

## PASSENGER CAR DIAPHRAGMS

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Once upon a time I had a large stash of MHP S scale diaphragms. But over the years I've gradually become dissatisfied with their appearance. Primarily, the bellows are too bulky. And I have to remove the alignment tabs on the striker plate (easy, I admit). But I kept using them until I ran out of them.

These days I make my own diaphragms for heavyweight passenger cars. For lightweight cars, I prefer American Models' one-piece rigid diaphragm moldings that come attached to AM's streamlined Budd cars. These are available separately from AM for \$4.95 per pair. I shave off the portion of the bellows that nestles into the Budd car end, then glue it to the car end with super glue (CA). The photo above shows, left to right:

- Homemade five-fold diaphragm for cars with no raised door frame. This one is on a brass Models by Miller PRR parlor car.

- Homemade three-fold diaphragm mounted on a car with raised door frames, in this case an AM heavyweight Pullman.
- An AM diaphragm applied to an AM lightweight Pullman.
- Standard MHP product (clones available from Scenery Unlimited), alignment tabs removed, applied to a brass Models by Miller 12-section 2-drawing room Pullman.

This article deals with the diaphragms that I use on my heavyweights.

My striker plates are cut from .040" styrene, and the bellows are cut and folded computer printer paper (what we elders used to call "typing paper"). The bellows are glued to the striker plates with CA (super glue), and then the other ends of the bellows are CA'd to the car end.

I use a three-fold bellows for cars with a frame around the end doors (e.g., American Models). For cars with no frame (mainly brass cars), I use a five-fold bellows. Templates for the striker plates and five-fold bellows are attached hereto. To make the three-fold bellows, simply use your scissors to remove two of the six pleats from the template.

Here's what you'll need besides the paper, styrene, and CA glue:

- Good sharp scissors.
- A nibbler for cutting the center material out of the striker plate. (See photo. If you can't find one locally, try Amazon.com, where I got mine.)
- A round cross-section jeweler's file
- A clean sharp edge over which to make your bellows folds. I use a steel straightedge clamped in my workbench vise.
- A can of spray glue for tacking the striker plate templates to your styrene sheet.
- The templates attached to this article.

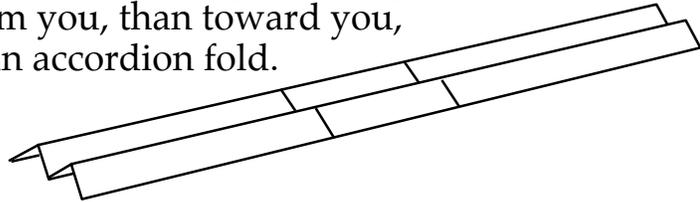


## Bellows

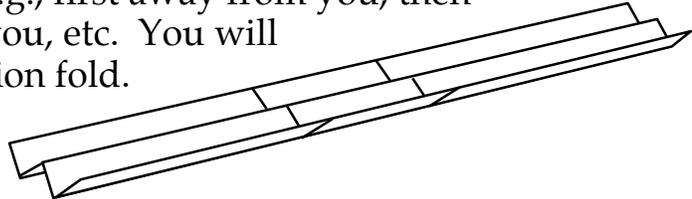
The trickiest part of the process is folding the bellows. Keep in mind that you will probably want to color your bellows. I use a black marking pen, so it's important to make all your folds before coloring, then flatten and color, then refold. Otherwise you lose your fold lines before you even get started! So let's try it now. Make a copy of the template page, then cut out one of the bellows. (If you're making the four-panel bellows, use your scissors to remove two of the panels.)

Now follow these steps (shown in the accompanying figures):

1. Fold the bellows along each of the long closely spaced lines, first toward you, then away from you, than toward you, etc., so you wind up with an accordion fold.

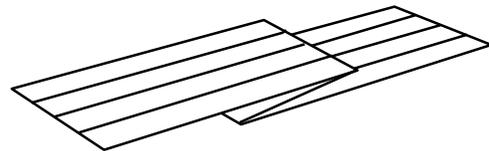
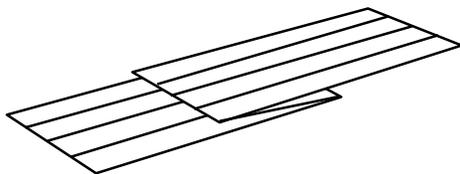


2. Now reverse all the folds, e.g., first away from you, then toward you, than away from you, etc. You will again wind up with an accordion fold.



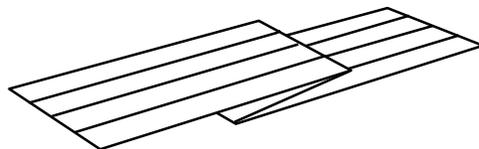
3. Unfold all the folds; i.e., flatten the paper.

4. Fold the paper on each of the two short lines that cross the bellows. Do this in both directions, just as you did with the accordion folds.

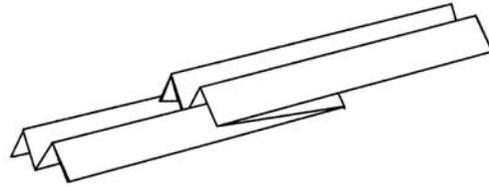


5. Now flatten the bellows and color it on both sides with a marking pen. (I use black; you can use whatever color suits you.)

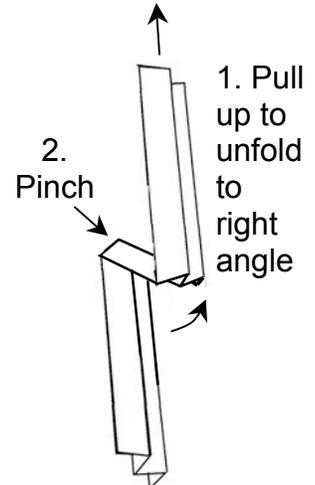
6. Now refold the paper along both short lines, making a Z. Squash the Z flat.



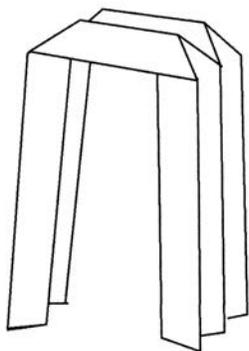
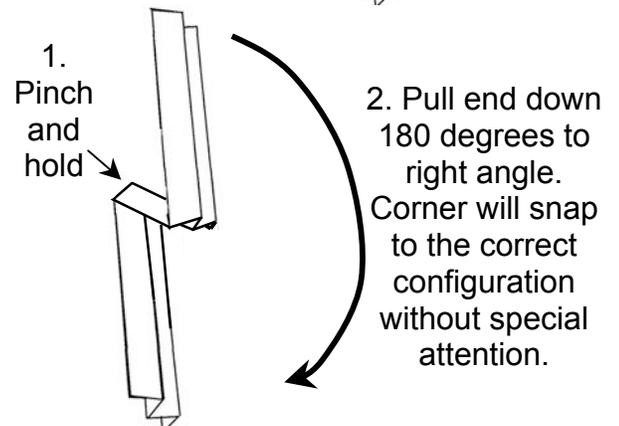
7. Fold the flattened Z along the accordion folds, just as you did in Step 1.



8. Then open your bellows so it looks approximately like a letter Z with two right angles. Pinch one leg's corner while maintaining the 90-degree angle.



9. While still pinching the corner, grab the other end of the bellows and reverse the cross-fold so the bellows forms a U instead of a Z.



10. Now pinch the other corner while maintaining a right angle.

## Striker Plate

This is the easy part. Lightly coat the back of your diaphragm templates with spray glue. While still tacky, overlay the templates onto your styrene sheet. Now cut a hole in the middle of each striker plate image, making it large enough for your nibbler to fit into. I use a 3/8" drill bit, but anything will do – a hole punch, for example. Use your nibbler to remove all the material inside the striker plate except for the upper inside corners, which you will finish with the round jeweler's file. You'll

discover that the nibbler can produce a very precise opening without any filing.

Once you've removed the center of the striker plate, cut it out of the styrene sheet with a good pair of scissors. Now peel off the paper template and rub the adhesive off with your finger. Then paint the plate, including the inside and outside edges. (I use a medium brown.)

### **Final Assembly**

Now, using CA glue, adhere the bellows to the striker plate. Begin with the center of the bellows U, gluing it to the top of the striker plate such that the inside edge of the bellows is even with the inside edge of the top of the striker plate. Then glue each side, one at a time, making sure that the bellows sides are straight up and down.

Finally, carefully glue the bellows to the frame around the car door opening, or – if there is no frame – around the outside of the door opening. That's all there is to it!

# TEMPLATES

