

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 RAILSYNCR 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

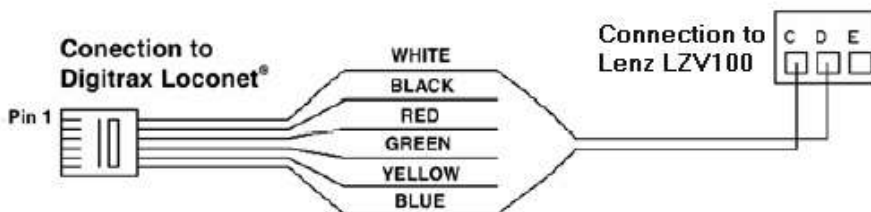
This version has no Loconet connection. The digital signal comes from another digital system.

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 | 16V-AC (yellow) for HO-scale and 12VAC for N-Scale |
| | J3 pin2 | 16V-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.

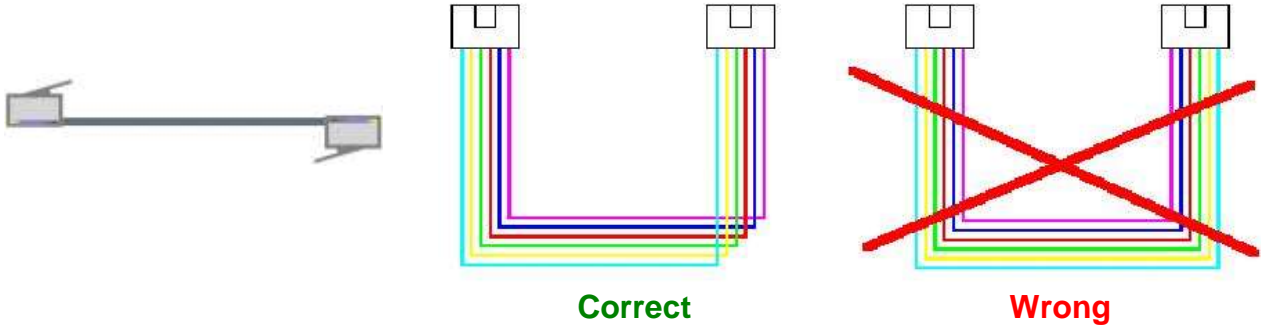


Remark:

- 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 16VAC power supply must be at least 70VA ability.
- Replace PIC software BST001 and BST002 with PIC software version BST003 or later for better protection in case of a short-circuit.

Loconet connection:

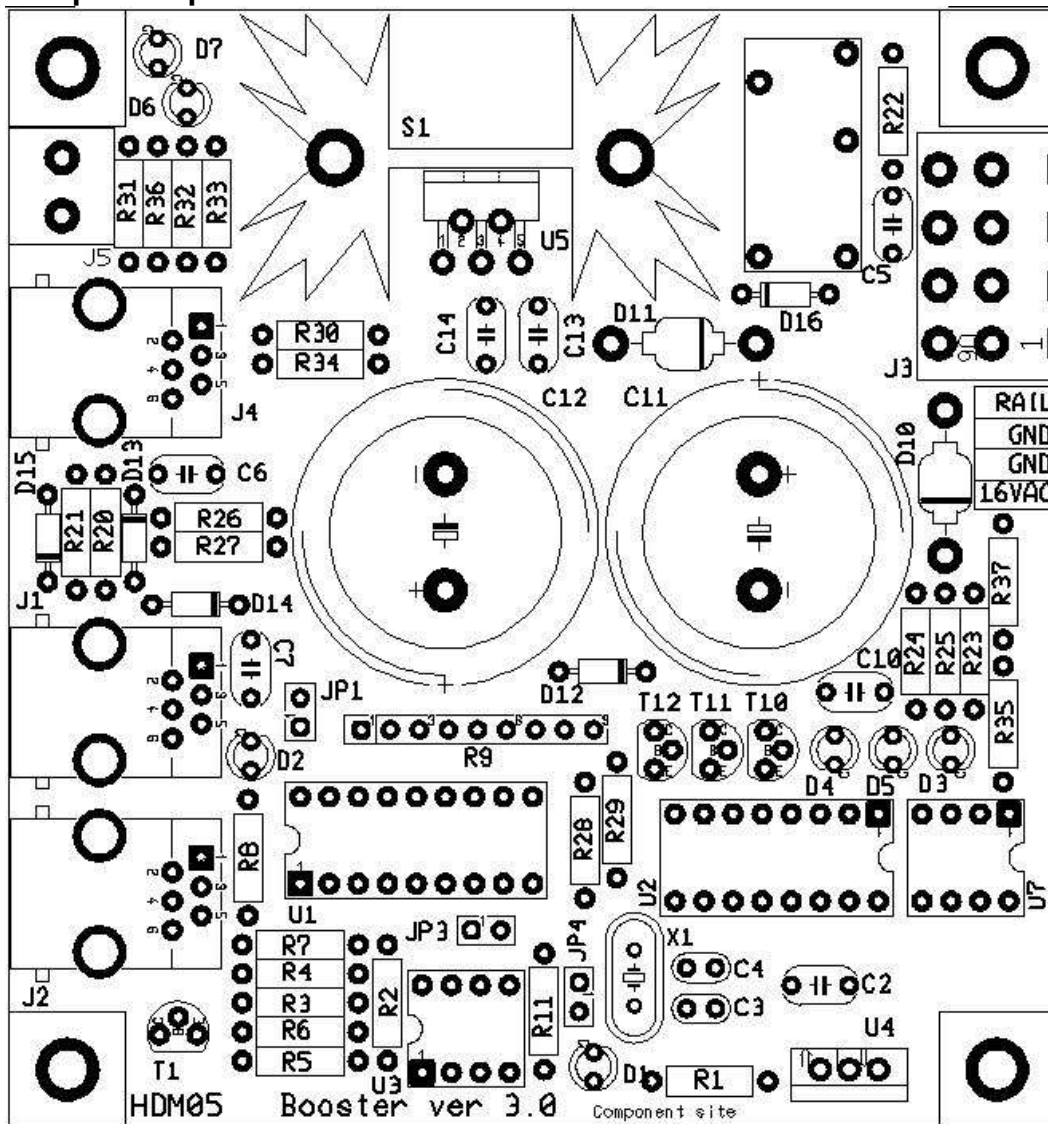
The connection to Loconet is with a 6-wire cable with RJ12 connectors. Important is that on the connector on both ends of the cable the pin1 to pin1 is connected.



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:

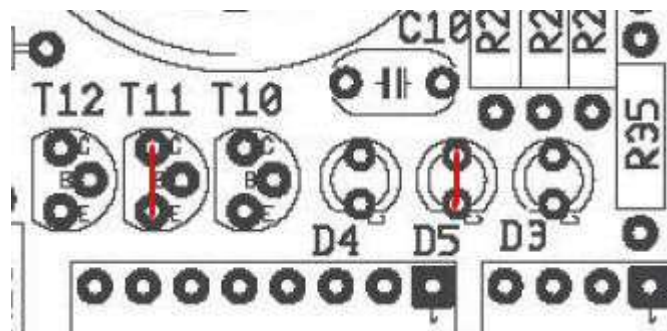
| UT_DEVICE | Refdes | L-Booster | N-Booster | S-Booster |
|----------------|-------------------|------------------|------------------|------------------|
| ELCO | C11,C12 | 6800uF/35V | 6800uF/35V | 6800uF/35V |
| Capacitor | C2,C5,C10,C13,C14 | 100nF | 100nF | 100nF |
| Capacitor | C6 | 10nF | 10nF | 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

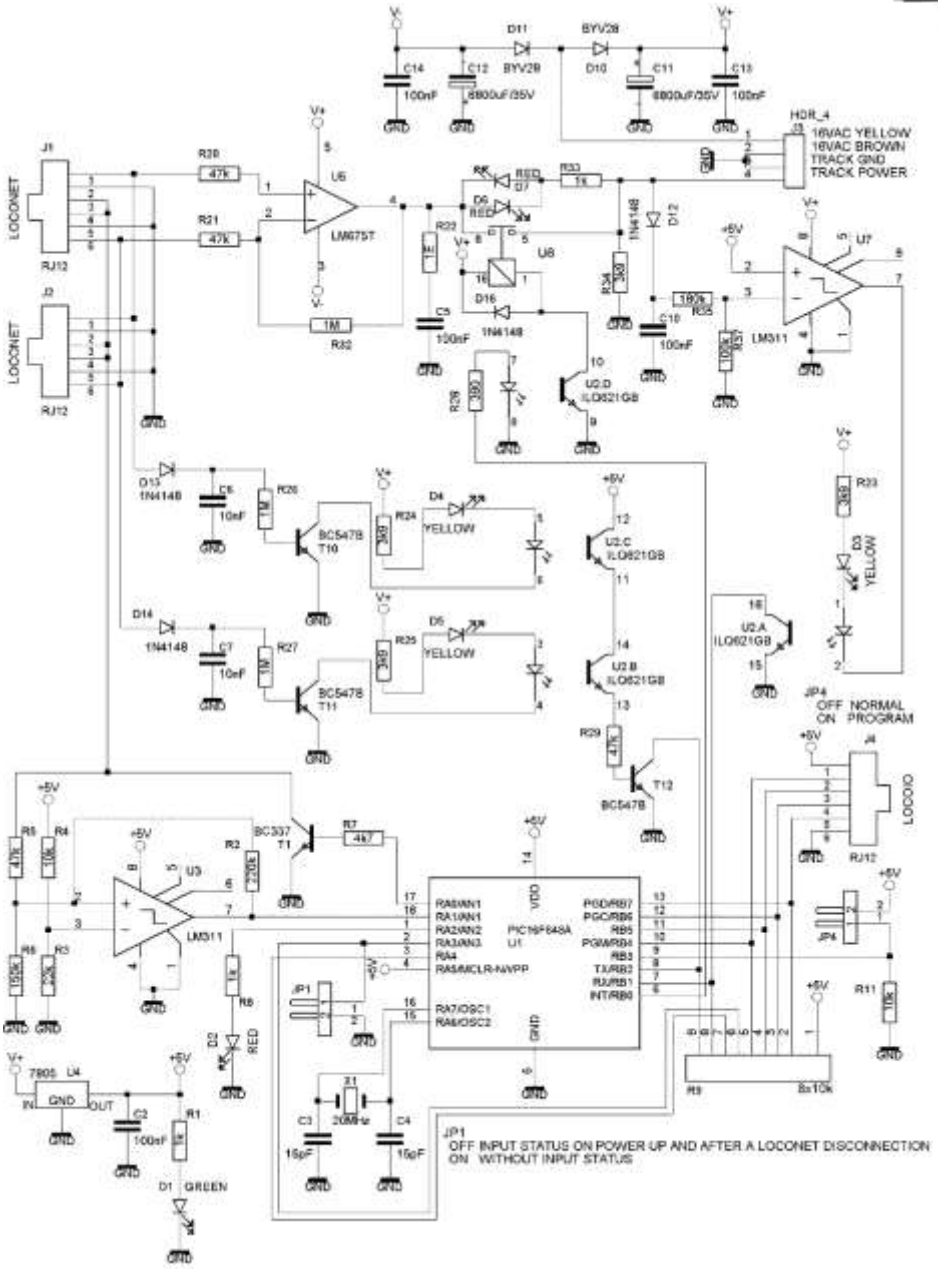
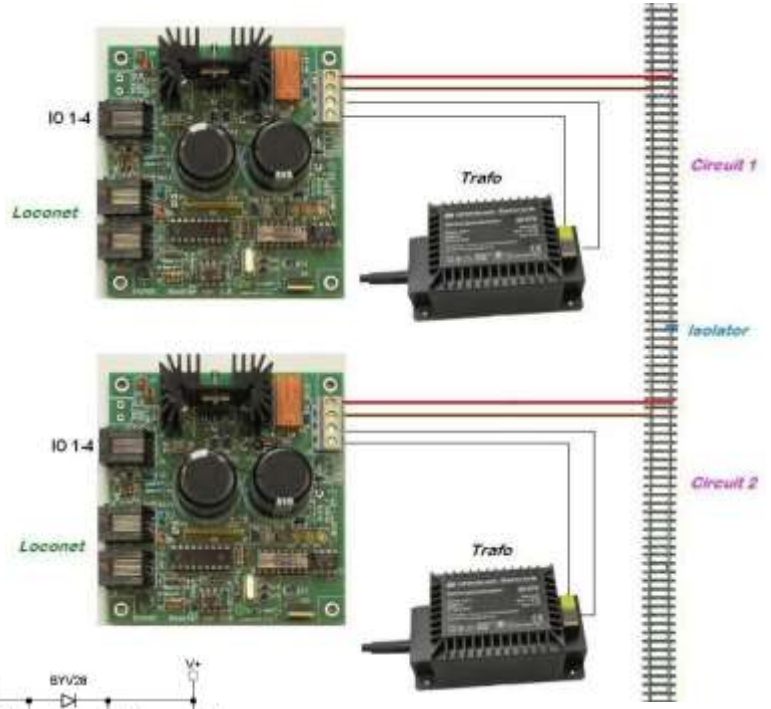
The most pin compatible Quad 16 pins optocouplers can be used.

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

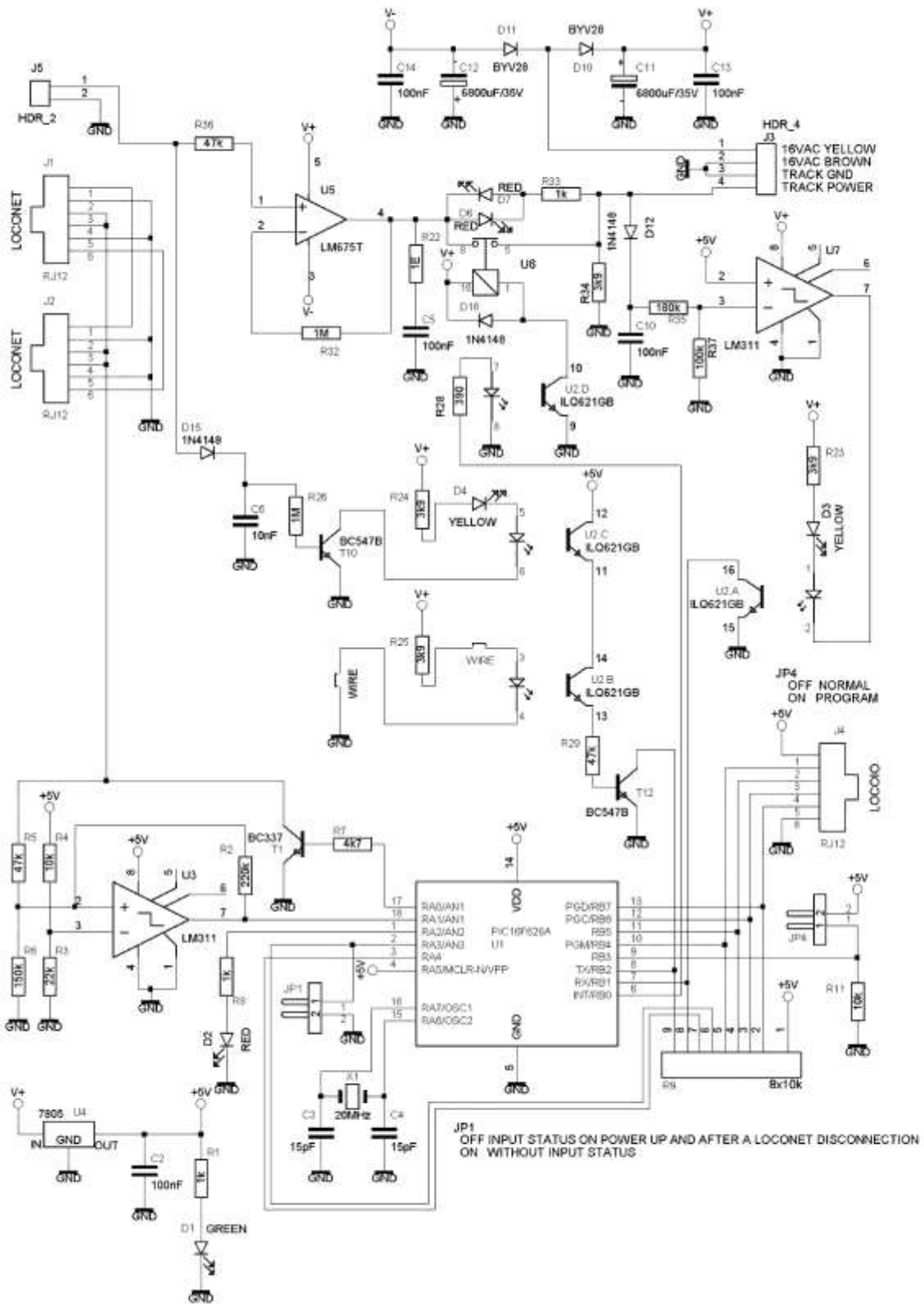


S-Booster Version

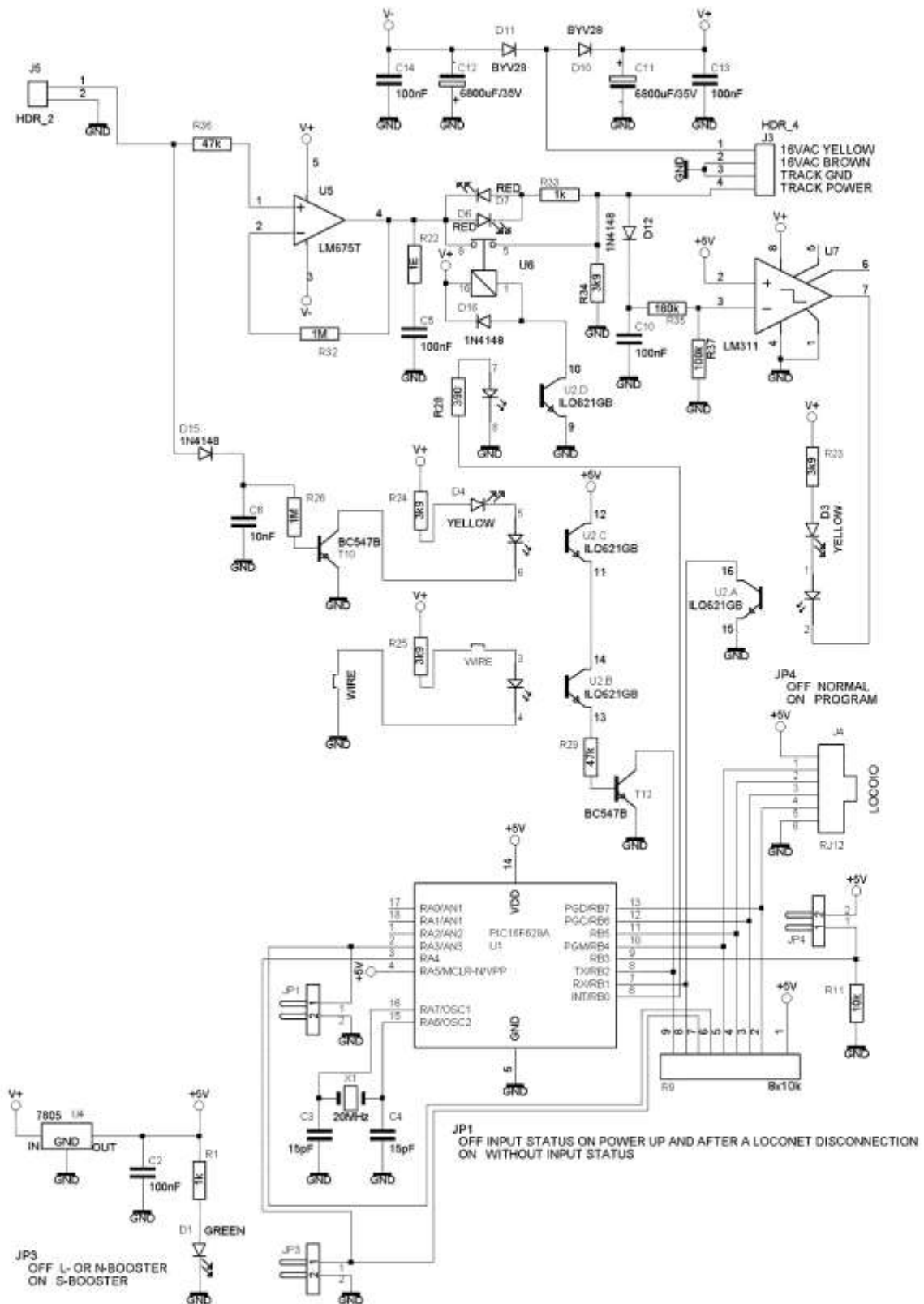
L-Booster



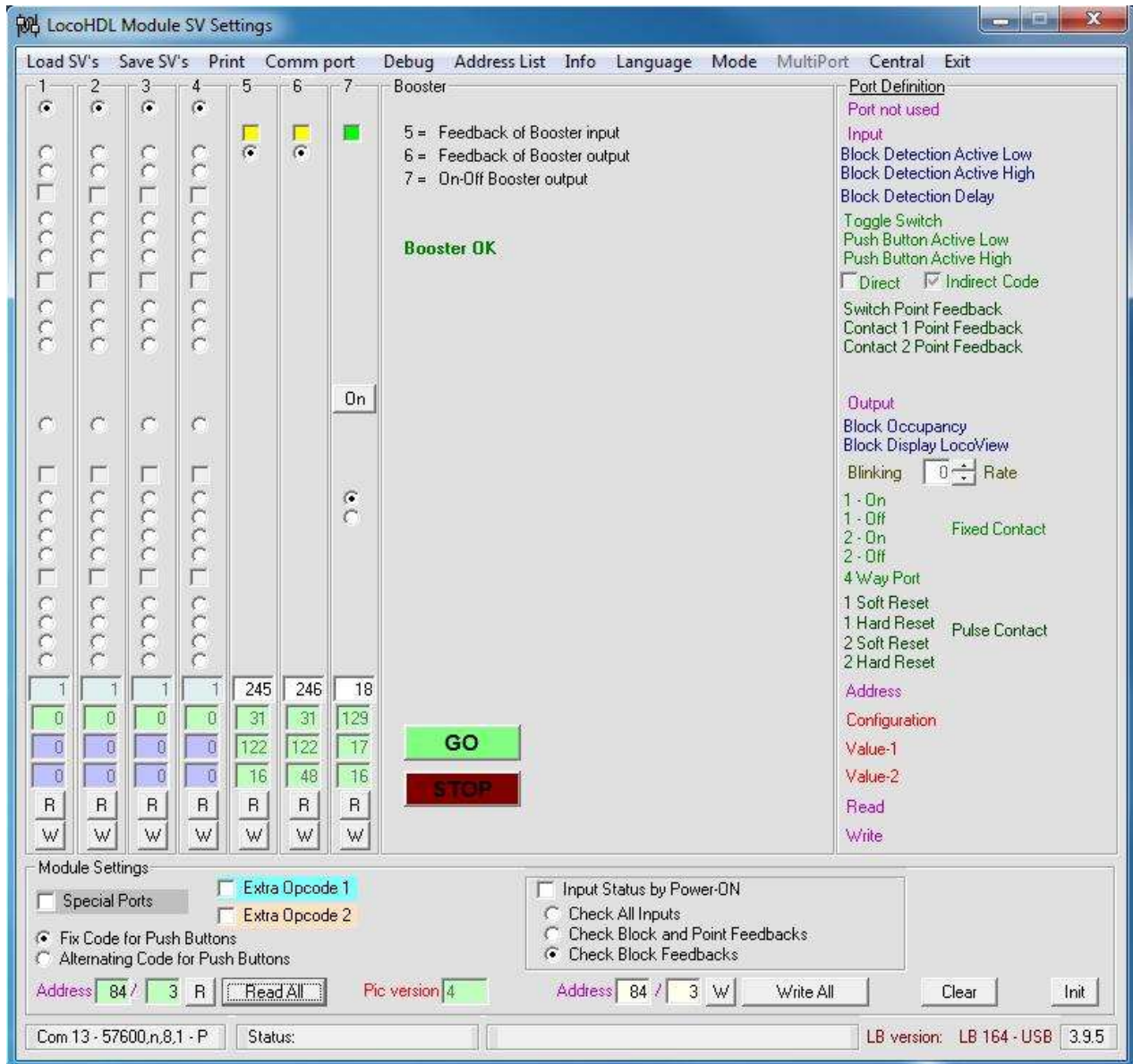
N-Booster



S-Booster



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).

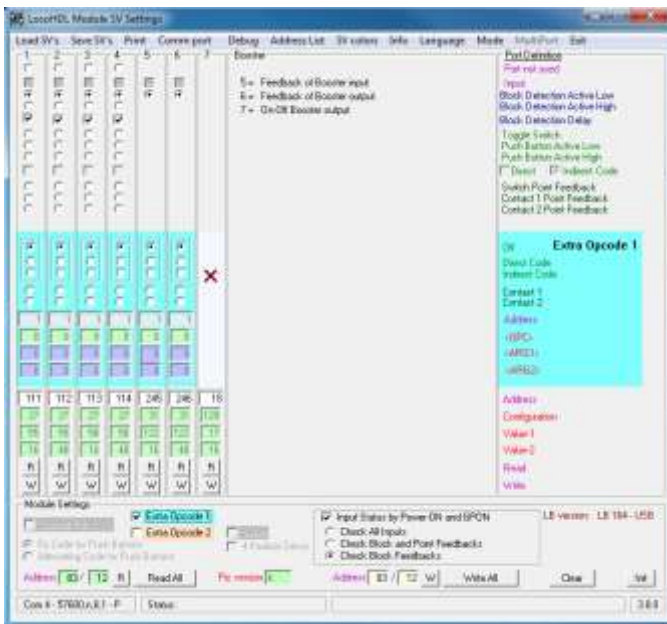
Port 7 is a Fixed Contact Output which switches the Booster output ON or OFF by means of a relays. The relays will **NOT** be switched on with a fixed contact output = ON if one or both feedback are not been available or an OPC_GPOFF (0x82) command is received.

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.

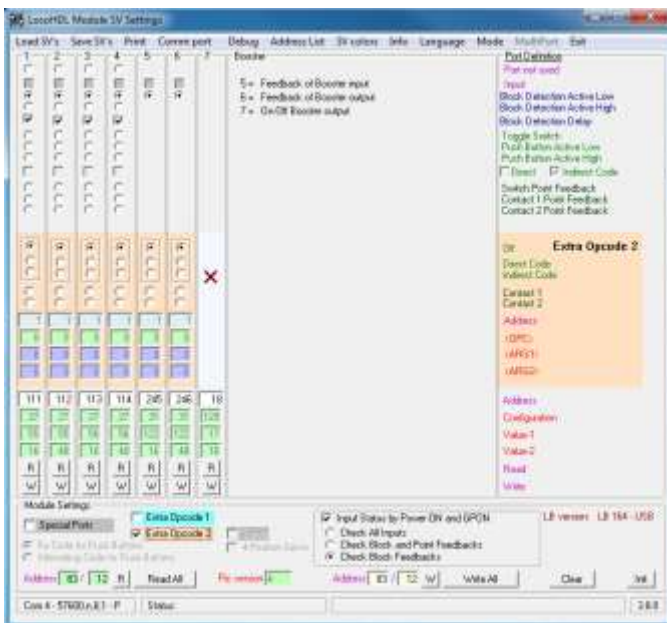
With a "1-Off Fixed Contact" or "2-Off Fixed Contact" the Booster will have to be switched on by a command.

Some Port 7 possibilities:

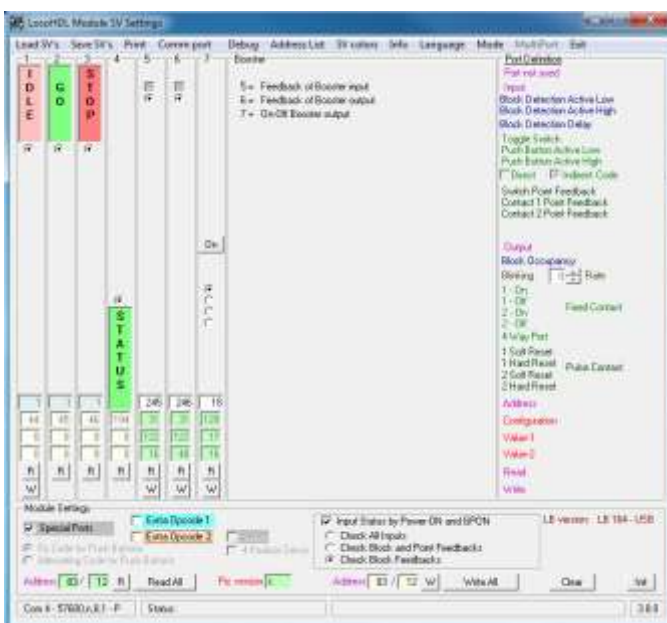
- It can be coupled to a signal to cut the power to a specific track.
- Individual rail sections can be interrupted in case of emergency.



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.

Example of transformers as power source for the booster:

Uhlenbrock Transformer 20 070 - 70 VA

Universal transformer for all digital systems, for the connection of Intellibox and power 3. The transformer has an output voltage of 16 V. with maximally 4.3 A. 2 high-speed pressure clamps on the low-voltage side make the connection.

Art.-Nr. 20070



Lenz TR150

230 V Input voltage

15 V Output voltage

75 VA Capacities

Dimension in mm: B132 x H62 x T72

Art.-Nr. 26150



Conrad

Capacities 70 VA,

Output voltage 16 V

Dimension in mm: B131 x H63 x T72

Art. Nr. 216465-89

