



HDM20D For all scale

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HDM20 LocoRCD2

LocoRCD2 is a Dual 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.

The LocoRCD2 also includes a possibility for train Influence, for trains who have a Railcom decoder. This may slow down the train, a stops a certain and then continue in the same or opposite direction except the corresponding signal permitting. This also allows to design with a simple shuttle service between stops for which no PC is

needed.

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

Where to place a LocoRCD2?

- 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.

- On a block in a station where you want shunting. A LocolO with a LocoView will give you the train address on a panel than you then can select on a hand controller.



- With the train Influence systems, can you drive trains and do them stop.

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

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Bill of materials for the basic driver module:

Component	Value	Nr	Reference
РСВ	HDM20	1	
IC-voet	18 pins	1	voor U2
IC-voet	8 pins	1	voor U5
Resistor	1kΩ (Brown, Black, Red, Gold)	9	R1,R8,R12,R15,R18,R21,R23,R27,R30
Resistor	220kΩ (Red, Red, Yellow, Gold)	1	R2
Resistor	22kΩ (Red, Red, Orange, Gold)	1	R3
Resistor	10kΩ (Brown, Black, Orange, Gold)	5	R4,R19,R20,R25,R29
Resistor	47kΩ (Yellow, Violet, Orange, Gold)	2	R5,R22
Resistor	150kΩ (Black, Green, Yellow, Gold)	1	R6
Resistor	4k7Ω (Yellow, Violet, Red, Gold)	1	R7
Resistor	33Ω (Òrange, Orange, Black, Gold)	1	R9
Resistor	220Ω (Red, Red, Brown, Gold)	2	R10,R11
Resistor	$33k\Omega$ (Orange, Orange, Orange, Gold)	1	R13
Resistor	270kΩ (Red, Violet, Yellow, Gold)	1	R14
Resistor	820Ω (Grey, Red, Brown, Gold)	1	R16
Resistor	1Ω8 (Brown, Grev, Gold, Gold)	1	R17
Resistor	470Ω (Yellow, Violet, Brown, Gold)	2	R24.R26
Trim potentiometer	47kΩ	1	R28
Capacitor	100nF (104)	11	C2,C5,C8,C9,C11,C14,C15,C17,C18,C20,C21
Capacitor	15pF (15)	2	C3.C4
Capacitor	1nF	1	C10
Capacitor	330pF	2	C16,C19
ELCO	100µF/25V	2	C1,C7
ELCO	220µF/25V	1	C6
LED Ø3mm	Green	1	D1
LED Ø3mm	Red	1	D2
LED Ø3mm	Orange	1	D3
LED Ø3mm	Yellow	2	D4,D5
Diode	1N4001 or 1N4002	1	D13
Diode	1N4148	5	D6,D7,D8,D11,D12
Diode	STTH2002DI	2	D9,D10
Transistor	BC337-40	1	Q1
Transistor	BC547C	2	Q2,Q3
Voltage Regulator	LM7805	1	U1
Voltage Regulator	LM78L05	1	U6
Dual Differential Comparator	LM393N	2	U3,U8
Quad Differential Comparator	LM339N	1	U4
Optocoupler	HCPL-7710-000E	1	U7
X-tal	20MHz	1	X1
6 pins PCB connector (5.08)		1	J3
Connector	RJ12	3	J1,J2,J4
Current Sensor Transformer	AS101	2	L1,L2
PIC	"RCD211"	1	U2 op IC-voet
PIC	"RD10"	1	U5 op IC-voet

12cm - 0,75mm² for scale O, 1 and G





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Version 16/10/2024



LocoNet and LocoView connection:

The connection to LocoNet and LocoView 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.



- The length of the cable between current sensor and rails preferably as short as possible, recommended maximum 30 cm.

- Per rail section is maximum power consumption 8A
- The sum of Digital power consumption is maximum 12A

Connector J1 and J2 connections: LocoNet

Connector J4 connections: LocoView - Cable maximum 200 cm

- LocoView

- Signals with LED on 5VDC with LocoCon

- HDM11MD3 or HDM11MD4 Driver Module for 2 signals

Connector J3 connections:

- Pin 1: GND Pin 2: +12V Pin 3: Digital Power (DP) Pin 4: Digital GND (DG) Pin 5: Rail Power2 (RP2) Pin 6: Rail Power1 (RP1)

Green LED: Power +5V Ok

Yellow LED: Current detection in block

Orange LED: RailCom detection

Red LED:

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

Adjusting Trim potentiometer R28:

- Put nothing on the track connected to the LocoRCD2.
- Open LocoHDL and double click on the LocoRCD2 in the Address List.
- Wait until the module is completely read.
- Make sure "Block Off Delay" is disabled (unchecked).
- 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.



_ 🗆 🗙 Not LocoHDL Module SV Settings Load SV's Save SV's Print Comm port Debug Address List Info Language Mode MultiPort Central Exit 10 13 Port Definition 8 9 12 14 15 16 œ œ œ œ С ø Ø œ œ Ø œ œ œ œ ē Port not used П Input Œ G ť ť С C ť ť ť С С Block Detection Active Low • 7 Г Г Г Г Г E г Г г П Г Г Г Block Detection Delay 32 ÷ Train Influenced Г Г Г E Г E Г Train Direction Change Г Г E Г Г Г Slow down and Pull-up delay Wait Time 0 🕂 Light intensity Display 1 2 1 1 1 1 1 1 1 1 1 1 1 1 Address 27 27 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Configuration 0 0 0 0 0 0 Value-1 16 0 48 0 0 0 0 0 0 Value-2 В R R R R R B R Read W Write Module Settings Extra Opcode 1 E Input Status by Power-ON Special Ports Г Extra Opcode 2 1/0 C LocoView

Setting the LocoRCD2 module with LocoHDL utility

Each LocoRCD2 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.

C

ē

Address 81 /

1 W

Write All

LB version:

Clear

LB 164 - USB 4.0.0

Init

LocoRCD2

Signals

Pic version 211

To set up a first module in LocoRCD2 with address 81/1 port 1 and 2. Give both port a unique block detection port address. Then change your address to a work address for example 82/1

Then connect a second LocoRCD2 module with address 81/1 port 3 and 4. Give both port a unique block detection port address. Then change your address to a work address for example 82/1

You can work set 8 LocoRCD2 modules on the same work address.

The ports should follow one another within the same work address beginning with Port 1 and 2, Port 3 and 4, etc. ... Without a gate in between to let unused.

You can afterwards common change the work address on all LocoRCD2 if necessary. The block detection address is also in LocoRCD2 work address changeable.

Fix Code for Push Button

Address 81 / 1 R

Com 8 - 57600,n,8,1 - P

Read All

Status

LocoView connected to LocoRCD2



Signals connected to LocoRCD2



Information when reading the Block Detection:



Block is occupied with a locomotive or wagon with a RailCom decoder with address 128

Note: Always set the Block detection Delay if you work without a PC or software without a built-in detection delay.

From Software version RCD211 you can set the switch-off delay of the Block. The switch-off delay is necessary to prevent unnecessary commands from being sent to the LocoNet network in the event of bad contacts between rails and wheels.

Without train Influence



The LocoRCD2 operates with 2 sections with current sensors and a RailCom receiver. The occupied train address and message are reported on LocoNet and can then be displayed on the PC or on a LocoView.

Display 🔽 🕂 Light intensity

You can change the light intensity of the LocoView with a value from 0 to 15 connected to the LocoRCD2.

A new value of the light intensity is only used in the LocoRCD2 after a write "Write All" from the Module settings.

LocoRCD2 with Train Influence

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With train Influence



The LocoRCD2 also has the ability to affect the train if you have the option "*Train Influenced*" checked. Influencing the train means that the LocoRCD2 the train can do slow down, stop, wait for a certain time, possibly do change direction and driving again.



The train Influence only works in one direction:

-The train must come in the block along section 1. After detection of the train with the Railcom address detection, the train goes slowing down to a minimum speed. When the train reached section 2 and detected with the current sensor, the train will stop.

- When the train come in the block along section 2, the train will just continue without train influence.

You can set a value for the slowing down in the text field "*Slow down and Pull-up delay*". Example "20" means 20 * \sim 50 ms = \sim 1 sec between slow down steps of the speed. The value you need to set depends on the length of section 1 and the speed at which the train arrives in section 1. **Remark:** slow down happens after that the Railcom receiver has received the train address. This can greatly depend on type of train decoder, the purity of the rails and wheels of the train.

o∐e	0 1 0	Port not used Input Block Detection Active Low
		Block Detection Delay 32 🛨
20 45		Train Influenced Train Direction Change Slow down and Pull-up delay Wait Time

If you "*Train Direction Change*" checked will the train change his direction The waiting time is expressed in seconds. Example 45 seconds.

47	48
27	27
23	23
16	48
R	
W	

This 4 settings and additional Extra Opcode 1 and 2 data can be changed with the port write button "S", after the first time reading the port information. The block address can only be changed if the module at address 81/1, and the "Write All" button.

Extra Opcode 2 æ Off 00 Direct Code Indirect Code Contact 1 Contact 2 Address 0 0 <0PC> 0 <ARG1> 0 Ū Ū <ARG2>

In both examples above will the LocoRCD2 do nothing more with the train if the Extra Opcode 2 is "*Off*".

More possibilities with train Influence



Remark: The Extra Opcode 1 for section 1 and 2 can be used as normal.

Remark:

If you have a LocoRCD2 used together with HDM10, add this circuit to have no voltage difference on the rails.



History of the software versions

LocoRCD2 version 210 due to errors in code, replace PIC to newer version - Start version

New in LocoRCD2 version 211

Adjustable Block Detection Delay
Supported LocoNet Commands OPC_SW_ACK, switching accessories with confirmation.

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