

## PROGRAMMING

This decoder supports all program modes and read back features. With MRC Prodigy Advance DCC you can read its address and CV values.

CV	Description	Range	Default
CV1	Short address	1-127	3
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	192-231	192
CV18	Long address lower byte	0-255	3
CV19	Advanced consist address	0-127	0
CV21	CV21=0, all accessory function will follow its own address. CV21=1, all functions will follow the consist address	0-1	0
CV49	Master volume control (0=off)	0-16	16
CV50	Horn type (22 types plus off, 22=off)	0-22	13
CV51	Horn volume	0-15	15
CV52	Bell type (8 types plus off, 8=off)	0-8	5
CV53	Bell volume	0-15	15
CV54	Bell ring rate	0-50	20
CV55	Diesel rumble volume	0-15	15
CV56	Brake squeal volume	0-15	10
CV57	Dynamic brake volume	0-15	15
CV58	Air release volume	0-15	15
CV59	Air pump volume	0-15	15
CV60	Safety pop valve volume	0-15	10
CV61	Engine cooling fan volume	0-15	15
CV62	Coupling volume	0-15	15
CV64	Rail wheel clack volume	0-15	15
CV65	kick start voltage	0-63	63
CV67-94	28 speed steps table while CV29.4=1	1-255	linear
CV105	User identification number	0-255	0
CV106	User identification number	0-255	0
CV112	Sand dropping volume	0-15	12
CV116	Flange squeal volume	0-15	12
CV117	Light brightness	0-255	200
CV122	Diesel notch mode, 0=auto notch, 3=manual notch	0-3	3
CV123	prime mover type, 6 types (See CV123 table)	0-5	0
CV125	Set it to 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 (128-9999) 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. The kick voltage, CV65 is only applied when the speed step changes from 0 to 1. 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 CV67's. When done with CV67-CV94, use read back CV to make sure their values are in increasing order. Note: When using MRC Prodigy DCC to program addresses it will automatically disable the speed table (set CV29's bit 4 to "0"). Programming CV125 to 1 will also disable the speed table and re-program CV67-CV94 to a default linear speed setting.

## TROUBLE SHOOTING

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. 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 reprogramming CV3 and CV4 to zero. If step 1's speed is too high, you should program start voltage, CV2 to zero. If its top speed is too slow, program top voltage CV5 to 31. You should also clean the 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](http://www.nmra.org).

## 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 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. If 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 considered 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](mailto:rrtech@modelrectifier.com)

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



## N Gauge DCC Diesel Sound Decoder with 28 Functions

Item #0001960 ( for Kato SD45/SD70MAC/AC4400)

Thank you for purchasing our highly advanced dual mode DCC locomotive sound decoder. Combined with any DCC System our new decoder with authentic diesel sounds will bring your locomotive come to life.

- Digital Signal Processor (DSP) and reverb effect
- Choice of six types of diesel prime mover sounds making it suitable for many types of diesel locomotives
- Built in 22 user selectable horns and 8 bells
- Lifelike, randomly associated locomotive sounds
- 28 accessory functions allowing more sound control than ever
- Programmable master and individual sound volumes (16 levels)
- 1.0 amp capacity
- 2-digit (1-127) or 4-digit (1-9999) addresses
- Supports full read back of CV's
- Programmable start and top voltage
- Programmable acceleration and deceleration rate
- Programmable 14, 28, 128 speed steps
- Supports custom speed tables
- Supports advanced consist (CV19)
- Supports programming on the main (OPS mode)
- Compatible with NMRA DCC standards
- Board mounted 10mm, 32 ohm speaker
- Directly replaces the circuit board in Kato SD45, SD70MAC and AC4400 and many other locomotive's

## INSTALLATION

Your new Sound Decoder will virtually “drop-in” to a Kato SD45, Kato SD70MAC and AC4400 diesel locomotive. It may fit in many other N scale locomotives with slight modification. Although easy, please follow instructions carefully.

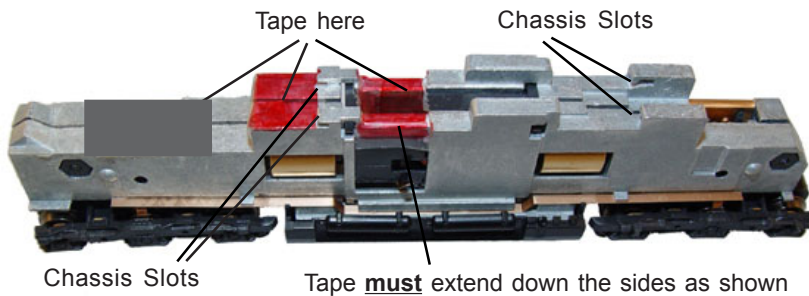
**The most important step in the installation is to insulate the motor terminals from the wheel pickups. Fail to do so will damage the decoder.**

Remove the locomotive body following Kato’s instructions. Remove the original circuit board by very carefully sliding the circuit board slightly to the rear of the chassis. Lift out. The decoder is installed in the same location.

First, deburr the chassis (with emery cloth) any casting flash that may cause a sharp edge under the location of the insulation tape. Then, using **electrical or equiv plastic tape**, carefully tape the chassis in the areas as indicated in Fig 1 to isolate the decoder from the chassis. **This must be done to prevent damage to the decoder.** Align the decoder and carefully insert it in the slots in the chassis. Gently press down on the rear (speaker side) of the decoder while sliding it into position, being careful **not to bend the PC board** and the vertical copper motor contacts on the side of the chassis. Ensure the vertical copper contacts (on the decoder) cover the thin vertical motor contacts. **The motor contacts must not touch the loco chassis.** The decoder installation is complete.

When replacing the body, ensure the copper contacts on the trucks are under the horizontal chassis contacts.

Fig 1



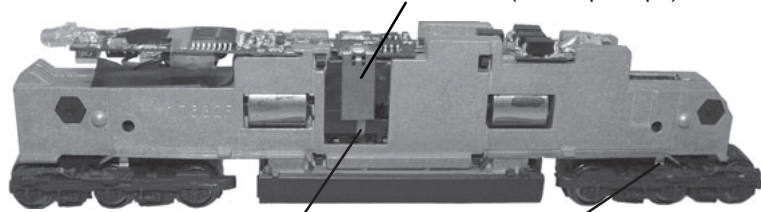
**Note:** Since the decoder fits different locomotive models, you may need to extend the light tube lenses, or L.E.D. legs for optimum lighting.

### CAUTION:

**The decoder must be isolated as shown. Apply electrical tape or kapton tape in the areas shown to prevent the electrical contacts from touching the chassis and damaging the decoder.**

### DCC OPERATION

These Vertical copper contacts (motor terminals) can not touch the chassis (wheel pickups)



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 different type of diesel motor. You can also program CV123 to value of 0 to 5 to select the correct prime mover for your diesel locomotive. The CV123 table shows the 6 prime movers and examples of the locomotive types that use them.

CV123	Prime mover	Suitable for the locomotive
0	EMD645E	SD39, SD40, SD40A, SD40-2, SD40T-2, SD45, SDP45, SD45X, SD45-2, SD45T-2, F45, FP45, DDA40X, GP15T, GP39, GP39-2, GP40, GP40-2
1	EMD645	SW1000, SW1001, SW1500, SW1504, MP15DC, MP15AC, MP15T, GP38, GP38-2, SD38, SD38-2, GP15AC, GP15-1
2	EMD710	SD70AC, SD70M-2
3	ALCO 244	RS-3, PA1, PB1
4	ALCO 539T	S-2, S-4, RS-1, RSC-1, RSD-1, DL-105, DL107, DL-108, DL-109, DL-110
5	EMD567	F2AB, F3AB, F7AB, F9AB, BL1, BL2, FP7, FL9, FT, GP7, GP9, GP18, GP28, E6, E7, E8, E9, NW2, NW3, NW4, SW1, SW7, SW8, SW9, SW600, SW900, SW1200

The decoder has start up and shut down feature. If the loco is previously shut down you have to start up the engine you have to press any function key to start up the engine before operating the loco. To shut down the engine you must bring the loco to idle and then press F8 three times.

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

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

The decoder is default to automatic notching. You can program CV122 to 3 to set manual notching for realistic operation. Then use F9 to notch up and use F8 to notch down. In real life the notch level, (engine R.P.M.'s) has no bearing on actual locomotive track speed. This is determine by throttle setting and tonnage.

To achieve slow speed at speed step one, you have to program start voltage CV2 and kick start voltage CV65. The kick start voltage will only kick in for a very short period of time when speed command changes from 0 to 1.

There are many 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 the Dynamic Brake and Rail Wheel Clack sound there will be one second delay.

Function	Idle/Moving
F1	Bell on/off
F2	Horn
F3	air release
F4	Coupling 1
F5	Brake release (idle) / brake squeal (moving)
F6	Dynamic brake on/off
F7	Air hose firing/uncoupling lever
F8	3 times will shut down when in idle / Manual notch down
F9	Engine cooling fan / Manual notch up
F10	Rail wheel clack (only moving)
F11	Traction air compressor
F12	Change prime diesel mover type (CV123, 6 types)
F13	Master volume reduce by 1 / air release when reach minimal
F14	Master volume increase by 1/ air release when reach maximal
F15	Air compressor
F16	Flange squeal
F17	Air release
F18	Change bell type (8 types plus off)
F19	Horn type select (total 22 different horns plus off)
F20	Associated loco sound
F21	Change bell volume and turn on the bell
F22	Change horn volume
F23	Change diesel rumble volume
F24	Safety valve pop
F25	Air release
F26	Flange noise
F27	Sand drop
F28	Air release