Uhlenbrock digital

Technical Description

Track-Control

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Track-Control

1. Overall Operation

1.1 LocoNet Programming

All modules are Uhlenbrock LocoNet modules and can be configured using this protocol. The necessary LocoNet instructions for this are documented in the LocoNet programming document.

All modules receive a Device ID, which corresponds to the part number/10. This Device ID is used at LocoNet level for all LocoNet Messages in module programming context. If the module is to be programmed with the Intellibox (or IB-Control starting from Software Version 1.55 and/or Piko power box) the part number must be used as Device ID in the programming menu (5 digits). On the other hand, on the Twin Center, the four digit Device ID (part number/10) must be used in the programming menu.

In each case 8 module LNCV's can be read with the Intellibox (SRC=01). However they can only be written by PC (SRC=08).

1.2 Key Lock and Brightness Control

All modules, irrespective of their function, have a key lock and the LED brightness adjustment.

The key lock is switched on and off using solenoid address 2000. If address 2000 is set to "red", the keys of each module are inactive. In the "green" state the keys are active. The status of the solenoid address is requested by the module from the Control Center at start up and the key lock is set according to the state of the solenoid address.

Note: If control desk is started and solenoid address 2000 is set to "red" none of the keys on the desk will work!

The key lock can be switched on/off in every module using module configuration (LNCV 3) Bit1. Meaning:
Bit1=1 key lock available using solenoid address 2000
Bit1=0 key lock not available

The brightness control of the panel's LEDs is achieved using solenoid addresses 1998 and 1999. Meaning:

1999 red = maximum brightness
1999 green = middle brightness
1998 green = minimum brightness

The LED brightness at start up of the desk is preset in the LNCV 2. At start up solenoid addresses 1998 and 1999 are not queried and the brightness is not matched to those values. The brightness control can be switched on/off in every module via module configuration (LNCV 3) Bit0. Meaning:
Bit0=1 brightness control using solenoid address 1998/1999 available
Bit0=0 brightness control not available, brightness always follows LNCV 2

1.2 Direct Module Control

All modules, irrespective of their function can be controlled directly by a single LocoNet Message. i.e. all LEDs can be switched on/off by LocoNet Message and each module spontaneously reports a change of its key state. This "**direct mode**" must be activated by configuration. If the module is in direct mode all other module specific functions are suppressed. On one hand this serves for testing the modules after production, but can also be used for applications where the desk logic is handled by a computer and is used only as an input/output device.

LED Control 1 :
[ED] [0F] [08] [05] [00] [20] [PXCT1] [D1] [D2] [D3] [D4] [D5] [D6] [D7] [CHK]
where: [D1] = F4h
[D2] = 1Ah
[D3] = Low Byte Module address (LNCV 0)
[D4] = High Byte Module address (LNCV 0)
[D5] = LED 7..0 (Bitx=0 LED off, Bitx=1 LED on)
[D6] = LED 15..8
[D7] = FE
[PXCT1] = [0, D7.7, D6.7, D5.7, D4.7, D3.7, D2.7, D1.7]
(in each case Bit7 of D1..D7 during the transmission on LN)
[CHK] = Check byte as per LocoNet specification

LED Control 2 :
[ED] [0F] [08] [05] [00] [20] [PXCT1] [D1] [D2] [D3] [D4] [D5] [D6] [D7] [CHK]
where: [D1] = F4h
[D2] = 1Ah
[D3] = Low Byte Module address (LNCV 0)
[D4] = High Byte Module address (LNCV 0)
[D5] = LED 24..16 (Bitx=0 LED off, Bitx=1 LED on)
[D6] = LED 31..25
[D7] = FE
[PXCT1] = [0, D7.7, D6.7, D5.7, D4.7, D3.7, D2.7, D1.7]
(in each case Bit7 of D1..D7 during the transmission on LN)
[CHK] = Check byte as per LocoNet specification

Output for Key Change:
[E5] [0F] [05] [08] [00] [1F] [PXCT1] [D1] [D2] [D3] [D4] [D5] [D6] [D7] [CHK]
where: [D1] = F4h
[D2] = 1Ah
[D3] = Low Byte Module address (LNCV 0)
[D4] = High Byte Module address (LNCV 0)
[D5] = Key (Bit0=0 Key vacant, Bit0=1 Key assigned)
[D6] = 0
[D7] = FFh
[PXCT1], [CHK] s.o.

These Messages correspond with the Messages to be used for LocoNet programming but differ in that in SOURCE (EDh) and/or destination (E5h) the identification 08h (PC) is used and that the data byte D7 has the value FEh or FFh, as module ID 6900 (1AF4h) is used in **all** modules.

Using this ID (6900) and SOURCE (EDh) and/or destination (E5h) identification 08h (PC) **all** modules can be programmed. It must be noted however that with "device cfg read" and "device cfg write" data byte D7, contrary to normal LocoNet programming, has a value of 0. (in the description of LocoNet programming D7 is designated as “not Used”.)

2. The Turnout Module 69220

Note: LNCV's for functions, which the respective module does not support, must have value 0 for a trouble free operation. If the same solenoid or feedback address is used for different functions the function cannot be implemented, unless it is specifically referenced.

2.1 Turnout Control

Each turnout module has a key to control up to two solenoid addresses of turnout motors as configured in LNCV 11 and/or LNCV 12.

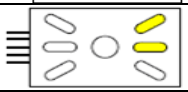
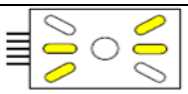
The turnout illumination always indicates the current state, in yellow if the turnout track section is "vacant", and in red if it is "occupied". The feedback address for the turnout is programmed in LNCV 13.

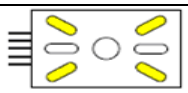
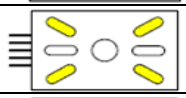
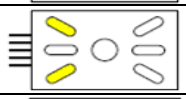
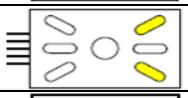
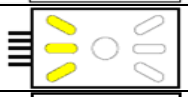
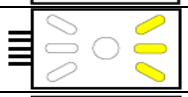
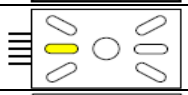
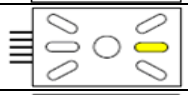
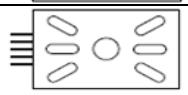
All positions of the turnout or crossing are switched with the module key. When the key on the turnout module is activated, the turnout switches to the next state and the appropriate switching instruction is sent by the module, so that the turnout motor is switched on. When the key is released, the module sends the appropriate switching instruction so the turnout motor is switched off. By pressing the key a number of times, the turnout/crossing will cycle through all possible states sequentially; for turnouts 2 different positions, for simple crossing slip three positions, and double crossing slips and three-way turnout for four positions.

If the turnout is reported as "occupied", the module can be configured so that the turnout cannot be changed. For this the Bit4 of LNCV 13 must be set to value 1.

If the turnout symbol is to blink while the turnout is changing to indicate the direction to which the turnout is changing, then Bit5 of LNCV 13 must be value 1. The blinking rate and time are fixed by the module and can not be altered. If a turnout command comes from the LocoNet and the turnout is already in the correct position the indicator does not blink.

Each electronic module can be combined with different symbols. The operation of the switch position (red/green) related to the symbol of the field is therefore not always the same. This can be configured in LNCV15. The following applies:

LNCV 15 value	Indication	Description
0		Turnout top-left Solenoid address → LNCV 11
1		Turnout bottom-left Solenoid address → LNCV 11
2		Turnout bottom-right Solenoid address → LNCV 11
3		Turnout top-right Solenoid address → LNCV 11
4		Double crossing slip top-left and bottom-right with single drive solenoid address → LNCV 11 for the motor solenoid address → LNCV 12 for the different displays of the routes, this is not used for switching motors
5		Double crossing slip top-right and bottom-left with single drive solenoid address → LNCV 11 for the motor solenoid address → LNCV 12 for the different displays of the routes, this is not used for switching motors

6		Double crossing slip (large) with single drive solenoid address → LNCV 11 for the motor solenoid address → LNCV 12 for the different displays of the routes, this is not used for switching motors
7		Double crossing slip top-left and bottom-right with dual drive solenoid address → LNCV 11 for the left motor solenoid address → LNCV 12 for the right motor
8		Double crossing slip top-right and bottom-left with dual drive solenoid address → LNCV 11 for the left motor solenoid address → LNCV 12 for the right motor
9		Double crossing slip (large) with dual drive solenoid address → LNCV 11 for the left motor solenoid address → LNCV 12 for the right motor
10		Y-turnout left solenoid address → LNCV 11
11		Y-turnout right solenoid address → LNCV 11
12		Three way turnout left solenoid address → LNCV 11 for the 1. motor solenoid address → LNCV 12 for the 2. motor
13		Three way turnout right solenoid address → LNCV 11 for the 1. motor solenoid address → LNCV 12 for the 2. motor
14		Switching operation with left indicator (e.g. lighting) solenoid address of switching decoder → LNCV 11
15		Switching operation with right indicator (e.g. lighting) solenoid address of switching decoder → LNCV 11
16		Uncoupler solenoid address and status → LNCV 11 programming is done as follows: XXXXC a 5 digit (max) decimal number XXXX the address from 1 … 2048 C = 0: solenoid red C = 1: solenoid green

With Bit 0 of LNCV 14 the display of the turnout status (red/green) can be swapped relative to the display for the turnout motor 1 specified with LNCV 11. Similarly Bit1 of LNCV 14 applies to turnout motor 2 specified with LNCV 12.

The operating modes 7, 8, 9 in accordance with LNCV 15 are for double crossing slips with two motors. Bit2 and Bit3 of LNCV 14 can be used as operating modes for simple crossing slips. States EKW1 = turnout 1 green/ turnout 2 red and/or
EKW2 = turnout 1 red/ turnout 2 green
can be suppressed in each case.

The solenoid address in LNCV40 (key lock) can be used to disable the turnout key. If this solenoid is switched to red the key is disabled. The state of the solenoid is not queried at module power-up therefore the keys are enabled after the power-up, independent of the solenoid status.

Programming:

LNCV 11, LNCV 12 = solenoid address of the turnout
LNCV 13, = feedback address of the turnout or crossing track section
LNCV 14 = Bit0: 0 = normal operation for status of W1
1 = operation red/green for W1 exchanged
= Bit1: 0 = normal operation for status of W2
1 = operation red/green for W2 exchanged
= Bit2: 0 = normal single turnout
1 = EKW1: turnout 1 green/ turnout 2 red not permitted
= Bit3: 0 = normal single turnout
1 =EKW2: turnout 1 red/ turnout 2 green not permitted
= Bit4: 0 = switch also when turnout is occupied
1 = do not switch when turnout is occupied
= Bit5: 0 = cycle flashing off
1 = cycle flashing on
LNCV 15 = operating mode of the turnout/crossing
LNCV 40 = solenoid address for disabling module key

2.2 Route illumination

Each turnout or signal module has 2 outputs i.e. the signal module has 2 additional LED's for yellow/red route indication. The yellow LED is switched on via solenoid address with green and turned off with red. The change between the indication of dark/red or yellow/red is done by a feedback vacant=dark yellow and/or occupied=red.

Programming und Assignment:

LNCV	Description		Value Range	Factory Default
	Route indication:			
21	Solenoid address, Route indication (Green=on, red=off)	external left	1-1997	0
22	Feedback address (vacant/occupied)	external left	1-4095	0
23	Solenoid address, Route indication (Green=on, red=off)	external right	1-1997	0
24	Feedback address (vacant/occupied)	external right	1-4095	0
25	Solenoid address, Route indication (Green=on, red=off)	internal left	1-1997	0
26	Feedback address (vacant/occupied)	internal left	1-4095	0
27	Solenoid address, Route indication (Green=on, red=off)	internal right	1-1997	0
28	Feedback address (vacant/occupied)	internal right	1-4095	0

Note: Outputs or indicators (yellow/red) which are not to be used must have the respective LNCV's values set to 0.

Note: Here different indicators can be provided with same addresses.

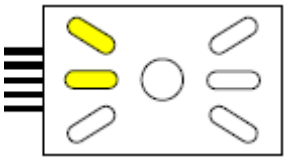
2.3 Programming by Key

LNCV 5 specifies the delay period till programming mode is switched. Factory setting: LNCV5 = 0. In factory setting the programming mode is switched on immediately the key is pressed. When the module is programmed by key, LNCV 5 is automatically set to 21, thus the time out is 11 seconds.

If the module is programmed from the IB or PC, then LNCV 5 must be set manually. This is set automatically by Track-Control Edit.

If programming mode is active the module successively shows all 17 operating modes by pressing the key.

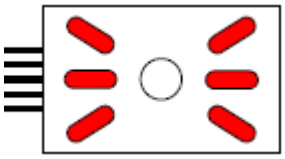
1. Operating Mode: Turnout top/left



These LED's blink yellow!

If this is the operating mode you want, switch the turnout from the center, otherwise press the key on the module in order to change to the next operating mode.

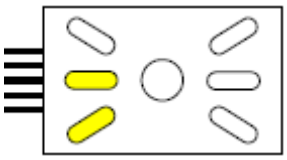
If the operating mode is selected the module indicates as follows:



These LED's blink red!

Now switch the turnout whose address corresponds to the desired feedback address for track section. If no feedback is wanted press the key on the module. The module is now operational.

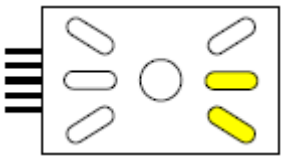
2. Operating Mode: Turnout bottom/left



These LED's blink yellow!

Program the turnout and feedback addresses as in 1.) or press the key on the module to advance to the next operating mode.

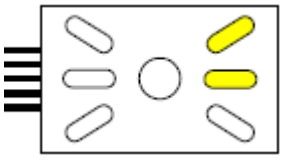
3. Operating Mode: Turnout bottom/right



These LED's blink yellow!

Program the turnout and feedback addresses as in 1.) or press key on the module to advance to the next operating mode.

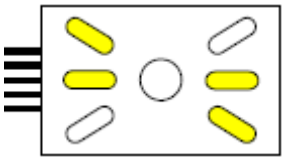
4. Operating Mode: Turnout top/right



These LED's blink yellow!

Program the turnout and feedback addresses as in 1.) or press key on the module to advance to the next operating mode.

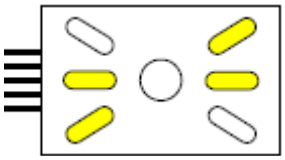
5. Operating Mode: Double crossing slip top/left and bottom/right with single drive



The LED's blink yellow!

Program the turnout as in 1.) or press key on the module to advance to the next operating mode. If a turnout address was programmed, the LEDs blink orange. Now program a second turnout address for the correct route indication in the same way. Subsequently program the feedback address as in 1.).

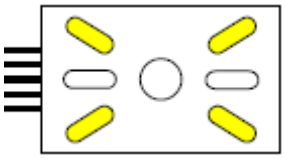
6. Operating Mode: Double crossing slip top/right and bottom/left with single drive



The LED's blink yellow!

Program the turnout and feedback addresses as in 5.) or press key on the module to advance to the next operating mode.

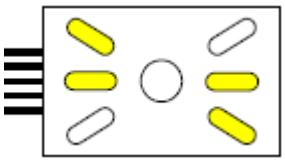
7. Operating Mode: Large Double crossing slip with single drive



The LED's blink yellow!

Program the turnout and feedback addresses as in 5.) or press key on the module to advance to the next operating mode.

8. Operating Mode: Double crossing slip bottom/left with dual drive

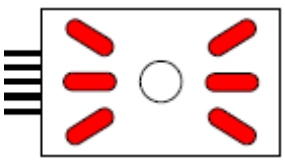


The left LED's blink yellow!
The right LED's are constantly on.

If this is the operating mode you want switch the right drive of the double crossing slip from the center, otherwise press the key on the module in order to change to the next operating mode.

If a turnout was changed the right LED's blink and the left are on constantly. Activate the switch in the center which switches the left drive of the double crossing slip.

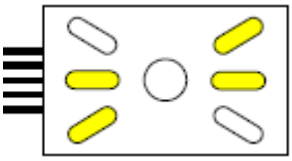
Now the module shows:



These LED's blink red!

Now switch the turnout whose address corresponds to the desired feedback address for track section. If no feedback is wanted press the key on the module. The module is now operational.

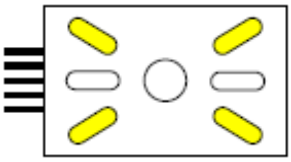
9. Operating Mode: Double crossing slip bottom/left and bottom/right with dual drive



The left LED's blink yellow!
The right LED's are constantly on.

Program the turnout and feedback addresses as in 8.) or press key on the module to advance to the next operating mode.

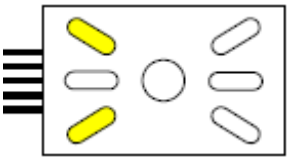
10. Operating Mode: Large Double crossing slip with dual drive



The left LED's blink yellow!
The right LED's are constantly on.

Program the turnout and feedback addresses as in 8.) or press key on the module to advance to the next operating mode.

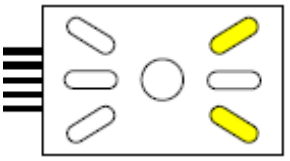
11. Operating Mode: Y-turnout left



The LED’s blink yellow!

Program the turnout and feedback addresses as in 1.) or press key on the module to advance to the next operating mode.

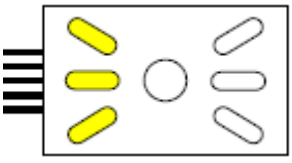
12. Operating Mode: Y-turnout right



The LED’s blink yellow!

Program the turnout and feedback addresses as in 1.) or press key on the module to advance to the next operating mode.

13. Operating Mode: 3-way turnout left

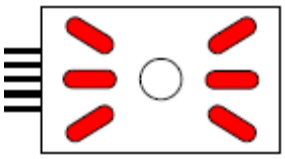


The LED in the center and top blink yellow!
The lower LED is constantly on.

If this is the operating mode you want switch the right drive of the three-way switch from the center, otherwise press the key on the module in order to change to the next operating mode.

If a turnout was changed the middle and lower LED’s blink and the upper is on constantly. Activate the switch on the center which is to switch the left drive of the three-way switch.

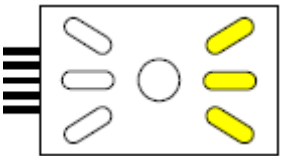
Now the module shows:



These LED's blink red!

Now switch the turnout whose address corresponds to the desired feedback address for track section. If no feedback is wanted press the key on the module. The module is now operational.

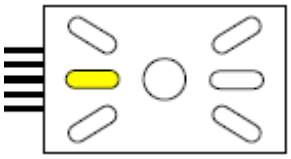
14. Operating Mode: 3-way turnout right



The LED in the center and top blink yellow!
The lower LED is on constantly.

Program the turnout and feedback addresses as in 13.) or press key on the module to advance to the next operating mode.

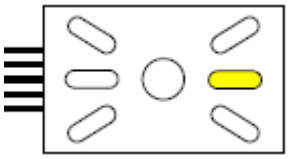
15. Operating Mode: Switching operation with left indicator (e.g. lighting)



The LED's blink yellow!

From the center activate the switch which operates the desired switching output and the module is operational.
If this is the desired operating mode press the key on the module.

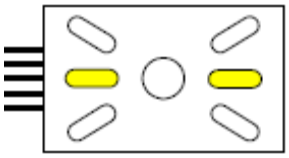
16. Operating Mode: Switching operation with right indicator (e.g. lighting)



The LED's blink yellow!

From the center activate the switch which operates the desired switching output and the module is operational.
If this is the desired operating mode press the key on the module.

16. Operating Mode: Uncoupler



The LED's blink yellow!

From the center activate the switch which operates the desired uncoupler and the module is operational.
If this is the desired operating mode press the key on the module.

Exit programming mode.

3. The Signal module

> **Warning:** If certain functions in a module are not to be used the associated LNCV's must be set to a value 0.

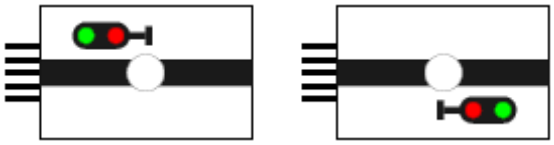
3.1 Control of the Home signal and Track barring signal

If the module has a home signal then the status is controlled by the solenoid address in the home signal's LNCV 31. Furthermore the home signal can be set to "stop" by the signal key (ST) and HaGT. If available the track barring signal is likewise switched to "stop".

FaGT can set the home signal to "proceed".

The track barring signal (if available) is set by the SGT as well as the ST "Sh1". The ST, together with the HaGT, sets the signal to "Sh0". The solenoid with the address in LNCV 33 is switched and/or changes indication, if it is switched from another location.

Bit 0 of LNCV 38 is specifies whether the signal symbol to be used is at the top or bottom of the module:



LNCV 38 Bit0=0 LNCV 38 Bit0=1

LNCV 38 Bit1 specifies whether (Bit1=0), a signal with several states, is used and is switched by a helper key or if (Bit1=1) only one home signal or track barring signal is used, which can be changed directly by the key on the module.

Programming:

LNCV 31 = Home signal Address
LNCV 32 = Pilot signal Address
LNCV 33 = Track barring signal Address
LNCV 38 = Signal control configuration:
Bit0 : Display Signal 0:top / 1:bottom
Bit1 = 1 only HS or GS by Key
Bit2 = 1 dynamic Pilot signal switching
Bit3 = 1 Pilot signal with 3 states
LNCV 7 = Address Group Key FaGT/HaGT (green=FaGT / red=HaGT)
LNCV 8 = Address Group Key SGT/FHT (green=SGT / red=FHT)
LNCV 40 = Key lock, blocks functions "Home signal proceed", "Barring signal proceed shunting", "Destination key" and "Start Key"

3.2 The Pilot signal

If the module has an alarm unit for a pilot signal on the mast of a home signal, the pilot signal can be directly controlled by the solenoid address specified in LNCV 32 or the alarm units, and pilot signal can be controlled dynamically, i.e. a special LocoNet Message can communicate the solenoid address of the distant home signals to the module that is controlling the pilot signal. After the module receives the address it queries the status of the distant home signals and indicates the status on the pilot signal alarm unit. The solenoid command with the address specified in LNCV 32 is sent on LocoNet to control the pilot signal on the layout. Each state change of the distant home signals is then reflected on the pilot signal. In this way, the pilot signal can be addressed by different home signals depending upon the route set. The LocoNet Message, which links pilot signal and distant home signal dynamically and the solenoid address of the particular home signals, is defined as follows:

[ED] [0F] [05] [05] [00] [20] [PXCT1] [D1] [D2] [D3] [D4] [D5] [D6] [D7] [CHK]
where: [D1] = F4h == 6900
[D2] = 1Ah
[D3] = LowByte Module address (LNCV 0)
[D4] = HighByte Module address (LNCV 0)
[D5] = LowByte solenoid address Home signal
[D6] = HighByte solenoid address Home signal
[D7] = 01
[PXCT1] = [0, D7.7, D6.7, D5.7, D4.7, D3.7, D2.7, D1.7]
(Bit7 of D1..D7 during the transmission on LN)
[CHK] = Checkbyte according to LocoNet specification

This command must be sent as part of the switching sequence which specifies a route. (Is accepted by Switching Sequence module 69240!)
The link between home signal and pilot signal must be released as soon as the route is no longer valid. This can be done via the instruction described above, however the home signal address must have a value of zero. Now the module sends the "red" state to the solenoid address of the pilot signal. If it is a home signal with pilot signal on the mast, the state of distant home signal is only passed to the pilot signal if the home signal is on green. If the signal is switched to red the status of the distant home signals is only stored, but is not passed on. The pilot signal then remains in the red state, which it accepts if the home signal is on red. To an unlinked pilot signal (Home signal LNCV=0) this does not apply. The dynamic allocation can be switched off. This may be necessary if the pilot signal the module is always controlled by the same home signal.

Extension of dynamic control of pilot signal (LNCV38 - Bit2 = 1) for the signal states: "stop, proceed and proceed slowly":
For this, the following conditions apply: A home signal and/or a pilot signal has three signal states, then stop/proceed is controlled via a solenoid address and the signal state proceed slowly via the following solenoid address. The individual states are:

Signal state	Solenoid address	Solenoid address +1
Stop	Red	Red
Proceed	Green	Red
Proceed slowly	Green	Green
Dark (light off)	Red	Green

If LNCV38 - Bit3 is set to value 1 the pilot signal state ‘proceed slowly’ is accepted by solenoid address +1, via the allocation instruction described above and the pilot signal on the layout is controlled by the solenoid address in LNCV 32 plus 1.

3.3 The ST as Start key of a Route

The ST serves as a start key of a route together with the destination key. Each module can have 10 destination keys. LNCV's 41, 45, 49, 53 to 77 contain the solenoid addresses of the destination keys and their status (red/green) according to XXXXC where C=0: red, C=1: green.

Each of the following LNCV's 42, 46, 50, 54 etc. contain a number which is the coded LocoNet instruction sent by the module in order to activate a switching sequence which:

- switches turnouts for the route,
- indicates the route,
- links the pilot signal and the home signal specified at the end of the route,
- locks all destination and start keys of crossing routes
- switches the associated signal to green.

Programming follows these rules:

XXXXC a maximum of 5 digit decimal number with XXXX an address of 1… 2048
C=0: solenoid red
C=1: solenoid green
C=2: Feedback vacant
C=3: Feedback occupied

These work in conjunction with LNCV's 43, 47, 51, 55 etc., which contain the feedback address of the track section with which the route is triggered.

Every 4th LNCV (44, 48, 52, 56 etc.) contains the LocoNet instruction to activate the switching sequence for the route and which

- switches the route indication off again,
- unlocks all locked destination and start keys
- and sets the associated signal to red.

Programming follows these rules:

XXXXC a maximum of 5 digit decimal number with XXXX an address of 1… 2048
C=0: solenoid red
C=1: solenoid green
C=2: Feedback vacant
C=3: Feedback occupied

If a route was specified and the instruction was issued by the module according to LNCV's 42, 46, 50, 54 etc., **no** further route can be activated from this module. If the module receives the feedback instruction for an address in LNCV's 43, 47, 51, 55 etc., the start key is unlocked again and a new route can be switched and also the module produces the LocoNet instruction from LNCV 44, 48, 52, 56 etc. to activate the switching sequence for releasing the route. So that an external route blocking device, which is verified and implemented in the Switching Sequence module, even a locked and therefore unimplemented route doesn't prevent another route from being activated, the module is unlocked if it receives an instruction in LNCV's 42, 46, 50, 54 etc. which exactly matches the instruction for the route stored in the module as 'active'.

With the FHT and the ST the route can be taken back. If this happens, the module sends the LocoNet instruction according to LNCV 44, 48, 52, 56 etc. to release the switching sequence, which opens the route again, accomplishing the actions specified above.

Programming:

LNCV 40 = Solenoid address to block the ST
LNCV 41 = Solenoid instruction for route 1
= XXXXC where XXXX = address and C=0: red/C=1: green
LNCV 42 = LN command for the switching sequence for establishment of the route 1
= XXXXC (5 digits max. decimal number) with XXXX = address and
C=0: Solenoid red/C=1: Solenoid green
C=2: feedback vacant/C=3: feedback occupied
LNCV 43 = address for the feedback (vacant/occupied) from the track section to setting route 1
LNCV 44 = LN command for the switching sequence for dissolving the route 1
= XXXXC (5 digits max. decimal number) with XXXX = address and
C=0: Solenoid red/C=1: Solenoid green
C=2: feedback vacant/C=3: feedback occupied

....

LNCV 77 = Solenoid instruction the destination of route 10
LNCV 78 = LN instruction for the switching sequence to set route 10
LNCV 79 = address of the feedback from the track section to dissolving the route 10
LNCV 80 = LN instruction for the switching sequence to release the route 10

3.4 The Route Indication

The route indication of this module corresponds to indicate the function in the turnout modules. The description corresponds to chapter 2.2.

3.5 The Route or Group key

The route key (destination FT) or Group key issues a solenoid command in LNCV 39. This LNCV contains the solenoid address and status as defined:

XXXXC a max. 5 digit decimal number where XXXX an address of 1... 2048
C=0: Solenoid red
C=1: Solenoid green

The solenoid with the address in LNCV 40 blocks output from the key when set to "red" and permits output again when set to "green". This solenoid can be used in a route switching sequence e.g. to block destination keys from crossing routes.

Programming:

LNCV 39 = solenoid address and state (XXXXC) for the destination key with
XXXX an address of 1… 2048
C=0: solenoid red
C=1: solenoid green
LNCV 40 = solenoid address to block the FT

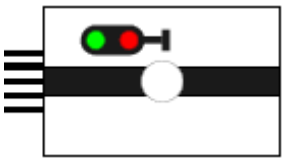
3.6 Programming by key

LNCV 5 specifies the delay period till the programming mode is switched. Factory setting: LNCV5 = 0. In factory setting the programming mode is switched on immediately the key is pressed.
When the module is programmed by key the LNCV 5 is automatically set to 21 by programming and thus the time out is 11 seconds.

The module programmed from the IB or PC LNCV 5 must be set manually. This is set automatically by Track-Control Edit.

If programming mode is active the module successively shows all 4 operating modes by pressing the key.

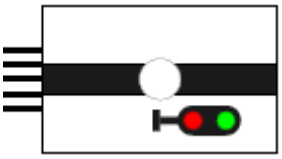
1. Operating Mode: Home Signal top/left



These LED's blink!

If this is the operating mode you want, change the turnout from the center, otherwise press the key on the module in order to change to the next operating mode.

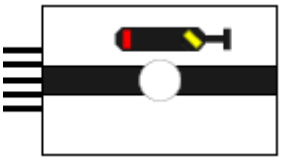
2. Operating Mode: Home Signal bottom/right



These LED's blink!

If this is the operating mode you want, change the turnout from the center, otherwise press the key on the module in order to change to the next operating mode.

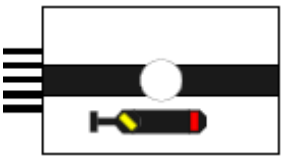
3. Operating Mode: Barring Signal top/left



These LED's blink!

If this is the operating mode you want, change the turnout from the center, otherwise press the key on the module in order to change to the next operating mode.

4. Operating Mode: Barring Signal bottom/right



These LED's blink!

If this is the operating mode you want, change the turnout from the center, otherwise press the key on the module in order to change to the next operating mode.

Using key programming, the selection is programmed in LNCV 31 (Home signal) or LNCV33 (track barring signal). LNCV38 Bit0 determines whether the symbol in the lower or upper position is to be used. LNCV38 Bit1 = 1 specifies that the key on the module switches the signal directly and no other functions are possible.

The LNCV list of Track-Control modules 69220 and 69230

LNCV	Description	Value Range	Default
	General Settings:		
0	Module address	1 - 4095	1
1	Software version		-
2	Brightness	0 - 10	10
3	Module configuration Bit0 = 1 Brightness Setting on Bit1 = 1 Key lock on Bit2 = 1 Use LocoNet instruction, otherwise via Flag Bit6 = 1 Reboot on LocoNet error at Startup Bit7 = 1 Direct mode on	0 - 255	64
4	Startup time in 0.5s intervals		0
5	Delay time for Programming key in 0.5s intervals		0
	Group und Help keys:		
7	Proceed/Stop Key green=FaGT / red=HaGT Solenoid address	1-1997	0
8	Shunting speed/Routes green=SGT / red=FHT Solenoid address	1-1997	0
	Turnout configuration:		
11	Solenoid address 1	1-1997	0
12	Solenoid address 2	1-1997	0
13	Address of Turnout feedback	1-4095	0
14	Turnout Control Configuration 1 Bit0 : Swap bit 1 Bit1 : Swap bit 2 Bit2 : Double Crossing/Simple Crossing 1 Bit3 : Double Crossing/Simple Crossing 2 Bit4 = 1 Occupied. Do not change turnout Bit5 = 1 Switch blinking on		0
15	Turnout Control Configuration 2: Type of Turnout	0-16	0
	Route indication:		
21	Solenoid address Route switch (green=on, red=off) external left	1-1997	0
22	Feedback address (vacant/occupied) external left	1-4095	0
23	Solenoid address Route switch (green=on, red=off) external right	1-1997	0
24	Feedback address (vacant / occupied) external right	1-4095	0
25	Solenoid address Route switch (green=on, red=off) internal left	1-1997	0
26	Feedback address (vacant / occupied) internal left	1-4095	0
27	Solenoid address Route switch (green=on, red=off) internal right	1-1997	0
28	Feedback address (vacant / occupied) internal right	1-4095	0
	Signal control:		
31	Home signal Solenoid address		0
32	Pilot signal Solenoid address		0
33	Shunting signal Solenoid address		0
37	Address of assigned LISSY receiver		0
38	Signal control Configuration: Bit0 : Display Signal 0:top / 1:bottom Bit1 = 1 only HS or GS via Key Bit2 = 1 dynamic Pilot signal assignment Bit3 = 1 Pilot signal with 3 states		
	Destination and Group Key:		
39	Key sends destination key solenoid instruction Input: XXXXC; XXXX=Address C=0:red C=1: green		0

40	Key lock, this Solenoid Address deactivates the key red deactivates key, green activates keys		0
	Routes:		
41	Key is start button and expected Solenoid address (destination 1) Input: XXXXC; XXXX=Address C=0: red C=1: green		0
42	After it receives Destination key sends LN (specify Route 1) Input: XXXXC; XXXX=Address C=0: red C=1: green C=2: vacant C=3: occupied		0
43	Feedback (vacant/occupied) for withdrawal of Route 1 Input: XXXXC; XXXX=Address C=2: vacant C=3: occupied		0
44	After it receives Feedback sends LN (Activate Route 1) Input: XXXXC; XXXX=Address C=0: red C=1: green C=2: vacant C=3: occupied		0
45-48	For Route 2 – Meaning as in LNCV 41-44		0
49-52	For Route 3 – Meaning as in LNCV 41-44		0
53-56	For Route 4 – Meaning as in LNCV 41-44		0
57-60	For Route 5 – Meaning as in LNCV 41-44		0
61-64	For Route 6 – Meaning as in LNCV 41-44		0
65-68	For Route 7 – Meaning as in LNCV 41-44		0
69-72	For Route 8 – Meaning as in LNCV 41-44		0
73-76	For Route 9 – Meaning as in LNCV 41-44		0
77-80	For Route 10 – Meaning as in LNCV 41-44		0
119	Sets all LNCV's, except LNCV 0, to factory default, if this LNCV is set to any value.		0
120-127	These LNCVs are only programmable by PC recordable and not by an Intellibox, they contain no configuration parameters and are not relevant for the module operation. They can hold user specific information and these LNCV's are used particularly by the 'Track-Control Edit' program. The SRC id of the LocoNet Message OPC_PEER_XFER-device_cfg must have the value 8 (PC), so that the LNCV can be written. The LNCV **127** is **automatically cleared** whenever the module is programmed by Intellibox (SRC=1). This way the PC program can determine whether the contents of a module were manually changed by the user without the PC program.		

4. The Switching sequence module 69240

The Switching sequence module (Part No. 69240) contains the switching sequences which are necessary for activating routes. The switching sequences must contain all solenoid Commands, to illuminate a route, to activate the feedback unit and to switch associated turnouts and signals to the correct state and/or to link pilot signals with Home signals.

The module can hold up to 2044 instructions and is easily programmable. The number of routes is not fixed and depends on the length of the individual routes. Each switching sequence starts with an entry which marks the beginning of the sequence and also determines which feedback address and status (vacant or occupied) activates the route. After that, the sequence contains the individual instructions for solenoids or feedbacks such as pauses or allocations of pilot signal and Home signal. The end of a sequence is marked by an LNCV with contents '0' or an LNCV which contains a new start instruction for another sequence.

All switching sequences are specified by LNCV programming. If a feedback arrives with the Route Memory module, then the module scans the LNCV 5 to 2047 to check whether this feedback activates a switching sequence. If the starting mark is found, the following LNCV's are processed in increasing order and the instructions of the switching sequence are implemented.

A switching sequence can be switched from any place within another switching sequence. After the processing of the called sub-sequence, the original route will continue the processing with the next instruction. No further sub-sequence can be called from within a sub-sequence. If this happens anyway the call is ignored and the sub-sequence continues working with the following instruction. In a switching sequence, several sub-sequences can also be called after another. If a sub-sequence is to be called within a switching sequence, it takes place via feedback address and the status which was assigned to this sequence as the activation event (see also instruction description and example). If a sub-sequence which is not in memory is called, the call is ignored and the sequence continues with the next instruction.

A switching sequence can block other switching sequences that can then no longer be activated. The blocking of a certain sequence can be implemented by several other sequences. Each blocking device is taken into account for every sequence. If the blocking counter is not equal to zero the sequence is not implemented. If a sequence bar is cancelled the blocking counter is decremented by one, and only if all bars are cancelled and the counter is Zero, the sequence can be implemented again.

Warning: If a switching sequence which has locked another is called several times then the blocking counter is also incremented several times, i.e. the locked sequence cannot be released by a single unblocking process!!

If a sequence is blocked the feedback instruction which activated the route on LocoNet can be repeated as a function of Bit6 - LNCV3. This serves to remove the route call which was stored in a signal module. By saving the route in the signal module no further route call can be activated. The signal module notes that a route was requested, but could not be implemented, due to a blocking device in the Switching Sequence module, only via this repetition of instructions. If the route call in the signal module is deleted, further routes can be called via this signal module.

If existing blocking devices cannot be deleted by routes then all existing blocking devices can be deleted by solenoid instruction "1998 - red". Blocking devices are not saved when switching the power off!

If the Route memory contains a switching sequence which begins with the feedback address 0/occupied, i.e. with code 0009, then this sequence is implemented after the module's power is switched on. This can be used in order to enforce particular initialization of the layout when it is switched on.

LNCV 2048 is used to completely delete the programming of the Switching Sequence module. Any value programmed in LNCV 2048 sets all other LNCV's from 0 to 2047 to zero. This also sets the module address back to zero.

Programming:

LNCV 0 = Module address of the switch module
LNCV 1 = Software Version
LNCV 2 = Time constant for the Turnout switching pulse in 20ms intervals
LNCV 3 = Bit0-Bit5 system start delay in 0.5 seconds intervals
Bit6 → = 1 repeat feedback command if route locked
Bit7 → = 1 use LocoNet CD directly, otherwise flag.
LNCV 4 = module ID for the pilot signal instruction
6900 for the Track-Control signal modules
LNCV 2040-2047 = these LNCV's are only programmable by PC and not with the Intellibox
the source id of the LocoNet Message "OPC_PEER_XFER-device_cfg"
must have a value of 8 (PC)

The programming of the routes (switching sequences) is done in LNCV 5 to LNCV 2039 with the following encoding:
Each LNCV contains a decimal number with up to 5 digits in the form XXXXC, where XXXX is an address in the range 1 to 2047 for solenoid addresses or 1 to 4095 for feedbacks and C is the command identification. (X and C are decimal digits with up to 5 digits) A '0' indicates a vacant memory location.

C= 0 :	Solenoid red	where	XXXX = Solenoid address
C= 1 :	Solenoid green	where	XXXX = Solenoid address
C= 2 :	Feedback vacant	where	XXXX = Feedback address
C= 3 :	Feedback occupied	where	XXXX = Feedback address
C= 4 :	Pilot signal link	where	XXXX = Address of the Home signal 0 = delete current link
	A second command with C=4 must follow C=4	where	XXXX = Module address LNCV0
	(If no 2nd command with 4 follows the sequence is terminated!)		
C= 5 :	Pause in 0.5s intervals where XXX = 1..255 => 0.5 to 127.5s		
C= 6 :	Call Route which was saved with 'vacant' status and Feedback address XXXX.		
C= 7 :	Call Route which was saved with 'occupied' status and Feedback address XXXX.		
C= 8 :	Route start This route is started by a Feedback with status *vacant* and the Address XXXX	where	XXXX = Feedback address
C= 9 :	Route start This route is started by a Feedback with status *occupied* and the Address XXXX	where	XXXX = Feedback address

Note: The route with feedback address *0* will be implemented at system startup. This way configuration can be preset when the layout is turned on or all feedback units can be made to report their current status.

Example of a programming:

```
LNCV 5 = 2008       ; Start of Route 1 for feedback 200 - vacant
LNCV 6 = 100        ; Solenoid 10 - red
LNCV 7 = 111        ; Solenoid 11 - green
LNCV 8 = 3002       ; Feedback 300 - vacant
LNCV 9 = 65         ; 3 seconds pause
LNCV 10 = 404       ; Home signal with solenoid address 40 is linked with
LNCV 11 = 4124      ; Pilot signal from module 412
LNCV 12 = 0         ; Route 1 ends
LNCV 13 = 109       ; Start of Route 2 for the feedback 10 - occupied
LNCV 14 = 1000      ; Solenoid 100 - red
LNCV 15 = 1101      ; Solenoid 110 - green
LNCV 16 = 118       ; Route 2 ends and Route 3 begins
.....               ; for feedback 11 - vacant

LNCV 20 = 128       ; Route for feedback 12 - vacant
LNCV 21 = 201       ; Solenoid 20 - green
LNCV 22 = 221       ; Solenoid 22 - green
LNCV 23 = 2006      ; At this point Route 1 for the feedback 200 – vacant
                    ; is called and processed and then continues with the
                    ; Instruction in LNCV 24
LNCV 24 = 231       ; Solenoid 23 - green
LNCV 25 = 0         ; the route ends
```

The route blocking device must be coded as follows:
The command encoding XXXXC where XXXX is larger than 4095 are invalid for the command definition described above, since address values larger than 4095 are not permitted. This address range is used for the blocking devices. Values 6XXXC is programming of blocking devices. Valid are:

6XXX1: This instruction should be used as the sub-route instruction of a route (switching sequence). The route receives the number XXX and a check determines if this route has been implemented or whether it is locked. If the route is locked, the feedback command which the route has activated, is resent on LocoNet. The route number stored in the signal module will be deleted and a new route can be requested. This would not be the case if the route number in the signal module concerned were not deleted. (The repetition of the feedback command will not take place if bit is 6 of LNCV 3 = 0)

6XXX2: Instructions with this encoding should always follow a 6XXX1 instruction in a route. The instruction locks the route with the number XXX. A counter is used as the blocking device, and is incremented by one, with each lock that is set in a route. If a blocking device in a route is deleted the counter is decremented by one. If the blocking device counter is equal to zero, the route can be implemented.

6XXX0: This instruction decrements all blocking device counters which were locked in routes with the number XXX. Only the blocking devices in route XXX which follow the 6XXX1 instruction are cancelled.

Address range of the route number XXX: 0 to 255.

Example of blocking devices:

```
LNCV200=29      ; Start of a route for feedback address 2 – State: occupied
LNCV201=60101   ; Number = 10, Check if locked
LNCV202=60012   ; blocking counter of route No. 1 incremented
LNCV203=60022   ; blocking counter of route No. 2 incremented.
LNCV204=60032   ; blocking counter of route No. 3 incremented.
LNCV205=…       ; further instructions …
LNCV250=28      ; Start of a route for feedback address 2 – State: vacant
LNCV251=60111   ; Number = 11, Check if locked
LNCV252=60100   ; save all locks for route 10
                ; that is the blocking for routes 1,2,3  etc.
```

The Switching Sequence module possesses 2 yellow red LED's at PCB center. The LED's have the following meaning:

Normal operating mode:

Left LED yellow:	Blinks when route is processed
Left LED red:	Switched on, if a blocked route cannot be implemented and will terminate at the beginning of the next route.

Programming mode:

Right LED red:	Blinks in the programming mode:
Left LED yellow:	Illuminated after every read operation
Left LED red:	Illuminated after every write operation

5. The Train Number Display 69250

5.1 Operation

The train number display is used on a model railway for reporting the locomotive address, train category, driving direction and the speed, which a LISSY receiver has detected. It is possible to report information of different LISSY receivers in different locations of the layout via up to 16 pre-configured reports by pressing the key to switch the display.

5.2 The Display

When switching the display on, it always shows the information of the LISSY receiver with the address from the display memory No. 1. If the display is switched to another LISSY receiver its information is queried and displayed.

5.2.1 Display with basic functions and switching operation

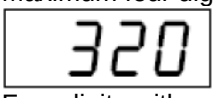
If the LNCV 28 of the LISSY receiver is set to operating mode 0-3 (basic functions, switching operation) the locomotive which last happened to pass this sensor is always displayed.

5.2.2 Display in Automatic Operation

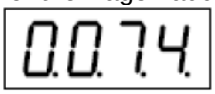
If the LISSY receiver is programmed to one of the automatic functions 20 to 26 (Shuttle train services, holding place, block section or station administration) the display indicates the locomotive information for the occupied track section. If the section is vacant the display changes to “block vacant“. If the display is switched to another LISSY receiver with an occupied section, the information of the locomotive which is in that section is indicated. For a vacant track “block vacant“ is indicated. (Available for LISSY receiver 68 600 from software Version 1.06).

5.2.3 The different Displays

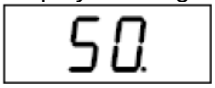
Loco or Turnout address
The address range which a LISSY receiver can monitor is 1-9999 for locomotive addresses and 10001-16382 for wagon addresses. The different addresses are indicated as follows:
Maximum four digit numbers without points e.g. for the locomotive address 320.



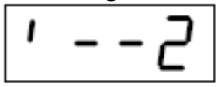
Four digits with points, in which the first digit of the address (the digit 1) is always missing, e.g. for the wagon address 10074:



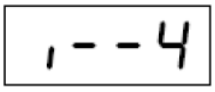
Display locomotive speed
Displays a 3 digits (max.) with trailing point, e.g. for a speed of 50 km/h.



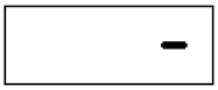
Display the train category with driving direction
The train category is displayed with the number at the right of the display. The driving direction by a vertical bar at left, e.g. the display of train category 2 and a vertical bar top/left for driving direction from sensor 1 to sensor 2



or the display of train category 4,
and vertical bar bottom/left for driving direction from sensor 2 to sensor 1.



Display of no locomotive / block vacant
The message “no locomotive“ is not displayed if, after switching the layout on, no locomotive has passed the LISSY receiver, or, if in automatic operation (LNCV 2 = 20-26), the block section is vacant.



5.2.4 Display mode

In factory setting the display indicates only the locomotive and/or car address. Alternatively Speed and/or train category with driving direction can be selected in LNCV 28. Then the display toggles between the information items. The display time for the individual item can be individually configured (see next chapter).

Note: *Speed and driving direction can be only displayed if the LISSY receiver is fitted with a double sensor (see LISSY Manual chapter “Reporting speed and direction”).*

5.2.5 Display time

If LNCV 28 contains a value other than 0 the display successively indicates the selected information for a LISSY receiver in rotation. How long the information is to be indicated can be adjusted by the LNCV 29 in 0.5 second steps. The pre-set is 3 seconds (LNCV 19 = 6).

Note: *The setting in LNCV 28 and 29 are generally valid for all display buffers.*

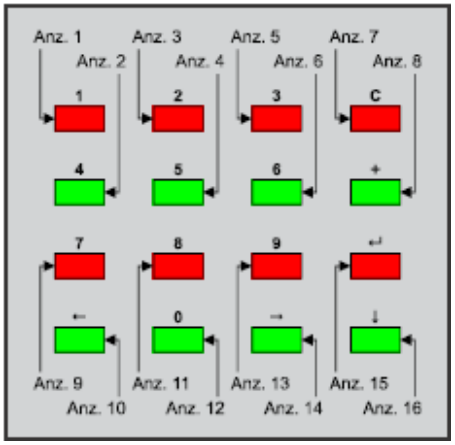
5.3 Configuration of the Display Indicator Memory

The installation display has 16 different display buffers available. Each display buffer can be individually assigned the address of the LISSY receiver whose information is to be displayed.

The following LNCV's are for configuration of the display buffers:

LNCV	Display Memory	Key	LISSY receiver Address	Default
11	1	1	Receiver address for Display Memory 1	1
12	2	4	Receiver address for Display Memory 2	0
13	3	2	Receiver address for Display Memory 3	0
14	4	5	Receiver address for Display Memory 4	0
15	5	3	Receiver address for Display Memory 5	0
16	6	6	Receiver address for Display Memory 6	0
17	7	C	Receiver address for Display Memory 7	0
18	8	+	Receiver address for Display Memory 8	0
19	9	7	Receiver address for Display Memory 9	0
20	10	←	Receiver address for Display Memory 10	0
21	11	8	Receiver address for Display Memory 11	0
22	12	0	Receiver address for Display Memory 12	0
23	13	9	Receiver address for Display Memory 13	0
24	14	→	Receiver address for Display Memory 14	0
25	15	↵	Receiver address for Display Memory 15	0
26	16	↓	Receiver address for Display Memory 16	0

The 16 different display memories can be selected by the number keys of the Intellibox, as shown in the picture. Simple turnout commands switch between the individual displays. In addition, in keyboard mode, the Intellibox top-left pair of keys is the address assigned into the LNCV 27 of the module which was registered as "start address for switching the display". In factory setting the train number display is not programmed to "change over", i.e. the LNCV 27 has the value "0".



The key assignment of the Intellibox can be changed as described in the Intellibox manual chapter "Keyboard Mode - Changing Key Assignment".

Note: *Turnout addresses must not be set in the address range which the display uses for the memory display! Please note that altogether 8 addresses are used for the eight pairs of keys on the keyboard. In factory setting the change over is deactivated.*

5.4 Programming the Modules by Key

A key is located on the back of the module. If the key is pressed the module enters programming mode and displays “Prog”. Now the module can be programmed directly by the driving over one of the LISSY sensors with a locomotive fitted with a LISSY transmitter. Simply allow the locomotive to drive over the sensor whose receiver data are later to be shown in the display. Once the locomotive has driven over the sensor the “Prog” display is removed and the address of the locomotive which just drove over the LISSY receiver sensor is briefly displayed.

Note: A condition for the above description is that all module settings were previously on the factory default.

5.5 The LNCV List for Train number Display 69250

LNCV	Description	Value Range	Factory Default
	General Settings:		
0	Module address		1
1	Software version		-
2	Brightness	1-10	10
3	Module configuration Bit0 = 1 Brightness setting enabled Bit1 = 1 Key lock enabled Bit2 = 1 use LocoNet CD direct otherwise use Flag	0-7	0
4	Startup time in 0.5s intervals	0-255	0
5	Delay time for Programming key in 0.5s intervals	0-255	0
	Display Settings:		
11	Display buffer 1 with the Address of the LISSY receiver	1-4096	1
12-26	Display buffers 2-16 with the Address of the LISSY receivers. Every Display buffer is assigned an Address of the LISSY receiver whose information it is to display.	1-4096	0
27	Start address for the Display buffer swapping 0 = no swapping – Always uses buffer 1	0-2047	0
28	Display mode 0 = only Locomotive address! Selected by Bit: Bit0 = Locomotive address Bit1 = Speed Bit2 = train category with driving direction	0-7	1
29	Time for the Display swapping. Value in 0.5s intervals of the time each item from LNCV 28 is to be displayed.	0-255	6
119	When this LNCV is set to any non-zero value, all LNCV's (except LNCV 0) are set to factory default.	-	0
120-127	This LNCVs is only programmable by PC recordable and not by Intellibox, it contains no configuration parameters and is not relevant for the module operation. I can hold user specific information and these LNCV's are used particularly by the "Track-Control Edit" program. The SRC id of the LocoNet Message OPC_PEER_XFER-device_cfg must have the value 8 (PC), so that the LNCV can be written. The LNCV **127** is **automatically cleared** whenever the module is programmed by Intellibox (SRC=1). This way the PC program can determine whether contents of a module were manually changed by the user without PC the program.	-	-

6. The Connecting Module 69050

6.1 The Power Supply

The connecting module 69050 has a 5V power supply for the Track-Control modules. If the power for the module is switched on, the 5V supply voltage is applied after an adjustable delay, specified in LNCV 4. The load on the module by the Track-Control modules is constantly measured and indicated by the LEDs. This means:

LED	Status	Meaning
Green	blinks	Start phase, output potential not yet switched on
	Switched on	Operating, output potential switched on, load normal
Yellow	Switched on	Load high
Red	Switched on	Load too high
Red	Blinks	Overload 5V output potential switched off (switches back on again after a short time!)

6.2 Auxiliary Facilities for Analog operation of the Track-Control

In order to be able to use Track-control in an analog model railway the panel can be combined with switch modules 63410. All of the layout's turnouts and signals are connected to switch modules. The switch modules receive their power supply for their turnouts and signals from their own transformers. The switch modules are interconnected by LocoNet cables. The LocoNet is also connected to the Track-Control connecting module. If track sections are to report 'red' for occupied, the Uhlenbrock track occupation alarm units 43500 or feedback modules 63350, that are powered by a LocoNet power feed (Part No. 63100), can be combined and likewise connected to the LocoNet. A digital center is not needed. The module can be adjusted in LNCV3 - bit 0 = 1 so that the module supplies the LocoNet with the necessary power. This does not refer to the supply voltage for LocoNet devices, which are attached to this LocoNet, but only to an auxiliary supply which is needed for communication on LocoNet.

So that the state of turnouts and feedbacks are not lost when the layout is switched off, and is available when switching the layout on again, the states are saved. The module can store up to 2048 states. The memory must be divided into solenoid (turnouts and signals) and feedbacks. In LNCV 10 and 11 one can specify which solenoid address range (start value LNCV 10 - end value LNCV 11) are to be saved and LNCV 12 and 13 (start value LNCV 12 - end value LNCV 13) have the settings for the feedbacks.

When the analog layout restarts, the desk modules load the saved states of the solenoids from the connection module. The module can send these saved states after system re-start. All saved feedbacks are sent after the time specified in LNCV 14, which begins after the start phase according to LNCV 4. If LNCV 14 = zero (factory setting) no automatic loading takes place after the system starts. Alternatively the feedbacks can be sent manually via the report address. The report address in LNCV 15 is a solenoid address with whose receipt the module immediately sends all stored feedbacks. While the feedbacks are being sent the yellow LED blinks.

If the setting of the address ranges in LNCV 10 to 13 are incorrect, and one exceeds the max. memory of 2048 states, the yellow LED blinks on startup, the settings must then be corrected.

6.3 The LNCV List for the Connection Module 69050

LNCV	Description	Value Range	Factory Defaults
	General Settings:		
0	Module address		1
1	Software version		-
2	Shows the actual power load Only contains a single measured value, no averaging Read only Switching off depends on this value	0-255	-
3	Module configuration Bit0 = 1 LocoNet power on Bit2 = 1 LocoNet CD used directly, otherwise via flag	0-255	0
4	Startup time in 0.5s steps	0-255	0
5		-	-
	Settings for protecting of the state of solenoid and feedbacks:		
10	Start address of solenoid to monitor and secure	1-2048	0
11	End address of solenoid to monitor and secure	1-2048	0
12	Start address of feedback to monitor and secure	1-4096	0
13	End address of feedback to monitor and secure	1-4096	0
14	Time period from Startup phase to sending of feedback	0-255	0
15	Reporting address (solenoid address) to send the feedback to	1-2048	0
	Settings for Power monitoring:		
20	Current threshold Green → Yellow	0-255	140
21	Current threshold Yellow → Red	0-255	160
22	Current threshold disconnect 5V supply from the desk	0-255	220
23	Time lag for disconnecting in 100ms intervals	0-255	10
24	Restarting time after switching off in 0.5s intervals	0-255	10
119	Sets all LNCV's except LNCV 0 to factory default, if this LNCV is set to any value.	-	0
120-127	This LNCVs is only programmable by PC recordable and not by Intellibox, it contains no configuration parameters and is not relevant for the module operation. IT can hold user specific information and these LNCV's are used particularly by the “Track-Control Edit“ program. The SRC id of the LocoNet Message OPC_PEER_XFER-device_cfg must have the value 8 (PC), so that the LNCV can be written. The LNCV **127** is **automatically cleared** whenever the module is programmed by Intellibox (SRC=1). This way the PC program can determine whether contents of a module were manually changed by the user without PC the program.	-	-