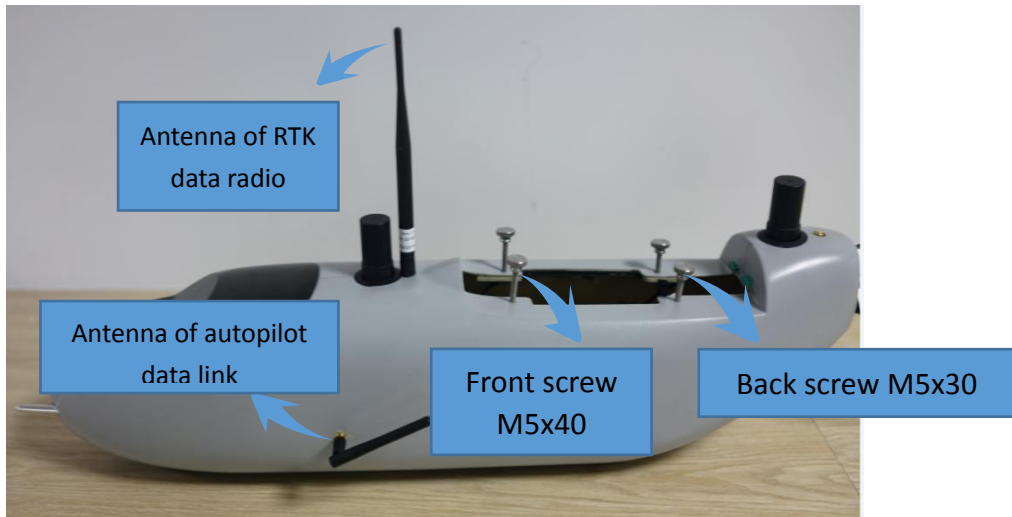
Step 4. Camera installment (fox example QX1)

Connect the triggering wire to camera, and place the camera on camera mount in place. AND tighten the seat belt to fix the camera.



Step 5. Assemble the wing assembly

Remove the two wing screws(M5x40 in the front) and two wing screws(M5x30 in the back). Fit the connectors on wing and fuselage, and place the wing assembly onto fuselage in place. Lastly tighten the four wing screws, and install the antennas.



Step 6. Battery installment (for example 18650 12000mAh)

Place the battery in the seat, and tighten the belt.



As below after assembly:



Flight Modes

The Futaba-T8FG transmitter is recommended to use in this airplane. There are 3 flight modes for use.

1. **Manual Mode**, under this mode the airplane is completely controlled by the pilot.
2. **Stabilize Mode**, under this mode it can detect whether the control surfaces operate correctly in autonomous flight.
3. **Auto Mode**, under this mode the airplane can fly autonomously according to the preset program.

The pilot can switch the dial on transmitter to select the flight mode.



Warning: please refer to the manual of the transmitter T8FG in Futaba website.

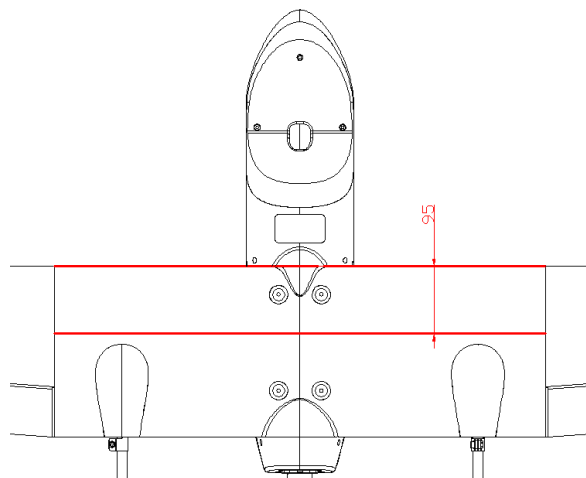
Field Operation Manual

WARNING: A careful preflight check is mandatory after the airplane is assembled.

Prior to powering up:

1. Check the airplane

- a) Visual check on the airframe, wing, tail, control surfaces etc. Make sure there is no damage or potential risk, especially the repaired area. Should you have any questions or concerns, please contact local supplier or the manufacturer.
- b) Check the binding mechanism, make sure that there is no damage in the connection of wing, tail and airframe.
- c) Check actuating mechanism. Make sure there is no damage, loose fit or deformation in the servos, pushrods, control horns and screws etc.
- d) Check the power system. Make sure the system is intact, and the motor is tightly fixed in airframe, propeller and spinner are intact and firmly fixed, all screws are firmly tightened.
- e) Check the wiring inside the cabin. All wires shall be intact. And the connectors shall be connected securely. Pack the excess wires to make sure the wires are in order.
- f) Antennas, receiver, GPS and autopilot etc. electronic parts shall be securely fixed, their connecting wires are correctly and well connected.
- g) Check the airspeed meter. Make sure it is securely fixed and the rubber tube is intact, and its air tightness is in good condition, especially the connection area.
- h) Check the camera, and make sure the triggering connector is well connected and the wires should be orderly.
- i) Check the center of the gravity (CG). The correct CG shall be as below (95mm away from the leading edge of wing).



2. Check the power supply

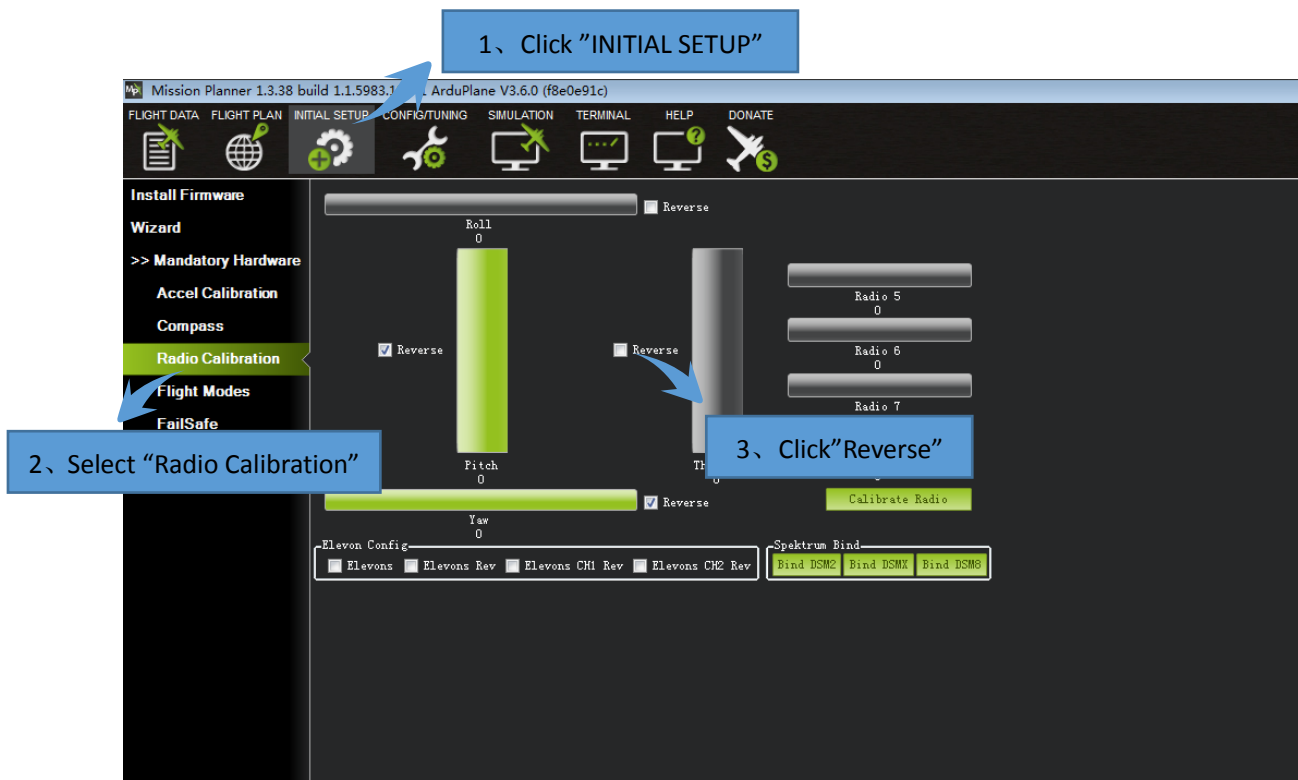
- a) Check the battery energy of ground station. Make sure the remaining battery energy is enough for this complete flight.

- b) Check the battery energy for power supply of airplane. Make sure the batteries are fully charged and the connections are in good condition.

After all these items mentioned above are checked and in good condition, power up the ground station, RC, and the airplane. Then start the software –Mission planner - in the ground station. Set the flight plan and send the settings to the autopilot. Check the operation status of ground station and equipments. Detailed procedures are as below.

After powering up:

1. Check the RC: make sure the model and mode selection are correct, and the battery energy of RC is enough for the full flight of this mission.
2. Check the control surfaces of the airplane:
 - a) Select the Manual Mode by switching the dial to the lowest position. And move the sticks on RC to check whether the control surfaces operate correctly. If it is reversed, please modify the settings in FUTABA RC. Please refer to the manual of RC in FUTABA website.
 - b) Select the Stabilize Mode by switching the dial to the middle position. And hold the airplane in the air. When rotating the airplane to the left in the axis of flying direction, the left aileron should be down (view from tail to nose) and the right aileron should be up. And rotate it to the right, up, and down, the control surfaces should operate to stabilize the airplane. If there is any inversed control surfaces, please modify the settings in Mission Planner, procedures for modification as below.



Step 1. Connect data link

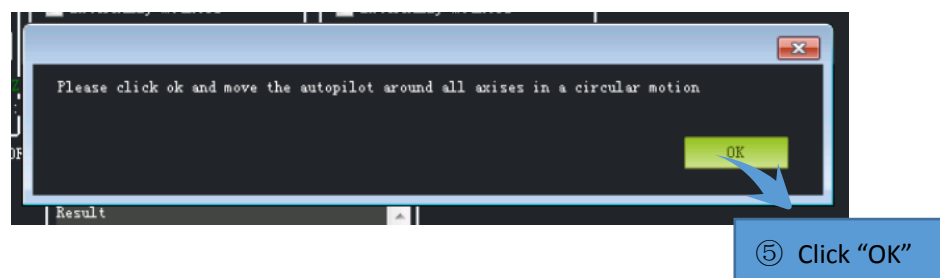
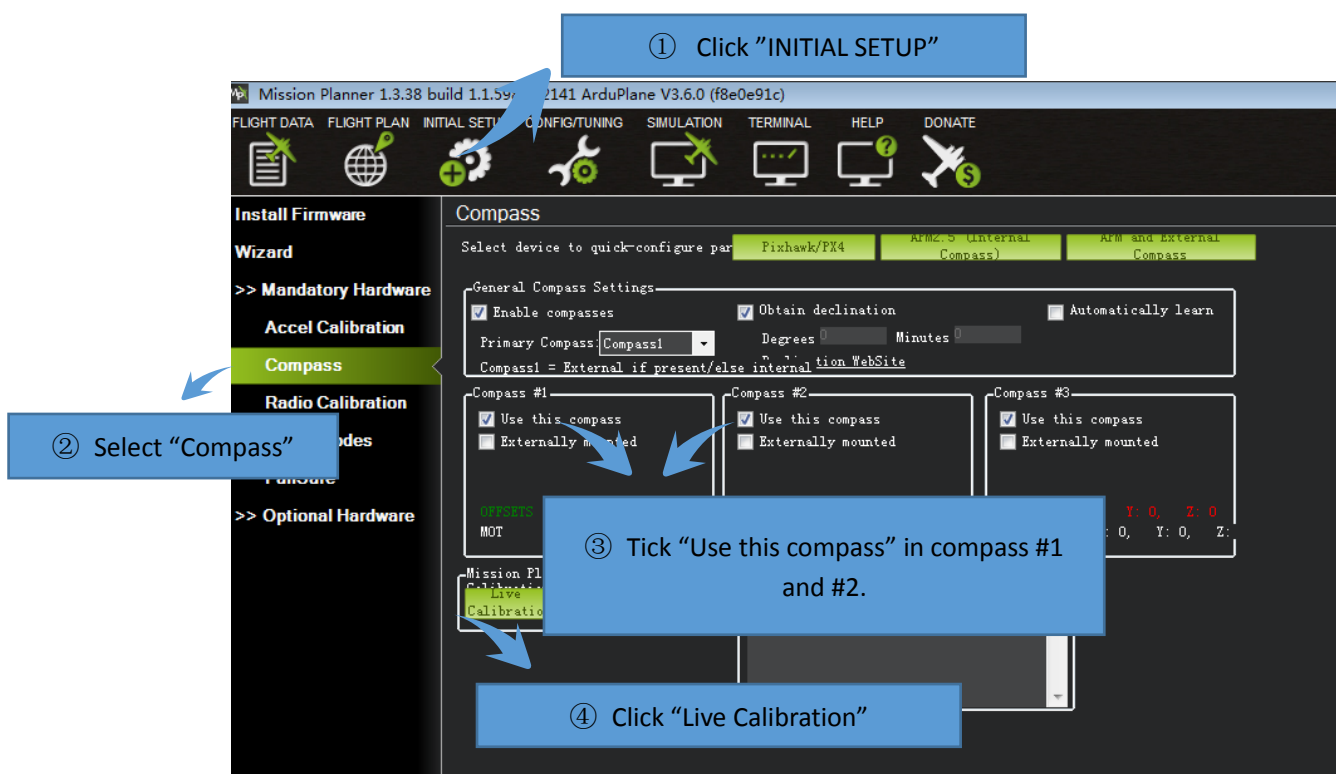
After the airplane is completely assembled, power it up. Connect the data link radio to computer. Then start Mission Planner program, select connection port and baud rate, and click "CONNECT" button. Normally please select "COM" port and baud rate at 115200 (it can be different).



Step 2. Compass calibration

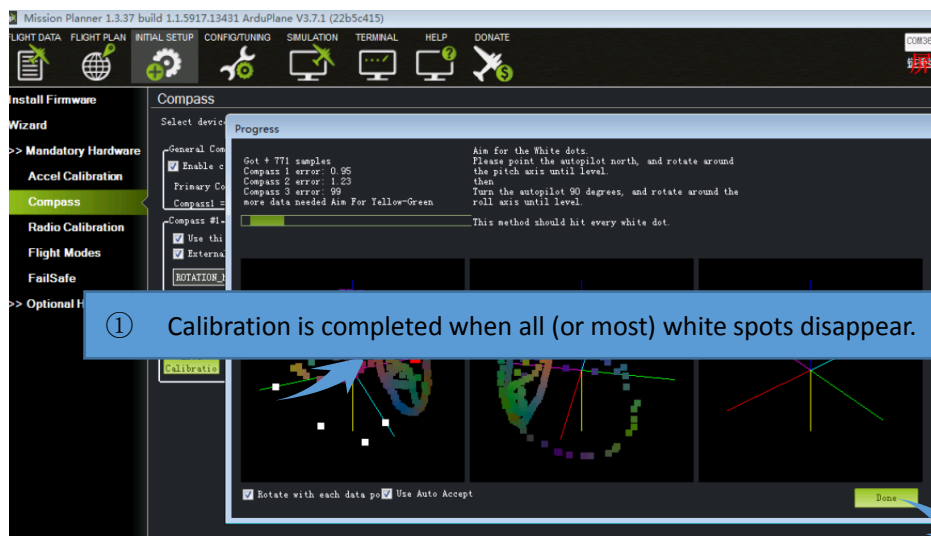
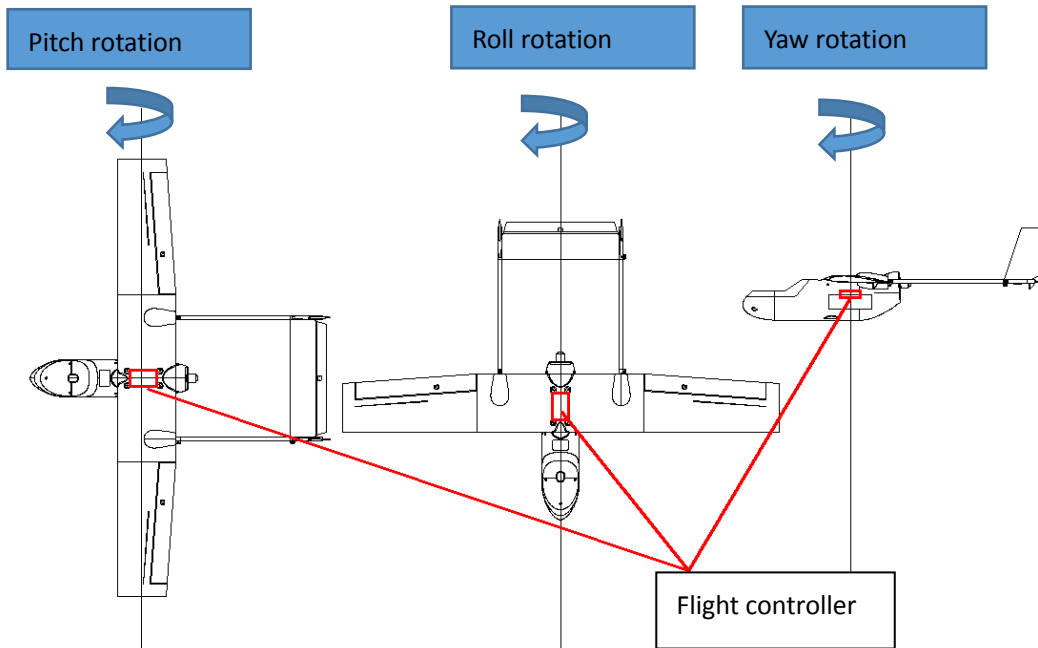
WARNING: Please calibrate the compass whenever the airfield is changed.

- 1) After the data link radio is successfully connected, it is mandatory to calibrate compass. Click "INITIAL SETUP" in the main menu bar, and select "Mandatory Hardware" → "Compass" in the left menu bar. Then tick "Use this compass" in Compass #1 and Compass #2. Then click "Live Calibration" to start the calibration.

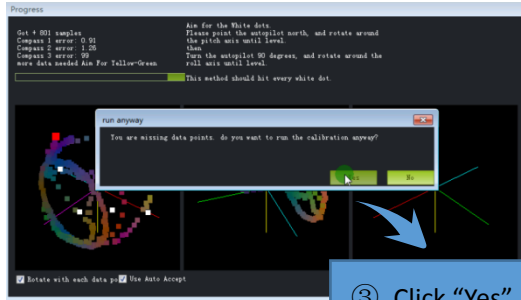


- Slowly rotate the airplane in 3 axes (pitch, row and yaw) respectively, at least two circles for every axis. The white spots on the dialog box of “Progress” are decreasing with the rotation of airplane. When all (or most) white spots disappear, the calibration is completed. Then click “Done” ->”Yes”->”OK” to finish calibration progress.

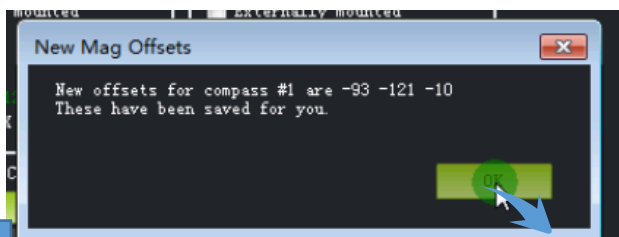
! If the white spots don't change while rotating, please check if the compasses are well connected.



② Click “ Done” when completed.



③ Click "Yes"



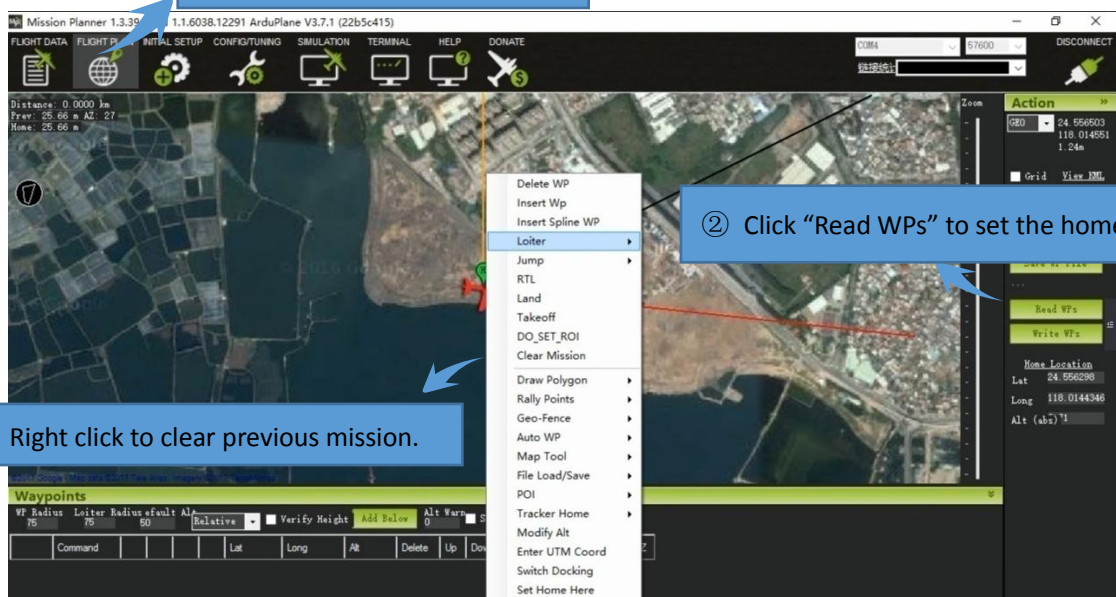
④ Click "OK"

Step 3. Flight route planning

1) Home point setting and clear previous mission

Click "FLIGHT PLAN" in the main menu bar. And click "Read WPs" in the right sided menu bar. Thus the home point is set. Move cursor to the map on screen, and right click to select "Clear Mission". Then the previous mission is cleared.

① Click "PLGHT PLAN"

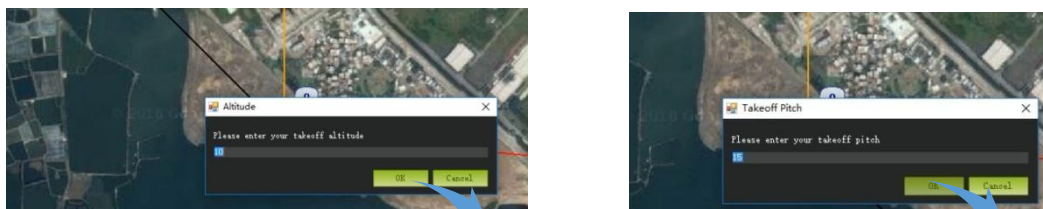
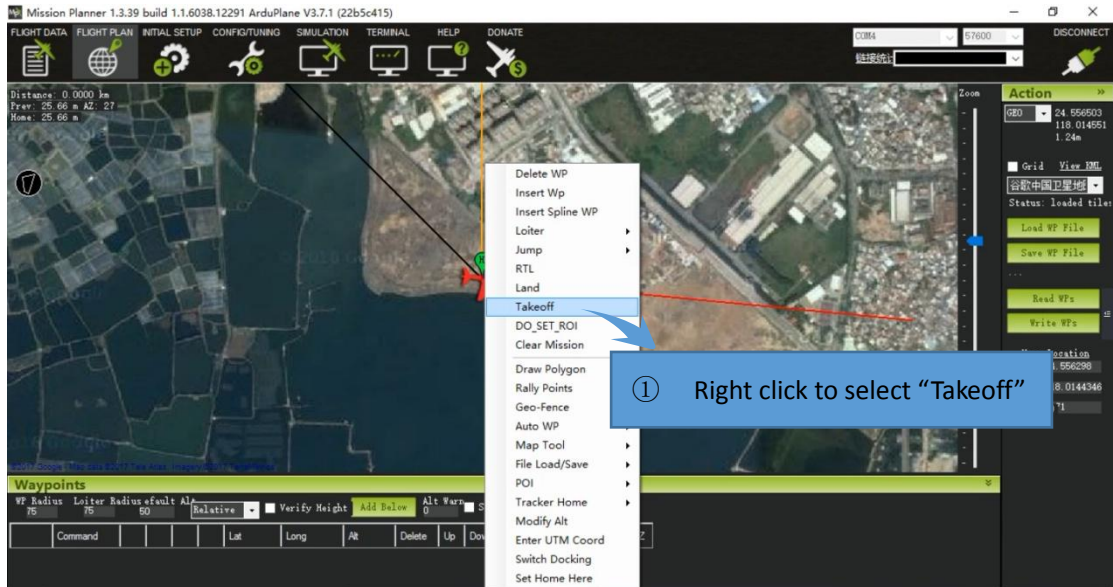


② Click "Read WPs" to set the home point.

③ Right click to clear previous mission.

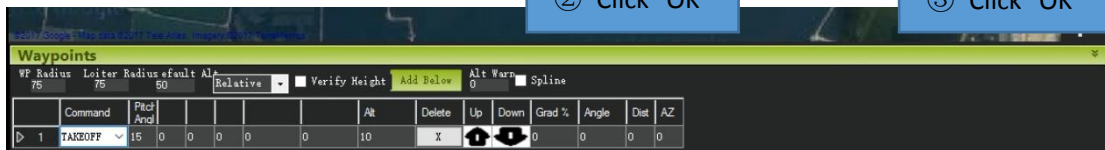
2) Mission setting

Right click the map and select "Takeoff".



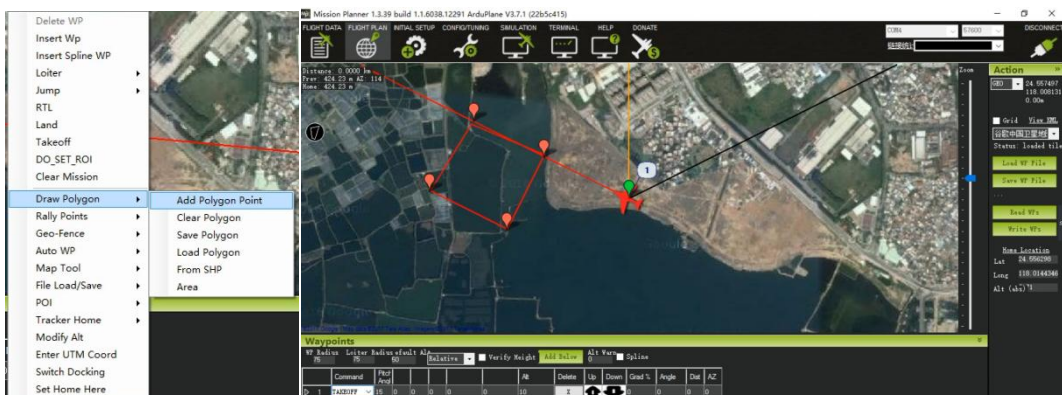
② Click "OK"

③ Click "OK"



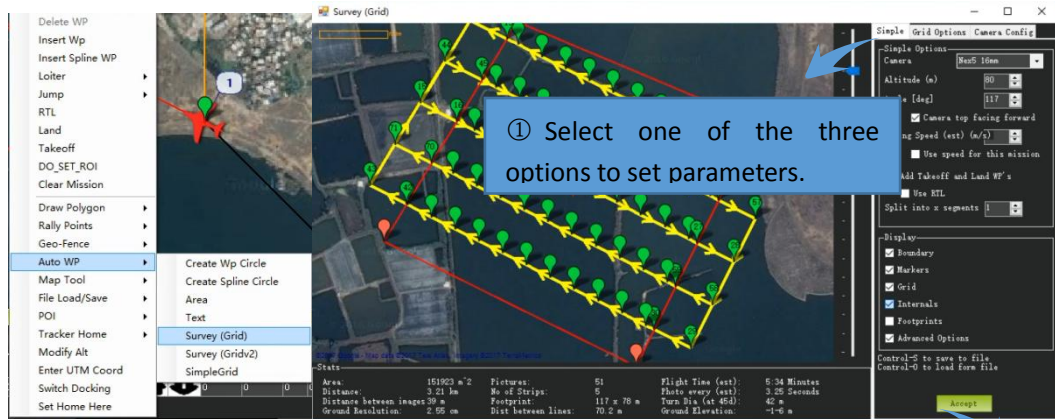
3) Draw mapping area

Right click the map and select "Draw Polygon" ->"Add Polygon Point", then place the necessary points to form the mapping area. Moving the polygon points is also doable by holding left click after the polygon points are set.



4) Waypoints planning

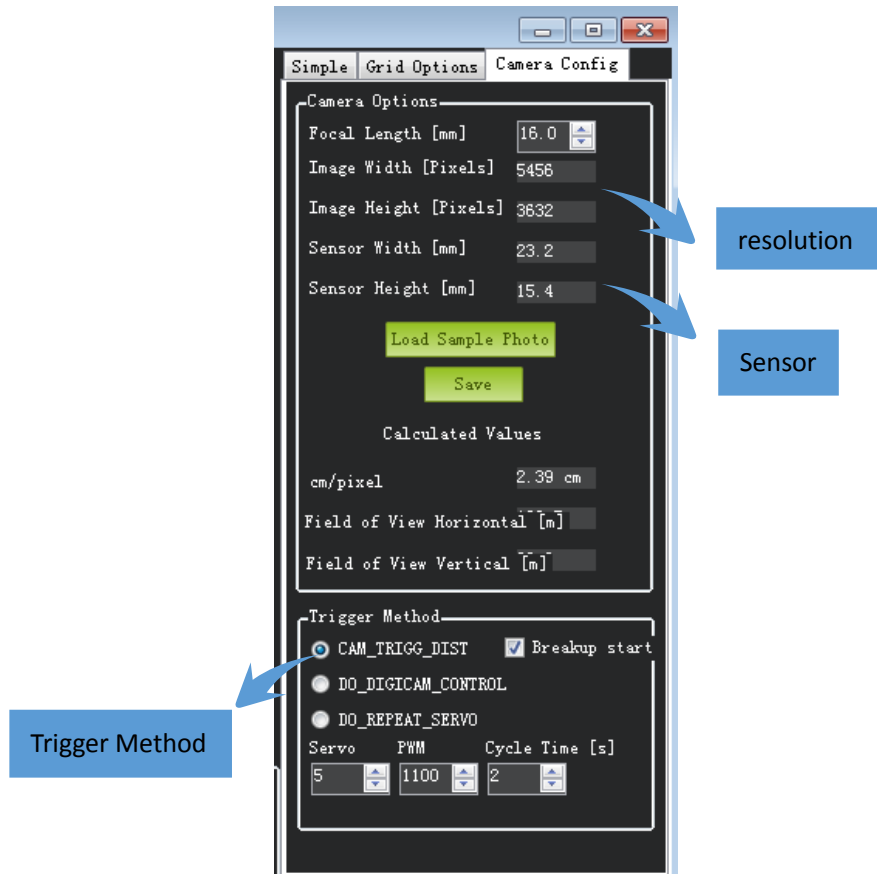
Right click the map to select “Auto WP” ->“Survey(Grid)”. There are 3 options on the right side of the window – Simple, Grid options and Camera Config – to set the waypoints parameters. And to get ideal waypoints the parameters need to be set according to the airplane conditions, the mapping requirements and payload etc. When all is set, click “Accept” to finish the waypoints planning.



② Click “Accept” to finish waypoints planning.

Detailed method of waypoints planning as below:

- i. Set the camera(take SONY QX1 camera with 16mm lens for example). The sensor of QX1 is 23.2x15.4mm, and its resolution is 5456x3632 pixels. Click “Camera Config”, and fill in the parameters of the camera. Then select “CAM_TRIGG_DIST” for the Trigger Method.



- ii. Set the “Grid Options”.
Set both “OverShoot” and “LeadIn” to 150 meters . Then set the “Overlap” and “Sidelap” according to requirement. And set “Dist between lines”, it needs at least 100 meters for the “Dist between lines” to ensure turn round smoothly. If the “Dist between lines” is less than 100meters, we need to set “Min lane separation”(find it at “Grid Options” -> “Alternate Lanes”).
According to the formula $\text{“Dist between lines”} \cdot (n+1) \geq 100$, we can get $n \geq (100 - \text{Dist between lines}) / \text{Dist between lines}$, n is an integer. And fill in the “Min lane separation with the n.
Please note that “Photo every(est)” is the interval time of photographing. If it is set to less than 2 seconds, there may be photos missing. Reducing “Overlap” Or “Ground resolution” can increase the interval time.
- iii. Set the “ Simple”
Set the “Angle” and “Altitude”. Please set the “Angel” according to the actual wing direction of flying field.

When setting “Altitude”, please move cursor to the left side, and the contents on the left side is refreshed. The corresponding Ground Resolution is visible. Reducing Altitude will increase Ground Resolution.

- iv. Do NOT select” Add Takeoff and Land WP’s” as they will be set manually.

Stats					
Area:	310304 m ²	Pictures:	87	Flight Time (est):	6:31 Minutes
Distance:	3.76 km	No of Strips:	4	Photo every (est):	2.84 Seconds
Distance between images:	34 m	Footprint:	146.3 x 97.5 m	Turn Dia (at 45d):	42 m
Ground Resolution:	3.19 cm	Dist between lines:	102.38 m	Ground Elevation:	-1-3 m

Click “Accept” to finish the setting.

5) Landing point setting

Right click the map to select “Draw Polygon” ->“Clear Polygon”. And left click to set a transition point (if necessary, a transition between the waypoints and landing point). Please set the height of the transition point to 30-50 meters, and 150-200 meters away from the landing point.

Right click the map to select “Land” to set the landing point.

The screenshot shows a flight planning interface with a map and several context menus. Three callouts provide instructions:

- ① Right click to clear polygon. (Points to the 'Clear Polygon' option in the 'Draw Polygon' menu.)
- ② Left click to set transition point. (Points to a green dot on the map.)
- ③ Set the landing point. (Points to the 'Land' option in the context menu.)

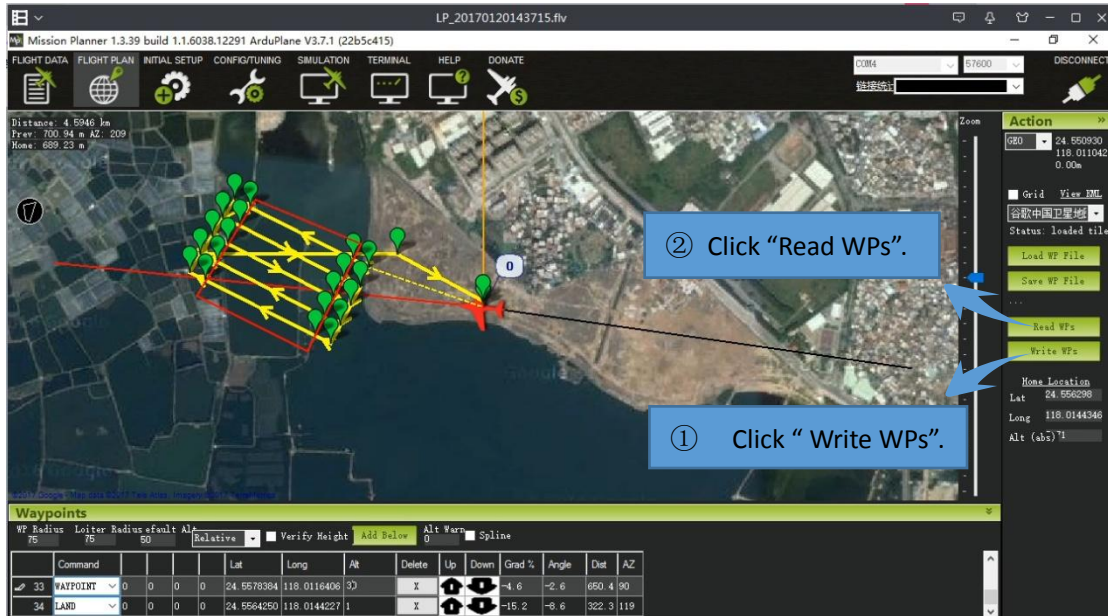
At the bottom of the interface, there are two tables:

Angle	Dist	AZ
0	0	0
11.3	397.0	289

Lat	Long	Alt	Delete	Up	Down
0	0	0	X		
0	0	24.5578384	118.0116406	50	X

6) Write waypoints

After procedures above are completed, click “Write WPs” on the left side. Then click “Read WPs” to check if all WPs are written correctly.



7) Airspeed meter calibration

Click “ FLIGHT DATA” on the main menu bar, and click “Actions”, then select “PREFLIGHT_CALIBRATION” ->“Do Action”. A message box pops up, but do not confirm anything for now.

Block airspeed meter (by using a bottle in front of the head of airspeed meter to block it). Make sure there is no air motion in front of airspeed meter. Then click “Yes” on the message box. Please note that do not form air pressure to the airspeed meter when blocking it.



Step 4. Carrying out the mission

Hold the airplane by hands. Please be aware of the propeller, keep your body away from the propeller!

Turn on the switch inside the cabin.

Switch the flight mode to Manual (switching a dial on transmitter). And place the throttle stick to the lowest right position for a few seconds to disarm the airplane. Then push throttle stick a little to check if it is disarmed successfully.

After it is disarmed successfully, switch the flight mode to Auto. And the motor automatically starts, elevator up. Throw the airplane out horizontally after 3-5s.



Step 5. Mission completed

The airplane will automatically land after preset mission is completed. Disconnect the battery firstly after it lands. Then take the camera out to get the pictures.



Please conduct detailed inspection after flight.

1. Check the flying platform

- Airframe, check the fuselage, wing, aileron, and tail etc. to make sure there is no damage on them, especially the bottom of fuselage.
- Binding mechanism, check the connection of wing, aileron, tail and fuselage etc.
- Actuating mechanism, check servos, pushrods, control horns to make sure there is no damage on them.
- Battery capacity, check the dump energy of power battery, battery for flight controller etc. to make sure the energy is enough for next flight.

2. Check the equipments

- Antenna, check the receiver, GPS, data radio to make sure there is no damage on them and the connection among them is in good condition.
- Flight controller, check the flight controller and its subsidiary bodies is in good condition, and make sure the damping mechanism is free from deformation and damage.
- Mission equipment, check the equipment and its connection are in good condition.
- Image data, check the quality and quantity of images to make sure they meet the requirements.

Warning: Please do not modify the parameters if you are not familiar with it.

You are responsible for the parameter modifications.