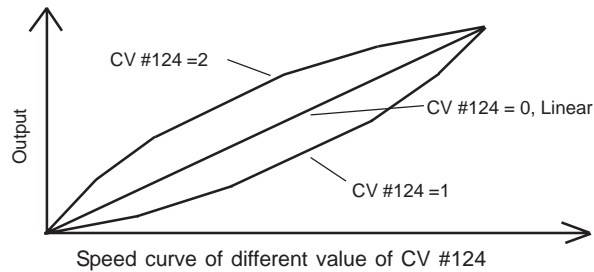


HOW TO SELECT SPEED CONTROL

You can select three speed curves (linear, slow increasing, fast increasing). The figure below shows the CV124's value and its speed curve. You can also enable back emf by program CV 123 with value of 1. When you enable back emf, it will automaticall add momentum for a smooth speed control.



Programming

The 0001650 decoder supports the following register and CV 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 function will follow its own address. When CV21=1, all functions will follow the consist address	0-1	0
CV59	strobe light	CV59=0 for double, =1 for single	0-1	0
CV60	head light	CV60=0 for directional, =1 for rule 17, =2 for on/off at same time	0-2	0
CV61	---	Ditch light rate	0-32	10
CV62	---	Mars light rate	0-32	10
CV63	---	Strobe light rate	0-32	10
CV64	---	CV64=0 F1-F4 normal on/off. =1 MRC special light effect	0-1	1
CV105	---	User identification number	0-255	0
CV106	---	User identification number	0-255	0
CV123		back emf on/off (1=on)	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	---	Factory default setting: Program it to 1 will restore all the CV to default setting	---	0

ABOUT BACK EMF SPEED CONTROL

The decoder has back emf speed control ability. By programming CV123 with a value of 1 will enable back emf. However back emf may not be suitable for the type of motor in the locomotive. If your locomotive hesitates in the mid to high speed range turn the back emf feature off by programming CV123 with a value of 0.

The MRC 0001650 decoder should perform well with your DCC system. See your DCC command station's manual to learn how to program and operate the decoder.

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.

TROUBLE SHOOTING

Whenever you find the decoder doesn't work properly please clean your track and the loco's wheels. And reprogram loco address or program CV125 with a value of 1 to restore factory default setting. Your decoder may simply lose its memory. **All you may need to do is to reprogram its address.**

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 \$9.00 check for shipping and handling fee.

Be certain to return the decoder only.

Send the decoder to:

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

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80 NEWFIELD AVENUE
EDISON NJ 08837-3817
Tel. 732-225-6360
PRINTED IN USA

INS-2268



MRC 1650 5-FUNCTION DECODER with MRC *Light Effects* Built-in NMRA DCC plug

Thank you for purchasing our highly advanced DCC locomotive decoder. Combined with any DCC System, our decoder will make your model railroad more realistic and more exciting.

- Designed for HO scale
- Built-in NMRA DCC plug
- Maximum current: 1.5 Amp
- Programmable for either 2-digit (1-127) or 4-digit (1-9999) addresses
- Programmable start voltage
- Programmable acceleration rate
- Programmable deceleration rate
- Programmable speed curve (factory pre-set)
- Programmable top voltage
- Programmable 14, 28, or 128 speed steps
- Directional lighting at 0.1 amp rate
- Easy setting "Rule 17" lighting, ditch, strobe and Mars lights
- 4 accessory functions (F1 to F4), at 0.1 amp rate
- Supports advanced consisting, (CV19)
- Supports programming on main
- Compatible with NMRA DCC standard
- Complies with the Part 15 of FCC
- 23.5mm long x 12.3mm wide x 4.5mm high

INSTALLATION

If your loco has an NMRA DCC socket, all you need to do is plug in the decoder. However, it is quite a challenge to install a decoder into a locomotive without the DCC socket. 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 locomotives. The terminals of the motor and lights are directly connected to the wheel pickups. Each type of loco has its own method of electrical pickup. The connection between wheel and motor/light could be wires, clips, the body or any conductor. Figure out your locomotive's electrical connection and how to disconnect (isolate) the motor and lights. The decoder will be inserted between the wheel pickups and the motor. The 'X' marks in Figure 1 show you where to disconnect.

Figure 1. Connection of a standard loco *Note: The 'X' signs indicate where to disconnect (isolate)*

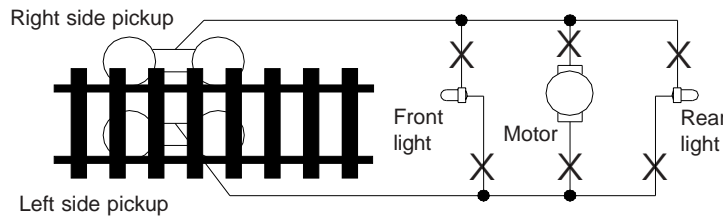
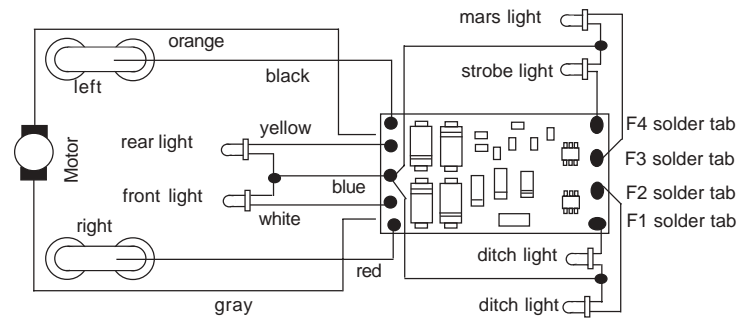


Figure 2 shows you how to wire the decoder. After disconnecting the motor terminals from pickups, connect the red wire to the right side pickup and the black wire to the left side pickup. Connect the orange wire to the motor terminal that originally connects to the right pickup. Connect the gray wire 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 very useful when you find that it is hard to isolate one of the light terminals from the pickup. Wiring the bulb this way will also make the light dimmer. If your loco has only a front light, you should connect the white and the yellow wires together.

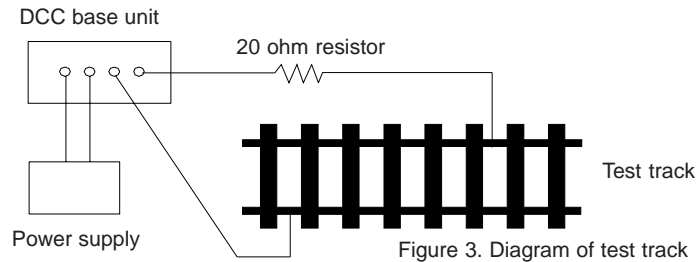
Solder tabs are furnished on the 0001650 decoder for accessory functions F1, F2, F3 and F4. If you wish to use these functions, you can solder wire to these tabs. Use a small wattage soldering Iron in conjunction with electronic soldering paste. To avoid any damage on the decoder do not solder one tab more than 5 seconds at a time. If you need more time to solder, please let it cool down before soldering again.

Figure 2. Decoder wiring diagram



MAKE A TEST TRACK

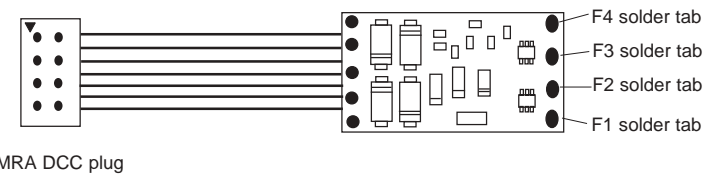
Before you start with your decoder installation, we strongly recommend building a test track which uses a 20 ohm resistor to limit current. **Only test your installed decoder on the test track.** The test track will prevent any damage due to an incorrectly wired decoder.



TEST

All MRC decoders have been factory programmed with address #3, 28/128 speed steps and maximum top voltage. After you have finished your decoder installation, you are ready to test it. **Never run the installed decoder on your layout without first passing the test.** You may damage the decoder if it is not wired correctly or if you have not properly isolated the motor and the lights.

Put the loco on the test track. Select the Run Mode of your DCC system and select or acquire address #3. Move up throttle and the loco should move forward. Push the light button and the front light of your loco should turn on. Push the reverse direction button. The loco should move backward and the rear light should turn on. The loco cannot get to normal speed because there is a 20 ohm protection resistor in the test track. If you are able to turn on/off the front and rear lights and you are able to move the loco in forward and reverse, you did a great job. Congratulations! **Do not test the loco on the test track for an extended period of time. To do so will cause the protection resistor to 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 your decoder. This is why making a test track is so important.

OPERATION

Headlight

There are three ways to operate headlight (depends on CV60):

1. Normal directional lighting (CV60=0)
2. Rule17 lighting (CV60=1). One light is bright to indicate direction of travel, the other is dim.
3. Both front and rear headlight on / off at the same time (CV60=2).

MRC LIGHT EFFECTS:

There are four function output solder tabs (F1, F2, F3, F4) on the decoder. When CV64=0, they are normal on/off and controlled by accessory function F1 to F4. When CV64=1, They are **MRC Light Effects (ditch light, mars light and strobe light)**. All MRC Light Effects have adjustable flash rates.

1. **Ditch lights** (CV64=1): Using decoder function output solder tabs F1 and F2 plus decoder blue common wire. Accessory function F1 controls the both ditch lights steady on or off. Function F2 triggers ditch lights flashing 10 times.
2. **Mars light** (CV64=1): Using decoder function output solder tabs F3. Function F3 turns on or off mars light.
3. **Strobe light** (CV64=1): Using decoder function output solder tabs F4. Function F4 turns on or off strobe light.

HOW TO SELECT THE MRC LIGHT EFFECTS

The decoder is shipped from the factory in the normal/default mode (address #3) normal lights & functions. To access the **MRC Light Effects** you have to program CV64 to value 1 (CV64=1). CV61 controls ditch light rate. CV62 controls mars light rate. CV63 controls strobe light rate. Refer DCC manual to learn how to program CV. See the register/CV chart to custom tailor your **MRC Light Effects**. For a more comprehensive understanding of CVs and registers, visit the National Model Railroad Association website at www.nmra.org.