# LocoMotive DCC with App - Assembly Instructions for PCB with on board L6203 IC v2

To download the FREE Arduino code, refer to my Instructable at : <a href="https://www.instructables.com/id/Bluetooth-DCC-Command-Station/">www.instructables.com/id/Bluetooth-DCC-Command-Station/</a> Or, go to website: <a href="https://www.locomotivedcc.co.uk/downloads/">https://www.locomotivedcc.co.uk/downloads/</a>

To obtain the 'LocoMotive Cab' App go to Play Store: https://play.google.com/store/apps/details?id=appinventor.ai bill falkland.LocoMotive Cab

To obtain the full App at £5.99 'LocoMotive DCC' with loco address 1-127 go to Play Store: <a href="https://play.google.com/store/apps/details?">https://play.google.com/store/apps/details?</a> id=appinventor.ai bill falkland.LocoMotive DCC

To obtain the full App at £8.49 'LocoMotive DCC 2' with 4 digit loco address go to Play Store: https://play.google.com/store/apps/details?id=appinventor.ai\_bill\_falkland.LocoMotive\_DCC\_2

The schematic and PCB layout diagrams are included in the included images below. Other components required (all available on ebay):

- 1 x  $0.1\Omega$  Resistor tolerance  $\pm 5\%$ ; pin spacing 400 mil; package THT; power 2W;
- $2 \times 10 \text{k}\Omega$  Resistor, tolerance  $\pm 5\%$ ; pin spacing 400 mil; package THT; power 0.25;
- 1 x 4.7k $\Omega$  Resistor, tolerance  $\pm 5\%$ ; pin spacing 400 mil; package THT; power 0.25;
- 1 x 470 $\Omega$  Resistor, tolerance  $\pm 5\%$ ; pin spacing 400 mil; package THT; power 0.25;
- 2 x 180Ω Resistor, tolerance ±5%; pin spacing 400 mil; package THT; power 0.25;
- 2 x 15nf Ceramic Capacitor, package 100 mil [THT, multilayer]; voltage 35V
- 1 x 220 nf 35v Ceramic Capacitor
- 5 x Ceramic Capacitor 0.1 uf 35v
- 1 x 220 uf Electrolytic Capacitor, 16v
- 1 x 10 uf Electrolytic Capacitor, 25v
- 1 x 470 uf 35v Electrolytic Capacitor
- 1 x Voltage Regulator, variant sink; chip 78005; package to220-igo; voltage 5V
- 2 x female header 12 pins, row single; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm);
- 1 x female header 4 pins, row single; hole size 1.0mm,0.508mm; pin spacing 0.1in (2.54mm);
- 2 x Rectifier Diode, UF4007, type Fast Rectifier; package 300 mil [THT];
- 2 x Screw terminal pins 2; hole size 1.1mm, 0.508mm; pin spacing 0.197in (5.0mm)
- 1 x L6203 package to-220-11 lead
- 1 x Heatsink TO220 Cooler 23\*16\*40MM With 2 Pins
- 1 x Zener Diode, breakdown voltage 3.6V or 3.2 or 4.2; package 300 mil [THT]; 0.5W;
- 1 x Arduino Pro Mini 5v 16 MHz ATMega328

NB: Be careful in selecting a good quality L6203 - some suppliers sell faulty ICs

#### Wire

Power supply: voltage of 14 to 18 volts DC

Do NOT use a DC train controller as these do not provide a true DC voltage.

Ensure correct polarity of output plug before connecting.

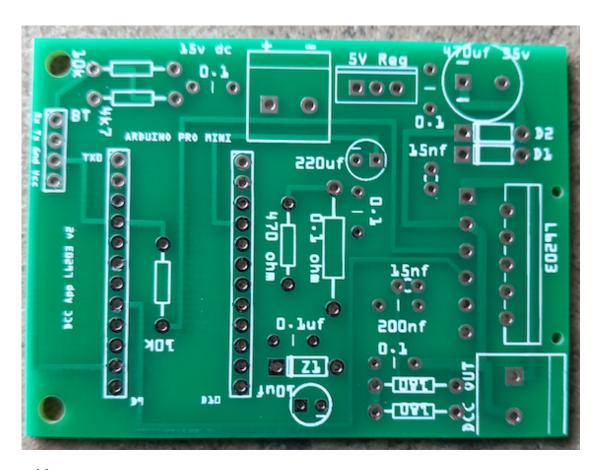
Connect a 15v 2 amp power supply with a 2.1mm/2.5mm x 5.5 mm plug , for example search for eBay item # 401871382681

or, Connect a 15v 3 amp power supply similar to PowerPax item SW4323B with a 2.1mm/2.5mm x 5.5 mm plug, available from <a href="mailto:cpc.farnell.com">cpc.farnell.com</a>

or, Connect a Multibao 15v 3A adapter with a 2.1mm/2.5mm x 5.5 mm plug, search for in Amazon

or, Connect a Photonic Universe 16v 3A adapter with a 2.1mm x 5.5 mm plug, search for in Amazon

### PCB:



#### **Assembly notes:**

The zener diode Z1 black bar and fast diodes D1, D2 white bar is to the left

The negative (indicated by arrows along the side) on 470uf and 220 uf capacitors is to the left

The negative on 10 uf capacitor is to the right

The capacitor marked 200nf is actually 220nf

The voltage regulator metal backing faces outwards

Use 2 x 12 way sockets to mount the Arduino Pro Mini

The Arduino pin Tx0 is close to the 4 way BT socket and the pin D9 is on the bottom left

When connecting the BT module Rx on PCB goes to Rx on the module and Tx to Tx.

The DCC output is from 'DCC OUT' to the rail tracks.

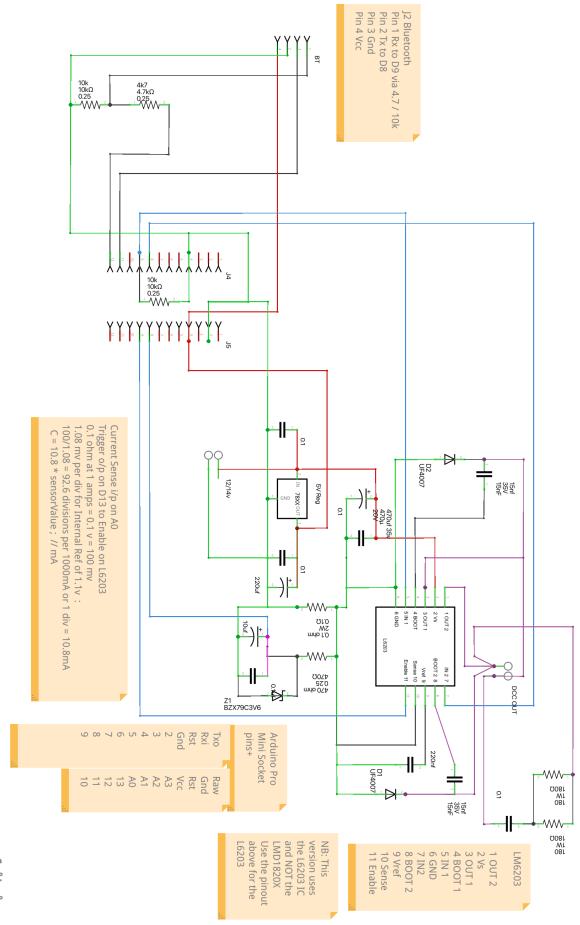
# Assembled controller:

Controller is shown mounted in a 3D printed enclosure.

Note: the Bluetooth module is tie wrapped to the Arduino pins to prevent any movement in use.



## Circuit Diagram:



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