



North Raleigh Model Railroad Club

Installing Decoders in N Scale Locomotives Detailed Instructions

Walthers/Life-Like 2-8-4 Berkshire Steam Locomotive

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Introduction

LifeLike's 2-8-4 Berkshire Steam Locomotive is a good looking locomotive and runs well on DC. However, it is one of the most difficult to convert to DCC. **Do not attempt this conversion unless you have a great deal of experience in converting steam locomotives to DCC.** You must totally disassemble the drive train and gearing to get to the bottom motor brush, which is necessary for connecting the decoder.

There is plenty of room in the tender for a wide range of decoders from several manufacturers. A sound decoder such as a SoundTraxx Micro-Tsunami could also be installed in the tender, but this description does not include the sound conversion. One modeler (Freddie Bell) has installed the decoder in the boiler, above the worm gear; a description and photograph of his installation are at the end of this document.

Also included are some tips and photos from Matthew Miller

Tools Required

To install the decoder and modify the frame 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

- X-Acto knife with #11 blade
- Pin vise with 0.040" diameter drill bit

Motor Conversion

- Jeweler's files
- Safety glasses
- Razor saw or Motor Tool
- Kapton Tape
- Walther's Goo

Detailed Installation Instruction Walther's Life-Like 2-8-4 Berkshire 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.

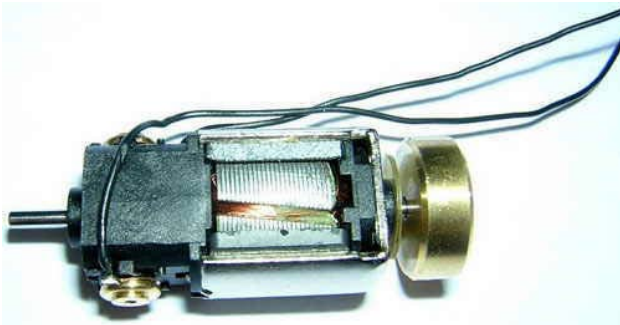
Set your browser left and right margins to 0.25" (File Page Setup) and print out this document. As each step in the installation is completed place a "X" or a check-mark through the bullet. All references to the frame are based on the front being at the top or away from you.

Before starting, test the decoder to insure that it is functioning correctly. Once this is determined, the covering must be trimmed on the end in order for it to fit as needed. Trim the cover opposite the wire side with a sharp X-Acto knife back to the edge of the decoder circuit board.

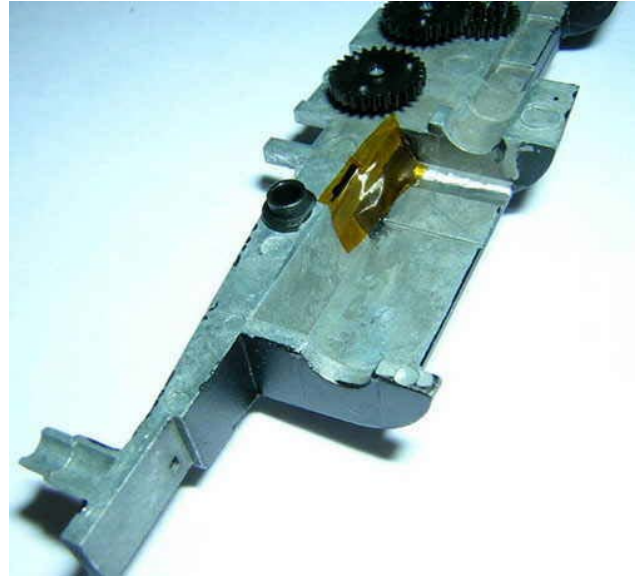
Let's get started. **Remember that this process is not for the faint hearted. If you are new at installing decoders or have never disassembled a steam locomotive, it is strongly suggested that you employ someone else to do this conversion for you.** [Click here](#) to see an alternate method recommended by Jeff Stritar in the box at the bottom of this page.

It is highly recommended that you take good quality photographs of the locomotive and each part of the locomotive before you take it apart. Photos of intermediate disassembly can also be very useful in case there is any question about how it is supposed to fit back together. Be especially sure to photo the drive wheels and assembly before taking it apart.

- ❑ Remove the 2 screws on the drive cap and gently ease the cap away from the locomotive.
- ❑ Remove both the lead truck and trailing truck and replace the drive cap.
- ❑ Remove the front assembly by removing the furthest screw.
- ❑ Remove the cab by spreading it slightly and sliding it up.
- ❑ Next remove the piping under the cab on both sides. This is a safety measure so nothing gets broken — be very careful of the piping on the left rear truck.
- ❑ Remove the small half moon shaped pipe near the front right cylinder assembly.
- ❑ Spread the rear of the boiler while lifting it up then sliding it forward.
- ❑ Remove the drive cap and gently remove the drive assembly — put it aside in a safe place. You should now have a nice clean frame sitting in front of you.
- ❑ Before starting disassembly of the frame remove the piping on both sides first — just as a safety measure.
- ❑ Undo the 2 frame screws and gently pry the frame apart. Don't loose the spacers, screws or nuts in the process.
- ❑ Before removing the motor write the word "TOP" on the top with a permanent marker so you can be sure to get it back in the correct orientation.
- ❑ Remove the motor.
- ❑ Remove both motor brush caps, springs and brushes. Trim the copper tabs so only 3/16" is left and solder a wire to each one, as shown in the following picture — the orange wire goes to the brush tab on the TOP of the motor.



- ❑ Using a Dremel tool grind a vertical groove on the right or left frame (it doesn't matter which side) to allow the wire to sit nicely beside the motor. Place Kapton tape in the area shown below on both frame halves.



- ❑ Cut a small area off the rear frame spacer as shown in the photo above. This is just to allow the leads from the motor to sit nicely without being pinched.



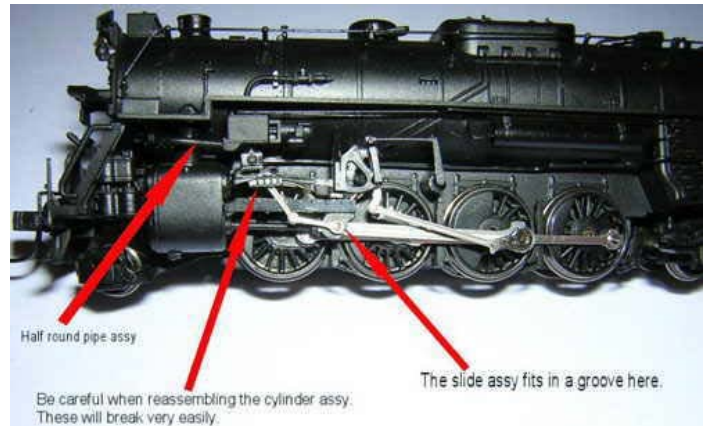
- ❑ Reassemble the 2 frame halves ensuring the two motor leads sit between the frame halves without being pinched. See the following photographs.



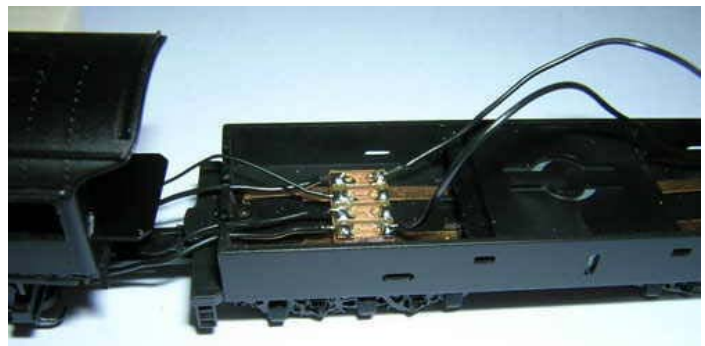
- ❑ Using a meter check that there is no electrical continuity between the frame halves and the motor contacts. Resolve any problems before continuing.
- ❑ To refit the drive train do the following:
 1. First make sure the worm drive is removed
 2. Lower the drive train into the frame.
 3. Rotate the bearings until the axles slide easily into the mounts.
 4. Temporarily replace the plastic gear cover.
 5. Using tweezers, locate the valve gear assembly and push it onto its mounting post; use the pictures for rod alignment. Repeat on the other side.
 6. Slide the cylinder assembly a small amount on its mount while locating the crosshead guide into its groove and the steam valve operating rod into the channel on the steam valve. You must do this on both sides and do it very gently and at the same time.
 7. The cylinder assembly should then seat itself firmly against its mount. Check and double check all of the operating rods and gear; use the pictures as a guide.
 8. Gently rotate the wheels checking for any binding. You might have to rotate one of the geared drivers a tooth or two to fix any quartering problems.
 9. If all goes well the drive gear should run smoothly.
 10. Refit the worm gear.
- ❑ Consider doing the following small modification before refitting the cylinders. This reinforces the steam valve mount by removing the plastic stud on the valve, drilling 0.32" holes in both the valve and cylinder and sliding the valve over the wire with a bit of CA glue to be sure. See the photo below:



- ❑ Using the photo below, ensure that all the rods are correctly located.



- ❑ If everything went OK you should be able to rotate the drivers by spinning the flywheel. All should rotate freely; recheck assembly if you find any binding.
- ❑ Reassemble the boiler, cab, piping and refit the lead and trailing trucks.
- ❑ Check the operation by applying DC power to the two motor leads. Resolve any problems before proceeding further.
- ❑ Make two small grooves in the front edge of the tender to allow the motor wires to enter.
- ❑ Consider gluing a small piece of PCB breadboard in the tender to ease the connection of the decoder. See the photo below.



- ❑ The extra wires in the photo above are for the headlight. I used a 1.5v bulb with the wires located over the top of the frame then out the rear.
- ❑ The photo above also shows two wires attached to the tender pickups. This was just so I could test the loco on my DC test track — do this before proceeding any further and resolve any problems found. The locomotive should run just as smoothly as it did right out of the box.

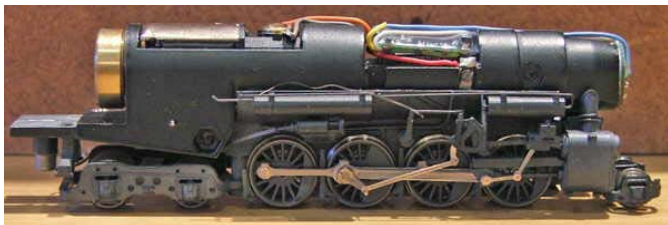
- ❑ Connect the decoder to the PCB in the front of the tender using a dropping resistor for the headlight.
- ❑ Connect the backup light using the original PCB mounted in the tender.
- ❑ Consider using a Micro-Trains bolster pin for the drawbar attachment between the tender and locomotive. The Micro-Trains bolster pin is sturdier than the small fragile pin Life-Like provided.



- ❑ The decoder installation is complete. Place the locomotive and tender on a programming track and check for decoder presence and programmability. If it comes back as no decoder present, or gives an indication that there is a short in the wiring, find and fix the problem before continuing. If the decoder is programmable, place it on a running track and test the operation of the light function.
- ❑ Place the locomotive and tender on a programming track and set the address and other CVs to the desired values.
- ❑ Do a final operating test on the mainline. The decoder conversion is complete

Alternate Decoder Mounting

Freddie Bell installed a Train Control Systems (TCS) M1 decoder in the boiler, above the worm gear, as shown in the following photograph:



Freddie also filed the frame to isolate the lower motor brush contact, thus requiring no Kapton tape, and he filed a slot in the side of the motor to allow the orange wire to pass between the frame and the motor.

Alternate Method of Disassembly

Jeff Stritar has developed a method that does not require disassembly of the drive train itself — the cylinders, drivers and rods can be removed together so that they stay aligned and are easier to replace.

The numbers in brackets in the description which follows refer to the Life-Like parts number.

- ❑ Remove the lead and trailing trucks, and then replace the gear cover (105).
- ❑ Remove the cab, boiler and pilot, and then carefully remove parts 123 and 125 on the right and part 77 on the left. Do NOT remove the cylinder assembly.
- ❑ Position a small screwdriver or something similar along the inside of the left cylinder and carefully pry part 78 away from the frame. The glued connection between part 78 and the crosshead (parts 59/60) may separate but it is easily glued back together later.
- ❑ The right side is a little more complicated. Ease part 47 away from the frame as you pry part 123 away from the frame (otherwise one of the pipes attached to the part 47 blocks removal of part 123).
- ❑ Take two strips of tape about 1/4" x 2.5" and wrap the end of one piece around the front of the cylinder and then gently press it along the rods and drivers on each side. Be sure to get as much contact as possible with the various parts of the drivetrain. Blue masking tape works well here — holds good enough and leaves no residue. See photo below.



- ❑ Remove the gear cover and lower the cylinders and drivetrain as a single unit.
- ❑ Continue with the modifications and decoder installation as described above.
- ❑ Reverse the removal process above to re-install. The drivetrain is already aligned. The worm gear can be replaced at the same time as the motor, so there is no need to squeeze it in after replacing the drivetrain.

Alternate Method for Tender

Matthew Miller used a small 4-pin connector in the front of the tender so he can separate the engine and tender to put them in the original Life-Like box. He also installed a SoundTraxx Micro-Tsunami sound decoder in the tender. See the photos below.



Connector made from computer header pin and plug



Tender showing installation of SoundTraxx Micro-Tsunami decoder