N Scale Decoder Installation

Kato C30-7 Locomotive
DIGITRAX DZ123 Decoder

Introduction

This installation was accomplished using Digitrax decoder DZ123. This is a very complex installation as this unit is not designed to be DCC ready. This procedure requires modification to frame and complete disassembly.

Tools:

- Screw Driver, small, Phillips
- Screw Driver, small, flat blade
- Wire cutter
- Soldering Iron, 25W max, small tip
- Dremel Tool with cutoff wheel
- Container to keep the parts in during installation

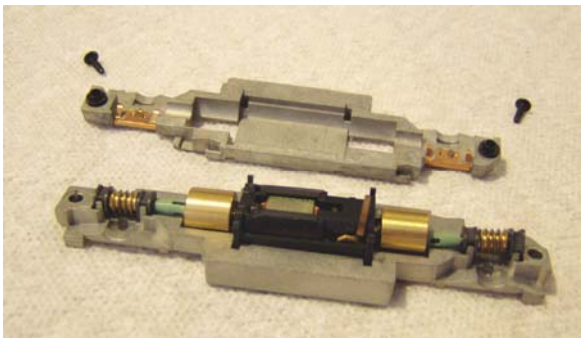
Disassembly

Remove the complete shell from the frame, may require a bit of jiggling of the long hood..

Remove the fuel tank.

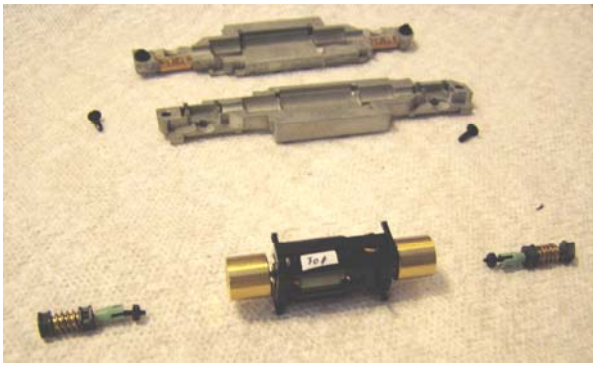
Next, remove Headlight hood, and side wipers. Remove the light boards.

Now undo the two screws that hold the frame halves together. When the screws are removed the trucks will slip out of the frame. Pull them out and set aside. Mark the frame with marker pin to identify Left (looking forward) and Right frame. I marked an “L” and “R” on respective parts.



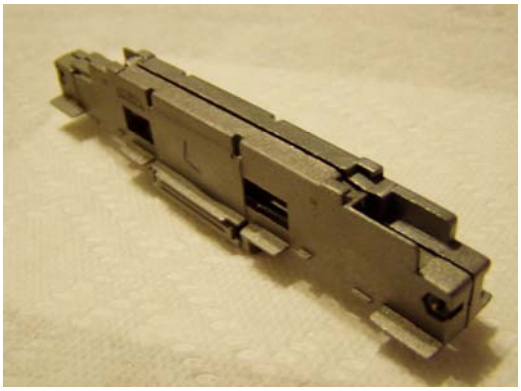
With the frame lying on its side, carefully pry the two halve apart and lift off the left half. Now **Mark the motor to indicate the top,** this is important, as this will determine the direction your engine will travel when decoder is installed. I cut a small piece off a label and put on the top of the motor.

Remove the motor and the drive trains.



Finally, remove the motor from its motor saddle,.

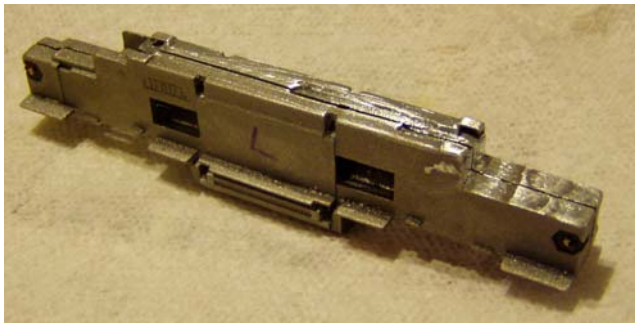
Frame Modification



The decoder will be placed below the rear light board. The rear end of the frame must be milled out to accept the decoder, or purchase one of the available retro frames.

Assemble the two halves of the frame with the screws and nuts, remove spacers for milling operation.

Mill a groove along the top of the frame, from the front to rear and on centerline. The groove should be approximately 5mm wide and between 1 and 2 mm deep. This groove accommodates the wires from decoder to front of frame as not to interfere with frame.



Next mill off the rear of frame as marked to provide space for decoder. Milled frame is shown.

After milling clean frame thoroughly, small filing can foul your motor assembly and cause it to fail. Wash frame in a solution of one Tablespoon of white vinegar in one Quart of water. This removes contaminates and any oils from the frame. I then washed the frame in warm water solution of detergent (Dawn) to remove all traces of the vinegar solution. I then blow dry with air hose. Alternatively you can set aside to dry naturally.

Light Board Modifications

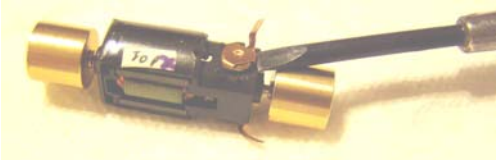
On both light boards, cut through the trace that is next to the number on the board, halfway between LED's solder connection point (on the LED leg opposite the one connected to the resistor) and the contact pad that fits into the loco frame. A brief touch of the Dremel tool 's cutting disk will remove the trace as shown.

Next either unsolder or clip the lead (very close to board) of the resistor and rotate the resistor around 180 degrees so that the resistor is positioned next to the LED. Refer to the picture.

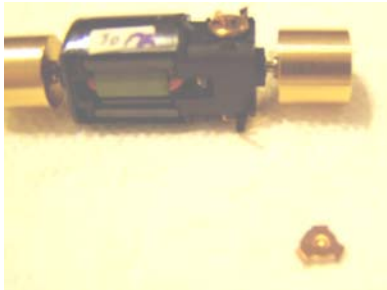
Decoder Installation

Warning! Do not attempt to solder wires to the motor with the brush caps installed. The plastic will melt in less than 1 sec.

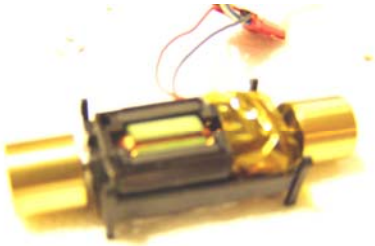
Remove the brush caps carefully. (I remove one at a time) - remember that there are brushes under the caps and a spring that will fly into orbit if you release it under pressure. Clip off the frame wipers as close to brushes as possible.



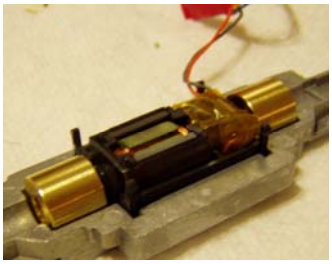
Determine wire lengths by placing motor assembly into one frame half and the decoder in its installed position, leaving a little slack. (This may vary depending upon how you route the wires) The orange wire goes to the brush cap on the top of motor and the gray wire goes to the cap on the bottom of motor assembly.



Solder orange wire onto removed brush cap for top of motor, do not use excessive heat or solder. Replace the brush cap, making sure the brush and spring are in the brush cavity.

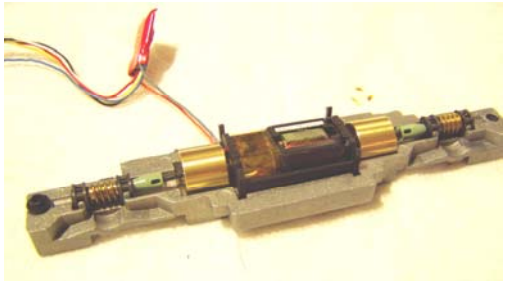


Next remove the bottom brush cap and solder the gray wire onto brush cap. Replace the cap as above.

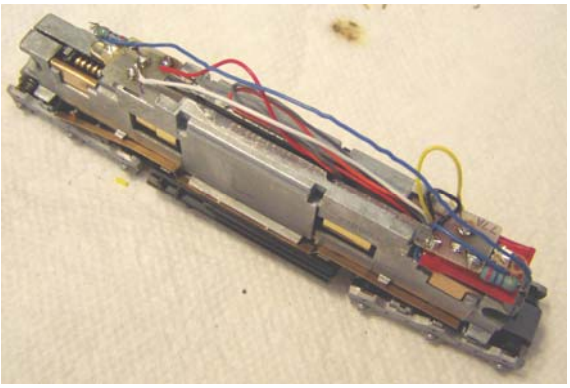


The brush caps must be insulated from the frames, failure to do so may damage your decoder. I wrapped the brush part of the motor assembly with two layers of 1 mil Kapton tape. Be careful not to obstruct the flywheel or armature. The motor must spin freely.

Route the gray wire along the side of the motor. It will be routed between the frame halves through the gap. Make sure you do not pinch the wires and short to frame.



Replace the motor in the motor saddle and insert into the frame half that retains the drive shafts. Reassemble the frame halves, start the screws, then insert the truck assemblies. Do not assemble side truck wipers at this time. The grey and orange wire should pass through the top of the frame.



The decoder can be placed in position with wires routed through center of light board contacts. Trim the part of the red cover off of decoder on the side away from the wires, very carefully not to cut the decoder parts inside.

Replace both light boards. The rear light board will hold the decoder in position. (refer to electrical diagram page 6) Carefully part the insulation of the blue wire (Front and Rear light common) at the position where it will connect to the free end of resistor on rear light board. Leave a little slack. Be careful, do not pull the wire out of the decoder. Solder the cleared spot to the end of the resistor The end of the blue wire should connect to the free end of the front light board resistor. This completes the light common connections. If it is too short splice and solder a piece of scrap onto wire to extend. Insulate splice.

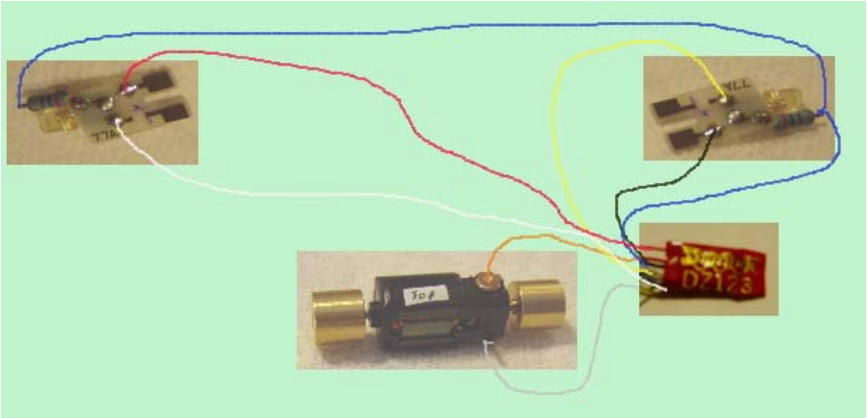
Next, cut the yellow wire (Rear Light) to a suitable length, remember to leave some spare for slack, and solder it to the rear light board's LED leg that is NOT connected to the resistor. Solder to the solder spot on the rear light board that is next to the cut that was made in the circuit board's trace.

Now cut the black wire (power pickup left side) a suitable length (remember slack) and solder it to the spot on the rear light board where you desoldered the one end of the resistor.

Next the red wire (power pickup right side) goes to the same spot on the front light board

Finally, solder white wire (Front Light) front light board to solder spot on LED leg without resitor just ahead of the cut trace.

Tuck the wires into the groove on the top of the frame. I held them in place with a strip of Scotch Tape along the top of the frame.



Loco Reassembly

Install the side truck wipers, be careful not to bend them excessively. The fit fuel tank—holds the wipers in position. Install headlight cover, making sure all the wires pass on the sides of the LEDs so that the light will not be obstructed. Leave the shell off until after testing.

Programming

Do a final check for shorts. Test the locomotive using address 3 (factory default). After test running your loco, replace the shell.

You may now program with address and features desired for operation in your fleet. Use DZ123 decoder instruction sheet for programming directions.

Electrical Connection diagram