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, airfields, 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, as well as automatic task point switching are also supported.

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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 as hardware devices the Nokia Internet Tablet N800/N810 with Maemo OS2008 and the N900 with Maemo OS2009. It can also run on a Linux desktop under X11/Qt4.

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 faster than 5 km/h, no 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 5 km/h, the screen is switched off after your programmed 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.

GPS

Any external GPS receiver, such as a Bluetooth GPS mouse or a flight logger, provided that it outputs NMEA data records, can be connected to your PDA, using either a serial, a USB or a Bluetooth connection. Cumulus can be used without a GPS receiver, but is far more useful with it.
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:

- *serial device* /dev/ttyS0 - RS232 serial device
- */dev/rfcomm0* - Bluetooth device
- */dev/ttyUSB0* - USB device

The default NMEA connection speed is 4800 bps; for Bluetooth devices it maybe higher.

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.

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. Download the maps, airspaces and airfields you need to your PC and install them from there in your PDA. See [Maps](#) for more information. Airfields and map files can be downloaded automatically by Cumulus, if you enable this option at start-up.

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* 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* before transferring it to the PDA. See [here](#) for more details on tasks.

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.
- **Airspace:** Cumulus only supports the OpenAir file format for airspace structures. Please search the Internet for files of the region where you fly. Addresses where you can - maybe! - find information:
  - Soaring Services - Airspace
  - Airspace Data Germany published by the DAeC
  - the AIP of the country you are interested in.
- **Airports, Airfields and Outlanding Points:** These data are read from the Welt2000 data base. See here for more information.

The maps can be installed in two different places:

- In *$HOME/Cumulus/maps* (Desktop) or in *$HOME/MyDocs/Cumulus/maps* (Maemo). These are the default locations.
- Anywhere else. On a PDA you should use an MMC card if possible, because the internal file system is often 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.

- The ground and terrain data files have to be put into a subdirectory called *landscape*.
- The airfield files have to be put into a subdirectory called *airfields*.
- The airspace files have to be put into a subdirectory called *airspaces*.

If you want to install the maps elsewhere than the known locations, you must give the path to the new map root directory in the Map Settings configuration page (Setup->General setup->Map Settings). Use the Maps button to navigate to the appropriate root directory under which the expected maps' subdirectories are to be found.

Only load the airfields 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 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.

OpenAir SUA map files

Cumulus supports the commonly-available OpenAir SUA file format for airspaces. Just put the map files in the subdirectory *airspaces* and make sure they have the *.txt* extension written in <u>lower-case</u> letters.

In addition to the OpenAir files themselves, you can add a file to configure the mapping of airspace types from the OpenAir file to the types Cumulus uses. Cumulus recognizes the following types:

- AirA
- AirB
- AirC
- AirD
- AirE
- AirF
- ControlC
- ControlD
- Danger
- Restricted
- LowFlight
- Tmz
- GliderSector
- WaveWindow

In order to create a mapping file, create a file with the same basename as the OpenAir file (without the *.txt* extension) and append *_mappings.conf* to the basename.

Example: Sourcefile=*openair.txt*, Mappingfile=*openair_mappings.conf*

The mapping file must be placed in the same directory as the OpenAir file. The syntax used in the file is 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 file you wish to map, and the value is the corresponding Cumulus type you wish to assign. The default mappings are:

- A = AirA
- B = AirB

- C = AirC
- D = AirD
- E = AirE
- F = AirF
- GP = Restricted
- R = Restricted
- TRA = Restricted
- Q = Danger
- CTR = ControlD
- TMZ = Tmz
- GSEC = GliderSector
- W = WaveWindow

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

Example: *CTR=ControlC*

This statement changes the assignment *ControlD* to *ControlC*.

Remember that the mappings are case-sensitive!

Usage of Welt2000 airfield and outlanding data

For airfields and outlandings, Cumulus uses the Welt2000 data base. These data were originally compiled by Michael Meier (known as Milomei) as one big file *WELT2000.TXT* found here.

Cumulus can download this file. See under Settings - Airfields for how to do that.

The Welt2000 file is installed in the subdirectory *airfields*. It must have the name *welt2000.txt*. Because a Welt2000 file covers the whole world, the amount of data to be read in must be limited to only that required. Cumulus provides for this in two ways:

- Filtering by countries or by a radius around your home position, as defined in the configuration setup for Airfields.
- Filtering by countries defined in a configuration file with the name *welt2000.conf*. See below for how to do that. This is an old option and should not be used any more. Please rather make your filter definitions in the Cumulus GUI as described above. Note! A filter rule setup in the GUI will overwrite the rules defined in the configuration file.

One disadvantage of Welt2000 is that it recognizes only three types of airfield (Airfield, Glider Field, Ultra Light Field), while Cumulus recognizes a lot more. This lack can be overcome by additional mapping. You can map the short names or ICAO identifiers of the Welt2000 file entries onto other Cumulus map elements in a configuration file, using the simple syntax shown below. The configuration file must have the name *welt2000.conf* and must be located in the same directory as the source file *welt2000.txt*. The file uses the following syntax:

- A comment line starts with a # hashmark or a *$* dollar sign and ends with a new line.

- **FILTER countries=**_country_1[,...,country_n]_
  This line defines a country filter rule. Several countries can be entered after the equal sign in one line as a comma-separated list. The country identifiers have to be coded according to ISO-3166. If such a rule is defined, only the listed countries will be extracted from the Welt2000 source file. As mentioned above, the use of the Cumulus GUI now makes this filter method obsolete. It is possible to define more than one filter rule.
- **MAP_SHORT_NAME** _short-name=map-element-of-cumulus_
  This line defines a rule for the mapping of the short name (the first six characters from the left) of a Welt2000 entry onto a special Cumulus map element.
- **MAP_ICAO** _icao-sign=map-element-of-cumulus_
  This line defines a rule for the mapping of the ICAO identifier of a Welt2000 entry onto a special Cumulus map element.

The supported Cumulus map elements for airfields are:

- IntAirport
- Airport
- MilAirport
- CivMilAirport
- Airfield
- ClosedAirfield
- CivHeliport
- MilHeliport
- AmbHeliport
- Gliderfield
- UltraLight
- HangGlider

Remember that the cumulus map elements used in the mapping rules are case-sensitive.

Short example of a welt2000.conf file:

Example of a welt2000.conf file, starting with a comment line
$ This is also a comment line
#
Now follows a country filter definition rule
Only the countries Germany, Poland and the Czech Republic will be extracted from the welt2000.txt source
FILTER countries=de,pl,cz
#
Now follows an ICAO identifier mapping rule
The German airport Berlin-Schönefeld is mapped to an international airport element
MAP_ICAO EDDB=IntAirport
#
Now follows a short name mapping rule
The German military airport Holzdorf is mapped to a military airport element
MAP_SHORT_NAME HOLZD1=MilAirport

Please note the following! If a new welt2000.txt file has been installed, the first start-

up of Cumulus after that will take a longer time (ca. 10-20 seconds) while it extracts the desired data from it. Cumulus generates a compressed file of the extracted data reuseable by its later runs. This file carries the name *welt2000.txc* and will be reused, as long as none of the following are changed: the original source, the configuration file, the map projection or the home position. This behaviour minimizes the read-in time after a restart.

If you make any necessary corrections to the data of the Welt2000 file, please report all your changes to the guys who maintain the source. Their email address is to be found in the header part of the Welt2000 file or at this page. We all should help to keep the Welt2000 source up-to-date and also remember to thank the guys who do this valuable work.

Settings

Press **SHIFT+S** to open directly the settings screen. The other way is, to press the menu button or the shortcut key **m** on the PDA to open the menu bar. Then navigate to Setup/General.

This dialog contains all basic configuration of Cumulus. It is separated into 12 sections:

- Personal
- GPS
- Gliders
- Maps
- Map Objects
- Terrain Colors
- Task
- Airfields
- Airspaces
- Units
- Information
- Look&Feel

Note! If you have done modifications in the single setting tabulators 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.

FYI, all internal configuration data are stored by Cumulus in the user directory *$HOME/.config* in the file *Cumulus.conf*. 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!

Settings - Personal

Personal

Here 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 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 Welt2000 airfield file when the radius option is in use.
- As predefined center point for the map download procedue.

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:

- **$HOME/Cumulus** on the desktop PC
- **$HOME/MyDocs/Cumulus** under Maemo (Nokia Internet Tablet)

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 accessable 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 tips 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!**

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.

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
GPS Location	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.
BT Adapter	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!
/dev/ttyUSB0	for a USB GPS device or, e.g., a USB-serial adaptor
/tmp/nmeasim	for the Cumulus NMEA Simulator

Serial and Bluetooth devices also need to be given a speed rate for their operation. The default serial NMEA connection speed is 4800 bps, while for Bluetooth we recommend the use of 115200 bps.

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
GPS	The default selection is GPS. Most GPS devices send MSL (mean sea level) altitudes, but some send HAE (Height above ellipsoid).
Pressure	Some logger devices can deliver altitude values derived from a pressure sensor. If you want to use these pressure data, select this alternative. **Please note!** 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
Cambridge	This 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).
Volkslogger	This 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 Preflight Settings/Common or in the altitude dialog. Furthermore, in the Volkslogger setup menu, you have to enable the sending of PGCS records.
	This can deliver altitude values derived from a pressure sensor

LX Navigation	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.
FLARM	Hardware version 2 or later. This 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 Cumulus Flarm 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 the Nokia Internet tablet this feature is switched off, 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.

Processed GPS sentences

Cumulus processes the following NMEA and proprietary sentences:

NMEA Id	Description
$GPRMC	Recommended Minimum Specific GNSS Data
$GPGLL	Geographic Position - Latitude and Longitude
$GPGGA	Global Positioning System Fixed Data
$GPGSA	GNSS DOP and Active Satellites
$GPGSV	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
$PCAID	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

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. Note that the boxes for *Added load* and *Max. water* are only intended for use in checking what the polar would look like at the all-up weight given by Empty weight + Added load + Max water. They do not affect the in-flight speed-to-fly or gliding angle calculations. However, 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 Added load is also 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 (m²), the wing load is displayed in Kg/m²

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 edit the file *glider.pol* located at /opt/cumulus/etc. But better would be to send your polar data to the Cumulus team for insertion into that file.

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

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.

Set Proxy

Press the *Set Proxy* button if a proxy is needed for downloads from the Internet. That opens a dialog box where you can make the necessary host and port entries. Let all fields empty if you need no proxy. The configured proxy is displayed right of the setup button.

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.

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 of 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.

24.12.11

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 the task turnpoint schemes and the drawing options.

TP Scheme

The turnpoint scheme defines how the automatic switch to the next turnpoint is executed, if a flight task is active. A flight task can be defined and activated in the Preflight setup Task Dialog. Two turnpoint schemes are supported, Cylinder and Sector. Whichever is selected, the appropriate definition window will appear containing the selectable parameters.

Switch Scheme

The automatic task turnpoint switch provides two modes. In both cases the area specified by the cylinder 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 turnpoint 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 turnpoint passage.

Cylinder

If Cylinder is selected in the TP Scheme, you can here define its radius centred on the turnpoint.

Sector

If Sector is selected in the TP Scheme, you can here define a Sector centred on the turnpoint. Three parameters can be used for the sector configuration. "Inner radius" defines a circle around the task point, whose radius can vary between zero and the value of "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 90 and 180 degrees.

Shape

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

Line to target point

Here you can define the width and the colour of the task target line. Furthermore you can define, if a bearing line from your current position to your selected target shall be drawn. This line is drawn in different colors, if a glider has been selected according to the reachability of the selected target. The used width is the same as for the target line.

Line in flight direction

Here you can define the width, the color and the drawing of a line in flight direction. This line shows you the direction in which you are moving.

Settings - Airfields

Airfields

Cumulus uses the Welt2000 file as the airfield and outlanding sites' data base. See here for more information.

The Welt2000 area on this menu page gives you various options for loading airfield data.

Welt2000 Country Filter
Here you can define the countries to be read from the Welt2000 file. Several countries can be entered as a list separated by commas or spaces. The country identifiers have to be coded according to ISO-3166. If you define countries here, you do not need to do the same in the configuration file of welt2000.conf. The definitions from this GUI page will override the FILTER rule in the configuration file.

Welt2000 Radius Filter
As an alternative to using the country filter, you can define a radius around your home position. All airfields lying inside this radius will be read from the Welt2000 data file. This option is only available when no country filter value is given. If the radius is zero, then a default radius of 500 kilometres is assumed.

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

Welt2000 Load Outlandings
If the check box *Load Outlandings* is activated, all outlanding sites contained in the selected region will be loaded too.

Set Proxy
Press the *Set Proxy* button if a proxy is needed for downloads from the Internet. This opens a dialog box where you can make the necessary host and port entries. The syntax has the following format: *proxy name:port*. If you do not need a proxy, all the fields should remain empty. The configured proxy is displayed to the right of the setup button.

Install Airfields
Cumulus can download the Welt2000 file containing the airfield data from the relevant Internet web page. The correct file name is important. The name has a date suffix that is changed from time to time. If the download fails, please check here for the correct file name. On the web page with the downloads, look at the last row of the download table: here the entry *WELT2000.TXT* is to be found. In the right-hand column is a date link. Go to this link (e.g. with "Save link as ...") and check that the suffix (in the form _YY_MM_DD) matches that of the filename in the editor field.
If Cumulus is in motion (faster than 5 km/h) no download is carried out. If the

download request is processed, you will immediately receive a result message. Although this message is not logged, it can be seen as a debug message if Cumulus is started in an X-Terminal window.

Welt2000 Data Reload

After a download or a change in home position or configuration, Cumulus will trigger an automatic reload of the Welt2000 data.

In the **List Display** area you can define some general properties of the airfield, waypoint and reachable lists.

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.

Install Airspace

The *Install Airspace* button opens a new dialog box, in which you can define a proxy (by pressing the *Set Proxy* button) if you need one for Internet access. In the box labeled *Airspace Url* you can enter a url pointing to an airspace file. The url must consist of the following items:

1. Scheme, such as *http*
2. Hostname
3. Pathname

If one of these is missing, the url is rejected. Furthermore, the file to be downloaded must be a normal file, not compressed, and must carry the extension *.txt* to enable it to be read in after download.

Airspace Load

The *Airspace load* button enables you to switch on or off the loading of airspace data files contained in the airspace directory. It opens a table where all available airspace data files are listed. 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.

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.

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, gstreamer, ... 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.

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.

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.

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 *ShowFonts* popups 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.

Map sidebar 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* 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.

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.

Preflight Settings

Press **p** to open the pre-flight settings screen. The same is possible by using the menu item *Setup/Pre-flight.*

The pre-flight settings dialog contains all the parameters you need to set before becoming airborne.

It is separated into four sections:

1. Glider
2. Task
3. Waypoint Import
4. Common

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

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 gilder is a double seater. The name is recorded in the IGC log file.

Added Load

Here you can define the added load, e.g. weight of the pilot, etc.

Water ballast

Here you can define the water ballast, filled in in your glider before take off.

Wing load

If you have defined a wing area for your glider, the wing load is displayed here in Kg/m².

Preflight Settings - Task

Task

Here you have the possibility to define your flight tasks. A common description about tasks is to find here.

Window description

The window is split into two subwindos. In the upper window you can see all defined tasks by you. Clicking on a task entry will select it and display the details in the lower window. In the upper line you can see different spin 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. 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

To activate the automatic task point switch, you have to select in the task view the first approach point by hand. Alternatively you can use the shortcut key **b** to do that. But note the difference. The shortcut key **b** 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 sector or cylinder 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 than 35 Km/h the automatic switch to the next task point will become active. If you approach into the sector described by the task point switch radius, the next task point is selected automatically. The task point switch behaviour can be configured in Settings/Task.

Task management

A selected task can be removed or edited by clicking on the related icons in the right upper corner of the window. If you want to define a new task, click on the plus icon. This will open a new screen, where you can select waypoints, airfields and outlanding points from a toggle list to be used for task definition. Use the arrows for moving up/down of task points or to the change the order of the task points.

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. Tow 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.

Autostart logging
If you activate this check box, Cumulus automatically starts the IGC logging when you start to move faster than 5 km/h. The current logger status is signaled by a variously-coloured field in the status bar.

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.

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 Waypoints, Reachable or Airfields 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, or estimated time of arrival at, selected target, respectively. Tap on the display to toggle between the two.
- **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 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.
- **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 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 airfields or waypoints are within reach. These airfields/waypoints 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.

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 60s. 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 in the last 60s, the display shows a value like *>99*. If the calculation result is not sensible, a dash is shown in the display.

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:

- *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 avaliable 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.

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

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 Cumlus 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 tipp on the baering 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 the define the scale borders for every *priority* property. See [here](#) for more information.

Waypoint runway directions

In the wayoint editor you have two combo boxes for runway directions. The handling of runway directions is a little bit tricky and derived from the Welt2000 handling. The following possibilities do exist:

- **09/27** means there is one runway with two useable directions. **Note! The difference between the two directions must be always 18.**
- **09/09** means there is one runway with only one useable direction.
- **09/18** means there are two runways 09/27 and 18/36 with two useable directions. **Note! The difference between the two directions must not be equal 18.**

Waypoint names and extra information

Via the menu bar entries *Toggels/Waypoint lables* 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 revers. 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, 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.

24.12.11

Tasks

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 is drawn on the map using a dark magenta line with clearly marked turnpoint sectors. The turnpoint sectors can be configured under Settings Task. Currently only *classic* tasks are supported. Support for newer task types, start lines, etc. will be added in a future version.

A task comprises at least four waypoints. That is also the minimum if you will fly a direct route. The used points have the following names in the display:

- Takeoff - take off place
- Begin - here starts the task
- Route - one or more route points, can be omitted for a direct route
- End - here ends the task
- Landing - landing place

Note: Takeoff and Begin also End and Landing can be the same points. If you will fly a direct route no route points have to be defined.

Tasks can be edited too with KFLog on the Linux desktop, where you can more easily maintain the list. ATM Cumulus supports only one task file. This file is installed under your selected Data Directory. As task file name must be used *tasks.tsk*. This is a hard coded name. Please make only task file transfer between your desktop and your PDA when Cumulus is not running. Otherwise the results are undefined.

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

Flarm

Cumulus can be connected to a Flarm 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 does not warn you of dangerous objects: that is Flarm's job! 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 a RS232-USB gadget. Which you use all depends on your available PDA hardware. The use of a USB connection requires the USB port to support the OTG (On-the-go) mode. This is the case for the Nokia Internet Tablets N8x0, but not for the N900 model.

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 *flarmcfg.txt*. This is contained on a micro SD card and put into your Flarm device before power-up, or can be set using the Flarm Tool on a PC. For more information, see *FLARM DATA PORT SPECIFICATIONS*, found at www.flarm.org.

Cumulus GPS settings

In the [Setup/General/GPS](#) menu select a serial, bluetooth or USB device according to your available hardware and set the transfer speed to 57600. Futhermore, 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 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:

Scale:	Pressing the zoom button toggles through three different scales (0.5, 1.0, 6.0 Km), displayed in the upper left corner.
List:	Pressing the list button opens a new window with a list of all the just-received Flarm contacts.
Time:	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.
Aliases:	Pressing the monkey button opens a new window with a table of your defined Flarm alias names.
Plus sign:	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.
Close:	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:

Square:	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.
Arrowhead:	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:

Black:	The alarm level of the object is *low*. This includes both the "no alarm" and "low-level alarm" levels described in the Flarm Dataport Manual.
Orange:	The alarm level of the object is *important*. This means that there is less than 13 seconds to go to a predicted collision.
Red:	The alarm level of the object is *urgent*, i.e., less than 8 seconds to a predicted collision.
Magenta:	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:

Flarm identifier:	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.
Distance:	The distance to the selected Flarm object is displayed in the lower right corner of the window.
Vertical separation and climb rate:	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:

Flarm identifier:	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.
Distance:	The distance of the Flarm object from one's own position.
Vertical separation:	The vertical separation of the Flarm object above (positive value) or below (negative value) one's own position.
Relative bearing:	The relative bearing to the Flarm object as an arrowhead.
Ground speed:	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.

File Storage Locations

No	Directory	File	Description
1	$HOME/.config	Cumulus.conf	File with configuration data of Cumulus
2	/opt/cumulus/etc	glider.pol	File with polar data of gliders
3	$HOME/Cumulus	task.tsk	Flight task data file, default location on desktop
4	$HOME/Cumulus	cumulus.[kwp|kflogwp]	Waypoint binary or XML data file, default location on desktop
5	$HOME/Cumulus	*.IGC	IGC logger files, default location on desktop
6	$HOME/Cumulus	cumulus-flarm.txt	File containing Flarm alias names, default location on desktop
7	$HOME/Cumulus/maps/[airfields|airspaces|landscape]	map data files	Map files, default root location on desktop
8	$HOME/MyDocs/Cumulus	task.tsk	Flight task data file, default location on Maemo
9	$HOME/MyDocs/Cumulus	cumulus.[kwp|kflogwp]	Waypoint binary or XML data file, default location on Maemo
10	$HOME/MyDocs/Cumulus	*.IGC	IGC logger files, default location on Maemo
11	$HOME/MyDocs/Cumulus	cumulus-flarm.txt	File containing Flarm alias names, default location on Maemo

12	$HOME/MyDocs/Cumulus/maps/[airfields|airspaces|landscape]	map data files	Map files, default root location on Maemo

Notes:

In Maemo (e.g., in Nokia hardware devices, like the N800, 810 and 900), the location of files numbered 8, 9, 10 and 11 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 7 and 12 is defined in Setup/General, Map Settings as *Maps*, under which are found the airfields, 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 and N900. 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 [GPL](#) 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 <axel@kflog.org> 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/, where you can find out how to get the [latest version](#). The sources can be fetched via subversion by using the following url: https://svn.kflog.org/svn/repos/cumulus/qt4

Please report any problems to our user mailing list and include a full description of the version you are using (press SHIFT-V for version information) and what you were trying to do. Also include info on the maps you had in your PDA at that moment and the location you were in.

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

Latest update: 23. December 2011 by Axel Pauli

start