

# FlarmView<sup>2</sup>

Version 1.05



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## 1 Important Notices

Information in this document is subject to change without notice. LXNAV reserves the right to change or improve their products and to make changes in the content of this material without obligation to notify any person or organization of such changes or improvements.



A Yellow triangle is shown for parts of the manual which should be read very carefully and are important for operating the FlarmView<sup>2</sup>.



Notes with a red triangle describe procedures which are critical and may result in loss of data or any other critical situation.



A bulb icon is shown when a useful hint is provided to the reader.

### 1.1 Limited Warranty

This FlarmView<sup>2</sup> product is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, LXNAV will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour, provided that the customer pays for shipping costs. 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 STATE TO STATE.

IN NO EVENT SHALL LXNAV 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 states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. LXNAV 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 LXNAV dealer or contact LXNAV directly.

## **Packing Lists**

- LXNAV FlarmView<sup>2</sup>
- FlarmView<sup>2</sup> cable
- SD card

## 2 Basics

### 2.1 LXNAV FlarmView<sup>2</sup> at a Glance

LXNAV FlarmView<sup>2</sup> is a Flarm and ADS-B traffic and collision warning display with preloaded FlarmNet database. The 2" QVGA sunlight readable display has a resolution of 320\*240 RGB pixels. For simple and quick manipulation, four push buttons on the FlarmView<sup>2</sup>. FlarmView<sup>2</sup> monitors the vertical speed and altitude of each object on the screen.



The housing is made of robust ABS plastic. On the left side of the unit there is a rocker button, on the right side there are 4 rubber push buttons.

A 4 GB solid state disk is used for data storage.

Data downloadable through a USB connection which is compatible with all operating systems (MS Win, Linux and Mac OS).



At the left side of the unit there is a mini USB connector, this is used for charging and data transfer.

## 2.2 Technical data

### Hardware

- ARM M4 core processor
- 4GBytes memory solid state disc
- QVGA 320\*240 colour pixel TFT sunlight readable trans reflective LCD
- Three direction rocker button and four push buttons

### Input and output

- USB interface (mass storage device)
- SD card for data exchange
- Serial RS232 interface for PDA connection

### Size and weight

- Outline dimension: 65 x 42 x 18 mm
- Weight: ~36g

### Power

- Power input 9V-16V DC input.
- Consumption (0.84W) ~70mA@12V

## 2.3 Rocker button

The rocker button has several actions; you can press it or move it left or right.



Moving the rocker button will increase or decrease the sound volume when on an info page. On pages with the map, the rocker button has a zoom function. In the setup page, you can move through each menu and make changes.

## 2.4 Four push buttons

FlarmView<sup>2</sup> has four push buttons, which have a dynamic function.



The function of each push button is described on the blue label adjacent to the button. A label can have two options with the second option coloured red on the label. This indicates that the button has two functions. The blue option is operated with a short press and the red option with a long press. For labels with two options, the second option is typically the opposite function of the first option. e.g. Next/Previous, Insert/Delete, Ok/Cancel, forward/backward.

The functions of buttons are mostly related to the current page (waypoint, task, flarm, info and setup). If there is no label next to the button, this button has no function.

Select near Waypoint			Exit
Name	Dis.	Brg	
BORKUM	8144.9	37°	▲ ▼
JUIST	8160.7	37°	▲ ▼
WESTERLAND	8168.5	35°	▲ ▼
NORDERNEY	8169.2	36°	▲ ▼
NORDEN NORDE	8170.9	37°	▲ ▼

▲ Sel. S



## 3 Operation

There are two modes of operation: **Data transfer** mode and **Normal operation** mode.

When in the data transfer (USB mode) mode, data can be exchanged. Normal operation mode is when FlarmView<sup>2</sup> is not in USB mode.

In **data transfer mode**, the last two or three green LEDs will be permanently lit, on the screen, there will be a message "USB connected", whereas in the **normal operation mode**, up to four LEDs will be blinking, or the screen will display data only.

### 3.1 User Input

The FlarmView<sup>2</sup> user interface consists of many dialogues, which have different input controls. They are designed to make input of names, parameters, etc., as easy as possible. Input controls can be summarised as:

- Text editor
- Spin controls (Selection control)
- Checkboxes
- Slider control
- Line width control
- Colour selection

To move the function from one control to another, use **up** or **down** buttons. By pressing the **EDIT** button access to the control that is displayed is possible.



#### 3.1.1 Buttons on FlarmView2

Each of the four buttons have dynamically set functions. When you press a button, beside the button will appear a blue label with the action assigned to that button in that context.

On the main screen, the top button always performs the function of switching between pages. Short press will cycle in one direction between pages, a long press will cycle in the opposite direction between pages. A number of the pages look similar initially as the cycling between them simply change's the zoom level. The screen will momentarily be updated to reflect the new zoom level. The number in a zoom level icon shows us the outer circle radius (2km – depends on distance units setting etc.). The inner circle is half of that distance.

The Middle buttons help with target selection by cycling through available targets. The lower button has an EDIT function, where we can edit/view the currently selected target.



### 3.1.2 Text Edit Control

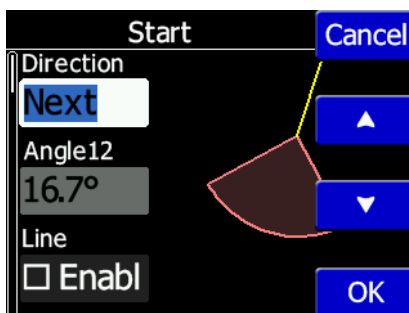
The Text Editor is used to input an alphanumeric string; the picture below shows typical options when editing text. Use the up/down buttons to change the value at the current cursor position.



Push button **next** = ">>B" will move cursor right. A long press on the **NEXT** button, will move the cursor left. At the last character position, a push of the button will confirm the edited value, long press **Ok C**) will cancel editing and exit that control. If a Long press is available, part of the button label will be a Gray colour. For the example above, a long press of the top button ">> B" has a "back" function. A long press of the bottom button has a "Cancel" function. The Flarm ID field is not editable; this is because the flarm identification number is unique.

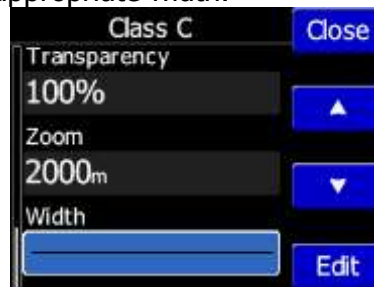
### 3.1.3 Selection Control

Selection boxes, also known as combo boxes, are used to select a value from a list of predefined values. Use the up/down buttons to select the appropriate value.



### 3.1.4 Line width selection

Line width boxes, are used to select a line width from a list of predefined widths. Use the up/down buttons to select the appropriate width.



### 3.1.5 Colour selection

Colour selection boxes, are used to select a colour from a list of predefined colours. Use the up/down buttons to select the appropriate colour.



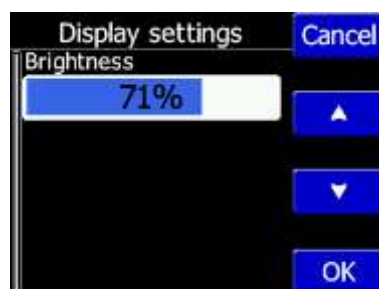
### 3.1.6 Checkbox and Checkbox List

A checkbox enables or disables a particular parameter. Press the **EDIT** button to toggle the value. If an option is enabled a check mark will be shown, otherwise an empty rectangle will be displayed.



### 3.1.7 Slider selector

Some values like volume and brightness are displayed as a slider



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With **EDIT** you can activate the slider control and then with the **up/down** buttons you can select the preferred value and confirm it with the **OK** push button.

### **3.2 Normal operation**

During normal operation mode, the user can use the FlarmView<sup>2</sup> as simple navigation, airspace indicator and Flarm radar display. There are five pages (information page, Flarm radar, waypoint page, task page and setup page).

## 4 Working with the FlarmView<sup>2</sup>

### 4.1 Tree structure

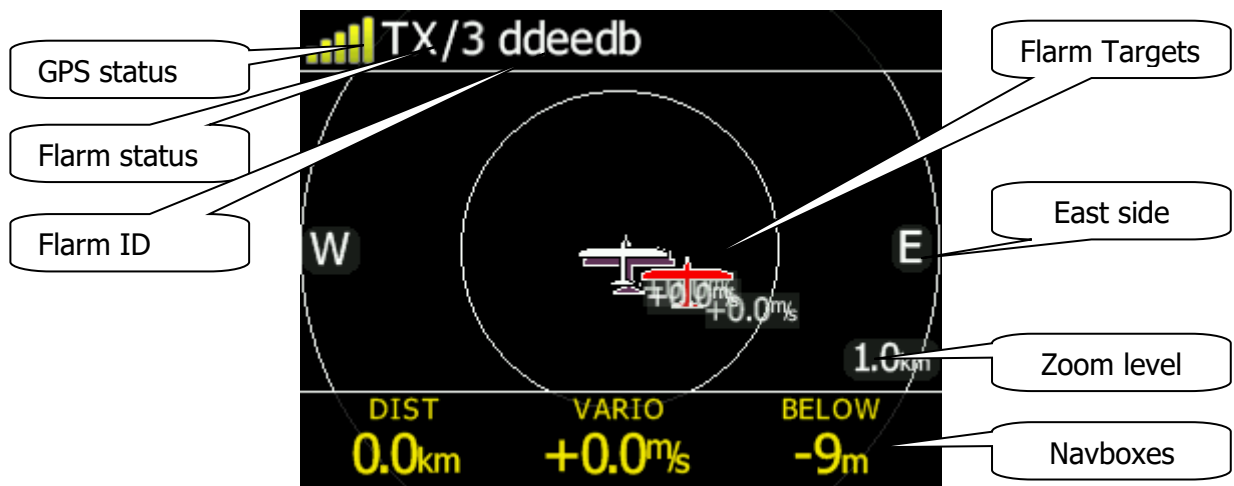
The FlarmView<sup>2</sup> has four modes, info, Waypoint, Task and Setup mode.



### 4.2 Main screen description

The main navigation screen consists of a map with coloured airspace, waypoints with names or task (depends on which page you are looking at). The status line indicates the status of the GPS, indicates the chosen waypoint that you are navigating to. Menu buttons appears, when you press any one of the buttons. Each button has its own function which is described on the button label. The functions of buttons are mostly related to the page where you are (waypoint, task, flarm, info, setup). If there is no label on the button, this button has no function.

In the centre top of the map is the "off course" indicator, which helps the pilot fly in the right direction. At the bottom of the map screen there are three navboxes, showing bearing, distance to the target and the pressure altitude.



#### Status of Flarm

TX/3, (TX) means, that flarm device transmits data, (3) means, that Flarm receives data from three Flarm devices.

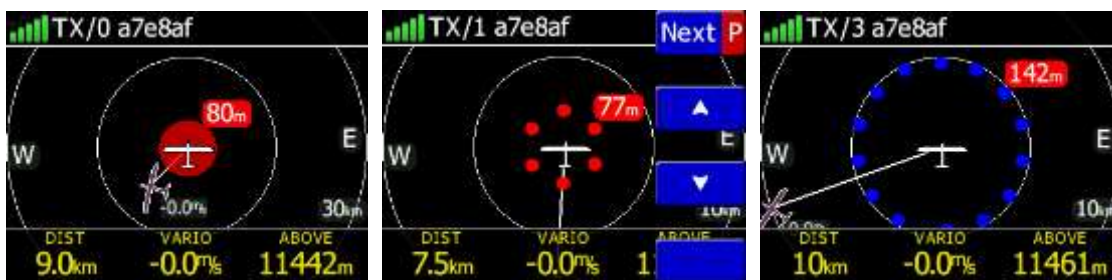
**Flarm identification** is a 6 digit hexadecimal number, which can be used to identify each target.

**GPS status** indicates the status of the Flarm's GPS receiver, the number of painted bars counts the number of satellites that Flarm gps receiver receives.

- green bars indicate the GPS 3D status
- yellow means GPS 2D
- red GPS BAD
- N.C. means that FlarmView<sup>2</sup> is not receive data from Flarm.

**Zoom level** tells us what the current zoom setting on the radar is

In the case of an undirected warning (such as a PCAS warning) being so close that we can't display as described above, a warning looks like the following picture:



All targets are displayed as a glider symbols. It's also possible to change the object's colour, depending on the relative altitude to our position. All received targets (Flarm or PCAS) are marked with the same type of symbol except undirected targets, for which we don't know from which direction they are coming from. Flarm targets can be separated only by their ID.

### 4.3 Info screen

On the info screen, data about GPS and Flarm status are available.

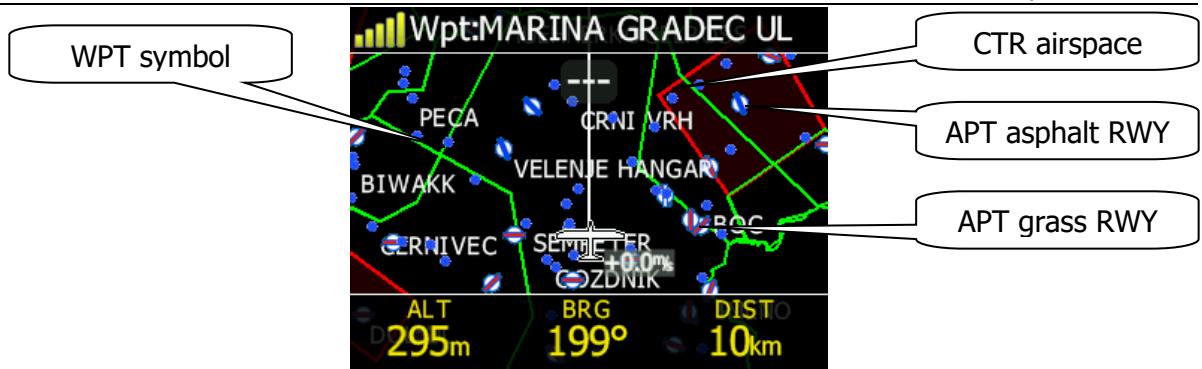


### 4.4 Flarm screen

Selection of flarm targets and zoom in/out is available. If the FlarmView<sup>2</sup> is connected to a PowerFlarm, it is also possible to show PCAS traffic.

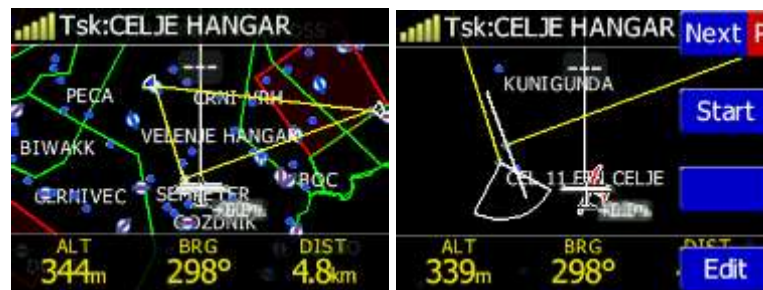
### 4.5 Waypoint screen

In this screen, the pilot can navigate to a selected waypoint, **Select** waypoint from opened CUP file, or select landable waypoint from near list - **Near** button



#### 4.6 Task screen

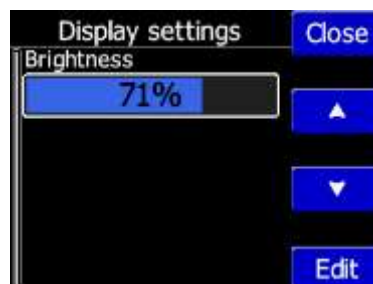
In this screen user can navigate to waypoints from a task, switching between them, edit task points and their zones. Read more in chapter 6.



#### 4.7 Setup Menu

##### 4.7.1 Display

Under this menu the **Brightness** of display can be set after press on the EDIT button.



## 4.7.2 Graphics

Graphics has many sub items which are related to **Map, Airspace, Waypoints, Glider and Track, Task, Flarm** and **Theme Setup** settings.



### 4.7.2.1 Map orientation

Map orientation can be set to:

- track up
- north up

### 4.7.2.2 Airspace

User can define indication, level of indication and colour of airspaces.

### 4.7.2.3 Waypoints

User can define the following settings:

- Enable waypoints indication
- Label length (from none to all characters)
- Label font size (16px, 18px and 24px)
- Label font colour

### 4.7.2.4 Glider and Track

Here it is possible to modify track and target settings (line to target, track line...)

### 4.7.2.5 Task

Graphics of task/zone settings (colour, width, transparency) can be adjusted under this menu.

### 4.7.2.6 Flarm

Flarm objects (traffic) indication can be adjusted by:

- Target above colour (default is blue)
- Target below colour (green)
- Target near colour (red)
- Selected target colour (pink)
- Label text
- Active timeout (15s) – adjusts, remaining time of glider on map after last seen
- Inactive timeout – adjusts remaining time of inactive gliders on the list. Inactive gliders are those, where their signal was lost, after active timeout, they become inactive and remains only on the list
- Draw line to target
- Draw history – tail behind the Flarm object
- Plane icon size



- Compass labels (in inner circle) – If enabled then "N", "E", "W", "S" are in the inner circle of Flarm radar screen

#### 4.7.2.7 Theme Setup

User can change graphic settings on FlarmView<sup>2</sup>.



#### 4.7.3 Warnings

Warnings can be enabled for three different levels (low, important and urgent), separately A/C (undirected warnings can be enabled), also a distance of A/C warning, where will be displayed flarm watch. If Alert on A/C mode is disabled, A/C mode distance is not applicable.

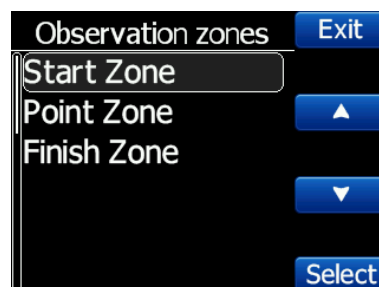


The warnings are classified into three levels (See Flarm manual for details on [www.flarm.com](http://www.flarm.com))

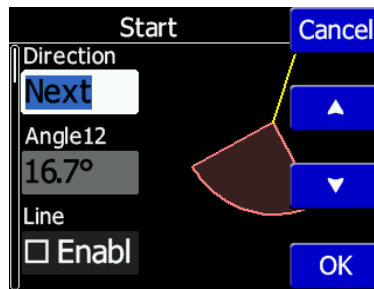
- First level (Low) approximately 18 seconds before predicted collision
- Second level (Important) approximately 13 seconds before predicted collision
- Third level (Urgent) approximately 8 seconds before predicted collision.

#### 4.7.4 Observation Zones

This menu defines the default observation zone geometry. The following items can be chosen: start zone, waypoint zone and finish zone.



Each type of observation zone is defined with two angles, two radius and mean bearing (**Angle12**). These parameters enable the creation of any known zone geometry separately for start, turn point and finish.



Using parameters in the zone dialogue it is possible to describe all types of observation zones.

**Angle12** defines the orientation of the observation zone.

Available values for **Direction** are:

- **Symmetric:** This is the most common selection for turn point.
- **Fixed:** This is mostly used for assigned areas.
- **Next:** will orient the observation zone in direction of the outgoing leg. This is usually used for start.
- **Previous:** will orient the zone in direction of the incoming leg and is usually used for the finish.
- **Start:** orientates the sector always towards the start.

If the **Line** checkbox is checked the sector will become a line type of observation zone. The **Radius 1** parameter describes half of width of line length. Use the UP/DOWN arrow buttons to increase or decrease radius for step 0.1. Long press will increase/decrease for 5.0.

If **Line** is not checked the **Angle1** parameter will define the basic shape of the observation zone. A value of 180° means that the zone is a cylinder and 45° is the classical FAI sector. Use Up/Down buttons to select right angle.

**Angle2** and **Radius2** are used for more complex observation zone setups.

When changing observation zone parameters the screen is automatically updated to display the new zone.

#### 4.7.5 Hardware



In the Hardware menu there are three sub items:

- Communication
- Sounds
- NMEA test

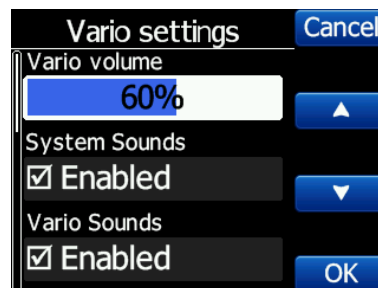
#### 4.7.5.1 Communication



In the communication menu, you can set external port baud rate. Flarm devices typically run at 19200 bps.

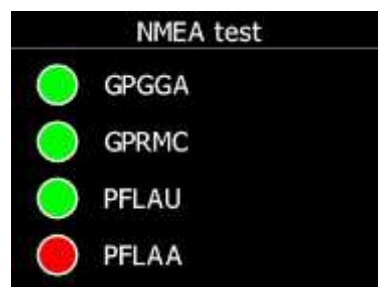
#### 4.7.5.2 Sounds

In this menu various setting for sounds can be adjusted **Volume**, enabling of **system sounds** and Flarm warnings.



#### 4.7.5.3 NMEA test

In this menu user can see which data is coming from the Flarm. This page is very useful for trouble shooting.

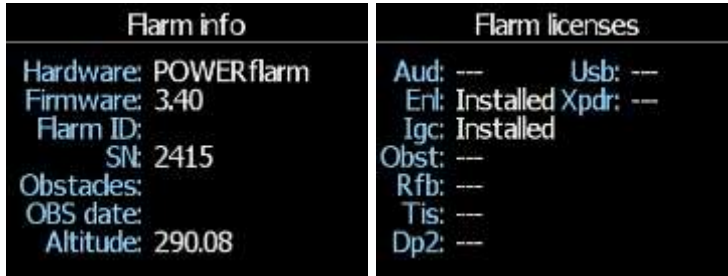
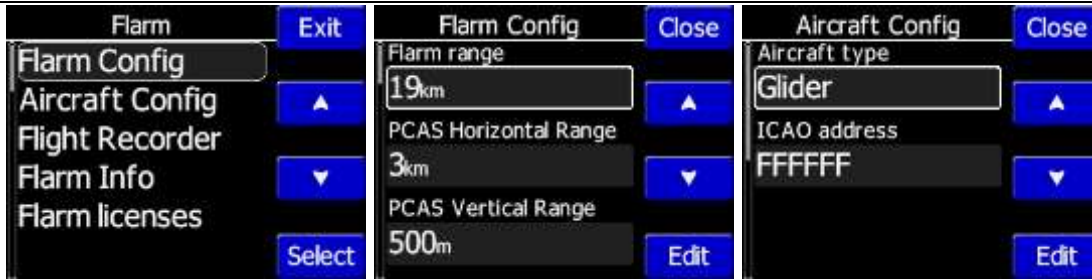


Explanation of Flarm sentences:

- GPGGA: Global Positioning System Fix Data
- GPRMC: Recommended minimum specific GPS/Transit data
- PFLAU: Operating status and priority intruder and obstacle data
- PFLAA: Data on other moving objects around (PCAS etc)

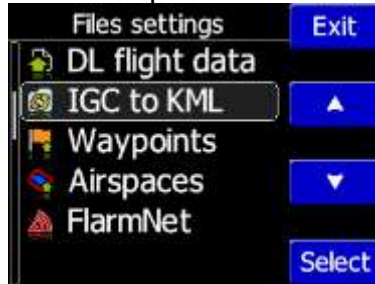
#### 4.7.6 Flarm

If a Flarm is detected, the user can make some configuration setting changes on the Flarm and get some Flarm status information.



### 4.7.7 Files

Under this menu, user can download and upload files.

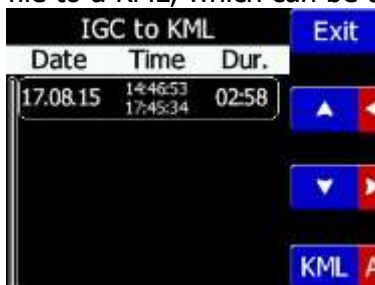


#### 4.7.7.1 Download flight data

With FlarmView<sup>2</sup> a user can download flights from Flarm through FlarmView<sup>2</sup> on to the SD card in the FlarmView<sup>2</sup>

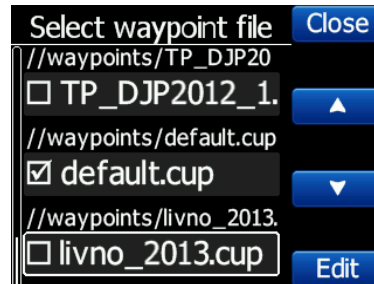
#### 4.7.7.2 IGC to KML

FlarmView<sup>2</sup> can convert the IGC file to a KML, which can be used for Google Earth software.



#### 4.7.7.3 Waypoints

The FlarmView<sup>2</sup> supports **CUP** file format for waypoints. There is no limitation in file size or number of waypoints. However, the smaller the waypoint, the faster the FlarmView<sup>2</sup> display will operate.



#### 4.7.7.4 Airspaces

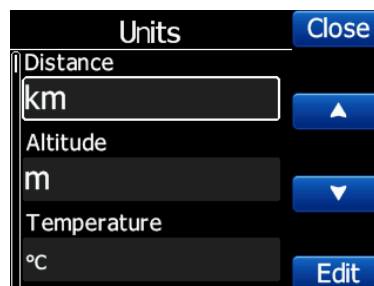
**CUB** file format for airspace is supported. There is no limitation in file size however, the smaller the airspace file, the faster the FlarmView<sup>2</sup> display will operate.



#### 4.7.7.5 FlarmNet

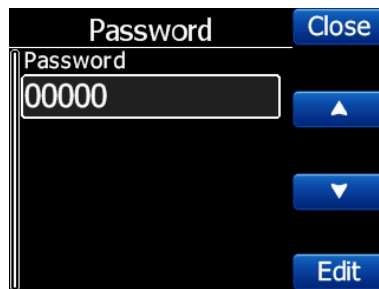
FlarmNet data can be loaded also in this section.

#### 4.7.8 Units



All units are user configurable.

### 4.7.9 Password



There are several passwords which run specific procedures as listed below:

- **00666** Resets all settings on FlarmView<sup>2</sup> to factory default
- **99999** Will erase all data on Flarm device
- **30000** Will delete Flarmnet user file on FlarmView<sup>2</sup>

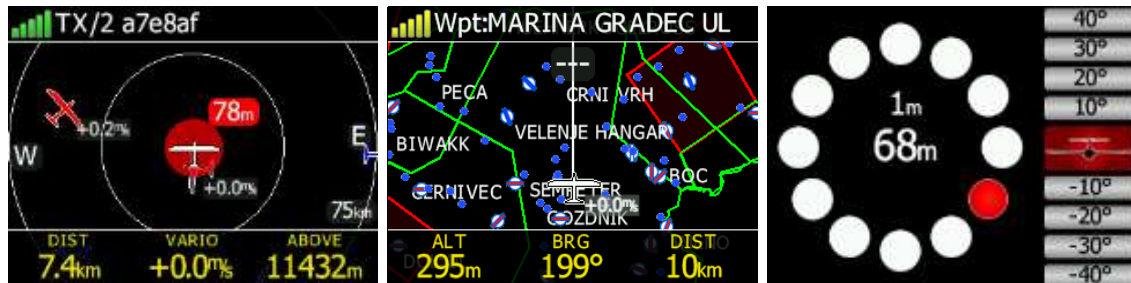
### 4.7.10 About



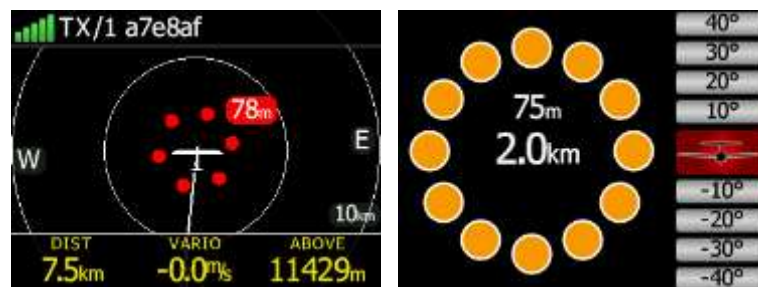
Under the about menu, a user can see the version and serial number of the FlarmView<sup>2</sup>

## 5 Using FlarmView<sup>2</sup>

FlarmView<sup>2</sup> is able to display Flarm and PCAS traffic on the map or on the radar screen. The Radar screen is visible only when Flarm is detected by FlarmView<sup>2</sup>. In case of collision warning, another screen will immediately appear with the direction of the threat.



PCAS alerts on the map are represented as a dotted circle with relative altitude. The PCAS warning is represented as lights on the clock as red or orange (PCAS target information has only a range and no direction).



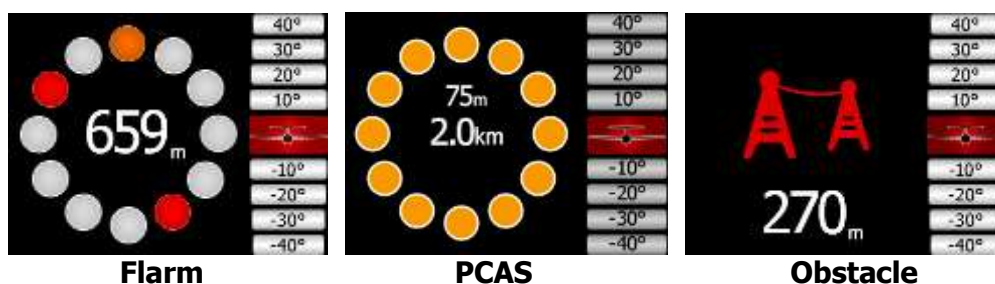
A warning can be dismissed with a short press of any button. Dismiss time can be configured in setup.

### 5.1.1 Selecting and switching between targets

The target can be selected using Up/Down (middle two) buttons. If the target disappear when it is selected, the FlarmView<sup>2</sup> will still indicate information about the last selected target. Information about distance, altitude and vario will disappear. If the target appears back, the trace will continue.

## 5.2 Flarm Warning

Below are warnings which will appear for Flarm, PCAS and Obstacle warnings.



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The screen indicates the relative position of the threat. In the first image two gliders are approaching from the left side at the same altitude and one from back right, the second screen is an example of undirected warning (AC mode). Middle number shows horizontal distance to the target. The last picture indicates an obstacle warning.



## 6 Editing of a task

In the Task page, the user can enter or edit the task. Waypoints can be loaded into a task from the active waypoint file.

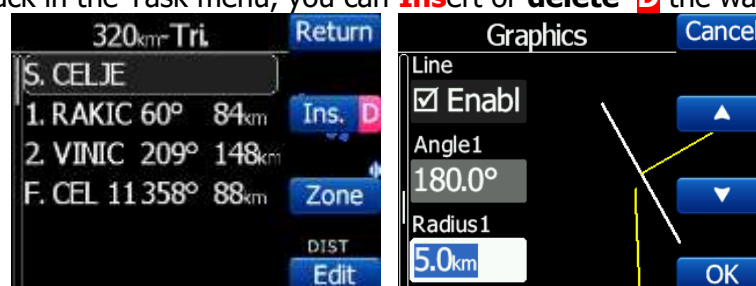


In the task page you can press the **edit** button. Using the up or down button you can highlight an existing waypoint or empty space and then set a new waypoint. By pressing the **Ins.** (insert) button you can start browsing through all of the waypoints in the selected CUP file.

Selecting from a list of waypoints is very intuitive. The FlarmView<sup>2</sup> will only offer you a choice of characters that are available from the list of waypoint names available. Using the button ">>" you can move to the next character (right), the red part of the label **B** indicates one space back or one character to the left using a longer press of the button. A similar function for the **"OK"** button, where you can confirm a selected waypoint or with the **C**, you can cancel the selection of a waypoint. The previous waypoint will then be selected.



When you are back in the Task menu, you can **Insert** or **delete D** the waypoint.



To *insert* a waypoint you make a quick press on the **Ins.** and to *delete* a waypoint you press and **hold down D** for about (not more than) a second

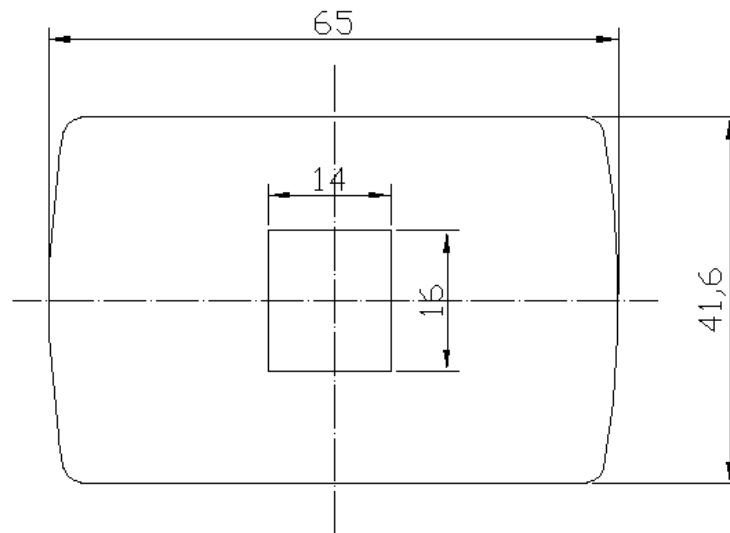
Each waypoint can have a custom zone or area applied.

These areas can be modified by pressing to Zone button.

## 7 Installation

### 7.1 Installing the LXNAV FlarmView<sup>2</sup>

The LXNAV FlarmView<sup>2</sup> cut-out is very simple. A square hole with dimensions 14mm x 15mm, need to be cut.



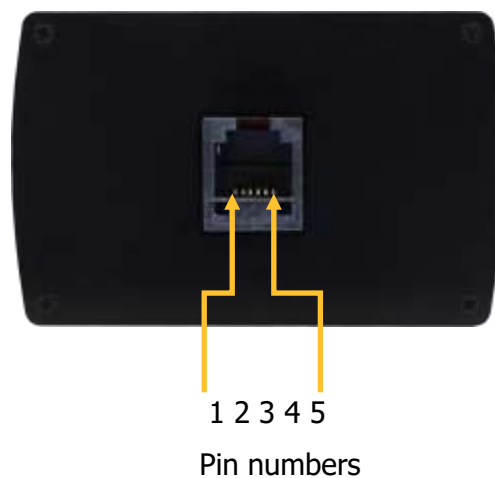
Peel off protection film and stick the FlarmView<sup>2</sup> to the instrument panel.

### 7.2 Connecting LXNAV FlarmView<sup>2</sup>

FlarmView<sup>2</sup> can be connected to any Flarm or ADS-B device with the FlarmView<sup>2</sup> cable.

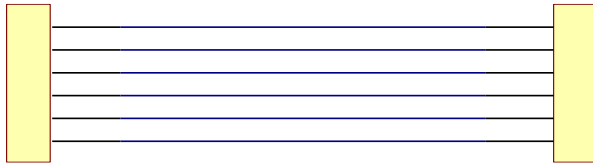
#### 7.2.1 Ports and Wiring

##### 7.2.1.1 LXNAV FlarmView<sup>2</sup> port (RJ11)



Pin number	Description
1	(Power input) 12VDC (On version 2)
2	(Power input) 3.3VDC (On version 1)
3	GND
4	(input) Data in RS232 – receive line
5	(output) Data out RS232 – transmit line
6	Ground

### 7.2.1.2 LXNAV FlarmView<sup>2</sup> wiring



## 8 Flarmnet Update

Flarm net database can be updated very easily.

- Please visit <http://www.flarmnet.org>
- Download file for LXNAV (LX8000, LX8080, LX9000) or click on following link:  
<http://www.flarmnet.org/files/lxfile.php>
- FLN type file will be downloaded.
- Copy flarm.fln file to SD card of FlarmView<sup>2</sup>.

## 9 Firmware Update

Firmware updates of the LXNAV FlarmView<sup>2</sup> can be easily carried out using the SD card. Please visit our webpage [www.lxnav.com](http://www.lxnav.com) and check for the updates.

You can also subscribe to a newsletter to receive news about the LXNAV FlarmView automatically.

### 9.1 Updating LXNAV FlarmView<sup>2</sup>Flash integrity failed”

- Download the latest firmware from our web site, section downloads/firmware <http://www.lxnav.com/download/firmware.html>.
- Copy **fv2.fw** file to FlarmView's2 SD card.
- Turn on FlarmView<sup>2</sup>.
- Firmware update will take a few seconds.



If the update procedure is interrupted, LXNAV FlarmView will not start. It will cycle in bootloader application with red message “Flash integrity failed”. Bootloader application is waiting to read the right firmware from SD card. After successful firmware update LXNAV FlarmView will start again.



If FlarmView gives you message “Flash integrity failed”, this means that firmware update was not successful and it will need to be repeated.

## 10 Revision History

June 2015	Initial release version 1.02
August 2015	Chapter 5.7.5.3 – explanation of NMEA sentences
October 2015	Added more detailed descriptions Added chapters from 4.7.2.1-4.7.2.7 Added chapters 4.7.7.1-4.7.7.5 Added chapter 9 and 9.1
November 2016	Updated ch.4.7.3