

## ESP DCC controller. Operating manual rev 2 (boards with POM read)

### PART 1: For units equipped with DSKY and jogwheel



The unit boots and shows the current software version as a date. It will then power up the track and enter loco **operations** mode.

### Operations mode



Operate mode. Here you can control one locomotive at a time.

B-key will switch between locomotives

A-key will let you edit loco addresses, delete locos and also set 28/126 speed steps.

To select a loco from the existing roster, press B repeatedly. 8 locos are supported in the roster.

Press A to enter **edit mode**. Press \* to toggle between 3-digit loco addresses and 5-digit addresses.

Press # to will toggle 28 and 126 step speed modes. If you enter a new address by using the digit keys, then press A, the unit will create a new loco entry in the loco roster.

The unit responds with "loco created." If it successfully creates a new entry. If there are no loco slots left, and no older locos can be bumped, then you will see a "no slots" message. A loco can only be bumped if it is stationary and is not currently under WiThrottle control.

To delete a loco, enter 000 or 00000 as the address and press A. You will see a 'loco deleted' message.

Each time the loco roster is changed, it is saved to EEPROM and also broadcast to all WiThrottles.

You may also abort your edit by pressing B. This will take you to loco operate mode.



In loco operate mode

\*-key to increase speed

0-key to decrease speed

\*0 together will emergency stop that loco.

#-key will reverse direction if speed is zero.

D-key will toggle headlamp on/off aka F0.

1-9 keys will toggle F1 to F9

A-key will enter edit mode

B-key will select next loco/ abort edit

C-key will toggle "shunter" mode

In operate mode, you can set the speed of one loco, then select another and set its speed and so on. The **red emergency stop button** comes in handy if you lose track of your locos and need to hit the panic button. The red emergency stop button will send eStop to all locos. It will not turn off track power.

Pressing C will toggle shunter mode. This is indicated by a solid arrow head for direction. In this mode, decreasing speed takes you down through zero, then direction is automatically reversed and

the speed will increase again. This is useful for shunting because it saves you having to enter a direction change command.



In operate mode you can also rotate the jogwheel CW or CCW to increase/decrease speed. If you press the jogwheel down, the loco will brake. Its speed will be reduced by 30% whilst you are holding the button down. Best used with an inertia setting on your decoder.

If the loco is stationary and you hold the jogwheel button down for more than 2 seconds, the loco direction is reversed.

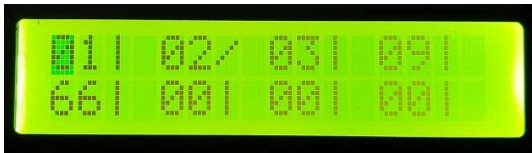
When driving with 126 speed steps, you may fast-rotate the jogwheel to have it increase/decrease speed in 5 step increments/decrements.

If shunter mode is active, the loco speed can be decreased by rotating the jogwheel say CCW. Once the speed hits zero, the direction automatically reverses and continued rotation in the same CCW direction will now cause a speed increase in the new loco direction.

With these features it is possible to drive, brake and reverse the loco solely from the jogwheel. This is a useful feature which is carried over to the turnout display.

### Turnout display

When in operations mode, press mode briefly and you are taken to **turnout** mode. If you press and hold mode, you are taken to **POM** mode.



The unit can store 8 turnouts in the turnout roster and these are kept in EEPROM. To call up a turnout, start typing its 2-digit address. E.g. 01. Once the second digit is entered, the cursor will jump to that particular turnout and blink on top of the closed/thrown indicator.

Pressing # will toggle the turnout state. Closed is indicated by a vertical line, thrown by a forward slash.

You can also quickly toggle turnouts in slots 1-4 by pressing the A, B, C or D button.

As you enter more turnouts, the least used ones are bumped. The unit supports addressing turnouts 01 to 99 through the keypad. It is possible to use the full 1 to 2047 turnout address range if you operate through the WiThrottle. Addresses over 99 are shown in hex, and those over FF are shown as XX because they cannot be displayed in 2 digits.

Whilst in the turnout display, the jogwheel will still control the last selected locomotive. This makes shunting operations very easy. You may stay in the turnout display switching the turnouts and continue to drive a loco through the jogwheel.

### Service mode (programming track)

To enter Service Mode, hit the Emergency Stop button and briefly press the Mode button.



# and \* will move the cursor across the CV address and CV value.

A-key will read the CV.

B-key has no function.

C-key writes in page/register mode.

D-key writes in direct mode.

When in Service mode, the unit complies with the DCC specification and will trip if the track current exceeds 250mA.

If you have just fitted a decoder to a loco, do not put it on the main track in operations mode! First put the unit into Service mode, this sets the power to max 250mA and then place the loco on the track. Try and read CV1. This should return a value of 3. You should also hear the loco buzz/move momentarily as it energises its motor as part of the read. If this does not happen, or the power trips at 250mA or more, then your decoder is not wired correctly and you must correct this before you put it on the main track in operations mode.

This unit only has one track output. There is no separate programming track. Also Service mode is a broadcast mode so all locomotives which receive the signal will be reprogrammed. There are many DCCwiki pages available on the details of service mode.

Only byte read and byte write are supported by the unit. Bitwise operations are not supported



Enter a CV and hit the A-key to read that register. If it fails to read, it is possible your decoder is wired incorrectly, or the loco is off the track or its wheels/pickups are dirty.

Hit the mode-key to exit back to operations mode.

Note: the DCC specification does not allow for driving locos when in service mode, i.e. you cannot test the loco will move forward/backward within the 250mA power limit. However, if you can read CVs successfully, then it is safe to put the loco on the track in operations mode.

### POM mode (programme on the main)

POM mode is entered by long-pressing mode when in the **operations** mode loco display.



A-key will read the CV from the loco address<sup>1</sup>

B-key toggles between byte mode (shown) and bit mode

C-key has no function

D-key writes to the loco address

# and \* keys navigate the cursor

<sup>1</sup> For revised hardware boards, rev 4 blue PCB with Railcom read support

POM mode reads or writes to CV registers when the loco is on the main line in operations mode. You can even write certain decoder CVs whilst the loco is in motion. Short loco addresses are denoted by S, long loco addresses by L.

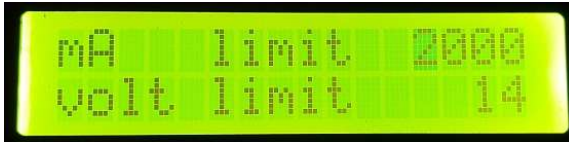


Bitwise mode. Here you can set or clear individual bits 0 to 7 in a specific CV register.

The loco will not visibly acknowledge the byte or bit write. The loco may acknowledge over LocoNet, which is not supported by this unit. For system boards that support Railcom read, pressing A will read the content of the CV to the display.

### Setting current and voltage trip

Enter this mode by pressing **emergency stop** and then long-press on the mode button.



A-key selects mA limit.  
B-key selects volt limit  
Mode-key exits and writes new settings to EEprom.

## PART TWO: Web interface

The unit supports a web interface and this is available even if the physical DSKY is not present.

- The default SSID is ESP\_DCC, with no password.
- The default home page is <http://192.168.6.1/index.htm>

### WiFi Station mode

The unit acts as a WiFi Station by default. In this mode, laptops and mobiles must find the SSID and connect to it.

### WiFi Access point mode

Software versions 2025 onward. You can set the unit to connect to your home WiFi network, i.e. act as an access point. First connect to the unit in Station mode, then can set the SSID and password for your network on the hardware screen. You enter these as the Station address and password. The next time the unit boots, it will try to log on to your home WiFi network as set in the Station parameters. If it succeeds, it will appear on your network at the IP address your router assigns it. You should program your router to assign the MAC address to a fixed IP, and this way your devices such as phones running engine driver have a predictable known IP to connect to when on your home net.

If the unit cannot log onto your home network (e.g. your WiFi is down, you changed the SSID or password, you move house etc.) then the unit will boot in Station mode and appear as ESP\_DCC. This lets you log back into the unit and update the Station settings.

**ESP DCC power settings**

Status	
mA	8
Volts	12.2
Track power is	<input checked="" type="checkbox"/> ON
Set trip threshold	
mA	2000
Volts	14
	<input type="button" value="SET"/>

The index.htm page is the system home page and allows you to navigate to the other web pages.

On this page you can also turn track power on/off, and also set the current and voltage trip thresholds.

Live readings of actual track power and voltage are displayed on this page.

[locomotive roster](#)

[turnout roster](#)

[service mode \(prog track\)](#)

[programme on main \(POM\)](#)

[hardware settings](#)

**ESP DCC hardware**

SSID	DCC_ESP
password	none
IP address	192.168.6.1
MAC	0D:D6:2B:94:01:60
version	20210206
Websocket port	12080
WiThrottle port	12090
Station SSID	
Station password	*****
	<input type="button" value="SET"/>

Caution: changing a setting will require a re-boot and you will need to navigate the new SSID/IP. If you change the Websocket or WiThrottle port, you also need to update these on your phone apps. SSID must be 4+ characters, password must be 8+ characters.

The hardware page allows you to set the SSID and set a password when unit acts as a standalone station.

The IP address can be set. The MAC is read only.

The WiThrottle port can be changed. WiThrottle(IOS) defaults to 12090 and cannot use ports below the 10000 range. EngineDriver can use any port, but 12090 is fine.

The websocket port is used for these web pages, and never needs to change. (not until this unit supports DigiTrains as a future).

Any changes you make here will require you to reboot the unit. And obviously if you change the SSID or IP address, you will need to navigate to your new settings.

2025: Station SSID and Station password are the network settings of your home network, should you wish to connect via this.

### ESP DCC loco roster

slot	address	Long	128	name
0	<input type="text" value="3"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
1	<input type="text" value="7003"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text" value="Class 70"/>
2	<input type="text" value="6"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
3	<input type="text" value="8005"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text"/>

If a loco is in-use by a WiThrottle, you cannot change that slot. You must first stop and release the loco.  
To delete a loco, set its address to 0.

[turnout roster](#)

[power settings](#)

The loco roster can support up to 8 locos. You may edit the roster entry here, and these changes will flow through to any WiThrottle controls.

If a slot is in use, i.e. the loco is moving or it is under the control of a WiThrottle, then the entry is highlighted and you cannot edit it until you zero the speed and/or release the loco in WiThrottle.

There is no support for DCC defined consists. You can create ad-hoc consists in EngineDriver.

### ESP DCC turnout roster

slot	address	name	state
0	<input type="text" value="1"/>	<input type="text" value="Main"/>	<input type="button" value="closed"/>
1	<input type="text" value="2"/>	<input type="text" value="Goods"/>	<input type="button" value="thrown"/>
2	<input type="text" value="3"/>	<input type="text" value="Shed"/>	<input type="button" value="closed"/>
3	<input type="text" value="9"/>	<input type="text" value="Decouple"/>	<input type="button" value="closed"/>
4	<input type="text" value="66"/>	<input type="text" value="New"/>	<input type="button" value="closed"/>
5	<input type="text" value="0"/>	<input type="text"/>	<input type="button" value="closed"/>
6	<input type="text" value="0"/>	<input type="text"/>	<input type="button" value="closed"/>
7	<input type="text" value="0"/>	<input type="text"/>	<input type="button" value="closed"/>

To delete a turnout, set its address to 0.

[loco roster](#)

[power settings](#)

The turnout roster can hold 8 turnouts. Routes are not supported.

You can edit the turnout address and name. Changes are pushed through to the WiThrottles. You can also toggle the turnout states from this page.

Addresses of 1-2047 are supported. This is an 11-bit schema.

Note: The DCC specification defines a 9-bit turnout schema with each address supporting 4 devices. This is quite confusing and most manufacturers use the 11-bit schema where each device effectively has its own address. DCC++ uses a 9-bit schema.

### ESP DCC Service Mode

You are now in Service Mode. Track power is limited to 250mA.  
Navigate to any other page to exit Service Mode and restore full track power.

Status	
mA	8
Volts	12.2
Track power is	<input type="button" value="ON"/>
Set CV (programming track)	<input type="text" value="29"/>
CV register	<input data-bbox="553 1791 784 1816" type="text" value="???"/>
Value	<input data-bbox="553 1816 784 1839" type="text" value="???"/>
<input type="button" value="READ CV REG"/>	<input type="button" value="DIRECT WRITE"/>

Service Mode, aka programming track. When you enter this mode, power is limited to 250mA. You can read/write CVs.

Only direct write mode is supported, and only byte values can be read/written.

If you have installed a new decoder, do NOT put it on the track in operations mode. First set the unit on service mode, then put the loco on the track. If you can read/write CVs to it, then it is wired correctly and can be used on the main.



Important: you need to navigate away from this page to allow full power to be restored to the main.

**DCC ESP POM Mode**

Status		
mA	42	
Volts	13.5	
Track power is	<div>ON</div>	
Set CV (POM)		
Loco addr	6830	long
CV register	8	
Byte write	Bit write	
???	0	set
BYTE WRITE		BIT WRITE
BYTE READ		BIT READ

[locomotive roster](#)

[turnout roster](#)

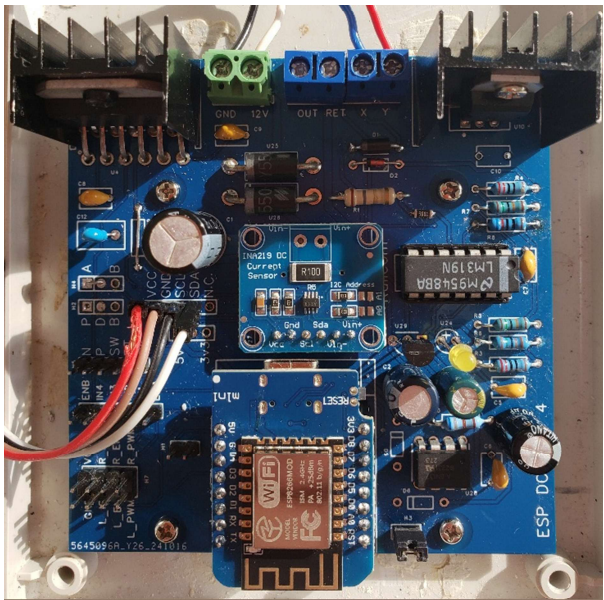
In POM mode, you can read/write to any loco address short or long on the main line. Some decoders even support you doing this as the loco is running.

2025: If using the rev 4 blue PCB which has Railcom read support, you can also read CVs from your locos.

You can bit write or byte write.

There is no read function; this requires LocoNet which is not supported by this unit.

Railcom is not supported by all decoders, but is supported by many new decoders. This system does not support automatic discovery of locos on the main.



The 2025 rev4 board with Railcom read support.