

## GARtrip Version 205 Overview

Next: [Getting Started](#)

Next: [What's new](#)

Changes with respect to version 204 are printed in red.

If you are new with GARtrip you should read [Getting Started](#) first.

You get this help text out of the running program GARtrip:  
through the *Help* menu,  
or by clicking on the menu or on the (part of) window you need help on, and subsequent F1 keystroke (context sensitive help).

You move through this help text  
by clicking on the underlined links, or on the *Back* button  
or by the *Search* button with keywords.

You may get actual info on GARtrip on the web: [www.gartrip.de](http://www.gartrip.de)

See the [Security advice](#) first!

The program GARtrip is used to manage and check the data of a Garmin or Magellan GPS-receiver. In addition you need a data cable and a free serial port on your PC.

The terms Waypoint, Proximity Waypoint, Route and Track (Track Log) are used with the same meaning as in the receiver manual.

see also: [Help topics](#)

### **Functions of the program:**

All functions are accessed by mouseclick on the [main window](#).

Transfer of data from/to the Receiver:

[Waypoints and Routes](#) , Routes with estimated duration

[Tracks](#)

[check Receiver link](#)

[switch off](#) Receiver

Storage in files:

[Waypoints and Routes](#) (common file)

[Tracks](#)

each with headline

[Import and Export](#) of many **file formats**

[Entering and display of Waypoints:](#)

in different Formats (Coordinate systems)

with respect to selected Geodetic Datum

with special aids for working with maps

as distance (km, miles, nautical miles or mm on map) and bearing from reference point

name conflicts are solved automatically

with symbols (if supported by the receiver)

Display of creation date and time with time zone correction

[Takeover](#) from stored Track

Averaging from stored track or from selection of waypoints

[List of Waypoints](#) in memory:

with names, descriptions, and distance from common reference point

sorted alphabetically, by distance, by age, by altitude, by coordinates, by symbol, or by many

other criteria

## Definition of Routes

Continuously when entering Waypoints, or afterwards  
Display of distances per leg or accumulated  
Calculation of included area  
Calculation of duration based on user estimated speed.  
Bearing correction for magnetic declination, entered manually.  
Use of avionics database.  
Create a new route out of a track.

## Chart display

on screen and printer  
**with selection of map projection**  
with map overlay (not for 16 bit version)  
optionally as overview (scaled automatically) or with user defined scale, split to several sheets if needed; portrait or landscape orientation, may be zoomed  
optionally with Waypoints, Routes, Track, grid lines  
Analysis of Data of selected track point or range  
Takeover as new Waypoint  
Averaging of track to increase the precision of a new waypoint  
Diagram with speed, altitude, **vertical speed, or gradient (steepness)**

## Display and analysis of the track

Clear single bad track points or ranges  
Display on chart, with milestones, time stamps, and comments  
Line color selected by speed, altitude, vertical speed, or gradient  
Analysis of duration, distance, speed, etc.  
Conversion into waypoint (optionally averaged) or route  
Manual drawing, or correction of existing track points

## **Help topics:**

### Index

### Main window

Link to receiver  
Menu File  
Menu Garmin(Magellan)  
Menu Edit list  
Menu System  
Menu Profile  
List of Waypoints  
Reference point  
Time Zones  
Waypoints with Symbol  
Format, Geodetic Datum

### The window Waypoint

entering new Waypoints, Example

### The window Routes

### The window Chart Control

Selection  
Scale  
Menu Track:File  
Menu Track:Garmin(Magellan)  
Menu Map  
Menu Edit Track

### The Chart drawn with mouse control

Map projection

Scanned Maps

## Getting Started

Next: [What's new](#)

Note: [Disclaimer of Warranty](#)

### **Starting the program**

You've already downloaded the program package from the Internet, unzipped it, and installed it using the program setup.exe. In the Windows Start folder you should find entries for the GARtrip program now, and for this Help.

Now start GARtrip, and select your user language on the following panel. You can change your selection at any time using the menu *System*.

On the following panel you see the conditions for using the program. Please accept these conditions. All preceding questions come up only at the first start of the program.

Now the window "Open Waypoint file" appears. Normally you will start working based on your own collection of waypoints. This is the reason the program asks for opening a file. But now, at your very beginning, you don't have a collection. So it is recommended to open the sample file sample.wp instead. At future program starts you may drop down the waypoint line, for selection among the last used files, or browse through the explorer.

### **Working with Waypoints**

Now you see the main window of the program, with the list of all waypoints shown. You can modify the width of each row here, and you may modify the size of the whole window, dragging its borders with the mouse. Your changes will be kept across program sessions.

All information on a specific waypoint is displayed by a double click on its line in the list, or by a single click followed by a click on Edit. Here you may modify the data. At the very end you might save your work in a new file using the menu *File, Save*.

### **Setup of the GPS receiver connection**

You've already connected the GPS receiver with a serial port of your computer by a suitable data cable, and you've switched it on. Now you must tell the program which serial port to be used: Menu *System, Serial port*. Then the panel "Properties and transfer protocols" will pop up. With the receiver contacted successfully, you will see its name displayed here. Otherwise you get a yellow warning box saying "no link". In this case please follow the notes on Link.

You should set the proper memory size values of the receiver but you can do this later as well. The essential settings are done automatically.

### **Transfer of waypoints from the GPS receiver**

Now you will try to fetch your own waypoints from the receiver. Use the menu *Garmin, Read: WP*.

The question "Append data" should be answered with yes whenever the previously opened waypoint file was related to the collection in the receiver. Then the transferred waypoints will be compared and you'll be informed about changes. With the sample file opened you should answer *no*.

### **Getting a Chart**

Now you want to see your waypoints graphically. Click on *Chart, Map, Tracks...* and on *Draw* in the new control window.

### **Defining and managing Routes**

Open the Routes window clicking on the *Routes* button.

To get more instructions just press the F1 key at the corresponding place of the program.



## What's new with version 205

Next: [Main Window](#)  
Note: [Disclaimer of Warranty](#)

### File formats:

New import format: [Mapsource](#)

### Track:

Tracks with unlimited number of points (former version: 32700 points)

Analysis of track with Gradient (steepness) and vertical speed\*)

Colour of [track](#) selected by speed, altitude, vertical speed, or gradient; with two limit values and selectable colours (replaces the functions Altitude limit and speed limit) \*)

[Averaging](#) for speed: 10 s, 20 s, 1 min, 5 min

[track range](#) cut and paste by Windows clipboard; paste in reversed order on request.

### Routes:

[Route window](#) had been redesigned with menus instead of many buttons.

Changes of route are shown immediately on the chart

Route with display of total ascent and total descent (provided that the route points have altitude value)

Order of route points is changed by drag&drop

New function: convert route to track. Helpful to get the altitude diagram of a prepared route, or to transfer a very long route to the track memory of the receiver.

Waypoint can be opened from route window

Copy, cut, and paste of route or part of it by Windows clipboard

### Chart:

[Map projection](#) selection: Mercator or Conic

Selection of density of [Coordinates grid](#)

New [menu functions](#): Reposition Waypoint to Track, copy coordinates of mouse to clipboard

[Current position](#) display with directional pointer

### Scanned maps:

[Map projection](#) selection

[Number](#) of maps "used at once" can be decreased to 2 or 3

### Waypoints:

Copy, cut, and paste of waypoints by Windows [clipboard](#)

Waypoint can be opened from [route window](#)

New [menu function](#): Reposition Waypoint to Track

**\*) The altitude is transferred by some new Receiver types only, like the eTrex. The popular GPS12c family does not. It is not a program failure if you don't see the altitude.**

DISCLAIMER OF WARRANTY:

THE USER ACCEPTS THIS SOFTWARE AS IT IS.

THERE IS NO WARRANTY OF PROPER FUNCTION.

THE USER ASSUMES THE ENTIRE RISK OF MALFUNCTION.

*NEVER rely on calculations done by this program or by your receiver. Always use compass and map and your common sense in addition.*

## Main window

Next: [Link](#)

After **Program start-up** you will be asked to select an existing Waypoint File. In general you will start your work based on an existing set of data. If you want to start from scratch you should hit *cancel*.

Some program functions are accessed by buttons, others by menu control as File, Garmin(Magellan), Edit List, System,Profile and Help.

The Main window shows the headline of the currently open file;

the List of existing Waypoints sorted by selectable criteria;

the selected Coordinate Format and the Geodetic Datum.

Buttons open additional windows:

*New Waypoint* opens the window Waypoint to enter a new Waypoint;

*Edit* opens the window Waypoint as well, to display and edit the data of a waypoint that has been selected on the List of existing Waypoints;

*insert in route* appends the marked waypoint to a route being selected (the window Routes must be open). **If multiple waypoints have been selected all will be inserted at once. In this case you must take care on the correct order afterwards.**

*Routes* opens the window Routes, to display and edit routes;

*Chart, Map, Tracks* opens the window Chart Control, to display Waypoints, Routes, map, and Track graphically.

With the symbol icon on the top right corner of Main window you may iconize all open windows of the program at a time, in order to use the screen for other programs.



## Link

*Next: [Import, Export](#)  
Note: [Waypoint Proximity waypoint Route](#)  
[Track Waypoint file](#)*

Use a dedicated data cable to connect the receiver to a free serial port of your PC and switch the receiver on.

If your PC has no serial port then you may use the USB connection together with a suitable adaptor. Ask your computer dealer.

Garmin receiver: Ensure that the settings on the menu I/O SETUP of the receiver are:

GRMN/GRMN or Garmin/Garmin	
-------------------------------	--

Select HOST if available.

Please take care that the serial port of the PC is really free. In many cases it will be used by another program, e.g. by a laptop synchronization program. In this case the connection to the GPS receiver will fail.

Define the used serial port within GARtrip by the menu [System / Port](#) or select "auto detect". The link will be tested automatically. On success you will get a model and software indication of your receiver.

This test can be repeated at any time by the Menu [System / Receiver properties](#).

Set the properties of your receiver correctly within the menu [System](#) .

In case of a transmission error you will be prompted whether following transfers shall be tried repeatedly. With this option you have the chance to get your data in case of a weak interface, on the risk of undetected data errors.

Should you get the message *Transmission error* frequently,

- close all other windows programs even if they were iconized;

- try another serial port;

- ask the supplier of your data cable for a cable with level converter. In general the signal voltage of some receivers is lower than claimed by the standard. However most PCs can deal with it without problems.

A Waypoint is a point on earth whose coordinates have been stored. They have been either entered on the PC or on the receiver, or they have been fixed by GPS (MARK key of receiver).

The waypoint is identified by a unique name. A description of any length may be added but not all receivers will show it, or it might be shown only to limited length (16 in most cases). Date and time of creation are stored as well by some receivers.

Please note that waypoint names may consist of uppercase letters, digits, and the minus sign. No other characters are allowed by the Garmin transfer protocol although some receivers offer other characters, for example space or plus sign. Gatrip converts all other characters to minus signs.

For some receivers an additional symbol may be defined. If your receiver doesn't support this feature, or if you don't want to use it then you should switch it off in general using the menu *System*.

A Proximity Waypoint is a waypoint with a defined area around it. You define the radius and you will be warned whenever you enter the area.

If your receiver does not support Proximity Waypoints, or you don't want to use them, you should disable them on the menu *System*.

A route is a series of waypoints. The receiver uses a route to guide you to your destination. Any number of routes of any length may be defined. If you have set the limitations of your receiver correctly (Menu System) then you will get a warning if exceeding the limits on transfer.

Routes with identical sequence of waypoints create a warning by Gartrip.

The 16-character long names of routes must be unique within the first 13 characters for some receiver types (Ex.: Etrex). If this is true for your receiver you should mark the suitable option in menu System, receiver properties.

Some receivers identify the routes by a number (Ex.: GPS12) When writing to the receiver route 00 is used only if all available routes have been defined. In this case route 20 (GARtrip) maps to route 00 (receiver). Normally route 00 remains unused because the receiver will overwrite it anyway whenever another route is activated.

A Track (Track Log) is your trace. The receiver stores it and shows it on its dynamic map screen. GARtrip handles several Tracks at once. Each track may be divided into Segments.

Whenever you switch the receiver on again, or after loss of satellite reception, a *pause* will be inserted into the track. The parts of track separated by pauses are called *segments*. On the chart both track points before and after a pause will not be connected by a line in order to make the pause visible. You may remove the pause by editing the track.

A Waypoint File is named with the extension .WP and stores Waypoints, Routes, Headline, Reference point, Scale, Format and Geodetic Datum, time zone, and sorting option. The limit for the number of waypoints depends on your system. With Windows 3.1 it is 4100.

The file format is binary.

There is a universal text format for import or export of data, and some dedicated formats for use by other programs.

## Import, Export as text file

Next: [Import, Export for other programs](#)

Note: [Headline](#)

Import and export is done using the functions *Open* or *Save as...* and selecting the proper file format.

Normally [Waypoint files](#) and [track files](#) are stored in a private binary format. This has some advantages: opening and saving is fast and files are short. Coordinates are stored in exactly the same format as used by the receiver, i.e. without any loss of precision.

In case you wish to edit the data by other means an ASCII text format is suitable. For this purpose select IMPORT GARtrip Text or EXPORT GARtrip Text, respectively. Please note that waypoints and routes are saved separately from tracks, this means in different files, both named as \*.txt.

In addition there are some dedicated [formats for other programs](#).

### **The general purpose text format (GARtrip Text \*.TXT)**

Coordinates of waypoints or track points are written in the format and datum selected on the main window.

*Be careful when importing data. Wrong number formats may cause unpredictable results!*

If you create such a text file to be imported then please follow these rules (see also the sample file SAMPLE.TXT):

#### **Waypoint file as text:**

1st line: must begin with the word "Waypoints". The coordinate format and geodetic datum may follow, both written exactly as in the selection fields of the main window. If you omit these indications then the coordinates will be interpreted according to the actual setting in the main window.

2nd line: headline for the following lines. May be omitted.

following lines: one line per waypoint. These consist of the following data fields. The field delimiter may be a tab, semicolon, or comma (only one of them for the whole file):

- > Name
- > Description
- > Zone (only if format = UTM or MGRS or British Grid or Irish Grid)
- > Latitude or Easting
- > Longitude or Northing
- > Creation time (Seconds since 31-DEC-1989, 00:00:00). May be omitted.
- > Symbol code. May be omitted.
- > Altitude in meters. May be omitted.

*Latitude and longitude can be imported in the wrong order, provided that the hemisphere is indicated by letters (N or S, E or W, but not + or -). The "degree" character "°" may be substituted by a space or by another special character.*

Further lines define the routes. There are two formats for routes; format a is not recommended, it is there only for compatibility to former program versions.

a) one line per route. These consist of the following data fields:

- > "Route"
- > Name
- > one name field for each waypoint within this route

b) a set of lines for each route. First line:

- > "Route"
- > Name of route; more data fields are not allowed within this line

For each waypoint one line to follow with its name in the first field. Following fields within each line are ignored.

After all waypoints of this route: "<end>"

*Note:* all waypoints used by routes must be defined first in the waypoint list.

When exporting, detailed information on the route legs follows. This informal fields are ignored when imported.

***Track file as text:***

1st line: must begin with the word "Track". The coordinate format and geodetic datum may follow, both written exactly as in the selection fields of the main window. If you omit these indications then the coordinates will be interpreted according to the actual setting in the main window.

2nd line: headline for the following lines. May be omitted.

following lines: one line per track point. These consist of the following data fields.. The field delimiter may be a tab, semicolon, or comma (only one of them for the whole file):

- > Zone (only if format = UTM or MGRS or British Grid or Irish Grid)
- > Latitude or Easting
- > Longitude or Northing
- > Creation time (Seconds since 31-DEC-1989, 00:00:00). May be omitted but in this case you will get no speed indication.
- > Flag: 0=standard; 1=new Segment; 2=new Track; 3=both. May be omitted.
- > Description. May be omitted.
- > Altitude in meters. May be omitted.



## Import and Export for other programs

Weiter: [Menü Datei](#)

For data exchange with some other programs you may select from a variety of dedicated formats. Here follows a list with special restrictions of each format

### **Files with waypoints and Routes:**

<i>Program</i>	<i>File type</i>	<i>Restriction</i>	<i>Coordinates format</i>
Mapsource	*.txt	Import only*)	all hddd...
PCX5	*.wpt;*.prx;*.rte;*.grm	no Routes in export	all hddd...
Fugawi	*.txt	Waypoints only	hddd.ddddd°
Gardown	*.gd		hddd°mm.mmm'
Garlink	*.swp	Waypoints only	hddd°mm.mmm'
OziExplorer	*.wpt;*.rte		hddd.ddddd°
Waypoint+	*.txt		hddd.ddddd°
StreetAtlas 7.0	*.txt	Waypoints only	hddd.ddddd°
Atlas GIS	*.bna		

\*) The program Mapsource only exports this format. It can't import it, so there was no need for exporting it from Gartrip

To send data to Mapsource you must use the PCX5 format..

### **Files with Tracks:**

<i>Program</i>	<i>File type</i>	<i>Restriction</i>	<i>Coordinates format</i>
Fugawi	*.txt		hddd.ddddd°
Gardown	*.gd		hddd°mm.mmm'
Garlink	*.twp		hddd°mm.mmm'
OziExplorer	*.plt		hddd°mm.mmm'
PCX5	*.trk		all hddd...
Waypoint+	*.txt		hddd°mm.mmm'
StreetAtlas 7.0	*.txt		hddd.ddddd°
Mapsource	*.txt	Import only	all hddd...
Atlas GIS	*.bna		

You may write a short description into the headline, in case the file name is too short for clarity. The headline will be stored within the waypoint file.

## Menu of Main window: File

Next: [Append, Update](#)  
Note: [Message](#)

### **open (Function key F6)**

With this function a [Waypoint File](#) will be read into the working memory of your PC, or imported.

The file selection box comes with the last use file. The 8 last used files can be chosen by a dropdown list. You may enter another file name directly, or use *Browse* for a general explorer style selection. In this case you may also use the file management functions of the explorer.

In case there are already data in the memory you will be asked if the file should be appended to the existing data, to combine two data sets into a single one.

When two data sets are combined a name conflict may arise, as waypoint names must be unique. In this case see [Read](#) from receiver. Identical coordinates are detected as well.

Should the existing data have been changed before you will be asked if they have to be stored - in case you forgot it.

See also [Status Message](#).

### **save (Function key F7)**

With this function the data in memory are stored in the currently opened [Waypoint File](#).

#### **Save as...**

Like *Save* with selection of another file name, and export format if desired.

On selection you may save only the waypoints you have marked on the list before, or all routes, or selected routes.

If you apply an existing file name then you may overwrite this file, or append the data to it. This helps to collect certain waypoints in different files without the need to open these files. Or you may update other files after having changed some common waypoints, see [Append, Update](#).

See also [Status Message](#).

It is recommended to save data files in dedicated directories. In each case the following files must be in the same directory as the program file GARTRIP.EXE:

GARTRIP.HLP, GARTRIP.RES, DATUM.INI, SYMBOL\_2.INI, SYMBOL\_3.INI, GARMIN.INI.

#### **Print**

You get a list of waypoints and routes on your printer. If more than one waypoint had been marked they are printed in red. Coordinate format, geodetic datum, and sorting option are used as chosen on the main window.

Each route is followed by a line named "direct". This shows the direct distance from the first to the last route point, and the direct bearing. If you use bearing correction then the direct bearing is corrected by the value defined for new route points.

Without registration you get part of your waypoints only.

#### **Exit Program**

If there are unsaved changes in memory you will be prompted for saving.

After having finished you'll get a status message. You may confirm this message by

- \* any keystroke
- \* mouse click on any button (will be effective)
- \* wiping it away using the mouse

## Append, Update

Next: [Menu Garmin\(Magellan\)](#)

These functions are of interest for the experienced user who has arranged their collection of waypoints in different files.

They are accessed after *Save as...* and selecting an existing file name but not the already opened one.

You may select multiple files at once to be renewed the same way.

### **Append**

You have entered new waypoints, and you want to have them in another file as well. Mark them on the list, then select the save option *marked only*, and click to *Append*. The same applies to routes.

You should open the completed file soon in order to have it checked for waypoint name conflicts.

### **Update**

Although you have split your waypoints in different files you will have some important waypoints common to several files, e.g. the waypoint HOME.

After having done changes on these common waypoints it will be tedious to do the same changes for all other files. The function *Update* helps doing that.

Do the changes on the first file manually. Save it. Then hit *Save as...* and select the next file. It doesn't matter which waypoints have been changed. Click to *Update*. This saves only those changed waypoints which have already been present in the selected file.

You may have refined the coordinates or changed the name or other properties *but not the coordinates and name at the same time*.

You should open the completed file soon in order to have it checked for replacements.

*Example:*

Original waypoints in two files:

file a.wp		file b.wp	
WAYP1	Position1	WAYP1	Position1
WAYP2	Position2	WAYP2	Position2
WAYP3	Position3	WAYP10	Position10
WAYP4	Position4	WAYP11	Position11
WAYP5	Position5	WAYP12	Position12
WAYP6	Position6		

Now you change in file a.wp:

WAYP1	renamed to HOME, position unchanged
WAYP2	position2 changed to position 2a
WAYP3	position3 changed to position 3a
WAYP7	position7 (new waypoint)

After *Update* to b.wp, the files will contain:

file a.wp		file b.wp	
HOME	Position1	HOME	Position1
WAYP2	Position2a	WAYP2	Position2a
WAYP3	Position3a	WAYP10	Position10
WAYP4	Position4	WAYP11	Position11
WAYP5	Position5	WAYP12	Position12
WAYP6	Position6		

WAYP7    Position7 (new Waypoint)

## Menu of Main window: Garmin (Magellan)

Next: [Menu Edit List](#)

Note: [Name conflict](#)

Reading routes or waypoints is done in separate functions. This helps to shorten the transfer time.

On the other hand routes and waypoints are stored in a common waypoint file on the PC.

### **read: WP (Function key F5)**

All waypoints stored within the receiver will be read into the working memory.

In case there are already data in the memory you will be asked if the data read should be appended to the existing ones. If you answer *yes* the newly read waypoints will be marked on the list.

*Hint:* When coming back from a trip it is good practice to open the waypoint file which had been transferred to the receiver before. Then you read the waypoints back from the receiver, answering *yes* to the "append" question. You will be informed what data have been changed or entered during your trip.

Whenever data are appended a new waypoint may have the same name as an old one. In this case the program proceeds as follows:

If the coordinates of the new point are the same as the old ones (up to 5 m distance) the new point is ignored.

Otherwise the points will belong to different locations. Then you are asked if you only want to go on with the old point, or only with the new point, or with both. (In the latter case the name of the new point will be changed.)

In addition it is checked whether there is another waypoint with exactly the same coordinates. In this case it is most likely that you have renamed a waypoint and you forgot to delete the old one within your receiver.

See also [Status Message](#).

### **read: Routes**

The [Routes](#) are read from the receiver together with the waypoints contained. (From Magellan receivers the sequence of points is read only. The suitable waypoints must have been read before.)

### **read: Tracks**

This operation is also available on the [Chart Control](#) window..

### **write (Function key F8)**

A subsequent option panel will ask you what to write: all waypoints, marked waypoints only, all routes, selected routes only.

When writing routes you may define the number the receiver shall use for these routes. This allows you to avoid existing routes being overwritten. *This applies only if your receiver uses route numbers (e.g. not for GPSIII or eTrex).* (When writing to a Magellan receiver the sequence of route points is written only. The suitable waypoints must already be present in the receiver.)

You should set the proper limitations of your receiver for Waypoints and Routes by the menu [System](#). Then you will get a warning if you try to write more data than allowed.

Waypoints will be appended to already existing waypoints within the receiver. If you want the receiver to store the new waypoints only you must delete its memory first by **DELETE ALL WAYPOINTS**.

If a waypoint has the same name as an existing one then some receivers overwrite the old one; others rename the new one.

*If the waypoint memory of the receiver is full then following transmission is ignored.*

When the transmission is completed GARtrip gives you a message with the number of used waypoints

within the receiver. Normally this number should be the same as the number of waypoints within the GARtrip working memory.

See also [Status Message](#).

***Power off receiver (Function key F4)***

This function is much more convenient than the red key of the receiver.



When attempting to store a waypoint with an already existing name the name of the new point will be changed automatically by appending a number, after a prompt.

## Menu of Main window: Edit list

Next: [Menu System](#)

### **Search...**

This function marks all waypoints with a certain string in the name or description. Useful for large lists.

### ***new WP from average***

This is a function dedicated to increase the precision of GPS by averaging multiple measurements.

To get a waypoint with increased precision do the following:

Save this position with your GPS receiver several times under different names (001, 002...). Read these waypoints into GARtrip and mark them.

The menu function *new WP from average* will create a new waypoint by averaging all marked coordinates.

The same averaging is available for a range of a track.

If one of the waypoints selected had been created itself by averaging then this one will be applied with an appropriate weight. So you may use this function again and again to add new measurements. *Valid from program version 200 on, and with the Gartrip file format (\*.wp) only.*

### ***new List***

With this function you may clear the working memory in order to begin from scratch.

### ***Time Zone of this list***

The time zone is stored in the waypoint files together with the waypoints themselves. Set it according to the region of your waypoints.

This way you may manage sets of waypoints of different regions, each with its correct time stamps.

### ***Invert selection***

This is for the experienced user only. Having marked several waypoints, e.g. by the search function, you intend to save not the marked ones but the unmarked ones. Just invert the selection before saving.

### ***Mark Group***

This helps housekeeping big lists. Mark a certain waypoint. Then this function helps you to mark a certain number of following waypoints.

With the following functions existing waypoints may be split among different files. This is useful to keep clear a growing collection of data. *See also: Save*

### ***Clear marked waypoints (delete key)***

With this function all marked waypoints will be removed.

### ***Cut / Copy marked waypoints***

With this function all marked waypoints are copied to the Windows clipboard. They may be appended to a new list or to another file later.

### ***insert / Check clipboard***

Herewith you may copy waypoints from the clipboard to the working memory.

Available only if the Windows clipboard contains suitable data. With *Check clipboard* you may check what kind of GARtrip data are available.

## Menu of Main window: System

Next: [Menu Profile](#)

Note: [PC Clock](#)

All system settings will be kept when GARtrip is closed (stored in WIN.INI).

### **Language...**

This is an on-line selection of the user language. Note that the language of the help text is not changed here. To change it, the file GARTRIP.HLP must be exchanged. A German version is available on [www.gartrip.de/download\\_d.htm](http://www.gartrip.de/download_d.htm).

### **Registration...**

Here you enter your personal [registration key](#). The same menu can be used to read the key in order to copy it to a second computer

### **Receiver properties (Function key F2)**

The correct [link](#) to the receiver is checked and model identification is showed together with the receiver software version.

Please enter the properties and transfer protocols of your receiver here. Then you will get a warning if you try to send more data to it. The settings "Symbols", "Altitude", and "Proximity" are set automatically upon each data transfer. You can change them manually for the moment if you want to enter waypoints for a receiver type that is not present.

If your receiver supports long waypoint names (more than 6 characters) you may enter the correct length here.

If "Proximity" is enabled and your receiver does not support proximity waypoints, or you don't want to use them, just set the memory size to 0. Then the suitable data field will not be shown on the waypoints window.

The selection "Show waypoints with altitude" defines whether you want to work with altitude values. You can enable it even if your receiver does not handle altitude. In this case the altitude values are for your information only and they will not be transferred.

### **Serial Port**

Here you define the number of the serial PC port used by the receiver.

### **Backup files**

If enabled, each time you overwrite a waypoint file (\*.WP) or a track file (\*.T) the old file will be kept and renamed to WPB or TP.

### **Set PC Clock**

If active, the PC clock will be set to the [GPS time](#) whenever you read data from the receiver (once per session).

### **Time zone at home**

Here you should define the local time zone valid at home. This allows the function *Set PC Clock* to convert the GPS time (UTC) to the correct local time.

### **Grid Coordinates with Dot (km)**

Coordinates in grid formats (e.g. UTM) have been standardized with meters as unit. This results in big numbers difficult to handle. GARtrip uses kilometers optionally (with decimal point followed by three digits) for better readability. This setting affects the display of coordinate values, and the export file format. See [Format](#).

### **Blue Background**

Here you may chose the background color of the Blue Planet.

***Unit for distance / speed / altitude***

Here you define what units any distance, speed, and altitude shall be based on.

The internal clock of most receivers is very imprecise if not locked to satellites for a long time.

The "write to receiver" functions are normally used when preparing a trip. Sometimes the receiver may not have been used for a long time.

The "read from receiver" functions are normally used after a trip. The receiver will have fixed new positions, and it will have received the correct clock time recently.

Therefore the PC clock is set only when reading data from the receiver. Differences below 5 seconds are ignored. For differences beyond 5 minutes you will be asked if you accept the change.

## Menu of Main window: Profile

Next: [Time Zone](#)

*Don't worry. You may skip this subject without losing control.*

Whenever you exit GARtrip the following properties will be kept for the next session:

- The position of each window (\*)

- The size of the Chart on screen (\*)

- Serial Port for communication with the receiver

- Time zone for new lists, and all settings of the menu *System*

- Settings of Chart control (e.g. Name, Description etc., Landscape format, auto, but not the selection of items to be drawn: Waypoints, Routes, Track, Map. You will prefer to select these each time differently.), show cursor position, play speed, record interval for actual position.

- Sorted by, Coordinates: Format and Datum (these settings are stored on the waypoint files as well. The values in waypoint file have priority. The values within the profile are only effective if you don't open a file at program start.)

- Scan resolution and stretch for new maps.

Within this menu you may define additional profiles. Later on you may switch between them at pleasure.

Example: You own two receivers. You use the GPS12XL for hiking. Then you prefer Kilometers, and you set the milestones distance to 1 km. After all these selections you create the new profile "hiking".

You use the GPSIII Pilot for avionics. You set the menu *System* accordingly, set the units to Nautical Miles, and the milestones distance to 50 NM. Then you create the new profile "avionics".

In this case you may connect both receivers to your PC at a time, using two serial ports. Selection of the profile also switches the port then.

Now you may switch among these sets of options directly by profile selection.

*Note:* each change of any option changes the active profile immediately.

The settings marked by (\*) within the list above are not saved within the different profiles. They are saved commonly.

Whenever you create a new profile all settings of the previously active profile are copied to the new one.

## Time Zone

Next: Waypoints with symbol

All Date and Time information given by the receiver is based on UTC.

This refers to the display of the creation time of waypoints within the window *Waypoint*, and to the date and time of track points within the window *Chart Control*, and to the function Set PC Clock.

If you want to get these times corrected to the local time then you must define the time zone here.

There are two time zone settings:

By the menu *System / Time zone at home* you define the time zone valid at your home. This setting controls the function "set PC clock", and it will be used whenever you start with a new waypoint list.

By the menu *Edit List / Time zone of this list* you define the time zone valid for this list of waypoints. When you travel to another country you can set the time zone of this country here so that all creation times of waypoints, and all track time stamps, will be converted according to this setting.

### **Format of time zone control string:**

- a) no correction, display in UTC, as it is: just set the time zone to 0.
- b) time zone without daylight saving: just enter the time shift in hours versus UTC, e.g. -5 for Eastern USA. Fractions of an hour are accepted, e.g. -6.5 or +7.25
- c) time zone with daylight saving: enter the time shift in hours versus UTC, valid during winter time, followed by a blank character.

In most cases the daylight saving period begins at the first or last Sunday of a spring month, and it ends at the first or last Sunday of an autumn month. During the daylight saving time the time shift is incremented by one hour.

Beginning: Enter the index (see below) followed by the month (as a number), then a blank character.

End: Enter the index (see below), followed by the month (as a number).

Index:	F	: first Sunday within this month
	S	: second Sunday within this month
	T	: third Sunday within this month
	L	: last Sunday within this month

*Example Central European Time (CET):* Winter shift is +1 hour, daylight saving from last Sunday in March until last Sunday in October: +1 L3 L10

## Waypoints with Symbol

Next: [AVD functions](#)

Some receivers (e.g. GPS12XL from version 3 on) group the waypoints by symbols. You may activate this function by the menu System.

In the list of waypoints and on the Chart symbols are shown as a short sign (up to three letters), e.g. hs for house.

The display option (symbol only, symbol + name, symbol + description) is shown on the list by an appended apostrophe (symbol + name), or two appended apostrophes(symbol + description).

You may get the waypoint list sorted by symbols, then you may mark all waypoints having a certain symbol to delete them at once.

To change the symbol or the display mode, mark all waypoints to be changed to the same symbol or display mode, then click to *Edit* and change the symbol setting.

### **Denotation of symbols:**

The name of symbols may be changed to your own preference by editing the file SYMBOL\_2.INI (for 16 symbols) or SYMBOL\_3.INI (for more than 16 symbols) using any standard editor.

This file contains one line for each symbol with the following data fields separated by a blank character:

- > Address (do not change!)
- > Short sign (up to 3 lowercase letters)
- > full name

You may change the order of complete lines if you want to see often used symbols on top of the selection list.

*Example:* You have nothing to do with fish. Therefore you want to use the symbol "fish" for restaurants instead. The according line should be, behind the address field:

rst Restaurant (fish)

If your receiver uses new symbols not known by GARtrip then you will get a message when reading such waypoints. GARtrip is learning them when reading. You should open the file SYMBOL\_3.INI afterwards using a text editor like Notepad, and set the names of new symbols as described above.



## AVD functions

Next: [Registration](#)

Some receivers are equipped with an internal database for avionics. These internal waypoints can be read only if they are part of a route. This leads to the following capabilities:

You already have defined a route within the receiver using the database. Read this route into GARtrip. Then the database waypoints will appear in the list of waypoints with an AVD index (see below) at the beginning of the description field. Further data (state, city, facility, altitude) are shown in the description field as well, whenever possible.

You also may define a route within GARtrip using database points although GARtrip does not own the database itself. For each point you have to know the proper name, and the AVD index (see below). You need not enter the coordinates! Just enter its name, and its AVD index instead of a description. After the route is finished write it to the receiver. Then read it back immediately. Now GARtrip will know the proper coordinates.

AVD-Index (shown and entered in the field *Description*)

1st character:            @

2nd character:           Class Code (A for apt, V for vor, I for int, N for ndb)

3rd and 4th character:   Country Code

Whenever the name or AVD index does not agree with a database entry the receiver will create a new user waypoint, or it will hit an error message.

## **Registration**

*Next: List of waypoints*

To save unlimited data in files you must be a registered user. Please follow the instructions within the file REGIST.TXT.

After having paid the registration fee you will get a key code fitting to your name. Run *System / Registration* and enter your name and key code.

To remove the registration key from this computer, e.g. because you are going to give the computer away, call this function again, and erase the key field.

It is strictly recommended to save the registration key in paper form. In case of a hard disk crash you will need it again, and a repeated delivery won't be not free of cost.

## List of waypoints

Next: Coordinates

Note: Multi select

This list shows all waypoints in the working memory. A scrollbar on the right side allows moving through a big list as you will know from other windows applications.

On top of the list on the right side the complete number of waypoints within the list is shown. If you have marked several waypoints the number of marked waypoints is shown in addition.

You may chose how the list shall be sorted for the best survey.

You select a waypoint by mouseclick on its entry. This selection affects the functions Edit, append to route, clear, copy (multiple selection is possible), Draw, Print.

The list is shown like by the Windows file explorer. This allows following user options (under Windows 95 some functions may be missing):

Drag the borderline between two headers in order to change the field width.

Double click on the borderline between two headers will adjust the filed width such that all text are fully visible.

You may suppress any unwanted column by moving the borderline between two headers completely to the left (width = 0). The hidden column may be recovered by moving the mouse pointer slightly to the right of the borderline between two headers. The pointer will become a separator symbol and you may open the hidden row again by dragging the separator symbol to the right.

Move the mouse pointer to any text field. A small yellow panel with its full text will pop up.

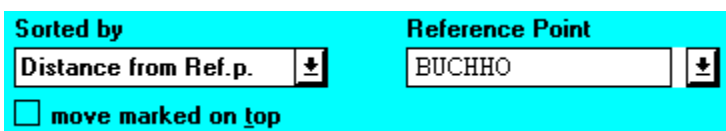
The whole window may be resized by dragging its borderline in order to see a bigger list.

Click to a header to get the list sorted by this column. Further sorting options are available on the selection below the list.

Double click in a list item opens this waypoint for editing.

Clicking a second time on a waypoint name after a short while, the name can be edited directly on the list.

### **sorted, reference point**



<b>Sorted by</b>	<b>Reference Point</b>
Distance from Ref.p. ▾	BUCHHO ▾
<input type="checkbox"/> move marked on top	

With the option field *sorted by* you select the sorting mode of the list:

*Name:* alphabetically by names.

*Symbol:* by waypoint symbol (when activated): by waypoint symbol and display mode. For example you may select all waypoints with a certain symbol in order to delete them.

*Description:* alphabetically by description.

*Altitude:* Elevation above sea level, when activated.

*Distance or Bearing from Ref.P.:* by distance or bearing from reference point. By this means you may group the waypoints according to regions.

*Distance from nearest:* Here you will see how far each waypoint is away from its closest neighbor. This helps to find out if there are multiple waypoints for the same location (distance 0.0), or if there

are waypoints of a different region than the others (distance very big).

*Date*: by creation date.

*Longitude / Easting or Latitude / Northing*: by coordinates.

*Routes*: by appearance in routes.

*Distance from routes*: You will be asked which routes to consider. This option helps you so see which waypoints are **close to a route**. You may want to write only these to the receiver.

*Distance from Track*: referring to the nearest track point. By this option you may see which waypoints were met on a track.

*Proximity* (when activated): keep in mind that most receivers allow a limited number of Proximity waypoints only (if at all)

The sorting option does not affect the content of the working memory.

*move marked on top*: after a multiple selection you may improve the clearness of the list by arranging the marked waypoints on top.

A mouseclick to the field *Reference Point* defines the marked waypoint as the new reference point. All displayed distances refer to this reference point. You may define the reference point using the context menu on the chart as well.

There is only *one common* reference point for the distances of *all waypoints*.

The reference point will be saved in the waypoint file.

To mark a coherent range, you click on the first item. Then keep the shift key pressed and click on the last item.

To mark non-coherent items, you click on the first item. Then keep the control key pressed and click on the other items.

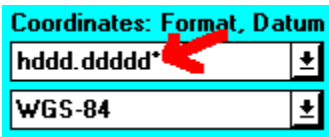
For the list of waypoints see [Example](#).

Example: You want to mark all waypoints closer than 50 km from reference point. Chose the list sorted by distance. Click to the last waypoint within the desired distance range. Then scroll to the top of the list and click on the topmost line with the shift key pressed.

## Waypoints: Format, Datum

*Next: [The window Waypoint](#)  
Note: [Proper settings Fixed zone](#)*

### Format



Coordinates: Format, Datum  
hddd.ddddd°  
WGS-84

Here you select the coordinate system for the waypoint to be entered and displayed.

The grid lines on the displayed Chart refer to this selection as well.

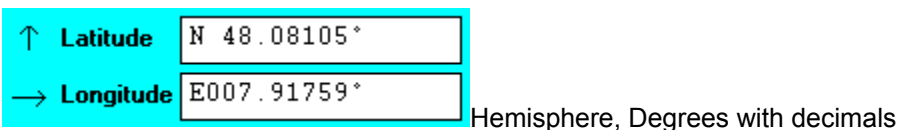
Whenever the format is selected GARtrip will automatically activate the most likely Datum. If your map contains an indication of the proper datum, select it accordingly. See [Hint](#).

You may select among 11 different formats

- hddd.ddddd°
- hddd°mm.mmm°
- hddd°mm'ss.s°
- UTM (with preselection of zone)
- MGRS
- (D) Gauß-Krüger (with preselection of zone)
- (CH) Swiss Grid
- (F) Lambert (with preselection of zone)
- (GB) British Grid
- (IRL) Irish Grid
- (NZ) New Zealand Grid
- ... and any number of user defined Grids (example: Swedish Grid)

*Hint:* to see the exact format it is recommended to look at an existing waypoint by using *Edit WP* before entering a new one.

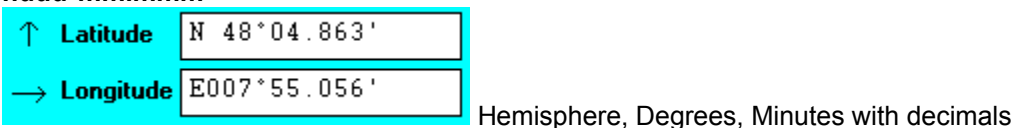
### hddd.ddddd°



↑ Latitude N 48.08105°  
→ Longitude E007.91759°

Hemisphere, Degrees with decimals

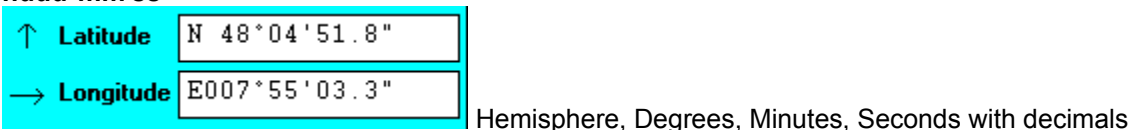
### hddd°mm.mmm



↑ Latitude N 48°04.863'  
→ Longitude E007°55.056'

Hemisphere, Degrees, Minutes with decimals

### hddd°mm'ss



↑ Latitude N 48°04'51.8"  
→ Longitude E007°55'03.3"

Hemisphere, Degrees, Minutes, Seconds with decimals

*Enter::* Hemisphere as uppercase or lowercase letter, or as plus/minus sign, leading or trailing.  
For eastern longitude or northern latitude the letter E or N may be omitted.  
The characters ° ' " . are all entered by the decimal point or comma or space key

**All following formats are metric grids**

**UTM**

Zone	32U	Zone 32: 9° ±3°
→ Easting	0419.384	
↑ Northing	5325.876	

UTM grid, world-wide used.

Both coordinates are given in meters or kilometers. Rather than longitude and latitude this format indicates:

Zone: the number defines a center meridian; the letter defines the latitude range.

Easting: The distance to the central meridian with a constant 500 km added.

Northing: The distance from equator (if south: negative with 10000 km added)

Projection: Transverse mercator. All values reduced by a factor of 0.9996.

*Display:* depending on the system menu setting the Easting and Northing is given in meters (standard) or kilometers (better readable). Right to the Zone field is shown the Zone, the center meridian, and the width of the zone strip.

*Enter:* **Zone:** The zone letter is only required on the south half of earth.  
**Easting and Northing in kilometers:** to be entered always with decimal point (or comma).  
**Easting and Northing in meters:** Enter the values without point or comma. At reduced precision you may omit trailing zeroes. **Never omit leading zeroes!** Example: instead of 0414500 you may enter 04145

*Hint:* The UPS System for polar regions is not available.

## MGRS

The MGRS grid is identical to UTM but each UTM zone is subdivided into 100x100 km squares. The square is named by two additional letters in the zone field, and the Easting and Northing values define the position within the square.

### (D) Gauß-Krüger

		Zone 3: 9° ±1.5°
→ Easting	3419.428	
↑ Northing	5327.568	

Gauß-Krüger grid, *German Grid*

This is the German version of Gauss-Krüger grids. For other national versions of Gauss-Krüger you may define a user grid in the file DATUM.INI.

Both coordinates are given in meters or kilometers. Rather than longitude and latitude this format indicates:

**Easting:** A zone number defining a central meridian followed by the distance to the central meridian, with a constant 500 km added.

**Northing:** The distance from equator (North only)

Projection: Transverse mercator.

*Display:* depending on the system menu setting the Easting and Northing is given in meters (standard) or kilometers (better readable). The zone number is part of the LON value (first digit).  
 Additionally shown is the Zone, the center meridian, and the width of the zone strip.

*Enter:* **Easting and Northing in kilometers:** to be entered always with decimal point (or comma).  
**Easting and Northing in meters:** Enter the values without point or comma. At reduced precision you may omit trailing zeroes. **Never omit leading zeroes!** Example: instead of 0414500 you may enter 04145



### (CH) Swiss Grid

→ Easting	635.695
↑ Northing	325.748

Swiss grid

Both coordinates are given in meters or kilometers. Rather than longitude and latitude this format indicates:

The horizontal distance from central point (old observatory in Bern at E 7°26'22.5" N 46°57'8.66") with a constant 600 km added

The vertical distance from central point with a constant 200 km added

Projection: oblique-axis, conformal cylindrical projection.

*Display:* depending on the system menu setting the Easting and Northing is given in meters (standard) or kilometers (better readable).

*Enter:* *Easting and Northing in kilometers:* to be entered always with decimal point (or comma).  
*Easting and Northing in meters:* Enter the values without point or comma. At reduced precision you may omit trailing zeroes. **Never omit leading zeroes!**

### (F) Lambert

Zone	2	Zone 2 Centrale fixed
→ Easting	0957.287	
↑ Northing	2330.071	

French grid (Quadrillage Lambert)

In most cases zone 2 is extended all over France (zone 2 étendu). For this reason zone 2 is preselected by GARtrip.

Both coordinates are given in meters or kilometers. Rather than longitude and latitude this format indicates:

The horizontal distance from central point (Pantheon in Paris at E 2°20'14" N 46°48') with a constant 600 km added

The vertical distance from central point with a constant 2200 km (zone 2) added

Projection: Lambert Conformal Conic

*Display:* depending on the system menu setting the Easting and Northing is given in meters (standard) or kilometers (better readable).

*Enter:* *Easting and Northing in kilometers:* to be entered always with decimal point (or comma).  
*Easting and Northing in meters:* Enter the values without point or comma. At reduced precision you may omit trailing zeroes. **Never omit leading zeroes!**

### (GB) British Grid

Zone	HU
→ Easting	40.415
↑ Northing	09.631

British Grid (British National Grid BNG, Ordnance Survey of

Britain)

Both coordinates are given in meters or kilometers. Rather than longitude and latitude this format indicates:

Zone: two letters define a square 100x100 km within one single transversal mercator strip. Easting and Northing define the position within this zone (0 to 99.999).

Easting: The horizontal distance to the center point (W 2°, N 49°), with a constant 400 km added.  
Northing: The vertical distance from center point with a constant 100 km subtracted.

Projection: Transverse mercator. All values reduced by a factor of 0.9996.

*Display:* depending on the system menu setting the Easting and Northing is given in meters (standard) or kilometers (better readable).

*Enter:* *Easting and Northing in kilometers:* to be entered always with decimal point (or comma).  
*Easting and Northing in meters:* Enter the values without point or comma. At reduced precision you may omit trailing zeroes. **Never omit leading zeroes!** Example: instead of 04500 you may enter 045

### (IRL) Irish Grid

Zone	H
→ Easting	40.415
↑ Northing	09.631

Irish Grid (Irish National Grid ING, Irish Ordnance Survey)

Both coordinates are given in meters or kilometers. Rather than longitude and latitude this format indicates:

Zone: one letters define a square 100x100 km within one single transversal mercator strip. Easting and Northing define the position within this zone (0 to 99.999).

Easting: The horizontal distance to the center point (W 8°, N 53.5°) with a constant 250 km added.

Northing: The vertical distance from center point with a constant 200 km added.

Projection: Transverse mercator. All values increased by a factor of 1.000035.

*Display:* depending on the system menu setting the Easting and Northing is given in meters (standard) or kilometers (better readable).

*Enter:* *Easting and Northing in kilometers:* to be entered always with decimal point (or comma).  
*Easting and Northing in meters:* Enter the values without point or comma. At reduced precision you may omit trailing zeroes. **Never omit leading zeroes!** Example: instead of 04500 you may enter 045

### (NZ) New Zealand Grid

This is another national grid with dedicated projection.

### Swedish Grid

The Swedish Grid uses the Transversal mercator projection as well. It has been realized as a User Defined Grid.

### Datum

Coordinates: Format, Datum	
hddd.ddddd*	↓
WGS-84	↓

See also: [Hint](#).

For the transformation of coordinates among the different formats the earth is described as ellipsoid. Its dimensions (radius of equator a, flattening factor f) and the position of its center have been defined differently by different nations. There is a trend towards a unique system (WGS84 with a=6378137 m and f=0.003352811). The internal coordinate system of GPS is based thereon. But it will take tens of years to use it commonly in cartography.

These characteristics are called the Geodetic Datum.

GARtrip uses optionally:

WGS-84	(new world standard, GPS internal)
European1950	(new European standard)
Potsdam	(Topo maps of Germany)
CH-1903	(Topo maps of Switzerland)
NTF	(Nouvelle Triangulation Française)
Ord Srvy GB	(Ordnance Survey of Great Britain)
NAD27 CONUS	(North American Datum 1927 Continental US)
NAD83	(North America)
RT90	(Sweden)
AGD84	(Australia)
Ireland 1965	(Ireland)
Geodetic'49	(New Zealand)

In case you need another datum, and you don't know the parameters for the file DATUM.INI, look at [www.gartrip.de](http://www.gartrip.de), or ask the author.

The geodetic datums are stored in the file DATUM.INI within the working directory of GARtrip. User defined grids are defined here as well.

### **The file DATUM.INI**

This file may be edited using a ASCII text editor (e.g. NOTEPAD) to append further geodetic datums. *Be careful! Wrong numbers within that file lead to wrong coordinate calculations!* Changes will be effective when you start GARtrip the next time.

First line:

The first line specifies the proper datum for each standard coordinate format separated by commas.

E.g. you want the datum *European1950* to be selected automatically whenever UTM is selected: apply *European1950* at fourth position.

Subsequent lines:

One line to follow for each datum.

Each line contains following values separated by commas:

Name

Delta a: Difference of equator radius to WGS84 in m

Delta f: Difference of flattening factor to WGS84

Delta x, Delta y, Delta z: Difference of earth center to WGS84 in m

Then the user-defined grids will follow. You may define only grids based on Transversal Mercator (Gauss-Krüger) projection as with your receiver. The number of grids is not limited.

As an example you find already the definition of the Swedish Grid in the file. One line follows for each user-defined grid. Each line contains following values separated by commas:

The character # immediately followed by the grid name

Name of the proper geodetic datum

Center meridian in degrees with decimals

Latitude of origin (mostly 0) in degrees with decimals

Scale factor (mostly 0.9996 or 1)

False Easting in meters

False Northing in meters.

*This hint applies to the receiver as well as GARtrip:*

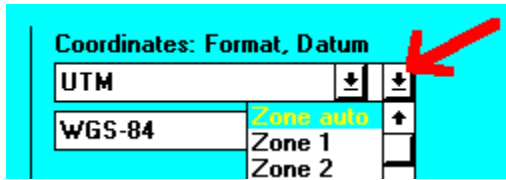
Whenever you save a position using the receivers MARK key the settings of format and datum are irrelevant. The coordinates are stored internally in a unique format.

You may select a different format and datum afterwards to convert the already stored coordinates.

Whenever you enter coordinates numerically, or you read them numerically, you must have selected the proper datum. Otherwise you may get errors of some hundred meters.

*If you have entered some waypoints with the wrong datum you will realize this error as soon as you take a GPS fix on one of these points. Then you may correct all wrong waypoints at once on the Chart.*

Near the border from one zone to another sometimes the display of coordinates based on the neighbor zone will be more useful. This leads to consistent numbers for different waypoints. For UTM, MGRS, and German grid and French grid you may preselect a zone.



*Hint:* outside the correct zone the precision of coordinates is reduced.

## The window *Waypoint*

Next: [Enter new waypoints](#)

Note: [Time stamp](#)

This window is opened by the buttons *New Waypoint* and *Edit* of [Main window](#).

You close that window again with the buttons *OK* (changes are kept in working memory) or *cancel* (changes are discarded).

### **Name, Description**

The unique name and the description are entered here.

Please understand that waypoint names may consist of uppercase letters, digits, and minus signs only. Other characters are not allowed by the official transfer protocol of Garmin although some Garmin receivers use other characters (space, plus sign). GARtrip converts all forbidden characters to minus signs.

The description field is of any length. Many receivers only show 16 or 40 characters. To check this limit the number of characters entered is shown on the top right side of the entry field.

The description may contain special characters but they will be replaced by "-" when written to the receiver. Some receivers can display special characters but the official transfer protocol does not allow transfer of those characters for compatibility reasons.

You may enter a name of any length. It's too long for your GPS receiver, it will be shortened accordingly and the full name will be taken over to the description (provided that you didn't enter your own description yet).

You don't need the shift key. Lowercase letters are converted to uppercase automatically. German umlauts are converted as well (ä to ae, ß to ss etc.).

For receivers with color display the waypoint color is defined by a code at the end of the description.

For receivers with waypoint depth data (like GPS168 Sounder) the depth is shown in the description field beginning with "\$" and ending with the unit "m" or "ft" (to be set in the menu *System, Unit for Altitude*.)

### **created (GPS) / created (PC) / read**

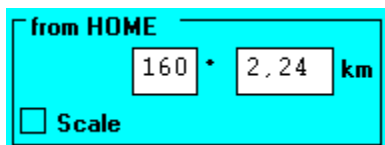
This field shows creation date and device of the waypoint. The description field needs not be reserved for this purpose.

This time stamp cannot be changed by the user. The time is corrected according to the time zone.

### **LON, LAT (Longitude, Latitude)**

The coordinates of the actual waypoint are shown and entered here according to the setting of Formats within the main window. See also [Enter new waypoints](#).

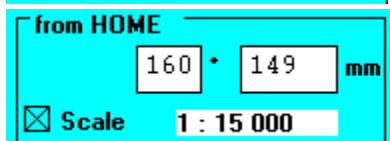
### **from (Reference point)**



from HOME

160 \* 2.24 km

Scale



from HOME

160 \* 149 mm

Scale 1 : 15 000

The distance and bearing from Reference point is shown here.

Distances beyond 1000 (100) km are shown in a red (yellow) box. This should be a warning for wrong coordinate entry.

If you activate the option *Scale* and enter the scale of your map the distance will be converted to millimeters on your map.  
*You may enter distance and bearing values as well.* The coordinates will be calculated accordingly.  
**nearest**

The three nearest waypoints are indicated here. This gives more confidence when entering new waypoints.

If you click on one of them this waypoint will become a temporary reference point. To be reset by click on "nearest".

*If you double click on one of them the display will change to that one. This is useful if you find that you had selected the wrong waypoint before.*

**Altitude** (only if activated in Menu System)

Here you see the altitude in meters or feet. May be edited. The value will be transferred to the receiver only if it supports altitude (e.g. the ETrex).

**Proximity** (only if activated in Menu System)

If you want this waypoint be a Proximity Waypoint then click to this option box and enter the alarm radius.  
If the option *Scale* is active the alarm radius is to be given in millimeters on the map.

**Symbol** (*only if activated in Menu System*)

Here you select a symbol and a display mode.

**To change the symbol, the display mode, or the Proximity of several waypoints at once:**

Mark all waypoints to be changed. Click to *Edit*, then change the symbol or Proximity, and click to OK.

**Set Default**

This function is an additional aid to enter new waypoints, or to find existing waypoints on a map.

The color code is appended to the description field:

&R	red	&G	green	&B	blue
----	-----	----	-------	----	------

Some Garmins use these codes in addition:

&BL	black	&DR	dark red	&DG	dark green
&DY	dark yellow	&DB	dark blue	&DM	dark magenta
&DC	dark cyan	&DA	dark grey	&LA	light grey
&Y	yellow	&M	magenta	&C	cyan
&W	white				



Some Garmin receiver models (GPS40, 45...) store a dedicated time stamp for each waypoint. This is shown here. The description field doesn't need to be reserved for this purpose.

Other Garmin receiver models (GPS 38, 45XL, II, 12XL...) don't store a time stamp. If the description field contains a creation date then GARtrip will copy it to its time stamp when read the first time. Otherwise the date of reading is stored.

## Enter new waypoints

Next: [Example](#)

*Hint: If the new waypoint shall be appended to a route then open the window [Routes](#) first. Each new waypoint will be appended to the selected route automatically.*

You may create a new waypoint by mouseclick directly on a [scanned map](#). If you don't use scanned maps please do the following:

You are going to enter some new waypoints taken out of a printed map.

### **a) The map shows a coordinate system.**

See detailed [example](#).

Select the proper [Format](#) and [Datum](#).

*If you have entered some waypoints with the wrong datum you will realize this error as soon as you take a GPS fix on one of these points. Then you may shift all wrong waypoints at once on the [Chart](#).*

Mark a reference grid line for longitude and latitude on the map near to the new waypoints.

Open the window *Waypoint* by clicking to *New Waypoint*.

Enter the coordinates of the reference grid lines, and click to *Set Default*.

Each time you open the window *waypoint* again by clicking to *new Waypoint* the coordinate fields will already contain the reference coordinates. Now you have two choices:

deselect the option *Relative to Default*, and complete the coordinates manually, or

keep the option *Relative to Default / Show Default* active, and fill in the mm fields. Enter the distance of your waypoint from the reference line on your map in millimeters (check the scale setting), negative if left or down. To check the result disable *Relative to Default*.

You may edit the default values all the time.

*Hint:* Setting the Default is easier by first editing an existing waypoint nearby. Place the text cursor in the Lat/Lon field and hit *Set Default*. These coordinates will be taken as default for new waypoints, up to the cursor position.

Confirm your entries by *OK* or by the *Enter* key. To enter further waypoint hit the *Enter* key again.

### **b) The map does not show a coordinate system**

You must know the coordinates of a reference point on the map, e.g. measured by GPS.

Mark this [reference point](#) on the map, preferably with a vertical line for the protractor.

Activate *Scale* and enter the scale of your map.

Now use ruler and protractor to get distance and [bearing](#) from the reference point to the new waypoint, and enter these values into the fields *from (ref.point)*.

### **To find stored waypoints on a map**

Both procedures described above may be reversed in order to find a stored waypoint on a printed map. In this case you must activate *Show Default*. Then GARtrip will show the coordinates of the reference lines followed by the distance between waypoint and reference lines in millimeters.

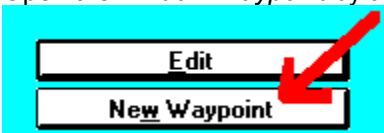
## Enter new Waypoints: Example

Next: [The window Routes](#)  
Note: [Bearing](#)

Assumed you use a map with longitude and latitude given in degrees, and you have set the format accordingly.

hddd\*mm.mmm

Open the window *Waypoint* by the *New Waypoint* button.



As reference lines you choose: 8 degrees 8 minutes East, 47 degrees 49 minutes north. Enter these values and click to *Set Default*.

↑ Latitude	N 47°49 .
→ Longitude	E 08°08 .



The following steps are to be repeated for each new waypoint.

Enter name and description.

Then measure the distance of the new waypoint from both reference lines: 15 mm to the right, 22 mm down. Enter these values into the mm fields and ensure the proper scale setting.

↑ Latitude	N 47°49 .	-22	mm
→ Longitude	E 08°08 .	+15	mm
<input checked="" type="checkbox"/> relative to Default			

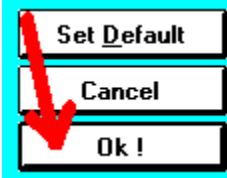
Scale 1 : 15 000

You may check the result: by click to *Show Default* you change between the display of true coordinates and the display with reference to the reference lines.

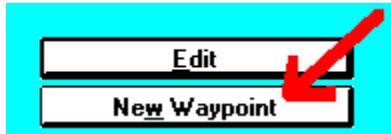
↑ Latitude	N 47°48.822'
→ Longitude	E008°08.181'
<input type="checkbox"/> Show Default	

↑ Latitude	N 47°49 .	-22	mm
→ Longitude	E 08°08 .	+15	mm
<input checked="" type="checkbox"/> relative to Default			

Finally you confirm your entries.



In case you want to enter further waypoints OPEN the window *Waypoint* again by the *New Waypoint* button.



or ENTER key.

ALL BEARINGS REFER TO GEOGRAPHICAL ("TRUE") NORTH. Magnetic declination is not included.

0° is the geographic north direction.

This is valid all the time, even if a metric grid system has been selected whose grid lines are not exactly oriented north-south.

Beginning with north = 0°, proceed clockwise: East = 90°, south = 180°, west = 270°.

The bearing leads along a great circle, i.e. it shows the direction of shortest distance. *Example*: looking for the bearing from North 50° West 100° to North 50° West 30°. Although these points are on the same latitude the bearing is not 90°. It is 62°.

## The window *Routes*

Next: [The window Chart control](#)

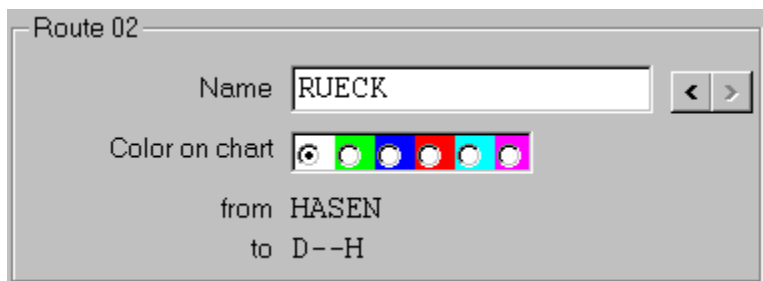
Note: [Other window](#)

This window is opened by mouseclick on the command button *Routes* within the main window.

You may go [back](#) to the main window without closing the window *Routes*.

If you use a Garmin receiver with avionics database see also [Routes with AVD](#).

### Top part: selection of route



Route 02

Name RUECK

Color on chart

from HASEN  
to D--H

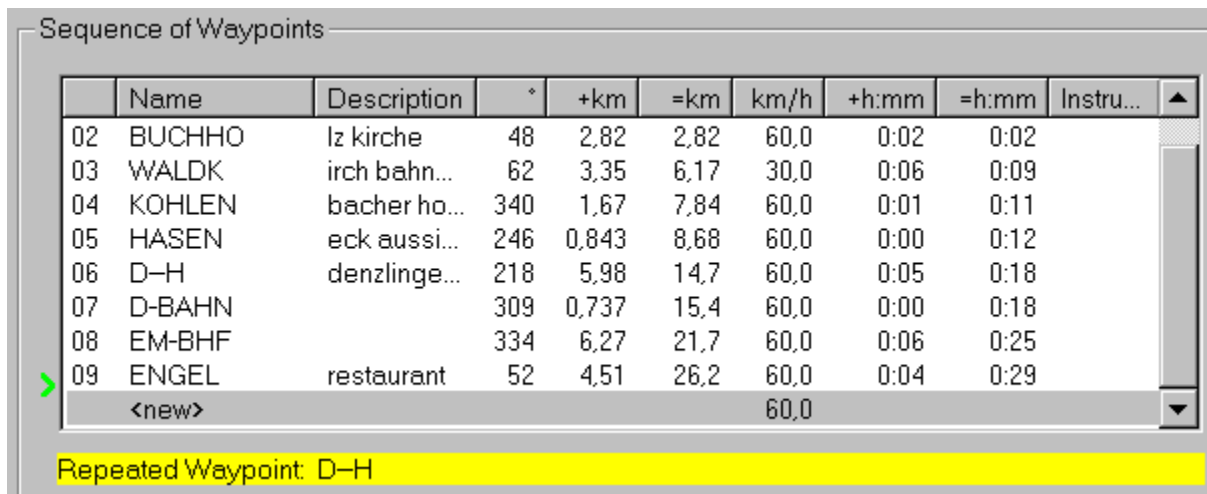
With the menu *Route* you select a [Route](#) to be defined or changed. This menu is easiest opened by a right mousekey click on the upper part of the window.

The name is entered here. Lowercase letters and umlauts are converted automatically. If you don't enter a name GARtrip will define one automatically.

Below you select the color to be shown on Chart.

Below the name of first and last waypoint is shown.

### Bottom part: sequence of waypoints



	Name	Description	°	+km	=km	km/h	+h:mm	=h:mm	Instru...
	02	BUCHHO	Iz kirche	48	2,82	2,82	60,0	0:02	0:02
	03	WALDK	irch bahn...	62	3,35	6,17	30,0	0:06	0:09
	04	KOHLN	bacher ho...	340	1,67	7,84	60,0	0:01	0:11
	05	HASEN	eck auss...	246	0,843	8,68	60,0	0:00	0:12
	06	D-H	denzlinge...	218	5,98	14,7	60,0	0:05	0:18
	07	D-BAHN		309	0,737	15,4	60,0	0:00	0:18
	08	EM-BHF		334	6,27	21,7	60,0	0:06	0:25
>	09	ENGEL	restaurant	52	4,51	26,2	60,0	0:04	0:29
	<new>					60,0			

Repeated Waypoint: D-H

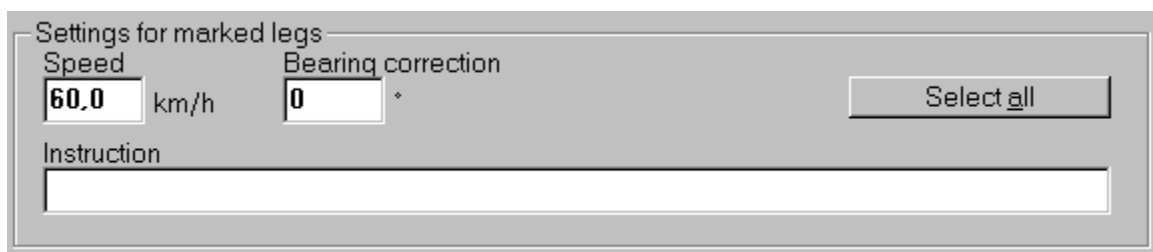
Here the waypoints belonging to the selected route are listed. The filed size within this list can be modified the same way as for the [waypoint list](#) on the main panel.

The list is edited using the menu *Edit*. This menu is easiest opened by a right mousekey click on the lower part of the window or on the list.

Next to each waypoint name you see the waypoint description, the bearing of this route leg, the distance from previous waypoint, and the distance from beginning of route. The estimated time of this leg and of the whole route up to this point follows provided you have entered a speed value. The last row shows your instruction if any.

A colored arrow on the left margin of the list marks the insert position.

If this is too much confusing information you may shift any row away (set its width to zero).



To get the calculation of estimated duration you must enter the speed first. If you want to set the same speed for the whole route you may first activate *select all*, then enter the speed value. Otherwise you should mark the route legs yourself before entering the speed.

The same way you can set a bearing correction value for the whole route or for certain legs only. This will mostly be used for magnetic declination. The value entered will be added to the calculated bearings on the Chart and on the printed list.

You may enter a instruction text for each route leg. This will be shown on the chart. You may select multiple legs or the whole route before entering the text. If your Garmin receiver shows the route links differently a code may be appended to the instructions: &A for "line", &B for "link", &C for "net", &D for "snap".

When creating a new route the speed and bearing correction of the <new> trailer of the last route will be copied.

Please keep in mind that the speed entered and the duration based thereon can be a rough estimation only because the route legs are considered straight lines. When you plan a ship route or a plane route the values may be precise but in case of a hiking tour a speed value of 2 km/h will be suitable although you walk at 5 km/h. To get a good impression what value will fit in your case look at the Chart of an already recorded track. Select *Edit Track*, then mark a typical range of the track. Look at the value for "Direct speed".

### **Menu Edit**

*Open Waypoint* will open the waypoint window with access to the full waypoint data. A double click to the item has the same effect.

*Remove, Cut, Copy, Insert, Select all*: those are the usual edit functions for the marked items. You'll need these functions to create a new route using parts of existing routes.

*Takeover selection to waypoints list*: the marked route points will be marked on the main window list as well. May be useful to delete the route points from the waypoints list.

*Takeover selection from waypoints list*: the waypoints you've marked on the main window list will be marked here also, provided that they exist in this route. You may use this facility to mark some route points on the chart, then takeover the selection to the route points list.

*Convert whole route to track*: a new track will be created which is in fact identical to this route. You may use this for two reasons: either you may have a route with defined altitude of the route points and you want to see the altitude diagram of your prepared route. Or you may have created a route which his too long for your GPS receiver. In this case you may want to transfer it into the track memory of the receiver instead.

*Invert order*: you should have marked the part of the route you want to be inverted.

*Optimize order*: you should have marked a contiguous part of the route you want to be optimized. The first and last point will stay in place, and the middle points will be rearranged for shortest distance. This function is recommended after inserting several points without regard to the correct order.

*Change order manually*: this menu item is informal only. Just mark the points to be moved, then drag them to the desired position by the mouse.

All changes to the route will be shown immediately on the chart provided that this route is already visible

on chart.

If all routes are ready you will close the window by the *close* button.

### ***Insert waypoints to routes***

There are three different ways to do that. Please ensure that the window *Routes* stays open all the time (maybe in the background),

a) the waypoint are already contained in the working memory: mark the route and the insert position (normally the end of the route). Go to the main window. Click to the waypoint wanted and then click to *insert in route, or double click to a waypoint in the list*.

b) Go to the window *Chart Control*. Display the waypoints. Left-Click to the wanted waypoint on the Chart and use the menu *Insert Waypoint in Route*.

c) the waypoints are not in the working memory: mark the route and the insert position (normally the end of the route). Go to the main window. Enter the new waypoints in the order they should be appended to the route. Or set a new waypoint by mouseclick on the chart.

Please check the correct order of route points in any case.

### ***Storing routes***

Routes are stored together with waypoints in waypoint files, see menu of main window: File.

When transferring routes to or from the receiver, only the waypoints contained in routes are transferred. See menu of main window: Garmin(Magellan).



To go to another open window just click to a visible part of that background window. Or hit Ctrl-F6.

With the option *Control window on top* activated each window is pushed on top if touched by the mouse pointer.

Should the windows overlap too much please click to the title bar on top of a certain window, keep the mouse button pressed, and drag it away.

## The window *Chart Control*

Next: [Selection](#)

This window is opened by a click on the button *Chart, Map, Tracks...* within the [Main window](#).

See also: the [Chart](#) drawn.

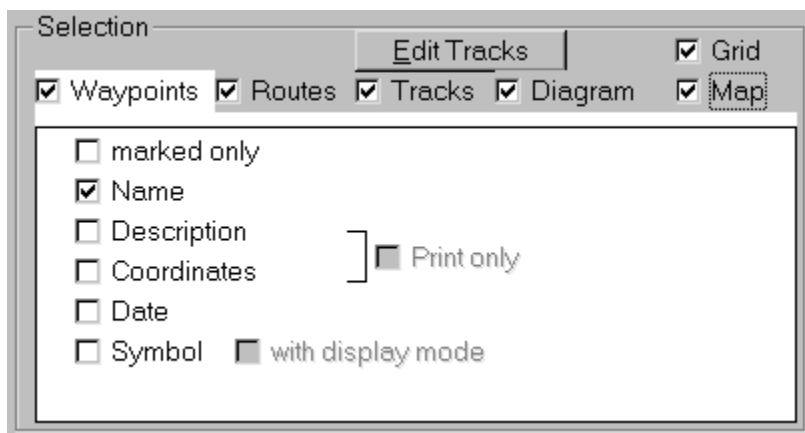
You may go [back](#) to the main window without closing the window *Chart Control*.

Some program functions are accessed by buttons, others by menu control as [File](#), [Garmin\(Magellan\)](#), [Map](#), [Options](#).

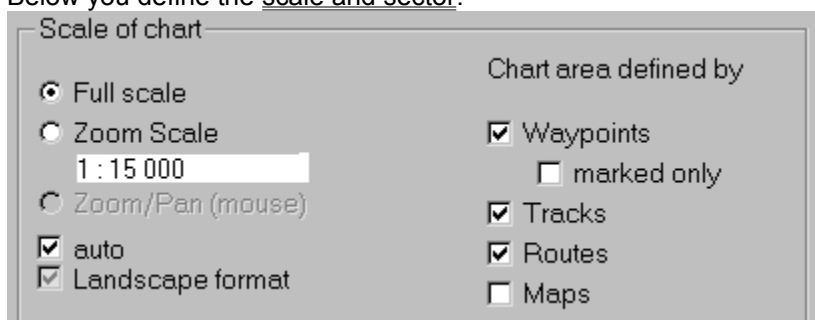
This window controls the graphical Chart display. In most cases you will first read the data of a [track](#) from a [file](#) or from the receiver. You control the track data by the menu functions [File](#), [Garmin\(Magellan\)](#), and [Edit Tracks](#). As soon as a track was read from file its [headline](#) will be displayed.

But the Chart display can also be used without a track, just to display waypoints, map, and routes.

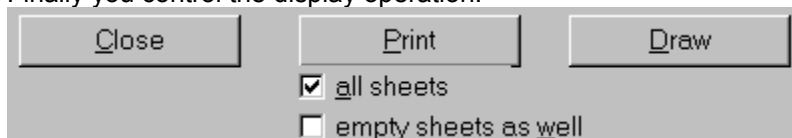
The field of option buttons defines the [selection of elements](#) to be displayed.



Below you define the [scale and sector](#):



Finally you control the display operation:



*Draw*: the Chart will be displayed within an own window on screen. If you notice an error during this operation you may *cancel* it.

*Print*: this command button is visible only when the Chart has been drawn on screen. Before printing you get a chance to select the printer and to change the printer settings. Then the headline definition panel comes up. During printing the screen shows a [page overview](#) with all texts replaced by black rectangles of

correct size. If you notice an error during this operation you may *cancel* it.

When printing a chart with maps you may print a small test strip first to check the printing quality.

*When you select "black only" on the printer selection box the Chart and the list of waypoints will be printed in black and white. When using a black and white printer the printer driver would convert colored items to gray without this option. Narrow lines would become invisible. The restriction to black and white prints may be useful as well if you use a color printer and intend to take photocopies later.*

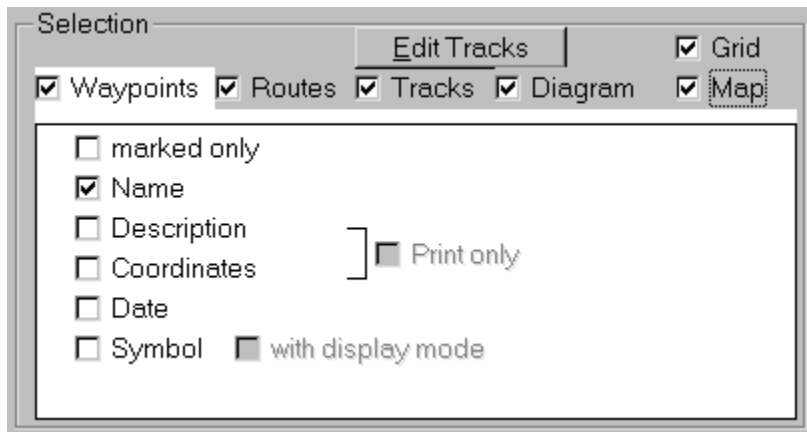
The paper print shows the same items as the screen display but the sector partitioning lines are missing. If a print spans multiple pages the pages will overlap a little for better handling. The exact sectors are marked by yellow lines (in black and white mode: dashed) as an aid when sticking them together. On request *all sheets* can be printed without user interaction. Some times not all sheets contain drawing items. These empty sheets are printed only if *empty sheets as well* is enabled. This may be useful to get a complete coordinate grid.

*Close:* This button closes the window *Chart Control* and the Chart itself.

## The window *Chart Control: Selection*

Next: [Scale](#)  
Note: [Segment](#) [Track](#)

See also: [Chart Control](#), [Scale](#), [Chart](#)



You will define first what to be drawn: **Waypoints, Routes, Track, Diagram, Map, Grid**.

Then the particular elements are selected on filing cards. These cards become visible whenever you **touch** their keyword (e.g. Waypoints).

### **Waypoints:**

The waypoints within the working memory are represented as a dot on the Chart with its name written next to. If a waypoint is presently marked on the [list of waypoints](#) within main window, the dot will be red (screen only).

*Hint:* the left mouse key allows to mark (single click), edit (double click), or move (drag) waypoints directly on the [Chart](#).

### **Marked Only:**

Optionally you will be shown only the waypoints marked on the [list of waypoints](#) within the main window. See also [Edit List, Mark](#) on the *main window menu*.

### **Name, Description, Coordinates, Date / Print only:**

The name and description fields, and the creation date of the waypoints can be shown optionally. Coordinates as well on request. When printing a small font will be used for the description. For screen display it is not recommended to show the description and coordinates because it leads to frequent [position conflicts](#).

### **Symbol, with display mode (only if enabled)**

The display mode controls the selection of Name and Description for each waypoint individually.

### **Routes:**

The routes within the working memory are shown using the colors attached on the window [Routes](#).

The start point of a route is indicated by a triangle, and the end point by a rectangle.

The waypoints belonging to the routes shown are shown as well.

### **Marked only:**

There appears a field for [selection](#) of desired routes. A double click on a route within this field will open the Window *Routes* immediately.

### **Route Names, Instructions, Duration, Course:**

The name of the route, the instructions, and the values for course and duration (see [Routes](#)) will be

shown for each leg (*Leg*) and/or accumulated (*Total*).

**Track:**

The data of a track must have been read before from a file or from Garmin(Magellan). The track will be shown as a colored line. Interruptions are shown as pauses.

**Edit Track:**

Select this button to analyze data of certain track points, or to edit the track. Then a overlaid window Edit Track is opened.

**Time stamps:**

The current daytime of the recorded track can be marked in selectable intervals. These marks are shown as small circles with the time written nearby. The recorded time stamps are corrected according to the time zone setting. All pauses from 5 minutes on are shown.

For tracks spanning more than one day the calendar day will be shown in addition to the time (print only).

Optionally the elapsed time (duration) will be shown instead of the daytime; pauses will be included or excluded optionally.

**Milestones:**

In user defined intervals the elapsed distance will be shown. Each new track will cause the odometer to be reset. The track speed will be shown averaged between adjacent milestones.

**Texts:**

Here you decide if the descriptions of certain track points shall be visible.

**Line color defined by: Track sequence, Speed, Altitude, Vertical speed, Gradient (Steepness)**

The standard will be *Track sequence*. Each track will be drawn completely in its own color. You define the color by *Edit Tracks*. Without your selection the track color will toggle red/blue.

When another criterion is selected you'll see the entry fields for the threshold values.

Line color defined by

Speed (km/h)	▼	15	60
--------------	---	----	----

In this example the parts of track with speed below 15 km/h will be drawn in light blue, speeds from 15 to 60 km/h will be shown in blue, and speeds above 60 km/h in red. If you want only one threshold then leave the second field empty. The colors are changed by clicking on the color field.

**Single Dots:**

All points of the track will be drawn by small circles in order to make isolated points visible. Even with this option deselected the first point of any segment will be shown as a small circle in order to make single points visible.

**Diagram:**

Below the chart a diagram will be drawn, showing the speed, altitude, **vertical speed, or gradient** (steepness) versus distance, duration, or daytime.

*Note:* the speed is calculated off the distance and time difference of any two track points. In case of bad GPS precision there may be big errors. It is recommended to use the option Track speed averaged. Otherwise you may use the outliers to find bad track points in order to delete them afterwards.

*Note:* Some receivers (e.g. eTrex) allow SAVING the track internally. Gartrip will read those saved tracks as well but they come without time information. In this case no speed can be calculated.

**Map:**

A scanned map is shown as a background of the chart. *This function is not available for the 16 bit program version.*

**Best Map within this folder:**

The program will select the map within the selected directory which fits best to the given chart area. Your map file selection is ignored. Only the directory selection is relevant. You should only have maps with the same nominal scale in this directory.

**Up to 4 at once:**

Up to 4 maps are shown at once if required. If your map files are huge the drawing may take very long with this option. Whenever you deselect this option the map memory is released immediately. When working with very small map files it might be useful to increase the maximum number of maps used at a time. Use the menu *Options, Best Map: Number*. **With slow computers it might be useful to select only 2 or 3.**

To show the other chart objects more clearly in case of a dark map there are three options:

**Brightness:**

The map can be shown in light colors. This will enhance the visibility of other objects, and it may save ink. When set to 0 the map will be shown in original colors.

**Blinking objects:**

All other chart objects will blink to avoid important map features from being covered. (Not for printing of course) Blinking is suspended whenever you move the mouse across the chart.

**White borders:**

All other objects come with white borders to make them better visible.

**Grid:**

In addition a coordinate grid can be drawn. You must have selected the proper coordinate format and datum (important!) on the main window before. The Chart will always be aligned to the coordinate system chosen (grid north). The geographical north direction is shown by an arrow in the upper right edge.

If you want the Chart to be aligned to the geographical north direction chose a coordinate format with degrees, not a metric grid. **The grid density may be selected**

Whenever the track record had been interrupted (the receiver has been switched off temporarily, or POOR GPS COVERAGE) the following track point is marked as the beginning of a new segment. This enables the interruption to be shown on the Chart. You may set or reset segment marks manually (Menu Track: Edit).

A new track is marked whenever you append a track to the track memory (by opening a file, or by reading from the receiver), and at pauses longer than 8 hours. Some receivers transfer separated tracks (eTrex), others handle separated tracks but transfer them as a single one (GPSIII). Sections are shown in red or blue alternately, or in the selected colour.

You may set or reset a track mark manually (Menu Track: Edit). This is useful to get a better Chart when forth and back tracks are close to each other.

The distance measurement for milestones is reset for each new track.



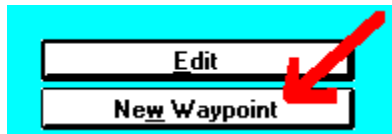
A range is a temporarily marked part of the track memory. The properties of the range are analysed and displayed, and you may save the range on file or write it to the receiver. The range marks are not saved on the track file.

## The window *Chart Control: Scale of chart*

Next: [Menu](#) [Track](#) [File](#)

Note: [Scale definition](#) [Placement](#) [Headline](#) [Track file](#)

See also: The window [Chart Control](#), [Selection](#), [Chart](#)



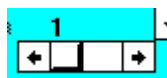
*Hint:* mouse clicks (right button) on the [Chart](#) allow you to change between *Full Scale*, *Scale*, and *Zoom*, and panning.

### **Full Scale:**

The scale is defined automatically so that all items fit to one page. If you want to define the scale for later use enter it just now. Then you will get a grid of sector partitioning lines in light blue color (on the screen only) provided that the Chart spans more than one partition. This shows you how the whole Chart will be split among several pages.

### **Zoom Scale:**

If this option is active the value entered into the field below will define the scale of the partition. This is a kind of true-to-scale zooming.



### **Panning:**

A horizontal and a vertical scrollbar is visible in zoom scale mode provided that the chart spans more than one partition. These bars define the partition to be shown.

*Hint:* The partition may be panned in 1/10 steps for special purposes. Click to the field between slider and arrow on the scrollbar. If intending to print partitions to stick them together you should use full steps only.

*Hint:* panning is also available by the right mouse key directly on the [Chart](#).

### **Zoom/Pan (mouse):**

This option is accessible only by defining a range with the right mouse key directly on the [Chart](#).

### **auto:**

This option enables the Chart orientation to be selected automatically.

### **Landscape format:**

On request you may force the orientation yourself.

### **Range defined by: Waypoints (marked only), Track, Routes, Map(s)**

These option buttons define the items to be included when the scale and sector of the Chart is fixed automatically. Example: You want the track to be shown completely but the waypoints in memory are spread over a bigger area. Activate the option *Range defined by* for *Track* only. Then the track will cover the whole Chart, and the waypoints are shown only as far as they fit into the same area.

The scale is valid when printing on a printer page (normally A4 size) provided that your printer and printer driver works true-to-scale. The author cannot guarantee for that.

At screen display the real scale depends on the size of your screen that is never known exactly. Therefore the following rule is used here: the screen represents a printer page exactly, independent of its true size.

When using a printer the first time with GARtrip, GARtrip will know its page size not before you printed the first time. Initially the normal A4 size is assumed.

Texts (names, descriptions, time stamps) are placed to avoid overlapping trackpoints nor other texts.

In case this is impossible you will get an additional option box *allow overlapping text*. If enabled all texts will be shown. Overlapping texts are highlighted by yellow background in this case (on screen only).

You may write a short description into the headline in case the file name is too short for clarity. The headline will be stored within the track file.

A track File is named with the extension .T and stores the track data and a headline.

The length of track is unlimited as long as the computer memory lasts. Extensive tracks might slow down the program, though. You may combine several tracks into one file.

The file format is binary. In case you wish to import or export data or to edit them with a text editor select the suitable file format, preferable GARtrip Export Text.

**open**

This function reads a track file into the working memory of GARtrip.

In case there are already tracks in the memory you will be asked if the file should be appended to the existing data.

If the existing data have been changed before you will be asked if they have to be stored - in case you forgot it.

See also Status Message.

**save**

This is done to store a track in the currently opened track file.

**Save as...**

Like *Save* with selection of another file name, and export format if desired.

In case you have marked a range you may save only this range.

If you apply an existing file name you may overwrite this file, or append the data to it. This helps to collect certain tracks in different files without the need to open these files.

See also Status Message.

**Draw by hand**

This function is also reached via *Edit Tracks*.

While active each mouse click on the chart will enter a new track point immediately after the position of the track cursor. You also may move an existing track point – just drag it by the mouse. After selecting a track range you may drag the whole range at once. Deselecting the option box *Draw by Hand* finishes this mode. When this mode is entered while the track cursor points to the end of the track a new segment will be defined.

## **Menu Chart Control: Track: Garmin (Magellan)**

Next: [Menu Map](#)

### **read (Function key F5)**

All track data of the receiver will be read.

In case there is already a track in the memory you will be asked if the file should be appended to the existing data, to combine two tracks into a single one.

If your receiver handles separate tracks ("saved tracks") all will be read. GARtrip will attach the name of a track to the first track point but the name "ACTIVE LOG" will be suppressed. After the reading is complete you may select what track shall be used. Unfortunately it is not possible to do this selection prior to reading. The transfer protocol gives no chance to.

Optionally a track with a pause longer than 8 hours or with a position change over 18 degrees will be separated into two tracks.

### **write (Function key F8)**

The track data in working memory will be transferred to the receiver, i.e. appended to the existing data. Normally you will clear the memory of the receiver before by *CLEAR TRACK LOG*.

*Hint:* Some receivers ignore time stamps when track data are written. Time information will be lost when reading this track back.

*Hint:* Some receivers not record a track after this operation. It will try to keep what you have written. To record again you must enable it yourself.

*Hint:* If your receiver uses named tracks (example: eTrex) you should enter a text for the first track point of each track (Edit Tracks) before using the write operation. This text will be transmitted as the track name. Otherwise you will be asked whether this track shall be transferred as "ACTIVE LOG" and therefore stored in the active track slot of the receiver.

### **Current position**

The current position of the receiver is read and displayed each other second. It will optionally be saved as a track, independent of the track memory of the receiver.

If you want to get the current position displayed on the Chart then draw a Chart first using a proper scale, and activate *follow track point*. The display frame will be panned automatically to keep the current position visible.

**The current position will be shown by a toggling cursor (Cross/Circle). An additional arrow will indicate the direction and speed of any movement. The arrow length shows the position you'll reach within 30 seconds.**

With Garmin receivers this function can be used with both transfer protocols: Garmin (GRMN) or NMEA. You must set the same protocol for your receiver and for Gartrip (program menu System, Receiver properties). GRMN is better because you don't need to change the protocol each time this function is used. NMEA is better because it transfers the altitude even with receivers that don't save the altitude themselves (example: GPS12):

### **Power off receiver (Function key F4)**

This function is much more convenient than the red key of the receiver.



## **Menü Chart Control: Map**

Weiter: [Menü Options](#)

### **Open: folder**

Here you enter the name of a map folder only. The option *Best map within this folder* will be selected automatically. The program will search for the best fitting map in this folder.

### **Open: single map**

Here you select a distinct map file to be used. The option *Best map within this folder* will be deselected.

### **Calibrate**

Select the map file to be calibrated. The option *Best map within this folder* will be disabled.

## Menü *Chart Control: Options*

Weiter: [Edit Track](#)

### **Properties of Chart**

You may change the font size and line width of each element as you like it. It is recommended to activate the option box *Headline: Print only* to suppress the headline on screen. You will need the headline on screen only if you want to make a screen copy.

The printed diagram can be set to *shaded* or *line only* in order to save ink. These options do not affect the diagram on screen.

The actual scale of the chart defines the density of coordinates grid such that you'll always get a reasonable number of grid lines. If you feel that more lines would be better you may increase it here but the finest grid is limited to 0.01°, 1', or 1 km depending on the coordinates format chosen.

The [map projection](#) to be used for the chart is also selected here. In case of doubt it is recommended to select *Conic*.

### **Track Speed not filtered / 10 seconds / 20 seconds / 1 minute / 5 minutes averaged**

In case of "not filtered" the track speed is calculated from two succeeding points. Otherwise it is averaged over the selected time. This applies to the numeric display of speed with *Edit Track*, to *Track colour defined by speed*, and to the *diagram*.

The calculation of Gradient (Steepness) is averaged as well. The gradient is not related to a time but to a distance, so the averaging is based on the following distances:

<i>Selection</i>	<i>Distance</i>
10 seconds	100 m
20 seconds	200 m
1 minute	600 m
5 minutes	3000 m

### **Control window on top**

#### ***By click (normal)***

This is the default setting. Dies ist die Standardeinstellung. You [change](#) among windows as usual.

#### ***by mouse movement (chart control only)***

To push the chart or the chart control on top you only have to move the mouse across it.

#### ***by mouse movement (all windows)***

Like above, but it also applies to the main window and routes window.

#### ***always when Edit Tracks or Calibrate Map***

The window *Chart Control* will always stay on top while *Edit Tracks* or *Calibrate Map* is active. This ensures that important data are visible all the time. The chart window will pop up for a short moment when touched by the mouse pointer.

### **Best map: number**

It is recommended to leave this setting unchanged at 4. In special cases, for example when working with very small map files it may be good to increase the number of maps used at once (limited to 20). When used with big map files the chart may appear very slowly, and the computer can run into memory problems. **With slow computers it might be useful to reduce this limit to 2 or 3.**

### **Reading tracks: Split tracks at pauses >8h**

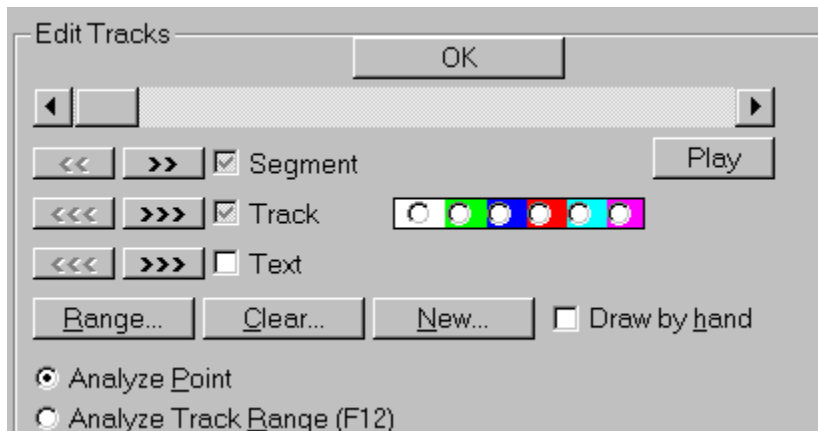
When reading tracks from the receiver this option will insert a new track mark after each interruption of more than eight hours. This leads to automatic distinction of forth and back way in many cases.



## The overlaid window *Edit Tracks*

Next: [The Chart](#)

This overlay window opens as soon as you click on *Edit Tracks* within the *Chart Control* window.



Here you find a scrollbar to mark a point on the track. *Hint:* if you click to the track on the Chart this point will be marked as well.

The marked point will be highlighted on the Chart by a cross mark/circle with the color of the track



If the marked track point is the beginning of a segment you will see a check mark for *Segment*. You may change this property. Using the buttons << and >> you move to the next or previous segment directly. If the marked track point is a new track you will see a check mark near *Track*. You may change this property. You may select the color used for this track on the Chart. If no color was selected tracks are drawn in red and blue alternatively. Using the buttons <<< and >>> you move to the next or previous track directly.

You can attach a comment text to certain track points. Just write it into the text field. It will be shown on the chart. If your receiver supports named tracks you will find these names here at the first point of the track.

All characteristic data of the marked track point are shown below.

If a range of the track has been defined the range data are shown alternatively.

The *Play* function lets the track point mark automatically move forward with the selected speed. This gives an impression of the trip afterwards.

The *Draw by hand* function allows to create a track manually by mouse click in order to write it to the receiver instead of a Route.

The option *Follow track point* pans the current Chart frame whenever the marked track point is outside.

### **Menu Range...**

#### **Set Begin of Range / Set End of Range**

With these functions you define a range of track. Characteristics of this range are evaluated and shown in the window.

Mark the desired startpoint or endpoint first with the scrollbar or with a mouseclick on the Chart.

The range will be drawn as a bold line (on screen only).

### ***Set range to whole segment (Function key F9) / to whole track***

Mark any point first within the desired range. Of course you may adjust the beginning or end of the range afterwards.

### ***Set range to all tracks (Function key F11)***

This shows you the calculations of the whole track memory.

### ***Set range to visible part***

After zooming into the chart this function sets the track range to the visible part of tracks.

### ***Marked range: Cut / Copy / Insert***

The Windows clipboard is used to displace parts of tracks. When inserting you'll be asked whether the track points should be reversed.

### ***Analyze point / Analyze track range (Function key F12)***

This toggles between showing the values for a range or for a point.

### ***Menu Clear...***

#### ***Single point***

Whenever a track contains a single bad point. e.g. caused by bad GPS reception, you may clear it after having set the mark on it.

#### ***All segment marks (in Range)***

The segment property of all points in the track range is cleared, optionally for short pauses only. This may be used to get separated parts of a track drawn contiguously. This can be undone as well.

#### ***All repeated points (in Range)***

Some receivers with barometric altimeter (eTrex Summit and Vista) sometimes use to record track points when they have no satellite coverage. Those track points come with identical coordinates and they can cause some confusion when analyzed. This function clears all unwanted track points. In some cases these points might be useful due to the altitude values.

#### ***All repeated points***

Some receivers with barometric altimeter (like eTrex Summit or Vista) use to record track points even if they have no GPS lock. Those track points have all identical coordinates of the last known GPS position, so they can lead to some confusion. This function deletes all track points with identical coordinates to the previous one. In some cases you might lose important altitude data then.

#### ***every other point (compress)***

If working with very long track you may reduce the amount of data using this function. On Chart you will see both versions of the track at the same time. You should undo this function (see below) if you see a significant difference.

#### ***ALL points in Range***

In many cases a track will contain too much points, e.g. because you had forgotten to clear the track memory of the receiver before starting to a trip.

You may clear a range of track by

1. defining the range (see above) then
2. clicking to the menu *Clear: all points in Range*.

Hint: If you clear more than 5 points at once the first following point will be treated as a new segment .

#### ***all points out of range***

With this function you remove everything outside the marked range.

### **undo**

You may undo *one* clearing action.

### **Menu New...**

#### ***New waypoint from track point***

After having set the mark on special track point you may create a new waypoint at this location. The window *waypoint* is opened to enter a name and so on.

#### ***New waypoint from average of track range***

This is a special function to increase the precision of GPS by *averaging*.

To mark a waypoint with the receiver to a precision of 10 meters do the following:

Set the TRACK LOG SETUP of the receiver to:

RECORD TRACK: YES

criteria: Time interval: 00:05:00

(a shorter interval is useless because the GPS error (SA) changes slowly).

Wait until the first 3D-Position is shown.

Clear the track memory of the receiver: CLEAR TRACK LOG.

Record a track for an extended period of time, 8 hours minimum, better 24 hours (external power supply or BATTERY SAVE recommended). The record doesn't need to be done in one piece. Only the sum of track points is relevant.

read the track into GARtrip and clear single extreme track points (outliers).

Define the range (normally whole track).

The menu function *new WP: marked point* creates a new waypoint by averaging the range.

By this method it is easy to afterwards store a precise waypoint at a trip pause location. Provided you had your receiver switched on during a trip pause, at home you may average the track range recorded during the pause.

*Note:* If your receiver does not provide the selection *Time Interval* for recording the track then this track will be useless for averaging. In automatic mode it will not record any points without motion.

#### ***New route from track range***

Define a track range first. The new created route will be kept within the selected distance from the track. When "use existing waypoints" is selected then all waypoints found within the given distance are used, and new waypoints are created if needed.

In case the number of track waypoints is too big you will be asked what to do.

## The Chart

*Next: [Limitations](#)  
Note: [Multi select](#)*

For the selection of Chart items see [the window Chart Control: selection](#).

For the definition for scale and sector see [the window Chart Control: Scale](#).

### **Full Screen:**

With the Windows Full Screen button (top right corner) you may extend the Chart to the full screen. Then you may pop up the control window by any keyboard key.

### **Size change:**

By dragging a border line you may change the size of the Chart on screen. *Please change the width only.* The height will be changed automatically for an aspect ratio of 1:1.4. Click to *Draw* to get the chart redrawn.

### **Mouse Control:**

#### ***in general:***

With the *left mouse key* you select Chart items (waypoints, track).

With the *right mouse key* you change the partition shown (zoom and pan), or you use a context menu.

#### ***Left mouse key (Track: Edit has not been selected)***

*Click* to a *waypoint* to get a context menu with several functions. You may click on its name or on its yellow flag as well. **The menu function "Reposition waypoint to track" allows to correct a waypoint after a trip, assuming that you reached it on the way although it is shown in a certain distance from the track. It is also used to takeover the altitude from the track.**

*Double click* to a *waypoint*. The window [Waypoint](#) will open, and you may check or edit the data.

*Click* to any point. You will get a context menu with the ability to clear the selection, or to create a new waypoint there. **"Copy cursor position" will copy the coordinates to the clipboard for use by another program.**

*Drag* a *waypoint* to another location. You will be prompted to accept the change of coordinates in order to **correct** them. *If you have selected some waypoints before, optionally all these waypoints will be moved the same way. This function may be helpful if you had entered several waypoints with the wrong datum.*

*Drag* a *rectangle* enclosing one or more waypoints. All enclosed waypoints will be marked. You may mark several waypoints. Sometimes this is useful to show the marked waypoints only.

#### ***Left mouse key (Track: Edit has been selected)***

*Click* to a track point. This track point will be marked as if you had selected it by the scrollbar in the overlay window [Edit Track](#).

*Drag* a line from one track point to another. By doing this you will mark a range of track.

*Drag* a *rectangle* around a part of the tracks. By doing this you will mark a range of track.

### **Right mouse key:**

#### ***Rectangle:***

Opening a rectangle with the right mouse key pressed, you define a new zoom partition. If you have checked the option *auto* on the control window then you may change the orientation as well.

Press the Alt key at the same time to pan instead.

*Click near the border:*

The context menu allows panning by one, 1/2 or 1/10 frame exactly.

*Click at any other position:*

The context menu offers a variety of zoom and pan operations. The zoom operations will center the new frame at the click position.

*Click at any other position with a control key held down (Shortcuts):*

Shift key:	Zoom in x2
Shift and Alt key:	Zoom out /2
Alt key:	Pan mouse position to center
Alt key, border position:	Pan 1/2 frame
Ctrl key:	Full scale
Ctrl and Alt key:	Zoom to scale



Keep the shift key depressed to keep already marked waypoints.

Keep the control key depressed to toggle the state of enclosed waypoints.

## Limitations

Next: [Map projection](#)

Under certain circumstances it will be impossible to draw a Chart.

Please keep in mind that GARtrip cannot draw a range exceeding the meridian at 180°.

**Message "Area too large to be shown as projection of format ... Select a format with degrees"**

The Chart is always based on the projection of the coordinate format selected on the main window. If the range of the Chart cannot be expressed in the numbering system of a single grid zone you will get this message.

**Message "Chart area will be limited to 90° longitude/latitude"**

You have tried to draw more than one quarter of the earth. GARtrip cannot do this.

The waypoints or the track contain one or more points far away from each other. Clear the waypoints HOME and GARMIN first.

Try to draw *only* waypoints *or* track. If even that is not possible:

**Waypoints:**

Mark one waypoint to be drawn on the list. Make this waypoint the reference point by clicking to the field *Reference Point*. Select the sorting option *Distance from Ref.P.* Look at the bottom of the waypoint list. Clear the waypoints with big distance.

**Track:**

Mark one waypoint near to the track. (If you have no appropriate waypoints then create one in the middle of the track. See Track: Edit / new waypoint.) Make this waypoint the reference point by clicking to the field *Reference Point*. Edit the track: look at the indicated distance from reference point, and clear the points with big distance.

## Map Projection

Next: [map projection examples](#)

In most cases this selection can be ignored.

At scales bigger than 1:200 000 (example: 1:50 000) any differences between those projections won't be noticed. At scales smaller than 1:500 000 (example: 1:1 000 000) you should take care on the correct selection, in particular when using a scanned map.

The map projection defines how any position on the earth (waypoint, track point) will be projected to a plane. In general no map can be created without such a projection.

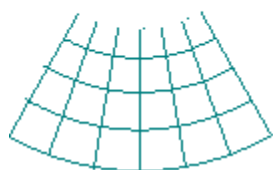
GARtrip uses a projection when drawing the chart. The kind of projection is selected according to the coordinates format you have chosen on the main window of the program.

Whenever a metric grid is selected (this is any format bin the list beginning with UTM) this grid will define the projection. For most grids this is the Transversal Mercator projection, also called Gauss-Kruger. All following instructions can be ignored in this case.

See also: [Examples](#)

If no metric grid is selected (this is any format with coordinates as latitude/longitude in fact hddd.ddddd° or hddd°mm.mmm' or hddd°mm'ss.s") the following three projections can be selected:

### Conic

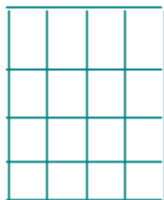


#### **Conic (Lambert)**

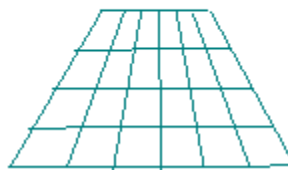
This projection is almost used for land areas. It is characterized by curved latitudes and converging meridians.

Experts might want to know the following properties: the two standard latitudes (parallels) are set to 20% and 80% of the shown latitudes. The central meridian is in the middle of the shown longitudes. This is true for the scale modes *Full scale* and *Zoom/Pan*. With *Zoom Scale* the projection parameters are defined by the original *full scale* chart. This leads to a set of charts with identical parameters.

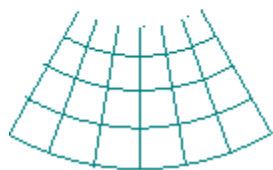
### Mercator



### Gartrip old



### Conic



#### **Mercator**

This projection is almost used for sea areas. It is characterized by rectangular latitudes and longitudes. The distance of latitudes increases towards the poles.

Mercator is the only projection without any angular distortion. This makes it most useful for long distance navigation. But the scale is not constant over the whole area. With GARtrip the indicated scale is valid at the center of the chart.

#### **Gartrip old**

This projection was used by former GARtrip versions. It is only recommended if the chart must fit to older printouts. In all other cases it is recommended to use Conic or Mercator.

*Hint:* for areas close to the equator all three projections will look the same.

**Selecting the projection:**

The projection is defined by three settings:

1. Highest priority: coordinates format selected on the main window. With a metric grid this grid itself will define the projection, and all other settings are meaningless.
2. Second highest priority: when a scanned map is calibrated its projection may be entered. Whenever this map is used this selection will define the projection used by GARtrip.
3. Lowest priority: on the menu Chart control: options: properties of chart you will find another place to select the projection. This selection is effective whenever no map is used, or a map with "unknown" projection is used.

## Map Projection – Examples

Next: [map files](#)

**You use maps with UTM grid only, or with another national metric grid, and you have this grid always selected for the coordinates format.**

Don't worry about map projections. No selection required.

**You use maps with scale 1:200 000 and 1:50 000 only.**

Don't worry about map projections. You won't notice any difference when selection a specific projection. It's recommended to leave the selection in "Properties of chart" as *Conic*, and to leave the selection at map calibration as *unknown*.

**You use maps with scale 1:1 000 000 or less but you have no information about the projection they are based on.**

Select *unknown* at calibration time. Then you may easily change the projection on the menu "Properties of chart" in order to check the coincidence of map features with your waypoints and tracks.

**You use maps with scale 1:1 000 000 or less and you know their projection.**

Select the known projection when calibrating. The setting in "Properties of chart" will be ignored whenever this map is used.

**You use sea maps with Mercator projection.**

Select *Mercator* when calibrating. The setting in "Properties of chart" will be ignored whenever this map is used.

## Map files

*Next: [How to create](#)*

The 32 bit program version allows to put an image behind the chart. This image will be a scanned map normally. You may use image file types BMP, GIF, and JPG. The map files must be created using an external program. See [How to create a map file](#). GARtrip does not change the map files at all. Therefore you may use the same map files with other programs as well.

Before using a map file it must be calibrated by defining the coordinates of two known points on the map. The calibration data will be stored in a separate file \*.cal for each map. If you move map files to another directory you must move the equally named cal file into the same directory, keeping it together with the map file.

You may get displayed more than one map at once on certain conditions.

## How to create a map file

Next: [Calibrate](#)

The map files are not created nor modified by GARtrip. You need a image editing program to create them out of a CD ROM or to read them from a scanner.

The North direction on the map must be upwards approximately. A skew up to 20° will be allowed by the calibration. Use your image editor to turn the image by 90° or 180° if needed before saving it.

It is assumed that the scale of the map is exactly the same in horizontal and vertical direction. Otherwise you will get reduced precision which can be compensated by the stretch factor.

**When using maps with very small scale (smaller than 1:500 000) the map projection should be selected correctly and the coincidence of map features with waypoints and tracks should be checked.**

If you use a scanner, please note:

Image files are huge. For most maps a scanner resolution of 150 dpi is suitable, 200 dpi when the map is a very fine printed one. GARtrip allows any other setting as well. Adjust the scanner such that the maps don't look dark.

You may use the file formats BMP, GIF, and JPG. The GIF format creates the smallest files at best quality but it is loaded slightly slower than BMP. When using BMP, 256 colors are suitable.

When scanning a big map divided into several A4 partitions, please note:

Please take care that all map parts are oriented identically. It is recommended to align the map border to the scanner lid border firmly. This makes the subsequent calibration very easy. This is also a precondition for the seamless display of more than one map at once.

You should scan the partitions with some overlap. 10% is a good choice. Ensure that the map is pressed tightly to the glass of the scanner. In most cases it is recommended to remove the lid of the scanner, and to use a book of proper size to press the map down. Do not fold the map.

Save all files belonging to the same paper map into the same directory, and don't save anything else there. This is also a precondition for the seamless display of more than one map at once.

There are special programs stitching the files together to one large single file. It is not recommended to do this here. The resulting files would be very huge, and they would be read slowly. In addition the calibration of such huge map areas would not be precise. It is better to use GARtrip's facility to tale the maps.

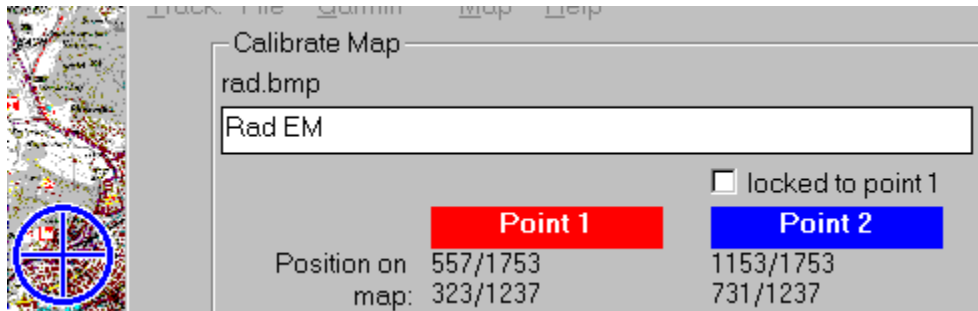
## Calibrate

Next: [Multiple maps](#)

Each map file must be calibrated before being used, to define the relation to coordinates. If you select an uncalibrated map it will be drawn without waypoints or track only.

After selecting the menu *Map / Calibration* the map and the calibration panel will be shown. You may call this function repeatedly to correct the settings. Whenever you leave the calibration panel by OK the settings are saved in a file <mmm>.cal automatically. (<mmm> represents the filename of your map file).

Don't forget to fill the title field. You should describe what places are shown on this map. The title will be shown on the file selection panel later on.



Now set the red and blue mark on the map to known places (left mousekey). Crossed grid lines are the best choice if the map has a grid. Otherwise you may set them to known waypoint locations. The marks should be spaced far away from each other. It is not relevant whether they are aligned horizontally, vertically, diagonally, or not at all. You may zoom into the map (right mousekey) to set the marks more precisely.

Coordinates:		
Easting	3417.299	3422.405
Northing	5325.717	5329.108
copied from WP	D--H	<nein>

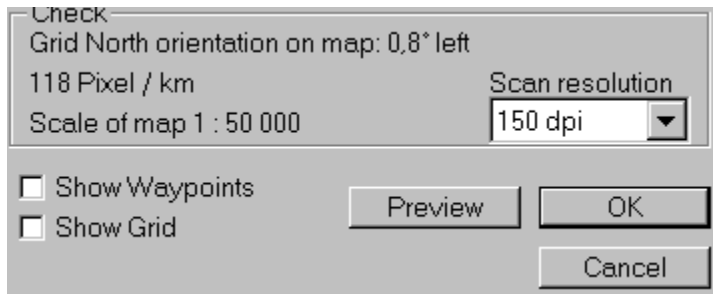
denzlingen hiho

Enter the coordinates for both mark points. The coordinate format and the geodetic datum applied is defined within the main window. Or select a waypoint by the selection "Copied from WP". In this case the coordinates of this waypoint will be used. This is not a permanent reference to this waypoint. This means that you may change or delete this waypoint after calibration without any effect for the map.

*Note:* It is good practice not to enter coordinates from scratch but to select a waypoint first, even if you won't use an existing waypoint for calibration. Once shown, the coordinates can be edited then. This method gives you a template. It shows how the coordinates shall look like.

Perhaps you will notice a mismatch of coordinates if looking at map parts far from the calibration points. This can be seen most clearly if your map came with a printed coordinate grid and you have enabled the grid of GARtrip. Or you compare other waypoints of high precision, or a track, with the map. The reason will be a distortion of the map caused by paper wear or folding, or by an inherent scaling error of the scanner. Many scanners don't scale the x-axis and y-axis the same exactly. You may compensate this effect by adjusting the *stretch* value. *Always leave it set to "none" if you are not sure about this.* The stretch value defines how much the long map side shall be expanded in relation to the short side in order to get the same scale. This leads to the value being the same if a map is rotated by 90 degrees (scanning in landscape orientation), and you may keep the same value for subsequent scans if the same scanner is used. *Note:* other programs use a third calibration point for the same purpose.





The field "map projection" allows selection what Map projection this map is based on.

The frame "check" shows some analysis of the current calibration. Watch the values whether they are reasonable before finishing. The scale of map indicated here is calculated based on your scanner resolution entry. The value is *not* required to reflect the original scale *exactly*.

At any time you may enable or disable waypoints, tracks, and grid to be shown for better clarity. The button *Preview* applies your setting to the map shown, and you may undo it by pressing *Cancel*. *Instant preview* shows the result of each change of a calibration point, coordinate, or stretch value immediately. If the border area of the scan is not of optimum sharpness, or if there are unprinted border areas on the scan, you should mark these *borders* accordingly using the left mouse key. This is important for subsequent use of the multiple maps feature.

When calibrating a big map divided into a series of A4 maps, please note:

After having calibrated the first map with its two calibration points you will be asked to copy this calibration for the next map to be calibrated. Please answer "yes". Then the calibration panel will show up with the option "locked to point 1" for the second calibration point enabled. This means that you only need to define the red mark and its coordinates, and the blue mark and its coordinates will be shifted in parallel.

If the subsequent maps are not oriented equally the result will not be perfect. You should check the precision of point 2 and correct it if needed.

## **Multiple Maps**

From program version 203 on multiple map files may be used at once.

### ***Preconditions:***

First please take care that the files (map files and their \*.cal files) are saved accordingly in directories. A directory shall contain only maps with the same nominal scale, not covering each other totally. Partial overlap is allowed and useful, though. Options Options You should be very careful when scanning the maps such that the partitions have all the same orientation, as precise as possible, see below. The number of map files per directory is not limited.

### ***Examples:***

So you should save the A4 partitions of the same paper map or several adjacent paper maps in one directory.

But you should use different directories for a) a hiking map, b) a biking map, and c) a topographic map of the same region.

You should use different directories also for a) a hiking map with scale 1:50 000 and b) a road map of scale 1:200 000.

### ***Function "Best map within this folder":***

This chart option instructs the program to use the best fitting map out of the chosen directory. The program will use the map covering the biggest part of the chart area.

You need only to select the folder by the *open: folder* dialogue.

But if you select "Chart area defined by maps" then all maps within this directory will define the chart area. The centre map will be drawn, and all other maps will be shown as rectangles. This gives you some impression on the covered area, and on the overlap of the maps.

Whenever you use zoom and pan functions to change the area drawn, a new centre map will be selected again.

### ***Function "up to 4 at once"***

When working near the borders between adjacent maps up to 4 maps will be shown at once. The number of 4 maps should be sufficient for all practical situations. If the chart area covers more than 4 maps, for example at a very small chart scale, the exceeding maps will be shown as rectangles. It would not be of use to draw all the maps at once. At this small scale you would not see much of them, and reading all the maps would waste computer memory and time. In extreme cases it may be useful anyway to show more or less than 4 maps. In this case you may change the maximum number by the Options menu.

The drawing may take a bit long if your map files are big. As soon as you deactivate this function the PC memory will be released immediately.

*Note:* It may take very long to print multiple maps. When GARtrip seems to have finished its printing activity it may take some minutes for the printer driver to prepare the printout.

### ***Overlapping and Borders***

In many cases the maps will overlap each other. The centre map will be on top then. When you zoom or pan around and another map becomes the centre map then this new centre map will be on top. The border line between the maps will move accordingly.

If the border area of the scan is not of optimum sharpness, or if there are unprinted border areas on the scan then you should mark these *borders* accordingly when calibrating. This avoids a bad part covering a good part. Marked borders are suppressed when the option "up to 4 at once" is activated. Otherwise the full map is shown because the border areas are better than nothing - they may contain useful information for calibration, for example.

### ***Remarks on the precision with "up to 4 at once"***

Maps are always displayed upright, like saved on the file. This is also true if the orientation of the map is not exactly north. GARtrip never rotates the map because this would diminish the resolution of the bitmap. To keep the relation to the objects all objects are rotated instead. You can see this when looking at the north arrow, or at the grid lines. This was such from program version 200 on.

If more than one map is displayed at once, and if these maps don't come with exactly the same orientation, then you might see some warping along the border between adjacent maps, looking a bit odd. The relation to the objects is precise, anyway. For each point on the chart, the map used at this point is the reference for the placing of objects. If you see this kind of warping you can be sure that all objects (Waypoints, Track points) are shown according to the map at this position.

This means that a track line crossing the border of maps might do some according side step. And you can define new waypoints by mouse click anywhere on the maps.

There is only one exception: the grid is valid for the centre map only. You get a note on the left bottom of the chart.

You may see what map is valid for a given chart point. When the chart option *Cursor position: show map name* (right mouse key menu on the chart) is active the coordinates indicator on the right bottom of the chart will say which map belongs to this point.

