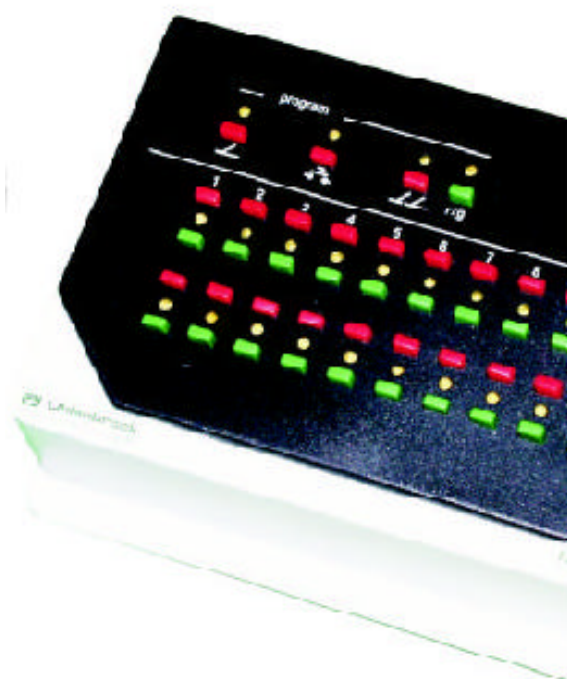
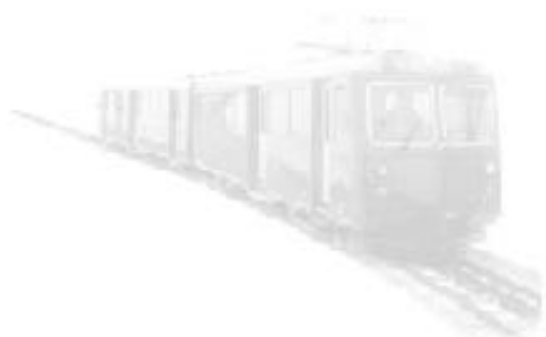


# IB-Switch

Turnouts and Routes control

## Manual



# Contents

<b>1. Introduction</b>	
1.1 Description	4
1.2 Connection	4
1.3 Technical data	4
<b>2. User interface</b>	
2.1 Programming keys	5
2.2 Key-pairs during operation	5
2.3 Key-pairs during programming	6
2.4 Erroneous input during address programming	7
<b>3. Electromagnetic devices (turnouts, signals, etc.)</b>	
3.1 Digital conversion	8
3.2 Controlling single devices through key-pairs	8
3.3 Programming single devices	8
<b>4. Routes</b>	
4.1 Terminology	11
4.2 Requesting a Route	11
4.3 Freeing (releasing) a Route	12
4.4 Programming a Route	12
4.5 Erasing a Route	15
4.6 Recalling a Route (sub-routes)	15
4.7 Inserting pauses	16
4.8 Route activation speed	16
<b>5. Interdependency and "Route blocking"</b>	
5.1 Programming interdependencies	17
5.2 Automatic search for interdependencies	18
<b>6. Automatic operation</b>	
6.1 Feedback modules	19
6.2 Sensor addresses programming	19
6.3 Feedback info processing	21
6.4 Disabling and enabling automatic operation	21
<b>7. IB-Switch reset</b>	
7.1 Auto-configuration	22
7.2 Reset of all data	22
<b>8. Keyboard lock (Keylock)</b>	
8.1 Keylock by key sequence	23
8.2 Keylock by Special Option	23
8.3 Programming lock	23
<b>9. Special Options</b>	
9.2 Instructions	25
9.3 List of Special Options	26

All registered trademarks belong to their respective owner/company.

# 1. Introduction

## 1.1 Description

The IB-Switch is an add-on device for the Intellibox and for other Command Stations featuring a LocoNet interface, e.g., the Fleischmann TWIN-CENTER or Command Stations by Digitrax. The IB-Switch adds, to the digital system, a keypad that provides control for turnouts, signals, uncoupling-devices, etc. It also allows "route" activation.

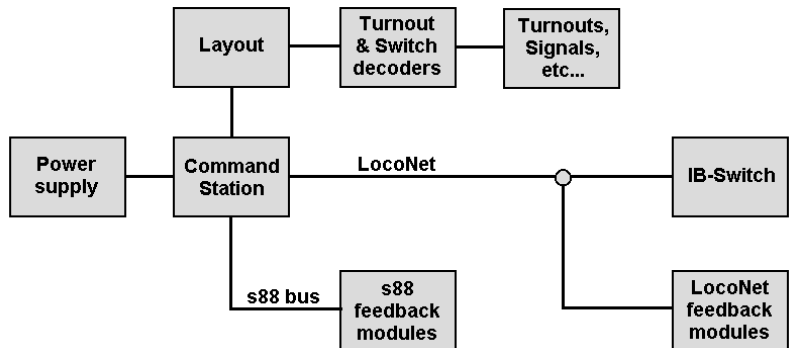
These actions can be performed by taking advantage of the 20 key pairs provided by the IB-Switch. The "level-selection" key ("r/g") lets you select between two "levels": a red level and a green level. This, in effect, allows you to double the amount of controllable devices, for a total of 40.

In addition to manual control of devices, actions can also be automatically performed by the trains running on the layout. This allows you to automatically control shadow stations, entry and exit from stations, block operations, etc.

## 1.2 Connection

The IB-Switch is connected to the LocoNet bus using the included cable. In order to do this, one can use a LocoNet connector on the Command Station or any other LocoNet connector. The device receives all needed data and energy from LocoNet.

The switching commands, issued by pressing a key on the IB-Switch, are sent through LocoNet to the Command Station which, in turn, "converts" them to the appropriate digital format (e.g., DCC or Motorola). The digital signal is then sent through the rails or the power bus to the turnout/signal decoders which eventually activate the turnout, etc.



## 1.3 Technical data

Controls 2 x 20 electromagnetic devices/routes  
 Max 20 "steps" for each Route (sub-routes are supported)  
 Address range: 1-2048  
 Current consumption (drawn from LocoNet): max 140 mA

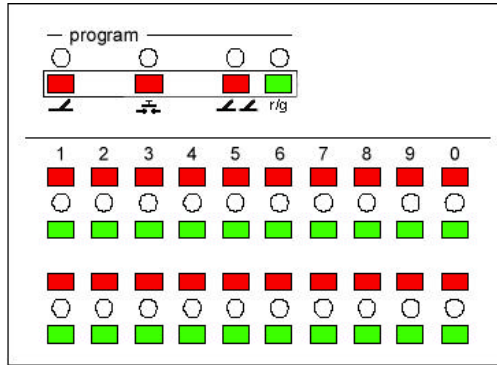
## 2. User interface

The key pairs on the IB-Switch front panel are used to issue switching commands and/or routes activation/release commands. The same keys can be used during programming in order to input all required data; no further device is required in order to program an IB-Switch.

### 2.1 Programming keys

The programming of single devices, feedback sensors and routes is started by pressing one of the leftmost three keys in the topmost row of keys of the IB-Switch front panel.

The LED (Light Emitting Diode – a small “electronic lamp”) placed above these keys lights up red or green as long as the corresponding programming operation is still being performed.



The “r/g” key (rightmost key of the topmost row) allows you to select, during normal operation, between two “levels” – thus doubling the amount of controllable devices, routes, etc. A “red” LED indicates that these key-pairs control devices numbered 1 to 20; a “green” LED indicates that these key-pairs control devices numbered 21 to 40.

During route programming, this same “r/g” key allows you to specify the “status” (red or green, i.e., thrown or closed) of the desired electromagnetic devices.

### 2.2 Key-pairs during operation

During normal operation, each key-pair can be used to issue the commands for which it has been configured.

Electromagnetic devices (turnouts, signals, etc.) can be set to the “thrown” or “red” status by pressing the “red” key of the corresponding key-pair, while pressing the “green” key will set them to the “closed” or “green” status.

Routes can be requested with the red key and released (freed) with the green key.

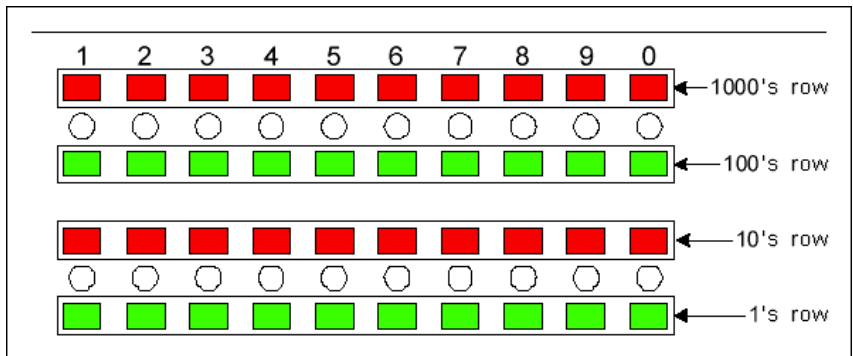
The LEDs placed between the key-pairs show the status of the corresponding electromagnetic devices or routes. For example, if the key-pair has been configured for control of a single device, then the LED will indicate “red” if the corresponding device was last set to the “red” or “thrown” position, and will indicate “green” for the “green” or “closed” position. If the key-pair has been configured for route control, then the corresponding LED will display “yellow” (green+red) if that route has been activated. The LED will be off (indicate no color) if the route has not been activated or has been released (freed).

### 2.3 Key-pairs during programming

During the programming of turnout addresses, feedback sensor addresses and routes, the key-pairs are used for address data input and for specifying the desired associations.

The LEDs show the value selected so far (e.g., an address) or the associations. The meaning of the LED display is documented in each chapter.

#### Key assignment



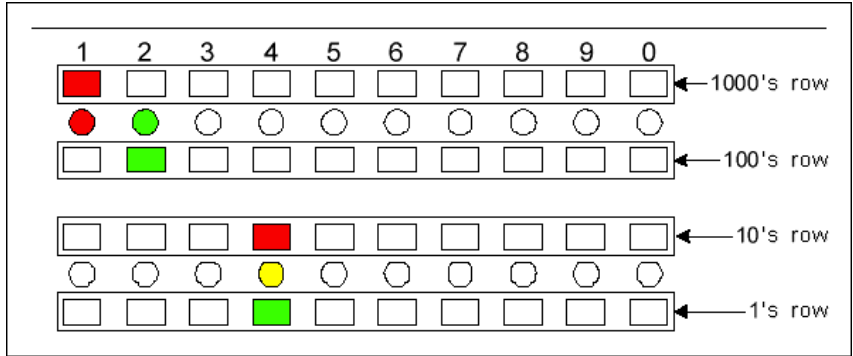
Excluding the topmost row, the IB-Switch has 4 rows of 10 keys each. The value within each row lies within the range of 1 to 9, and 0, in agreement with the labels placed above the keys. The rows have a value of 1000, 100, 10 and 1 (from top to bottom). This means that pressing a key in the top row sets the 4<sup>th</sup> digit (the “thousands”) of the value (e.g., the address) being input. The 2<sup>nd</sup> row sets the 3<sup>rd</sup> digit (the “hundreds”), the 3<sup>rd</sup> row sets the 2<sup>nd</sup> digit (the tens) and the 4<sup>th</sup> row sets the 1<sup>st</sup> digit (the units).

#### Address input

For example, if address 1244 has to be input, the following keys have to be pressed: 1 in the top row (thousands) , 2 in the 2<sup>nd</sup> row (hundreds), 4 in the 3<sup>rd</sup> row (tens) and 4 in the bottom row (units).

These keys can be pressed in any order. More than one key can be pressed within a single row but only the last key will be taken into account. This way, there is no need for special keys to erase or clear a

previous value. In other words, new inputs automatically “overwrite” previous data.



The LEDs between the key pairs show the currently selected value. A red LED indicates that the red key just above that LED has been pressed. A green LED indicates that the green key just below that LED has been pressed. A yellow LED indicates that both the red key above that LED as well as the green key below that LED have been both pressed (this is the case of the “44”, the last two digits of the previous example).

## 2.4 Erroneous input during address programming

Addresses of electromagnetic devices (taken as single devices or within a route) and of feedback sensors lie in the range of 1-2048.

If one erroneously specifies a value higher than this, all LEDs are turned off and the LED corresponding to the last key which was pressed will keep blinking red until a valid value is specified.

### 3. Electromagnetic devices (turnouts, signals, etc.)

Each key-pair can control either a single electromagnetic device or a route.

#### 3.1 Digital conversion

On a digital layout, all turnouts and signals which feature an electromagnetic “motor” and which the operator wishes to control digitally have to be driven through an appropriate decoder (turnout or signal decoder). In a similar way, lights, light-signals and sections of tracks which are to be turned on or off have to be controlled through a suitable “switching decoder” (a decoder featuring one or more relays).

These decoders receive energy and control signals from the Command Station.

The decoders should be connected according to what is specified in the corresponding user manuals.

Furthermore, one has to assign an address to each turnout decoder (or, eventually, to each output of each turnout decoder). Uhlenbrock turnout decoders (MD2) and “switch decoders” (SD1 and SD2) can be programmed by simply pressing the programming key on the decoder and then pressing the desired control key(s) on the control device. For other decoders, please refer to their respective manuals.

#### 3.2 Controlling single devices through key-pairs


If a key-pair has been assigned to control a single electromagnetic device, then pressing the red key of that key-pair will set the corresponding turnout to the “thrown” (curved) side, while pressing the green key will set it to the “closed” (straight) position. The LED placed between the key-pair shows the current status of that device according to the last command issued to it.

The LED correctly shows the status even if a different device (other than the IB-Switch itself) issued the switching command. This may be, e.g., a LocoNet device like an IB-Control or the Intellibox.

The reverse applies as well: if the switch command is issued by the IB-Switch, then all other devices connected to LocoNet will also show the new status of that turnout or signal (provided those LocoNet devices do support this feature).

#### 3.3 Programming single devices

##### Select Programming mode

Press the  key to activate the single electromagnetic device Programming mode. The LED above that key will light up green.

**“Level” selection**

The IB-Switch has 20 key-pairs. Each key-pair can be used with the red or green “level”. The currently active level is selected by pressing the rightmost key of the topmost row of keys: the “r/g” key. The LED above that key is red if the 1<sup>st</sup> (red) level is active (1-20). It is green if the 2<sup>nd</sup> (green) level is active (21-40).


**Display of currently assigned key pairs**

At this point, the IB-Switch shows which key-pairs have already been assigned: a green LED is shown for each key-pair which has been configured for control of a single electromagnetic device. A yellow LED is shown for each key-pair that controls a route.

**Selection of the to-be-configured Key-pair**

The first step is to select the key-pair that you want to configure. To do this, simply press one of the two keys (red or green) belonging to the desired key-pair.

**Display of a previously assigned address**

After having selected the key-pair to be configured, the LED above the  key switches from green to red. If a turnout address has already been assigned to that key-pair, it will then be shown using the two rows of LEDs between the key-pairs (check 2.3 “User interface – Key-pairs during programming”) and can be edited.

Conversely, if that key-pair has not yet been assigned to the control of any single electromagnetic device, or if it had been assigned to the control of a route, then all those LEDs will be turned off.

**Address input**


Any electromagnetic device address can be freely assigned to any key-pair.

Input of the address of the electromagnetic device to be controlled is performed as described in section 2.3 “User interface – Key-pairs during programming”.

Please note that the data to be input is the turnout address, not the turnout *decoder* address. This also applies to the address to be input in the Keyboard Mode of the Intellibox (after pressing the [menu] key).


In the case of the Fleischmann TWIN-CENTER, the virtual address of the turnout/signal must be specified.

**End of key-pair configuration**

As soon as the desired address has been input, the configuration of the key-pair can be terminated by pressing the  key. The specified




address is memorized and the corresponding LED will flash yellow for a brief time.

If the key-pair configuration is ended by pressing the  key without having input any (new) address, then the existing key-pair configuration (either for control of a single electromagnetic device or of a single route) will be retained. The LED will not flash (yellow).

### **Erasing a key-pair configuration**

During address input, the first key-press of one of the 40 keys used for address input will erase any old value and show the one being currently input.

If that first key-press is a “0” (on any row) – and no further key is pressed (other than the terminating  key) – then the configuration of that key-pair will be erased and no function will be assigned to that key-pair anymore.

## 4. Routes

A route is a sequence of switching commands that can be automatically executed by pressing a single key. That sequence can include switching commands for turnouts and signals, as well as pauses and “calls” to previously defined routes – to be regarded as “sub-routes” of the current route. Each route can include up to 20 commands. If you also consider the possibility of recalling sub-routes, then a maximum of 761 switching commands can be automatically executed by pressing just a single key. All these switching commands are executed one after the other so as not to overload the digital energy source of the layout.

### 4.1 Terminology

With regard to routes, this manual uses the following terms:

**to request**

A route is requested (the activation of a route is requested) by either pressing a key on the IB-Switch or by a feedback sensor event. This implies that, at the moment the route is requested, it is not yet certain whether that route can be directly activated or not.

**to activate**

A route gets activated by executing all its switching commands.

**active**

A route is active once all its switching commands have been executed.

**to free (to release)**

A route is freed (released) by either pressing a key on the IB-Switch or by a feedback sensor event. If a route is “free”, this implies that it may not be considered “valid” anymore. This also implies that its turnouts, signals, etc. may now be used within different routes.

**to block**

A route is blocked if one or more turnouts/signals belonging to it are currently in use by other (active) routes.

**dependent**

A route is dependent on another route if one or more turnouts/signals belong to both routes. Such routes would block each other. Route dependencies may also be manually edited.

### 4.2 Requesting a Route

A route can either be manually requested, by pressing the red key of a key-pair configured for control of that route, or be automatically requested by a feedback sensor – e.g., by a “track is occupied” or “track is free” sensor status change caused by a travelling train. If this route is not blocked by other routes, then it is activated. All of its switching commands are executed and all the electromagnetic devices specified are set, step by step, to the desired position. The LED corresponding to that key-pair will be set to yellow to indicate the route is active.


### 4.3 Freeing (releasing) a Route

An active route is freed (released) by:

- pressing the green key of its controlling key-pair;
- the activation of a route which is not dependent on the given route but includes at least one electromagnetic device which is also included in the given route (note: keep in mind that route dependencies may be edited and/or automatically searched for);
- switching (by this very IB-Switch or by another device) an electromagnetic device which belongs to the route.

### 4.4 Programming a Route

#### Select programming mode

Press the  key in order to activate Route Programming mode. The LED above that key will light up green.


#### “Level” selection

The IB-Switch has 20 key-pairs. Each key-pair can be used with the red or green “level”. The currently active level is selected by pressing the rightmost key of the topmost row of keys: the “r/g” key. The LED above that key is red if the 1<sup>st</sup> (red) level is active (1-20). It is green if the 2<sup>nd</sup> (green) level is active (21-40).


#### Display of currently assigned key pairs

At this point, the IB-Switch shows which key-pairs have already been assigned: a green LED is shown for each key-pair which has been configured for control of a single electromagnetic device, while a yellow LED is shown for each key-pair which controls a route.

#### Selection of the to-be-programmed Key-pair

The first step is to select the key-pair that you want to use to control the desired route. To do this, simply press one of the two keys (red or green) belonging to the desired key-pair. After having selected the key-pair to be configured, the LED above the  key switches from green to red.

It is possible to select a yet unused key-pair or a key-pair already used for controlling a route – a route that you’d like to review or edit. It is also possible to select a key-pair that was, until now, assigned to the control of a single electromagnetic device.

Please note: the current configuration/assignment of a key-pair will be overwritten as soon as a new input is memorized. However, you can still leave Programming mode by pressing the  key without having

changed any existing configuration/assignment. If you didn't input any new value, the old programming will remain unchanged.

### Input of switching commands

You can now use the keys on the four rows to input the 1<sup>st</sup> electromagnetic device of this route (check also 2.3 "User interface – Key-pairs during programming"). Select the desired turnout/signal "position" (red or green) by pressing the "r/g" key (rightmost key of the topmost row consisting of 4 keys). Complete your input by pressing the **↵** key: the LED above that key will now flash yellow while the IB-Switch memorizes your input.

You can continue inputting more electromagnetic device addresses and "colors" (positions: red or green) as just described.

If you reach the maximum of 20 commands within a route, the IB-Switch will automatically revert to normal operation (exiting Route Programming mode).

If you need less than 20 commands for a route, press the **↵** key directly a second time (after the LED above that key finishes flashing yellow) in order to terminate route programming.

### Checking (reviewing) switching commands

Start route programming by pressing the **↵** key. Next, select the desired key-pair as described above. The IB-Switch will now use the LEDs between the key-pairs to show the address of the 1<sup>st</sup> electromagnetic device to be switched within the selected route. You can read the position (red or green) by looking at the LED above the "r/g" key.

Each subsequent key-press of the **↵** key will indicate the next electromagnetic device to be switched within this route. At the end of the route (if shorter than 20 steps), the IB-Switch will show an empty position in order to allow you to extend the route if desired: all LEDs will be turned off.

One final key-press of the **↵** key will exit Route Programming mode.

### Editing switching commands

Please proceed as described in the previous section – "Checking (reviewing) switching commands" – until you reach the route step you wish to edit. You can now select a different electromagnetic device address and/or select a different red/green position.

#### TIP

During address input, the first key-press erases the previous address. The new address being selected is immediately shown using the LED between the key-pairs which corresponds to that 1<sup>st</sup> key pressed.

### Appending switching commands

You can always extend an existing route by adding more commands (up to max 20 commands per route).

Please proceed as described in the previous section – “Checking (reviewing) switching commands” – until you reach the last step of the route, i.e., the one identified by the fact that all LEDs are off. You can now specify the address of the electromagnetic device you wish to add to this route (including its red/green position). Complete your input by pressing the **↵** key: the LED above that key will now flash yellow while the IB-Switch memorizes your input.

### Inserting switching commands

You can always insert a new command in any position within a route (up to a maximum of 20 commands per route).

Please proceed as described in the previous section – “Checking (reviewing) switching commands” – until you reach the step before which you’d like to insert a new command. Now press the **↵** key in order to insert a new “empty” command at this point in the route (before the step you just reached).

You can now specify the address of the electromagnetic device you wish to add to this route (including its red/green position). Complete your input by pressing the **↵** key: the LED above that key will now flash yellow while the IB-Switch memorizes your input.

The IB-Switch will now show you, once again, the step immediately after the step you just inserted. By pressing the **↵** key you can now proceed to the next step in this route, etc. A final pressing of the **↵** key “on” the last step of this route (when all LEDs are off) will exit Route Programming mode.

### Removing switching commands

Any single command within a route can be removed. If the removed command is not the last one within a route, then all subsequent commands will automatically be moved up in sequence by one position so as to “fill the gap” left by the deleted command.

Please proceed as described in the previous section – “Checking (reviewing) switching commands” – until you’ll reach the step you would like to remove.

Set the address of the command you wish to remove to the value 0. Complete your input by pressing the **↵** key: the LED above that key will now flash yellow while the IB-Switch memorizes your input.

The IB-Switch will indicate the step immediately after the step you just removed. By pressing the **↵** key you can now proceed to the next

step in this route, etc. A final press of the **↵↵** key “on” the last step of this route (when all LEDs are off) will exit Route Programming mode.

**TIP**

If you erase the 1<sup>st</sup> address of a route, that entire route will be erased. If you only wish to remove the 1<sup>st</sup> command of a route, then copy the contents of the 2<sup>nd</sup> command to the 1<sup>st</sup> command and then remove the 2<sup>nd</sup> command of the route.

### 4.5 Erasing a Route

If the very first step (command) of a route is set to the address “0”, then that route will be “declared inactive”. That is, the subsequent steps (starting with the 2<sup>nd</sup> step) will still be “there” (in the memory of the IB-Switch), however, since the 1<sup>st</sup> step is now “0”, the IB-Switch will disregard any command requesting the activation of that route.

Please proceed as described in the previous section – “Checking (reviewing) switching commands”. Now set the address of the 1<sup>st</sup> step of the route to the value “0”. Complete your input by pressing the **↵↵** key: the LED above that key will now flash yellow while the IB-Switch memorizes your input.

A final press of the **↵↵** key “on” the last step of this route (when all LEDs are off) will exit route programming.

**TIP**

If a non-zero address is once again programmed as 1<sup>st</sup> step of an “erased” route, then all the steps of that route will be “active” once again.

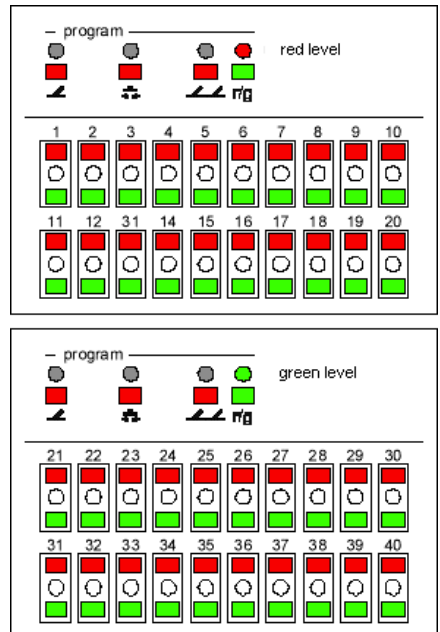
### 4.6 Recalling a Route (sub-routes)

If there are common “sub-routes”, these can be programmed and recalled by different “main routes” without having to explicitly re-program each sub-route each time it is needed.

You may recall a “sub-route” at any step of a route. All commands which lie “after” the “call” to the sub-route will be executed as soon as all commands belonging to that sub-route (and to any further “nested” sub-route) have been executed.

Picture 4.61  
Key-pair assignment for routes

This is how to proceed in order to “call” a sub-route within a route. Select “90” as the first two digits (most significant digits) of the address of a route command (what would normally be the electromagnetic device address – those are limited to the 1-2048



range). For the last two digits, specify the route number (01-40) you would like to “call” – where the number will be understood to indicate the route number within this very IB-Switch. Therefore, you “call” a sub-route by selecting an “address” in the range of 9001 through 9040.

The 1<sup>st</sup> “level” (red) contains routes numbered from 1 (“01”) to 20, while the 2<sup>nd</sup> “level” (green) contains routes numbered from 21 to 40.

The “r/g” key allows you to specify whether the specified sub-route should be requested (red) or released (green).

It is allowable to “nest” the calling of sub-routes up to 5 levels. Any subsequent call to more deeply nested sub-routes will be ignored. This also prevents a situation of “endless loops” (a route calling itself as sub-route – even via an indirect way, such as from a different route).

## 4.7 Inserting pauses

By inserting a “pause” during the activation of a route, it is possible to allow for a rather long switching time of a specific turnout motor without having to slow down the entire route command execution rate.

Pauses can be inserted anywhere in a route. They take up the place of one switching command.

A pause is specified by the input of a “special” address: a pseudo-address in range 8000 through 8255. The time length of the pause is specified in 50ms increments. To that value, you must add 8000.

For example, if you specify a pseudo-address of 8010, this will insert a pause of  $10 \times 50\text{ms} = 500\text{ms} = 0.5 \text{ seconds}$ .

## 4.8 Route activation speed

Special Option No. 1 of the IB-Switch allows you to determine how much time to allow for the switching of each electromagnetic device.

Special Option No. 2 allows you to select the length of the pause between subsequent commands within a route.

These values are specified in 50ms increments. The allowable input range is 0 to 255. The default value for both Special Options is 4. This implies that each command will last 200ms, followed by a pause of 200ms.

Changing the value of Special Options is described in chapter 9.

## 5. Interdependency and “Route blocking”



You can declare a route to be dependent on other route(s). For example, if route 1 depends on route 2, then route 1 cannot be activated as long as route 2 is active.

In this situation, the request to activate route 1 will be memorized by the IB-Switch. Route 1 will be activated as soon as route 2 is released.

The dependencies for the mutual blocking of routes can be either automatically or manually determined by the IB-Switch.

### 5.1 Programming interdependencies

#### Select programming mode

In order to show or edit dependencies, please press in sequence the  and the  keys. The LEDs above both keys will light up green – thus showing that the IB-Switch is now in Route Dependency Programming mode.

At the same time, the IB-Switch will show (using yellow LEDs) which key-pairs have been assigned to the control of routes. No LED will light up between the keys of a key-pair which hasn't been configured or which has been configured for controlling a single electromagnetic device.



#### “Level” selection

The LED above the “r/g” key shows the currently active “level”. Pressing this key will alternate (toggle) between the two levels (red and green).

#### Route selection

Press one of the two keys (red or green) of the key-pair that controls the route you wish to review or edit the dependencies of.

#### Dependency display

The LEDs above the  and  keys will now change from green to red, showing that it is now possible to review or change the dependencies of the selected route. Red LEDs show on which route(s) the current route is dependent.

Routes are assigned to key-pairs as shown in picture 5.11: routes 1-20 in the red “level” and routes 21-40 in the green “level”. Press the “r/g” key in order to display the dependencies of the routes in the other level.

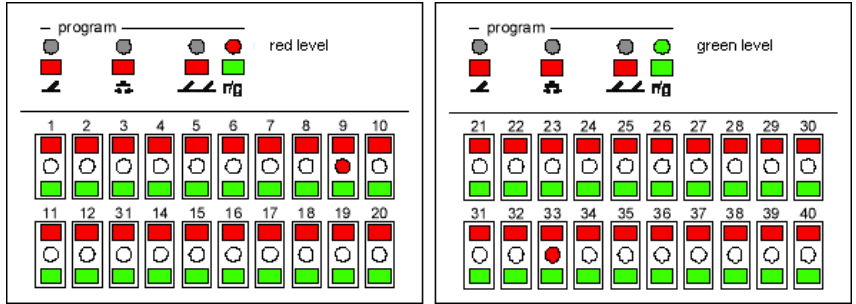
If there is no dependency, all LEDs will be off.

For example, if route 1 depends on routes 9 and 33, then, after selecting route 1 the LED between the keys of the key-pair controlling



route 9 in the 1<sup>st</sup> (red) level and the LED between the keys of the key-pair controlling route 33 in the 2<sup>nd</sup> (green) level will be on (red).

picture 5.11  
Example:  
dependency  
display for  
route 1



**Adding or removing dependencies**

To add a dependency, press the red key corresponding to the route you want the route being currently reviewed to be dependent on.

In a similar way, you can press the green key of a key-pair in order to remove that dependency from the currently reviewed route.

**End of programming mode**

Once you have completed editing all dependencies, press the **LL** key in order to quit Route Dependency Programming mode and revert to Normal mode.

If you leave Programming mode without having performed any changes, the old dependencies (if any) will remain unchanged.

**5.2 Automatic search for interdependencies**

The automatic search for mutually blocking interdependencies can be enabled or disabled by the value of Special Option No. 4. However, it is always possible to manually set the dependencies.

As soon as a route has been programmed, once the last command of that route has been entered, the IB-Switch checks whether this route is blocked by other routes or, conversely, whether this route blocks other routes.

During this automatic search, the IB-Switch assumes that such a blocking (dependency) condition is established as soon as at least one electromagnetic device is “shared” between two routes. The “position” (red/green, or thrown/closed) does NOT count. What matters is the electromagnetic device address, nothing else.

The dependencies thus identified by the IB-Switch – that is, which route depends on which route – can be reviewed or edited as described above.

## 6. Automatic operation

Every action which can be started by pressing one of the keys of a key-pair of the IB-Switch can also be started by a feedback sensor event. Therefore, both single electromagnetic device switching commands (red or green) as well as route activation/release commands can be issued by feedback sensor events.

Each of those keys of the IB-Switch can be “associated” to a feedback sensor event. The IB-Switch gets feedback sensor events through LocoNet.

### 6.1 Feedback modules

It is possible to use feedback modules directly connected to LocoNet. That is, devices which send directly over LocoNet, and thus to an IB-Switch, any feedback sensor status changes. However, it is also possible to use Märklin s88 (or s88 compatible) modules connected to the s88 connector of either an Intellibox or a Fleischmann TWIN-CENTER. Indeed, the events originated by those modules are collected by the Command Station and “echoed” on LocoNet – this enables them to be processed by an IB-Switch and other LocoNet devices.

By using LocoNet feedback modules, each sensor input can be individually programmed – this is, of course, device (and producer) dependent. These inputs can have addresses in range of 1-2048.


If s88-compatible modules are used, then the address of each sensor input is determined by the connection order of these modules to the Command Station. The module closest to the Command Station handles sensors 1 through 16, the next (second) module handles sensors 17 through 32, etc. up to the highest possible s88 module (module No. 31) which would handle sensors 481 through 496.

If both LocoNet as well as s88-compatible modules are used, then it is suggested that LocoNet sensors be configured to use addresses beyond the range used by s88 modules. We suggest using addresses 1 through 496 for s88 sensors and addresses 497 through 2048 for LocoNet sensors.

### 6.2 Sensor addresses programming

Any IB-Switch key of a key-pair can be associated with a sensor event. This allows a travelling train to generate, through sensor events, switching commands on the IB-Switch – the same as if the operator had pressed the corresponding key(s).

#### Select programming mode

In order to program the sensor event to be associated with a given key, press the  key. The LED above that key will indicate green. The IB-Switch is now in Sensor Programming mode.


**“Level” selection**

The IB-Switch has 20 key-pairs. Each key-pair can be used with the red or green “level”. The currently active level is selected by pressing the rightmost key of the topmost row of keys: the “r/g” key. The LED above that key is red if the 1<sup>st</sup> (red) level is active (1-20). It is green if the 2<sup>nd</sup> (green) level is active (21-40).

**Display of currently assigned key pairs**

At this point, the IB-Switch shows which key-pairs have already been assigned: a green LED is shown for each key-pair which has been configured for control of a single electromagnetic device, while a yellow LED is shown for each key-pair that controls a route.

**Selection of the to-be-programmed Key-pair**

Select the key with which you wish to associate a sensor event. You can either select a key that controls a single electromagnetic device or a key which controls a route. Press a red key if you wish to set the turnout or signal on the thrown/red position or if you wish to request activation of a route. Press a green key if you wish to set the turnout or signal on the closed/green position or if you wish to release a route. After having selected a key, the LED above the  key will be red.

The IB-Switch now shows, in the usual way, which sensor address is already associated to that key. If no sensor has been associated, then no LED will be turned on.


**Sensor address input**


You can now use the keys on the four rows to input the sensor address (check also 2.3 “User interface – Key-pairs during programming”).

**Event type selection**

By using the “r/g” key (rightmost key of the topmost row) you can further specify “when” the desired action has to be started. If the LED above that key is red, then the action will be started when the sensor event reports “on” (e.g., the track section corresponding to that sensor was free (no train) and is now occupied by a train). Conversely, if the LED above that key is green, then the action will be started when the sensor event reports “off” (e.g., a train has left a section of track).


**End of programming mode**

Once you are satisfied with your input, complete the procedure by pressing the  key: the LED above that key will now flash yellow while the IB-Switch memorizes your input.

If you didn't change anything and directly press the  key, then no existing configuration/programming will be changed. The existing configuration will be retained.

### Erasing an assigned sensor

During address input, the first key-press of one of the 40 keys used for address input will erase any old value and show the one being currently input.

If that first key-press is a "0" (on any row) – and no further key is pressed apart from the concluding  key – then the configuration of that key will be erased and no sensor will be associated with that key anymore.

## 6.3 Feedback info processing







Switching and route commands associated with feedback sensor events are memorized by the IB-Switch and are processed according to the order in which they are generated.

If these events happen during the activation of a route, they will be memorized and executed as soon as possible (e.g., at the end of the activation of the current route – if there are no dependencies!).

Up to 7 such "requests" can be stored by the IB-Switch. Any further "request" will be discarded and, in effect, will be "lost".

## 6.4 Disabling and enabling automatic operation

It is possible to turn "on" or "off" the processing of feedback sensor events that would automatically trigger switching or route commands on the IB-Switch. If automatic operation is disabled, any feedback sensor event will be ignored by the IB-Switch.

Press the  key and then the  key to disable automatic operation by the IB-Switch. The LED above the  key will indicate "yellow". To turn automatic processing back on, press the  key and then the  key. The LED above the  key will turn off, indicating that automatic operation is indeed turned on once again.


Automatic operation can also be controlled by Special Option No. 7 (see chapter 9).

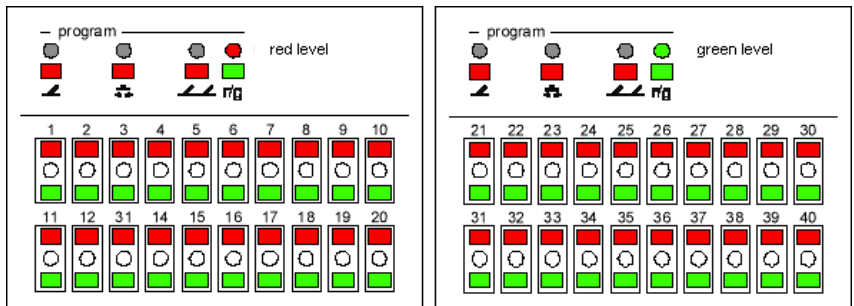
## 7. IB-Switch reset

The IB-Switch can either be reset to its default configuration or the entire configuration data can be erased. In either case, the Special Options will be reset to their default values.

### 7.1 Auto-configuration


This procedure allows you to reset the IB-Switch to its default configuration, that is, the same configuration with which the IB-Switch leaves the factory.

Disconnect the IB-Switch from LocoNet and connect it back to LocoNet while keeping the  key pressed.





Picture 7.11

Key-pair assignment for the control of single electromagnetic devices – default IB-Switch configuration

The key-pairs will be automatically assigned so as to control the single electromagnetic devices with addresses 1 through 20 (for the red “level”) and 21 through 40 (for the green “level”). During this automatic configuration, the LED above the  key will flash red until the automatic configuration procedure has been completed.

### 7.2 Reset of all data

This procedure allows you to erase the entire programming/configuration memory of the IB-Switch. After performing this procedure, no key-pair will be in control of anything.

Disconnect the IB-Switch from LocoNet and connect it back to LocoNet while keeping the  key pressed. During the erasure procedure, the LED above the  key will continue to flash red until the erasure procedure has been completed.




## 8. Keyboard lock (Keylock)

An inadvertent IB-Switch key-press during automatic operation can lead to big problems (train accidents), eventually stopping the automatic operation. And, along a similar line of thought, it may be very useful to be able to impede an accidental activation of the IB-Switch programming mode during normal operation.




With the intent of avoiding this kind of problem – due to an involuntary key-press – the IB-Switch features either a complete or partial Keyboard lock (Keylock).

### 8.1 Keylock by key sequence

Using special key sequences, it is possible to quickly switch from Keylock to normal Keyboard status (no Keylock).


Press, in sequence, the  and the  keys. The active Keylock status is indicated by the yellow color of the LED above the  key.

The entire keyboard is locked. Only the “r/g” key can be pressed in order to select the red or green “level”. Even with the Keyboard locked, the status of single electromagnetic devices and of routes will still be displayed via the LEDs.

A further pressing, in sequence, of the  and  key will re-enable the entire Keyboard (removing the Keylock). The LED above the  key will be turned off.

### 8.2 Keylock by Special Option

Special Option No. 5 allows you to lock the Keyboard. Such a lock cannot be removed by the “unlocking” key-press sequence described above.

Set the value of Special Option No. 5 to 1 in order to activate the Keylock. The active Keylock status is indicated by the yellow color of the LED above the  key.

The entire keyboard is locked. Only the “r/g” key can be pressed in order to select the red or green “level”. Even with the Keyboard locked, the status of single electromagnetic devices and of routes will still be indicated via the LEDs.

The Keylock status can be removed by changing the value of Special Option No. 5 back to 0.

Changing the value of Special Options is described in chapter 9.

### 8.3 Programming lock

During normal operation it may be very useful to prevent the inadvertent turning on of Programming mode.

Special Option No. 5 can be used to block the Programming mode activation keys of the IB-Switch.

If the value of Special Option No. 5 is set to 2, then the three keys that allow programming single electromagnetic devices, feedback sensors and routes are disabled.

If this “programming lock” is active, all keys other than the leftmost three keys of the topmost row are active. That is, all 20 key pairs can still be used to manually control turnouts or routes and the “r/g” key can still be used to switch between “levels”.

The “programming lock” status can be removed by changing the value of Special Option No. 5 back to 0.

Changing the value of Special Options is described in chapter 9.

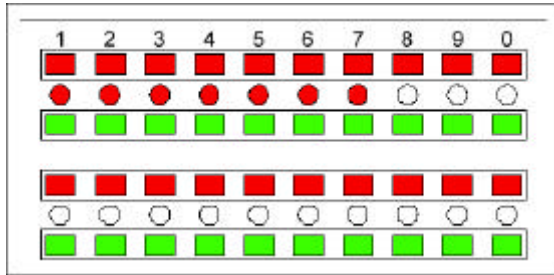
## 9. Special Options

By using the Special Options, it is possible to configure the IB-Switch. Currently, Special Options No. 1 through No. 7 are available.

### 9.1 Instructions

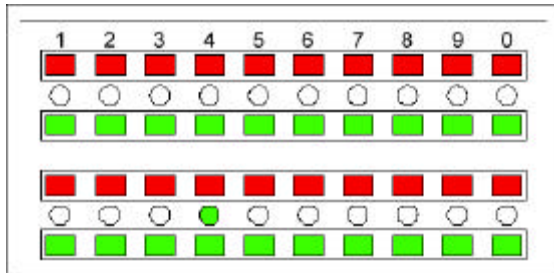
Disconnect the IB-Switch from LocoNet and connect it back to LocoNet while keeping the **↵** key pressed.

picture 9.11  
LED display after reconnection in view of Special Options review/edit



The red LEDs show which Special Options can be edited. The identification number of each Special Option equals the label on the key (1, 2, 3, 4, 5, 6, 7, 8, 9, 0). Select one of the keys of the key-pair corresponding to the Special Option you wish to either check or edit.

picture 9.12  
LED display while editing a Special Option currently set for the value 4



The LED display will now show the current value of the selected Special Option. That value will be in range 0 through 255.

It is now possible, as described in section 2.3 “User interface – Key-pairs during programming”, to edit the value of the Special Option.

A further pressing of the **↵** key will memorize the new value of the Special Option – this will be indicated by the flashing yellow LED above the **↵** key. The IB-Switch will then return to the status where the different selectable Special Options are shown by red LEDs (check above).

You can now edit/check more Special Options or terminate this operation by pressing the **↵** key.



## 9.2 List of Special Options

### Special Option No. 1

This Special Option determines the “on” switching time of electromagnetic devices.

The value is specified in 50ms increments (ms = millisecond = 0.001 seconds).

The allowable range of values is 0 through 255. The default value is 4 – which translates to 200ms = 0.2 seconds.

### Special Option No. 2

This Special Option determines the length of the pauses between each command of a route.

The value is specified in 50ms increments (ms = millisecond = 0.001 seconds).


The allowable range of values is 0 through 255. The default value is 4 – which translates to 200ms = 0.2 seconds.

### Special Option No. 3

Keyboard or Programming lock:

0 = (no keyboard nor programming lock) all keys are operational

1 = Keyboard lock:

only the “r/g” key is operational, all other keys are locked (shall be ignored by the IB-Switch). The LED above the  key is yellow to indicate the Keyboard lock is active.

2 = Programming lock:

no programming/configuration operation can be performed. Turnouts and routes can still be manually activated by key-presses.

### Special Option No. 4

Automatic search for dependencies:

0 = off (default setting)

1 = on

### Special Option No. 5

This Special Option determines which event may free (release) a route:

an internal switching command, that is, a switching command issued by the IB-Switch itself – a switching command which would affect an electromagnetic device belonging to the given route;

an internal route command, that is, a route activation which is performed on the IB-Switch itself and which would affect at least one electromagnetic device belonging to the given route;

an external switching command, that is, a switching command issued by a device other than the IB-Switch itself – a switching command which would affect an electromagnetic device belonging to the given route.

The value of this Special Option can be deduced from the following table by adding the desired values:

Options for freeing (releasing) a route	value
Internal switching commands: no	0
yes	1
Internal route commands: no	0
yes	2
External switching commands: no	0
yes	4

**Example** Routes are freed (released) by:

internal switching commands: yes (value = 1)  
 internal routes: yes (value = 2)  
 external switching commands: yes (value = 4)

The sum of these values is 7 – which is also the default value for this Special Option.

**Special Option No. 6**

Wait time after a LocoNet “LONG ACK” (fail) message, before a renewed switching command. Expressed in 50ms increments.

This is the wait time before repeating the “rejected” switching command. This “rejecting” occurs when the Command Station reports that its input buffer for switching commands is full. This may happen when either too many switching commands have been sent to the Command Station (in too short a time) or when the Command Station is in the “power off” status (“STOP”) – thus not being able to process any switching command, nor send them to the turnout decoders.

Allowable values are in the range of 0 through 255. The default value is 60, which equates to a wait time of 3 seconds.

**Special Option No. 7**

Controls whether automatic operation is enabled or disabled:

0 = disabled  
 1 = enabled (default value)

**Authors: Dr.-Ing. T. Vaupel, M. Berger**

(English translation: Stefano Chiti-Batelli with kind support by Mr. Robert Frowenfeld)

© Copyright Uhlenbrock Elektronik GmbH, Bottrop - Germany

1<sup>st</sup> english edition, January 2002

All rights reserved

Unauthorised reproduction (including partial reproduction) prohibited

**Order number: 60 582**