

# LISSY

## Unofficial manual

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# 1 LISSY - Locomotive identification and control system

At last it is possible, to implement on a digital layout, what has been possible on an analogue layout for a long time. Until now automatic setups like shuttle operation, and block section control has been difficult, unless you have a computer in operation.

This description is written for my pleasure, it is a short and free translation from the German manual, with minor additions from my own experience. The chapters are the same as in the German manual, so figures and pictures can be seen there (download available on the Uhlenbrock website). My thanks to N C Friswell, who kindly gave me much help with the language.

## 1.1 *These are the Lissy capabilities*

Train identification

Shuttle train - change direction at end stations.

Train dependent hidden yard operation.

Digital block section operation

Speed measuring

Smooth acceleration and braking at signals.

Automatic control of locomotive functions, for example, light and sound.

Train dependent control of turnouts and signals.

Train dependent speed control.

Works without sectionizing the layout (isolation of tracks).

Lissy consists of a little infra red sender, mounted under a locomotive or other vehicle, and a receiver module, placed near the track. The receiver normally has two IR sensors placed in the middle of the track. The receiver is connected to the LocoNet of a digital system which uses this control bus. The receiver recognizes locomotive address, train category 1-4, speed and direction, and it transmits information to LocoNet, depending on the configuration. This information may be commands to the locomotive and turnouts, or just information to other LocoNet modules. In this way Lissy may be used also with computer programs.

And Lissy can do more:

Identify trains and show on a LocoNet display what train that arrives in a particular track.

Controls shuttle train traffic, with braking, waiting, direction change, starting and signal control of a single track secondary line.

Lissy can control a hidden yard, so that arriving trains selects a suitable (for train or category), and free track.

If desired, Lissy can also handle the start from a hidden yard.

Lissy may be used on block sections, so that trains brake smoothly, without extra equipment. Signals may be switched for as required. Light and sound remains on (if desired) of course.

Lissy may sound the horn/whistle at level crossing, and turn off the high beam light at stations. Sound volume may be reduced in tunnels (if the sound decoder permits).

Speed may be changed when passing stations, on slopes etc.

## **1.2 And this is how Lissy works**

The Lissy-sender, mounted under a locomotive or another vehicle, has an address like a locomotive decoder. If it is a locomotive, or a vehicle serving a particular locomotive, it has the same address as the locomotive. In addition, the sender may have a programmed category 1-4. This information is sent by infra red radiation, the same type of transmission as is used to control for example TV sets. The sensors in the track detect this information and transfer this information to the Lissy receiver. If two sensors are placed together, the receiver is able to detect direction and speed of the vehicle.

The receiver is configured (programmed) via LocoNet. The receiver is capable of processing information from the sensors and other units connected to LocoNet, and make clever decisions, depending on this configuration. As a result it sends commands on LocoNet to the locomotive and/or other units, or just information for other units to interpret. The Motorola, DCC or Selectrix signals to the locomotive or accessories are generated and sent by the central units as usual.

In this way Lissy may be used in lots of configuration; the only absolute requirement is that the digital system supports LocoNet. An Intellibox system or Twin Center directly allows for the full range of functions, but operating the locomotive works as well with a Daisy system or a 6021-LocoNet adapter system. These cases need some extra for the configuration of Lissy though. Also other digital system than those from Uhlenbrock/Fleischmann may be used, provided they support LocoNet.

Lissy typically uses the address it receives from the sensors when sending commands to the locomotive. It is also possible to switch turnouts and signals (accessories). In the latter case a Lissy sender may be mounted under an unpowered vehicle as under a locomotive.

## **2 Getting on track**

This chapter describes how a Lissy set is installed, and how an initial test is performed.

Requirements:

A LocoNet supporting Digital system, for example, Intellibox, Daisy or Twin Center, or a Märklin 6021 with LocoNet adapter. This is enough for running the trains and doing the test in this chapter. To configure the receiver you need Intellibox with software 1.3, Twin Center with software 1.1, or IB-Control with software 1.550.

Transformer

Locomotive and a decoder that is controlled by the digital system.

A Lissy set with two senders (one is needed), a receiver, two sensors, and a LocoNet cable 2.15 m

## **2.1 Installation of the Lissy sender 68300**

The sender is attached under the digital locomotive using the enclosed adhesive tape. The tape is attached to the flat side of the card so that the components including the IR diode are facing the rails. If there is too little space on the locomotive, Lissy may be attached to a coupled vehicle instead. However, power must be supplied. The lowest parts must not be lower than the top of the rails, so as not to interfere with circuit tracks or turnouts. The distance to the sensors should also not be more than 12 mm. The sender should be mounted so that it on curves is situated near the middle of the track, which means mounting near wheels or bogie. The vehicle should not stop the IR radiation going in all directions.

The two wires should be connected to the current pickup; with 3 Rail the red wire could go to the pickup shoe, and the black to the wheels. With 2 Rail each of the wires go to the different sides wheels.

## **2.2 Connection of the Lissy receiver 68600**

Every Lissy receiver use two (in certain cases three) small sensors, each with one white and one grey wire. These are placed in the track, centered between the rails. For a double sensor, the distance may be 1-2 sleepers apart.

For rails without roadbed, drill a 4.5 mm diameter hole. Put the enclosed shrink tube on the sensor, so that only the top of the sensor is visible. Then set the sensor in the hole, from the upper side. See the pictures in the Geman manual. Later (9.9) is described how it's done with Märklin C-track.

Remember to place the sensors in the middle of the track. In a curve, possibly slightly towards the inside. The sensors should not be above the rail level, 0.5 mm below is recommended. For 3 Rail the sensor should be just below the contact studs.

The Lissy receiver is placed nearby and the sensors wires are connected. Don't let the wire go too near other wire, to avoid interference. The receiver can be fixed with screws 2.5 x 10 mm.

Connect the enclosed LocoNet wire to LocoNet, the LocoNet T connection on Intellibox. If the connection is correct, the LED of the receiver will light up for a short moment.

Please note that two receivers connected in LocoNet must have different module address to work properly. This address is factory set to 1. It is advisable to connect one Lissy receiver at a time and immediate change its address. You must also remember that Lissy can be tested and used in any LocoNet system, but to configure it special equipment is needed.

## **2.3 First try**

As delivered, the sender has address set to 3. It should normally have the same address as the locomotive. Put the locomotive on the programming track (PT) of the Intellibox (IB), or anywhere if Daisy beeing used, and begin the programming. Select CV 1 or 116, and set the desired address. CV 1 will also change the address of the locomotive decoder. See 3.3 for more possibilities.

The procedure is the same if you have a Motorola, Selectrix or FMZ decoder; the address should be the same, regardless if the protocol used is the same.

The receiver has module address factory set to 1, and two switching mode functions preprogrammed; when a train passes in one direction its light is put on, in the other direction it is shut off.

Put the train on the main track, set its address on the control unit, and drive to the Lissy sensors. The receiver should blink when the train passes, and the light should be turned on or off depending on the direction.

If nothing happens, go back and check every step in this instruction. Did the receiver blink when it was connected to LocoNet? Are the sender and the receiver correctly connected? Did the receiver blink when the train passed? With IB/TC you can also read CV116 to verify that the programming did work, and the sender is correctly connected.

## 3 Lissy sender

### 3.1 Technical data

Size	13,5 x 9 x 2,5
Current consumption	~ 50 mA
Factory value short address	3
Factory value long address	2000
Locomotive addresses	1-9999
Vehicle addresses	10000-16382
Categories	1-4
Programmable with	DCC Direct Mode (CV-programming) DCC Register Mode Motorola central
Sensor distance	max 12 mm

### 3.2 Installation of Lissy sender 68300

See 2.1

### 3.3 Programming and reading

The Lissy sender is programmed like a locomotive decoder. It is usually connected in parallel with the locomotive decoder, meaning that it listens to the same programming as is done to the locomotive decoder. If you use the first column below, both Lissy and the decoder are affected. CVs in the second column probably only affect the Lissy sender. But take care, these CVs may also have a (different) meaning in the locomotive decoder. In this case only the first column is usable.

Here follows the CV table.

CV standard	CV Lissy	Register	Motorola	Description	Values	Factory values
1	116	1	1	Short address	0-127	3
17	117		17	Long address, most significant byte		256
18	228		18	Long address, least significant byte		
29	129		29	Short address selected	0	0
				Long address selected (bit)	32	
	115	5	15	Train category (2 bits)	1-4	0
		8		Manufacturer		155

The Lissy sender can of course be used in conjunction with a decoder than cannot be programmed with DCC.

CV and registers can also be read by the Intellibox. However, should the locomotive decoder and Lissy have different values, an error message is shown.

To program long addresses, it's preferable to use the Intellibox menu.

### **3.4 Train categories**

The receiver can be configured to perform tasks for all locomotives or for locomotives with certain addresses. In addition, it is possible to select locomotive by train category. This requires that a category 1 to 4 has been set for each sender. The meaning of each category 1 to 4 is decided by you; for example electric locomotives which cannot use lines without category, local trains which should stop at certain places, or trains that have common functions, like whistle on f3.

### **3.5 Programming with a Motorola central**

Programming of the Lissy sender can also be done on a Motorola central, like this:

Put the locomotive with the IR sender right above a sensor. Make sure you can see the LED of the Lissy receiver. It's only this LED that may acknowledge your programming.

Reset the digital central, by pressing [stop] and [go] for at least 3 s. The display goes out, and the shortly the address 99 is shown.

Enter address 80 and press [stop].

Put the speed dial in direction change (left) position, keep it there and press [go].

Release the dial to speed 0. Now the LED of the Lissy receiver should blink. If you have the LocoNet display 63450 or the IB control 65400 (from software 2.0), you can see address and category in the display.

Enter the 'Motorola' number from the table in 3.3, and change direction. The receiver blinks twice. If a display is present the values of the register is shown.

Enter the desired value, and change direction. The receiver blinks once.

You can change other values by repeating the last two steps.

When ready, press [stop]. Next time power gets on, the sender will work with the new values.

To enter a value of 0, use 80 on a Märklin unit.

To program long addresses you must be aware that the address is calculated as  $CV17 * 256 + CV18$ .

## 4 Lissy receiver

### 4.1 Technical data

Size	53 x 50 x 21 mm
Current consumption	25 mA from LocoNet
Module article number for programming	68600
Module address	1-4095 Factory set: 1
Programmable	Intellibox, software from 1.3 Twin Center, software from 1.1 IB Control, software from 1.550
Commands in switching mode	10 for speed, 10 for locomotive function, and 10 for accessories
Automatic modes	7
Direction sense	Yes, if desired
Requires track section isolation	No
Depending on digital format	No
Data transmission	via LocoNet

Normally a Lissy receiver has two sensors. These may be placed a few millimeters apart (double sensor) or at completely different places (two single sensors). In the first case, direction and speed may be detected.

Chapter 4.2, 4.3 and 4.4 in the German manual, installation and connection of the receiver, is covered in chapter 2.2.

## 5 Lissy receiver configuration

The Lissy receiver is configured using an Intellibox with software 1.3 or later. If required, this software can be downloaded from Uhlenbrocks web site: [www.uhlenbrock.de](http://www.uhlenbrock.de). A Fleischmann Twin Center with software from 1.1 can also be used. If you have another LocoNet system you may perform the same task by attaching a IB Control with software 1.550

### 5.1 Lissy receiver addressing

In the menu of the Intellibox (or IB-Control) you select LocoNet programming.

First you enter the article number for the Lissy receiver which is 68600. Then you enter the module address of the receiver. This number is factory set to 1. When these two values are given, the receiver is addressed. The receiver notifies this by blinking. If you don't get connected, a '?' is shown in the display.

The receivers Configuration Variables may now be read and altered. These values are called LNCV, LocoNet Configuration Variables, to distinguish them from locomotive decoders CVs. The procedure is as normal with the IB; enter a CV number and press enter to read; go to the value, change and press enter to write.

The module address itself is found in LNCV 0. If you have lost it, there is a last resort called broadcast address, see 5.3.

## 5.2 Programming and reading

Reading is done as usual with the Intellibox, fill in the LNCV number and press [enter].

Writing is done by going to the value, change it, and [enter]. Please note that if you just move from LNCV number to value, the current value is not read from the receiver.

The rest of the manual describes the different LNCVs and their uses, arranged by different mode of operation.

## 5.3 Broadcast address

Module address 65535 is used to address all modules. Meaning of course, that only one receiver may be connected to LocoNet when using this technique. By reading LNCV 0 in this mode, it's possible to pick up a lost module address.

## 6 Lissy receiver common functions

LNCV	Description	Values	Factory setting
0	Module address and first sensor address	1-4095	1
1	Second sensor address, if single sensors		2
2	Function: Train recognition, chapter 8.2 Switching modes, chapter 8.3 Automatic modes, chapter 8.4 Resets, chapter 6.3	0-1 2-3 4-10,20-26 96-99	2
15	More options (bit field). Add values! Save operation state (automatic modes) at power off Don't save. Fleischmann Lokboss in use	8 0 4	8
16	Software version (Read only) 1.00, 1.01 ...	100, 101 ...	100, 101 ...

Lissy may be used with Fleischmann Lokboss, but in a rather restricted manner. It can only handle locomotive speed and functions, not any accessory commands. This means that of the automatic modes, only timer controlled shuttle traffic and stopping place make sense.

### **6.1 The module address of the receiver**

The receiver uses two variables for LocoNet identification. The first, LNCV 0, is the module address used when configuring the receiver. The same number is used when a double sensor sends information into the LocoNet. If two single sensors are used, the second sensor has its own identity, given by LNCV 1.

### **6.2 Function selection**

Lissy can be used for train identification, in switching mode, or in automatic mode. Each of these modes have several variations.

Train identification means that the Lissy sender is identified by single or double sensor, and information is sent over LocoNet, about locomotive ID, category and possibly, speed and direction. This information may be shown or used by a computer or other module connected to the LocoNet.

Switching mode means that train identification triggers one or several events, affecting the locomotives speed or function setting, or emits an accessory command (throws turnouts or signals).

Automatic mode means automatic control of shuttle traffic, stopping place, block section, and (hidden) yard control. Most functions are preprogrammed, only a limited number of parameters need be given.

### **6.3 Resets**

There are four kinds of reset of the receiver:

<b>LNCV 2</b>	<b>Description</b>
96	Reset of operation state. LNCVs are not changed.
97	Clear all LNCVs for switching mode (from LNCV 20)
98	Clear all LNCVs except 0 and 1 (address)
99	Reset all LNCVs to factory default

98 is suitable if you are going to enter configuration for a new application. Please note that LNCV 15 also controls if operation state (automatic mode) is saved at power off.

Factory defaults for a Lissy receiver are

<b>LNCV</b>	<b>Description</b>	<b>Value</b>
0	Module address, and first sensor address	1
1	Second sensor address	2
2	Direction sensitive switching mode	2
15	Save module operation mode at power off	8
	<i>Function 1</i>	
20	For all trains	20000
30	f0 (light)	1
40	Turn off if direction S1 -> S2	2
	<i>Function 2</i>	
21	For all trains	20000
31	f0 (light)	1
41	Turn on if direction S2 -> S1	11

## 7 First use

### 7.1 To switch a turnout

Lets say we want to switch the turnout with address 20 to straight (green), whenever a train passes a single sensor.

Do the following programming

<b>LNCV</b>	<b>Description</b>	<b>Value</b>
2	Switching mode with single sensors	3
80	All locomotives selected	20000
90	Set turnout 20 to straight	201

Comment: 200 should be used to set to curved.

Lets say that the other sensor instead should set signal at address 30 to red, if train with address 10 passes

Do the following programming

<b>LNCV</b>	<b>Description</b>	<b>Value</b>
2	Switching mode with single sensors	3
85	Locomotive 10 selected	10
95	Set signal 30 to red	300

Comment: The selection of 85-89 and 95-99 target the second sensor.

## 7.2 To implement a shuttle train station.

We have a simple shuttle train station with one track. We want an arriving train to wait for 20 s before new departure. There is an exit signal with address 10, which should be controlled by Lissy. We want the Lissy to ready for new operation 5 s after the departure.

Do the following programming

LNCV	Description	Value
2	Auto mode, shuttle train time controlled	4
4	Waiting time	20
6	Signal address to be changed	10
10	Set Lissy ready for new train 5 s after departure	5

With LNCV 10 = 266 (256+10) the signal 10 is automatically set to red when the Lissy is ready for new operation, which is 10 s after departure.

## 8 Functions

### 8.1 Prepare the Lissy receiver

It's recommended to reset the receiver before new configuration. This is done by writing 98 into LNCV 2. It's also good practice to plan your configuration and fill in a form with the values. This form may later serve as documentation.

### 8.2 Train recognition

Train recognition means a function that identifies trains and reports the result to LocoNet. No commands are sent directly, but the information may be shown, or used by a connected computer.

LNCVs used are shown below. Most important are 0, 1, 2 and 15.

LNCV	Description	Value
0	Module address and first sensor address	1-4095
1	Second sensor address, if single sensors	
2	Function:	
	Train recognition with one double sensor	0
	Train recognition with two single sensors	1

14	Scale factor for speed, if double sensor. x = distance in mm between the sensors	
	Scale 1, 1:32	576 * x
	Scale H0, 1:87	1566 * x
	Scale TT, 1:120	2160 * x
	Scale N, 1:160	2880 * x
15	More options (bit field). Add values!	
	Format on LocoNet: Uhlenbrock	1
	Digitrax "Transponder exits block"	2
	Digitrax "Transponder enters block"	3

For high speed (250 km/h) the measured error may be 5 %. The least speed possible to measure, is

Scale 1: 0.04608 \* s km/h

Scale H0: 0.12528 \* s km/h

Scale TT: 0.1728 \* s km/h

Scale N: 0.2304 \* s km/h

### 8.3 Switching mode

Switching mode is the straightforward digital replacement of switch tracks of the analogue world.

In switching mode Lissy is used to identify a locomotive, passing a double sensor, or one of two single sensors, and conditionally emit 5 locomotive functions, 5 speed commands, and 5 accessory commands per sensor. If double sensor is used, that makes 10 of each.

Examples:

- All trains of a certain category turn at a turnout. For example, an electric locomotive that should not go into a line without catenary.
- A locomotive with a whistle on f1, sounds when approaching a level crossing.
- Another train which uses f3 for the same purpose.
- A train with high beam light turns it off when approaching a station.
- All trains passing lower their speed to 60% of their original speed, or 20% of their top speed.

LNCV	Description	Values
0	Module address and first sensor address	1-4095
1	Second sensor address, if single sensors	

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2	Function: Switching mode with one double sensor Switching mode with two single sensors	2 3
11	Accessory address to deactivate Lissy. Always active Deactivation with red button on address 1-2000	0 1-2000
14	Scale factor for speed, if double sensor. x = distance in mm between the sensors Scale 1, 1:32 Scale H0, 1:87 Scale TT, 1:120 Scale N, 1:160	576 * x 1566 * x 2160 * x 2880 * x
15	More options (bit field). Add values! Format on LocoNet: no information Uhlenbrock Digitrax "Transponder exits block" Digitrax "Transponder enters block"	0 1 2 3
20-29	Address for locomotive functions. No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000
30-39	Function for locomotive functions Add values for f0=1, f1=2, f2=4, f3=8, f4=16, f5=32, f6=64, f7=128, f8=256, f9=512, f10=1024, f11=2048, f12=4096	1-8191
40-49	Locomotive function options. Add values Both directions Sensor 1 -> Sensor 2 Sensor 2 -> Sensor 1 Deactivate locomotive function Activate locomotive function Change loco function (active -> not active and vice versa) Apply time out Time for time out	0 2 3 0 8 16 32 Time (s) * 256

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50-59	Address for train speed No command Locomotive addresses Category 1-4 All trains	0 1-9999 20001-20004 20000
60-69	Train speed Absolute speed Relative speed Speed in km/h (only double sensor, with LNCV 14 given)	0-127 0%-255% 0-
70-79	Train speed option Both directions Sensor 1 -> Sensor 2 Sensor 2 -> Sensor 1 Absolute speed in 60-69 Relative speed in 60-69 Speed in km/h in 60-69	0 2 3 0 8 16
80-89	Decoder address which activates accessory or route command No command Locomotive address Vehicle address (Lissy sender without locomotive decoder) Category 1-4 All trains	0 1-9999 10000-16382 20001-20004 20000
90-99	Accessory, route or feedback command. c= 0 if red, 1 if green, 2 if free, 3 if occupied Ordinary accessory or feedback Routes Intellibox	1c-2000c 2001c-2024c
100-109	Options for accessory and route command Both directions Sensor 1 -> Sensor 2 Sensor 2 -> Sensor 1	0 2 3

If single sensors are used, the 5 first of each decade are used with sensor 1, the last 5 with sensor 2. For example, LNCV 20-24, 30-34 and so on relate to sensor 1, LNCV 75-79 to sensor 2.

2x, 3x and 4x are used together, as well as 5y, 6y and 7y, as well as 8z, 9z and 10z. For example, 23, 33 and 43 describe one function, and 87, 97 and 107 another

When the receiver is activated, first train speed commands are executed, then accessory commands, and last locomotive functions. Within each group commands are processed in order, and under condition described in 8.3.2.

### 8.3.1 Commands in general

In 2x, 5x and 8x addresses or categories are given that must be matched by the passing train, in order for the command to be executed. For the 2x and 5x groups, commands are always processed for the address of the passing locomotive only, also if the command should be executed for all locomotives or for a category.

### 8.3.2 Priority for command execution

Commands are given a priority depending on the type of address used (in 2x, 5x and 8x). Addresses have highest priority, categories have medium, and 'all' has low priority. The meaning of this is that once a command has been matched, following commands on lower priority are not executed.

Another way to put this is, that it gives the opportunity to configure "do xxx for all locomotives of category 2 except for locomotive 17 and 18". This is done by having three commands: first one matched by locomotive 17, then one matched by locomotive 18, and last the command matching category 2. If this is not desired, the commands for 17 and 18 should be placed after the one for category 2.

This priority counts within one group of commands (2x, 5x, and 8x). Once the 5x group is finished, the 8x is executed regardless of any matches in 5x group.

### 8.3.3 Locomotive functions

Locomotive functions are codes as in the table above. F0-f12 may be controlled, and several of them with a single command. The functions may be put on, put off, or changed (on->off or off->on). Time out may be given, so the functions state is reset after the time limit. Good for some sounds, and functions that need a reset before a new activation.

Example:

You want a blink with the light, and sound function f3 in 7s if a locomotive of category 4 is passing.

Then 2x =20004, 3x=1+8=9, and 4x is at least 8+32+256\*7.

### 8.3.4 Train speed

Train speed may be set in different ways.

Absolute speed is set in the range 0-127, which is recalculated internally depending on the number of speed steps of the decoder. Meaning, that 127 is maximum for all decoders.

Relative speed is a change of the current speed of the locomotive, and may be set as 0-255 %.

Prototypical speed is set in km/h, and requires setting in LNCV 14.

### 8.3.5 Accessory commands etc

Accessory commands can be used either to switch accessories like turnout and signals, or to activate a train route in Intellibox, or to simulate a feedback signal. The latter might server to trigger a function in IB-switch, or in a computer program for example.

The last digit in LNCV 9x tells what shall be done: 0 set to 'red', 1=set to 'green', 2=indicate 'free', 3='occupied'.

The digits before the last tells the address. Train routes in Intellibox are reached through special addresses 20001-20024.

## 8.4 Automatic modes

Following preprogrammed cases are called automatic modes.

### 8.4.1 Shuttle operation, timer controlled

A Lissy receiver brakes the train by the decoder brake delay. It lets the train wait for a predefined time, changes direction of travel, and starts the return trip. It is possible to operate the exit signal automatically, and also other functions in the locomotive or around the station. The speed upon arrival is remembered and reattained, unless changed by specific commands. This mode (and the other automatic modes) uses a double sensor where the train should begin to brake.

Important LNCVs are 0,2,3,4 and to some extent, 6 and 10.

LNCV	Description	Values
0	Module address and sensor address	1-4095
2	Function: Shuttle operation, timer controlled, normal Shuttle operation, timer controlled, announces 'occupied' on LocoNet, for example for yard control	4 20
3	Direction for activation Sensor 1 -> 2 Sensor 2 -> 1	0 1
4	Waiting time at station (seconds)	0-255
5	Waiting time for switching accessories. Train route commands may take significant time.	0-255
6	Address of exit signal where the train is waiting before starting from station. Lissy controls this signal, but only for the appearance.	1-2000

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7	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p> <p>Example: signal 137 red: 1370. IB Route 3 green: 20031. Feedback 14 occupied: 143.</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
8	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
9	<p>Block speed.</p> <p>Stop train with decoder deceleration</p> <p>Immediate (emergency) stop</p> <p>Slow speed, until third sensor.</p> <p>With sensors separated, or a third sensor after the double sensor, it's possible to do a precision stop. The speed 2-127 is the slow down speed used between the brake point at the stop point. See 8.5.2</p>	<p>0</p> <p>1</p> <p>2-127</p>
10	<p>Block option. Block state is changed to "free" when</p> <ul style="list-style-type: none"> <li>- signal at LNCV 6 is set to stop</li> <li>- time in 1-255 s has elapsed from start</li> <li>- time in 1-255 s has elapsed. In addition, signal at LNCV is set to stop</li> </ul>	<p>0</p> <p>1-255</p> <p>257-511</p>
11	<p>Accessory address to deactivate Lissy.</p> <p>Always active</p> <p>Deactivation with red button on address 1-2000</p>	<p>0</p> <p>1-2000</p>
12	<p>Category selection</p> <p>All trains selected for automatic function</p> <p>All categories except 1-4 selected for automatic function</p> <p>Only category 1-4 selected for automatic function</p>	<p>0</p> <p>1-4</p> <p>11-14</p>

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14	Speed factor (if LocoNet information, LNCV 15) d=distance between sensors in mm Scale 1, 1:32 Scale H0, 1:87 Scale TT, 1:120 Scale N, 1:160	576 * d 1566 * d 2160 * d 2880 * d
15	More functions (bit field). Add values (one of 0-3) LocoNet Format : No information Uhlenbrock Digitrax "Transponder exits block" Digitrax "Transponder enters block" Save operation state at power off Don't save. Fleischmann Lokboss in use	0 1 2 3 8 0 4
20-29	Address for locomotive functions. No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000
30-39	Function for locomotive functions Add values for f0=1, f1=2, f2=4, f3=8, f4=16, f5=32, f6=64, f7=128, f8=256, f9=512, f10=1024, f11=2048, f12=4096	1-8191
40-49	Locomotive function options. Add values At arrival at sensor When departing Deactivate locomotive function Activate locomotive function Change loco function (active -> not active and vice versa) Apply time out Time for time out	0 4 0 8 16 32 Time (s) * 256
50-59	Address for train speed No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000

60-69	Train speed Absolute speed Relative speed Speed in km/h (only double sensor, with LNCV 14 given)	0-127 0%-255% 0-
70-79	Train speed option At arrival at sensor When departing Absolute speed in 60-69 Relative speed in 60-69 Speed in km/h in 60-69	0 4 0 8 16
80-89	Decoder address which activates accessory or route command No command Locomotive address Vehicle address (Lissy sender without locomotive decoder) Category 1-4 All trains	0 1-9999 10000-16382 20001-20004 20000
90-99	Accessory, route or feedback command. c= 0 if red, 1 if green, 2 if free, 3 if occupied Ordinary accessory or feedback Routes Intellibox	1g-2000g 2001g-2024g
100-109	Options for accessory and route command At arrival at sensor When departing	0 4

The order of command (LNCV 20-109) execution is:

Accessory commands (80-109)

Await LNCV 5

Speed commands (LNCV 50-70)

Locomotive function commands (LNCV 20-40)

#### 8.4.2 Shuttle operation, manually started

A Lissy receiver brakes the train by the decoder brake delay. The exit signal is set to 'red', and the train waits. Lissy monitors external commands to the exit signal; if set to 'green', it changes direction of travel, and starts the return trip. It is possible to operate other functions in the locomotive or around the station automatically. The speed upon arrival is remembered and

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reattained, unless changed by specific commands. This mode (and the other automatic modes) uses a double sensor where the train should begin to brake.

Important LNCVs are 0,2,3,6 and to some extent, 10.

<b>LNCV</b>	<b>Description</b>	<b>Värden</b>
0	Module address and sensor address	1-4095
2	Function:  Shuttle operation, manual, normal  Shuttle operation, manual, announces 'occupied' on LocoNet, for example for yard control	5  21
3	Direction for activation  Sensor 1 -> 2  Sensor 2 -> 1	0  1
5	Waiting time for switching accessories. Train route commands may take significant time.	0-255
6	Address of exit signal where the train is waiting before starting from station. Lissy may set this signal to red (see LNCV 10), and awaits external green command before starting the return	1-2000
7	Accessory, route or feedback command.  c= 0 if red, 1 if green  Triggered by all trains at arrival (see LNCV 12)  Not used  Ordinary accessory or feedback  Routes Intellibox  Feedback, f=2 if free, 3 if occupied	0  1c-2000c  2001c-2024c  1f-2048f
8	Accessory, route or feedback command.  c= 0 if red, 1 if green  Triggered by all trains at arrival (see LNCV 12)  Not used  Ordinary accessory or feedback  Routes Intellibox  Feedback, f=2 if free, 3 if occupied	0  1c-2000c  2001c-2024c  1f-2048f

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9	<p>Block speed.</p> <p>Stop train with decoder deceleration</p> <p>Immediate (emergency) stop</p> <p>Slow speed, until third sensor.</p> <p>With sensors separated, or a third sensor after the double sensor, it's possible to do a precision stop. The speed 2-127 is the slow down speed used between the brake point at the stop point. See 8.5.2.</p>	<p>0</p> <p>1</p> <p>2-127</p>
10	<p>Block option. Block state is changed to "free" when</p> <ul style="list-style-type: none"> <li>- signal at LNCV 6 is set to stop</li> <li>- time in 1-255 s has elapsed from start</li> <li>- time in 1-255 s has elapsed. In addition, signal at LNCV is set to stop</li> </ul>	<p>0</p> <p>1-255</p> <p>257-511</p>
11	<p>Accessory address to deactivate Lissy.</p> <p>Always active</p> <p>Deactivation with red button on address 1-2000</p>	<p>0</p> <p>1-2000</p>
12	<p>Category selection</p> <p>All trains selected for automatic function</p> <p>All categories except 1-4 selected for automatic function</p> <p>Only category 1-4 selected for automatic function</p>	<p>0</p> <p>1-4</p> <p>11-14</p>
14	<p>Speed factor (if LocoNet information, LNCV 15)</p> <p>d=distance between sensors in mm</p> <p>Scale 1, 1:32</p> <p>Scale H0, 1:87</p> <p>Scale TT, 1:120</p> <p>Scale N, 1:160</p>	<p><math>576 * d</math></p> <p><math>1566 * d</math></p> <p><math>2160 * d</math></p> <p><math>2880 * d</math></p>
15	<p>More functions (bit field). Add values (one of 0-3)</p> <p>LocoNet Format : No information</p> <p>Uhlenbrock</p> <p>Digitrax "Transponder exits block"</p> <p>Digitrax "Transponder enters block"</p> <p>Save operation state at power off</p> <p>Don't save.</p>	<p>0</p> <p>1</p> <p>2</p> <p>3</p> <p>8</p> <p>0</p>

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20-29	Address for locomotive functions. No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000
30-39	Function for locomotive functions Add values for f0=1, f1=2, f2=4, f3=8, f4=16, f5=32, f6=64, f7=128, f8=256, f9=512, f10=1024, f11=2048, f12=4096	1-8191
40-49	Locomotive function options. Add values At arrival at sensor When departing Deactivate locomotive function Activate locomotive function Change loco function (active -> not active and vice versa) Apply time out Time for time out	0 4 0 8 16 32 Time (s) * 256
50-59	Address for train speed No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000
60-69	Train speed Absolute speed Relative speed Speed in km/h (only double sensor, with LNCV 14 given)	0-127 0%-255% 0-
70-79	Train speed option At arrival at sensor When departing Absolute speed in 60-69 Relative speed in 60-69 Speed in km/h in 60-69	0 4 0 8 16

80-89	Decoder address which activates accessory or route command No command Locomotive address Vehicle address (Lissy sender without locomotive decoder) Category 1-4 All trains	0 1-9999 10000-16382 20001-20004 20000
90-99	Accessory, route or feedback command. c= 0 if red, 1 if green, 2 if free, 3 if occupied Ordinary accessory or feedback Routes Intellibox	1g-2000g 2001g-2024g
100-109	Options for accessory and route command At arrival at sensor When departing	0 4

The order of command (LNCV 20-109) execution is:

Accessory commands (80-109)

Await LNCV 5

Speed commands (LNCV 50-70)

Locomotive function commands (LNCV 20-40)

### 8.4.3 Stopping place

A Lissy receiver identifies the train, sets a signal to red, and brakes the train gently. It holds for a predefined time. Then Lissy sets the signal to green and starts the train again. It is possible to operate other functions in the locomotive or around the station automatically. The speed upon arrival is remembered and reattained, unless changed by specific commands. This mode (and the other automatic modes) uses a double sensor where the train should begin to brake.

Important LNCVs are 0,2,3,4 and to some extent, 6 and 10.

LNCV	Description	Värden
0	Module address and sensor address	1-4095
2	Function: Stopping place, normal Stopping place, announces 'occupied' on LocoNet, for example for yard control	6 22

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3	<p>Direction for activation</p> <p>Sensor 1 -&gt; 2</p> <p>Sensor 2 -&gt; 1</p> <p>Both directions</p>	<p>0</p> <p>1</p> <p>2</p>
4	Waiting time at station (seconds)	0-255
5	Waiting time for switching accessories. Train route commands may take significant time.	0-255
6	Address of exit signal where the train is waiting before starting from station. Lissy controls this signal, but only for the appearance. The next address is used if train operation in the opposite direction (S2->S1)	1-2000
7	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
8	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
9	<p>Block speed.</p> <p>Stop train with decoder deceleration</p> <p>Immediate (emergency) stop</p> <p>Slow speed, until third sensor.</p> <p>With sensors separated, or a third sensor after the double sensor, it's possible to do a precision stop. The speed 2-127 is the slow down speed used between the brake point at the stop point. See 8.5.2.</p>	<p>0</p> <p>1</p> <p>2-127</p>
10	<p>Block option. Block state is changed to "free" when</p> <ul style="list-style-type: none"> <li>- signal at LNCV 6 is set to stop</li> <li>- time in 1-255 s has elapsed from start</li> <li>- time in 1-255 s has elapsed. In addition, signal at LNCV is set to stop</li> </ul>	<p>0</p> <p>1-255</p> <p>257-511</p>

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11	Accessory address to deactivate Lissy. Always active Deactivation with red button on address 1-2000	0 1-2000
12	Category selection All trains selected for automatic function All categories except 1-4 selected for automatic function Only category 1-4 selected for automatic function	0 1-4 11-14
14	Speed factor (if LocoNet information, LNCV 15) d=distance between sensors in mm Scale 1, 1:32 Scale H0, 1:87 Scale TT, 1:120 Scale N, 1:160	576 * d 1566 * d 2160 * d 2880 * d
15	More functions (bit field). Add values (one of 0-3) LocoNet Format : No information Uhlenbrock Digitrax "Transponder exits block" Digitrax "Transponder enters block" Save operation state at power off Don't save. Fleischmann Lokboss in use	0 1 2 3 8 0 4
20-29	Address for locomotive functions. No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000
30-39	Function for locomotive functions Add values for f0=1, f1=2, f2=4, f3=8, f4=16, f5=32, f6=64, f7=128, f8=256, f9=512, f10=1024, f11=2048, f12=4096	1-8191

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40-49	Locomotive function options. Add values	
	Both directions (if LNCV 3=2)	0
	Sensor 1 -> Sensor 2	2
	Sensor 2 -> Sensor 1	3
	At arrival at sensor	0
	When departing	4
	Deactivate locomotive function	0
	Activate locomotive function	8
	Change loco function (active -> not active and vice versa)	16
	Apply time out	32
	Time for time out	Time (s) * 256
50-59	Address for train speed	
	No command	0
	Locomotive addresses	1-9999
	Category 1-4	20001-20004
	All trains	20000
60-69	Train speed	
	Absolute speed	0-127
	Relative speed	0%-255%
	Speed in km/h (only double sensor, with LNCV 14 given)	0-
70-79	Train speed option	
	Both directions (if LNCV 3=2)	0
	Sensor 1 -> Sensor 2	2
	Sensor 2 -> Sensor 1	3
	At arrival at sensor	0
	When departing	4
	Absolute speed in 60-69	0
	Relative speed in 60-69	8
	Speed in km/h in 60-69	16

80-89	Decoder address which activates accessory or route command No command Locomotive address Vehicle address (Lissy sender without locomotive decoder) Category 1-4 All trains	0 1-9999 10000-16382 20001-20004 20000
90-99	Accessory, route or feedback command. c= 0 if red, 1 if green, 2 if free, 3 if occupied Ordinary accessory or feedback Routes Intellibox	1g-2000g 2001g-2024g
100-109	Options for accessory and route command Both directions (if LNCV 3=2) Sensor 1 -> Sensor 2 Sensor 2 -> Sensor 1 At arrival at sensor When departing	0 2 3 0 4

The order of command (LNCV 20-109) execution is:

Accessory commands (80-109)

Await LNCV 5

Speed commands (LNCV 50-70)

Locomotive function commands (LNCV 20-40)

#### 8.4.4 Block section control

A Lissy receiver monitors a block section with an exit signal. If a train passes its double sensor when the signal is red, Lissy brakes the train. It sets the sections entry signal to red, and the previous signal to green, and awaits green from the sections exit signal. Then it starts the train. In this way it's possible to combine several blocks, each with one Lissy receiver.

It is possible to operate other functions in the locomotive or around the station automatically. The speed upon arrival is remembered and reattained unless changed by specific commands. This mode (and the other automatic modes) uses a double sensor where the train should begin to brake.

Important LNCVs are 0,2,3,6,7,8.

LNCV	Description	Värden
0	Module address and sensor address	1-4095

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2	<p>Function:</p> <p>Block section control, normal</p> <p>Block section control, announces 'occupied' on LocoNet, for example for yard control</p>	<p>7</p> <p>23</p>
3	<p>Direction for activation</p> <p>Sensor 1 -&gt; 2</p> <p>Sensor 2 -&gt; 1</p>	<p>0</p> <p>1</p>
5	<p>Waiting time for switching accessories. Train route commands may take significant time.</p>	<p>0-255</p>
6	<p>Address of a signal. Lissy listens for commands to this signal, to decide if trains should stop or not.</p>	<p>1-2000</p>
7	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p> <p>May be used to set signal at block entry to red</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
8	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p> <p>May be used to set signal at previous block entry to red</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
9	<p>Block speed.</p> <p>Stop train with decoder deceleration</p> <p>Immediate (emergency) stop</p> <p>Slow speed, until third sensor.</p> <p>With sensors separated, or a third sensor after the double sensor, it's possible to do a precision stop. The speed 2-127 is the slow down speed used between the brake point at the stop point. See 8.5.2</p>	<p>0</p> <p>1</p> <p>2-127</p>
10	<p>Block option. Block state is changed to "free" when</p> <p>- signal at LNCV 6 is set to stop</p>	<p>0</p>

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11	Accessory address to deactivate Lissy. Always active Deactivation with red button on address 1-2000	0 1-2000
12	Category selection All trains selected for automatic function All categories except 1-4 selected for automatic function Only category 1-4 selected for automatic function	0 1-4 11-14
14	Speed factor (if LocoNet information, LNCV 15) d=distance between sensors in mm Scale 1, 1:32 Scale H0, 1:87 Scale TT, 1:120 Scale N, 1:160	576 * d 1566 * d 2160 * d 2880 * d
15	More functions (bit field). Add values (one of 0-3) LocoNet Format : No information Uhlenbrock Digitrax "Transponder exits block" Digitrax "Transponder enters block" Save operation state at power off Don't save.	0 1 2 3 8 0
20-29	Address for locomotive functions. No command Locomotive address Category 1-4 All trains	0 1-9999 20001-20004 20000
30-39	Function for locomotive functions Add values for f0=1, f1=2, f2=4, f3=8, f4=16, f5=32, f6=64, f7=128, f8=256, f9=512, f10=1024, f11=2048, f12=4096	1-8191

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40-49	Locomotive function options. Add values At arrival at sensor When departing Deactivate locomotive function Activate locomotive function Change loco function (active -> not active and vice versa) Apply time out Time for time out	0 4 0 8 16 32 Time (s) * 256
50-59	Address for train speed No command Locomotive addresses Category 1-4 All trains	0 1-9999 20001-20004 20000
60-69	Train speed Absolute speed Relative speed Speed in km/h (only double sensor, with LNCV 14 given)	0-127 0%-255% 0-
70-79	Train speed option At arrival at sensor When departing Absolute speed in 60-69 Relative speed in 60-69 Speed in km/h in 60-69	0 4 0 8 16
80-89	Decoder address which activates accessory or route command No command Locomotive address Vehicle address (Lissy sender without locomotive decoder) Category 1-4 All trains	0 1-9999 10000-16382 20001-20004 20000
90-99	Accessory, route or feedback command. c= 0 if red, 1 if green, 2 if free, 3 if occupied Ordinary accessory or feedback Routes Intellibox	1g-2000g 2001g-2024g

100-109	Options for accessory and route command	
	At arrival at sensor	0
	When departing	4

The order of command (LNCV 20-109) execution is:

Accessory commands (80-109)

Await LNCV 5

Speed commands (LNCV 50-70)

Locomotive function commands (LNCV 20-40)

### 8.4.5 Yard control

Lissy may control a whole yard, typically a hidden yard. One Lissy receiver called 'Entry manager' is placed before the yard. This sets the right track for arriving train and stops them if the track is occupied. Every yard track, (2-10 tracks) may have a Lissy receiver which stops the trains, and indicate that the track is occupied. There may also be one Lissy 'Exit manager' after the station which selects which trains should start when the line is free.

The setup may be used without exit manager, or without entry manager if semi automatic operation is wanted. It is also possible to connect a entry manager to two shuttle train Lissys for example. With these modes route control is required, either in the Intellibox or with an IB-switch.

#### 8.4.5.1 Entry manager

The double sensor of an entry manager is placed before the first turnout of the yard, followed by a signal as usual (for the looks of it). Lissy is configured with the module for every yard track, and preferences about what track should be selected for each train and/or train category. It triggers route commands in order to select a free track. If no matching track is found, or all matching tracks are occupied. the arriving train will be stopped until a track becomes free. There are 8 selection criteria per yard track.

Important LNCVs are 0,2,3,6 and 20-119 (selection)

LNCV	Description	Värden
0	Module address and sensor address	1-4095
2	Function:	
	Yard entry manager, normal	8
	Yard entry manager, announces 'occupied' on LocoNet	24
3	Direction for activation	
	Sensor 1 -> 2	0
	Sensor 2 -> 1	1
5	Waiting time for switching accessories. Train route commands may take significant time.	0-255

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6	Address of signal where the train may wait before entering the station. Lissy listens for commands to this signal, to decide if trains should stop or not.	1-2000
7	Accessory, route or feedback command. c= 0 if red, 1 if green Triggered by all trains at arrival (see LNCV 12) Not used Ordinary accessory or feedback Routes Intellibox Feedback, f=2 if free, 3 if occupied	0 1c-2000c 2001c-2024c 1f-2048f
8	Accessory, route or feedback command. c= 0 if red, 1 if green Triggered by all trains at arrival (see LNCV 12) Not used Ordinary accessory or feedback Routes Intellibox Feedback, f=2 if free, 3 if occupied	0 1c-2000c 2001c-2024c 1f-2048f
9	Block speed. Stop train with decoder deceleration Immediate (emergency) stop Slow speed, until third sensor. With sensors separated, or a third sensor after the double sensor, it's possible to do a precision stop. The speed 2-127 is the slow down speed used between the brake point at the stop point. See 8.5.2.	0 1 2-127
10	Block option. Block state is changed to "free" when - signal at LNCV 6 is set to stop	0
11	Accessory address to deactivate Lissy. Always active Deactivation with red button on address 1-2000	0 1-2000
12	Category selection All trains selected for automatic function All categories except 1-4 selected for automatic function Only category 1-4 selected for automatic function	0 1-4 11-14

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14	Speed factor (if LocoNet information, LNCV 15) d=distance between sensors in mm Scale 1, 1:32 Scale H0, 1:87 Scale TT, 1:120 Scale N, 1:160	576 * d 1566 * d 2160 * d 2880 * d
15	More functions (bit field). Add values (one of 0-3) LocoNet Format : No information Uhlenbrock Digitrax "Transponder exits block" Digitrax "Transponder enters block" Save operation state at power off Don't save.	0 1 2 3 8 0
20	Lissy module address for stations track 1	1-4095
21	Route command to enter track 1 (Intellibox) c means 0 if red, 1 if green If IB switch, (feedback triggered) u=2 if free, 3 if occupied Last in the train route, the signal in LNCV 6 should get a 'go' command.	2001c-2024c 1u-xxxu
22-29	Address or train category which should be allowed to track 1 Locomotive address Category 1-4 All trains	1-9999 20001-20004 20000
30-39	As 20-29 for station track 2	
40-49	As 20-29 for station track 3	
50-59	As 20-29 for station track 4	
60-69	As 20-29 for station track 5	
70-79	As 20-29 for station track 6	
80-89	As 20-29 for station track 7	
90-99	As 20-29 for station track 8	
100-109	As 20-29 for station track 9	
110-119	As 20-29 for station track 10	

When a train passes the double sensor, Lissy first looks for a track with the address of the locomotive as selection criterion. If found, the first of these that is free is selected for entry; if none of them is free, the train must wait until one becomes free.

If the address is not found, the same procedure is repeated for the train category.

If the category is not found either, a third search is done for "all trains" (address 20000). It is recommended to have at least one track with this address or else a train which does not fulfil the other criteria is stopped forever at the entrance to the yard.

### 8.4.5.2 Exit manager

The double sensor of the exit manager is placed at least one train length after the yard, with a following signal. The exit manager knows the module address of Lissy for each track, see 8.4.5.3, and route commands for setting an exit route from each track.

When the exit block is free, the exit manager selects a train to start, either in chronological order, or randomly. It's also possible to select a train in a way that any waiting train before the yard should get a free track as soon as possible (if LNCV 13 set).

Important LNCVs are 0,2,3,6 and 20-119 (selection).

LNCV	Description	Värden
0	Module address and sensor address	1-4095
2	Function: Yard exit manager, normal, track choice chronological Yard exit manager, normal, track choice random As 9, announces 'occupied' on LocoNet As 10, announces 'occupied' on LocoNet	9 10 25 26
3	Direction for activation Sensor 1 -> 2 Sensor 2 -> 1	0 1
5	Waiting time for switching accessories. Train route commands may take significant time.	0-255
6	Address of a signal after the exit of a station, the first block signal after the station. Lissy listens for commands to this signal, to decide if trains should stop or not.	1-2000
7	Accessory, route or feedback command. c= 0 if red, 1 if green Triggered by all trains at arrival (see LNCV 12) Not used Ordinary accessory or feedback Routes Intellibox Feedback, f=2 if free, 3 if occupied Can be used for a route that sets all signals of the station to stop.	0 1c-2000c 2001c-2024c 1f-2048f

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8	<p>Accessory, route or feedback command.</p> <p>c= 0 if red, 1 if green</p> <p>Triggered by all trains at arrival (see LNCV 12)</p> <p>Not used</p> <p>Ordinary accessory or feedback</p> <p>Routes Intellibox</p> <p>Feedback, f=2 if free, 3 if occupied</p>	<p>0</p> <p>1c-2000c</p> <p>2001c-2024c</p> <p>1f-2048f</p>
9	<p>Block speed.</p> <p>Stop train with decoder deceleration</p> <p>Immediate (emergency) stop</p> <p>Slow speed, until third sensor.</p> <p>With sensors separated, or a third sensor after the double sensor, it's possible to do a precision stop. The speed 2-127 is the slow down speed used between the brake point at the stop point. See 8.5.2.</p>	<p>0</p> <p>1</p> <p>2-127</p>
10	<p>Block option. Block state is changed to "free" when signal at LNCV 6 is set to stop</p>	<p>0</p>
11	<p>Accessory address to deactivate Lissy.</p> <p>Always active</p> <p>Deactivation with red button on address 1-2000</p>	<p>0</p> <p>1-2000</p>
12	<p>Category selection</p> <p>All trains selected for automatic function</p> <p>All categories except 1-4 selected for automatic function</p> <p>Only category 1-4 selected for automatic function</p>	<p>0</p> <p>1-4</p> <p>11-14</p>
13	<p>Module address for entry manager</p> <p>Not connected</p> <p>Used to allow the exit manager to select track suitable to let trains waiting at entry continue.</p>	<p>1-4095</p> <p>0</p>
14	<p>Speed factor (if LocoNet information, LNCV 15)</p> <p>d=distance between sensors in mm</p> <p>Scale 1, 1:32</p> <p>Scale H0, 1:87</p> <p>Scale TT, 1:120</p> <p>Scale N, 1:160</p>	<p>576 * d</p> <p>1566 * d</p> <p>2160 * d</p> <p>2880 * d</p>

15	More functions (bit field). Add values (one of 0-3) LocoNet Format : No information Uhlenbrock Digitrax "Transponder exits block" Digitrax "Transponder enters block" Save operation state at power off Don't save.	0 1 2 3 8 0
20	Lissy module address for stations track 1	1-4095
21	Route command to exit track 1 (Intellibox) c means 0 if red, 1 if green If IB-switch, (feedback triggered) u=2 if free, 3 if occupied Last in the train route, the signal for station track 1 exit should get a 'go' command.	2001c-2024c  1u-xxxu
22-29	Address or train category which should be allowed to track 1 Locomotive address Category 1-4 All trains Needed only if the entry manager and the exit manager are connected (LNCV 13)	1-9999 20001-20004 20000
30-39	As 20-29 for station track 2	
40-49	As 20-29 for station track 3	
50-59	As 20-29 for station track 4	
60-69	As 20-29 for station track 5	
70-79	As 20-29 for station track 6	
80-89	As 20-29 for station track 7	
90-99	As 20-29 for station track 8	
100-109	As 20-29 for station track 9	
110-119	As 20-29 for station track 10	

### 8.4.5.3 Lissy receiver for yard track

For every track in the yard use a Lissy receiver with automatic function 23, Block section control with occupied announcement.

Other functions with occupied announcement can be used as well. One example is a shuttle train station with more than one track, or a yard with more than 10 tracks.

## 8.5 Special Functions

The chapter of the Geman manual is discussed where it belongs, except for 8.5.2, precision stop.

## 8.5.1 Resets

See 6.3

## 8.5.2 Precision stop

The chapters with the automatic modes, describe how the train when passing the double sensor, brake with the programmed deceleration. Different trains stop at different positions, and the initial speed also affects this position.

However, this behaviour can easily be changed by separating the two sensors, so that the first is placed where the brake should begin, and the second where the train should finally stop. In LNCV 9 a low speed (in the range 2-127) is set, meaning the speed the train should brake to when passing the first sensor. The speed 2-127 is recalculated to fit the decoder used. Speed 0 is set meaning that the train should stop, possibly before the target, and 1 means an emergency brake application.

This does not work if the section is used in both directions. In this case a third sensor is used. A double sensor is placed where the brake should begin, and the third at the target position. This third is connected in parallel with the second sensor. Avoid too much light on the unused sensor; this may cause malfunction. And, if the receiver is of version 1.00 the third sensor should be connected in parallel with the first instead, and the train should not pass both the first and the last sensor within 2.5s, to assure that the train really stops at target.

## 9 Tips and tricks

### 9.1 *Saving state, and shutting off*

See 6.3

### 9.2 *Shuttle operation and multi traction*

There is no problem with having a Lissy sender in each end of a shuttle train. This allows for stopping at the same place regardless of which end comes first.

In multi traction the first locomotive is identified with its address. The central unit keeps track on multi traction sets, and sends the correct commands to all locomotives.

### 9.3 *Duration of commands*

A command takes typically 0.5 s. If several commands are executed, this takes correspondingly longer time.

Within locomotive function, some functions may have an assigned duration, for example a whistle. Execution of the following commands must wait until such commands are done. So, be careful!

### 9.4 *Distributed stations*

In 8.4.5 is shown how yard entry and exit managers may be used to automatize yards. Clearly, nothing says that the tracks of this yard must be located physically after the entry manager. By

distributing such Lissys around the layout, very interesting traffic patterns may be implemented. This obviously requires careful planning though. Recommended for those who love intellectual difficulties!

### 9.5 ***Lissy and Daisy***

Lissy may be used in a Daisy system. Vehicle addresses above 9999 cannot be used. If you want to use route commands (as in entry and exit mangers), an IB-switch must be used. The sender is easily programmed with CV programming.

It's not possible to configure/program a Lissy with only a Daisy system. But it works OK with a connected IB-Control, with at least software 1.550. The IB control is used as an Intellibox in this case. It may be easiest to bring your Lissy receiver to a friend with an Intellibox though.

### 9.6 ***Lissy and 6021***

Lissy may as well be operated together with a 6021 system, with a LocoNet adapter 63820. f0-f4 commands may be used, and speed commands, in the address range 1-80. 256 turnouts may be controlled, also if keyboard is missing. To use route commands an IB-switch must be connected, and to program the receiver an IB control (or Intellibox). The sender is programmable also with a 6021.

### 9.7 ***Lissy and Fleischmann Twin Center***

Twin-Center must be upgraded to version 1.1. The software is found at Fleischmanns web site. After that the Twin Center may be used exactly as an Intellibox.

### 9.8 ***Lissy and Fleischmann LOK-BOSS***

Lissy can be used with limitations also together with LOK-BOSS. Accessory commands are not available; therefore only shuttle operation and stopping place operation make sense with this setup.

### 9.9 ***Install sensors in Märklin C-track***

Pictures in the Geman manual

1. Cut the middle rail for the distance of about 1-1.5 cm., and remove some plastic.
2. Drill a 3 mm hole for each sensor.
3. Insert the sensors in the holes. The sensors should not go above the contact studs. May be glued with instant glue.
4. Connect the middle rail connector of each end with wire.