



North Raleigh Model Railroad Club

Installing Decoders in N Scale Locomotives Detailed Instructions

Bachmann Spectrum USRA Light 4-8-2 Steam Locomotive

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Table of Contents

Introduction.....	Page 1
Tools Required.....	1
Detailed Instructions.....	2

Introduction

The Bachmann Spectrum USRA Light 4-8-2 Mountain steam locomotive is a very fine unit and the hook up of the decoder is very easy. The removal of the shell, however, is difficult and caution should be taken as many of the details are fragile and easy to bend or break. Here is a step by step write up on how I did my installation.

Suitable decoders are the Digitrax DZ-series, several Lenz decoders and the TCS M-series decoders. Note that you may have to strip the insulating plastic on some decoders so they fit more easily.

As you carry out the detailed instructions below, also refer to the assembly diagram and parts list provided by Bachmann with the locomotive. It will help in laying out the parts and understanding the terminology used.

Tools Required

To install the decoder and modify the frame you will need the following tools:

- 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

Detailed Installation Instruction Bachmann Spectrum USRA Light 4-8-2 Mountain Steam Locomotive

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 description describes placing the decoder in the locomotive where the power connections are located and in place of the boiler weight. Part numbers in brackets refer to the Bachmann assembly diagram and parts list included with the locomotive.

- Step 1 — Remove the Tender



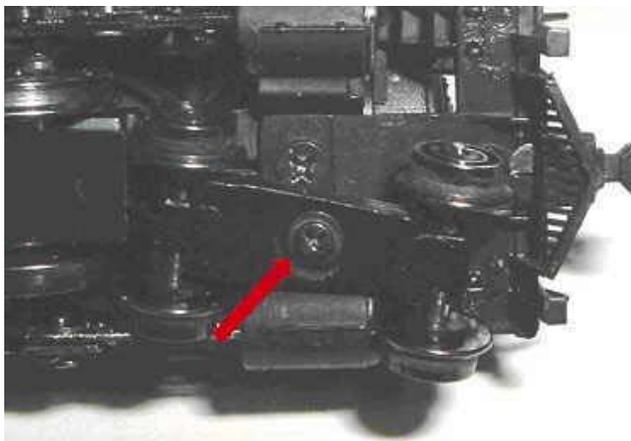
Remove the tender from the locomotive by splitting the wires apart and then lifting the drawbar off the post.

Do any desired conversion of the tender's coupler to a Micro-Trains coupler (MT 2004) now.

Set the tender aside until the decoder installation in the locomotive is complete.

- Step 2 — Remove Pilot Truck

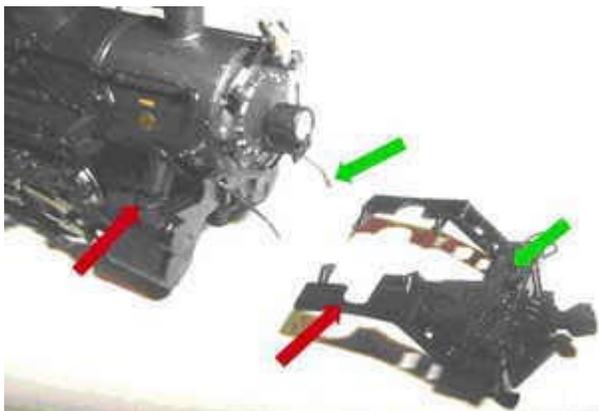
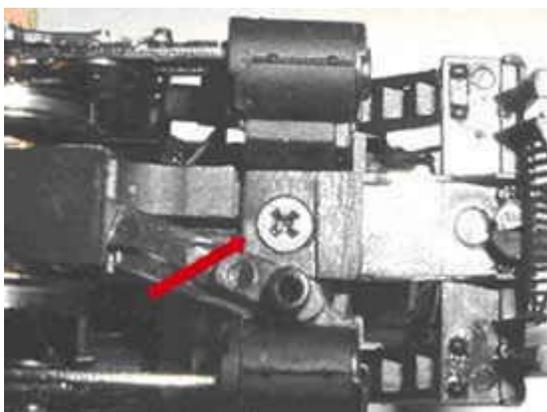
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Remove the screw holding the pilot truck and lift off the truck assembly. Place the screw and truck aside until they are replaced later in this process.

A small muffin tin with its various compartments provides an excellent place to safely sort and store individual parts removed during the installation process.

□ Step 3 — Remove Pilot and Step Assembly



Referring to the top photo above, remove the screw which holds the pilot and step unit.

Referring to the lower photo above, very carefully flip out the handrails (MTZ20 and MTZ21) from the pilot/step unit

before you try to remove the pilot/steps from the locomotive (Green Arrows). Next, carefully pull out the pilot/step assembly from the grooves in the firebox supports. You have to lift it up and over as you slide it forward. BE VERY CAREFULL (Red Arrows).

The screw just removed also holds the cylinders in place. Once the pilot and steps are removed replace this screw to keep the cylinders from coming off the pistons.

Perform any desired coupler conversions to the pilot at this time, and then set aside.

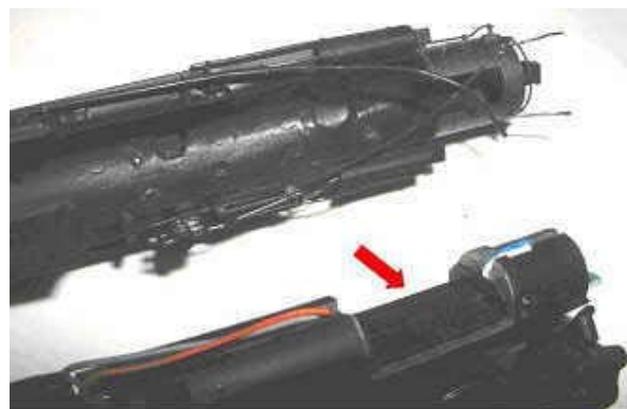
□ Step 4 — Remove Locomotive Shell



Lift up the rear of the shell and slide it forward. You must be a little aggressive to get it off, but BE CAREFUL. Note that you do not have to remove the cab assembly or cab handrails. Place the shell aside until re-assembly later.

Note that the boiler weight (OOS02) may lift up at the same time as the shell. If this happens the weight will keep the shell from sliding forward. Use a small flat-blade screwdriver to pry the weight down.

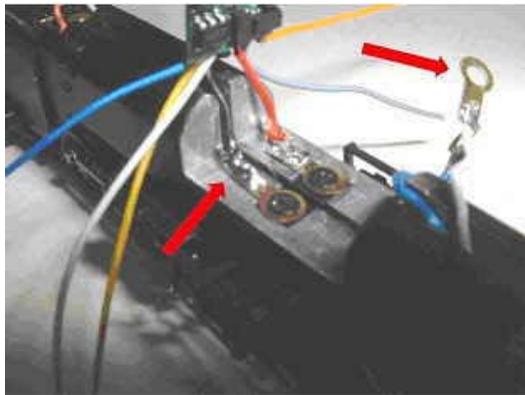
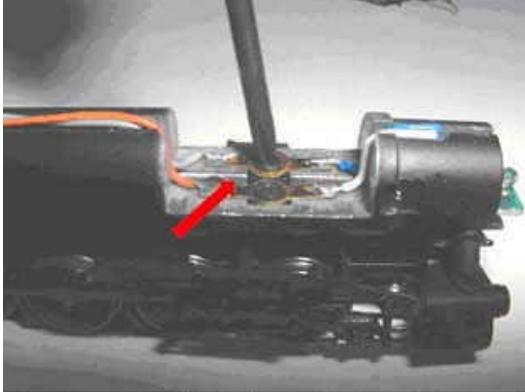
□ Step 5 — Remove Locomotive Weight



Remove the weight from the boiler and set it aside. Also remove the plastic cover that sits beneath the weight and over the screw terminals. Note from the photograph there is plenty of room to mount a decoder in this area.

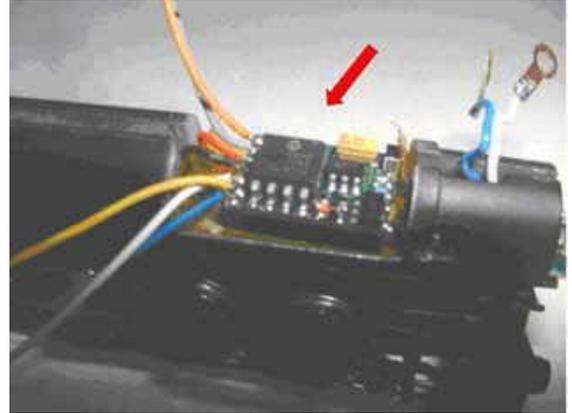
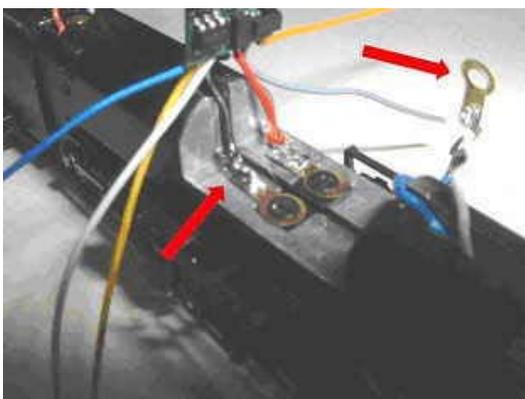
There are several suitable decoders from at least three manufacturers that can be used. Select your desired decoder based on price and desired features.

□ Step 6 — Install the Decoder



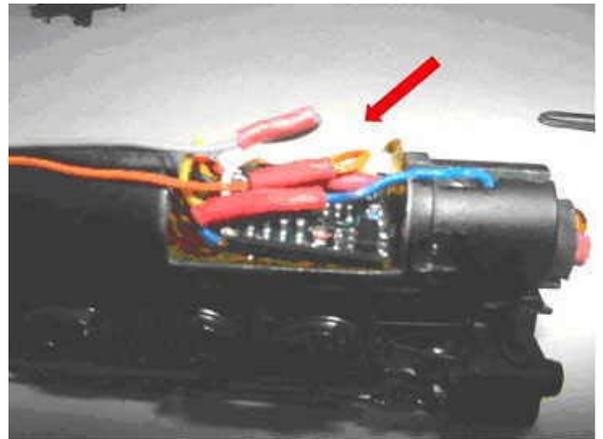
Referring to the top photo above, remove the screws from the terminals, then unsolder the wires from the eyelets. Two of the eyelets will be used for the decoder power leads (red and black). The other two eyelets will not be used.

Referring to the lower photo above, cut the red and black decoder leads to length then solder each to one eyelet. Screw the eyelet with the red decoder lead back into place on the right side of the frame. Screw the eyelet with the black decoder lead back into place on the left side of the frame.



Referring to the photo at the bottom of the previous column, if using a decoder without shrink wrap insulation place a piece of Kapton Tape (or other insulating tape) over the screws. Make sure the tape goes up both sides of the cut out in the frame to insure the decoder cannot short out on the frame.

As shown in the photo above fold the decoder over so it sits on top of the tape. Do this gently as the wires on the decoder are very small and may break off if bent too tight.



For the wires from the decoder to the motor brushes simply splice the orange decoder wire to the wire from the right hand motor brush and splice the gray decoder wire to the wire from the left hand motor brush so the joints are over the decoder cavity. Insulate with heat shrink tubing or tape. See photo at left.

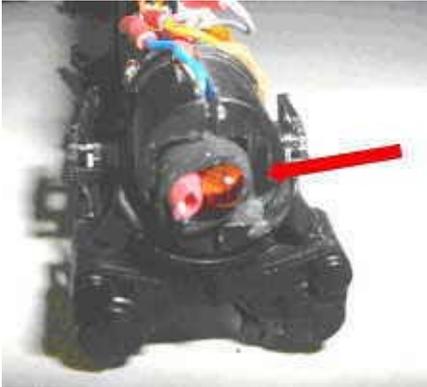
Use Kapton Tape or other insulating tape to hold the splices in place over the decoder.

□ Step 7 — Connect the Headlight

There are at least three ways to do the headlight on this locomotive. The first uses the existing light board with the yellow LED unmodified, except the wire colors are reversed for DCC operation — blue is negative (-) and white is Positive (+). Thus for correct operation, headlight blue

should be connected to decoder white, and headlight white should be connected to decoder blue.

The second replaces the yellow LED in the existing light board with a Richmond Controls 3mm golden white LED. Use a soldering iron with a maximum 15 watts power. Remove the existing yellow LED. Carefully cut the leads and bend them at right angles to fit the golden white LED on the board with its leads going to the holes where the yellow LED was removed. Solder the LED to the board. Using a 9-volt battery, determine which wire is positive, then connect that headlight wire to the decoder blue wire, and the other headlight wire to the decoder white wire.

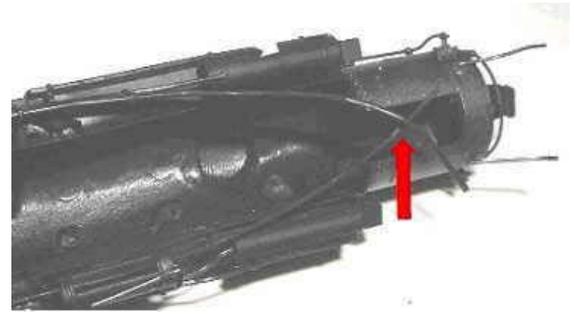


For the third method, instead of using the light board supplied with the locomotive, you can make realistic-looking headlight with a Richmond Controls 3mm Golden-White LED. Solder a 560- or 680-ohm, 1/8 watt resistor close to one lead of the LED, then embed the entire assembly in a piece of heat shrink tubing. This assembly fits nicely in the cavity where the light board was located, as shown above.

□ Step 8 — Test the Locomotive

The next step is to test the installation and be sure it works as it should, using the default address of 03 for new decoders. The tender is not needed for this test, but make sure all the locomotive side rods and linkage are in place. If the locomotive does not perform as it should recheck all connections to the decoder and test again. Do not proceed until all problems are resolved.

□ Step 9 — Reassemble the Locomotive



Next we reassemble the locomotive, essentially in the reverse sequence to its disassembly. Pay careful attention to the piping. The pipes must be held out of the way until the shell is back on. Then they must be put back in place, using tweezers for assistance. (There is also the option of cutting them where the arrow is in the photo at left, as they are not seen much and it makes it much easier to fit them back in place.)

Continue with refitting the pilot and steps, and then the pilot truck. Finally re-attach the tender.

□ Step 10 — Program the Decoder

Perform a test of the locomotive and tender on the railroad to ensure proper operation.

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.

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