PaoDesign

MiniBOX

LocoNet® DCC Command Station

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1 Introduction

This LocoNet® DCC Command Station is designed specially for you (FREMO-) FRED owners, who like the idea of a D.I.Y. Command Station to use at home.

Therefore there are a lot your MiniBOX doesn't do, but – on the other hand – it does what you probably want, and need:

1.1 Features

- Supports all NMRA DCC format loco decoders
- Use any LocoNet® throttle, e.g. the FREMO FRED
- Run up to 6 loco addresses at the same time
- Use up to 6 throttles (e.g. FRED) at the same time
- Full numeric keypad for easy operation
- Four 7-segment LEDs display for address, speed and programming
- Painless short (1-127) and long (128-9999) address selection
- 128 speed steps for smooth speed control
- Control light (FL), and F1 to F8 (depends on throttle)
- Supports 14 and 28 speed steps throttles
- Small built-in booster (600mA) for running one locomotive
- Built-in read[1]/write programmer for Address and CV byte/bit programming
- Supports NMRA Direct mode programming on separate track, and
- Operations mode programming - to program individual locos on the layout
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[1] To be able to read Address and CV values from a loco, an optional ACK-detector is required.

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2 MiniBOX Front Panel

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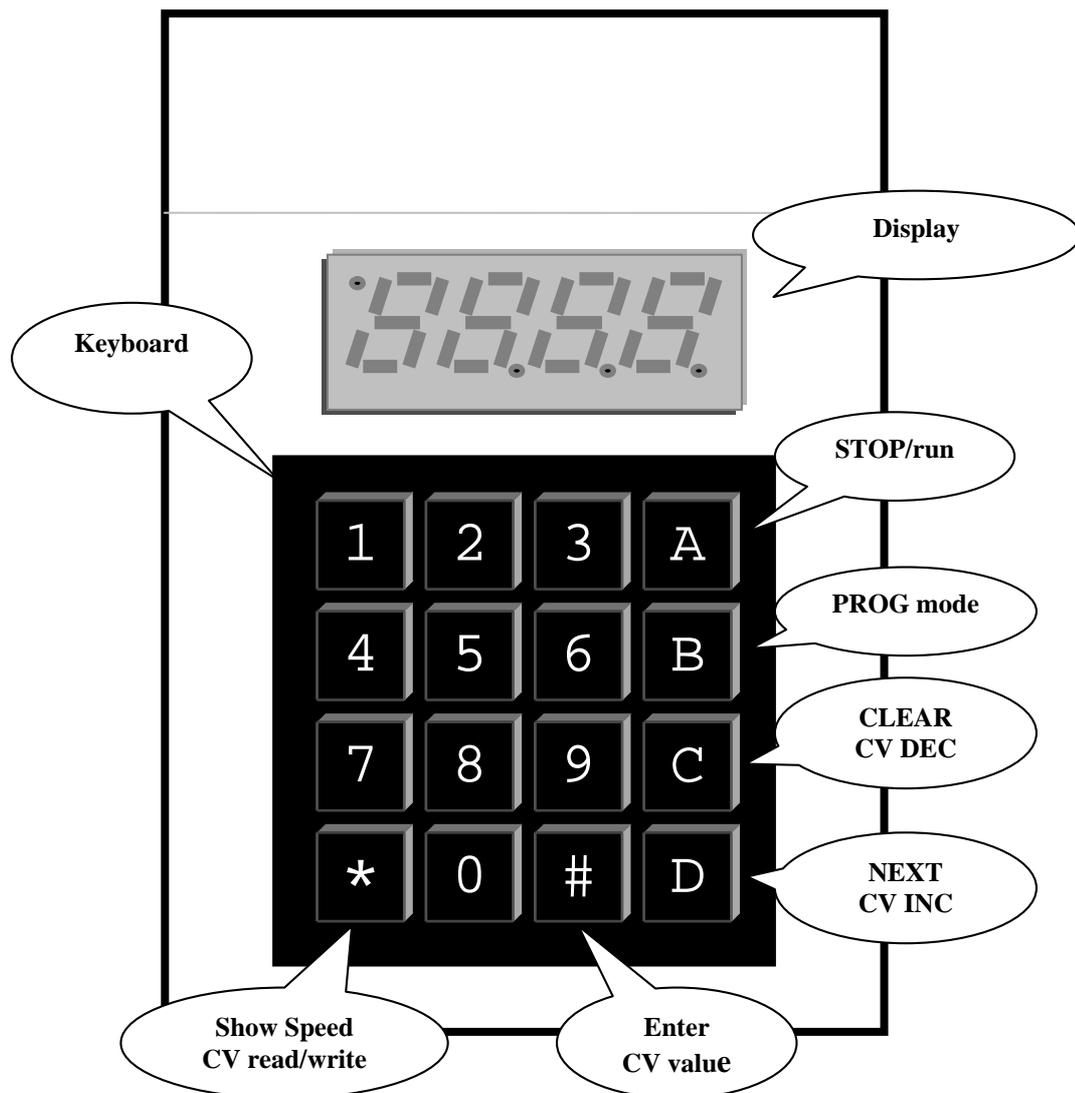
2.1 Keyboard

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

2.1.1 10-digit keypad

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

2.1.2 STOP/RUN key (A-key)

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

2.1.3 PROG key (B-key)

Enter and select programming mode.

2.1.4 SLOT-CLR / CV Dec key (C-key)

Clear loco slot - decrement CV.

2.1.5 NEXT / CV Inc key (D-key)

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

2.1.6 ENTER / CV BYTE/BIT key (#-key)

Enter loco address – CV byte/bit value.

2.1.7 SPEED / ADDR/CV RD/WR key (*-key)

Show speed – Address/CV read/write.

2.2 Display

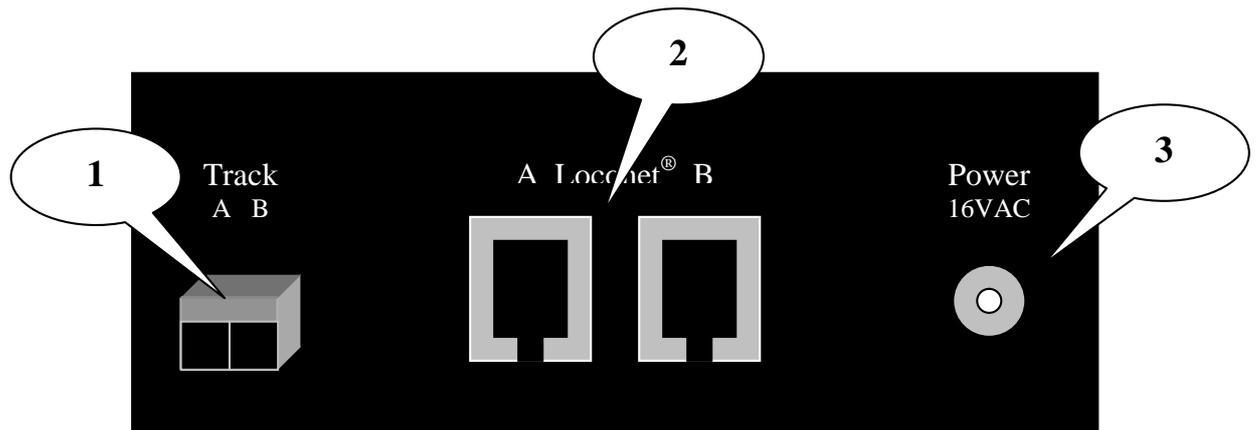The MiniBOX's LED Display is made up of 4 digits, and 4 indicator dots.

The upper left indicator always shows LocoNet® activity, the other three have context dependent meaning.

3 Connecting the MiniBOX

Connecting the MiniBOX is indeed simple;
Connect your layout, plug in a (some) throttle(s), and bring the power.

1. Hook up the wires from the track to the TRACK A & TRACK B terminals on the MiniBOX. Insert one wire from each rail into each of the two terminals and turn the screws to fix.

2. Plug the RJ12 connector from your LocoNet® throttle into any of the two **LocoNet**® connectors.

3. Enter power from your Wall adaptor to the **Power** jack, and the MiniBOX display will lit and say **run** for a second.

4. If your connected throttle previously was running a loco, the same loco is automatically loaded and ready to run.

4 Operation (Run-) mode

4.1 Running Loco with the (FREMO) FRED Throttle

1. Use the **Keypad** to enter your loco's address (e.g. 2680), and press **ENTER** (#-key).

2. Display shows *2680.*. The dot indicates an idle/new loco address in slot.

3. Repeat to enter more addresses.

4. Use the **NEXT** key (D-key**)** key to browse through the entered locos.

5. Press **Dispatch-Get** key-sequence on the FRED to acquire the loco currently shown in the MiniBOX 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 MiniBOX with a new Dispatch Key-Sequence, and then perform another **Dispatch-Get** to get next loco.

4.2 Running Loco with other Throttles

See throttle manual for instructions.

4.3 Emergency STOP

If things are getting out of control and you need to stop the whole layout, press the **STOP** key (A-key) to turn off LocoNet® power, and put everything on the layout into "**Emergency Stop**".

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

To resume operation press the key again.

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

4.4 Release loco

If MiniBOX's display shows *FULL* when entering loco address this means it has reached the limit of 6 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.

To release an address use the **NEXT** key (D-key) to browse through the idle/common slots, and press the **SLOT-CLR** key (C-key) 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.

4.5 Show "speed"

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.

5 Decoder Programming

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 preprogrammed 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 MiniBOX supports two types of programming:

Service Mode Programming is done on an electrically isolated programming track. Using this mode, the command station **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 MiniBOX, and that rest of the layout is insulated. This mode works with all DCC decoders.

Operations Mode Programming 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 operations mode programming.

5.1 Setting Up a Service Mode Programming Track

Your programming track can be as simple as a spare piece of track directly connected to the TRACK A & B terminals, or it can be a double gapped section of track connected via a DPDT switch.

NOTE! If your layout is powered by an external booster connected to the LocoNet® you don't have to disconnect since LocoNet® RailSync is disabled during Service Mode Programming.

5.2 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-key) to enter Stop-mode, and then press the **PROG** key (B-key) to go to Address programming. If you press the PROG key repeatedly, you will toggle between Address (***Addr***) and CV (***dir***) programming mode.

3. If you have the optional Ack-detector connected (see section 6), you can now press the **ADDR-READ** key (*-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 can not 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 (*-key). The display will flicker for a moment, and then return to blink ***Addr***.

5. Repeat from 3. or press the **RUN** key (A-key) 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.

5.3 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-key) to enter Stop-mode, and then press the **PROG** key (B-key) 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-key) to get last used CV – and then increment or decrement CV number with the **CV-INC** and **CV-DEC** keys. The display will show ***c*** followed by the CV number, e.g. ***c005***. The "***c***" indicates you are entering CV number.

4. If you have the optional Ack-detector connected (see section 6), you can now press the **CV-READ** key (*-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 can not 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 5.4 for how to manipulate single bit in the CV.

6. Press the **CV-WR** key (*-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-key) to resume normal operation.

TIP: Pressing the **CV-GET** key any time will allow you to reselect the CV number.

5.4 CV Programming (bit)

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 (#-key) while in data entry mode. The display will change from the "*d*" followed by 3 digits to "*b*" followed by bit.value, e.g. *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 the 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.

5.5 Operation Mode Programming

Operations 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 MiniBOX can use Ops mode programming to change the CV value in ANY CV, except addresses.

1. Use the **NEXT** key to browse through the slots, or use the keypad and **ENTER** key to enter a loco address, and press the **PROG** key 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-key) to get last used CV – and then increment or decrement CV number with the **CV-INC** and **CV-DEC** keys. The display will show *c* followed by the CV number, e.g. *c005*. The "*c*" indicates you are entering CV number.

3. Press the **CV-BYTE** key (#-key) to go into CV value entry mode, and use the keypad to enter the new value. See section 5.4 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 (*-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-key) to resume normal operation.

6 Optional Ack-detector

Coming soon…