

RAILROAD & Co.TM

+SmarHandTM



Version 8

Manual

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RAILROAD & Co.TM

+SmartHandTM

Handheld Railroad Control System

Version 8

Manual

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Overview

RAILROAD & CO. is the leading product line of computer programs for digitally or conventionally controlled model railroads. It contains the following members:

- **TrainController™** is the world's leading software for model railroad computer control.
- **TrainProgrammer™** is the program, which makes programming of DCC decoders as simple as a few clicks with your mouse.
- **+Net™** is a module, that allows to control your layout with a network of several computers running **TrainController™**.
- **+4DSound™** is a module, that recreates realistic spatial sound effects for each model railroad layout controlled by **TrainController™** without the need to install on-board sound into each decoder.
- **+SmartHand™** is the world's premium handheld railroad control system designed for computer controlled model railroads.

By reading this manual you can obtain information about how to control your entire model railroad with **+SmartHand™** and remote handhelds, that are connected to a computer running **TrainController™**.

An overview of the basic concepts of **TrainController™** is provided in the **TrainController Users Guide**. It is assumed, that you are familiar with the contents of that document.

1 Introduction

1.1 Overview

TrainController™ is a system to operate a model railroad layout from a Personal Computer running Microsoft Windows 7, XP or Windows Vista.

TrainController™ provides you with the ease of point and click to operate your switches, signals, routes and other accessories displayed on track diagram panels. Track diagram panels are individually created for each yard or section, as desired. You can run your trains with on-screen throttles, external hand held throttles connected to your computer, or with your favorite throttles or hand held throttles supported by your digital system. You can operate digital engines equipped with their own decoders, as well as conventional models without decoders. Digital and conventional engines can run on the same track. Far-reaching automation features make railroad operations manageable by one person and match those found on the largest club layouts. You can see on the screen which engine/train is on which track.

1.2 +SmartHand™ - Handheld Railroad Control System

+SmartHand™ enables you to control your model railroad with a handheld system, that has been especially designed for model railroad computer control with **TrainController™**. The handhelds work like a remote control for the **TrainController™** visible on the computer screen. **+SmartHand™** exceeds by far the possibilities provided by the normal computer keyboard, mouse or joystick. The handheld system can be used by a single operating person or in operating sessions with multiple users, it can be used on small or on large layouts. Up to 31 handhelds can be connected simultaneously at arbitrary locations on the layout.

The handhelds are available in two variants:

+SmartHand™ Classic handhelds are specific devices provided by Freiwald Software. They are connected through *Plug Panels*, which can be installed in any number anywhere on your layout. Using these plug-panels you can unplug the handheld at any time and plug it in again at another, even remote location in order to follow your travelling trains or to operate items, that are located far away from the computer.

+SmartHand™ Mobile handhelds are regular smartphone, PDA, netbook or other mobile devices, which are connected through a network (usually WLAN, but also LAN or even WAN) to the computer running **TrainController™**.

TrainController™ provides a built-in Web server, where mobile devices can connect to by entering the address of the computer running **TrainController™** in the Web browser of the particular device. For this purpose it is not necessary to install any specific software on the device.

Notebook and even desktop computers can be used as **+SmartHand™ Mobile** handhelds, too, to establish additional operator stations in a simple manner.

+SmartHand™ Mobile and **Classic** handhelds can be combined with each other and can be used simultaneously.

All important operational functions of **TrainController™** can be controlled with **+SmartHand™**. This includes all train functions like speed, engine functions or direction, but also the operation of turnouts, signals and routes. It is even possible to use **+SmartHand™** to control the status of blocks, execute schedules and start trains with **AutoTrain™**. On screen controls such as train speedometer and odometer as well as the status of other items are also synchronized with the handheld. And if you have turned on the simulation of fuel or water consumption for your trains, then your handheld is temporarily suspended in case your train runs out of these resources.

Changing of the operated objects via **+SmartHand™** is possible at any time. The selection of trains, which can be operated with a particular handheld, can be restricted. In multi-user sessions this feature provides interesting possibilities. For example, it is possible that a Dispatcher located at the computer assigns a particular train to the handheld of another person acting as engineer. This person is then only able to control this assigned train. In another example, the person responsible for a particular switching yard is provided only with control over those turnouts and routes, that are located in this yard.

In particular **+SmartHand™** provides the following features and functions:

- Operation of the entire model railroad layout, in particular engines and trains, turnouts, signals, routes, accessories, blocks, schedules, macros, sound files etc.
- Built-in support of **Running with Interlocking**. Select a train and the desired direction and start the train to run, either automatically or driven by the human operator as engineer, in both cases under full control and protection of the **TrainController™** Dispatcher.
- Built-in support of **AutoTrain™**: select a train and a destination block, where the train shall run to, and start the train to run, either automatically or driven by the hu-

man operator as engineer, in both cases under full control and protection of the **TrainController™** Dispatcher.

- Highly customizable to individual requirements
- Changing of trains and other objects is possible at any time - selection of available objects can be restricted by settings in **TrainController™**.
- Self explaining menu driven operation.
- Suitable for all digital systems
- Train control with display of speedometer and odometer
- Brake and emergency stop.
- Realistic simulation of train tonnage; simulation of water, coal and fuel consumption
- Display of the fast clock; synchronized with the clock of **TrainController™**.
- A sophisticated system of privileges and rules allow customization to different skills (novice, expert, etc.), functions (engineer, yardmaster, dispatcher, etc.) or role (lay-out owner, administrator, visitor, etc.) of the handheld operator.
- Up to 31 handhelds can be connected to a single USB interface (or serial port in case of older versions) of your computer (+**SmartHand™ Classic**) or via network (+**SmartHand™ Mobile**).

+**SmartHand™ Classic**

+**SmartHand™ Classic** handhelds additionally provide the following features:

- Graphical backlight LCD with self-explaining indication and 20 key keypad for control of all important operational functions of **TrainController™**.
- Solidly built rotary knob for speed control
- Customizable icons display the status of auxiliary train functions
- Switchboard view for intuitive operation of turnouts
- Keyboard mode for effective operation of multiple objects
- Multi color signal indicator lights for indication of the calculated home and distant signal as in the **TrainController™** Train Window. The displayed signal aspects can be customized to fit to the signaling system used on the particular model railroad layout.
- Different data transmission rates up to 57600 bps.
- Plug Panels, which can be purchased separately, allow plugging in of handhelds at arbitrary locations of the layout within a distance up to 100 meters (subject to transmission rate).
- Six foot long connector cable

To begin you need at least one handheld and the +**SmartHand™**-Computer Interface. It is possible to connect one handheld directly to the interface.

Additional handhelds can be connected to the system with separate plug panels. Additional handhelds and plug panels may be purchased separately. For two additional handhelds at least one additional plug panel is needed. Further plug panels increase flexibility by allowing plugging in of handhelds at additional locations on the layout.

The interface is only needed once. Up to 31 handhelds can be connected to the system, which is connected via one interface to the computer.

The following diagram shows a sample configuration:

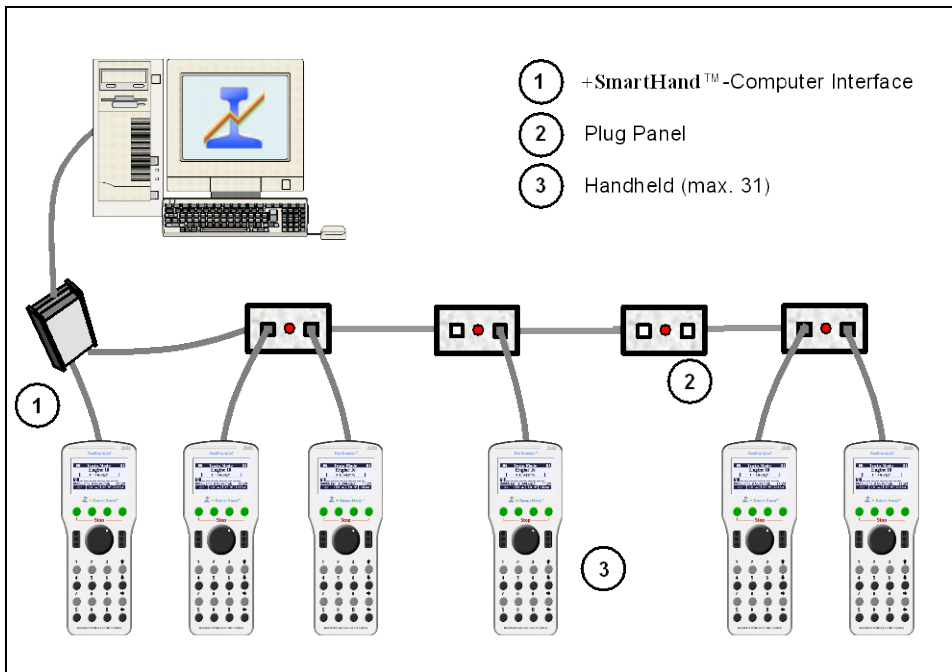


Diagram 1: Sample Handheld Configuration

+SmartHand™ Mobile

By entering the address of the computer, where **TrainController™** is running, into the Web browser of a mobile device a **+SmartHand™ Mobile** handheld is established.

- Mobile devices with a functioning Web browser and equipped with touch screen and WLAN support are suited in general. Netbooks, notebooks or even desktop computers can be used as additional operator stations for **TrainController™**, too. The operating system of the mobile device doesn't matter as long as a suited Web browser is available.
- Graphical display with self-explaining indication on the touch screen of the mobile device.
- Remote control of all important operational functions of **TrainController™**.
- Display of the complete train window of **TrainController™**.
- Switchboard view like in **TrainController™**.
- Control of routes, schedules and macros.
- Very useful in conjunction with a handy device for maintenance and testing on and below the layout.
- Software update via Internet

To begin you need at least one appropriate mobile device. Up to 31 mobile devices can be connected to the system.

In the following pages the usage of the handheld, its setup in the software, as well as its installation is explained.

2 Using +SmartHand™ Classic Handhelds

The handheld provides a 128x64 graphical display and a keypad with 20 keys. It is displayed below:

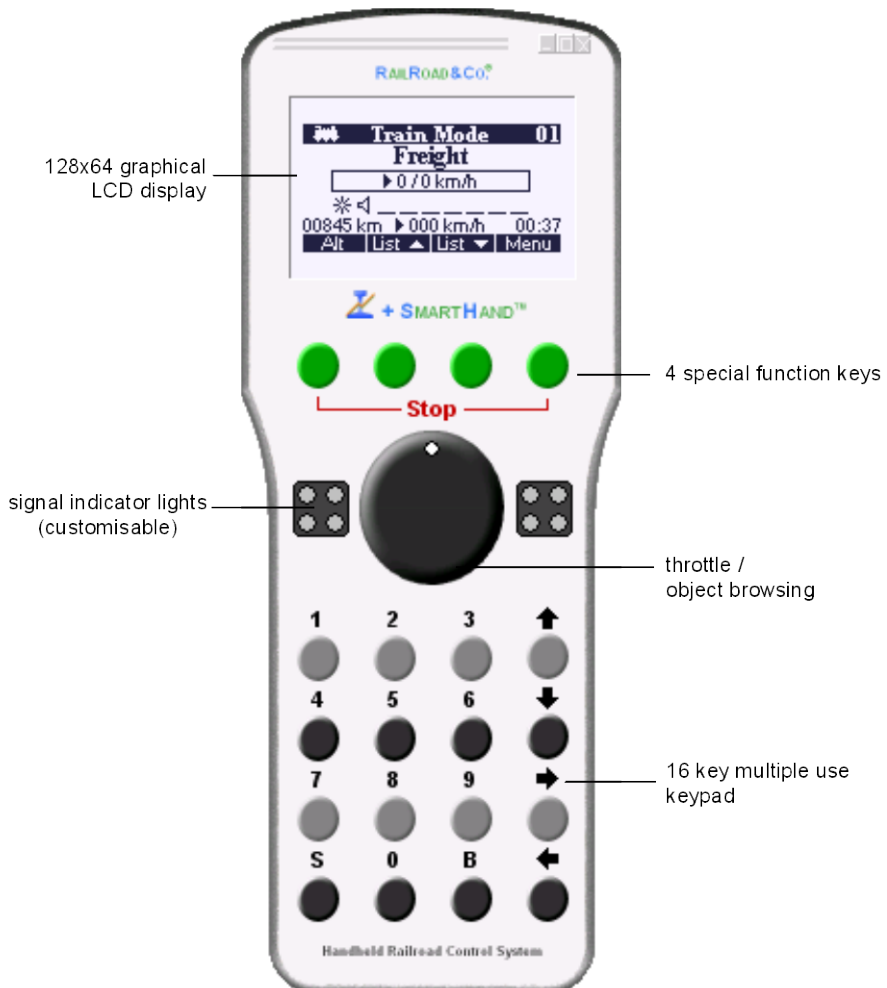


Diagram 2: Controls and Indicators of +SmartHand™ Classic

The controls and indicators of **+SmartHand™** are described below:

Graphical Display

This display provides 128 x 64 graphical and text indication. It is an LCD display with backlight. The content of the display depends on the current context **+SmartHand™** is running in. These contents are described below.

Throttle/ Object Browsing Knob

When in use for train control rotating this knob to the right increases the engine speed, subject to the momentum and speed profiles that have been defined for the engine being controlled, which are implemented in the **TrainController™** software. Rotating this knob to the left decreases the engine speed. The position of the control is scaled or modified based on the engine characteristics and the digital system actually controlling the engine.

In many situations this knob can also be used to select another engine, turnout, signal, route etc. quickly. In such situations rotating this knob to the right moves forward to the next elements while rotating this knob to the left moves backward.

Special Function Keys

These keys allow navigation through the functions and menus of the handheld system or provide access to specific functions useful for operation of your model railroad. The meaning of these keys vary and depends on the current context **+SmartHand™** is running in. The current meaning of each key is always displayed in the menu bar with up to 4 entries at the bottom border of the graphical display.

Keypad

The keypad provides 10 numeric buttons plus 6 special buttons with a specific meaning. The use of the particular keys is explained in more details in the following sections.

Signal Indicator Lights

These two groups of lights are used to provide information to the operator depending to the particular situation. The typical usage would be to show the operator the current block signal and the next upcoming (advanced) block signal - analogue to the indication in the **TrainController™** train window. This is the case if the train is operated under control of the **TrainController™** Dispatcher in order to provide the operator with the signal indication even at locations far away from the computer screen. The displayed signal aspects can be customized to fit the signaling system of the particular model railroad layout.

Keyboard Notation

In the following sections the operation of engines, trains, turnouts, signals, routes etc. is described in detail. The following notation is being used to describe keyboard input:

0-9	Press and release one of the numeric keys.
B	Press and release the B (Brake) button.
<Up>	Press and release the button labeled with the up arrow.
<Down>	Press and release the button labeled with the up arrow.
(1,2)	The brackets and comma ‘,’ are used, if two or more buttons are to be pressed and released one after the other. (1,2) for example, means: press and release 1 , then press and release 2 .
<TL>	Turn the throttle knob to the left.
<TR>	Turn the throttle knob to the right.
<Throttle>	Press and release the throttle. The response to this action can be customized by the end user to personal needs.
<Left>	Press and release the button labeled with the left arrow.
<Right>	Press and release the button labeled with the right arrow.
S	Press and release the button labeled with S.
[Alt]	Squared brackets refer to special function keys. [Alt] , for example, means: press and release the special function key, that corresponds to the entry “Alt” in the menu bar at the bottom of the graphical display.
[Alt]+B	The ‘+’ sign is being used, if two buttons are to be pressed simultaneously. [Alt]+B , for example, means: press and hold down [Alt] , press and release B , finally release [Alt] .
S*	Press the S button. Usually no action takes place, until the particular button is released. The asterisk ‘*’ indicates, that the described action is already executed, when the button is pressed.

General Key Assignment

If not explicitly described differently the following general key assignment applies to all modes of +**SmartHand**TM:

[Menu]	Open the main menu.
[List ▼]	Step forward through the list of elements of the current type to select another element.
[List ▲]	Step backward through the list of elements of the current type to select another element.
[Esc]	Close the current display and return to normal train mode.
[Alt]*	Toggle the alternate menu bar, toggle alternate functions.
[Alt]+[Freeze]*	(leftmost and rightmost special function key pressed simultaneously) Emergency stop of the entire model railroad layout.
[Alt]+[Hist◀]	select previous object in the list of most recently operated objects (MRO list)
[Alt]+[◀▶]	toggle between the current and the most recently operated object
<TR>	Step forward through the list of elements of the current type to select another element.
<TL>	Step backward through the list of elements of the current type to select another element.

2.1 Operating Engines and Trains

By default +**SmartHand**TM is in train mode. In this mode the handheld can be used to operate engines and trains.

Display Layout

In normal train mode the display looks like as displayed below:

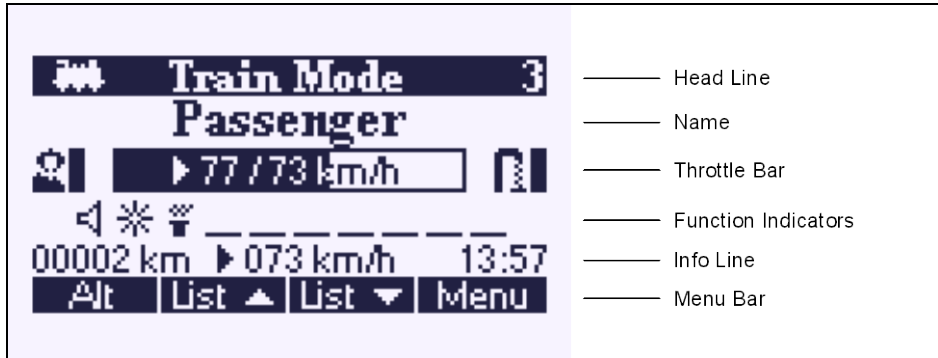


Diagram 3: Display in normal train mode

Head Line	icon reflecting the current orientation of the selected train (heading to the right/down or to the left/up with regard to the current block of the train); Title “Train Mode”; number of the engine
Name	train name. Long names are abbreviated.
Throttle Bar	Relative position of throttle (marked as filled black rectangle); selected direction (forward ►, backward ◄) of the throttle; physical speed step corresponding to the current throttle position; selected scale speed corresponding to the current throttle position. Status of coal, water, diesel and oil (‘O’) as percentage left and right of the throttle bar.
Function Indicators	Status of up to 10 functions; function symbols can be customized to personal needs and individual equipment of each particular locomotive;
Info Line	Total mileage; Actual direction and scale speed of the train; Current time of the fast clock.
Menu Bar	current meaning of the four special function keys.

Notes:

The direction and scale speed displayed in the throttle bar and in the info line may differ. If the direction of a train running forward at full speed is reversed, then the throttle bar will show the new direction at once. The train will now decelerate, stop, reverse and accelerate, until it reaches the speed, that corresponds to the current throttle position. During this process the throttle bar constantly displays the target direction and target speed, while the info line displays the temporary changes of speed and direction. When the train reaches the selected speed and direction both displays are identical. The throttle bar shows the selected (target) direction and speed, that corresponds to the current throttle position, while the info line shows the actual current direction and speed of the train.

Key-Assignment

1-9	Operate train function 1 to 9. Assignment as push button or on/off switch as specified in TrainController™
0	Turn on or off engine sound (see +4DSound™ product)
[Alt]+0-9	Operate train function 10 to 19. Assignment as push button or on/off switch as specified in TrainController™
<Up>	increase throttle level (by one step)
<Down>	decrease throttle level (by one step)
<Left>	Change to backward direction
<Right>	Change to forward direction
B	apply the brake (see below)
S	Stop the current train abruptly. If the train is running a schedule in TrainController™ , then this schedule is terminated, too.
<TR>	Increase throttle level.
<TL>	Decrease throttle level.
<Throttle>	The response to this action can be customized by the end user to personal needs. By default the direction of the currently selected train is changed.
[Alt]+<TR>	Step forward through the list of elements of the current type to select another element.
[Alt]+<TL>	Step backward through the list of elements of the current type to select another element.

Applying the Brake

When B is pressed and released, then the brake is applied to the operated train. The display changes and shows the string “*BRAKE” in the throttle bar.

The throttle level is set to 0, the throttle bar of the display disappears and the brake bar, that shows the current level of the brake is displayed. This is shown in the following diagrams:



Diagram 4: Display when applying the brake

While the brake is being applied <TL> and <TR> as well as <Up> and <Down> increase or decrease, respectively, the braking level. The brake can be released by decreasing the braking level to zero or by pressing and releasing **B** once more. After releasing the brake the display of the handheld returns to normal train mode.



A decelerated stop of the train, i.e. stopping the train subject to momentum and tonnage specified in TrainController™, can be triggered by pressing and releasing **B twice.** Pressing and releasing **B** the first time shortly applies the brake and sets the throttle level to 0. Pressing and releasing **B** the second time releases the brake while leaving the throttle level at 0. This causes a smooth, decelerated stop of the train.

2.2 Emergency Stop

Pressing **[Alt]+[Freeze]** on the handheld at any time causes **TrainController™** to “freeze” operation. All running trains are stopped and all running processes and schedules are interrupted without being terminated. **[Alt]+[Freeze]** causes the same effect as using the **Freeze** command of the **Railroad** menu in **TrainController™**.

As long as the frozen status is active, **+SmartHand™** shows the following display:



Diagram 5: Display in freeze mode

By pressing and releasing **[Start]** the interrupted operation of the layout can be started again (same as **Power On** command of the **Railroad** menu in **TrainController™**). By pressing and releasing **[Stop]** the operation will be stopped and all active (and currently interrupted) processes and schedules will be terminated.

2.3 Operation of Turnouts, Signals, Routes and other Objects

Object Selection

First press and release **[Menu]** to open the main menu. **+SmartHand™** shows the following menu:

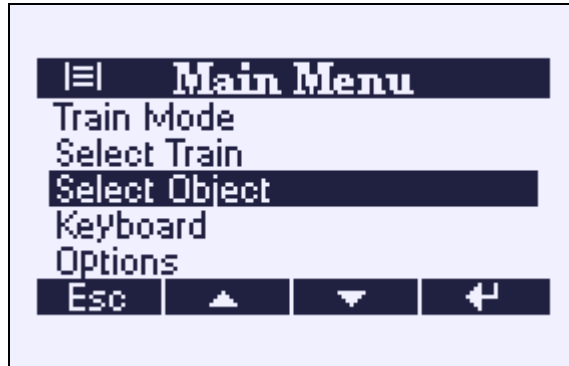


Diagram 6: Main Menu

Press [▲] and [▼] to move the selection up and down. Select the entry **Select Object**. After pressing [↵] or <Throttle> the handheld shows the list of available object types. This list exceeds the size of the display. With [▲] and [▼] you are able to scroll through the complete list.

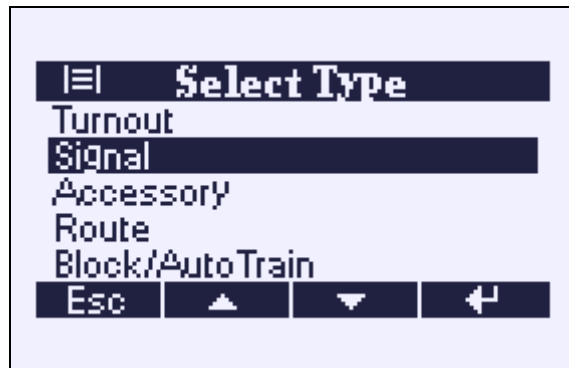


Diagram 7: Type Selection

Select the type of object, that you want to operate and press [↵] or <Throttle>.

Object Operation

After selecting the entry **Signal**, for example, in the screen displayed above the display will show:

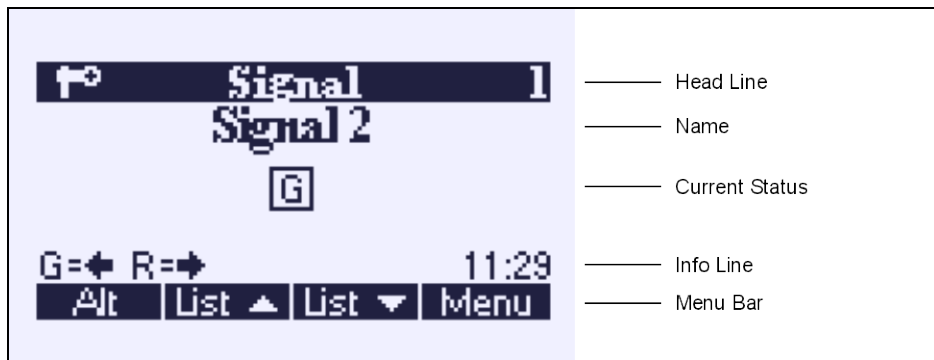


Diagram 8: Object Operation

Head Line	icon and text reflecting the type of the currently operated object; number of the object
Name	object name. Long names are abbreviated.
Current Status	current status of the object
Info Line	assignment of object states to arrow keys; current time of the fast clock.
Menu Bar	current meaning of the four special function keys.

Object Operation - Key-Assignment

<Left>	set the state of the object as displayed in the info line
<Right>	set the state of the object as displayed in the info line
<Up>	set the state of the object as displayed in the info line
<Down>	set the state of the object as displayed in the info line
<Throttle>	iterate through the states of the object
0-9	Enter the number of another object
<TR>	Step forward through the list of elements of the current type to select another element.
<TL>	Step backward through the list of elements of the current type to select another element.
S	Return to normal train mode.
B	Extend switchboard view (switchboard view only, see below).

Objects are operated by pressing and releasing **<Left>** or **<Right>**. If the selected object has more than 2 states, than **<Down>** and **<Up>** trigger the third and fourth state. The following table applies to the operation of the different types of objects:

	<Left>	<Right>	<Down>	<Up>
turnout	Closed	thrown	-	-
triple switch	Closed	right diverging	left diverging	-
single/double slip	as shown on the display			
Signal	green/proceed	red/stop	yellow/slow	white
push button	Press = on release = off	-	-	-
on-off switch	on/off	-	-	-
toggle switch	state 1	state 2	-	-
route	activate/ deactivate route	-	-	-
block	AutoTrain with arrival to the right/bottom (see below) [Alt]+<Left>: turn engine orientation to the left/up	AutoTrain with arrival to the left/top (see below) [Alt]+<Right>: turn engine orientation to the right/down	lock exit to the right/bottom or release existing exit lock [Alt]+<Down>: remove the current train from the block	lock exit to the left/top or release existing exit lock [Alt]+<Up>: reserve the block with the currently selected train
schedule	start schedule in reverse direction from a specified destination block to a start block	start schedule in normal direction from a specified start block to a destination block	terminate schedule for all trains, that are executing it	-
macro	execute macro	-	-	-

Table 1: Key assignment for Object Operation

Turnout Operation / Switchboard View

If turnouts are selected as type for object operation (see Diagram 7: Type Selection), then the display looks a bit different and shows the section of the **TrainController™** switchboard, where the currently selected object is located. This provides a more intuitive view to the operated turnouts. This feature makes +**SmartHand™** a unique device. No other handheld available in the model railroad industry is currently able to display a track diagram control panel of the model railroad layout.

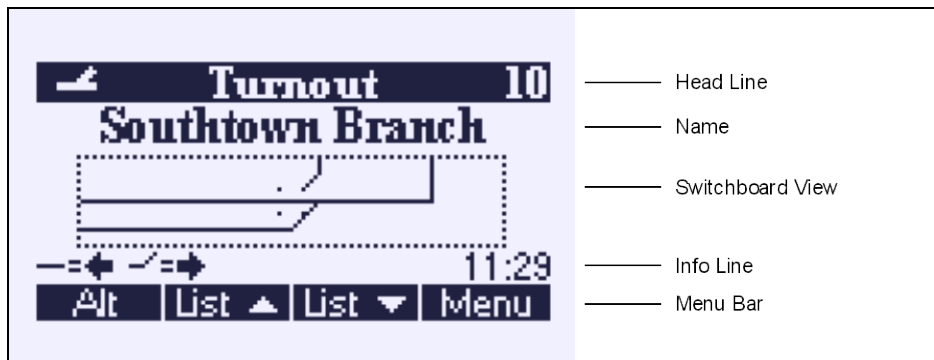


Diagram 9: Switchboard View

Switchboard View

section of the **TrainController™** switchboard, where the currently selected turnout is located. The display always shows the current position of the turnout in the center of the switchboard view.

Usually the switchboard view shows a section of the switchboard with 15 columns and 3 lines. While pressing **B** (“big”) the view is extended to 15 columns and 7 lines as shown below:

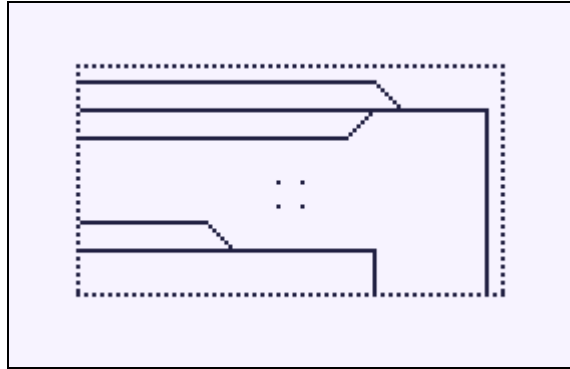


Diagram 10: Extended Switchboard View

Other turnouts can be selected in the same way as described above. It is also possible to move the switchboard view by pressing **[Alt]** or **B** (for extended view) plus one of the digit keys **1** to **4** or **6** to **9** simultaneously. This moves the switchboard view by one line and/or column according to the following scheme:

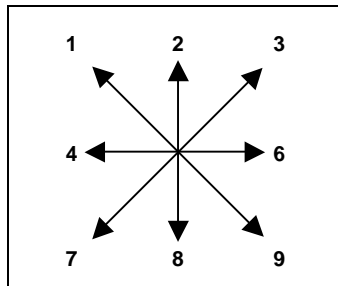


Diagram 11: Switchboard Navigation

Pressing **[Alt]+4** (or **B+4**), for example, moves the switchboard section one column to the left. With **[Alt]+3** (or **B+3**) the section is moved one column to the right and one line up. If no turnout is located in the center after moving the switchboard view, then the **Name** field remains empty and the arrow keys do not trigger any operation.

2.4 Blocks / AutoTrain™

With +**SmartHand**™ it is also possible to manipulate the status of blocks, to reserve blocks for trains or to start **AutoTrain**™ at any time during operation.

Blocks

The exits of blocks can be locked or released according to the key assignment outlined in Table 1.

The handheld also provides the possibility to reserve a block for a train, to change the engine orientation or to remove a train from a block. Table 1 shows the keys, that change the train orientation or that remove a train from a block. To reserve a block for a train, proceed as follows:

- Select the train, that you want to reserve a block for, in the display of the handheld in normal train mode.
- Enter [**Menu**] to open the main menu, then select the entry **Select Object** and press [**↵**].
- Next select **Block/AutoTrain** and press [**↵**].
- Select the block, that you want to reserve for the currently selected train.
- Press [**Alt**]+<**Up**> to reserve this block for the currently selected train. If the displayed train orientation does not match the actual orientation of the train, press [**Alt**]+<**Right**> or [**Alt**]+<**Left**>, respectively, to adjust the orientation of the train.

AutoTrain™

With **+SmartHand™** it is also possible to start **AutoTrain™** at any time during operation. **AutoTrain™** is a unique feature of **TrainController™**, with which it is possible to start a train under control of the computer without the need to define a schedule first. The train can run automatically or manually. In the first case the computer controls speed and direction of the running train. In the latter case the human operator of the handheld acts as the engineer. **TrainController™** will take care for appropriate routing and blocking of the train, while the human operator is responsible for speed and direction of the train. He has especially to obey the signals, that are calculated by **TrainController™** according to the traffic situation. These signals are displayed in the signal indicators of the handheld. This is another feature, that makes **+SmartHand™** a unique device. No other handheld available in the model railroad industry is currently able to display signal aspects, that are calculated according to the traffic situation on the model railroad layout.

To start **AutoTrain™** with a specific train perform the following steps:

- Select the train, that you want to start, in the display of the handheld in normal train mode. This train must be currently located in a block! If no block is currently reserved for this train, then perform the steps outlined in the previous section to reserve the block, where the train shall start, for this train.
- Select the direction, i.e. forward or backward, in which the train shall start. If necessary change the direction with **<Left>** or **<Right>**.
- Enter **[Menu]** to open the main menu, then select the entry **Select Object** and press **[↵]**.
- Next select **Block/AutoTrain** and press **[↵]**.
- Select the block as destination, where the train shall stop.
- If the train shall enter the destination block from the left/top to the right/bottom, then press **<Right>**. If the train shall enter the destination block from the right/bottom to the left/top, then press **<Left>**. In both cases **TrainController™** tries to find a path from the current position of the train to the specified destination block and starts the train, if such path can be found.

2.5 Operation of multiple Objects - Keyboard Mode

The keyboard mode provides the possibility to experienced users to operate several objects simultaneously.

In Keyboard mode the 16 grey and black keys form a generic keyboard panel. This panel allows simultaneous operation of a group of up to eight objects. Each pair of two keys (one black and one grey), that are located on the keyboard on top of each other, are associated with one object. **1** and **4**, for example, are associated with the first object of the group, **2** and **5** with the second and so on up to the two buttons in the lower right corner of the keypad, which are associated with the eighth element of the group.

The display shows up to 8 small rectangles – each rectangle is associated with one pair of keys and thus associated with one object.

To enter keyboard mode, open the main menu and select the entry **Keyboard Mode**. Now select the desired type of objects in the same way as for single object operation (see Diagram 7). +SmartHand™ now changes to keyboard mode and the display looks similar as shown in the following sections:

Keyboard Mode

The handheld shows the following display in keyboard mode:

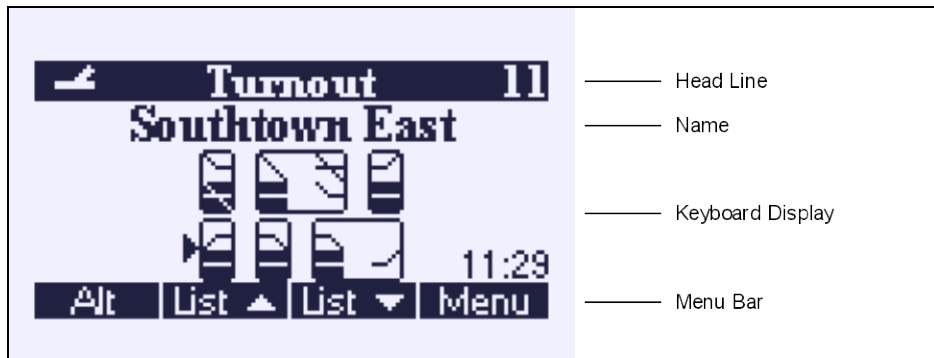


Diagram 12: Keyboard mode

Keyboard Display

schematic keyboard display (see below)

The key assignment is as follows:

0-9, <S>, , <Up>, <Down>, <Right>, <Left>

set the state of the object as outlined below

<TR> Step forward through the list of elements of the current type to select another element.

<TL> Step backward through the list of elements of the current type to select another element.

<Throttle> iterate through the states of the currently selected object

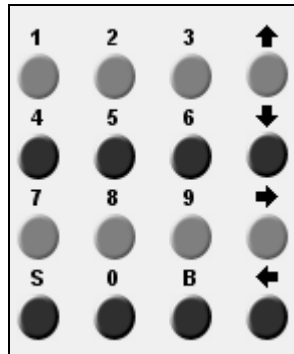


Diagram 13: Keyboard panel

If a certain object has 3 or more states, then two consecutive pairs of keys are associated with this object. In the display such groups of four keys (or two pairs of keys) are drawn with a common rectangular frame. Diagram 12 shows a keyboard, where the keys **2**, **5**, **3** and **6** are associated with the same turnout.

Each two symbols in the keyboard display represent two keys of the keyboard and show the current status of the associated object. The upper symbol corresponds with the upper key, the lower symbol with the lower key of the associated pair of keys. If the upper symbol is highlighted in black, then the upper key was pressed most recently, if the lower symbol is highlighted, then the lower key was pressed most recently.

One object of the currently visible group of up to 8 elements is always selected as current object. The rectangle, that corresponds to this object, is marked with a small arrow pointing to the right. In Diagram 12 turnout “Southtown East” is currently selected; it can be operated with **7** and **S** of the keyboard.

The actions triggered by the upper or lower key, respectively, correspond to the actions triggered by **<Left>** (lower) and **<Right>** (upper), respectively, in single object operation and are listed in Table 1. Entering **7**, for example, would cause the same effect as

selecting “Double Slip 2” for single object operation according to section 2.3 and entering **<Right>**.

If an object has 3 or 4 states and a second pair of keys is associated with it, then the upper or lower key, respectively, of the second pair correspond to the actions triggered by **<Down>** (lower) and **<Up>** (upper), respectively, in single object operation and are listed in Table 1, too.

2.6 Object Selection

There are two policies for selection of objects. The first and default is selection by name and the second is selection by numbers.

Selection by Name

This is the default selection policy. If this policy is selected, then all objects are listed in alphabetical order. Scrolling through these lists in the particular screens described above follows the alphabetical order of the objects.

The number, by which each object can be accessed quickly through numeric keys, corresponds to its position in the alphabetical order.

In this mode all objects can be accessed (if their access is not restricted by privileges - see below).

Selection by Number

Each object in **TrainController™** can be provided with a handheld number. This number must be unique for all objects of the same type (e.g. for all turnouts). If the policy to select objects by number is selected, then objects are listed according to the order of assigned handheld numbers. Scrolling through these lists in the particular screens described above follows the order of handheld numbers.

In this mode objects can only be accessed, if they are associated with a handheld number (and if their access is not restricted by privileges - see below).

The default selection policy is valid for all handhelds and determines the initial setting at the beginning of the first operating session. Additionally it is possible to change the selection policy of individual handhelds at any time during operation. In this way each handheld can be set to the preferred policy at any time during the session.

Favourites

It is possible to specify an individual set of objects as favourites for each handheld. These favourites can be used for several purposes: the type selection provides an additional entry „Favourites“ (Diagram 7). If this entry is selected, then the list of favourites assigned to this handheld is displayed. If this list is not too big, then frequently operated objects can be quickly picked from this list.

Furthermore it is possible to limit the selection of objects to the favourites. This is useful, if it is desired, that the handheld may access certain objects only.

3 Using +SmartHand™ Mobile Handhelds

The screen of a +SmartHand™ Mobile handheld usually looks as follows:

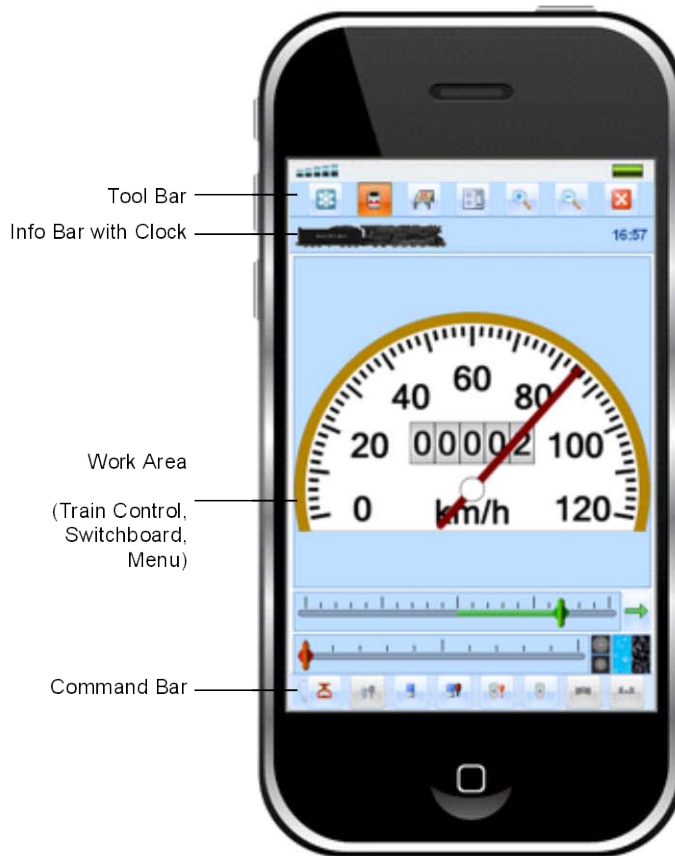


Diagram 14: Controls and Indicators of +SmartHand™ Mobile

Tool Bar

The Tool Bar contains commands for the emergency stop, to switch between the train view, switchboard view and menu view and to zoom in and zoom out the view.

Info Bar

The info bar shows the name or symbol of the currently selected train or switchboard and, optionally, the current time of the **TrainController™** clock.


Workspace

The workspace shows the train or switchboard view or menus to select or control other objects. The layout of the train or switchboard view is identical to the layout in **TrainController™**.

Command Bar

The command bar contains commands to control the currently selected object (e.g. emergency stop of the currently selected engine, selection of the driving mode, operation of a turnout, setting an exit lock for a block, etc.). In the train view, the command bar can be made visible or invisible by tapping into the info bar. If the switchboard view or a list view is opened, then the command bar is displayed whenever an object is currently selected, which can be controlled with the command bar.

3.1 Control of Locomotives and Trains

+SmartHand™ Mobile initially displays the train view (see Diagram 14). In this mode, the handheld is used to control locomotives and trains. The train view can be invoked by tapping on  in the tool bar.


The display has the same structure as the train window in **TrainController™**. The use of individual controls is identical to the operation of the train window (for more information, see documentation of **TrainController™**).



As the train window in **TrainController™**, the look and feel of the train view in **+SmartHand™ Mobile** can be adapted to your needs. The same options are available here, too.

To allow precise adjustment of the train speed, the following features are helpful in particular:

- If the zero position of the throttle is located in the middle, then by tapping into the throttle region, which is opposite to the current direction, the throttle is reset to zero and the currently controlled train is stopped.









- With additional optional buttons the position of the throttle and thus the speed of the train can be stepwise (e.g. by one decoder speed step) increased or decreased.
- Another optional button allows you to set the throttle directly to the zero position and to stop the train.
- If supported by the mobile device, it is also possible to change the speed with two fingers (see below). The sensitivity, with which the throttle responds to multi touch gestures, is also adjustable.

By tapping on  in the tool bar the controlled locomotive can be changed.

By tapping on  or  in the tool bar it is possible to zoom in or out the display of the work area.

Commands in the Command Bar


By tapping into an area of the train view, which is not used to control the locomotive (e.g. the speedometer area), the command bar is displayed. It contains the following commands:

- : Emergency stop the current locomotive.
- : Starts **driving with interlocking** for the current locomotive (or the train set it is contained in). The engine is started in its current direction of travel. If the reverse direction of travel is currently selected, for example, then the locomotive will run backwards.
- : Sets the driving mode of the locomotive to **automatic** (for details for the drive mode see documentation of **TrainController™**).
- : Sets the driving mode of the locomotive to **computer resumes at red signal**.
- : Sets the driving mode of the locomotive to **manual with enforced stop at red signal**.
- : Sets the driving mode of the locomotive to **manual**.
- : **TrainController™ Gold** only: join the train set, if the vehicle is part of a train set.
- : **TrainController™ Gold** only: separate the train set in front of the vehicle, if the vehicle is part of a train set. If the vehicle is the first in the train set, then the separation is done behind this vehicle.

Multi Touch Operation – Imaginary Rotary Knob

If supported by the mobile device, then in the train view locomotives can be very sensitively controlled with the thumb and forefinger like with a rotary knob. Simply tap anywhere on the screen in the train view with thumb and forefinger and keep both fingers as if between the two is an invisible rotary knob. Now rotate your thumb and forefinger against each other, as if you wanted to turn this knob. Clockwise rotation increases the speed, rotation in the opposite direction decreases it. You will be amazed how sensitive the speed can be controlled. And because the knob responds at any point of the train view, you do not even need to look to the mobile device while controlling a locomotive.

3.2 Operation of Turnouts and Signals – Switchboard View

By tapping on  in the tool bar the switchboard view becomes visible.

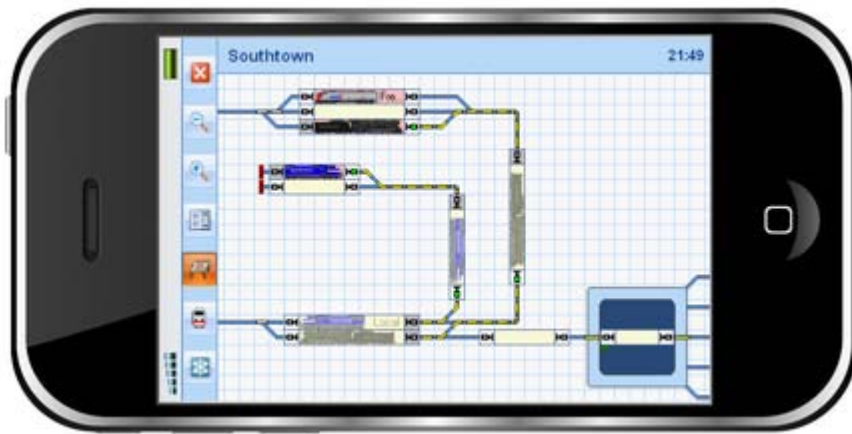





Diagram 15: Switchboard View in +Smarthand™ Mobile

The display of the switchboard is identical to the display in **TrainController™** (for more information, see documentation of **TrainController™**).

By tapping on  in the tool bar the visible switchboard can be changed.
















By tapping on  or  in the toolbar it is possible to zoom in or out the display of the switchboard in the work area.

If a turnout, a signal, a switch or other functional symbol with up to two states is tapped in the switchboard, an enlarged view of this object (“magnifier”) is displayed. In order to operate such objects, tapping on the corresponding symbol in the switchboard is sufficient. When tapping on objects with more than two states (e.g. three aspect signal, double slip turnout) and also blocks the command bar becomes visible, which contains the possible commands for this object. To operate the object tap on the corresponding symbol in the command bar.

Commands for Blocks

While the commands in the command bar for turnouts, signals and switches just correspond to the particular states of the selected object, the command bar for a block contains the commands listed below.

Some commands always refer to the **current locomotive**. This is the locomotive most recently selected in the train view. If this locomotive is included in a train set (only **TrainController™ Gold**), then, where necessary, the command is applied to the train set instead.

-  : Select the locomotive currently displayed in the block, as current locomotive.
-  : Assign a locomotive (or its train set, respectively) to the currently selected block.
-  : Reserve the block for a locomotive (or its train set, respectively).
-  : Reverse the train orientation.
-  : Release the block.
-  : Lock the corresponding entry into the block.
-  : Lock the corresponding exit of the block.
-  : Start driving with interlocking to the associated direction for the train in the currently selected block.
-  : Start an **AutoTrain** run with the train in the selected block as start and exit in the corresponding direction. To perform an **AutoTrain** run select the desired start block followed by tapping that  symbol in the command bar, which corresponds to the desired exit direction. Then tap on the desired destination block in the switchboard and finally on one of the  symbols in the command bar, that corresponds to the direction, which the train will enter the destination block in. After starting the procedure by tapping  on the start block the color of the button changes to  to allow selection of the destination block. Tap  to cancel this process.
-  : Terminate the currently active schedule, AutoTrain run or running with interlocking for the current locomotive.

AutoTrain by Multi Touch Operation

If supported by the mobile device, then it is also possible to start **AutoTrain** runs with two fingers. To do this, tap on the block, where the train will start, namely near the exit, where the train will leave this block. Hold the finger and tap with another finger on the desired destination block, namely near the exit, where the head of the train will stop. Then release both fingers.

Operation of Turntables

After tapping on a turntable symbol in the switchboard (**TrainController™ Gold** only) the command bar contains the following symbols:




: Choose this symbol, if you want to turn the bridge with the house to the selected track. Then tap on the desired track.



: Choose this symbol, if you want to turn the bridge with the opposite side of the house to the selected track. Then tap on the desired track.

3.3 Routes, Schedules, Macros

By tapping on  in the tool bar while the train view or switchboard view is active the menu is opened. Now select the menu entry **All Objects** and then the type of the desired object (e.g. routes). In the list, which shows all objects of the desired type, tap on the desired object. Finally tap on the desired command in the command line.

The following commands are available:

Routes:



: Deactivate the currently selected route.



: Activate the currently selected route.

Schedules:





: Start the currently selected schedule in the normal direction with an arbitrary train.




: Start the currently selected schedule in the reverse direction with an arbitrary train.




: Start the currently selected schedule in the normal direction with the train, which is currently selected in the train view.



- : Start the currently selected schedule in the reverse direction with the train, which is currently selected in the train view.
- : Terminate the currently selected schedule.

Macros:

- : Execute the currently selected macro. If the macro contains train operations, then these operations are applied to the train, which is currently selected in the train view.

3.4 Emergency Stop

By tapping on  in the tool bar at any time causes **TrainController™** to “freeze” operation. All running trains are stopped and all running processes and schedules are interrupted without being terminated. This command causes the same effect as using the **Freeze** command of the **Railroad** menu in **TrainController™**.

As long as the frozen status is active, +**SmartHand™ Mobile** shows the text “Freeze” on its display. By tapping on  in the command bar the interrupted operation of the layout can be started again (same as **Power On** command of the **Railroad** menu in **TrainController™**). By tapping on  in the command bar the operation will be stopped and all active (and currently interrupted) processes and schedules will be terminated.

4 Managing +SmartHand™

There is a wide range of options, with which the use of +SmartHand™ can be customized to personal needs. These options are accessed through the +SmartHand Manager window of TrainController™.

This window shows a list of all handhelds as displayed below:


No.	Controlled Object	Msg.
<input type="checkbox"/> 01		
<input type="checkbox"/> 02		
<input type="checkbox"/> 03		
<input checked="" type="checkbox"/> 04	 Passenger	
<input type="checkbox"/> 05		
<input type="checkbox"/> 06		
<input type="checkbox"/> 07		
<input type="checkbox"/> 08		
<input type="checkbox"/> 09		
<input type="checkbox"/> 10		

Diagram 16: Handheld List

The handhelds are identified by a number between 01 and 31. In case of +SmartHand™ Classic this number corresponds to the digital address of the handheld. This number does not also serve to address the handheld (Classic case) but also to identify a handheld or an individual set of handheld settings, respectively, uniquely in the system. In this way it is possible to define different handheld profiles for different purposes by specifying different settings for the particular handheld numbers, which can be even used by the same handheld device at different times. Connected handhelds are highlighted and show the symbol and name of the currently controlled object.

The operator at the computer can change the controlled train of each handheld at any time by dragging the symbol of a train from another location of the screen to the entry in the handheld list, that corresponds to the particular handheld. This selection overwrites any selection of objects done on the handheld itself.



Each handheld, that you want to communicate with TrainController™ must be enabled with the check mark left of its number.

By removing the check mark the affected handheld can also be temporarily locked. This can be useful if the current handheld operator is misusing his privileges, or if a

handheld is currently not in use and communication bandwidth should be reduced on the network.

All settings specified in this dialog can be applied to all handhelds or only to particular handhelds, if desired. In the latter case the regarding handhelds must be selected by clicking to the particular entries. To select more than one handheld simultaneously, hold the **CTRL** key of your keyboard pressed, while clicking to the handheld entries. Selected handheld entries are highlighted (often with blue color).

The **+SmartHand Manager** window furthermore provides several tabs with several sets of options each. These options are explained in the following:

4.1 Connection

The following options allow to specify the connection settings.



The settings can only be applied to all handhelds at the same time. After changing an option do not forget to use the option [Apply to all], otherwise the changes may not have an immediate effect.

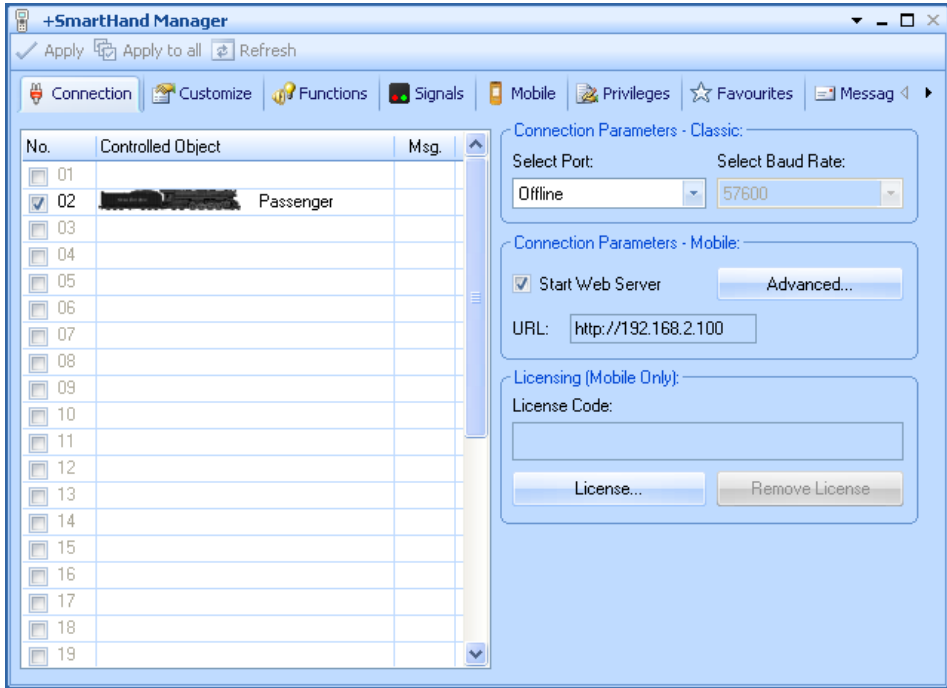


Diagram 17: Connection tab

Options for +SmartHand™ Classic

Select Port:

Select the USB or serial port of your computer, to which the handheld system is connected. The entry **Offline** activates the virtual handheld demo (see chapter 5).

Select Baud Rate:

Select the desired baud rate. Change this value only in case of connection problems. Use the default value 57600, if possible.

Options for +SmartHand™ Mobile

Start Web Server:

Starts the built-in Web server. This option must be turned on in order to use mobile devices using their Web browser as +SmartHand Mobile handhelds.

URL:

This field shows the address, which must be entered into the address bar of the Web browser of the mobile device to connect to the Web server. The address bar looks as follows:

http:// <computer>

where <computer> is the name or IP address of that computer on which the **+SmartHand Mobile** Web Server is running. If more than one network adapter is installed on your computer, then it may be, that the value displayed as <computer> is not appropriate. This is the case when mobile devices connect over another network adapter than the one that was used to determine this value. In this case, the display of <computername> must be ignored. Instead the name or address of the computer in that network must be determined by other means, through which the mobile devices connect to the computer.

Advanced:

This option allows advanced users to make additional settings for the Web server. These settings are described in Section 6.2, “Operation“ below. For normal operation of **+SmartHand™ Mobile** these advanced settings are not necessarily required.

4.2 Customizing **+SmartHand™ Classic** Handhelds

The following options allow to customize the handling of each **Classic** handheld to personal preferences:

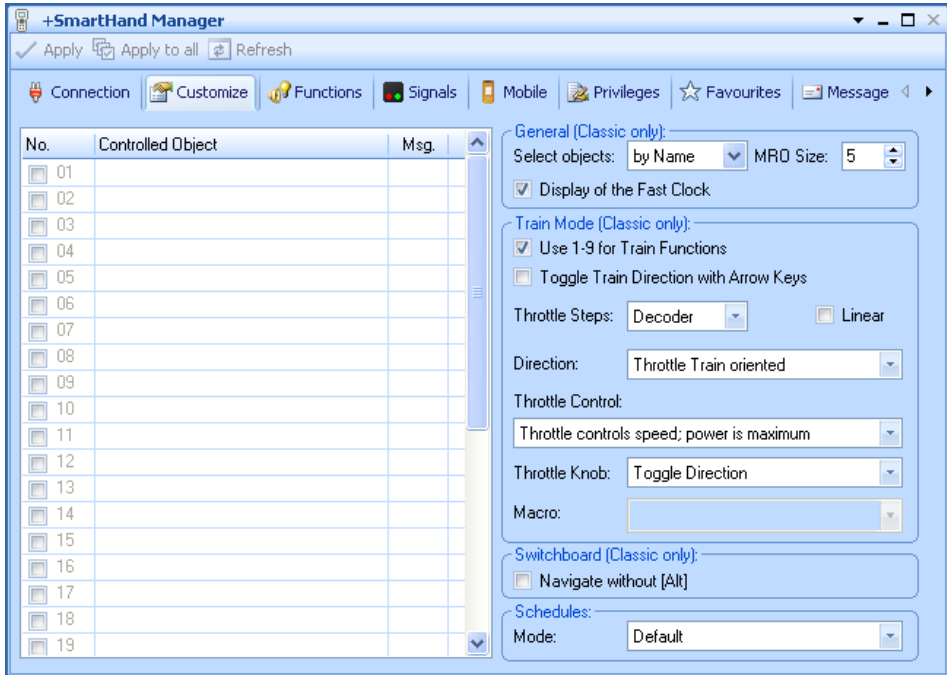


Diagram 18: Customize tab

Select objects:

With this option you can specify, whether objects shall be selected by name or by number (see section 2.6).

MRO Size:

Set the size of the MRO list. By default this size is set to 5, i.e. the 5 most recently objects are stored in the MRO list. By pressing **[Alt]+[Hist◀]** it is possible to scroll through this list.

Display of the Fast Clock:

Turn on and off the display of the fast clock on the handheld.

Use 1-9 for Train Functions:

By default the keys 1-9 are used for the first nine train functions, while 0 is reserved for engine sound (+4DSound™). Persons, who are accustomed to operate the headlights as function 0 can turn off this option to use 0-8 for the first nine train functions and 9 for engine sound. This option has no effect for the train functions 10 to 19.

Toggle Train Direction with Arrow Keys:

By default <Left> changes the train direction to backward, and <Right> to forward. Optionally both keys can be set up to toggle the current train direction.

Throttle Steps:

Specify the number of ticks of the throttle knob between 0 and maximum speed. If **Decoder** is selected, then the number of ticks corresponds to the number of speed steps of the decoder of the selected locomotive. Otherwise the number of ticks corresponds to the number selected here. If 25 is selected for example, then it takes 25 ticks to turn the throttle from the zero speed position to the maximum speed position.

Linear:

If this option is checked, then each movement of the throttle knob causes a fixed rate of change.

If this option is not checked, then the faster the throttle knob is turned, the faster the speed changes.

Direction – Throttle Train oriented:

A **train oriented** throttle causes the train always to move forward, when the direction control is pointing to the right, and to move backward, when the direction control is pointing to the left.

Direction – Throttle Layout oriented:

A **layout oriented** throttle causes the operated train to move to the left/top on the layout, when the direction control is pointing to the left, and to move to the right/bottom on the layout, when the direction control is pointing to the right. This setting is only effective for trains currently assigned to a block. It emulates the characteristics of a former throttle for analogue DC railroads.

Throttle Control – Throttle controls speed; power is maximum:

If the throttle controls the speed, then the train is always accelerated with the maximum engine power. Turning the throttle to a certain position causes the same effect, as if the throttle were first turned to the maximum position and then reduced to this position, when the train reaches the corresponding speed. This is the most convenient setting, where the momentum specified for the associated train, still applies.

Throttle Control – Throttle controls power; speed follows power:

If the throttle controls the power, then the train is always accelerated with the power, that corresponds to the throttle position. This provides more realistic train control, because many throttles of real railroads actually control the effective power rather than the

speed of the train. In such cases the speed indirectly “follows” the effective power. This option, however, also requires more complex user intervention for train control and is less convenient than direct speed control.

Throttle Control – Throttle controls speed; no momentum:

If the throttle controls the speed without momentum, then all momentum settings specified in the software are disabled for all trains controlled with this throttle. Speed changes apply directly without any momentum.

Throttle Knob - No Effect:

If this option is selected, then <Throttle> (pressing and releasing the throttle knob) does not cause any effect in train mode.

Throttle Knob - Toggle Direction:

<Throttle> changes the direction of the currently selected train. This option is effective in train mode only.

Throttle Knob - Halt Train Slowly / Toggle Dir:

<Throttle> slows down the currently selected train and stops it. If the train is already stopped, then <Throttle> changes its direction. This option is effective in train mode only.

Throttle Knob - Stop Train / Toggle Direction:

<Throttle> stops the currently selected train abruptly. If the train is already stopped, then <Throttle> changes its direction. This option is effective in train mode only.

Throttle Knob - Freeze Layout:

<Throttle> freezes the complete layout. This option is effective in train mode only.

Throttle Knob – Run with Interlocking:

If this option is selected, then the currently selected train is started in its current direction to run with interlocking. For details about run with interlocking refer to the Users Guide of **TrainController™**, please.

Throttle Knob - AutoTrain:

This option is useful for quick execution of **AutoTrain™**. <Throttle> directly changes to the block display, where you can select the desired destination block and start **AutoTrain™** without the need to step through the main menu first.

Throttle Knob - Call Macro:

<Throttle> executes the macro selected in the option **Macro**. If this macro contains engine operations, then these operations are applied to the currently selected train. In

this way it is possible to define a complex train operation and to perform it directly for each train.

Navigate without [Alt]:

This option applies to the switchboard view (see page 22). Usually it is possible to navigate through the displayed switchboard by pressing **[Alt]** and a digit, which determines the direction of navigation. Entering a number without pressing **[Alt]** selects the turnout with this number. If this option is selected, then the meaning of **[Alt]** is inverted: pressing a digit without **[Alt]** navigates through the switchboard and entering a number while pressing **[Alt]** selects the turnout with this number. Select this option, if you prefer convenient navigation through the switchboard over convenient access to objects by numbers.

Schedule Mode – default:

Applies to schedules or AutoTrain™ started by the handheld. Each schedule is executed with the driving mode specified in the properties of the particular schedule in **TrainController™**. Trains started by AutoTrain™ will be fully controlled by the computer.

Schedule Mode – automatic:

Applies to schedules or AutoTrain™ started by the handheld. Trains under control of such schedules or AutoTrain™ are always completely controlled by the computer, regardless of any settings in the schedule properties. This setting overrides the settings in the properties of the particular schedule in **TrainController™**.

Schedule Mode – stop at red:

Applies to schedules or AutoTrain™ started by the handheld. The human operator is responsible for controlling the speed of trains under control of such schedules or AutoTrain™, as long as the signal calculated for the train is not red. If red the computer will take over control and stop the train. This setting overrides the settings in the properties of the particular schedule in **TrainController™** or the usual automatic mode of AutoTrain™.

Schedule Mode – manual:

Applies to schedules or AutoTrain™ started by the handheld. The human operator is responsible for controlling the speed of trains under control of such schedules or AutoTrain™, regardless of the settings in the schedule properties in **TrainController™**. This setting overrides the settings in the properties of the particular schedule in **TrainController™** or the usual automatic mode of AutoTrain™.

4.3 Customized Function Symbols

The options in the **Functions** tab allow customization of the train function symbols displayed by the **Classic** handheld.

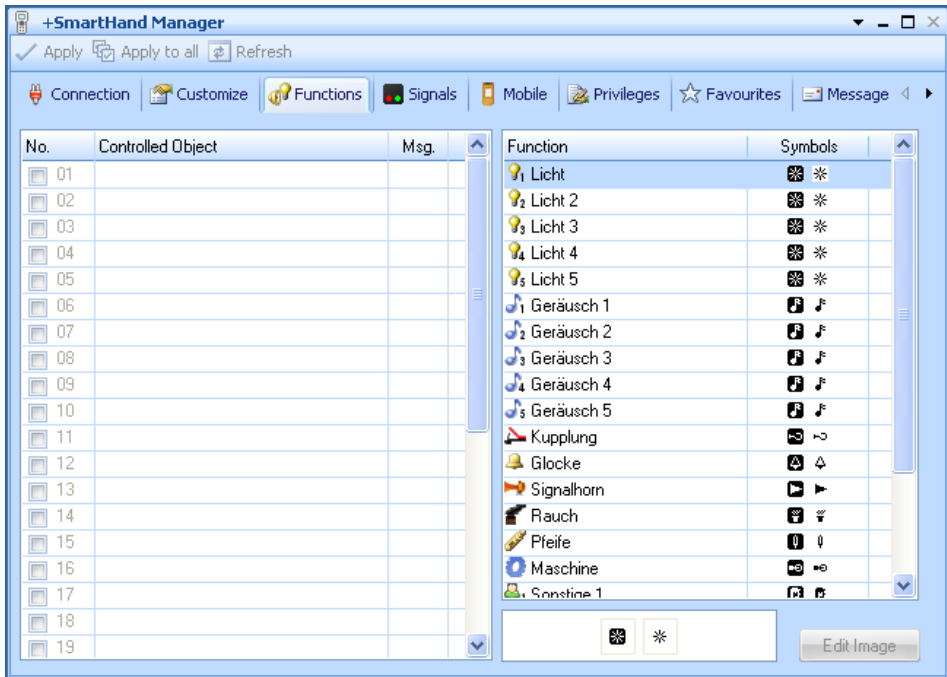


Diagram 19: Functions tab

After selecting a function in the list, the two associated symbols for the two states on and off of the function are displayed in the lower right area of the dialog. Select here the image, that you want to change and click the **Edit Image** option (alternatively double click to the image, that you want to change). **TrainController™** now opens an image editor, that allows to edit the image.

Note, that even though each change is directly stored in the data of the software, the new symbols will not be displayed on a **Classic** handheld, as long as the new symbols are not explicitly transferred to this handheld. To initiate this transfer select the desired handhelds and press **Apply to selected Handhelds** or press **Apply to all Handhelds**.

This transfer must be repeated later for all handhelds, that are newly connected to the network at a later time.

But even if customized symbols are not transferred accordingly no major problems will arise. If the handheld misses a symbol to be displayed, then it displays a default symbol showing an 'F' instead. If the symbol stored on an handheld is outdated, because a new version of that symbol was not transferred after it was changed, then the old version of the symbol is still visible on the handheld. Both are just display problems and do not raise any functional consequences.

4.4 Customizing the Signal Display

The options in the **Signals** tab allow customization of the signal aspects displayed by the signal indicator lights, which are located left and right of the throttle of a **Classic** handheld. These aspects are calculated as home and distant signals by **TrainController™** for all trains under control of a schedule. For more details about these aspects refer to the section about Block Signals in the **TrainController™ Users Guide**, please.

Each group of indicator lights contains 4 single lights. The left group reflects the currently calculated home signal, the right group belongs to the distant signal. Each single indicator light can be configured to show red, yellow or green or to stay off for a certain signal aspects. This is done as described below:

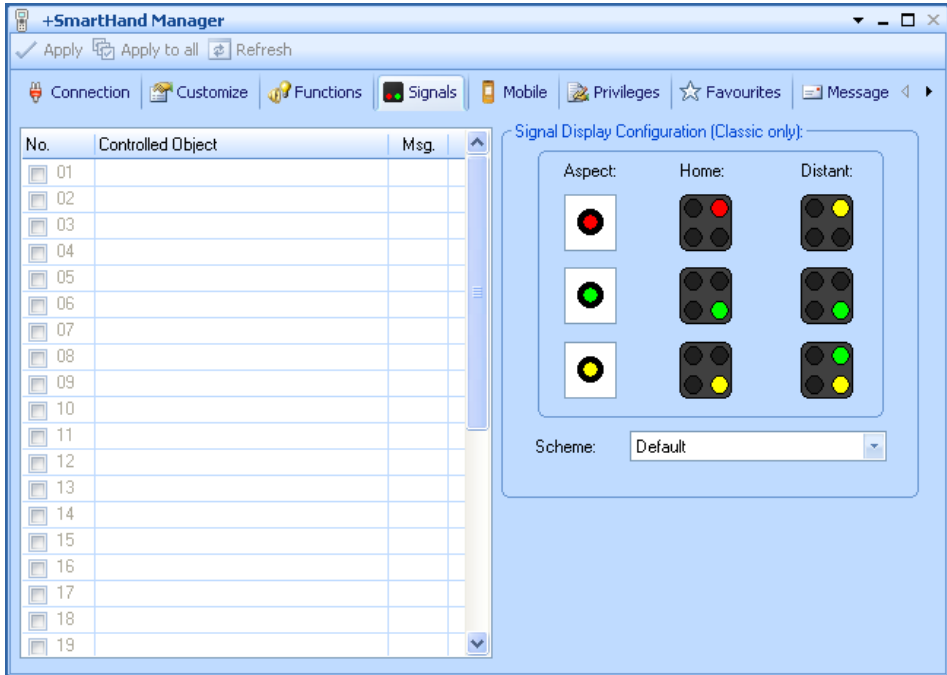


Diagram 20: Signals tab

Home:

This column shows, how the associated signal aspects are displayed by the signal indicator lights located on the left of the handheld throttle (home signal). Each line in this column reflects the display, that belongs to one of the three available aspects (red/stop, green/go and yellow/slow). By clicking to the particular circles you can change the color, that is shown by the associated indicator light for the associated aspect, or you can turn the display of this particular light off.

Distant:

This column shows, how the associated signal aspects are displayed by the signal indicator lights located on the right of the handheld throttle (distant signal). The display of these lights is configured in the same way as the lights, that belong to the home signal.

Scheme:

While the display of each particular indicator light can be configured individually it is also possible to configure the display more conveniently by selecting one of the predefined signal schemes. This changes the configuration of all lights in one single step. If

Germany is selected, for example, then the display corresponds to the signal aspects of German Bundesbahn light signals.

4.5 Customizing +SmartHand™ Mobile Handhelds

The following options allow to customize the handling of each **Mobile** handheld to personal preferences:

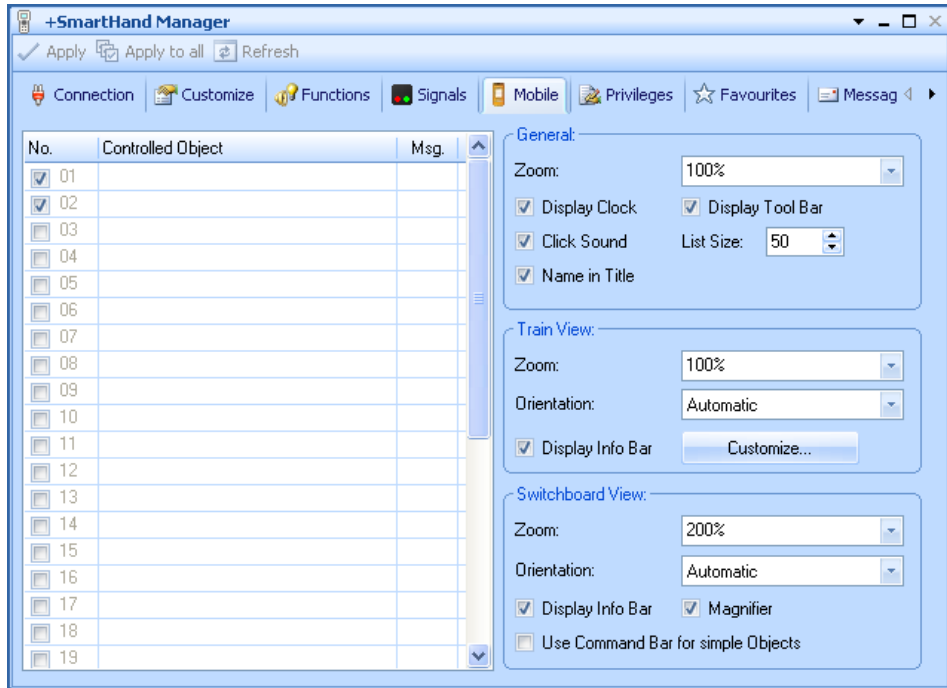


Diagram 21: Mobile tab

General - Zoom:

Specify a magnification factor for the display of the tool bar, the info bar, the command bar and menus on the screen of a mobile device.

Display of the Fast Clock:

Turn on and off the display of the fast clock in the info bar of the mobile device.

Display Tool Bar:

Determines whether the tool bar is displayed or not. Hiding the tool bar is for example useful to save screen space in cases, when the handheld is not allowed to use the commands in the tool bar.

Click Sound:

Specify whether to play a click sound on the mobile device or not, when an appropriately responding area of the screen is tapped. Changing this option requires reload of the screen display on the Web browser of the mobile device.

List Size:

With this option the number of items in a selection list can be limited. This is useful if the device is not able to display large lists with many entries on one single page. If the list size is set to 50, for example, then large lists are displayed page by page with 50 items each. The default value 0 sets no limit.

Name in Title:

If this option is selected, then the name of the currently selected switchboard or train will be displayed in the title or tab bar in the browser of the mobile device.

Train View - Zoom:

Specify a scale factor for the display of the train view in the work area on the screen of the mobile device.

Train View - Orientation - Automatic:

Select this setting, if the orientation of the train view should automatically follow the orientation of the mobile device. This setting is useful if the mobile device has an accelerometer and the screen is aligned automatically depending on how the device is held.

Train View - Orientation - Portrait:

Select this setting, if the train view should always be displayed in portrait orientation. This setting is useful if the mobile device does not have an accelerometer and the train view should always be displayed in portrait orientation.

Train View - Orientation - Landscape:

Select this setting, if the train view should always be displayed in landscape orientation. This setting is useful if the mobile device does not have an accelerometer and the train view should always be displayed in landscape orientation.

Train View - Orientation - Smart:

By using this option it is possible to toggle automatically between train view and switchboard view by turning the mobile device. If the device is turned to portrait orien-

tation, then the train view is automatically displayed. If the device is turned to landscape orientation, then the switchboard view is automatically displayed.

Train View – Display Info Bar:

Determines whether the info bar is displayed in the train view or not. Note, that the command bar cannot be made visible, if the info bar is turned off. In this mode the commands of the command bar are not available.

Train View - Customize:

This option provides access to a range of other settings that you can use to customize the look and the handling of the train view on the mobile device. These are the same settings as the menu command **View -> Train Window -> Customize** in **TrainController™** for the on-screen train window. These settings are described in the **Help** menu of **TrainController™**.

Switchboard View - Zoom:

Specify a scale factor for the display of the switchboard view in the work area on the screen of the mobile device.

Switchboard View - Orientation - Automatic:

Select this setting, if the orientation of the switchboard view should automatically follow the orientation of the mobile device. This setting is useful if the mobile device has an accelerometer and the screen is aligned automatically depending on how the device is held.

Switchboard View - Orientation - Portrait:

Select this setting, if the switchboard view should always be displayed in portrait orientation. This setting is useful if the mobile device does not have an accelerometer and the switchboard view should always be displayed in portrait orientation.

Switchboard View - Orientation - Landscape:

Select this setting, if the switchboard view should always be displayed in landscape orientation. This setting is useful if the mobile device does not have an accelerometer and the switchboard view should always be displayed in landscape orientation.

Switchboard View - Orientation - Smart:

By using this option it is possible to toggle automatically between train view and switchboard view by turning the mobile device. If the device is turned to portrait orientation, then the train view is automatically displayed. If the device is turned to landscape orientation, then the switchboard view is automatically displayed.

Switchboard View – Display Info Bar:

Determines whether the info bar is displayed in the sitchboard view or not.

Switchboard View - Magnifier:

Specifies whether the enlarged view of simple objects (turnouts with two positions, two aspect signals, switches or buttons) is to be displayed or not, when such objects are tapped.

Switchboard View - Use Command Bar for simple Objects:

Specifies whether simple objects (turnouts with two positions, two aspect signals, switches or buttons) should be operated by direct tapping on them or via the command bar.

4.6 Privileges

With the following privileges each handheld can be limited to certain functions or operation of certain objects.

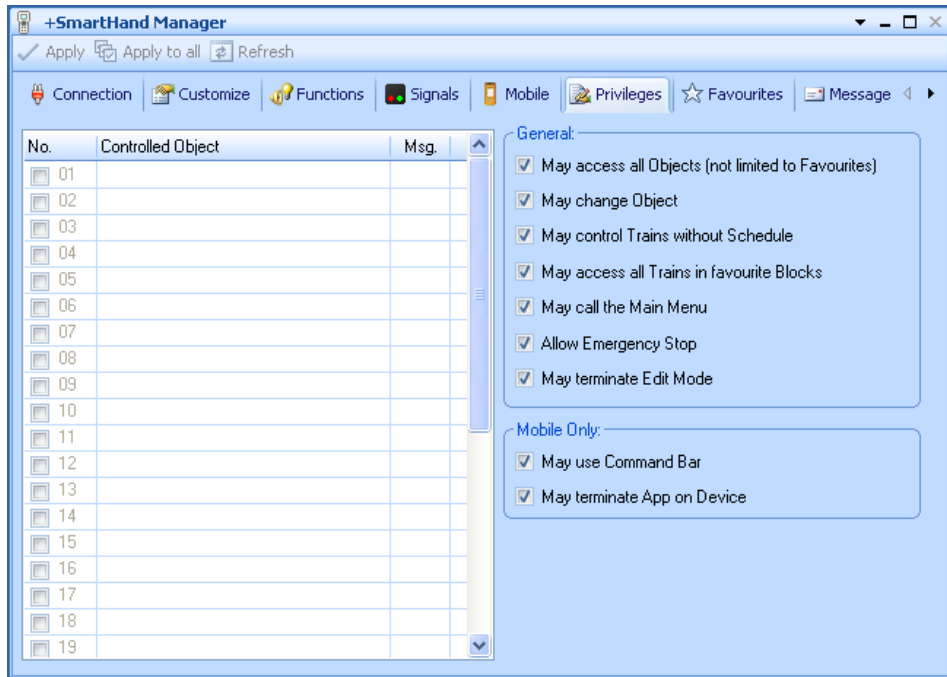


Diagram 22: Privileges tab

May access all Objects:

If this privilege is set, then the handheld may operate all objects. If this privilege is not set, then the handheld may only operate those objects, that are marked in the favourite list of this particular handheld (see below). With this privilege it is possible to limit the use of the affected handhelds to operation of certain trains or to all objects, that are associated with a certain area (e.g. yard) of the layout. This is for example useful, if a yardmaster should be able to operate all turnouts and routes in his yard with the handheld but no turnouts or routes, that are located in other areas of the layout.

May change Object:

This is the most restrictive privilege. If this privilege is not set, then the handheld may operate only the particular train, that has been assigned to it by the human dispatcher sitting in front of the computer. This assignment can be done by dragging the symbol of an object from another screen location to the entry of the particular handheld in the handheld list.

May control Trains without Schedule:

If this privilege is not set, then the handheld may operate trains only, if they are currently under control of a schedule. This option is useful to ensure, that all trains controlled by this handheld are under control of a schedule. By specifying appropriate modes for the related schedules it is possible to force all trains controlled by this handheld to stop in front of a red signal.

May access all Trains in favourite Blocks:

This option is only effective, if the option **May Access all Objects** is not set. It allows the handheld to control all trains, that are currently located in a block, which is again marked in the favourite list of the handheld (see below). In this way it is possible to restrict the handheld to control of a certain section of the layout (e.g. all turnouts, signals, routes and blocks, that belong to a certain yard) while simultaneously allowing the handheld to control all trains, that are currently located in this section, or more precisely: in a block contained in this section.

May call the Main Menu:

With this privilege the handheld may open the main menu.

Allow emergency Stop:

With this privilege the handheld may emergency stop (freeze) the complete layout with the according keystroke. Additionally the handheld may terminate an existing freeze or stop status.

May terminate Edit Mode:

For technical reasons all handhelds are always locked, while edit mode is turned on in **TrainController™**. In this locked state the only thing handhelds can do is termination of the edit mode. With this privilege certain handhelds can be prevented from terminating edit mode (e.g. if father has to edit the data and little son playing with the handheld should wait, until father is ready).

Mobile Only – May use Command Bar:

With this privilege a mobile device can be limited to a *view-only* device. This option is useful if the device should only provide a display of a switchboard without the possibility to operate the objects contained therein.

4.7 Favourites

In this tab the favourites can be selected.

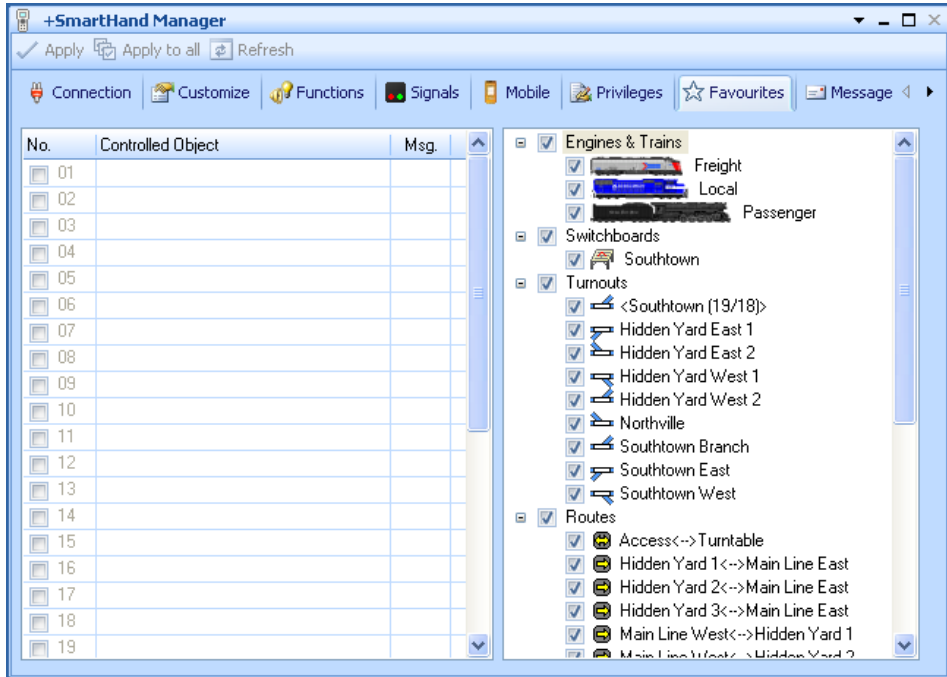


Diagram 23: Favourites tab

By selecting a set of objects as favourites and not applying the privilege **Not limited to Favourites** it is possible to limit the affected handhelds to the operation of the regarding objects. If this privilege is not applied, the handheld can access only those objects, that are marked as favourites.

The favourites also allow quick access to frequently used objects in cases, too, where the said privilege is applied and the handheld has unlimited access to all objects. In this case an additional pseudo-type **Favourites** is displayed in the type selection list of the handheld (see Diagram 7). If the entry **Favourites** is selected, then a list of all favourites is displayed, which allows quick access to one of these objects.

4.8 Sending Messages to Handhelds

The options in the **Message** tab allow communication with particular handhelds by sending messages and receiving short responses.

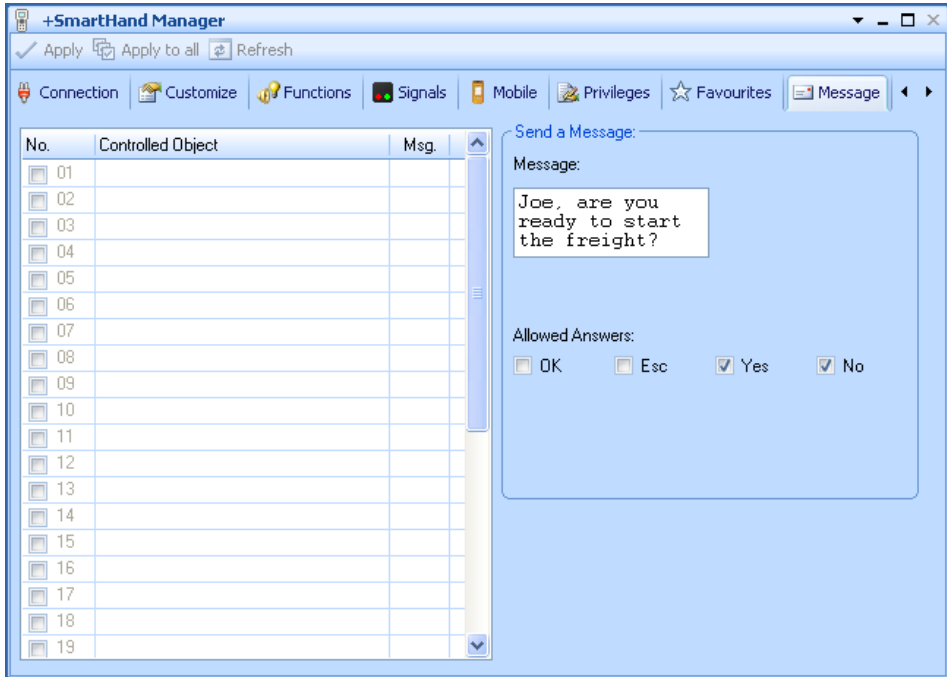


Diagram 24: Message tab

Message:

Enter the text to be sent to all or selected handhelds.

Allowed Answers:

Select one or more answers, that can be used by the handheld as response to this message. Possible options are **OK** for commitment, **Esc** to signal, that this message has been aborted or ignored, **Y** for 'yes' and **N** for 'no'. If no response is selected, then **OK** is used by default.

To send the message select the desired handhelds and press **Apply to selected Handhelds** or press **Apply to all Handhelds**.

After sending this message is displayed on the affected handhelds as shown below:



Diagram 25: Message Display

By pressing [Y] or [N] the handheld operator can now send the appropriate response back to the computer. The response is then displayed in the **Msg.** column of the handheld list (see Diagram 24).

5 The Virtual Handheld Demo

+**SmartHand**TM is delivered with a virtual handheld demo program. This program can be used to try the use of a +**SmartHand**TM **Classic** handheld prior to purchase or to learn the use of +**SmartHand**TM without the need to install a physical handheld. The +**SmartHand**TM demo program is free of charge and can be downloaded from the Internet (www.freiwald.com) free of charge for trial purposes prior to purchase of +**SmartHand**TM.

After start of the demo the program displays an image of a **Classic** handheld as displayed in Diagram 2. The demo is full functional. This means, that all functions of the real handheld can be executed with the +**SmartHand**TM demo, too. After start the demo automatically connects to a running instance of **TrainController**TM, if any. If **TrainController**TM is not running, then a generic welcome screen is visible on the display of the handheld, until **TrainController**TM is running, too.

In the +**SmartHand Manager** the demo is visible as handheld with number 01.

All features and procedures of the physical handheld as described in the previous section apply in general sense to the demo, too. The most important difference is the simulation of the handheld keyboard with the input devices of your computer, i.e. the computer keyboard and mouse.

In order to simulate entering **S** on the physical handheld, for example, enter 'S' on your computer keyboard. In general the following table applies:

Handheld	Computer Keyboard	Computer Mouse
0-9	0-9 of the normal keyboard or 0-9 of the numeric keypad	Click to the regarding button control on the computer screen.
B	character 'B'	
<Up>	up arrow	
<Down>	down arrow	
<Left>	left arrow	
<Right>	right arrow	
S	character 'S'	
[...] (special function keys mapped to entries of the menu bar such as [Alt] or [Menu])	F1, F2, F3, F4 F1 maps to the leftmost entry of the menu bar (usually [Alt]); F2 maps to the second entry; F3 maps to the third entry; F4 maps to the rightmost entry (usually [Menu])	
<TR>	-	Drag white marker of the rotary knob control clockwise or turn wheel of wheel mouse up
<TL>	-	Drag white marker of the rotary knob control counterclockwise or turn wheel of wheel mouse down
<Throttle>	Space Bar	Click to the throttle control with the right mouse button.

Table 2: Mapping of input controls from handheld to computer keyboard and mouse

6 Installation, Operation and Licensing

6.1 Installation

For the operation of **+SmartHand™** the following components are required:

- The **+SmartHand™** computer software. This software can be downloaded free of charge from www.freiwald.com. It contains among others the required **+SmartHand Manager** and must be installed in the same directory as **TrainController™**.

as well as

- The **+SmartHand™ Classic** computer interface and at least one **+SmartHand™ Classic** handheld. Both devices are available in a starter set from www.freiwald.com. The computer interface is supplied with appropriate USB drivers, which are installed according to the instructions shipped with these devices. The wiring of the devices is done according to these instructions, too.

or

- At least one mobile device (smartphone, tablet computer, PDA, Netbook, notebook, etc.), which is suited for use as **+SmartHand™ Mobile** handheld (WLAN, touch screen for handsets, WLAN / LAN, etc. for Netbooks). Usually it is not necessary to install specific software on the device.

6.2 Operation

Normally, no special instructions apply.

+SmartHand™ handhelds usually connect automatically with **TrainController™**, if **TrainController™** was launched with a correctly installed **+SmartHand Manager**. **+SmartHand™ Classic** handhelds need to be plugged in accordingly; **+SmartHand™ Mobile** handhelds need a functioning network connection to the computer running **TrainController™**. To connect a mobile device, start the Web browser on this device and enter the address displayed in the **Connection** tab of the **+SmartHand Manager** (see Diagram 17).



It is also important that the required handheld numbers are activated in the handheld list of the **+SmartHand Manager** (see Diagram 16).

Advanced Settings for the +SmartHand™ Mobile Web Server

The advanced settings for the **+SmartHand™ Mobile Web server** are opened by pressing the **Advanced** option in the **Connection** tab of the **+SmartHand™ Manager**. The program opens the dialog shown below.

No.	User	IP-Address
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		

Server:

Timeout: 5000 Start Page: [dropdown]

Client:

Tile Width: 1024 Tile Height: 1024

Timing:

Idle Interval: 500 Busy Interval: 100 Busy Frames: 3

Image Quality: Poor/Fast [slider] Good/Slow

OK Cancel

Diagram 26: +SmartHand Mobile Advanced Settings

User:

By clicking a field in this column an optional user name can be specified for each of the available handheld numbers between 01 and 31. A mobile device can only connect with the respective handheld number, if it is called in the browser address line with the user name stored here given (see page 63). In this way it is possible to allow only specific handheld numbers for specific user groups (e.g. drivers, dispatchers, visitors, etc.). For the respective numbers the adjustments described in chapter 4, “Managing +SmartHand™” can be made to tailor the handheld for users assigned to the number. For the user group "dispatcher", for example, it could be determined that this group may only see the switchboard view. For the group of "visitors" it could be established that they can only drive with a dedicated locomotive etc.

User names can be freely chosen, but permitted are only letters and numbers and no special characters. User names are not case sensitive. The same user name may also be associated with several handheld numbers.

IP Address:

Displays for each handheld number 01-31 the IP address of the device, which was most recently connected with this number.

Timeout:

With this option you can specify a timeout. It is measured in milliseconds. If the Web server does not receive a request from the mobile device within the specified period of time, it is assumed that the connection is lost. A train currently driven from the mobile device is stopped in this case as a precaution. Increase this value if the screen content of the mobile device is reset to the start screen and reloaded frequently. The value **0** disables the timeout.

Start Page:

With this option you can specify your own start page. Normally when you enter the address of the Web server into the browser the normal handheld screen described in the preceding chapters is displayed. By defining your own start page more interesting possibilities arise. In this option, the name of the HTML files are listed, which are stored in the subdirectory **SmartHandCustom** of the installation directory of **+TrainController™**. **+SmartHand™ Mobile** comes with two sample files. The file "Login" provides a login screen where the user can enter a user name (see above). The File "Split View" displays three handhelds at the same time in the browser; the left two handhelds show the train view, while the handheld on the right shows a switchboard. This allows simultaneous access to two locomotives and a switchboard. If you are familiar with HTML, you can modify the supplied files for personal use or add new files to the collection. New files have the extension .HTM and have to be stored in the specified directory. See also the notes in the next section.

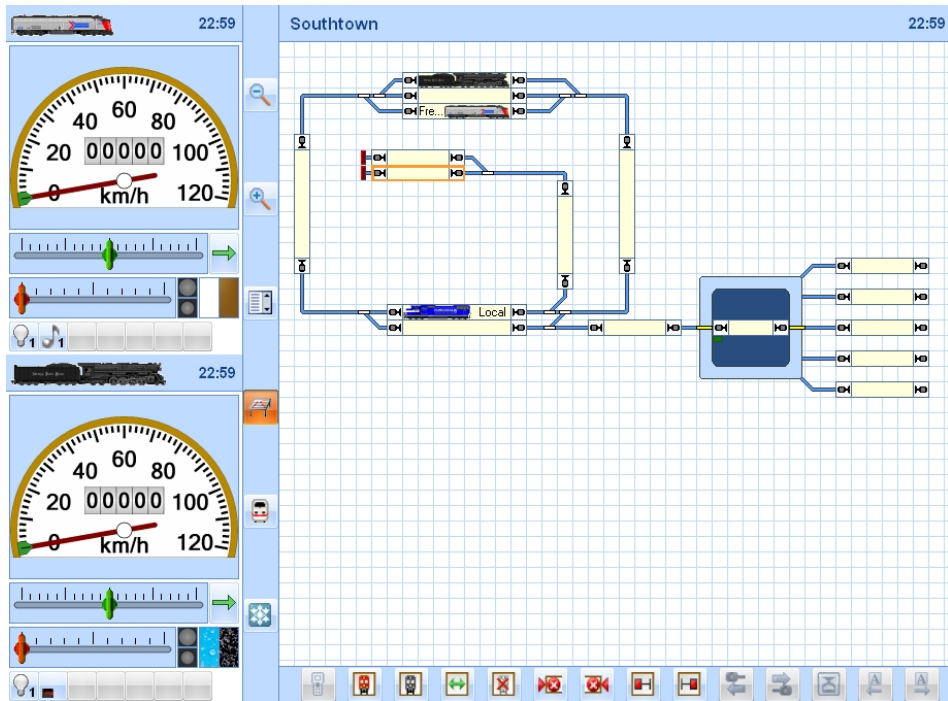


Diagram 27: Split View – Simultaneous Display of multiple Handhelds

Tile Width / Tile Height:

Because some browsers can only handle images with a certain dimension (e.g. 2 megapixels), the images sent to the browser are divided into tiles. With these options you can adjust the size of the tiles. Change this value only in case of performance problems in the network or mobile device. Choose small tile sizes, if your system configuration can handle many small images better than a few large images.

Idle / Busy:

To keep the display current, the Web browser running on the mobile device permanent-ly sends requests to the +SmartHand™ Manager. The option **Idle Interval** determines the time interval (in milliseconds) with which these requests will be sent when the screen contents remained unchanged for a certain while. The option **Busy Interval** determines the time behavior that is used during screen changes. Decrease these values if you want a faster screen update. Note, however, that the network or the mobile device can be overloaded by a too drastic reduction.

Busy Frames:

Screen refresh is always working with multiple images, which are exchanged between client and server. The more frames per time unit can be exchanged, the faster theoretically the screen update. On the other hand, this also increases the memory requirement in the mobile device and the network load. In the case of performance problems, you can try with this option, whether changing this value causes an improvement.

Image Quality:

With this option you can influence the quality of transmitted images. In the case of performance or network problems, decrease the image quality in favor of a low system load.

Parameter for the +SmartHand™ Mobile Address Bar

When calling **+SmartHand™ Mobile** in the browser you can enter additional optional parameters in the address bar. The syntax follows the known standards in the Internet. The following parameters are available:

c:

If this parameter (custom start page) is included with a value of **0** (i.e. c=0), then the start page specified in the advanced web server settings (see previous section) is ignored and the normal start screen of the handheld is displayed. This option must be necessarily set if **+SmartHand™ Mobile** is called from your own start page to avoid a recursive call to this start page.

i:

For this parameter (initial screen), one of the letters 't' or 's' is valid. This will determine whether the handheld starts with the train view (i = t) or with the switchboard view (i = s).

u:

With this parameter a user name can be transmitted. For details about user names see the previous section.

t:

If multiple handhelds are opened in the same browser (see also the description of the parameter 'w' below), then the effect of the command for selecting a locomotive in the switchboard can be controlled with this option (see page 34). If the option t=1 is included in the address line (t for "transfer"), then the switchboard will not turn to the train view after selecting a train in a block. Instead the train is selected in that handheld, which has been clicked or touched most recently. This is useful if, for example in a

browser two train views and a switchboard are visible simultaneously. If one of the train windows is clicked or touched first and then a train is selected in a block of the switchboard, this train is then selected in the train view for further operation rather than the switchboard is turned to train mode.

w:

This parameter must be specified necessarily when multiple handhelds are opened simultaneously in the same browser or on the same mobile device. Each handheld must be associated with a logical window (w for "window"), to allow unambiguous assignment of the messages exchanged between the browser and the Web server to the associated handheld. Numbers are allowed as values, so w=1, w=2, w=3 can be used for the first, second, third, etc., handheld running at the same time.



Caution: In the current version the status of the ‘w’ option is still experimental. Only the creation of one handheld in the same browser or the same mobile device at the same time is currently officially supported by the software. We furthermore reserve the right to remove this option from the program. On the other hand, we want to give you the opportunity to play with this opportunity already now if you wish. This condition applies as a consequence also for the parameter ‘t’, which is only meaningful together with ‘w’, as well as for the included start page "Split View" (see previous section), which uses the option 'w', too.

Example:

Entering

http://192.168.2.100?i=s&u=Dispatcher

in the address bar of the browser connects to the computer with the IP address 192.168.2.100 and opens a handheld in switchboard view. The name “Dispatcher” is additionally transferred as user name.

6.3 Licensing

The operation of +SmartHand™ Classic handhelds does not require a separate license. This also applies to the virtual handheld demo.

For the use of +SmartHand™ Mobile handhelds there is a separate license, which can be acquired through www.freiwald.com. The associated license code can be entered or removed via the **License** and **Remove License** options in the **Connection** tab of the +SmartHand Manager (see Diagram 17). The license allows unlimited use of mobile devices as +SmartHand™ Mobile handhelds up to the maximum number supported by the software (i.e. the license does in particular not depend on the number of connected

mobile devices). Without a license the connection to the mobile devices is closed about 15 minutes after each program start. This allows at least for momentary trial runs without a license.

The license described above and its associated warranty only cover the possibility to use those mobile devices as **+SmartHand™ Mobile** handhelds, which comply with the requirements of **+SmartHand™**. A mobile device, on the other hand, complies with the requirements of **+SmartHand™**, if its Web browser runs appropriately with **+SmartHand™**. This compliance can be verified by performing a trial-run.

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