# E-Z COMMAND®
# Two Function Decoder

## Features

- Acceleration and deceleration separately adjustable
- Directional lighting and dimming feature
- Programming on main track
- Advanced consisting
- Operation on standard DC systems (analog operation) possible. This feature can be disabled.

## Getting Started

The Bachmann *E-Z COMMAND®* locomotive decoders can be used with standard digital control with an NMRA conformance seal. If in doubt, ask the system suppliers.

Note the maximum current-carrying capacity of the outputs must not be exceeded. Exceeding this will destroy the decoder. The parts of the locomotive decoder must not touch the metal components of the chassis or the body of the locomotive. This could cause a short-circuit within the locomotive decoder which might destroy it.

Extreme care must be taken when operating locomotives equipped with *E-Z COMMAND®* decoders using overhead line (catenary), either on conventional DC or DCC layouts. Choose either catenary or track power operation (not both), or the locomotive could be subject to double voltage that would destroy the decoder.

Before installing an *E-Z COMMAND®* Decoder, check the loco in normal DC operation to make sure that it works as it should before modifying the locomotive. Replace worn wheel contacts, motor brushes and bulbs as needed. Only a locomotive that is mechanically fine will function properly with a locomotive decoder.

## Installation

Some decoders come with a NMRA/NEM652 medium plug. To install this type decoder simply remove the dummy socket in your locomotive and install the decoder plug. To ensure the headlights work properly you must align the plug properly. Pin 1 of the plug connects to the orange wire (Fig 1). Ensure this is aligned to Pin 1 of the locomotive. If the plug is installed backwards the lights will not work. When installing or removing the plug, be careful that the pins do not become bent or broken. **Note:** Pin 1 is indicated by either "A1" or a colored dot marking.

**Fig. 1**



Orange — Pin 1
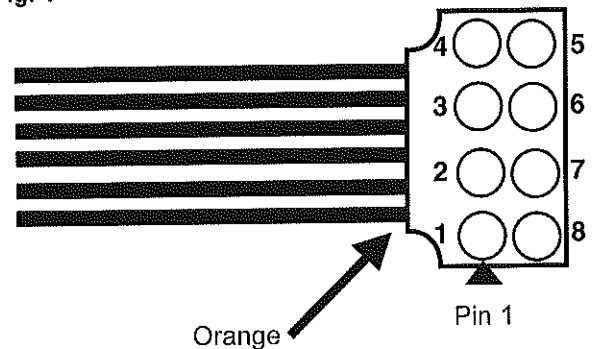
To install a decoder with wire harness, refer to the wiring guide below for proper connections.

**Wiring Guide For Decoder with 8-Pin Plug and Decoder with Wire Harness:**

| NMRA Plug | Meaning | Wire Harness |
|---|---|---|
| 1 | Motor terminal 1 | Orange |
| 2 | Function Output B (rear headlight) | Yellow |
| 4 | Left rail pickup | Black |
| 5 | Motor Terminal 2 | Gray |
| 6 | Function output A (front headlight) | White |
| 7 | Function positive common | Blue |
| 8 | Right rail pickup | Red |

Follow the *E-Z COMMAND®* instructions to change the decoder address. The decoder has advanced programmable functions using suitable equipment, but it will operate as supplied. Do not worry if you do not understand all of the functions of the decoder. For advice, please call the Service Department at 1-800-356-3910 or e-mail via *www.bachmanntrains.com.* You can also visit *www.nmra.org* for additional information.

**PLEASE NOTE** that except for allocating address and direction, *E-Z COMMAND*® is unable to program decoder CVs

## Programming the decoder
### (Not applicable to *E-Z COMMAND*®)

The locomotive address, acceleration and deceleration delay, and all other features of the locomotive decoder can be changed as often as desired by reprogramming. The features are "stored" permanently in special locations even when the operational voltage is switched off. These locations are called "configuration variables" or simply CV. The configuration of the values is done electronically, which means that it is not necessary to open the locomotive again after the decoder has been installed.
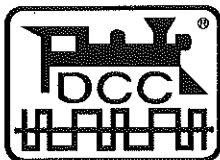
On delivery, the decoder is programmed for operating with the basic address 03, 28 speed steps and an internal speedline. The decoder can be used immediately on purchase with these basic configurations. All configurations can, of course, be changed.

## Testing the installation on equipment other than Bachmann *E-Z COMMAND*®.

Place the locomotive on the programming track (without its housing) and read the address. At the factory, the decoder is programmed to the address 03. If you have connected the decoder correctly thus far, you should now be able to read the address. If you are not able to do so, it is possible that you made a mistake when connecting the wires. Do not subject the loco to full-running track power until you obtain the correct "03" address read-out. Check the wire connections and change them as required. You should now be able to send your locomotive on its first test run on your layout.

## Technical Data

**Normal operation:**

| | |
|---|---|
| current carrying capacity of the decoder in sum | 1 A |
| motor output | 1 A |
| function output | 100 mA |
| addresses | 1 - 9999 |
| speed steps | 14, 27, 28, 128 |
| dimensions | 23x16x3.5mm |

## List of supported CVs
Bits are counted beginning with '1'

| CV | Min-Max | CV Definition | Deft |
|---|---|---|---|
| 1 | 1-99 | Locomotive address | 3 |
| 2 | 0-31 | Starting voltage | 10 |
| 3 | 1-255 | Acceleration momentum | 1 |
| 4 | 1-255 | Deceleration momentum | 1 |
| 7 | - | Version number | 46 |
| 8 | - | Manufacturer ID | 101 |
| 17 | | Extended address, high byte | 0 |
| 18 | | Extended address, low byte | 0 |
| 19 | 1-99 | Multi unit (consist) address | 0 |

**CV29 - Default value decimal 6**
Decoder configuration byte 1

| Bit No. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|
| Default | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Bit = 1 | | | Decoder uses extended address CV's 17/18 | | | Operation on digital and analog | 28/128 speed steps | Operates with reverse direction |
| Bit = 0 | | | Decoder uses CV1 value as address | | | Digital operation only | 14/27 speed steps | Operates with normal direction |

**CV50 - Default value decimal 4**
Decoder configuration byte 2

| Bit No. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|
| Default | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Bit = 1 | | | | | | Slows with brake momentum (set in CV4) if DC on track when CV29 is set for DCC only | | |
| Bit = 0 | | | | | | Does not operate if DC on track when CV29 is set for DCC only | | |

**CV51 - Default value 0**
The bit set corresponds to the Function button F1 to F8 to switch output to the dimmed value (CV52). If set to 0 the output can be switched on/off with F0

| Bit No. | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|
| Default | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bit = 1 | Function output dimmed by F8 | Function output dimmed by F7 | Function output dimmed by F6 | Function output dimmed by F5 | Function output dimmed by F4 | Function output dimmed by F3 | Function output dimmed by F2 | Function output dimmed by F1 |
| Bit = 0 | | | | | | | | |

| 52 | 0 - 255 | Dimming F-output A, 0 is dark 255 is max brightness | 64 |
|---|---|---|---|
| | | Function output dimming | |
| | 0 | Dark | |
| | 255 | Maximum brightness | |