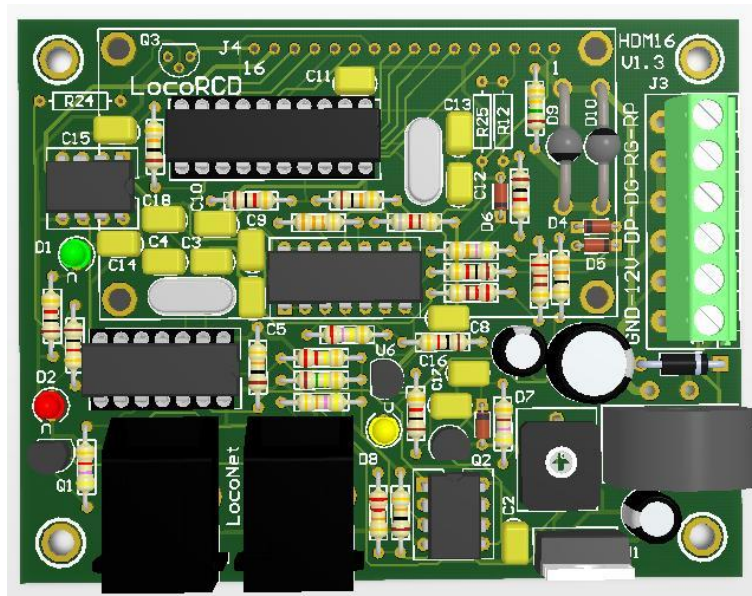


LOCORCD

Manual



HDM16

For scales N, TT, HO

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 judgement and common sense!

HDM16 LocoRCD

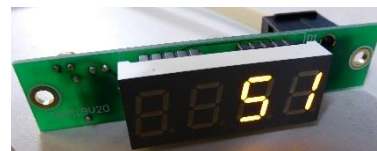
LocoRCD is a Current Sensor that also read data transmitted from Train RailCom decoders. The train addresses and the occupied message gets reported on Loconet and can then be displayed on the PC or a LocoView.

LocoRCD can also be equipped with a Display as an option to let see address and possibly other data on a programming track, see page 7.

The isolated section should be at least twice the length of your longest locomotive.

Where to place a LocoRCD?

- On a block where you're placing your locomotives on the layout. The locomotives will then sign up or unsubscribe.
- On a block at a transition from a zone that is not PC controlled, to a zone that is controlled by a PC with current sensors. The locomotive will then sign up and be further controlled by the PC.
- On a block where you on a panel with LocoView the train number would indicate.
- With the Display option on a programming track.
- On a block in a station where you want shunting. A LocoIO with a LocoView will give you the train address on a panel than you then can select on a hand controller.



Note: When switching on a Central Station there will only be sent information by the Railcom decoders if a locomotive (shall be arbitrarily address) is selected on the Central Station or on a PC connected to the Central Station or loconet.

RailCom

RailCom is the name of the technology of bi-directional communication developed by Lenz according to the RP 9.3.1 and RP 9.3.2 of the NMRA. RailCom allows an external device to be able to read real data transmitted from a decoder. These data can include among others: the actual speed of decoder, its load, the contents of any CV and its direction.

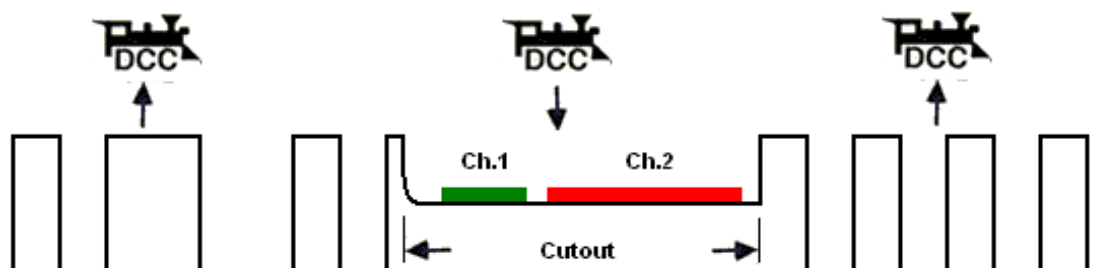
To enable the bi-directional features of RailCom you need these components:

1. A RailCom decoder that transmits the information.
(Lenz Gold, Lokpilot v3 and v4, Zimo MX64, Tams LD-G-32, HDM17_FD_Railcom...)
2. A detector that can receive these transmissions such as the Lenz LRC120 or the LocoRCD
3. A cutout device that conditions the track for the transmission such as LocoRCC.

Bi-directional communications requires a window for the decoder to communicate in. This window can be turned on or off. The Bi-Directional activation can be set using operations mode programming (PoM).

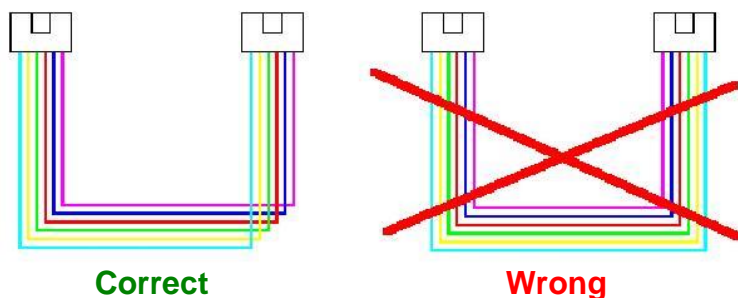
Bi-directional communication is enabled in the decoder with CV29, bit 3. Some decoders in the CV28 indicate the data messages transmitted. The usual configuration of this CV is:

- CV28, Bit 0: Channel 1 used for address broadcast.
- CV28, Bit 1: Channel 2 used for data (CV, speed, etc...)
- CV28, Bit 2: Channel 1 used for command acknowledge



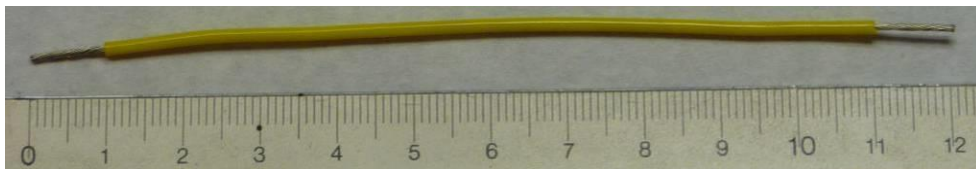
Loconet connection:

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.

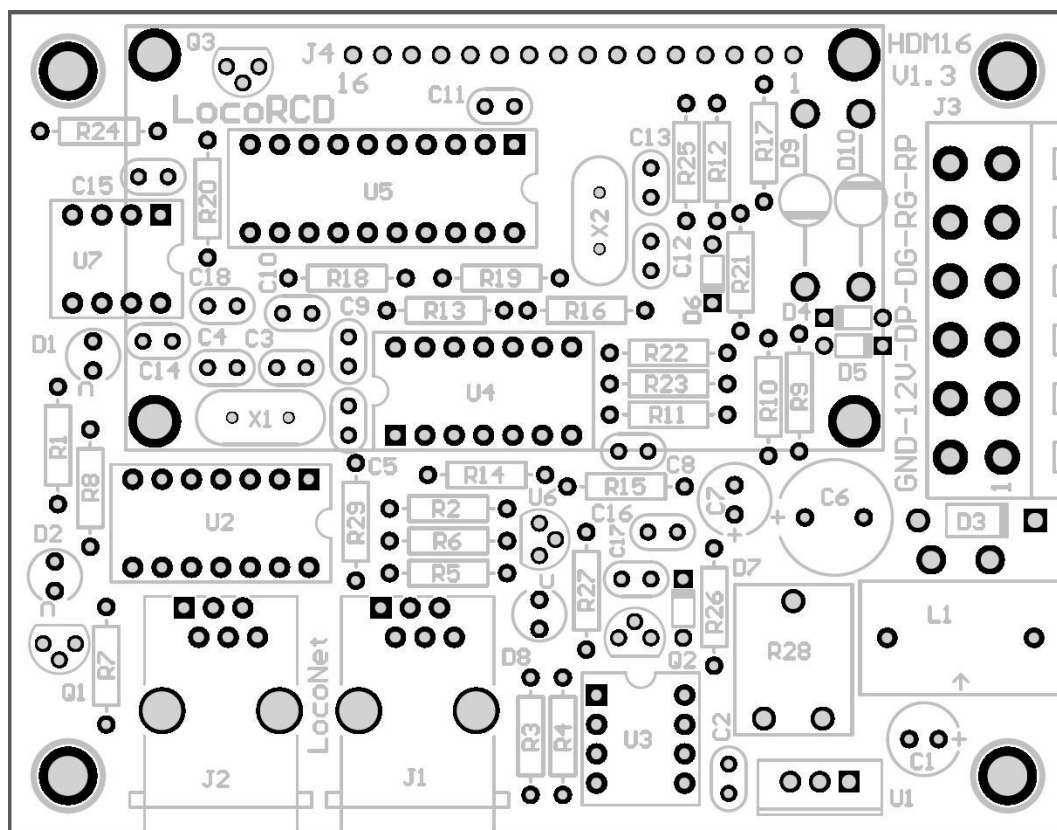
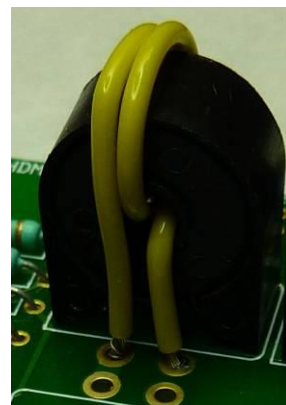


Bill of materials for the basic driver module:

UT_DEVICE	UT_VALUE	Refdes
Resistor	1k Ω	R1, R8, R15, R18, R21, R23, R27
Resistor	220k Ω	R2
Resistor	22k Ω	R3
Resistor	10k Ω	R4, R19, R20, R29
Resistor	47k Ω	R5, R22
Resistor	150k Ω	R6
Resistor	4k7 Ω	R7
Resistor	33 Ω	R9
Resistor	220 Ω	R10, R11
Resistor	33k Ω	R13
Resistor	270k Ω	R14
Resistor	820 Ω	R16
Resistor	1 Ω 5	R17
Resistor	470 Ω	R26
Trim potentiometer	47k Ω	R28
Capacitor	100nF	C2, C5, C8, C9, C11, C14, C15, C17, C18
Capacitor	15pF	C3, C4, C12, C13
Capacitor	1nF	C10
Capacitor	330pF	C16
ELCO	100 μ F/25V	C1, C7
ELCO	220 μ F/25V	C6
LED \varnothing 3mm	Green	D1
LED \varnothing 3mm	Red	D2
LED \varnothing 3mm	Yellow	D8
Diode	1N4001	D3
Diode	1N4148	D4, D5, D6, D7
Diode	BYV28	D9, D10
Connector	RJ12	J1, J2
HDR_6	6 pins PCB connector (5.08)	J3
Current Sensor Transformer	AS101	L1
Transistor	BC337-40	Q1
Transistor	BC547C	Q2
Voltage Regulator	LM7805	U1
Voltage Regulator	LM78L05	U6
PIC	PIC16F1824-I/P "RCD200"	U2
PIC	PIC16F690-I/P "DSP001"	U5
Dual Differential Comparator	LM393N	U3
Quad Differential Comparator	LM339N	U4
Optocoupler	HCPL-7710-000E	U7
Xtal	20MHz	X1
Xtal	8MHz	X2



Tip for Current Sensor Transformer



Connector J3 connections:

- Pin 1: GND
- Pin 2: +12V
- Pin 3: Digital Power (DP)
- Pin 4: Digital GND (DG)
- Pin 5: Rail GND (RG)
- Pin 6: Rail Power (RP) **maximum 3A**

Note: The length of the cable between current sensor and rails preferably as short as possible, recommended maximum 30 cm and the wire 0,25 mm² or more. In a three-rail system need Rail GND not be connected because the rails have a common ground.

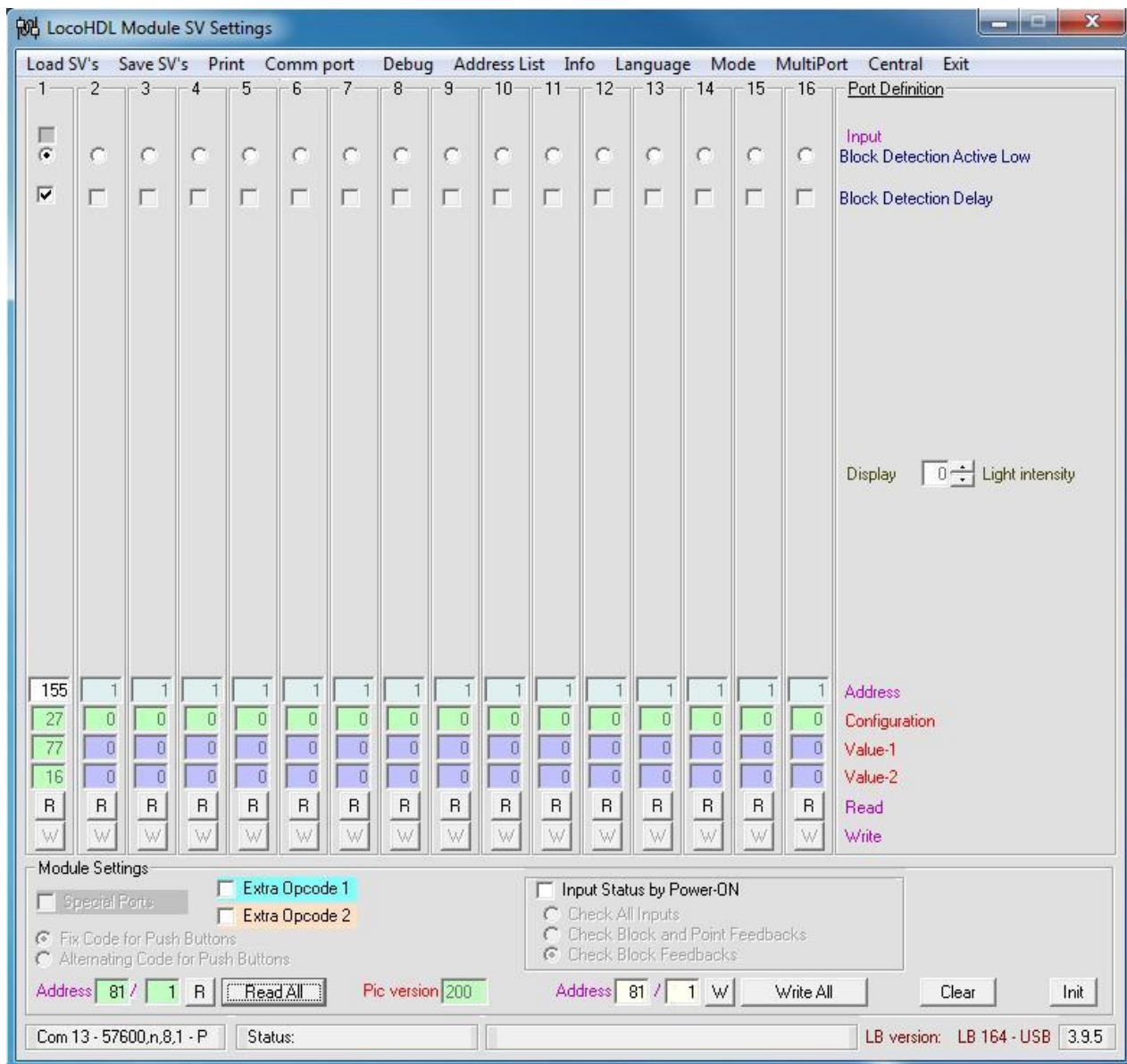
Green LED: Power +5V Ok

Yellow LED: Current detection in block

Red LED:

- On No central station connected or current source on LocoBuffer with J6 selected.
- Off Loconet OK, no activity
- Blinking Loconet command transfer

Setting the LocoRCD module with LocoHDL utility

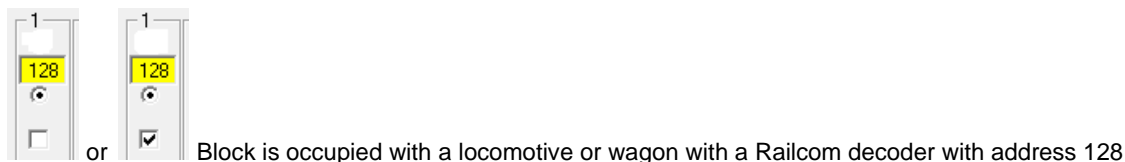
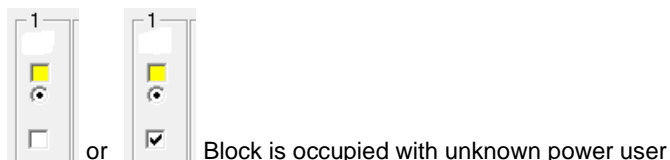
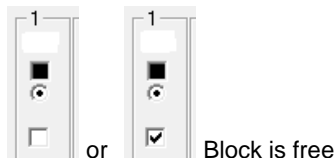


Each LocoRCD module must first be individually adjusted at address 81/1 and then put on another to work. Address (SV1) = 1 ... 79 or 81 ... 127 (80 is reserved for Locobuffer), Default = 81 after initialization. Subaddress (SV2) = 1 ... 126, Default = 1 after initialization.

To set up a first module in LocoRCD with address 81/1 port 1, then change your address to a work address for example 82/1
Then connect a second LocoRCD module with address 81/1 port 2, then change your address to a work address for example 82/1
You can work set 16 LocoRCD modules on the same work address.
The ports should follow one another within the same work address beginning with Poort1, Poort2, etc. ...
Without a gate in between to let unused.

You can afterwards common change the work address on all LocoRCD if necessary. The block detection address is also in LocoRCD work address changeable.

Information when reading the Block Detection:

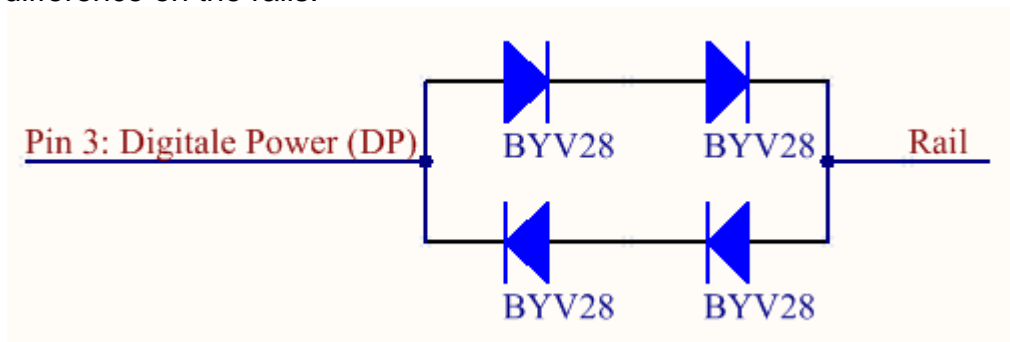


Adjusting Trim potentiometer R28:

- Put nothing on the track connected to the LocoRCD.
- Open LocoHDL and double click on the LocoRCD in the Address List.
- Wait until the module is completely read.
- Turn first R28 slowly clockwise until the port indicated busy.
- Then turn R28 slowly counter clockwise until the port indicated empty and remains.
- Now the current detector is adjusted.

Remark:

If you have a LocoRCD used together with HDM10, add this circuit to have no voltage difference on the rails.



Display Visualization Option

Resistor	4k7Ω	R24
Resistor	10kΩ	R25
Resistor	470Ω	R12
Transistor	BC337-40	Q3
Display	FDCC1602L-FLYYBW-51LK	J4

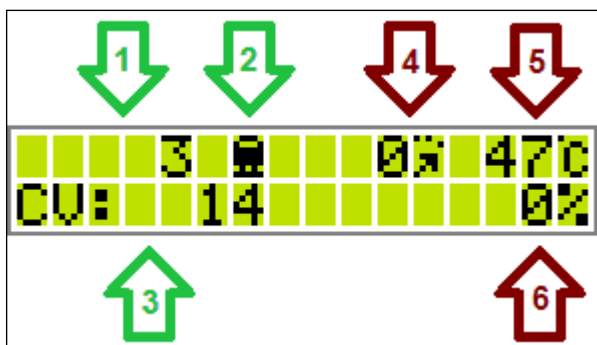


Display Light intensity

With the value of the Light intensity you can set the backlight of the display. Therefore the module must be connected to Loconet.

If the module is in a test setup only used to read the information on the display, the Loconet cable must not be connected.

RailCom data are displayed in the LCD with this aspect:



Only data really transmitted by the decoder are displayed, when it gives sending up after a few seconds disappears the indication.

! Depending on decoder more or less data are show, minimum are locomotive address and CV value if you read it in PoM mode.

Oject	Data	Visualization	Description
1	Locomotive	■■■■3	Locomotive address
2	RailCom	■	Decoder is sending RailCom data
		■	No RailCom data received
3	CV Value (PoM)	CV: ■■■14	CV value read in PoM
		■■■29: ■■14	CV number and value read in PoM
4	Speed	■■■0%	Current locomotive speed (in 128 speed steps)
5	Temperature	■■■470	Decoder temperature (in Celsius)
6	Load	■■■0%	Decoder load (in percentage)