

Ground Station Wireless Data-link User Manual

V 2.5



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Disclaimer

Thank you for purchasing product(s) in DJI. Please strictly follow these steps to install all the software and hardware products, and make sure your Ground Station and Wireless Data-link work perfectly. Please use the wireless data-link in accordance with the provisions of the local radio control. Dajiang Innovation Technology Co. Ltd. assumes no liability for damage(s) or injured incurred directly or indirectly from the use of this product.

Profile

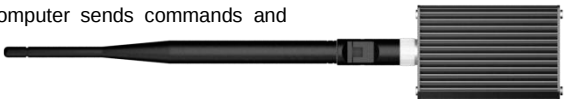
Thank you for purchasing DJI product. Please read this instruction thoroughly for proper operation of your new DJI Ground Station and Wireless Data-link. Full featured DJI Ground Station enables 3-D Map Way Points Editing, Flight Path Planning, Real-time Flight State Feedback and Auto Takeoff and Landing. This product is specially designed for the purpose of aircraft 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 aircraft, easy operation for the pilot, but also allows the aircraft to fly along the flight path set before or modified during the flight mission in the Ground Station software autonomously. This manual covers both Single Waypoint and Ground Station products. Read this manual according to your product package. E.g., if you have WKM Single Waypoint, then you do not need to read section 4.4. Please refer to DJI autopilot manual for semi-auto takeoff and landing.

Production	ACE				WKM		
Product packages	View Mode	Joystick /Keyboard Mode	Single Waypoint	Ground Station	Single Waypoint	5 Waypoints	Ground Station
3D MapDisplay	●	●	●	●	●	●	●
Real-time Flight Monitoring	●	●	●	●	●	●	●
Flight Simulation		●	●	●	●	●	●
One Key Takeoff (WKM)					●	●	●
Joystick / Keyboard Mode		●	●	●	●	●	●
One Key Go Home			●	●	●	●	●
Click Go Mode			●	●	●	●	●
Waypoints Editing				● 200 Waypoints		● 5 Waypoints	● 50 Waypoints
Automatic Takeoff & Landing				●		●	●
F Channel Controller				●		●	●
General Purpose Servo Action				●		●	●
Six Route Templates				●		● No photogrammetry Tool	●
Photogrammetry Tool				●			●

In Box

Wireless Data-link Ground End ×1

It connects to your computer. Computer sends commands and receives flight data through it.



Wireless Data-link Air End 900MHz ×1 or 2.4GHz ×1

It connects to DJI autopilot system. Autopilot system sends flight data and receives commands from computer by it.



Ground Station Install CD×1

It contains Ground Station and all required software installation files.



USB Cable ×1

For connection between wireless data-link ground end and computer.

4-Pin Cable ×1

For connection between wireless data-link air end and autopilot system.

Warranty Card ×1

It recommends the necessary conditions for using this system and related safety issues. Please fill out the customer & information card and return to DJI to register your product warranty.

Contents

- Disclaimer - 2 -
- Profile..... - 2 -
- In Box..... - 4 -
- Contents..... - 5 -
- Matters Need Attention..... - 6 -
- Connection..... - 7 -
- Ground Station Software - 8 -
 - Install Software..... - 8 -
- Start Software - 9 -
- Application - 9 -
 - Control Mode Switch - 10 -
- GUI - 11 -
- 1 View Mode - 14 -
 - 1.1 View Mode Procedures..... - 14 -
 - 1.2 System Setting - 14 -
- 2 Joystick/Keyboard Mode..... - 18 -
 - 2.1 Simulator..... - 18 -
 - 2.2 One Key Takeoff - 19 -
 - 2.3 Joystick and Keyboard Mode..... - 20 -
- 3 Click Go Mode..... - 22 -
- 4 Waypoint(Single Waypoint User Skip This) - 24 -
 - 4.1 Waypoint Mode - 24 -
 - (I) Flight Mission Setting - 27 -
 - (II) Upload Flight Mission..... - 31 -
 - (III) Take off Aircraft..... - 31 -
 - (IV) Switch to Autopilot Mode - 31 -
 - (V) GO!! - 32 -
 - 4.2 Auto Takeoff and Landing..... - 33 -
 - 4.3 F Channel Controller - 34 -
 - 4.4 General Purpose Servo Action (GP-Servo Action) - 35 -
 - 4.5 Six Pre-Programmed Route Templates..... - 37 -
 - 4.6 Photogrammetry Tool..... - 38 -
- Appendix - 39 -
 - List of Ground Station Shortcut Keys - 39 -
 - Troubleshooting - 40 -
 - Data-link LED Introduction..... - 43 -
 - Wireless Data-link Specification..... - 44 -

Matters Need Attention

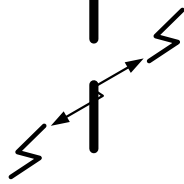
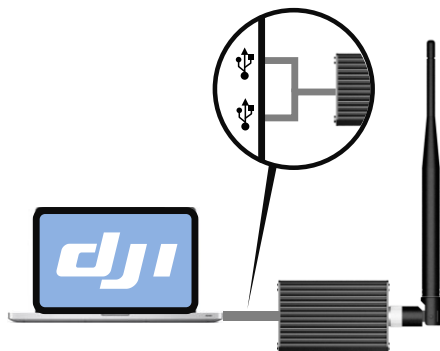
1. The ability of penetrating of radio signal from 2.4GHz wireless data-link is weak; please make sure the antenna of it is always visible to the ground end during the flight. Human body, trees, buildings or hills will stop the communication between air end and ground end.
2. You'd better put the ground end at high place. This can guarantee a good communication range.
3. Make sure the antenna head of air end is erect down, and the antenna head of ground end is erect up. Make sure there is no obstacle between antennas; otherwise the communication range will be reduced.
4. Ground end Link-Alarm red light on is distance alarm, red light off is safe. When it is on, you'd better return your aircraft.
5. When ground end Link-Alarm green light is off, this indicates the communication between ground end and air end is off, whatever the state of red light.
6. Make sure the driver is installed correctly.
7. Please choose the right com port.
8. Check out the power supply of wireless data-links before use.
9. Please close the DJI assistant software before open the ground station. Otherwise there will be port conflict.
10. Make sure the distance between 2.4GHz ground end and air end is over 1.5m; the distance between 900MHz ground end and air end is over 5m.
11. Use the right cable for connection.
12. High voltage servos & FBL systems can drain the flight battery fast. Please make sure your flight pack is sufficient for the flight time intended.
13. About control modes (Manual, Atti., GPS Atti., GPS Cruise), please refer to *ACE Control Modes* in *ACE Waypoint User Manual* and *WKM Control Modes* in *WKM User Manual*.
14. Autopilot Mode (auto mode) means: GPS Atti. or GPS Cruise Mode in ACE; GPS Atti. Mode in WKM.

If you have any problem you cannot solve during installation and usage, please contact our customer service.

Connection

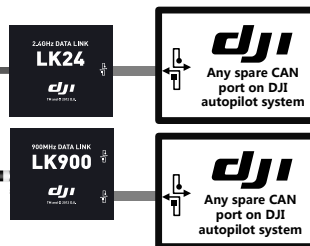
⚠ Ground End

- You should have a DJI Ground Station installed laptop.
- Use the USB cable supplied by us to connect the ground end to you laptop. One end of the USB cable has two heads, make sure both of them are plugged into your laptop.

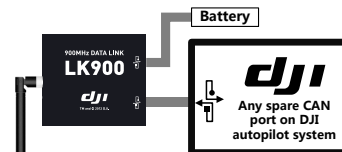


Antenna Head

Normal connection with ACE, WKM autopilot system



ACE autopilot, low voltage servo and 900M data-link connection



⚠ Air End

- 900MHz wireless data-link has two CAN ports. When you use it with ACE autopilot system and low voltage servo, you should connect one CAN port to spare CAN port on autopilot system, and connect another one to a battery whose output voltage is in the range of air end working voltage.
- 2.4GHz wireless data-link has only one CAN port.
- Usually connecting one CAN port on air end to any spare CAN port on DJI autopilot system is enough.
- WKM user should use it with PMU.
- High voltage servos & FBL systems can drain the flight battery fast. Please make sure your flight pack is sufficient for the flight time intended.
- Make sure the antenna head of air end is erect down, then you can have the largest range.

Ground Station Software

Install Software

- Operating system requirement: Windows XP(Needs to install sp2 patch), Vista, 7 (32-bits, 64-bits, basic version needs to install sp3 patch);
- Adobe® Reader® is required for user manual reading;
- Please follow the following install procedure strictly to install all required software.



Insert the CD to CD-ROM, auto-run window will appear.

- STEP1:** Check if .Net Framework 3.5 has been installed. If not, click **Install .Net Framework 3.5** to install. If yes, go to step 2.
- STEP2:** Check if Internet Explorer 8 has been installed. If not, click **Install Internet Explorer 8** to install. If yes, go to step 3.
- STEP3:** Click **Install Google Earth Plugin For DJI** to install Google Earth.
- STEP4:** Click **Install GS Radio USB Driver** to install driver.
- STEP5:** Click **Install DJI Ground Station** to install GS.
- STEP6:** Click **Exit** to finish installation.

Start Software



Start Window

(1) Start the Application of GS

- 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.

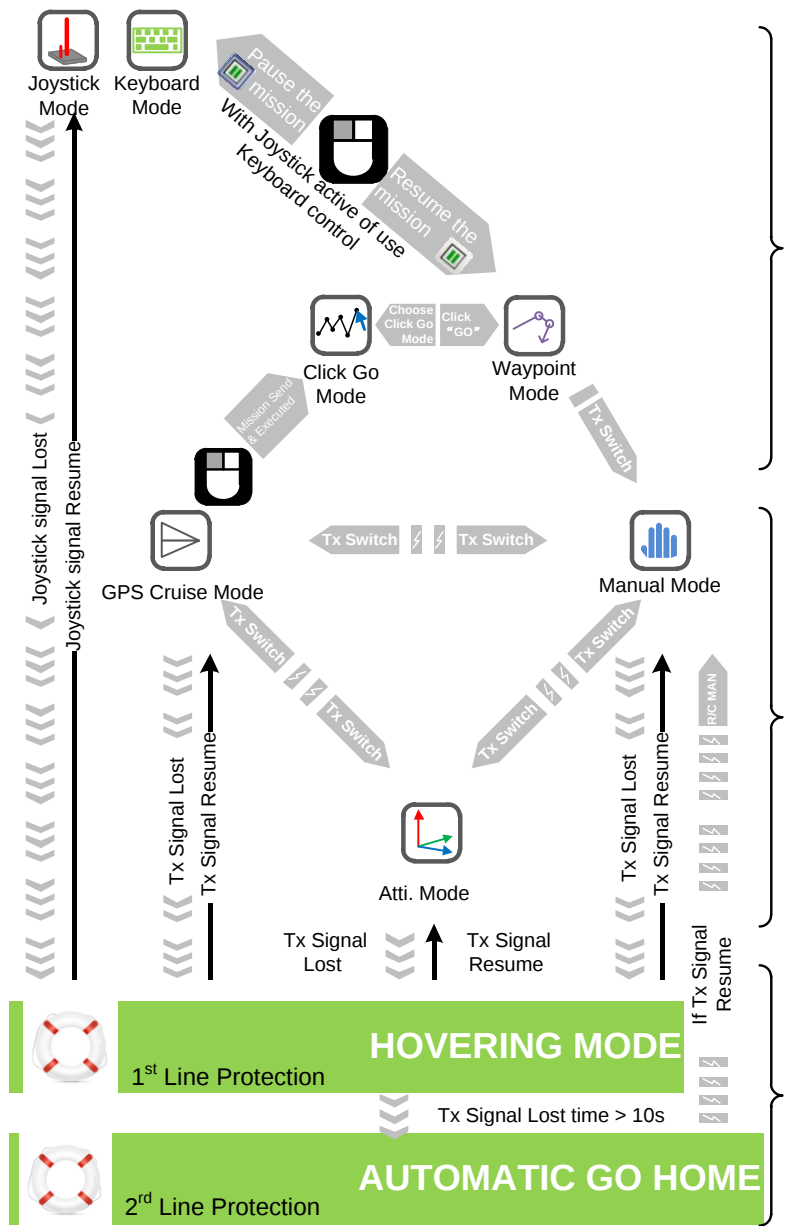
(2) Connect to Main Controller

- Click **Connect** button on the upper right corner to connect to DJI autopilot main controller.
- If errors are showed, it means there may be some problem on connection, please check.



Application

Control Mode Switch



GUI



GUI Instruction

1. Joystick:

- **Stick**: Choose your input equipment.
- Choose **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.
- **Action Config**: General purpose servo action configuration.
- **Photogrammetry Tool**: Photogrammetry toolbox.

3. Sys_set→Options:

- **Basic Setting**:
 - Sound: Turn on or off the sound.
 - Instrument Board Style: Choose different style of the Instrument Board.
 - Action Setting: Action number display interval.

- Pause Mode Control Interval: Frequency of data packages sent to MC.
- Target Line: Line between aircraft and current target.

→ **Data Link Setting:**

- The waypoint number of one package.
- Upload one package.
- Retry one package timeout.

Sys_set → **Altitude offset:** Set up the altitude offset.

- Height: Height mode.
- Elevation: Elevation mode.

Sys_set → **Data Record Folder:** Include both **Log** and **Mission** Folders, for saving log files and flight route files.

4. **Language(语言):** 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. **Fly Trace:** Click to show the trace of aircraft.

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

9. **Map Details:** Click to see map details.

10. **Instrument 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 aircraft will continue the remaining (Unfinished) mission.

13. **Pause:** Mission pause.

14. Serial port selection.

15. **Connect:** Click to connect to main controller.

16. **Aircraft:** Click to find aircraft location.

17. Real-time coordinates of aircraft, you can copy the data.

18. **One Key Takeoff:** Click to take off the aircraft.

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

20. Real-time coordinates of home location, you can copy the data.

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

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

23. To show **Real mode** or **Simulation mode**.

24. **Signal strength**: Shows the connection state between controller and ground station.

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

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

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

28. Other state parameters: The autopilot system decides.

→ **WKM:**

- **MotorVoltage**: Battery voltage.

→ **ACE:**

- **ServoVoltage**: Servo output voltage.
- **Pitch%**: Real-time pitch percentage.
- **Throttle%**: Real-time throttle percentage.

29. Download and upload progress bar.

30. **Cancel**: Cancel button.

1 View Mode

1.1 View Mode Procedures

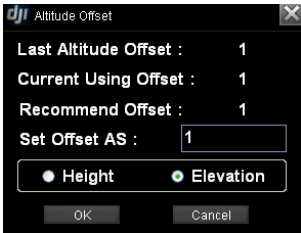
- STEP1:** Check Signal Strength:  shows no communication between GS and MC, please check *Troubleshooting in Appendix*.  is constructed, can go to next step.
- STEP2:** **Aircraft**: When **GPS** signal is good enough, click **Aircraft** will show **LATI**, **LONGI** and **ALTI** of aircraft, then the aircraft logo will be showed on the map; if the aircraft logo can't be found, please double click **Aircraft**.
- STEP3:** **AltitudeOffset**: Click **AltitudeOffset** from **Sys_set**, you can just use the value recommended, and click **OK**. Read the paragraph below to get more details.
- STEP4:** Switch **Height** or **Elevation** Mode: **Height** mode shows relative height, and the 0 meter is the aircraft height when you choose Height mode, above 0 is positive and below 0 is negative. **Elevation** mode shows height above sea level, figure is showed in Fig②
- STEP5:** **Home Point**: Home point can be found only when **GPS** signal is good enough. If WKM, Home Point is 20 meters above the aircraft position where user pushes the throttle stick first time; while ACE is 30 meters.
- STEP6:** View **Fly Trace**, **Instrument Board** and State Information: For displaying flight track and aircraft state. Contents are decided by autopilot system. Fig①A will be displayed if you are using WKM; Fig①B will be displayed if you are using ACE. **Instrument Board** is showed in Fig③.



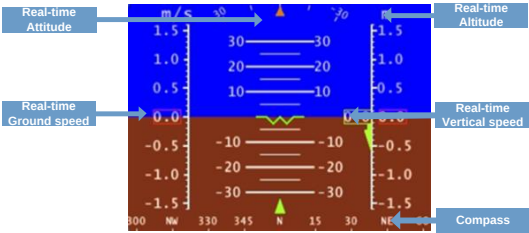
Fig①A WKM



Fig①B ACE



Fig②



Fig③

1.2 System Setting

System Setting includes **Options** Setting, **Altitude Offset** Setting and **Data Record Folder**.

(1)Options

Tips:

Click **DEFAULT** to retrieve default parameters.

The **Options** setting includes both **Basic Setting** and **Data Link Setting**.

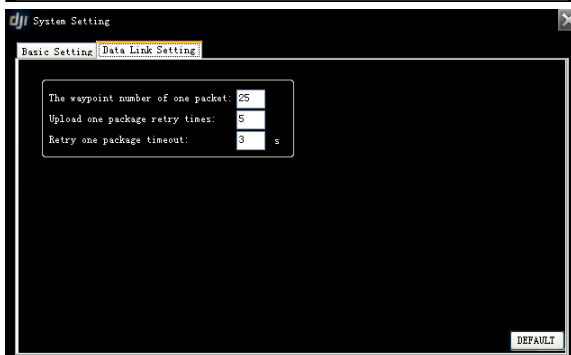
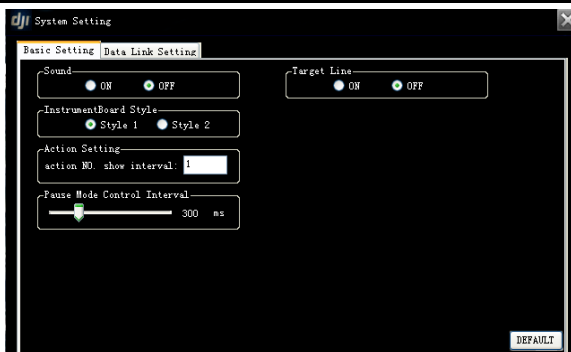
Basic Setting

- **Sound**: If switch **on**, there will be alarm sound when the radio signal is bad.
- **Instrument Board Style**: Choose different instrument board style.
- **Action Setting**: Set action number display mode. For example, 3 means that a mark will be displayed every three action intervals.
- **Pause Mode Control Interval**: Time interval of sending commands to the MC when use joystick or keyboard in pause mode, the smaller interval, the more fine control.
- **Target Line**: Display a line between aircraft and current target when switch **on**.

Data Link Setting

Setting parameters for the communication between MC and GS. Usually just keep **DEFAULT** parameters.

- **The waypoint number of one package**
- **Upload one package retry times**
- **Retry one package timeout**

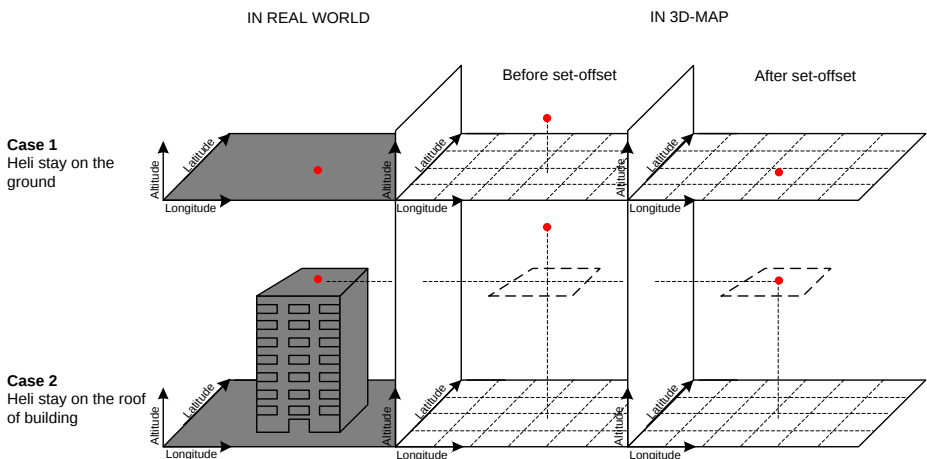


(2)Altitude Offset Setting

- GIS database (Google Earth™) is not precise, while 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.
- Pressure sensor is used for altitude sensing, leading 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 aircraft altitude before take-off, as L_{Ground}
 - 2) Way point altitude = Relative Flight Height + L_{Ground}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 Case 1 in fig.① shown below. The aircraft 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 aircraft 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 aircraft 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.

Tips:

We highly RECOMMEND you to consider the relative flight height discussed during flight mission editing.



(3)Data Record Folder

- **Log** Folder: Ground Station data recording function which is for recording all data transmitted and received by radio module. You can open the log files in this folder by notepad. You can send the log files to DJI customer service for analysis if you have any usage problems.
- **Mission** Folder: Auto saves each flight route. You can open these files by **Editor**.

2 Joystick/Keyboard Mode

Joystick/Keyboard mode is the 2nd permission for users, and Fly Simulation, One Key Takeoff and Joystick/Keyboard functions can be operated.

2.1 Simulator

Pre-Flight Simulation aims to help you getting familiar with the Ground Station software. A successful flight under simulation mode does not guarantee your aircraft to work successfully in real world, since it is only a virtual environment based on the assumption that your aircraft is working under perfect condition with infinity power supply, favorable weather, and also that the GIS & GPS are providing 100% correct and precise information. The aircraft physical model in simulator might not perform the same flight characteristic as your real aircraft.

Notices:

ENSURE the following requirements whenever during/before Simulation Mode:

- 1) You MUST NOT take off your aircraft.
- 2) You MUST NOT turn on your aircraft engine/motor.
- 3) You CAN disconnect the power supply for electric motor, or disconnect the throttle control servo motor for fuel engine. Otherwise, incorrect operation could result in serious personal injuries.

Please follow the steps strictly for Simulation Mode use:

- | | |
|--------------|--|
| STEP1 | Connect the whole main control system completely, including IMU、GPS, etc. |
| STEP2 | Hold <u>Ctrl</u> then <u>Right click</u> , you will see <u>simulate</u> and the aircraft logo will be at the current mouse position. |
| STEP3 | Click <u>simulate</u> , you will see a "Warning" window. |
| STEP4 | Click <u>Yes</u> to turn on <u>Simulate Mode</u> . Now GS is in <u>Simulate Mode</u> !!! |

Notices:

- 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.
- The simulation model requires a complete main control system connection, and you can reference to *Assembly* in DJI autopilot system user manual.

2.2 One Key Takeoff

Notices:

One key takeoff is a function especially for WKM, that can be used only in autopilot mode and when GPS signal is good.

Messages may be showed as follows:

Successful takeoff message

"The aircraft is auto Takeoff!"

Error messages

"Auto Takeoff failure, GPS is not ready!"

"The aircraft is Takeoffing!"

"Auto Takeoff failure, the aircraft is already flying!"

"Auto Takeoff failure, please switch to auto mode!"

2.3 Joystick and Keyboard Mode

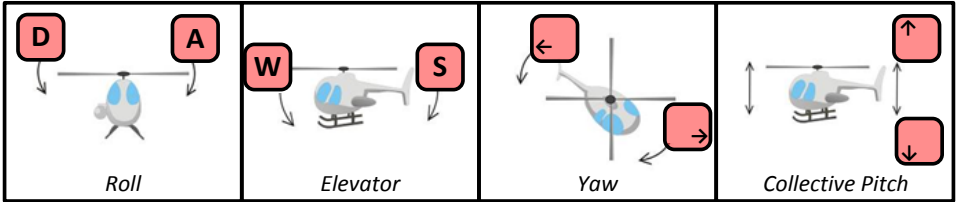
Please ensure GPS signal is good enough, the aircraft is already flying in air, and the control mode is autopilot mode; then click **Pause**, choose joystick or keyboard mode, Fig.① shows that keyboard is chosen, and then you can use keyboard control the aircraft.



Fig①

Keyboard Mode

Use keys **W**, **S**, **A**, **D**, **I**, **J** and **←**, **→** to control the aircraft. **A**, **D** for Roll, **W**, **S** for Pitch, **←**, **→** for Rudder and **I**, **J** for Throttle. For example, use helicopter to be aircraft model, shown as Fig.②.



Fig②

Joystick Mode

→ 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 (Fig③).

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.



Fig③

→ Technology Requirements

- At least 4 linear control channels are necessary; otherwise the joystick function will not work properly.
- Use USB connection.

→ Connection

Joystick → Choose Joystick

Refer to the user manual of the specific controller / Joystick you choose, and ensure the USB cable is properly connected.

Notices:

Please **ENSURE** the Joystick is properly connected physically, do not disconnect the joystick connection when Joystick Mode is activated.

→ Calibration

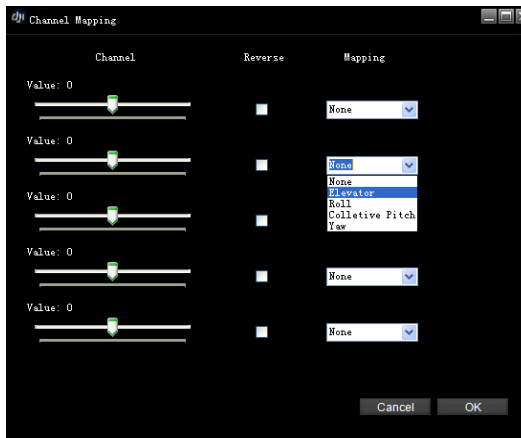
Joystick → Calibration

Steps	Joystick (Type1)	Type1	Type2
Step 1		Place all trim levers (for physical fine turning) in their neutral, or centered position. Click Next .	For Type 2 controller, might not have these physical fine turning levers. Click Next .
Step 2		Center all the sticks. Click Next to continue.	Center all stick including throttle stick. Click Next to continue.
Step 3		Move all sticks through their motion range completely several times. When completed, click Finish .	Move the sticks through their 3D motion range completely several times, including pitch. When completed, click Finish .

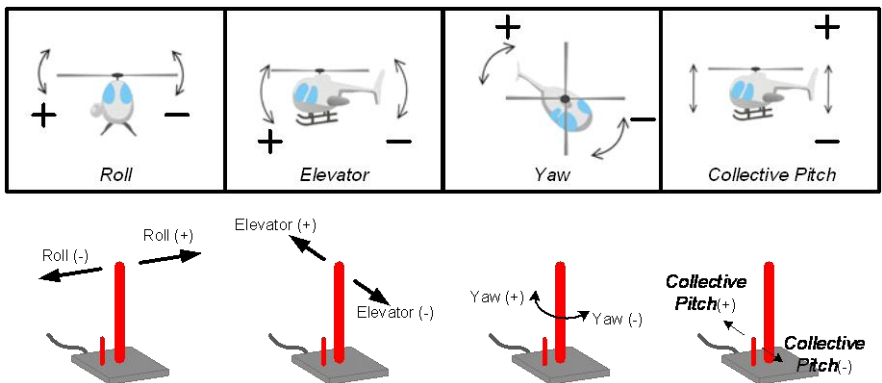
→ Channel Mapping

Joystick → Channel Mapping

- Each control channel can be reversed, and mapped to one of the control functions listed in corresponding drop down boxes.(Fig①)
- These control function are 'Roll', 'Elevator', 'Yaw' & 'Collective Pitch', they represent the cyclic and rudder control of your aircraft. use helicopter for example, shown in the figures below(Fig②). Where the '+' represents positive channel value, '-' represents negative channel value.
- Push your joystick, and the channel value feedback will tell whether it matches with suggested joystick control direction or your own settings, and then make your adjustments. For Type 1 controller, please refer to the controller's manual.



Fig①

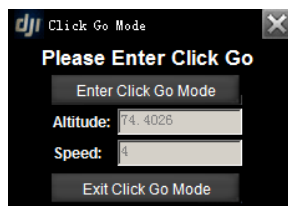


Fig②

3 Click Go Mode

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

- STEP1:** Please ensure GPS signal is good enough, the aircraft is already flying in air, and the control mode is Autopilot Mode (ACE is **GPS Atti** or **GPS Cruise Mode**, WKM is **GPS Atti. Mode**).
- STEP2:** Click **ToolBox** → **Click Go Mode** to open the window as the figure shows.
- STEP3:** Click **Enter Click Go Mode**. Now the aircraft will go into hovering station.
- STEP4:** Input the waypoint Altitude and aircraft Speed.
- STEP5:** Hold the **Space key** on the keyboard, move the mouse in the 3D map, **left click** to set the waypoint. Then the aircraft will fly toward this waypoint immediately. You can also set a new waypoint during the flight.
- STEP6:** Click **Exit Click Go Mode**, the aircraft will hover again.
- STEP7:** Click **CONTINUE** button to continue the previous flight.



Notices:

- The aircraft will go into hovering station while the MC isn't receive a heartbeat package from the GS in 5 seconds;
- The aircraft will go into auto go home while the MC isn't receive a heartbeat package from the GS in a minute.

Tips:

When in the **Click Go Mode**, all Tx control sticks are disabled. To regain control using the Tx, flip the mode switch to **Manual mode**, and then to other control modes (ACE: **Atti**, **GPS Atti**, or **GPS Cruise mode**; WKM: **Atti**, **GPS Atti**).

4 Waypoint(Single Waypoint User Skip This)

Waypoint package includes Waypoint Mode, Auto Takeoff/Landing, F Channel Controller, General Purpose Servo Action, 6 Pre-Programmed Route Templates and Photogrammetry Tool.

4.1 Waypoint Mode

See the flow chart to get the information about Waypoint mode operation.



Mission Editor



Instructions

- 1) **LOG** to print info. Such as: upload success, upload failed...
- 2) **Waypoint list**: You can click icon **+** before **Editing Mission** to show all waypoints in the table.
- 3) You will see **Mission properties** if **14** selected.

→ Mission properties

- **MissionTimeLmt**: If the flight-time exceeds the value (≥ 60 sec), it will go home automatically.
- **Route**: The mission execution mode selection: includes both modes of **Start_to_End** and **Continuous**.
- **StartWayPoint**: Define the first way point that the aircraft goes to after clicking **GO**. Select the proper way point index number listed.
- **VerticalSpeedLimit**: Vertical speed for up or down direction, unit is m/s.

→ Set Mission properties

- **SetAllWPsAlt**: Set altitude of all waypoints.
- **SetAllWPsSpeed**: Set speed of all waypoints.
- **SetAllWPsTurnMode**: Set turn mode of all waypoints: **StopAndTurn**, **Bank_turn**, **Adaptive_Bank_Turn** and **None**.
- **SetAllAction**: Setup the parameters of a set 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 **left click** on the map. Or **left click** on the map with **Ctrl**. Click **-** to delete the selected points.
- 7) **Clear**: Click the **Clear** button to delete running mission or editing mission on the map.
- 8) **Save** and **Open** the mission.
- 9) **Cancel** all edited waypoints.
- 10) **Upload** the mission to Main Controller.
- 11) Click **Go** to execute assigned mission, including Auto Take off as assigned.
- 12) Show Waypoint properties. Any item in **Editing Mission** selected 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 is limited to ≤ 25 m/s.

→ **HeadingDegree**: Heading degree facing this way point, unit in degree.

→ **HoldTime**: The time to stay at this waypoint, 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.

15) Set the editor box transparent.

16) Set the editor box size.

(I) Flight Mission Setting

STEP1: Click  to open the mission editor, see fig.①.

STEP2: Click **New** to edit a new mission.

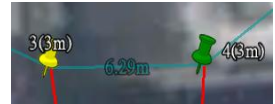
STEP3: Add waypoints.



Fig①

→ Add waypoints

There are two ways on adding waypoints. A maximum of 200 waypoints can be added in the ACE waypoint mode, and a maximum of 50 waypoints can be added in the WKM waypoint mode. If selected, the waypoint will change to be green, see fig.②.



Fig②

(1)Add Point by Point

STEP1: Click , or press **Ctrl**.

STEP2: **Left click** on the 3D-Map where the locations you want to add a waypoint.

Tips:

Repeat above procedure if you wish to add more new waypoints. 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** with **Left click**.

(2)Using Relative Coordinates Editor

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

STEP1: Select one waypoint, then press **Shift+F** you will see the input window shown as fig.③.

STEP2: Use **Tab** to switch between these two input frames.

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.

Angle (degree):	0
Distance(meter):	0
OK CANCEL	

Fig③

→ Delete Way Points

STEP1: Select waypoint either in map or in **Editing Mission** Menu, and the selected waypoint is in green;

STEP2: Click  or press **delete** to delete all the waypoints added.

Tips:

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

→ Waypoint Properties Editing

Select the way point in 3D-Map or in the **Editing Mission** Menu. See figure as following, **Altitude**, **TurnMode**, **Forward Flight Speed**, **HeadDegree** and **HoldTime** can be set, then press **Enter** to confirm.

1. Way point properties

Latitude	22.528799057006836
Longitude	113.93341827392578
Altitude	3
TurnMode	StopAndTurn
Forward Flight Speed	4
HeadDegree	360
HoldTime	3

(1)

(2)

(3)

(4)

(5)

(1) Altitude

The altitude (unit m), if pointed to **height** mode, means relative height; otherwise **altitude** mode means the waypoint altitude.

- Edit the altitude of each waypoint by clicking the **+1 +10 -1 -10**
- Type in the precise altitude in the box.

(2) TurnMode

There are three different turn modes for the aircraft at each waypoint: **StopAndTurn**, **Bank_Turn** and **Adaptive_Bank_Turn**. The default turn mode in the system is **StopAndTurn**. Change it according to the following steps.

The **Hold Time** in waypoint property is deactivated if **Bank_Turn** or **Adaptive_Bank_Turn** is chosen.

- Make a selection from the drop down box after **TurnMode** for mission execution mode.

(3) Forward Flight Speed

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

In Waypoint Mode, the default speed is 4m/s, and the maximum speed allowed is 25m/s.

- Type in the precise **Forward Flight Speed** in the box.

(4) HeadDegree

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

- Input the degree value in the item.
- **Right click** waypoint and hold on, then move wheel or press **↑**, **↓** to change head degree.

(5) HoldTime

Sets the time to stay in a particular waypoint, not for **Bank_turn**, only for **StopAndTurn** (In second).

- Type in the time to stay in a waypoint after the **TimeHold** in the box.

→

Mission Properties Editing

Click `Editing Mission` and the `Mission properties` figure shown as following. Please set `MissionTimeLmt`, `Route` selection, `StartWayPoint`, `VerticalSpeedLimit` and `Set Mission properties`, and press `Enter` to confirm.

□ Mission properties

MissionTimeLmt65535

RouteStart_to_End

StartWayPoint0

VerticalSpeedLimit1.5

□ Set Mission properties

SetAllWPsAlt

SetAllWPsSpeed

SetAllWPsTurnModeNone

SetAllAction=====>

(1)

(2)

(3)

(4)

(5)

(1) MissionTimeLmt

If the aircraft's flying time exceeds the value, it will go home automatically. (Default value is 65535sec. Min value is 60sec, Max value is 65535sec.)

●

Type in precise time in the box after `MissionTimeLmt`.

(2) Route

Selection route modes: `Start_to_End` or `Continuous`.
`Start_to_End`: execute once from start point to end point; `Continuous`: repeat from start point to end point. (Default setting is `Start_to_End`.)

●

Make a selection from the drop down box after `Route` for mission execution mode.

(3) StartWayPoint

Setting for start waypoint from the existing waypoint indexes. (Default start waypoint is 0.)

●

Make a selection from the drop down box after `StartWayPoint` from the existing way point indexes.

(4) VerticalSpeedLimitSetting

This Speed limit is the absolute velocity of aircraft in vertical direction, up or down (Unit in m/s). The default vertical speed limit is 1.5m/s and the maximum speed allowed is 5.0m/s.

●

Type in the precise speed in the box after `VerticalSpeedLimit`.

(5) Set Mission properties

● SetAllWPsAlt

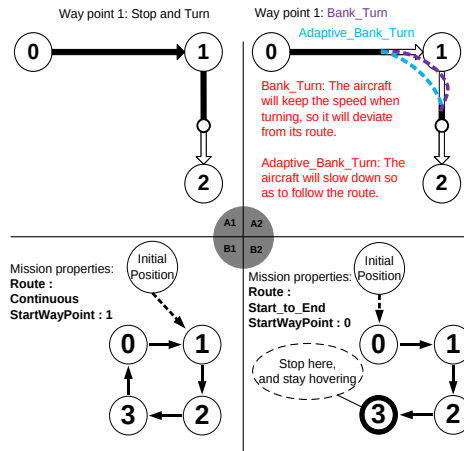
● SetAllWPsSpeed

● SetAllWPsTurnMode

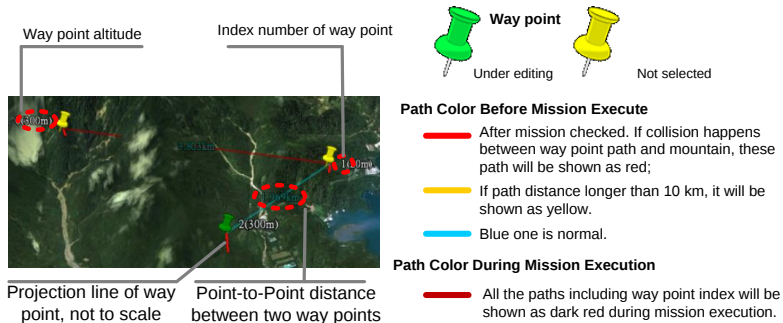
● SetAllAction

The properties setting above, once set, then all the destinations will change and be the same; if a single waypoint's properties are set individually, then the corresponding waypoint properties will change.

- ◆ **Examples for Way Point turning mode:** Shown as figure A1/A2 as following.
- ◆ **Examples for Mission/Way Point properties setting:** B1/B2 Selection for the state of Route, and StartWayPoint.



- ◆ **Examples for path of way point:**



➔ Mission Save & Load

Mission Save

STEP1: Click SAVE to save mission edited.

STEP2: Choose a name with extension '.awm'. For Example: DJI_Mission_20100101.awm.

Mission Load

STEP1: Click OPEN to load mission saved; choose mission file with extension '.awm'.

Notices:

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

(II) Upload Flight Mission

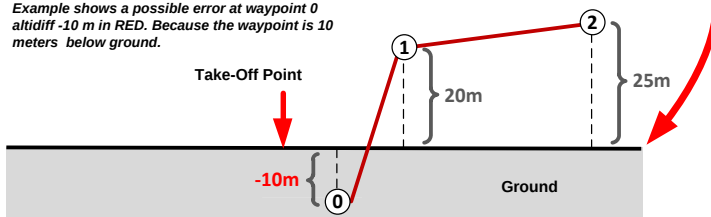
Final Check & Mission Transmitting: Click **UPLOAD** on the upper bottom of the mission **Editor** to send flight mission to DJI autopilot main controller. Here a mission review table as following example will appear for mission final check. Press **OK**. The mission is ready to be executed after synchronized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

Example of “Mission Review” table under 3 waypoints mission

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

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

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



Tips:

After synchronization, if mission is re-edited, you should re-do the synchronization.

(III) Take off Aircraft

After finishing all the above steps, take off the aircraft in one of three takeoff modes. If you want to use Auto Takeoff and Landing function, please skip the step III and go to Step IV directly. You can take off your aircraft in **Manual Mode**, please hover it at a suitable height.

(IV) Switch to Autopilot Mode

Switch to any autopilot mode on your TX. Ground station is able to control the aircraft only after switching to autopilot mode!

Notices:

Making sure sufficient GSP satellite signal is acquired.

Tips:

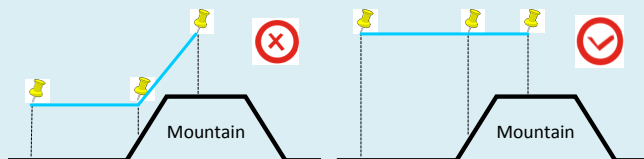
Refer to *DJI Autopilot System User Manual* for **Manual**, **Atti**, **GPS Atti**, **GPS Cruise** switching of your autopilot system, and also the *Manual* of your R/C Transmitter (Tx).

(V) GO!!

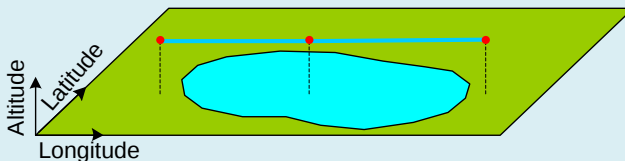
Click **Go** in the mission **Editor**, and the aircraft will fly automatically according to the path set in the flight mission.

Tips:

- Using **EDIT** to re-edit the mission, while a mission is in process. Please click **EDIT** in mission **Editor** to do so. Then the mission editor will return to the state explained in previous section **Flight Mission Setting**
- Using **PAUSE** to pause the mission, while a mission is in process. Please click **PAUSE**, and the aircraft will slow down and stay hovering. Click **CONTINUE** and the aircraft will resume the un-finished mission.



When you set the waypoints for the aircraft to climb a mountain, please make sure that you leave enough distance between the aircraft and the mountain, in order to avoid collision caused by aircraft air speed.



Please note that when you set a waypoint above water such as lake/sea/river, the default altitude the map shows will be at the bottom of the water body. Please be careful in setting altitude over water.

4.2 Auto Takeoff and Landing

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

Tips:

ACE users need to obtain Semi Auto Takeoff and Landing permission. **WKM** has this function built-in.

Auto Takeoff

Only after assigning or editing all waypoints, the mission is ready to take off.

STEP1: Place transmitter throttle stick to the lowest position. Otherwise, a tip The aircraft is on the ground, but the throttle is not in the lowest position, please do not switch to manual mode! will be shown.

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

STEP3: Press Gd command on the Editor, the aircraft main rotor will begin to spool up.

Notices:

Aircraft is ascending to waypoint altitude, please place throttle to mid-stick! This warning will go away after you place the throttle stick at mid-point, a safety feature in case you accidentally bump the mode switch to Manual mode or GPS Atti mode.

Auto Landing

After mission completing or the aircraft returning home, and the aircraft

hovers 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), T/T (Throttle) and ←/→ (Rudder) to navigate to decent landing zone, or allowing Ground Station automatically provided a landing zone is clear of any obstacles, in order to decent the aircraft.

Use one of the methods bellow to land the aircraft.

- (1) Click Auto landing, aircraft will auto land then stop engine by itself. In the latter situation, to terminate auto landing, please press ↑ or ↓, or deselect the keyboard control button  → .
- (2) Use ↓ to land the aircraft. After landing, keep holding ↓ until engine stops.

Notices:

Please press pause button and select keyboard mode, before auto landing operation.

4.3 F Channel Controller

Use Ground Station to customize the MC's F channel control, so that you can control the external payloads such as camera and gimbal.

- STEP1:** Click **ToolBox** → **F_ChannelControl**, the setup window shows as the follow figure.
- STEP2:** Click the small box beside channel name to choose the channels will be used.
- STEP3:** Click the button with letter, then **press key** shown and you need to choose a new control key on the keyboard.
- STEP4:** Setup the channel measuring range in the number boxes.
- STEP5:** Usually, the slide left endpoint 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.

Tips:

ACE supports F1, F2, F3 and F4;

WKM supports F1 and F2 only.

The screenshot shows the F_ChannelControl setup window. It contains four rows for channels F1, F2, F3, and F4. Each row has a checkbox, a channel name, a range box, a slider, a range box, a letter button, and a Reverse checkbox. The F1 channel is highlighted with a dashed box. Below the channels, there is a warning message and two buttons: 'Exit and Holding' and 'Exit without Holding'.

Channel	Checkbox	Channel Name	Range Box	Slider	Range Box	Letter Button	Reverse		
F1	☐	F1-	0	-1000		1000	G	F1+ ☐ Reverse	
F2	☐	F2-	0	Y	-1000		1000	H	F2+ ☐ Reverse
F3	☐	F3-	0	J	-1000		1000	K	F3+ ☐ Reverse
F4	☐	F4-	0	0	-1000		1000	L	F4+ ☐ Reverse

If F1, F4 channel can not be controlled, please check off Action Mode OnOff in the general pupose servo action config page.

Exit and Holding Exit without Holding

4.4 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 external devices. This feature allows DJI autopilot to operate your external devices automatically during basic aircraft waypoint mission.

GP-Servo Action Setting

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: For ACE, the GP-Servo uses the output channel F4 in the MC; for WKM, the GP-Servo uses the output channel F1 in the MC.

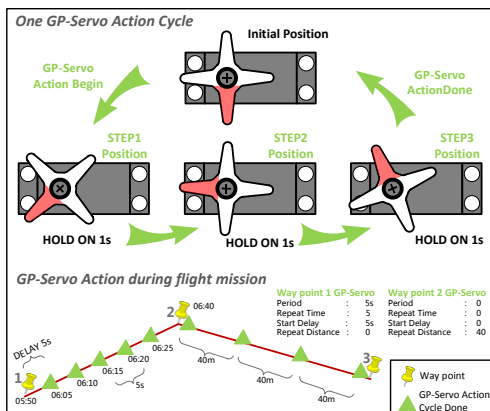
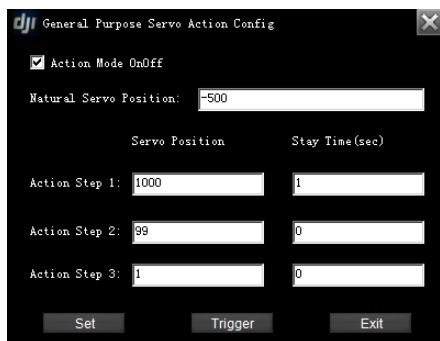
Notices:

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

The software aims to let you program four different servo positions, use servo for example.

- 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.

Please assign a default position for servo in natural status, and others 3 positions as well as the time to stay in such positions for servo to work as assigned. After all 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

Find and set the waypoint action properties according to the following procedures:

- STEP1:** Click , the Mission Status will show **Editing Mission** label upon the Mission **Editor**.
- STEP2:** Edit flight mission.
- STEP3:** Select the waypoint either in 3D-Map or in the **EditingMission** menu, and get **Waypoint** action, shown as Fig..
- STEP4:** Give the proper parameters explained in **Editor**: **Period**, **RepeatTime**, **StartDelay**, and **RepeatDistance**. Set **RepeatTime** and **RepeatDistance** zero to disable the GP-Servo Action.

Tips:

Use **SetAllActioninMission** 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 three waypoints, etc.

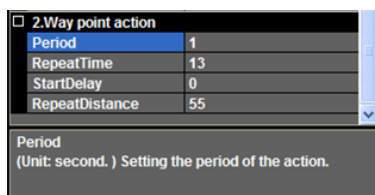


Fig. ①

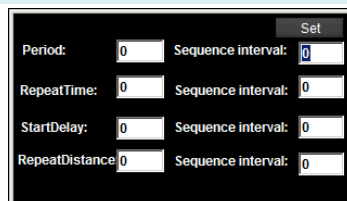


Fig. ②

4.5 Six Pre-Programmed Route Templates

Use one of the six Route templates to generate points automatically.

- STEP1:** Open the Template Form **Toolbox**→**Route Template** shown as Fig.①.
- STEP2:** Click **Add Area** button to add an area, shown as Fig.②.
- STEP3:** Choose the waypoint icon of the chosen area, and drag it to change the area size.
- STEP4:** **Left click** mouse to rotate the area, rotation 30 ° per click; click / to adjust the area rotation angle and rotation 0.1° per click, as Fig. ③ shown.
- STEP5:** Click one **Template** to generate waypoint(s), for example, choose **Scan**, as Fig. ④ shown.
- STEP6:** Click **Import to Edit List** to do template edit, for example, choose **Scan**, as Fig. ④ shown.

Tips:

- You can exchange and redo STEP3 and STEP4, until get an area needed.
- Dragging the waypoint icon also can move the area, and the chosen icon shows green.
- More than one area can be added; operation will effect on every chosen area, if more than one area is chosen.
- Left click mouse to choose or not choose an area, green area is chosen, and red is not.
- You need to choose the area if you want to delete it by click **Delete Area**.
- Click **Scan** button once or twice, the route waypoints will be assigned vertically or horizontally
- Mouse on **Param** shows parameter meaning, row numbers for **Scan** and points for others.
- You can set sea level at **Alti**, and ensure that the altitude is higher than the aircraft altitude.
- Edit waypoints after clicking **Import to Edit List** button
- 5 Waypoints station will not enable **Scan** mode.

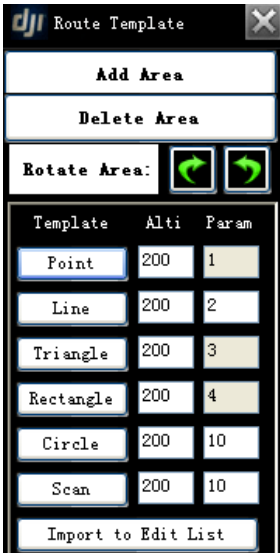


Fig.①



Fig.②



Fig.③



Fig.④

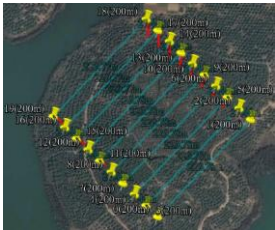


Fig.⑤

4.6 Photogrammetry Tool

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

Tips:

This tool is actually a functions combination. It simplifies the parameters setup procedure for the aerial photography.

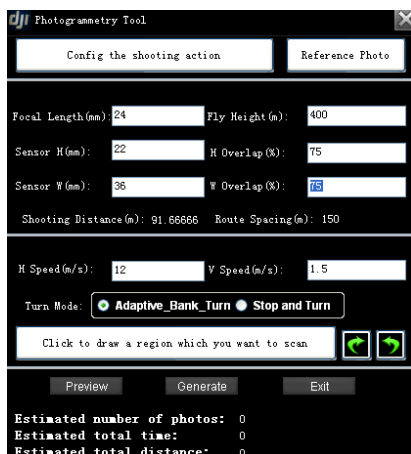


Fig.①



Fig.②

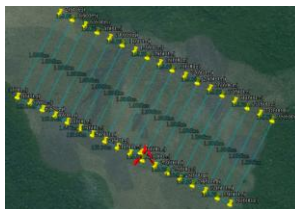


Fig.③

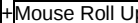
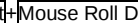
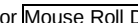
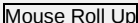
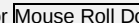
- STEP1:** Click **ToolBox**→**Photogrammetry Tool** to open the setting window, shown as Fig.①.
- STEP2:** Click **Config the shooting action** to setup the servo action for the camera shooting action, reference to section 4.4.
- STEP3:** Click **Reference Photo** to see if the camera is working as you want.
- STEP4:** Fill in the right **Focal Length**, **Sensor Height**, and **Sensor Width** according to the camera.
- STEP5:** Fill in the **Fly Height**, **H Overlap** and **W Overlap** as you like. **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 **turn 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, reference to section 4.5 to change the area.
- STEP9:** Click **Preview** to preview the mission plan, shown as Fig.②.
- STEP10:** If everything is OK, click **Generate** to generate all waypoints. Now you will have a flight mission generated automatically in the **Editor**, shown as Fig. ③.

Tips:

You can edit any waypoint in the Editor after generate all waypoints.

Appendix

List of Ground Station Shortcut Keys

Operation	Function
View Mode	
 	Up/Down/Left/Right to move the map
   	Up/Down/Left/Right to move the map
 	Up/Down/Left/Right to rotate the map
 +   + 	Left/Right to rotate the map
 +   + 	Up/Down to rotate the map
Double click  or 	Zoon In the Map
Double click  or 	Zoon Out the Map
Joystick/Keyboard Mode	
 + 	Start Simulator
Keyboard Mode	
 	Roll
 	Pitch
 	Throttle
 	Rudder
Keyboard Mode	
 + 	Set the Target Waypoint
Waypoint	
 + 	Add New Waypoint
Left click waypoint then  or 	Head Degree Setting
Left click waypoint then  or 	Head Degree Setting
Left click waypoint then then  + 	Open the Relative Coordinates Editor

Troubleshooting

Ground Station Launching Failure

→ Map loading failure and abort.

Solution:

Choose “run as administrator” when you right click the Ground Station icon in Windows 7.

→ In English version Windows XP, if customer cannot open the program and the following error is reported: system. Format exception.

Solution:

Start → Control Panel → Date, Time, Language and Regional Settings → Regional and Language Options → Regional Options (change to English), senior (change non-Unicode program language into English).

→ The earth map is not shown up when you launch the Ground Station.

Solution:

Try again or use Offline Mode.

→ If the Connect button is gray and can't be clicked after launch the Ground Station.

Solution:

Please take the following steps to uninstall the Google Earth plugin, Start → All Program → Google Earth → Uninstall Google Earth Plug-in, and then use the installation CD to re-install the Google Earth plugin for DJI.

→ Communication failure after click the Connect button.

Solution:

- Please choose the right COM port, and make sure that the driver is installed correctly.
- Make sure the transmitter and the receiver of the station are powered on.
- Make sure the transmitter and the receiver are matched; do not change the setup of switches on the radio station.
- Close the Assistant Software to avoid the port confliction.

Instrument Board Failure

→ The Ground Station launching failure when you click to open the instrument board; the reason is that your computer can't support the OpenGL.

Solution:

You may choose the Style2 (shown in Fig.①, ②) in System Setting → Options before you open the instrument board.



Fig①



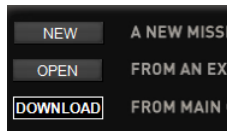
Fig②

Ground Station Software Crash

➔ Ground Station Software Crash will not affect the aircraft under mission execution. The aircraft 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, Aircraft tracks and Way points.

Solution:

Click on the DOWNLOAD button, to retrieve the previously set way points from the DJI Autopilot main controller.



Launch Flight Failure

➔ Aircraft doesn't execute mission after click on GO.

Solution:

- If aircraft is in the air, please ensure it is in Autopilot Mode, and there is no need to set center position.
- If aircraft is on the ground and does not takeoff, please use Assistant Software to setup the center position and the throttle servo working range.
- If Auto Takeoff fails, you may take off the aircraft and then land manually in autopilot mode, then wait until throttle cut off automatically; or reboot the autopilot system to initialize the controller.

Action Usage Faults

➔ If there is no output change on F4 channel when click on the Trigger in the Action Setting window after connect to main controller.

Solution:

- Please ensure the receiver has been connected.

- Please ensure it is under the Autopilot Mode or Waypoint Mode.
- The action will not be valid unless the value of **hold time** is more than one second.

When Wireless Data-Link Doesn't Work

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

Solution:

- Make sure radio driver have been installed.
 - 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 2.4GHz wireless data-links should be longer than 1.5 meters; the valid communication distance between 900MHz wireless data-links should be longer than 5 meters.
-

Data-link LED Introduction

	Function	Introduction
Ground End		
 LINK-ALARM	Distance Alarm	Light on indicates distance warning.
 LINK-ALARM	Network Light	Light on indicates communication is on with air end.
 DATA-POWER	Power Light	Light on indicates working well.
 DATA-POWER	Data Light	Light flash indicates data transmit and receive.
Air End		
 Link	Data Light	Light on indicates communication is on.
 Power	Power Light	Light on indicates working well.
 TX	Transmit Light	Light on indicates data transmit.
 RX	Receive Light	Light on indicates data receive.

Wireless Data-link Specification

	2.4GHz	900MHz
Performance		
RF Data Rate	700kbps	100kbps
Indoor/Urban Range	≤500m	≤1Km
Outdoor/RF Line-of-Sight Range	≤3km	≤10Km
Transmit Power	130mW	1000mW
Receiver Sensitivity (1%PER)	-95dBm	-110dBm
Power Consumption	Ground end: 460mW	Ground end: 1600mW
	Air end: 460mW	Air end: 1500mW
Features		
Frequency Band	2.4GHz(2400MHz ~2483MHz)	900MHz(902MHz ~928MHz)
Serial Data Rate	115200 bps	115200 bps
Antenna Options	SMA	SMA
Operating Temperature	-40°C ~+85°C	-40°C ~+85°C
Operating Humidity	0~95%	0~95%
Size (No Antenna)	Ground end: 70x48x17mm	Ground end: 78x47.8x17mm
	Air end: 51x37x10mm	Air end: 73x42x10mm
Weight (Has Antenna)	Ground end: 55g	Ground end: 100g
	Air end: 20g	Air end: 60g
Power Requirement		
Supply Voltage	4.5V~12V	4.5V~12V
Transmit Current	220mA	1300mA
Receive Current	62mA	100mA
Regulatory Approvals		
FCC (USA)	Yes	Yes
IC (Canada)	Yes	Yes



Ground Station / Wireless Data-link

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