

***RAILROAD & Co.***<sup>®</sup>

**Handheld**

**Users Manual**

**Version January 2002**

**Copyright<sup>®</sup> Freiwald Software 2002**

**Contact:**   Freiwald Software  
              Kreuzberg 16 B  
              D-85658 Egming, Germany  
              e-mail: [info@freiwald.com](mailto:info@freiwald.com)  
              <http://www.freiwald.com>

All rights reserved.

The content of this manual is furnished for informational use only, it is subject to change without notice. The author assumes no responsibility or liability for any errors or inaccuracies that may appear in this book.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, recording, or otherwise, without the prior written permission of the author.

## Table of Contents

<b>General .....</b>	<b>4</b>
<b>1 Usage .....</b>	<b>6</b>
Speed Control Knob .....	6
Direction Pushbuttons .....	6
Train Select Pushbuttons .....	7
Brake and Emergency Stop .....	7
Function Buttons .....	7
Signal Indicator Lights .....	7
Throttle Adjustment Procedure .....	7
Meaning of the Signal Indicator Lights.....	8
<b>2 Setting up the Handheld in the Software.....</b>	<b>9</b>
<b>3 Installation of the Software.....</b>	<b>11</b>
<b>4 Installing the Hardware .....</b>	<b>12</b>
Connecting the Handheld Computer Interface .....	12
Wiring the Plug Panel.....	13
Power Wiring .....	13
Signal Wiring .....	13
Plug Panel Mounting.....	14
Connecting the Handheld.....	14
Controller Address .....	14

## General

**RAILROAD & Co.** enables you to control your engines and trains with a handheld, which has been especially designed for the software. This handheld works like a remote control for the **RAILROAD & Co. Train Window** visible on the computer screen. It exceeds by far the possibilities provided by the normal computer keyboard, mouse or joystick. The handheld is useful for a single operating person, to support operating sessions with several users, or for large layouts. Up to 16 handhelds can be connected at arbitrary locations on the layout.

The handhelds 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.

All important functions of the **RAILROAD & Co. Train Window** can be controlled with the handheld. This includes all standard functions like speed, engine functions or direction. The on screen controls such as speedometer and odometer 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.

Special controls support changing of the operated train via the handheld 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 engines located in this yard.

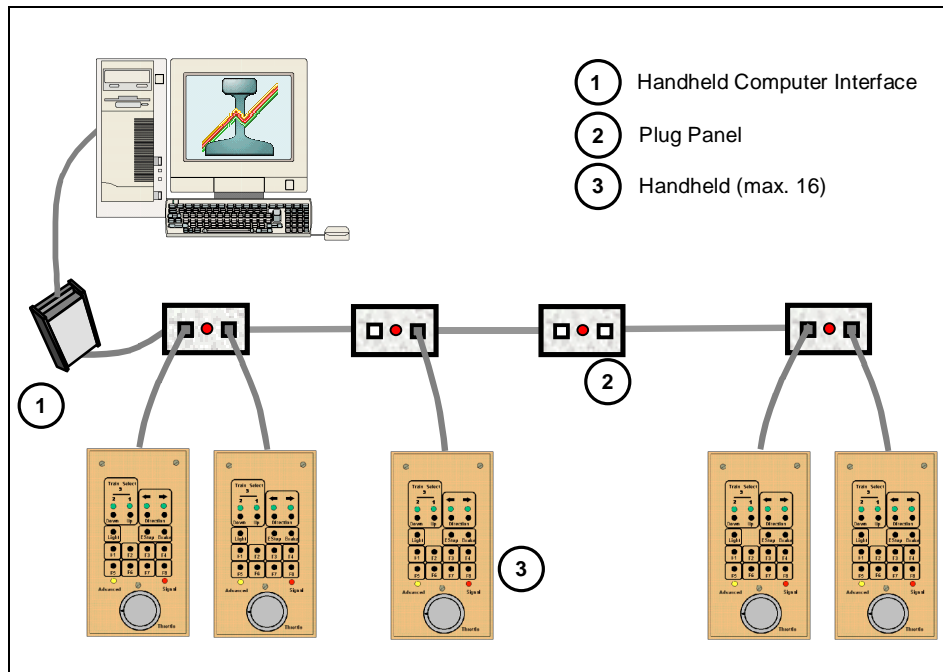
In particular the handheld provides the following features and functions:

- Up to 16 handhelds can be connected to a single serial port of your computer
- Plug Panels, which can be purchased separately, allow plugging in of handhelds at arbitrary locations of the layout within a distance of 300 meters.
- Suitable for all digital systems
- Solidly built rotary knob for speed control
- Nine function buttons for control of train functions configured in the **RAILROAD & Co. Train Window** (including playing of sound files stored in the computer). Depending to the configuration of the train function the related function buttons works as a push button or as a on/off switch.
- Two direction controls with direction indicator lights for selection and indication of train direction.
- Brake and emergency stop
- Multi color signal indicator lights for indication of main and advanced signal as in the **RAILROAD & Co. Train Window**
- Changing of trains is possible at any time - selection of available trains can be restricted by software.
- Six foot long connector cable

To begin you need at least one handheld and the *Handheld Computer Interface*. This interface contains all needed circuitry needed to connect up to 16 handhelds to the computer. The Handheld Interface is needed only once. Additionally the Interface is delivered with one Plug Panel supporting the connection of up to two handhelds.

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 following diagram shows a sample configuration:

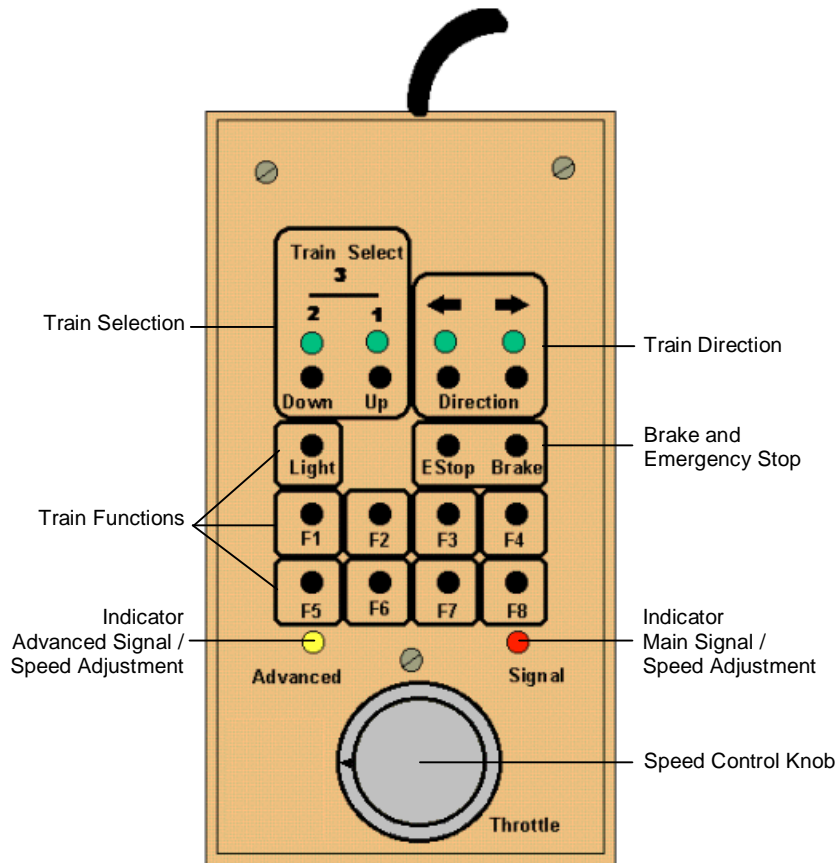


**Diagram 1: Sample Handheld Configuration**

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

# 1 Usage

The following image shows a schematic diagram of the controls and indicators of the **RAILROAD & CO.** handheld:



**Diagram 2: Controls and Indicators of the Handheld**

The controls and indicators displayed above are used as follows:

## Speed Control Knob

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 **RAILROAD & CO.** software. The position of the control is scaled or modified based on the engine characteristics and the digital system actually controlling the engine.

## Direction Pushbuttons

The right button sets the direction to forward; the left button corresponds to reverse. Actual reversing is controlled by the software and may be subject to standard momentum calculations performed by the **RAILROAD & CO.** software. The Direction Indicator Lights immediately show the selected direction, regardless of whether the locomotive has actually already changed direction. If another train is selected, then the current direction of this new train is indicated.

### Train Select Pushbuttons

These buttons are used to cycle through the list of trains, which are allowed to be used by this handheld. The right button moves Up through the list and the left button moves Down through the list. **RAILROAD & CO.** controls the number of trains in this list. After selecting a train successfully and if the handheld is ready to take over control of this train, then the indicator near the label "2" is illuminated.

After selecting a new train it might be necessary to perform a "Throttle Adjust" sequence. This is explained below.

### Brake and Emergency Stop

Pressing and holding the Brake Pushbutton will apply the brakes and decelerate the train at a rate that is set by the **RAILROAD & CO.** software. Braking will continue until the button is released.

Pressing the Emergency Stop Pushbutton will immediately halt the train currently operated train.

Pressing and holding both the Brake Button and Emergency Stop button will stop the complete model railroad layout. A restart of the layout can only be performed through the **RAILROAD & CO.** software or the connected digital system. This feature can optionally be disabled through the **RAILROAD & CO.** software if the handheld shall not be allowed to stop the complete layout.

### Function Buttons

Pressing the Light button turns on or off the first function of the currently controlled engine. This is the function, which is stored as the first entry in the list of functions assigned to this engine in the **RAILROAD & CO.** software. The buttons F1 to F8 control the other functions assigned to this engine. If a sound file or macro is stored in **RAILROAD & CO.** for a particular function, then the sound is played, when the button is pressed, or the macro is executed.

Depending to the setup of a certain function in **RAILROAD & CO.** the function button works as a push button or on/off switch.

### Signal Indicator Lights

These two 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 **RAILROAD & CO.** train window. This is the case if the train is operated under control of the **RAILROAD & CO.** Dispatcher in order to provide the operator with the signal indication even at locations far away from the computer screen.

In special situations these lights have another meaning. These are explained in Table 1.

### Throttle Adjustment Procedure

When the operator changes the locomotive he is controlling or for certain other reasons the throttle may not match the actual speed of the locomotive being controlled. When this happens, the left or right Signal Indicator Light will flash red, indicating that the throttle should be turned in that direction until it is set correctly. The operator should turn the throttle in the direction indicated until both lights flash briefly indicating, that the throttle should not be moved any further. At that point the throttle has been synchronized, both lights will return to their normal indication - eventually indicating any appropriate block signals - and the light near the label "2" in the upper left corner of the handheld will be illuminated. This indicates that the user has control of the engine with the throttle.

### Meaning of the Signal Indicator Lights

Some meanings of the Signal Indicator Lights have been mentioned already. In the following a complete overview of the meaning of the particular indications is given:

Left Signal Indicator	Right Signal Indicator	Meaning
Alternating fast red flashing		No connection to the software
Slow red blinking	off	Adjust throttle by turning to the left
off	Slow red blinking	Adjust throttle by turning to the right
Brief yellow illumination of both indicators		Throttle adjusted correctly; don't turn the throttle any further until this indication changes again.
Slow red blinking of both indicators		Throttle locked; for example because locomotive is operated automatically by the <b>RAILROAD &amp; Co.</b> Dispatcher or because control of the locomotive is assigned to the digital system.
off	off	Handheld ready to operate the locomotive
Light "2" on		
Block Signal Indication	Block Signal Indication	Locomotive is operated under control of the <b>RAILROAD &amp; Co.</b> Dispatcher Handheld ready to operate the locomotive
Light "2" on		

**Table 1: Meaning of the Signal Indicator Lights**



## 2 Setting up the Handheld in the Software

In order to use the handheld with the *RAILROAD & Co.* software, the software must be told, to which serial port of the computer the handheld is connected. This is done in the **Setup Digital Systems** dialog:

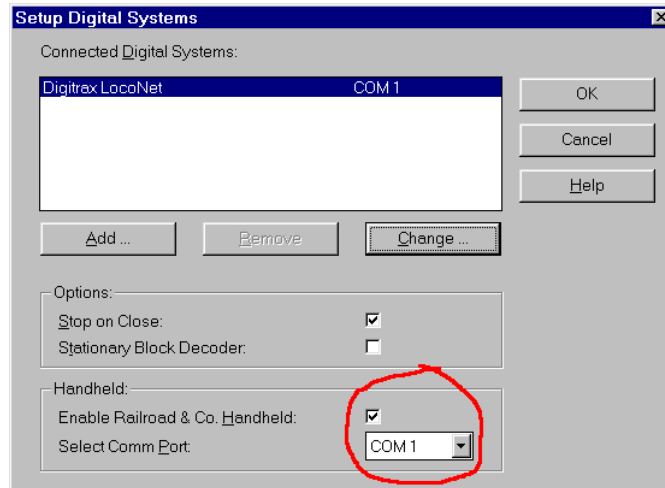


Diagram 3: Setting up Connection to Handheld

### Note:

The options displayed above are only available, if the software module needed for the handheld is installed accordingly (see chapter 3, "Installation of the Software").

The connected handhelds are individually assigned to *RAILROAD & Co.* Train Windows. Since it is possible to connect up to 16 handhelds you can equip up to 16 train windows with a handheld. It is not possible to assign the same handheld to different train windows, nor is it possible to assign different handhelds to the same train window.

In order to setup a handheld for a particular train window, select the **Enable Handheld** command of the **View** menu. *RAILROAD & Co.* opens the **Handheld** dialog as displayed below:

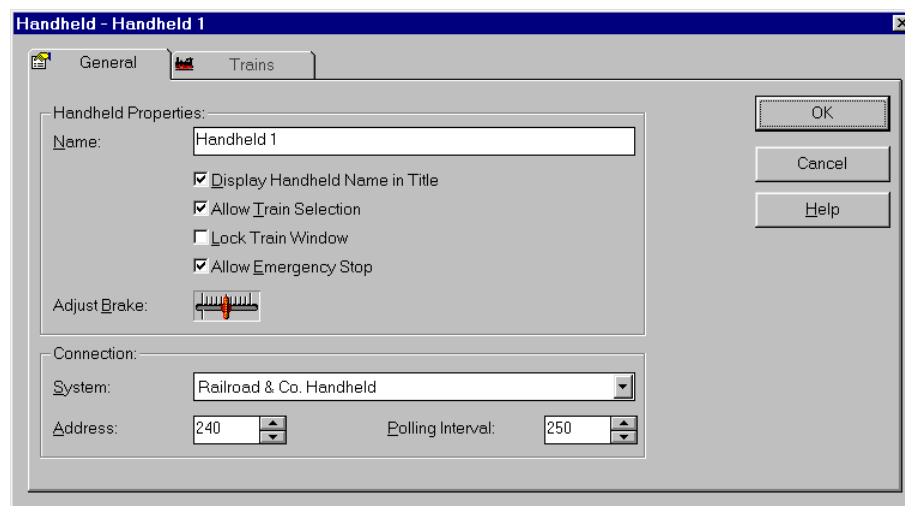


Diagram 4: Setting up a handheld

The following options are available.

**Name:**

Enter an arbitrary name of the handheld here. This name can be displayed in the title bar of the associated train window if desired. For example, if several persons are operating, it would be possible to enter the name of the operator.

**Display Handheld Name in Title:**

Select this option if the name of the handheld shall be displayed in the title bar of the train window.

**Allow Train Selection:**

Select this option, if the operator of the handheld shall be able to select another train. If this option is turned off, then only the train currently selected in the train window can be operated with this handheld. This is useful if a Dispatcher at the computer wants to assign only dedicated trains to the operators.

**Lock Train Window:**

Select this option, if you want the handheld to take over complete control. In this case the related Train Window is locked. This option is for example useful if different train windows, which are partly assigned to handhelds and partly operated directly, are displayed on the computer screen in order to protect the train windows associated with handhelds from unintentional input .

**Allow Emergency Stop:**

Select this option if the handheld may stop the complete layout in case of emergency. For security reasons this option is by default selected in order to enable the operator to stop the layout at any time. Turning off this option might be useful in cases where a person is dedicated to watching the layout at the computer screen, and others operating individual trains should not have the right to stop the complete layout.

**Adjust Brake:**

Select the effect of the brake which shall be applied when the Brake Pushbutton is pressed on the handheld.

**Address:**

Enter the address of the handheld (240-255) here, which you want to assign to the current train window.

**Polling Interval:**

Normally the state of the handheld is read by the computer each 250 milliseconds. You can change the duration of this cycle, if you want the software to read the state of the handheld more or less often. Reducing this value is only recommended on fast computers. Normally it should not be necessary to change the default.

In addition to these options it is possible to restrict the selection of engines, trains and *train groups* allowed to be operated by this handheld with the tab labeled **Trains**. This tab as well as the concept of train groups is explained in detail in the *RAILROAD & Co.* online help. The help text can be opened after selection of the **Trains** tab and pressing the button labeled **Help**. Even though the text of the online help explains only, how the selection of trains can be restricted for *schedules*, the general sense of this text also applies to handhelds instead of schedules.

### 3 Installation of the Software

For operation of the handheld with *RAILROAD & Co.* a specific software module is needed. This module is contained in the file RAILHAND.DLL on the floppy disk delivered with the Handheld Computer Interface.

This software module is installed by copying the file RAILHAND.DLL into the directory of your computer where the *RAILROAD & Co.* software is already installed.

## 4 Installing the Hardware

### Connecting the Handheld Computer Interface

The Handheld Computer Handheld consists of two parts, the interface card and the interface converter, which are delivered together. These two parts are connected with several leads as displayed in the following diagram:

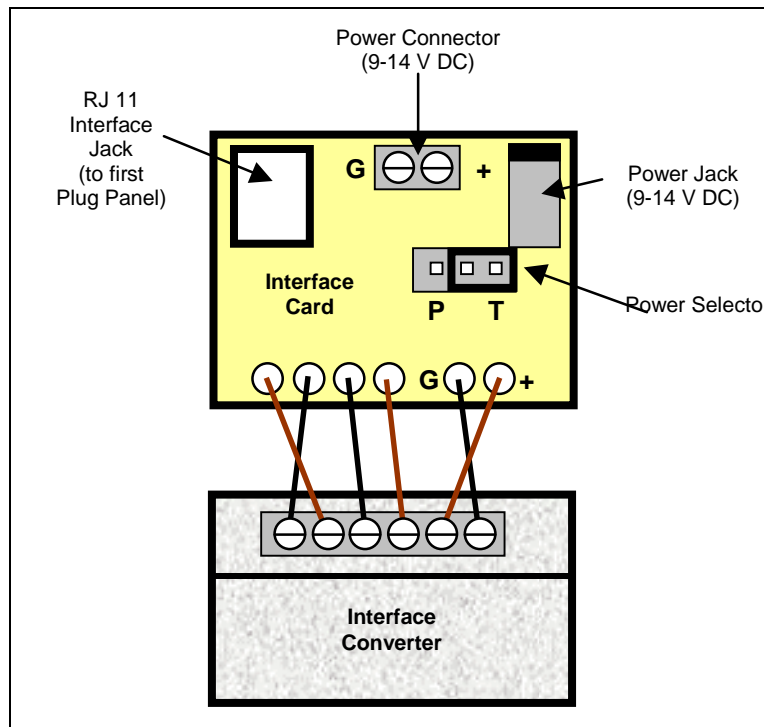


Diagram 5: Schematic of the Handheld Computer Interface

The computer interface must be connected to your PC via a standard serial port. The interface requires a cable with a standard 25-pin-male D-connector. At the computer end, the cable should have either a 9-pin or 25-pin female connector as appropriate for your computer. The user must supply the interface cable between the computer and the interface.

#### Note:

**The markings on the small interface card may be incorrect. The connections between the card and converter must be wired as shown in Diagram 5. Especially the transposition of the two leftmost wires has to be done as shown in the diagram.**

The Handheld Computer Interface requires **9 to 14 volt DC** power. It may be powered in either of two ways:

- A small wall transformer with a 2.1 mm center positive plug. In this case, set the jumper to the right-hand position (marked T).
- From any 9-14 volt DC power supply. In this case, connect the positive supply to the right-hand terminal (marked +, nearest the power jack), and the ground/negative to the left-hand terminal (marked G, nearest the RJ11 interface jack).

## Wiring the Plug Panel

The diagram below shows the rear end of the Plug Panel. The four position connector at the lower left should be connected to the 9-14V DC power supply. Connect the ground/negative power to either of the two terminals on the left and the positive power to either of the two terminals on the right.

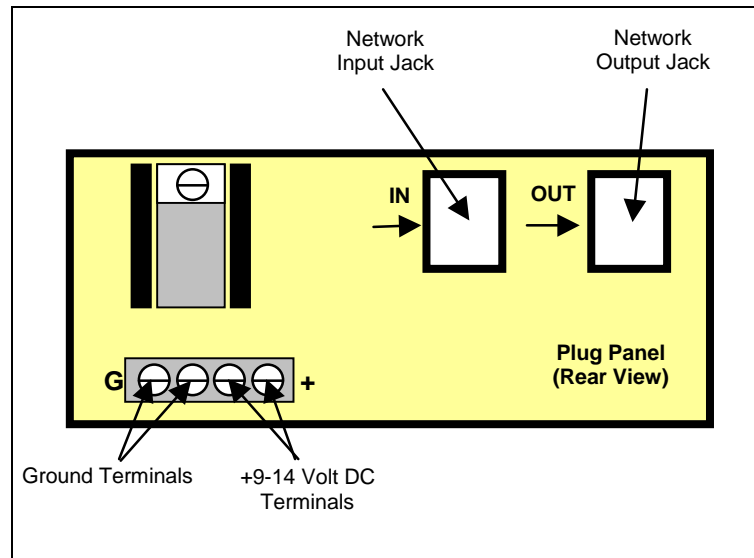


Diagram 6: Plug Panel Rear View

The network connection coming from the computer should be plugged into the left-hand jack at the top using the 4-wired cable delivered with the Plug Panel. If additional Plug Panels are used, run a cable from the right-hand jack to the left jack of the next panel. The last panel will have nothing in the right-hand jack. Any number of panels may be connected in this manner, as long as the total length of the cables is less than 300 meters.

## Power Wiring

Both the Plug Panel and the Handheld Computer Interface require **9 to 14 volt DC** power, which should be supplied by a transformer isolated power supply. If possible, use the same power supply to operate the interface and all attached Plug Panels. This provides a common ground connection to all connected units. If separate power supplies are used, a common ground connection must be supplied that interconnects the computer interface with each of the Plug Panels. This can be achieved in one of two ways:

- Run a separate ground wire from the ground terminal on the computer interface to each of the Plug Panels' ground connection.
- Use 6 wire phone cables to interconnect the computer interface and all of the attached Plug Panels. The two extra wires carry the ground connection.

**Do not connect a higher, lower, or AC voltage to the Handheld Computer Interface or Plug Panels. Damage to the circuitry may result!**

When power is turned on, the red light on the front of each Plug Panel should glow.

## Signal Wiring

The Handheld Computer Interface and the Plug Panels are interconnected using a standard 4 or 6 wire RJ-11 telephone cable. Using 6-wire cable eliminates the need for a common ground wire and allows each panel to use its own isolated power supply. If a 4-wire cable is used, either one common power supply must be used for all panels and the interface, or a separate ground wire must be run to interconnect the computer interface and all of the plug panels.

Wiring of the interface cables is simple: just connect one end of the first cable to the interface board, and the other end to the left-hand jack on the REAR of the plug panel. For each additional plug panel, connect one end to the right hand jack on the REAR of the plug panel and the other end to the left-hand jack on the next plug panel. Continue this until all plug panels have been connected. The last panel will have nothing in the right-hand jack.

### **Plug Panel Mounting**

Make a cutout in the fascia where the plug panel is to be installed, slightly smaller than the dimensions of the panel. The rear of the panel must be accessible for power and network wiring. If the rear of the panel is hard to reach, it may be easier to make all the wiring connections before attaching the panel to the fascia. Use 4 wood screws or machine screws with lockwashers and nuts to attach the panel to the fascia.

### **Connecting the Handheld**

Plug one end of the 8-wire RJ45 cable delivered with the handheld into the handheld controller itself and the other end into either of the jacks on the FRONT of the panel. The two signal lights on the front of the handheld should flash alternately. If the computer software has been configured properly and is operational, the flashing will halt almost immediately. This indicates that the computer has recognized the handheld and is communicating with it. If the lights continue to flash, the computer has not been configured, the *RAILROAD & CO.* software is not running, or the wiring is incorrect.

#### **Attention:**

**Use only the cable delivered with the handheld to connect the handheld unit. USING UNSUITED CABLES MAY RESULT IN DAMAGE TO THE HANDHELD UNIT AND/OR THE PLUG PANEL. There is no liability in case of possible damages.**

### **Controller Address**

Each controller has an address that is used to distinguish it from other controllers plugged into the same network. The address is preset to a value from 240 to 255, which is indicated on a small label on the reverse side of the unit. Attempting to use more than one controller with the same address on the same network will cause errors to occur.