Ground Station Wireless Data-link User Manual

V 3.04

2015.05 Revision

Disclaimer

Thank you for purchasing product(s) in DJI Innovations. 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. DJI Innovations assumes no liability for damage(s) or injured incurred directly or indirectly from the use of this product.

As DJI Innovations has no control over use, setup, final assembly, modification (including use of non-specified DJI parts i.e. motors, ESCs, propellers, etc.) or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability. DJI Innovations assumes no liability for damage(s) or injured incurred directly or indirectly from the use of this product.

Google logo is a registered trademark of Google Inc. DJI is a registered trademark of DJI Innovations. Names of products, brands, etc., appearing in this manual are trademarks or registered trademarks of their respective owner companies. This product and manual are copyrighted by DJI Innovations with all rights reserved. No part of this product or manual shall be reproduced in any form without the prior written consent or authorization of DJI Innovations. No patent liability is assumed with respect to the use of the product or information contained herein.

Profile

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 flight control 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 ACE Single Waypoint, then you do not need to read section 4.4. Please refer to DJI flight control system manual for semi-auto takeoff and landing.

Production	ACE				WKM	A2	NAZA-M/ NAZA-M V2	Phantom 2
Product packages	View Mode	Joystick /Keyboard Mode	Single Waypoint	Ground Station	Ground Station	Ground Station	Ground Station	Ground Station
3D MapDisplay	●	●	●	●	●	●	●	●
Real-time Flight Monitoring	●	●	●	●	●	●	●	●
Flight Simulation		●	●	●	●	●	●	●
One Key Takeoff					●	●	●	●
Joystick / Keyboard Mode		●	●	●	●	●	●	●
One Key Go Home			●	●	●	●	●	●
Click Go Mode			●	●	●	●	●	●
Waypoints Editing				200 Waypoints	50 Waypoints	50 Waypoints	16 Waypoints	16 Waypoints
Automatic Takeoff & Landing				●	●	●	●	●
F Channel Controller				●	●	●	●	
General Purpose Servo Action				●	●	●	●	
Six Route Templates				●	●	●	●	●
Photogrammetry Tool				●	●	●	●	

In Box

Wireless Data-link Ground End ×1

It connects to your computer. Computer sends commands and receives flight data through it.
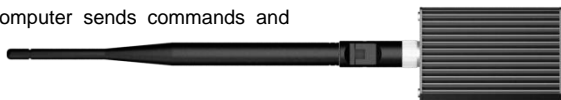
Wireless Data-link Air End 900MHz ×1 or 2.4GHz ×1

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

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 flight control 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 Innovations to register your product warranty.

Contents

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 *Control Modes* in *A2/WKM/ NAZA-M/NAZA-M V2/ Phantom 2 User Manual.*

14. Autopilot Mode (auto mode) means: GPS Atti. or GPS Cruise Mode in ACE; GPS Atti. Mode in A2/WKM/ NAZA-M/NAZA-M V2; Ready to fly in Phantom 2.

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

Connection

- You should have a DJI Ground Station installed laptop.
- Use the USB Cable supplied by us to connect the wireless data-link ground end to you laptop. One end of the USB cable has two heads, make sure the communication interface is plugged into your laptop. If the power supply is insufficient using one USB port, then plug the power interface Into the laptop also.

Communication Interface

Power Interface

DJI
Ground Station

Antenna Head

Normal connection with flight control system	ACE flight control system, low voltage servo and 900M data-link connection

2.4G-S DATA-LINK
LK24
dji

dji
⚙ Any spare CAN port on DJI flight control system

900MHz DATA-LINK
LK900
dji

dji
⚙ Any spare CAN port on DJI flight control system

Battery

900MHz DATA-LINK
LK900
dji

dji
⚙ Any spare CAN port on DJI flight control system

⚠ **Air End**

- 900MHz wireless data-link air end has two CAN ports. When you use it with ACE flight control 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 wireless data-link air end working voltage.
- 2.4GHz wireless data-link air end has only one CAN port.
- Usually connecting one CAN port on air end to any spare CAN port on DJI flight control system is enough. Note that A2 uses should use CAN2 port.
- 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 Wireless data-link 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, Windows 7,Windows 8 (32-bits, 64-bits, basic version needs to install sp3 patch);

- Visit the official DJI website to download and install the following software:

  1. Google Earth Plugin;
  2. Ground Station software (Install the .Net Framework 3.5 first, if installation is unsuccessful.);
  3. Driver Installer.

Start Software

(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

Joystick Mode

Keyboard Mode

Pause the mission

With Joystick active of use Keyboard control

Resume the mission

Choose Click Go Mode

Click "GO"

Click Go Mode

Waypoint Mode

Tx Switch

Mission Send & Executed

Joystick signal Lost

Joystick signal Resume

GPS Cruise Mode

Tx Switch

Tx Switch

Manual Mode

Tx Switch

Tx Switch

Tx Switch

Tx Switch

R/C MAN

Tx Signal Lost

Tx Signal Resume

Tx Signal Lost

Tx Signal Resume

Atti. Mode

Tx Signal Lost

Tx Signal Resume

If Tx Signal Resume

HOVERING MODE

1st Line Protection

Tx Signal Lost time > 10s

AUTOMATIC GO HOME

2rd Line Protection

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.
➔ NetWork Setting:
- GS VPN: VPN switch.

  ON: If ON is selected, the VPN auto connnect when you launch the GS.

  OFF: If OFF is selected, the VPN not auto connect when you launch the GS.

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 flight control system decides.

   ➔ **WKM/A2/NAZA-M/NAZA-M V2/Phantom 2**:
      ● 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

1. Check Signal Strength: [icon] shows no communication between GS and MC, please check *Troubleshooting* in *Appendix*. [icon] is constructed, can go to next step.

2. 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.

3. AltitudeOffSet: Click AltitudeOffSet from Sys_set, you can just use the value recommended, and click OK. Read the paragraph below to get more details.

4. 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

5. Home Point: Home point can be found only when GPS signal is good enough. If **WKM/A2/ NAZA-M/NAZA-M V2/Phantom 2**, Home Point is 20 meters above the aircraft position where user pushes the throttle stick first time; while ACE is 30 meters.

6. View Fly Trace, Instrument Board and State Information: For displaying flight track and aircraft state. Contents are decided by flight control system. Fig①A will be displayed if you are using ACE; Fig①B will be displayed if **WKM/A2/NAZA-M/NAZA-M V2/Phantom 2**. Instrument Board is showed in Fig③.

| GPS: weak | ATTI: good | MODE: gps cruise | ServoVoltage: 5.2 V | Pitch%: | 80 | Throttle%: 0 |

Fig①A **ACE**

| GPS: weak | ATTI: good | MODE: atti | MotorVoltage: 11.5 V | |

Fig①B **WKM/A2/NAZA-M/NAZA-M V2/Phantom 2**
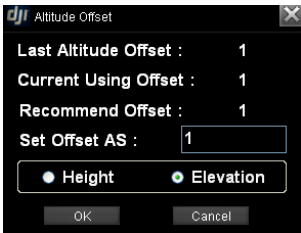
Fig②
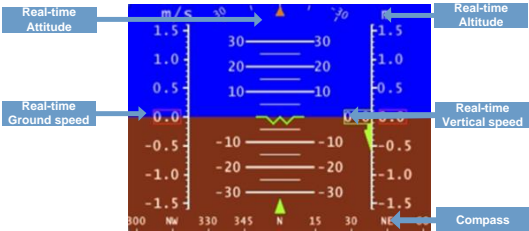
Fig③

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.

- UI Float Tips Show: If selected, the corresponding item(s) will real-time display in the main form. Voltage of ACE is Servo Voltage while WKM is Motor Voltage.

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
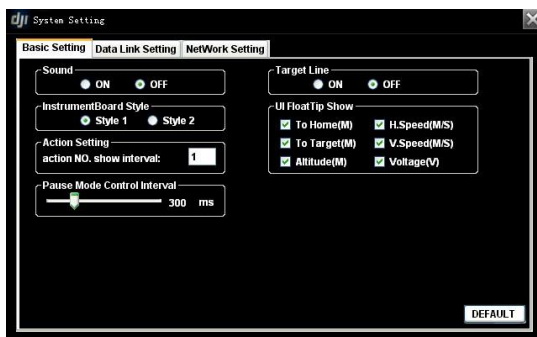
UI Float Tips with ACE

UI Float Tips with

WKM/A2/NAZA-M/NAZ

A-M V2/Phantom 2

(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_{Gound}
  2) Way point altitude = Relative Flight Height + L_{Gound}

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

- The Altitude Offset value given is only for the purpose to avoid visual confusion, such as 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.
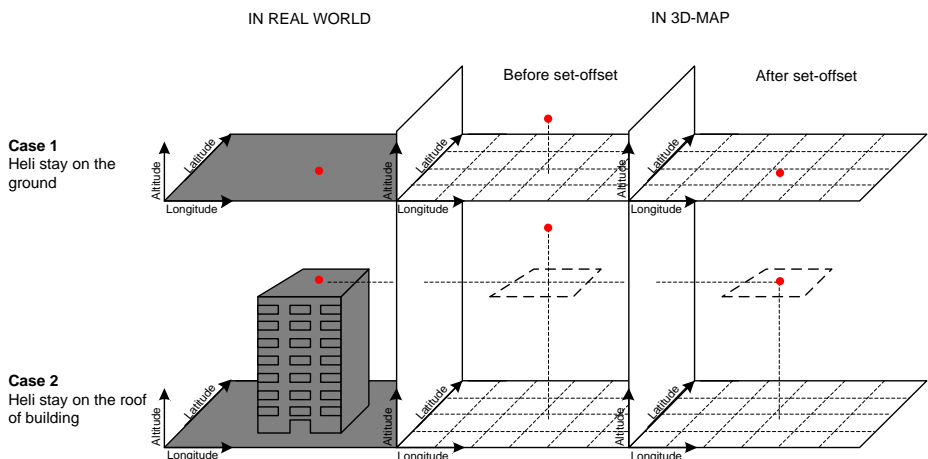
(3) Data Record Folder

- 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:

1. Connect the whole main control system completely, including IMU、GPS, etc.
2. Hold Ctrl then Right click, you will see simulate, and the aircraft logo will be at the current mouse position.
3. Click simulate, you will see a "Warning" window.
4. Click Yes to turn on Simulate Mode. Now GS is in Simulate Mode!!!

> **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 flight control system user manual.

2.2 One Key Takeoff

> ### Notices:
> One key takeoff is a function especially for **WKM/A2/NAZA-M/NAZA-M V2/Phantom 2**, 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, and drag the cursor to change roll, pitch and rudder control value, the higher the cursor, the bigger the control value.

Fig①

Keyboard Mode

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

| Roll | Elevator | Yaw | Collective Pitch |
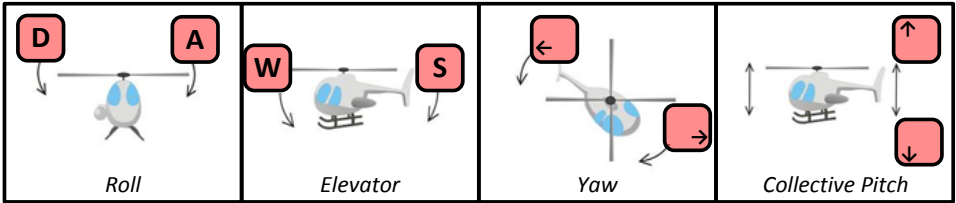
Fig②

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

- 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**

- 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.
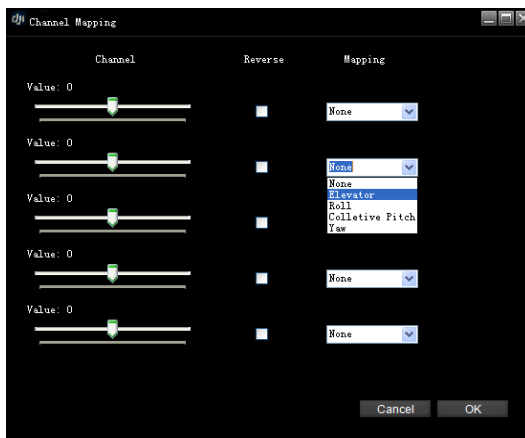
Fig①
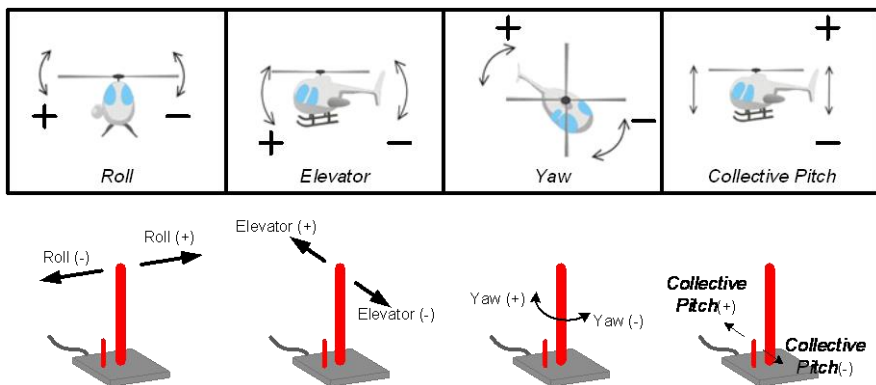
Fig②

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.

1. 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/A2/NAZA-M/NAZA-M V2** is GPS Atti. Mode, **Phantom 2** is Ready to fly or Ready to fly (non-GPS)).

2. Click ToolBox→Click Go Mode to open the window as the figure shows.

3. Click Enter Click Go Mode. Now the aircraft will go into hovering station.

4. Input the waypoint Altitude and aircraft Speed.

5. 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.

6. Click Exit Click Go Mode, the aircraft will hover again.

7. 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/A2/NAZA-M/NAZA-M V2: Atti, GPS Atti; Phantom 2: Ready to fly, Ready to fly (non-GPS)).

4 Waypoint(Single Waypoint User Skip This)

Waypoint package includes Waypoint Mode, Auto Takeoffing/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 (>=60sec), 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, a maximum of 50 waypoints can be added in the WKM/A2 waypoint mode, and a maximum of 16 waypoints can be added in the NAZA-M/NAZA-M V2/Phantom 2 waypoint mode. If selected, the waypoint will change to be green, see fig.②.
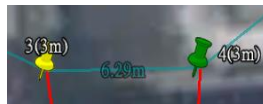
Fig②

(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 way point.

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.

1. Select one waypoint, then press Shift+P you will see the input window shown as fig.③.

2. Use Tab to switch between these two input frames.

3. Input the relative coordinates: Angle is the relative angle to the north of current waypoint; Distance is the relative distance to the current waypoint.

Fig③

4. Press Enter, then you will see a new waypoint after the current waypoint.

➔ Delete Way Points

1. Select waypoint either in map or in Editing Mission Menu, and the selected waypoint is in green;

2. Click - or press delete to delete all the waypoints added.

Tips:

Repeat above procedure to delete more. Click CANCLE 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, erticalSpeedLimit and Set Mission properties, and press Enter to confirm.

（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.

Way point 1: Stop and Turn

Way point 1: Bank_Turn
Adaptive_Bank_Turn

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

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

Mission properties:
**Route :
Continuous
StartWayPoint : 1**

Initial Position

Mission properties:
**Route :
Start_to_End
StartWayPoint : 0**

Initial Position

Stop here, and stay hovering

◆ **Examples for path of way point:**

Way point altitude

Index number of way point

Way point

Under editing   Not selected

Path Color Before Mission Execute

After mission checked. If collision happens between way point path and mountain, these path will be shown as red;

If path distance longer than 10 km, it will be shown as yellow.

Blue one is normal.

Path Color During Mission Execution

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

Projection line of way point, not to scale

Point-to-Point distance between two way points

➔ **Mission Save & Load**

Mission Save

1. Click SAVE to save mission edited.

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

3. Mission Load

4. 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	Longtitude	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.
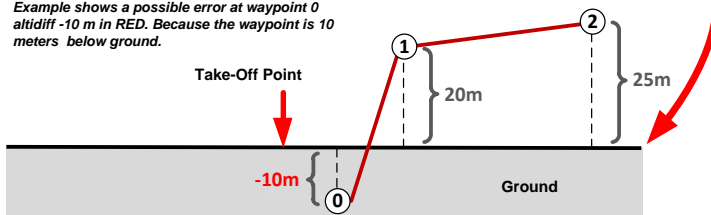
Tips:

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!

Tips:

Refer to *DJI Flight control system User Manual* for Manual , Atti. , GPS Atti. , GPS Cruise switching of your

flight control 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.
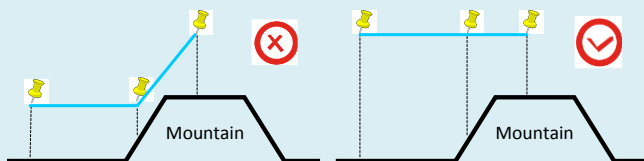
When you set the waypoints for the aircraft to climb a mountain, please make sure that you leave enough

distance between the aircraft and the mountain, in order to avoid collision caused by aircraft air speed.
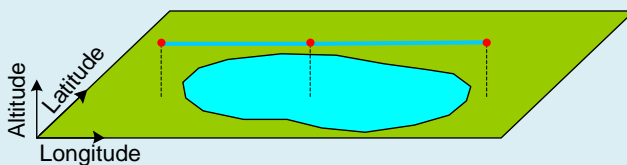
Please note that when you set a waypoint above water such as lake/sea/river, the default altitude the map

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/A2/NAZA-M/NAZA-M V2/**
>
> **Phantom 2** has this function built-in.

Auto Takeoff

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

1. 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.

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

3. Press Go 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 accidently 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), ↑/↓ (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.

1. Click ToolBox→F_ChannelControl, he setup window shows as the follow figure.

2. Click the small box beside channel name to choose the channels will be used.

3. Click the button with letter, then press key shown and you need to choose a new control key on the keyboard.

4. Setup the channel measuring range in the number boxes.

5. Usually, the slide left endpoint represents the minimum value. However you can tick the Reverse box to reverse the measuring range.

6. Click Exit and Holding to exit and keep the range value; Click Exit without Holding to exit and forget the range value.
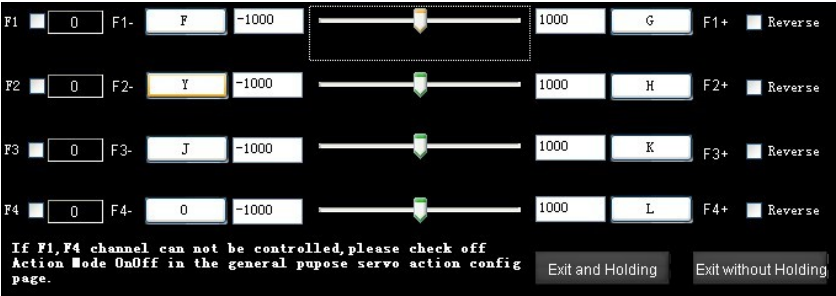
Tips:

ACE/A2 supports F1, F2, F3 and F4;

WKM /NAZA-M/NAZA-M V2 supports F1 and F2 only.

For A2, set the F channels function through the following four methods:

	"Advanced" of A2 Assistant	"RC" of A2 Assistant	"F_ChannelController" of Ground Station	"GP Servo Action Config" of Ground Station
F1	Landing gear (mapping required)	Mapping	Click to enable	N.A.
F2	Servo and gimbal	Mapping	Click to enable	Click to enable
F3		Mapping	Click to enable	N.A.
F4	Parachute	Mapping	Click to enable	N.A.

When you set the F channels function through methods above, the priority of F1~F4 output channels function is as follows:

"Advanced" of A2 Assistant > "RC" of A2 Assistant > "F_ChannelController" of Ground Station > "GP

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 flight control system and external devices. This feature allows DJI autopilot to operate your external devices automatically during basic aircraft waypoint mission.

GP-Servo Action Setting

1. Click ToolBox→GP Servo Action Config to open the General Purpose Servo Action Config windows;
2. Click the box Action Mode OnOff to enable the GP-Servo Action function;
3. For ACE, the GP-Servo uses the output channel F4 in the MC; for A2, the GP-Servo uses the output channel F2 in the MC; for WKM/NAZA-M/NAZA-M V2, 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:

1. Click, the Mission Status will show Editing Mission label upon the Mission Editor.
2. Edit flight mission.
3. Select the waypoint either in 3D-Map or in the EditingMission menu, and get Waypoint action, shown as Fig..
4. 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.

1. Open the Template Form Toolbox→ Route Template, shown as Fig.①.

2. Click Add Area button to add an area, shown as Fig.②.

3. Choose the waypoint icon of the chosen area, and drag it to change the area size.

4. Left click mouse to rotate the area, rotation 30 º per click; click 🔄/🔄 to adjust the area rotation angle and rotation 0.1º per click, as Fig. ③ shown.

5. Click one Template to generate waypoint(s), for example, choose Scan, as Fig. ④ shown.

6. 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.
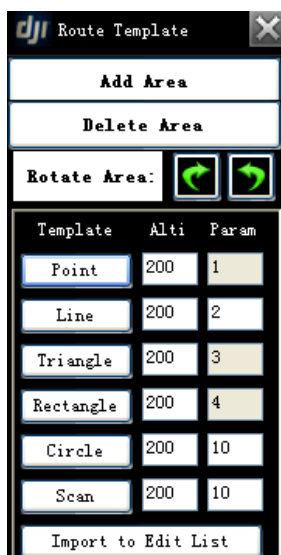
Fig.③

Fig.②

Fig.③

Fig.④
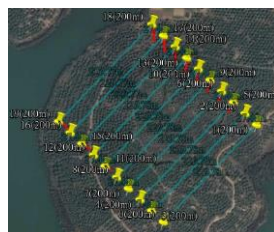
Fig.⑤

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.
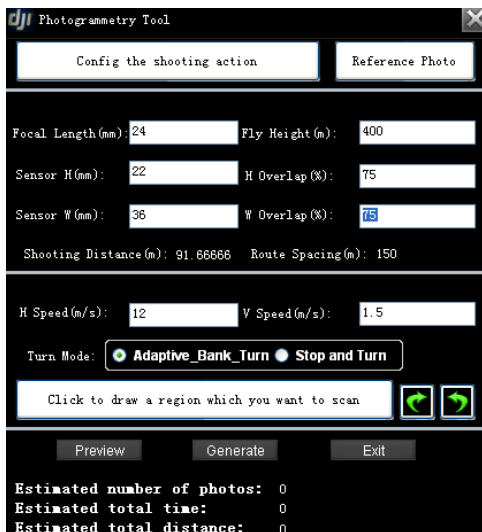
Fig.①

Fig.②
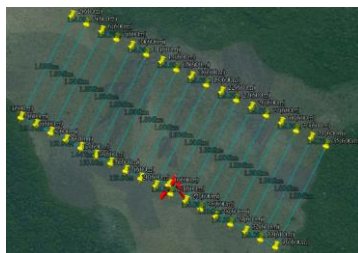
Fig.③

1. Click ToolBox→Photogrammetry Tool to open the setting window, shown as Fig.①.
2. Click Config the shooting action to setup the servo action for the camera shooting action, reference to section 4.4.
3. Click Reference Photo to see if the camera is working as you want.
4. Fill in the right Focal Length, Sensor Height, and Sensor Width according to the camera.
5. 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.
6. Fill in the flight horizontal and vertical speed in H Speed and V Speed separately.
7. Choose turn mode between Adaptive_Bank_Turn and Stop and Turn.
8. Click Click to draw a region which you want to scan to choose an area, reference to section 4.5 to change the area.
9. Click Preview to preview the mission plan, shown as Fig.②.
10. 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.
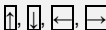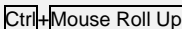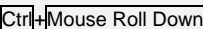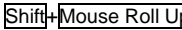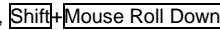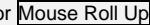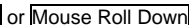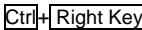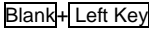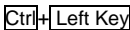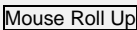
11. If using a WKM, NAZA-M or NAZA-M V2 flight control system, use the GPSExporter to export the attitude data when the aircraft takes a photograph. (Download this tool from the official DJI website). If using an A2 flight control system, use the DJI Data Viewer software and click the Export GPS button to export data.

Tips:

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

Appendix

List of Ground Station Shortcut Keys

Operation	Function
View Mode	
Left Key+	Up/Down/Left/Right to move the map
↑, ↓, ←, →	Up/Down/Left/Right to move the map
Left Key+	Up/Down/Left/Right to rotate the map
Ctrl+Mouse Roll Up, Ctrl+Mouse Roll Down	Left/Right to rotate the map
Shift+Mouse Roll Up, Shift+Mouse Roll Down	Up/Down to rotate the map
Double click Left Key or Mouse Roll Up	Zoon In the Map
Double click Right Key or Mouse Roll Down	Zoon Out the Map
Joystick/Keyboard Mode	
Ctrl+ Right Key	Start Simulator
Keyboard Mode	
D, A	Roll
W, S	Pitch
↑, ↓	Throttle
←, →	Rudder
Keyboard Mode	
Blank+ Left Key	Set the Target Waypoint
Waypoint	
Ctrl+ Left Key	Add New Waypoint
Left click waypoint then Mouse Roll Up or Mouse Roll Down	Head Degree Setting
Left click waypoint then ↑ or ↓	Head Degree Setting
Left click waypoint then then Shift+P	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:

Since some areas set restriction to network access, the GS cannot access to the Google sever, which leads to the failure in opening the map. Please use the VPN mode to launch the GS, by clicking the "VPN Mode" button signed by the red line.

➔   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.
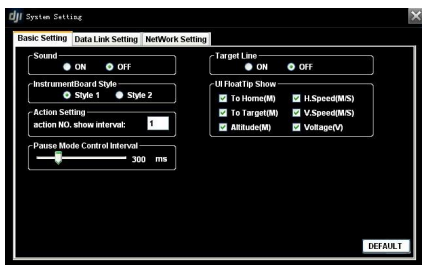

Fig①

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.
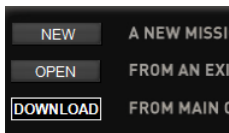
Launch Flight Failure

➔ 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 flight control system to initialize the controller.

Action Usage Faults

➔ If there is no output change on F4 channel (ACE) / F2 channel (A2) / F1 channel (WKM/NAZA-M/ NAZA-M V2) 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 Air end: 460mW	Ground end: 1600mW 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 Air end: 51x37x10mm	Ground end: 78x47.8x17mm Air end: 73x42x10mm
Weight (Has Antenna)	Ground end: 55g Air end: 20g	Ground end: 100g 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

Flight Limit of Special Areas

All UAV operators should abide by all regulations from such organizations at ICAO (International Civil Aviation Organization) and per country airspace regulations. For safety reasons, key areas have been restricted, such as:

a)   Within the radius of 8Km from the airport.

Users will not be able to build waypoints or Home points in designated special areas and the waypoint routines go through these special areas are invalid, and the UAV will fail to cruise to those areas.

All the special areas have been restricted are specified on the DJI official website and please refer to Special Areas List (http://www.dji.com/fly-safe/category-gs) to obtain details.