

# Intellibox

Das Multi-Protokoll Digitalsystem  
für Motorola, Selectrix und DCC

## Handbuch



English  
Edition



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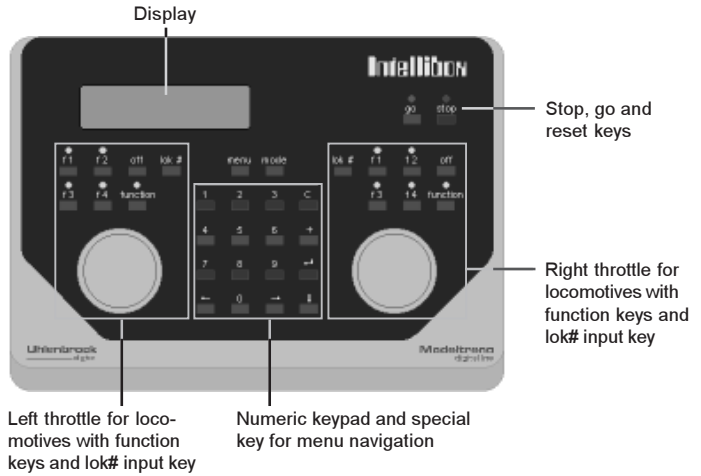
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## Building elements



## Connections



- |                     |  |
|---------------------|--|
| 1 6-pin socket:     | Transformer, Normal track, Programming Track |
| 2 3-pin socket:     | Lenz/DCC Booster                             |
| 3 5-pin DIN socket: | Lokmaus                                      |
| 4 6-pin socket:     | Feedback Bus (s88)                           |
| 5 5-pin socket:     | Marklin Booster                              |
| 6 Western-socket:   | LocoNet B (Booster)                          |
| 7 Western-socket:   | LocoNet T (Throttle)                         |
| 8 DB-9 socket:      | Computer Interface                           |
| 9 Side connectors:  | Marklin I <sup>2</sup> C-Bus                 |

## A quick start

**IMPORTANT!** Please note that this quick start section should only be used to test the Intellibox. It is absolutely necessary to read the whole manual in order to understand and use all Intellibox features.

### Connecting the plug

You need a transformer with 16 V AC output voltage and a minimum output power of 52 VA. Use wires with max. diameter 1.1 mm (cross sectional area = 1 mm<sup>2</sup>, 18AWG). The 16 V AC voltage from the transformer and the two poles of the track are connected to the clamps of plug #1 on the backside of the Intellibox.

**If you are using the Marklin Digital System** (Motorola or AC-format) please make the following connections to plug #1.

- The middle rail to clamp 3 (red Marklin cable)
- The two rails (body of the track) to clamp 4 (brown Marklin cable)
- The AC voltage to clamps 5 and 6



*How to handle the plugs*

### If you are using a DCC/NMRA format

please make the following connections to plug #1.

- One out of two rails to clamp 3 (red Marklin cable)
- The other rail to clamp 4 (brown Marklin cable)
- The AC voltage to clamps 5 and 6

### Automatic set-up at power on

Should you keep a key pressed during the Intellibox power on, you will force the Intellibox to perform special actions:

#### [1]...[8]

selects and stores in the flash-ROM the corresponding language.

Possible languages and their code numbers are:

German (default factory setting, key #1), English (2), French (3), Italian (4), Dutch (5), Swedish (6), Spanish (7), Portuguese (8).

#### [mode]

test mode (keypad, LCD display, LED's and rotary encoders)

#### [+]

restores LCD contrast and backlight to their default values.

#### [C]

allows you to define and interactively store the LCD display contrast. Use the [←] key to decrease and the [→] key to increase the contrast voltage. Store with [↔].

### Connecting the Intellibox

**CAUTION!** Before you now connect plug #1 to the Intellibox, please verify carefully that the wires from the transformer have not been swapped with those from the track, or that short-circuits did not occur among the various wires of the connector!! A short-circuit between the transformer and the track could destroy the output stage of the Intellibox!

As soon as the plug has been inserted in socket #1 of the Intellibox (the transformer must be connected to the AC main line), the display starts showing the initialization procedure. After about 5 seconds the green LED turns on.

If you observe a blinking red LED, a short circuit occurred on the track. Remove it and press the [go] key.

### Select the data format

If you are using the Marklin Digital System and most of your decoders for locos, turnouts and switching devices conform to the Motorola data format you can use the factory default of the Intellibox.

If most of your decoders for locos, turnouts and switching devices conform to the DCC/NMRA data format, please do the following steps:

After switching on the Intellibox, press [menu] and then [mode], then press the [↓] key until you reach the text "Loco data fmt". Press the [→] key. Now you can scroll all available formats using the [↓] key. Choose, e.g., the DCC 14 format by pressing the [←] key.

After switching on the Intellibox, press [menu] and then [mode], then press the [↓] key until you read "Loco data fmt". Press the [→] key. Now you can scroll all available formats using the [↓] key. Choose, e.g., the DCC 14 format by pressing the [←] key. This causes the default format to be defined as DCC/NMRA with 14 operating levels (or speeds). With the [menu] key you will leave the menu.

Similarly, in order to define the default format for solenoid devices, press [menu]-[mode], then press the [↓] key until you reach the text "Access.Setting". Press the [→] key: you read "General type". Press the [→] key again. You can now scroll between the two available formats (Motorola and DCC) using the [↓] key. Select the DCC format and confirm by pressing the [←] key. This causes the default format for solenoid devices to be defined as DCC/NMRA. With the [menu] key you will leave the menu.

### First steps with the Intellibox

#### How to switch the layout on after a "stop"

- Press the [go] button.

#### How to introduce a loco address

- Press the [lok#] key on the right or left control section.
- Use the numerical keyboard to input the loco address.
- Conclude the input sequence by using the [←]-key.

**How to steer a loco**

- Turn the speed knob clockwise to increase the speed of the loco.
- Turn the speed knob counterclockwise to decrease the speed.

**How to reverse the direction of the loco**

- Press the speed knob, then the loco is stopped. The next time it will start in the opposite direction.

**How to control the light of the loco**

- The [function] key switches the light on.
- The [off] key switches the light off.

**How to control the extended functions**

- Press one of the keys: [f1] - [f4]

**How to control a turnout**

The keyboard (numerical keyboard) in the middle of the Intellibox frontpanel is used to control the turnouts. The eight pairs of keys of this keyboard control the eight outputs of turnout decoders with addresses 1 to 8. The positions of the turnouts are shown in the middle of the LCD display.

**The Programming Track**

For the time being, please do not connect and use the Programming track. Its connections and use are extensively explained in the remaining part of the manual.

**Definition of the digital format of single locomotives**

- Press [lok#] on the left or right cab
- Introduce the locomotive address on the numeric keypad
- Press the [menu] key
- Choose the locomotive format using the [↓] key
- Confirm by pressing the [←] key



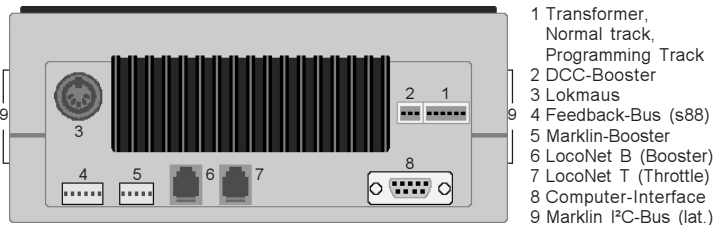
# 1. The Intellibox connectors

This chapter describes the connectors of the Intellibox and shows what must be taken into account when different devices are to be connected to the Intellibox.

## 1.1 Definition of the Intellibox connectors

Figure 1.11 is the rear view of the Intellibox with all its connectors. All designations of the connectors are included in this figure. The connectors for devices with a Marklin compatible system bus are located on either side of the Intellibox.

*Figure 1.11*  
Connectors on the rear  
side of the Intellibox  
with all definitions

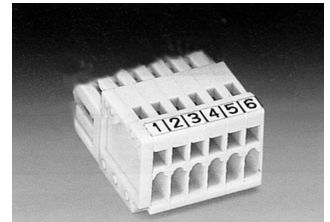


## 1.2 Connecting the clamp plugs

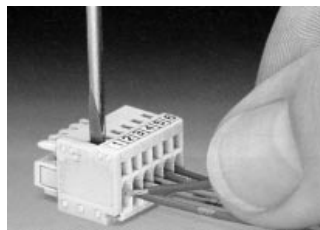
*Figure 1.21*  
Designations of the  
clamps in connector #1

To connect the transformer, the normal track and the programming track as well as the Lenz booster, two clamp plugs are supplied with the Intellibox. Use a work bench or similar surface, when connecting the cables to the clamps.

The designations of the clamps are shown in Figure 1.21.



*Figure 1.22*  
How to insert a wire  
into the plug



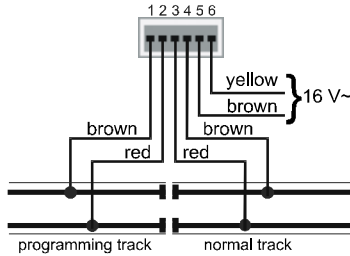
To mount a wire onto the clamp plug, remove approx. 6mm of the wire insulation at the wire end. Use a small screwdriver (2.5mm) and insert it into the upper slot of the plug. A gentle downward push on the screwdriver opens the cage clamp of the plug. Insert the un-insulated wire end into the clamp.

After removing the screwdriver out of the upper slot of the plug, the wire is secured. As shown in the figure, it is recommended to insert the wire in a slightly bent position.

### 1.3 Connecting transformer, track and programming track

The 6-pins plug #1 is used to connect the transformer, the track and the programming track.

Figure 1.31  
Connections of the 6-poles connector



- 1 Programming track (brown)
- 2 Programming track (red)
- 3 Digital voltage to the track (Marklin red)
- 4 Digital voltage to the track (Marklin brown-digital ground)
- 5 Ground 16 V AC from Transformer (Marklin brown)
- 6 16 V AC from Transformer (Marklin yellow)

#### The transformer

In order to obtain a troublefree operation of the Intellibox please use a transformer of min. 52 VA output power. The maximum output AC r.m.s. voltage from the transformer should not exceed 18V.

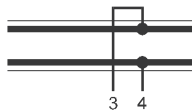
The transformer must be connected to clamps 5 and 6 (brown and yellow, respectively).

**CAUTION!** Please verify carefully that the wires from the transformer have not been swapped with those from the track, or that short-circuits did not occur among the various wires of the connector!! A short-circuit between the transformer and the track could destroy the output stage of the Intellibox!

#### The track

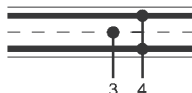
The track must be connected to clamps 3 and 4 of plug #1.  
For 2-rails tracks, follow this example:

Figure 1.32  
Connections to a 2-rails track



For 3-rails tracks, clamp 4 is the ground potential of the digital voltage and corresponds to the brown wire of a Marklin digital system (external rails). Clamp 3 corresponds to the red wire and must be connected to the central rail.

Figure 1.33  
Connections to a 3-rails track



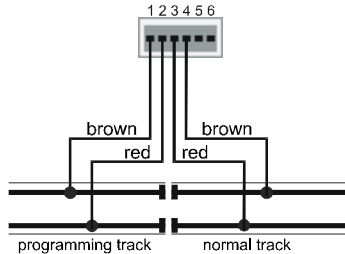
### The programming track

The programming track (PT) is a special track for programming and reading out the configuration variables of loco decoders.

#### VERY IMPORTANT

Both rails of the PT **must be isolated** from the normal track. This must also be true for 3-rails Marklin tracks, where **the two lateral rails must also be isolated!** With "M" tracks this is a really difficult task (insulation of the ballast)! During programming, the isolation gaps must not be crossed or bridged by locomotives or boogies, being this prejudicial to a good electrical insulation.

Figure 1.34  
Connections of the  
Programming Track



The PT is connected to clamp 1 (brown) and 2 (red) of plug #1.

Use the basic settings of the Intellibox (section 5.8) to choose how the Intellibox handles the PT. You can choose either "only programming track" or "automatic". The latter means that you can use part of your normal layout track (but insulated on both rails). The advantage in this case is that you can drive a loco into the PT, enter the programming mode, change and read configuration variables and finally steer the loco out of the PT. The changeover between PT and normal track is done by a relais in the Intellibox.

#### CAUTION!

In case of a short-circuit between the normal track and the programming track the Intellibox will display an error message.

A short circuit also occurs when the two terminals of the Programming Track are erroneously swapped.

#### HINT

It is preferable that a newly installed decoder is first connected to the PT (a low-current, low-energy track) instead of the normal track, in order to check for the correctness of the installation. In fact, in case of wrong connections, it is less likely to produce a damage on the decoder. For this reason we suggest installers of decoders to choose the option "only programming track" in the basic settings of the Intellibox.

## 1.4 Connecting a DCC booster

In principle, all optoisolated DCC Booster can be connected to plug #2. DCC Boosters are not able to output a Selectrix signal.

### Lenz Booster

These Boosters can directly be connected to the Intellibox. The signal lines C and D and the short signal line E must be connected to the 3 pole clamp plug as shown in the picture.

Figure 1.41  
Front view of the  
3-pin connector



- 1 C = Signal +
- 2 D = Signal -
- 3 E = Short-circuit signal line

### Marklin- and Arnold Digital= Booster

Marklin Digital= Boosters (6016) and Arnold Digital= Boosters (86015) are optoisolated. Therefore they can be connected to connector #2, but only using the Uhlenbrock adapter #693.

### Other DCC boosters

Only **optoisolated** DCC Boosters can be connected to the Intellibox! Usually, DCC boosters have only two wires. These wires should be connected to plug #2, clamps 1 and 2 of the Intellibox.

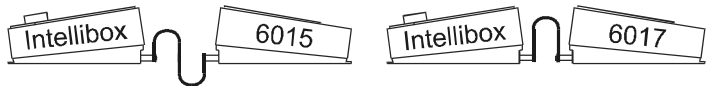
**CAUTION!** These boosters are not able to transmit a short-circuit signal to the Intellibox. But they are usually protected by their own short-circuit protection.

## 1.5 Connecting a Marklin Booster

Connector #5 is designed for Marklin Boosters (6017 and 6015) and all Marklin-Motorola compatible Boosters.

The flat cable delivered with the Marklin Booster must be tied at connector #5 of the Intellibox, running upwards. On the Booster side (see also the operating manual of the Booster) this cable must run downwards from the model Marklin 6015 and upwards from the model Marklin 6017, as shown in Figure 1.51.

Figure 1.51  
Appearance of  
the flat cable



**HINT** The SO #901 has to be changed to a value of 3, in order to control DCC locomotives on layout sections supplied through a Marklin Booster 6015 or 6017.

## 1.6 Connecting a LocoNet Booster

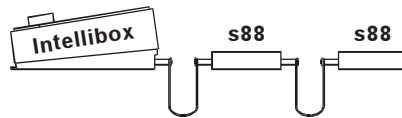
LocoNet Boosters (optoisolated only!) must be connected to connector #6 on the rear of the Intellibox using a 6-poles Western cable.

**CAUTION!** These boosters are not able to transmit a short-circuit signal to the Intellibox. But they are usually protected by their own short-circuit protection.

## 1.7 Connecting the s88 feedback modules

Feedback modules are used for detecting the presence of trains on several track sections and for automatic train control. All feedback modules which are compatible with the Marklin s88 (6088) can be connected here.

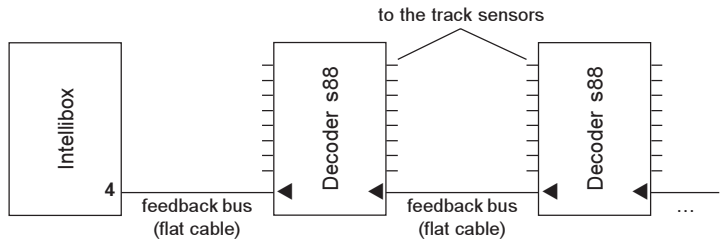
Figure 1.71  
Connection of several feedback modules with the Intellibox and appearance of the flat cables.



The flat cable delivered with the feedback modules must be connected between the Intellibox connector #4 and the first feedback module. Both ends of the flat cable, in the Intellibox and in the feedback module, must run downwards.

If several feedback module are to be connected to the Intellibox, the enclosed special cables must be used to connect the output of one module to the input of the next module. This is shown in Figure 1.72 (see also the operating manual of the feedback module).

Figure 1.72  
Connection of several feedback modules with the Intellibox



## 1.8 Connecting the Lokmaus

Both Roco and LGB Lokmaus can be used. They must be connected to connector #3 of the Intellibox.

Eight different locos can be controlled with one Lokmaus. The loco can be selected using the 8-positions slider of the Lokmaus. Up to eight Lokmaus could be used at the same time with the Intellibox.

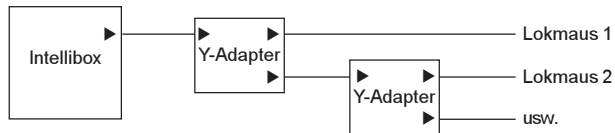
With the factory setting of the Intellibox the positions 1-8 of selection switch correspond to the loco addresses 1-8.

The assignment of loco addresses to the position of the selection switch can easily be changed using the basic settings menu of the Intellibox (see also section 5.11).

### Connecting more than one Lokmaus

Several Lokmaus could be connected to the Intellibox using a Y-shaped cable (ROCO 10755).

Figure 1.81  
Connection of  
several Lokmaus



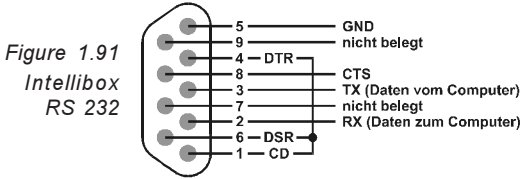
### Take into account when using a Lokmaus:

- Due to the Lokmaus characteristics, the Power on/off button can only be pressed once every 5 seconds.
- The light and the horn button can only be pressed every second.
- The light button of the Lokmaus corresponds to the [funktion]/[off] buttons of the Intellibox.
- The horn button corresponds to the [f1] button of the Intellibox.
- Should several Lokmaus try to control the same loco using the same position of the selection switch, then only the "first" one will actually control that loco indicated by the red LED.

**CAUTION!** Only Lokmaus compatible devices could be plugged into this connector. **Do not plug any XBUS device in it!**

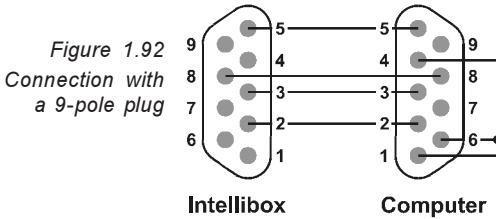
## 1.9 Connecting a computer

The Intellibox can be connected to the serial interface of the computer. Every IBM compatible PC or Laptop and every Apple Macintosh feature a serial interface. Sometimes it is called ComPort, V.24-Interface or RS232-Interface.



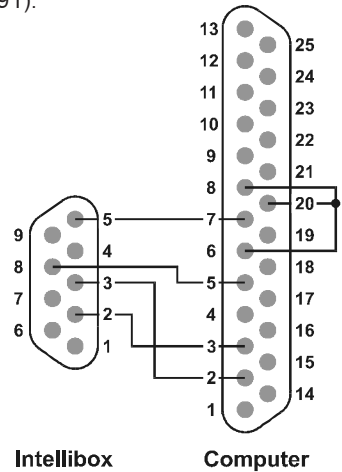
The factory settings configure the Intellibox for an IBM compatible PC and for using only the syntax of the Marklin 6050/6051 Interface. The default Intellibox serial interface settings are: 8 data bits, 2 stop bits, baud rate 2400 bit/s, no parity, CTS line used, DTR line not used. Changes to this configuration could be made using the basic settings menu (see section 5.9)

The Intellibox can be connected to the computer using a normal Com Port cable as in the case of the connection between a computer modem and the computer (art. #691).



Should you like to build your own cable, please use the connections shown in Figure 1.92 in case of a computer with a 9-pole serial interface, or in Figure 1.93 in case of a computer with a 25-pole plug.

Figure 1.93  
Connection with  
a 25-pole plug



## 1.10 Connecting LocoNet devices

All presently known LocoNet devices can be connected to the Intellibox.

The LocoNet Booster must be connected to the LocoNet connector B (plug #6). LocoNet control panels, LocoNet throttles and other LocoNet control devices should be connected to the LocoNet connector T (plug #7), which delivers no digital track signal.

## 1.11 Connecting Marklin devices

Left and right hand side plugs of the Intellibox can be used to connect Marklin devices (on the I<sup>2</sup>C bus).

### Connections on the left hand side

Marklin-Keyboard 6040

Marklin-Memory 6043

Arnold Keyboard 86040

Marklin-Switchboard 6041 (up to 4 Switchboards)

### Connections on the right hand side

Marklin-Control 80 6035

Marklin-Control 80f 6036

Marklin Infra Control 80f 6070

Arnold Control 80 86035

Arnold Control 80f 86036

### Connections on both sides

Marklin-Motorola Central Units 6020, 6021, 6022, 6023

DCC Central Units 6027, 6029, 6030, Arnold 86028

### Please notice!

- To connect these Central Units you need the adapter #692 from Uhlenbrock.

### CAUTION!

- These units must be powered on at the same time of the Intellibox. Their supply voltage must be feeded using a transformer separate from the Intellibox transformer. Any electrical link between the Intellibox transformer and the Central Unit transformer is not allowed! A Marklin Central Unit connected using the special adapter #692 must be connected immediately close to one side of the Intellibox!
- The control panel of some units can be used to control locos through the Intellibox internal Booster.
- The output section (red+brown) of the Central Units can be used to power the turnout decoders of the layout on a separate electrical circuit.
- It is not possible to control locos using the power output section (red+brown) of these units.
- If you are using the Marklin Central unit 6027 you have to press the reset button of this unit during a system power up!
- If you are using a Marklin Central unit 6029 or 6030, it is only possible to use the booster of this unit. The control panel does not work, because it is not connected to the I<sup>2</sup>C bus.

See also the section "Tips and Tricks" in the Appendix.



**Available addresses in C80, C80f and Infra-Control 80f units**

When you plug a Control 80 on the right side of the Intellibox, you are obviously allowed to control the locomotive addresses from 1 to 80.

However, in the case of a Control 80f (or an Infra-Control 80f), the maximum number of locomotives depends on the combination of the units you are using:

- from 1 to 99    Intellibox and C80f
- from 1 to 80    Intellibox, C80f and Central Unit - Motorola format  
(6020, 6021, 6022, 6023)
- from 1 to 99    Intellibox, C80f and Central Unit - DCC format  
(6027, 6029, 6030, 86028)

## 2. Compatible locomotive decoders

The Intellibox features an independent control of digital decoders with different data formats.

### **Loco decoders**

Old Motorola format

(ZyTX, ZyMOS, Blaupunkt, LDE, 701.13 Marklin chips)

New Motorola format, Gauge-1 format

DCC format, all loco decoders compliant to the NMRA standard

Selectrix, the Trix digital system

### **Function decoders**

Old Motorola format

New Motorola format, Gauge-1 format

DCC format, all function decoders compliant to the NMRA standard

Selectrix, only decoders with standard functions f0 and f1

### **Solenoid devices-Accessory decoders-Motorola format**

Marklin (6083, 6084)

Modeltreino 66001

Viessmann (5211, 5213)

### **Solenoid devices-Accessory decoders-DCC format**

Arnold K87N 86078

Lenz LS100/110/120

DCC decoders conforming to the NMRA standard

See also the section "compatible decoders" in the Appendix.

## 3. Technical Data

### **Maximum supply voltage**

18 VAC

### **Maximum current load**

3A to the rails

1 A to the I<sup>2</sup>C Bus

0,2 A to LocoNet B output

0,5 A to LocoNet T output

### **Maximum number of feedback modules**

s88 or s88 compatible modules - addr. 1-31

additional modules, connection through the LocoNet - addr. 32-128

The Intellibox can control up to 2048 feedback contacts.

### **Maximum number of loco addresses**

Motorola format, available with the Marklin Digital system - addr. 1-80

Motorola format, available with Uhlenbrock decoders - addr. 1-255

DCC format - addr. 1-9999

Selectrix format - addr. 0-111

### **Maximum number of solenoid device decoder addresses**

Motorola format - addr. 1-320

DCC format - addr. 1-2040

### **Maximum number of connected Boosters**

15 Marklin Boosters

15 DCC Boosters

### **Dimensions**

180 x 136 x 80 mm

## 4. Display, keyboard and menus

### 4.1 The display

The user interface is implemented into a backlighted LCD display. The display is divided in three parts and is designed in order to give the user a quick and clear view of the available commands.

```
m 12 | ---- | m 36
0 ↑ | ---- | 0 ↑
```

At both sides the display shows the relevant loco decoder format, the address, the speed level and the driving direction.

```
m 12 | ■■■ | m 36
0 ↑ | ■■■ | 0 ↑
```

In the middle part the display shows information on the presently active mode; f. i. the current position of the solenoid devices in "keyboard mode".

```
Decoder Program.
> Uhlenbrock
```

The text for menu-driven decoder-programming is shown on the whole screen.

### 4.2 Key functions

#### [go], [stop], [stop]+[go]

Switch the digital voltage on (go) and off (stop).

A system reset is performed when [stop]+[go] are pressed at the same time for about 2.5 seconds.

#### [f1] [f2] [f3] [f4]

Toggle the loco extended functions.

Together with the [lok#] key it toggles the f5 to f8 functions of DCC decoders (see section 6.4).

#### [function] [off]

Switch the direction-dependent function on and off.

#### [lok #]

Starts the input of a loco address.

If you are controlling a locomotive, by pressing [lok#] and [menu] in sequence you enter the data-format menu.

Together with the [f5]-[f8] keys, toggles the f5 to f8 functions of DCC decoders (see section 6.4).

See also the function of the [C] key.

#### [menu]

Start/end of a context menu (followed by the [mode] key).

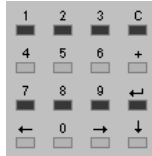
Just after the introduction of a locomotive address you are allowed to define its digital format.

**[mode]**

Toggles among the Intellibox control panel modes: keyboard, s88 monitor and programming mode.

In some edit fields (Register and CV programming mode and Special Options), pressing [mode] while the cursor is blinking on a value (not the number!) shows the current value in hexadecimal format (with a leading "\$"). Pressing [mode] again (or performing any editing action) causes the value to be shown back again in decimal format.

*Figura 4.2  
The buttons of the  
central block*

**[0] - [9]**

Decimal digits

**[←] [→]**

One menu level (or one column) to the left or to the right

**[↓]**

Decrements a value by one or goes one menu entry downwards

**[+]**

Increments a value by one or goes one menu entry upwards

Builds a consist

Adds a loco to a consist control

**[↵]**

Confirmation key (enter)

**[C]**

Deletes the last entry from the keyboard

Deletes a consist

If pressed into an empty field:

- shows the default value of the Special Options

- shows the last programmed value in the menus

If you are controlling a Lok, by pressing [lok#], then [C] and finally [lok#] once again, you will put that knob back in the "no controlled Lok" condition and you will also prepare that very lok you were in control of for "takeover" by a LocoNet simple throttle like the Digitrax BT-2, Fremo and Uhlenbrock FRED, etc. In LocoNet terms this is called "dispatching a Lok".

## 4.3 The menus

### 4.3.1 Structure and navigation

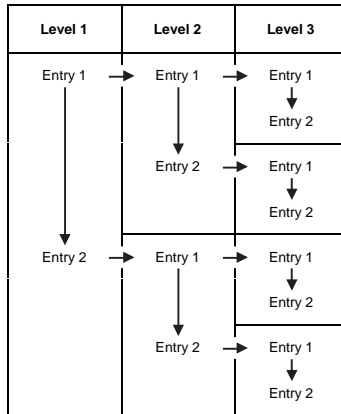


Figure 4.3  
The structure of the  
menus of the Intellibox

[→] One menu level (or one column) to the right

[←] One menu level (or one column) to the left

[↓] One menu entry downwards (from top to bottom)

[↑] One menu entry upwards (from bottom to top)

[menu] ends a context menu and returns to the normal Intellibox control mode.

**HINT** During navigation in the menus the display shows the relevant messages instead of the status of locomotives and turnouts. All control functions for locomotives are still active: knobs for speed and direction change, function keys [f1]-[f4], [function]-[off] keys. Therefore, during navigation you are still able to control the last selected locomotives.

### 4.3.2 Special characters of the display

Should a level include further menu levels, then the first character in the second row of the display will be a ">".

```
Decoder Program.
> Uhlenbrock
```

Should the entry be a parameter value, which could be activated or changed, then the first character in the display will be a "=".

```
Language:
= English *
```

All active entries are indicated with a "\*" at the end of the line.

### 4.3.3 Inputs

Numeric values can be entered using the numeric key pad. The input position is shown by a blinking character in the display.

The [C] button clears the last entered digit.

If you want to run "horizontally" among the different levels, use the [←] and the [→] buttons to step between the columns.

The [↵] button confirms the last input or selects a parameter.

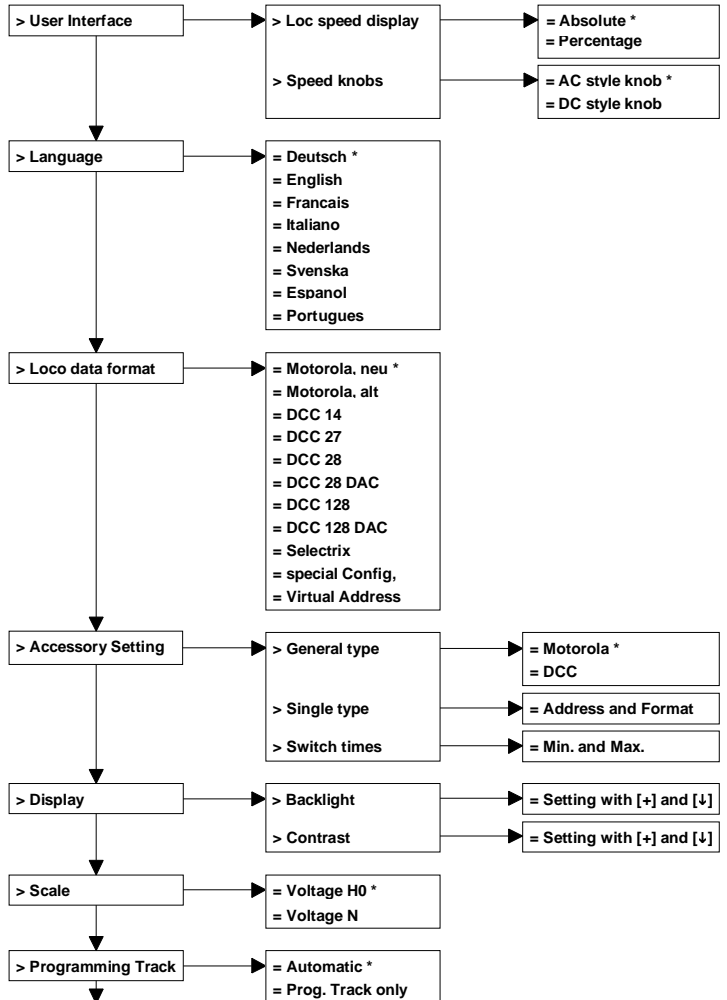
## 5. The basic setting menu

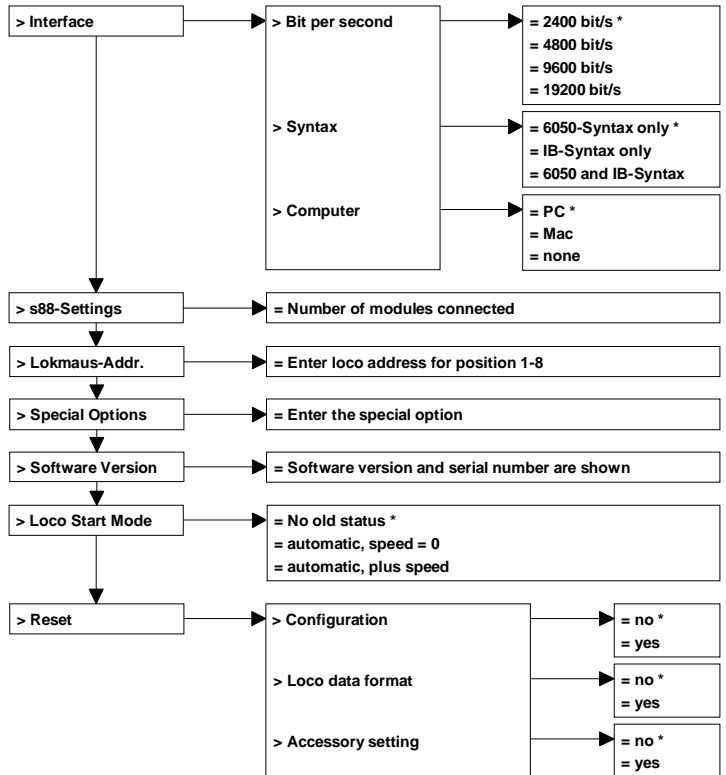
The basic settings of the Intellibox can be changed using this user-friendly menu. All setting will permanently be saved in the non-volatile memory of the Intellibox.

Press the [menu] and the [mode] buttons one after the other in order to enter the basic settings menu.

### 5.1 Menu structure

Default value is marked by a star (\*).





## 5.2 Menu "User interface"

### 5.2.1 Loco speed display

The speed of the loco can be displayed in two different ways.

#### Absolute Speed (default factory setting)

The speed level will directly be displayed using the current operating level. According to the chosen data format the display will show numbers in the range 0-14, 0-27, 0-28, 0-31 or 0-127.

#### Percentage of maximum speed

The speed level will be displayed in percentage of the maximum speed independently of the current data format.

#### How to set loco speed display

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "User Interface"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you read "Loc speed display"



- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

### 5.2.2 Speed knobs

Here you can choose the style of the speed knob. An AC style knob or a DC style knob could be chosen.

The default factory setting is the "AC style knob".

#### The AC style knob

The AC Style mode works like an old-fashioned three rail AC controller.

Using the AC style, the speed will always be increased while turning the knob clockwise and will be decreased while turning the knob counterclockwise. If the max. speed or the speed zero is reached, a further turn of the knob in the same direction has no effect. The max. speed or the speed zero will be maintained.

A slight push on to the speed knob will reverse the direction of the loco.

Pushing the speed knob during driving will stop the loco first (emergency stop). Then the direction will be changed. Depending on the decoder format, some locos stop immediately (Marklin, DCC) while other locos stop using their current deceleration rate (Selectrix).

Figure 5.21  
How an  
AC style knob  
works

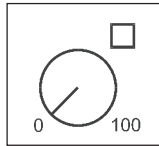
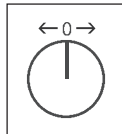


Figure 5.22  
How a  
DC style knob  
works



Using the DC style, turning clockwise the speed knob starting from a zero speed level will increase the speed of the loco in forward direction. Turning the speed knob counterclockwise will decrease the speed until the zero speed level is reached. A further turn of the knob will reverse the direction of the loco and will increase the speed in reverse direction. If the max. speed level is reached, further turns of the knob in the same direction will not cause any change. On the other hand, when speed zero is reached, you will be allowed to change direction to the locomotive only after about half a second. Only after this pause is a further knob rotation accepted. This feature prevents unwanted direction changes.

A slight push on to the speed knob will stop the loco. Depending on the decoder format some locos will stop immediately by a loco dependent emergency stop (DCC) while other locos will stop using their current deceleration rate (Marklin Motorola, Selectrix).

### How to change the style of the speed knob

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "User Interface"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you read "Speed knobs"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

## 5.3 Menu "Language"

Here you can choose the language of the displayed text.

Possible languages and their code numbers are:

German (key #1), English (2), French (3), Italian (4), Dutch (5), Swedish (6), Spanish (7), Portuguese (8).

The default factory setting is "German".

### How to change the language of the display

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Language"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

**HINT** It is also possible to change the default language by switching the Intellibox on while pressing one key from 1 to 8 (see the previous table). For example, by pressing the "2" key you will set the default language to "English".

## 5.4 Menu "Loco data format"

Here you can choose the default loco data format. This format will automatically be used when new decoder addresses are introduced, if no other format is explicitly defined.

This menu should be used to define the data format which will be normally used.

The default factory setting is the new Motorola format.

Possible formats are:

### Motorola - old

Old Motorola data format

Loco decoder without additional functions

Old-fashioned function decoders will be controlled by [f1] - [f4] (e.g. Marklin coach with automatic waiter or digital crane)

### Motorola - new

Also called Gauge-I-Format, including the extended functions f1-f4.

### DCC 14-27-28-128

DCC format using 14, 27, 28 or 128 operating levels

### DCC 28-128 DAC

DCC format with 28 and 128 operating levels with decoder assisted consisting (DAC)

### Selectrix

Trix selectrix with 31 operating levels

### How to change the loco data format

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Loco data format"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

**HINT** The digital format of each locomotive can be modified independently of all other locomotives. Detailed instructions are given in section 6.5.

## 5.5 Menu "Accessory (decoder) setting"

Solenoid device decoders from Marklin, Viessmann and Modeltreno are compatible with the Motorola format. Their addresses are defined using suitable microswitches (DIP switches) that can be found inside each unit. Each decoder is characterized by a unique address. In the Appendix you can find a table showing the microswitch position for each address.

On the contrary, DCC/NMRA-compliant solenoid device decoders have no microswitches and can be programmed using the Programming track - or directly on the "main track".

### 5.5.1 General type

The general data format used for most of your accessory decoders. After defining a general type you can define the type of each solenoid device decoder following the instructions of section 5.5.2.

Possible choices are:

**Motorola** (default factory setting)

Accessory decoders using the Motorola data format:

Uhlenbrock, Modeltreno, Viessmann, Marklin

**DCC**

Accessory decoders using the DCC data format:

Roco, Arnold, LGB, Lenz, Marklin, Digitrax, etc.

### How to change the accessory (decoder) setting

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Accessory (decoder) setting"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you read "General type"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

### 5.5.2 Single type

Independently of the general data format for accessory decoders, you can choose an individual data format for each accessory decoder address.

### How to change the setting for a single type

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Accessory setting"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you read "Single type"
- Enter the menu with the [→] key

```
Single type:
Addr 22 = Mot.*
```

- The address of a decoder which should get an individual data format must be entered in the first input column after "Addr".
- The [→] key can be used to jump to the right input column.
- Scroll with the [↓] key to the desired data format:  
"Mot." for Motorola (Marklin) or "DCC"
- Select this setting by pressing the [←] key
- Go back to the main display with the [menu] key

### 5.5.3 Switching time

The switching pulse triggered by the pressure on a keyboard button usually lasts until the button is released.

Here the minimum and maximum switching times of the accessory decoders can be changed.

The default factory setting is minimum 100 ms (0.1 seconds) and maximum 5000 ms (5 seconds).

You can introduce values between 50 and 9999.

#### How to change the switching time

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Accessory setting"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you read "Switch time"
- Enter the menu with the [→] key
- In the 1st column you can set the minimum switching time. This is the min. duration of the voltage pulse for switching an accessory decoder, even in the case of either a very short manual actuation or a computer command. The input value will be rounded to the nearest 50 ms.

```
SwTime Min: Max:
in ms: .100 5000
```

Should you input a "zero" value, the switching pulse will be issued only until the key is pressed.

- The [→] key can be used to jump to the right input column.
- In the 2nd column you can set the maximum switching time. Correspondingly, the max. switching time defines the max. duration of the voltage pulse for switching an accessory decoder, even when no command will reach the Intellibox to switch the accessory decoder off. The input value will be rounded to the nearest 50 ms. Should you input a "zero" value, the switching pulse will always be issued until the key is pressed.
- Go back to the main display with the [menu] key

**HINT** These settings are common to all solenoid device decoders.

## 5.6 Menu "Display"

The Display menu could be used to adjust the brightness and the contrast of the LCD.

### How to change brightness and contrast of the LCD

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Display"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- The adjustment can be done using the [↓] and the [+] keys
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

**HINT** If you leave the menu without using the [↵] key, the old settings will be restored.

**IMPORTANT** If the display is unreadable because of a wrong setting of the brightness and/or contrast, you could recall the default factory settings by switching the main power on while pressing down the [+] key at the same time.

## 5.7 Menu "Scale"

By setting the scale the output voltage of the built-in Booster will be adjusted.

### H0 scale

The output voltage will not be controlled to a fixed maximum level. It could reach a max. level of 21 V peak voltage if the input AC voltage is 16 V.

### N scale

The output voltage is clamped to a peak voltage of 18 V.

The factory default is the "H0" setting for H0 and all bigger gauges.

### How to change the voltage of the built-in booster

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Scale"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

## 5.8 Menu "Progr. Track"

The Intellibox features an internal relays, connected in such a way that an existing track of a layout (Programming Track) can be used either as a "real" Programming Track or as a "normal" track.

Here you can choose whether the programming track connector will output the programming voltage only, or if it will automatically be switched between the normal track voltage and the programming voltage.

### Programming Track only

The programming track output is never connected to the normal digital voltage. The connector outputs a voltage (the programming voltage) only during read and write operations.

### Automatic

The programming track connector will automatically be switched from the normal track voltage to the programming voltage when entering the programming mode.

**CAUTION!** Both rails of the programming track must be electrically isolated from the normal track. It is not allowed to bridge the isolation points with a bogie of a car or a loco.

The default factory setting is "automatic".

### How to change the style of the speed knob

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Prg. Track"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [←] key
- Go back to the main display with the [menu] key

**HINT** An easy test of the Programming Track can be accomplished by reading the configuration variables of a newly purchased decoder (e.g. DCC/NMRA: reading CV1 in "bite mode" should give CV1=3).

**HINT** If you have just installed a decoder, in order to check the electrical connections it is advisable to test it first on the Programming track (a low-current, low-energy track) instead of the normal track.

Due to this reason, we strongly suggest installers of decoders to choose the option "Prg. Track only" in the configuration menu of the Intellibox.

## 5.9 Menu “Interface”

You can change the settings of the serial interface of the Intellibox.

### 5.9.1 Speed

The transmission rate of the serial computer interface depends on the software in use.

Possible choices are 2400, 4800, 9600, 19200 bit/s

Factory default is 2400 bit/s.

### 5.9.2 Syntax

You can change the serial interface protocol used by the Intellibox.

The Intellibox can be controlled with the serial protocol of the Marklin 6050/6051 Interface (see Appendix). The Intellibox will also recognize an extended serial protocol (“P50X”) fully compatible with the 6050/6051 syntax (updated documentation will be available in the Uhlenbrock and Modeltreino homepages).

Possible choices are:

#### **6050 (syntax) only**

Only the syntax of the 6050/6051 interfaces is used.

#### **Intellibox (syntax) only**

Only the syntax of the Intellibox is used.

#### **6050 and Intellibox**

Both syntaxes (P50 and P50X), are used simultaneously. The Intellibox automatically recognizes the syntax of the commands it receives.

Factory default is “6050 and Intellibox”.

### 5.9.3 Computer

This option lets you choose the type of computer interface.

#### **PC (factory default)**

IBM-compatible Personal Computer.

For the technically minded: if the “CTS” (clear to send) line of the RS232 interface is high, connector 8 CTS pin outputs +12 V, allowing the computer to transfer data to the Intellibox.

#### **Mac**

Apple Macintosh Computer.

For the technically minded: if the “CTS” (clear to send) line of the RS232 interface is high, connector 8 CTS pin outputs -12 V, allowing the computer to transfer data to the Intellibox.

#### **None**

No computer.



### How to change the settings of the Intellibox interface

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "Interface"
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired option
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key".

## 5.10 Menu "s88 configuration"

In other digital systems, s88 feedback modules are read only by computer command. The Intellibox, instead, continuously reads and memorizes the s88 modules, in order to maintain an updated status of the layout's sensors. The computer can also query the Intellibox about the occurrence and type of changes in the feedback bus signals. In order to optimize the feedback bus operation, the Intellibox must be aware of the number of s88 modules connected to it.

### How to make the "s88" entry

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read "s88 settings"
- Enter the menu with the [→] key

```
Modules s88
connected: 31
```

- In this entry you should input the number of s88 modules connected to the feedback bus.
  - Go back to the main display with the [menu] key
- You may connect at the most 31 s88 modules to the Intellibox.

## 5.11 Menu “Lokmaus address”

You can connect up to 8 Lokmauses in the 5-pin DIN connector #3, by means of “Y” adapters.

The Lokmaus has an eight position slider for locomotive selection. Each of the eight positions can be assigned to a specific loco address. The assignments are common to all Lokmauses: in this manner, you can control maximum 8 locomotives, even if you have 8 Lokmauses.

### How to change the style of the speed knob

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read “Lokmaus-Addr.”
- Enter the menu with the [→] key

<b>Lokmaus Selector</b>	
Pos 1 = Loco	1

- Use the column after “Pos” to input the desired slider position or use the [↓] and [+] keys to review the available positions (1-8).
- The [→] key can be used to jump to the right input column.
- Input the locomotive address (1 to 9999) to be assigned to this slider position.
- Save the settings by pressing the [←] key
- Go back to the main display with the [menu] key

Factory defaults assign positions 1-8 to loco addresses 1-8.

## 5.12 Menu “Special Options”

The Intellibox features a number of special options which affect its operating mode. The effect of any given special option depends of the installed Intellibox software version. You can choose the special option by means of its code number.

### How to set a special option

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read “Special Option”
- Enter the menu with the [→] key

```
Special Option:
No.  . . 1 = ---
```

- Use the column after “No” to input the **special option code** number. In case of error, you can cancel the last digit with the [C] key.
- The [→] key can be used to jump to the right input column.
- Input the **special option value** in the right field. In case of error, you can cancel the last digit with the [C] key. If you press [C] after erasing the last remaining digit, the special option default value will be displayed.
- Pressing the [↵] key confirms the entry. A “\*” in the display shows, that the special option is activated.
- Go back to the main display with the [menu] key

**HINT** The Appendix lists some of the special options. This listing is intentionally incomplete since the modification of certain special options by non-experts can compromise the correct operation of the Intellibox. Special options in coming software versions will be described in documents to be made available in our Internet sites.

**HINT** Hexadecimal display  
In the special options menu, by pressing the [mode] key when the cursor is standing on the value of a special option, it is possible to display its value in hexadecimal format. However, it is not possible to modify this value directly in hexadecimal format; it is just a different display mode. By pressing [mode] again, the normal (decimal) display will be restored.

### 5.13 Menu “Software Version”

In this menu you can read the Intellibox serial number and the software version number.

#### How to display the version numbers

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read “Software Version”
- Enter the menu with the [↵] key

```
Ver : 1.0
S/N : ----
```

- In the upper line you can read the Intellibox software version number.
- In the line below you can read the Intellibox serial number.
- Go back to the main display with the [menu] key

### 5.14 Menu “Loco at power-up”

The status of your layout is stored when you switch off the Intellibox. When you next switch it on, the Intellibox allows you to recall the latest locomotive settings. In this menu, you can specify the Intellibox behaviour at power-up.

#### no memory (factory default)

The speed, direction, consisting and auxiliary function settings of the different locomotives are **not** recalled at power-up.

#### automatic, speed = 0

The direction, consisting and auxiliary function settings of the different locomotives are recalled, but speed is set to zero for all the locomotives present in the layout at power-up.

#### automatic + speed

The speed, direction, consisting and auxiliary function settings of the different locomotives are recalled. If you choose this option, the Intellibox will ask you for confirmation prior to powering-up all the locomotives in the layout.

#### How to change the loco start mode

- Press the [menu] key
- Press the [mode] key
- Scroll with the [↓] key until you read “Loco start mode”
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

## 5.15 Menu “Reset”

This menu allows you to reset the Intellibox to factory defaults.

### Configuration

All changes in the basic settings menu will be deleted.  
Factory settings of the special options will be restored.

Speed display	Absolute
Speed knobs	AC-style
Loco data format	Motorola new (prevailing type)
Accessories data format	Motorola (prevailing type))
Scale	Voltage H0
Programming track	Automatic
Speed (interface)	2400 bit/s
Syntax	6050-Syntax
Computer	PC
Lokmaus-adresse	Addr. 1-8 for Pos.1-8
Special options	Back to default values

Table 5.15  
Intellibox factory  
defaults after reset

The setting for the selected language does not change.

### Loco data format

All entries for single locomotive decoders that were made in the menu “Loco data format” (section 6.5) will be deleted. The corresponding addresses will receive the default loco data format (section 5.4).

### Accessory (decoder) setting

All entries for single accessory decoders that were made in the menu “Single type” (section 5.5.2) will be deleted. The corresponding addresses will receive the default data format for accessory decoders (section 5.5.1).

### How to make a reset

- Press the [mode] key
- Press the [menu] key
- Scroll with the [↓] key until you read “Reset”
- Enter the menu with the [→] key
- Scroll with the [↓] key until you reach your desired entry
- Press the [→] key
- Scroll with the [↓] key until you read “yes”
- Select this setting by pressing the [↵] key
- Go back to the main display with the [menu] key

## 6. The control panel

Locomotives can be addressed and controlled by means of the control panel. The Intellibox has two independent control panels, located left and right of the numeric keypad.

You can assign a specific data format (protocol) to each locomotive address controlled by the Intellibox. The Intellibox can control, simultaneously and independently, locomotive decoders conforming to different protocols.

Use of the control panel is possible even when the Intellibox is in programming mode or when configuring the unit.

Figure 6.1  
Front view of  
the Intellibox



### 6.1 Building elements

#### The [stop] key

Use the [stop] key to switch the digital voltage off in the normal track. The display will show “STOP”. Pressing this key will act on both control panels.

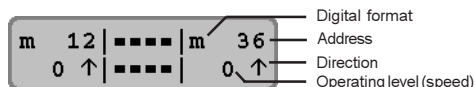
#### The [go] key

Use the [go] key to switch the digital voltage on in the normal track. Pressing this key will act on both control panels.

**HINT** You can reset the Intellibox by pressing both the [go] and [stop] keys for about two seconds.

#### The display

The backlighted liquid crystal display continuously shows the detailed status of the currently controlled locomotives: the address, the protocol (data format), the operating level and the direction of travel are shown in the left and right sections of the display.



In each control panel you will find the following elements:

### **The [f1] [f2] [f3] [f4] keys**

These keys control the locomotive's extended functions, e.g. lights, sounds, smoke generator.

If you press [lok#] followed by one of the [f1] - [f4] keys, you will be able to switch the f5 - f8 extended functions of DCC decoders (see section 6.4).

### **The [function] and [off] keys**

These two keys switch the locomotive lights on/off.

### **The [lok#] key**

Starts the input of a locomotive address.

After completing the locomotive address input, you can change the decoder protocol. Press [menu] and select the appropriate data format (protocol).

If you press [lok#] followed by one of the [f1] - [f4] keys, you will be able to switch the f5 - f8 extended functions of DCC decoders (see section 6.4).

### **The speed knob (throttle)**

Use the knob to change a locomotive speed and direction of travel. Suppose that you have chosen with the [lok#] key a previously controlled locomotive. Given the fact that the knob can rotate freely, the Intellibox automatically reads from its memory the previous operating level of the locomotive, and takes control from that level.

Even if you are in the process of changing an Intellibox parameter (in configuration mode), you can still control a locomotive with a speed knob: the ongoing configuration can proceed without problems.

## 6.2 The locomotive addresses

Each locomotive in a digital system can be controlled by means of an “address”, a combination of digits that uniquely identifies the locomotive’s decoder.

Each decoder has its own address. An address should identify one, and only one, locomotive.

Normally, a locomotive decoder is controlled by only one of the two control panels. However, it is possible to control the same decoder with both throttles.

### 6.2.1 Selecting a locomotive address

In order to control a locomotive with the Intellibox you must select its address.

To select a locomotive address, first press [lok#]. The display will show a blinking cursor in one of the address fields, prompting you to input a value.

There are two methods to do it:

#### Address selection using the numeric keypad

- You have just pressed [lok#] (right?)
- Input the digits that form the whole address with the numeric keypad
- Terminate address input:
  - pressing the [←] key,
  - pressing any other key in the control panel: [function] [off] [f1] [f2] [f3] [f4] [lok#],
  - turning the knob (throttle),
  - pressing the knob to induce a change of direction.

**HINT** Use the [C] key to erase wrong entries, one digit at a time. If you cancel the whole address, a further press of the [C] key will recall the previous address.

#### Address selection using the throttle

- You have just pressed [lok#] (right?)
- Turn the knob to change the address, clockwise to increase the value, counterclockwise to decrease it.
- Terminate address input:
  - pressing the [←] key,
  - pressing any other key in the control panel: [function] [off] [f1] [f2] [f3] [f4] [lok#],
  - pressing the knob to induce a change of direction.

**HINT** Should you try to take control of a locomotive which is already steered by another knob, the Intellibox will show the message "Loco used by another controller!" After this message you are allowed to control the relevant locomotive using both manual controllers (the external and the internal ones).



### 6.2.2 Recalling from memory a stored address

The Intellibox stores in its memory the address of the last locomotive controlled by each of the control panels.

It is possible to recall this address:

- Press [lok#]
- Press [↓]

The last valid address is displayed and is ready to be used.

### 6.2.3 Releasing a locomotive address

To release the control of a locomotive address (the released locomotive can now be taken over by a manual controller without selection keypad, e.g. FRED by Uhlenbrock or BT-2 by Digitrax), use the following procedure:

#### Single locomotive

- Press [lok#]
- Cancel the whole address with the [C] key
- Press [lok#].

#### Consist

- Press [lok#].
- Press any number key (0-9)
- Cancel the whole address with the [C] key
- Press [lok#].

## 6.3 The speed knob (throttle)

Use the knob to change a locomotive speed and direction of travel. Suppose that you have chosen with the [lok#] key a previously controlled locomotive. Given the fact that the knob can rotate freely, the Intellibox automatically reads from its memory the previous operating level of the locomotive, and takes control from that level.

The throttle has two different operating modes:

- AC style
- DC style

Please refer to section 5.2.2 for a detailed description of these operating modes.

Factory default: AC style. You can change this setting in the configuration menu (section 5.2.2)

## 6.4 Lights and extended functions

The [function] key and the extended function keys [f1] - [f4] control the lights and the locomotive decoder extended function outputs.

### [function]

Switches on the direction-dependent auxiliary function (usually the locomotive lights).

### [off]

Switches off the direction-dependent auxiliary function.

If you press the [off] key, the auxiliary function switches on briefly, even if it was not previously switched on with the [function] key.

### Extended functions

Press one of the [f1] - [f4] keys to control the relevant extended function.

Each key press toggles the relevant decoder output from “off” to “on”, and viceversa.

### Additional functions

The [lok#] key used in combination with the [f1] - [f4] keys, controls the f5, f6, f7, f8 functions of 8-function decoders. The [lok#] key must be pressed before (not simultaneously with) the [f1] - [f4] keys.

The following key combinations are valid:

- [lok#] and [f1] control function f5
- [lok#] and [f2] control function f6
- [lok#] and [f3] control function f7
- [lok#] and [f4] control function f8.

During the control of an extended function the display will show its status (1=on, 0=off).

**HINT** The function status is displayed for about 2 seconds. During this period, you can change the status of another function without first having to press [lok#].

## 6.5 Changing the data format of a locomotive decoder

The Intellibox is able to control simultaneously decoders with different digital data formats (protocols) in the same layout.

It is possible to transmit a different data format for each individual locomotive address. In this case it is necessary to define the protocol for each locomotive.

Section 5.4 describes how to configure the Intellibox default protocol.

### 6.5.1 Data formats (protocols)

The following data formats (protocols) are available:

#### Motorola - old

Old Motorola format with 14 operating levels

Locomotive decoders without extended functions

Control of earlier function decoders with the [f1] - [f4] keys

#### Motorola - new

New Marklin-Motorola protocol, also known as Gauge-1 format, with 14 operating levels (speeds) and the extended functions f 1- f4.

#### DCC 14/27/28/128

DCC protocol with 14/27/28/128 operating levels

#### DCC 28/128 DAC

DCC protocol with 28/128 operating levels and "decoder assisted consisting" (DAC)

#### Selectrix

Trix Selectrix protocol with 31 operating levels

#### Special configuration

This menu entry allows one to modify some special settings for each particular decoder. This could be requested in case of a wrong (maybe crazy) behaviour of the decoder when using the default settings. A list of these special configurations will be available for some decoders on the Internet. In particular cases, or in case of problems, refer to the available Hotline in order to understand which special configuration should be modified.

#### Locomotive virtual addresses

A virtual address is not a data format or protocol!

You can control a locomotive using a "virtual" address, different from the real one.

The Intellibox can use 4-digit virtual addresses. Therefore, it is possible to address a locomotive using its "class", e.g. 444, even if the decoder is limited to 80 addresses.

Please refer to section 6.6 for a detailed description.

### 6.5.2 Symbols used to display different data formats

The decoder's data format is displayed on the left of the locomotive address.

The following symbols are defined:

Motorola - old	= m without direction arrow
Motorola - new	= m with direction arrow
DCC, all formats	= d
Selectrix	= s
Virtual address	= *
Consist	= + (see section 6.7)

### 6.5.3 Procedure

Please use the following procedure to assign or modify the data format of a single decoder address:

#### How to assign a data format to a single decoder address

- Press the [lok#] key and enter an address (if you didn't do before)
- Press the [←] key
- Press the [lok#] key
- After pressing [menu], the display will show the currently assigned format marked with a "\*" at the end of the line.
- Use the [↓] or [+] keys to scroll through the different formats.

**CAUTION!** Please do the next three steps only if you have selected "spec. Configuration".

```
Loco Settings
spc.Config. = 0
```

- Use the first position of the cursor to input the codenumber of the desired configuration (here a "1").
- Use the [→] key to jump to the right input column.
- Input the value of the desired configuration (here a "0").
- Press the [←] key to accept the displayed format. The selected format will be marked with a "\*" character.
- Go back to the main display with the [menu] key.

## 6.6 Locomotive virtual addresses

### 6.6.1 Introduction

Railway modellers would rather designate a locomotive by its class number, than by some random (and sometimes meaningless) number. In most cases this is not possible because of the narrow range of (possible) decoder addresses. For instance, an E444 locomotive equipped with a DCC decoder with 99 addresses, cannot normally be controlled with the number 444.

With the Intellibox you can use virtual addressing, i.e. addresses which are not real decoder addresses.

**HINT** You can assign a virtual address to each “real” locomotive address, providing that the address is not already used by another decoder. It is not possible to assign a virtual address to another virtual address. The available range for virtual addresses is 1-9999.

Example: a class 636 locomotive is equipped with a DCC decoder with 99 addresses. The Intellibox could control the locomotive with its normal address, e.g. 10.

You can now assign a virtual address 636 to the real address number 10. Your locomotive can now be controlled with both addresses (10 and 636).

Virtual addresses can be recalled from the Intellibox control panels (IB-Control, Intellibox) and can also be stored in the Lokmaus association table. Unfortunately, it is not possible to use them with Marklin units connected to the I<sup>2</sup>C-Bus.

The locomotives associated with a virtual address can, however, be controlled using their “normal” address, also using Marklin units (Control 80 or 80f).

Virtual addresses are stored in the Intellibox. If you decide that you will no longer use a particular virtual address, you can erase it from the Intellibox memory.

The selected virtual address can be used to control the locomotive just like any real address and can even be used in consisting.

### 6.6.2 Virtual address assignment

If an address is already displayed, press the [lok#] key and then the [menu] key. This sequence displays the data format and virtual address configuration menu.

If the Intellibox is in address input mode, you can press the [menu] key to change the format of the displayed address.

Press [↓] or [+] to page through the different options until “Virt.Addr.” is displayed. The cursor is positioned in the right column, where you can input the virtual address. Possible values are comprised between 1 and 9999.

```
Loco Settings
= vrt.Adr .232*
```

After inputting the virtual address, press the [8] to store its value. Pressing the [menu] key will take you back to the normal display.

```
* 232 | ---- | m 36
  0 ↑ | ---- | 0 ↑
```

A virtual address is marked with a "\*" at the left of the address field.

### 6.6.3 Displaying a virtual address

If you are controlling a virtual address, pressing [lok#] followed by [menu] will display the address assignment, e.g.:

```
Virt. Adr. : 232
Deco. Adr. : 12
```

### 6.6.4 Deleting a virtual address

To delete a virtual address, recall the locomotive by pressing the [lok#] key and using its **real address**, enter the data format menu by pressing [menu], input a value of zero in the "Virt. Adr.:" and confirm the entry with [+]. Alternatively, you can delete the address by pressing the [C] key.

## 6.7 Consisting

The Intellibox is able to control several locomotives with a single throttle. This is called “consisting”. A consist can be composed of a maximum of 4 locomotives. Each locomotive can be introduced in a consist using either its “normal” address or its virtual address. The Intellibox can control a maximum of eight consists.

### 6.7.1 Setting up a consist

You can create a consist by adding up to three additional locomotives to a “base” locomotive.

Suppose that, in normal control mode, you are controlling the locomotive chosen as the base for the consist. Now, press the [lok#] key, followed by the [+] key. The consisting menu is displayed:

```
Consist
Loco 2: . . . .
```

With the numeric keypad, input the address of the locomotive to add to the base locomotive.

If you want to add a further locomotive, press again the [+] key and input another address. In this case the display will show:

```
Consist
Loco 3: . . . .
```

The “consisting” sequence is terminated with the [+−] key. The Intellibox display returns to the normal control panel and the consist can be controlled with the base locomotive address.

If you press [+−] without inputting any number or after cancelling the entry with the [C] key, no locomotive will be added to the consist.

By pressing the [menu] instead of [+−] you go back to the locomotive control mode.

```
+ 56 | ---- | lok#
29% ↑ | ---- | ?
```

When controlling a consist, the symbol which is normally reserved to the decoder type is substituted by a “+”. On its right side you will find the base locomotive address. In the final version of the Intellibox software, the speed of the consist will be displayed as a percentage of the maximum speed.

### 6.7.2 Consist behaviour

After having created a consist, you can control all the locomotives using the base locomotive address. If you try to recall the address of a “consisted” locomotive, the display will show “MUL” in the speed

field and the direction field of the locomotive will show a “-” symbol. Moreover, you will not be able to change the locomotive speed.

```
m 56 | ---- | m 36
MUL - | ---- | 0 ↑
```

However, it is possible to change the direction of travel of this locomotive, provided the consist is stopped (speed = 0), independently of the direction of the other locomotives of the consist.

**REMARK** This feature allows one to correct, if necessary, the direction of travel of a locomotive which has just been added to the consist, without the need to remove the locomotive from the consist.

If the consist includes locomotives with different numbers of operating levels, the Intellibox will operate the consist using the number of operating levels of the base locomotive.

If, for instance, the consist has a base locomotive with only 14 operating levels and another locomotive with 128 operating levels, the Intellibox will only use 14 operating levels to control both decoders.

**HINT** To correctly use a consist, all locomotives should have the same maximum and minimum “real” speeds.

The maximum and minimum operating levels can be configured in the decoder itself. Please refer to each decoder’s operating manual.

### 6.7.3 Releasing a consist

You can release a consist (relative to the base locomotive) either completely or by unfastening one locomotive at a time.

Recall the base locomotive on the control panel. Press the [lok#] key to remove single locomotives or the whole consist. Then, press [C]. The display will show:

Pressing the [+ ] key will release the whole consist. Otherwise, use the [+ ] or [↓ ] keys to browse the list of locomotives in the consist. When the locomotive to remove is highlighted, press [+←].

```
m 56 | ---- | m 36
MUL - | ---- | 0 ↑
```

Just after the Intellibox will go back to the standard control panel. The [menu] key will return the Intellibox to the normal control panel.

**REMARK** While you can add locomotives to a consist through their virtual address, only the real address is shown while removing single locomotives from a consist.

### 6.7.4 Storing a consist

Consists can be stored in the Intellibox non-volatile memory. To do so, you must modify the base parameter “Locomotive at start-up”, as described in section 5.14.



## 6.8 Controlling function decoders

Function decoders are used to control models with special electric or electronic features.

From a technical standpoint, there is no difference between the data format (protocol) of a locomotive decoder and a function decoder. You can configure the protocol for these decoders as described in section 6.5 for locomotive decoders.

**REMARK** Function decoders can be controlled with the [f1] - [f4] keys.

You can control functions f5 - f8 of DCC decoders with the [f1] - [f4] keys preceded by the [lok#] key.

The [f1] - [f4] keys are able to control function decoders conforming to the old Motorola protocol (e.g. Marklin digital crane or dancing car), but only if the relevant addresses are configured for this (old) protocol.

While a full compatibility exists between the old and new Motorola protocols regarding speed control, this property does not hold true for functions.

## 7. Keyboard mode

In a digital control system, turnouts and signals are controlled by means of special decoders, identified by individual addresses.

The Intellibox is able to control electromagnetic devices and accessories that conform to two different protocols: Motorola and DCC. Decoders of each format can be controlled simultaneously. As is the case for locomotive decoders, the user can configure a prevailing (general) type of accessory decoder.

Marklin, Viessmann and Modeltreño accessory decoders conform to the Motorola protocol. Their addresses are defined by DIP switches located inside each unit. Each decoder has its own address, which differentiates it from all others. In the Appendix you will find a table listing the addresses and the corresponding DIP switch settings.

Decoders conforming to the DCC/NMRA standard, instead, have no DIP switches and are programmed with the programming track.

The protocol for these decoders (Motorola, DCC) can be individually set in the system's configuration menu (see also section 5.5)

### 7.1 Selecting the Keyboard mode

The Intellibox has several operating modes. Three are currently available: Keyboard, s88 monitor and programming.

The Intellibox toggles among its operating modes each time the [mode] key is pressed. The layout of the display is updated accordingly.

To select the "Keyboard" mode, press the [mode] key until "Keyboard" is displayed.

### 7.2 Keyboard control

In "Keyboard" mode, the numeric keypad is used to control electromagnetic (solenoid) devices (turnouts, signals, relays). At power-up, you can control, without any additional configuration, the first 8 devices.

*Figura 7.2  
The keypad  
(in Keyboard mode)  
and the numbering  
of key pairs*



Switching is accomplished with the red and green keys. The display will show "R" or "G" when you press, respectively, a red or a green key. Additionally, the sequential address of the controlled device is also displayed.

Normally, the display will show the current status of the Keyboard:

```
m  12 | ■■■■ | m  36
    0 ↑ | ■■■■ | 0 ↑
```

If the last key to be pressed was a red one, its rectangular marker will be in the “up” position (see figure, positions 1, 7, 8 of the available 8, 4 in each line). If, however, the last key to be pressed was a green one, its marker will be in the “down” position.

### 7.3 Configuring switching timing

In solenoid device decoders, especially of the Marklin/Motorola type, the switching pulse, started with a key press, is usually terminated with the release of the initiating key.

To obviate the occurrence of too short (which wouldn't be able to switch the solenoid), or too long (which could destroy the solenoid) pulses, you can configure the decoder's maximum and minimum switching times. This procedure takes place in the Intellibox's system configuration menu. Please refer to section 5.5.3.

The factory defaults are 100 ms (0.1 second), minimum duration, and 5000 ms (5 seconds), maximum duration.

**REMARK** DCC decoders might not be affected by these settings. Many of them have configuration variables that define their own switching timing (output duration, waveform, etc.).

## 7.4 Selection of the Keyboard address

After a system reset, the red/green couples numbered 1 to 8 in Figure 7.2 are assigned to devices from 1 to 8. Since accessory decoders usually have 4 outputs, this arrangement corresponds to the first two decoders.

To change this assignment, if you are in Keyboard mode, press the [menu] key. The display will show:

```
Keyboard
Addr.: ...1 - 8
```

The address associated with the first pair of keys ([1] and [4]) will blink in the first column of the second line. The second column shows the address controlled by the 8th pair of keys ([←] and [↓]).

If you change the address for the first pair of keys, the address for the 8th pair will also change automatically. This will be the display if the first pair of keys has an address of 17:

```
Keyboard
Addr.: ..17 - 24
```

You can also use the [←] [→] keys to increase or decrease the displayed value (in 8 unit steps): e.g., if 9 is displayed, pressing [→] will increase the value to 17.

You can use the addresses 1-320 in the Motorola format and the addresses 1-2040 with DCC decoders.

Incorrect entries will generate an error message.

## 7.5 “Table” Keyboard mode

We already know that, when in the Keyboard mode, by pressing the [menu] key it is possible to specify the address of the first solenoid device controlled by the first pair of keys ([1] and [4]), thus automatically assigning the following key pairs to the following solenoid devices.

However, it is also possible to assign a particular solenoid device to a particular key pair. This is the so-called “Table” Keyboard mode. In order to switch this mode on, just select “0” (zero) as the address associated to the first key pair. When doing this, the display will confirm the activation of the “Table” mode with the following indication:

```
Keyboard
Addr. :...0 - Tab
```

It is now possible, through the configuration menu (submenu “Special Options”) to assign a specific solenoid device address to a particular key pair. In order to accomplish this task, please refer to the description of special option #810 in the Appendix.

## 8. s88 monitor mode

If you control your layout with a computer, your software will probably need some sort of feedback signaling in order to be “aware” of track occupation and, thus, be able to automatically switch turnouts and signals.

This can be accomplished using s88 modules, which can “see” a section of track and “understand” if it is “free” or “occupied”, transmitting this data to the Intellibox. The computer software reads this information through the serial interface and issues its commands accordingly.

You can connect the Intellibox to a maximum of 31 s88 modules with 16 feedback contacts each and to further LocoNet feedback modules (addresses 32 to 128). The  $31 \times 16 = 496$  s88 contacts will be superimposed to the first 496 LocoNet contacts. You can have a maximum of  $128 \times 16 = 2048$  inputs.

### 8.1 Operation

In s88 mode, the display will show the status of the s88 modules. Unlike other digital systems, the Intellibox continuously reads all the s88 modules connected to the feedback bus and stores their status information. This way, a computer connected through the serial interface to the Intellibox is not obliged to continuously monitor the s88 modules. In the Intellibox memory there is a one bit “flag” which registers the occurrence of changes in the s88 status. The computer can only be requested to monitor this flag.

To maximize the reading speed of the s88 modules connected to the feedback bus, the Intellibox must know how many s88 modules are connected to it. This value must be inputted in the system configuration menu (refer to section 5.10).

### 8.2 Selecting the s88 mode

The Intellibox has several operating modes. Three are currently available: Keyboard, s88 monitor and programming.

The Intellibox toggles among its operating modes each time the [mode] key is pressed. The layout of the display is updated accordingly.

To select the “s88” mode, press the [mode] key until “s88” is displayed.



A filled rectangle indicates a closed contact, while an open circle denotes a “free” contact.

### 8.3 Monitoring another s88 status

After a system reset, the s88 mode will display the status of the first s88 module. To monitor the status of another s88, you must change the module's address.

Pressing [menu] will display:

```
s88 module Addr:
.1
```

Change the module's address with the numeric keypad. Terminate with [←].

### 8.4 “Zooming” on a contact

Pressing one of the sixteen keys in the numeric keypad, in s88 mode, lets you “zoom” on that particular contact: its status is shown with a “0” or a “1”.

Please note that there is no relation between the contact number and the keypad legend.

1	2	3	4
█	█	█	█
5	6	7	8
□	□	□	□
9	10	11	12
█	█	█	█
13	14	15	16
□	□	□	□

*Figure 8.4  
Correspondence  
between key positions  
and contact numbers of  
the feedback modules*

## 9. Programming mode

You can program Uhlenbrock, Selectrix and DCC decoders with the Intellibox.

### 9.1 Programming track

Programming is carried out in a special track, called “programming track”, which can be a section of normal track, electrically isolated from the rest of the layout, or a side track, available in most layouts.

**CAUTION!** Both rails of the programming track must be electrically isolated from the rest of the layout. In the case of Marklin track, not only the third (central) rail must be isolated, but also the two outer rails must be disconnected from the rest of the layout.

The programming track is connected to pins 1 and 2 of connector #1 for the Intellibox.

The configuration menu “Progr. Track” (section 5.8) lets you choose how the Intellibox handles the programming track. The default mode is “automatic”. In this mode, the programming track supply voltage automatically changes from the normal digital voltage (in normal control mode) to the programming voltage (when the Intellibox enters the programming mode). If you use the programming track solely for this purpose you should, instead, choose the “Prg. track only” option.

### 9.2 Selecting the programming mode

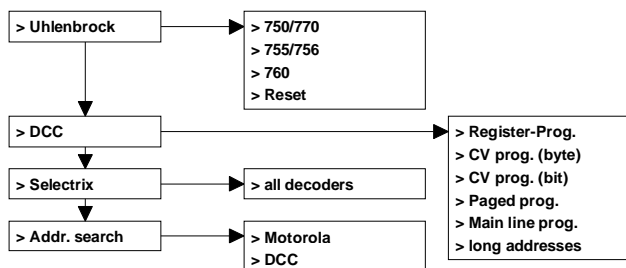
The Intellibox has several operating modes. Three are currently available: Keyboard, s88 monitor and programming.

The Intellibox toggles among its operating modes each time the [mode] key is pressed. The layout of the display is updated accordingly.

To select the “Programming” mode, press the [mode] key until “Programming” is displayed.

### 9.3 Structure of the programming menu

The following menus are available:





## 9.4 Programming Uhlenbrock decoders

The “Uhlenbrock” menu lets you program the various Uhlenbrock decoders.

**CAUTION!** Before initiating the programming procedure, you must enter the old (current) decoder address.

Please key in, one by one, the parameters that you want to configure (terminating with [↵]). Parameters that you leave blank will not be changed during the decoder's programming procedure.

**HINT** The meaning of each parameter is explained in the decoder's manual (Uhlenbrock #685). In the moment it is available only in German language.

Pressing the [↵] key in the line labelled “Programming” initiates the programming sequence and transmits all the parameters to the decoder.

Pressing the [menu] key exits the menu, without programming the decoder.

### 9.4.1 DGL750/770 menu

This menu lets you program DGL750, DGL751 and DAL770 decoders. Valid parameters and respective values are:

old Address	1-255	
new Address	1-255	
min Speed	1-63	(1-30)
max Speed	1-63	(40-63)
Deceleration	1-79	(1-30)
Acceleration	1-79	(1-30)
2nd Address	1-255	
Analog/Digital	1/2	
Programming		

Bracketed values assure a correct behaviour of the decoder.

### 9.4.2 DGR755/756 menu

This menu lets you program DGR755 and DGF756 decoders. Valid parameters and respective values are:

old Address	1-255	
new Address	1-255	
Speed Table	1-4	(see info)
min Speed	0-254	(2-50)
max Speed	0-254	(120-254)
Deceleration	1-79	(1-30)
Acceleration	1-79	(1-30)
2nd Address	1-255	
3rd Address	1-255	
Analog/Digital	1/2	
Spc. Option	0-63	
Programming		

Bracketed values assure a correct behaviour of the decoder

#### INFO Speed table

- 1 = normal driving mode with load-independent speed
- 2 = slow driving mode (by means of the f3 function key) with load-independent speed

### 9.4.3 DGF 760 menu

This menu lets you program DGF760 decoders. Valid parameters and relevant values are:

old Address	1-255
new Address	1-255
Mode	1-4
PWM-Frequency	1 or 2
Voltage output 1	1-8
Voltage output 2	1-8
Flash rate1	1-79
Flash rate2	1-79
Flash assgn1	0-31
Flash assgn2	0-31
Programming	

### 9.4.4 Reset menu

This menu allows a user to reset all Uhlenbrock decoders to the factory default conditions. This can be accomplished by simply:

- *Introduce the locomotive address*
- *With the [↓] key choose the menu "Reset"*
- *Start the reset procedure with the [←] key*

## 9.5 Programming DCC decoders

When programming DCC decoders you must use type-specific procedures. The Intellibox is able to use all procedures currently defined for DCC decoders.

DCC decoders can be programmed in the normal track or programmed and read out in the programming track (PT).

### 9.5.1 Register programming

Use the menu “Reg.-Prog.” for 8-register decoders, programmable on the PT. These are typically older type decoders; although some newer decoders may also be programmable this way.

This menu can be used for both reading and programming the registers of the decoders.

The display will show:

```
Reg . Prog :
Reg 1 = ---
```

Input the register number in the left column. The column on the right will display the register value to be transmitted to the decoder.

Use the numeric keypad to input the relevant values, or press the [+] key to increase the value by one unit, or the [↓] key to decrease it one unit. The [→] key moves the cursor to the right column. Values must be between 0 and 255.

Press the [←] key to start programming the desired register.

If the right column is left blank, no programming will be carried out.

During the programming procedure, the Intellibox activity is shown by the word “prog” and a spinning bar in the display.

After successfully programming a register, the display’s top line will show “o.k.”.

If the programming operation fails, you will get an error message (refer to section 9.5.7).

Pressing the [←] key, when the cursor is in the leftmost column of the second line, will ask the Intellibox to read the value of the selected register, from the decoder’s memory.

During the read operation the Intellibox will display the word “Read” and a spinning bar in the top line. This operation can take up to 30 seconds.

If the read operation fails, you will get an error message (refer to section 9.5.7).

**REMARK** A read error can be generated when you try to access a write-only register. On the other hand, sometimes, read or write errors can be caused by faulty electrical contacts between the locomotive and the tracks. In this case you should correct the problem and move the Intellibox cursor with the [←] key to the left-hand column. Press [←] again to re-read the same register.

After successfully reading a register, the display's top line will show "o.k.". You can now change, should you like to do so, the register's value, as described before.

**CAUTION!** Register no. 1 contains the decoder address. If you are programming older decoders, never use values greater than maximum allowed value for that decoder. This maximum allowed value (usually 99) should be mentioned in the decoder manual.

### 9.5.2 CV programming (byte)

Use the "CV Prog (byte)" menu to program DCC decoders with 1024 configuration variables (CV) on the PT.

This type of programming is also known as "direct programming". It is the fastest and most usual method to program a DCC decoder, taking a maximum of 5 seconds.

The programming menu will show the following display:

```
CV Prog:
CV ...1 = ---
```

Input the number of the desired CV (1-1024) in the left-hand column and its value (0-255) in the right-hand column.

Programming and reading procedures, follow what has been described in section 9.5.1 about register programming. In this section, please take special notice of the highlighted paragraphs.

### 9.5.3 CV programming (bit)

Use the “CV Prog (bit)” menu to program DCC decoders with 1024 configuration variables (CV) on the PT. With this programming method, you can easily read or write single bits in a CV. This is really useful when each bit in a configuration variable has a special meaning, usually controlling different decoder options.

The programming menu will show the following display:

```
CV Prog:
CV ...1,Bit0 = -
```

The menu has three columns. The leftmost is used to input the CV number (1-1024), the central one to input the desired bit number (0-7) and the right-hand column to input the bit value (0-1).

**CAUTION!** Bits are numbered 0 to 7. Some decoder’s manuals (e.g. Lenz) use numbers from 1 to 8. Don’t forget to convert these values before using this menu!

Programming and reading procedures, follow what has been described in section 9.5.1 about register programming, with the exception that the reading procedure is initiated by pressing the [←] key when the cursor is in the central column.

If the decoder cannot accept direct programming, the display will show an error message. You will not be able to change the desired bit through this menu: you will have to use the “CV Prog (byte)” menu (refer also to the Appendix).

**HINT** Some decoders use decimal values for the configuration variable bits. A table is given in the Appendix, with all possible bit-byte conversions. The following table could also help the user in the conversion among different standards of different companies.

<b>Bit no. (Intellibox)</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Bit no. (Lenz)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>Decimal value</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>16</b>	<b>32</b>	<b>64</b>	<b>128</b>

### 9.5.4 Paged programming

Use the “Paged Prog.” menu to program DCC decoders with 1024 configuration variables (CV) on the PT.

The programming menu will show the following display:

```
Page Prog:
CV ...1 = ---
```

Input the number of the desired CV (1-1024) in the left-hand column and its value (0-255) in the right-hand column.

Programming and reading procedures, follow what has been described in section 9.5.1 about register programming. In this section, please take special notice of the highlighted paragraphs.

### 9.5.5 Programming on the main track

Use the “Main line Prg.” menu to program decoders on the main track. This programming mode is useful to change a decoder’s configuration variables “on the fly”.

This method uses the CV programming procedure. However, it is not possible to **read** the decoder’s CVs.

**REMARK** Depending on the decoder’s model, programming on the main track might fail if the locomotive is not stationary on the track (speed ≠ zero).

Initially the programming menu will show:

```
Main line Prg.
Loco Addr = ...1
```

You should input now the decoder’s address. After confirming the address with the [↵] key, the display will change to:

```
Loco 1:
CV ..1 = ---
```

Input the number of the desired CV (1-1024) in the left-hand column and its value (0-255) in the right-hand column.

The remaining programming and reading procedures, follow what has been described in section 9.5.1 about register programming. In this section, please take special notice of the highlighted paragraphs.

**CAUTION!** It is not possible to carry out “programming on the main track” when the locomotive is on the programming track!

### 9.5.6 Programming long addresses

This menu provides a simple method to program “long” (14 bit) addresses (DCC addresses greater than 127).

Long addresses are stored in two CVs of the decoder (CV 17 and CV 18). To enable the use of long addresses, bit 5 of CV 29 should be set to 1.

In principle, you should be able to carry out this type of programming using the normal CV direct programming procedure (refer to sections 9.5.2 and 9.5.3). If, instead, you choose to use the “programming long addresses” menu, the Intellibox will automatically compute the correct CV values and write to or read from all the necessary CV.

The “long addresses” menu includes the two sub-menus “read” and “program”.

Use the “read” sub-menu to read and display long addresses. The read procedure is initiated by pressing the [+ ] key.

**CAUTION!** Take note that even during a read operation, bit 5 of CV 29 is set to 1! From that moment on, it will no longer be possible to control the locomotive with its CV 1 “short” address, unless you reset bit 5 of CV 29 to zero.

Use the “program” sub-menu for programming addresses greater than 127. The programming operation is initiated by pressing the [+ ] key.

**HINT** The long addresses programming procedure changes the decoder’s CV 17, 18 and 29. After programming a long address, the “short” address in CV 1 and the consisting address in CV 19 are no longer available. If you want to use these addresses again, you must set bit 5 of CV 29 to zero.

### 9.5.7 DCC programming error messages

If the programming operation of a DCC decoder fails, the top line of the display will show one of the following error messages:

- **error**

The read or write operations of a register or a CV has failed.

- **no loc**

No locomotive is present in the programming track (PT), or the locomotive has a defective electrical contact with the PT.

- **short**

Short-circuit in the programming track.

- **danger**

Electrical contact (non admissible!) between the PT and the main track.

- **no pag**

The decoder doesn't accept paged programming.

- **in use!**

The PT is being used by another device (e.g. by the PC through the serial interface).

## 9.6 Programming Selectrix decoders

Use this menu to program Selectrix decoders.

The menu has the following options:

Address	0-111
Max. speed	1-7
Acc./Decel.	0-7
Puls duration	1-4
Stop zones	1-2
Programming	

Upon entering the menu, all the variables of the decoder present on the PT are read and the address is displayed. You can review the other values using the [+] and [↓] keys.

Input the values for the registers you want to change with the numeric keypad. Once all the changes are made, select "programming" and initiate the process by pressing [←].

**HINT** If you forget to enter even one of the 5 requested values, the programming procedure will fail.

**CAUTION!** If the programming procedure generates an error message, repeat it, after turning (rotating) the locomotive on the PT 180°.

A zero value of the maximum speed sets some Selectrix decoders to conventional operation (read the decoder manual in order to understand how the decoder works). The conventional operation of Selectrix decoders is not handled by the Intellibox.



## 9.7 Searching a decoder's address

The search menu can scan for the address of a decoder that cannot be electrically read or whose address is set with DIP switches.

The search algorithm can be used with Motorola and DCC decoders.

To use this menu, follow this procedure:

- *press the [mode] key until "Mode Programming" is displayed*
- *press the [menu] key*
- *with the [↓] key page through the menus until "Address search" is displayed*
- *Choose this option with [→]*
- *Choose between Motorola and DCC with the [↓] key*
- *Begin the search with [↵]*
- *Return to the normal control panel by pressing the [menu] key*

**REMARK** This operation can take a long time to complete, because the search process sequentially reads all the decoder's addresses!

## 10. The PC interface

The Intellibox's PC interface is connected to the PC's serial interface with a standard modem cable, available as art. #691.

With a maximum speed of 19200 baud, the Intellibox serial interface is 8 times faster than the Marklin Interface. Moreover, it has an I/O buffer that further increases its throughput.

### Installation

Depending on the software, it may be necessary to configure the serial interface (refer to section 5.9).

An application that uses the new communications protocol (P50X) adopted in the Intellibox, doesn't need to be user-configured. Everything is done automatically.

The default settings of the serial interface are as follows:

Speed:	2400, 4800, 9600 or 19200
Start bits:	1
Stop bits:	2
Data bits:	8
Parity:	none
Handshake:	hardware, RTS-CTS

### Compatibility and protocols

The Intellibox serial protocol is completely compatible with the serial protocol of the Marklin 6050 and 6051 Interfaces. The Intellibox can be used with any train control software designed for the Marklin Interface.

In addition to the Marklin syntax, the Intellibox uses several advanced commands that either replace Marklin commands or can be used simultaneously. This can be defined in a configuration menu in the Intellibox system parameters (section 5.9.2).

**HINT** The Intellibox serial protocol is described in a file, available through download from our Internet sites.

## 11. Error messages

In case of error during normal Intellibox operation, its power supply is immediately interrupted, the red LED above the [stop] key starts blinking and the display shows an error message.

```
-- Short --
rail pwr output
```

Short-circuit on the main track.

```
-- Short --
Booster
```

Short-circuit on a section controlled by a Booster.

```
-- Short --
LocoNet or C/D
```

Short-circuit on the CID lines booster or LocoNet outputs.

```
-- Short --
Layout PT C/D LN
```

Short-circuit on the DCC booster output (connector #2 pin 1 and 2) or on the LocoNet B output between (connector #6 pin 1 and 6).

Short-circuit between main track and PT, DCC booster or LocoNet outputs.

```
-- Short --
Lokmaus
```

Short-circuit on the Lokmaus bus.

```
-- Short --
Dev. overheated
```

Overheating: If you continuously use the Intellibox at its maximum rated output, its heat sink could become too hot. In this case, an internal thermal protection circuit is activated and the Intellibox is shut down to avoid permanent damage to its electronic circuitry.

**HINT** As soon as the error has been corrected and/or the temperature decreases, you can power your layout again by pressing the [go] key.

## 12. Software updates

The Intellibox system software can be updated to a newer version, by downloading the new software from the computer, through the serial interface. This procedure doesn't require any physical intervention on the Intellibox.

### Hardware requirements

You need to power the Intellibox with a transformer. You will also need a serial cable to connect the Intellibox to a Personal Computer. There is no need to open up the Intellibox!

### Software requirements

Contact your local retailer to obtain a diskette with the software update, or download it from our Internet sites.

### How to update the software

- Connect the serial cable between the Intellibox and a PC serial (COM) port.
- Switch off the Intellibox for about 10 seconds. Switch it back on and wait for the completion of the initialization procedure.
- Run the application "ibupdate.exe" on your PC and follow the on-screen instructions.

### Checking the software version

With the "Software vers." menu in the system's parameters, you can check the software version of your Intellibox.

- *Press the [menu] key*
- *Press the [mode] key*
- *Press the [↓] key until "Software vers." is displayed*
- *Enter this menu by pressing [→]*

```
Ver: 1.0  
S/N: ----
```

- *The top line displays the system's software version number, while the bottom line shows the Intellibox serial number.*
- *Press the [menu] key to return to the main screen.*

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## Compatible devices

This section lists the successfully tested devices

### Marklin I<sup>2</sup>C Bus

#### Marklin I<sup>2</sup>C Bus, left side

Marklin Keyboard 6040

Marklin Memory 6043

Arnold Keyboard 86040

Marklin Switchboard 6041 (up to 4 Switchboards)

#### Marklin I<sup>2</sup>C Bus, right side

Marklin Control 80 6035

Marklin Control 80f 6036

Marklin Infra Control 80f 6070

Arnold Control 80 86035

Arnold Control 80f 86036

#### Marklin I<sup>2</sup>C Bus, both sides, using the adapter #692

Marklin Central Units 6020, 6021, 6022, 6023, 6027, 6029, 6030.

**REMARK** If you are using the Marklin Central Unit 6027 you have to press the reset button of this unit during a system power up.

If you are using a Marklin Central Control 6029 or 6030 as a Booster, it is not possible to use their control panels, since they are not connected to I<sup>2</sup>C bus.

**INFO** Important differences exist among different production series of the same type of Marklin Digital Central Unit. Nevertheless, we tried to make the Intellibox as compatible as possible to most of these series and versions. However, we cannot exclude the occurrence of troubles in a limited number of cases.

### Lokmaus connector

**CAUTION!** Do not connect any X-Bus device here!

ROCO Lokmaus 10750

LGB Lokmaus 55010

### Feedback bus

Marklin s88 6088

Modeltreino s88 66002

Viessmann s88 5217

### Marklin Booster connector

Uhlenbrock Booster 656; output format: Motorola, DCC, Selectrix.

Modeltreino Booster 66007 (Marklin and DCC compatibility mode).

Marklin Booster 6017 and 6015; output format: Motorola.

In order to control DCC locomotives it might be necessary to modify the Special Option #901 from 1 to 3 (see section 5.12).

### **DCC Booster connector**

Lenz Booster LV100

Lenz Booster LV101

Marklin Booster 6016 with Adapter (#693)

Arnold Booster 86015 with Adapter (#693)

**HINT** Most of DCC Boosters are able to supply the Motorola format. In order to accomplish this task with Boosters 6016 and 86015, it could be necessary to modify their electronic circuit.

### **LocoNet connector**

Uhlenbrock manual controller IB-Control (#654)

Uhlenbrock hand-held controller FRED (#660)

Digitrax hand held throttles DT100, DT100IR, BT2

**HINT** The Selectrix format can be supplied only with the Intellibox and the Uhlenbrock Booster 656.

# Compatible decoders

## Turnout and accessory decoders

### Motorola format

Uhlenbrock solenoid and accessory decoders 762, 765, 766  
 Modeltreño solenoid device decoder 66001  
 Viessmann solenoid device decoder 5211  
 Viessmann relay decoder 5213  
 Marklin K83 (6083)  
 Marklin K84 (6084)

### DCC format

Uhlenbrock solenoid and accessory decoders 762, 765, 766  
 Arnold K87N (86078)  
 Lenz LS100/110/120  
 DCC compatible decoders from other manufacturers

## List of tested decoders

The following decoders have been tested with the Intellibox. They can be controlled by the Intellibox without any known problem. The compatibility of non-listed decoders is not guaranteed (unless NMRA standard compliant).

- Uhlenbrock and Modeltreño Decoders
- Marklin Decoders, e.g. 6603 (Delta), 6080, 6081, 6090, 6090x new, 6095, special decoders for some locos.

**HINT** Marklin decoders 6080, 6090 and Delta featuring chips with serial numbers less than 701.17 (also LME or Zymos) should be defined as conforming to the old Motorola format.

- Old Marklin Digital= Decoder (c82)
- Old and new Lenz decoders, e.g. LE030, LE040, LE075, LE103, LE103XF, LE104, LE110, LE130, LE131, LE135, LE062XF, LE105XF
- LE100 in DCC format only  
Shows problems in the multiprotocol environment.
- Several Digitrax decoders
- New Arnold decoders (81200, 81210)  
It is recommended to switch off the automatic detection of the Motorola protocol (CV 49, bit 4=1).
- Selectrix decoders (66830, 66832), only using the Intellibox.  
Other Boosters (Marklin or DCC) cannot be used.
- Wangrow and North Coast Engineering decoders
- XR1 decoder (Motorola compatible)
- Roco decoders (Lenz)
- ZIMO MX61N decoder



## Some Special Options of the Intellibox

The Intellibox uses up to 1000 Special Options (SO), numbered from 0 to 999. These are modifiable by the user only through the Intellibox menus, not by a PC. However, the PC can read the value of all SO's.

Each SO controls a particular aspect of the Intellibox configuration. Only some of these SO's are documented along with their "meaning". These would be those SO's which would make sense being able to modify. **Please do NOT change the value of other SO's** as this could interfere or even impede correct Intellibox operation.

A maximum and a minimum value are internally associated with each SO. The Intellibox does not allow selecting a value outside that range.

**SO #20** factory default = 1

Whether (1) or not (0) P50 commands to an already "busy" locomotive are allowed ("busy" = already controlled by another (non-PC) device).

**SO #21** factory default = 0

Whether (1) or not (0) to discard P50 turnout commands issued while the Intellibox is in Power Off.

**SO #25** factory default = 1

Whether (1) or not (0) to always send a DCC signal - eventually a DCC idle signal (if there is no DCC Lok in the refresh cycle).

**HINT** If you have no DCC locomotives, in order to increase the Intellibox transmission rate to the tracks please write "0" to this SO.

**SO #27** factory default = 2

0 = no "purging"

1 -240 = Time in minutes between the last command delivered to a loco and the time when the commands for that loco are purged from the refresh cycle.

**SO #28** factory default = 0

Defines the "purging condition"

= 0 locomotive speed = 0

= 1 locomotive speed ≠ 0

**SO #812** factory default = 1

Default s88 module number to be shown when activating the s88 mode after turning on the Intellibox. Possible values are 1-128.

**HINT** The s88 module # 32-128 only correspond to LocoNet sensors.

**SO #861-868** factory default = 1

You can select what extended function (F1 - F4) is controlled through the "F1" Lokmaus key (i.e. the right function key of the Lokmaus). Furthermore, you can also tell the Intellibox, whether the function is to be toggled at each key press, or if the function is to be turned on only as long as the Lokmaus key is kept pressed ("pulsed" or "push-button" behaviour). The following table shows the association between the special options and the Lokmaus number:

Special option number	861	862	863	864	865	866	867	868
Lokmaus number	1	2	3	4	5	6	7	8

The value of each of these SO must be within 1 to 8. One would choose a value from 1 to 4 in order to specify which function to change (toggle), while you would choose a value from 5 to 8 (i.e. +4 with respect to the previous case) in order to specify which function to "push button" on. This concept is explained in the following table:

"Toggled" extended function	F1	F2	F3	F4	-	-	-	-
"Pulsed" extended function	-	-	-	-	F1	F2	F3	F4
Special option value	1	2	3	4	5	6	7	8

For example: the default for all these SO's is 1. This implies that, upon each new closure of the Lokmaus "F1" key, the F1 function status is toggled. Setting one of these SO's, let's say SO #864, to the value 3 would imply that, upon each new closure of the Lokmaus #4 "F1" key, the F3 function status is toggled. Setting that very SO to the value 5 would imply that, upon pressing the Lokmaus #4 "F1" key, the F1 function is turned on - and that this very function is turned off as soon as the Lokmaus "F1" key is released.

The following table could be used in order to register the chosen values of the Special Options 861-868.

Special option value	861	862	863	864	865	866	867	868
Default value	1	1	1	1	1	1	1	1
User's value								

**SO #871-878** min = 0, max = 255

In the "Table Keyboard mode" (see Special Option 810), each turnout control key-pair is associated to a user-defineable turnout address. The first turnout address is taken from the value of SO #871 decremented by 1, the second from SO #872 (-1), the 3rd from SO #873 (-1), the 4th from SO #874 (-1), the 5th from SO #875 (-1), the 6th from SO #876 (-1), the 7th from SO #877 (-1) and the 8th turnout address is taken from SO #878 (-1).

For example: setting SO #871 to the value 10 would allow you to control the turnout address 11 through the [1] and [4] key-pair (of course: only if this special "Table Keyboard mode" has been activated with SO #810=0).

The following table could be used in order to register the chosen values of the Special Options 871-878.

Special option number	871	872	873	874	875	876	877	878
Key pair	1	2	3	4	5	6	7	8
Default addresses	10	20	30	40	50	60	70	80
User's values								

**SO #901** factory default = 1

This SO has to be changed to a value of 3, in order to control DCC locomotives on layout sections supplied through a Marklin Booster 6015 or 6017. Factory default = 1 means no DCC signal output.

**SO #907** factory default = 1

"Idle" format on the main track at Intellibox startup:

1 = Motorola

4 = DCC

5 = mixed Motorola and DCC

The following table could be used in order to register the chosen values.

Special option number								
User's values								

## List of the standard serial commands (6050 syntax)

By means of the standard "P50" or "6050-type" binary commands the Intellibox is able to communicate with any program written for the Marklin 6050/6051 interfaces. In the following table you will find the decimal values of the available P50 commands.

Locomotive and solenoid device commands are composed of two bytes, with the exception of the emergency stop command. The first byte defines the type of command, while the second byte represents the decoder address. Using these commands you are allowed to control locomotives with an address range 0 to 255 (standard P50 range is 1-80). All other commands are composed of just one byte.

The only commands implying a reply from the interface are those dealing with feedback modules.

Command byte	Address byte	Function
97	-	Emergency stop, same as [stop] key
96	-	End of emergency stop, same as [go] key
1-14	1-80 (0-255)*	Locomotives: operating levels 1-14 and "function light" off
15	1-80 (0-255)*	Locomotives: direction change and "function light" off
17-30	1-80 (0-255)*	Locomotives: operating levels 1-14 and "function light" on
31	1-80 (0-255)*	Locomotives: direction change and "function light" on
64-79	1-80 (0-255)*	Locomotives: toggle extended functions f1, f2, f3, f4 Command byte = $64+1*f1+2*f2+4*f3+8*f4$ fx = 0 → Extended function fx off fx = 1 → Extended function fx on
33 34 32	0-255 0-255 -	Solenoid devices: green (straight) Solenoid devices: red Solenoid devices: switch off the last addressed decoder Zuordnung der Adressbytes: 1-4 = outputs #1-4 of the first solenoid device decoder 5-8 = outputs #1-4 of the second solenoid device decoder ..... 255 = third output of the last (64.) solenoid device decoder
128	-	Feedback modules: read without reset
129-159	-	Feedback modules: read n s88 modules till the indicated module 129 → reads only the first feedback module 159 → reads all 31 feedback modules The Interface replies with 2 bytes per module, showing the status of the inputs from 1-16
192	-	Feedback modules: read with reset ("reset-mode" = default)
193-223	-	Feedback modules: read a single s88 module 193 → reads the first feedback module 223 → reads the last feedback module (#31) The Interface replies with 2 bytes per module, showing the status of the inputs from 1-16

**HINT** A manual on the extended serial protocol (called P50X) of the Intellibox is available on diskette (ask your local dealer) or at our Internet sites.

## Converting bits to bytes

Some DCC decoders do not accept the “bit-wise” programming mode. When programming a single bit of a configuration variable it could be necessary to convert the 8 bits of a CV to a complete byte.

The following table could be used for this purpose. In the table the label “CV adresse” represents the decimal value corresponding to the 8 bit sequence.

CV Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
6	0	1	1	0	0	0	0	0
7	1	1	1	0	0	0	0	0
8	0	0	0	1	0	0	0	0
9	1	0	0	1	0	0	0	0
10	0	1	0	1	0	0	0	0
11	1	1	0	1	0	0	0	0
12	0	0	1	1	0	0	0	0
13	1	0	1	1	0	0	0	0
14	0	1	1	1	0	0	0	0
15	1	1	1	1	0	0	0	0
16	0	0	0	0	1	0	0	0
17	1	0	0	0	1	0	0	0
18	0	1	0	0	1	0	0	0
19	1	1	0	0	1	0	0	0
20	0	0	1	0	1	0	0	0
21	1	0	1	0	1	0	0	0
22	0	1	1	0	1	0	0	0
23	1	1	1	0	1	0	0	0
24	0	0	0	1	1	0	0	0
25	1	0	0	1	1	0	0	0
26	0	1	0	1	1	0	0	0
27	1	1	0	1	1	0	0	0
28	0	0	1	1	1	0	0	0
29	1	0	1	1	1	0	0	0
30	0	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0	0
32	0	0	0	0	0	1	0	0
33	1	0	0	0	0	1	0	0
34	0	1	0	0	0	1	0	0

CV Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
35	1	1	0	0	0	1	0	0
36	0	0	1	0	0	1	0	0
37	1	0	1	0	0	1	0	0
38	0	1	1	0	0	1	0	0
39	1	1	1	0	0	1	0	0
40	0	0	0	1	0	1	0	0
41	1	0	0	1	0	1	0	0
42	0	1	0	1	0	1	0	0
43	1	1	0	1	0	1	0	0
44	0	0	1	1	0	1	0	0
45	1	0	1	1	0	1	0	0
46	0	1	1	1	0	1	0	0
47	1	1	1	1	0	1	0	0
48	0	0	0	0	1	1	0	0
49	1	0	0	0	1	1	0	0
50	0	1	0	0	1	1	0	0
51	1	1	0	0	1	1	0	0
52	0	0	1	0	1	1	0	0
53	1	0	1	0	1	1	0	0
54	0	1	1	0	1	1	0	0
55	1	1	1	0	1	1	0	0
56	0	0	0	1	1	1	0	0
57	1	0	0	1	1	1	0	0
58	0	1	0	1	1	1	0	0
59	1	1	0	1	1	1	0	0
60	0	0	1	1	1	1	0	0
61	1	0	1	1	1	1	0	0
62	0	1	1	1	1	1	0	0
63	1	1	1	1	1	1	0	0
64	0	0	0	0	0	0	1	0
65	1	0	0	0	0	0	1	0
66	0	1	0	0	0	0	1	0
67	1	1	0	0	0	0	1	0
68	0	0	1	0	0	0	1	0
69	1	0	1	0	0	0	1	0

CV Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
70	0	1	1	0	0	0	1	0
71	1	1	1	0	0	0	1	0
72	0	0	0	1	0	0	1	0
73	1	0	0	1	0	0	1	0
74	0	1	0	1	0	0	1	0
75	1	1	0	1	0	0	1	0
76	0	0	1	1	0	0	1	0
77	1	0	1	1	0	0	1	0
78	0	1	1	1	0	0	1	0
79	1	1	1	1	0	0	1	0
80	0	0	0	0	1	0	1	0
81	1	0	0	0	1	0	1	0
82	0	1	0	0	1	0	1	0
83	1	1	0	0	1	0	1	0
84	0	0	1	0	1	0	1	0
85	1	0	1	0	1	0	1	0
86	0	1	1	0	1	0	1	0
87	1	1	1	0	1	0	1	0
88	0	0	0	1	1	0	1	0
89	1	0	0	1	1	0	1	0
90	0	1	0	1	1	0	1	0
91	1	1	0	1	1	0	1	0
92	0	0	1	1	1	0	1	0
93	1	0	1	1	1	0	1	0
94	0	1	1	1	1	0	1	0
95	1	1	1	1	1	0	1	0
96	0	0	0	0	0	1	1	0
97	1	0	0	0	0	1	1	0
98	0	1	0	0	0	1	1	0
99	1	1	0	0	0	1	1	0
100	0	0	1	0	0	1	1	0
101	1	0	1	0	0	1	1	0
102	0	1	1	0	0	1	1	0
103	1	1	1	0	0	1	1	0
104	0	0	0	1	0	1	1	0

CV Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	
105	0	1	0	0	1	0	1	1	0
106	0	1	0	1	0	1	1	0	
107	1	1	0	1	0	1	1	0	
108	0	0	1	1	0	1	1	0	
109	1	0	1	1	0	1	1	0	
110	0	1	1	1	0	1	1	0	
111	1	1	1	1	0	1	1	0	
112	0	0	0	0	1	1	1	0	
113	1	0	0	0	1	1	1	0	
114	0	1	0	0	1	1	1	0	
115	1	1	0	0	1	1	1	0	
116	0	0	1	0	1	1	1	0	
117	1	0	1	0	1	1	1	0	
118	0	1	1	0	1	1	1	0	
119	1	1	0	1	1	1	1	0	
120	0	0	0	1	1	1	1	0	
121	1	0	0	1	1	1	1	0	
122	0	1	0	1	1	1	1	0	
123	1	1	0	1	1	1	1	0	
124	0	0	1	1	1	1	1	0	
125	1	0	1	1	1	1	1	0	
126	0	1	1	1	1	1	1	0	
127	1	1	1	1	1	1	1	0	
128	0	0	0	0	0	0	0	1	
129	1	0	0	0	0	0	0	1	
130	0	1	0	0	0	0	0	1	
131	1	1	0	0	0	0	0	1	
132	0	0	1	0	0	0	0	1	
133	1	0	1	0	0	0	0	1	
134	0	1	1	0	0	0	0	1	
135	1	1	1	0	0	0	0	1	
136	0	0	0	1	0	0	0	1	
137	1	0	0	1	0	0	0	1	
138	0	1	0	1	0	0	0	1	
139	1	1	0	1	0	0	0	1	
140	0	0	1	1	0	0	0	1	
141	1	0	1	1	0	0	0	1	
142	0	1	1	1	0	0	0	1	
143	1	1	1	1	0	0	0	1	
144	0	0	0	0	1	0	0	1	
145	1	0	0	0	1	0	0	1	
146	0	1	0	0	1	0	0	1	
147	1	1	0	0	1	0	0	1	
148	0	0	1	0	1	0	0	1	
149	1	0	1	0	1	0	0	1	
150	0	1	1	0	1	0	0	1	
151	1	1	1	0	1	0	0	1	
152	0	0	0	1	1	0	0	1	
153	1	0	0	1	1	0	0	1	
154	0	1	0	1	1	0	0	1	
155	1	1	0	1	1	0	0	1	

CV Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
156	0	0	1	1	1	0	0	1
157	1	0	1	1	1	0	0	1
158	0	1	1	1	1	0	0	1
159	1	1	1	1	1	0	0	1
160	0	0	0	0	0	1	0	1
161	1	0	0	0	0	1	0	1
162	0	1	0	0	0	1	0	1
163	1	1	0	0	0	1	0	1
164	0	0	1	0	0	1	0	1
165	1	0	1	0	0	1	0	1
166	0	1	1	0	0	1	0	1
167	1	1	1	0	0	1	0	1
168	0	0	0	1	0	1	0	1
169	1	0	0	1	0	1	0	1
170	0	1	0	1	0	1	0	1
171	1	1	0	1	0	1	0	1
172	0	0	1	1	0	1	0	1
173	1	0	1	1	0	1	0	1
174	0	1	1	1	0	1	0	1
175	1	1	1	1	0	1	0	1
176	0	0	0	0	1	1	0	1
177	1	0	0	0	1	1	0	1
178	0	1	0	0	1	1	0	1
179	1	1	0	0	1	1	0	1
180	0	0	1	0	1	1	0	1
181	1	0	1	0	1	1	0	1
182	0	1	1	0	1	1	0	1
183	1	1	1	0	1	1	0	1
184	0	0	0	1	1	1	0	1
185	1	0	0	1	1	1	0	1
186	0	1	0	1	1	1	0	1
187	1	1	0	1	1	1	0	1
188	0	0	1	1	1	1	0	1
189	1	0	1	1	1	1	0	1
190	0	1	1	1	1	1	0	1
191	1	1	1	1	1	1	0	1
192	0	0	0	0	0	0	1	1
193	1	0	0	0	0	0	1	1
194	0	1	0	0	0	0	1	1
195	1	1	0	0	0	0	1	1
196	0	0	1	0	0	0	1	1
197	1	0	1	0	0	0	1	1
198	0	1	1	0	0	0	1	1
199	1	1	1	0	0	0	1	1
200	0	0	0	1	0	0	1	1
201	1	0	0	1	0	0	1	1
202	0	1	0	1	0	0	1	1
203	1	1	0	1	0	0	1	1
204	0	0	1	1	0	0	1	1
205	1	0	1	1	0	0	1	1
206	0	1	1	1	0	0	1	1

CV Address	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
156	0	0	1	1	1	0	0	1
157	1	0	1	1	1	0	0	1
158	0	1	1	1	1	0	0	1
159	1	1	1	1	1	0	0	1
160	0	0	0	0	0	1	0	1
161	1	0	0	0	0	1	0	1
162	0	1	0	0	0	1	0	1
163	1	1	0	0	0	1	0	1
164	0	0	1	0	0	1	0	1
165	1	0	1	0	0	1	0	1
166	0	1	1	0	0	1	0	1
167	1	1	1	0	0	1	0	1
168	0	0	0	1	0	1	0	1
169	1	0	0	1	0	1	0	1
170	0	1	0	1	0	1	0	1
171	1	1	0	1	0	1	0	1
172	0	0	1	1	0	1	0	1
173	1	0	1	1	0	1	0	1
174	0	1	1	1	0	1	0	1
175	1	1	1	1	0	1	0	1
176	0	0	0	0	1	1	0	1
177	1	0	0	0	1	1	0	1
178	0	1	0	0	1	1	0	1
179	1	1	0	0	1	1	0	1
180	0	0	1	0	1	1	0	1
181	1	0	1	0	1	1	0	1
182	0	1	1	0	1	1	0	1
183	1	1	1	0	1	1	0	1
184	0	0	0	1	1	1	0	1
185	1	0	0	1	1	1	0	1
186	0	1	0	1	1	1	0	1
187	1	1	0	1	1	1	0	1
188	0	0	1	1	1	1	0	1
189	1	0	1	1	1	1	0	1
190	0	1	1	1	1	1	0	1
191	1	1	1	1	1	1	0	1
192	0	0	0	0	0	0	1	1
193	1	0	0	0	0	0	1	1
194	0	1	0	0	0	0	1	1
195	1	1	0	0	0	0	1	1
196	0	0	1	0	0	0	1	1
197	1	0	1	0	0	0	1	1
198	0	1	1	0	0	0	1	1
199	1	1	1	0	0	0	1	1
200	0	0	0	1	0	0	1	1
201	1	0	0	1	0	0	1	1
202	0	1	0	1	0	0	1	1
203	1	1	0	1	0	0	1	1
204	0	0	1	1	0	0	1	1
205	1	0	1	1	0	0	1	1
206	0	1	1	1	0	0	1	1

## Coding table for solenoid devices

The address of decoders conforming to the Motorola format (from the companies Marklin, Viessmann and Modeltreno) is defined using 8 microswitches. Since every decoder controls 4 solenoid devices, the decoder address is different from the solenoid device address.

The following table shows the position of the 8 microswitches of these decoders. The correlation with solenoid device addresses and Marklin Keyboard is also included.

Keyboard number	Keyboard keys	Sol. dev. addr.	Decoder Microswitches ON							
			-	2	3	-	5	-	7	-
1	1..4	1-4	-	2	3	-	5	-	7	-
1	5..8	5-8	-	-	3	-	5	-	7	-
1	9..12	9-12	1	-	-	4	5	-	7	-
1	13..16	13-16	-	2	-	4	5	-	7	-
2	1..4	17-20	-	-	-	4	5	-	7	-
2	5..8	21-24	1	-	-	-	5	-	7	-
2	9..12	25-28	-	2	-	-	5	-	7	-
2	13..16	29-32	-	-	-	-	5	-	7	-
3	1..4	33-36	1	-	3	-	-	6	7	-
3	5..8	37-40	-	2	3	-	-	6	7	-
3	9..12	41-44	-	-	3	-	-	6	7	-
3	13..16	45-48	1	-	-	4	-	6	7	-
4	1..4	49-52	-	2	-	4	-	6	7	-
4	5..8	53-56	-	-	-	4	-	6	7	-
4	9..12	57-60	1	-	-	-	-	6	7	-
4	13..16	61-64	-	2	-	-	-	6	7	-
5	1..4	65-68	-	-	-	-	-	6	7	-
5	5..8	69-72	1	-	3	-	-	-	7	-
5	9..12	73-76	-	2	3	-	-	-	7	-
5	13..16	77-80	-	-	3	-	-	-	7	-
6	1..4	81-84	1	-	-	4	-	-	7	-
6	5..8	85-88	-	2	-	4	-	-	7	-
6	9..12	89-92	-	-	-	4	-	-	7	-
6	13..16	93-96	1	-	-	-	-	-	7	-
7	1..4	97-100	-	2	-	-	-	-	7	-
7	5..8	101-104	-	-	-	-	-	-	7	-
7	9..12	105-108	1	-	3	-	5	-	-	8
7	13..16	109-112	-	2	3	-	5	-	-	8
8	1..4	113-116	-	-	3	-	5	-	-	8
8	5..8	117-120	1	-	-	4	5	-	-	8
8	9..12	121-124	-	2	-	4	5	-	-	8
8	13..16	125-128	-	-	-	4	5	-	-	8
9	1..4	129-132	1	-	-	-	5	-	-	8
9	5..8	133-136	-	2	-	-	5	-	-	8
9	9..12	137-140	-	-	-	-	5	-	-	8
9	13..16	141-144	1	-	3	-	-	6	-	8
10	1..4	145-148	-	2	3	-	-	6	-	8
10	5..8	149-152	-	-	3	-	-	6	-	8
10	9..12	153-156	1	-	-	4	-	6	-	8
10	13..16	157-160	-	2	-	4	-	6	-	8

Keyboard number	Keyboard keys	Sol. dev. addr.	Decoder Microswitches ON							
			-	-	-	4	-	6	-	8
11	1..4	161-164	-	-	-	4	-	6	-	8
11	5..8	165-168	1	-	-	-	-	6	-	8
11	9..12	169-172	-	2	-	-	-	6	-	8
11	13..16	173-176	-	-	-	-	-	6	-	8
12	1..4	177-180	1	-	3	-	-	-	-	8
12	5..8	181-184	-	2	3	-	-	-	-	8
12	9..12	185-188	-	-	3	-	-	-	-	8
12	13..16	189-192	1	-	-	4	-	-	-	8
13	1..4	193-196	-	2	-	4	-	-	-	8
13	5..8	197-200	-	-	-	4	-	-	-	8
13	9..12	201-204	1	-	-	-	-	-	-	8
13	13..16	205-208	-	2	-	-	-	-	-	8
14	1..4	209-212	-	-	-	-	-	-	-	8
14	5..8	213-216	1	-	3	-	5	-	-	-
14	9..12	217-220	-	2	3	-	5	-	-	-
14	13..16	221-224	-	-	3	-	5	-	-	-
15	1..4	225-228	1	-	-	4	5	-	-	-
15	5..8	229-232	-	2	-	4	5	-	-	-
15	9..12	233-236	-	-	-	4	5	-	-	-
15	13..16	237-240	1	-	-	-	5	-	-	-
16	1..4	241-244	-	2	-	-	5	-	-	-
16	5..8	245-248	-	-	-	-	5	-	-	-
16	9..12	249-252	1	-	3	-	-	6	-	-
16	13..16	253-256	-	2	3	-	-	6	-	-
-	-	257-260	-	-	3	-	-	6	-	-
-	-	261-264	1	-	-	4	-	6	-	-
-	-	265-268	-	2	-	4	-	6	-	-
-	-	269-272	1	-	-	4	-	6	-	-
-	-	273-276	1	-	-	-	-	6	-	-
-	-	277-280	-	2	-	-	-	6	-	-
-	-	281-284	-	-	-	-	-	6	-	-
-	-	285-288	1	-	3	-	-	-	-	-
-	-	289-292	-	2	3	-	-	-	-	-
-	-	293-296	-	-	3	-	-	-	-	-
-	-	297-300	1	-	-	4	-	-	-	-
-	-	301-304	-	2	-	4	-	-	-	-
-	-	305-308	-	-	-	4	-	-	-	-
-	-	309-312	1	-	-	-	-	-	-	-
-	-	313-316	-	2	-	-	-	-	-	-
-	-	317-320	1	-	3	-	5	-	7	-

## Troubleshooting general problems

In this section you can find the solution to most of the common problems found when playing with the Intellibox.

### **The Intellibox does not switch on**

If the Intellibox does not switch on (the liquid crystal display stays off) the AC voltage could be missing. Maybe the plug of the transformer is not correctly connected in its socket.

Check the connections between the transformer and the Intellibox. Connect the plug in the wall-socket.

### **The Intellibox does not “speak” English**

Switch off the Intellibox. After some seconds switch the Intellibox on again keeping the “2” key pressed.

### **The red LED (“stop”) of the Intellibox keeps blinking**

A short-circuit occurred on the rails or a thermal overload occurred in the electronic circuits of the Intellibox, or a short-circuit occurred between the normal rails and the programming track.

Eliminate the short-circuit and wait for the cooling of the electronic circuits. The liquid crystal display usually helps in finding out the problem.

### **The red LED (“stop”) of the Intellibox keeps blinking**

Overload of the output amplifier (Booster) of the Intellibox, due to an excessive number of users (locomotives, lamps, etc.) connected at the same time.

Subdivide the layout in more than one part and feed them using more than one Booster (and proper transformers).

### **The green LED (Go) lights up, but the locomotives do not run**

If the Intellibox switches on, the green LED (Go) lights up, but the locomotives do not run and the solenoid devices do not switch, then probably the connection between the output amplifier of the Intellibox and the rails is interrupted. As an alternative, the connection between the Intellibox and the relevant Booster or between the Booster and the track is interrupted.

Check and correct the connections. In case of use of an external Booster, check the status of the power-on indications (LED) on the Booster.



### **The Lokmaus does not work**

If the Lokmaus does not work (e.g. the round central push-button is not working), then probably the 5 pole plug of the Lokmaus or of the Lokmaus adapter is not correctly connected in its socket.

Check the connection of the plug or of the adapter.

### **You are not able to control a locomotive using the Lokmaus**

If the red LED of the Lokmaus remains inactive even after trying to control a locomotive, then it is likely that the locomotive is under control of another hand-held controller or of a computer.

Select a different locomotive address on the second hand-held controller or on the computer program.

### **The locomotive does not work**

After introducing the address of a locomotive on the Intellibox control panel, the locomotive does not work. It is likely that you defined the wrong locomotive type. Please verify first what is the current locomotive format:

- Press [lok#] on the relevant control panel (left or right hand side)
- Input the locomotive address on the numerical keypad
- Confirm by pressing [↵] key
- Press a second time the [lok#] key
- Press the [menu] key
- Now the locomotive digital format is shown on the display
- Should the digital format be wrong, browse all available formats using the [↓] key, until you find the right one
- Confirm by pressing [↵] key
- Go back to the normal display by pressing [menu]

And now please test again your locomotive.

### **The solenoid devices are OK but the locomotives do not run**

You are using the Intellibox in conjunction with a Marklin control unit (6020, 6021, 6022, 6023, 6027, 6029, 6030, which could be used as a booster for solenoid devices). You are able to control the solenoid devices but the locomotives do not run. You probably connected the track to the output plugs of the Marklin unit instead of the output plug of the Intellibox.

Disconnect the rails from the Marklin unit and connect them to the output of the Intellibox or of a booster directly connected to the Intellibox.

### **The display of a Marklin Control connected to the Intellibox blinks**

After introducing a locomotive address in a Marklin Control 80 (6035) or 80f (6036) the display blinks. The locomotive is probably under control of another manual controller or of a computer.

Marklin Control 80 (6035): It is not possible to gain control the locomotive until it is released by the other controller.

Marklin Control 80f (6036): Introduce again the locomotive address or introduce a different address.

## Troubleshooting decoder problems

In this section you can find solutions to the most common decoder problems.

### Old and new Marklin function decoders

The Panorama car and the Marklin Digital remote control rotary crane (7051+7652), are controlled with the old Motorola protocol, using f1-f4 functions. They are not able to operate with the new Marklin-Motorola protocol.

On the opposite, new Marklin locomotives (with smoke, sound effects, etc), new Marklin decoders (60901, etc.) and Uhlenbrock decoders (755, 756, 760 in operating mode 1-3) operate only in the new protocol, and ignore the f1-f4 function signals of the old protocol.

### DCC decoder problems with the Motorola protocol

Some Motorola and DCC decoders may exhibit an abnormal behaviour in layouts operating in a mixed mode.

While Marklin decoders behave normally in the presence of a DCC signal, the opposite is not always true for many DCC decoders in presence of a Motorola signal (notwithstanding NMRA compliance!). These decoders erroneously interpret the Motorola protocol as an analog feed and start "jittering" or moving at an unpredictable speed.

In this eventuality, you should switch off the decoder's analog signal automatic recognition feature. Please refer to the decoder's instruction manual to determine which CV should be modified.

In latest generation decoders, bit #2 of CV #29 should be set to zero, although this might not be true for all DCC decoders.

### Problems controlling the lights in DCC decoders - 1

If the locomotive lights no longer respond to the [function] key, in most likelihood the decoder is configured for 28 operating levels while the Intellibox only foresees for that locomotive address 14/27 speed levels. To solve this situation, change (in the Intellibox) the configuration of the relevant decoder address to 28 operating levels.

Remember that NMRA standards impose the following specifications for CV #29:

- 14 operating levels -> CV#29 Bit 1 = 0
- 27 operating levels -> CV#29 Bit 1 = 0
- 28 operating levels -> CV#29 Bit 1 = 1
- 128 operating levels -> CV#29 Bit 1 = 1

### Problems controlling the lights in DCC decoders - 2

If the lights of a locomotive equipped with a DCC/NMRA decoder are switched on with even operating levels, switched off with odd operating levels and do not respond to the [function] key, in most likelihood the decoder is configured for 14/27 operating levels while the Intellibox foresees for that locomotive address 28 speed levels. To solve this situation, change (in the Intellibox) the configuration of the relevant decoder address to 14 or 27 operating levels or re-configure the decoder (if possible) for 28 operating levels.

Remember that NMRA standards impose the following specifications for CV #29:

14 operating levels -> CV#29 Bit 1 = 0  
 27 operating levels -> CV#29 Bit 1 = 0  
 28 operating levels -> CV#29 Bit 1 = 1  
 128 operating levels -> CV#29 Bit 1 = 1

### Controlling the Roco crane wagon (Digital DCC)

The address of the Roco digital crane wagon (40110 or 46800) should be configured for DCC - 14 operating levels. The crane wagon uses one locomotive address.

The different functions are operated with the [function], [off] and [f1] keys and turning the corresponding knob.

**REMARK** The decoder address cannot be read on the programming track. Should you program a different address, you will get an error message, even if the programming procedure was successful.

### Non-compatibility of Roco locomotive decoder 829162

It has been noted that, as soon as a Selectrix Locomotive is in the refresh cycle, this decoder starts "jittering" (micro-jumping).

### Controlling the Marklin TEE train 3471

The address of this model should be configured for the old Motorola protocol.

## Tips and Tricks

### Controlling the Marklin Digital rotary crane

The address of the digital rotary crane must be configured for the old Motorola protocol. The crane's functions, like turning the cab and raising/lowering the boom, are controlled with the [f1] and [f2] keys and the speed knob. The working lights and the magnet are switched on with the [function] key and switched off with the [off] key.

**HINT** If, in multiprotocol operation, the crane should not respond correctly, try changing its address.

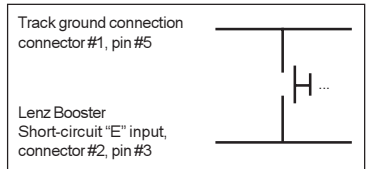
### Controlling the Marklin Digital turntable

The turntable can be retrofitted with a specific decoder (7687) compatible with the Motorola protocol. The different functions respond to the solenoid devices addresses 225 to 240.

Add	Key	Function	Add	Key	Function
225	red green	Ends programming Programming / Input	233	red green	Rotates to segment #9 Rotates to segment #10
226	red green	Cancel programming Rotates 180°	234	red green	Rotates to segment #11 Rotates to segment #12
227	red green	Next segment clockwise Next segm.counterclockwise	235	red green	Rotates to segment #13 Rotates to segment #14
228	red green	Rotation clockwise Rotation counterclockwise	236	red green	Rotates to segment #15 Rotates to segment #16
229	red green	Rotates to segment #1 Rotates to segment #2	237	red green	Rotates to segment #17 Rotates to segment #18
230	red green	Rotates to segment #3 Rotates to segment #4	238	red green	Rotates to segment #19 Rotates to segment #20
231	red green	Rotates to segment #5 Rotates to segment #6	239	red green	Rotates to segment #21 Rotates to segment #22
232	red green	Rotates to segment #7 Rotates to segment #8	240	red green	Rotates to segment #23 Rotates to segment #24

### Emergency stop button in the Lenz Booster output

If you connect the Intellibox ground (connector #1, pin #5) with the Lenz Booster short-circuit signalling line "E", (connector #2, pin #3) with a momentary switch, the Intellibox will shut off power to the track and to all connected Boosters.



You can have a number of "emergency stop" buttons, connected in parallel, spread along your layout.

## **Accessories**

- 650 Intellibox**
- 685 Manual with demo program of the Intellibox**
- 691 Serial interface cable for PC's**
- 692 Control Unit adapter**
- 693 Marklin Digital= Booster (6016) adapter**
- 694 Spare connectors (3 and 6 poles)**
- 750 DGL decoder for DC motors**
- 751 DGL with universal NEM-NMRA plug**
- 755 DGR decoder with load-independent regulation**
- 756 DGF decoder for Faulhaber motors**
- 760 Function decoderDFU**
- 770 DAL decoder for universal motors (Marklin)**
- 775 DSU digital swapper for pickup shoes**
- 785 Decoder manual**
- 1006 Book: Digital Command Control by Rutger Friberg**
- 1606 LocoNet cable, 6m with 2 plugs**
- 1622 LocoNet coupler, with 2 sockets**

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