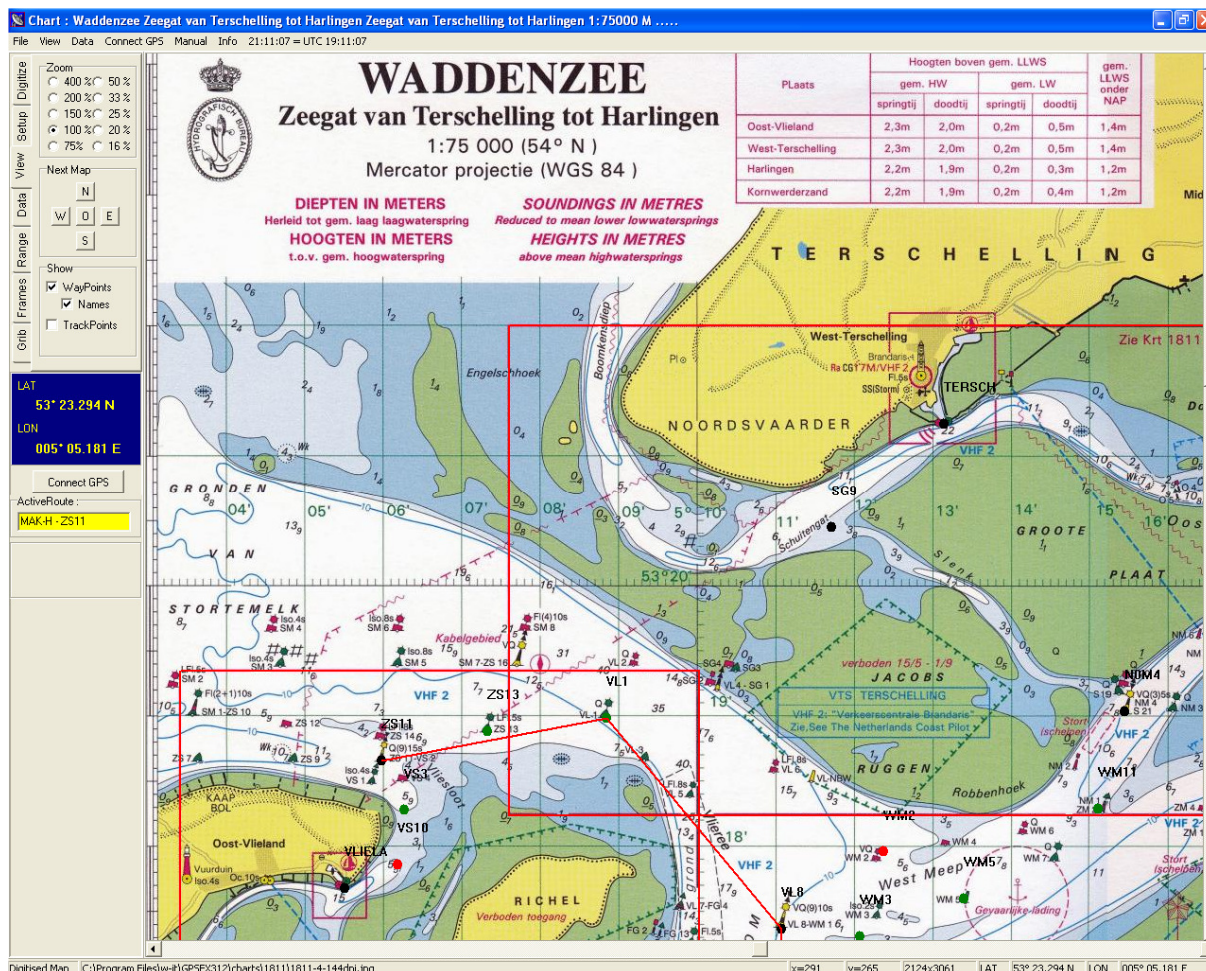


GPSFX312

CHART PLOTTING SYSTEM WITH GPS AND/OR AIS CONNECTION AND GRIB WEATHER INFO

v. 1.4

2000 -2016 © J.W. Welleman



USERS MANUAL

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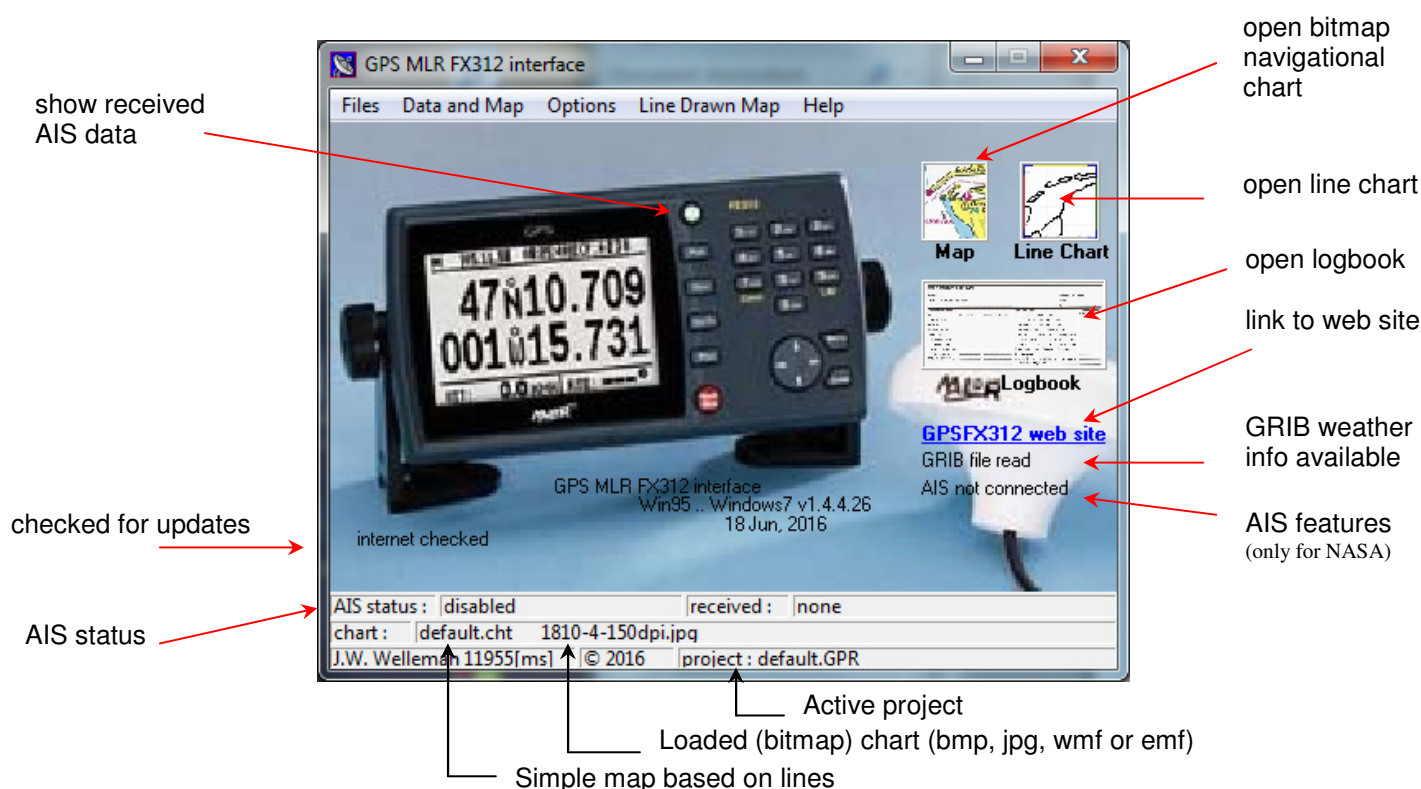
CONTENTS

INTRODUCTION.....	3
DIGITAL CHARTS.....	4
Bitmap based scanned charts.....	4
View Panel	6
Data Panel	9
Grib Panel.....	10
Digitize Panel	14
Frames Panel	16
Setup Panel.....	17
Simple line based charts.....	19
GPS DATA	20
Receive.....	20
NMEA code.....	22
Database	23
Waypoints.....	24
Route	25
Import and export of WAYPOINTS and ROUTES.....	26
Upload a line based chart to the GPS (no longer supported).....	27
Upload the current database of chart points and lines.....	27
Upload the current view of the chart to the GPS.....	28
AIS & GPS connection	31
Hardware Connection to GPS	32
Plotting GPS position data and AIS data on the current Map.....	33
Position Tracking	35
AIS data.....	37
POLAR data	40
Alarm function	41
Integrated Logbook	42
Test received sentences	44
APPENDIX	45
Installation.....	45
Mark and un-mark options for upload to GPS or export to file	46
The view options within bitmap maps	46
Map data within maps.ini initialization file	47
IO Files and Rig and Wind Farm data.....	48

INTRODUCTION

The GPSFX312 is a program which enables the user to read and write data to a GPS-receiver and to view real time position and TRACK on digital nautical maps. The program has originally been designed to read the MLR FX312 GPS-receiver based on the NMEA data protocol but will also work with generic NMEA GPS and AIS devices. With the program WAYPOINTS and ROUTES can be specified which are also shown on a special layer on top of the active map. In this layer also GRIB weather data can be shown from received GRIB files via an internet connection. New developments will also enable a fully integrated digital SHIPS LOG.

The main application starts with a simple interface which is shown below.



After starting, the program will check for **updates** (active internet connection required). If a newer version is available the user is asked whether this version should be installed. Answer with **Yes** for a fully automatic update. GPSFX312 can be used on **Windows XP, VISTA, 7, 8 and 10™**.

Based on start-up options of a project, the program can automatically start with the active bitmap chart or any other action. When this option is active the main application remains in the background. (See **PROJECTS AND OPTIONS** in this manual)

The application has a main menu which consists of:

- Files
- Data and Map
- Options
- Line Drawn Map
- Help

The program can be terminated with the menu option **Exit** under **Files**.

NOTE : Do not forget to **save** the project data with the **Files→Save** menu option in case the data has been modified.

DIGITAL CHARTS

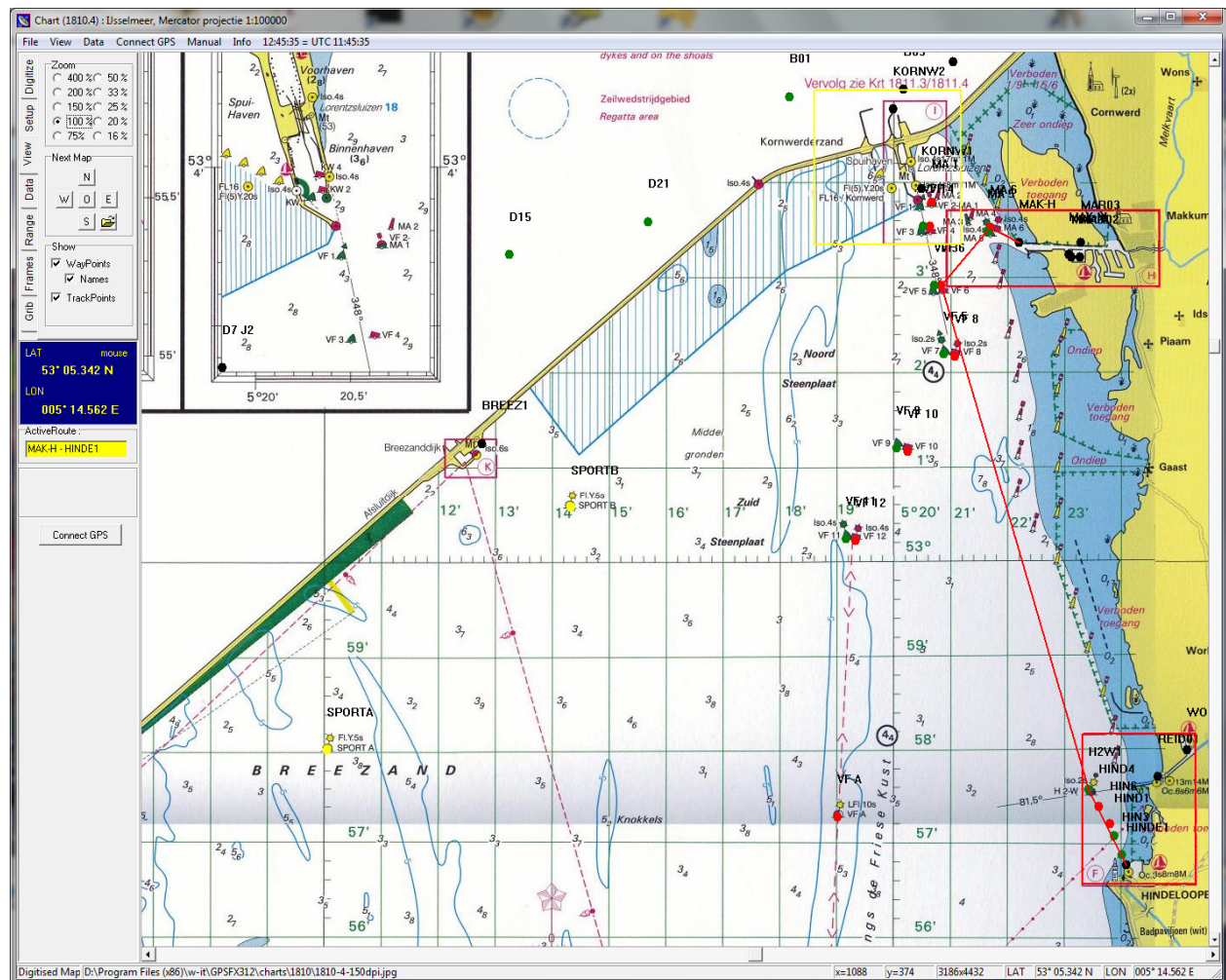
Projects can be created to combine WAYPOINTS, ROUTES, AIS and GRIB data with the general stored bitmaps of nautical charts or with simple line drawn (polyline) maps. The maps or charts can also be used without a loaded project. Thus GPSFX312 supports two different types of maps :

- Bitmap charts, scanned images from original nautical charts (for navigational use)
- Simple charts based on drawn lines (general overview for AIS, GRIB or navigation)

For normal navigation the detailed bitmaps of the nautical charts will be used. Both types will be discussed in this chapter.

Bitmap based scanned charts

If a project is loaded the user can load the bitmap chart with the main menu option **Data and Map → Show Map**. Possible navigational warnings related to the map are also shown.



The bitmap chart is the most practical way to navigate with the GPSFX312 program. If a project is loaded the active map will be shown. If no project is loaded or a default map has not been specified, a map can be opened with one of the **File** menu options of the Map form:

- **Open Map** open a BMP, JPG, WMF or EMF bitmap
- **Open Map Set** select a map from the map set

On top of the map the WAYPOINTS will be displayed and an active route can be shown with a red line. WAYPOINTS and ROUTES are only available if a data project has been opened or linked within the project. Special parts of a map can be marked with selectable **Frames** to move to details or photos. With **Connect to GPS** the current position can be plotted and this position is stored to a TRACK. With the mouse the LAT and LON position on the map can be read in the **blue display** on the tool frame and if the mouse is on top of a waypoint the name and comments of the waypoint will be shown below the yellow box on the left tool frame. The first and last waypoint of the current **active route** is shown in a special yellow marked field. By double clicking on this field the route information can be obtained. Using the right mouse button in the list boxes with the WAYPOINTS and ROUTES the data of these items can be shown.

CONNECT GPS/SERVER OR AIS (Further details see later on)

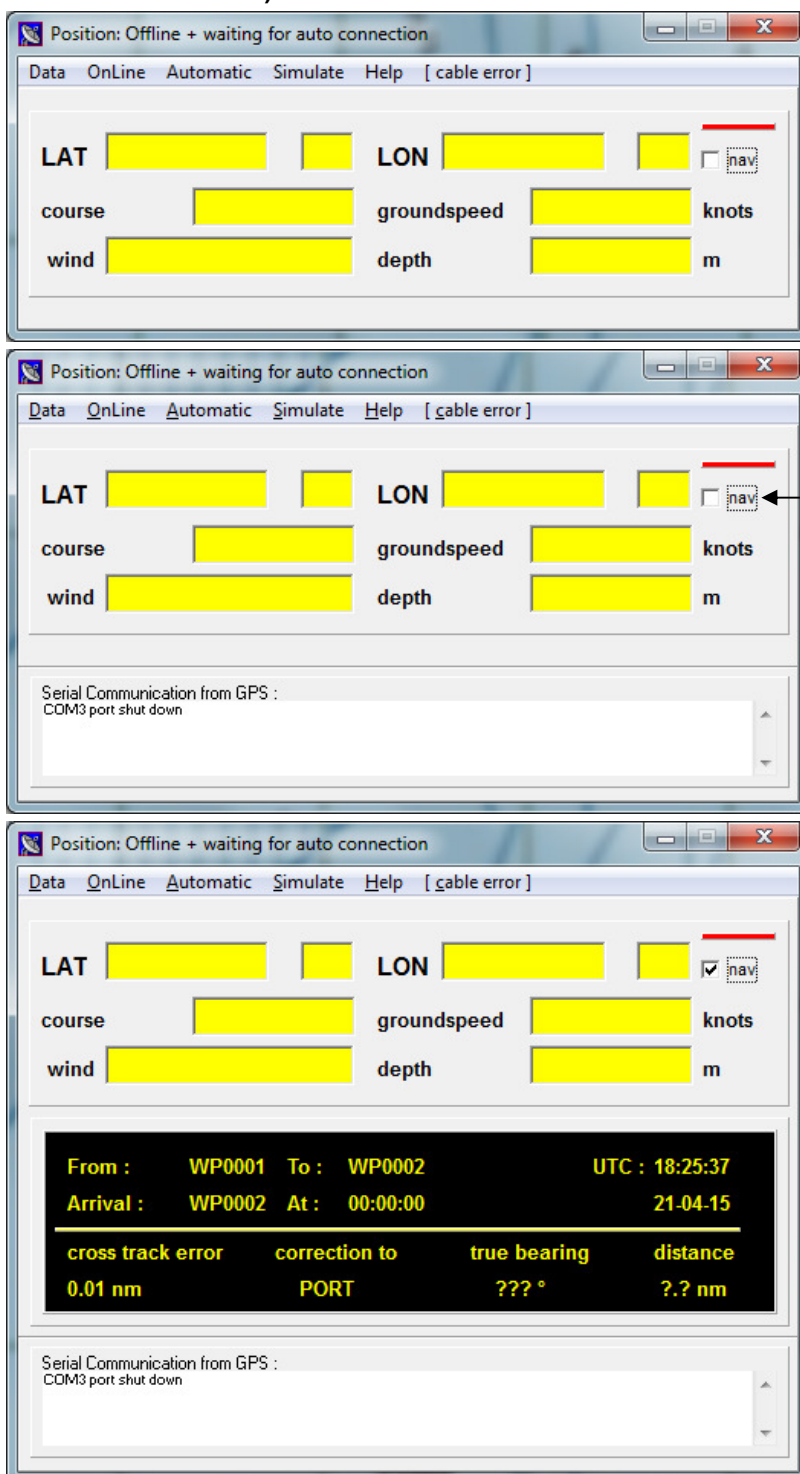
If the **Connect to GPS** button is pressed (or the menu option) a small window with the **GPS/SERVER** data will be opened and shown minimised in the lower left corner of the screen. To view this data click with the mouse on this minimised screen. Wind and depth data will be shown only if the **GPS/SERVER** transmits these data.

This screen has some additional panels which can be shown. With the main menu option **Data → Show GPS Data** the received **GPS** and or **AIS** data becomes visible.

With the check box **nav** additional **GPS** data can be shown:

If the red indicator becomes green data is received from the **GPS**. The connection with the **GPS** is cyclic. The settings can be changed with the main menu **Options → Communication**.

By default automatic connection is turned on. So you only have to connect the **GPS** or **AIS**, switch it on and wait for connection.



After a map is loaded on the left hand side of the screen a toolbox is shown. This box can be hidden with a special menu option under **View**. The map has horizontal and vertical scroll bars. The toolbox consists of seven tabs:

- **View** (default shown tab)
- **Data** (list with WAYPOINTS and ROUTES)
- **Range** (select two points and calculate the range and course between them)
- **Digitize** (special feature to construct simple line based maps)
- **Setup** (select to points with a known position (LAT,LON) to calibrate the chart)
- **Frames** (create a sub frame on the current map with a link to a detail or photo)
- **Grib** (download GRIB files with weather info from the internet)

If the chart is calibrated the mouse position will be shown in the blue box in standard LAT and LON coordinates. If the chart has not been calibrated the mouse position will be shown in pixel position. The current ships position can be shown by pressing the **Connect GPS** button.

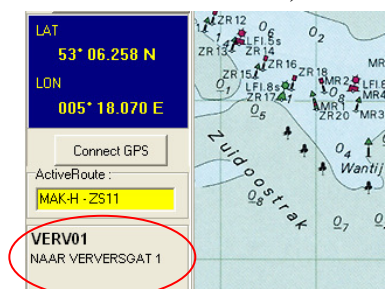
Available **Frames** are not visible in **Digitize** or **Setup** mode. After switching to another mode available Frames will be shown and can be selected with the left mouse button. The Frame properties can be selected by selecting the frame with the right mouse button.

View Panel

On the **View panel** a **Zoom** function is available. With the checkboxes in the **Show** area the user can hide either the names or the waypoints and names which are projected on top of the map. With **Track points** the stored positions in the track file can be shown or hidden. Navigating between maps is made easy with help of **Next Map** area. The N (north) S (south) E (east) W (west) and O (oversailor) buttons which will load the connecting maps. The user can specify this connectivity with the **Map Properties** menu option. This option is also available by pressing the right mouse button over the map. A pop-up menu will appear with numerous options e.g.:

- **New** create a new data point (WAYPOINT)
- **Modify** modify a selected waypoint (mouse is on top of the waypoint)
- **Del** delete the selected waypoint (mouse is on top of the waypoint)
- **Move** move the selected waypoint (mouse is on top of the waypoint)
- **Add to active route** Add WAYPOINT to active ROUTE (if route is active)
- **Insert to active route** Insert a WAYPOINT to active ROUTE (if route is active)
- **Del from active route** Delete WAYPOINT from active ROUTE (if route is active)
- **Waypoint mark/un-** Mark/un-mark WAYPOINTS for upload/export, see appendix
- **Grib, Polar, Sailplan** Additional options for grib, polar and Sailplan data
- **View** Viewing options (with extensive sub menus, see appendix)
- **New Active Route** Create a new ROUTE and make this active
- **Map Sets** show the database with existing maps
- **Map Properties** show the map properties if a map has been loaded
- **Note** show additional note (reminder) of the active map
- **Open Active Frame** Open the selected (active) frame (only if frames are available)
- **Active Frame Properties** Change the active frame properties (only if frames are available)

Not all options are always available. For some, a WAYPOINT should be selected first. To select a WAYPOINT move the mouse over the WAYPOINT until the WAYPOINT name and description becomes visible below the yellow **ActiveRoute** bar in the tool menu. Click the right mouse button for the specific WAYPOINT options like **Modify**, **Add to active route** etc.



To list the current Map options use a right mouse button click on a empty part of the map.
An example of the **Map Properties** is shown below.

The screenshot shows the 'MapPropertiesForm' dialog box with the 'Properties' tab selected. The form contains the following fields and controls:

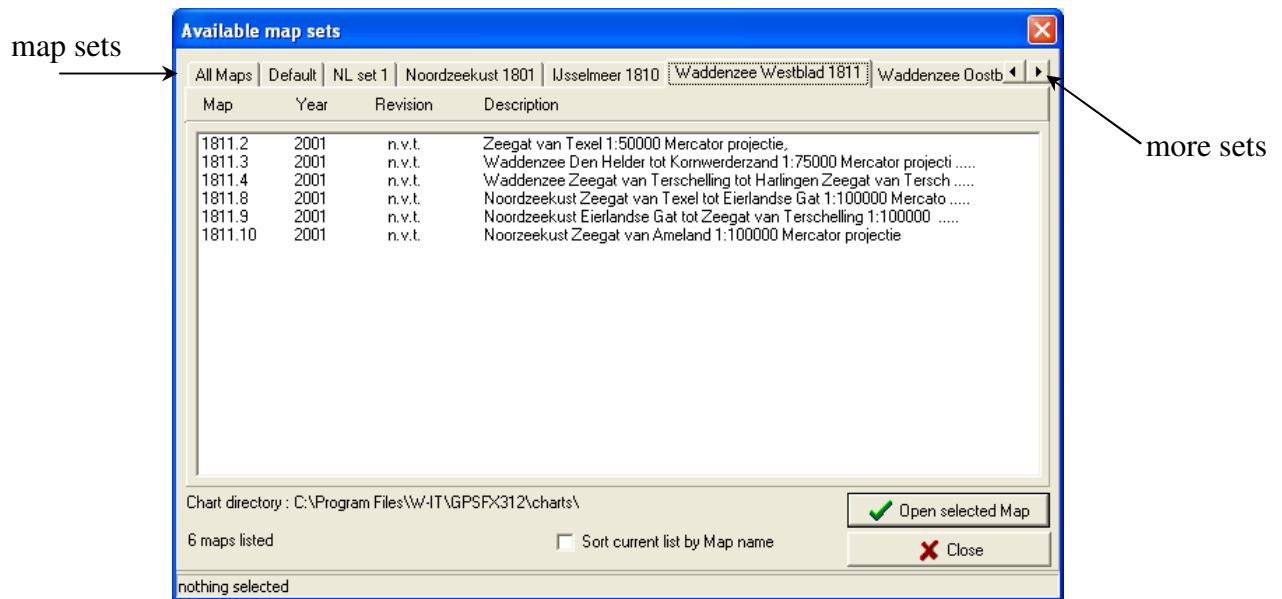
- Map data :** C:\Documents and Settings\Standard\Mijn documenten\gpsfx312\data\charts\1811\1811-4-144DPI.JPG
- Description :** Waddenzee Zeegat van Terschelling tot Harlingen Zeegat van Terschelling tot Harlingen 1:75000 Mercator projectie
- Map size :** 2115 x 3059 pixels, 6.403 Mb (file size)
- Type :** JPG
- Map set :** Waddenzee Westblad 1811 (selected in a dropdown menu)
- Note :** At low water keep to green line in Boontjes
- Year of publication :** 2001
- Latest revisions :** n.v.t.
- Chart datum :** WGS 84 (selected in a dropdown menu)
- Chart label or nr :** 1811.4
- zoom:** Radio buttons for 400 %, 200 %, 150 %, 100 % (selected), 75 %, 50 %, 33 %, 25 %, 20 %, 16 %.
- h-scroll :** 2064 pixels
- v-scroll :** 1718 pixels
- OK** button with a green checkmark icon.

The user can modify the initial **zoom** factor which is used when the map is shown and specify the **Map set** to which the map belongs. Specify a new name or select an existing **Map set** name by using the drop list. On the tag **Related Maps** the related maps can be specified for the North, South, East and West buttons. Also an **OverSailor** map can be specified.

The screenshot shows the 'MapPropertiesForm' dialog box with the 'Related Maps' tab selected. The form contains the following fields and controls:

- Related Maps** section with five rows:
 - North**: C:\Documents and Settings\Standard\Mijn documenten\gpsfx312\data\charts\ (with a folder icon)
 - South**: C:\Documents and Settings\Standard\Mijn documenten\gpsfx312\data\charts\ (with a folder icon)
 - East**: (empty text field) (with a folder icon)
 - West**: C:\Documents and Settings\Standard\Mijn documenten\gpsfx312\data\charts\ (with a folder icon)
 - OverSailor**: (empty text field) (with a folder icon)

The **Map Sets** menu option will show all the available bitmap charts which are stored in the data\charts folder in the directory tree of the program. An example is given below. This option is also available with the menu option **View → Map Properties** if a map has been loaded. To view the selected map click on **Open selected Map**. Maps can be organised in sets which are shown as map set tabs. See the figure below.



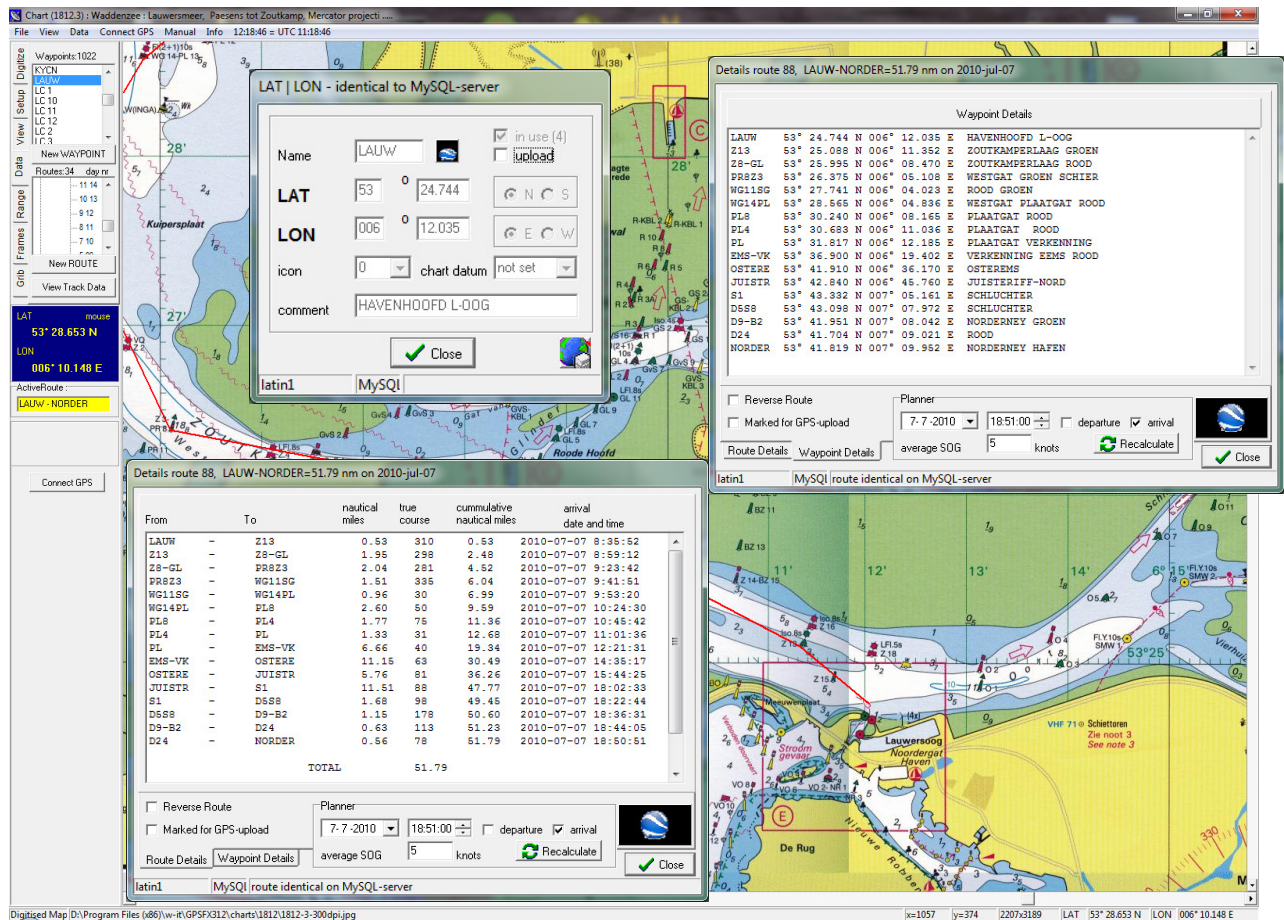
Maps can only be added to a map set with **Map Properties**. The **Map Sets** utility is a read only utility to provide an overview of existing maps and to open a specific map. The **All Maps** tab will show all available maps from the sets. This list is always sorted by name.

The list shown for a selected map set is not automatically sorted, the order of originally inputted maps is shown by default. If needed these lists can be sorted with the checkbox **Sort current list by Map name**.

All data related to maps is stored in the file `maps.ini` which is in the programs root directory. This file should not be altered. The **Map Sets** utility can also be found in the main program menu. If used here, maps can not be opened to be viewed.

Data Panel

The **Data panel** shows all the **WAYPOINTS** and **ROUTES** within the loaded project.

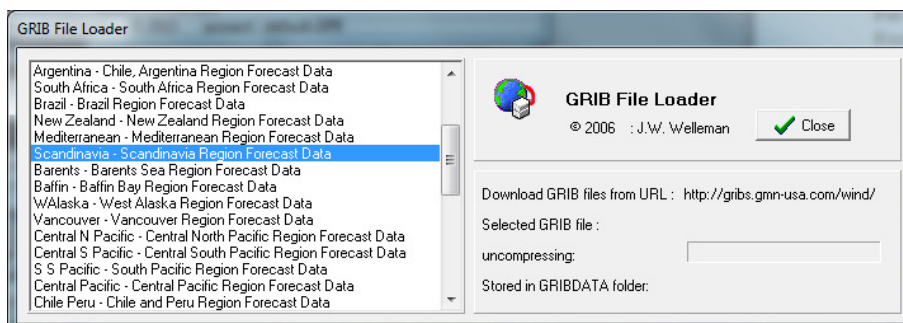


- Press the right mouse button on a **WAYPOINT** or **ROUTE** to view the data as *read only* except for the **upload** (to GPS) checkbox and the **Planner** settings. The example shows the data for **WAYPOINT LAUW** and **ROUTE nr 88 (LAUWerssoog to NORDERney)**. Route details consists of distance and true course from **WAYPOINT** to **WAYPOINT** and cumulative distances in nautical miles. Routes are sorted and presented in a tree list based upon year, month and day with the most recent route on top. If synchronisation with a web server is installed the web icon can be used to check the data on the web server.
- **ROUTE** details of the active route can also be shown by clicking on the yellow field of the **ActiveRoute**. The route can be shown also in reversed order with the **Reverse Route** checkbox. Waypoint details of the route are listed by clicking on the **Waypoint Details** tab of the Route details dialog.
- If a track has been stored the track data can be viewed by pressing **View Track Data**.
- New **WAYPOINTS** and **ROUTES** can be created with the **New WAYPOINT** and **New ROUTE** button on the **Data panel**. These same options can also be found via the menu option **Data → New Waypoint** and **Data → New (active) Route**.
- **ROUTE**, **WAYPOINT** and **TRACK** data can be viewed in **GOOGLE EARTH** by clicking on the globe icon (if **GOOGLE EARTH** is installed and if connected to the internet).

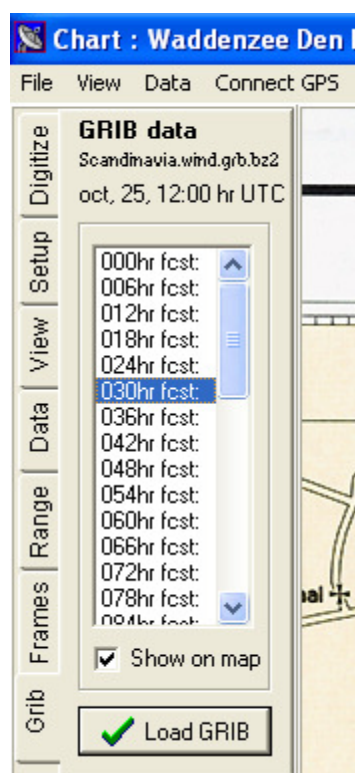
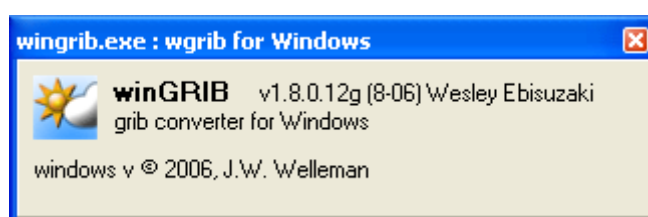
The pop-up menu which opens by pressing the right mouse button over the map contains the same options. If no map is loaded or the map is not yet calibrated these options are inactive.

Grib Panel

With the GRIB Panel the weather (wind) forecast can be retrieved from the internet. If no data is available the **GRIB File Loader** will be started and the user can choose an area for which the forecast should be downloaded from <http://gribs.gmn-usa.com/wind/>.



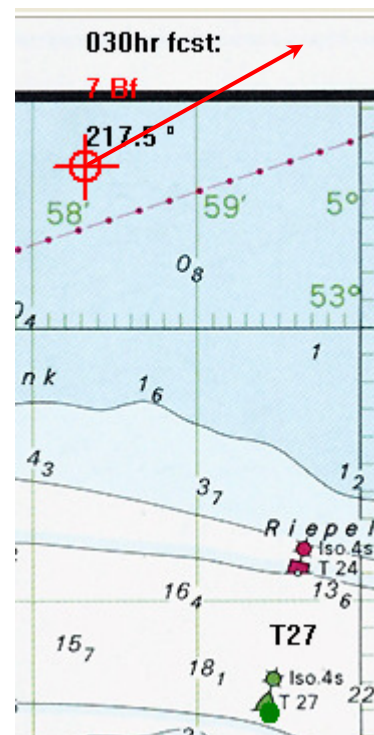
For the Netherlands either Northern Europe or Scandinavia are valid areas. After selecting a region the GRIB file is downloaded, unpacked and stored in the GRIBDATA directory in the GPSFX312 programs root directory.



These GRIB files can be used with other programs if needed. The GPSFX312 program will use the winGRIB utility to read the GRIB records from the GRIB files. WinGRIB is based on the GRIB utility from Wesley Ebisuzaki.

If no errors occur this utility will disappear automatically. The forecast is now available and can be shown on top of the map in use. The filename and the date and time of the analysis are shown on the **GRIB Panel**. The list with forecasts are in hours with respect to the date and hour of the analysis.

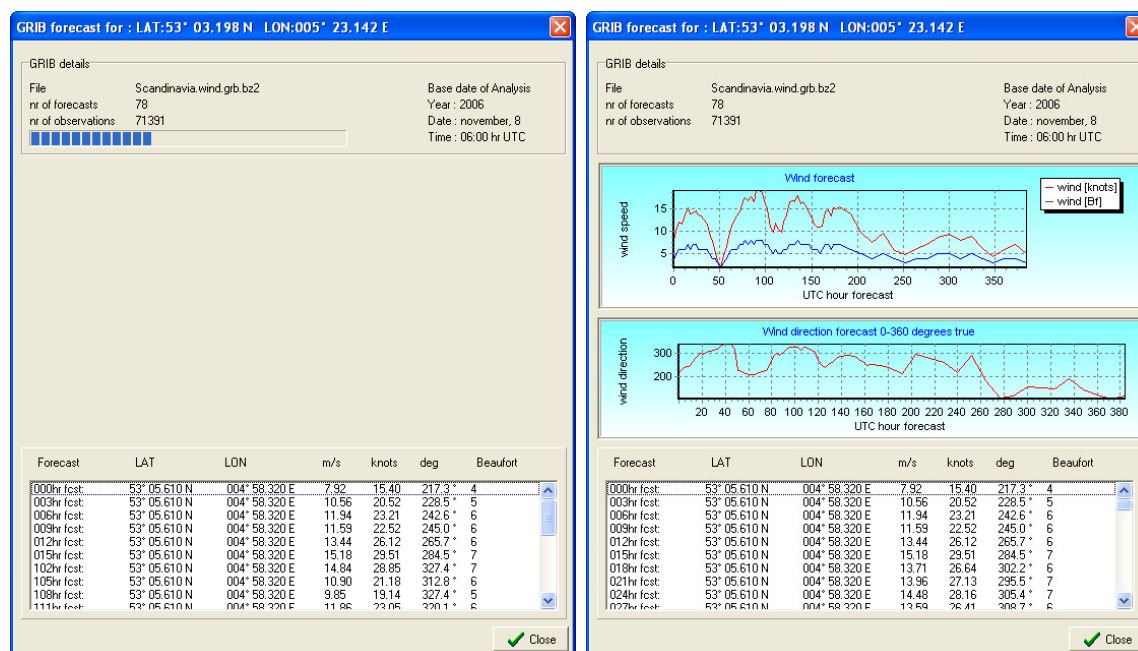
A typical GRIB symbol on the map is shown at the right side. Above wind speeds of 7 Beaufort the indicated wind speed is shown in red. The wind direction is shown in 360-degrees (wind from the North is 0 degrees). With the **Show on map** checkbox GRIB data can be hidden from the map view.



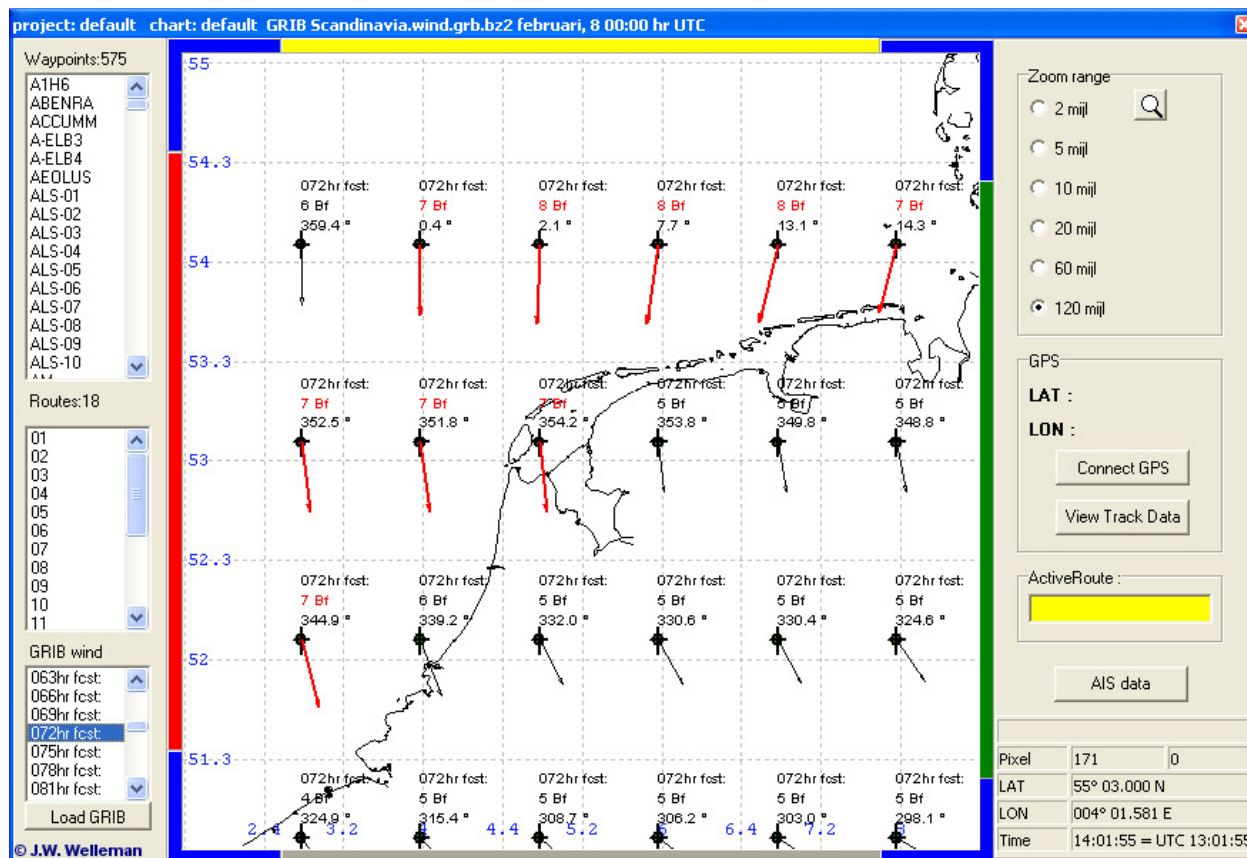
By selecting a different forecast the wind predictions can be seen for all the grid points within the GRIB record.

A different GRIB file can be download by pressing the **Load GRIB** button on the **Grib** panel.

The wind forecast can also be shown for a specific location pointed on the map. Select with the **right mouse button** from the popup menu the option **GRIB forecast**. The cursor now changes into a cross and you can pick with the **left mouse button** a point on the map. A dialog window will open and the known forecast data of the closest GRIB grid point is loaded.



The GRIB functionality is also implemented in the simple charts based on drawn lines which can be accessed by the main program menu option **Line Drawn Map → Show Line Drawn Map**.



When selecting a forecast with the right mouse button, the GRIB data will be presented in table form as can be seen below.

GRIB details : Scandinavia.wind.grb.bz2

GRIB : variable grid	Base date of Analysis	000hr fct:	wind velocity units :
nx=36	Year : 2006	LAT1=70° 00.000 N	<input type="checkbox"/> Knots
ny=31	Date : october, 25	LON1=005° 00.000 W	
date=2006102512	Time : 12:00 hr UTC	LAT2=40° 09.900 N	
nrec=37		LON2=029° 54.120 E	

LAT	LON	u wind [m/s]	v wind [m/s]	wind [m/s]	direction from	Bf
70° 00.000 N	005° 00.000 W	-3.20	-11.50	11.94	15.5 °	6
70° 00.000 N	004° 00.168 W	-3.90	-10.90	11.58	19.7 °	6
70° 00.000 N	003° 00.336 W	-3.90	-11.30	11.95	19.0 °	6
70° 00.000 N	002° 00.504 W	-3.30	-11.90	12.35	15.5 °	6
70° 00.000 N	001° 00.672 W	-2.30	-12.50	12.71	10.4 °	6
70° 00.000 N	000° 00.840 W	-1.20	-12.50	12.56	5.5 °	6
70° 00.000 N	000° 58.992 E	-0.30	-12.10	12.10	1.4 °	6
70° 00.000 N	001° 58.824 E	0.10	-11.70	11.70	359.5 °	6
70° 00.000 N	002° 58.656 E	0.00	-11.50	11.50	360.0 °	6
70° 00.000 N	003° 58.488 E	-0.20	-11.10	11.10	1.0 °	6
70° 00.000 N	004° 58.320 E	0.00	-10.10	10.10	360.0 °	5
70° 00.000 N	005° 58.152 E	0.50	-8.30	8.32	356.6 °	5
70° 00.000 N	006° 57.984 E	1.10	-5.90	6.00	349.4 °	4
70° 00.000 N	007° 57.816 E	1.70	-3.30	3.71	332.7 °	3
70° 00.000 N	008° 57.648 E	1.80	-1.30	2.22	305.8 °	2
70° 00.000 N	009° 57.480 E	1.60	-0.10	1.60	273.6 °	2
70° 00.000 N	010° 57.312 E	1.00	0.30	1.04	253.3 °	1
70° 00.000 N	011° 57.144 E	0.30	0.30	0.42	225.0 °	0
70° 00.000 N	012° 56.976 E	-0.30	0.10	0.32	108.4 °	0
70° 00.000 N	013° 56.808 E	-0.70	0.10	0.71	98.1 °	1
70° 00.000 N	014° 56.640 E	-0.90	0.90	1.27	135.0 °	1
70° 00.000 N	015° 56.472 E	-1.10	1.90	2.20	149.9 °	2

000hr fct:
006hr fct:
012hr fct:
018hr fct:
024hr fct:
030hr fct:
036hr fct:
042hr fct:
048hr fct:
054hr fct:
060hr fct:
066hr fct:
072hr fct:
078hr fct:
084hr fct:
090hr fct:
096hr fct:
102hr fct:
108hr fct:
114hr fct:
120hr fct:
126hr fct:
132hr fct:
138hr fct:
144hr fct:
150hr fct:
156hr fct:
162hr fct:

Close

Scrolling through the forecast list will present a table with the wind data of all grid points. Wind speeds are by default read in [m/s] but with the **Knots** checkbox all speeds can be shown in knots. The **u** and **v** columns represent the wind component in LON and LAT direction from the GRIB record. The **wind** column is the actual resulting wind. The last column shows the wind according to the Beaufort scale in **Bf**. The GRIB grid can be constant or variable as indicated. If a variable grid is used, for each forecast a different number of grid points **nx** and **ny** in LON and LAT-direction will be observed.

NOTE : Since GRIB records cover a large area the use of detailed charts in combination with reading GRIB data is not very wise. So use charts which will also cover a large area.

The same data can also be obtained from the main program menu option **Data and Map → GRIB Data → Show current data**. If no data is loaded the **GRIB File Loader** will start.

During the start up of the GPSFX312 program the integrity of the GRIB system is checked. If needed, the winGRIB utility is downloaded from the internet and the required GRIBDATA directory is created in the program root. Any inconsistencies will result in a disabled GRIB functionality.

If the program terminates the downloaded set of GRIB files will be left in the programs root directory. During start up of the program this last set of downloaded GRIB files will be loaded. If you do not want to keep these files you can change the settings under **Options → Settings → General Settings → Remove last loaded set of GRIB files**.

Range Panel

With the **Range Panel** a distance between two marked points on a **calibrated map** can be calculated.



Click on the **pick** button in the box **Point 1** and point with the mouse to a start point on the map. Set a mark with the left mouse button. In the box **Point 2** a pick button will now become visible. Select this button and set a second mark on the map with the left mouse button. After this mark has been set the distance and course (true bearing) from the first to the second mark will be shown.

If a current ship position is known from an attached GPS or AIS device, the distance from the current ships position to a point can also be computed by pressing the right mouse button on the target and choose from the popup menu **Heading and Range**. The course and range to the target is being updated after a ships position update and the course and distance is plotted on the map with a red arrow. The numerical output is shown in a small tool window. If the tool window is closed the arrow with range and heading also disappears.

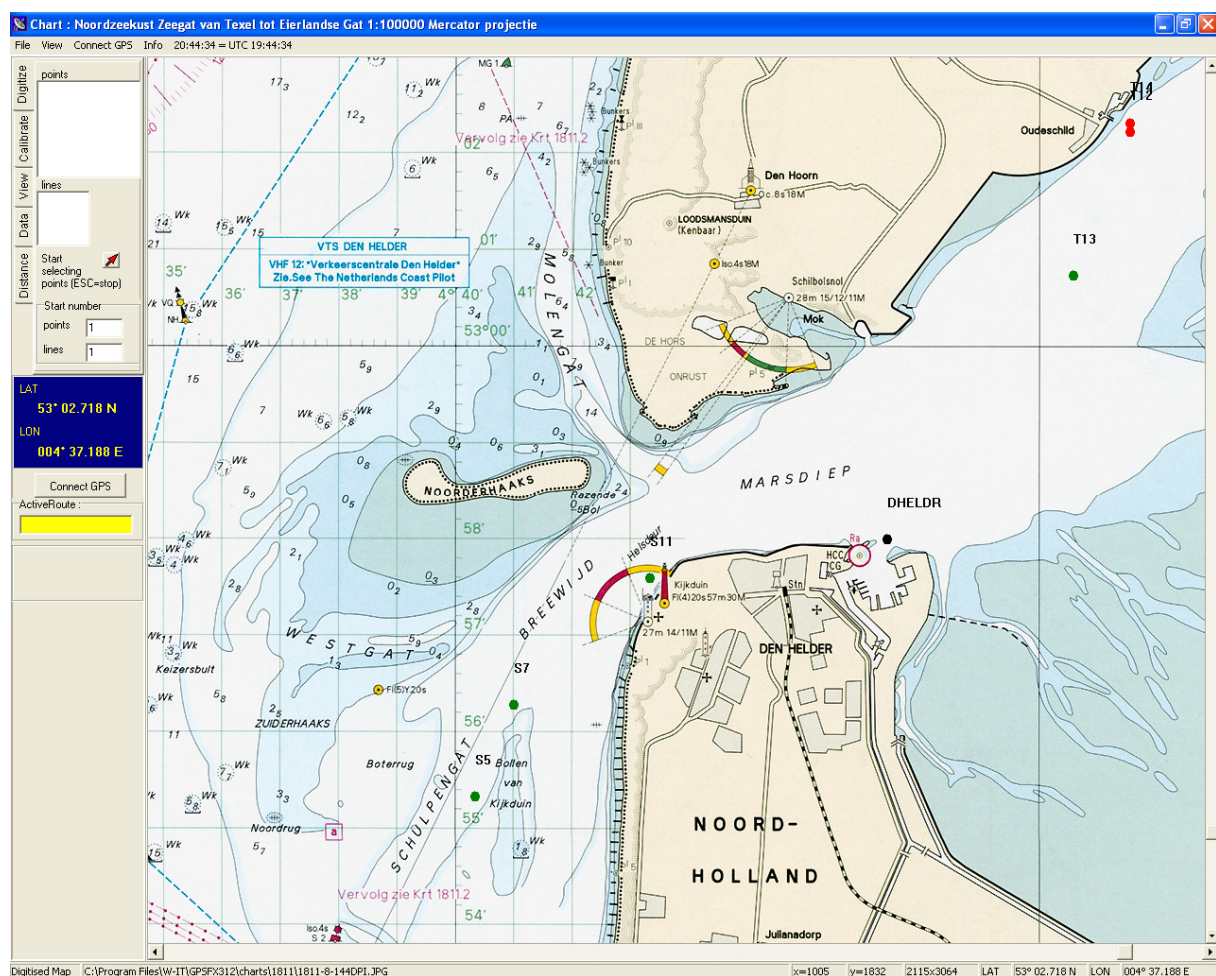


Digitize Panel

This option is a special feature to create a line based chart from a bitmap chart. The chart which is created will be stored as a file `DIGITIZE.CHT` in the program directory. This file can later be renamed and placed in the working directory using Windows Explorer. Viewing these files in GPSFX312 is explained in the section **Simple line based charts** on page 19.

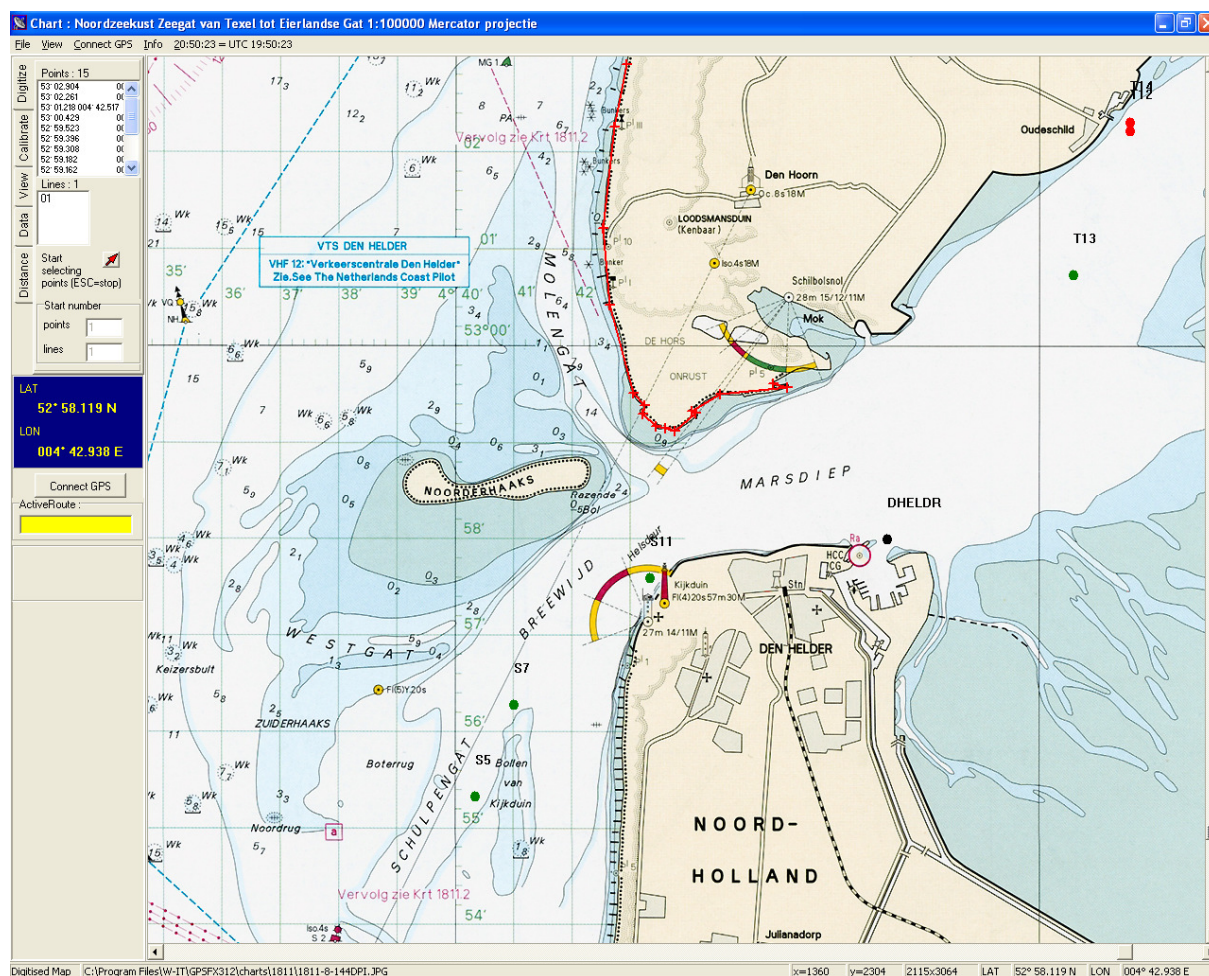
Small line drawn charts can no longer be uploaded to the MLR FX312 by using the *Personal Map System PMS™*. This development has been ceased. The digitising of a map within the GPSFX312 program is not restricted to any limit. By default a map `DEFAULT.CHT` is installed in the database directory. This map covers large parts of the Dutch coast up to the Baltic Sea.

To start digitizing a bitmap chart select the **Digitize panel**.



Before digitizing select the **Start numbers** of the first chart **point** and the first **line** number of the chart. By default both are set to the current nr of points and lines +1 of the current line chart but if you want to start a new chart set both to 1. To start select first the red arrow and then select point along the chart outline. To end a line press ESC. If more than 15 points are added to a line the program will end the current line. To continue, repeat the outlined procedure.

The digitized points are shown on top of the bitmap chart and the line is shown in red. The details of the points are collected in a list box on the **Digitize Panel** as can be seen from the example on the next page.



The digitized map is stored in the program directory under the name `DIGITIZE.CHT`. This is a simple ASCII text file which can be viewed in any text editor like notepad.

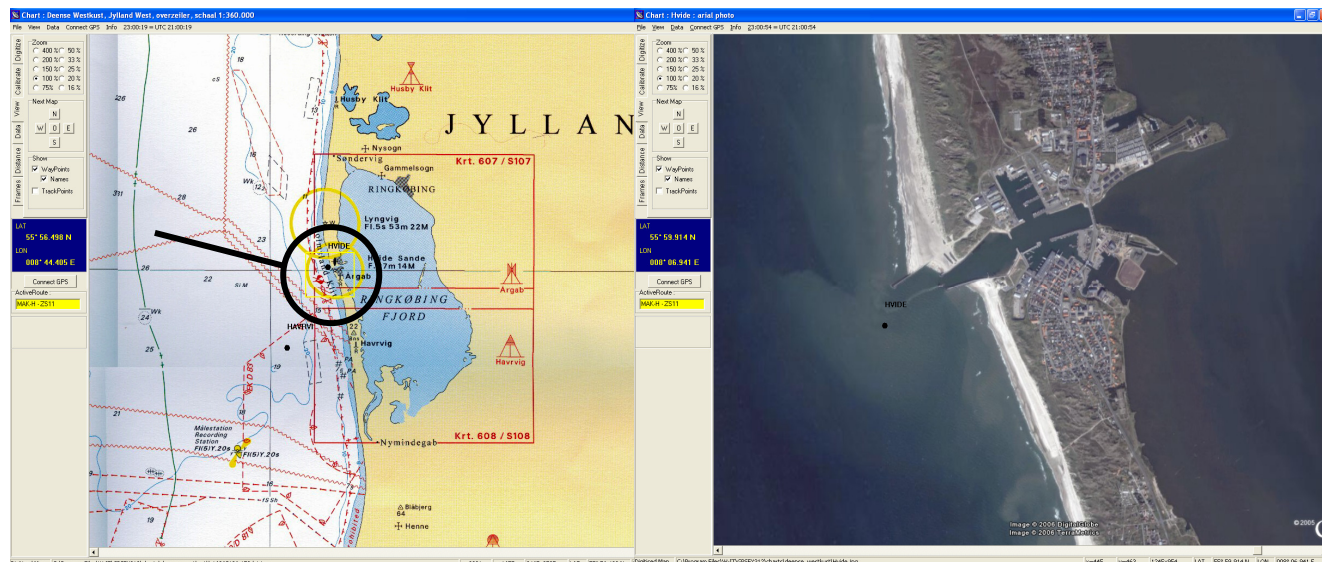
```
[CHARTPOINTS] 15
1 "5302.904" "N" "00442.922" "E" "" "0" "" -1 0 0
2 "5302.261" "N" "00442.711" "E" "" "0" "" -1 0 0
3 "5301.218" "N" "00442.517" "E" "" "0" "" -1 0 0
4 "5300.429" "N" "00442.630" "E" "" "0" "" -1 0 0
5 "5259.523" "N" "00443.035" "E" "" "0" "" -1 0 0
6 "5259.396" "N" "00443.229" "E" "" "0" "" -1 0 0
7 "5259.308" "N" "00443.197" "E" "" "0" "" -1 0 0
8 "5259.182" "N" "00443.424" "E" "" "0" "" -1 0 0
9 "5259.162" "N" "00443.586" "E" "" "0" "" -1 0 0
10 "5259.133" "N" "00443.748" "E" "" "0" "" -1 0 0
11 "5259.318" "N" "00444.104" "E" "" "0" "" -1 0 0
12 "5259.337" "N" "00444.039" "E" "" "0" "" -1 0 0
13 "5259.513" "N" "00444.525" "E" "" "0" "" -1 0 0
14 "5259.581" "N" "00445.675" "E" "" "0" "" -1 0 0
15 "5259.620" "N" "00445.432" "E" "" "0" "" -1 0 0

[CHARTLINES] 1
1 "01" 15 1 1 2 2 3 3 4 4 5 5 6 6
7 7 8 8 9 9 10 10 11 11 12 12
13 13 14 14 15 15 0 0
```

If the map form is closed and if the starting numbers are consistent with the current line chart, the user is asked if the digitised data should be added to the current line chart (*.CHT). If answered with yes, do not forget to save the data in the main program before closing the program.

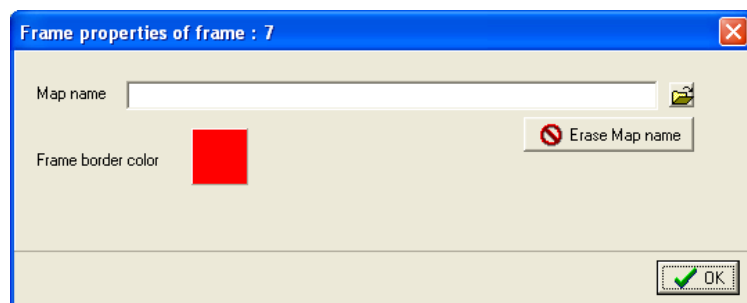
Frames Panel

With the **Frames** panel Frames can be defined on top of Bitmap Charts. Selecting Frames with the left mouse button will switch to the map or photo linked by the selected **Frame**. An example is given below.



Selecting the yellow frame will result in switching to a detail picture of Hvide.

Frames can be created with the **Frames** tab of the Tool panel. After selecting a **Upper Left Corner** and **Lower Right Corner** with the right mouse button on a position of the map a dialog frame will be shown to set the frame properties.



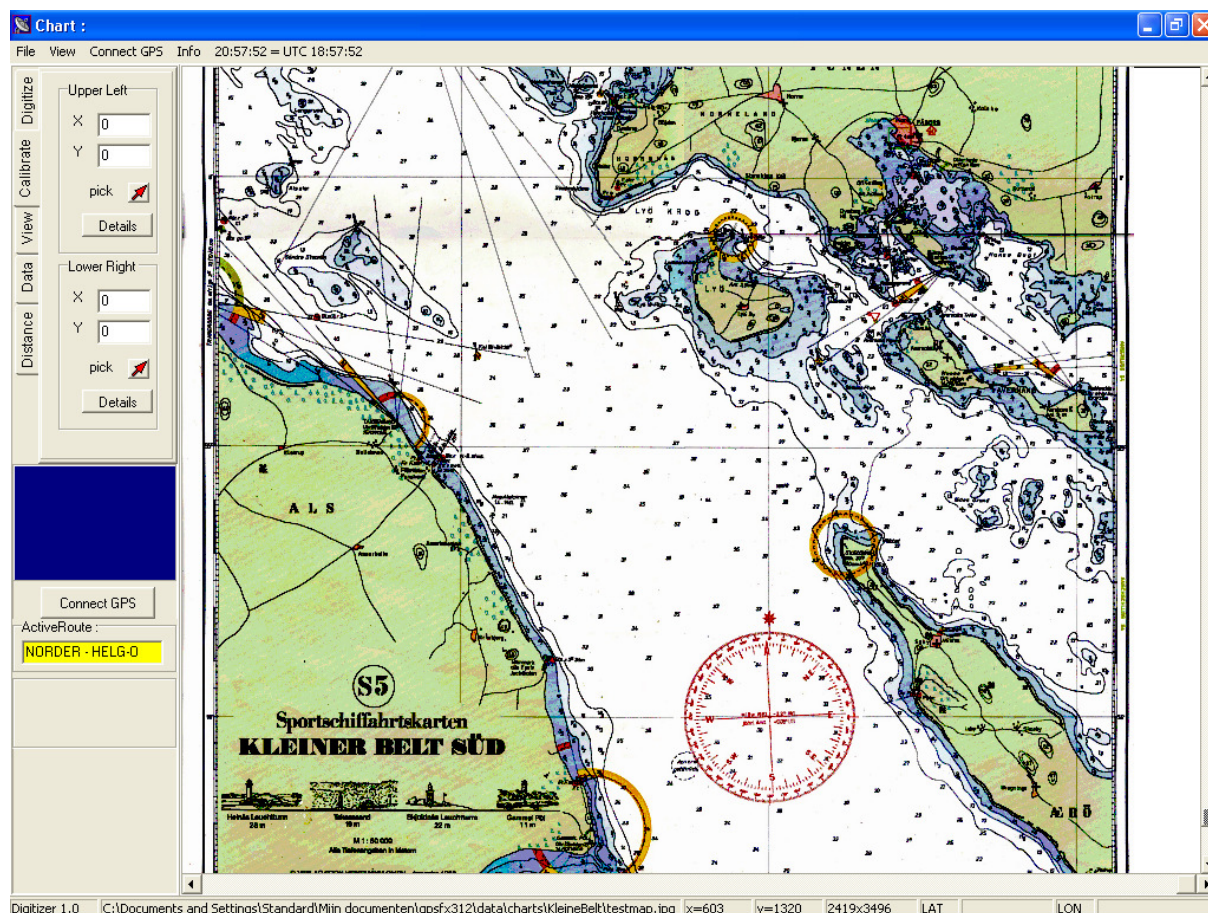
The link to a map can be created by clicking on the yellow folder speed button. An empty link will erase the created frame. The frame colour can be set with the colour tool by clicking on the coloured square and picking a colour from the colour dialog which will be shown. With the frame colour differences can be set e.g. red for detailed maps and e.g. yellow for photos.

The frame properties can be changed by selecting a frame with the right mouse button. The frame properties dialog will appear. All frame data will be stored in the map.ini file.



Setup Panel

With this panel a new map can be calibrated. If a map has not been calibrated no LAT – LON position of the mouse will be available. In stead only the absolute pixel position of the mouse will be shown in the status bar. In order to translate the pixel position in to a LAT –LON position, two points on the map must be marked and the LAT and LON of these points must be specified. In the GPSFX312 a upper left and lower right point will be used to calibrate the map.



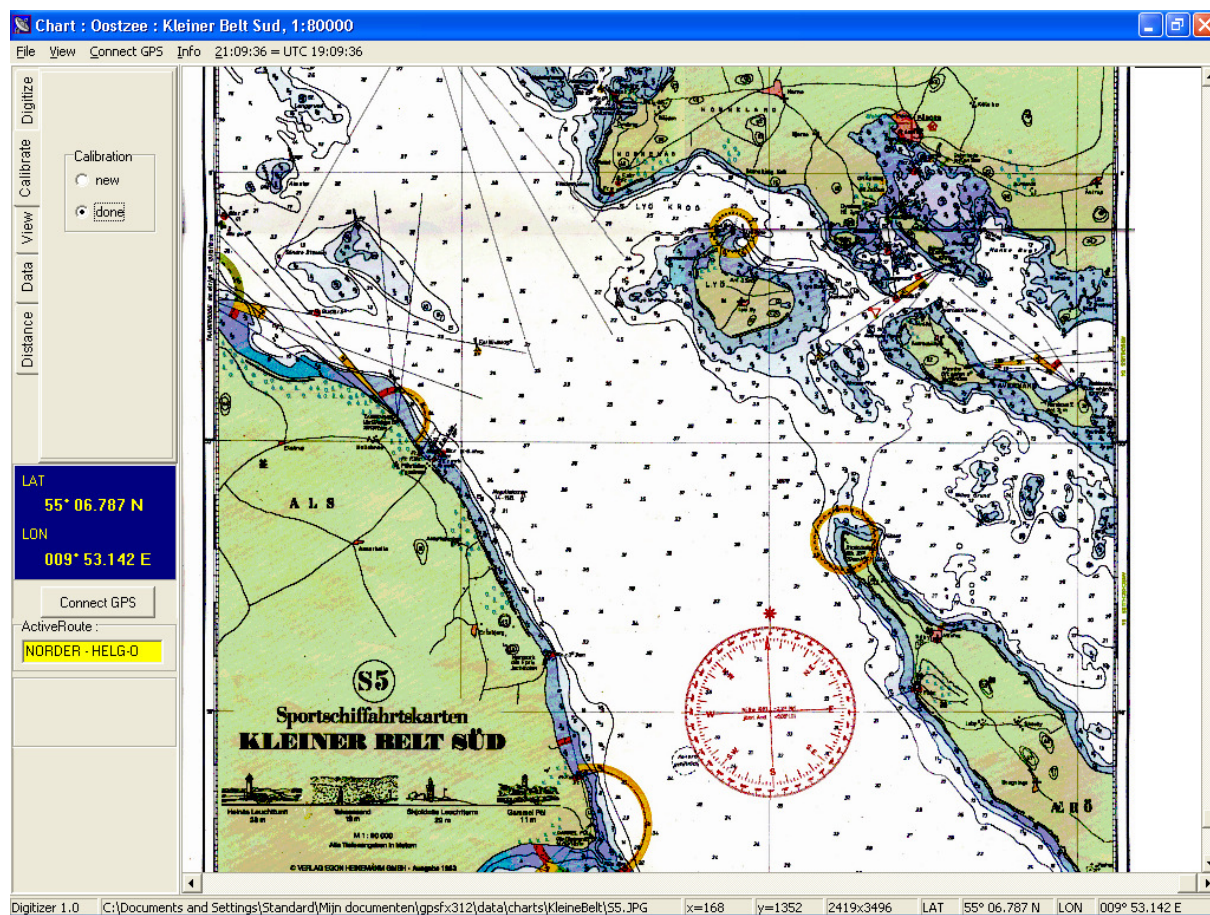
To start the calibration select the **pick** button from the box **Upper Left**. Mark a point some where in the upper left side of the map from which the exact position is known. A dialog box will appear to specify the exact position.

Continue with the lower right point by selecting the the **pick** button from the box **Lower Right**. Mark a point some where in the lower right side of the map from which the exact position is known. A dialog box will appear to specify the exact position. Use only the LAT and LON fields to input the degrees and the minutes. The minutes must be entered in decimal notation :

48.22

The decimal part in this notation is not 22 seconds but 22/100 of a minute. Do not forget to check the N S and E W radio buttons.

After a successful calibration the LAT and LON of the mouse position on the map will be shown in the blue position field and on the status bar.



↑ ↑ Bitmap size ↑ ↑
mouse position in pixels mouse position in LAT and LON

If a map has already been calibrated a new calibration can be executed by selecting the **new** radio button from the **calibration box**. Continue with the previous described steps.

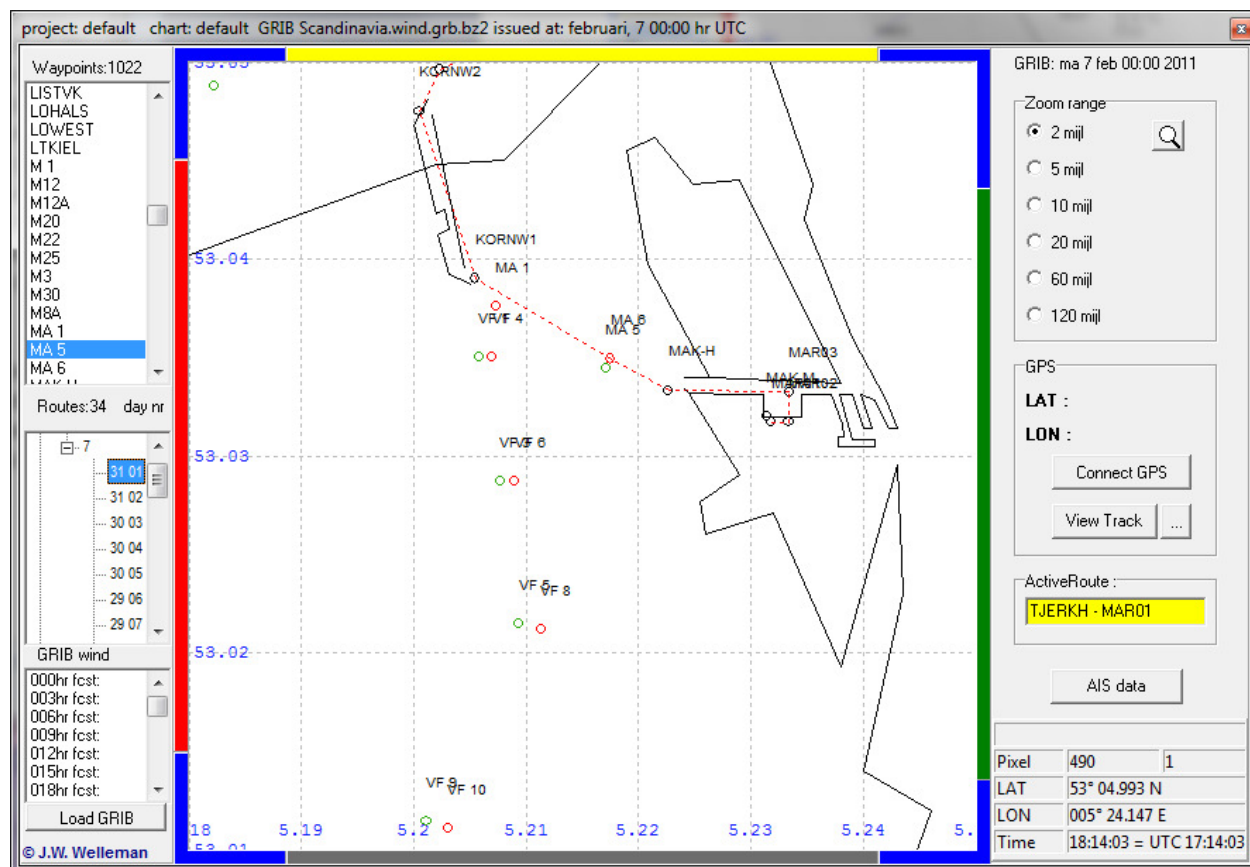
Scanning charts with ample resolution and acceptable file size is not so easy as it seems. The following, rather fussy, procedure results in fine coloured maps with enough resolution and acceptable file size in JPG-format.

SCANNING NAUTICAL CHARTS ROUTINE

- Scan in A4 size with 300 dpi (24 bits) and save in BMP format
- Read A4-parts in CorelDraw and compose complete A2 size
- Export total map to 300 dpi (24 bits) in BMP format
- Read total map in to Adobe Photoshop for auto-color-correction
- Save corrected BMP with Paint to 256 colors and half pixel size,
- and save in Paint as JPG-format

Simple line based charts

If a project is loaded the user can load the line drawn chart with the main menu option **Line Drawn Map** → **Show Line Drawn Map**. The Line Drawn Map is an old feature from the early GPS models like de FX312 / FX412 without modern screens.



The WAYPOINTS of the active database are projected on top of the line based map. Navigating is made simple by clicking on the coloured edges or by selecting the preset zoom radio buttons below the map. The magnifying glass can be used for maximum zoom. If the GPS is connected the current position can be plotted by pressing the **Connect GPS** button. If the right mouse button is pressed on the map a popup menu appears with additional options. The **AIS data** button will list the received AIS messages from ships within a range of max 35 miles. Pressing the **View Track Data** button will show a list of recorded track points of the current ships movements. If a WAYPOINT is selected in the list, the map will jump towards this waypoint. If a ROUTE is selected the active route will be plotted as a coloured line. Routes are listed in a tree list with year, month on day as trees. The most recent route is on top. With the right mouse button details on WAYPOINTS and ROUTES can be obtained. If GRIB data is available below the ROUTE list a FORECAST list will be shown.

By default the line based chart **DEFAULT.CHT** is installed and used. If an internet connection is available the program will update this file regularly. Copy the default file to another file if you want to use your own line based map and change the link of the **Digital Chart** in the project options (see page 29). By using the digitiser (see page 14) you can add lines to this personal file. An other way to extend line based charts is to import data form **GOOGLE EARTH**. Draw a path in **GOOGLE EARTH** and save this as **KML** file. Read the file with the main menu-option **Line Drawn Map** → **Import LINES from Google Earth (KML)**. The lines will be added to the current line based chart (*.CHT).

GPS DATA

The GPSFX312 program has been written for the MLR FX312. Based on the output/input specifications of the FX312 the following features have been implemented in the program :

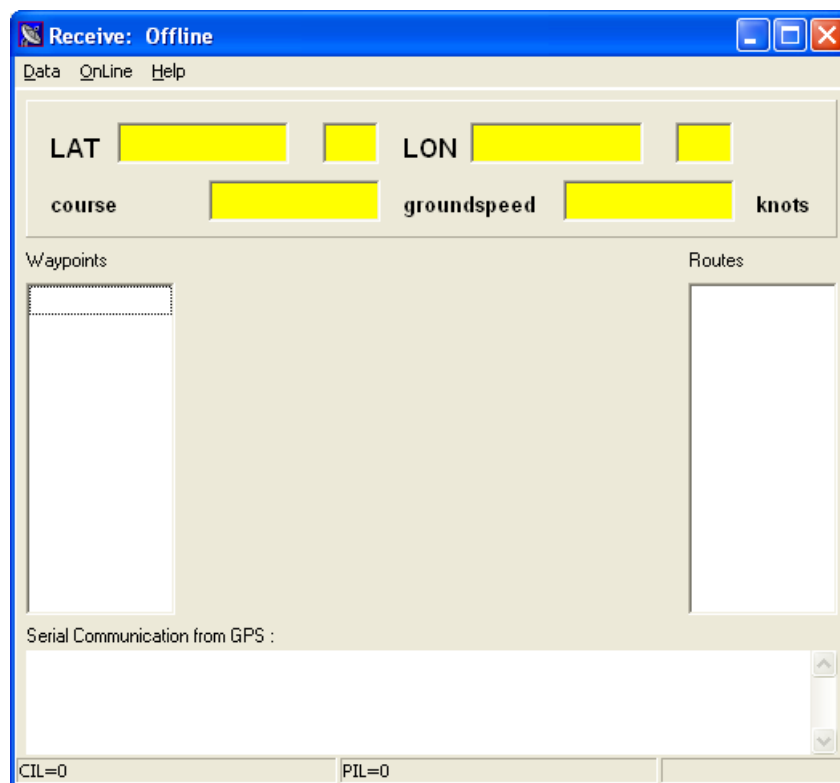
- | | | | |
|---------------------|--------------|---------------------|----------|
| • Waypoints | (NMEA) | • True bearing | (NMEA) |
| • Routes | (NMEA) | • Distance | (NMEA) |
| • Chartpoints | (line map) | • From Waypoint | (NMEA) |
| • Chartlines | (line map) | • To Waypoint | (NMEA) |
| • Current position | (NMEA) | • UTC time and date | (NMEA) |
| • Current speed | (NMEA) | • Depth, Wind and | (NMEA) |
| • Current course | (NMEA) | • Water temperature | (NMEA) |
| • Cross track error | (NMEA) | • Compass data | (NMEA) |

The WAYPOINTS and ROUTES data are stored in a data project. In this way special projects can be made e.g. North Sea, Baltic, Channel Islands. In this way it is possible to reduce the number of stored data in the GPS since most of these systems have a maximum of e.g. 500 data points and 20 routes. The GPSFX312 program has no data limit. Data can be received from the GPS or send to the GPS. For these actions you can use the main menu option **Data and Map** of the main program.

- **Receive from GPS**
- **Waypoints and Routes** (for sending data to the GPS)

Receive

For receiving data from the GPS connect the GPS to the serial port of the computer and use the main menu option **Data and Map → Receive from GPS**. The following window will appear.



NOTE: Receiving data should only be done with an empty project and after receiving the data it should be saved. Current available data will be over written !

By default the connection with the GPS is OFF LINE. Check the data protocol of your GPS. Normally there are different ways to send data from the GPS to the computer. GPSFX312 uses the two models shown below.

DATA MODELS

1 Sending WAYPOINTS and ROUTES

GPS serial output = WPTS+RTES for Waypoints and Routes

2 Sending current position, speed, course etc

GPS serial output = NMEA183 2.0 for position, speed and course

=> use sentences found in help

=> 4800 bauds

=> 2 stop bits (One or One5 if errors occur)

=> no parity

=> 8 databits (7 if errors occur)

The data models and used sentences can always be viewed by using the programs **help** option



If the correct output model has been selected on the GPS you can switch the Receiver ON LINE. Received data from the COM port will be shown in the lower text area. If the received data is correct the WAYPOINTS and ROUTES will appear in the listboxes on the left and right side of the window. This process can take a while. After completion the number of received waypoints and received routes should be the same as the stored numbers in your GPS system. Switch to OFF LINE and **save** the received data.

NOTE : If WAYPOINTS and ROUTES are not shown, a NMEA error is made. Select an other GPS system type with **Options** → **Communication** → **GPS**. If errors still occur try to save the received messages from the COM port and send these to the program developer.

NMEA code

For the navigational options the following generic NMEA codes have been implemented:

- GGA	- VDM	- MWV *
- GLL *	- GSA	- VHW *
- RMC *	- GSV	- VWR *
- VTG *	- HDM *	- HDM
- RMB	- HDT *	- HDT
- BWC	- DPT *	- VWT *
- ZDA	- DBT *	
- XTE	- MWD *	
- ZTG	- MTW *	*relayed via AIS

For WAYPOINTS and ROUTES the following two NMEA codes are available:

- WPL (not working on some FURUNO models)
- RTE (not working on some FURUNO models)

An example of some of the NMEA codes used in the GPSFX312 are listed below

MLR FX312 RECEIVED CODES :

(A) SERIAL COMMUNICATION WITH WPTS+RTES

WAYPOINTS

```

$GPWPL,5253.080,N,00521.100,E,HAVE020-----*6D
$GPWPL,5303.290,N,00522.330,E,HAVENH0-----*6C
$GPWPL,5303.270,N,00523.300,E,KANAAL0-----*74
$GPWPL,5300.190,N,00519.510,E,VF16 0-----*6B
$GPWPL,5302.800,N,00520.750,E,VF6 0-----*74
$GPWPL,5302.160,N,00521.000,E,VF8 0-----*76

```

ROUTE

```

$GPRTE,4,1,C,01,MARINA,KANAAL,HAVE02,MA5 ,VF1 *2F
$GPRTE,4,2,C,01,VF6 ,-----,-----,-----,-----*3A
$GPRTE,4,3,C,01,-----,-----,-----,-----,-----*3D
$GPRTE,4,4,C,01,-----,-----,-----,-----,-----*3A
$GPRTE,4,1,C,02,OUDEHA,VF-B ,VF-A ,VF16 ,VF14 *2F
$GPRTE,4,2,C,02,VF12 ,VF10 ,VF8 ,VF6 ,VF1 *32
$GPRTE,4,3,C,02,MA5 ,HAVENH,HAVE02,KANAAL,MARINA*33
$GPRTE,4,4,C,02,-----,-----,-----,-----,-----*39

```

(B) SERIAL COMMUNICATION WITH NMEA183 2.0

POSITION, COURSE AND SPEED

```

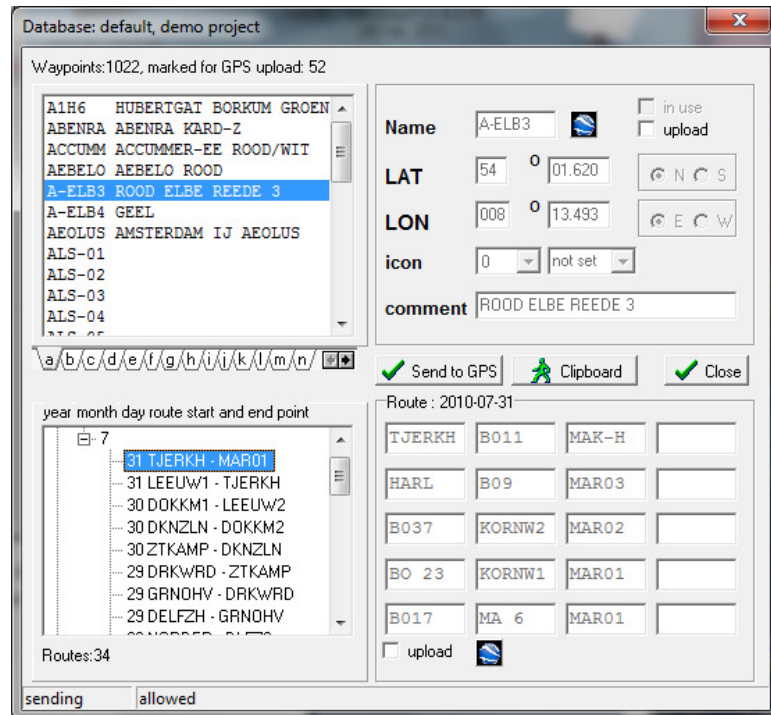
$GPGGA,132005,5212.80,N,00307.05,E,1,08,02.0,-0083,M,-048,M,,*77
$GPGGA,132008,5212.81,N,00307.03,E,1,08,02.0,-0083,M,-048,M,,*7D
$GPVTG,285,T,285,M,015.7,N,029.0,K*46
$GPVTG,285,T,285,M,015.7,N,029.0,K*46

```

For the codes of your own GPS-system see the documentation of your GPS-system. Since the NMEA implementation has been generic practical any GPS device can be read. Uploading is however restricted to the capabilities of the connected device. Uploading of WAYPOINTS will be no problem, ROUTES can be difficult. For e.g. the GARMIN Geko the **Garmin Protocol** has been implemented to upload Waypoint and Route data.

Database

If a project is loaded the data can be reached from the main program menu option with **Data and Map → WAYPOINT & ROUTE Data → Waypoints and Routes**.



If a WAYPOINT or ROUTE is selected the details are presented as read only data in the shown boxes. Route data is presented in a tree view list with year, month and day as trees. The most recent route is always on top.

With the three green buttons shown, the user can :

- **Send to GPS** upload marked Waypoints and Routes to the GPS. In case of a GARMIN device, the **Garmin Protocol** can be activated for uploading Waypoints and Routes, see AIS & GPS connection.

Remark

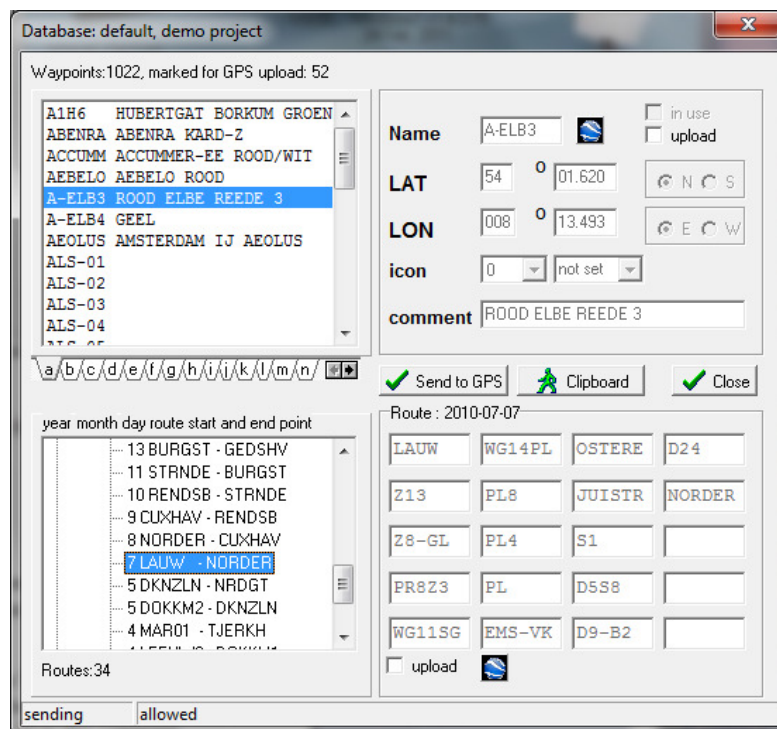
Uploading Waypoints and Routes is limited by the capabilities of the GPS device. For the MLRFX312 this results in a maximum of 500 waypoints and 20 routes (see the APPENDIX for changing these standards for your GPS device). All marked routes for uploading are renumbered starting with route number 0. Existing routes in the GPS device will be replaced by the uploaded routes. The renumbering of routes is only used for the upload list to the GPS device and is not used further. The sequence starts with the oldest route. Keep all the routes stored in the GPSFX312 program and unmark unused routes. In this way no data is lost and all journeys are kept for later usage.

- **Clipboard** copy Waypoints and Routes to the Windows Clipboard and import with paste into a word processor or other applications
- **Close** close the window

With the option Copy to Clipboard the Waypoints and Routes can be included as ASCII text in other document such as WORD.

You can also use from the main menu **Data and Map → WAYPOINT & ROUTE Data → Import / Export → Export Marked Data (ASCII or GPX)** the export to ASCII or GPX file which will be discussed further on.

The WAYPOINTS are shown in alphabetical order. The data can be shown as read only by selecting a name. The same holds for the ROUTES shown. An example is shown below.



Waypoints

If WAYPOINT data has to be modified select the name with the right mouse button and a pop-up menu will appear with the following options :

- New
- Modify
- Del
- Convert chart datum (do not use this option, see remark)
- Mark all Waypoints for upload or export (by default all new Waypoints will be marked)
- Un-mark all Waypoints for upload or export

With the modify option the individual WAYPOINT data can be changed. If a WAYPOINT is being used in a ROUTE the data can not be changed and the **in use** checkbox will be marked. Select the **upload** checkbox to mark a WAYPOINT for upload to GPS or export to file. If in the comment field the colour ROOD, ROT or RED is used the WAYPOINT is shown as a red dot on top of the map. The same holds for GROEN, GRUN or GREEN and GEEL, GELB or YELLOW. By default WAYPOINTS are shown as black dots. Do not forget to press the **Store** button after modifications have been made ! WAYPOINTS can only be removed if they are not being used in any ROUTE, shown by the **in use** checkbox. The name of a WAYPOINT must be unique!

Remark

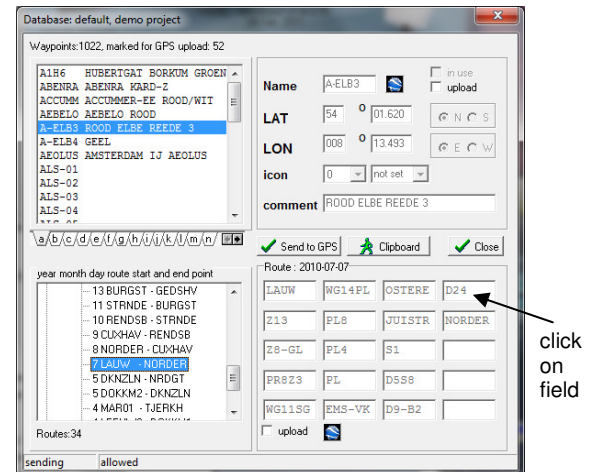
The **convert chart datum** option is only there to automatically convert EUR1950 coordinates into WGS1984 coordinates. A small shift in coordinates will be the result, these results however are not exact but a good estimate. The best way to check whether the coordinate shift has been done properly is to load a WGS84 map and view the results. Use this option not without first making a backup of your database, this option is more or less obsolete since all old styled data is more or less history.

The best way to add or modify WAYPOINTS is to use the features within the graphical Bitmap Chart part. Then you can see directly the position of the waypoint and move it to the exact position. The database form is only useful if exact locations are known.

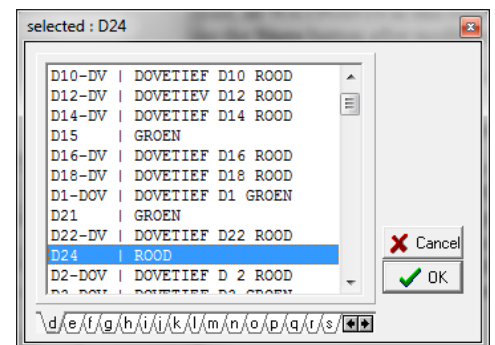
Route

If the ROUTE data has to be modified select the name with the right mouse button an a pop-up menu will appear with the following options :

- New
- Copy
- Reverse
- **Modify**
- Del
- Details
- Clean up Routes
- Unmark all Routes
- Mark all Routes



Select **Modify** to change the current ROUTE. Press on one of the white boxes within the route and the WAYPOINT selector will appear. It will start with the current WAYPOINT name but you can change it now, names are sorted from a-z with tabs. In this way the whole route can be specified up to 20 WAYPOINTS which is the limitation of the MLR FX312 GPS device. If a field should be made empty select ***empty*** on top of the list. Select the **upload** checkbox to mark a ROUTE for upload to GPS.



If a ROUTE as been marked for upload, all WAYPOINTS in this route will be marked for upload. Press the **Store** button after modifications have been made. With **Copy** a ROUTE can be copied and this copy will get the date of today. With **Reverse**, the ROUTE waypoints will be stored in reverse order. The **Details** options will show the ROUTE details as is seen in the example to the right. The ROUTE date can be set on the **Planner** panel. Use new routes for each day, in this way the route list is also a record of the journey. The most recent route is on top of the list.

From	To	nautical miles	true course	cumulative nautical miles	arrival date and time
LAUW	Z13	0.53	310	0.53	7-7-2010 8:35:52
Z13	Z8-GL	1.95	298	2.48	7-7-2010 8:59:12
Z8-GL	PR8Z3	2.04	291	4.52	7-7-2010 9:23:42
PR8Z3	WG11SG	1.51	335	6.04	7-7-2010 9:41:51
WG11SG	WG14PL	0.96	30	6.99	7-7-2010 9:53:20
WG14PL	PL8	2.60	50	9.59	7-7-2010 10:24:30
PL8	PL4	1.77	75	11.36	7-7-2010 10:45:42
PL4	PL	1.33	31	12.68	7-7-2010 11:01:36
PL	EMS-VK	6.66	40	19.34	7-7-2010 12:21:31
EMS-VK	OSTERE	11.15	63	30.49	7-7-2010 14:35:17
OSTERE	JUISTR	5.76	81	36.26	7-7-2010 15:44:25
JUISTR	S1	11.51	88	47.77	7-7-2010 18:02:33
S1	D5S8	1.68	98	49.45	7-7-2010 18:22:44
D5S8	D9-B2	1.15	178	50.60	7-7-2010 18:36:31
D9-B2	D24	0.63	113	51.23	7-7-2010 18:44:05
D24	NORDER	0.56	78	51.79	7-7-2010 18:50:51
TOTAL				51.79	

Planner: 7-7-2010 18:51:00 departure arrival
 average SOG 5 knots Recalculate

The best way to add WAYPOINTS to a ROUTE is to use the features within the graphical Bitmap Chart part with the main menu option **Data and Map → Show Map**.

Either create a new active ROUTE or select an existing ROUTE using the **Data panel** on the Map form. **Add**, **Insert** or **Delete** WAYPOINTS to and from this active ROUTE by selecting an existing WAYPOINT on the map by pressing the right mouse button. If a WAYPOINT is selected the name and description is shown in the tools window directly beneath the yellow **ActiveRoute** field. When inserting WAYPOINTS the nearest ROUTEPOINT is searched for and the user is asked to insert **before** or **after** this nearest point.



Import and export of WAYPOINTS and ROUTES

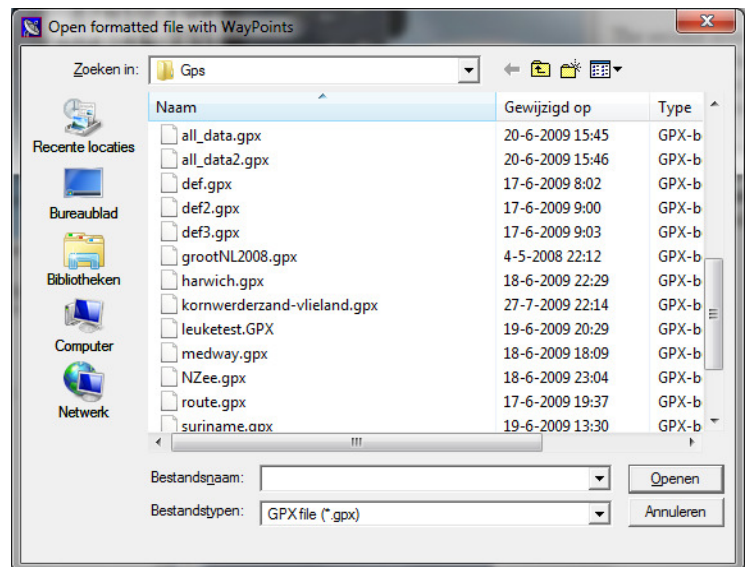
Data exchange is possible with the GPSFX312 program. Four file formats have been implemented:

- WP file exchange format, fixed ASCII based GPSFX312 file format
- GPX file format, widely used between GPS applications
- KML file format to import a path from GOOGLE EARTH (import only)
- MySQL file format (mysql database for e.g. webserver) (export only)

The first format is only used to store (parts) of data which can then be read into new projects. This file format is of little use in the exchange of data between different applications.

The second mentioned data format can be used to export ROUTE and WAYPOINT data to other applications. The implemented GPX protocol can read WAYPOINTS, ROUTES and TRACKS. The GPX protocol is an international standard based on <?xml> file format. The files can also be read with a word processor. Further information can be found on the internet.

With the main menu option **Data and Map → WAYPOINTS & ROUTES Data → Import / Export → Import data(ASCII/GPX)** a text file with waypoints can be added to the existing database. By **default** the format is **GPX** but the file filter can be selected to the WP file format. Only unique WAYPOINT names will be accepted. Both formats will handle exact the same information.



With the main menu option **Data and Map → WAYPOINTS & ROUTES Data → Import / Export → Export data** WAYPOINTS and ROUTES **marked for upload to GPS or export** will be exported. So first mark the data and then use the export function. Select either the WP, GPX or the MySQL file format for export. The **Export all data to a MySQL dump** option will create a full dump of **all** ROUTE and WAYPOINT data and will store this in a *.sql script file. Created paths in GOOGLE EARTH can be imported as a ROUTE with the **KML import** option.

The WP file format is printed as comment at the top of the data file to explain its format. The position of the fields in the file is fixed so special attention to the format is required when using this WP file format. Using the GPX protocol is much easier. All selected WAYPOINTS and ROUTES are exported. From the waypoint the **LAT, LON, name, comment** and **icon** fields are exported. These record fields can be found in the tag <wpt lat="" lon=""> ... </wpt> by nested tags like <name>, <cmt> and <symb>. All other data will be ignored.

Waypoint names are limited to a length of 6 characters and the comment field is limited to a length of 22 characters since these are the limitations of the MLR FX312 GPS device.

Export and import of data has been tested with the EASYGPS program which is a very useful program to upload data to different GPS devices which may not be present in this program.

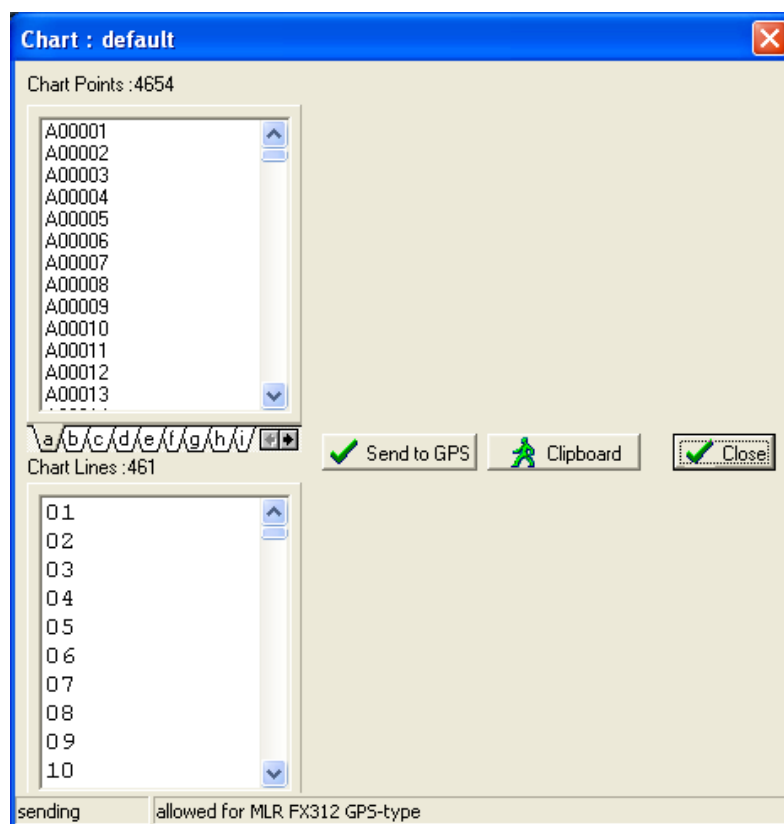
Upload a line based chart to the GPS (no longer supported)

With the GPSFX312 program the current line based chart (.CHT) can be uploaded to the MLR FX312 using its *Personal Mapping System* PMS™. Chart up to 250 points can be uploaded. There are two ways implemented:

- Upload the current database of chart points and chart lines
- Upload the current part of the chart which is visible

Upload the current database of chart points and lines

With the main menu option **Line Drawn Map → Points and Lines** a database of points and lines of the line drawn chart is shown which is very similar to the database of WAYPOINTS and ROUTES. Press the button **Send to GPS** to upload the chart data (up to 250 points).



If the GPS type is set to MLRFX312 the chart points can be uploaded to the GPS. In order to do so the MLR FX312 has to be set in a special listening mode. The program will show a message containing the instructions how to reach this listening mode :

```
To start uploading activate ENTER CHART OUTLINE on the MLR FX312:
- press menu button
- select PLOTTER MENU or press 4
- select ENTER CHART or press 5
- start uploading the PMS (Personal Map System) data
- after upload select SAVE CHART OUTLINE on the MLR FX312
```

Do you want to continue, Yes or No ?

If the MLR FX312 has been set to listening mode continue with pressing **Yes**. After uploading the points, save these points on the GPS with SAVE CHART OUTLINE.

Upload the current view of the chart to the GPS

With the main menu option **Line Drawn Map → Line Drawn Map** the line drawn chart will be showed. From this chart itself it is also possible to upload the line based chart to the GPS. With this option not the entire loaded map will be uploaded but only the visible part of the map (up to 250 points). To upload the visible part of the chart press the right mouse button somewhere on the line based map to enter the special pop-up menu. This pop-up menu consists of the following options:

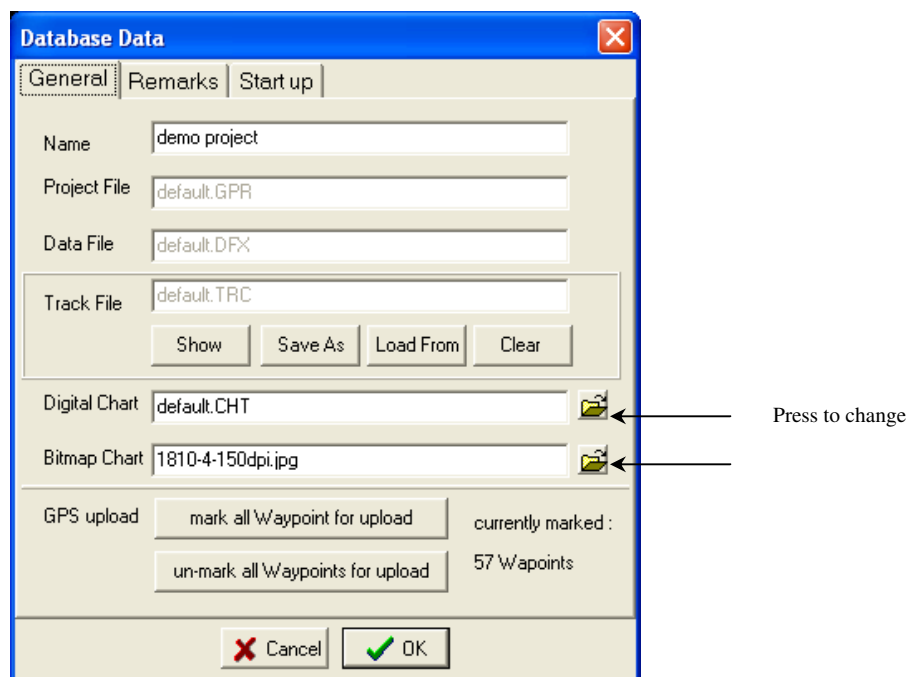
- Hide Names
- Hide Track Points
- Show Chart Points
- Copy visible chart to File
- Send visible chart to GPS

Select the last options to upload the chart. The same instruction will be shown as outlined in the previous section. Remind that this option only works for the MLR FX312. The other options of this pop-up menu are self explanatory. The option to save the visible part of the chart to file can be very handy if from a large chart only a small part, e.g. the approach of a harbour has to be uploaded or saved as a separate chart.

NOTE : The support for the uploading of line based maps to the MLR device has been ceased as from version 1.4.4.12.

PROJECTS AND OPTIONS

With the main menu option **Files→ New Project**, new projects can be made. Projects contain the WAYPOINTS and ROUTE data. If a new project is to be made the current project is closed and the user is asked to specify a new project name. This name should have the extension **.GPR**. After a valid name has been specified the following window appears in which the project data can be stored under the three tabs **General**, **Remarks** and **Start up**.



General data tab

Each project consists of a project file (* .GPR) and a data file (* .DFX) . the user is not allowed to modify these names or the data contents.

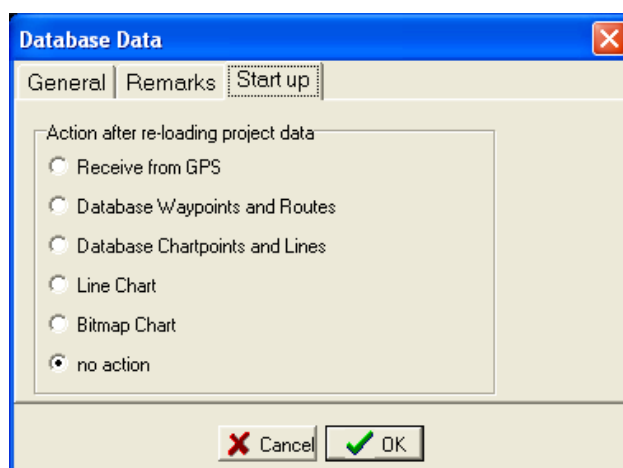
Each project can contain a reference to a line drawn chart and/or a bitmap chart. The user can specify these names with a file selector by pressing the yellow folder icon. If the program is connected to a GPS the actual position is stored in a track file. This data can be viewed or erased with the buttons **Show** and **Clear**. Current track data can be stored with **Save As** or read with **Load From**. With the two GPS upload buttons Waypoints can be marked or un-marked for uploading to the GPS. In this way the user can influence the set of WAYPOINT that can be uploaded. In the bitmap charts an option is available to mark and un-mark all WAYPOINTS which are in view. So un-mark all WAYPOINTS and then start within a map to mark all WAYPOINTS which are in view. In this way a very precise set can be built even for databases with more than the GPS's type maximum nr of WAYPOINTS.

Remarks tab

On the remarks tab special info about the project can be stored, e.g. some notes you do not want to forget.

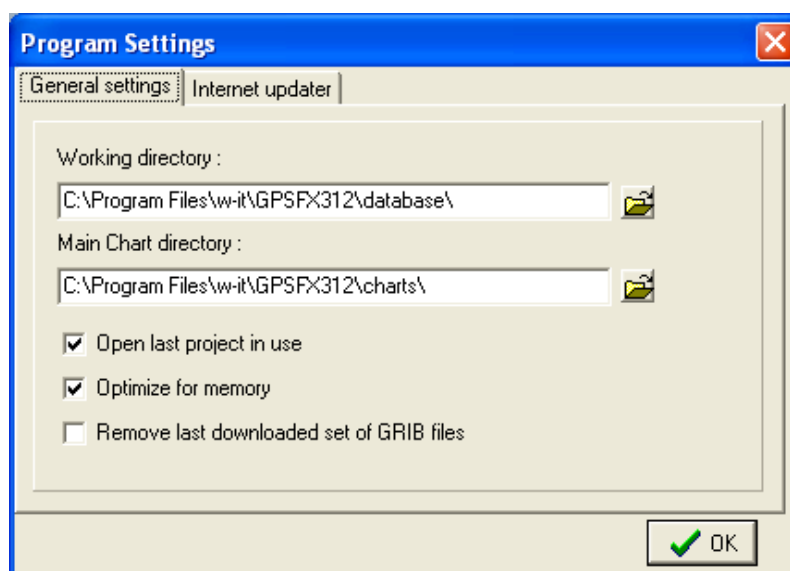
Start up tab

During start up of a project the program can be instructed to switch to a certain activity. The user can select the action on this tab-sheet.



A handy option is to switch automatically to the **Bitmap Chart** specified on the General tab-sheet whenever the project is opened. By default **no action** is selected.

Apart from the options within the project there are also standard program options which can be set with the main menu option **Options → Settings**. The following window appears.



The settings on the **Directories** tab are :

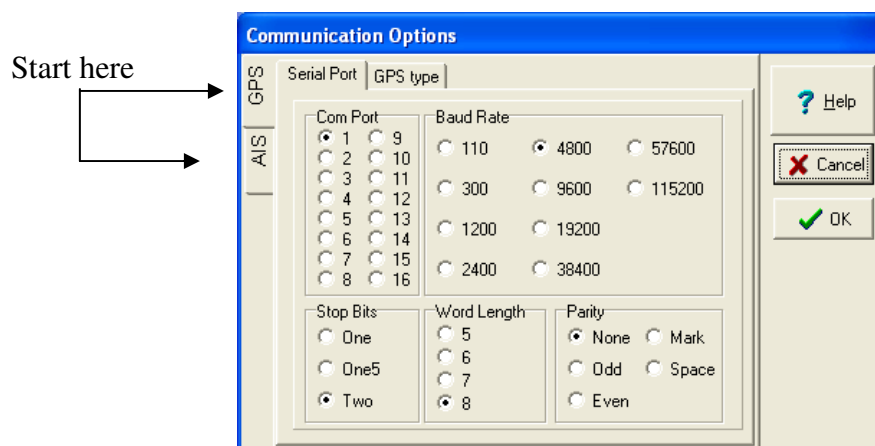
- Changing the working directory (be careful with this option)
- Changing the main chart directory (be careful with this option)
- Open the last project used
- Optimize for memory (in case JPEG loading is failing)
- Remove last downloaded set of GRIB files (default : not checked)

The **Open last project in use** feature is very handy. If selected the program automatically starts up with the last project used and if in this project a start up action has been specified the program automatically starts with the selected action. This could e.g. be starting the bitmap chart of the current project. If loading of very large JPEG charts fails the last option can be set in order to optimize for memory consumption. Normally this option is not needed. The **Internet updater** tab shows the location of the URL for files updates on the internet. Do not change this address unless you are instructed to do so. With the **automatic check for updates** a check for updates is performed during start up of the program. By default internet is checked for updates.

AIS & GPS connection

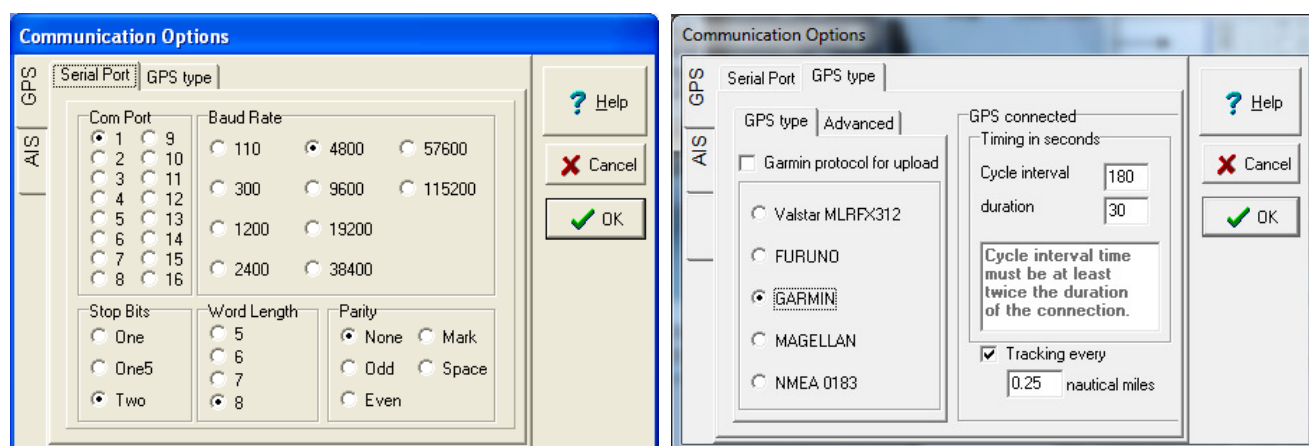
The FX312 program can be connected with a GPS and/or AIS device. The connection with the GPS is always discontinuous. The connection with the AIS device is continuous. If an AIS device is connected which repeats the GPS data and resends this via the serial link it may be treated as a GPS device and connected via the GPS link.

From the main menu the settings for the communication can be set under **Options → AIS & GPS connection**. The dialog screen which appears will look like:



For both the AIS and GPS two separate data sheets are implemented for additional settings like, **Serial Port** and **AIS or GPS type**. The **Advanced** tab under **GPS type** is not yet implemented.

The communication with the GPS-system can be changed depending on the brand of system used. For the Valstar MLR FX312 the following COM Port settings are the default.



From these settings, normally only the used COM port has to be changed. If the COM port number exceeds 16, the port can be set manually in the `GPSFX312.ini` file (`port=value-1`).

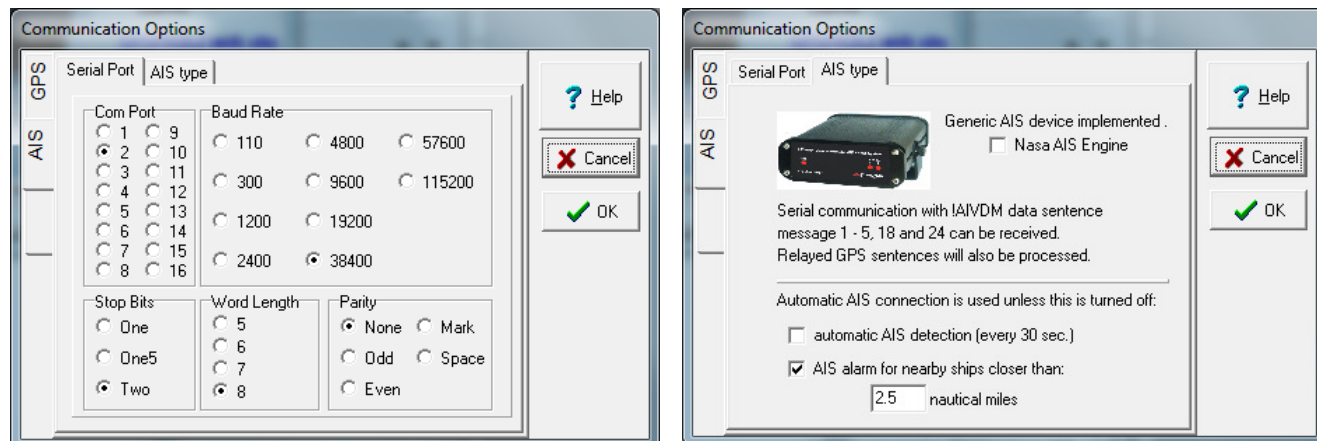
For generic NMEA or unknown GPS type select NMEA0183 on the **GPS** tab. In case of a GARMIN device the Garmin Protocol can be selected for uploading. The Baud Rate will automatically be adjusted to 9600 during uploading.

Every **cycle interval** the program is for a certain **duration** of time connected to the GPS. With the **Tracking** checkbox set, the actual position is stored in a track file with the specified minimum distances in nautical miles between tracked positions. The track of positions can be seen on the bitmap chart used by turning on the **View Trackpoints** when viewing the maps.

NOTE : Full functionality works only with the MLR FX312. For the FURUNO some functionality like uploading a Chart will not work. All generic NMEA sentences however, for obtaining the course, speed cross track error etc will work. Also the WPL command and the RTE command for Waypoints and Routes will work if proper NMEA0183 implementation has been used.

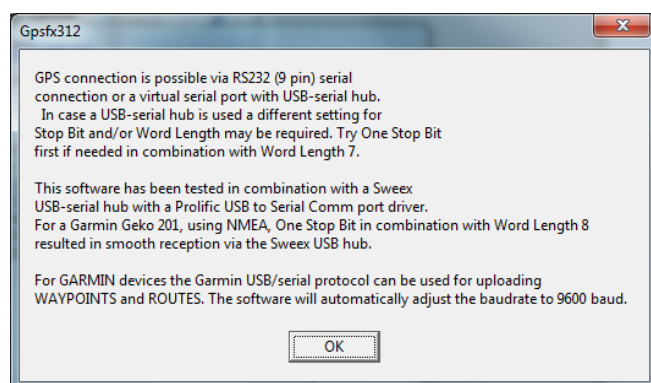
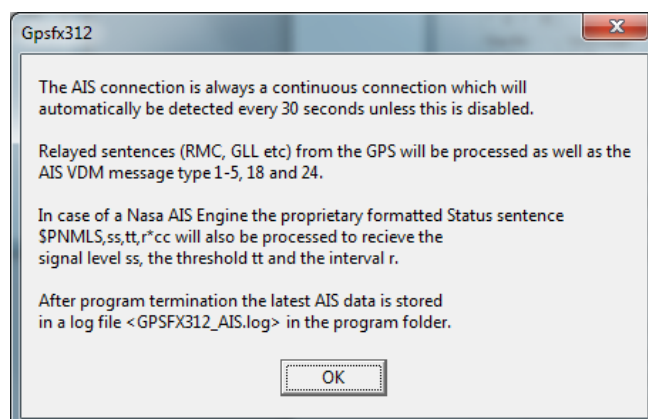
In case any functionality is not working, send the specific device details to j.w.welleman@hetnet.nl to improve the current program.

The communication with the AIS device can be set on the **AIS** tab.



The AIS device will be detected automatically unless this is turned off with the checkbox **automatic AIS detection**. Default the **AIS alarm** is turned on for ships closer than 2.5 nautical miles. On this tab sheet this data can be altered. If a **Nasa AIS Engine** is used the user can specify this with a checkbox.. The proprietary sentences of the Nasa AIS device will then also be available.

The software can handle two devices connected to different serial ports. The continuous AIS connection will process the !AIVDM data sentences send by the AIS device and relayed RMC sentences from a GPS connected via the AIS. The discontinuous GPS connection will process all implemented NMEA sentences and the !AIVDM sentence. In case both connections transmit the same AIS data, the software will handle this as single data without any problem as long as both devices are physically connected to different serial ports.



Hardware Connection to GPS

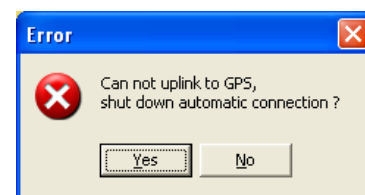
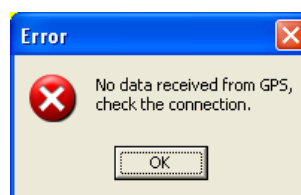
This program can be used in combination with a 9-pin RS232 serial connection to a GPS device or via a **USB-to-serial Com** hub. By pressing the **help** button more info about this connection type can be obtained.

Plotting GPS position data and AIS data on the current Map

When the **Connect GPS** button on the Map is pressed a dialog will be started. This dialog will be shown minimized in the lower left corner of the screen. When pressing on this dialog it will be shown as:

The dialog box has a title bar 'Position: Offline + waiting for auto connection' and a menu bar with 'Data', 'OnLine', 'Automatic', 'Simulate', and 'Help'. Below the menu bar, there are input fields for 'LAT', 'LON', 'course', and 'groundspeed', each followed by a yellow rectangular box. To the right of the 'LON' field is a checkbox labeled 'nav'. At the bottom right, there is a 'knots' label.

By default the program will wait for automatic connection. If no data is received from a connected GPS or if no GPS is connected the following error will be shown.



After this message the user will be asked if the automatic connection loop has to be aborted. If answered with **Yes** a future connection can be established by pressing the **OnLine** menu option.

The position screen can be extended by selecting the **nav** checkbox. The screen will then look like:

The dialog box is titled 'Position: Offline'. The 'nav' checkbox is checked. Below the input fields, there is a black box with yellow text showing tracking data:

From :	WP0001	To :	WP0002	UTC :	13:48:50
Arrival :	WP0002	At :	00:00:00		11-09-06
cross track error	0.01 nm	correction to	PORT	true bearing	??? °
				distance	?.? nm

The raw data from the GPS or AIS device can be viewed with the menu option **Data → Show GPS data**. Any data received will be shown in the white memo field at the bottom.

The valid GPS position and AIS data will be shown on the current Map. Track data will be logged (see section on Position Tracking) and AIS data will be kept *up to date* (see section on AIS data).

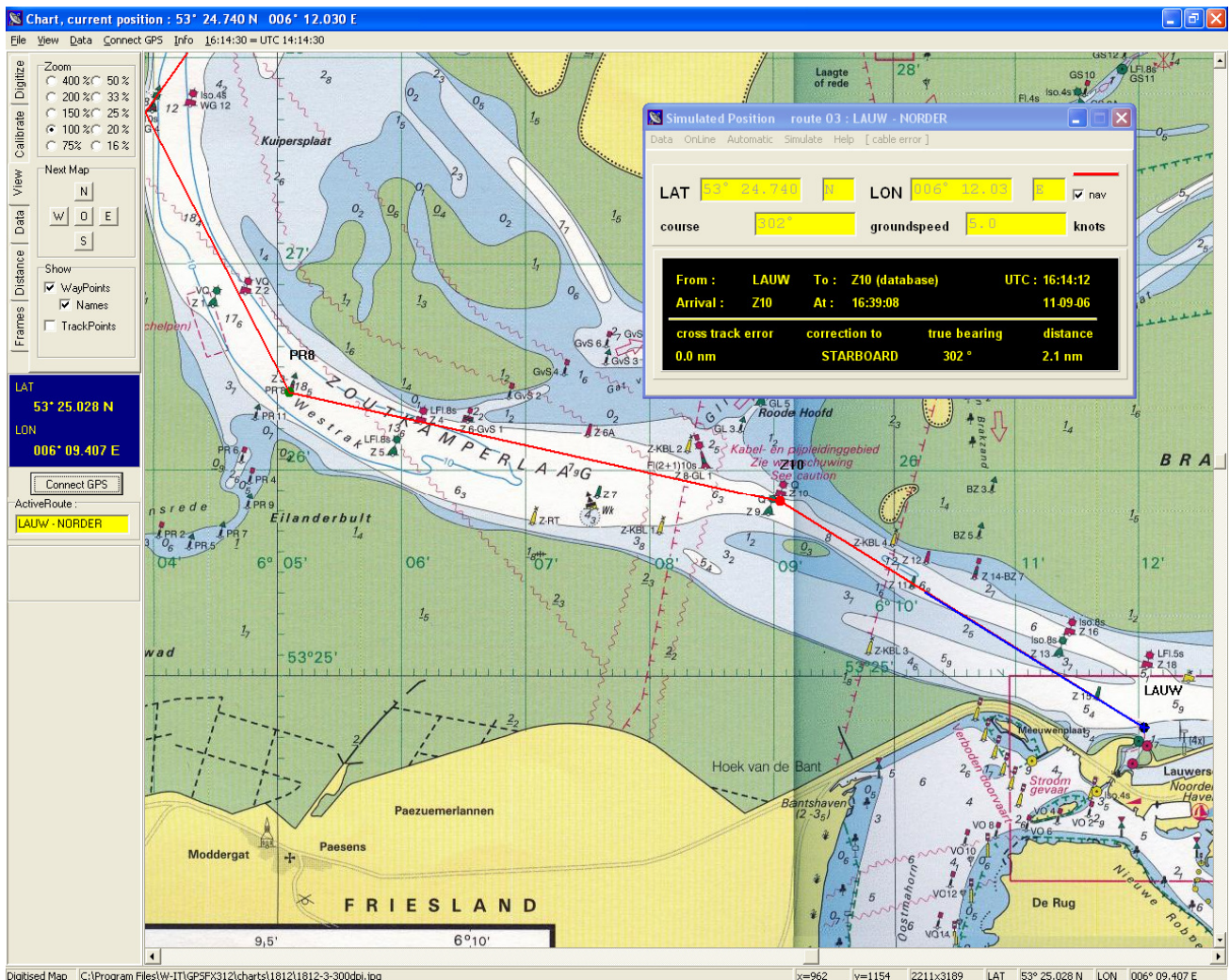
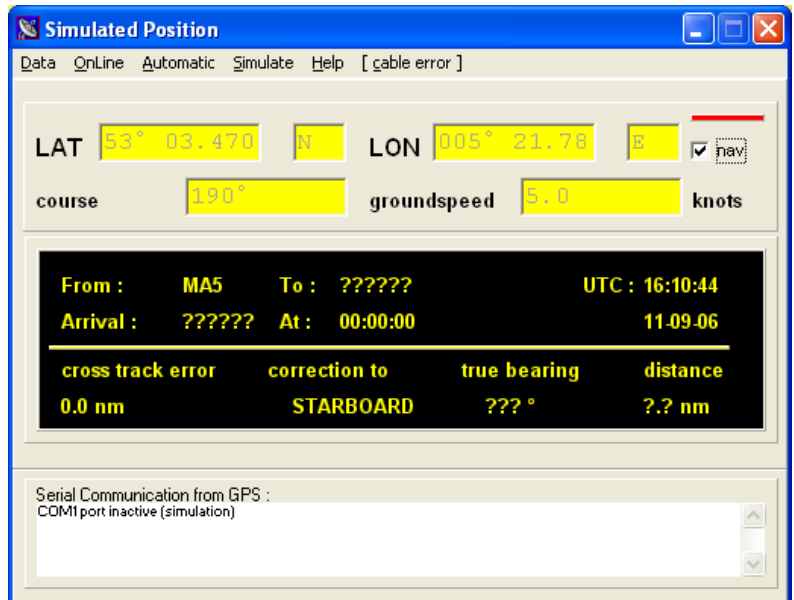
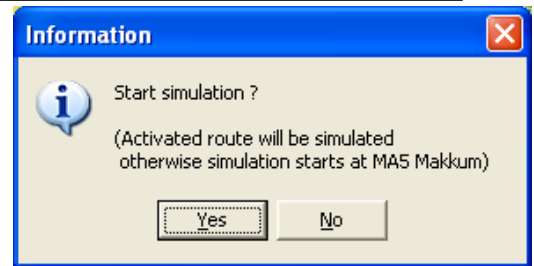
The dialog box is titled 'Position: Offline'. The 'nav' checkbox is checked. Below the tracking data table, there is a white memo field with the text: 'Serial Communication from GPS : COM1 port shut down'.

With the program a GPS simulation has been built in. By selecting **Simulate** from the menu the program will simulate a connected GPS.

By default this simulation starts at the green MA5 bouy near Makkum. If however an active route has been selected this route will be simulated. The vessel speed is set at 5.0 knots.

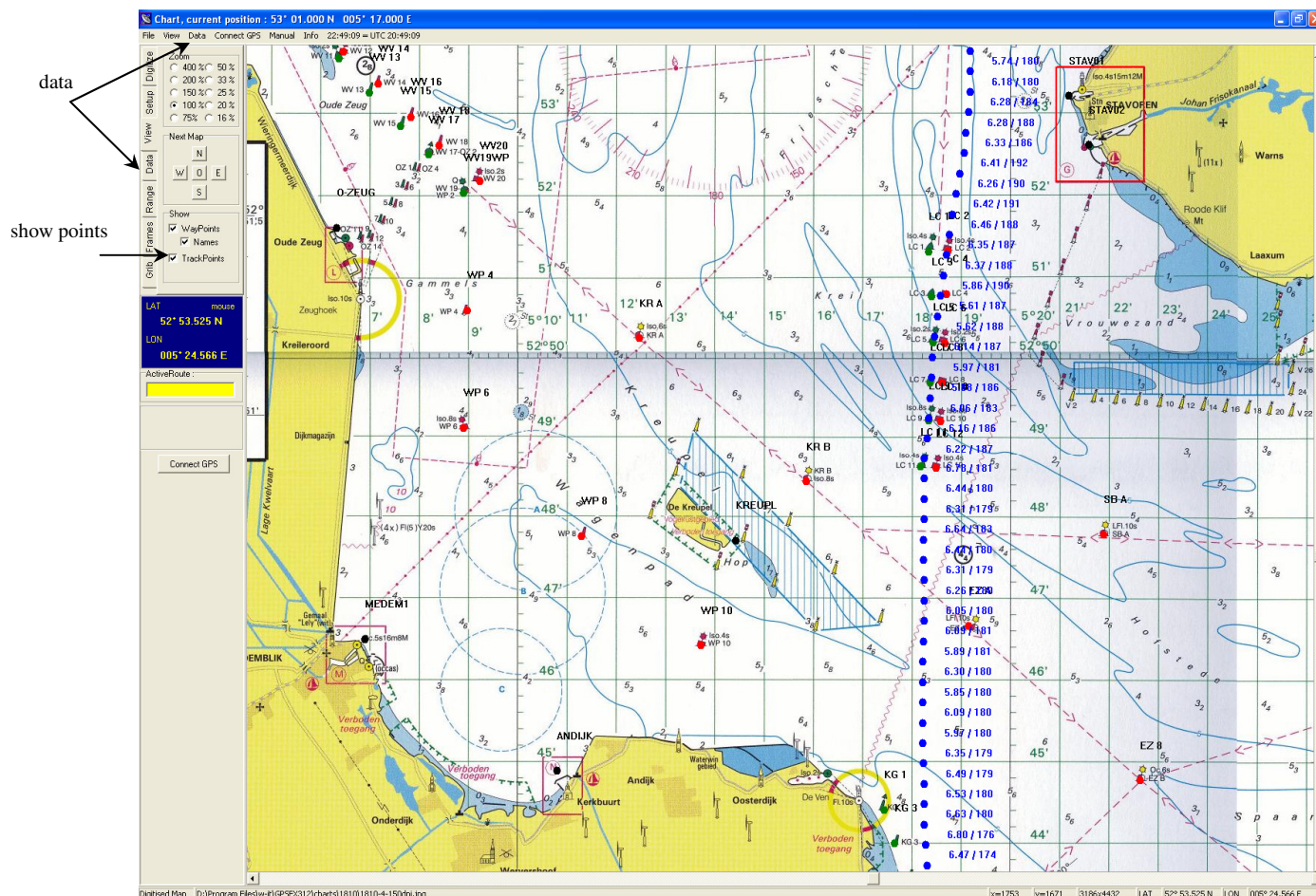
The right screen shows the default simulation started at the MA5 with a true course of 190 degrees and a speed of 5.0 knots.

The lower screen shows the simulation of a selected route 03 from Lauwersoog to Norderney. The current ship position is marked with a blue cross and the course and speed is visualised with the blue line indicating the ships position within 15 min. Each track will be simulated and at the end of the route the simulation stops.

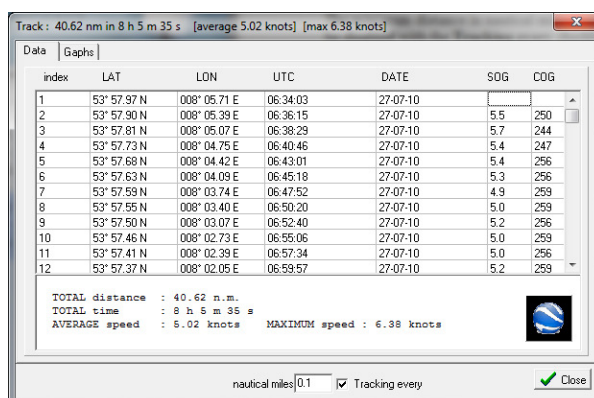
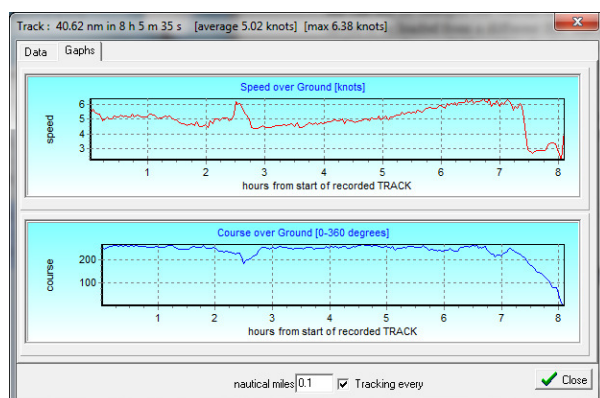


Position Tracking

With the GPSFX312 program the current ships position can be stored in a track. The track points can be displayed with the checkbox **Trackpoints** on top of the bitmap chart (use **View** panel). Apart from the position also **Speed and Course over Ground** are indicated in blue.



The track data can be viewed on the **Data** tab by using the **View Track Data** button or by using the menu option **Data and Map → TRACK data → Show current data**. Graphs will be shown. Track data can be found on the **Data** tab.



Other options within this menu are, **Save TRACK as ..**, **Load TRACK from ..** and **Clear TRACK data**. Current track data is always stored in the current project track file (*.TRC) and a GPX formatted file (*.GPX) in the database folder. The name of this file can not be changed but current data can be saved to or loaded from a different file.

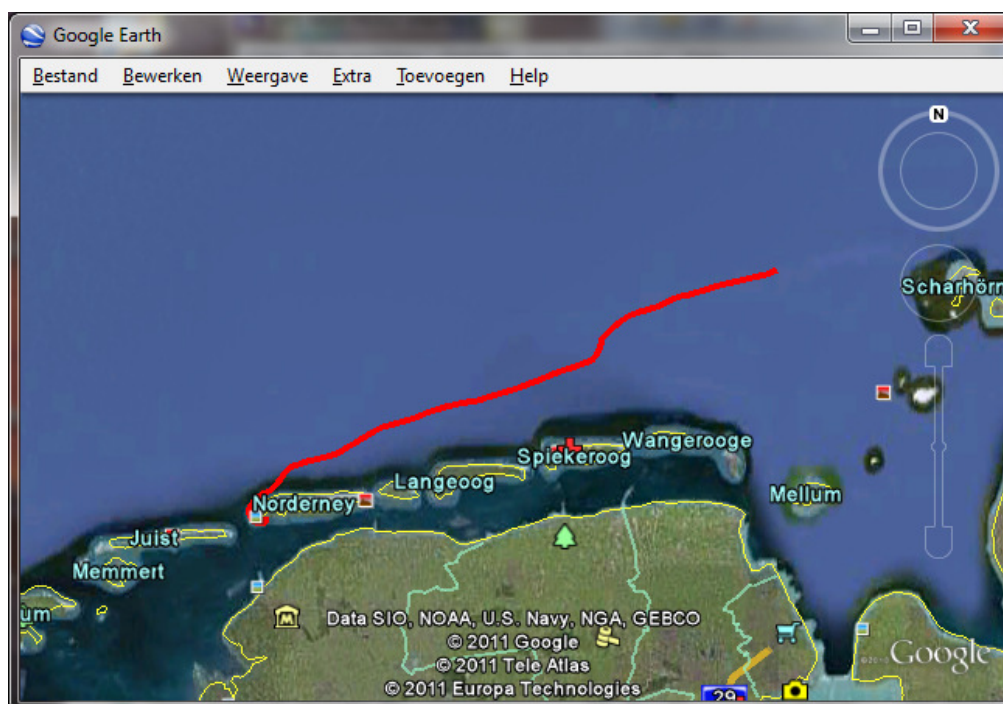
The same options are also available within the Line Based Map, the Main Program Menu and within the Project Options (page 29).

The minimum distance in nautical miles between stored points can be set and tracking can also be disabled with the **Tracking every** checkbox at the bottom of the dialog screen. If tracking is enabled at least every hour a position will be stored even if there is no ship movement. Track data can also be stored in a MySQL script file (*.sql) with the menu option **Data and Map → TRACK data → Export to a MySQL dump**. This file can be uploaded to a webserver using mysql.

If a TRACK is exported to a different file <newname>.TRC, a GPX formatted file <newname>.GPX will also be created. The GPX formatted file can be read in other GPS applications.

Viewing a TRACK in GOOGLE EARTH is supported in three ways:

- Press the GOOGLE EARTH logo on the **Data** tab, the total TRACK can be viewed.
- Select a specific DATE in the grid to view the TRACK data from a specific day
- Select a LAT/LON/UTC cell in the grid to view a specific point.



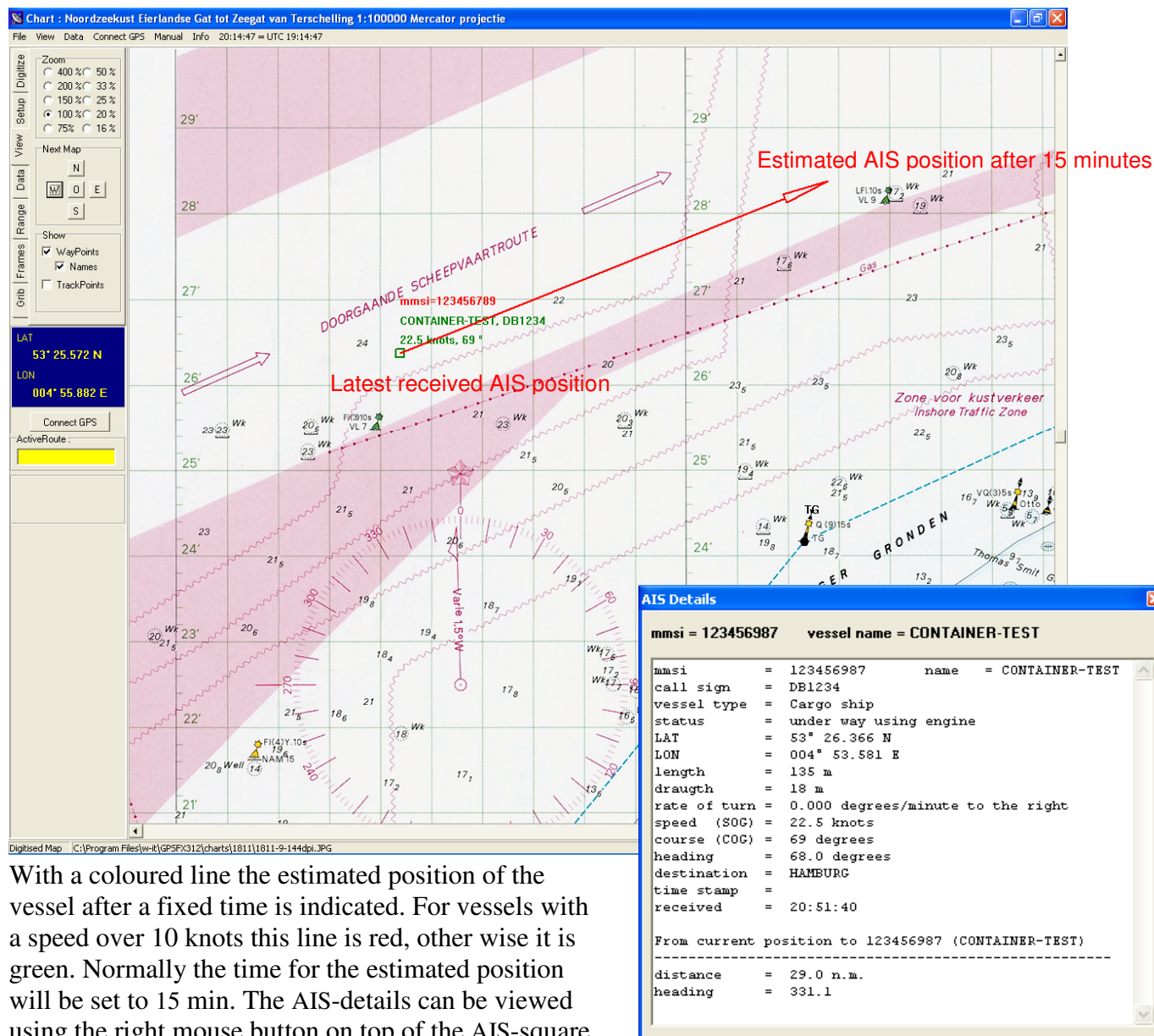
Loading a TRACK in GPX format is also supported with **Data and Map → TRACK data → Load TRACK from ...** either to add the TRACK or to overwrite existing TRACK data.

WAYPOINTS, ROUTES and TRACK can also be imported with the **Data and Map → Import/Export → Import data (ASCII or GPX)** menu option in the main program. Track segments in this total GPX file will be added to the existing TRACK since the GPSFX312 program only supports one list with TRACK data.

If the current TRACK data has to be saved, store the track with the **Data and Map → TRACK Data → Save TRACK as ..** menu option in the main program before importing or loading new data. The new data has to be stored with the menu option **Files → Save**. The data will then be written to the standard project TRACK file (*.TRC) and (*.GPX).

AIS data

The GPSFX312 program can also receive the AIS VDM messages when connected via a serial link to an AIS device. Messages of *type 1 – 5, 18 and 24* can be interpreted. Received data will be plotted to the current map and temporarily stored. Only the data of vessels which are “*alive*” is stored and shown with a green square on the current map.



With a coloured line the estimated position of the vessel after a fixed time is indicated. For vessels with a speed over 10 knots this line is red, otherwise it is green. Normally the time for the estimated position will be set to 15 min. The AIS-details can be viewed using the right mouse button on top of the AIS-square.

If the current ship's position is known the program will also calculate the distance and heading towards the selected AIS-vessel and ring an **AIS alarm** if ships are too nearby.

All received AIS-data can be shown by selecting **Data → AIS Data** from the menu. If within 15 minutes no AIS update has been received for a certain MMSI number this record will be removed (if the active map is shown).

NOTE : A change in communication setting may be needed in order to receive the AIS data sentences. See the AIS device for more details.

AIS

☒ AIS alarm for nearby ships (< 2.5 n.m.)

mmsi	name	LAT	LON	distance	heading
123456987	CONTAINER-TE	53° 26.366 N	004° 53.581 E	29.0	331.1
123456789	KOMPASROOS	53° 15.651 N	005° 16.177 E	14.7	358.1
001234567	NOORD HINDER	52° 00.084 N	002° 51.089 E	107.9	235.6
244391108	KEPITING	53° 03.089 N	005° 21.708 E	3.5	53.6

GPS position avail list update every 10 s LAT 53° 01.000 N LON 005° 17.000 E

The AIS data can be send to the GPSFX312 program via the GPS or the AIS link.

AIS via GPS connection

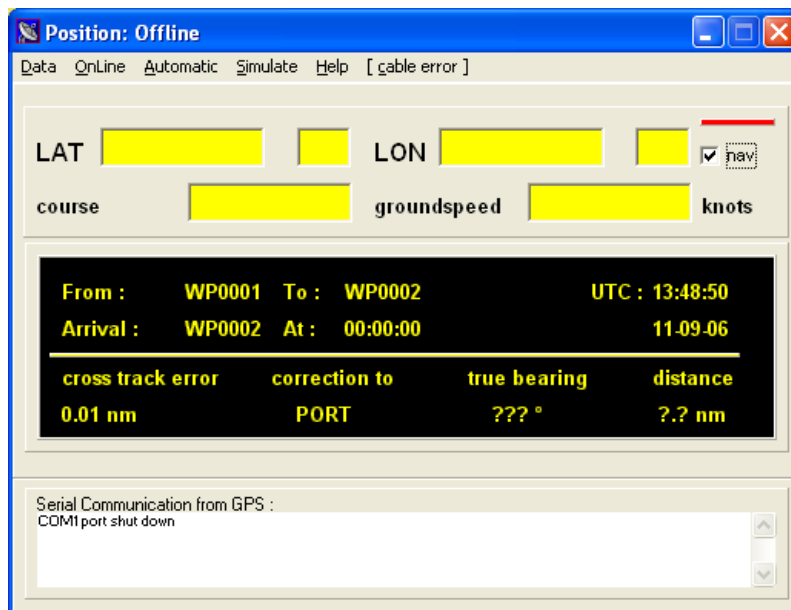
If a bitmap chart or a line based chart is activated, the received data from the GPS link can be viewed by pressing the button **Connect GPS** or the equivalent menu option. Within the **Position Form** the raw data can be shown by selecting **Data** → **Show GPS data** from its menu. All received data will be shown in the white memo field at the bottom as also described on previous pages. The GPS connection will process all implemented NMEA sentences.

AIS via AIS connection

If the AIS device is not connected as a GPS device, the raw data will be interpreted by the main AIS-engine. The raw data can be seen by showing the hidden AIS-data screen of the main program. Press the green on/off button in the picture of the MLR-FX312 on the screen and a white box will appear. If messages are being received from the AIS they will be shown in this screen. The main AIS-engine will process !AIVDM sentences with message *type 1-5, 18 and 24* and also interpret incoming RMC, GLL etc sentences from the AIS if the AIS is also connected to a GPS. In this situation a separate GPS connection is not required. The current ships position will be taken from the AIS data and plotted on the map.

Click with the left mouse button on the white screen to store AIS-messages to the clipboard.

To hide the communication data, press the green on/off button again in the MLR-FX312 picture.



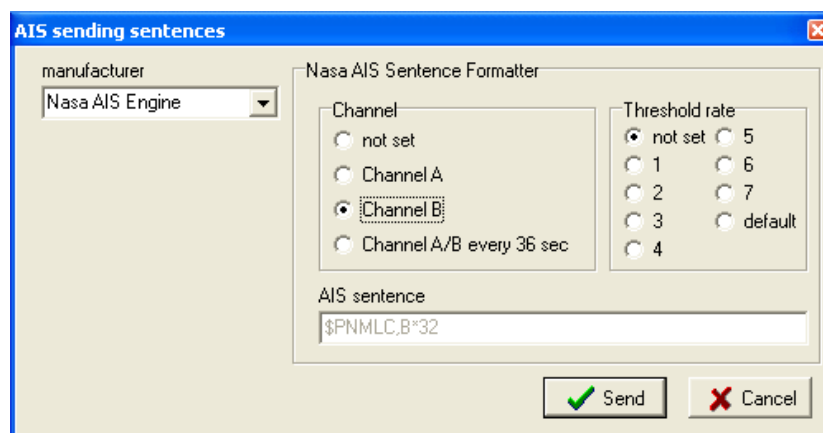
In case the AIS device is a **Nasa AIS Engine**, the program will also interpret the proprietary sentences send by the AIS. The Nasa STATUS sentence \$PNMLS will result in a status text which will be shown in the footer panel behind AIS status: . The text will show the signal level [0..63], the threshold setting and the interval setting (in seconds) between the automatic reductions of the threshold.

Programming the AIS

If a **Nasa Engine** is attached to the AIS connection of the GPSFX312 program, the following data sentences can also be send to the AIS device:

- Channel setting
- Threshold setting

To send correct sentences a simple interface is available. If the user clicks with the right mouse button on the white AIS communication screen the following user interface will be shown.



At this moment only the **Nasa AIS Engine** has been implemented for sending data which gives excellent results. Either a Channel or a Threshold setting can be selected. The correct sentence will then be shown in the white AIS sentence bar. If the **Send** button is pressed the sentence will be send to the AIS device and the form with the user interface will be closed.

Sentence details:

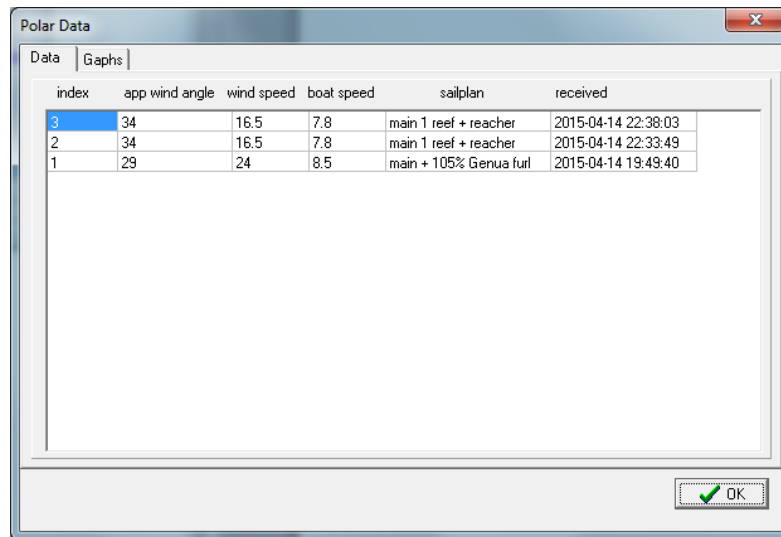
Channel	A	:	\$PNMLC,A*31	
	B	:	\$PNMLC,B*32	
	A/B	:	\$PNMLC,S*23	(checksum error in Nasa documentation)
Threshold	0	:	\$PNMLT,0*57	(default, 3 seconds)
	1	:	\$PNMLT,1*56	
	2	:	\$PNMLT,2*55	
	3	:	\$PNMLT,3*54	
	4	:	\$PNMLT,4*53	
	5	:	\$PNMLT,5*52	
	6	:	\$PNMLT,6*51	
	7	:	\$PNMLT,7*50	

The details have been taken from the **Nasa AIS Engine** specifications. In this documentation however the checksum of the sentence `PNMLC, S` for alternating between channel A and B is wrong. The correct checksum is 23 as specified above.

Please send documentation for other AIS-devices to the author of this program to extend the program features.

POLAR data

With the **Data and Map → POLAR Data** the stored data for a polar diagram can be viewed. At this moment only the stored entries of boat, wind and sail conditions can be listed.

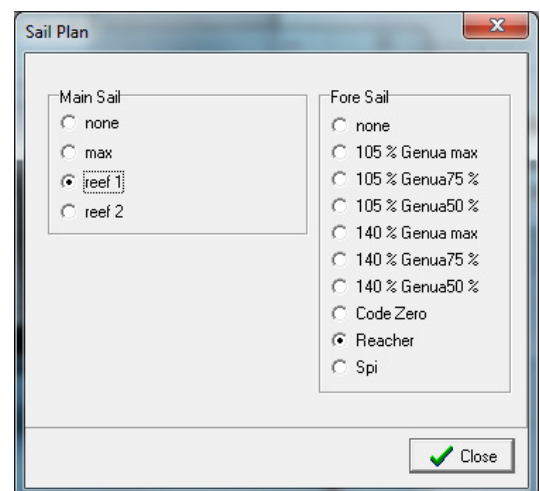


index	app wind angle	wind speed	boat speed	sailplan	received
3	34	16.5	7.8	main 1 reef + reacher	2015-04-14 22:38:03
2	34	16.5	7.8	main 1 reef + reacher	2015-04-14 22:33:49
1	29	24	8.5	main + 105% Genua furl	2015-04-14 19:49:40

The **Graphs** tab is not yet implemented but in future versions on this tab the polar diagram can be viewed. Entries to the polar data can be made with the **Add POLAR data** option which can be activated if a map is used by clicking the right mouse button. This option is only available if the following data is present:

- Sailplan data
- GPS data (NMEA)
- WIND data (NMEA)

The Sailplan data can be specified with the **Data and Map → SAIL plan** option. A dialog will be shown to specify the current sailplan. When a map is active the sailplan option can be found in the map menu as is shown below. The NMEA data can be obtained from a connected GPS or SERVER.



Sail Plan

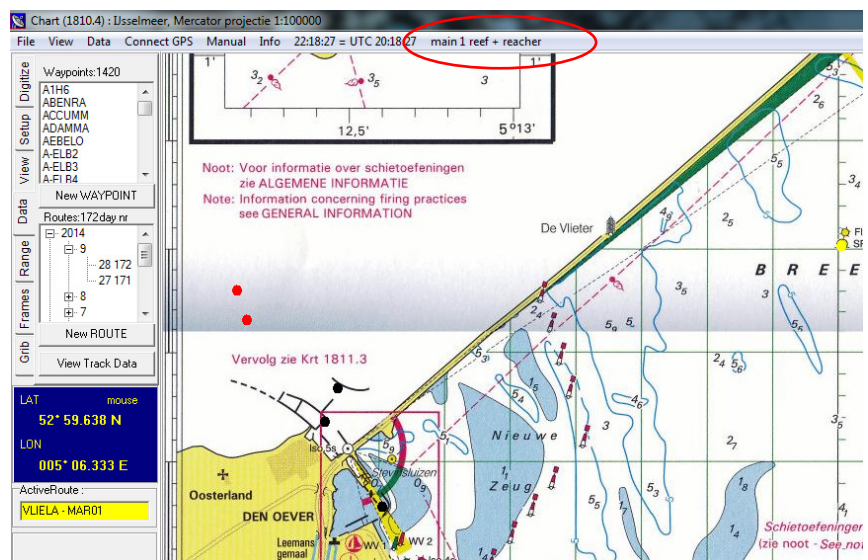
Main Sail:

- ☐ none
- ☐ max
- ☒ reef 1
- ☐ reef 2

Fore Sail:

- ☐ none
- ☐ 105 % Genua max
- ☐ 105 % Genua75 %
- ☐ 105 % Genua50 %
- ☐ 140 % Genua max
- ☐ 140 % Genua75 %
- ☐ 140 % Genua50 %
- ☐ Code Zero
- ☒ Reacher
- ☐ Spi

Close



Alarm function

With the **Options** → **Set Alarm** the program can alert with an audio alarm in combination with the auto-start of applications. So far the user can specify three alarms which can be set.

The fields can be changed by a double mouse click. With the **daily** mark the alarm can be set daily. The alarm can be activated with the **activated** mark.

This alarm function can also be set from the Map form. With a click on the current time and UTC time in the menu bar of this form the alarm function can be set.



Integrated Logbook

The shareware version of this program does not permit the use of this function.

The GPSFX312 program is also fitted with a fully integrated logbook. This ships log is also integrated with a web server which will show the ships log live on the internet using php-scripts. All data from the GPSFX312 program can be uploaded to the web server based on implemented MySQL database facilities.

With the menu option **Data and Map → Ships Log → Show local data** the digital ships log will be shown.

Ships Log : 25 jul 2010, from Brunsbittel to Cuxhaven

date: 2010-07-25 From: Brunsbittel To: Cuxhaven

standard tidal port: HW 0:00:00

sun + 0:00:00

sun - 0:00:00

note: Het tij is of hee vroeg of begin van de middag. Het waait in de ochtend nog stevig maar de wind neemt wat af. Ruim een half uur voor de sluis liggen draaien met de neus in de wind. We moeten op de motor tegen de wind in. De Elbe stroomt nog niet hard als we vertrekken en we kunnen flink doorstromen. Dichter onder de wal bij Cuxhaven geen last meer van de tijd-golven. Redelijk wat scheepvaart, twee supergrote containerschepen. Cuxhaven ligt behoorlijk vol na een paar dagen met flinke wind. Totaal 17,5 mijl vandaag. Bij aankomst diesel getankt [27 liter].

weather: NW-W 5 tot 4 afnemend. Mogelijk regen.

food supplies and diner

Used Routes: 24 BRNSBH - CUXHAV Show

Cuxhaven jachthaven

Day Notes

Close

The ships log is organised per day. Notes of each day are collected on a separate tab.

Ships Log : 25 jul 2010, from Brunsbittel to Cuxhaven

time	type	note	position	baro meter	main sail	fore sail	wind Bf	*	tide knots	boot depth	knots	heading	log
14:00:00	depart	Brunsbittel jachthaven, naar de sluis	BRNSBH	0	0	0	0.0	0	0.0	0	0.0	0	563.0
14:50:00	depart	uit de sluis	BRUNSB	0	0	0	0.0	0	0.0	0	0.0	5.5	563.5
17:45:00	arrival	Cuxhaven jachthaven afgemeerd	CUXHAV	0	0	0	0.0	0	0.0	0	0.0	0	580.5

Scheepvaart op de Elbe bij Cuxhaven

Day Notes

Close

ROUTES, WAYPOINTS and TRACKS are integrated in this ships log and can be accessed directly by selecting the **position** field or a route in the **Used Routes** list or pressing the Google Earth logo. All photos and videos used should be placed in the media folder structure in the database folder of the program. The media folder structure is yyyy → mm → photo[s].jpg or movie.mp4.

The ships log is kept local as if it were a written log. Each day with its own entry and with relevant notes during the day. Each log entry can also contain pictures and movies as can be seen on the previous page.

If an internet connection is available the ships log can be uploaded to the web server. In order to obtain a fully compatible web based log the WAYPOINTS, ROUTES and TRACK of the GPSFX312 program should also be send to the web server. The web pages on the web server are using PHP and MySQL to retrieve the log pages and show them as a proper web page. An example in Dutch is shown below.

The image displays two screenshots of the GPSFX312 web interface. The left screenshot shows a detailed log entry for a voyage from 2010-07-15, including a table of fuel consumption and a photograph of a coastal scene. The right screenshot shows a 'DETAILS ROUTE 17 van 2010-07-15' page with a table of waypoints and a map view showing the route on a satellite map.

DETAILS ROUTE 17 van 2010-07-15

nr	Waypoint	LAT [°N]	LONG [°E]	Omschrijving	koers [graden]	afstand [mijlen]	totaal [mijlen]	tijd
1	KLINHL	54°56.874' N	012°12.874' E	KLINTHOLM HAVEN	-	-	-	-
2	WP352	54°58.818' N	012°12.148' E	FICTIEF MON	127	2.46	2.46	11:14
3	WP351	54°57.470' N	012°14.889' E	MON FICTIEF WAYPOINT	46	2.83	5.29	11:48
4	WP465	54°54.889' N	012°13.854' E	VERK RODVIG	339	17.84	23.13	15:22
5	RODVIG	54°52.841' N	012°12.412' E	HAVEN RODVIG	323	1.19	24.32	15:36

Gepland vertek om 10:45 uur
Geplande aankomst om 15:36 uur
Totaal afstand 24.32 mijl
Aangehouden snelheid 5.00 knopen
Registreerd door Hans GPSFX312 van boord K&B70210

logboeknotities:

boordtijd	notitie	opmerking	LAT/ON [°S °E °W]	barometer [hPa]	groot zeil	voort zeil	wind [Bf]	richting [graden]	stroom [knopen]	richting [graden]	diepte [meters]	lucht [knopen]	koers [graden]	log [mijlen]
10:40:00	vertrek	Klinterholma maritiem los van de stager	-	-	-	-	4.5	130	0.0	0	0.0	4.0	0	350.50
10:50:00	aankomst	Klinterholma, buiten de haven op zeil	54°58.818' N	-	max	highaspect	0.0	0	0.0	0	0.0	6.0	0	351.00
11:50:00	aankomst	Man's klinter	54°57.470' N	-	max	highaspect	5.0	110	0.0	0	13.0	7.5	340	357.00
15:30:00	aankomst	Rodvig, afgemeerd in Fiskerihaven	54°52.841' N	-	-	-	0.0	0	0.0	0	0.0	0.0	0	376.00

gebruikte routes:

- route 17, gepland vertek: 10:45:00

2010-07-15 Rodvig

Blijven liggen en met de trein naar Kopenhagen. Eerst met de lokale boemel naar Køge en dan met de metro naar Kopenhagen Centraal Station (aankomst 10:00 uur). Binnenstad helemaal bekeken en lunch in het park bij de Giftingspringvandet (fontein). De zonnemin is uitgeteld aan Shanghai, via het kastellet (is nog een kazeme) terug naar de stad. Met de veerboot naar Christianshavn en Christiania, wat een heerlijke rommel! Met de diepe nieuwe metrolinje een stralje terug naar het centrum. Lange dag in een prachtige maar snikhete stad.

water SB water SB diesel gas petroleum startacc gebruikaccu motoruren
max 1.2 48.0 1.4 max max max 0.00

weerbeeld:
Heet, 34 graden en onbewolkt met gelukkig wat wind.

eten:
Lunch in Kopenhagen, avondeten op de boot.

2010-07-17 Rodvig

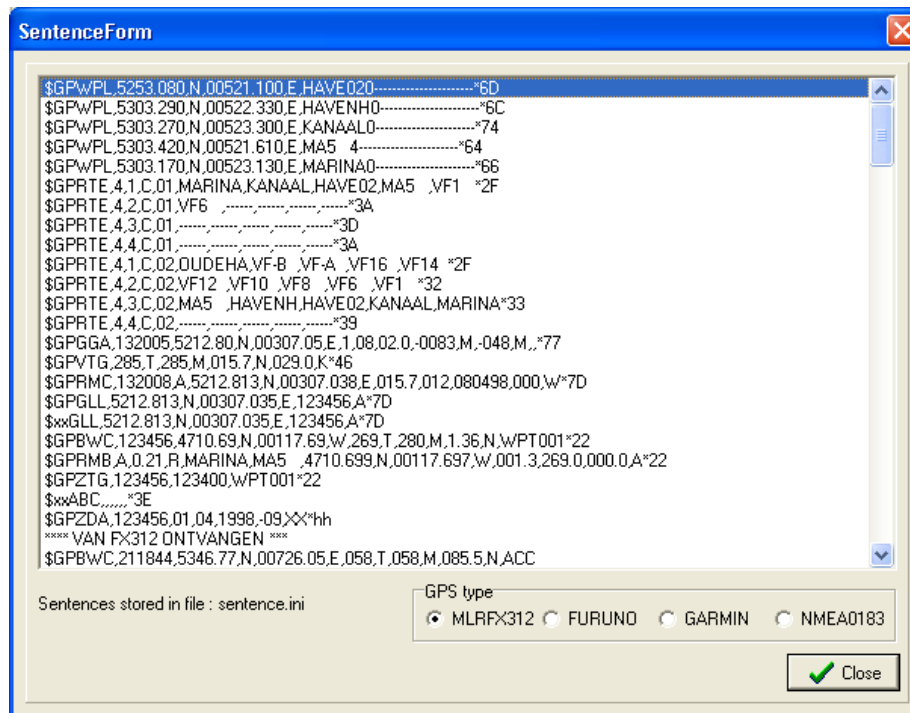
Op zeil naar Steen. Vanaf de ankerplaats bij het boei van de Baneboom varen we op motor. Thuis na een paar uur. Vanaf de ankerplaats Steen is...

All available ROUTE, WAYPOINT and TRACK data is fully integrated with GOOGLE MAPS as is shown in the example on this page.

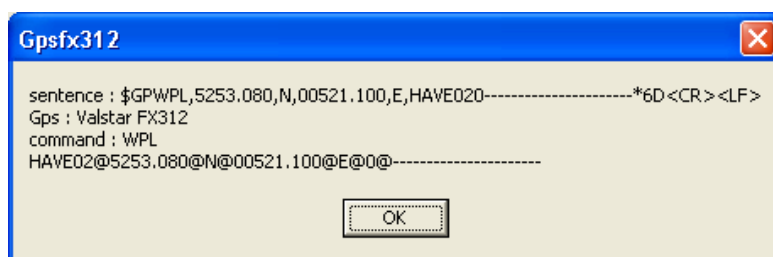
The scripts for the ships log and the set up of the database is not included in the shareware distribution of this program.

Test received sentences

The received sentences can be copied from the communication fields to the clipboard and stored in a `sentence.ini` file. The commands from this file can be tested with the option **Options** → **Test Sentences**. The file `sentence.ini` must be placed in the program root directory where the program `GPSFX312.EXE` itself is stored. If no file exists the program will create one.



The GPS type can be changed with the radio buttons. The stored sentences for this GPS type will then be loaded from the `sentence.ini` file. By clicking on a certain sentence the line is interpreted. A correct interpretation will result in:



If a sentence can not be interpreted, please send an e-mail to the developer for further improvement of the program. The `sentence.ini` file syntax is shown below:

```
[MLRFX312]
$GPWPL,5253.080,N,00521.100,E,HAVE020-----*6D
$GPRMB,A,0.00,L,-WPT,ANDI,5244.834,N,00510.852,E,019.8,202.0,00.00,V*49

[GARMIN]

[FURUNO]
$GPBWC,150101,5303.000,N,00520.660,E,263,T,264,M,1.51,N,VF1VF4

[NMEA0183]
$GPWPL,5253.0800,N,00521.1000,E,HAVE020-----*6D
```

APPENDIX

In this appendix some details will be specified.

Installation

The Installer will install the GPSFX312 program directory tree under [PROGRAM FILES]\W-IT on the hard drive. An example is shown in the figure to the right.



In the GPSFX312 directory three subdirectories will exist :

- Database contains the *.GPR and *.DXF project files and the *.TRC track files
- Charts contains the *.BMP, *.JPG, *.WMF or *.EMF charts
- GRIBDATA contains the downloaded and unpacked *.grb GRIB files from internet.

In these directories all project files and charts will be stored. Within the main program directory GPSFX312 the map initialisation file `maps.ini` will be placed. This file contains all the data concerning the available maps. A general initialisation regarding GPSFX312 is either placed in the `win.ini` file in the WINDOWS directory of your system or in the `GPSFX312.ini` file in the programs root directory. The entry in this ini-file could look like :

```
[FX312]
mem=1
gps=1
port=1
test=0          { default test=0, when 1 program runs in TESTMODE }
baud=4
parity=0
databits=8
stopbits=2
autoupdate=1
workingdir=C:\Program Files\W-IT\GPSFX312\database\
chartdir=C:\Program Files\W-IT\GPSFX312\charts\
openlastproject=1
lastproject=C:\Program Files\W-IT\GPSFX312\database\april-mei-2003.GPR
simulation_startname=MA 5
simulation_startLAT=5303.443
simulation_startNS=N
simulation_startLON=00521.712
simulation_startEW=E
simulation_speed=5
simulation_course=190
uploadMaxWP=500
uploadMaxRoute=20
MaxWPperRoute=50
```

The last three entries limits the number of Waypoints/Routes to be uploaded to the GPS and the number of Waypoints per Route. Check the specs of your device for the correct settings. Installation of data/charts in a different location is of course possible if all the links are adjusted in the mentioned ini-files. GRIB, WINDFARM, RIGS and POLAR DATA can not be moved.

Mark and un-mark options for upload to GPS or export to file

By pressing the right mouse button on an empty spot on the map a popup menu appears with a number of options. One of these options contains a sub menu with **Mark/un-mark for upload to GPS or export**.

Mark/un-mark ...	→	Mark ALL Waypoints for upload to GPS or export UN-Mark ALL Waypoints for upload to GPS or export Mark VISIBLE Waypoints for upload to GPS or export UN-Mark VISIBLE Waypoints for upload to GPS or export
-------------------------	---	--

With this option WAYPOINTS can be selected or deselected to be uploaded to the GPS or export to file. The uploading or exporting of the WAYPOINTS should be started from the main menu.

Mark ALL	All WAYPOINTS in the database will be marked for upload to the GPS device or export to ASCII file.
UN-Mark ALL	All WAYPOINTS in the database will be un-marked for upload to the GPS device or export to ASCII file.
Mark VISIBLE	All VISIBLE WAYPOINTS on the current map will be marked for upload to the GPS device or export to ASCII file.
UN-Mark VISIBLE	All VISIBLE WAYPOINTS on the current map will be un-marked for upload to the GPS device or export to ASCII file.

The view options within bitmap maps

By pressing the right mouse button on an empty spot on the map a popup menu appears with a number of options. One of these options contains a sub menu with **view options**.

View	→	Waypoints Track points Hide names GRIB data Estimated position
		Estimated position → <div> off 15 minutes < 30 minutes 45 minutes 60 minutes </div>

Waypoint	enable or disable the view of Waypoints
Track points	enable or disable the view of Track points
Hide names	hide the names of the waypoints
GRIB data	shows wind forecast from downloaded GRIB files
Estimated position	use vector for estimated position after 15/30/45/60 minutes
<	indicator which setting is active

Map data within maps.ini initialization file

All data related to bitmap scanned nautical charts are stored within one single file `maps.ini`. This file should normally not be altered by hand. Sometimes however is quite useful to be able to interfere in this file when data becomes corrupted. The details concerning the data can be found here. A typical **mapdata** record stored in `maps.ini` is shown below:

Field	Example
map tag	[1801.1-150dpi.jpg]
file name	MapName=1801\1801.1-150dpi.jpg
map set	Mapset=Noordzeekust 1801
description	Description=Overzichtskaart Noordzeekust - De Panne tot Den Helder
add note	Note=
chart label	ChartLabel=1801.1
year	PublicationYear=2005
revision	RevisionDate=n.v.t.
chart datum	ChartDatum=WGS 84
link to	OverSailorMap=
link to	NorthMap=
link to	SouthMap=
link to	WestMap=
link to	EastMap=
pixel size	xpixels=2188 ypixels=3164
x-origin	x0=2.34136310223267
x-scale	xscale=0.00117508813160987
y-origin	y0=53.1877022653722
y-scale	yscale=0.000719165767709457
zoom 1..4	zoomindex=4
v-scroll	vs=2601
h-scroll	hs=2180
frame 1	subframe1=255@1801\1801.9-150dpi.jpg@5253.657@N@00419.847@E@5226.602@N@00444.242@E
frame 2	subframe2=255@1801\1801.8-150dpi.jpg@5230.399@N@00402.785@E@5212.362@N@00447.274@E
etc	...

If the yellow marked fields are removed the map can be recalibrated. Make sure a backup is made of the file `maps.ini` before changes are made by hand.

The **subframe** data contains data in one line:

```
SubFrameX=color@filename@UL-LAT@N/S@UL-LON@E/W@LR-LAT@N/S@LR-LON@E/W.
```

Integer	SubFrameX	frame numbers (unsorted)
Integer	color	colour number 255=red
String	filename	including the path starting from the chartdirectory
Double	UL-LAT	upper left corner LAT in decimal degrees [xx.yyy]
Char	N or S	N=northS=south
Double	UL-LON	upper left corner LON in decimal degrees [xxx.yyy]
Char	N or S	N=northS=south
Double	LR-LAT	lower right corner LAT in decimal degrees [xx.yyy]
Char	N or S	N=northS=south
Double	LR-LON	lower right corner LON in decimal degrees [xxx.yyy]
Char	N or S	N=northS=south

IO Files and Rig and Wind Farm data

The GPSFX312 program uses the following file extension for I/O. In this appendix a short summary is given of all files and their purpose :

GPSFX312.INI	Main program initialisation file	(GPSFX312 format)
GPSFX312.KML	Temporary Google Earth Route file	(KML format)
TRACK.KML	Temporary Google Earth Track file	(KML format)
GPSFX312_polar.DAT	POLAR data file	(GPSFX312 format)
GPSFX312_GRIB.INI	GRIB initialisation file	(GPSFX312 format)
GPSFX312_GRIB.DAT	GRIB data file	(GPSFX312 format)
<filename>.GRB	GRIB file from internet	(GRIB format)
ERROR.TXT	Error file from WinGrib	(ASCII format)
GPSFX312_AIS.LOG	AIS log file	(GPSFX312 format)
MAPS.INI	Nautical Charts database	(GPSFX312 format)
MANUAL GPSFX312.pdf	Users manual	(PDF format)
RIGS.CHT	Employed rigs in the North Sea	(GPSFX312 format)
WINDFARM.CHT	Operational wind farms	(GPSFX312 format)
<projectname>.GPR	Project, general data	(GPSFX312 format)
<projectname>.DFX	Project, Waypoints and Routes	(GPSFX312 format)
<projectname>.TRC	Project, current TRACK	(GPSFX312 format)
<projectname>.GPX	Project, current TRACK	(GPX format)
<projectname>.SPL	Project, Ships Log Book data	(GPSFX312 format)
<filename>.CHT	Simple Line based map	(GPSFX312 format)
Digitize.CHT	Output from map digitalisation	(GPSFX312 format)
Sentence.ini	NMEA test sentences	(GPSFX312 format)
AISALARM.WAV	AIS alarm sound file	(standard wav)
FX312.WAV	Alarm sound file	(standard wav)
<filename>.TXT	Export of Waypoints and Routes	(GPSFX312 format)
<filename>.GPX	Export of Waypoints, Routes, Track	(GPX format)
<filename>.sql	MySQL dump of Waypoints and Routes	(MYSQL format)
<filename>.sql	MySQL dump of Track data	(MYSQL format)
logbook_<yyyymmdd>.sql	MySQL dump of ships log day data	(MYSQL format)
notes_<yyyymmdd>.sql	MySQL dump of ships log notes data	(MYSQL format)

The user can modify the two files with **oil rigs** and **wind farms**. Both files use the same data models as is being used for WAYPOINTS and ROUTES. Wind farms are constant under construction. From the notices to Mariners actual data can be retrieved. To add this data on top of all charts use the windfarm.cht file. In this file the chart points and boundaries of the wind farms are stored. An example is given below. If modified do specify the correct number of points and the number of wind farms behind the [CHARTPOINTS] and [CHARTLINES] keys.

```
[CHARTPOINTS] 18
1  "5237.854" "N" "00421.797" "E" "" "0" "P1 EGMOND" -1 0 0 0
2  "5237.672" "N" "00421.617" "E" "" "0" "P2 EGMOND" -1 0 0 0
3  "5237.389" "N" "00421.827" "E" "" "0" "P3 EGMOND" -1 0 0 0
4  "5234.479" "N" "00425.972" "E" "" "0" "P4 EGMOND" -1 0 0 0
5  "5234.698" "N" "00427.324" "E" "" "0" "P5 EGMOND" -1 0 0 0
6  "5236.194" "N" "00428.060" "E" "" "0" "P6 EGMOND" -1 0 0 0
7  "5237.991" "N" "00425.702" "E" "" "0" "P7 EGMOND" -1 0 0 0
8  "5238.164" "N" "00425.176" "E" "" "0" "P8 EGMOND" -1 0 0 0
9  "5237.243" "N" "00423.254" "E" "" "0" "P9 EGMOND" -1 0 0 0
10 "5237.881" "N" "00422.248" "E" "" "0" "P10 EGMOND" -1 0 0 0
11 "5237.881" "N" "00422.248" "E" "" "0" "P11 EGMOND" -1 0 0 0
12 "5128.290" "N" "00138.070" "E" "" "0" "P1 THANET" -1 0 0 0
13 "5126.890" "N" "00140.440" "E" "" "0" "P2 THANET" -1 0 0 0
14 "5124.800" "N" "00141.880" "E" "" "0" "P3 THANET" -1 0 0 0
15 "5123.770" "N" "00140.820" "E" "" "0" "P4 THANET" -1 0 0 0
16 "5124.330" "N" "00137.120" "E" "" "0" "P5 THANET" -1 0 0 0
17 "5126.580" "N" "00134.170" "E" "" "0" "P6 THANET" -1 0 0 0
18 "5127.650" "N" "00136.070" "E" "" "0" "P7 THANET" -1 0 0 0

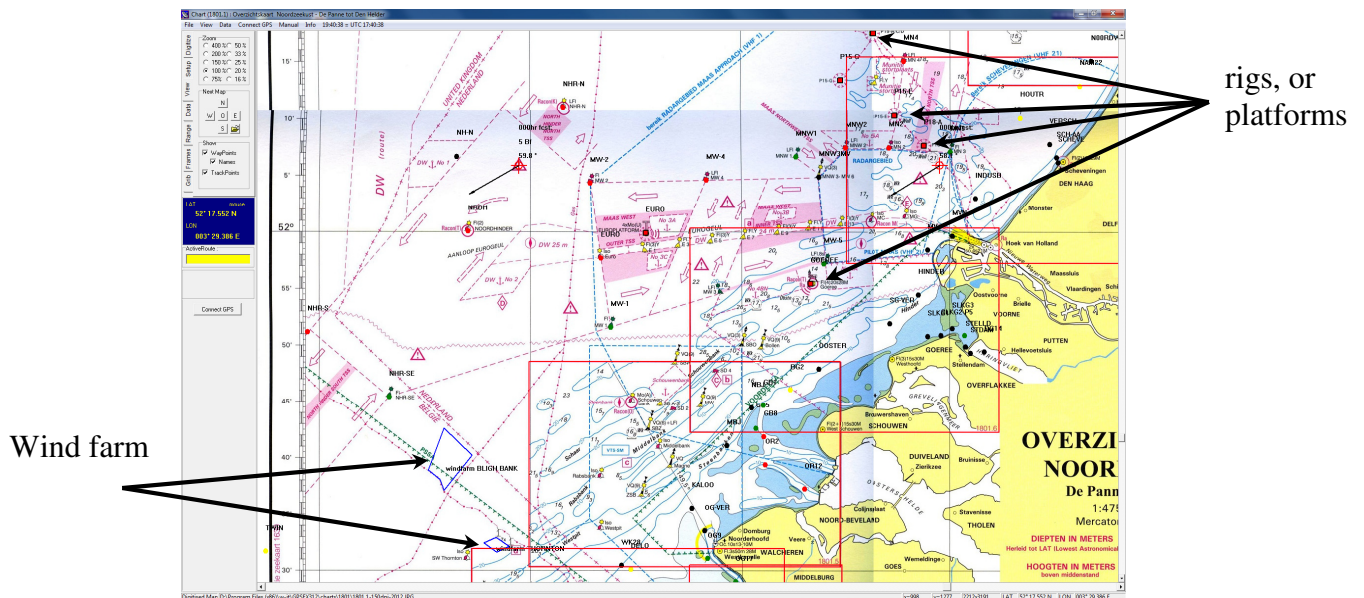
[CHARTLINES] 2
1 "EGMOND" 11 1 1 2 2 3 3 4 4 5 5 6 6
7 7 8 8 9 9 10 10 11 11 0 0 0
2 "THANET" 7 1 12 2 13 3 14 4 15 5 16 6 17
7 18 0 0 0
```

An example of the `rigs.cht` is given below. If modified also change the number of entries behind the [WAYPOINT] key.

```
# source www.hydro.nl
#
# Summary of rigs employed in the North Sea
#
# 24-06-2010
# .....

[WAYPOINTS] 62
1 "5333.05" "N" "00443.86" "E" "GSF B" "0" "GSF Britannia" -1 0 0 0
2 "5334.03" "N" "00452.29" "E" "GSF M" "0" "GSF Magellan" -1 0 0 0
3 "5407.20" "N" "00137.10" "E" "GSF M" "0" "GSF Labrador" -1 0 0 0
...
...
62 "5304.956" "N" "00232.448" "E" "49-28-A" "0" "" -1 0 0 0
```

An example of a map with both rig and windfarm augmented data is shown below.



This data is also shown on top of the line drawn charts. If present the data can not be suppressed and is always visible.