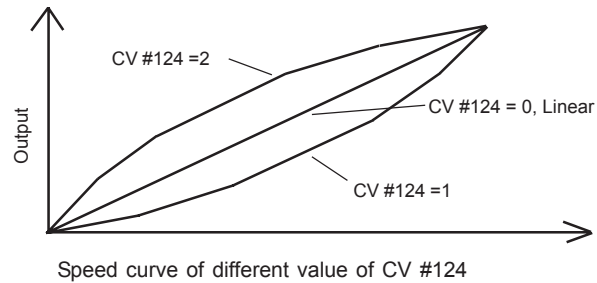


PROGRAMMING FOR DCC OPERATION – DIGITAL MODE

This decoder supports all program methods including register, paged mode, direct CV programming, and programming on the main (OPS mode)

CV	Register	Description	Range	Default
CV1	R1	Short address	1-127	3
CV2	R2	Start voltage	0-32	0
CV3	R3	Acceleration	0-32	8
CV4	R4	Deceleration	0-32	8
CV5	---	Top voltage	0-32	32
---	R6	Page number	---	---
CV29	R5	Basic configuration	---	2
CV7	R7	Manufacturer version number	---	32
CV8	R8	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	---	When CV21=0, all accessory function will follow its own address. When CV21=1, all functions will follow the consist address	0-1	0
CV49	---	Master volume control(0=off, 1=low, 2=mid,3=max)	0-3	2
CV50	---	Whistle type	0-13	0
CV51	---	Whistle volume	0-3	3
CV52	---	Bell type	0-3	0
CV53	---	Bell volume	0-3	3
CV54	---	Bell ring rate	0-50	10
CV55	---	Chuff type	0-3	0
CV56	---	Chuff volume	0-3	3
CV57	---	Brake squeal volume	0-3	1
CV58	---	Air release volume	0-3	3
CV59	---	Blower hiss volume	0-3	3
CV60	---	Fire box door volume	0-3	3
CV61	---	Injector volume	0-3	3
CV62	---	Coupling volume	0-3	3
CV63	---	Air pump volume	0-3	0
CV105	---	User identification number	0-255	0
CV106	---	User identification number	0-255	0
CV112	---	Conductor volume	0-3	3
CV115	---	Auto brake squeal enable/disable	0-1	1(enable)
CV116	---	Shoveling volume	0-3	3
CV117	---	Air pump type	0-2	0
CV118	---	Accessory light effect	0-3	0
CV119	---	Air hose fire volume	0-3	3
CV120	---	Chuff rate	0-30	12
CV121	---	Chuff start point	0-7	3
CV122	---	Double chuff enable	0-1	1(enable)
CV123	---	Back emf on/off(1=on, you must have a motor to get chuff sound)	0-1	0
CV124	---	Speed curve select(0=linear, 1=slow increase at slow speed, 2=fast increase at slow speed)	0-2	0
CV125	---	Program it to 1 will restore CV's 1,2,3,4,5 to factory default setting	---	0



TROUBLE SHOOTING

This sound decoder should perform well with all DCC systems. See your DCC system manual to learn how to program and operate the decoder. For more information about register/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.

Due to the nature of all sound decoders, the CV read back may not work.

Whenever the decoder doesn't work it may lose its address. Please use program track to re-program the loco address or program CV# 125 with value 1 to restore the decoder to factory setting. This should bring the decoder to life.

FCC COMPLIANCE

This device complies with the part 15 of FCC rule. 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

If it should become necessary to return your decoder, unplug the decoder and return the decoder only. Please include a letter (printed clearly) with your name, address, a daytime telephone number, and a detailed description of the problem you are experiencing. Please also include a \$19.00 check for shipping and handling. **Be certain to return only the decoder.**

Warranty does not include abuse, neglect, or using this product for anything other than it's intended purpose. Warranty coverage will be handled on a case by case basis, and other charges may apply for

Send the decoder to:

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



HO Gauge Synchronized Steam Sound Decoder with 28 Accessory Functions

Item #0001656

Thank you for purchasing our highly advanced DCC locomotive sound decoder. Combined with any DCC System, our new decoder with authentic steam sound truly will make your model railroad come to life.

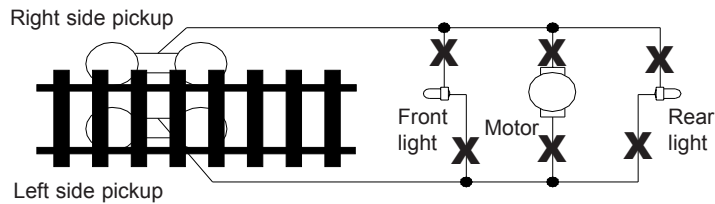
- Synchronized steam chuff with random sounds
- 8 selectable chuff sounds (4 regular/ 4 articulated)
- User selectable 14 different whistles and 4 bells
- 28 accessory functions allowing more sound control than ever
- Programmable individual sound volumes
- 1.5 amp capacity
- Programmable for either 2-digit (1-127) or 4-digit (1-9999) addresses
- Programmable start voltage
- Programmable acceleration rate
- Programmable deceleration rate
- Programmable top voltage
- Programmable 14, 28, 128 speed steps
- Selectable factory default speed curve
- Directional lighting control for front and rear lights at 0.2 amp rate.
- Realistic firebox flicker and accessory lighting
- Programmable chuff rate and chuff starting point
- Supports advanced consisting (CV19)
- Supports programming on the main, (Ops mode)
- Compatible with NMRA DCC standard
- NMRA 8 pin plug included for easy installation
- Complies with the part 15 of FCC
- 28mm speaker included
- Dimensions: 45.0mm x 18.0mm x 6.2mm

INSTALLATION

If your loco has a NMRA 8 pin receptacle, simply remove the dummy plug and match first pin and plug in the decoder. Otherwise 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.

Each manufacturer and loco may have different ways of decoder installation. There is no standard rule for installing decoders. It is always better to consult the loco manufacturer on how to install a decoder in that particular loco.

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.

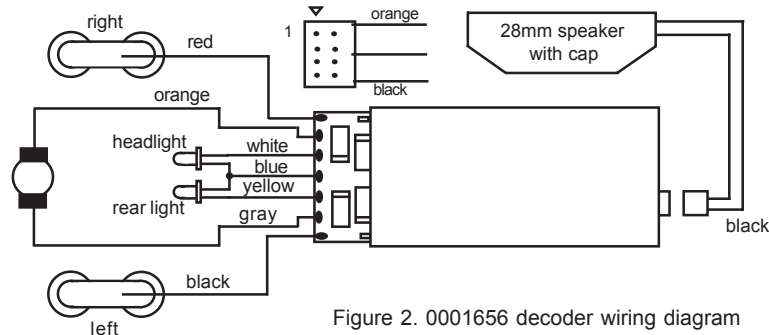


Figure 2. 0001656 decoder wiring diagram

MAKING A TEST TRACK

Before you begin decoder installation, 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 may prevent damage from an incorrectly installed decoder.

Note: The program track is NOT a test track. The program track does not use a current limiting resistor. So it will not protect an incorrectly installed decoder.

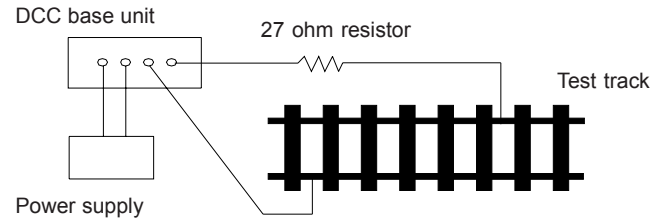


Figure 3. Diagram of test track

TESTING

The decoders has been factory programmed with address #3, 28/128 speed steps and maximum top voltage. **Never run the installed decoder on your layout without first successfully running on test track.** Otherwise, you may damage the decoder if it is not wired correctly or if you have not properly isolated the motor and lights.

To test, place the loco on the test track. Select the "Run" mode of your DCC system and select or acquire address #3. Move up the throttle and the loco should move forward. Push the light button [F0] and the front headlight should come on. Change the direction of the loco and the loco should change direction and the rear headlight (if equipped) should come on. The loco cannot reach full speed, due to the resistor. If all 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. That is why the test track is so important. Also do not correct limiting resistor. Sound decoders need full power to the program track to install all programming instructions.

LIGHT EFFECTS

There are 4 solder tabs on the bottom of the decoder for the accessory lighting features marked "ACC1" and "ACC2", with the two innermost tabs used as the common. "ACC1" is for the adjustable light effects, [see CV 118 chart]. "ACC2" is used for the firebox flicker effect. "ACC2" is non-adjustable, and is controlled on/off with F3, which also controls the accessory lights.

LIGHT EFFECT PROGRAMMING CHART FOR CV#118

CV118	ACC#1 Light effect
0	Gyra light
1	Mars light
2	Strobe light
3	Steady on/off, (used for interior cab light)

All the decoder's light outputs are track output voltage (around 14V) supplied by your DCC system. They are designed for 12V light bulbs. Please contact your loco manufacturer for lights' operation voltage. If you have a 1.5V bulb use 1k ohm resistor or LED, you should connect a 2k ohm resistor in series to one of the leads to limit current.

STEAM SOUNDS / ACCESSORY FUNCTION CHART

Function	Idle/Moving
F0	Directional Lights on/off
F1	Bell on/off
F2	Whistle
F3	short Air release and accessory light on/off
F4	Coupling
F5	Brake squeal
F6	Conductor
F7	Fire box door open/close
F8	Sand drop
F9	Reverser
F10	Water
F11	Blower hiss
F12	Master volume: max, mid, min, off 4 levels
F13	Coal auger
F14	Air Hose fire
F15	long air release
F16	Showeling
F17	air pump
F18	bell type
F19	Whistle type select*
F20	Bell ring rate
F21	Bell volme
F22	Whistle volume control
F23	Chuff volume control
F24	Chuff type
F25	Chuff rateslow down (CV120 decrease 1)with associated loco sound
F26	Chuff rate speed up (CV120 increase 1) with associated loco sound
F27	Start moving chuff rate slow down (CV121decrease 1) with associated loco sound
F28	Start moving chuff rate speed up (CV121 increase 1) with associated loco sound

*NOTE- Functions F25 through F28 are fine tuning adjustments while the loco is running.

Due to limitations in some types of DCC systems or older DCC systems, some of the sound/accessory functions may not be able to be accessed. Also, you might be limited to factory default CV settings. This decoder supports the new N.M.R.A. protocols that use up to function 28, (F28). Right now only MRC prodigy² has 28 functions.