Intellibox

**The Multi-protocol Digital system
for Motorola, Selectrix and DCC**

Operating manual

MODELTRENO
_____ **digital line**

Contents

Building elements and connections

- Stop, go and reset keys
- Display
- Right throttle for locomotives with function keys and lok# input key
- Numeric keypad and special key for menu navigation
- Left throttle for locomotives with function keys and lok# input key
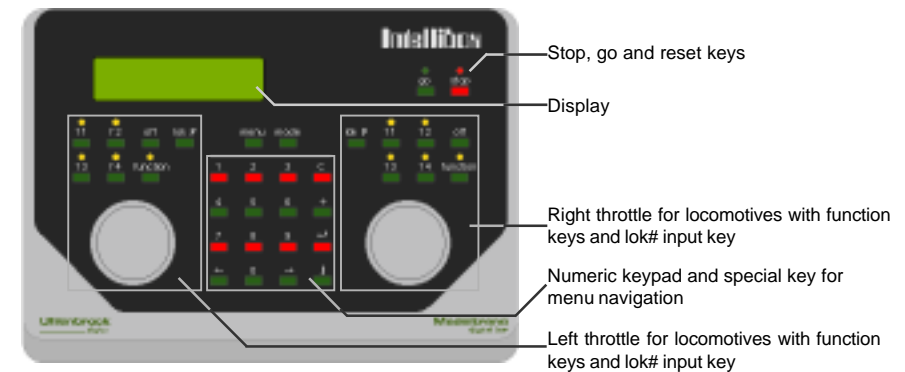
1	6-pin socket:	Transformer, Normal track, Programming Track
2	3-pin socket:	Lenz/DCC Booster
3	5-pin DIN socket:	Lokmaus
4	6-pin socket:	Feedback Bus (s88)
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A quick start

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.

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^2, 18AWG). The 16V 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.

Read this in case...
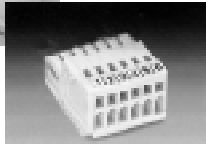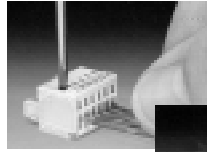
you are using the **Märklin Digital System** ("**Motorola**" or "AC" format) and most of your decoders for locos, turnouts and switching devices conform to the Motorola data format. Please make the following connections to plug #1 (do **not** insert the plug in socket #1 of the Intellibox):

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

Connect now plug #1 to the Intellibox. Before doing this, 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 between the two rails of the track. Once the short-circuit is removed, press the [go] key.

Read this in case...

you are using a **DCC/NMRA** format and most of your decoders for locos, turnouts and switching devices conform to the DCC/NMRA data format. Please make the following connections to plug #1 (do **not** insert the plug in socket #1 of the Intellibox):

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

Connect now plug #1 to the Intellibox. Before doing this, 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 between the two rails of the track. Once the short-circuit is removed, press the [go] key.

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.

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.

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.

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
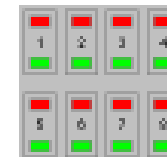
The key pairs
of the Keyboard

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

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 (automatic set-up).

[menu] forces the Intellibox keyboard to enter the "upload" mode (software update). This action can also be accomplished automatically by the PC-program which updates the Intellibox software.

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

[+] restores LCD contrast and backlight to their default values (i.e. the production values - as set in the Special Options).

[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 [↵].

[0] forces the keyboard program to be activated, even if checksum not Ok or some other kind of "error" in the flash-ROM

[1]..[8] selects and stores in the flash-ROM the corresponding language.

Possible languages are: 1) German
2) English
3) French
4) Italian
5) Dutch
6) Svedish
7) Spanish
8) Portuguese

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 Märklin 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 Transformer,
   Normal track,
   Programming Track
2 DCC-Booster
3 Lokmaus
4 Feedback-Bus (s88)
5 Märklin-Booster
6 LocoNet B (Booster)
7 LocoNet T (Throttle)
8 Computer-Interface
9 Märklin I²C-Bus (seitl.)
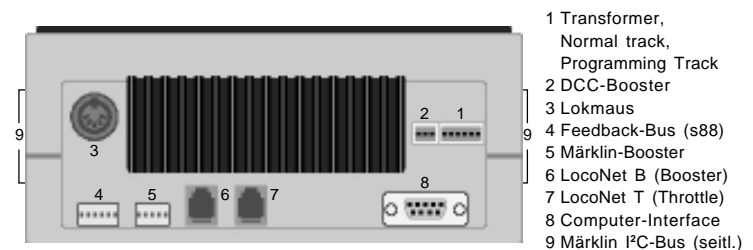
1.2 Connecting the clamp plugs

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 conntecting the cables to the clamps.

The designations of the clamps are shown in Figure 1.21.
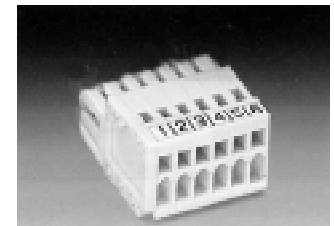
Figure 1.22
How to insert a wire into the plug
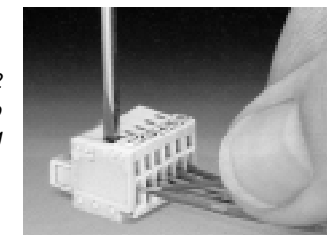
To mount a wire onto the clamp plug, remove approx. 6mm of the wire insulation at the wire end. Use a small screwdriver (2.5mm) and insert it into the upper slot of the plug. A gentle downward push on the screwdriver opens the cage clamp of the plug. Insert the un-insulated wire end into the clamp. After 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
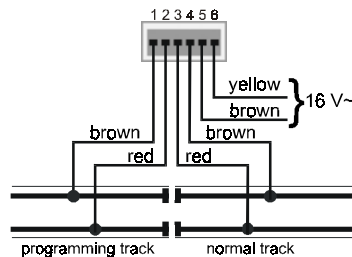
1 Programming track (brown)
2 Programming track (red)
3 Digital voltage to the track (Märklin red)
4 Digital voltage to the track (Märklin brown-digital ground)
5 Ground 16 V AC froml Transformer (Märklin brown)
6 16 V AC from Transformer (Märklin yellow)

The transformer

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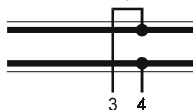
For 3-rails tracks, clamp 4 is the ground potential of the digital voltage and corresponds to the brown wire of a Märklin digital system (external rails). Clamp 3 corresponds to the red wire and must be connected to the central rail.

Figure 1.33
Connections to a
3-rails track
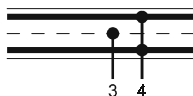
The programming track

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 Märklin tracks, where **the two lateral rails must also be isolated**! With "M" tracks this is a really difficoult 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.

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

Figure 1.34
Connections of the
Programming Track
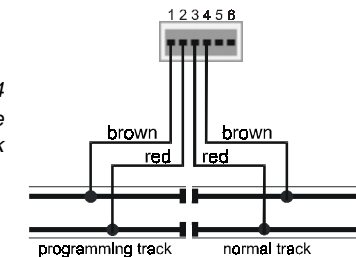
Use the basic settings of the Intellibox (section 5.8) to choose how the Intellibox handles the PT. You can choose either "only programming track" or "automatic". The latter means that you can use part of your normal layout track (but insulated on both rails). The advantage in this case is that you can 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.

CAUTION! 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

Märklin- and Arnold Digital= Booster

Märklin Digital = Boosters (6016) and Arnold Digital = Boosters (86015) are optoisolated. Therefore they can be connected to connector #2, but **only using** the Uhlenbrock/Modeltreno adapter no. 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. These boosters are usually protected by their own short-circuit protection.

1.5 Connecting a Märklin Booster

Connector #5 is designed for Märklin Boosters (6017 and 6015) and all Märklin-Motorola compatible Boosters (including Modeltreno #66007).

The flat cable delivered with the Märklin 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 Märklin 6015 and upwards from the model Märklin 6017, as shown in Figure 1.51.

Figure 1.51
Appearance of the
flat cable
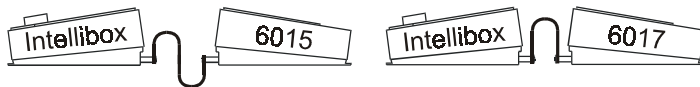
HINT The SO #901 has to be changed to a value slightly higher than the factory default one (e.g. from 1 to, say, 3) in order make it possible to control DCC locomotives on layout sections supplied through a Maerklin Booster 6015 or 6017.

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. These boosters 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 Märklin s88 (6088) can be connected here.

Figure 1.71
Connection of several feedback modules with the Intellibox and appearance of the flat cables.
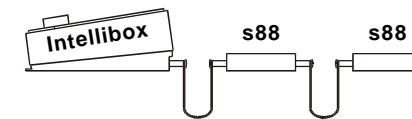
The flat cable delivered with the feedback modules must be connected between the Intellibox connector #4 and the first feedback module. Both ends of the flat cable, in the Intellibox and in the feedback module, must run downwards.

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
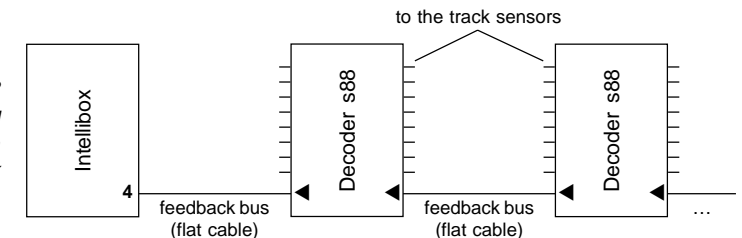
1.8 Connecting the Lokmaus

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
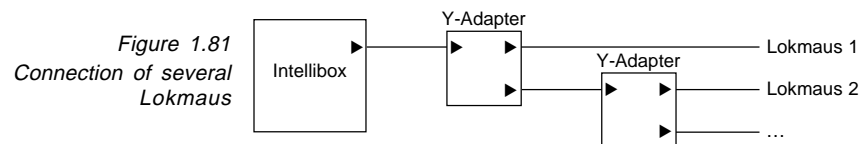
The following points must be taken into account when using a Lokmaus:

• 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 [functon]/[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 one of them (the first one) will actually control that loco.

• A loco which is controlled by a Lokmaus cannot be controlled by a second Lokmaus.

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

1.9 Connecting a computer

Computer   Intellibox
(socket)   **(a)**   (plug)

Computer (socket)   **(b)**
Intellibox (plug)

Figure 1.91
Connection of the serial interface
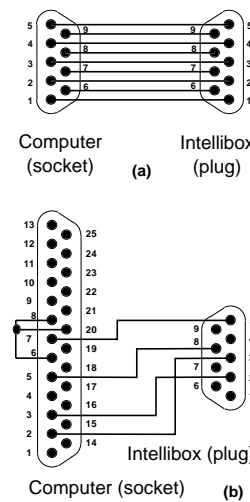
The Intellibox can be connected to the serial interface of the computer. Every IBM compatible PC or Laptop and every Apple Macintosh feature a serial interface. Sometimes it is called ComPort, V.24-Interface or RS232-Interface.

The 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 1.91(a) in case of a computer with a 9-pole serial interface, or in Figure 1.91(b) in case of a computer with a 25-pole plug.

The factory settings configure the Intellibox for an IBM compatible PC and for using only the syntax of the Märklin 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)

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 Märklin devices

Left and right hand side plugs of the Intellibox can be used to connect Märklin devices (on the I²C bus).

Connections on the left hand side
Märklin-Keyboard 6040
Märklin-Memory 6043
Arnold Keyboard 86040
Märklin-Switchboard 6041 (up to 4 Switchboards)

Connections on the right hand side
Märklin-Control 80 6035
Märklin-Control 80f 6036
Märklin Infra Control 80f 6070
Arnold Control 80 86035
Arnold Control 80f 86036

Connections on both sides
Märklin-Motorola Central Units 6020, 6021, 6022, 6023

DCC Central Units 6027, 6029, 6030, Arnold 86028.

• To connect these Central Units you need a special adapter (art. #692)

CAUTION! • These units must be powered on **at the same time** of the Intellibox. Their supply voltage must be fed using a transformer separate from the Intellibox transformer. Any electrical link between the Intellibox transformer and the Central Unit transformer is not allowed! A Maerklin 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 ouput section (red+brown) of these units.

• If you are using the Märklin Central unit **6027** you have to press the **reset** button of this unit during a system power up!

• If you are using a Maerklin 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 I²C bus.

See also the section on tips and tricks in the Appendix.

Available addresses in C80, C80f ed 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 Märklin 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
Märklin (6083, 6084)
Modeltreno 66001
Viessmann (5211, 5213)

Solenoid devices-Accessory decoders-DCC format
Arnold K87N 86078
Lenz LS100/110/120
DCC decoders conforming to the NMRA standard

3. Technical Data

Maximum supply voltage
18 V AC

Maximum current load
3 A to the rails
1 A to the I²C Bus
0,2 A to LocoNet B output
0,5 A to LocoNet T output

Maximum number of feedback modules
31 s88 or s88 compatible modules (addresses from 1 to 31).
Additional modules can be connected to the LocoNet (addresses from 32 to 128).
The Intellibox can control up to 2048 feedback contacts.

Maximum number of loco addresses
255 - Motorola format (1-255): the 1-80 addresses of the Märklin Digital system and those from 81 to 255, presently available only with Uhlenbrock decoders.
9999 - DCC format (1-9999)
112 - Selectrix format (0-111)

Maximun number of solenoid device decoder adresses
320 - Motorola format (1-320)
2040 - DCC format (1-2040)

Maximum number of connected Boosters
15 Märklin Boosters;
15 DCC Boosters.

Dimensions
180 x 136 x 80 mm

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4. Display, keyboard and menus

4.1 The display

The user interface is implemented into an LCD display with backlight. 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.
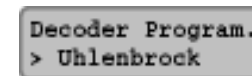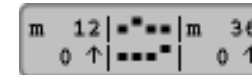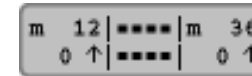
At both sides the display shows the relevant loco decoder format, the address, the speed level and the driving direction.

In the middle part the display shows information on the presently active mode. For example: the current position of the solenoid devices in "keyboard mode" or the text for the menu driven programming mode.

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.

[0] - [9]

Decimal digits

[←] [→]

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

[↓]

Decrements a value by one or one menu entry downwards

[+]

Increments a value by one or add a loco to a consist control or one menu entry upwards

Builds a consist

[↵]

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 [Clear] 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 FRED, etc. This is called "dispatching a Lok" in LocoNet terms)

Figura 4.2
The buttons of the
central block
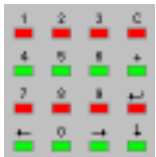
4.3.1 Structure and navigation

Figure 4.3
The structure of the
menus of the Intellibox
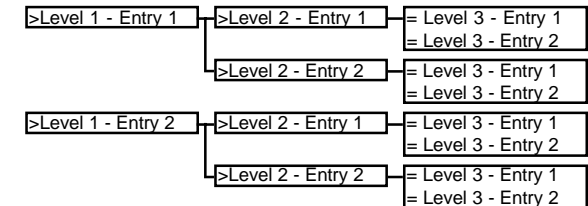
[→] One menu level (or one column) to the right

[←] 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. Don't worry! All control functions for locomotives (not for turnouts, unfortunately) 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 menu level include further menu levels, then the first character in the second row of the display will be a ">".

```
Decoder Program.
> Uhlenbrock
```
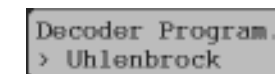
Should the menu entry be a parameter value, which could be activated or changed, then the first character in the display will be a "=".

```
Loco Settings
= vrt.Adr  .232*
```
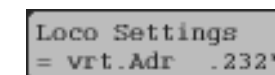
All activated entries are marked by a "*" character at the end of the display line.

```
Language:
= English      *
```
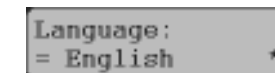
All active entries are indicated with a character "*" at the end of the line.

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 (i.e. different columns), use the [←] and the [→] buttons to step between the columns.

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

5. Detailed description of 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			
	>User interface	>Loc speed disp	= Absolute* = Percentage
		>Speed knobs	= AC style knob* = DC style knob
	>Language		= Deutsch* = English = Français = Italiano = Nederlands = Svenska = Español = Português
	>Loco data fmt		= Motorola, old = Motorola, new* = DCC 14 = DCC 27 = DCC 28 = DCC 28 DAC = DCC 128 = DCC 128 DAC = Selectrix = spc. Config. = Virtual Address
	>Access.Setting	>General type	= Motorola* = DCC
		>Single type	= Address and format
		>Switch times	= Min. and Max.
	>Display	>Backlight	= setting with [+] and [↓]
		>Contrast	= setting with [+] and [↓]
	>Scale		= Voltage: H0* = Voltage: N
	>Progr. Track		= Automatic* = Prg Track only
	>Interface	>Bit per sec.	= 2400 bit/s* = 4800 bit/s = 9600 bit/s = 19200 bit/s
		>Syntax	= 6050-Syn. only = Intellibox-Syn. only = 6050 and Intellibox*
		>Computer	= PC* = Mac = none
	>s88 settings		= # of modules connected
	>Lokmaus-Addr.		= enter the Loco address for Pos.1-8
	>Special Option		= enter the special option
	>Software Vers.		= software vers. & serial # are shown
	>Loco start mode		= no old status* = autom, Speed=0 = autom. + Speed
	>Reset	Configuration	= no or =yes
		Loco data fmt	= no or =yes
		Access.Setting	= no or =yes

5.1.1 Some examples of navigation

Following these simple examples and using the Table of section 5.1 you will be able to navigate through all menus without any problem.

Let's first suppose to change the Intellibox language to Spanish.

• [menu] *key*
• [mode] *key*
• *With the* [↓] *key scroll until you read "Language"*
• *Enter the Language menu with the* [→] *key*
• *With the* [↓] *key scroll until you read "Espanol"*
• *Select this language by pressing the* [↵] *key*
• *With the* [menu] *key you go back to the main display*

Quite obviously, now you need to re-execute the same procedure in order to tell the Intellibox to speak English. Try it!

And now we want to change the syntax of the serial interface to a "6050 only" syntax

• [menu] *key*
• [mode] *key*
• *With the* [↓] *key scroll until you read "Interface"*
• *Enter the Interface menu with the* [→] *key*
• *With the* [↓] *key scroll until you read "Syntax"*
• *Enter the Syntax menu with the* [→] *key*
• *With the* [↓] *key scroll until you read "6050 and Intellibox"*
• *Select this setting by pressing the* [↵] *key*
• *With the* [menu] *key you go back to the main display*

Re-execute the same procedure to set the Intellibox to "6050 only" syntax.

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 choosen 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.

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 knob 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.

Figure 5.21
How an AC style knob works
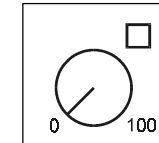
A slight push on to the speed knob will reverse the direction of the loco.

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

DC style knob
The DC Style mode works like a DC speed control device for DC two rail systems.

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.

Figure 5.22
How a DC style knob works

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 (Maerklin Motorola, Selectrix).
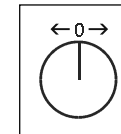
5.3 Menu "Language"

Here you can choose the language of the displayed text.

Possible languages are:
1) German
2) English
3) French
4) Italian
5) Dutch
6) Swedish
7) Spanish
8) Portuguese

The default factory setting is English. 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 "4" key you will set the default language to "Italian".

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 (e.g. Märklin coach with automatic waiter or Digital crane) will be controlled by [f1] - [f4].

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 operative levels.

DCC 28-128 DAC
DCC format with 28 and 128 operative levels with decoder assisted consisting (DAC).

SELECTRIX
Trix selectrix with 31 operative levels.

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 Märklin, Viessmann and Modeltreno are compatible with the Motorola format. Their addresses is 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.

The default factory setting is the Motorola format.

Possible choices are:

Motorola
accessory decoders using the Motorola data format:
Märklin, Modeltreno, Viessmann, Uhlenbrock.
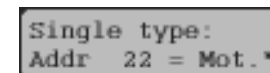
DCC
accessory decoders using the DCC data format:
Roco, Arnold, LGB, Lenz, Märklin=, Digitrax, etc.

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.

The address of a decoder which should get an individual data format must be entered in the first input column after the word "Addr".

```
Single type:
Addr  22 = Mot.*
```
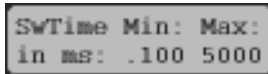
The [→] key can be used to jump to the right input column.

Now the desired data format can be chosen by using the keys [↓] or [+] and entered by the [↵] button.

5.5.3 Switching time

HINT 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. You can introduce values between 50 and 9999.

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

1st column: Minimum switching time.
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 defauft factory setting is 100 ms (0.1 seconds). The input value will be rounded to the nearest 50 ms.

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

2nd column: 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 default factory setting is 5000 ms (5 seconds). 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.

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.
The adjustment can be done using the [↓] and the [+] keys.
The [↵] key will store the desired settings.

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

CAUTION! 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. The "H0" setting is for both H0 and big gauges (0, 1, G, etc.)

H0 scale
The output voltage will not be controlled to a fixed maximum level. It could reach a max. level of 21V peak voltage if the input AC voltage is 16V.

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

5.8 Menu "Programming Track"

The Intellibox features an internal relais, 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.

The defauft factory setting is automatic.

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.

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 Intelli-box.

5.9 Menu "Interface"

5.9.1 Speed

You can select the transmission rate of the serial computer interface (dependent 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 Märklin 6050/6051 Interface (see Appendix). The Intellibox will also recognize an extended serial protocol ("P50X") fully compatibile with the 6050/6051 syntax (updated documentation will be available, from February 1999, in the Modeltreno and Uhlenbrock homepages).
Possible choices are:

6050 (syntax) only
Only the syntax of the 6050/6051interfaces 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 IB automatically recognizes the syntax of the commands it receives.

Factory default is "6050 and IB".

5.9.3 Computer

This option lets you choose the type of computer interface.
Possible choices are:

PC
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 +12V, 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 -12V, allowinging the computer to transfer data to the Intellibox.

None
No computer.

Factory default is "PC".

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 IB must be aware of the number of s88 modules connected to it.

"s88" entry
In this entry you should input the number of s88 modules connected to the feedback bus.

```
Modules s88
connectd: .8
```

The maximum is 31.

5.11 Menu "Lokmaus address"

You can connect up to 8 Lokmauses in the 5-pin DIN connector n.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 the Lokmaus: in this manner, you can control "only" 8 locomotives, even if you have 8 Lokmaus.

Use the first column of the menu (after "Pos") to input the desired slider position or use the [↓] and [+] keys to review the available positions (1-8).

Change the input column with the [→] key and input the locomotive address (1 to 9999) to be assigned to this slider position.

```
Lokmaus Selector
Pos 1 = Loco   1
```

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

If you try to assign a Lokmaus to a locomotive previouly assigned to another Lokmaus, the "Loc" field will display "Pos xx", where "xx" will indicate the position already assigned to that locomotive.

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.

"No." field
Special Option code number.

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

Input the Special Option code number in the left field. In case of error, you can cancel the last digit with the [C] key. Pressing the [↵] key confirms the entry.

Second field
Special Option value.

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.

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 Modeltreno and Uhlenbrock 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 Intellbox serial number and the software version number.

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

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.

Factory default is "No memory".

5.15 Menu "Reset"

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

Table 5.15 Intellibox factory defaults after reset

User interface	Speed display	Absolute
	Speed knobs	A.C. Style
Loco data format		Motorola new
Accessories	Prevailing type	Motorola
Scale		Voltage: H0
Programming Track		Automatic
Interface	Speed	2400 bit/s
	Syntax	6050 and IB
	Computer	PC
Lokmaus addresses		Addr. 1-8 in pos. 1-8
Special options		Back to default values

HINT **Personal settings**

For your convenience, you can register your personal settings in the following array.

User interface	Speed display	
	Speed knobs	
Loco data format		
Accessories	Prevailing type	
Scale		
Programming Track		
Interface	Speed	
	Syntax	
	Computer	
Lokmaus addresses		Position 1: address
		Position 2: address
		Position 3: address
		Position 4: address
		Position 5: address
		Position 6: address
		Position 7: address
		Position 8: address

6. The control panel

Locomotives can be addressed and controlled by means of the control panel. The IB 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 IB. The IB can control, simultaneously and independently, locomotive decoders conforming to different protocols.

Use of the control panels is possible even when the IB 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 two and a half 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.

Digital format
Address
Direction
Operating level (speed)
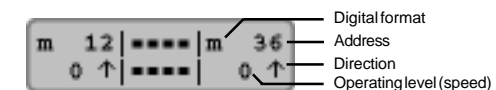
In **each control panel** you will find the following elements:

The [f1] [f2] [f3] [f4] keys
These keys control the locomotive's extended functions, e.g., lights, sounds, smoke generator.

HINT 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 IB 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 IB 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 IB 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 adress 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.

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). The endless regulation of the speed knob of the Intellibox is really helpful in this operation, while the display will continuously show the present speed of the locomotive.

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#] and then

• 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 loco-motive can now be taken over by a manual controller without selec-tion keypad, e.g. FRED by Uhlenbrock or BT-2 by Digitrax), use the following procedure:Single locomotive:

1) take control of another locomotive; or:

2) • 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 con-trolled locomotive. Given the fact that the knob can rotate freely, the IB 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 configu-ration menu (section 5.2.2)

6.4 Lights and extended functions

The [function] key and the extended function keys 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.

REMARK If you press the [off] key, the auxiliary function switches on briefly, even if it was not previouly 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).

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 simultaneously control 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 proto-col.

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 Märklin-Motorola protocol, also known as Gauge-1 format, (with 14 operating levels or speeds) with f1...f4 extended functions

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

CAUTION! 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 IB 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 of virtual addresses.

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:

1a) If you are already controlling a locomotive address and the Intellibox is in normal operating mode, press first [lok#] and then [menu] to change the data format for the displayed address.

1b) If, instead, no address is currently displayed (after the Intellibox power-up, for instance), press first [lok#]. The Intellibox will then prompt you to enter an address, after which you can press the [menu] to change its data format.

2) 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 review the different formats. Press the [↵] key to accept the displayed format. The selected format will be marked with a '*' character.

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 the virtual address is not already in use by another decoder. 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).

You can assign virtual addresses to all **real** addresses. It is not possible to assign a virtual address to another virtual address.

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 Märklin units connected to the I²C-Bus. The locomotives associated with a virtual address can, however, be controlled using their "normal" address, also using Märklin 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 IB 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 [↵] to store its value.

Pressing the [menu] key will take you back to the normal display.

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.:   333
Deco. Adr.:     1
```

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.Addr.:" and confirm the entry with [↵]. Alternatively, you can delete the address by pressing the [C] key.

6.7 Consisting

The IB 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 IB 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.

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.

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

Moreover, you will not be able to change the locomotive speed.

However, provided the consist is stopped (speed = 0), it is possible to change the direction of travel of this locomotive 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 IB 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:

```
Consist
remove all Locos
```

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 [↵].

```
Consist
remove Addr  23
```

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.

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

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

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

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

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7. Keyboard mode

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

The IB 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 locomtive decoders, the user can configure a prevailing (general) type of accessory decoder.

Märklin, Viessmann and Modeltreno 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 IB has several operating modes. Three are currently available: Keyboard, s88 monitor and programming.

The IB toggles among its operating modes (Keyboard, s88 monitor and programming) each time the [mode] key is pressed. The display is updated accordingly.

The layout of the display's central area depends on the currently selected operating mode.

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.

Swithching is accomplished with the red and green keys

Figura 7.2
The keypad (in Keyboard mode) and the numbering of key pairs
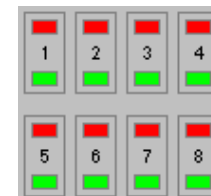
The display will show "R" or "G" when you press, respectively, a red or a green key. Additionally, the sequential address of the controlled device is also displayed.

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 Märklin/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 swithching times. This procedure takes place in the IB'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 mumbered 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 for an address of 17 (first pair):

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

You can use a range of 320 addresses in the Motorola format and 2040 addresses with DCC decoders. In the latter case, the valid range of values is 0...2033, where "0" assumes a particular function: it activates a special keyboard mode where each red/green pair of keys controls its own device address. Please refer to the description of Special Option #810, in the Appendix.

Incorrect entries will generate an error message.

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.

The [↓] key, on the other hand, will decrease the value in the first column by one unit.

7.5 "Table" Keyboard mode

We already know that, when in the Keyboard mode, it is possible (by pressing the [menu] key) 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 Appendix dedicated to the Special Options.

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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 IB. The computer software reads this information trough the serial interface and issues its commands accordingly.

You can connect the IB to a maximum of 31 s88 modules with 16 feedback contacts each and to further LocoNet feedback modules (addresses 32 to 128). The 31x16=496 s88 contacts will be superimposed to the first 496 Loconet contacts. You can have a maximum of 128x16=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 to the Intellibox through the serial interface 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 IB toggles among its operating modes (Keyboard, s88 monitor and programming) each time the [mode] key is pressed. The display is updated accordingly. Press the [mode] key until "s88 monitor" is displayed

The layout of the display's central area depends on the currently selected operating mode. In this case, it shows the status of the 16 inputs of the s88

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.

Figure 8.4
Correspondence between key positions and contact numbers of the feddback module

9. Programming mode

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

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 Märklin 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 no. 1.

The configuration menu "Progr. Track" (section 5.8) lets you choose how the IB 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 IB 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 IB toggles among its operating modes (Keyboard, s88 monitor and programming) each time the [mode] key is pressed. The display is updated accordingly. Press the [mode] key until "Programming" is displayed

The layout of the display's central area depends on the currently selected operating mode.

9.3 Structure of the programming menu

The following menus are available:

>Uhlenbrock	>DGL 750/770
	>DGR 755/756
	>DFU 760
	>Reset
>DCC	>Register prog.
	>CV prog.(byte)
	>CV prog.(bit)
	>Paged prog.
	>Main line prog.
	>Long addresses
>Selectrix	>all decoders
>Addr. search	>Motorola
	>DCC

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 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.

The meaning of each parameter is explained in the decoder's manual (e.g. Uhlenbrock 680).

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 programming 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)
Decelerat.	1-79	(1-30)
Accelerat.	1-79	(1-30)
2nd Addr.	1-255	
Analog/Dig.	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)
Decelerat.	1-79	(1-30)
Accelerat.	1-79	(1-30)
2nd Addr	1-255	
3rd Addr	1-255	
Analog/Dig.	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-Freq.	1 o 2
Volt. output 1	1-8
Volt. output 2	1-8
Flash rate1	1-79
Flash rate2	1-79
Flsh assgn1	0-31
Flsh 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"*
• *With the* [↵] *key you start the reset procedure*

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 either in the programming track (PT) or in the normal track.

9.5.1 Register programming

Use the menu "Register-Prog." for 8-register decoders, programmable on the PT. These are tipically 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 leftmost 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 IB 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 IB 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 IB 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 (on the PT) DCC decoders with 1024 configuration variables (CV).

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 (on the PT) DCC decoders with 1024 configuration variables (CV). 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 (e.g. CV no.29) 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.

HINT 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).

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.

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

9.5.4 Paged programming

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

The programming menu will show the following display:

```
Page Prg:
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 (CV17 and CV18). To enable the use of long addresses, bit 5 of CV29 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 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 CV29 is set to 1! From that moment on, it will no longer be possible to control the locomotive with its CV1 "short" address, unless you reset bit 5 of CV29 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 CV17, 18 and 29. After programming a long address, the "short" address in CV1 and the consisting address in CV19 are no longer available. If you want to use these addresses again, you must set bit 5 of CV29 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 durat.	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 [↵].

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

HINT If the programmimg procedure generates an error message, you must repeat it, after turning (rotating) the locomotive on the PT 180°.

CAUTION! 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 The search process sequentially reads all the decoder's addresses.

REMARK This operation can take a long time to complete!

10. The PC interface

The IB's PC interface is connected to the PC's serial interface with a standard modem cable, available as art. no. 691.

With a maximum speed of 19200 baud, the Intellibox serial interface is 8 times faster than the Märklin 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 Märklin 6050 and 6051 Interfaces. The Intellibox can be used with any train control software designed for the Märklin Interface.

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

HINT The Intellibox serial protocol is described in a file, available from February 1999 through your local retailer or through download from these Internet sites:

http://www.modeltreno.it

http://www.uhlenbrock.de

11. Error messages

In case of error during normal IB operation, the red LED above the [stop] key starts blinking and the display shows an error message.

Overheating

```
---Attention---
Dev. overheated
```

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

As soon as the temperature decreases, you can power your layout again by pressing the [go] key.

Short-circuit on the main track

```
---Attention---
      Short
```

If a short-circuit on the main track occurs, its power supply is immediately interrupted.
After correcting this situation, press the [go] key to restore power to the layout.

Short-circuit in a section controlled by a Booster

??? figure

Short-circuit in the Lokmaus bus

```
---Attention---
Lokm. Bus Short
```

A short-circuit in the Lokmaus bus occurred.

After correcting this situation, press the [go] key to restore power to the Lokmaus bus.

Short-circuit in the DCC booster or LocoNet outputs

Short-circuit in the DCC booster output (pins 1 and 2 of connector #2) or in the LocoNet B output (pins 1 and 6 of connector 6).

figure???

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

???figure

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 IB 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 the following Internet sites:

http://www.modeltreno.it

http://www.uhlenbrock.de

How to update the software

• Connect the serial cable between the IB and a PC serial (COM) port.
• Switch off the IB 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 [→]*
• *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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Appendix

Compatible devices

This section lists the successfully tested devices

Märklin I²C Bus

Märklin I²C Bus, left side
Märklin Keyboard 6040
Märklin Memory 6043
Arnold Keyboard 86040
Märklin Switchboard 6041 (up to 4 Switchboards)

Märklin I²C Bus, right side
Märklin Control 80 6035 (max. 80 addresses)
Märklin Control 80f 6036 (max. 99 addresses with: Intellibox; 6027, 6029 and 6030 connected with adapter #692. Max. 80 addresses with: 6020, 6021, 6022, 6023 connected with adapter #692)
Märklin Infra Control 80f 6070
Arnold Control 80 86035
Arnold Control 80f 86036

Märklin I²C Bus, both sides (using an adapter #692)
Märklin Central Units 6020, 6021, 6022, 6023, 6027, 6029, 6030.

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

REMARK • If you are using a Märklin Central Control 6029 or 6030 as a Booster, it is not possible to use their control panels, since they are not connected to I²C bus.

INFO Important differences exist among different production series of the same type of Märklin 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
ROCO Lokmaus 10750
LGB Lokmaus 55010

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

Feedback bus
Märklin s88 6088
Modeltreno s88 66002
Viessmann s88 5217

Märklin Booster connector
• Uhlenbrock/Modeltreno Booster 656; output format: Motorola, DCC, Selectrix.
• Märklin Booster 6017 and 6015; output format: Motorola.

HINT In order to control DCC locomotives it might be necessary to modify the Special Option #901 from 1 to 3 (see section 5.12). It is not possible to supply the Selectrix format.

• Modeltreno Booster 66007 (Märklin and DCC compatibility mode).

DCC Booster connector
Lenz Booster LV100
Lenz Booster LV101
Märklin Booster 6016 with Adapter (art. n.693)
Arnold Booster 86015 with Adapter (art. #693)

HINT The Selectrix format can be supplied only with the Intellibox. DCC Boosters cannot supply a Selectrix format. 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
Manual controller Modeltreno/Uhlenbrock IB-Control (Art. #654)
Hand-held controller Uhlenbrock FRED (Art. #660)
Digitrax Hand held throttles DT100, DT100IR, BT2

Compatible decoders

Turnout and accessory decoders

Motorola format
Märklin K83 (6083)
Märklin K84 (6084)
Modeltreno solenoid device decoder 66001
Viessmann solenoid device decoder 5211
Viessmann relay decoder 5213

DCC format
Arnold K87N (86078)
Lenz LS100/110/120
DCC comp. 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 Modeltreno Decoders
- Märklin Decoders, e.g. 6603 (Delta), 6080, 6081, 6090, 6090x new, 6095, special decoder for some locos

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

- old Märklin 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 (CV49, bit4=1)
- Selectrix decoders (66830, 66832), only using the Intellibox. Other Boosters (Märklin 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. This document lists some of these 1000 SO's, along with their "meaning". Only some SO's are documented. These would be the "main" SO's, i.e. those which would or could 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 #6 (factory default = 254) - min = 0, max = 255

P5Xa "RT" cmd default value.

254 would mean: upon a non-PC power off, the CTS line is disabled for about 13 seconds (254 * 50 ms = 12.7 seconds). Please check also 'RT' cmd documentation.

SO #7 (factory default = 88 = ASCII 'X') - min = 80, max = 95

Default P50X cmds leading character (when in mixed P50/P50X mode).

SO #11 (factory default = 50) - min = 30, max = 100

How long, in 50 ms units, the Stop and Go keys must be held pressed before an Intellibox reset (warmstart) is performed.

The default corresponds to 2.5 seconds.

SO #20 (factory default = 1) - min = 0, max = 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) - min = 0, max = 1

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

SO #23 (factory default = 1) - min = 0, max = 62

s88 "half-module" number which is the source for the s88 Timers. (0 = s88 Timers are disabled).

SO #24 (factory default = 1) - min = 0, max = 62

s88 "half-module" number which is the source for the s88 Counters. (0 = s88 Counters are disabled).

SO #25 (factory default = 1) - min = 0, max = 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 #26 (factory default = 1) - min = 0, max = 1

Whether (1) or not (0) a PC Break (RS-232) forces 2400 bps.

SO #27 (factory default = 2) - min = 0, max = 240

Time (in minutes, about 10% accuracy) between the last command delivered to a loco and the time when the commands for that loco are purged from the refresh cycle.

0 = no "purging"

SO #28 (factory default = 0) - min = 0, max = 1

Defines the "purging condition"

= 0 locomotive speed = 0
= 1 locomotive speed ≠ 0

SO #810 (factory default = 1) - min = 0, max = 255

Default turnout address (after turning on the Intellibox) to be controlled through the first Intellibox key-pair devoted to turnout control while in Keyboard mode (keys [1] (red) and [4] (green)).

The allowed range is 0,...,255, with 0 having a special meaning: it activates a special Keyboard mode - known as "Table Keyboard mode". See the description of Special Options 871-878.

This special Table Keyboard mode can also be activated "on the fly".

SO #812 (factory default = 1) - min = 1, max = 128

Default s88 module number to be shown when activating the s88 mode after turning on the Intellibox. s88 module numbers 32...128 only correspond to LocoNet sensors.

SO #815 (factory default = 0) - min = 0, max = 2

Determines the IB startup mode (0 = Keyboard, 1 = s88, 2 = Prog).

SO #817 (factory default = 100) - min = 1, max = 255

Minimum permanence time for messages on the display.

SO #818 (factory default = 50) - min = 1, max = 100

With a "D.C. style" knob you cannot turn the knob very fast and, besides stopping the Lok, also immediately change its direction. A pause (in 10 ms units) is enforced when passing through speed "zero".

SO #861-868 - min = 1, max = 8

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 number	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 turn-out 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 eigth 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	87-8
Key pair	1	2	3	4	5	6	7	8
Default addresses	10	20	30	40	50	60	70	80
Chosen values								

SO #901 (factory default = 1) - min = 1, max = 100

This SO has to be changed to a value <u>slightly</u> higher than the factory default one (e.g. 3) in order make it possible to control DCC locomotives on layout sections supplied through a Maerklin Booster 6015 or 6017.

SO #907 (factory default = 5) - min = 0, max = 255

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

- SO n.907=1 Motorola

- SO n.907=4 DCC

- SO n.907=5 mixed Motorola and DCC

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 Märklin 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	(0)1-80(255)	Locomotives: operating levels 1-14 and "function light" off
15	(0)1-80(255)	Locomotives: direction change and "function light" off
17-30	(0)1-80(255)	Locomotives: operating levels 1-14 and "function light" on
31	(0)1-80(255)	Locomotives: direction change and "function light" on

64-79	(0)1-80(255)	Locomotives: toggle extended functions f1, f2, f3 and 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. 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 (64th) solenoid device decoder 0 = last (fourth) output of the last (64th) 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 to 16
192	-	Feedback modules: read with reset ("reset mode")
193-223	-	Feedback modules: read a single s88 module 193 -> reads the first feedback module 223 -> reads the last (31st) feedback module The interface replies with 2 bytes per module, showing the status of the inputs from 1 to 16

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

www.modeltreno.it   or   www.uhlenbrock.de.

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 Adresse	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 Adresse	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 Adresse	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 Adresse	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
105	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	1	0	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 Adresse	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 Adresse	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
207	1	1	1	1	0	0	1	1
208	0	0	0	0	1	0	1	1
209	1	0	0	0	1	0	1	1
210	0	1	0	0	1	0	1	1
211	1	1	0	0	1	0	1	1
212	0	0	1	0	1	0	1	1
213	1	0	1	0	1	0	1	1
214	0	1	1	0	1	0	1	1
215	1	1	1	0	1	0	1	1
216	0	0	0	1	1	0	1	1
217	1	0	0	1	1	0	1	1
218	0	1	0	1	1	0	1	1
219	1	1	0	1	1	0	1	1
220	0	0	1	1	1	0	1	1
221	1	0	1	1	1	0	1	1
222	0	1	1	1	1	0	1	1
223	1	1	1	1	1	0	1	1
224	0	0	0	0	0	1	1	1
225	1	0	0	0	0	1	1	1
226	0	1	0	0	0	1	1	1
227	1	1	0	0	0	1	1	1
228	0	0	1	0	0	1	1	1
229	1	0	1	0	0	1	1	1
230	0	1	1	0	0	1	1	1
231	1	1	1	0	0	1	1	1
232	0	0	0	1	0	1	1	1
233	1	0	0	1	0	1	1	1
234	0	1	0	1	0	1	1	1
235	1	1	0	1	0	1	1	1
236	0	0	1	1	0	1	1	1
237	1	0	1	1	0	1	1	1
238	0	1	1	1	0	1	1	1
239	1	1	1	1	0	1	1	1
240	0	0	0	0	1	1	1	1
241	1	0	0	0	1	1	1	1
242	0	1	0	0	1	1	1	1
243	1	1	0	0	1	1	1	1
244	0	0	1	0	1	1	1	1
245	1	0	1	0	1	1	1	1
246	0	1	1	0	1	1	1	1
247	1	1	1	0	1	1	1	1
248	0	0	0	1	1	1	1	1
249	1	0	0	1	1	1	1	1
250	0	1	0	1	1	1	1	1
251	1	1	0	1	1	1	1	1
252	0	0	1	1	1	1	1	1
253	1	0	1	1	1	1	1	1
254	0	1	1	1	1	1	1	1
255	1	1	1	1	1	1	1	1

Coding table for solenoid devices

The address of decoders conforming to the Motorola format (from the companies Märklin, 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 Märklin Keyboard is also included.

Keyboard number	Keyboard keys	Sol. dev. addresses	Decoder: microswitches ON							
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
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	-	-	-	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 hte Intellibox. After some seconds switch the IB 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 or 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 ohe output amplifier (Booster) of the Intellibox, due to an eccessive 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 (hand-held controller) 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 (hand-held controller) 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 Märklin 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 Märklin unit instead of the output plug of the Intellibox.

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

The display of a Märklin Control 80f connected to the IB blinks

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

Introduce again the locomotive address or introduce a different address.

The display of a Märklin Control 80 connected to the IB blinks

This time the problem is related to a Control 80 and not a Control 80f.

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

It is not possible to gain control the locomotive until it is released by the other controller.

Troubleshooting decoder problems

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

Old and new Märklin function decoders

The Panorama car and the Märklin 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 Märklin-Motorola protocol.

On the opposite, new Märklin locomotives (with smoke, sound effects, etc), new Märklin 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 Märklin 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, altough 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 IB only foresees for that locomotive address 14/27 speed levels. To solve this situation, change (in the IB) 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 eqquiped 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 IB foresees for that locomotive address 28 speed levels. To solve this situation, change (in the IB) 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.

Controlling the Märklin Digital rotary crane

The address of the digital rotary crane must be configured for the old Motorola protocol. The crane's functions (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.

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 Märklin TEE train 3471

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

Tips

### Controlling the Märklin 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.

Address	Key	Function	Address	Key	Function
225	red green	Ends programming Programming / Input	233	red green	Rotates to segment no.9 Rotates to segment no.10
226	red green	Cancels programming Rotates 180	234	red green	Rotates to segment no.11 Rotates to segment no.12
227	red green	Next segment, clockwise Next segment, counter-clockwise	235	red green	Rotates to segment no.13 Rotates to segment no.14
228	red green	Clockwise rotation Counter-clockwise rotation	236	red green	Rotates to segment no.15 Rotates to segment no.16
229	red green	Rotates to segment no.1 Rotates to segment no.2	237	red green	Rotates to segment no.17 Rotates to segment no.18
230	red green	Rotates to segment no.3 Rotates to segment no.4	238	red green	Rotates to segment no.19 Rotates to segment no.20
231	red green	Rotates to segment no.5 Rotates to segment no.6	239	red green	Rotates to segment no.21 Rotates to segment no.22
232	red green	Rotates to segment no.7 Rotates to segment no.8	240	red green	Rotates to segment no.23 Rotates to segment no.24

Emergency stop button in the Lenz Booster output

If you connect the Intellibox ground (connector no.1, pin no.5) with the Lenz Booster short-circuit signalling line ("E", connector no.2, pin no.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.

Track ground connection
connector no.1, pin no.5

Lenz Booster
Short-circuit "E" input,
connector no.2, pin no.3
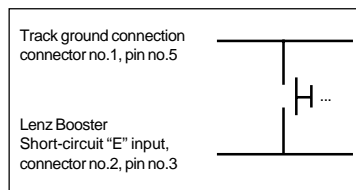
Accessories for the Intellibox

These items are available separately:

650 **Intellibox**

685 **Manual with demo program of the Intellibox**

691 **Serial interface cable for PC's**

692 **Control Unit adapter**

693 **Märklin 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 decoderfor Faulhaber motors**

760 **Function decoderDFU**

770 **DAL decoder for universal motors (Märklin)**

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**

HOTLINE

Authors: A. Scorzoni, S. Chiti-Batelli, T. Vaupel, M. Berger

Order number 685/E

Addendum

For the present and future versions the following notes have to be taken into account.

Solenoid devices through a Märklin Central Unit

The minimum and maximum "on" times for turnouts are presently NOT effective for turnout decoders supplied through an external Märklin Central Unit.

How to recognize to which consist a locomotive belongs

Imagine that you select a Lok and that the display shows "MUL - ".

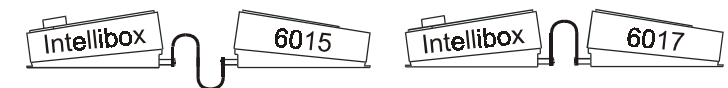You now know that that Lok is in a consist... but in which one?

One could do this: press [Lok], then press [+]. The Intellibox now shows the error message "Lok already in a consist", but it should also say in what consist! This will be introduced in a future software version.

1.5 Connecting a Märklin Booster

Connector #5 is designed for Märklin Boosters (6017 and 6015) and all Märklin-Motorola compatible Boosters (including Modeltreno #66007).

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

Figure 1.51
Appearance of the
flat cable

Available addresses in C80, C80f ed 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)

5.12 Menu "Special Options"

(last paragraph)

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 <u>not</u> 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.

5.15 Menu "Reset"

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

Table 5.15 Intellibox factory defaults after reset

User interface	Speed display	Absolute
	Speed knobs	A.C. Style
Loco data format		Motorola new
Accessories	Prevailing type	Motorola
Scale		Voltage: H0
Programming Track		Automatic
Interface	Speed	2400 bit/s
	Syntax	6050 and IB
	Computer	PC
Lokmaus addresses		Addr. 1-8 in pos. 1-8
Special options		Back to default values

6.2.1 Selecting a locomotive address

...(last paragraph)

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). The endless regulation of the speed knob of the Intellibox is really helpful in this operation, while the display will continuously show the present speed of the locomotive.

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:

1) take control of another locomotive; or:

2) • 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#].

6.5 Changing the data format of a locomotive decoder

(...)
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

(...)

6.6 Locomotive virtual addresses

6.6.1 Introduction

(...)

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 Märklin units connected to the I²C-Bus. The locomotives associated with a virtual address can, however, be controlled using their "normal" address, also using Märklin units (Control 80 or 80f).

6.7 Consisting

The IB 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 IB 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.

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.

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

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   23|■■■■|+  56
MUL ↑|■■■■| 0% ↑
```

However, provided the consist is stopped (speed = 0), it is possible to change the direction of travel of this locomotive 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 IB 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 <u>base locomotive</u> on the control panel. Press the [lok#] key to remove single locomotives or the whole consist. Then, press [C]. The display will show:

```
Consist
remove all Locos
```

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 [↵].

```
Consist
remove Addr  23
```

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.

7.5 "Table" Keyboard mode

We already know that, when in the Keyboard mode, it is possible (by pressing the [menu] key) 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 Appendix dedicated to the Special Options.

9.3 Structure of the programming menu

The following menus are available:

>Uhlenbrock	>DGL 750/770
	>DGR 755/756
	>DFU 760
	>Reset
>DCC	>Register prog.
	>CV prog.(byte)
	>CV prog.(bit)
	>Paged prog.
	>Main line prog.
	>Long addresses
>Selectrix	>all decoders
>Addr. search	>Motorola
	>DCC

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)
Decelerat.	1-79	(1-30)
Accelerat.	1-79	(1-30)
2nd Addr.	1-255	
Analog/Dig.	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)
Decelerat.	1-79	(1-30)
Accelerat.	1-79	(1-30)
2nd Addr	1-255	
3rd Addr	1-255	
Analog/Dig.	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-Freq.	1 o 2
Volt. output 1	1-8
Volt. output 2	1-8
Flash rate1	1-79
Flash rate2	1-79
Flsh assgn1	0-31
Flsh 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 pressing the [↵] key when in the reset menu.

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 durat.	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 <u>all</u> the changes are made, select "programming" and initiate the process by pressing [↵].

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

HINT If the programmimg procedure generates an error message, you must repeat it, after turning (rotating) the locomotive on the PT 180°.

CAUTION! A zero value of the maximum speed sets 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.

10. The PC interface

(...)

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

(...)