“PreFlight” Flight Planning

Version 4.1

for

IBM compatible computers using Microsoft Windows

or

Apple Macintosh OS X

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1. Introduction

Congratulations for purchasing the "PreFlight 4.1" flight planning software. The program "PreFlight" takes over all the substantial preparations, required for a safe execution of a visual flight. Already while creating the flight route, you will profit by the versatility of PreFlight. You can either select the fast **text input, providing input assistance** or the **route planning by mouse-click** on the interactive map view. Beside the mandatory **flight execution plan,** "PreFlight" offers a detailed fuel computation, the determination of the position of the centre of gravity, the computation of the starting and landing distance necessary, a comparison of your planned flight altitudes with the **highest elevations** in the closer vicinity and an automatically filled in **flight plan** for the air traffic control. The again and again needed data of locations and aeroplanes are stored in internal data bases. You can add new records or change existing records as you need. For each of your flight routes, "PreFlight" produces a further file, which you can regard as a bare listing of locations flown over. Usually weather and loading are variable and therefore these parameters will not be stored with the flight route. To prepare a flight, you first update loading and weather, then you select your aeroplane from the internal data base. Finally you either create a new flight route or you open a flight route file stored before.

Then, the only thing you have to do for preparing a flight, is to check and notice the results determined by "PreFlight". If you own a GPS, which is supported by "PreFlight", you can write your **flight routes into your GPS** or read routes back into the computer. Furthermore - with help of a portable computer - it is possible to record a flown (or driven) track. If you activate the **Moving-Map** mode, you will see your current position on a scanned map or on the elevation profile in 1-km-resolution.

1.1. Environment

"PreFlight" was developed for **IBM-compatible computers** and for the **Apple Macintosh**. The computers should have 64 MB memory and a processor with a clock frequency of at least 266 MHz. On your hard disk, you need 170 MB free disk space (without ICAO-charts) or 300 MB, with ICAO-charts. As operating system you need Windows 95 or higher for IBM compatible computers or OS 10.x or higher for Macintosh computers.

1.2. Important Information for Working with Databases

PreFlight offers quick access on data of airfields and radio navigation facilities of complete Europe, on all parameters of your aeroplanes, on all maps added to the administration, on the elevation profile and last but not least on all way points of your flight route (Illustration 5). You can extend, change or remove all data. For that, different input windows are available, which are characterized all by a similar function mode: These windows indicate the names of the individual data records in a **list**. Basically counts: If you click on an entry of the list, the parameters of that specific data record are displayed in the window. To **change** a data record, it is sufficient to overwrite the desired parameters and to change to the next data record or to leave the window. If you inadvertently overwrote somewhat, simply click immediately after it on the name of the data record in the list, and your changes are replaced by the data stored so far. To **add** new data records, you simply overwrite an existing data record and confirm that afterwards by clicking on the **»Add«** button. To **remove** a data record you first click on the appropriate name in the list and afterwards on the **»Remove«** button.

1.3. Installation

Here you learn, how to install PreFlight on your computer. Note that in order to use the maps provided, they must be still imported after the installation of the program! You will find details for this in the section “Importing Maps”.

1.3.1. Installing the PC-Version

Put the CD-ROM in your CD drive and launch the **“setup.exe”** application**.** If your CD-drive letter is “E”, the following steps result:

- Put the **CD into the CD-ROM drive**
- In the **»Start«** menu select the **»Run«** item.
- In the **»Run«** dialog box enter: **“E:\setup”** and click on **»OK«**.
- In the **»Welcome«** dialog box of the setup-application select **»Install«** and **»More«**.
- Answer all questions of the Setup-application.

Through a click on the **»Install«** button in the last dialog box of the Setup application (Illustration 1) you start the PC-installation.

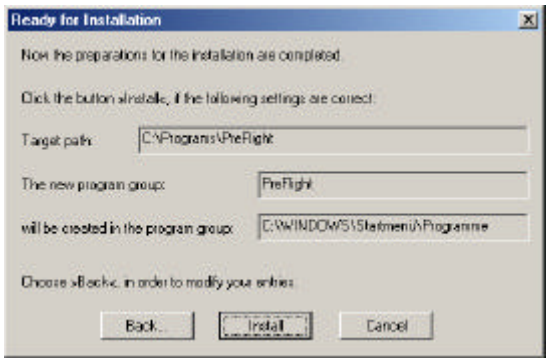

Illustration 1: PC Setup

1.3.2. Installing the Mac-Version

Put the CD-ROM in your CD drive and launch the application **“Setup.pkg”**. For that, the following steps result:

- Put the **CD in the CD-ROM drive**
- Open the volume “PreFlight 4.1”
- Click on “Setup.pkg”.
- The **»Install PreFlight«** window appears. Here click on »Continue«.
- After that select your **target volume** (Illustration 2), click on »Continue« and in the following window on »Install«.
- After the installation is completed, the “The software was installed successfully” message appears. Here click on »Close«.

Now you will find PreFlight in the folder **“/Programme/PreFlight41X”**. of your target volume.

If you prefer to store PreFlight at an other position, move the folder “PreFlight41X” accordingly. But do this **before(!)** starting PreFlight the first time!

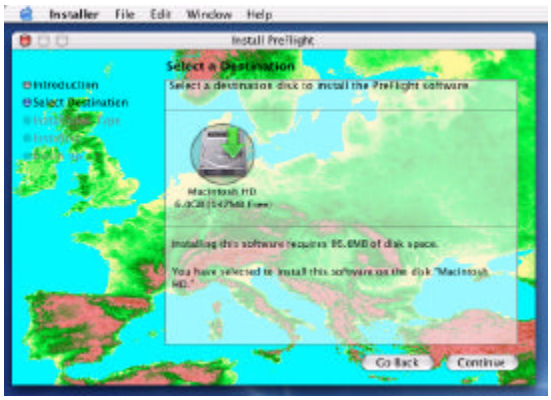

Illustration 2: Mac Setup

1.3.3. After the Installation

In order to launch the PC-version, choose “Start – Programs – PreFlight Navigation – PreFlight 4.1”.

To execute the Macintosh-version, open the new generated folder and double click the “PreFlight”-Icon.

Now, as you are launching PreFlight the first time, the »**Personalization**« dialog box asks you to enter both, your name and the city where you live. Additionally, you should enter the serial number of your copy of PreFlight in the last field. After these steps you are ready to use “PreFlight” for creating flight routes via the **»Flight Route«** dialog box or via the generated map.

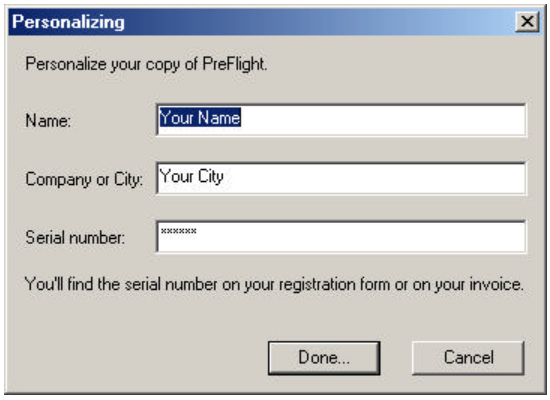

Illustration 3: Personalize your copy

In order to work on the scanned map of Germany or on the optional **ICAO charts**, you have to **import** them. Chapter 1.4 describes this step.

1.3.4. Help-Functions

With the **»? – Help Topics«** menu option “PreFlight” offers you a tutorial (PC only) and supports your work within dialogs through a context-sensitive help (PC and Mac). So if you are unfamiliar with the meaning of an element within an dialog, then – on the PC - click with the mouse on the **“?” on the right-hand side of the menu bar of the window** and after that on the unfamiliar control. Thereupon an explaining text appears. For the **Mac** choose the **»Help – Help-Tags«** menu option and move the mouse over the unfamiliar element.

1.4. Importing Maps

If you like to see real maps on PreFlight’s map view, you either have to scan and calibrate your own maps or to import already prepared maps. By “calibrating” we understand the assignment of geographical co-ordinates to the image of the map. With already prepared maps, calibrating is no longer necessary. A file (e. g. “Calibration.scm”) is assigned to these maps, from which “PreFlight” reads the calibration information during the import process. To become familiar with using scanned maps, you will find a simple German map and an image made by satellite on each PreFlight-CD. According to your order, you will also find all German ICAO charts on the CD. These maps are ready to use immediately after importing.

1.4.1. Importing the German Map

In order to immediately use the provided geographic map, “PreFlight” must import the calibration information from the file "Calibration.scm". You can find this file in the root of the PreFlight CD. For importing the calibration information you proceed as follows:

- In “PreFlight” choose the **»Miscellaneous – Administration of Maps«** menu option.
- In the **»Scanned Maps«** dialog box click the **»Import«** button.
- Change to the **CD-ROM drive**.
- In the window “Open” choose the file **“\Calibration.scm”**.
- In the list of the **»Scanned Maps«** dialog box **double click** on the maps name **“Germany”**.

After these steps you see the calibrated map (Illustration 4). Move the mouse over the map and compare the mouse position with the co-ordinates, you see in the status bar at the bottom of the window.

Illustration 4: The calibrated map

You will find the calibration information for the **satellite image** of Germany on the PreFlight-CD in “**\FromSpace\Calibration.scm**”.

1.4.2. Importing the Optional ICAO-Charts

If you have also purchased the ICAO-charts of Germany (on CD), you can import them like the simple German map. For that, you have to open at least *one* calibration file from CD. This file contains all required descriptions for a complete set of maps. However, on the CD, you will find 2 complete sets of maps: One high resolution (150 dpi) set and one low resolution (75 dpi) set. In any case, you should import the high resolution set (“\ICAO\150”). If you **also** import the low resolution set of maps, these maps will appear, if you scale down the standard maps by clicking on the **“-”**. in the symbol bar. Your decision is not final. In the “Administration of Maps” dialog box, imported charts can be deleted and replaced by new imports at any time. In order to import the high resolution charts, proceed as follows:

- In “PreFlight” choose the **»Miscellaneous – Administration of Maps«** menu option.
- In the **»Scanned Maps«** dialog box click the **»Import«** button.
- Change to the **CD-ROM drive**.
- In the **»Open«** dialog box choose the file **“\ICAO\150\Calibration.scm”**.

2. Creating Your First Route

Immediately after installation, PreFlight is configured to give you access to the German database (if available). Initially, always the first airfield ("Aachen") of your current region is regarded as your home airfield. Before you select your preferred airport of departure, you should temporarily select "Egelsbach" to be your home airfield, because the following examples presuppose this setting. (See: 3.2: Home Airfield). Thus, the starting point of your route is already fixed. Every **new** route has already added "Egelsbach" as first way point. Therefore you can directly start to extend your route. Now we describe two different proceedings to prepare a flight to "Aschaffenburg".

2.1. By Keyboard from within the »Flight Route« dialog box

Here let us suppose that you already know the names of your way points. Then you can use the **»Flight Route«** dialog box to simply enter them together with the planned altitude. Select the "**Route – Edit...**" menu to open that dialog box. Overwrite the "Name:" field with: **"EDFE-E".** "E" is the abbreviation for the compulsory reporting point "ECHO", east of Egelsbach. Now press the tab-key to change to the "Altitude:" field and enter the value **"1500"**. Now this altitude will be used for the following way points, until you change the altitude again. Click on **"Add"**, in order to add the compulsory reporting point to your route.
Now overwrite the "Name:" field with **"Aschaffenburg"**. Here you need to write only up to second "A" of "Aschaffenburg"; because the **input assistance** completes the remainder automatically.

Subsequently you again use the tab-key to change to the "Altitude" field, where you enter the altitude **"1400"** for the traffic circuit. With a last click on **»Add«**, you add the airport to your route.

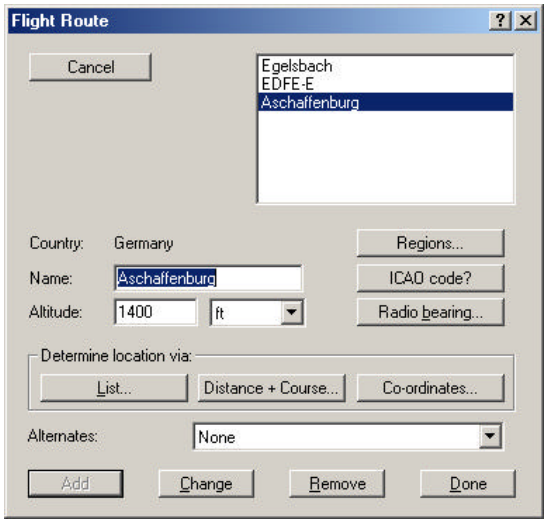

Illustration 5: After adding the airport "Aschaffenburg"

Now you see all way points of your route in the list of the windows (Illustration 5). If everything is fine, you click on **»Done«,** to leave the dialog box.

2.2. By mouse click on the generated map

Use the **»File – New«** menu option to delete the route, you have just created and switch to the generated map. To change the view, use the **»View – Route Map – Generated«** menu option. Enlarge the view by holding down the "Ctrl-key" and clicking the right mouse button. (**Macintosh**: Propeller-key and mouse button). A popup appears, where you select "Map section – Scale up" twice. (Illustration 6).
You can obtain the same setting via the symbol bar. Click the following button sequence:

New: 

Generated Map: 

2 x Scale up: 

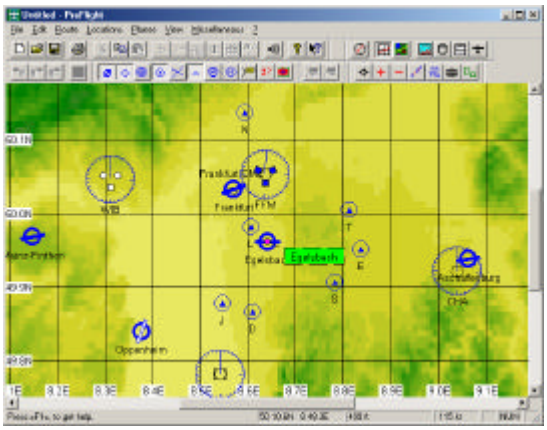

Illustration 6: The enlarged graphic

Move the mouse approximately into the vicinity of the compulsory reporting point "ECHO" (located east of Egelsbach) and subsequently click the right mouse button. (**Macintosh**: Option-Key and mouse button). A menu appears, where the second option is **“Append”**. If you move the mouse on that option, a further menu with different locations appears. At the topmost position you can see the geographical co-ordinates, which correspond to the current mouse position. Under that, you can find further locations sorted by their distance from the mouse position. Therefore you will probably find **“EDFE-E”** in the upper half of the list. Select “EDFE-E”, in order to add the exit point to your route.

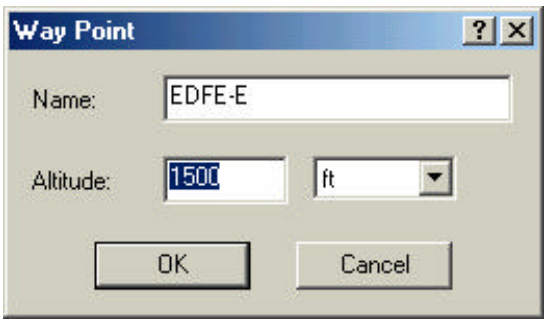

Illustration 7: Enter the altitude

Before the changes become visible on the generated map, you have the possibility to set the altitude in the **»Way Point«** dialog box. (Illustration 7). Accept the suggested value of "1500" and click on “OK”. Then your first leg appears on the map. Now move the mouse approximately into the vicinity of the airport “Aschaffenburg” (located east of “ECHO”) and subsequently push the right mouse button. Here select **“Append – Aschaffenburg”**, in order to add the airport to your route.

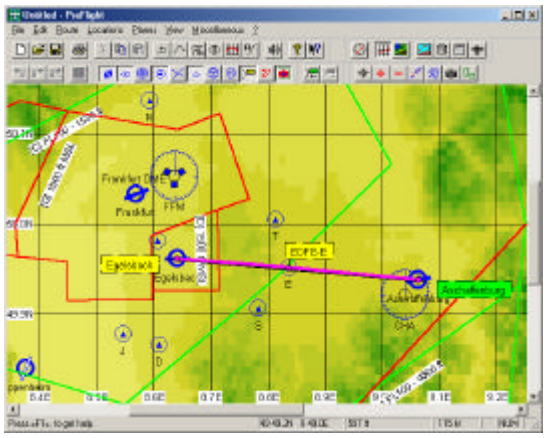

Illustration 8: Planning on generated map

Again, before the changes become visible on the generated map, you get the possibility to enter the altitude “1400” into the **»Way Point«** dialog box. Change the altitude and click on “OK”. Now the complete route from Egelsbach to Aschaffenburg appears on the map. Finally use the symbol bar to select

Labels: 

Airspace: 

in order to see labels and airspaces on the generated map. (Illustration 8).

Before we learn more about how to edit a route, we adapt “PreFlight” to your needs.

3. Preferences

This chapter describes the extensive configuration options of “PreFlight”. When “PreFlight” terminates, all settings discussed here (except the date, see 3.3) are stored. Thus, after a restart of “PreFlight”, they will be effective again.

3.1. Regions

“PreFlight” supports your flight preparation by a location database for entire Europe. This database is the basis for the automatic functions "Auto Routing" and "input assistance", as well as for the symbols drawn on the maps. Thus if you have activated all regions, the input assistance looks for suitable locations in entire Europe and the “auto routing” function may also add a navigation facility to your route, which lies beyond the border. And in the map view you will find all locations of Europe. This is desired, if you fly across Europe. However if you touch only one or two countries, then you should choose the **»Locations – Activate«** menu option to open the **»Regions«** dialog box. In the right-hand list of that dialog box, you can collect all the regions you need. Then, the automatic functions will only use locations of that reduced quantity, and in the map view, you will also find locations and airspaces of the regions selected only. In the next section you become familiar to the **»Locations«** dialog box. It lists all the locations of your selected regions.

3.2. Home Airfield

Every route, you initiate via the **»File – New«** menu option, the “Home Airfield” will automatically be assigned as first way point. To always get *your* home airfield as first way point, please choose the **»Locations – Home Airfield«** menu option. Thereupon the **»Locations«** dialog box appears, where you select your airfield by a mouse click on either its ICAO indicator or on its full name. Finally, select the **»File – New«** menu option, in order to create a new route, starting at you home airfield.

3.3. Calculations

Choose the **»Route – Calculate – Preferences«** menu option, in order to control the process of the calculations. Therefore the **»Calculation - Preferences«** dialog box appears, which makes it possible to change some constants. E. g., if you restart “PreFlight”, always the *current* date will be used to calculate the times for sunrise and sunset. If you now prepare a flight you intend to conduct in a few days, you can change that date in the preferences dialog box. In the consumption view, you will then find the times of sunrise and sunset for the specified date. As an alternative you could use the preferences dialog box in order to determine your preferred cruising altitude that is used for creating new way points in **Autorouting** mode (Route – Calculate – Way Points).

3.4. Units

Use the **»Units - Preferences«** dialog box, which appears after you have selected the **»View – Units«** menu option, if you like to change the units used in the different views.

3.5. Colours

Use the **»View – Colours«** menu option to open the **»Graphic - Preferences«** dialog box (Illustration 9). Here you determine the colours to draw routes, bearings and other **graphic symbols** on both the scanned map and the generated map. In the last section of the dialog box you have the possibility to make the **1-km-resolution elevation profile** visible on the generated map. A click on the **»Based on mean sea level«** or **»Based on flight altitude«** button opens the **»Colour Table«** dialog box, which allows you to change the corresponding colour table if necessary. For route planning, a colour table is available, which orients itself at the ground elevation. Beyond that, you can activate a second dynamic colour table for the moving map mode. That colour table adapts constantly to your current flight altitude. Thus the terrain, lying below your current altitude, will appear in greenish colours, while the area, which lies above your flight altitude, will be shown in reddish colours. The different settings do control the generated map as follows:

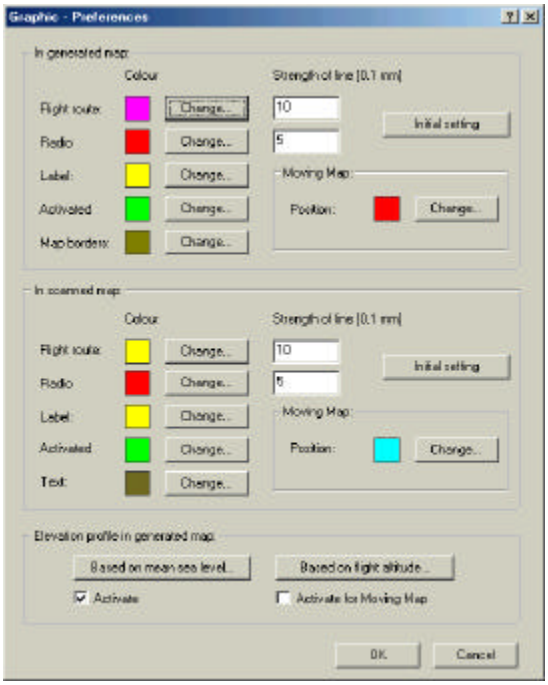

Illustration 9: Graphic-Preferences

Based on mean sea level	Based on flight altitude	Moving Map off	Moving-Map-on
Activated	Activated	Elevation profile	Terrain warning
Activated	Not activated	Elevation profile	Elevation profile
Not activated	Activated	White background	Terrain warning
Not activated	Not activated	White background	White background

3.6. Colour Table

Each colour table contains 256 different colours. However, from the 256 different colours, you can only set 8 colours **directly**. Thereby undefined colours will depend smoothly on the neighbouring colour fields: If you, for example, set the 100th colour on "blue" and the 200th colour on "green", then you have defined 100 colours, which change slowly from blue to green. Thus you receive smooth transitions between the individual colours. However, if you like a sudden colour change after a certain height, simply define two colour numbers, lying close together. Thus the colour table "Based on flight altitude" (Illustration 10) achieves, that all heights, which lie close to and above your present altitude, will suddenly appear in another colour.

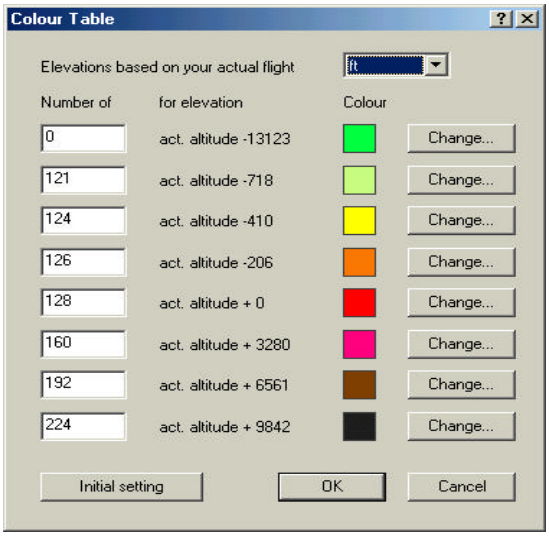

Illustration 10: Colour Table

3.7. Moving Map

Choose the **»Route – Track – Preferences«** menu option, in order to open the **»Moving Map - Preferences«** dialog box. Here you can specify the map view symbols, used to represent your current position and the route already flown. Furthermore you can determine how close the current position may approach the border of the map before "PreFlight" will change to the next map. In Moving-Map-mode, you usually use the actual position, determined by a GPS (Illustration 11). But you can also conduct a moving-map-simulation, based on an already stored track or on a planned route. Choose "Actual Route" as data source for moving map, open a flight route (*.way) and select the **»Route – Track – Moving Map«** menu option. Thus an aeroplane symbol moves along your planned flight route.

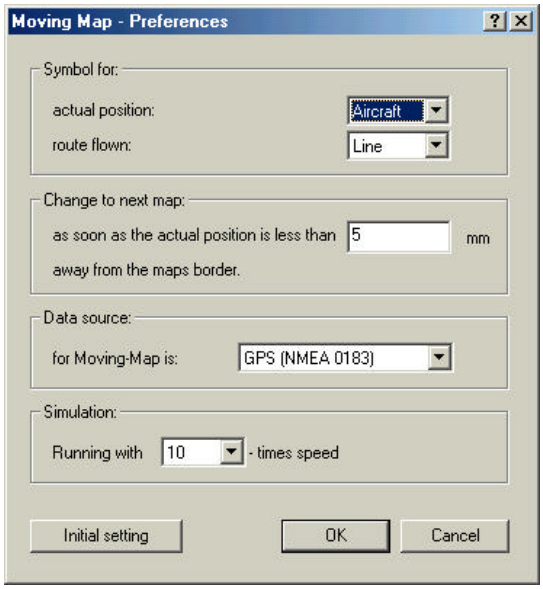

Illustration 11: Moving Map using GPS as Data Source

3.8. GPS

Without any additional software you can transfer your routes directly into **Garmin** or **Magellan 315/320** GPS devices. Therefore all your computer needs to have is a free serial port. On an Apple-Macintosh computer you select an USB port, where you have connected a serial adapter, e. g., the "Keyspan USA-19QW". Before you start the data transmission, connect your GPS device with your computer. Chapter "Satellite Navigation" describes, how to establish the physical connection.

If the connection is established, switch on your GPS and check the transmission mode. To check the transmission mode of a Garmin GPS 55, use the option "IN/OUT" of the "SETUP MENU". The correct setting is either

- "GRMN/GRMN" to transfer routes or
- "NMEA 0183" to record the route flown.

With the GPS 195 you select "Data Transfer - Slave Mode" to transfer routes or "No In/NMEA Out - NMEA 0183 - 4800 Baud" to record the route flown.

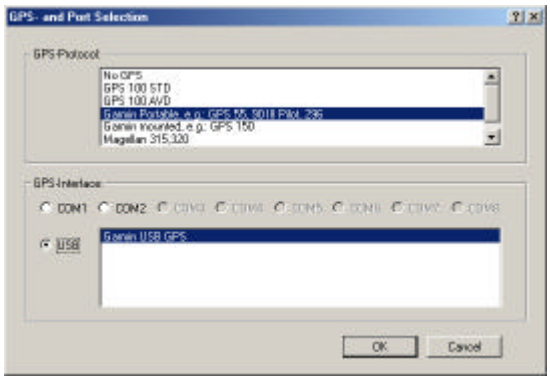

Illustration 12: Here you choose your GPS

Now launch "PreFlight" and select the "**Miscellaneous - GPS Selection**" menu option, in order to choose both, the protocol, your GPS communicates with and the port you have connected the device (Illustration 12). For devices, talking the "**Garmin Portable**" protocol, beside the **COM**-ports, the **USB**-interface is also available on the PC!. Thus, the preparations for data transmission are done.

4. Administration of Maps

For your flight planning, you can use geographic maps, created through **cone-projection**. You can recognize suitable maps by circle-arc-shaped degrees of latitude and straight-line degrees of longitude. Degrees of longitude and degrees of latitude cut themselves right angled and the degrees of longitude do unite on the earth’s poles. **ICAO-charts** are perfectly suitable within “PreFlight”.
Furthermore you can scan all maps, which don’t cover more than about 50 km. For such maps, the kind of projection can be approximated by a **linear** procedure. Thus, **visual approach charts** or city maps can be used in “PreFlight”.

4.1. Adding Maps, Already Calibrated

If you receive new maps together with a calibration file (calibration.scm), it’s not necessary to calibrate the maps manually, because the calibration information is already stored in the calibration file. To import already calibrated maps, proceed as follows:

- Use the “Miscellaneous – Administration of Maps” menu to open the **»Scanned Maps«** dialog box (Illustration 13).
- Afterwards select the **»Import«** button.
- Open the new calibration file (*.scm), you have received together with the new maps.

Thus “PreFlight” reads the new calibration information and copies it into the existing main calibration file (“ScanMaps.scm”). Now you are asked whether you would like to copy the maps into the BMP folder of your hard disk. In order to ensure fast access to the maps, you should answer here with “Yes”, if possible. Then, your new maps are always ready to use.

You have to store scanned maps as “BMP”-file on PCs or as “Windows-BMP”-file on Macintosh computers. For Macintosh, the PICT-file format is also possible. Furthermore you have to reduce the number of **colours** to **256**.
Maps, which are **not yet calibrated**, have to be added to the administration of maps. Subsequently you calibrate them. The calibration relates geographically co-ordinates to the image of the map.
You can also **import maps**, which are already calibrated. Therefore, the calibration information has to be stored in the file “calibration.scm”. You’ll find those files e. g. on the CD of the scanned ICAO-charts.

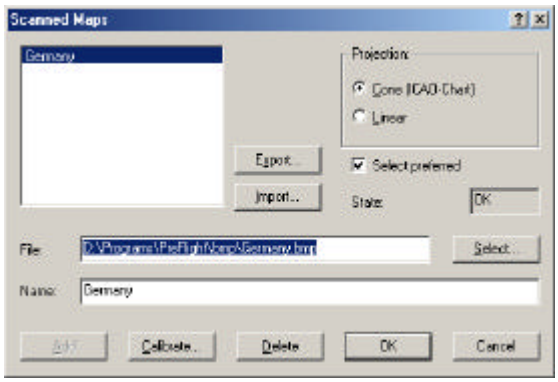

Illustration 13: The Administration of Maps

If you have already calibrated own maps, you may want to use them on another computer. In this case, you should create a new calibration file for that maps only: Just select the corresponding maps and click the **»Export«** button. To **import** your **maps on an other computer**, put your maps and the new created calibration file into one folder and, follow the standard import procedure.

4.2. Scanning Maps

You should use a flat bed scanner to scan your own maps. With it you can also scan larger map formats in several sections, without having to cut the maps. Then "PreFlight" will put the sections together again, like a mosaic. A maximum resolution of 200 dpi is sufficient. Devices with this resolution are already available for less than 100 Euros. If the map is to appear on the screen approximately in original size, use a **resolution of 100 dpi**. If the map is to appear larger, then try it with 150 or 200 dpi. Don't forget to reduce the number of bits per colour of the BMP files from 24 bits to 8 bits. Thus your map is still represented in **256 different colours**.
Surely you intend to scan your **ICAO-charts**. If your scanner supports the format DIN A4, you have to scan eight sections for each map. Using the ICAO-chart "Frankfurt" as example, you now see, how to define the sections. In order to easily hit the correct section, you either should lengthen the degrees of longitude, used to separate the individual sections, about 2 cm beyond the upper and lower edge of map (Illustration 14), or set and label four equal distanced marks on the back of the map.

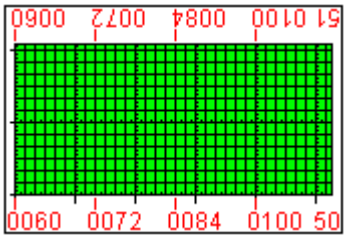

Illustration 14: Front with marked edges

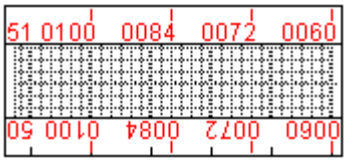

Illustration 15: Back with edges turned over

Subsequently fold the map in such a way that you can see the marked edges, after you have turned the map (Illustration 15).

While scanning the map, place the map once at the upper and once at the lower fold and shift them up to the marked degrees of longitude respectively. Give the files names, which consist of the geographical co-ordinates. Thus you will not lose the overview. For the ICAO chart "Frankfurt" the following files result:

N51E0060.BMP	N51E0072.BMP
N51E0084.BMP	N51E0100.BMP
N50E0060.BMP	N50E0072.BMP
N50E0084.BMP	N50E0100.BMP

Scanning **Visual Approach Charts** is much easier. They can be scanned in one step. Only make sure, that the vertical side edges stand accurately perpendicularly. As file name you can use the ICAO code or the real name of the airport, e. g. "EDFE.bmp" or "Egelsbach.bmp".

4.3. Adding Maps, not yet calibrated

At first, you must add a new map to the map administration. Therefore you proceed as follows:

- Use the "Miscellaneous – Administration of Maps" menu, to open the **»Scanned Maps«** dialog box.
- Give to the map an expressive **name** or leave that item blank, in order to use the file name.
- Use the **»Select«** button, to determine the path of the file.
- Click on the **»Add«** button.

Your map is now added to the map administration, but not yet calibrated.

4.4. Calibrating ICAO-Charts

After you have added your new map to the administration of maps, stay in the **»Scanned Maps«** dialog box, choose the **»Cone«** projection and click on the **»Calibrate«** button, in order to calibrate the map or in order to correct the calibration of the current map. Thereupon the **»Calibration«** dialog box appears, where you have to define four points in the corners of your map (Illustration 16). These calibration points should be set on the outermost completely visible lines of the co-ordinate net respectively.

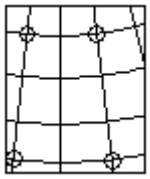

Illustration 16: Points used for Calibration

You always should first click on the calibration point **in the map**, before you enter the corresponding co-ordinates in the **»Calibration«** dialog box (Illustration 17).

- The first calibration point is on the intersection between the westernmost degree of longitude and the northernmost degree of latitude. For this point, enter both latitude and longitude.
- The second calibration point is on the intersection between the easternmost degree of longitude and the northernmost degree of latitude. For this point, enter only the new longitude.
- The third calibration point is on the intersection between the easternmost degree of longitude and the southernmost degree of latitude. For this point, enter only the new latitude.
- The fourth calibration point is on the intersection between the westernmost degree of longitude and the southernmost degree of latitude. For this point, no further input is necessary.

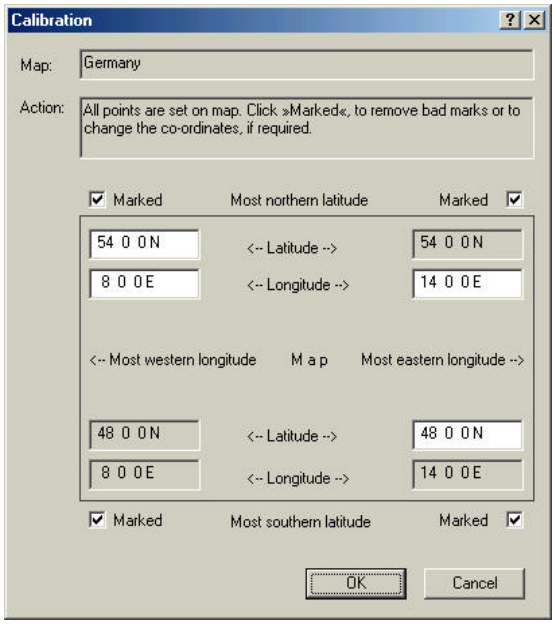

Illustration 17: Calibrated ICAO-Chart

If you like to correct a calibration point of the map, then remove the checkmark from the appropriate **»Marked«** item in the **»Calibration«** dialog box and afterwards click on the **»OK«** button.
Then you can repeat the calibration for that point.

4.5. Calibrating Visual Approach Charts

After you have added your new map to the administration of maps (as described in 4.3), choose the "**Linear**" projection and click on the **»Calibrate«** button, in order to calibrate the map or in order to correct the calibration of the current map. Thereupon the **»Linear Calibration«** dialog box appears, where you have to define two points, describing a diagonal line on your visual approach chart. Compulsory reporting points are particularly suitable for this.

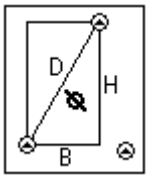

Illustration 18: Two points known

However if the airfield is the only place on the map, whose co-ordinates you know, then look for a salient point in one of the corners of the chart and define its position, by determining the distance (D) and the course from the airfield to that point (here: 142 Degrees).

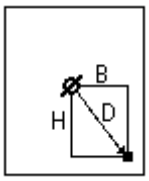

Illustration 19: Only one point known

While choosing the calibration points make sure that the sides of the corresponding rectangle (H, B) do cover at least a quarter of the chart. I.e., the distance B must be at least as long, as a quarter of the width of the chart and the distance H must be at least as long, as a quarter of the height of the chart.

You should always first click on the calibration point **in the map** before you enter the corresponding co-ordinates in the **»Linear Calibration«** dialog box (Illustration 20).

- The first calibration point has to be a place, whose co-ordinates you know.
- The second calibration point has to be a further place, whose position you define through co-ordinates or through distance and course from the first point.

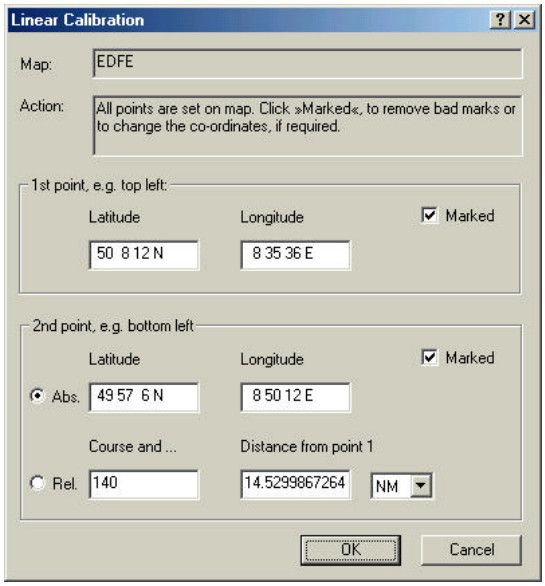

Illustration 20: Calibrated Visual Approach Chart

If you like to correct a calibration point of the map, then remove the checkmark of the appropriate "Marked" field in the **»Linear Calibration«** dialog box and afterwards click on "OK". Then you can repeat the calibration for that point.

4.6. Selecting Maps

If you have scanned several maps, one of it must be selected. You can either do the selection by yourself or you leave that to PreFlight. If some regions are covered by several maps in different resolutions, only that maps are preferred selected, which have checked the corresponding mark in the **»Scanned Maps«** dialog box. Maps in other resolutions will only appear while scaling the view up or down (Symbol bar „+“ or „-“), or if they are selected manually. In order to be not disturbed by frequently changing maps, only one set of maps should be allowed to be selected preferred, e. g. the 150 dpi ICAO-charts.

4.6.1. By Opening a Flight Route

“PreFlight” automatically selects a new map, if you open a new flight route. Therefore “PreFlight” looks for a map, on which you can see the starting point of your flight route. You must have activated the **»Route Map-Scanned«** view, in order to see your flight route on the scanned map!

4.6.2. By Changing the Active Way Point

Click on the **»Scanned Map«** button of the symbol bar. Immediately after opening a new flight route, you so see the starting point of your route on the scanned map. With the two buttons named **»Closer to departure aerodrome«** and **»Closer to destination aerodrome«** you activate the next way point of your route and make it visible on the map, respectively.

Scanned Map: 

Closer to departure aerodrome: 

Closer to destination aerodrome: 

4.6.3. By Cursor Keys

If you have scrolled one map until you have reached its edge, simply press the appropriate cursor key, to get the next map.

4.6.4. By Clicking into an Area

If you only know the geographical area of the map, then proceed in such a way, as you are used to it from the "table of contents" of an atlas. Use a graphical presentation to search for the areas, which are offered as scanned maps:

- Change to the **»Route Map - Generated«** view.
- In the **»Generated Map«** symbol bar click on the **»Maps«** button.
- Choose the »Scale Down« function to get a scale, easy to survey.
- Click into the middle of a map frame.
- Confirm the following interrogation, in order to activate the map of the corresponding area.

4.6.5. By Selecting the Name

If you know the name of a map, then:

- Choose the **»Miscellaneous - Administration of Maps«** menu.
- In the list of the **»Scanned Maps«** dialog box, double click the name of the desired map.

4.6.6. From ICAO- to Visual Appr. Chart

In order to quickly get the desired visual approach chart into view, it’s sufficient to activate the way point concerned of the route and to press the “**V**”-key (like **V**isual Approach Chart). Press the “**V**”-key again, to review the ICAO-chart.

4.6.7. By Moving-Map-Mode

Before you start the Moving Map mode, open a flight route, which at least contains the aerodromes of departure and destination. Thus, PreFlight knows your intentions and will display the corresponding visual approach charts, as long you are in the vicinity of that places.

4.6.8. Menu “Locations – Edit”

If you leave the **»Location Database«** dialog box via the **»Done«** button, then PreFlight centres the selected place on either the scanned map or the generated map.

5. Editing Flight Routes

For each kind of flight route, PreFlight offers you the optimal input mode. For an efficient work, the correct choice is not to be underestimated. You should distinguish particularly between flights over short or far distances. For planning a short flight, you should prefer the interactive map view on a scanned ICAO-chart. However, for a long distance flight, you should use at first the Flight Route dialog box, in order to specify at least the aerodromes of departure and destination. Afterwards change to the "Route Map – Generated" view, in order to immediately get a presentation of the complete flight route. Now turn to the details, either by increasing the map view if necessary or by changing to the "Route Map – Scanned" view, in order to continue working on scanned maps.

5.1. By Text Input

Despite the undisputed advantages of the interactive input mode, creating a route via the **»Flight Route«** dialog box (**»Route – Edit«** menu) often is the fastest way to reach the goal. This is valid in particular, if you already exactly know the way points and their designations.

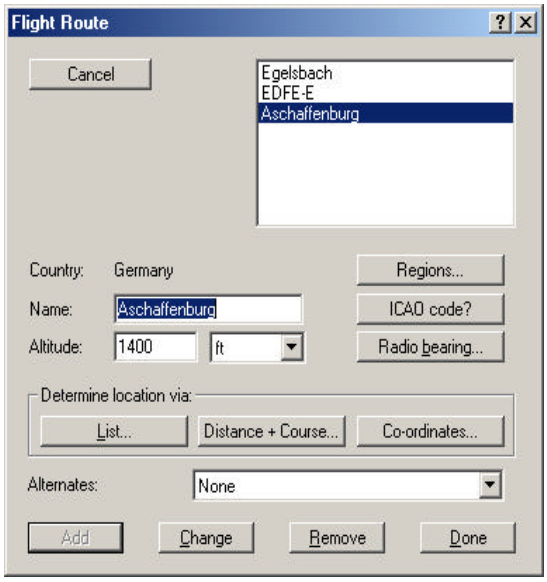

Illustration 21: Editing the Flight Route

To add a **new way point** to your flight route, use the **»Flight Route«** dialog box and

- Click on the way point, behind which the new point is to be added, if necessary.
- Define the geographic position.
- Specify the flight altitude.
- Click the **»Add«** button.

To **delete** a way point from your flight route, use the **»Flight Route«** dialog box and

- Click on the way point to be deleted.
- Choose the **»Remove«** button.

To calculate the **bearing** to a way point of your route, use the **»Flight Route«** dialog box and

- Click on the way point, for which you like to calculate the bearing.
- Choose the **»Radio Bearing«** button, to open the **»Radio Bearings«** dialog box.
- Decide, whether to edit the first or second bearing, if necessary.
- In the **»Receivable Navigation Facilities«** list of the **»Radio Bearings«** dialog box double click the name of the facility desired.

To **delete** a bearing to a way point of your route, use the **»Flight Route«** dialog box and

- Click on the way point, for which you like to remove the bearing.
- Choose the **»Radio Bearing«** button, to open the **»Radio Bearings«** dialog box.
- Decide, whether to remove the first or second bearing, if necessary.
- Click the **»Remove«** button of the **»Radio Bearings«** dialog box.

Alternates
Here declare the last way point(s) of the route to be an alternate airport. To add the alternate "Mainbullau" to our route, just add "Mainbullau" like a normal way point, but select Alternates: "**The last way point**".

5.2. Defining a Location from within the »Flight Route« dialog box

To define the geographical co-ordinates of a way point, the following possibilities are given in the **Flight Route** dialog box:

5.2.1. By Typing the Name

Enter the **Name** or the **ICAO-indicator** of the new way point into the **Name** text box (Illustration 21). If you have chosen a place which is also present in the location data base, the definition of that place is already done. After you have clicked the **»Add«** button, the new way point is added to your route.

5.2.2. By Typing the Co-ordinates

If you like to extend your route with a place, not present in the location data base, then – **after** specifying a name – click the **»Co-ordinates«** button in order to use the **»Determine location – Absolute«** dialog box (Illustration 22) to enter the geographic co-ordinates of that place.

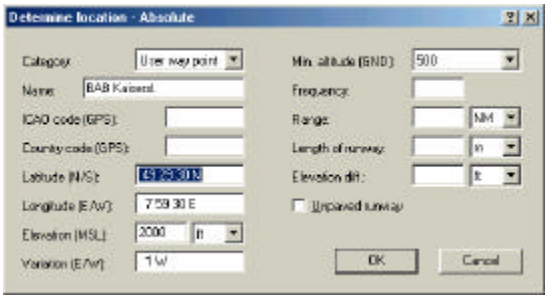

Illustration 22: Entering co-ordinates

After you have left the **»Determine location - Absolute«** dialog box via "OK", it's sufficient to click the **»Add«** button of the **»Flight Route«** dialog box, to add the new way point to your route.

5.2.3. By Distance and Course from a Way Point of your Route

If you like to extend your route with a place, not present in the location data base, then you can define its co-ordinates by a (magnetic) bearing and a distance related to any way point of your current flight route. This procedure is particularly suitable to create check points for departure and arrival. E. g., thus you can compute the co-ordinates of a place, which is situated – with a given course – fife nautical miles away from a compulsory reporting point. Therefore - **after** you have specified a name – click the **»Distance + Course«** button, in order to use the **»Determine location – Relative«** dialog box (Illustration 23) to enter the corresponding data.

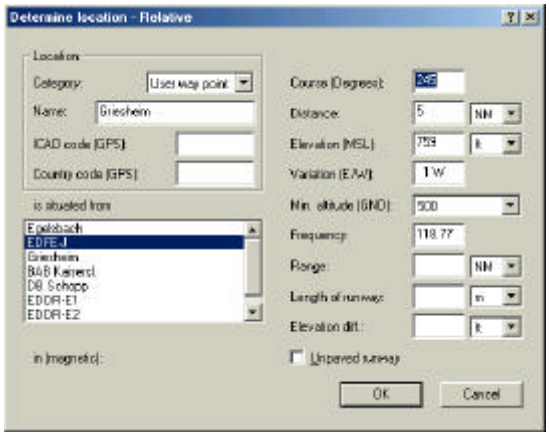

Illustration 23: Distance and Course

After you have left the **»Determine location - Relative«** dialog box via "OK", it's sufficient to click the **»Add«** button of the **»Flight Route«** dialog box, to add the new way point to your route.

5.2.4. By Selecting from the Current Location List

If you like to extend your route with a place, whose spelling you don't know exactly, then you can directly select it from the current location list. The current location list contains all places of the momentarily activated regions. To select a place – **without** specifying a name before – directly click the **»List«** button of the **»Flight Route«** dialog box, in order to use the **»Locations«** dialog box to select a place. After you have left the Locations dialog box via "OK", it's sufficient to click the **»Add«** button of the **»Flight Route«** dialog box, to add the new way point to your route.

5.3. Using the Map View to Edit Flight Routes

It's also possible to edit your flight route in the map view. Thereby it's insignificant whether you work with a generated or scanned map. The procedures to edit routes are identical for both. If you use the **Macintosh version**, please always replace the words "right mouse button" with "option key and the mouse button".

Thus you can use the **»Route Map«** view to **add** a **new way point** to your flight route:
- Click on the **leg** of the flight route, into which the new point is to be inserted,
- Define the **geographical place** (See chapter 5.3.2).
- Use the **»Way Point«** dialog box to specify the planned altitude and
- Leave that dialog box by clicking the **»OK«** button.

Thus you can use the **»Route Map«** view to **append** a **new way point** to your flight route:
- Define the **geographical place** (See chapter 5.3.2).
- Use the **»Way Point«** dialog box to specify the planned altitude and
- Leave that dialog box by clicking the **»OK«** button.

Thus you can the **»Route Map«** view to delete a **way point** from your flight route:
- Move the mouse pointer approximately into the vicinity of the way point you intend to delete.
- Click the right mouse button and select **»Delete«**.
- From the appearing popup menu select the way point to be deleted.

Thus you can use the **»Route Map«** view to **calculate a bearing** to a way point of your flight route:
- Click on the leg **behind** the way point, whose bearing is to be calculated.
- Move the mouse pointer approximately into the vicinity of the navigation facility desired.
- Click the right mouse button and select **»Take Bearing«**.
- From the appearing popup menu select the name of the navigation facility desired.

Thus you can use the **»Route Map«** view to **delete a bearing** to a way point of your flight route:
- Click on the leg **behind** the way point, whose bearing is to be deleted.
- Move the mouse pointer approximately into the vicinity of the navigation facility concerned.
- Click the right mouse button and select **»Take Bearing«**.
- From the appearing popup menu select the name of the navigation facility, whose bearing is to be deleted.

Thus you can use the **»Route Map«** view to **change the planned altitude**:
- Move the mouse pointer approximately into the vicinity of the way point, where you intend to change the planned altitude.
- Click the right mouse button and select **»Flight Altitude«**.
- From the appearing popup menu select the name of the way point, whose planned altitude is to be changed.
- The **»Way Point«** dialog box appears, where you can change the altitude and confirm it by clicking the **»OK«** button.

5.3.1. Selecting a Leg of your Flight Route

If you work on the generated map, make sure that the map frames (used to select a scanned map) are switched off. Therefore use the **»Maps«** symbol of the **»Generated Map«** symbol bar, if necessary. Otherwise the flight route cannot be worked on.

Click with the mouse into the vicinity of the leg which you would like to work on. Then “PreFlight” searches for the leg nearest to your mouse position. Imagine, **you click approximately between the third and fourth way point** of your route. Then “PreFlight” draws the label of the third way point and the line between the third and fourth way point in the colour (e. g. "green"), you have assigned for **»Activated«** items in the **»Graphic Preferences«** dialog box. **Now the third way point is activated**, and – like working in the **»Flight Route«** dialog box - a new way point will be added to your route **behind** the activated way point. If the colour of the leg should not change with the activation, switch off the “Elevation Figures” of the **»Map Symbols«** symbol bar.
If you like to select the last way point of your route, so don’t click with the mouse on the last drawn leg, but behind it! Then, only the label of the last way point gets the “Activated” colour.

5.3.2. Defining a Way Point in the Map View

You can directly transfer the co-ordinates of new way points from the map into your **route** or into your **location data base:**

If you don’t see your way point, then
- Activate (via “Miscellaneous – Administration of Maps”) a map for the region of your flight.
- Activate (via “Locations – Activate”) the databases for the region of your map if necessary.
- Activate the way points of the category desired (airfields, VORs, ...). Therefore use the **»Map Symbols«** symbol bar **or** click the right mouse button while holding down the “CTRL”-key (**For Mac:** Propeller-key + mouse button). Then move the mouse pointer to the “View” item and choose the category from the popup menu.

If you have found your way point, then
- Move the mouse pointer approximately into the vicinity of the way point desired.
- Click the right mouse button and choose **»Insert«** or **»Append«**.
- From the popup menu select the place desired.

Thus you define a **user way point for your flight route**:
- Activate (via “Miscellaneous – Administration of Maps”) a map for the region of your flight.
- Move the mouse pointer **exactly** onto the user way point.
- Click the right mouse button and choose **»Insert«** or **»Append«**.
- Select the **topmost entry** of the popup menu.

That user way point is now part of your current flight route (only).

Thus you define a **way point for your location database**:
- Activate (via “Miscellaneous – Administration of Maps”) a map containing your new way point.
- Move the mouse pointer **exactly** onto that way point.
- Click the right mouse button and choose **»Location Database«**.
- Select the **topmost entry** of the popup menu.
- The **»Location Database«** dialog box opens, the co-ordinates of your new way point already set.
- Change the way points name and other parameters, if necessary, before you use the **»Add«** button to add the new place into your location database.

Now that new way point is available for **each** flight route!

6. Modifying Your Flight Route

After you have created a flight route, you can induce PreFlight to do some modifications. Therefore activate one or more calculation options or change the meteorological data.

6.1. Calculations

If desired, PreFlight tries to change or extend your route according to certain criteria. You can activate these calculations by either the “Route – Calculate” menu or the symbol bar.

Menu Item	Symbol Bar	Meaning
Return Flight		Arranges the way points of your flight route in reverse order.
Change of Altitude		Considers the different planned flight altitudes while calculating flight time and fuel consumption.
Safe Altitudes		Increases your flight route so far, until all points lie above the elevation profile flown over.
Semi Circular (VFR)		Raises the planned flight altitudes to the "semi-circle flight altitudes" prescribed for the respective (magnetic) course.
Orthodrome		Calculates way points to fly along an orthodrome and adds them to your flight route.
Way Points (AutoRouting)		Searches in the database for radio navigation facilities, suitable as way points for your route and adds them to your route.

6.2. Weather

Use the **»Miscellaneous – Weather«** menu option to open the window for specifying meteorological data (Illustration 24). The data you enter here will be assigned to the aerodrome of departure, to the flight route and to the aerodrome of destination. For the aerodromes of departure and destination, the parameters interrogated are “temperature”, “air pressure” (QNH) and “moisture”, respectively. If you terminate your flight at your starting point, you can assign its meteorological data also to the aerodrome of destination. To do so, click the **»Use«** button (same values for destination aerodrome). For the flight route, you can specify both wind direction (in degrees) and the wind velocity for four different altitudes (1500 ft, 3000 ft, 5000 ft and 10000 ft). The corresponding data you get best from the automatic **g**eneral **a**viation flight weather **for**ecast announcements (GAFOR).

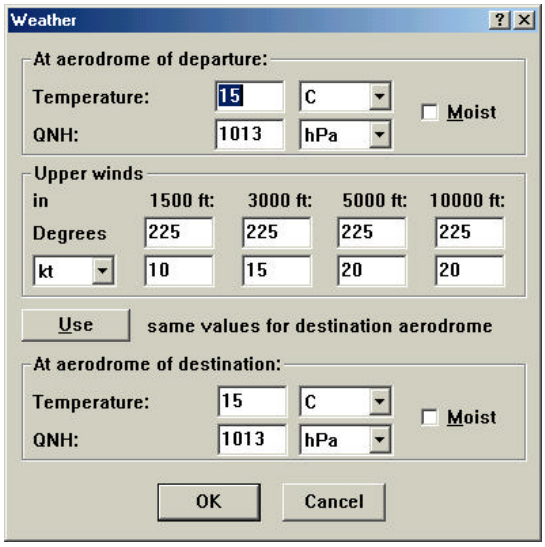

Illustration 24: Wind and Weather

7. Location Data

The term “Location Data” stands for data concerning airports, radio navigation facilities and compulsory reporting points, PreFlight needs to draw maps and to build your flight route. You can change, extend or delete that data as you like.

7.1. Edit

Use the **»Locations – Edit«** menu option to open the **»Location Database«** dialog box, where you can view or change all entries available. If you leave this window via the **»Done«** button, PreFlight centres the last selected place in the map view.

7.2. Import

Do you have a list of geographical co-ordinates of places which you would like to use in PreFlight? If you convert that list to an *import file* for PreFlight, you can then use the **»Locations – Import«** menu option to extend your current location database by that new places. Or do you prefer to put the new places into a completely new region? Then first copy the “NewRegion.krd” file from your CD-ROM to the PreFlight-directory on your hard disk. Subsequently rename that file, as your new region is to be called and launch PreFlight.

For Macintosh only: After you have renamed your copy of “NewRegion.krd”, use the **»Locations – Update«** menu option, to copy that renamed file to an internal folder. Therefore select your PreFlihgt’s folder (“/Programme/PreFlight33X”) and click the **»Update«** button. After that second copy, the first copy (in your PreFlight’s folder) is no longer required and can be deleted.

Now use the **»Locations – Activate«** menu option in order to open the **»Regions«** dialog box. In the left list double click on your new region to move it to the right into the list of regions activated. Then select your new region in the right list and click the **»Done«** button to leave the **»Regions«** dialog box.
If you now choose the **»Locations – Import«** menu option, you will be asked, whether you would like to import text file based locations into your new region. E. g., your text file might look as follows:

```
DELIMITER=;
NAME;LAT;LON
Asuncion;25 10S;57 30W
Bogota;4 34N;74 0W
Buenos Aires;36 30S;60 0W
```

With this file (a part of the file "Amerika.txt" from CD) you transmit three new places into your current location database. The first two rows are required in any case. They help PreFlight to parse the following lines. In the first row you specify the **character**, used to **delimit** the individual parameters. In this example, location name, latitude and longitude will be separated by a semicolon (;). The second row tells PreFlight, in which **order** the parameters do follow. Here it’s important that you only use words from the following lists (see next page). The sample mentioned above doesn’t define the parameter “TYPE”. Thus only **user way points** will be created by importing that file. Now however, still another example: If you now like to extend your database “Germany”, again open the **»Regions«** dialog box (via the **»Locations – Activate«** menu option), select “Germany” in the list on the right and leave the dialog box by clicking the **»Done«** button. Subsequently choose the **»Locations – Import«** menu option and open the file “TestImport.txt” on the PreFlight-CD.

```
DELIMITER=;
NAME;IDENT;COUNTRY=ED;TYPE=WP_AIRPORT;LAT;LON;ELEV=0;ELEV_IN=DIM_FEET;VAR;FREQ;RWYDIR;RWYLEN;RWYLEN_IN=METER;SURFACE=1
Test-Heli;XXXX;ED;WP_HELI;50;9;1000;;1w;121,72;9;;;1;
Test-Segel;ZZZZ;;WP_SAIL;52;12 30 e;500;DIM_METER;2e;123,45;9;900;DIM_METER;1;
```

Note that you can specify default values in line two. Simply add a "="-character behind the keyword and type the value. That value will be used for each place definition, where there is no specific value set for the corresponding column. Thus also the place "Test-Segel" receives the country code "ED", although after the ICAO code "ZZZZ", there is no value between the delimiters ";;". Here, the default value, specified in line two after "COUNTRY=" was used.

The **parameters** possible:

Keyword	**Meaning**	**Example**
COUNTRY	Country code	ED
NAME	Location name	Egelsbach
IDENT	ICAO code	EDFE
TYPE	Category of place	WP_AIRPORT
LAT	Latitude	49 57 36 N
LON	Longitude	8 38 36 E
ELEV	Elevation above MSL	384
ELEV_IN	Unit used for elevation	DIM_FEET
VAR	Variation	0 E
FREQ	Frequency	121.72
RWYDIR	Runway designation	9
RWYLEN	Length of runway	840
RWYLEN_IN	Unit used for runway length	DIM_METER
RWYSLOPE	Difference of threshold elev.	0
RWYSLOPE_IN	Unit used for threshold difference	DIM_FEET
SURFACE	Paved surface	1
RANGE	range	Not for airports
RANGE_IN	Unit used for range	Not for airports

For the parameter **TYPE** the following keywords are possible:

Keyword	**Meaning**
WP_AIRPORT	Airport
WP_REPORT	Reporting point
WP_INTERSECTION	Intersection
WP_NDB	Non directional beacon (NDB)
WP_VOR	VHF omni directional radio range (VOR)
WP_USER	User way point
WP_SAIL	Gliding field
WP_HELI	Heli port

For the parameters **ELEV_IN**, **RWYLEN_IN** and **RWYSLOPE_IN** use one of the keywords:

Keyword	**Meaning**
DIM_FEET	Feet
DIM_METER	Metres

For the parameter **SURFACE** use one of the keywords:

Keyword	**Meaning**
1	Paved runway, asphalt, concrete
0	Unpaved runway, grass, gravel

For the parameter **RANGE_IN** use one of the keywords:

Keyword	**Meaning**
DIM_NM	Nautical miles
DIM_KM	Kilometres
DIM_STM	Statute miles

8. Elevation Profiles

For checking your planned flight altitude, PreFlight offers two procedures. The elevation parameters of these procedures differ in meaning and scope. Both kinds of elevations can be changed or extended for new geographic regions via the "Locations" menu.

8.1. Elevation Profile (ICAO)

The "Elevations (ICAO)" contain the **flight altitude**, in which you can safely fly above all elevations of the area concerned in low resolution (0,5-degree-steps). These values originate from the ICAO-charts, where they are indicated in large digits. (Multiply each by 100, to get the value in feet.)

8.1.1. Regions Available

PreFlight offers those values for the countries Austria, Denmark, Germany and Switzerland.

8.1.2. Extending the Elevation (ICAO)

Use the **»Locations – Elevations (ICAO)«** menu option to open the **»Elevation Profile (ICAO)«** dialog box (Illustration 25), where you can edit the elevation data.

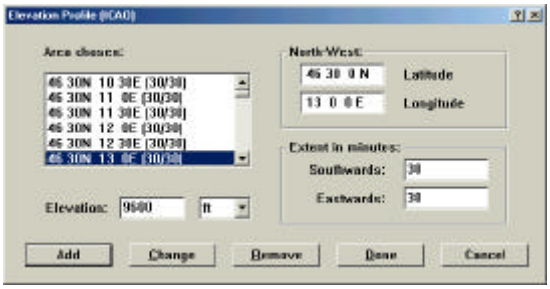

Illustration 25: Elevation Profile (ICAO)

8.2. Elevation Profile (1-km)

The "Elevations (1-km)" contain the **mean elevation above MSL** of the area concerned in high resolution (1-km-steps)**.** This elevation profile will be visible in the "Vertical Profile" view, below the *planned* flight altitude and in the "Track Altitude" view, below the *recorded* flight altitudes. Furthermore these data do serve for increasing too low planned altitudes while creating your flight route and for determining the elevation of any place you like: As soon as the mouse pointer hovers for at least one second above a certain place in the map view, PreFlight indicates the appropriate elevation at the lower edge of window.
The elevations of certain regions are collected in individual files.

8.2.1. Regions Available

PreFlight already knows the elevations of both, Central and East Europe.

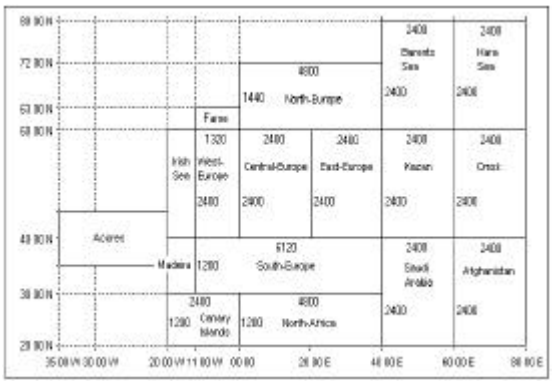

Illustration 26: Regions Available

8.2.2. Adding New Elevations (1 km)

Elevation profiles are offered free of charge from the “National Geophysical Data Center”, Colorado USA via Internet. At present (2007), you can use
http://www.ngdc.noaa.gov/cgi-bin/seg/ff/nph-newform.pl/seg/topo/customdatacd
to reach following page:

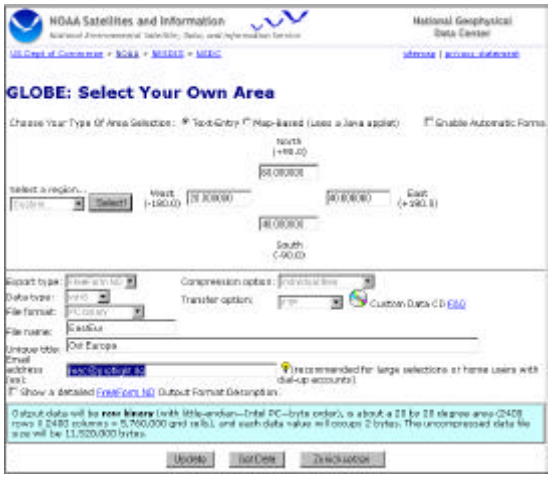

Illustration 27: Definition 1-km-Profile

Here you can specify, for which geographical area and in which data format you would like to receive the data. After you have clicked the **»Get Data«** button, the production of the desired data begins. Depending upon extent of utilization of the server, this can take 30 to 60 minutes. After your data file is ready, you will receive an e-mail containing a link for downloading your elevation data. Thus you can terminate your internet connection after placing your order to fetch the results one or two days later. But don’t wait too long, because your files will be deleted from the server after some days.

8.2.3. Adding New Elevations

Beside the actual result file (EastEur.bin) you also receive a file with the extension "hdr" from the internet. That file holds the parameters you have to enter in the **»Elevation Profile (1 km)«** dialog box, in order to use the elevation data in “PreFlight”.

```
file_title                = Ost Europa
data_type                 = raster
grid_cell_registration    = center
map_projection            = Lat/Lon
left_map_x                = 20.00000000000
right_map_x               = 40.00000000000
upper_map_y               = 60.00000000000
lower_map_y               = 40.00000000000
number_of_rows            = 2400
number_of_columns         = 2400
grid_size                 = 0.00833333333
elev_m_unit               = meters
min__value                = 1
max__value                = 3174
elev_m_min                = 1
elev_m_max                = 3174
elev_m_missing_flag       = -500
number_of_display_colors  = 256
data_value_unit           = elev_m
data_byte_order           = little_endian
```

Illustration 28: The File “EastEur.hdr”

Use the **»Locations – Elevations (1 km)«** menu option to open the window to describe the elevation profile.

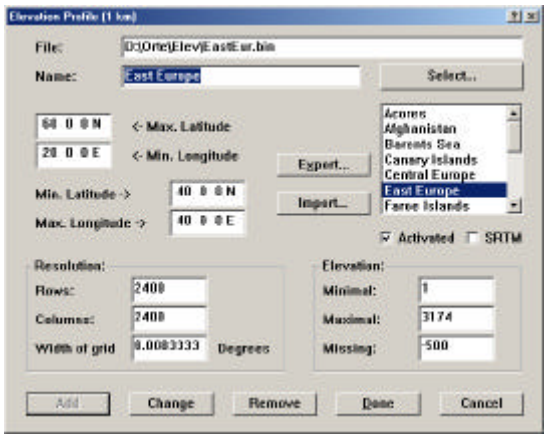

Illustration 29: Description of Elevations

8.2.4. Structure of the Elevation Files

The elevation data for same latitudes are arranged directly one behind the other in rows, whereby there are two bytes available for each elevation (little_endian). The first elevation represents the northernmost degree of latitude and the westernmost degree of longitude. You could also create such files by suitable software by yourself.

8.2.5. Photo Function

By clicking the **camera** in the symbol bar, you can create a 300 dpi BMP image from the elevation data, visible in the generated map view.

9. Planes

Use this menu to select your current plane, to change technical data, to add new planes or to modify the payload.

9.1. Edit

Use the **»Planes – Edit«** menu option to open the **»Plane Database«** dialog box (Illustration 30), where you can view or edit all available entries. If you should not yet know the meaning one of the elements in this dialog box, then – for PC – click with the mouse on the “?”, the last item of the menu bar and afterwards on the unknown element. Thereupon a help text appears. For Mac, choose the **»Help – Help-Tags«** menu option and move the mouse to the desired element.
While adding new planes, don’t forget to set the parameters accessible through the buttons named “Flight Plan”, “Take off/Landing”, “Seats/Baggage” and “Tank”.

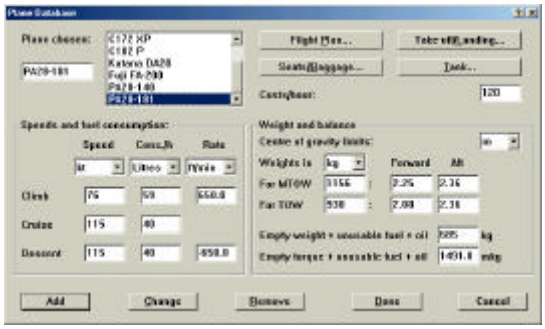

Illustration 30: Plane Database

9.2. Payload

Use the **»Planes – Payload«** menu option to open the window for modifying the payload (Illustration 31). Here you have the possibility of placing both passengers and luggage on up to five different positions. If there are two persons with a total weight of 150 kg on the front seats of your plane and if you intend to carry luggage with a weight of 5 kg in the first section of the baggage area, then you should enter the entry "150" for the first seat row and the value “5” for the first luggage area.

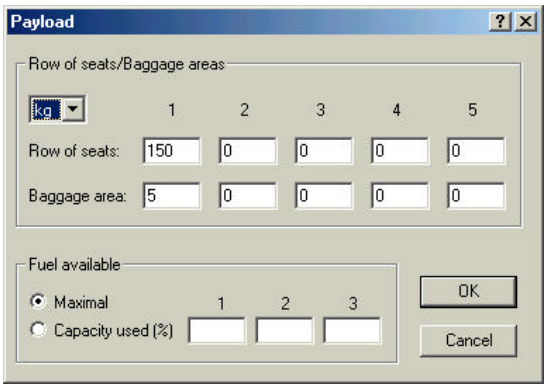

Illustration 31: Payload

In the lower section of the window you determine, whether you want to fully use the tank capacity of your plane, or whether a certain percentage of the tank capacity is sufficient. Therefore you can distribute your fuel supply on up to three tanks. Immediately after installation, the option **"Maximal**" is chosen. That induces "PreFlight" to use the maximal fuel quantity possible while calculating the fuel consumption. Thus you obtain the longest range. However, if you decide to choose the option **"Capacity used (%)"** and if you e. g. enter the value of "60" for the first tank, then not more than 60% of the tank capacity available will be used for calculating the fuel consumption. Now "PreFlight" will determine a shorter range, but the distances for take-off and landing are reduced too.

10. The Views

Use this menu, in order to display the different results of the flight preparation. The illustrations shown here do refer to the flight named "Flight2", with the calculation options “Change of Altitude” and “Semi Circular” activated.

10.1. Heading + Time

Use this command to display the **flight execution plan** (Illustration 32). Immediately after PreFlight is launched, this view is already active and offers the most important parameters about your planned flight.

File: Flight2.wxy Plane: PA28-181 Date: 15.04.2007

Location	W / S kt	WCA	Var	GS kt	TT	Dist NM	Alt ft	MH	Time
Egelsbach (EDFE)						384			
EDFE-J	225/10	1	0 E	105	216	6 1500	**217**		4
Rhein	225/10	-1	1 W	105	244	7 1500	**243**		4
CTA 3500	225/12	1	1 E	103	216	7 2500	**216**		5
49 42N 8 14E	225/16	2	1 W	60	217	3 4500	**220**		3
BAB Kaisersl.	225/19	1	1 W	96	217	15 4500	**219**		10
132/32.3NM FROM Kim VORTAC (117.50 MHz)									
DB Schopp	225/19	0	1 W	96	230	16 4500	**230**		10
160/34.0NM FROM Kim VORTAC (117.50 MHz)									
49 19N 7 24E	225/19	-6	1 W	101	269	11 4500	**263**		7
EDDR-E1	225/16	-5	0 E	103	269	5 2500	**263**		3
309/ 8.1NM FROM Zweibrüc. VOR/DME (114.80 MHz)									
EDDR-E2	225/13	-1	0 E	102	239	4 2500	**237**		3
288/10.1NM FROM Zweibrüc. VOR/DME (114.80 MHz)									
Saarbrücken (EDDR)	225/13	1	0 E	102	212	5 2000	**213**		3
						79			0:52:00
Zweibrücken (EDRZ)	225/12	4	0 E	123	092	11 2000	**096**		6
						90			0:58:00

Upper wind in:	1500 ft	3000 ft	5000 ft	10000 ft	
	225/10	225/15	225/20	225/20	[Degrees/kt]
Fuel consumption [Litres] Flight: 48.9 Reserve: 24.0 Total: 72.9					
Sunset in Saarbrücken: 18:21:45 UTC					
This is your text, e. g.: Frankfurt ATIS 118.02					

Illustration 32: Screen Shot of Flight Execution Plan

In the title area you find the name of your flight route file and the designation of the plane selected.

- The column “**Location**” lists the names of your way points or the geographical co-ordinates of calculated places. If you have defined a way point more exactly by radio bearings, the appropriate results do appear in a new line below the location name.
- The column designated “**W/S**” displays the direction and the velocity of the wind for the planned altitude.
- The column “**WCA**” displays the wind correction angle, required to compensate the drift.
- The column “**Var**” displays the local grid declination (variation), used to calculate the magnetic course.
- The column “**GS**” displays the speed, your selected plane moves over ground. The value depends on the flight condition (cruise or climb) and on wind conditions.

The entries of all further columns always refer to the flight <u>leg</u> from the place of the preceding line to the place of the current line!

- The column “**TT**” displays the true course to the place, shown at the beginning of the line.
- The column “**Dist**” displays the distance between the way points.
- The column “**Alt**” either displays your planned altitude or the semi circular altitude calculated.
- The column “**MH**” displays the magnetic heading. The value depends on the true course over ground (TT), on the drift (WCA) and on the local variation (Var). Note that thereby the compass deviation was not considered!
- The last column “**Time**” finally displays the flying time between the way points (in minutes).

Instead of the columns “W/S” and “WCA” the printed flight execution plan displays the communication frequency and the minimum safe altitude (Illustration 33).

File: Flight2.wxy Plane: PA28-181 Date: 15.04.2007

Location	Freq	min. Alt. ft	GS kt	TT	Dist NM	Alt ft	MH	Time	ETO	ATO
Egelsbach (EDFE)	121.72	385			384					
EDFE-J	130.90	1600	105	216	6 1500	**217**		4		
Rhein		779	105	244	7 1500	**243**		4		
CTA 3500		1104	103	216	7 2500	**216**		5		
49 42N 8 14E		?	60	217	3 4500	**220**		3		
BAB Kaisersl.		2500	96	217	15 4500	**219**		10		
132/32.3NM FROM Kim VORTAC (117.50 MHz)										

Illustration 33: The Printed Plan

10.2. Route Map

Decide here whether you would like to view and edit your planned route on a generated or on a scanned map. Both views can be scaled up or down within certain limits via the **»+«** and **»-«** buttons of the symbol bar. Likewise it is possible in both views to select a place to be displayed as centred as possible on the window. While changing between these views, PreFlight also tries to display the momentarily centred place in the middle of the new view.

10.2.1. Generated

Use the **»Route Map – Generated«** menu option to get a graphical representation of the flight route (Illustration 34). The map grid of the geographical co-ordinates is created by **Mercator projection**. The principle of this projection is that the map grid of the earth is projected on a cylinder, touching the earth globe at the equator.

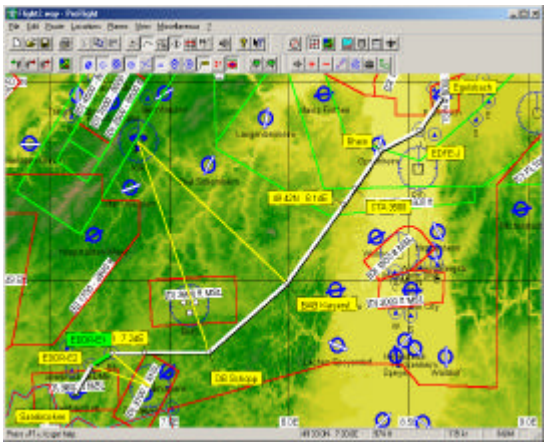

Illustration 34: Generated Map

The representation is orthomorphic (true angles) and shows lines of constant course (loxodromes) as straight lines. Great circles (orthodromes) show up as lines curved towards the pole. The more the degree of latitude increases, the more the distance of the parallels of latitude and thus the scale increases. The consequence is, that this projection cannot be used for the representation of the pole areas. However, the representable area from 85th degree of southern latitude over the equator up to 85th degree of northern latitude should be sufficient for most of your flight routes.
If the elevation profile (in 1-km-resolution) is available for the area of your flight route, then a background picture is generated from it. This picture can be switched off or modified in the **»Graphic - Preferences«** dialog box (Illustration 9).

10.2.2. Scanned

Use the **»Route Map – Scanned«** menu option to get a graphical representation of the flight route on a scanned map. (Possibly, the ICAO chart shown in Illustration 35 is not contained in the scope of supply.)
In order to be able to call this menu item, you must have added and calibrated at least one map, created by secant cone projection. The principle of this projection is that the map grid of the earth is projected on a cone, cutting the earth globe at two standard parallels of latitude. The centre of the earth is the centre of the projection. The representation is orthomorphic (true angles), provides nearly constancy of scale and shows lines of constant course (loxodromes) as lines curved towards the equator. Orthodromes appear as nearly straight lines.

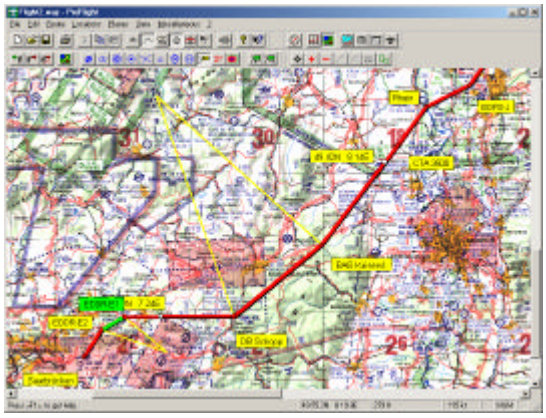

Illustration 35: Scanned ICAO-chart

Likewise, scanned **visual approach charts** will be activated via the **»Route Map – Scanned«** menu option. However, since these maps cover only a relatively small geographical area, a **linear** calibration procedure, which is independent of the actual map projection is sufficient.

10.3. Vertical Profile

Use the **»Vertical – Profile«** menu option, in order to compare your planned flight altitudes with the highest elevations in the vicinity of your flight route. (Illustration 36). The elevation data correspond to the data, which you also find on the ICAO charts. The view displays: the planned flight altitude as a function of the flying time, the **airspaces** and the maximum elevations of the closer vicinity.

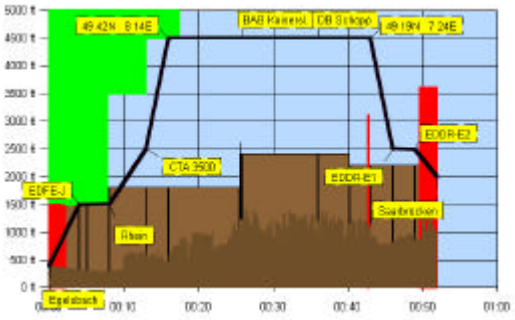

Illustration 36: The Vertical Profile

10.4. Consumption

Via the **»Consumption«** menu option you get a table with graphic elements, which informs you, whether the flight is feasible at all under the given conditions. The table (Illustration 37) is divided into the following sections:

Weight and Balance
Here both the amount of fuel usable and the centre of gravity will be determined in dependence of the current loading. In the graphic you can immediately see whether the centre of gravity is safe (inside the green section).

Consumption of Fuel
Here it will be determined in single steps, how much fuel is necessary for the safe execution of your flight. The arrow beside the tank indicates, how far the tank must be filled at least.

Take-off and Landing
The computation of the take-off and landing distances essentially depends on the recommendations from **"Flugsicherheits-Mitteilungen" 3/75** (reports of flight safety). Thus the take-off distance over a 50 ft obstacle for a temperature of 15 degrees Celsius and mean sea level will be taken as base value, which has to be increased by additional values for "pressure altitude", "air temperature", "runway slope", "grass surface" and "moisture". For both, take-off and landing, **wind influences are not considered!** If you fly against the wind – what is usually the case – the real take-off or landing distance can be shortened in relation to the result calculated. Regard this difference as safety reserve.
Finally this section displays the times for **sunrise and sunset** at the aerodromes of departure and destination.

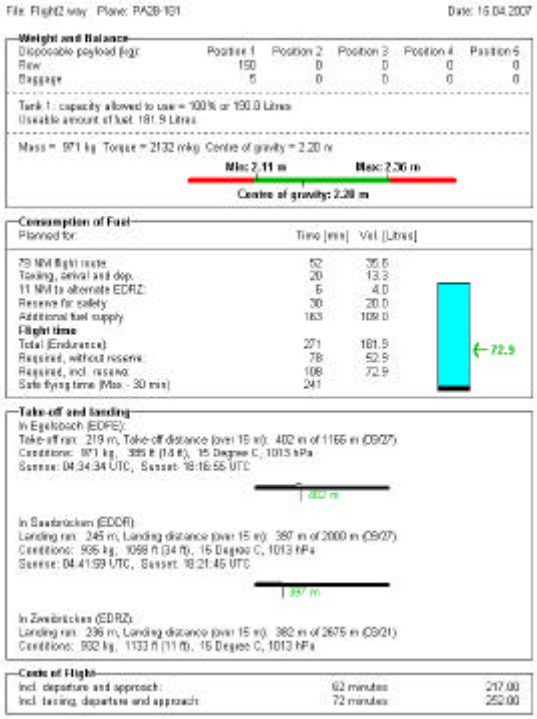

Illustration 37: Consumption

Costs of Flight
The costs of the flight are computed for the one-way distance, whereby the landing fee is not considered.

In the consumption view, you will be referred to inadmissible results by appropriate warnings in each case. On the screen, the messages appear in separate message boxes, while in the view, they appear as red marked graphic and as an additional output below the regular output.

10.5. Flight Plan

Use the **»Flight Plan«** menu option, in order to view or print the flight plan, completely filled in by PreFlight (Illustration 38). If you have a fax printer driver, you also can transfer the form directly to the air traffic control.
Via the **»Miscellaneous – Flight Plan«** menu option, you open the **»Flight Plan«** dialog box, where you can make changes at the form automatically filled in. Click the **»Supplementary information«** button to open a further dialog box, where you can specify the name of a BMP-file, which shows your signature (see "Sign.bmp" in the "BMP" - directory). Thus your signature appears already in the printed or faxed flight plan.

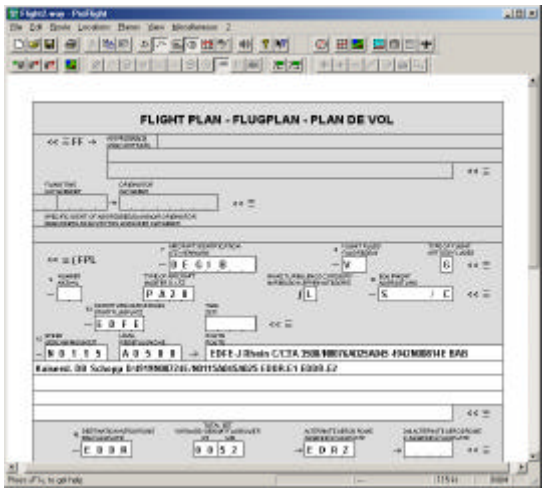

Illustration 38: The Flight Plan

10.6. Way Points

Choose the **»Way Points«** menu option to get a list with the most important data of your flight route (Illustration 39). For each place of your current flight route, beside the geographical co-ordinates, also the variation, a frequency and the planned flight altitude will be shown.

File: Flight2.way

Location	Latitude	Longitude	Var	Freq	Alt ft
Egelsbach	49 57 42 N	8 38 30 E	1 E	121.72	364
EDFE-J	49 52 42 N	8 32 48 E	0 E	130.90	1500
Rhein	49 49 37 N	8 23 03 E	1 W		1500
CTA 3500	49 44 00 N	8 16 37 E	1 E		2500
49 42N 8 14E	49 41 33 N	8 13 43 E	1 W		4500
BAB Kaisersl.	49 29 30 N	7 59 30 E	1 W		3500
DB Schopp	49 19 00 N	7 40 00 E	1 W		3500
49 19N 7 24E	49 18 53 N	7 23 36 E	1 W		4500
EDDR-E1	49 18 48 N	7 15 30 E	0 E	118.35	2500
EDDR-E2	49 16 48 N	7 10 24 E	0 E	118.35	2500
Saarbrücken	49 12 54 N	7 06 36 E	0 E	118.35	2000

Illustration 39: Way Points

10.7. Plane

Via the **»Plane«** menu option, you get a collection of the current planes technical data (Illustration 40).

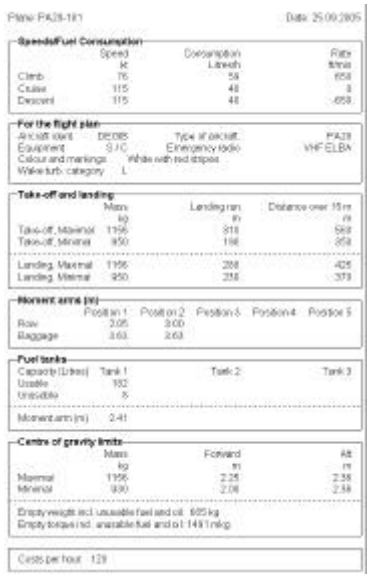

Illustration 40: Technical Data

10.8. Track Map

Decide here, whether you would like to see your *recorded* flight route on the generated or on the scanned map.

10.8.1. Generated

Via the **»Track Map – Generated«** menu option, you get a graphical representation of your recorded flight route (Illustration 41).

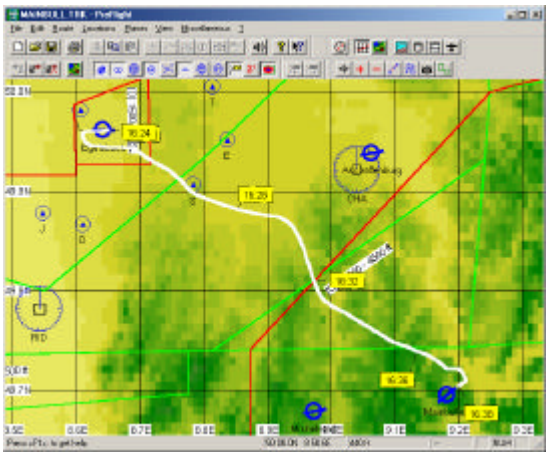

Illustration 41: Track on Generated Map

10.8.2. Scanned

Via the **»Track Map – Scanned«** menu option you get a graphical representation of your recorded flight on a scanned map. (Possibly, the map shown in Illustration 42, is not in the scope of supply.)

Illustration 42: Track on ICAO-Chart

10.9. Track Altitude

Via the **»Track Altitude«** menu option you see the recorded altitude as a function of the flying time (Illustration 43). Note that the accuracy of the data heavily depends on the current satellite reception conditions.

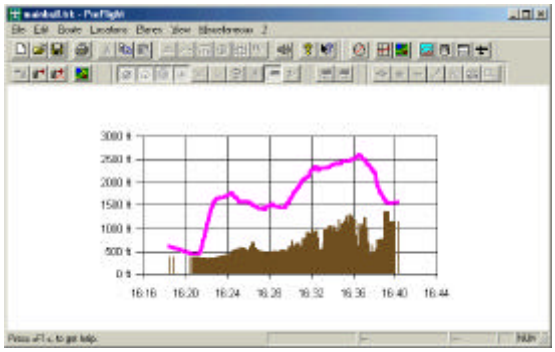

Illustration 43: Recorded Altitude

10.10. Track Speed

Via the **»Track Speed«** menu option you see the recorded speed as a function of the flying time (Illustration 44).

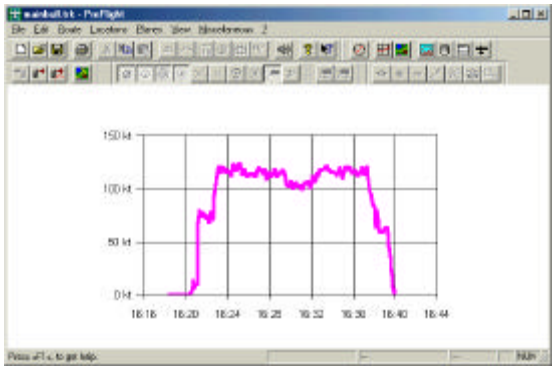

Illustration 44: Recorded Speed

11. Satellite Navigation

To transmit data from your computer to your GPS, you can acquire a data cable offered by the GPS manufacturer or you can use the power- and data cable possibly contained in the scope of supply of the GPS. There is only missing the plug, which fits to your computer.

11.1. Garmin GPS at the PC

From the power- and data cable, which may be supplied with your GPS, three cores must be connected with the PC. Usually you need for this a 9-pin D-Sub-socket. Illustration 45 points the complete connection diagram to connect the GPS via this socket to the PC. The pin numbers of the D-Sub-socket are shown, as you can see them from the solder side of the socket. To connect a power supply unit is not essential. You can also connect a battery-operated GPS to the PC.
If your computer is equipped with a 25-pin serial interface, connect the black line 2 from the GPS not with pin 5, but with pin 7 of a 25-pin D-Sub-socket. All further connections correspond to the illustration.

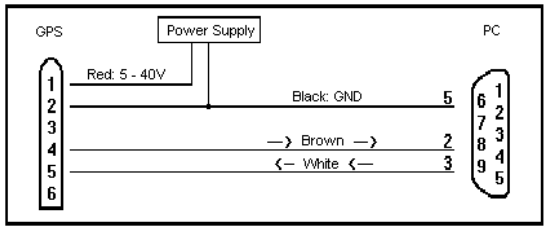

Illustration 45: GPS at the PC

11.2. Garmin GPS at the Macintosh

From the power- and data cable, which may be supplied with your GPS, three cores must be connected with the Macintosh. Here you need – like for PC - a 9-pin D-Sub-socket. To connect that socket to an USB-port of your Macintosh computer, an “USB – Serial” - adapter (e. g. KEYSPAN USA-19QW) is required. You can order it via internet.

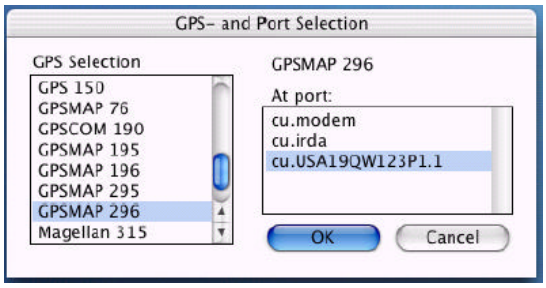

Illustration 46: GPS at the Macintosh

11.3. Using the GPS-Internal Database

If you have selected one of the GPS devices “Garmin Portable...” or “Magellan 315/320”, “PreFlight” tries to create your GPS flight route with the help of the original GPS database! I.e., if you have used airfields or navigation facilities as way points of your route, “PreFlight” does not transfer *user* way points into the GPS, but the request to use the original GPS data. Thus the GPS route resulted by “PreFlight” differs in no way from a route, you have directly (manually) entered into the GPS, and if further information (e.g. frequencies) does exist in the GPS database, this information is available in your GPS route too. Only way points, which the GPS does not know, will be transferred by “PreFlight” as *user* way points. But how does “PreFlight” know whether the GPS has own data for a particular way point or not? For this, the database of “PreFlight” is divided into categories like "Airport", "Reporting Point", "Intersection", "NDB", "VOR" and "User way point". For the GPS devices above mentioned, “PreFlight” knows the internal data structure. Thus, for each category of way point, the corresponding instruction can be sent to the GPS. If you extend the database of “PreFlight” with own way points, which the GPS also should know (e.g. an airfield outside of Europe), then don’t forget to enter, beside **ICAO-code** and **category,** also the correct **country code**. It is needed from the GPS to identify the way point!

11.4. Adjusting Place Names

Usually, the detailed place names of “PreFlights” location database cannot be entered completely into the GPS. Therefore the names which are sent to a GPS will be automatically adapted by “PreFlight” according to the ability of the respective GPS device. Generally only capitals are permitted. The characters: "ßÄÖÜ" will be replaced by: "SAOU". For airfields “PreFlight” uses the ICAO-code and for radio navigation facilities only the first part of the name will be used. Compulsory reporting points are treated separately. Here, the first two letters and the hyphen are ignored. Thus "EDFE-D" converts to "FED" and "EDFE-MESSEL" converts to "FEME" or "FEMESS", depending upon GPS. The automatic transformation of the compulsory reporting points works only, if the fifth character of the name is a hyphen. Hence you can get the name of your choice, if you rename the reporting point in the location database accordingly, or if you assign a code (indicator) to your reporting point; because generally for each category of way point applies: If a **code** is present, then it is used for the transmission into the GPS and an automatic name conversion doesn’t take place.

11.5. Exporting to GCAS

Select the **»Route – Export for GCAS«** menu option, in order to create a XML formatted export-file. This file is suitable to transfer a route that you have planned within “PreFlight” into the “GCAS Flight Companion”. GCAS stands for “**G**round **C**ollision **A**voidance **S**ystem”.

“GCAS Flight Companion” was manufactured by the “Euro Telematik AG”. To run this software, you need a pocket PC, e. g. the “H3630” from “Compaq” and a GPS providing a NMEA interface. You get further information about “GCAS Flight Companion” via internet at “http://www.flightcompanion.de”.

11.6. Exporting as KML

Select the **»Route – Export to KML«** menu option, in order to create a XML formatted export-file. This file gets the “KML” extension and is suitable to view a route that you have planned within “PreFlight” in “Google Earth”.

To run this software, you must have access to the internet. You’ll get “Google Earth” and further information about via internet at “http://www.google.co.uk/intl/en_uk/earth/”.

11.7. Writing a Route into GPS

If this menu option is disabled, at first choose the **»Miscellaneous - GPS Selection«** menu option, in order to select *your* GPS. Also make sure, that the transmission mode **“GRMN/GRMN**” (or “**Data Transfer - Slave Mode**” for GPS 195) is activated in your GPS. As soon as you have created or opened a flight route, you can choose the **»Route – Write into GPS«** menu option to open the **»Transmission into GPS«** dialog box (Illustration 47). Here you specify the number, used to store your route in the GPS. After that, you start the transmission by clicking the **»Transmit«** button. During the transmission, among other things, the names of the currently sent way points appear below “State:”. After the transmission is completed, the dialog box closes automatically. If you like to close the dialog box, without sending a route into GPS, then choose the **»Cancel«** button. If you do this during a **running** transmission, you probably have to restart your GPS, so that the next transmission succeeds.

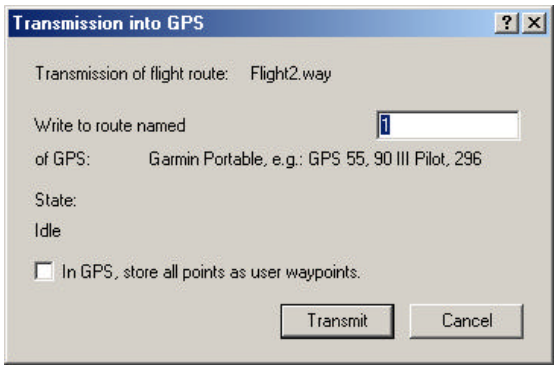

Illustration 47: Transmission into GPS

11.8. Reading a Route from GPS

If this menu option is disabled, at first choose the **»Miscellaneous - GPS Selection«** menu option, in order to select *your* GPS. Also make sure, that the transmission mode **“GRMN/GRMN**” (or "**Data Transfer - Slave Mode**" for GPS 195) is activated in your GPS. Use the **»Route – Read from GPS«** menu option in order to open the **»Read from GPS«** dialog box (Illustration 48).

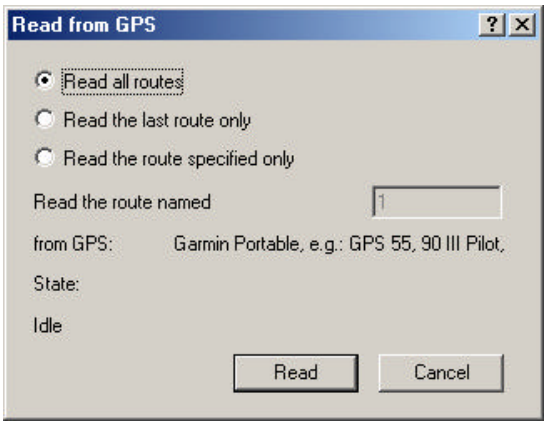

Illustration 48: Reading a Route from GPS

Select the **»Read all Routes«** radio button, if you like to automatically read all GPS routes in one single step. Thereby “PreFlight” generates file names like “EDFEEDDR.way”, or (if already used) like “RouteXX.way” (XX: serial number).
Select the **»... specified only«** radio button, if you like to read one specific GPS route only. Nevertheless, after you have clicked the **»Read«** button, the GPS sends **all** defined routes. Below "State:" you can see what the GPS currently sends. But now, “PreFlight” only stores the way points of the route desired. In this case, to generate a file name, “PreFlight” uses both, the first and last way point of the route selected. As soon as the GPS has sent the last defined route, the dialog box closes automatically. Now you probably will be asked, whether you like to **use data for »XXXX« from database**, whereby »XXXX« stands for a name of a way point of the GPS route. If you answer this question with "Yes", then “PreFlight” completes the way point parameters, which the GPS did not supply, by the appropriate entries from the current location database. If you like to close the dialog box, without reading a route from GPS, then choose the **»Cancel«** button. If you do this during a **running** transmission, you probably have to restart your GPS, so that the next transmission succeeds.

11.9. Peculiarities of the GPS III and GPSMAP 295

Compared with the other devices of Garmin, for GPS III and GPSMAP 295 it is noticeable, that the route number is not freely selectable when **writing routes** into GPS! I.e., you always have to enter the smallest free route number. Usually this corresponds to the number, the GPS displays in the routes menu as “Used”. Thus if you have already transferred three routes (0, 1 and 2), then the GPS displays:

“Routes: 17 Avail, 3 Used”,

and since the first route gets the number “0”, for the next transmission the number “3“ should be used.

Furthermore note, that the **New Route** menu item must be activated before you can transfer a new route into the GPS. Thus an empty route with the name **"EMPTY-1"** appears in the GPS. Now you can start the transmission of a route in PreFlight.

If you have already stored some routes in the GPS and you don’t know anymore which route numbers can be used for new routes, it‘s recommended to delete all routes in your GPS (“**Delete All“**), after you have read and stored important routes with PreFlight. Thereupon you can write your new route with the number "0" into the GPS.

Each stored route is marked in the GPS by a name like "EDFE-EDDH", whereby a reference to the route number is missing. From the sequence within the route list the number cannot be determined also, since the names are displayed alphabetically sorted. In order to nevertheless make possible a direct access to the desired route when **reading in routes** from the GPS, PreFlight doesn’t ask the GPS III and the GPSMAP 295 for the *number*, but for the *name* of the route (Illustration 49).

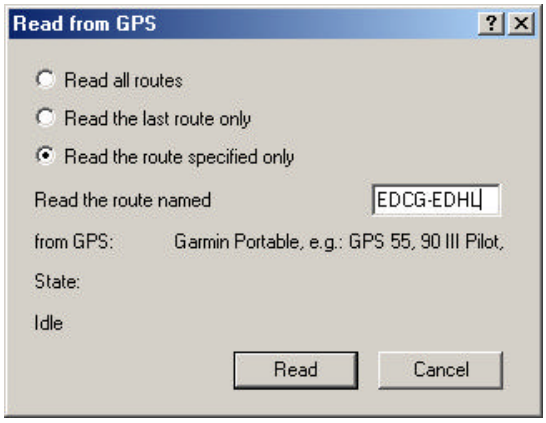

Illustration 49: Reading a route from the GPS III

Take the names possible from the route list of the GPS. The names can be written in upper or lower case.

11.10. Reading a Track from GPS

Many of the GPS receivers of Garmin or Magellan are able to store the way travelled in more or less good resolution. There, the recorded way is saved as “Track”. If you have recorded such a track with your GPS, then you can use PreFlight to read and evaluate that track. Therefore choose the **»Route – Read Track from GPS«** menu option. The **»GPS-saved Tracks«** dialog box (Illustration 50) appears. If you read **all GPS tracks** in one single step, then “PreFlight” generates file names, which contain the time of the recording. If this file name should already exist, “PreFlight” uses a name like “TrackXX.trk”, where XX will be replaced by a serial number. If you like to read **one specific track** only, then use the number "0" to get the first track.

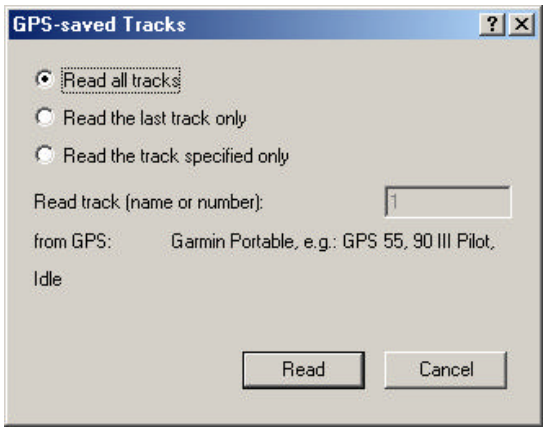

Illustration 50: GPS-saved Tracks

11.11. Track

If you possess both, a portable computer and a GPS with NMEA 0183 interface, “PreFlight” can be also used as navigation system, which constantly stores and displays your current position on the ICAO map or on the generated map. In the case that the **»Route – Track - Moving Map«** or **»Route – Track - Flight Recorder«** menu options should be disabled, first choose the **»Miscellaneous - GPS Selection«** menu option, in order to select *your* GPS. Make sure also that your GPS has activated the transmission mode **"NONE/NMEA 0183”**.
Within the “Route – Track” sub menu, you have the possibility to store tracks in your computer, (“Save as...”), to read previously saved tracks (“Open...”), to export tracks as KML-file (“Export as KML”), to delete tracks from memory of your computer (“New”) or to record new tracks (“Flight recorder”).

11.11.1. Moving Map

Activate “Moving Map” via the **»Route – Track – Moving Map«** menu option or via the symbol bar:

Moving Map on/off: 

If you just have selected the “Map – **Scanned**” view, then “PreFlight” looks for a suitable (ICAO-) chart, in order to mark your current position on it. If no map should be available, or if you have selected the view "Track Map - **Generated**", then “PreFlight” displays the generated map, where you can see your current position on the elevation profile! Depending upon which colour table you have activated in the **»Graphics - Preferences«** dialog box (Illustration 9), you see a static elevation relief or a dynamic one, where the colour representation depends on your flight altitude:

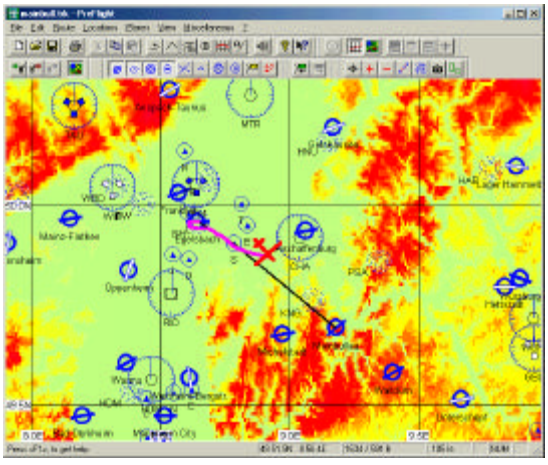

Illustration 51: Ground Obstacles

“PreFlight” displays all elevations, lying above your current flight altitude, in reddish colours (Illustration 51).

While the moving map mode is activated, it`s also possible to scale the map up or down via the symbol bar:

Scale up: 

Scale down: 

Thus you always exactly know where you currently are, but are you on the *correct* course also? In order to be able to check this at any time, the course desired should have to be drawn in the map. You get this graphical target course, if you open a route (via “File – Open...”), describing the course desired. Then this flight route becomes visible as a thin black line (hopefully below your current position) (Illustration 52).

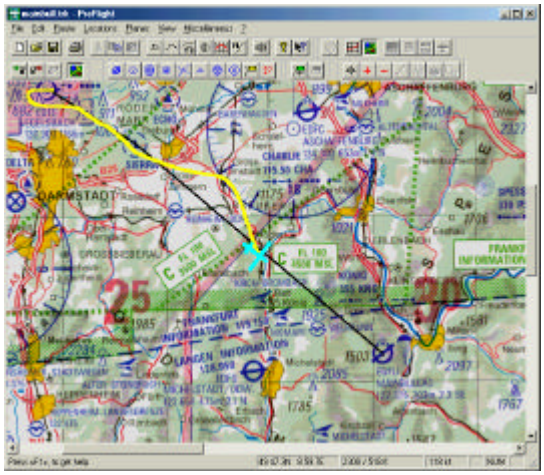

Illustration 52: Moving Map

If you have added visual approach charts for the aerodromes of departure and arrival to the administration of maps, then “PreFlight” activates these maps, if you are in the vicinity of that places.

If Moving-Map mode is activated, at the lower edge of the window you see both, the co-ordinates of the current position and the actual flight altitude. If the 1-km-elevation profile is available, you can also see the mean ground elevation beside those values.

11.11.2. Flight Recorder

The function "Flight Recorder" essentially differs from the **»Moving Map«** menu option only by the kind of display while recording.
Use the **»Route - Track – Flight Recorder«** menu option in order to open the **Track** dialog box (Illustration 53), where you can record and play back position, speed, altitude, distance and time. The dialog box remains opened during the entire recording. Thereby you directly see the data, the GPS currently sends. In order to terminate recording, click the **»Stop«** button. Now you can analyze the recorded track point by point. To save the track, click the **»Save as«** button.

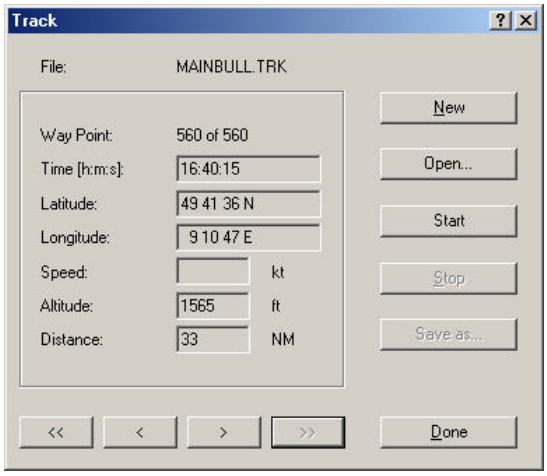

Illustration 53: Recording a Track

12. Airspaces

For each region, the airspace data is stored in two files:

- Region.spa, contains general information.
- Region.seg, describes the segments.

General information about airspaces can be edited in the **»Airspace** dialog. Open this dialog via the **»Locations – Airspace«** menu or from within a map: Hold the Ctrl key down and click the right mouse button. Then a new menu lists all the airspaces around your current mouse position. In order to open the »Airspace« dialog select the airspace you want to edit.
The »Airspace« dialog is used to edit both the category and the vertical size of the airspace. Click on the **»Edit segments«** button, to open the **»Airspace Segments«** dialog box, where you can specify the shape of the airspace. Here you can add, change or remove segments of the current airspace. You can change the start point or the end point of a segment either manually in this dialog or with the help of the mouse on a scanned map. In order to modify an airspace with the mouse, you must convert the airspace to a flight route! This can be easily done by clicking the **»Export...«** button. Once you have a route surrounding your airspace, close the airspace editors and modify the airspace route like a flight route.
Note:

- The last (closing) segment is not required. It will be added automatically while importing a route.
- Arc segments will be replaced by line segments. You must add arc information later in the **»Airspace Segments«** dialog box.

To convert a route to airspace segments, open the airspace to be modified in the »Airspace« dialog and click on the »Edit segments« button. In the **»Airspace Segments«** dialog box use the **»Import...«** button, in order to replace the current segments with new segments created from the current flight route. If a line segment must be converted to an arc segment, change its form to “CLOCKWISE ARC” and add a radius value. If you don’t know the centre of the arc, select the **»Calculate«** button. Because there are always two possible solutions, a second click on that button will generate the second result.

13. Table of Illustrations