

# Cumulus

A Linux-based flight navigation program for the soaring community

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# Cumulus



Cumulus is a program designed for the soaring community. It provides a moving map display with all the information you need to make navigation easier while flying, yet requiring a minimum of user interaction. Navigation during flight is based on the processing of standard NMEA records delivered by a GPS receiver. Additionally, the proprietary NMEA sentences of some logger devices can be included in the processing.

Cumulus features a full colour moving map with information on terrain, point data, airspace, (rail-) roads, water, cities and many other details. It handles waypoints, IGC logging and tasks in cooperation with KFLog. Wind determination, reachable sites, final glide, sunrise and sunset calculations, retrieving of airport weather reports (METAR and TAF), live tracking of flights as well as automatic task point switching are also supported.

## Software license agreement

Cumulus is distributed as open source under the GPLv3 license. See [here](#) for the license conditions.

## Important hint to all program users

***This program comes with ABSOLUTELY NO WARRANTY!***

*Do not rely on this software program as your primary source of navigation. As pilot in command you are responsible for using official aeronautical charts and proper methods for safe navigation. The information presented by this application may be outdated or incorrect.*

*This software may not be used as a traffic and collision-warning system!*

*You use this program at your own risk. If you don't agree, don't use this software!*

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## Getting Started

To take full advantage of Cumulus, you need a PDA with either an internal or an external GPS receiver and a set of map files. Currently Cumulus supports the following hardware devices:

- Android devices up release level 2.2.x (FroYo) and higher with a screen resolution 800x400 and higher in landscape mode
- The Nokia Internet Tablets N800/N810 with Maemo OS2008
- The Nokia Internet Tablet N900 with Maemo OS2009
- PC Linux desktop running Debian or Ubuntu

When you start Cumulus, it will create all the necessary data directories by itself, if they do not already exist. Furthermore you will be asked once whether you want to download missing airfield or map files from the Internet. Your decision is valid until to the termination of the program. If Cumulus is moving no file downloads are executed. Only enable the automatic download if you have an active Internet connection running!

### PDA

As long as the program runs on the PDA and you are on the move, the automatic shut-down of the screen to save battery life is deactivated. If you move slower than the defined speed limit, the screen is switched off after a certain time. If you then move faster, the screen is automatically switched on again. The speed limit can be configured in the [Look&Feel](#) settings.

For operation over several hours you need to supply external power to your PDA. Furthermore, it is recommended that you switch off all automatic connection or update attempts (WLAN, version updates, ...) before take-off, as these can rob Cumulus of resources, slowing it down for a while and irritating you with popup dialogs.

### Android Hints

Please notice, that some functions under Android are only reachable via the *Android Menu Key* and not over the internal Cumulus menu. That concerns the GPS receiver and the barometric sensor. After every startup of Cumulus you must switch on again these functions! The previous state is not saved.

### Android's Barometric Sensor

If your Android device has a built in pressure sensor, you can activate it, that it delivers air pressure data. If you want to use these data in Cumulus, you have to switch the [altimeter display](#) to Baro. Furthermore you have to adjust the altimeter to the correct MSL altitude.

Please notice, that in this case no other external connected devices deliver barometric altitude data, otherwise you can get displayed wrong values.

### Possibilities to connect to external GPS devices

Cumulus can be operated with build-in or external GPS devices. A GPS

device can be connected via Serial (RS232), USB or Bluetooth from Cumulus. The following variants are possible for connection to a GPS receiver:

- **Linux PC**
  - Serial (RS232)
  - USB
  - Bluetooth
- **Nokia Internet Tablet N8x0**
  - Build-in GPS
  - USB
  - Bluetooth
- **Nokia Internet Tablet N900**
  - Build-in GPS
  - Bluetooth
- **Android device**
  - Build-in GPS
  - Bluetooth
  - USB-IOIO

### GPS Hardware

Many flight recorder and also Flarm provide only a serial interface as link to other devices. To connect to such devices you need an adapter. Cumulus supports the following adapters:

- Serial-USB adapter (not for Android)
- Serial-Bluetooth adapter
- USB IOIO Uart board (only for Android)

Examples for such adapter:

- Serial-Bluetooth adapter
  - [K6-Team](#)
  - [SoarTronic Bluetooth BT1](#)
  - [GliderTools](#)
  - LM TECHNOLOGIES - LM048V2 adapter
- USB IOIO Uart board, firmware 4.0 and higher (only for Android)
  - [DroidSoar](#)
  - [Glidertools Androport](#)
  - [SoarTronic's IOIO UART interface board](#)

### GPS Activation

Once you manage to connect your GPS to Cumulus, select the correct device and baud rate in the [GPS Settings](#). Refer to your GPS manual for the correct settings. The most common devices are:

- `/dev/ttyS0` - Serial (RS232) device
- `/dev/rfcomm0` - Bluetooth device
- `/dev/ttyUSB0` - USB device

The default NMEA connection speed is 4800 bps on a RS232 serial channel.

If you have a **Nokia Internet Tablet** N800/N810 or N900, it is not necessary to set up a special GPS device. Available devices will be recognized automatically during Cumulus start-up, unless you want to connect to a GPS device via USB. In this case you have to select the USB device from the GPS configuration options.

If you have an **Android** device with a built in GPS nothing has to be setup. To external GPS devices is only a connection possible via Bluetooth radio or an USB IOIO Uart board. A USB IOIO Uart board must be configured and activated via the Android menu before you can use it. See [GPS Settings](#) for more information.

**Note the following exception!** After every startup of Cumulus under Android the GPS receiving **must be enabled by hand**. To do that, press the **Android Menu key**, select the entry *GPS on* and choose the desired device (internal, Bluetooth or IOIO). Bluetooth devices must be paired before Cumulus is started. Cumulus does not support BT pairing!

Once your GPS device is set up, press the key **G** or click on the GPS status indicator in the status bar to check the GPS status. You can remove the GPS status page with the Escape key or with the close button.

## Personal

In Personal Settings you define the coordinates of your home position in the area in which you fly. The setting is important to ensure an unskewed map rendering! See [Personal Settings](#) for more details.

## Glider

Define your preferred gliders in Glider Settings. See [Glider Settings](#) for more details.

## Maps

Cumulus uses the same maps as *KFLog*, the KDE Flight Logger. Needed airfield and map files are downloaded automatically by Cumulus, if you enable this option at start-up. To install all the maps around your home position, see [here](#) for more information.

## Waypoints

Cumulus uses waypoints to facilitate navigation. You can either edit the waypoint files on the PDA or prepare them on a PC using *KFLog* or *Cumulus* and then transfer them to the PDA. See [waypoints](#) for more details.

## Tasks

Cumulus also supports the definition of flight tasks. You can either create and edit a task file on the PDA or prepare it first on your PC using *KFLog* or *Cumulus* before transferring it to the PDA. See [here](#) for more details on tasks.

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## Maps

Cumulus uses the following sets of maps:

- **Ground and Terrain Maps** with streets, highways, cities, rivers, lakes, ... and terrain data with elevation information. These cover the entire world. The maps are to be found in the [KFLog Map Room](#). Cumulus is able to download all the map files that you need. See [Map-Settings](#) for more information.
- **Airspaces:** Cumulus supports the *OpenAir* and the *openAIP* file format for airspace structures. Further hints you can find [here](#).
- **Point Data:** Sources for airports, airfields, nav aids and outlandings are:
  - [openAIP](#) project. It provides airfields, nav aids and hotspot data but no outlandings at the moment.

The maps are installed in different places depending on the used device:

OS	Map root directory
Linux Desktop	\$HOME/Cumulus/maps
Maemo	\$HOME/MyDocs/Cumulus/maps
Android	/sdcard/Cumulus/maps (internal or external SD-card)

These are the default locations.

On the Nokia Internet Tablet you should use an external storage medium if possible, because the internal file system is limited in its capacity. At the first startup on the Nokia Internet Tablet, Cumulus itself tries to discover the best location for storing the map files. The following places are checked for existence in chronological order:

- /media/mmc1/Cumulus
- /media/mmc2/Cumulus
- /home/user/MyDocs/Cumulus

The first match is taken and the necessary subdirectories are created by Cumulus itself.

**Please note! The map files have to be stored in different subdirectories under the root map path.**

Directory	Map kind
.../maps/landscape	The ground and terrain data files

<b>.../maps/points</b>	POI data files like airfields, outlandings, nav aids and hotspots
<b>.../maps/airspaces</b>	The airspace files

If you want to install the maps elsewhere than the known locations, you must give the path to the new map root directory on the [Map Settings](#) configuration page. Use the [Maps](#) button to navigate to the appropriate root directory under which the expected maps' subdirectories are to be found.

**Note! Under Android you cannot change the map root directory.**

Only load the point data and the airspace maps for the area you need. This will make Cumulus faster and save runtime memory. If you experience memory problems running Cumulus, you can choose not to install certain map sets. You could, for instance, skip the terrain maps. This will disable the display of terrain features (the isolines) but it will also save memory and reduce the time used for map loading and drawing. It is advisable to use at least the Ground maps because otherwise you will end up with a blue background, which is not very helpful for navigation.

The maps you install are not projected. This work is done on loading. Because this is a computationally complex operation, the resulting maps are stored again with a *.kfc*, *.aic* or *.txc* extension. For many maps, these files are a bit smaller than the original files. The next time Cumulus needs to load the file, it first tries to load this *compiled* file to improve speed. In the [Map Settings](#) page you can modify the behaviour of Cumulus for map projection and map compilation.

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## Maps - Airspace

Cumulus supports two different source formats:

- OpenAir
- openAIP

as database for airspaces.

### OpenAir

*OpenAir* files must be downloaded manually from the Internet and installed in Cumulus. Addresses where you can find *OpenAir* airspace files are:

- [Soaring Services - Airspace](#) for many countries of the world
- [Airspace Data Germany \(Deutschland\)](#) published by the DAeC

### openAIP

[openAIP](#) airspace files can be found on the openAIP website, where this project is hosted. The download and installation of openAIP airspace files is supported by Cumulus. See [here](#) for further help.

### Installation Directory

Just put your airspace files in the directory **.../maps/airspaces** and make sure, that OpenAir files have the *.txt* extension while openAIP files uses the *.aip* extension. The extension spelling is not case sensitive for *.txt* files.

Because you can have a lot of airspace files in the airspace directory, maybe one for every country, it is useful to define, which files should be loaded only to save run-time memory. That can be done in the configuration setup for [Airspaces](#). Press the Load button on that page and select the airspace files in the displayed list to be loaded.

### Mapping Services

Certain OpenAir/openAIP airspace elements are not unique mapable to Cumulus airspace elements. Therefore Cumulus provides additional mapping services.

- One global mapping file
- Special mapping files, related to one airspace file

The mapping files must be placed in the same directory as the airspace files are installed. Their rules overwrite the default Cumulus mapping rules.

### Global Mapping File

The global mapping file is applied first to all read airspace file. The name of the file is *airspace\_mappings.conf*.

## Special Mapping Files

Special mapping files can be applied only once to a related airspace file. Such a file consists of the basename of the airspace file without the extension *.txt* or *.aip*, extended by the string *\_mappings.conf*.

**Example:** SourceFile=*openair.txt*, MappingFile=*openair\_mappings.conf*

**Cumulus knows the following airspace types:**

- AirA
- AirB
- AirC
- AirD
- AirE
- AirF
- AirUkn
- Ctr
- Danger
- Prohibited
- Restricted
- LowFlight
- Rmz
- Tmz
- GliderSector
- WaveWindow

The syntax used in the mapping file is very simple. Lines starting with *#* or *\** are ignored and can be used for comments. Empty lines are also ignored. The rest of the lines should contain entries in the form *key = value*, one entry per line. The key is the airspace type in the OpenAir/openAIP file you wish to map, and the value is the corresponding Cumulus type you wish to assign.

## Default mapping for OpenAir

- A = AirA
- B = AirB
- C = AirC
- D = AirD
- E = AirE
- F = AirF
- CTR = Ctr
- GP = Restricted
- P = Prohibited
- Q = Danger
- R = Restricted
- RMZ = Rmz
- TMZ = Tmz

- TRA = Restricted
- GSEC = GliderSector
- UKN = AirUkn
- W = WaveWindow

### Default mapping for openAIP

- A = AirA
- B = AirB
- C = AirC
- D = AirD
- E = AirE
- F = AirF
- DANGER = Danger
- PROHIBITED = Prohibited
- RESTRICTED = Restricted
- CTR = Ctr
- TMA = Ctr
- RMZ = Rmz
- TMZ = Tmz
- GLIDING = GliderSector
- OTH = AirUkn
- WAVE = WaveWindow

**Note!** You only need to define the values you actually want to change in the read airspace file. These instructions will overwrite the default mappings.

**Example:** *CTR=AirC*

This statement changes the default assignment for *Control Zone* to *Airspace C*.

**Remember that the mapping definitions are case-sensitive! Otherwise the mapping rules will fail.**

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## openAIP - Navigation Data

[openAIP](#) has the goal to deliver free, current and precise navigational data to anyone. *openAIP* is a web-based crowd-sourced aeronautical information platform that allows registered users to add, edit, download and comment aeronautical data in many common formats used in General Aviation.

As first you should register yourself by the [openAIP](#) project, that you can use their provided data.

Please read and accept the [Terms and Conditions](#) from [openAIP](#), before you download and use their data with Cumulus.

**Caution!** Please note, that all openAIP files carry the extension **.aip**. You should never change that extension otherwise Cumulus cannot recognize these files.

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### openAIP Airfield, Navaid and Hotspot data

Cumulus can download and install on user request *openAIP* airfield, navaid and hotspot files. Go to the [Settings/Point Data - openAIP](#) page and make there your desired settings.

### openAIP Airspace Data

Cumulus can download and install on user request *openAIP* airspace files. Go to the [Settings/Airspaces](#) page and make there your desired settings.

---

**Please help to improve the *openAIP* data. If you found mistakes, correct them. If you miss something, add it to the *openAIP* data base.**

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## Settings

Press the key **s** to open directly the settings page. The normal way is, to press the menu button or the **m** key on the PDA to open the pop up menu. Then navigate to *Setup->General*.

The opened table contains all basic configuration pages of Cumulus. It is separated into 14 sections:

- [Personal](#)
- [GPS](#)
- [FLARM](#)
- [Gliders](#)
- [Maps](#)
- [Map Objects](#)
- [Terrain Colors](#)
- [Task](#)
- [Lines](#)
- [Point Data](#)
- [Airspaces](#)
- [Units](#)
- [Information](#)
- [Look&Feel](#)

**Note!** If you have done modifications on a single setting window and you want to make them permanent you must leave this window by pressing the green *Ok* button. To cancel all done modifications, use the red *Cancel* button instead of.

FYI, all internal configuration data are stored by Cumulus in the user directory *\$HOME/.config* in the file *Cumulus.conf*. Under Android this file is to find in the directory */sdcard/Cumulus/Settings*. Do only modifications there, if you know what you do and Cumulus is not running!

**WARNING: Make your settings while safely on the ground, not while flying!**

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## Settings - Personal

### Personal

On this page you can enter and define your personal data.

#### Pilot name

This data is used as pilot's name for the IGC logfile.

#### Language

Select the language which you do prefer. English is always the default also in case if your selection do fail. After a language change you must restart Cumulus to get a complete translated surface.

#### Home site country

The home site country has to enter as two letter code according to ISO 3166. It is used as default setting, if the waypoint editor is opened to create a new waypoint. The country code is set too, if a new home position is selected in one of the overview lists.

#### Home site name

Enter here the name of your home site. This value is displayed in the To box, if you navigate to your home site.

#### Home site elevation

Enter here the elevation of your home site. This value is taken into account if you select AHL (above home level) in the altitude dialog. In this case the displayed altitude is related to your home base also referred as QFE.

#### Home site coordinates

The home site coordinates are used for:

- The [Map Projection Settings](#)
- The [Manual Navigation](#)
- As center point for the point data to be read, when the [radius option](#) is set.
- As predefined center point for the map download procedure.

The home site coordinates can also be set in the airfield and waypoint pages. In this case the data are taken over from these pages and a manually entry is superfluous. The default home position is set at the Brandenburger Tor, in the center of Berlin (Germany).

### Data Directory

With the Button **Data Directory** and the text entry field beside you can define a new storage place for your waypoint, task and IGC logger files. The default storage place of Cumulus is:



- **\$HOME/Cumulus** on the Linux desktop PC
- **\$HOME/MyDocs/Cumulus** under Maemo (Nokia Internet Tablet)
- **/sdcard/Cumulus or similar** under Android (internal SD card not changeable)

On the Nokia tablets N8x0 it is recommend to define a new location, which lays on one of the SD cards (/media/mmc1 called external card or /media/mmc2 called internal card). The SD cards are accessible with the Maemo file manager and also via USB. So you can transfer your data files between your PC and the Internet Tablet very conveniently.

When you press the Data Directory button, a directory dialog is opened and you can navigate to another directory storage place. Use short double taps on the Nokia tablets for moving between the directories. The directory dialog shows only existing directories. If you want to create a new subdirectory you have to add the new pathes in the text field by hand. Cumulus tries to create the new subdirectories, if you leave the settings dialog with the Ok button.

E.g.

**/media/mmc1/Cumulus or /media/mmc2/Cumulus**

should be good places for use on the Nokia N8x0 tablets. Note, if you change the data directory no files will be transfered automatically by Cumulus to the new area. Such moves must be done alone by your self, if Cumulus is **not running!**

**Notice!** The data directory is not changeable under **Android**. It is always located at the internal SD card. In the display field you can see where the real place is of it.

### Proxy

If you can access the Internet only via a Proxy, press the button *Proxy* and define it there.

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## Settings - GPS and other peripheral devices

### GPS

This page is used for entering the connection information for the primary GPS device used by Cumulus for navigation. Please refer to your GPS manual for these connection values. Cumulus can also accept and process data from other peripherals such as Cambridge, Volkslogger, Flarm or LX Navigation.

#### Android Hints

Under Android this page is nearly empty. Please use the Android menu key and the GPS menu to switch on/off your desired GPS device. There are exist different possibilities according to the provided hardware of your Android device.

- Use of build-in GPS.
- Connection establishment via Bluetooth to a GPS device. If the GPS device does not support Bluetooth you will need an adapter to connect the device.
- Connection establishment via an USB IOIO Uart board to a GPS device with a serial interface. Cumulus supports that at the moment only for IOIO boards with firmware 4.0 or higher and for only one Uart. The IOIO uart to be used and its connection speed have to setup via the Android menu key, Setup, IOIO GPS. If you use an **Android** device with **OS release < 4.1** you have to **switch on USB debugging** in the developer options. If the **OS release is >= 4.1 USB debugging must be switched off**. Otherwise you will never get a connection running.

Cumulus can provide you with some status information concerning your GPS reception. If you want to know what satellites are in view, where they are, how strong their signal is, or if you want to take a look at the raw NMEA stream of your GPS, use the **G** key or click on the GPS status indicator in the status bar. This will open a status dialog for the GPS. The dialog can be closed with the "close" button.

#### GPS Device

In the combo box you can select the connection type to be used for your GPS or peripheral connection. The following alternatives are available:

Item	Description
<b>GPS Location</b>	only for using the Location Service provided by the Internet Tablets N8x0/N900. Users of the N8x0 or N900 can make use of the option in the tablet's own Settings/Control panel/GPS location to use either the built-in GPS receiver or

	an external Bluetooth GPS device.
<b>BT Adapter</b>	for direct connection to an external Bluetooth device. In this case Cumulus will automatically scan your environment for a reachable device, and, if it finds one, will open up a combo box dialog from which you can make the appropriate selection. A wrong selection will mean that you will have to restart Cumulus!
<b>/dev/ttyS0</b>	for a serial GPS device like Flarm, using an RS232 interface. <b>Note!</b> On a Linux desktop, e.g. Ubuntu, it is required, that the Cumulus user must be a member of the Linux group <i>dialout</i> . Otherwise the device ttyS0 cannot be opened. Execute the following command to enable that:  <i>sudo gpasswd --add &lt;cumulus_user&gt; dialout</i>
<b>/dev/ttyUSB0</b>	for a USB GPS device or, e.g., a USB-serial adaptor
<b>/tmp/nmeasim</b>	for the Cumulus NMEA Simulator

Serial devices and RS232-USB adapters also need to be given a speed rate for their operation. The default serial NMEA connection speed is 4800 bps but we recommend always to use the maximum supported speed.

If your device is not found in the selection list, you can change one of the predefined entries to what you need, e.g. /dev/ttyS0 for an RS232 serial device or /dev/rfcomm0 for a Bluetooth device.

#### Speed (bps):

This will have the greyed-out default value unless e.g. the connection selected above is to a device whose speed can be manually set.

#### Altitude Reference

Item	Description
<b>GPS</b>	The default selection is GPS. Most GPS devices send MSL (mean sea level) altitudes, but some send HAE (Height above ellipsoid).
<b>Pressure</b>	Some logger devices can deliver altitude values derived from a pressure sensor. If you want to use these pressure data, select this alternative. <b>Please note!</b> If you have selected the pressure item, Cumulus expects to receive the appropriate NMEA records from the connected peripheral device. Without these you will not get any altitude data displayed at all, nor will you get a variometer reading, unless this information is supplied separately by the peripheral!

If your displayed altitude always deviates by a constant factor from the

expected value, you can correct this in the altitude dialog. This is opened by tapping on the altitude display in the map view. Add your correction value in the spin box labelled "Leveling". Positive values will be added to and negative values subtracted from the delivered altitude value. For pressure values, the correction will be applied immediately. For GPS values, the correction will only be applied when a GPS fix is established.

#### Processed data from supported devices

Cumulus processes additional data from the devices listed below, if they are connected, but only if the data sentences have a valid checksum. Data from external devices are the first choice for Cumulus before its own calculation is started. This means that the wind, variometer and MacCready data from these peripheral devices will be accepted and used automatically, if they are available. The MSL and STD altitudes derived from a pressure sensor, however, are only made use of if specifically asked for, i.e., "Pressure" must be selected in the menu.

Device	Processed data
<b>Cambridge</b>	This device can deliver altitude values (MSL and STD) derived from a pressure sensor. Cumulus also uses the QNH, wind and McCready data from the Cambridge !w proprietary sentence (see below).
<b>Volkslogger</b>	This device can deliver the STD altitude derived from a pressure sensor. To get the right MSL altitude, you have to set the correct QNH value in the Cumulus <a href="#">Preflight Settings/Common</a> or in the altitude dialog. Furthermore, in the Volkslogger setup menu, you have to enable the sending of PGCS records.
<b>LX Navigation</b>	This device can deliver altitude values derived from a pressure sensor and wind data. Some devices can also deliver McCready and variometer data. Enable the sending of LXWP records in the LX setup menu, as follows (e.g. on an LX20 device you will have to enter the password - the default is 96990): go to the NMEA menu, where you should set the entry LXWP? to 'Y'. Set the transfer speed in Cumulus to 4800 bps - the LX20 device uses this speed for NMEA transfer regardless of the selected PC transfer speed.
<b>Classic FLARM and PowerFLARM</b>	This device can deliver altitude values derived from a pressure sensor, as well as aircraft and ground obstacles information. Enable the sending of these data in the FLARM setup menu. Look also at the page <a href="#">Cumulus Flarm</a> for more information.

#### Sync Clock

If the option *Sync Clock* is activated, Cumulus is able to synchronize the PDA system clock to the GPStime, but this will only work, if Cumulus is running as

user *root*. On Android and the Nokia Internet tablets this feature is available, because user processes are not normally running under the root user.

### Save NMEA Data

If the option *Save NMEA Data* is activated, the received NMEA data stream is logged into a file. The file is stored in the user's data directory and it has the name *CumulusNmea.log*. After each new start of Cumulus or if this option is activated in the setup menu, a new log file is opened. The content of the previous file is save as backup copy with the name *CumulusNmea.log.old*. You can use this option to save the GPS NMEA data for a later analyze or any other post-processing. We recommend to use this option only for special purposes because it has also influence to the performance in general.

### GPS Source

With the selection box *GPS Source* you can define the GPS system, from witch the default sentences should be processed. The following choice is possible:

- \$GP GPS (USA)
- \$BD GPS Beidou (China)
- \$GA GPS Galileo (Europe)
- \$GL GPS Glonass (Russia)
- \$GN combined GPS Systems

### Processed GPS sentences

Cumulus processes the following NMEA and proprietary sentences:

NMEA Id	Description
[\$BD GA GL GN GP]RMC	Recommended Minimum Specific GNSS Data
[\$BD GA GL GN GP]GLL	Geographic Position - Latitude and Longitude
[\$BD GA GL GN GP]GGA	Global Positioning System Fixed Data
[\$BD GA GL GN GP]GSA	GNSS DOP and Active Satellites
[\$BD GA GL GN GP]GSV	GNSS Satellites in View
\$GPDTM	Map datum
\$PGRMZ	Garmin and FLARM proprietary sentence with barometric or GPS altitude data
\$PFLAU	FLARM proprietary sentence with status, intruder and obstacle data
\$PFLAA	FLARM proprietary sentence with data about other aircraft around
\$PCAIID	Cambridge proprietary sentence with STD altitude

!w	Cambridge proprietary sentence with MSL altitude, QNH setting, wind direction, MacCready value, wind speed and variometer data
\$PGCS	Volkslogger proprietary sentence with STD altitude
\$LXWP0	LX Navigation proprietary sentence with MSL altitude, variometer and wind data
\$LXWP2	LX Navigation proprietary sentence with McCready data
\$MAEMO0	Cumulus internal proprietary sentence, if LibLocation from MAEMO 5 is used
\$MAEMO1	Cumulus internal proprietary sentence, if LibLocation from MAEMO 5 is used
\$Android	Cumulus internal proprietary sentence, if the Android device delivers only own location updates and no NMEA data.

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## Settings - FLARM

### FLARM

This configuration page is only available, if Cumulus is not moving.

Cumulus supports two types of FLARM.

- Classic FLARM
- PowerFlarm

The FLARM setup page is organized as a table with the following columns from left to right:

Column	Description
CMD	Get command for the listed item
CMD	Set command for the listed item
Item	Configuration item name
Value	Configuration item value

**Note!** If you want to change items, please inform you before about the possible values of the items. Some SET commands are clearing the FLARM device. If you do not know what are the consequences of a SET command, do not execute it. In every case you should have read the document **FTD-014, FLARM CONFIGURATION SPECIFICATION**. You can request if from [here](#).

#### Column CMD GET

If the CMD GET button is pressed, the value of the listed item is requested from the FLARM device.

#### Column CMD SET

If the CMD SET button is pressed, the value of the listed item is transferred to the FLARM device.

#### Column Item

Under the column *Item* the FLARM configuration items are listed. Read only items have only a GET button, Read-Write items have a GET and a SET button, Write only items have only a SET button.

Clicking on the item header will sort the item list. Double and single clicking of an Item field opens a little help dialog. Tipping at the help box will close it. After 30s the help box is closed automatically.

## Column Value

Under the column *Value* the values of the FLARM configuration items are listed. Clicking of an item *Value* field of a configuration item, which is writable, opens a little editor where you can modify the item value.

## Button Load

Clicking the button *Load* (lower right corner), will request all supported item values from the FLARM device.

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## Settings - Gliders

### Gliders

Cumulus supports multiple gliders that you can configure. You can then choose the glider you will be using for a particular flight from a list and have all the relevant data instantly available. Using the buttons above the list, you can add (paper icon), edit (pencil icon) or delete (trashcan icon) gliders from your list. As with other settings, changes are only stored if you exit the settings dialog with the OK (green with the white tick) button. If you accidentally delete a glider from your list, just tap the cancel (red with the white x) button and you'll be fine.

If you tap the add or edit buttons, you'll be presented with a new dialog. Here you can enter information about your glider. The polar is used for the final glide calculations. Select your glider from the list or enter the correct values for your glider in the boxes. The values represent three points on your glider's polar; these are used to make an approximation to this curve. These points are given as pairs of speed (in km/h) and rate of sink (in m/s). For optimal results, take the values at the speed for best L/D as the first point,  $V_{Ne}$  as the third, and a point halfway between these as the second point.

The box *Ref. weight*: has to contain the dry weight of the airplane when the polar data were measured.

The box *Load corr.*: enables a load correction, if the reference weight is not the correct one for your personal airplane.

If your glider can carry water, leave the full amount entered here, as this value will limit the actual amount you can enter on the [Preflight Settings/Glider](#) menu page. The actual Load correction can also be entered on the same page.

If the *Wing area* box contains a non zero value the *Wing load* is calculated and displayed on the polar page. The unit for the wing area is square meters (m<sup>2</sup>), the wing load is displayed in Kg/m<sup>2</sup>

You can see a graphical representation of the resulting polar if you select the **Show Polar** button. Included in this display is information on the speed for the best L/D for the selected glider. Using the cursor rocker you can simulate wind and lift by pressing the up/down (lift) and left/right (wind) buttons. The related tangent is calculated, and the best speed-to-fly and resulting sink are displayed accordingly. With the **Space** key you can return to the original state of the polar.

To add your own types to the selection list, please create your own polar file in the [polar directory](#). Take an existing file in that directory, make a copy of it and edit its content. But better would be to send your polar data to the Cumulus team for adding it into the polar directory.

The values for registration and call sign are used in the IGC logfile and as a unique identifier for the glider.

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## Settings - Maps

### Maps

On this page you can set the maps storage location and the map basic data.

#### Maps Location

As location for the map data for Maemo (Nokia Internet Tablet) you should define a directory on one of the SD cards. With the help of the button *Maps* you can open a directory selection dialog and navigate to the SD card locations to find under `/media/mmc[1|2]`. In the text field beside the button you can see the current selection. You can modify the text field also by hand and set so your preferred location.

#### Projection

The coordinate points of the raw maps Cumulus uses are not projected. They are coded according to WGS84 datum. Therefore all these points are projected on first loading. There are many types of map projections available. You need a projection because the earth is a sphere (or close to it) and your map is flat.

Cumulus supports two projections:

1. *Plate Carrée* - Equidistant Cylindrical Projection
2. *Lambert* - Conical Orthomorphic Projection

The first is computationally simpler and thus the preferred one in Cumulus. The latter is more complex, so your maps will take much longer on first load but it is more realistic. Each map projection needs a basis from where to work.

For the *Plate Carrée* projection choose a parallel close to your home base. If the option *Projection follows Home Position* is activated, the parallel is automatically set to the latitude of your Home Position in the assumption that the Home Position is your preferred flight space. That ensures an unskewed map display and you are not forced to set this parallel by hand. That is the default setting.

For *Lambert* projection you should select the parallels so that they are covering the area you are flying. For example, you could choose the parallels from your official flying map. Then you will have an equal look like these maps. You should select the longitude from the middle of the area you are flying. It is needed because of some technical reasons not for the projection itself. No automatic update of projection data is done here. You must do that always by hand. Therefore use this kind of projection only, if you are familiar with the Lambert projection.

After changing the projection kind or the standard parallel values Cumulus is forced to recompile your map files.

**Please note that:** If you don't set the projection options correctly, you will likely end up with a blue screen or a skewed map. This is especially so if

you are far away from the coordinates used in the projection!

### **Projection follows Home Position**

If this check box is selected a Home Position change will trigger automatically a recompilation of the map files. This option ensures best drawing results but it is only available for the *Plate Carrée* projection.

### **Unload unused maps from RAM**

Cumulus supports two strategies for keeping maps in memory. Maps are only loaded if needed, but they can either stay there until they really need to be moved out of memory, or they can be removed sooner. The first strategy is more suited for users who want to zoom in and out a lot and have plenty of memory in their device, the latter strategy is the default one and to be recommended for people with lower memory devices.

### **Center Latitude/Longitude**

The coordinates of your center point around that map files shall be downloaded from the Internet.

### **Install Maps and Distance**

Define a distance in the spin box around your center point and press then the *Install Maps* button. Cumulus tries to download all map files from the KFLog Map Room, which lays around the center point. Ensure that an active Internet connection is available to that time. Otherwise all downloads do fail. If Cumulus is in move (faster as 5 Km/h) no downloads are executed. If all download requests are processed you will get once a result message. Cumulus does not record a special log file for that. If Cumulus is started in a X-Terminal window you can see the single results as debug messages.

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## Settings - Map Objects

### Map Objects

Here you can choose the items to be loaded and displayed on the map.

#### Memory

If you experience problems with memory consumption or if you just wish to decrease the amount of information displayed on the map, you can choose to turn off some items on the map. These items will then not be loaded anymore. You should restart Cumulus after changing these options, because the options are only effective for newly loaded maps.

#### Performance

Disabling objects in general will increase map load and drawing speed and lower the memory consumption. Especially the isolines are concern of that. If you enable isoline drawing, the background of the map will be colored according to elevation. This coloring will be more detailed if you zoom in and less detailed if you zoom out. **Note that the isolines are needed if you want to use the ground elevation feature!**

#### Item Labels

Disabling the drawing of item labels will turn off labels on the map by default but you can toggle the display also via the menu bar or by using [shortcut keys](#). A label, normally the name of the item, is drawn beside the item, if the option is active. But be carefully with the activation of labels. On higher scales they can hide other map items, if you enable too much.

#### Waypoints

[Waypoints](#) do carry an importance attribute. The following attributes are known:

- low
- normal
- high

Under the group box *Draw Waypoints until this scale* you can define until to which scale an importance attribute is displayed. If the current map scale exceeds these limits, the related waypoint will disappear from the map. With the help of the importance feature you can better control the waypoint display. Do not set too high limits otherwise the labels will hide other important details.



## Settings - Terrain Colors

### Terrain Colors

On this page you can set the colors of the terrain levels. The levels comprise the elevation range from under zero to nearly 9000m. On the left side of the window you can see the currently used colors for the different elevations as bar with a scale at the right side. The scale unit can be in meter or foot depending on your selected preferred altitude unit. In the middle of the window you have in a frame a combo box and different buttons. In the combo box you can select the elevation of the terrain level to be modified. Pressing the button *Terrain Color* popups the color editor in which you can assign a new color if you want.

### Terrain Level

In the combo box you can select the terrain level to be edited. Choose the level and press the button *Terrain Color*.

The level  $< 0$  (subterrain) is used as default ground for the oceans and if there are no ground maps loaded.

### Terrain Color

Pressing the button *Terrain Color* popups a color editor with the color of the selected terrain level. Now you can change the color. With pressing of *OK* this new color will replace the previous one.

### Ground Color

If isoline drawing is switched off, this color is taken as general ground color. Here you have the possibility to define a brighter color to have a better contrast on the map. For instance in the mountains the terrain color maybe to dark, so you can unify the ground color. Pressing the button *Ground Color* popups a color editor with the used color. Now you can change the color. With pressing of *OK* this new color will replace the previous one.

### Color Defaults

Pressing the button *Color Defaults* will reset all colors to the internal defaults of Cumulus.

### Elevation Offset

With the help of the spin box you can move the elevation color index to be used in positive or negative direction. Normally in the flat land you need no offset but in the mountains it could be useful to move down the used color index a little bit to get a better map contrast as result.

## Settings - Task

### Task

Here you can define general task related turn point attributes and figures.  
Supported taskpoint figures are:

- Line
- Circle or Cylinder
- Photo sector
- Sector segment
- Keyhole sector

### Switch Scheme

The switch scheme defines how the automatic switch to the next turn point is executed, if a flight task is active. A flight task can be defined and activated in the [Preflight setup Task dialog](#). The automatic task turn point switch provides two modes. In both cases the area specified by the circle or sector has to be actually entered, or at least touched. *Minimum* means that the switch to the next task point will be executed after the distance to the TP, which has up to that time been decreasing, starts to increase, i.e., the minimum distance to the current turn point has been reached. *Touched* means that the switch occurs when the the outer border of the cylinder or sector is first crossed. In both arrival cases, the IGC logger interval is automatically set to one second for a duration of 30s to ensure the recording of the turn point passage. If the checkbox *Report* is activated a detailed information is displayed in the switch moment.

### Shape Box

Here you can define whether the Circle/Sector used has an outer border line or not, and whether this is filled with a transparent colour. Switching off both will make the turn point invisible, if it is not otherwise marked by a symbol, such as an airfield.

The filling defines the transparency of the drawn task point figure.

### Zoom

The check box with the Name *Auto* defines, if the map is zoomed in automatically in the near of the turn point to make the turn point details better visible. If the turn point is passed the old zoom level is activated again except the user has changed the zoom level in the meantime.

### Task Point Figures

Three different task point figures are supported for the start, finish and observation (route) point. Task point figures can be a line, a sector, a sector segment, a keyhole sector or a circle. A circle expect always a radius value in its input box. If a sector is selected as task point figure, you can define a sector centered on the turnpoint. Three parameters can be used for the sector configuration. Radius 1 the *Inner radius* defines a



circle around the task point, whose radius can vary between zero and the value of Radius 2 the *Outer radius*. If the inner and outer radii are equal, the result will be a full circle without a sector. The angle of the sector can vary between 1 and 360 degrees.

In the *Schema* box you can define, which of the provided task point figures should be the default. This default definition can be overwritten in the taskpoint editor for every single task point.

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## Settings - Lines

### Lines

Here you can enable/disable the drawing and define the width and the color of different lines drawn at the map.

### Heading

Enable/disable drawing and define the width and the color of the heading line.

### Path

Define the width and the color of the path line. The path line is the line drawn between the task points.

### Target

Enable/disable drawing and define the width of the target line. The color of this line depends on the reachability of the target.

### Trail

Enable/disable drawing and define the width and the color of the trail line. The trail line is the line of the flown course.

### Task Figures

Enable/disable drawing and define the width and the color of the task figures. The task figures are drawn around task points.

### AS Border

Define the width of the drawn airspace borders. The color depends on the drawn airspace and can be configured [here](#).

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## Settings - Point Data

### Point Data

Cumulus uses the following source:

- [openAIP](#)

as database for point data, such as airfields, radio points, thermal hotspots, etc.

*openAIP* uses one file per country. The advantage of *openAIP* is, that you can bring in directly your own contributions or corrections on their webpage at [www.openaip.net](http://www.openaip.net). A little disadvantage is, that you have to define in Cumulus the countries which you want to install. The rest is done automatically by Cumulus, if you press the download button.

### Terms of use for external data

Please read and accept the Terms and Conditions of

- [openAIP](#)

before you use these data.

---

### openAIP - Download

Enter the countries beside the *Download* button, which you want to download from openAIP. The country identifiers have to be encoded according to ISO-3166 as two letter code. Allowed separators are space or comma. Press the *Download* button to get the desired files from openAIP. If Cumulus is in move, no downloads are possible.

Updates of the files are provided in short time intervals without an extra announcement by openAIP. Therefore you should download from time to time again the desired point files to be up to date. **Note!** Cumulus will not do that automatically.

### openAIP - Radius Filter

All point data lying inside your home position radius will be read from the openAIP data files, which are selected on the load page.

**Please Note!** *If the home position is too far away from the area defined by the radius value, no airfield data are shown on the map.*

### openAIP Runway length Filter

Here you can define a minimum runway length for the point data to be read in to filter out objects with too short runways. To switch off the filter set its value to zero.

### openAIP - Load

Pressing the *Load* button opens a table showing all loadable openAIP

point data files. The point data files, downloaded by Cumulus, have the following naming format:

<two-letter-country-code>\_wpt.aip for airfields  
<two-letter-country-code>\_nav.aip for radio navigation facilities  
<two-letter-country-code>\_hot.aip for thermal hotspots

In the header of the table you can see the directory, where the listed files are stored. At the left side of every table row you can see a checkbox. If you activate the checkbox, the listed file is loaded otherwise not. If the box *Check or Uncheck all* is checked, all listed files are loaded by Cumulus. If you want not to load all, deselect as first this checkbox. Only then you can make single selections of files. If you select a whole table row, you can remove the selected data file by pressing the trash button.

---

### List Display

In the **List Display** area you can enlarge the height of the list rows applied to the point lists and the reachable list for a better legibility.

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## Settings - Airspaces

### Airspaces

#### Airspace Table

The table shows you which kind of airspaces can be drawn on the map. Mark the boxes of the airspaces you want displayed. To change the colour of the airspace border or the airspace area, touch on the related field in the table. This will open a colour dialog. Pressing the *Color Defaults* button will assign the programmed default colours to all the airspaces.

A special airspace type are Flarm Alert Zones. They issued by Flarm Devices and warn you for airspace usage by other flying objects. It is highly recommended, that you do not fly in in such alert zones!

**Caution!** Warnings are only generated for airspaces which are enabled in the table.

#### Ignore AS

If you enable the checkbox *Ignore AS*, you can setup a vertical border in the spinbox at which an airspace is ignored, if its lower limit lays over the predefined vertical border. The border value uses the unit FL (Flight Level). This feature allows you to filter out upper airspaces and to reduce the drawn items at the map.

#### Download of openAIP Airspace data

Enter the countries beside the *Download* button, for which you want to download airspace data from the openAIP server. The country identifiers have to be encoded according to ISO-3166 as two letter code. Allowed separators are space or comma. Press the *Download* button to get the desired files from the openAIP server.

**Note!** If Cumulus is in move, no downloads are possible.

Updates of the airspace files are provided in short time intervals without an extra announcement by openAIP. Therefore you should download from time to time again the airspace files to be up to date.

**Note!** Cumulus will not do that automatically.

#### Airspace Load

The *Airspace load* button enables you to switch on or off the loading of [airspace files](#) contained in the airspace directory. It opens a table where all available airspace files are listed. In the table header is displayed the directory, where the listed airspace files are to find. At the left side of every table row, beside the file name, is located a checkbox. With the help of this checkbox you can switch on (checkbox is checked) or switch off (checkbox is unchecked) the corresponding file load. If you want to

activate the load of all files, enable the checkbox in the upper first row with the title *Select all* . Please note! To make single selections the checkbox *Select all* must be unchecked. Leaving window with *Ok* triggers immediately a reload of the airspace data, if something has been changed.

### Airspace Warnings

You will get an optical and acoustical warning if you are near, very near or inside the specified airspace. If you press the button *Airspace Warnings* you can set the lateral and vertical distances (separately for above and below) that will be applied when generating warnings. If the distance to an airspace is smaller than the specified values, the position is considered *near* or *very near* to the airspace.

The units used for the vertical and horizontal proximity distances can be configured on the [Setting/Units](#) page.

The display duration of warnings and their suppression for a certain time can be configured on [Settings/Information](#) page.

**Note that Cumulus will only warn you for airspaces that are drawn unless you have activated the check box *Draw all airspaces ... above me*.**

### Airspace Filling

The *Airspace filling* button enables you to switch on or off the changing of the airspace fill colour according to the glider's proximity. As you get closer to the airspace vertically or horizontally, the transparency of the airspace fill colour changes, the percentage amount of change being set by the table according to whether you are near, very near or inside the airspace in question. If you disable the airspace filling, a fixed pattern is used for filling.

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## Settings - Units

### Units

Altitudes, Speeds, Distances, Lifts, Wind, Positions and Time Zones can be displayed in different units. Select the units you are comfortable with.

The time zone option provides two time zones *UTC* or *Local*. If *Local* is chosen, all times are displayed according to the selected time zone of your running OS.

Note, the new unit settings take effect in all other menus not until you leave the configuration settings with ok.

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## Settings - Information

### Information

In the text field beside the button *Sound Player* you can enter a command line sound tool, which is called by Cumulus to play alarm or notification sounds. Pressing the push button will raise a file selection box. With the help of the box you can navigate to a command line sound player tool like *aplay*, *gststreamer*, ... and select it. If the sound file must be placed inside the command arguments you can use the *%s* as a dummy argument for that.

Example:

```
/usr/bin/aplay  
or  
/usr/bin/aplay %s
```

do the same. Note that you have to add the full path name to the sound tool, that it works sure.

In the spin boxes you can configure the display duration of the information windows. The information windows can appear automatically (warnings) or if you touch a symbol on the map. After given time is expired it will be removed automatically unless the time is set to zero. In this case the user must quit the window manually by hand touch.

All times are defined in seconds. To make the display duration more sensitive with the amount of information to be displayed the real time is weighted with them. That means more items to display will extend the window stay time.

With the item *Warning suppress time* you can suppress the same airspace warning for a certain time to be defined in minutes here. Multiple warnings are generated, if you move between the different warning distances, definable under the tabulator *Airspace* e.g. during circling. The value zero switches off the suppression.

An audible alarm can be switched on/off. It is used to emphasize special situations like approaching near to airspaces. The general default is on.

Flarm traffic information and alarms can be switched on/off here. If switched on little popup windows will appear with the related traffic information, if Cumulus is with a Flarm device connected. The general default is on.

The *Nearst Site Calculator* is computing the distances and the reachability to the nearst sites in flight. If this feature is unwanted, it can be switched off here to spare processing resources.

If the *black display* is checked, waypoint and turnpoint data are shown on a black background with white writing, to make them better readable in sunshine.



If the box not checked the display is reverse.

The button *Reset to defaults* can be used to reset all done changes to the initial state. The settings here take immediate effect, if the OK button is pressed.

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## Settings - Look&Feel

### Look&Feel

On this page you can set some Look&Feel items of your GUI.

#### GUI Style

In the combo box you can select different GUI styles. The default is *Plastique*. For that style Cumulus is optimized. On a Nokia Internet Tablet the *GTK* style is better adapted to this device.

#### GUI Fonts

Pressing the button *Show Fonts* pops up a font editor with your current used font. If you want, you can change the font now. But be careful not all fonts do work properly together with Cumulus. Especially if you choose a too big font size, the layout of some widgets maybe displayed not more correct.

With pressing of *OK* the new font will replace the previous one.

#### Infobox frame color

Here you can change the frame color of the little display boxes located at the left side on the map screen.

Pressing the button *Edit Color* pops up a color editor with the used color. Now you can change the color.

With pressing of *OK* this new color will replace the previous one. Please note, that the color change will become effective only after a program restart.

#### Screensaver on

Here you can define a speed limit taken into account for screensaver switch on or switch off. The screensaver is switched on automatically for saving battery power, if your movement is going under the defined limit. Every 10 seconds the speed check is done.

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## Preflight Settings

Press **p** to open directly the pre-flight settings screen. The normal way is, to press the menu button or the shortcut key **m** on the PDA to open the menu bar. Then navigate to *Setup->Preflight*.

The opened table contains all pre-flight and post-flight configuration menus of Cumulus. There are:

1. [Glider](#)
2. [Task](#)
3. [Flarm](#)
4. [Waypoint Import](#)
5. [Common](#)
6. [Checklist](#)
7. [Flight Logbooks](#)
8. [METAR and TAF](#)
9. [Live Tracking](#)
10. [Wind](#)

**Note!** If you have done modifications on a single setting window and you want to make them permanent you must leave this window by pressing the *OK* button. To cancel all done modifications, use the *CANCEL* button instead of.

**WARNING: Make your settings while safely on the ground, not while flying!**

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## Preflight Settings - Glider

### Glider

Here you can select the glider to be used for your flight.

#### Glider selection list

In this list you can select one of the gliders defined before in [Settings/Gliders](#). The glider is listed with its type, registration and competition sign. The list is empty, if no glider definitions do exist.

#### Deselect button

Pressing the button will deselect the current selected glider in the list.

### Co-Pilot

Name of the Co-pilot, if the glider is a double seater. The name is recorded in the IGC log file.

### Load coor

Here you can adapt the reference weight of your airplane, used during polar measurement, to the actual situation. An adaption is necessary, if the weight of the pilot and his luggage (not the water ballast) do substantially differ from the reference weight. The entered correction factor is included in the final glide calculation.

### Water ballast

Here you can define the water ballast, filled in in your glider before take off. The entered value is included in the final glide calculation.

### Wing load

If you have defined a wing area for your glider, the wing load is displayed here in Kg/m<sup>2</sup>.

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## Preflight Settings - Task

### Task

Here you have the possibility to define flight tasks. A common description about tasks is to find [here](#).

### Window description

In a list overview you can see all defined tasks by you. Select a task entry and click the button *Show* to see the details of that task. In the type column you can see the assigned task point figures to the task points as little red icons.

In the upper line you can see different boxes. In one of them you can enter your true air speed TAS you want to fly. Also wind direction and wind speed can be entered. Both values are identical with the manual wind values, which you can set in [Preflight Settings - Wind](#). That means, you can change the manual wind also via this configuration page.

If TAS and wind speed are greater than zero they will be included in the task calculation. In this case you can see under the column TH (true heading) the course to be flown to reach the next target. In the other case the column is named TC (true course). That means wind speed or TAS are zero. If wind triangle calculation fails, you will also see the column TC (true course). In such a case wind correction angle (WCA) and ground speed (GS) are set to a dash.

If you leave the menu with the OK button, the selected task is treated as to fly now. In this case the task is drawn on the map.

### Automatic task point switch

Precondition is, you have selected a task before and you are now in the map view. Open the task view by touching the *To* box in the upper left corner of the map display. To activate the automatic task point switch, you have to press the *Start* button in that view. That sets the selection to the begin point of the task. Alternatively you can select any other point by hand. But note the difference. The *Start* button will always select the first approach point of a flight task whilst in the task view you can select any point. If you could not touch a task point line, sector or circle you must select by hand the next task point. There is no automatic switch done to the next point as some GPS devices are doing.

If you select the first approach point already on ground and move faster as defined [here](#), the automatic switch to the next task point will become active. If you pass the line or approach into the sector or circle described by the task point switch radius, the next task point is selected automatically. The common task point switch behaviour can be configured in [Settings-Task](#). Furthermore you have the possibility to edit every task point in the task editor and to overwrite the common assigned task point behaviour.

## Task management

A selected task can be removed or edited by clicking on the related buttons in the right upper corner of the window. If you want to define a new task, click on the plus button. This will open a new screen, where you can select point data from different list to be used for task definition. Use the arrow buttons for moving up/down of task points. The circle button changes the order of the task points, the trash button removes a task point. Cloning of a task point is possible with the double rectangle button.

Furthermore you can edit single task points by selecting them and pressing the pencil button to change their data, the assigned task figure, the values of the task figure and the auto zoom flag. A modified task point is marked with a yellow background in the type column of the task display. Modified task points or the whole task can be reset to the configuration default values, which are defined in [Settings-Task](#), with the *Brush* button.

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## Preflight Settings - Flarm-IGC

### Flarm

Here you have the possibility to readout and set several Flarm data. On this page you can upload a selected flight task together with its related data to the Flarm device.

#### Window description

In the upper window part are displayed different read only items in the *Flarm Data* panel from the Flarm device. The headline of the box is set to the Flarm device type. If the fields are filled with ??? no data could be read from the Flarm device. In this case there seems to be no active connection available. The abbreviated labels in the *Flarm Data* panel have the following meaning:

<b>SN:</b>	Serial number
<b>Radio Identifier:</b>	ICAO/FLARM
<b>Sv:</b>	Severity of issue
<b>Err:</b>	Error code
<b>FW:</b>	Installed firmware version
<b>FWEXP:</b>	Expire date of firmware
<b>Region:</b>	The region in which the device can be used
<b>IGC:</b>	IGC version. Empty on none approved IGC Flarms.

**Note!** If Flarm reports a severity or an error code in the framed box beside the *Sv:* or *Err:* label, you can click on that framed box and you will get a textual description of the code.

### LogInt

Here you can define the log interval of the IGC Flarm logger. The possible setting range is 1...8 seconds. The default is set to two seconds.

### Priv

Here you can set/unset the so called *Stealth mode* of the Flarm device. 0 means off and 1 means on. **If you don't know, what it is, let it switched off (0)! That is better for your personal safety.**

### NoTrk

Flarm *opt-out* option for ground tracking (â€œno trackâ€). If set, the receiving ground stations should not process or store position data of

your glider. 0 means off and 1 means on.

### **H-Range**

Here you can set the horizontal distance of aircraft to be shown in meters. PowerFlarm supports the range 2000...65535m. All other Flarms 2000...25500m.

### **Pilot and glider data**

In different input boxes you can set the pilot and glider data, used in IGC data file logging.

### **Task**

In the displayed label at the right side of the task label you can see the currently activated task in Flarm, if you have a PowerFlarm. All other Flarms do not support that.

In the displayed combo box at the right side of the task label you can select a task to be flown. Preselected is the currently activated task in Cumulus. But you can change here the current task selection, if you want to do that. The new selected task will be considered as the task to be used for flying, if you upload it to the Flarm device.

A task can also be selected at the [preflight task page](#).

**Note:** A taskname and all waypoint names must be consist of pure visible ASCII signs out the code range 0...127. If the taskname contains other signs, e.g. umlauts, special national signs, etc., the task upload to Flarm will fail with an error message.

### **Read**

Pressing this button will read out all available data from the Flarm device and put them in the related fields of the window.

Note, that a set IGC Task can be read out only by a PowerFlarm.

### **Set**

Pressing this button sets the data, defined in Cumulus, in the fields of this window. On request you can adapt these values to your personal needs.

### **Clear**

Pressing this button will clear all input fields and reset the task selection.

### **Write**

Pressing this button will upload all data from the edit fields and the selected task to the Flarm device. At the end of the upload procedure you will ask to reboot the Flarm. That is necessary to activate the just uploaded task in the Flarm device.

### **Close**

Pressing this button will close the window.

### **Please note the following!**

1. Task support works only for the IGC approved Flarm devices!
2. To get activated an uploaded task, you have to cycle the power switch of



the Flarm device or to restart it via a software command respectively.

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## Preflight Settings - Waypoint Import

### Waypoint Import

Here you have the possibility to import external waypoint data into Cumulus from different sources by using of additional filter options.

#### Select

In the Select group you define two filter parameters applied during read in.

##### Type

Type of waypoint to be read.

##### Radius

Radius around the center point. All waypoints laying inside the defined radius are read.

#### Center Point

In the Center Point group you define the center position for the radius option. Three different possibilities are available:

##### Position

A user-defined position can be entered here.

##### Homesite

The homesite is taken as the center position.

##### Airfield

The selected airfield is taken as the center position. Click on the airfield name, to change the selection.

#### Storage Format

Two waypoint storage formats *Binary* or *XML* are supported. The default is the binary format. It uses less space as the XML format and is faster to read. The XML format has the advantage, that the data can be viewed and modified in a normal text editor.

#### Storage Priority

The priority of the imported waypoints can be changed before insert in the global waypoint list. If the priority *Source* is chosen, nothing is changed. Otherwise the selected value will overwrite the priority of the imported waypoint.

## Waypoint Import Management

If you press the *Load* button, a file selection dialog box is opened. In this box you can navigate to a file to be read in. Supported file formats are:

- KFLog and Cumulus binary format with extension *.kwp*
- KFLog and Cumulus XML format with extension *.kflogwp*
- SeeYou format with extension *.cup*
- WinPilot or CAI format with extension *.dat*
- British Gliding Association DOS turnpoint file with the extension *.dos*, to find at [BGA List of Waypoints](#)

The selected file is read in by applying the filter options, if the checkbox *Filter* is active. In a first run the number of imported waypoints is counted only and the result is displayed to you. Now you can decide, if you accept the result or not. If the result is accepted, the waypoints are read in again and put in the global waypoint list of Cumulus. If the amount of waypoints is too high for you, you can vary the filter parameters and start a new load. Please note, that a new waypoint is not added to the global waypoint list, if its name and its coordinates are already contained there. Such waypoints are ignored.

**Please note the following:** Be very carefully with the amount of waypoint data to be read in. Too much data needs a lot of run-time memory and can have a negative influence on the processor performance!

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## Preflight Settings - Common

### Common

This is where you enter various common preflight data.

#### Arrival Altitude

The arrival altitude is your chosen safety (reserve) altitude above the terrain altitude of your goal when on final glide. In calculating the final glide parameters, the value entered here is added to the elevation of the selected target. For many situations, the default value of 200 metres would be sensible. The units used for this value are set in [Settings/Units](#).

#### Arrival Altitude Display

The arrival altitude display selection is only active, if a flight task and a glider are setup. The arrival altitude is calculated above the selected target. Two different display targets can be selected.

- **Landing target:** Displays the arrival altitude above the landing target by taken into account of all turnpoints starting at the current position. That is the default setting.
- **Next target:** Displays the arrival altitude above the next turnpoint target starting at the current position.

#### QNH

The area QNH (as given by ATC) is entered in hPa (hectopascal). It is only used in calculation of the vertical warning distance to airspace boundaries expressed as flight levels. The default value is 1013 hPa.

#### LD average time

Here you can adjust the calculation time for the current LD. More about the current LD is to find [here](#) under the headline LD-Display.

#### Autostart IGC logger

If you activate this check box, Cumulus automatically starts the IGC logging when you start to move faster as displayed in the spinbox. With the help of the spinbox you can adjust the speed limit to your needs. The current logger status is signaled by a variously-coloured field in the [status bar](#). After landing the flight is closed, if 90s no moving could be detected. If the GPS signal breaks down, the same condition is applied.

#### B-Record Interval

Interval for logging of the IGC B-Record. Default time is 10 seconds. Note that shorter times will increase the log file size and the processor load.

#### K-Record Interval

Interval for logging of the IGC K-Record. Default is *None*, i.e., switched off.

If you enter a valid time, the following additional items are logged, if they are available. Otherwise default values are used.

- HDT, true heading as 3 numbers
- TAS, true airspeed as 3 numbers with unit kph
- WDI, wind direction as 3 numbers
- WSP, wind speed in km/h as 3 numbers
- VAT, compensated variometer (total energy/netto) vertical speed in m/s and decimals with sign if negative.

Note that the activation of this option will increase the log file size and the processor load.

It should be noted that the Cumulus IGC logger does not fulfill in all respects the IGC requirements for glider flight documentation. There is no security G-Record written into the log file, because the PDA device cannot be secured against external manipulation. Furthermore, there are not always pressure altitude values available, as required by the IGC. For more information about the FAI IGC requirements, including the IGC logger formats, see [here](#).

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## Cumulus Preflight Settings - Checklist

### Checklist

Here you can define a checklist, which could help you during your flight preparation and that you don't forget important points. The checklist is located in the data directory of Cumulus and carry the name *cumulus-checklist.txt*. This file is a simple text file and can also be created outside of Cumulus, e.g on your PC. From the PC you can copy the file onto your PDA, maybe via USB. If you use special characters or umlauts, please ensure, that they all are UTF-8 encoded.

The checklist menu page supports also the creation and modification of checklist entries with the help of the right placed buttons.

When the checklist is opened, you can see at the left side of every check entry a question mark icon. If you have finished the check at a line you can tip at the question mark icon to change it to an OK icon. So you can see, which checks have been passed successfully.

**Note!** If the checklist is opened, all icons are set to question marks.

Button	Description
Menu	If you press the Menu button, you can show and hide the file name of the checklist above the list display.
Plus	If you press the Plus button, you can add a new empty line after the selected entry or at the end of the list, if no entry is selected.
Pencil	If you press the Pencil button, you can edit the selected list entry in a separately opened editor.
Trash	If you press the Trash button, you can remove all selected entries from the list.
Red X	If you press the Red X button, all your done changes are discarded.
Green	If you press the Green button, all your done changes are saved into the checklist file.

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## Cumulus Preflight Settings - Flight logbooks

### Common

Here you can view the flight logbooks managed by Cumulus. There exist two kinds of them.

### My flightbook

If Autostart logging is enabled, Cumulus records the basic data of your flight into a logbook. Pressing the button *Open* opens a window, where all flight logs are listed. If you want you can remove the selected or all entries. The Logbook is a pure ASCII data file in a CSV format. Semicolon is used as separator. The file carries the name *cumulus-logbook.txt* and is stored in in the [data directory](#) of Cumulus.

### Flarm flightbook

Pressing the button *Open* opens a new window. If you press the button *Read* a flight overview is downloaded from the Flarm device and displayed in a list. Now you can select one or more flights. If you press the button *Download* all selected flights are downloaded to your device into your defined [data directory](#). All flights are stored there under the subdirectory *flarmlog*.

### Flights to USB stick

This feature is only supported and visible by a connected **Power Flarm**. If you press the button *Start*, all Flarm flights are transferred to the connected USB stick. During transfer the transferred file together with a progress bar is displayed.

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## Preflight Settings - METAR and TAF

### Common

At this page you can retrieve airport weather reports (METAR and TAF) from the NOAA server in the USA. For that purpose you need an active Internet connection running. The airport weather stations have to be entered into a list as four letter ICAO code. As weather info you will get the METARs and TAFs of the listed stations. The METAR report is partly displayed in a more human readable form.

### Add

Enter here the four letter ICAO code of the airport station, where you want to retrieve weather data.

### Update

If you press the Update button, all weather stations contained in the list will be asked for their current weather. **Notice!** Please ensure, that you have an active Internet connection running to make the data download possible.

### Details

If you press the Details button, all weather data of the selected station in the overview list are displayed on a new page. The METAR report is partly displayed in a more human readable form. At the end are to see the original METAR and TAF reports.

If you press the Update button, the weather data of the displayed station are retrieved once again. **Notice!** Please ensure, that you have an active Internet connection running to make the data download possible.

### Delete

If you press the Delete button, the selected station in the list is deleted.

### Close

If you press the Close button, you will return to the overview menu.



## Preflight Settings - Live Tracking

### Live Tracking

At this page you define all the things for the *Live Tracking*.

*Live Tracking* means using a GPS to determine your position and a mobile network to send this position in real-time to a server, that other people can see your exact position and track presented in a map just in time. The tracking option needs the capability to connect to mobile networking during flight with your used device.

If you switch on the Live Tracking at this page, the sending of position data is started automatically, if a certain speed over ground is reached. The start speed is adjustable on this page at the menu point [Autostart IGC logger](#). If you stand still for ca. 60s, the Live Tracking is finished and closed automatically. Per flight there exists only one active session. If all data of the previous session could not be transmitted to the server, they will be removed with the start of a new Live Tracking session.

### Live Tracking on/off

Here you can switch on/off the Live Tracking. You can do that at any time also during the flight in the air. The switch off closes immediately an existing Internet connection.

### Tracking interval

Here you can define the time interval for transmitting of position updates to your selected server in the Internet.

### Airplane type

Define your used airplane type here. Further data are taken from your selected airplane.

### Server

Please select the service, which you want to use for Live Tracking. Several variants are possible:

- [www.livetrack24.com](http://www.livetrack24.com) LiveTrack24
- [test.livetrack24.com](http://test.livetrack24.com) for test purposes with LiveTrack24
- [livexc.dhv.de](http://livexc.dhv.de) LiveTrack DHV
- [skylines.aero](http://skylines.aero) SkyLines LiveTracking

Before you can use one of these services, a registration is required at the web page of the service provider. That can you do over the following listed links.

- [www.livetrack24.com](http://www.livetrack24.com)
- [livexc.dhv.de](http://livexc.dhv.de)
- [skylines.aero](http://skylines.aero)

If your registration was successful you should have an user account with a user name and a password.

### User name

Enter your user name here. That is dependent on the service which you want to use. For *Livetrack24* and for *Livetrack DHV* you have to enter the *Livetrack* user name. *SkyLines* expects a so called *Live Tracking Key* which can you find at their web page under the menu point *Live Tracking*, if you have logged in there. Enter this key as your user name here.

### Password

Enter the password from your user account here. *SkyLines* expects not really a password. Here you can leave the entry empty.

### Login Test

If you press the button *Login Test* you can check if your entered account data are accepted by your selected server. **It is advisable to do this check after each entry or change to ensure that you have no trouble during flight.**

### Session

The last line shows you the current Live Tracking session state. If the service is switch on and active you can see here the cached and sent position packages to the server in the Internet. In case of a high number of cached packages you should check the status of your mobile data connection. On a stable connection there should be to see only a small number of cached packages. If your mobile Internet connection is down for a longer time (ca. 1h) the oldest route package is removed from the cache during the entry of a new route package to prevent a memory overflow.

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## Preflight Settings - Wind

### Wind

At this page you define the manual wind settings. Furthermore you get displayed a wind statistics about the altitude range.

#### Manual Wind On/Off

Here you can switch on/off the manual wind. You can do that at any time also during the flight in the air. The manual wind is used immediately after its activation for the glide path calculation.

#### Manual Wind WD

Clicking the label *WD* opens a number editor where you can enter a value for the wind direction. The direction range covers the interval from 0...360 degrees.

#### Manual Wind WS

Clicking the label *WS* opens a number editor where you can enter a value for the wind speed.

### Wind Statistics

The wind statistics shows you the last hour of the wind calculation about the altitude range, where wind direction and speed have been calculated during circling.

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## Display

The main, so-called map view of Cumulus consists of three information areas. These contain:

1. the flight information
2. a map
3. a status bar

In addition, a menu bar may be raised above the display. This gives access to various setup menus and other options.

### Flight information

The group of small windows on the left-hand side are (from top to bottom and left to right) as follows:

- **To** - Selected target and, in parentheses, its elevation. Tap on display to select a target from the points lists.
- **Arr** - Arrival Altitude above (positive) or below (negative) the selected target ([see glide path](#)).
- **Aircraft symbol** - Bearing to target relative to the current heading. Tapping on the icon will save the current position as a waypoint, which will show up on the map as a green flag.
- **Dis/Eta** - Distance to, time duration to and estimated time of arrival at, selected target, respectively. Tap on the display to toggle between the three.
- **Brg** - Bearing to target. Tapping on this window causes the reverse course to be shown with a red flag for five seconds.
- **Gs** - Current ground speed
- **Trk** - Track (also indicated by the direction of the aircraft symbol). If you tap here, the FLARM Radar view is opened.
- **Wd/LD** - Wind speed and direction toggled with LD by short tapping on the display. The LD display shows both the required and the current LD to the selected target. See also the [LD description](#) for more info. A longer tip at the wind label opens the manual wind configuration dialog.
- **Msl/Std/Agl/Ahl** - Current aircraft height in relation to MSL, standard pressure, ground altitude below the aircraft or altitude of the home site. To get the dialog box sub-menu for selecting the height datum, tap on the display. For further explanations, see [Altitude display](#).
- **Var** - Variometer display normally derived from the GPS altitude. If a peripheral device provides variometer information, this is used instead (see [Settings-GPS help page](#)). Tap on the display to bring up a dialog box where you can change the integration time and the TEK adjustment.
- **Mc** - The McCready value used for the glide path and best speed-to-fly calculations. Tap to open the in-flight dialog for changing the expected lift, water ballast amount or deterioration in performance due to bugs. This display is only active if a glider has been selected. Furthermore the current flight time is displayed, if the IGC logger is set to the autostart mode.

- **S2f/MU** - Best airspeed for the current McCready setting, wing loading and bug setting. This display is only active if a glider and a target are selected. The target is that displayed in the **To** window. Instantaneous variometer information is not considered at present: it is set to zero. If you tap on the window, it toggles the menu bar, placing it along the top of the display. The letters **MU** may help you remember this.

Of course all information is displayed in the units you selected in the [Settings/Units](#) dialog.

## Map

The map displays a graphical representation of the current position (indicated by the intersection of the fuselage and wings of the glider symbol) and heading (indicated by the rotation of the glider symbol). If there is no GPS fix, Cumulus displays an X symbol instead of a glider. See under [Manual Navigation](#) for more details. The current scale is displayed in the lower left corner of the map.

If Cumulus is connected with a Flarm device and the current map scale is sufficiently low, the most important object reported by Flarm is also drawn on the map as a circle, labeled with the distance and the relative vertical separation. In the Flarm display menu a Flarm contact can be selected; this object will be displayed on the map too, if it is in view.

The map shows the terrain elevation using colours. The detail level of this display changes with the zoom factor: more zoom gives more detail in the terrain shapes. You can turn off the drawing of elevation on the [Settings/Map Objects](#) page.

Depending on the maps you installed, Cumulus displays airports (the type is indicated by the standard ICAO symbol), cities (yellow), highways (red/white), roads (red), railways (dark dashed line) and water (blue). Not all details are displayed at all zoom factors. Cumulus also displays airspace structures, the different types being indicated by different colours configurable under [Settings/Airspaces](#). For basic information on an airport or airspace structure, simply touch the related symbol or area on the screen, when the info on the interesting object will appear in a pop-up window. The window disappears automatically after a certain time that can be configured in the [Settings/Information](#) menu.

If you tip longer as one second at the map the airspace status display is opened as popup window. In the display you can see, if you are inside of a certain airspace or in its near.

If you touch on an airfield icon, you will get detailed information on this item. You can add an airfield to your waypoint list if it isn't in the list already. Added waypoints will have a *normal* priority.

Cumulus can calculate which points are within reach. These points have a green background to them. If you would arrive below the safety height, the point has a magenta background to it. The line to the currently selected waypoint is coloured to match, and will be in red if the waypoint is not within reach. The safety height margin is set at the [Preflight Settings/Common](#) page.

## Status bar

The status bar displays the following items (from left to right):

The first item shows the mode Cumulus is operating in. If no GPS connection has been established (i.e., Cumulus is in Manual mode), *G-0* will appear, otherwise *G-N*, where N is the number of satellites in use by the GPS receiver.

The next item in the status bar combines a logging and flight indicator. If IGC logging is enabled and running, the background is green, whereas if the logger is in standby mode (autostart), the background is yellow. A grey box means that the logger is not enabled. The flight status symbol is shown by one of the character symbols below:

- ? - Unknown
- C - Cruising
- L - Circling Left
- R - Circling Right
- S - Standstill

The next item shows the number of received Flarm devices. If no Flarms are seen, *F-0* will appear, otherwise *F-N*, where N is the number of received Flarms. Obviously this item is only visible if Cumulus is connected to a Flarm device.

The next item in the status bar indicates the current position in latitude and longitude.

The next item shows the glider selected.

The rest of the status bar is used to display warnings and other information.

If you want to maximize the screen area for the map display, you can disable the status bar via the menu entry *Toggles/Statusbar*.

## Altitude display

The altitude display can present the aircraft's altitude relative to one of four different references. All are derived from the GPS altitude, unless pressure altitude information is being provided by an external device.

- Msl - Altitude above mean sea level.
- Std - Altitude based on standard pressure, 1013,25 hPa. This is used to determine the vertical warning distance to airspaces defined by flight levels. As Cumulus does not "know" what the current pressure at sea level is, this must be given as (an area) QNH in Setup/Pre-flight setup/Common or by using the menu "behind" the altitude display (described next).
- Agl - Altitude above ground level. Only available when terrain data have been loaded.
- Ahl - Altitude above home site level. Requires the right elevation setting of the home site above MSL [here](#).

You can very easily change the altitude display reference: just tap on the display, and a configuration dialog is opened, where you can change the altitude

reference, the unit, the height correction factor and the QNH. The height correction factor is used to compensate the difference between the altitude delivered by the GPS system and the true altitude. Both GPS and pressure altitudes often differ from the expected altitude.

Another function of this dialog is the calculation and the display of the gained altitude. When you press the S button, the calculation of your gained altitude is started. The *AltGain* box shows you the height between your deepest and highest point after the start button press. That is a good help, if you want to make a certain altitude gain as it is required for the silver and gold-C and for the 5000m diamond.

## Glide path

The glide path indicator gives you an estimate of whether or not your selected target is in range. This it calculates using the following parameters:

- your current height
- the elevation and range of the target
- the polar values given in the [Settings/Gliders](#) menu.
- the mass of the pilot given in the [Preflight Settings - Glider](#) menu.
- the amount of water ballast carried. The initial amount is set before take-off in the [Preflight Settings - Glider](#) menu, but if ballast is reduced in flight, then the value can be adjusted accordingly in the Mc window's sub-menu.
- the reduction in performance by bugs on the wings, also adjustable in the Mc window's sub-menu
- the wind strength and direction shown in the Wd window
- the minimum arrival height at the target as set in the [Preflight Settings/Common](#) menu.

It is assumed that you fly at the indicated best airspeed, S2f, for the currently-set McCready value. If, however, the indicator shows a negative value, you are below the glide path and the target is not within reach. If you are above the glide path, i.e., the target is reachable, you can probably fly a bit faster to reach it sooner, depending on the polar of your glider. The theoretical value of the speed to fly can be found by adjusting your McCready value in Mc until the glide-path indicator shows just slightly positive.

## LD-Display

In addition to the glide path indicator you can check your situation with the LD display, too. A precondition for the LD calculation is likewise that you have selected a target, otherwise nothing is displayed. The LD display consists of two values, separated by a slash. On the left side is displayed the required LD to the selected target - normally this should show positive! The safety height margin and the elevation of the target are both taken into account in the calculation. On the right side of the slash is displayed the current LD achieved over the last 30s. The measurement time can be adjusted on the [Preflight Settings/Common](#) page under the headline *LD average time*.

If the current LD is higher than the required LD, you should be on a safe glide path to your selected target. If you have climbed or flown at the same altitude over the last whole measurement cycle, the display shows a value like >99. If the

calculation result is not sensible, a dash is shown in the display.

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## In flight usage

Cumulus permits the use of the keyboard to minimize the use of the stylus or directly touching the screen while in flight. For N800 user the hardware key support is limited on the available keys. So most of the functions are only accessed by using the menu.

### Shortcut Keys

The following shortcut keys are defined in GPS mode:

- **D** - Toggle display of info boxes left beside of the map
- **A** - Toggle display of airfield labels
- **O** - Toggle display of outlanding labels.
- **W** - Toggle display of waypoint labels.
- **T** - Toggle display of taskpoint labels
- **E** - Toggle display of detailed labels information
- **R** - Display a list of nearest resp. reachable points where you can land.
- **I** - Information about selected waypoint
- **H** - Navigate to home site
- **Y or Z** - Zoom in
- **X** - Zoom out
- **Cursor right** - Zoom in
- **Cursor left** - Zoom out
- **V** - Zoom to waypoint
- **L** - Toggle logging on/off
- **P** - Show Pre-flight settings dialog
- **F** - Show In-flight settings dialog
- **B** - Begin flying of the current flight task
- **G** - Show GPS status
- **Cursor up** - Increase McCready value
- **Cursor down** - Decrease McCready value
- **M** - Toggle status bar
- **SPACE** - Toggle maximized or normalized Cumulus
- **ESC** - Leave GPS dialog or Cumulus

If you are working in [manual navigation mode](#), there are more keys available to control Cumulus. See [here](#) for more details.

You can also get information on objects on the map by typing them with the stylus or your finger nail. An information box is shown on the screen that contains all available data about the touched object. Press **I** to get the data for the selected waypoint. In the info menu you can also add the listed airfield as a new waypoint or select it as your waypoint.

Use Zoom to waypoint to get the waypoint you selected into view on the map. Cumulus will try to display the selected waypoint near to the edge of the map. A selected waypoint's name is displayed in reverse colors as the other names. Depending on the distance to the waypoint, the waypoint may be too far away

to show on the map because the zoom factor would exceed it's minimum. In that case, a message is shown in the bottom of the screen (in the taskbar area). If the waypoint is too close, the zoom is set to maximum and the waypoint may be further from the edge than normal.

Labels for different point items maybe turned off or on by pressing the related shortcut key (A, O, T, W, see above) or via the menubar item *View-Labels-...*. The defaults are set in the [Map Objects](#) configuration tab. You can add distance and projected arrival altitude to the labels by pressing **E**. Normally the labels just show the item point name.

Logfiles are written in accordance to the IGC file standard. They are placed in the [user's data directory](#), so you can easily transfer them to your desktop, beam them to your friends or analyze them using *KFLog*.

Tasks are routes between waypoints, which are handled as turnpoints here. They can be created and modified in the Pre-Flight setting dialog under the tabulator task. Tasks stored from there are automatically shown in the task selection dialog. Tasks are drawn in thick purple lines, and turn points are drawn with the correct photo sectors drawn in red and green.

Prior to the flight, you should select the glider you're flying with and enter the amount of water balast you've taken with you. You can do that in the Pre-flight settings. On the second tab, you can select a task.

In-flight settings are values that may change in-flight. There are three dialogs, which can be easy used. There are:

- Altimeter Dialog
- McCready Dialog
- Variometer Dialog

You can open these dialogs by tipping on the related display at the left side of the map view.

### **Altitude Dialog**

This dialog allows you to change the altitude reference (MSL, STD, AGL, AHL), the altitude unit (Meters or Feet), the QNH (hPa) and to leveling the displayed altitude to the expected value.

### **McCready Dialog**

This dialog allows you to change the amount of water you still have, the bug factor and the McCready setting. It is only available, if a glider selection exist.

### **Variometer Dialog**

This dialog allows you to change the integration time of the variometer. Furthermore the variometer can operate in a TEK mode but for that it needs wind information for calculating the true airspeed. Be careful with the TEK mode, it is not validated that it works always right.

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## Manual Navigation

If you don't have a GPS connected to Cumulus, or the GPS can't get a good fix, Cumulus switches to Manual Navigation Mode. In this mode, the glider symbol on the map is replaced by an X symbol, and the glider's altitude is fixed at 1000 m. You can now use the cursor to move this X around on the map. The selected position is used for all calculations and is displayed in the status bar.

You now have the following keys available:

- **Arrows** - move across the map (up is north)
- **C** - centre on currently selected waypoint/airfield
- **SHIFT+H** - centre on home site

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## Waypoints

Waypoints are used in Cumulus to support the navigation. When used in tasks they also serve as turnpoints. Waypoints can be created or edited inside cumulus or by using KFLog on the Linux desktop, where you can more easily maintain the waypoint list.

### Waypoint file remarks

Cumulus works with only one global waypoint file in two different formats. This file is installed under your selected [Data Directory](#). The global waypoint file name is hardcoded and its extension depends on the used format. The format is defined in [Pre-Fight Settings - Waypoints Import](#). The name for binary storage is *cumulus.kwp*, for XML storage *cumulus.kflogwp* is used.

### Waypoint import

Under [Pre-Fight Settings - Waypoints](#) you have the possibility to import waypoint data from other data files into Cumulus. That is the best way for your waypoint management. Alternatively you can use KFLog to prepare a global Cumulus waypoint file.

### Waypoint file transfer

You can transfer the global Cumulus waypoint file between your desktop PC and your PDA but notice, that Cumulus is **not running** during the file transfer. That can cause a corrupted file.

### Waypoint list display

To open the waypoint list tipp at the waypoint display, located at the left upper corner on the map screen. Now you can see all your known waypoints sorted in alphabetically order. With different buttons in the window you can modify the waypoint list or do other things.

- Press one of the filter buttons above the list to navigate to a certain waypoint.
- Press the plus button to create a new waypoint.
- Press the pencil button to edit the selected waypoint. The button works only, if one waypoint is selected.
- Press the trash button to remove one or more selected waypoints.
- Press the cross button to remove all waypoints.
- Press the house button to set the selected waypoint as your new home position.
- Press the **Info** button to get displayed the details of the selected waypoint. The info screen for a waypoint will close automatically after some seconds. Press the **Stop** button to prevent this. The **Home** button sets this waypoint as your new home position.
- Press the **Select** button to make the selected waypoint to your new target. You may want to use **V** after selecting a waypoint to ensure it is visible on the map.
- Press the **Show ...** button to toggle the waypoint display according to the waypoint priorities low, normal and high or to display all.

### Waypoint list filters

You can narrow down the list of waypoints using the buttons above the

list. These act as a filter. In only a few steps, you can reduce a list of thousands of items to only a few, making it much easier to find the waypoint you are looking for.

### Creating a waypoint from the current position

At any time you can tap on the bearing icon on the map to remember the current position. A waypoint with the name *WPx-HH:MM* will be generated that contains the current coordinates and altitude, where *HH:MM* is derived from the current time. The new waypoint is shown in the map display and can be edited in the waypoint screen as any other waypoint.

### Waypoint management

If you want to add, modify or delete waypoints use the buttons at the right side of the waypoint list. **For security reason it is not recommended to do that in flight!** If you press the plus sign or the pencil button an editor is opened with entry fields for the waypoint properties.

### Waypoint priority

The *priority* property deserves some explanation. To prevent overcrowding the map with waypoints if you zoom out far, not all waypoints are drawn at all zoom factors. You can control which waypoints are to draw by selecting the priority. If you select *high* the waypoint will always be drawn. This would be appropriate for your home site and other important sites. If you select *normal* the waypoint will be drawn in normal zoom modes but not if you zoom out too much and the *low* prioritized waypoints are only drawn if you zoom in far enough. The currently selected waypoint is always visible. In the configuration setup of Map Objects you can define the scale borders for every *priority* property. See [here](#) for more information.

### Waypoint runway headings

In the waypoint editor you can define two different runways. To activate a runway, click in the runway checkbox. That enables the other runway input fields.

- **Heading** The runway heading in the range 01...36. 0 means there is no runway heading defined. In this case all other runway entries are ignored after pressing save!
- **Length** The runway length in the user's preferred unit.
- **Surface** The surface of the runway.
- **both** If the box is checked the runway has two headings otherwise only one
- **usable** If the box is checked the runway is usable otherwise not.

### Waypoint names and extra information

Via the menu bar entries *Toggels/Waypoint labels* and *Toggels/Extra labels info* you can switch on the display of the waypoint names and their reachability (distance and arrival altitude) besides their icons, if a glider is selected. The text labels are drawn at a white background with black letters. The currently selected waypoint is drawn reverse. If a waypoint is land- and reachable the text is drawn bold. **The extra information distance and arrival altitude are only displayed, if the landable attribute of the waypoint is set.** If the waypoint is below your safety altitude, the text box frame is drawn in red color.

The same is valid for airfields, nav aids, outlandings and task points.

### Final glide calculations

Waypoints are also used for final glide calculations. If you plan to use this feature of cumulus, please make sure that you **correctly enter the position and the elevation** of the waypoints! Otherwise you will get unpredictable results.

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## Tasks/Routes

Tasks are routes between waypoints which are handled as turnpoints here. They can be created and modified in the [Preflight Settings-Task](#) menu. The task/route is drawn on the map using a dark magenta line with clearly marked turnpoint figures. The turnpoint figures can be configured under [Settings-Task](#). Currently three taskpoint figures, line, circle and sector with symmetrical angles are supported.

A task comprises at least two points according to FAI IGC, a Start and a Finish point. Takeoff and Landing airfield are not more a mandatory part of an IGC task. Therefore these points are not considered by Cumulus. Two Points are the minimum in Cumulus, if you will fly a direct route. The used points have the following names in the display:

Taskpoint	Short Form	Description
Start	S	Here starts the task or route
Turn	T	One or more turnpoints, can be omitted for a direct route
Finish	F	Here ends the task or route

Cumulus stores every task in a single file. These files are to find under your selected [Data Directory](#) in a subdirectory with the name *tasks*. As file name uses Cumulus the task name extended by the suffix *.tsk*. You can make task file transfer between your PC and PDA but make it only when Cumulus is not running. Otherwise the results are undefined.

Press **T** to open the task list from the mapview.

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## Flarm

Cumulus can be connected to a Classic FLARM or to a PowerFlarm device and is able to process the proprietary sentences emitted by that device. On the map display it shows the positions of the most important (collision-threatening) aircraft or ground obstacles, as well as one selected object. Furthermore, as an alternative to the map view, a radar view display is provided showing all received Flarm contacts.

### Warning

**Please note: Cumulus is not a replacement for Flarm, it is only an addition to it!**

### Flarm connection

Flarm devices only have a bidirectional serial RS232 interface. Cumulus can be connected to a Flarm device via this interface or by means of an RS232-USB gadget or an USB IOIO Uart Board or an RS232-Bluetooth gadget. Which variant do you use depends on your available PDA hardware. The use of a USB connection requires the USB port to support the OTG (On-the-go) mode. See also in [Settings - GPS](#) for more informationen.

### Flarm configuration

To get the specific Flarm data, you have to enable the NMEAOUT option in the FLARM setup menu. Activate the sending of GPRMC, GPGGA, GPGSA, PGRMZ plus the FLARM proprietary sentences. As transfer speed, you should select 57.6 kBaud. Cumulus sends no initialization data to Flarm, so you must set up the Flarm device by using an initialization file contained on a micro SD card (Classic FLARM) or on an USB stick (PowerFLARM).

**Note:** The Flarm device must be connected with the storage unit containing the initialization file before power-up.

An initialization file can be created by using the FLARM CONFIGURATION TOOL. Additional information you can find at the web page from [flarm.com](http://flarm.com).

### Cumulus GPS settings

In the [Settings - GPS](#) menu select a serial, bluetooth or USB device according to your available hardware and set the transfer speed to 57600. Furthermore, as *Altitude Reference* select the entry *Pressure*. This ensures that the data of the Flarm pressure sensor are used as altitude. Calibrate the altitude shown to the expected altitude by using the altitude dialog (Leveling). This can be opened by tapping on the altitude display in the map view.

### Flarm IGC data setup

Cumulus can setup IGC parameters in the Flarm device and can upload a task to



it. That all can be done on the [Preflight Settings - Flarm](#) page.

## Flarm IGC file download

Cumulus can download IGC flight files from the Flarm device. To do that, open the [Preflight Settings - Flight logbooks](#) page.

## Flarm traffic - information and alarms

If Flarm issues a traffic message or an alarm, Cumulus opens a popup box with an arrow picture signaling the traffic movement direction and additionally some basic information is displayed.

## Flarm radar view

You can open the Flarm radar view by tapping on the Track (Trk) display in the map view. The view consist of an inner and outer circle with a cross in the centre. The upper end of the vertical line points to 12 o'clock (straight ahead as seen from the cockpit). In the upper left corner you can see the current selected display scale, while at the right side of the window you have, from top to bottom, the following operational buttons:

- |                                 |  |
|---------------------------------|--|
| <b>Scale:</b>                   | Pressing the zoom button toggles through three different scales (0.5, 1.0, 6.0 Km), displayed in the upper left corner.  |
| <b><a href="#">List:</a></b>    | Pressing the list button opens a new window with a list of all the just-received Flarm contacts.   |
| <b>Time:</b>                    | Pressing the time button toggles the refresh interval of the radar view through 1, 2 and 3 seconds. Default is 2 seconds. The refresh rate also has an influence on the processor load and the object selection.   |
| <b><a href="#">Aliases:</a></b> | Pressing the monkey button opens a new window with a table of your defined Flarm alias names.  |
| <b>Plus sign:</b>               | The plus button is only to see, if you have selected a Flarm object. Pressing the plus button opens a dialog window where you can enter an alias name for the selected Flarm object. The entered name is added to the alias list, if you leave the dialog via the ok button. An existing entry will be updated with the new passed data. |
| <b>Close:</b>                   | Pressing the cancel button (red with white X) returns to the map view.   |

In the radar view, Flarm objects are displayed with different shapes according to the information they contain:

- |                   |  |
|-------------------|--|
| <b>Square:</b>    | If no track information is available, the Flarm object is drawn as a square. The square is also used to indicate a ground obstacle contained in your Flarm's database. |
| <b>Arrowhead:</b> | If track information is available, the Flarm object is drawn as an arrowhead pointing in the direction of  |

movement.

Objects are drawn in different colours according to their assigned alarm level, or to indicate selection. The colours used are:

<b>Black:</b>	The alarm level of the object is <i>low</i> . This includes both the "no alarm" and "low-level alarm" levels described in the Flarm Dataport Manual.
<b>Orange:</b>	The alarm level of the object is <i>important</i> . This means that there is less than 13 seconds to go to a predicted collision.
<b>Red:</b>	The alarm level of the object is <i>urgent</i> , i.e., less than 8 seconds to a predicted collision.
<b>Magenta:</b>	The object has been selected by the user. In this case the alarm level of the object is not considered.

**Note!** The Flarm Operating Manual v4.06 uses different (English) terms for the above-mentioned alarm levels.

If you tap on a Flarm object in the radar view, you will get additional information displayed, if available. The information, drawn in magenta, is as follows:

<b>Flarm identifier:</b>	The identifier of the selected Flarm object is displayed in the lower left corner as a 6-digit hex value. If an alias name has been defined for the Flarm identifier, this name replaces it.
<b>Distance:</b>	The distance to the selected Flarm object is displayed in the lower right corner of the window.
<b>Vertical separation and climb rate:</b>	The vertical separation and the climb rate of the selected Flarm object are displayed in the upper right corner of the window.

### Flarm list view

Pressing the list button in the radar view opens a new window giving a list of all just-received Flarm contacts. The following information may be displayed:

<b>Flarm identifier:</b>	The identifier of the Flarm object as 6-digit hex value. If an alias name has been defined for the Flarm identifier, this name replaces it.
<b>Distance:</b>	The distance of the Flarm object from one's own position.
<b>Vertical separation:</b>	The vertical separation of the Flarm object above (positive value) or below (negative value) one's own position.
<b>Relative bearing:</b>	The relative bearing to the Flarm object as an arrowhead.
<b>Ground speed:</b>	The ground speed of the Flarm object.

**Rate of climb:** The rate of climb of the Flarm object. Can be positive or negative.

Any entry in the list can be selected by tapping on it. If you then press the *Select* button, the window is closed and you will return to the radar view. The additional data of your selected entry are now displayed there. A selection can be reset by pressing the *Unselect* button followed by the *Close* button.

### Flarm alias list

Pressing the monkey button opens a new window giving a table view of your defined Flarm alias names. A 6-digit Flarm hex identifier can be replaced by a more easily-remembered name. The length of an alias name is limited to 15 characters. To add a new alias name, press the *Plus* button. This appends a new row with two columns at the end of the table. In the left column enter the Flarm identifier to be translated and in the right column your desired alias name. An existing entry can be changed by clicking on the cell to be modified. **Note!** If you add the same Flarm identifier to the table more than once, only the last entry is saved. If you want to remove one or more entries, select them and press the *Trash-bin* button.

Leave the window with the *Ok* button to store the changes you made, or with the *Cancel* button to discard all changes.

If you select a row in the table and leave the window with the *Ok* button, the selected Flarm object will become your new selection in the map and radar views. To make a deselection of a selected object in the radar view, go into the alias window, do not select anything and return via *Ok* to the radar view.

### Flarm alias file

The content of the Flarm alias table is stored in a file with the name [cumulus-flarm.txt](#). This file name is hard-coded and the file is stored in the user's [Data Directory](#).

The file format of the Flarm alias list is very simple. A comment line starts with a hash mark or a dollar sign in the leftmost position and ends with a new line. A valid entry has the following format:

**<Flarm-Id> '=' <Alias-Name>**

#### Example:

```
# Flarm alias file, comment line
$ another comment line
ABCDEF=My best friend
```

Note that no white spaces are allowed on either side of the equals sign!

### Flarm data up-to-dateness

Flarm data age very fast, especially if the objects are circling. Flarm normally

sends data every second about the objects in view. If a Flarm contact moves out of the receiver range, Cumulus will no longer get new data about it. To clean up such old collected data, all Flarm contacts that are not updated within three seconds are automatically removed.

In order to reduce the processor load, the data in the Flarm list views are only updated every three seconds.

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## Root Storage Locations

No	OS	Root Path	Description
1	Linux Desktop e.g. Ubuntu	\$HOME	Home directory of current user
2	Android	/sdcard	Root directory of Android user is put on the SD-card
3	Maemo 4 and 5	/media/mmc1 /media/mmc2 /home/user/MyDocs	Root directory of Maemo 4 and 5 users

## File Storage Locations

No	Directory	File	Description
1	\$ROOT/.config	Cumulus.conf	File with configuration data of Cumulus
2	/opt/cumulus/etc or /sdcard/Cumulus/etc	*.plr	LK8000 polar files for different airplanes. There exists one file per glider.
3	\$ROOT/Cumulus	task.tsk	Flight task data file
4	\$ROOT/Cumulus	cumulus.[kwp kflogwp]	Waypoint binary or XML data file
5	\$ROOT/Cumulus/igc	*.IGC	IGC logger files
6	\$ROOT/Cumulus	cumulus-flarm.txt	File containing Flarm alias names
7	\$ROOT/Cumulus	cumulus-flarm.tsk	File containing Flarm task declaration
8	\$ROOT/Cumulus	cumulus-logbook.txt	File containing flight logbook data
9	\$ROOT/Cumulus	cumulus-checklist.txt	Checklist file
10	\$ROOT/Cumulus/flarmigc	*.IGC	Downloaded IGC flight files from Flarm device
11	\$ROOT/Cumulus/tasks	*.tsk	Cumulus task files
			File

12	\$ROOT/Cumulus/weather	airport_icao_names.txt	containing the airport ICAO identifiers
13	\$ROOT/Cumulus/weather/[METAR TAF]	*.TXT	Downloaded METAR and TAF files from NOAA weather server
14	\$ROOT/Cumulus/maps/[points airspaces landscape]	map data files	Map files

Notes:

In Maemo (e.g., in Nokia hardware devices, like the N800, N810 and N900), the location of files numbered 3-13 is defined in Setup/General, Personal as the [Data Directory](#). If Cumulus does not find this entry, it tries to create it in the following directories in order:

- /media/mmc1/Cumulus
- /media/mmc2/Cumulus
- /home/user/MyDocs/Cumulus

The location of files numbered 14 is defined in Setup/General, Map Settings as [Maps](#), under which are found the points, airspaces and landscape folders.

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## About Cumulus

Cumulus is a flight computer program primarily designed for use by the soaring community. At present it supports the hardware devices Nokia Internet Tablet N800, N810, N900 and Android devices running release 2.2.x (Froyo) and higher. Cumulus is a fork of KFLog, the KDE Flight Logger program. It is meant to be used in tandem with KFLog, but it can also be used stand-alone.

Cumulus is distributed as open source under the [GPLv3](#) license.

Cumulus was created in 2002 by:

- André Somers
- Eggert Ehmke

who wrote the first releases by reusing parts of [KFLog](#). André was the project manager. In November 2006 André passed the leadership to Axel Pauli, who is also the current maintainer:

- Axel Pauli ([kflog.cumulus@gmail.com](mailto:kflog.cumulus@gmail.com)) Maintainer

From time to time different people have brought their ideas and contributions to Cumulus, among others:

- Derrick Steed
- Eckhard Völlm (author of the NMEA simulator)
- Hendrik Müller
- Hendrik Hoeth
- Josua Dietze
- Michael Enke
- Peter Turczak
- Robin King
- Stephan Danner

The following KFLog developers wrote the template for Cumulus:

- Florian Ehinger
- Heiner Lamprecht
- Harald Maier
- Thomas Nielsen

KFLog can be found at: <http://www.kflog.org>.

Cumulus has its own home page at [www.kflog.org/cumulus/](http://www.kflog.org/cumulus/), where you can find out how to get the [latest version](#).

The Cumulus sources are stored by [GitHub](#).

Please report any problems to our user mailing list and include a full description of the version you are using (Menu *Help-About Cumulus* or shortcut key *SHIFT-V* for version information) and what you were trying to do. Issues can

also be reported via [GitHub](#), if you have created your [personal account](#) there before.

A special thanks goes to Robin King, who has reviewed these online help pages.

**Latest update:** 10. March 2018 by Axel Pauli

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