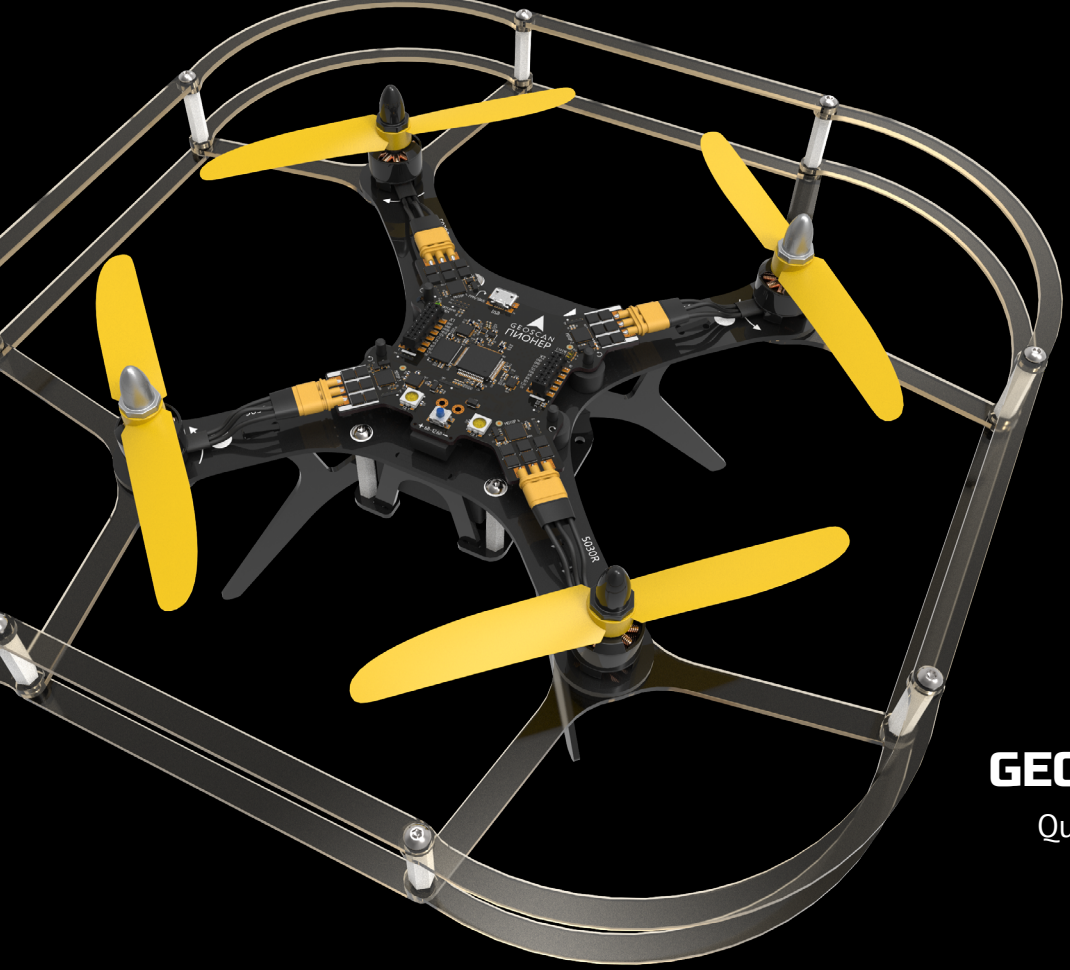

GEOSCAN PIONEER

Quadcopter Assembly and Operation Manual

Ver. 2.0

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Community

Join Pioneer users community.

Get the latest news and updates.

Share your stories, ask questions.

Get comments and tips from product engineers.

Participate in competitions and win prizes.

Help the engineers make the product even better – give us your feedback and comments.

Join us!

YouTube Geoscan Pioneer channel.

Vkontakte community.

Instagram account.

Geoscan.aero forum.

Pioneer page at Geoscan website www.geoscan.aero/ru/pioneer/

Introduction

Congratulations on your purchase of Geoscan Pioneer assembly kit! This kit is the base kit for a range of products. Using additional modules produced by Geoscan, you can create various copter designs, perform flights in manual control mode and autonomous flights according to the programmed flight task.

The company is constantly working on creating new additional modules that expand the capacities and the scope of use of Pioneer quadcopter.

The features of additional modules and systems are described on the website of the company «Geoscan» and in the documentation.

Pioneer kit description, specification and figures included in the manual are relevant at the date of publication. Geoscan company reserves the right to change the product design and specification without notice.

Pioneer quadcopter is a highly engineered product. For safe and fault-free operation, the rules set out in the Safety Guide must be strictly observed.

When using the quadcopter, the requirements of current legislation regulating the use of airspace, photo and video survey using quadcopters, and the disposal of hazardous waste, must be strictly observed.

This manual will help you to assemble the quadcopter, keep it in working conditions and master the basic methods of piloting in manual control mode.

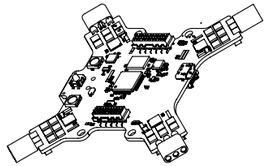
In the box:

Propellers

RH rotation propeller (4 pc.)

LH rotation propeller (4 pc.)

Main board



Protection

Protection arch (8 pc.)

Protection bar (8 pc.)

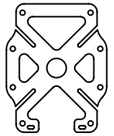
Protection base (4 pc.)

USB cable

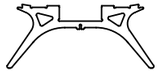
Frame

Battery compartment back plate

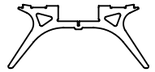
Frame base



Battery compartment cover



Landing gear (upper part)



Landing gear (lower part)

Frame fixings

Studding nut (metal, short) (6 pc.)

Studding nut (long) (6 pc.)

Studding nut (short) (6 pc.)

Screw M2x4 (12 pc.)

Screw M3x5 (6 pc.)

Screw M3x10 (12 pc.)

Screw M3x4 (6 pc.)

Damper (4 pc.)

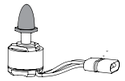
Protection fixings

Studding nut (long) (12 pc.)

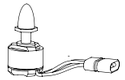
Screw M2x6 (12 pc.)

Screw M3x10 (24 pc.)

Motors

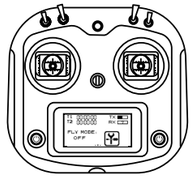


RH rotation motor (2 pc.)

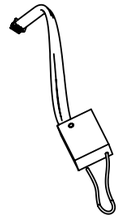


LH rotation motor (2 pc.)

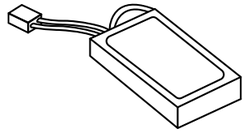
Remote control unit



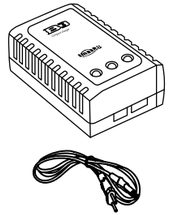
Receiver



Li-Po battery 7.4 V 1300 mAh (2S)



Charger with power cord

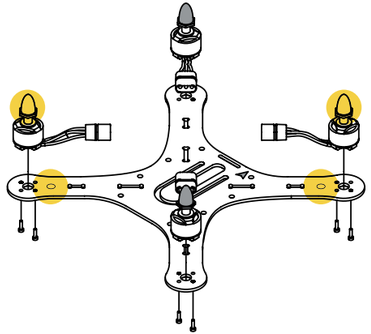


Tools

HEX 1.5×50 screwdriver

HEX 2.0×50 screwdriver

Quadcopter Assembly

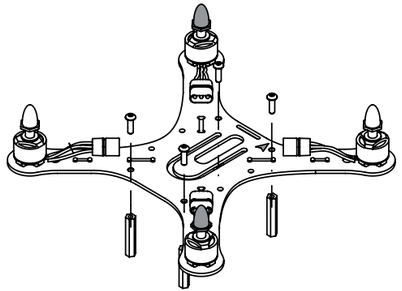


Prior to assembling the quadcopter, prepare a convenient workplace. The kit includes many small parts, so take care not to lose them when assembling.

Step 1

Prepare: Frame base, RH rotation motor - 2 pc., LH rotation motor 2 pc., screw M2x4 - 8 pc.

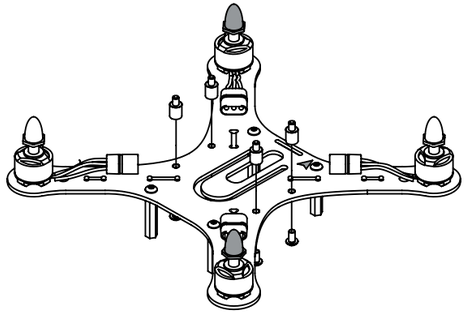
The places to install the motors with silver nuts are marked with white circles on the frame base. Following the color marking, install the motors on the frame base and secure each motor with two screws, placing the screws diagonally.



Step 2

Prepare: the unit assembled at Step 1, studding nut (long) - 4 pc., screw M3x10 - 4 pc.

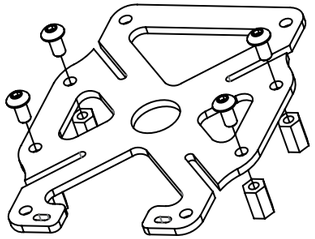
Install studding nuts on the frame base opposite to the motors and fix them using screws M3x10, as shown in the figure.



Step 3

Prepare: the unit assembled at Step 2, damper - 4 pc., screw M3x10 - 4 pc.

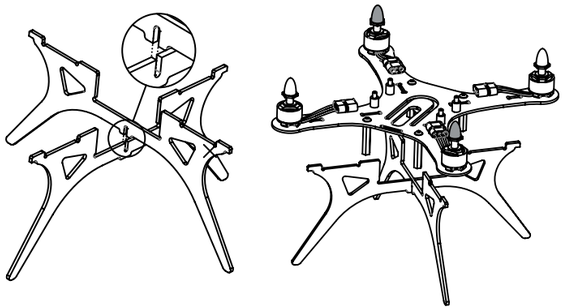
Install the dampers onto the frame base at motor side and fix them using screws M3x4, as shown in the figure.



Step 4

Prepare: battery compartment cover, studding nut 8 mm - 4 pc., screw M3x5 - 4 pc.

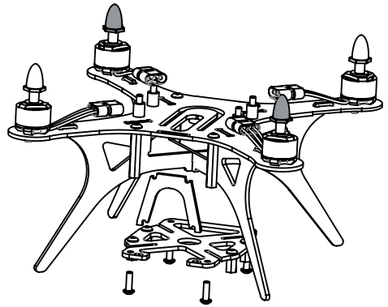
Using screws M3x5, fix studding nuts at the battery compartment cover, as shown in the figure. These studding nuts can be used to install additional modules.



Step 5

Prepare: the unit assembled at Step 3, landing gear (upper part), landing gear (lower part), battery compartment back plate.

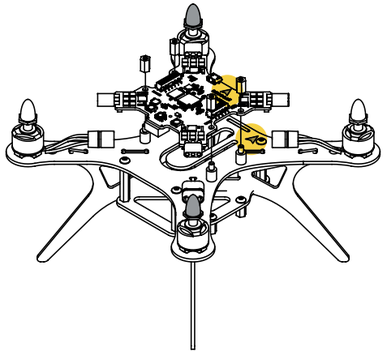
Install landing gear and battery compartment back plate into corresponding slots on the frame base.



Step 6

Prepare: the unit assembled at Step 4, the unit assembled at Step 5, M3x10 screws.

Using M3x10 screws, couple the unit assembled at Step 4 with the one assembled at Step 5 as shown in the figure.



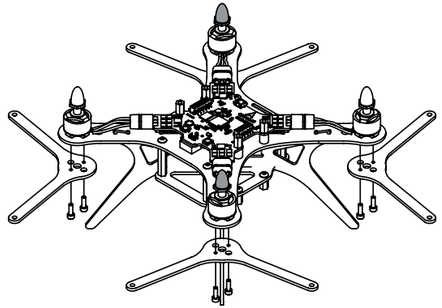
Step 7

Prepare: the unit assembled at Step 6, studding nut (metal, short) - 4 pc., main board.

Place the board onto the dampers so that the arrows on the board coincide with the ones on the frame base.

Secure the board using studding nuts.

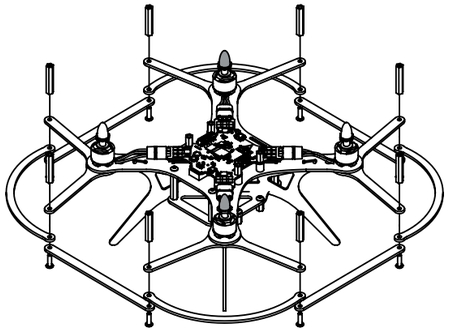
Plug motor connectors into corresponding connectors on the board. The connectors have a guide pin to observe the polarity, be careful not to exert excessive force when plugging the connectors.



Step 8

Prepare: the unit assembled at Step 7, protection base - 4 pc., screw M2x6 - 8 pc.

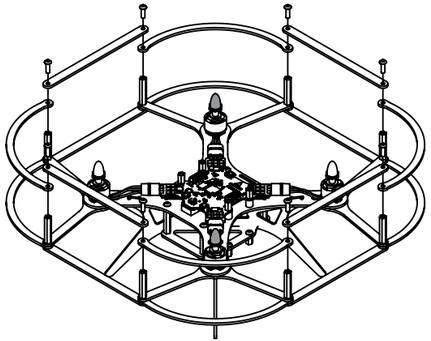
Install the protection bases and fix them using screws M2x6, as shown in the figure.



Step 9

Prepare: the unit assembled at Step 8, protection arch - 8 pc., protection bar - 8 pc., screw M3x10 - 8 pc., studding nut (long) - 8 pc.

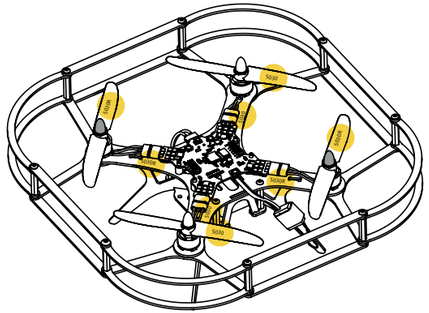
Using M3x10 screws, secure protection arches, protection bars and studding nuts on protection bases, as shown in the figure.



Step 10

Prepare: the unit assembled at Step 9, protection arch - 8 pc., protection bar - 8 pc., screw M3x10 - 8 pc.

Using M3x10 screws, secure protection arches and protection bars on studding nuts as shown in the figure.

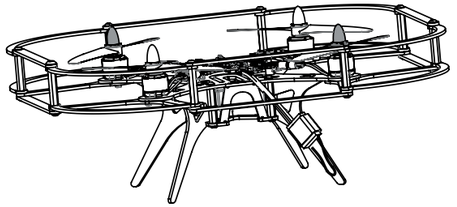


Step 11

Prepare: the unit assembled at Step 10, propeller 5030 - 2 pc., propeller 5030R - 2 pc.

Attention: the black nuts have a left-hand thread! Propeller labels (5030 or 5030R) must correspond to labels on the frame.

Remove the nuts from the axes of the motors, install the propellers (labels should be on top) and secure them with nuts. The silver nuts are tightened clockwise (right-hand thread), the black nuts are tightened anticlockwise (left-hand thread).



Step 12

Prepare: the unit assembled at Step 11, receiver (is packed with the remote control unit).

Using elastic ring, secure the receiver on the landing gear. Plug the cable connector into the PPM connector on the main board (PPM connector is located under the micro-USB connector).

The quadcopter is ready for operation!

Control

In manual mode, the quadcopter is controlled using a remote control unit operating via the PPM protocol. FlySky i6S control unit is included into standard delivery.

For the detailed description of remote control unit controls and features, refer to the manual for the remote control unit. In this manual, only controls needed to perform the Pioneer flight are described.

In order to prevent accidental deactivation of the control unit during the flight of the quadcopter, the control unit is switched on and off only when the two buttons are pressed simultaneously.

The basic control of the quadcopter is carried out by means of two spring-loaded sticks. The left stick (throttle-heading) controls quadcopter ascent, descent and rotation around vertical axis, the right stick (roll-pitch) is responsible for the slope of the quadcopter around the horizontal axes.

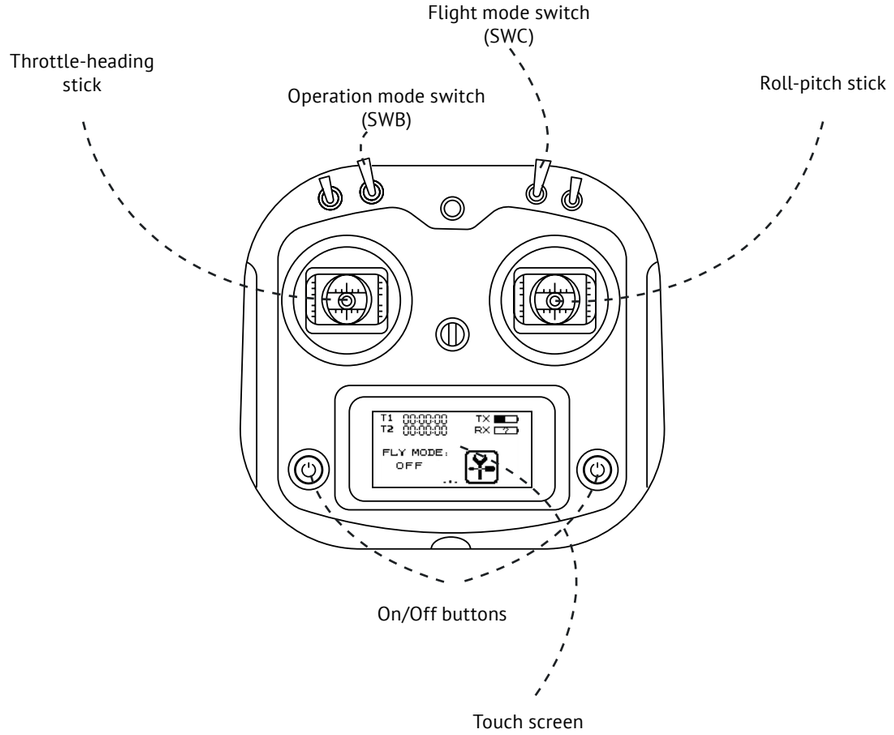
The mode switch has three positions. When turning the remote control on, the mode switch (and all other switches) must be in up position. If the control unit is turned on when the switches are in a different position, a warning message appears on the control unit screen accompanied by a beep.

Warning! Place all switches in their up position!

To master the methods of quadcopter control one can use PicaSim freeware (http://www.rowlhouse.co.uk/PicaSim/), which allows to perform the flight on a PC screen. In order to use the software, the control unit is connected to the PC via USB cable. The cable is supplied with the remote control unit.

The control unit supplied with the quadcopter is ready for operation without any additional configuration or binding.

In the case of using a quadcopter and a remote control unit from different packages, it is necessary to bind the remote control unit to the quadcopter receiver and perform remote control unit setup.



Battery installation

Open battery compartment cover.
Place 4 AA batteries into battery compartment, observing the polarity.
Close battery compartment cover.

Binding the control unit to the receiver

1. Switch remote control unit on. To do this, press two power buttons simultaneously and hold them down until the remote control unit screen is turned on.

2. Press the icon on the touch screen to open settings menu.

3. Select Rx Bind item at SYSTEM tab. “Binding to RX...” appears.

4. Press and hold “BIND” button down on the receiver.

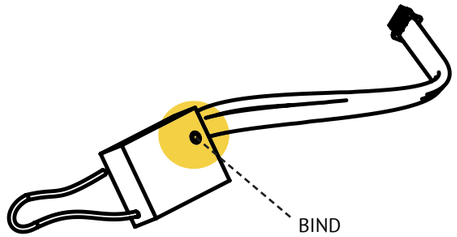
5. Holding the button down, power the quadcopter.

6. Exit the Rx Bind setting mode by pressing the icon on the touch screen.

If the binding is successful, the quadcopter should beep.

In case there is no beep, try to repeat the binding procedure or contact technical support.

The binding procedure described above is valid only for FlySky-A8S receiver.



Remote control unit setup

1. Switch the remote control unit on. To do this, press two power buttons simultaneously and hold them down until the remote control unit screen is turned on.

2. Press the icon on the touch screen to open settings menu.

In the settings menu there is a FUNCTION tab, in which the control unit is configured, and also a SYSTEM tab, in which the model controlled by the remote control unit is set up.

Set the following parameters in the FUNCTION tab:

1. REVERSE → Ch2 and Ch4–Rev

2. AUX. CHANNELS → Channel 5 → ⊘ → In CH TYPE window select SWx switch type → press SwA, and select SwC in pop-up menu.

3. AUX. CHANNELS → Channel 6 → ⊘ → In CH TYPE window select SWx switch type → press SwA, and select SwD in pop-up menu.

4. AUX. CHANNELS → Channel 7 → ⊘ → In CH TYPE window select SWx switch type → press SwA, and select SwB in pop-up menu.

At SYSTEM tab:

1. OUTPUT MODE → Output → PPM

2. STICKS MODE → M2 (Mode 2)

Press the icon on the touch screen to exit setting mode.

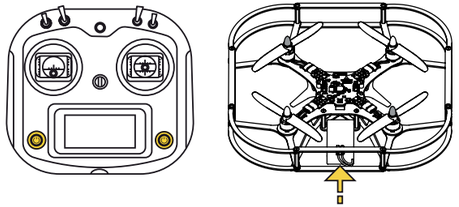
Preparation for flight

When using the quadcopter, the requirements of current legislation regulating the use of airspace, photo and video survey using quadcopters must be strictly observed.

There should be no people or animals in the flight zone.

Keep the quadcopter in sight.

No flights near power lines, cell poles, crowded places, railways and highways are allowed.



Fully charge the quadcopter battery. Charge the battery according to the instructions given at page 24. Do not leave the battery connected to the charger unattended.

Inspect the quadcopter to make sure that there are no mechanical damages. Tighten the fixing screws, if necessary.

Insert the battery into the compartment at the bottom of the quadcopter, gently pushing the battery until bumping.

Switch the remote control unit on. To do this, press two power buttons simultaneously and hold them down until the remote control unit screen is turned on. The remote control unit battery level is shown in the upper right corner of the screen. Make sure that the battery level is sufficient to complete the flight.

Plug the battery connector into the power connector on the quadcopter board. The connectors have a guide pin to observe the polarity. Be careful not to exert excessive force when plugging the connectors, so as not to break the guide pin.

Important! To prevent uncontrolled action of the quadcopter, the remote control unit should always be turned ON before powering on the quadcopter, and off – AFTER turning off the power of the quadcopter.

Control and flight modes

The quadcopter can perform the flight both in control from the remote control unit, and in automatic mode according to the program.

To select the remote control unit mode set SwB switch to the upper position.

When using the navigation system or GPS (for this, corresponding optional module has to be installed on the quadcopter), automatic position hold mode can be used. To select this mode set SwB switch to the central position. The flight is controlled from remote control unit.

To perform automatic flight according to the program, SwB switch should be set to lower position. During programmed flight, the pilot can always switch to manual control mode by setting SwB switch to upper position.
When controlling the quadcopter from the remote control unit, one of three flight modes can be chosen. Flight mode is selected by SwC switch.

Stabilization mode (SwC switch in upper position)

Throttle stick controls motor power.

Altitude hold mode (SwC switch in central position)

The quadcopter holds the altitude automatically, vertical speed in controlled by throttle stick. When throttle stick is in central position, the quadcopter holds the altitude. When the stick is moved up, the quadcopter starts the ascent. The more the stick is moved, the higher the speed of quadcopter ascent. When the stick is moved down, the quadcopter starts the descent.

Altitude and heading hold mode (SwC switch in lower position)

When starting motors, the direction in which the quadcopter is oriented is fixed.

The altitude is controlled as in previous mode. The quadcopter can be rotated by yaw angle. Forward/backward and left/right movements are performed relative to stored initial direction.

Flight

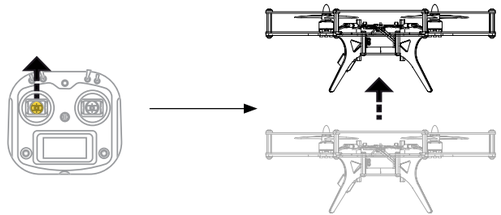
To start the propellers, move the left stick (“throttle/heading») to the right and down, and hold it in this position until the propellers start.

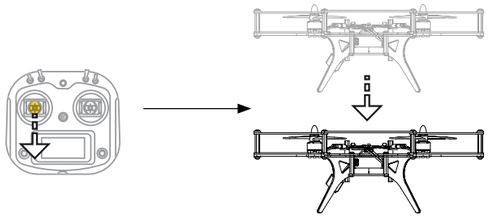
Perform the flight, controlling the quadcopter by sticks and mode switch.

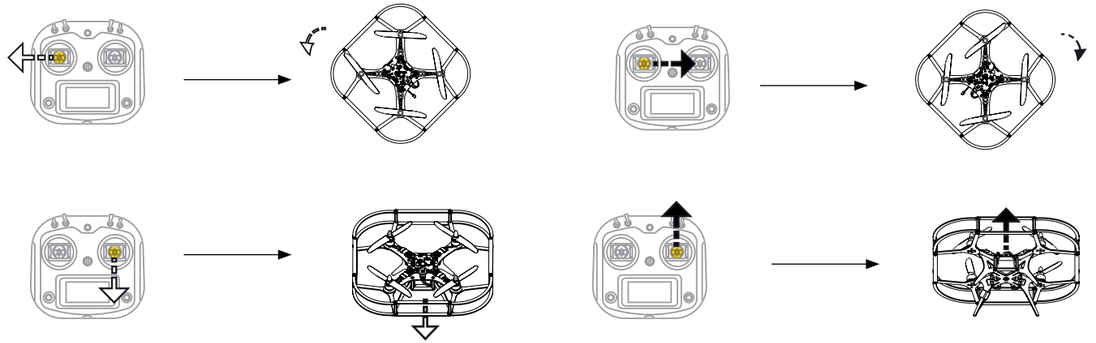
After landing, stop the propellers by moving the left stick (“throttle/heading») to the left and down, and hold it in this position until the propellers stop. During the flight, the battery, motors and other parts of the quadcopter can become hot. Be careful.

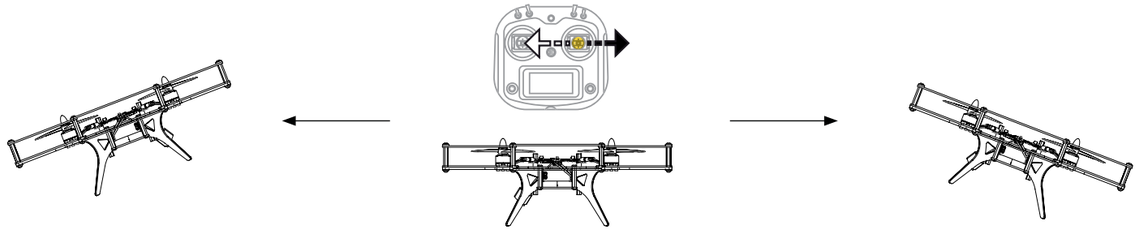
After completing the flight, turn off the power of the quadcopter. Carefully unplug the battery connector from the power connector on the board.

Switch the remote control unit off. To do this, press two power buttons simultaneously and hold them down until the remote control unit screen is turned off.









Expand quadcopter functionality by using optional modules.
At present, the following optional modules for Pioneer quadcopter have been developed by Geoscan company:

GPS/GLONASS module
(for outdoors autonomous flight)

OpenMV programmable camera
(for onboard image processing)

Load engagement module
(for metal payload moving)

USB radio modem
(for remote data exchange)

Photo & video camera
(ideal both for aerial survey training and for obtaining high-quality photos and video).

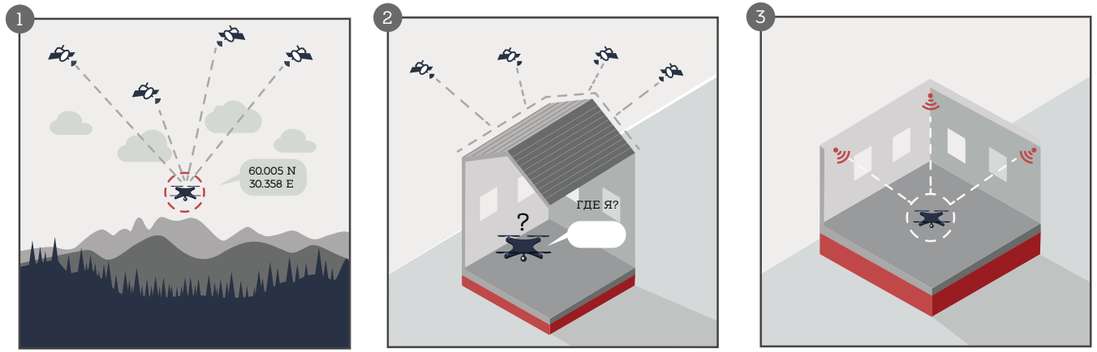
LED module
(allows to display information and quadcopter status and create visual effects).

Get new functionality.

Follow the updates at https://www.geoscan.aero/ru/products/pioneer/.

Update quadcopter firmware using the latest firmware version and the manual on update available on the website.

Learn more about Geoscan indoors ultrasonic navigation system allowing to make autonomous flights in the absence of GPS signals.



Storage, transportation and disposal

Before storing remove the battery from the quadcopter and the batteries from the control unit.

Keep the quadcopter in a dry place, away from heat sources, in a package that prevents mechanical damage. The factory packaging, in which the parts for quadcopter assembling are supplied, makes it convenient to place the assembled quadcopter in the box. Keep the original packaging for convenient transportation and storage.

The product contains plastic parts, electronic components and chemical power supplies. The components of the product at the end of service life should be disposed of in accordance with local legislation.

Li-Po batteries usage

Important! Do not dispose Li-Po batteries in household waste containers. Incorrect disposal of used power supplies can be hazardous to the environment. Dispose Li-Po batteries in accordance with local regulations, taking them to the nearest hazardous waste collection facilities.

To charge the quadcopter battery, use the charger provided.

Do not attempt to charge the battery with a charger that is not intended to charge such batteries, as this can lead to unpredictable consequences and fire!

Charge the battery on a non-flammable and non-conductive pad.

Do not leave the battery connected to the charger unattended.

Monitor battery temperature during charging. If the battery becomes extremely hot, immediately disconnect it from the charger.

If the battery was stored or transported at low temperature, it is necessary to let the battery to take up the room temperature before charging.

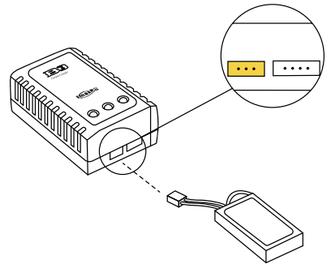
Forced battery warm-up is inadmissible!

Battery charging

1. Connect the charger to AC power supply 110-240 V. If the charger is working properly, three LEDs will light up green.

2. Carefully plug battery connector into corresponding charger connector. The charger allows to charge 2- or 3-element batteries. To charge 2-element Pioneer battery use the three-pin connector. The connectors have a guide pin to observe the polarity. Be careful not to exert excessive force to the connectors, so as not to break the guide pin. If all the LEDs are green, the battery is charged, no additional charging is needed. If one or two LEDs are red, it means that charging has started.

3. When the battery is fully charged, all the LEDs turn green.



Battery storage

Store the batteries at room temperature, in a dry, fire-safe place.

It is recommended to store Li-Po batteries partially discharged. Optimal voltage for battery storage is 7.4 V. The voltage can be checked by connecting the quadcopter to the PC. If it is not possible to measure the battery voltage, to store the battery charge it completely and then partially discharge it by running the motors of the quadcopter for 3-5 minutes. When storing batteries for a long time, check the battery approximately every three months and recharge it, if necessary.

If something goes wrong

- **The quadcopter falls to the side when trying to take-off.**
  Be sure that the motors and the propellers are mounted properly. The motors and the propellers should be mounted according to the marking on the frame.

- **When giving throttle, the propellers rotate, but the quadcopter does not take off.**
  Be sure that the propellers are mounted properly. The propellers should be mounted according to the marking on the frame. The propeller labels should be on top.

- **When starting the motors, one or more motors do not rotate.**
  Check motor cables connections.

- **When starting the motors from the remote control unit the quadcopter does not react in any way.**
  Check the remote control unit settings. Perform receiver binding procedure.

- **Quadcopter has poor control response.**
  Make sure the quadcopter and the remote control unit batteries are charged.

- **When connecting the battery the quadcopter does not react in any way.**
  The battery may be low. Try to check the voltage. The voltage should not be lower than 6.4 V. Try to use a different battery.

- **Heavy quadcopter vibration in flight.**
  Be sure that the frame, the protection and the main board are mounted properly.

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