The following table lists the various CVs supported in the Bachmann advanced decoder used in the N Scale EM-1. Both the NMRA DCC CV numbers and the older Register numbers are provided for cross reference.

Please note: Some CVs (such as CV29) have specific meanings for each bit. The bit assignments in this table use a bit numbering scheme of 0-7 to correspond the NMRA convention for universal bit numbering. Many handholds use a scheme of 1-8 to refer to the individual bits rather than 0-7. The bit numbers in () within these tables uses the 1-9 numbering convention.

**Table of supported CVs**

<table>
<thead>
<tr>
<th>CV</th>
<th>Meaning</th>
<th>Range</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic locomotive address. This number is the short address used to control the locomotive. When writing this CV, CV19 (consist address) is automatically cleared and CV29 Bit 6 (use of extended address) is deleted is set to 0.</td>
<td>1-127</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Minimum starting voltage</td>
<td>0-255</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Starting delay</td>
<td>0-255</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Braking delay</td>
<td>0-255</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Maximum speed</td>
<td>0-255</td>
<td>255</td>
</tr>
<tr>
<td>6</td>
<td>Mid speed Vmid (a value of 60 will give a linear curve)</td>
<td>0-255</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>Version number</td>
<td>-</td>
<td>81</td>
</tr>
<tr>
<td>8</td>
<td>Manufacturer’s ID (to reset all the decoder CVs to their factory setting, write a value of 8 into CV8)</td>
<td>-</td>
<td>101</td>
</tr>
<tr>
<td>9</td>
<td>Back EMF Repetition Rate</td>
<td>0-63</td>
<td>15</td>
</tr>
<tr>
<td>17</td>
<td>Extended locomotive address, high-order byte</td>
<td>192-231</td>
<td>192</td>
</tr>
<tr>
<td>18</td>
<td>Extended locomotive address, low-order byte</td>
<td>0-255</td>
<td>100</td>
</tr>
<tr>
<td>19</td>
<td>Consist address</td>
<td>1-99</td>
<td>0</td>
</tr>
<tr>
<td>29</td>
<td>Decoder Configuration, Byte 1:</td>
<td>1-99</td>
<td>6 (dec)</td>
</tr>
<tr>
<td>bit 0 (1)</td>
<td>Locomotive direction of travel:</td>
<td>0,1</td>
<td>0</td>
</tr>
<tr>
<td>0 = locomotive’s direction is normal</td>
<td>[1]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = locomotive’s direction is reversed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bit 1 (2)</td>
<td>Headlight mode:</td>
<td>0,1</td>
<td>1</td>
</tr>
<tr>
<td>0 = Operation with 14 or 27 speed step systems.</td>
<td>[2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = Operation with 28, 55 or 128 speed steps. Note: your system must be set to the same mode.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bit 2 (3)</td>
<td>Usage on conventional DC layouts:</td>
<td>0,1</td>
<td>1</td>
</tr>
<tr>
<td>0 = locomotive operates in digital mode only</td>
<td>[4]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = locomotive can operate on either conventional DC and on DCC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bit 3 (4)</td>
<td>Not Used</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
bit 4 (5)  
Speed Curve Selection:  
0 = factory pre-set speed curve is used  
1 = user defined speed curve is used. Please enter the appropriate values into CV 67 to 94 before setting this bit.

bit 5 (6)  
Extended Addressing  
0 = Normal addressing  
0-32  
1 = Four digit extended addressing  

bit 6 7 (7-8) always 0  

30 Fault indication  
bit 0 (1) = 1 Light short-circuit  
bit 1 (2) = 1 Overheating  
bit 2 (3) = 1 Motor short-circuit  

CV Function mapping for function outputs:  
In order to allocate a function of the digital system to a function output, look for the section where the row of the desired function meets the column of the desired function output. Enter the number found in the respective CV. For the purpose of clarification, factory settings are shown in bold print.

CV Function output:  
A    B   C
33 F0 forward  8 16 32  8
34 F0 backward 8 16 32  8
35 Function 1  8 16 32  0
36 Function 2  8 16 32  0
37 Function 3  8 16 32  0
38 Function 4  1 2 4  0
39 Function 5  1 2 4  4
40 Function 6  1 2 4  0
41 Function 7  1 2 4  0
42 Function 8  1 2 4  0

50 Motor configuration  
bits 0-3 (1-4) Select motor type 0-5, enter as decimal number  
0,1 [0-5]  5

Bit 5 (6) = 0 EMF switch inactive  
= 1 EMF switch active  

Bit 6 (7) = 0 EMF Control switched on  
= 1 EMF Control switched off  

Bit 7 (8) = 0 High-frequency motor control (approx. 23 kHz)  
= 1 Low-frequency motor control (approx. 19 Hz)  

51 Braking configuration  
bit 0 (1) = 1 Constant braking distance activated  
bit 1-4 Not used  
bit 5 (6) = 1 Stopping with DC independent of the polarity (only if Bit 3 is deleted in CV29).  

52 Braking distance with activated constant braking distance  
0 = factory pre-set braking distance is used  
1 = user defined braking distance  

55 Sets brightness at function outputs A and C:  
255 = max  

56 Sets brightness at function outputs B:  
255 = max  

57 Function mapping:  
- Each bit of the CV stands for a function of the digital system: Bit 0(1) for function 1, Bit 1(2) for function 2 and so on up to Bit 7(8) for function 8. If you wish to allocate a function for dimming, the respective bit in CV 57 must be set.

58 Switching speed function:  
0 = factory setting F3  
4 = Double strobe  

59 Acceleration and deceleration delay function:  
0-255  

60 Lighting effect at function outputs A and B. The units digit of the value stands for function output A, the tens digit for function output B:  
0 No effect  
1 Marslight  
2 Gyrolight  
3 Strobe  
4 Double strobe  

61 Function mapping: lighting effect at function outputs A and B  

62 Lighting effect at function outputs C:  
The units digit of the value stands for function output C:  
0 No effect  
1 Flashing  
2 Flickering type 1 (smooth)  
3 Dimming with value from CV55  

63 Flashing frequency for function outputs C and D:  
default approx. 1 sec, f = 1 / ( 0.03 * (1 + CV63))  

64 Function mapping: lighting effect at function output C  

67 Values for user defined speed table, default = factory speed curve  

105 User identification #1  
106 User identification #2  

113 Minimum PWM value, control for motor types 4 or 5  

114 Change duty cycle for motor type 4 or 5  

128 Decoder software version – read only