

NEW!

Technical Reference
for the

MASTER SERIES
Digital Command Control

D102-EU Decoder

WITH AUTO-REVERSING HEADLIGHT

Dimensions:

1.66 x .65 x .123 inches

42 x 16.5 x 3 mm

Decoder version 2.1

\$29.95

This is an EPF (extended packet format) decoder supporting:

- , Four digit address (long)
- , Uploadable speed table with programmable motor drive frequency
- , 128 Speed mode operation
- , Decoder assisted consisting
- , All forms of operations mode programming (programming on the mainline)
- , Programmable Start Voltage works for all speed modes
- , Motor rating 1.3 Amp continuous, 2 Amp peak (stall)
- , 2 Function outputs rated for up to 40mA incandescent bulbs (150mA when used with LEDs or if a 22 to 33 ohm resistor is used in series with bulb)
- , Automatic reversing headlights

**Every attempt has been made to ensure this decoder complies with
all applicable NMRA Standards and Recommended Practices**

This book, schematics and artwork copyright 1997, 1998
North Coast Engineering 1900 Empire Blvd. Suite 303
Webster, NY 14580 716-671-0370

Last revised: 16 November 1998

Configuration Variables used by D102 Decoders

- CV1** normal 7 bit loco (short) address; 1-127 valid
- CV2** vstart, value added to all speed steps of "standard speed table", 1 count = .89% of full voltage when using the normal speed table. If uploadable speed table is used the percentage varies with the frequency of PWM motor control in CV9.
- CV3** acceleration rate (each unit = 32mS between speed steps) 254 max. CV23 is added to this value on power up]
- CV4** deceleration rate (each unit = 32mS between speed steps) 254 max. CV23 is added to this value on power up
- CV7** Manufactuer ID. North Coast = 11
- CV8** Decoder version number. This decoder is 16 which means ver. 1.6
- CV9** PWM frequency. This CV determinesthe total PWM period for the uploadable speed table. Each unit = 128uS this allows a frequency of 30hz to 279hz. 279hz comes from using each speed = 1 count this yields: max speed = 28*128us for a 3.58mS period which equals 279hz.
- CV17** high byte of 14 bit address
bit 6,7 always= 1
bits 0-5 are upper 6 bits of 14 bit address
- CV18** low byte of 14 bit address (lower 8 bits)
- CV19** 8 bit address for consist, when active the consist responds to all commands addressed to it the same as it would to it's normal 8 or 14 bit address. Note: the normal 8/14 bit address is still active for all non-speed/direction commands (especially useful for headlight and other function controls of individual locomotives while in consist). If the consist address is set to 0 then the consist is inactive.
bits 0-6 7 bit consist address (1-127)
bit 7 0= direction is normal, 1= direction is reversed
- CV23** acceleration rate adjust (each unit = 32mS between speed steps) this value is added to the value in CV3 at power up or when reprogrammed
- CV24** deceleration rate adjust (each unit = 32mS between speed steps) this value is added to the value in CV4 at power up or when reprogrammed
- CV29**
- bit 0 1= direction of operation is reversed, 0= direction is normal
 - bit 1 1= use 28 speeds mode, 0= 14 speed mode
 - bit 2 1= DC conversion enabled. 0 = disable DC mode
 - bit 3 not used
 - bit 4 1= use alternate (uploadable) speed table, 0= use normal speed table
 - bit 5 1= use 14 bit address in CV17,18 (do not use CV1), 0= use CV1 not CV17,18
 - bit 6 not used
 - bit 7 not used

UPLOADABLE SPEED TABLE VARIABLES

- CV66** Speed step 0 of uploadable table (Must be 0 for proper operation)
- CV67-CV94** Speed step 1 to 28 of uploadable speed table

PROGRAMMING INFORMATION:

This decoder complies with NMRA RP-9.2.3 for **paged mode and register mode programming.**

Details on register mode programming:

- Register 1: CV1
- Register 2: CV2
- Register 3: CV3
- Register 4: CV4
- Register 5: CV29
- Register 6: Page register
 - Page 1 uses registers 1-4 to access CVs 1-4
 - Page 2 uses registers 1-4 to access CVs 5-8
 - Page 3 uses registers 1-4 to access CVs 9-12, etc.
- Register 7: Software version number
- Register 8: Manufacturer Code (NCE=12 decimal, 0C hex)

OPERATIONS MODE PROGRAMMING: Decoders will only respond to long forms mode programming at their normal (long or short) address. They do not respond to the long formops mode programming instructions at their consist address (RP-9.2.1). Use the short form to modify consist momentumLenzcommand stations only generate short form and Digitraxonly generates long form. North Coast Master Series, System One,DynatrolandRamtraxx use both types automatically.

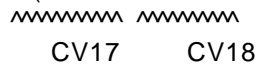
OTHER NOTES:

A decoder can only respond **either** it's 8 bit 'base' address(CV1)**or** it's 14 bit 'base' address(CV17,CV18)according to the state of CV29bit 5 but not both at one time.

Regardless of the state of CV29bit 5, a decoder will still always respond to any 8 bit address other than zero that is programmed into**consist address** (CV19). In this manner consist control always works no matter which 'base' address is being used by the decoder.

The long form ops Mode Programming only works at a decoder's normal address and not to it's consist address. This avoids setting CV29 while in a consist then later wondering why the decoder now only responds to it's long address rather than the short or vice-versa.

The extended address of 0 is a valid address (11000000 00000000).



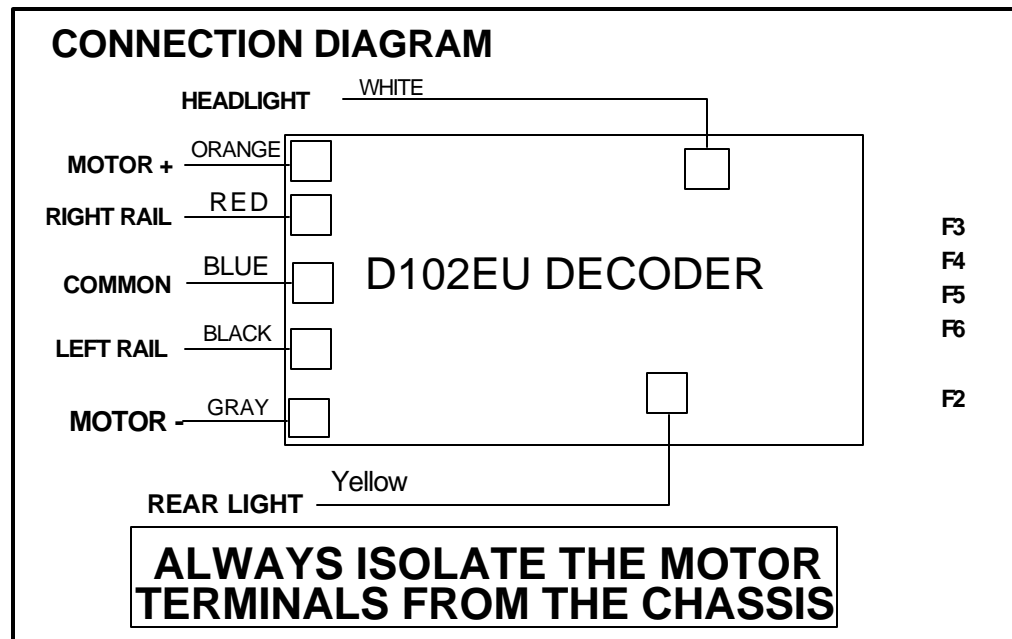
So are extended addresses in the range of 1-127, (please be aware that the DigitraxChief**can not** use these addresses)

Tip for using consists and extended addresses: leaveCV1 set to 3, or some other conveniently remembered address and only use the extended address(CV17,CV18)set to your desired value. This avoids mixing up normal 'short' addresses with consist addresses.

Factory default values for decoder Configuration Variables (CVs)

Digitrax users: use the hex numbers, all other systems use normal decimal numbers

CV	Default value in		Description	CV	Default value in		Description
	decimal	hex			decimal	hex	
1	3	3	short address	74	23	17	alt spd table step 8
2	4	4	start voltage	75	27	1B	alt spd table step 9
3	0	0	acceleration	76	31	1F	alt spd table step 10
4	0	0	deceleration	77	36	24	alt spd table step 11
9	195	C3	PWM frequency	78	39	27	alt spd table step 12
17	192	C0	long address high byte	79	44	2C	alt spd table step 13
18	0	0	long address low byte	80	50	32	alt spd table step 14
19	0	0	consist address	81	55	37	alt spd table step 15
23	0	0	acceleration adjust	82	60	3C	alt spd table step 16
24	0	0	deceleration adjust	83	64	40	alt spd table step 17
29	6	6	decoder configuration	84	71	47	alt spd table step 18
30	0	0	error register	85	77	4D	alt spd table step 19
66	0	0	alt spd table step 0	86	86	56	alt spd table step 20
67	2	2	alt spd table step 1	87	93	5D	alt spd table step 21
68	4	4	alt spd table step 2	88	103	67	alt spd table step 22
69	5	5	alt spd table step 3	89	112	70	alt spd table step 23
70	9	9	alt spd table step 4	90	123	7B	alt spd table step 24
71	12	0C	alt spd table step 5	91	135	87	alt spd table step 25
72	16	10	alt spd table step 6	92	150	96	alt spd table step 26
73	20	14	alt spd table step 7	93	168	A8	alt spd table step 27
				94	195	C3	alt spd table step 28



Due to the high in-rush current of an incandescent grain-of-wheat type bulb (about 10 times the normal operating current) function outputs are rated at 40mA each. We recommend Miniaturics part number 18-014-10.4mm diameter 14 volt/30mA bulbs or, if you like a whiter light, the 18-712-10.7mm diameter 12 volt/30mA bulb for best results. If LEDs are used the functions are rated at 150mA continuous.