Timetable Construction System FBS

Documentation

Edition November 2015
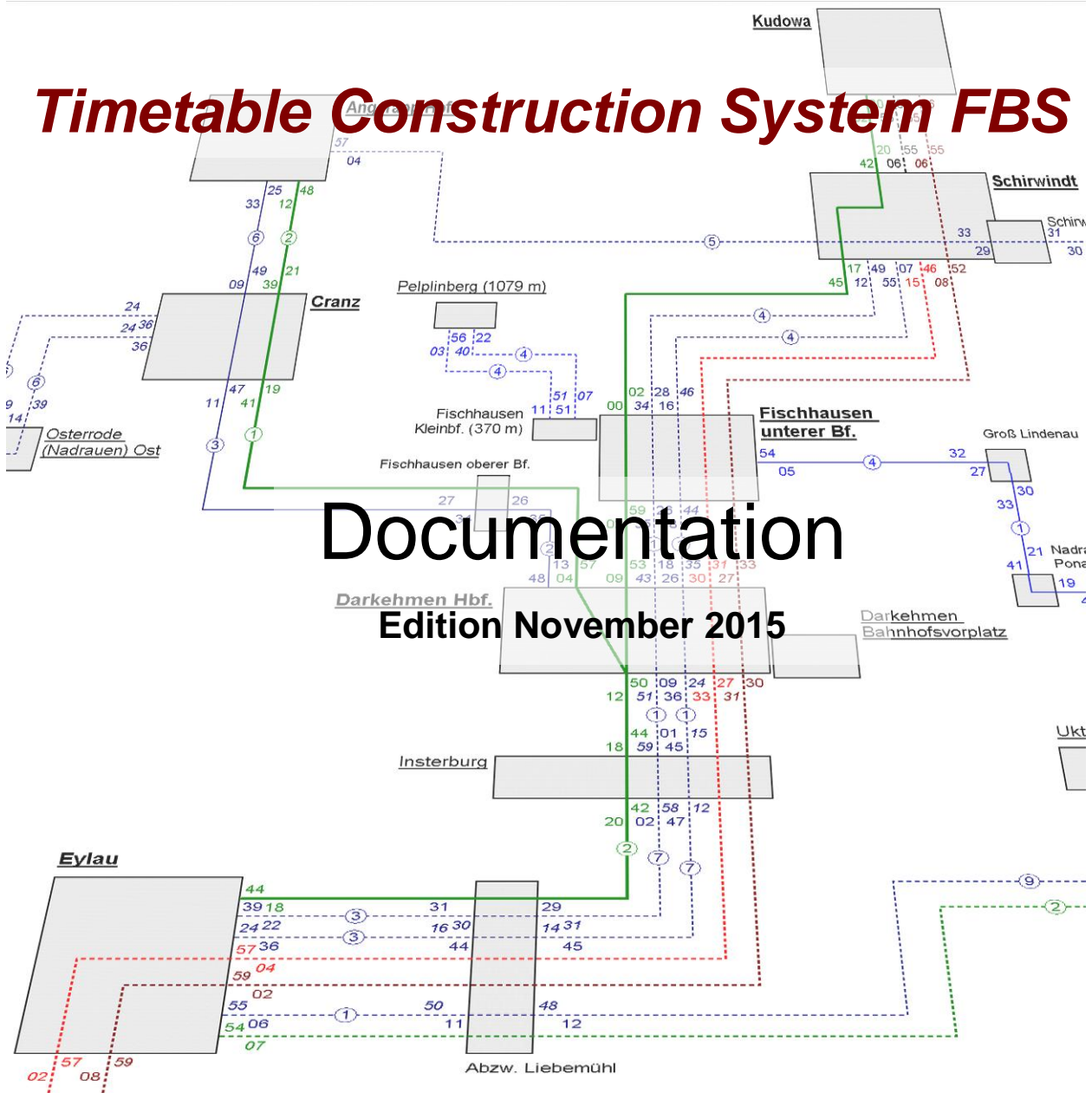
A software family made by
Institut für Regional- und
Fernverkehrsplanung

iRFP

FBS – That's how to create timetables!

I

Global table of contents

1 <u>General Information</u>

1.1 Introduction

When the engineer Andreas Schubert arrived with the first German-built steam engine in Dresden on April 1st, 1839, the story of the means of transportation began, which revolutionised the world, had distances be connected and still cannot be imagined without these days. Through the rail, invention and new fields of scientific research were promoted that developed into sciences and educational institutions of its own throughout the 20th century.

The conditions that were changing within the railway operation- particularly the deeper consideration to customer needs- intensified the requirement of more improved and more flexible planning instruments. Timetable Construction Programme FBS has offered technologists an efficient tool for timetable construction since 1993. With FBS, a programme package for a computer aided construction of all working timetables necessary within the railway operation has been created with the help of which railway traffic from extensive graphic timetables up to station timetables of large central stations are planned and carried out nationwide these days.

Since 1997, FBS has been further developed at the Institute for Traffic Planning Systems iRFP. Market-determined benefits as the computer aided evaluation and control of relevant data (e.g. timetable slots) and the consistent using of system available data are further extended and important functions are newly implemented, as required by the traffic market nowadays. However, simple, fast and reasonable work is still possible on account of low demands on hardware, the central data maintenance within the network and modular organisation of software.

This instruction offers you detailed information on the work with FBS, on opportunities and the functional range of the programme system as well as on the organisation and using of data structure. Since the FBS programmes have constantly been further developed, a supplement to the manual with the most recent functions is added if required. You find a summary of the innovation on our Internet page at www.irfp.co.uk.

The timetable programme currently (November 2015) consists of the following programmes:

- FBS-Dispatcher (survey of files)

- Integrated planning program iPLAN

- Station Database Editor BSV

- Train type and h'code Editor ZNV

- Engine Database Editor TFZ

FBS is available in a wide range of functions as well as in versions for industrial purposes (FBS*bahn*) and for research and teaching purposes (FBS*FuL*). For non-industrial purposes by private individuals a specific version is marketed with the scope of service that is adjusted to the hobby field (FBS*privat*). Thus, mainly historic locomotives are included in FBS*privat*; commercial functions for analyses and statistics were not implemented and expressions indicate information about private use.

If requested, further additional programmes are available, in particular, for the conversion of data in or rather from existing data systems. Likewise, the conversion can be carried out by iRFP.

The programmes of the FBS-family are still deliberately delivered without any textual assistance. In our experience, textual assistance loses its meaning after a certain training period anyway and for the consulting it is still better to use a computer-independent assistance. You can find quick information above most buttons and symbols if you do not move the mouse pointer for a moment.

On this spot, we want to thank the users of the previous versions for their advice, tips and hints, which could be incorporated for the most part. Naturally, such great project still lives according to the response of the users and the practical orientation involved. Therefore, we would still like to ask you for active notification of your experience, problems and suggestions to our institute (addresses look at the inner booklet).

1.2 Further Information/ Support/ Response

You can inform yourself about reforms, update-opportunities as well as planned functions on our homepage at www.irfp.de/aktuelles.

For specific questions and problems please use our service per e-mail. The following addresses are available for you:

for **FBS*bahn***-version:	fbsbahn@irfp.de
for **FBS*FuL***-version:	fbsful@irfp.de
for **FBS*privat***-version:	fbsprivat@irfp.de
In general:	service@irfp.de

In the **Info**-window in all FBS-programmes (yellow button or menu help/info) you find a **Service**-button. So you can send a message quickly and directly to our service team.

For **FBS*bahn***-customers, we recommend concluding a completing service-contract, which offers, among others, additional telephone-support as well as a technology guarantee for the time after the deadline of the guarantee period. We welcome you to inform yourself about extent and conditions at info@irfp.de.

1.3 Text conventions in this document

Bold type indicates menu items, columns headers, tabs and buttons, which you may find again with this term. The individual menu items, submenus and tabs are separated from each other by **>**.

Those individual words, which need to be particularly stressed for an emphasizing of details, are underlined in the text.

Additional explanations are printed in italics.

Explanations of special significance are indicated by an exclamation mark. Please read through those passages with careful consideration. Settings, for example, are explained here which have fundamental significance for a project and should therefore occur in the beginning of the work or which will have far-reaching consequences.

1.4 System requirements

1.4.1 Minimum requirements

Pentium IV or compatible processor, 800 MHz, 256 MByte RAM, 4 MByte graphics card (XVGA, 1024 x 768 points), a two button mouse or similar device, 50 MB hard disc storage unit, CD-ROM drive for first installation, 32-Bit-system software (Microsoft® Windows© 7, other Windows versions on request), Windows-compatible printer.

1.4.2 Recommended requirements for a faster use of FBS

Pentium-III-processor, AMD K7 or compatible processor with at least 800 MHz, 512 MByte RAM or more, ≥16 MByte graphics card, PCI- or AGP-Bus, mouse, ≥17"-monitor with 1024 x 768 points, two-monitor-mode, colour plotter
The screen resolution has to be set on at least 1024 x 768 points, otherwise there could occur problems with the window and type sizes.
If you would like to use FinePrint you need version 5 or higher.

1.5 Installation

The timetable scheduling system is delivered on a CD with an installation programme. It fulfils the Microsoft-Windows principles and only changes its system files in a permissible way, which can be cancelled again. For the installation in Windows 2000 and XP you need administration rights.

Please put the CD into the CD drive and select **Start> Run** from the taskbar. Following this, please enter **[CD-drive]:\Setup** and press **Ok**. (If auto start has been activated for your CD-drive, the setup-programme starts automatically.) Everything else will be carried out by the installation programme, which will also ask you about the installation path and extent of the requested installation. You may subsequently install individual FBS-elements, which you do not want to install initially, later on.

We recommend compiling a folder (directory) of its own for FBS. The installation programme suggests **C:\Programme\FBS**, however, you can compile any other folder, as well. The target folder must not necessarily be available; it is automatically created if relevant.

If you wish to have the Timetable Construction System FBS be enlisted in menu **Start**, please enter a programme group in the installation programme or select an existing one. This programme group is constructed again, if it does not exist yet.
The installation programme also takes care of the registration of the programmes and the timetable files in the Windows-registry database.

1.6 Subsequent installation und de-installation

Currently, there can only be one reasonable cause to de-install FBS: You have got a new version...
You may also install FBS in another directory than the old version has been. When installing above an existing version you run the risk that not all of the files are replaced correctly or that unnecessary files remain at the hard disc.

You may also add an incomplete installation. For that purpose, the installation programme starts appropriate files and registration entries during the installation. At the de-installation all files that were delivered with FBS as well as the registration entries will be deleted. FBS files that were started by the user will not be deleted also not the FBS-directory if it still contains timetable files.

For the subsequent installation or de-installation please proceed as follows:

Close all FBS-programmes (F12) and select the item Control Panel (**Start > Settings > Control Panel**). Open **Software** and select the item **FBS** from the list **Installation/De-installation.** The setup-programme now offers you the option for the complete reinstallation, the supplement of components as well as for the de-installation. For the reinstallation or supplement you need the original FBS-CD. Windows carries everything else out.

1.7 Trains, train parts and direct connections

1.7.1 Trains in FBS

A train is an operational view on a ride from station A to B. For operational purposes it is not relevant whether all parts of the train run from A to B or which tariff is allowed for that train. Important is train's head code for priority of train and trains number for identification. In some cases special information of trains attributes is also coded into the head code. So DB uses annex –T for tilting trains in the head code. A tilting ICE vehicle runs ever as ICE-T in operational view.

Along a train run several (nearlly all) data can change. The only thing which keeps the train as one train is the train number.

In FBS runs a background system which combines several sections of a train run to one train when all following conditions are fullfilled:

- same train number,

- same multiple train index,

- the first section ends where the second section begins and

- arrival and departure of the train is in less the 12 hours.

1.7.2 Function of train parts

Train parts as the name says are parts of a train. Every train has a minimum of one train part in each section. The train part consists of the vehicles, operational days and a product name which is shown to the customer. It is also possible to give a train part several attributes like line number, coloure, ... For circulation purposes it is required that each engine is put in an own train part. So a train consisting of two multiple unit has two train parts. One for each multiple unit. It is not usefull to change vehicles during a train part run. If you want to change from Diesel- to electric-engine you should handle them as different train parts.

Train parts of a train do not need to have one attribute together. They can differ completely in operation days, vehicles are whatever. It is also not necessary that all train parts have to run the whole route of the train. So a train part can begin later or end earlier than another. The operational days of a train route section is defined by an intersecting set of all train parts inside this section.

Train part number is used to identify a train part in FBS. In case you use the same train part number in different trains it will be also set together like a train. This way it is possible to define train coupling and sharing in FBS.

Combining train parts between different trains can change the operational days for a train rund especially for circulation purposes. For example:

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- graphic timetable 1: Train within train part 3001 Dresden – Bischofswerda, daily,

- graphic timetable 2: Train within train part 3001 Bischofswerda – Zittau, W not 24. and 31. december

Result for train parts:

- 1. train part: 3001: Dresden – Zittau, W not 24. and 31. december

- 2. train part: 3001: Dresen – Bischofswerda, S also 24. and 31. december

This way you should make sure what happens in a closed timetable period:

At the last day of a timetable period ends at 12 p.m. and the first day beginns 0 a.m. So a train runing over midnight would have an apprupt end at the last day and a sudden beginning at the first day of the timetable period. If the defined timetable period is a mutiple of seven days it is defined that the train runs at the last day of the timetable period to its normal destination. Normally a timetable period begins at the night between saturday and sunday so nearlly all periods can be seen as a closed loop.

1.7.3 Definition of direct connections

For railway customers trains and train parts are not the required database for information. So a modell of direct connections is defined. They consist of the train part runs and are further analyised. A direct connection here is the longest section you can travel without interchange. If there is a second train part at (a part of) this section and has less operational days it is not relevant for customer information. So they can be filtered. This is the base for customer information via customers timetable are arrival and departure poster.

1.8 Functions in all FBS-programmes

The FBS-programmes stick to the general Windows-standard. Menu layout, window control and short cut are standardised as familiar to you from Microsoft Office products, for example.

Usually, there are four opportunities to activate a programme function: You can select the appropriate menu item with the mouse or you can activate the menu by the underlined letters (in combination with the Alt key). Moreover, numerous menu items have a so-called short cut, a key sequence. This is indicated in the menu. You can tap the key sequence at any time in which the particular function will be activated immediately.

Eventually, the Timetable Construction System FBS offers you mouse buttons for most of the functions. Those are arranged in the toolbar at the upper window edge and only need to be clicked on with the mouse (no double-click) to activate the function. Some mouse buttons represent an on state and therefore can be ”pushed in“ and “out“.

✍ *Short information to all mouse buttons is displayed if you hold the mouse pointer for some seconds above the button. This information provides an indication of the function that is activated by the button.*

1.9 Run programme and Open file

If the installation has been carried out correctly, you will find the programme entries of the single FBS-elements in the subdirectory **Programme \ Timetable Construction System FBS** of the “Start“ menu of Windows. Furthermore, the installation programme creates a linkage at the desktop. This represents the fastest way to reach the FBS-Start window (see chapter 1.12, at page 6).

The file extension of the FBS files are linked with the appropriate programmes. You can double-click those files in the Windows explorer and Windows changes to the respective FBS programme or rather runs it. In addition, a specific logic ensures the selection of various files without starting a programme several times.

1.10 The menu "Programmes"

If you work with several FBS programmes, the functions to change programmes are available to you: There is the **Programmes**-menu in all FBS programmes. By choosing an entry you can select another programme or change to it.

Moreover, the menu buttons correlate with a uniform key sequence. Thus, you reach every FBS programme directly via keyboard. In principle, the following short cuts are applied:

Shift + F1	FBS – Data Overview
Shift + F2	iPLAN – Timetable Programme
Shift + F5	BSV – Station Database
Shift + F6	ZNV – Train Type and h'code Database
Shift + F7	TFZ – Engine Database
Shift + F12	Exit all FBS-Programmes

When selecting a programme by the **Programmes**-menu (or a F-key respectively) it is checked first, whether the selected programme has already been run under Windows. If this is the case, the current programme will be minimized to an icon. The programme that has been selected is informed that it has to display itself as complete picture and that it must undertake the input control. If it does not run yet, it is started again.

1.11 The menu items "Window" and "File"

The programme iPLAN is a so-called <u>Multi-Document-Interface-Programmes.</u> This means programmes, which can open several files in there own sub-windows. Each sub-window is allocated to a file and can be scaled at will in the range of the main window.

The menu items in the menu **Window** regulate the sub-windows. You may arrange those in various ways and change and jump among them.

The menu item **File** each opens, closes, saves and starts sub-windows. The number is solely limited by the memory store.

1.12 The FBS-Start Window

1.12.1   General Information

The click on the FBS-icon at the desktop or in Start menu opens the FBS Start Window. With this you have a quick access to the Timetable and Network Timetable Programme, in which you can begin with a new file or an existing file. **FBS-Dispatcher** leads to FBS' own file overview (see chapter 1.13, at page 7). At the **Additional Programmes** you find the the Station database, the Train type and h'code Programme, as well as the Engine database programme.

1.12.2   Installation and maintenance

1.12.2.1 *Change language*

Ctrl+Alt+L

FBS is available in English, French, German and Czech. Under **Installation and Repair > Change Language** you can select the required language. However, please pay attention to the fact that not all windows allow the change of the language during the processing. In this case, please close the window and open it again after the change of the language. Additional languages are implemented on request. Some windows are managed by your Windows® and so they use the Windows-language you have chosen.

1.12.2.2 *Installation and Repair – Additional Functions*

With this you can check or, if necessary, change the file types and path details for the FBS programmes within the tab **Update Registration Entries**. For it you must possess administration privileges. For the work at the computer you can change the layout of the menus under **Menu-Layout Configuration**. Next to four standard designs, there is a colour palette for each of the menu items available to you. Moreover, you can change diverse measures.

Changes to the licence data may require a modification of the licence plug. For that purpose appropriate functions are offered under **Install Driver for Licence Key** and **Run Service Programme for Licence Key**. Finally, with **Window Configuration** you can adapt the Start window to your ideas by yourself. Besides, you can decide whether the Start Window may be kept open or should be closed if you run one of the FBS Programmes.

1.13 The FBS File Overview

1.13.1   General Information

You reach the FBS-file overview via the menu item **Open FBS-File** from the Start menu or via key **Shift + F1** from all FBS-programmes. This is arranged similarly to the Window-Explorer. It features the same functions to delete, copy, rename and replace files as well known through the explorer. Moreover, there is the tree structure of the databases.

1.13.2   Detail Layout

Here, the FBS-files are displayed additionally with version number, purpose, creation time, editing time and person as well as with a short specification. With this, a clear structured administration of FBS-files is possible and the orientation within the FBS-database is facilitated.

You can edit information on **Purpose** and **Specification** files in the appropriate FBS-programmes (e.g. within the Timetable Programme in the **General Line Data**) or with the menu item **Properties** from the FBS-File Overview in the context menu of the right-hand mouse button.

2 <u>Working in a network with iPLAN</u>

2.1 General

2.1.1 Preliminary note

iPLAN manages one or more lines in track files (*.fpl). So for example a customer timetable does not need to beginn at the station where the line file starts. A junction is mostly not interesting for a passenger. Also a train can change the line at a station but the driver´s timetable should be continued so that the driver does not need to search another page. Furthermore the engines of a circulation plan would not only operate at one line. Finally you can produce an ambitious interval graphic to show the relations in a clock-face timetable system.

A network for the programme is a collection of line data, timetable at the line and the definition of nodes in which lines are combined. If you would like to create timetables for a single line, you also need to define a network with only this line. Just for your orientation you can produce a network grafik and print it. This graphic is not used any longer in the programme. For illustration, publishment or presentation the interval graphic might be the better way.

2.1.2 Condition for use of iPLAN

iPLAN uses a file ending on ntz. So the track files (*.fpl) are linked into the ntz-file and combined there by knodes. This file includes the basic informations about the network: the links to the fpl-files, the nodes and so on. All this data are saved in a file ending with **.ntz**. The file includes the objects, which are:

- grafik timetables,
- station timetables,
- driver´s timetables,
- customer´s timetable or schedules,
- circulation plans and
- interval graphics.

It is possible to use relative paths and variables to define the folders in which the files are saved. So the timetable data do not need to be saved in the same folder as the NETZ-file. The fpl-files are searched by the following ways:

- if there is no path filled in: inside the folder in which the NETZ-file is saved
- if a path is known: in this patth which can start by <FBS>, <OWNER>, <USER>.

2.1.3 Steps by working with network timetables

The following steps are recommended for simple use of iPLAN:

1. create a folder for the timetable and network file on your hard disk
2. start the **iPLAN**-programme and create a new ntz-file in this folder
3. add a line to the network (chapter 2.2.3, page 15)
4. as an option you can set the color of the line

5. select the nodes of the line

6. repeat the steps 3 to 5 until all lines are filled in

7. as an option you can fill in koordinates for the nodes at the network graphic

8. as an option you can edit the nodes in the network graphic (symbol, size of font and angle of text)

9. insert new objects (driver´s timetable, customer´s timetable, circulation plan, interval graphic)

Please note, that some objects have to be supplemented by further informations, which are not included in the fpl-file (hints in customer´s timetables,...). Normally some circulation planes are possible so that you have to select one of them. At the end you can print the objects.

All the steps are described at the following pages. Before you create your first ntz-file you should comprehend the steps in a delivered example ntz-file. The context menu summerises functions, which you often need and so you can do a fast job.

2.1.4 Contents of main window

The main window is separated in several parts. The left part shows you a network graphic based on coordinates of the stations and the colours of the lines. This is used for your orientation and is one of the options to get a graphic timetable (see chapter 3 starting at page 27) or a customers timetable (see chapter 5 starting at page 93) for example. The part on the rightern side is split in three parts. The upper part contains the list of line files which are included in the current network. If you click on a node inside of the graphic on the left the first line which is linked to the node will be selected. Below the list of line files you can see a list of nodes of the network. If a node has the same abbreviation in every line file the lines will be combined there so it is possible to change at this node from one line to the other.

At the lower part of the rightern side of the window you find the list of all network objects which have been created for this network.
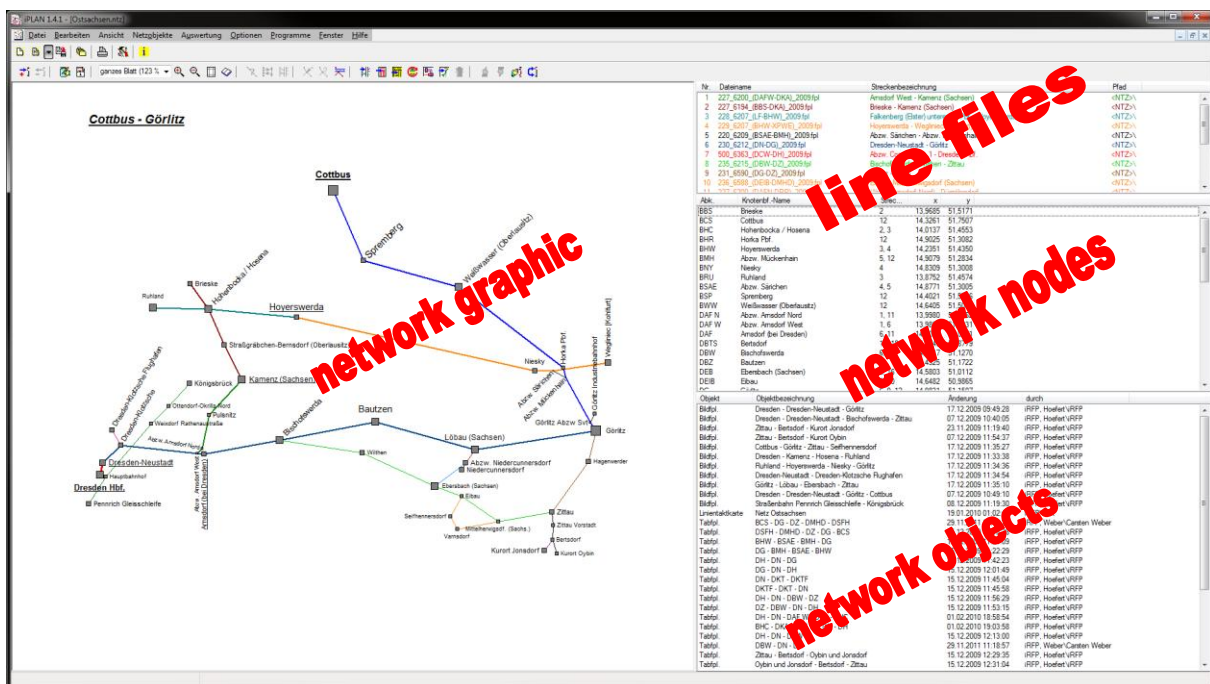
2.1.5 Handling of network graphic

Some network objects (graphic timetable, customers timetable) are defined by marking the path inside of the network graphic. To be able to see which lines have been selected at the moment they are highlighted with yellow colour like using a text marker on paper. After you defined the main route of a customers timetable and used the continue button the colour changes from yellow to blue. The branch line you define now will again be shown with yellow colour.

It is possible to extend or detour the current path. By klicking the first and the last node of your wished path the programm shows you the shortes way between them. Using the right mouse button allows you to define, whether your thrird click is an extension of the current path or it is a detour maybe for easier train runs.

Additionally to the show path inside of the graphic a window is shown which lists all nodes at whom the lines are changed. A doubleclick at the last entry of this list deletes the node so that you can correct the way through the network.

2.1.6 The context menu (mouse meu) of iPLAN-programme
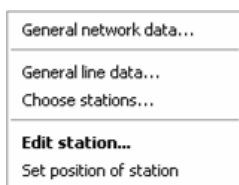
If you click an element in the network graphic or the lists by mouse and do a right click the contextual menu opens. So you see all functions which ca be done with this element. The current functions depend on the element you have choosen. All the functions are äquivalent to the symbol line on top of the programme window.

Some items can be reached faster by a double click at the element. These items are written in bold.

The functions in relation to driver's timetable are explained in chapter 4.6 on page 91.
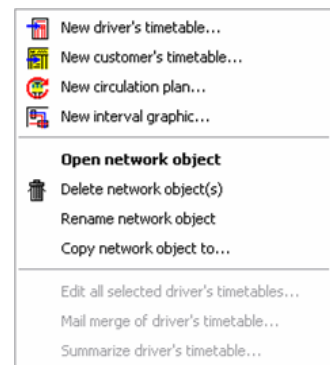
2.1.7 Undo/Redo

Alt+Rück for undo

All objects and the iPLAN-programm itself have there own undo and redo functions. They are located inside of the Edit-menu. Just take care, that the undo functions are interleaved. That means if you undo step 3, after doing step 4 inside of the shown changes inside of the shown NETZ are undo too. A special function exists inside of the function edit table inside of the customer's timetable. It has an own undo function, which is integrated in the undo system. Undoing step 5 after doing step h inside of the table means changes I to IV are undo too. The number of possible undo steps is configured by you as explained in 2.5.1 at page 20.

step	iPLAN	object
1	1	
2	2	
3	3	
4		a
5		b
6		c
7		d
8	4	
9	5	
10		e
11		f
12		g

2.2 Edit menu

2.2.1 General network data...

 or c**ontext-menu in line files list** or **context menu inside network graphic**

2.2.1.1 *Register "File information"*
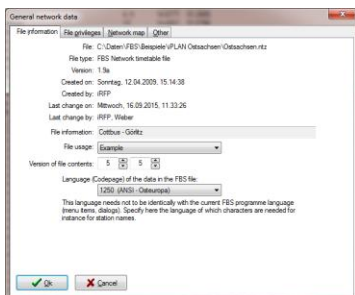
This page shows you path and file name and further details of the file itself. For example file version, last change and so on.

The label **File information** can be used for a free text which will be shown in the list of line files. Also **File useage** helps you to get an orientation what would be filled in this file.

2.2.1.2 *Register "File provileges"*

Here you have to push the "Change rights" button first. After that you can define, who is allowed to **open** this file. **Every User**, every User with the **same license name** (your company), Users with **your license key** (number) or **with a valid password**. You can also limit here the users which are allowed to **change and/or save data**. It is also possible to limit the access to the infrastruktur or levels or train groups of trains. So you can fix for example your regular train services and other users can only add or delete special train services. To do so all trains to be saved have to be in the levels or train groups you select here.

2.2.1.3 *Register "Network map"*

Here you can insert a **description** of the network in the meaning of a headline. The headline is also shown in the corner on top left.

> The description filled in here can be used in several objects you can create so it would be helpful to use a signifcant name.

2.2.1.3.1 Area "Coordinate system (outer coordinates)"

The coordinates of the stations are filled in in geographic coordinates (longitude and latitude). The advantage of this system is shown by station databases, which include this data and so they can be used here. You can change the size of the graphic so that it is

stretched or compressed. If you do not have the coordinates you have to position the stations manually.

2.2.1.3.2 Area "line width and font sizes"

Here you define the behaviour of iPLAN by zooming in the network graphic. You can say **scale down only** or **scale down and enlarge** lines and font sizes. The first option is usefull if you want to see details which are placed near. The other option can be used like a normal loupe.
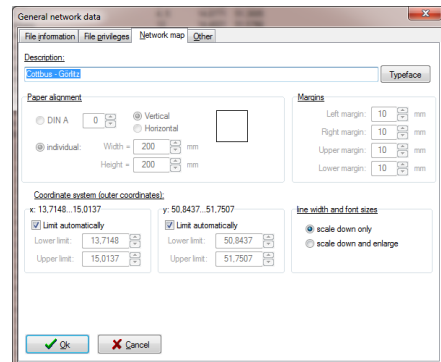
2.2.1.4 *Register "Other"*

This is a free text box to fill in remarks for you or other uses how to handle this file.

2.2.2 General Timetable Data

Or Alt + F

This window contains several question mark buttons. By clicking them you can see a list of files which is included in the network and the database or setting which is included at each file. So you must select one of them to be used in every single file. In case of all files use the same setting a hint is shown to you.

2.2.2.1 *Register "References"*

2.2.2.1.1 Part "cross references"

At first you can select the database files for stations, engines, waggons, train type and h'code, which are used, for this timetable. New files point to delivered database files. The string <FBS> means the installation path of FBS-programmes. So the programmes start searching the datafiles at the position of the current file and can find the other files shown there. This relative links are also avaibale for <FPL> and <NTZ> for network files.

If you do not wont to use the delivered file you can create your own databases. The FBS-program family includes programs, which will help you editing:

- BSV for station database (chapter **9**, Page 145)
- ZNV for trains type and h'code database (chapter **12**, Page 150)
- TFZ for engine database (chapter **13**, Page 152)

2.2.2.1.2 Part "Railway Company"

You can define a standard railway company to find engines easier. It helps you to find the engines with names you know. Engines used by other railway companies get the short cut of the company at the beginning. The engines of your standard company are shown on top of the engines list.

2.2.2.2 *Register "Technical Data"*

2.2.2.2.1 Area „Run time calculation"

iPLAN takes care for a minimum remaining period between accelerating and breaking during the time calculation. This remaining period helps you saving energy. 30 seconds is default for

the minimum remaining period. You can change it bye yourself. A realistic result of today is rail traffic is calculated with 5 to 10 seconds. By engineering the infrastructure you should use 30 seconds. The difference in run time is not important but the difference in used energy.

2.2.2.2.2   Area "braking table"

In case you need a special braking table to be used for brake calculation you can select the version which should be used.

2.2.2.3   Register "Calendar"

Detailed information to fill in the operation days can be found in Annex – Declaration of operation days.

If you would like to create a study or prototype timetable without exact dates you do not need to fill in anything here. In this case you can use only the standard functions of statistics and regular operating days. Functions like special operating days or data related days of run are not possible.

To use statistic and other functions of the FBS-family you should define a timetable period. Just activate the box period is defined. Please fill in the first and the last date of the period. Normally a period is not longer the 370 days. If you wont you can define periods of some years but not more then 32768 days.

Take care: If you have defined a timetable period and filled in other calendar dates (e. g. holidays, special operating days) you can change the period only by reset-button. So Please note this for defining the period of your timetable.

If you wont to recycle a timetable with a defined period you have to reset the period at first and reload the special operating days.
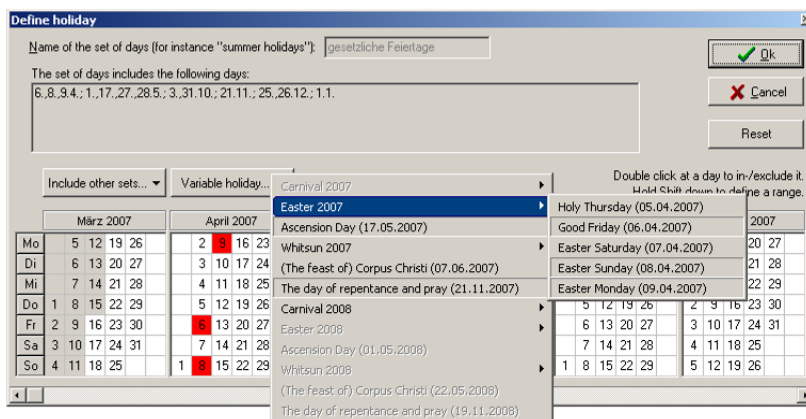
The following parts of the instruction will help you to reload the holidays with less effort.

After defining timetables period you should define holidays. It is not possible to enter the dates in the input field. Press the button on the right of the input field. A new calendar window opens. The Saxon holidays are marked red. A double-click marks or demarks a day.

The file fbs.ini includes a part in which the default holidays are included. You can change them in an easy editor program. The headline of the section is [Feiertage]. If you enter an exact date the holiday is located every year at the same date. FBS is able to calculate variable holidays for example Christmas.
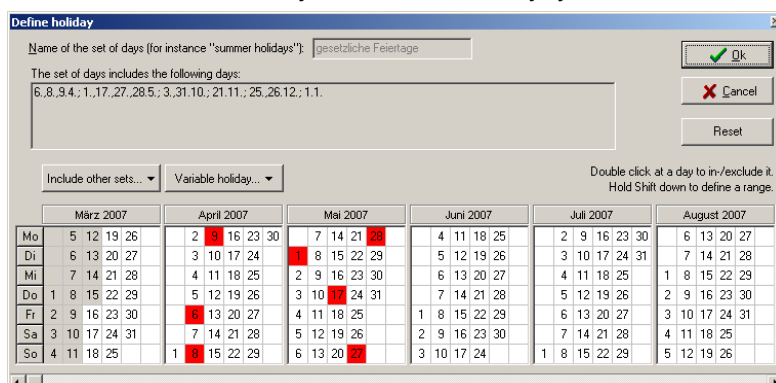
The button **variable holidays** shows you selected Christian holidays. You can activate or

deactivate the black written by a click. Holidays in grey colour are not in the period and so they cannot be activated.

You can also mark holidays, which are not fixed by law or confession but relevant in the period, by double-click.

If you need special holiday definitions just call the service of FBS.

The field **The set of days includes the following days:** shows you all selected dates for holidays. The months are summarized if possible. The reset button erases all dates, which are not default. (All holidays are cleared and default holidays are reloaded from fbs.ini.) If you have defined **service periods** in the calendar register you can also define them as holidays in your period.

In register **calendar** you can define up to 20 **service periods**, which are often used. It is easier to define school holidays here as to mark the service days for every train in your timetable. These service periods can be used as regular operating days for your trains. So trains can be "in service only in", "except of" or "also in" the service period. You can connect the operating day informations e.g. "Mo-Fr, only service period 1" or "Mo-Fr, except of service period 1". For your control you should give the set of days a name like "summer holidays" or "soccer championship". The examples as to be seen above means: "Train is in service from Monday to Friday only by summer holidays" resp. "Trains in service from Monday to Friday but not in summer holidays."

To use the service periods as holidays you have to open the holiday window again and use the button **include other sets** and collect the correct period by here name.

A day of service period can include other days of services or single days – just like you want. So you can build a service period "school holiday" by service period "summer holiday" and "winter holiday" and "spring holiday" and so on. To choose the days quickly click the first day, press shift and click the last day.

Existing service periods can be edited by double-click on one of the list elements. To erase a service period use the button **delete**. A request helps you to block erase by mistake.

If you would like to use the service periods in another timetable you can use the **copy to …** button. The following dialogueue shows all opened timetables and gives you the possibility to copy period and holidays only ore period, holidays and special days. It is important that no other service periods are defined in the file you would like to copy them in. The copied service periods are not linked so that you can edit them in different files.

Sometimes you might need a summary of service days. To get it easy into your text editor press the **summary …** button. iPLAN copies the data into the clipboard so that you can paste it in your text editor.

2.2.3 Traffic input data

2.2.3.1 *Register "Regular stop times"*

This side shows you all stations inside your network and the stop times which are definied in the 8 lists from each line file. So you can rename a list in all files by clicking the header and replacing the text. You can also select the included lines, the order of the stations and the station attributes which have to be fullfiled by the stations which are shown. In some cases an entry in the table is marked with yellow background color. That means in different line files is a different behaviour defined at the current list of stop times for this station. If you correct

them next time you will see only one line for this station and no yellow background color anymore.

2.2.4 Insert line ...

You have to repeat the following procedures for every line you need in your network. The row of the lines is not important.

To go one you have to select whether you would like to include a line from an existing file or you would like to create a new FPL-file as a blank line file.

2.2.5 Edit line

You can change the **colour**, the **category** and **remarks** for a line by adding here or do it separat. The **category** is also the tickness of the line beeing shown in the network graphic. The remarks are not shown anywhere.

The file name is the fpl-file you selected and the description is taken from the lines start and ending station.

2.2.6 Remove line

This function delets the selected line from the network. All stations, which belong only to this line, will be deleted too. The fpl-file itsself is not deleted.

2.2.7 Rename FPL files

In some situations it might be helpfull to give the included FPL-files in your network another name. So you have several options here to define a new name for the files.

2.2.8 Choose junctions...

The railway nodes in the meaning of the NETZ-programme are the terminals of the timetable files. Also every possibility to change a line along another line has to be marked as a railway node or junction. This can also be a junction! You can mark every other station as a railway node if this station is important in you meaning. Please note, that customer timetables can only start or end at nodes.

The left part of the window shows all train order change places of the current line and the right one shows all nodes selected from the line. You can move the stations from left to right or just the opposite by the arrow buttons. The option **show all** shows all stations and locations along the line. So they can also be shown in the network graphic which can help you by your orientation.
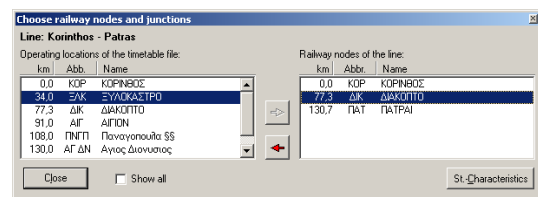
If the station and location database includes the geographic coordinates of the node it will be positioned automatically in the network graphic. If not, you can use the function as written in 2.2.9, page 17.

All nodes are differe in the system by there abbreviation. So a node, which exists in some line files, has to have the same abbreviation! So you should use the function **Create unequivocal abbreviations of stations** in graphic timetables (look at chapter 3.2.10.4, starting at page 39). The lines and nodes are listed on the right of the iPLAN-window. The window at the corner down right is reserve for the objects made by iPLAN. To call up one of the following functions you can click in the network graphic or in of the three lists by a right click. The mouse menu shows you the possible functions to the element you have choosen.

The   St.-Characteristics   button opens the **Station data**-window in which you can fill in the data as written in chapter 2.2.9 on page 17.

2.2.9 Edit junction

 or **Network > Edit junction** or **double click at the station in the station list** or **double click at the station in the network graphic** or **mark the station in the station list and use the item Edit junction**

It might be possible to adjust the label of a station because the label overlaps each other. You migh also need differet font sizes or symbols to show the importance of a station.

The station data window allows you to change:

- the name of the station (taken from the graphic timetable file),

- the coordinates of the station inside of the network graphic (related to the maximum size of the network),

- the size of the symbols in typographic points an

- the text justification, the angle and the typface. It is possible to justify the text left, right or up or down the posistion.
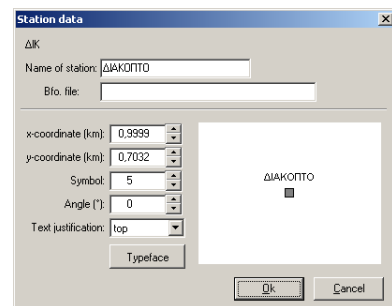
2.2.10   Set position of junction

If you would like to create your network graphic you only need to set a posistion for every node. Click a node at he list on the right of the window. If the coordinates are found in the station and location database this coordinates are used. Otherwise click the mouse button **Set position of junction** or choose the item at the context menu. After that click the position at which the node should be placed.
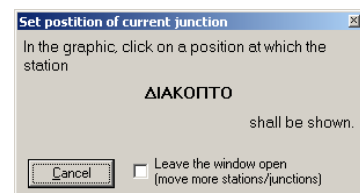
Repeat this step for all nodes. To keep the window open click the check box **Leave the window open** and click the next station and use the context meu to repeat the function. The nodes of one line are linked directly. You can change colour and thickness as written in chapter 2.2.5, at page 16.

2.2.11   Reload coordinates

If you changed the positions of the stations and locations manually and you are not happy about the result, you can reload the coordinates for all stations as saved in the station and location database. All stations are moved back to this coordinates.

2.3 Network objects menu

2.3.1 Open network object

You can open an object by a double click at the list item or by some items of the context menu. Further details about the possibilities can be found in the object chapters at the following pages.

An object cannot be opened twice. If you open an object, which is still open the programme shows you the window of the object. You can skip between open windows by **Tab** or **Shift+Tab** or **Ctrl+F6**.

Every object has its own name, which is normally related to the content and is simillar to a headline. The name is used to identify the object in the list of objects and can be changed by context menu item **Rename network object**.

2.3.2 Rename network object

You can use this function if you would like to change the name of the network object. Enter the new name in the line and press **Ok** to save the new name.

2.3.3 Delete network object(s)

Select the object and use the mouse button or the item in the context menu. If the object is still open please close it at first and delete it after that. If you erase the object all links and the object is lost forever. So you have to confirm the erasing of any object. It is not possible to undo this function!

2.3.4 New NETZ-objects

At the moment it is possible to create the following objects:

- graphic timetable ,

- station timetable ,

- driver's timetables ,

- customers timetables

- circulation plans and

- interval graphic .

It is also possible to create **arrival and departure posters**, which are handled in a special way.
These functions are only available if you have defined at least one line in your network.

All objects belonging to the network are shown in the box on bottom right of the iPLAN-window. Furter details to create a object and how to handle it you can read in the chapters 4 for Driver's timetables (starting at page 80), 5 for Customer's timetable (starting at page 93), 6 for Circulation plan (starting at page 110) and 7 for Interval graphic (starting at page 130).

2.4 Analysis menu

2.4.1 Station overview

2.4.1.1   General

Here you can see the result of the comparison of all stations and locations in your network against the stations and locations included in the station database. The result is shown in the right column. If everything is ok there is an x. If there is an exclamation mark to be seen there might be a conflict because there is a station or location known by the abbreviation but it has a different name. The question mark shows you a station known in the database by abbreviation and name but it has a different state.

2.4.1.2   Station database > Select station database

There opens a window to select the station database, which should be used for comparison.

2.4.1.3   Station database > Update station database

This way is useful if you could use most of the data by the station database and if there are only fewer conflicts. Choose one of the options to update the station database. You can select the stations, which should be changed in the station database by the conventional way of selection in Windows®-programmes.

2.4.1.4   Station database > Edit station database

The item **edit station database** opens the station database programme as explained in chapter 9, starting at page 145.

2.4.1.5   Station database > Create new station database

If you could use only some data by your station database or you are not interested in a nationwide database you can create a new station database by your network. So you have to create a new station database by this item and to give here a name. The station database will be opened. Please close this winow and select the function Station database > Update station database > **Fully update whole station database** to fill the data in.

2.4.2 Train overview

2.4.2.1   General

In this window all found trains, train parts and interval groups are shown to controll them. So you can check the data if all changes to other lines are made correct. This check is important to create correct timetables and circulation plans.

Changing data can only be done in the graphic timetables. After comeback to this window the Train overview window is updated automatically.

The lists can be sorted by every coloumn ascending or descending.

2.4.2.2 *Register "Trains"*

The departure time at the first station and the arrival time at the last station are shown to you. So you can copy the first and the last station to all fpl-files in which the train runs to show this data at the graphic timetable. Marking all relevant trains and using the context menu can make this. The item there sets this data to all graphic timetables, which are relevant.

2.4.2.3 *Register "Train parts"*

Here you can see detailed data of every train part to controll them.

2.4.2.4 *Register "Interval groups"*

The register shows all known interval groups to controll theire correct run. If there is no inteval group to be found here you are not able to create an interval graphic.

2.4.3 Stop time overview

The appearing window shows you trains, train parts or direct links which have stop times higher than the defined figure and lower than the other figure. To control the contents of the window you select to see trains, train parts or direkt links.

2.4.4 Overview of driver's timetables

This window shows you all trains inside of the network and gives you the title and the page no. which is defined as first page inside of the existing network object. So you can check whether every train has an driver's timetable.

If some trains are running in intervalls you can also see whether a driver's timetable is given by another existing driver's timetable or not. This way you can also check which driver's timetables have to be created to make sure that every trains has a driver's timetable and you did not create to much of them.

The button check for update shows you whether you have to do an update for existing driver's timetables or not. The button show unrequired driver's timetables lists you all the existing timetables which have no train inside of the graphic timetable.

It is possible to copy the list into clipboard and to use it in other programms for further details.

2.5 Options menu

2.5.1 Configuration

 or **Ctrl+K**

Here you can set default values for creation of network objects.

2.5.1.1 *Register "General"*

To be shown at headers or footers a **general logo** can be set here. Only bitmap-files (*.bmp) can be used as a logo.

To be able to offer you differen functions by a **double click at the list of line files** you can define here what should happen.

2.5.1.1.1 Part "System"

To use an automatic save function you can switch it on or off here and set the period to save the file. Please do not use this function any longer. Some trouble might appear by an automatic safe during opened windows or during train handling and so on.

You can also set here the **Number of undo** steps. All existing objects and iPLAN itself reserve per step 100 kB in your RAM. That means if there are 5 elements and 3 number of undo steps configured, you need (5+1)*3*100 kB = 1,8 MB. So be carefull by raising the number of undo steps, because the used RAM space increases unknowingly by creating a new object. (Every driver's timetable is an own object!) The steps inside of the edit table function in costumers's timetable are included in the steps of this customer's timetable. If you choose more steps take care of more required space to keep the steps in the RAM of your computer and so it can take more time to calculate one step. Look also at part 2.2 at page 12.

2.5.1.1.2 Part "Elements in graphic timetable window"

You can also select a **Horizontal** or a **Vertical scrollbar**. At small displays you might blank the scrollbar to have more space for the timetable.

There can also be settings done here for further informations beeing shown in the status bar at the bottom of a graphic timetable. Select here the informations you would like to see there.

2.5.1.2 *Register "Public holidays"*

To define public holidays which should be handled by FBS you can Add or Delete here days into a list of public holidays. Fill in a Description and a fixed date or if it is not possible a predefined non-fixed holiday can be calculated by the programm. Please do not forgot to define which base calculation should be used for the calender.

In some cases it is not necessary to know the current public holidays so you can fill in **Default settings for statistical year**. Here you can define the number of days the statistic year includes. So you can add the numer of public holidays then or the number of sundays and public holidays, saturdays and monday to friday without public holidays. This settings wil be used for default calculation of statistic year in the network statistic.

2.5.1.3 *Register "Graphic Timetable"*

2.5.1.3.1 Part "Train lines"

If you select the **Radius of points at arrival and departure** as 0 no point will be drawn. We advice you to use 2 points to differ trains that stop from trains running through.

By activating **Draw standing lines while stopping** a line is drawn between the arrival and departure time of the train. So you can see, that a train stands in the station. If some trains stop in the stations the lines are drawn one over another.

2.5.1.3.2 Part "Time scale"

With **Interval of time lines** you can select the time lines shown in the graphic timetable for a better orientation. Default interval is set to 10 minutes. The intervals can be changed in steps of 5 minutes.

For a better orientation you can also **Stress full and half hours** in the graphics. Clock hours get a fat line and half hours a thin continuous line.

By activating **Repeat times at mouse pointer** a little box is shown close to the mouse pointer which includes the current minutes and tenth of a minute at which the pointer is

situated. If Windows® starts another action during iPLAN draws a new arrow the box does not disappear. This can happen from time to time and is not critical. These "ghosts" disappear if the graphic is painted again. If you do not like these ghosts or you will get too much of them you can deactivate this option. The time is also shown in the status line below the graphic.

2.5.1.3.3   Part "Change departure times"

If you use the function **Construction > Move departure times** you can move the preview line by help of the cursor keys every tenth minute. This way is precise but takes a lot of time. Departure times are normally used at special tenth of a minute, for example x,2 or x,3. The departure time is published by a rounded down minute so that your crew has the rest of the time to close the doors and start the engine.

So you can configure whether all tenth are allowed as departure times or the mouse position by **moving departure times** is changed to the number set here.

2.5.1.3.4   Part "Colours"

You can set here the **background colour** and the **colour of timelines and time scale** and **the station lines and timetable header**. Clicking the quadrate in front of the label can change the colours. These settings are also used for the prints. Normally the raster is painted in orange. Some defined colours are a free set colour can be used for all the colour functions here. The colour is selected by a click in the boxes there. The brightness can be changed at the bar on the right. At **colour/basic** you can have a preview to the colour. The button **Add colour** amended the colour to the user-defined colours.

2.5.1.3.5   Part "Labelling of trains"

These settings are made to get the position of the train label at the graphic timetable. You can set the relative position to the mileage the train runs.

Delete background makes a better readability.

If **Recalculate angel after moving of label** is activated the angel of the label is calculated again after moving the label. Otherwise the calculation of the angle is online made by adding the train to the graphic timetable.

2.5.1.3.6   Part "Minutes at train line"

Here you can set to **Delete Background** for a better view to the time information along the train line.

2.5.1.3.7   Part "Automatic train number indication"

During the construction of your timetable a small window close to the mouse pointer shows all trains which are near the pointer and which one of them can be selected. Here you can set the situation in which the window shall be shown (look at chapter 3.2.2.3, page 28).

2.5.1.4   *Register "Driver's timetable"*

By creating a new Driver's timetable iPLAN uses the settings of the last Driver's timetable, which exsists in the file. If there is a Driver's timetable marked his settings are used for the new one.

You can set a default format in this window. All useable formats are shown in the list. It is difficult to change from one format to another one. So please be careful by selecting the

format. If you choose the option to select the format during the creation of a new one you will get a window, which asks you for the format.

All other settings related to a Driver's timetable are made inside the object.

2.5.1.5   Register "Circulation plan"

You can set here the **Frame colour** in your circulation plans. So you are able to modify the colours of the circulation plans to your one wish. The frame colour is also used to mark 0, 6, 12 and 18 o'clock.

The colour of the other hours can be set by **Colour of the time lines**.

For better overview guidelines can be **drawn** between the single jobs a vehicle has to do. These lines are drawn if the check box is set. The colour can also be changed at the colour box.

The **maximum running interval for centric display of direction reversing stations** in minutes can be set here. This time has to be free to show all abbreviations along the circulation day. If the break is shorter than the time set here only one abbreviation is shown to get a better overview in the circulation plan.

To get the right minutes to be shown in the circulation plan you can choose here the **Rounding rule** for new circulation plans.

2.5.1.6   Register "Customer's timetable"

Customer timetables are printed and given to your customers so you can **avoid incomplete train columns**. So you get a better view of your timetables, because all train columns orientate on the right border of the page and the left space is given to the station column. The size of the station column as set in Register "Layout & content Part "Table at page 99 shows only the minimum.

It is also possible to **Fill last chart with empty columns on the right**. So all charts have the same size and no free space is shown at your timetable pages. If you deactivate the box the empty columns are not shown so that you can use this space for legends or promotion or something else.

To get your own colour scheme you can set here the **Standard foreground and background colour**. The background colour is only used for showing the timetable on the screen.

2.5.1.6.1   Part "Standard for new timetable charts"

Here you can set the general design of the graphic timetable. You can use the **Hot type** or **Photosetting** face. The hot type is the older design. Both designs are defined in UIC no. 411.

The following aspects depend on the switch between hot type and photosetting face:

- The headline of the table is set in hot type in the centre and in the photosetting on the left. In photosetting there is a frame set around the headline.

- The headline of the table consists of three lines in photosetting and two lines in hot type. So in hot type train code and train number have to be placed in on line and in photosetting in two separate lines. In photosetting all train headcodes are shown and in hot type only them for important trains (the trains with short train numbers).

- Headcode, train number and general train informations are shown centred in hot type and right aligned in photosetting along the train column. This is also for horizontal hint texts inside the table.

- In hot type there are shown arrows between the two-neighbourd departure and arrival times in the station column on the right. In photosetting there is only a symbol shown in lines, which include only the arrival times.

- The line style of table lines changes at different positions in the faces.

To show the **Railway administration** and their **Logo** you can fill in the name and the logo as a Bitmap file. If you would like to show only one of them keep the other field clean.

2.5.1.6.2 Part "Highlight times in bold print"

To mark trains, which are important you can fill in the train types here. So iPLAN prints this trains in bold. Separate the categories with comma and no blanks in the whole line.

2.5.1.6.3 Part "Show train category"

The train category is shown in the headline of the timetable. Here you can select, which train categories should be shown. You can choose between **all** or **no train** categories or only for special trains as written in the line **following trains**. Please separate the categories by commas and use no blanks.

2.5.1.7 *Register "Customer's timetable symbols"*

2.5.1.7.1 Part "General symbols"

A double click allows you to change the symbols in both timetable designs for the following entries:

Symbol for	Photosetting	Hot type
Empty entry	...	
Passage	|	|
Diversion (train uses another line)	{	{
Restriction of traffic	⟨	⟨
Arrival (at the station column if the whole line shows the arrival times or before the time if only this entrie shows the arrival time)	o	an
Subject to supplement	:	:
Railcar	�car	🚗

The points for empty entries in hot type are used for keeping the line by reading the schedule. The useage of this helpful symbol is also recommended to the photoseting like the different symbol for passage a diversion.

By creating the customer's timetable iPLAN searches all timetables and sets the railcar symbol, if the train consits only of railcars.

Yourself can change the symbols by a double click at the line you would like to replace. A window opens, which allows you to set the new symbol or text. You can also use here the **Special characters** as defined in FBS programme familiy.
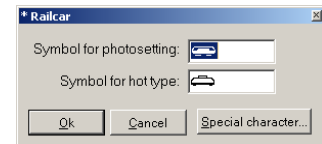
2.5.1.7.2 Part "Replace the following categories by symbols"

You can define here train categories, which have an own symbol for corporate design. A double click opens a new window, which asks you for the name of the train category that should be changed or replaced. After the **Ok** you will see a window to exchange the symbols for hot type or photosetting. By creating the customer's timetable iPLAN replaces the train cateogries by the symbols. The [buttons] buttons give you the possibilty to add or erase train categories from the lists. The settings here are saved and are reloaded again.
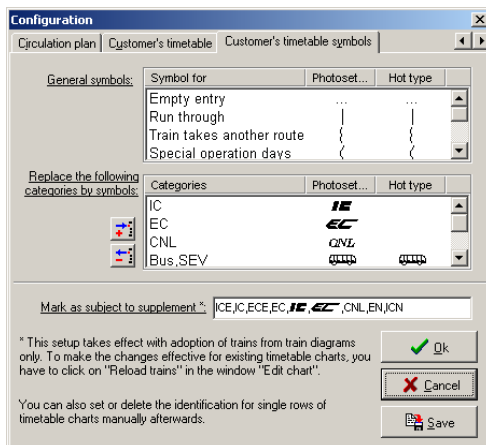
2.5.1.7.3 Part "Mark as subject to supplement"

To show the trains, which can be used only by paying a **supplement**, you can define here the train categories, which should be marked. If such a train is found during creation of the Customer's timetable all entries in the table get the symbol, which is defined before the entry.

2.5.2 Button bar

Ctrl+L

You can hide or show the standard toolbar to save space or to get faster access to these functions.

2.5.3 Language

Ctrl+Alt+L

All useable languages are shown in a dialouge window. You can set the new language only for this session or as default. Please note, that some functions will not change theire language during the programm is open. The best way to make sure, that all parts are translated is to **save** the new language **as default** and close and reopen the programme.

2.5.4 Reset splitter

This function resets the splitter in the global network window. If you moved the splitters to get a better overview to special parts of the window you can reset the position of the splitter.

2.6 General object functions

2.6.1 Object preview

If this button is pressed the network graphic on the left of the window disappears and a preview to the selected object is shown to you. This may help you if you have a lot of objects in your file. If the objects consist of more than one page only the first one of them is shown. Driver's timetables are even shown in portrait and circulation plans are shown in landscape size of a paper. Customer timetables format depends on their last setting.

2.6.2 Sraborn objects

As default the objects are shown in the row of their creation. You can change this row by using the mouse buttons. If you click at one of the buttons the object moves one position up or down.

You can also sort the objects automatically by **name and type** or by **type and name**.

2.6.3 Measure distance

This function opens a window, which lists you the distances between a selected station and all other stations inside the network. A station can be selected by a click inside the network graphic.

km	Abbr.	Station
0,0	ΚΟΡ	ΚΟΡΙΝΘΟΣ
6,5	ΙΣΘ	ΙΣΘΜΟΣ
12,5	ΛΟΥ	ΛΟΥΤΡΑΚΙ
53,4	ΑΓΣ	ΑΡΓΟΣ
64,4	ΝΥΠ	ΝΑΥΠΛΙΟΝ
77,3	ΔΙΚ	ΔΙΑΚΟΠΤΟ

3 <u>Graphic Timetable</u>

3.1 *Getting a new graphic timetable*

You have several ways to define the path of a graphic timetable you would like to see in iPLAN.

- First option is to select a line file and use the context menu there which allows you to open the graphic timetable of the file. This is not the best option to get a graphic timetable because most of the trains might not be shown in there whole runway. So you might not be able to check and edit them completly.

- Second option is to use the button new graphic timetable. If you have not more than 10 line files in your network you can also open them here.

- Third option is to open a graphic timetable by defind the runway in the network graphic. This is explained at 2.1.5 at page 11.

- Fourth option is to open a graphic timetable for an existing train. If you call up this option you get a window which shows you all found trains in your network. You can select a train from the list there. You can also limit the number of shown trains by filling in a head code and/or the first (or all) figures of the train number. After that you can define whether you would like to **Create timetable for the whole route of the train** or **Create timetable for a section of the train's route only**. You also have to set the option to **Insert graphic timetable into object list** or **Create temporary graphic timetable**. If you would like to see a section of train's route only a second window appears. At which you can select the part of route. Please make sure that the first and the last entry you marked is a train order change place like a station.
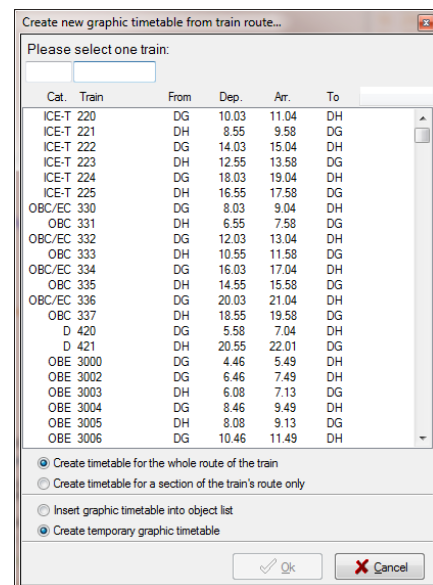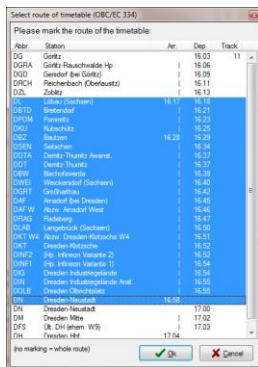
3.2 *Edit Menu*

3.2.1 Add a new train...

To add a new train you have to choose the **direction** the train will take. After that you can select the **from station** and the **to station** by a list. This list shows all stations marked as Train home station. Then you have to fill in a departure time. iPLAN uses the next free slot after the departure time you filled in. All settings made here can be changed later except of the direction of the train.

If you miss a station in the list it is not marked as a train home station. If it is only one train, you can use a station before and change the real start station in the train data window at

point **"Train is route sections"** (look at chapter 3.3.7, page 56). You can also change the station settings in the infrastructure window.

It is possible to copy train data settings from one train to another. To do this select the **Copy train data from** box and choose one of the existing trains. You can also copy data by a train, which takes the other direction, but please change in these cases at least the speed list in the train data window. The new train is added by button **Ok**. The Train data window opens than (chapter 3.3.10.1, page 57).

3.2.2 Call up a train...

3.2.2.1 …by menu

This way is the safest but the longest too. Choose the menu **edit > Call up a train…** and fill in the head code you would like to edit. If two trains with one head code exist in your file the one starting earlier is called up. It is possible to use the same head code again and again but it should not be done. The same function can be used in the mouse menu called up with the right button. The current head code is shown in the footer.

3.2.2.2 …by mouse click

You can select a train by click on the train line. The footer shows the current head code which will be opened if you click. To use this function the button leftmost in the headline hast to be pushed.

The opposite picture shows you the general connection between the mouse position and the train, which will be chosen. The picture shows you a typical train crossing. The vertical in the middle is a station line. If you click in one of the sectors **up left** or **downright**, the train arrival 54/departure 00 would be selected. A click down left or up right would call up the other train arrival 57/departure 58.
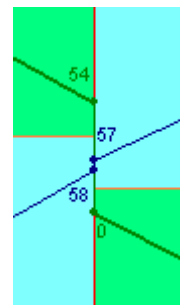
Please note: If you click at a position amount the minute 54 on the right of the station line, the second train would be called up whether the train arrival 54 is closer to the mouse pointer! So respect the station line and the time to select the right train.

The advantage of the principle is shown you in your daily work: If you would have to edit some trains in a short time it is difficult to hit train lines exactly. If you internalize the sector principle you can work fast and intuitive.

3.2.2.3 …by mouse click and some trains close together

During your timetable construction you might be interested to see a long period on your screen to have a good complete picture. At the same time the train lines move close together so it could become difficult to click the right train line. In this case a yellow hint window with the possible head codes will be shown. This window can be configured the following ways:

- The window is shown, if there is more than one train near the mouse,

- The window is shown, if trains lay over each other (they occlude them self)

- The window is not shown in any case.

If you keep the **shift** key pushed and move the mouse the window is shown in every case also if there is only one train close to the mouse pointer. So you get a fast orientation if you are not able to see the train information at the train line.

By a left click a menu opens in which every train close the mouse pointer is shown to select or to select. If you click a head code on the upper part the wished train becomes the current train. This way means more clicks, but it ensures that you get the right train and do not have to click again and again the wrong train.

If you would like to do any mouse action with one train (e. g. **Change departure time**, chapter 3.3.3, page 55), and some trains lines are close to the mouse pointer you can select the right train by **Alt** key. The edit action is done with the first train in the yellow window. The order changes by every use of the **Alt** key. It is also possible to do this if the yellow window is not shown.

3.2.3 Edit several trains

3.2.3.1 *Selection of trains in the window "select trains"*

This window lists all trains, which exist in the file. You can select trains, which you would like to edit in common. A fast selection can be done by the following functions:

Button to select all trains

Button to deselect all selected trains

Button to invert the selection

Button to select all passenger trains

Button to select all freight trains

Button to select all trains of one train type

Button to select all trains belonging to an interval group

Here you can change the sorting of the train list.

If you selected trains by train type you can mark some train types by repeating this function.

Inside of the list **Select trains** the typical Windows®-standards are useable. Some trains can be selected by mouse click while **Ctrl-key** is pressed, a complete area of following trains can be marked by **Shift-key** and mouse click.
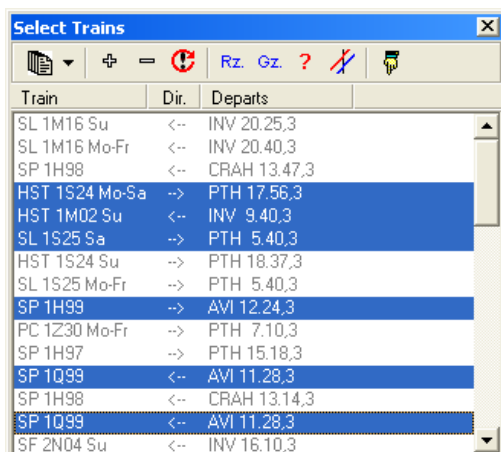
By interval traffic the interval groups allow you the following possibilities:

You can sort trains by direction or interval group.

You can select **all trains with the same interval group**. So all trains belonging to the same interval group to which the current train belongs are selected.

Tip: If you select a train, which does not belong to any group and use the all trains with the same

interval group, all trains without an interval group are selected.

✍ A double click at a train number in the "Select trains" window the graphic timetable moves so that you can see the train.

3.2.3.2 *Selecting trains by click in the graphic timetable*

- Single-click: selects one train (look at chapter 3.2.2, page 28)
- Double-click: opens the train data window (look at chapter 3.3.10, page 57)
- The **Ctrl-key** kept pressed and clicked at some trains after another. You can let the key go between two clicks.
- So far as you selected some trains the other trains are shown grey. The function can only be used if the mouse mode **Select trains** is active. Clicking another train without pressing the Ctrl-key can stop the selection.

3.2.3.3 *Edit some trains*

▼ By click at this button in the symbol line you can use the following functions:

- **Edit data for selected trains:** look at chapter 3.2.3.4, page 30
- **Copy selected trains in an interval:** look at chapter 3.3.12, page 69
- **Move selected trains parallel:** look at the chapter 3.2.3.4, page 32
- **Park trains:** look at chapter 3.3.10.6, page 69
- **Delete all selected trains:** deletes all trains after a safety question
- **Finish multi section:** deletes the current selection and closes the mouse menu

The last used function is shown as shortcut next to ▼ .

3.2.3.4 *Edit data for selected trains*

This window stops the troublesome editing of every train to change train or label data. Select only the options, which should be changed for all marked trains. Use this function with care. Undo of accidental changes can be difficult. (☞ Is the Undo-Function active? 💣)

3.2.3.4.1 Register "General train data"

3.2.3.4.1.1 Part "Train category and non-linear supplements"

This part allows you to assign train categories and to check the supplement times depending on train category.

3.2.3.4.1.2 Part "Run time / technology"

You can assign new input data to driving dynamics (maximum speed, load, run time supplement, load supplement or brake percentage. So activate the cell and fill in the new value.

Changes in this data although changes the run time calculation, so all run times have to be recalculated. This is only being done if you activate the function in the part of the window. iPLAN reminds you to this problem.

After that, the trains have new run times, but they are not changed in the graphic timetable. This will only be done if you click the function "Search new slot for all selected trains" or you do it manually. This function can change the complete picture of your graphic timetable

because the relations between the trains can be changed. Try to appreciate the result to your timetable and decide by yourself to do the slot search automatic or manual.

Finally you can change reference lists for the selected trains. This might be helpful if track works will start or the traffic input data changes.

If you change the train type it is normally needed to change the reference lists too. You can adopt the stop times list, the line speed list and/or the station track list.

3.2.3.4.2   Register "Train parts"

This register allows you to change train data for train parts of some trains. So select at first whether the changing is are valid **for the first train part at each section only** or **for all train parts of the selected trains**.

You can change the operation days or although the line name. It is also possible to replace an old engine series by a new one in every train part. It is better to activate the function "**recalculate run times**" in the general train data register, because of different engines data.

All coaches and waggons can be cleared to block engines runs. Especially by composite freight trains you can change the maximum speed, the load and the train length. The fields are filled by the current data if you activate the box to change the data.

3.2.3.4.3   Register "View data"

During the timetable construction it can happen that a train label is not to be found directly at the train line. To sort them again you can recalculate the position and the angle of all train labels. The position of the label is set in the configuration. But labels can be positioned this way that you cannot read them completely. So you can move the label manual (look at chapter 3.3.2, page 54) and activate here **Recalculate angle for all train labels at actual al position**. This function might be used at finishing your graphic timetable to get a better view of your timetable.
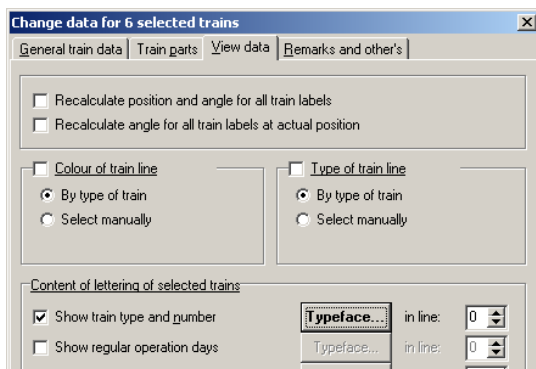
You can change the **Colour of train line** and the **Type of train line** differently from the standard. So set the check mark und choose whether the parameter should be set by type of train or manually. If you choose this option a list opens and shows you the possible formatting.

The part **Content of lettering of selected trains** allows it to you to change the informations shown at the train line. You only have to activate or deactivate them if you like.

The typeface is only changed if the typeface window was opened at least one time and closed by **Ok**. The line number is only set to the labels if you changed one or more of them. Typeface button and line number are shown bold if they will be set new (as to be seen in the graphic above).

The train labels in the graphic timetable should be written in TrueType- or OpenType-typeface, because typeface, which do not belong to this groups, are not shown inclined in the graphic timetable by using some Windows®-Versions.

3.2.3.4.4   Register "Remarks and other is"

This register makes it possible to change remarks to the trains or to set a Far-distance route (a route which is longer than your line) and construction remarks. Just an example:

- You calculate freight train slots for different Train Operating Companies. If you have only slot query and not orders you should use the state planned. At the day you get the orders for the slots you can select the trains and set the current construction state to "to be processed".

3.2.3.4.5 Copy trains in an interval

This function is explained in chapter 3.3.12, on page 69. Here the function is used automatically to all selected trains.

3.2.3.4.6 Move selected trains parallel

This function moves all selected trains at an interval. So you can calculate a model timetable for your line. At the time you know the connections at a station exactly you can move all (selected) trains at an interval to get better connections. The interval time has to be filled in by the typical FBS scheme. This function also releases no slot search.

☞ A movement of 90 minutes has to be filled in like "1.30" or "130"!

3.2.3.4.7 Park trains

This function is already explained in chapter 3.3.10.6, page 69.

3.2.3.4.8 Delete all selected trains

This option deletes all selected trains. A question helps to block operating errors. To undo this function you have to activate the undo function in configuration.

3.2.4 Interval groups

This way a window opens, which shows you all existing interval groups and the trains belonging to them. Here you can fill in single trains or dissolve out a train from group. Additionally or later you can collect groups together or collect single trains to a group. So look at the right button menu at the list.

A double click or enter at the **current interval group** another window opens. The table shows you all trains belonging to this group. The column **Offset** includes the time distance between the current train and the first one of them. The trains are shown in a row starting with the train after the largest gap (normally it would be over night). The

button **Recalculate offset** helps you to get the trains in order again. The train after the largest gap gets the offset 0 and then the list starts. This train is now shown in all window related to the interval groups.

If you would like to **Renumber trains** or bring mixed train numbers in a row again you can

open another window by the button . Here you can define the train number of the first train and the offset to the next train and the consequences to the train part numbers.

During the timetable construction arrival and departure times can be changed. The column **Ok** includes a cross if the train passes exactly to the group. The tolerance of interval times to get the x amounts ±1/10 min.

By clicking the arrow a train list is added to the window which includes all trains that could belong to the interval group but do not belong right now. The tolerance in this case amounts ±1/2 min. If there is now train shown in the left list (new, clean interval group), all trains shown on the right could belong to the group.

Please note, that the interval groups can be evaluated at an interval graphic in NETZ programme (look at chapter 7, starting at page 130). So the interval time is only shown if the intervals are "clean", that means all interval times between the trains have the same range. It is possible to adapt changing is in the interval graphic after changing is in the graphic timetable.

These buttons allow you to add or erase trains to an interval group.

Please note the following specifics to work with trains in interval groups:

If you move a train line label of a train belonging to an interval group by mouse there is no question to adopt these changes to the other trains. The labels of all the other trains are adopted by time or data changes in the interval group. If the labels of all trains in the group should get the same relative position you can do this by "apparently" changes of train data or train times.

Removing a single train is not related to other trains of the group. If you remove an interval group by window **Edit > interval** groups the trains are not eliminated. To remove all the trains belonging to a group you should select them by multiple selection (**Window Select trains > Select all trains with the same interval group > Delete all selected trains**).

If you edit arrival or departure time is manual (window show arrival and departure times) it has no influence on a possibly existing interval group. Instead of this time changes you should use non-linear Supplement times (look at chapter 3.2.11.3, on page 47).

Set train messages

This function is adjusted to the German operation system called "Zugleitbetrieb". It is a simplified system for lines with less traffic. If you call up this function you can assign every station or location train messages. So select the stations or locations, which use the same principle for train messages. The selection can be done in the Windows®-logic. After that you can assign train messages differed by the shown possibilities. Train messages can be assigned to the train

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driving the other direction or the trains the reaches the station first.

To configure the situation train crossing in all existing possibilities the button **Crossings** opens a new window. The four special cases are written here and the time parameter to recognize these situations automatically can be changed. If the parameter is 0 this crossings are not checked and if it is 1440 min (=24 h) all crossings are respected.

If such a case exists, the train messages are automatically given to the trains. The messages can be differed by the direction.

The function sets this train messages to all existing trains in your timetable. If you add new trains later this trains do not get the messages automatically. So the best way to use this function is to call her up when all trains are filled in. The messages set here are automatically filled in the driver is timetable made in NETZ-program.
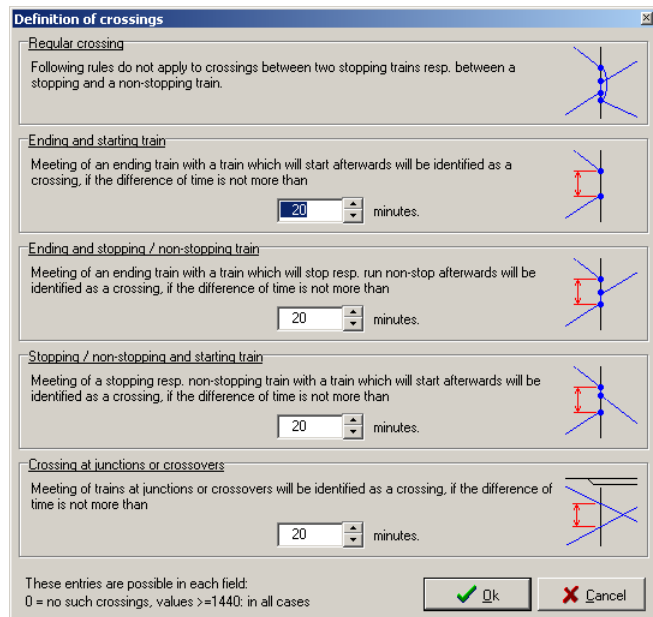
3.2.5 Change drawing order

Train lines and informations can lay one upon the other. The following trains overdraw the existing trains. This has a great influence to the labels. Take care that all the train lines are painted first then all the labels are drawn in the same order. So the labels are ever on top of the graphic timetable. The changes act to all trains been marked.

3.2.6 Continue running from another line…

Trains often change from one line to another line. This train helps you saving time to fill in all train data. It also helps you to start trains at junctions not earlier as they arrive at the junction. Call up this function by the timetable in which the train should continue running. The file, which includes the train, has to be opened too. You can choose to Continue train route or to Copy train data only and insert a new train. By using the last option you can also start the train at another station and not at the junction. If the train number you would like to copy is used iPLAN shows you a message. It is made to get a clear identification of the train. The information is related to the station track are set by the new line. The complete function can also be used for interval groups. If you change train data (stopping times, speed lists, …) they are also changed for all trains in the group. Only the changed data are copied to the other trains. Different operation days or something else are kept alive.

3.2.7 Adopt trains from another line…

An extension of the function explained below is the function to adopt trains from another line. If a line section exists in two files you can copy all trains you calculated in one file into the other file. This function might be helpful at line section near stations with a lot of traffic.

The file, which you use to copy the trains from, has to have in at least one section the same stations and locations as the file you want to fill them in. It is possible to have more stations in the original file as in the copy file but not less than the copy file.

Adopted trains can be deleted or hide completely. The common erase function is helpful if you would like to readopt them again. This might be necessary if you change data in the original file.

If you hide the adopted trains they are also respected at slot search. The hide function helps to get a better overview.

Trains, which are adopted from other lines, cannot be edited. You can change only the labels of them.

3.2.8 Blind out adopted trains

Blinding out trains makes them invisible. The trains are anymore included in the graphic timetable and respected by conflict search or evaluations. Recalling these functions makes the trains visible again.

3.2.9 Delete adopted trains

If you want to delete all the trains you adopted into the graphic timetable you can do it by using this function.

3.2.10   Infrastructure data

 Or **Alt + S**

3.2.10.1 *The Profile Diagram Window*
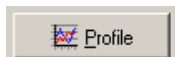
 You can have a look at the different line speeds, the gradient profile, the curve profile or the tunnels along the line. To open the diagram window use the **profile**-button in the infrastructure window. The shown lines have to be marked in the list to be found behind button **lines**. The different profiles are shown in one diagram so that you can see differences in different lists easily. The stations are shown with their abbreviation and the line style defined in the stations & locations register. If you mark a line point in one of the lists a green line shows this point in the profile diagram window.

The colours of the different lines can be changed by click on the **lines** button and the right mouse button at the line you wont to change.
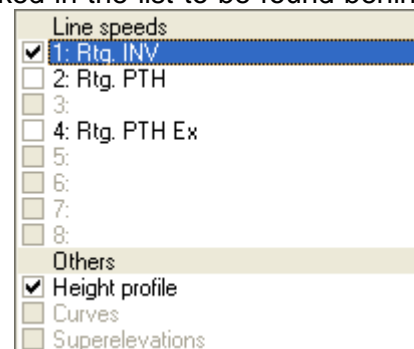
The profile diagram window can be changed in its size. You can export the window to the clipboard, save it as a bitmap or print the window by click on the **export** button.

3.2.10.2 *Register "Zones"*

3.2.10.2.1 Part "Kilometre zones"

To manage all the line data iPLAN needs a relative distances. That means: every information has a relative distance to the first station. So the relative distance starts with 0 and increases linearly to the last station.

The mileage or kilometres shown along the line often have different numbers to the relative mileage. Just an example: to fasten the trains some curves are rebuild, so that the lines becomes a closer straight way. The mileage along these changes will be adapted but the

rest of the line is not touched. So the mileage can change, "jump" or decrease. FBS assists the absolute mileage too.

- Absolute mileage or distance = position of the milestones along the line

- Relative mileage or distance = real distance of one point along the track to the first station

You have to define the mileage zones before you start filling in the infrastructure. The mileage zones cannot have gaps between them and must be sorted by the real (absolute) mileage. The jumps or directions can be changed like you need it.

If the absolute mileage is identically equal to relative mileage you can define on zone starting at 0.0 and increasing mileage.

To fill in a new zone bring the cursor to the first free line and press enter. An assistant is opened and helps you defining and sorting the new zone into the existing mileages zone system.

Only the delete button at your keyboard can delete the last mileage zone.

3.2.10.2.2 Part "Tariff- or recordation zones"

A lot of statistic results are not limited by milestones but political or administration. One of the zone limits can be a border of different states.

You can define up to 16 zones with the button **number of zones**. These zones are shown behind the **remark** column. By double click at the title line you can give the zones a name. Zones can be:

- States, departments, districts, …

- Traffic management organisations.

Now you can define mileage zones in the mileage point is column and set a cross by click in the zone column.

These zones can be evaluated in FBS statistic functions for the whole line or single zones.

In this example you can see a section beginning at mileagepoint 0,000 belonging to "Sweden". All data behind the relative kilometre 129,200 belongs to the section "Norway". The remarks are just for your information and can be used as free text.

3.2.10.2.3 Cab radio zones

Cab radio zones are shown in driver's timetable to give the driver the information for cab radio. You can define cab radio zones here and the will be filled in the drivers timetable automatically. A double click makes a cab radio zone for the whole line. So it helps you that the cab radio zone information do not have a gap along the line. If you click an empty line below the existing zones an assistant will be opened and leads you through the define process. Fill in all the data. The use of the data depends on the driver timetable layout. Hints for example are not shown in every layout. The remarks are only for your information and are never shown in the driver timetable.

3.2.10.3 *Register "Classification"*

This register saves the global information to kind and properties of the line. These settings can change at every mileage along the line. Some properties normally change only in the middle of a station (e. g. class) but other can change also on between the stations (e. g. owner, start or end of rack).

In many cases you can select the information out of a list but you can also enter free text. It is planned to do cross checks for some properties to block illegal combinations. For example: the electrification system and the equipment of the engine. This cross checks can only be done with the FBS proposals.

If you miss zones, figures or rules please call the service. We will include the data in one of the next versions.

Here you find some explanations to the properties and kinds:

Relative and absolute mileage point: look at the instructions above (register **zones**).

Line-Number: The line number design is X.Y.Z, by: X: UIC-Number of the railway infrastructure company, normally two-digit, Y: rather line number, unique in the railway infrastructure company, Z: optional track or part number to differ separated graphic timetables if there are more then two tracks.

A double click into the field opens an assistant with a special help to find out the right UIC-Number.

Infrastructure data

Zones | Classification | Stations & Locations | Station tracks | Line speeds | Gradient profile | More...

Kind and properties of the line:

rel. MP	abs. MP	Line-No.	Gauge	Legal provision, classification, grade	Owner	Dist. / Prot.	Br.-Dist.	Electrificat
0·000	151·410	70.2601	1435 mm	GB:Main line	RailTrack	k->|AWS	1610 m	---

To delete a section press "Delete".

Dist.: Distant-keeping principle
Prot.: Train protection
Br.-Dist.: Maximum allowed braking distance

Note: For reasons of backward compatibility you'll find the number of line tracks under "Stations & Locations".

▼ Import/Export | ▼ Line | Profile | ✓ Close | ✗ Cancel

Gauge: This setting is important for run time calculation for the calculation of the curve resistance if curves are filled in. Default gauge is 1435 mm / 4' 8,5".

Another assistant helps you to fill in **Legal provision** (legislative nation and the exact law), **classification** of the line (e.g. main or branch line) maximum **axle load** and **load spreading**.

Owner: (abbreviation of the railway infrastructure company). This field is only for information. You can choose it also by UIC-Number.

Distance-keeping: At first choose the principle to keep the distance between the vehicles:

View distant operation: This method is typical for trams or busses. FBS does not control the distance between the vehicles. This job has to be done by the user.

Time interval operation: You can choose this operation type but FBS does not support any function for it.

Space distant operation: This method is typical for railways. At the moment you can use only fixed blocks.

Train protection and cab signalling: Additionally to the distance-keeping method you can set a train protection and cab signalling system. These settings are needed to calculate the correct run times by some train protection systems. It is possible to fill in some train protection systems for one zone.

Regular distant signal distance: The regular distant signal distance means the way between the distant signal and the main signal. Please enter this fact exactly because it has a great influence to the break phases in run time. The break phase handling by planned stop expect signal is at the moment implemented.

Electrification: The details to contact line voltage and so on are explained here. These facts are necessary to choose the right engine diagrams for multi voltage engines. FBS warns you to use an engine, which does not belong to the electrification data you filled in here.

Others: At the moment you can enter remarks or rack sections or train control sections. The rack sections are used to select the right engine diagrams by mixed rack-wheel and adhesion engines.

At the moment the gauge information is the only information used for calculation. All the other informations do not have any influence to the FBS scheduling. Take care if you would like to exchange the data by data interface this facts can be important. The data can be shown in the head of the graphic timetable, if you are interested in. Furter details to this function can be found in chapter 3.2.12.3 (Register "Header of timetable") starting at page 51.

3.2.10.4 *Register "Stations & Locations"*

You can move the active field by cursor keys on the keyboard. To edit the field use enter.

To fill in a **new station** or location use the button. A dialogue window opens and here you can enter the name, the abbreviation and the position. If there exists a station and location database you can fill in the name by choosing it with the abbreviation. You can also search the station or location in the database by complete name. You have to fill in the location.

Every location has an exact relative or absolute mileage (look at chapter Part "Kilometre zones", page 35). The absolute mileage is being calculated by iPLAN in using the defined mileage zones.

The absolute mileage is shown in the head of the graphic timetable. If the absolute mileage changes in the station or location you should position it at the beginning of the new zone.

You can use three ways to locate the station or location. The relative mileage is the fastest way if you now this fact. Normally you will use the absolute mileage. So you have to enter the mileage and the zone in which this mileage is situated. (A mileage can exist more than one time in a line!) This way can only work correct if there are no gaps in the mileage zones. A comfortable way to position a new station or location is a relative mileage to an existing station or location. Take care of the before and after possibility.

If you change the relative mileage the new absolute mileage of the station or location and the mileage data of the tracks in the station are calculated by iPLAN. So the whole station is being "moved". If you change the absolute mileage the relative mileage and the position of the station tracks does not change.

It is possible to enter stations, which have a negative relative mileage. All stations and locations are moved by iPLAN so that the first station gets again mileage 0,0. Take care, that such a station is a block stop with loop.

For fast scheduling you should enter all stations before you start filling in trains. If you have forgotten a station you can edit her also then but all trains will pass this station without a stop. So it is possible that you might have to change many trains.

To do get correct train sequences it is important to give the stations and locations the right properties. iPLAN differs between operational, customer and other properties.

The first and the last points of a line have to be stations. You can change between single or double track only at stations. Please define a halt also as a station. Trains can only begin or end in a station not at a halt.

The column **stop** should be filled with a "T" like terminal if it is a bigger station or a junction. This information is needed if you export the data to a crew rostering program or to customer information system this data can be needed. This information also help you in the NETZ program of FBS family. All stations and locations being marked with "T" are shown to you as potential start or end station if you create a new train. You can set the "T" by double click and click to "**Train home station**". This window allows you to set general stop informations. Seldom used halts can be marked as a stop by request to mark it in the customer timetable. If all stops at this point are only without passenger change or cargo handling for example to change the crew you can mark them as an operational stop.

At the righter sight of this window you can set default messages given by the train crew to a dispatcher. It is possible to set default messages only in one direction.

If there are still trains in the graphic timetable FBS asks you what to do with this trains and the edited station settings. You can also change this data for all existing trains in the graphic timetable. A stop on request is only set for trains, which consists majority of coaching stock. If the stop time is longer than 0,5 minutes the stop is not kept as a stop on request.

Hint: You can set the stop on request information also to trains, which pass the station without a stop. So you can use the gain of time by stop on request halts. Please use this function only if these trains have a train type speed restriction at this stations or the first stop on request has a stop time.

The **number of tracks** can be chosen between 1 and 2 and change only at stations. At monotrack lines train crossings can only be done in stations. A double track line is divided in two monotracks with one direction. It is possible to use the double track tracks in both directions. You can define it at the train settings. Lines with more than two tracks have to be divided in several files. Good experiences are made this way in great stations. The combining of tracks in NETZ is not trammelled by this method.

Line column sets the line style of the station or location in the graphic timetable. The current line style is to be seen in this column for every station and location. If there is no preview to be seen so no line will be drawn. Maybe you should modify these settings before printing the graphic timetable. The line style has no influence to the run time calculation.

At the point of intersection of a train line and a station line the arrival and/or departure time is shown. You can choose the time, which is shown in column Arr/Dep by, double click. It is also possible to shown nothing to get a better picture.

At short stops regularly the departure time is shown. To save pace the arrival time does not need to be shown. So you can choose a setting **Dep., >1 min Arr** which shows automatically the arrival time if it is more than one minute earlier than departure time. The function **>1min Arr.+Dep** is designed for stops at e.g. home signals if there are sometimes operational stops needed. The arrival and departure times are shown if the difference between them is greater than one minute.

The column allows you to select a **font** size for the times. 8 points are normally used at important stations, 7 points at normal stations and 6 points at stops.

The **pre and post-occupation time (t_{PP})** of a station or locations is an additional time to the blocking time. This time is needed to change the routes so it is additionally needed between

two trains driving one after the other. The times can differ so that there exist two columns one for each direction.

The **crossing time (t_{Cr})** (also known as direction changing time) means the time, which is needed between the arrival of one train from one direction until another train can enter the same track in the other direction. This time is only needed if you (regularly) use tracks in both directions. Because of possible differences between the directions there are also two columns for the direction of the first train, which enters the station.

At a first glance one or two minutes seem to be a lot of time. But these times include the running times to pass view distances, safety distances or safety overlap and reactions times of man and machine. The back blocking of an automatic block signal is of course finished in some seconds but Please note that the following trains should have enough space to the distant signal of the next block signal so that the engineer does not start breaking. If there are train protection technologies installed they also might force the train to break to a lower speed. This case should not be included in a timetable.

The column **station tracks** are explained in the following chapter 3.2.10.5. We suggest you to fill in the station track informations after the line speeds.

The button **create abbreviations** opens a window to bee seen on the right. FBS is able to create the abbreviations by it is self. You can choose three ways: The first one creates abbreviations for all empty entries with conditions. The second way checks the uniqueness of the abbreviations and changes them if they are identical. The third way fills in the abbreviation of station names in all empty entries for stations.
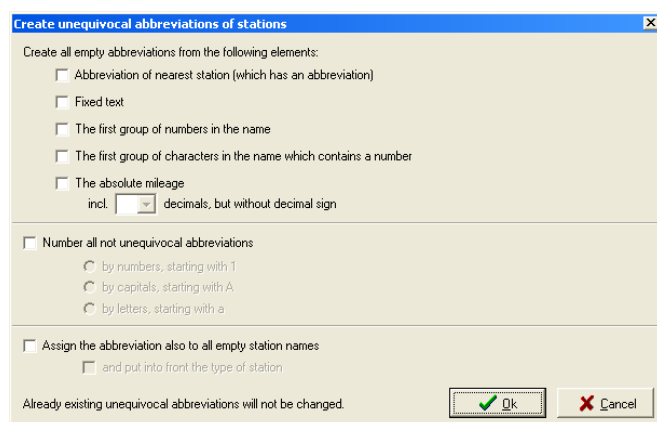
The uniqueness is important for the cooperation of all FBS programs and all interfaces to other programs. The NETZ program needs unique abbreviations in all timetables but this cannot be checked by iPLAN. By defining a signal you have to check the direction it is used. In default the signal is used in both directions, also at a two-track line.

By reation of a driver's timetable it can happen, that a lot of stations and locations are shown in a short distance and if only lesse time between them. So it could be helpful to hide the station line in some cases. Use the right mouse button to call up a context menu, which includes the item **Display in driver's timetable**.

3.2.10.5 *Register "Station tracks"*

The register "line speeds" (3.2.10.6) encloses only the track maximum speeds and so it contains the speed on the main tracks in stations. Normally other speed limits are necessary in the other tracks in a station because of the points. These station speed limits are authoritative to the run time calculation and so for the whole timetable.

All the data filled in this list are used only for run time calculation! FBS does (at the moment) not check the length of track with the length of the trains and also the usage of the track. These checks have to be done by yourself until FBS programme family is able to do it.

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After double click or enter in the second column of this register you get a new window to fill in the **station tracks** of the station.

The following data is needed:

- The name of the track,

- The maximum speed for entering or leaving at every head of the station,

- The position of the home signals and,

- The position for the clearance points for every head of station.

The beginning of the entrance speed limit is normally at the starter signal but if the speed limit starts at the first point you should use this position in the starter signal column.

✋ The position of the starter signal is used only for run time calculation not for train sequence searching. The train sequence calculation uses a station as a simple point. At the moment a station is used as a point with unlimited train capacity. That means that the trains beginning and ending at one day is not compared with the station tracks. At the moment it is the easiest way, because shunting runs are not watched in FBS. If you need trains signals as train following place, please define an extra signal at the position of the starter signal in the register **station & location** as a **signal group** of signals.

The end of the escape speed is normally positioned at the end of the last point. In some cases it is before. iPLAN calculates the train length to this point and starts acceleration after leaving this point. A start signal should only be defined in an exception. For example if the distance between the regular trains stop and the start signal is large.

iPLAN can only calculate one speed for one station track so you have to define the track two times if it is possible to enter the station in the same track with different speeds (for example missing overlap). You should also define it if the entrance and the leaving speed are different this difference is important for you.

☞ If you click the box table coloured a graphic is shown to you with different colours that are also shown in the coloums where you have to fill in the data.

Stations often have some tracks with the same speed and the same clearing point so that you are able to fill these tracks in as one track. If you would like to create a station timetable it would be easier if you define here all tracks. So they can be adopted automatically in the station timetable. We please you to fill in all the tracks to be able to use the checks in the stations belonging to track use and the length.

The function **View > Station tracks** shows the track names in the graphic timetable in square brackets behind the arrival or departure time.

After defining the station tracks you can refer the station tracks to up to 4 different train categories in **traffic input data** in the register **usage of station tracks** (chapter 3.2.11, page 47). If for example regional trains use regulary track 4, you can fill it in there and do not need to refer it later. It is also possible to change the usage of station tracks train by train in the graphic timetable.

✋ Trains ever using the through track you do not need to list here. This is default.
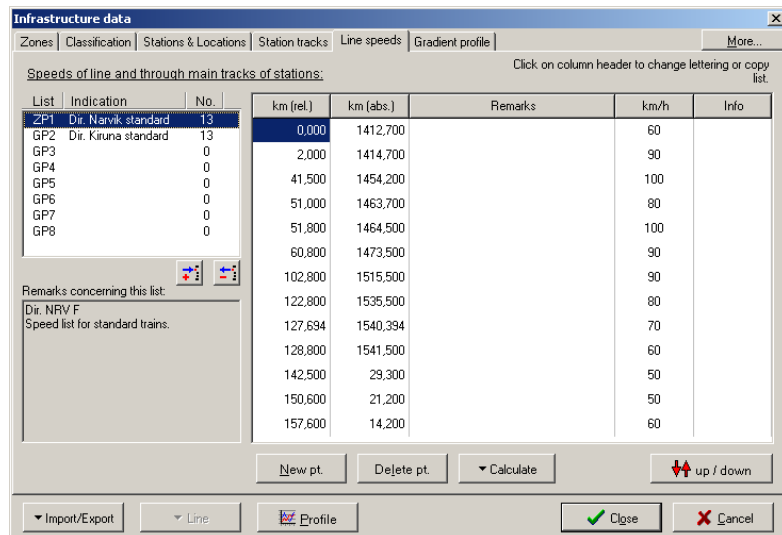
You can change the order of the tracks by drag & drop. So you see this order in every case you can refer the station tracks to the trains.

3.2.10.6 *Register "Line speeds"*

This register is separated into three parts.

The left table shows all known speed lists with theire indication and the number of speed changes. Below the table you can see the **remarks concerning this list** to get a fast overview. On the right table you can see the **relative** and **absolute mileages** and **Remarks**, if filled in and the **speed** to be used from this kilometre. On the right column additional informations are shown for the validty of the speed change.

A list can be added by the button and deleted by the button. If you delete a list, which is not the last one, all other lists are moved up. So all trains linked to this lists loose the correct speed list. This can be avoided by clearing the list. The context menu in the speed list table can also call up these functions. If you add a new list an empty list is set to the speed list table.

The properties of the lists can be changed by a double click to the speed list item.

Another window opens, which contains four registers.

You can add or erase speed changes every time. iPLAN does not recalculate the new run times. You have to start this by yourself. Speed limits given by engine or waggons are not relevant here!

To add new speed changes you have four possibilities to set the location:

- Relative mileage to the start station

- Relative to a station or location e. g.: "2 miles after Xy junction"

- Relative to an existing track point: "miles before the next gradient change"

- Absolute mileage. The absolute mileage differs to the relative mileage if

    o The first station is not located at mileage 0,0,

    o The mileage increases along the line or

    o One or more mileage changings are included.

If you used one of the last three possibilities and press the **Ok**-button iPLAN calculates the relative mileage at first. Please check the mileage and then press ok again.

Inside of stations you have to enter the maximum speed for the through path. The entrance and escape speed for the other tracks are defined as written in 3.2.10.5 on page 41.

Take care by working with absolute mileage that you use the right mileage part. Absolute mileages can exist sometimes along a line. To define a mileage part, look at page 35.

The row of the lists can be changed by drag and drop. The links between the lists and the links from the trains to the list are kept alive.

3.2.10.6.1 Register "Contents"

The indication helps you to find out the right list in the other functions, which use the speed lists. In addition to this, it is possible to describe other hints in the Remark box on the bottom of the register. You can fill in free text in both fields.
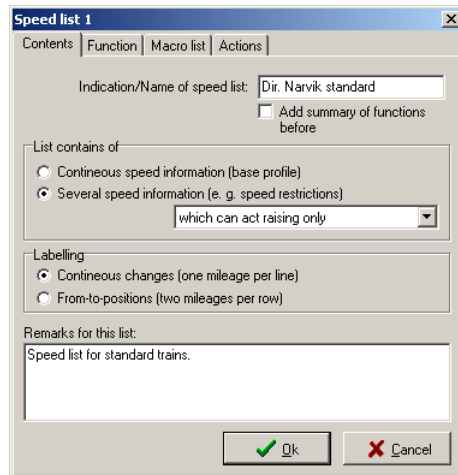
3.2.10.6.1.1 Part "List contains of"

Here you can define the handling of the speed list. A base profile includes **Continous speed** information in opposition to a list of **Several speed informations**. If you use the second option you can choose the way of the information useage. So the speed informations can act restrictive or raising only. This way allows you to get a speed list quickly for example for trains with tilting technology or for trains with heavy axle loads.

3.2.10.6.1.2 Part "Labelling"

This part is used for speed changes data. You can set them by **Continous changes** with one mileage per line or **From-to-positions** by two mileages per row.
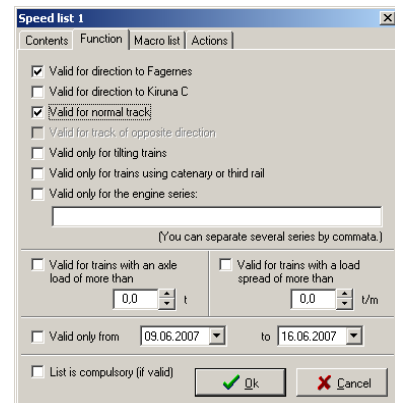
3.2.10.6.2 Register "Function"

This register is made to set limitations to the validty of the speed list. So the limitations can be set depending on the direction, track useage, train equipment or engine series. Limitations can also be given by axle load or load spread. The maximum axle load is respected by the limitations of the track it self. So they are calculated for every train and checked by the validty of the speed list.

You can also set a period of validty independent from the timetable period. Please set the check box, if the list should be compulsory if valid. That means if a configured train fullfills all settings of the list, the list can not be deselected.

3.2.10.6.3 Register "Macro list"
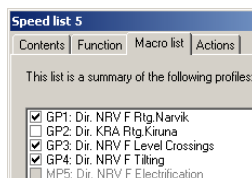
Here you can summarize speed lists to be used in the current speed list. One of the speed lists has to be set as a base profile. Just click the boxes before the indication of the line to include them into the current speed list. It is not possible to use speed changes in summarized lists, if there exist changes, they will be deleted.

3.2.10.6.4 Register "Actions"

This register is designed for faster handling of speed lists. So you can set all speeds to a limit or limit all speeds to a maximum speed. It is also possible to replace all set speeds to a new speed value. Redundant values can be deleted too for a better overview for you and a faster calculation for the programme. It is also possible to delete the list totally. To check the effects of speed changes or to handle the speed limitations for building sites you can copy complete lists to a free list number and change the speeds there. If you have checked the correctness of the speed changes you can exchange the positions of speed lists to set them into function.

3.2.10.7 *Register "Gradient profile"*

Similar to the speed changes you have to enter gradient changes along the line. Every gradient change has a defined height to normal zero and a defined gradient, which starts at this point. Because of the connection between the height and the gradient some algorithms are positioned here: By filling in a gradient the following altitudes are calculated. If you change an existing altitude a window opens which allows you to correct the following or previews altitudes or gradients.

To fill in the mileage the same system as to change line speeds is used as written in the chapter before. To put in the gradients you have two possibilities:

- Gradients as miles per thousand miles or

- Gradients as ratio between height difference and length difference. You can only enter the length after which one miles height difference is fulfilled.

The sign of the number is related to the increasing mileage. So a positive sign means increasing altitude and negative sign decreasing altitude.

☞ Take care that the gradient profile and the speed profile have a great influence to the run time calculation. On the one hand the maximum speeds should be filled in exactly on the other hand you should fill in not too much gradient changes. It is no problem to combine some gradient changes. As a rule of thumb the distances between gradient changes should not be shorter than the length of a train. Normally it is adequate to fill in the crest and the lowest point of each valley.

Some hints to fill in gradient changes:

- It is exactly enough if you have the altitude of the stations and the breaking points of the line.

- Guess the length of the station or location and calculate the beginning and the end by the know middle of the station. Fill in these points as line points. You can use the function **Station altitudes**.

- If you have the mileage of the starter signals use this mileage also for gradient changes because at starter signals the speed changes often.

- Put in the altitude change between the end of a station and the beginning of the next station. Normally stations do not have an important gradient. If you would use the middle of the station as the beginning of a gradient the trains start in the gradient and will take a lot of time to accelerate.

- Avoid if it is possible gradient changes between stations to keep the calculation at the acceleration as exactly as possible. Gradient changes are inhomogenities in the acceleration curve calculation. This hint is insubstantial if there are rack changes between the stations.

- Take care of breaking points between the stations. It is a difference if you have an increasing gradient and then a decreasing gradient or a plane line between two stations.

If you have the altitudes of your stations and the distances between the station middle and the breaking point you can use the assistant as to be seen on the left. This is assistant is started by the **station altitude** button. To use the assistant no gradient changes should be filled in the list yet.

After starting the assistant the first station is sown. Fill in all the parameters and press **Ok**. After it the next station or location is shown. Repeat the put in until all values are filled in. If the altitude does not change between two stations or locations you can **skip** them with the button.

3.2.10.8 *Register "Curves"*

This register is shown to you after marking the **more…** button. New curve changes can be filled in the same way as known by **speed** or **gradient changes**.

The influence of the curve resistance to the run time is small. It is only appreciable if the engines are driven at the limit of power for a longer period. This is to be found if there are many acceleration parts or strong gradients at the line. The run time difference for passenger trains is smaller than ½ % and 1-2 % for the rest of the railway traffic. The curve resistance has a little bit more influence to the **energy consumption** because energy is consumed in every phase of a run and not only at the seldom driving at the limit of power. There exist examples in which the difference of energy raises up to 5 %.

The **gauge** has an influence to the curve resistance and this way also to the run time. If there is no gauge filled in register classification 1435 mm are used as default. If a line has a change in gauge it is respected by iPLAN. But if you create a train driving through the gauge change the change is not respected for run time calculation. It is no problem to respect the different gauges in one file if no train passes the gauge change. The program does not check it but the run time calculation will not be exact. If you want to create a train driving through the gauge change, you should divide the train path into two trains.

The context menu gives you the possibility to calculate speeds inside of curves depending on different parameters.

3.2.10.9 *Register "Tunnels"*

This function is only available if the button **More…** is marked. The tunnel resistance depends on the cross section, the length of the tunnel, the form and the number of waggons in the train. The most important influence is made by the form and the relation between train cross section and tunnel cross section. The preciseness of the tunnel cross should be smaller then 10 square meters (~10 sq).

Though the tunnel resistance can be quite high, it has lass influence to the run time because of the small tunnel length in relation to the line length. So the tunnel resistance is important if the line has a great part of tunnels as usual on subways or suburban trains. Tunnels shorter

than 500 meters can be neglected (as written in WENDE, Fahrdynamik, Teubner-Verlag, Wiesbaden, 2003).

3.2.11 Traffic input data

Or **Alt + V**

3.2.11.1 Register "Regular stop times"

For easier handling of stop times you can list here the regular stop times for every station and location which is marked as an **access place** in the **Line > stations & locations** register. So you can select the list in the train datasheet, which sets the stop times for the train. It is possible to change the stop times during the timetable construction.

If you have to do a stop at a station or location, which is not marked as an access place, for example to change the crew, you can click **show all stations and posts** at the bottom of the register. So you are able to define regular stop times for every station and location.

A double click opens a list where normal stop times are filled in. You can also select **stop on request** or **run through** or **not applicable** and of course you can enter a time by yourself.

You can mark an area of cells (keep shift or click and move with the mouse) and edit the times by pressing the enter button. So you can change the times for several stations quickly.

The lists can be named free. Click in the head of the column and fill in the name. These titles you see in the list of regular stop times in the train datasheet. So we suggest you to use train categories or line numbers.

It is not needed, that trains have to finish at the last station of the track, because the train can go one on another line. So you can fill in the regular stop time for the last station too.

3.2.11.2 Register "Usage of station tracks"

At the infrastructure data (chapter 3.2.10.5, page 41) you could define different station tracks with different speeds. It is often demanded that special groups of trains have to use a defined platform or trains have to use a siding because a platform exists only there and not at the trough path. You can list 4 different regular station tracks.

At the first column you can see al the stations where additional tracks are filled in. In the next columns you can enter the tracks normally used. The list of tracks in the station is shown to you by double click so that you can choose one. If you select the through path the cell is clean.

You can name the lists by double click on the headline of the column.

3.2.11.3 Register "Supplement times"

To balance differences in run times between several programmes or to react to short not predictable speed limits (e. g. track works) with an FBS timetable, it is possible to define **supplement times** applied to a **station** or a **section** of the line.

The column section/station shows the section or station at which the following data are used.

The supplement times can be limited to train categories or train types or engines. Different train categories can get different supplement times in one and the same section. The

supplement time can be filled in in minutes and tenth-minutes or also in percent in the **supplement time** column.

Please note for using supplement times. Differences in run time calculations or more exact data can be cleared often so that this way is the better way than supplement times. In a worst case a train wants to use a station track earlier, because the supplement time is sized too large or was not needed. If the station track is still used the train would have to stop at the open signal. So the run time and the energy consumption rise up and the next train has to break to because the block he wants to enter is used longer than calculated.
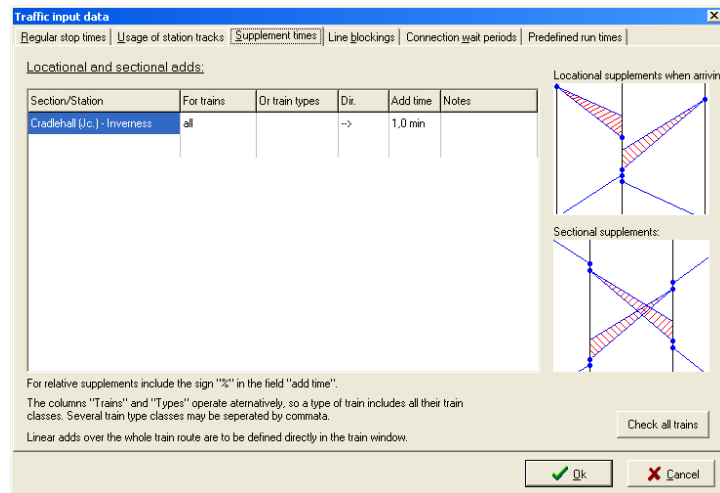
If there are trains in the timetable, which are concerned by edited supplement times, you can use the button **Check all trains** to see which trains need a new run time calculation. Supplement times applied to a section for only one direction are similar to station supplement times. Relative supplement times in both directions are illogical because the run times in the sections can differ.

3.2.11.4 *Register "Line blockings"*

This register allows you to define line blockings, which are not caused by running trains. To define a new blocking uses the button **New**. At first the blocking should be limited along the line. You can use only stations and locations as start or end position. Then you can define the time in which this blocking is active. You can use absolutely times or relative times belonging to trains or a combination. So the blocking can start immediately after a train and end immediately before a train.

If you have defined a timetable period you can also use a limitation of days of run.

These blockings are respected by slot search and conflict detection.
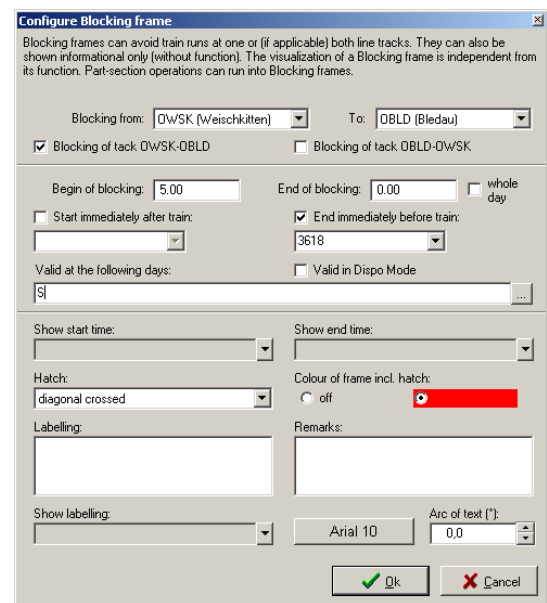
The blockings are shown in the graphic timetable with settings you can do in the bottom of the window. You can select a hatch, the colour, a label and the position of the label relative to the blocking frame. The font settings can be done by the button, which is signed with the current font and font size. It is possible to turn the label. You can also leave remarks for your orientation. Finish the editing by **Ok** or **Cancel**.

3.2.11.5 *Register "Connection wait periods"*

To consider connections to other means of transportation or to other lines, iPLAN includes connection wait periods by slot search. You should define all connections, which trains should be waiting for.

Use the New button to fill in a new connection wait period into the list. A new window opens in which you can edit the relevant data. At first you should give the connection a name for example: "Arriving of bus line 3". Then you should choose the station at which the connection should be realised. Just for your information: If you erase the station all connections at this station are erased too.

Here an example to use the window:

Starting at 8.20 every second hour a bus reaches the station "Dyfi Junction". You are interested in connections to this bus line. So you should fill in **Connection from** line the mean of transport, the line and the transportation company. It is just for your information and not shown at any place. **At junction** you have to select Dyfi Junction. The **arrival time** you will get by the connection partner. The **minimum changing time** depends on the way, which the passengers have to cover. In this example we calculate 3 minutes to walk and two minutes supplement time the trains **earliest departure time** is 8.25. The **maximum preliminary period of time** is default by 20 minutes. So no train, which could have a departure time between 8.05 and 8.25, can leave the station because they should wait for the bus.

If this **connection repeats** (for example every two hours) you can enter the number of repeating and the **interval** between two connections.

If the connections are limited to some **days of run** you can fill in the code for the days of run and mark the train types. It is also possible to use this connection for the one, the other or both directions.

The connection wait periods can be shown in the graphic timetable with a little frame at the station line. The frame starts at the time when no departures are allowed and finishes at the connecting time. The frame is positioned in the direction, which has to connect. The colour of the frame can be chosen individual by the **coloured button** at the window.

If you try to move a departing train into the connection frame the departing is blocked. Take care, that the slot search is made as written in chapter 3.3.3 on page 55. So you are not able to set an arrival time. You have to look at the preview line by moving departure time.

To ignore the connection in your timetable construction, click the check mark in the On column. So the connection is deactivated but shown in the graphic timetable and ignored by all trains. This is helpful in case of unimportant connections, which should not be managed in every situation. Independent from this function you can deactivate all connection wait periods per simple click (look at the following break).

You can also use this function to take care for traffic input data. For example the times of school ends or loading slots for combined traffic.

3.2.12   Display settings depending on timetable

 or **Alt+A**

Here you can do settings only for the display settings in opposition to the general timetable data.

3.2.12.1 *Register "Units & Layout"*

3.2.12.1.1 Part "Paper alignment"

Here you can set the format of the paper used for showing the informations on screen. You can choosen between the different DIN A-formats in **Vertical** or **Horizontal** orientation or an individual size defined by **Width** and **Height** in mm.

Set default size depends on the resolution of your screen. If the size is larger than 1024 pixels the DIN A2-format is used, if it is small than DIN A3-format is set.

3.2.12.1.2 Part "Margins"

The margins are used to save space on the borders of the paper. It gives a better view after printing the graphic timetable. You can define margins on all four sides of the paper in different values. The head- and footlines are always printed above respectively below the **Upper** or **Lower** margin. These margins are called up by starting the print function. They can be changed there for the current print.

3.2.12.1.3 Part "Alignment of graphic timetable on screen"

Here you can choose the orientation of the whole graphic timetable on screen. You can set **Distance axis horizontally, time axis vertically** or just the opposite as **Time axis horizontally, distance axis vertically**. We advise you to change this option before starting the creation of the graphic timetable. Some functions get in trouble by changing the orientation after filling in the trains. The orientation of the graphic timetable is a traditional fact, so that you might set this before starting the editioning and do not change it during the work.

This function changes also the orientation of other functions like moving the time axis from the up and down arrows to the left and right arrows.

3.2.12.1.4 Part "Contents of graphic"

Some options are helpful to keep the overview especially if large graphic timetables are needed. So you can **Repeat hours at right/down side** to avoid searching them on the other end of the paper. **Zoom line width of train lines too** keeps the proportion of the train lines in different zooms to be able to differe the importance of trains too. It is better to deactivate this option if there are a lot of trains to be seen in a tighty space. Espescialy if you have to move some trains you might keep this function off.

To keep the "What you get is what you see"-principle alive you can **Show margins on screen**. So you get an empty border on the left and right respectively on upper and lower side which takes only space on screen. The limitations of the margins can be shown by **Show lines at margins on screen**. This way allows you to get an overview of the needed space on the paper.

3.2.12.1.5 Part "Distances and Speeds"

This box allows you to change the unit system for distances and speeds. Default units are based on **Metric** system km and km/h in conformity to SI-system. It is possible to use to ways for mile unit. If you choose **Decimal miles** the figures behind the point mean miles divided by decimal figures. The **Imperial mile** system divides the mile in 80 chains. Take

care for the separator: in decimal systems it is the comma and in imperial systems it is the point. In FBS the SI-system is used for calculating.

3.2.12.1.6 Part "Altitudes"

You can switch the unit for altitude data between **Metric** m and **English feet** ft.

3.2.12.2 *Register "Titles"*

The titles entered here are shown on top of the timetable by printing it. As default the first and the last station are filled in the part **"Title for timetable's header"**. The length of the track and the period (if defined) are shown in the part **"Remarks, hints, annotations"**. You can complete the information with free text and/or the following variables:

#P	=	timetable period (validity period)			
#L	=	length of line			
#B1	=	First station of line	#Bx	=	Last station of line
#N1	=	Name of first user	#N2	=	Name of last user
#D0	=	Current date	#T0	=	Current time
#D1	=	Date of file is creation	#T1	=	Time of file is creation
#D2	=	Date of previous change	#T2	=	Time of previous change
#FN	=	File is name without path	#FP	=	File is name with path

The texts are shown on the graphic timetable print. If you want to safe hints, which should not be printed use the **Edit function** of hint text (chapter 3.2.13, on page 54).

It is also possible to fill in these macros inside of the parts **Headline(s)** and **Footline(s)**.

To show page numbers on the pages you can show page numbers. You can set the **First page no.** here.

3.2.12.3 *Register "Header of timetable"*

This register sets the shown data on top of the graphic timetable. These informations are positioned above the distance axis. The **Contents of timetable header** can be set by activating or deactivating the different informations in the list. The informations are collected from the different lists inside of the timetable file. The row of the data can not be changed.
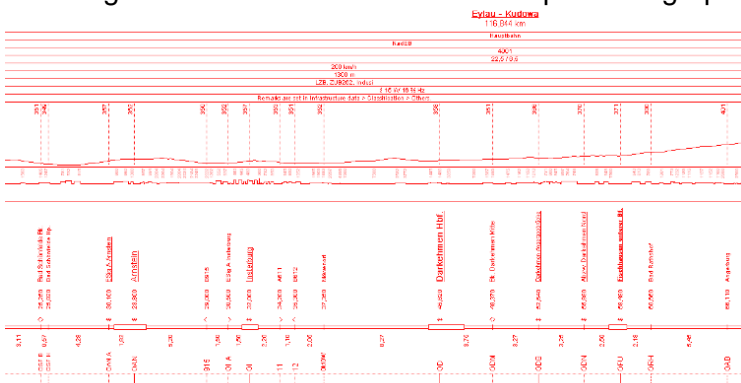
The picture on the right shows you an example of the maximum shown informations inside of the head of the graphic timetable. Please note, that the title and his remarks are shown independent from the orientation of the graphic timetable always on top of the paper. All the other informations are shown on top of the distance axis.
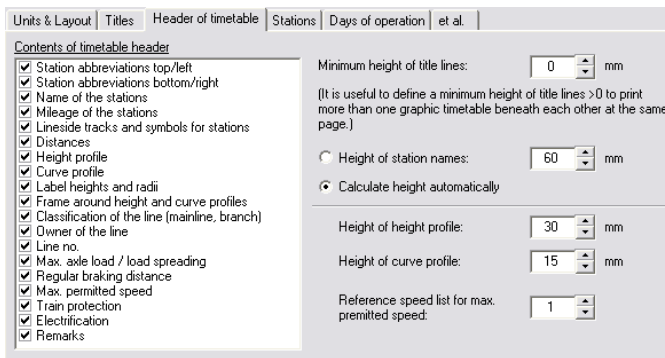
The **Remarks** are set in Infrastructure data > Register "Classification" > Others as explained in chapter 3.2.10.3 starting at page 37.

The **Minimum height of title lines** is usefull if you would like to print more than one graphic timetable abreast/beneath each other at the same page.

To save space you can define the **Height of station names** or **Calculate height automatically**.

Height of heigt profile and **curve profile** is fixed by the data filled in here. So the size of the data is calculated automatically to keep the data inside of these dimensions.

Reference speed list for maximum premitted speed is set here to be shown inside of the head of the timetable.

3.2.12.4 Register "Stations"

At the moment there are no functions useable here.

3.2.12.5 Register "Days of operation"

This register allows you to set the display settings of days of operation.

3.2.12.5.1 Part "Display name of months as "

Here you can change the notation of month. For example complete name or Arabic numbers.

3.2.12.5.2 Part "Number of special days of operation at train line"

A better picture will be done by reducing the number of special days of operation at the train line. If the limit is exceeded the code "VT" refers to the legend.

3.2.12.5.3 Part "Display of VT-references "

If a train has limited days of operation the days of operation can be shown in different outputs in different ways. You can differ between graphic timetable, legend or train datasheet. At the train line you can use the number of set of days and at the legend the complete name of the set of days. You can also show all days in the set of days. The set of days can be edited by general timetable data > calendar (look at chapter 2.2.2 on page 14).
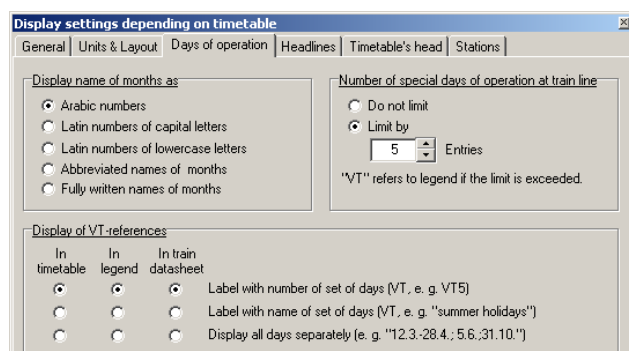
3.2.12.6 Register "et al."

3.2.12.6.1 Part "Operator logo"

It is possible to set a special logo to use in this timetable in opposition to the logo set in options > configuration.

3.2.12.6.2 Part "Content of train features"

The list shown in this box shows you the extra data, which is shown in this timetable below the train number.

The load unit is fixed in t, the axel unit is x and train length in m. The order of this data is also fixed by iPLAN.

- Maximum speed (in miles/h or km/h),

- Short name of engine(s),

- List of short names of waggons,

- Load in t,

- Length of train in m,

- Number of axels and

- Seats.

If you click "show" load, the load is only shown if it is greater than zero. This is essential for the waggon list too. If the train exists only of engines or multiple units this data are not shown. Seats are also shown if the train is a cargo train. Seats are only shown as sum of all classes.

We advise you to use axle number and seats only, if you can reach a result by this information. If you use it just for fun it will decelerate FBS. The program has to load the data from list files, which takes time.

3.2.12.6.3 Part Rounding of the minutes in the graphic

Here you can set the shown times inside of the graphic timetable. You can differ between **Showing tenth of minutes**, **Round to half minutes** or **to integer minutes**. The tenth of minutes are the most exact way, which could be shown so the times are not rounded. The other options allow you to choose different rounding rules:

- Traffic rule (normally round off departues, round up arrivals),

- Mathematically (round off <x.5, round up >=x.5),

- Round off departures, Round arrivals mathematically or

- Round off all.

The intention is to separate the shown times from the rounding rule.

3.2.12.6.4 Part "Character set for train messages"

At the moment there are 4 schemes useable for train messages, which have to be sent by chief of train. These messages are shown in graphic timetable and also in driver's timetable.

It is a system used for less engines in steam lines in countries with German safety philosophy. If you want to get detailed information please call the service.

3.2.12.6.5 Part "View settings for new trains"

The Button **Edit settings** opens the **View settings for trains** window. Here you can change settings for trains, which are put in the timetable after pressing ok button.

So you are able to get detailed data for trains you added new to the file and only short information for trains, which have been in the timetable. If you choose **copy train data from** the settings of this train are used. These settings are saved with the file. To reduce the information look at chapter 3.3.10.5 on page 68 for only one train or for more trains at chapter 3.2.3.4 on page 30.

3.2.13   Info text file

Or **Alt + I**

This window helps you to remember hints to the timetable or to the line. The scratchboard in the button shows you whether a text is present (a filled scratchboard) or not (an empty scratch board). These hints are saved together with the timetable and opens automatically if you open the file.

You can edit the text by the Edit button in a window. The usual buttons on top of the edit window can change the formatting of the text. It is possible to copy the text to a standard text program or can paste texts form there.

3.3 Construction Menu

3.3.1 Select train

3.3.1.1   *General*

Any mouse action in this chapter can be assisted by the method to mark single trains. If a help window shows you some trains so the mouse action is related to the first train. The row of trains is change by **Alt** key, so press as often as you need and move the mouse pointer a little bit. Look also at chapter 3.2.2, page 28.

3.3.1.2   *Mouse menu*

The mouse menu can be opened every time by clicking the right mouse button. If you are in preview mode (move departure times, train leaves the line/train changes to line) the preview can be stopped by the first entry in the menu.

You can also call up a train in the second part of the menu. This is helpful if the train is not shown in the current view and cannot be selected by mouse.

All the other menu entries are short cuts to function, which can be opened in other ways. The most functions are related to the selected train.

3.3.2 Move description in the graphic timetable

Select the second mouse button and click close to the train line. Note the shown train in the status line on the bottom. The next click marks the left bottom edge (independent of the direction the train uses) of the label. The label is positioned new at this position.

Position and angle can also be changed in the train data window (look at chapter 3.3.10.5, page 68). If the label is not shown, you can call up the train by mouse menu.

3.3.3 Move departure times

This might be one of the most important functions of the programme. It allows you to change departure times fast and clear without typing in.

Select at first the third mouse button and after that the train by clicking close to the train line (note the status line). You have to select the right train at the right station. Only departure times in direction of the train are changed. The programme shows now a preview line, which you can move by mouse. Preview lines are shown only for useable slots at all operation days by respecting the trains filled in the timetable. Move the mouse until you found the best departure time and press the left mouse button to select the times or the right button to cancel. You can read the current time in the status line on the right or at the mouse pointer. If you are not able to see the wished departure time use the roll buttons in the symbol line.

If it is to difficult for you to select the new departure time you can type it in by function **Enter departure time** or **Enter stoppage time** at mouse menu (look at 3.3.1.2, page 54). FPS uses the next free slot after the time you filled in.

An exact slot search can be done by helpful of the up and down (respectively left and right) cursor keys. So the preview line is moved a tenth minute.

It the next free slot does not include a pass through at a station an operational stop is calculated. So an arrival time is calculated and as fast as possible a new departure time is used. The operational stop is signed by a "+" in the column info at the run time table (look at 3.3.15, page 71). In the case of compact train relations it can happen that the programme changes recurrently between pass through and operational stop. The sand glass is shown (⌛). You can stop it by clicking and fill in the times by yourself.

The calendar function makes it possible to calculate the exact exclusions during the slot search. That means that two trains exclude themselves if they run at more than one day in common at one day of the timetable period. The regular and the special operation days are respected in this function.

Just an example: If one train runs every working day without Saturday and another one runs Saturday, Sunday and on public holidays so they can use a single track line at the same time because the operation days have no day in common. If the first one of them runs also at the first of may (it is a public holiday in Germany) they cannot run at the same time because a common operation day exists!

This problem can became quite difficult by finding an answer to the question: "Is it possible, that a train operating every Friday and Saturday and a train operating at days before public holidays run at one day?" Who can answer it quickly?

The devil is in the detail: Two trains operating W and S do net exclude themselves. If you divide the train operating at W in a train dividing WXSa and one operating Sa you will get a problem. The train operating on Saturdays gets in conflict to the train running on S, because there exists a public holiday at a Saturday. To solve this conflict you have to change the operation days of the Sa train to SaXS.

Attention! *As long as a period is not defined, iPLAN checks only the regular operation days. Only conflicts between weekdays and holidays at weekdays, but not concrete public holidays are checked. So a train operation at S gets in conflict to every other train.*

3.3.4 Determine station tracks

Choose the mouse button "Determine station tracks" and click an intersection between train and station line. Please not again the train head code written in the status line. After that you can select the station tracks and their speeds.

At a station you have more than only the through track, which speed is limited only by the speed list. If you have defined station tracks and a determined a train this track he respects the speeds of the station track.

Attention! iPLAN does not check the train order in a station track. But you should take care for this problem in iPLAN too to avoid changes. You can control the station tracks as written in chapter 3.4.7, page 74.

3.3.5 Determine/cancel non-stop running

Choose a train by click at the station in which the train runs through are stops and it is switched between stop and non-stop running. If a non-stop running is not possible because of a used track to the next signal an operation stop is shown. To undo this process you can repeat your click. Chapter 3.3.9 tells you at page 56 how a stop is named.

3.3.6 Train ends at intermediate station

Select a train again at a station to end him there. If you would like to undo this you can use mode "Move departure time" at this intermediate station.

3.3.7 Train starts at intermediate station

This function is needed if a train should start at a station later on his current run. Choose the station at which the train should start now and click there. It is not possible to undo this function except of undo at edit menu. If you would like to start the train at an earlier station you have to change trains route section (look at chapter 3.3.10.3.2, page 59) or to define the train again (look at chapter 3.2.1, page 27).

3.3.8 Train leaves or changes to this line

This mouse mode works in the same principle as the one explained before. The arrival or departure times are connected with a short line starting or ending at the station the train leaves or reaches the line. You can move these short lines by drag and drop with the mouse. Note the time shown in the status line.

The short lines do not end as a normal line at the station line they end shortly before or after it. So it is easier for you to differ between trains, which end at a station or leave the station to another line.

3.3.9 Set stoppage information

This function has no influence to trains run but you change properties of a stop. Such properties are for example operation stops (+) or stop on request (x) as train messages used in simplified operation modes (in Germany known as "Zugleitbetrieb").

If you select the button stoppage information the last type of information is in use. To change this, use the small button on the right of the stoppage information button. A small menu

opens to select the information you would like to set and after that you can click at an intersection between train and station line and the symbol is set.

If you repeat setting the same information the information and the symbol are erased.

The operational stop symbol (+) is set by programme if it is needed. You can use this stop also for other things if it cannot be cleared. Please note that such an operational stop set only by iPLAN can be cleared automatically if it is not needed any more.

If you need the stop for example to change crew or to refill the water of a steam locomotive you have to set the operational stop manual.

The symbol for a stop on request (x) does not have influence to the stop time. It is better to set the stop time in the list (chapter 3.2.11.1, page 47) by a short time or 0. It makes no sense if you declare a stop of two minutes to a stop on request.

It is also possible to define a stop for **pick up only** or **alight only**. This will also be shown inside the customer's timetables.

Some symbols cannot be used together. The programme shows in this cases only one of them.

The symbols for simplified operation modes are taken from the list defined in display settings depending on timetable (chapter 3.2.12.2, page 51). These symbols are shown directly in front of the arrival resp. departure times. The Arrival message cannot be used at the start station of your train and the Permission to proceed not at the end station of the train. The sense of these messages is not checked by iPLAN so handle them with care. The messages set here, are automatically used in the driver is timetable if the right form is chosen.

3.3.10   Edit train data ...

or **Double click at a train**

This function is only available, if a train is selected. The current train is also shown at the status line on the bottom of the iPLAN-window. This window allows you to set all the data being relevant to the train.

3.3.10.1 *Part "Train type and number"*

His train type and his number identify every train. The train type shows also the traffic job he has to do and the meaning of the train. So try to give a train his own headcode arisen from train type and number. A special file includes the list of train numbers lined to the train types. The general timetable data (Register "References", page 13) keeps the information which **Train type and headcode database** is being use in this timetable because they can differ by every infrastructure company.

To fill in a **train type** you can choose a train type shown in the list there. To work faster, you can also fill in a train number in the space for train numbers and iPLAN finds the train type belonging to this train number automatically if have not fill in a train type by yourself (look also at chapter 9, Page 145). It can happen, that some train types are possible to one number, but often the automatic function finds the right result.

The train type is not urgent needed but helps to differ trains in the graphics and makes other functions useable in timetable construction or statistics.

3.3.10.2 *Part "Days of operation"*

This box shows you the summary of all operation days of the train inside of this timetable. Every day where at least one train part runs one section of the line is shown inside to control th operation days.

3.3.10.3 *Register "Overview"*

3.3.10.3.1 Part "Train parts"

Every train consists of at least one train part. But there are many cases in which trains consist of some parts. Examples for these cases are:

- Train sharing and coupling: Two (or more) parts are shared at a station and both parts use different lines to run on.

- Additional waggons at special operation days: for example on Fridays or before and/or during holidays. The additional load and length has to be considered to the run time calculation. So take care that the run time differs to the other operation days.

- Through carriage: Special waggons belong to a train for a part of it is run and are given then to another train.

- Sharing of freight trains: In some cases heavy trains have to be shared to pass strong ramps and to be coupled again at the flat country and continue running. You can also fill in parts, which are left or picked up in stations during the run.

- Changing engine(s) at a border or energy supply changing station: Normally a train operating company tries to use the most effective engine(s) to run a train. Also an approval can be missing or the parameters of the electrification system can be wrong, so that the engine hast to be changed.

Whenever the train composition changes or single parts (also only a single waggon) require other operating day rules the train should be separated into several parts.

Take care for the property **Train parts are homogeneous**. It says, that the properties of the train are the same in every section the run is divided in. This does not mean, that all train parts exist in all sections, but if they exist, all parts with the same head code have the same data. If you would like to use train parts with the same number at different operation days to different sections set in you have to deactivate the **Train parts are homogeneous** box.

☞ The **train part number** is the **unique** name for a train part. It is important if trains or parts of trains leave the line and continue running at another line. To make sure, that the FBS programmes will detect a complete train run right, the train part number has to be the same at every line!

A new window opens by using the **New train part…** button in which the new train part number should be filled in. iPLAN gives you a suggestion, which you can overwrite. Two ways to do this exist:

- If two coupled trains run alone at other sections use the regular train numbers. Only the first train number is shown to you but the second train number is saved in the data. This is the usual way to handle trains being shared. The train parts keep their train number so that change free connections can be found.

- Train parts without their own train number (e.g. through carriage…) should be named as the train they are transported followed by a small letter.

3.3.10.3.2 Part "Train's route sections"

If the train parameters differ at different route sections you have to define the route sections at first. Click at **Split route…** and choose the station to split in the following window. So the route is divided into two parts. A new register is shown in the train data window between the **Overview** and the **others** register. Every route section has there own register. These registers are named by the abbreviations of the stations.

It is possible to split the route if you have just filled train data in. The existing train parts have the same settings in all route sections and so they can be changed now independent.

So long as the filled in and the really route sections are different please check if:

- It was not possible to calculate a run time (gradient, maximum speed) or

- It was not possible to find a slot in a section with five hours.

3.3.10.4 *The registers of the single route sections*

3.3.10.4.1 Input into the table
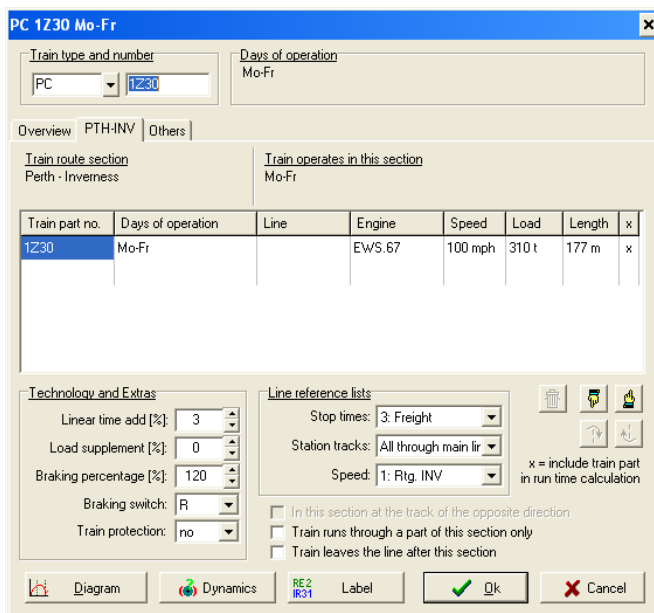
To get a better overview the route section is written with his complete name at the register side. The table includes the train parts in the same order as in the train himself. You can change the order in the table by using the "hand" buttons ![icon] ![icon]. Please note that the order is changed in head stations.

If you would like to change only less data between the separate route sections you can copy all train parts and their settings from the other route sections by using this buttons ![icon] ![icon]. The train part numbers can be changed here by double click directly into the table. By click into the last (empty) cell a new train part number will be shown. A small letter will add the train number. It is also possible to fill in a completely different train number. If you use the same train number the first train part gets an "a" after leaving the train part number settings.

The column **Days of operation** is used to fill in the regular and the special operating days. This function can only be used if a **timetable period** is defined in **Edit > general timetable data > Calendar** (look at chapter 2.2.2.3, page 14). A double click opens the window, which allows filling in the operation days.

You can fill in the regular operation days as written in chapter 15 starting at page 162 (for example Mo, Fr). Take care of the **Operates** and **Not on** Field. By leaving these fields the

working days are translated into the calendar shown on the bottom. The colours are set in the following system:

Yellow fields: regular operating days

Blue fields: days of the week at which the train does not operate
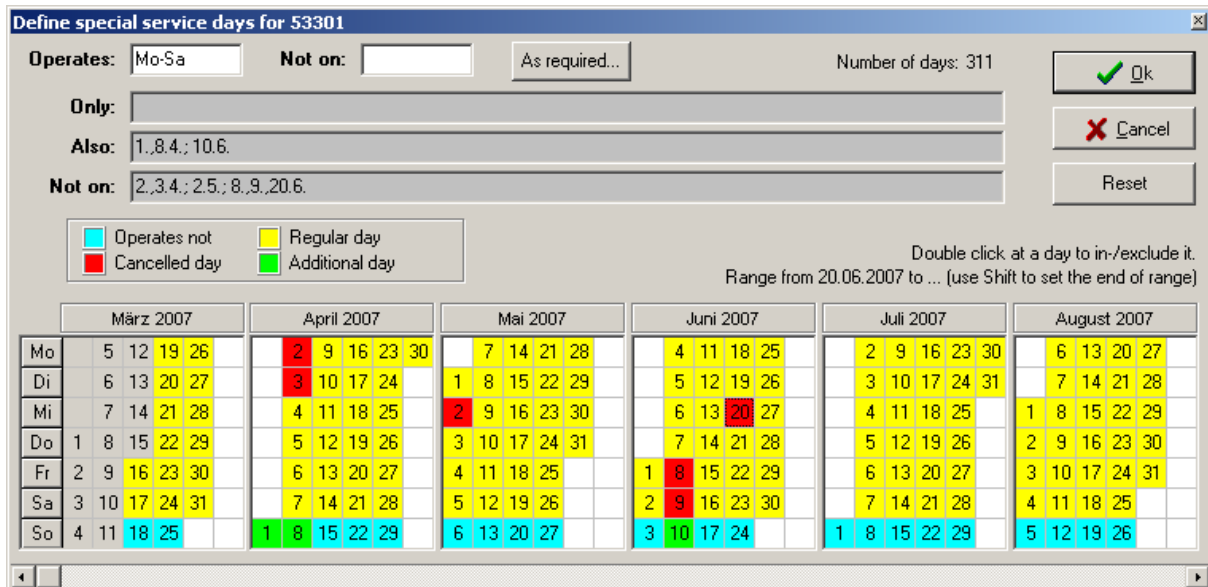
If you are not able to do an optimal recreation of the traffic task of a train by standard rules, you can do the following detailed inputs:

- The day, where the train does not operate becomes an operating day. So it is an **additional day**, which is also shown in the line **also**.

- A double click at a regular operating day changes him to a **loss day** and will also be shown in the line **not on**.

To select a whole range of days click at the first day and keep the shift key pressed and click at the last day. After that a mouse menu opens in which you can:

- **Invert all days from… to…** in their meaning.

- **Include all days from… to…** as Also days.

- **Exclude all days from… to…** as Not on days.

- Define a new **period** only for this train. This data is filled in the line **Only**. This function is helpful, if the train operates only in a season. Typical for this function are holidays or harvesting times.

The data entries can be inverted. iPLAN summaries the dates in the grey cells automatically. On the top of the window you can see the sum of the operation days in the timetable period. Days, which do not belong to the period, cannot be chosen. These days are coloured in grey.

As an alternative to the shown window you can also fill in the operation days faster directly in the cell in the train data window in the train route section registers or can paste them by clipboard. To do this keep the Ctrl-key pressed during you call up the column days of operation. Here you can use the abbreviations of the regular operation days and the time key words not, also and only and also a concrete date.

If you use the timetable for daily work you can change operation days shortly by keywords today, tomorrow and the day after tomorrow without filling in the date it is self. iPLAN changes this relative dates to a concrete date. This function works only if a period is defined. Depending on the Windows®-settings you can also use the complete name of a month or the abbreviation. It is also possible to fill in a month in Arabic or Roman figures.

You can find further informations to operation days in Annex – Declaration of operation days.

The column **Line** is used in iPLAN for multi selection of trains. And interval graphic can be made easily by using the line names in Netz programme (look at chapter 7, page 130). This property is also needed to use interfaces to passenger information systems to differ different lines using one route.

The **Engine** column shows all engines used in this train part at this route section. A double click opens a window to change or choose the engines. At first you can see the engines defined for the Train Operation Company set in configuration. After that the engines are listed in alphabetic order of all Train Operation Companies and followed by a list sorted by producer. The right button mouse menu allows it to change the sorting system.

The table also shows you important **run time calculation parameters** of the engines. So the different columns include maximum speed, engine power and the power-mass-relation. The engine power is shown because this parameter is more known than the power at the coupling hook. The power-mass-relation is calculated by the tractive power and not by the engine power. So you have a better indicator to the acceleration behaviour. So it is possible to compare engines easier without reading the complete engine datasheet.

Available Engines							
Series	Series, model, version	Axle arrangement	Type of constru...	vMax	Perf.	P/m	Remarks
----- EFE: Empresa de los Ferrocarriles del Estado, Chile -----							
SD39M-3	SD39M-3	Co'Co' de	Diesel-electric en...	102 km/h	1720 kW	12,9 kW/t	
----- ET: Eurostar UK Ltd. -----							
92	92-0,75 = 750V	Co'Co' e	Electric engine	140 km/h	4080 kW	32,2 kW/t	Stromschienenbetrieb
373	TGV-Tr0,75 = 750 V	6x(Bo')+18x(2') etr	Electric muliple unit	113 km/h	3400 kW	4,1 kW/t	Stromschienenbetrieb
----- EWS: English, Welsh & Scottish Railway Ltd. -----							
37	Type3	Co'Co' de	Diesel-electric en...	129 km/h	1300 kW	8,6 kW/t	Standard Design
66	JT42CWR	Co'Co' de	Diesel-electric en...	121 km/h	2385 kW	14,7 kW/t	
67	JT42HW-HS	Bo'Bo' de	Diesel-electric en...	201 km/h	2385 kW	20,7 kW/t	
92-0,75	92-0,75 = 750V	Co'Co' e	Electric engine	140 km/h	4080 kW	32,2 kW/t	Kanal-Tunnel-Lok/Stromschienenbetrieb
92-25	92-25 ~ 25kV, 50Hz	Co'Co' e	Electric engine	140 km/h	5100 kW	40,3 kW/t	Kanal-Tunnel-Lok
----- FS: Ferovie dello Stato, Italia -----							
ATR410	ATR410	Bo'Bo'+Bo'Bo' detr	Diesel-electric mul...	160 km/h	1060 kW	6,8 kW/t	Diesel-Pendolino
E412-1,5	E412-1,5 = 1,5 kV	Bo'Bo' e	Electric engine	200 km/h	2525 kW	28,7 kW/t	3-System-Lok
E412-15	E412-15 ~ 15kV, 16,7...	Bo'Bo' e	Electric engine	200 km/h	5150 kW	58,6 kW/t	3-System-Lok
E412-3	E412-3 = 3 kV	Bo'Bo' e	Electric engine	200 km/h	5600 kW	63,7 kW/t	3-System-Lok
ETR500	ETR500	Bo'Bo'+11x(2'2')+Bo'...	Electric muliple unit	300 km/h	8800 kW	14,5 kW/t	Werte nicht bestätigt keine Messwerte ...
----- GKB: Graz-Köflacher Eisenbahn GmbH -----							
2150.9	G1206BB-V	B'B' dh	Diesel-hydraulic e...	100 km/h	1500 kW	12,8 kW/t	Caterpillar 3512B DI-TA-SC
DH1500	DH1500	B'B' dh	Diesel-hydraulic e...	100 km/h	1120 kW	11,4 kW/t	Linzenz Henschel DHG1500
----- GNER: Great North Eastern Railway -----							
1x43	1x43	Bo'Bo' de	Diesel-electric en...	201 km/h	1680 kW	18,9 kW/t	1 Triebkopf
2x43	2x43	Bo'Bo'+Bo'Bo' de	Diesel-electric en...	201 km/h	3360 kW	18,9 kW/t	2 Triebköpfe
1x91	1x91	Bo'Bo' e	Electric engine	201 km/h	4800 kW	56,0 kW/t	1 Triebkopf
2x91	2x91	Bo'Bo'+Bo'Bo' e	Electric engine	201 km/h	9600 kW	56,0 kW/t	2 Triebköpfe

✓ Accept   ✗ Cancel   ? Help   🗑 No engine   ▼ Sort...   ☐ Show not usable engines   Licence for iRFP, Weber   iRFP / FBS 1993-2005

Engines, which you are not allowed to use by your license, are normally not shown. You can show them by clicking **Show not usable engines**. Here you can also use only the engines, which are known by the programme. Finish you choice by **Ok** button. If you want only a simple list to choose the engine, you can also click the cell and use **Ctrl+Enter** to select the engine.

A second engine used in your train has to be defined as a second train part.

No. of waggons/carriages
Number of waggons of type Apmz117:
5
Reservation/booking no.:
217   -- 221
✓ Ok   ✗ Cancel

If you double click in one of the cells **Speed**, **Load** or **Length** the coach and waggon arrangement window opens. The upper list shows all useable waggons and the lower list the waggons being used in your train part composition. After double click a waggon, a new window opens to fill in the **Number of waggons of type** and the **Reservation/booking no.**. By filling in the Reservation noumber of the first one the numbers are counted on until the used waggons are fulfilled. If you use the same type of waggon after each other and the numbers are not counted continousley, the waggons have to be listed one by one inside of the waggon list. These numbers can be copied into reservation systems ore something else.

You can copy the **current train composition** by click with the context menu to the clipboard. So the composition is added to the mouse menu and you can recall it by selecting in the context menu. This clipboard is not the WINDOWS®-clipboard. It is an iPLAN-own clipboard and exists as long as iPLAN is not closed. Train compositions can be copied to other iPLAN-files by this way. **Add all existing train compositions to the clipboard** means that every composition used in this file is copied into the clipboard. Delete current composition erases all waggons used for the current train.

It is not necessary to model all the existing waggons to get a better precision of run time calculation. You can replace waggons with the same length, mass and maximum speed like you want. The order is also not interesting. But please note that this data can have influence to other timetables made by this timetable.
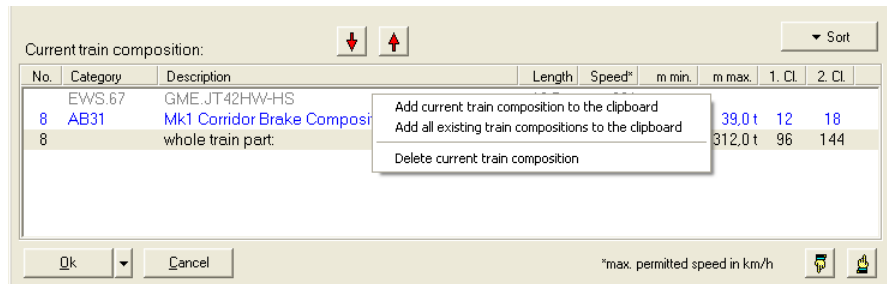
A freight train with unknown composition cannot be modelled exactly so that you can fill in the (maximum) mass, length and the maximum speed of it by using **Ctrl+Enter** at the cells for this data.

The maximum speed of the composition is the speed of the slowest waggon. The maximum speed of the engine is accounted by iPLAN. You only need to change the speed cell if you would like to run the train slower as he is allowed to.

The trainload is the mass of the loaded waggons so it is without engines mass. Train is length includes the engines. The programme calculates this values by it is self. You can change this data in **your own authority** to any value. Please note, that the run time calculation can result useless results because trains are to heavy and to short or to long and to easy. The relation of train length and mass should reach a good result. Please prefer the waggon lists.

The column "X" of the tab is marked if the train part is regarded in run time calculation. Attention: If separate train parts do not run on all operation days please select the composition of the train, which results the longest run time. Which combination results it you can get by help of the **diagram window** (as written below). So a separate train part can extend the run time because of it is mass or can shorten the run time because of its engine power.

If you press **Ok** or the **diagram window** the run time is calculated again if necessary.

3.3.10.4.2 Part "Technology and Extras"

A **linear time addition** should be used to balance the scattering because of bad weather or wet rails. The value should not be under 2 %, 3 % for regional trains and 6 % for long distance trains.

If you need a **load supplement** you can fill it in the next cell.

The run time calculation needs the Braking percentage (quotient by break mass and train mass of all vehicles in the train multiplied by 100) and the Braking switch. Both values are

determination the absolute breaking of the train. Typical braking percentages are between 80 % and 200 %. Avoid braking percentage below 50 % and above 225 %.

The real braking is influenced by the existence and the system of **Train protection**. iPLAN can differ between:

- **No** Train Protection: Trains start braking at a position, which is calculated by empirical formula, depending on current speed and speed at next speed change, gradients, braking percentage and braking switch.

- **ATP:** The train gets information to signals at discrete track points and has to break the way the train protection leads. The ATP-System is designed as PZB90 being used at German railways (Today this mode does not work.)

- **ATO1:** This mode is similar to the German LZB72/80. So the trains have to brake down in steps, which are defined in hardware with constant braking acceleration.

- **ATO2:** The braking acceleration is calculated as constant depending at the speed, which should be reached. The braking acceleration is calculated up to 0,78 m/s². This mode does not belong to a special technique and so it can be used international.

- **ATO3:** The current maximum speed is calculated by variable braking acceleration depending on the current speed. This mode is in discussion for future ATO-systems.

3.3.10.4.3 Part "Line reference lists"

The line reference lists determine the regular **stop times**, the **station tracks** (speed in the station) and the **maximum speeds** (along the line). The stop times and the station tracks can be changed in the timetable individual. The speed lists will be checked to the validity for this train configuration.

If you change at a station the station track list the station where you change will be run completely by the old list. Stop times are similar to this.

3.3.10.4.4 Further Settings

Normally all trains of a double track line running in one direction use the same track. If you would like to use the track of the other direction, activate the option **In this section at the track of the opposite direction**. This option can only be used, if there exist two tracks in the following section.

Train runs through a part of this section only means a train, which would start or end at a location that is not block post with loop. This is typical for attending private sidings or shunts over station limits. It is possible to use a track in the false direction. We know, that this operation type is a Germany speciality. FBS can only allow runs that do not start or end at a station this way.

The Information Train leaves the line after the section is only activated at the last section the train runs on this line. So that stop at the last station is calculated and a short line shows you that this train continues running at another line. **Train changes to this line** exists but hast to be set manually.

3.3.10.4.5 Train diagram

The train diagram is a graphic output of the calculation of run times as a speed profile. The colours of the lines mean:

- Blue line   shows the speed allowed by track

- Green line   speed at start of train

- Violet line   speed at the middle of train

- Red line   speed at end of train

It is of course trivial that the end of the train runs as fast as the start of the train. The diagram shows the influence of speed changes because they have to be passed by the whole train length.

Above the train speed diagram the run times of every section is shown. By switching between train data window and train diagram it is easy to show differences of different engines, mass or tab lists.

If you open the **train diagram** by the register **Overview** the complete run is shown. By opening it at a section register only the run in this section is shown.

If you have changed settings which have an important influence on the run time and you close the train data window a message appears and tells you, that the train lines in the graphic timetable do not agree with the run time. You are asked to search for now slots.

The context menu opened by right mouse button allows you to change the form and the outputs. So you can show tractive effort or theoretical output. So you can reach a run time calculation **protocol**, which shows you the separated acceleration-, run time- and brake process.

☝ If you wonder at the constant speed sections below the maximum speed you can explain them by the Minimum remaining period. This period can be changed at general timetable data (look at chapter 2.2.2.2, on page 13) to realities values of 5 to 10 seconds.

The **Export** button opens a dialogueue window to save the diagram as a bitmap or to save it into the clipboard to fill in a text.

If the train diagram and the protocol are shown at the same time (use the right mouse button at the train diagram > **Show protocol**) the protocol jumps to the position where the mouse pointer is clicked in the train diagram. A green line shows the position, which is selected at the protocol window.

3.3.10.4.6 Dynamics

The button **dynamics** leads you to helpful functions to calculate the effective gradient, the maximum load being used in this configuration and the minimum braking percentage. These functions have a relation to the current train data but you do not need to call them up. You might need the seldom.

The **maximum load** can be helpful to calculate the maximum load of a freight train. This function is helpful to rate engines and lines and not to configure the timetable construction.

Sometimes it is better to calculate the timetable by using the **minimum braking percentage** for a train because the real braking percentage is not known at the day of scheduling.

The **effective gradient** for a concrete train is a necessary condition to calculate the values written above. So it is only a step to the result, which is shown only for your information.

3.3.10.4.6.1   Function "Minimum braking percentage"

Please note, that the braking percentage for a train is normally higher than the minimum braking percentage. The minimum braking percentage should only be used if the train composition is unknown or highly varying. For passenger trains, multiple units, light engines and freight trains of fixed rolling stock the existing brake percentages are to be used.

For an assumption of existing brake percentages and brake switches the following guiding values can be used:

- Passenger trains and multiple units > 160 km/h: 225 % R+Mg

- Passenger trains and multiple units > 140 km/h: 165 % R+Mg

- Other modern multiple units: 150 % R+Mg

- Other passenger trains: 140 % R

- Light engines: 100 % P

- Freight trains > 100 km/h: 100 % P

- Freight trains <= 100 km/h: 80 % P

3.3.10.4.6.1.1 Register "Single calculation"
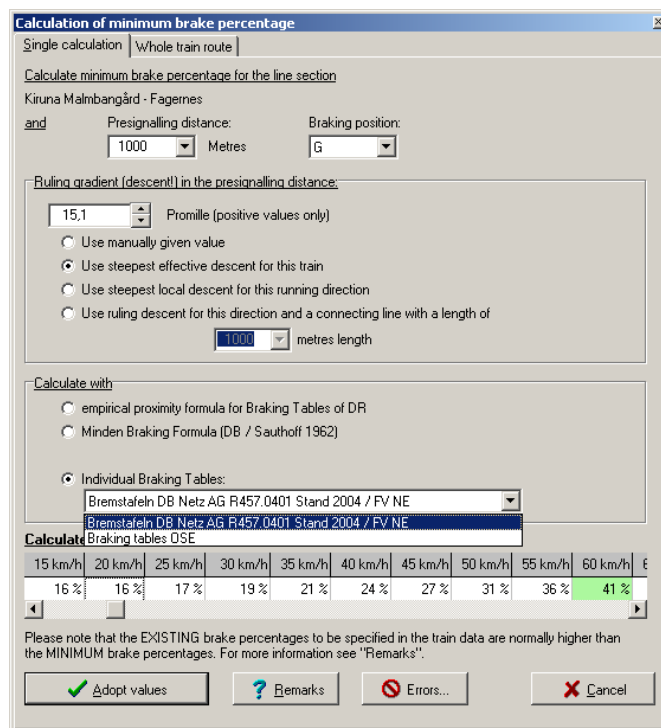
The minimum brake percentages $\lambda_{Min}(v_{Max}, i_M, s_{VA})$ tells the minimal necessary braking capacity to stop a train from its maximum permitted speed v_{Max} at the given **pre-signalling distance** s_{RVA} and the ruling gradient (descent) i_M with an emergency braking. The presignalling distance contains the braking phase but not the reaction phase.

Please note that several combinations consisting of presignalling distance, gradient (descent) and permitted speed are possible on one line. The most restrictive case is to be debugged.

The empirically calculated minimum brake percentage does not always correspond with the results of a brake percentage table, which is determined by experiment.

Part "Calculate With"

The **Minden Braking Formula** (Sauthoff 1961) defines the connection between braking percents, speed, gradient and braking distance for a completely emergency braking including a 10 % surcharge for a compressed air disc or block brake. It is only valid between 30 and 160 km/h (P, R, R+Mg) or between 10 and 90 km/h (G). If there are **Individual Braking Tables** available you can also select them for the calculation.

If the speed exceeds 160 km/h, in some countries automatic train operation with cab signalling is mandatory. In case disturbances occur, these trains have to be able to stop

within the usual pre-signalling distance (1000 - 1300 m) from 160 km/h. So you can calculate the minimum braking percentage for ATO1-system up to 160 km/h and in ATO2/3 it is limited by 225% braking percentages. If higher braking percentages are necessary new tables have to be defined.

3.3.10.4.6.1.2 Register "Whole train route"

This register includes a table of all sections which could be relevant for finding the minimum braking percentage.

from km (rel.)	to km (rel.)	from km (abs.)	to km (abs.)	Braking distance (m)	Speed (km/h)	Brake switch	Max. descent (prom.)	Max. eff. descent (prom.)	Min. braking perc. (%)
61,690	60,890	59,900	59,100	700	60	P	7,00	4,88	30
60,890	53,290	59,100	51,500	700	80	P	11,80	5,80	60
53,290	52,840	51,500	51,050	700	75	P	5,80	3,99	49
52,840	51,890	51,050	50,100	700	80	P	5,30	5,30	59

A new line is set by a change in the descent, braking distance or speed. The maximum is marked line in green background.

If you reach the table of the whole train route from outside the table a hint is shown to you including the line section to give you information of the position of this part of the line.

3.3.10.4.6.2   Function "Effective gradient and Maximum Load"

3.3.10.4.6.2.1 Register "Effective gradient"

The effective gradient considers the train as an inhomogeneous mass line. So it is only valid for the current composition at the current line section and for the running direction. It changes continuously by running along the line.

A long train will often involve some gradient changes. An inhomogeneous train related to his mass allocation – and this is normal – has to be differed whether the heaviest or easiest part of it is in the superior gradient. This is also true by more than two gradient changes and more than two train parts.

At a train part the mass of the engines and the waggons are shown as homogeneous related to the engine and the waggon part. The train parts are calculated in the row of the list shown in the train data window: At first normally the engine and than the waggons of every train part.

The minimum of the effective gradient (regularly it is the most effective descent for the train) is needed to calculate the minimum braking percentage.

The maximum of the effective gradient is needed to calculate the maximum load.

The register effective gradient includes a **diagram** that shows the local effective gradient and the gradient profile. By click
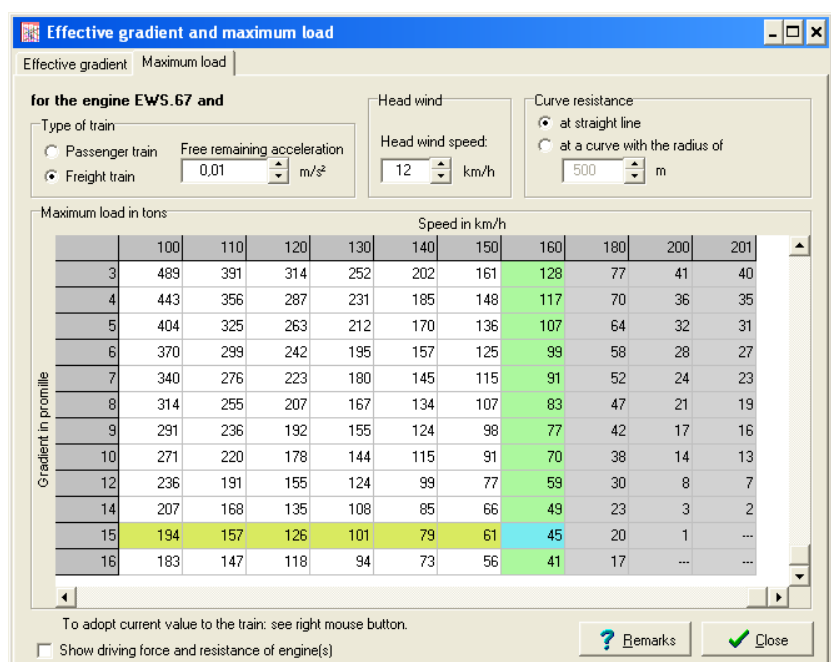
in the diagram the values of this position are shown.

The **table of the effective gradient** shows you all parts of the line in which the effective gradient exceeds a chosen limit. This table can help you to identify section in which a too heavy train should not be stopped. So you can decide whether the train can run because there is no reason to stop there are if he would be stopped he can roll back. The table shows only the maximum of the effective gradient inside one part of the line.

3.3.10.4.6.2.2 Register "Maximum Load"

The **maximum load** is the maximum load (mass of the waggons), which can be run safe with the engines along a line with a minimum speed. The value includes variable input data (weather, engine power) and to get a better operation.

There are different formulas used for **passenger and freight trains** waggon resistance (passenger trains: Sauthoff; freight trains: nach Strahl).

Free remaining acceleration (at maximum speed) is a kind of reserve. To accelerate in the maximum gradient it would take a long time to reach the maximum speed without any free remaining acceleration. Simplified you can say: as much higher the free remaining acceleration is as shorter are the acceleration phases. Typical values are 0,01 m/s² for freight and 0,02 m/s² for passenger trains.

The head wind hinders the acceleration so that you should use a **head wind speed** to calculate the acceleration. Normally 10 to 15 km/h are used for head wind speed.

Inside the maximum load table the colours tell you:

- **Grey columns** are the speeds, which are possible for the engine but not allowed at this line.

- The **green column** is the line maximum speed at the current route section (it can be lass than the maximum speed of the whole line).

- The **yellow line** shows the maximum effective gradient at the current route section (see below).

Please note, that the calculation of the effective gradient is done for the concrete train length. The maximum load can require a shorter length so that the effective gradient is different to it. So if the maximum load results another train length (especially a shorter one) repeat the maximum load calculation.

The column for speed = 0 shows the load which can be kept at their position at engines maximum power or the friction limit in the effective gradient. So the train is not able to accelerate. The start maximum load is the load by which the engine(s) is able to accelerate and leave the section by starting in the effective gradient. The lowest speed results by the maximum of:

- The lowest run speed of the engine (for example 20 km/h) and

- The lowest accepted speed to leave the section.

It is also possible (and is the custom at DB Netz AG) to calculate the **starting load** from the speed = 0 but with a relatively high free remaining acceleration. This acceleration then causes the train to move after all. In this case it is recommended to use 0.2 m/s² for passenger and 0.1 m/s² for freight trains.

If you would like to see the **driving force and resistance of engines** the symbols mean:

- F_T = sum of all driving forces at traction wheels perimeter of all engines

- F_{WFT} = sum of all resistance of engines.

3.3.10.5 *Label*

3.3.10.5.1 General information

The button **Label** opens a large window in which you can edit settings to data, which should be shown to a train line in the graphic timetable. So you can reduce the data for your timetable calculation and fulfil them to print the timetable. It is possible to do different settings to every route section. Please note the selection by the **Ok** button.

The Label window can only be opened at a route section register. If you leave the window by cancel button the labels are not changed. At the lower side of the window you find a preview window.

The register "General" at display settings depending on timetable sets the default values for the label (look at 3.2.12.2, page 51).

3.3.10.5.2 Parts "Colour of train line" and "Style of train line"

The easiest way to get the right colour and style of the train line is to select her by **type of train**. So the colour and style defined in the train type and headcode database is used. The advantage of this selection is the easy way to read the timetable. If for example passenger trains are painted red and freight trains black you can read a timetable easier.

If you choose **Select manually** a menu opens to select the colour and the line style. So it is possible to:

- To show the regular trains in one colour and trains outside the interval or additional trains in another colour,

- To mark trains which belong to another connection,

- Mark if multiple units are used as single or double (differed at route sections).

3.3.10.5.3 Parts "Display in graphic timetable" and "Train diagram remarks"

iPLAN shows you here the position of the left down corner of the label. The coordinates are shown in timetable form that means in kilometre and time. The angle related to time and kilometre is also shown. So you can move the label to every coordinate of the diagram.

A train diagram remark makes it possible to fill in free text as hints to read the timetable. These remarks are shown and printed and not covered like all other remarks.

3.3.10.5.4 Part "Display options"

During the timetable construction it is possible that train lines and labels are not parallel or close together. The options **Recalculate angle** and **Recalculate position** produce a better style of the timetable. The other options give you the possibility to add or erase arrival or departure times. So if you do not have much space at your diagram between trains you can reduce the shown times.

3.3.10.5.5 Part "Contents of label in graphic timetable"

Seven elements to for lettering the train line are useable here. These parts can be selected and deselected at the beginning of the line. You can use different **typefaces** for every letter. The button opens a Windows®-Window to edit the typeface. You can also position the lettering in six lines.

3.3.10.6 *Register "Others"*

The **Far distance route** of a train can be entered manually to show the complete run of the train. Start- and end station of the train do not need to be at current line. If it is too difficult for you to fill in the informations to every graphic timetable the informations in chapter Register "Trains on page 20 may help you.

Internal remarks are saved to every train but not printed.

Construction remarks, Train state and **Order date** help you at your daily work, especially the different requirements of Train Operating Company and Railway Infrastructure Company can be respected here.

The property **Train consist majority of coaching stock** sets the formula to calculate the run resistance if filled in only length and train mass. The train typesets this property automatically so that you only need to activate this manually if you do not use a standard train type.

If you mark **Train is parked** the train is not respected by slot search. All this trains get a grey train line and label. So the train needs not be moved away and later back to the time he should run. Other trains do not respect parked trains but respect all other trains at slot search.

The conflict check continues working, so that a conflict involving a parked train is shown by red warning sign. The parked trains are named in the conflict list too, also if they do not have any conflict.

For **dispo mode** look at chapter 3.5.4, page 78.

3.3.11   Copy train

This function copies the train. The new train has the same data as the original and so you will get a conflict automatically. To solve this problem you have to change train data. You can use other operation days or other departure times. This function is helpful to get a train with the same data.

3.3.12   Copy train in interval

This function is similar to copy a train but the trains created here are copied in an interval. The train numbers of these trains
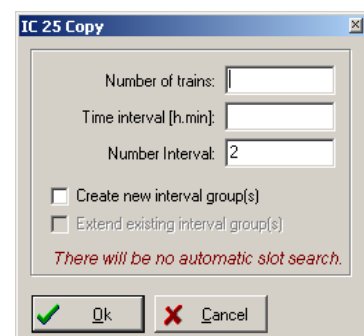
are counted in an interval too. The function can be opened by **Alt+T** or **Construction > Copy train in intervals…**

To use the function you have to fill in the number of copied trains, the interval time and the steps between the train numbers. The time interval has to be filled in in hour.minute or hour.minute,tenth like in all FBS programmes. The point between hour and minute can be kept away but the comma must be set if you would like to use tenth.

☝ A 90-min-interval is set by "1.30" or "130"!

For your later work you can group the interval trains. So you can select the option to extend an existing group or to build a new group. So you have two possibilities:

- **Create new interval groups** is marked automatically if you create more than one new train. This trains and the original train are grouped together.

- **Extend existing interval group(s)** can be marked if a train is copied which belongs right now to a group.

Please note, the copies are made without a slot search. The trains are simple copied in the interval distance and get another number. So you can get conflicts after using this function. The existing conflicts are shown to you by a sign and listed in the conflict list. You have three possible ways to solve the problems:

- You decide a higher priority for the trains in interval and move all disturbing trains away.

- In a single case a change in the interval time is allowed because it cannot be avoided. After creating the interval group you can move single trains without changing the whole group.

- It is ideal to move the complete group of trains to solve the conflicts. So you keep the idea of the interval timetable alive. iPLAN asks you to transfer the changing is to all the other trains in the group.

If you would like to create only a copy of the train use the function **Copy train** (look at chapter 3.3.11, page 69).

By copying the trains in interval all new created trains have the same properties as the original train and are related to him – so **interval groups** are build.

So the programme saves the information, which trains belong to an interval group because of the **Copy-in-intervals-function**.

If you later change properties of a train belonging to an interval group iPLAN asks you to transfer the functions to all trains in-group. If you click **Yes** it will be differed between:

- After changing data in the train data window all trains get exactly the same data as the train at which you changed the data. Only the train number and the train part number are kept. It similar to delete all trains copied before, changing the first one and copies them in interval again.

- During the timetable construction all other trains of the group get the arrival and departure times and the exactly route section. All other properties are not changed this way. So differences in the arrival and departure times in relation to the calculated times are possibly wrong. If such a difference exists a yellow sign pops up.

3.3.13 Park a train

A parked train is not respected by slot search and shown in grey. So you do not need to move the train away and later back.

Any other trains do not respect parked trains but they respect all other trains by slot search. All parked trains are named in the conflict list. So you get a warning sign if there is one or more train parked.

3.3.14 Delete train

This function deletes the current train. If the undo-function is activated you can recreate the train. There is also a question to make sure that you want to delete the train.

3.3.15 Show arrival and departure times

This menu point opens a window with a table of the run times of the train. This window can also be reached by mouse menu (look at 3.3.1.2, page 54).

If you marked a line and open the context menu you can handle occupation times of the current train. You can copy them or edit them manually. The data inside the clipboard will be erased, if the original train is deleted.

3.3.16 Slot search until...

The function Slot search until… allows you to move train times only at a part of the line at not until the end of the line or train. So you can choose slot search until Next token exchange place or the end of the train or line. This is helpful if you would like to move a train only between two stops and not at the complete line.

3.3.17 Enter departure time

This function allows you to enter the departure time at the station the current slot search starts. So you can avoid long movments of the train line. The programme uses the next possible slot to start trains run. That means you fill in the first time stap the train should start.

3.3.18 Enter stoppage time

You can change the stoppage time of the train in the station the slot search starts this way. The programme uses then the next possible slot to start trains run.

3.3.19 Cancel preview

ESC

The preview of the possible slot stopps and the slot search is aborted. The train uses the slot he used before you started slot search.

3.4 View Menu

3.4.1 Time

Ctrl+Enter

A window opens, in which you can fill in the start time to be shown. This way you change the first shown time on the graphic timetable.

3.4.2 Mouse buttons

This buttons have a defined function by a different design. To give you a view of the function you should imagine the graphic timetable as a wheel with an admeasurement of 24 hours. After that the timetable data repeats. You can turn this wheel by the two buttons on the left. The first one turns the wheel this way, that you move the time one hour back and the second one move the time one hour forward. The other buttons displace the wheel along the turning axis so that the shown line section is moved. So this buttons are only available, if the line resolution does not allow to show the whole length of the line on the given screen.

The design of the arrows turns 90 degrees, if you change the alignment of the graphic timetable. Just for your imagination you bowl down the wheel.

As you have defined in chapter 3.2.12.1 starting at page 50 your paper size is set. So the margins the title and the headlines are subtrahted so that the defined rectangle is fulfilled by the graphic timetable.

3.4.3 Length/Time resolution

The resolution of the "graphic timetable wheel" is set by the buttons. The left button changes the **Length resolution** and the other one the **Time resolution**. You find predefined scales there or can set a resolution by yourself. It is also possible to set the scale to show the **Line completly**. You can pull down the time resolution down but it is not possible to show more than 24 hours on one page.

Please note, that you change the shown part of the graphic timetable this way. If you would like to zoom in and out the shown data only you might use the functions explained in chapter 3.6 at page 78.
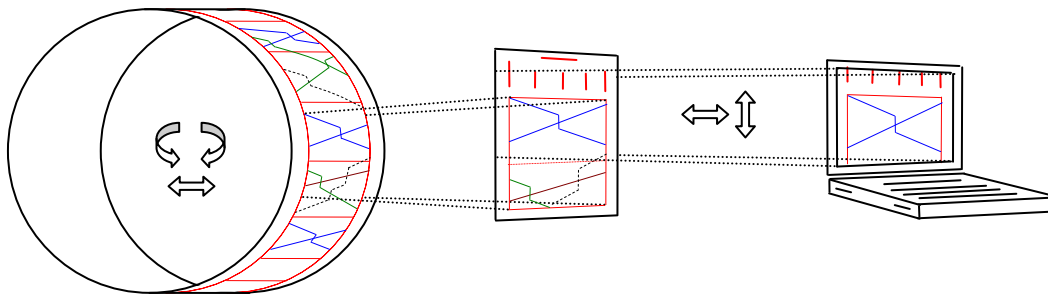
Turning and Moving of the "graphic timetable wheel"

(Setting the shown part on the paper by):

arrow buttons, mouse wheel

or Ctrl+Enter

Setting paper size and orientation:

(Edit display settings)

Moving the visible part of the paper on your screen:

, scroll bars

Zooming in/out of the shown part of the paper on your screen by:

100 %
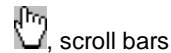
3.4.4 Weekdays

or **Alt+W**

Normally all trains are shown in graphic timetable. If it is too heavy you can reduce the trains by week or operation days. Here you can use the same principle to mark the operation days. Please note if you select "Mo" the trains operating at Monday and the trains operating on Public holiday are shown. The common day is the public holiday on a Monday. If you would fill in MoXS you will see only trains operating on Monday at not on public holidays.

If the timetable period is defined you can use the words today, tomorrow or the day after tomorrow to show the timetable for these days.

The symbol **Weekdays** is marked with a red tick if not all operation days are to be seen. This symbol shows you the limitation of operation days and helps you to search for trains, which are not seen.

If a period is defined the button **More…** leads you to a calendar window, where you can make detailed inputs. If you limit the operation days down to one day you can print a graphic timetable for a concrete day.

☞ *This function allows it to print blank control papers for you dispatchers or operators. It is also possible to print timetables differed by operation days for example for WXS and Sa and S. This may help you especially by the discussion of local train connections.*

3.4.5 Timetable head

Alt+K

This option shows you the head of the timetable, as it will be printed. Normally the head is not show to save space. So you can control settings made in infrastructure window and change them if needed. To come back to your timetable you can hide the head of the

timetable by another call up of **Alt+K**. If the head of timetable is shown, the tracks are also to be seen.

3.4.6 Line tracks

Alt+G

This item shows you the **Line tracks** and the symbols of the stations and locations on top of the abbreviations. This function is really helpful if single and double track sections change often. If you click this option again the tracks are hided again. If you use **Alt+K** one of the statuses shows you only line tracks too.

3.4.7 Station tracks

For your orientation which train uses which station track you can blend the station tracks. The track names are shown in square brackets behind the arrival and the departure times.

Please note that the stations tracks are not only important for the right speed but also for easy creating the correct station timetable. If you use the station tracks consequently you might have less work at small stations to create the station timetable.

3.4.8 Occupation times

or **Alt+Z**

The classic railway science knows blocking time stairs, which tell you line usage, train following distances and so the pass through and strength of your line. An iPLAN-user does not need to take care for this blocking time stairs. iPLAN makes it in the background.

Some user or in some cases it can be interesting to have a look at the line usage in a graphic. iPLAN is able to show you occupation time stairs by frames or filled with hatching. Occupation time stairs are simplified blocking time stairs because they include only the time a train needs to pass the section (including stops) and the pre- and past occupation times. A blocking time stair includes also the times at which the blocking of the section starts and is finished completely.

The formatting and the size of the occupation time stairs can be changed at the menu to be found by the right the occupation time mouse button. This menu allows it to show the stairs separate for every direction.

If you marked some trains and are interested only in their occupation time stairs you can choose this item at the menu.

3.4.9 Connection times

This button shows you the **Connection wait periods** (look at chapter 3.2.11 starting at page 49) inside of the graphic timetable. The function of these times is also only useable, if you can see them inside of the timetable. The departure of a selected train is blocked if you would like depart inside of the connection wait period. This function is only relevant for the train types you selected by configuring them. The train can start before the connection wait period starts or after that. This
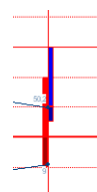
way you can easily take care for connections between trains or other traffic systems.

3.4.10   Time labelling

In some cases and depending on the status of the timetable you can change the accuracy of the shown times. It is possible to show the minutes and tenth, only half of the minute or full minutes. The function has no influence to the exactness of the calculation but it can bring you a better view on your timetable.

The additional information is related to the times can also be shown or hide here.

3.4.11   Slot conflicts

 or **Alt+C**

iPLAN does not allow any timetable, which includes train conflicts. As you have read there are situations in which conflicts can reach your timetable. For example by copying trains in intervals, so one of the copied trains can get in conflict to an existing train.

It would be possible to block all functions, which would cause conflicts. But this will not help you because you do not know why the function was blocked. That is why a conflict check runs in the background and shows you just after a few moments a red or yellow sign if a conflict exists. To stop spreading timetables including conflicts the sign is also shown on every print you would like to produce to hint to the conflict.

A list of conflicts tells you the train, the conflict type, the time and the Line section where the conflict is situated. So you can decide which way you would resolve the conflict.

To find the conflict in the graphic timetable you can do a double click and iPLAN jumps to the 10-minute-limit before the conflict.

3.4.12   List of train parts

This window lists all train parts related to their train number, the train route section and the vehicles defined for the train part. The list is sorted by the row of the train numbers.

3.4.13   Disposition

To use FBS as help for operators or dispatchers this mode is designed. The programme can be used this way as a control sheet.

Select the weekday by help of the menu item (as seen in chapter 3.4.4, page 73).

The nominal position in the train diagram of every day running this day is shown grey. If the first message reaches the operator he has to click the train and open the mouse menu. By selecting item **operate train** the train is set in operation and gets the original colour. To be reminded to the operating train it gets the operation day hint "actual". You can edit the train in all data. Normally you will only move the departure time at some stations. The conflict search is also active in this mode but only active trains are checked. So the operator is able to make previews to handle overhauls or train crossings. He is also able to see the effects of using a reserve engine (by different series).

At the end you get a complete control sheet at which you can see the differences between the nominal run and the real run and can evaluate them.

Please note the following hints to this mode:

- To fill in a new train you can use the function add a new train. The operation day has to be set as "actual"!

- The actual trains are added additionally to the nominal trains. The sum of all trains in a timetable data is not allowed to raise 255 trains.

- The actual trains are saved in common in the complete timetable file. You should make a copy for the actual date of the original file before the first train starts and work with this copy. So the original file can be used as model and the working file for the can be saved eventually.

3.5 Analysis Menu

3.5.1 Train data sheet

 or **Alt+X**

This window shows you details to a selected train. You can see the arrival and departure times, the used station tracks and other remarks.

Behind the button **Display** you can select the shown data. You even get a view to Critical buffer times, if there exist buffer times below the limit you set there. The minimum buffer time can be limited between 0,5 and 5 minutes. In the case of existing critical buffer times they are shown in common with the critical train and the section in which the problem is to be found.

The train data sheet has got a second page at which you can find only the arrival and departure times of all stations and locations and if marked a train diagram and the parameters to get it and the results of energy consumption.

The button **Remarks** opens a text window in which you can fill in free text to give another user hints to this train. It is thought as an electronic notice sheet and is saved in the timetable file.

You can define a **Period** in a special window for statistic calculations. You can differ between a **special period** and a **statistic period**. The special period is only useable inside the timetable period, because it needs the concrete definition of public holidays and the sum of every weekday. The statistic period is used to get an independent model to compare timetables. Further details you can read at chapter 3.5.2, page 77.

To get the best details for your **statistic** you can select some options here.

3.5.2 Statistics-table

At first to typical examples to use the statistic functions:

- Calculation of parameters of your timetable to do further calculations or comparisons. To calculate mileage depending costs you have to count all miles which trains run in the timetable.

- For later analysis of the real operation statistic data is need from the timetable.

Many parameters to build trains mean that the figures for a train depend on the mileage and/or to the operation days.

Period At first you should define the period, which would be evaluated. So time related data is ever relative to the current chosen period. So year does not mean in every case year, it can be a **special period** or a **statistic period**.

The special period can be the **period of the timetable** or a part of the timetable period.

The **statistic year** is a method to calculate data independent from the current year. You would better avoid this method but sometimes it is ordered by an organisation. To get more informations to this method have a look at Annex – Statistic Data.
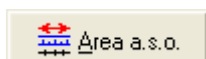
Area a.s.o. All listed data can be differed to the whole line or to the zones defined in **Infrastructure data > Zones**. Both options are identical if there are no zones defined. The evaluation can be also made for 1st class or 2nd class and all the other options to be seen there.

This column can sort all lists with a little arrow inside. Just click at it to change the sorting direction. Please note that the lists are sorted alphanumeric and not by the numbers.

You can export the tables in the clipboard or in files as text or as a Rich-Text-Formatting. The file type can be chosen in the save as window.

3.5.3 Energy-Time-Spreading

This function is created to analyse the energy consumption in different periods. The window consists of two parts. The first part sets the periods and the second part lists all the trains inside of the graphic timetable. As default the period runs from 0.00 to 0.00. You can add your own periods by adding new limits using the [+] button. Fill in the new limitation time by the known hh.min,s format. If you marked a period and press the [–] button and a confirmation asks you to delete the end of the current limit. The periods are saved for the session and can be used in other opened fpl-files too.

The **Refresh** button reloads the data of the trains to the defined periods. At the end you can see the list of trains including the **head code**, the **total run time**, the **energy consumption per run** and the **spreading to the periods**. The shown value can be changed by the context menu inside of the list. You can differ between **energy spreading in percent** (default), **time spreading in percent**, **absolute energy spreading** or **absolute time spreading**.

The button **Weekdays** allows you to cut down the days included in the calculation. The known from window from chapter 3.4.4 at page 73 is shown in which you can use the checkboxes or the text field on the bottom to fill in your limitation.

The whole list can be copied into clipboard and used in other programmes.

3.5.4 Evaluation

This function is not completely redesigned to respect the new functions like rout sections, different operation days of train parts and so on. So you cannot use this function until the redesign is finished. We apologize for any inconvenience.

3.6 Moving inside of the graphic timetable

3.6.1 Zoom in/out

In large graphic timetables it might be helpful to zoom into special parts, to control data or to see more details for conflict handling. This can be done in two ways:

- You can zoom in positioning the mouse pointer at one of the corners of the zoom area. Press the **Alt** button and move the mouse to the other edge of the zoom window. The margins are shown on the screen to control the size of the window. After leaving the **Alt** button the window is frozen on your screen. A **click** inside of the window zooms in and a click outside of the window erases the window.

- You can change the zoom factor by typing a new zoom factor and pressing **Enter** independent from the choosen mouse button in the toolbar. There are also predefined relative functions available (Page width, Page height, Whole page) or often used absolute zoom factors, which can be called up by a list.

- The 🔍 🔍 (**+/- button at the keypad**) buttons increase or decrease the zoom factor by 50% at every click.

- You can skip between the current and the last zoom factor by **F12**.

By useing this functions you change the connection between the defined paper and the shown contents on your screen as to be seen in the known graphic.

Turning and Moving of the "graphic timetable wheel"	Setting paper size and orientation:	Moving the visible part of the paper on your screen:
(Setting the shown part on the paper by):		🖐, scroll bars
		Zooming in/out of the shown part of the paper on your screen by:
arrow buttons, page up/down, mouse wheel or Ctrl+Enter	(Edit display settings)	Alt+Mouse, Ctrl+mouse wheel

3.6.2 Moving the current position

You can move easily inside of the graphic timetable. There are two functions available to change the current position, which is shown to you without changing the settings for the shown data on the paper:

- Move the mouse during you click inside of the graphic timetable.

- You can also use the vertical and horizontal scrollbars. If necessary you might activate them in **Options** menu.

3.7 Further information

If you want to change data of a train please do it in a graphic timetable which includes the whole train run (in your network). Otherwise you might have mixed data during trains runway. This might bring you a lot of trouble at later steps in your work.

To get a graphic timetable for whole train run you can click a train in an open graphic timetable and use the context menu. If you find the item **Show graphic timetable of that train** you do not see the whole train in the current graphic timetable. The further steps are explained at 3.1 at page 27 step 4.

4 Driver's timetables

4.1 Create a Driver's timetable

[icon] Or **Network > New Driver's timetable...**

If you have set a standard format for the Driver's timetable you will reach at first the window to select the train, which should be filled into the timetable. If you have not selected a standard format a window opens in which you have to choose the format you would like to have for this Driver's timetable.

You can select one or more trains to create their Driver's timetables. On the bottom of the window you can choose between the **whole train's route** or **a section of train's route only**. By pressing the **Ok**-button there will open another window in which you can mark the part of the route, which should be printed in the Driver's timetable. The timetable includes all informations, which are relevant between the first and the last marked stations. This window does not appear, if the whole route should be respected.

After that the object Driver's timetable will be created. If you marked more than one train and you would like to create driver's timetables only for a section of train's route, you will be asked for the first and the last station, which should be included to the next train's timetable.

The data is taken from the whole route known by this iPLAN-file. If all relevant data is handeld carefully in the iPLAN-files you will have no or less work to get the complete driver's timetable. If you miss data in the driver's timetable please correct them in the graphic timetable and not manuall at the driver's timetable. If these changes are related to some trains it is faster than the manuall changing in some objects. By doing this changes manually you will have to change this data in all driver's timetables. These changes are also lost if you use the **Update** button.

After loading the new driver's timetable you will see the result of all collected data, which includes in every case:

- Train number and head code in the headline,
- the start and end terminal of the run inside the defined network,
- as known in graphic timetable the remarks and special operting days of the train,
- engines series, maximum speed, load and minimum braking percentage (if this data differes in different sections the data from the first section along the run is shown),
- stations and locations at which the train passes including the arrival and departure time or the pass through time rounded to a complete minute,

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- absolute mileage of the stations and locations, maximum speed on the line and speed changes between the stations and locatons; the speeds are taken from the graphic timetable file, which is set for this train,

- entries for train crossings and overtakings, if it can be taken exactly from the timetable file,

- entries for trains which have to stopp in front of home signal boards, if the other train arrives earlier or later than the current,

- number of track inside the station, if it is selected in the station track useage at the timetable file,

- abbreviations of train messages, which have to be send if they have been set in the timetable file.

As you can see in this list, it is less work to do if you manage your graphic timetables carefully.

All following explanations are related to the **Standard design** of driver's timetable. If you use your own design, some contents can be positioned at different places or can be filled in additionally or kept away. The standard design shows the following **stations and locations**:

- all train order change places (also by status: out of use, under planning, abandoned/withdrawn),

- all block signals, but not block posts,

- all access places,

- all stopps,

- political borders (it might be also a border of railway infrastructure company).

A change in the line classification is not shown, also not, if the owner (railway infrastructure company) changes. If you would like to show this data set a location **Country border** in the graphic timetable. This is also helpful to mark other control centres to be called in case of emergencies or something else. Cab radio zones are also shown and are independent to the country borders.

4.2 Customized driver's timetables designs

The Standard design includes nearly all possible function in relation to driver's timetables. It is the only one, which is translated and this is also available in englisch, german, french and if required in other languages.

All other designs are created by customers' guidelines. So they are not generally accepted and so not translated. New designed driver's timetables are also delivered to other customers, which use the same language to be able to create nonstop driver's timetables. The deliviering to other customers can be blocked, if you tell us. Changes to existing driver's timetables, which are not made for you, are not allowed.

If you need your own design call the service to define your design.

4.3 Driver's timetable menu

4.3.1 Sychronisation with graphic timetables ...
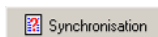
This function can only be used inside the Driver's timetable window.

If you have changed data inside your timetable files the data of all objects in the networks, which link to this file have to be checked. To do this as fast and as easy as possible you can use this function.
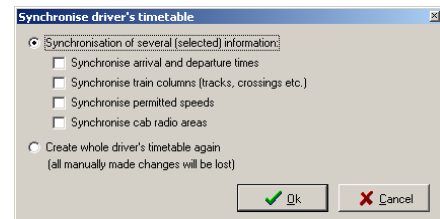
A dialogue window opens. Here you can choose options for data, which should be synchronised. So you can select only special data like arrival and departure times or cab radio areas or set to **Create whole driver's timetable again**. This option delets the current data and builds a complete new driver's timetable with the current design. All manuall changes you made until now will be lost!

4.3.2 Calculation of minimum braking percentage...

The iPLAN programme collects all relevant data along the whole run of the train and calculates the minimum braking percentage. So you will get a window with a table inside, which includes all data for calculation. At the end you can adopt the result to fill it automatically into the driver's timetable or cancel the calculation.

By reaching the table from outside of the table a hint is shown to you, which contents the next stations to give you information of the line section in which this part is positioned.

4.3.3 Calculation of required parking brake capacity...

This function is used to calculate the arrows along the driver's timetable. The iPLAN programme collects all relevant data along the whole run of the train and calculates the required parking brake capacity to be shown as no, one or more arrows. So you will get a window with a table inside, which includes all data for calculation. At the end you can adopt the result to fill it automatically into the driver's timetable or cancel the calculation.

By reaching the table from outside of the table a hint is shown to you, which contents the next stations to give you information of the line section in which this part is positioned.

4.3.4 Graphic export
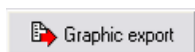
The created driver's timetable can be saved as a graphic file. By clicking this item a new window opens in which you can choose the settings for the graphic.
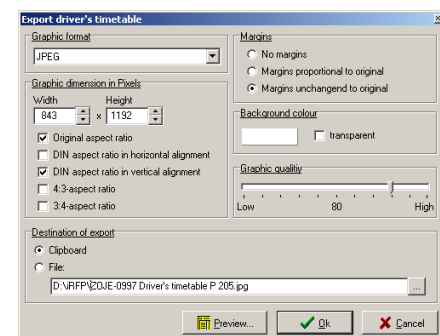
Only the current page will be saved as a graphic file. So you have to repeat this function for every page you would like to have as a graphic file.

4.3.4.1 *Part Graphic format*

You can choose between three available formats:

- Win32 Enhanced Metafile,

- Bitmap or

- JPEG.

4.3.4.2   *Part Graphic dimension in Pixels*

The dimension can be set in pixels for **Width** and **Height**. Some options are available to get a pleasant look of the driver's timetable.

4.3.4.3   *Part "Margins"*

The margins can be kept away from the graphic file or can be used **proportional to original** or **unchanged to original**.

4.3.4.4   *Part "Background colour"*

The background colour can be changed by your requirements by clicking the coloured box. You can select the new background colour by a Windows®-colour change window. For some useages it might be helpful if the background would be **transparent**, so you can also this "colour".

4.3.4.5   *Part "Destination of export"*

The graphic can be copied to the clipboard to be inserted into other programmes or can be saved as file at the position you selected.

4.3.4.6   *Part "Graphic qualitiy"*

If you would like to save the graphic as a *.jpeg, you can also set the qualitiy of the file.

4.3.4.7   *Preview*

The preview button opens another part of the graphic export window. So you can see the result of your settings and can correct them on the right of the window by the functions to be seen there.
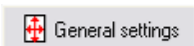
4.3.5 Print

 or or **Ctrl+P**

The known FBS-print-dialogue opens. So it is not explained here again.

4.4 Edit Menu

4.4.1 General settings

4.4.1.1   *Part "Paper alignment"*

The papaer aliment allows you to set the size, which is usable for the driver's timetable. As default DIN A5 in vertical direction is used. You can also use individual sizes.

4.4.1.2   *Part "Margins"*

To have a margin at every side of the paper you can set here the size of them.

4.4.1.3   *Part "Layout"*

At first you can see here the **Format** of the Driver's timetable. You can change the format here, but please take care, that the programme wants to create a new driver's timetable if the contents are diffrent. So all manual changes get lost. This function is only helpful if you did not do any manual changes or for a check of other formats.

The **Number of first page** can be set here to include the whole Driver's timetable into an existing or new Driver's timetables book.

As usual in all FBS-timetables you can change here the **Rounding rule for arrival-/ departure time**. We advise you to round of all times, so that the driver will not get the feeling of beeing to fast. This can happen, if you select round mathematically and the train should pass regularly at min x,5.
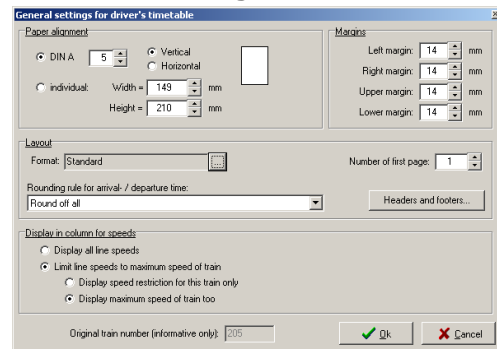
Some information should be written in the **Head- & footlines** at every page of this Driver's timetable. So the button calls up a shortcut to the Head- & footlines window. Further information to handle them you can find at chapter Edit Menu>Head- & Footlines on page 88.

4.4.1.4 *Part "Display in column for speeds"*

The handling of speed restrictions along the run of the train is handled different from operator to operator. So you can **display all line speeds** independent from the maximum speed of the train. To avoid misunderstandings it is better to **Limit line speeds to maximum speed of train** so that there is no speed to be seen, which is higher than the maximum speed of the train. If you choose this option, you can **display speed restrictions for this train only** so some speed restrictions are not to bee seen, because the train is not allowed to run so fast. It is also possible to **display the maximum speed of the train** in these situations, so the driver can control the maximum speed for his train by the Driver's timetable. This is the way to get the highest safety into the system of speeds so it is default for the standard format.

For you information you can see the **Original train number** on the bottom of the window.

4.4.2 Edit contents

[Edit contents] or **Ctrl+Enter**

4.4.2.1 *Preliminary note – to be read absolute*

You can change every Driver's timetable by yourself. In an extreme case you can create a complete new Driver's timetable, which has nothing in common with data at the timetable files. This function is not made for that purpose.

In every case you have to check before printing Driver's timetables the following data manual:

- Checking of Minimum braking percentage and the Braking switch. If you did not calculate the graphic timetable by minimum
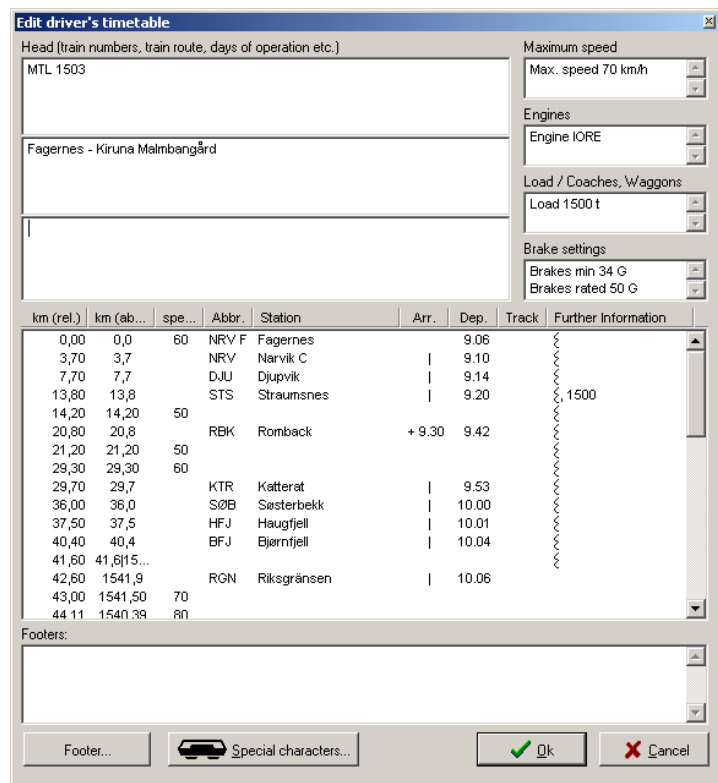
braking percentage, fill in the minimum braking percentage and add the related Braking switch. iPLAN uses only blanket data.

- Check the mileage of every speed restriction (speed change) along the whole run.

- Check and complete the data in the column **train messages** (if it exists). The automated entries cannot be used unmodified in every case.

- If there are more train crossings to be done in a station or other longer entries exist, it can happen, that this text is placed in the height of another station. For a better overview you should fill in blank lines to get some free space.

- To detect a train crossing, there exist three ways. Also so called "half crossings" are included:

- "real (normal) train crossing": Inside the graphic timetable at a single track line a train running in the other direction arrives before the own arrival and starts after the own departure,

- "half crossing departing": Inside a single track line section another train, ending at this station arrives inside 20 minutes before the own arrival,

- "half crossing incoming": Inside the graphic timetable at a single-track route section another train starts in 20 minutes after the own arrival.

- To detect overtaking, there exist two possibilities. In this case only "real" overtaking can be detected:

- Overtaking another train: another train running in the same direction arrives earlier and leaves after the own arrival,

- To be overtaken by another train: Another train running in the same direction arrives later and leaves before the own departure.

- It goes without saying, that not all detected cases are correct and make sense. So reoperation should be done. The programme does not know, whether there is a signalman at the station or not and if the entries in the column Crossing with/Overtaking are necessary. Read the following parts how to edit the entries of train crossings and overtaking.

It has to be annotated here, that the authors of the programme exclude liability for situations, which are caused by wrong or questionable data in the Driver's timetable. The automatic created Driver's timetables cannot be used possibly without a review! Printing of Driver's timetables without postprocessing is an incorrect use of the programme. The Railway Infrastructure Company has the complete liability for the correctness of Driver's timetables. Last but not least you are able to edit every information manual.

If you have problems or questions by producing the correct topic, please call service. We try to help you by hints or programming.

It is helpful to wait for editing Driver's timetables until you need them, especially if you know, that the graphic timetables might be changed. By a synchronisation your manual changes can get lost, so that you have to fill them in again. We cannot give you a guaranty that all your changes are kept alive.

4.4.2.2 *Editing Head*

The head includes the train type, the train number and the operation days of the train, if he does not operate every day. The typeface of these lines is fixed by the design of the Driver's timetable and cannot be changed.

The next line is reserved for trains' route so it includes the start and the end terminal of the train.

The next line includes hints for example for the period of this Driver's timetable. The programme does not fill this line and so it can be used for other hints to the driver.

4.4.2.3 *Further information in the head of the Driver's timetable*

The small printed lines in the head o the Driver's timetable show information, which have been the basement for the calculation and so for the usage of this paper. The driver can check the data of the current train and the content of the Driver's timetable to make conclusions about the truth of the content. For example if a freight train has not the load by which he was calculated he might be faster and so he can accelerate slower as normal.

So you have four boxes to fill in this information. The boxes are titled to find the information in every Driver's timetable at the same position. So a Driver's timetable includes information about the **Maximum speed** of the train composition, the **(working) engines**, the **Load or Coaches and Waggons** and the **Brake settings**.

4.4.2.4 *Editing a Driver's timetable line*

Double click a line or **Context menu > Edit line**
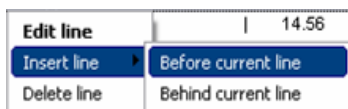
A relative mileage related to the start of the Driver's timetable sorts the lines inside the Driver's timetable. This mileage is only important for sorting and so it is not shown. So it is also not interesting if this data is correct.

If you fill in new lines manually, you can use every mileage between the existing lines. Only the absolute mileage is shown, if the entry exists.

The usage of every field in the Edit line of driver's timetable window depends on the format you have chosen. Only less formats use all entries. Especially the fields for **Crossing with train** and **Overtaken by** or **from** are used seldom.

In Germany **Wavy lines** are used to show the driver how many hand brakes have to be used to keep the waggons in the current gradient. So the locomotive is not calculated, to be able to keep the waggons alone and use the engine for other jobs. This data is only used in exceptional circumstances – so very seldom. If you want to use this information to, you can change the number of **Wavy lines** in this window too. The wavy lines do not have their own start or end line. They start with the last line being shown end finish with the next line of driver's timetable. The system in Germany is calculated by an effective gradient of 50 m is higher than 10 % and continues for more than 50 metres. If the gradient is higher than 20 % two wavy lines are used and so on.

The field **Maximum speed of train from here** and **Maximum line speed from here** can be empty, if the values do not change here. If this values change here, you have to fill in both speeds, that iPLAN is able to differ, which speed is relevant for the train. The maximum speed of the train can change along the run by adding or leaving waggons or for run time calculation reasons.

Train crossings and **Overtaking** are detected and filled in automatically as written above. Train crossings and Overtaking in stations, in which one of the train changes the graphic timetable are only detected and filled in correct, if the arrival and departure time of both trains are to be found in one graphic timetable.

The row of entering a station is filled in standard format only, if the station has the property **Without home signals** (look at **3.2.10.4** at page 39).

The column **Reports** includes all **Train messages, which** are found in the graphic timetables. To find out who has to send this message, iPLAN looks in to the track data to find out, if the station is unstaffed so that the message has to be sent by train's crew. So the guard is shown, otherwise signm. (signal man) is set to explain, that this message is send by the staff of the station.

An empty line in a Driver's timetable can be made by the function **Insert line** before or above the current line. Fill in some space characters, so that the programme does not ignore the line. A line without any content would not be shown, because of no information in the line.

The context menu allows you also to delete a line, if you are sure, that this line is not needed. This way of erasing a line has the disadvantage, that this line will be detected as a change by synchronisation the Driver's timetable to the graphic timetables. It can be blocked by clicking the box **Hide this line**.

The edit window allows you to set a **Page break after this line**.

4.4.2.5 *Special characters...*

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Driver's timetables use normally an FBS-own font, to be able to show all rail specific special characters. Special characters can be used in every input field to show special information. To insert a special character click move the cursor to the position of the special character and use the button **Special characters**. The programme knows the last used characters and the last shown group of characters.
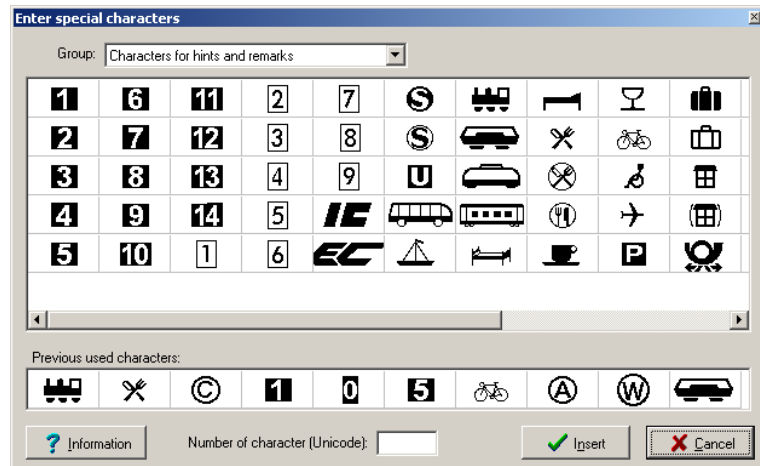
There exist several groups of signs. If you cannot find the symbol you are interested in, you can call the service to help you.

4.4.2.6 *Footers*

Sometimes it is necessary to explain an entry by more details. So you can use footers to give more information to all data outside the table. Move the cursor to the position of the footer and press the **Footer**-button.

At first choose Footer's **character** out of the list and then fill in the **Footer's text**. You can also use here **Special characters**, if you want.

By using the context menu inside the part footers of the edit driver's timetable window you can select the positioning of the footers at the **First page**, **last page** or **all pages**.
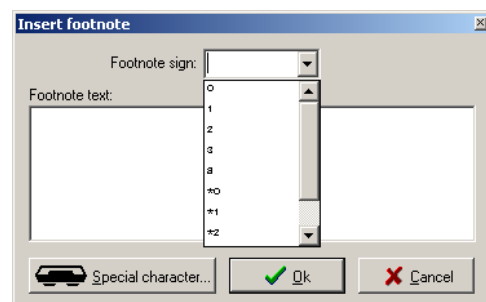
4.4.3 Head- & Footlines
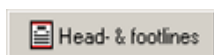
Head- and footlines are written in the margin always. Headlines run from the margin line up, footlines down. An optional parting line is drawn exactly on the margin line.

The head- and footlines are shown on every page, which is created inside the object.
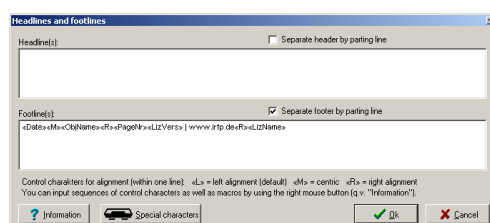
Alignment of headlines and footlines text can be managed by sequences of control characters. Text is aligned as default (i. e. without any input) to the left. You can realize a centric or right-justified alignment by use of control characters <M> and <R>. The alignment concerns text, which follows a sequence of control characters up to the next sequence of control characters or up to the end of line.

You can input sequences of control characters as well as following macros by using the **right mouse button**.

Available macros are:

«PageNr»   = current page number

«FirstDate»   = first day of timetable period*

«LastDate»   = last day of timetable period*

«Date»   = current date

«Time»   = current time

«ObjDate»   = date of previous modification of object

«ObjTime»   = time of previous modification of object

«FileDate»   = previous date of saving *.ntz-file

«FileTime»   = previous time of saving *.ntz-file

«ObjName»   = name of object

«NetzName»   = name of iPLAN-network

«FileName»   = *.ntz-filename without path

«FileNameAndPath»   = *.ntz-filename with path

«FilePath»   = path of *.ntz-file

«LizName»   = name of FBS-license

«SerNr»   = serial number of FBS-license

«LizVers»   = version of FBS-license

«CurrentUser»   = current user of windows login

«LogoXxxxxx»   = logo picture-file (see below)

«EditUser»   = username of previous modification of the object

* First and last day of timetable period can be displayed only, if the periods of all involved timetables are defined and equal.

Within the keywords of macros there is case sensitivity. Date and time indication use preset formats from system control.

In order to display the logo, which is declared at options / configuration / operator-logo, following format can be given:

«LogoLxxxxx»   = logo aligned at left margin

«LogoMxxxxx»   = logo aligned at centre of page

«LogoRxxxxx»   = logo aligned at right margin

If the logo is aligned centric, eventually also centric aligned text is displayed above the logo.

There has to follow either a two digit declaration of height (in mm) or two digit declarations in the specified manner <width>x<height> (e.g. 11x22) after the keyword. If the height is declared only, the width will be calculated proportionally to the height analogical to the logo's original ratio of dimensions. If both dimensions are declared, they have to be separated by x. Valid declarations are e. g.:

«LogoR10»   = logo aligned right, 10 mm high, width proportional

«LogoL08x15»   = logo aligned left, dimensions 8 x 15 mm.

You can also use **Special characters** inside the Head- and footlines.

The context menu gives you also the possibility to change the **Type size** for headlines and footlines texts. Please position the cursor before you choose this function to the beginning of the fields.

For a better view you can set the **Distance to page margin …** by context menu.
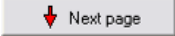
4.5 View Menu

4.5.1 Zoom in/out

 or **+ (at keypad)** as the case may be or **– (at keypad)**

For a better control of the readability of the driver's timetable you can zoom in and out. You can also use the list on the right of the window to use specific values of zooming. If you would like to have a zoom size, which is not included in the list, you can also fill in a value manually.

4.5.2 Previous/Next page

 or **Page up** as the case may be or **Page down**

This function is needed to move between the different pages of one driver's timetable. You can only see one page a time. So do not forget to check all pages before printing these drivers's timetable.

4.5.3 Display margins

To control the position of the margins you can show or hide them. This might be helpful if you use headlines and footlines.

4.5.4 Display legend

If you are interested in displaying the headlines of the columns of the driver's timetable. You can differ between three options:

- **off**,
- **at first page** only,
- **at all pages**.

4.6 Functions fore some Driver's timetables
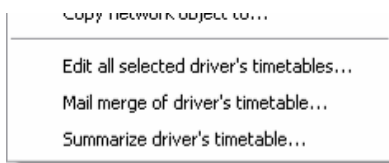
All this functions are only available by the context menu in the objects parts. The details about this menu items are written here because it might be easier to understand this functions if you know at first how to handle driver's timetables.

For all the function you have to select at first the driver's timetables, which you would like to use for the function.

4.6.1 Edit all selected Driver's timetables

This function allows you to exchange data inside of the selected driver's timetables. So you can **Add or replace text** in all fields with the title you can choose by a list. You can select four possibilities to fill in the new **text into new lines before**, or **behind** or **into last existing line** or **Search and replace an existing text**. You can also **delete all existing text and replace with the following text** as written in the field.

You can also **Add or replace a complete line** as found by the **km**, **abbreviation of a station** or **station name**. After choosing the search criteria you can select the function, which should be done there to **Insert a new line at the given place**, **Insert a new line behind the given existing line** or **Replace an existing line by the new one**, which can be defined behind the button **Contents of the new line…**.

After **Ok** the programme does all the choosen activities. This way you can edit driver's timetables quickly.
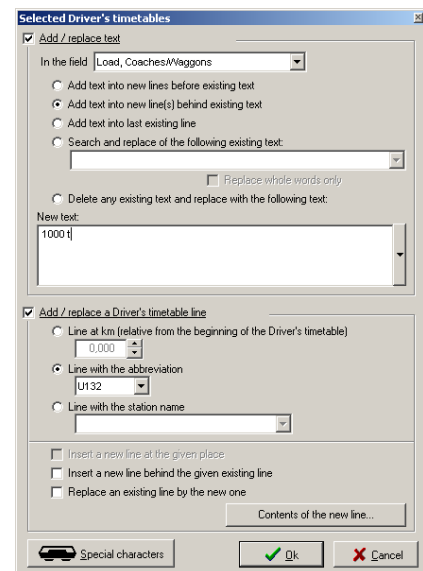
4.6.2 Mail merge of driver' timetables
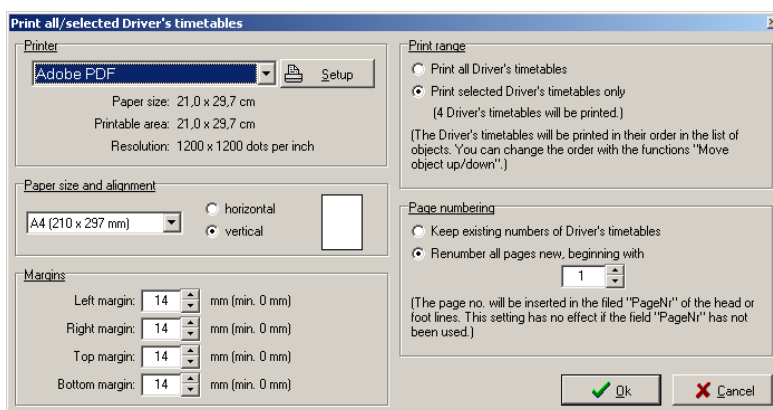
4.6.2.1   *Part "Printer"*

You can choose here the printer you would like to use for printing the driver's timetables.

Your computer and printer set all the functions here. The items here are normal windows style.

4.6.2.2   *Part "Paper size and alignment"*

Here you can change the direction of the printed-paper.

4.6.2.3   *Part "Margins"*

You can set here the current margins for printing. These margins can differ to default values of margins. The changes here have no influence to the default values.

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4.6.2.4   *Part "Print range"*

The range of the printed driver's timetable can be set to **all Driver's timetables** or the **selected Driver's timetables only**. In brackets you can see the number of the selected driver's timetables. The Driver's timetables will be printed in their order in the list of objects. You can change the order with the functions "Move object up/down".

4.6.2.5   *Part "Page numbering"*

To **Keep existing numbers of Driver's timetables** you can select this option. For a better handling you can **Renumber all pages new, beginning with** a page number selected by you. This way is only useable, if you used the field «PageNr» in your Driver's timetables. Otherwise iPLAN is not able to print the new page numbers.

4.6.3 Summarize driver's timetable

Normally most or all Driver's timetables are summarized in a loose-leaf. To create a table of contents, there exists the function **Summarize Driver's timetable** in the context menu of a Driver's timetable. The following window is designed to configure the table of contents of the "book". If you have selected the information you would like to have there, you will reach the print preview. Here you can change typeface and other formats of the text. These settings cannot be saved, because at the next call, you might use other settings.

5 <u>Customer's timetable</u>

5.1 *Preliminary note*

5.1.1 General

Customer's timetables can be created in FBS along any lines, line combinations or line sections, which are summarized in one network. The following comments understand a Customer's timetable as a schedule for one relation. This relation can include branches separated by direction of travel. A Customer's timetable can consist of some tables depending on the size of paper and the number of trains. In general you need to create two independent schedules – one for each direction.

Customer's timetables are saved as a object inside the *.ntz-file.

5.1.2 Hints to times published in schedules

In opposition to timetables used inside the railway system (graphic or driver's timetable, …) customer's timetables are mostly published. The tenth of a minute are not shown there to keep the overview to the large table of times. It is not attractive to round the tenth in mathematical way, because a rounding up means, that the train departures earlier es published to the customers. So nearly all customers' timetables show you rounded down times. It would be possible to use the worst case rounding up for arrival times but this can result negative stoppage times in the customer's timetable.

The rounding down system has the effect the times between the arrival of the own train and the departure of the connecting train seems to be longer as it is.

The whole probleme "published times in schedules" is old, but canot be disregarded. Today it is solved by the timetable construction to use departure times at complete minutes or shortly after complete minutes.

You can set the **Rounding rule** in **Register "Layout & content"** inside the **"View"** window. Default rule is the UIC.

5.1.3 Layout-variants

Before you start creating customers' timetables you should inform yourself to the layouts, which could be made by FBS. We suggest you to set a default layout before you start producing customers' timetables at the configuration. You can change the layout later, but some symbols have to be changed manual to get an exact switch to the other layout. You can change the layout complettly if you reload the trains from the graphic timetable.

The UIC defines the customter's timetable layouts in two ways: The **hot type** and the **photosetting**. These terms are taken from printing and can be use here in the name of the layout and not the way of printing because only fewer timetables around FBS are typesetted.

The decision of the layout, which would be used for your timetables, is in your hand and not given by the programme. It is also possible to combine parts of the layout from one face to the other. At the end FBS is not as flexible as a manuall setting of the customers timetable could be, but it gives you a lot of possibilities to create a schedule in a practicable way. We think it is the best way between optimized readability and fast, automatic creation of customers' timetables.

The layout can be set in the **Options menu > Configuration > Customer's timetable** (chapter Register "Customer's timetable at page 23). The individual settings are explained in chapter Register "Customer's timetable at page 23. It might be the best way to try both variants and decide than, which one you would prefer and which changes should be done. A possible mixture of both layouts is the **adjusted photosetting** as created by FBS.

5.1.4 Limitations of Layout

As said at the beginning, FBS is not able to create all known cases of customer's timetables. The limitations are as follows:

- The original hot type could show trains, which are shared in a part of their run, in one column at split them at the part of the line, which thay run shared. This is not possible in FBS. Both parts of the train need their own coloumn above the whole run of the train. You do not need more space and both entries can have the same head code of the train.

- There has been a special face for lines with less traffic. So the stations have been positioned in the middle of the table and the trains in one direction were shown on the left and the other direction on the right of the stations. The trains in one direction had to be read from up to down and the other direction from down to up. This is also not possible in FBS. You have to create separate schedules for each direction.

- In hot type the train run informations are shown by ovale, negative printed footers. We are sorry, but it was not possible to position these special characters inside the FBS font. You could use the rectangular symbols too. The difference between the rectangular and oval signs is not so big. This problem is also not so important, if you use train-running rows.

- The distance is often shown only at the first table of a direction. The following tables and the opposite direction often have not this information. In FBS you can show the distance completely or hide the distance at all tables. The distances can be shown by an exactness of tenth of kilometres. If you use another system to calculate the tariff as the distance you should use a hint at the beginning of your book of timetables but not keep the distance information away.

5.2 Adding a new Customer's timetable

An assitent helps you to get a new customer's timetable. He collects all informations that are needed to create the schedule. The data to select the train to be shown inside the customer's timetable can be changed later on.

Plase note that you have to create a *.ntz-file to create a customer's timetable, also if you would like to have a timetable for only one line.

Step 1: Select relation

After clicking the **Create new customer's timetable**-button the first part of the assistant opens.

The list inside the window shows all selected stations for the customer's timetable. You have to choose at least the first and the last station of the
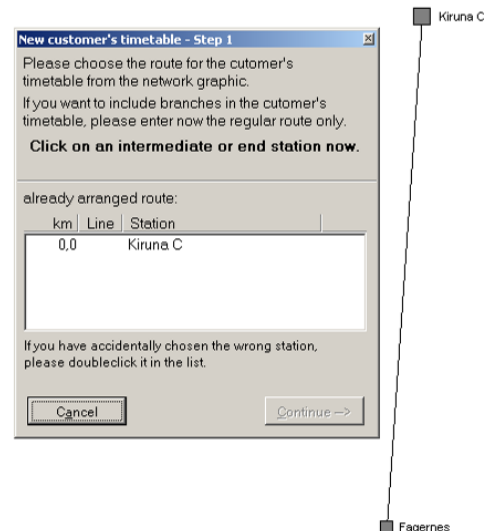
schedule. This has to be done by clicking the boxes of the stations inside the network graphic. Normally there are only the important stations to be seen, which are often the first and the last station of a customer's timetable too. If you would like to create a customer's timetable starting or ending at stations, which are at the moment not inside the graphic, use the next stations outside the customer's timetables, which are included in the graphic. If you have choosen the wrong station you can delete here by a double click inside the list.

If you have some possible ways to get from the first to the last station you should select the stations along the line by yourself by the first, the intermediate stations and then the last station. The selected intermediate stations are printed in bold inside the schedule. Branches can be filled in later. If you have choosen the main line of your customer's timetable press the **Continue** button.

Step 2: Adding branches

If the schedule shall include branches you should answer the question with yes. So another window opens in which you can select the (first) branch by the same system as the main line. Select at first the station in which the branch is connected to the main line and after that the end station of the branch. It is not possible to add lines, which have no connection to the main line. After Ok you set the direction of trains, which should be shown inside the customer's timetable.

After this you come back to the step to select a branch. You can repeat it as often as you want, but please take care of the readability of the customer's timetable. It is not possible to create schedules with more than 255 station lines. Two or three branches are mostly enough for one timetable to understand which train runs which line.

Step 3: Layout and Headlines

This window allows you to change the **Layout-Variant** from the default to the special variant. Here you can also fill in the **Number or head-code for the chart** and the **Title** of the customer's timetable. You can just design the title in the style written in Register "Title & remark at page 100.

Step 4: Edit stations

After completing the selection of lines the Edit station window opens. All the functions, which can be done inside this window are explained in chapter Stations at page 98.

Step 5: Adopt trains

Now you can choose all limitations to add trains to the customer's timetable. As standard only the public passenger train types to be filled in are marked. The chapter Reload the whole customer's timetable at page 105 tells you all the settings you can do here further.

After that, the customer's timetable is being created and shown to you in a window. Right now you can edit the train table or change the headlines or everything else.

 Hint: Alle examples inside the documentation or delivered files for the programmes and timetables of existing railway companies or train lines do not show you the real data. Sometimes the data is change to show special effects and functions of the programmes.

🚞 333a Gernrode (Harz) – Alexisbad – ___**Harzgerode**___ **_(Selketalbahn)_** Alle Züge 🚞
Straßberg – Stiege – Hasselfelde   und 2. Klasse

km		Zug-Nr.	8951 🚌	8967 🚌 ◇	8961 🚆		8953 🚌		8963 🚆		8955 🚌		8965 🚆		8957 🚌
0,0	Gernrode (Harz) 🚞 332 ③ ab		8.01 ↗	8.26	9.01	...	11.01	...	13.01	...	15.01	...	17.01	...	18.01
1,3	Osterteich x	🍴	8.05 {	|	9.05	...	11.05	...	13.05	...	15.05	...	17.05	...	18.05
5,7	Sternhaus-Haferfeld x	|	8.20 {	|	9.20	...	11.20	...	13.20	...	15.20	...	17.20	...	18.20
6,9	Sternhaus-Ramberg (413m)	↯	x 8.24 {	|	9.24	...	11.24	...	13.24	...	15.24	...	x 17.24	...	x 18.24
10,2	Mägdesprung ✗ (295m) an		8.34	9.00	9.34	...	11.34	...	13.34	...	15.34	...	17.34	...	18.34
	ab		8.35 {	9.00	9.35	...	11.35	...	13.35	...	15.35	...	17.35	...	18.35
11,6	Drahtzug x	↯	8.40 {	|	9.40	...	11.40	...	13.40	...	15.40	...	17.40	...	18.40
14,6	**Alexisbad ✗** 333 ② an		8.49 ↗	9.18	9.49	...	11.49	...	13.49	...	15.49	...	17.49	...	18.49
14,6	**Alexisbad ✗** ab		8.57	❶	❷	...	11.57	...	❷	...	15.57	...	❷	...	18.57
17,5	**Harzgerode** (400m) an		9.07	...	...	...	12.07	...	...	...	16.07	...	...	...	19.07

◇ = Sonderfahrt mit GHE T1 (12 Plätze, besonderer Tarif)
❶ = nach Nordhausen Nord
❷ = nach Hasselfelde

Simple customer's timetable in hot type

5.3 Timetable Menu

5.3.1 Print

🖶 or [🖶 Print] or **Ctrl+P**

Here you find some hints for printing a customer's timetable:

• You can print the customer's timetable by using every printer being correctly installed by Windows®. We advise you to print these timetables not smaller than DIN A4 and to sizen them outside of FBS before final printing.

• Caused by different resolutions of the screen and the printer it can happen, that the design of the print is different to the design on the screen. The resolution of the printer is normally higher than the screen, so that it is possible to bring more information in a line by printing. If there are only less trains inside the last table this table can be removed in some cases if it is possible to show more trains in one table as to be seen on the screen. The resolution on your screen is sized by FBS, that you are able to read all the signs, which are arranged inside the customer's timetable. Maybe you can change some parameters after a look at the print preview given to you by the **Print** function. It can happen, that the result of the print looks different to the print preview. This depends on the font settings and the printer driver, so that we have no influence to this problem. Finally you can check this only by some tests.

• Not only the settings in the print window have influence to the schedules also the colour- and size settings made in View-function at page 99 and the parameters set inside the Configuration as explained starting at page 20.

• The **Standard type size** inside the schedule books is 2 mm including the line distance, which is also used as default in FBS. If it is possible for you to use larger sizes (2,5 to 3 mm), please use them, especially for posters or flyers. (look at Part "Table at page 99 to edit the type size)

• Caused by a lot of small signs and symbols you should use a printer for customer's timetables, which as a high resolution. We advise you to use a laser printer with more than 600 dpi (dots per inch) for producing large numbers of customer's timetables. Special or coloured tables for example for a poster should not be printed with less than 720 dpi. Do not print below 300 dpi!

• If your printer driver includes the option: Print a graphic as grid pattern or bitmap, TrueType-Fonts as graphic, print unidirection please switch them on. If you have

problems by printing, please check whether you can deactivate the memory inside the printer and use the function: create graphic inside the computers memory.

- • Normally the first print is not perfect. Try some settings and write them down to use them again.

All the functions inside the **Print** window are similar to them explained in chapters before, so they are not repeated here again.

5.3.2 Export

5.3.2.1   *Register "Export as text"*

You are able to export the customer's timetable into a text file.

5.3.2.1.1   Part "Output format"

Here you can select **8-** or **16-bit-unicode** text or **8 bit text in the character set**, which has to be taken from the shown list.

5.3.2.1.2   Part "Special characters"

Special characters are not defined in the normal font sets so that you could get in trouble with them. You can **replace by normal text**, if it is possible (operation days, and symbols for running through, diversion or wavy line are possible, multiple unit, sleepers and so one are not possible) or **Do not replace special characters, but export them unchanged**. To read them correct in the text file you need special software or a unicode set of characters to display.
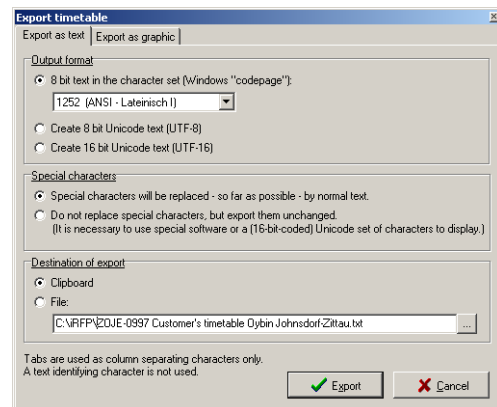
5.3.2.1.3   Part "Destination of export"

To export the data to the right position you can choose to export the data to the **Clipboard** or the a *.txt-**File** in the directory given by the **save as-window (…)** or filled in manually.

5.3.2.2   *Register "Export as graphic"*

All the functions are similar to them, which are explained in chapter 4.3>Graphic export at page 82.

*Hint: For exchanging the customer's timetables for professional publishing to a print office ths PostScript- or Adobe-Acrobat-files are usually used. These files can be produces by the **Print**-function as explained above.*

5.3.3 Other functions

All other functions here a similar to the functions explained in the chapters before and so they are not written here again.

5.4 Edit Menu

5.4.1 Stations
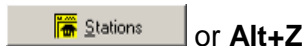
[Stations] or **Alt+Z**

5.4.1.1 *Part "List of all operating locations"*

This list shows you all stations and locations along the customer's timetable. They are sorted at first by the **Line part** and than by the mileage depending on the direction of the running trains.

To add a station from this list into the customer's timetable mark it and use the arrow to the right table or double click at the station.
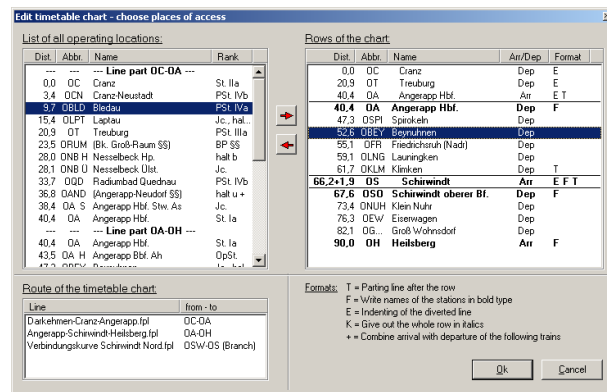
The **Edit place of access** window opens to set the data related to this station. This window consists of two registers. The **Content** register includes the settings to be seen in the station column like **Name**, **Tip** and **Distance to be shown** and only for synchronisation the **Abbreviation of station**.
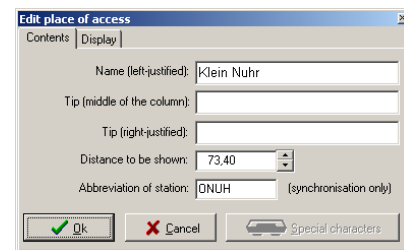
The **Display** register sets the parameters for the data shown in the station line. So you can change the format the following ways:

- **Write names of the station in bold type**: This is helpful to mark important stations or stations for train changing.

- **Indent row**: This option is normally used for stations along diverted lines.

- **Write whole rom in italics** may also be used for diverted lines.

- **Insert a splitting line after this row**: A splitting line should divert Branches and main lines. It is also used to divert arrival and departure times, if they are shown for one station. The lines are also helpful for a better reading so they are used after more than five rows.
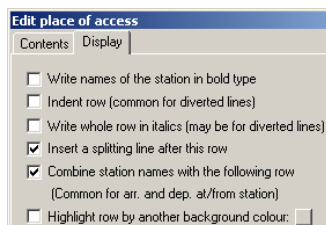
- **Combine station names with the following row**: This function is also used if you show the arrival and departure times of a station in two following rows. So the station name is to be seen only once and not two times.

- **Highlight row by another background colour**: To create customer's timetables, which are used as timetables posters at a station you can highlight here the row of the station to get a faster overview of the table. It is also possible to highlight some stations inside the timetable to mark new stations or important stops for tourists. (Note: The different colour of a background of the column is set in foreground and the background colour of a row is set in background. So a background colour is to be seen in front.)

5.4.1.2   *Part "Rows of the chart"*

This list shows all stations, which are included in the customer's timetable. The column **Distance**, **Abbreviation**, **Name** and **Arrival/Departure time** show the data to be seen inside the timetable. The names are indenting, if this option is used. The rows, which should be shown in bold type, are written here in bold too. The **Format** column shows you the abbreviation of additional format settings as explained on the bottom of the table.

If you would like to change the settings for a station do a double click and you are back in the **Edit places of access** window as explained above to edit the data.

The **arrival** and **departure time** property is set the following way: If a station is filled in the first time the property is set to departure time. By filling in the station again the new row is positioned above the existing row and the property is set to arrival time. The last station inside the table becomes the arrival property too.

5.4.1.3   *Part "Route of the timetable chart"*

This table shows you the files of the lines, which are included, and the first and the last station, which is to be seen in the **List of all operating locations.**

5.4.2 View

 or **Alt+A**
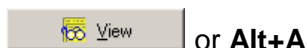
This window is used for general settings of this customer's timetable in addition to the general settings made in Configuration-window as explaind starting at page 20. The window is separated into two registers.

5.4.2.1   *Register "Layout & content"*

5.4.2.1.1   Part "Paper alignment"

Here you can set basic data for the used papers to print the timetables. You can choose the **DIN-A-formats** or **individual** sizes defined by the **Width** and **Height** in mm. The orientation can be changed here from **Vertical** to **Horizontal** or back.

5.4.2.1.2   Part "Margins"

Here you can set the margins at all sides of the paper. Default values are 20 mm.

5.4.2.1.3   Part "Layout"

This part sets the **Format** to **Photosetting** or **Hot type**. To number the pages during the printing you can set the **Number of first page** for this customer's timetable. Take care, that customer's timetables can use more than one page, depending on the number of stations and the amount of trains.

The button **Head- & footlines…** give you a shortcut to the headlines and footlines settings explained in Head- & foo at page 107.

5.4.2.1.4   Part "Table"

To get a timetable design by your way you can hide or show informations or use colours and so on as explained as follows:

- **Show distance column** is used to show or hide the
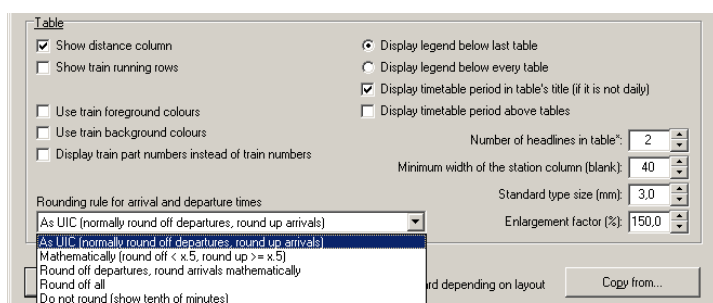
distance along the customer's timetable.

- **Show train running rows** shows the start and the end station of the train to be able to find out trains running special relations directly. It is often used if there are trains inside the timetable, which do not start or end inside the customer's timetable. They are only defined for photosetting but FBS allows you to use them in hot type too.

- **Differing background colour**: If you set **Show train running rows** this item appears to set the backbround colour of the train running row. Click the button at the end of the line and the known colour-changing window opens to set the colour.

- **Use train forground/background colours** takes the colour settings from the graphic timetable and does not use the default colours for the entries. Do not forget to allow coloured printing at your printer.

- **Display train part number instand of train numbers** might be helpful if trains with completely different head codes run in one slot at the same time.

- **Display legend below last/every table** you can select here the positioning of the legends. It is helfpul to use the legend after every table if the tables include a lot of stations, so all the tables might be printed at several pages.

- **Display timetable period in table's title** shows a bar above the tables with black background and written in white colour the operation days for this table.

- **Number of headlines in table**: you can change here the number of lines in the headline of every table to be able to show more information or to save space. If you set the value to 0 the default value of the customer's timetable format is used.

- **Minimum width of the station column (blank)** this size is used to set a minimum width for the station column if you need this space to show all relevant information. The size is set in blanks. If you set **avoid incomplete train columns** in Register "Customer's timetable at page 23 this size might be overstepped. If this option is not used the station column is set to the width of blanks set here.

- **Standard type size (mm)** is used to set the size of the not bold types inside the station and train columns including the distance of rows. All the other type sizes are handled proportional. Default value is 2 mm, which should be used as an absolute minimum.

- **Enlargement factor (%)** allows you to enlarge the whole data inside the customer's timetable and not only the size of the types inside the tables.

- **Rounding rule for arrival and departure times** is used to change the rule for rounding the times inside the customer's timetables. Take care of the changed informations to your customers and the consequences resulting by them.

The **Copy from …** button opens a window to copy the settings from another existing customer's timetable from all open *.ntz-files.

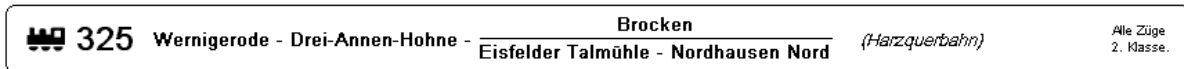### 5.4.2.2 Register "Title & remarks"

The positioning of the **Table No.**, **Title**, **Remarks to the title** depend on the choosen layout. In **hot type** they are centered and in **photosetting** they are left-justified and framed.

Head of a customer's timetable in hot type:

The same head in photosetting:

You can edit here the following informations:

- The **Table No.** is normally the number of the line in your schedule book or the number of train line. You can use here text, figures or **Special characters**.

- **Title**: Here you set the start and end station of the customer's timetable and important stations between them. If the timetable includes branches you can handle the stations like a fraction. Set all branches in braces and separate the upper station up a | from the down station. You can create difficult titles as you want be using the braces and the |. The example shown above was filled in this way: **Wernigerode - Drei-Annen-Hohne - {Brocken|Eisfelder Talmühle - Nordhausen Nord}**

- **Remarks to the title**: can be a name of a line or hints to the operation days of this schedule. The entries here a shown in italic.

- **Remarks top right**: Here are hints to be found to the classes, multiple unit or not, narrow gauge railways and so on.

- **Entry in the top left column of the chart**: Normally the railway operation company is shown here on top of the station column.

- **Enter writing "Class"**: sets the keyword "Class" in this field too to get a new row in the headline of the chart to show hints to the class.

- **Include logo file**: you can also set a logo on top of the station column, which could be a gif, jpg, jepg, bmp, ico, emf or wmf-file. You can use here also relative paths to the logo by keywords <FBS>, <USER> and <OWNER> so that the logo is to be found after moving the files on your computer. <FBS> means the path to the FBS-programme; <OWNER> links to the path where the *.fpl- or *.ntz-file is saved and <USER> shows to path **own files** as set in Windows®. By using the **…** button you can select the file directly in an absolute path.

- **General remarks in the header**: are shown between the headline and the first table. Normally you find here information to tariff or operation days of the schedule.

- **General remarks under (each) chart**: this remarks are repeated after each chart in opposition to the legend, which is shown only once under the last chart of the tables. There are often hints to other lines or stations, which are not linked by railways.

You can use in every field **Special characters** to show informations in symbols. The special characters are the same as defined in the wholw FBS-family.

It is also possible to fill in the same Macros as explained in chapter Head- & Footlines at page 88 in the following fields: **Remarks to the title**, **Remarks top right**, **General remarks in the header** and **General remarks under (each) chart**. At the moment it is not possible to fill them in by context menu, so it the easiest way to fill them in is to use the **Copy & Paste** function from the Head- & Footlines window.

5.4.3 Edit train table

 or **Alt+T**
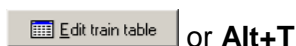
5.4.3.1 Preliminary note – to be read absolute!

After starting this function you are able to edit every data inside the customer's timetable so that you can have a completely different timetable from the graphic timetable – including all consequences. So the same rules as explained in Preliminary note – to be read absolute starting at page 84 are valid too.

For a better overview you can **Fix station columns** during scrolling inside the table. So they are not moved like the other cells. If you reach the end of the screen the table moves automatically horizontal to see more trains.

You can start editing the table the following ways:

- Mark a cell and call up the context menu by the right mouse button,
- Double click a cell,
- Mark a cell and press Enter.

The upper part of the window is separated into three parts. The first part is to be seen on the left and includes all data related to the station columns. The second part is on top of the table and includes all data related to a train like head code, general operation days and so on and the third part are the cells for the times.

If you would like to mark some trains click at the part between the time cells and the train headcode and hold the **Ctrl** key pressed.

5.4.3.2 Edit station data

You reach the **Edit place of access** window again to change the data. This window is still explained in Edit Menu, Stations on page 98.

5.4.3.3 Edit general train data

Normally all data here is taken from the graphic timetable, so that the fields are fullfiled automatically. Some train categories could be hide by the configuration of the customer's timetable, so that these trains are not included in the table.

So the **Train category**, **Train number** and **Train part number(s)** can be changed here.

The **Operation days** are filled in here to create the correct symbol – depending on the layout (hot type or photosetting) if the train does not operate daily. A unique footer inside the legend rows shows the **Special operation days**. If you change the special operation days, iPLAN tries to erase the old legend entry and to create a new one. Please take care, that some train might use the same legend entry.

Informations related to the whole train for special waggons (sleepers, dinning cars, …) are shown inside the **Class and general hints** field. The classes are only shown, if they are not standard. If all trains inside the customer's timetable have the same classes of waggons it is

normally shown in the head of the table. If you set the **number of headlines in table** (View>Register "Layout & content>Part "Table at page 99) higher than 2 the lines are given to this fields to get more informations to the train.

The fields **Train runs from/to** include the start and end station of the train, which are shown inside the **Train running rows**, if they are activated (View>Register "Layout & content>Part "Table at page 99). Every entry can use two lines in the width of the train columns. The programme sets a line break automatically if a blank or divider could be found in the field. iPLAN cannot do automatic syllable division, so that you should divide long station names by yourself. A "hard" line break can be made by Enter-button.

If you use **Train colours** (View>Register "Layout & content>Part "Table at page 99) you can see here the current colours for this train. You can change them by clicking the small boxes behind the item and set a new **Foreground** or **background colour**. At the field behind these items you can check the relation of the two colours. You can also **Keep the background colour of the sheet** to keep the colour like the whole timetable. The foreground colour takes the way from the Train number database to the graphic timetable to the customer's timetable. So you can change the colour at all this parts of the programme two, but have to be sure about the consequences. That means if you change the colour in the train number database, all trains of this train type get a new colour.

5.4.3.4   *Edit time entries*

A train column and a station row locate a **time entry**. It is not necessary, that they have to be filled with a time. These cells can also include nothing or symbols.

The time entry cells consist of two parts. A small part for symbols is reserved on the left and a large part on the right for the time.

5.4.3.4.1   Part "Add at the left margin of the column"

You can select here one of four predefined symbols or a special character of footnote symbol. Some combinations of the symbols are possible, but you cannot show more than two of them. The **symbol of the regular service days** is set automatically depending on the choosen format (photosetting or hot type) and the operation days of the train. This works only, if a symbol is defined for this kind of operation days. If this is not possible, you should use a **Special character or footnote symbol** and explain the limitation of operation days in the legend.
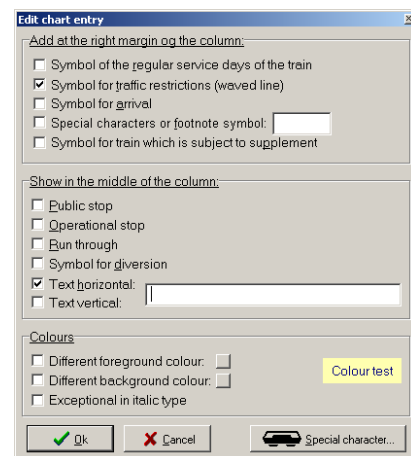
5.4.3.4.2   Part "Show in the middle of the column"

If a time should be shown in the time cell on of the options **Public stop**, **Operational stop** and **Run through** has to be choosen. So a field is shown in which you can fill in the time in the known FBS-format. You can select for public stops also **Mark as stop by request** symbol can be shown, if the station is not a general stop by request. If there is an operational stop selected, it can be **caused by Infrastructure company** or **Operator**. By using another line the **Symbol for diversion** should be shown. You can also fill in **Text horizontal** or **vertical** for hints or train names for example. The cell you filled it in centers the vertical text. So use a cell in the middle of the cells, which limit the space for the vertical text, to get a better view. The text is not shown vertical inside the **Edit train table** window. It is also possible to use **Special characters** as known from FBS-programme-family.

5.4.3.4.3   Part "Colours"

It is also possible to set different colours to a cell. Clicking the boxes after the items can change the colours and at the field on the right you can check the contrast of the chosen colours. It is also possible to write the contents **Exceptional in italic type**. That means if the entrie would normally shown italic it is shown normal and reverse.

5.4.3.5   *Change row of trains*

The trains are sorted by the time inside the table. You can move the whole train by drag the cell with the train type and number and drop between two other trains.

5.4.3.6   *Add a new train*

Ctrl+Einfg

This function is normally designed for filling in empty columns or bus runs or rail replacement bus services.

Click the train column after which you would fill in the new run. Use **Ctrl+**Einfg or the **Context menu** item to start the function. A confirmation window helps you to check the position of the new column. Now you can edit all the data in this column as explained in the steps above.

5.4.3.7   *Delete train(s)*

Ctrl+Entf

To delete a train, which does not run any longer or something else you can use this function. The whole train data will be deleted after your confirmation.

5.4.3.8   *Search & Replace*

Ctrl+R

For faster editing of the table you can use a Search and Replace function. A dialoque window opens in which you have to fill in the **Search string**, select as minimum one of the fields: **Train category**, **Train number**, **Class and general hints**, **Train runs from** or **Train runs to** and fill in the new string. You can also use **special characters** to replace or to be replaced.
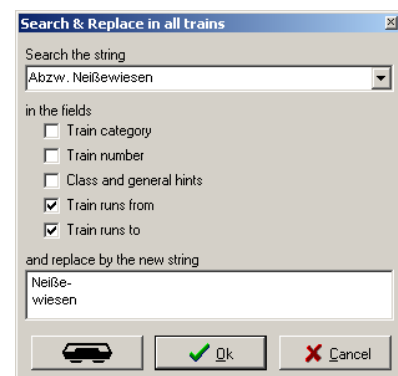
5.4.3.9   *Delete entry/entries*

Del

This function deletes the whole entry in this cell and replaces for example the departure time by a symbol for **Run through**.

5.4.3.10   *Operation day lettering*

This function can be used for one or for selected trains to set or delete the operation day lettering. The letters are taken from the operation days set in the graphic timetable.

5.4.3.11   *Surcharge lettering*

The surcharge lettering can also be used for one or for selected trains to set or delete the letters for surcharge. The lettering depends on the train type.

5.4.3.12 *Copy times of this train*

Ctrl+C

You can copy the data inside the time entries to use them by other trains inside this customer's timetable.

5.4.3.13 *Paste copied times*

Ctrl+V

The copied times can be filled into the marked column this way. If the copied times do not replace or reach existing times the run through symbol is set in the lines, which have been empty up to now.

5.4.3.14 *Save table as…*

It is possible to save the customer's timetable as a grafik or text. Further details to this function can be found in Export at page 97.

5.4.3.15 *Synchronise*
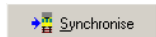
There are two possibilities to synchronise the data inside of your customer's timetable. You can **Reload the whole customer's timetable** or **Synchronise times and trains routes only**.

5.4.3.15.1 Reload the whole customer's timetable

If you use this function the whole train data gets lost and you restart the creation of the customer's timetable. So you have to confirm, that you would like to use this function.

A window opens, which allows you to configure the trains to be shown inside the customer's timetable. As default **Regional** and **Long distance trains** ar marked. These are the train categories, which are normally to be seen inside a customer's timetable. You are also able to show only the **Public cargo trains** or **Non-public cargo rains** to get a cargot schedule. In some cases also **Service/operational train**, **Empty passenger trains**, **Empty cargo trains** or **Light engines** might also be interessting. The links of train categories to the groups used here are set in the train number database as explained in 12.3 starting at page 150.

You can also select **In addition/In no case adopt trains of the following categorie(s)** to show or hide special categories. So you can hide night trains or other train types if you like to. It is also possible to show or hide train lines by the function **In addition/In no case adopt trains of following line(s)**. You can fill them in manually or use the arrow on the right of the field to select them by all

categories used inside the current network.

If you would like to create customer's timetables for several operation days you can also do a **Selection of days of operation** in opposition to **Adopt trains of all days of operation (daily)**. This might be usefull if the trains operate at different slots for example at weekend and during Monday to Friday. To set the selection the known Calendar window opens to **Define special service days for Customer's timetable**. You can use here all known functions for this window, which are explained in Annex – Declaration of operation days starting at page 162. You are also able to exclude periods (if the timetable period is defined inside the graphic timetable), in which special timetables are in use. If you did not define the days correctly you can reactivate this window by toggling the days of operations.

To **Adopt trains only, which have at least one arrival or departure time within the following time window** you can limit the shown trains further. This might be helpful if you would like to show only one or two interval period(s) in a customer's timetable. The times have to be filled in the known FBS-style.

If you created a customer's timetable within branches or other lines it might be possible that trains run in a section the "wrong" direction to use another part of the customer's timetable in the correct direction. So you can use a **Restrictive direction detection** to show only the trains, which have raising times in all section or use **Advanced direction detection** so that trains are shown, which have a minimum of section in which the time steps are raising up.

Normally only traffic stops are included in the customer's timetable to keep the overview and to avoid discussions of overlooked signs of running through trains. If you are interested in showing these times you can **Consider through running trains too** and show theire times of through running. It is also possible to **Consider trains with operational stops too** and to show these stops. You cannot activate the running through times without activating the operational stops.

To avoid single time entries by reaching or leaving a branch or other line you can **Do not show times, which are separated a section**.

Coupled trains parts can be adopted in three ways:

- In separated columns,

- With different first or last stations separately or

- Fundamentally in one column only.

This setting should be handled carefully. If you show coupled train parts in separated columns it is difficult for the customer's to find out, that this two trains operating the same times run as one train. If you show them only in one column the information of trains, which leave the other train part inside the customer's timetable cannot be found as trains operating coupled in the section before. So the middle way might be the best way so that only this coupled trains are shown in separate columns, which have different
first or last stations.

In the right bottom corner you can see **Further settings** for symbols, which are taken from the train data to show special informations to the passengers. These symbols can be choosen by the button on the right of the list.
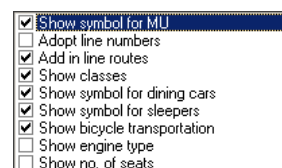
By pressing **Ok** the new data is collected and sorted in the customer's timetable.

5.4.3.15.2 Synchronise times and trains routes only
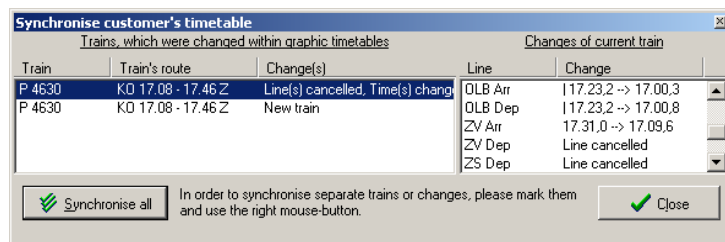
This option keeps the whole data of the customer's timetable alive and looks for (saved) changings inside all graphic timetables for the trains include in the schedule. If changes could be found a window appears and shows **Trains, which were changed within graphic timetables** and if you selected one you can see on the right the **Changes of current train**. The Lists are sorted by **Train** and show you **Train's route** and the kind of **Changes**.

The right part shows you the row inside the customer's timeable and the changed data.

You have three possiblities to synchronise the data finally. So you can synchronise:

- All changed data,
- Marked trains or
- Marked changes along a train run.

So you can mark single or grouped changes to synchronise them into the customer's timetable. This way you can update your data inside the customer's timetable quite fast after changings in the graphic timetable.

5.4.3.16 *Edit Legend*

The entries in the legend are set automatically, so far as FBS can handle them. So you should check the legend before publishing the customer's timetable. You can display the legend below every or the last table as set in View>Register "Layout & content>Part "Table (explained at page 99). You can show the **Standard symbols** for operation days by using the **Legend** button at the bottom of the window and use the last item there. Normally these symbols are explained once inside the schedule book, so that they are not shown as default. If you use the customer's timetable outside of the schedule book you might add them to clear all the symbols inside the table.

5.4.4 Head- & footlines
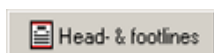
This window and the functions are same as explained in Head- & Footlines at page 88. The headlines & footlines them selves are not linked so that you can handle them different for Driver's timetables and Customer's timetables.

5.5 View Menu

5.5.1 Move row highlight up/down

Ctrl+up/down

If you activated the **Highlight row** function you can move the row by the combination **Ctrl+up/down** quickly. This might be helpful if you have finished the creation of your customer's timetable and would produce station posters for small station in a fast way. For important stations it would be better if you use the **Arrival & Departure poster** as explained in chapter 2.3.4 starting at page 18.

5.6 Options Menu

5.6.1 Default legend for customer's timetable
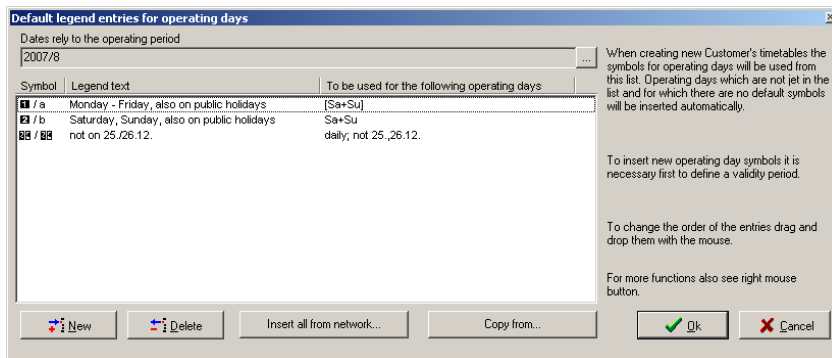
This function helps you and the customer's to keep the overview insight of all of your timetables in one period. All legends use the same operating day symbols, if they are required in this timetable. So it's blocked to use the symbol in one timetable for one operation day and in another timetable for other operation days. It is also possible to use all symbols below every customer's timetable, also if some of them are not required. The symbols are numbered figure by figure starting with number 1.

The **operating period** can be defined by the button. A small window opens, in which you can change between a **not defined** and a **defined** period for the validty of this legend. The **from** and **until** date can be filled by a calendar, which opens by clicking at the arrow at the right end of the box. The settings can be **Cancel**ed or accepted by **Ok**.

The table in the middle shows all defined **Symbols**, **Legend texts** and the rule **To be used for the following operating days**. If there are operating days used, which are not included inside the list they are added automatically. You can **change the order** of the list entries by **drag and drop**.
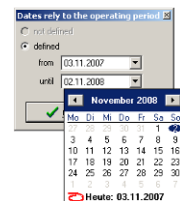
 These buttons are designed for adding or deleting new symbols.

The **New** button leads you to the same window as to edit an existing entry, but it is without any content. A new window opens, in which you can define the new legend entry. The **symbols** can be differed for **photosetting** or **hot type** layout. The signs will be shown in Customer's timetable in train columns and in the legend below the table. You can use all signs defined inside of your font or **Special charatercs** by using the button at the lower end of the window.
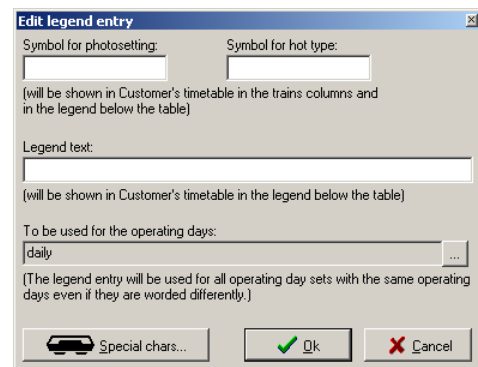
The **Legend text** is only to be seen inside of the legend.

Last but not least the **operating days** have to be defined, which should be replaced by these legend entry. The operation days are defined by the know FBS-Calendar as explained in chapter 2.2.2 starting at page 14.

The **Insert all from network** button collects all existing operation days and there symbols. A list shows you the customer's timetables and the realeted operatioin days. You can also abort this insert.

You can also use the existing operation day symbols from other networks by the **Copy from** button.

The context menu at a legend entry shows you two functions to **Existing Customer's timetables**. You can **Check for accordance** of this entry. That means iPLAN checks all existing customer's timetables for using this symbol or another symbol for the same operation days. If there are differences they are shown to you in a list.
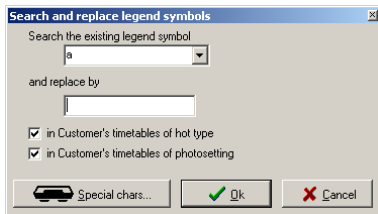
It is also possible to Search and replace symbols. The window shows you the current symbol and you have to select the new symbol. This function can be limited to hot type or photosetting customer's timetables or both of them.

All settings have to be confirmed by the **Ok** button or can be **Cancel**ed.

5.7 Create opposite direction …

This function can be called up the context menu inside the object window on the right bottom of the iPLAN-window. Select the customer's timetable, which you would like to "turn around". Call up **Create opposite direction …** function and now you are inside the creation process of a new schedule at the position choose places of access or as explained as Step 4 in chapter 5.2 at page 94. All the other steps are also explained there. So you need to create a customer's timetable within all steps only for one direction and can create the other direction quite faster.

6 Circulation plan

6.1 General

Circulation plans rule the row of trains, which are composed by certain vehicles. These plans can be differed by engine or waggon plans.

You can create Circulation plans for any groups of trains, so that you can choose the content of the plan for only a region are the complete network.

The most important property of a circulation is that it is closed. That means the circulation starts and ends at the same station. So that you can break this circulation at any station and you can repeat the circulation as often as you want. The shortest possible circulation includes only a round trip from A to B and back.

Caused by the long trips of the vehicles they often do not arrive at the same station again as they started in the morning. That is why typical railway circulations are some days long. That means the row of runs repeats after same days and not every day. Circulation plans are normally not longer the 30 up to 40 days. Longer periods are difficult to handle because you will even have too much trouble in the row of the circulation.

Another typical property of rail circulation plans is the difference of runs at weekends. So at Saturdays, Sundays and often on Mondays there are different rows of runs as at the other days of the week. A classical circulation plan is separated in Monday, Tuesday to Friday, Saturday and Sunday.

FBS handles the seven days of a week separate for a circulation plan. The known classical circulation plan is in FBS only an accident of the same row of trains at Tuesday to Friday. A one-day circulation plan includes every day the same runs.

Today the Railway Operation Companies try to create Circulation plans with a length of 30 to 40 days. The advantage of such a Circulation plan is to be seen in the equal distances of every circulation day for a better handling of maintenance and the centralisation of depots. FBS tries to reach equal distances as one of the criteria for optimisation.

A Circulation plan shows not the usage of a special vehicle (the current number of the vehicle) for a run. In theory you can recalculate the current vehicle running a service in the Circulation plan by start situation of the plan and the number of days, which are gone. This follow of runs often has to be changed in praxis by a dispatcher because of maintenance, breakdowns or public holidays or extra tours. The vehicle usage plan is similar to the dispatching mode in graphic timetable to handle the plan for daily operation. It is possible to include the vehicle usage plan in FBS*bahn* if you are interested in.

6.2 Create a Circulation plan

After clicking this button an assistant starts to lead you through the first steps of the creation of a circulation plan. The following steps should be done to get a useful result:

1. Selection of Engine or Waggon/coach circulation plan

110
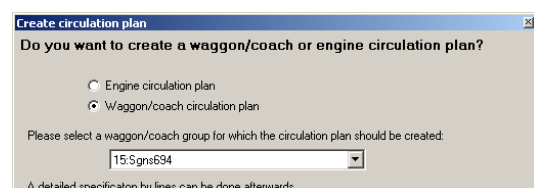
Choose here the type of vehicles, which you would like to fill in a circulation plan. You can create different plans for engines or waggons.

2. Selection of Engine series or group of waggons
    You can choose the series of the engine or the group of waggons as found as a single train part in any graphic timetable inside your network. This selection is not possible if only one series or waggon group could be found. Press the **Continue** button after setting this data.

3. Potential restriction of line numbers
    If the train parts are linked to a line number you can limit here the circulation plan to some lines or exclude some line numbers from the calculation. The line numbers are taken from the train data window in graphic timetable.

4. Potential restriction if smaller vehicle groups are included in larger vehicle groups
    This restriction can be done by a **Filter function**. Before using the filter function you have to make sure, that all train parts are linked to a line number. A special declaration of appropriate days of operation, separated by tab behind the train part number, can be made, if a train part shall not be selected on all of his days of operation.

    Blank lines and lines beginning with a semicolon will not be interpreted. Furthermore it is possible to write any remarks behind the declaration of days of operation, separated by tab or space. These remarks will not be interpreted, too.

    A train part is selected only on his declared days of operation, if such a declaration follows his number.

    If the filter is used negated ("only read in trains, which do not correspond to the filter"), the circulation plan will embrace:

    ▪ train parts, which are not included in the filter list

    ▪ train parts, which are included in the filter list with declaration of days of operation on such days, which are not declared
    After that the circulation plan window opens.

5. Setting of global and local preparation and postprocessing times
    Here you can set the preparation and postprocessing times, which are needed in every station when a train starts or ends. Special jobs like train heating or shunting jobs inside a station can be set later and are not defined here. The further functions of this window can be read in chapter Register "Preparation and postprocessing at page 113.

6. Overview above Train balance
    A window opens, which shows you the train balance. So you can have a fast look to the result of the calculation. If the **Difference** arriving and departing trains during the whole week is not 0 empty running might be needed. Further details to this window can be found in chapter Show train balance at page 126.

After that you are in the middle of the creation of the circulation plan. Now you can use the functions to define additional jobs, which should be respected by the calculation. You get back to this window after every recalculation. For the first time you can see only a frame without contents. In the bottom of the window you see the list of trains (explained in chapter Show trains at page 122).

By setting forced links you can fill in your own boundary conditions to the calculation (for example the respectation of outdoor advertising).

After the calculation of the variants the following steps are necessary, which are explained in the following parts:

1. (optional) completion of fixed jobs, which are not train runs, e. g. shunting or train heating

2. (optional) setting of forced links

3. check and selection of useful results

4. review and optional adding of maintenance and other times

5. printing

6.3 Circulation plan Menu

6.3.1 Synchronize with graphic timetable > Update trains

or **Alt+R** or **Show list of trains > context menu**

This function is made for simple handling of your Circulation plans. If you created once your Circulation plan and the settings in the graphic timetable have changed and saved your Circulation plan can be updated this way. So you do not need to delete the Circulation plan or change the data manual. The window shows you all the changes made in the graphic timetable file. If the train is not included up to now you can select the train and use the **Insert** button or **Update** for trains where only data is changed. The **Delete** button deletes trains from the Circulation plan, which are not found in the graphic timetable.

After finishing this function the warning sign appears to show you, that this Circulation is not correct. A new calculation has to be done.

Please note, that the changes in the graphic timetable can have such an influence to the Circulation plan, that you might need more or less vehicles.

6.3.1.1 *Synchronize with graphic timetable > Select trains manually*

This window is created for including or excluding trains from the circulation plans. So you can select trains, which should be respected by calculation. All other properties inside your calculation are kept alive in opposition to recreation of the circulation plan.

Select the trains in the upper window and click the **Insert** button to ad d them to the calculation.

Trains can be deleted by the same way using the **Delete** button.

6.3.1.2   *Synchronize with graphic timetable > Recreate circulation plan*

By using this function the whole Circulation plan is erased and you restart the assistant for defining a new Circulation plan.

6.3.2 General circulation data

 or **Alt+A**

This window is necessary to set the method, the side conditions and the aim for circulation calculation. This window opens automatically by creating a new Circulation plan. You can edit the settings by recalling this window in an existing Circulation plan.

 Hint: The success and the convenience of an automatic created Circulation plan depend hard on the setting of some entries at the general circulation data. So do not skip or scan and skim this window if you would like to have useful circulations. If you try to "anger" or challenge the programme too hard, it will "answer" the settings with senseless or no Circulation plans.

6.3.2.1.1   Register "Preparation and postprocessing"

Between the arrival of a train and the departure of the next run there has to be a period for changing crew or for shunting. Here you can set **Global preparation times** to start a train and **Global postprocessing time** after finishing trains run. These times are added and so the sum of them has to be left between two services of a vehicle. These entries here show you the minimum of turning times in the terminals.

The table in the middle of the window allows you to set special times to stations, which you have marked in graphic timetable file as a **terminal** (look at chapter **3.2.10.4** at page 39) To change the Preparation and Postprocessing times for a station double click the line and a window opens to enter the Preparation time and after Ok the Postprocessing time can be set. The times have to be filled in, in the normal FBS-style (h.min). If you would change from special turning times back to the global turning times fill in **-1**.

If some trains need special times for preparation or postprocessing you can set this times directly to the train outside of this window.

On the bottom of the register you can select the **Rounding rule** for this circulation plan. This setting is saved in relation to the circulation plan. So the settings made by Configuration are only relevant for new circulation plans.

Please note, that modern railcars and push-pull trains need only some minutes between two train runs. During the calculation of the Circulation plan the arrival and departure times are rounded in the set rule, so that it can happen, that minutes might be lost. It is helpful to set the preparation and postprocessing times by three or four minute turning times down to one
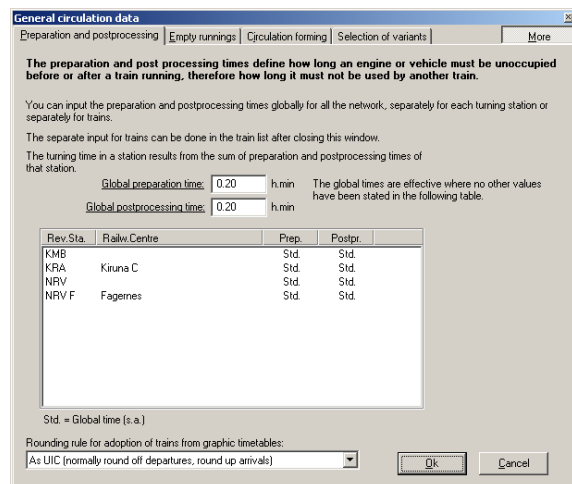
minute. Please make sure that the turning times are not too short, so that they are unreal and might bring you trouble.
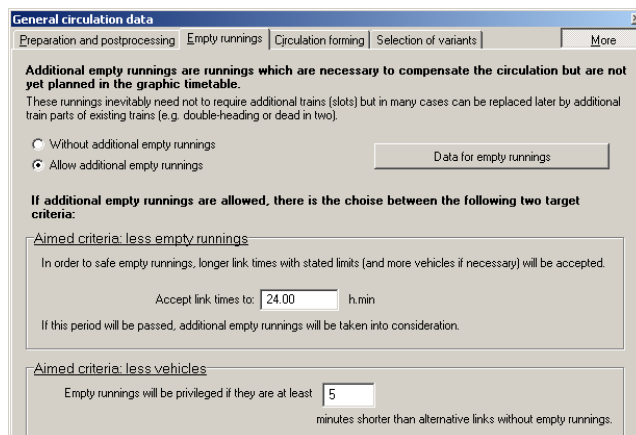
6.3.2.1.2 Register "Empty runnings"

iPLAN is able to preview possible empty runnings, which are needed to close the circulation. You should use this function, if you could not take care for a complete circulation during the timetable construction. If the **Train balance** window is checked iPLAN suggests you to calculate a circulation plan without empty runnings, if this is theoretically possible.

Empty runnings do not always mean an extra slot or train, because they can be combined with existing trains or changed days of operation of a train.

So you can calculate circulation plans **Without additional empty runnings** or **Allow additional empty runnings**.

You can set the following **Data for empty runnings** by a click at this button.

For a faster calculation the empty runs are handle with an **average speed**. The current average speed of all trains inside the circulation plan is shown to you to get an image of a useful average speed. The usage of free slots in the timetable is only done, if you respect the explanations in chapter Register "Empty runnings at page 114.

You can limit the **maximum empty running distance** to avoid runs through the whole network only for saving one car but paying for the slots and the run itself.

To calculate useful slots, the programme needs less data to calculate the run of the train. The normal train data has to be filled in like in the **train data window of graphic timetable**. Do not forget to choose an engine, if the circulation plan is only made for waggons!

If additional empty runnings are allowed, you have to choose between the following two targets criteria:

- **less empty runnings**: Here you fill in the accepted link time between two trains, before an empty run will be suggested. The maximum link time is a time limit for links. It will make no sense to keep a train waiting from a train arriving on Monday morning until Thursday evening. The programme crosses this time only, if there is no possible trains found in this period.
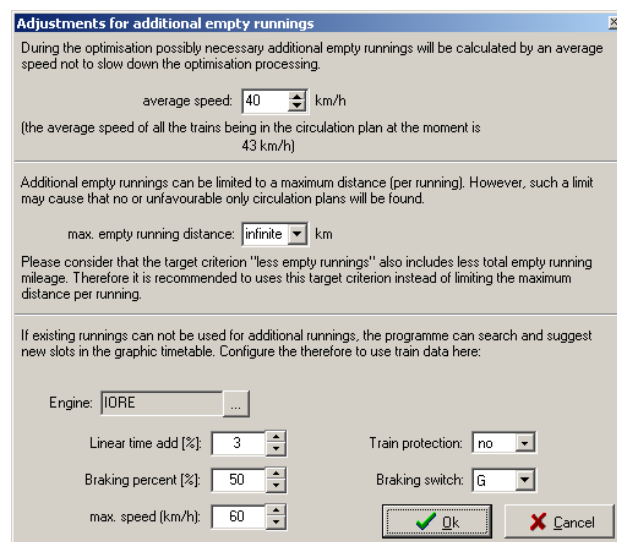
• **less vehicles**: Here you set a time limit, which has to be overrun by an empty running to be "better" as waiting for the next possible train from the same station, without an empty running.

6.3.2.2 *Register "Circulation forming"*
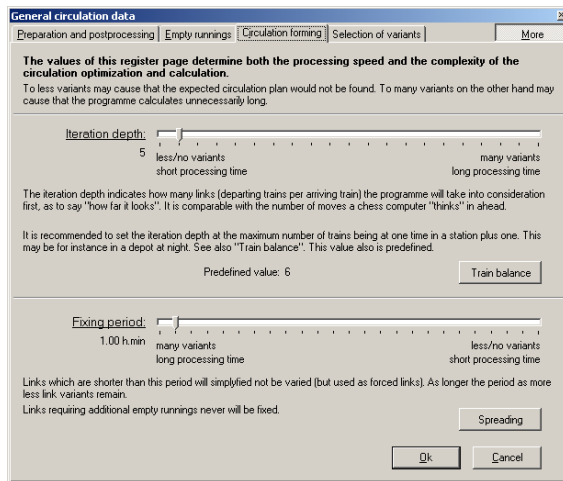
This register is only available if you switch the **More** button on the right top of the **General circulation data** window.

Here you can set two parameters, which have an influence to the quality of the circulation calculation.

To fewer variants may cause that the expected circulation plan would not be found. Too many variants on the other hand my cause that the programme calculates unnecessarily long.

The **Iteration depth** indicates how many links (departing trains per arriving trains) the programme will take into consideration first, as to say "how far it looks". It is comparable with the number of moves a chess computer "thinks" in ahead. It is recommended to set the **iteration depth** at the maximum number of trains being at one time in a station plus one. This may be for instance a depot at night. The value is predefined by the maximum of trains at one time in a station being calculated in **Train balance** window for every station and shown in the column **Trains maximum**.

The **Fixing period** means a time limit. If the time between the arrival and the departure of a train is shorter than the **Fixing period** this link is handle like a fixed link between the trains. All times longer than the **Fixing period** are handled inside the programme as variable links between two trains. This value can be set also in the **Spreading** (🔲) window too. This window can be opened up after the first calculation of a circulation plan. You can see there the relative number of link times for this circulation plan. The blue line shows the **Fixing period**, which was used for the done calculation. You can move the fixing period here by clicking the blue line and keep it clicked during you move the mouse pointer left or right. The relative number of fixed trains this way is shown below the diagram. If all links are fixed it is impossible to optimize the circulation plan, so only the circulation plan diagram has to be calculated and shown. If the fixing period is set to nearly zero, the programme has to calculate many variants, which results a long processing time.
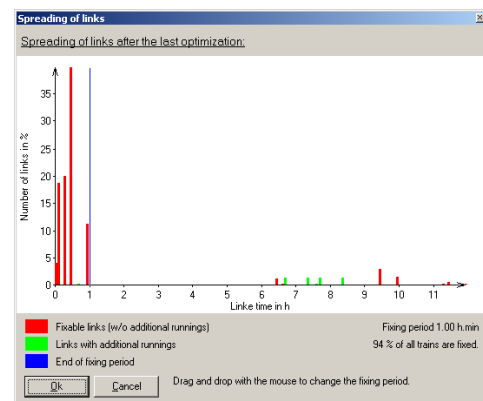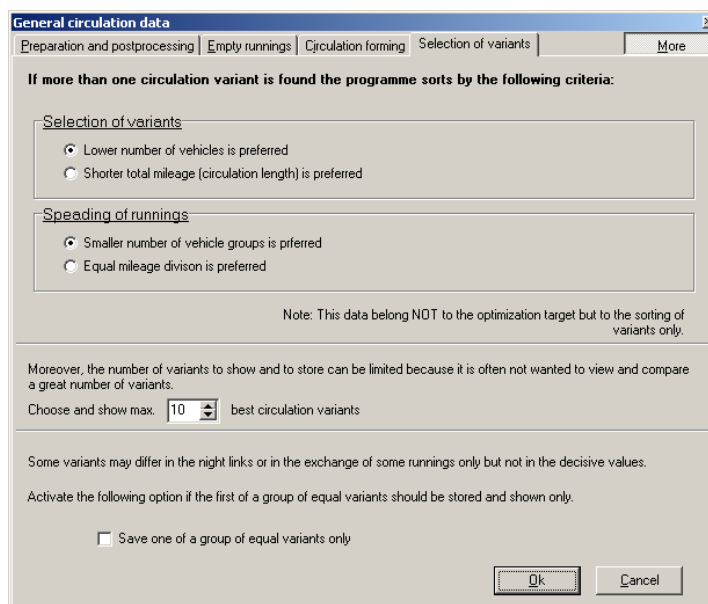
6.3.2.3   *Register "Selection of variants"*

This register is only available if you switch the **More** button on the right top of the **General circulation data** window.

By calculating the possible circulation plans many possibilities can be resulted. To find out the obviously best one of them you can do settings here.

You can do a **Selection of variants** by **lower number of vehicles** or **shorter total mileage**. The first one is better if the vehicles are rare and the second one if the slot costs are high.

The spreading of runnings can do another possible sorting. You can prefer a **Smaller number of vehicle groups[1]** or an **Equal mileage division** of the vehicles.

You can also limit the **shown number of variants** of the best circulation variants.

For saving space you can also set to **Save one of a group of equal variants only**, because some variants may only be different in the night links but not in the runnings along a day. So you do not see them as different variants but they are different for the programme.

6.3.3 Start circulation > Target aim: less vehicles

This function starts the calculation of the Circulation plan. The target here is to use as less vehicles as possible with the current properties. To make sure, that you are interested in recalculation all variants of this Circulation plan you have to confirm the next window. At first the programme checks whether it is possible to get variants of circulations or not. This check might need some seconds inside huge circulations. If it is not possible to get a result, you get a hint to change the basic data. If it is possible to start calculation – the calculation starts.
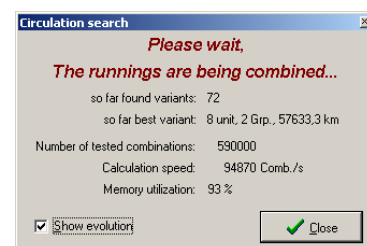
Depending on the number of services and their dependence to each other service you can have a lot of variants for circulation. Up to now it is not possible to calculate the number of possibilities and so the time for calculation the circulations. To get a faster overview of the needed vehicles you can use the option **Quick calculation (one variant only)**. If you would like to see some circulations a window appears, which shows you the current data for calculation. You can stop the circulation search if you want by button **Close**.

A complete calculation of the circulation can take some minutes up to some hours, depending on the number of runs, number of links and the used method. It might be, that the founded circulations do not include the optimum. The algorithm is designed to find with a high chance the best variants at first, but it is not possible to include all the different values of the parameters to predict the best variants.

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[1] A group of runs means a circulation, which starts and ends at one and the same station so these circulation days can be run without any connection to the other circulation days. Most of the railway operation companies try to get circulation plans with fewer groups. A circulation for a group could be handled as a single circulation plan or a circulation plan for a series of engines (or waggon groups) can be (if groups exist) seen as a sum of different circulation plans.

After finishing or stopping the search you can evaluate the found variants, change the parameters or forced links and restart the calculation.

6.3.4 Start circulation > Target aim: less empty runnings

This button is similar to the Target aim: fewer vehicles. The only difference is the target to minimize empty runnings. This way is useful if you have a lot of traffic inside your network and you see less chance for empty runnings. Please note, that empty runnings can be combined with existing runnings, without an additional slot for transferring vehicles.

6.3.5 Start circulation > Quick calculation

This function stops the calculation of circulations after the first circulation variant is completed. You can switch it on or off. This function is only used in connection with the different target of optimizing.

6.3.6 Sort variants > Delete all other variants

Show list of circulation variants > context menu

If it was possible to create more than one variant the best of them are saved until the maximum of best circulation variants you set (chapter Register "Selection of variants, page 116) is fulfilled. If a better variant could be found the worst one of the existing variants in the list is erased. If you have checked all the variants and found out the best one for you, you can **Delete all other variants** to save space on your disk.

6.3.7 Sort variants > Current variant to the top

Show list of circulation variants > context menu

If the best variant suggested by iPLAN is not the best for you, you can set the current marked variant to the top of the list.

6.3.8 Sort variants > Delete current variant

Show list of circulation variants > context menu

If an existing variant does not make sense in your mind, you can delete this variant to avoid analyzing this variant again and again.

6.3.9 Export forced links...

If you set forced links inside your Circulation plan, it is possible to export them into a text file to import it again, if you have created a new circulation plan. By starting this function please fill in the name and the directory of the file and press **Save**.

6.3.10 Import forced links...

For importation of forced links you can use this function. After selecting the file a window shows you the result of importation.

6.3.11 Export circulation plan > Text format

6.3.11.1 *Part "Destination of export"*

Many users have to use Circulation plans in other programmes for example to handle statistics or vehicle usage programmes. You can export the Circulation plan into **clipboard** or into **a text file**. Do not forget to choose the **Long** or **Compact layout** for your usage. The text formats are not standardized, so that they can be changed in every new version of FBS. If you want to have an own export standard please call the service.
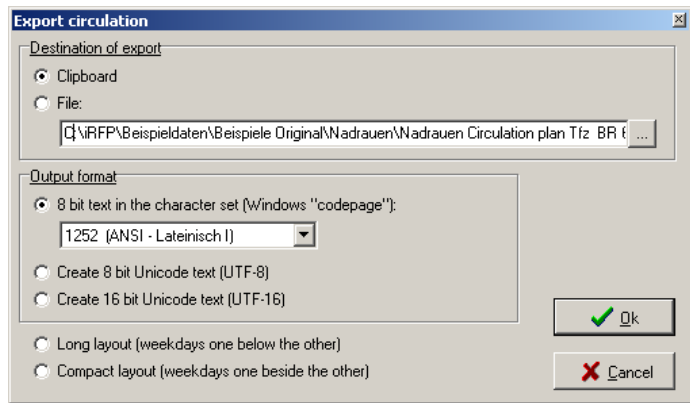
6.3.11.2 *Part "Output format"*

You can choose here also the output format as 8 bit text or 8 or 16 bit Unicode text.

At the end you can choose the **Long** or **Compact layout** depending on the weekday sorting.

There are also interfaces to other programmes possible. For further information call the service.

6.3.12   Export circulation plan > VISPER

Finished Circulation plans can be summarized to the import layout of programme VISPER. This programme is made by Fraunhofer-IVI and handles staff and vehicle usage. The dongle settings have to be changed for using this function, so it is blocked if you do not have VISPER on your computer.

6.3.13   Print

The design of the Circulation plan is made for horizontal usage of paper in DIN-dimensions. So the prints are also defined as horizontal papers. On the bottom of the print window you can select the **Weekdays from … until** and the **Rows per sheet** and the **Rows from … to ….** It is also possible to print the Circulation plan **With header** and/or **Use of colours**. You can also print the Circulation plan to a pdf-file by the known way.

6.4 Edit menu

6.4.1 Search train

This function jumps to the train in the train list. You cannot use it to jump to the train in the circulation graphic.

6.4.2 Edit train/Insert train

Context menu inside the graphic circulation plan or **Context menu inside the train list** or **context menu inside the Circulation table**

This window allows you to change the data for one train inside the circulation plan or to create a new train. A train can mean here different jobs for an engine or a group of waggons. The trains defined here are taken into the list of trains and not into the graphic. To find these trains inside the graphic you have to recalculate the circulation. The warning sign shows you, that there is a difference between the train list and the trains inside the graphic. The sign disappears after a new calculation of the cirulcation graphic.

So at first you can choose between different kinds of jobs: Passenger operation, Freight operation, Empty coach stock, Empty freight operation, Light engine, Shunting service, Maintenance, Readiness/Emergency service, Train heating, Train cleaning and Filling engine. This setting changes the hatching of the bar.

All train runs can be set by the window to be seen on the right and all the other possible kinds of jobs can be set by the window shown on the left.

Existing trains are shown with all data being found inside the graphic timetable or in the *.ntz-file related to this run. If you insert a new train run or service or maintenance an empty window is shown.

6.4.2.1 Train runs

The train **Category** and **Train number** are the typical data to identify a train. The field **Regular service days** are shown if they cannot be shown in the list on the right of the window. The **Start of preparation** and the **End of postprocessing** are important for calculation of circulation plan. This data is calculated by the pre- and postprocessing times filled in by you in the register belonging to the **General circulation data** (chapter General circulation data at page 113) and the departure and arrival times taken from the graphic timetable. These times and the stations for the start and the end of the run are also shown to you inside the window.

The **Distance** is also taken from the graphic timetable and used for calculation the whole circulation data and the consumptions related to the distance.

To keep additional information to this run you can fill in a free text in the **Remark** field. The **Line** field shows you a line code given by the graphic timetable if it could be found there. The **Engine** is taken also from the graphic timetable and important for the circulation. You can change the entries here, but they are not relevant for a recalculation of the circulation plan.

You can change the **Colour** of the train run by the button in a known Windows®-style.

The operation days on the right show the days in which the train run exists (exactly starts his run).

6.4.2.2 Not train runs

Not train runs means all the jobs, which do not include a run from one station to another station.

So you can set only the station **in** which this job is done and the times **from** start **to** the end of the job. You can **Set back consumption counter 1/2** to get an additional calculation of the consumption counters. They might be helpful for calculation of filling stops or something else.

You should fill in a **Description**, which is shown inside the circulation plan and you can fill in a **Remark** for your one information.

For example a shunting service means also movement of the engine and so the **Running performance to be counted** should be estimated by you and filled in to get a realistic calculation of the whole run of the engine.

You can also set this job only for some or all days of the week by the boxes of the days on the right of the window.

6.4.3 Delete train

This function deletes the current train run after your confirmation.

6.4.4 Assign forced links

Alt+U

If you need to force links between two jobs of an engine or a group of waggons you can tell this the programme this way. After marking the ending train you can call up this window and see the list of operation days of the train repeated on top of the window. So you can select another train by a list given to you. This list includes at first the trains, which can be reached by this engine or waggon at the same station. The second part includes all other trains found in the next 24 hours.
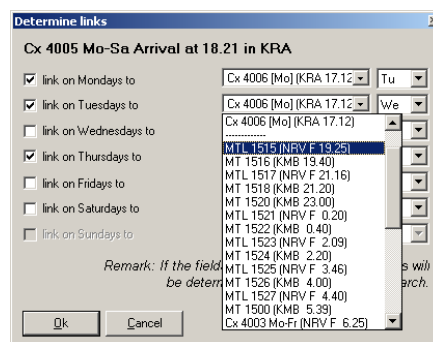
So you can set the link to the next train. You can also jump to next or a further day. You get a bigger gap inside of the circulation plan. If it is possible to set this forced link to some operation days a dialogue window opens to help you to copy this link to the other operation days.

6.4.5 Show empty running possibilities

or **Alt+L**

If it was possible to find a slot to bring the engine or waggons to the start of the next operation, the possibilities are sorted by the following way:

1. Using existing slots before adding operation days or defining new slots (Target: safe train mileages)

2. Trains of the own circulation before trains in other circulations (Target: coupling of same vehicles)

3. as possible a small number of existing train parts at the existing train (Target: reducing couplings)

4. as possible a long stop for coupling the train parts (for brake test and so on)

5. as possible a long stop for uncoupling the train parts (for passenger changing if needed)

6. as possible a long time to the next run (to get enough time for shunting and so on)

The window lists all possible trains, which can be used to bring the engine from the end of the last run to the

120
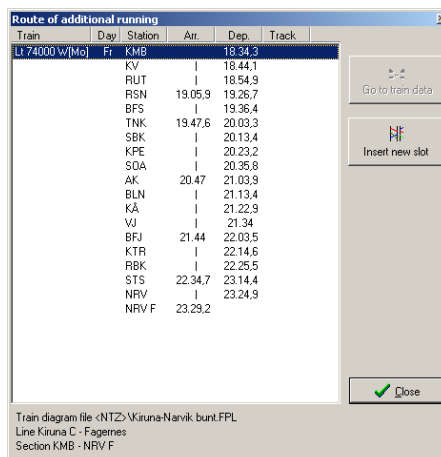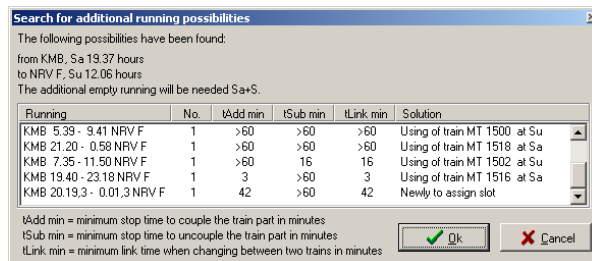
start of the next run. There is only one **Newly to assign slot** shown.

This slot starts as fast as possible after the last job to bring the engine as fast as possible to the next job. (How knows what will happen during the empty run…). The slot is optimized by latest possible departure and earliest possible arrival time. At every junction a stop is calculated, because it is not sure, that the run can pass the station without a change of direction.

It can happen, that now empty running possibility is shown. This can happen in some cases, caused by the average speed being used to calculate the run. So the average speed might be too slow or it is not useful in a line section or the usage of the line (section) is really so high, that it is not possible to run the train with average speed. All the cases, which appeared right now, could be cleared by a manual slot search.

If you double click an empty running possibility the following details are shown in an extra window:

1. If you picked an existing slot you can **Go to train data** window of the existing train in graphic timetable. The data of this train will not be changed automatically, so you can fill in the train data for the additional train part by yourself.

2. If you only need to change the operation days of an existing train the same procedure as explained in 1. has to be done.

3. In case of the new empty run slot you can **Insert new slot** to the graphic timetable(s). The graphic timetable will be opened and the slot is filled in and the train data window for this run opens. So you have to check the train settings by yourself.

These steps have to be handled stringent by the user, that the timetable design is not destroyed by an optimized circulation plan. The final liability for inserting the new train keeps by the user of FBS-programme family!

By name of multiple units or engines empty runnings multiple units are possible so that you can couple some vehicles of the same series. That means for the circulation plan, that some vehicles drive a train at the same time. So you have to check the graphic timetable again, whether multiple unit runs have influence to the running times (at least the length of the train changes).

So you can update the train data and recalculate the circulation plan. It is useful to update the trains included in the circulation plan after handling all empty runs. Otherwise you might get empty runs to round the circulation plan with an "old" empty run so that you could have trains running through the network, which are not needed for traffic but for a mistake in calculating circulation plan.

6.4.6 Current service > Reset consumption counter 1/2

Context menu inside the graphic or table circulation plan

This function resets the consumption counter 1 or 2 to zero at the beginning of this run. So you can control the consumption depending on the mileage. It does not have to be consumption in the sense of the word you could also use it for limitation of maximum distance without toilet cleaning or something else.

6.4.7 Current service > Reset time counter

Context menu inside the graphic or table circulation plan

This function resets the time counter to zero at the beginning of this run. So you can control the consumption depending on the time. It does not have to be consumption in the sense of

the word you could also use it for limitation of maximum time without toilet cleaning or something else.

6.4.8 Current service > Exchange current link

Context menu inside the graphic or table circulation plan

This function is not available now.

6.4.9 Current service > Extract (skip) journey

Context menu inside the graphic or table circulation plan

This function hides the current journey. By recalculating the circulation plan the journey is respected again. So the run is not completely erased from the circulation calculation.

6.4.10   Insert new journey > Current train

Context menu inside the graphic or table circulation plan

This function copies a service from one circulation day to another. You can set the new circulation day **only at the current operation day** or **on the following weekdays** as checked in the boxes on the bottom.

The current job will be copied to the other circulation day. To delete the original job from the circulation day use the function **Extract (skip) journey** as explained above.
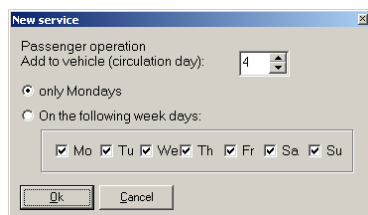
6.4.11   Insert new journey > Insert a new train

This function combines the **Insert train** function with **Insert new jouney > Current train**. So you can define here additional jobs for the engines or waggons, which are not included in the graphic timetables and bring them into the circulation graphic. If it was not possible to find a gap for this job inside the circulation day and the operation day a message tells you the problem. In this case the job is taken into the train list but could not be placed inside the graphic. So a recalculation solves this problem, but please take care, that you might need more engines to fullfill all your wished jobs for this circulation.

6.5 View Menu

6.5.1 Show trains

 or **Alt+Z**

This function opens or closes a part inside the Circulation plan window, which shows all trains and train parts, which are relevant to the current Circulation plan. The train runs are summarized along the whole run if the train runs through different Graphic timetables. The train runs are connected by their train part number and not by their train number, so please take care during the creation of Graphic timetables.

The first columns of the table show the **Train** and **train section** number and the **days of operations**. The next column includes the **start** terminal and the **departure time**, the arrival time and the **end terminal**. After that the **Beginning** and **End** column show the time where this service starts and ends, so it is the departure respectively the arrival time added by the **preparation** respectively the **postprocessing time** at this station. These times can be changed as written in chapter Register "Preparation and postprocessing at page 113. So the entries there are used to calculate the circulation.

The **Remark** column is not filled automatically but can include hints for you. The hints can be filled in as written in part Edit train at page 118.

The columns of the **weekdays** show an x if the train operates this day or nothing if the train does not operate. If the entry shows an arrow to the right a forced links is set, so that the calculation has no freedom to change the link from the arriving train to another departing train. So the last column includes the trains, which follow the current run if they are a **Forced link**, differed by the operation days if necessary. Look at chapter Assign forced links (page 120) to set or delete forced links.

The context menu in this part gives you short cuts to train related functions.

6.5.2 Show circulation variants

 or **Alt+V**

This function also opens another part inside the Circulation plan window, which shows you the know variants. The known variants are at a minimum of one up to enormous numbers or limited by your self. You can limit the number of variants automatically by Register "Selection of variants as explained at page 116 or by stopping the calculation.

Variant	Groups	Vehicles	Total mileage	Mileage per veh.	Diff. day	Diff. week	Variant	Group	Vehicle	per week	average per day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1					140,3	140,3	140,3	140,3	141,2	140,3	140,3
2	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	1	1	4765,6	680,8	680,8	680,8	680,8	680,8	680,8	680,8	680,8
3	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	1	2	4765,6	680,8	680,8	680,8	680,8	680,8	680,8	680,8	680,8
4	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	2	3	4935,8	705,1	680,8	680,8	851,0	510,6	680,8	680,8	851,0
5	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	2	4	4595,4	656,5	510,6	680,8	680,8	851,0	510,6	680,8	680,8
6	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	2	5	4765,6	680,8	851,0	510,6	680,8	680,8	851,0	510,6	680,8
7	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	2	6	4765,6	680,8	680,8	851,0	510,6	680,8	680,8	851,0	510,6
8	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	3	7	3750,8	535,8	680,8	680,8	680,8	680,8	340,4	343,6	343,6
9	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km	1	3	8	3420,0	488,6	343,6	343,6	343,6	343,6	684,0	680,8	680,8
10	3	8	35764,3 km	4470,5 km	140,4 km	524,7 km												

During the calculation you can see the best of the variants by their calculation number, which are renamed again after finishing the calculation.

The table on the left includes the most important data for one circulation. That means the number **Groups**, the needed **Vehicles**, the **Total mileage** of the whole Circulation plan and the average **Mileage per vehicle**, the average **Difference per day** and the **Difference per week**. This part of the table includes a context menu, which allows you to sort the variants your way. The functions inside the context menu are explained starting in chapter Sort var**i**ants > Delete all other variants at page 117.

The table on the right shows more details to the circulation plans shown on the left. So you can see the number of the **Variant**, the **Group** in which this vehicle is sorted and the number of the **Vehicle**. The following columns show you the mileage **per week** and the mileage as **average per day** for one vehicle. Below the first line you can see the mileage the vehicle runs at every day of the week. So you can control here the parameters for the Circulation plan.

6.5.3 Show circulation graphic

 or **Alt+G**
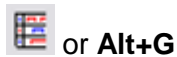
A Circulation plan is often handled as a graphic, but it is also possible to show the data in a table.

Normally you find the following data in relation to one train:
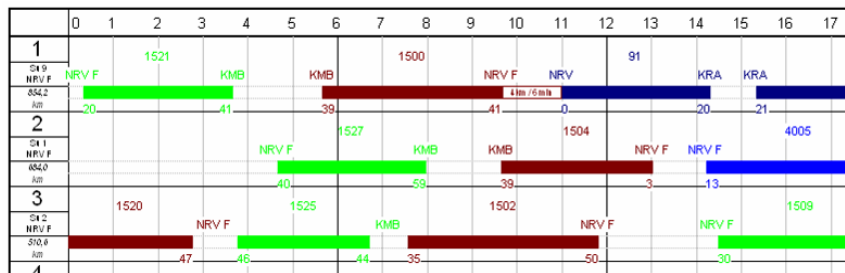
- The train number above the train bar.

- The start station and the departure time. The hour along the x-axis and the minute written below the train bar.

- The end station and the arrival time. The hour along the x-axis and the minute written below the train bar.

- On the left you find the data for this vehicle circulation, including the circulation number, link to the circulation before this circulation and the station at which the vehicle is waiting for the next job.

- On the right of the graphic you can see again the number of the circulation, the link to the next circulation and the station at which the vehicle is waiting for the next job.

- At the midnight time line the total mileage of every circulation day is shown.

- The picture above shows also a calculated empty run in circulation one between 9.41 to 11.00 from NRV F to NRV, that means a distance of 4 km and the prediction of the running time of 6 minutes. At the end your Circulation plan should not include such unplanned empty running. How to handle the empty run information can be read in chapter Show empty running possibilities at page 120.

- For a better view the information's of the runs inside the graphic Circulation plan is shown in the colour, which is used in the Graphic timetable. So you can also differ here between the different train head codes.

6.5.4 Show circulation table

 or **Alt+T**

The circulation table is another way to show the circulation data. This mode allows a compressed presentation in relation to the circulation graphic.

The information about the predicted time for an empty run is not shown.

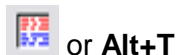On the right you can control the different counter values for **Maintenance**, **Consumption 1 and 2** and the **Operation time**

Variant	Group	Vehicle	Day	Empty running	Train / train section	from	Departure	Arrival	to	Maintenance	Consumption 1	Consumption 2	Operation time
1	1	1	Mo		MTL 1521	NRV F	0.20	3.41	KMB	10411,0 km	10411,0 km	10411,0 km	115.53
1	1	1	Mo		MT 1500	KMB	5.39	9.41	NRV F	10581,2 km	10581,2 km	10581,2 km	119.55
1	1	1	Mo	3,7 km	R 91	NRV	11.00	14.20	KRA	10753,0 km	10753,0 km	10753,0 km	123.15
1	1	1	Mo		R 96	KRA	15.21	20.10	NRV	10921,1 km	10921,1 km	10921,1 km	128.04
1	1	1	Mo	3,7 km	MTL 1517	NRV F	21.16	0.22	KMB	11095,0 km	11095,0 km	11095,0 km	131.10
1	1	1	Tu		MT 1524	KMB	2.20	5.54	NRV F	11265,2 km	11265,2 km	11265,2 km	134.44
1	1	1	Tu		MTL 1501	NRV F	7.05	10.55	KMB	11425,4 km	11425,4 km	11425,4 km	139.34

6.5.5 Show graphic header

| Mo | iRFP
depot: KRA F
shed: KRA | **Circulation plan**
Series Test | Date: 19.05.2007 \| No. of vehicles: 11 veh.
Mileage of all vehicles per week: 45037,8 km
av. mileage per vehicle and day: 600,5 km |

The graphic header is designed especially for printing of circulation plans.

This function hides or shows the graphic header if the circulation graphic is shown. The header cannot be shown in the circulation table. The contents of the header can be set as written in chapter Headlines... at page 125.

6.5.6 Zoom in/out

To zoom in or out you can use this function. This function works only in the circulation graphic.

6.5.7 Fit to page width

This function is only useable in the graphic circulation plan and if you selected to show only one day (look at part Day of week, at page 126). By clicking this button the graphic is sized to the width of your screen to get a better overview of the graphic. The height of the page is also sized in the relation given by DIN-A-paper format to the width.

6.5.8 Headlines...

This function allows you to change the data in the head of the Circulation plan. The **Headline** and **Circulation plan's title** includes the data shown in bold type in the centre part of the headlines.

The left box of the headlines is normally used for **Railway administration, operation yard and so on**. The contents given by the programme can only be a hint for you.

The right box can include a mixture of text and data shown by the following synonyms:

- #fa – for the number of runnings,

- #fz – for the number of vehicles needed,

- #gr – for the number of vehicle groups,

- #zg – shows the number of trains inside the circulation plan,

- #l1 – shows the running performance of all vehicles per week or

- #l2 – shows the average running performance per vehicle and days.

You cannot change the typeface of the headlines.

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6.5.9 Day of week

 or **Alt+1 to Alt+7** for single day of the week (1=Monday … 7=Sunday) or **Alt+0 for the whole week**

You can select here directly the day of the week, which should be shown in the graphic circulation plan. You can differ between the whole week and a single day.

6.5.10   Line height/line number

This function sets the height of a line or the number of lines, which would be seen. This is helpful if the runs are only short and so many data are shown in less space. You can also fill in a number of lines per page.

You can also set the height of the line automatically to use the size of your screen as maximum.

6.5.11   One line up/down

 or **Shift+Up/Down arrow**

You can scroll one line up or down this way to use defined jumps between the rows of the graphic circulation plan.

6.6 Tools

6.6.1 Show train balance

 or **Context menu inside the train list**

The train balance window is designed to show the **Number of Arrivals** and the **Number of Departures** in all stations in which trains start or end. The **Difference** between arriving and departing trains is shown in extra column. If this difference is 0 in every station at every day a simple circulation plan without empty runnings could be calculated. If the difference is not 0 in on of the stations (and so automatically in a second station too) empty runnings are unavoidable.

The window shows also the number of **Trains maximum** in the station to be able to control the **Iteration depth** of the circulation calculation (as explained in Register "Circulation forming at page 115).

The table inside the window is sorted at first by the abbreviation of the **stations** and as second by the **Days** of a week.

The button **Mo…Su** shows the balance for every day of the week. The difference in arrivals and departing at single days is not a sign for necessary empty runnings. The **sum** of the week is important for the need of empty runnings if it is not 0. So you can also show the sum of every station in a week.

It might be possible to create better circulations within empty runnings also if the train balance in all stations all over the week is 0. A better circulation might be a circulation with fewer vehicles.

6.6.2 Arrival and departure list

▦ or **Context menu inside the train list**

The arrival and departure at reversing station window shows a list of **Arrival times** and **Train numbers** in opposite to the **Departure times** and **Train numbers** at a station and on a single weekday. This list might be helpful for you to control, whether all trains are found and which links are useable at this station.

6.6.3 Show links

This window shows you the **Day**, the **Train**, the **Arrival** time and the station, **in** which the train ends. The next **Possible links to** another train is shown by the **train number**, the **operation day**, the **departure time**, the **next final station** and if the button **Time** is set the link time between the postprocessing and the preprocessing time.

For a better overview you can see only one day of the week with all the possible links at this day.

To define a forced link you can double click a line and the known forced link window opens (explained in chapter Assign forced links at page 120)

6.6.4 Convert circulation into forced links

This function sets all the links in the current circulation plan to forced links. After this the circulation could not be optimized any more. So a dialogue helps you to make sure that you know what you are doing. If the circulation plan includes empty runnings another window shows you this and asks you, whether this links should be set to forced links too or not.

6.6.5 Show link spreading

▦

This function opens the window, which is still explained in Register "Circulation forming at page 115.

6.6.6 Ruler > Off

This function hides all rulers inside the circulation graphic.

All ruler functions are only useful if you have choosen one job, which resets one or more of the counters.

6.6.7 Ruler > Operation time

This item activates the **Operation time ruler** inside the graphic. This timer shows you the sum of the time used since the last reset of the time counter. So you can control the operation time.

6.6.8 Ruler > Mileage maintenance

This ruler can control distances between two maintenance jobs. To use it correctly you have to define at least one job for maintenance inside the circulation plan.

6.6.9 Ruler > Mileage consumption 1/2

Both mileage consumption counters can be used for two different jobs depending on the mileage, for example for refilling water and coal. They are not combined so that you can use them for completely different jobs.

6.6.10 Check counter value...
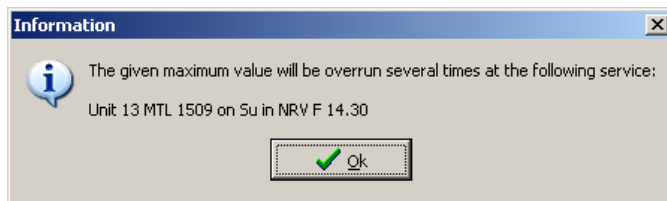
This function opens a window, which allows you to check the counter value to a maximum of kilometres or hours. By pressing **Ok** a window opens that shows you at which job the maximum value will be overrun. There is only the first job to be seen, which could be found. If no job crosses the counter limit it is also shown to you.

6.7 Moving inside of the circulation plan

6.7.1 Zoom in/out

In large circulation plans it might be helpful to zoom into special parts, to control data or to see more details for conflict handling. This can be done in two ways:

- You can zoom in positioning the mouse pointer at one of the corners of the zoom area. Press the **Alt** button and move the mouse to the other edge of the zoom window. The margins are shown on the screen to control the size of the window. After leaving the **Alt** button the window is frozen on your screen. A **click** inside of the window zooms in and a click outside of the window erases the window.

- You can change the zoom factor by typing a new zoom factor and pressing **Enter** independent from the choosen mouse button in the toolbar. There are also predefined relative functions available (Page width, Page height, Whole page) or often used absolute zoom factors, which can be called up by a list. Das funktioniert nur im Bildfahrplan?! Wenn das überall gehen soll, dann das ganze Kapitel nach vorn als Grundlage für alle Programme?

- The (**+/- button at the keypad**) buttons increase or decrease the zoom factor by 50% at every click.

- You can skip between the current and the last zoom factor by **F12**.

By useing these functions you change the connection between the defined paper and the shown contents on your screen.

6.7.2 Moving the current position

You can move easily inside of the graphic timetable. There are two functions available to change the current position, which is shown to you without changing the settings for the shown data on the paper:

- Move the mouse during you click inside of the graphic timetable.

- You can also use the vertical and horizontal scrollbars. If necessary you might activate them in **Options** menu.

7 <u>Interval graphic</u>

7.1 *General*

The graphic timetable is a helpful paper to get an overview of the railtraffic along one line inside of a network. If the passengers or freights use some lines during theire trip it is important to synchronize the traffic on different lines for an easy journey. This can be done in side the interval graphic, which shows only the important stations and the arrival and departure times there. Railway networks with theire lines can be shown easily this way.

The interval graphic shows the nodes and the train lines operating theire in a schematic way, which are linked to the geographic positions and the timestamps taken from the graphic timetable. So you can see the important timetable connections of a railway network in one view.

The interval lines inside of the graphic can have different line styles, width and colours to differ between train types and interval times of different trains. The interval lines are connected to the stations along the run and change theire direction orthogonal. Additional points along the line can give you informations to the stops between the shown stations, the name of the line and so one.

7.2 *Adding a new interval graphic*

After calling up the function **new interval graphic** the basement of the graphic is created in the background. So the title, the stations and the defined logo are positioned inside of the graphic.

A window appears, which allows you to edit the **Properties of interval graphic** as explained in chapter 7.3.6 part Properties starting at page 139. It is helpful to select the paper size before editing the interval graphic, because the elements do not move or size if you change the paper size later on.

After that you are in the interval graphic window to start editing the interval graphic.

To create a useful graphic, you should walk the following steps:

1. Editing the nodes
2. Filling in the interval lines
3. Move the elements for well arranged view
4. Synchronize the changings to the graphic timetables
5. Filling in explanations and hints
6. Printing.

All these steps are explained in the following chapters.

7.3 *Graphic Menu*

7.3.1 Synchronise with timetables>Current interval line's point

Context menu for a marked interval line's point

This function is only available, if an interval line's data point is marked. A basepoint cannot be compared with the graphic timetable.

A window shows you the difference between the graphic timetable and the interval graphic, if there exists one. You can **Correct** the data or **Cancel** the changings.

7.3.2 Synchronise with timetables>Current interval line

Context menu for a marked interval line

This function is only available, if an interval line inside of the interval graphic is selected.

A list shows you all changes along this part of the interval line. Marking them and pressing the **Correct**-button can brings the changings into the interval graphic.

7.3.3 Synchronise with timetables>Whole interval graphic

This function checks all the data inside of the interval graphic against the data to be found inside of the graphic timetables. If changes could be found a list opens, which shows you all changes. Select the data by the Windows® marking system and use the **Correct**-button to achieve the changings.
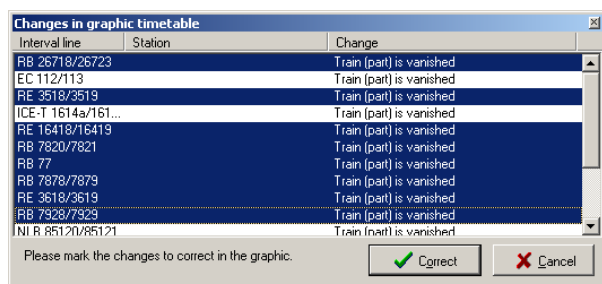
If no changes could be detected, a message shows you this.

7.3.4 Print

Ctrl+P

This function opens the FBS-print-window, which is not explained again here.

7.3.5 Close

Alt+F4

This functioin is trivial to finish editing an interval line and closing the object.

7.3.6 Edit Menu

7.3.7 Edit off

F1

This function deactivates all active editioning parts inside the interval graphic. So you can deactivate them faster than clicking every one alone.

7.3.8 Edit of stations/interval lines/graphic elements

F2 … F4

This button activates or deactivates the different editioning functions. There are different functions group behind this buttons. You can **Insert new station** or **Delete stations** by activating the **Edit of station** function.

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The **Edit of interval lines** allows you to add, change or delete interval lines.

Edit of Graphic elements is used to fill in or change additional informations to the interval graphic.

7.3.9 Insert new station

 or **Context menu**

This function opens a list of all train order change places or access stations, which could be found inside of the defined network. By using the right mouse button inside of the table you can show all operational facilities. The list is sorted by the **Abbreviations** and includes the full **Name**, the **Number of lines**, which have been found there and the **coordinates** taken from the Station table
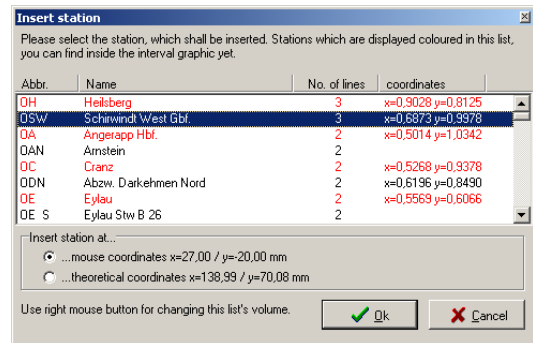
7.4 English translation

Sorry, for this new function does not exist an english documentation. It will be filled in as soon as possible.

Documentation to FBS
Edition November 2015

Chapter 8 • Create Arrival & Departure poster
8.1 • Part "Timetable poster for..."

8 Create Arrival & Departure poster

The posters are designed for passenger informations at a station. The design of these posters is not defined in any directive, so that we give you a help to create this kind of passenger information.

At the end of the creation of a new timetable poster Microsoft®-Word or Microsoft®-Write are opened to see the result of your work.

8.1 Part "Timetable poster for..."

Here you can select the station or location for which you would like to create the timetable poster. You can also differ between arrival and departure times.

8.2 Part "Included trains"

Here you can controll the train types, which should be shown. At first you can differ between **passenger trains** and **freight trains and others**. It is also possible to choose no one of these options and fill in the train types manuall. Please separate them by commata. If you click the arrow on the right of the box, a list, including all train types in the network, is shown. You can also click the train types there.

8.3 Part "Rounding rule ..."

Here you can select the rounding rules for the included times.

8.4 Part "Created poster..."

At the moment you can only save it as a file. You can fill in the path and file name manuall or use the Windows®-save as window to choose the position of the created file. The data is saved as Rich-Text-Format-files (*.rtf).

8.5 Part "Contents"

The contents are set here to give you the possibility to create the timetable posters in the design you are interested in.

So you can select at first the data belonging to the train at the current station. So you can include the **time**, the **days of operation** in UIC411-style or an FBS-style. If you want to have operation days at every train please activate the **show daily also** box. The **train type**, the **train number** and the **track** can also be shown.

For a better overview it might be helpful to see the **start and end terminal** of the whole train run **added by the linked times**.

Some railway operators like to show the next stations following after the current station. One option is to show all following stopps until a limit of stopps is reached. You can also include stopps, which have a regular stoppage time higher than a time limit set by you. Also all stopps with the highest-level service can be included. It is also possible to include stopps by yourself to mark stations with a special interest for the passengers. For example: to get access to a fair area or a park or something else.

It might be helpful for you to get every station in theire own line. This can be helpful if you would like to go one designing the timetable poster in other programmes.

Station database (look at chapter 9 at page 145). If iPLAN could find coordinates you can choose the option to **Insert station at thertical coodinates** on the bottom of the window. If the coordinates cell is empty, you can only **Insert station at mouse coordinates**. Calling up the function by the **Context menu** uses this option the best way. Otherwise the mouse coordinates are set to the upper left corner of the interval graphic.

Coloured stations are still included to the interval graphic. You cannot insert them again.

8.5.1 Delete station

 or **Context menu**

This function deletes the selected station from the interval graphic after your confirmation to this function. All train lines, which have a connection to the station, are deleted too.

8.5.2 Insert new interval line

 or **Alt+N** or **Context menu**

A line means here a group of trains running from one station to another station in a clock face time. By calling up this function an assistant starts to lead you through this function.

8.5.2.1   Step 1: select an interval for the line

The window shows all lines, which are found inside of the whole network. By a context menu inside the table you can edit the filter function to select the shown trains. It is possible to show the **Intervals only**, **All passenger trains** or **All trains**.

The table consists of different columns, to give you the possibility to choose the right one of the lines. The **Type** is taken from the train type as set inside the **train data window**. The data inside the **Line** columns is taken from the line entry done by a train part row inside of the **train data window** as explained at chapter **The registers of the single route sections** at page 59. The following columns show you the operation **Days,** the **Interval**, the **Number** of trains, which belong to this line, the **From** station and theire **Departure** time and the **Arrival** time at the **To** station.

If you used different train part numbers you will find two lines with the same name and train type operating from station A to B and B to C. The connect them you have to check the train part numbers inside of the different graphic timetables. If you made a circulation plan with this trains, you also might have found different jobs for a train you created for running through. So take care for the train part numbers to get a correct behaviour of the iPLAN programme.

So please select the line operating from A to C and press the **Next** button.

8.5.2.2   Step 2: select the route for the line at the graphic

All stations along the run of the line are shown in two lists to select the **First** and the **Last station** of the interval line inside of the graphic timetable. The first and the last station, which could be found is marked automatically, so that you can skip this step by the **Next** button, if you are not interested in changing the first and the last shown station.

If you made a mistake you can get back by the **Back** button.

Step 3: select the interval for the opposite direction

The next window shows you all kind of trains, which belong to the same group you have choosen for the first direction, which are running the opposite direction. So please select here the line for the opposite direction or use the option **No interval in opposite direction** on top of the list. After that, use the next button to get to the last step.
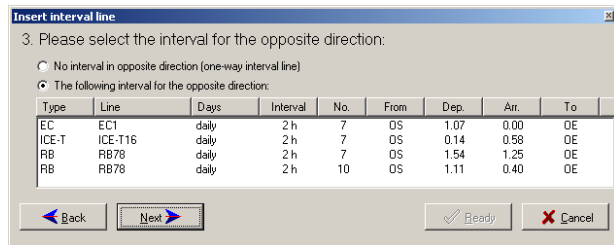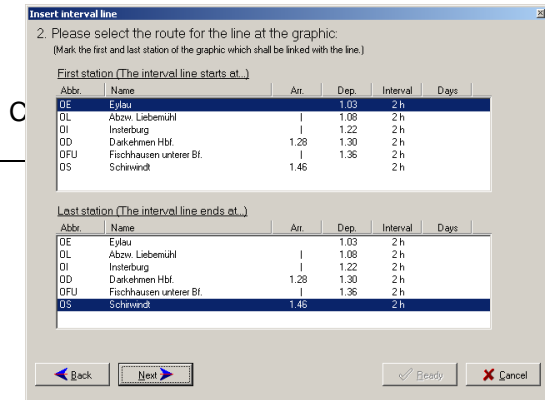
8.5.2.3 *Step 4: configure additional properties of the interval time*

At first you can change here the **Name** of the line to get another **labelling of the line**.

Below this line you can see one or more registers in relation to the stations during the run. The stations, where the operation days change en route, separate these registers.
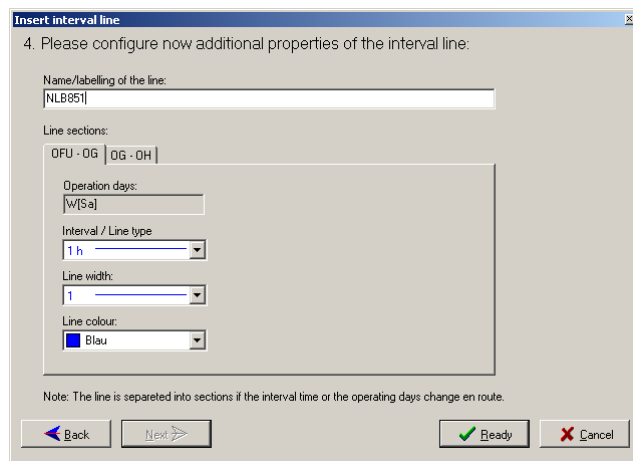
Just for youre information you can see at first the **Operation days**. After that you can change the **Interval/Line type**. There exist line types for the steps of 15, 20, 30 minutes, 1, 2 or 4 hours and a free style for trains or groups of trains, which do not operate in intervals.

The **Line width** and the **colour** can be changed to mark the importance of the train.

All these settings can be differed for every operation day register.

After finishing these steps you can use the **Ready** button to insert the interval line or the **Cancel** button to stop it. You can skip between the steps by the **Back** and **Next** buttons.

A new interval line's point can be filled in as explained in chapter 8.5.14 starting at page 141.

8.5.3 Delete interval line

or **Context menu**

This function deletes the selected interval line from the interval graphic after your confirmation to this function.

8.5.4 Delete interval line's point

Ctrl+Entf or **Context menu**

This function works different by the function of the selected line's point. If you selected a point, which is only used for fixing the line or changing the direction it will delete the point without any confirmation. If the point includes further informations, you have to confirm the deletion of the point.

8.5.5 Exchange interval line's point with previous/next point

To get a better overview you can change the positions of two line points with additional informations.

8.5.6 Insert a new graphic element

or **Context menu**

You can fill in five types of graphic elements:

- Rectangle,
- Textbox,
- Picture,
- Line and
- Legend.

The rectangle is only a graphic element, which includes no text or pictures. It is only used for marking an area.

The textbox is filled with a text to explain some facts.

A picture can be used to

Please give all elements a name to be able to identify them in other lists again. This helps you to copy the elements from on interval graphic to another.

8.5.6.1 *Element Rectangle*

8.5.6.1.1 Part "Position at page"

Two points define the rectangle. The **x** and **y-coordinates** set one of the points and the other one by the **Width** and **Height** of the rectangle.
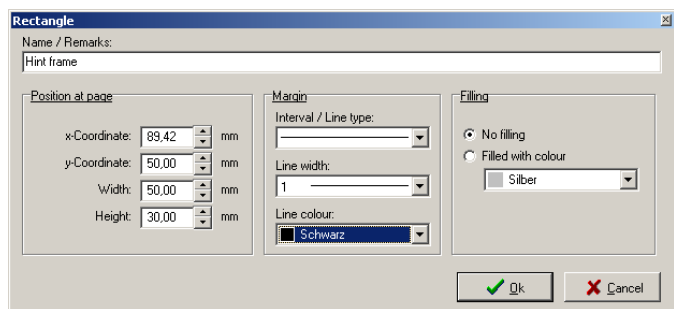
8.5.6.1.2 Part "Margin"

The **Interval/Line type**, the **Line width** and the **Line colour**, which can be changed here, define the margins.

8.5.6.1.3 Part "Filling"
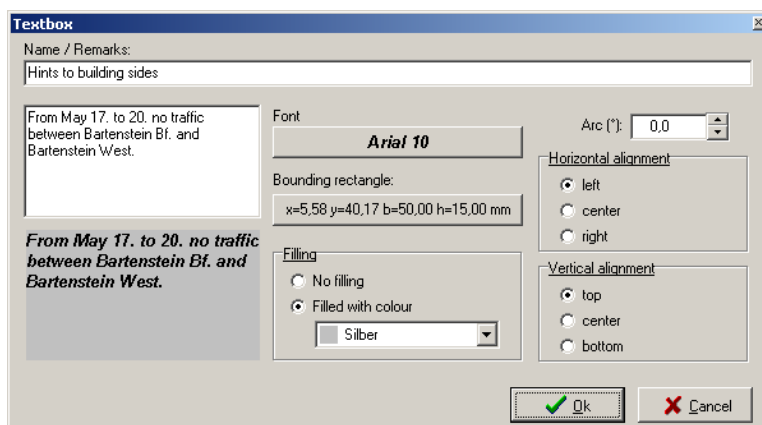
The rectangle can be kept blank or filled with colour, which you can select here.

8.5.6.2 *Element Textbox*

A textbox is used to fill in additional hints in clear text. The

box on the left bottom gives you a preview to the settings, which you still made. The preview is only made for checking the contrast between the text, the Font settings and the background. The text himself has to be filled in the field above the preview area. Fill in the text without respect to the size of the box. The alignment is done after closing this window. You can set the **Font** by clicking the button within the current typeface. A Windows® typeface editor opens to change the settings. The **bounding rectangle** can be defined behind the button, which shows the current settings. The top left corner and the width and height define the rectangle here too.

In some cases it is helpful to position a text in an angle. You can set them by the field **Arc**.

8.5.6.2.1   Part "Filling"

You can select here the background colour for the text. If you would like to get a coloured rectangle within your text you should define a rectangle with the wished background colour and position it behind the textbox, which has no filling.

8.5.6.2.2   Part "Horizontal/Vertical alignment"

The alignment of the text can be edited here. You can mix here three positions in horizontal and three positions in vertical direction.

8.5.6.3   *Element Picture*

The picture element fills in a graphic file into the interval graphic. You might use it to show logos for operators or logos for regions, which are shown here. The file can be choosen by the button behind the **Path and filename of picture file**. If you set a logo inside the Configuration window, this logo is set here as default too. You can change it here or add other logos this way. The position of the logo is set by the **x-** and **y-coordinates** and the **Width** and **Height**. To get a good view to the face of the logo you can mark the check box on the bottom to **Keep original height-width-dimensions**.
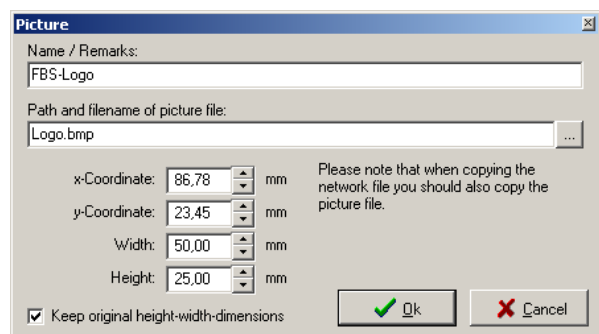
8.5.6.4   *Elements Line and Legend*

These elements are not available right now.

8.5.7 Delete graphic element

All graphic elements are delected this way, after your confirmation.

8.5.8 Duplicate graphic element

Context menu

This function copies and pastes the element again into your interval graphic. The new element is position close to the existing element and has the same name. So it might be helpful to change the name of the new element as soon as possible to keep the overview of all elements inside of the interval graphic.

8.5.9 Move object into foreground/background

Alt+V for foreground and **Alt+H** for background or **Context menu**

These functions are used to bring one of the elements infront or behind another element, if they overlap at any parts. The elements are always shown behind the stations and the train lines.

8.5.10   Show list of objects

🔲 or **Alt+L** or **Context menu**

This window shows you all elements, which could be found inside of interval graphic. **Stations**, **Interval lines** and **Graphic elements** are differed in the three registers. You can control the elements by some properties, which are shown inside of the tables. You can select elements from each one of the registers or **Select all** inside of the interval graphic. All selected elements are summariezed on the bottom of the window. The context menu inside of the tables leads you to three items.

8.5.10.1 *Edit element*

The **Edit** function brings you to the different property windows of the elements. The list of objects is kept in the background and activated again after finishing the editing.

8.5.10.2 *Move/Resize selected elements*

You can also **Move/Resize** the elements to reposition. A new window opens, which allows you to **Move** the elements **by dx** and **dy** in millimetres to use get a better overview. It is also possible to **move and scale free by factor** to get larger or smaller elements. If you select this you can set the calculation to **Round coordinates by grid size** and/or to **Scale up/down type size too**.

Otherwise you can **Move to left up – right down** the selected elements to the four corners of the defined graphic.

Last but not least you are able to **Move and scale into the full paper size**. So the programme calculates the scale factor automatically to get the best useage of the interval graphic. It is useful to activate the option for **Proportional** scaleing to keep the form and layout of the graphic alive. The **Distance from margin** can be set to keep space between the elements and the margins. The **dimensions of textboxes** can be **considered** or **not** to keep the all elements inside of the margins or only the stations and train lines.

Some functions are only available if they have an influence to the result.

8.5.10.3 *Copy to …*

The selected elements can be copied to another interval graphic inside of all open *.ntz-files. A list allows you to select the target of the copy.

8.5.11   Properties

Alt+Enter

The content of the property window depends on the element you selected. The properties of the interval graphic can be changed if you did not select an element.

8.5.11.1 *Properties of interval graphic*

8.5.11.1.1 Part "Paper alignment"

The size and the orientation of the used paper can be set here before you start the **Print**-function. It is possible to use predefined **DIN-A**-dimensions of paper in **Vertical** or **Horizontal** orientation. If your papersize is different to the German DIN-format you can fill in an individual **Width** and **Height** of the paper.

The sizes and positions of the objects inside of the interval graphic are not changed automatically. So you can define a larger papersize if you find out during your work, that the choosen size is too small.

8.5.11.1.2 Part "Margins"

You can define here **Margins** to keep the elements in a distance to the paper dimensions. All four of the margins can be changed independed for example to create enough space to file the paper.

8.5.11.1.3 Part "View"

This part allows you to **Show margins** at the screen only or to hide them.

As default value all trains times are shown on the rightern side in running direction. You just can turn it around, if your trains are running left-handed. To activate this option please set the check box **Show times for left-hand operation**.

In some cases it could be helpful to see the **run-through times**. These times are shown the same way as departure times, but there is no arrival time to be seen.

For showing the differences of stops between faster and slower train categories it is helpful to show the number of stops, which are not to be seen inside of the interval graphic. If there is only one stop between two included stations there is a point to be seen, which can also be shown by a **single stop as number**.

Clicking the button, which shows the current setting, you can change the **Font for time values**. A Windows® known window opens to set another typesize.

8.5.11.1.4 Part "Grid"

The grid is used to catch moved or sized elements to a grid. The result of your work will have a better view if all elements in a line are in a line. Two grids exist here: one for the **General** positioning of elements and the other one for the **interval lines at stations**.

Setting the value to zero deactivates the grids.

8.5.11.1.5 Part "Loading train data from graphic timetable"

The line name is normally taken from the cell being filled in the **Train data window** (as explained in chapter **The registers of the single route sections** starting at page 59). You can also recrute a line number, if there is nothing filled inside the train data. The name will be set together by **train type** and **number**. To keep the overview it is possible to use only the first figures of the train number by selecting the divisor for the train numbers to get the line number. So you can also define a line name by clever train numbers.

As known from other objects or other results of FBS you can change here the **Rounding rule for arrival and departure times** by a given list of possibilities.

8.5.11.2 *Properties of a station*

A station can be handeld as a combination of the elements Rectangle and Textbox. The upper part of the window allows you to edit the settings of the rectangle, which is needed to connect all the lines passing or starting or ending at the station. Further details to the settings are written in chapter Element Rectangle starting at page 136.

The other part is used to set the shown text. The functions of a textbox are still explained in chapter Element Textbox at page 136.
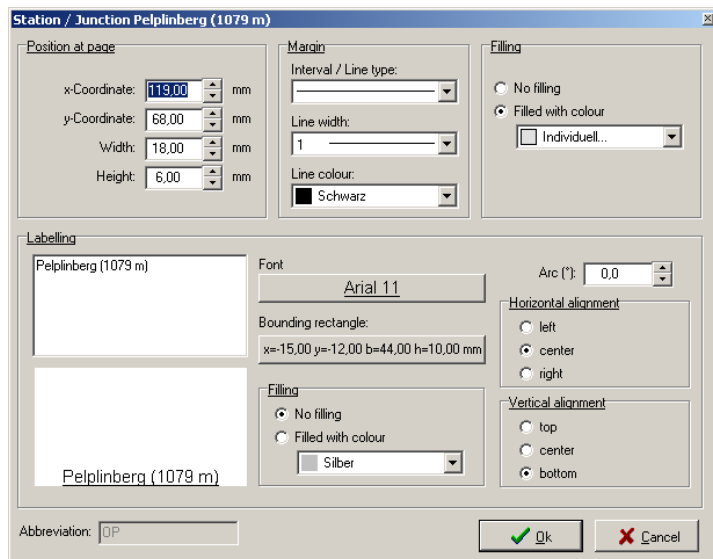
8.5.11.3 *Properties of an interval line*

The Name of line is used for sorting and showing it in lists and to label the interval line inside of the interval graphic.

8.5.11.3.1 Part "First line type"

You can change here the **Interval/Line type**, the **Line width** and the **Line colour**. These settings are only validly for the current part of the interval line.
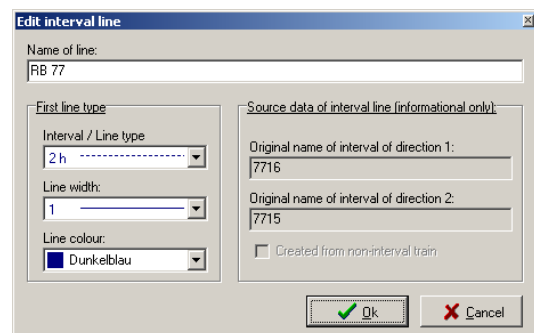
8.5.11.3.2 Part "Source data of interval line"

This part shows you the train numbers, which are used to collect all shown data. One of them runs in the first choosen direction, the other one just the opposite. The check box shows you, if a non-interval train creates this interval line. This box should give you a hint that a comment should be given to this line, because there is no interval to befound behind this line.

8.5.11.4 *Properties of an interval line's point*

The properties of interval line's points are explained in chapter Insert a new interval line's point starting at page 141. To reach the properties of an interval lines point, you have to select the interval line and after that the exact point.

8.5.11.5 *Properties of a graphic element*

The properties of the graphic elements are still explained in the chapter Insert a new graphic element starting at page136.

8.5.12   View Menu

8.5.13   Zoom in/out

🔍 🔍 or **+/- at the keypad**

You can zoom in or out this way to get a better overview or to see more details. It is also possible to select one of the given zooms inside the `100 %` ▼ list or to fill in a value by your self.

8.5.14   Further Functions

8.5.15   Insert a new interval line's point

Ctrl+Einfg or **Context menu** (if an existing interval line's point is marked)
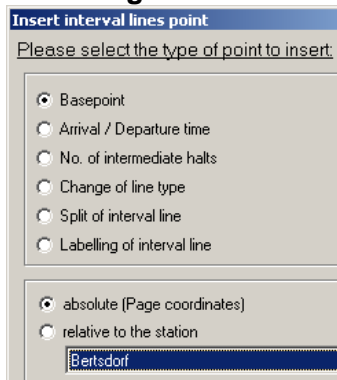
8.5.15.1   *General*

There are several interval line's points available to show different informations. A **Basepoint** is used to change the direction of the interval line. The **Arrival / Departure times** show the times along an interval line in relation to a station. The **No. of intermediate halts** can be shown separate to see the different stops during a run. If there are different interval times in some sections a **Change of line type** is required. A **Split of interval line** separates the lines in two ways: a train is shared to run on two (or more) lines or to change the lines and this way also the interval times. For example **Labelling of interval line** can show the name of a train line.

Except of the Arrival / Departure times all other informations can be shown independent from a station. So you can set the coordinates **absolute** or **relative to the station** selected by the list of stations.
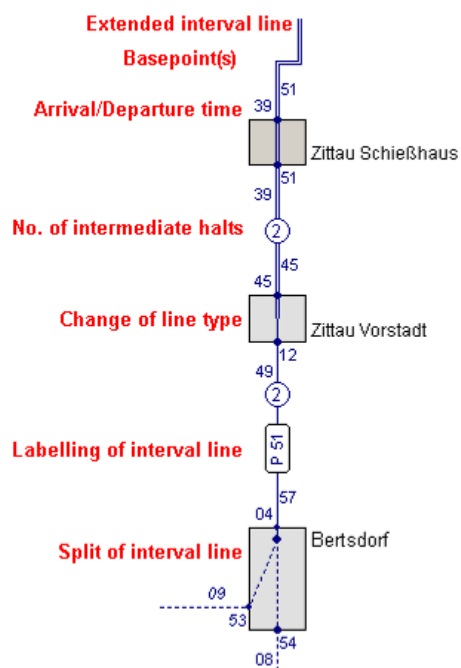
8.5.15.2 *Basepoint*

A Basepoint is used to change the direction of the interval line, without any additional information. So a basepoint is filled in the line without any additional information. You can move the basepoint by drag & drop and change the direction of the interval line easy this way.

8.5.15.3 *Arrival / Departure time*

8.5.15.3.1 Part "Coordinates"

This line point can only be shown at a station line, so that you can only edit the **x**- or **y**- coordinates of the Arrival / Departure time. It is easier to position the point by drag & drop inside of the graphic.

8.5.15.3.2 Part "Arrival / Departure"

This part shows at first the **Orientation** of the shown times. One point shows even the arrival time of one direction and the departure time of the other direction. If the train Runs through, there is only the departure time to be seen. The shown times are to be seen inside of the **Arrival Direction A** or **Departure Direction B**. If the train of this train line **Run through** just click the check box behind the times. If you fill in a new Arrival / Departure lines point, you can also collect the data from the timetable, which would be exact.
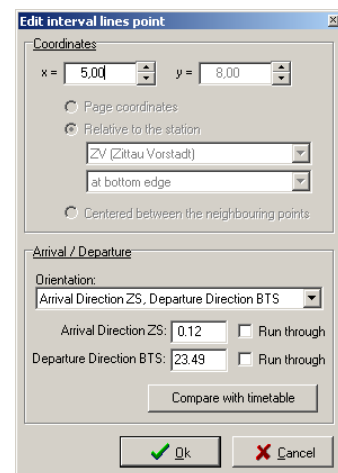
8.5.15.4 *No. of intermediate halts*

8.5.15.4.1 Part "Coordinates"

The **Number of intermediate halt(s)** is shown between two stations. So you have three ways to position the point:

- At the Page coordinates,
- Relative to the station or
- Centered between the neighbouring points.

The page coordinates are given at first by the mouse coordinates and can be changed inside of the window by the **x**- and **y**-coordinates. It is easier to mark the point inside of the graphic and move it per drag & drop.

If you would like to position the point **Relative to the station**, you can select by the first list the station and the second list shows you the four possible edges of the station rectangle and as fith option a **freely moveable** position. The point can be moved by drag & drop inside of the graphic, but it is not possible to position the point outside of the station rectangle as long as this option is choosen.
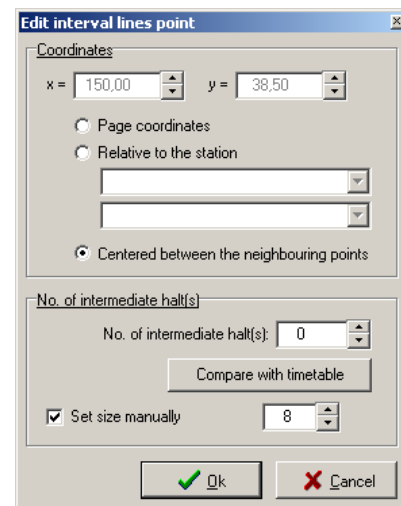
For a better view and an eaysier positioning you can also use the option **Centered between the neighbouring points**. As points are only the Arrival / Departure points and the Basepoints accepted. It is not helpful to position another information centered between two other information points, which are freely moveable.

8.5.15.4.2 Part "No. of intermediate halt(s)"

You can fill in the value directly into the filed or **Compare with timetable** to get the exact figure. It is possible to **Set size manually** if you use the checkbox and fill in the new size of the data point.

8.5.15.5 *Change of line type*

8.5.15.5.1 Part "Coordinates"

This part is the same as explained in Part "Coordinates" at the No. of intermediate halts chapter at page 142.

8.5.15.5.2 Part "Change of line type"

Here you can change the Interval / Line type by a given list. The Line width and the Line colour can also be set here, if they should be changed. A change of line type is automatically set, if it appears at a border of a graphic timetable.
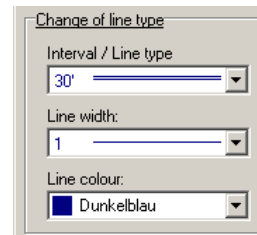
8.5.15.6 *Split of interval line*

8.5.15.6.1 Part "Coordinates"

This part is the same as explained in Part "Coordinates" at the No. of intermediate halts chapter at page 142. The only one difference here is, that these points cannot be centered between the neighbouring points. A train line cannot be splitted outside of a station rectangle.

8.5.15.6.2 Part "Split of interval line"

Here you can select the **Target interval line and direction** by the name of all filled in interval lines. This data is used to show the correct data along the line starting here.
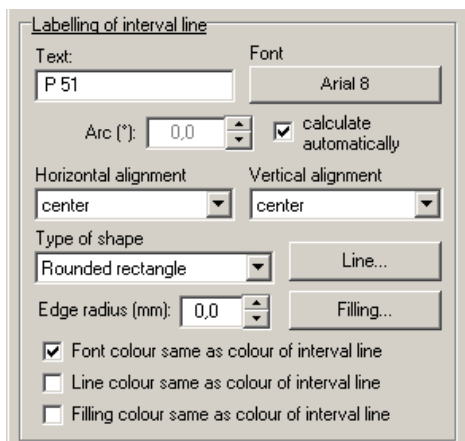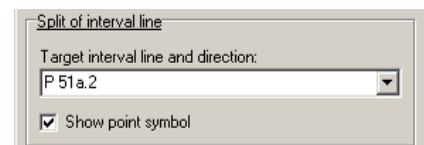
8.5.15.7 *Labelling of interval line*

8.5.15.7.1 Part "Coordinates"

This part is the same as explained in Part "Coordinates" at the No. of intermediate halts chapter at page 142.

8.5.15.7.2 Part "Labelling of interval line"

The content of the label is set in the **Text** field. The data is taken at first from the train data inside of the graphic timetable. You can change the name here, if it is needed. Using the button, which shows you the current settings of the font, you can edit the **Font**.

The alignment of the text is normally set at the right angle to the bisecting line of the angle given from the interval lines. So the **Arc** can be **calculated automatically** by the programme or beeing set by yourself after deselecting the check box for automatic calculation.

The **Horizontal** and the **Vertical alignment** inside of the label can be set by the two lists.

The **Type of shape** can be changed to a

- Rectangle,

- Rounded rectangle,

- Square,

- Circle or

- No shape.

The **Line** settings and the **Filling** of the shape can also be changed behind the buttons. In some cases you can edit special data for one kinde of a shape.

The **Font**, **Line** and **Filling colour** can be fixed to the **same as colour of interval line**.

8.5.16   Extend interval line

Context menu

This function is only available, if you selected the last existing point of an interval line. The interval line will be extended this way to a point, which you have to select in the opened window. This way you can indicate trains running out of the area shown inside your interval graphic. The settings of this point can be done in the same way, as if you would insert a new interval line's point.

9 Station table

9.1 English translation

Sorry, for this new function does not exist an english documentation. It will be filled in as soon as possible.

Documentation to FBS
Edition November 2015

Chapter 10 • Create Arrival & Departure poster
10.1 • Part "Timetable poster for..."

10 Create Arrival & Departure poster

The posters are designed for passenger informations at a station. The design of these posters is not defined in any directive, so that we give you a help to create this kind of passenger information.

At the end of the creation of a new timetable poster Microsoft®-Word or Microsoft®-Write are opened to see the result of your work.

10.1 Part "Timetable poster for..."

Here you can select the station or location for which you would like to create the timetable poster. You can also differ between arrival and departure times.

10.2 Part "Included trains"

Here you can controll the train types, which should be shown. At first you can differ between **passenger trains** and **freight trains and others**. It is also possible to choose no one of these options and fill in the train types manuall. Please separate them by commata. If you click the arrow on the right of the box, a list, including all train types in the network, is shown. You can also click the train types there.

10.3 Part "Rounding rule ..."

Here you can select the rounding rules for the included times.

10.4 Part "Created poster..."

At the moment you can only save it as a file. You can fill in the path and file name manuall or use the Windows®-save as window to choose the position of the created file. The data is saved as Rich-Text-Format-files (*.rtf).

10.5 Part "Contents"

The contents are set here to give you the possibility to create the timetable posters in the design you are interested in.

So you can select at first the data belonging to the train at the current station. So you can include the **time**, the **days of operation** in UIC411-style or an FBS-style. If you want to have operation days at every train please activate the **show daily also** box. The **train type**, the **train number** and the **track** can also be shown.

For a better overview it might be helpful to see the **start and end terminal** of the whole train run **added by the linked times**.

Some railway operators like to show the next stations following after the current station. One option is to show all following stopps until a limit of stopps is

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reached. You can also include stopps, which have a regular stoppage time higher than a time limit set by you. Also all stopps with the highest-level service can be included. It is also possible to include stopps by yourself to mark stations with a special interest for the passengers. For example: to get access to a fair area or a park or something else.

It might be helpful for you to get every station in theire own line. This can be helpful if you would like to go one designing the timetable poster in other programmes.

11 Station database editor

11.1 General

This programme is included in the FBS programme family and allows it to create and edit your own station database or to change an existing file.

The station database links the abbreviation and the full name of a station or location. Nearly all FBS programmes work together with the station database. So you can create stations and their abbreviations very fast to use them in all programmes.

If you would like to create your own station database please note the following conditions:

- Every station has to have an own abbreviation.

- Abbreviations have a maximum length of 5 letters or figures.

- One and the same abbreviations cannot exist for two stations.

- Upper and lower case is only differed at stations name.

- Station names can have length up to 25 letters or figures.

11.2 Create a new station database

 or **Ctrl+N** or **File > New**

A new empty database is shown to you.

11.3 Open an existing station database

 or **Ctrl+O** or **File > Open…**

The open a file dialogue opens and you can select the file you would like to edit. Station database files have the ending bsv.

11.4 Fill in a new station or location

 or **Alt+Einfg** or **Edit > Insert station…**

At first you have to fill in the abbreviation of the station. Upper and lower case is not differed in the abbreviation.

The station is sorted into the list by their abbreviation. The position inside the programme cannot be changed.

After that, please fill in the at least the name and the type of the station. The settings can be changed later if you would like to. The programme calculates the type of the station. Open the extra window by click on the **…** button. Here you can change the properties of the station. The complete settings are a sum of operational and transport properties and the current usage (out of use, under planning, …). If you call up the station in a graphic timetable the properties are filled in automatically.

The other properties you do not need to fill in. They are normally used to handle interfaces to other programmes.

Helpful are the properties Longitude and Latitude. If you would like to create a network in the iPLAN programme you can use this data to position the station in the real distance to other stations.

After pressing the button **Ok** the station is sorted in the list. This may take some time because some stations might be moved. If the abbreviation still exists a message is shown to you and you will get back to the edit window. So change the abbreviation to be able to fill the station into the list.

11.5 Delete current station from database

or **Alt+Entf** or **Edit > Delete station**

By calling up this function the current selected station or location will be deleted. The deletion has to be confirmed. It also might take several times because some stations might be moved inside the list.

11.6 Edit name or properties of a station

or **Alt+Enter** or **Edit > Edit station**

You can reach this function also by double click at the station in the list. The window to fill in a new station is opened and the station data is shown there. You can edit all properties and finish it by button **Ok** or **Cancel** the changes.

11.7 Search a station by abbreviation

or **Alt+A** or **Search > Search for a station abbreviation**

Here you can search a station by her abbreviation. If the abbreviation is not found in the list the station, which is as close as possible to your search string in alphabetic order is shown.

11.8 Search a station by name

or **Alt+N** or **Search > Serach for a station name**

A window opens in which you can fill in the search string. It is enough to fill in the first letters of the station. You can also search for strings, which are included in the string and not at the beginning of the station name. The programme searches automatically all stations, which have this string at first. The search starts at the current position in the list. If the found station is not the right one you can continue search by or **Enter** or **Search > Search further on**.

11.9 Detailed search

or **Alt+F** or **Search > Detailed search …**

Other programmes of the FBS-family to search for a station can also call up this function. A window opens in which you can fill in all the properties the station has or the stations you are looking for should have. You can use every combination of properties to limit the search. A double click at one of the found stations fills them into the programme you used.

12 Train type and head code database

This programme extends the possibilities to fill in the train type and head codes of trains. By defining train types you get a working title for trains, which have to run by the same type of transport. So you can show trains well arranged in timetables by their train type. It is also possible to calculate statistics for train types.

12.1 Menu file

These functions are similar to all the other FBS programmes. Please do not forget to save your znv-file after finishing your work.

12.2 General description of file

The general description of file is only a text to explain the data included in the file. For example: Train types until 2003.

12.3 Administration of train types

12.3.1 Insert a new train type

or **Edit > New train type**

Every train type has an own name and abbreviation. Please fill in the new abbreviation and the full name of the train type. The description is only optional but it may help you if you would like to edit the train types later. Every train type should be assigned to one of the general train types shown in the box.

The design of the train lines in the graphic timetable is also set here. You can change the line style, the width and the colour. Normally important trains are shown in fat lines and empty stock trains are shown in broken line.

12.3.2 Edit a train type

or **Edit > Edit train type**

Please select at first in the left column the train type you would like to edit. You will reach the same window as in item **New train type** but filled in with the data of the current train type.

12.3.3 Delete a train type

or **Edit > Delete train type**

The marked item in the list is deleted this way. Of course there will be a call back before the train type is finally deleted.

12.4 Administration of number range

12.4.1   General

By filling in trains into FBS it is helpful if an inserted train number gets automatically the right train type. The right column in the programme window shows you the currently known number ranges. A range of numbers can be used by more than one train type.

12.4.2   Insert a new number range

or Edit > New number range

You only have to fill in the last possible train number in this range. The beginning is set automatically at the first train number after the end of the number range before.

For example if you fill in 1199, the current range ends at this number and the next range starts at 2000.

In the next line you can fill in the train types, which are allowed to use this range of numbers.

It is also possible to leave a remark here for later changes.

12.4.3   Edit a number range

or Edit > Edit current number range

The known number ranges can be edited be selecting them in the list and one of the possibilities shown up here.

There opens the same window as to insert a new number range.

12.4.4   Delete a number range

or Edit > Delete number range

The marked item in the list is deleted this way. Of course there will be a call back before the train type is finally deleted.

12.5 Menu View

or View > Show description of train types

This function shows also the description of train types in the list. This might be helpful at rarely used train types. Normally this text is hided to show more train types at the screen.

or View > Move train up / down or Ctrl+Nach oben / Ctrl+Nach unten

This function moves the current train type up or down in the list. So you can change the order of train types to see often used train types on top of the list at the train data window inside of a graphic timetable.

13 Engine Database Editor

This programme is designed for you to check engines data and for short tests of other engine configurations. Please call the Service to define new engines to your database.

The programme "TFZ" allows it to you to show the engine data as a graphic and to add your engines in a simple way. The programme calculates the relevant data for run time calculation by help of "normal" technical data (motor power, mass). To fill in the data correctly assistants will help you. So difficult manual calculations and to look up for empiric figures in large tables can be saved. The assistant uses the know formulas by WENDE and includes a huge formula and figure database.

The functions explain themselves by hints (stop the mouse pointer a moment above the button).

The programme window is divided in two parts. On the left you can see the list of engines sorted by railway companies. This list is longer then the list of engines on the right, because the same type of engine can be used several times at different railway companies. If you click a series entry at the left the engine is also shown on the right window. If you select an engine the first entry of a series with this engine is shown to you.

13.1 Menu File

The file menu is similar to the other programmes of FBS family.

You can only save the files if you have the full version of FBS!

If you save the file the list in the open iPLAN file is being updated so that you can use the engine without a restart.

Additional here is the function to join files. So you can open other files to add them to the file, which is still open.

13.2 Menu Edit

Please note: You cannot change all data for engines, which are not defined by you! Some data are fixed. We do not recommend you to change the data of engines, which exist right now in the database. Small changes of some figures have an important influence to the results you can achieve and so to your timetable and all following data. If you are not sure how to fill in the data correct please contact the service!
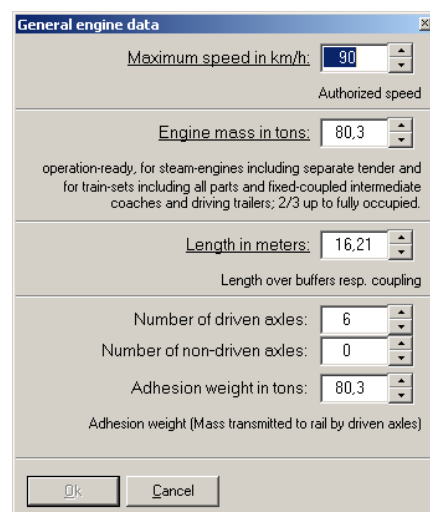
13.2.1 General engine data

Alt+A or **Edit > General engine data** or **context menu**

Here the general data of the engine is filled in. At first the maximum speed in kilometres per hour and the mass of the engine.

The length of the engine is important to calculate the right length of the train.

The number of driven axles and non-driven axles is important to calculate the right force by starting the train.

So please fill in the correct adhesion weight in tons.

13.2.2 Special engine data

Alt+S or **Edit > Special engine data** or **context menu**

By this window you will see you need a lot of special data to fill in or edit an engine correctly. The first fact called **Coefficient of mass increase** is a special factor to describe the rotating mass inside of the engine.

The next box is made for defining the front of the engine. Fill in the **Front area as a cross-section area in m²** into the field and select one of the **Head shapes** included in the list.

The **Type of bearing** has also an influence to the force resistance. Please select roller bearing or plain bearings.
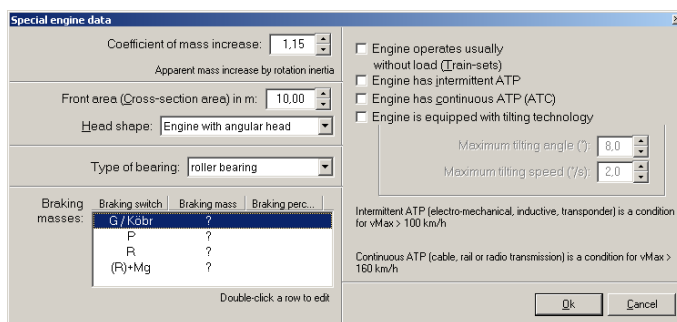
The small table is needed to fill in the **Braking masses** of the engine if it doesn't not work in a train. To fill in the braking masses to the breaking switches a double click opens a new window.

On the right side of the box you can fill some data to the equipment of the engine. If your engine or train has a tilting technology please fill in also the maximum tilting angle and the maximum tilting speed.

13.2.3 Traction and performance figures

Alt+L or **Edit > Traction and performance figures** or **Context menu**
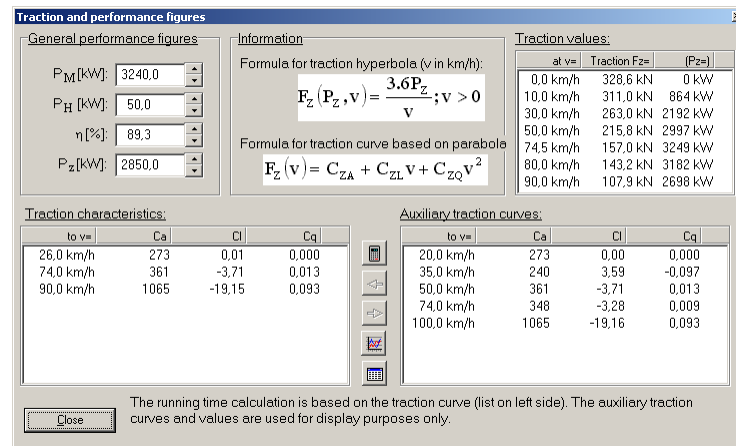
In this window the lines to create the speed-force-diagram are defined.

At first the sum of the power of the motors is inserted in kW. The next data describes the maximum of power for other functions (e. g. cooling, trainlines, …) also in kW. After that the efficiency of the complete traction system is inserted in percent. So the traction power is calculated. You can also turn calculation and fill in a traction power to calculate the sum of the motor powers.

The next box shows you only the formulas, which combine the different figures.

At the right table you can fill in single points to describe the traction curve. These **Traction values** are the results of the traction force measurements made with

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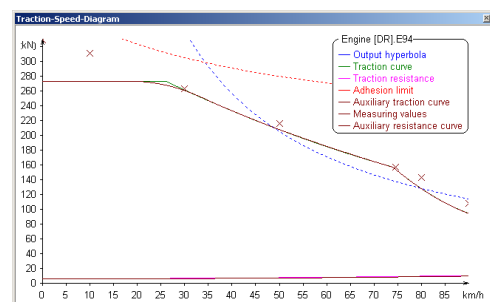
this engine. To get a usable traction curve it is needed to fill in the values in steps of 10 km/h.

Auxiliary traction curves have similar the same function as the traction values. You can fill in the coefficients, which are explained in the box **Information** to describe these formulas. To fill the coefficients use the context menu and select new or edit curves.

If you have finished filling in the data use the ⊞ button to calculate the **Traction characteristics**. You can control the data by diagram ⊞ or table with traction-speed values ⊞. The diagram includes all the curves being able to calculate with the data of the window. The table shows only the figures, which are interesting in further calculations.

13.2.4 Train resistance

Alt+W or **Edit > Train Resistance Data** or **Context menu**

The resistance of the engine or train is defined in this window. You can change the coefficients of the quadratic equation.

$$F_W(v) = C_{WA} + C_{WL}v + C_{WQ}\left(\tfrac{v+10}{10}\right)^2$$
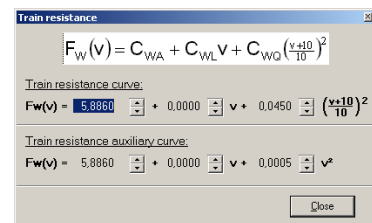
13.2.5 Engine Information and Remarks

Edit > Engine Information and Remarks or **Context menu**
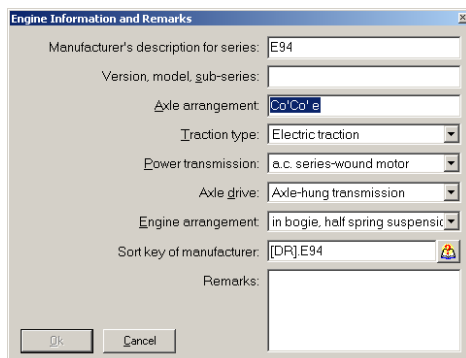
The data inserted in here is not important for calculation but it is important for you to find the engine in the list of the useable engines.

At first the Manufacturer is description for series is needed to sort the engine into the manufacture list. Additional descriptions can be filled in the second field. The axle arrangement (normally related to the German system) is also only for your information.

Important is also the **Sort key of manufacturer**. This key is the sum of the manufacturer, the series and the version or sub-series. You cannot change this key here. To change it look at chapter 13.2.9.

13.2.6 Engine series data

Enter or **Edit > Engine series data** or **Context menu**

This data are important for statistic calculations in iPLAN. Please fill in the number of seats in the first and second class and the part of low-loader. You just can edit these data for all engines or better rail cars in this window for one time.

13.2.7 New Engine

▭ or **Ins** or **Edit > New engine** or **Context menu**

This function leads you through the definition of a complete engine. Starting by **Manufacture** and **Type description** to the **General engine data** to the **Special engine data** and the

Traction and performance figures. At the end you can assign the engine to the series of some railway companies.

13.2.8   Copy Engine

Alt+C or **Edit > Copy Engine** or **Context menu**

This function is only available for engines defined by you.

By calling up this function you can change the Manufactory and the Type description so that you do not need to fill in all the data again if you want to define a similar engine.

13.2.9   Rename Engine

Edit > Rename Engine or **Context menu**

This function is also only available for engines defined by you.

You can change here the manufactory and / or the type description. The engine will be sorted in the list by the new sort key.

13.2.10   Delete Engine

Edit > Delete Engine or **Context menu**

This function allows you to delete engines, which you have defined. You cannot delete all the other engines. A call back prevents you before mistakes.

13.2.11   Rename Series

Alt+Enter or **Edit > Rename Series** or **Context menu**

This function is similar to the **Rename Engine** function as written in 13.2.9 on page 155.

Here you can change the railway company and / or the series description.

13.2.12   New series

Alt+Ins or **Edit > New Series** or **Context menu**

This might be the most important function for you by handling the list of engines.

At first enter the Railway Company using this series. Insert the companies name for this series and press Ok. After that a window opens in which you have to select the engines, which has to be related to this series. Here you can also change the number of seats if this company uses another seating.

13.2.13   Delete Engine

Edit > Delete Series or **Context menu**

This function allows you to delete a series. A call back prevents you before mistakes.

13.2.14   Edit Railway Companies

Edit > Edit Railway Companies or **Double click at a railway company in the list**

Railway companies are managed by their abbreviation. You can change the name in the list by a double click. A new company will be created if you create a new engine. You can also delete a company in this window. They are not deleted automatically if there is no engine related to the railway company.

13.2.15   Edit Manufacturer List

Edit > Edit Manufacturer List or **Double click at a manufactory in the list**

The system here is similar to the system of the railway companies. You can also edit the name or delete a manufactory. New manufactories are filled in automatically by creating a new engine.

13.3 Menu View

13.3.1   Traction-Speed-Diagram

 or **View > Traction-Speed-Diagram**

This function shows you the result of all settings made for the engine in a diagram. The x-axis shows the speed and the y-axis the power. All lines that limit the useable power are shown in the diagram too.

13.3.2   Display value table

 or **View > Display value table**

A table including the relevant data for the selected engine is shown to you.

13.4 Check Selection

This menu includes the "conventional" items but one, which might be really interesting for you.

The item **Check Selection** opens the list of Available Engines as know from iPLAN. Here you can control all changes you made to the list, which you normally use in iPLAN.

14 Annex – Statistic Data

14.1 Statistic data of one train part

This data can be set in register "Train parts…"

Basic values:

- Spacially: total mileage of the train part

- temporally: total run time, total travel time

- attributes:

    - Number of operation days per period

    - Train parts mass (to be selected by only, including or without engine)

    - Number of axels (to be selected by only, including or without engine)

    - Number of seats (including engine, to be selected by 1. and/or 2. class)

Derivated values:

- Run time share (= total run time / total travel time)

- Average travel speed (= total mileage / travel time)

- Average run speed (= total mileage / run time)

- Tons kilometre (= train part mass x total mileage)

- Axle kilometre (= Number of axles x total mileage)

- Seat kilometre (= Number of seats x total mileage)

- Tons per year (= train part mass x number of operation days)

- Axels per year (= Number of axles x number of operation days)

- Seats per year (= Number of seats x number of operation days)

- Sum of operation time per year including stops (= total travel time x number of operation days)

- Sum of operation time per year excluding stops (= total run time x number of operation days)

- Mileage per period (=total mileage x number of operation days)

- Tons kilometres per year (= train parts mass x total mileage x number of operation days)

- Axle kilometre per year (= number of axels x total mileage x number of operation days)

- Seat kilometre per year (= number of seats x total mileage x number of operation days)

Sums all over some train parts:

It is possible to sum all values, which include the operation days. But often it is difficult, because you cannot see a train part or if there are some train parts coupled.

So the mileage per period can be applied:

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a) It is the same as the mileage per period if all trains parts run single (uncoupled).

b) It is the same as the vehicle mileage per period if all train parts consist of the same vehicle[2]

c) The value has no use, if the train parts consist of different engines or waggons and / or run partially coupled.

These values are normally not shown in the programme to avoid confusions by the train kilometres per year.

To explain it in another way: The sum of train parts travelling time is called Sum of operation time including stops. So you can get the impression to use this time to guess the engineers working hours. This is not right because not every train part needs an engineer. You might use this time to guess the working hours of your conductors if you would have a conductor on all train parts. This time can also be used to guess the maintenance figures of engines if all train parts include the same number of engines.

General meaning can only be done by sums, which show properties exactly to the vehicles:

- Sum of ton kilometres a year

- Sum of axle kilometres a year

- Sum of seat kilometres a year

The incorrect property train parts are replaced by the exact properties mass, axles or seats. So no misunderstanding is possible. These values are always shown in statistics.

14.2 Statistic values of a train

These values depend on the line section and operation days but are independent to train parts.

To calculate all this values the trains are separated in sections with the same number of operation days. So the sections are not separated if only the train part data is changing (number, load, …). Strictly speaking the sum of operation days are the or connections of the operation days of all train parts of a route section. This sum of operation days is shown in train data window at the register of a route section in "Train operates in this section:"

Basic values:

- Spacially: route length ("train kilometres")

- temporally: travel time, run time

- attributes: number of operation days in period

Derivated values:

- run time share (= run time / travel time)

- average travel speed (= route length / travel time)

- average running speed (= route length / runtime)

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[2] This way you can calculate the vehicle mileage per period in a graphic timetable without calculating a circulation plan. This can make sense if a head code or a graphic timetable includes only on type of vehicles.

- mileage in the area (= route length x number of operation days, "train kilometres a year")

<u>Sum of some trains:</u>

You can only sum values of some trains which include the operation days. That means you can only sum the number of operation days and the train kilometres a year.

The number of operation days changes to the number of runs in period. A train operating on WXSa (250 days) and 10 trains at Sa+S (104) results 6040 train runs in period. The change in measures is explained by:

$$\frac{Runs}{operation\_days} \, x \, \frac{operation\_days}{period} = \frac{Runs}{period}$$

The factor 1 is often forgotten because a train runs only once an operation day.

It makes no sense to add travelling times of trains directly:

Example: 4,5 h at WXSa + 3,7 h at Sa+S = 8,2 h at ???

To get such an information the sum of travel time and running time has to be related to the operation days:

- Sum of travel time a year = $\sum \left(t_{R,i} \times n_i \right)$

- Average weighted travel speed = $\dfrac{\sum \overline{v_{R,i}} \times s_i \times n_i}{\sum (s_i \times n_i)} = \dfrac{\sum \dfrac{s_i{}^2 \times n_i}{t_{R,i}}}{\sum (s_i \times n_i)}$

- (the same way for running speed)

with n_i = number of operation days of train i

s_i = route length of the train i

$t_{R,i}$ = travelling time of train i

$v_{R,i}$ = average travelling speed of train i

14.3 Calculation of operation days in a statistic year

Please avoid using a statistic year. The resulting number of operation days is a statistic value again, which fills in two problems:

a) The number of working days "WXSa", the Saturdays "SaXS" and the Sundays and public holidays "S" exists often only unexact. A train, which is not operating in this operation day periods, has to be interpreted in relation to the given numbers of days. This interpretation of the operating days can be handled different in regions. FBS allows you to fill in the relative number of public holidays an working days and on weekends to solve this problem.

b) It is not an exact calculation if you round a value in your calculation until a result based on the statistic year is calculated. iPLAN rounds the number of operation days of a train to whole days also if this is not the result of the calculation.

Example 1:

A train operating on Mo-Do+So from a city to the region for example to prepare the following rush hour train from Mo-Fr. The mileage he runs is 83 km. The statistic year includes 294 x WXSa, 52 x SaXS and 64 x S. So iPLAN calculates the numbers of operation days as follow:

- Number of days by WXSa = $^4/_5$ x 249

- Number of days by SaXS = 0

- Number of days by S = 52 + $^5/_7$ x (64-52)[3]

  ➢ Total number of operation days = round($^4/_5$x249 + 52 + $^5/_7$x(64-52)) = 260

  ➢ Total mileage in a year = 260 d/a x 83 km = 21.580 km/a.

Example 2:

The same train operats at Mo-Do+SoXvS, that means to prepare a train operating WXSa:

- Number of days by WXSa = $^4/_5$ x 249

- Number of days by SaXS = 0

- Number of days by S = 52 + $^5/_7$ x (64-52) - $^4/_7$ x (64-52)

  ➢ Total number of operation days = round ($^4/_5$x249 + 52 + $^1/_7$x(64-52)) = 253

  ➢ Total mileage in a year = 253 d/a x 83 km = 20.999 km/a.

This way is not the best but it is the easiest way to describe a statistic year only by three figures. This way bases on the model, that every day in a group of days has the same number like the other days in the group. So a public holiday is in one year a Monday in the next a Tuesday and so on. But this is not true. It would be better to calculate the real number of working days inside of "WXSa" and the public holidays "S" and to use this figures. So FBS allows it to use an alternative way to put in the numbers of all 14 single week days and public holidays in the year.

→ Example 2 shows you a bad side of the statistic: If the train starts early in the morning at WXSa to run to the city it results 249 days (Number of "WXSa"). If the train is prepared the evening before ((So+Mo-Do)XvS) he runs also 249 days and not 253 days as calculated in the example!

→ Another basic mistake of the most of the statistic years that the result has to be 365+$^1/_4$-$^1/_{400}$ = 365,2475 days and so the single components have to able to be a real number.

→ It would be consequent if there only this trains are allowed, which operate exact on **WXSa, SaXS, S, Sa+S, XSa or daily**. This should be enough for strategic studies. But the example above shows you, that it is not done this way. And in some regions the real train orders (train kilometres) are calculated by a statistic year and financed this way.

14.4 An exact statistic year

How should a statistic year look like?

Example Saxony: 13 public holidays

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[3] Here a year has as much Saturdays as Sundays. So the number of public holidays is the same as number of S without number of SaXS This number is balanced in many statistic years to $^1/_7$ to every day of the week.

- New Year's Day   variable holiday

- Good Friday   even on Friday

- Easter Sunday   even on Sunday

- Easter Monday   even on Monday

- May Day   variable holiday

- Ascension day   even on Thursday

- Whit Sunday   even on Sunday

- Whit Monday   even on Monday

- Anniversary of German unification   variable holiday

- Day of Reformation   variable holiday

- Day of repentance and pray   even on Wednesday

- Christmas Day   variable holiday

- Boxing Day   variable holiday

Real division of the holidays

- Mo	2x	Fr	1x
- Di	0x	Sa	0x
- Mi	1x	Su	2x
- Do	1x	**variable**	**6x**

Every Weekday exists 52.1782 times in a year with 365,2475 days. To calculate now the number of the working days of a week we subtract the number of holidays at this weekday and $6x \frac{1}{7}$ for the probability that a variable holiday will be at this day:

	Working days of a Week	public holidays	
Mo	52,1782-2-6/7 = 49,32	2+6/7 = 2,857	
Di	52,1782-0-6/7 = 51,32	0+6/7 = 0,857	
Mi	52,1782-1-6/7 = 50,32	1+6/7 = 1,857	
Do	52,1782-1-6/7 = 50,32	1+6/7 = 1,857	
Fr	52,1782-1-6/7 = 50,32	1+6/7 = 1,857	
Sa	52,1782-0-6/7 = 51,32	0+6/7 = 0,857	
Su	52,1782-2-6/7 = 49,32	2+6/7 = 2,857	
Sum	352,24	+ 13,000	= 365,24 days

14.5 Statistics and train coupling and sharing

The difference between the train part mileage in the area and the Mileage in the area shows the train kilometres, which can be saved by train coupling and sharing.

→ This is important if you couple trains to save route toll.

15 Annex – Declaration of operation days

15.1 General

FBS differs between regular operation days and special operation days. Regular operation days have been developed in the history of railway systems. They are known around the world and easy to handle. Nearly all cases can be described this way. Special operation days can added to the regular operation days in special cases.

FBS understands the two letter abbreviations of the days of a week. Just for customizing some operators to describe the operation days depend on the language you have selected. So you are not able to use the German system if your language is set to English and the reverse way too. FBS also knows the abbreviations of the months depending on the language of your Windows® settings.

15.2 Regular operation days

Regular operation days represent the seven days of a week without any connection to a concrete date or week. To differ the working days from a public holiday there exist seven operation days too. So the regular operation days consist of the seven working days of a week, which are not public holidays, and seven public holidays of a week.

The syntax behind the system, which is used in FBS has been developed since the first railways started operation. The system consists of:

- Abbreviations for the seven days of a week,

- Abbreviations for often used combinations of weekdays and public holidays of a week,

- Logic operators to combine the symbols.

The abbreviations depend on the language settings of FBS. Please look at the table at the end of this annex.

For controlling the public holidays of a week there exist special codes.

If the train operates at all working days but not on public holidays you can use the code: **W**. Just for the opposite (only on Sundays and public holidays) you can use the symbol: **S**. Trains which operate a day before a public holiday can be described by the Symbol: **bS**. **aS** describes a train operating at the day after a public holiday or Sunday. By using **2bS** and **2aS** you can set operation days to two days before or two days after Sunday and public holidays.

W	=	"Working days": Weekdays Mo-Sa without the public holidays at these days
S	=	"Sundays and public holidays": Weekday Su and all public holidays
		(Sunday and all other weekdays if they are public holidays)
bS	=	Working day (including Saturday) before a Sunday or public holiday
2bS	=	Working day (including Saturday) two days before a Sunday or public holiday
aS	=	Working day (including Saturday) after a Sunday or public holiday
2bS	=	Working day (including Saturday) two days after a Sunday or public holiday

As operators you can use in all languages:

- **+ , ; &** or **Space** for the simple addition (logic or). The programme reads all this signs and "translates" them to a "+" and shows only this sign.
- **[ ]** Definitions in square brackets show the days in which the train does not operate (logic NOT, negativ-days, not on). The square brackets symbolize the frame, which would be signed if the operation days would be written down by hand. You can also fill in parentheses or braces, which are translated by the programme to brackets. All negative days are positioned behind the positive days.
- **-** The minus is used in the combinations specified above as "until"-sign.

Every positive or negative area can include four codes for operation days.

You can use every combination of operation day codes without any difference in function. FBS does not summarize the combinations e.g. **We+Th+Fr** will not be changed to **We-Fr**. If FBS builds combinations itself (for example by summarizing train parts) it uses the shortest way to show the operation days. The programme prefers the **operates** line before the **not on** line. The combination of two train parts operating on **Mo-Fr** and **Su** is summarized to **Su-Fr**, whether **[Sa]** would be possible.

If it is not possible to summarize the operation days of train parts the programme shows VT (German abbreviation of operation days **V**erkehrs**t**age).

15.3 Special operation days

A special operation day is nothing else than a concrete date. To calculate with this date the timetable period has to be set by the first and the last day of operation in this period. The beginning and the end of the timetable period are saved relative to the 30.12.1899. To rebuild a timetable which was used before that date please ask the service.

To define the special operation days they are differed in three ways:

- Only means a period or single days in which the train operates. Only days limit the operation period of the train.
- Also means a period or single days in which the train operates additional to the regular operation days.
- Not on means a period or special days in which the train does not operate whether the regular operation days require it. These days are often used exclude operation days for example a day between a public holiday and a weekend.

The operation day settings are handled in the following priorities:

- The highest priority belongs to the only days. No one of the following days can be out of the range of the only days.
- Not on can exclude single days or a period in another period. No one of the following days can include these day again.
- Also can include single days or a period in another period. No one of the following days can exclude them again.
- The following days are decided by the regular operation days.

15.4 The data bS, 2bS, aS and 2aS

This data defines special days inside of the group of the regular operation days. Their opportunities places them between the regular and the special operation days. You can say they are the special regular operation days.

Related to a Sunday they are redundant to the following regular operation days:

- bS = SaXS

- 2bS = FrXS

- aS = MoXS

- 2aS = TuXS

In relation to the public holidays, which are not a Sunday, you can use the functions only if a timetable period is defined and includes the concrete public holidays. That means: **the before and after dates are used as regular operation days if there is no period defined or the timetable does not have any public holiday**. Or said the other way: To use the before and after dates you have to define a period and include the public holidays.

In this case the before and after days work to Sundays and public holidays, which are not Sundays or another public holiday.

Operation days, which are defined in brackets, have a higher priority then the other dates.

15.5 Train which operates as required (+Q)

Another railway historic phenomenon is the train that operates as required. This information was used to show the railway employee along the line that a train could be cancelled without a foregoing notice. Along the time many influences changed the meaning of train, which operates as required. Actually this information is used seldom. It is avoided at passenger trains and freight trains operate nearly normally as required without any special sign.

FBS allows the as required labelling by an own window:

- Train operates at the given days as required only.

    This option does not effect the internal function of operating days. It is informational only and is normally used in Station Timetables to tell the staff that the train may be cancelled without notice.

- Train may additionally operate as required at days not shown.

    This option sets the internal function of operating days to "daily" to secure that there ca not be any conflicts at any day. In the graphic the regular days are still shown. The train has only influence to the statistic at his regular operation days.

- **Q** does not overwrite the only or not on areas.

Example: We+Q = at Wednesdays only and only as required

                Q+We = only as required, but even on Wednesday

                QXS = only as required but not at Sunday or public holiday

Priorities of operation day settings:

1. only can do further limitation to the general period; no one of the following settings can be outside of this area

2. not on can exclude single days or periods inside of the timetable period; no one of the following settings can include this days again

3. also can include days or periods inside the timetable period; no one of the following settings can exclude this days again

4. the following days are decided by the regular operation days.

15.6 Helpful function in defined timetable periods

If you have to change the operation days of trains shortly you can change them by keywords today, tomorrow, the day after tomorrow. FBS calculates the dates itself and shows them to you. It is also allowed to start the entries at the special operation days (only, also, not on) by a concrete day. You can also combine such entries if they are separated by ";". A legal entry would be: tomorrow; 3.10.; also 20.12.-31.12.; not on 24.12.

Please note that you have to fill in the month after every day. FBS tries to reduce the entries and changes the entry 3.04.-12.04. to 3.-12.04.

For a further simplifying you can fill the month in Arabic numbers, in small or upper roman figures or the name of the month or the abbreviation of the month depending on your Windows® settings.

16 Annex – Stations and Locations in FBS

You can differ between **operational places** and **access places** along a line. The functions can of course be combined.

Operational places have an influence to the operation of the railway especially for slot search. They can be differed to train order change places and to train following places.

> **Train order change places** can be used to change the order of the trains for example to overtake trains or to cross trains at a single track line.

> **Train following places** limit the room in which a train can drive. So you can handle only running in blocking limits by FBS. Train following places regulate the distance between the trains and not the row of them.

Access places are the interfaces to the railways. They are differed between passenger and freight traffic. The clearest attribute to a **passenger access places** is stop to change passengers and a platform. They are further differed in

> Category (a): service personal, ticket counter and information

> Category (b): "machine" service and

> Category (c): only placards.

Often passenger access places are interfaces to other means of transportations (for example to the bus).

Freight access places can be differed in freight stations for example to handle containers or public good sidings or private sidings.

You can combine every access places with every operational place. The following part explains especially the properties of operational places because they are important to the timetable. All other properties are mostly used for your information or to handle interfaces to other programmes.

Meaning of the following "classic" properties of an operational place in FBS:

> ➢ **Temporary unstaffed[4]**: During the time of operation no signal man has the controll about this station. The station can be managed every time by a train crew which arrived at the station. So there is no functional difference to a staffed station.

> ➢ **Temporary out of use**: The station is not staffed in times, which you selected. So the station is not controlled locally, or remote controlled and cannot be managed by train crews. In these times the station has no function for railway operation.

> ➢ **Remote-controlled**: That means the station is operated from another place and the dispatcher has no visual contact to the station. For FBS it is the same as a local operated station. The differences are shown in times of failures but this has no influence to the timetable. This option cannot be activated if "temporary out of use" is chosen.

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[4] Only unstaffed would be wrong, because a real unstaffed station has no influence to railway operation.

Meaning of other properties of all stations and places in FBS:

➤ **Out of use**: The station is regularly not used but it still exists and can be reactivated for construction levels or changes in the timetable. This property sets all operational and transport properties out of function.

➤ **Abandoned / withdrawn**: The station cannot be used any longer and is filled in here only for information. This property sets all operational and transport properties out of function.

➤ **under planning** is only for information and has no influence to the function.

➤ **Country border, Tariff border, Depot**, **Engine shed** and **power station** are only for your information. This properties will be used in further versions of FBS to get another basic conditions (e.g. depots for circulation plans).

Examples for typical stations

local staffed station

→ Operation: train order change place, *station class I - IV* depending on the meaning

- iPLAN does not take care for train following places between the home and the distant signal
- In iPLAN the station has an unlimited capacity

Station controlled by an Integrated Electronic Control Centre

→ Operation: train order change place, *station class I-IV* depending on the meaning, *remote controlled*
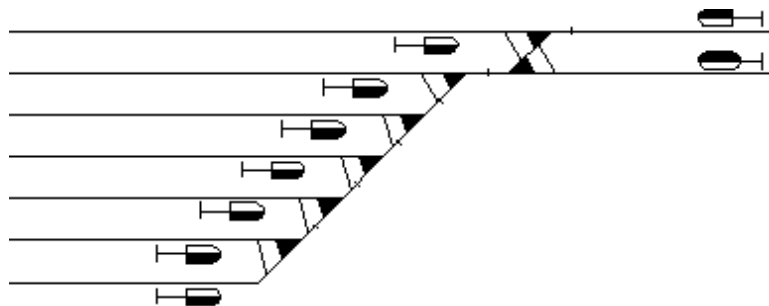
- Functions in FBS like a local controlled station

unstaffed station in direct traffic control ("Zugleitbetrieb")

→ Operation: train order change place, *station class III or IV*, *station without home signals*, *remote controlled*
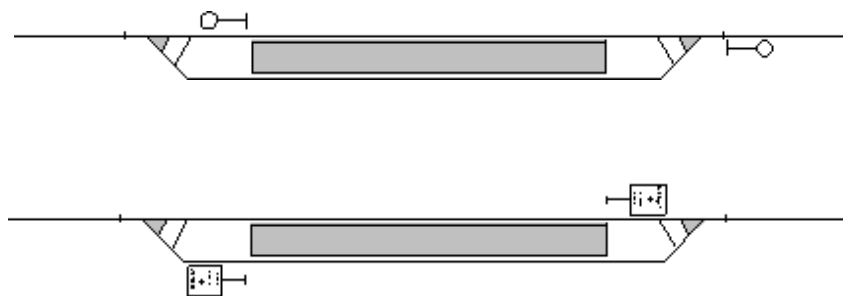
- Stations **without home signals** (normally unmanned stations at simple operation systems) are handled by capacity of one train per running direction. A following train is kept in the station before until the train in this station has left[5]. At a train crossing the train that reached at first can start as far as the other train reached the station too.

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[5] So "real" overtakings are blocked by FPL. If you would like to do an overtaking you should end the first train, run the other train and restart the first train.

Such a station has a more restrictive influence to following trains as to crossing trains.[6]

- if you use self reset points please take care of the entries in the speed lists.

- or if you can change the used track please note the regular station track list

- *remote controll* is also possible, if there are no local controlled elements there (for example by Radio Electronic Token Block).

Unmanned station at simplified operation systems "Zugleitbetrieb"

→ operation: train order change place, normally *station class IV*, *temporary unmanned*

- Default position of the points leads to the main track, trains reach always at this track.

- It works in FBS like a normal station, so it is not checked that the first train enters the running through track.

- It is not relevant whether the station is temporary controlled by a signal man or by trains crew.

- Because of manual route controlling use a crossing time by 5 minutes.

- Neither general speed limit by entering the station or a speed limit by the station tracks

Junction (two lines)

→ operation: train order change place, *junction*, as the case may be *remote controlled*

→ transport: *no properties*
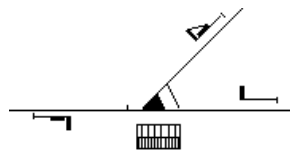
- iPLAN blocks train crossings at junctions. It is possible to set the train property **train leaves/changes to the line**. Overtakings, ending or starting trains are also not allowed[7].

- If your line uses the slower direction of the junction please set the lower speed to the line speed limits and not to the station speed limits.

crossover between single and double track areas

→ operation: train order change place, *Crossover*, as the case may be *remote controlled*

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[6] Because of this discrepancy the longer blocking time for following trains is not shown in the blocking time stairs.

[7] Exception: Trains can look like trains starting or ending at a junction at the end or beginning of a line.
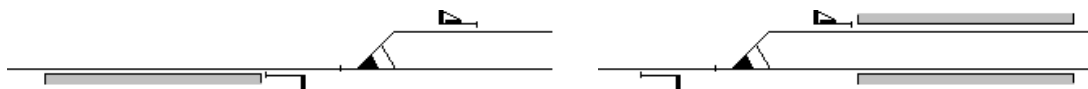
→ transport: *no properties*

- It is not possible to create overtakings and no beginning or ending trains.
- The speed of the slower track inside the point has to be filled in the line speed limit of the direction.

Crossover between single and double track areas in combination with a stop

→ it is absolutely needed to separate this into a stop and a crossover

crossover inside a double track area

→ operation: train order change place, *crossover*, often *remote controlled*

→ transport: *no properties*

- If it is possible to change the track but it is regulary not needed it would be better to define it as a train following place (blocking signal).

Station without sidings or loops
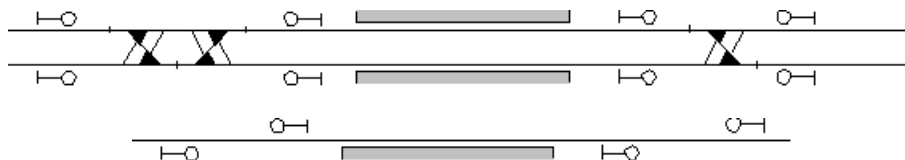
- either fill it in as a normal station and handle the restrictions manual
- or separate it into a stop and two crossovers or train following places (recommended)
- Please note that the stop can be a train order change place if trains end or start there.

Crossing station with only a one side controlled siding

→ operation: train order change place, *station class IV, station without home signals,*

temporary unmanned or *remote controlled*

→ transport: *no properties*
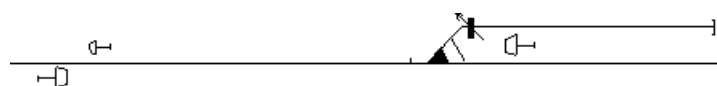
- Use a large crossing time (around 10 min)
- There are no overtakings allowed. If they are needed separate the first train into an ending and starting train.

Passing loops

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Passing loops are a special case in Germany: It becomes a "**goods siding with crossing possibility**" if it is combined with **goods siding**. The passing / crossing of trains is possible with token-less runs only. Though passing loops are arranged with train order change places, they do not work like those. I. e. iPLAN does not suggest any train crossings or passings there. At such infrastructural facilities crossings are possible under very special conditions and functional combinations only.

Stop

→ operation: *no properties* (look at the comments)

→ transport: *passenger transport*

- If trains shall begin or end there, you can use two ways to reach the target:
  If there are block limits there, configure it as a train order change place, *station class IV, without home signals, temporary unmanned*

  Or handle the train as a train running through a part of the section only

Block post

→ operation: train following place, *block post*, as the case may be *remote controlled*

→ transport: *no properties*
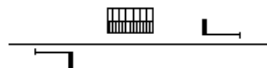
Please note: If both signals of a block post have an important distance separate them into to different train following places with relevant pre- and post blocking times. It is possible to differ the direction of the block signals.

Stop in combination with a block post

→ operation: train following place, *block post*, as the case may be *remote controlled*

→ transport: *stop (non serviced passenger transport)*

Stops in combination with a private siding or loading bank

→ operation: *no properties*

→ transport: *Stop* and *private siding or loading bank*

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- Trains to operate the private sidings or loading bank have to marked as trains running through a part of the section only.

ATC block post

→ operation: train following place, *ATC block post*, *remote controlled*

→ transport: *no properties*

These block posts are only used for trains using ATC. Trains, which are driven by signals, do not attend this train following places.

Dividing lines at simplified operation systems

→ operation: train following place, *block post*, *temporary unmanned* or *remote controlled* (!)

→ transport: *no properties* or any kind of *passenger transport*
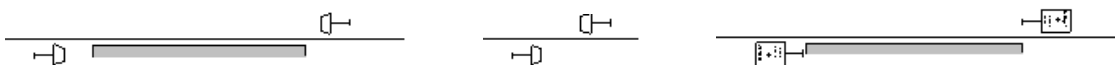
- The technique of the train following place (block post, block signal or group of signals) and the manning can also be selected free
- Look also at the remarks to "stop"

Locations, which have only a transport function, have **no operational properties** or simple access places.

Under planning: This location is shown in brackets and cursive in all pictures and can be identified this way easily.

Country border and **Tariff border** are locations, which show you the borders of ownerships, excutive bodies or tariffs. This locations are suggested in the menu **Zones** at infrastructure window as borders.

17 Annex – Overview of hotkeys in FBS

The hotkeys explained here, are shown like you can find them in the menu items. So the following keys are translated as:

Strg = Ctrl; Umsch = Shift; Alt = Alt; Tab = Tab; Bild auf = page up; Bild ab = page down; Einfg = ins; Entf = del; Enter = enter.

General hotkeys

Umsch+F1	- change to FBS-Dispatcher
Umsch+F3	- change to BFO-Programme
Umsch+F4	- change to iPLAN-Programme
Umsch+F5	- change to Station database programme
Umsch+F7	- change to Engine database
Umsch+F12	- close all FBS-Programmes
Ctrl+Alt+L	- change Language
Ctrl+Esc	- opens Windows®-startmenu
Alt+Tab	- changes to the next running programme (if there are some programmes running)

In a field:

Strg + C	- copy the marked text to the clipboard (also Strg + Einfg)
Strg + X	- cut the marked text to the clipboard (also Shift + Entf)
Strg + V	- fill in the text from the clipboard at the cursor position (also Shift + Einfg)

In lists and tables:

Strg + Einfg	- copy the list as a tab-separated text into the clipboard

Network timetable programme iPLAN

Tab	- skip to the next network file (if some of them are open)
Umsch + Tab	- skip to the last network file (if some of them are open)
Strg + F4	- close the current network file
Alt + F4	- close the network programme
Strg + A	- save all files
Strg + I	- Programme-information
Strg + K	- Programme-Configuration
Strg + L	- switch symbol line on / off
Strg + N	- open a new network file

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Strg + O   - open a network file

Strg + P   - print the current network file

Strg + R   - reset the divider of the list

Strg + S   - save current network file

Strg + U   - save current network file as …

Circulation plan - window

Alt + A   - general circulation data

Alt + B   - show the complete width of the sheet

Alt + G   - show the circulation graphic

Alt + L   - show the possibilities of empty running

Alt + P   - print circulation

Alt + R   - check the trains in the circulation plan by the graphic timetable files

Alt + T   - show the current circulation table

Alt + U   - set determine links to the current train

Alt + V   - show the list of current circulation possibilities

Alt + Z   - show / hide the list of trains

Alt + F4   - close the circulation window

Umsch + up   - roll up the graphic one engine (without Umsch: roll in the current list)

Umsch + down   - roll down the graphic one engine (without Shift: roll in the current list)

Umsch + P   - switch the protocol on / off (produces an Uml.txt-file during the calculation of the circulations)

Graphic timetable

Strg + A   - save all

Strg + I   - Programme-Information

Strg + K   - Programme-Configuration

Strg + L   - switch on / off the symbol line

Strg + N   - open a new timetable file

Strg + O   - open a timetable file

Strg + P   - print the current timetable file

Strg + S   - save the current timetable file

Strg + U   - save the current timetable file as …

Strg + X   - switch on / off the horizontal scroll bar

Strg + Y	- switch on / off the vertical scroll bar
Strg + <	- allow departure times at every tenth of a minute
Strg + 0	- allow departure times only at full minutes
Strg + 1	- allow departure times only at 0,1 minutes
Strg + 2	- allow departure times only at 0,2 minutes
Strg + 3	- allow departure times only at 0,3 minutes
Strg + 4	- allow departure times only at 0,4 minutes
Strg + 5	- allow departure times only at 0,5 minutes
Tab	- change to the next timetable file (if some of them are open)
Umsch + Tab	- change to the last timetable file (if some of them are open)
Strg + F4	- close the current timetable file
Alt + F4	- close timetable programme
Ctrl+Enter	- fill in the time to show
Alt + A	- opens "Edit display settings depending on timetable menu"
Alt + B	- activate menu "Edit"
Alt + C	- show conflict list
Alt + D	- activate menu "File"
Alt + E	- activate menu "Window"
Alt + F	- edit general timetable settings
Alt + G	- show / hide line tracks
Alt + H	- activate menu "help"
Alt + I	- edit info text
Alt + K	- show / hide head of timetable
Alt + O	- activate menu "options"
Alt + R	- changing rounding rule
Alt + S	- fill in line data
Alt + T	- copy the current train in clock
Alt + V	- open the window "traffic input data"
Alt + W	- choose the weekday which should be shown
Alt + X	- show train data sheet
Alt + Z	- show / hide the blocking times

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Alt + Einfg   - fill in a new train

Alt + Entf   - delete the current train

Alt + Rück   - undo the last action

Alt + 0   - round the shown times to full minutes

Alt + 1   - round the shown times to $^1/_{10}$-minutes

Alt + 5   - round the shown times to $^1/_2$-minutes

Alt + <   - switch slot search between until the next train order change place or trains end station

Alt   - change the train to edit (if some trains are selected)

Shift   - show train number of the train behind the mouse pointer

F1… F10   - activate the mouse mode (similar by pressing on of the buttons up on the toolbar)

F12   - skip between page width/height zoom and last zoom size

+ (keypad)   - enlarge zoom factor

- (keypad)   - scaling down zoom factor

Strg + mouse wheel - enlarging/scaling zoom factor

Alt + left mouse button - create zoom rectangle

Cursor left   - scroll the line section mileage down

Cursor right   - scroll the line section mileage up

Cursor up   - scroll the time 10 minutes earlier

Cursor down   - scroll the time 10 minutes later

Bild auf   - scroll the time 1 hour earlier

Bild ab   - scroll the time 1 hour later

ESC   - abort the current preview (if a preview line is shown)

Train diagram (s-v-Diagram)

Alt + C   - Copy chart to the clipboard

Alt + D   - print chart

Alt + E   - export the chart into a file

Alt + H   - use the full height of the sheet on / off

Alt + L   - show / hide legend

Alt + P   - show the complete protocol