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Digitrax Command Control

DZ121

1 Amp Digital Command Control Mobile Decoder

1.0 Amp Mobile DCC Decoder

User Scalable Back EMF Speed Stabilization (BEMF)

Supports Both Short (127) and Long (10,000) Address Modes

User Programmable Address, Acceleration, Deceleration,
Start voltage, Midpoint voltage, Max voltage & more
usable in 128 speed step mode

Programmable from DCC compatible equipment without opening the loco

Automatic conversion to analog operation with functions operational

2 User Configurable, Independent Function Leads Rated at 125ma
Use These as Regular Function Leads or As Directional Lights or
User Configurable Strobe Lights (CS)

Smooth locomotive speed control, from zero to full throttle, with user selectable
14, 28, or 128 forward & reverse speed step capabilities

User loadable speed tables for customized speed control
& loco speed matching with 128 speed step resolution

Supports Basic, UniVersal & Advanced Consisting

User configurable loco direction of travel, you decide
which way is forward without rewiring the motor!

Integrated Digitrax Transponder

Interoperable with other DCC systems **Made in USA**

Digitrax manuals & instructions are updated periodically.
Please visit www.digitrax.com for the latest version.

Setting Up Scaleable Speed Stabilization (Back EMF)

CV55 controls the STATIC compensation or how much the decoder considers the difference between the current motor and locomotive speed and the target speed set on the throttle when determining the next speed command to send to the motor. This is like the stiffness of a spring. The stiffer the spring, the more compensation you will get. Values can range from 0-255. High values give a more intense reaction and lower values give less intense reactions. The factory default value is 80 hex.

CV56 controls the DYNAMIC compensation or how much the decoder considers the historical difference between the current speed and the target speed when determining the next speed command to send to the motor. This setting is like a damper or shock absorber on the spring that helps to restore the spring to its new position. Values can range from 0 to FF hex or 255 decimal. High values cause more rapid adaptation to the target speed and low values cause slower adaptation to the target speed. The factory default value is 30 hex. Excessive values in this CV will tend to allow a locomotive to "hunt" around a new desired speed when a change of speed is commanded. Use the minimum amount of this compensation needed to give the desired performance.

CV57 control the amount of DROOP or speed loss as load is increased, by limiting the amount of change or compensation that the decoder is allowed to implement. This CV57 controls the droop separately for both regular addresses and consist addresses. The lower hex digit controls the amount of droop in effect when speed is controlled using the standard decoder 2 or 4 digit address, and the high hex digit value controls the droop in effect when the decoder is in an Advanced Consist for speed and direction control. Values of each digit can range from 0 to 15 (F). 0x=Regular Address and y0=Advanced Consist.

A digit value of 0 is speed stabilization OFF, i.e. Maximum speed droop is experienced since no load compensation is in effect. A value of 15 (or "F") is speed stabilization FULL ON and speed droop will be at its least amount, consistent with the settings for CV55 and CV56. If the droop CV value is too high, you may see locos jump from one speed to the next if they encounter an obstacle or problem with track work. If the value is too low, there will be very little speed stabilization effect at all. A higher number/digit makes the droop or speed fall-off less. Droop 0 means no compensation is applied. A typical value for many locomotives is a value of CV57=05, but the actual value that is best for a locomotive and train size needs to be *determined by the user by observation and experimentation*.

Note that this value of 05 for this example means that no speed compensation is used when this decoder is in an Advanced Consist.

CV55, CV56 and CV57 can be changed while the locomotive is moving using Operations Mode programming. This conveniently allows the characteristics of the whole train to be optimized as needed.

It is not necessary to employ a large value of CV02 or Start Voltage to compensate for sluggish motors since, if speed compensation is in effect, the decoder will automatically try to adjust the motor power up to at least the Start Voltage setting, so as to achieve the actual speed commanded. This means that low speed % steps such as e.g. 3% or 4% will give best slow operations when CV02 is =00.

How to set up a loco with scaleable speed stabilization

1. Install the decoder.
2. Program CV57 (Droop control) to a starting value of 05. This will turn on speed stabilization.
3. Put the loco on level track and run it at about 20% of full speed. In Program Mode increase the value in CV55 (Static) from the default value of 80 upward until you observe the loco jumping as speed steps increase. Finish this step by now programming CV55 to the value just before the jumping started.

Note: OPTS MODE programing on the main line works very well here.

4. Follow the same procedure with CV56, beginning with the default value of 30 and increasing it until you notice the loco oscillating, faster-slower, faster-slower, as speed is increased. Finish this step by programming CV56 to the value just before the oscillation started.
5. Follow the same procedure with CV57, beginning with the value 05 as programmed in step 1. Increase the value in this CV until the speed when going up hill is roughly equivalent to the speed on level track. This will yield a best droop consistent with the locomotive characteristics.
6. Keep notes about the values you program for these 3 compensation control CVs so that you can use them as a starting point for setting up scaleable speed stabilization in similar locomotives.

Configurable Strobes using CV's 49 and 50

CV49 controls the White Lead

CV50 controls the Yellow Lead

The value programmed for each CV consists of 2 digits

The first digit controls the conditions under which the light will be active

1x=Reverse, if 1 is the first digit then the light will be on when the locomotive is in reverse

2x=F0 Qualified, if 2 is the first digit then the function will be active when F0 is on and off when F0 is off regardless of direction.

4x=Forward, if 4 is the first digit then the function will be On in the locomotive is in forward

The second digit controls the blinking of the light

x1 Simulated Flicker

x2 Simulated Mars Light

x3 Blinking Headlight

x4 Single Pulse Strobe

x5 Double Pulse Strobe

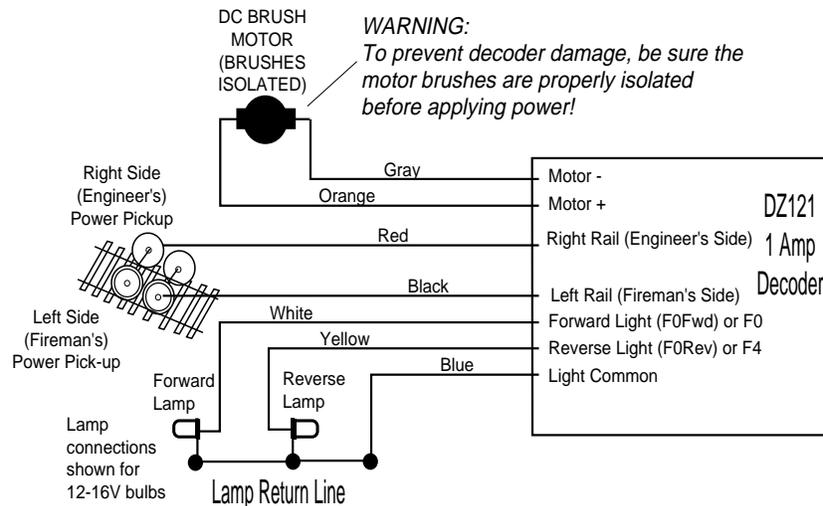
x6 Simulated Rotary Beacon

For example if you program CV49 to a value of 26, the light on the white lead will be on no matter what direction the loco is traveling and will be blinking similar to a rotary beacon. Experiment and ENJOY!



Decoder Installation Wiring Diagram DZ121

See Digitrax Decoder Users Manual for complete decoder test procedures, installation instructions and technical information. This manual is available at no charge from your dealer. If your dealer is out of these manuals, contact Digitrax: (770) 441-7992, FAX (770) 441-0759 or e-mail sales@digitrax.com & we will gladly send you a copy.



The DZ121 comes from the factory with **BACK EMF SPEED STABILIZATION (BEMF)** turned off. To activate the **BEMF** feature, change CV57 to a value of 06. This will give good performance with most brands of locomotives. If the locomotive surges while using BEMF use a lower value for CV56. It may also be necessary to adjust CV's 55, 56, & 57 to get the motor performance desired for your particular locomotive.

Commonly Used Configuration Variables			Commonly Used Configuration Variables		
CV#	Used For	Default	CV#	Used For	Value
CV01	2-digit address	03	CV61	Directional Lights	x0
CV02	Start Voltage	00		White=F0 & Yellow=F4.	x1
CV03	Acceleration Rate	00		Disable BEMF w/F5 ON	1x
CV04	Deceleration Rate	00		Disable Vstart, Vmid, Vmax	2x
CV05	Maximum Voltage	00		in 128 step mode	
CV06	Mid Point Voltage	00		CV49-50	Configurable Strobes (CS)
CV55	BEMF Static Adj.	80	(W & Y)Set ups (x1 - x6)		
CV56	BEMF Dynamic Adj.	30	1x = Rev		
CV57	BEMF Droop	00 (00-FF)	2x = F0 Qualified		
	0x=Std		4x = On in either Dir.		
	x0=Adv. Consist		CV65-95	Loadable Speed Tables	See Manual
CV29	Configuration Register	06=Advanced Mode, Analog Conversion On			
	Examples:	04=Standard Mode (14 Speed Steps), Analog Conversion On			
		07=Reversed Direction, Advanced Mode, Analog Conversion On			
		16=Enable Loadable Speed Table, Analog Conversion On			

ALL VALUES ARE HEXADECIMAL AS USED WITH DIGITRAX THROTTLES

Damaged decoders should be returned directly to Digitrax for repair.
The standard repair charge is \$17.

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