LXNAVIGATION

PowerFLARM Eagle mobile 2022

user's manual

www.lxnavigation.com

PowerFLARM Eagle mobile 2022

Device manual

- LX navigation -

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LXNAVIGATION

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Document information

0.1 Abstract

This document represents the user manual for the PowerFLARM Eagle mobile 2022. The installation manual, technical datasheet and additional info can be found on **www.lxnavigation.com**.

0.2 Document status

Document status: PUBLIC

Document status	Explanation
Internal	Intended only for LX navigation staff
Public	Available publicly to all
Personal	Intended for a specific person and/or company, noted on this page
Dealer	Intended for a specific dealer, noted on this page
Manufacturer	Intended for a specific manufacturer, noted on this page

0.3 List of applicable products

Device	HW Version
PowerFLARM Eagle mobile 2022	1.0
PowerFLARM Eagle mobile 2022 ADS-B	2.0

0.4 Revision history

Document name	Document revision	SW version	Build	Date	Revised by	Approved by	Notes
LX_EMUM	R1	1.1	321	16.2.2023	A.S.	N.S.	initial edition

Contents

Important notices

1.1 Using this manual

This manual has been created in LaTeX, giving us the possibility of linking up everything we find linkable. You will find references to other parts of the manual, to other manuals, webpages, etc. throughout the manual.

Linkable content will be **bold and underlined**, i.e. you can find additional info on how to take care of your in the **Taking care of your PowerFLARM Eagle mobile 2022** section of this manual (click on the underlined text).

NOTE
The most recent version of this manual will always be available at
https://lxnavigation.com/support/

1.2 Device operating limits

This instrument may be used under VFR (Visual flight rules) only! Any navigational information is provided for reference only. The pilot takes all responsibility and risk associated with the use of this device.

Have a nice flight.

1.3 Limited warranty

This device is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, LX navigation will, at its sole discretion, repair or replace any components that fail in normal use. Such repairs or replacements will be made at no charge to the customer for parts and labour, the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alterations or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM COUNTRY TO COUNTRY.IN NO

EVENT SHALL LX NAVIGATION BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT.

Some countries do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. LX navigation retains the exclusive right to repair or replace the unit or software, or to offer a full refund of the purchase price, at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY. To obtain warranty service, contact your local LX navigation dealer or contact LX navigation directly.

The manufacturer does not take the responsibility for possible mistakes or misprints in this text and gives no guarantee for accuracy of this manual. This manual has been written with the greatest care and we have done our best to avoid any mistakes but with all respect please check any doubtful statement and let us know. We would be very grateful and we thank you in advance for any comment.

1.4 Sunburned display

Damages to the device, especially the display part, are not covered by the warranty and will be considered as misuse of the device. To learn how to take care of your display and device in whole, check the **Taking care of your PowerFLARM Eagle mobile 2022** section of this manual.

1.5 Disclaimer/EULA

Getting started

2.1 Device overview

The PowerFLARM Eagle mobile 2022 is a portable collision avoidance transceiver with build in flight display and 8h of battery authonomy.
Version with an ADS-B module will offer the pilot ADS-B warnings as well.

The device features a transflective technology display.

The units's primary function is to alert the pilot of an on-coming collision with audio and visual warnings. The secondary function is to show the pilot all Flarm and ADS-B (if an ADS-B module is installed) objects on the Flarm radar page and the tertiary function is to act as a simple navigation device.

The device is designed for simple pilot operation with a single 4-way push-button that features both short and long-press functions.

The unit is capable of providing **APT (airport)** and **TP (turnpoint)** navigation on two dedicated navigation pages. Navigation pages feature navboxes, showing bearing to point, track, distance, ground speed and altitude. It also shows airspace, airports and turnpoints on the map.

There is a dedicated logbook page, listing all flights with date, take-off and landing times and flight duration.

The PowerFLARM Eagle mobile 2022 features:

- 2.7 inch transflective technology sunlight readable display
- 4-way push-button with short and long-press functions, for simple and effective handling
- IGC + ENL flight recorder
- Internal beeper (for Flarm warning)
- Voice-OUT (Audio-OUT)
- Voice module as an integrated part of the system
- Second FLARM® antenna (Diversity module)
- ADS-B in (With ADS-B collision warnings)
- WiFi ® connectivity
- Bluetooth ® connectivity
- SD Card slot
- USB-A interface for FLARM configuration
- Micro USB connector for charging internal battery

Functions:

- Complete TP/APT navigation with airspace information and warnings
- Traffic radar screen
- Logbook
- Voice announcement
- WiFi Configuration Portal accessible with your smartphone for configuring the FLARM module and displayable data, export and import various files and connect with LX Cloud.

The unit has the capability of being updated to any later firmware release free of charge.

Basic operation

We will go through the basic gestures and what they do on all pages.

The Eagle mobile uses a single 4-way push button with both short and long-press functions.

3.1 Turning the unit on

Unit is turned on by pressing the 4-way push button.
Once the device is turned on, a sequence of screens will appear in the following order:

- **LX navigation greeting screen**
- **Second screen** stating the device type, serial number and firmware version

WARNING

When the device is turning on, a warning may appear, indicating limited operation capability to the pilot. You should contact **LX support** as soon as possible. The device might be operable even with the warning present, but full operational capability is not guaranteed.

- **Internal memory error -** there is an issue with the internal memory of the device. Device will continue to operate and show Flarm warnings, but some pictures and assets may be corrupted.

3.2 Device interface

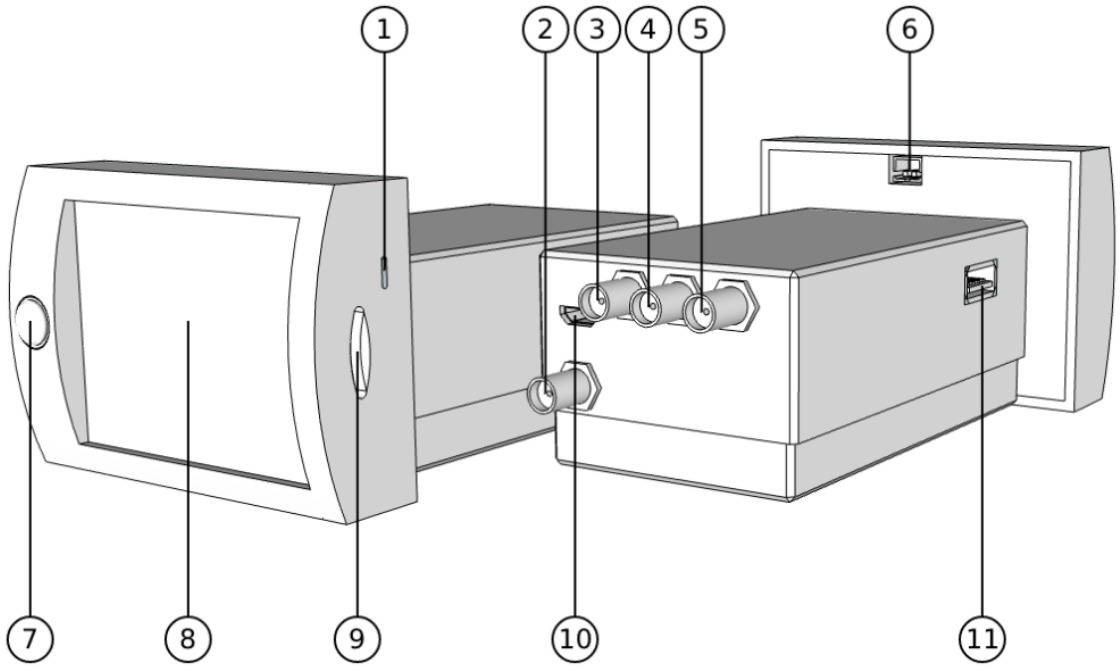

Figure 1. LX Traffic Square front plate interface

On the front plate, we can see the following items:

1. Beeper opening
2. GPS antenna
3. ADS-B antenna
4. Secondary FLARM antenna
5. Primary FLARM antenna
6. Audio-OUT connector
7. 4-way push-button
8. 2.7 inch transflective display
9. External SD card slot
10. Micro USB connector for charging internal battery
11. USB-A interface

The device is capable of providing AUDIO-OUT both for Flarm warnings, as well as for the built-in voice module. Instead of using the 3.5 mm jack, we have a special connector. You can get the connector with 2 open-wire cables for connecting to your speaker of choice or an intercom in a powered airplane, to receive audio warnings in the headset, as an accessory.

Additionally, we offer the following accessories:

- **AUDIO-OUT adapter cable -** for connecting to a speaker or intercom

NOTE
Please note that the device can only be used in landscape mode.

We will name the different movements of the 4-way push button by their functions:

- **LEFT-RIGHT -** Pages - Changes between pages
- **UP-DOWN -** Zoom - zooms on zoomable pages
- **Short press -** Enter - enters page, text dialog, confirm etc
- **Long press -** Sub-page - opens additional sub-page on pages that have them (mainly navigation pages for additional info for navigation points)

3.3 User input

The 4-way push-button's operation can be divided into left-right and up-down motion with appropriate short and long-press functions.

3.3.1 Left-right motion

Left-right motion is used for the following functions:

- **Changing between primary pages**

3.3.2 Up-down motion

Up-down motion is used for the following functions:

- **Zooming**, on all zoomable pages
- **Scrolling** through menus and choosing letters and number in alphanumeric dialogues

3.3.3 Short-press

Short-pressing (1s) the push-button will act as 'enter', 'confirm', 'yes', 'open', etc.

3.3.4 Long-press

Long-pressing (3s) the push-button will act as 'open sub-page', 'exit', 'back'. The latter two only when in a sub-page.

3.4 WiFi portal

When the unit is turned on it creates WiFi access point. Access point name (SSID) consists of text "LX FLARM Eagle" and serial number of the unit (Exp. LX FLARM Eagle 1234).
The network authentication key/password can be found on the back side of your unit.

After joining the network using a personal device (tablet, smartphone, PC, etc), the built-in WiFi configuration portal shows up automatically.
WiFi portal then serves as the user interface for configuring the unit, checking it's status, perform updates, access logbook, etc.
More about the portal functions in the Configuration portal section.

NOTE
In case the portal is not shown automatically, open a web browser and enter url: 192.168.4.1

3.5 Performing an update

In order to be on track with the latest software releases, follow our **Support webpage**. Once you find an update, download it to your computer.

The PowerFLARM Eagle mobile 2022 has a separate update procedures for updating Display, FLARM and Eagle modules.

3.5.1 Updating Display module

Once you've downloaded the update file, follow these steps:

1. Copy the desired software update file to the root of the microSD card. The update file should have the word Traffic Square within its name (or something like TrfSqr) and an extension of .lxu. Be sure to use the supplied SanDisk Ultra microSD card.
2. Insert the microSD card and turn the device on
3. Go to **Setup** $>$ **Service** $>$ **Software update**
4. Select the desired update file
5. If prompted for an update code, type in '00000'.
6. The device will copy the file to the internal memory and perform the update. It may restart a couple of times.
7. Once the update has finished, verify that the update has been successful by going to **Setup** $>$ **Service** $>$ **Device info** and checking that the SW version has changed to the desired one

NOTE
The unit will turn off during the update procedure. A manual turn on might be needed.

WARNING
Make sure the unit's internal battery is charged before starting the update procedure.

3.5.2 Updating Flarm module

The Flarm module can be updated in two ways. Either using a USB key or via built-in WiFi configuration portal.

There three types of updates that can be uploaded to Flarm module:

- Firmware

- Obstacle database
- License file

Each type of update is performed in the same way.

The Flarm firmware update file is published on www.lxnavigation.com under section “Support”.

NOTE
Obstacle database and License files are created by FLARM and depend on module serial number. Therefore they are not published on the LX Navigation website.

Updating using USB key:
In order to update Flarm module, follow the steps:

1. Save the downloaded update file to the root of the USB key.
2. Insert the USB key into the unit.
3. Turn the unit on.
4. Wait. The unit will update on its own. Typical duration is less than 5 minutes.
5. After an update the unit will restart and boot into a new version.

Updating using WiFi portal:
WiFi configuration portal is accessible by connecting to the unit’s access point using a personal device (tablet, smartphone, PC, etc). After successful connection, the portal shows up automatically.

NOTE
In case the portal is not shown automatically, open a web browser and enter url: 192.168.4.1

In order to update Flarm module, follow the steps:

1. Save the downloaded update file to the device you will use while connecting to the portal.
2. Connect to the portal.
3. Go to “Transfer” > “Update FLARM module” (check note below).
4. Choose the previously downloaded file and click “Upload”.
5. Status message at the bottom of the page will indicate the progress of the upload. At the end message: “Finished uploading. Please, restart the device.” shows up.
6. Restart the unit manually.

NOTE
For uploading an Obstacle database or License file go to “Transfer” > “Update database” or “Transfer” > “Update license” in step 3.

3.5.3 Updating Eagle module

Eagle module firmware is user updatable via built-in WiFi configuration portal only. WiFi portal is accessible by connecting to the unit's access point using a personal device (tablet, smartphone, PC, etc). After successful connection, the portal shows up automatically.

NOTE
In case the portal is not shown automatically, open a web browser and enter url: 192.168.4.1

Eagle module firmware update contains two files: application part and file system part.

Check the current firmware version
In order to check the current firmware version (application and file system parts) follow steps:

1. Connect to the portal.
2. Go to "System info".
3. Under the section "System" there are attributes "Firmware version" (application part) and "File system version" (file system part).

Update application and file system part
The latest firmware is published on www.lxnavigation.com under section "Support".

Download and extract the archive. There are separate binary files for application and file system part. Save those files to the device you will use while connecting to the portal (smartphone, tablet, PC, etc).

NOTE
It is recommended to first update the application and then file system part.

To update application follow the steps:

1. Connect to the portal.
2. Go to "Transfer" > "Update Eagle".
3. Under the "Application" section choose the application file. (named FlarmEagle_ESP32_1.0.160.bin or similar).
4. Click "Upload" (button in "Application" section).
5. Status at the bottom of the page should now show the message: "Uploading... This might take a while". Wait until the message "Finished uploading" pops up. The unit will then automatically restart.

NOTE
The latest versions use file extension .app instead of .bin for application update.

To update file system follow the steps:

1. Save the downloaded update file to the device you will use while connecting to the portal.
2. Connect to the portal.
3. Go to “Transfer” > “Update Eagle”.
4. Under the “File system” section choose the file system file. (named FlarmEagle_esp32_spiffs_1.0.161.bin or similar).
5. Click “Upload” (button in “File system” section).
6. Status at the bottom of the page should now show the message: “Uploading... This might take a while”. Wait until the message “Finished uploading” pops up. The unit will then automatically restart.

NOTE
The latest versions use file extension .sfs instead of .bin for file system update.

3.6 Turning the unit off

The unit turns off by holding the 4-way push button.

3.7 Charging the internal battery

The PowerFLARM Eagle mobile 2022 is equipped with internal rechargeable battery. Charging is performed via micro USB connector on the back side of the unit. You can find recommendations on preserving battery life in section Taking care of your PowerFLARM Eagle mobile 2022.

The unit should operate over 8 hours when fully charged.

Advanced operation

Primary pages overview

This section will cover the complete specter of operations possible on LX Traffic Square's primary pages.

There are 6 primary pages on the LX Traffic Square. You can scroll between these pages by using the right-left movement of the push-knob. The pages are listed as follows:

1. **Flarm radar page**
2. **Turnpoint navigation page**
3. **Airport navigation page**
4. **Info page**
5. **Logbook/Flight statistics page**
6. **Setup page**

4.1 Flarm radar page

The Flarm radar page shows all surrounding objects reported to the LX Traffic Square by a Flarm device. If the said Flarm device has an ADS-B module, the LX Traffic Square will show ADS-B objects as well. Flarm objects are shown on a radar screen with track-up orientation.

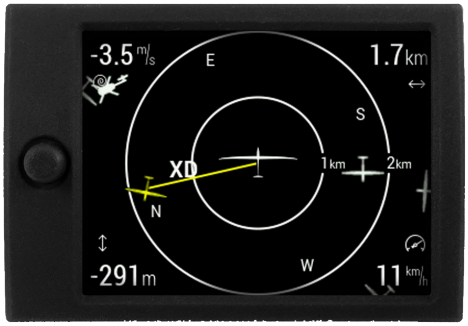

Figure 2. Flarm radar screen

Figure 3. Flarm radar select circle

Objects presented as a dot on the screen are objects where pilots have intentionally activated the PRIVACY mode on their Flarm unit. Objects in privacy mode send limited data strings and can't be visualized completely. However, all warnings will appear regardless of privacy mode.

It will also display 'non-directional' traffic. This is traffic reported by some Flarm devices with built-in ADS-B receiver capable of receiving Mode-S transponders (example of such a device is LX navigation Flarm Eagle with ADS-B). Non directional traffic is displayed as a circle around the object.

Short-pressing the push-button will invoke the selection of a Flarm object to follow. For a selected object, additional details will be displayed in the corners of the screen, as depicted on Flarm radar select circle.

The following icons are used for each parameter:

- **- Climb rate**
- **- Vertical distance**
- **- Horizontal distance**
- **- Ground speed**

Moving the push-knob up and down will change the zoom of the flight radar screen and long-pressing it will open the Flarm objects sub-page. In the Flarm sub-page, a list of all visible aircraft is shown. A green dot next to the name of the object shows which object has been select for additional info on the Flarm radar page. Object ID and distance is also shown.

By choosing an object and pressing the push-button, additional information can be seen and/or edited, for each object:

- **Callsign**
- **Pilot**
- **Airfield**
- **Registration number**
- **Frequency**
- **Flarm ID (always non-changeable)**

The LX Traffic Square supports FlarmNET database files, check **Flarm NET** section for additional information.

Figure 4. List of visible Flarm objects

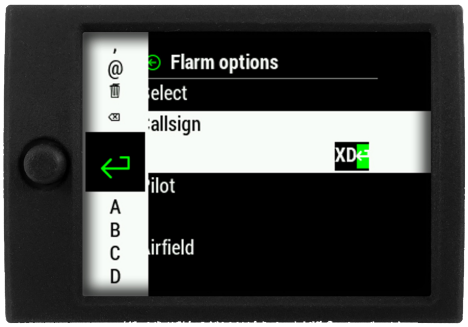

Figure 5. Additional info for objects

An important safety feature of the LX Traffic Square is the Flarm warning page. This page pops-up whenever the Flarm device sends a warning sentence, regardless of the menu, page or setup you're currently in.

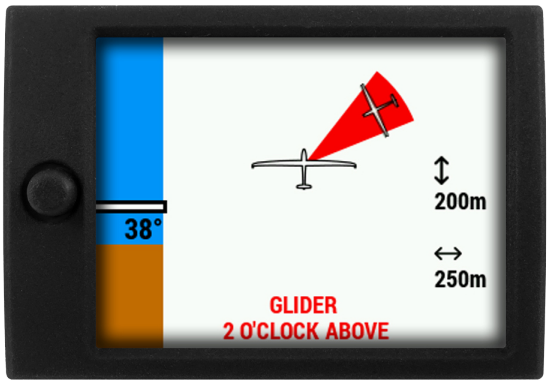

Figure 6. Flarm warning page

The Flarm warning screen shows the type of object the Flarm is warning you about, from the list of supported Flarm objects (Glider shown on figure). It's relative direction to your heading, relative altitude and distance, as well as an angle from the horizon, with the blue/brown scale on the left side of the screen. The relative direction of the object is also written in word with **GLIDER 12 O'CLOCK ABOVE**.

The LX Traffic Square can show the following objects with appropriate graphics:

- **Glider -** 
- **Tow plane -** 
- **Helicopter -** 
- **Skydiver -** 
- **Drop plane -** 
- **Hang-glider -** 
- **Para-glider -** 
- **Powered ac -** 
- **Jet aircraft -** 
- **UFO -** 
- **Balloon -** 
- **Blimp, zeppelin -** 
- **UAV -** 
- **Obstacle -** 

NOTE

A lot of effort was put into the design of the Flarm Warning screen, shown by figure 34. It's sole purpose is to quickly familiarize the pilot with the potential danger. Flarm provides us with three distinctive levels of danger:

- **13 to 18 seconds to impact -** the Flarm Warning screen appears, the LX Traffic Square's internal beeper and the flashing of the direction cone are in the same, steady frequency. The lady from the LX Traffic Square's internal voice module notifies you of the location of the object.
- **9 to 12 seconds to impact -** same as previous level, both the internal beeper frequency and beeping interval, as well as the flashing interval, intensify (higher frequency)
- **0 to 8 seconds to impact -** as on previous level, with the highest frequency of beeping and flashing.

4.2 Navigation pages

The LX Traffic Square offers 2 separate navigation pages, giving the pilot simultaneous navigation to a **turnpoint & airport**.

The basic layout of each navigation page is the same. In the top of the page, we can see the header. Below the header, we can see the moving map. A zoom scale is present and in the bottom of the page, the NavBox line is positioned.

Long-pressing the **push-knob** will show additional info for the point we're currently navigating to on the **tunpoint & airport**. Moving the push-knob up and down will change the zoom level.

Short-pressing the **push-button** will open the turnpoint or airport selection sub-page.

4.2.1 The map

The Turnpoint navigation page is based on a map, covering the central part of the screen. The map shows **turnpoints and airports** with small circles and their names, as well as **airspace lines**.

On the Map, an aircraft icon represents your current location. The LX Traffic Square supports both North-up and Track-up orientation, which can be set in the **Graphics** section.

On the right, the map scale is shown.

Figure 7. A navigation page

Two lines can be seen on the screen, starting at the aircraft. The first one is showing the direction of your movement, your track, and the second one is showing the direction to your chosen turnpoint, the destination line. Colours can be changed in the **Graphics** setup menu.

4.2.2 The Header

The Header represents the top part of the screen, covering three vital pieces of information:**Page name, Turnpoint name** and **Relative bearing**.

In the far top of the screen, we can see **'TP:'** written. The **TP** indicates that we are on the **Turnpoint navigation page**. After the colon, the name of the turnpoint to which we are navigating to is displayed.

Next to the turnpoint name, relative bearing is shown in degrees. When the relative bearing is 0, we are flying towards the turnpoint.

Since the relative bearing is calculated from the bearing to turnpoint and your current **track** (not heading), **the wind is already calculated into the relative bearing**.

On either side of the relative bearing, a green arrow will show in which direction you should turn by the noted amount of degrees in order to be on course for the turnpoint.

4.2.2.1 The NavBox line

In the lower part of the screen a **NavBox line** containing 4 NavBoxes is shown. **Ground speed, Track, Bearing** and **Distance** to turnpoint are shown.

4.2.3 Turnpoint navigation page

This page is used for navigating towards a single turnpoint, from the .cup file, loaded into the LX Traffic Square. The navigation screen shows turnpoints, airports and airspaces.

Figure 8. Turnpoint page overview

Basic operation on this page has been explained in the **Navigation pages** section. Here, we will explain some specifics of the Turnpoint navigation page, and how to perform basic Turnpoint operations.

Long-pressing the **push-knob** will open the TP info sub-page, showing Bearing, Distance, Surface type and Elevation, if available.

Figure 9. Turnpoint additional info

Above the Bearing, an arrow is shown. The direction of the arrow indicates the steering course, relative to your current track.

Short-pressing the **push-button**, while on the navigation page, you will enter the 'Select turnpoint' sub-page. Here, a selection of turnpoints will be shown, along with distance and bearing, as well as **(relative bearing)** as described earlier, with an arrow. These points can be sorted by either Distance, Name, or Code.
Choosing Name or Code will open up the Filter setting, where you can type the name or code

lettering. Choosing a turnpoint will set the turnpoint as the navigation point for the turnpoint navigation page.

For additional info on how to install database files, check the **Transfer** section of this manual.

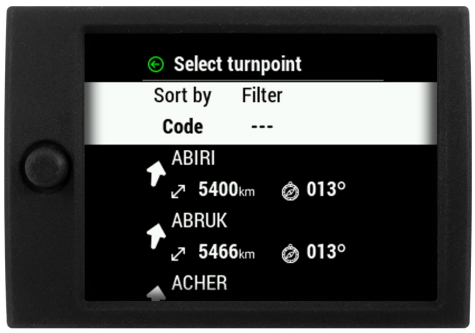

Figure 10. Turnpoint selection sub-page

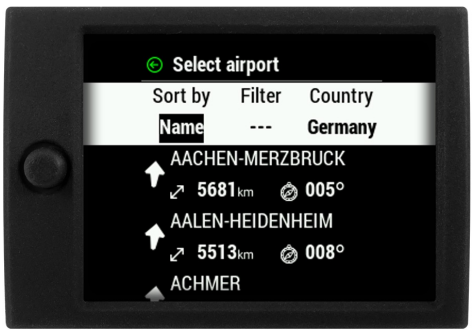

Figure 11. Search by name

4.2.3.1 Choosing a Turnpoint

To recap on how to choose a Turnpoint for navigation, follow these steps:

0. Have a .cup file loaded and selected
1. Go to the Turnpoint navigation page
2. Short-press the **push-button**
3. Select the sorting criteria **Name, code and distance available**
4. Type in the Name or code if Name or code are chosen as sorting criteria
5. Scroll the list until you find the desired turnpoint. You can scroll regularly with the up-down movement of the push-button
6. Confirm the desired point by pressing the push-knob
7. The device will automatically take you back to the Turnpoint navigation page and start navigating to the desired turnpoint.

NOTE

In order to use navigation pages to their full extent, be sure to have airspace (.cub), turnpoint (.cup) and airport (.af) files installed. Some of these, like .cup and .cub files, are available on competitions, from club managers, or governing national air bodies (like DAeC) or can be created by yourself manually, while other, like the .af file, are provided solely by LX navigation.

NOTE

Files provided by LX navigation (.cub and .af) can be found on **https://www.lxnavigation.com/support**. LX navigation does not provide official .cup files, for unofficial turnpoint files, you can check with your club mates and webpages like **https://www.openflightmaps.org**/.

4.2.4 Airport navigation page

The Airport navigation page is set up in much the same way as the **Turnpoint navigation page**, so be sure to check the previous section for additional information.

This page is used for navigating towards a single airport, from the .af file loaded into the LX Traffic Square. The navigation screen shows turnpoints, airports and airspaces on the map area.

Figure 12. Airport navigation page overview

Basic operation on this page has been explained in the **Navigation pages** section. Here, we will explain some specifics of the Airport navigation page, and how to perform basic Airport operations.

Figure 13. Airport selection sub-page

Figure 14. Airport additional info sub-page

Long-pressing the **push-knob** will open the APT info sub-page, showing Bearing, Distance, Surface type, Elevation, Airport Frequency and Runway directions.

Short-pressing the **push-button**, while on the airport navigation page, you will enter the 'Select airport' sub-page. Here, a selection of airports will be shown, along with distance and bearing, as well as steering course (relative bearing) as described earlier, with an arrow. These points can be sorted by either Distance, Name, or ICAO code.

Choosing Name or ICAO will open up the Filter setting, where you can type the name or code lettering. Choosing an airport will set the airport as the navigation point for the airport navigation page.

NOTE

When selecting an airport, the lady from the LX Traffic Square's internal voice module will notify you over the speaker of the runway's direction and airport frequency.

4.2.5 GPS DATA INVALID

If you lack a GPS connection, there will be a red cross across the screen and **'GPS DATA INVALID'** written in a notification box.

If this happens, check that your device is connected to a GPS source (Flarm device), that it has a clear line of sight from the GPS antenna to the sky, and wait for the device to connect.

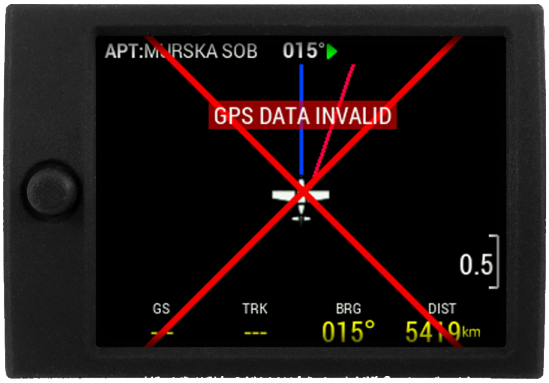

Figure 15. GPS DATA INVALID

4.3 Info page

The info page shows the current GPS status and additional info, received from the GPS, like the GPS location, UTC time and date.

The device shows the battery voltage of the LX Traffic Square's external (airplane) power supply.

Lastly, the page shows the Flarm connection status, and Flarm device ID. You can use this ID to register the device at OGN network.

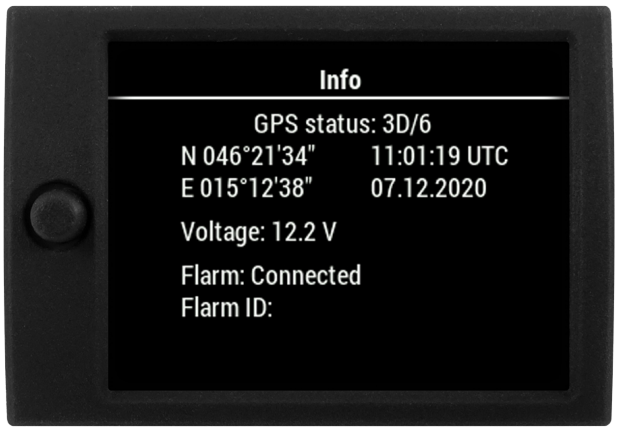

Figure 16. Info page overview

4.4 Logbook/Flight statistics page

This page can be either the 'Logbook' or 'Flight statistics page, based solely on if the device is in flight mode.

4.4.1 Logbook

When the device is not in flight mode, this page will be in Logbook mode.

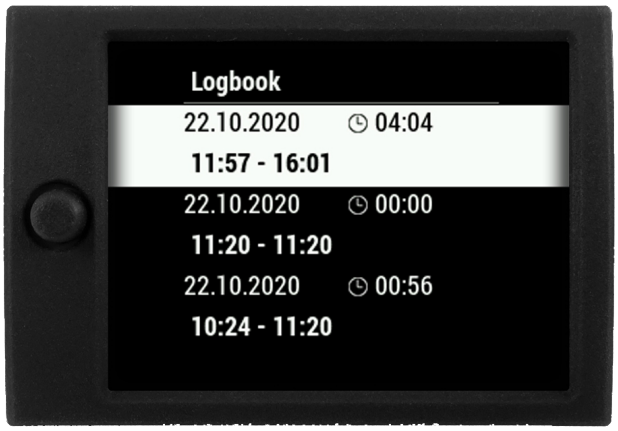

Figure 17. Logbook page

Entering the Logbook page will show the list of all flights the LX Traffic Square has in its memory. You can move up-down the list with the up-down movement of the push-button.

4.4.2 Flight statistics

Once the device enters flight mode, the Flight statistics page appears.
We can see the take-off time, flight duration, maximum altitude and maximum indicated airspeed, as well as an altitude graph.

NOTE

Once the LX Traffic Square determines that you are not in flight, it will start the 5 minute countdown to finishing your flight.
The conditions for finishing a flight are:

- GPS lock
- Ground speed less than 10 m/s
- Altitude less than 3000 m QNH

NOTE

If you wish to forcefully finish a flight, prior to the LX Traffic Square starting the finish procedure, you can do this by going to the 'Flight statistics' page and pressing the push-knob and confirming the 'End flight?' question.

WARNING

If the LX Traffic Square turns off due to the external power supply being cut, the flight might not be logged.

Device setup

This section will go through the complete setup process for the LX Traffic Square. It is important to note that the Setup menu is divided into two sections - the **User** and **System** settings.

Settings in the User setting part of the menu tailor the user experience with features such as Voice & sounds, Active pages and Graphics.

The System part of settings embodies system settings, including Units, NMEA settings, Transfer, Localisation and Service options.

5.1 User settings

The user part of setup incorporates the following sub-menus:

- **Voice**
- **Pages**
- **Graphics**

5.1.1 Voice

The Voice setup sub-menu holds the volume and mixer options for voice warnings, as well as a list of available voice warnings to choose from.

- **Volume**
- **Mixer**
- **Flarm traffic**
- **Flarm warning**
- **Flarm obstacle**
- **Flarm h. distance**
- **Flarm v. position**

5.1.2 Pages

The pages setup sub-menu provides the pilot with a list of all primary pages. The pilot can choose to show or hide different pages, i.e. hiding the TP navigation page if you lack the need for it.

- **Flarm**
- **TP page**
- **APT page**
- **GPS info**

5.1.3 Graphics

The Graphics sub-menu provides the pilot with options for personalizing the graphical appearance of the LX Traffic Square.

The following sub-pages exist:

1. **Airspace**
2. **Map**
3. **Theme**

5.1.3.1 Airspace

The airspace sub-menu holds the settings for colour and transparency of the fill and outline for the following airspace types:

- **Controlled zone**
- **Prohibited**
- **Restricted**
- **Danger**
- **Terminal area**
- **Airway**
- **Glider**
- **Military**
- **Other**
- **Class A, B**
- **Class C**
- **Class D**
- **Class E**
- **Class F**

5.1.3.2 Map

The Map sub-menu holds settings for the graphical appearance of the Map are on all navigation pages. The following settings are available.

- **Orientation -** offers the two common map orientations - 'North up' and 'Track up'.
- **TP/APT text size -** changes the size of airports and turnpoints names on the map.
- **Dest. line colour -** the colour of the line connecting your current position and your navigation point.
- **Track line colour -** the colour of the line showing your current true track.
- **Display APT names -** whether or not to display airport names (alongisde the icon) on the map.
- **Display TP names -** whether or not to display turnpoint names (alongside the icon) on the map.

NOTE

APT icons are shown on the map up to a zoom level of 25km. TP icons are shown up to a zoom level of 9km. At higher zoom levels we are only showing Airspace lines, due to legibility.

5.1.3.3 Theme

The Theme sub-menu offer the pilot to choose between 2 themes. White panel uses the white colour for background and black and black text, while the black panel uses the black colour for background and white colour for letters.

WARNING

Changing the theme will cause the unit to instantly restart. Changing the theme in flight is not possible, due to this reason.

NOTE

Experience has shown that in high sunlight conditions, the 'White panel' colour theme is most visible, while the 'Black panel' colour theme is least straining for the eyes in low light conditions. Of course, sometimes it is just a matter of taste, which means **De gustibus non est disputandum**.

Due to the transflective display we recommend using the white theme. The white theme enables the transflective LCD panel to reflect the light from environment (eg. Sun) back to the user. This type of screen is visible in any ambient light conditions.

5.2 System settings

5.2.1 Aircraft

The following aircraft associated settings can be found in this sub-menu:

- **Category -** which category of aircraft does your aircraft belong to. Changing this will change the aircraft icon, as depicted with the aircraft icons selection below.

Aircraft icon selection:

- **Airplane** - 
- **Rotorcraft** - 
- **Jet** - 
- **Glider** - 
- **Gyrocopter** - 
- **Fighter** - 
- **Motor glider** - 
- **Airship** - 

5.2.2 Units

Sets the units used for different parameters throughout the device. The following parameters and units are available:

- **Altitude -** meters [m] or feet [ft]
- **Climb rate -** meters per second [m/s], knots [kts] or feet per minute [fpm]
- **Speed -** kilometers per hour [km/h], miles per hour [mph] or knots [kts]
- **Wind speed -** kilometers per hour [km/h], miles per hour [mph], knots [kts] or meters per second [m/s]
- **Distance -** kilometers [km], nautical miles [nm] or statute miles [ml]
- **Pressure -** hectopascal [hPa], inches of mercury [inHg] or millibars [mb]
- **Temperature -** degrees Celsius [C] or degrees Fahrenheit [F]
- **Weight -** kilograms [kg] or pounds [lb]
- **Aera -** square meters [m2] or square feet [ft2]

5.2.3 NMEA

The LX Traffic Square acts as a pass-through device for NMEA data received from the Flarm through the **DATA IN** port and forwards it through the **DATA OUT** port.

The pilot can set the bauderate of both the incoming and outgoing data by selecting one of the options between **4800** & **11520**.

5.2.4 Transfer

The Transfer sub-menu setup page holds all microSD transfer related options. In this setup page, we will see how to transfer database files, load tasks and FlarmNET files.

WARNING

LX navigation provides database files on an informative level and can in no way be held accountable implicitly, or otherwise, for and damage, be it material, personal or other, that may occur due to the use of this device. It is the pilot's responsibility to abide to all rules of air safety and to utilize good airmanship practice. In this sense, information provided by the LX Traffic Square is of an informative nature only and should be taken with reserve. No guarantees are made on the accuracy of information found in databases released by LX navigation.

WARNING

It is important to note, that some microSD cards of lower quality may cause issues and not be read by the LX Traffic Square. This is why we strongly recommend you use the supplied SanDisk Ultra red/grey micro SD card, supplied with the device, as depicted on the figure below. The microSD card should be formatted to the FAT32 file system. Cards of up to 32 GB of memory were successfully tested on the LX Traffic Square.

Figure 18. The correct type of microSD

NOTE

Pilot must be careful not to exceed the file size of 750 kB, except "FlarmNET" file, where the max file size of 5 MB is allowed.

NOTE

If you have just inserted the microSD card into your LX Traffic Square unit and the files are not showing up, try leaving the transfer setup page and entering again.

5.2.4.1 Turnpoints

Turnpoint files, in the .cup file format, are not supplied by LX navigation, but can usually be found at competitions, various webpages or from club manager and club mates. As a starting point, you can check the **Open flight maps**. You can even create your own turnpoint files either by hand, or using different software.

In order to use turnpoint files on your LX Traffic Square, first you need to copy them to the device. In order to do this, you need to have the file saved to the **root of your microSD card**. Once the microSD card is inserted go to **Load** sub-menu and select the file you wish to transfer to the LX Traffic Square's internal memory.

Now go to the **Select** sub-menu and select which of the files in the LX Traffic Square's internal memory you wish to have active.

You can have multiple turnpoint files active at the same time.

NOTE
The LX Traffic Square requires turnpoints in the .cup file format.

5.2.4.2 Airports

Airport files, in the .af file format, are supplied by LX navigation exclusively. For the latest available database files, check the **Support part of LX navigation website**.

The airports file holds the frequencies to all airports, which is why it is especially important to use the latest database files available. If inconsistencies are found in the files, please refer them to the **LX navigation support email**.

In order to use a certain airport file, first you need to copy it to the LX Traffic Square's internal memory, through the **Load** sub-menu, and then select it as active through the **Select** sub-menu. Only one airports file can be active at a time.

NOTE
The LX Traffic Square requires airport files in the .af file format.

5.2.4.3 Airspace

Airspace files, in the .cub file format, can be found on both the **LX navigation support** part of webpage, as well as supplied by competition directors, club managers, club mates and other readily available database sources.

In order to use a certain airspace file, first you need to copy it to the LX Traffic Square's internal memory, through the **Load** sub-menu, and then select it as active through the **Select** sub-menu. Multiple airspace files can be selected at once.

NOTE
The LX Traffic Square requires airspace files in the .cub file format.

5.2.4.4 Flarm NET

The LX Traffic Square allows the utilization of **Flarm NET databases**. If a database is used, and a Flarm object with a Flarm ID found in the database shows up, the LX Traffic Square will automatically use the info from the FlarmNET database and assign it to the said object.

5.2.5 Localisation

Contains information regarding the local settings of the LX Traffic Square. In this setup menu the language of the device, timezone and a check box for daylight saving time can be set.

At this moment, the following languages are available:

- **English**
- **Dansk**
- **Deutsch**
- **Italiano**
- **Nederlands**
- **Norsk**
- **Slovenščina**

If you wish to contribute and add your language, contact us at **LX support**.

5.2.6 Service

The Service setup page contains various device and service related settings, as noted below:

- **Device info -** shows basic information regarding the LX Traffic Square:
  - **Serial number**
  - **Firmware version**
  - **Build**
  - **Hardware version**
- **Flarm info -** shows additional info related to the connected Flarm device
  - **Hardware version**
  - **Serial number**
  - **Firmware version**
  - **Database**
  - **Database exp. date -** database expiration date
- **Password -** opens up the dialog for admin passwords.
- **Software update -** used for updating the device. For further information, check the **Performing an update** sub-section for additional info.

The following passwords are at the pilot's disposal:

- **46486 -** Deletes all internal files (database files, pilot information, etc.) Can be considered as reverting the device to factory settings.
- **99999 -** Empty logbook

Configuration portal

This section will cover the complete specter of unit's built-in WiFi configuration portal.

Detailed description on how to connect to configuration portal is described in section WiFi portal.

There are 7 primary menu items in the portal main menu a.k.a. dashboard. The items are listed as follows:

1. **System info**
2. **Status**
3. **Configuration**
4. **Transfer**
5. **Logbook**
6. **Traffic Monitor**
7. **Range Analyzer**

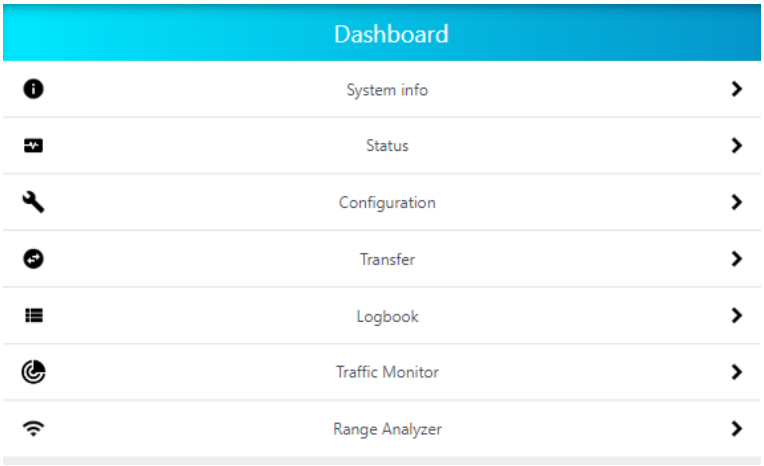

Figure 19. Dashboard overview

6.1 System info

This page displays detailed information about the unit and it's components. As mentioned in section Performing an update, unit consist of FLARM module which actually performs traffic awareness and collision avoidance functions and Eagle module which serves connectivity and configuration purposes.
Information is divided into four logical sets:

- **FLARM** - contains FLARM module related info,
- **System** - contains Eagle module related info,
- **Database** - shows current obstacle database info,
- **Development** - shows development information used for debugging and possible issue analyzing.

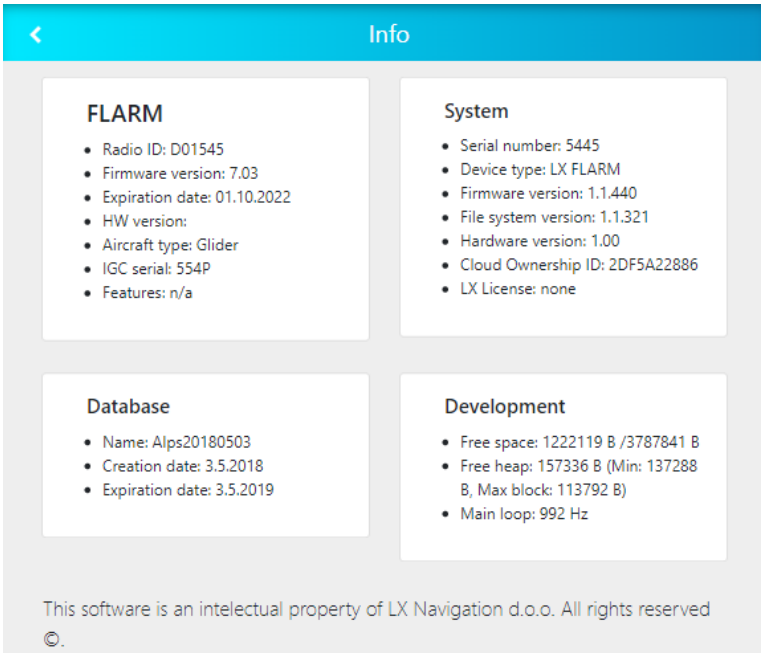

Figure 20. System info page

6.2 Status

Status page serves a focal point for checking the current unit's operational state. There are two colour indicators separately showing current FLARM and GPS signal status (green for OK and red for BAD signal).
There are two additional colour indicators which are by default gray and blink green when signal is transmitted or received on FLARM antennas.

There is a separate set of attributes related to GPS status. For 3D position a signal from a minimum of 4 satellites have to be received. However 6 or more is desirable.

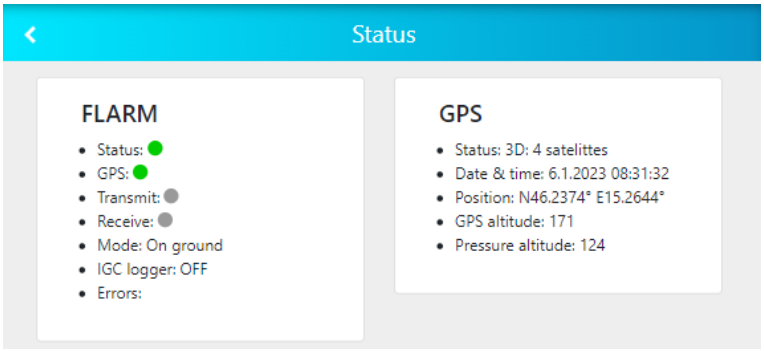

Figure 21. Status page

NOTE
When installing GPS antenna follow guidelines from PowerFLARM Eagle Installation manual (Document LX$_{FEIM}$).

6.3 Configuration

The main feature of PowerFLARM Eagle is it's capability and ease of configuring the unit via WiFi configuration portal.

Configuration is divided into three logical sets.

FLARM

FLARM configuration is a set of parameters that are being send directly to FLARM module. Besides portal, these settings can be configured by the use of the config file stored on the USB flash drive or via FLARM port using FLARM data port interface protocol as well. Please check section USB configuration or FLARM document FTD-012 Data Port Interface Control Document.

Keep in mind that some parameters shown on the figure FLARM configuration depend on the FLARM module features and loaded licenses. For example ADS-B ranges are available only if ADS-B in license is loaded.

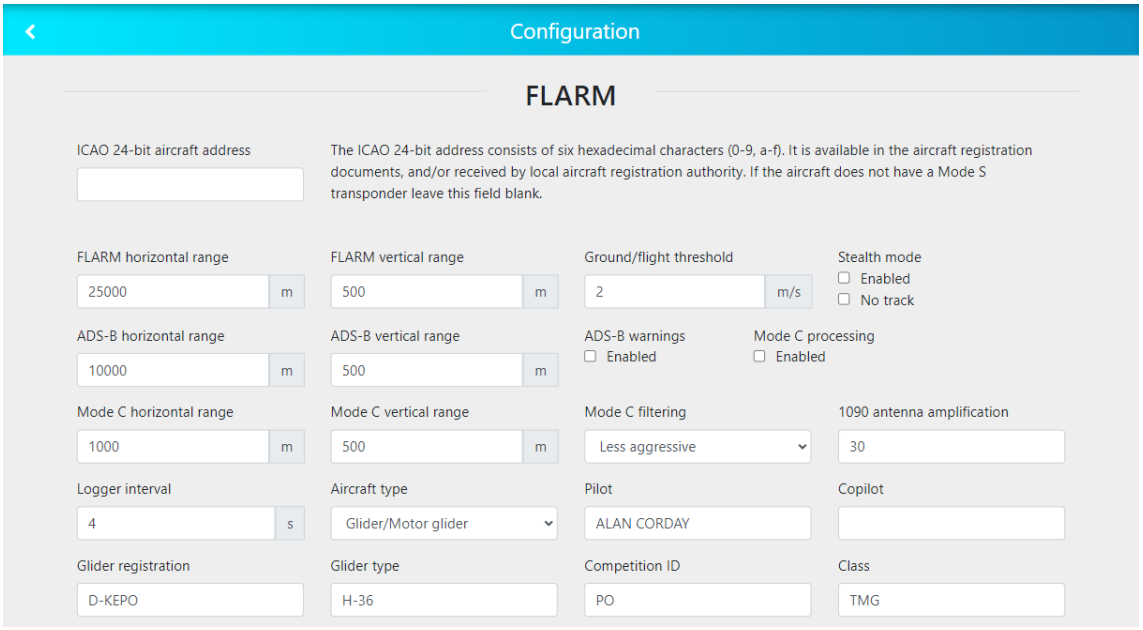

Figure 22. FLARM configuration

System

System configuration is a set of settings related to connectivity and voice/audio features.

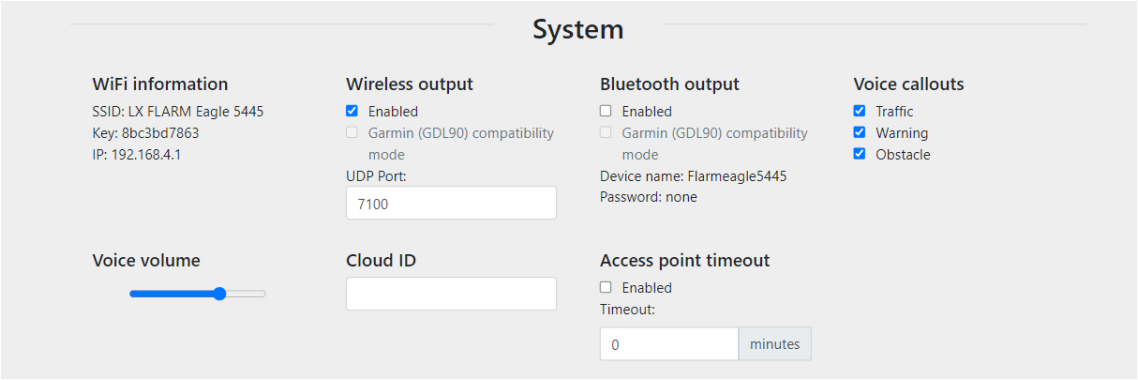

Figure 23. System configuration

Units

Unit settings are used for personalizing Traffic Monitor display.

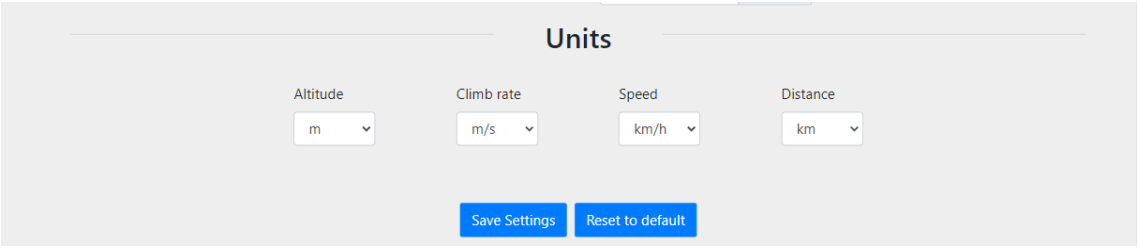

Figure 24. Units

6.4 Transfer

This page features a sub-menu for uploading and downloading files from the unit.

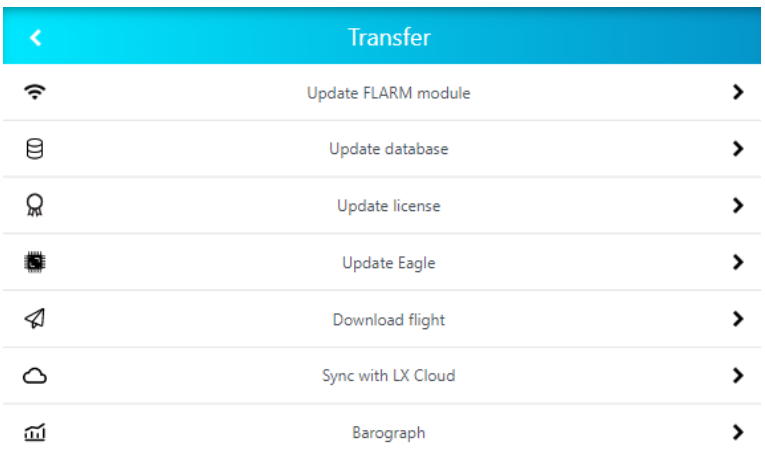

Figure 25. Transfer sub-menu

FLARM firmware, obstacle database and license

Flarm module firmware, obstacle database and license files can be uploaded/updated using these pages.
The desired file is selected with system dialog after pressing "Choose file". The upload is initiated with button "Upload".
Status message at the bottom of the page will indicate the progress of the upload.

Details on updating Flarm module can be found in section Performing an update.

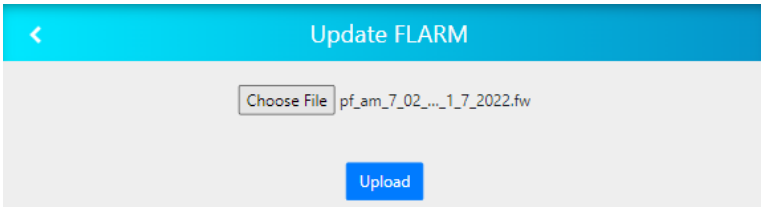

Figure 26. Flarm module update

Eagle firmware and file system

Eagle module firmware and file system can be updated using these pages.

Details on updating Eagle module can be found in section Performing an update.

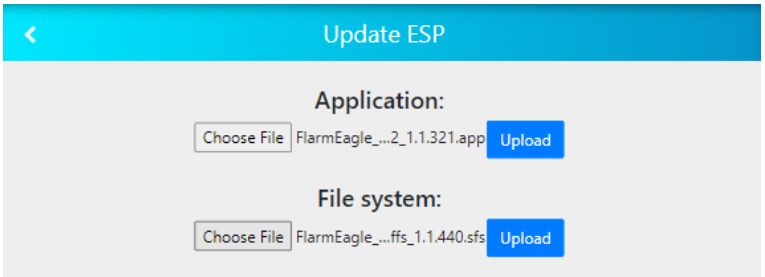

Figure 27. Eagle module update

Sync with LX Cloud

Flights recorded on PowerFLARM Eagle can be synchronized to LX Cloud.

The unit will list the available networks as on figure Select network. In case the unit was previously already connected to the network that is currently available, it will first prompt user whether he or she wants to connect to that network or to select another.
If option to connect to the last network is selected, PowerFLARM Eagle will automatically connect using same credentials as previously. If other network is desired, user will be prompted to enter new network parameters. This is normally network authentication key/password only. In case the network uses static IP addressing, additional options display after checking "Static IP DNS" checkbox.

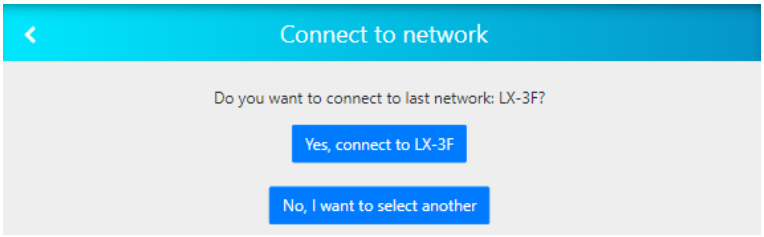

Figure 28. Connect to last network

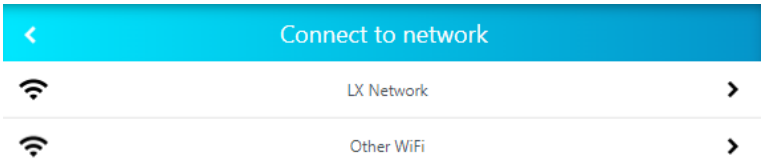

Figure 29. Select network

After the connection is established PowerFLARM Eagle uploads flights to LX Cloud.

In the mean time the portal will shutdown and unit's access point won't be accessible. This due to the fact the network module can only work either in the access point or client mode. But not both at the same time.

NOTE
Keep in mind that User Cloud ID has to be entered in System Configuration for this feature to work.

Details on LX Cloud features can be found in section Cloud services.

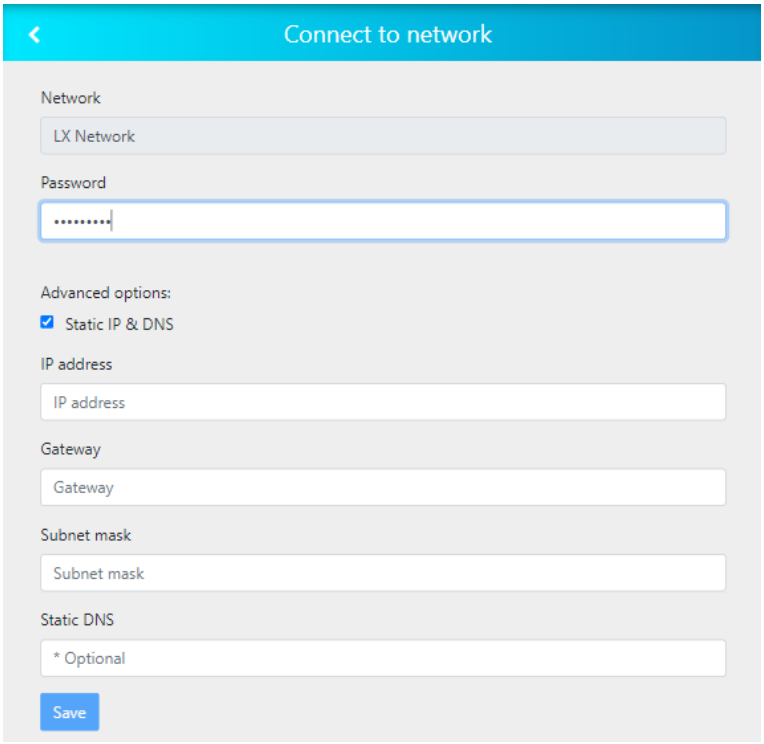

Figure 30. Set network parameters

Barograph

Each unit with IGC logger features is simulated altitude tested in factory. The resulting barograph is supplied with the unit physically on the paper and electronically in the unit's internal memory.
Electronic version can be recalled using this menu (button "Download PDF"). In case the new altitude test is being performed in the lifetime of the unit, it can be uploaded into unit's internal memory using the same menu (button "Update file").

NOTE
If a new file is uploaded into PowerFLARM Eagle's internal memory, the old factory generated file is overwritten. It is strongly recommended that before new file is uploaded, the old one is downloaded and safely stored.

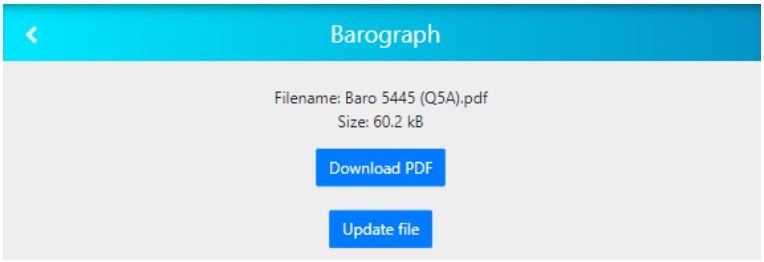

Figure 31. Barograph

6.5 Logbook

The most convenient way to download flight is via USB flash drive, as it is an automatic procedure. FLARM module will store all finished flights from internal memory to USB flash drive (if it is inserted). Stored flights can be viewed on PC (.igc format).

However if having USB flash drive inserted into PowerFLARM Eagle all the time is not convenient, flights can be viewed and downloaded directly to mobile device from configuration portal as shown on the figures: Flights overview and Flight details.

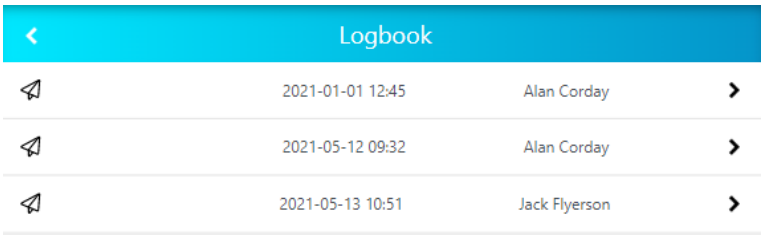

Figure 32. Flights overview

Figure 33. Flight details

6.6 Traffic Monitor

This page features a FLARM radar page that can be used for traffic awareness in case no dedicated FLARM compatible display is connected on the unit or for testing purposes.

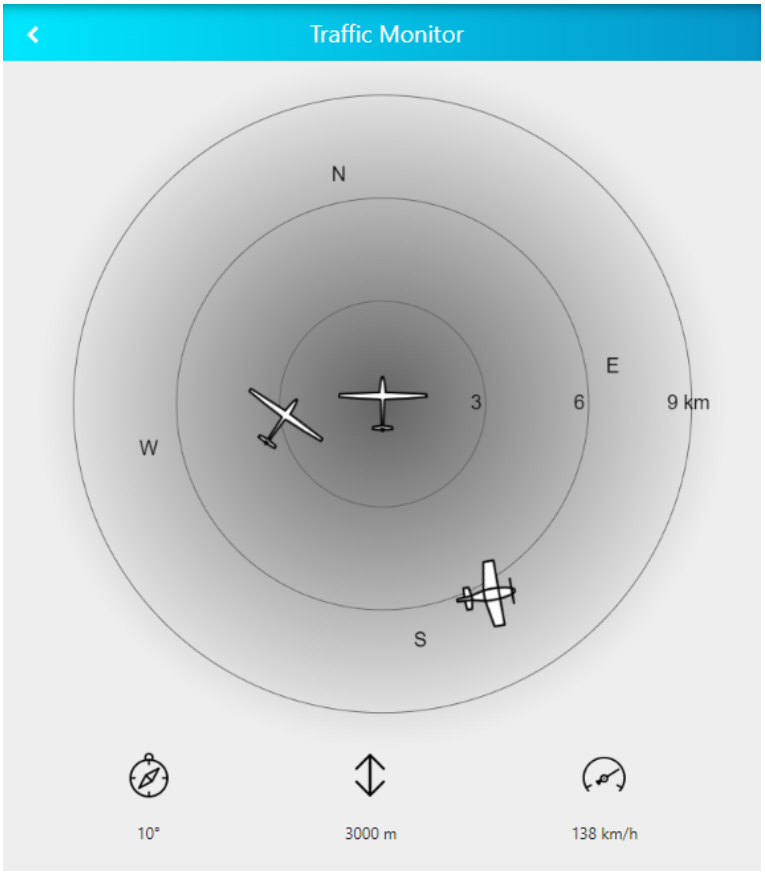

Figure 34. Traffic Monitor page

WARNING
This page does not feature any warning capabilities, only the traffic awareness bird view.

6.7 Range Analyzer

This page features a FLARM antennas range anylizer tool. It is highly useful for determining the antenna locations on the airplane. Range of each antenna is shown in 20 18° sectors in green and blue colour. The red line represents minimum recommended range for each sector.

For the tool to work, it needs previous contacts. Contact means a reception from other FLARM equipped airplanes. More contacts basically means better statistics. However if the period of recording is too long a recent degradation of antenna range stays hidden. It is therefore recommended to reset statistics at least once per year (annual inspection) or after a change in the airplane equipment is performed.

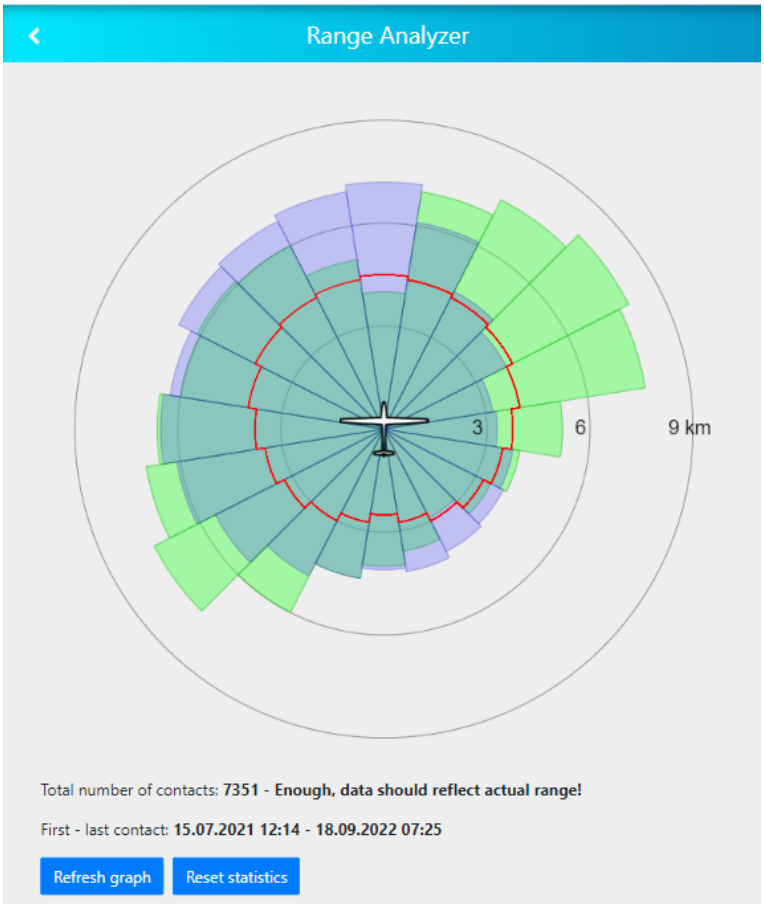

Figure 35. Range Analyzer page

6.8 USB configuration

Besides the WiFi configuration portal, PowerFLARM Eagle can be configured by the use of the config file stored on the USB flash drive as well. This is done using on-line software FLARM CONFIGURATION TOOL from flarm.com (can be found under Support/Tools Software.)

USB interface is located on the left side of the Power FLARM Eagle casing.

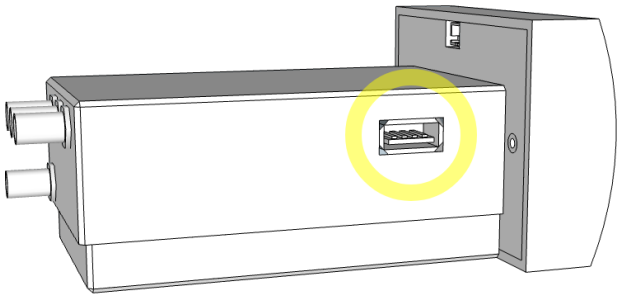

Figure 36. USB interface location

Taking care of your PowerFLARM Eagle mobile 2022

If you were taken here by following the link from the introductory part of this manual, you can get back by clicking on the underlined text - **Using this manual**.

7.1 Display

Leaving the glider canopy open in the sun is known to have a magnifying glass effect, concentrating the sun rays to a smaller area. This can damage the internals of your cockpit, as well as the display of the PowerFLARM Eagle mobile 2022. Applying excessive heat will make the coating of the display start to become yellow and bubble (best case scenario), or destroy the device completely.

This is why it is prudent to always have your canopy, or your instrument panel, covered from direct sunlight.

7.2 Device housing

Visible external damages to the housing of the PowerFLARM Eagle mobile 2022 can void your unit from a warranty repair.
By FAI IGC rules, visible external damages can void your competition, record or badge flight, from being processed as valid if the unit is used as an IGC recorder. Care should be taken not to damage the housing and the 'Data not valid if seal is broken' stickers not to be torn up.

7.3 MicroSD card reader

The unit features a microSD card reader on the side of the device. The microSD should always be inserted carefully, not to miss the internal microSD card reader electronics. Sometimes when taking it out, the microSD card can eject, due to the spring-loaded mechanism inside, so the pilot should take care not to loose the card.

7.4 Internal battery

The unit is equipped with internal rechargeable Lithium-ion battery. All batteries are sensitive to the temperature at which they are being operated. To maintain your battery in a good health, keep the unit in environment between -20°C and 40°C when being used or between

0℃ and 30℃ when storing it for a longer period of time.
The optimum temperature for charging is 20℃. Do not charge the batteries at temperatures exceeding 0℃ and 40℃.
The unit is equipped with protection circuits for charging the batteries. This prevents batteries to be overcharged or drained completely.

7.5 USB connector

The PowerFLARM Eagle features a USB 2.0 A interface on the left side of the device. The USB extension cables or flash drive should always be inserted and removed carefully.

7.6 SMA (antenna) connectors

SMA screw in connectors are used for all types of antenna connections. Make sure the cable routing is performed in compliance with PowerFLARM Eagle Installation manual (Document LX_FEIM). In any case avoid sharp bends.

Cloud services

This section covers in detail everything regarding connectivity and cloud features of LX navigation.

To use LX cloud features, you will need to have a system or device that has access to the internet (a WiFi module inside). The following systems are capable of utilizing LX cloud features:

- Any **Zeus system** with the following variometers:
  - **Era 80**
  - **Era 57**
  - **Eos 80**
- **LX 10k -** with any vario unit
- **Era 80 -** standalone variometer
- **Era 57 -** standalone variometer
- **Eos 80 -** standalone variometer
- **Colibri X -** handheld flight logger
- **PowerFLARM Eagle 2022 -** FLARM transceiver (supports logbook syncronisation feature only)

If you have an older type **Zeus system** with a **USBD 60** or **Eos 57** variometers, you will need to acquire one of the variometers noted above. To get information on these units, feel free to contact **info@lxnavigation.com**.

The LX cloud system offers the following features to our pilots, depending on the system they have:

- **Database synchronisation**
- **Logbook synchronisation**
- **Automatic updates**
- **Weather information for the Zeus**
  - SkySight
  - Rain Radar
- **Mail**
- **OLC**
- **SeeYou Cloud**
- **Soaring spot**
- **WeGlide**

8.1 Cloud interface

The LX cloud is located under the following link: **https://cloud.lxnavigation.com/login**.

Once you've clicked on the link, you will be taken to the Login/Registration page. Fill out your registration or login if you've already registered.

We use a standard registration process, where you'll need to confirm your registration in an email we sent you. Be sure to check your SPAM folder if you can not find it.

Once registered, you will be greeted with the main page - the Dashboard.

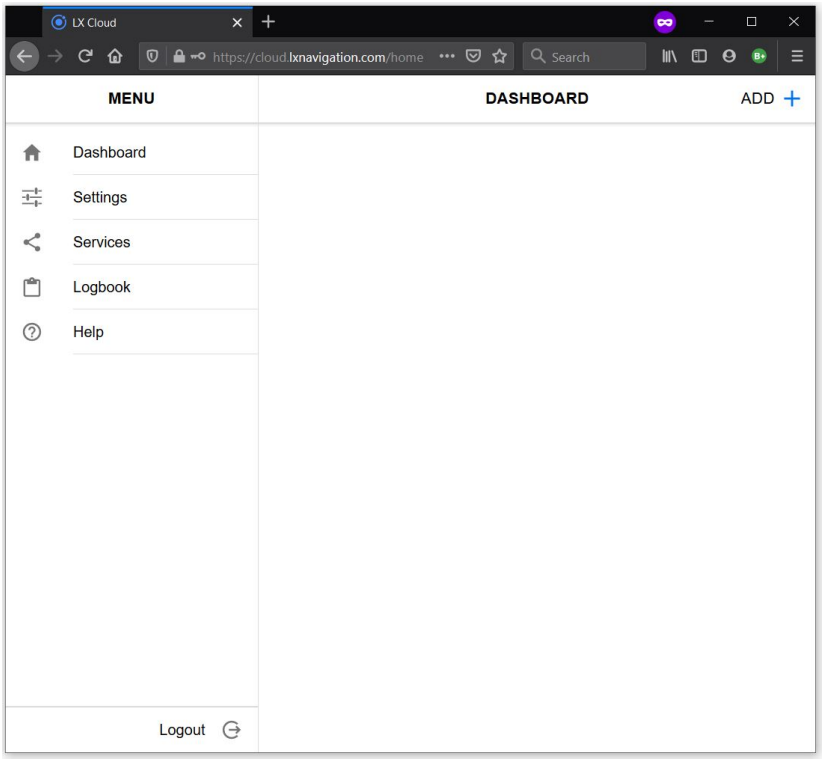

Figure 37. Dashboard overview

The Dashboard is used to display all devices you have registered to your name on the right and additional options and services to the left. Once you've added a device, it is displayed as pictured on the figure below.

8.1.1 Adding a device

It is important to note that the LX cloud recognizes two different types of users: *Administrators* and *Users*.

Here are the differences between **administrator** and **user** accounts: **Administrators can:**

- **Backup device files**, which can be used in case there is an issue with data corruption

- **Set glider number of hours and flights**, the LX cloud will then show the current total hour and flight count for the glider in question and choose device administrator email
- **Set which database files are in use**, these files will be automatically uploaded to the device, once online
- **Access ALL flights in the device's memory**, regardless of which pilots have actually flown the flight

Users can:

- **Backup device files**, which can be used in case there is an issue with data corruption
- **Remove device from LX cloud profile**
- **Access flights in the device's memory**, which have been made by the user's LX cloud profile (if the Cloud ID has been properly used)

In a club environment, the administrator would be the person designated by the club to keep all devices up to date and all database files current, as well as the person who needs to be able to check **all** flights flown on the glider. Each pilot still has the full freedom to choose in his own pilot profile on the device, which files is he going to use.

8.1.1.1 Adding a device as Administrator

Firstly, we need to acquire the information required for adding a device. The following info is needed:

- **Cloud ID -** found in our LX cloud web-application under the following link: **https://cloud.lxnavigation.com/login**. It can be found under the Settings tab. Is different for every Cloud user account.
- **Cloud ownership ID -** found on device itself by going to **Setup** > **Service** > **Device info**. Is different for every device.
- **Serial number -** found on device itself by going to **Setup** > **Service** > **Device info**. Is different for every device.
- **Administrator email -** if you wish to add additional administrators.

In order to add a device as an administrator, click on the **ADD +** button in the upper right corner in LX cloud. On your device, go to **Setup** > **Service** > **Device Info**, where you will find the **Serial Number** and **Cloud Ownership ID** needed for registering your device.

If the device you're adding is part of a system (like a Zeus-Era system), you only need to add the Era and it will in turn now that a Zeus is connected and report it automatically. Both devices in a system (Zeus and Era) share the same Cloud ownership ID.

If the device is part of a club, the designated club administrator's email should be added. You can add as many administrators as you wish and they will all share the same administrator

privileges as noted above (useful for co-owned gliders).

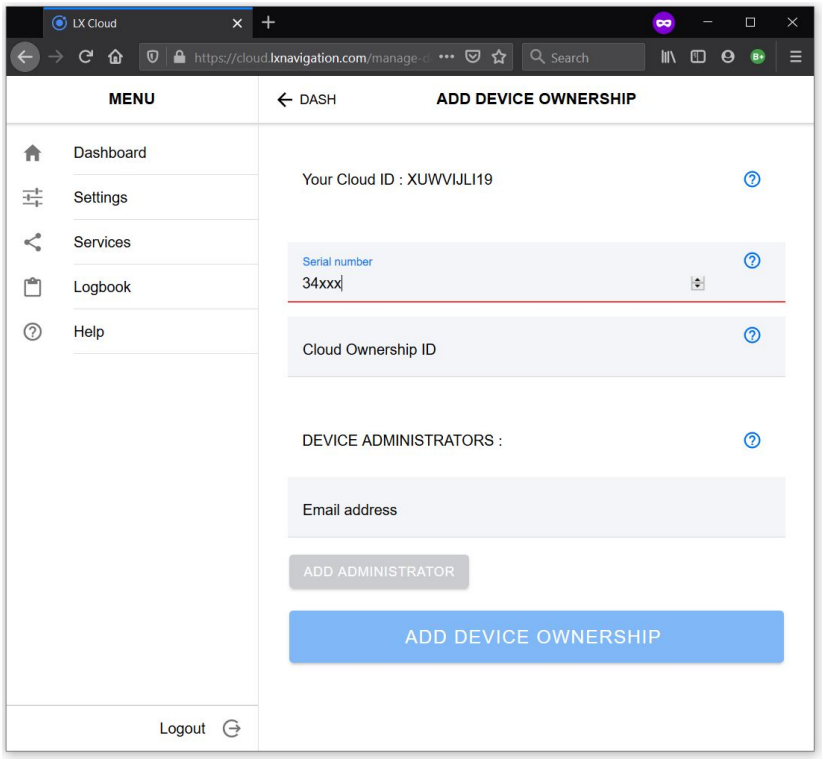

Figure 38. Adding a device as administrator

Once finished, press 'ADD DEVICE OWNERSHIP' and your unit will be added to your LX cloud pilot profile. Now, the unit is shown on your dashboard and additional options are available.

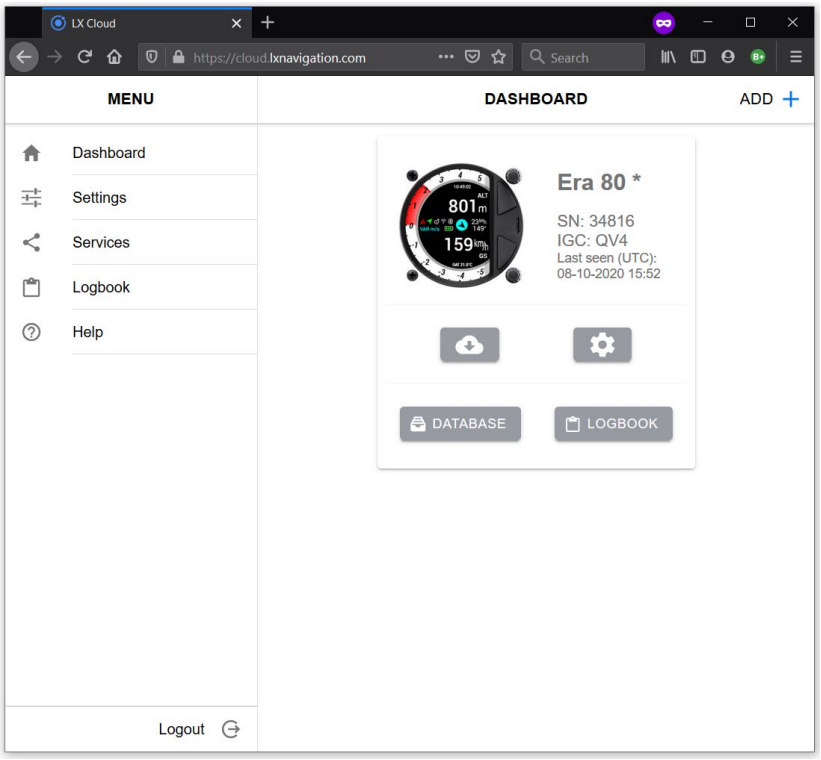

Figure 39. Dashboard overview with a device

8.1.1.2 Adding a device as User

On your device (Era, 10k, Eos 80, Colibri X - the IGC logger in your system), go to Setup > Pilot and type in the Cloud ID found in the cloud web interface under Settings. The device will connect your pilot profile on the device with the cloud profile.

A device will appear on your dashboard.

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