

Aero-M

Operation Manual



Thank you for purchasing an Aero-M! This manual contains important information about your aerial mapping platform. Please read these instructions before your first flight.

1 Plan	1
2 Fly	20
3 Process	37
Appendix	41



Online information portal:
3DR support:
Terms and conditions:
Pix4D instructions:

3DR.com/Aero-M
help@3DR.com
3DR.com/terms
support.Pix4D.com



I Plan

Parts	2	Mission Planning	8
Flight Battery	3	Operating Parameters	8
Charging	3	Load Maps	9
Safety	3	Draw Polygon	10
Powering the Aero	4	Configure Survey	11
		Save and Write Mission	19
Camera Setup	5		
3DR EAI	5		
Charging	5		
Starting a Mission	5		
Mounting	6		
Ground Station Setup	7		
Download Software	7		
Connect to Radio	7		

Parts



Aero



batteries (2)



camera



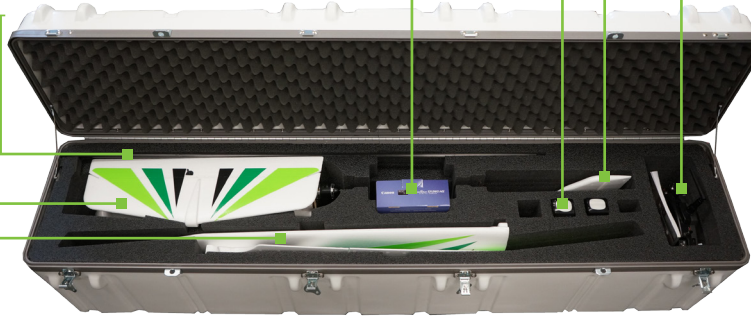
wing spar



horizontal stabilizer



wings



registration card and
Pix4D license key

FPV/OSD System

If you selected to receive a FPV/OSD system, those components will be included with the Aero's accessories. See page 34 for parts and instructions.



RC controller and
accessories



ground station radio



micro-USB cable



charger and
accessories



battery guard bag



wing rubber bands
(4 plus 2 spare)



propellers (1
plus 1 spare)



hex keys (?)



propeller wrench



spare control horns
(2)



spare servo rods (2)



spare camera
mount filters (2)



Pixhawk micro-SD
card adapter

Flight Battery

The Aero is powered by a rechargeable lithium polymer (LiPo) battery. Charge the battery before your first flight.

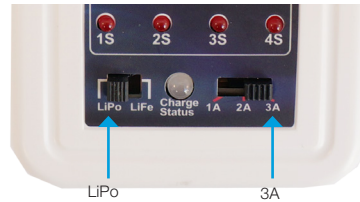
Charging

- 1 Connect the charger to the power adapter cable and a wall outlet. Connect the red cable to the + port and the black cable to the - port.



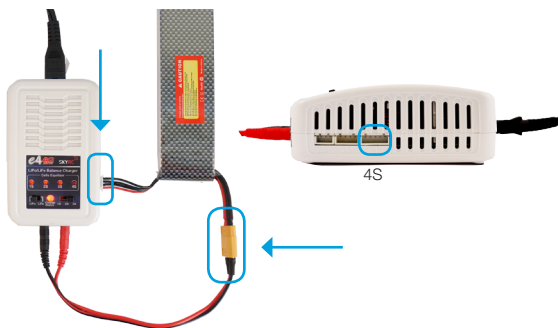
Charger with power cable and split-wire charging cable

- 2 Set the charger to LiPo and 3A.



Charger settings

- 3 Connect the white connector to the 4S port, and join the two yellow connectors together.



Flight battery charging wiring

- 4 Secure the battery inside the guard bag, and charge until the status indicator displays green.



Charging in process

Safety



Flying with a low battery is a safety risk and can render the battery permanently unusable. Always fly with a fully charged battery.

Charge the battery using a designated LiPo balance charger only. Always monitor the battery while charging. Protect the battery from extreme heat, extreme cold, puncturing, and flammable surfaces. Always transport, charge, and store the battery in the guard bag.

Inspect the battery for damage before and after flying. If you observe any swelling of the package or the battery ceases to function, do not use the battery; locate your local battery recycling center, and dispose of the battery. In the US and Canada, visit call2recycle.org to find a location. Do not dispose of the battery in the trash.

Powering the Aero

1

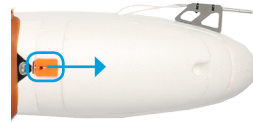
Turn on the controller. To avoid triggering the controller's startup alarm, ensure that all switches are set back (away from you) and the throttle stick is set fully down.



RC controller

2

Open the battery compartment by sliding the knob on the orange switch forward and lifting out the lid.



Aero: battery compartment lid

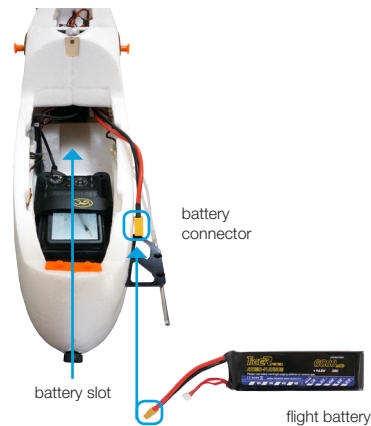
3

Insert a charged battery into the battery slot, and attach the yellow connectors. This will power on the Aero.



Hold the Aero still and level while it powers on.

Attach the velcro above the battery slot to the velcro on the battery. Close and secure the lid onto the battery compartment.



Aero: battery compartment interior



It is important to establish communication before powering on the Aero. Always turn on the controller before connecting the battery. When powering off the Aero, disconnect the battery before turning off the controller.

Camera Setup

The Aero includes a Canon PowerShot S100 running the 3DR EAI script.

3DR EAI (Exposure-Aperture-ISO)

3DR EAI runs on the Canon Hacker Development Kit (CHDK), a powerful open-source tool that expands the functionality of Canon point-and-shoot cameras. 3DR EAI optimizes image exposure and integrates with the Pixhawk autopilot to enable distance-based imaging.

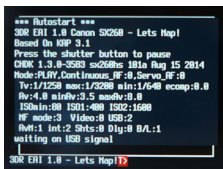
This software is designed to load off the camera's SD card, leaving the original Canon programming intact. The yellow switch on the side of the SD card allows you to lock or unlock the card. Lock the SD card to run 3DR EAI; unlock the SD card to save images to your ground station or to boot the camera with its original programming.

For more information about 3DR EAI, see page 43.



SD card locked
Load 3DR EAI

» Fly a mapping mission



Camera running 3DR EAI



SD card unlocked
Load default Canon software

» View images on camera
» Save images to ground station
» Update script



Camera running Canon software



Power off the camera before removing the SD card.

Charging

Charge the camera battery before your first flight. Once fully charged, insert the battery into the camera.



Canon battery charger

Starting a Mission

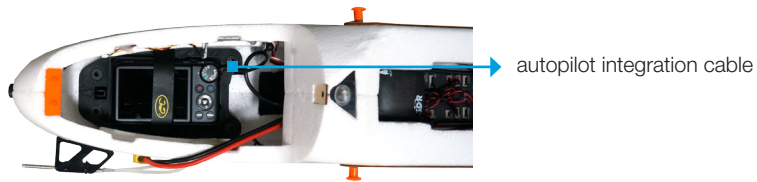
To prepare the camera to fly a mapping mission, ensure that the mode dial is set to *P (program)* mode. Power on the camera using the silver button on the top. 3DR EAI will start automatically, and you will see the script messages on the camera display. Check to see that the last line of the script reads *waiting on USB signal*. The camera is now ready to map!



Camera ready to map: *waiting on USB signal*

Mounting

The camera mounts to the Aero inside the battery compartment and connects to the autopilot using the mini-USB cable. When the camera is ready to start the mission, insert the camera into the mount inside the battery compartment as shown below, connect the mini-USB cable to the camera, and secure the camera in place using the velcro strap.



Aero battery compartment: camera mount



Camera (side)

The camera mount is fixed to the inside of the battery compartment and is not intended to be removed from the Aero.

The camera mount includes a lens cap that protects the filter during travel. Make sure to remove this lens cap before you fly, and check that the filter contains no foam particles, dirt, or scratches that could affect image quality.

It is expected that the filter will accumulate scratches after significant use. If you notice any damage to the filter that could affect image quality, unscrew the filter and replace with one of the extra filters provided with the Aero.



Camera mount (bottom): cap removed



Camera mount (bottom): cap attached

Ground Station Setup

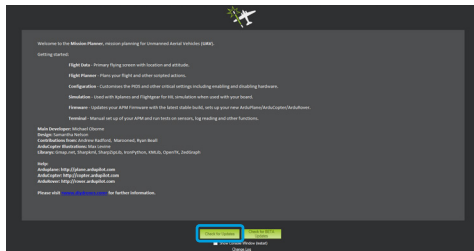
Mission Planner allows you to turn a Windows laptop into a full-featured ground station for configuring and monitoring autonomous missions. You will need to take this laptop into the field when you fly the mission. As part of the mission procedure, you will use the Pix4D Rapid Check to verify the quality of the image set before leaving the field.

Download Software

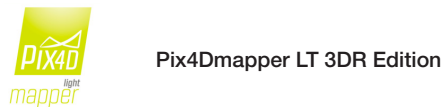


Mission Planner is a full-featured ground station application for planning missions and monitoring the Aero in flight. Download Mission Planner from 3DR.com/download_software.

If you already have Mission Planner installed, make sure you're running the most recent version: Select the *Help* tab and *Check for Updates*.



Mission Planner: *Help* tab



Your license key for Pix4Dmapper can be found on the registration card inside the documents package.

Visit mapper.pix4d.com/license-redeem to create an account and redeem your license key; then visit pix4d.com/download to download Pix4Dmapper Discovery. Pix4D will automatically upgrade from the Discovery edition to the LT 3DR Edition (or Pro Edition if you selected to upgrade) when you log in to the program with your Pix4D account information.

Connect to Radio

To connect the Aero to Mission Planner, connect the ground station radio to the laptop, and power the Aero.

- 1 Connect the ground station radio to your laptop using the micro-USB cable. Open Mission Planner.
- 2 Select *57600* and *AUTO*, then select *CONNECT*. (When connecting directly to Pixhawk's micro-USB port, set the rate to 115200.)



Ground station laptop with radio connected



Mission Planner *Connect* tool (top-right corner)

- 3 Select *Flight Data* to view live data from the Aero.

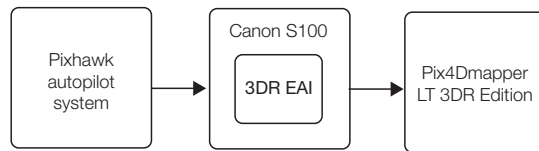


Mission Planner *Flight Data* tab: connected to aircraft

Mission Planning

Operating Parameters

The Aero is a complete solution for creating high-resolution visual-spectrum aerial maps.



Mapping system diagram

To create a map, the Aero flies an autonomous mission over the survey site, using the integration between the Pixhawk autopilot and custom-programmed camera to capture images at a consistent distance interval. Pix4Dmapper then stitches these images together into a georeferenced, orthorectified mosaic.

The accuracy of the map depends on the configuration of the mission. Planning a mission that captures high-quality images requires balancing the Aero's operating parameters with the environmental factors at the survey site.

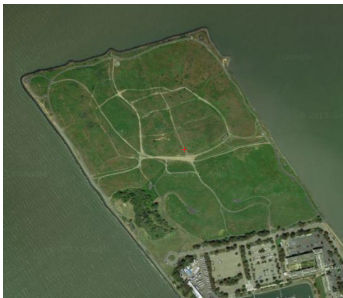
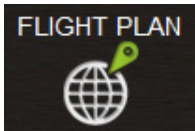
Operating Parameters

Camera	Canon S100
Camera Orientation	Portrait (side facing forward)
Operating Altitude	80-120 m
Standard Operating Altitude	100 m
Low-Wind Conditions	0-6 m/s
High-Wind Conditions	7-10 m/s
Maximum Wind Conditions	10 m/s
Operating Speed	8-20 m/s
Default Speed	15 m/s
Estimated Maximum Flight Time	40 min
Estimated Ground Resolution	5 cm/pixel
Estimated Maximum Survey Area	1 km ²
Minimum Photo Interval	2 seconds

Load Maps

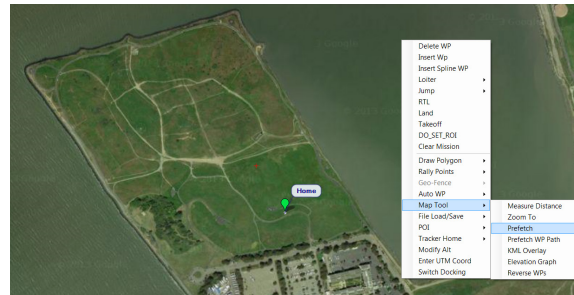
Mission Planner allows you to plan the mission away from the mapping location; however, it is important to assess the environmental conditions on site at the time of the mission and adjust the flight plan if necessary. Alternatively, you can plan the entire mission at the mapping location. To create or alter the mission, Mission Planner requires an Internet connection to access the maps. If you're unable to access the Internet on site, follow the instructions below to pre-fetch the maps within Mission Planner while you have Internet access.

- 1 Open Mission Planner, select *Flight Plan*, and zoom to your flying location.



Mission Planner *Flight Plan* tab: zoom to mapping location

- 2 Right-click on the map, select *Map Tool* and *Prefetch*, and accept the default prompts. Mission Planner will download the maps for the selected location to your computer.



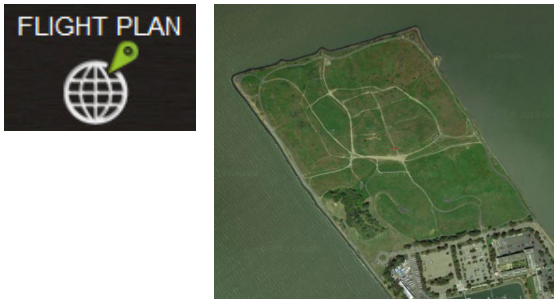
Mission Planner *Flight Plan* tab: Select *Prefetch*

- 3 Mission Planner will attempt to load the map data from the current level of zoom down to the closest level of zoom available. However, it can take hours to pre-fetch every level of zoom, and it is unlikely that the closer levels will be useful in planning the mission. To shortcut this process, check the slider on the right side of the map. The levels of zoom are represented by this slider from 0 (bottom) to 25 (top). Press the ESC key to skip levels of zoom at a greater detail than you need for mission planning.

Draw Polygon

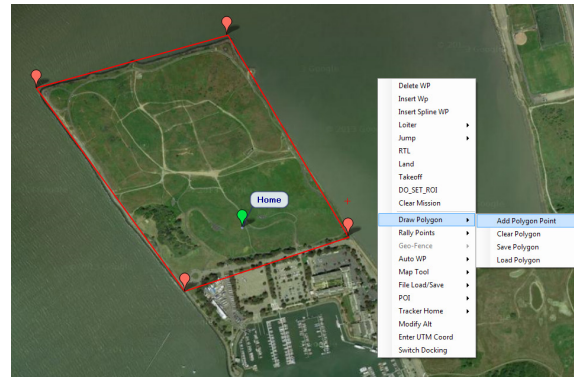
To begin planning the mapping mission, select the area you want to map using the *Polygon* tool. You'll be able to adjust the size and shape of the polygon later in the mission configuration process.

1 Select *Flight Plan*, and zoom to your mapping location.



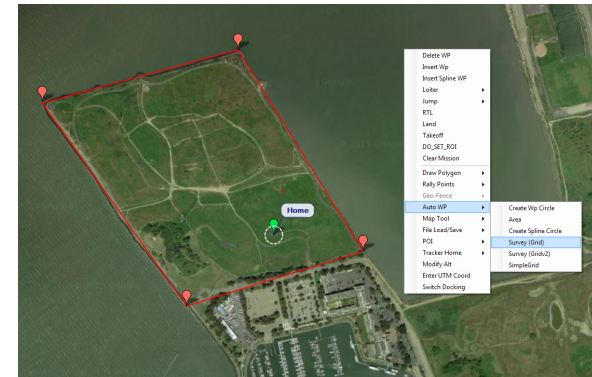
Mission Planner *Flight Plan* tab: zoom to mapping location

2 Right click on the map. Select *Draw Polygon* and *Add Polygon Point*. Click and drag to add points around the area you want to map.



Mission Planner *Flight Plan* tab: draw polygon

3 Right click on the polygon. Select *Auto WP* and *Survey (Grid)* to open the Survey Tool.



Mission Planner *Flight Plan* tab: open *Survey* tool



Units

The Survey Tool uses metric units. If your Mission Planner is set to imperial units, please change the settings to use metric to plan the mission. Support for imperial units in Mission Planner is coming soon; check [3DR.com/Aero-M](https://www.3dr.com/aero-m) for updates.

Configure Survey: Set Default Parameters

The Survey tool allows you to configure a mapping mission according to the Aero's operating parameters and the current environmental conditions at the mapping location. First, set the default values for the Aero.

Simple Options

Camera: Canon S100-S120

Altitude [m]: 100

Angle [deg]: 253

Camera top facing forward

Flying Speed [m/s] (est): 15

Use speed for this mission

Add Takeoff and Land WP's

Use RTL

Display

Boundary

Markers

Grid

Internals

Footprints

Advanced Options

Stats

Area:	367001 m ²	Pictures:	131	Flight Time (est):	13:52 Minutes
Distance:	9.98 km	No of Strips:	16	Photo every (est):	4.57 Seconds
Distance between images:	69 m	Footprint:	137.1 x 101.1 m		
Ground Resolution:	3.37 cm	Dist between lines:	40.44 m		

Accept

Set Camera
Canon S100-S120

Set Camera Orientation
Uncheck the option for *Camera top facing forward*.

Simple Options

Camera: Canon S100-S120

Altitude [m]: 100

Angle [deg]: 253

Camera top facing forward

Flying Speed [m/s] (est): 15

Use speed for this mission

Add Takeoff and Land WP's

Use RTL

Display

Boundary

Markers

Grid

Internals

Footprints

Advanced Options

Stats

Area:	367001 m ²	Pictures:	131	Flight Time (est):	13:52 Minutes
Distance:	9.98 km	No of Strips:	16	Photo every (est):	4.57 Seconds
Distance between images:	69 m	Footprint:	137.1 x 101.1 m		
Ground Resolution:	3.37 cm	Dist between lines:	40.44 m		

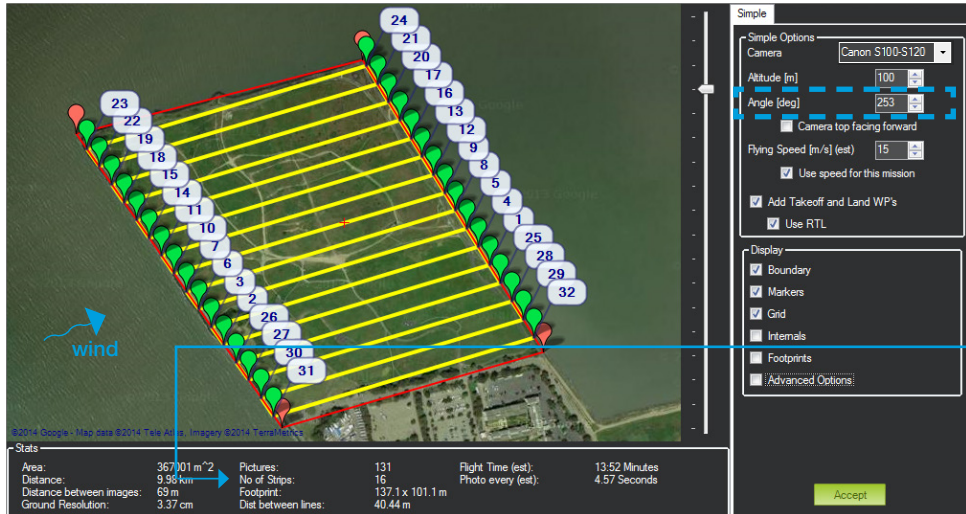
Accept

Set Default Speed
15 m/s

Apply Survey Speed
Check the option for *Use speed for this mission*.
If unchecked, the mission will use the Aero's default speed of 15 m/s regardless of the speed selected in the Survey Tool.

Configure Survey: Set Angle

Next configure the angle of the flight path for the current wind conditions.



Mission Planner Survey tool

Set Angle

Wind Direction

In environments with winds of less than 6 m/s, set the angle so that the Aero flies into the wind. In winds from 7-10 m/s, configure the flight path to travel perpendicular to the wind so the Aero flies cross-wind.

No. of Strips

Adjust the angle so that the Aero makes as few turns as possible to complete its course. The *No. of Strips* parameter shows how many passes the plane will make as you adjust the angle.

Review Wind Conditions On-Site

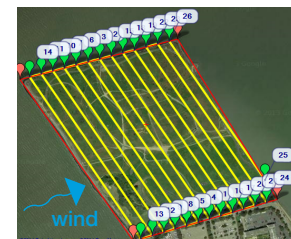
Always assess the wind conditions at your survey site at the time of the mission and adjust the mission accordingly.

Mission Planner Tip: Adjust Polygon

Click and drag the red polygon points to adjust the size and shape of the polygon from the Survey Tool.



Configure the flight path parallel with the wind in low winds (1-6 m/s).



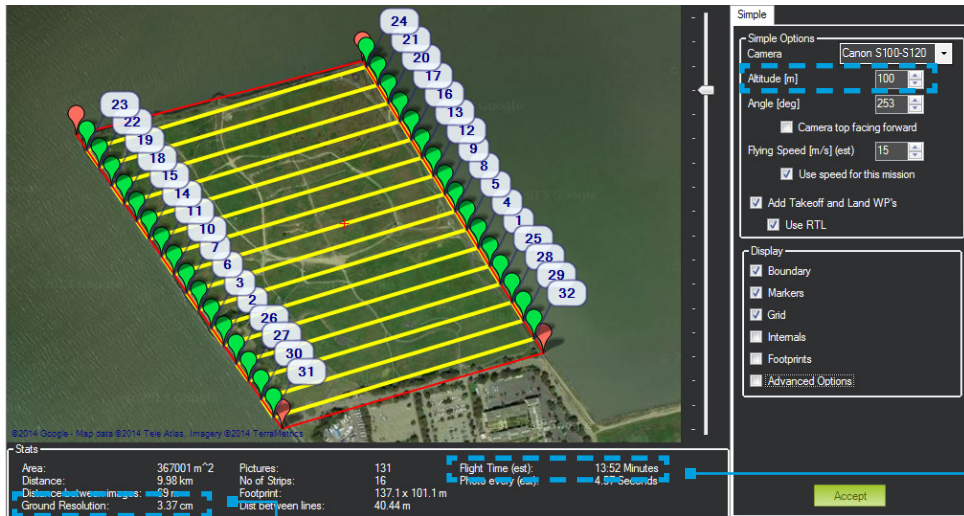
Configure the flight path perpendicular to the wind in high winds (7-10 m/s).



Use caution when flying in winds over 10m/s. Mapping results may degrade as a result of inability to make headway or maintain appropriate groundspeed.

Configure Survey: Set Altitude

The survey altitude determines the duration of the mission and the ground resolution of the final map. Adjust altitude to balance flight time and power consumption with the current environmental conditions.



Mission Planner Survey tool

Set Altitude

Standard operating altitude: 100 m
Operating altitude range: 80-120 m

Increasing altitude decreases flight time, allowing you to cover more area per minute. Decreasing altitude improves ground resolution. Set the altitude to get the best ground resolution while keeping the flight time under 40 min and the altitude under 120 m.



Keep altitude below 120 m, and ensure that the altitude is appropriate for your flying area and local regulations.

Check Ground Resolution

Ground Resolution is the centimeters per pixel that you will have in the map and corresponds to the amount of detail that you will see.

To improve ground resolution by decreasing the number of centimeters per pixel, decrease altitude.

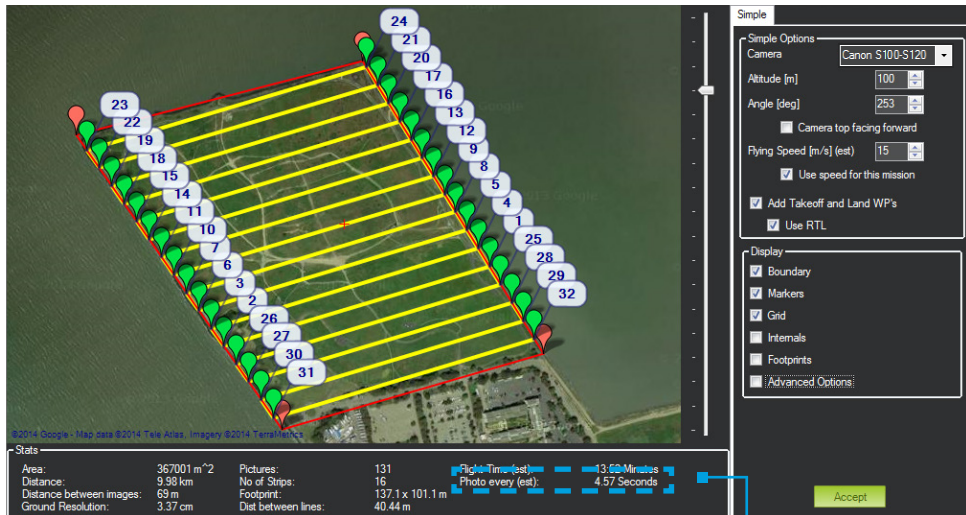
Check Flight Time

Flight Time estimates the duration of the mission. The total estimated flight time must be under 40 min for a fully charged Aero battery. To decrease flight time, increase altitude or speed.

High winds, humidity, high altitude, and extreme heat can affect power consumption and reduce flight time. Consider the environmental factors at your site when configuring flight time.

Configure Survey: Check Photo Interval

With the basic parameters in place, verify that the photo interval calculated from the altitude and speed complies with the operating parameters for the camera.



Mission Planner *Survey* tool

Check Photo Interval

Photo Every must be longer than 2 seconds for the S100 camera.

Altitude

Increasing altitude increases photo interval.



Keep altitude below 120 m, and ensure that the altitude is appropriate for your flying area and local regulations.

Speed

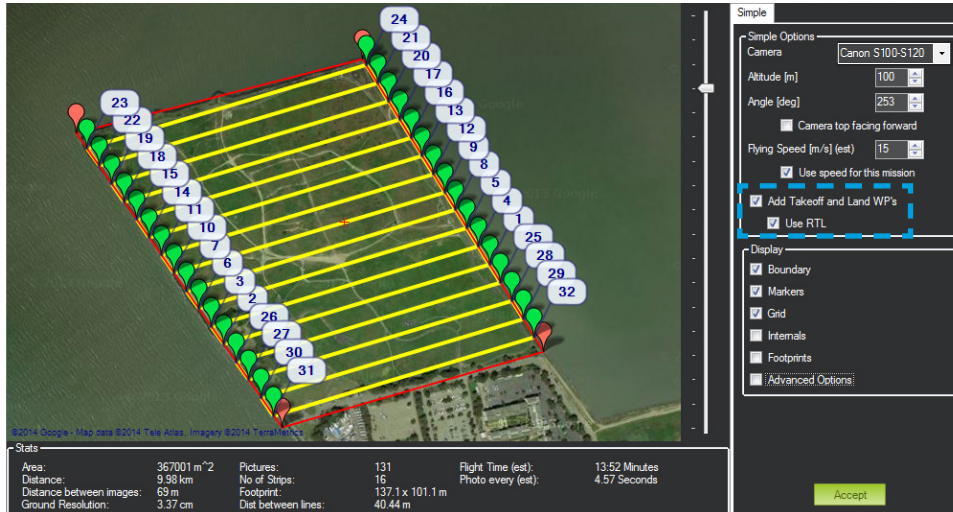
Decreasing speed increases photo interval.



Ensure that the *Use speed for this mission* option is checked.

Configure Survey: Set Takeoff and Landing

Now select a takeoff and landing pattern, either manual or automatic.



Mission Planner Survey tool



Takeoff and Land WP's

For automatic takeoff and landing

Check the *Add Takeoff and Land WP's* option.
Uncheck the *Use RTL* option.

This will create a takeoff waypoint and a placeholder waypoint for the landing pattern. After accepting the survey, configure the automatic landing pattern by following the instructions on page 20.

For automatic takeoff and manual landing

Check both the *Add Takeoff and Land WP's* option and the *Use RTL* options.

This will create a takeoff waypoint so the Aero will automatically climb to the survey altitude before heading to the first waypoint. The Aero will return to circle over the launch point after completing the mission.

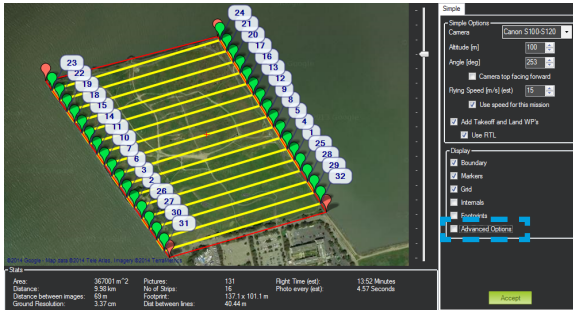
For manual takeoff and landing

Uncheck the *Add Takeoff and Land WP's* option
Check the *Use RTL* option.

For this option, take off manually then initiate the mission in flight. The Aero will return to circle over the launch point after completing the mission.

Configure Survey: Advanced Options

The Survey tool includes the following advanced configuration options. These options allow you to customize the mission to comply with best operating practices.



Check Advanced Options to view the Survey Tool's advanced configuration options.



Select Grid Options

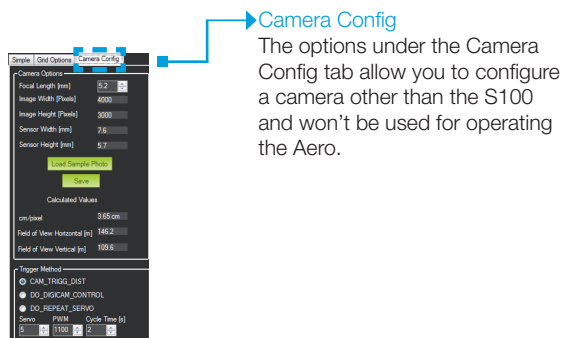
Set OverShoot

The Aero has a minimum turning radius of 90 degrees. To accommodate the sharp angles of the survey mission, set both *OverShoot* parameters to 50 to have the Aero overshoot the waypoints on either side of the polygon by 50% to ensure that the complete area of the polygon is covered by the images.



OverShoot will affect flight time. Ensure that the total estimated flight time is less than the Aero's maximum flight time of 40 minutes.

Mission Planner *Survey* tool: advanced options



Camera Config

The options under the Camera Config tab allow you to configure a camera other than the S100 and won't be used for operating the Aero.

Adjust StartFrom

During the mission, you will maintain contact with the aircraft through the RC controller and ground station signals. If your mission is likely to experience a loss of signal, it is best practice to start from the corner of the mission farthest from the launch point. In this example, TopLeft is the corner of the mission farthest from the launch point.

Adjust Overlap and Sidelap

Overlap and sidelap are set to 50% and 60%, respectively, by default. See page 42 for an in-depth discussion of these parameters.

Mission Planner *Survey* tool: advanced options

Configure Survey: Accept Survey

Before accepting the survey, verify that the mission complies with the Aero's operating parameters.



Mission Planner *Survey* tool

Operating Parameters

Camera
Canon S100-S120

Altitude
80-120 m

Camera top facing forward
unchecked

Flying speed
9-15 m/s

Use speed for this mission
checked (optional if speed set to default speed of 15 m/s)

Photo Every
greater than 2 s

Flight time
under 40 min depending on environmental conditions

Accept

Select **Accept** to create this mission. After accepting, you will need to reconfigure the survey completely to make any adjustments.

If Mission Planner prompts you for a home altitude, enter the altitude that you specified in the *Survey* tool.



Do not accept the mission if any of the parameters exceed the Aero's operating limits.

Configuring Automatic Takeoff and Landing

If you selected automatic landing in the Survey Tool by checking the *Add Takeoff and Land WP's* option and unchecking the *Use RTL* option, you will need to configure the landing waypoint pattern manually at this step in the mission planning process.

To begin, determine the direction of the wind and select an unobstructed area 200-500 m in length leading to the launch point, into the wind. On the main Flight Plan screen, create a series of waypoints along this path to decrease altitude gradually from the survey altitude to 0, ensuring that:

- » Turns along the flight path are greater than 90 degrees.
- » The altitude decreases by a maximum of 20 m between waypoints
- » There is at least 20 m between each waypoint
- » The *Grad %* does not exceed 20%

To add a waypoint, right click on the map in the location of the waypoint you would like to add, and select *Insert WP*. For each waypoint you add to the mission, Mission Planner will prompt you for the new waypoint's place in the script: Add the series of landing waypoints immediately before the *LAND* waypoint in the script of events. For the first waypoint in the pattern, add it to the mission immediately following the *DO_SET_CAM_TRIGG_DIST* waypoint at the end of the mission. Specify the altitude of each waypoint and check the distance and gradient angle in the waypoints table.

WP Radius	Loiter Radius	Default Alt	Verify Height
25	73	20	<input type="checkbox"/>
1	TAKEOFF	20	0 0 0 0
2	DO_CHANG...	0	5 0 0 0
3	WAYPOINT	0	0 0 0 37.87439
4	DO_SET_CA...	68.5555572509766	0 0 0 0
5	WAYPOINT	0	0 0 0 37.87600

Command	Del	Lat	Long	Alt	Delete	Up	Down	Grad %	Dist	AZ	
35	WAYPOINT	0	0	0	37.8695698	-122.3210349	100	X	0.0	573.6	253
36	DO_SET_CA...	0	0	0	0	0	0	X	0	0	0
37	WAYPOINT	0	0	0	37.8713133	-122.3236656	80	X	6.6	301.5	310
38	WAYPOINT	0	0	0	37.8756833	-122.3156834	70	X	1.2	852.6	55
39	WAYPOINT	0	0	0	37.8750796	-122.3119712	50	X	6.0	332.8	102
40	WAYPOINT	0	0	0	37.8727192	-122.3109412	40	X	3.6	277.0	161
41	WAYPOINT	0	0	0	37.8722788	-122.3131299	30	X	5.0	192.3	256
42	WAYPOINT	0	0	0	37.8717791	-122.3151896	20	X	6.0	200.0	254
43	LAND	0	0	0	0	0	0	X	0	0	0

Mission Planner *Flight Plan* tab: Correctly configured automatic landing pattern

To add a waypoint, right click on the map in the location of the waypoint you would like to add, and select *Insert WP*. For each waypoint you add to the mission, Mission Planner will prompt you for the new waypoint's place in the script: Add the series of landing waypoints immediately before the *LAND* waypoint in the script of events. For the first waypoint in the pattern, add it to the mission immediately following the *DO_SET_CAM_TRIGG_DIST* waypoint at the end of the mission. Specify the altitude of each waypoint and check the distance and gradient angle in the waypoints table.

Locate the Takeoff waypoint in the mission script and set the first option in the row to assign the takeoff angle.

Set the takeoff angle to 20-25 degrees depending on the length of your takeoff area.

Waypoints						
WP Radius	Loiter Radius	Default Alt	Verify Height			
25	73	20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Command	Takeoff angle				
1	TAKEOFF	20	0	0	0	0
2	DO_CHANG...	0	5	0	0	0
3	WAYPOINT	0	0	0	0	37.87439
4	DO_SET_CA...	68.5555572509766	0	0	0	0
5	WAYPOINT	0	0	0	0	37.87600

Mission Planner Tip: Configure Waypoints

Measure the distance between waypoints by right-clicking at one end and selecting *Measure Distance*; then right-click on the other end and select *Measure Distance* again. A dialog box will open with the distance between the two points.

Double-click on a field in the waypoint table to edit the parameters for a waypoint.

Use the Up and Down arrow icons to re-order the waypoints.

Use the Delete option to remove a waypoint from the mission.

Save and Write Mission

For the Aero to run the mission, write the waypoint file to the autopilot.
Don't forget to save the waypoint file to your ground station for future use.

The screenshot shows the Mission Planner interface. The main window displays a map with 41 numbered waypoints connected by yellow lines, forming a grid pattern over a body of water. A 'Home' point is marked at the bottom center. The 'Action' panel on the right contains buttons for 'Load WP File', 'Save WP File', 'Read WPs', and 'Write WPs'. Below the map is a 'Waypoints' table with columns for Command, Del, Del, Lat, Long, Alt, Delete, Up, Down, Grad %, Dist, and AZ.

Command	Del	Del	Lat	Long	Alt	Delete	Up	Down	Grad %	Dist	AZ	
35 WAYPOINT	0	0	0	37.8695698	-122.3210349	100	X	⬆	⬆	0.0	573.6	253
36 DO_SET_CA...	0	0	0	0	0	X	⬆	⬆	0	0	0	0
37 WAYPOINT	0	0	0	37.8711133	-122.3236556	100	X	⬆	⬆	5.6	301.5	310

Select Save WP File

to save the mission file to your computer. To repeat this mapping mission, load the saved WP file from your computer.

Select Write WPs

to save the mission to the Aero.

Mission Planner *Flight Plan* tab: Save and write mission



2 Fly

Safety	21
Aircraft Operation	22
Components	22
Assembly	23
Controls	26
Modes	27
Arming and Disarming	28
LED Indicators and Tones	28
GPS Lock	28
Preflight Checks	29
Manual and Automatic Takeoff	32
Manual and Automatic Landing	33
FPV System Operation	34
Flying Mapping Missions	35
Takeoff Checklist	35
Initiating	35
Monitoring	35
Failsafes	36

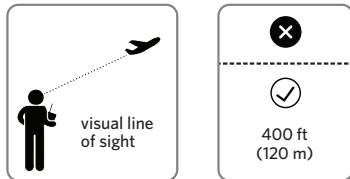
Safety

To ensure safe and successful flying, familiarize yourself with the safety information on this page. Always fly in accordance with your location regulations and these best operating practices.

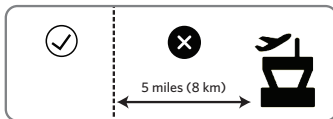
Before you fly, determine the boundaries of your safe flying area. If the Aero moves outside the designated area or exhibits instability in flight, switch to fly-by-wire mode and land the plane manually. Always be ready to regain manual control of the plane in the event of an unsafe situation.

The Aero will not avoid obstacles on its own, including during missions. As the operator, it's your job to recognize and avoid obstructions while flying. When planning missions, ensure that the selected altitude is appropriate for all geographical features of the area, including terrain.

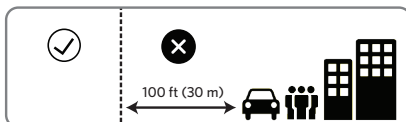
Location



Always fly below 400 ft (120 m) and within your visual line of sight. Don't let the Aero get too far away from you; make sure you can always see its orientation. Don't fly in low light, rain, or other conditions that might impede visibility.



Always fly at least 5 miles (8 km) away from airports and other areas where pilots operate manned aircraft.



Always fly at least 100 feet (30 m) away from people, vehicles, and buildings. Make the safety of people and property your first priority!

Propeller



Spinning propellers can cause serious injury. The safety button indicates the status of the motor to help you prevent hazardous contact with the Aero's high-speed propeller.

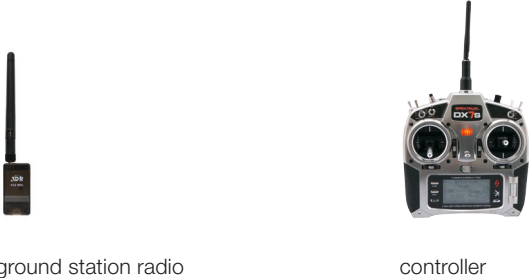
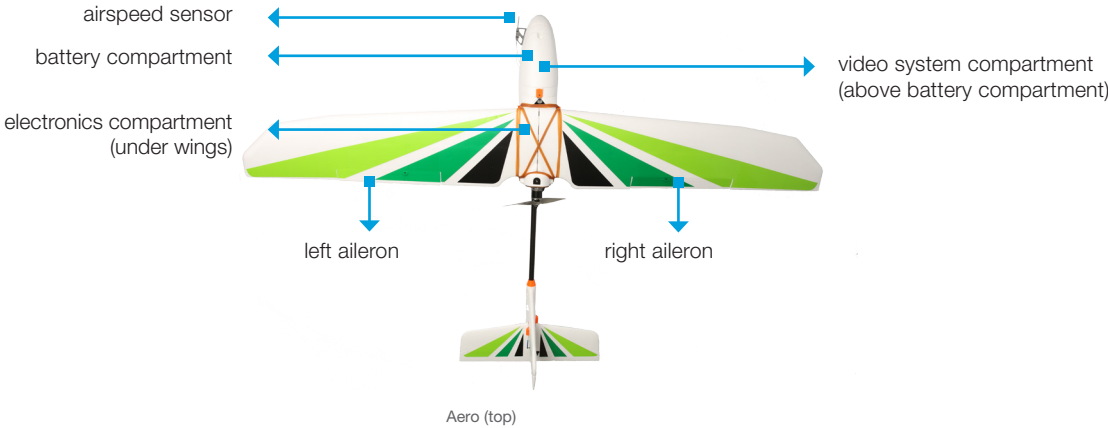
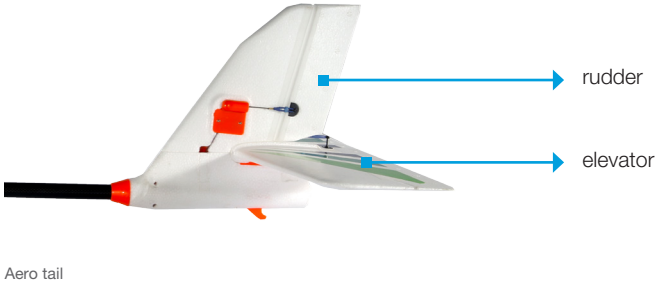
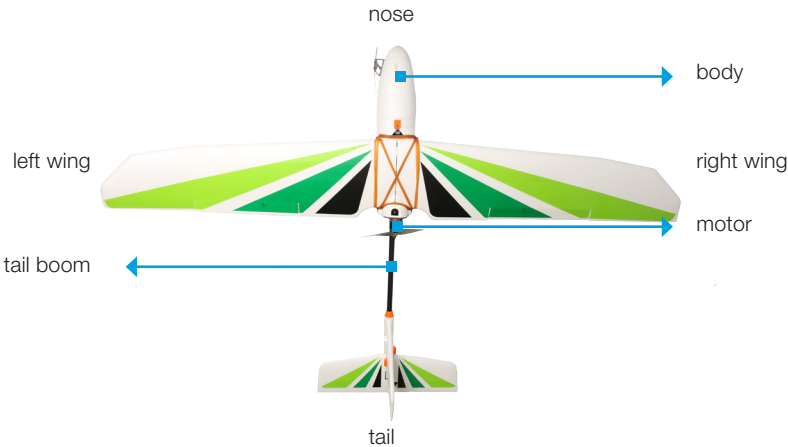
- When the Aero is powered on, the safety button will blink red, indicating that the motor is inactive and the propeller is safe to handle.
- When you're ready to fly, press and hold the safety button until it shows solid red. This indicates that the motor is armed and the propeller will spin if the throttle stick is raised. To make the propeller safe to handle again, press and hold the safety button until it blinks red.



You can find more safety tips throughout these instructions where you see this yellow box.

Aircraft Operation

Components



If the terms above are unfamiliar to you, visit 3DR.com/Aero-M, and dive into the exciting world of planes with our Introduction to Flying Fixed-Wing Aircraft.

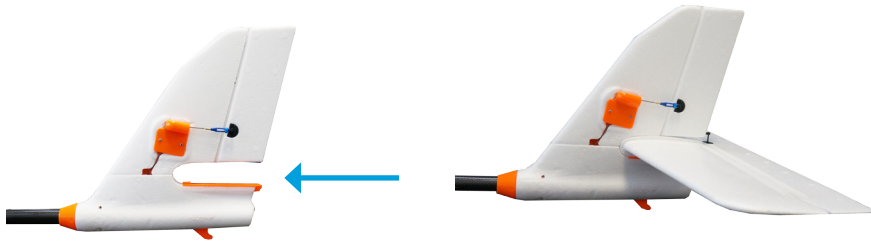
Assembly

Tail

Slide the horizontal stabilizer into the vertical stabilizer along the orange groove. Make sure not to stress any of the components on the tail.



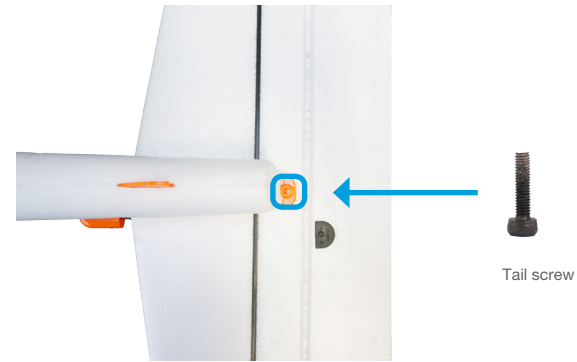
Horizontal stabilizer



Vertical stabilizer

Complete tail assembly

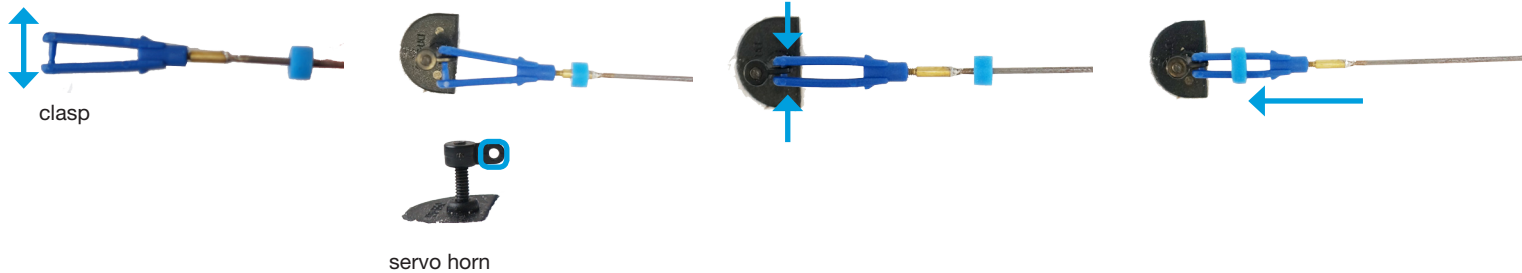
Turn the plane over and insert the provided tail screw into the horizontal and vertical stabilizers.



Tail assembly (underside)

Tail screw

On the top of the horizontal stabilizer, open the blue clasp at the end of the servo rod. Insert the pegs on the clasp into the open space in the servo horn, and close the clasp. Slide the blue rubber ring over the clasp to secure it in place.



clasp

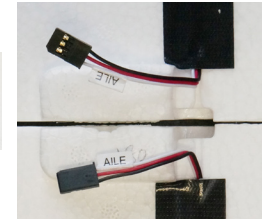
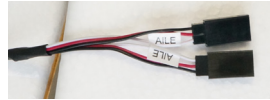
servo horn

Wings

Attach a wing onto each side of the spar. Do not twist the wing or the spar so as not to stress the foam.



Locate the two cables inside the electronics compartment marked AILE. Connect these cables to the two cables on the wings marked AILE. (Either of the wing cables can connect to either of the plane cables; the order doesn't matter.)

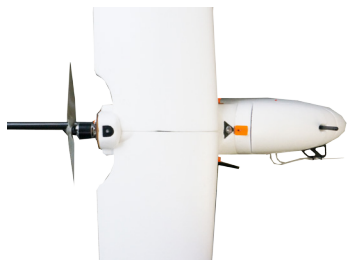


Place the wings over the body of the Aero with the foam squares fitted into the matching space in the electronics compartment. Make sure not to pinch the AILE cables.

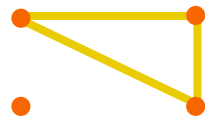
Locate the four large rubber bands. Use the bands to secure the wings to the body of the Aero by the four orange knobs on the body around the wings.

Repeat on the other short side with the remaining two rubber bands, resulting in two pairs of opposing right triangles.

Attach two of the bands to the two knobs on one of the short sides and opposite knobs on the opposing side.



1



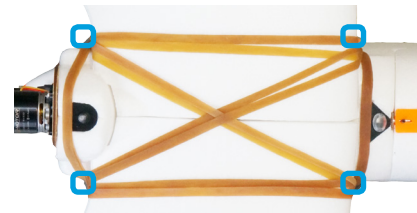
2



3

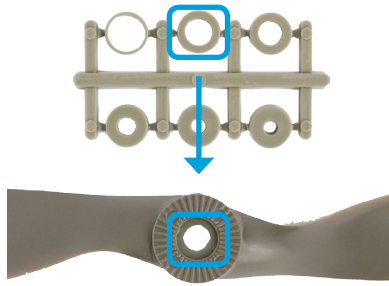


4

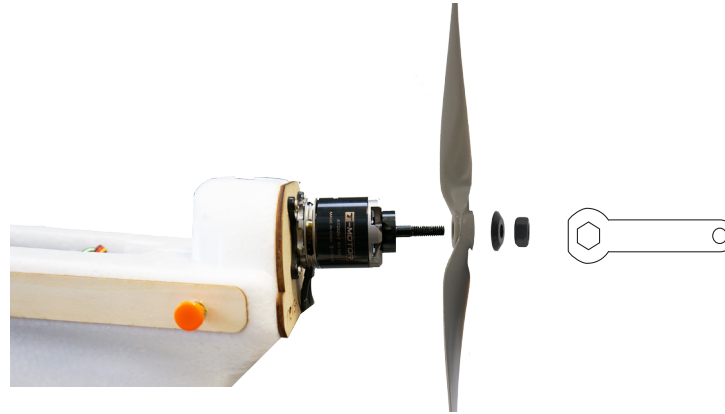


Propeller

Locate the rings inside the propeller package. Remove the ring with the second-largest internal diameter, and insert it into the back of the propeller hub.



Remove the nut and the washer from the motor, add the propeller with the writing on the propeller facing towards the nose of the plane, add the washer and the nut over the propeller, and tighten the nut.



Controls

Fly the Aero manually using the RC controller.



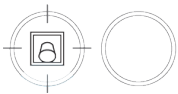
Throttle: Move the left stick forward and backward to control the motor.

Yaw: Move the left stick horizontally to turn left and right using the rudder.

Pitch: Move the right stick up to pitch down and down to pitch up.

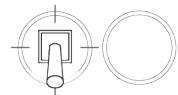
Roll: Move the right stick left and right to control the bank angle.

throttle up



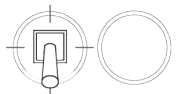
Increase motor speed.

throttle down



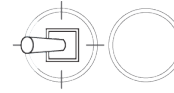
Decrease motor speed.

throttle fully down



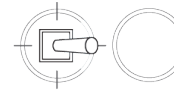
Stop motor.

yaw left



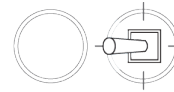
Turn left.

yaw right



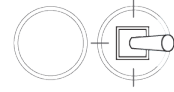
Turn right.

roll left



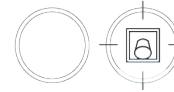
Roll left.

roll right



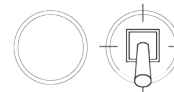
Roll right.

roll and pitch center



Automatically level.

pitch up



Pitch up.

pitch down



Pitch down.

Modes

Auto - *fly a mission*

Fly an autonomous mission. This is the mode that the Aero will use to create the map.

Fly by Wire - *assisted manual control*

Let the autopilot manage the control surfaces, and navigate based on where you want the Aero to fly. Fly-by-wire mode* (FBW) is the easiest way to fly and is the recommended mode for new operators.

*ArduPlane mode FBWA

Return to Launch (RTL) - *recall to launch point*

Command the plane to circle over the launch point. The Aero will return to the position where it acquired GPS lock and enter into a circle pattern at an altitude of 100 meters.

Loiter - *circle*

Activate GPS-positioned circling; the Aero will enter into a circle pattern with a radius of 60 meters at the current altitude. Move the right stick to adjust the position of the circle.

Stabilize - *stabilized manual control*

Stabilize mode provides manual control with an added autopilot safeguard: Release the right stick and the Aero will automatically return to a level flying orientation. Use stabilize mode for the freedom of manual control with return-to-level stabilization.

Manual - *full manual control*

Fly with fine-tuned manual control without autopilot assistance. Manual mode gives you the most direct input to the control surfaces, resulting in precise in-flight adjustment. Try manual mode if you're an experienced RC plane operator.

To select a flight mode:

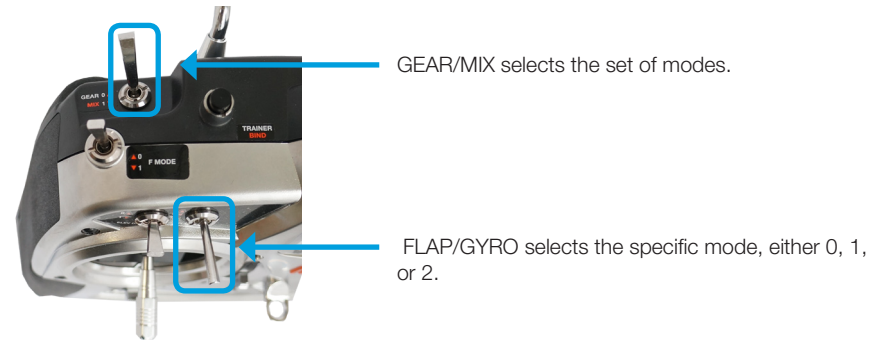
First, set the GEAR/MIX switch to select a set of modes. Then use the FLAP/GYRO switch to 0, 1, or 2 to select a specific mode.

With GEAR/MIX set to **GEAR**,

set FLAP/GYRO to: 0 for **Manual**
 1 for **Stabilize**
 2 for **Loiter**

With GEAR/MIX set to **MIX**,

set FLAP/GYRO to: 0 for **Auto**
 1 for **Fly by wire**
 2 for **RTL**



RC controller (top)

Arming & Disarming

Arming and disarming are important steps that must be completed before takeoff and after landing to activate and deactivate the motor, respectively.

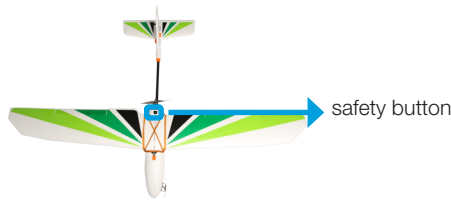
Before arming, check the status LED. The LED will flash blue while the Aero acquires GPS; this can take a few minutes. Once you see the green LED, the autopilot has acquired GPS lock.

- (Red, Blue, Red, Blue) Initializing, please wait.
- (Blue) Acquiring GPS lock, please wait.
- (Green) Autopilot ready, GPS locked



To arm the motor, press and hold the safety button until it displays solid red.

To disarm, press and hold the safety button until it displays blinking red.



- (Red) Inactive, motor disarmed
- (Red) Active, motor armed

LED Indicators

- (Red, Blue, Red, Blue) Initializing, please wait
- (Blue) Acquiring GPS, please wait
- (Green) Armed, GPS locked
- (Yellow) Loss of RC signal, automatic landing
- (Yellow) with 3 curved lines Low battery, automatic landing
- (Blue, Yellow, Blue, Yellow) with 3 curved lines Loss of GPS signal, switch to fly-by-wire
- (Yellow) System error, see troubleshooting guide

Tones

Visit 3DR.com/Aero-M to listen to Pixhawk's status tones.

GPS Lock

Auto, RTL, and loiter modes requires GPS lock. When powered, the autopilot will automatically search for GPS lock. The position of the Aero when the autopilot acquires GPS will be saved as the home position, and used as the coordinates for the launch point during RTL. If you plan to use auto, RTL, or loiter modes during your flight, ensure that the Aero is located at a suitable launch point when powered, and the autopilot acquires GPS lock before takeoff, indicated by a blinking green status LED.



The arming and disarming procedures ensure that you can safely start and stop the motor without risk of injury.

The Aero's motor can spin when armed! Do not place your hands in the way of the propeller while the safety button is active (solid red).

Preflight Checks

Before each flight, perform a physical component check, center of gravity check, and control checks in both manual and stabilize modes. If any of the components or assemblies in these checks are not secure, tighten the screws or use CA glue (super glue) to secure the components to the foam.

1

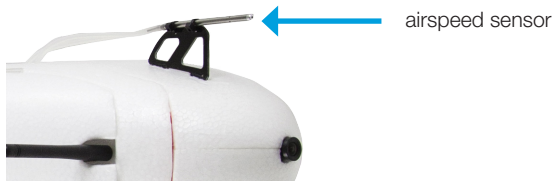
Examine the Aero to ensure that all components are secured in flight configuration.

- » Check that the wings, tail, and tail boom are fully assembled and securely attached.
- » Check that the propeller is secured tightly to the motor.
- » Check that the servo rods are secured to the servo horns with the blue clasps.



2

Check that the airspeed sensor is secured to the side of the Aero and the tube is free from obstructions.



3

With the battery connected and the lid secured, check that the Aero is correctly balanced for flight. Hold the Aero with one finger on each of the clear, plastic balancing points shown below. These points indicate the Aero's center of gravity.



If the plane balances on your fingers, then the center of gravity is correct. If it won't balance, adjust the position of the battery until you can balance the plane on two fingers as shown below.

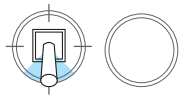


Flying the plane without the camera will affect the center of gravity. If you choose to fly without the camera, make sure to re-balance the center of gravity.

Preflight Checks: Manual Control Check

Before flying, power and arm the Aero on the ground and complete these checks to verify that the control surfaces respond correctly to the control inputs. Place the plane on the ground, and set the mode switches to select manual mode. Move each of the sticks as shown, and check for the corresponding movement of the motor or control surfaces.

- 1**
Raise the throttle slightly until the motor spins, then immediately set the throttle back to fully down position.

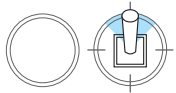


Motor spins.



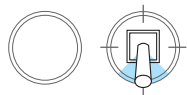
Do not raise the throttle more than just enough to spin the motor while the plane is on the ground, and do not place your hands in the way of the propeller while the motor is armed.

- 2**
Pitch down



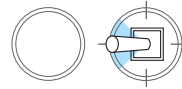
Elevator tilts down.

- Pitch up



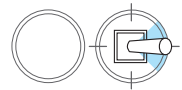
Elevator tilts up.

- 3**
Roll left



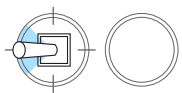
Left aileron tilts up, right aileron tilts down.

- Roll right



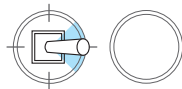
Left aileron tilts down, right aileron tilts up.

- 4**
Yaw left



Rudder tilts left.

- Yaw right



Rudder tilts right.

Preflight Checks: Stabilize Control Check

Set the mode switches to stabilize, and hold the plane in front of you. Move the plane as shown, and check for the stabilization response from the control surfaces.

1

Test: Tilt the plane left.

Result: Left aileron tilts down, right aileron tilts up.



Test: Tilt the plane right.

Result: Left aileron tilts up, right aileron tilts down.



2

Test: Tilt the plane down.

Result: Elevator tilts up.



Test: Tilt the plane up.

Result: Elevator tilts down.



Automatic Takeoff

Auto-takeoff works by sensing the movement of the plane and launching it in that direction. Set the Aero to autonomous mode when you're ready to launch.

Find a launching area with at least 100 feet of clear space in front of you. Face into the wind, and hold the body of the Aero in one hand under the center of gravity. Be careful not to place your hand in the way of the propeller!

Hold the Aero above your head, run, and throw the plane at an upwards angle. The Aero will sense the throw, power the motor, and climb to the altitude specified by the takeoff waypoint before starting the survey mission.



DO NOT WIND UP YOUR THROW; if the Aero senses any backwards momentum it will attempt to launch in that direction. Use only forward momentum to throw the Aero!



Automatic takeoff requires you to configure the takeoff angle during mission planning. See page 18.

Manual Takeoff

If you're new to planes, we recommend having a friend help you launch the Aero. Have your friend throw the Aero while you control the controller.

We recommend setting the Aero to fly-by-wire mode for takeoff. Find a launching area with at least 100 feet of clear space in front of you. Face into the wind, and hold the Aero at the center of gravity. Raise the throttle to center position to start the motor. Be careful not to place your hand in the way of the propeller!

Hold the Aero above your head, run, and throw the plane at an upwards angle.

Once launched, the Aero will require immediate adjustment with the controller to navigate away from the ground and up to the desired altitude. Pitch up (right stick down) and add any other necessary controls based on wind, speed, and terrain.

Automatic Landing

To land automatically at the end of the mission, the Aero requires the mission to be configured with a specific pattern of landing waypoints that gradually decreases the altitude so that the Aero can land safely. For instructions on configuring automatic landing, see page 18.

Manual Landing

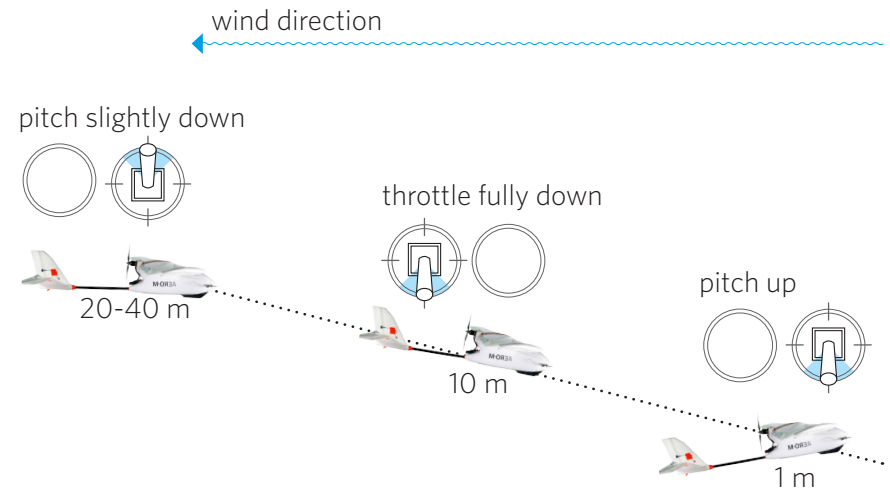
When you're ready to end your flight, follow these steps to land:

- » Fly a circle pattern above your landing area.
- » Come in on a final approach, flying into the wind at an altitude of 20 to 40 meters.
- » When the plane reaches an altitude of 10 meters, set the throttle fully down to turn off the motor and glide down on a 15 to 20 degree down-pitch angle.



After stopping the motor at an altitude of 10 m, keep your thumb on the throttle stick in fully down position to ensure that the motor does not accidentally spin during landing.

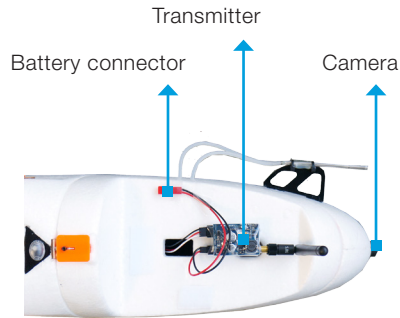
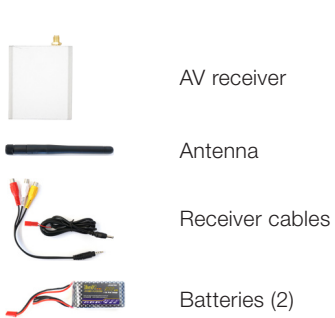
- » When the plane is one meter above the ground, pitch up (flare) to land the Aero on the body of the plane instead of the nose.



FPV System Operation

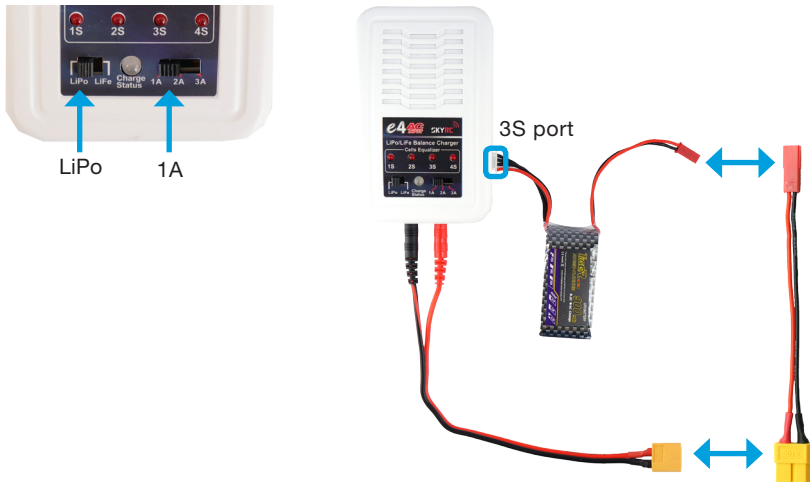
If you selected to receive an optional FPV/OSD system, the components are pre-installed into the Aero to transmit on-board video.

Parts



1 Charge battery

Charge both batteries before your first flight. Set the charger to LiPo and 1A. Connect the white battery connector to the 3S port, and connect the XT60-JST charger adapter to the red battery connector and yellow charger connector.



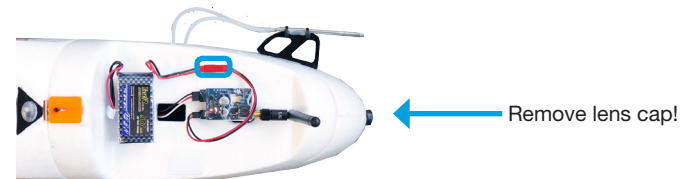
2 Wire and power receiver

Attach an antenna to the receiver. Connect the AV output cable to either receiver AV OUT port. Connect the RC power cable to the receiver DC IN port, and attach a battery to the red connector.



3 Prepare on-board components

Connect a fully charged battery to the transmitter inside the compartment in the nose of the plane. Remove the lens cap from the camera.



4 Viewing video

When using a 3DR Black Pearl Monitor to view your video, set the mode to *DIV* (M button changes modes), the channel to *8* (+ and - buttons), and the band to *E* (press the power button to access the menu).

For more information about configuring the FPV/OSD system, visit 3DR.com/Aero-M.

Flying Mapping Missions

Takeoff Checklist

Before flying the mission, check the following:

- » Camera is on with mission script ready and is secured into the mount with the mini-USB cable connected and the cap removed.
- » Aero is powered and connected to the ground station with all pre-flight checks passed.
- » The survey mission has been adjusted to account for present environmental conditions and saved to the Aero.

Initiating

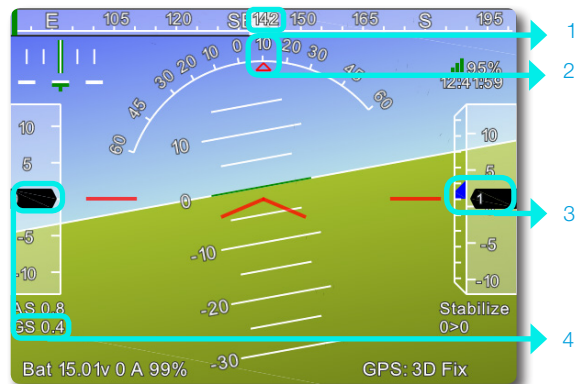
For automatic takeoff, set the Aero to auto mode and launch according to the instructions in the Automatic Takeoff section of these instructions (page 33).

For manual takeoff, set the Aero to auto mode after takeoff to initiate the mission in flight.

Monitoring

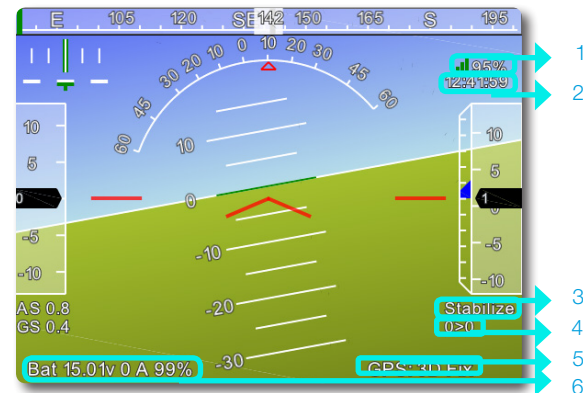
Monitor the Aero closely during the mission using your line of sight and the Mission Planner Flight Data screen.

Mission Planner Flight Data: Attitude



- 1 Heading direction
- 2 Bank angle
- 3 Altitude (black) and rate of climb (blue bar)
- 4 Ground speed

Status

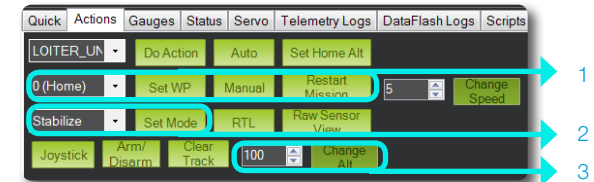


- 1 Ground station signal
- 2 GPS time
- 3 Currently enabled mode
- 4 Distance to current waypoint > current waypoint number
- 5 GPS status
- 6 **Battery status***
Full battery: 16.8 V
Low battery failsafe: 13.8 V

End your flight at 14 V!

*Failsafe behavior enabled

Actions



- 1 Change waypoints or restart a mission
- 2 Change modes
- 3 Change altitude

Flight Map



- 1 Current heading
- 2 Direct path to current waypoint
- 3 GPS-reported direction of travel
- 4 Actual flight path
- 5 Latitude, longitude
- 6 Altitude

Failsafes

The Aero is programmed with a set of failsafe behaviors to prevent a crash in the event of a loss of one of the data or communication channels required for autonomous flight. Although certain failsafe have assigned LED indicators and tones, it is unlikely that you will be able to see these at a distance. Monitor the Flight Data screen for failsafe indications. If a failsafe is triggered, the assigned behavior will activate. To override the failsafe behavior (RTL in most cases), use the controller to regain manual control.

Regaining Manual Control

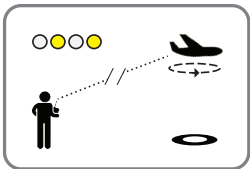
To regain manual control during the mission, switch to fly-by-wire mode using the controller. If you're a confident operator, switch to stabilize mode. If you observe instability in the Aero's flight behavior or if the aircraft moves outside your designated safe flying area, switch to RTL. Turning off the controller will automatically trigger an RTL and can be used in an emergency situation as a hard recall command.

RC Controller Signal Failsafe

Physical obstructions and interference from nearby wireless signals can affect the Aero's connection with the RC controller.

If the Aero loses contact with the controller, it will return to the launch point automatically and enter into a circle pattern above the launch point, indicated by a blinking yellow status LED.

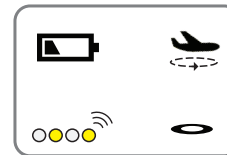
If the controller failsafe is triggered, wait for the Aero to return to the launch point, then regain manual control and either land or restart the mission.



Low Battery Failsafe

Environmental conditions can affect power consumption. Use the Mission Planner Flight Data display to monitor the voltage of the battery during flight.

If the battery reaches 13.8 V, the Aero will return automatically to circle above the launch point, indicated by a blinking yellow status LED and a quick repeating tone.





3 Process

On-Site Quality Check	38
Spot Check	38
Download Images	38
Download Log File	39
Pix4D Rapid Check	40
Full Processing	40

On-Site Quality Check

Before leaving the survey site, check the images using Pix4D to ensure sufficient quality for mapping by downloading the images from the SD card, downloading the log file from the Aero, and completing Rapid Check Initial Processing in Pix4D.

If you observe poor image quality or the quality report returns errors, see the Image Quality Troubleshooting section on page 45 and repeat the mission.

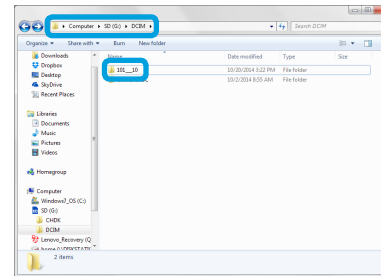
Spot Check (Optional)

The quickest way to see the images after a flight is to unlock the SD card and restart the camera. The camera will load the default Canon programming and you can select the playback button to review the images.



Download Images

Unlock the SD card and load into your ground station. Select the DCIM folder and locate the folder for your flight. Copy the files into a project folder on the ground station and delete them from the SD card.



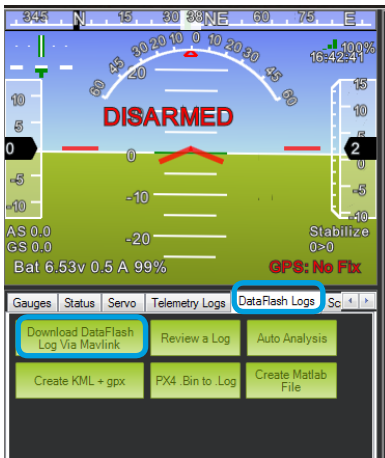
SD card file structure: Download images

Download Log File

Pix4D uses the GPS data from the Aero's log file to georeference the images. To download the Aero's dataflash log, power the Aero and connect to Mission Planner. The download process will be faster if you connect the micro-USB cable directly to Pixhawk's micro-USB port instead of connecting using the ground station radio. (When connecting directly to the Aero, set the rate to 115200.)

On the Flight Plan screen, select the *DataFlash Logs* tab under the heads-up display, and select *Download DataFlash Log over Mavlink*.

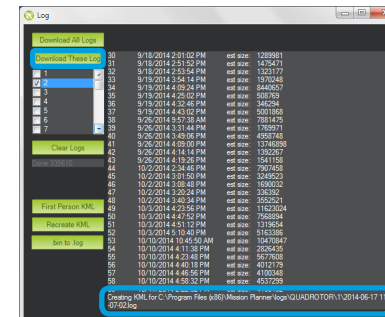
Mission Planner: Flight Data heads-up display



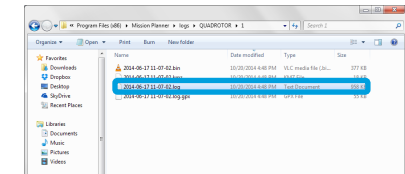
The Log window shows the Aero's recent flights. Select the flight for your mission, and select *Download These Logs*. This will save the log file to your computer in the location displayed under the list of flights.

To retrieve the log file, access your computer's file structure under *Program Files/Mission Planner/logs/PLANE*, and select the .log file for the date of your flight.

Mission Planner: Download Logs



Program Files: Retrieve log file

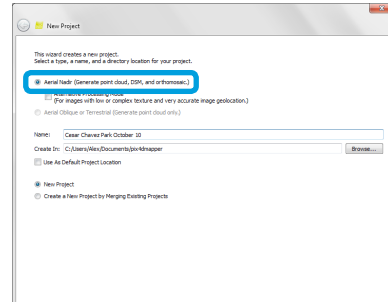


Pix4Dmapper Rapid Check: Create Project

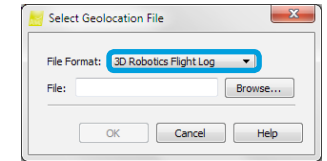
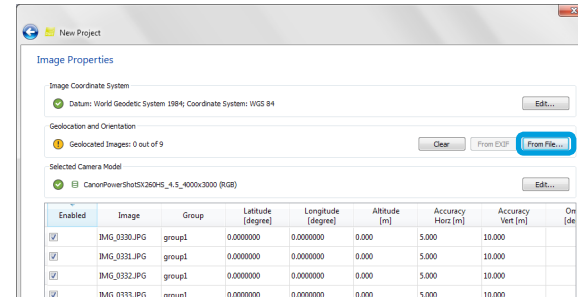
1 Open Pix4D Mapper, and create a new project.



2 Select Aerial Nadir as the project type.

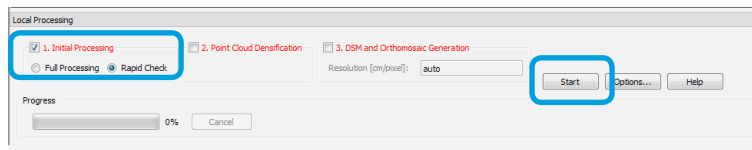


3 After adding the images, select *From File* to add the geolocation data from the Aero's log file. In the pop-up window, select 3D Robotics Flight Log as the file format, and upload the dataflash log file downloaded from Mission Planner.



Pix4Dmapper Rapid Check: Initial Processing

After creating the project, select the Local Processing screen (Process menu). Check the option for Initial Processing and Rapid Check. Uncheck all other local processing options, and select Start.



Pix4D will generate a Quality Report that will indicate if the images are of sufficient quality to create a map.

Quality Report



Summary [\(help\)](#)

See [Quality Report Help](#) for detailed explanations. Generated with version 1.1.21

Project:	mining_quarry
Processed:	2014-Apr-25 16:30:49
Camera name:	CanonIXUS220HS_4.3_4000x3000
Average Ground Sampling Distance (GSD):	9.3 cm
Area covered:	0.5979 km ² / 59.7946 ha / 0.231 sq. mi.
Image coordinate system:	WGS84
Ground Control Point (GCP) coordinate system:	WGS84
Output coordinate system:	WGS84 / UTM zone 32N
Processing type:	full (scale 1) aerial nadir
Time for initial processing (without report):	24m:01s

Quality Check [\(help\)](#)

Images:	median of 31313 keypoints per image	✓
Dataset:	127 out of 127 images calibrated (100%), all images enabled	✓
Camera optimization quality:	0.43% relative difference between initial and final focal length	✓
Matching quality:	median of 11203 matches per calibrated image	✓
Georeferencing:	7 GCPs (7.3D), 0.045 m	✓

Full Processing

To complete full processing for the map, visit support.pix4d.com for instructions.



Appendix

Aerial Imaging Concepts	42
3DR EAI	43
Image Quality Troubleshooting	45
Operational Troubleshooting	46

Aerial Imaging Concepts

Understanding key concepts in aerial images can help you understand the mission planning process and create better maps.

Distance-Based Imaging

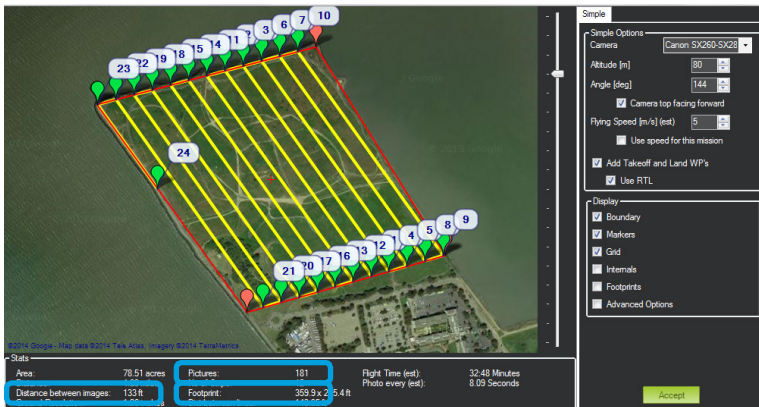
By default, the camera captures only the images required to create the map. The Pixhawk monitors the distance traveled by the aircraft and sends a command to the camera to capture an image at the distance interval specified by the camera trigger distance parameter (*CAM_TRIGG_DIST*). This parameter is set by the Mission Planner Survey tool during survey configuration by calculating the minimum distance between images based on the parameters specified for the survey (altitude, overlap, sidelap). This distance-based imaging allows for more precise data collection, resulting in less images and data storage cost. Once configured, the Survey tool creates an event at the start of the mission script (after takeoff) to set the camera trigger distance to 0. This distance-based imaging allows for more precise data collection, resulting in less images and data storage cost. Once configured, the Survey tool creates an event at the start of the mission script (after takeoff) to set the camera trigger distance to 0 and an event at the end of the mission (before landing) to reset the camera trigger distance to 0.

Time-Based Imaging

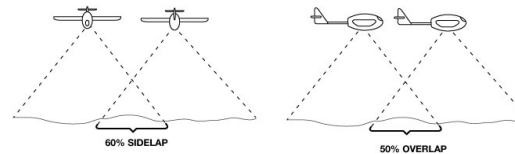
The camera is also equipped to capture images at a consistent time interval instead of using distance. This function can be useful if you want to capture images over an area without planning a mission. This time-based imaging results in more images per area, and therefore more processing time and storage cost. See the Trigger Type options on page xx to enable time-based imaging.

Overlap and Sidelap

To capture images for the map, the aircraft flies a lawnmower-like pattern in strips across the survey site. The front-to-back overlap between sequential images is called overlap; the side overlaps of adjacent pictures in different strips is called sidelap. The overlap and sidelap parameters in the Survey tool (see Advanced Options page xx) determine the distance between images and the number of images to be captured based on the projected ground area that each image will cover, called a footprint. Increasing overlap and sidelap improves the accuracy of the map while increasing flight time and processing time.



In the Survey tool, *Distance between Images* shows the specified camera trigger distance that will be assigned to the mission. You can also see the projected image footprint size and the total number of images to be captured.



Default overlap: 50%
Default sidelap: 60%

3DR EAI

3DR EAI is based on KAP UAV Exposure Control Script v3.1: a great open-source project for kite and UAV aerial photography.

Start and Stop Script

Ensure the camera is set to P (program) mode before powering the camera. Upon startup, 3DR EAI starts automatically and listens for commands from the autopilot, indicated by *waiting for USB signal*. To stop (and re-start) the script, press the shutter button. The script will display INTERRUPTED when stopped.



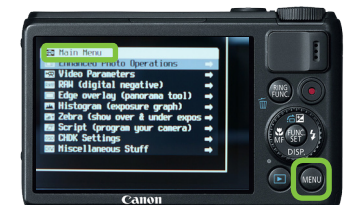
Script start: waiting on USB signal



Script stopped: INTERRUPTED FINISHED

CHDK Menu

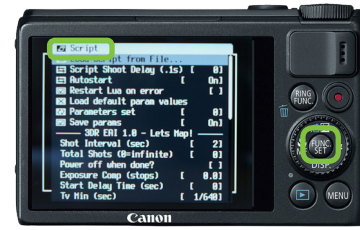
The CHDK menu contains all the standard options provided with CHDK. To access the CHDK menu, stop the script and select the *MENU* button.



CHDK menu

Script Menu

The script menu allows you to change the parameters associated with the script itself, including changing the trigger mode and adjusting exposure. To open the script menu, stop the script and select the *FUNC.SET* button. These parameters are configured for the S100 and do not require adjustment as part of standard operation.



Script menu

Trigger Type

This parameter allows you to control how the camera captures images. Trigger type defaults to *USB* for distance-based imaging during mapping missions. For time-based imaging, select *Interval* and specify the length in the *Shot Interval* parameter.

Trigger Type default: *USB* (mapping)

Variable intervalometer: *Interval* (default to 2 seconds, specified by *Shot Interval*)



Script menu: Trigger Type

Memory Reset

If the battery is left out of the camera for too long, the camera will reset its memory. To re-configure the camera in this case, visit 3DR.com/Aero-M for instructions.

Online Resources and Information

Visit 3DR.com/Aero-M for links to updates, more information about KAP UAV, and full CHDK instructions.

Image Quality Troubleshooting

If you observe poor image quality during the spot check or if you receive error messages during processing, use the settings below to troubleshoot the image quality.

Blurry Images

To correct motion blur, adjust the shutter speed using the *Target Tv* parameter in the script menu.

Target Tv (shutter speed) default: 1/1250
 To correct moderate motion blur: Set to 1/1600.
 To correct severe motion blur: Set to 1/2000.



Example image: motion blur



Script menu: Target Tv

Overexposure

If the images are overexposed but do not show any motion blur, it can be due to flying in extremely bright conditions. To correct this, set the *Allow use of ND filter* parameter to YES in the script menu.

Allow use of ND filter default: No
 To correct overexposure: Set to Yes.



Example image: overexposure

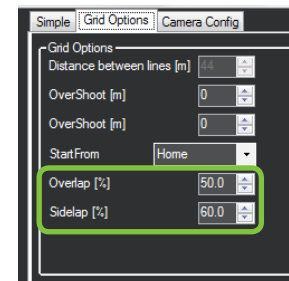


Script menu: ND Filter

Processing Errors

If you receive errors from Pix4Dmapper regarding the images, dataset, or matching points, increase the overlap and sidelap during survey configuration to improve the quality of the image set.

Overlap default: 50%
 Sidelap default: 60%
 To improve processing: Set overlap to 60% and sidelap to 70%.



Mission Planner Survey tool Advanced Grid Options: Overlap and Sidelap

Operational Troubleshooting

No Images Captured

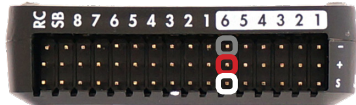
- 1 If the camera did not capture any images during the mission, first perform a physical inspection on the Aero.

Is the mini-USB cable connected to the camera's USB port?



Camera (side)

Are the AUX OUT 6 pins connected on Pixhawk?



AUX OUT 6: black (-), red (+), white (S)

Pixhawk (side)

Is the camera battery charged? Unlock the SD card to view the Canon's battery level indicator.



Camera with SD card unlocked, running Canon software

- 2 Take a distance-triggered test image on the ground by manually setting the camera trigger distance parameter to 1 m.

Power the aircraft and connect to Mission Planner. Select *Config/Tuning* and *Full Parameter List*. Change the *CAM_TRIGG_DIST* parameter to 1, and select *Write Params*. Now carry the Aero for a few meters to see if the autopilot triggers the camera.



Mission Planner Full Parameter List: Set CAM_TRIGG_DIST to 1.