

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Hi All,

I've had the King Ludwig train set with the extension cars since it was produced in 1992-1993 by Trix as a cooperative project with Märklin.

29-04-2017 update starts on page 14.

History

Here is a scan of the 1991-92 English/Italian catalogue showing the train was made as three variants 2880, 2680 and 2698. Please read text below for further details.

The King Ludwig Train Il treno di Re Ludovico

■ Locomotive B VI "Tristan" No. 316 of the Royal Bavarian State Railroad (K. Bay. Sts. B.). All-metal frame and body. High-efficiency Faulhaber motor in the boiler. Precision gear drive to both driving axles of the locomotive. Electronic circuit plate/digital decoder in the tender. Prototypical, see-through outside frame. Outside Stephenson valve gear with Hallschen cranks. Fine, all-metal wheels with shaped spokes and segmented counter weights. Sprung pilot truck axle. Detailed throwbar brake on the tender. Triple headlights which change over which the direction of travel, fine, free-

standing lanterns. Separately applied metal hand rails with formed hardware. Numerous separately applied details: whistle, safety valves, control rods, sound deadener and detailed cabs with separately applied levers. Close coupling with guide mechanisms between locomotive and tender. Close coupler with guide mechanism and standard coupler pocket on the tender. Train lighting provided by means of a current-conducting coupler. Standard coupler pocket can be installed on front of unit.

Car for Travel Commissar and Attendants No. 4556 of the K. Bay. Sts. B. Original two-axle version. Metal frames. Detailed underbody with Heberlein brake system. Delicate axle supports with partial side play. Fine metal wheels with interlaced spokes. Exterior walls with separately applied details: ventilation hoods, roof-walks, etc. Two compartments with interiors. Interior lighting integrated into the car ceiling, power supplied via current-conducting close couplers. Detailed end platforms. Close couplers with guide mechanisms and standard coupler pockets.



Main Salon Car for the Service of His Majesty No. 4555 of the K. Bay. Sts. B.

Original version with four separate axles. Metal frame. Detailed underbody. Delicate axle support with partial side play. Fine metal wheels with interlaced spokes. External walls with separately applied, genuine gilded details: garlands with relief carving, coats-of-arms, etc. Roof with separately applied details: ventilation hoods, roofwalks, genuine gilded royal crown, etc. Reception room, salon, sleeping compartment and 2 wash-rooms with interior details. Extensive furniture in several colors. Interior lighting integrated

into the ceiling, power supplied via current-conducting couplers. Detailed end platforms with genuine gilded roof supports. Close couplers with guide mechanism and standard coupler pockets.

Observation Car No. 7348 of the K. Bay. Sts. B.

Original two-axle version. Metal frame. Detailed underbody. Delicate axle supports with partial side play. Fine metal wheels with interlaced spokes. External walls with separately applied, genuine gilded details: garlands with relief carving, coats-of-arms, etc. Roof with separately applied details: ventilation hoods, roofwalks, genuine gilded royal crown, etc. One closed and two open compartments with interior details. Interior lighting integrated into the ceiling, power supplied via current-conducting couplers. Detailed end platforms with genuine gilded roof supports. Close couplers with guide mechanisms and standard coupler pockets.

2880 Märklin H0

Three-rail AC system electronic reserve unit

2680 Märklin Digital H0

Three-rail Digital system for conventional and digital operation

2698 HAMO Digital H0

Two-rail Digital system for conventional and digital operation

A cooperative project of Märklin and TRIX.

The model of the King Ludwig Train is already sold out at the factory.



The train is illuminated by bulbs which have a high current draw and generates a lot of heat. Heat shields are installed in the car roofs to prevent heat damage.

I thought it was about time I tried converting the lights to LED lighting to improve the lighting effects and reduce the power requirements and eliminate the heat generated in each car.

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Lights for Tristan Locomotive No. 316

I wanted to change out the bulbs for LED lighting without damaging the locomotive so it could be returned to its original state if required.

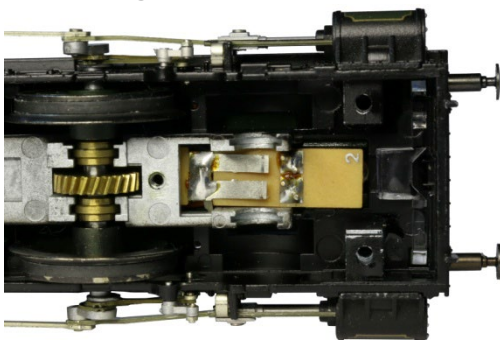


The front of the locomotive shows bulbs on the left and new warm white LED lights on the right. The rear of the locomotive shows bulbs on the left and new warm white LED lights on the right.



I couldn't resist showing the side view of the locomotive.

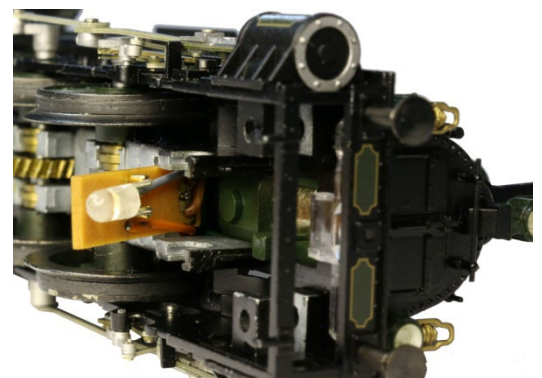
Installing the Locomotive LED lights



The bottom plate which holds the wheels in position has to be removed along with the front wheels to access the bulb to remove it.

The small PCB is bent back to allow access to remove the bulb. Because there is limited space I

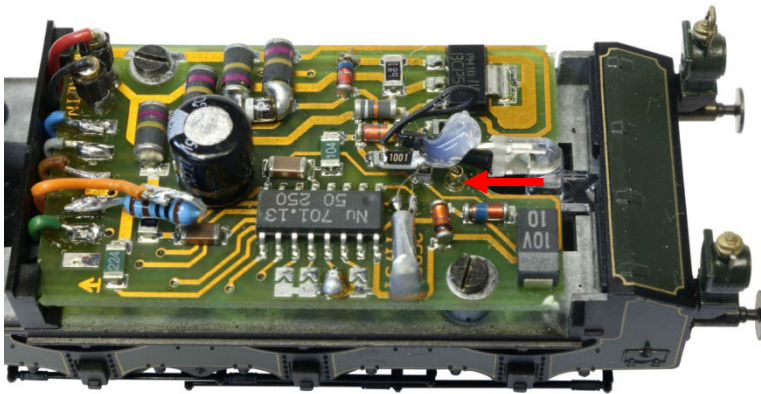
decided to file the collar off the 3mm warm white LED for a better fit. The LED is plugged into the original socket and with the cathode to the grey wire and the anode to the orange wire. The LED current limiting resistor will be mounted in the tender to overcome the limited space at the front of the locomotive.



Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Installing the Locomotive LED lights (continued)



Front LED Limiting Resistor

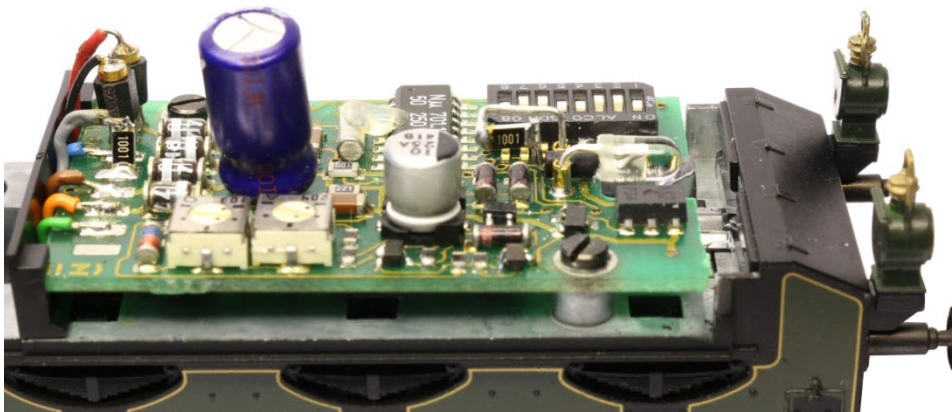
In the tender for the front LED limiting resistor, I removed the orange wire and soldered the 1k resistor direct to the solder pad. The orange wire is soldered to the other end of the resistor as shown. For clarity I removed the heat shrink tube over the resistor. In this example the current limiting resistor connects to the anode of the front LED.

Rear LED and Limiting Resistor

I removed the collar off the 3mm warm white LED by filing it. In the photo above I plugged in an off cut resistor lead bent at 90 deg. to the positive socket (red arrow) to this lead I soldered a 1k 1206 resistor. A black wire was soldered to the other end of the resistor which was soldered to the anode of the LED.

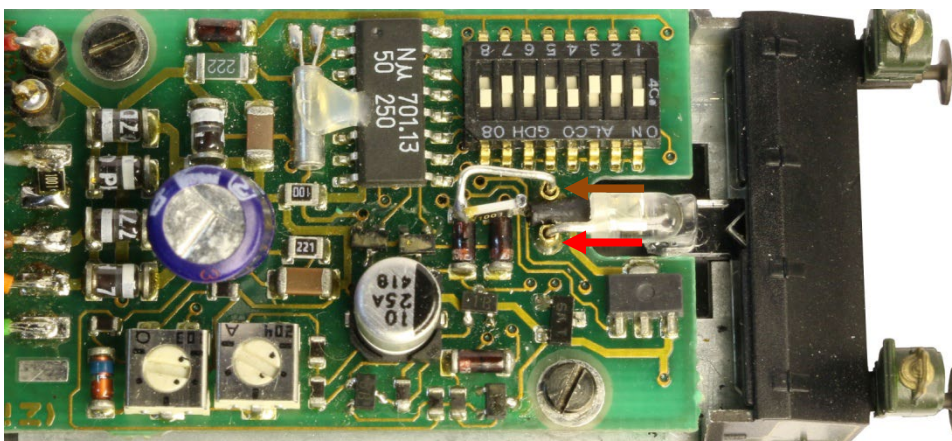
The cathode of the LED was plugged directly into the minus socket under the hot melt glue which was to stop the arrangement twisting off centre. The above arrangement shows the limiting resistors connected to the anode side of the LEDs.

For the 3797-3497 Murnau (Peat Train) locomotives I have the current limiting resistors on the cathode side of the LEDs which I think works better.



On the lefthand side, you can see a 1k 1206 resistor soldered direct to the pad in a vertical position with the grey wire for the front LED soldered direct to the top of the resistor.

The rear LED anode lead is plugged into the plus socket (red arrow).



The LED cathode is protected by heat shrink tube between the sockets then bent up to allow the 1k 1206 resistor to be soldered to it. At the other end of the resistor an off cut resistor lead is shaped to plug into the minus socket (brown arrow). I took care to ensure there weren't any short circuits.

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Installing LED Lights in the Main Salon Car No. 4555

I decided to start with the king's salon car. Below you see the car light with the original bulb lighting.



The bulbs cast an orange light and don't show the true colours of the interior which are blue, gold and red. Also one bulb is located above an enclosed area which cannot be seen from the outside. My first attempt using yellow LEDs was a disaster as it didn't improve the overall appearance of the lighting.



Using cool white LEDs, the colours improved as shown above but the lighting effect didn't look true to the period because they were too white with a blue tinge and bright so I needed to find a compromise that was between the two examples shown above. The windows on the right have yellow LEDs to just give the appearance of dull light.

LED Tinting

The 0603 bright white LEDs I have show a blue tinge to the light output. To cure this problem I used Tamiya Clear Yellow X-24 acrylic paint.



Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024



With the LEDs painted I've achieved a balance of light suitable to the period and to show different colours in the coach. The two photos below show both sides of the coach.



The car on the left has the new LED lighting and the car on the right has the original bulbs.



The other side of the cars shows the car on the left has the original bulbs and the car on the right has the new LED lighting.

All photos showing two cars have been exposed with the same camera settings so a truer comparison can be made on the LED lighting versus the original bulb lighting (see last page).

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Inside The Kings Car (2680, 2880 and 2698)

Lighting PCBs



2680

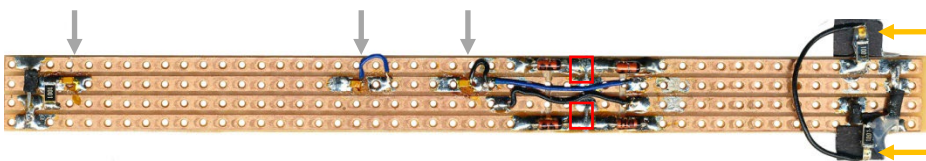
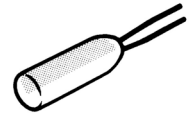
2880: 61 004
2680: 61 008
2698: 61 004

With the PCB above you can see I moved the bulb position away from its internal location in an earlier modification.



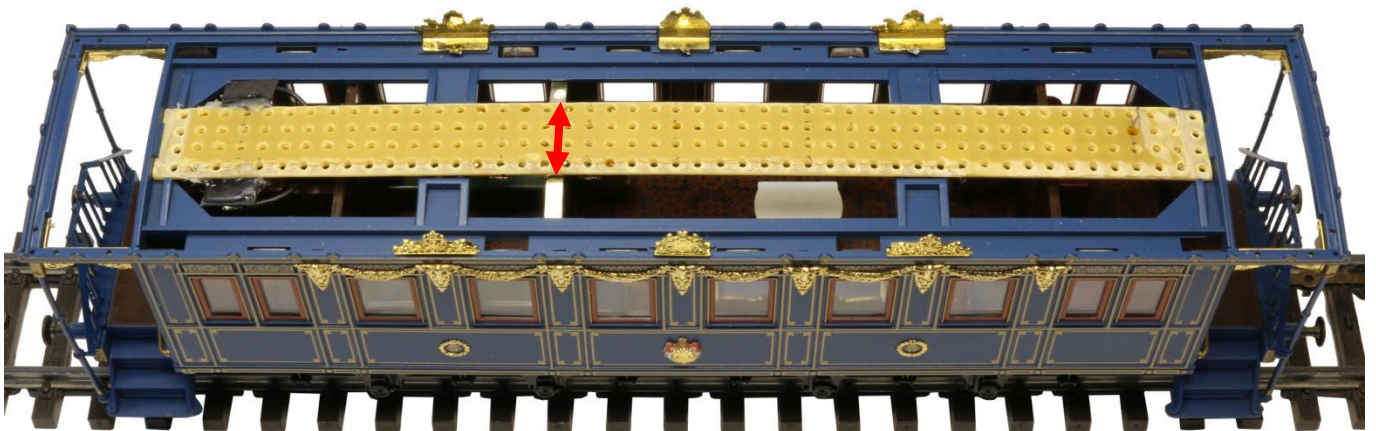
2880

With 1N4007 diode



LED light replacement.

The grey arrows show the white LED positions. The orange arrows show the yellow LED positions. The red rectangles indicate the locations of the power spring contacts red arrow for the coach. I constructed a bridge rectifier from 1N4198 diodes to eliminate the digital flicker. The three white LEDs are in series with one 1k 1206 resistor and the two yellow LEDs are in series with two 1k 1206 resistors.



The LED light PCB in position with the violet arrow showing the locations of the power spring contacts for the car.

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

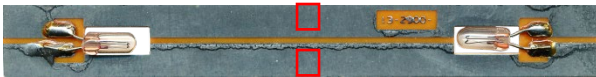
The Travel Commissar and Attendants Car No. 4556



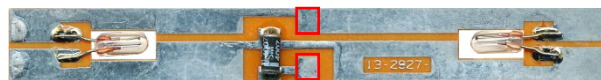
The coach on the left has the new LED lighting and the coach on the right has the original bulbs.

Inside The 4556 Car (2680, 2880 and 2698)

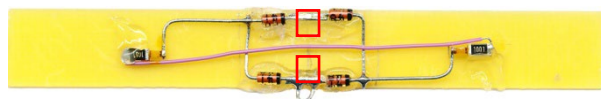
Lighting PCBs



2680



2880 with 1N4007 diode

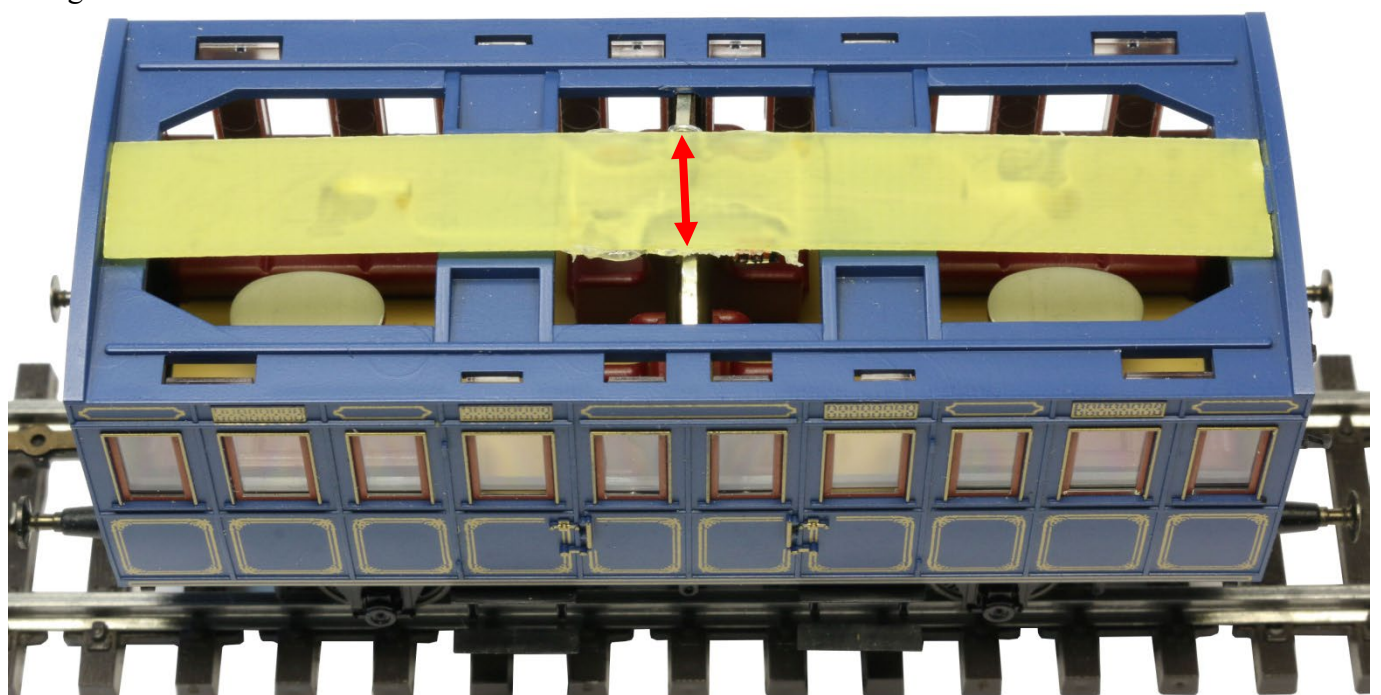


LED light replacement.
0.8mm thick blank PCB

2880: 61 004
2680: 61 008
2698: 61 004



The red rectangles indicate the locations of the power spring contacts for the coach shown by the red arrow in the photo below. I constructed a bridge rectifier from 1N4198 diodes to eliminate the digital flicker and the two white LEDs are in series with two 1k 1206 resistors. All components are glued to the PCB with hot melt glue.



Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

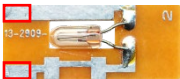
The Observation Car No. 7348



The car on the left has the new LED lighting and the car on the right has the original bulbs.

Inside The 7348 Car (2680, 2880 and 2698)

Lighting PCBs



2680



2880 with 1N4007 diode



LED light replacement. The Vero board was reduced to 0.8mm thickness by sanding.

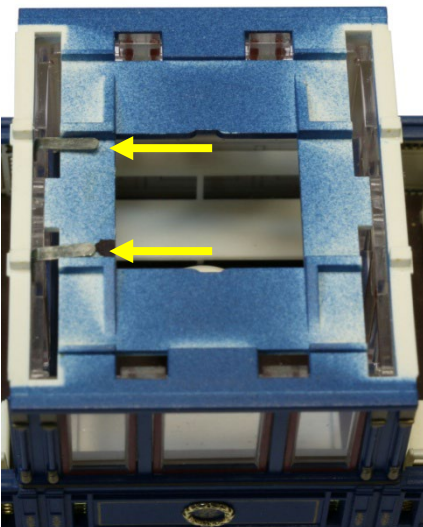
2880: 61 004

2680: 61 008

2698: 61 004



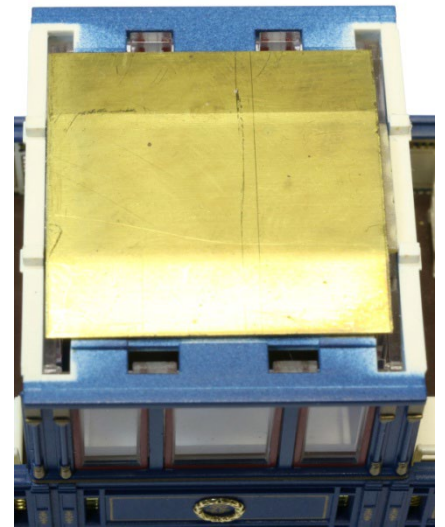
The red rectangles indicate the locations of the power spring contacts for the coach shown by the yellow arrows in the photo below. I constructed a bridge rectifier from 1N4198 diodes to eliminate the digital flicker and the one yellow LED is current limited by a 1k 1206 resistor.



First photo shows the contacts



The second photo shows the PCB



Last photo is with heat shield

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

The Supplement Cars (4396, 4398 and 4399)

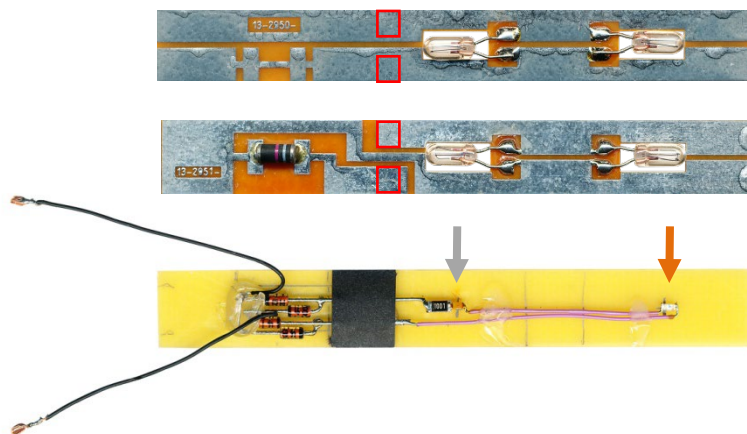
The Servants/Heating Car No. 4559



The car on the left has the new LED lighting and the car on the right has the original bulbs.

Inside The 4559 Car (4396, 4398 and 4399)

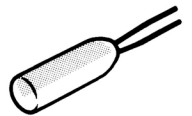
Lighting PCBs



2880: 61 004

2680: 61 008

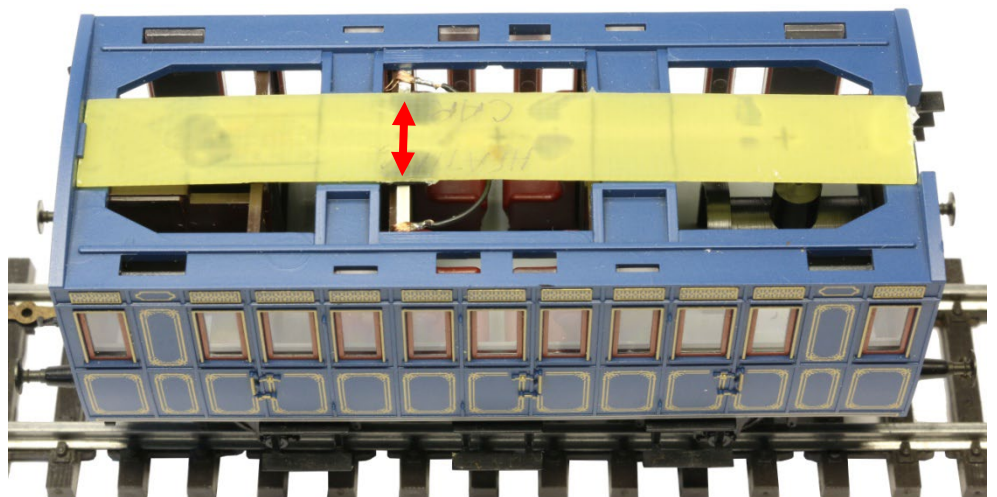
2698: 61 004



LED light replacement.
0.8mm thick blank PCB.

The red rectangles indicate the locations of the power spring contacts for the car shown by the red arrow in the photo below. I constructed a bridge rectifier from 1N4198 diodes to eliminate the digital flicker with the grey arrow showing the location of the white LED and the orange arrow for the yellow LED position which is a series circuit, current limited by a 1k 1206 resistor.

At the end of the wire leads I constructed a wire loop that is threaded onto the spring contacts. The black insulation paper in the photo above prevents any short circuits on the spring contacts.



Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

The Galley/Service Car No. 19040



The car on the left has the new LED lighting and the car on the right has the original bulbs.

Inside The 19040 Car (4396, 4398 and 4399)

Lighting PCBs



4396



4398 with 1N4007 diode

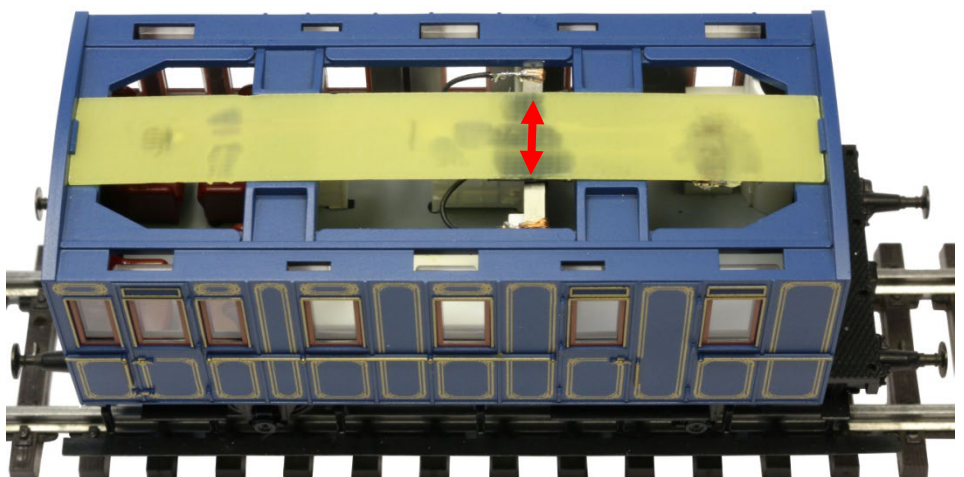


2880: 61 004
2680: 61 008
2698: 61 004



The red rectangles indicate the locations of the power spring contacts for the car shown by the red arrow in the photo below. I constructed a bridge rectifier from 1N4198 diodes to eliminate the digital flicker with the grey arrow showing the location of the white LED and the orange arrow for the yellow LED position which is a series circuit, current limited by a 1k 1206 resistor.

At the end of the wire leads I constructed a wire loop that is threaded onto the spring contacts. The black insulation paper in the photo above prevents any short circuits on the spring contacts.

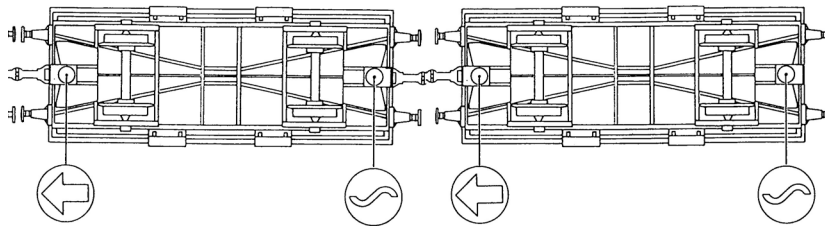


Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Extra Information

4399



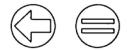
Märklin H0 2880
4398



Märklin Digital H0 2680
4396



HAMO Digital H0 2698



Märklin provide the information above in the manuals for the various systems. The symbols on the right are moulded into the coupling pockets on each car. Once the LED light upgrade has been done it will work on any of the systems.

Kolls 2000

2680	1	König-Ludwig-Zug wie 2880, jed. DIG → <i>Hamo-Digital 2698</i> <i>Sonderserie in Zusammenarbeit mit TRIX</i>	1992+1993	1600
	2	ergänzt durch Dienerschafts-Heiz-Wagen und Küchen-Service-Wagen (4396), zweistufiger Metall-Präsentations-Sockel z. Austausch	1993	1900
2880	1	König-Ludwig-Zug: Dampf-Lok B VI der Königlich Bayerischen Staatsbahn, grün/schwarz, Name Tristan, 3497.10; Salonwagen, vierachsig, Terrassenwagen, zweiachsig, Commissär-Wagen, zweiachsig; Präsentations-Vitrine aus Holz mit Gleis-Sockel und Plexiglas-Fenster <i>Lokomotive mit Vitrine und die Wagen wurden einzeln geliefert</i> <i>Sonderserie → 2680, Hamo-Digital 2698</i> <i>in Zusammenarbeit mit TRIX, dort auch Gleichstrom und Trix-Express</i>	1992 / 1993	1500
	2	ergänzt durch Dienerschafts-Heiz-Wagen und Küchen-Service-Wagen (4398), zweistufiger Metall-Präsentations-Sockel z. Austausch	1993	1800
4396	1	Ergänzungs-Wagen zum König-Ludwig-Zug (2680, Digital-System): Dienerschafts-Heiz-Wagen mit hochstehendem Bremserhaus, Küchen-Service-Wagen mit Dachaufbau, jeweils 2 Achsen, blau, mit Plattform, Inneneinrichtung, Innenbeleuchtung, >9,7 cm< <i>Sonderserie in Zusammenarbeit mit der Firma Trix</i>	1993	300
4398	1	Ergänzungs-Wagen zum König-Ludwig-Zug: (2880, Normal-System), sonst wie 4396 <i>Sonderserie in Zusammenarbeit mit der Firma Trix</i>	1993	300

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Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Current Measurement Table

	2680		2880		4396		4398	
Car No.	Bulb	LED	Bulb	LED	Bulb	LED	Bulb	LED
4559	24mA	3mA	75mA	3mA				
4555	35mA	7.5mA	115mA	7.5mA				
7348	40mA	1.6mA	40mA	1.6mA				
4559					24mA	6mA	78mA	6mA
19040					24mA	6mA	78mA	6mA

The current measurements above are a typical indication of the power consumption for each car.

With the LED upgrade, power consumption is very low and the heat in each car has been reduced to near zero.

Conclusion

The time taken to do this project is well worth the effort to have improved lighting that renders more true colours and the light levels between each car match the time period by not being too bright. I'm happy with the outcome but will let you judge if you think I was successful.

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Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Final look with all Cars on the one page, LED lighting on the left and original bulbs on the right.



Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

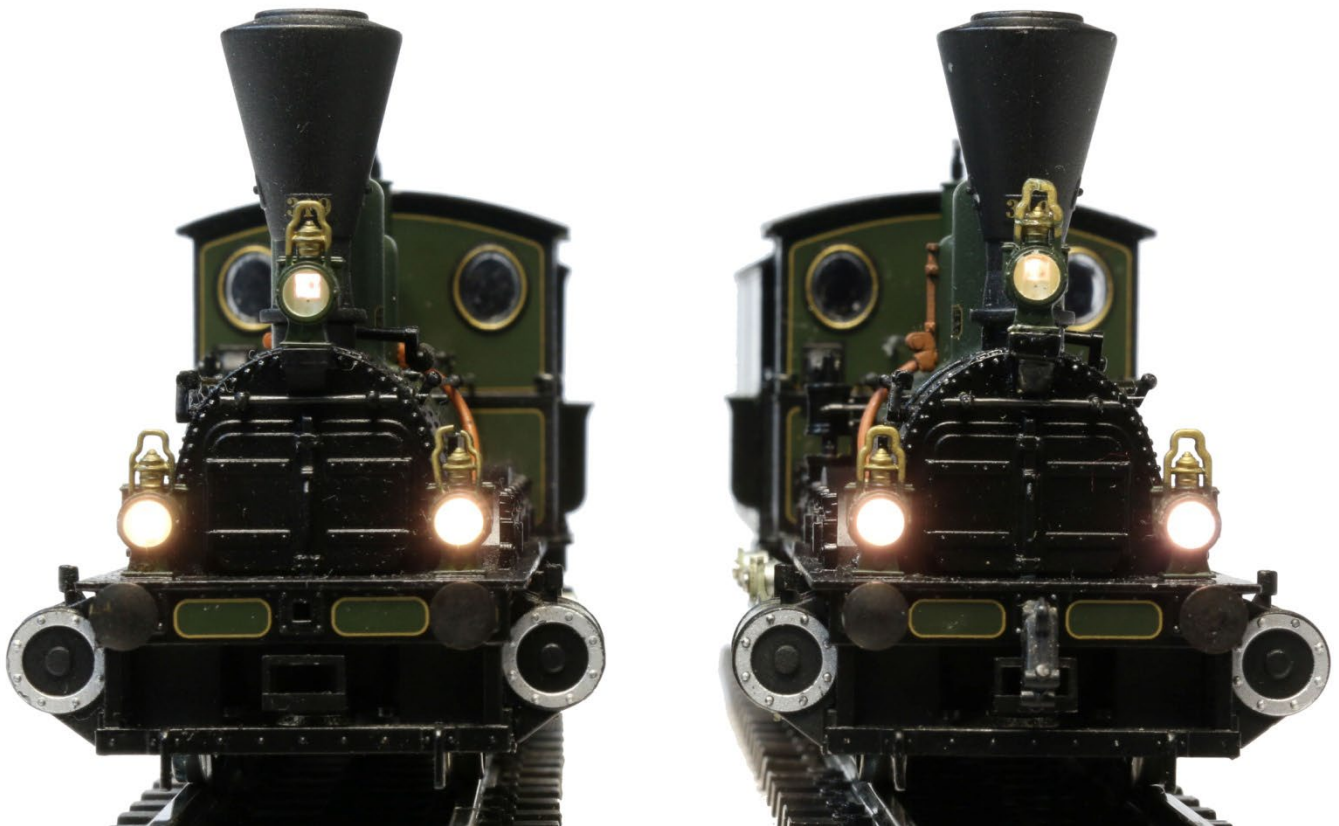
Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

Front Centre Top Light Fix

I was on my last LED light upgrade for the 3797-3497 Murnau (Peat Train) locomotive which is similar to the Tristan (King Ludwig) locomotive. With the LEDs installed I discovered that the front top centre light wasn't working so I put myself to the test to fix the problem. This fix isn't easy but I thought it was worth including here.

The previous owner of this locomotive had used plastic cement to glue the lantern in place as these locomotives are notorious for the lanterns coming off very easily. Using glue made the light pipe go a milky yellow colour which cut down on the light transmission from the lantern close to zero. My first thought was to look at the spare parts list for this locomotive, I couldn't find any for the 3797-3497 locomotives but I found a parts list for the 37974 locomotive. To my dismay the required parts are not listed at all which seems to be a trend that Märklin has adopted to make spares difficult to get.

I decided to create my own parts that would function as replacements to get the light working once more and this proved difficult and time consuming to get the results shown below.



The locomotive on the left has LED lights with the original light pipe and the photo on the right has LED lights with the home made light pipe and lantern holder. The light is better than the photo shows as these things are always hard to photograph. I was pleased that the centre light now worked to the same brightness as the other locomotives and the lantern holder looked close in size and shape as the original.

Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024

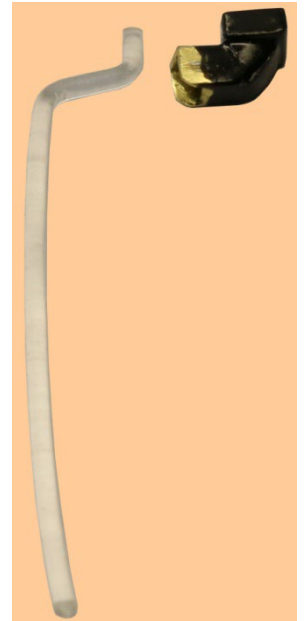
First, I tried to remove the light pipe and lantern holder but because glue was used to hold the lantern the glue had migrated to the light pipe and lantern holder making it impossible to remove in one piece.



On the left you can see the original light pipe and lamp holder, both broken.

On the right I used a 1mm dia. optic fibre with a homemade lantern holder made from brass tube.

I decided to turn the optic fibre up and drill a 1.05mm hole into the bottom of the lantern to try and improve light output and help support the lantern.



make the brass holder size.



The lantern holder was made from 1/8" and 3/64" square brass tube. I measured the original holder and tried to make the same

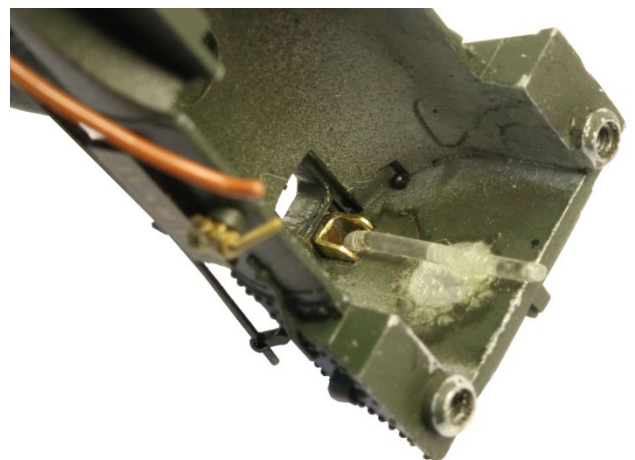
The brass together, a flat black goes to get kept solder for a insert the solder



tubes were soldered filed smooth and painted as shown. I had three the solder to hold as I removing too much nice finish and trying to stiff optic fibre broke the joints.

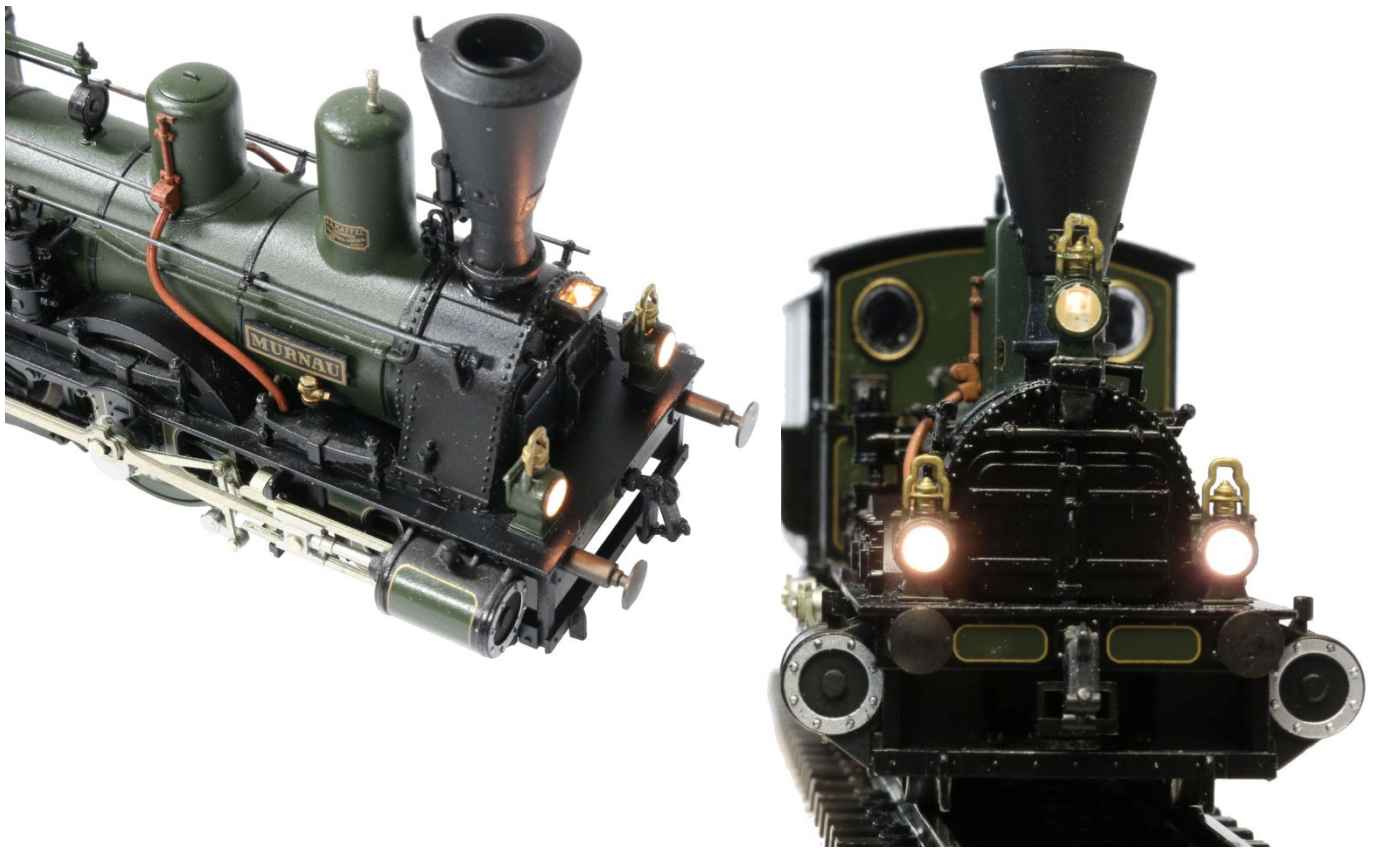
The optic fibre light pipe first had to be inserted into the lantern holder before inserting the lantern holder into the locomotive as the s-bend shape of the optic fibre was too stiff to allow insertion if the holder was inserted into the locomotive body first.

The lantern holder was carefully glued using super glue (liquid). Acetone and a cotton bud were used to remove the paint overspray then I glued the light pipe in the middle using Selleys ALLFIX flexible clear glue making sure that there was a 0.6mm clearance under the light pipe at the body shell edge to make reassembly of the body shell to the chassis.



Tip: 2680-2880 King Ludwig Train Set and 4396-4398 LED Light Upgrade

Date: 18-04-2017 29-04-2017 Update, New 16-01-2024



The LED light and optic fibre light pipe was tested at this stage to ensure I got the required results. I found that I had to glue the lantern on as the brass lantern holder was too big to hold the lantern tight so I smeared on super glue gel very sparingly to ensure that no glue would get on the light pipe.

Even though this proved to be a very time consuming fix, over all I was happy with the end results.

As always enjoy your model trains.