

Please read this sheet before installing the decoder in your locomotive

Introduction

Thank you for your choice of the Bachmann E-Z Command 36-558 decoder. This item is a high quality DCC decoder incorporating back EMF monitoring for fine control of the motor at low speed. The default settings are designed for Graham Farish locomotives

Features

- High frequency pulse power for quiet operation
- User configurable Back EMF control
- 2 function outputs to control functions on the locomotive (eg lighting)
- NMRA DCC with 14, 28, 128 speed steps
- Short or long addresses
- Accepts all programming methods
- Dimensions: 13.3 x 10.0 x 3.5 mm
- Motor Output: 500mA
- Function outputs: 100mA

Important default values

Address 03, 28 speed steps

Important:

- The decoder is designed for use in model railways only
- Avoid mechanical force and impact on the decoder
- Do not expose to wet and humid conditions
- Do not remove the heat shrink sleeve around the decoder
- Never solder on the circuit board
- Never wrap the decoder in insulation tape, since this may cause overheating
- Always remove the locomotive from the track when installing the decoder

Functions

- F0 Locomotive directional lighting
- F7 Light Dimming

Prior to installation

The locomotive must be in perfect technical condition prior to installation. Only a locomotive with a trouble free mechanism and smooth running properties *when used with a DC power supply* should be converted for digital operation. Inspect the model and clean and lubricate if necessary. All work should be carried out with the locomotive placed on a suitable base (not the track) without power. Make sure there can never be any electrical power applied to the loco during the conversion – even inadvertently.

Aligning decoder

Plug the decoder into the socket aligning pin 1 to the mark on the loco PCB. The plug is arranged so that there will be no damage if plugged in reversed, - (note: the 6-pin plug is arranged so both motor and lights do not work when plugged in backwards)

Use in a model without 6-pin socket

Do not attempt to solder wires to the pins of the decoder. The decoder can be used in a model that does not have a 6-pin socket by using either 36-562 6-pin socket with wiring harness

36-563 6-pin socket with 8 pin plug for use in small OO scale locos with 8 pin socket

Long addresses

Refer to the instructions with your DCC equipment regarding the procedure for entering long addresses.

IMPORTANT – Back EMF motor control

The default CV values are suitable for many motors. However, there may be instability in motor performance when the back EMF control is not matched to the requirements of the motor. If this is found to be the case CVs 209 and 210 should be adjusted to alter the back EMF to suit the motor. For advice on this please refer to the extended decoder sheet available to download from www.bachmann.co.uk

CV Programming

The *Configuration Variables* - CVs - hold values within the processor of the decoder which control its performance characteristics. They can be changed as many times as required using an appropriate DCC command unit or standalone programmer. The tables overleaf show the purpose of and the default value for each CV that is available on this decoder and the range of values each may hold. Some CVs can contain a value from a range (eg start voltage) whilst others use the individual 'bits' of the CV to act as on/off switches for features (eg direction of operation).

Inappropriate CV values may cause the decoder to operate incorrectly: if in doubt please take advice from your retailer or Bachmann Europe plc.

Further information on the operation of the decoder is available to download from www.bachmann.co.uk

Speed curves

The decoder offers a selection of alternative *speed curves* to tailor the performance of the locomotive. Logarithmic curves give faster acceleration at low speeds changing to slower acceleration at high speeds, exponential curves give slower acceleration at low speed with faster acceleration at higher speeds as shown in the Figure 1. In addition, there is the option of a *user defined* curve.

Set CV 25 to the chosen value from table overleaf
Add 16 to the value of CV29 (see CV29 table overleaf)
User defined speed curve CVs 67 to 94

The example in Figure 2 shows a possible curve for a shunter that reaches maximum speed at Speed Step 8.

Set an increasing value to CVs 67 to 74 and then this same value to CVs 75 to 94.
Result: your shunter will have low speed control between 0 and speed step 8 but will not increase speed if the controller is increased further.

Decoder reset

The values can be reset to the defaults as above by writing value 08 to CV 8

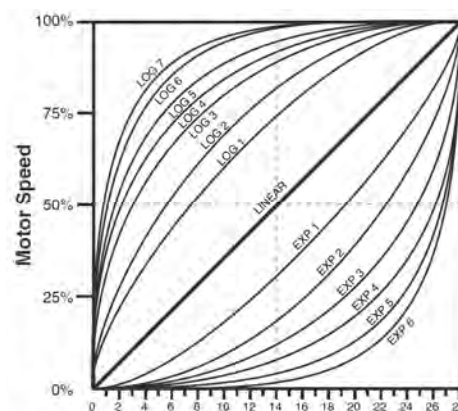


Fig 1 Available speed curves

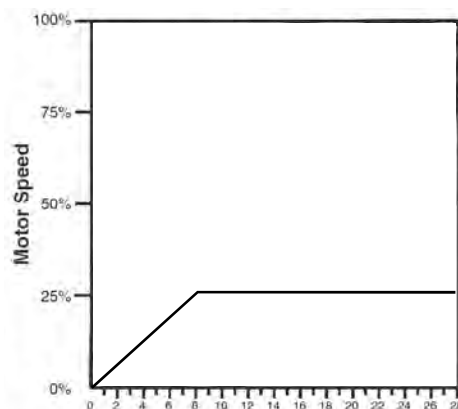


Fig 2 Example of user defined speed curve for a shunter

Guarantee

This product is guaranteed for 12 months from the date of purchase against faulty materials or workmanship. During this period it will be repaired or have parts replaced free of charge provided that:

- 1 the product is returned to Bachmann Europe plc with evidence of purchase date in accordance with the claims procedure outlined below;
- 2 this product has not been misused or handled carelessly or used on a voltage supply other than that stamped on the product; and
- 3 repairs have not been attempted other than by approved service staff

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General CVs

CV	Description	Range	Default
1	Primary Address	1 - 127	3
2	Start voltage		0
3	Acceleration rate		0
4	Deceleration rate		0
7	Version		1
8	Manufacturer ID	Soundtraxx	141
10	Back emf cut out		0
11	Packet timeout value		0
15	CV unlock code		0
16	CV Lock ID		0
17	Extended address		192
18	Extended address		3
19	Consist address	1-127	0
21	Consist function active		0
22	Consist FL function active		0
23	Consist acceleration		0
24	Consist braking rate		0
25	Speed table select		0
29	Configuration	See below	2

A further explanation of advanced features and any update to this document are available to download from www.bachmann.co.uk

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36-558
V1.1 10/09

Function mapping CVs

33	F0 (F) Function Map		1
34	F0 (R) Function Map		2
35	F1 Function map		0
36	F2 Function map		0
37	F3 Function map		0
38	F4 Function map		0
39	F5 Function map		0
40	F6 Function map		0
41	F7 Function map		16
42	F8 Function map		0
43	F9 Function map		0
44	F10 Function map		0
45	F11 Function map		64
46	F12 Function map		0
49	Lighting control	0-1	1
50	Lighting control	0-1	1
59	Lighting flash rate		3
61	F11 brake rate	0-255	0

Configuration data - CV29

Each bit of CV 29 is a 'switch' setting a feature of the decoder. Add the decimal values of chosen features and write this to CV29 to achieve all the effects chosen.
The setting of the Long Address bit will often be done automatically by DCC equipment when setting a long address: if so the value held in CV29 will already have been changed from default.

Bit	Purpose	Effect when Bit is 0	Effect when bit is 1	Decimal value of default	Decimal value when bit is selected
0	Direction	Normal	Reversed	0	1
1	Speed steps	14	28/128	2	2
2					
3					8
4	Speed table	Default	User	0	16
5	Address	Short CV1	Long CV 17/18	0	32
6					64
7					128

Back EMF and motor control CVs

CV	Description	
66	Forward trim	128
95	Reverse trim	128
105	User identifier 1	0
106	User identifier 2	0
209	PID Kp coefficient	25
210	PID Ki coefficient	20
212	BEMF feedback intensity	50
213	BEMF sample period	8
214	BEMF sample window size	8
216	BEMF reference voltage	160
217	Motor control register	2

User Speed table definition

CV25 Speed table selection

V al ue	Description
0	Straight line (default)
1	Not used
2	Not used
3	Logarithmic curve 1
4	Logarithmic curve 2
5	Logarithmic curve 3
6	Logarithmic curve 4
7	Logarithmic curve 5
8	Logarithmic curve 6
9	Logarithmic curve 7
10	Exponential curve 1
11	Exponential curve 2
12	Exponential curve 3
13	Exponential curve 4
14	Exponential curve 5
15	Exponential curve 6
16	User defined, uses the values entered into CVs 67 to 94

Forward / reverse trim CVs 66 and 95 adjusts the *whole* speed curve up and down for forward and reverse direction respectively. CV29 must also be set to the appropriate value - add 16 to the value contained in the CV.

CV	Speed step	Value
66		
67	1	9
68	2	18
69	3	27
70	4	36
71	5	45
72	6	55
73	7	64
74	8	73
75	9	82
76	10	91
77	11	100
78	12	109
79	13	118
80	14	127
81	15	137
82	16	146
83	17	155
84	18	164
85	19	173
86	20	182
87	21	191
88	22	200
89	23	209
90	24	219
91	25	228
92	26	237
93	27	246
94	28	255

