



## FY-31AP Path Navigation & GCS Manual

### Dear Customer:

Thank you for choosing FY31AP as your autopilot system. Please read this manual carefully before using the system to ensure proper use and operation.

The installation and use of this device require some skill and knowledge in flying remote controlled fixed wing aircraft.

- If you are a complete beginner and have never flown one before, we do not recommend you install this device on your own.
- Please find assistance from an experience RC Pilot who may provide you with the basic knowledge required to use this device successfully.
- If you are already an experienced flyer, you will find the FY31AP installation to be easy and logical. Just follow this manual and you won't go wrong.

If you need any technical support you can send mail directly to: [service@feiyu-tech.com](mailto:service@feiyu-tech.com)

### 1. Brief introductions for GCS

FY-31AP GCS is similar to FY-3ZT GCS, the main functions include electronic map, telemetry data monitoring, flight attitude instrument, speed, altitude instrument, location, and telemetry data recording and playback, air route editing, map loading management etc. The GCS soft invoking the live-action of Google earth directly, It can support 3D display and map shows in the offline mode. Brief introductions for the GCS of FY-31AP are shown as below.

#### Software operating environment:

**CPU frequency:** 1GHz or more

**Memory capacity:** 1G or more

**Hard disk space:** At least 200MB free disk space

**Operating System:** Windows XP, Vista, Win 7 etc

**Monitor:** 1024x768 resolution or above

**The computer Serial Port:** Support USB serial converter or 9-pin port which baud rate is 19200 or more

**Other Peripherals:** Keyboard, Mouse

### 2. The installation of GCS and USB-TLL

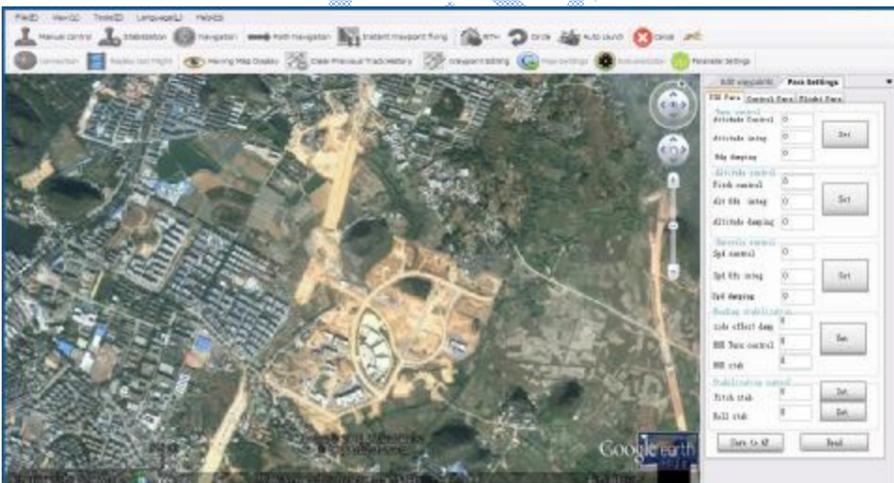
Firstly, you should download the GCS and USB-TLL serial drive on our official website: [www.feiyudz.cn](http://www.feiyudz.cn).

After that, you can set up the software. You had better set the value as default, or select suitable installation path, but the path should not be on desktop or too deep, and it shouldn't include Chinese, space, or other strange characters.

Before using the GCS, you have to install dotnetframework3.5 (download link: [www.feiyudz.cn](http://www.feiyudz.cn)) and Google Earth (download link: <http://www.google.com/earth/explore/products/plugin.html>).

You had better uninstall the Google Earth soft which has been installed before.

Open the GCS, you can see the following interface.



( If you can't open the GCS in Vista or Win7 system, please find out the executable file, and run it as the administrator. )

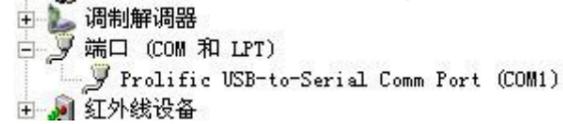
#### Step 1: install the USB-TTL serial drive

- 1) Double-click the serial drive, installed by default.
- 2) Restart the computer and make the drive be activated.
- 3) If it can't be used, please uninstall the original drive and reinstall this one, or search its PL2303 chip to the latest version on the Internet.

#### Step 2: confirm the USB-TTL Virtual serial number (take Win XP for example)

- 1) Insert the USB-TTL interface cable into computer USB COM port(don't connect TTL port to any other wire ), you will find there is more than one port(COM and LPT), the port "COM1" in the "Prolific

USB-to-Serial Com Port (COM1)" exactly is the Virtual serial number.

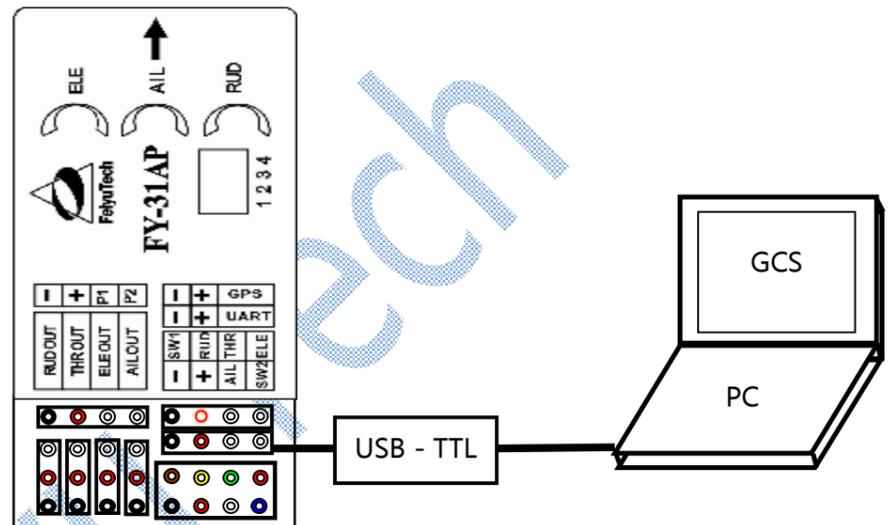


- 2) insert a few times for confirmation
- 3) Modify the serial number if necessary

### 3. Hardware connection instruction

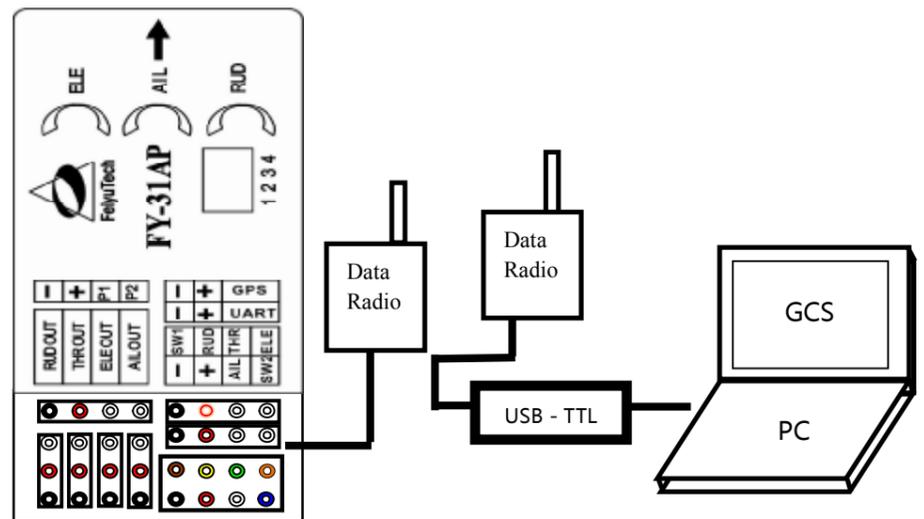
FY-31 AP provides a data radio interface (UART), you can downlink telemetry data and receive control information by radio and monitor the real time flight by the computer. The telemetry data includes: Longitude, latitude, altitude, speed, heading, positioning, operation mode and the real-time output amount of the servo and so on. By matching with remoter adaptor, you also can send the receiver signal to FY-31AP module by the radio to achieve remote control. By matching the GCS, it can real time display flight trace and flight parameters. In addition, you can conduct pointing flight, or change flight attitude in real time and circling radius and so on.

#### A. Connect the FY-31AP to the computer directly for setting (shown as below)



Connect the UART port of FY-31AP to the computer by UBS-TTL cable. If you use a USB-TTL interface cable for power supply, you should power down for FY-31AP. This connection is the simplest way, but you can only set the value on the ground, so it is not convenient to debug and set flight path. You also can't realize the function of monitoring flight status and path. Remember to save the setting when you do some changing, or the setting data will lose if power down.

#### B. Use the data radio to connect to FY-31AP.

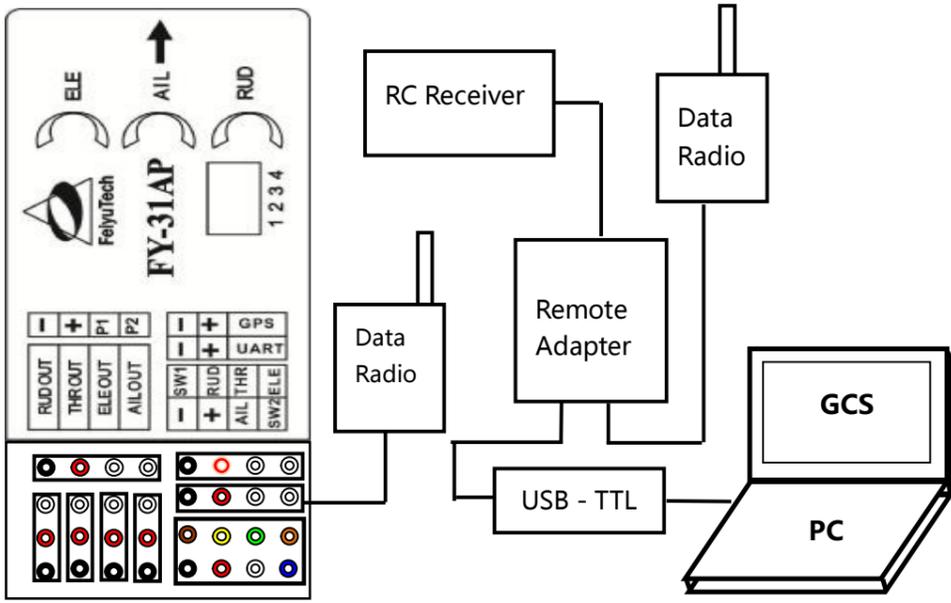


You can use a pair of data radio to realize wireless setting. It is convenient to debug, and you can upload air route at any time. You also can realize the function of monitoring flight attitude and flight trace. You can fly to anywhere on the map or change flight attitude by using FY GCS.

#### C. Use the data radio and Remote Adapter to connect to FY-31AP.

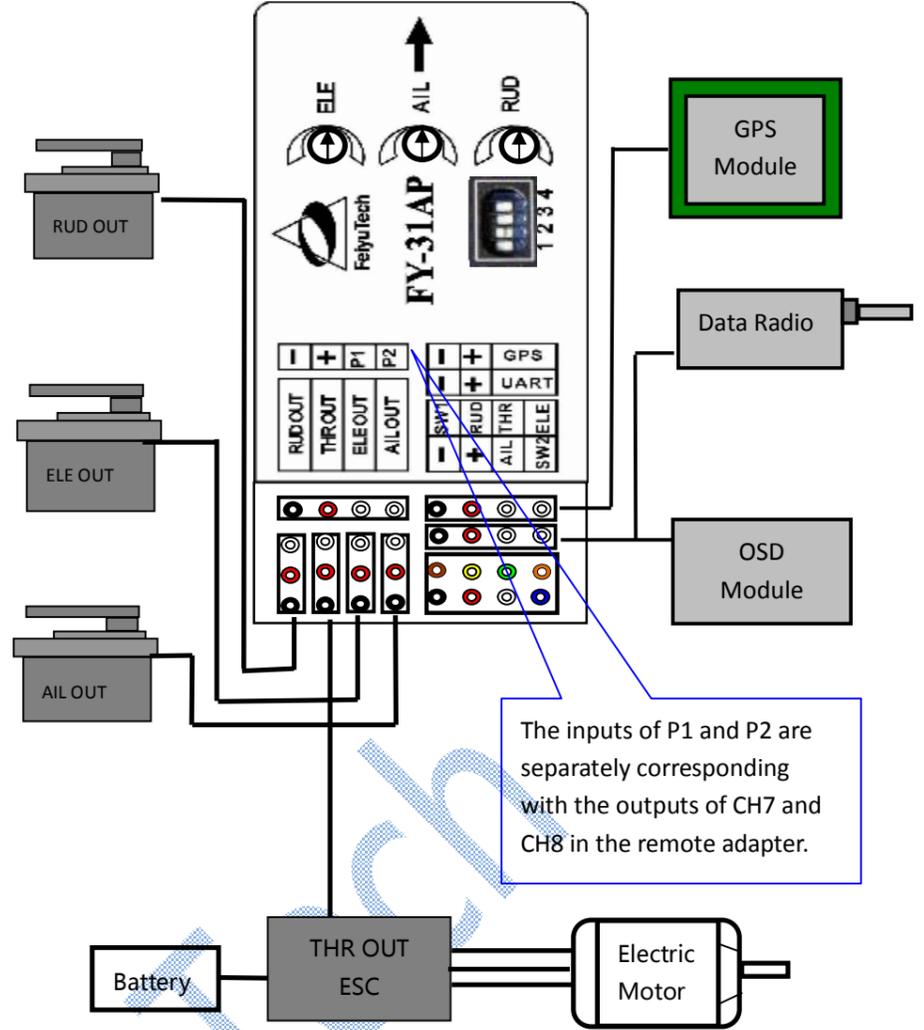
In this way, you need not connect to RC receiver. The remote adapter transforms the signal offered by RC receiver into digital data, The signal would be transmitted to FY-31AP by data radio. You can not only set the value at any time via data radio, but also extend the remote distance, this distance is determined by the radio communication distance. As a result, you can realize FPV for farther distance easily. Without receiver, the connecting would be simple, but there will be some delay when you control the flight.

Show as following:



**D. Remote adaptor introduction**

The main function of remote adaptor board is to send the digitalize output signal of the remote receiver to FY-31AP through data radio, at the same time send the control instructions of the GCS to FY-31AP through data radio, and send the flight trace and flight parameters which sent back by FY-31AP to GCS. Remote adaptor board includes the port with receiver, the port with data radio and the port with PC, the typical connecting diagram is as following:



**4. Air route setting and path navigation**

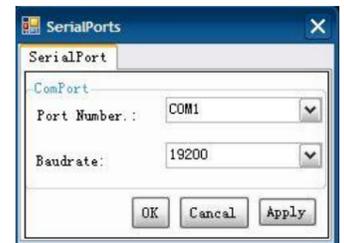
You can set air route after install the USB-TTL serial drive and GCS. ( just do as following)

- a) Confirm the hardware connection correctly
- b) Open the FY GCS



**c) Connect to FY-31AP**

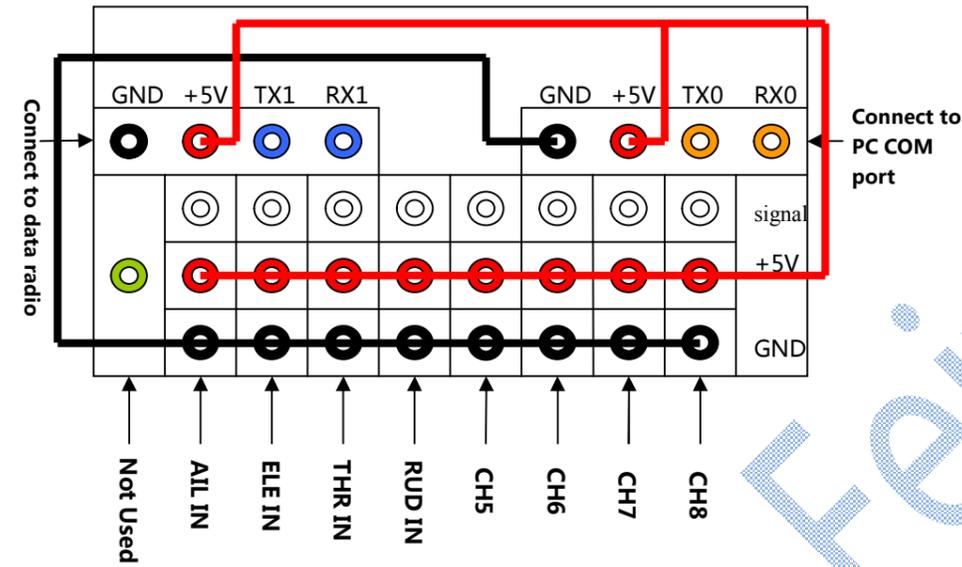
Click , you can see the interface of serial ports(shown on the right). Choose the default , for example , the port number is "COM1" , the baud rate is 19200.



When connect successfully , please click ,then you will turn to instrument interface. If changing the flight attitude, you can observe the results on this interface



**d) Altitude Initialization.**



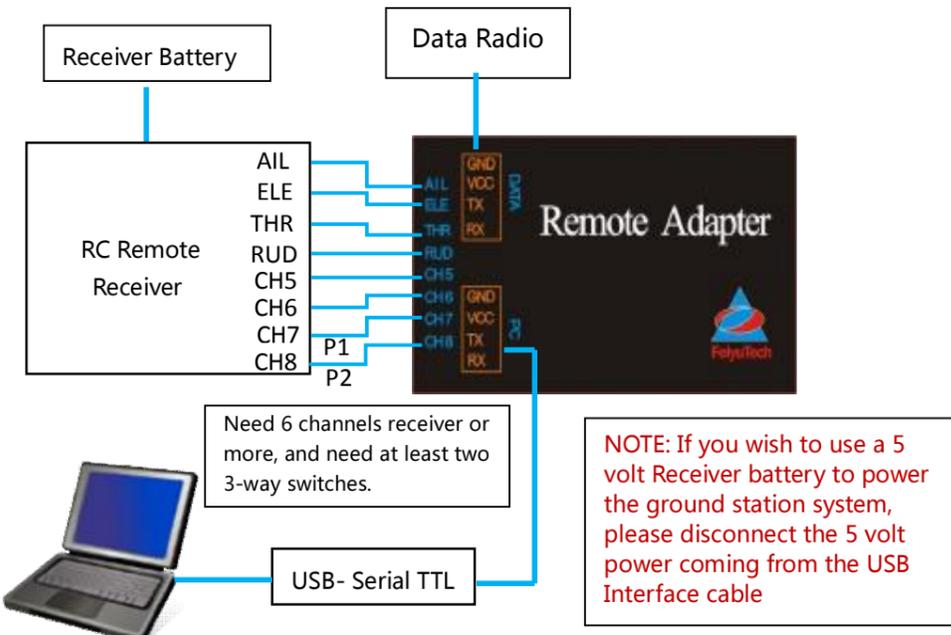
Remote Adapter



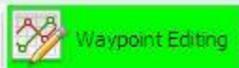
FY-606 data radio

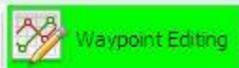
**E. Connection:**

**Ground Station Diagram**



FY-31AP only passes back relative ground height, so you have to initialize and pick up the altitude. This altitude is used to render 3D flight path, Otherwise the rendering path may be keep out of the map layer.

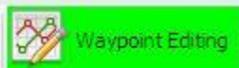


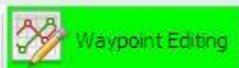
Click  , The button background will turn green,

Click " tools" in the menu bar and choose "Altitude Initialization" , then press the "Ctrl" key, Move the cursor over the take-off point position in the map and click the left button to confirm. ( shown as below)



**e) Air route setting**



Click  , The button background will turn green, then

the waypoint editing is activated and you can set the route., click this



button  ,after the background turn green, you can plan the air route by

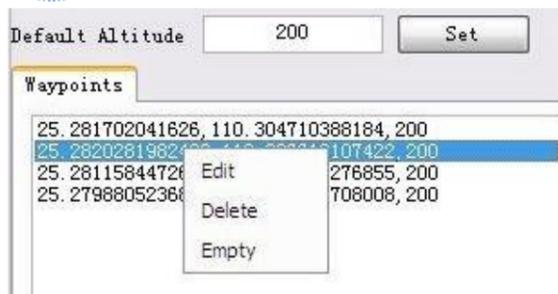
clicking mouse. Fill in the flight altitude here :



Press the "Ctrl" key, you can plan the air route on the electronic map. You can set at most 8 navigation points at present.



If you are not satisfied with the planning route, you can reedit it. If you want to change the position or add the navigation point, please use the mouse to click the target location on the electronic map. You also can edit directly on the "Edit Waypoint" window on the right. Selecting the route that you want to modify and clicking the right mouse button, modifying the latitude and longitude of the navigation point by choosing "Edit" . (shown as the right picture)



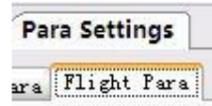
After setting the route, please click "Upload Waypoints"  , to

upload the waypoints to FY-31AP. You can remove all waypoints by clicking

 , and download the waypoints by clicking  .After download the waypoints, you can detect if all waypoints are correct.

**f) Flight speed setting**

First, turn to "Para Settings" and choose "Flight Parameter"



, set the expectations value of current speed according to your experience. For example, if the value is 60KM/H, please fill in the dialog



box and set to upload  . You

also can empty the dialog box after setting. Click  ,

then you can detect the data and confirm correctly upload.

**Waypoint**



g) At last, don' t forget to click this button to save  , otherwise the setting waypoints will be lost if power down.

**h) Flight navigation testing**

Check out the equipment before taking off. Check the servo control switch direction in balance mode. Here we suppose the aircraft can keep automatic balance flight. At this time, the channel 5 to automatic navigation

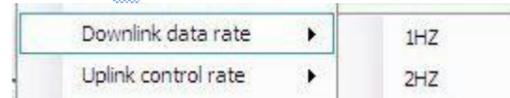


mode,  , when the

"Navigation" button turn green, meaning you have enter the Flight Navigation mode.

**5. Other possible use Settings**

**A. Link rate setting**



You can set the output telemetry data rate by choosing "downlink data rate" , the higher setting value is, the faster rate will be. It can help to improve the refresh rate of OSD data overlay and GCS display data. But the value can' t be set too high, because of being limited by communication rate when using data radio. Otherwise the large output data will block the communication.

When connect to remote adaptor, "uplink control rate" is used to set the upload link data rate. The higher setting value is, the better real time telemetry data will be. But the value can' t be set too high, because of being limited by communication rate when using data radio. Otherwise the large output data will block the communication.

Settings Suggest:

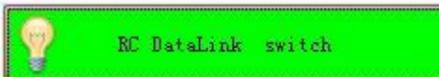
When using the data radio, and connecting the RC receiver to FY-31AP directly, "downlink data rate" could be 4HZ;

When using the data radio, and connecting the RC receiver to remote adaptor, you need not set the frequency and the "downlink data rate" will turn to 2HZ automatically.

When without the data radio, and connecting to OSD, the "downlink data rate" could be 10HZ. It will help to improve the refresh rate of data overlay.

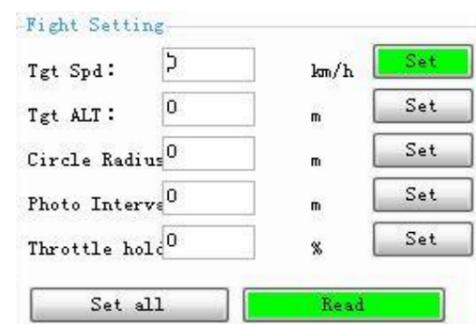
**B. RC Data Link setting**

When using remote adaptor, you have to click this button to make it turn



green  .If the receiver connects to the FY-31AP directly, you should close the button, and make it turn gray, or you can' t control the aircraft.

**C. Current flight parameter setting**



**Target Speed:** Set the flight cruising speed. FY-31 AP will compare the current flight speed with the target speed, then control the throttle.

**Target Height:** Set the current altitude when fixed high flight. You can change the altitude of fixed high flight when real time set the value.

**Circle Radius:** Set the circling radius.

**Throttle Hold:** This value will be got automatically when enter automatic mode. You do not need to set.

**D. Gyro Initialization**

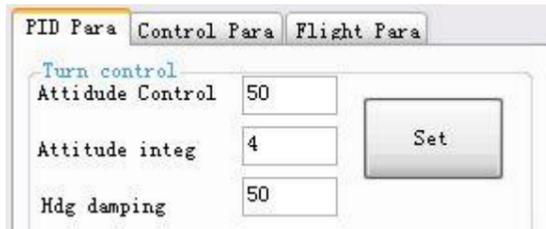


You can initialize gyro via FYGCS, but please keep stationary while initializing. Click this button to finish.

**E. PID Parameter Setting**

In normal time, you don't need to modify the PID settings, the default values are OK for most planes. If you modify it, please take care, it may cause a crash.

**Turn control:**

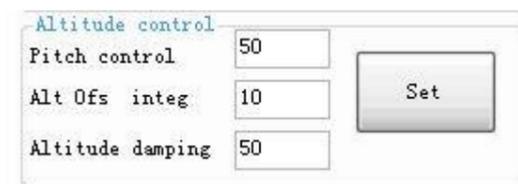


**Attitude Control:** a controlled quantity of angle of roll when in turn control

**Attitude Integral:** an accumulation controlled quantity of angle of roll when deviate from the air route

**Heading damping:** a quantity that damps heading changing when change the air route

**Altitude control:**



**Pitch control:** a controlled quantity of angle of pitch when up or down

**Altitude Offset Integral:** an accumulation controlled quantity of angle of pitch when deviate from the flight altitude.

**Altitude damping:** a controlled quantity that damps changing altitude when you want to change the altitude

**Throttle control**

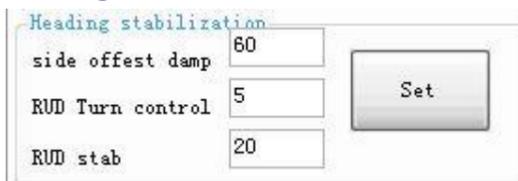


**Speed control:** a controlled quantity of acceleration or deceleration

**Speed Offset Integral:** an accumulation controlled quantity when deviate from target speed.

**Speed damping:** a controlled quantity to damp speed changing

**Heading stabilization**

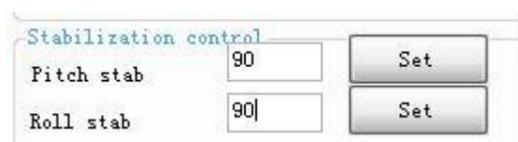


**Side offset damp:** a quantity to control the sensitivity of PTZ.

**Rudder Turn control:** the control amount for damping the deviaton speed of the path.

**Rudder stabilization:** control the heading stabilization

**Stabilization control**



**Pitch Stabilization:** a controlled quantity to change attitude angle of pitch

**Roll stabilization:** a controlled quantity to change attitude angle of roll

**F. Home point setting**

When FY-31AP is powered and positioning for the first time, it will

record the current position as home point. You also can change the home point position via GCS, just do as following.

Firstly, click "Edit waypoints" , than choose "Edit home point" button

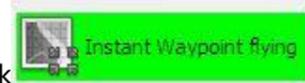


and make it turn green. Depress the "Ctrl" key and click the target point in the Google Earth map when ready, then an icon will



appear, that means you have uploaded successfully.

**G. Instant waypoint flying setting**



First click , and make it turn green, it means



you have entered Mouse Click point mode. Click , and



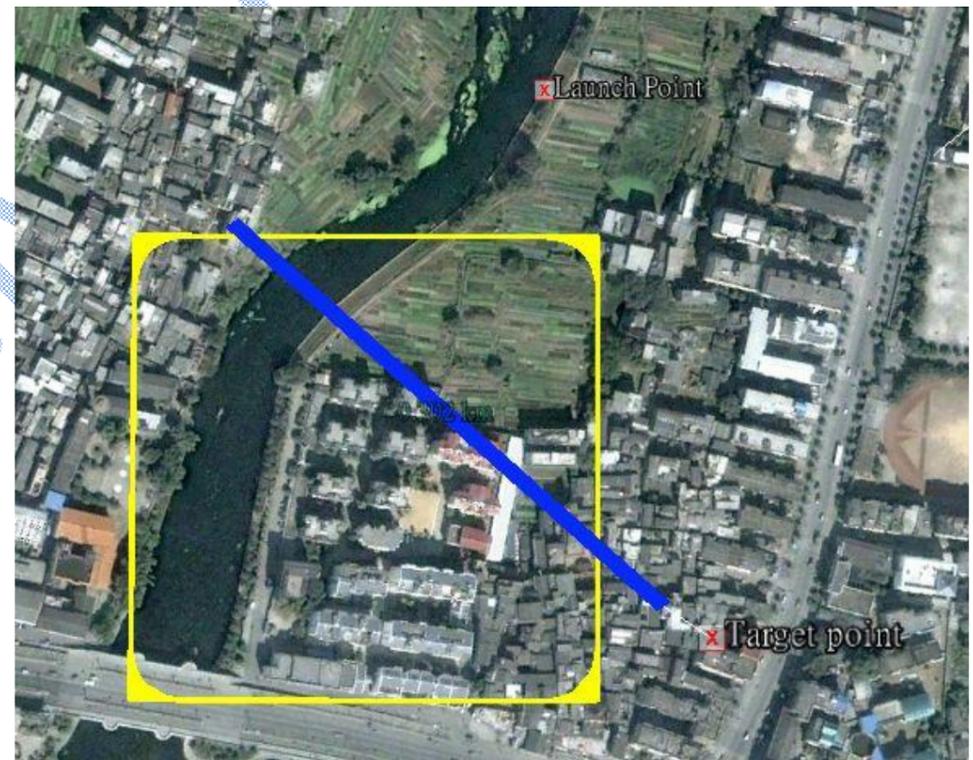
choose "edit target waypoint".When this button turn green,

depress the "Ctrl" key and click the target point in the map when ready,



then an icon will appear, it means you have uploaded

successfully. (shown as below)



---END---

**Note:** We reserve the right to change this manual at any time! And the newest edition will be shown on our website.