North Raleigh Model Railroad Club

Installing Decoders in N Scale Locomotives
Detailed Instructions

Con-Cor Budd RDC-1/2/3 Rail Diesel Cars

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Introduction

The following detailed description covers installation of a Digitrax DN93 decoder in Con-Cor Budd RDC-1, RDC-2 or RDC-3 Rail Diesel Cars, as performed by the author of this publication, and reflects the experiences encountered during the installation.

The Digitrax DN93 decoder was chosen because it was the most advanced decoder available at the time of the installation. Decoders from Digitrax, Lenz, NCE, TCS, etc. can be used.

The most important factor to remember in performing an analog to digital conversion is to ensure both motor brushes and the decoder orange and gray wires are insulated from the frame. Any contact of the brushes and/or these wires with the frame may result in virtually instant destruction of the decoder.

The first step in the description which follows is to test the decoder for proper operation, following the instructions provided by the manufacturer. The purpose of this step is to ensure any non-operational or dead-on-arrival decoder can be repaired by the manufacturer under warranty.

Tools Required

To install the decoder you will need the following tools:

Installing the Decoder

- Small Phillips-head and flat-head screwdrivers
- Wire cutter and stripper
- Soldering iron with fine tipped point, 20 watts maximum
- Fine resin core solder
- Tweezers (hook tipped work best)
- Long-nosed pliers, small
- Set of flat hobby files
- Paint or magic marker

Modifying the Frame

- Motor Tool with metal cutting buts (ball shape, cone shape, etc.
- No. 600 wet and dry sandpaper
- Safety glasses

Modifying the Frame

The frame contains two raised metal pads, used for anchoring various wires, which must be removed for the decoder to have sufficient vertical clearance. A motor tool is required for this modification. Instructions are provided in the installation section below. Note that this modification may not be necessary if one of the current Z-scale decoders is used for the conversion.

Detailed Installation Instruction
Con-Cor RDC-1/2/3 Rail Diesel Cars

Print out this document. As each step in the installation is completed place a "X" or a check-mark through the box. All references to the frame are based on the front being at the top or away from you.

This installation places a Digitrax DN93 decoder inside the body shell of the RDC-1, RDC-2 or RDC-3. The decoder will be located backward of the motor, but vertical clearance is tight. All connection points are readily accessible.

In normal analog (DC) operation, the RDC receives right track power via wires from the right side of the trucks to the top motor brush, and left track power via the wires from the left side of the trucks to the frame, and via the frame to the bottom motor brush.

- ❑ Begin by testing the Digitrax DN93 decoder for proper operation per the instructions provided by Digitrax.
- ❑ Very carefully remove the body shell from the frame. Take extreme care doing this as the steps and ends can easily be cracked and/or broken. Use a small screwdriver or hobby

knife to pry gently at each end of the shell between the end door and the frame. Once released, be sure to pull the shell straight up.

It is not necessary to remove the trucks for this conversion.

- ❑ Unsolder the wire from the top motor brush. From beneath the frame, remove the plastic clip holding the motor in place, and remove the motor and drive shafts. The side of the frame where the wire from the top motor brush connects is considered the right side of the frame.
- ❑ Lift the wires on each side of the frame out of the small metal anchors to the rear of the motor. These anchors, two raised metal pads on each side, each with two wire anchors, must be removed to provide sufficient vertical clearance for the decoder.
- ❑ Use a Dremel ¼" diameter rotary engraving cutter or equivalent in a motor tool to grind away the raised metal pads and wire anchors (remember to wear eye protection) until the frame is flat and even. Smooth the sharp edges of the frame with fine sandpaper to ensure the insulation on the wires cannot be pierced.
- ❑ Clean all the grindings from the frame.
- ❑ Replace the motor and drive shafts in the frame, securing the motor with the plastic clip from below. The brush end of the motor faces the front end of the frame.

In the steps that follow, the orange decoder wire will be connected to the top motor brush, and the gray decoder wire will be connected to the frame, which will be the current path to the lower motor brush. (There is no electrical path between the frame and the trucks.)

- ❑ Cut the decoder wires as follows:

Red	½”
Black	½”
Orange	2¼”
Gray	2¼”
White	4”
Yellow	4”

- ❑ Cut the green decoder wire to ¼" and dress out of the way; it is not used. The white and yellow wires are left at 4" and dressed out of the way in the RDC as the author intends a future installation of headlights using the Miniatronics 18-001 1.5 volt bulb with focused lens.
- ❑ Strip 1/8" insulation from the ends of the red, black and orange decoder wires. Strip 3/8" insulation from the end of the gray decoder wire.
- ❑ Connect the wire running from the front truck on the right of the frame to the rear truck on the right of the frame. Connect the red decoder wire to this wire close to the rear truck. Solder all joints and tape as necessary.
- ❑ Remove the brass pin that is inserted in the left side of the frame just forward of the motor. The wires connecting the left of the front and rear trucks will come loose when the brass pin is removed.
- ❑ Connect the wires running from the front truck on the left and the rear truck on the left. Connect the black decoder wire to this wire close to the rear truck. Solder and insulate all joints.
- ❑ Solder the orange decoder wire to the top motor brush.
- ❑ Twist the strands of the gray decoder wire together, then insert into the hole in the left side of the frame just forward of the motor. Insert the brass pin into the hole with the gray wire, ensuring a tight fit.
- ❑ Make sure that the various wires cannot get caught in the drive shafts, then test the Rail Diesel Car to ensure proper operation of all functions of the decoder. Resolve any problems before continuing.
- ❑ Dress all decoder wires and the wires from the front truck to the rear truck so they cannot interfere with the motor and drive shafts, then fasten in place as necessary, using either the metal anchors to the front of the motor or electrical tape. The wires must also clear the plastic window glass inserts inside the shell.
- ❑ Re-install the body shell on the frame, again being careful to keep the shell aligned evenly with the frame so no damage is caused to the ends.
- ❑ Test the operation of the locomotive on the railroad. It should operate just as if no modifications had been made. Resolve any problems.
- ❑ Place the locomotive on the DCC programming track and set the DCC Command Station to the programming mode.
- ❑ Program Configuration Variable "CV29" to "06" (for 2-digit addressing or "26" for decoders capable of 4-digit addressing) then program the decoder to the desired address.
- ❑ Carry out a final check of the locomotive on the railroad.
- ❑ Record the decoder CV's and address, and the reporting marks of the locomotive.

The conversion is complete. Enjoy your DCC-equipped locomotive.