Hattons Originals
Neo Decoder Instructions

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General Use

CV Settings

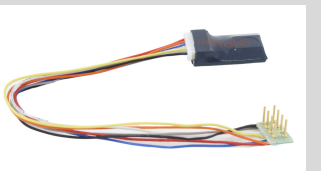
INSTRUCTIONS RELEVANT TO:

DCR-6Pin-Direct-Neo
6-pin 2-function
1.1Amp
Direct plug decoder
with back EMF

View at hattons.co.uk

DCR-8Pin-Harness-Neo
8-pin 4-function
1.1Amp
HarnessDecoder
with back EMF

View at hattons.co.uk



DCR-8Pin-HarnessMini-Neo
8-pin 2-function
1.1Amp
Harness Mini Decoder
with back EMF

View at hattons.co.uk

DCR-21Pin-Direct-Neo
21-pin 6-function
1.1Amp
Direct plug decoder
with back EMF

View at hattons.co.uk

RESETTING DECODERS

Write 8 to CV8 to reset the decoders.
If the settings are not changed by a decoder reset, the decoder may be locked. Program CV15 to 0 and CV16 to 1 on the programming track to unlock it first, then reset it again.

INFORMATION STORED ON DECODERS

The manufacturer version is available by reading CV7, there are the following versions currently available:

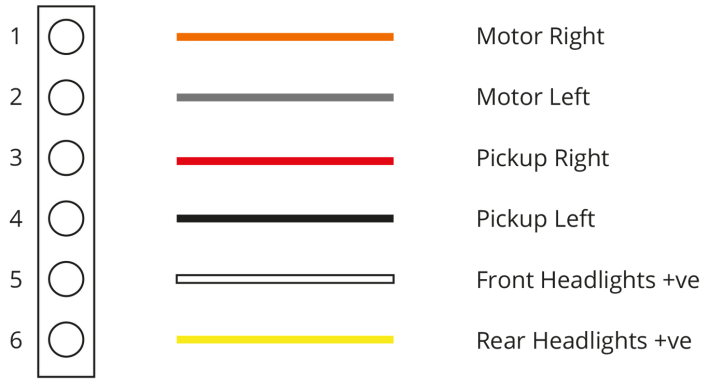
- 048 - 4 function, 8-pin wire harness 1.1Amp Neo
- 028 - 2 function 8-pin wire harness 1.1Amp Micro size Neo
- 068 - 2 function, 6-pin direct 1.1Amp Neo
- 218 - 6 function, 21-pin direct 1.1Amp Neo

The Manufacturer ID can be found by reading CV8, for Hattons Original decoders, this should be 079

DECODER CONNECTIONS

DCR-6Pin-Direct-Neo

The 6 pin decoder is only supplied as a direct connection decoder but below is the pin configuration if it is required for a wired installation with the use of a 6 pin harness plug (not supplied).

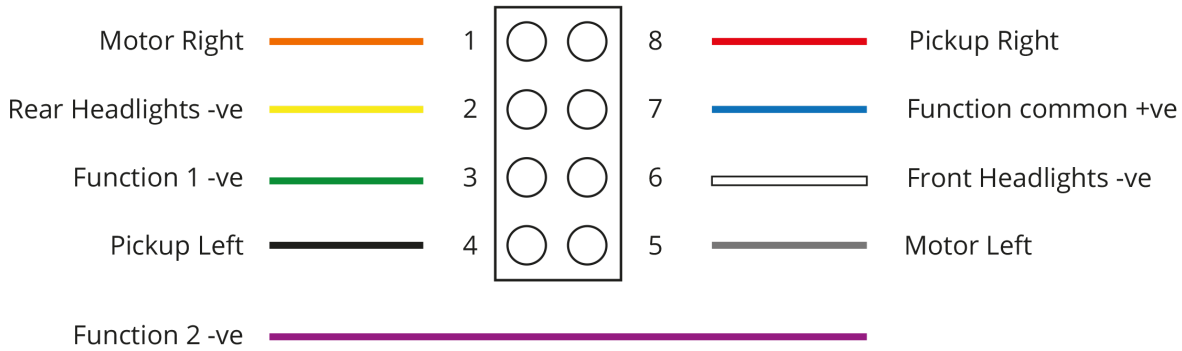


The return +ve connection for lighting is usually done through the chassis.

Pin 1 location:

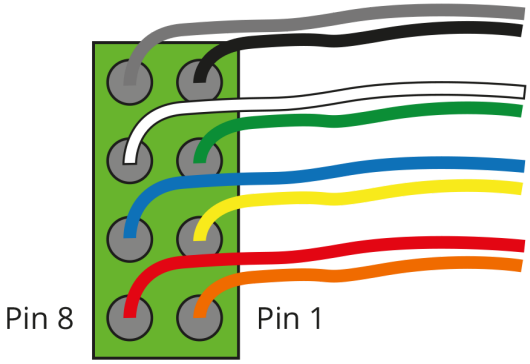
Dimensions (Excluding pins) - L 17mm, W 9mm, D 3mm

DCR-8Pin-Harness-Neo

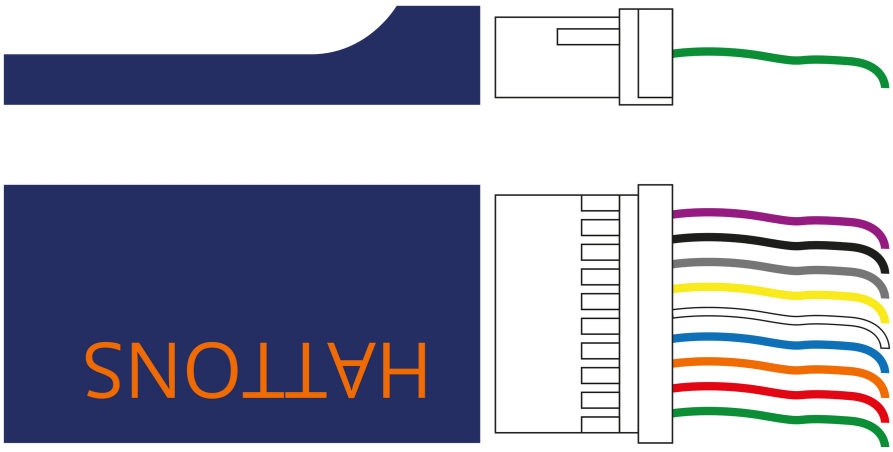


The purple wire is a flying lead not connected to the 8 pin plug and is only used for extra functions. If using with a locomotive with an 8 pin socket fitted, it should be isolated with tape unless used with an additional function which the user has added themselves.

Pin 1 location:

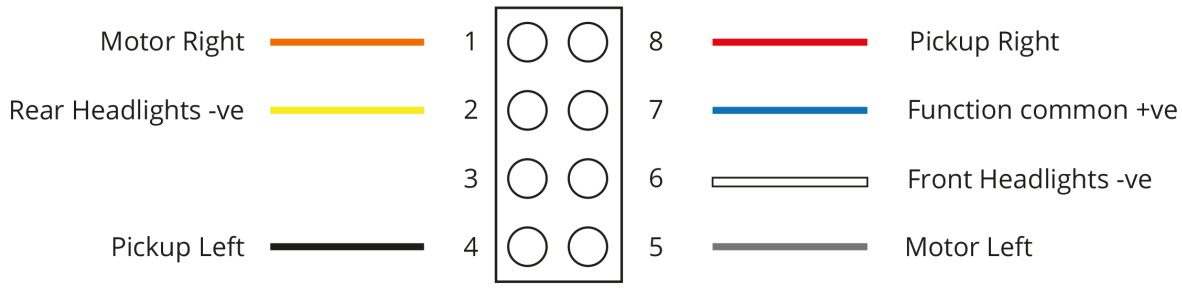


The Harness will only connect to the decoder in 1 orientation, do not force it in.

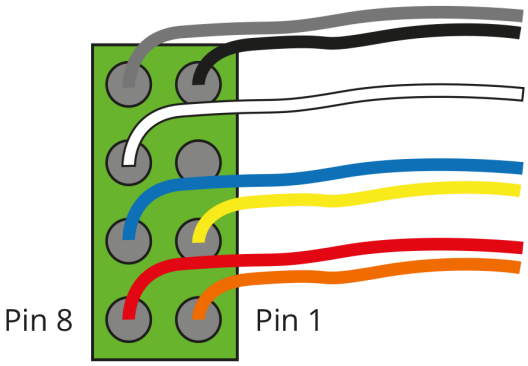


Dimensions (Excluding harness) - L 20mm, W 12mm, D 6mm

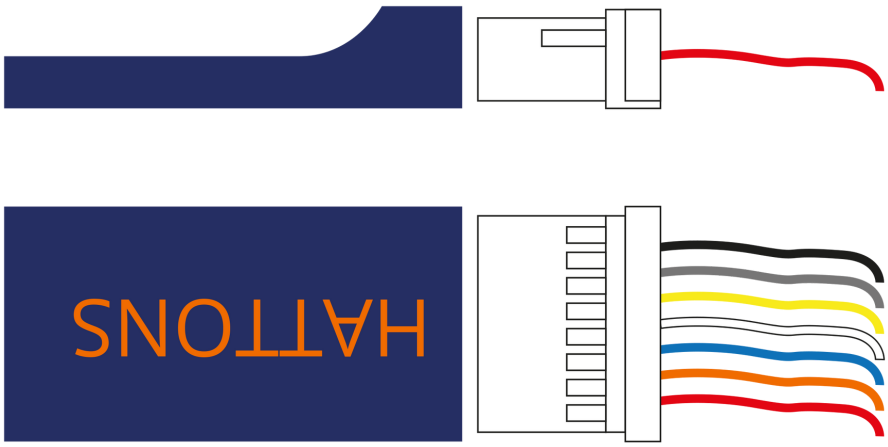
DCR-8Pin-HarnessMini-Neo



Pin 1 location:

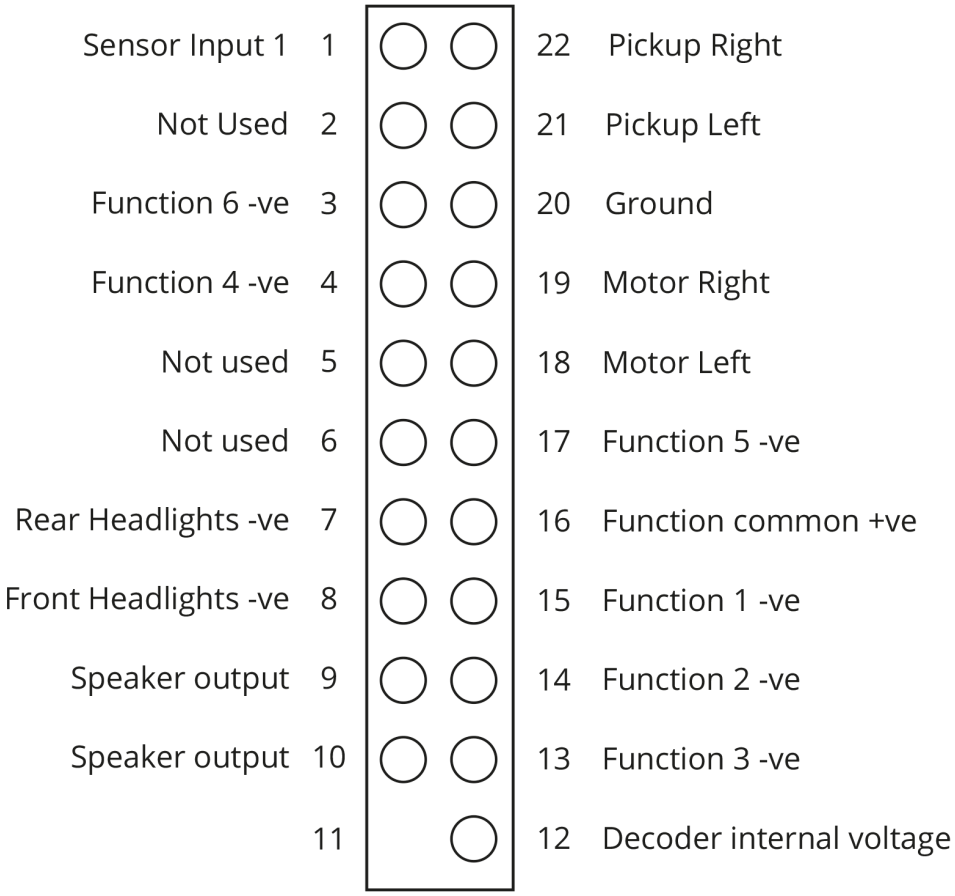


The Harness will only connect to the decoder in 1 orientation, do not force it in.



Dimensions (Excluding harness) - L 19mm, W 10.5mm, D 4.8mm

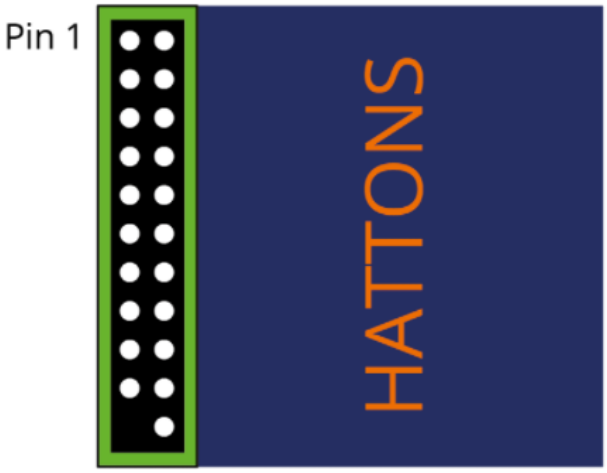
DCR-21Pin-Direct-Neo



Functions 3 & 4 are full power functions for use with our Class 66 and other locomotives with full power on these functions. Most locomotives will only have 2 functions for lights so this will not matter.

Please check your locomotive instructions for information on how many functions it has.

Pin 1 location:



Dimensions - L 16.5mm, W 16mm, D 4mm

CV SETTINGS

All Hattons Neo decoders use the same CV settings between all types.
The only thing that differs is the plug type and number of functions.

For all CV changes, please consult your controller instructions for details of how to set each one. Please do not attempt to change any CVs unless you are comfortable with what it will do. Incorrect assigning of CVs can cause a decoder to stop working.

SHORT ADDRESSING

CV Number	Use	Default Setting	Value Range
1	Primary Address/2 Digit Address/Short Address	3	1 - 127

To set a short address, either set it on your controller or write the address into CV 1.

LONG ADDRESSING

17	Long address	0	N/A
18	Long Address	0	N/A
29	Configurations Supported	6	N/A

Long addresses can be between 0001 and 9999.

It is always recommended to set a long address on your controller. If you need to set the long address manually using CV's the use of a CV Calculator is recommended.
(such as https://www.ruppweb.org/Xray/comp/decoder.htm)

To enable long addressing, CV29 must be set to 1 in location 5. For long addresses between 128 and 9999 a value of 32 must be added to the value in CV29.

CONSIST ADDRESS

19	Consist address	0	1-128

Consist Addressing is similar to 2-Digit Addressing in that it can accept values from 1-128. However, Consist Addressing differs in that it allows for a second address to be applied to a decoder specifically for use when the locomotive is being operated in a Consist or double-heading a train.

The second feature of the Consist Address is that if you add a value of 128 to whatever address you plan to use, the locomotives forward and reverse will be swapped. This allows for consists that have locomotives running back to back.

CONSIST LIGHTING CONTROL

21	Consist address Lighting F1-F8	0	1-255
22	Consist address Lighting F9-F12 & FL	0	1-255

To use more than just the default headlight function when using locomotives in a consist, you will need to write the function values into the 2 CV's above.

CV21 covers functions 1-8

CV22 covers the headlight function (Function 0) and functions 9-12 (but no Hattons decoder has more than 6 functions so these are not relevant)

To turn on the functions you need to use the following table and add together the values of the functions to turn on.

CV21

F1	F2	F3	F4
1	2	4	8

So if you want all 4 functions to work, then set CV21 to 15, if you just want F1 and F3 set CV 21 to 5.

CV22

F0 Forward	F0 Reverse
1	2

As none of our decoders have functions as high as 9, the only 2 values needed are the Headlights in either direction.

DECODER LOCK

15	Decoder Lock Check Digit	0	0-7
16	Decoder Lock Address	1	1-6

Decoder lock is used when more than 1 decoder is to be used in a locomotive, such as where the motor and sound are controlled by 2 separate decoders.

For this, CV16 can be assigned the following values:

1	Motor (default)
2	Sound
3-6	Other decoders

DECODER LOCK - continued

CV16 must be set before the decoder is installed into the locomotive with others.

To change one of the settings, firstly set CV15 to the number of the decoder that you wish to change which should match the number in CV16 for the chosen decoder.

Once CV15 is set, the locomotive can have the CV setting programmed as usual on your controller, but only the decoder that has matching values in CV15 and CV16 will actually change the values.

If the default 0 value is set in CV15, all decoders will have the CVs changed. If CV15 is set to 7, all decoders will be locked.

DECODER CONFIGURATIONS

29	Decoder Configurations	6	N/A

Hattons Neo decoders are compatible with Digitrax CV29 calculators. Use the below link to choose the function you want, then get a CV29 value to program into CV29:

http://www.digitrax.com/support/cv/calculators/#cv29_calc

LIGHTING EFFECTS

Hattons decoders have 2, 4 or 6 functions. The first 2 functions are used for the forward and reverse headlights. The rest are numbered sequentially.

There are several lighting functions which can be assigned to each of the lighting functions by re-writing the values of the following CVs:

- **Front Headlight** = CV49
- **Rear Headlight** = CV50
- **Function 1** = CV51
- **Function 2** = CV52
- **Function 4** = CV53
- **Function 5** = CV54

49	Front Headlight	0
50	Rear Headlight	16
51	Function 1	32
52	Function 2	32
53	Function 3	32
54	Function 4	32

To change the direction a light shows, set the CV to one of the following:

- **Forward direction** - 0
- **Reverse direction** - 16
- **Both directions** - 32

LIGHT EFFECT CODE

Constant light	0
Random flicker	1
Mars light	2
Flashing light	3
Single-pulse strobe	4
Double pulse strobe	5
Rotary beacon effect	6
Gyra light	7
Rule 17(dimmable light)	8
Ditch light phase A	10
Ditch light phase B	11
Constant dim light	12
Auto Mars effect	14

To add the effect to one of the lighting functions, add the direction code to the effect code to get the value you need to program to the CV of the function.

For example: If you want to make Function 1 to be Random Flicker and only on when Forward, the direction code is 0 and the effect code is 1, so you add direction code and effect code 0+1=1 and then set this to the Function 1 CV (CV51), so you need to program the sum 1 to CV51.

FUNCTION REMAPPING

Functions can be mapped (moved) between function locations to allow functions to be operated by different buttons or even multiple functions activated by 1 button press. To do this the relevant function CV is configured with the value associated with the button it should be controlled by on your controller.

The button values are as follows:

Controller Key	Value
Front Headlight	1
Rear Headlight	2
1	4
2	8
3	16
4	32
5	64
6	128
7	4
8	8
9	16
10	32
11	64
12	128

The CV's to remap are as follows. Note that there are 2 CVs for most functions, depending on if you are setting control keys 0-6 or 7-12 (control key 0 is usually the headlight button and rarely has 2 buttons).

CV	Function	Default
33	Front Headlight	1
34	Rear Headlight	2
35	Function 1 (0-6)	4
36	Function 2 (0-6)	8
37	Function 1 (7-12)	0
38	Function 2 (7-12)	0
39	Function 3 (0-6)	16
40	Function 4 (0-6)	32
41	Function 3 (7-12)	0
42	Function 4 (7-12)	0
43	Function 5 (0-6)	0
44	Function 6 (0-6)	0
45	Function 5 (7-12)	0
46	Function 6 (7-12)	0
123	On/Off Rule 17 dimming	32
124	On/Off Ditch Light blink	8
134	Button control of motor circuit	2
136	BEMF Map	2

3 POINT SPEED GRAPH

2	Start Volts	0	0-255
6	Mid Volts	0	0-255
5	High Volts	0	0-255

These CVs enable a speed curve to be set up for a decoder. Simply set a value for each of the steps between 1 and 255. Each step must be equal or higher than the previous. 1V = approximately 18 units so if a loco starts at around 1.5v, set CV2 to 27.

Each CV corresponds to around ⅓ of the speed range of the decoder.

LOADABLE SPEED TABLE

CV29 can be used to set up a loadable speed table, this then uses CV67 - CV94 to smooth out the curve set in the 3 point speed graph and improve the acceleration characteristics of the decoder.

While it is possible to set this up manually, we suggest the use of an online calculator or a programmer (such as the ESU Lokprogrammer) to make the setup a lot easier.

ACCELERATION & DECELERATION RATES

3	Acceleration rate	1	0-255
4	Deceleration rate	1	0-255

The rate at which the decoder increases or decreases speed from one-speed step to the next in response to a new speed command can be set using the above CVs.

Just like the prototype, you can set your locomotives to get off to a slow start because of a heavy load and to take a long time to come to a stop because of the inertia of the train once it is moving.

The higher the number, the longer it will take to get to the next speed step.

BACK EMF

61	Back EMF	1	0-1

Back-EMF is self-adjusting and can be either on or off.

Set CV61 to 1 (default) for on, 0 for off.

If you want Back-EMF to turn off after the locomotive is underway (for example, if consisted locos fight each other, this will make consisting smoother) set CV10 to the speed step at which you want it to turn off.

e.g. CV10 = 15 will make Back-EMF turn off at speed step 15.

PASSENGER/ COACHES LIGHTING EFFECTS - F0 CONTROL

59	Passenger/Coaches lighting control	0	0-2

This function is used to simulate fluorescent lighting in coaches of more modern rolling stock and map it to Function 0.

Attention: When you want to use this function, please make sure all functions are turned off before setting or else the F1 and F2 will not be controlled by F0.

0	Off
1	Function 1 & 2 will flicker then stay on when turned on using F0
2	Front & rear headlights, Function 1 & 2 will flicker then stay on when turned on using F0

BUTTON CONTROL OF THE MOTOR

133	Power level for button control	0	0-255

This CV enables a decoder to be used for static motors for things like cranes, turntables, windmills etc. It allows the motor output to run at a constant speed with a single button press.

To set the motor speed set CV133 to between 1 and 255. The recommended level to start with is 60.

There are 2 control methods:

Method 1: Function 2 - motor forward Function 3 - motor reverse	Set CV61 to 64
Method 2: Function 2 - motor on Direction buttons - motor direction	Set CV61 to 68

RANDOM FLICKER ADJUST

135	Random flicker rate	16	1-255

The overall speed of the flicker used in the random flicker effect can be adjusted from 1-255 (1 being the fastest and 255 being the slowest).

TROUBLESHOOTING

Nothing happens (new decoder)	All decoders have been fully checked and tested before being released by the factory and all are set to Address 3. If this does not work, try resetting CV8 to 8 and try address 3 again.
Nothing happens or forgotten address (Already Fitted)	If the decoder is already fitted but you can't get it to work or the decoder won't respond, try resetting CV8 to 8 and use Address 3. If this does not work, set CV15 to 0 and CV16 to 1 & CV8 to 8 and try again on address 3.
Loco runs in the reverse to what it should do	Ensure the decoder is fitted the correct way into the socket. If it still runs in the opposite direction, read CV29, add 1 to the read value, and set this to CV29, it should now work the opposite way to before.
Lighting or functions do not work	Have you tried using Function 0, remembering that these functions are directional. Have you changed any settings for the lighting which could have affected the setup? If so, a reset will put the settings back to how they were when new.
I have changed a CV and now the decoder won't work	All CV changes can be reset by setting CV8 to 8
The decoder had got hot or has heat shrink damage	The only way this can happen is by a short circuit within the loco or incorrect wiring. If this occurs then the decoder will have been damaged beyond repair and must be replaced.

Hattons ORIGINALS

CV LIST

CV	ITEM	DEFAULT	RESETS TO
1	Primary Address/ 2 Digit Address/ Short Address	3	3
2	Vstart	0	0
3	Acceleration Rate	1	1
4	Deceleration Rate	1	1
5	Vhigh	0	0
6	Vmid	0	0
7	Manufacturer Version Number	-	Read Only
8	Manufacturer ID	79	79
10	EMF Feedback Cutout	88	88
13	Alternate Mode Function Status	255	255
14	Alternate Model Function 2 Status	255	255
15	Decoder Lock	0	0
16	Decoder Lock	1	1
17	Extended Address/ 4 Digit Address/ Long Address	0	0
18	Extended Address/ 4 Digit Address/ Long Address	0	0
19	Consist Address	0	0
21	Consist Address Active for F1, F8	0	0
22	Consist Address Active for FL and F9, F12	0	0
23	Acceleration Adjustment	0	0
24	Deceleration Adjustment	0	0
29	Configurations Supported	6	6
33	Forward Headlight FL (F0F)/ White Wire	1	1
34	Reverse Headlight FL (F0R)/ Yellow Wire	2	2
35	Function 1/ Green Wire (0 6)	4	4
36	Function 2/ Purple Wire (0 6)	8	8
37	Function 1/ Green Wire (7 12)	0	0
38	Function 2/ Purple Wire (7 12)	0	0
39	Function 3/ Brown Wire (0 6)	16	16
40	Function 4/ Pink Wire (0 6)	32	32
41	Function 3/ Brown Wire (7 12)	0	0
42	Function 4/ Pink Wire (7 12)	0	0
43	Function 5/ Pink/ Purple Wire (0 6)	0	0
44	Function 6/ Green/ Brown Wire (0 6)	0	0
45	Function 5/ Pink/ Purple Wire (7 12)	0	0
46	Function 6/ Green/ Brown Wire (7 12)	0	0
49	White Wire/ FL Feature	0	0
50	Yellow Wire/ RL Feature	16	16
51	Green Wire/ F1 Feature	32	32
52	Violet Wire/ F2 Feature	32	32
53	Brown Wire/ F3 Feature/ When Available	32	32
54	Pink Wire/ F4 Feature/ When Available	32	32
56	Dither Frequency	3	3

CV LIST - continued

CV	ITEM	DEFAULT	RESETS TO
57	Dither Amplitude	10	10
59	Passenger/ Coaches Light F0 Control	0	0
61	Configuration Options	1	1
63	Ditch Light Blink Hold Over	63	63
64	Dim Value	6	6
67	Speed Table Step 1	8	8
68	Speed Table Step 2	16	16
69	Speed Table Step 3	24	24
70	Speed Table Step 4	32	32
71	Speed Table Step 5	40	40
72	Speed Table Step 6	48	48
73	Speed Table Step 7	56	56
74	Speed Table Step 8	64	64
75	Speed Table Step 9	72	72
76	Speed Table Step 10	80	80
77	Speed Table Step 11	88	88
78	Speed Table Step 12	96	96
79	Speed Table Step 13	104	104
80	Speed Table Step 14	114	114
81	Speed Table Step 15	124	124
82	Speed Table Step 16	134	134
83	Speed Table Step 17	144	144
84	Speed Table Step 18	154	154
85	Speed Table Step 19	164	164
86	Speed Table Step 20	174	174
87	Speed Table Step 21	184	184
88	Speed Table Step 22	194	194
89	Speed Table Step 23	204	204
90	Speed Table Step 24	214	214
91	Speed Table Step 25	224	224
92	Speed Table Step 26	234	234
93	Speed Table Step 27	244	244
94	Speed Table Step 28	255	255
112	Mars Min Brightness	1	1
113	Mars Max Brightness Time	9	9
114	Mars Total Light Cycle	1	1
115	Mars Mid Brightness	6	6
116	Mars Max Brightness	22	22
117	Ditch Light Blink Rate	3	3
118	Rotary Min. Bright	1	1
119	Rotary Min. Bright Time	5	5
120	Rotary Total Light Cycle	1	1

CV LIST - continued

CV	ITEM	DEFAULT	RESETS TO
121	Dither Amplitude	15	15
122	Passenger/ Coaches Light F0 Control	25	25
123	Configuration Options	32	32
124	Ditch Light Blink Hold Over	8	8
125	Dim Value	0	0
126	Speed Table Step 1	0	0
127	Speed Table Step 2	0	0
128	Speed Table Step 3	0	0
129	Speed Table Step 4	0	0
130	Speed Table Step 5	0	0
131	Speed Table Step 6	0	0
132	Speed Table Step 7	0	0
133	Speed Table Step 8	0	Not Reset
134	Speed Table Step 9	2	Not Reset
135	Speed Table Step 10	16	16
136	Speed Table Step 11	2	Not Reset

View the full range of Hattons Originals products at:
www.hattons.co.uk

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