

Ground Control Software FYGCS

FYGCS is the ground control software of FY-3ZT , the main functions include electronic map, telemetry data monitoring, flight attitude instrument, speed, attitude instrument, location, and telemetry data recording and playback, air route editing , map loading management ect. The interface of FYGCS include shortcut toolbar, status displays bar, the flight instrument display, electronic map display area, air route and navigation parameter setting area.

1. Software Operating Environment

CPU frequency: 1GHz or more.

Memory capacity: 256MB or more.

Hard disk space: At least 50MB free disk space.

Operating System: Windows98, Windows2000, Windows XP system.

Monitor: 1024x768 resolution or above.

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

Other Peripherals: Keyboard, Mouse.

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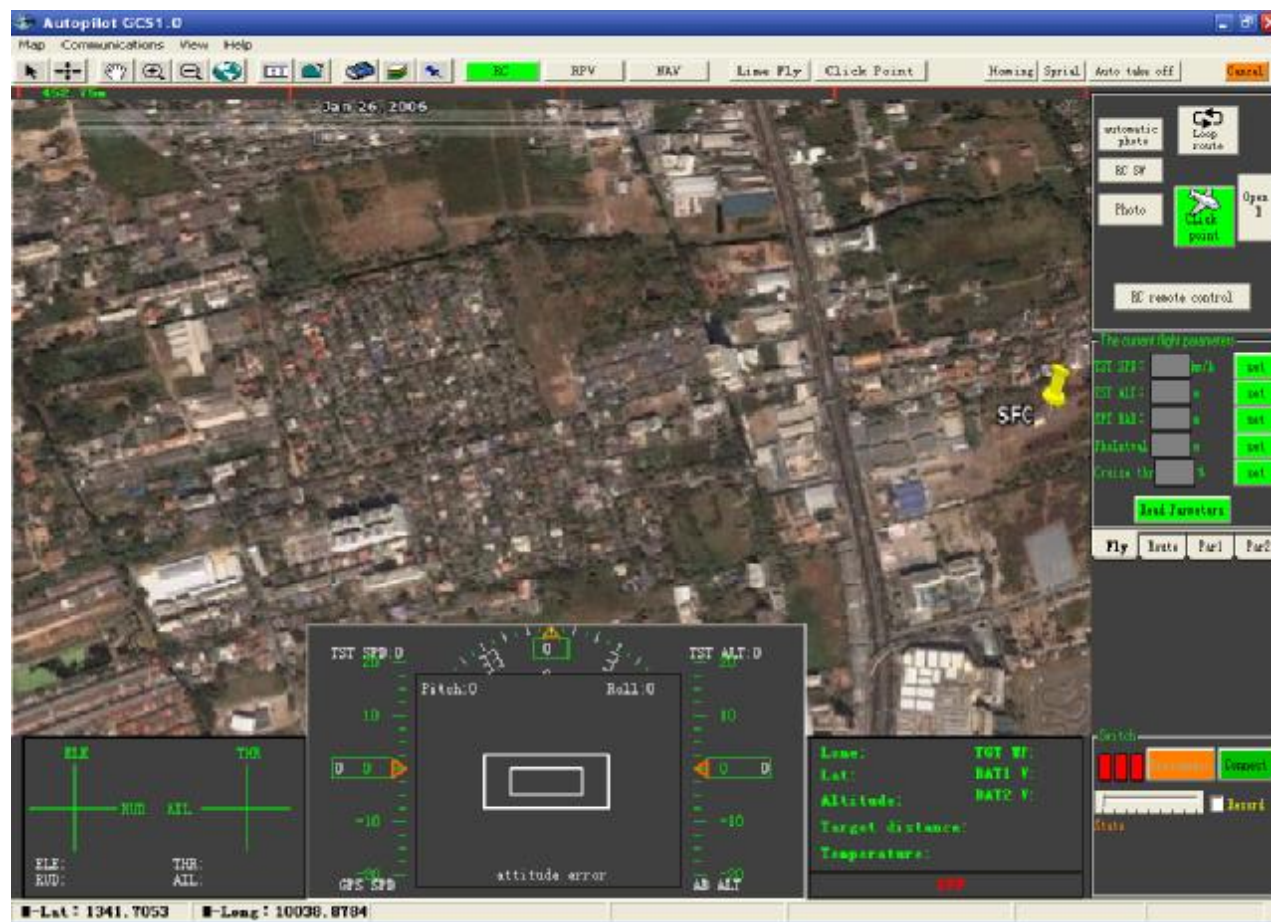
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3. Function module Introduction



Software Interface



The Menu Bar and Tool Bar

4. The Menu Bar:

I 、"Map" menu items are respectively :

1. Open the Map: Loaded the electronic atlas of the MapInfo format (*.gst files) into the map window of the software.
2. Load Layer: Add the new layer to the original atlas map (*.tab files).
3. Save as Map: Save the map contents inside the current electronic map window as a new atlas (*.gst file)
4. Save as Image: Save the map contents inside the current E-map window as images (BMP / JPG / GIF / PNG and other image format).

II 、"Communication" menu items are respectively:












- 1、Initialization: Open the "Initialization" dialog window, and start the relate operation of the flight control initialization.
- 2、Port: Select the port number by requested, the choosing range is from COM1 to COM16.
- 3、Baud rate: Select the communication baud rate used by the port, the choosing range is from 300

to 115200.

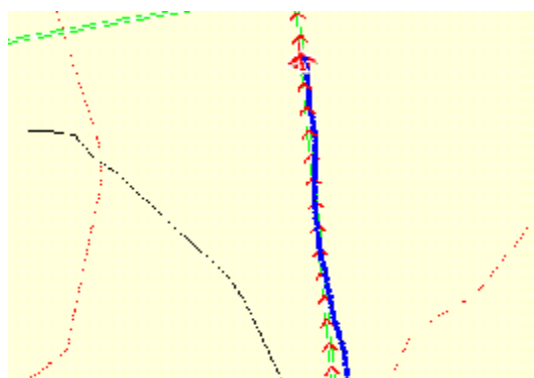
III、"View" menu items are respectively:

- 1、Air Route Management: This is a complex option, can be used in hiding and displaying the” flight management” of the software which is on the right of the main interface.
- 2、Connect Switch: This is a complex option, can be used in hiding and displaying the “master switch” of the software which is on the bottom right of the main interface.
- 3、Screen Display: The map reduces to half size.

5. Toolbar:

- 1、 Pointing tool: Used for pointing the element on the map.
- 2、 Target center: Keep the target plane in the center of the map.
- 3、 Roaming: For this tool, you can pan the map by drag the mouse.
- 4、 Zoom in: Zoom in the map view.
- 5、 Zoom out: Zoom out the map view.
- 6、 Map Display: Please zooming the map view, in order to show all the elements on the map area.
- 7、 Distance Measurement: Measure the distance on the map.
- 8、 Area Measurement: Measure the area on the map.
- 9、 Clear Track: Used to clear the track lines of the plane flew on the map window.
- 10、 Layer Control: Manage the each layer of electronic map.
- 11、 Add Place mark: Add a temporary mark points on the map.

6. Electronic Map Area:



Electronic map display the current location, flight course, the current target route, flight tracks, flight plan objectives and target destinations of the user's aircraft

Red Plane Icon: The current aircraft's position and heading;

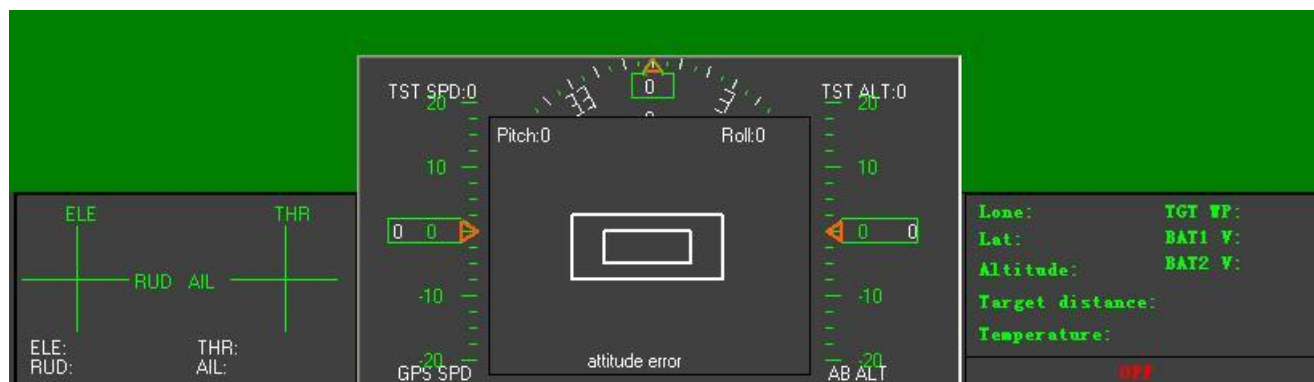
Blue Dotted Line: Aircraft flew over the track.

Virtual Red Line: The current target route.

Hollow Double Green Line: The planned target route.

Red Flag Icon: The planned target destination.

7. Meter Bar:



Graphical instrument is divided into six meters; the topside is the map scale. The upper left is output meter to monitor the servo output; the lower left is the character display data sheet. Followed by the middle of the table are GPS speed, flight attitude instrument, and pressure altimeter. The above is the heading table. The green triangle indicates data on the speedometer, the altimeter, as well as the heading table is the current value, the orange hollow triangle indicates data is the target value.

Flight Attitude Instrument: Displaying the pitch angle, roll angle, unit and degree of the current aircraft.

GPS Speed: GPS measures the relative velocity, the unit and km/h between the aircraft and ground.

Barometric altitude: Baroreceptor measures the altitude difference between the aircraft and take-off location .unit: meter.

Heading Table: The figures inside the dial represent the tens digit, for example, dial "3" represents the 30 degrees, dial "33" represents 330 degrees. N for True North, S for true south, E for true east, W is true west. Solid triangle indicates data means the current course, orange hollow double-triangular data means the current goal course.

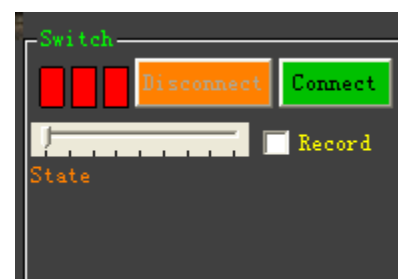
8. Air Route and Navigation Parameter Setting:

Status and Control Display Columns:

Green color means the current mode is open.

Master switch:

- 1.Connection:** Communication connection, the software start working.
- 2.Disconnect:** Communication disconnect, the software will be closed.
- 3.Data playback:** Select when data playback.



Air Route setting:

- 1. Returning Point setting:** Click this button; you can set the returning point through use the mouse click on the target location on the electronic map.
- 2. Immediately Flying:** After input the latitude, longitude and altitude of the target in the three

input boxes on the left, set the return point. Click this button; the aircraft will fly to the target location immediately. (The navigation mode will take effect in the "pointing" mode.)

3. Add to the List: After input the latitude, longitude and altitude of the target in the three input boxes on the left, and then set the return point. Click this button; you can add flight point information to the following list of local destinations, in order to upload the air route together on the next step.

4. Mouse Planning: Click this button, you can add the navigation point through to use the mouse click the target location on the electronic map, then add the navigation information to the following list, in order to upload the air route together on the next step next

5.Upload selected point: Only upload the selected navigation point from the list box.

6.End of the plan: To make electronic map area out of the mouse planning status.

7.Undo: Delete the latest added navigation point from the local air route list.

8. Clear: Delete all the navigation points from the local air route list.

9.Download Air Routes: Download the air route from the electronic storage of the autopilot to the local air route list.

10.Upload Air Route: Uploaded the air route from local air route list to the electronic storage of the autopilot.

11. Open the Route File: Loaded the air route from the local routes file (*.wpt) to the local air route list.

12. Save Air Route File: Saved the air route of the local air routes list to local air route file (*.wpt).

13.Permanent Preservation of the Air Routes: Write the upload air route to FY-3ZT, and preserve it permanently.

Button Switch:

1、Automatic photography button, turn on the automatic photography function.

2、Photo Button: Take a photo immediately.

3、RC Receiver Button: Close the remote control operation.

4、Air Route Circle Buttons: Circle flying according to the set route. (Work in the air route flight mode)

5、Switch Button: Switch between RC remote control receiver and data radio remote control.

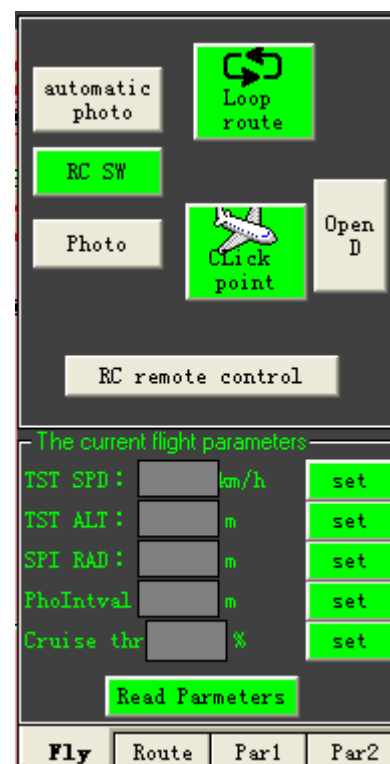
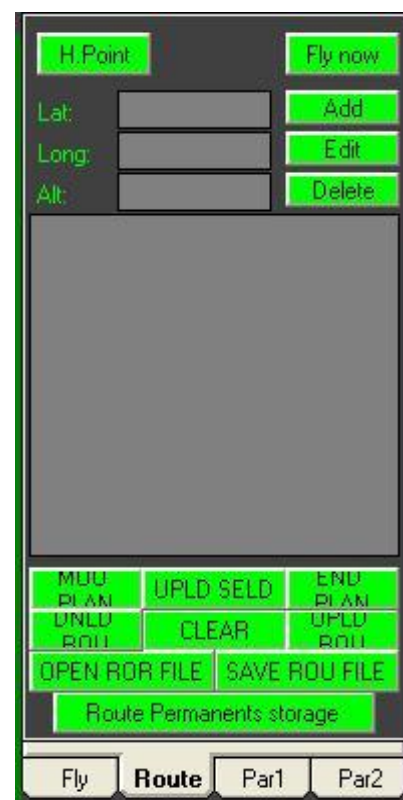
Flight Parameter Setting:

1. Target Speed: Set the expectations value of the current speed, unit: km / h.

2. Target Height: Set the expectations value of the current altitude, unit: m.

3. Target Distance: Set the expectations value of the current distance, unit: m.

4. Circle Radius: Set the circling radius, unit: m.



5. Photographic Interval: Set the space distance between every automatic photography. Unit: m.

Parameter Setting 1 and Parameter Setting 2

1. **Setting:** Set up the parameter of each flight control gain.

2. **Mixed-Control Mode:** Set up the mixed control mode of the autopilot, for adapt to different rudder surface layout aircraft.

3. **Reverse Rudder Setting:** Set up the pros and cons direction of rudder movement.

4. **Permanently preserve the setting parameters:** Preserve the setting parameters to FY-3ZT permanently.

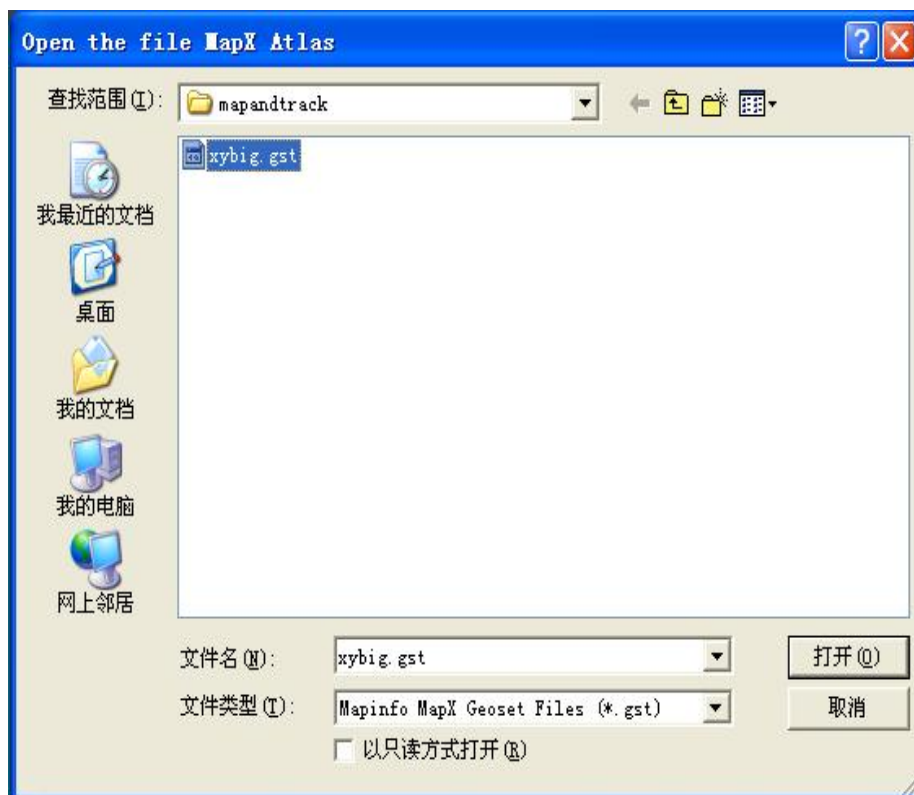
The screenshot displays the FY-3ZT software interface with the following sections:

- Turn Control:** Roll angle control, Roll integrator, Course damping. Each has a numeric input field and a 'set' button.
- Height Control:** Pitch angle control, Pitch integrator, Height damping. Each has a numeric input field and a 'set' button.
- Throttle Control:** Speed control, Speed damping. Each has a numeric input field and a 'set' button.
- Route stability:** Side Offset damping, Rud stability. Each has a numeric input field and a 'set' button.
- stability control:** Pitch stability, Roll stability. Each has a numeric input field and a 'set' button.
- Auto take off setting:** take off pitch (deg), take off speed (m/s). Each has a numeric input field and a 'set' button.
- Control reverse:** AIL REV, ELE REV, RUD REV, DEP REV, PHO REV. Each has a checkbox and a 'read' or 'set' button.
- Mix control:** A dropdown menu with 'read' and 'set' buttons.
- Init:** A yellow warning box with a triangle icon and the text 'Gyro init'. Below it, a note says 'Note: Gyro init to keep the static initialization'. At the bottom, a button says 'Record servo neutral'.
- Bottom Bar:** Buttons for 'Fly', 'Route', 'Par1', and 'Par2' are repeated twice.

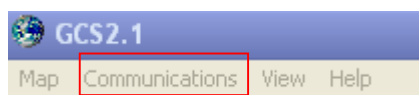
9. Software Operation Process

1 The Basic Operation Sequence

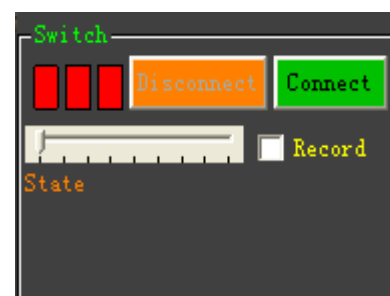
1. Please connect the computer serial port with the data radio correctly, keep the equipment connecting in normal working condition.
2. Please install the software correctly, if the map does not work properly, please install the MapInfo Map control.
3. Run this software.
4. Through the menu bar of the "map"-"open the map", choose a MapInfo Map Geoset atlas file whose suffix name is(.gst) from the computer, and then click "Open" to load it to the main map interface.

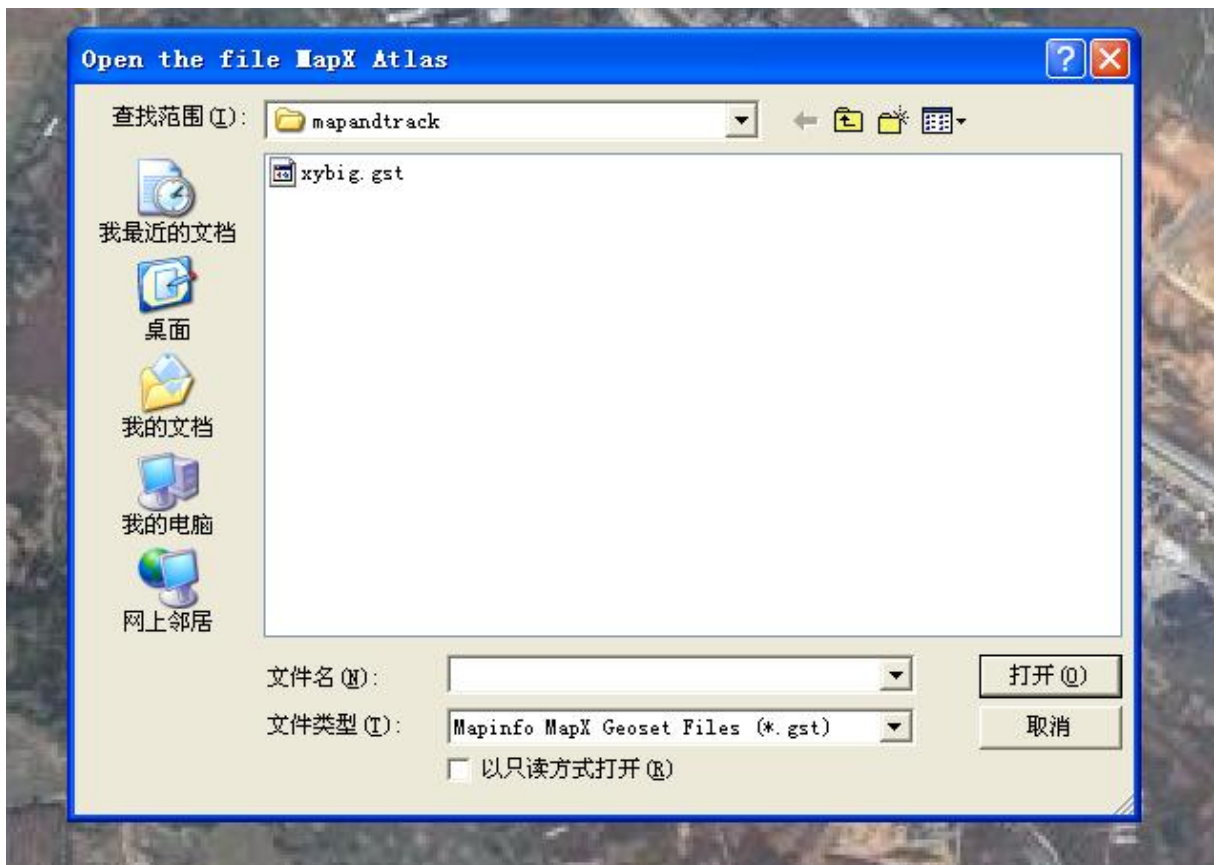


5. Through the menu bar of the "communication" - "port" and "baud rate", set it to the actually use port which connect the computer and the data radio. Make sure the baud rate is same with the port baud rate of the data radio. The baud rate of FY-3ZT is 19200.



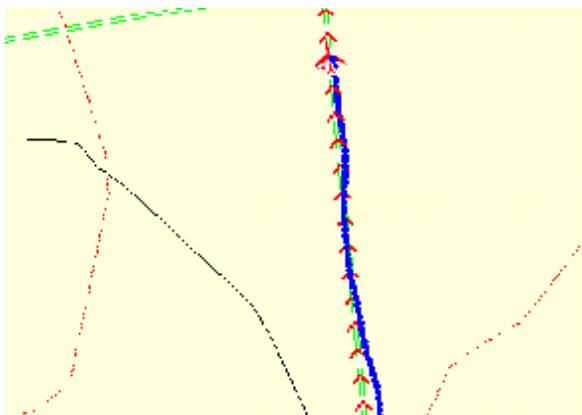
6. Click the green "connect" button from the "master switch" which in the lower right corner of the software interface, the "Save track log" file dialog box will pop up, you must enter the location and file name where you want to save the flight track (recommended to use the current date and take-off movements times to name the track file names, such as the :20070501-1. txt), and then click "Save" will begin to communicate with the autopilot panel and began to record telemetry data to the track log file.





If the port work normally, the first square indicating light inside the "master switch" box should turn from red to green which means the port open properly .

7. The biggest part of the center software interface is the map display section, if communicate with the autopilot successfully, and after the GPS has been 3D positioned, a red "aircraft" symbol will appear on the map, this point is the location and the movement direction of the aircraft on the map; moving the plane 10 meters, you can see the aircraft on the electronic map moves as well, blue tracks will be formed on the moved location.



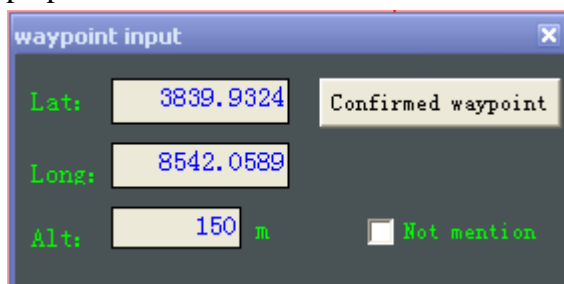
8. When the GPS status shows the number of satellites is more than 4 ,check whether the control parameters of the autopilot working all right , the rudder of each servo working all right and the attitude is all right ,if it necessary ,it need gyro initialization operation .
9. Planning and design the route point and return point, please follow the practical situation, check the setting control parameter.
10. If everything goes well ,the fly can prepare to take off .

10. Air Route Planning

Ordinary Air Route Design

First click “Route Designing” button from the “air route management” page which inside the main interface.

At this time, the electronic map will enter to the air route design mode ,you can choose the navigation point by use the mouse click on the electronic map straightly , after click the mouse ,the “navigation point input information “dialog box will be pop up .

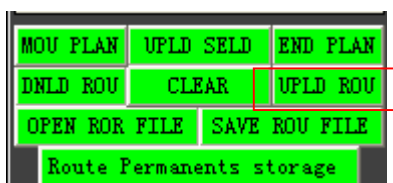


A dialog box titled "waypoint input" with a close button (X). It contains three input fields: "Lat:" with value "3839.9324", "Long:" with value "8542.0589", and "Alt:" with value "150 m". There is a "Confirmed waypoint" button and a checkbox labeled "Not mention".

The main function is to enter the navigation point height (must enter!), you also can modify the latitude and longitude of the navigation point manually, confirmed the two nearby navigation point will formed air route automatically on the electronic map. The added navigation point will be add to the local air route automatically.

If you want to modify the location of some point in the air route, just double-click to change the navigation point in the list box, after the list box turns red, you can use your mouse to relocate this navigation point on the map.

When you added enough navigation point, please click "Upload Air Route" button,



A grid of buttons: "MOU PLAN", "UPLD SELD", "END PLAN", "DNLD ROU", "CLEAR", "UPLD ROU", "OPEN ROR FILE", "SAVE ROU FILE", and "Route Permanents storage". The "UPLD ROU" button is highlighted with a red border.

Program will automatically send the navigation point which in the local air route list to the autopilot gradually. (Note: Please don't click any other button when the air route in uploading or downloading status and before the successful transmits of the entire navigation point, or the air route transmission will be interrupted.)

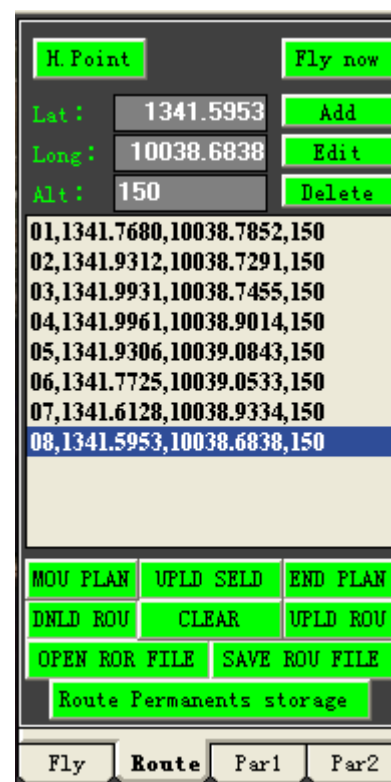
Track Record Playback

Choose the “record playback” option from the ‘Master Switch’ which on the top right corner of the software interfaces.

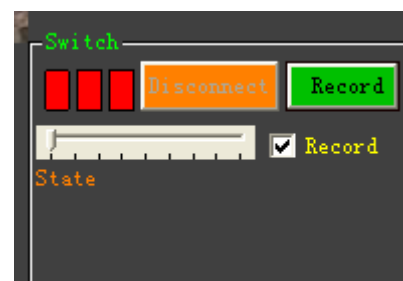
And then click the green “Playback” button from “Master



A grid of buttons: "MOU PLAN", "UPLD SELD", "END PLAN", "DNLD ROU", "CLEAR", "UPLD ROU", "OPEN ROR FILE", "SAVE ROU FILE", and "Route Permanents storage". Below this grid are four buttons: "Fly", "Route", "Par1", and "Par2".

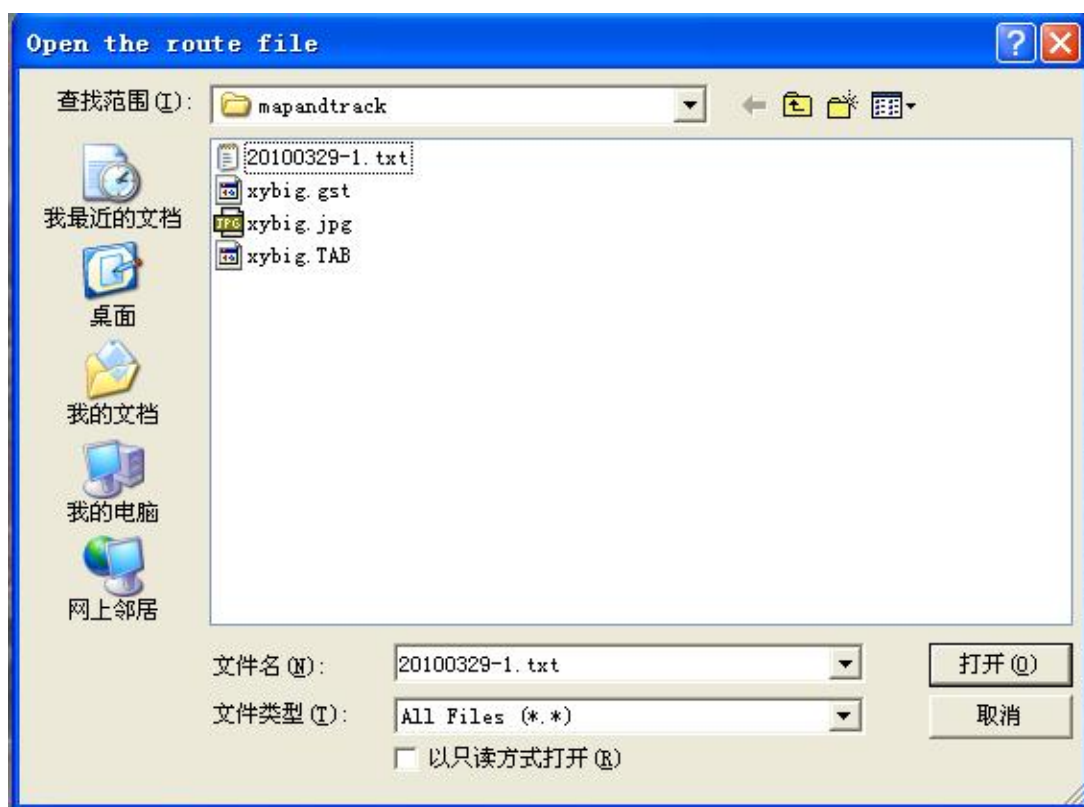


A dialog box titled "H. Point" with a "Fly now" button. It contains input fields for "Lat:" (1341.5953), "Long:" (10038.6838), and "Alt:" (150). There are "Add", "Edit", and "Delete" buttons. Below these is a list of 8 points: "01,1341.7680,10038.7852,150", "02,1341.9312,10038.7291,150", "03,1341.9931,10038.7455,150", "04,1341.9961,10038.9014,150", "05,1341.9306,10039.0843,150", "06,1341.7725,10039.0533,150", "07,1341.6128,10038.9334,150", and "08,1341.5953,10038.6838,150". Below the list are buttons "MOU PLAN", "UPLD SELD", "END PLAN", "DNLD ROU", "CLEAR", "UPLD ROU", "OPEN ROR FILE", "SAVE ROU FILE", and "Route Permanents storage". At the bottom are buttons "Fly", "Route", "Par1", and "Par2".



A dialog box titled "Switch" with a "Disconnect" button and a "Record" button. There is a progress bar and a checkbox labeled "Record". Below the progress bar is a label "State".

Switch” which on the lower right corner of the software interfaces. The “Open track log” file dialog box will be pop-up.



Select the track file which you want to playback (*.txt), and then click "Open" will start to playback the record event in the track log file.

If it works well, the first square indicating light should change to blue color which inside the "master switch" box that means is being play back track. After finished play back the tracks, the indicating light will turn to yellow color .In the process of track play back, you can drag the bottom drag to select playback speed.

Note: All the "read out" and "Settings" button of this software will change color automatically according to the operating condition. When you click on the button, its will turn to yellow color immediately, which means is sending the button command. If the button command has been successfully implemented, its will turn to green color. Which means the button operation is successful. If the button always keep yellow color, which means the button command operate unsuccessful. this may caused by the errors of the communication data or other factors .At this time , the procedure will start to re-send automatically until the button turn to green color ,so once you click on the command button ,you don't need to repeat click until the button turn to green color .