

DCC Installation of a Smoke Unit and Lighting in an American Models Wood-Sided Caboose

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The following documentation is an overview of how I installed a smoke unit and lighting in an American Models wood-sided caboose. I made two PCBs for this project one for the decoders and one for the lighting. Making your own PCBs is not a difficult task. There are many How-To articles available. The one I liked the best can be found at <http://www.riccibitti.com/pcb/pcb.htm>. The only deviation I made from the article is that I did not scrub the copper board to clean it. I used Brasso which did not scratch the copper. I used a band saw to cut the board. If you do not own one, that is not a show stopper. Use a fine toothed saw. An X-Acto saw should work just as well.

There are probably several other ways to accomplish the same task. However, this appears to be the least complicated.

When I was looking for a smoke unit, I wanted something that could be set up to provide a wisp of smoke. I did not want my caboose to look like a steam locomotive under full load. My first consideration was Seuthe units, but I found it difficult to control the volume of smoke as well as the heat that radiated from the unit. For this project I chose a unit from S-Helper Service. This is the same unit that they use in their wonderfully detailed 2-8-0. See Figures 1a, 1b and 1c.

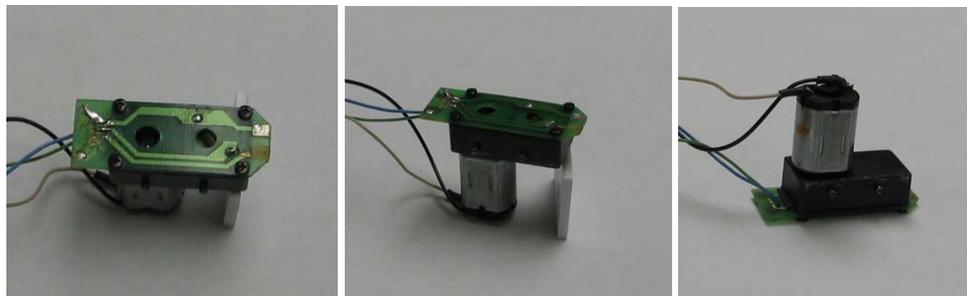


Figure 1a

Figure 1b

Figure 1c

The smoke unit incorporates a heating element as well as a fan unit. Each of which can be adjusted separately with the proper components to achieve the best results. I removed the manufacturer's heating element and installed one of my own. For the core of the heating element, I used an product by Corning called Macor.

http://www.corning.com/specialtymaterials/products_capabilities/macor.aspx

Macor, a machinable glass ceramic, comes in various shapes and sizes. I used a 1/16 inch diameter rod cut to 3/8 of an inch in length. I then used #40 Nickel Chromium wire as the heating element.

In order to drive the smoke unit and control the lighting I utilized a four function decoder from TCS. The model FL4 decoder is rated at 200mA per channel. In order to reduce the speed of the smoke unit fan, I utilized a TCS VR1.5, which as the name hints, is a 1.5 volt regulator.

As designed, the heating element demanded 235mA. In order to reduce the current, I used two 10Ω resistors rated at 3 Watts each. This reduced the demand of the heating element to approximately 160mA. I wired the heating element to function 1 of the decoder and wired the smoke unit fan to function 2. I then re-mapped function 2 to function 1 so that one button controlled the heating element and the fan. I mounded the components on a 1.75 x 1.00 inch PCB. See Figure 2.

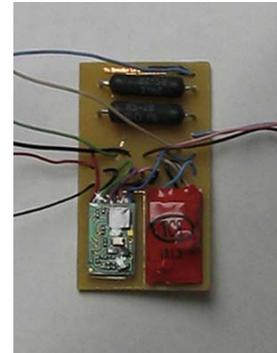


Figure 2

I wanted to provide lighting for the cabin as well as the cupola. To achieve this, I made a PCB that has one LED on the cupola side (Top) and two LEDs on the cabin side (Bottom). The LED used to supply light to the cupola is 1.5mm in diameter. To reduce the voltage, I used a 470Ω resistor. This provides a subtle lighting effect. For the cabin I used two 5mm LEDs with a 1kΩ resistor. The cupola is set to Function 3 and the cabin is set to Function 4. I also utilized rule 17 (CV 123) for dimming the cabin lights using Function 5. See Figures 3a and 3b.

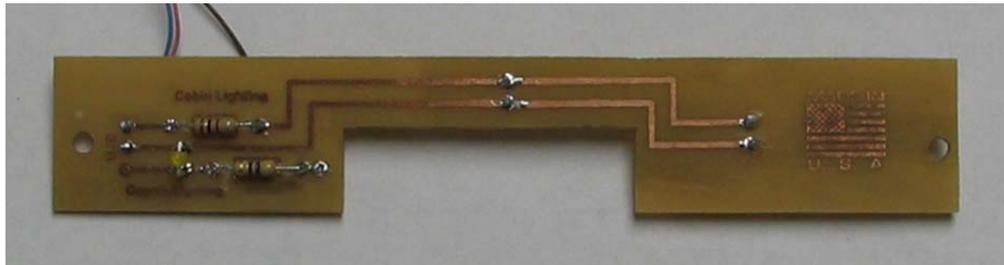


Figure 3a (Top)



Figure 3b (Bottom)

In order to mount the smoke unit, it is necessary to construct a housing. I used Evergreen .080 styrene for this. I was concerned that heat from the smoke unit or stray smoke fluid would affect the styrene or the glue joints. As of this writing, it has not been affected and appears to be holding up very well. Notice that the inside walls of the smoke unit support have a groove cut into the styrene. This is to accommodate the two pins that are on each side of the smoke unit. This provides a nice way to slide the smoke unit in and out for any repair that might be needed. The original weight had to be removed to allow for the smoke unit. However, the additional bulk of the smoke unit and components gives the caboos some bulk. I also installed two posts on which to mount my lighting PCB. These are nothing more than two long screws with tubing slipped over them, held down with washers and nuts. I enlarged two existing holes in the shell to accommodate the screws. See Figures 4a and 4b.

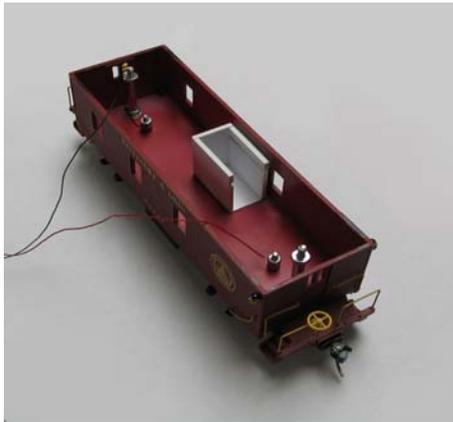


Figure 4a

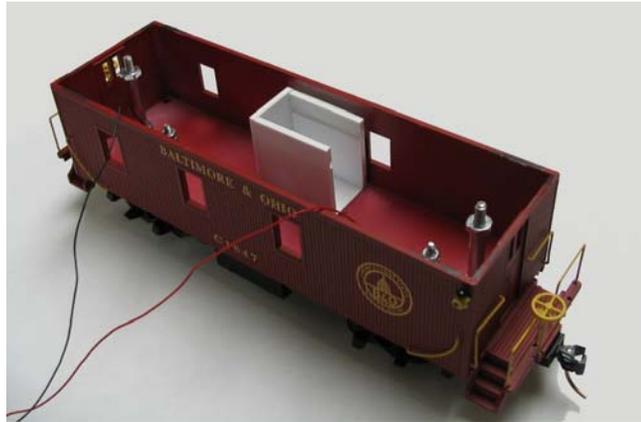


Figure 4b

After wiring and mounting all the components, the caboos has little space left. The PCB for the decoders is fastened to the left rear side wall with two strips of double sided tape. This provides an air space between the two resistors and the plastic shell. See Figures 5a and 5b.



Figure 5a



Figure 5b

For the smoke to exit the caboose, I had to remove the original plastic stack and replaced it with one that I made from brass tubing. I also made a support that fit into the hole of the smoke unit. This is made from two small pieces of brass slipped over each other and soldered together. The support acts as a stop to prevent the stack from slipping into the smoke unit and hitting the heating element. I also cut a small piece of styrene that slips over the stack support. Its only function is to hold the small brass piece in place and maybe absorb some of the heat. See Figures 6 and 7.



Figure 6



Figure 7

Finally, a small piece of glazing had to be cut from the roof section in order to allow it to slip past the decoder PCB. See Figure 8.

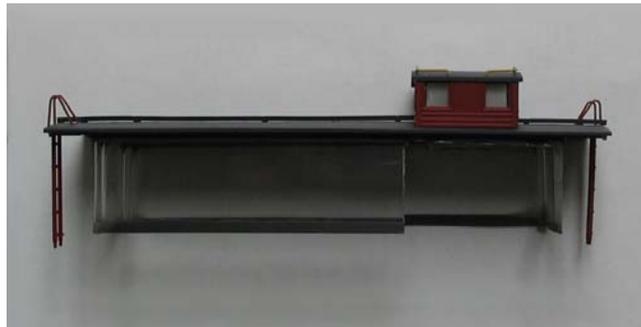


Figure 8

The Completed Project.

