Instructions for DN142 Series Decoder Installation
DN142, DN142P, DN142PS

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Digitrax Command Control

DN142 Series
1.0 Amp Digital Command Control Decoder

1.0 Amp (1.5 Amp Peak) Mobile DCC Decoder

User Scaleable High Resolution Speed Stabilization (Back EMF)

Integrated Digitrax Transponder

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

Programmable from DCC compatible equipment without opening the loco

User Programmable Address, Acceleration, Deceleration,
Start-voltage, Mid-point voltage, Max voltage and more

Automatic conversion to analog operation

4 User Configurable, Independent Functions Rated at 125ma
Use These as Regular Function Outputs or as FX™ Outputs
To Generate Special Lighting Effects
Choose from Mars, Gyralite, Single or Double Strobe, Ditch Lights and more

Smooth locomotive speed control with user selectable
14, 28, or 128 forward & reverse speed step capabilities

User loadable speed tables for customized speed control
with 128 speed step resolution

Supports Basic, Advanced & UniVersal Consisting

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

Compatible with the DCC Standard **Made in USA**

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Please visit www.digitrax.com for the latest version.

Setting Up Scaleable Speed Stabilization

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 x00-xFF hex or 000-255 decimal. High values give a more intense reaction and lower values give less intense reactions. The factory default value is x80/128.

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 x00 to xFF hex or 000-255 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 x30/048. Excessive values in this CV will tend to allow a locomotive to "hunt" around the new speed setting when a change of speed is commanded. Use the minimum amount of dynamic compensation needed to yield 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. 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 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 x05 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 scaleable speed stabilzation is implemented, the decoder will automatically try to adjust the motor power up to at least the Start Voltage setting, to achieve the actual speed commanded. This means that low speed % steps such as 3% or 4% will give best low speed operations when CV02 is =x00/000.

How to set up a loco with scaleable speed stabilization

1. Install the scaleable speed stabilized capable decoder.
2. Program CV57 (Droop control) to a value of x05/005. 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 x80/128 upward until you observe the loco jumping as speed steps increase. Finish this step by programming CV55 to the value that is 1 less than the value just before the jumping motion was observed.
   Note: OPS MODE programing on the main line works very well here.
4. Follow the same procedure with CV56, beginning with the default value of x30/048 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 that is 1 less than the value programmed just before the oscillation was observed.
5. Follow the same procedure with CV57, beginning with the value x05/005 as programmed in step 1. Increase the value for CV 57 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 CV values you program for these 3 scaleable speed stabilization control CVs so that you can use them as a starting point for setting up scaleable speed stabilization in similar locomotives.

Commonly Used Configuration Variables			Commonly Used Configuration Variables		
CV#	Used For	Default	CV#	Used For	Value
CV01	2-digit address	x03/003	CV61	Directional Lights	x0
CV02	Start Voltage	x00/000		White=F0 & Yellow=F4.	x1
CV03	Acceleration Rate	x00/000		Disable BEMF w/F5 ON	1x
CV04	Deceleration Rate	x00/000		Disable Vstart,Vmid,Vmax	
CV05	Maximum Voltage	x00/000		in 128 step mode	2x
CV06	Mid Point Voltage	x00/000			
			CV49-54	FX Effect Set Ups	See Manual
CV55	BEMF Static Adj.	x80/128		See note below for F2 FX	
CV56	BEMF Dynamic Adj.	x30/048	CV65-95	Loadable Speed Tables	See Manual
CV57	BEMF Droop	x00/000			
	0x=Std				
	x0=Adv. Consist				

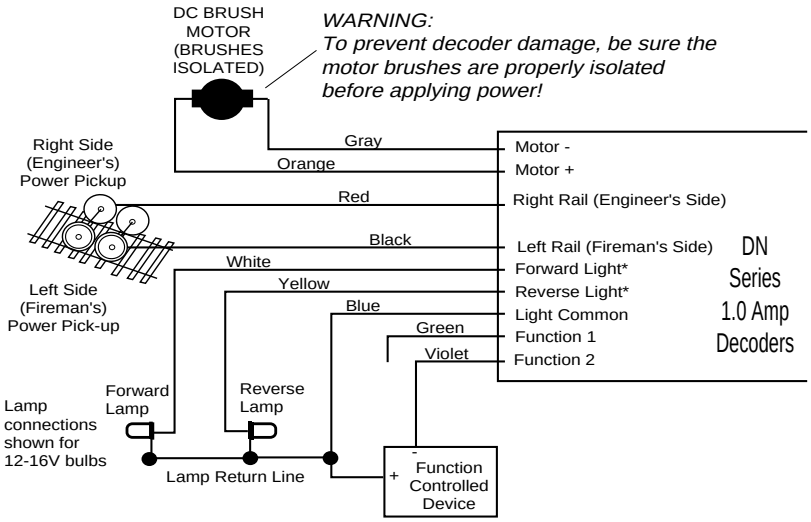
CV29	Configuration	x06/006=Advanced Mode, Analog Conversion On
	Register	x04/004=Standard Mode (14 Speed Steps), Analog Conversion On
	Examples:	x07/007=Reversed Direction, Advanced Mode, Analog Conversion On
		x16/022=Enable Loadable Speed Table, Analog Conversion On

CV VALUES ARE SHOWN AS x## FOR HEXADECIMAL AND ### FO DECIMAL NOTATION

Special note on FX operation of F1 & F2 with DH142, DN142, DN141K2, DN141E2 & DN149K2
When F1 is set up for FX operation, F2 must also be used as an FX function (it can't be used as a standard on/off function). If you want to use a combination of FX and standard on/off operation with Functions 1 & 2, please use F1 for the standard on/off lead and F2 for the FX lead.

Decoder Installation Wiring Diagram
DN142

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.



*** Forward and reverse lights can be run as independent functions on F0 & F4. See CV61 in chart on previous page and see Digitrax Decoder Manual for Complete Instructions.**

The DN142 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.

Notes:

1. Light Common is the positive lead for "full wave" function power operation. Do not exceed the 200ma rating of the function outputs. If Light Common is not used, power the lamp or function from either track power pick-up for "half-wave" operation by connecting the Lamp Return Line to either track pickup.
2. If you use an inductive(coil) type load, you should place an inductive kick-back suppression diode across the coil with the cathode(banded) end connected to the Light Common side. A small signal diode such as IN4148 or rectifier such as IN4001 is ideal. Be careful because an incorrectly connected diode can damage the function output.
3. See the Digitrax Decoder Users Manual for full details of wiring 12-16V lamps, 1.5V lamps, & LED's for full and half wave operation. Lamps that draw more than 80ma when running require a 22 ohm 1/4 watt resistor in series with the directional light function lead to protect the decoder.

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