Tip: Faller 130980 Iron Foundry LED Light Upgrade

Date: 01-11-2020, Fix 12-05-2024

Hi All,

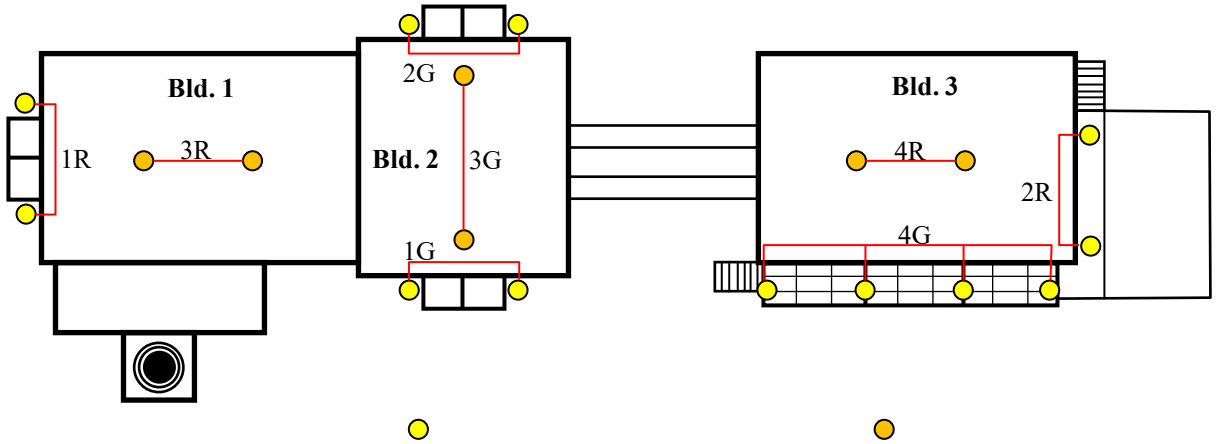
The faller **130980** Iron Foundry is no longer available but has been produced under the following catalogue numbers **194980** and **222185** which is the current model number.

I have had this model on my layout for over 20 years and after finding the imitation outside lights in my box of spare plastic parts this was the catalyst for upgrading the imitation lights to real lights first, see article below then to install them on the iron foundry buildings shown above.

Faller Imitation light to Real Light version 3 starting on page 6

I was never happy with the standard bulb lighting in these buildings as the light was orange in colour and the light level was very low. Upgrading to LED lighting isn't always easy as the light is more directional and fitting them into an assembled building has a few challenges which I will cover in this article.

Planning



Total of 18 LEDs, 12 x **0603** white LEDs and 6 x **PLCC2** warm white LEDs
The LEDs are controlled with an **m83** decoder with 8 switching functions (1R, 1G.....4R, 4G). The outside lights use the Low Energy Lamp option, the internal building lights use the Dimmer option and the 4G canopy lights use the Fluorescent Tube option, more on this later.

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Planning continued

The Iron Foundry is mounted on its own base board which can be removed from the layout. To remove the Iron Foundry, I just had to unplug the motor for the overhead gondola system, lighting circuit and the smoke unit for the smoke stack. After removing four mounting screws from the base board the foundry assembly can be lifted and removed from the layout.

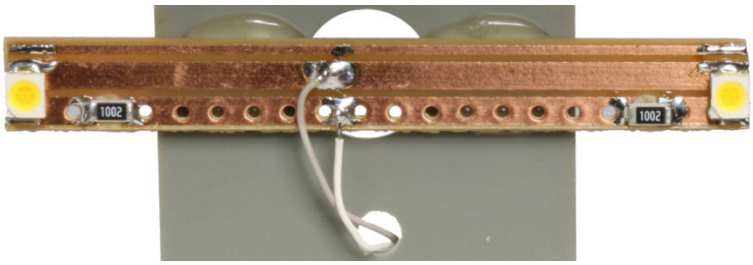
With the increase in LEDs, wiring and **m83** decoder required I decided to still have the base board removable but I would go one step further and be able to remove each building from the layout without removing the base board as this would allow me to remove one building at a time for cleaning and maintenance as required.

Each LED would have its own current limiting resistor which would allow individual control of each LED. For practical purposes I grouped the LEDs into switching groups to be controlled by one m83 module see diagram on previous page. If at some later stage I wanted to change how the LEDs are controlled the changes to the wiring would be easy to implement.

Building 1 Wiring

I started with **Bld. 1** by removing the bulbs and existing wiring. **Bld. 1** has the least number of LEDs to wire and would give me an idea where I should place the LEDs and what other problems I might encounter. The floor of the building wasn't glued so could be removed to make fitting the LED lighting strip below easier to glue in place.

I constructed the LED lighting strip 50 mm length using PLCC2 warm white LEDs and a 10k current limiting for each LED. The PCB is hot melt glued to the central support across the original bulb mounting location.



The grey wire is connected to the anode of each LED and the white wire is connected to each 10k resistor. The other end of the resistor is connected to the cathode of each respective LED.

When I tested the building lights, I found the light was dim and the building looked empty because of the clear windows without detail decals.

The light intensity was improved by adding thin white card at two locations (red arrows).

The empty look was solved by gluing thin Baking Paper over the windows with PVA glue. I made sure the glue was away from the window area.

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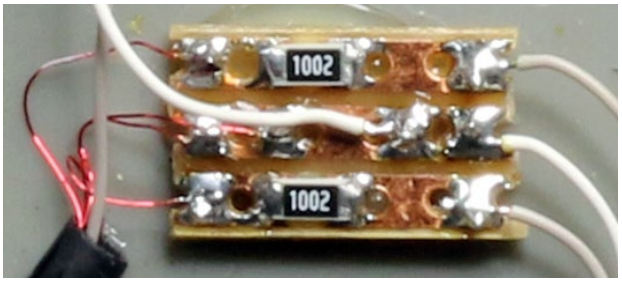
Building 1 Wiring continued

I decided the location for the outside lights and using the lines of the building bricks I drilled a 0.5 mm hole for each light to ensure both lights would be equal in height and would look symmetrical on the building.

I soldered the wires on each light together to make threading of the wires through the wall and the black masking card behind much easier.

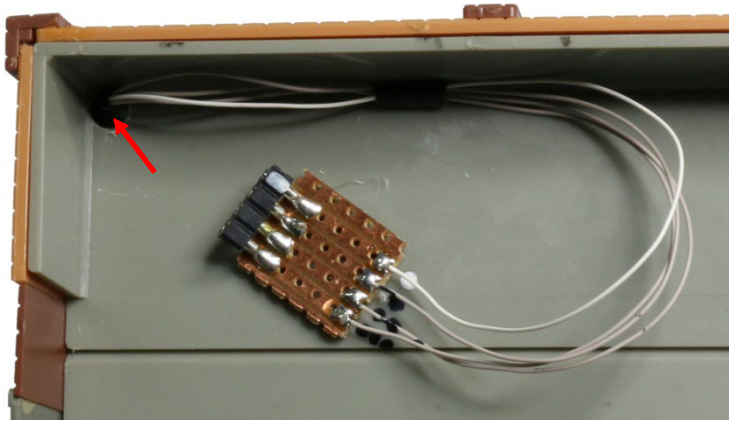
Finally, the lights were glued into place with Faller Expert glue.



A small PCB for the outside lights shown right was constructed with the anodes of the LEDs connected to the 10k resistors. The cathodes of the LEDs are joined together and connected to the white negative foil with the white wires. The two grey and one white wire on the right are routed to the m83 via a connector in the base of the building.

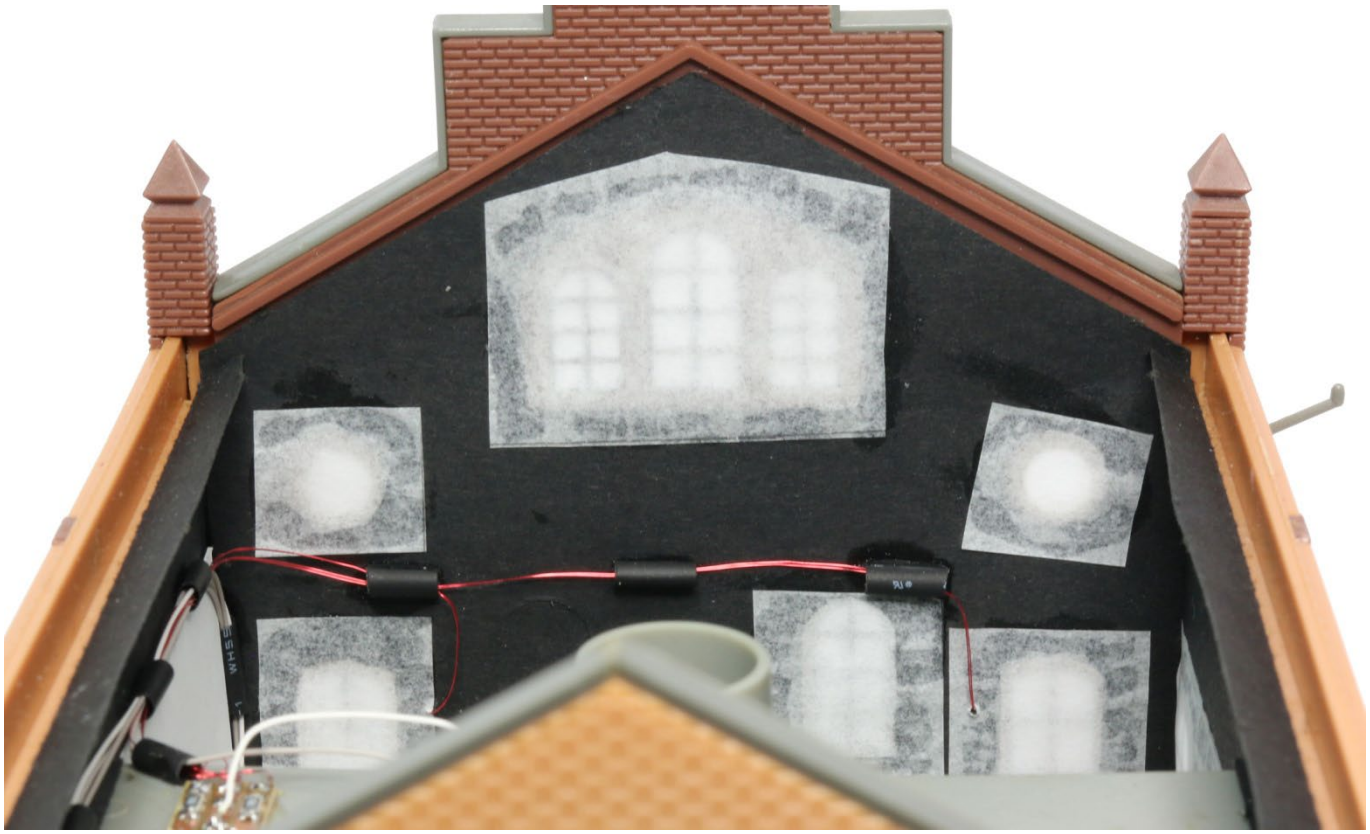
The 0.15mm enamelled copper wires from the outside lights are routed through small lengths of heat shrink tube to the resistor interconnection PCB which was hot melt glued in place as shown.

Building 1 Wiring continued



I drilled a 2.5 mm hole in the corner of the floor insert, (red arrow) which allowed the heat shrink that held the wires in the corner of the building to protrude through the hole. The wires were threaded through the hole then the floor was inserted into the base of the building. The loop in the wires allows the removal of the floor without unsoldering the wires.

The interconnection PCB was constructed with a 4-way socket made from rolled IC pins. The white wire is the common negative and three grey wires are the positive wires which are switched by the m83 decoder.



The Baking Paper makes a very good translucent window. Using heat shrink tube to support the wires allows removal or further additions if required in the future.

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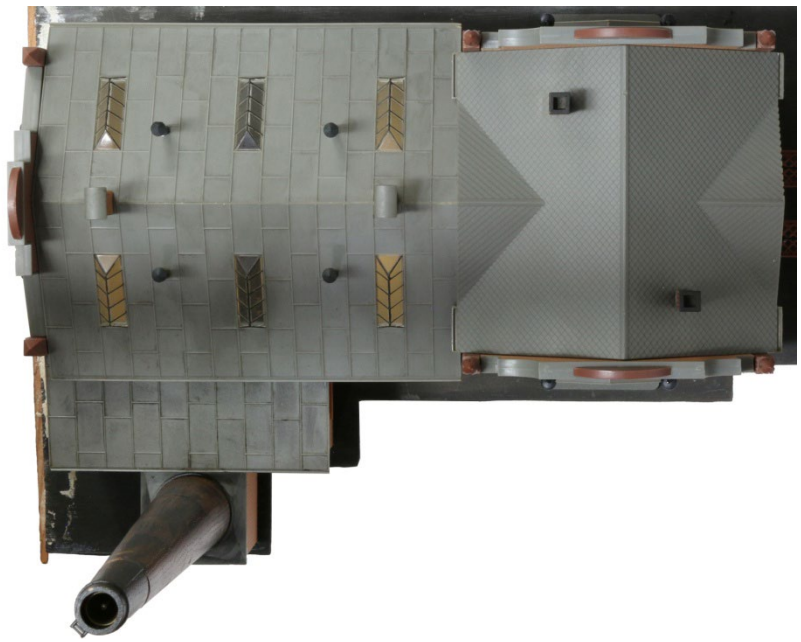
Building 1 Lights

Building lights and outside lights on. With these results I was keen to continue on to the next building.



The roof skylights light up when the building lights are on.

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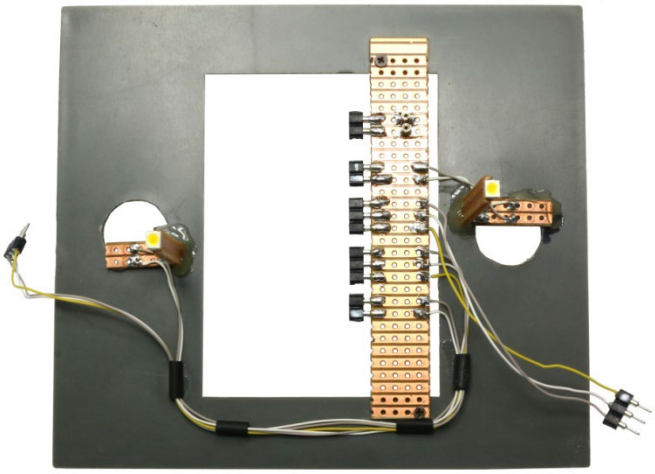
Building 2 Wiring

Building 2 is the central building of the foundry where the motor for the overhead gondola system is housed. All the windows have detail decals.

This building presented unique challenges as I wanted easy serviceability for the motor and be able to remove the building from the layout for cleaning and maintenance.

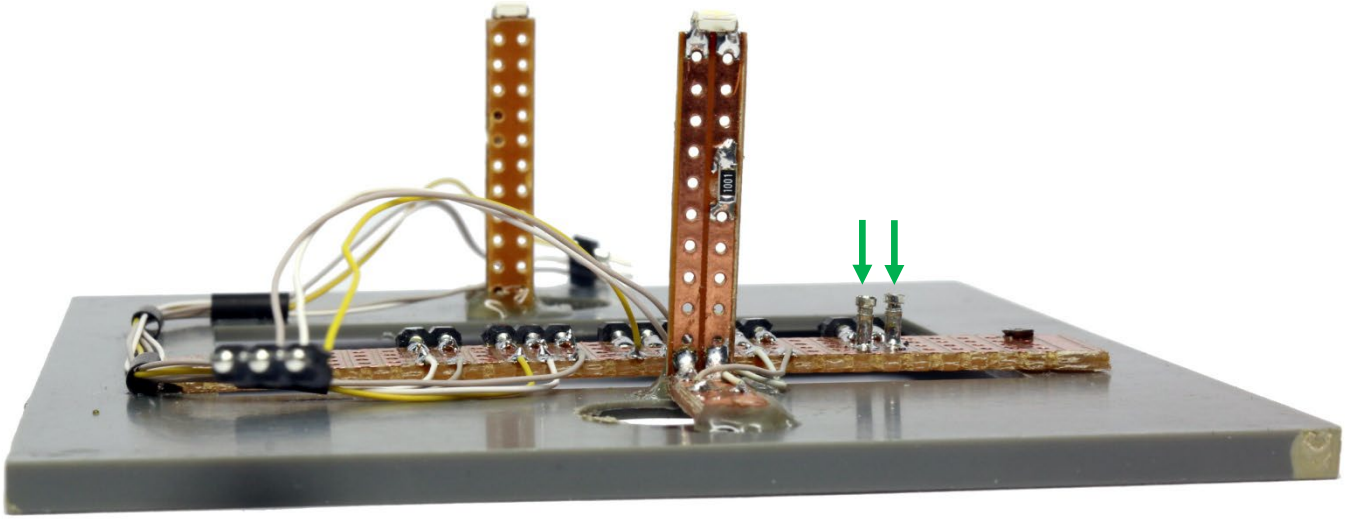
Once again with the roof and base removed, I removed the old wiring and bulbs.

Using a PLCC2 LED on extension wires I positioned the LED pointing upwards where the original bulb would have been and found it didn't light the windows evenly and the light level was very low.



I found by raising the LEDs up to a height of around about 34 mm the light coverage for all windows improved. The two raised LEDs each have a **1k** current limiting resistor.

The top view left shows an interconnection PCB with rolled IC pins used as sockets. The two 3 pin plugs on free wires is for the front and rear door lights, more on this later in the text.



The 2 sockets (green arrows) are where the motor plugs in when the building is fitted on the base. For maintenance the entire base can be removed.

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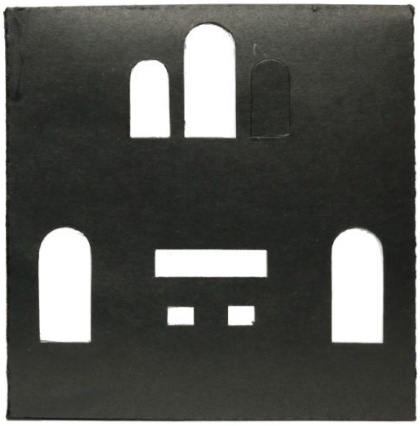
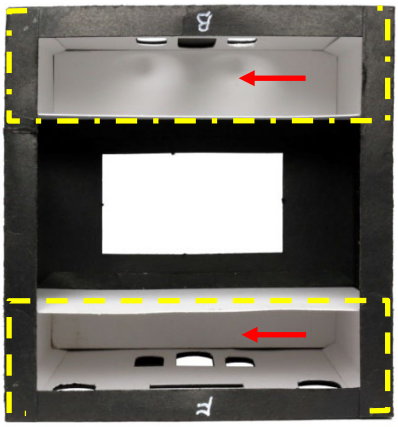
Building 2 Masking

The next issue was to improve the light level for the building lights. I removed the black card lighting mask supplied in the original kit to insert thin white card inside the light light-mask to improve light levels and to provide an even diffused light for all windows.



The first step is to cut 2 pieces of card to fit at the front and back window locations.

On each card I traced out all the window locations and removed those parts of the card. The light would only show where the black card has been removed.



2 pieces of white card were cut for the roof of the lighting mask insert (red arrows). The final 2 pieces are the rear and sides of each lighting section. The card is folded as indicated by the yellow dashed lines and once inserted into the black mask it holds all the white hard in position without any glue.

The final light mask assembly is marked to show the front and back position and with a satisfactory result with the building lights on I once again removed the mask assembly to install the front and rear outside door lights.

Building 2 Door Lights

I used the same method for the outside lights as building 1 using the lines of the building bricks I drilled a 0.5 mm hole for each light to ensure both lights would be equal in height and would look symmetrical on the building. This was done for the front and back of the building.

The wires for the lights were threaded through the holes and finally the lights were glued into place with Faller Expert glue.

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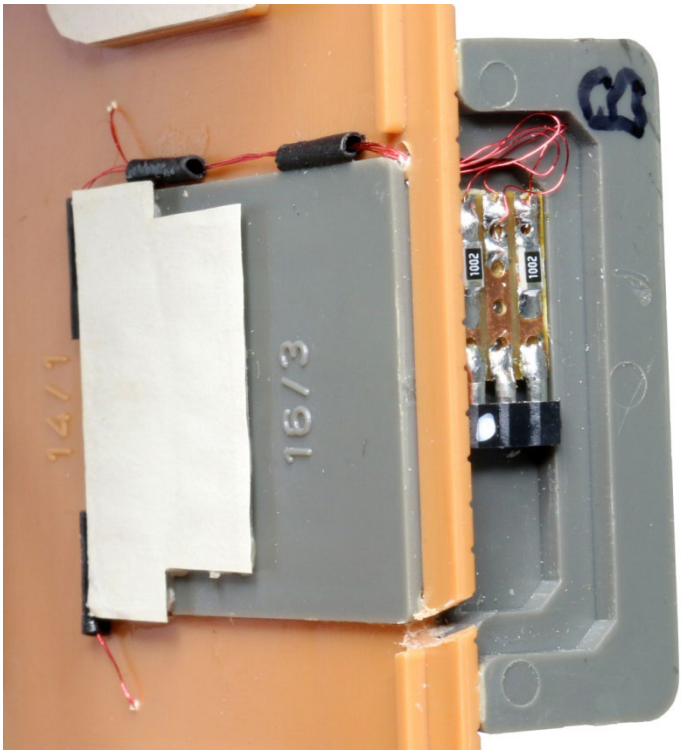
Building 2 Door Lights Wiring

Because I wanted to be able to service the motor if required, I need to be able to remove the building light mask which means the wiring for the outside lights has to be routed behind the building wall and somehow enter the building without interfering with the light mask, this is how it was done.

The 0.15mm enamelled copper wires from the lights are routed across and down beside the door part held in place with lengths of heat shrink tube that has been shrunk to 1 mm as this enables the wire supports to remain below the rear of the door. The building light mask has no problems sliding past this area.

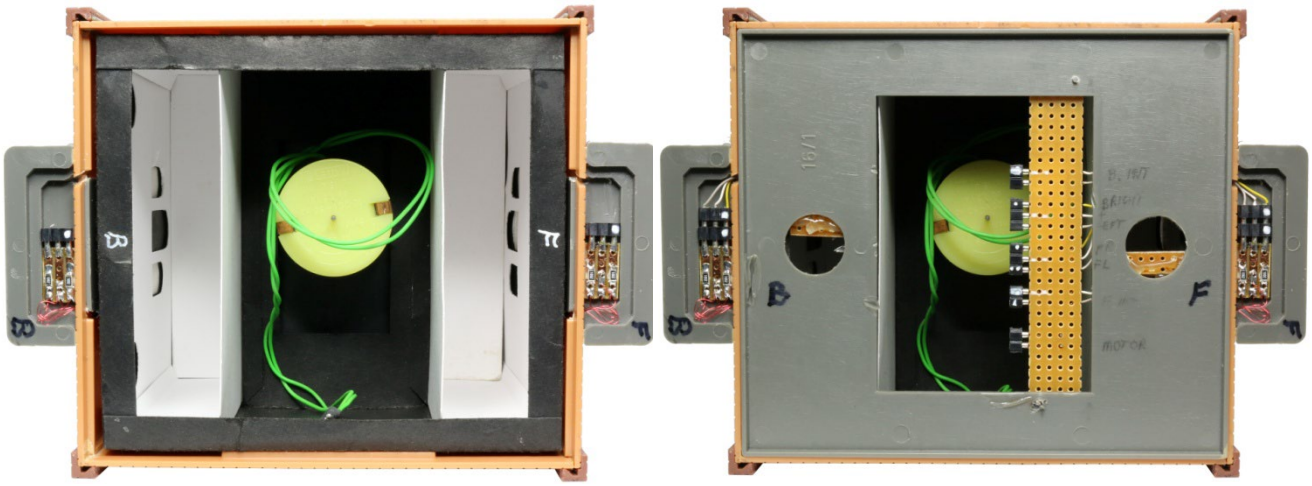


A 1 mm hole was drilled at an angle from the underneath of the foot-steps to exit below the lower edge of the door.

Under the door step you can see a small PCB with 10k current limiting resistors. Using rolled IC pins a 3-way socket is at the end of the PCB.

The copper wires are threaded through the holes and soldered to the PCB foils. The negative supply for the lights is the centre foil.

On the other side of the door, I have cut a narrow slot to allow the wires from the base plate assembly to be plugged into the socket after the light mask has been fitted.



With the light mask fitted the next step is to plug in the motor then the front and back door lights to their respective sockets under the steps and carefully insert the building base plate ensuring no wires are pinched.

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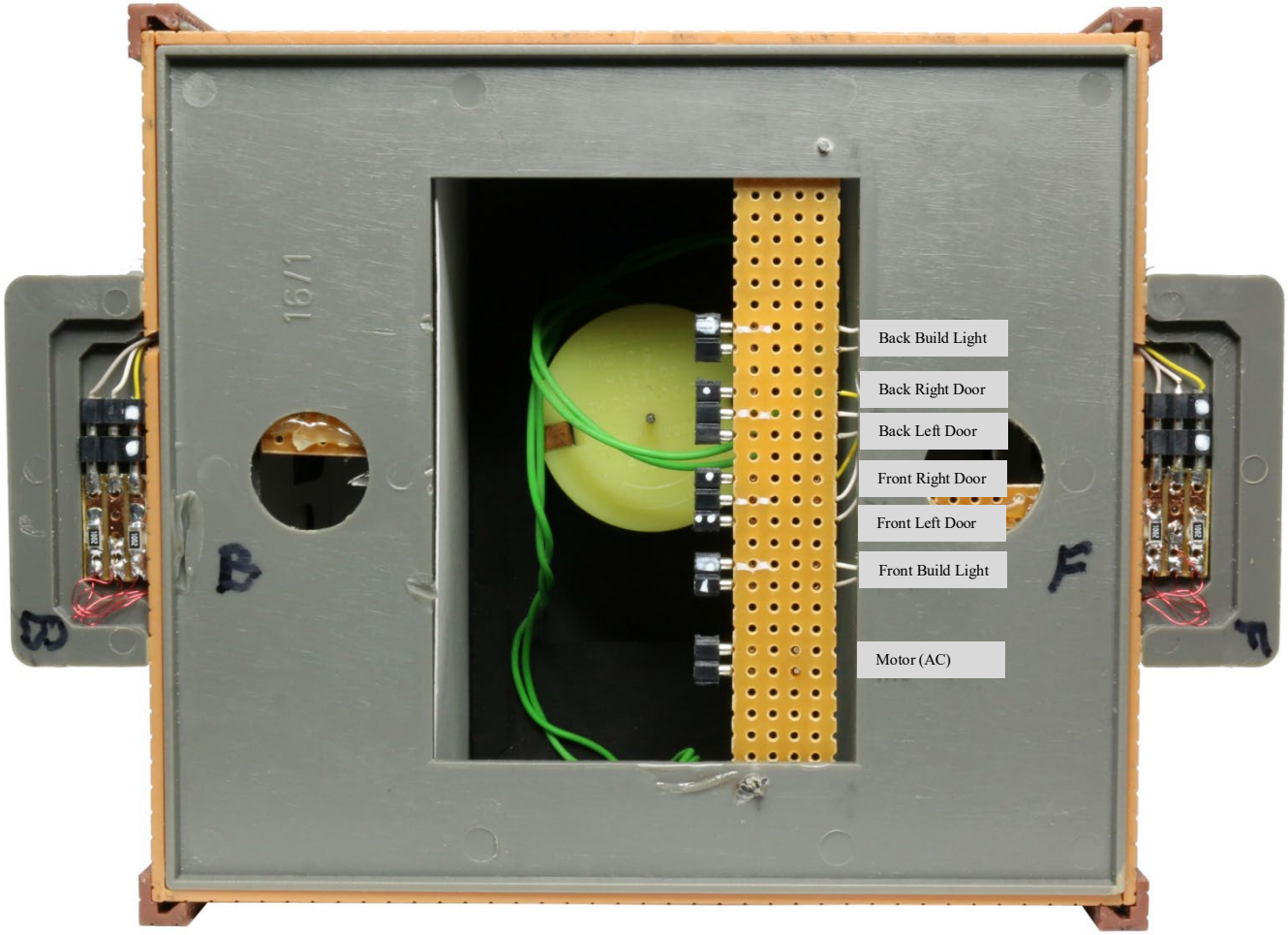
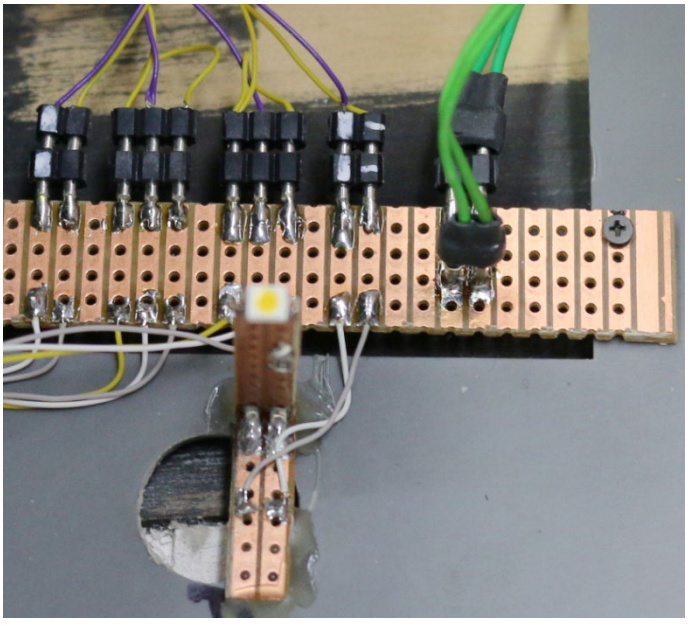
Building 2 Wiring



In the building all the LEDs are individually wired to the interconnection PCB with the rolled IC pins soldered on as sockets. The white lines indicate the negative power connections. Each socket group is marked with white dots to identify the orientation of the plug.

This photo shows a view of the plug and socket arrangement. The violet wire on the plug connectors is the negative power.

The green wires for the motor are AC powered so the orientation isn't important.



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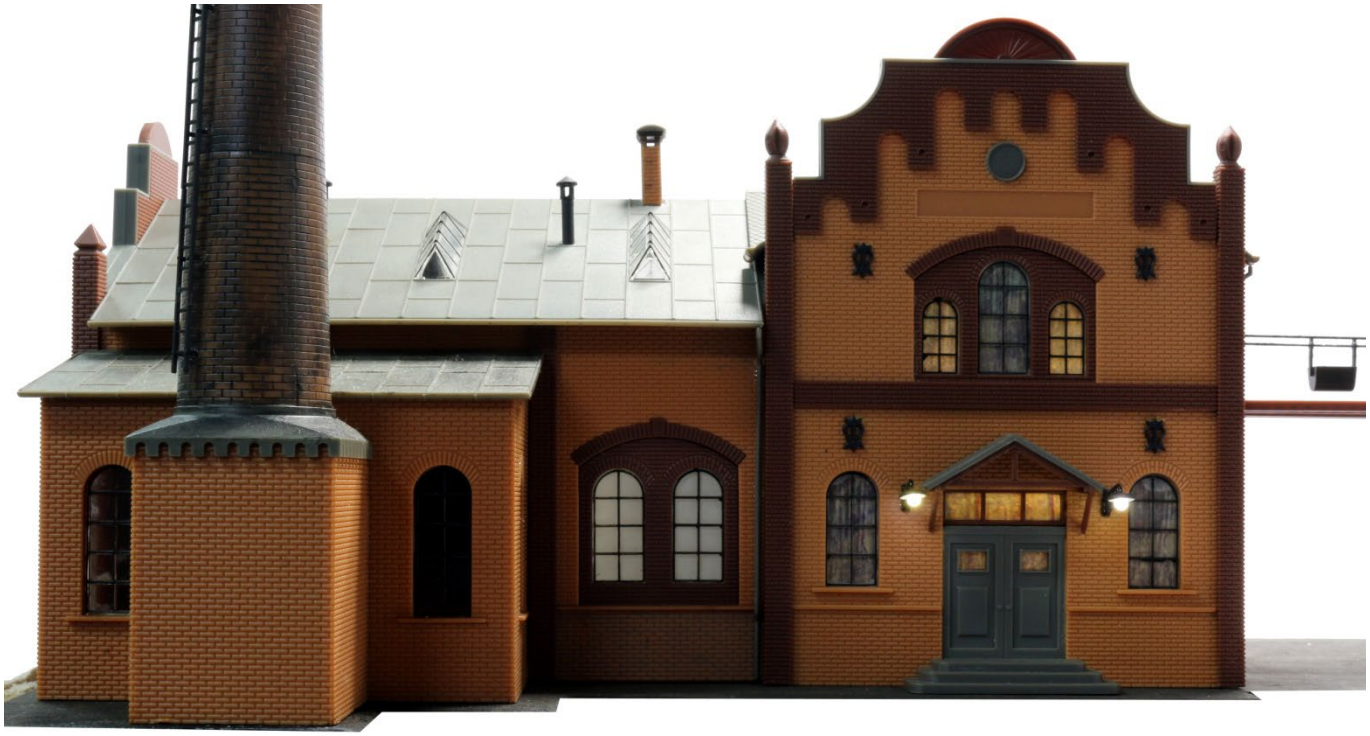
Building 2 Lights

Front side Bld. 2 with Bld. 1 on the right.



Back side Bld. 1 with Bld. 2 on the right

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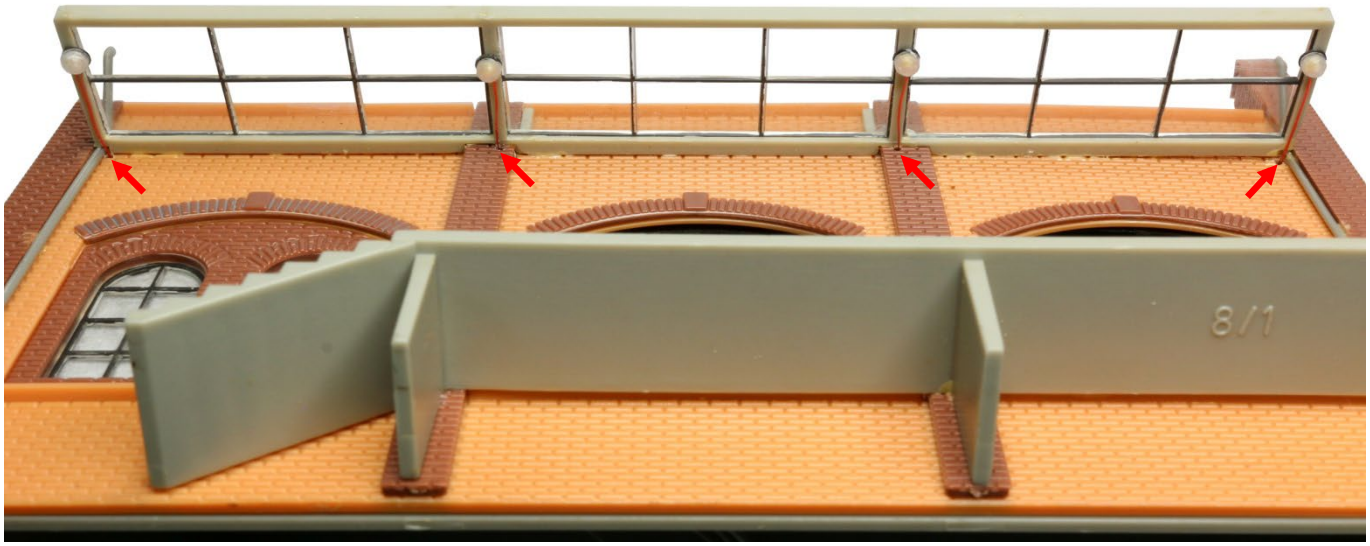
Building 3

Back side Bld. 2 with Bld. 3 showing the loading dock with over-head canopy light and outside lights.

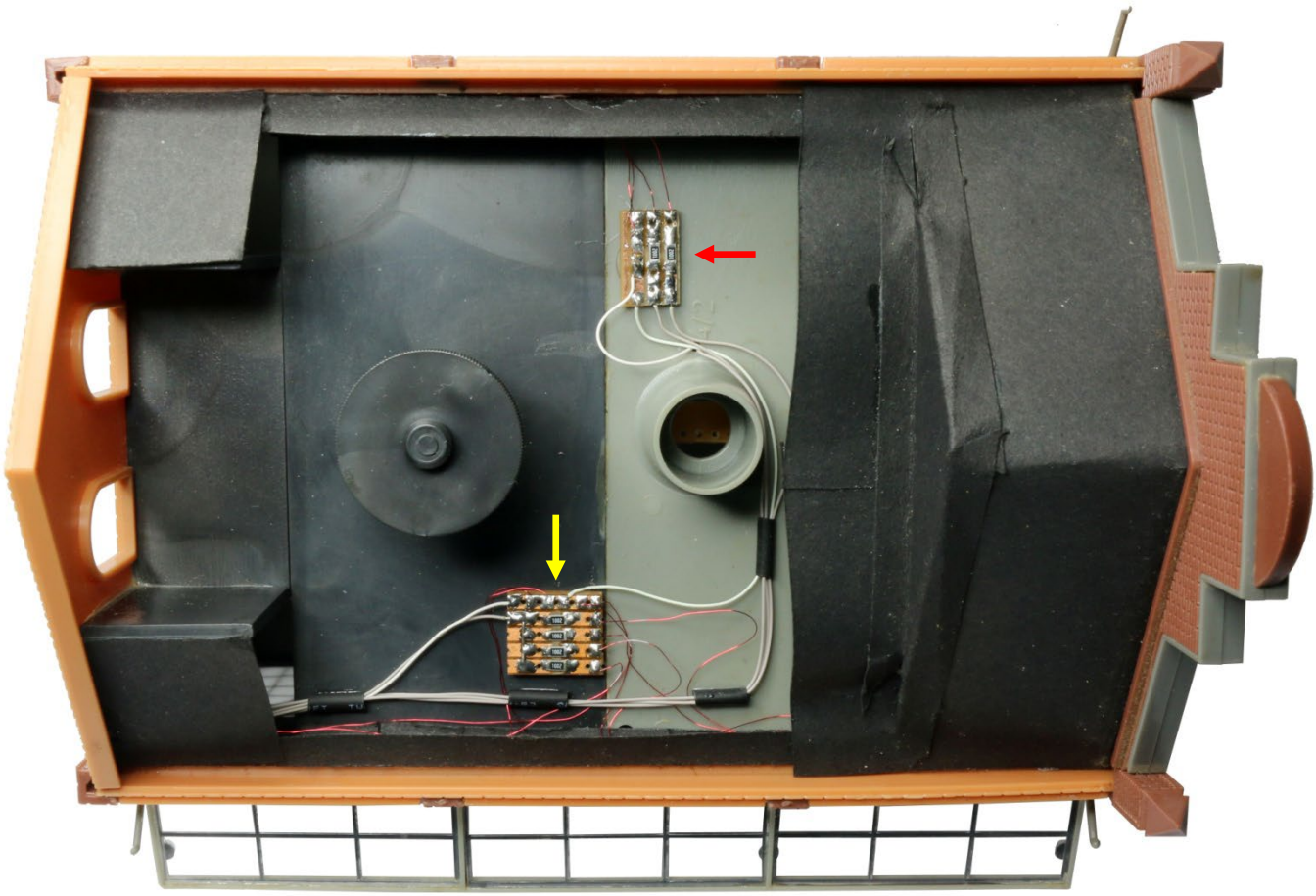
Building 3 has the same techniques used as building 1 with Baking Paper placed over all windows, outside lights and the new feature using my variation of the outside light with the glass cover which I mounted on the loading dock canopy.

Canopy Lights

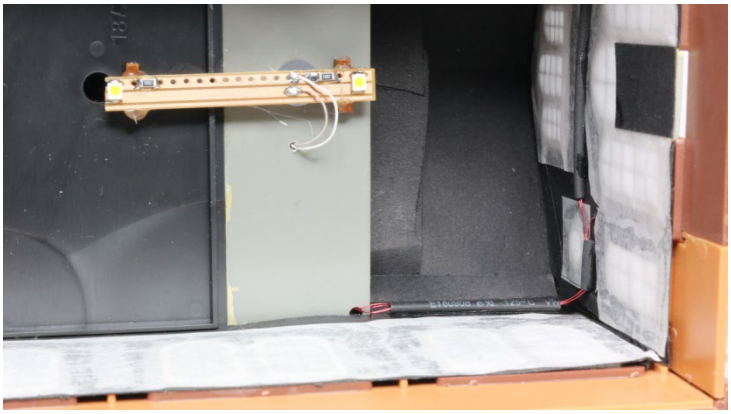


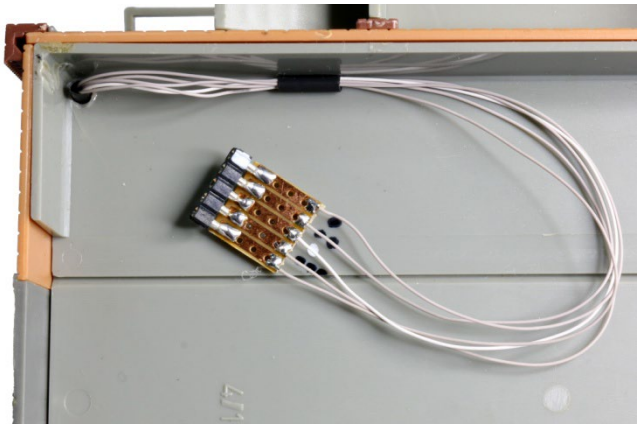
I drilled 4 x 0.6 mm holes under the canopy with the drill close and parallel to the canopy frame. The wires for each light assembly are threaded through the respective holes then each light is glued to the frame with PVA glue.

Canopy Lights continued



I constructed two interconnection PCB's the smaller PCB (red arrow) is for the outside lights with 2 x 10k resistor and a negative foil (white wire). The larger PCB (yellow arrow) has 4 x 10k resistors and a negative foil (white wire). All the resistors are common on the left side and connected with the grey wire which will enable all canopy lights to be switched on/off as required.





The internal lights are constructed the same as building 1. All connections exit the underside through a 2.5 mm hole and are terminated on another interconnection PCB with rolled IC pins to create a socket connector.

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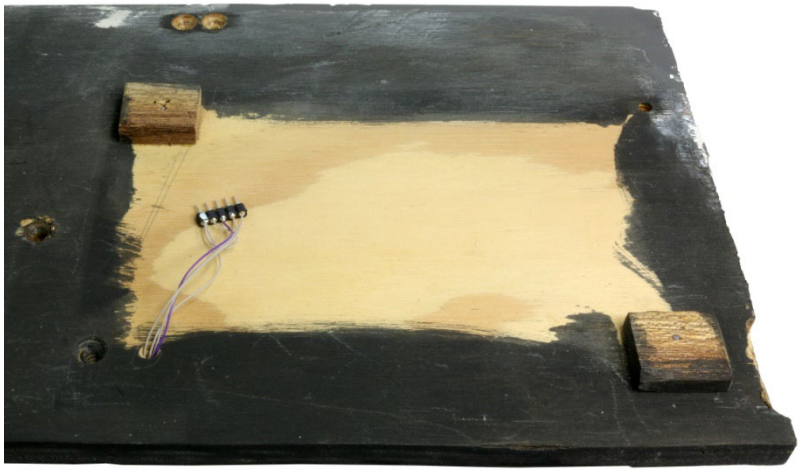
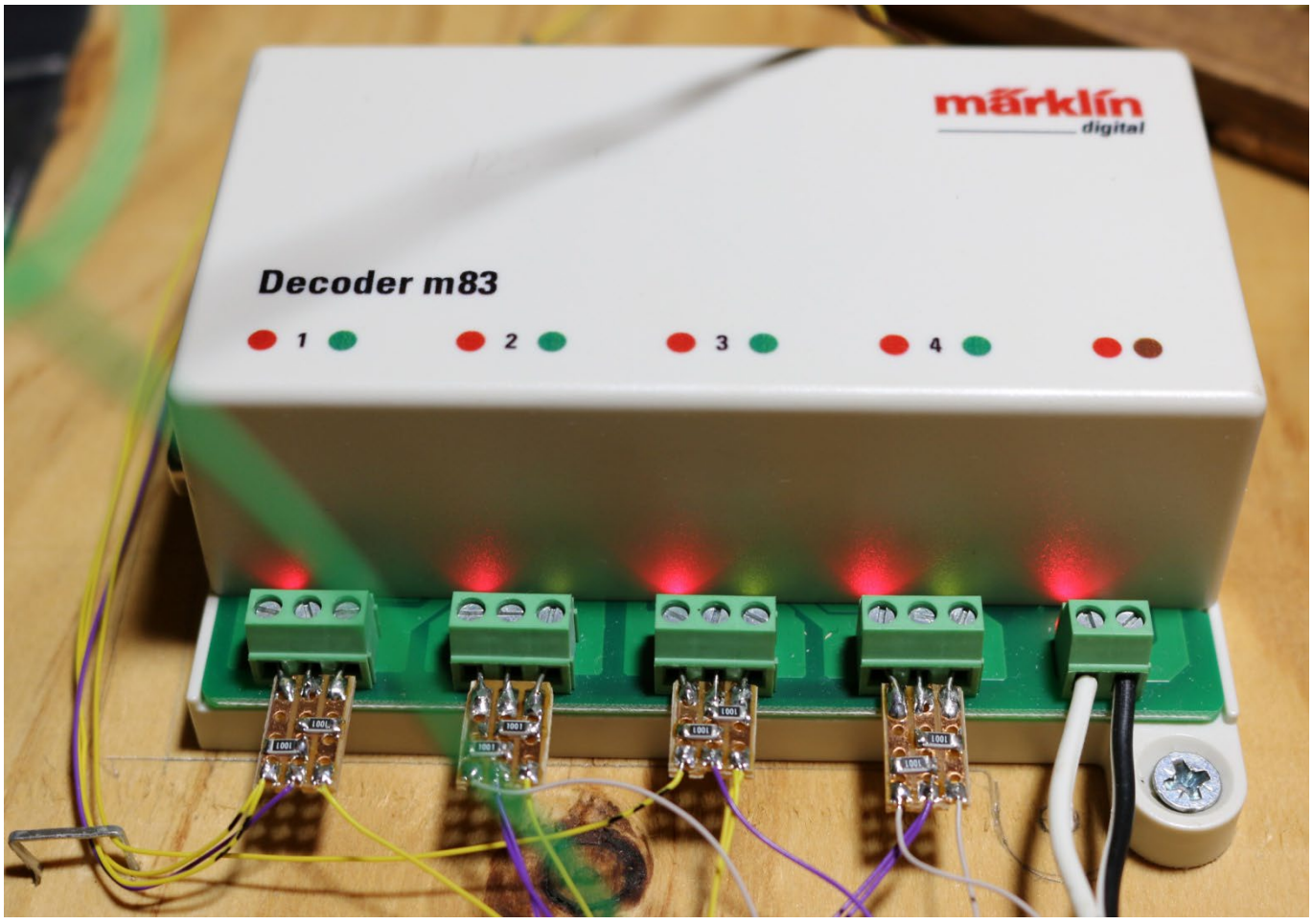
Miscellaneous Bits



For **Bld. 1 and Bld. 3** I glued small blocks of wood to the baseboard as shown which positioned the buildings to the correct distance for the spacing required for all buildings.

This makes it easy to remove and replace the buildings as required.

The rolled IC pins used as a plug make the connection for each building easy to disconnect/connect. The wires are routed through a single hole and wired to the controlling m83 module screwed to the underside of the removable baseboard.



I forgot to take a photo of the m83 wiring while I had it on my workbench so I crawled under the layout and took this photo with a few wires obscuring the view.

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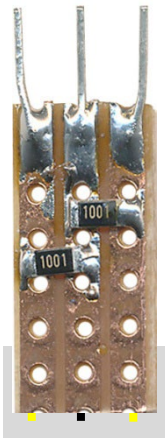
Wiring the m83 for the Building Lights

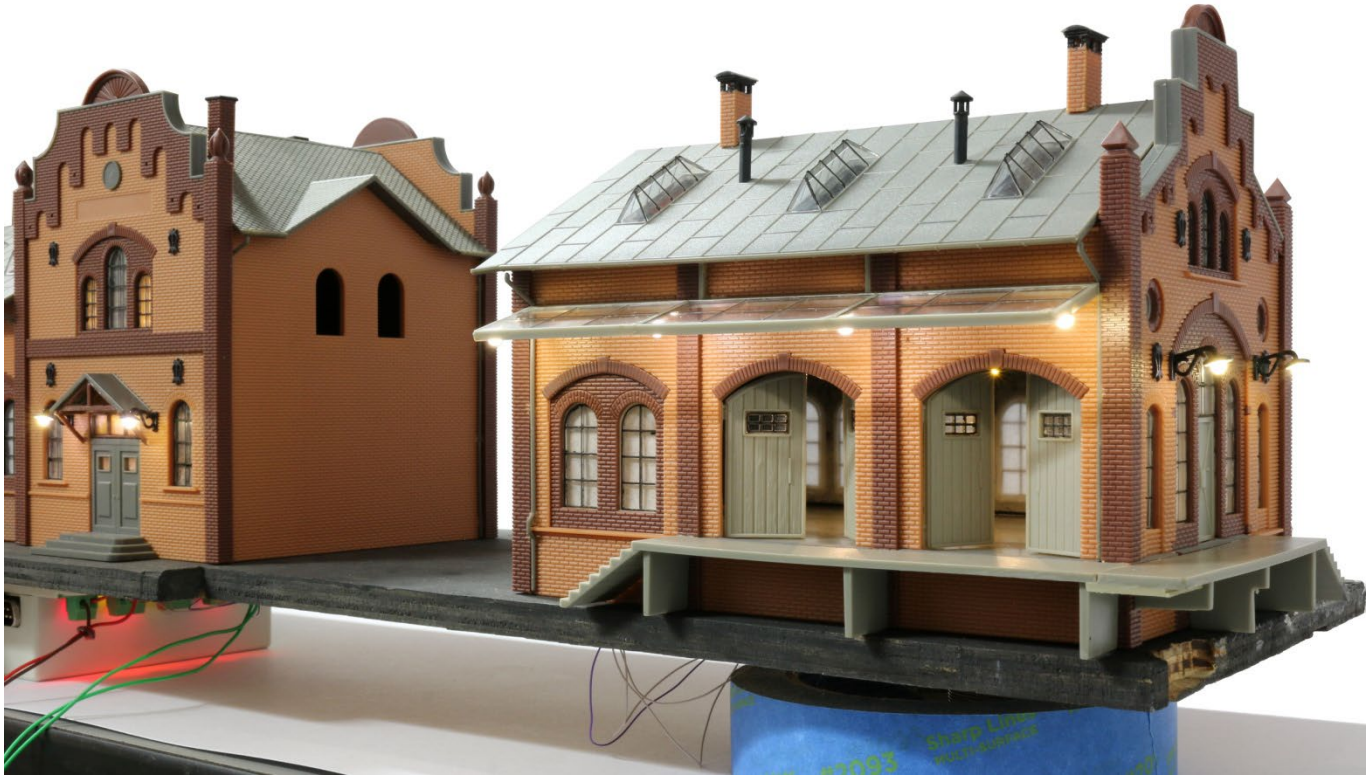
Please refer to [m83 Special functions used with TrainController] for more detail.



For the use of LED lights, you will require additional wiring to protect the LEDs and suppress the LED glowing in the OFF position.

All current limiting resistors for the lights are installed in the building. I have used 2x 1k 1206 resistors soldered across the foils as shown to suppress the LED glowing in the OFF position.

The yellow wires are the LED anode connections and the black is the common for the LED cathode connections.



This is the setup on my work bench where the m83 is mounted under the removable baseboard of the Iron Foundry. Wiring for the m83 was easy to complete and the only wires I had to connect under the layout were the red and brown digital connections to the existing bus. The smoke unit and motor cables were plugged into existing connections.

I also programmed all the m83 CVs for the lighting effects I thought suited the Iron Foundry.

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Configuration of the Outputs for DCC address 125-128, m83 switch address '6, 10'

To be safe use the programming track to configure the following options.

CV		Meaning	Value Range	Value Set	Comment	Function
112	POM	Switching Function Turnout 1	0-142	**142**	Switches the 'red' output for Turnout 1	Low E. L
113	POM	Pulse Width	0-255	**255**	255 = 100%	
114	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	1R
115	POM	Switching Function Turnout 1	0-142	**142**	Switches the 'green' output for Turnout 1	Low E. L
116	POM	Pulse Width	0-255	**255**	255 = 100%	
117	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	1G
118	POM	Switching Function Turnout 2	0-142	**142**	Switches the 'red' output for Turnout 2	Low E. L
119	POM	Pulse Width	0-255	**255**	255 = 100%	
120	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	2R
121	POM	Switching Function Turnout 2	0-142	**142**	Switches the 'green' output for Turnout 2	Low E. L
122	POM	Pulse Width	0-255	**255**	255 = 100%	
123	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	2G
124	POM	Switching Function Turnout 3	0-142	**129**	Switches the 'red' output for Turnout 3	Dimmer
125	POM	Pulse Width	0-255	**255**	255 = 100%	
126	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	3R
127	POM	Switching Function Turnout 3	0-142	**129**	Switches the 'green' output for Turnout 3	Dimmer
128	POM	Pulse Width	0-255	**255**	255 = 100%	
129	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	3G
130	POM	Switching Function Turnout 4	0-142	**129**	Switches the 'red' output for Turnout 4	Dimmer
131	POM	Pulse Width	0-255	**255**	255 = 100%	
132	POM	Period	0-255	**255**	Time interval between the pauses; 1=0,05 sec.	4R
133	POM	Switching Function Turnout 4	0-142	**141**	Switches the 'green' output for Turnout 4	F. Tubes
134	POM	Pulse Width	0-255	**255**	255 = 100%	
135	POM	Period	0-255	**60**	Time interval between the pauses; 1=0,05 sec.	4G

Possible Switching Functions

Value		Function Name	Comment
Touch-	**Switch**		
0	**128**	Everything off	
1	**129**	Dimmer	
2	**130**	Blinking light 1	
3	**131**	Blinking light 2	Parallel blinking light to blinking light 1
4	**132**	Flash 1	Flashing light
5	**133**	Flash 2	Double flashing light
6	**134**	Random task/flickering light	Random sequence of pause/pulse
7	**---**		
8	**136**	Zoom	Soft turning on/off
9	**137**	Mars	Specific blinking light
10	**138**	Gyra	Specific blinking light
11	**---**		
12	**---**		
13	**141**	Tubes	Simulates fluorescent tube lights
14	**142**	Low energy lamp	Simulates energy-saving lamps
15	**---**		
16	**---**	Max. switching	"Period" indicates the Max. Switching time
17	**---**	Min. switching	"Period" indicates the Min. Switching time
18*	**---**	Min. Switching with end switch	Switching time is "period" or until the end position is reached
*	Factory Setting		

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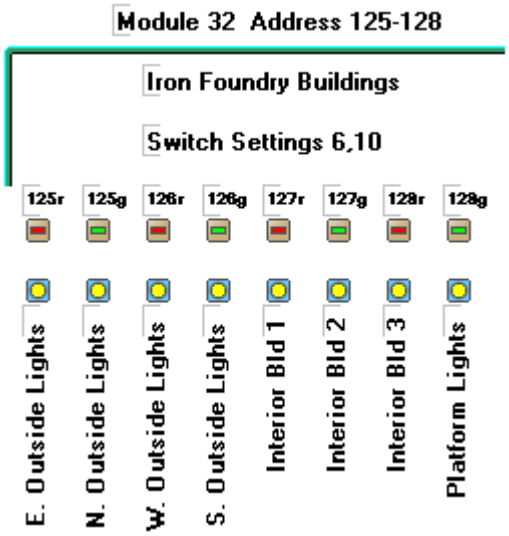
TrainController Items



All the Iron Foundry lights are controlled by the 8 on/off switches (yellow) and are the memory for what switches are on if I have to do an emergency stop of the layout. With the power switched on I have macros that look at the state of the pushbuttons and turn on the lights automatically after a power shutdown.

The pushbuttons above the on/off switches are the actual red/green address that is sent to the m83.

Iron Foundry Light Functions

I have three different light effects for the Iron Foundry.

1. The outside lights are set for 'Low Energy Lamp' where the light starts very dim and increases in brightness over a small period of time.

2. The interior building lights are set to 'Dimmer' which in this case is just on/off.

3. The canopy lights are set to 'Fluorescent Tube Lights' which flash on/off for a small period of time before remaining at a steady level of light.

Other Iron Foundry Functions

Smoke Unit in the smoke stack (Standard).
Overhead motorized Gondola system between buildings that can move (Standard).
Moving Storeman Self designed project.

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Photos

On the Tips Section of my pages you can see some animation of the lights being turned on.

Moving Storeman

This is a photo how I imagine the foundry to look in daytime.

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Photos continued

As always enjoy your model trains.