A DCC controller for less than £50 (ish) (plus decoders)













So I looked at what else there was available

But there was a major problem.....



DACK TO LESURE



Kato 22-018 SX Standard Controller Brand: Kato 4.5 ***** 545 ratings

£3900

√prime One-Day

FREE Returns V

• This item is NOT a toy and is intended for modelling use

> See more product details

E Report an issue with this product



Sponsored

ROKR Automatic Marble Run Wooden Puzzle LGC01 ROKR Marble Run 3D Wooden... 4.7 ***** 73 £5995 vprime

£3900

√prime One-Day FREE Returns V

FREE delivery Tomorrow, 12 October, Order within 3 hrs 15 mins. Details

O Deliver to MR - Shrewsbury SY4 2HF

In stock

Quantity: 1

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Dispatches from	Amazon
Sold by	GJG AUDIO
Returns	Returnable within 30 days of receipt
Packaging	Ships in product packaging
✓ See more	
Add gift opt	ions





Bachmann E-Z Command Plus Digital Command Control System Brand: Bachmann

£14450

Pay over time with no interest. Subject to financial status & eligibility. Credit broker: Amazon EU S.a.r.l, Lender: Barclays. Terms Apply.

Purchase options and add-ons

Payment plans Instalment options available

Report an issue with this product

£14450 O Deliver to MR - Shrewsbury SY4 Only 1 left in stock. Add to Basket Buy Now Gaugemaster Dispatches from Gaugemaster Sold by Gaugemaster Customer service ✓ See more Add to List v

V

amazon business

Separate your purchases and easily download VAT invoices.

Roll over image to zoom in

Ruy it with



Digitrax Inc. Zephyr Express Starter Set DGTZEPE Power Supplies Brand: Digitrax 4.6 126 ratings

£27950

r¹1

Pay with Instalments by Barclays. Subject to financial status & eligibility. Credit broker: Amazon EU S.a.r.I, Lender: Barclays. Learn more

Purchase options and add-ons

Payment plans	
Instalment options available	

- · Run multiple trains at once without blocking!
- · Jump Ports for using DC power packs as additional throttles
- Over 9000 Locomotive Addresses
- 3.0 Amps of Power to run multiple trains.
- · Control lights and sound with 29 functions (F0-F28)
- > See more product details

E Report an issue with this product



IR-DDM-4999 Abestop 2 in 1 Function Thermal Imaging Multimeter, 20Hz Image...

£27950 FREE delivery 26 February - 5 March. Details O Deliver to MR - Shrewsbury SY4 2 Usually dispatched within 5 to 6 days Quantity: 1 V Add to Basket Buy Now Dispatches from Fast Media Ships From USA Fast Media Ships Sold by From USA Returnable within Returns 30 days of receipt Payment Secure transaction ✓ See more Add to List v

V



Roll over image to zoom in

Hornby R8214 Elite DCC Control Unit Visit the Hornby Store

4.3 ***** • 65 ratings



FREE Returns V

Pay with Instalments by Barclays. Subject to financial status & eligibility. Credit broker: Amazon EU S.a.r.I, Lender: Barclays. Learn more

Style Name: TOYS_AND_GAMES

Bundles with this item



TOYS_AND_GAMES + TOYS_AND_GAMES,R... -4% £295.25 Was: £308.04 See all bundles Purchase options and add-ons

Payment plans From £57.01/mo (5 mo) at no interest Buy new: £285°5

V

FREE Returns V

FREE delivery Tomorrow, 8 February. Order within 4 hrs 4 mins. Details

0

O Deliver to MR - Shrewsbury SY4 2

Only 15 left in stock.





Gaugemaster DCC06 Prodigy Express WiFi Digital Control System

Brand: Gaugemaster

5.0 **** 3 ratings

£34055

Your Instalments by Barclays account is availaible to use. Subject to financial status & eligibility.Credit broker: Amazon EU S.a.r.l, Lender: Barclays. Learn more

Purchase options and add-ons

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nstalment options available	

About this item

- This item is NOT a toy and is intended for modelling use
- > See more product details

Additional details

Small Business



This product is from a small and medium business brand based in the U.K. Support small. Learn more

Report an issue with this product

£34055

O Deliver to MR - Shrewsbury SY4 2

Usually dispatched within 2 to 3 days

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Sold by	Jadlam Toys & Models
Returns	Returnable within 30 days of receipt
Payment V See more	Secure transaction
Add to List	~

Other sellers on Ama	azon
New (2) from [£] 340 ⁵⁵ &	FREE





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Märklin 60226 - Central Station CS 3 Digital Multiprotocol Control Unit (mfx, mfx+, DCC, Motorola), Various Brand: Märklin 4.5

£54488

FREE Returns 🗸

Pay with Instalments by Barclays. Subject to financial status & eligibility. Credit broker: Amazon EU S.a.r.l, Lender: Barclays. Learn more

Style Name: Single

Purchase options and add-ons

Payment plans

From £108.98/mo (5 mo) at no interest

About this item

- Digital multi-protocol control unit (mfx, mfx+, DCC, Motorola) High-definition modern colour touch screen. Integrated central track control panel
- Housing with central stop button and 2 knobs in robust industrial quality. Up to 32 switchable locomotive functions. 2 built-in locomotive card readers.
- Built-in speaker. Built-in SD card slot. Built-in powerful booster.
- 5.0 A max. Output power when using 60101/L51095 switching network (recommended for track 1 or LGB). Up to 320 Motorola and 2048 DCC magnetic items switchable. Switching power supply is not included.

£54488 FREE Returns V FREE delivery Wednesday, 12 February for Prime members. Order within 8 hrs 25 mins. Details O Deliver to MR - Shrewsbury SY4 2 In stock Quantity: 1 v Add to Basket Buy Now Dispatches from Amazon Amazon Sold by Returnable within Returns 30 days of receipt Available at Gift options checkout ✓ See more Add to List v Other sellers on Amazon New (3) from £54488 FREE

V

Why are DCC controllers so expensive?

Let me give you a clue.....





- 1. They have to do so much more then a simple DC controller, for example:
 - Be able to select the address of the loco you want to control.
 - Be able to alter the address of the loco.
 - Be able to show, by lights or a screen, which loco you are controlling.
 - Be able to adjust which way is forward and which is reverse.
 - Be able to switch functions on and off.
 - Be able to set up double-heading.
 - Adjust the speed curves.
 - Control points, signals, turntables and the like.
 - And so much more.
- 2. So there is the high cost of developing the necessary hardware and software compared with the number of controllers sold.
- 3. There is the high cost of manufacture compared with the number sold.

So could I find an alternative that was:

- Be really affordable?
- Have very few limitations?
- Something I could build myself using parts I was already familiar with?

- 1. Use an existing electronics board that's already sold in very large numbers, so individual units are comparatively cheap.
- 2. Use open source (in other words, free) software that someone had already written for this electronics board.
- 3. Use something I already owned to control the locos (etc) and to display what's going on.
- 4. A power supply for the locos, points and the like.
- 5. A suitable case to hold the hardware.

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DCC-EX

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DCC-EX

Computer and/or smart phone.

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DCC-EX

Computer and/or smart phone.

My existing controller's power supply.

- 1. Use an existing electronics board that's already sold in very large numbers, so individual units are comparatively cheap.
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- 3. Use something I already owned to control the locos (etc) and to display what's going on.
- 4. A power supply for the locos, points and the like.
- 5. A suitable case to hold the hardware.

DCC-EX

Computer and/or smart phone.

My existing controller's power supply. Plywood or plastic box or use a 3D printer.

I couldn't find any books about DCC-EX so I looked on YouTube

And came across a series of video by DriverDTrains



First Step

The electronics board to use for DCC-EX is an Arduino Mega.

Arduino boards come in different shapes and sizes, each with a different amount of RAM and number of connections. For DCC-EX you need an Arduino Mega as it has the most RAM.





ELEGOO MEGA R3 Controller Board Compatible with Arduino IDE with USB Cable Black Version Visit the ELEGOO Store 4.8 ****** 852 ratings Intracons Choice 10+ bought in past month		Delivery Pickup €1899 ✓prime One-Day FREE Returns ~ ✓ FREE delivery Tomorrow. Order
	E1899 <pre> <pre> <pre> </pre> </pre> <pre> </pre> </pre> <pre> <th>within 8 hrs 50 mins. Details © Deliver to MR - Shrewsbury SY4 2 In stock Quantity: 1 ~ Add to Basket Buy Now</th></pre>	within 8 hrs 50 mins. Details © Deliver to MR - Shrewsbury SY4 2 In stock Quantity: 1 ~ Add to Basket Buy Now
Roll over image to zoom in	BrandELEGOOModel nameMEGA R3Memory storage capacity256 KBConnectivity technologyUSBWireless communication standardInfrared	Dispatches from Amazon Sold by ELEGOO Official Returns Returnable within 30 days of receipt Payment Secure transaction V See more

(Some boards are blue, some are black. The colour is totally cosmetic.)

< Back to results



SUNFOUNDER The Most Complete Starter Delivery Project Kit Compatible with Arduino IDE Mega £3299 R3 Nano, Included 42 Online Tutorials Visit the SUNFOUNDER Store **√**prime 4.3 ***** 13 ratings FREE Returns ¥ FREE delivery Sunday. Order £3299 within 3 hrs 35 mins. Details **√**prime O Deliver to MR - Shrewsbury SY4 2 FREE Returns * With Amazon Business, you would have saved £90.62 in the last year. Create a Only 14 left in stock. free account and save up to 7% today. Quantity: 1 Specific uses for programming product Add to Basket Brand SUNFOUNDER Buy Now Screen size 1 Mils CPU model Intel Core i9 Dispatches from Amazon CPU manufacturer IBM Sold by MakerMaker Connectivity 12C Returns Returnable within technology 30 days of receipt Customer Service Amazon CPU speed 1.00 ✓ See more About this item Add gift options

- [Compatible with Arduino IDE] Suitable for Young Beginners and Experienced Software/Hardware Engineers who wants to learn electronics and programming
- [250+ Quality Components] Comes with Development Board compatible with Arduino Mega, 1602LCD, Motors, Ultrasonic Modules etc.

amazon business

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Motor Shield



diymore L298P Shield Expansion Board DC Motor Driver Module 2A H-Bridge 2 way Visit the diymore Store 4.5 ***** 216 ratings

-6% £1559

RRP: £16.59

✓prime One-Day

FREE Returns ×

- The Motor Shield is based on the L298, which is a dual full-bridge driver designed to drive inductive loads such as relays, solenoids, DC and stepping motors
- The L298P Expansion Board lets you drive two DC motors with your board, controlling the speed and direction of each one independently
- You can also measure the motor current absorption of each motor, among other features
- Motor controller L298P, Drives 2 DC motors or 1 stepper motor
- Max current 2A per channel or 4A max (with external power supply)
- > See more product details
- E Report an issue with this product

Delivery	Pickup
£ 15 59	
√prime One-D	ay
FREE Returns	, ⁻
FREE delivery T	omorrow. Order
within 8 hrs 44	mins. Details
O Deliver to MR	- Shrewsbury SY4 2
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Dispatches from	Amazon
Sold by	diymore®
Returns	Returnable within
	30 days of receipt
Payment	Secure transaction
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Hardware, basic requirements



Hardware, basic requirements

Arduino Mega board Motor Shield USB cable Power supply for Mega board 15 volt power for motor board A PC or laptop or Mac or Raspberry Pi

Total:

£18.99 £15.99 comes with Mega board from USB cable already have already have

£35.00 approx

Second Step.

Connecting the hardware

Now, let's connect up the hardware

1. Look at the motor shield and carefully bend the VIN pin slightly outwards.


Now, let's connect up the hardware

2. Carefully push the motor shield male pins into the female sockets of the Mega board, making sure that all the pins have gone in correctly except for the VIN pin.



Now, let's connect up the hardware



Power to main track

Now, let's connect up the hardware

6. Connect the USB cable to the USB socket on the mega board, and the other end to a computer.



Third Step.

The Arduino Software

The programs that run on an Arduino are known as sketches.

A sketch has a file type of .ino

A sketch can make use of additional, pre-written programs called libraries

- 1. Go to the Arduino website ∞ www.arduino.cc/en/software and download the IDE software.
- 2. Click on the downloaded file to install it on your computer.



After the Arduino software is installed it will open a new sketch (i.e. a program)

🔯 ske	sketch_mar16a Arduino IDE 2.3.2			X
File Ed	Edit Sketch Tools Help			
\bigcirc	→ 🖗 Y Arduino Mega or Mega 2 👻		√	Ø
	sketch_mar16a.ino			
5	<pre>2 // put your setup code here, to run once: 3 4 }</pre>			
0h	<pre>5 6 void loop() { 7 // put your main code here, to run repeatedly:</pre>			
0	8 9 10			
Q	19			



is a comment and is ignored by the sketch. In other words, it's something for human to read and the Arduino to ignore.

Let's see that for real.....

Fourth Step.

The DCC-EX Software

First, a little bit of background.....



The person who started this work is an American called Greg E. Bermann.

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Around 2013 he came up with the idea of creating a DCC Controller based on an Arduino Uno electronics board and easily obtainable motor controllers with the aim of providing a cheaper DCC option for modellers with basic electronics skills. He called it DCC++ and it first became available in 2015.

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This original DCC++ controller project was later partly rewritten and taken over by others, becoming the DCC-EX project. However, re-writing is done in such a way that it remains, as far as possible, backwards compatible with DCC++.

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Today DCC-EX is an ongoing, open source, development project with contributions from people in the USA, UK, India, Australia, Europe and elsewhere.

DCC-EX

You need to download the CommandStation-EX software.

To do this you need use the browser on your computer and go to web address **dcc-ex.com**

DCC-EX software



This page will open.

What do I need to know?

Choose Your Comfort Level

PRODUCTS

EX-CommandStation

EX-Installer

EX-WebThrottle

EX-MotorShield8874

EX-WiFiShield-8266

EX-DCCInspector

EX-Toolbox

EX-COMMANDSTATION ADD-ONS

EX-RAIL (Automation/Animation)

TrackManager (DCC & DC)

EX-Turntable

EX-IOExpander

EX-FastClock

SUPPORT & INFO

Troubleshooting & Getting Help

Throttles (Controllers)

The Big Picture

希 / DCC-EX Model Railroading

DCC-EX Model Railroading

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, doit-yourself, and free open source products run on off-the-shelf Arduino technology and are supported by numerous third party hardware and apps like JMRI, Engine Driver, wiThrottle, Rocrail and more.

If you are just starting with DCC-EX then the sections below are intended to help you understand how our products might suit your needs. We've curated this guidance based on feedback from our users:

- What is DCC and DCC-EX?
- · DCC-EX does DC as well
- · I'm interested in DCC but have a limited budget
- I just want to run DCC trains
- · I want to operate my turnout/points & run DCC trains
- · I want to control accessories & run DCC trains
- · I want some extra automated/animated realism
- · I want a fully automated exhibition layout for my club
- Why DCC-EX? Comparing EX-CommandStation to Commercial Systems

If these haven't helped, or you've read them and you are still unsure, then feel free to contact us, preferably through our Discord server where you can that directly with our team members. Details of this and other control of the team of the team members of the server of the team of team of



C Edit on GitHub

DCC-EX

07 Mar 2024 - Another new EX-Installer release

The DCC-EX team is pleased to announce another new release of EX-Installer (version 0.0.18). As always, we encourage all users to download this new version of the installer to take advantage of the bug fixes and new features available.

Continue reading...

26 Feb 2024 - Announcing EX-Turntable 0.7.0

The DCC-EX team is pleased to share the next Beta version of EX-Turntable with version 0.7.0 being released today. Please be aware that there are some changes in this version that may impact configuration options set, particularly for those using two wire stepper drivers such as the A4988, DRV8825, or TMC2208. Users with ULN2003 stepper drivers should not be impacted. NOTE If you are using the STEPPER_DRIVER option A4988_INV you will need to edit your configuration file, please see STEPPER_DRIVER and INVERT_ENABLE for more information.

Continue reading..

Read the full DCC-EX News feed here. RSS/Atom

DCC-EX software



What do I need to know?

PRODUCTS EX-CommandStation

Choose Your Comfort Level

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C Edit on GitHub

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Continue reading...

Read the full DCC-EX News feed here. RSS/Atom

You can click on the various links to get more information.



The Big Picture

For example:

EX-RAIL (Automation/Animation)

TrackManager (DCC & DC)

EX-Turntable

EX-IOExpander

EX-FastClock

SUPPORT & INFO

- Troubleshooting & Getting Help
- Throttles (Controllers)
- The Big Picture
- DOWNLOADS
- Downloads
- **PURCHASING & MERCHANDISE**
- DCC-EX Official Dealers / Resellers
- DCC-EX Third Party Suppliers

DCC-EX Merchandise

DETAILED INFORMATION

Reference

Features under development

Related Projects

EXTERNAL REFERENCES

Articles and Videos

Standards & technical references

JMRI integration

The Components of a Full System

To actually run your model railroad you will need a few items:

- 1. a EX-CommandStation This consists of:
 - · an Arduino microprocessor,
 - a Motor Driver board / motor shield,
 - Optionally:
 - a WiFi shield (Recommended) ¹ (This option is described on the following pages), or
 - an ethernet shield, or
 - a Bluetooth board, or
 - direct connection to a PC², and
 - our free, open source, custom software
- a Throttle (Controller) Something to control your trains with.
 Such as our EX-WebThrottle, or other apps like JMRI, Engine Driver, wiThrottle, etc.
 Power The Arduino and the Motor shields need to be powered separately, so
 - a 9-14v DC power supply for the motor shield to the track, and
 - a 5-9v DC power supply for the Arduino
- 4. a "Main" track, aka "Operations" track most people already have this: it's your layout!
- 5. a "Programming" track, aka "Service" track an isolated short section of track that you will use to program locomotives
- 6. a Train Specifically, a locomotive equipped with a DCC decoder (either a standard or sound decoder). Ideally, it should be a loco already proven to work on DCC. Otherwise, if you have a problem, you may not be able to tell if the problem is the decoder or the EX-CommandStation





Finally click on the Downloads option on the menu on the left, and then select **EX-CommandStation** from the drop-down menu that appears.



Then scroll down past Automated Installer and click on the Official Release page

Troubleshooting & Getting Help

Throttles (Controllers)

The Big Picture

DOWNLOADS

Downloads

EX-CommandStation

ESP8266 (WiFi Boards)

EX-DCCInspector

EX-Turntable

EX-IOExpander

EX-FastClock

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Standards & technical references DCC-EX Third Party Suppliers

THE DCC-EX PROJECT

About Us and the Project

Donating & Contributing

from your computer to your Arduino or other supported board. Click here for EX-Installer installation instructions.

Note that the new **EX-Installer** will unfortunately not work on Windows 7.

Automated Installer



Manually loading the software

If you plan to use the the Arduino IDE or Visual Studio Code (VSC) to configure your **EX-CommandStation** you can use the links below to download the appropriate version.

UT ANY THE COMPANY OF

For MacOS / OSX

For Linux x64

Latest EX-CommandStation Official Release

Note

On the releases page, select the most recent version and download the .zip file. You will see the 2 files for download, choose the compression format you prefer: CommandStation-EX eight or CommandStation-EX.tar.gz. The zip/tar file contains the Arduino Sketch file for **EX-CommandStation**. You will need either the Arduino IDE or the PlatformIO development environment in order to upload it to your microcert oner board. Click here for Arduino IDE installation instructions.

Official Release page 🛛

Latest EX-CommandStation Unreleased Development Version

Not

The link below is to the "devel" branch in GitHub. You can use the "Download ZIP" option from the "Code" pulldown menu to obtain a local copy of this code. Please open the zip file, go into the "CommandStation-EX-master" folder, and unzip all the files in that folder into your "CommandStation-EX" sketch folder. Make sure you DO NOT just unzip the entire zip file, since it will have the incorre t folder name. The Ardunn IDE requires that the folder name and the ino file inside that folder match names.

A new tab will open in the browser. Click on Source code (zip) to download the files onto your computer.

EX-CommandStation v5.0.7 Production Release (Latest)

The DCC-EX Team is pleased to release CommandStation-EX v5.0.7 as a Production Release for the general public.

This release is a Bugfix release to fix various issues.

EX-CommandStation features, fixes, and enhancements

- Execute 30ms off time prior to re-JOIN of PROG to MAIN on ESP32 hosts
- Check WiFi AT firmware revisions, specifically looking for v2.2.0.0-dev as this is non-functional
- Correct command missing default roster
- Correct lost TURNOUTL description
- Correct myHal.cpp_example.txt to include PCA9555 header, and correct the HALDisplay create call
- Correct issue with command parsing
- Add list of OPCODEs for DCCEXParser.cpp

Full Changelog: v5.0.0-Prod...v5.0.7-Prod

Assets 4

CommandStation-EX-5.0.7-Prod.tar.gz	777 КВ	Jan 6, 2024
CommandStation-EX-5.0.7-Prod.zip	868 KB	Jan 6, 2024
Source code (zip)		Nov 6, 2023
Source code (tar.gz)		Nov 6, 2023

1. Extract all the downloaded files into a suitable folder.

2. When you open this folder it will have a sub-folder called **CommandStation-EX**

	Name	Date modified	Type	Size	
🖈 Quick access		25/20/2024 14 42	51 A 13		
🛄 Desktop	CommandStation-EX	25/08/2024 14:49	Filefolder		
🕹 Downloads	A				
🗄 Documents	A				
E Pictures	A				
a OneDrive	*				

3. Open this sub-folder and you will see a list of files.

Release_Notes	03/03/2024 12:19	File folder	
Release - Architecture Doc	03/03/2024 12:19	File folder	
📙 .github	03/03/2024 12:19	File folder	
travis.yml	03/03/2024 12:19	YML File	2 KB
📓 installer.ps1	03/03/2024 12:19	Windows PowerS	18 KB
linstall_via_powershell.cmd	03/03/2024 12:19	Windows Comma	1 KB
💿 objdump.bat	03/03/2024 12:19	Windows Batch File	1 KB
myHal.cpp_example.txt	03/03/2024 12:19	Text Document	13 KB
myHal.cpp.txt	03/03/2024 12:19	Text Document	17 KB
bjdump.sh	03/03/2024 12:19	SH File	T KB
installer.sh	03/03/2024 12:19	SH File	5 KB
release_notes.md	15/03/2024 19:11	MPrile	16 KB
README.md	15/03/2024 19:11	MD File	6 KB
CONTRIBUTING.md	15/02 2024 19:10	MD File	4 KB
installer.json	15/03/2024 19:11	JSON File	9 KB
🔤 CommandStation-EX.ino 🦊	15/03/2024 19:10	INO File	6 KB
WiThrottle.h	15/03/2024 19:11	H File	4 KB
Wifilnterface.h	15/03/2024 19:11	H File	3 KB
WifilnboundHandler.h	15/03/2024 19:11	H File	3 KB
WifiESP32.h	15/03/2024 19:11	H File	2 KB
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Turnouts.h	15/03/2024 19:11	H File	9 KB
🧾 TrackManager.h	15/03/2024 19:11	H File	4 KB
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SSD1306Ascii.h	15/03/2024 19:11	H File	3 KB
SerialManager.h	15/03/2024 19:11	H File	2 KB
Sensors.h	15/03/2024 19:11	H File	4 KB
RingStream.h	15/03/2024 19:11	H File	3 KB
Outputs.h	15/03/2024 19:11	H File	2 KB
myEX-Turntable.example.h	15/03/2024 19:11	H File	5 KB
myAutomation.h	15/03/2024 19:11	H File	1 KB

3. Open this sub-folder and you will see a list of files.

Scroll down until you see a file called **CommandStation-EX.ino**

Release_Notes	03/03/2024 12:19	File folder	
Release - Architecture Doc	03/03/2024 12:19	File folder	
📙 .github	03/03/2024 12:19	File folder	
travis.yml	03/03/2024 12:19	YML File	2 KB
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🚳 objdump.bat	03/03/2024 12:19	Windows Batch File	1 KB
myHal.cpp_example.txt	03/03/2024 12:19	Text Document	13 KB
myHal.cpp.txt	03/03/2024 12:19	Text Document	17 KB
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CONTRIBUTING.md	15/02.2024 19:10	MD File	4 KB
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Outputs.h	15/03/2024 19:11	H File	2 KB
myEX-Turntable.example.h	15/03/2024 19:11	H File	5 KB
myAutomation.h	15/03/2024 19:11	H File	1 KB

3. Open this sub-folder and you will see a list of files.

Scroll down until you see a file called **CommandStation-EX.ino**

Click on it and it will load the CommandStation-EX sketch (plus the required libraries) into the Arduino software you have running.

Even with a powerful computer this will take a minute or two.

Release_Notes	03/03/2024 12:19	File folder	
Release - Architecture Doc	03/03/2024 12:19	File folder	
🧾 .github	03/03/2024 12:19	File folder	
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install_via_powershell.cmd	03/03/2024 12:19	Windows Comma	1 KB
🚳 objdump.bat	03/03/2024 12:19	Windows Batch File	1 KB
myHal.cpp_example.txt	03/03/2024 12:19	Text Document	13 KB
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CONTRIBUTING.md	15/02, 2024 19:10	MD File	4 KB
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CommandStation-EX.ino	15/03/2024 19:10	INO File	6 KB
WiThrottle.h	15/03/2024 19:11	H File	4 KB
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	Output		=	A

Let's see that for real.....

Fifth Step.

The Web Throttle

Now we have the CommandStation-EX software downloaded we still need a throttle to run our trains.

Return to the web browser and click on EX-WebThrottle



Scroll down past Try It Now and then click on Download



USB port and which has a compatible prowser installed. Use a USB serial cable from your computer to the USB connector on the EX-CommandStation. Power everything up and put a loco on the MAIN track.

part about connecting your EX-CommandStation

Run or Install EX-WebThrottle

You have an option for how you would like to run EX-WebThrottle, from the cloud or installed locally on your machine. We recommend using it from the cloud or as a web app, but the choice is yours.

Try it now (Run from the cloud)

Just click the 'Try it now' button below and you will load a web page from our server that will run the web throttle on your machine. You can connect it to the EX-CommandStation or just run it in emulator mode where you don't have to have any hardware. Please read the requirements above for what you need in order to run EX-CommandStation in your browser. If you want to remember the link to run the throttle, it is https://dcc-ex.github.io/WebThrottle-EX.

Try It Now

EX-WebThrottle is also a Progressive Web App (PWA). That means you can install it on your computer and run it right from your start menu! If you go into the EX-WebThrottle settings panel (click the 3 line, or 3 dot "mamburger menu" at the top left), you will find a "Settings" menu. Click on "Apps" and then select "Install as an App". You cap now work offline and always find EX-WebThrottle with your other Apps!

Download

This will install all the files to run locally on your machine. You won't need an internet connection to run the software best download the latest zip file from the link below and extract it to approve you have run permission on. Then click on the index.html file to aunch the throttle in your browser. Create a shortcut to it on your resktop so you can launch it more easily.

G Previous

We recommend using the version hosted on our servers as this will auto-update whenever we release a new update!

0----

Download

Next O

As for the previous download, a new tab will open.

Select Source code (zi	p)	
DCC-EX / WebThrottle-EX		다. Notificatio
<> Code 🕢 Issues 26 🎲 Pull requests 3 🖓 Discussi	ons 🕑 Actions 🖽 Projects 2 🖽 Wiki 🛈 Security 🗠 Insights	
Releases Tags		Q Find a release
Apr 5 flash62au V1.3.27 -0- 51a7ac7 Compare -	 1.3.27 Latest support state and label changes for Routes <jb></jb> overcurrent and/or short toast message 	
	▼ Assets 2	Apr 4
	Source code (tar.gz)	Apr 4

As before, extract all the downloaded files and put them in a suitable folder.

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	14/02/2025 12:39	GITIGNORE File	1 KB
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Changelog.md	14/02/2025 12:39	MD File	4 KB
CONTRIBUTING.md	14/02/2025 12:39	MD File	3 KB
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🗋 manifest.json	14/02/2025 12:39	JSON File	1 KB
README.md	14/02/2025 12:39	MD File	6 KB
💰 sw.js	14/02/2025 12:39	JavaScript File	2 KB

As before, extract all the downloaded files and put them in a suitable folder.

When you open this folder it will have a sub-folder called WebThrottle-EX-1.3.27

~			
Name	Date modified	Туре	Size
📙 .github	14/02/2025 12:40	File folder	
css	14/02/2025 12:40	File folder	
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📊 js	14/02/2025 12;40	File folder	
📙 originals	14/02/2025 12:40	File folder	
	14/02/2025 12:39	GITIGNORE File	1 KB
htaccess	14/02/2025 12:39	HTACCESS File	1 KB
headers	14/02/2025 12:39	File	1 KB
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README.md	14/02/2025 12:39	MD File	6 KB
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As before, extract all the downloaded files and put them in a suitable folder.

When you open this folder it will have a sub-folder called WebThrottle-EX-1.3.27

Open this sub-folder and you'll see a list of files.

Click on the file called index.html

Train Stuff > 009 gauge stuff > Web Throttle 1.3.27				~		
Name	Date modified	Туре	Size			
📙 .github	14/02/2025 12:40	File folder				
css	14/02/2025 12:40	File folder				
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Changelog.md	14/02/2025 12:39	MD File	4 KB			
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README.md	14/02/2025 12:39	MD File	6 KB			
🛞 sw.js	14/02/2025 12:39	JavaScript File	2 KB			

5
A web page will open. This is the Throttle. IT IS NOT ACCESSING THE INTERNET





Let's see that for real.....

Sixth Step.

Transferring the DCC-EX software to the Mega board

- 1. You do this by returning to the Arduino program you already have running.
- 2. Connect the Arduino board to your computer using the USB cable that came with it (or a longer one if necessary).

Let's see that for real.....

Seventh Step.

You're ready to run a train

1. Check you've turned on the 15 volt power supply that's connected to the motor shield and the USB cable is still plugged in between your computer and the Mega board.

- 1. Check you've turned on the 15 volt power supply that's connected to the motor shield and the USB cable is still plugged in between your computer and the Mega board.
- 2. Make sure the middle two pins of the motor shield are wired to the main track of your layout.

- 1. Check you've turned on the 15 volt power supply that's connected to the motor shield and the USB cable is still plugged in between your computer and the Mega board.
- 2. Make sure the middle two pins of the motor shield are wired to the main track of your layout.
- 3. Put a loco on the track.

- 1. Check you've turned on the 15 volt power supply that's connected to the motor shield and the USB cable is still plugged in between your computer and the Mega board.
- 2. Make sure the middle two pins of the motor shield are wired to the main track of your layout.
- 3. Put a loco on the track.
- 4. Return to the web throttle app that you have running on your computer, and you can run the loco.

Finally, let's do that for real

You've done all the hard work. The Mega board is permanently loaded with the DCC-EX software and you're running trains.....

Pause

Welcome back

We'll now look at various additions to the basic DCC-EX setup

First, let's add wifi

You have a choice of two slightly different wifi boards.

You can either buy this shield for £14.99 from CMMME (Chesterfield Model Making)



It plugs in directly on top of the motor shield and just needs two jumper wires from it to the Mega board.



Alternatively, you can buy a wifi module and adapter from Amazon



The wifi module plugs into the adapter but the adapter is not a shield. In other words, it doesn't plug directly into the motor shield.

- Instead it requires four jumper leads to connect to the Mega board and the motor shield.
- The cost of each module plus adapter is less than £6, if you buy more than one.



The complete wifi set up



Plug the USB cable into the Mega board, open up the wifi throttle, click on Connect EX-CS and select the Arduino Mega board COM port number.
Scroll up and down the Debug Console entries and make sure you see: <* Wifi Check: [OK} *>



There are two ways you can use your smartphone to control locos.

One is called **Access Mode**, where you alter the wifi setting on your phone to the IP address and port number of the wifi shield of the arduino.

I've found this a bit inconsistent in use, so I prefer the alternative of connecting through your home wifi network, called **Station Mode**.

Make sure you have the name of the home router and the password ready to hand.



Open the Arduino app if it isn't already running, and click on the three dots at the top right of the window. A list will drop down of the external libraries DCC-EX uses.
Scroll down until you see config.h and click on it.

Con	tation-EX (Arduino IDE 2.3.2	>
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	<pre>andStation-EX.No CONTRIBUTING ind CommandDistributor.cpp CommandDistributor.cpp DCCACK DCCEXCh DCCEXPerser.cpp DCCEXPerser.h DCCRMT.cpp DCCRMT.h DCCTimer.h DCCT</pre>	VR cpp DCC
	•	

• config.h will open and the name appear at the top left.

CommandStat	tion-EX - config.h Arduino IDE 2.3.2	- C	1 >
9 😌 💿	🜵 Arduino Mega dh Mega 2 👻		∿ ¢
tter cpp 1 2 3 4 5 6 7 7 8 9 9 0 11 12 13 14 15 16 16 16 17 18 19 20 21 22 23 24 22 23 24 22 23 24 22 23 24 22 23 24 25 26 27 27 28 29 20 20 20 20 20 20 20 20 20 20	StingFormatter TrackManagering TrackManagering Turnouts op Turnouts h WiThrottle op WiThrottle h WitESP32.cp WitESP32.h WitEInboundHandler.pp WitEInboundHandler.h WitEInboundHandler.h	conf	gh ↔
Output			= (

Scroll down until you find an entry #define WIFI_SSID "Your network name"
Carefully change Your network name to the name of your router.

// If DONT TOUCH WIFI CONF is set, all WIFI config will be done with 93 // the <+> commands and this sketch will not change anything over 94 // AT commands and the other WIFI * defines below do not have any effect. 95 //#define DONT TOUCH WIFI CONF 96 97 98 // WIFI SSID is the network name IF you want to use your existing home network. 99 // Do NOT change this if you want to use the WiFi in Access Point (AP) mode. 11 100 // If you do NOT set the WIFI SSID and do NOT set the WIFI PASSWORD, 101 // then the WiFi chip will first try to connect to the previously 102 // configured network and if that fails fall back to Access Point mode. 103 // The SSID of the AP will be automatically set to DCCEX *. 104 // If you DO set the WIFI SSID then the WiFi chip will try to connect 105 // to that (home) network in station (client) mode. If a WIFI PASSWORD 106 // is set (recommended), that password will be used for AP mode. 107 // The AP mode password must be at least 8 characters long. 108 109 // Your SSID may not contain ``"'' (double quote, ASCII 0x22). 110 #define WIFI SSID "Your network name" 111 11 112 // WIFI PASSWORD is the network password for your home network or if 113 // you want to change the password from default AP mode password 114 // to the AP password you want. 115 // Your password may not contain ``"'' (double quote, ASCII 0x22). 116 #define WIFI PASSWORD "Your network passwd" 117 11 118 // WIFI HOSTNAME: You probably don't need to change this 119 #define WIFI HOSTNAME "dccex" 120 121 11

• A few lines further down you'll see an entry **#define WIFI_PASSWORD** "Your network passwd"

• Carefully change Your network passwd to your router's password.

// If DONT TOUCH WIFI CONF is set, all WIFI config will be done with 93 // the <+> commands and this sketch will not change anything over 94 // AT commands and the other WIFI * defines below do not have any effect. 95 //#define DONT TOUCH WIFI CONF 96 97 // WIFI SSID is the network name IF you want to use your existing home network. 98 // Do NOT change this if you want to use the WiFi in Access Point (AP) mode. 99 11 100 // If you do NOT set the WIFI SSID and do NOT set the WIFI PASSWORD, 101 // then the WiFi chip will first try to connect to the previously 102 // configured network and if that fails fall back to Access Point mode. 103 // The SSID of the AP will be automatically set to DCCEX *. 104 // If you DO set the WIFI SSID then the WiFi chip will try to connect 105 // to that (home) network in station (client) mode. If a WIFI PASSWORD 106 // is set (recommended), that password will be used for AP mode. 107 // The AP mode password must be at least 8 characters long. 108 109 // Your SSID may not contain ``"'' (double quote, ASCII 0x22). 110 #define WIFI SSID "Your network name" 111 112 // WIFI PASSWORD is the network password for your home network or if 113 114 // you want to change the password from default AP mode password // to the AP password you want. 115 // Your password may not contain ``"'' (double quote, ASCII 0x22). 116 117 #define WIFI PASSWORD "Your network passwd" 118 // WIFI HOSTNAME: You probably don't need to change this 119 #define WIFI HOSTNAME "dccex" 120 121 122 // WIET CHANNEL. If the line "#define EMARLE WIET thue" is uncommonted

• Finally, a A few lines further down you'll see an entry **#define WIFI_HOSTNAME** "dccex"

• Leave this unchanged, but remember it for later.

// If DONT TOUCH WIFI CONF is set, all WIFI config will be done with 93 // the <+> commands and this sketch will not change anything over 94 // AT commands and the other WIFI * defines below do not have any effect. 95 //#define DONT TOUCH WIFI CONF 96 97 // WIFI SSID is the network name IF you want to use your existing home network. 98 // Do NOT change this if you want to use the WiFi in Access Point (AP) mode. 99 100 // If you do NOT set the WIFI SSID and do NOT set the WIFI PASSWORD, 101 // then the WiFi chip will first try to connect to the previously 102 // configured network and if that fails fall back to Access Point mode. 103 // The SSID of the AP will be automatically set to DCCEX *. 104 // If you DO set the WIFI SSID then the WiFi chip will try to connect 105 // to that (home) network in station (client) mode. If a WIFI PASSWORD 106 // is set (recommended), that password will be used for AP mode. 107 108 // The AP mode password must be at least 8 characters long. 109 // Your SSID may not contain ``"'' (double guote, ASCII 0x22). 110 #define WIFI SSID "Your network name" 111 112 // WIFI PASSWORD is the network password for your home network or if 113 // you want to change the password from default AP mode password 114 // to the AP password you want. 115 // Your password may not contain ``"'' (double quote, ASCII 0x22). 116 117 #define WIFI PASSWORD "Your network passwd" 118 // // WIFI HOSTNAME: You probably don't need to change this 119 #define WIFI HOSTNAME "dccex" 120 121 // 122 // WIFI CHANNEL: If the line "#define ENABLE WIFI true" is uncommented,

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⊘ €) 🖊	🖓 Arduino Mega or Meg 👻	
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Output	Serial Monitor	
28 29 30 31 32 Output Sket Glob	<pre>#else #warning config.h not found. Using defaults from config.example.h #include "config.example.h" #endif Serial Monitor ch uses 68650 bytes (27%) of program storage space. Maximum is 253952 bytes. al variables use 2099 bytes (25%) of dynamic memory, leaving 6093 bytes for local variables. Maximum is</pre>	8192 bytes.

Ln 22, Col 1 Arduino Mega or Mega 2560 on COM12 🗘 2 🛅

You can either use an Android or an Apple smart phone to control your loco, the DCC-EX software has been written for both.

However, the Android side of things has, to date, seen more development.

I currently use an iPhone, so that's a down side for me.

The iPhone option is called **WiThrottle**. You can use it on your iPhone or iPad.

Unfortunately, the full blown version costs \$9.99. There is a free, more basic, version called **WiThrottle Lite**.

That's is the one I use.

It's main disadvantages are:

• You can only control one loco at a time.

• It doesn't turn the power on to the track (but there is an easy way around this)

•You can't program CVs from your phone.



Let's see that for real.....

But what if you have an Android smart phone.....

The Android wifi app is called **Engine Driver**. It's free.



Prerequisites for Using Engine Driver
 Operation - Using Engine Driver
 Configuration
 Videos
 Downloads
 Changes / Updates
 Contributing
 Glossary / References / Copyright
 Support & Contact

希 » Engine Driver

C Edit on GitHub

ENGINE DRIVER

JMRI Engine Driver Throttle, more commonly known as Engine Driver, is a free Android application that connects to a WiThrottle^{™ 1} Server to control model trains.

Supported servers include JMRI, DCC-EX Command Station, MRC Prodigy WiFi, Digitrax LnWi, and WifiTrax (for NCE). Once connected, you can control the speed direction and up to 29 DCC functions of your DCC enabled locomotives (locos). From one to six locos or consists / multiple units can be controlled at the same time. You can easily create and edit on-the-fly consists / multiple units (software-defined). You can also control layout power, turnouts/points, routes, and access JMRI web panels and windows.



See the About Engine Driver page for more information. See the Operation - Using Engine Driver page for details on how to use Engine Driver.



Why Use Engine Driver

You can use **Engine Driver** to operate your DCC model train layout without being physically tethered by any wires. This allows you to walk around your layout, following your trains and/or position yourself anywhere around your layout (e.g. at your favourite viewing position).

SK724 60 Stop Reverse >> You can add a but turn Arits proprietary co

You can add additional Engine Driver controllers inexpensively using old Android phones or tablets, instead of proprietary controllers. (You don't need to have a sim card in the phone.)

You only need to interact with JMRI and/or your DCC command station directly when setting up or re-

There is a free, associated Android option called **EX-Toolbox**.

It allows you to do things like CV programming from your android phone.

EX-Toolbox

EX-Toolbox - Overview

EX-Toolbox - Installing and Using

EX-COMMANDSTATION ADD-ONS

- EX-RAIL (Automation/Animation)
- TrackManager (DCC & DC)
- EX-Turntable
- EX-IOExpander
- EX-FastClock

SUPPORT & INFO

- Troubleshooting & Getting Help
- Throttles (Controllers)
- 🗄 The Big Picture

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EX-Tool	lbox		DCC-EX
Tipkeese	Essinera	0	S EX-100100X
Level	Level		

EX-Toolbox is a standalone android app that can:

- CV Programming in the programming track (Service Mode)
- CV Programming in the main track (Operation Mode)
- Servo motor testing and adjustment
- Sensor testing
- Current Meter (Only available when connected to EX-CommandStation version 5.0.0 and above.)
- Track Manager (Only available when connected to EX-CommandStation version 5.0.0 and above.)
- EX-Toolbox Overview
- EX-Toolbox Installing and Using



There's one more thing I choose to do:

We bent the VIN pin on the motor shield to stop 15 volts being sent to the Aurduino Mega through the VIN pin, which can only work at 5 to 9 volts.

The Mega board was getting its power via the USB cable from the computer. However you may not want to be running trains with a computer always plugged in.
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There is a 9 volt socket on the Mega so, if you have a spare 9 volt power supply, you could plug that in instead, but having two power supplies is a bit clumsy although you could just use the USB cable plugged in to a mains USB charging plug.

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Another, and I think better, way is to reduce the 15 volts from the motor shield down to a lower voltage the Mega can handle. For that you use a **Buck Converter.**



Roll over image to zoom in

Buck Converter, Adjustable DC Input 8-80V to Optional DC Output 3.3V/5V/6V/9V/12V/15V Max 2.1A High Efficiency Conversion Voltage Regulator Module(5V)

Visit the Jectse Store Search this page

£**4**05

Brand	Jectse		
Power source	Battery Powered		
Current rating	2.1 Amps		
Minimum frequency	50 Hz		
tem weight	0.02 Kilograms		

About this item

- 1. Input reverse polarity protection
- 2. TVS overvoltage protection
- 3. High frequency filter capacitor
- 4. High Q value 100UH inductance
- 5. Output overcurrent protection



Roll over image to zoom in

DC-DC Buck Converter Buck Module,Voltage Regulator Step Down Module 5A 4.0V~38V to 1.25V~36V Adjustable

Visit the Jectse Store

4.6 ★★★★★ (2) | Search this page

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Pay £6.51 £0.00 for this order. Get a £25 Amazon Gift Card when approved for the Amazon Business Amex Card. Rep. APR 39.3% Variable. Amazon is a credit broker not a lender.

Brand	Jectse
Included components	inc
Special feature	default
Amperage	5 Amps
Wattage	75 watts
Number of items	1
Specification met	Ma
× See more	

About this item

- FEATURE: With power indicator, With voltmeter display and the voltmeter can be self-calibrated. A more
 advanced voltage microprocessor is adopted, the error of the voltmeter is ±0.05V, and the range is 0~40V.
 (Note: To ensure the accuracy of the voltmeter, please ensure that the input voltage is above 4.5V)
- HIGH PERFORMANCE:Buck Converter Buck Module,touch the button to switch between measuring input or
 output voltage, and there is an indicator light to show which voltage is being measured, and the setting is
 saved, even if the power is turned off and on again.
- ADVANTAGE: The voltmeter can be turned off, and it can be easily realized by tapping the button on the left

Hardware, wifi requirements

Already spent Wi-Fi shield Buck converter (15 volts down to 5 volts) £4.05 (or less if bought in bulk)

£35 £6.00 or £14.99

Total:

approx £45 or £54

But you could spend more.....

What about a LCD display to provide a bit of information about what's going on? A display won't be wanted by everybody as many DCC-EX controllers are attached to the underside of the layout board. However, it could be an option for some users.



with Cable Brand: DAOKAI 5.0 ***** 5	£6 ⁷⁹ ✓prime One-Day		
-12% [£] 6 ⁷⁹		August. Order within 5 hrs mins. Details	
✓prime One-Day Colour Name: Blue LCD :	 Deliver to MR - Shrewsbury SY4 Only 6 left in stock. 		
Brand	DAOKAI	Quantity: 1	
Voltage	5 Volts		
Circuit breaker type	Standard	Add to Basket	
Mounting type	Plug-In Mount	Duri Maur	
Number of poles	4	Buy Now	

Returnable within

30 days of receipt

Secure transaction

Returns

Paymen

- Module: 2004A LCD screen 20X4 2004 character display LCD module 204A LCD/LCM blue screen 5V
- Parameters: Display screen: blue screen, display content 20 characters × 4 lines, working voltage: +5V,

Alternatively, an OLED display:



Roll over image to zoom in

AZDeli	ZDelivery I2C 0.96-inch OLED Display Compatible with SSD1306					Pickup	
with An √isit the AZ 4.5 ★★★	rduino ^{Delivery St}	and Ra ore 3,097 rating	spberr	y Pi Including E-Book!	99 ime One-Da E Returns ❤	у	
Prime One-Day REE Returns ✓ Save 5% on any 4 Terms Redeem Save 10% promo code: WK5FX7PJX4XZ Terms Shop items >					FREE delivery Tomorrow , 28 August . Order within 9 hrs 9 mins. Details Deliver to MR - Shrewsbury SY4 2 In stock Quantity: 1		
Number Of	Items: 1	e te te prom	io code. In i		Add to	Basket	
1 £5.99	3 £13.99	5 £16.14	25		Buy	Now	
√ prime	√prime	✓prime	√prime	Disp Sold Retu	atches from I by urns	Amazon AZ-Delivery-Shop Returnable within	
Screen size		0.96 In	iches	Pavr	ment	30 days of receipt Secure transaction	
Screen surf description	ace	Glossy		v s,	ee more		



Roll over image to zoom in

ALMOCN 120PCS Breadboard Jumper Dupont Wire, Multicolored 10cm 40pin Male to Female, 40pin Male to Male, 40pin Female to Female Breadboard Jumper Wires Ribbon Cables Kit for arduino

Brand: ALMOCN

★★★★☆ × 25 | Search this page 50+ bought in past month

£599

✓prime One-Day FREE Returns ∨
Buy 2 or more, save 9% Discount by Amazon Terms ×

Pay £5.99 £0.00 for this order. Get a £25 Amazon Gift Card when approved for the Amazon Business Amex Card. Rep. APR 39.7% Variable. Amazon is a credit broker not a lender.

Colour Name: Clear		
Colour	Clear	
Brand	ALMOCN	
Material	Aluminum, Copper	

About this item

- The 10 colour repeat clear carrier colour coded 40 PIN ribbon cable, which can be separated into single wire
 or multi strand combination for various usages.easy to identify each wires in your DIY or prototype.
- Cable material: 12-core pure copper wire, premium quality and safe, saving space and weight.
- Connector Type: Standard 2.54mm pitch dupont housing connector / 1pin-1pin
- Package include:10cm 40pin Female to Female+10cm 40pin Female to Male+10cm 40pin Male to Male.

£599 **√prime** One-Day FREE Returns ~ FREE delivery Tomorrow. Order within 30 mins. Details O Deliver to MR - Shrewsbury SY4 2 In stock Quantity: 1 + -Add to Basket Buy Now Amazon Dispatches from Sold by Dacha EU Returnable within Returns 30 days of receipt Customer Service Amazon ✓ See more Add gift options Add to List

Spent so far LCD Display Jumper cables for LCD display and wifi £45 £6.79 (or £5.99 if you opt for the OLED) £5.99 (if you don't have any)

Total

£58 approx

But many users won't want or require all of these, so this is the **maximum** cost so far.

You probably want to put your DCC-EX controller into some kind of case so it doesn't get knocked or damaged.

All of you are proficient in cutting plywood, so making something suitable shouldn't present much of a challenge.

Alternatively you could buy a suitable plastic box, such as a small lunchbox, and cut and drill the required holes.

As I have a 3D printer, I designed and printed my own box. The cost in materials and electricity was less than £1.

As an alternative, I could have gone to the Thingiverse website and downloaded, for free, one of the 3D printable cases for DCC-DX controllers that can be found there.

👭 UltiMaker Thingiverse

O Search Thingiverse

Explore Education Create -



 \leftarrow

DCC EX / DCC++ case for Arduino and motor shield dcyale October 09, 2020

eady EX 03.0.P





 \rightarrow









Extra pieces of hardware to consider continued

Maximum spend so far: £58 max

If you have a large layout or run many locos at once, the 2 amp motor shield may not be sufficient. If so, you'll definitely need the 5 amp motor shield for £42.99, which has been designed and manufactured by DCC-EX themselves.

Extra pieces of hardware to consider continued

Maximum spend so far: £58 max

If you have a large layout or run many locos at once, the 2 amp motor shield may not be sufficient. If so, you'll definitely need a 5 amp motor shield for £42.99, which has been designed and manufactured by DCC-EX themselves.

However, you won't need the £15.99 2 amp motor shield and, as the DCC-EX motor shield has a built-in buck converter, the VIN pin isn't bent out and so you don't need a separate £4.05 buck converter.

Total spend: £58 + £42.99 - £15.99 - £4.05 = **£81** approx





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* Home Model Railway Electronics DCC-EX Motor Shield



Tags: DCC, DCC++ EX, motor shield

Pay Later

But, for £2 less, you could buy the whole thing, already preassembled, with the 5 amp power shield and LCD display included, directly from CMMME, for £79.



Ð,

3

★★★★★ (27 customer reviews) f69.00 - f99.00Variation Base Station × Motor Shield DCC++ EX 8874 20v 5a 🗸 **UK Power Supply** No LCD Screen Clear Yes × £79.00 7 in stock (can be backordered) Add to basket

Basic *

DCC EX Arduino System *

And that's hardly scratching the surface.....

Not everyone likes controlling the loco's speed using a slider on a smart phone. If you'd like to use a physical throttle, you could buy one of these:

The down side is that it doesn't work with an iPhone if you use free WiThrottle Lite.

	Image: Signature of the sector of the sec
	Buy it now Add to basket
Have one to sell? Sell it yourself	Make offer

You can control servo motors to work points and the like.



Dominouus

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 - DCC Track Wiring Information

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Default Pin/VPin Allocations and Recommendations

🗄 Supported Motor Drivers

🖽 WiFi Boards

Ethernet Boards

- Supported Bluetooth Devices
- I2C Hardware

I2C Displays

I2C Devices

12C GPIO Expander Modules

Connecting a Servo Module

I2C Multiplexers

Accessory Controllers

The servo module itself is powered from the Arduino, but the servos themselves contain motors that consume more current than the Arduino is able to supply, and so a separate 5V supply is required for the servos. This is connected to the green terminal block at the top of the module, with terminals labelled V+ and GND. The V+ terminal is connected to 5V and the GND to the 0V (ground) wire of the supply.

Connections to the Arduino are made with four jumper wires (+5V power and GND, and SCL and SDA), as shown on the following diagram:





In **EX-CommandStation**, the drivers for the PCA9685 module is already installed, and made available to for use as pin numbers 100-115. A servo is shown in the diagram, connected to the first set of pins on the module. This will be accessed using pin number 100.

Once you've made all of the connections, apply power to the Arduino.

Then, in the Serial Monitor, enter the command <*D SERVO* 100 450>. The servo should move, as long as it isn't (by some fluke) already in that position.

EX-Toolbox

EX-COMMANDSTATION ADD-ONS

EX-RAIL (Automation/Animation)

TrackManager (DCC & DC)

EX-Turntable

EX-IOExpander

EX-FastClock

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Using an L293D motor driver - single solenoid/coil turnouts



A single L293D motor driver IC can be used to control two turnouts/points and will require six digital output pins either directly from your EX-CommandStation (as per the diagram above), or these can also be connected via an I/O expander such as an MCP23017 or EX-IOExpander.

To operate the turnouts/points in this manner, the direction of the turnout (close/throw) is configured by setting the input pins (2 and 7, 10 and 15) high or low, and briefly setting the appropriate enable pin high (1 or 9).

Note that the 10K pull down resistors connected from ground to the enable pins are there as a safety feature to ensure that any unknown states during start up don't cause the enable pins to be set to a high state, causing the coils to overheat and burn out.

TrackManager (DCC & DC)

EX-Turntable

EX-IOExpander

EX-FastClock

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Using a Capacitive Discharge Unit (CDU) - dual solenoid/coil turnouts

Option 1 - DIY CDU by "Rosscoe" (DCC-EX user on Discord)

The information here is based on the combined driver and CDU as outlined in this GitHub repository, with a PCB available from PCBWay

DCC Solenoid Turnout Driver



This board has an MCP23017 which is connected to your **EX-CommandStation** via I²C, which is then controlled like any other MCP23017. This MCP23017 controls two ULN2803 darlington arrays to switch power to the turnout/point solenoids.

The connections will depend on the driver and CDU.

EX-Turntable

EX-IOExpander

EX-FastClock

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AUTOMATION to take it on a journey around the layout.

Things You Can Do With EX-RAIL

- Create 'Routes' which set multiple turnouts/points and signals at the press of a button in **EX-WebThrottle** or Engine Driver, wiThrottle, or other WiThrottle-compatible throttles are available
- Automatically drive multiple trains simultaneously, and manage complex interactions such as single line working and crossovers by setting up Automations 'Sequences'
- Drive trains manually, and hand a train over to an Automation
- Animate accessories such as lights, crossings, or cranes
- · Intercept turnout/point changes to automatically adjust signals or other turnouts
- Turn on the coffee pot when the train reaches the station

What You Don't Need

While extra functionality may be attained by using additional tools and applications, to get the benefit of **EX-RAIL** you don't need anything more than a **EX-CommandStation**, and the Arduino IDE used to configure it.

You DON'T need:

- JMRI, or any additional utilities
- Engine Driver, wiThrottle, or any other WiThrottle app
- A separate computer living under your layout
- Knowledge of C++ or Python/Jython programming

Next Steps - myAutomation.h

Click here or click the Next button to learn how to edit the file which will contain your automation sequences.



JMRI® is...

- Setup
- Preferences Pane
- Configuration Profiles
- Error Codes
- InstallTest

JMRI Setup and

- Installation JMRI environments...
- Windows
- macOS
- Linux (multiple vers)
- Raspberry Pi OS on Raspberry
- Pi
- Debugging an installation

Applications

- By the community of JMRI.org: DecoderPro®
- PanelPro™
- DispatcharD
- DispatcherPro™ OperationsPro™
- <u>OperationsPro</u> SoundPro™
- SoundPro
- Apps with JMRI connections... Jython Apps for JMRI...
- Jyunon Apps for Jr
- FAQ

Tools

JMRI tools for working with your layout:

- Common Tools:
- <u>Throttles</u>
- Turnouts
- Lights
- Sensors Signaling
- signaling
- Consisting
- Reporters
- Memory Variables
- Blocks: Blocks

JMRI®: Setup

General Installation

Installation | Starting JMRI | Setting Preferences | Fixing Problems

Installation

Full instructions for installing JMRI on different platforms can be found here:

- Windows
- macOS
- Linux
 - <u>Raspberry Pi</u>

JMRI® requires that Java be installed:

- Version 2.12 can run on any computer system that will run Java 1.5 through Java 8 (also known as Java 1.8).
- Version 2.14.1 requires Java 1.5 (or Java 1.6 to support for drag & drop) through Java 8.
- Version 3.10.1 requires Java 1.7 through Java 8.
- Version 4.2 thru 4.25.5 requires Java 8 (except release 311) or Java 11 (recommended).
- Version 4.25.6 thru 4.26 requires Java 8 or Java 11 (recommended).
- Version 4.99.x and beyond: REQUIRES JAVA 11 ONLY. See our Java instructions page on getting Java 11.

As of JMRI 4.20, JMRI is only fully supported when running on Java release 8 or 11. As of JMRI 4.99.1, JMRI is only fully supported when running on Java release 11 as noted above. Some problems have been encountered while using a Java version beyond Java 11 and support is offered only on a "best effort" basis. Some issues may only be addressable by using a supported version.

Starting the program

Once you have downloaded the JMRI® software and installed it, simply open the program in the usual manner for your operating system. Windows will show an icon on desktop (with default install options selected).



Keep checking the DCC-EX website for updates

connections.

For example, they've recently introduced the EX-CSB1, which combines the Mega board, 5 amp motor shield, wi-fi board and buck converter into one. It can also connect directly to

You can obtain one for £104, complete with LED display, case and fully preloaded DCC-EX software, from CMMME.

EX-CommandStation / **Booster One Express**

Suitable For: Conductor 1 evel

Designed by the **DCC-EX** development team, the

Tinkere

EX-CommandStation / Booster One Express replaces up to 3 different

stacked Arduino boards to provide a complete, expandible DCC and DC

PWM command station or booster with dual 5A track outputs, integrated

programming track capability, and built-in fast WiFi for throttle control

Engineer Level



On this page

- What is the EX-CSB1?
- Why did we make it?
- How can Lot one?
 - Suppliers / Resellers List
 - In the United States serving USA, Canada, & Mexico
 - In England serving the UK
 - In Austria serving the European Union (EU) In Australia serving AU, NZ, and APAC
- · Prices
- Next Steps



Fig 264: EX-CSB1 CommandStation / Booster

What is the EX-CSB1?

The EX-CommandStation / Booster One Express is the first fully integrated DCC Command Station with DC PWM and Booster mode capabilities developed by the DCC-EX Team. This versatile board can function as a complete Command Station with USB or WiFi connectivity or serve as a stand-alone booster, making it an ideal addition to any layout, including those using non-DCC-EX systems.

Keep checking the DCC-EX website for updates

New throttles to run on your smartphone are arriving thick and fast.

I've just discovered two, developed for iPhones:

Locontrol

and Train Driver.

I haven't had much time to investigate further other than they're a bit of a fiddle to set up and they're not free.



• Search YouTube for **DriverDTrains** for how-to-do-this videos.

- Search YouTube for **DriverDTrains** for how-to-do-this videos.
- Visit the DCC-EX website https://dcc-ex.com

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or email me at mikewakefielduk@btinternet.com

Any Questions?