COCKPIT 1.3

USER GUIDE

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Overview and setup

Cockpit is the Flyability official application used to pilot the Elios system.

Its main use is to serve as a cockpit, allowing to view the video feed from the aircraft thus enabling FPV flights.

In addition, a dashboard with useful flight and camera telemetry is shown to the pilot.

First time installation

System requirements

Cockpit is developed and tested work on Samsung Tab A and Active 2 tablets, running Android 8. Other tablets and operating system versions are not guaranteed to work.

Get the application, download it onto the tablet

The application is distributed as a standard Android application file (.apk), available on my.flyability.com.

Using the USB connection of your tablet, copy the APK file to a place you can browse to, using a file explorer on the tablet. An alternate solution is to copy the file on an SD card, especially for Mac users.

From Cockpit 1.2 onwards, an automatic updater is available to keep you up to date when new releases are available and make them installable at the click of a button.

Note : some tablets do not have file explorers provided; you may get a free one on the Google Play store.

Allow unknown sources in Android

Go to the settings screen on your Android tablet.

Based on your tablet brand, the architecture of settings menus may vary and may not be exactly named as in this manual. However, the steps are similar and may just bear different names on your specific model of tablet.

Go to Lock screen and Security.

Check if Unknown sources is enabled; tick it if it is not. A warning may appear about application security concerns; you can acknowledge it.

Install the application

Using the file explorer on your tablet, browse to the APK file location you have just copied from your computer. Tap the file to run the software installer. Some confirmations about access to specific features may appear; you can acknowledge without concerns.

A Flyability icon should now be available in your application menu and your home screen!

Updating an already installed application

Updates to an already installed application can be done in two different ways.

Internet update process

Be sure your device has Internet access. As you start Cockpit, the availability of updates is checked.

Should a more recent version be available, you will be notified and prompted to proceed with the update or decline it. If you proceed, download of the newer installation file begins automatically.

Please note, at the next time you will connect your aircraft to the system, the application will prompt you to perform a firmware upgrade. Read the Aircraft firmware upgrade section for more details on that process.

Manual update

Follow the steps noted in the "Installing the application for the first time" section.

Setting up the remote controller

If you already used a remote controller with your tablet, typically with the DJI GO app, some setup is necessary to enable Cockpit to recognize it without other applications taking over the connection.

Reset default application for the controller

You can skip this step if you never used the remote controller on your tablet since purchase or latest factory reset.

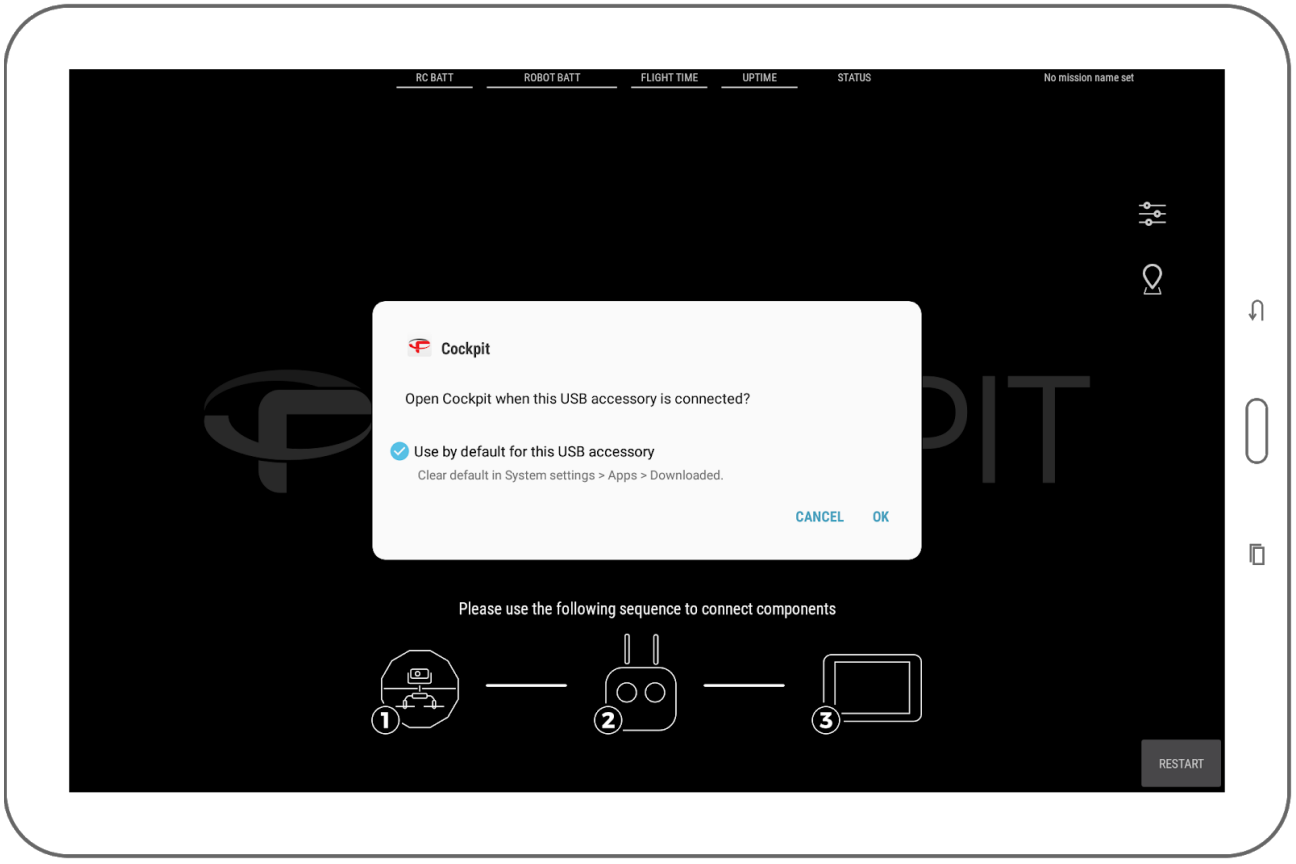
Each time the remote controller is plugged and turned on, the tablet runs the default assigned app to handle it and other compatible apps will not see it. The default app must be reset in such cases.

1. Open the Settings menu of your tablet.
2. Go to Applications.
3. Open Applications Manager.
4. In the list of apps, locate DJI GO or the one you have used before. Tap it.
5. In the next screen, select Set as default (the name is ambiguous).
6. In the next screen, tap Clear defaults.
7. The default application for the remote controller is now reset.

Set Cockpit as default application

Turn the remote controller on, make sure it has enough battery, and plug a USB cable between the full-size USB port of the controller and the micro-USB port of the tablet (or USB-C if applicable).

If multiple applications able to handle the controller are present, a popup window asks you to pick one. Depending on the tablet models, another option, “Just once” or “Always” is selectable. A checkbox mentioning “Always use” can alternately be proposed.



It is recommended to choose Always / Use by default, as you can later perform the actions in the section above to reset the defaults.

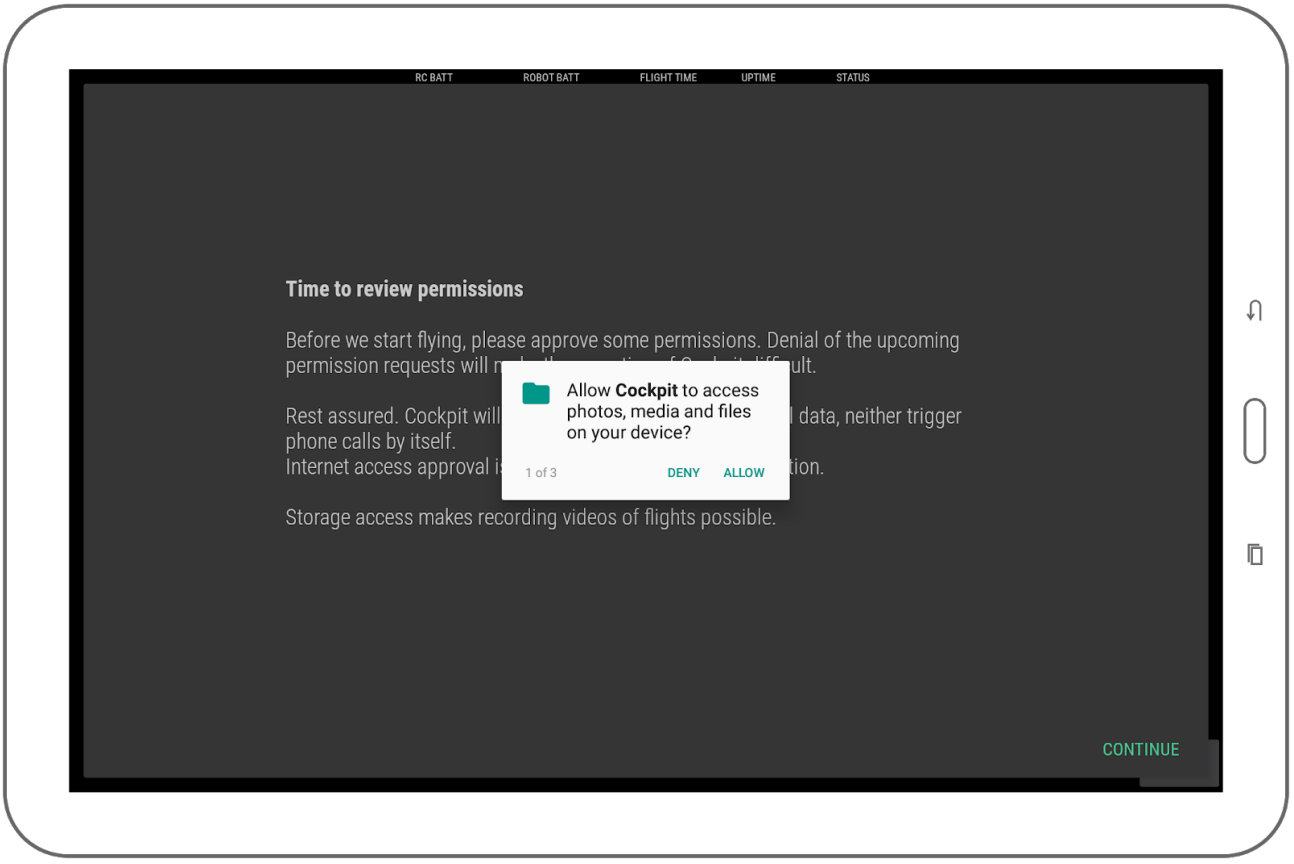
First launch

Upon a fresh install or unboxing of your Flyability aircraft, steps that are specific to first launch may be encountered.

Please be patient when the application starts for the first time. Initialization of long-standing components should take place; this is normal behaviour. Some of the long procedures run during the first launch only.

Authorizations

Be sure to accept all requested Android system authorizations.

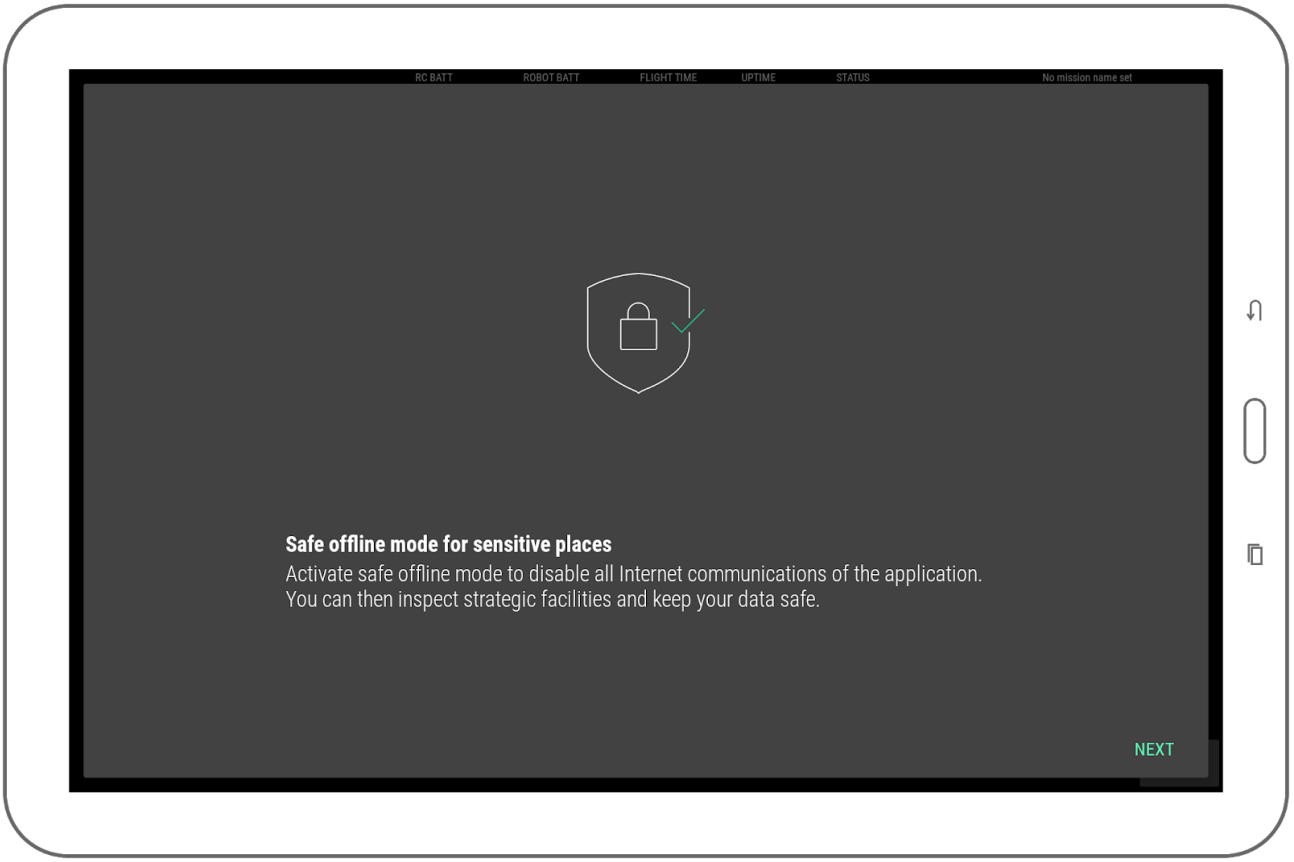


Cockpit keeps your data safe.

- It will never initiate paid phone calls or contact paid services on its own
- It will never upload videos, flight logs, data from the Android device. The only data that is uploaded is minimal aircraft identification data for servicing purposes, for the sole use of Flyability. A safe offline mode is available to block such data transfers if this is a concern.

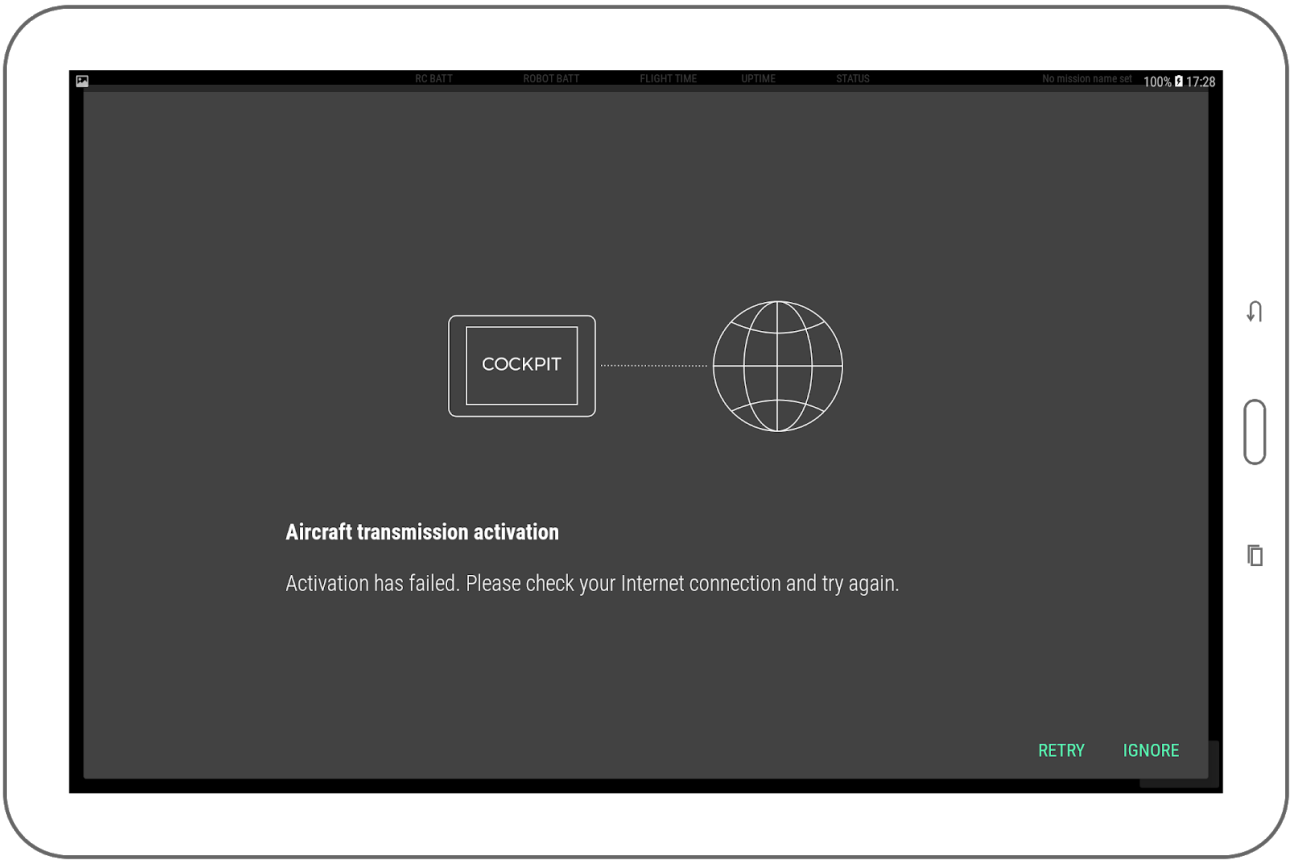
New features

Every new version of Cockpit presents its newly added features in a slideshow. Read through to understand and get acquainted with the latest improvements of the application.



Transmission activation

The transmission system must be activated one time. Afterwards, there is no more need to activate it even after app upgrades.



Be sure to have Internet connectivity for activation to succeed. Without activation, Cockpit functions cannot be used. A reminder appears if activation cannot succeed.

WARNING

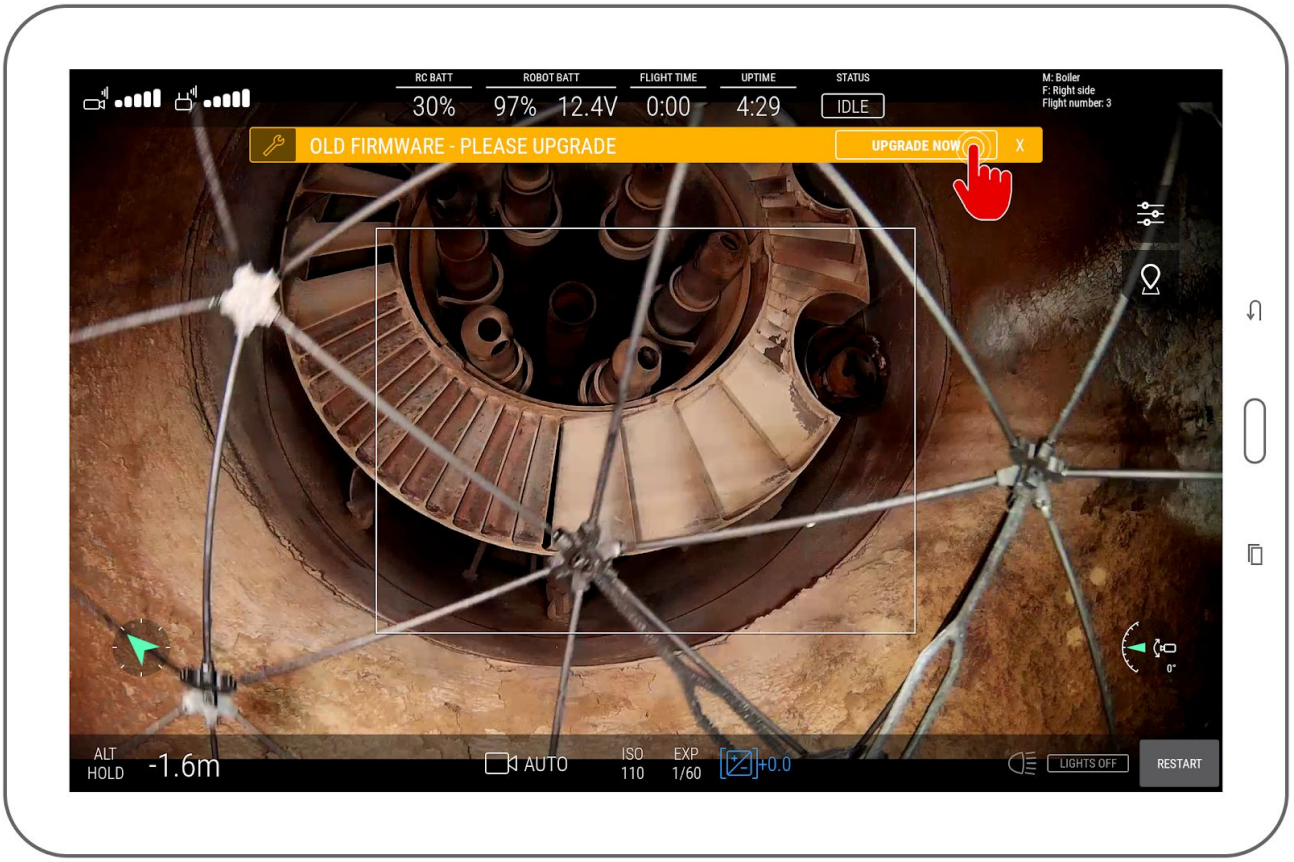
If the "Clear data" function in Android application manager is used to reset Cockpit, another activation will be required on next launch.

Aircraft firmware upgrade

Starting from version 1.2, Cockpit ships upgrade files for Flyability aircraft. It is easier to perform the upgrade than before: Cockpit streams the update over-the-air to the aircraft. Using a SD card to transfer the update file is no more required.

Next time you connect your Flyability aircraft to Cockpit, its version is analyzed and the pilot is warned when an upgrade should be done.

A warning appears on screen if an upgrade is necessary. It is highly recommended to perform the upgrade so that you can benefit of all the new features. If you keep your aircraft with an outdated firmware, some of the newer features of Cockpit will not be enabled. The warning is visible as an example on the screenshot below.



By clicking on the “Upgrade now”button on the warning, you can access the upgrade tool.

Make sure to use a full battery for running the upgrade process. This minimizes risks of the aircraft turning off in the middle of a file transfer.

The upgrade tool tells you:

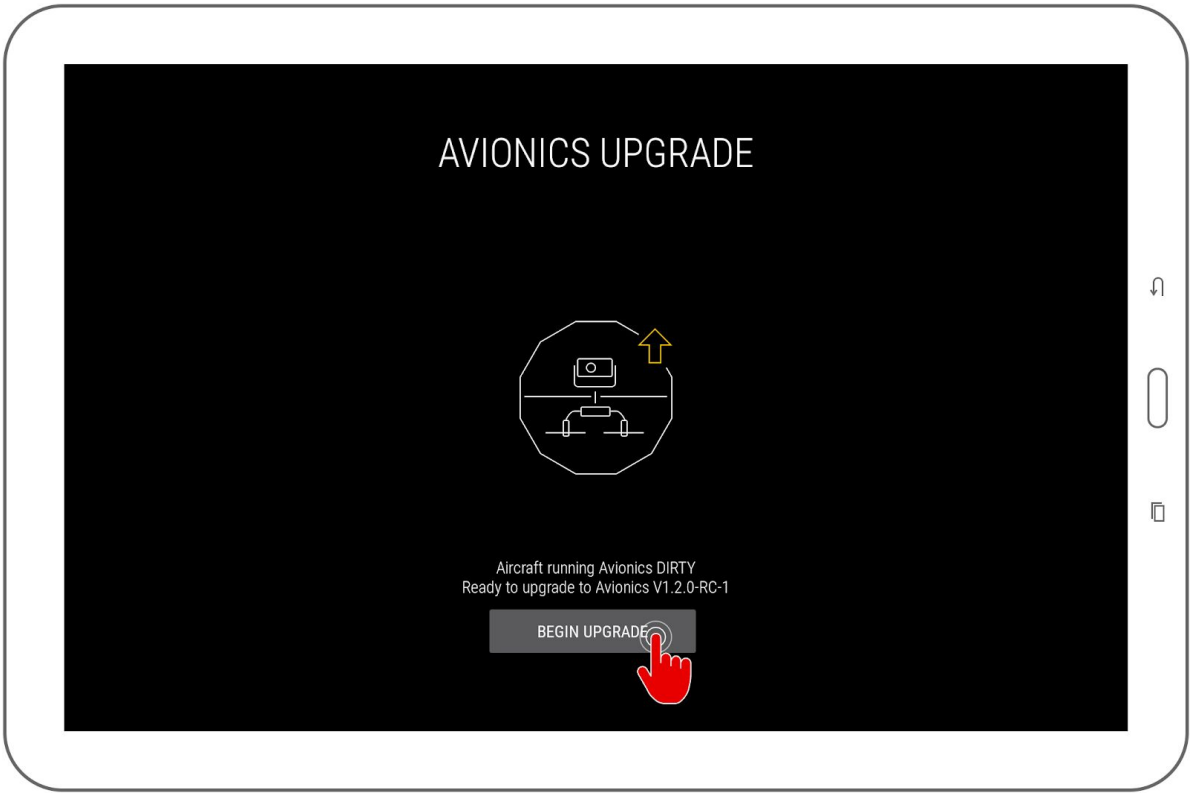
- The current version of Avionics on the aircraft.
- The new version of Avionics ready for transfer.

In case of older aircraft or those not maintained for a long time, the use of a SD card for firmware upgrade can still be mandatory. In such case, Cockpit mentions it on screen.
Elios running Avionics earlier than 1.1 must be upgraded using a SD card. Instructions on how to perform this operation are available on https://my.flyability.com/hc/en-us/categories/115000689665

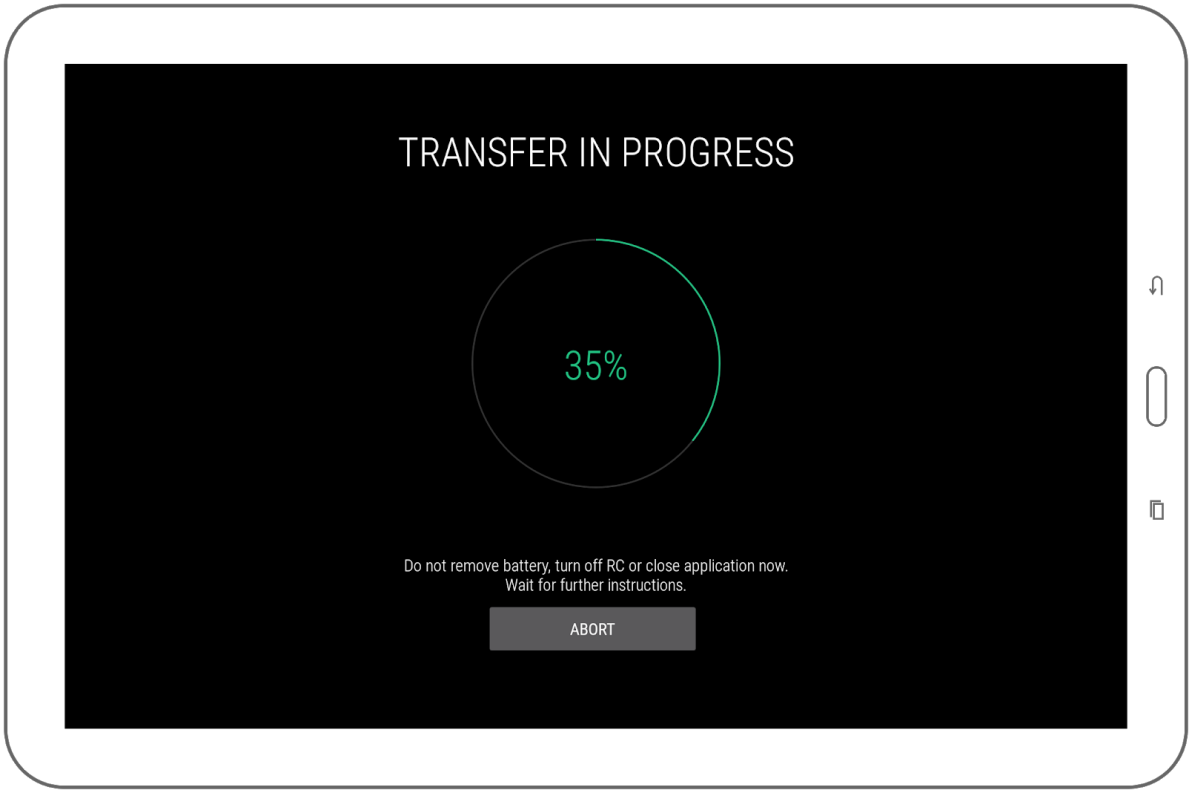
Upgrade using over-the-air file transfer

If the tablet shows “Ready for upgrade” and the start button is available, all conditions are met to start the upgrade.

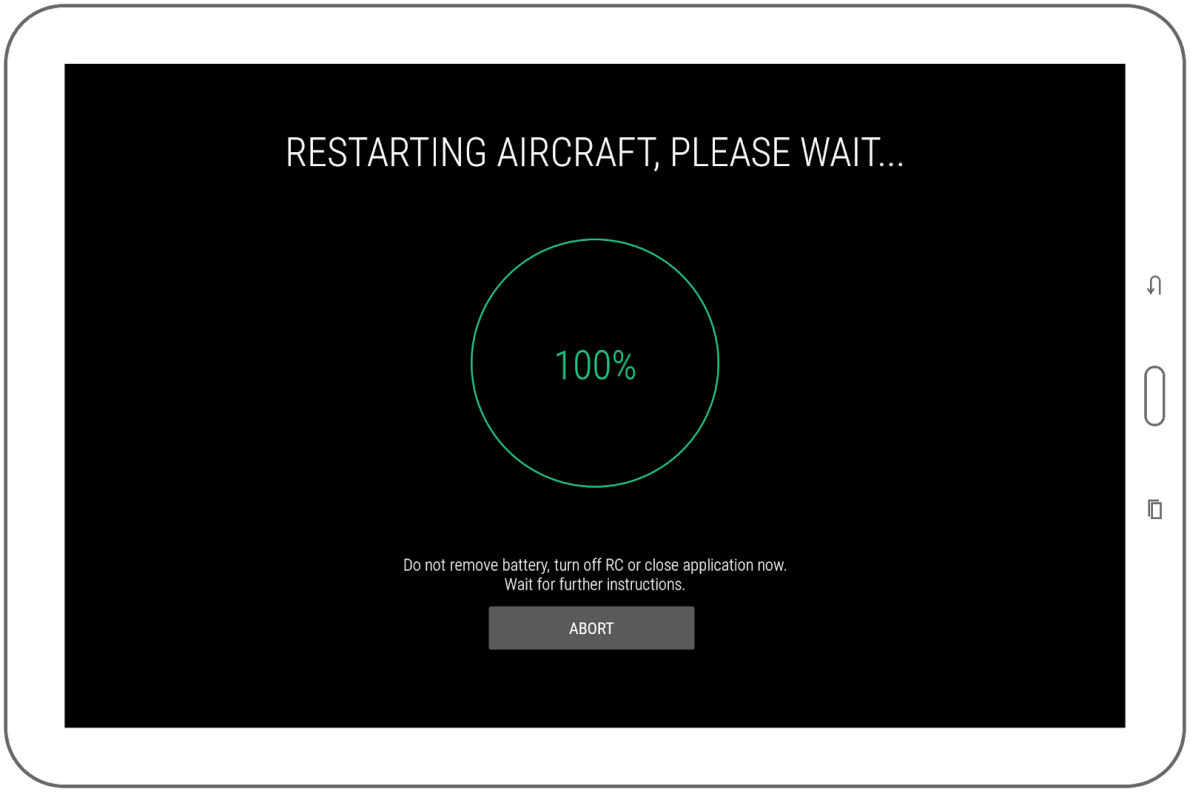
1. Make sure the aircraft is close to remote controller, ideally on the same table.
2. Make sure there is an SD card with free space in the log slot. Without this, the upgrade cannot succeed.
3. Press the “Begin upgrade” button on the tablet.



4. Let the upgrade run until the progress bar reaches 100%. In optimal situations, this process is expected to last for 6 minutes. Do not disconnect any component while the transfer is running.

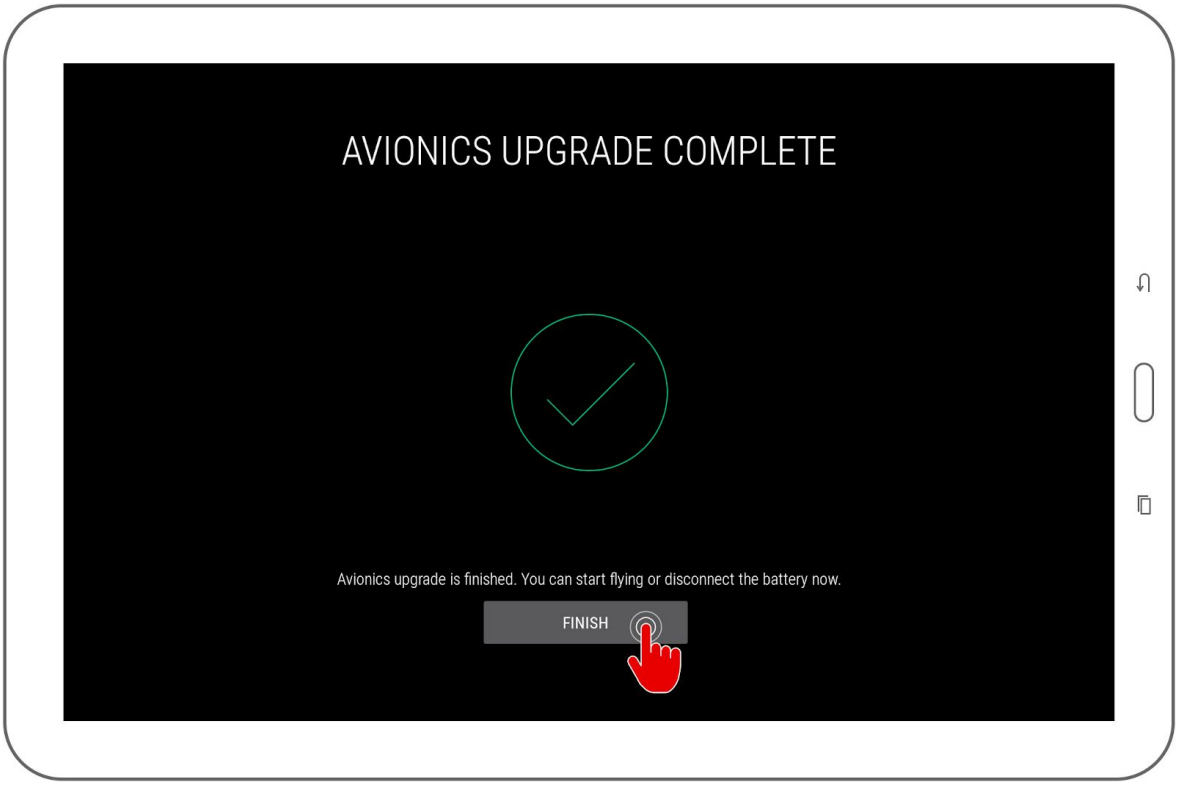


5. The screen now informs us of an imminent aircraft reboot process.



6. Wait for the aircraft to restart, and check that a rapid blinking LED sequence is visible at a certain moment. This fast LED blinking sequence corresponds to the moment the new firmware package is actually written on the system.
7. When the upgrade is successfully finished, the application should play a short music and show a success message.

8. Press the “finish” button to go back to the main screen



9. Open the About panel in the settings menu; you can now verify that the latest version is present (no upgrade invitation message shown).

Upgrade by SD card

If Cockpit requests to use an SD card, the over-the-air function is not available for the specific connected aircraft. The on-board version of Avionics does not support the over-the-air update.

In this case:

1. Download the firmware package (.BIN file) from my.flyability.com
2. Copy the package on the SD card that is used for the flight logs.
3. Insert the SD card into the log slot of the aircraft.
4. Plug a full battery.
5. Wait for the following lights sequence: rapid blinking, stop blinking, then slowly blinking.

User interface reference

Connection progress

By default, the main screen contains a Flyability logo and some information on the sides.

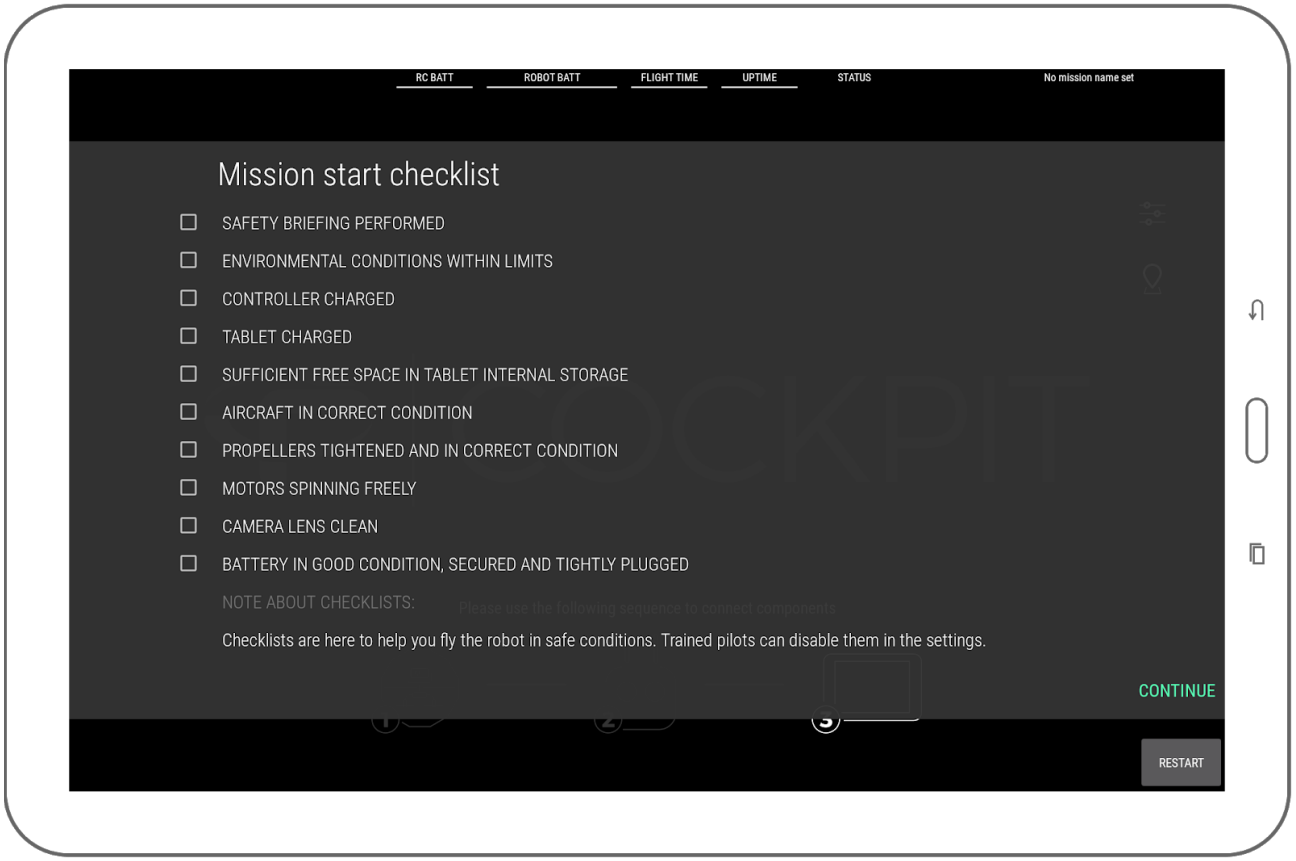
At this point, the application is waiting for a controller and aircraft to connect. When this happens, the logo is replaced by the video from the camera and flight information appears on the sides.

The progress bar on the bottom informs of the current connection status, using icons.

- Tablet icon: represents your tablet in the connection order. If wi-fi streaming is used and this tablet is used as viewer, the tablet icon flashes when no connection is established to the emitting tablet. See Streaming video and telemetry to a second tablet for details.
- Controller flashing: the controller is being searched.
- Aircraft icon flashing : the controller is recognized and is now looking for the aircraft.

When the connection process is complete, the progress bar disappears and the video appears.

Checklists



Checklists are shown to the user depending on the current operational stage. For instance, one is shown at application startup and the other one appears when an aircraft has finished establishing the link with the device running Cockpit.

You can check the boxes to keep track of your progress in the checking process.
These checklists can be customized; see further in the advanced topics.

Checklists are an aid to minimize human error by ensuring completeness in preparing your mission, flight and post-flight phases. You can skip them, even if you have not checked the boxes by directly clicking on Continue, or by disabling them in the settings menu.

Not all points are present on the same checklist. The points shown are specific to the moment the checklist appears.

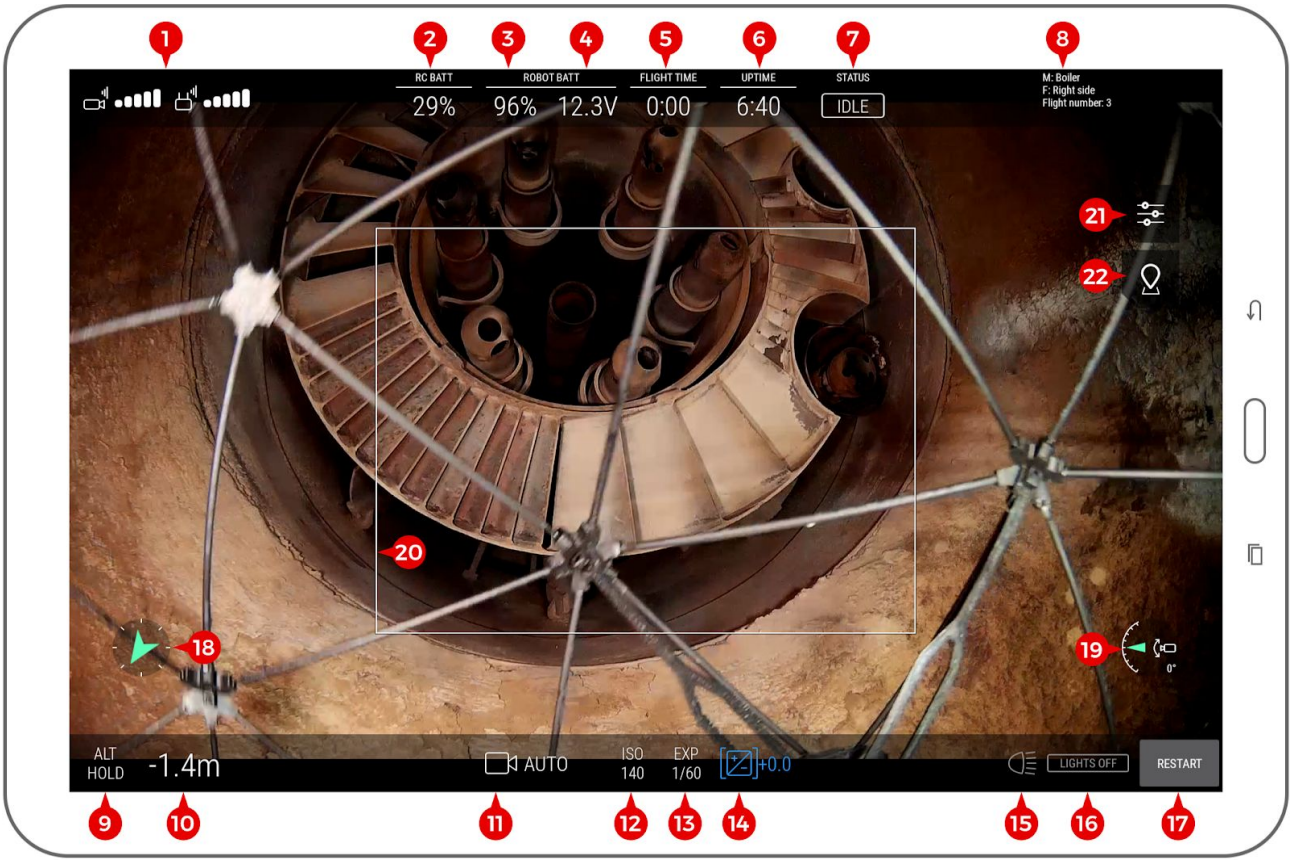
For more information about each mentioned point from the checklists, please refer to the Elios instructions manual and safety documents.

Disabling checklists

For users who are well acquainted with the routine checks, it is possible to disable checklists from the settings. See Image panel to access the option.

Main instrument panel

The instrument panel is fully shown once the connection is established and the application has received data from the aircraft.



1. Signal strength (left: video reception quality / right: command transmission quality)
2. Remote controller battery charge
3. Aircraft battery charge
4. Aircraft battery voltage
5. Flight time
6. Uptime (time elapsed since battery is plugged in)
7. Flight status
8. Mission and flight information
9. Altitude hold / manual thrust indicator
10. Altimeter (tap to reset altitude zero level)
11. Camera mode (auto, manual high or low ISO, thermal)
12. Camera ISO
13. Camera exposure time
14. Camera exposure value (only available in auto mode)
15. LED lights status
16. LED lights power indicator
17. Restart button
18. Heading (tap to reset the heading and use the current aircraft heading as the new reference)
19. Camera pitch (up or down inclination angle indicator)
20. Thermal camera field-of-vision frame
21. Settings button (opens settings)
22. Flight location naming button (opens flight location naming window)

Signal strength

Signal quality reading includes:

Video reception quality

Command transmission quality

When signal quality becomes low, a warning appears to inform you. Make sure to fly closer to the remote control to regain some signal quality and reduce the risk of losing communication. Or for your next flight use a range extender to increase the obtainable range.

For detailed data about the signal quality, refer to the radio settings panel.

Battery status

When the aircraft is not able to estimate its own percentage of battery charge left, question marks "???" are shown instead. In such situation, keep attention to the readings nearby to estimate remaining flight time. You should rely on voltage reading to know when it is time to finish the current flight; please refer to Elios instructions for information about the appropriate voltage levels to watch for. Aircraft running up-to-date Avionics firmware still notifies you when battery is critically low in this case.

Battery charge indicator changes colors to warn when charges becomes too low.

White	Battery charge is good
Yellow	Battery charge is low. If in flight, consider finishing the current flight.
Red	Battery charge is critically low. Land immediately to avoid damaging the battery.

The voltage level can raise warnings as well, independently from the battery charge level.
If the voltage indicator is red, you should land immediately.

Camera and video recording

Camera mode indicator (11) is related to the current mode set by the pilot using the camera mode switch marked (C2-C1-A) on the remote controller.

Auto mode
Manual low / high ISO
Thermal camera

Both Cockpit and aircraft begin recording the video stream as soon as the arming sequence is performed. When recording is active, an indicator on-screen shows a timer in red and a recording symbol. The time shown corresponds to the aircraft video recorder; the Android device is also recording a backup video for immediate review and backup purposes. You can view the backup videos in Flyability/Cockpit/Recordings; this process is detailed in Checking video recordings.

Please note: The best video quality is always found on the on-board video SD-card.. Due to the nature of the transmission link, video received by the Android device has a higher compression rate, which adversely impacts the video quality.

LED lights status

The car headlights symbol turns green when the LED lights are on. The gauge next to it shows the lighting power setting.

Note that you cannot set the LEDs to full power until the aircraft takes off. This is due to the heat generated by the LEDs that are cooled down by the propellers' airflow while flying.

Altimeter

Zero-level of altimeter is the altitude at which the aircraft is present when the battery is plugged in. It is possible to set a new zero reference by tapping the altimeter.

Altitude units (meters or feet) can be changed in the settings (see Image settings section)

The altitude mode indicator shows if the altitude hold mode is enabled. If the control mode of the aircraft is set to manual thrust, the automatic altitude stabilization is disabled; the pilot must manually control the thrust. Thus, in manual thrust mode, holding a constant altitude is more difficult.

Heading

Keep in mind that by default there is no sensing of the North and the heading is thus relative to the aircraft startup heading, unless absolute heading is enabled.

At any moment, it is possible to set the current aircraft heading as the new reference heading. Tap the compass to make the arrow point upwards for the current aircraft heading. Both heading and altitude information are stored in the logs and can be used in our Inspector software to help orientate and create situational awareness..

An absolute heading option is available, taking advantage of the on-board magnetometer. Refer to flight settings for more information. When the aircraft is armed and this option is active, the compass aligns with the magnetic North.

WARNING

Heading drifts over time depending on aircraft and environmental conditions. It is a navigation aid, not an accurate measurement tool. The absolute heading option in the flight settings may improve the accuracy in some conditions.

WARNING

Absolute heading can be disturbed by metallic structures.

Settings button

The Settings button opens the Settings screen.

Flight location naming button

The Flight location naming button opens the flight location naming dialog. Use it to reference your flight for later review using Flyability Inspector.

Restart button

The restart button performs a full restart of Cockpit.

WARNING

Restart while flying should be used as a last resort if video quality is too low or the application gets stuck. In case a flight is in progress, video recording by Cockpit will terminate then resume in a new file after restart. This does not affect the aircraft video recorder.

While Cockpit is required to arm Elios, restarting it does not affect the flying status of the aircraft.

Thermal camera target

The frame (20) shows the field of view of the thermal camera. Only the objects inside this frame will get their thermal images recorded. The frame can be changed and/or hidden in the settings menu; refer to Image settings section.

Settings wheel focus

On the entire screen, some values shown can be altered using the parameter wheel on the remote control. The currently focused value is shown in blue between brackets, when this is the case.

More details regarding the remote control usage can be found in the ground control system manual

The focused value depends on the camera mode choice and activation of the thermal camera feed. Lights intensity is controlled by keeping Fn button pressed.

Focused setting (example: EV correction value)

Unfocused setting

Thermal camera instrument panel

When the thermal camera view is active, the thermal camera target enlarges to the entire screen size so that the viewer keeps track of the reduced field of view.

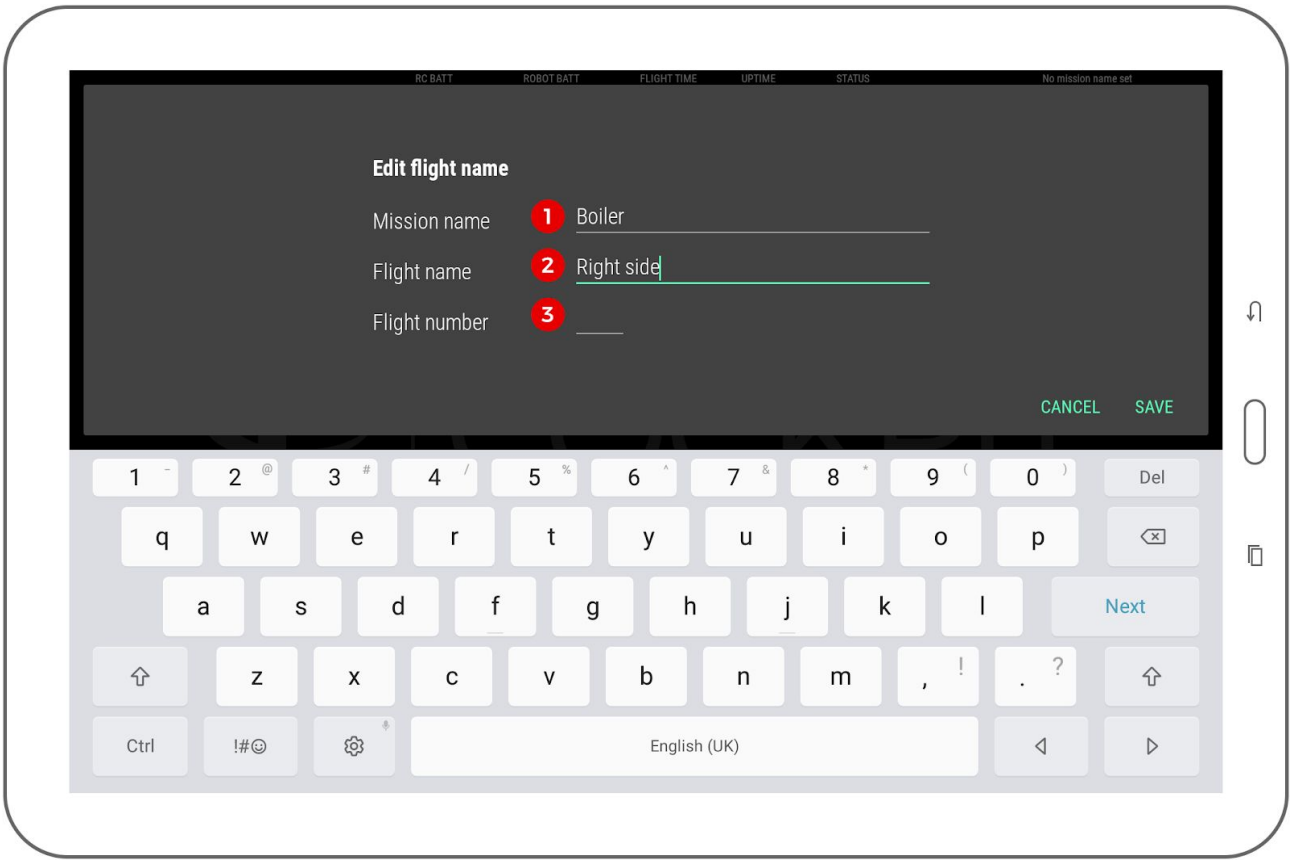
The only available image setting in this mode is the contrast of the thermal image.

Scroll the settings wheel to change the contrast between highest and lowest temperatures on the image.

Switching between thermal and optical image does not alter the video recordings on the aircraft, as both are always recorded on the LOG and CAM SD cards respectively for later review. The same principle is valid for the thermal contrast setting.

Flight location naming window

The flight location naming window records the mission name, flight name and flight number of the current or upcoming flight.



1. Mission name input
2. Flight name input
3. Flight number input

Mission name and flight name can be 40 characters long at most.
Flight number must be between 1 and 255; this flight number is automatically incremented for the next flight upon disarming once it is filled out. If the field is left blank it will not be automatically incremented.

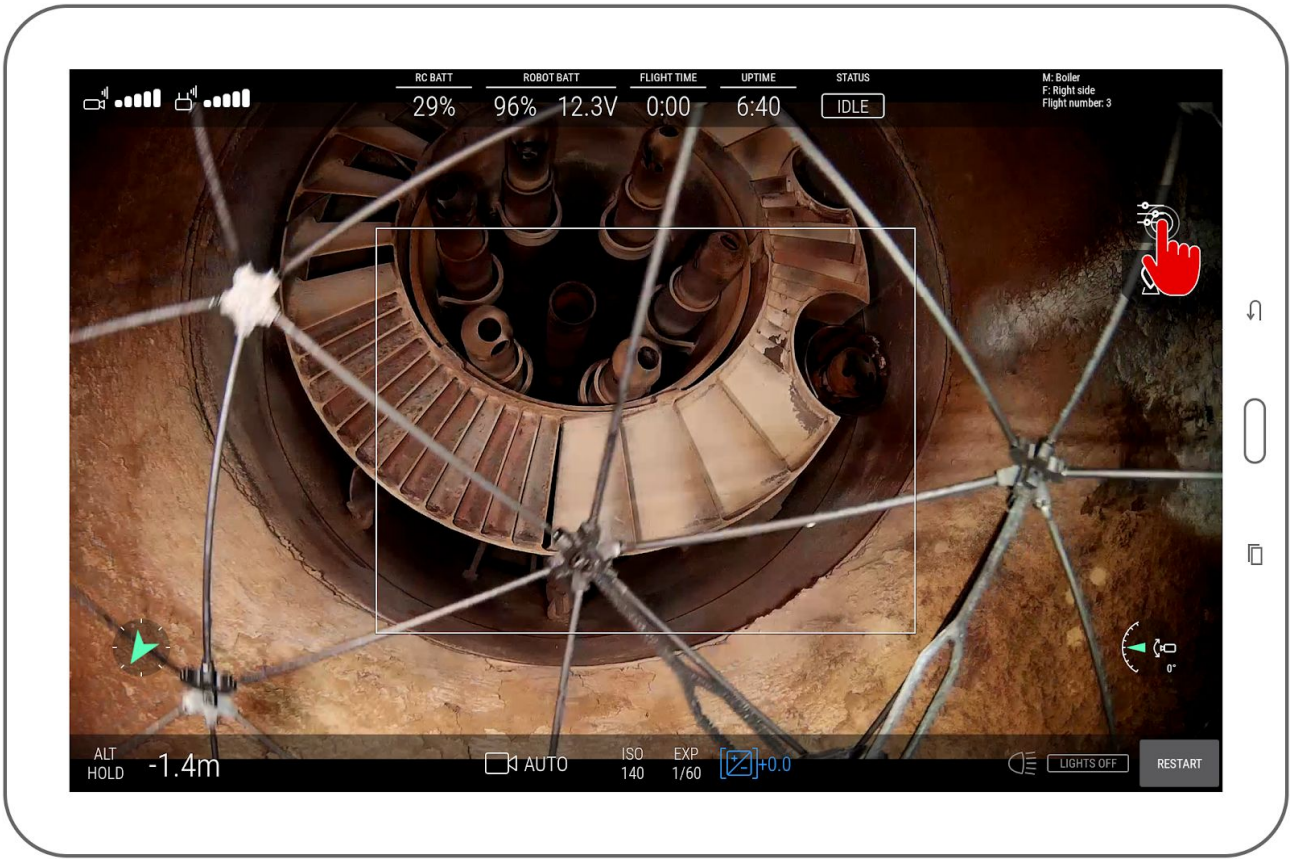
It is possible to change flight location naming multiple times over the course of the flight; data that is considered as definitive naming for the flight is the one being active at the moment of disarming.

Each field is optional. Simply let the field blank to unset the value for the next flight.

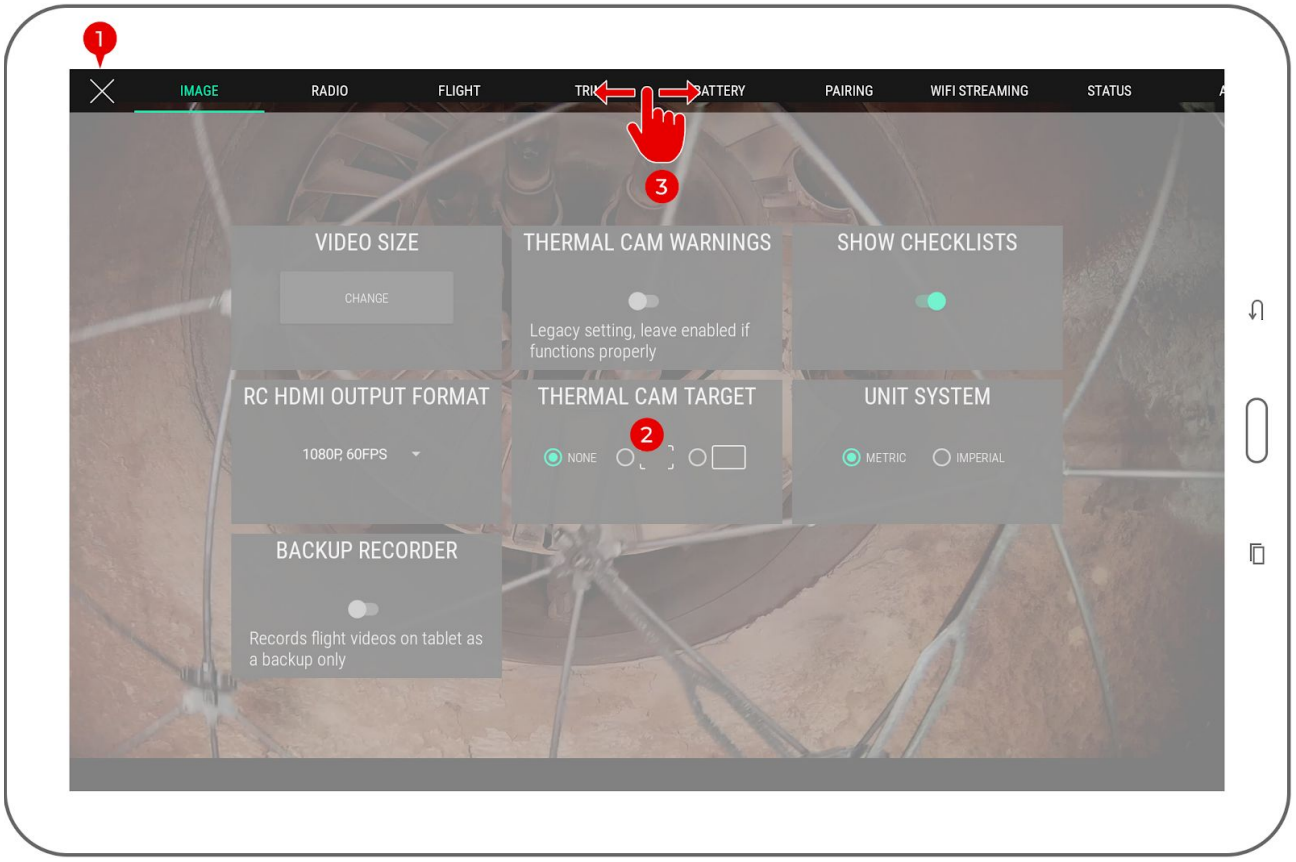
For post-mission analysis, all information entered in this dialog box can be retrieved later on a computer using Flyability Inspector 1.4 and above.

Settings

The settings screen consolidates all changeable options in Cockpit and various parameters.



Press the Settings button on the main screen to open the settings screen.



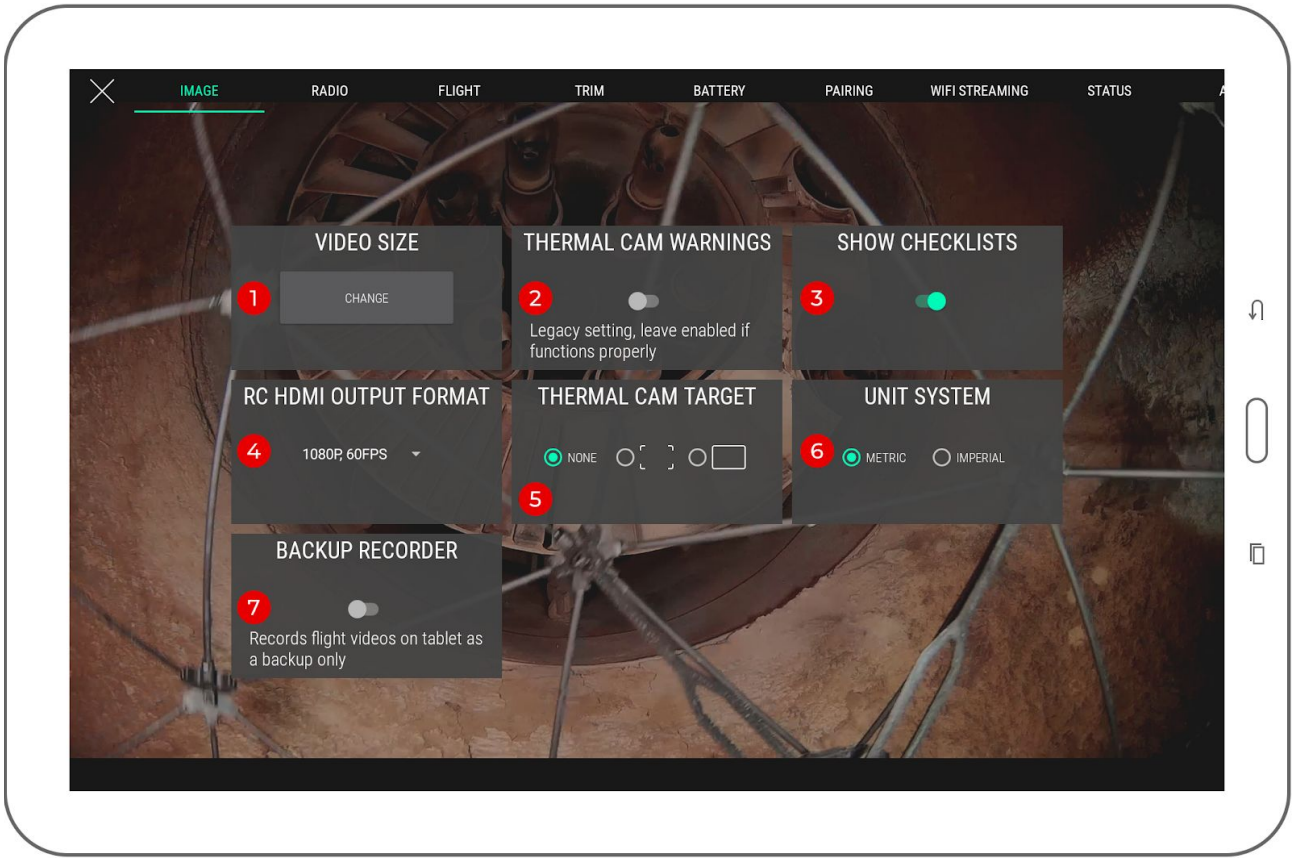
To close the setting screen and go back to the main screen, press the back button on the tablet or the on-screen close button (1) in the top left corner.

The settings screen shows multiple panels with settable parameters which are detailed inside this section. Panels contents appear in the middle (2).

Tabs at the top give access to each panel. You can click on the tabs to view the corresponding panels, or do a horizontal finger swipe gesture to go from one to another.

More tabs are actually available than shown on screen. A horizontal swipe gesture on the tab strip (3) scrolls its content to reveal the additional tabs.

Image panel



1. Video size toggle (changes between full screen or bigger margins to avoid overlapping telemetry display)
2. Thermal cam use switch (if off, warnings related to thermal camera are not shown)
3. Show checklists switch (completely disables checklists when shown)
4. Remote controller HDMI output format* (sets video signal attributes for external monitor plugged on the remote controller HDMI port).
5. Thermal camera field-of-vision delimiter shape, with option to hide it
6. Unit system for altimeter (metric = meters, imperial = feet)
7. Backup video recorder toggle (if on, application will automatically record streamed video when aircraft is armed). We highly recommend to let this on as recorded video is useful in case aircraft is lost.
   By default, video recording is enabled, except on specific tablet models on which this video recording feature is known to create instability.

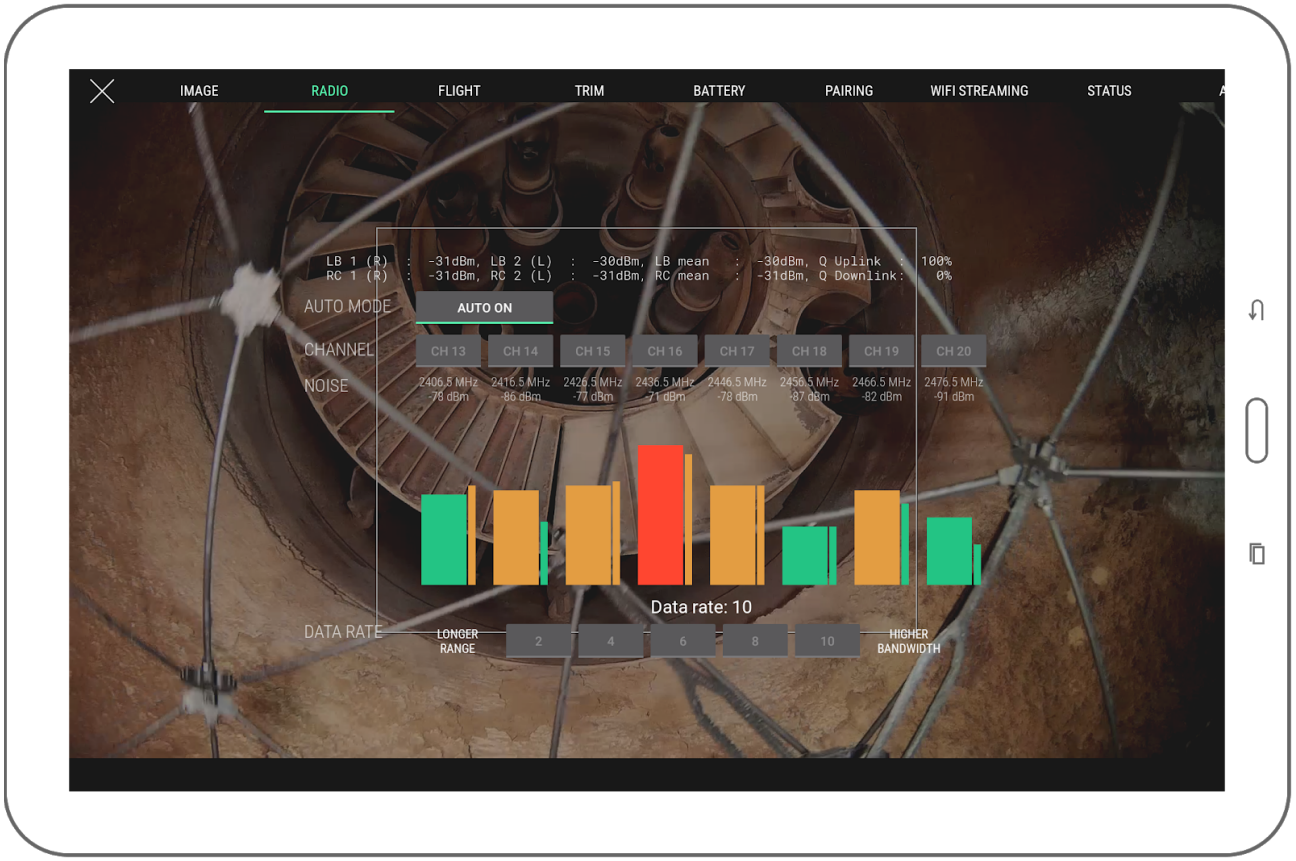
* Only the output signal from the remote controller is affected; the on-board camera of Elios delivers 30 frames per second even if the HDMI port video mode is set to a higher framerate.

HDMI output format note

The HDMI output format only affects video signal sent to the external screen. Changing it is mostly useful for compatibility purposes.

In all cases, video quality received by the remote controller is standard definition (SD); play video files from the on-board SD card to view high-resolution footage.

Radio panel



This panel displays detailed data about the radio link quality between the controller and aircraft.

Normal flight operation should not require changing settings shown here. However, if you are in an environment challenged by parasite radio signals, have other aircraft flying in the same area or have special constraints by plant radio equipment, you can select a specific channel.

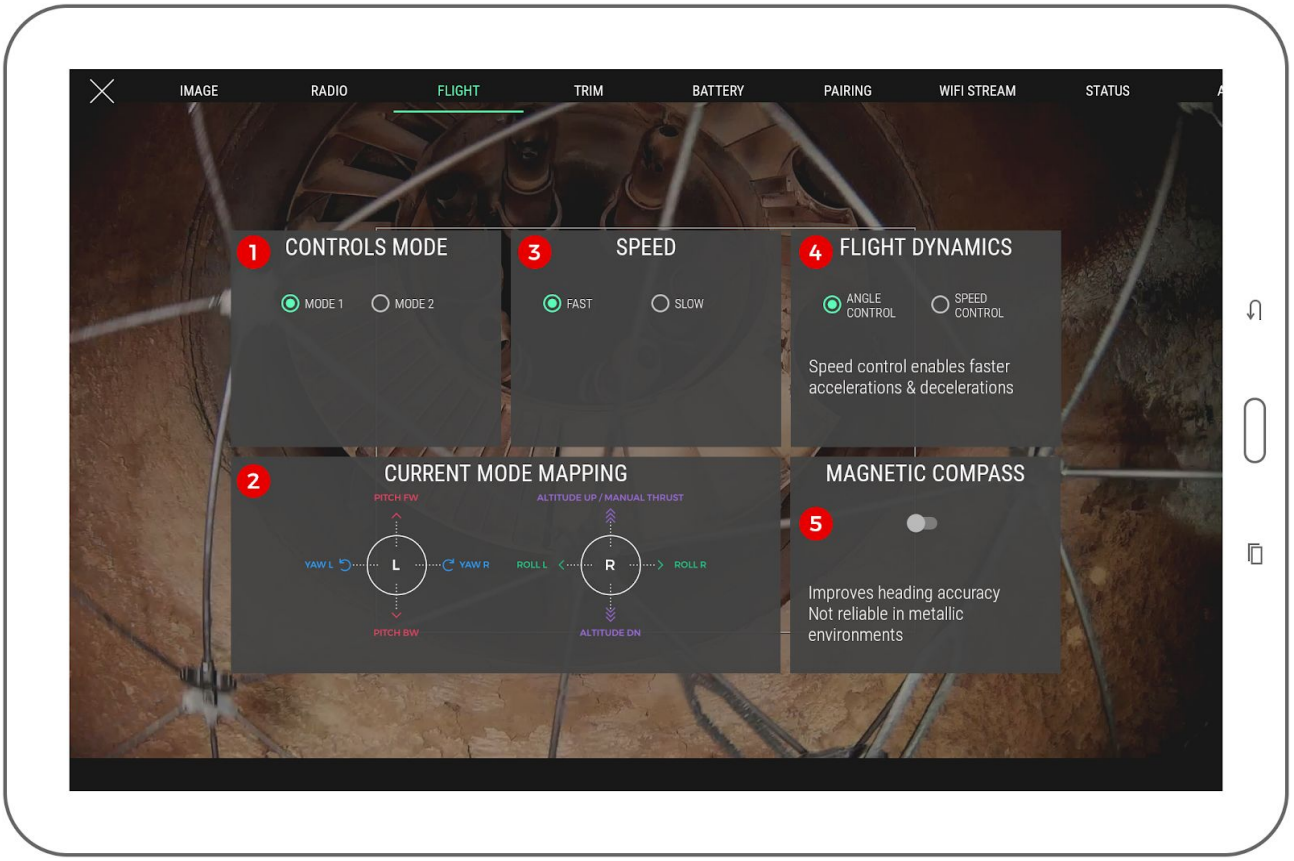
This screen shows the noise on each radio channel which the underlying system is able to use to stream the video feed. By default, the automatic mode is enabled, making an automatic jump to a different channel if the current one is deemed too busy for a quality link. You can force using a specific channel by tapping the corresponding button.

Noise readings are related to how busy each channel is. A higher reading probably means that other radio communications already operate on the same channel in the surroundings; the closer the radio operation happens, the bigger the noise. Below each channel, the large bar is an average reading and the small one is an instantaneous reading. Colors go from green to orange then red as noise level is higher.

When manually choosing a channel, select one which has the lowest noise reading for best signal quality. Once you select the channel, you may see the corresponding noise level raising; this is an expected behaviour as radio transmission starts on the selected channel.

By tapping the Auto button, you can resume the automatic mode for channel choice.

Flight panel



This panel shows options related to flight controls and modes.

1. Controls mode (mode 1 and mode 2 are different mappings between stick axes and aircraft flight control axes)
2. Current mapping of the selected controls mode
3. Maximum horizontal speed (not using the pro mode)
4. Flight dynamics choice (changes acceleration and deceleration behaviour of aircraft)
    a. Angle control (default behavior)
    b. Speed control (extra acceleration and braking assistance)
5. Magnetic compass (enables more accurate reading of heading by using magnetometer)

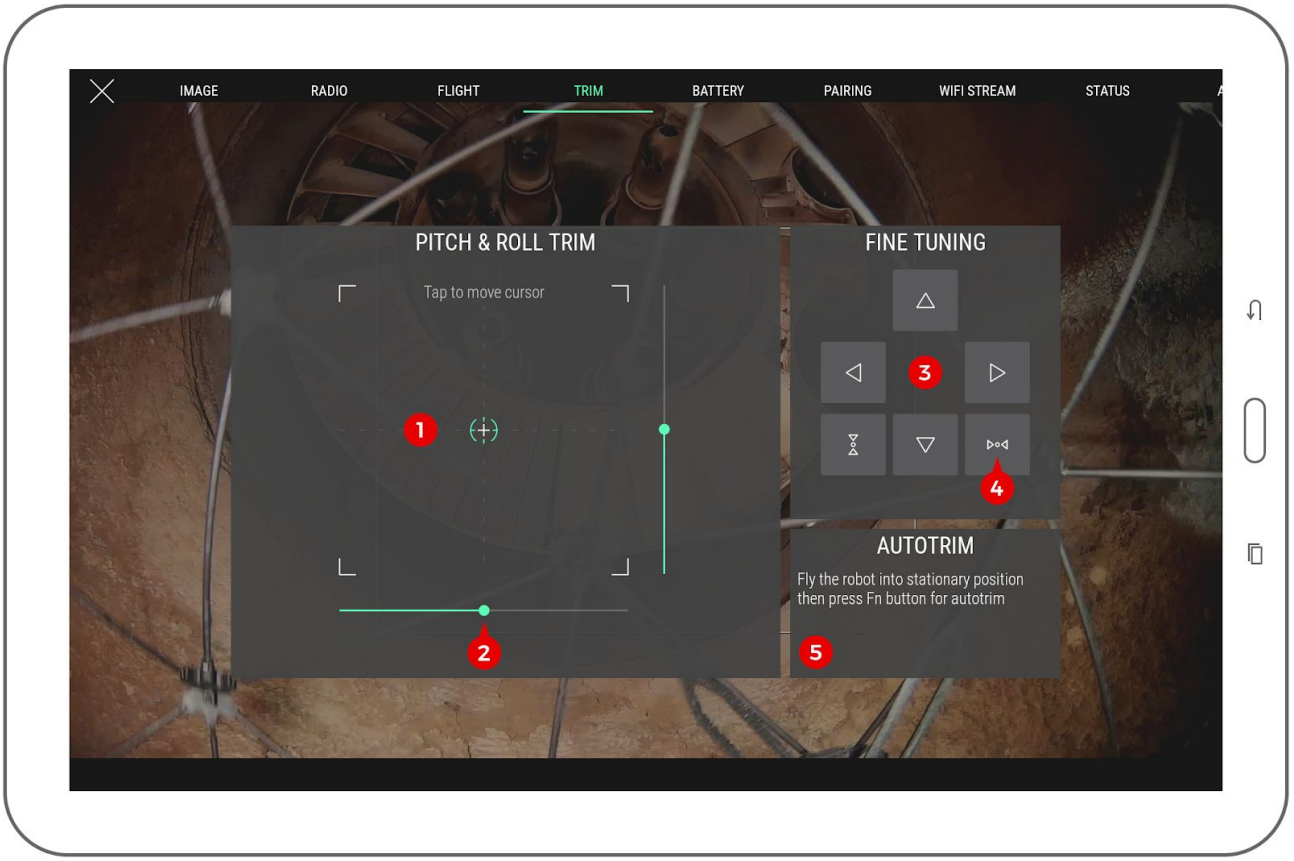
Magnetic compass considerations

Magnetic compass can be enabled for a more accurate reading of the heading using the magnetometer, but should not be used in a metallic environment. Consider extra drift of the reading over time if disabled or in a metallic environment, as a metallic structure disturbs the magnetometer.

WARNING

Magnetic compass cannot be enabled during a flight for calibration reasons. It is possible to disable it if airborne; afterwards, it cannot be enabled again until aircraft is disarmed.

Trim panel



This is the place where the user can trim a horizontally-drifting aircraft. Various controls are available to perform trimming.

1. Touch frame (tap to enable then drag finger to set pitch and roll trim at once)
2. Pitch / roll sliders (drag to trim each axis separately)
3. Fine tuning buttons (tap arrows for small trim increments)
4. Trim axis reset button (reset trim to zero on each axis)
5. Autotrim function status (see autotrim procedure for more detail)

Trimming is usually performed while aircraft is flying in a stable position in a wide open area to avoid turbulence.
To perform a good trim operation, please refer to the trimming procedure section.

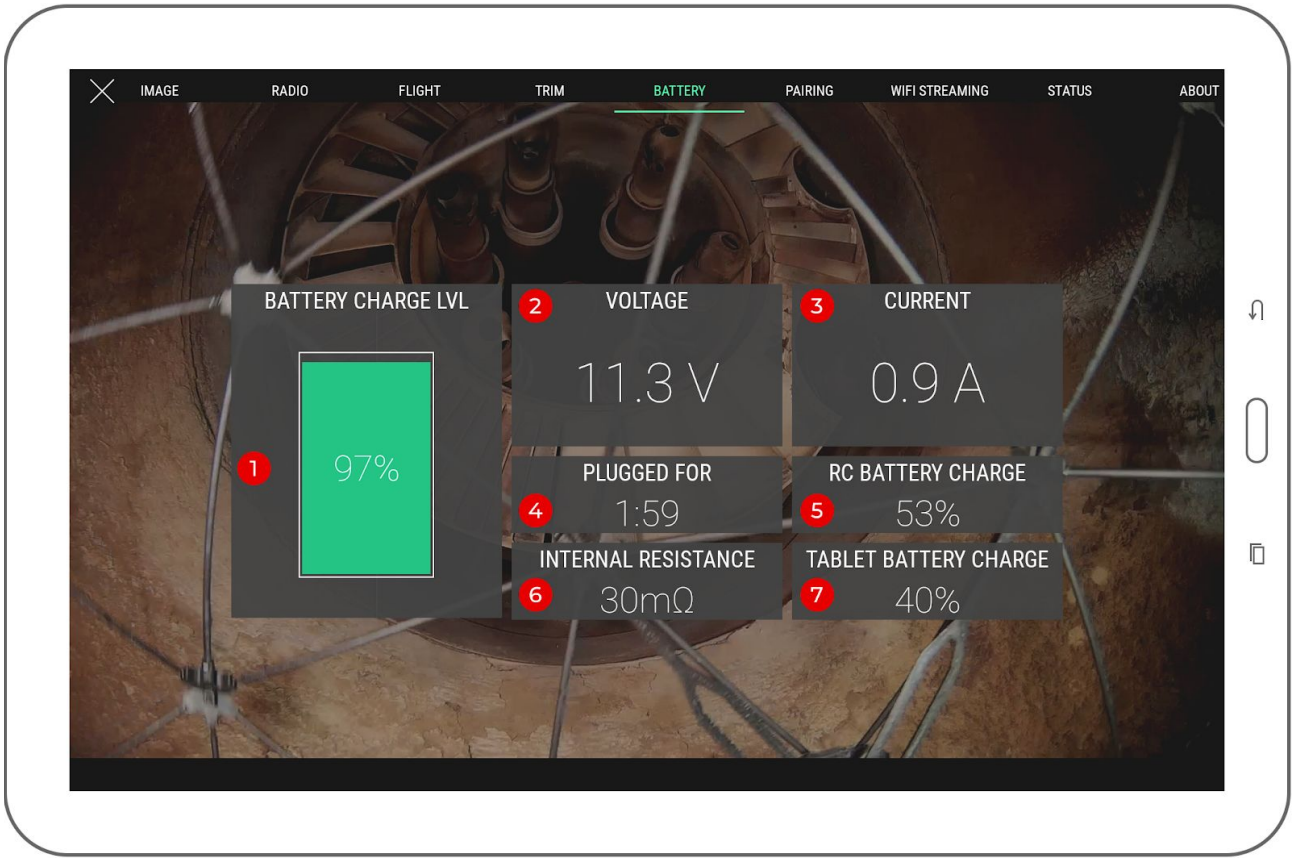
WARNING

If the trimming procedure of DJI GO was used in the past, please recalibrate the sticks using the Recalibrate function of DJI GO before using the trim feature in Cockpit.

WARNING

Trim range is voluntarily limited to a part of the full control range. This prevents cases such as accidentally pushing the trim value up to the maximum horizontal speed which makes the aircraft difficult to stop. This behaviour may differ if you have experience using the trim function of other radio-controlled vehicles or aircraft.

Battery panel

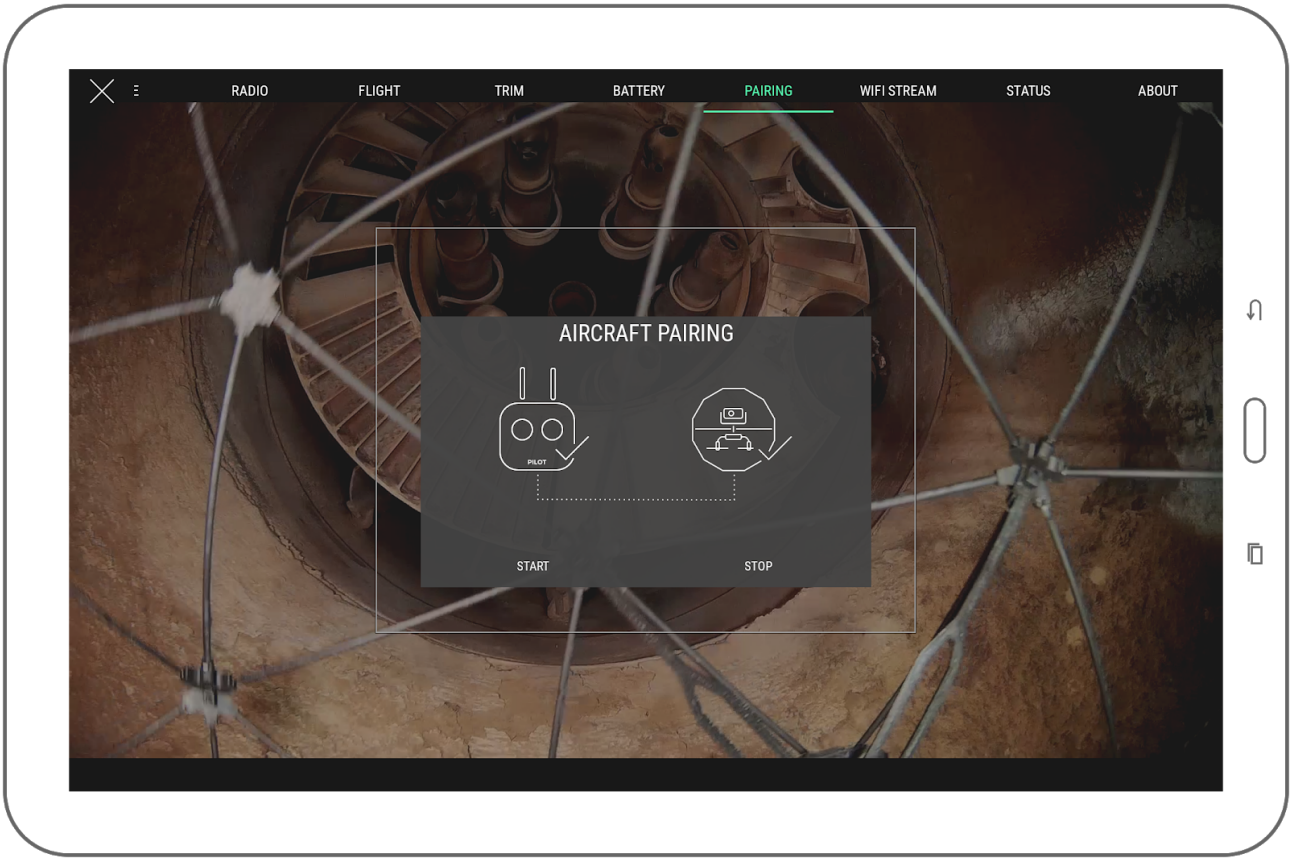


This panel shows data about the current battery status.

1. Aircraft battery charge
2. Aircraft battery voltage
3. Aircraft battery current
4. Time elapsed since aircraft battery was plugged in
5. Remote controller battery charge
6. Aircraft battery internal resistance (measured one time when battery is plugged. If greater than 50mOhm, the battery is considered broken and can not be used for flying.)
7. Tablet battery charge

Please refer to the Elios instructions for more detail about each of the above points.

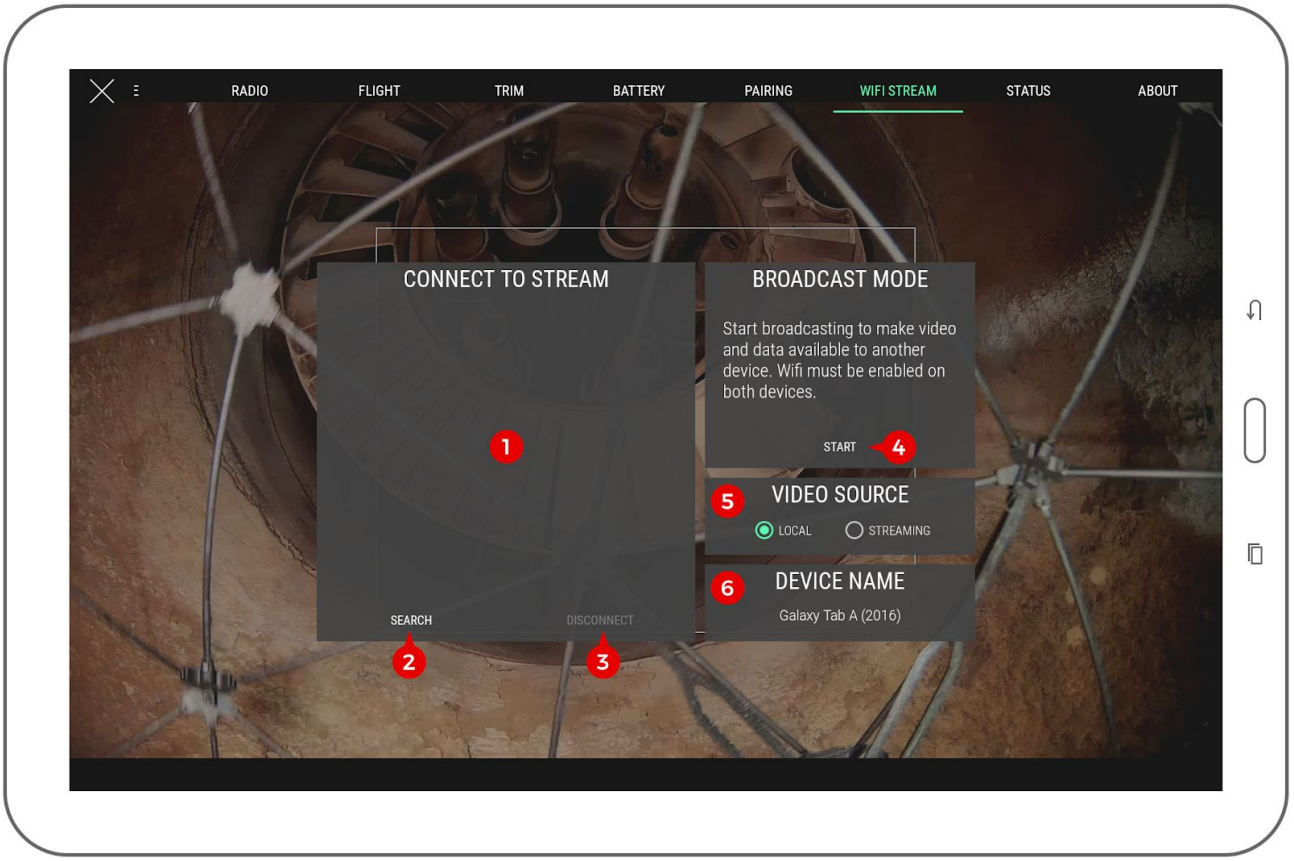
Pairing panel



This panel contains the commands to perform pairing operations between a controller and an aircraft.

To initiate a pairing sequence, press “start”. The ground unit starts beeping; push on the pairing button on aircraft. Pairing is complete when continuous beeping ends. Use the Stop button to manually interrupt the process.

Wifi streaming panel

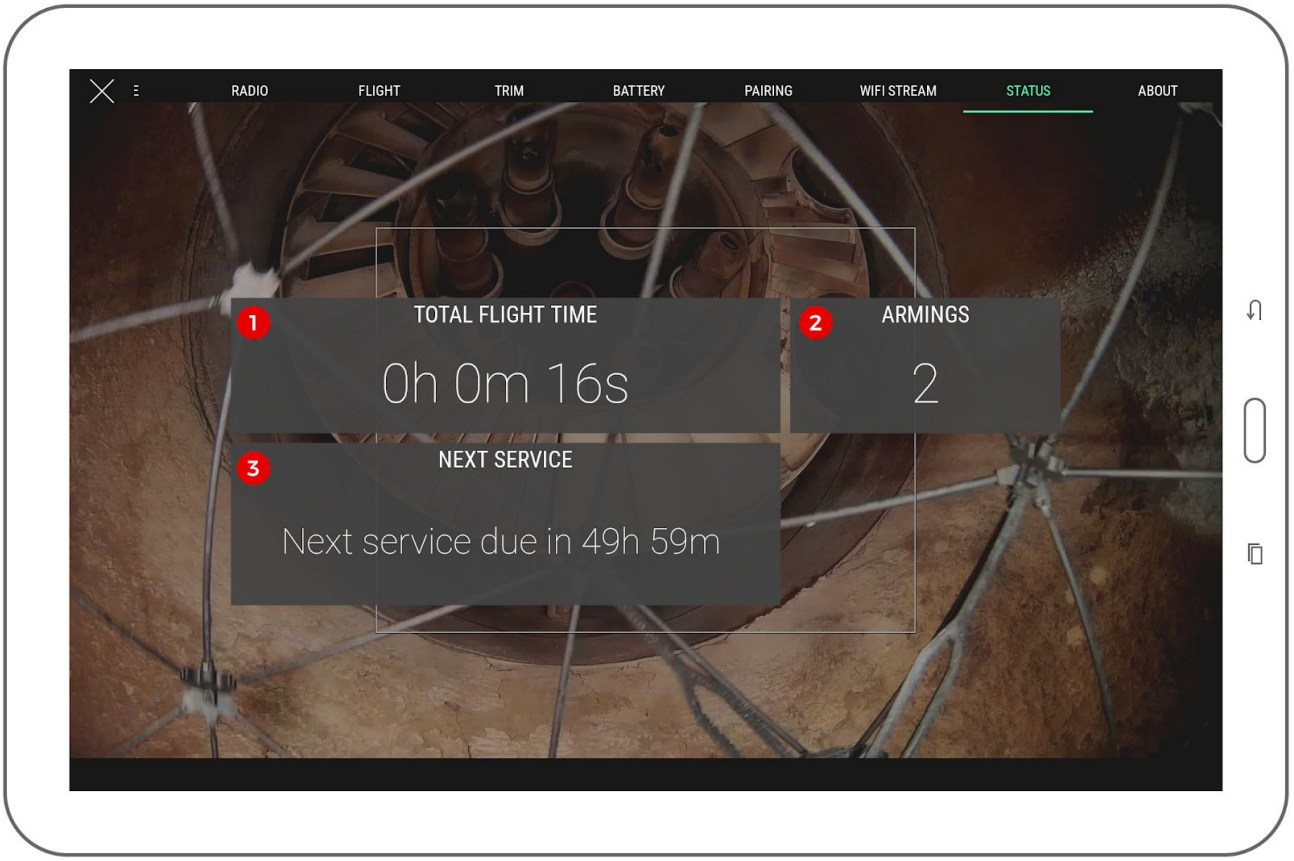


This panel controls everything related to data streaming between two devices through wifi. Wifi streaming allows using a secondary device as a simple viewer without needing to connect it to an actual remote controller; thus, two people can monitor a flight while using a single remote controller. Wifi streaming requires all devices to support Wi-Fi Direct.

Detailed processes on how to work with wifi streaming are explained in common procedures. See the wifi streaming procedures.

1. List of detected Wi-Fi direct devices (used to connect to a streaming device when in receiving role)
2. Streaming devices search button (starts a new search of devices around)
3. Disconnect button (disconnects active connection, available when a connection is established)
4. Broadcast start/stop button (starts streaming from the current device and makes it visible from other devices)
5. Video source selection for easy switching
    a. Local : locally-connected RC and aircraft through USB cable (default)
    b. Streaming : video streamed over wi-fi from another device
6. Name of this Android device as advertised in wi-fi system options; refer to this name when searching the current device from another device in receiving role.

Status panel



This panel shows the status counters of the aircraft, including total flight time, information about the next planned maintenance and number of armings.

1. Total flight time counter
2. Total armings counter
3. Flight time left before next required aircraft maintenance

Service deadlines

Elios aircraft is due for service every 50 hours.

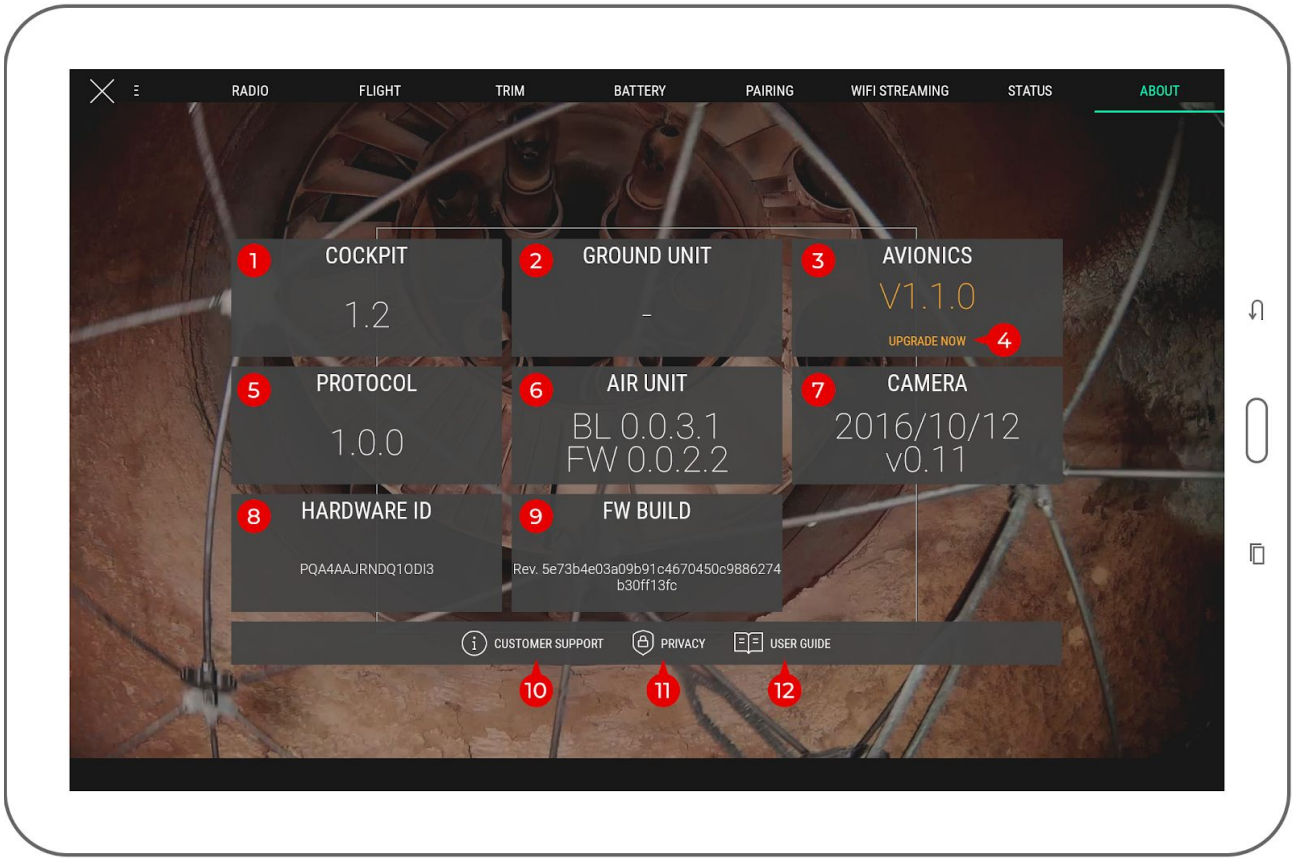
Warnings appear when service deadline approaches, with less than 5 flight hours left.

Flight time restriction

If the connected aircraft has a flight time restriction, an additional block is visible describing flight time left under this restriction. The flight time shown is not related to battery charge at all. To increase flight time, press the Add time button on the same block then enter the code given by your account manager. For the detailed process, refer to the time unlocking process.

The block is not shown when the aircraft has no active restriction on flight time.

About panel

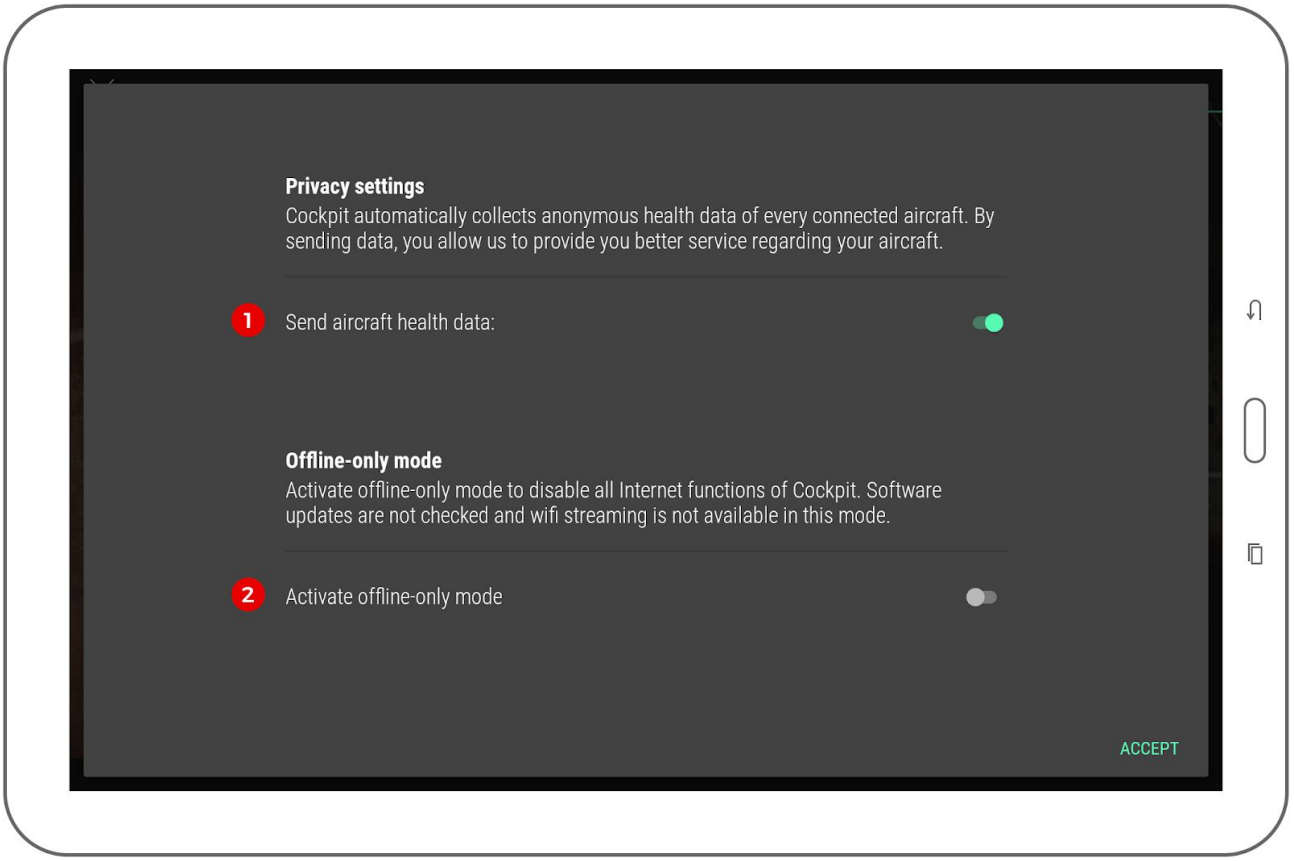


The different version numbers and identifiers of the Elios system are mentioned on this page.

In any incident report, please make sure to include the data shown here; this information helps Flyability to troubleshoot the issue you are experiencing and expedites incident response time.

1. Cockpit version
2. Ground unit (remote controller firmware) version
3. Avionics version of connected aircraft
4. Avionics upgrade button (visible if connected aircraft requires a firmware upgrade, open the firmware upgrade tool)
5. Protocol version of connected aircraft
6. Air unit version of connected aircraft
7. Camera firmware version of connected aircraft
8. Hardware identifier of connected aircraft
9. Build revision of connected aircraft
10. Customer support information button (shows support contact information)
11. Privacy settings button (opens the privacy settings window)
12. User guide button (shows this user guide)

Privacy settings



Accessed from the About panel, privacy settings screen contains settings related to privacy and data security.

1. Send aircraft health data (enables Flyability to receive periodic updates about aircraft flight time and prepare better maintenance procedures)
2. Activate offline-only mode (disables all Internet-related features of Cockpit)

Offline-only mode

Operators in sensitive sites may have to disable all Internet access from their devices to comply with company policies.

Offline-only mode disables all Internet functions of Cockpit, including:

- Software updates check
- Sending aircraft health data to Flyability

You will need to actively check for software updates on your own to get them as they are available.

Common procedures

This chapter describes processes used in typical usage cases

Aircraft firmware upgrade

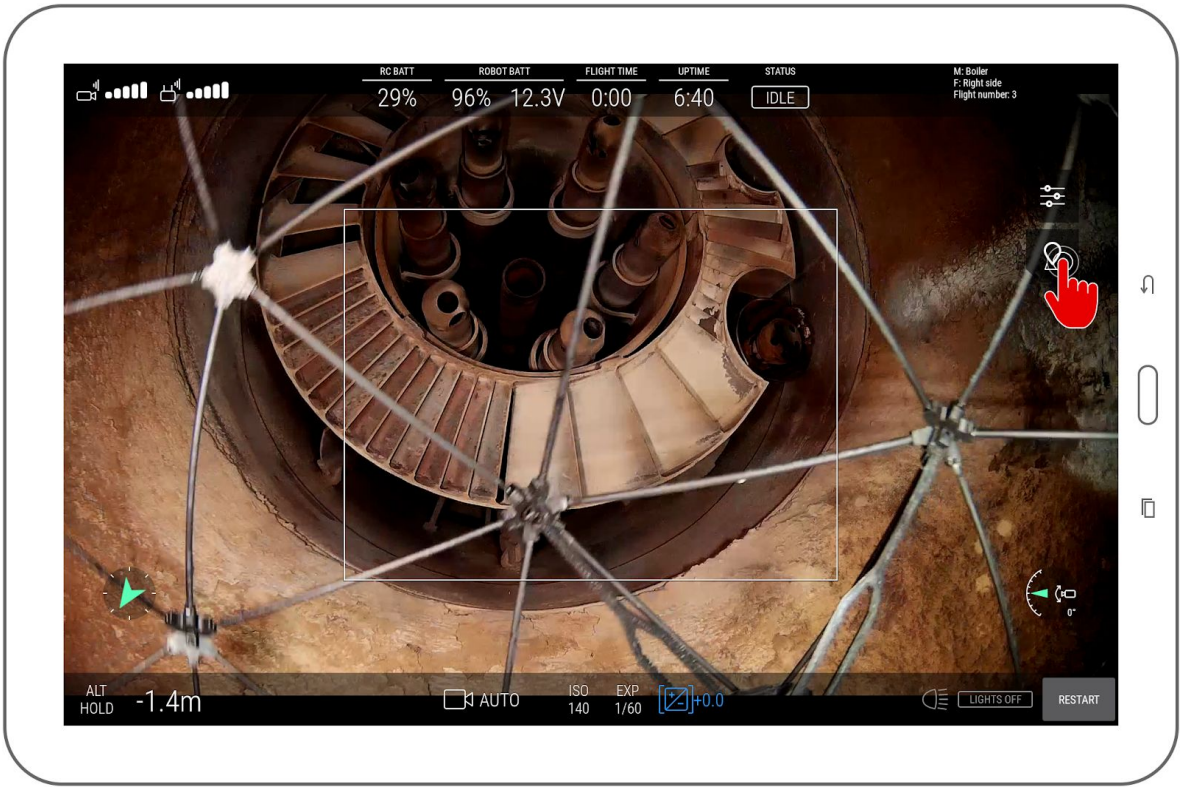
Refer to the Overview and setup chapter, in the Firmware upgrade section.

Saving name of flight location

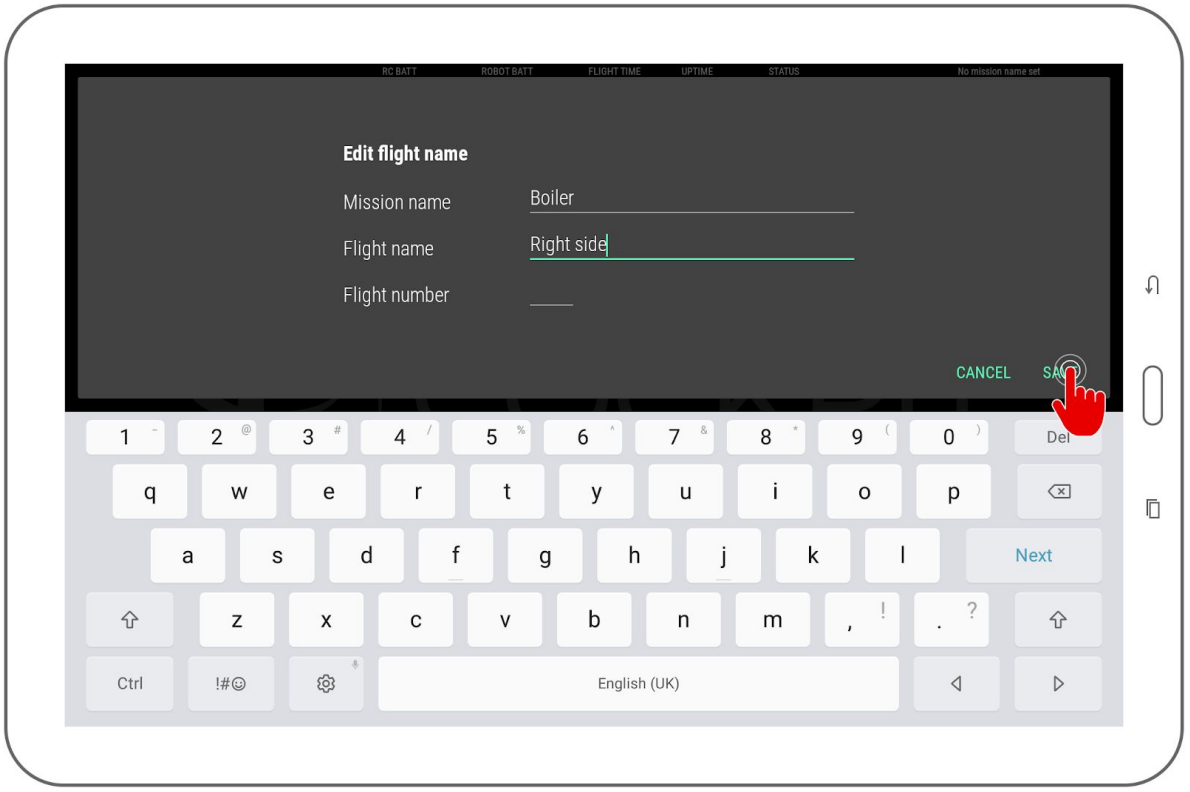
To easily recall context of past flights, it is possible to associate mission & flight names to any flight.

Supposed your equipment is ready and you are set for beginning a mission:

1. From the main screen of Cockpit, tap the Flight location naming button.



2. In the flight location naming window, enter the mission name, the upcoming flight name and a flight number. All fields are optional. Press Save to close window & send names to aircraft recorder.



3. Perform the flight as usual.
4. When flight is over, right after disarming, if a flight number was entered beforehand, it is incremented automatically. You can check current flight number and naming anytime on the top right corner of the main screen.

Calibrating / trimming aircraft

Trimming the aircraft is a mechanism to compensate for a horizontal drift while no controls are touched.

For a successful trimming, you need to be able to fly in a wide open space with no obstacles or people in the area for safety reasons. Turbulence can occur if the area is too narrow.

WARNING

If the trimming procedure of DJI GO was used in the past, please recalibrate the sticks before using the trim feature in Cockpit.

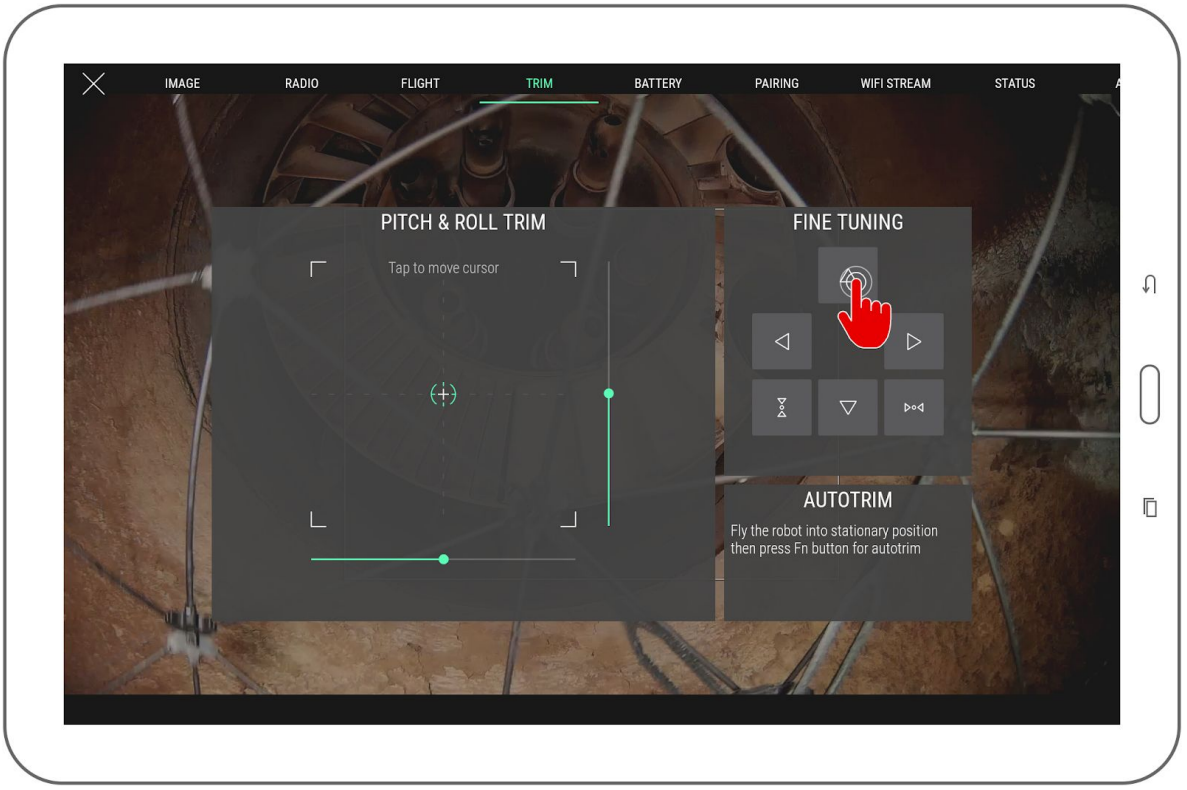
WARNING

Trim range is voluntarily limited to a part of the full control range. This prevents cases such as accidentally pushing the trim value up to the maximum horizontal speed which makes the aircraft difficult to stop.

Manual trimming

1. Have the aircraft flying in a safe place, if possible open enough to avoid airflows from the propellers blow back on the aircraft.
2. Open trim panel in settings.

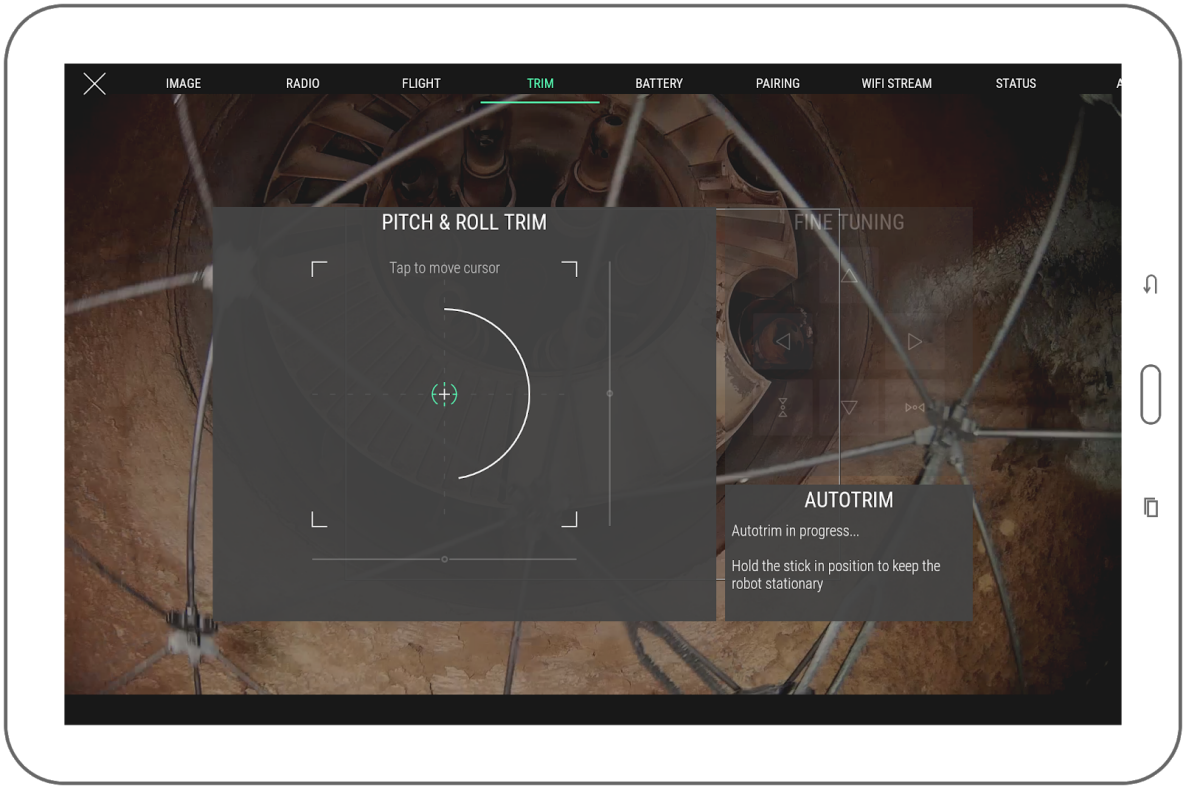
3. For accurate trimming, tap the arrows on the upper right pad. You can alternately use the trackpad to set a trim position.



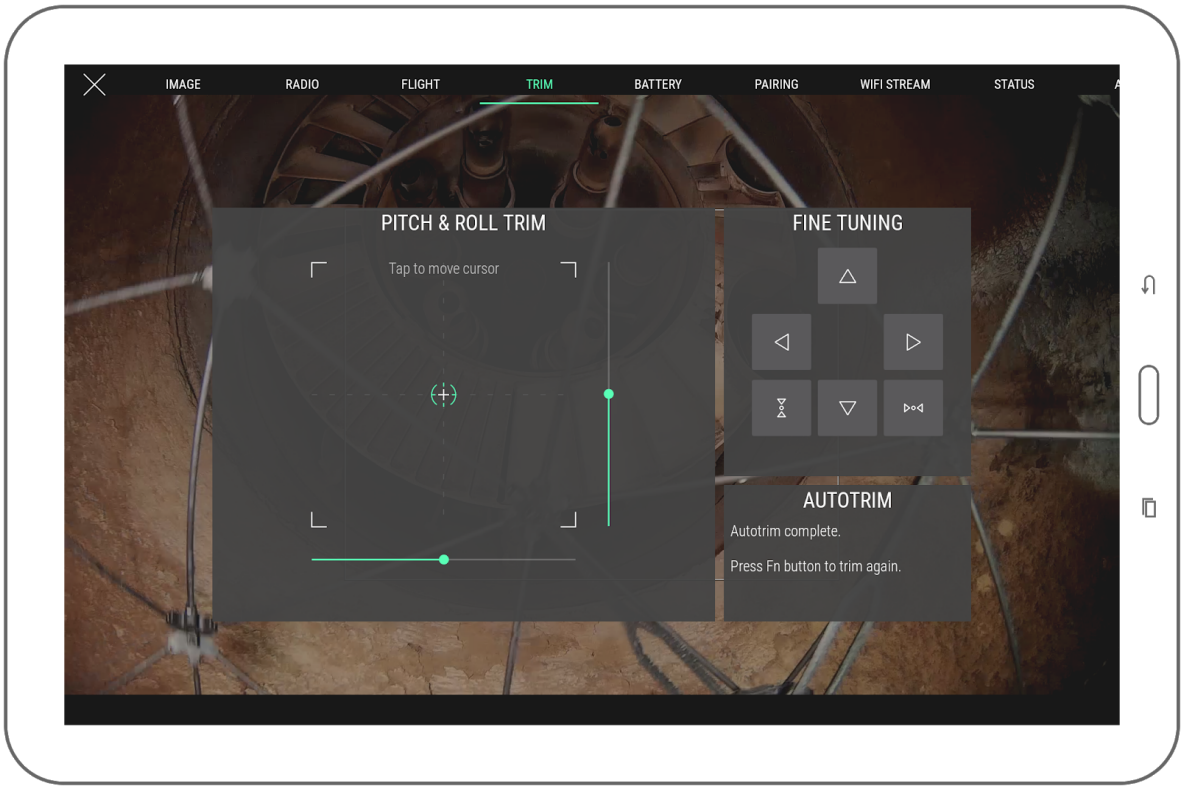
Using autotrim function

1. Have the aircraft flying in a safe place, if possible open enough to avoid airflows from the propellers blow back on the aircraft.
2. Open trim panel in settings.
3. Using the pitch & roll stick, find the position in which the aircraft is stationary. The small cross indicates the current stick position relative to the current trim. Don't use aggressive stick motions, but instead try to find a constant stick position combination that stabilizes the aircraft and prevents it from drifting horizontally.
4. Press the Fn button on the remote controller to begin recording.
5. While the recording progress bar fills up on screen, hold the stick into the position that makes the aircraft steady. During this moment, values from the stick are collected to compute an average that

will be the new trim position.



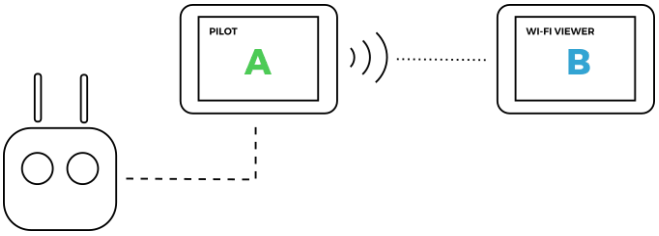
6. New position is then recorded, unless the stick has moved too much during the recording. The trim target takes the position of the small cross when recorded. Success is confirmed by the message shown in the Autotrim box on screen and a sound signal.



7. You can attempt autotrim as many times as you want in a row. Each autotrim take is relative to the previous trim setting; all that is needed is to fly the aircraft in the steady position and the application takes care of saving it.

Streaming video and telemetry to a second tablet

Wifi streaming allows using a secondary device as a simple viewer without needing to connect it to an actual remote controller; thus, two people can monitor a flight while using a single remote controller. Wifi streaming requires all devices to support Wi-Fi Direct.



In addition, during the use of a range extender and a camera operator remote controller, it is usually not possible to receive video signal from the camera operator RC due to the way transmission works as it needs to be in direct line of transmission with the aircraft; only the controls will be working in such scenario as these are relayed through the pilot RC. Therefore, wifi streaming is a handy way to catch live video while using a camera operator RC and the range extender at the same time.

In this section:

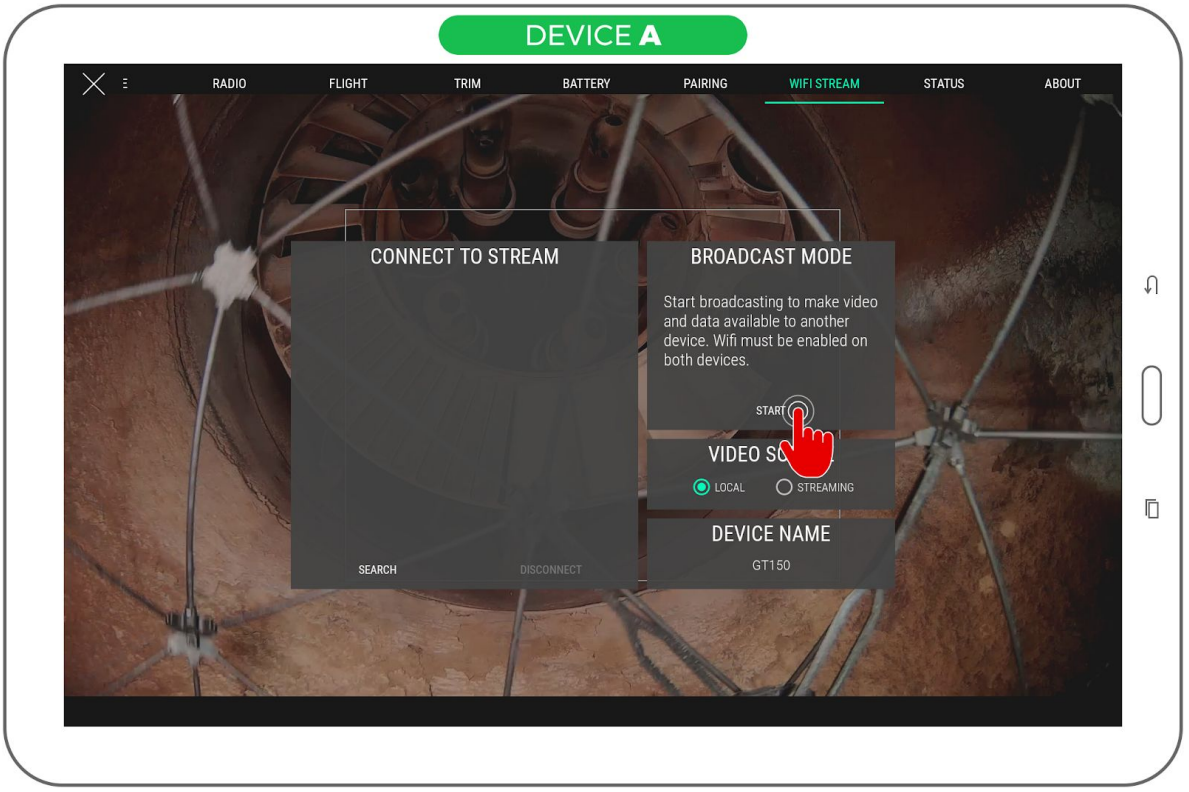
- The Android device running Cockpit emitting the video stream, attached to the main pilot controller, is named as “device A”
- The Android device running Cockpit that receives the video stream is named as “device B”

Starting a wifi streaming session

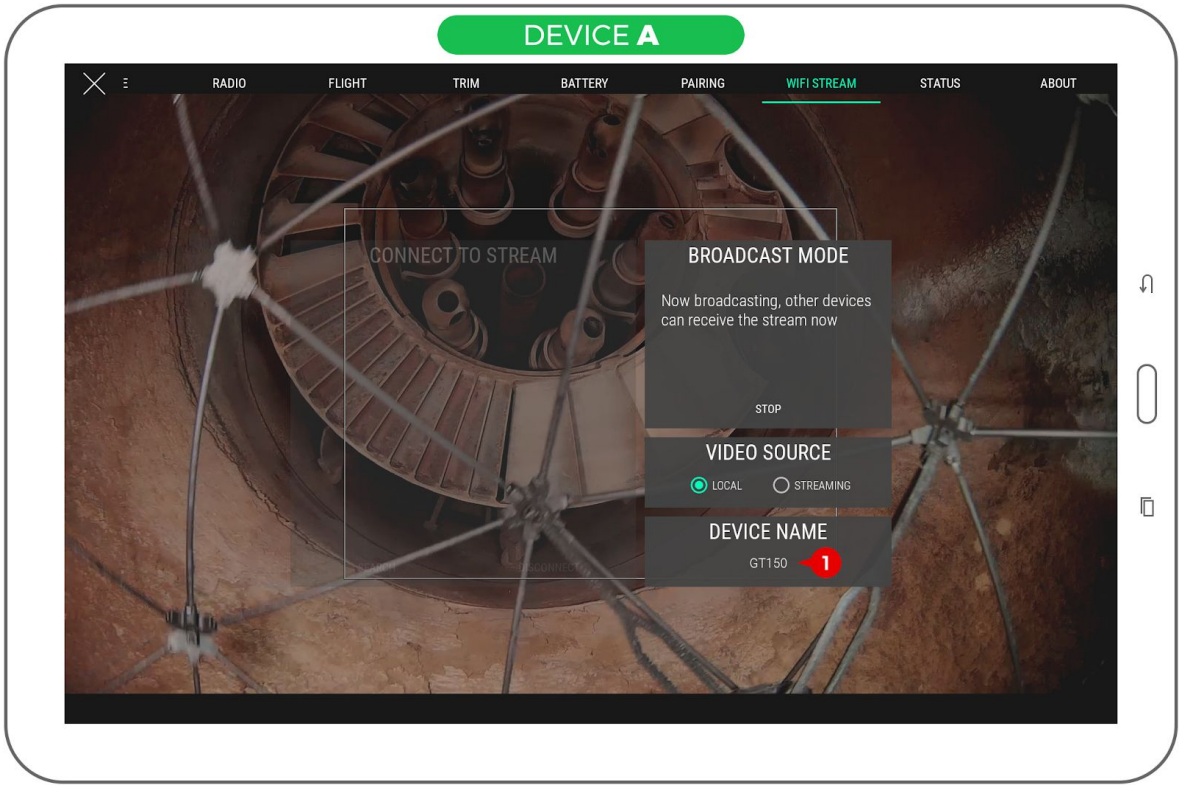
One remote controller and two devices running Cockpit are required. Device A is the one connected to the remote controller; device B is not connected to any controller and will receive the streaming video.

1. Connect device A to remote controller. Start Cockpit on both devices.
2. Open Settings and go to Wifi streaming panel on device A.

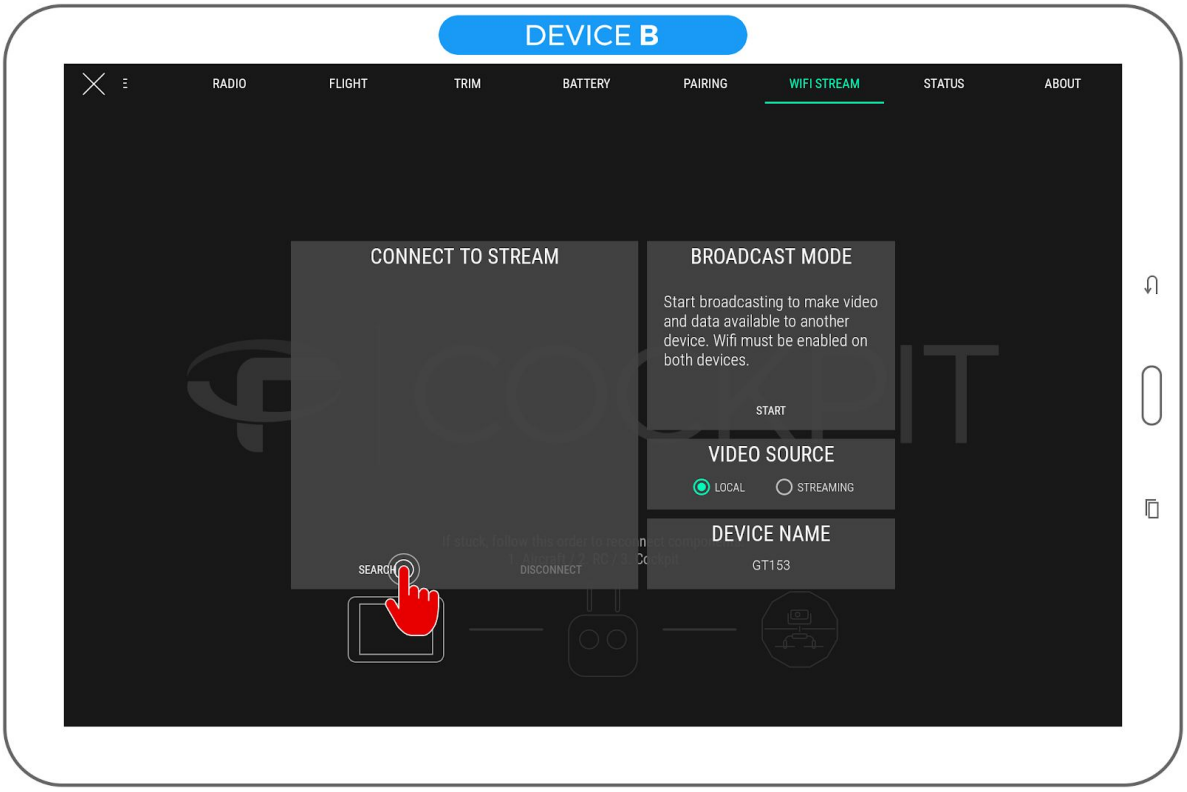
3. Press Start (broadcast mode) button on device A and make sure the video source is set to “local”.



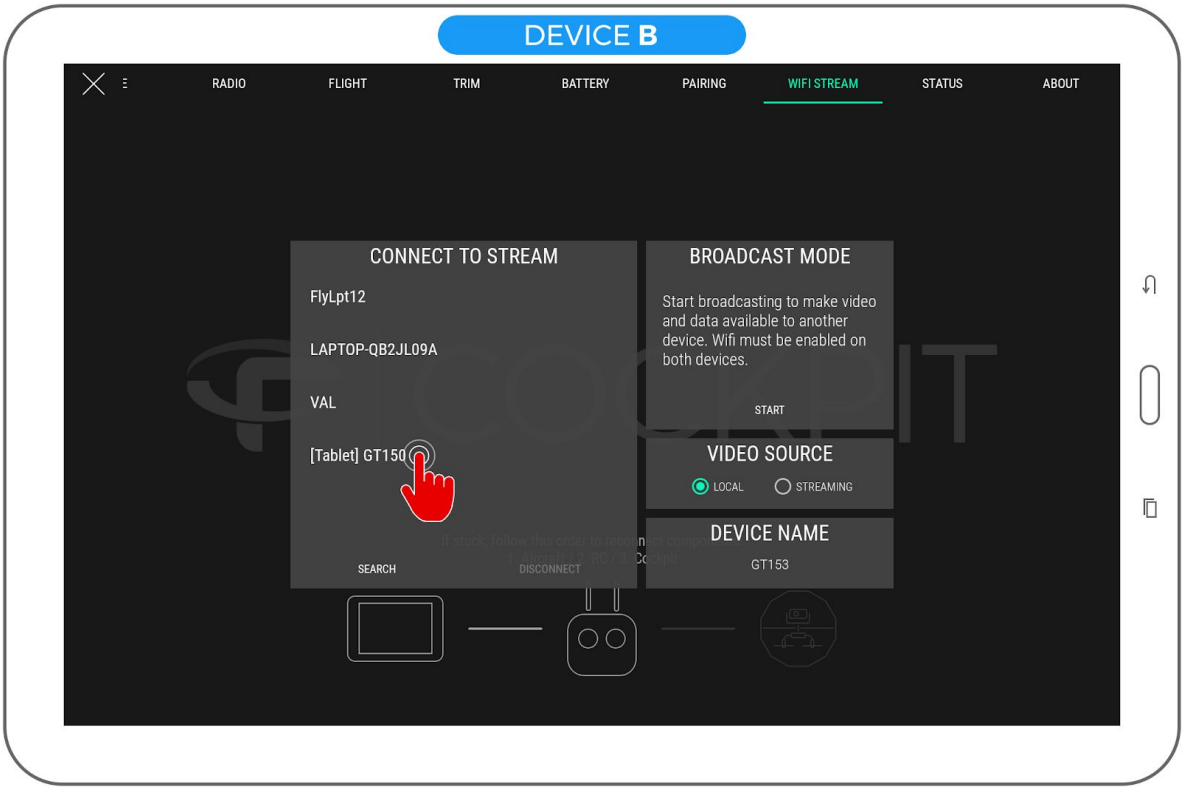
4. Broadcast mode block is now showing that broadcasting is active. Locate the device name (1), it will be the one we will select on the other side to initiate connection.



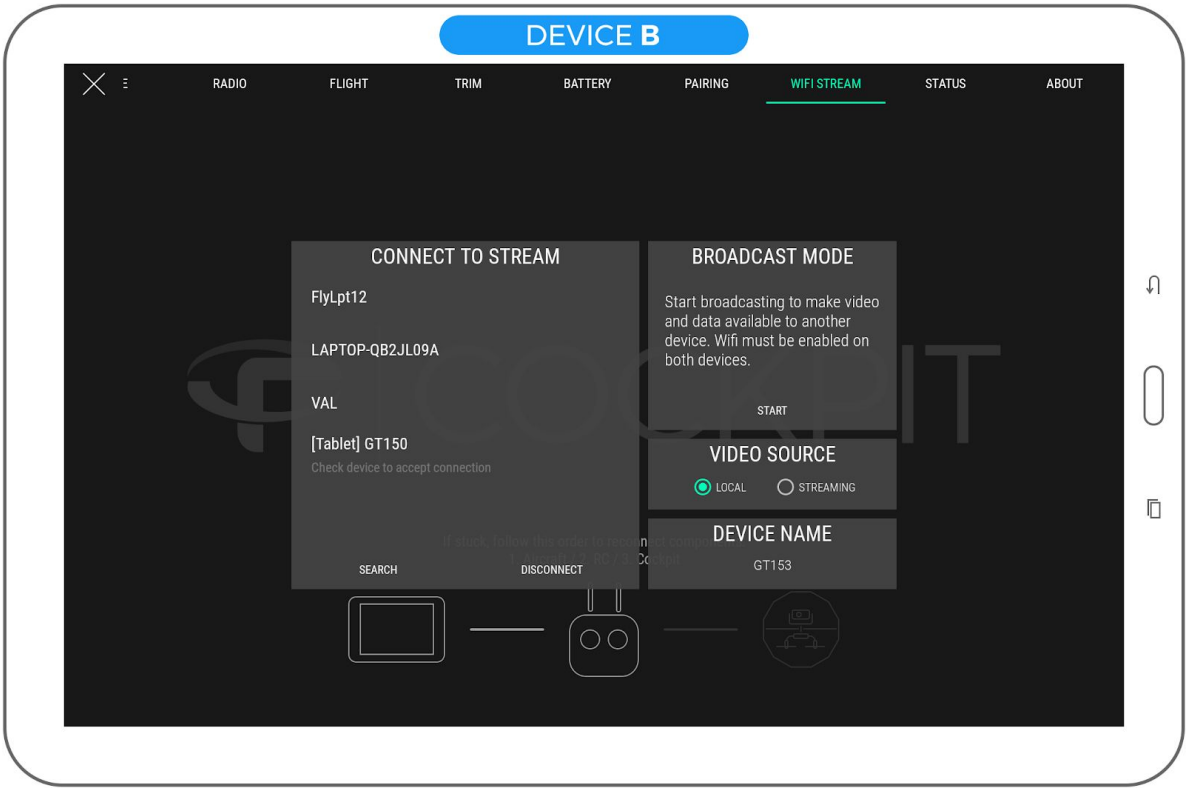
5. Press Search to begin searching for streaming sources on device B.



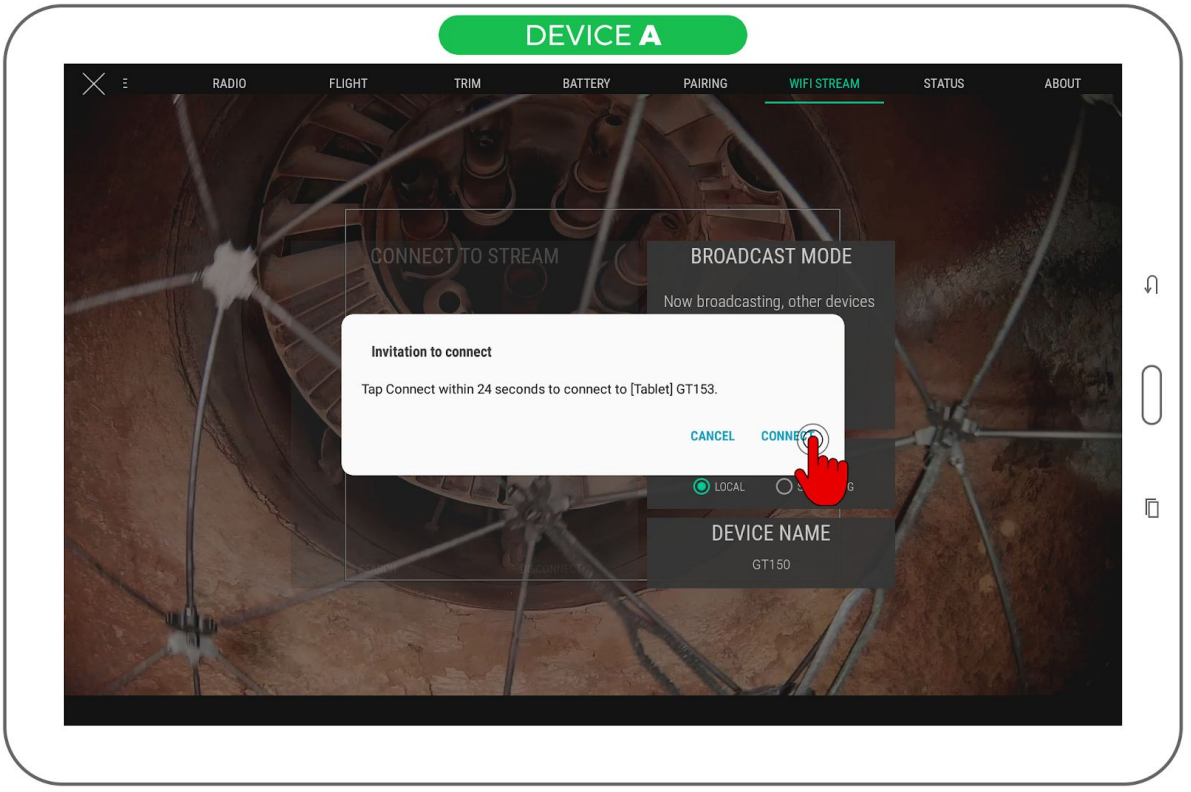
6. On device B, click the source named as previously seen on device A in the list.
Be careful, some incompatible Wi-Fi Direct peripherals such as printers may be listed here. Be sure to match by name.



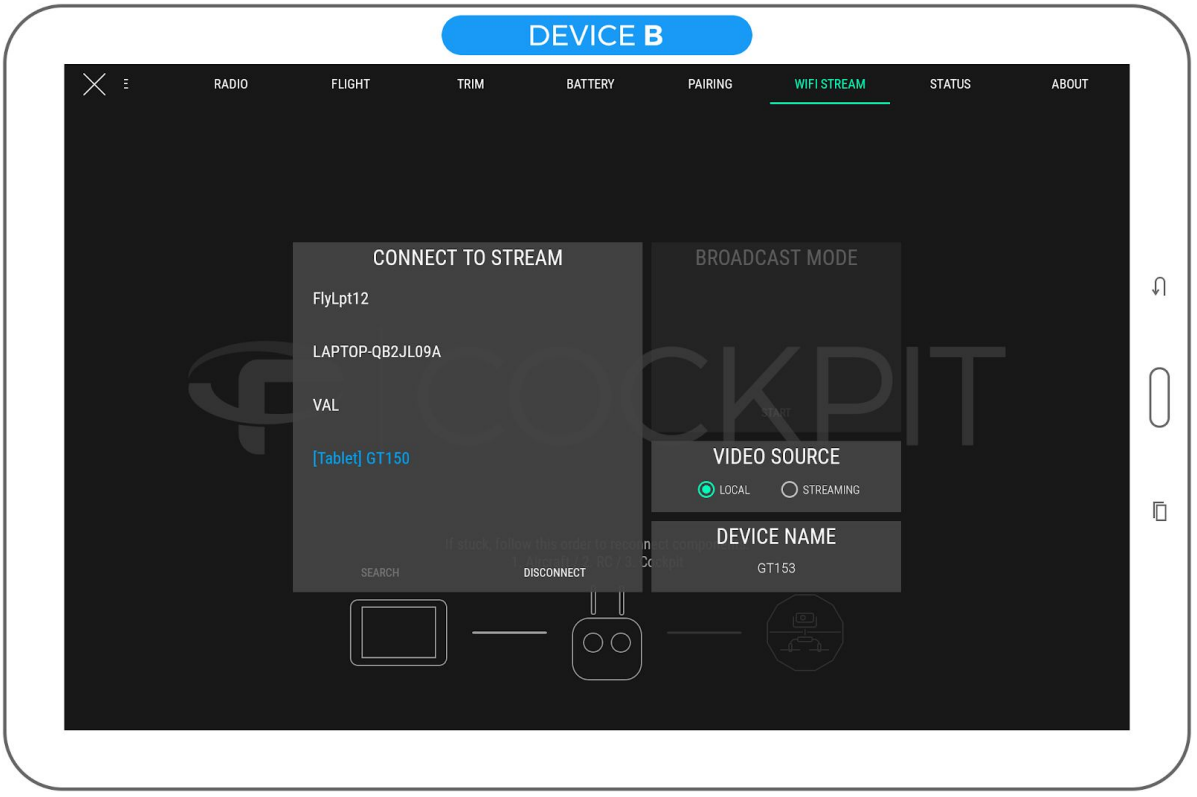
7. Device is now marked as waiting for acceptance from other side.



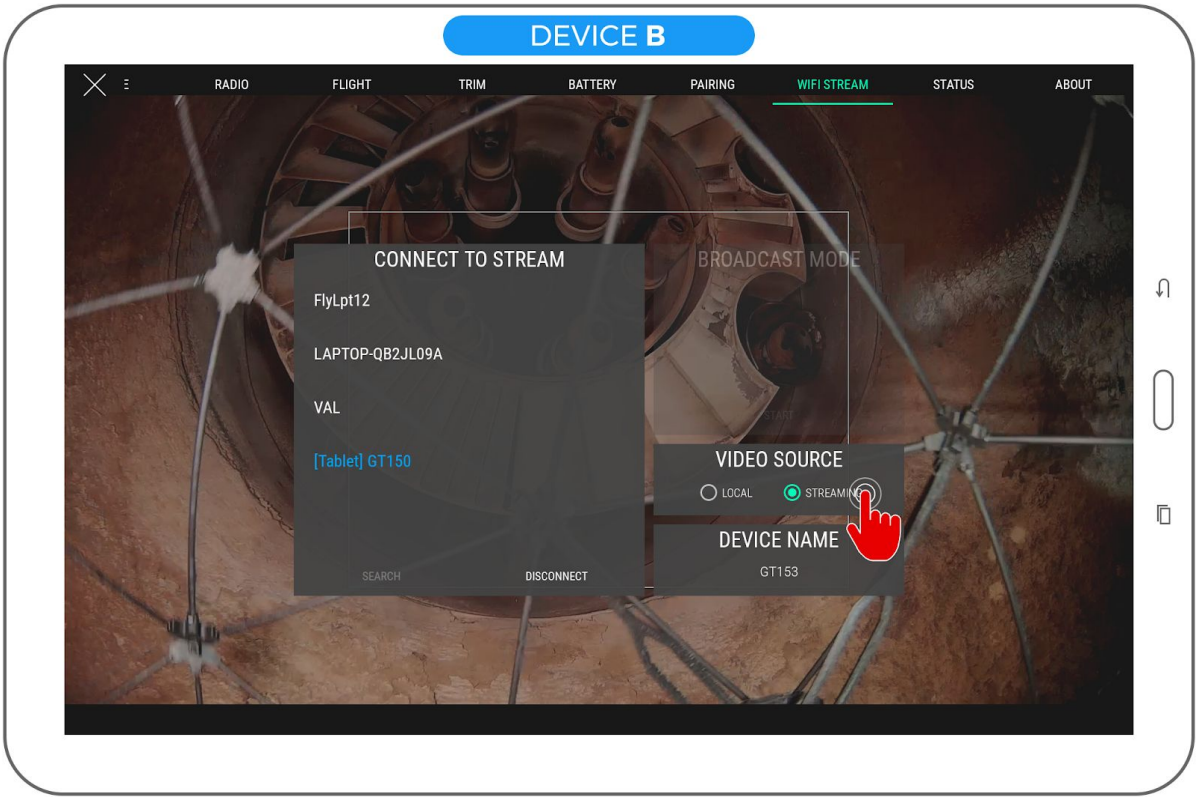
8. Accept Wi-Fi Direct connection on device A by acknowledging the system dialog requesting so.



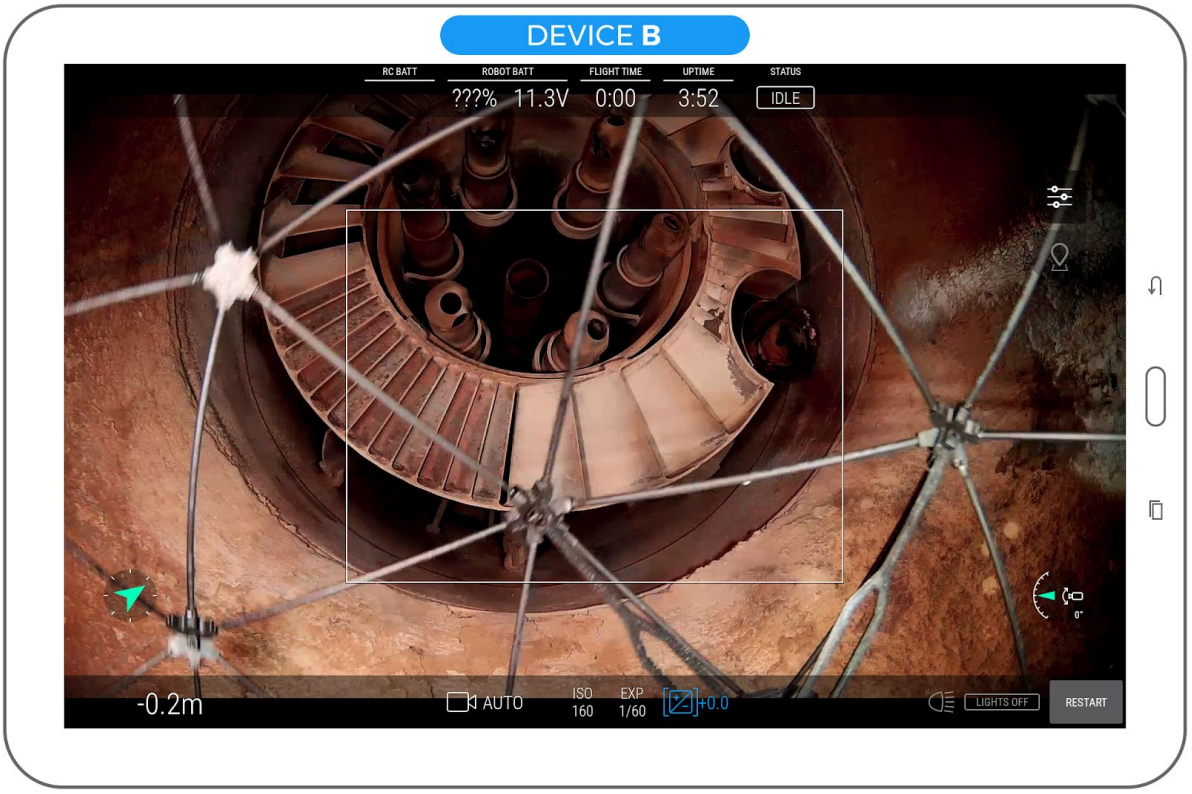
9. When connection is established, device A appears in blue on device B's list.



10. Set the video source to "streaming" on device B.

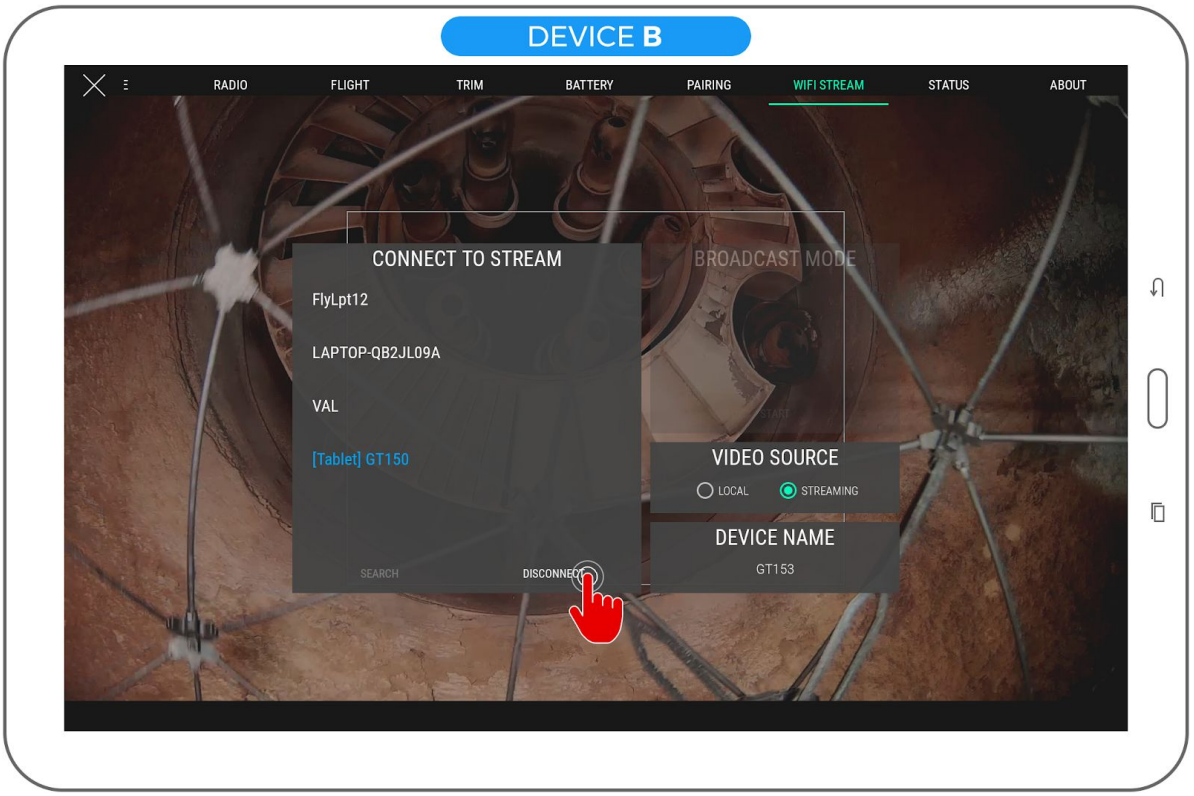


11. Video and telemetry should be visible on screen of device B now. Exit settings to view telemetry. Note: a few bits of information are not available as a wi-fi streaming receiver.

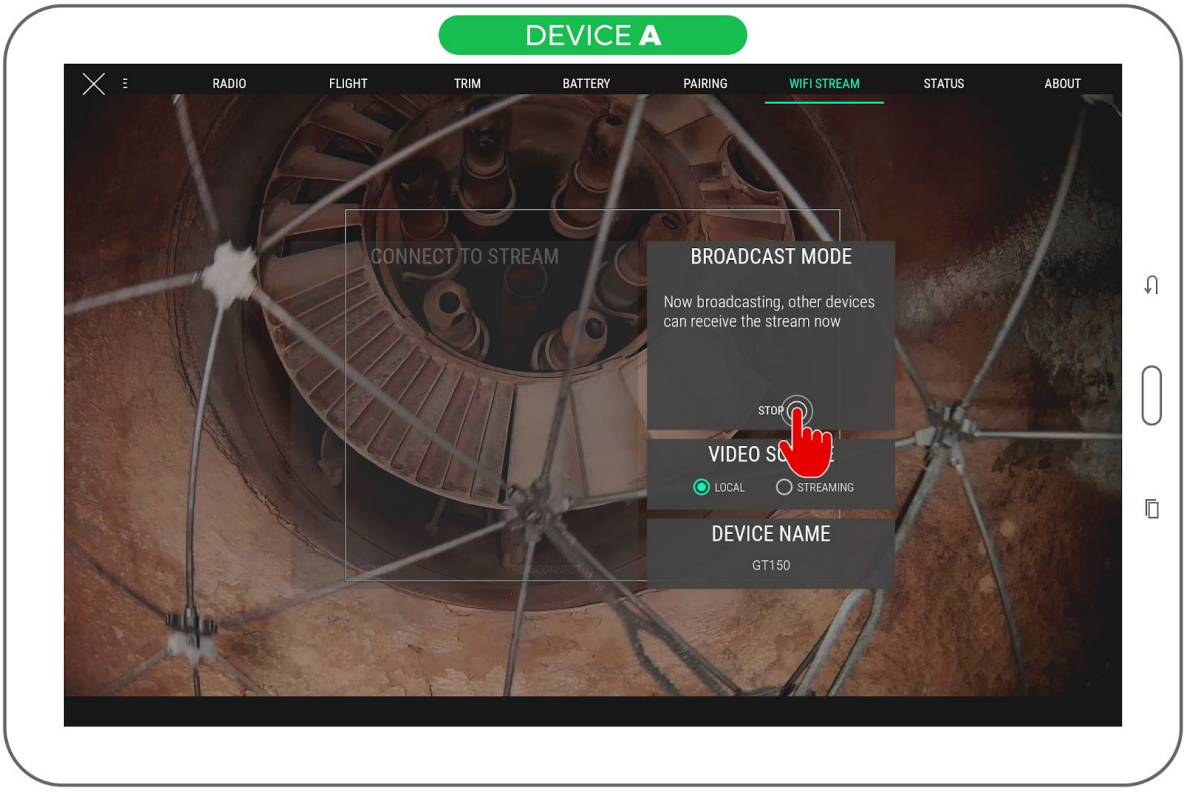


Stopping the streaming session

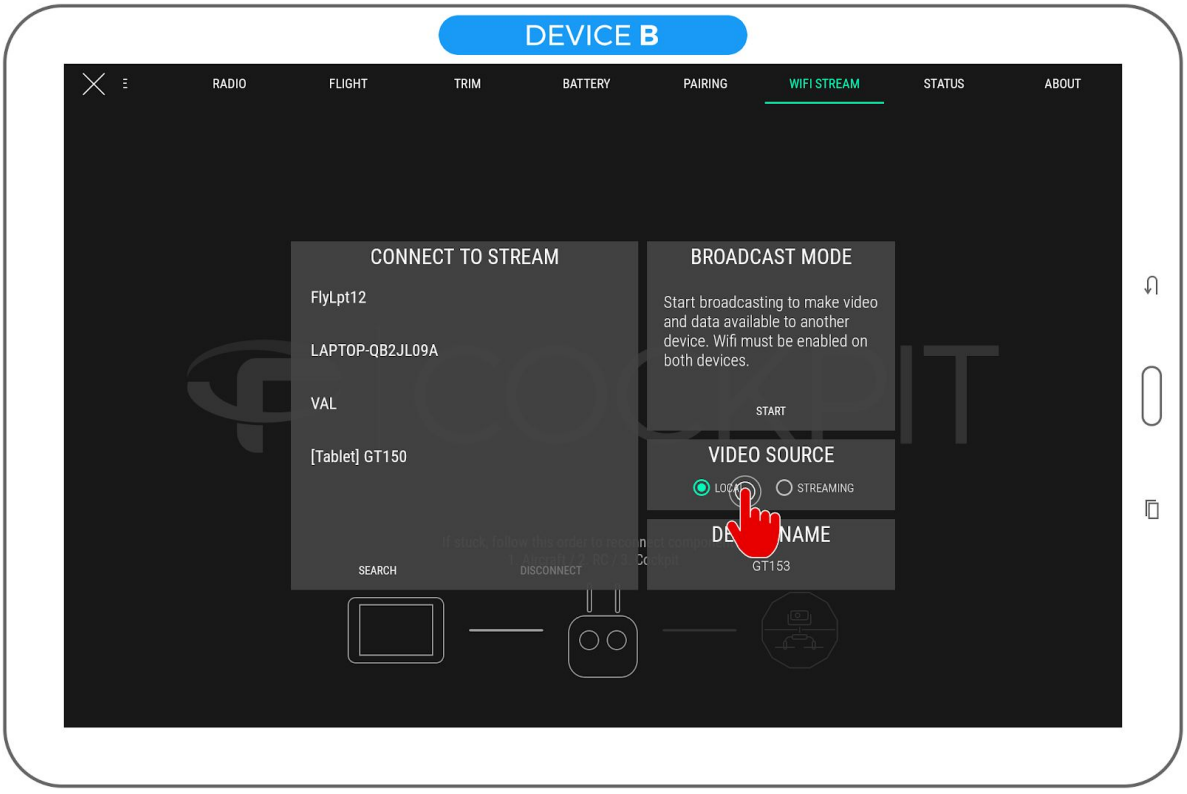
1. On device B, press the Disconnect button below the streaming sources list.



2. On device A, press the Stop server button in Broadcast mode section.



3. Select "local" video source on device B to resume viewing video from a locally connected RC.



Using a camera operator with range extender

Two remote controllers (one being pilot and the other being camera operator) and two devices running Cockpit are required, together with the Flyability range extender. We assume the pilot and camera operator pairing is already active; if it is not the case, see section related to this to achieve pairing first.

The device attached to the RC used as pilot is named "Device A", while the one attached to the RC used as camera operator is named "Device B".

1. Connect device A to remote controller used as pilot, device B to remote controller used as camera operator. Start Cockpit on both devices.
2. Continue by following the steps in Starting a wifi streaming session.

Now, at any time, you may switch to the "local" source to view footage coming directly from the camera operator RC. Switch again to "streaming" source to resume footage coming from device A.

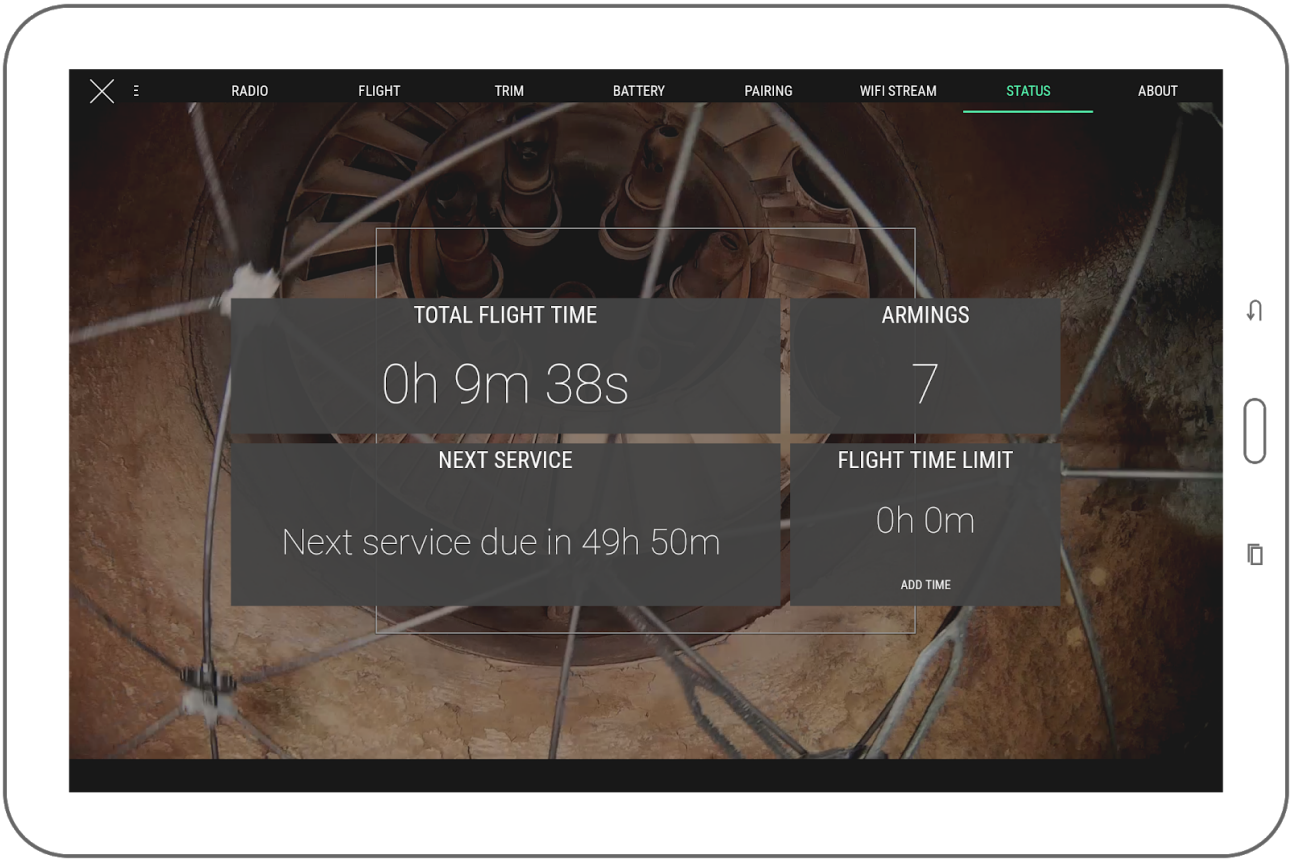
Aircraft with flight time restriction

In specific cases, aircraft can have a flight time restriction in correspondence with your contract. If it is enabled, Cockpit can help you see remaining time and increase it following reception of a code.

Reading remaining flight time

With an aircraft connected, go to the Status panel in the settings.

If the aircraft has a flight time restriction: the “Flight time limit” block can be seen on the panel as shown below. The block displays current remaining flight time.

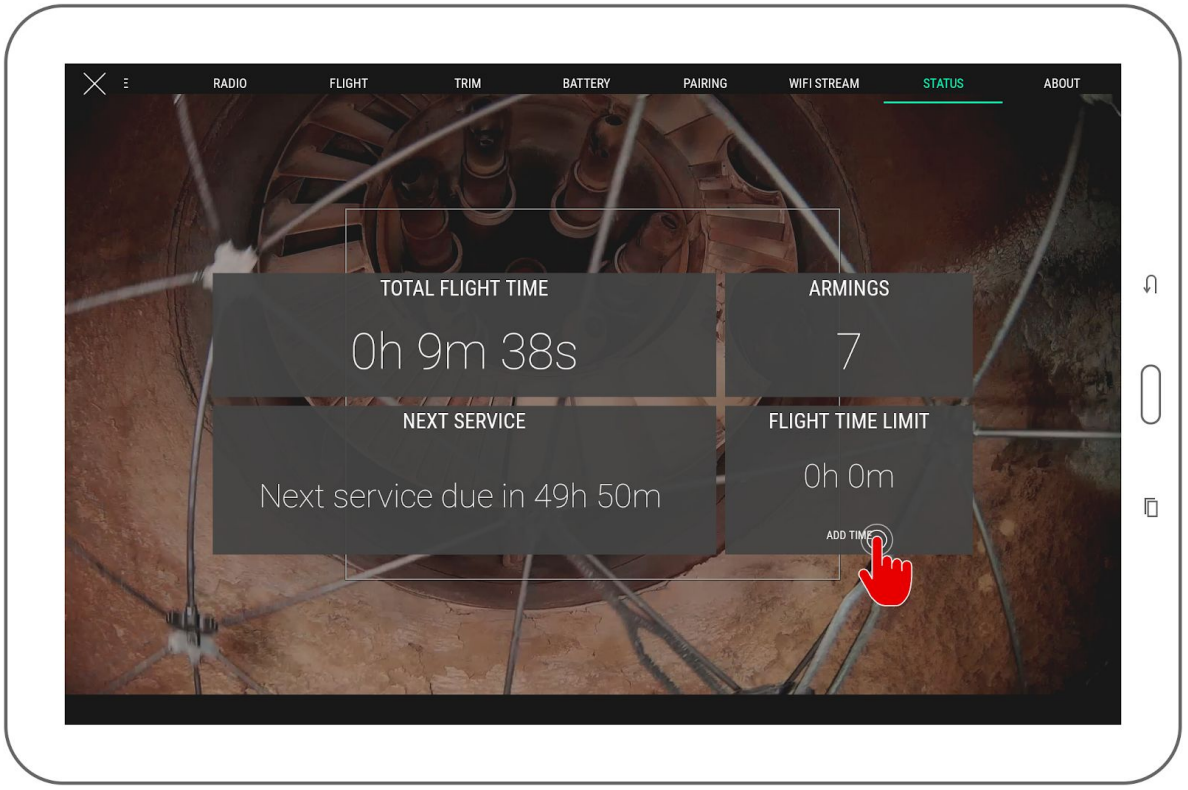


Adding extra flight time

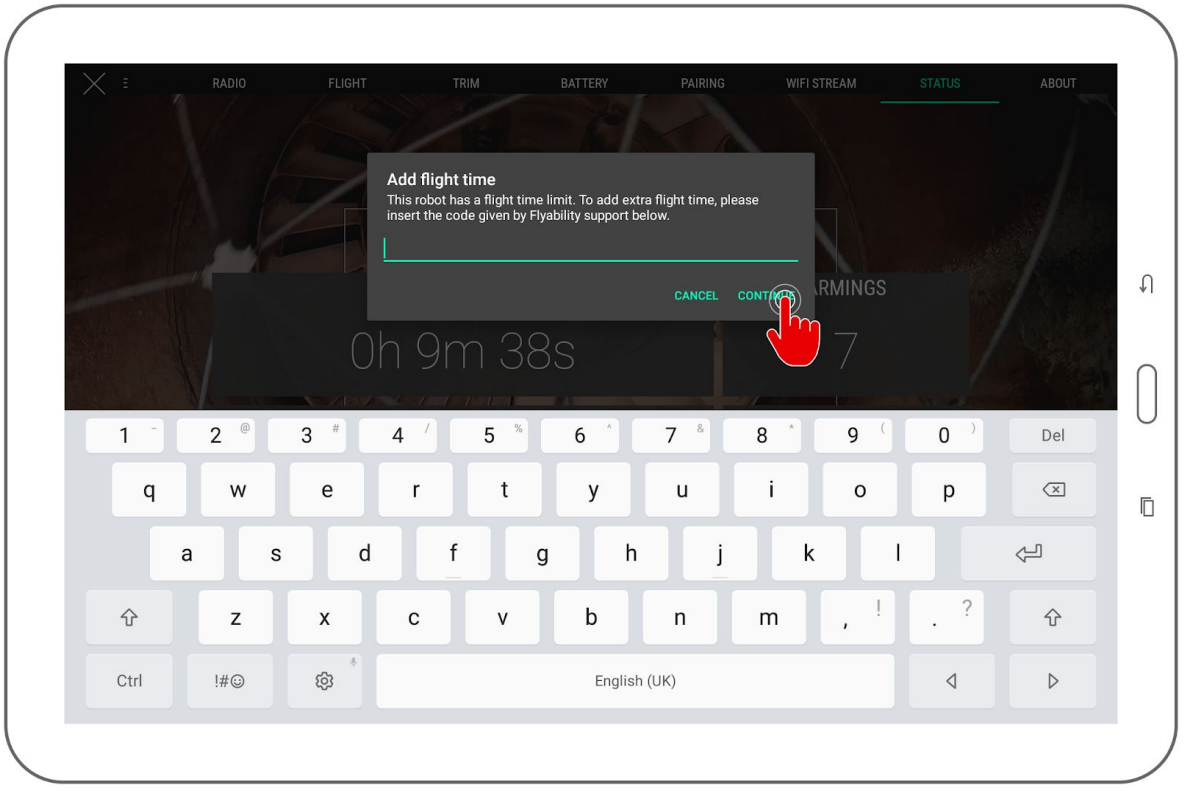
Once you have received a code from Flyability support:

1. Connect aircraft, RC and start Cockpit
2. Wait for connection process to finish
3. Open Settings, go to Status panel

4. Press the Add time button



5. In the entry dialog that appears, type in the code given by support; Press Continue when the code is entirely typed in.



6. If the entry is accepted by aircraft, a dialog confirms operation success. Your flight time is increased and you may resume flying from now on if it was depleted before.

Checking streamed video recordings

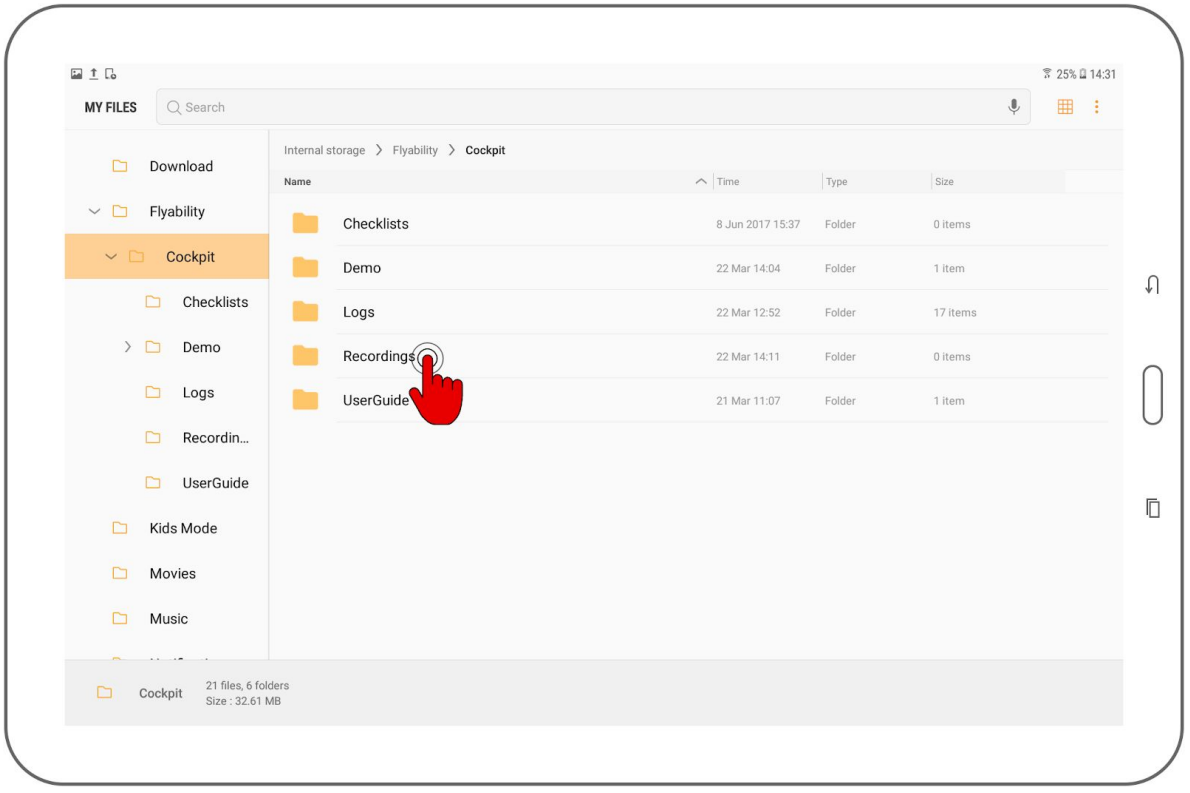
Cockpit automatically starts recording the tablet screen when aircraft arming sequence is started and stops when aircraft is disarmed. Telemetry in the form of movie subtitles is also recorded along.

Main use of streamed video recordings are:

- Immediate review of flight on the tablet, without extracting SD card from aircraft
- Backup in case aircraft cannot be recovered

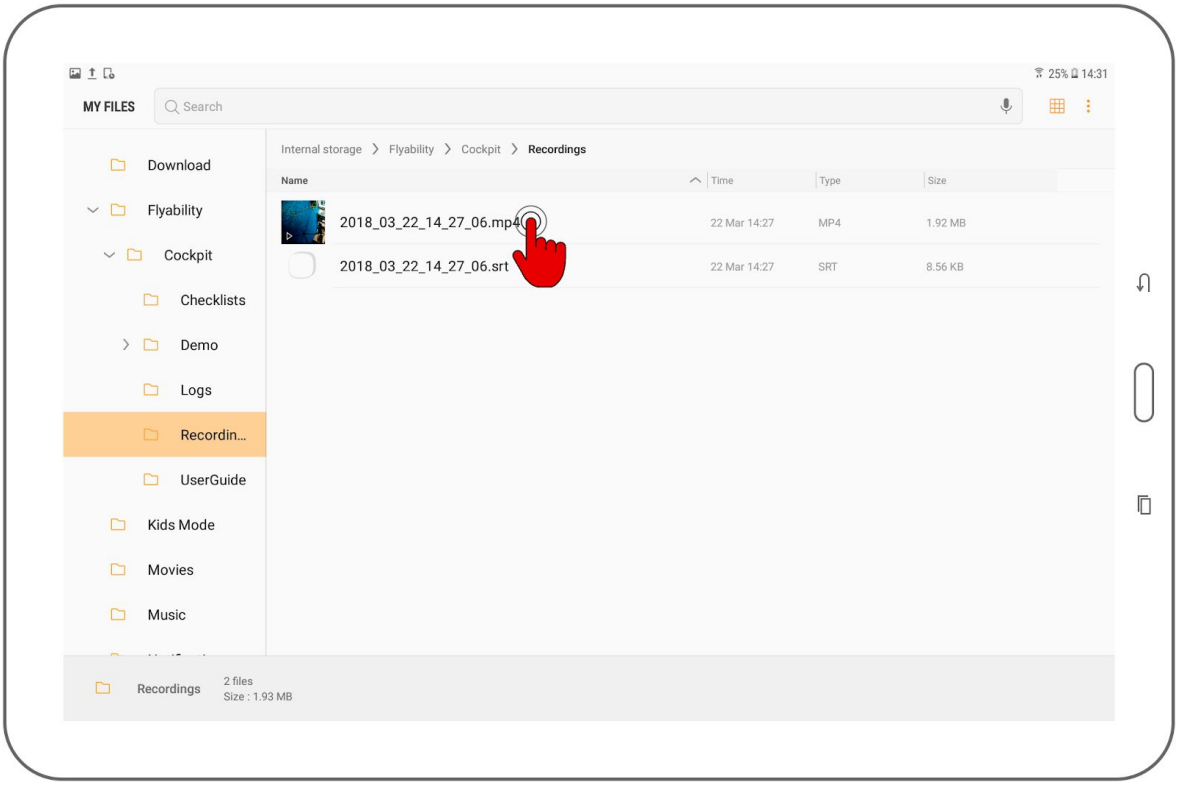
Such recordings have lower quality than the on-board footage on the aircraft SD card. To review those videos:

1. Open the file manager application on your Android device
2. Browse to the root folder of internal storage (sometimes called “internal SD card”)
3. Browse into Flyability/Cockpit/Recordings



4. Find the video files corresponding to your previous flights. Files are named by date and time of recording. SRT-files accompanies videos recorded with Cockpit 1.2 and later; these contains recorded telemetry in the form of subtitles.

Tap a video file to play it using the system video player.



5. Make sure telemetry is visible in subtitles. All videos recorded using Cockpit 1.2 and later contain subtitles. Check the video player options if these are not visible.

Video storage limits

For performance and space management, once the total size of the recordings folder exceeds 4GB, the oldest videos are automatically deleted as new footage is recorded.

Please mind doing backups of such files in a timely manner if you would like to keep them.

Warning messages

To ensure the best experience with Elios and prevent failures, the application will issue warnings when necessary. It is important to take action as described in the table below when such warnings appear.

> WARNING
>
> **Failure to take the necessary actions after a warning can have consequences ranging from difficulty to operate to severe damage, loss or personal injury.**

Warning types

Multiple levels of importance are given to different warning messages, expressed using different colors.

COLOR	SEVERITY	EXPLANATION
Blue	Information	Advice for improving the user experience of the Elios system; gives recommended actions which are good for most cases but can be ignored depending on the pilot skill level.
Yellow	Warning	Point that requires attention.
Red	Critical / Error	Point that requires immediate action. Safety of aircraft, people and property can be impacted, or flight can be made impossible.

Audible warnings

Low battery warnings trigger a flashing frame around the screen and an audible tone.

Make sure the System sound level of the tablet is raised so that the alarm tone can be heard, especially if flights take place in a noisy environment. The use of headphones can help.

Message explanations

Following is a mention of actions that should be taken when error or warning messages are seen throughout the application.

MESSAGE	REQUIRED ACTION / EXPLANATION
Battery level unknown - Use voltage and time	The battery that was plugged was not full, and the Elios is not able to evaluate its real charge. It is advised to cancel the flight and use a freshly charged battery instead. If the problem persists even when the battery was freshly charged the battery is worn out and should be replaced. With an aircraft running the latest firmware, when the critical battery voltage level is reached, the corresponding warning is shown anyway with the associated alarm sound.
Low battery	Elios battery has reached a low level. Consider finishing the current flight.
Critically low battery - Land now	Aircraft battery has reached a very low level. This is critical; immediately land the aircraft in safe conditions and replace the battery with a fully charged one to continue flying. Discharging a battery to a too low voltage can damage it irreversibly.
Battery voltage low - Land now	Aircraft battery voltage is critically low. This can be independent of the current charge level. Immediately land the aircraft in safe conditions and replace the battery with a fully charged one to continue flying.
Controller battery low	Controller battery is low. Even if the controller does not discharge as fast as the aircraft, consider charging it soon.
Cold or damaged battery - Cannot fly	The on-board system has evaluated the battery as risky. Batteries with the same conditions can have critical issues during flight, including loss of power during flight and crash even if still charged at a good level. Arming is impossible in this situation for safety reasons. Replace the battery before flight. If you are in a cold environment such as during winter, the battery can be faulty due to the low temperature although in good condition. Replace the battery with one at a normal ambient temperature (typically 10°C to 30°C). One possibility to keep batteries warm is by using a special LiPo-safe bag with built-in electric warmer. Please refer to the battery safety guidelines for more information. Please refer to the Elios instructions for more information about battery handling specifics.
Dead battery - remove and discard safely	Aircraft battery is discharged beyond minimum voltage and cannot be used anymore. Remove it from aircraft and dispose of it according to the

	instructions given by Flyability. Do not attempt to charge it, contact support for more information.
Propulsion system failure	Failure detected in the aircraft propulsion system. Check that propellers are in good condition, tightly attached to the motors and each one is mounted to a motor with the correct direction of rotation. A propeller may be broken, loose or in the wrong place; can also signal a motor failure. If you are confident with the proper tightening of propellers and correct state of motors, restart the aircraft to be able to arm it again.
Manual thrust engaged. Move switch down for altitude hold.	The altitude control lever is in the thrust position. Dismiss this warning if you are comfortable flying in this advanced mode, or switch to altitude hold mode instead.
Manual transmission channel set. Use auto if quality is low.	Radio transmission channel choice is set to manual on the current aircraft, likely during a previous flight. This is a reminder of this setting since manual channel choice can decrease the video quality in comparison with the automatic mode. On-board video recording quality is not affected by this. You can safely fly with the current transmission setting. If video quality is low at some point, you can set the channel choice mode to automatic to attempt to get better quality.
Camera SD card missing	Check the camera SD card slot. If the camera card is already there, check that it is properly pushed in.
Camera SD card full	Camera SD card is full. Remove files from it to be able to continue recording video.
Camera SD card error	Error concerning camera SD card operation. Can be caused by a corrupt card.
Log SD card missing - Cannot fly	Check the log SD card slot. If no SD card is present, the aircraft cannot fly. This is a requirement so that flight logs can be properly recorded. Log files are required in regard to the Elios warranty. Insert an SD card in the log slot with enough space available after having disconnected the aircraft, then restart it.
Log SD card full	Log SD card is full. Remove files to make room for new log recordings.
Log SD card error	Either the SD card used for log recording is faulty or the aircraft has stopped recording log files. If this message persists, the current SD card can be damaged; this can be checked easily by using a different SD card.
Thermal camera error - Restart aircraft	The thermal camera cannot record at the moment. Restart the robot once to restore recording. If the issue persists, please contact support.
Camera error	The camera is encountering a problem that can affect recording. Also caused by old camera firmware version; consider upgrading the camera firmware especially after an aircraft firmware upgrade.

If video quality is too low, press the Restart button (will restart application).	Depending on the circumstances, it has been noticed that video quality can diminish over time after the application has started. If you notice such a quality decrease, this message is a reminder that better video quality can be restored by fully quitting and restarting Cockpit. A shortcut is proposed to fully quit and restart Cockpit which is the Restart button. This action clears the video decoding buffers, ensuring optimal video quality.
Tablet temperature high	The internal components of the tablet on which Cockpit is running are hotter than during operation in normal conditions. It is likely that an external source is heating it up, such as direct sunlight or hot ambient air inside the facility. Take action to protect the tablet from overheating to keep an acceptable transmission quality. Normal operating temperature ranges depend on the tablet itself. Please refer to the tablet specifications and instructions to know the recommended temperature range.
Tablet temperature too high - performance is reduced, flying not recommended	The tablet is too hot for safe operation. System can reduce video transmission quality at that point to prevent overheating of the internal components. Stop flying and store the tablet so that it cools down to normal operation temperature. Do not put it inside a fridge or freezer due to risk of moisture. You can use another available tablet to continue the ongoing mission, provided its temperature is within the normal operation conditions range. Normal operating temperature ranges depend on the tablet itself. Please refer to the tablet specifications and instructions to know the recommended temperature range.
Allowed flight time over - contact support	Aircraft has an active flight time restriction; flight time left has reached zero. Contact support for instructions on how to activate your aircraft for additional flight time. If you already received a code, follow the procedure to add flight time.
Magnetometer calibration failure	Magnetometer has failed to calibrate during arming sequence. This can be caused by aircraft being moved. Do not move the aircraft while the calibration takes place, and make sure it is on a stable surface.
Low Android storage space	Available storage space in internal memory of Android device is low. Free some storage space by deleting unwanted files. System and Cockpit see their performances greatly reduced when internal storage gets full: more latency, bad video quality, slow user interface. Built-in video recorder will not record when this warning is active. Minimal free space (1GB) is required for the recording to start, as it takes additional buffer space into account for the actual recording. Be sure to have freed enough space before you resume flying.
Old firmware version - please upgrade	Aircraft runs an outdated version of Avionics. To benefit of all the newest features of Cockpit, please upgrade the aircraft with the latest Avionics version. You typically see this warning after installing a new version of Cockpit.
Magnetometer calibration in progress, do not block rotation	As absolute heading is on, aircraft is performing a slow spin to calibrate its magnetometer. Do not block rotation of aircraft during this phase for an accurate heading measurement, and make sure it lies on a stable surface. If

	external movement happens during calibration, aircraft will detect it and stop the engines.

Troubleshooting

This is a reference for typical issues and their solutions.

A message about activation failed appears

Make sure the Android device has access to Internet for the activation procedure. This only needs to be done once.

All components are turned on and connected but Cockpit is still showing a black screen with the connection bar.

Check connection of every component, including the USB cable. Cause can be a bad contact on either end.

Cockpit is showing video from aircraft but the connection progress bar is blinking indefinitely

Turn off aircraft, RC and quit Cockpit. Then, turn all these components back on using the following order:

1. Turn aircraft on and wait for red & green LEDs to blink alternately in a slow rhythm.
2. Turn remote controller on and wait for green LED on it
3. Start Cockpit

Video quality is bad

Make sure you have a good signal level from aircraft; check the signal meters on screen. Weak signal is a cause for low video quality.

If Android device storage is full or nearly full (less than 1GB remaining), applications have more difficulty to run correctly and this can affect video quality.

Video is slow / more latency is observable

Screen recording software, applications running background processes (see notifications) and widgets like on-screen CPU meters may affect performance. Shut those down if not needed.

If Android device storage is full or nearly full (less than 1GB remaining), applications have more difficulty to run correctly and this can affect video quality.

Aircraft firmware upgrade is slow

Upgrade process should complete in about 6 minutes. If it is much slower:

1. Make sure aircraft is close to remote controller. Low signal can make the upgrade procedure longer.
2. Quit and restart Cockpit, then try again.

In general, we highly recommend restarting Cockpit after a failed upgrade attempt.

My flight videos have disappeared from the recordings folder

When there are 4 GB of recorded videos or more on the tablet, older recordings are automatically deleted. Make sure you save videos in a different place soon enough to keep them.

Advanced

Customizing checklists contents

Checklists shown in Cockpit are built with the distribution. Should you need extra check steps in your case or appreciate to customize the workflow of an inspection department, you can customize the checklists contents for that.

Each checklist type can be customized by adding a file with the format explained below.

File format

A custom checklist is simply written into a text file using the JSON syntax as follows.

```
{
	"checklist_steps" : [
		{
		"title" : "Title of the first check"
		},
		{
		"title" : "Title of a second check"
		},
		{
		"title" : "You may add as many checks as you like"
		}
	]
}
```

File paths

The custom checklists must be placed at a specific path in the device storage, starting from the storage root: Flyability/Cockpit/Checklists/

> HINT
>
> Run the application at least one time; the directory above will automatically be created for you.

Using the file structure above, create the following files:

- mission_begin_checklist.json for the pre-flight checklist visible on startup
- new_subsequent_flight_checklist.json for the pre-flight checklist of the second and subsequent flights of the mission; this skips checks that have to be done only at the beginning of the mission
- robot_connected_first_time_checklist.json when the aircraft is ready for take-off, for the first flight of the mission
- robot_connected_subsequent_time_checklist.json when the aircraft is ready for take-off, for the second and subsequent flights of the mission
- end_of_flight_checklist.json for the post-flight checklist, shown a few seconds after the aircraft is disconnected