LocoMotive DCC - instructions

Note: do not use a model railway DC controller as a supply source - ensure a true DC regulated 14v or 15v DC supply is connected to V+ and V- terminals.
The supplied power jack is suitable for a 5.5mm diameter / 2.1mm inner diameter plug. Normally the inner pin is positive but must be checked before connecting. The power unit will have a diagram to indicate polarity.

Bluetooth connection:
Ensure Bluetooth module is inserted the correct way round as shown in photograph above. Bluetooth module DCC525 password 1234
Go to bluetooth settings on your phone or tablet and pair with this module.
Open the App, press 'Get Bluetooth' button, choose DCC525 from the list.

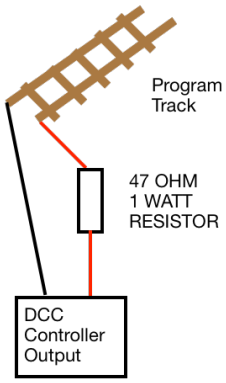
Safe use of this product is limited to:
Suitable for use by persons over 14 years old only.
For indoor use only, do not expose to water or moisture.
Maximum environment temperature: 35 degrees Celsius
Note: The enclosure material will become soft above this temperature.
Ensure you use a safe 14 or 15 volt regulated DC power supply.
Power supplies with isolated outputs must be used. Isolated means that the output terminals of the supply are not electrically connected to the ground and/or neutral wires of the AC mains supply circuit.

LocoMotive DCC - Disposal:
The enclosure for this product consists of 3D printed PLA.
Please check with your local recycling centre before disposal.
Disposal of the enclosure has 4 possible scenarios:

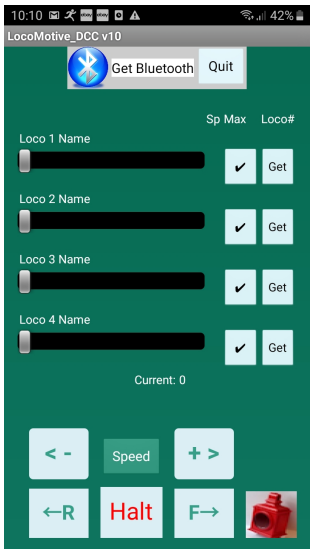
1. Recycling: can be recycled using chemical or mechanical methods.
2. Composting: PLA is biodegradable under industrial composting conditions
3. Incineration: PLA can be incinerated, leaving no residue and producing 19.5 MJ/kg (8,368 btu/lb) of energy.
4. Landfill: the least preferable option is landfilling because PLA degrades very slowly in ambient temperatures.

The printed circuit board and components should be taken to your local recycling centre to obtain advice on correct disposal or recycling.

Read/Write CV's:
Place your loco on the program track i.e. an isolated piece of track connected to the controller.
Connect a 47 ohm 1 watt resistor in series with one of the output wires to the program track.



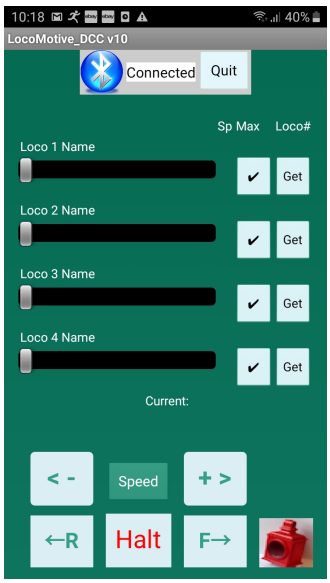
LocoMotive DCC - v36 - for digital trains - **Full App Operating instructions**



This App is available on the Google Play Store: Search for “LocoMotive DCC”
Or type in this link:
https://play.google.com/store/apps/details?id=appinventor.ai_bill_falkland.LocoMotive_DCC

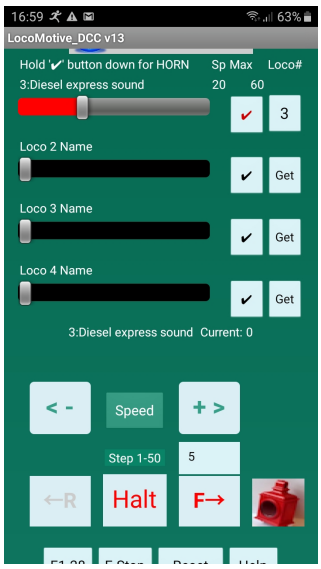
Go to Bluetooth settings on your phone/tablet and pair using ID of the DCCxxxx Bluetooth module on hardware circuit. The password is 1234

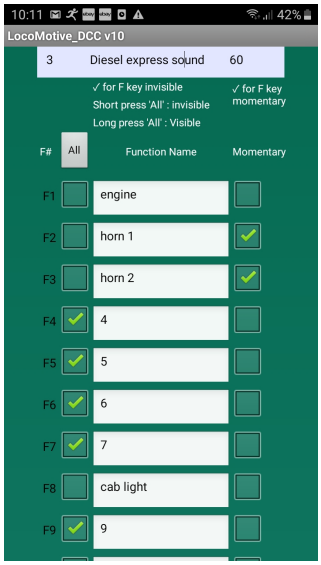
Once paired, press
‘Get Bluetooth’ at top of screen and select the DCCxx module from the list.



The screen should now look like this.
The ‘Get Bluetooth’ Label changes to ‘Connected’
Select **‘Get’** under ‘Loco#’ heading then pick the loco number from the list displayed.
If you select ‘3’ you now have control over loco with address number 3 on your layout.
The ‘✔’ indicator will turn red ‘✔’ to indicate this loco is currently under control
When the ‘✔’ button is long pressed, the horn function (F2) will be momentarily be activated.

To give this loco a name and to configure its functions press the **‘Config’** button.



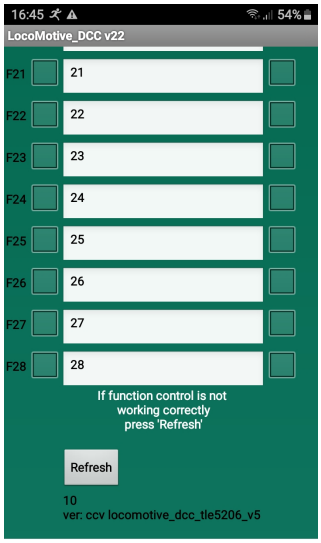


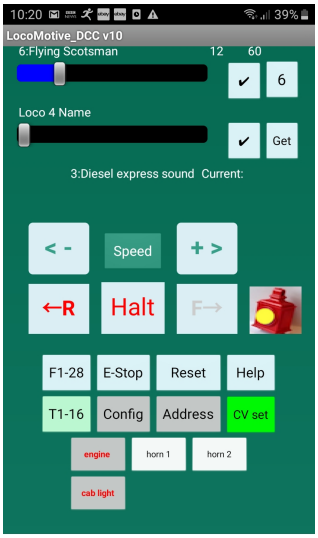
You are now on this layout.
With ‘3’ displayed under Loco# enter the required name of your loco and set a maximum speed if desired.

If there are no functions on this loco to control, select ‘All’ which ticks all of the 1 to 28 function boxes.
If you have say F1 for starting an engine sound, this function can be unticked and given its name as shown.

To make a function operate ‘momentary’ simply tick the required box on the right hand side as shown for F1 and F2 (horn sounds)

Press the ‘Refresh’ button to clear any fault found in the function controls.

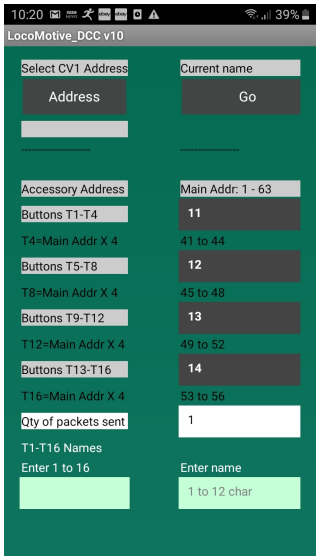




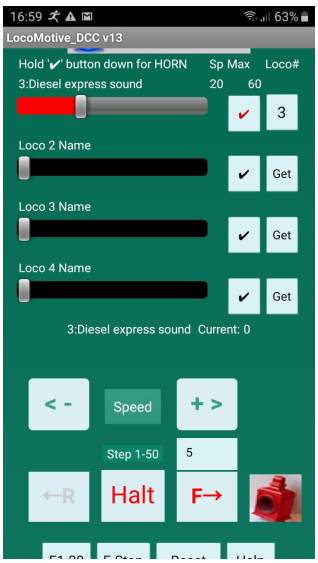
On the main layout again, if you want to set the CV1 address of a loco press **'Address'**
You are now on this layout —>
With the loco on the track on its own - or use a separate track to ensure no others are affected.
Select **'Address'** number you require (1 to 127) and press **'Go'.** Alternatively, use '**CV Set'** layout and write the loco address (1-127) directly into CV1
If the address has been programmed, a message will tell you so. The loco will move slightly to indicate good connection and successful programming.

— — — — — — — — —

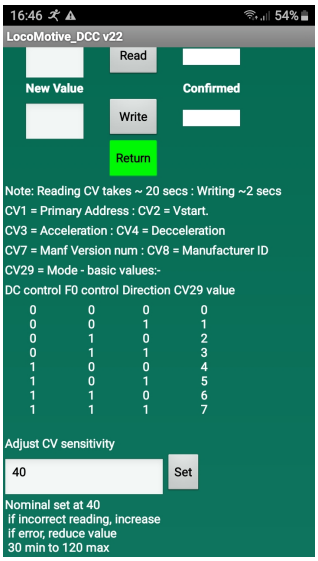
For accessory switching, the default main addresses are given as 1. 2, 3 and 4 which will operate decoder addresses 1 through 16



These may be changed to suit your accessory decoder for turnouts/points etc. Example here shows main address of 11 to 14 which will operate decoder addresses 41 through 56
The number of packets sent to DCC system may be changed by entering 1 to 5 in 'Qty of packets sent'.
The names on buttons T1 to T16 may be edited here also.



Back to the main layout,
To reverse loco direction use **'F'** and '**R**' arrow keys.
'**Halt**' to stop.
The '**<-**' Speed '**+>**' buttons allow fine control of the current selected loco speed.
Short press changes speed by +/- 'Step 1-20' single step
Long press changes speed incrementally by +/- 'Step 1-20' in multiple steps.
The directional lights on the loco are switched on/off by pressing the lamp symbol shown.
'**E-Stop'** is for emergency stopping of all locos.
Press **'Reset'** to start up again.
If there is a short circuit or over load (>2 amps) the system will shut down and a message displayed. Clear the fault and press '**Reset"**
To access the accessory switches press **'T1-T16'**
Press **'F1-F28'** to remove display of T1 to T 16
To access the CV Read/Write screen, press the **'CV set'** button.



You are now here.
With the loco on the programming track, connect a 47 ohm 1 watt resistor in series with one of the output wires of controller to the program track.
Enter the CV number you want to read or write into the **'ENTER CV# 1-1024'** box
Press **'Read'** button and the value will appear in the **'CV value'** box
To change this value, enter the new value for this CV into the **'Enter New Value'** box.
Press **'Write'** button.
When complete the '**Confirmed'** box will show the result.
A selection of commonly used CVs are listed along with basic values for CV29 and how they affect control of DC operation, F0 active, and loco direction.
When reading a decoder, the sensitivity may need to be adjusted in the box named 'Adjust CV Sensitivity'
(See fault finding notes)

Bill Cuthbert, 21 June 2024

Fault finding notes :

Fault condition:
The controller self limits the current load to 3 amps and will cut off the power to the output stage when this occurs. If the DC power unit has a cut off limit of 3 amps also, it may shutdown in the event of a short circuit for example and the bluetooth connection will be broken.

1. If App indicates a short circuit, the bluetooth connection is still working.
   a) Clear short circuit or reason for overload
   b) Press 'Reset' button on App
2. If App indicates bluetooth connection failure, the power unit has shut down.
   a) Clear short circuit or reason for overload
   b) Re-connect bluetooth on App with the controller.

CV Read/ Write issues:
All decoders require that a motor (or similar 'load') be connected to the decoder for proper reading on the program track.
The most common reasons (in order) you cannot read a CV are:
Dirty track / dirty wheels / off track. Broken or loose wires in the loco / installation
Defective or blown decoder. Particular manufacturer that does not support read-back

Remember that you MUST NOT read back ANY CV's on the main.
You MUST only read back on a separate program track.
Is the track perfect, AND are the wheels 100% clean?
As the CV routine cycles through each bit of data, any slight interruption to current flow will give an 'error'
Just because you cannot READ the CV does not mean you cannot WRITE the CV. It's called blind push programming.
This is a fairly common issue and not always an indication of hardware problems. The fact is some decoders will not read back at all but will program just fine.

Each time you read or write information to the loco it should move a small tiny bit to visually confirm it received your input and is doing something. If you can't tell it is moving when reading or writing visually, you can lightly rest a finger on the loco and feel for movement.
You may adjust the sensitivity of the CV read system by changing the value in the CV layout field 'Adjust CV sensitivity'. Values of 30 to 120 are allowed. (nominal value of 40) If incorrect readings increase this value or if 'error' reported, decrease value.
if you can't get a response of any kind, read a CV, or get any movement when programming, the decoder installation needs to be checked. It could be a faulty decoder or you may not have a decoder installed correctly.
In 'CV Set' mode on the App, enter '1' into the **'ENTER CV# 1-255'** box.
Then press 'Read'. If you get 'read error' in the **'CV value'** box check for reasons listed above.
Some decoders will not react to the changes you make until after they are "rebooted" In some decoders the value of the CV is read **ONLY at startup.** Switch system off/on, then try reading the CV value again.

This system uses 'direct mode' for CV read and write.
Although the NMRA standard specifies ALL methods must be capable on all decoders, this sometimes does not apply - especially to older decoders. However, this system has been tested on a wide variety of modern day decoder types with no failures found to date.

Hornby, TTS sound,	TCS T4X,	NCE N14IP
Bachmann standard and sound,	Lenz standard, silver and gold	
Digitrax DH126P	DCC Concepts ZEN Buddha	
LGB (on the 5 amp version of Locomotive DCC)		

Power supply issues:
Please be aware that PC charging units are 'switching regulators' that often have a limitation on the minimum current drawing from them. This will give problems when used with a controller.
Manufacturers often specify a minimum load current. This is required to maintain reliability and the stability of the supply. Typical minimum loads for switching supplies are 10% of the maximum load current and usually one ampere, or less.