PROGRAMMING

This decoder supports all programming modes and supports read back of all CV's with most dcc systems.

CV1  Description          Range  Default
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CV2     Start voltage      0-32    0
CV3     Acceleration       0-32    0
CV4     Deceleration       0-32    0
CV5     Top voltage        0-32    32
CV29    Basic configuration ---  2
CV7     Manufacturer version number ---  32
CV8     Manufacturer ID     ---    143
CV17    Long address upper byte 196-231 192
CV18    Long address lower byte 0-255  3
CV19    Advanced consist address 9-127  0
CV21    CV21=0, all accessory function will follow its own address. CV21=1, all functions will follow the consist address
CV49    Master control voltage 0-16  10
CV50    Horn type          0-22   13
CV51    Horn volume         0-15   12
CV52    Bell type          0-6    3
CV53    Bell volume         0-15   12
CV54    Bell ring rate      0-50   3
CV55    Diesel rumble volume 0-15  12
CV56    Brake squeal volume 0-15  12
CV57    Dynamic brake volume 0-15  12
CV58    Air release volume  0-15   12
CV59    Air pump volume     0-15   12
CV60    Safety pop valve volume 0-15  12
CV61    Engine cooling fan volume 0-15  12
CV62    Fan volume          0-15   12
CV64    Rail to rail crack volume 0-15  12
CV65    Kick start voltage  0-43  63
CV67-94 28 speed steps table w/ 61 steps CV67-94 = 1-255 linear
CV105   User identification number 0-255  0
CV106   User identification number 0-255  0
CV112   Sound dropping volume 0-15   12
CV113   Back EMF Load control proportional gain Kp 0-31  20
CV114   Back EMF Load control integral gain Ki 0-31  10
CV115   Auto brake squeal enable/disble 0-1  0
CV118   Range squeal volume 0-15  12
CV119   Spur brightness      0-255  200
CV122   Diesel notch mode, Oval-auto notch, 3manual notch 0-3  3
CV123   Prime mover type, 6 types 0-5  5
CV124   Back EMF Load control intensity (0loff) 0-255  150
CV125   Set if 1 to restore some factory default CV settings 0-1  0

SPEED TABLE CV67-CV94 FOR 28 SPEED STEPS

When CV29’s bit 4 is set to “1” it will use the speed table formed by CV67-CV94 to control speed (motor voltage). It allows you to setup each speed for all 28 speed steps. First, program CV29 to 18 for short addresses (1-127) or program CV29 to 50 for long addresses (128-999) to enable speed table control. Then select throttle to 28 speed steps and run your loco at speed step 1. Use program CV on the main to change CV67’s value (1-255) to adjust step 1’s speed. Then apply kick voltage, CV65 is only applied when the speed steps change from 0 steps to 1 step. You should switch between 0 to 1 many times to check step 1’s speed. When done with CV67, select speed step 2 and program CV68. CV68’s value must be greater than then CV67’s. When done with CV67-CV94, use read back CV to make sure their values are in increasing order.

TROUBLE SHOOTING

This decoder should perform well with all DCC systems. The maximum DCC output should be less than 15 V. If the locomotive does not respond to commands, it may have lost its address. Please re-program the address and program CV19 to 0 (disable consist). If it responds slowly, you should clear its momentum by re-programming CV3 and CV4 to zero. If step 1’s speed is too high, you should program CV start voltage, CV2 to zero. If its top speed is too slow, program long voltage CV3 to 31. You should also take the clean track to improve electrical pickup. Read your DCC system manual to learn how to program and operate the decoder.

For more information about registers/CVs and their functions, please refer to the NMRA DCC Standard & Recommended Practices, RP-9.2.2. This is available directly from the NMRA or their website at www.nmra.org. Whenever the decoder doesn’t work please use the program track to program CV# 125 with value 1 to restore the decoder to factory settings. This should bring the decoder to life with address #3.

FCC COMPLIANCE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions. (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

RETURN PROCEDURE

This decoder carries a 6 month warranty against factory defects. This warranty does not include abuse, misuse, neglect, improper installation, or any modifications made to this decoder, including but not limited to the removal of the NMRA plug if applicable. It should become necessary to return the decoder for warranty repair/replacement, please include a copy of the original sales receipt. Please include a letter (printed clearly) with your name, address, daytime phone number, and a detailed description of the problem you are experiencing. Please also include a check or a money order for $10.00 to cover return shipping and handling. If the decoder is no longer covered under warranty, then please include a check or a money order for $50.00 to cover the cost of repair or replacement and return shipping and handling. Be certain to return the decoder only.

Any questions regarding Warranty Policy can be directed to our Customer Service Department by calling 732-225-6360 between the hours of 8:30am and 6:00pm EST, or by emailing: rrtech@modelrectifier.com

Send the decoder to:
Model Rectifier Corporation
Altn: Parts & Service
80 Newfield Avenue
Edison, NJ 08837-3817 U.S.A
Printed in USA

Thank you for purchasing our highly advanced DCC 16 bit locomotive sound decoder. Combined with any DCC System, our new decoder with authentic diesel sounds will bring your locomotives to life.

- Six synchronized diesel prime movers with random associated locomotive sounds
- Adjustable back EMF load control with ultra slow speed control
- 1.0 amp capacity. Can be used in small HO loco.
- Comes with NMRA 8 pin plug
- Programmable for either 2-digit (1-127) or 4-digit (1-9999) addresses
- Programmable start voltage and top voltage
- Programmable acceleration and deceleration rate
- Programmable 14, 28/128 speed steps
- Programmable user selectable 22 horns and 8 bells
- Programmable individual sound volumes (16-levels)
- Programmable master sound volumes (16-levels)
- 28 accessory functions (F1-F28)
- Supports full read back of CV’s
- Supports advanced consisting (CV19)
- Supports programming on the main (OPS mode)
- Compatible with NMRA DCC standards
- Complies with part 15 of FCC regulations
- 13mm speaker included
INSTALLATION

It is quite a challenge to install a decoder into a loco. You should have some basic electrical knowledge and soldering skills. If you do not have the above requirements, please ask the dealer for help in installation.

Figure 1 shows the electrical circuit of most standard locos. The terminals of the motor and light(s) are directly connected to the wheel pickup. Each type of loco has its own method of electrical pickup and distribution. The connection between the wheels, motor and light(s) could be wires, clips, the body or chassis, PC board or any other type of conductor. First, figure out your loco’s electrical wiring and how to disconnect (isolate) the motor and light(s).

Figure 1. Connection of standard locomotive. Note: The ‘X’ marks indicate where to disconnect (isolate).

The decoder will be inserted between the wheel pickup and the motor. Figure 2 shows how to wire the decoder. After disconnecting the motor terminals from the pickup, connect the red wire to the right side pickup and the black wire to the left side pickup. Connect the orange wire to the motor terminal that was originally connected to the right pickup. Connect the gray wire to the motor’s other terminal. Connect the front light to the blue wire and the white wire. Connect the rear light to the blue wire and the yellow wire.

The blue wire is the common terminal for lights and accessory functions. You may use the black wire or the red wire to replace the blue wire. This is useful when isolating one of the light terminals from the pickup is difficult. Wiring the bulb this way will make the light dimmer. If your loco has only a front light, you should connect the white and the yellow wires together. If your locomotive has a NMRA 8 wire, it will make the light dimmer. If your loco has only a front light, you should use the black wire or the red wire to replace the blue wire. This is useful when you have to make the blue wire to the loco to turn on and then press F8 three times.

This decoder has 22 different horns. You can use F19 or program CV50 to select these 22 horns. You can also use F18 or program CV52 to select different 8 bell sounds.

Most of the sounds have their own volume control CV. There is also a master sound volume control CV49. Also F13 will reduce the master volume by 1 (you will hear an air release when you reach CV49=1). Pressing F14 will increase volume by 1 (you will hear an air release when you reach CV49=16). Programming CV49 to 0 will shut the sound off.

The decoder is default to automatic notching. You can program CV122 to 3 to set manual notching for realistic operation. And then use F9 to notch up and use F8 to notch down. This simulates the way a real locomotive operates.

This decoder is equipped with adjustable back EMF closed loop speed control. Its proportional gain (CV113), integral gain (CV114) and derivative gain (fixed) are pre-tuned for most locomotives. We recommend that you do not change these settings. Too much gain may cause the motor to oscillate (become unstable). Too little gain may cause slow response. Please get some basic knowledge of PID feedback control before trying to adjust CV113/114.

There are many more program features available with this decoder. Please refer to the CV Chart to explore other features of the decoder.

Note: Bell, Dynamic Brake and Rail Wheel Clack cannot play at the same time. If you activate the Bell sound (F1), while either the Dynamic Brake or Rail Wheel Clack sounds are activated, the Bell sound will override the other 2 sounds. Rail Wheel Clack cannot play while the loco is in idle. When you turn off Dynamic Brake and Rail Wheel Clack sound there will be one second delay.

ABOUT SPEAKER

The decoder comes with 13mm speaker fitting in wide body N scale loco. If you use it in a narrow body loco you have to replace the 13mm speaker with big speaker (20mm or 16x36mm) to improve the sound effect.

DCC OPERATION

The decoders have been factory programmed with address #3, 28/128 speed steps and maximum top voltage. Select the “Run” mode of your DCC system and select or acquire address #3. Move up the throttle and the loco should move. The decoder has 6 types of diesel prime mover sounds. You can use F12 to change the prime mover sounds. You can also program CV123 to value of 0 to 5 to select the following primer mover for matching your diesel engine. The CV123 table shows the 6 prime mover sounds and their associated locomotive types.

The decoder has a start up and shut down feature. If the loco has been previously shut down, you have to start up the engine by simply pressing any numbered function button. To shut down the engine you must bring the loco to idle and then press F8 three times.

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