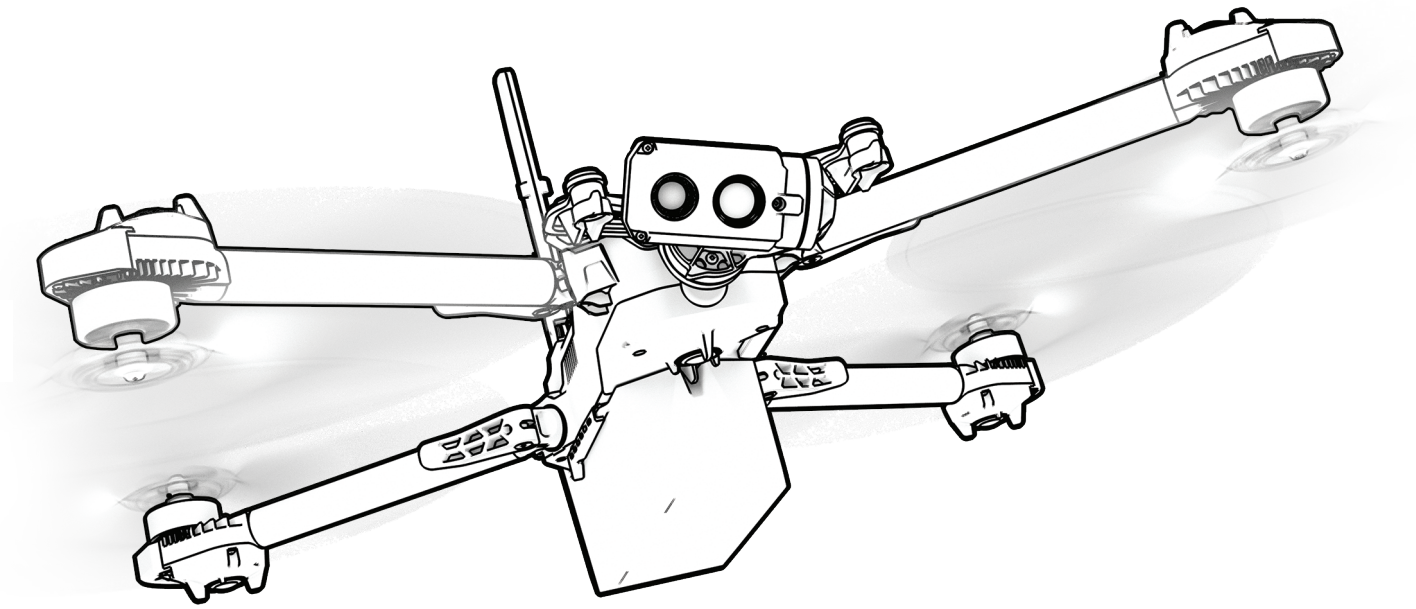
Skydio

Operator Manual

Skydio X2D QGC



WARNING: *Please read all documentation provided with your Skydio X2D including but not limited to the Safety & Operating Guide found here: www.skydio.com/getstartedX2*

Effective date: **Oct 18, 2021**

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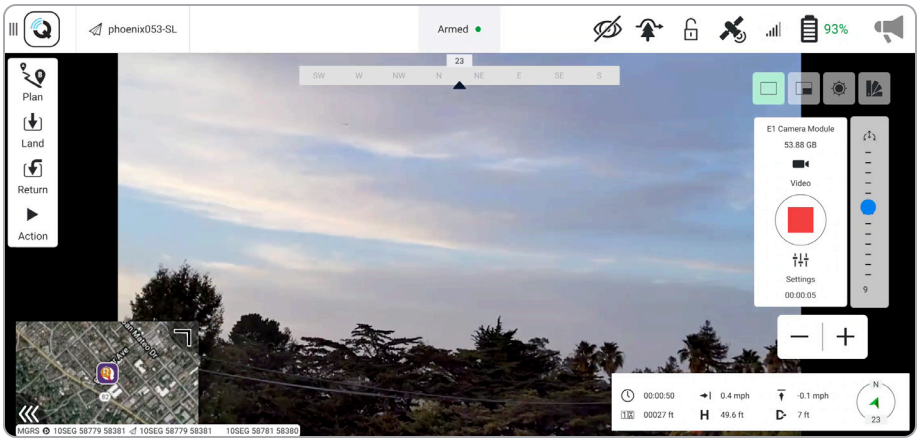
Overview

Skydio Ground Control (QGC)

Skydio QGC is an alternative application available for the Skydio Enterprise Controller for full flight control and access to X2 autonomy features.



Skydio Autonomy Enterprise Software

Skydio QGC supports a subset of the Skydio Autonomy Enterprise features:

FEATURE	DESCRIPTION	MAIN USE CASES	KEY BENEFITS
CLOSE PROXIMITY OBSTACLE AVOIDANCE	Fly closer to obstacles. **Close (~11")** **Minimal (~4")** **Disabled** **Standard (~34")**	• Situational awareness • Inspection	Allows closer flight for indoor navigation e.g. through large doorways and up-close inspection of detailed assets
SUPERZOOM	Blends the six 4K navigation cameras to create an omnidirectional view. Allows the user to zoom digitally with algorithmic image stabilization	• Situational awareness	See farther, and in all directions without moving the drone - reduces pilot cognitive load
VERTICAL VIEW	Gimbal can vertically look straight up above the drone	• Inspection	Allows for overhung inspections such as ceilings, bridges, and canopies
RANGEFINDING	Provides rangefinding using the augmented reality MGRS grid on the controller UI	• Situational awareness • Inspection	Increases operator situational awareness and reduces time to vectoring maneuvering forces.

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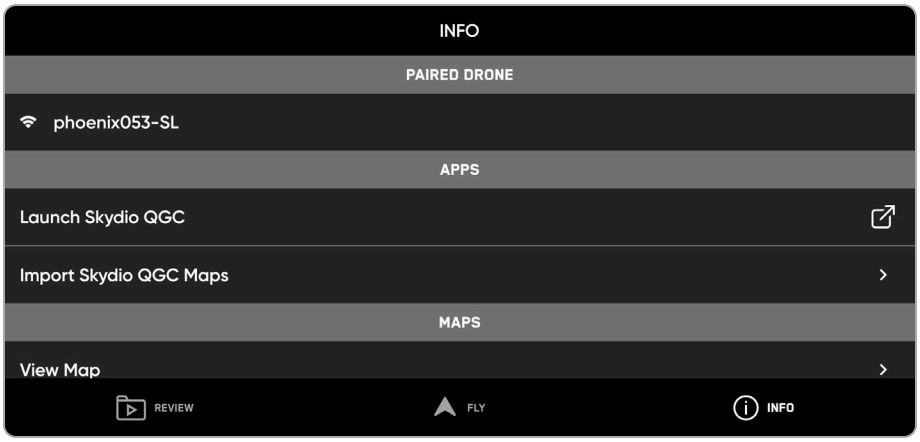
Pre-flight

Launch QGC

To access Skydio QGC, power on the Enterprise Controller:

Step 1 - Select the **INFO** menu

Step 2 - Select **Launch QGC**



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Pre-flight

Offline maps

Skydio QGC requires a specific map file that can only be generated using the QGC application on a device with access to the Internet. To generate map files:

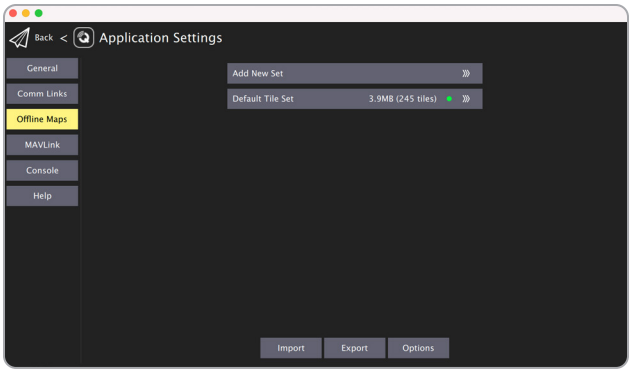
Step 1 - Using a computer or devices download the QGC application to your desktop

- visit http://qgroundcontrol.com/downloads

Step 2 - Select the **QGC icon** in the top left corner

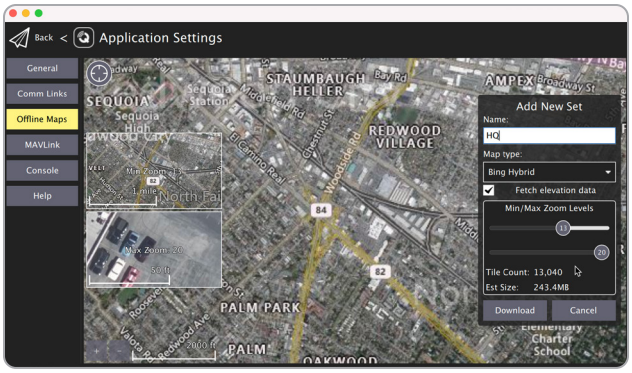
Step 3 - Select **Application Settings**

Step 4 - Select **Offline Maps**



Step 5 - Launch QGC

- select the **QGC icon** in the top left corner
- select **Application Settings**

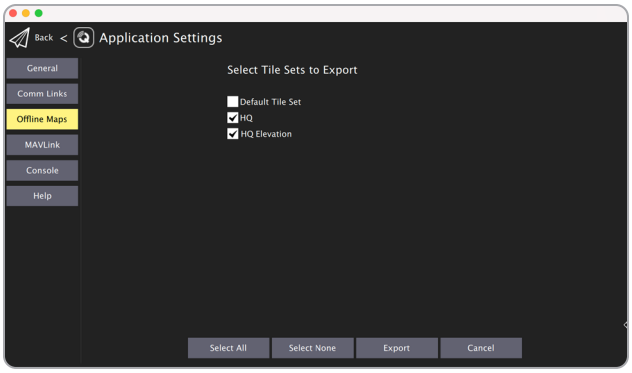


Step 6 - Select **Offline Maps**

Step 7 - Select **Add New Set**

- navigate to your desired map location. You will need to zoom into a specific area.
- set the zoom levels for offline maps
- choose your preferred map provider
- name the location of your map
- select **Download**
- select the tile sets you want to export and select **Export**

Step 8 - copy the file with the extension .qgctiledb to a USB-C flash drive



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Pre-flight

Offline maps

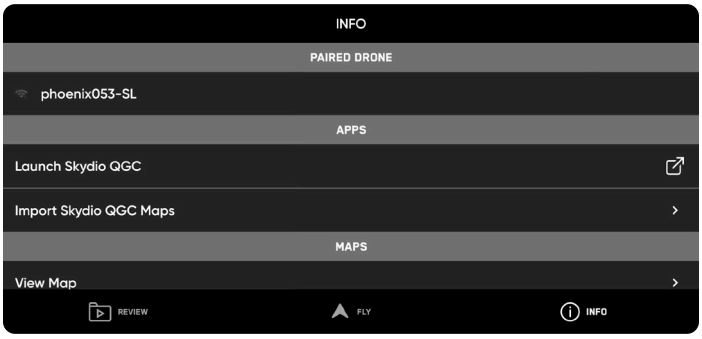
Import map to Skydio Enterprise Controller:

Step 1 - Power on your Skydio Enterprise Controller

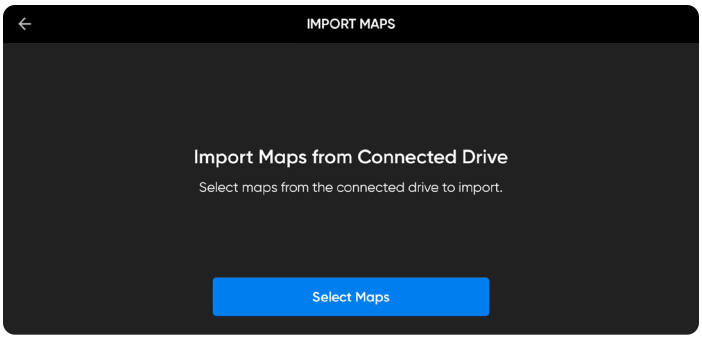
Step 2 - Select the **INFO** menu

Step 3 - Select **Import Skydio QGC Maps**

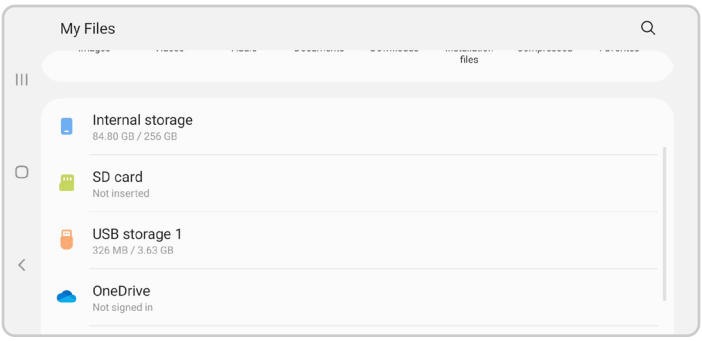
Step 4 - Insert the USB-C flash drive containing the QGC map file

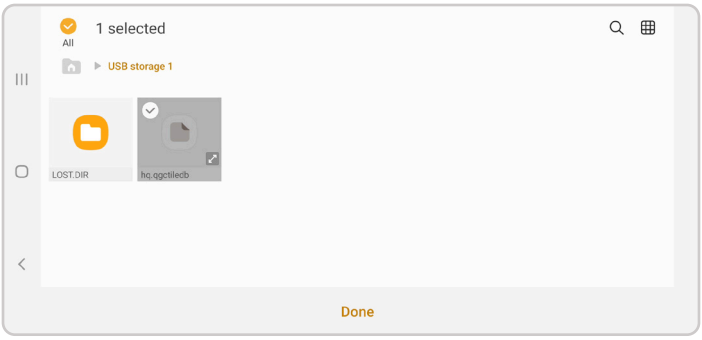


- select **Maps**
- navigate to **My Files**



- select the USB storage device
- select the map file
- select **Done**





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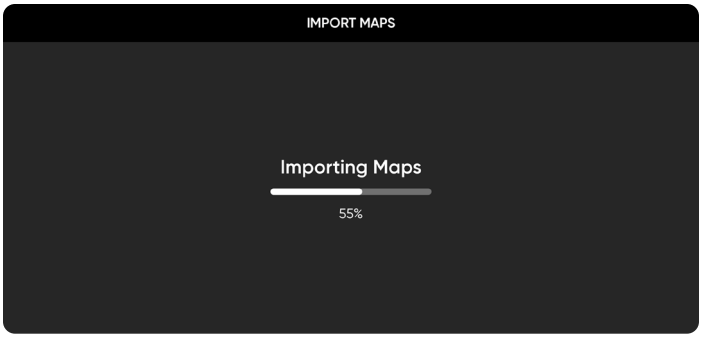
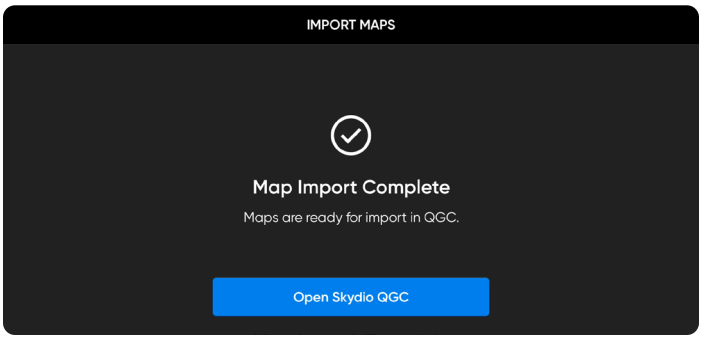
Pre-flight

Offline maps

Your QGC map tiles will then import to the Skydio Enterprise Controller map directory.

After completing the final step, you will only have 24 seconds to import the maps to QGC before your map files are deleted.





***NOTE**: If an import fails, select and hold Import Skydio QGC Maps and clear the imported map directory when prompted. Any maps not yet imported to Skydio QGC will need to be imported again.*

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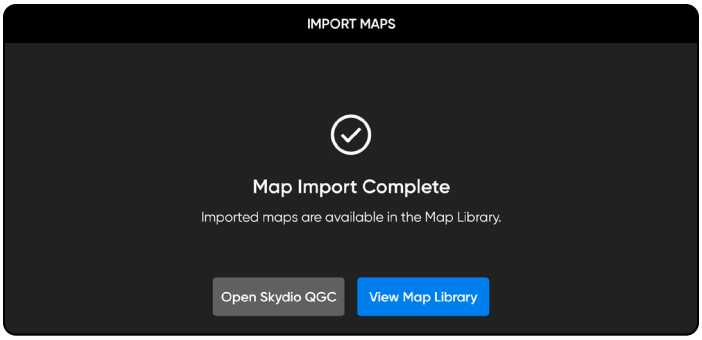
Pre-flight

Offline maps

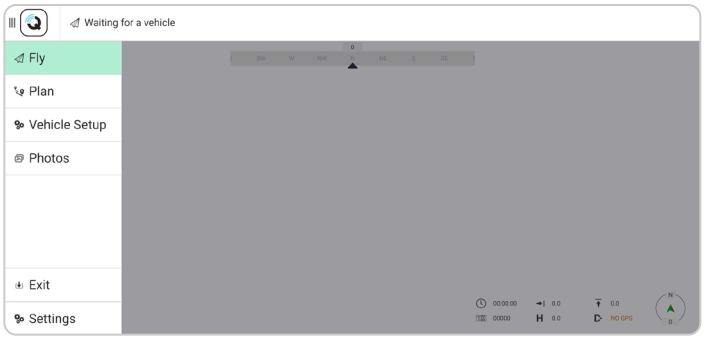
Import maps to QGC:

Step 1 - Select Open Skydio QGC



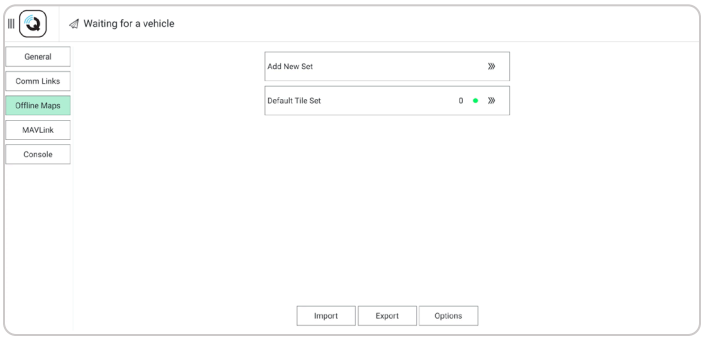
Step 2 - Select the QGC Icon in the top left corner of the screen to bring up the menu

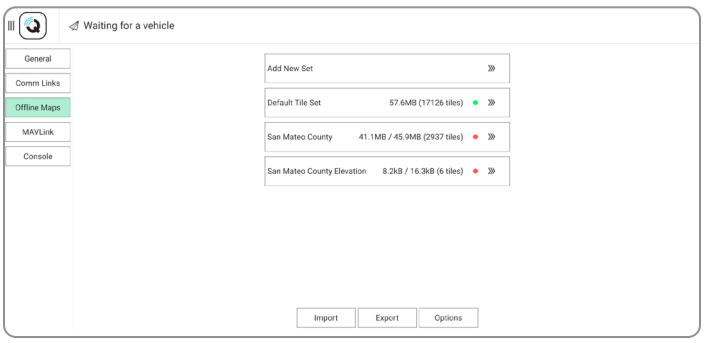
Step 3 - Select Settings



Step 4 - Select Offline maps

- select Import and then Import again
- tap on the tile set to import





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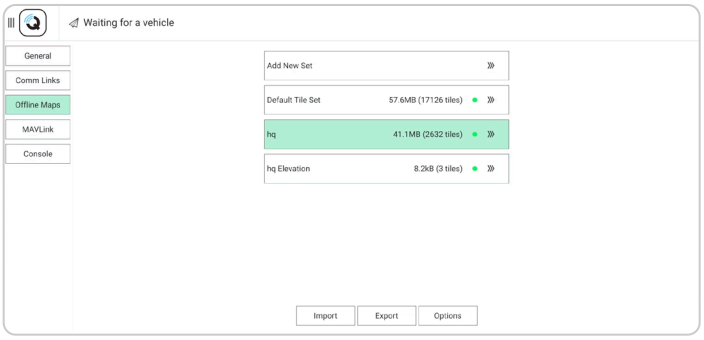
Pre-flight

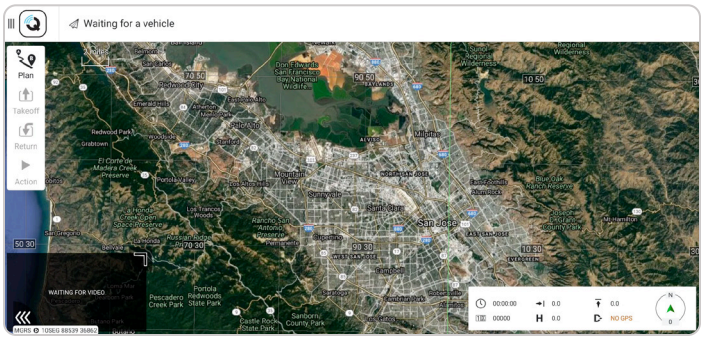
Offline maps

Ensure your map provider and map types match

Step 1 - Select General

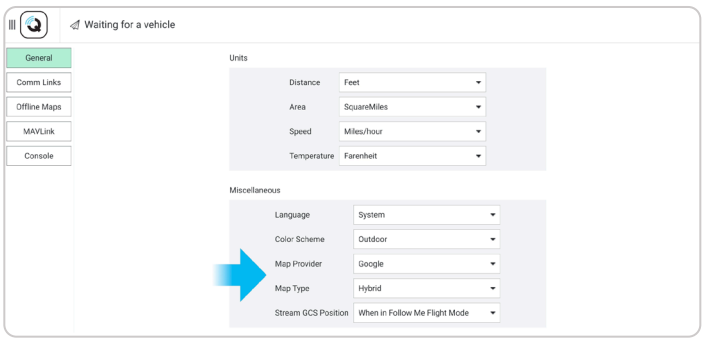
Step 2 - Select Miscellaneous





Step 3 - Choose the correct options from the Map Provider and Map Type menus

Step 4 - Navigate back to the main screen



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QGC Flight

Media Encryption

When your vehicle is provisioned for encryption, your media will be encrypted when flying with Skydio QGC. Skydio QGC will indicate the state of your media encryption in the X2 status bar:

Media is not encrypted - your vehicle is not provisioned for encryption.

Media is encrypted - your media is currently encrypted. If you have provisioned your vehicle for encryption, your media will always be encrypted when flying with Skydio QGC.

Encrypted media unlocked - displays when you insert the security key into X2 while it is powered on. You will be able to view and access your decrypted media until you power off the drone or fly again.

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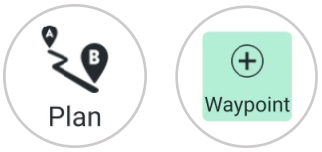
QGC Flight

Waypoint Mission

Missions allow X2 to fly to designated waypoints without requiring you to manually fly. As X2 reaches each waypoint, X2 can execute a number of operations before proceeding to the next waypoint. Missions can be planned pre-flight and loaded onto the vehicle.



Step 1 - Select the Plan button to display the Map view

Step 2 - Select the parameters to set X2D behaviors while executing a mission

Step 3 - Select the **Waypoint** button to begin marking waypoints

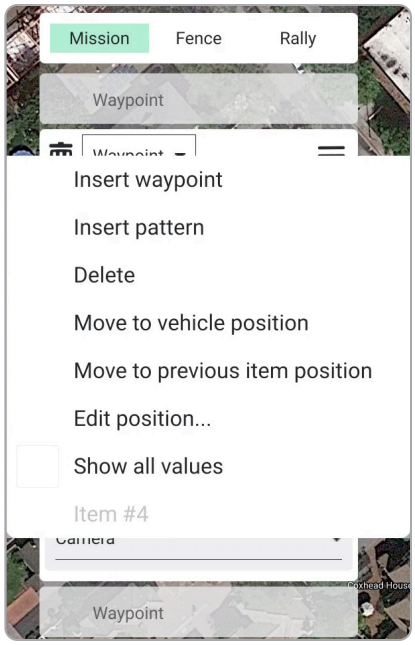
- tap on the map to set the waypoints
- continue tapping on the map to set waypoints until your mission plan is complete

Step 4 - Adjust parameters and behaviors in the right sidebar, such as:

- altitude
- hold duration (in seconds)
- where X2 will loiter before proceeding
- changing the gimbal pitch angle
- planned photo

Selecting the **hamburger** icon allows you to set a different command for that point in the mission.

To delete a waypoint, select the point you want to delete, and the trash icon.



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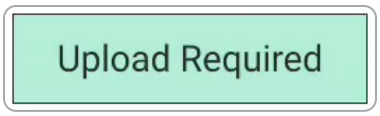
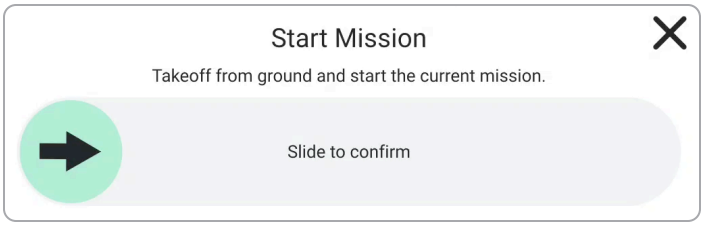
QGC Flight

Waypoint Mission

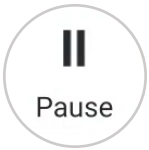
Select **Upload Required** to upload the mission. A **Done** notification will display if the mission upload is successful



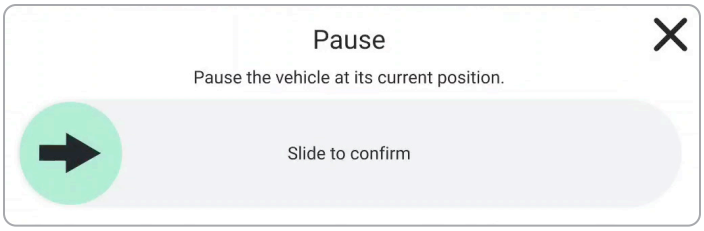
Return to the flight screen and begin the mission by sliding from left to right on Slide to confirm.

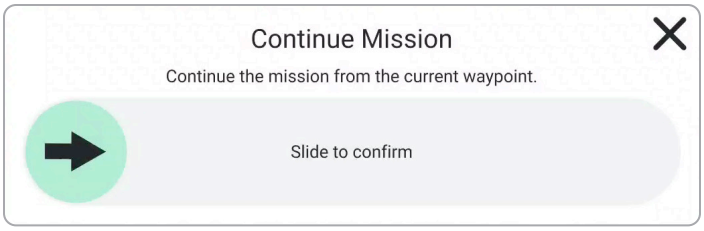


While a mission is executing, tap the Pause button in the left Toolbar and slide from left to right on Slide to confirm to pause the mission.



Slide from left to right again to resume the mission.





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QGC Flight

Launch

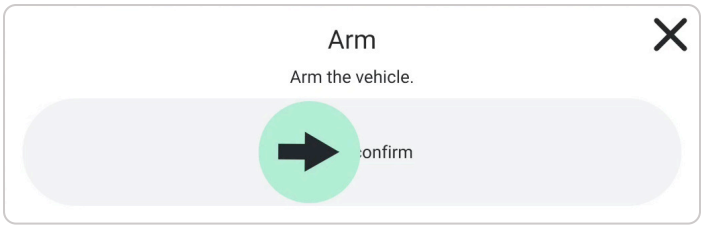
Select the **Megaphone** icon to display system notifications and status information for flight readiness. Dismiss this screen by tapping the **X** button in the top right corner.

Flight status is displayed in the top left corner of the flight screen:

Step 1 - Select the **Takeoff** button to begin the takeoff process.

Step 2 - Slide to Arm the drone and start the **Skydio Autonomy Engine.**

Step 3 - Swipe to take off. The propellers will begin to spin and the vehicle will launch.



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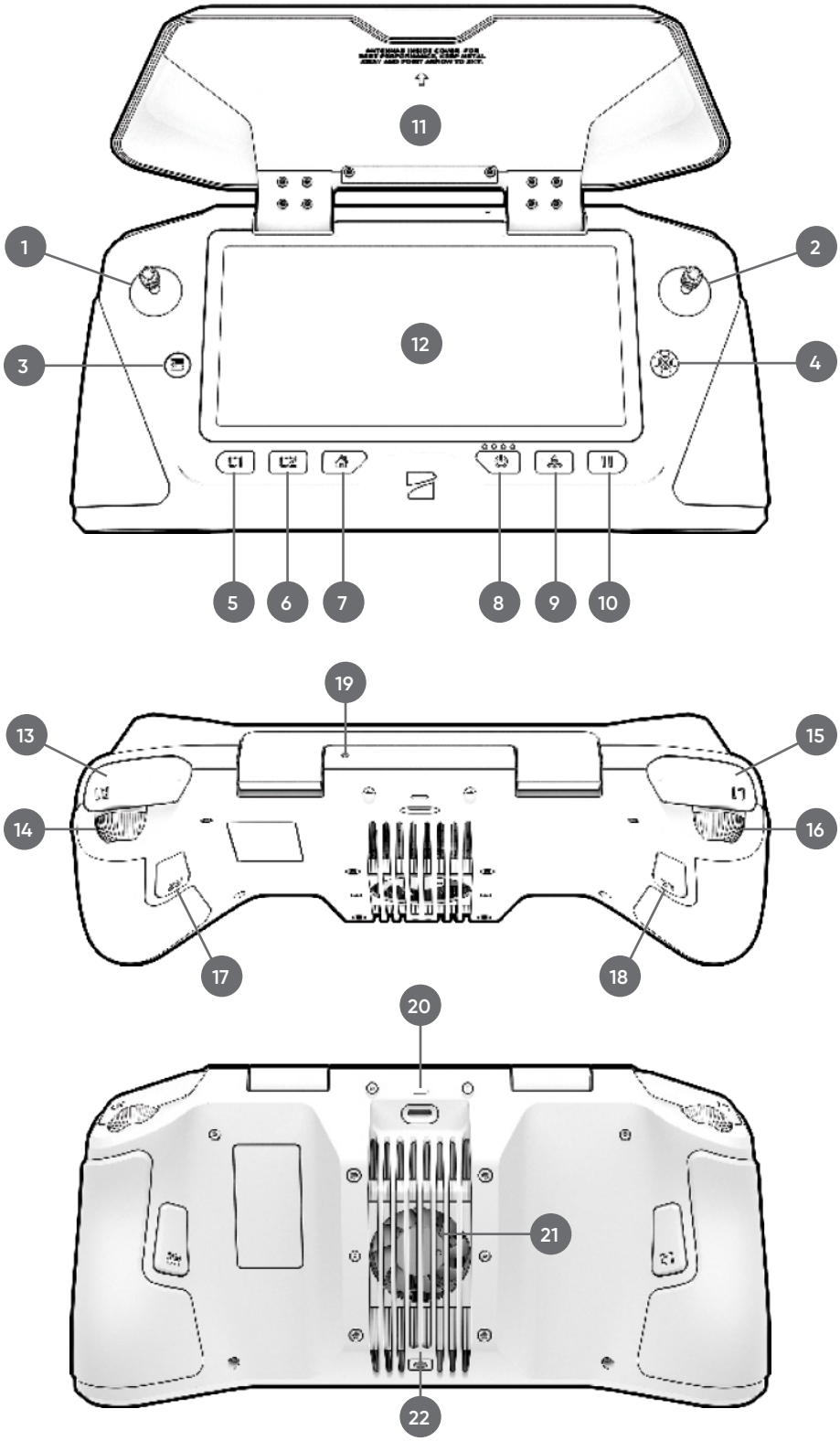
Flight

Flight Controls

1. Left joystick
2. Right joystick
3. Menu/back button
4. Directional pad (D-pad)
5. C1 Button - toggle Obstacle Avoidance
6. C2 Button - toggle Lights
7. Return to Home button
8. Power button
9. Launch/Land button
10. Pause button
11. Controller clamshell embedded antennas
12. User interface screen
13. R1 button - shutter/record
14. Right wheel - zoom
15. L1 button - boost
16. Left wheel - gimbal tilt
17. R2 button - toggle map
18. L2 button - color camera
19. Reset button
20 USB-C port
21. Cooling fan
22 Neck strap/tripod (¼-20 mount)



CAUTION: *Skydio Enterprise Controller is not weatherproof. Do not operate in any precipitation, including rain, fog, snow, or similar environments. Do not rest the controller in sand, dirt or on similar terrain where particles can get trapped in the fan. Do not use batteries if the magnets or connector pins are damaged.*

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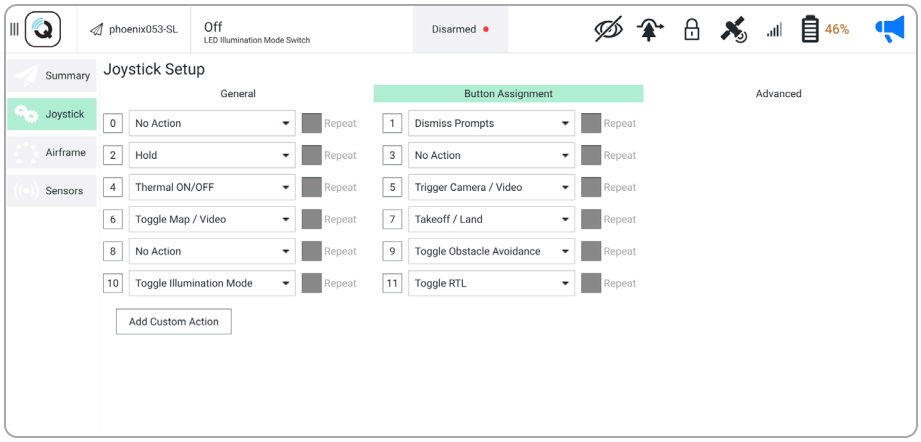
Flight

Flight Controls

You have the ability to modify the controller button mapping as needed. Button mapping in Skydio QGC will not change the button mapping in the Skydio Enterprise Controller.

Step 1 - Select the QGC
Step 2 - Select Vehicle Setup
Step 3 - Select Joystick
Step 4 - Select Button Assignment



Pressing on each button on the controller will highlight the corresponding button number in the Skydio QGC app, allowing you to verify your button assignments.

BUTTON ACTION	BEHAVIOR
NO ACTION	Button will not be mapped to any behavior
ARM	Starts autonomy engine and gets ready for takeoff
DISARM	Stops autonomy engine not ready for takeoff
TOGGLE ARM	Switch between the armed and disarmed states
CONTINUOUS ZOOM IN	Holding down the button will continue to zoom in
CONTINUOUS ZOOM OUT	Holding down the button will continue to zoom out
STEP ZOOM IN	A single zoom step is taken each button press

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QGC Flight

Flight Controls

BUTTON ACTION	BEHAVIOR
STEP ZOOM OUT	A single zoom step is taken each button press
TRIGGER CAMERA	Captures a photo
TRIGGER VIDEO	Starts/stops recording
THERMAL ON/OFF	Toggle the thermal overly.
THERMAL ON	Turn the thermal overlay on
THERMAL OFF	Turn the thermal overlay off
THERMAL NEXT PALETTE	Cycle between the thermal color palettes
TOGGLE OBSTACLE AVOIDANCE	Toggles obstacle avoidance settings Standard > Close/Reduced > Minimal > Disabled
TOGGLE RGB LEDS	Toggles RGB lights on/off
TOGGLE RTL	Initiate a return to launch (or rally point)
TOGGLE SUBJECT HIGHLIGHTING	Toggles subject detection on/off
SENSOR SLEW	Reset the zoom level and center gimbal pitch
TOGGLE ILLUMINATION MODE	Switch between modes (none, visible strobe, ir strobe)
DISMISS PROMPTS	Dismiss any blocking prompts (required for night takeoff). Also cancel landing/takeoff
GIMBAL DOWN (FINE)	Pitch the gimbal up (scales with zoom)
GIMBAL UP (FINE)	Pitch the gimbal down (scales with zoom)
YAW LEFT (FINE)	Yaw the vehicle to the left (scales with zoom)
YAW RIGHT (FINE)	Yaw the vehicle to the right (scales with zoom)
START TRIANGULATION	Initiate the triangulation skill. The first button push enters the skill and a subsequent push starts ranging
LAND	Initiate a landing.
TAKEOFF	Initiate a takeoff.

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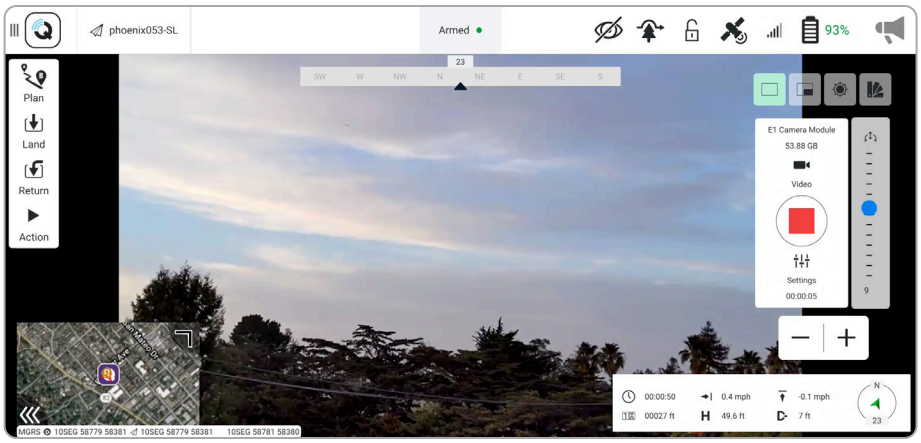
Flight

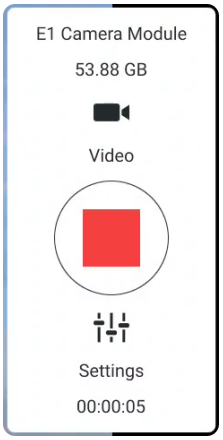
Flight Screen



Media Controls

Media controls to capture video and photos:

- **Photo**/**Video** icon allows you to toggle between video and photo mode.
- **Record**/**Shutter** icon to start/stop recording or take still photos, depending on your capture mode.
- **Settings** icon to access the video/photo settings for both color and thermal camera



By default, Skydio X2 will not automatically record video or photos. Switch to your desired capture mode and tap the shutter button to record a video or take photos.

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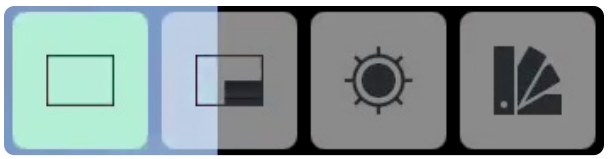
Flight

Palette and View Menu

Choose between the three different views and the thermal camera palette options.

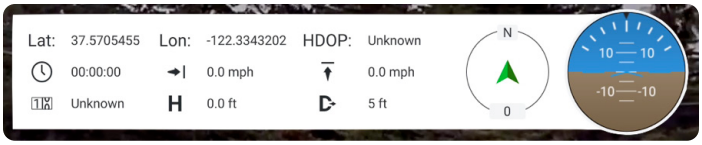
From left to right:

- Color Camera
- Picture in Picture
- Thermal Camera
- Thermal Camera Palette

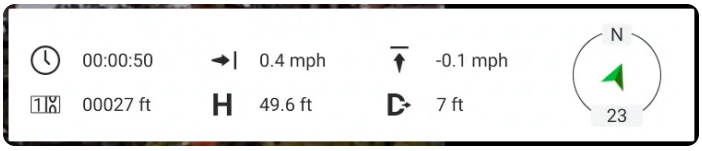


Flight Information Bar

The **Flight Information** menu displays live flight telemetry from Skydio X2.



Double-tap the **Flight Information** to display a limited menu for more space to view the map or live video.



***NOTE**: No GPS indicates the Skydio Enterprise Controller does not have a GPS position. This is normal.*

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Flight

Status Bar

The Status Bar menu offers more information about the status and health of Skydio X2.

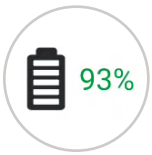
Subject Detection - subject detection is enabled/disabled

Obstacle Avoidance - indicates which obstacle avoidance setting is active. Tap **C1** to toggle between each obstacle avoidance setting

Encryption - indicates whether or not media on the SD card is encrypted. This feature is optional and requires the use of a security key. See the **Media encryption** section for more information.

Satellite - view live GPS telemetry from Skydio X2

Signal Strength - displays the current strength of your radio link to the Skydio X2 while in flight



Battery Status - displays current battery level. Tap the Battery Status icon to view the controller battery level

Megaphone - displays system notifications and status. This screen is the best location to find all information for flight readiness

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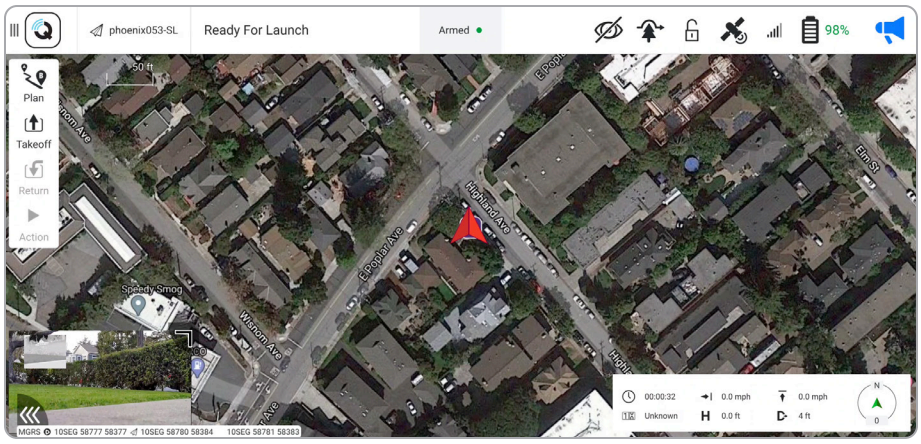
Flight

Map View

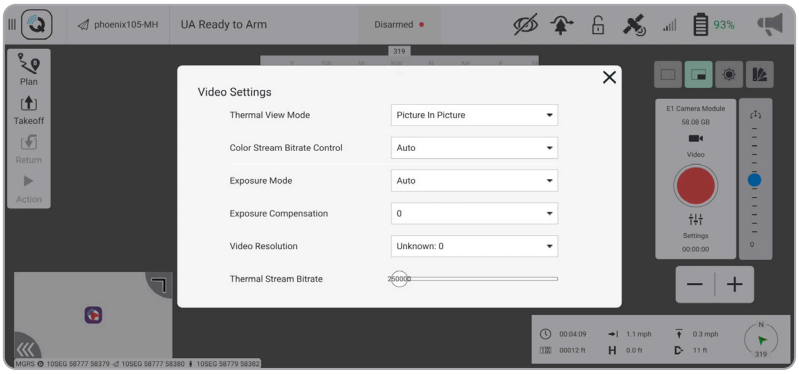
The view in the bottom left of the screen displays the map.



Tap the Map picture-in-picture (PIP) to view the Map full screen and minimize the video stream. Tap the video stream in the bottom left corner again to make the video stream full screen and minimize the Map. Tap and drag the corner of the PIP to increase or decrease its size. Pinch with two fingers to zoom in on the map. Pinch out with two fingers to zoom out of the map. With one finger, drag on the map to move the map around.

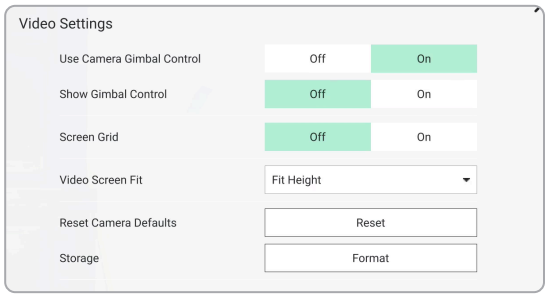
Flight Settings

Select the Settings icon to adjust the video settings for both the color and thermal cameras.



Select Video Settings to adjust exposure, video resolution, and thermal camera settings.

- restore Camera Defaults settings to default select **Reset**



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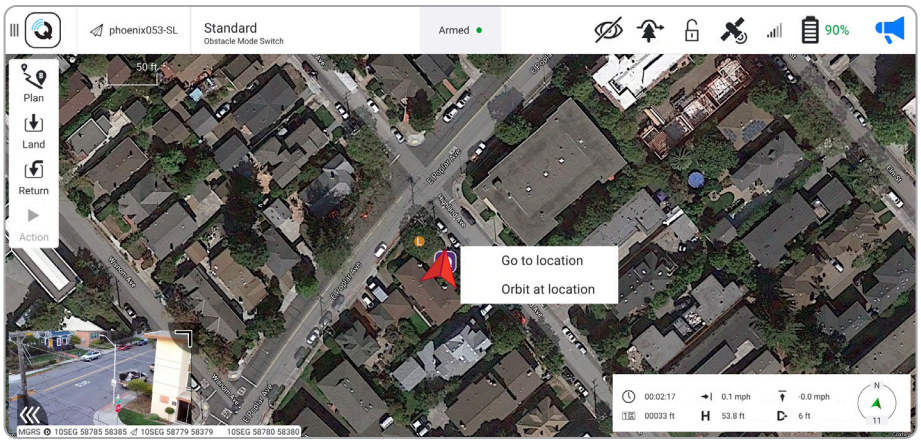
Flight

Orbit a point of interest

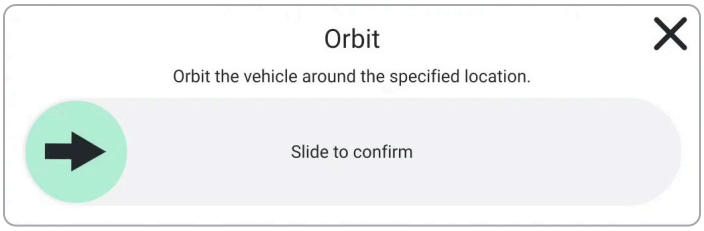
Step 1 - Press and hold anywhere on the map

Step 2 - Select Orbit at location to begin orbiting around that point

- adjust the orbit range by adjusting the vehicle's pitch while in flight



Step 3 - Slide from left to right to start the mission



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QGC Flight

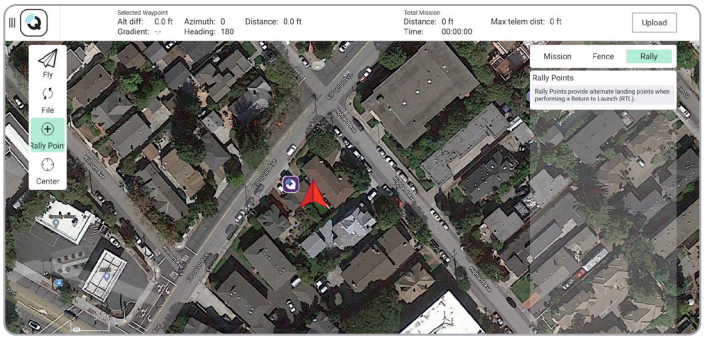
Rally Points

A rally point can be used as an emergency landing location ans a point where the drone will travel upon completing a mission. The default rally point will be the takeoff location.

To create and use a new rally point:

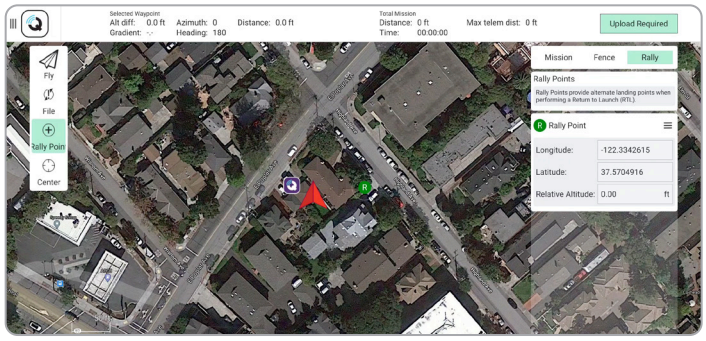
Step 1 - Select the **Plan** tab

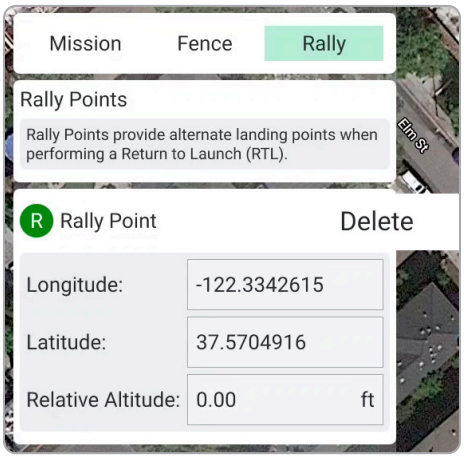
Step 2 - Select the **Rally** icon



Step 3 - Tap on the map to place a rally point

- edit a rally point by selecting it and then changing either its longitude, latitude, or relative altitude
- move a rally point by holding down on it and dragging it on the map
- delete a rally point, select the point you want to delete. Select the hamburger icon in the top right of the rally point panel and delete.





NOTE: *although you can set multiple rally points, the drone will only use the first point set.*

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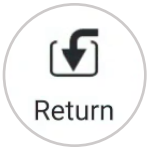
QGC Flight

Rally Points



Select the **Return** button and confirm the return action by sliding from the left to the right when prompted.

- the vehicle will first ascend 65 ft (20 m) before returning. Once it has arrived at the rally point, it will descend to 35 ft (10 m) AGL (above ground level).

NOTE: *This same action can also be triggered using the RTH button on the Skydio Enterprise Controller.*

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Flight

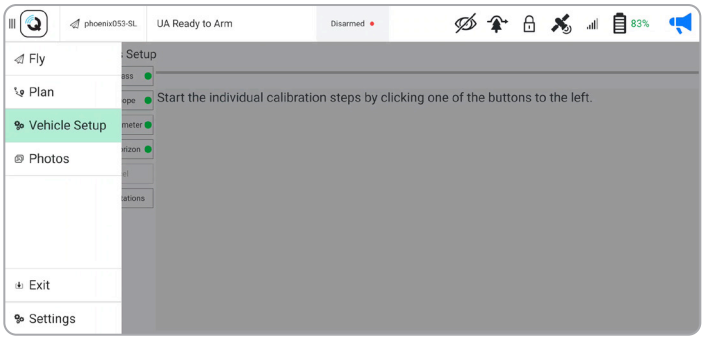
GPS Night Flight

Enable GPS Night Flight when flying in low-light conditions. Ostacle Avoidance is disabled, the vehicle will use GPS sensors, instead of its vision system, to navigate. Skydio X2 will notify you in QGC if the environment is too dark to fly using the vision navigation system and will prompt you to fly using GPS Night Flight.

> ***WARNING:*** *GPS Night Flight mode requires flying without obstacle avoidance. X2 may drift when in GPS Night Flight mode; take extra caution when flying in this mode and do not stand near the vehicle.*

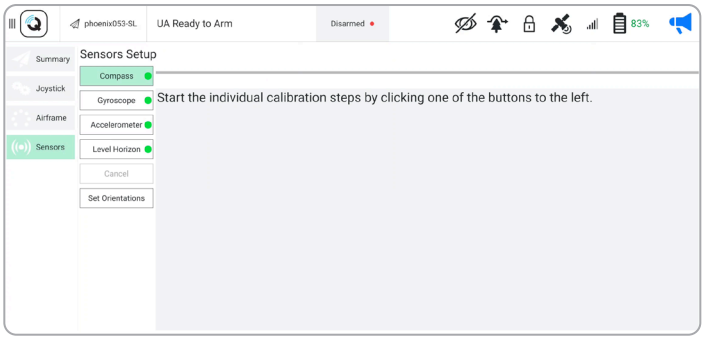
Step 1 - Disable obstacle avoidance

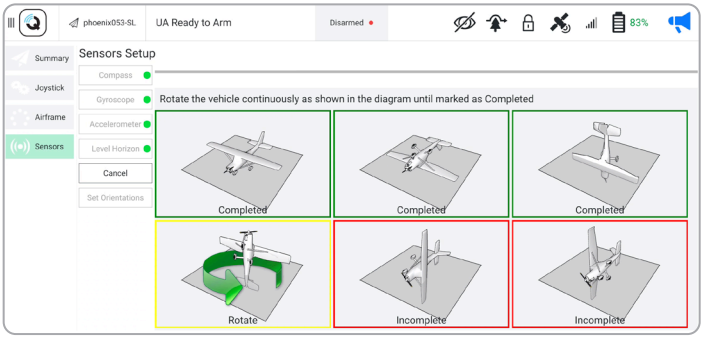
Step 2 - Select the **C2** button to enable infrared or strobe light



Step 3 - You may be prompted to calibrate X2 before you can fly:

- select the QGC Menu and then Vehicle Setup
- select **Sensors**
- select **Compass**
- select **OK** to start calibration
- rotate X2 in all orientations mirroring the illustrations
- select **OK** when all of the calibrations are marked with green
- navigate back to the **Fly** tab





> ***NOTE:*** *Calibration will not be required for several weeks or even months, depending on the environment. You will be prompted when another calibration is necessary.*

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Flight

GPS Night Flight

Obstacle avoidance

When flying at night, Skydio X2 does not use the vision system and **obstacle avoidance is disabled**. Take extra caution when piloting the drone to avoid obstacles and stay clear of people.

Visibility

Improve visibility by enabling X2 infrared or visible strobe lights.

Return behavior

When returning, Skydio X2 will first ascend 65 ft (20 m) before returning. Once it has arrived at the rally point, it will descend to 35 ft (10 m) AGL (above ground level). Skydio X2 does not avoid obstacles when in GPS Night Flight mode, so keep the return behavior in mind before commanding a return. When landing, use the controller joystick to descend down to **15 ft (3 m)** then once you're ready to land, press and hold the **LAND** button on the screen or the controller.

WARNING: *Never hand launch or land Skydio X2 when flying at night.*

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Flight

Land

When you are ready to land:

Step 1 - Descend down to **15 ft (3 m)**

Step 2 - Select the **Land** button

Step 3 - Confirm the land action by sliding from left to right when prompted.

Exit the QGC app

Step 1 - Disarm your Skydio X2

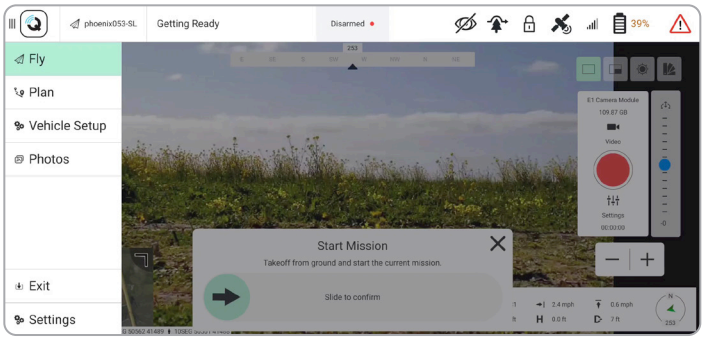
- if armed after landing X2 will automatically disarm

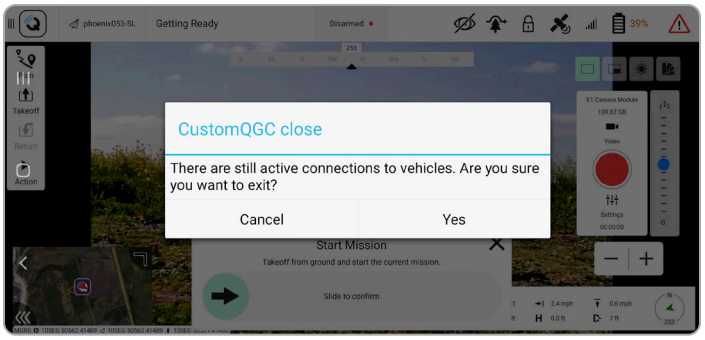
Step 2 - Select the QGC icon

Step 3 - Select Exit

Step 4 - Select **Yes** to confirm

- you will then return to the Skydio Enterprise app





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Control #: A0156