

LocoBooster



HDM05

Liability disclaimer:

Use all items that can be bought and installation instructions that can be found on this site at your own risk. They have been developed for personal use, and I find them very useful. That is why I wish to share them with other model railroad hobbyists. All items and procedures have been tested and used on my own model railroad systems without causing any damage, but this does not necessarily imply that all modifications and procedures will work in any and all environments or systems. I cannot take any responsibility when items or procedures are used under different circumstances. Always use your own judgment and common sense!

3A Booster module

The Booster is an amplifier of the digital signal coming from a digital commando station (IB, TC... or other). Via the Booster the locomotives can be supplied with the necessary power and the digital information necessary to control them.

For a digital track several Boosters will be needed to supply all locomotives with power.

It is advisable to use several smaller Boosters instead of one large Booster. In case of a short-circuit sparks will be generated that will create burn marks on the wheels of the locomotives. On the long term these sparks will damage the wheels.

The Booster is available in 3 versions:

L - BOOSTER

The small Booster is ideal for modular tracks in a LocoNet network with a Command station. This way the Boosters can be divided over the different modules. This Booster is controlled completely via the Loconet cable. The board is equipped with control circuits to check the presence of the incoming RAILS SYNC signal, and to check for short circuits on the board; the status of the board is indicated by means of feedback commands.

The Booster output can be switched on and off by means of a Fixed Contact Output.

(Loconet commando OPC_SW_REQ [0xB0])

The Loconet command "General Power Off" switched the Booster output off

(Loconet commando OPC_GPOFF [0x82])

And the command "General Power On" switched the Booster output again on.

(Loconet commando OPC_GPON [0x83])

The Booster PIC is based on the LocoIO and also has 4 ports that work identically as those on the LocoIO.

The setting of the PIC is done by means of the LocoHDL configuration program.

N – BOOSTER

This Booster is functional identical on a L-Booster only the input signal is not coming from the Loconet cable but from an other digital system.

S – BOOSTER

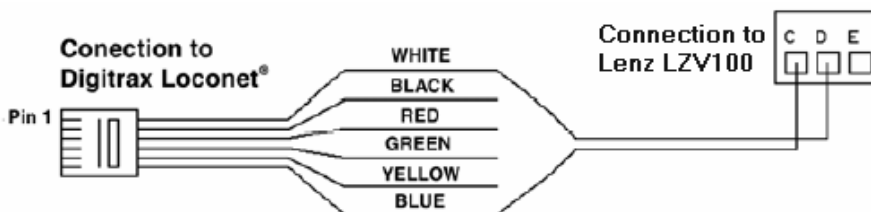
This version has no Loconet connection. The digital signal comes from another digital system.

This is a simple Booster with control circuits to check the incoming signal, and to check for short circuits on the board.

Connections:

J1 and J2	Loconet (L-Booster en N-Booster)	
J3	Power and Rail	
	J3 pin1	15V-AC (yellow) for HO-scale and 12VAC for N-Scale
	J3 pin2	15V-AC (brown) for HO-scale and 12VAC for N-Scale
	J3 pin3	Ground connection Rail (brown or K)
	J3 pin4	Rail connection (red or J) or connection to Current sensors
J4	LocoIO port 1 to 4 (L-Booster en N-Booster)	
J5	Digital signal (N-Booster en S-Booster)	
	J5 pin1	Rail connection (red or J)
	J5 pin2	Ground connection Rail (brown or K)

For Lenz: If no other command station is connected to, you can also use an L-Booster.

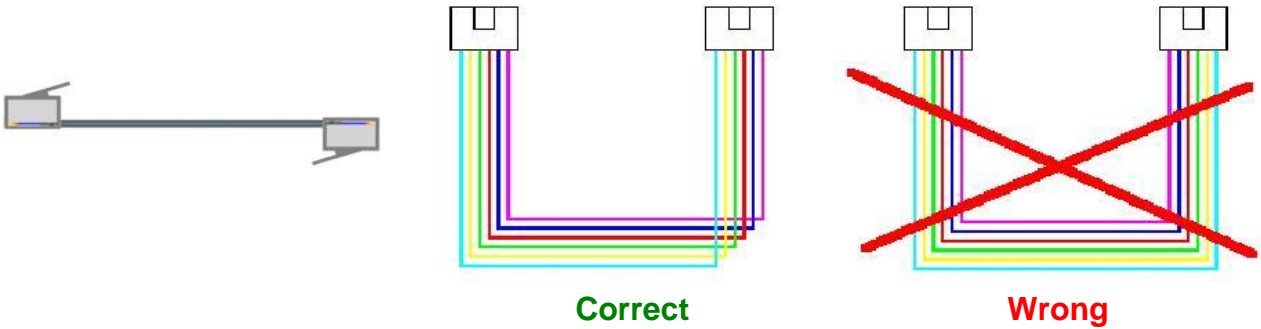


Remark:

- An AC Power supply of a LocoIO and LocoBuffer may **NOT** connected with the AC power supply of a Booster or the AC power supply of an Intellibox or another Command station.
- The 15VAC power supply must have at least 70VA power and may not exceed 16VAC.
- ! Replace PIC software BST001 and BST002 with PIC software version BST003 or later for better protection in case of a short-circuit.

Loconet connection:

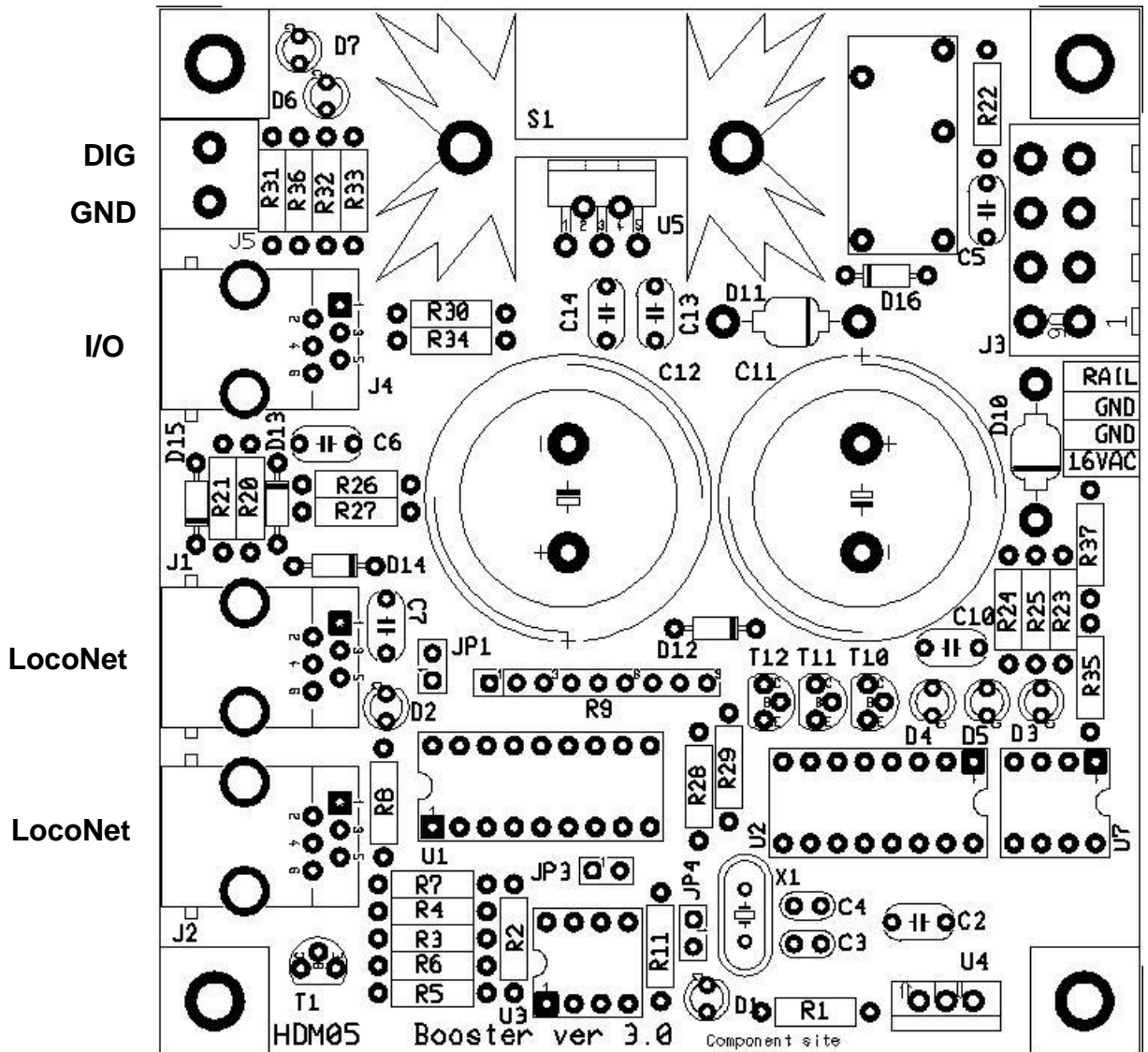
The connection to Loconet is with a 6-wire cable with RJ12 connectors. Important is that on the connector on both ends of the cable the pin1 to pin1 is connected.



LED:

D1	Green	5V Power OK
D2	Red	Loconet activity
D4	Yellow	Railsync-B OK (L-Booster)
D5	Yellow	Railsync-A OK (L-Booster) of Digital Signal (N-Booster and S-Booster)
D3	Yellow	Output power OK
D6 and D7	Red	Short circuit when D3 is OFF Power output switched OFF when D3 is ON

Component place:



Jumper setting:

JP1 Off Input status on Power-ON, after a Loconet disconnection and on a GPON.
On Only input status on a GPON

Remarks:

- User of a Digitrax Command Station DB150 and Intellibox need to set JP1 On.

- Starting from LocoBooster version BST004 is JP1 no longer used, this function will be taken over by the LocoHDL utility program.

JP3 Off L-Booster or N-Booster
On S-Booster

JP4 Off normal
On not used

List of mounted parts on board:

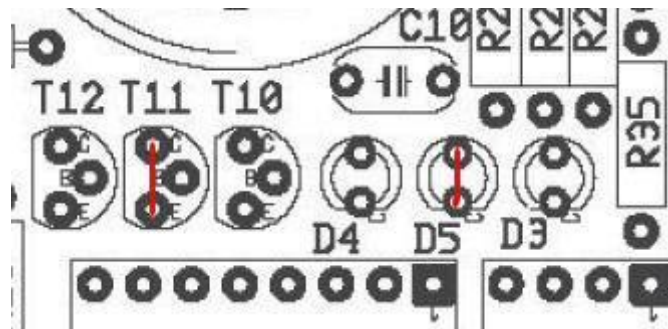
UT_DEVICE	Refdes	L-Booster	N-Booster	S-Booster
ELCO	C11,C12	6800uF/35V	6800uF/35V	6800uF/35V
Capacitor	C2,C5,C10,C13,C14	100nF	100nF	100nF
Capacitor	C6	10nF	10nF	10nF
Capacitor	C7	10nF	X	X
Capacitor	C3,C4	15pF	15pF	15pF
LED 3mm	D1	Green	Green	Green
LED 3mm	D3,D4	Yellow	Yellow	Yellow
LED 3mm	D5	Yellow	*	*
LED 3mm	D2	Red	Red	X
LED 3mm	D6,D7	Red	Red	Red
Diode	D10,D11	BYV28	BYV28	BYV28
Diode	D12,D16	1N4148	1N4148	1N4148
Diode	D13,D14	1N4148	X	X
Diode	D15	X	1N4148	1N4148
RJ12	J1,J2,J4	RJ12	RJ12	X
HDR_4	J3	4 pins	4 pins	4 pins
HDR_2	J5	X	2 pins	2 pins
Jumper	JP1,JP3,JP4	2 pins	2 pins	2 pins
Transistor	T1	BC337-40	BC337-40	X
Transistor	T11	BC547B	**	**
Transistor	T10,T12	BC547B	BC547B	BC547B
IC	U1	PIC16F648A-I/P	PIC16F648A-I/P	PIC16F648A-I/P
DC-Optocoupler	U2	ILQ621GB	ILQ621GB	ILQ621GB
IC	U3	LM311	LM311	X
IC	U7	LM311	LM311	LM311
IC	U4	7805	7805	7805
IC	U5	LM675T	LM675T	LM675T
Relay	U6	Schrack RE032024	Schrack RE032024	Schrack RE032024
Resistor	R22	1Ω	1Ω	1Ω
Resistor	R28	390Ω	390Ω	390Ω
Resistor	R1,R33	1kΩ	1kΩ	1kΩ
Resistor	R8	1kΩ	1kΩ	X
Resistor	R23,R24,R25,R34	3k9Ω	3k9Ω	3k9Ω
Resistor	R7	4k7Ω	4k7Ω	X
Resistor	R4	10kΩ	10kΩ	X
Resistor	R11	10kΩ	10kΩ	10kΩ
Resistor	R3	22kΩ	22kΩ	X
Resistor	R36	X	47kΩ	47kΩ
Resistor	R5	47kΩ	47kΩ	X
Resistor	R20,R21	47kΩ	X	X
Resistor	R29	47kΩ	47kΩ	47kΩ
Resistor	R37	100kΩ	100kΩ	100kΩ
Resistor	R6	150kΩ	150kΩ	X
Resistor	R35	180kΩ	180kΩ	180kΩ
Resistor	R2	220kΩ	220kΩ	X
Resistor	R26, R32	1MΩ	1MΩ	1MΩ
Resistor	R27	1MΩ	X	X
Resistor	R30,R31	X	X	X
ResPack8	R9	8x10kΩ	8x10kΩ	8x10kΩ
X-TAL	X1	20MHz	20MHz	20MHz

Remarks on mounting:

X = do not mount

* = LED D5 is replaced by wire connections.

** = Transistor T11 is replaced by a wire connection between C and E



U6 alternatives

Omron G6B-1114P-US
Tyco-Schrack RE032024
Nais JQ1a-24V or JQ1aP-24V

U2 alternatives

The most pin compatible Quad 16 pins optocouplers can be used.

It is been advised to replace the PIC software version 1 and 2 by version 3 or higher.

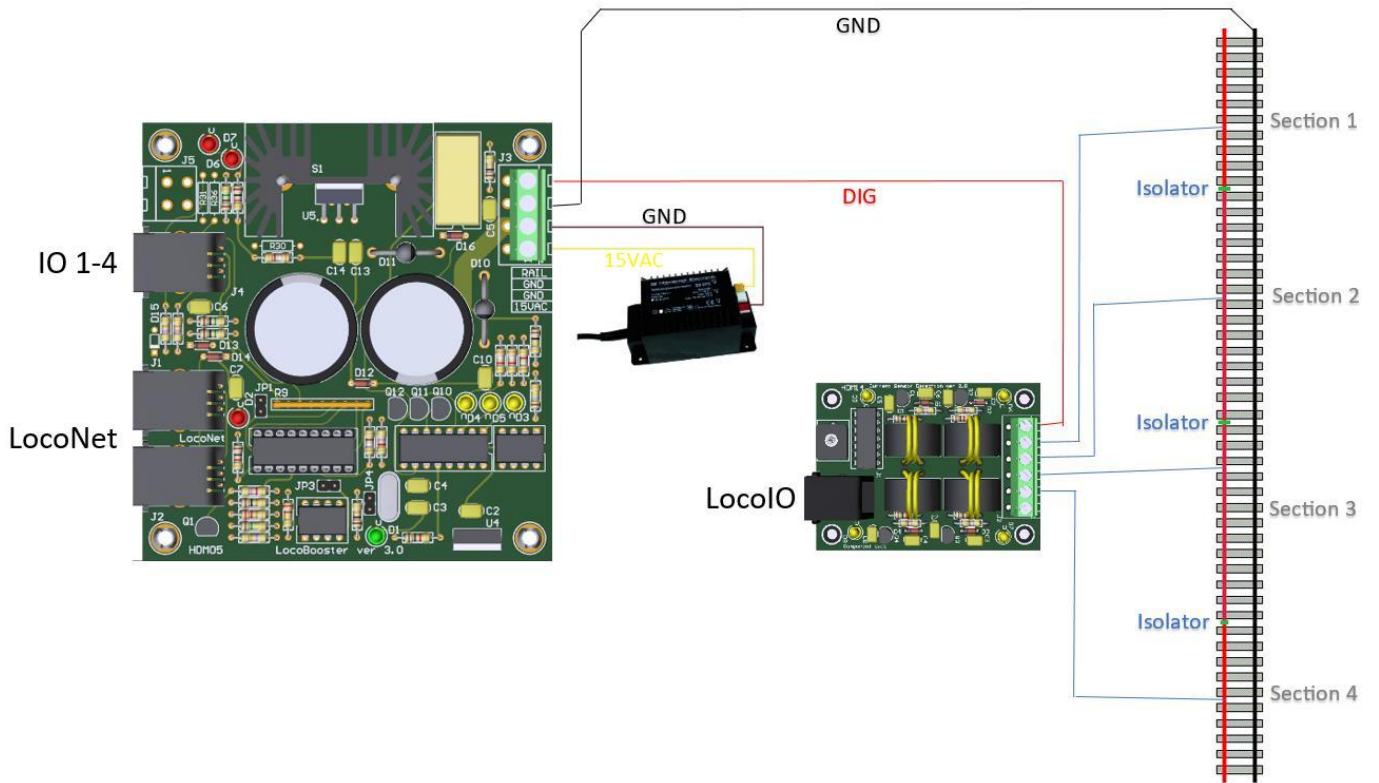


S-Booster Version

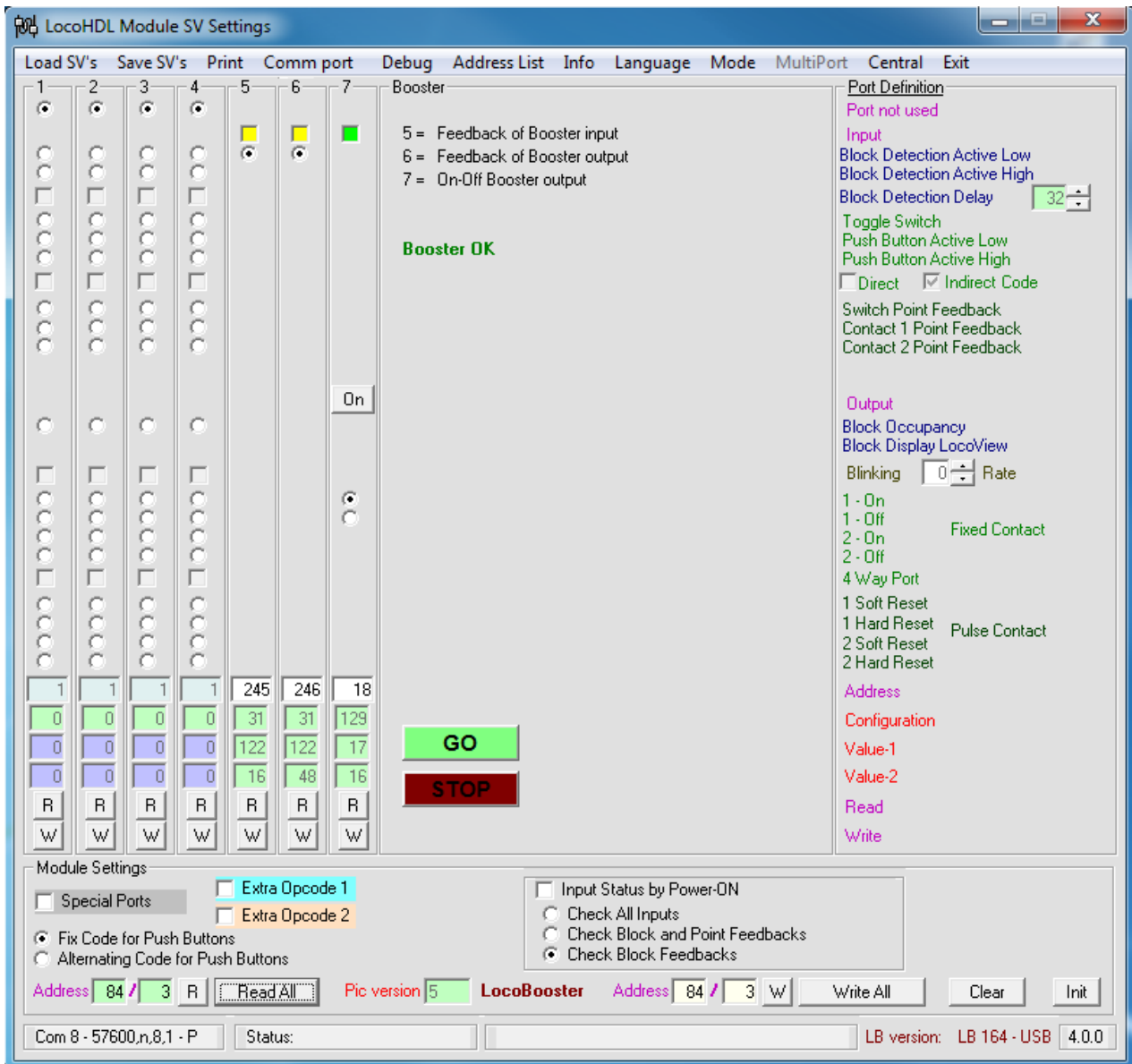
LocoBooster connection example

LocoBooster GND signal always goes directly to one side of the rail in two-rail system and to both rails in three-rail system.

LocoBooster DIG (digital signal) goes to the current sensors and never directly to the rails.



LocoHDL for configuration of the L-Booster and N-Booster



In terms of functionality the first 4 ports are identical to a LocoIO.

Port 5 has been permanently set to give a feedback message indicating that the input signal of the Booster is present.

Port 6 has been permanently set to give a feedback message indicating that the output signal is OK. This means there is no short-circuit and the input signal is present. It does not necessarily mean that the Booster output signal is activated (see port 7).

Port 7 is a Fixed Contact Output which switches the Booster output ON or OFF by means of a relays.

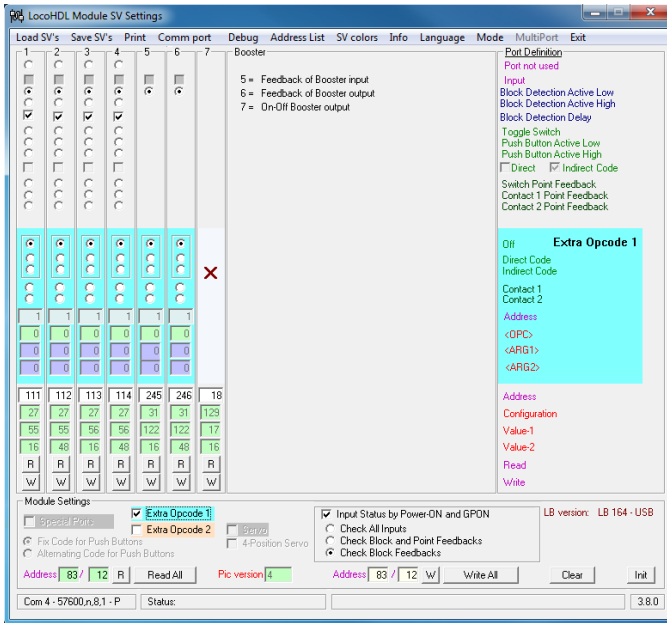
The relays will **NOT** be switched on with a fixed contact output = ON if one or both feedback are not been available or an OPC_GPOFF (0x82) command is received.

With a "1-On Fixed Contact" or "2-On Fixed Contact" the Booster, after powering up and when receiving an input signal, will switch on the output.

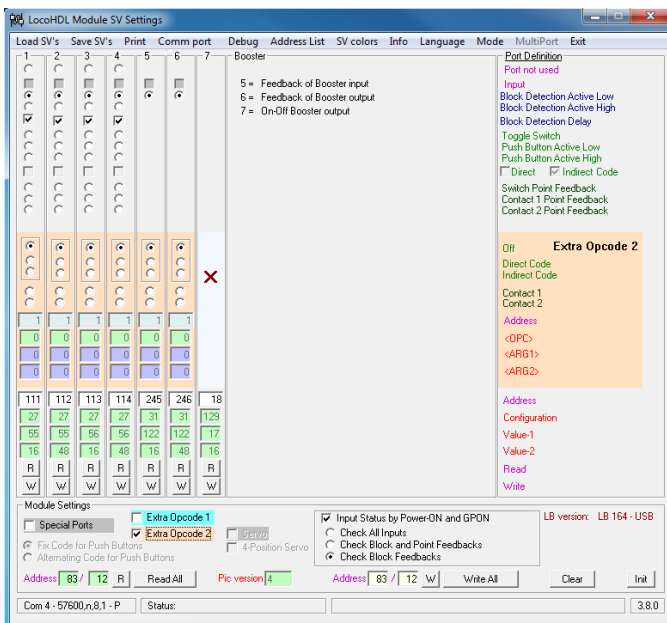
With a "1-Off Fixed Contact" or "2-Off Fixed Contact" the Booster will have to be switched on by a command.

Some Port 7 possibilities:

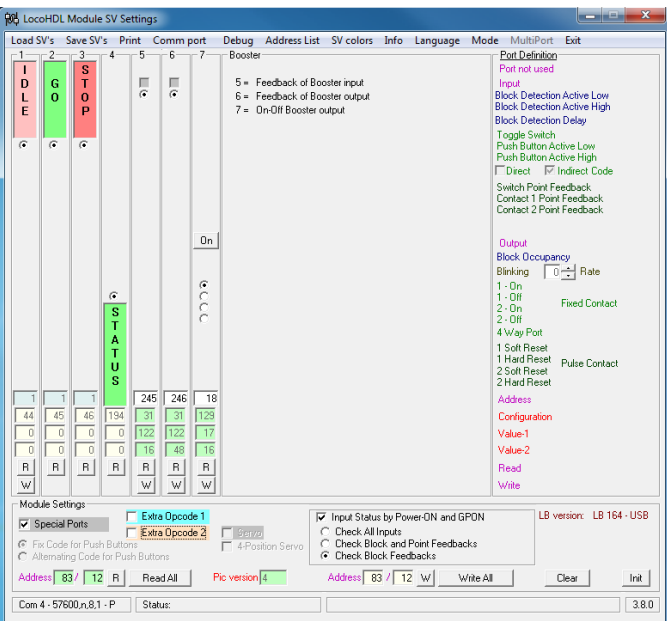
- It can be coupled to a signal to cut the power to a specific track.
- Individual rail sections can be interrupted in case of emergency.



The Booster also has an “Extra Opcode” setting



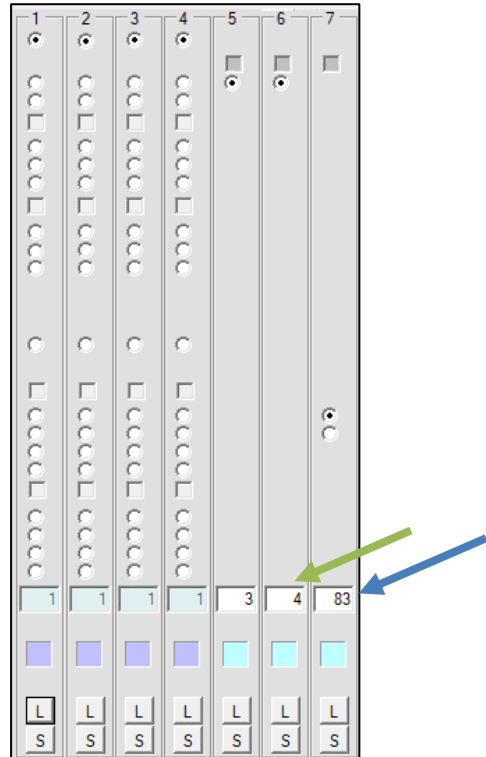
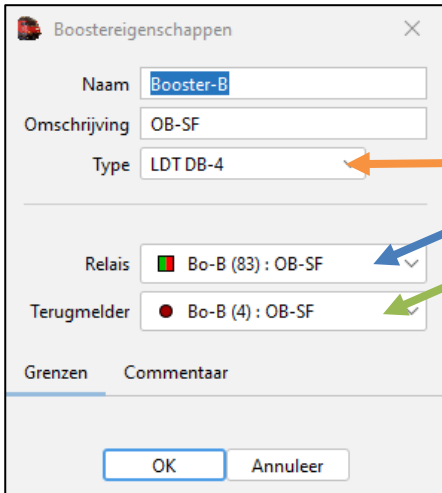
As from Booster Software version 4 you have also “Extra Opcode 2” possibility.



As from Booster Software version 4 you have also a “Special Ports” possibility.

Further information about this can you find in the LocoHDL configuration manual.

LocoBooster settings in iTrain



Recommendation: HDM803 transformer for LocoBooster



230VAC Schuko mains plug
15VAC/60VA

Example of transformers as power source for the booster:

The transformer has an output voltage of **15VAC** for Scale HO or **12VAC** for Scale N with maximally 4,67 A. 3 high-speed pressure clamps on the low-voltage side make the connection.

Uhlenbrock Transformer 20 075 - 70 VA



Lenz Transformater TR150 – 70VA

