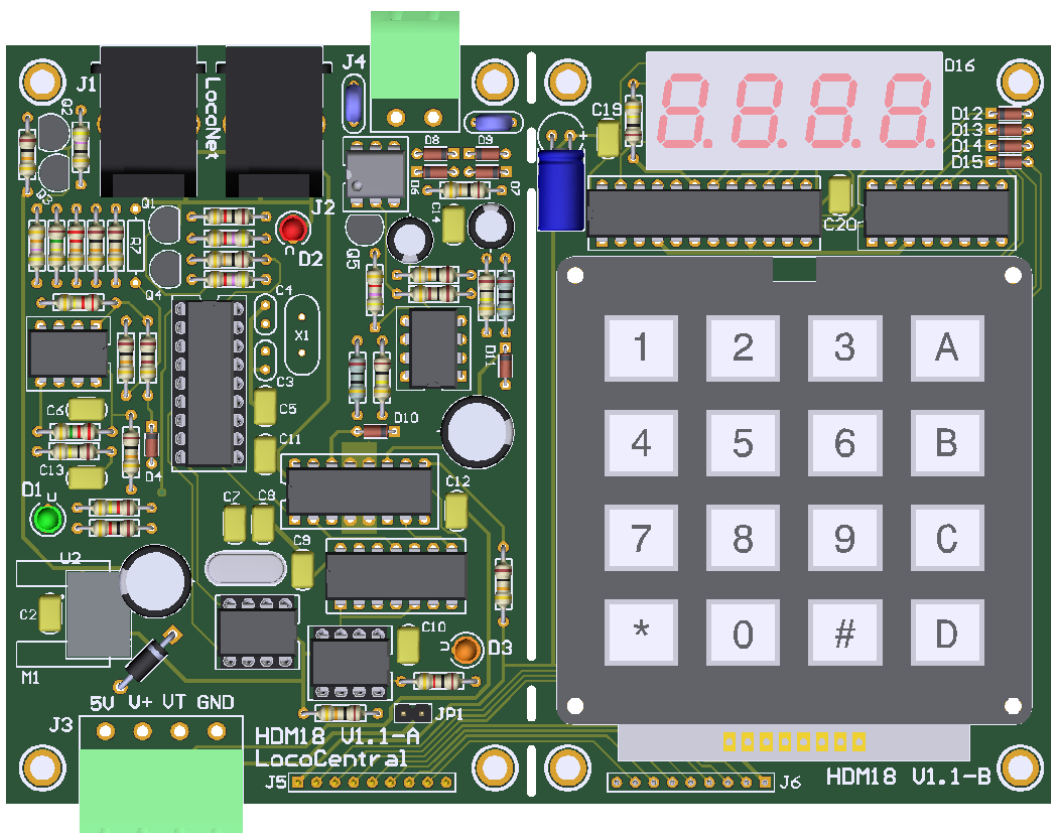


LocoCentral

Manual



HDM18

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!

LocoCentral module version 1.1

- LocoNet DCC Command station with build-in LocoRCC for RailCom.
- Supports all NMRA DCC format loco decoders.
- Can run up to 8, 16 or 32 (*1) loco addresses at the same time.
- Short (1-127) and long (128-9999) address selection.
- 28 or 128 speed steps for smooth speed control.
- Control light (F0), and F1 to F8, F28 or F9999 (*2).
- Direct mode programming (NMRA preferred service mode) on programming track.
Read/write programming for address, CV bytes and CV bits programming on keypad.
Read/write programming of CV bytes with LocoNet commands (*3).
- Operations mode programming-program individual locos on the layout.
Write of CV byte except CV1, CV17 and CV18 (no address changes)
With keypad or LocoNet commands (*3)
- Recognize LocoNet DCC accessory Decoder commands and sends it to.
- Used LocoNet hand controls, such as FRED, DAISY II, Profi-Boss, IB-Control.
- Can use up to 8 or 16 (*1) hand controls at the same time.
- One built-in train controller for speed, direction and F0 to F9 on keypad (*4).

(*1) 8 for LC050 and 16 for LC051, LC052, LC053 and 32 for LC054 or higher

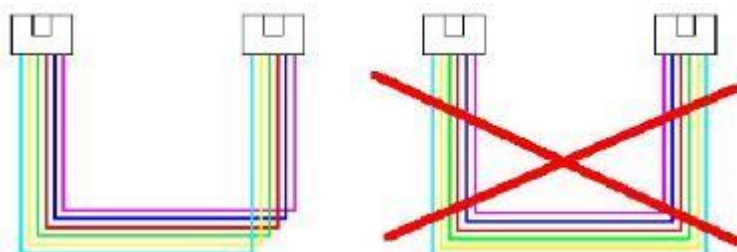
(*2) F1 to F8 for LC050 and LC051, F1 to F28 for LC052, F1 to F9999 for LC053 or higher

(*3) LocoNet commands for LC053 or higher

(*4) LC054 or higher

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.



Jumper setting:

JP1	Off	Turn Bi-Directional OFF	No Railcom Cut-out
	On	Turn Bi-Directional ON	Railcom Cut-out

Note: further information sees LocoRCC manual.

Power connector J3 possibilities:

Pin 1: 5V output

Pin 2: "V+" 12VDC input (provide minimum 15W) used for the Central

Pin 3: "VT" 12VDC for N-scale

12-18VDC for HO-scale input for LocoNet Railsync and Programming Track
(Provide minimum 20W)

Pin 4: GND

! The voltage on pin 3 should not exceed the 21VDC to not damage the locomotive decoders.

Connector J4:

Connection for programming track. Neither connection connects to the LocoBooster of the main track.

Green LED: *You can also notice this if the display gives an indication.*

OFF No Power - no display indication
ON +5V Ok - display lights up

Red LED: *This is the same as the leftmost point on the display.*

Off LocoNet OK, no activity
Blinking LocoNet command transfer

Orange LED: *Visible on the left when installed in the housing.*

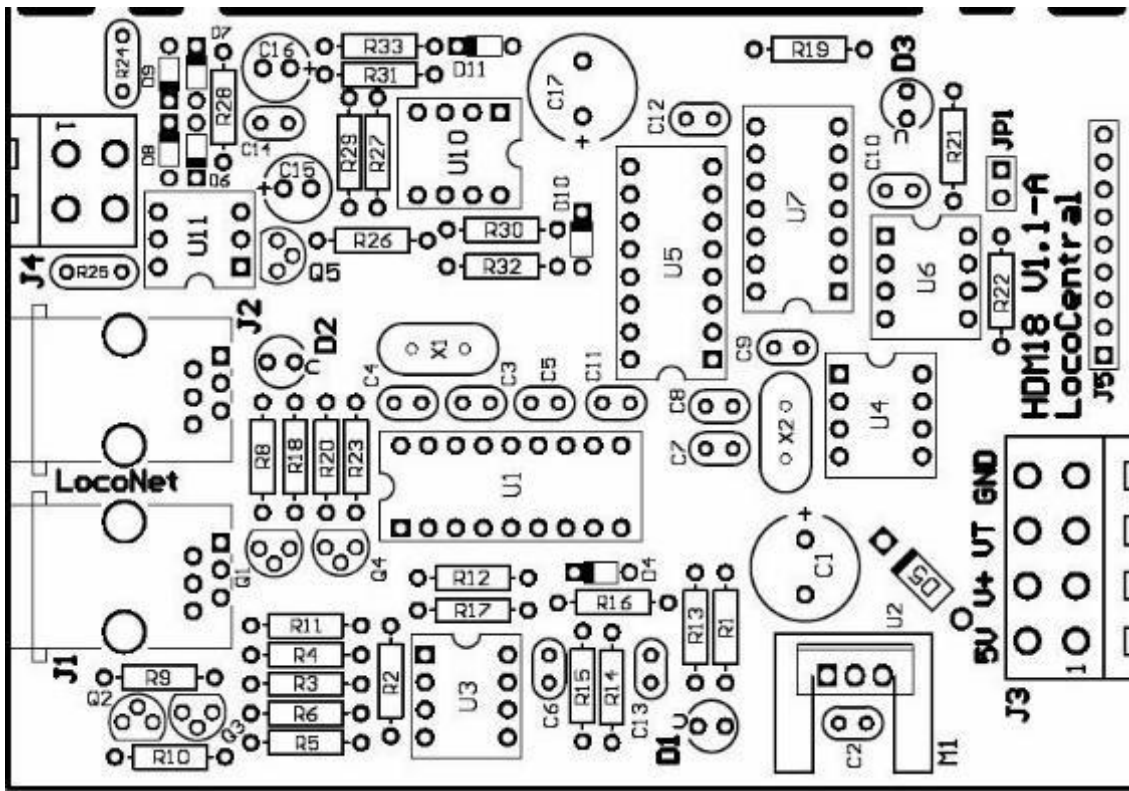
OFF No Power
ON Normal operating condition.
Flashes slowly No Railsync on LocoNet Input
Double flashes System is in configuration mode, after setting CV7 with value 50 in Ops mode programming Program CV7 in Ops mode programming with the appropriate value.
After 15 seconds the system returns to normal operation.

Note: Railcom reception is started if a first train address is set on the LocoCentral via keyboard or by PC via LocoNet.

Bill of materials: HDM18-A

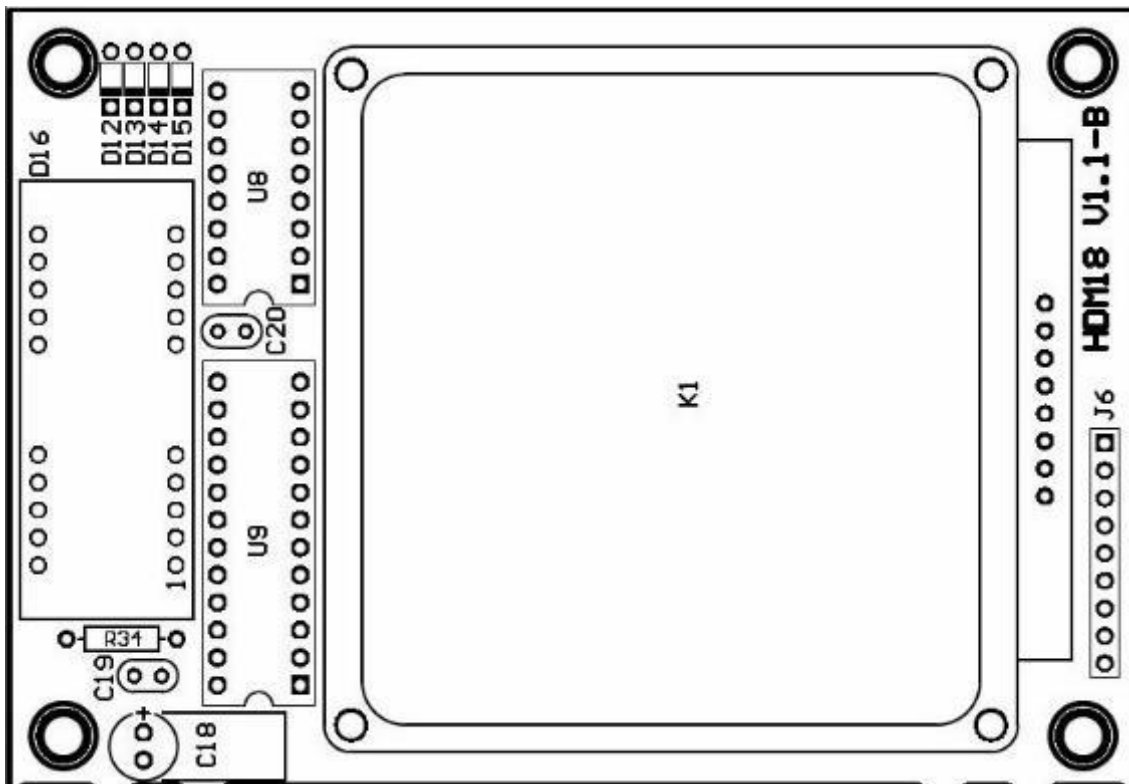
ELCO	220µF/25V	2	C1, C17
ELCO	10µF/25V	2	C15, C16
Capacitor	100nF	7	C2, C5, C6, C9, C10, C11, C12
Capacitor	15pF	2 or 4	C3 (*4), C4 (*4), C7, C8
Capacitor	10nF	2	C13, C14
LED Ø3mm	Green 3mm	1	D1
LED Ø3mm	Red 3mm	1	D2
LED Ø3mm	Orange 3mm	1	D3
Diode	1N4148	7	D4, D6, D7, D8, D9, D10, D11
Diode	1N4001	1	D5
Connector	RJ12	2	J1, J2
Connector TH	4 pins print connector (5.08)	1	J3
Connector SC	4 pins plug in connector (5.08)	1	for J3
Connector TH	2 pins print connector (5.08)	1	J4
Connector SC	2 pins plug in connector (5.08)	1	for J4
HDR1x9RJ	9 pins socket	1	J5 (*5)
Jumper	2 pins	1	JP1
Transistor	BC337-40	1	Q1
Transistor	BC547B	2	Q2, Q3
Transistor	BC557B	2	Q4, Q5
Resistor	1kΩ	3	R1, R8, R21
Resistor	220kΩ	1	R2
Resistor	22kΩ	1	R3
Resistor	10kΩ	10	R4, R10, R11, R16, R17, R19, R20, R22, R28, R29
Resistor	47kΩ	1	R5
Resistor	150kΩ	1	R6
Resistor	4k7Ω	3	R18, R23, R26
Resistor	47Ω	1	R9
Resistor	100Ω	2	R12, R27
Resistor	120kΩ	1	R13
Resistor	100kΩ	3	R14, R30, R31
Resistor	2M2Ω	1	R15
Resistor	10Ω	2	R32, R33
Resistor	RXF050	2	R24, R25
PIC	"LC053"	1	U1
PIC	"DCC1"	1	U4
PIC	"RCC2"	1	U6
Voltage Regulator	R-78E5,0-1,0	1	U2
Comparator	LM393N or LM293P	2	U3, U10
Power IC	SN754410NE	1	U5
DC-Optocoupler	4N37	1	U11
Nand Gates	74LS132N	1	U7
XTAL	Quartz 16MHz	0 or 1	X1 (*2)
XTAL	Quartz 4MHz	1	X2
Cool plate	for TO-220 housing	1	M1

Note: R7 is not installed.
(*4) C3, C4 and X1 not installing with LC051 or higher
(* 5) J5 and J6 are placed at the bottom of the PCB



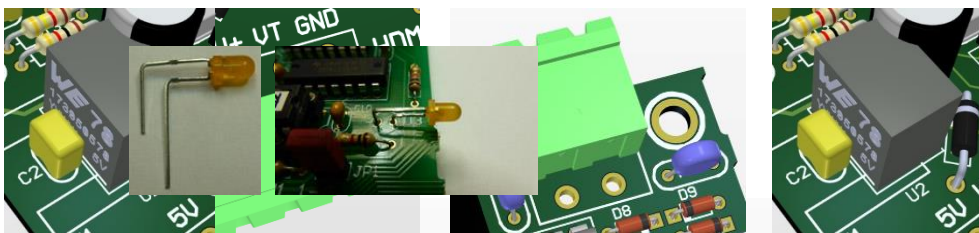
Bill of materials: HDM18-B

ELCO	10µF/25V	1	C18
Capacitor	100nF	2	C19, C20
Diode	1N4148	4	D12, D13, D14, D15
Display	CC04-41SURKWA	1	D16
HDR1x9RA	9 pins socket pins	1	J6 (*5)
Keypad	MCAK1604NBWB	1	K1
Resistor	100kΩ	1	R34
IC	74LS138N	1	U8
IC	MAX7219CNG	1	U9



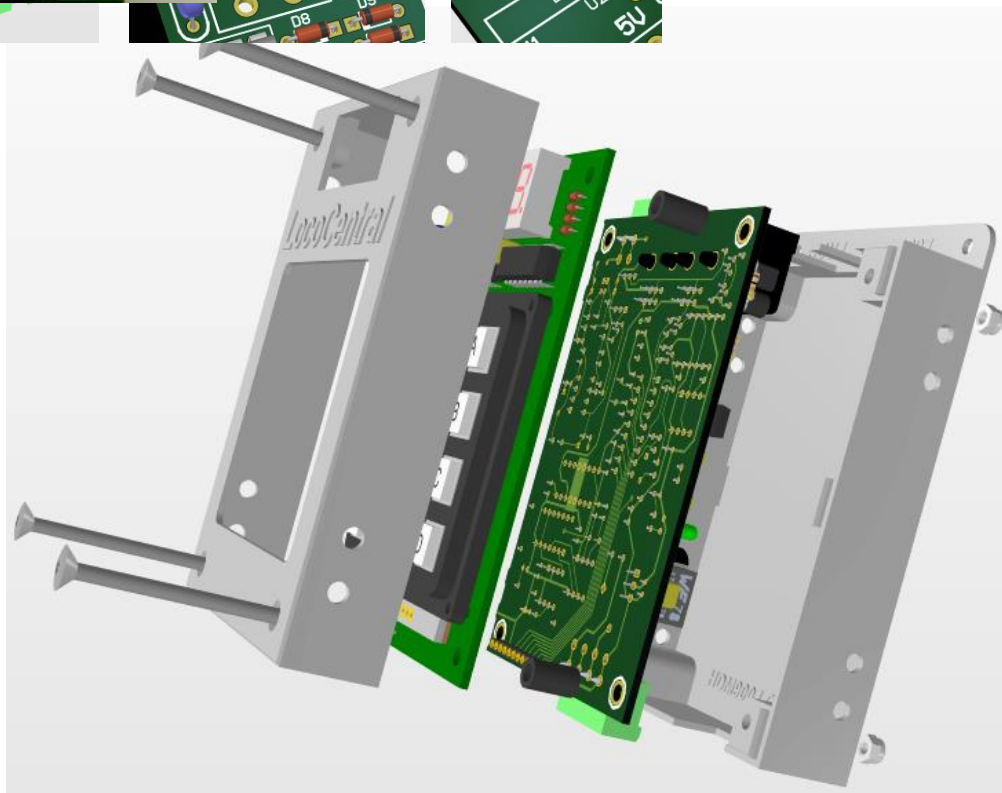
Installation in housing HDM900

Placing connectors J3 and J4 on the outer row of holes.
 Power IC with text facing C2. Can push a bit against C1, but easy to install.



Fold orange LED as shown in photo

Assembly:



Connection:



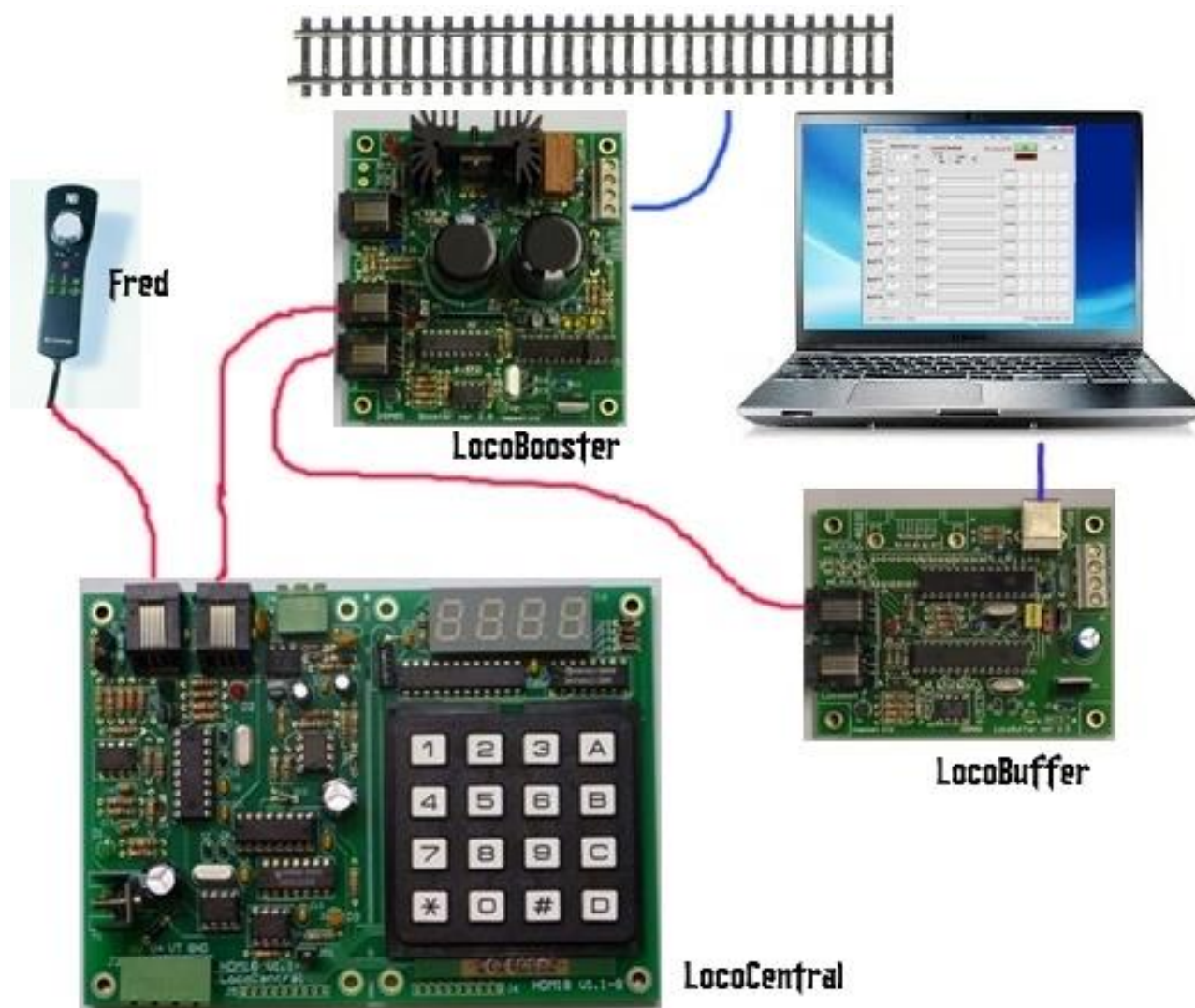
1 – Trains driving with LocoCentral

Operating the trains can happen in different ways.

- 1) A train software that operate the LocoCentrale via a LocoBuffer.
 - With LocoHDL you can make trains operate and also set certain settings, see Chapter 5.
 - Each train software that supports LocoNet can be used.
- 2) LocoCentral with hand controls through keyboard, see Chapter 3



- 3) Software and hand controls together.



2 - LocoCentral panel

Before starting to use the LocoCentral, take a few minutes to look at the front panel buttons and indicators.



Keyboard

The keyboard consists of the 10-digit keypad, and the function keys.

10-digit keypad

Use this to enter loco address to run, and address, CV number and value during programming.

STOP/RUN key (A)

Repeatedly pressing this key will toggle between (Emergency) STOP- and RUN mode.

PROG key (B)

Enter and select programming mode.

SLOT-CLR/CV Dec key (C)

Clear loco slot - decrement CV.

NEXT / CV Inc key (D)

Get next idle loco from dispatch stack - get/increment CV.

Enter / CV BYTE/BIT key (#)

Enter loco address CV byte/bit value.

Speed / ADDR/CV RD/WR key (*)

Show speed Address/CV read/write.

3 Operations (Run-) mode

3.1 Running Loco with the (FREMO) FRED Throttle

1. Use the Keypad to enter your loco s address (e.g. 1237), and press ENTER key (#).
2. Display shows **1237.**. The dot indicates an idle/new loco address in slot.
3. Repeat to enter more addresses.
4. Use the **NEXT** key (D) to browse through the entered locos.
5. Press **Dispatch-Get** key-sequence on the FRED to acquire the loco currently shown in the LocoCentral display.
6. The display goes back to - or shows the next idle loco in turn.
7. Repeat 4. to acquire more locos.

Tip! You can **Dispatch-Put** the loco back to the LocoCentral with a new Dispatch Key-Sequence, and then perform another **Dispatch-Get** to get next loco.

3.2 Running Loco with other Throttles

See throttle manual for instructions.

3.3 Emergency STOP

If things are getting out of control and you need to stop the whole layout, press the **STOP** key (A) to turn off the LocoBooster, and put everything on the layout in **Emergency stop**.

The display will slowly blink **STOP** to remind you that the LocoCentral is in Stop mode.

To resume operation, press the key again.

Note! All loco slots resume with speed set to e-stop, so you probably need to turn throttle down to zero to get your train going.

3.4 Release loco

If the LocoCentral display shows **FULL** when entering loco address this means it has reached the limit of 8, 16 or 32 (*1) locomotives it can manage simultaneously. If you want to select additional addresses, you will need to release one or more addresses from the loco idle stack. If you want to select additional addresses, you will have to release one or more addresses that are in idle. To release an address, use the **NEXT** key (D) to browse through the idle/common slots, and press the **SLOT-CLR** key (C) when the address you want to release is shown in the display.

NOTE! It is not possible to release an address currently in use by a throttle.

3.5 Show speed on display

While running your locos, you may press the **SPEED (*)** key to continuously display the actual loco speed and direction. However, this function will always show the last speed message SEEN on LocoNet, so if you run more than one loco, the speed display will flicker between the locos.

4 - Decoder Programming modes

Your DCC Decoders have many different Configuration Variables (CVs for short) that let you set up a different set of characteristics for each decoder installed in a locomotive. When you want to change a loco's address, set up how its lights work, change its momentum characteristics, etc. you will program new CV values into the appropriate CVs to set it up just the way you want. Each CV controls a characteristic of the decoder. See your decoder manual for a list of the most commonly used CVs and their meanings. However, each decoder comes pre-programmed with factory settings that will let you run it right away. It is a good idea to run your decoders with the default CV values that come pre-programmed in your decoders until you get used to the system & what it can do for you. Once you are comfortable with running the trains, then you can begin customizing loco characteristics. Decoders are programmed when the command station sends programming information to them through the rails.

The LocoCentral supports two types of programming:

Service Mode Programming is done on an electrically isolated programming track. Using this mode, the LocoCentral **broadcasts programming information to all decoders on the program track**. Because this is a broadcast mode, you must ensure that only the loco you want to program is connected to the LocoCentral, and that rest of the layout is insulated. This mode works with all DCC decoders.

Operations Mode Programming (OPS) is done on the layout by sending programming commands to a specific locomotive address. To use this mode, you must have decoders that are capable of OPS mode programming.

4.1 Setting Up a Service Mode Programming Track

Your programming track can be as simple as a spare piece of track directly connected to connector J4 of the LocoCentral. You can connect the connector J4 also to a double gapped section of track via a DPDT switch.

NOTE! If your layout is powered by LocoBooster connected to the LocoNet, you don't have to disconnect them, since LocoCentral send to the LocoBooster a GPOFF to disable your lay-out power during Service Mode Programming.

4.2 Decoder Address Programming

1. Be sure that only the locomotive you want to program is on the programming track.
2. Press the **STOP** key (A) to enter Stop-mode, and then press the **PROG** key (B) to go to address programming. If you press the PROG key repeatedly, you will toggle between Address (**Addr**) and CV (**dir**) programming mode.
3. You can now press the **ADDR-READ** key (*) to read the decoder address. The display will flicker during read, and the current decoder address will blink in the display. If the address cannot be read, the display will return to blink **Addr**.
4. To change, simply use the keypad to enter the new address don't worry about short or long and press the **ADDR-WR** key (*).The display will flicker for a moment, and then return to blink **Addr**.
5. Repeat from 3. or press the **RUN** key (A) to resume normal operation.

NOTE! The long address programming procedure changes the decoder's CV 17, 18 and 29. After programming a long address, the short address in CV 1 and the consisting address in CV 19 are no longer available. If you want to use these addresses again, you must set bit 5 of CV 29 to zero or reprogram a short address.

4.3 Configuration Value (CV) Programming

1. Be sure that only the locomotive you want to program is on the programming track.
2. Press the **STOP** key (A) to enter Stop-mode, and then press the **PROG** key (B) twice to go to CV programming. If you press the PROG key repeatedly, you will toggle between CV (**dir**) and Address (**Addr**) programming mode.
3. Use keypad to input CV number or press the **CV-GET** key (D) to get last used CV and then increment or decrement CV number with the **CV-INC** (D) and **CV-DEC** (C) keys. The display will show **c** followed by the CV number (example: **c005**). The **c** indicates you are entering CV number.
4. You can press the **CV-READ** key (*) to read the CV value. The display will flicker during read, and the current CV value will show in the display headed by a **d**. If the value cannot be read, the display will show **d000**. The **d** indicates (decimal) CV value.
Note: If you do not want to read back the CV's data value as described above, you can simply press the **CV-BYTE** (#) key to go directly to the data entry mode. In this case, the display will show **d** followed by 3 digits.
5. Use the keypad to enter the new CV value you want to program into the decoder. See section 4.4 for how to manipulate single bit in the CV.
6. Press the **CV-WR** key (*) to write the new CV value to the decoder. The display will flicker for a moment, and then return to blink **dir**.
7. Repeat from 3. or press the **RUN** key (A) to resume normal operation.
TIP: Pressing the **CV-GET** key (D) any time will allow you to reselect the CV number.

4.4 CV bit Programming

Sometimes it is more convenient to set or clear a single bit of a CV register.

1. Toggle between Byte and Bit entry mode by pressing the **CV-BYTE/BIT** key (#) while in data entry mode. The display will change from the **d** followed by 3 digits to **b** followed by bit.value, (example: **.b 4.1**).
2. Use the keypad (0-7) to select the bit and repeat the key to toggle the value (0/1).
3. Press the **CV-WR** key (*) to write the single bit value to the decoder. The display will flicker, and then return to show the present programming mode.

NOTE! Bits are numbered 0 to 7. Some decoder's manuals (e.g. Lenz) use numbers from 1 to 8. Don't forget to convert these values before using this procedure.

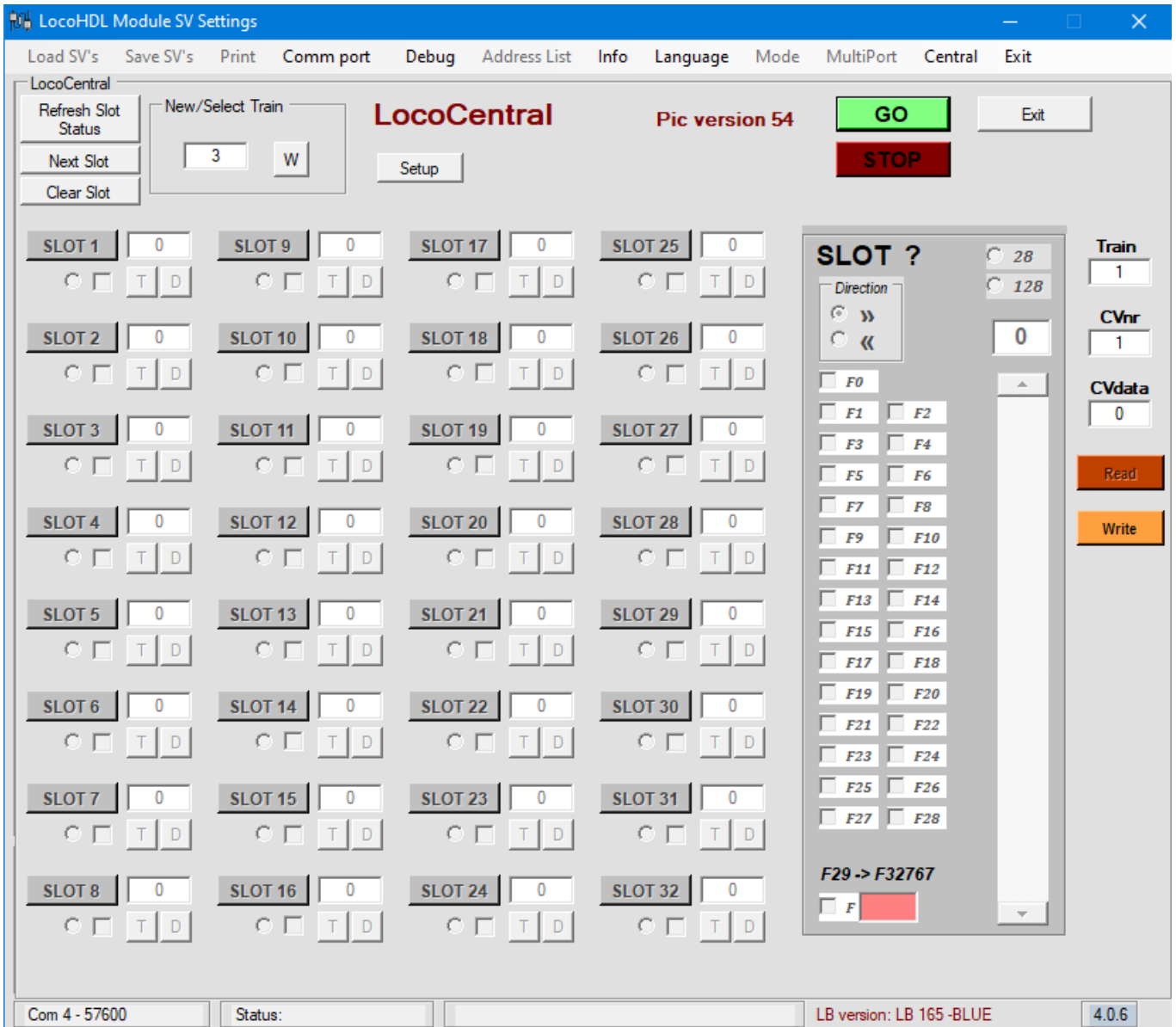
4.5 OPS Mode Programming

OPS mode programming lets you program CVs in DCC locomotives equipped with Extended Packet Format decoders while they are on the layout. A typical use for Ops mode programming would be to change the acceleration rate (CV03) or the deceleration rate (CV04) of your locomotives to simulate the weight and braking capability of the train to compensate for changing the number of cars or power units on a train.

The LocoCentral can use OPS mode programming to change the CV value in ANY CV, except addresses.

1. Use the **NEXT** key (D) key to browse through the slots or use the keypad and **ENTER** key (#) to enter a loco address, and press the **PROG** key (B) to enter OPS-mode programming. The display will show **OPS**. If address is in use the display will blink rapidly and you have 3 seconds to press the **PROG** key.
2. Use keypad to input CV number or press the **CV-GET** key (D) to get last used CV and then increment or decrement CV number with the **CV-INC** (D) and **CV-DEC** (C) keys. The display will show **c** followed by the CV number (example: **c005**). The **c** indicates you are entering CV number.
3. Press the **CV-BYTE** key (#) to go into CV value entry mode and use the keypad to enter the new value. See section 4.4 for how to manipulate single bit in the CV.
NOTE! It is not possible to program CVs 1, 17 & 18 with OPS Mode programming.
4. Press the **CV-WR** key (*) to write the new CV value to the decoder. The display will flicker for a moment, and then return to blink **OPS**.
5. Repeat from 2. or press the **PROG** key (B) to resume normal operation.

5 – Set up and operate the LocoCentral with LocoHDL



! The data in the LocoHDL window may differ depending on the software version of the LocoCentral.



LocoHDL not know the State of the LocoCentral.

LocoCentral is in normal working condition

LocoCentral is in STOP mode

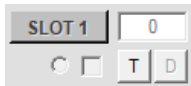


Leaving this LocoCentral window. The data continue to work in the background.



With the Setup window you can set the startup conditions of the LocoCentral.

5.1 Slot overview:



Slot not in use.



Slot to a locomotive assigned but not in use. De selection of this slot means that this slot is in de display of the LocoCentral and is the active slot. With the key "T" train you can assign a train to LocoHDL.



Slot to a locomotive allocated and in use by a hand controller.



Slot to a locomotive allocated and in use by LocoHDL. With the "D" key can you disconnect this slot from LocoHDL and can be used by someone else.



Slot to locomotive allocated and in use by different users.



With the key "Refresh Slot Status" you can query the State of the Central, if this settings are changed by the LocoCentral keyboard or other software and do not match LocoHDL.

The key "Next Slot" has the same meaning as the key "D" on the LocoCentral keyboard. With it you can change current slot.

The key "Clear Slot" has the same meaning as the key "C" on the LocoCentral keyboard. With it you can make the current Slot empty from the locomotive data.

5.2 How to operate a train:



Here you can enter a new train number and with the key "W" assign to a Slot.

The locomotive is assigned to a free slot.



Be taken over by a hand controller.
Example for a FRED from Push [stop]-key and hold. By slot assigned to the hand

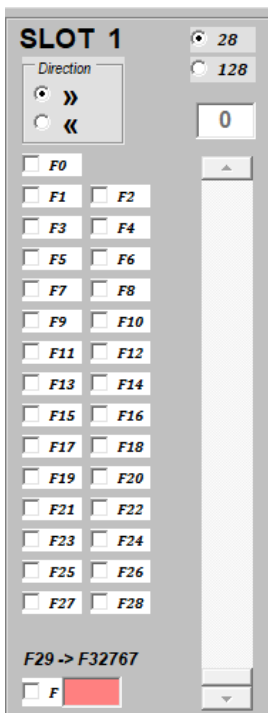


controller. Uhlenbrock: pressing the [function]-key is the locadres of the selected controller.



Or

By pressing the key "T" you can assign a train to LocoHDL. With the key "SLOT x" you can make the data of the Locomotive visible

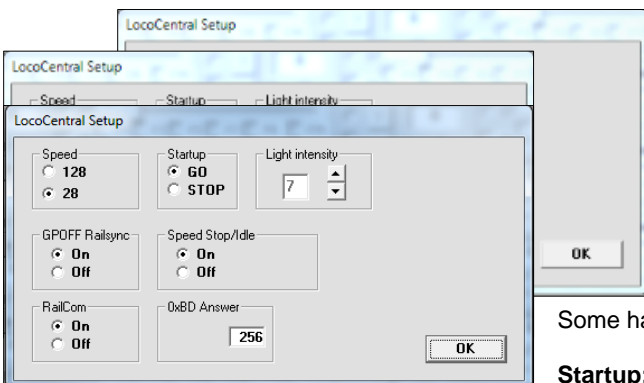


Operate the Locomotive in the active Slot window.

Set the speed steps between 28 or 128.
Control the speed.
Change the direction.

Operate the functions if they are present in the Locomotive.
F0 to F28 can be checked directly.
F29 to F32767 can be operated by entering the function number.

5.3 LocoCentral Setup:



LC050 and LC051

LC052

LC053

Speed:

You can set the start-up speed on 28 or 128. Afterwards, you can still change the rate per slot.

Some handhelds can adjust the Slot individually to the speed set on the handheld.

Startup:

Sets the State of the LocoCentral after switching on the power supply.

Light intensity:

With it you can set the light intensity of the Display.

GPOFF Railsync:

Allows you to indicate whether the Railsync signals must stay On or go Out when you push STOP on the LocoCentral. Normally this is On, but there are Boosters that the GPOFF command doesn't recognize.

Speed Stop/Idle (from LC052)

With it you can, after a GPOFF or GPIDLE command, to restore the speed of the trains or set all speeds to zero.

0xBD Answer (from LC052)

The new LocoNet command for signals and turnouts expected an answer. DCC modules cannot give this answer and most LocoNet modules either, for this reason, the LocoCentral the answer. If you do not have DCC modules and works with LocoNet which itself answers, you can disable the answer from the LocoCentral.

From LC053 you can enter from which address the signals and turnouts work with the answer command.

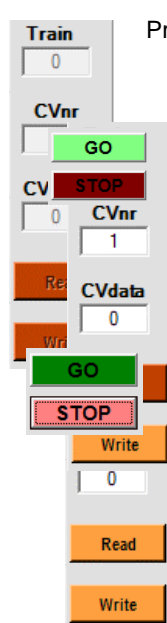
RailCom (from LC053)

With this you can set the Railcom cut-out On or Off

OK

When pressing OK key, the data is sent and stored to the LocoCentral.

5.4 Program on Main track or Programming track with LC053



Programming not possible



(or version is LC052 or lower)

When you are in GO you can write CVs on Main track at a given train address.

Changing address with CV1, CV17 and CV18 is not possible.

When you are in STOP you can read CVs on Programming Track

and to write.

You do not have to enter a train address on programming track.