

# User Manual:

## Uhlenbrock Switch-Control 63400

### Connection Module for Track Diagram Control Board

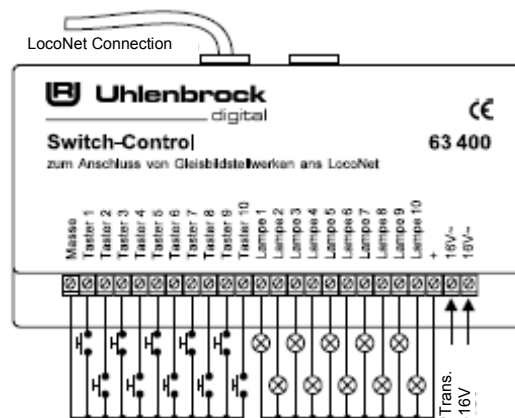
(Translated and revised by *Modell-Zug Elektronik*, Rev. 01/2006)

#### 1. Description

The Switch-Control 63400 provides the interface between a Track Diagram Control Board (TDCB) and an Uhlenbrock Digital system. It is suitable for use with all digital central units with a LocoNet connection such as the Intellibox, TwinCenter, Daisy, etc. The Switch-Control 63400 has 10 inputs for connecting buttons and 10 outputs for lamps or LEDs with series resistors. The buttons or lamps can be connected individually or as part of a TDCB, such as those available from companies like Heki and S.E.S.

#### 2. Connection

Using the supplied LocoNet cable, connect the Switch-Control to the LocoNet T or LocoNet B output of the Intellibox or TwinCenter, or with the LocoNet port of the Daisy system.



Next, connect the two “16V~” terminal clamps to a 12-16V transformer, for instance the L-O outputs of a standard Märklin transformer. It is possible to connect additional Switch-Controls or other consumers (for example, house or street lighting) on the layout to the transformer feeding the Switch-Control. However, there must be **NO** electrical connection between this transformer and the track or central unit in any way. For this reason, a transformer that supplies the Intellibox, TwinCenter or a Booster can **NOT** be used. **CAUTION:** Failure to adhere to this rule can cause permanent damage to the Switch-Control’s circuitry!

The momentary push-buttons of the TDCB are each connected with one pole on the Switch-Control “Taster” (Key) inputs 1 to 10, and with the other pole to the connection marked “Masse” (Common/Ground).

The lamps are each connected with one pole to the lamp outputs 1 to 10 and with the other pole to the connection marked “+” on the Switch-Control. It is important that the rated voltage of the lamps used are in agreement with the output voltage of the connected transformer. (If using the L-O outputs of a Märklin transformer, the Switch-Control lamp voltage will be approximately 20V.) If you wish to use LED indicators instead, a resistor of 1.5Kohm (minimum) ¼-Watt must be connected in series with **each** LED. It is also necessary to pay attention to the polarity of the LED, the cathode “K” of the LED must allow be connected to the lamp output of the Switch-Control.

**3. Function**

When a button connected to the Switch-Control is activated, a command will be sent out. This command might switch a turnout or signal or access an entire route, which is stored in an Intellibox, Fleischmann TwinCenter, or IB-Switch. The Switch-Control can also send out a command when two buttons are activated in succession. Consequently, a TDCB can be built which uses “Start & End” buttons, for example.

The Switch-Control monitors all switch commands of the digital system and can switch a connected indicator lamp On or Off, when a matching command is sent. The lamp can be influenced through the switching commands of accessories or through digital feedback. This gives the possibility of using the connected lamps for the display of turnout positions, track occupancy information, or entire routes. The connected buttons and lamps are assigned a function using the LocoNet Program menu of the Intellibox (version 1.3 and up), even in normal layout operation.

**3.1 Single Keys and “Start & End” Key Combinations**

The Switch-Control can generate the following commands through a keypress:

1. A matching magnetic accessory to position “red”
2. A matching magnetic accessory to position “green”
3. A feedback “free” generated with a matching feedback address
4. A feedback “occupied” generated with a matching feedback address
5. A matching magnetic accessory to return to its previous position (one key “toggle” operation)

The commands 1 to 5 can be generated through the activation of a single key, for the switching of turnouts and signals or the execution of entire routes.

Often on TDCBs however, Start & End keys are used for activating entire routes. A Start&End key combination is selected by first pressing and holding the Start key and then closed by activating the End key. With either key pressed individually, a properly programmed Switch-Control can also issue the commands 1 to 4 of the list above.

**3.2 Lamp Functions**

The Switch-Control can switch a lamp output On or Off through the following commands of the digital system:

1. A matching magnetic accessory to position “red”
2. A matching magnetic accessory to position “green”
3. A matching feedback module reports “free”
4. A matching feedback module reports “occupied”
5. A matching key or key combination of the Switch-Control is activated

**3.3 Factory Default Settings**

The keys of inputs 1 and 2 switch the magnetic accessory with address 1. Key 1 switches the accessory to position “red” or “curved.” Key 2 switches the accessory to position “green” or “straight.” The lamps on outputs 1 and 2 show the position of the accessory, output 1 for position “red” and output 2 for position “green.” The remaining key inputs and lamp outputs are sequentially reserved to addresses 2 to 5:

<i>Inputs / Outputs</i>	<i>Accessory Address</i>
1 & 2	1
3 & 4	2
5 & 6	3
7 & 8	4
9 & 10	5

**4. Programming**

In order to send the desired commands from the Switch-Control by a key press, the module must first be programmed. For this purpose, there are two different possibilities:

Using the *Simple Programming* mode, the inputs 1&2 will be assigned to switch, and the lamp outputs 1&2 to display, the position of the magnetic accessory at the desired address. The following inputs and outputs automatically receive the subsequent accessory addresses. Further settings are not necessary.

With the *LocoNet Program* menu of the Intellibox (version 1.3 and up), the individual programming of all LocoNet Configuration Variables of the module is possible. All previously described operating possibilities can be used in optional combinations.

*Tip:* Please pay attention to the Application Examples at the end of the manual. Here you will find clear examples for all common operating situations.

**4.1 Simple Programming**

Using this programming method, the Switch-Control can be configured for two keys and two lamps to be used for the switching and supervision of a magnetic accessory. The Switch-Control can control a total of 5 accessories in this operating mode.

The Simple Programming procedure is as follows:

1. Connect the Switch-Control to LocoNet.
2. Be sure that the Switch-Control's transformer is turned off (or not connected).
3. Press and hold down the button connected to input 1.
4. Turn on (or connect) the Switch-Control's transformer.
5. The lamp connected to output 1 will blink, and the button at input 1 can then be released.
6. The keypair on inputs 1 & 2 can now be assigned to a magnetic accessory address.
7. On your accessory controller, send a command to the address that you wish to program into the Switch-Control. (Suitable controllers include: Intellibox, IB-Control, IB-Switch, Daisy, TwinCenter, TwinControl, or Keyboard).
8. The lamp on output 1 will light up, and programming is now complete.

The remaining inputs and outputs are automatically assigned to the subsequent addresses. With respect to the accessory switched at address "X" (for example, 10) during the programming phase, the module is configured as follows:

<i>Accessory Address:</i>		<i>Selection with:</i>	
<b>General</b>	<b>Example</b>	<b>Keys</b>	<b>Lamps</b>
X	10	1 and 2	1 and 2
X+1	11	3 and 4	3 and 4
X+2	12	5 and 6	5 and 6
X+3	13	7 and 8	7 and 8
X+4	14	9 and 10	9 and 10

**4.2 LocoNet Programming with the Intellibox**

Programming from the Intellibox is possible after software version 1.3. All module input is performed through the programming of the LocoNet Configuration Variables (LNCVs). The significance of each LNCV is explained in Section 5 (*Description of the LNCVs*) below.

**4.2.1 Module Address Programming**

Each Switch-Control uses its own unique module address for communication. A new module has a default module address of 0. For proper communication, this value must always be changed if multiple Switch-Controls are to be operated on the same layout. The module address is changed to a new value by programming LNCV 0 to a value between 1 and 2047.

**4.2.2 Programming the LNCVs**

The procedure for programming the LocoNet Configuration Variables (LNCVs) is as follows:

1. Connect the Switch-Control to its transformer and to LocoNet.
2. On the Intellibox, press the [menu] key and then the [mode] key to reach the “Basic Settings” menu.
3. Using the [↓] key, scroll down until you reach the menu position “LocoNet Prog.”
4. Use the [→] key to select the submenu “LocoNet Prog.” The display will show:

```
LocoNet Prog.:  
Art.-Nr.: .....
```

5. Type the article/product number of the module (here 63400) and press the [enter] key. The display will show:

```
LN Prog.: 63400  
Modul Adr.: .....
```

6. Type the present address of the module (0 for a new module) and press the [enter] key. The display will show:

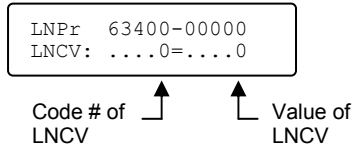
```
LNPr 63400-00000  
LNCV: ....0=....0
```

In the upper line, the article number of the module and the valid module address are shown. The lower line states the number of the LNCV (0 for the Module Address) and its present valid value (set to address 0).

7. At the cursor position, type in the assigned number of the LNCV you would like to program.
8. Press the [enter] key. The Intellibox reads out the LNCV, and the present value will be shown to the right on the lower line of the display.
9. Using the [→] key, position the cursor in the right display field and type the desired new value for that LNCV using the numeric keys.
10. Pressing the [enter] key will program the new value into that LNCV.

**5. Description of the LNCVs**

All programming of the Switch-Control is carried out using the LocoNet Configuration Variables (LNCVs). The LNCVs can be accessed using their code number, and then set to an appropriate value.



The LNCVs 1 to 6 are for internal programming use by the Switch-Control, and also for cancellation of the LNCV values stored in memory. The true functions of the module are stored in LNCVs 10 to 29 and 100-199:

<i>LNCV</i>	<i>Function</i>
0	Module Address
1-5	Programming Help for Switching of Accessories
6	Presetting and Canceling of LNCVs
10-19	Lamp Outputs ON
20-29	Lamp Outputs OFF
100-199	Programming of Single Keys and Key Combinations

**5.1 The Module Address – LNCV 0**

Each Switch-Control must be programmed with a unique module address, from a central unit that is common to all modules. The permitted address range is 0-2047.

**5.2 Switching of Magnetic Accessories – LNCV 1-5**

The LNCVs 1-5 configure the module to switch magnetic accessories such as signals and turnouts. This programming mode uses two keys to switch and two lamps to display the position of each accessory. Each LNCV can be programmed with any address value in the range of 1-2048, so that the five accessories do not need to be at consecutive addresses. The LNCVs correspond to the inputs and outputs as follows:

<i>LNCV</i>	<i>Key Inputs</i>	<i>Lamp Outputs</i>
1	1=red; 2=green	1=red; 2=green
2	3=red; 4=green	3=red; 4=green
3	5=red; 6=green	5=red; 6=green
4	7=red; 8=green	7=red; 8=green
5	9=red; 10=green	9=red; 10=green

Note that LNCVs 1-5 are only a programming aid. Each of the LNCVs 1-5 change the values in several of the true operating LNCVs located above LNCV 9 as follows:

<i>LNCV</i>	<i>Programs these LNCVs</i>
1	11, 12, 21, 22, 111, 122
2	13, 14, 23, 24, 133, 144
3	15, 16, 25, 26, 155, 166
4	17, 18, 27, 28, 177, 188
5	10, 19, 20, 29, 100, 199

*Tip:* To cancel the programming of the module memory, LNCV 6 may be programmed to a value of 11.

**5.3 Module Configuration and Cancellation of Memory– LNCV 6**

LNCV 6 can be used to quickly configure the Switch-Control for controlling accessories in one of two modes: *single key* or *keypair*. With LNCV 6 set for single key mode, one key and one lamp will switch and display the position of an accessory, as a toggle function. With LNCV 6 set for keypair mode, two keys and two lamps will switch and display the position of an accessory, as a double-throw function. In both cases, a base address (AAAA) must be entered along with the mode (1 or 2) that will be applied to the first key or keypair. The remaining keys will be automatically assigned to the subsequent accessory addresses in order.

LNCV 6 can also be used to cancel the programmed functions associated with specific inputs or the entire module memory. When canceling the programmed functions of an input, both its single key and key combination functions are cancelled.

The corresponding values of LNCV 6 for these programming operations are as follows:

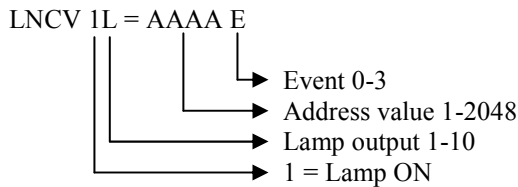
<i>Value</i>	<i>Significance to LNCV 6</i>
1-10	Cancels all program info for a given input 1-10, including any key combinations where it is used
11	Cancels the entire memory of the module
1AAAA*	Configures the module for <i>keypair</i> operation: Inputs/Outputs 1&2: Address AAAA Inputs/Outputs 3&4: Address AAAA+1 Inputs/Outputs 5&6: Address AAAA+2 Inputs/Outputs 7&8: Address AAAA+3 Inputs/Outputs 9&10: Address AAAA+4
2AAAA*	Configures the module for <i>single key</i> operation: Input/Output 1: Address AAAA Input/Output 2: Address AAAA+1 Input/Output 3: Address AAAA+2 ..... Input/Output 10: Address AAAA+9

\*AAAA = Accessory Address in the range 1-2048.

**5.4 Lamp Outputs ON – LNCV 10-19**

The LNCVs 10-19 are used to program the events that will switch ON lamp outputs 1 to 10. Each output of the Switch-Control can be individually programmed to react to one of five different events.

For events 0-3, programming is as follows:

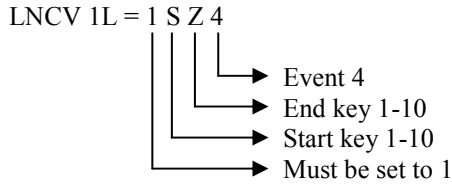


*Hint:* For lamp output 10, you must enter a “0.” Leading nulls of the address entry will not be shown.

***Description of the Events:***

- E=0: Lamp output ON when the magnetic accessory is in position “red.”
- E=1: Lamp output ON when the magnetic accessory is in position “green.”
- E=2: Lamp output ON when the feedback module reports “free.”
- E=3: Lamp output ON when the feedback module reports “occupied.”

If a lamp is to be switched ON when a key or key combination has been activated on the Switch-Control, event E=4 may be applied. The programming is as follows:



*Hint:* For lamp or key 10, you must enter a “0.”

Examples:

Lamp number 2 will be switched ON when the feedback module with address 1055 reports “occupied”:

LNCV 12 = 10553

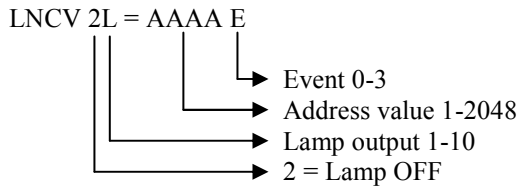
Lamp number 9 will be switched ON when input key number 7 of the Switch-Control is activated:

LNCV 19 = 1774

**5.5 Lamp Outputs OFF – LNCV 20-29**

The LNCVs 20-29 are used to program the events that will switch OFF lamp outputs 1 to 10. Each output of the Switch-Control can be individually programmed to react to one of five different events.

For events 0-3, programming is as follows:

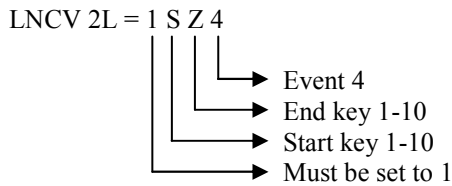


*Hint:* For lamp output 10, you must enter a “0.” Leading nulls of the address entry will not be shown.

**Description of the Events:**

- E=0: Lamp output OFF when the magnetic accessory is in position “red.”
- E=1: Lamp output OFF when the magnetic accessory is in position “green.”
- E=2: Lamp output OFF when the feedback module reports “free.”
- E=3: Lamp output OFF when the feedback module reports “occupied.”

If a lamp is to be switched OFF when a key or key combination has been activated on the Switch-Control, event E=4 may be applied. The programming is as follows:



*Hint:* For lamp or key 10, you must enter a “0.”

Examples:

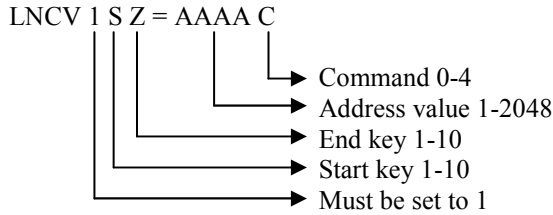
Lamp number 2 will be switched OFF when the feedback module with address 1055 reports “free”:  
LNCV 22 = 10552

Lamp number 9 will be switched OFF when key 7 is activated:  
LNCV 29 = 1774

**5.6 Input Key Functions – LNCV 100-199**

The LNCVs 100-199 are used to program the commands that are transmitted by the Switch-Control when single keys or start & end key combinations are activated. Each LNCV may be individually programmed to generate one of five different commands.

The programming of these LNCVs follows the format below:



*Hint:* For input key 10, you must enter a “0.” Leading nulls of the address entry will not be shown.

**Description of the Commands:**

- C=0: The accessory with address AAAA will be brought to position “red”
- C=1: The accessory with address AAAA will be brought to position “green”
- C=2: The feedback command “free” will be sent with the address AAAA
- C=3: The feedback command “occupied” will be sent with the address AAAA
- C=4: The accessory with address AAAA will be toggled to the other position

As shown above, the desired key combination to be programmed is entered in the code number for the LNCV (1SZ). Here, the ten’s digit of the LNCV code represents the Start key (from 1 for key 1 up to 0 for key 10) and the one’s digit represents the End key. When these two digits of the code are set the same, the LNCV will be used to program a command for a single key, instead of a key combination.

The address of the magnetic accessory or feedback contact and the corresponding command to be sent are entered in the value of the LNCV (AAAAC). This is the address and command type that will be transmitted by the Switch-Control when the desired single key or key combination is pressed.

Examples:

- LNCV 100 receives the command for the single key 10.
- LNCV 144 receives the command for the single key 4.
- LNCV 137 receives the command for the key combination Start key 3 and End key 7.

## **6. Application Examples**

### **6.1 Turnouts switched with a keypair**

A common application of the Switch-Control is to safely switch and display the positions of magnetic accessories. For this application, the Switch-Control may be easily programmed so that its input and outputs are grouped into five sets of key pairs and lamp pairs. This programming can be carried out in either of two ways:

1. Using the Simple Programming method described in Section 4.1 above, or
2. Using the LocoNet Program menu of the Intellibox, as described in Sections 4.2 and 5.3 above.

In the second case, LNCV 6 only should be programmed with the value 1AAAA, where AAAA stands for the address of the desired magnetic accessory to be associated with inputs 1 & 2 and outputs 1 & 2. The remaining input and output pairs will automatically receive the next four addresses in order.

#### **Example:**

The Switch-Control will be programmed to control accessory address 10 with key and lamp pairs 1&2:  
LNCV 6 = 1 0010

Keys 1 & 2 switch accessory address 10,  
Keys 3 & 4 switch accessory address 11, and so on until,  
Keys 9 & 10 switch accessory address 14.

*Tip:* You can cancel the entire memory afterwards with LNCV 6 = 11.

### **6.2 Turnouts switched with a single key**

In this configuration, up to 10 magnetic accessories can be switched with the Switch-Control. Each indicator lamp will light only when the accessory is in the “red” position.

To program this configuration, you must use the LocoNet Programming method described in Sections 4.2 and 5.3 above. LNCV 6 must be programmed to the value 2AAAA, where AAAA stands for the desired accessory address to be assigned to key 1 and lamp 1.

#### **Example:**

The Switch-Control will be programmed to control accessory address 37 with key 1 and lamp 1:  
LNCV 6 = 2 0037

Key 1 switches magnetic article 37,  
Key 2 switches magnetic article 38, and so on until,  
Key 10 switches magnetic article 46.

*Tip:* You can cancel the entire memory afterwards with LNCV 6 = 11.

### **6.3 Indicating track occupation (feedback) information**

The lamp outputs of the Switch-Control lamp may be used to indicate feedback information for track sections that are overseen by digital feedback modules. To control a lamp output in this way, the appropriate LNCVs must be programmed as described in Sections 5.4 and 5.5 above.

The following example shows the necessary programming information for Lamp 3 controlled by feedback contact address 87.

#### **Example:**

Feedback address 87 “occupied” will switch Lamp 3 ON:

LNCV 13 = 0087 3

And feedback address 87 “free” will switch Lamp 3 OFF:

LNCV 23 = 0087 2

**6.4 Overseeing a magnetic accessory through two lamps**

Often, a pair of lamp outputs of the Switch-Control will be used to display the position of an accessory. To control a pair of lamp outputs in this way, the appropriate LNCVs must be programmed as described in Sections 5.4 and 5.5 above.

In the example below, the address of the accessory is 1157 and the lamps on the TDCB for this accessory are connected to outputs 8 and 9 of the Switch-Control. Lamp output 8 will indicate the “red” position and lamp output 9 will indicate “green.”

**Example:**

Switching accessory address 1157 to position “red” turns Lamp 8 ON and Lamp 9 OFF:

LNCV 18 = 1157 0

LNCV 29 = 1157 0

And switching accessory address 1157 to position “green” turns Lamp 9 ON and Lamp 8 OFF:

LNCV 19 = 1157 1

LNCV 28 = 1157 1

**6.5 Accessing a route in the Intellibox using a single key**

It is possible to activate routes stored in the Intellibox (equipped with Memory Mode software) through specific accessory commands sent from any LocoNet device, including the Switch-Control. The Switch-Control is programmed using the appropriate LNCVs as described in Section 5.6 above. The following accessory commands can be used to access each of the 48 routes stored in the Intellibox:

<i>Accessory Address</i>	<i>Position</i>	<i>Intellibox Route</i>
2001	Red	Route 1; Group 1
2001	Green	Route 2; Group 1
2002	Red	Route 3; Group 1
2002	Green	Route 4; Group 1
...	...	...
2024	Red	Route 15; Group 3
2024	Green	Route 16; Group 3

Note that there should not be any accessories on the layout assigned to an address within this range, or they will also be activated when the routes are accessed.

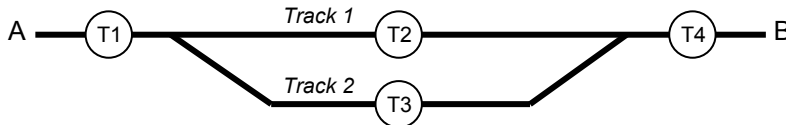
**Example:**

To access Intellibox Route 4 of Group 1 using a button connected to input 5 of the Switch-Control:

LNCV 155 = 2002 1

**6.6 Accessing routes in the Intellibox using Start&End key combinations**

Multiple keys, in different combinations as Start and End keys, can access different routes stored in the Intellibox.



The figure above shows a simple station area with two tracks. The turnouts and signals of the station will be controlled by routes stored in Routes 1 to 4 of Group 1 of the Intellibox. The routes will be accessed by issuing special accessory commands from the Switch-Control using Start/End key combinations. The keys T1 to T4 are connected to the inputs 1 to 4 of the Switch-Control in order.

The Start/End key sequences to control the station routes are as follows:

1. First key 1 is pressed as the Start key and then key 2 as the end key, Route 1 of Group 1 of the Intellibox sets the train entrance from A to Track 1.
2. First key 1 is pressed as the Start key and then key 3 as the end key, Route 2 of Group 1 of the Intellibox sets the train entrance from A to Track 2.
3. First key 2 is pressed as the Start key and then key 1 as the end key, Route 3 of Group 1 of the Intellibox sets the train exit from Track 1 to A.
4. First key 3 is pressed as the Start key and then key 1 as the end key, Route 4 of Group 1 of the Intellibox sets the train exit from Track 2 to A.

The Switch-Control is programmed using the appropriate LNCVs as described in Sections 4.2 and 5.6 above. The necessary programming information is as follows:

Start key 1 and End key 2 switch accessory address 2001 to “red,” and activate Route 1 of Group 1:

LNCV 112 = 2001 0

Start key 1 and End key 3 switch accessory address 2001 to “green,” and activate Route 2 of Group 1:

LNCV 113 = 2001 1

Start key 2 and End key 1 switch accessory address 2002 to “red,” and activate Route 3 of Group 1:

LNCV 121 = 2002 0

Start key 3 and End key 1 switch accessory address 2002 to “green,” and activate Route 4 of Group 1:

LNCV 131 = 2002 1

#### **6.7 Accessing a route in the IB-Switch using a single key**

A set of switching commands for a route may be stored in the IB-Switch as one of its 40 routes. The red key of this route on the IB-Switch must be assigned a feedback address and a condition, “free” or “occupied.” This allows the route to be called remotely from the Switch-Control. (For more information, please see the IB-Switch manual.)

#### **Example:**

A key on the TDCB is connected to input 6 of the Switch-Control. This key will be used to call a route in the IB-Switch that has been assigned to feedback address 21 with the condition “occupied.” The following LNCV must be programmed in the Switch-Control:

LNCV 166 = 0021 3

#### **6.8 Accessing routes in the IB-Switch using Start&End key combinations**

The track plan shown in Application Example 6.6 above will be used with the IB-Switch. The switching commands of the four desired routes must first be stored in the IB-Switch. The red keys associated with each of these IB-Switch routes are also programmed with a feedback address and condition, “free” or “occupied.” This allows each route to be called remotely from the Switch-Control using Start&End key combinations. (For more information, please see the IB-Switch manual.)

#### **Example:**

Feedback addresses 501 to 504 will be used with the condition “occupied” to access each of the four routes stored in the IB-Switch. To use the routes according to Example 6.6 above, the Switch-Control must be programmed as in Sections 4.2 and 5.6 by setting the following LNCVs:

Start key 1 and End key 2 send feedback address 501 “occupied,” which activates Route 1:

LNCV 112 = 0501 3

Start key 1 and End key 3 send feedback address 502 “occupied,” which activates Route 2:

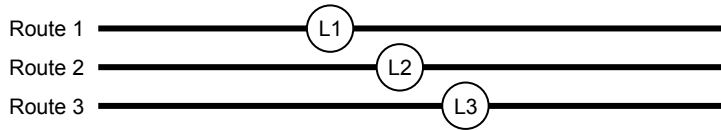
LNCV 113 = 0502 3

Start key 2 and End key 1 send feedback address 503 “occupied,” which activates Route 3:  
 LNCV 121 = 0503 3

Start key 3 and End key 1 send feedback address 504 “occupied,” which activates Route 4:  
 LNCV 131 = 0504 3

**6.9 Indicating a set route**

An accessory command can be used to indicate a “set” (active) route on the TDCB, which will not switch any accessory on the layout. This must be a special command only for activating a lamp output of the Switch-Control.



**Example:**

As in the diagram above, Routes 1-3 will be indicated as “set” through lamps L1-L3 on the TDCB. When another route becomes set, the new route will also turn off any other lamps. The lamps are connected to the lamp outputs 1-3 of the Switch-Control. The LNCVs must be programmed as described in Sections 4.2 and 5.6 above, by entering the following information:

Accessory address 200 set to “red” switches Lamp 1 ON:  
 LNCV 11 = 0200 0

Accessory address 210 set to “red” switches Lamp 1 OFF:  
 LNCV 21 = 0210 0

Accessory address 201 set to “red” switches Lamp 2 ON:  
 LNCV 12 = 0201 0

Accessory address 210 set to “red” switches Lamp 2 OFF:  
 LNCV 22 = 0210 0

Accessory address 202 set to “red” switches Lamp 3 ON:  
 LNCV 13 = 0202 0

Accessory address 210 set to “red” switches Lamp 3 OFF:  
 LNCV 23 = 0210 0

The following switching commands must also be defined within Routes 1-3 that are stored in the Intellibox or IB-Switch:

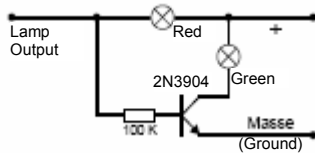
- Route 1: Accessory address 210 “red” and then 200 “red”
- Route 2: Accessory address 210 “red” and then 201 “red”
- Route 3: Accessory address 210 “red” and then 202 “red”

The command “accessory address 210 ‘red’” in each route will switch all of the lamps L1-L3 OFF, before the subsequent command will switch ON the lamp for the new route.

## 7. Tips & Tricks

### 7.1 Connecting an additional lamp to indicate position “green”

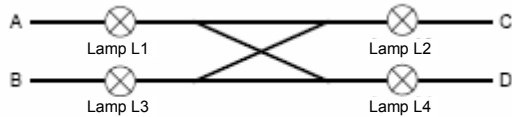
As described in Example 6.2, an accessory may be switched through a single key and overseen by one lamp output. While the key will toggle the accessory position between “red” and “green,” the lamp output will only be activated when the accessory is in the “red” position. The following external transistor circuit may be added to activate a second lamp (green) when the lamp output of the Switch-Control is not active.



### 7.2 Using a lamp to indicate multiple routes

When indicating several routes on a TDCB with illuminated paths, certain portions of a path may be found within multiple routes. To display a path with multiple lamps, diode logic circuits may be added to allow each output to control more than one lamp at a time.

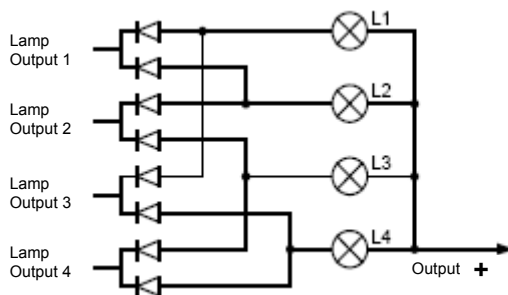
Example track plan:



Based on the example track plan above, the routes listed below may be created. When each route is called, the corresponding lamp output of the Switch-Control will also be activated:

- Route 1 (from A to C)  
Activate lamp output 1 (lamps L1 and L2)
- Route 2 (from B to C)  
Activate lamp output 2 (lamps L2 and L3)
- Route 3 (from A to D)  
Activate lamp output 3 (lamps L1 and L4)
- Route 4 (from B to D)  
Activate lamp output 4 (lamps L3 and L4)

The following diode matrix can be used to control the TDCB lighting:



Diodes such as the 1N4001 can be used. If using LEDs with series resistors for all indicators, 1N4148 diodes may also be used due to the lower current requirement.