Ground Station User Manual

Ver. 1.2

Date: 1-Sep-11

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Reader's Guide for This Manual

Please strictly follow these steps to install all the hardware and software products.

■ *Icons seen in this document*

Forbidden	Please refer to the page(s) mentioned	R/C Transmitter configuration required	Alt Key
Caution	Assembly & Mounting Tips	Mouse Left Click	Enter Key
Correct	General Tips	Mouse Right Click	Up/Down/ Left/Right
Wrong	Assistant software configuration required	Ctrl Key	Directions Keys

Contents

Introduction

Thank you for purchasing DJI product. Please read the instructions thoroughly for proper operation of your new DJI Ground Station. Full featured DJI Ground Station enables 3-D map way points editing, flight path planning, real-time flight state feedback and auto takeoff and landing. This product is specially designed for the purpose of advanced Unmanned-Helicopter operation, BVR (Beyond Visual Range) flying in applications such as surveillance, aerial photography, etc. Working with DJI autopilot system, DJI Ground Station not only ensures stable performance and safety of the helicopter, easy operation for the pilot, but also allows the helicopter to fly autonomously according to the flight path set before or modified during the flying mission in the Ground Station software. This manual covers Ace View, Ace Joystick / Keyboard, Ace Click Go and Ace Waypoint. Please refer to DJI autopilot manual for semi-auto takeoff and landing.

■ *System Architecture*

DJI Ground Station Kit

1 Ground Station Software & User Guide

2 Laptop (User Equipment, Windows XP/7 installed)

3 Wireless Data-Link (Ground end)

4 Wireless Data-Link (Air end)

DJI Autopilot System Kit

5 DJI Autopilot Kit

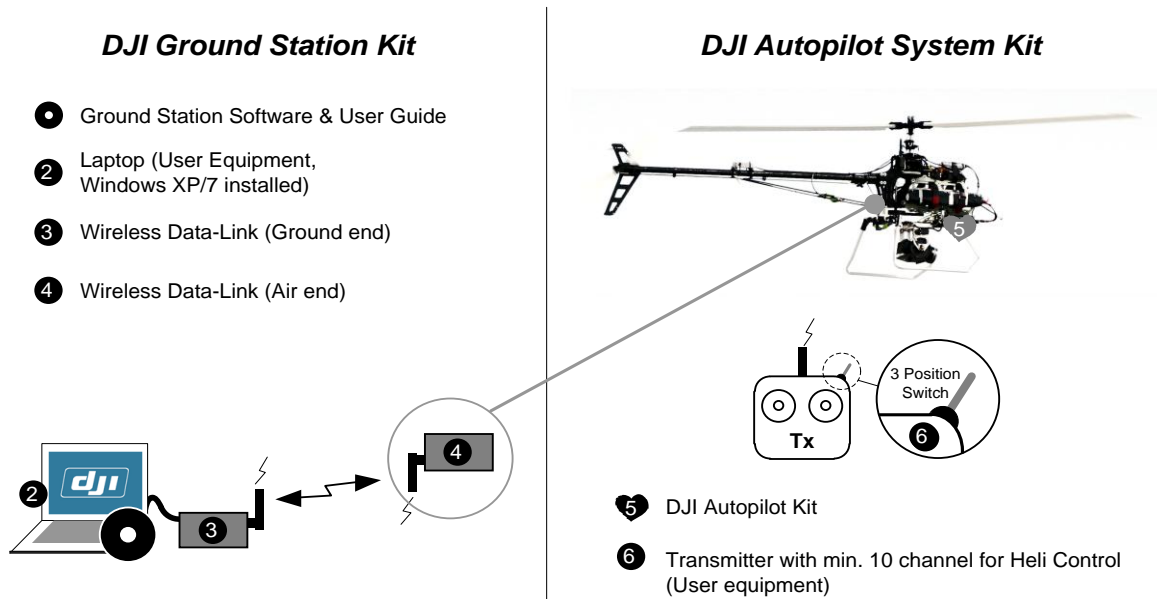6 Transmitter with min. 10 channel for Heli Control (User equipment)

■ *System Features*

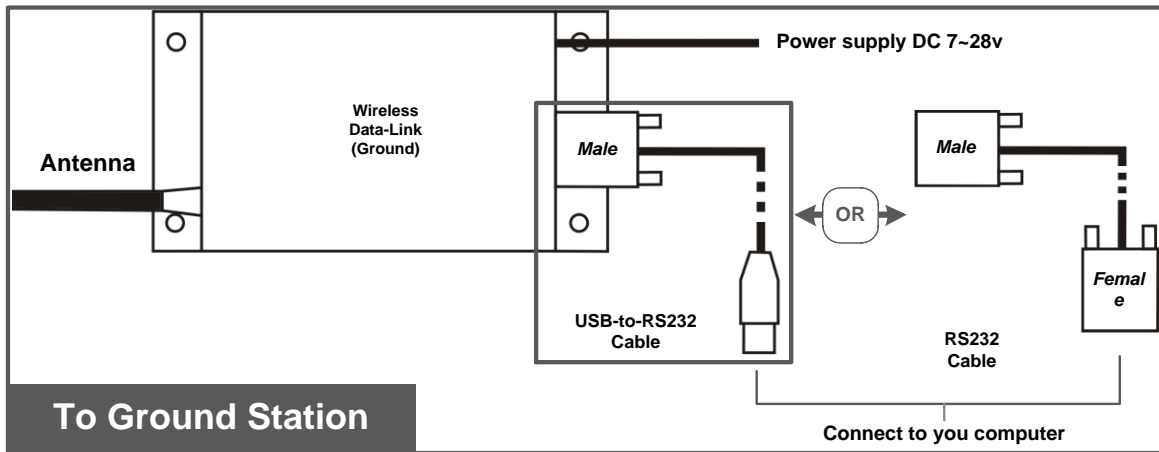|		
● 3D geographic information display	● 6 pre-programmed route templates.	
● Real-time flight monitoring.	● Flight Simulation.	
● Joystick / Keyboard mode.	● General Purpose Servo Action (GP-Servo Action).	
● One key go home.	● Automatic takeoff and landing.	
● Click go mode.	● 3 turning modes	
● Waypoint mode: Mission editing with 200 waypoints	● Photogrammetry tool	

Different color represents different product package. **Joystick / Keyboard** includes **View; Click Go** includes **View + Joystick / Keyboard; Waypoint** is the full package.

View	**Joystick / Keyboard**	**Click Go**	**Waypoint**

Assembly

Both wireless data links provided by DJI are the products of a third party manufacturer. These wireless data links are tested by DJI, as well as the necessary configurations being made, such as device ID and communication data rate. Please do not make any changes to the settings, or reset the wireless data links. Any changes might affect product performance and will cause you to return your products to DJI for repair or replacement.

For details about these wireless data links, please refer to the documentation attached with your DJI Product CD.

For low voltage servo

GPS

IMU

Antenna

Main Controller

Any Spare Port

Wireless Data Link (Air)

BEC Or Battery (4.8 – 6v)

NOT RECOMMAND

+ −

AWP01

Battery (7.4 - 12v)

To Helicopter

For high voltage servo

GPS

IMU

Antenna

Main Controller

Any Spare Port

AWP03 Battery (7.4 – 8.4v)

Wireless Data Link (Air)

THR AWP02 ESC

Or

Engine Servo (Gasoline)

+ −

To Helicopter

Power supply DC 7~28v

Wireless Data-Link (Ground)

Antenna

Male

Male

Female

OR

USB-to-RS232 Cable

RS232 Cable

To Ground Station

Connect to you computer

- For customers who are using low voltage servo, please follow the connection way in the left figure. In this case, we do NOT recommend using one battery for both wireless data link (air) and main controller.
- For customers who are using high voltage servo, please follow the connection way in the right figure.

- Make sure you are using correct cables provided for different connection methods.
- High voltage servos & FBL systems can drain the flight battery fast. Please make sure your flight pack is sufficient for the flight time intended.

Ground Station Software

Install

STEP1: Insert the DJI Product CD into your CD-ROM, an Autorun window will appear:

STEP2: Install .Net Framework 3.5;

STEP3: Install Internet Explorer 8;

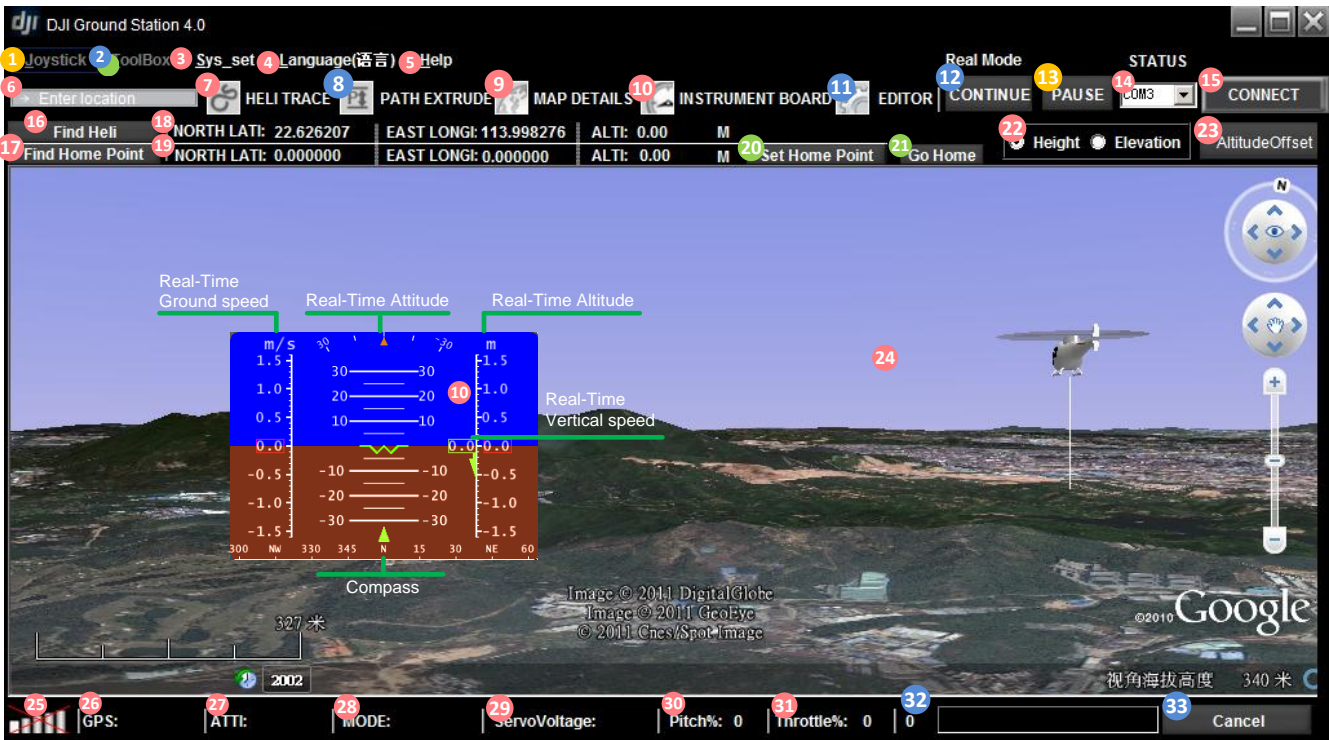**STEP4:** Install Google Earth Plugin for DJI;

STEP5: Install Ground Station USB to serial driver;

STEP6: Install DJI Ground Station;

STEP7: Click **[Exit]** after you finish all the installation.

Main Window

1 **Joystick:**
- ➔ **Choose Joystick:** Choose your input equipment.
- ➔ **Calibration:** Joystick calibration.
- ➔ **Channel Mapping:** Joystick channel mapping.

2 **ToolBox:**
- ➔ **Click Go Mode:** A real-time single waypoint function.
- ➔ **F_ChannelController:** Customize F channels' function of Main Controller.
- ➔ **Relative Coordinates Editor:** Add a new waypoint relative to current waypoint.
- ➔ **Route Template:** Route library.
- ➔ **GP Servo Action Config:** General purpose servo action configuration.
- ➔ **Photogrammetry Tool:** Photogrammetry toolbox.

3 **Sys_set:**
- ➔ **Options:**
  - ● **Sound:** Turn on or off the sound.
  - ● **Instrument Board Style**: choose different style of the Instrument Board.
  - ● **Action Setting:** Action number display interval.

4 **Language:** Click to change language, English or Chinese.
- ➔ **中文**
- ➔ **English**

5 **Help:**
- ➔ **Check for Update:** Update software here.
- ➔ **About:** Check your DJI Ground Station version here.

6 **Enter location:** Go to the location of your input

7 **HELI TRACE:** Click if you want to see Heli Track.

8 **PATH EXTRUDE:** Click if you want to see flight Path Extrude during mission editing.

9 **MAP DETAILS:** Click to see map details.

10 **INSTRUEMENT BOARD:** Click if you want to display instrument board.

11 **EDITOR:** Click if you want to display mission editor.

12 **CONTINUE:** if you switch into autopilot mode from waypoint mode, click pause then click continue , the heli will continue the remaining (Unfinished) mission.

13 **PAUSE:** Mission pause.

14 Serial port selection.

15 **CONNECT:** Click to connect to main controller

16 **Find Heli:** Click to find heli location.

17 **Find Home Point:** Find your home location.

18 Real-time coordinates of heli.

19 Real-time coordinates of home location.

20 **Set Home Point:** Change your home point.

21 **Go Home:** Click to go home.

22 Choose **Height** to display the relative height of waypoints to the current height of helicopter; Choose **Elevation** to see the altitude.

23 **AltitudeOffSet:** Set up the altitude off set.

24 Main window.

25 Signal strength.

26 **GPS:** Real-time GPS signal quality.

27 **ATTI:** Real-time attitude quality.

28 **MODE:** Real-time control mode.

29 **ServoVoltage:** Real-time servo voltage.

30 **Pitch:** Real-time pitch percentage.

31 **Throttle:** Real-time throttle percentage.

32 Download and upload progress bar.

33 Cancel: Cancel button.

Joystick

⚠ You must do the calibration and channel mapping every time before you take off your heli!!

■ *Requirement*

Joystick control based on a third party hardware controller, you can choose your preferred device based on the two types of joystick indicated below.

Type 1: Traditional R/C style flight simulation controller; or your R/C Tx with a third party simulator link

Type 2: Linear single stick 3D controller

USB connection and at least 4 linear control channels are necessary; otherwise the joystick function will not work properly.

Type 1   **Type 2**

Real Flight® InterLink™ Plus Controller   *Logitech® Extreme™ 3D Pro Joystick*

■ *Connection*

[Joystick] → [Choose Joystick]

Refer to the user manual of the specific controller / Joystick you choose, and ensure the USB cable is properly connected. Please ensure the Joystick is properly connected physically, do not disconnect the joystick connection when Joystick Mode is activated.

■ *Calibration*

[Joystick] → [Calibration]

Step 1	Step 2	Step 3
For Type 1		
Place all trim levers (for physical fine turning) in their neutral, or centered position. Click **[Next]** to continue.	Center all the sticks. Click **[Next]** to continue.	Move all of the sticks through their complete range of motion several times. When completed, click **[Finish]**.
For Type 2		
For Type 2 controller, you might not have these physical fine turning levers. Click **[Next]** to continue.	Center you stick including your throttle. Click **[Next]** to continue.	Move the sticks through its complete range of 3D motion several times, including pitch. When completed, click **[Finish]**.

■ *Channel Mapping*

[Joystick] → [Channel Mapping]
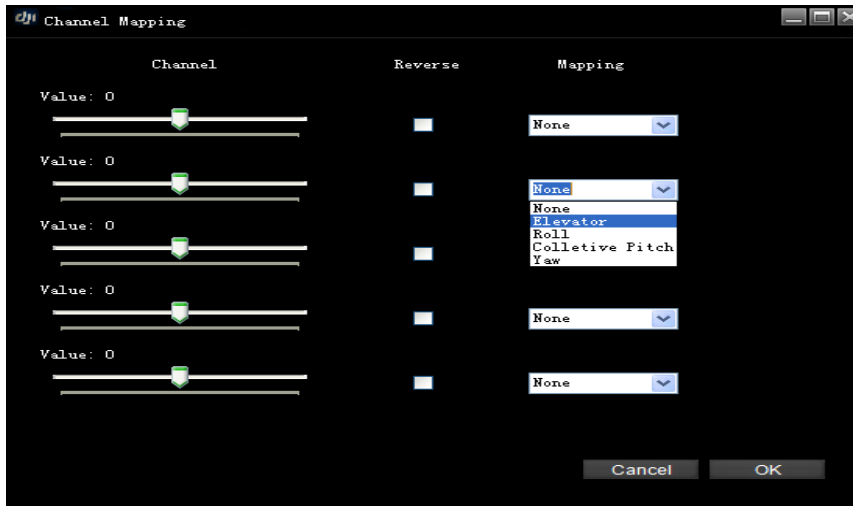
Each control channel can be reversed, and mapped to one of the control function which will be listed in corresponding drop down boxes. These control function are **'Roll'**, **'Elevator'**, **'Yaw'** & **'Collective Pitch'**, they represent the cyclic and rudder control of your helicopter, as in the figures below. Where the **'+'** represents positive channel value, **'-'** represents negative channel value. Push your joystick, and the channel value feedback will tell whether it matches with our suggested joystick control direction or your own settings, and then make your adjustments. For **Type 1** controller, please refer to the controller's manual. For safety reasons, all previously used settings will be cleared whenever you re-enter **[Joystick Channel Mapping]**, and you will need to carefully repeat the steps above.

| *Roll* | *Elevator* | *Yaw* | *Collective Pitch* |
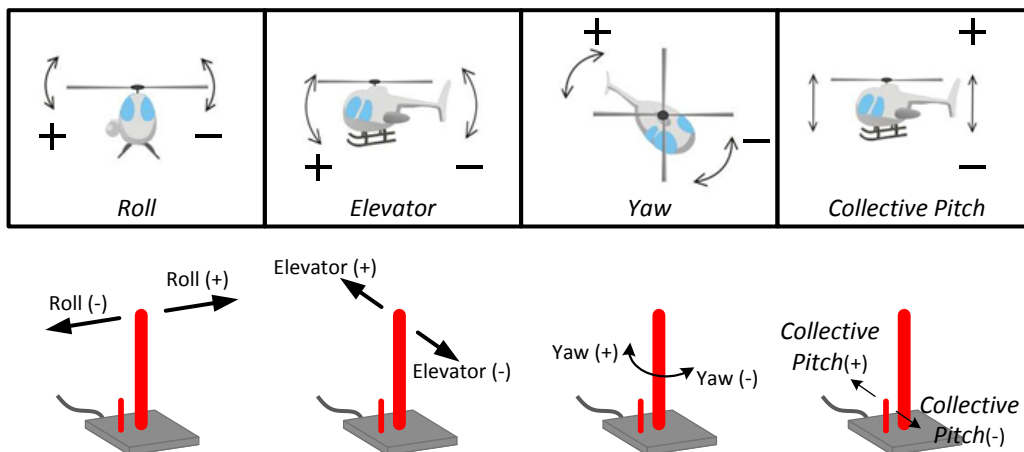
Click Go Mode

Click Go Mode is a real-time single waypoint flight mode. Under this mode, you can send a waypoint to your helicopter immediately.


STEP1: Make sure your helicopter is already flying in *GPS Atti.* or *GPS Cruise Mode*;

STEP2: Click **[ToolBox] → [Click Go Mode]** to open the window as the figure shows.

STEP3: Click **[Enter Click Go Mode].** Now your helicopter will go into hovering state.

STEP4: Input the **[Altitude]** of the waypoint which you are going to set; Input the **[Speed]** at which your helicopter is going to fly;
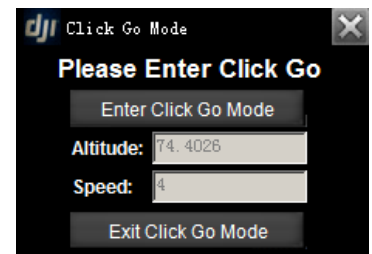
STEP5: Hold the Space key on your keyboard, move your mouse in the 3D map, to set the waypoint. Then your helicopter will fly toward this waypoint immediately. You can also set a new waypoint during the flight;

STEP6: Click **[Exit Click Go Mode]**, your helicopter will hover again;

STEP7: Click **[CONTINUE]** button to continue your previous flight.

⚠️ When in the Click Go Mode, all control sticks of the Tx are disabled. To regain control using the Tx, flip the mode switch from Manual mode to *Atti, GPS Atti,* or *GPS Cruise mod*e.

Mission Editor
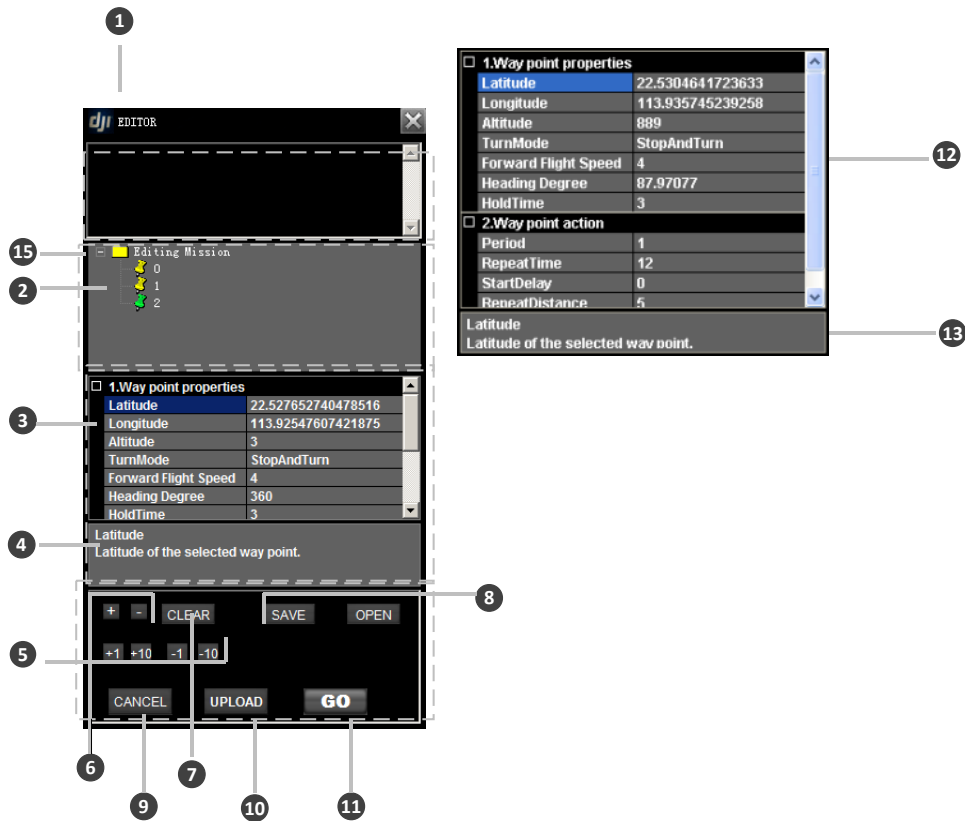
1. **LOG** to print info. Such as: upload success, upload failed..
2. **Waypoint list**, you can click the yellow icon to select the waypoint properties in the table.
3. You will see **Mission properties** if **15** selected.
    ➔ **Mission properties**
    ➔ **Mission Time Lmt**: If the heli flight-time exceeds the value (>=60sec),it will automatically go home.
    ➔ **Route**: The selection of mission execution mode: **Start_to_End**, one time executes; **Continuous**, for repeat flying from start way point to end way point.
    ➔ **StartWayPoint**: Defines the first way point your helicopter goes to after you click **GO**. Select the proper way point index number listed.
    ➔ **Vertical Speed Limit**: Vertical speed for up or down direction, Unit is m/s
    ➔ **Set Mission properties**
    ➔ **SetAllWPsAlt:** Set Altitude of all way points.
    ➔ **SetAllWPsTurnMode:** Set turn mode of all way points, StopAndTurn, Bank_turn, Adaptive_Bank_Turn or None.
    ➔ **SetAllAction:** Setup the parameters of a number of repeat actions.
4. **Description** of selected item.
5. Altitude change **10m** or **1m per click**.
6. **Add** new way point by click**"+"**, and then click on the map. Or [Ctrl]🖱 on the map. **Delete** way point by selecting them, and then click**"-"**.You will delete the selected point.

7. **Clear** , if you want to delete running mission or editing mission in the map you can click the clear button.
8. **Save** and **Open** the mission.
9. **Cancel** All edited way points.
10. **Upload** the mission to Main Controller.
11. **Go** to Execute Assigned Mission, Including Auto Take off as assigned.
12. You will see **Waypoint properties** (if any items in **2** were selected) for Editing Mission is writeable; Assigned Mission is read only.
    ➔ **Latitude & Longitude:** Units are in degree.
    ➔ **Altitude:** Unit is in meters.
    ➔ **TurnMode:** Set the turn mode individually.
    ➔ **Forward Flight Speed:** Velocity from previous point to current point which is limited to <= 25 m/s.
    ➔ **Heading Degree:** Heading degree facing this way point, unit in degree.
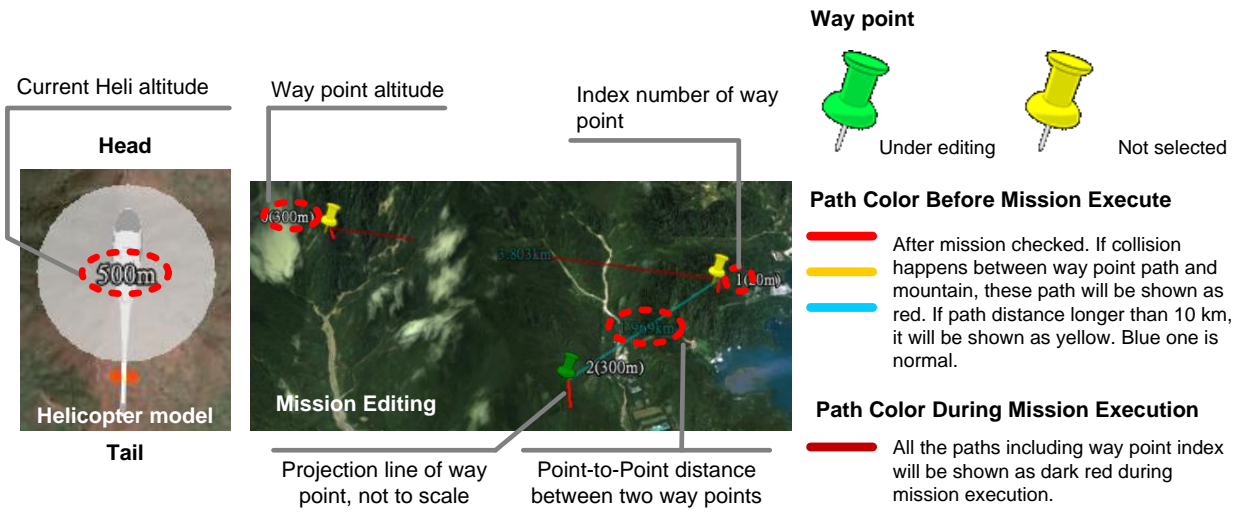   ➔ **HoldTime:** The time to stay at this way point, unit in second.
13. Waypoint Action properties
    ➔ **Period:** (Unit: second) Setting the time period of the action.
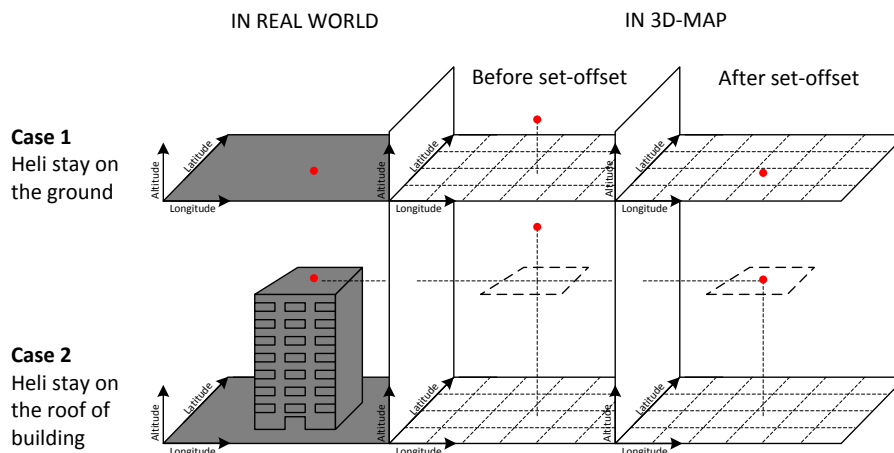   ➔ **RepeatTime:** Setting the repeat time of the action assigned
    ➔ **StartDelay:** (Unit: second) Setting when to activate assigned servo actions if the flight arrives this way point.
    ➔ **RepeatDistance:** (Unit: meter.)Setting the repeat action in distance

Current Heli altitude

Head

500m

Helicopter model

Tail

Way point altitude

Index number of way point

Mission Editing

Projection line of way point, not to scale

Point-to-Point distance between two way points

Way point

Under editing

Not selected

Path Color Before Mission Execute

After mission checked. If collision happens between way point path and mountain, these path will be shown as red. If path distance longer than 10 km, it will be shown as yellow. Blue one is normal.

Path Color During Mission Execution

All the paths including way point index will be shown as dark red during mission execution.
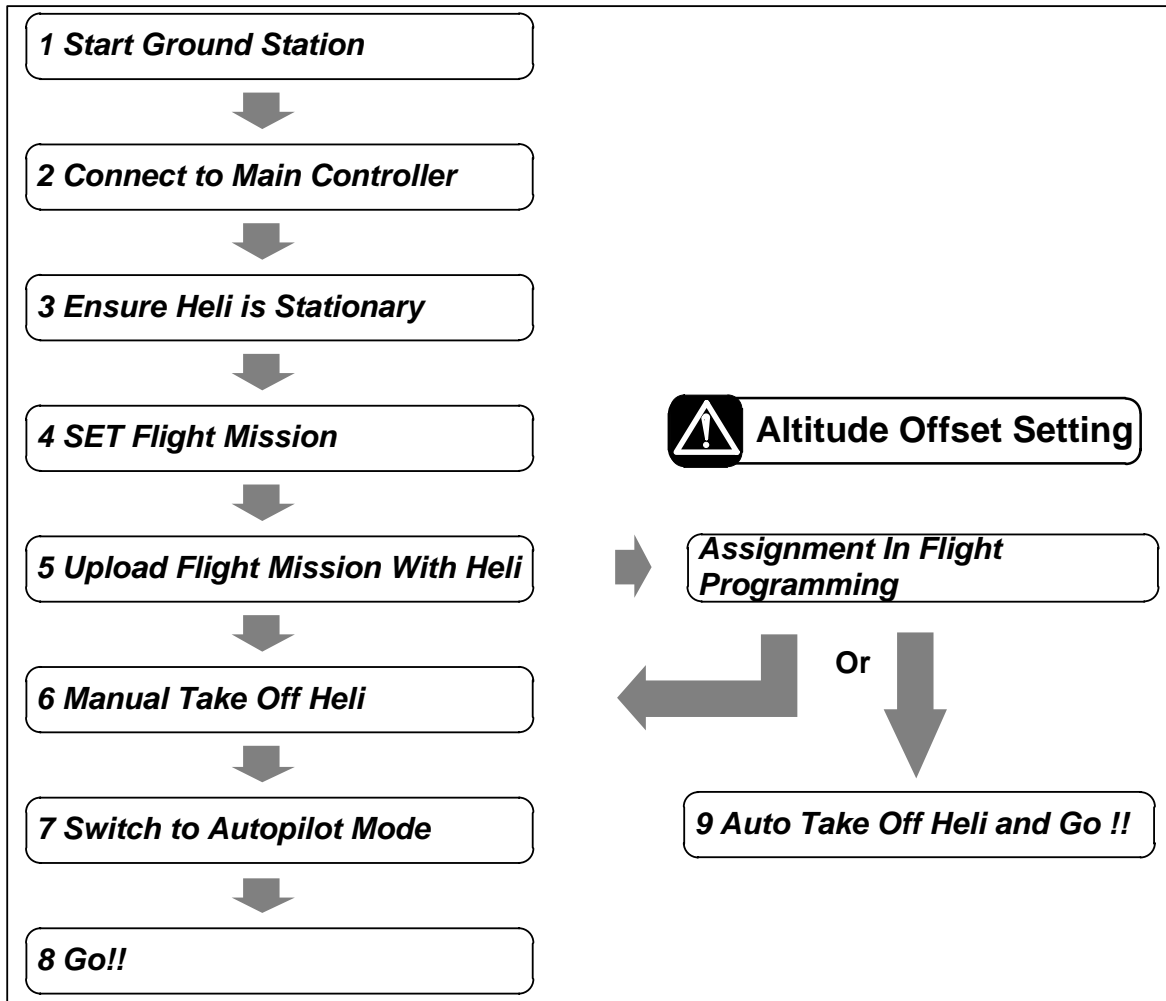

⚠️ ### *Altitude Offset Setting*

- GIS database (Google Earth™) is not precise, and Flight Path Mountain and other obstacle/building collision checking feature performed based on this database, which is not real-time or up-to-date. Google Earth™ plug-in is only for the purpose as a general landscape browser, for quick way points positioning without much safety guarantee.

- We are using pressure sensor for altitude sensing, the result varies according to weather. Therefore, you might have different altitude values on the same location at different times. However, its relative height may be far from precise than absolute altitude information in GIS.

- Due to above problems, the following method for relative flight height calculation would be most reliable.

  1 Record the heli altitude before take-off, L_{Gound}

  2 Way point altitude = Relative flight height + L_{Gound}

  Please keep in mind that this method is the most reliable way for flight path collision precaution.

- The Altitude Offset value given is only for the purpose to avoid visual confusion, such as in Case 1 shown below. The helicopter represented by the red point was located on the ground in real world but floating in the sky within 3D-Map. You have to give a negative offset value to reduce the helicopter altitude for visual effect only. The calculate altitude offset function will give you a suggestion for offset setting but not guaranteed to be correct. Because if the helicopter is landed on the roof of the building as in Case 2 in figure shown below, and the building information will not appear in GIS database, which means you cannot use the same method as in Case 1. You should calculate this offset value with a known or estimated building height.

- We highly recommend you to consider the relative flight height we discussed above during your flight mission editing.

IN REAL WORLD   IN 3D-MAP

Before set-offset   After set-offset

Case 1
Heli stay on the ground

Case 2
Heli stay on the roof of building

Operation

■ *Basic Operation Flow*

```
1 Start Ground Station
        ↓
2 Connect to Main Controller
        ↓
3 Ensure Heli is Stationary
        ↓
4 SET Flight Mission                    ⚠ Altitude Offset Setting
        ↓
5 Upload Flight Mission With Heli   →   Assignment In Flight
        ↓                                Programming
6 Manual Take Off Heli                         Or
        ↓                                       ↓
7 Switch to Autopilot Mode              9 Auto Take Off Heli and Go !!
        ↓
8 Go!!
```

1. Start Ground Station Launch

- Network Detection, if the Network connection fails, it will go offline mode automatically.
- You also can go into offline mode by clicking the offline mode button.

2. Connect to Main Controller
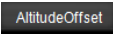
1 Choose the communication port in the drop down box.

2 Click [Connect] button on the upper left corner to connect to DJI Autopilot main controller.

3. Ensure Heli is Stationary

Make sure your heli is installed/setup correctly with DJI Ground Station - Autopilot, placed on level ground, and ready to fly.

4. Set Flight Mission

1   Click ⚙ to open the mission editor.

2   Click **NEW** to edit a new mission.

3   Determine offset value: you should determine the Altitude Offset. Click [AltitudeOffset] to find our recommended altitude offset value, and click ok to set the recommend offset.

> ⚠ This recommended altitude offset value is only valid before the heli takes off.

4   Add way points.

> 💡 You have three way to add way points.

- **Add point by point.**
  - **STEP1:** Click ＋
  - **STEP2:** 🖱 on the 3D-Map where the locations you want to **add** a way point.
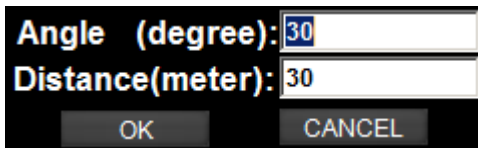
OR

  - **STEP1:** Press `Ctrl`🖱on the 3D-Map where the locations you want to **add** a way point.

Repeat above procedure if you wish to add more new way points. The initial waypoint index will be 0, incremented by 1 each new way point is added. If you want to insert a point before another point, you can move the mouse over the point then press ctrl and left click your mouse.

After the first waypoint, you can use **[Toolbox]** -> **[Relative Coordinates Editor]** to add new

- **STEP1:** Select one waypoint, then press Shift + p, you will see the input window as following:

Angle (degree):	30
Distance(meter):	30
OK	CANCEL

- **STEP2:** Use Tab to switch between these two input frame;
- **STEP3:** Input the relative coordinates: Angle is the relative angle to the north of current waypoint, Distance is the relative distance to the current waypoint;
- **STEP4:** Press `Enter ⏎`, then you will see a new waypoint after the current waypoint.
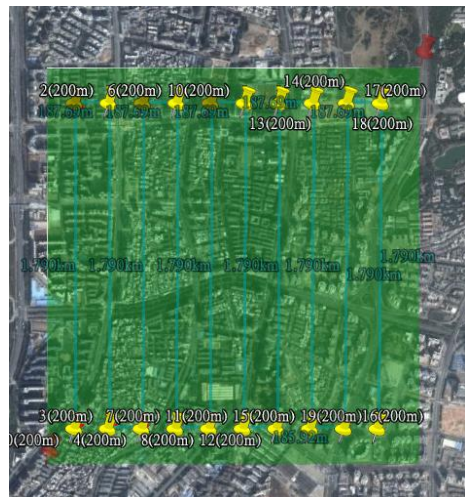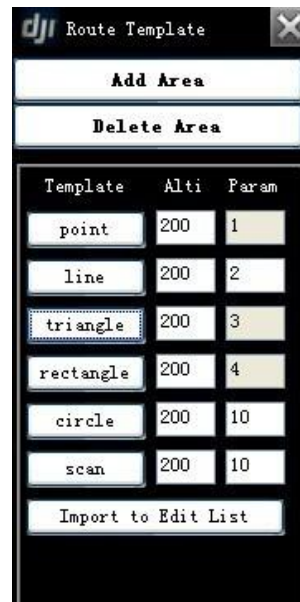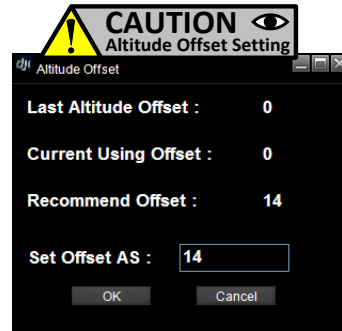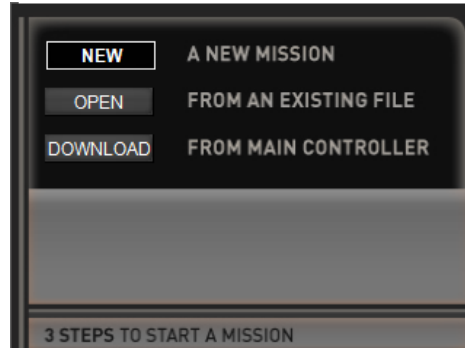- **STEP5:** Press Shift + p to quit.

Note: A maximum of 200 way points can be added.

- **Add from mission file when previous waypoints have been defined.**
  - **STEP1:** Click [OPEN] to open a mission file which you had saved before.

- **Use one of the six Route templates to generate points automatically.**
  - **STEP1:** Open the Template Form **[Toolbox]** -> **[Route Template]**.
  - **STEP2:** Click **[Add Area]** button to add an area, then click

the template which you want to generate.

5 Delete way points.

STEP1: Select the way point either in 3D-Map or in **Editing Mission** Menu. The Selected waypoint is in green.

STEP1: Click ▬ to delete it.

Repeat above procedure to delete more. Click CANCEL to delete all the way points added.

Waypoint Properties Editing

☐ 1.Way point properties	
Latitude	22.528799057006836
Longitude	113.93341827392578
Altitude	3
TurnMode	StopAndTurn
Forward Flight Speed	4
HeadDegree	360
HoldTime	3

6 Waypoint altitude setting.

STEP1: Select the way point either in 3D-Map or in the Editing Mission Menu.

STEP2: Edit the altitude of each way points by clicking the **Altitude Calibration butto** +1 +10 -1 -10

OR

STEP1: Select the way point either in 3D-Map or in the **Editing Mission** Menu.

STEP2: Type in the precise **"Altitude"** figure in the **"Way Point Properties"** box.

STEP3: Press Enter↵ to confirm.

7 Speed setting.

This Speed is the air speed of heli flying to specific way point editing. **(Unit in m/s)**

STEP1: Select the way point either in 3D-Map or in the **Editing Mission Menu**.

STEP2: Type in the precise "Forward Flight Speed" in the "**Way Point Properties**" box.

STEP3: Press Enter↵ to confirm.

8 Turning Mode setting

There are three different turning modes for the heli at each way point: **Stop and Turn, Bank_Turn and Adaptive_Bank_Turn**. The default turning mode in the system is '**Stop and Turn**'. You can change it according to the following steps.

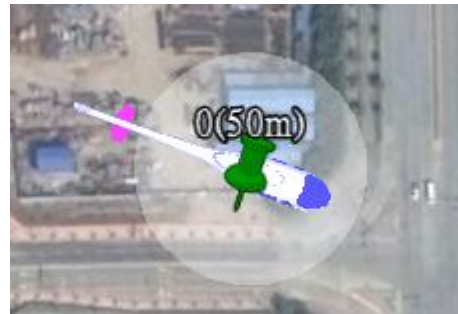**STEP1:** Select the way point either in 3D-Map or in the **Editing Mission** Menu.

STEP2: Make a selection from the drop down box after "**TurnMode**'" for mission execution mode.

9 Heading Degree

When the heli arrives at a given point you want it to head towards a certain direction, you can use this value. (**Unit in degree**)

- You can input the degree value in the item.
- You also can use mouse to input the degree: 🖱the point, hold on, then move the wheel or press the up and down key in the keyboard.
- Default value is the degree from the direction of last point.

10 Hold Time setting

Sets the time to stay in a particular way point, not for **Bank_turn**, only for **StopandTurn**. (**In second**)

STEP1: Select the way point either in 3D-Map or in the **Editing Mission** Menu.

STEP2: Type in the precise time to stay in a way point (in seconds) after the "**TimeHold**" in the "**Way Point Properties**" box.

STEP3: Press Enter↵ to confirm.

Mission Properties Editing

11 MissionTimeLmt

☐ Mission properties	
MissionTimeLmt	65535
Route	Start_to_End
StartWayPoint	0
VerticalSpeedLimit	1
☐ Set Mission properties	
SetAllWPsAlt	
SetAllWPsSpeed	
SetAllWPsTurnMode	StopAndTurn

MissionTimeLmt
Mission time limit, If the plane flying time exceeds this value, it will automatically go home.(>= 60 sec)

STEP1: Click 📁 Editing Mission , you will see Mission properties.

STEP2: Type in the precise figure after "**MissionTimeLmt**" in the "**Mission Properties**" box.

STEP3: If the heli's flying time exceeds the value, it will automatically go home.(default value is 65535sec.Min value is 60sec,Max value is also 65535sec.)

Note: This is to make sure the helicopter either has enough fuel or battery power to finish the entire mission. The default status is **"False"**.

12 Route selection

STEP1: Click 📁 Editing Mission , you will see Mission properties.
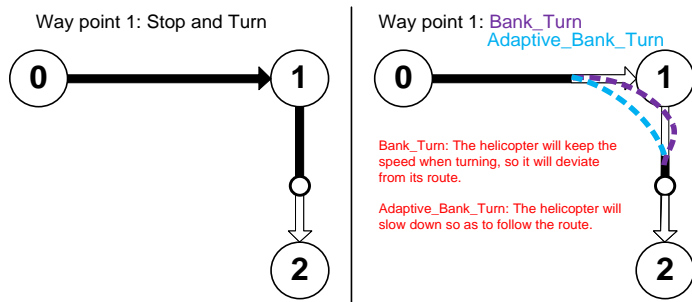
STEP2: Make a selection from the drop down box after "**Route**" for mission execution mode:
"**Start_to_End**", one time execute;
"**Continuous**", repeating.

Note: The default status is **"Start_to_End"**.

13 Start way point selection

STEP1: Click 📁 Editing Mission , you will see Mission properties.

STEP2: Make a selection from the drop down box after "StartWayPoint" for start way point from the existing way point indexes.

Note: The default start way point is 0.

14 Vertical Speed Limit
This Speed limit is the absolute velocity of heli in vertical direction, up or down (Unit in m/s)

STEP1: Click 📁 Editing Mission , you will see Mission properties.

STEP2: Type in the precise figure after "VerticalSpeedLimit" in the "Mission Properties" box.

STEP3: Press Enter ⏎ to confirm.

⚠️ The default vertical speed limit is 1.5m/s and the maximum speed allowed is 5.0m/s.

Mission Save & Load

15 Mission Save
STEP1: Click SAVE to save your mission edited,
STEP2: Choose a proper name with extension '.awm'.
For Example: DJI_Mission_20100101.awm

⚠️ The Altitude offset value will not be saved in mission file. You must set it every time!!!
**XP3.1 and 3.2 files cannot be read by Ground Station 4.0.**

16 Mission Load
STEP1: Click OPEN to load your mission saved,
Choose your mission file with extension '.awm'.

💡 Examples for Way Point turning mode

Way point 1: Stop and Turn

Way point 1: Bank_Turn
Adaptive_Bank_Turn

Bank_Turn: The helicopter will keep the speed when turning, so it will deviate from its route.

Adaptive_Bank_Turn: The helicopter will slow down so as to follow the route.

💡 Examples for Mission/Way Point properties setting
A1/A2: Selection for the state of "**Route**", and "**StartWayPoint**". **B1**: If the "**HoldTime**" timer of a waypoint has been set, your heli would stay hovering on this waypoint until "**HoldTime**" timer was time out.
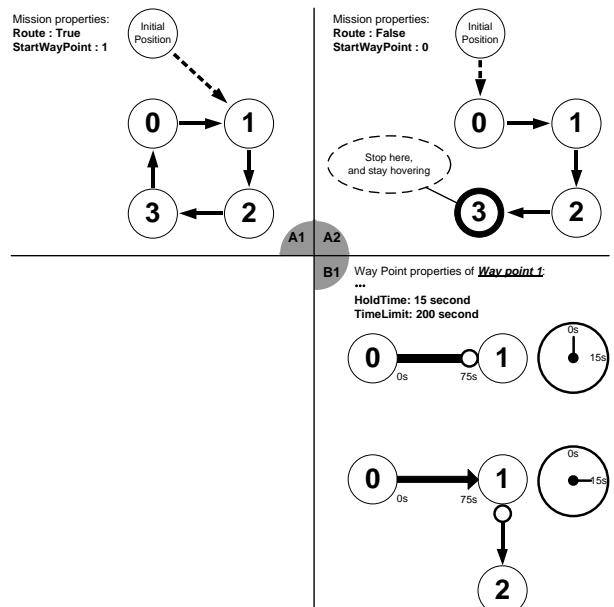
5. Synchronize Flight Mission with Helicopter

1   Record Take-Off Location: First, you should record your helicopter take off location. Click ＂set＂ button in the map. The heli's location is the location of take-off point.
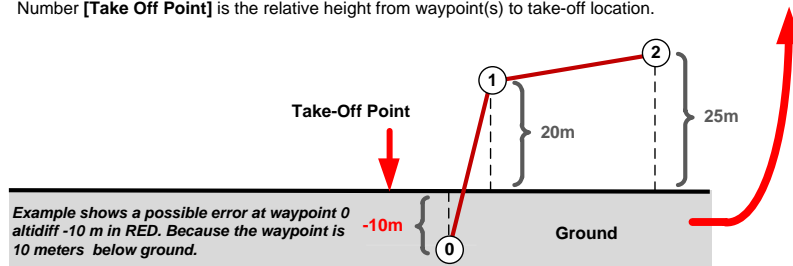
Recording or not is not critical for the ground station working out the relative height between waypoints and take-off location.

2   Final Check & Mission Transmitting: Click UPLOAD on the upper bottom of the Mission Editor to send flight mission to DJI Autopilot main controller. Here a mission review table as following example will appear for mission final check. Press OK to confirm, after successfully synchronized, the mission is ready to be executed.

Waypoint	Latitude	Longtitude	Altitude	Speed	Turn Mode	Altidiff	Action Module
0	xxxxx	xxxxx	xxxxx	4	StopAndTurn	-10	NULL
1	xxxxx	xxxxx	xxxxx	6	StopAndTurn	20	In second
2	xxxxx	xxxxx	xxxxx	15	StopAndTurn	25	In meter

Example of "Mission Review" table under 3 waypoints mission

Number **[Altidiff]** is the current relative height from waypoint(s) to helicopter.
Number **[Take Off Point]** is the relative height from waypoint(s) to take-off location.

Take-Off Point

20m

25m

Example shows a possible error at waypoint 0 altidiff -10 m in RED. Because the waypoint is 10 meters below ground. **-10m**   **Ground**

After synchronized, you still can re-edit your mission by "**Re-Edit**", click EDIT to do so. Then the mission editor will return to the state as we told in step **4 "Set Flight Mission"**.

6. Take off Heli

After finishing all the above steps, take off your helicopter in one of 3 modes. If you want to use **Auto Takeoff and Landing** function, please skip the step **6**, **7** and **8**, go to Step **9** directly. You can take off your helicopter in **Manual Mode**, please hover it at a suitable height.

7. Switch to Autopilot Mode

Switch to the any **Autopilot Mode** on your TX. Ground station is able to control your helicopter only after this switching!

Making sure sufficient GSP satellite signal is acquired. Refer to "*DJI Autopilot System User Manual*" for **Manual, Atti., GPS Atti., GPS Cruise** switching of your Autopilot System, and also the Manual of your R/C Transmitter (Tx).

8. Go!!

Click GO in the "**Mission Editor**", and the helicopter will fly automatically according to the path you have set in the flight mission.

For **Flight Mode Layout**, Click INSTRUMENT BOARD, you will find "**meter**" on the right side as shown below.
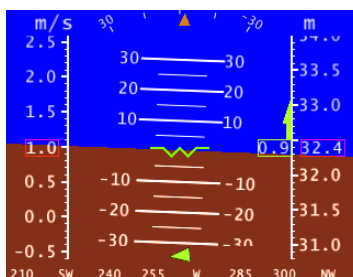

The right information board will appears after mission begins.

Current point flight time: 00:03:43
Total flight time: 00:20:47
Total estimated time of round trip: 00:05:19
Total distance of round trip: 726.255m

- While a mission is in process, you can still re-edit your mission by using **[Edit] function.** Please click `EDIT` in mission editor to do so. Then the mission editor will return to the state as explained in previous section" Error! Reference source ot found.".
- While a mission is in process, you can pause the mission by using **[Pause] function**. Please click `PAUSE`, and the helicopter will slow down and stay hovering. Then click `CONTINUE` the helicopter will resume the un-finished mission.
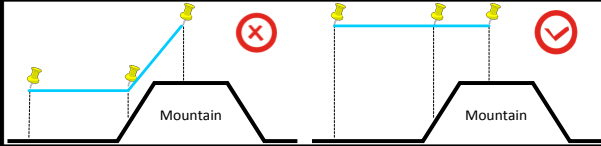
When you set the waypoints for the helicopter to climb a mountain, please make sure that you leave enough distance between the helicopter and the mountain to avoid collision caused by heli air speed.

Please note that when you set a way point above water such as lake/sea/river, the default altitude the map shows will be at the bottom of the body of the water. Please be careful in setting altitude over water.
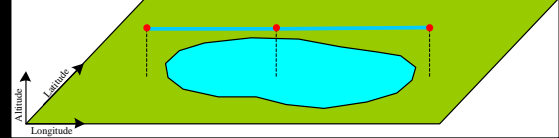
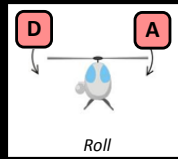### ■ *Pause the mission and control the helicopter via Keyboard or Joystick*

Press [**Pause**] button, the helicopter would stay hovering and you will be able to make a selection between Keyboard control and Joystick control. (Full/Semi Auto landing is available under keyboard control)
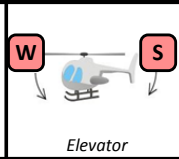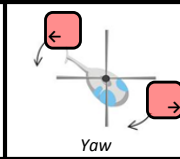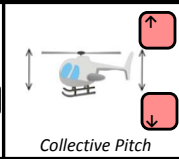

Joystick selected   Disconnected

Roll   Elevator   Yaw   Collective Pitch

9. Auto Takeoff and Landing

Please read this carefully in order for this feature to work properly. It is imperative that you understand the procedures outlined before executing auto takeoff and landing functions.

■ *Full-Auto Takeoff*

Only after all waypoints are assigned/edited, the mission is ready for taking off

STEP1: Place transmitter throttle stick to the lowest position.

STEP2: Flip the flight mode switch to either "GPS-Cruise" or "GPS-Atti" mode.

STEP3: Press "Go" command on the keyboard, the helicopter main rotor will begin to spool up.

At lift off rotor speed, the helicopter will accent gradually. At this point, a warning will show the throttle stick position not being centered.

This warning will go away after you place the throttle stick at mid-point, a safety feature in case you accidently bump the mode switch from Auto to Manual.

■ *Full-Auto Landing*

After completing the mission or when the helicopter returns home, hovering above within visual contact. Use ground station keyboard for auto landing (Press pause button then select

keyboard control). **[Auto Landing]** button will be available. Use W, S (Pitch), A, D (Roll), ⬆⬇(Throttle) and ⬅➡(Rudder) keys to navigate to decent landing zone, or allowing Ground Station to decent automatically provided the landing zone is clear of any obstacles. Then you can use ⬇ to land your helicopter. After landing, keep holding ⬇ until engine stop. Or you can simply click **[Auto landing]**, helicopter will land then stop engine by itself. In the latter situation, **to terminate auto landing**, please press ⬆or⬇key on your keyboard, or deselect the keyboard control button →

Assignment in Flight Programming

◼ *What is General Purpose Servo Action (GP-Servo Action)?*

GP-Servo Action is supported by one of the servo output channels in the transmitter, which will work as an interface between DJI Autopilot system and your external devices. This feature allows DJI autopilot to operate your external devices automatically during basic helicopter waypoint mission, as explained in previous sections.
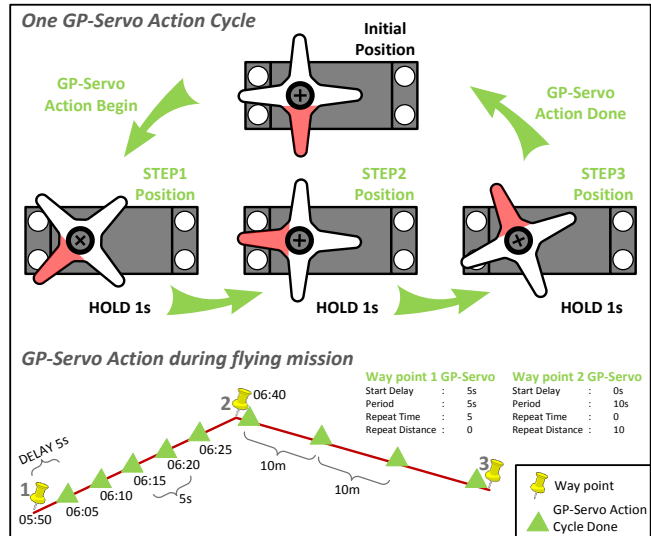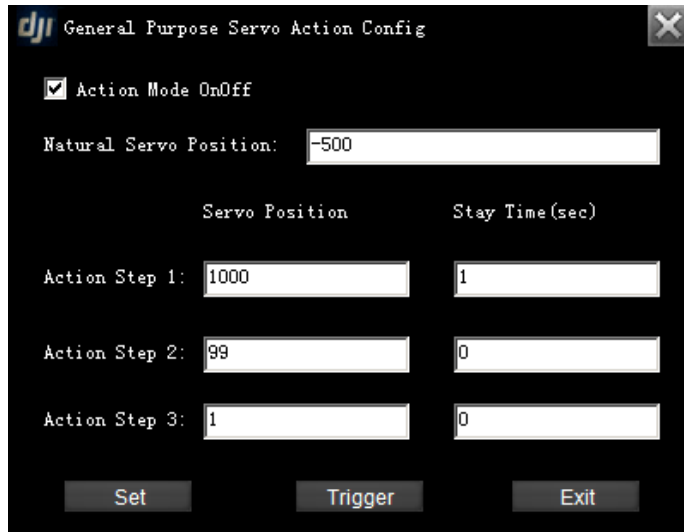
◼ *Our software aims to let you program four different servo positions, which is defined as:*

- Initial servo position and three specific servo working positions;
- Timing of each servo transition in one GP-Servo Action cycle;
- The repeat time of a GP-Servo Action assignment on a particular assigned way point;
- Time gap between each GP-Servo Action assignments.

◼ *GP-Servo Action Configuration*

STEP1: Click **[ToolBox]** → **[GP Servo Action Config]** to open the **General Purpose Servo Action Config** windows;

STEP2: Click the box **[Action Mode OnOff]** to enable the GP-Servo Action function;

STEP3: The GP-Servo is using the output channel **[F4]** in the MC.

Note: The servo position value is from -1000 to 1000; The Stay Time is in second.

Please assign a default position for servo in Natural status, and others 3 positions as well as the time to stay in such postions for servo to work as assigned. After all of these settings (click **"Set"** to save the settings), then click **"Trigger"** you review the GP-Servo Action, as we explained in **"One GP-Servo Action Cycle"**.

◼ *Way point Action Editing*

You can find and set the Way point action properties according to the following procedures:

STEP1: Click 🖼 find **"Mission Editor"** on the right hand side.

STEP2: Click EDIT , the Mission Status will show **"Editing"** in the **"Status"** label upon the Mission Editor.

STEP3: Set waypoints in Step *4* of Basic Operation Flow.

STEP4: Select the way point either in 3D-Map or in the [**Editing**] -> [**Mission**] Menu.
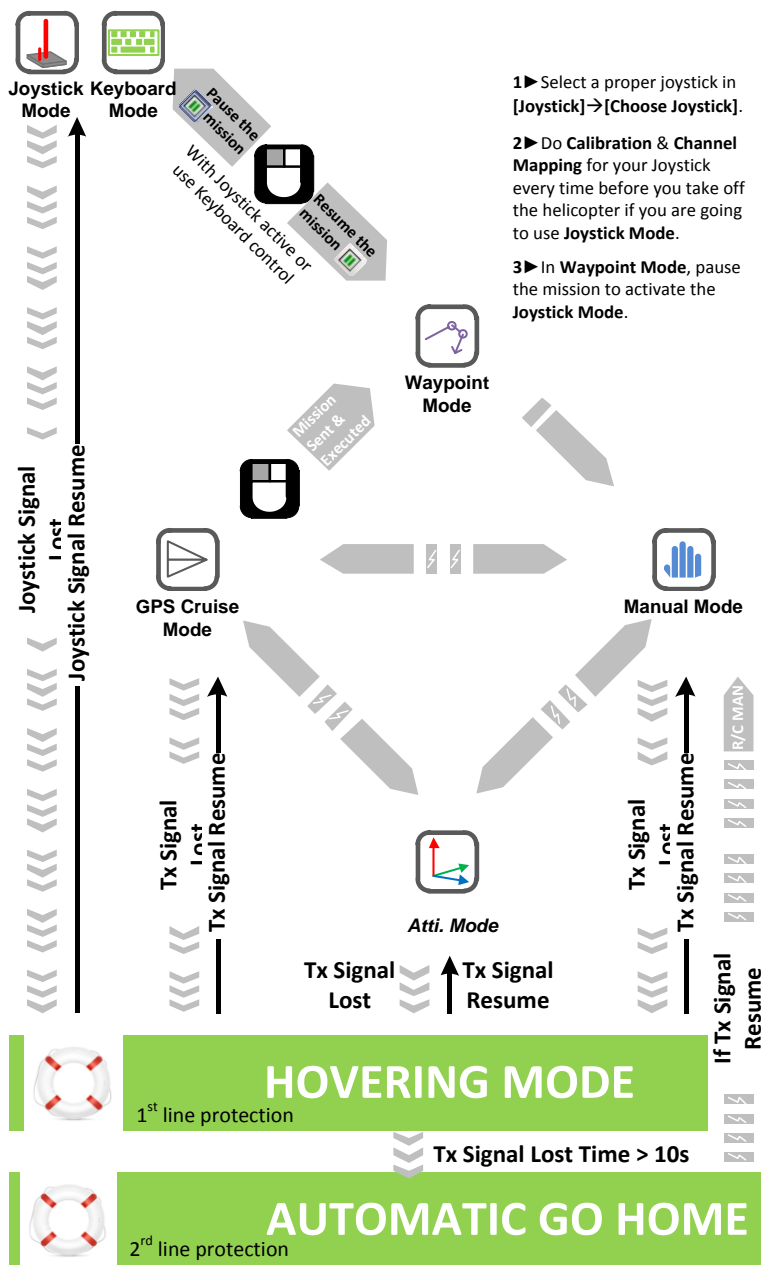
Give the proper parameters as explained in **"Mission Editor"**: **"Period"** , **"RepeatTime"**, **"StartDelay"**, **"RepeatDistance".** Set **"RepeatTime"** and **"RepeatDistance"** to zero if you want to disable the GP-Servo Action.
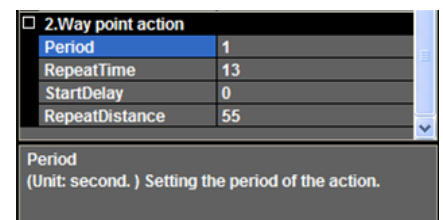
You can use *SetAllAction* in *Mission properties* to setup the sequence interval. For example: 0 means action property is applied to no waypoint; 1 means action property is applied to every waypoint; 2 means action property is applied to every two waypoints; 3 means action property is applied to every 3 waypoints, etc.

Control Mode Switching

Joystick Mode **Keyboard Mode**

Pause the mission

Resume the mission

With Joystick active or use keyboard control

1► Select a proper joystick in [Joystick]→[Choose Joystick].

2► Do **Calibration** & **Channel Mapping** for your Joystick every time before you take off the helicopter if you are going to use **Joystick Mode**.

3► In **Waypoint Mode**, pause the mission to activate the **Joystick Mode**.

Waypoint Mode

Mission Sent & Executed

GPS Cruise Mode

Manual Mode

R/C MAN

Joystick Signal Lost

Joystick Signal Resume

Tx Signal Lost

Tx Signal Resume

Tx Signal Lost

Tx Signal Resume

Atti. Mode

Tx Signal Lost **Tx Signal Resume**

If Tx Signal Resume

HOVERING MODE

1st line protection

Tx Signal Lost Time > 10s

AUTOMATIC GO HOME

2rd line protection

With the support of Ground Station system, operations of greater flexibility and intelligence can be achieved. Based on a friendly GUI, all you need to do is to 🖥
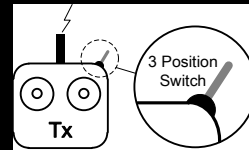
Holds the highest priority control of the system. You can switch between control modes (Manual, GPS-Cruise, GPS-Atti., Atti.) easily via a 3-position switch on the r/c Tx.

3 Position Switch

Tx

Switching via Tx

Please refer **"DJI Autopilot System User Manual"**

Protection under fail-safe strategy, eliminates system failure due to Tx/Rx failures, and ensures safety of the helicopter & the accessories related. You will need to configure the settings in the Assistant Software.

"DJI Autopilot System User Manual"

F Channel Controller

You can make use of ground station to customize the MC's
F channel control by yourself, so that you can control the
external payloads such as camera and gimbal.

STEP1: Click **[ToolBox]** → **[F_ChannelControl],** you
will see the setup window as the right figure shows;

STEP2: Click the small box beside the channel name to
choose the channels which you are going to use;

STEP3: Click the button with letter, it will ask you to **[press key]** to choose new control key on your key board;

STEP4: Setup the measuring range of the channel in the number boxes;

STEP5: Usually, the left endpoint of the slide represents the minimum value. However you can tick the **[Reverse]** box to reverse the
measuring range;

STEP6: Click **[Exit and Holding]** to exit and keep the range value; Click **[Exit without Holding]** to exit and forget the range value.
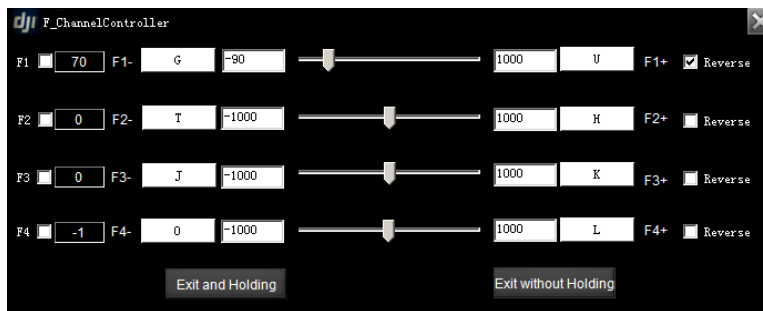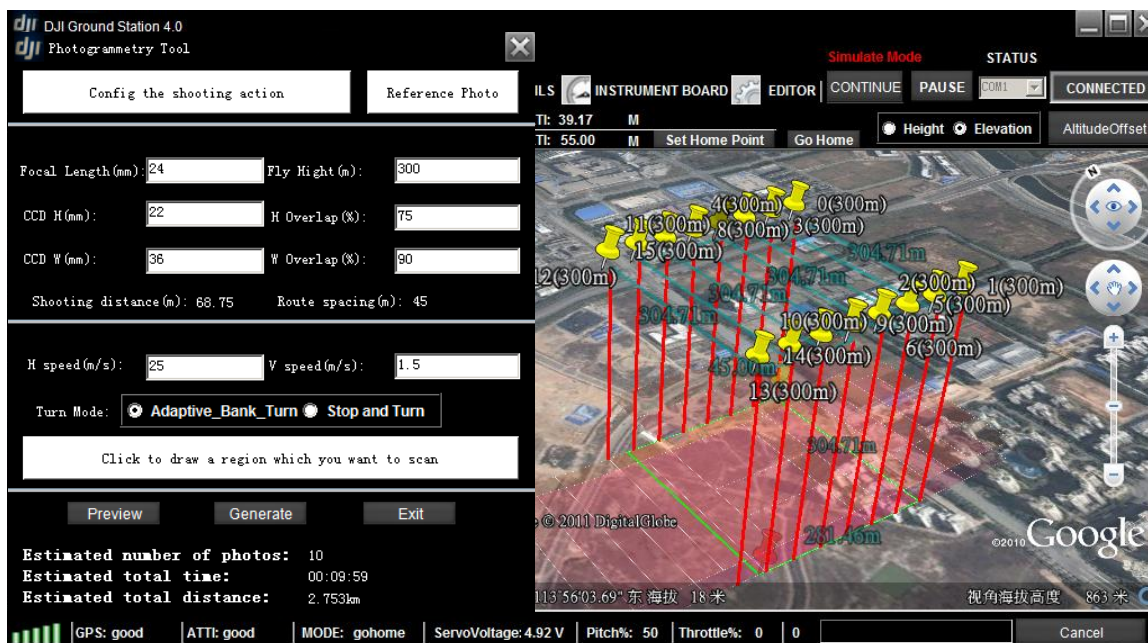

Photogrammetry Tool

Photogrammetry tool is for the user who wants to create the professional maps by aerial photography easily. In order to do that, you
just need to setup the servo action and mission path correctly as follows.

> This tool is actually a functions combination. It simplifies the parameters setup procedure for the aerial photography. You can
> still setup all the tools introduced before individually for your aerial photography, however that will be very complicated.

STEP1: Click **[ToolBox]** → **[Photogrammetry Tool]** to open the setup window;

STEP2: Click **[Config the shooting action]** to setup the servo action for the camera shooting action;

STEP3: Click **[Reference Photo]** to see if your camera is working as you want;

STEP4: Fill in the right **[Focal Length]**, **[Sensor Height]**, and **[Sensor Width]** according to your camera;

STEP5: Fill in the **[Fly Height]**, **[H Overlap]** and **[W Overlap]** as you want. **[H Overlap]** and **[W Overlap]** represent the overlap
percentage across the sensor height and width;

STEP6: Fill in the flight horizontal and vertical speed in **[H Speed]** and **[V Speed]** separately;

STEP7: Choose your turning mode between **[Adaptive_Bank_Turn]** and **[Stop and Turn]**;

STEP8: Click **[Click to draw a region which you want to scan]** to choose an area;

STEP9: Click **[Preview]** to preview the mission plan;

STEP10: If everything is OK, click **[Generate]** to generate all the waypoints. Now you will a flight mission generated automatically in
the **[Mission Editor]**.

STEP11: Follow the procedure mentioned before to finish your aerial photography task.

Troubleshooting

■ *Ground Station Software Crash*

Ground Station Software Crash will not affect the helicopter under mission execution. The helicopter will keep going on the flight

mission edited even the Ground Station Software crash. The Ground Station Software can be

launched again, but loss of the following information will happen:

● Altitude Offset value

● Heli tracks

● Way points

Click on the "**DOWNLOAD**" button to retrieve the previously set way points from the DJI

Autopilot main controller.
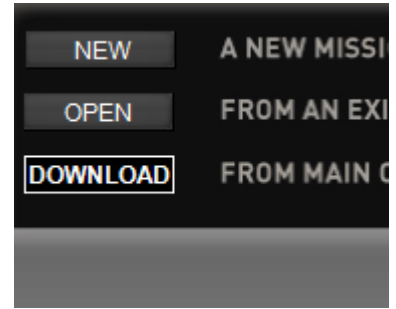
■ *When Wireless Data-Link Doesn't Work…*

If your Ground Station cannot be connected with the main controller, please check the following issues:

● USB-to-Serial wire version too old, you have to use the new USB-to-Serial adapter provided by DJI. If your computer already has

   a RS-232 serial COM port, please connect your wireless data-link directly without using USB-to-Serial adapter.

● If the Antenna is broken, the communication distance cannot be guaranteed.

● Two Wireless Data-Link Terminals had been placed too close. The valid communication distance between wireless data-links

   should be larger than 5 meters.

■ *Instrument Board Crash*

If Ground Station crashes when you click to open the instrument board, which is because your computer does not support OpenGL.

You can choose style 2 instrument board in **[Sys_set]** → **[Options]** before you open the instrument board to solve this problem.