



North Raleigh Model Railroad Club

Installing Decoders in N Scale Locomotives Detailed Instructions

Key Imports Harriman Common Standard 2-8-0 Locomotives UP 300 Series/SP Class C-9 & C-10 2-8-0 Consolidation

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Introduction

The following detailed description covers installation of a Digitrax DZ120 decoder in a Key Imports Harriman Common Standard 2-8-0 Locomotives, Union Pacific 300 Series/Southern Pacific Class C-9 and C-10, 2-8-0 Consolidation steam locomotive, as actually performed by the author of this publication, and reflects the experiences encountered during that installation.

This is one of the easier DCC conversions to carry out, and is recommended for a first or early-on installation. No disassembly of the locomotive is required and only a hole for the decoder wires must be drilled in the tender.

The DCC decoder will be mounted in the coal hopper in the tender, with the wires passing to the locomotive through a hole drilled in the front wall of the tender. There is no room in the locomotive for the decoder. There are currently several decoders small enough to fit in the coal hopper. The Digitrax DZ120 decoder was chosen because it was available.

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 and modify the tender 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 Tender

- Motor Tool with 1/16" and 1/8" drills or Hand drill.
- Round hobby file
- Safety glasses

Detailed Installation Instruction Harriman Common Standard 2-8-0 Locos UP 300 Series/SP Class C-9 & C-10 2-8-0 Consolidation

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.

In normal analog (DC) operation, the tender picks up power from the left rail and the locomotive picks up power from the right rail. As you look at the rear of the locomotive the motor right terminal is the left rail connection and the left terminal is the right rail connection.

- Begin by testing the Digitrax DZ120 decoder for proper operation per the instructions provided by Digitrax.

- ❑ Cut the red, black, orange, gray, white and blue decoder wires to 1-1/2" and strip 1/8" of insulation from the ends. Cut the yellow decoder wire to 1/2", leaving a length that can be used should the decoder be later installed in another locomotive.
 - ❑ Paint all but the last 1/4" of the decoder wires (next to the stripped ends) black so they will be less visible between the tender and the locomotive. Let dry.
 - ❑ Very carefully drill a 1/16" hole centered in the front wall of the tender. Proceed slowly and do not use too much pressure on the drill or the front wall of the tender will be bent. Be very careful not to let the drill bit get caught in the hole or significant damage to the tender may result.
 - ❑ Now use the 1/8" drill to very carefully enlarge the hole to 1/8", again being careful not to let the drill bit snag in the hole or to press too hard on the tender wall.
 - ❑ File the edges of the hole smooth so it cannot pierce the insulation on the wires.
 - ❑ Twist the decoder wires together and feed through the hole in the tender front wall from inside the tender. Push the decoder carefully down into the coal hopper.
 - ❑ All locomotive wiring is connected to the motor terminals at the rear of the locomotive. These are accessible from the rear of the locomotive without any disassembly. The wires going downwards from the motor terminals are the power pickup wires from the track, while the wires going upward are the headlight wires.
Carefully unsolder all the wires from the motor terminals.
 - ❑ Place the tender front at right angles to the locomotive rear, either to the left or to the right of the locomotive, and close to the locomotive.
 - ❑ Solder the gray decoder wire to the right motor terminal, then solder the orange decoder wire to left motor terminal. Solder quickly so no heat damage is caused to the motor terminals or the locomotive.
 - ❑ Solder the red decoder wire to the wire coming from the locomotive frame, which should be the wire below the left motor terminal. Insulate the connection.
 - ❑ Solder the black decoder wire to the wire coming from the drawbar connection to the tender, which should be the wire below the right motor terminal. Insulate the connection.
 - ❑ Solder the blue decoder wire to one of the headlight wires, which are the wires above the motor terminals. Insulate the joint. Likewise, solder the white decoder wire to the other headlight wire, and insulate the joint.
 - ❑ Using an ohmmeter, carefully check for shorts between each motor terminal and both the locomotive and tender frame. Correct any problems before proceeding.
 - ❑ Couple the locomotive and tender together and test the operation of the locomotive and tender on the railroad. Resolve any problems.
 - ❑ Push any extra length of the decoder wires back into the tender, being careful not to strip any insulation on the edges of the hole in the front wall of the tender. This will probably push the decoder out the top of the coal hopper. Dress the wires in a manner which will allow them to be hidden under the decoder while the decoder is fully in the coal hopper.
 - ❑ Again 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 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.
 - ❑ Construct a removable platform above the decoder in the coal hopper, and make a load of coal attached to the platform. This will hide the decoder and provide a realistic-looking coal load in the tender.
- The conversion is complete. Enjoy your DCC-equipped locomotive.