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

This decoder should perform well with all DCC systems. The maximum DCC output should be less than 16 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 check its current by reprogramming CV3 and CV4 to zero. If step 1's speed is too high, you should program top start voltage, CV2 to zero. If its top speed is too slow, program top voltage CV5 to 31. You should also check 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. Whenever the decoder doesn’t work please use the program track to program CV9 125 with value 1 to restore the decoder to factory settings. This should bring the decoder to life with address #3.

**TROUBLESHOOTING**

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 $8.00 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 $29.00 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 732-225-0360 between the hours of 8:30am and 6:30pm EST, or by emailing: rrtech@modelrectifier.com

**RETURN PROCEDURE**

This decoder should perform well with all DCC systems. The maximum DCC output should be less than 16 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 check its current by reprogramming CV3 and CV4 to zero. If step 1’s speed is too high, you should program top start voltage, CV2 to zero. If its top speed is too slow, program top voltage CV5 to 31. You should also check the track to improve electrical pickup.

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**FCC COMPLIANCE**

This decoder 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.

**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 speeds 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 CV29, select speed step 2 and program CV108. CV68’s value can be greater then CV67’s. When done with CV108-CV94, use read back CV to make sure their values are in increasing order.

Notes: 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.

**PROGRAMMING**

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

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

Printed in USA

**HO Drop in DC/DCC**

**SD40 Diesel Sound Decoder for KATO SD40-2 Locomotive**

(Simple Soldering Required)

Item #0001802

Thank you for purchasing our most advanced DC/DCC locomotive sound decoder. Combined with any DCC System or MRC Blackbox, our true live capture digital SD40 sound decoder will make your model railroad come to life.

- SD40 synchronized diesel prime mover sounds:
- 1.5 amp capacity
- 16 different types of horns and 8 types of bells
- Programmable individual sound volumes
- Programmable either 2-digit or 4-digit addresses
- Programmable start voltage and top voltage
- Programmable acceleration and deceleration rates
- Programmable 14, 28, 128 speed steps
- Supports full readback capability
- Selectable factory default speed curve
- Advanced speed table control CV67-CV94
- Kick start voltage control CV65
- 3 headlight effects: Directional / rule 17 /off-dim-bright cycle.
- User controllable ditch lights
- 28 accessory functions (F1-F28)
- Supports advanced consisting (CV19)
- Supports programming on the main (OPS mode)
- Compatible with NMRA DCC standards
- Complies with Part 15 of FCC Rules
- 40 mm speaker included
- Dimensions: 83mm x 16mm x 7.5mm. Completely replaces Kato OEM circuit board
INSTALLATION

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

Figure 1 shows the electrical circuit of most standard locos. The terminals of the motor and lights are directly connected to the wheel pickup. Each type of loco has its own method of electrical pickup and distribution. There is no standard rule for installing decoders. It is always better to consult the loco manufacturer on how to install a decoder in your particular loco. Figure 1, first outline your loco’s electrical wiring and how to disconnect (isolate) the motor and light(s). Label all wires before you disconnect them.

Figure 1. Connection of standard locomotive.

Right side pickup

Motor     light     Rear

X               X

X     X      X

X

Light Motor Rear

Front light

X

Note: The ‘X’ marks indicate where to disconnect (isolate).

Left side pickup

Motor tabs Pickup solder pads Speaker plugs

Figure 2. 0001802 decoder wiring diagram

MAKING A TEST TRACK

We strongly recommend building a test track with a 27 ohm resistor to limit current. Only test your installed decoder on the test track. The test track will reduce the chance of damaging your decoder due to an incorrectly installed decoder. (Note: The test track is not a program track)

Figure 3. Diagram of test track

TESTING

The decoder has been programmed to address #3, 28/128 speed steps. To test, place the loco on the test track. Select address #3 and 28 speed step. Move up the throttle and the loco should move. Push the light button [F0] and headlight should come on. Change the direction of the loco and the loco should change direction. The loco cannot reach full speed, due to the resistor. If all the above occurs, you passed the test. Congratulations! Do not run the loco for an extended period of time on the test track or the resistor will overheat. If your installed decoder does not pass the test, find the problem, correct it and test it again. As long as you test the decoder on the test track there is little chance of damaging the decoder. This is why the test track is so important.

OPERATION

The decoder has start up and shut down features. If the loco was previously shut down you have to start up the engine. 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 two types of diesel prime movers. You can use F12 to select them. It can also be operated with the diesel sounds off. So it can be used in an Electric Type Traction Loco such as Trolley or GG-1. You can use F19 to select 16 different horn sounds and use F18 to select 8 different bell sounds. With MRC Prodigy Advance DCC has 28 functions, you can easily setup and access all the decoder’s functions. If not, you may not be able to access all the features of the decoder. For other types of DCC systems you have to use CV programming to setup the decoder.

The decoder default is set to automatic notch. You can program CV122 to 3 for manual notch for realistic operation. And then use F9 to notch up and use F8 to notch down.

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

The decoder can also be operated by a regular DC power pack. This will give you synchronized engine sounds only. If you wish to enjoy the full array of sound functions using your DC power pack, the unique MRC Blackbox (item #0001050) for DC operation will allow you to control all of the sounds in your sound equipped locomotives. The MRC Blackbox is easy to setup and use.

Function | Idle/Moving
--- | ---
F0 | Headlight on/off or rule 17 or cycle of dim, bright, off
Double F0 | Double click F0 within 1 second will turn on/off sound (CV49)
F1 | Bell on/off
F2 | Horn
F3 | Ditch light on/off
F4 | Coupling 1
F5 | Brake release (idle) / brake squeal (moving)
F6 | Dynamic brake on/off
F7 | Air hose firing/uncoupling lever
F8 | Click 3 times during idle will shut dow n / notch dow n w hile CV122=3
F9 | Engine cooling fan / notch up while CV122=3
F10 | Rail wheel clack (only moving)
F11 | Traction air compressor
F12 | Change prime mover type (2 plus off)
F13 | Short air release
F14 | Coupling 2
F15 | Air pump
F16 | Associated loco sound
F17 | Flange noise 1
F18 | Change bell type (use F1 to turn off bell after adjustment)
F19 | Horn type select (total 16 different horns)
F20 | Associated loco sound
F21 | Change bell volume (use F1 to turn off bell after adjustment)
F22 | Change horn volume
F23 | Change diesel rumble volume
F24 | Coupling 3
F25 | Long air release
F26 | Flange noise 3
F27 | Loco associated noise
F28 | Ditch lights flash enable/disable (CV121) with Air release

Note: Bell, Dynamic Brake, and Rail Wheel Clack cannot play at the same time.