

# MikroKopter LiveView

Documentation

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## General

MK-LiveView was created with the intention to show relevant telemetry data of the copter clear on the screen.

The data is send by a serial connection between the debug port of the copter and the pc.

By implementing the code from GreatMaps ( <http://greatmaps.codeplex.com/> ) the actual position of the copter can be displayed on different kind of maps.

The programm depends on the Navi-Ctrl with gps module.

At the time of creation the firmware of the copter used was:

Flight-Ctrl: V2.15k

Navi-Ctrl: V2.15h

BL-Ctrl: V1.10

The software was tested with the following hardware:

Flight-Ctrl: V2.2 (V2.1 with ACC upgrade)

Navi-Ctrl: V2.0

BL-Ctrl: V3.0

The programm was created with VisualStudio 2015 in WPF/C# .

The „MikroKopter Serial Control Tutorial“ (<http://hdl.lib.byu.edu/1877/2747>) by John C. Macdonald has contributed essentially for the implementation oft he programm. He created a C#-project for controlling a MikroKopter by PC.

# Visualisation and operation

## Elements

The screenshot shows the MK LiveView 1.0 interface with several callout boxes pointing to specific features:

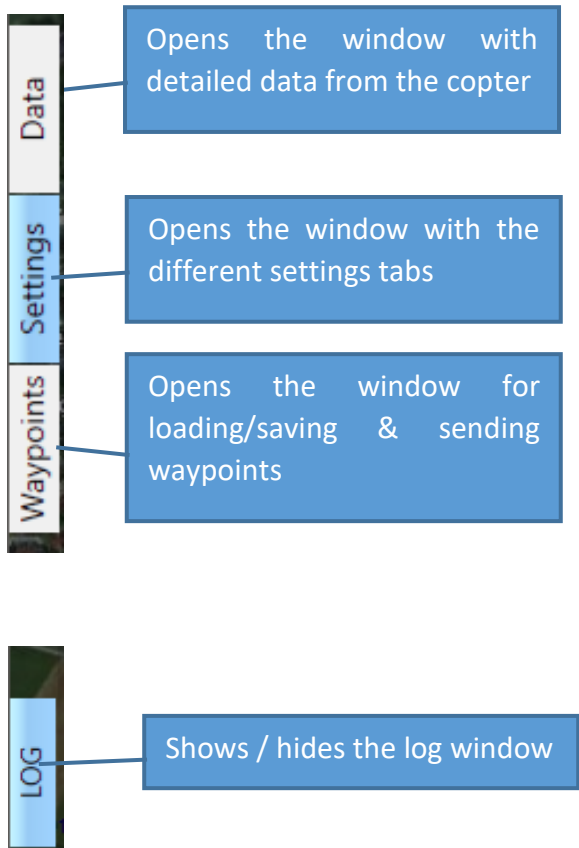
- Topbar with telemetry data:** Points to the top status bar showing voltage, battery, current, time, distance, speed, and signal strength.
- Serial port and connection status (opens/closes connection with click):** Points to the serial port settings panel on the left sidebar.
- Toggle fullscreen button:** Points to the fullscreen icon in the top right corner.
- Settings window:** Points to the 'Serial port connection' settings panel.
- Log message windows displaying general notifications or warnings:** Points to the empty log area at the bottom.
- Artificial horizon with indicators for heading and homeposition:** Points to the compass-like indicator in the bottom right.
- left sidebar with menu buttons:** Points to the vertical menu on the left with categories like Data, Settings, Waypoints, and LOG.
- Right sidebar with copter status and menu buttons:** Points to the vertical menu on the right with categories like OSD, Motors, and WP-Edit.

### TopBar telemetry data

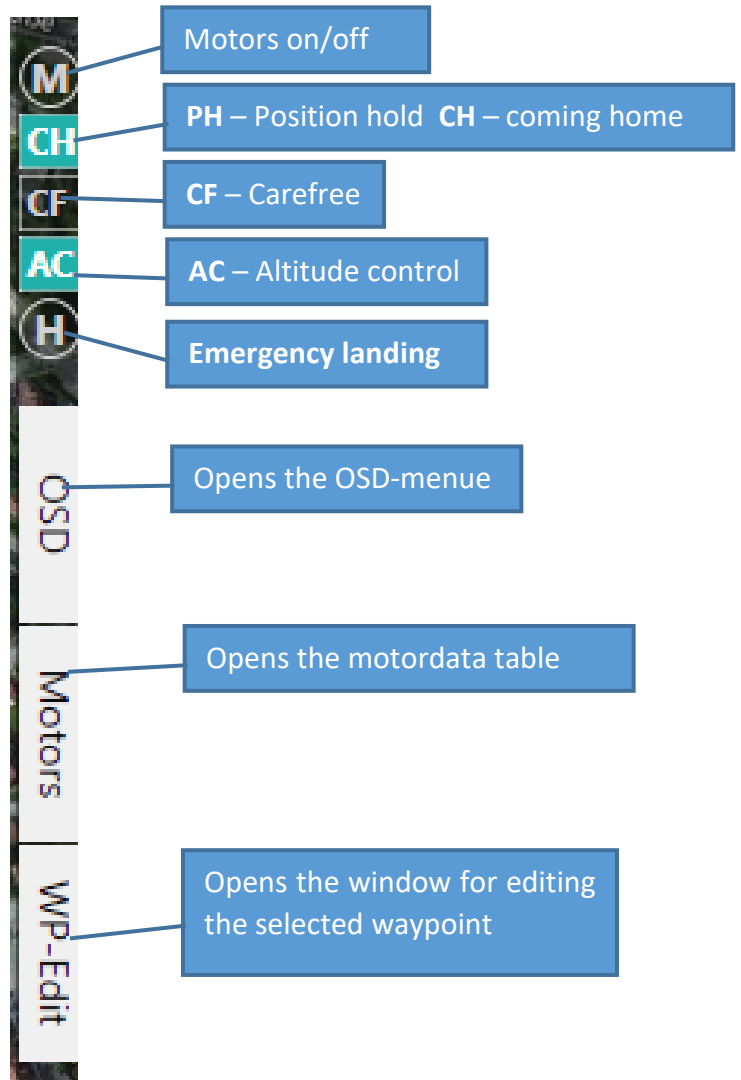
This section provides a detailed view of the top bar telemetry data with callouts for each metric:

- Capacity used:** 16.3 V (Remaining voltage)
- flighttime:** 125 mAh (Current consumption)
- height:** 0.5 A (Distance to homeposition)
- Earth magnetic field:** 00:00:00 (Speed over ground)
- RC level quality:** 10.2 m (Satellites in use)

Left sidebar



Right sidebar

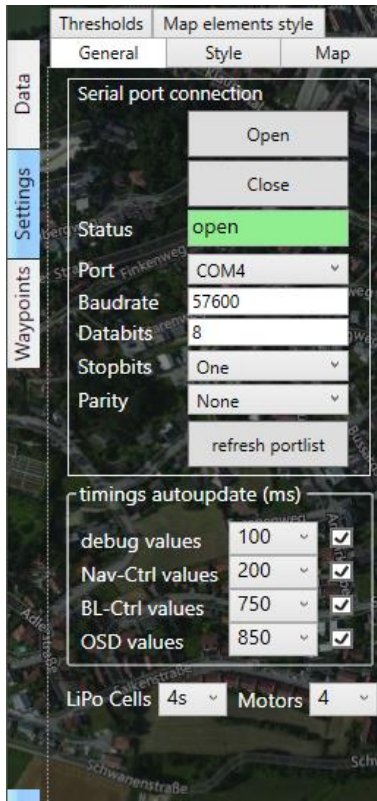




## Settings

### Connect

When start up the subwindow Settings is open



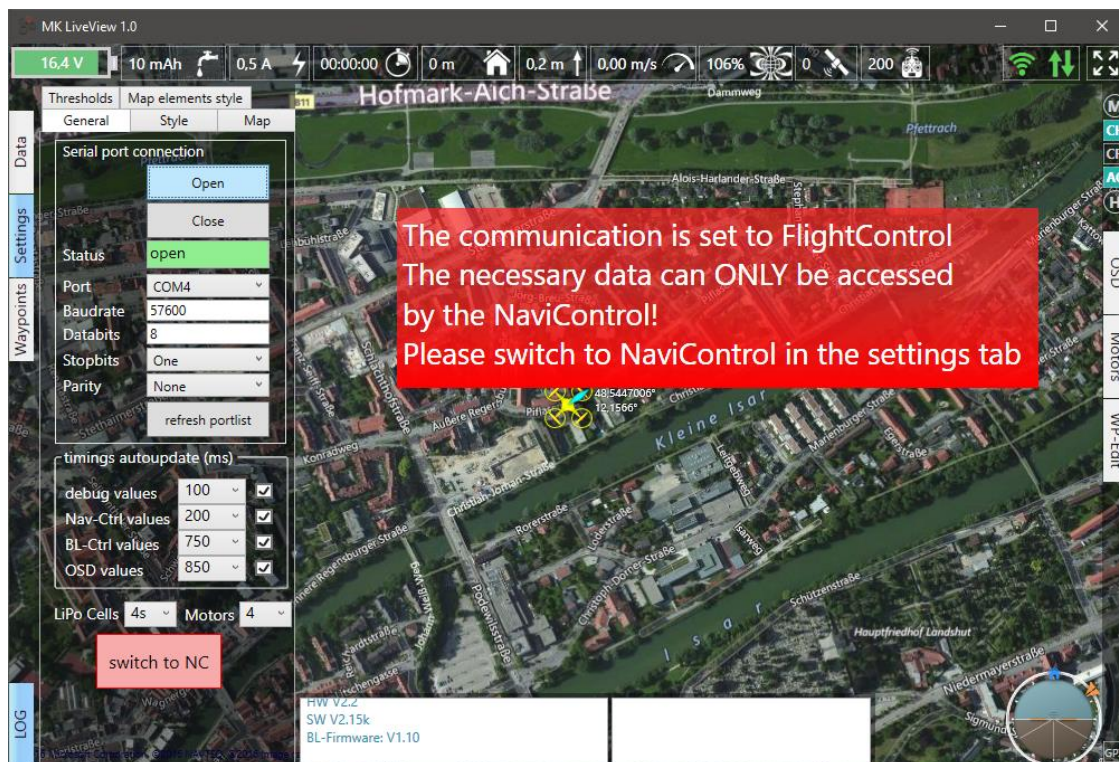
You first need to check, if the right COM-Port is selected. The other settings are already set to the necessary communication settings – don't change them unless You know what You're doing.

By clicking 'Open' the COM-Port is initialized and the program starts requesting the telemetry data from the copter.

The timings usually should work with the current settings. The debug and NavCtrl timings are very fast in order to give a 'floating' experience.

The LiPo Cells settings affects the warning thresholds for battery level.

The motors settings determines how many rows are shown in the motors tab



In case the active controller on the copter is set to FC, a warning is displayed and a button 'switch to NC' is displayed on the settings tab.

## Style



Most of the subwindows and bars can be scaled to fit your needs.

These settings may be stored for normal window state and for fullscreen state.

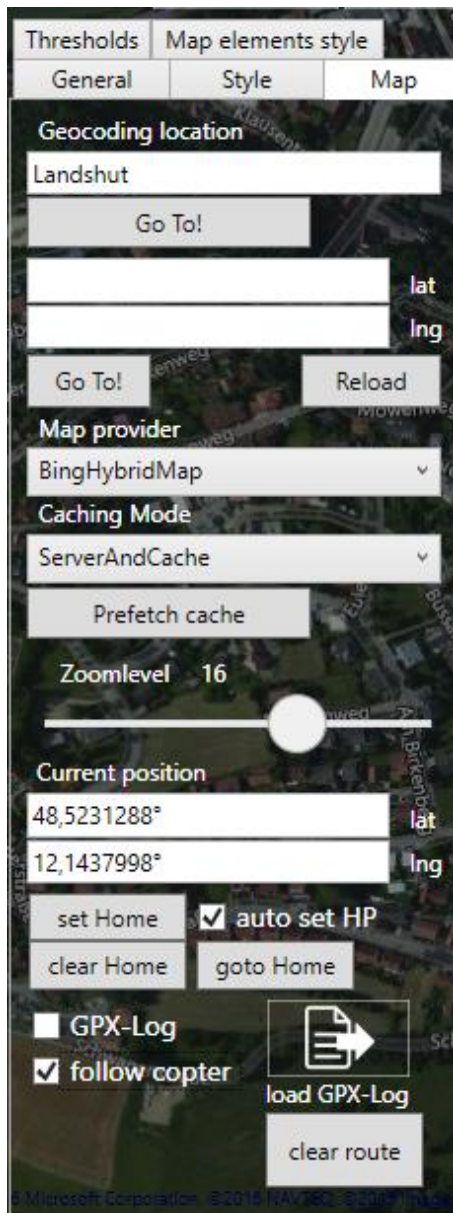
By 'Reset' the scalings are set back to default.

Each of the topbar items except the connection status and the fullscreen button can be hidden

The artificial horizon in the lower left corner can be hidden too.

All these settings are stored when closing the programm and restored at next start.

## Map



Geocoding location lets you move the map to a known location like a city.

You can also put the coordinates directly in the fields below.

Map provider lets you chose from different online map providers.

There are a lot more available, but I selected the most reliable and useful providers.

At this point I have to notice You, that some providers like google don't agree that their services are accessed directly like gmap does. There has been a lot of discussion about this on their website with some officials of the providers.

The problem is, that their APIs are only available for webapplications but not for desktop apps like gmaps.

So it's up to you if you want to use google maps service nevertheless or not.

As far as I know bing maps/microsoft don't have a problem with accessing their data like this...

The great thing about GreatMaps is that you can prefetch necessary map areas for later offline use.

For this you need to select an area of the map by holding the ALT key and drawing a rectangle with the left mousebutton pressed. Finally click 'prefetch cache'

The programm will download all tiles from the current zoomlevel upward to maximum zoomlevel. **Therefore**

**you should check before wich levels you really need as this is quite a lot of data at higher levels.**

You will always be asked after one level is finished if you want to proceed or skip next level or if you want to abort (finish) prefetching.

When **auto set HP** is checked, the homeposition is set when at least 5 sattelites are available.

If you want to change, correct the position, you can always use '**set home**' / '**clear home**'  
The position is taken from the center of the map.

**HINT:** You can also set the homepositon by clicking the 'distance to home' field in the topbar

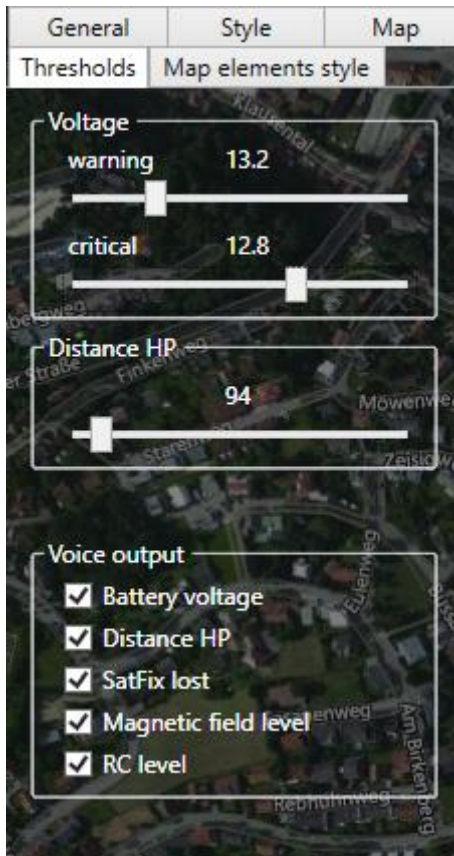
**Follow copter** keeps the copter centered on the map as it is moving.

GPX-log logs the position and time beginning whe the copter is in the air.

It is stored in the general gpx format and can be viewed with any compatible gpx viewer. You can also load the logged route with this programm.



Thresholds



Here you can set warning levels for voltage and distance.

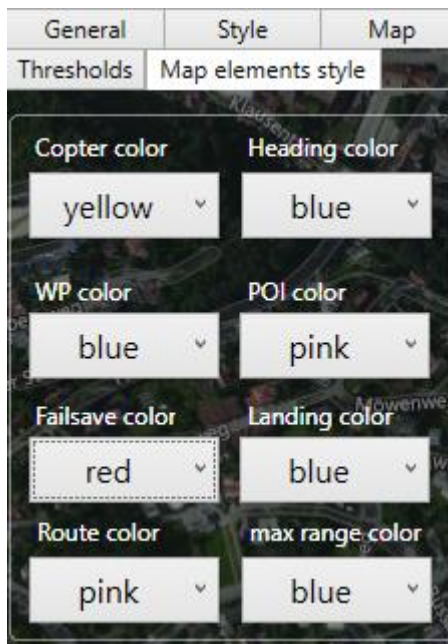
You may also de-/activate voice output on certain conditions.

All conditions listed here are also visualized with red flashing in the top bar.

The voice warnings have been generated with a [text to speech engine](#) in the web.

**Hint:** If want to use a different voice or language you can record the voice there (with a recording programm like audacity) and replace the appropriate file in the “Voice” subfolder of the programm.

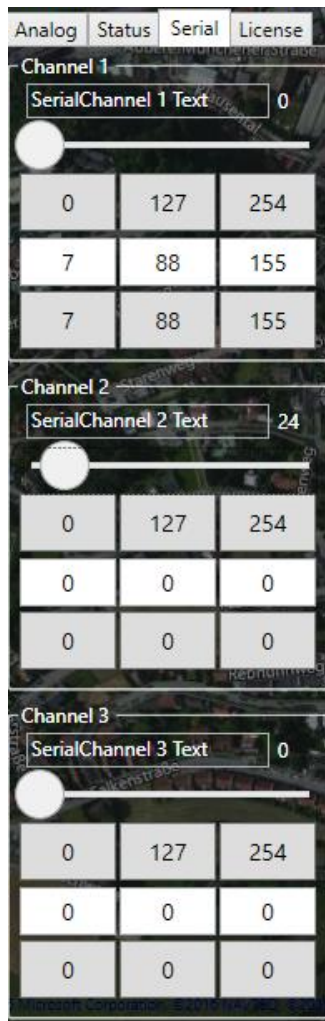
Map elements style



Here you can change the colors for the different map elements

Data

Serial



The serial channels might be useful if you don't have enough channels on your RC.

With serial channels you could extend the RC by 8 channels.

At moment I've implemented 3 of them.

**One thing I've to mention is that by design always all 8 channels will be set when changing just one.**

So please make sure that you haven't assigned any other channels in the MK tool when using this here.

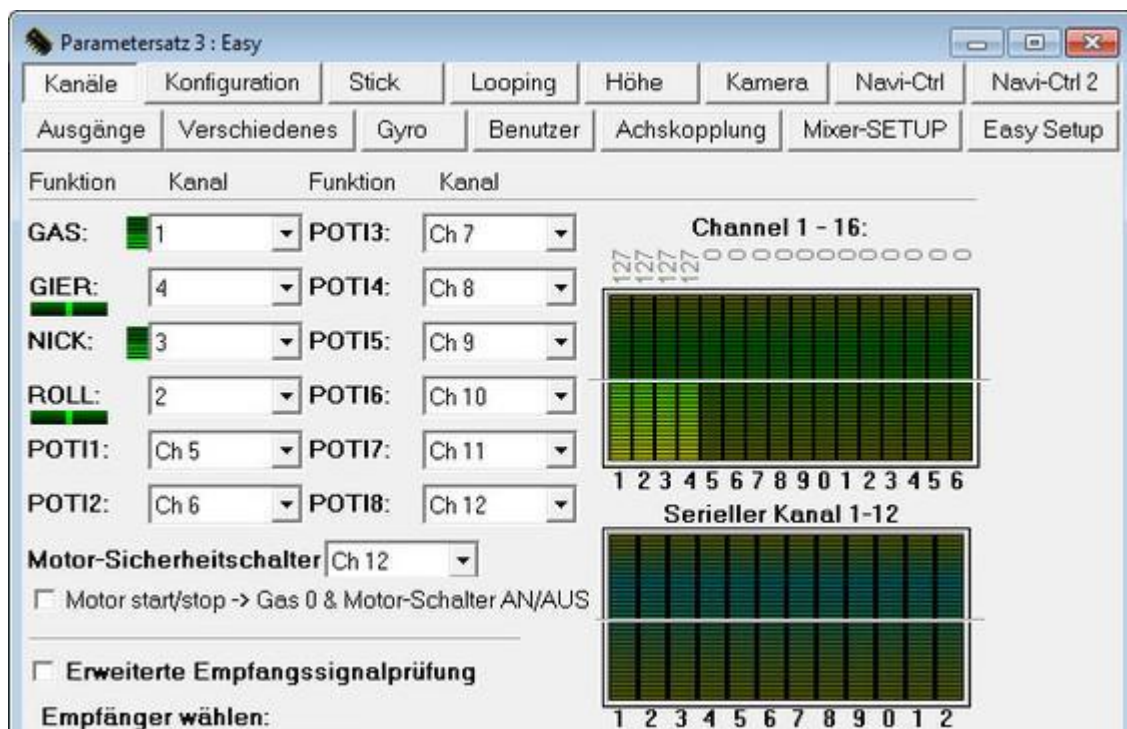
In the first line you can assign a name to the channel.

The slider immediately assigns the value to the channel.

There are three buttons below that may act like a three state switch on the RC.

Below you can assign 3 individual values to the buttons below. These might be values that you need often like certain cam angles...

In order to make this work you have to set up the assignment of the serial channels in the MK-Tool. Normally you assign them to any of the potis on channel page:



There are also other possibilities to assign the channels to – just look and see...



### Waypoints

The screenshot shows the MK LiveView 1.0 interface. At the top, there's a status bar with battery (16.3 V), power (0.5 A), and other flight data. Below that is a table of waypoints. The map shows a flight path connecting waypoints P1 through P10, with a POI at the end. A control panel at the bottom contains buttons for sending/receiving files, saving/loading files, clearing lists, and simulation options. A status box at the bottom left shows hardware and software versions.

Index	Type	Name	Latitude	Longitude	Altitude	Heading	Speed	ClimbRate	Radius	HoldTime	AutoTrigger	CamAngle	Out1Timer
1	WP	P1	48,5229832 °	12,1441282 °	22,5 m	WP 14	1,2 m/s	0,5 m/s	10 m	5 s	---	Auto	1
2	WP	P2	48,5228642 °	12,1441899 °	33,6 m	WP 14	2,2 m/s	0,5 m/s	10 m	5 s	---	---	8
3	WP	P3	48,5227061 °	12,144316 °	44,7 m	WP 14	3,3 m/s	0,5 m/s	10 m	5 s	---	Auto	8
4	WP	P4	48,5226226 °	12,1445547 °	55,8 m	83 °	4,0 m/s	0,5 m/s	10 m	5 s	---	Auto	8
5	WP	P5	48,522699 °	12,1449221 °	66 m	83 °	5,0 m/s	0,5 m/s	10 m	5 s	---	Auto	8
6	WP	P6	48,5228518 °	12,145067 °	77 m	83 °	6,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
7	WP	P7	48,5229939 °	12,1450938 °	88 m	83 °	7,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
8	WP	P8	48,523104 °	12,1450723 °	99 m	83 °	8,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
9	WP	P9	48,5231999 °	12,1448792 °	22 m	83 °	9,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
10	WP	P10	48,5232319 °	12,1444528 °	22 m	83 °	10,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
11	WP	X11	48,5232017 °	12,1442597 °	22 m	83 °	11,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
12	WP	Y12	48,5231022 °	12,1441336 °	22 m	83 °	12,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
13	WP	Z13	48,5230383 °	12,1441309 °	22 m	83 °	13,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1
14	POI	O14	48,5229317 °	12,1445359 °	100 m	83 °	6,0 m/s	0,5 m/s	10 m	5 s	---	Auto	1

Loads a \*.wpl file

Saves the list to a \*.wpl file

receives the list stored on the copter

Clear the local list

Clear the list on the copter

Show/hide the routepath

Show/hide the statusbar on top

Show/hide the maximum range circle according to your license

Automatically open the waypoint edit window when selecting a point from the list

## Waypoint edit window



Here you can edit a selected waypoint

You can find a detailed description of the values in the [MK WaypointEditor wiki](#)

When you have finished editing you need to save the changes with the button 'save changes'

Hitting 'add WP' adds the current point the end of the list.

'Delete WP' deletes the point from the list.

'Send to copter' sends the waypoint data to the copter (it's the data from this window, so changes you haven't stored yet are send nevertheless)

'Set as active WP' activates the WP as active target – **this is only working with the new beta FW (2.15h) and waypointflight has to be active (at moment)**

'Add current Pos' adds the current position of the copter as new waypoint to the list. Depending on the selected options 'use copter height' and 'use copter heading' these values will be

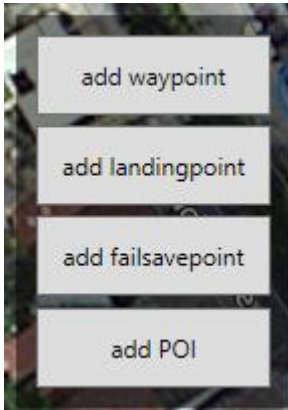
taken from the copter or will be set to the default values.

'save as default' stores the current values as default values. Next time you add a waypoint these values will be taken.

**Up/down** arrows move the waypoint in the list accordingly. This affects the order the waypoints are processed.

## Various

### Setting waypoints



You can set waypoints either as described before by clicking **'Add current Pos'** or by double clicking with the left mouse button or double tapping on a touch display on the desired position.

**The option 'add landingpoint' is only working with the new beta FW (2.15h) and the upcoming final release 2.16 (and onward)**

### Moving waypoints

You can simply move the waypoints by dragging the waypoint with the left mousebutton pressed or by touch (needs exact positioning of the finger)

### Map zoom

You can either zoom with the scroll wheel of the mouse, the touch zoom gesture with two fingers or with the zoom slider on the map settings tab

### Map scroll

The map is scrolled with right mouse button pressed or by touch dragging



### Additional Software:

The artificial horizon is based on the discussion [Creating an advanced HUD](#)

The map display and processing by [GreatMaps](#) – really great!

I made some changes and additions to fit my needs – so if you want to recompile the project you can't use the original source of greatMaps – the changed sources are available in the [MK svn](#).

And last but not least parts of the sources from the „**Mikrokopter Serial Control Tutorial**“ (<http://hdl.lib.byu.edu/1877/2748> )

## Obligatory

```
///=====
/// MKLiveView
/// Copyright © 2016 Steph
///
///This file is part of MKLiveView.
///
///MKLiveView is free software: you can redistribute it and/or modify
///it under the terms of the GNU General Public License as published by
///the Free Software Foundation, either version 3 of the License, or
///(at your option) any later version.
///
///MKLiveView is distributed in the hope that it will be useful,
///but WITHOUT ANY WARRANTY; without even the implied warranty of
///MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
///GNU General Public License for more details.
///
///You should have received a copy of the GNU General Public License
///along with cssRcon. If not, see <http://www.gnu.org/licenses/>.
///
///=====
///Credits:
/// radioman (http://www.codeplex.com/site/users/view/radioman)
/// for his really GreatMaps! (http://greatmaps.codeplex.com/)
///
/// I made some changes to the source, so You need all files from this project here in
order to compile and run
///
/// JOHN C. MACDONALD at Ira A. Fulton College of Engineering and Technology
/// for his MIKROKOPTER SERIAL CONTROL TUTORIAL (http://hdl.lib.byu.edu/1877/2747)
/// and the sourcecode (http://hdl.lib.byu.edu/1877/2748)
/// By his work I finally managed to get the communication with the Mikrokopter
controllers to run
/// Some of his code was used in this programm like the SimpleSerialPort class (with
lots of changes)
/// and the FilghtControllerMessage class
///
///=====
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///
/// I created this software with my best knowledge and belief.
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///
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/// =====
```