

## **ATTENTION!**

- 1. You will need to be familiar with the correct installation, configuration and operation of XP3.1 Autopilot before you start using XP3.1 WayPoint, and make sure your helicopter can enter hovering status in autopilot mode without the support of GroundStation software.**
- 2. Please use the recommended power supply for your WayPoint version main controller, 2S LiPo battery (7.4V ~ 8.4V)**

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## Introduction

Thank you for purchasing DJI product. Please read the operating instructions thoroughly for proper operation of your new DJI XP3.1 Waypoint.

**DJI XP3.1 WayPoint** is the new DJI flight control system with Ground Station software that enables 3-D map way points editing, flight path planning and real-time flight attitude feedback. This product is specially designed for the purpose of advanced Unmanned-Helicopter operation, BVR (Beyond Visual Range) flying and applications such as surveillance, aerial photography, etc. Based on the existing XP3.1 Autopilot, XP3.1 WayPoint not only ensures stable performance and safety of the helicopter, easy operation for the pilot, but also allows the helicopter to fly automatically according to the flight path set before or modified during the flying process in the Ground Station software.

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## Trademarks

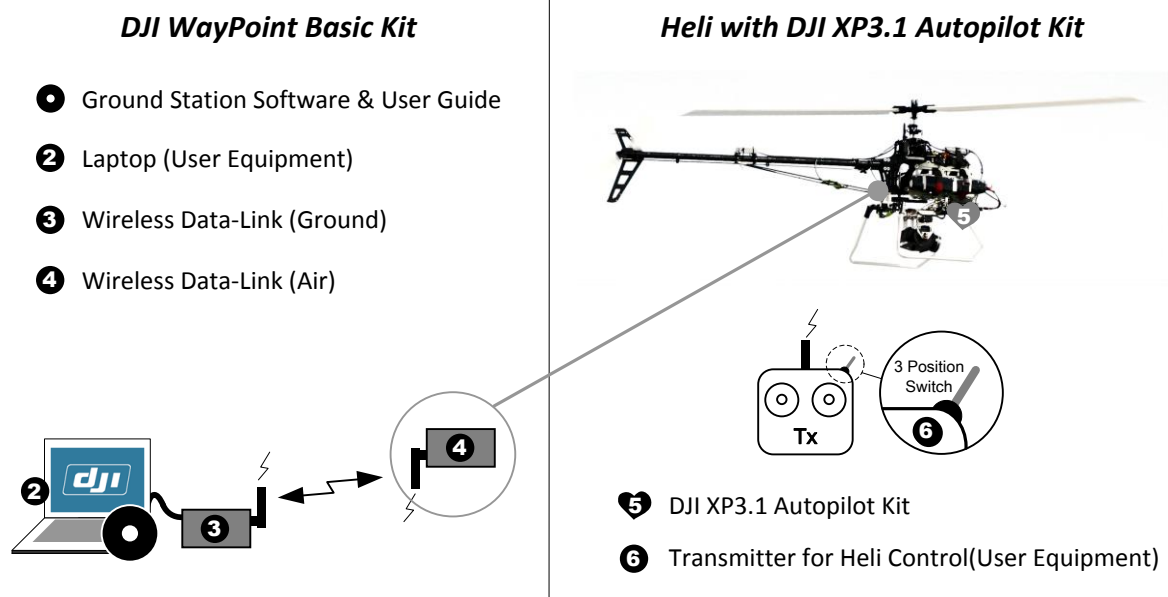
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# General Introduction

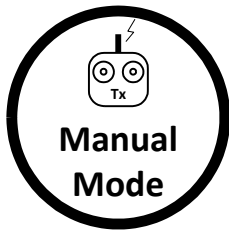
## System Architecture



## System Features

- 1 Way points editing, maximum 50 way points can be added
- 2 Flight path planning and modifying, before and during the flying process
- 3 Real-time flight attitude feedback
- 4 Meters provided to read real-time helicopter information, including velocity, attitude and altitude.
- 5 Validity check of flight path
- 6 More secured communication protocol, automatic justification upon loss of data.
- 7 Pre-Flight Simulation
- 8 Joystick aided control
- 9 General Purpose Servo Action (GP-Servo Action)

## Multiple Control Modes



### Manual Mode<sup>1</sup>:

Pure manual control, your helicopter electromechanical system will react to your R/C Tx command directly.



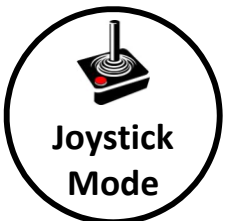
### Attitude Mode<sup>1</sup>:

Ensure attitude consistency in a no GPS condition with R/C Tx aid.



### Autopilot Mode<sup>1</sup>:

Allow users to fly the helicopter in an easily-operational way, and even enable stable control of the helicopter in a few minutes for learners and first-time-flyers.



### Joystick Mode:

With all the features in autopilot mode, enable multiple choices in control devices besides traditional R/C Tx. The transmission distance can also be extended beyond the range of a traditional R/C Tx which depends on wireless data-link.

Please refer ["DJI XP3.1 Standard Manual"](#) for operation under autopilot mode.

### Waypoint Mode:

100% unattended flight mode. Preset or real-time modify your flight mission in Ground Station and remotely upload to helicopter. With flexible programming environment, you can modify the flight mission any time.



## HOVERING MODE

PROTECTION CLASS I

Auto-hover your helicopter when R/C Tx communication is unstable.



## AUTOMATIC GO HOME

PROTECTION CLASS II

Auto-navigate your helicopter back to pre-set home location when R/C Tx signal is totally lost. Please refer ["DJI XP3.1 Standard Manual"](#) for configuration, otherwise this protection strategy will not be activated.

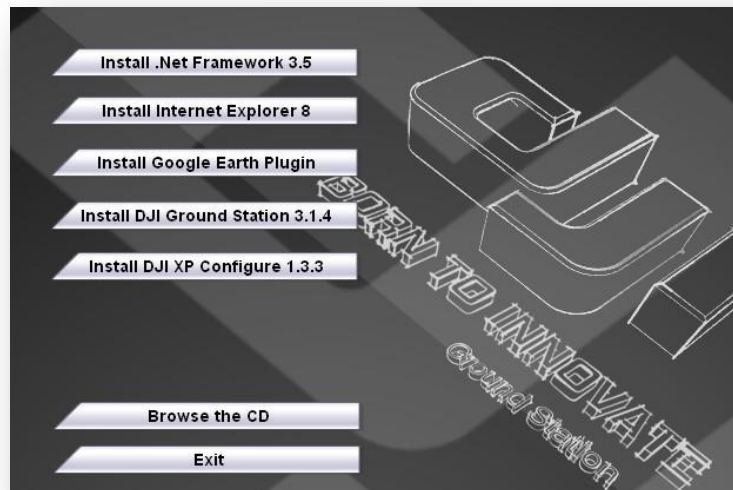
<sup>1</sup> Supported by XP3.1 Standard

## System Requirements

- ✓ Operating System: Windows XP, Windows Vista and Windows 7 32-bits
- ✓ Internet Explorer 8 (Inclusive in DJI Product CD)
- ✓ .NET framework 3.5 (Inclusive in DJI Product CD)
- ✓ Google Earth™ Plug-In (Inclusive in DJI Product CD)
- ✓ Adobe® Reader® (For user manual reading)

## Install DJI Ground Station 3.1.x

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



**2** If you did not install .Net Framework 3.5, IE 8 or Google Earth™ Plug-In, please click on the buttons respectively to install them first, as they are **REQUIRED** for DJI Ground Station 3.1.x.

**3** Click [**Install DJI Ground Station 3.1.x**], follow the installation guide, and install the Ground Station software.

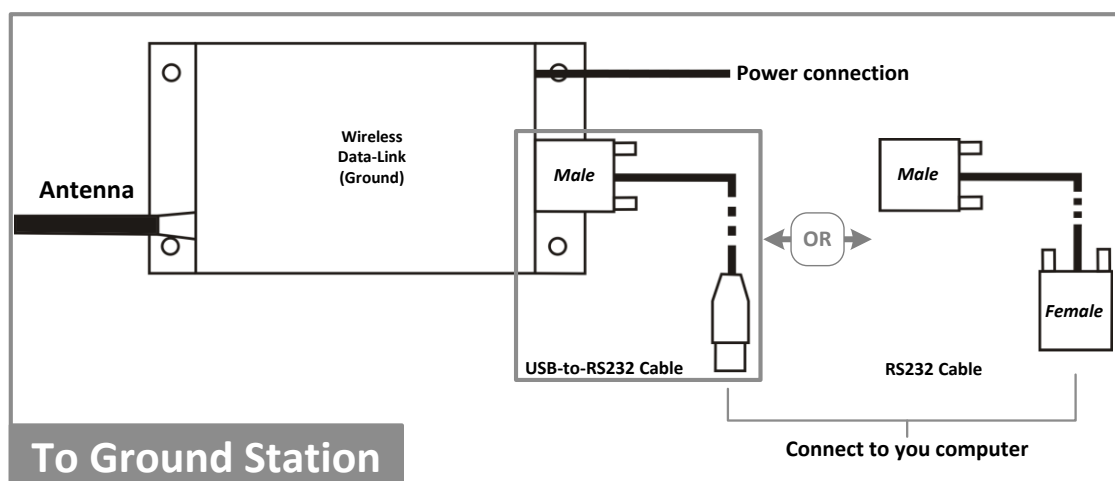
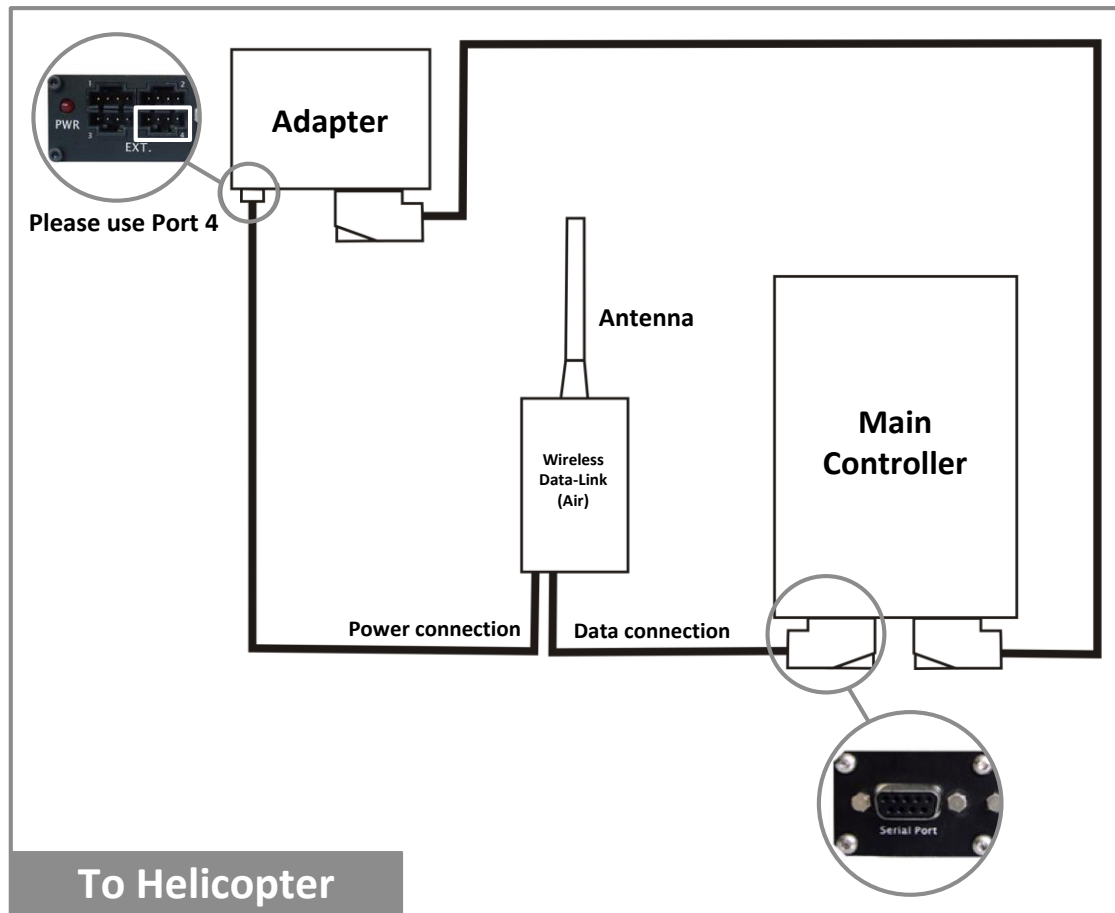
**4** Before using Ground Station to control your helicopter, you need to configure your XP3.1 Autopilot correctly, click [**Install DJI XP Configure 1.3.3**] to install the configuration software. For configuration details, click [**Browse the CD**], and read the “XP3.1 Standard Manual”

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

# Hardware Assembly (Wireless Data-Link)

## Wireless Data-Link Connection

Both wireless data links provided by DJI are the products of a third party manufacturer. These wireless data links had already been tested by DJI, and as well the necessary configurations being made, such as device ID and communication data rate. Please do not do any changes to the settings to, or reset the wireless data links. Any wrong operations might cause you to return your products to DJI for repair or replacement. For details about these wireless data links, please refer to the documentation of which attached with your DJI Product CD.



# Hardware Assembly (Joystick)

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## Joystick Minimum 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

### Technical requirement

- At least 4 linear control channel, otherwise the Joystick function will working abnormal
- USB connection



*Real Flight® InterLink™ Plus Controller*

*Logitech® Extreme™ 3D Pro Joystick*

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## Joystick Connection

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 break the joystick connection when Joystick Mode is activated.

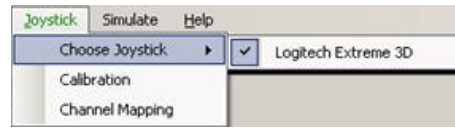
# Hardware Assembly (Joystick)

## Joystick Calibration



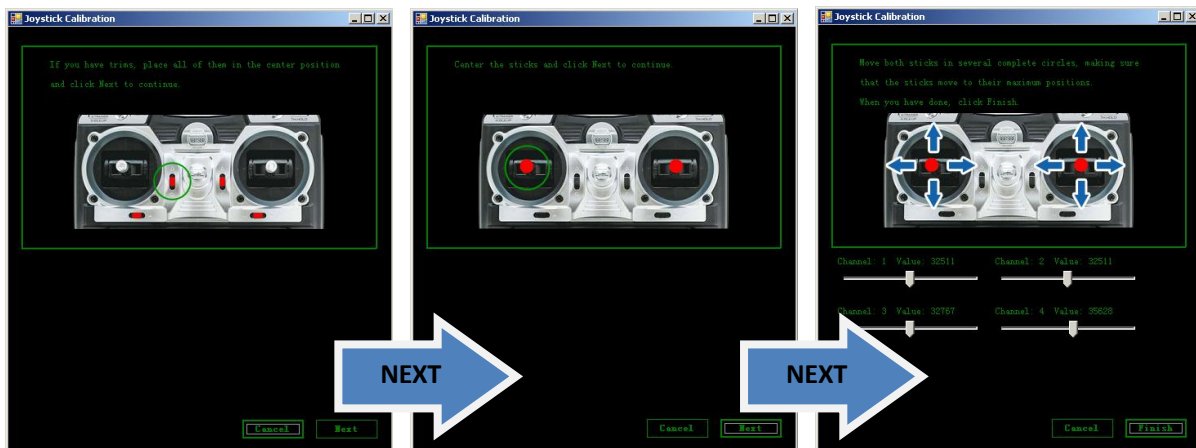
### CAUTION

You must & only do this procedure every time before you take off your heli !!



Menu list [Joystick] → [Choose Joystick]

- 1** Select a proper joystick in [Joystick] → [Choose Joystick], as indicated above.
- 2** Click [Joystick] → [Calibration], you will see popup windows shown as below.



### For Type 1

As directed, 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.

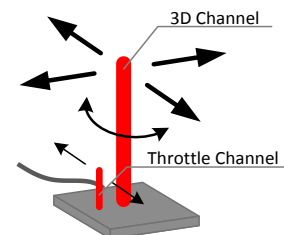
Move all of the sticks through their complete range of motion several times. When completed, click [Finish].

### 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].



Sketch of 3D Joystick

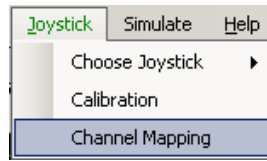
# Hardware Assembly (Joystick)

## Joystick Channel Mapping



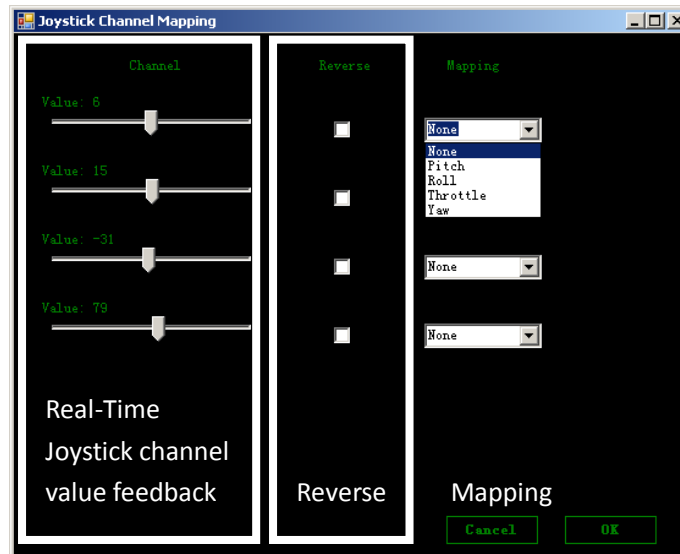
### CAUTION

You must & only do this procedure every time before you take off your heli !!

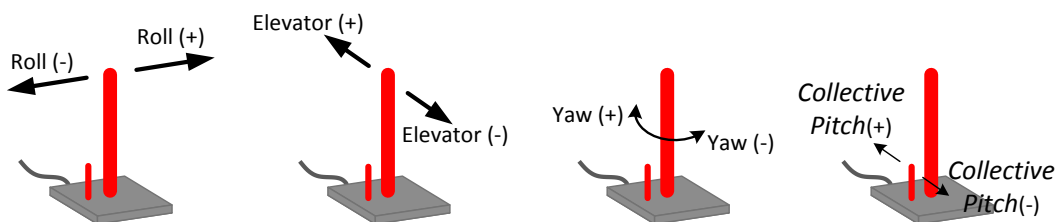
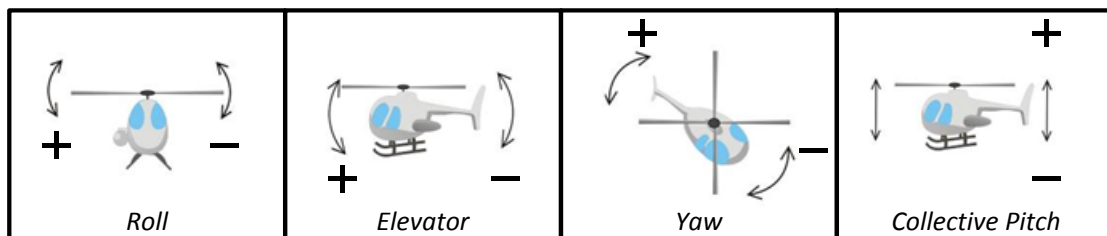


Menu list [Joystick]→[Channel Mapping]

Click [Joystick]→[ Channel Mapping], you will see popup windows shown as below.



Each control channel can be reversed, and mapped to one of the control objects which will be listed in corresponding drop down boxes. These control objects are 'Roll', 'Elevator', 'Yaw' & 'Collective Pitch', they represent the motion status 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.



# User Interface, Buttons & Parameters

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## Menu Navigation

The top-level menu found in DJI Ground Station is as follows:

- **File**

<i>Load Mission</i>	You can save your flight mission in your local hard drive or flash-disk. This features allows you load your frequently use mission without edit them every time.
<i>Save Mission As</i>	
<i>Exit</i>	
  
- **View**

<i>Meter</i>	Select the equipments which you would like to be display.
<i>Mission Editor</i>	
<i>3D Map</i>	
<i>Joystick Viewer</i>	
  
- **Set**

<i>Use Online Heli Model</i>	If the heli model cannot be display (load from your local device), check it. It might take few minutes depends on your network conditions.
<b>Tips</b>	
<i>GP-Servo Action</i>	Programming for GP-Servo's motion and timing.
  
- **Joystick**

<i>Choose Joystick</i>	Click it, you will found a list of joystick(s) selection if your Joystick(s) had connected to USB port.
<i>Calibration</i>	Joystick calibration
<i>Channel Mapping</i>	Joystick control channel mapping
  
- **Simulate**

<i>Simulation Mode OnOff</i>	The simulation features aims to help you familiar with this software. You can only use the simulation Mode on land.**
<i>Set SIM heli location</i>	
<i>Simulate</i>	
  
- **Help**

<i>About</i>	You can check your DJI Ground Station version here.
<i>User Guide</i>	Hyperlink to user manual provided with Ground Station Product. ( You have to install a PDF Reader for this manual )

**Note:**

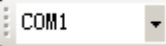








\* If GP-Servo Action function had been activated,

\*\* Only available if correctly connected with DJI Autopilot main controller.

# User Interface, Buttons & Parameters

## Tools Bar Navigation

The icons found below top-level menu are as follows:

	Serial port selection
	Click to connect with main controller
 *	Get suggested <b>“Altitude Offset Value”</b>
 *	Edit Mode Layout
 *	Flight Mode Layout
 *	Mission Pause
 **	GP-Servo Action Manual Trigger
 *	Click to record your take off location and altitude
	Indication for working status: <b>“Real Mode”</b> for real flight execution; <b>“Simulation Mode”</b> only for on land tutorial

**Note:**

- \* Only available if correctly connected with DJI Autopilot main controller.
- \*\* Only available if GP-Servo Action functions had been activated.



# User Interface, Buttons & Parameters

## 3D Map

The coordinate of the location mouse is pointed at. \*\*

Tick if you want to see **Heli Track**.

Tick if you want to see **Map Details** in text.

Zoom In the map to find heli location.\*

3D Map

Heli  
Lati: 22.397141  
Longi: 114.252861  
Alti: 500.00

Mouse  
Lati: 22.393791  
Longi: 114.245407  
Alti: 375.84

Heli Track  Map Detail

Path Extrude  Navigator

Find Heli

Find Home

Real-Time coordinates of Helicopter. \*

Tick if you want to see **Path Extrude** during mission editing.

Tick if you want to use **Map Navigator**.

Zoom Out the map to find your **Home** location. \*\*\*

Current Heli altitude

Head

500m

Helicopter model

Tail

Way point altitude

Index number of way point

Way point

Under editing

Not selected

Path Color Before Mission Execute

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

Path Color During Mission Execution

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

Mission Editing

Projection line of way point, not for scale

Point-to-Point distance between two way points

211m

0

3.582 km

1

206m

2

257m

1.256 km

### Note:

\* Only available if correctly connected with DJI Autopilot main controller.

\*\* Here the altitude will be re-generated depending on the altitude offset value you set.

\*\*\* Only available after **Mission Execute**, the Home location is where the **Start Way point** located.

# User Interface, Buttons & Parameters

## Mission Editor






1. **SYNCHRONIZE** upload the mission to Main Controller.
2. **Go** to Execute Fixed Mission.
3. **Re-Edit** the Fixed Mission.
4. **Reload Mission** from Main Controller.
5. **Mission Status Indicator** which red light indicating the current status.
6. **Waypoint Action** properties.
7. **Waypoint properties** for Editing Mission are writeable; Fixed Mission is read only.

<b>Latitude &amp; Longitude</b>	Units are in degree.
<b>Altitude</b>	Unit is in meters.
<b>TurnMode</b>	You can select <b>&lt;Stop and Turn&gt;</b> or <b>&lt;Coordinated Turn&gt;</b>
<b>Speed</b>	Velocity from previous point to current point which is limited under 15 m/s.
<b>HoldTime</b>	The time to stay at this way point, unit in second.
<b>TimeLimit</b>	Down-count timer for the maximum time-of-flight from previous waypoint to current way point, terminate the way point if time out even this way point has not been reached. Unit in second.

# Altitude Offset Setting

**8.** Description of selected item.

**9.** Mission properties, you will see this instead of  &  if  selected.

<b>IsPatrol</b>	The selection of mission execution mode: <b>False</b> , one time executes; <b>True</b> , for repeatedly flying from start way point to end way point.
<b>StartWayPoint</b>	Defines the first way point your helicopter going to after you click <GO>. Select the proper way point index number listed.
<b>Vertical Speed Limit</b>	Vertical speed for up or down direction, Unit is m/s

**10.** Altitude decrement **10m per click**.

**11.** Altitude decrement **1m per click**.




**12.** Altitude increment **10m per click**.

**13.** Altitude increment **1m per click**.

**14.** Mission **Check**, this feature can help you to avoid most of the way point edit error, such as Mountain-Flight Path collision.

**15.** Force all the waypoints to be **Coordinated Turn**.

**16.** Force all the waypoints to be **Stop and Turn**.

**17.** Add new way point by click , and then click on the map. Or  +  on the map.

**18.** Delete way point by selecting them, and then click .

**19.** Editing Mission Menu.

**20.** Begin Edit.

**21.** Cancel All edited way points.

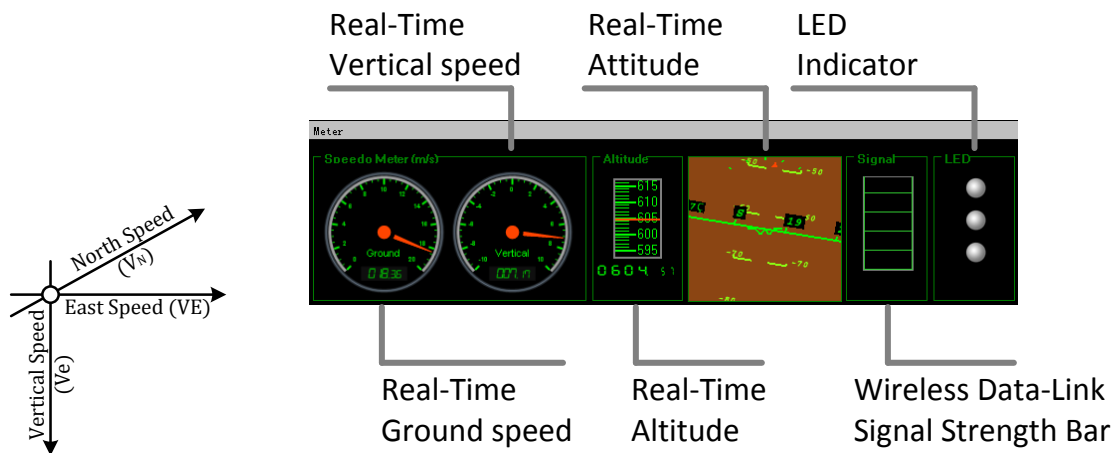
**22.** Fixed Mission Menu.

**23.** Set Altitude Offset, Unit in meters.



# Altitude Offset Setting

## View - Meters



According to the definition of GPS coordinate (As shown in the upper left graph), an arrow pointing down stands for a positive vertical speed.

The Ground speed is not direction oriented, but a value calculated from  $V_N$  &  $V_E$  with the following equation.

$$\text{Ground speed} = \sqrt{V_N^2 + V_E^2}$$

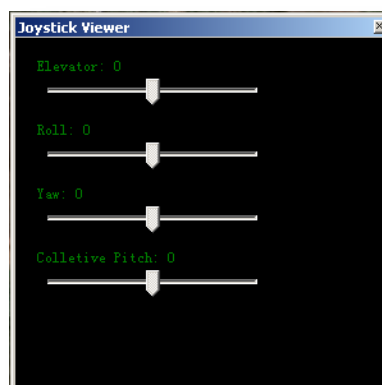
All the speed unit is in m/s, Altitude unit is in meters.

### Note:

1. The above features are only available when correctly connected with DJI Autopilot main controller.
2. **LED indicator** performs the same status indication as the physical DJI LED Indicator does.

## View - Joystick Viewer

To check the real-time Joystick feedback value, please use the joystick viewer which without affecting the joystick channel mapping.

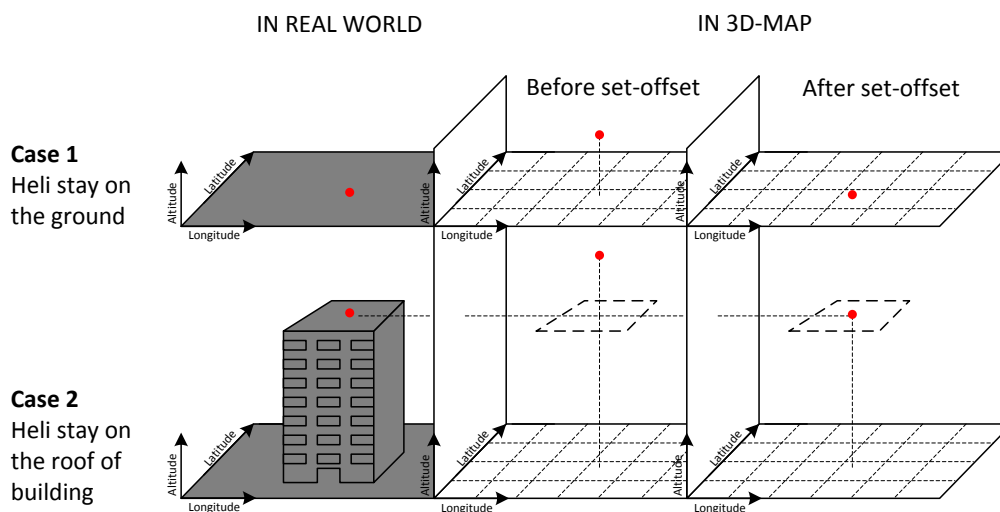


# Altitude Offset Setting

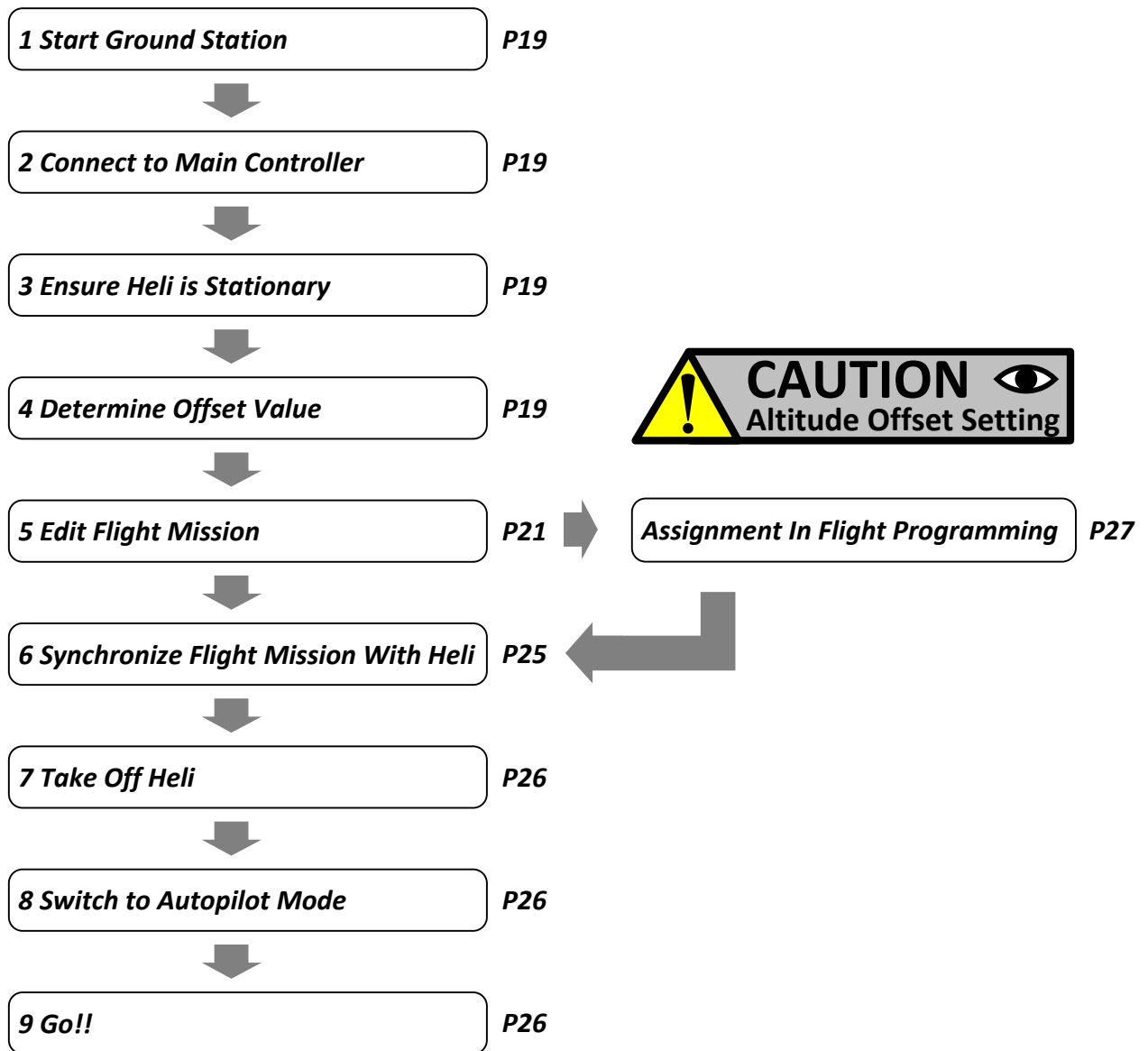


## CAUTION Altitude Offset Setting

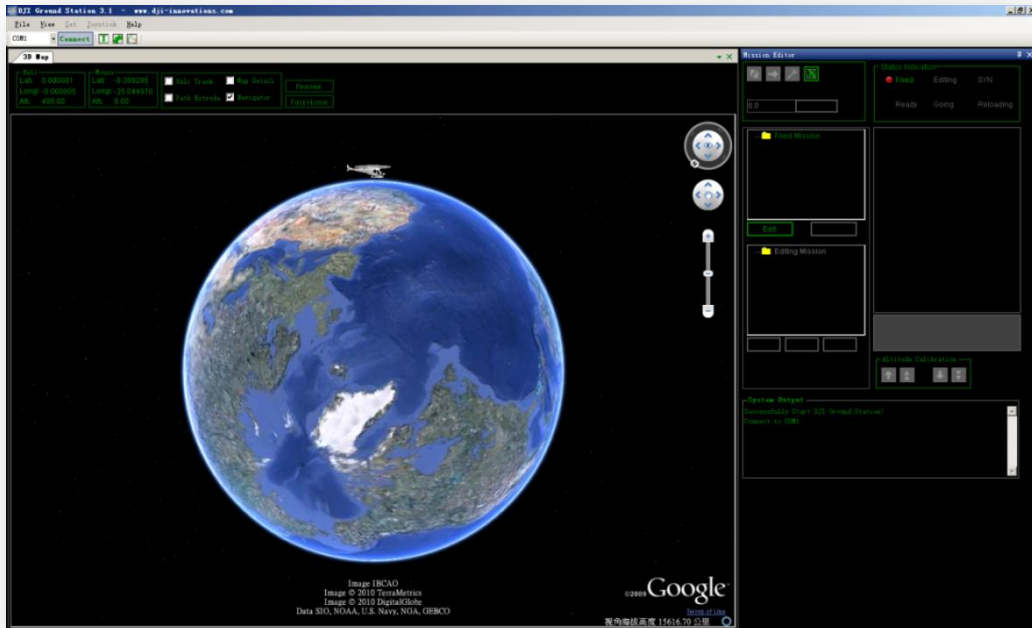
- GIS database (Google Earth™) is not precise, and Flight Path Mountain collision checking feature is performed based on this database, which is not real-time or up-to-date. Some landform might be different from what you see in the 3D-Map such as new buildings. Here the Google Earth™ plug-in is only for the purpose as a general landform 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 is far more precise than absolute altitude information in GIS.
- Due to above problems, the following method for **relative flight height** calculation would be most reliable.
  - a) Record the heli altitude before take-off,  $L_{Ground}$
  - b) **Way point altitude** = Relative flight height +  $L_{Ground}$Please keep in mind that this method is the most reliable way for flight path collision prediction.
- The Altitude Offset value given was 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 visually 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.



# Basic Operation Flow

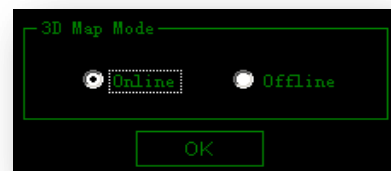


# Basic Operation Flow



## 1 Start Ground Station Launch

- ① Choose either “online” or “offline” mode according to your network connection.
- ② Click [OK] to confirm.



## 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 with the DJI Autopilot main controller.



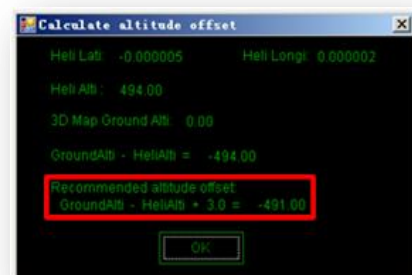
## 3 Ensure Heli is Stationary

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

## 4 Determine Offset Value



Before flight mission editing, you should determine the **Altitude Offset**. Click  to find our recommended altitude offset value, and record it in your flight log book which will help you in later step.




*Note: This recommended altitude offset value is only valid before the heli takes off.*




# Basic Operation Flow


## 5 Edit Flight Mission

- (1) **Edit Mode Layout.** Click , you will find “Mission Editor” on the right hand side.
- (2) **Begins to edit.** Click , the Mission Status will show “Editing” in the “Status Indication” box.

- (3) **Set offset value.** 
  - ① Type your offset value in  
  - ② Then click [Set Offset].


- (4) **Add way points.**
  - ① Click 
  - ② Left click your mouse on the 3D-Map where the locations you want to **add** a way point.


**OR**

  - ① Press  and hold.
  - ② Left click your mouse 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.

**Note:** A maximum of 50 way points can be added.

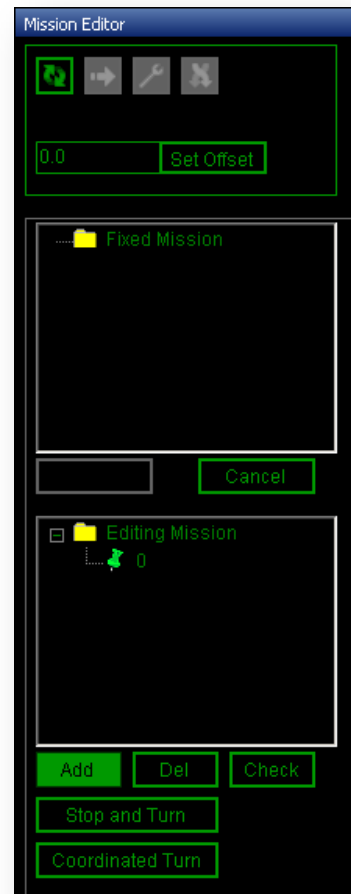
- (5) **Delete way points.**
  - ① Select the way point either in 3D-Map or in **Editing Mission Menu**. The Selected waypoint is in green.
  - ② Click  to delete it.

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

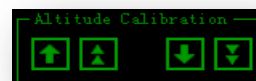
### >> Waypoint Properties Editing

- (6) **Way point altitude setting.**
  - ① Select the way point either in 3D-Map or in the **Editing Mission Menu**.
  - ② Edit the altitude of each way points by clicking the [Altitude Calibration buttons].

- OR**
- ① Select the way point either in 3D-Map or in the **Editing Mission Menu**.
  - ② Type in the precise figure after “Altitude” in the “Way Point Properties” box.
  - ③ Press **Enter** to confirm.



**Note:**  
The currently selected way point is in color green.



Way point properties	
Latitude	22.394607543945312
Longitude	114.28118133544922
Altitude	254.38723754882813
TurnMode	CoordinatedTurn
Speed	4
TimeLimit	3600
HoldTime	3

# Basic Operation Flow

## (7) Speed setting.

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

- ① Select the way point either in 3D-Map or in the **Editing Mission Menu**.
- ② Type in the precise figure after **"Speed"** in the **"Way Point Properties"** box.
- ③ Press **Enter** to confirm.

### **Note:**

The system default speed is 4m/s, and the maximum speed allowed is 15m/s.

## (8) Turning Mode setting

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

- ① Select the way point either in 3D-Map or in the **Editing Mission Menu**.
- ② Click **Stop and Turn** or **Coordinated Turn** to select the desired turning mode.

### **Note:**

The Hold Time in way point property will be deactivated if Coordinated Turn chose.

The selected turning mode will appear in **'TurnMode'** box of way point properties.

You can also change the turning mode in the way point properties window discussed in previous sections.

## (9) Time Limit setting

A way point time-limit timer, will set time limit between two way points, and terminate the flying upon time out even the way point has not been reached.

**(Unit in second)**

- ① Select the way point either in 3D-Map or in the **Editing Mission Menu**.
- ② Type in the precise maximum time of flying between two way points (in seconds) after **"TimeLimit"** in the **"Way Point Properties"** box.
- ③ Press **Enter** to confirm.

### **Note:**

You have to estimate the maximum time spent to approaching current editing way point from previous way point.

## (10) Hold Time setting

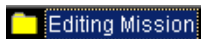
Sets the time to stay in a particular way point. **(in second)**

- ① Select the way point either in 3D-Map or in the **Editing Mission Menu**.
- ② Type in the precise time to stay in a way point (in seconds) after the **"TimeHold"** in the **"Way Point Properties"** box.
- ③ Press **Enter** to confirm.

# Basic Operation Flow

## >> Mission Properties Editing

### (11) Patrol or Not selection

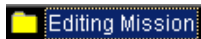
- ① Click , you will see Mission properties.
- ② make a selection from the drop down box after "IsPatrol" for mission execution mode:  
"False", one time execute; "True", repeating.



**Note:**

The default status is "False".

### (12) Start way point selection

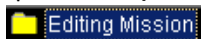

- ① Click , you will see Mission properties.
- ② make a selection from the drop down box after "StartWayPoint" for start way point from the existing way point indexes.

**Note:**

The default start way point index is "0".

### (13) Vertical Speed Limit

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

- ① Click , you will see Mission properties.
- ② Type in the precise figure after "VerticalSpeedLimit" in the "Mission Properties" box.
- ③ Press  to confirm.

**Note:**

The default vertical speed limit is 2 which means ,  $-2\text{m/s (up)} \geq \text{vertical speed} \leq 2\text{m/s (down)}$  and the maximum speed allowed is 4m/s.

## >> Mission Save & Load

### (14) Mission Save

- ① Click [File]
- ② Click [Save Mission As] to save your mission edited, choose a proper name with extension '.mis'.  
**For Example: DJI\_Mission\_20100101.mis**
- ③ Press [Save] to confirm.

**Note:**

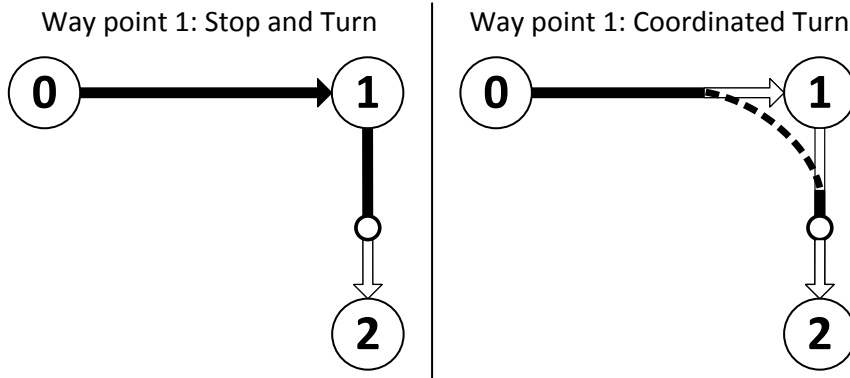
The Altitude offset value will not be saved in mission file. You must set it every time!!!

### (15) Mission Load

- ① Click [File]
- ② Click [Load Mission] to load your mission saved, choose your mission file with extension '.mis'.
- ③ Press [Open] to confirm.

# Basic Operation Flow

## Examples for Way Point turning mode

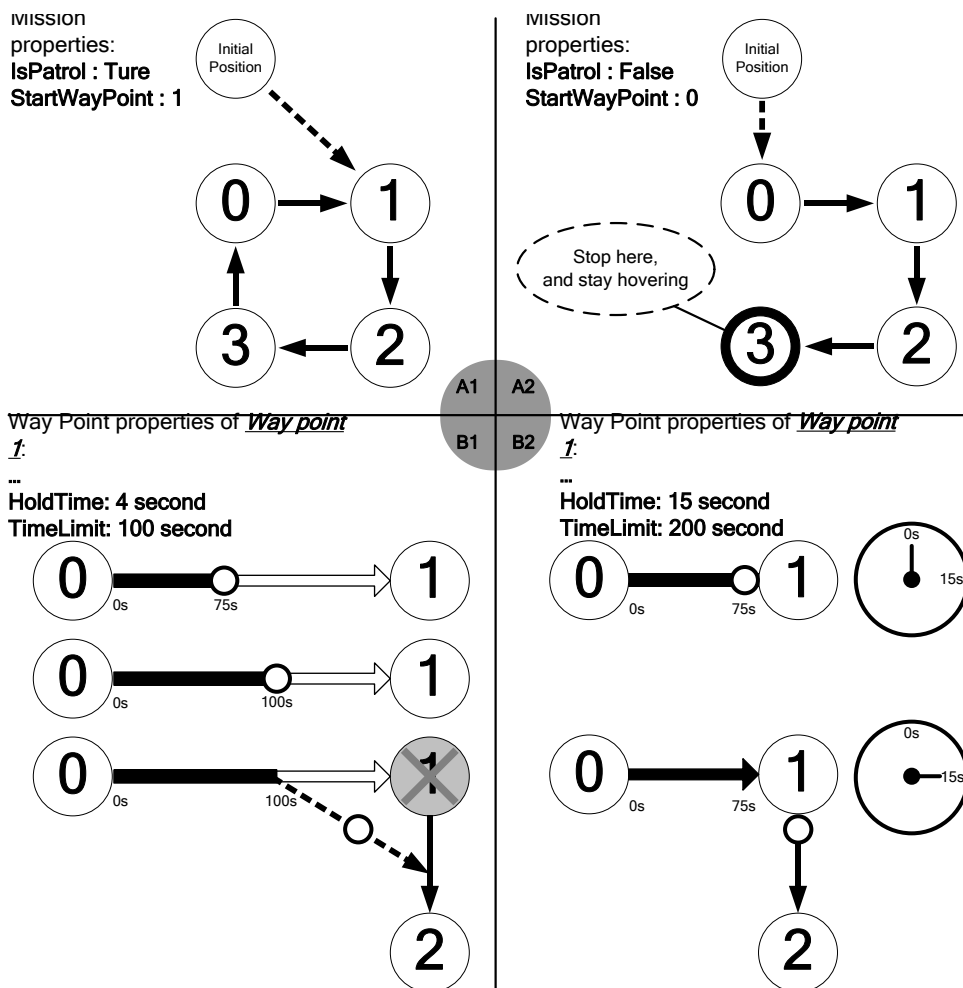


## Examples for Mission/Way Point properties setting

**A1/A2:** Selection for the state of “IsPatrol”, and “StartWayPoint”.

**B1:** If the “TimeLimit” timer of a waypoint has been set and time out before heli approached this way point, your heli will ignore this way point and turn to the next flight path.

**B2:** If the “HoldTime” timer of a waypoint has been set, your heli would stay hovering on this waypoint until “HoldTime” timer was time out.




# Basic Operation Flow

## 6 Synchronize Flight Mission with Helicopter

### >> 1. Record Take-Off Location

First, you should record your helicopter take off location:

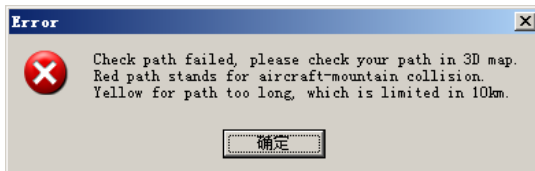
- ① Click ;
- ② Left click your mouse on the 3D-Map where the locations you are ready to take-off.

This procedure is important, which could let the ground station work out the relative height between waypoints and take-off location.

### >> 2. Automatic Safety Check

Click  to verify your waypoints, software can help you to prevent most of hazards.

- 1 **Flight path mountain collision.**
- 2 **Single flight path too long, larger than 10km.**





**Error Message: check your way point.**



**Pass Message: you can go on.**

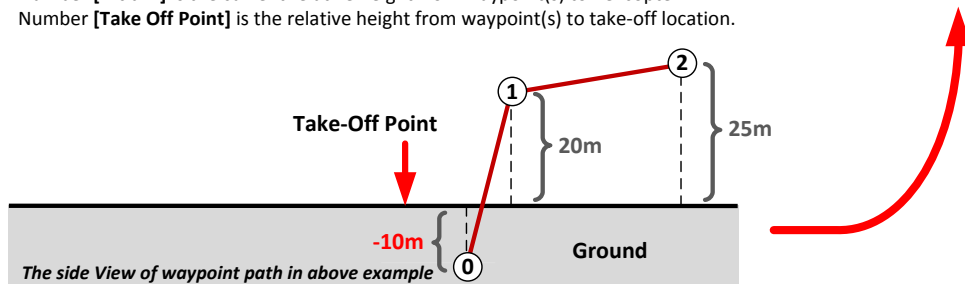
### >> 3. Manually Final Check & Mission Transmitting


Click  on the upper left corner of the Mission Editor to send flight mission to the DJI Autopilot main controller. Here a mission review table as following example will be appears for mission final check. Press  to confirm, after successfully synchronized, the mission is ready executing.

WayPoint	Latitude	Longitude	Altitude	Speed	Turn Mode	Altidiff	Take Off Point
0	xxxxx	xxxxx	xxxxx	4	StopAndTurn	-10	-10
1	xxxxx	xxxxx	xxxxx	6	StopAndTurn	20	20
2	xxxxx	xxxxx	xxxxx	15	StopAndTurn	25	25

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.



After synchronized, you still can re-edit your mission by "Re-Edit", click  to do so. Then the mission editor will return to the state as we told in previous section "[5 Edit Flight Mission](#)"

# Basic Operation Flow

## 7 Take off heli

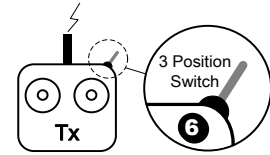
After finishing all the above steps, take off your helicopter in **Manual Mode**, and hover it at a suitable height.

### Note:


Refer "[DJI XP3.1 Standard Manual](#)" for **Manual Mode / Auto Mode** switching of your DJI Autopilot System, and also the Manual of your R/C Transmitter (Tx).


## 8 Switch to Autopilot Mode

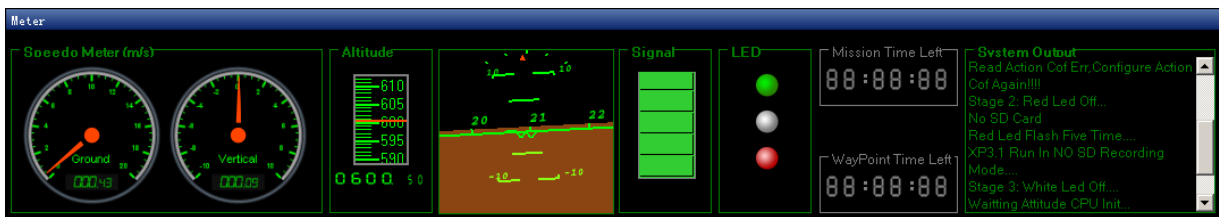
Switch to the **Autopilot Mode** on your Tx.







## 9 Go!!

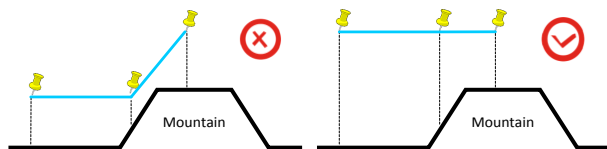
Click  in the "**Mission Editor**", and the helicopter will fly automatically according to the path you have set in the flight mission.

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



## Tips

- ◆ While a mission is in process, you can still re-edit your mission by using **[Edit] function**. Please click , then click  in mission editor to do so. Then the mission editor will return to the state as explained in previous section "[5 Edit Flight Mission](#)".
- ◆ While a mission is in process, you can pause the mission by using **[Pause] function**. Please click , and the helicopter will slow down and stay hovering. Then click  again, 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 inertial.

Please note that when you set a way point above a lake/sea/river, the default altitude the map identifies will be at the bottom of the lake/sea/river. Please be careful for to avoid water-collision.

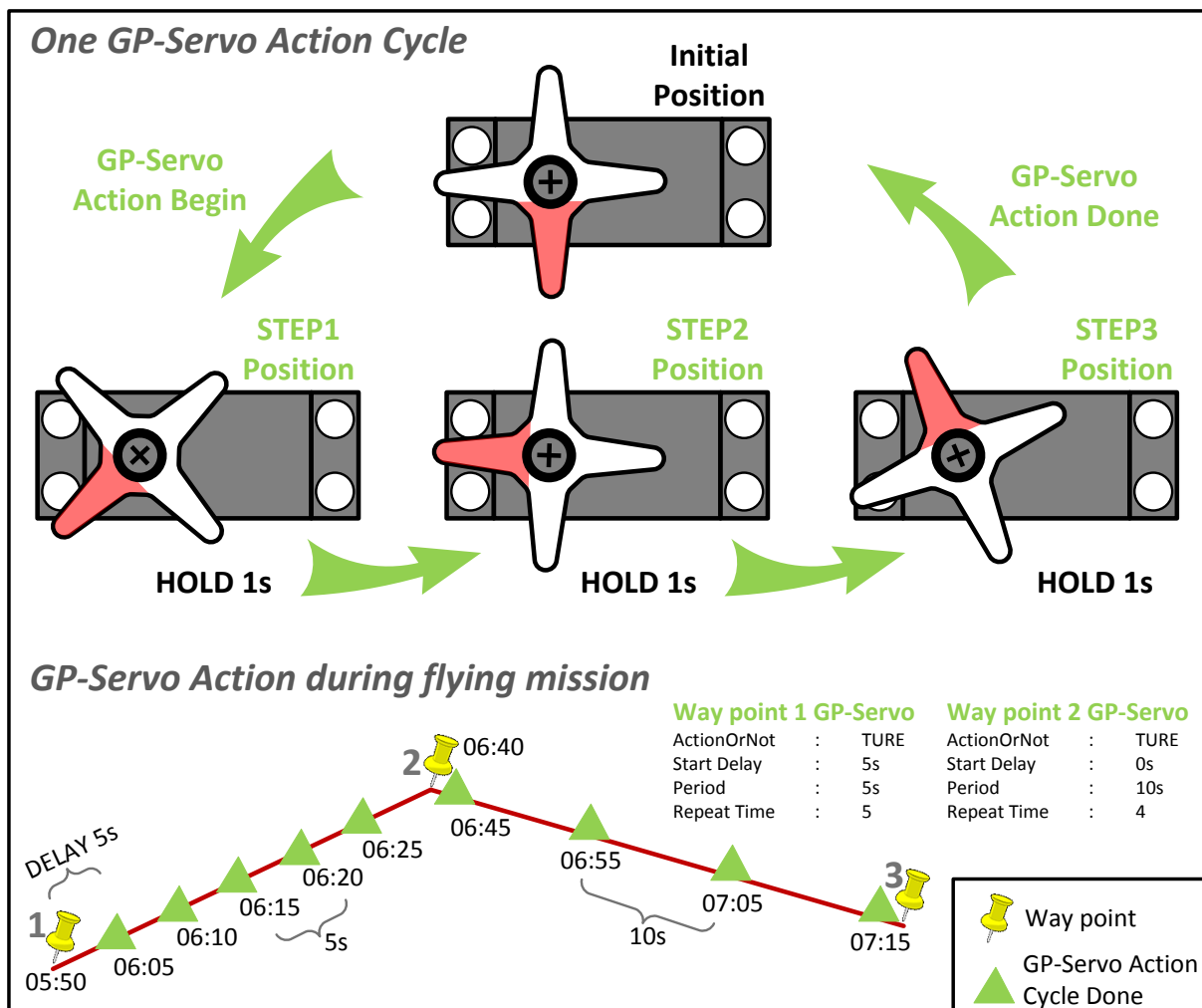
# Assignment In Flight Programming

## What is General Purpose Servo Action (GP-Servo Action)?

GP-Servo Action is supported by one of the servo output channel in the adapter of XP3.1 standard, which will work as an interface between DJI Autopilot system and your external devices. This feature allows the DJI autopilot to operate your external devices automatically during basic helicopter waypoint flying mission, as explained in previous sections.

Our software aims to let you program four different servo positions, which is defined as:

1. Initial servo position and three specific servo working positions (DJI system will drive the servo transition to follow the three positions you set, then return to the initial position which enables a completely GP-Servo Action cycle );
2. Timing of each servo transition in one GP-Servo Action cycle;
3. Whether a waypoint will be assigned a GP-Servo Action function or not;
4. The repeat time of a GP-Servo Action assignment on a particular assigned waypoint;
5. Time gap between each GP-Servo Action assignments



# Assignment In Flight Programming


## GP-Servo Action Configuration

- ① Click **[Set]** in main menu.
- ② Click **[GP-Servo Action]** to open the GP-Servo Action Configuration windows
- ③ Tick the box **[Action Mode OnOff]** to enable the GP-Servo Action function.

The GP-Servo is using the output channel **[AUX]** in the adapter of XP3.1 standard autopilot system. The gimbal function which also uses this same channel would be disabled when the GP-Servo Action function was enabled.

	Servo Position	Stay Time
Action Step 1:	-1000	1
Action Step 2:	500	1
Action Step 3:	1000	1



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

Please give a default position for servo in idel status, and others 3 positions as well as the time to stay in such postions for servo to work in action. After all of these settings, click **"Set"** and click  in main tools bar to trigger an GP-Servo Action, and you will see the GP-Servo motions, as explained in **"One GP-Servo Action Cycle"**.

## Way point Action Editing

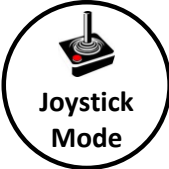
You can find and set the way point action properties by the following procedures:

ActionOrNot	False
StartDelay	0
Period	0
RepeatTime	0

- (1) Click , and find **"Mission Editor"** on the right hand side.
- (2) **Begins to edit.** Click , the Mission Status will show **"Editing"** in the **"Status Indication"** box.
- (3) **Set waypoints, as instructed in Step 5 of Basic Operation Flow.**

- ① Select the way point either in 3D-Map or in the **Editing Mission** Menu.
- ② choose **"False"** or **"True"** to disable or enable GP-Servo Action for the selected waypoint(s), in the **"Way point action"** box; and also give the proper GP-Servo Action parameters, as explained in **"GP-Servo Action during flying mission"**, as **"StartDelay"**, **"Period"** & **"RepeatTime"**.

# Control Mode Switching

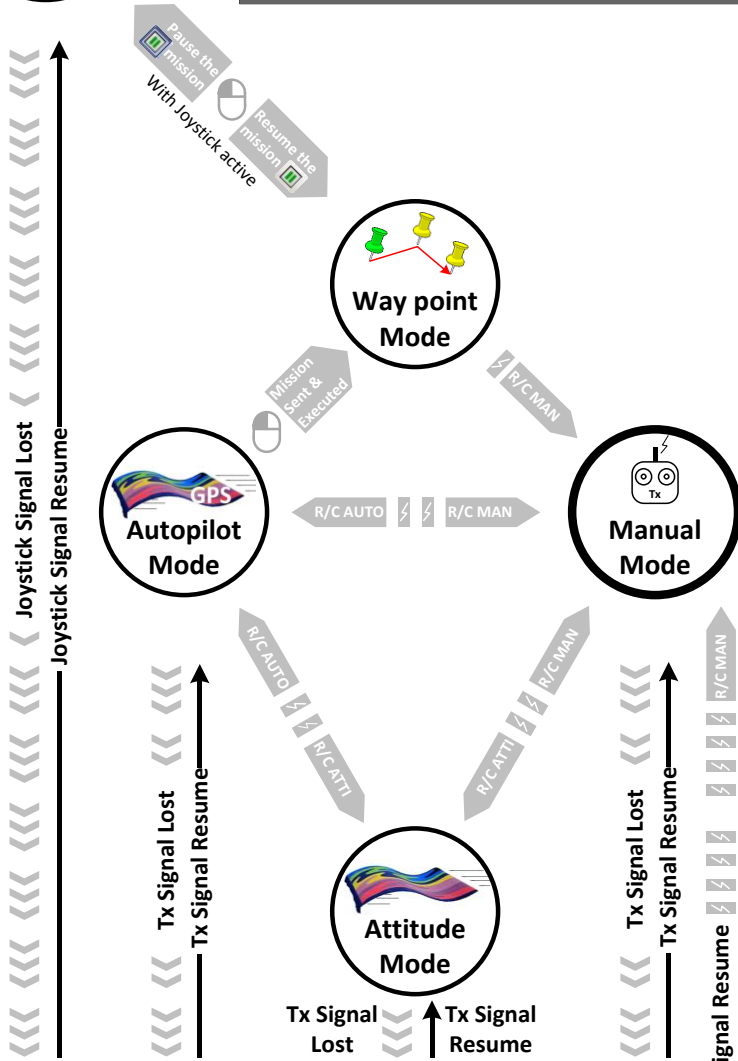



**Joystick Mode**

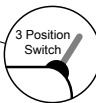
**CAUTION** *Preparation For Joystick Mode*

- ▲ Keep your R/C Tx power on and successfully connected with Rx either before or after DJI system power on.
- ▲ Make sure your Joystick is properly connected physically.
- ▲ **Manual Mode** should be the initial mode for DJI system.




- 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**.



 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 click your mouse.


 Holds the highest priority control of the system. You can switch between control modes (Manual/Auto/Attitude) easily via a 3-position switch on the r/c Tx.

**Switch to**


-  R/C MAN → Manual Mode
-  R/C ATTI → Attitude Mode
-  R/C AUTO → Auto Mode

Please refer "DJI XP3.1 Standard Manual"

 **PROTECTION CLASS I HOVERING MODE**

 Tx Signal Lost Time > 10s

 **PROTECTION CLASS II AUTOMATIC GO HOME**

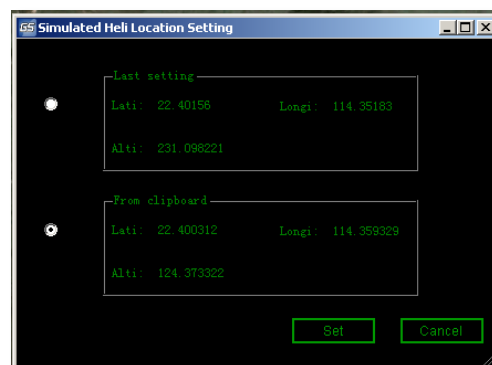
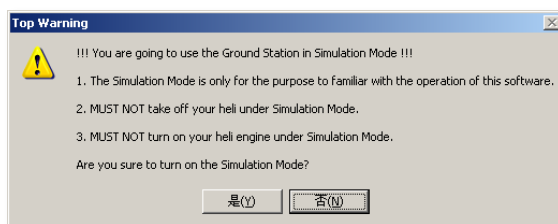
 Protection under fail-safe Strategy, eliminates system failure due to Tx/Rx failures, and ensures safety of the helicopter & the accessories related. You will need to configure the settings in the XP3.1 Autopilot Configuration Software, please refer "DJI XP3.1 Standard Manual"

# Pre-Flight Simulation



## CAUTION Pre-Flight Simulation

- Our system support Pre-Flight Simulation which only aims to help you get familiar with the Ground Station software. A successful flight under simulation mode does not guarantee your helicopter to work successfully in real world, since it is only a virtual environment based on the assumption that your helicopter is working under perfect condition with infinity power supply, favorable weather, and also that the GIS & GPS are giving 100% correct and precise information. The helicopter physical model in simulator might not perform the same characteristic as your real helicopter.
- Ensure the following requirements whenever during/before Simulation Mode:
  - 1) You **MUST NOT** take off your helicopter.
  - 2) You **MUST NOT** turn on your helicopter engine.
  - 3) You **CAN** disconnect the power supply for electric motor, or disconnect the throttle control servo motor for fuel engine.Otherwise, wrong operation could result in serious personal injuries.
- Please follow the steps strictly for the use of Simulation Mode:
  - ① Perform [step1 & step2](#) from the <Basic Operation Flow> Section.
  - ② Click **[Simulate]**→**[Simulation Mode OnOff]**, you will see a prompt “Top warning” window.
  - ③ Browse the 3D Map, and record the coordinates in your clipboard:
    1. Press **Ctrl** and hold.
    2. Right click your mouse on the location you want to perform the simulation.
    3. Select **[Copy mouse Lati/Longi/Alti to Clipboard]**
  - ④ Click **[Simulate]**→**[Set sim heli location]**, you will see a prompt “Simulated Heli Location Setting” window. Select **[From clipboard]** and confirm by click **[Set]**
  - ⑤ Click **[Simulate]**→**[Simulate]** to turn on Simulation Mode.  
*Now, your system is working under Simulation Mode!!!*
  - ⑥ Perform [step 5, 6 & step 9](#) from the <Basic Operation Flow> Section.



- We highly recommend **Simulation Mode** for practicing purpose for flight mission edit, try to get familiar with all the operations of your Ground Station as much as you can.

## Ground Station Software Crash

Ground Station Software Crash will not affect the helicopter under mission executing. 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:

1. Altitude Offset value
2. Heli tracks
3. Way points

Click on the “**Reload**” button to retrieve the previously set way points from the DJI Autopilot main controller.



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## When Wireless Data-Link Doesn't Work...

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

1. **USB-to-Serial cable version too old**, you have to use the new USB-to-Serial adapter provided with DJI XP3.1 Waypoint Kits instead of the old one provided with DJI XP3.1 Standard. If your computer already has a RS-232 serial COM port, please connect your wireless data-link directly without using USB-to-Serial adapter.
2. If the **Antenna was broken**, the communication distance cannot be guaranteed
3. **Two Wireless Data-Link Terminals had been placed too close**. The valid communication distance between wireless data-links should be larger than 5 meters.

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## Google Earth information doesn't match the real-world

GIS database (Google Earth™) is not precise, and Flight Path Mountain collision checking feature is performed based on this database, which is not real-time or up-to-date. Some landform might be different from what you see in the 3D-Map such as new buildings or trees. Here the Google Earth™ plug-in is only for the purpose as a general landform browser, for quick way points positioning without much safety guarantee.