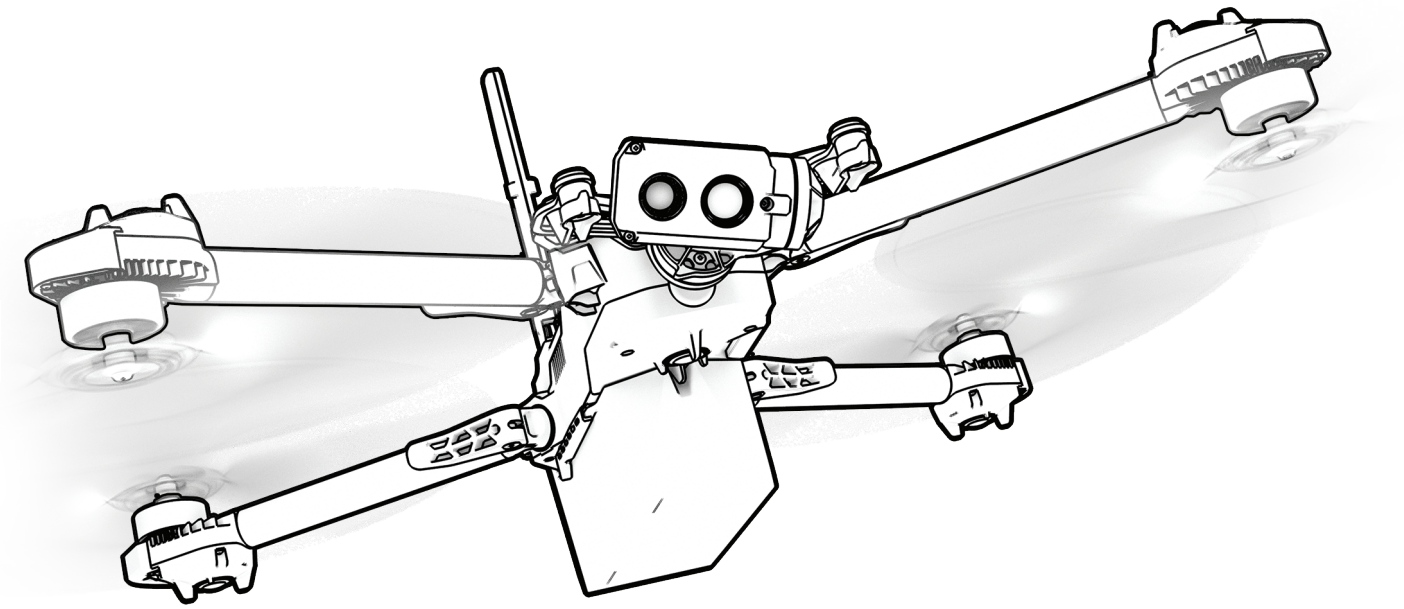
Skydio

Operator Manual

Skydio QGC-Gov



WARNING: *Please read all documentation provided with your Skydio X2D. For additional safety and operating resources and information visit: Skydio.com/support*

Effective date: **June 6, 2024**

Version: **24.19.8**

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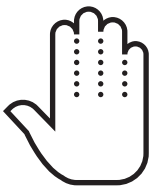
Overview

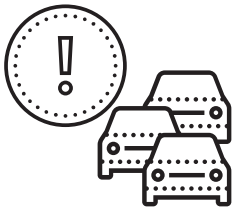
Skydio QGC-Gov is an alternative application available for the Skydio Enterprise Controller for full flight control and access to X2D autonomy features. Skydio QGC-Gov enables the planning and automated execution of complex preplanned ground, structure and corridor survey missions using simple graphical tools. Images can be captured automatically using the color and thermal cameras, and at any time you can view the video feed, flight path and telemetry.

Safety Guidelines



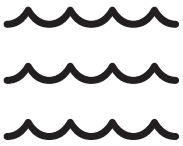
Keep your fingers away from moving propellers at all times.

Use caution around thin branches, utility lines, ropes, wires, netting, chain link fencing, etc.

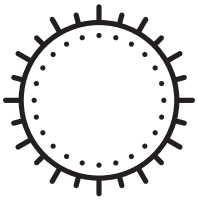


Skydio X2D does not avoid moving objects or cars.

Skydio X2D is not weatherproof – don't fly in rain, snow, fog, high winds, etc.

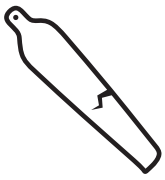


Fly cautiously over bodies of water more than 30ft (9.1m) across.



Obstacle avoidance is off during GPS Night Flight mode and can be impaired when in low light & poor visibility. Fly with **extreme caution** under these conditions.

Clean all of the camera lenses so Skydio X2D can see clearly.



Check your propellers for damage before flying.

Follow all civil aviation authority regulations, as well as any applicable local and federal laws

Overview

Flying Safely

Pre-flight

- Ensure that all of the camera lenses are dust and smudge-free prior to flight
- Inspect the battery magnets and connections for damage and debris prior to flight
- Inspect propeller blades for nicks, cracks, or other visible damage prior to flight
- Inspect the chassis for damage and debris prior to flight
- Ensure all 4 arms are fully deployed against the hard stops and arm clamps are fully seated prior to initiating flight. Failure to do so may result in unstable flight and/or a loss of control. A moderate amount of force is required to fully seat the clamp to the arm - if the arm clamp closes with low effort, damage has occurred within the hinge and the drone should not be flown.

Environment

- Do not fly in precipitation, fog, or snow
- Fly with caution in low light, poor visibility, and nighttime conditions - obstacle avoidance is disabled
- Do not fly in extremely hot temperatures above 109°F (43°C)
- Do not fly in extremely cold temperatures below 14°F (-10°C)
- When flying in temperatures below 32°F (0°C) ensure your batteries are pre-warmed to 50°F (10°C) prior to launch
- Avoid windy weather conditions, or gusts above 23 mph (37 km/h)
- Fly cautiously around reflective surfaces such as still water or mirrors
- Before flying over water, ensure your drone has GPS lock. Launch and land your drone over a dry surface
- Avoid objects less than 0.5 in (1.27 cm) in diameter such as thin branches, utility lines, ropes, and netting
- Do not fly around objects in motion such as cars, boats, balls, animals, or other drones

Warnings

- Fly cautiously around people
- Avoid transparent or reflective surfaces, windows, or mirrors greater than 23 in (58 cm) wide
- Avoid moving obstacles, cars, and animals
- The pilot in command (PIC) is responsible for managing altitude, range, and battery level and monitoring in-app messages and alerts
- Avoid flight in low-light conditions
- Alert messages will display if Skydio X2 determines the environment is not safe for flight
- When instructed to do so, immediately fly Skydio X2 to the safest area and land
- Flying at high altitudes may significantly increase the time required to return and safely land
- Propeller blades are sharp—handle with care
- Skydio should not be used or handled by a person under the age of 18 years

Regulations

- Follow all civil aviation, such as the FAA or your countries regulatory agency, rules and regulations
- You are responsible for your Skydio X2 at all times, when operating your Skydio X2 check knowbeforeyoufly.org / B4UFLY / CASA-verified before flying.
- Do not fly in an environment where the use of the device is not authorized or restricted.
- Maintain visual line of sight at all times, unless you have received express permission to fly beyond visual line of sight from a civil aviation authority such as the FAA.

INFO: *Visit https://skydio.com/safety and https://skydio.com/support for more information, helpful tips, videos, and articles.*

Pre-flight

Launch QGC-Gov

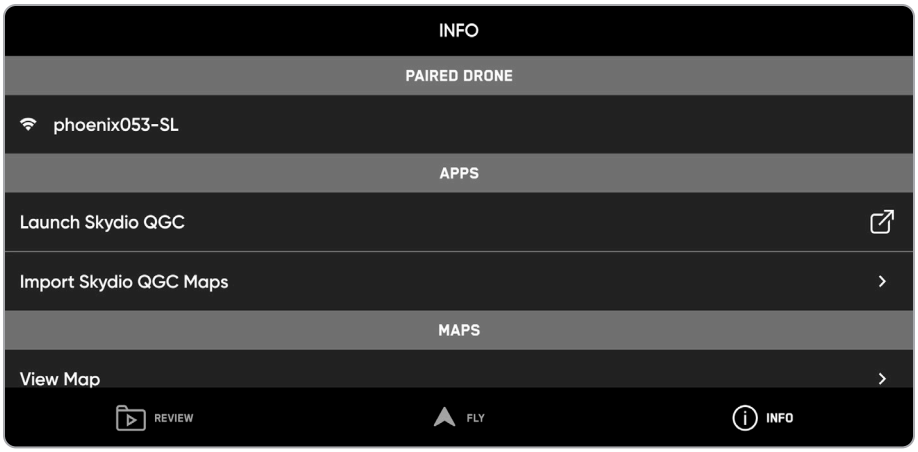
Step 1 - Power on Skydio Enterprise Controller and X2D

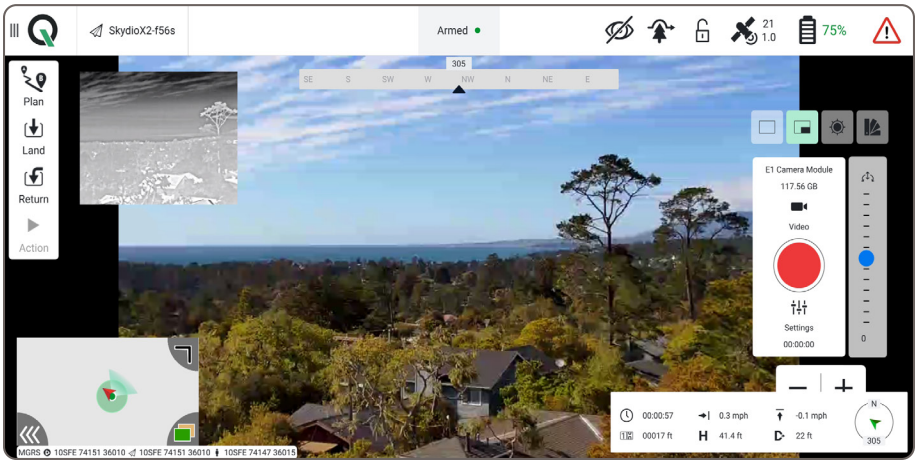
Step 2 - Wait for the drone and controller to pair

Step 3 - Select the **INFO** menu

Step 4 - Select **Launch Skydio QGC**

- QGC-Gov will launch the Fly screen

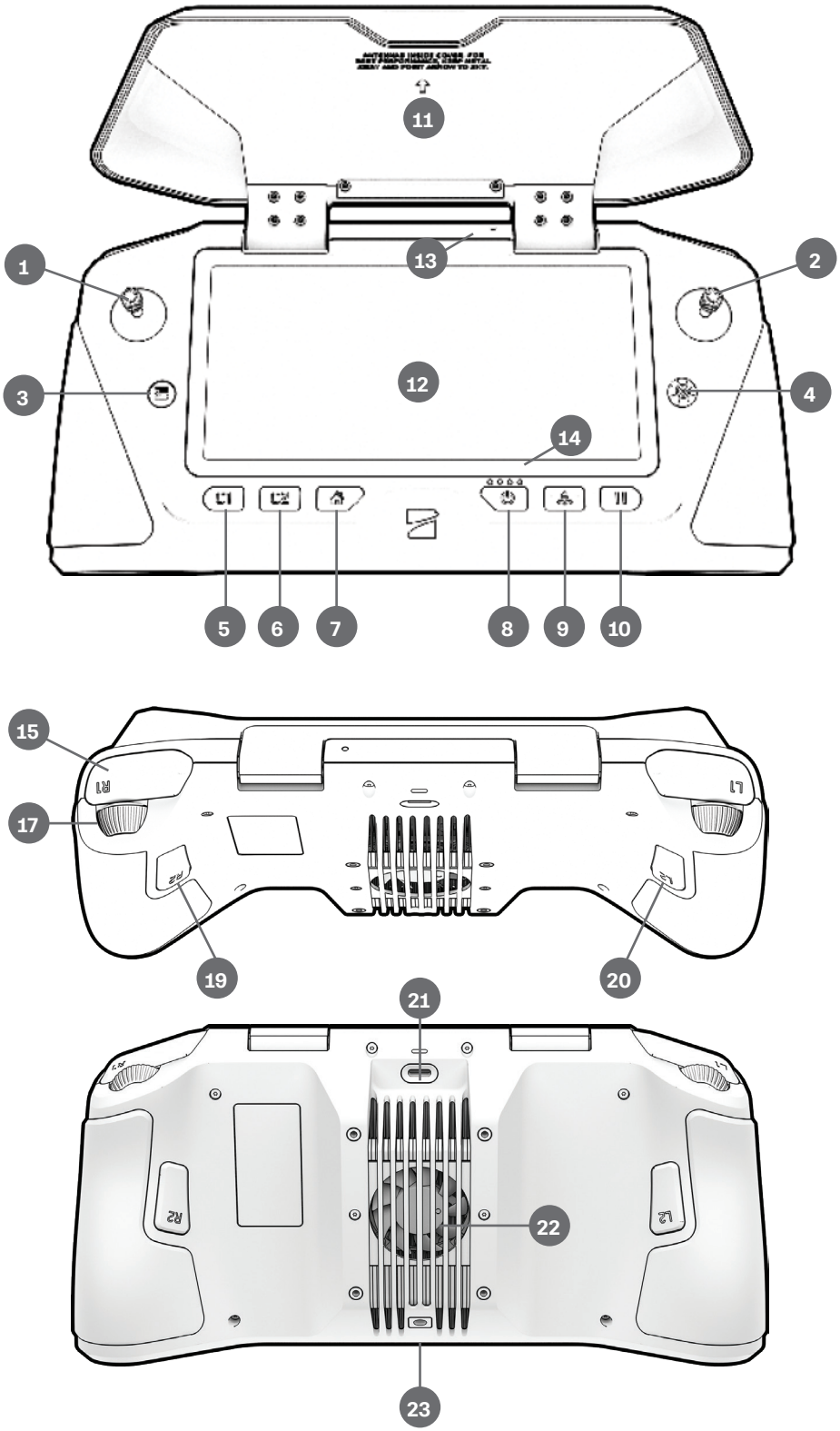




Overview

Skydio Enterprise Controller

1. Left joystick
2. Right joystick
3. Menu/back button
4. D-pad
5. C1 button - obstacle avoidance
6. C2 button - toggle lights on/off
7. Return to Home button
8. Power button
9. Launch/Land button
10. Pause button
11. Controller clamshell
12. User interface screen
13. Reset button
14. Reset button (alternate)
15. R1 button shutter/record
16. L1 button boost
17. Right wheel zoom
18. Left wheel gimbal tilt
19. R2 button toggle map
20. L2 button toggle thermal to color
21. USB-C port
22. Cooling fan
23. Neck-strap and 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.*

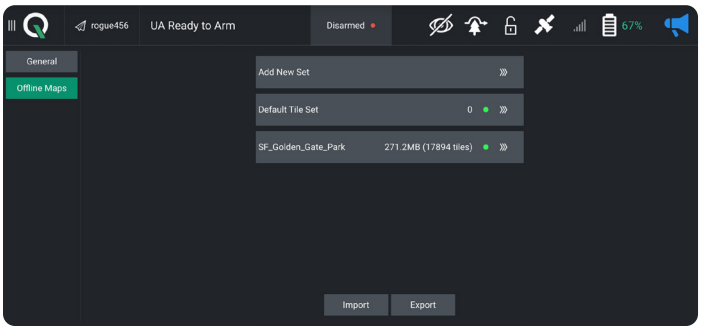
Preflight

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

- http://qgroundcontrol.com/downloads
- Select **Downloads**
- Follow prompts
- Launch the QGC application



Step 2 - Select the QGC app menu in the top left corner

Step 3 - Select **Settings**

Step 4 - Select **Offline Maps**

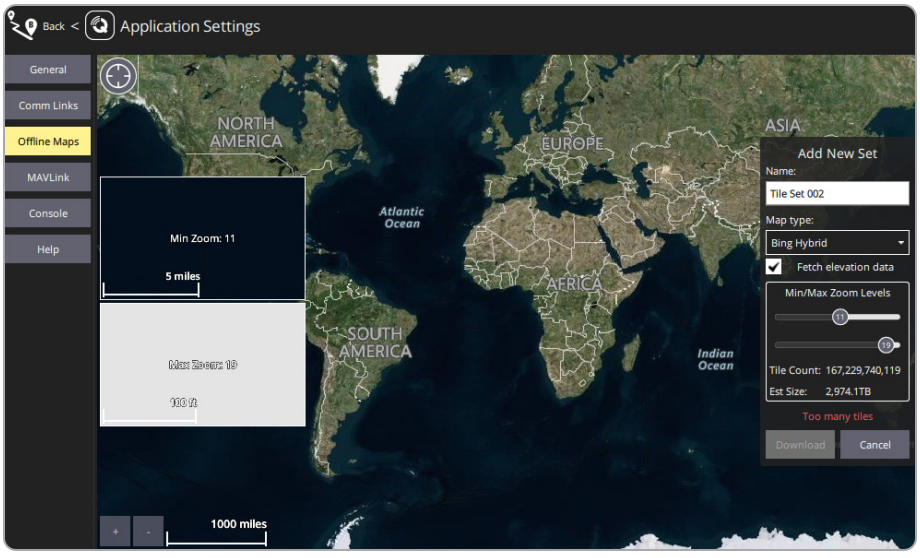
Step 5 - Navigate to the **Add New Set** dialog box

Step 6 - Name your map set

Step 7 - Select the map type

- Zoom into a specific area to create your map
- Set the zoom levels for offline maps
- 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



Preflight

Offline maps

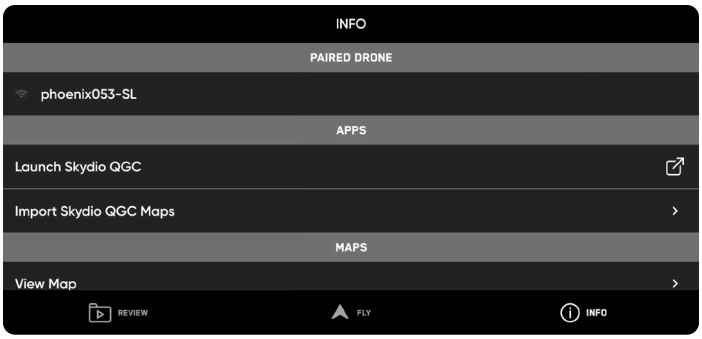
Import map to Skydio Enterprise Controller:

Step 1 - Power on your Skydio Enterprise Controller

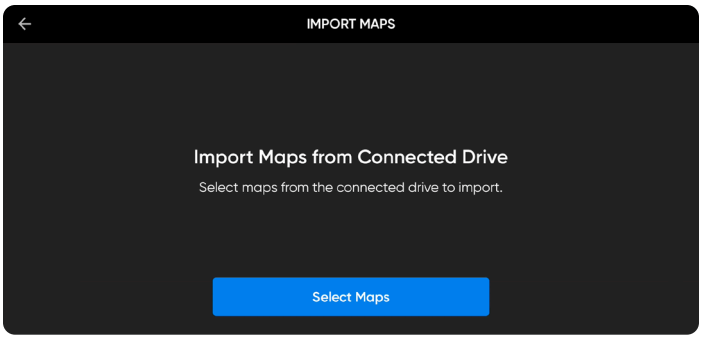
Step 2 - Select the **INFO** menu

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

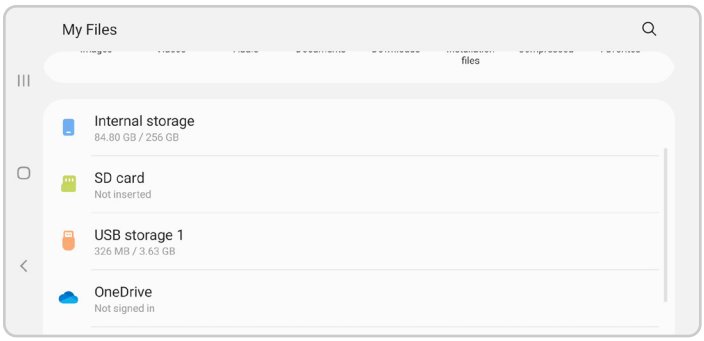
Step 4 - Insert the USB-C flash drive containing the QGC map file

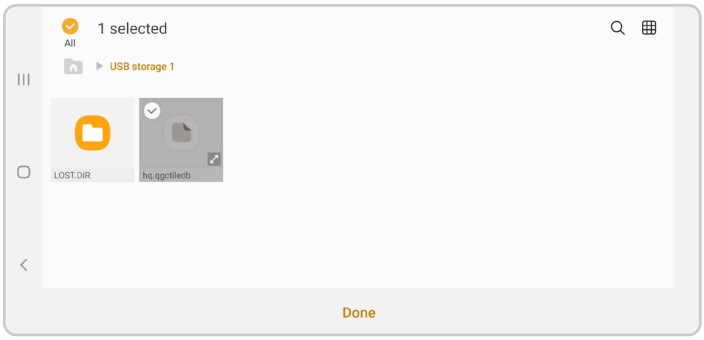


- Select **Maps**
- Navigate to My Files
- Select the USB storage device



- Select the map file
- Select **Done**



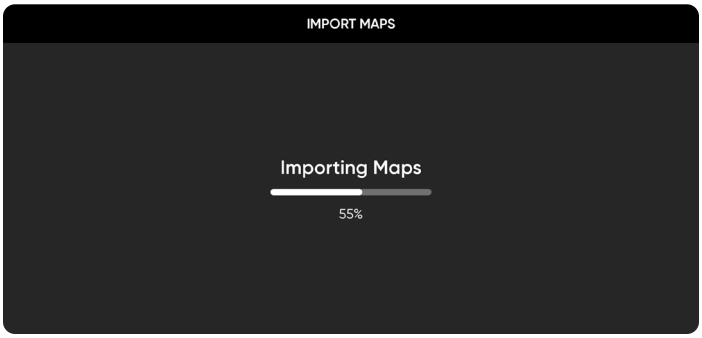


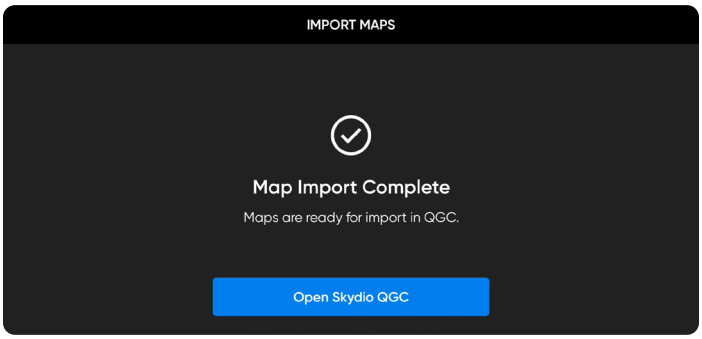
Preflight

Offline maps

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

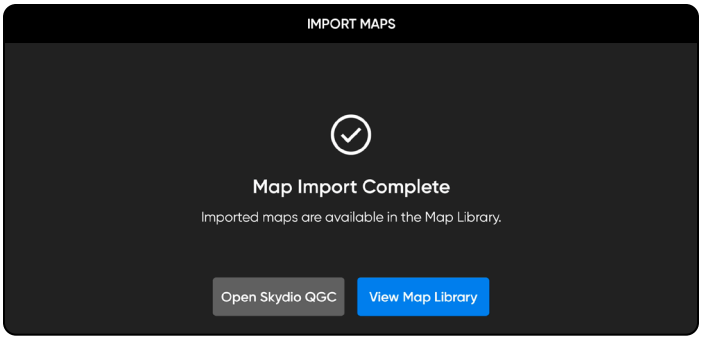
After completing the final step, you will only have 24 seconds to import the maps to QGC before your map files are deleted.





***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.*

Import maps to QGC:



Step 1 - Select **Open Skydio QGC**

Step 2 - Select the QGC-Gov app icon

Step 3 - Select **Settings**

Step 4 - Select **Offline Maps**

- Select **Import** and then **Import** again
- Tap on the tile set to import

Step 5 - Select **General** menu

Step 6 - Scroll to the Miscellaneous tab

Step 7 - Choose the correct options from the Map Provider and Map Type menus

Step 8 - Navigate back to the **Fly** screen

- Ensure that your map provider and map types match

QGC Flight

Media Encryption

To provision the vehicle for encryption

Step 1 - Power on Skydio X2D

Step 2 - Insert the security key into the USB-C port on the vehicle

- The light on the key will begin blinking green

Step 3 - Remove the security key when the light on the security key turn off

When your vehicle is provisioned for encryption, your media will be encrypted when flying with Skydio QGC-Gov. The state of your media encryption in located in the 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.

You have the option to enable or disable encryption. When Enable Encryption is selected, all media captured will be encrypted. When Disable Encryption is selected, all media captured will not be encrypted. To enable or disable encryption:

Step 1 - Power on your Skydio Enterprise Controller

- Wait for your X2D to connect

Step 2 - Select the **INFO** menu

Step 3 - Select your drone under Paired Devices

Step 4 - Select **Encryption**

Step 5 - Enable (default) or Disable Encryption

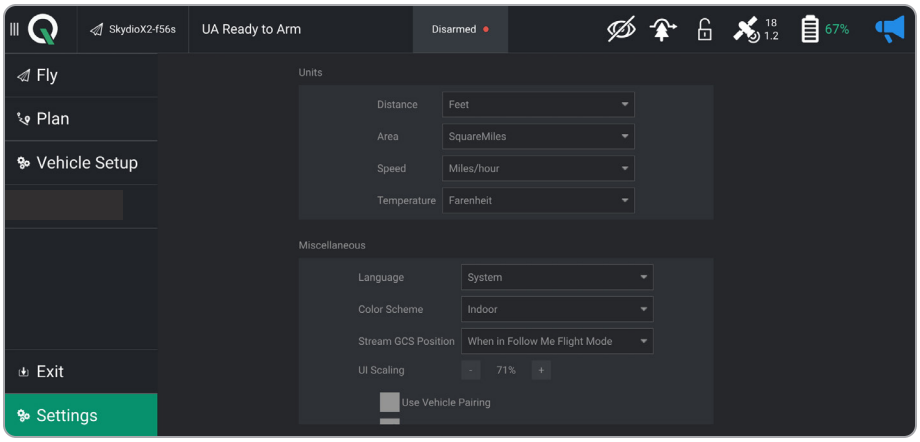
Preflight

Global Settings Menu

The application menu provides access to:

- **Fly** (default) - pilot both manually and autonomously, using map or camera view
- **Plan** - missions, geofence, and rally points
- **Vehicle Setup** - configure vehicle-specific settings (calibration)
- **Settings** - configure user interface settings

Settings



Configure settings:

Step 1 - Select the **App Settings** menu

Step 2 - Select **General** to set:

- Units of measure
- Language
- UI dark or light mode
- UI scaling
- Data persistence
- Telemetry logs
- Fly and plan view

Step 3 - Select **Offline Maps** to add a new map set

Step 4 - Select **Console** to view logs

Preflight

Vehicle Setup

Use the Global Settings QGC menu to access the Vehicle Setup menu.

Step 1 - Select **Fly Now**

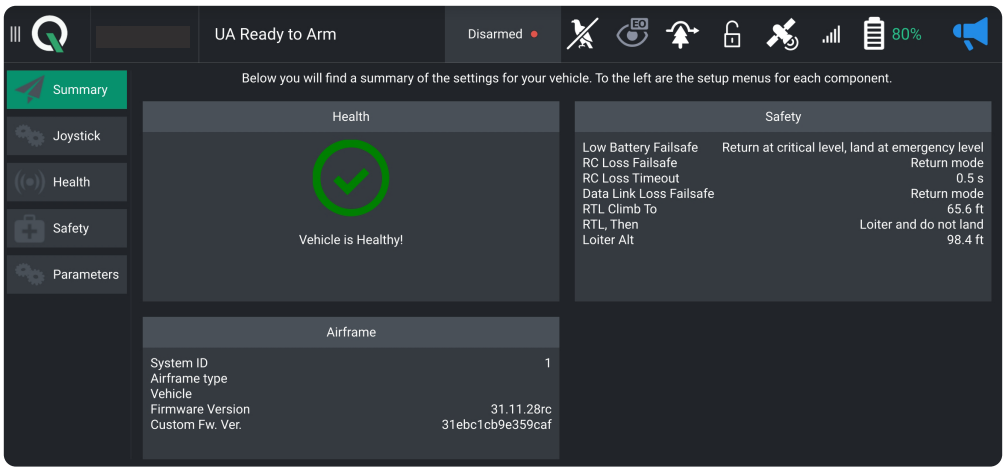
Step 2 - Select the QGC Global Settings icon

Step 3 - Select **Vehicle Setup**

- Summary
- Joystick
- Health
- Safety
- Parameters

Summary

The Summary menu displays a overview of your settings selections.



Preflight

Joystick Setup

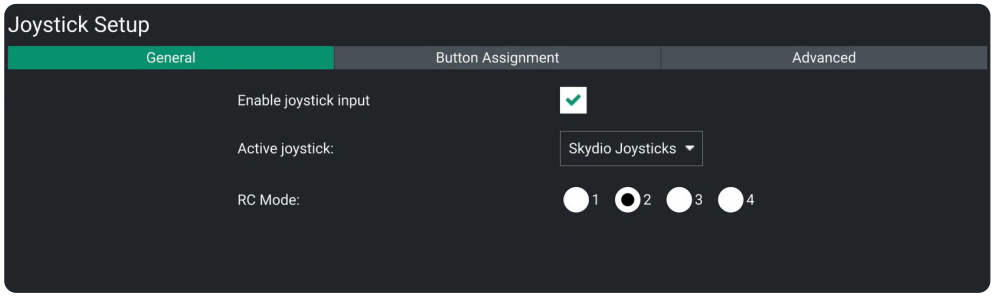
Step 1 - Select the QGC Global Settings icon

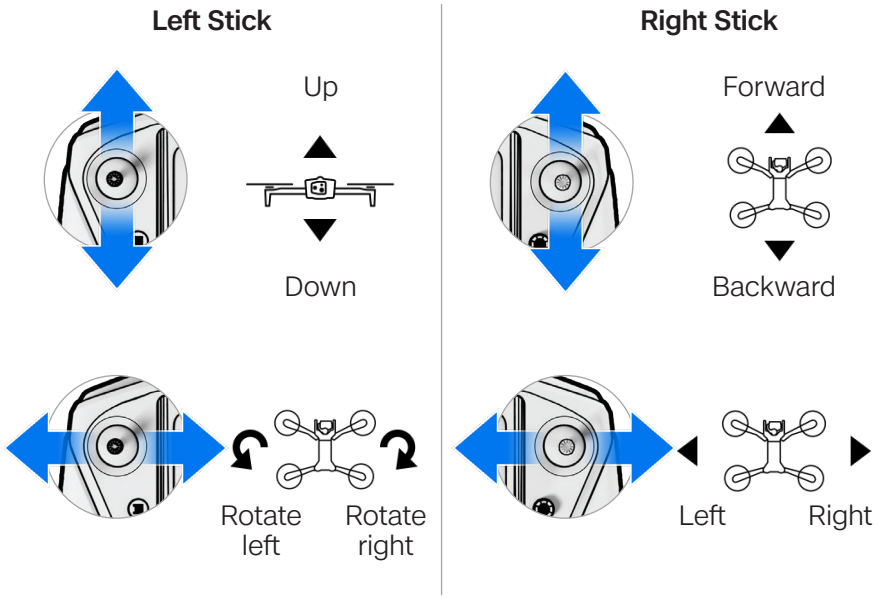
Step 2 - Select Vehicle Setup

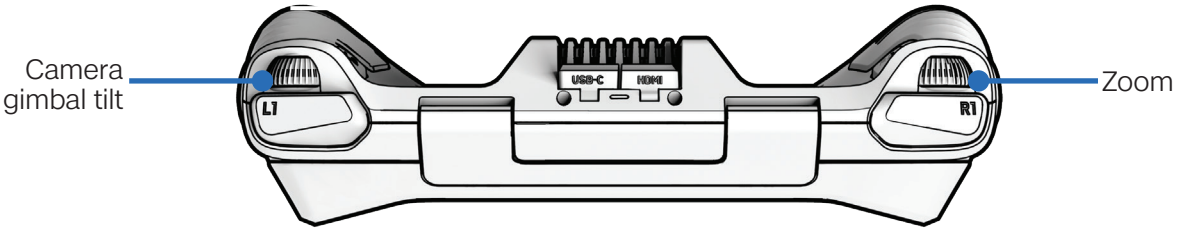
Step 3 - Select Joystick

Step 4 - Select the General tab

By default, flight controls are set to Mode 2, the left joystick controls the elevation and horizontal rotation of the drone, and the right joystick controls the forward, backward, and lateral movements of the drone.







Preflight

Joystick Button Assignment

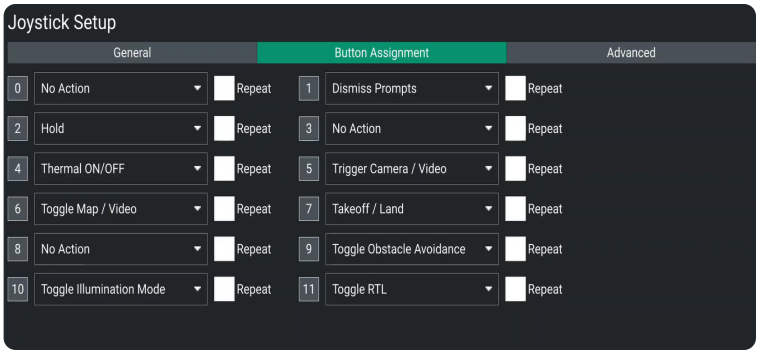
You have the ability to modify the controller button mapping as needed. Button mapping in Skydio QGC will not change the button mapping in the Skydio Enterprise Controller.

Step 1 - Select the QGC Global Settings icon

Step 2 - Select Vehicle Setup

Step 3 - Select Joystick

Step 4 - Select the Button Assignment tab



Pressing on each button on the controller will highlight the corresponding button number in the Skydio QGC, 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

Preflight

Joystick Button Assignment

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)
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)
LAND	Initiate a landing
TAKEOFF	Initiate a takeoff

Preflight

Joystick Advanced

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.

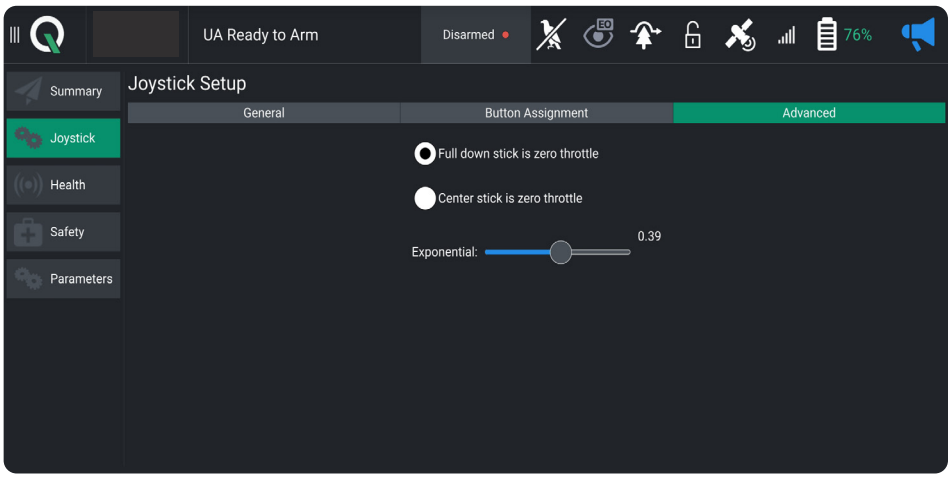
Step 1 - Select the QGC Global Settings icon

Step 2 - Select **Vehicle Setup**

Step 3 - Select **Joystick**

Step 4 - Select the Advanced tab

- Full down stick is zero throttle (default) - release joystick to center, the vehicle remains stationary
- Center stick is zero throttle - manually fly/command an ascent to keep the vehicle at a stable altitude. Release joystick to center, the vehicle will descend
- Exponential slider - control the joystick sensitivity ranging from 0 (full speed/sensitivity) --> .75 (least sensitive)



Preflight

Health

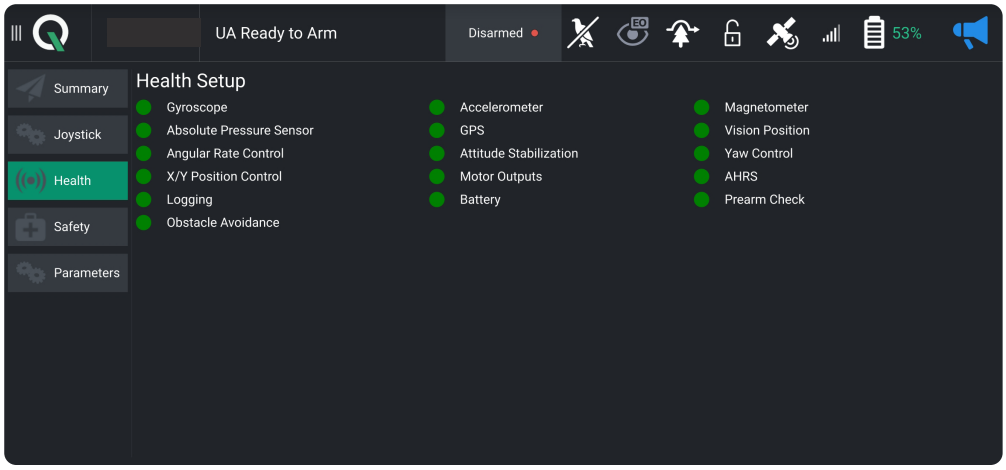
The Health tab displays the status of flight performance.

Step 1 - Select the QGC Global Settings icon

Step 2 - Select **Vehicle Setup**

Step 3 - Select **Health** - use this menu to view an overview of the vehicle, navigation, and flight readiness for your preflight check

- Green - flight readiness
- Yellow - unhealthy but not critical for flight
- Red - unhealthy not ready for flight



Preflight

Safety

The Safety tab displays the status of flight performance

Step 1 - Select the QGC Global Settings icon

Step 2 - Select **Vehicle Setup**

Step 3 - Select **Safety** - use this menu to set the data loss link action from:

Return mode (default)

- The vehicle will return to the home point if the signal connection is lost
- Autonomous flight modes will stop

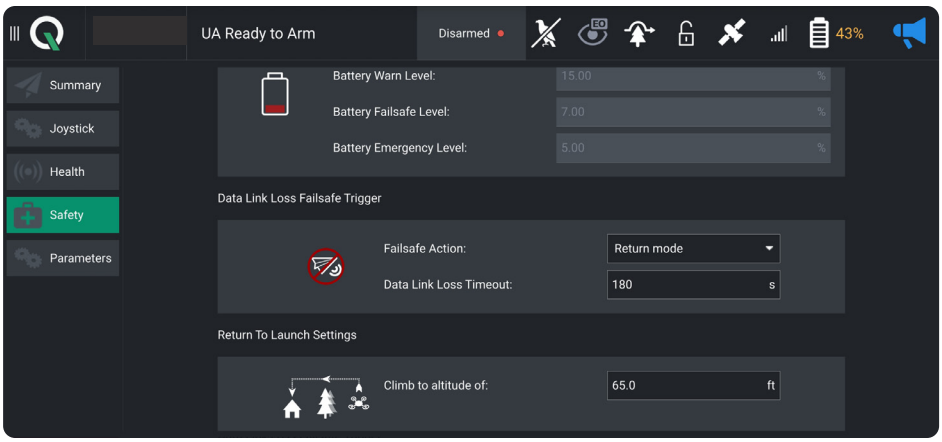
Step 4 - Set the Data Loss Link Timeout

- Set the amount of time that you want the vehicle to wait before returning from 5 to 300 seconds

Step 5 - Set the return altitude from 0 (current altitude) to 492 (above current altitude) feet

Disabled

- The vehicle will continue the autonomous flight mode until the signal is reconnects or the battery is depleted
- The vehicle will land in place

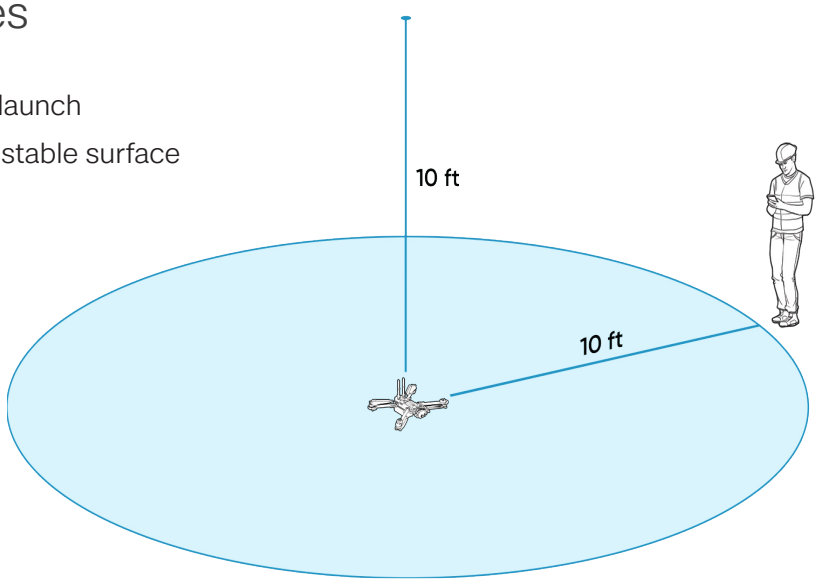


Flight

Launch Procedures

Step 1 - Find a clear area to launch

Step 2 - Place X2D on a flat, stable surface



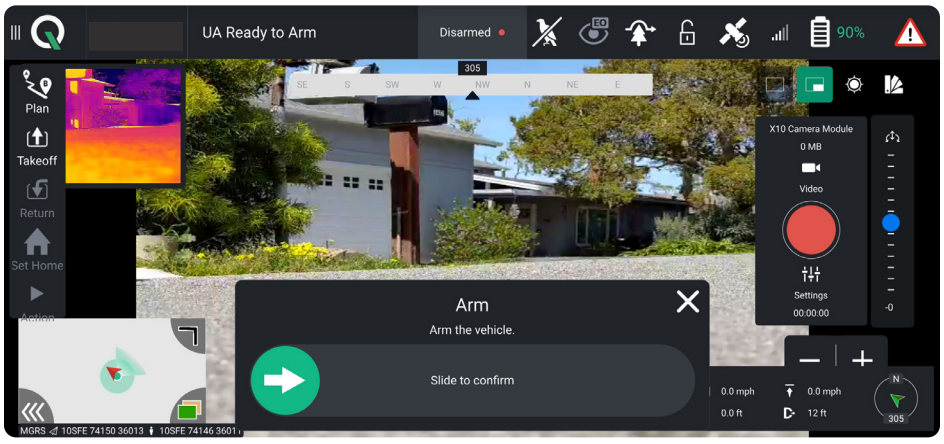
Select the Megaphone icon to display system notifications and status information for flight readiness. Dismiss this screen by tapping the X button in the top right corner.

Step 3 - Select Disarmed in the top toolbar

Step 4 - Slide to Arm the drone and start the Skydio Autonomy Engine

Step 5 - Select the Takeoff button to begin the takeoff process

- The propellers will begin to spin
- The vehicle will launch



WARNING: *Obstacle Avoidance is disabled during launch. The drone will launch, ascend and hover at 8 ft (2.4 m) above the ground, at which point Obstacle Avoidance is fully enabled. Exercise extreme care to avoid injury, and do not touch spinning propellers.*

Flight

Hand Launch Procedures

Step 1 - Identify a clear area to launch, 10 ft (3 m) above, 15 ft (4.5 m) in front, and 3 ft (1 m) on either side

Step 2 - Do not hand launch on windy days. Ensure that it is not blowing towards you.

- If the wind is gusty or coming from different directions, consider a ground launch

Step 3 - Create a launch pad on your open hand by lightly gripping the battery to stabilize

- Keep the drone level and still, at arm's length from your body
- Keep your fingers below the chassis and away from the propellers at all times
- Point the camera away from you
- Ensure that the rear propellers will not make contact with your arm

Initiate launch using:

Controlling device - select the launch button

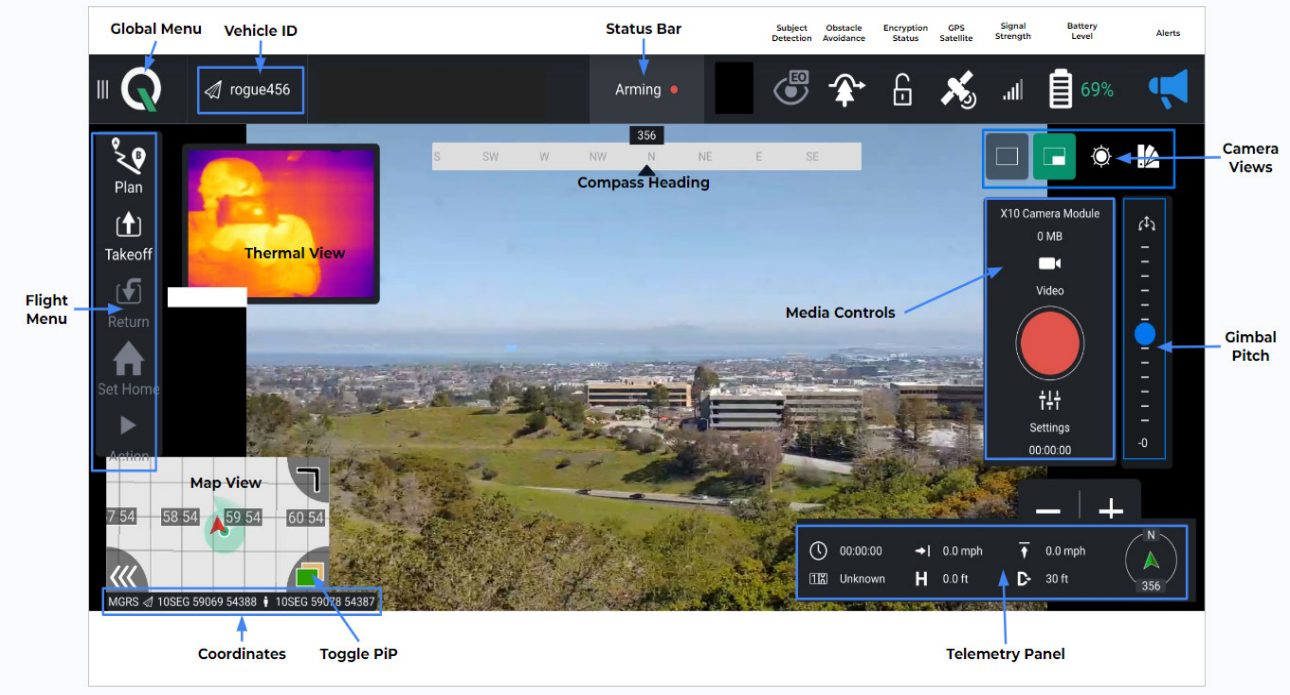
Quick Launch - press the battery power button four times

Step 4 - As the propellers begin to spin up slowly relax your grip. Keep your hand still and level

- X2D will slide off your palm and take flight
- Do not push or throw the vehicle up in the air

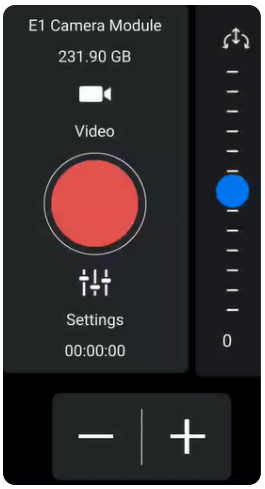
Flight

Flight Screen



Flight

Media Controls



Media controls to capture video and photos:

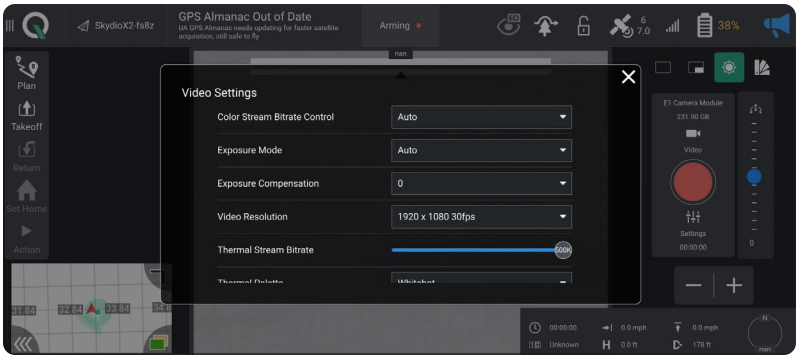
- **Photo/Video** icon allows you to toggle between video and photo mode
- **Record/Shutter** icon to start/stop recording or take still photos, depending on your capture mode
- **Settings icon** to access the video/photo settings for both color and thermal camera

By default, Skydio X2D 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.

Select the Settings icon to adjust the video and photo 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**



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

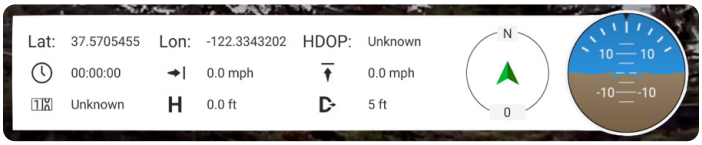
From left to right:

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

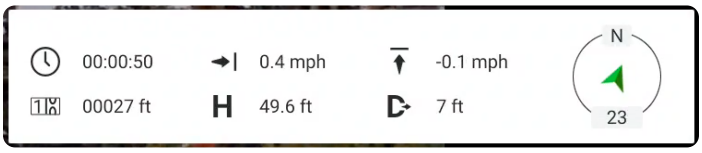
Flight

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.

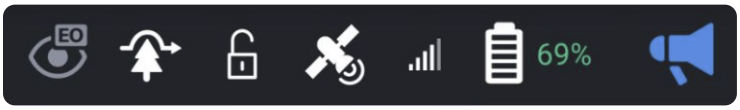


NOTE: *No GPS indicates the Skydio Enterprise Controller does not have a GPS position. This is normal.*

Flight

Status Bar

The Status Bar menu offers more information about the status and health of Skydio X2D



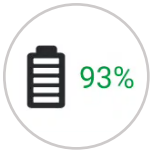
Encryption - enabled/disabled

Subject Detection - detect EO, Detect IR, and disabled

Obstacle Avoidance - indicates which obstacle avoidance setting is active. Tap to toggle between each obstacle avoidance setting, Full, Reduced, Minimal, and Disabled

Satellite - view live GPS telemetry from Skydio X2D

Signal Strength - displays the current strength of your radio link to the Skydio X2D 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

Flight

Home Point

Step 1 - Select the Home tab

Step 2 - Press and hold anywhere on the map

- Home point location represented by an H on the map

Step 3 - Select the altitude

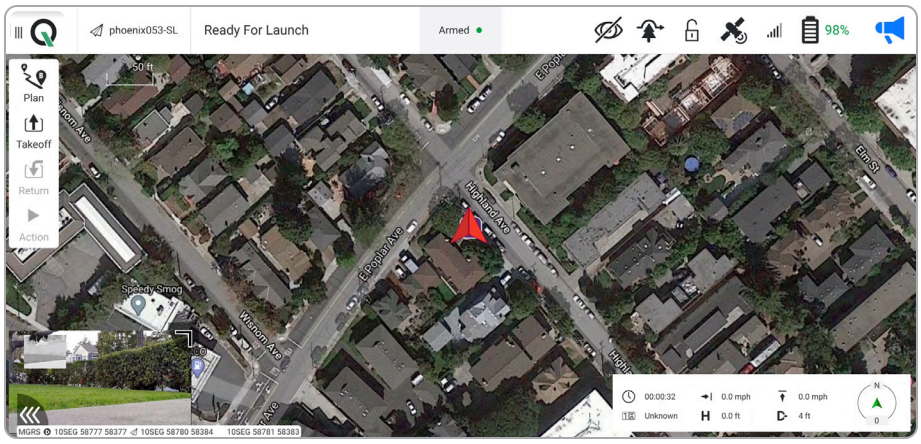
Step 4 - Select the Home icon on the left side of the screen

Step 5 - Slide to confirm

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

Home Point

Step 1 - Select the Home tab

Step 2 - Press and hold anywhere on the map

- Home point location represented by an H on the map

Step 3 - Select the altitude

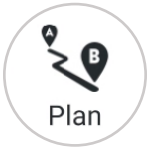
Step 4 - To return to the home point select the Home icon on the left side of the screen

- Slide to confirm

Flight

Waypoint Mission

Missions allow X10D to fly to designated waypoints without requiring you to manually fly. As the vehicle reaches each waypoint, it can execute preset operations before proceeding to the next waypoint. Missions can be planned preflight.



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

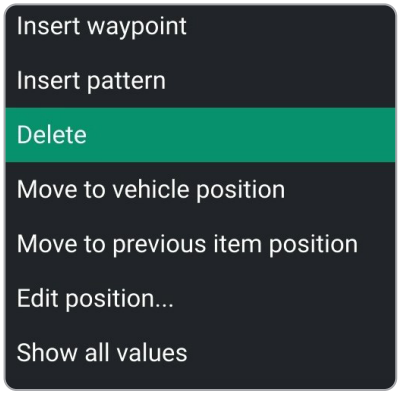
- Tap on the map to set the waypoints
- Continue tapping on the map to set waypoints until your mission plan is complete

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

- Altitude
- Hold duration (in seconds)
- Will loiter before proceeding
- Change the gimbal pitch angle
- Planned photo

Select the **hamburger** icon to set a different command for that waypoint in the mission.

To delete a waypoint select the waypoint and the trash can

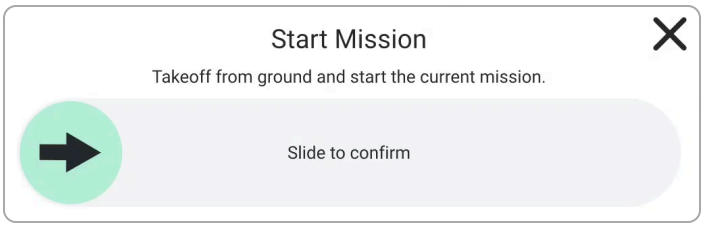


Flight

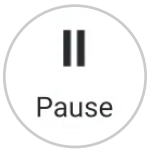
Waypoint Mission

Step 5 - Select **Upload Required** to upload the mission. A 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.

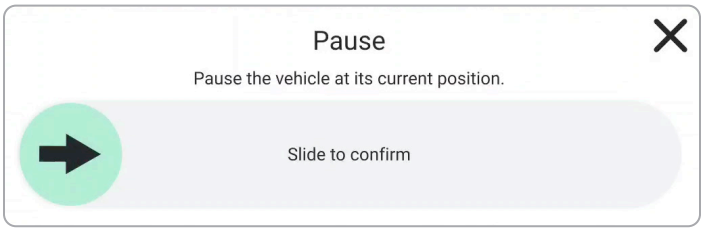


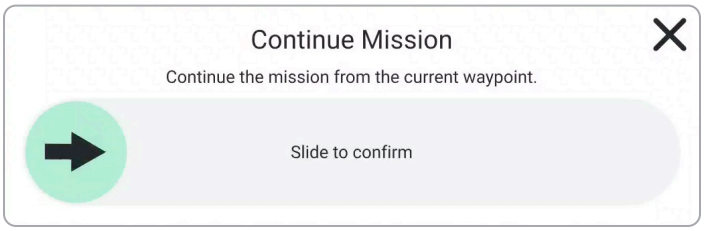
NOTE: *When you slide to confirm Start Mission the vehicle will autonomously arm and launch.*



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.





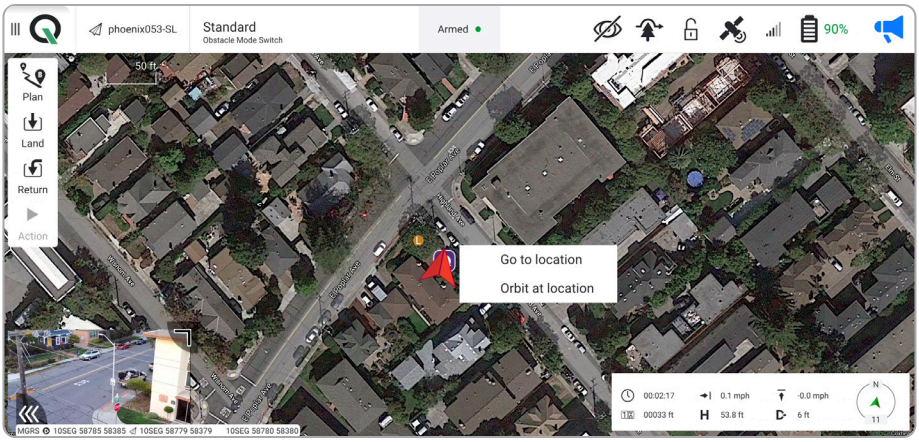
Flight

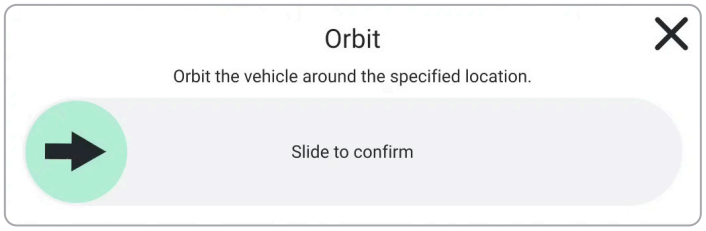
Orbit a point of interest

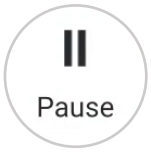
Step 1 - Press and hold anywhere on the map to set the orbit point

Step 2 - Slide to confirm

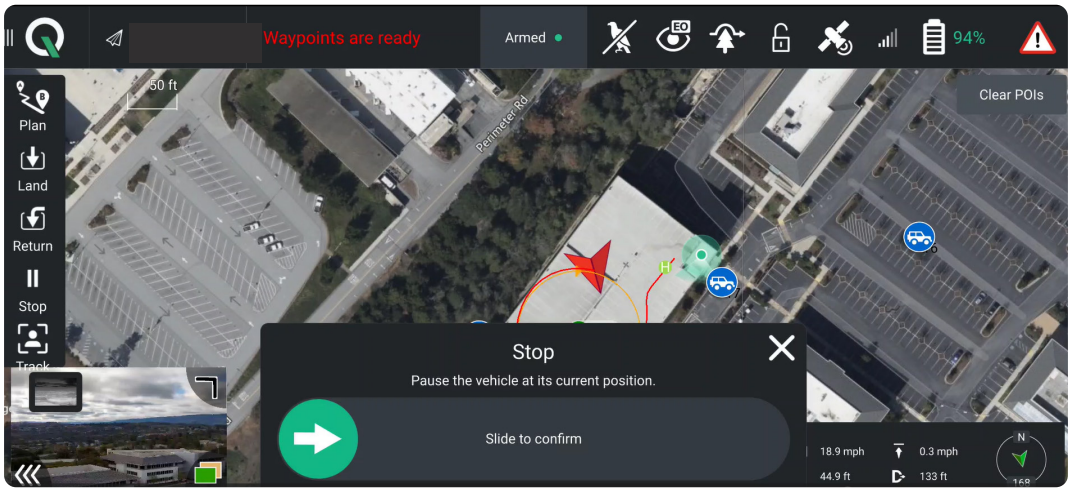
- Adjust the orbit range by adjusting the vehicle's pitch while in flight







While a orbit is executing, tap the Pause button in the left Toolbar to stop the vehicle at its current location. Slide to confirm.



Flight

Track

To initiate a subject track

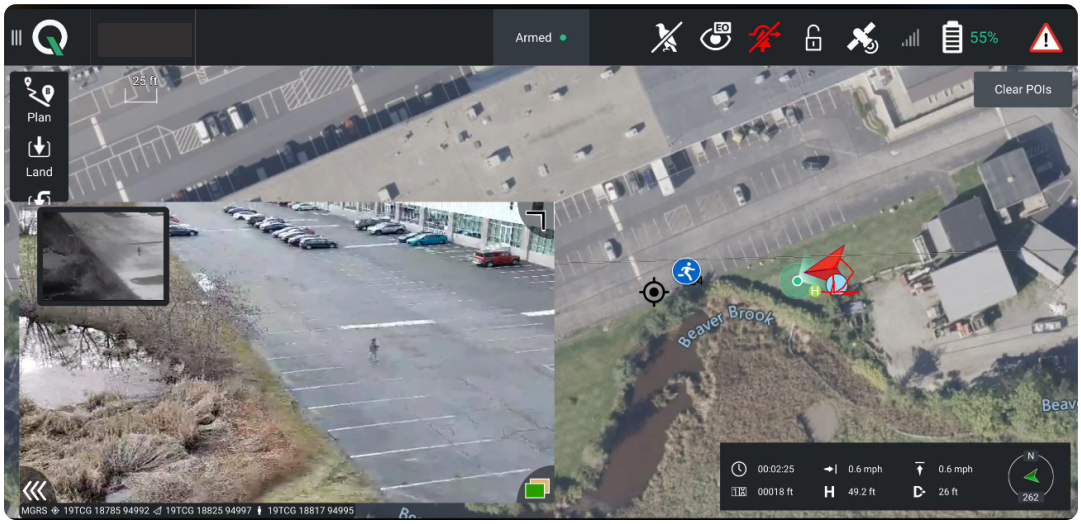
Step 1 - Select the subject detection icon to enabled in EO or IR

Step 2 -Locate a point of interest on the map view

Step 3 - Tap the point of interest person or vehicle icon to select

Step 4 - Adjust the orbit range by adjusting the vehicle's pitch while in flight

Step 5 - Select Clear POI to stop tracking



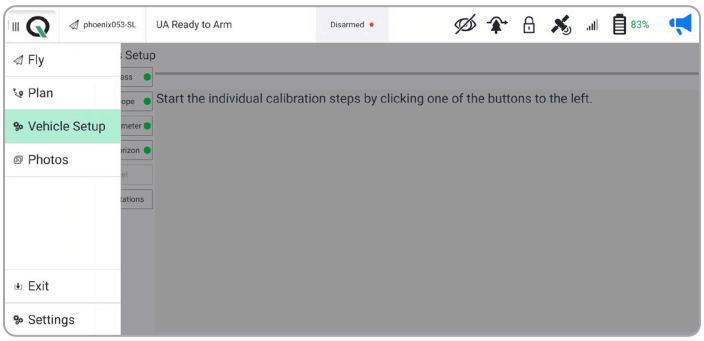
Flight

GPS Night Flight

Enable GPS Night Flight when flying in low-light conditions. Obstacle 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.

Step 1 - Disable obstacle avoidance

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



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

Flight

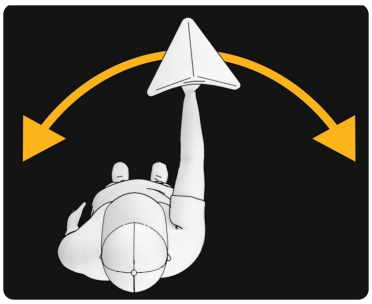
GPS Night Flight

If this is your first time enabling GPS Night Flight mode, you will need to complete a calibration before flight. Access the calibration modes in the Vehicle Setup menu.

Hand Wave:

Toggle Hand Wave calibration on

- select the **Settings** menu and the **Drone** tab
- select GPS Night Flight
- enable GPS Night Flight Mode
- wave the drone back-and-forth



A visual tutorial will guide you through the calibration process the first time you initiate a Hand Wave Calibration. Access the instructions at any time by navigating to the info menu and selecting Hand Wave Guide.

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.*

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.

Flight

Exit QGC-Gov

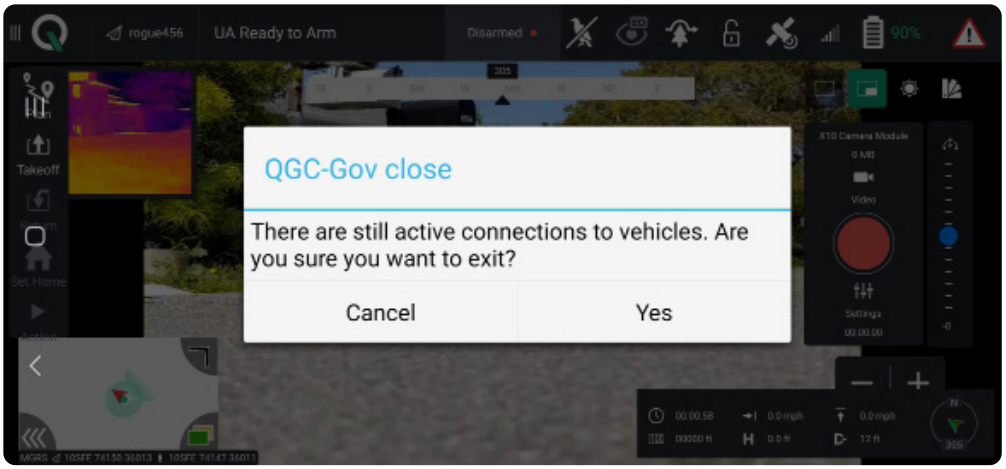
Step 1 - Disarm your Skydio X2D

Step 2 - Select the QGC icon

Step 3 - Select Home

Step 4 - Select Yes to confirm

- To return to the Home Screen
- The signal link will disconnect momentarily



Control #: A0156