PROGRAMMING

This decoder supports all programming methods including: register, paged CV, direct CV, and programming on the main (ops mode programming).

CV	Register	Description	Range	Default
CV1	R1	Short address	1-127	3
CV2	R2	Start voltage	0-32	0
CV3	R3	Acceleration	0-32	0
CV4	R4	Deceleration	0-32	0
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 functions will follow its own address. When CV21=1, all functions will follow the consist address	---	0
CV49		Sound on/off (0=on)	0-1	0
CV50	---	Horn type	0-1	0
CV51	---	Horn volume	0-3	0
CV52	---	Bell type	0-1	2
CV53	---	Bell volume	0-3	3
CV54	---	Bell ring rate	0-50	3
CV55	---	Diesel rumble volume	0-3	3
CV56	---	Brake squeal volume	0-3	3
CV57	---	Dynamic brake volume	0-3	3
CV58	---	Air release volume	0-3	3
CV59	---	Air pump volume	0-3	3
CV60	---	Safety pop valve volume	0-3	3
CV61	---	Engine cooling fan volume	0-3	3
CV62	---	Coupling volume	0-3	3
CV63	---	Random noise volume	0-3	3
CV64	---	Rail wheel clack	0-3	3
CV105	---	User identification number	0-255	0
CV106	---	User identification number	0-255	0
CV112	---	Exhaust volume	0-3	3
CV113	---	Coupling fire volume	0-3	3
CV114	---	Light brightness (green, brown)	0-12	3
CV115	---	Auto brake squeal enable/disable	0-1	1(enable)
CV116	---	Coupling sound type	0-2, 2=off	1
CV117	---	Lights enable/disable	0-1	1(enable)
CV118	---	Accessory light #1 configuration	0-6	0
CV119	---	Accessory light #2 configuration	0-6	0
CV120	---	Brake release volume	0-3	3
CV122	---	Diesel sound type (0=off, 1=rpm & notch synchro to speed, 2=linear rpm synchro to speed, 3=notch up/down (F8=notch down, F9=notch up))	0-3	1
CV124	---	Speed curve select (0=linear, 1=slow increase at slow speed, 2=fast increase at slow speed	0-2	0
CV125	---	Factory default setting: Programming to 1 will restore all CV's to default setting	---	0

NOTE: Due to limitations in older DCC systems, some of the sound functions or light effects functions may not accessable. ALSO, you might be limited to factory default CV values.

LIGHT EFFECTS WIRING

Your MRC Synchronized Diesel Sound Decoder is equipped with normal directional lighting, plus MRC light effects. If your loco has ditch lights, mars light or strobe light, you can solder wires to the four solder tabs (2 pairs marked with ACC1,ACC2) on the bottom of the decoder. The two center solder tabs are the common for the accessory light effects.

> **All the decoder's light outputs are track output voltage (around 14V) supplied by your DCC system. They are designed for 12V light bulb. 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.**

TROUBLE SHOOTING

The MRC 0001657 HO diesel 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 is not 100% correct. This is not a defect of the decoder or your DCC. Whenever the decoder doesn't work 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 $15.00 check to cover 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 repair/replacement of the product.

Send the decoder to:

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

HO Gauge Synchronized Diesel Sound Decoder with 28 Accessory Functions

Item #0001657

Thank you for purchasing our highly advanced DCC locomotive sound decoder. Combined with any DCC System, our new decoder with "Camegie Hall" sound quality will make your model railroad come to life.

- Synchronized diesel prime mover with randomly associated locomotive sounds
- 1.5 amp capacity
- Programmable choice of 2 different horns and 2 bells
- Programmable individual sound volumes
- 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 (FO) at 0.2 amp rate
- Programmable for either ditch lights, mars light, gyra light andprime strobe light
- 28 accessory functions (F1-F28)
- Supports advanced consisting (CV19)
- Supports programming on the main (OPS mode)
- Compatible with NMRA DCC standards
- NMRA 8 pin plug included for easy installation
- Complies with Part 15 of FCC
- 20mm speaker with baffle included (other size, aftermarket speakers are available from MRC)
- Dimensions: 46.0mm x 17.5mm x 5.0mm
- The decoder can be upgraded to all the horns included in the Demo F19, and more choices of bells.

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).*
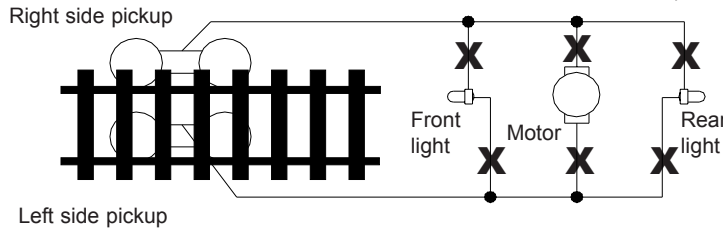
The decoder will be inserted between the wheel pickup and the motor.

> **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. If your locomotive has a NMRA 8 pin receptacle, remove the dummy plug. Match first pin and plug in the decoder.
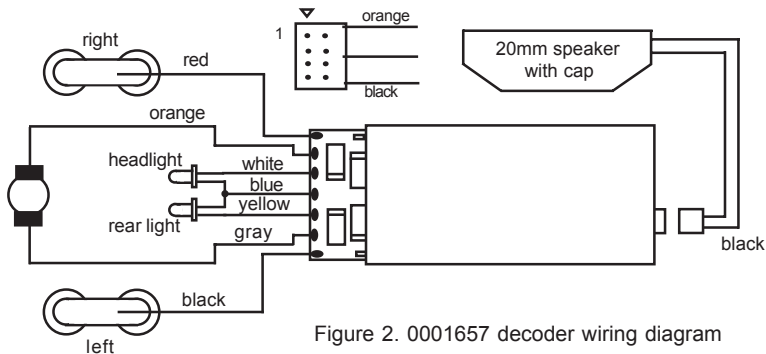

Figure 2. 0001657 decoder wiring diagram

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.

> The program track is NOT a test track. The program main track does not use a current limiting resistor. So it can't protect an incorrectly installed decoder.
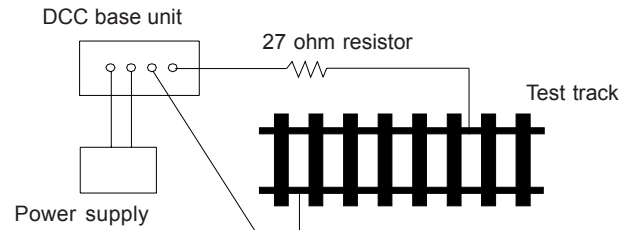

Figure 3. Diagram of test track

TESTING

All MRC decoders have 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 confuse a test track with a program track. A program track does not use the current limiting resistor. Sound decoders need full power to the program track to install all programming instructions.

OPERATION

This decoder can be operated with the diesel sounds on or off. It can also be used in an Electric Type Traction Loco such as Trolley or GG-1 by turning off diesel sounds. To turn off the diesel prime mover sounds, program CV #122 with value 0.

If your DCC system supports higher functions, F18 and F19, you can use these functions to change the type of bell sound, (F18), or horn sound, (F19) on the move without having to go into "OPS mode" programming or by changing CV values.

This decoder supports the new NMRA protocols that use up to function 28, (F28). Right now only MRC Prodigy2 has 28 functions.

There are many more program features available with this decoder. Please refer to the CV Chart to explore other features of the decoder. If you don't use MRC Prodigy[2] you may not be able to access all the features of the decoder.

DIESEL SOUNDS CHART

Function	Idle/Moving
F0	Headligh on/off
Double click F0)	Sound on/off
F1	Bell on/off
F2	Horn
F3	Air release sound/Accessory light #1 on/off
F4	Coupling sound
F5	Brake release (idle) / brake squeal (moving)
F6	Dynamic brake on/off
F7	Uncoupling lever
F8	Air hose firing
F9	Engine cooling fan
F10	Rail wheel clack (only moving)
F11	Traction air compressor
F12	Sound on/off
F13	Short air release/accessory light function #2 on/off
F14	Coupling crash
F15	Air pump
F16	Associated loco sound
F17	short air release
F18	Bell type select (use F1 to turn off bell after selecting)
F19	Demo sample horns if upgraded
F20	Bell ring rate
F21	Change bell volume (use F1 to turn off bell after adjustment)
F22	Change horn volume
F23	Change diesel rumble volume
F24	Dynamic brake volume
F25	Brake squeal volume
F26	safety valve pop
F27	Safety valve pop
F28	Short air release

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

LIGHT EFFECT PROGRAMMING CHART FOR CV#118/119

You would program CV #118/119 to choose the desired light effect. CV118 for ACC1 and CV119 for ACC2. For ditch light both CV118 and CV119 must to 0.

CV118/119 value	ACC#1/ACC#2 Light effect
0	Ditch light
1	Gyra light
2	Marslight
3	Prime strato light
4	Single strobe light
5	Double strobe light
6	on/off