



Geoscan Lite

User Manual

Updated on February 15, 2024

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Introduction

Thank you for choosing Geoscan Lite UAV!

This manual is designed to describe UAV structure and the operating rules. We highly recommend to read the manual carefully before using UAV.

If you have any questions about UAV, technical service and repair, please contact our support: <https://www.geoscan.ru/en/support>.

We always glad to help you and answer any questions.

The information, specifications and pictures in this manual are relevant at the time of publication. Geoscan Group may change the UAV design or specifications without prior notice.

Do not make any changes to UAV structure by yourself. Any UAV damages or degraded specifications caused by structure changes are not covered by the warranty.

We always work to make our products better and add new features. You can always download the newest version of this manual from our website:

<https://www.geoscan.ru/en/products/lite>



This mark highlights important information and recommendations. It is necessary to follow these instructions for people and UAV safety.

Abbreviations List

GNSS	Global Navigation Satellite System
UAV	Unmanned Aerial Vehicle
USB	Universal Serial Bus

Main Information



Geoscan Lite UAV is designed to obtain georeferenced photos of objects and aerial photography. The aerial data can be used for:

- terrain evaluation;
- aerial photography with precise time stamps for georeferenced images;
- orthophotos and digital terrain models creation;
- altitude maps creation;
- 3D terrain models;
- volumetric calculation for quarries and fills.

Kit

- Geoscan Lite UAV
- UAV Transport Bag/Protective Case
- Launcher in Transport Bag
- Customized Camera
- Battery
- Radio Modem with Antenna
- Battery Charger
- Geoscan Planner Software
- Folding Rack
- Spare parts and accessories

Maintenance Service

Visually inspect UAV for a damage after each flight.

If propeller blades or fins are damaged, you can replace them by yourself using spare parts and tools from the kit.

If aircraft or system structural damages are detected, please contact службу технической поддержки.

After 80 flights it is recommended to send your UAV to the manufacturer for inspection and maintenance.

Storage

Geoscan Lite system (without battery) and launcher are recommended to be stored in transport bags and dry room at a temperature of +5 to +25 °C and relative humidity not more than 80% without any condensation.

Service life – 2 years.

Batteries should be stored in a cool and dry place without direct sunlight, at a temperature of +5 to +25 °C and a relative humidity of 80% without condensation.

The optimum temperature range – from 5 to 10 °C.

The optimum voltage level for placing the battery to storage: 15.12 V.

Service Life – 1 year.

Safety Rules

You should follow these rules for safe UAV using:

- UAV launch and maintenance can be held only by persons, who trained for Geoscan Lite unmanned aerial system operation and read this manual.
- Follow the dealer's and/or manufacturer's recommendations and instructions for use of the equipment, as given in this manual and received during operation period.
- It is necessary to inspect the flight area before the flight and make sure that the planned flight path passes not less than 100 m above the terrain and high-rise objects (mountains, towers, pipes, transmission towers, etc.).
- There should be no high objects in $\pm 30^\circ$ takeoff sector. Max safe height of an object should be no more than $0.2L$ if L is the distance from takeoff point.
- Do not launch the UAV if you detected any damage.
- Before straining the catapult rubber cords, make sure that the safety lock is plugged in. Safety lock must stay plugged in until the launch moment.
- After connecting the battery to the UAV it is prohibited to stay in the propeller blades plane of rotation;
- Don't exceed UAV's altitude, weight and flight time operational limits;
- Don't launch the UAV near high power radio transmitters;
- Don't allow unauthorized persons into the UAV launch area;
- Make sure that the UAV will land away from roads, power lines, ponds and crowded places. Remember about the possible drift of the parachute during the land;
- Avoid flying above crowded places.

Follow these operating precautions:

- Do not assemble or disassemble the UAV when the power is on;
- Do not stay near the propeller when the power is on;
- Installation and removal of the propeller's blades is allowed only when the power UAV turned off;
- Do not short circuit UAV battery.

To avoid damage to parts of the system:

- Transport UAV only in transport bag/protective case;
- Do not move UAV elevons manually;
- Hold the fuselage, when carrying UAV in the area of landing or launch;
- Remove the camera lens cap only before the aerial survey;
- In case UAV gets into the water, immediately disconnect the battery and dry all structural elements, wires, connectors, electronic equipment;
- Do not make any changes in UAV and launcher construction.

Operational restrictions

- Operating temperature range: -20 to +40 °C
- Max wind speed: 12 m/s

The aerial survey system is not intended for flights during rain, snow and other precipitation.

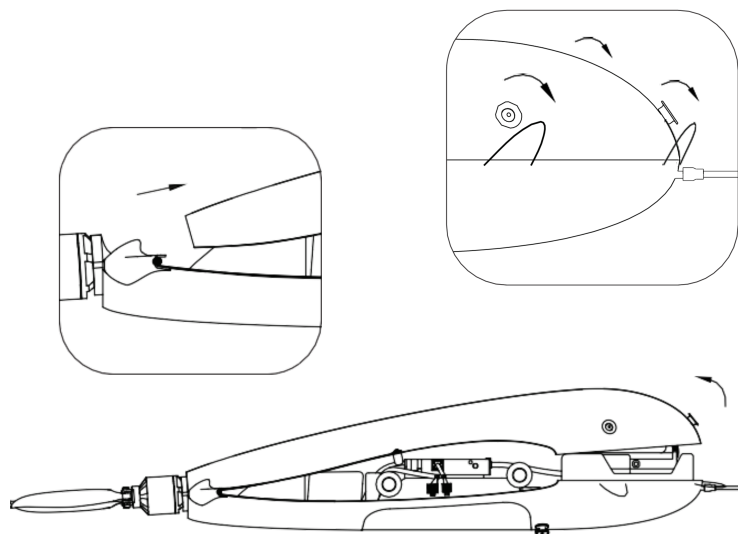
The UAV in can't fly below starting point altitude in automatic mode.

In mountains conditions, find the lowest point of the area for flight mission start. The entire flight route must pass above the starting point.

Assembly

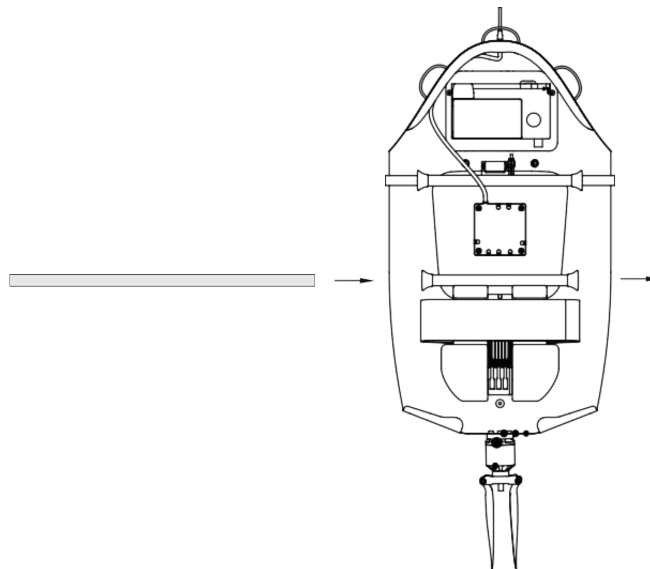
UAV Assembly

1. Take the Wings and Fuselage from the UAV transport bag.
2. Place the Parachute in the parachute compartment (see [Parachute](#) section for details).
3. Remove Fuselage Top Cover:
unclasp the rubber locks to unlock the cover;
Eject back of the cover from grooves.



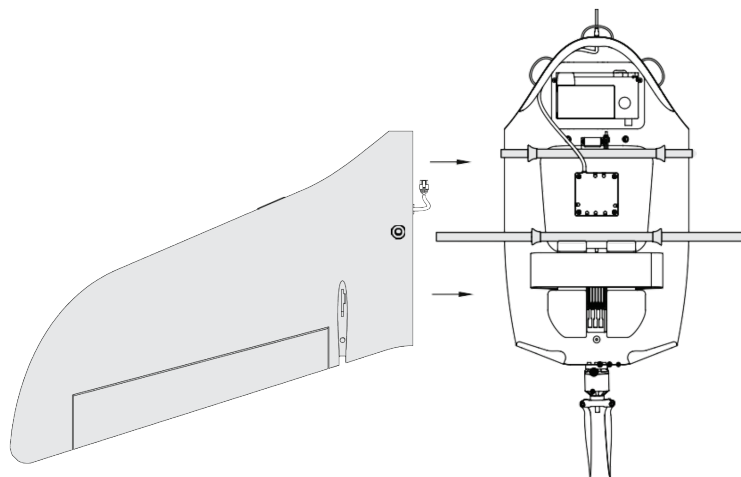
Fuselage Top Cover Removing

4. Insert Mounting Rod into the Fuselage Tube.



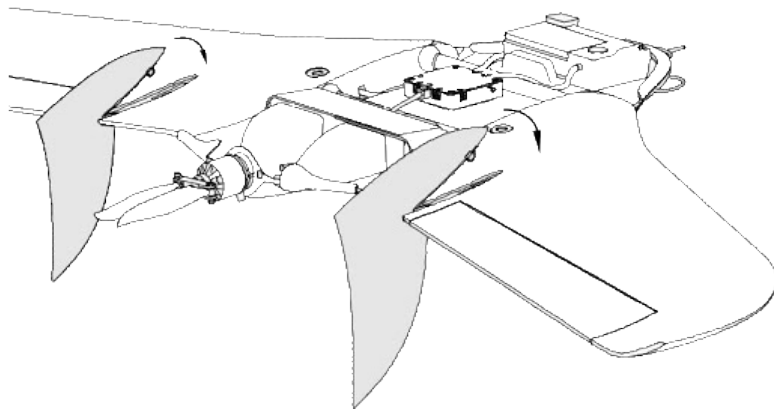
Mounting Rod inserting

5. Put the Wings on Mounting Rods and move them to fuselage.



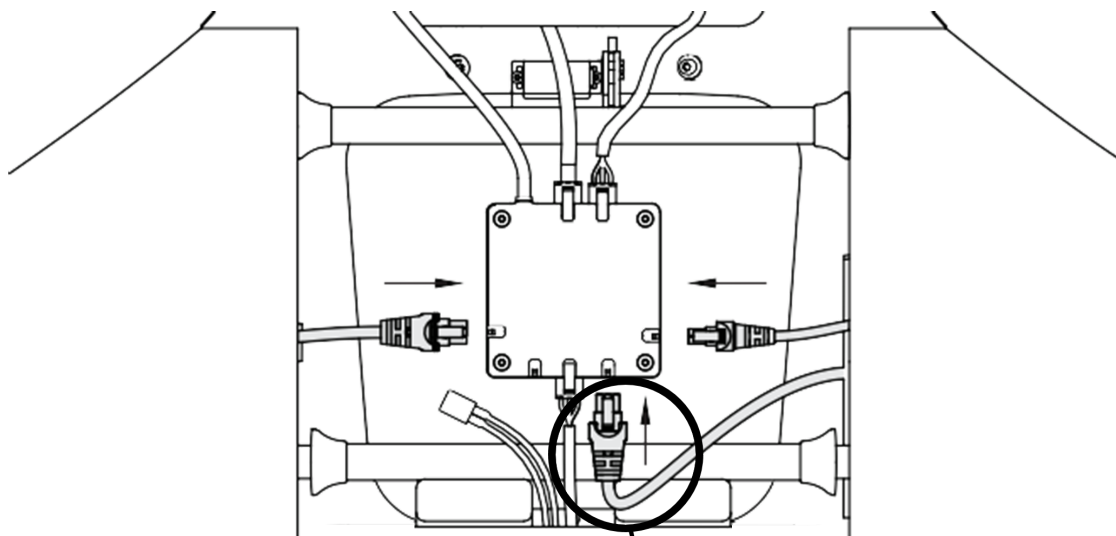
Wing installing

6. Attach Fins and fix them in place. Make sure the Fins are secured by magnets.



Installation of the fins

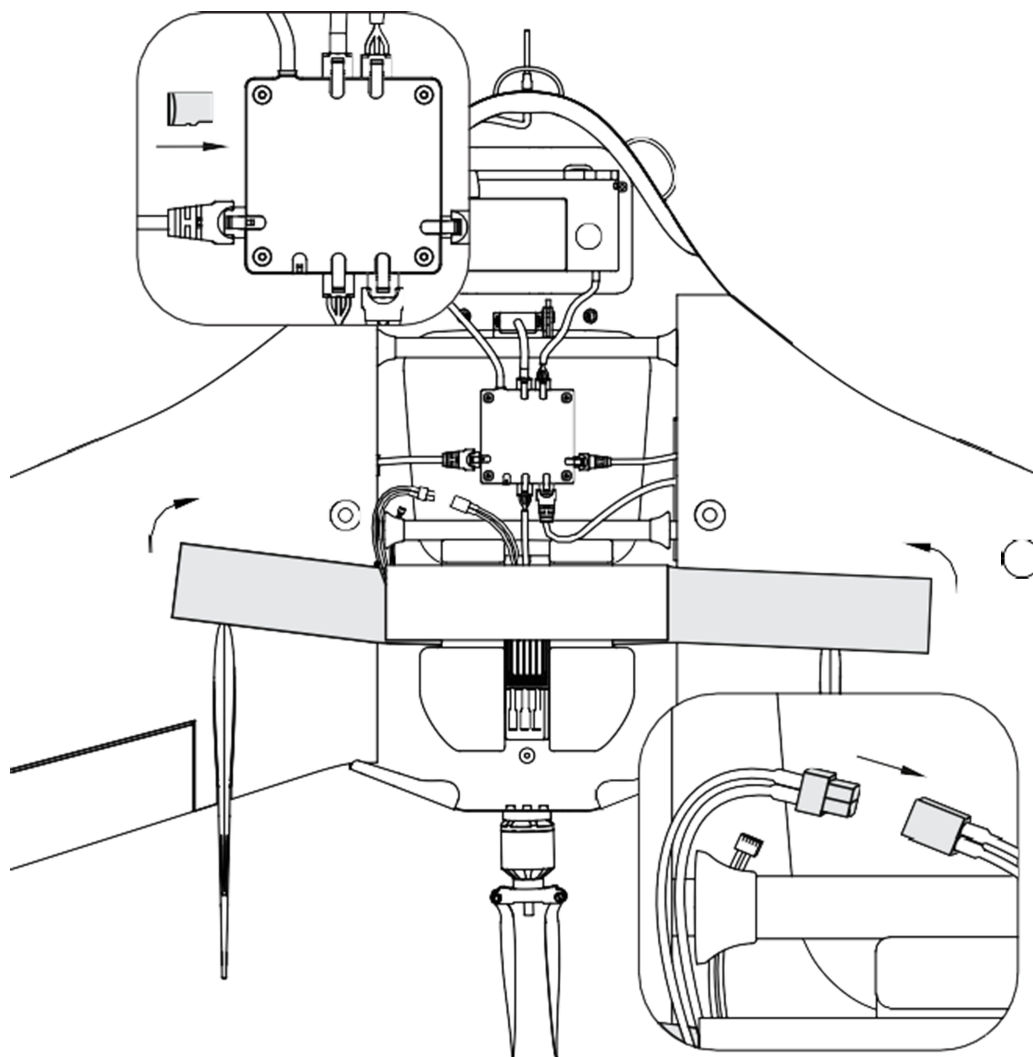
7. Connect wings' cable connectors into the appropriate slots in the autopilot. Connect GNSS receiver cable, if UAV delivery kit included this option.



GNSS Cable Connector

Cables connection

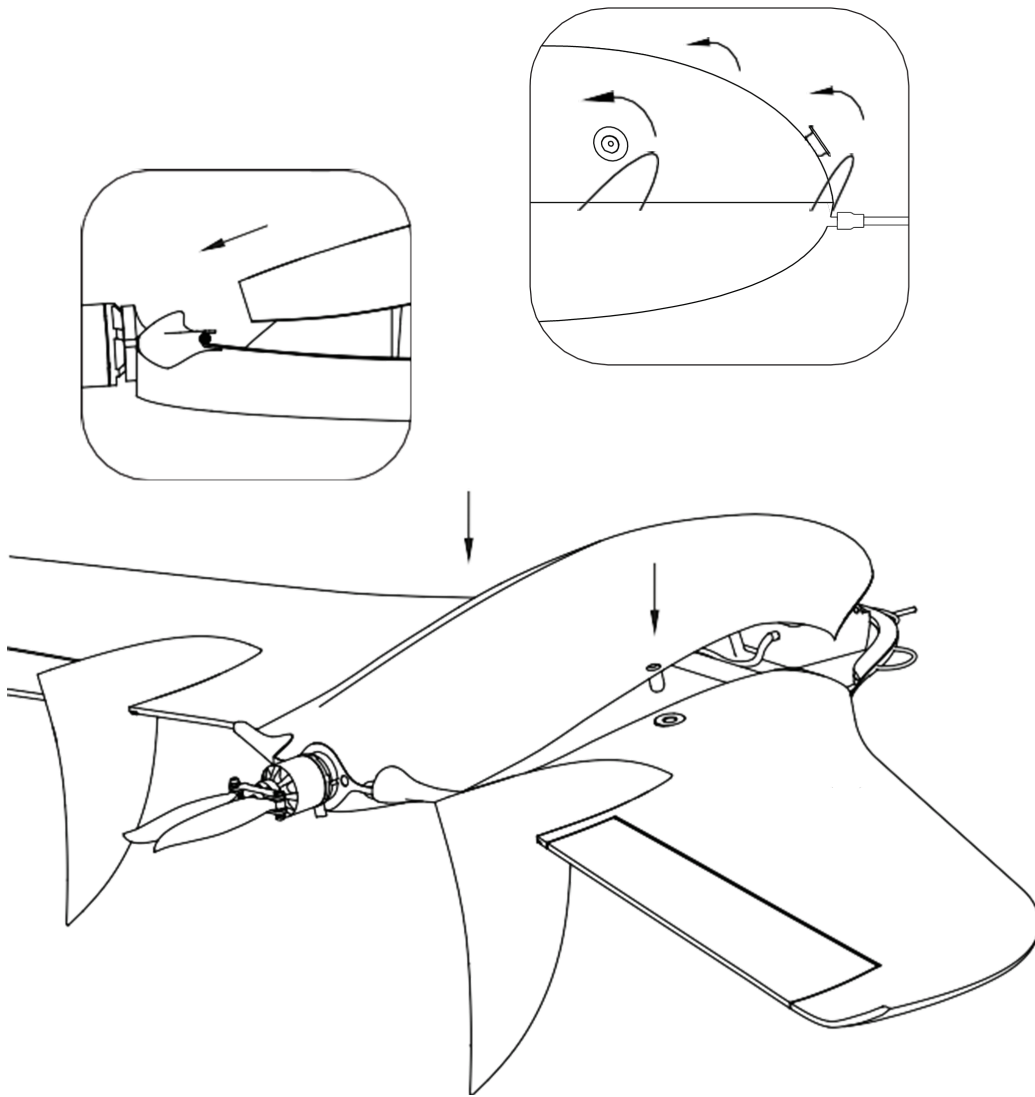
8. Remove memory cards from autopilot and camera. Format them and put back in slots.
9. Place and lock the Battery by textile clasp.
10. Connect power connector with the battery.



SD card and Battery installing. The Battery connection.

11. Set up the Camera (see [Camera Settings](#) section for details) Place Camera in UAV cradle.

12. Close the top cover and clasp the rubber locks.

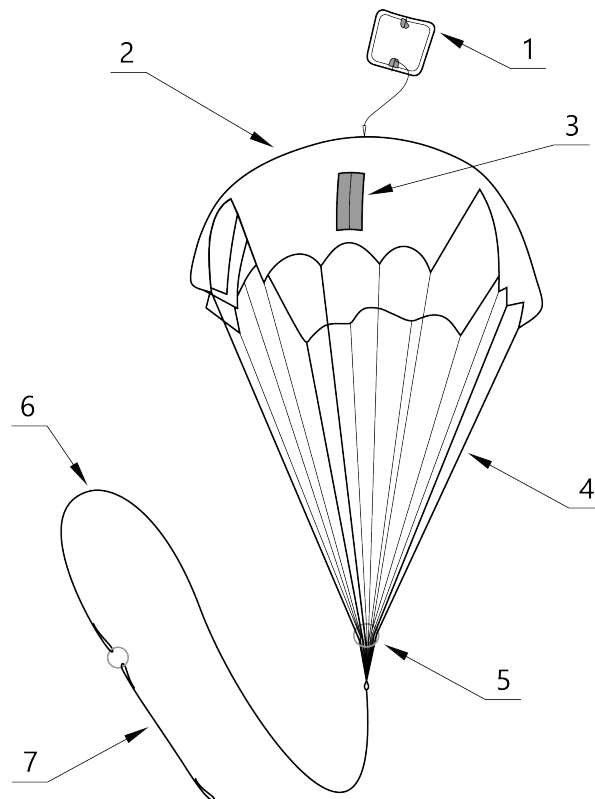


Fuselage Top Cover closing

UAV is ready for pre-launch check.

Parachute

Parachute components:



- 1. Parachute Compartment Cover
- 2. Parachute Dome
- 3. Rigging Lines' Pockets;
- 4. Rigging Lines

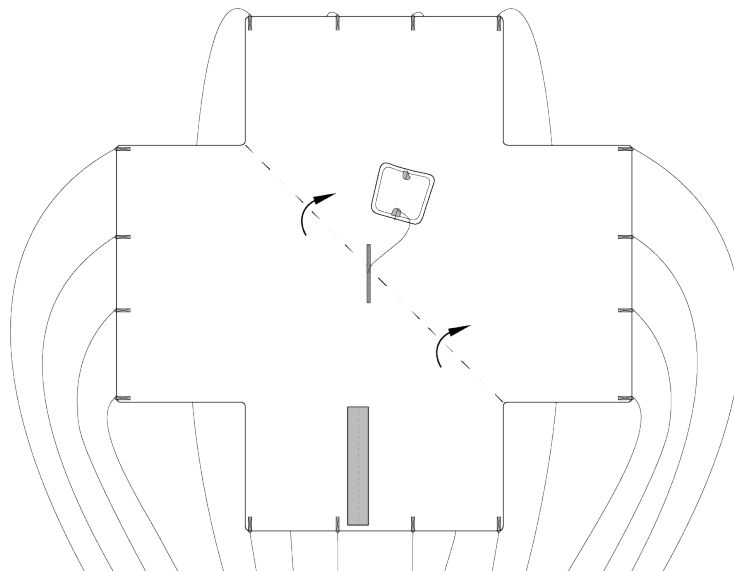
- 5. Locking Ring
- 6. Long Static Line
- 7. Short static line with unhook ring system

Parachute Folding



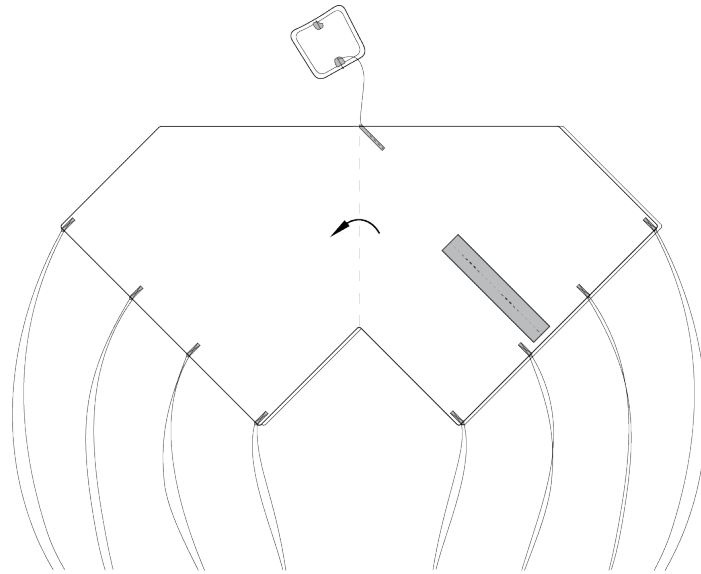
Make sure that the Parachute Dome, Rigging Lines and their attachment to the dome are not damaged before laying the Parachute. The Dome and Rigging Lines should be dry and clean. Repack the Parachute if the previous packaging is more than 10 days ago, or you were carrying UAV in an airplane.

1. Make sure that the Parachute doesn't have any damages.
2. Make sure the Rigging Lines are not tangled.
Make sure, that Rigging Lines are not tangled in the process of parachute laying.
Control Rigging Lines Pockets position. They must remain on the outside of the folded dome.
3. Smooth the Dome and fold it in half, aligning one side with other.



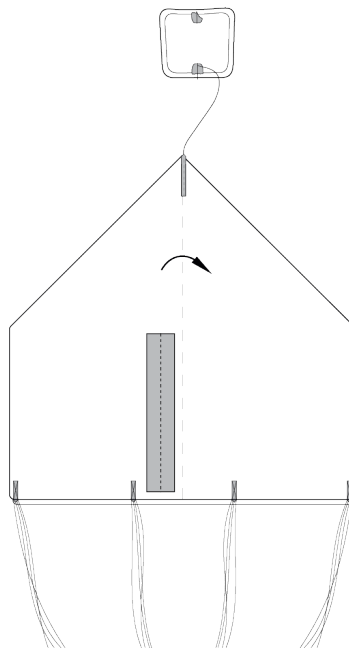
Folding the Dome in half

4. Fold the Dome in half and align the edges.



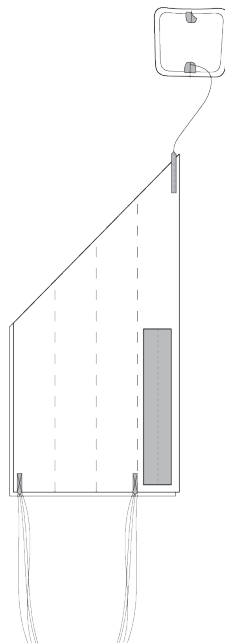
Folding the Dome in half second time

As the result, the Rigging Lines should be collected in 4 bundles with 4 rigging lines in each.



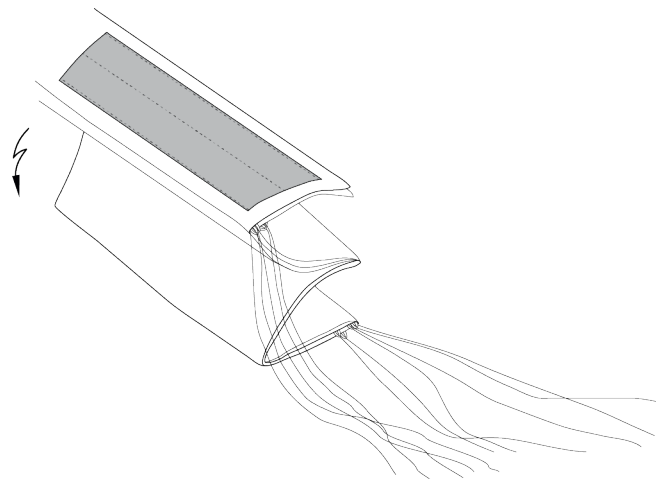
Result

5. Fold the Dome in half again. The pockets for laying the rigging lines must be outside.



Folding Rigging Lines pockets out

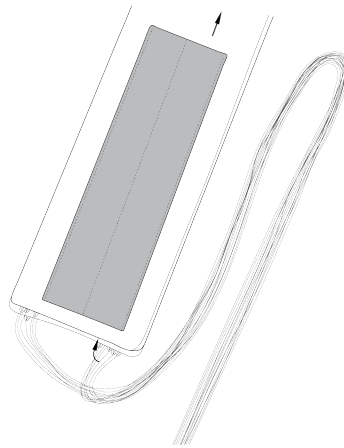
6. Fold the Dome as see on the picture.



Folding the Dome

Make sure that in the process of laying the parachute rigging lines are not tangled. Straighten the lines out if it needs.

7. Put the Rigging Lines in the pocket. Measure the length of the bundle of rigging lines exceeding the depth of the pocket. Fold the rigging lines bundle in half and stretch in the pocket, so that the bend of the bundle a few centimeters protruded from the opposite side of the pocket. If necessary, you can eliminate the slack of the rigging lines at the edge of the Dome by pulling them over the bend on the opposite side of the bundle.



Putting the rigging lines into the pocket

8. Move holding ring to dome. Put straps in empty dome pocket. The Rigging Lines remaining part is positioned between the loops of the rigging lines after laying.

9. Fold the Dome as see a picture.

Parachute Installing

1. Turn the UAV to The Parachute Compartment was on top.
2. Pick up the Carabiner and straight the Rigging Lines.
3. Put the short static line end in a carabiner (see a picture).
4. Put short static line end in unhook system ring (see a picture).

5. Put short static line end in deattach system ring and lock the rope between halves of locker.



Make sure that deattach system lock is securely locked.

6. Make sure that deattach system lock is securely locked: take the parachute dome and make some short sharp jerks.
7. Carrfully pack the ropes of parachute system and rigging lines.
8. Pack the folded parachute. The base of the parachute with the ring was at the bottom of the parachute compartment.

9. Put the salient in parachute compartment's cover rear in UAV body's slot and hold down the cover.

Lock the cover by servo horn.

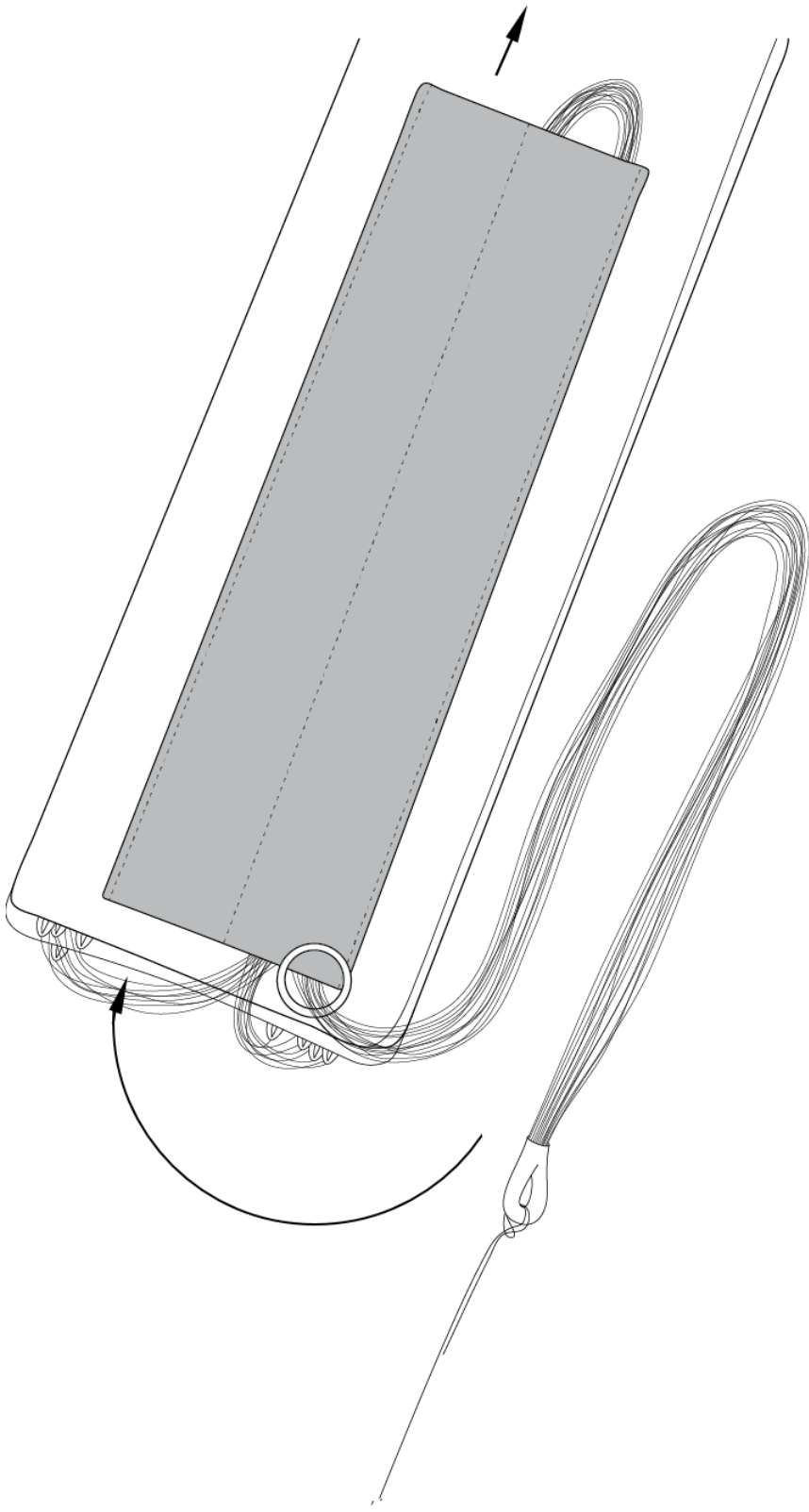


Check that the parachute compartment cover can opens. To do that just rotate servo horn. The parashute rigging lines must be free.

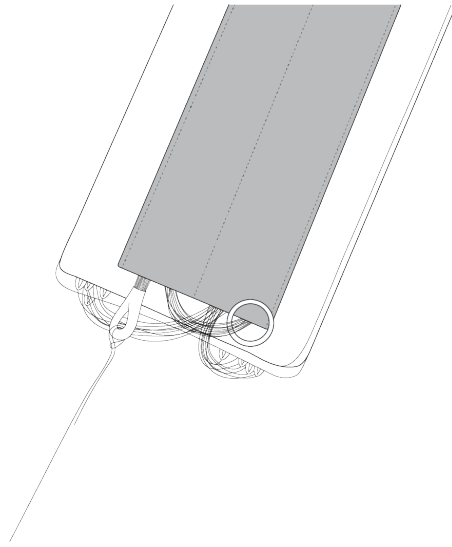
10. Close and lock the cover by servo horn.



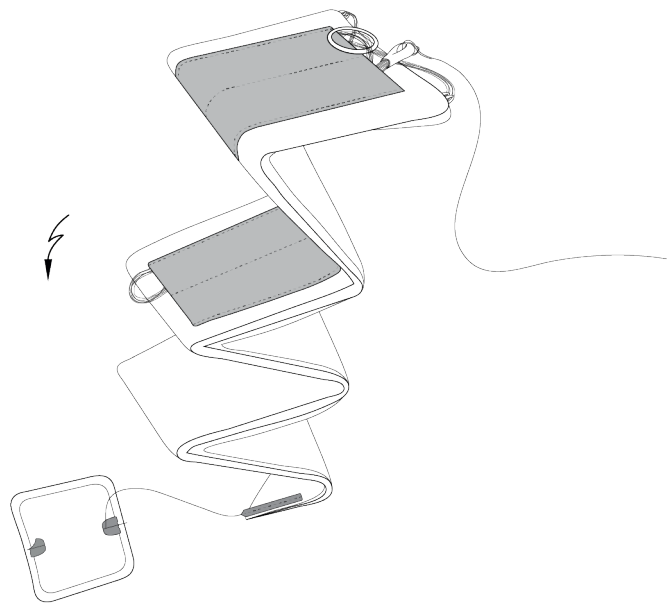
Don't rotate servo horn when power is on!



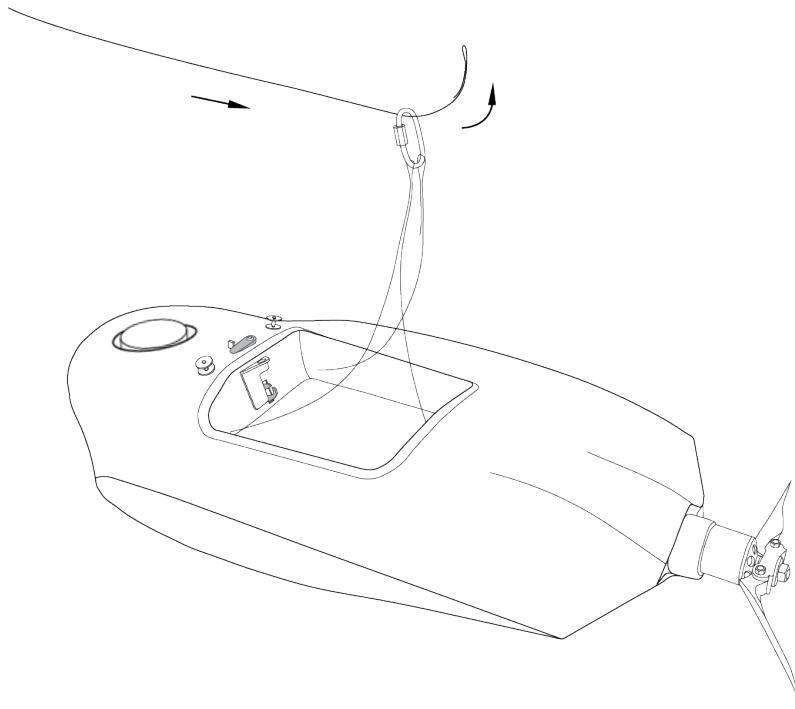
Rigging lines pulling ²⁷ through the pocket



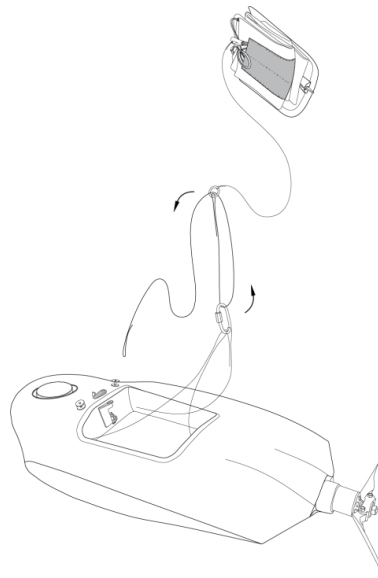
Result



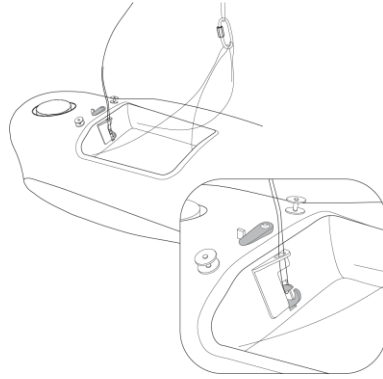
Dome folding



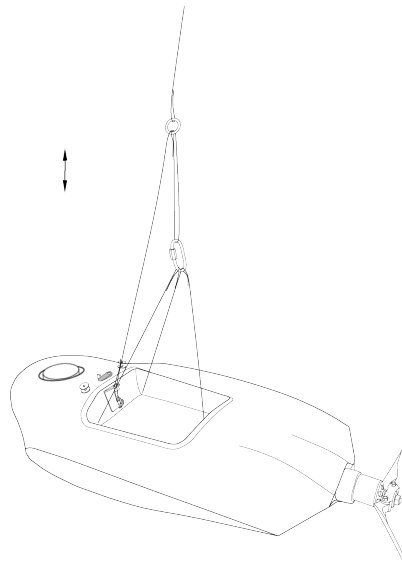
Short static line end in carabiner



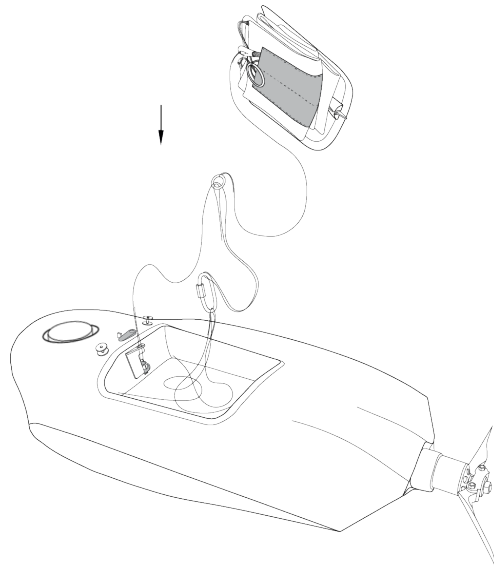
Short static line end turning into the ring of deattaching system



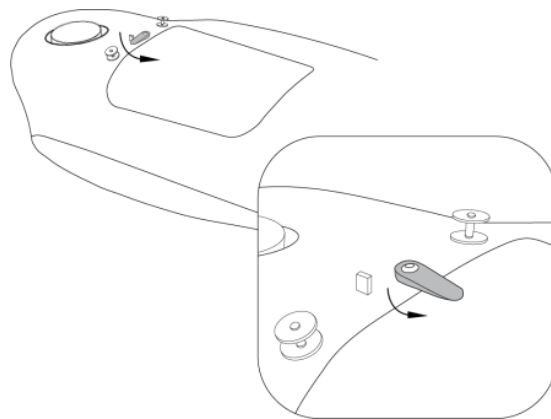
Locking the loop in the lock



Deattach lock check



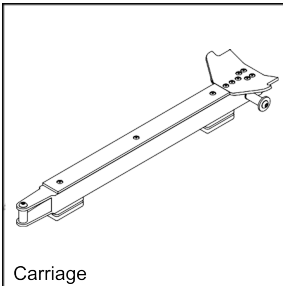
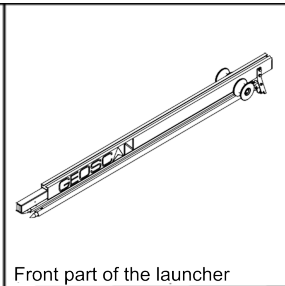
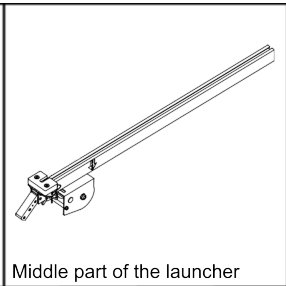
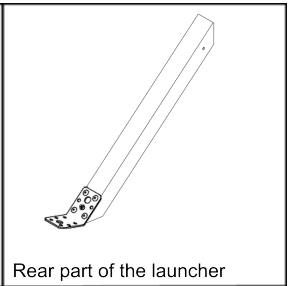
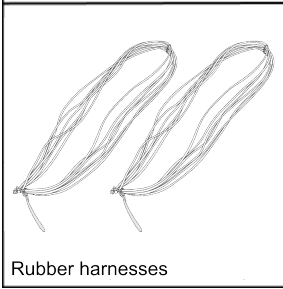
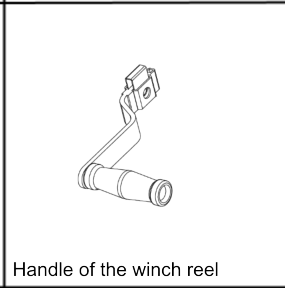
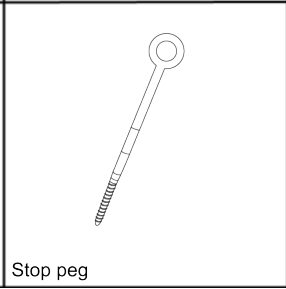

Packing the parachute



Fixing the parachute compartment's cover

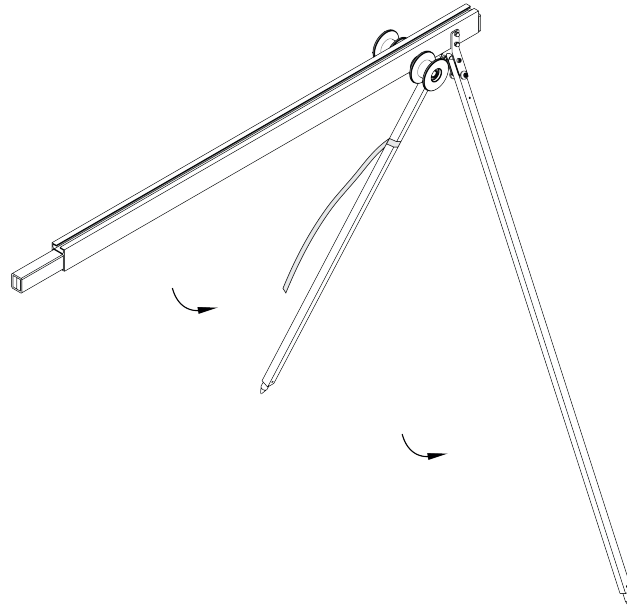
Launcher

Parts

 <p>A long, narrow metal carriage with a small wheel at the front and a hook-like attachment at the rear.</p>	 <p>A long metal rod with a hook at the front and a small circular component at the rear. The word "GEOSCAN" is printed on the rod.</p>	 <p>A long metal rod with a hook at the front and a small circular component at the rear.</p>	 <p>A long metal rod with a hook at the rear and a small circular component at the front.</p>
Carriage	Front part of the launcher	Middle part of the launcher	Rear part of the launcher
 <p>Two long, thin, curved rubber strips with small loops at the ends.</p>	 <p>A small, curved handle with a hook at the top and a cylindrical base.</p>	 <p>A long, thin metal rod with a circular ring at the top and a threaded end at the bottom.</p>	 <p>A simple hammer with a flat head and a handle.</p>
Rubber harnesses	Handle of the winch reel	Stop peg	Hammer

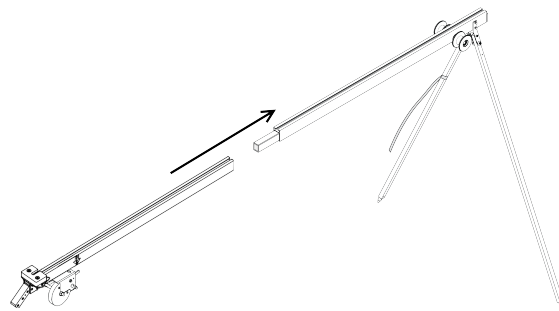
Assembly

1. Take out the launcher parts from transport bag.
2. Spread out the supports on the launcher front part. Make sure that they are securely fastened by locks. To fold the supports pull the locks down.



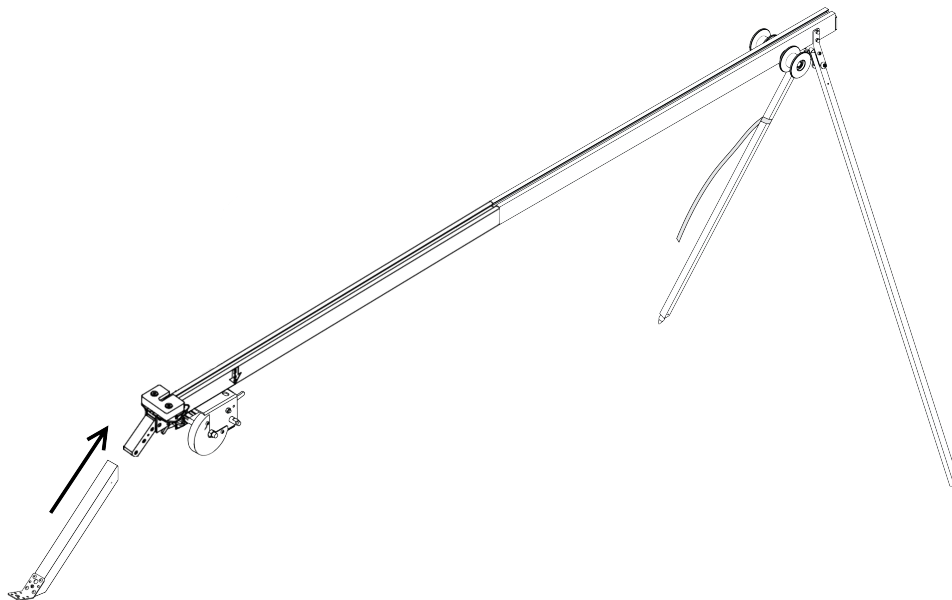
Supports installing

3. Attach the launcher's middle part.



Attaching of the launcher's middle part

4. Attach the launcher's rear part.



Attaching of the launcher's rear part

5. Insert the locking pin into the hole in the launcher's middle and rear part.

6. Place the launcher on a flat surface. The UAV must be launched against the wind. Make sure that the launcher is stable on the ground and that its guide has no roll. If it needs, bury one of the supports to align the launcher.



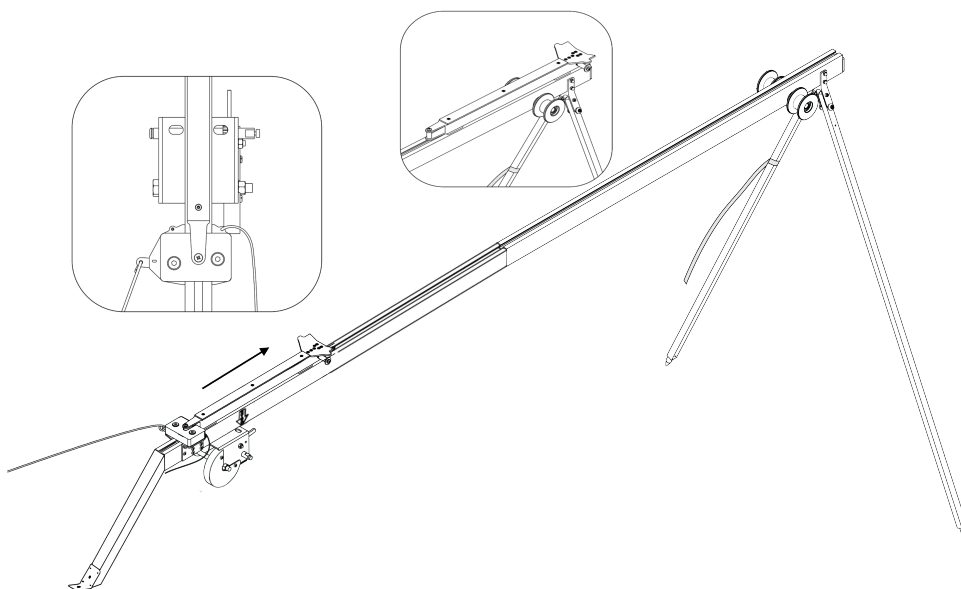
UAV launch is allowed only against the wind. It is strictly forbidden to launch the UAV in the direction of the wind. Otherwise, the UAV will not be able to correctly gain altitude and may collide with objects on the way.

7. Install and hammer the stop peg into the hole at the rear part of the launcher to prevent displacements when the UAV starts.



The jerk of the rubber cords leads to the throwing of the launcher's rear part, when the UAV starting. You must hammer on the stop peg on the entire length to fix the launcher's rear part. Don't to deform the launcher, when you hammer on the stop peg.

8. Place the carriage onto the guide of the launcher, so that it could slide along launcher rails.

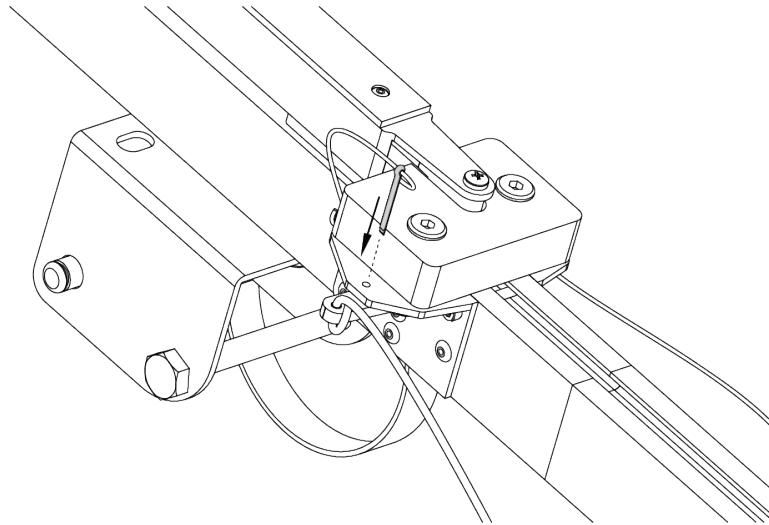


The carriage installing



Before each start of the UAV make sure that the carriage slides on the rails without catching of the launcher's parts.

9. Move the carriage down until it locks in the lock.
10. Insert the safety pin into the starting mechanism.



Inserting the safety pin

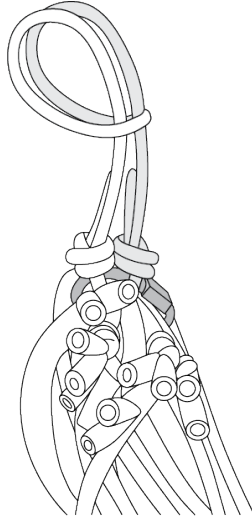


The lock may accidentally trigger, if you does not insert the pin!

11. Eject winch stopping pin and unwind the tension cable.

12. Take the rubber cords. Straighten the cords. Make sure the cords are not tangled.

13. Use the rope ring at the end of the rubber cord to make loop and hook the carriage.

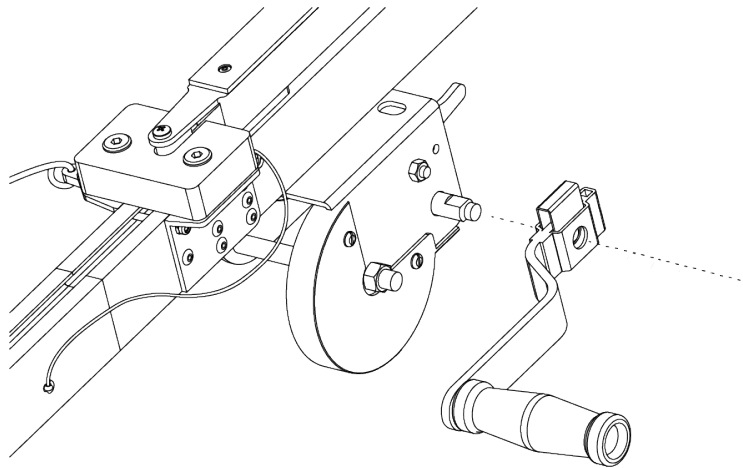


Rope ring loop

14. Connect the another end of the rubber cord to the end of the starting cable by a carabiner. The starting cable must lay through the roller. The carabiner screw-lock must be screwed.

15. Attach the second rubber cord similarly.

16. Put the handle of winch reel on reel shaft and slide until fixing mechanism clicks.



Installing the winch reel handle

Preparation to UAV Launch



Pull the cords only after the successful pre-launch preparation immediately before the launch. This will increase their shelf life and ensure safety on the launch area.

1. Move the winch stopper to the cable tension position.
2. Pull the rubber cords by rotating the winch reel handle. In case of contact with the cords between the roller and the launcher's parts or break from the roller, it is necessary to stop the tension of the cords. Displaced cable should be placed on the roller. Continue to pull the rubber cords only after that.

On the launcher's middle part engraved "STOP" marker. You must stop the cords stretching, when carabiners will be opposite to it.

Now the UAV can be placed on the launcher.

Rules of Rubber Cords Use

- Check the condition of the rubber bands regularly. Replace the damaged ring by a spare ring from the spare parts kit, if damages are found.
- Don't keep the rubber cords stretched for a long time. Pull cords directly before placing UAV on the launcher.
- Do not allow long-term exposure of rubber cords in direct sunlight in a warm season.
- Do not allow the rubber cords to freeze in a cold season. Before to installation keep them in a warm place and pull directly before starting. Immediately remove the cords from the launcher and put them to a warm place after the UAV starts.

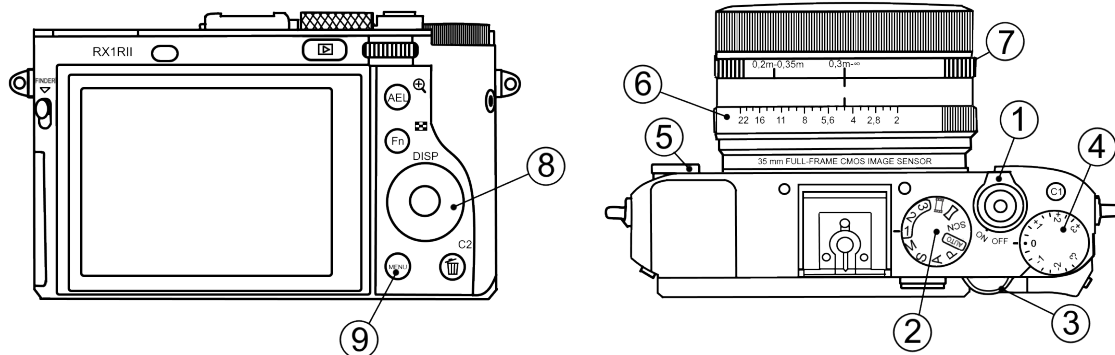
Camera Settings

UAV camera type depends on delivery kit. This section describe recommended settings for aerial survey in normal daylight conditions.

Sony DSC-RX1RM2 Digital Camera

Main Parts

Please, carefully read Camera Operating instructions <https://www.sony.com/electronics/support/res/manuals/4579/45798651M.pdf>, to get full information about functions and control parts before change settings. Basic camera control elements are shown on the picture:



1. ON\OFF Switcher
2. Mode Dial
3. Control Dial
4. Exposure compensation dial

5. Focus Mode Dial
6. Aperture ring
7. Macro switching ring
8. Control Wheel
9. Menu Button

Presets

Geoscan UAVs are equipped with 2 presets for Sony DSC-RX1RM2 cameras.

Use **Mode Dial** near ON/OFF switcher to select preset for your needs.

Preset 1 serves for shooting in normal daylight conditions. The aperture value is fixed, which provides fixed aperture for better orthophotomosaic generation.

Use these settings for this mode:

- **Mode Dial** in «1» position;
- **Focus Mode Dial** in **MF** position;
- **Exposure Compensation Dial** in **0** position;
- **Macro switching ring** in **0,3m-∞** position;
- **Aperture Ring** in **4,5** (first mark after 4).


Preset 2 – universal set with automatic variable aperture control (Shutter Priority).

Use these settings for this mode:

- **Mode Dial** in «2» position;
- **Focus mode dial** in **MF** position;
- **Exposure compensation dial** in **0** position;
- **Macro switching ring** in **0,3m-∞** position.

The aperture value is not taken into account.

Preset 3 can be used for user settings.

Select settings in menu, go to  camera settings (tab 8) and select **Memory**.


Set **Mode Dial** in «3» position and press button in the middle of **Control Wheel**.

Presets Restoring

Settings of 1 and 2 presets can be restored, if you change them.


For preset 1 restoring:

- Set **Mode Dial** in position **M** (Manual aperture control).
- Set shutter speed **1/1000** by **Control Dial**.
- Select **ISO – Auto** in camera menu..

Press **Menu** button, go to  Camera Settings (Tab 8) and select **Memory**. Set **Mode dial** in «1» position and press middle button of **Control Wheel**.

For preset 2 restoring:

- Set **Mode Dial** in **S** (Shutter Priority) position.
- Set shutter speed **1/1000** by **Control Dial**.
- Select **ISO – Auto** in camera menu.

Press **Menu** button, go to  Camera Settings (Tab 8) and select **Memory**. Set **Mode dial** in «2» position and press middle button of **Control Wheel**.

If you change or reset settings you also need to switch off automatic photo review and shooting by MOVIE button, set max. time before power saving start and reset for file number. Change these settings:

- Switch off **Auto Review** in  User Settings (tab 2) and **MOVIE Button – Movie Mode Only** (tab 6).

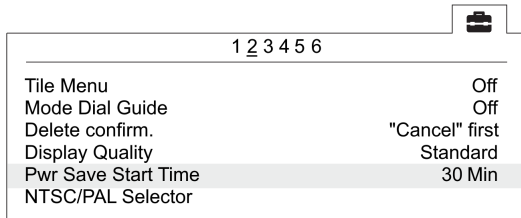
1 2 3 4 5 6	
Audio Level Display	On
Auto Review	Off
DISP Button	
Peaking Level	Off
Peaking Color	White
Exposure Set. Guide	On

Auto review – Off

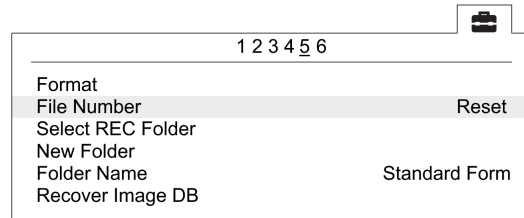
1 2 3 4 5 6	
MOVIE Button	Movie Mode Only
Dial/Wheel Lock	Unlock

Movie mode only for MOVIE button

- In  settings section set **Power Saving Start Time – 30 min.** (tab 2) и **File Number – Reset** (tab 5).




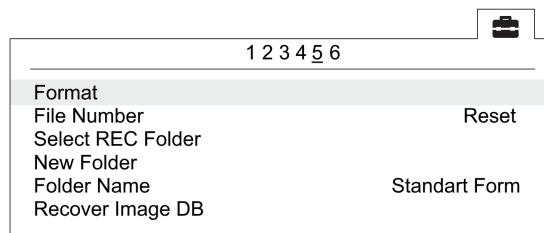
Power saving start time



File number reset

SD Card Formatting

- In  Settings menu (tab 5) select **Format**.



Format option

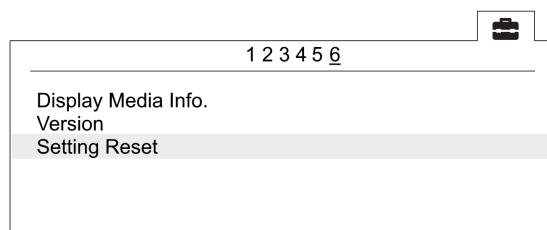


All data on SD card will be deleted!

Settings Reset

Reset of the camera will delete presets' shooting settings (Presets 1 and 2)!

- In  Settings menu (tab 6) select **Setting Reset**



«Setting reset» option



Do not remove the battery during a reset process!

- After camera reboot, you need to set **Timezone and date**, otherwise the settings will not be saved and this menu will appear at every turn on.
- Use ON/OFF switcher to turn the camera off.
- Wait 3 minutes for all settings to be saved (do not disconnect the battery or power cord).



«E:61:00» error may appear on the screen, as the camera is focused to infinity. **This message will not interfere with camera's function.**

Sony DSC-RX1 Digital Camera

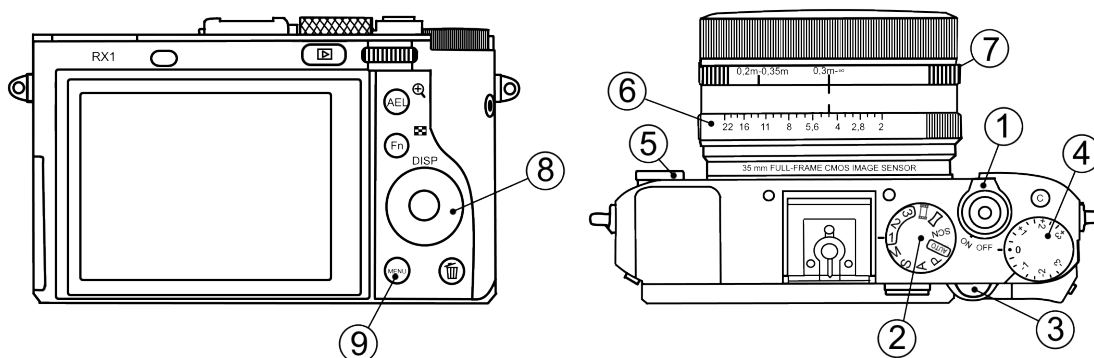
Main Parts

Please, carefully read Camera Operating Instructions

<https://www.sony.ru/electronics/support/res/manuals/4469/44695786M.pdf>,

to get full information about functions and control parts before change settings.

Basic camera control elements are shown on the picture:




1. ON\OFF Switcher
2. Mode Dial
3. Control Dial
4. Exposure compensation dial


5. Focus Mode Dial
6. Aperture ring
7. Macro switching ring
8. Control Wheel
9. Menu Button

Camera Settings


- **Mode Dial** in «1» position;
- **Focus Mode Dial** in **MF** position;
- **Exposure Compensation Dial** in **0** position;
- **Macro Switching Ring** in **0,3m-∞** position;
- **Aperture Ring** in **4,5** (first mark after 4).
- For normal daylight conditions switch **Mode Dial** in **M** (Manual aperture control) position and **Aperture Ring** in **4,5** (first mark after 4) position.
- For cloudy weather switch **Mode dial** in **S** (Shutter priority) position. The aperture value is not taken into account in this mode.

To set camera soft parameters, push **MENU** button, then select parameters according to the following instructions.


- In  User settings menu (tab 1) turn off **Automatic preview** and set **MOVIE Button – Movie mode only** (tab 3).


 1 2 3 4	
FINDER/LCD Setting	Auto
Red Eye Reduction	Off
Grid Line	Off
Auto Review	Off

Turn off automatic preview


 1 2 3 4	
Func. of C Button	ISO
Func. of AEL Button	AEL hold
Func. of Left Button	Not set
Func. of Right Button	Not set
Func. of Down Button	Not set
Smart Telecon./Zoom	Smart Telecon.
MOVIE Button	Movie Mode Only


Movie mode only

- In  Settings menu (tab 2) set **Power saving time – 30 min.**

 1 2 3 4	
LCD Quality	High
Power Saving Start Time	30 min.
HDMI Resolution	Auto
CTRL FOR HDMI	On

Power saving time

- In  Memory Card menu set select **File № - Clear.**

 1	
Format	-
File Number	Reset
Folder Name	Standart Form
Select REC Folder	-
New Folder	-
Recover Image DB	-
Display Card Space	-

Clear file number

Other settings should not be changed from default values.

SD Card Formatting

- Select **MENU** →  **[Memory card]** → **Format**



All memory card data will be deleted!

Settings Reset

Follow these steps to set default settings:

- Select **MENU** →  **[Settings menu]** → **INITIALISATION** → **Reset**



Do not remove the battery during a reset process!

- After camera reboot, you need to set **Timezone and date**, otherwise the settings will not be saved and this menu will appear at every turn on.
- Use ON/OFF switcher to turn the camera off.
- Wait 3 minutes for all settings to be saved (do not disconnect the battery or power cord).

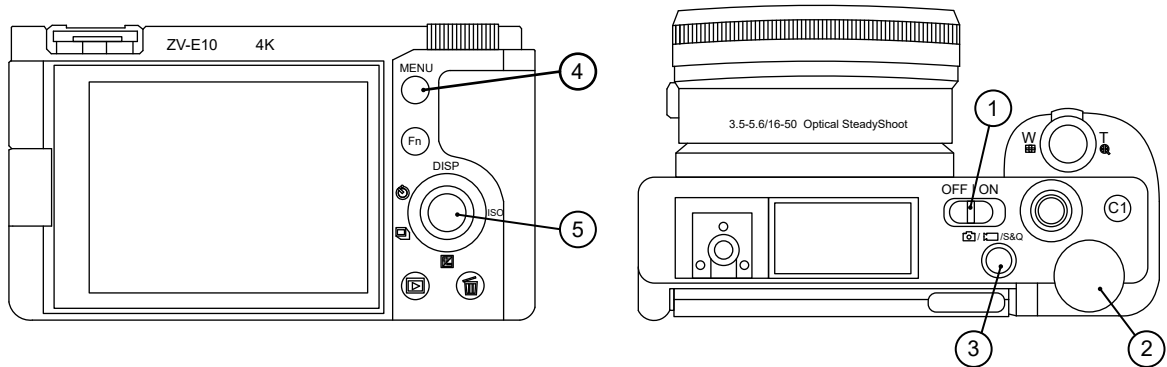


«E:61:00» error may appear on the screen, as the camera is focused to infinity. **This message will not interfere with camera's function.**

Sony ZV-E10 Digital Camera

Main Parts

Please, carefully read Camera Operating Instructions <https://www.sony.com/electronics/support/res/manuals/5027/14720adf8b80e68f1cedb3d09c9ffe5b/50278353M.pdf>, to get full information about functions and control parts before make settings. Basic camera control elements are shown on the picture:



1. ON/OFF Switch
2. Control Dial
3. Photo/Video/S&Q Button

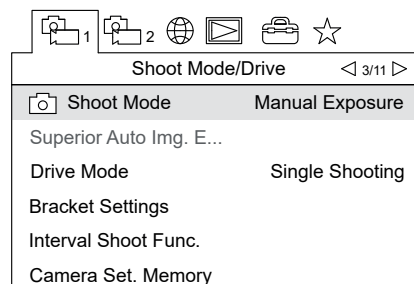
4. Menu Button
5. Control Wheel

Camera Settings

Make sure that the camera is switched to photo mode. Press **Photo/Video/S&Q** (3) button to switch mode if it needed.

Press **Menu** (4) to access Settings menu.

Press the right side of **Control Wheel** (5) in 1 Photo and Video settings 1 tab to select subsection 3 and set **Shoot Mode – Manual Exposure**.




Manual Exposure mode

Press the right side of control wheel to select subsection 4.
Set **Focus Mode – Manual Focus**.

AF1 < 4/11 >	
Focus Mode	Manual Focus
Focus Area	Zone
Focus Area Limit	
Face/Eye AF Set.	
AF w/ shutter	On
Pre-AF	

Manual Focus mode

Select subsection 5 in  Photo and Video settings 2 tab and turn on **Silent Shooting** and **Release without Lens** parameters.

Shutter/SteadyShoot < 5/9 >	
Silent Shooting	On
e-Front Curtain Shutter	On
Release w/o Lens	Enable
Release w/o Card	Enable
SteadyShot	Off

Silent Shooting and Release without Lens parameters

Press the right side of control wheel to select subsection 7.
Disable automatic reviewing by setting **Auto Review – Off**.

Display/Auto Review < 7/9 >	
DISP Button	
Zebra Setting	
Grid Line	Off
Exposure Set. Guide	
Live View Display	Setting Effect ON
Auto Review	Off

Auto Review – Off

In  settings tab select **Power Setting Option** and set **Power Save Start Time – Off**.



Setup 1 < 1/5 >	
Monitor Brightness	Manual
Gamma Disp. Assist	Off
Volume Settings	7
Delete confirm.	"Cancel" first
Display Quality	Standard
Power Setting Option	

Power Setting Option

Power Setting Option	
1	
Power Save Start Time	Off
Power Save by Monitor	Both Linked
Auto Power OFF Temp.	Standard

Power Save Start Time – Off

Select **File/Folder Settings** in subsection 4 and set **File Number – Reset**.

Setup 4 < 4/5 >	
Format	
Select REC Folder	
New Folder	
 File/Folder Settings	
 File Settings	
Recover Image BD	

File/Folder Settings

File/Folder Settings	
1	
File Number	Reset
Set File Name	DSC
Folder Name	Standard Form


File Number – Reset

Press **Menu** (4) button to exit from Settings menu after all sets.

Select **1/1000** exposure by rotation of **Control Wheel** (5).

Check **ISO – AUTO** parameter. Press the right side of **Control Wheel** (5) to change ISO value if it needed.

SD card Formatting

Select **MENU** →  (subsection 4) → **Format**



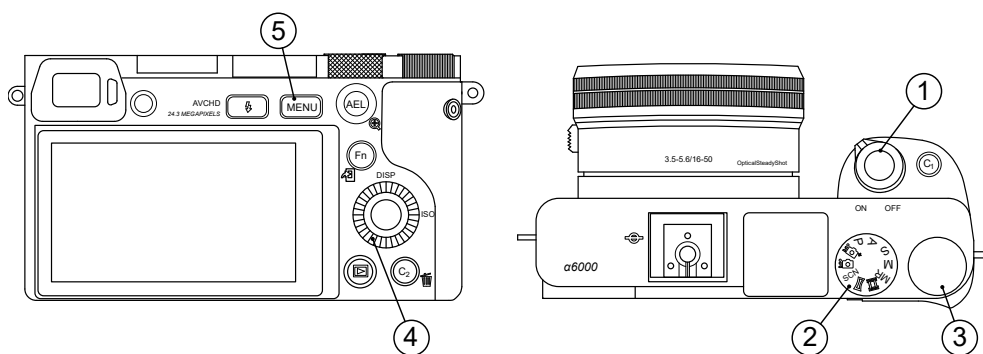
All data on SD card will be deleted!

Sony A6000 Digital Camera

Main Parts

Please, carefully read Camera Operating Instructions <https://www.sony.ru/electronics/support/res/manuals/4532/45320554M.pdf>, to get full information about functions and control parts before change settings.

Basic camera control elements are shown on the picture:




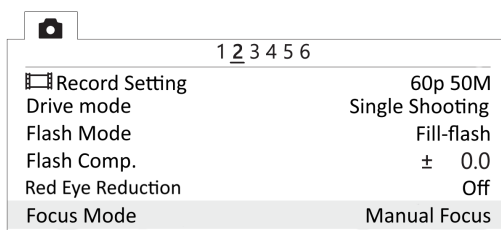
1. ON/OFF Switcher
2. Mode Dial
3. Control Dial

4. Control Wheel
5. Menu Button

Camera Settings

Use the control wheel to set the following parameters:

- Switch **Mode Dial** (2) in **S** (Shutter priority) position.
- Set Exposition – **1/1000** and **ISO – Auto** by **Control Wheel** (4).
- In  Still Shooting menu (tab 2) set **Focus Mode - Manual focus**.



Focus Mode

- In  Custom Settings menu (tab 1) disable **Automatic preview**, turn on **Lens-less Shutter** (tab 3) and set **MOVIE** button - **Video mode only** (tab 6).

1 2 3 4 5 6	
Zebra	Off
<input checked="" type="checkbox"/> MF Assist	On
Focus Magnif. Time	2 Sec
Grid line	Off
Auto review	Off
DISP Button	


Automatic preview off

1 2 3 4 5 6	
<input checked="" type="checkbox"/> Pre-AF	Off
Zoom Setting	Only optical zoom
<input checked="" type="checkbox"/> Eye-Start AF	
FINDER/MONITOR	Auto
Release w/o Lens	On
<input checked="" type="checkbox"/> AF w/shutter	On

Turn on the shutter without a lens

1 2 3 4 5 6	
Function Menu Set.	
Custom Key Settings	
Dial/Wheel Setup	<input checked="" type="radio"/> SS <input type="radio"/> F/no.
Dial/Wheel Ev Comp	Off
MOVIE Button	Video Mode only
Dial/Wheel Lock	Unlock

Video mode only for Movie button

- In  Setup menu set **Start time energy saving - 30 min** (tab 2) and set **File Number - Reset** (tab 5).

1 2 3 4 5 6	
Title Menu	Off
Mode Dial Guide	Off
Delete confirm.	"Cancel" first
Pwr Save Start Time	30 Min

Set the time to start energy saving

1 2 3 4 5 6	
Format	-
File Number	Reset
Select REC Folder	-
New Folder	-
Folder Name	Standart Form
Recover Image DB	-

Reset file number

SD card Formatting

Select **MENU** →  (tab 5) [Setup] → **Format**



All data will be deleted!

Offsets

The information is valid for Geoscan Lite UAVs with installed GNSS receiver.

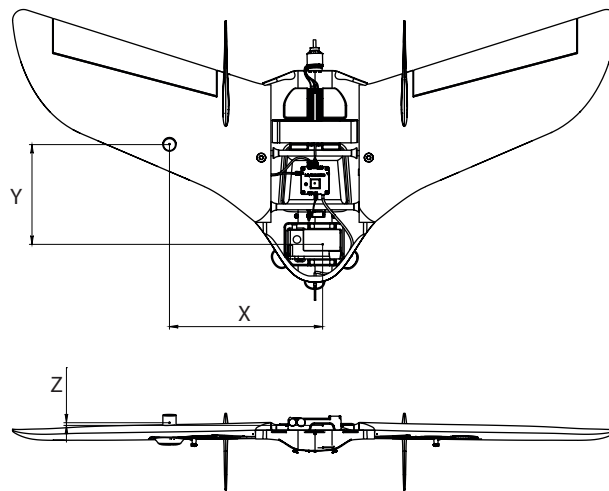
The antenna of the geodetic receiver is located inside the UAV wing.

The phase center is offset from the center point of the camera lens. The offsets coordinates should be taken, when you generate orthophotomaps and 3D models.

To set the offsets in Agisoft Metashape software select **Camera Calibration** in **Tools** tab.

Set in **GPS/INS Offsets** tab a deviation in meters and accuracy.

Camera	Coordinate (m)		
	X	Y	Z
Sony DSC-RX1RM2	0.3374	0.2238	0.0422
Sony DSC-RX1			
Sony ZV-E10/A6000	0.3475	0.2274	0.039



Coordinates position

Charger and Battery

The section contains presets for chargers, which can be included in UAV kit and rules for safe battery using.

Safety Rules

Battery

- Do not disassemble or deform the battery (don't drop and pierce).
- Do not allow heat the battery more than +60 degrees.
- Do not overcharge the battery (over 16.8 V). Do not discharge the battery (voltage level lower than 12 V).
- Do not store battery fully discharged. For long-term battery storage (a month or more) it must be transferred to the **Storage** mode by the battery charger.
- Don't charge battery by currents more than charge limit (no more than 100% of the capacity. We recommended to charge 50% of the capacity to extend the battery's life cycle). Current more than the limit will heat the battery over than +60 °C.

Battery Charger

- Cables and connectors must be inspected for damage before each use.
- Do not operate with the battery charger in direct sunlight.
- Do not leave the battery charger without supervision.



Failure to follow the above instructions may result in fire or battery and charger failure.

Tips for Lithium Polymer (LiPo) Battery Using

The following rules must be observed to prevent dangerous situations:

- The battery must be stored in a warm place before launch for a flights in a temperature lower than 0 °C. LiPo batteries can lose up to 30% of a capacity in cold. You need to pay attention to this, when you're planning a flight task.
- The battery must be stored in a cool place before launch for a flights in temperature above +25 °C protected from direct sunlight. Don't charge the battery immediately before flight. It should cool down. Charge the battery only in a cool and protected from direct sunlight place.

Key Settings For Any Battery Charger

The charger is configured from the factory.

Follow the instructions to config preset, if the settings are different.

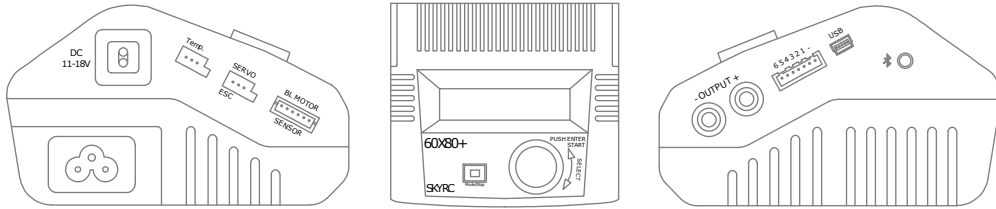
We try to provide customers with as much information as possible on the operation of the supplied equipment, however, the type of the storage device may differ from those described in this section, when the devices are unavailable.

The battery charger can be replaced with a similar functions to speed up UAV delivery.

In this case, set the key values:

Charge Current – 6.0 A; Discharge Current – 2.0 A; Cells – 4S, 14.8V.

SkyRC 6X80+ Battery Charger



SkyRC 6X80+ Battery Charger

Choose and change settings by control wheel on the front panel.
Mode/Stop button provides cells type select and stop charging process.

Charge Settings

1. Connect AC cable.
2. Press **Mode/Stop** button and select **LiPo** cells type by control wheel.
Press on the control wheel to set type.
Change mode to **Charge** by control wheel and press it to set mode.
3. Select charge current – **6.0 A** by control wheel and press it to set.
4. Select Battery cells - **4S**.
Voltage 14.8 V will be seted automaticly.

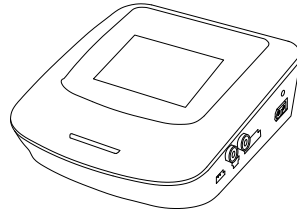
LiPo CHARGE
6.0 A 14.8V(4S)

Battery charger settings

Battery Charging

1. Connect charge cable pins ("+" – red, "-" – black) in **OUTPUT** charger's slots.
2. Connect balance pinpad to charger's balance socket (7 pins, 654321-).
3. Connect the battery to pinpad's XH socket (4S) and charge cable.
4. Approve charge settings by long press on the control wheel until **Battery Check** message.
The charger will check connected battery.
5. Approve charging process start by long press on the control wheel.

SkyRC T6755 Battery Charger

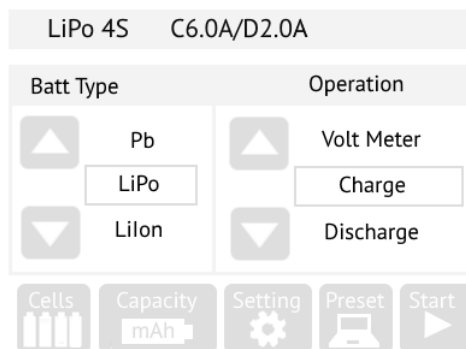


SkyRC T6755 Battery Charger

Use the touch screen to set charge parameters.

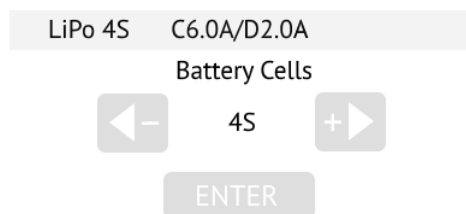
Charge Settings

Select **LiPo** in **Batt Type** section.
Select **Charge** in **Operation** section.



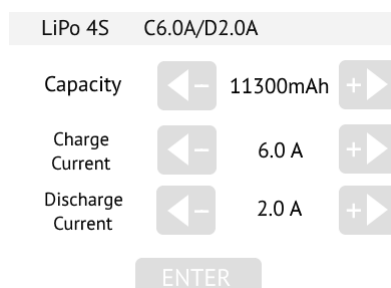
LiPo and Charge settings

Set **4S** in **Cells** menu.



Cells menu

In **Capacity** menu set:
Capacity – 11300 mAh;
Charge Current – 6.0 A;
Discharge Current – 2.0 A.



Capacity menu settings

In **Safety Protection** section of **Setting** menu select:
Capacity Cut Off - 11300 mAh.
Safety Time Off - 200 min.
Temp. Cut Off - 80°C/176°F.



Safety protection settings

Battery Charging

1. Connect charge cable pins ("+" – red, "-" – black) in **OUTPUT** charger's slots.
2. Connect balance pinpad to charger's Balance Socket.
3. Connect the battery to pinpad XH socket (4S) and charge cable.
4. Press **Start** button in main menu to start charge process.

ImaxRC X100 Battery Charger

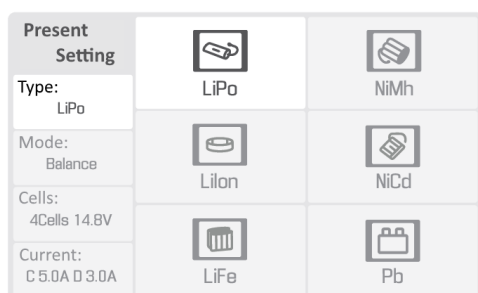


ImaxRC X100 Battery Charger

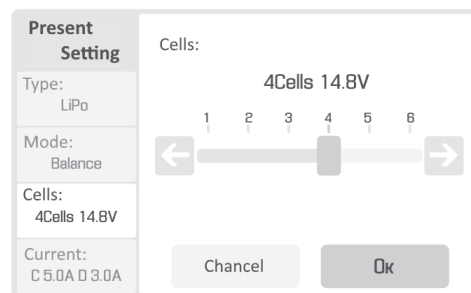
Use the touch screen to set charge settings.

Modes and Settings

Select **LiPo** in **Type** section and **4Cells**.
Select **14.8V** in **Cells** section and press **Ok** button.

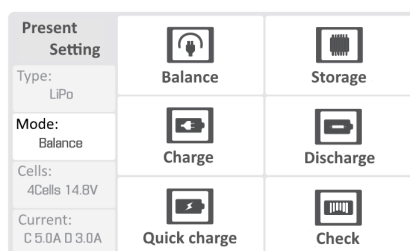


Type selection



Cells section

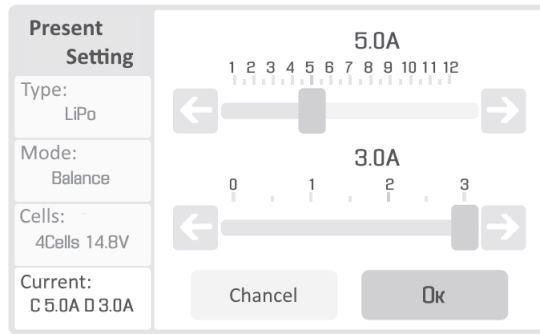
Select mode in **Mode** section:



Mode section

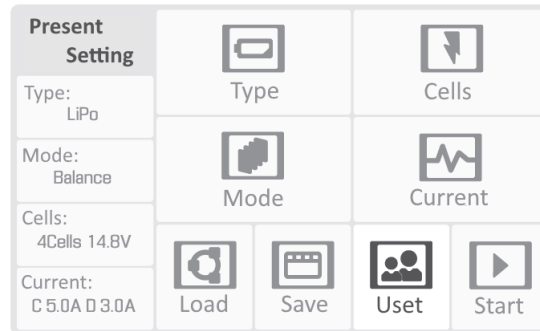
Balance - for battery cells balancing;
Storage – to switch the battery in storage mode;
Charge – for battery charge;
Discharge – for battery discharge;
Fast Charge – for charge with high current (we do not recommend to use this mode);
Check – for battery cells check.

Select charge current (top slider) **6.0A**, discharge current (bottom slider) in **Current** section and press **OK** button.



Current

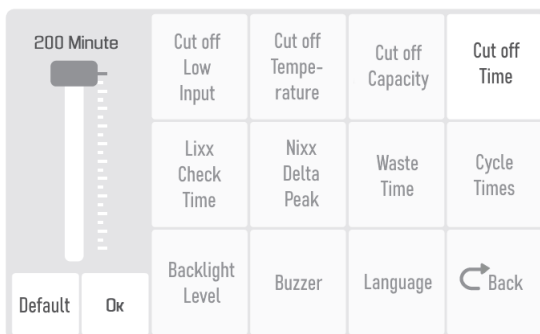
Select **Uset** section:



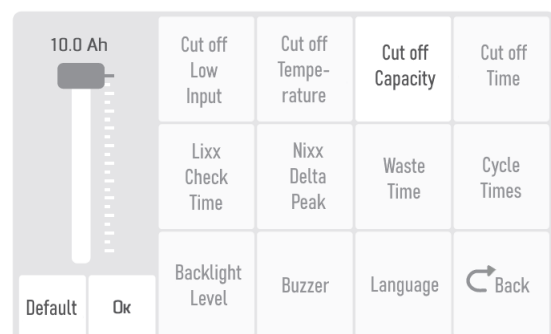
Settings

Select **Cut-off Time – 200 Minute** and press **OK** button.

Select **Cut-off Capacity – 10.0 Ah** and press **OK** button.











Cut-off Time



Cut-off Capacity

Battery Charging

1. Connect AC power cable.
2. Put AC plug in a socket.
3. Connect balance cable to the battery.
4. Connect power cable to the battery.
5. Check settings and press **Start** button to start charge process.

Present Setting	 Type	 Cells		
Type: LiPo	 Mode	 Current		
Mode: Balance				
Cells: 4Cells 14.8V	 Load	 Save	 Uset	 Start
Current: C 5.0A D 3.0A				

Start button

6. Disconnect the battery in charge process end.

Battery Check

We recommend make a full charge/discharge cycle for battery's cells state check:

- Charge the battery.
- Discharge battery to 13.5 V by switch the charger in **Discharge** mode and start diis-charge.
- Charge the battery again.

Storage and Discharge

Use storage mode for a long (more than 14 days) battery storage.

Switch the charger to **Storage** mode, check battery cells (4 Cells (4S)) and start storage cells balancing by press **Start** button.

Store batteries in dry cool place without direct sun light at the temperature range from +5 to +25 °C witch relative humidity no more than 80% without any condensation.

Optimum temperature range: from +5 to +10°C.

Optimum battery voltage range for a storage: 15.4 V

Service life: 1 year.

Battery Recycling

Do not utilize batteries with household trash.

It may be dangerous for ecology.

Send them to recycling points.

Geoscan Planner Software



Geoscan Planner software allows to configure UAV and create flight tasks for aerial survey of areas and single objects.

System Requirements

Minimum System Requirements

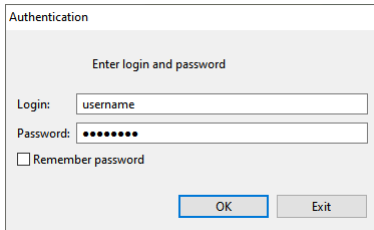
Operating system	MS Windows 7,8,10
CPU	Intel Core i3
RAM	4 Gb
GPU Type	Dedicated
GPU Model	Nvidia GeForce GT620M, GT630M, 710M, GT720M; AMD Radeon HD 7670M

Recommended System Requirements

Operating system	MS Windows 7,8,10
CPU	Intel Core i5, i7
RAM	8 Gb
GPU Type	Dedicated
GPU Model	Nvidia GeForce GT645M, GT745M, 845M, GT720M, 940M and higher

New Project

1. Install and launch **Geoscan Planner** software.
2. Enter your login/password in authentication window and create new project by press **New Project** button.

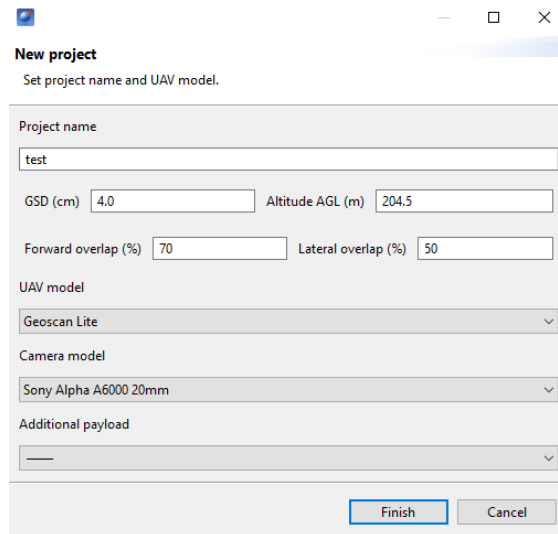


Authentication window



New Project button

3. Enter a project name and shooting parameters in the new project window.



Parameters in new project window

Aerial Surveying

Aerial surveying is a polygon surveying. User sets vertices of the polygon (more than 3) and the software will automatically calculate a flight route.

1. Press **Create aerial surveying** on the toolbar.



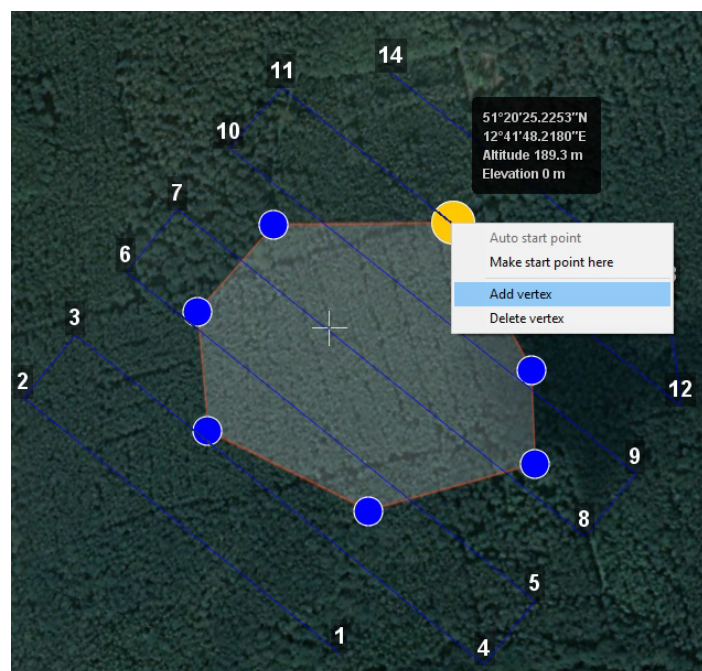
Create aerial surveying

2. Click on the map to set vertices of aerial surveying area. The program will automatically calculate the flight route.

Polygon Vertices Adding and Removing

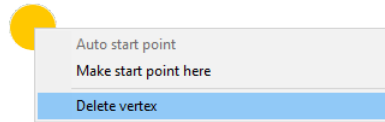
You can add vertices to polygon.

1. Hold left mouse button and move middle point of a polygon side. The vertex will be created automatically. A floating window will display location of the vertex.



Vertex adding

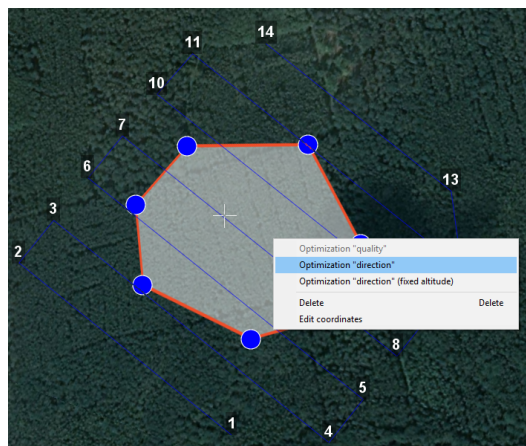
- To remove the vertex:
1. Right click on the vertex.
 2. Select *Delete vertex*.



Delete vertex

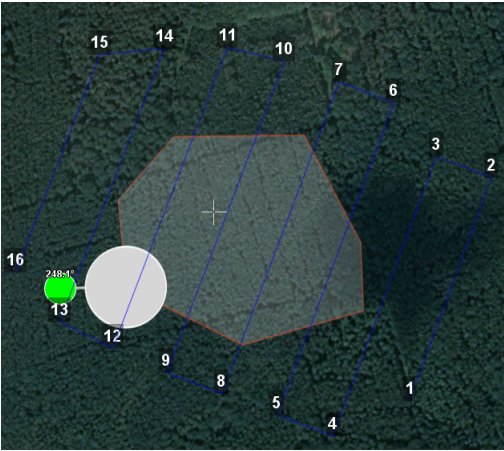
Change Flight Route Direction

The need to change a flight route may be caused, if the force and direction of the wind are unfavorable (strong wind along the flight route of the polygon). Right-click on the polygon and select the option *Optimization «Direction»* in context menu to change the direction of flight route.



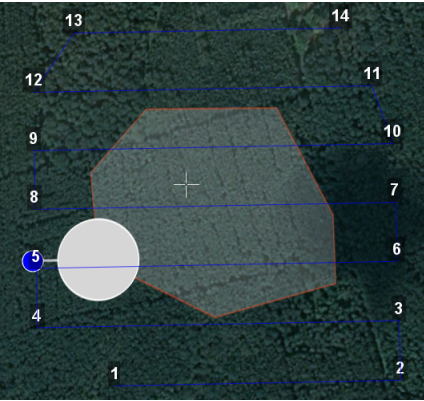
Optimization by direction

One of the vertices of the polygon will be colored gray. Use the point's slider to set the flight route direction.



Correction of the flight direction

A new flight route through the polygon in a selected direction will be generated automatically.

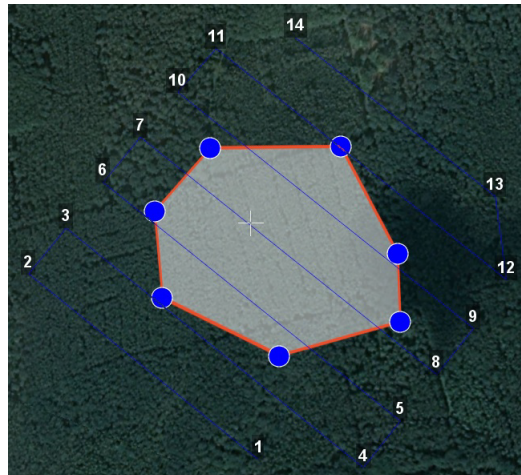


Changed flight route

Start Point Changing

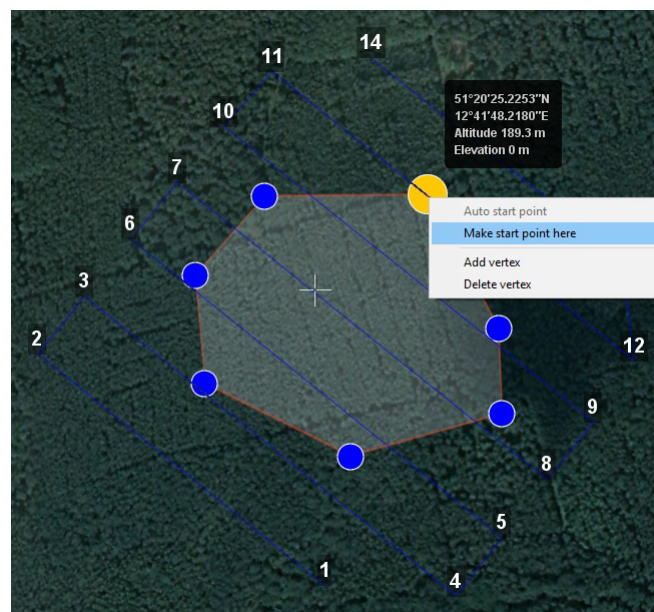
Follow these steps to change the polygon entry point:

1. Select a polygon.




Selected polygon

2. Select vertex, right click and choose *Make start point here*.



Context menu of a point

The selected point will be marked with a flag 

Linear Surveying

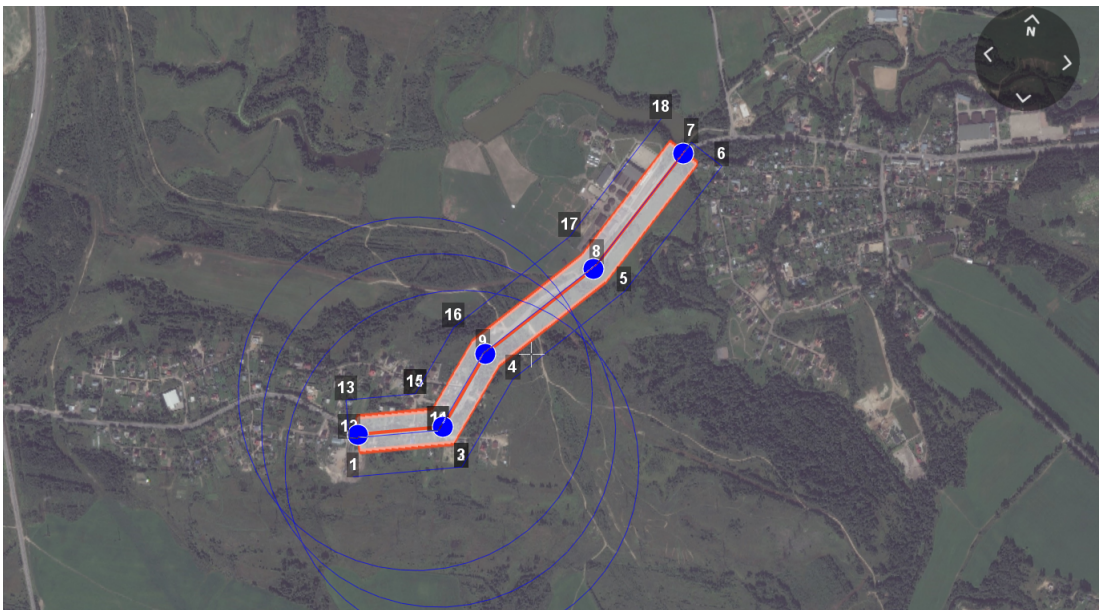
Create linear surveying tool allows to create a flight route along linear objects, such as: rivers, roads, oil pipelines, etc. .

1. Press **Create linear surveying** button on the toolbar.



Create linear surveying button

2. Single clicks to set a path around an object. The program will automatically generate flight route.



Linear survey example

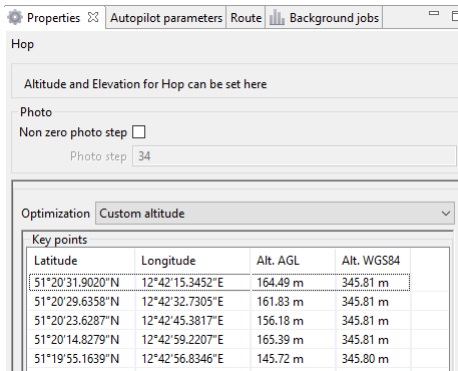
Hop

Fight by pre-seted route with a seted altitude. It is mainly used for passing around point objects (i.e. high objects) and topographic inequality.

Click on the icon **Create hop** on the toolbar.



Create hop button



Hop options

2. Specify the flight route by single-clicking. To build a hop at different altitudes, select **Optimization - Custom altitude** in properties window.

3. **Non zero photo step** function activates the camera.

You can change the step of photo in meters is specified in the corresponding field. Values of the Alt. AGL column are the differences between the absolute height of the flight task point and the relief below it. Thus, the height of the relief must be taken into account. The absolute heights of the points are also available for editing through the column Alt. WGS84. Besides, height can be changed by visual editing (drag mouse with Shift key pressed).

Hop route between two flight elements is built according to the following rules:

If the flight task elements have the same height, then the flight will be performed at the same height.

If the flight task elements have different heights, then the flight will be performed at the highest of them.



If conditions do not allow to reach the height of the second point by a straight trajectory (for example, due to small distance between points, but a large difference in altitude), the aircraft will fly with the maximum allowable pitch by a straight trajectory in order to reach a point by the coordinates, after which it will rise/descend in a spiral.

Waiting Point

Create waiting point tool allows to hold UAV on selected map point.

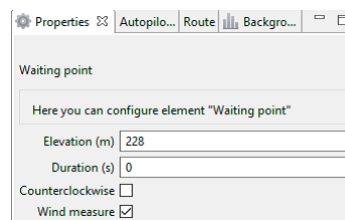
1. Press **Create waiting point** on the toolbar.



Waiting point button

2. Click mouse button on the map to set waiting point.

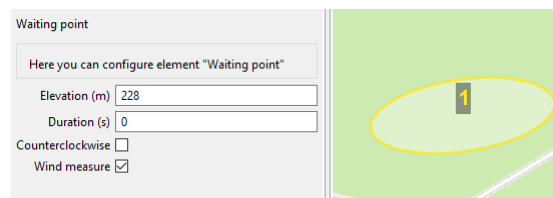
You can activate more options an expert mode: set delay point height, waiting time, direction, wind measurement and endless devay functions.



Waiting point options

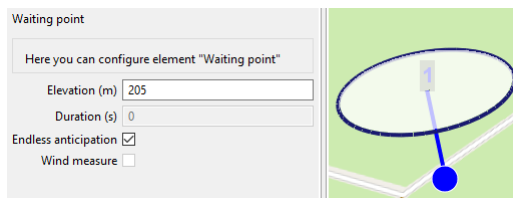
UAV will hold the point on the set height during seted time, and then go back to the flight route.

In **Wind measure** mode the waiting point will be colored yellow, and the duration will change to 15 seconds. UAV will take into account a wind mesurements when performing a flight task.



Waiting point in wind measure mode

Infinite waiting option sets holding point in the air (point will be hold until the low battery charge will trigger automatic return to start point). The waiting point color will change to deep blue.



Infinite waiting point



We recommend to set the waiting point with wind measurement before each flight element at the height of the flight element, especially if they are located a large distance from each other.

Landing Point

Create landing point tool is used to set the UAV landing point.

It is necessary to land UAV at the flight mission end.

Choose open dry place without trees and other barriers for landing.

Check the wing direction at landing route and correct land trajectory if it needs.

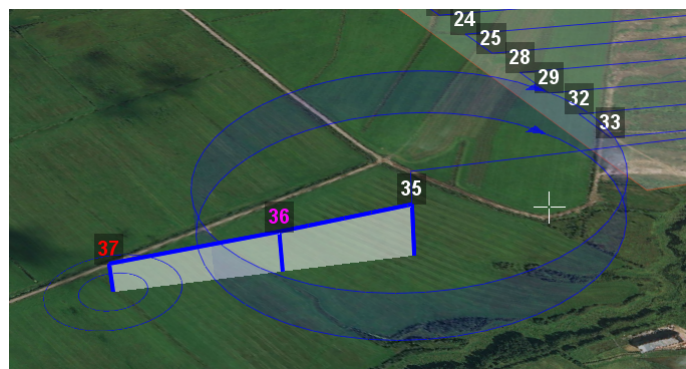
1. Press **Create landing point** button on the toolbar.



Create landing point button

2. Click on the map to select landing point for UAV.

The software will generated 3 points landing route automatically.



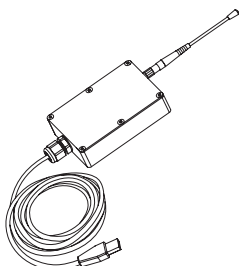
Landing route example





Landing should be carried out against the wind in the landing area. Otherwise, a hard landing is possible. It may provide UAV damages.

Connection Settings

Radio Modem Connection



The radio modem is used to load a flight task into the autopilot memory, set up and semi-automatic control UAV flight up to 40 km, if a flight zone doesn't have any signal barriers. This section describes how to set up wireless connection between the UAV and laptop.

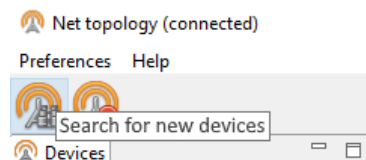
1. Connect radio modem to laptop's USB port.
2. Install  **MdmDisp** and  **NetTopology** software.
3. Turn UAV power on.
4. Launch **MdmDisp** utility.

The antenna icon and the number of connected UAVs will be displayed in a right corner of the laptop screen.



4.1 At the first time you need to configure connection with UAV.

- 1) Run the **NetTopology** utility.
- 2) Press **Search** button.

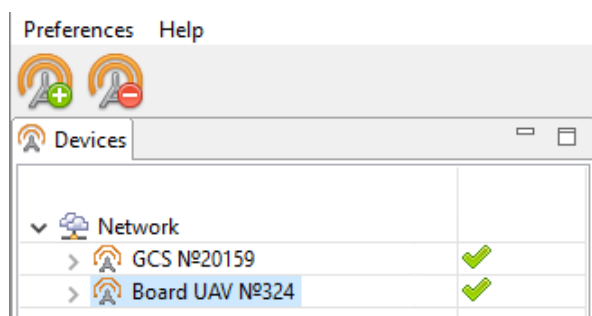


The program will show the list of detected devices. The search will continue until the **Search new devices** button will be pressed again.

- 3) Select UAV N°xxxx and press **Add device** button.

The utility saves the list of added devices automatically.

Before the next flights just run MdmDisp utility and check successful connection.



Adding a new device

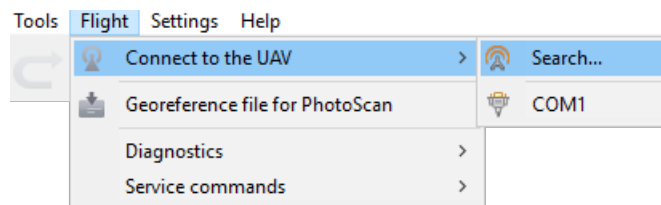
If UAV is not detected reconnect radio modem by right-click on the MdmDisp icon and select **Reconnect**. in the context menu.

If connection is failed:

- Check connection of the radio modem to laptop's USB socket.
- Check network settings in NetTopology.
- Set COM-port of the radio modem manually. Right click on the MdmDisp antenna icon and select textbfSettings in the context menu. Set **Connection type – Serial** and select COM-port of the radio modem.
- Right click to MdmDisp icon and select **Reconnect**.

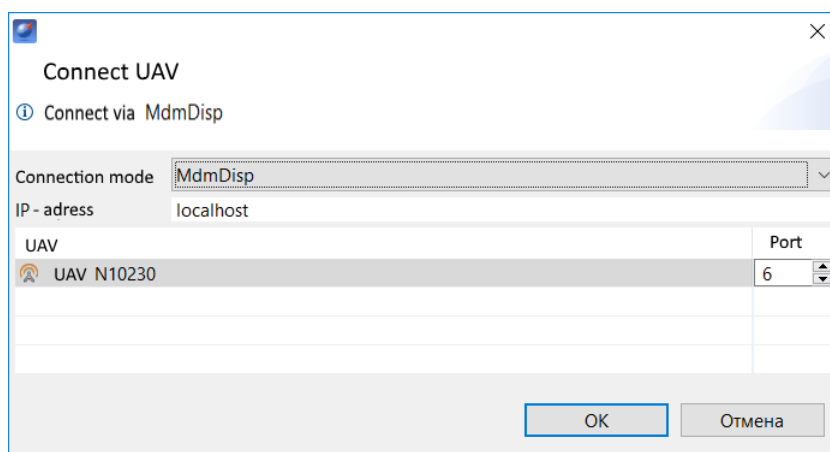
Connecting UAV to Geoscan Planner

- 1) Select **Connect to the UAV – Search...** in **Flight** tab.



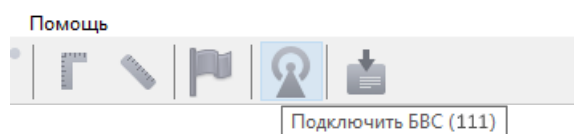
UAV connection

- 2) Select connection type in **MdmDisp**.
Set *IP-adress – localhost*.
In **UAV** list set **UAV – Port 1**.



Connection settings

The settings will be automatically saved. At the next connections turn on the UAV power and use **Connect UAV** button on the toolbar.

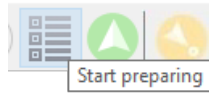


Connect UAV button

The receiver will automatically detect UAV coordinates and display position on the map.

Pre-launch Check

Launch **Start Preparing Wizard**.



Start Preparing Wizard launch button

Follow the instructions of the Start preparing Wizard (most tests are runned automatically).

On **Parameters** stage set:

Parashute autodeattach radius (m) – radius around landing point, that trigged parashute autodeattach after landing.

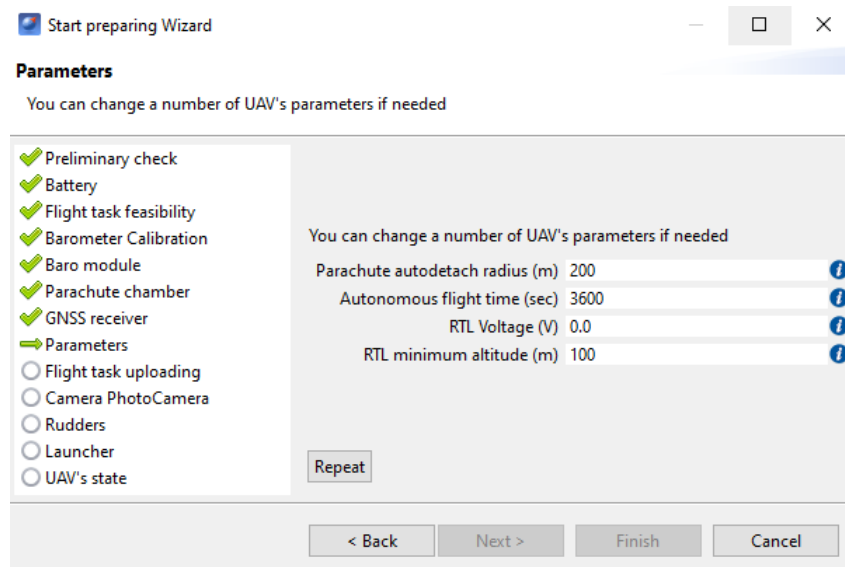
Example: If trees, transmission towers or any other barriers stays on landing route set value less than 150 m. It helps to off autodeattach, if UAV will landed on a tree.

The value shuld be in range from 0 to 300 m, where 0 – disabled autodeattach system.

Autonomous flight time (sec) – time after radio signal loss that UAV will fly in automatic mode. If the connection is not restored in this time, UAV will start retun to start point.

RTL Voltage (v) – battery voltage cut-off that launch immediate landing. Cut-off safety range: from 13.6 to 16.6 v.

RTL minimum altitude (m) – altitude cut-off that launch immediate landing. It sets if terrain or other barriers can block return route. Safety value range: from 100 to 4000 m.

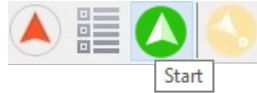


Flight mission settings

Place UAV on the launcher's carriage after successful pre-launch check.

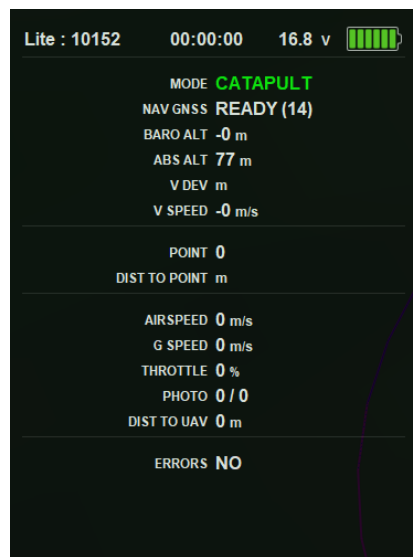
Flight

Press **Start** button.



Start button

UAV autopilot will change mode to start.
The telemetry panel will display **CATAPULT** mode.



Catapult mode



It is necessary to switch the UAV to start mode only after placing it on the launcher. It is forbidden to take and move the UAV after switching to **CATAPULT** mode.



To cancel the switching to Catapult mode, press the cancel button **Cancel**. UAV will be switched to the **Preparation** mode. It will require to go through the flight preparation again.

Eject safety pin and activate launch by pulling the launcher's cord. UAV will take off.

Launch

Follow the instructions, to launch GEOSCAN Lite:

1. Charge the battery and make sure it works correctly (see [Battery Charger](#) section for details).
2. Create a flight task (see [Geoscan Planner Software](#) section for details).
Don't forget to set the landing point.
Save flight project to load it before flight quickly.
3. Assemble UAV launcher (see [Launcher](#) section for details).
Install the rubber cords. Pull them on immediately before flight.
4. Assemble UAV (see [UAV Assembly](#) section for details). Install the parachute.




Check that the parachute compartment cover can open. To do that just rotate servo horn. The parachute rigging lines must be free.

5. Close and lock parachute compartment's cover by servo horn.
6. Install and connect the battery.
7. Format camera's SD card. Connect camera connector to UAV. Set up the camera (see [Camera Settings](#) section for details). Install camera in UAV cradle.
8. Close the fuselage's top cover and clasp three rubber locks.
9. Turn laptop on and connect radio modem (see [Connection Settings](#) section for details).
10. Open flight project in Geoscan Planner software.

Launch  **Start Preparing Wizard.**

On the stages of start preparing remove camera lens cap, install UAV on launcher and pull rubber cords.

11. Make sure, that the preparation is successful and press **Finish** button.
12. Press  **Start** button to switch UAV autopilot in catapult mode. Remove safety lock and pull the launching cord to launch the UAV.

The UAV will take off.

13. Loosen the tension of the rubber cords after starting the UAV. Hold the winch handle with one hand, and the second - remove the winch stopper and smoothly unwind the tension cable. The cords can be removed from the launcher by disconnecting the carabine from the cable and the loop from the carriage.

UAV Disassembly

1. Unclasp rubber locks to remove fuselage's top cover. Remove the back of the cover from grooves.
2. Turn UAV power off.

SD card can be removed from UAV camera to process a shooting results.

3. Close fuselage's top cover by inserting the back of the cover into grooves and clasp rubber locks.
4. Fold the dome and carefully place it in parachute compartment.
5. Close parachute compartment cover by moving the servo horn.

UAV can be moved to folding rack for disassembly.

6. Place UAV on folding rack.
7. Detach the fins by pulling the magnets.
8. Remove fuselage's top cover.
9. Remove UAV battery by unfastening the textile clasp.
10. Disconnect wings' cables from autopilot.
11. Remove wings by pulling them from rods.
12. Pull mounting rod out from the fuselage.
13. Close fuselage's top cover by inserting the back of the cover into the grooves and clasp the rubber locks.
14. Place the parts in transport bag/case.

Appendix

Specifications

UAV

UAV Type	Fixed-wing
Motor	Electric Brushless
Flight Speed	64 - 130 km/h
Max. Weight	3,1 kg
Max. Payload Weight	0,8 kg
Max. Wind Resistance	12 m/s
Wingspan	1,38 m
Min. Safety Flight Altitude	100 m
Max. Flight Altitude (ASL)	4000 m
Max. Flight Time	60 min
Max. Flight Distance	70 km
Operating Temperature Range	from -20 to +40°C

Battery

Battery Type	LiPo
Capacity	11300 mA·h
Cells	4S
Charge Current	Recommended Current: 6 A Max. Current: 10 A
Max. Charge Voltage	16,8 V
Min. Charge Voltage	13,2 V
Normal Voltage	14,8 V
Operating Temperature Range	from -20 to +40°C
Dimensions	165 × 41 × 62 mm
Weight	0.85 kg

U-blox ZED-F9 GNSS Receiver *

Number of channels	184 universal tracking channels
Acquisition time (hot/cold start)	<2 / <25 sec
Signals tracked	GPS: L1/L2; GLONASS: L1/L2; Galileo: E1B/E1C/E5c; BeiDou: B1I/B2I
Positioning accuracy (PPK)	horizontal: 10 mm + 1 ppm × baseline length; vertical: 10 mm + 1 ppm × baseline length

Topcon B111 GNSS receiver *

Number of channels	226 universal tracking channels
Acquisition time (hot/cold start)	<15 / <44 sec
Signals tracked	GPS: L1/L2; GLONASS: L1/L2
Positioning accuracy (PPK)	horizontal: 5 mm + 0.5 ppm × baseline length; vertical: 10 mm + 0.8 ppm × baseline length

Radio modem *

Operating frequency	867.75 – 872.25 MHz
Transmitting power	<1 W
Max. bandwidth	500 kb/s
Max. delay	20 ms
Duplexing mode	TDD
Max range	40 km

Sony DSC-RX1RM2 Digital Camera *

Sensor	Full-frame CMOS Exmor R (35.9x24 mm)
Number of Pixels	43,6 MP
Shutter	central
Aperture	f/2-22
ISO Range	100-102400
Shutter Speed	from 1/4000 to 30 sec

Sony A6000 Digital Camera *

Sensor	CMOS
Number of Pixels	24,3 MP
Shutter	focal
Focal Length	16-50 mm
Aperture	f/3.5-22
ISO Range	100-25600

Sony ZV-E10 Digital Camera *

Sensor	CMOS APS-C (23,5 × 15,6 mm)
Number of Pixels	24,3 MP
Shutter	focal
ISO Range	100-32200

Transport Bag*

Materials	Polyvinyl Chloride (outside) Polyethylene Foam (inside)
Dimensions	730 × 440 × 210 mm
Weight (with equipment)	10 kg

Protective Transport Case*

Material	Damage resistant plastic
Dimensions	780 × 520 × 310 mm
Weight (with equipment)	~20 kg
Wheeled	Yes

* – transport case, camera and installed GNSS receiver type depends on delivery kit

