

## Tip: 3477 Rail Zeppelin 60903 Conversion and LED Light Upgrade

Date: 05-04-2009, 19-05-2019 LED lights

Hi All,

A friend asked me to convert his **3477 Rail Zeppelin** and supplied a 60903 Märklin decoder conversion kit to improve the running and light functions. I serviced the loco to ensure smooth running and gave all axles some light oil then I started the conversion procedure.



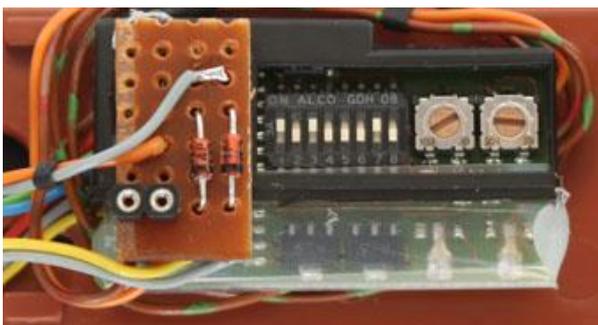
**Warning:** - You undertake the following modifications at your own risk.

Because this model has two motors controlled by one decoder I first took some voltage measurements of the fan motor to ensure that using the new decoder the fan motor received the same amount of power as it did before. The fan operated in the range 1.2 - 11VDC.

The old driving motor was an easy upgrade to the new motor from the kit. Once operational I measured the motor voltage at the brushes and found it to be just over 13VDC.



I chose to reduce the voltage to the fan motor by using 8x1N4007 diodes. If you trace the green and blue wires from the fan motor you will see I have soldered two diodes in series pointing in one direction and another two diodes in series pointing in the opposite direction for each wire. The voltage reduction is just over 2 volts and brings the fan motor within its normal operating voltage range. I used hot melt glue to secure the diodes. You will also notice I didn't mount the chokes on the motor but in line with the wires and placed them in a small trough in the locomotive body.

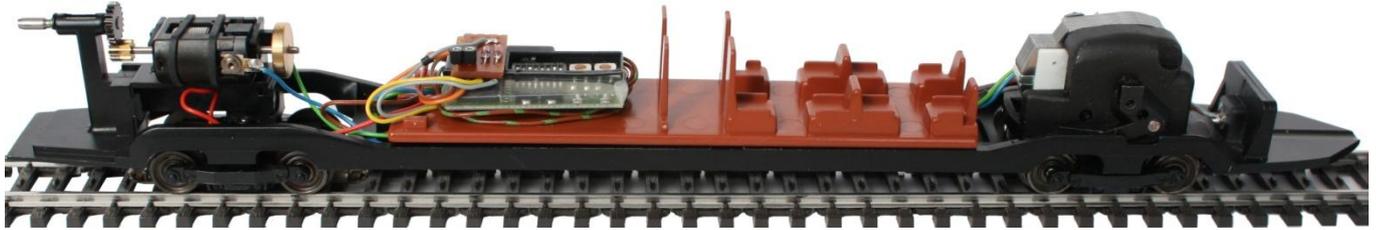


Using a small piece of Vero board, I mounted two 1n4148 diodes and connected the grey (front) and yellow (rear) lighting wires to the cathode end of the diodes respectively. The diode anodes are linked and a grey wire goes to the front light. The orange (+) and the red/brown (F1) wires from the decoder are connected to a two pin socket. The copper foil under the two diodes is cut using a 3mm drill. The Vero board completed is hot melt glued to the top of the new decoder.

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Decoder arrangement at the back of the Zeppelin



Using some Vero board I made a lighting strip for three 610080 lamps and soldered two black wires (80mm length) to the foil on the Vero board and two pin plug to the other end.



I adjusted the pots for max speed (set to the lowest speed, the pot would allow) and inertia to be suitable to speed profile using RR&Co. This locomotive has a very high gearing and even with the speed pot set at minimum it was still too fast. Max speed profiled at 250kph. I think a LokPilot decoder may have allowed a further speed reduction for better profiling.



The final look showing the cabin lights, front light at two different light levels. Well worth the effort both in looks and improved running.

This is the end of the original article see next pages for the LED light upgrade.

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### LED Light Upgrade

I promised my friend that I would change the bulbs to LED lighting which would include a red rear light and I have finally completed this promise.



I noted that my friend had painted the prop and inserted some passengers. The photo above shows the new front and rear LED lights on.



**F1** switches the coach LED lights on. You will notice the lights are a warm white colour and not the intense orange light shown with the bulb lighting on the previous page. The front light is nice and bright and the rear red light a new addition can be seen reflected on to the coach body from the painted prop. The passengers are well illuminated and enhance the look of the Rail Zeppelin.



**F0** switches the front and new rear lights on.



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### Rear Light



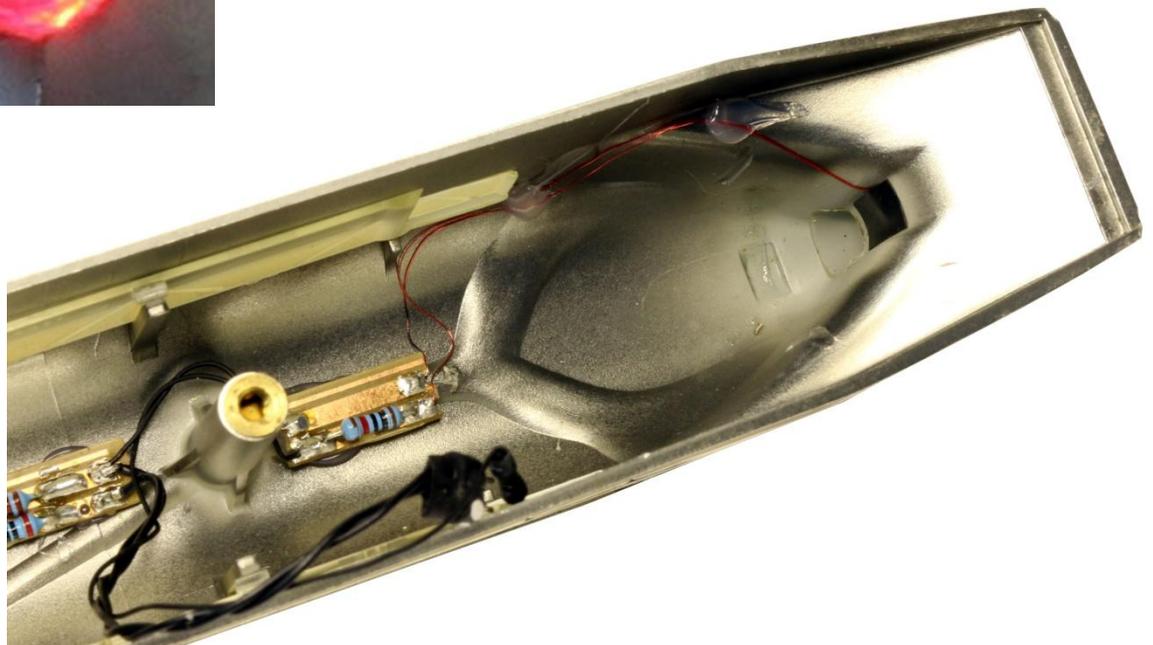
At the back of the body shell there is a moulded indent where the rear light should be. I drilled a 2mm hole just deep enough to fit the 0603 red LED. A 3mm drill was used to create a very small chamfer to allow gluing a homemade lens over the LED.

The two small 0.5mm holes are drilled to allow the 0.25mm enamelled copper wires soldered to the LED to pass through into the interior of the body shell. The two holes prevent the LED from rotating in the hole.

The hole was painted with silver paint, once dry the wires from the LED were threaded through the small holes. A small amount of PVA glue was used to glue the LED into position and finally the homemade lens is glued into position with PVA glue.



Close up with the red LED on. The homemade lens can be seen seated in the chamfered hole which reflects the red light.

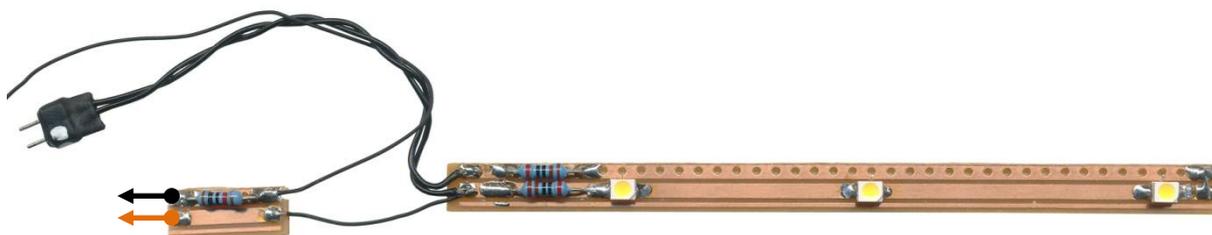


The copper enamelled wires from the rear LED must be protected from the fan mount with some electrical tape to prevent rubbing. I routed the wires as shown, held in place with hot melt glue. The wires are soldered on a small Vero board PCB with a 10k current limiting resistor.

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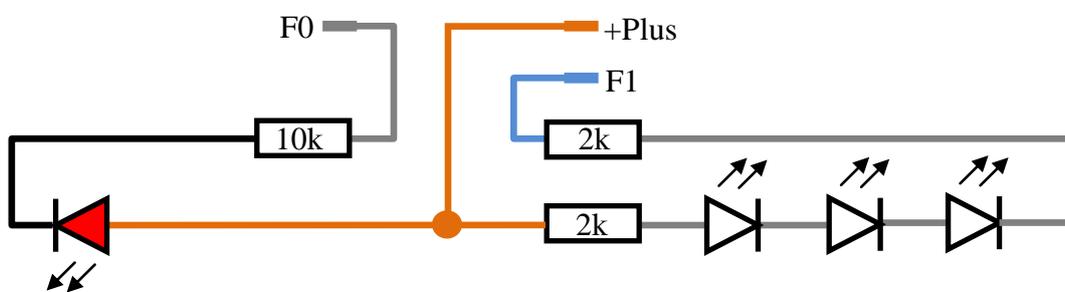
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### Coach LED Lights



I assembled two Vero board PCBs as shown. The small PCB is to mount the 10k current limiting resistor and to be a connection point for the copper enamelled wires for the rear LED. The orange arrow is +Plus and the black arrow is -Neg. The single wire from the 10k resistor is wired to a plug which is connected to the F0 front lights.

### Wiring Diagram Coach LED Lighting



The bulb PCB was removed and the LED lighting PCB is hot melt glued into place as shown.

A single pin socket was added to the existing interconnection PCB for the F0 red light function.

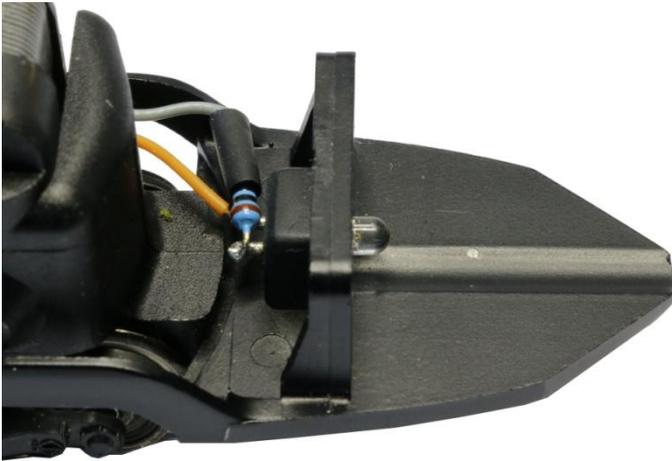
The double pin plug and socket was marked with white paint to ensure correct orientation.



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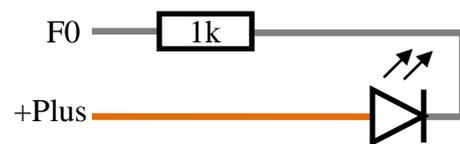
### Front Light



The bulb was removed from the existing socket and the leads of the 3mm warm white LED were filed down to enable plugging into the existing socket.

A 1k resistor was soldered direct to the cathode side of the socket and the orange wire is soldered to the anode side of the socket

### Wiring Diagram Front LED



I'm sure my friend will be happy with the results.

As always enjoy your model trains.