

APAHCE5 USV

Operation Manual

July, 2017

The logo for Geodesical, featuring the word "Geodesical" in a light blue, sans-serif font. A light blue orbital ring is positioned around the letter "G".

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1. Introduction



APACHE 5(USV) is composed of Control unit, Lithium battery, thruster, wireless bridge, radio module, RTK receiver and D230 echo sounder. The shore-based system is composed of RTK base, control computer, wireless bridge, remote control. And the software contains MissionPlanner, VCOMM316, Hydro Sounder, Hydro Survey.

2 Connection of Hardware

2.1 Preparation

Charge the battery of RTK receiver and controller of rover. If users use accumulator for power supply of base, please charge accumulator and make sure that battery level is high.

Charge the remote control.

Charge lithium battery of APACHE 5 with B6 Multi-functional charger. As shown below:



Press **Batt Type** to switch battery type to be Program Select LiPo BATT.

Press **Enter** to enter LiPo BATT. Two types are selective: LiPo CHARGE and LiPo BALANCE (Recommended).

Select **LiPo BALANCE**, and press **Enter** to set max electric current and voltage.

Use left arrow and right arrow button to change currency (Recommended value: 2.5A)and voltage(Recommended value: 3.7V).

Long press **Enter**, the LCD screen will display **CANCEL(STOP)** and **CONFIRM(ENTER)** after a beep, press **Stop** to stop charging or **Enter** to continue charging. While charging, the LCD will display the current, charging duration and battery level. Press **CANCEL(STOP)** to stop charging if battery level is full.

Note: The voltage of LiPo is 3.7V(refer to the label on body), select corresponding voltage while charging.

2.2 RTK Base Setup

Set base receiver, DL6 Datalink, Datalink antenna and tripod on the control point. And set base as external radio mode to send correction data, and configure the radio of rover to receive the correction data from base to get a high accuracy position (Horizontal: 1cm+1PPM, Vertical: 2cm+1PPM).



Accuracy check of rover: Check the measured GNSS position with the known position. If the accuracy passes, then go to next step.

Put rover on APACHE 5, set NMEA 018-GPGGA output(Baudrate 9600). CHC

smart GNSS receiver support web UI, users can access to the web UI by the WIFI of receiver.

- WIFI name is GNSS-SN, password 12345678.
- Web address is 192.168.1.1
- User Name: admin
- Password: password

Then go to IO Configuration and set NMEA output through serial port.

2.3 Installation of APACHE 5

1. Installation of hardware:

Fix the two balance wings to the two sides of body with four screws.

Fix the 18.5V battery to board with the belt in the cabin and connect the XT60 to the interface of body.

Connect the 14.8V battery with echo sounder with XT60 interface.

2. Self-Check

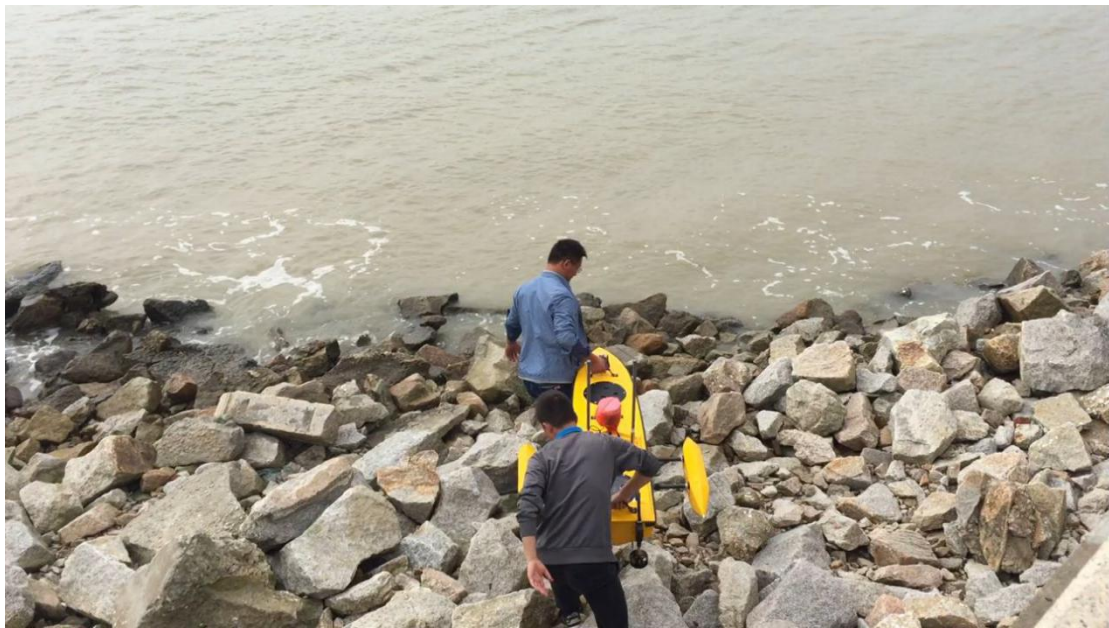
Long press the power button of remote control to turn it on, and turn the button of body to be on.

After a beep, turn the right button to be on.

Push the left rocker up and down to check whether the propeller works or not.

Push the right rocker left and right to check whether the thruster works or not.

Finish checking, close the covers and put APACH 5 to the water, and use remote control to drive to safe area(Slow flow, depth is deeper than 0.5m, distance from shore is longer than 5m, distance from remote control is less than 100m).



3 Software

3.1 Mission Planner

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Usually, users design the work area indoor and save the mission as .waypoint.


Run Mission Planner, click **FLIGHT PLAN**, right click on the map--> Draw Polygon
--> Add polygon point--> Click the edge points, distance from shore longer than 5m.

Mission Planner 1.3.39 build 1.1.6058.19622 ArduRover v3.0.1 (2279c20e)

FLIGHT DATA | FLIGHT PLAN | INITIAL SETUP | CONFIG/TUNING | SIMULATION | TERMINAL | HELP | DONATE

COM8 | 57600 | DISCONNECT

Distance: 0.0000 km



Waypoints

WP Radius: 3 | Loiter Radius: 0 | Default Alt: 100 | Relative | Verify Height | Add Below | Alt Warn: 0 | Spline

Command	Lat	Long	Alt	Delete	Up	Down	Grad %	Angle	Dist	AZ		
WAYPOINT	0	0	0	0	10.1284131	123.7307739	0	X	0	0	0	0

Action

UTM: 51P
594929.864
1134602.909
0.00m

Grid | View KML

GoogleSatelliteMap

Status: loaded files

Load W/P File

Save W/P File

Read WPs

Write WPs

Home Location

Lat: _____
Long: _____
Alt (abs): _____

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FLIGHT DATA | FLIGHT PLAN | INITIAL SETUP | CONFIG/TUNING | SIMULATION | TERMINAL | HELP | DONATE

COM8 | 57600 | DISCONNECT



FAILSAFE
Error pos vert variance

AS 0.0
GS 0.0
Manual 0>0

Bat 25.74v 0.0 A 100% EKF Vibe GPS: No GPS

Quick | Actions | PreFlight | Gauges | Status | Servo | Telemetry

Altitude (m): -2.80 | GroundSpeed (m/s): 0.00

Dist to WP (m): 0.00 | Yaw (deg): 36.49

Sat Count: 0.00 | DistToMAV: 0.00

hdop: 100.0

Sats: 0 | Current Heading | Direct to current WP | Target Heading | GPS Track (Black)

0.0017 Google - Map data ©2017 Terra Atlas - Imagery ©2017 TerraMetrics

GEO | 0.000000 0.000000 -2.80m | Tuning | Auto Pan | Zoom 16.0



Right click mao --> Auto WP --> Simplegrid ,

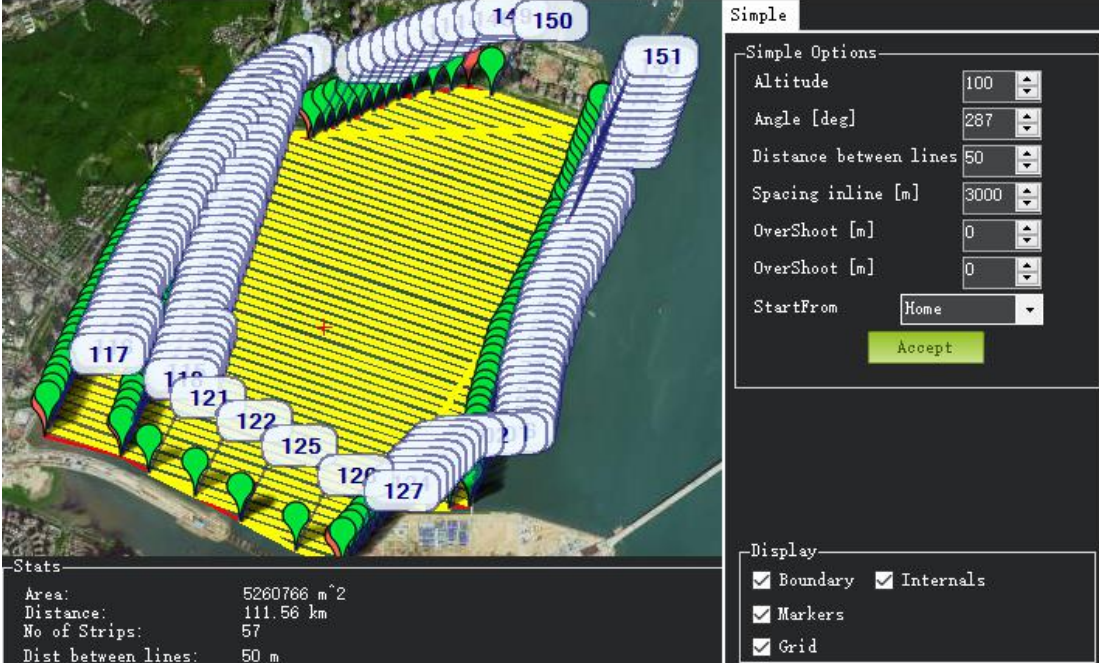
Angle defines the course.

Distance between lines defines the distance between two adjacent lines.

Spacing inline defines the distance between two waypoint.

Accept.

Grid
— □ ×



Stats

Area: 5260766 m²
 Distance: 111.56 km
 No of Strips: 57
 Dist between lines: 50 m

Simple

Simple Options

Altitude: 100

Angle [deg]: 287

Distance between lines: 50

Spacing inline [m]: 3000

OverShoot [m]: 0

OverShoot [m]: 0

StartFrom: Home

Accept

Display

Boundary Internals

Markers

Grid

Click **Save WP File** to save as .Waypoint for future use.

Connect MP radio datalink to USB port of PC, and check the COM port in device manager.

Run Mission Planner, select corresponding COM and baudrate and click connect.

Click **FLIGHT PLAN** --> Load WP File, and select the uploaded file. As shown below:



Note: Please make sure that Home point and last point meet the requirement of safety standard.

Click Write WPs.

Click **FLIGHT DATA**.

If mission starts from point 1 under auto mode, please click restart mission plan, the value marked red will change to be 0>1. If mission starts from other points (Not point 1), please click menu 0(Home), select start point, and set waypoint, the value marked red will be 0>No.(The No. of selected point).



3.2 Data Communication

Set up wireless bridge and supply power by POE with 18.5V battery. Connect the other cable to the ethernet port of PC (Note: the IP address of PC is 192.168.1.18, gate way is 192.168.1.1)

Run VCOMM, change the TCP protocol to be RS -232 protocol, and check the position data and depth data.

3.3 camera

Step 1, open the explore, insert the web address: 192.168.53.64;

Step 2, insert the username: admin, and password: admin1234;

Step 3, Log in