Introduction to DCC-EX

-- Martin Wade

Adopted from M Steve Todd's presentation to ZoomTRAK, Jan 13, 2024

Goals

1) Provide Overview of DCC-EX as a DCC Command Station.
2) Demo a hardware build and software install.
3) Run DCC Command Station with Engine Driver

It's all easier than you think.

What is DCC-EX?

➔**DCC Command Station**
➔**5 amp Main channel plus 2nd Prog Channel**
➔**DC options and can add more channels.**

➔ My words

Low-cost Hardware and free software (Open Source)

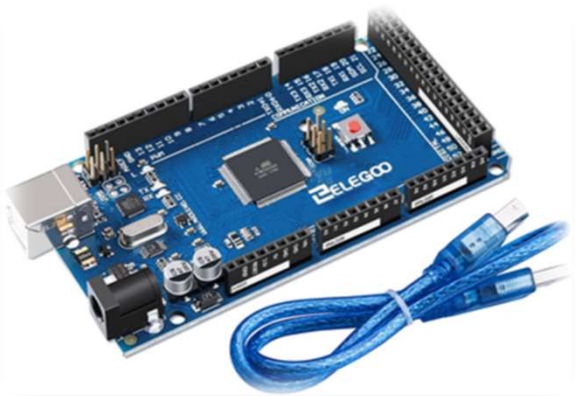
➔ Their words

DCC-EX is a team of dedicated enthusiasts producing open source *DCC & DC solutions* for you to run your complete model railroad layout. Our easy to use, do-it-yourself, affordable products are based on off-the-shelf Arduino technology and are supported by numerous third-party hardware and apps like JMRI, Engine Driver, WiThrottle, Rocrail and more.

Arduino Mega

Arduino is an inexpensive open-source electronics platform

This is the Computer of the DCC Station

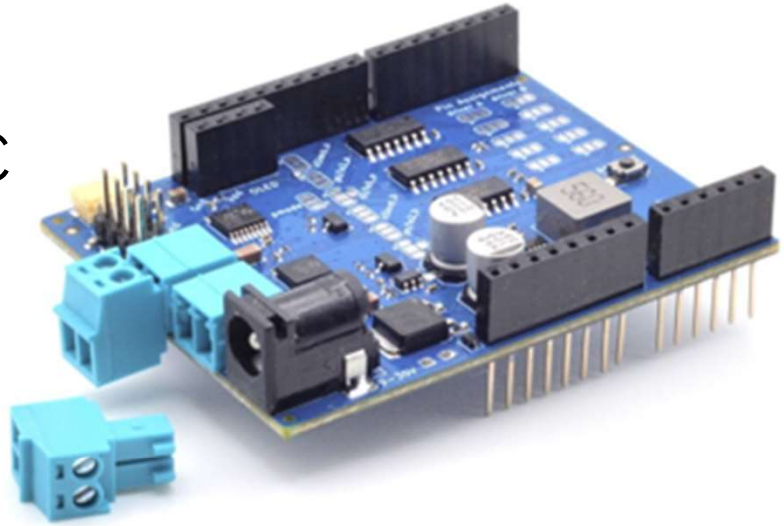


DCC EX Motor Shield

Motor Shield

plugs into Arduino

Creates DCC signal OR DC output



DCC EX Shield

Designed for Trains

No customization needed

5Amp per Channel + add Features

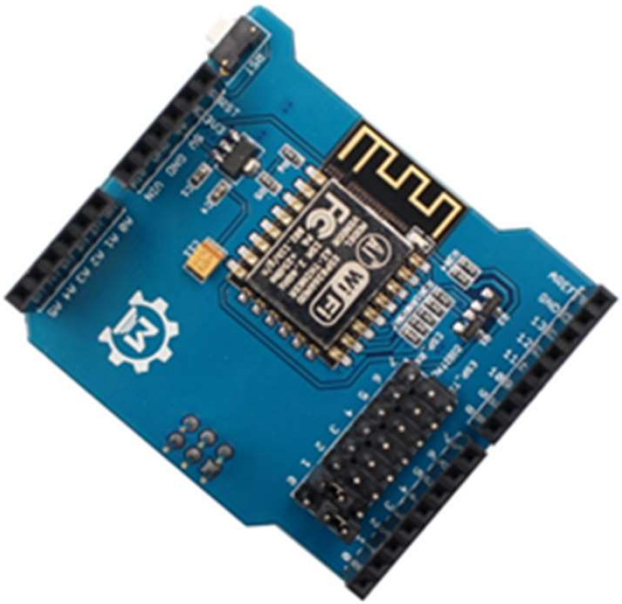
Wifi Shield

Wifi Shield

- Connect to your network
- Create its own Access Point

DCC EX Store

- Preloaded with correct Firmware
- Comes with 2 cables needed



Basic Steps to build one

1) Get some stuff from list on web page

2) Plug stuff together (no soldering!)

3) Download and install software

4) Connect to layout and power

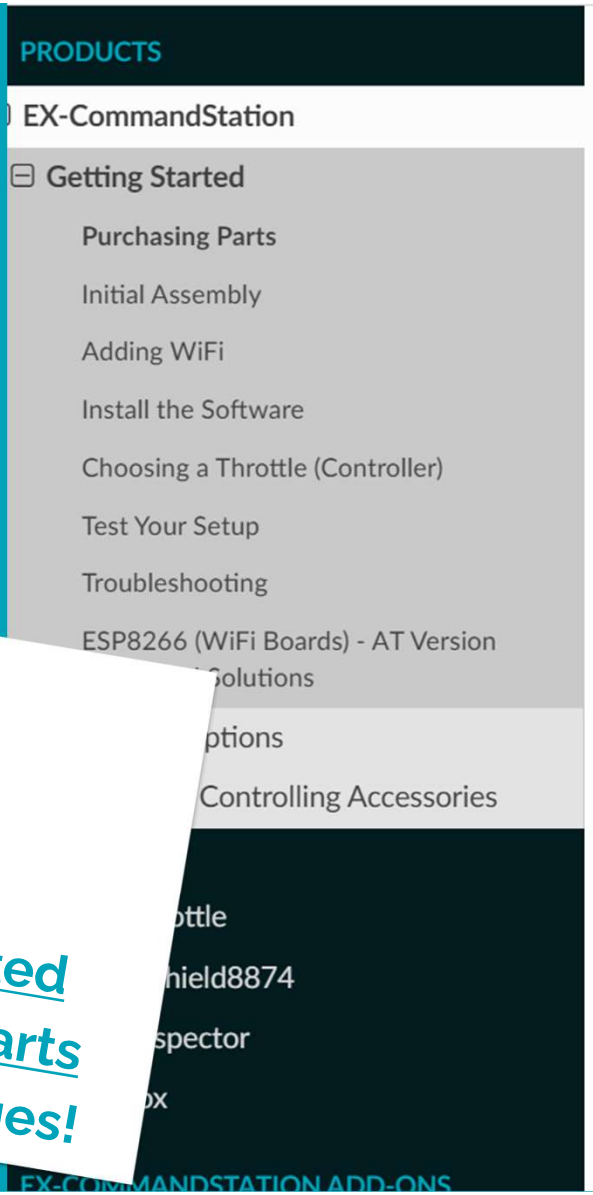
5) Run trains from phone!

1) Get the stuff

Great Website!

- → Open dcc-ex.com
- → Go to Getting Started
- → Click Purchasing Parts

Links to vendor pages!



What you need to Acquire

Hardware

You will need to find or purchase:

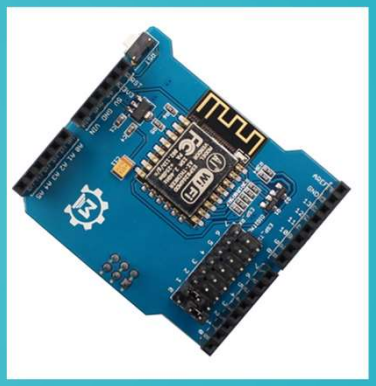
1. a supported **Arduino board** ✓ **Amazon**
   We recommend the Elegoo Mega 2560
2. a supported **Motor Driver** ✓ **DCC EX Store**
   We recommend either our own EX-MotorShield8874 or Arduino Motor Shield Rev3
3. a supported **WiFi shield** ✓ **DCC EX Store**
   We recommend the EX-WiFi Shield 8266 (aka Makerfab Shield) or from Makerfabs
4. Two (2) Male to Female **Jumpers leads** ✓ **Amazon**
   size based on Scale
5. a 9-14v DC power supply for the motor shield
   We recommend 12V 5Amp Power Supply for the Track
6. a 2.5mm x 5.5mm Female DC Plug to **Screw Terminal (o**
   but recommended) to connect the motor shield power s

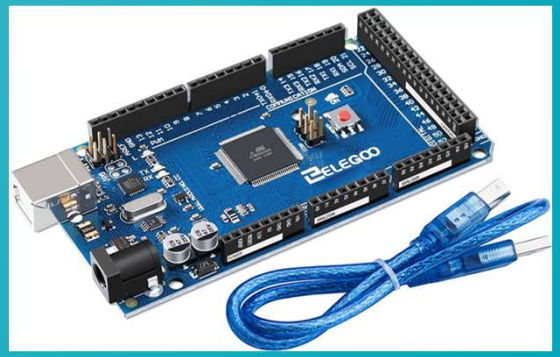
Standard parts, DIY assembly

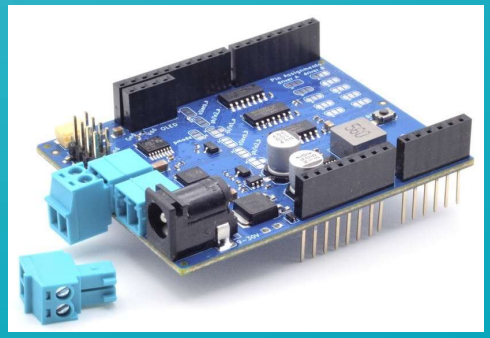
- Elegoo Mega 2560 = $21
- DCC EX Motor Shield = $40
- DCC EX Store WiFi Shield = $14
- 15V 3A Power Supply = $15
- LCD Display 20x4 = $5

Total = $95

NO ~~Note: WiFi Shield may need flashing to v1.7.4~~







Amazon Parts

https://www.amazon.com/hz/wishlist/ls/2YME45G7QT3UQ?ref_=wl_share

DCC EX Store Parts

EX-MotorShield8874

$39.98

EX-WiFiShield 8266

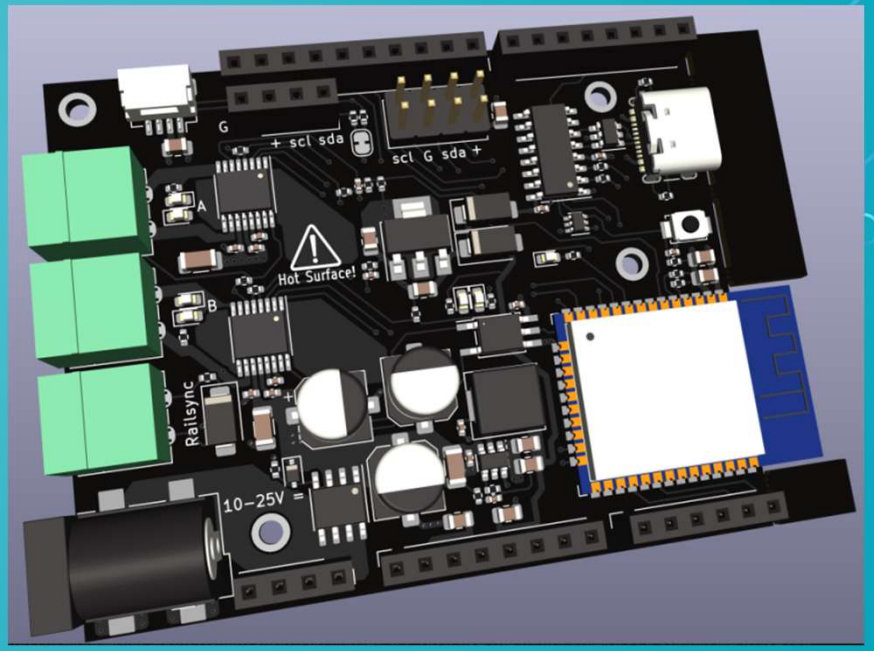
$13.95

https://store.dcc-ex.com/

The Future!

- EX-CommandStation ESP32 = $70
- 15V 3A Power Supply = $13

Total = $83



2) Plug stuff together

Assemble it

- → Go to Initial Assembly
- → Add Motor Shield
- → Add Wifi Shield

DCC-EX

DCC-EX

Search docs

- Before You Begin
- EX-CommandStation
- Getting Started
  - Purchasing Parts
  - Initial Assembly
  - Adding WiFi
  - Install the Software
  - Choosing a Throttle (Controller)
  - Test Your Setup
  - Troubleshooting
- Advanced Options
- Input and Output Devices
- EX-Installer
- EX-WebThrottle
- EX-RAIL (Automation)
- EX-Turntable
- EX-DCCInspector
- Troubleshooting & Getting Help
- The Big Picture
- Throttles (Controllers)
- Downloads

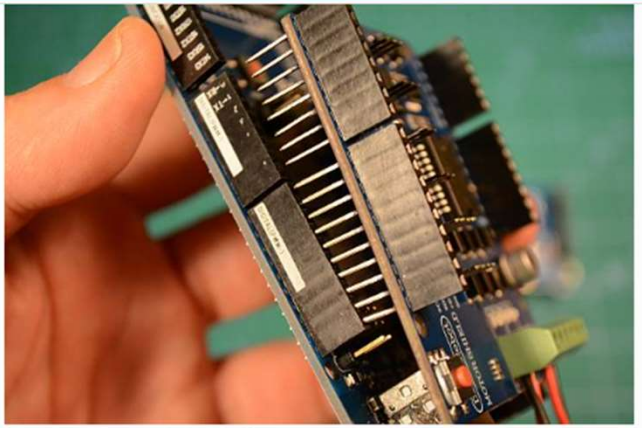


Figure 6 *Line up left side first*

c. Just align them and start to push them in but don't push them all the w
Use your fingers to try to push the pins to get them to all go into the h

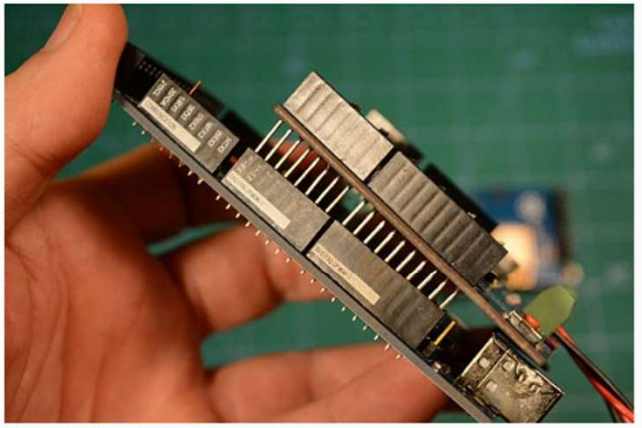


Figure 7 *Get all the pins started*

d. Do the same on the other side.
Get all the pins aligned and start to press gently to get them into the h

3) Install Software

Software

- → Go to Install the Software
- → Download and Run EX-Installer
- → Load to Arduino

Requirements (for installing)

- a Windows, Linux or MacOS X **Computer**
- an **EX-CommandStation** (Arduino Mega/Uno + Motor shield and optional WiFi shield)
- a **USB cable** to connect your computer to the Microcontroller

USB Cable

Make sure your USB Cable is connected
computer to the **EX-CommandStation**
sure no other programs (like the Arduino
using the same USB port.

1. Getting Ready

Instruction for Windows, Mac OS X, and Linux (including the Raspberry Pi)

Connect your **EX-CommandStation hardware** to your computer via USB.
Make sure your USB Cable is connected from your computer to the EX-CommandStation. Make sure no other program
Arduino IDE) are using the same USB port.

2. Download and Run EX-Installer

- Download the EX-Installer app.

- For **Microsoft Windows**:
  - Open the Windows *File Manager*
  - Find the folder in which the **EX-Installer-Win64.exe** or **EX-Installer-Win32.exe** was saved.
    Generally this will default to downloading to the *downloads* folder but your browser may be configured differently.
  - **Run** `EX-Installer-Win64.exe` or **EX-Installer-Win32.exe** or **EX-Installer-Win32.exe**

Warning

Antivirus Software
You *may* need to turn off your antiviru
before you try to install.
Sometimes our software gets blocked
antivirus apps. If you see any errors o
screen, this is usually the issue.

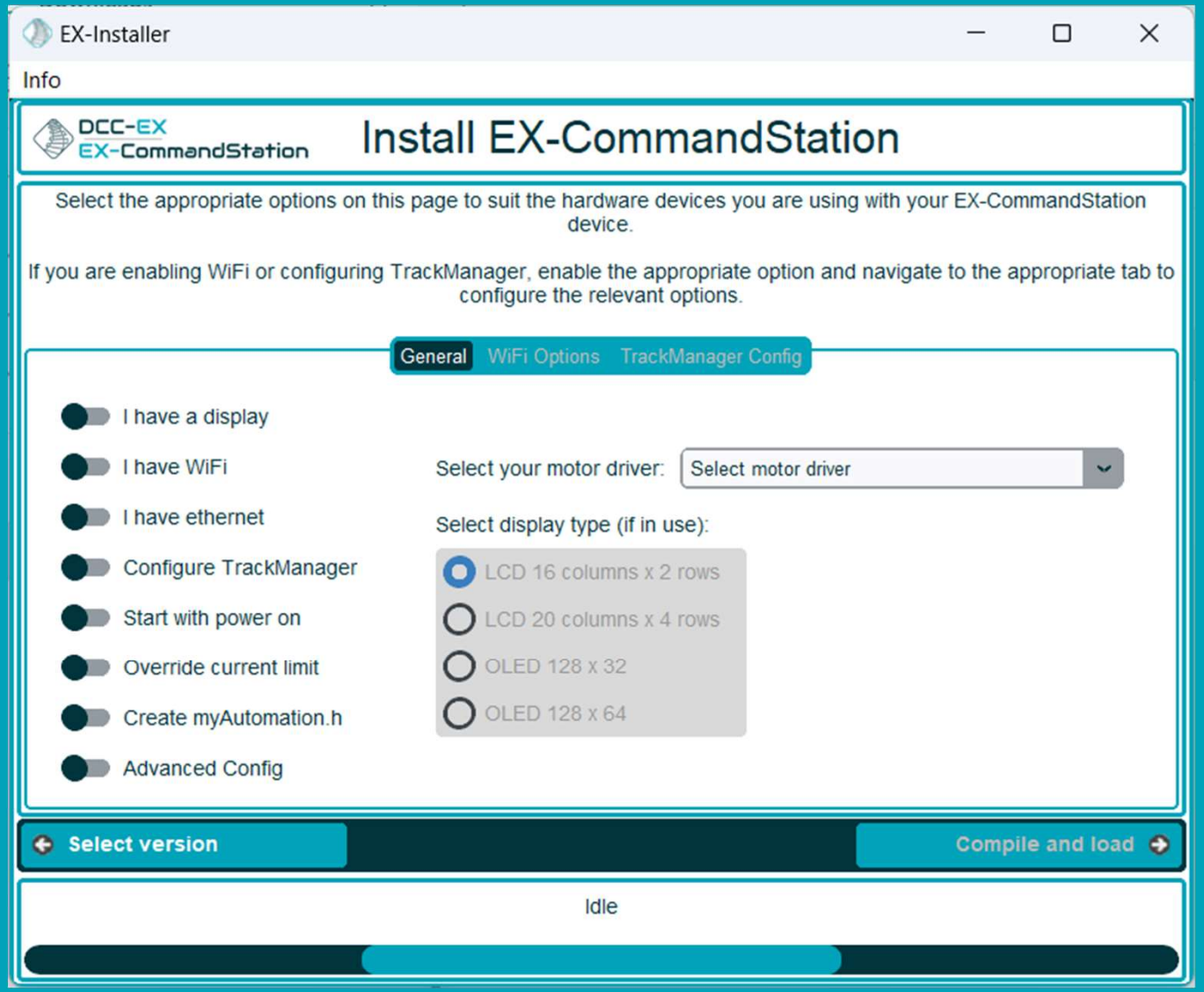
DCC-EX

Configure Software

EX-Installer

- → Multi-page wizard
- → Note the tabs
- → Lots of options!
- → Device Monitor
- → Live demo

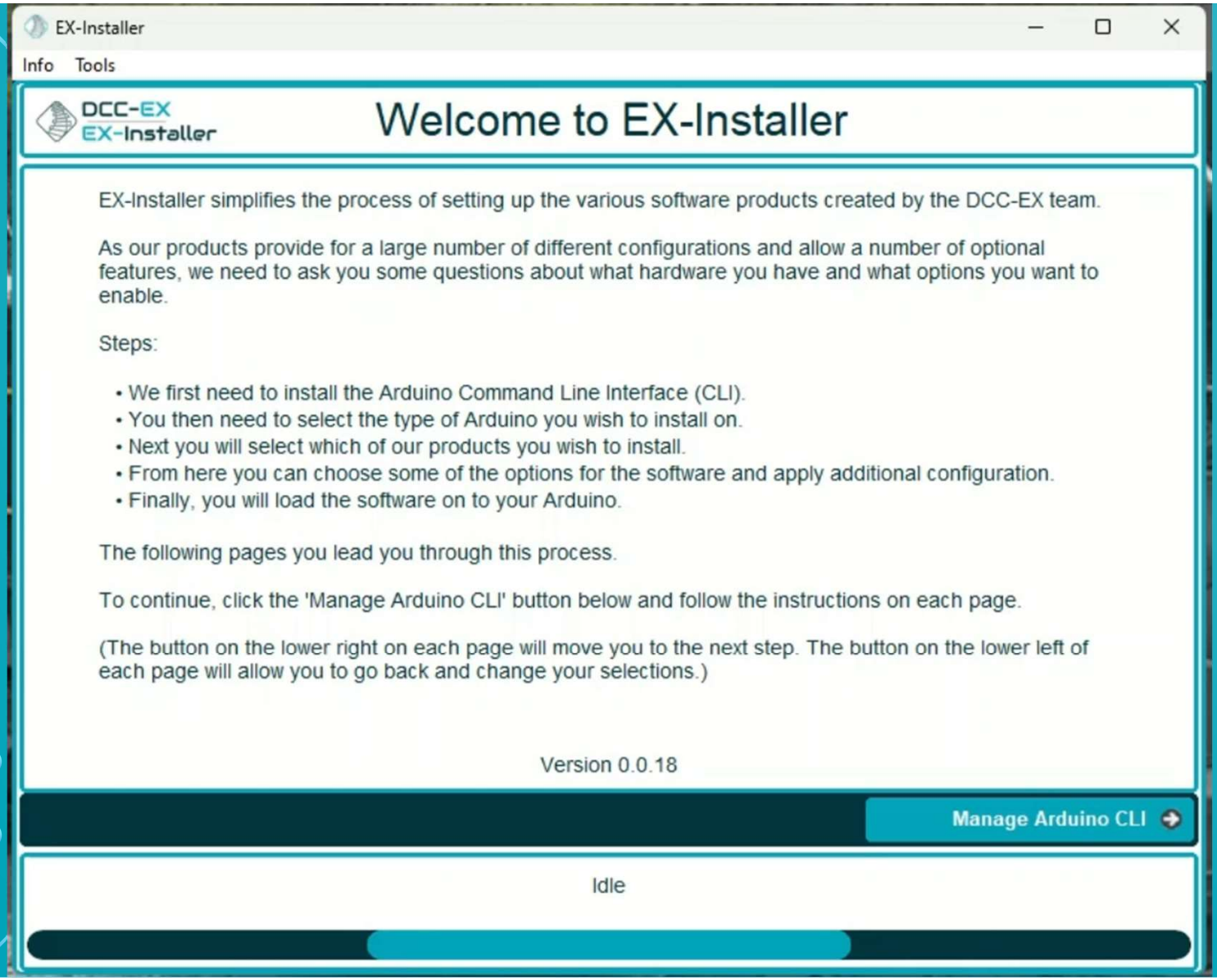
  (if time permits)

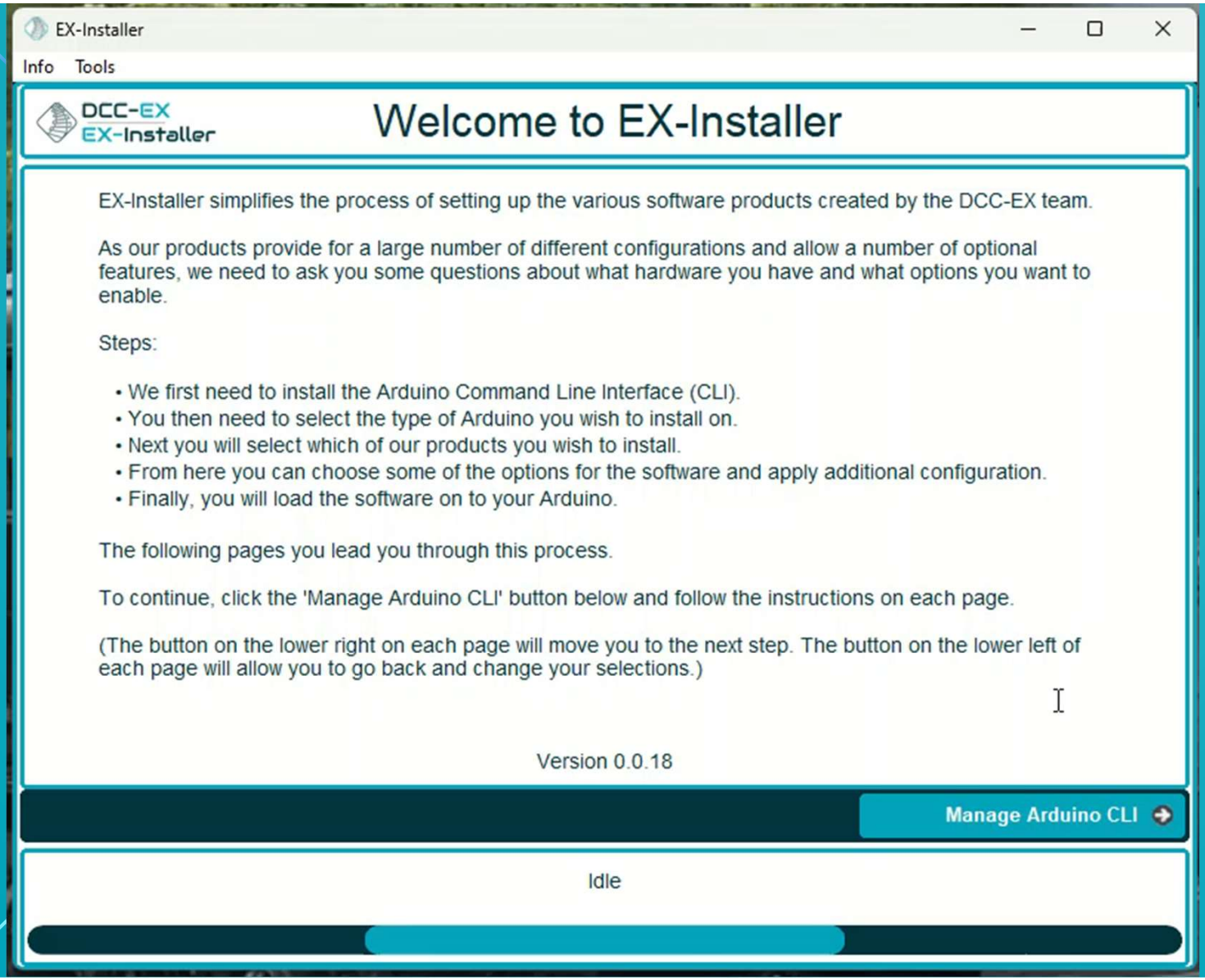


DCC-EX

Hands on Demo

- Board Assembly
- Software Install
- Connection
- Web Throttle
- JMRI
- Engine Driver Demo
- DCC vs DC


EX-Installer
Info
Tools
DCC-EX
EX-Installer
Welcome to EX-Installer
EX-Installer simplifies the process of setting up the various software products created by the DCC-EX team.
As our products provide for a large number of different configurations and allow a number of optional features, we need to ask you some questions about what hardware you have and what options you want to enable.
Steps:
• We first need to install the Arduino Command Line Interface (CLI).
• You then need to select the type of Arduino you wish to install on.
• Next you will select which of our products you wish to install.
• From here you can choose some of the options for the software and apply additional configuration.
• Finally, you will load the software on to your Arduino.
The following pages you lead you through this process.
To continue, click the 'Manage Arduino CLI' button below and follow the instructions on each page.
(The button on the lower right on each page will move you to the next step. The button on the lower left of each page will allow you to go back and change your selections.)
Version 0.0.18
Manage Arduino CLI
Idle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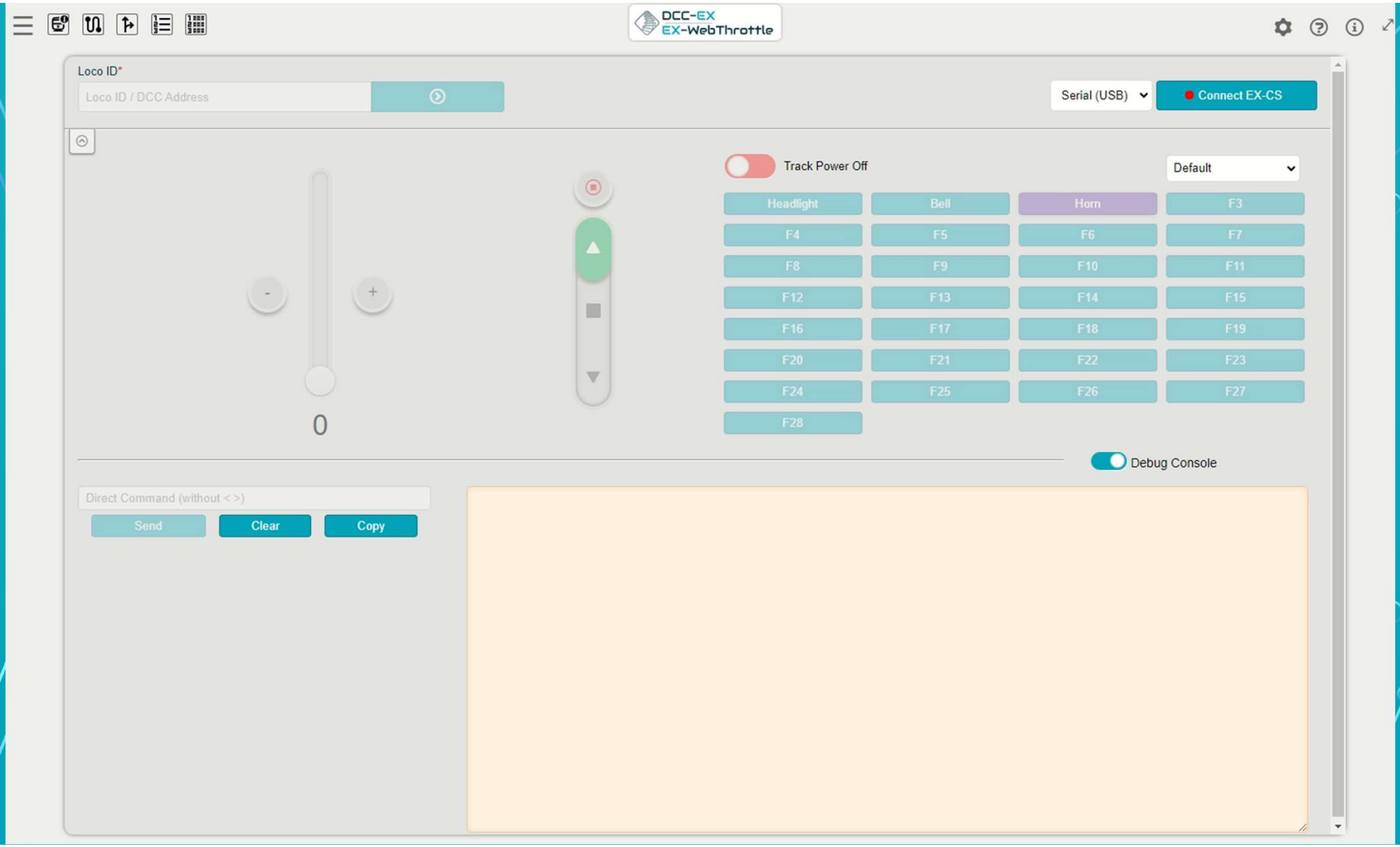
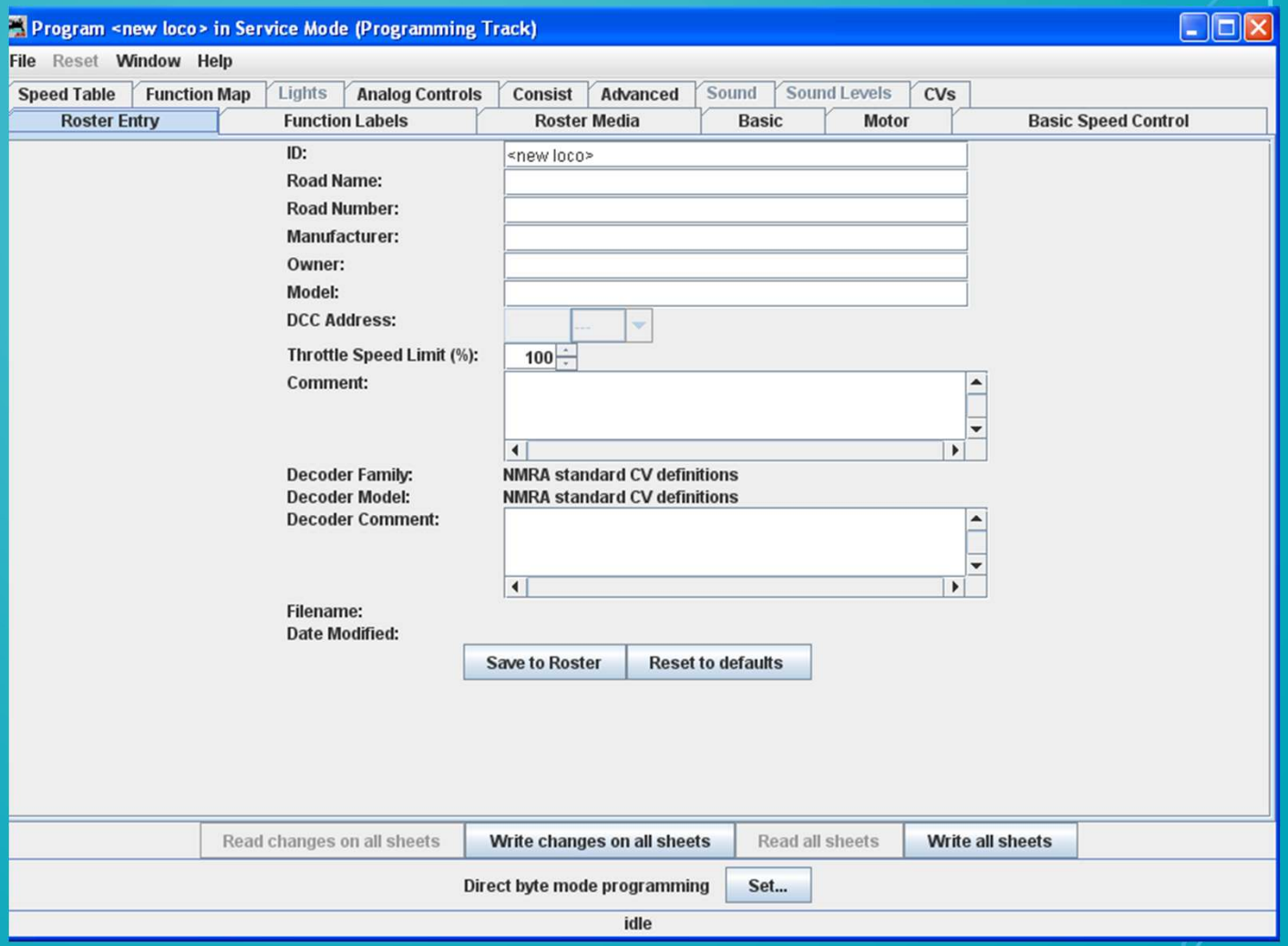

DCC-EX
EX-WebThrottle
Loco ID*
Loco ID / DCC Address
Serial (USB)
Connect EX-CS
Track Power Off
Default
Headlight
Bell
Horn
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
F13
F14
F15
F16
F17
F18
F19
F20
F21
F22
F23
F24
F25
F26
F27
F28
0
Debug Console
Direct Command (without < >)
Send
Clear
Copy

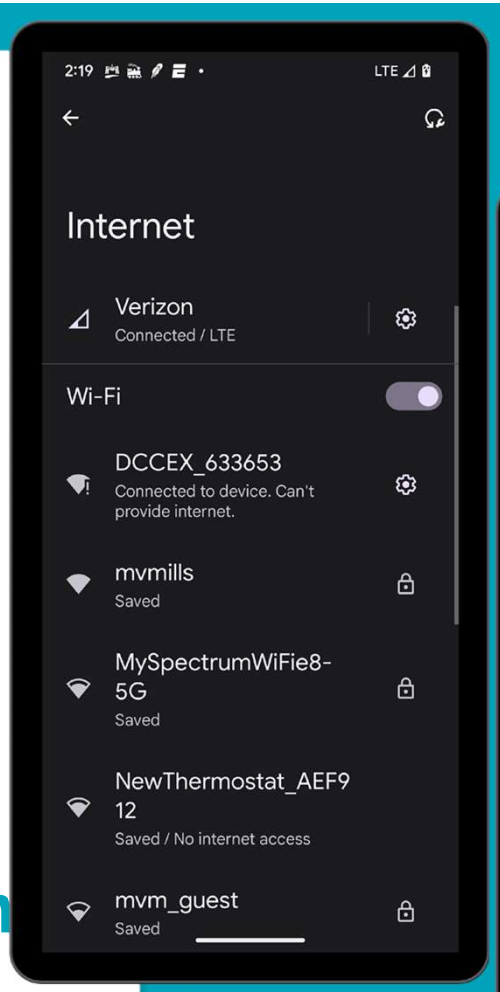
Connect JMRI DecoderPro

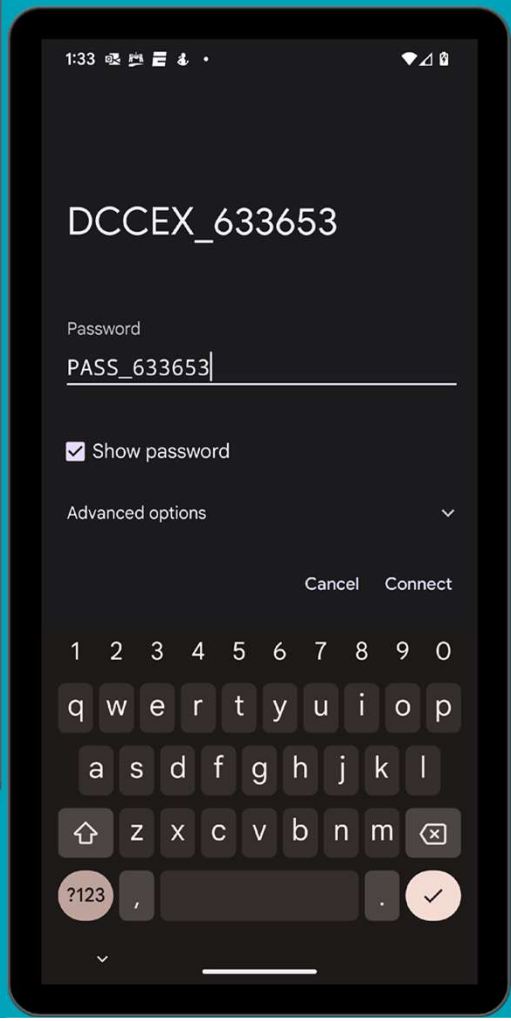
- ➔ Dedicated Programming Track
- ➔ Switch track between MAIN and PROG



Engine Driver

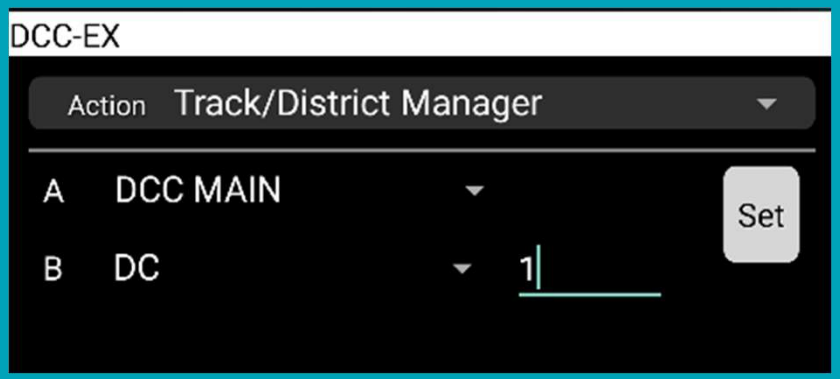
- Connect your phone to
  - Your Network OR
  - Access point network
    - `DCCEX_nnnnnn`
    - `PASS_nnnnnn`
- Open EngineDriver
  - Select `DCCEX_nnnnnn` from Discovered Servers
- Enter Loco address and Go!

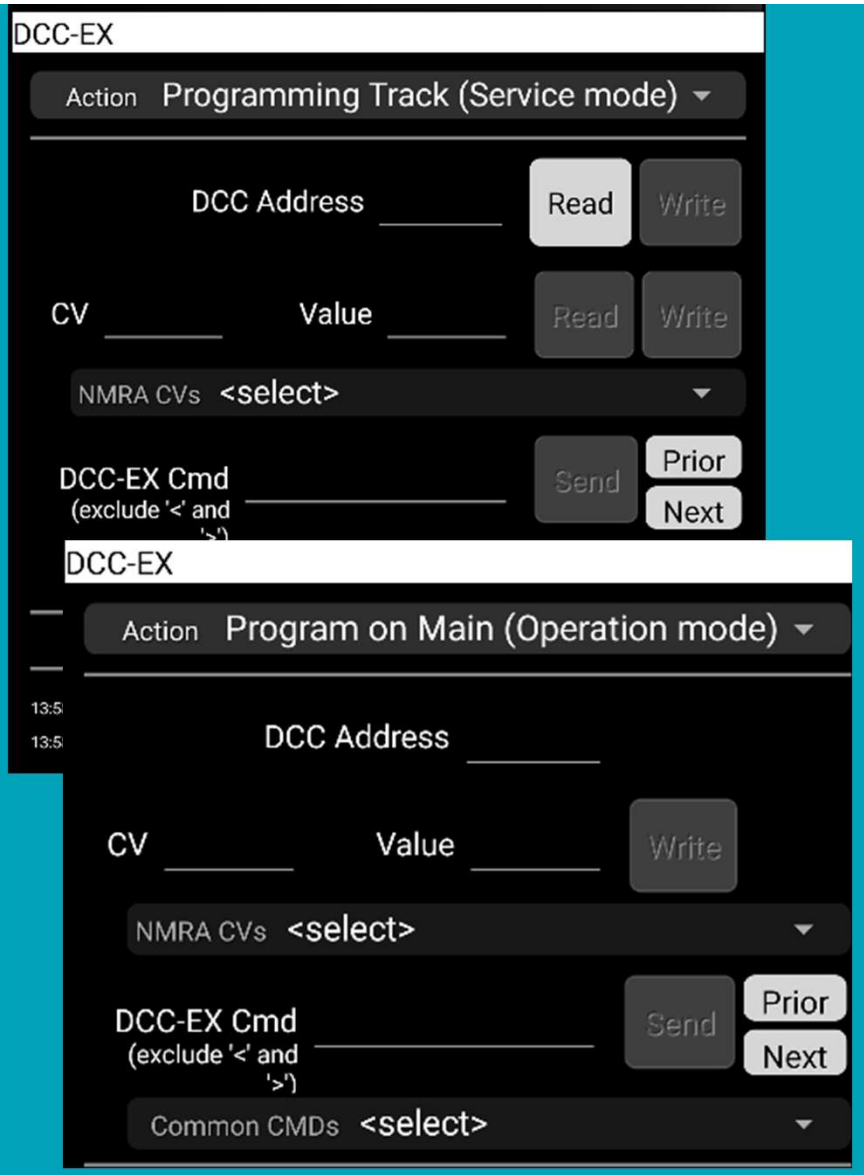




EngineDriver
DCC-EX Features

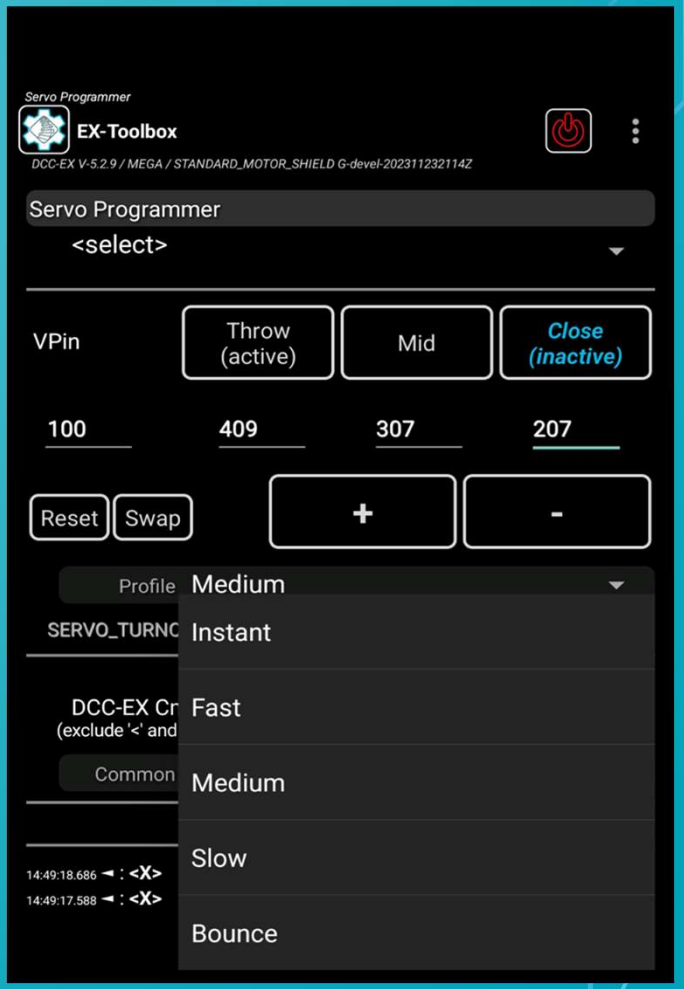
- → Track/District Manager controls
- → Service Mode CV Reads and Writes
- → Operations Mode CV Writes

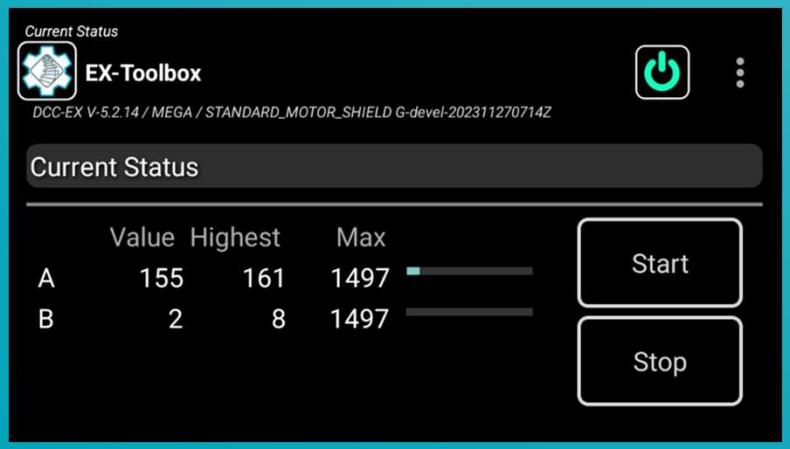




EX-ToolBox Features

- → Current Status
- → Servo Programmer
- → Sensor Status
- → Loco Status





Questions???