Modeling Manual Crossing Gates

Some Background Info
and
Some Ways to Make Them

This document does not contain images that may be copyrighted. There is a link to a website containing most of the images shown in the live clinic.

Source Info

- Article “Manual crossing gates”, Charles Yungkurth, *Railroad Model Craftsman,* April 1996
- Whippany Railway Museum, Whippany NJ,
  - Website: www.whippanyrailwaymuseum.net
- Article “Simple crossing gates”, John Nehrich, *Model Railroader,* November 1999

Some History

- Gates date to the 1860's
  - Signage was used initially to mark crossings
  - The first patent for gates issued August 27, 1867
  - A gate operator ("gatekeeper", "watchman") was stationed at the crossing

For images, go here:

http://www.whippanyrailwaymuseum.net/exhibits/structures/railroad-crossing-gates-a-signals

How they worked

- Steel or iron base and hinge end
- Wooden arms (easily replaced)
- Counterweights balanced length of wood arms
- Operated by hand cranks on the base or separate housing
- Chain or rods connected gates across the tracks and streets
- Gates blocked entire street, one gate on each side
- Complex crossings had more gates
  - Pedestrian gates
  - Multiple gates for streets
  - Angled crossing gates might be 40 feet long

How they worked…

- Iron rods hinged from middle of arm, to hold up end of gate when in the down position
- Lanterns could be hung on gate for night visibility
- More counterweights were needed to compensate for lanterns, or ice and snow

The Gatekeeper

- Gatekeeper typically provided with a shack or shanty with minimal furnishings
- Complex crossings might have elevated tower for watchman
  - Mechanisms would be more complex
  - Manual pneumatic hand-pump system might be used to move gates
- Only a few turns of the crank needed to raise or lower gates
- Gates might eventually be powered with electric motors

Modeling challenges

- Problem #1 – almost nobody makes scale models of this gate design
  - Most were the old Plasticville style.

- Problem #2 – your roads have to match what the manufacturer makes.
  - Length of gate vs. number of width of lanes in your road.

Crossing Gate Plans

- An example from the Pennsylvania RR

http://www.whippanyrailwaymuseum.net/exhibits/structures/railroad-crossing-gates-a-signals

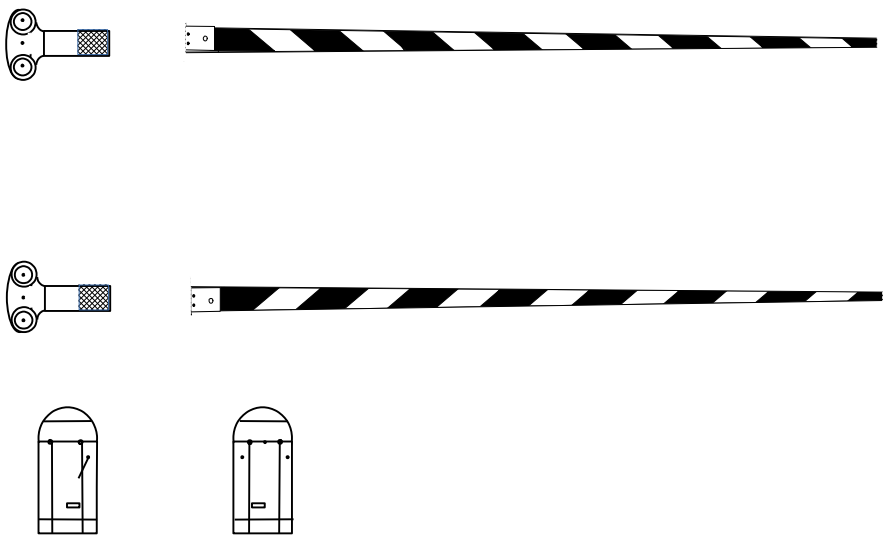
Scroll down for image of PRR crossing gate

Crossing Gate Design

- RMC article had image of gate design
- Shows an extension piece at tip of gate, several feet long, used if needed to extend gate length
- Cross bracing between gate arms kept them separated
- Lanterns, and later, lights gave visibility at night.
- A pivoting support rod hung from a point about ¾ of distance from base to tip to hold gate horizontal when in down position

A scalable image

- This image is very close to HO scale and not copyrighted (because I made it!).
- It is available as a Powerpoint slide on the NCR Division 8 website clintonriverdivision.ncr-nmra.org under the “Presentations” tab, with instructions
- By selecting the gate arm, it can be adjusted in length in Powerpoint
- Drawing objects can be enlarged or reduced as needed for other scales



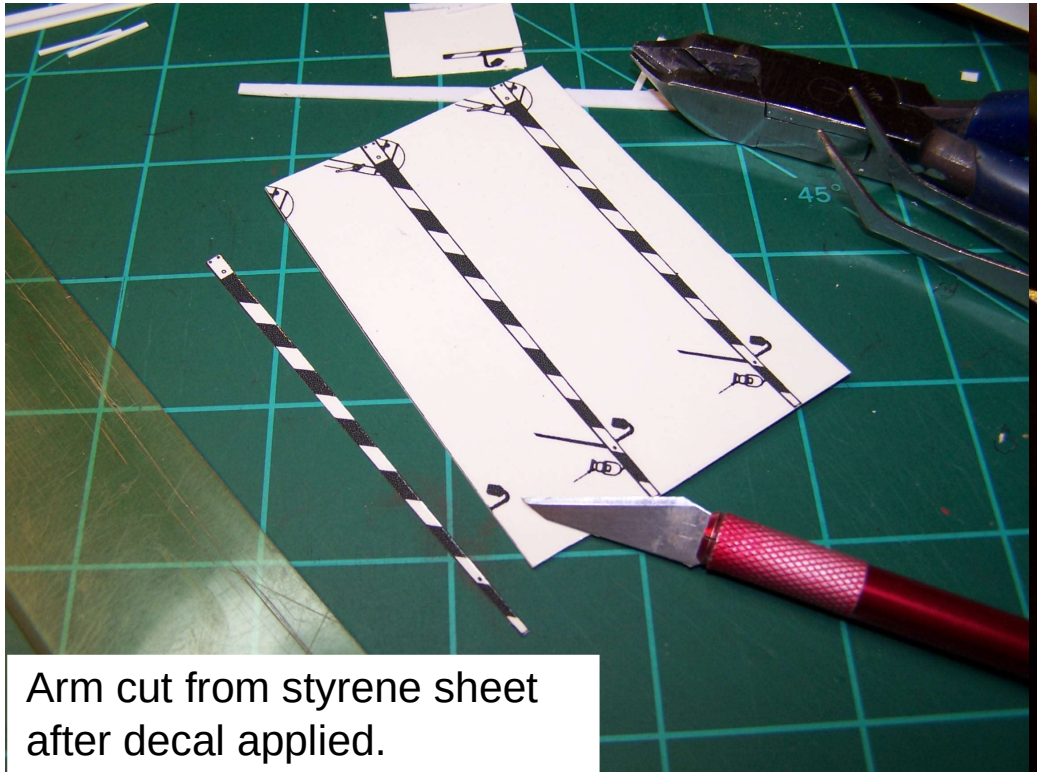
Dimensions as measured on original RMC drawing:

Base of arm:	12”
Tip of arm:	4”
Length of arm:	26’
Width of counterwgt	32”
Diameter counterwgt	12”
Height of cabinet	4’9”
Width of cabinet	27”
Thickness of cabinet	10”

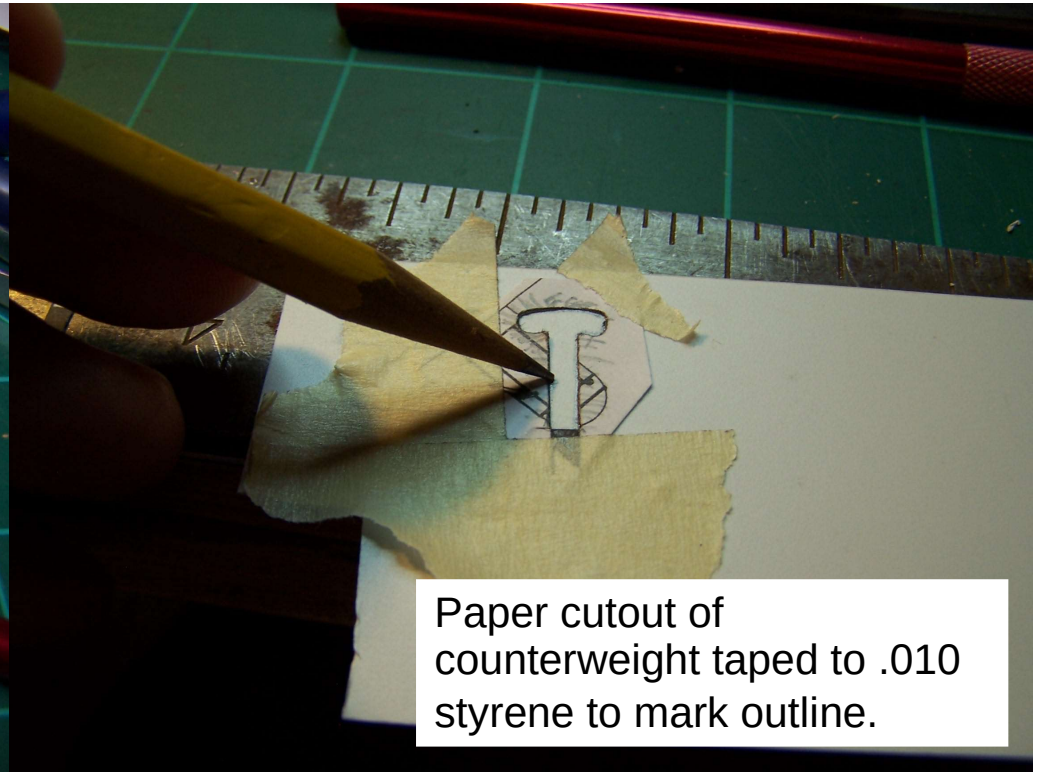
In assembly, the crosshatch on the counterweight arm overlaps behind gate arm

Build Example 1 using RMC article plan

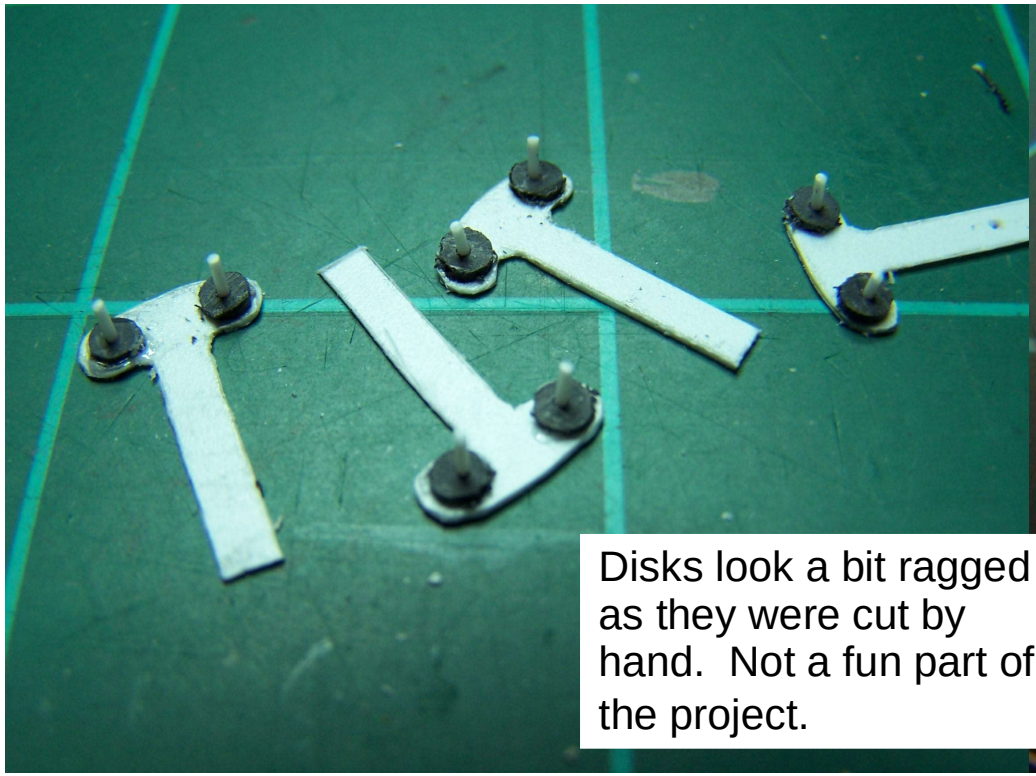
- Material:
  - *.010” styrene sheet*
  - *.100 styrene sheet*
  - *3/16 styrene I beam*
  - *.020” styrene rod*
  - *.015 wire*
  - *Decal paper*
- Arms and counterweights from .010” styrene
- Print decals of arms and apply to .010” styrene
- Counterweight section was printed on paper, then used as a pattern for the styrene
- Counterweights are disks of .010” styrene, styrene rod is pin to hold counterweight
- I-beam used as spacer between arms
- Base units from .100 styrene, use rod for seams
- Drill through pivot points in counterweights and base, insert .015” wire and clip flush for pivot.



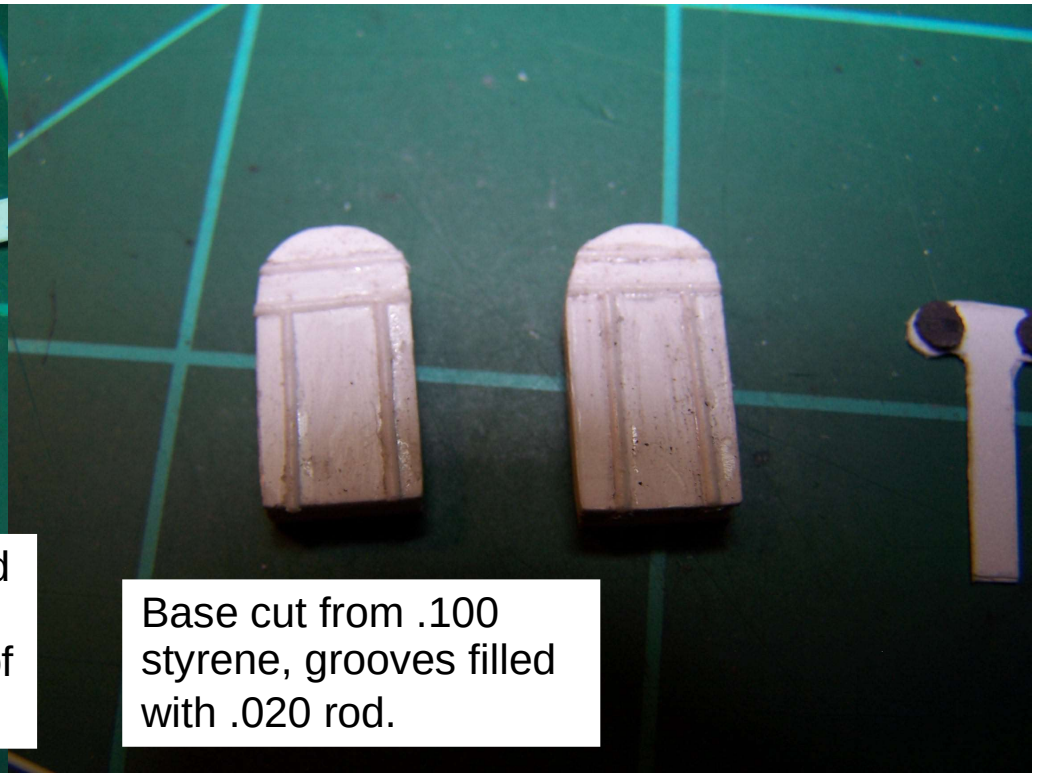
Arm cut from styrene sheet after decal applied.



Paper cutout of counterweight taped to .010 styrene to mark outline.



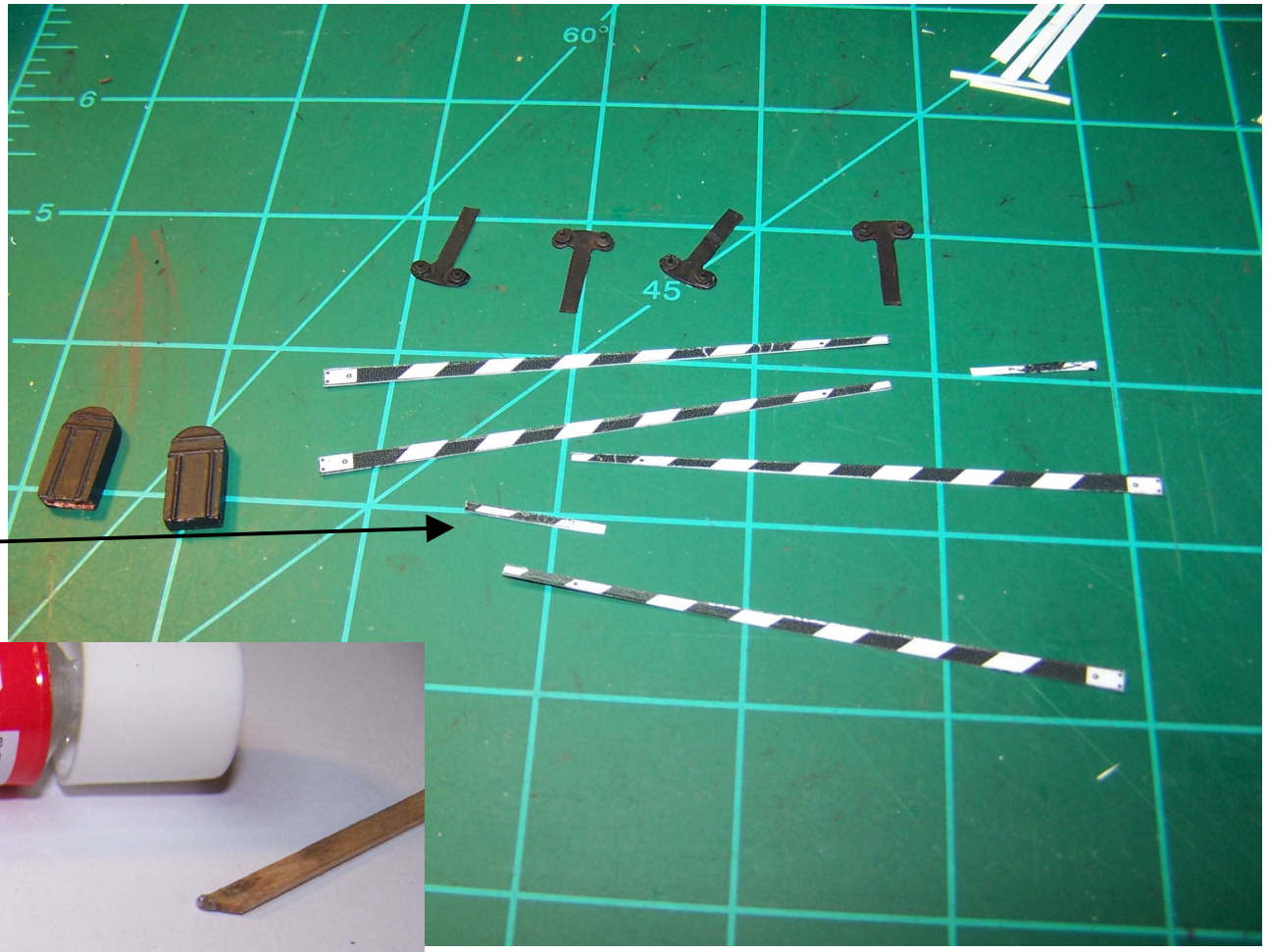
Disks look a bit ragged as they were cut by hand. Not a fun part of the project.

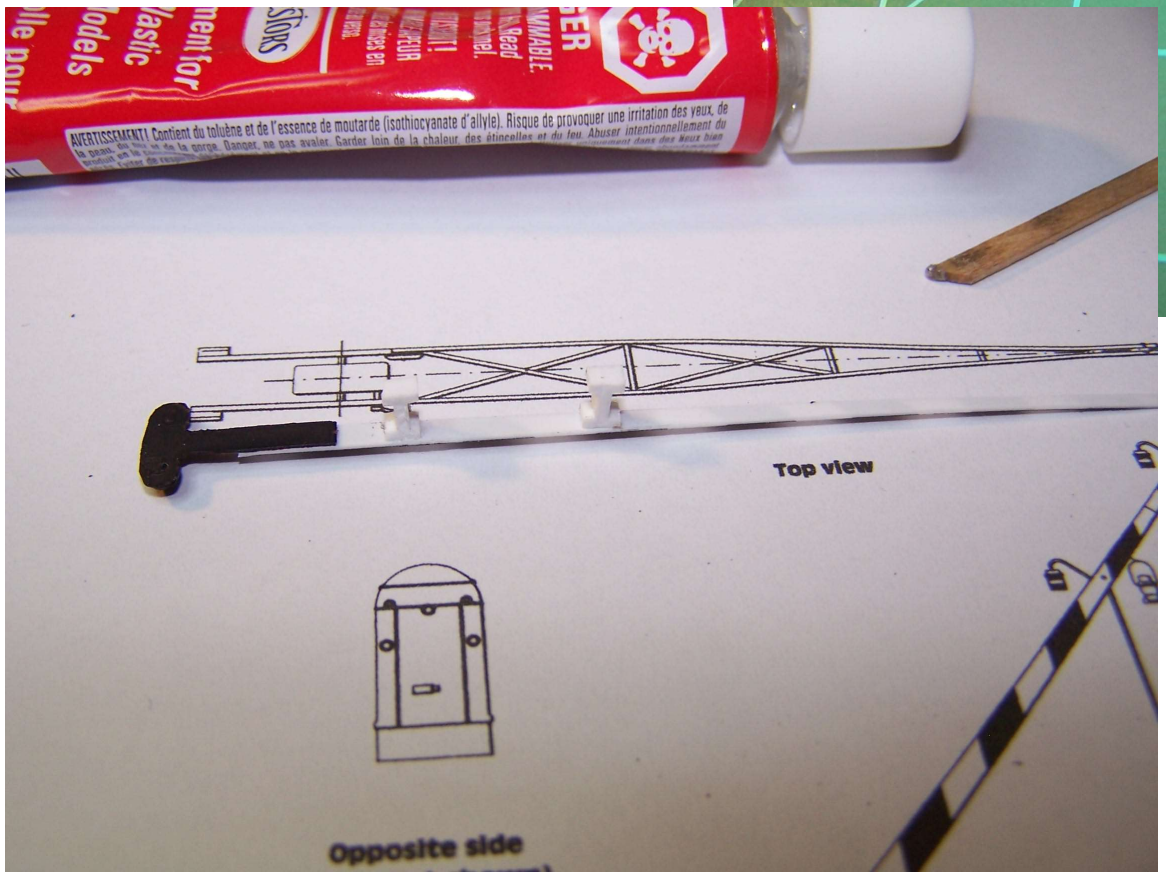


Base cut from .100 styrene, grooves filled with .020 rod.

Ready for assembly. Counterweights and bases painted black.

Note the short extension piece that will be glued between the tip of the gate arms.





Assembling gate. I-beam used between gate arms. Tube cement, being tacky, was easier to use to position parts.

Bases were attached to a square of .100 styrene as a base and glued to the scenery.

They came out well, except they are too long for the single lane road. Prototype gates only go to the lane marker.

Note that the iron rod that hangs down on the prototype about 2/3 of the way to the gate end is not modeled. Getting it to hang properly, or gluing it with the angle to match exactly so it was vertical, was difficult so I left it off.

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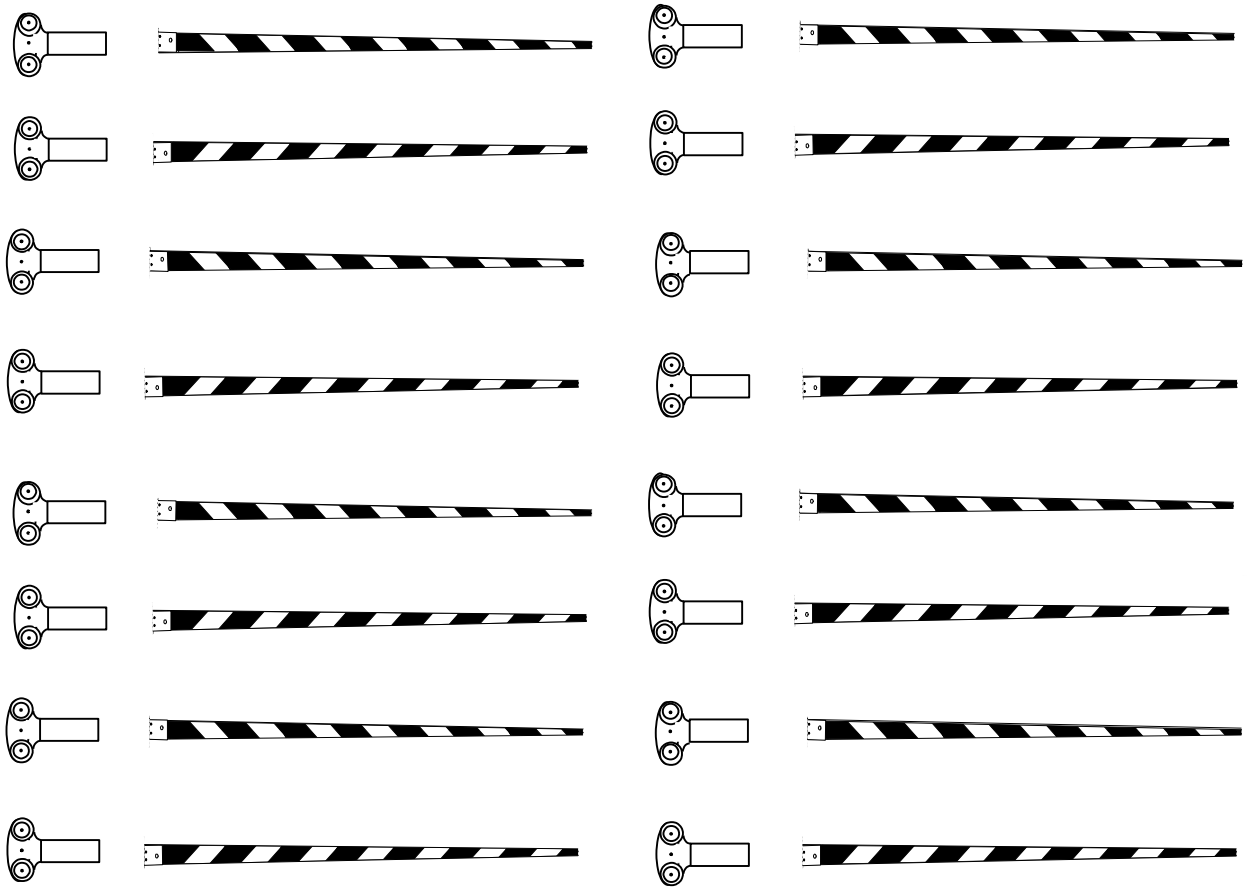
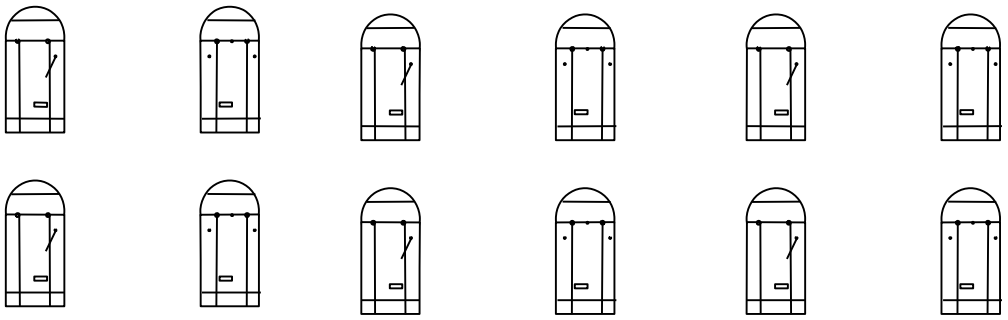
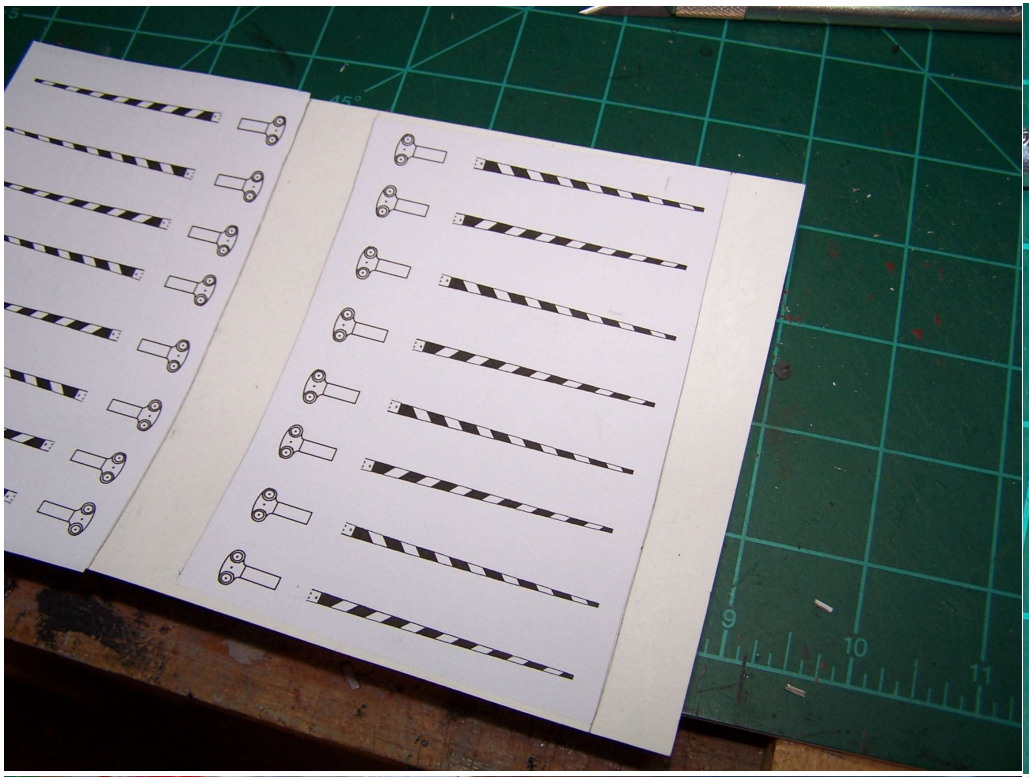
Build Example 2

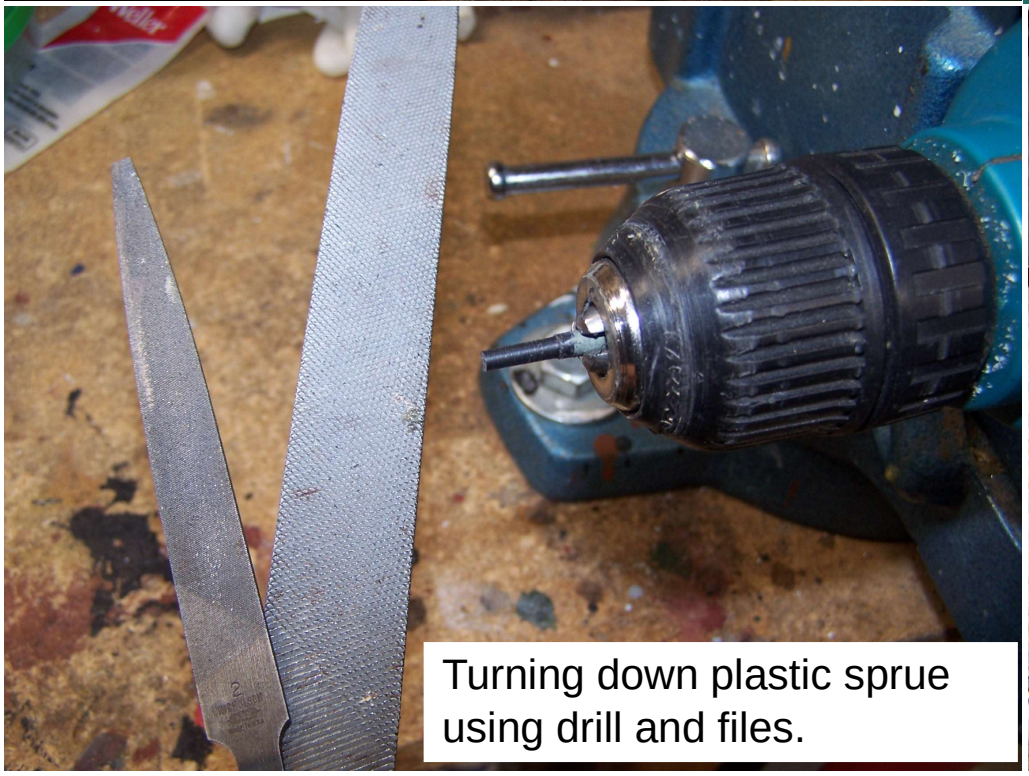
- Material:
  - *Cardboard or index card*
  - *1/16” basswood*
  - *Glue, either spray or stick*
  - *Sprue pieces*
  - *Printer paper*
- Print arms and counterweights on paper, glue to shirt cardboard or index card
- Counterweights made from sprue by slicing with razor saw. Glue to counterweights
- Use scrap of cardboard as spacer between arms
- Paper base image glued to 1/16” basswood, used as pattern to cut and sand to size.
- Paint base units and counterweights
- Glue counterweight assembly to arms
- Glue 2 arms together at the tip, glue small piece of cardstock between arms to keep them spread apart
- Glue arms/counterweight assembly to base units.
  - First glue a tiny scrap of cardboard to the base to separate counterweight pivot area from base.
- Use care to get all arms at same angle.





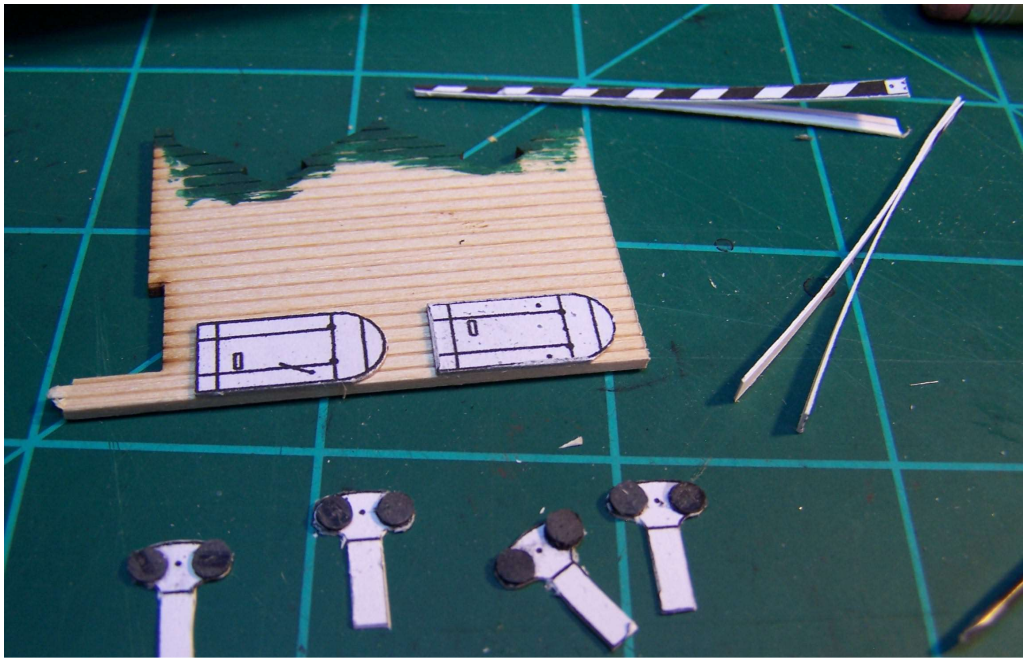
I print many gate components on a sheet of paper



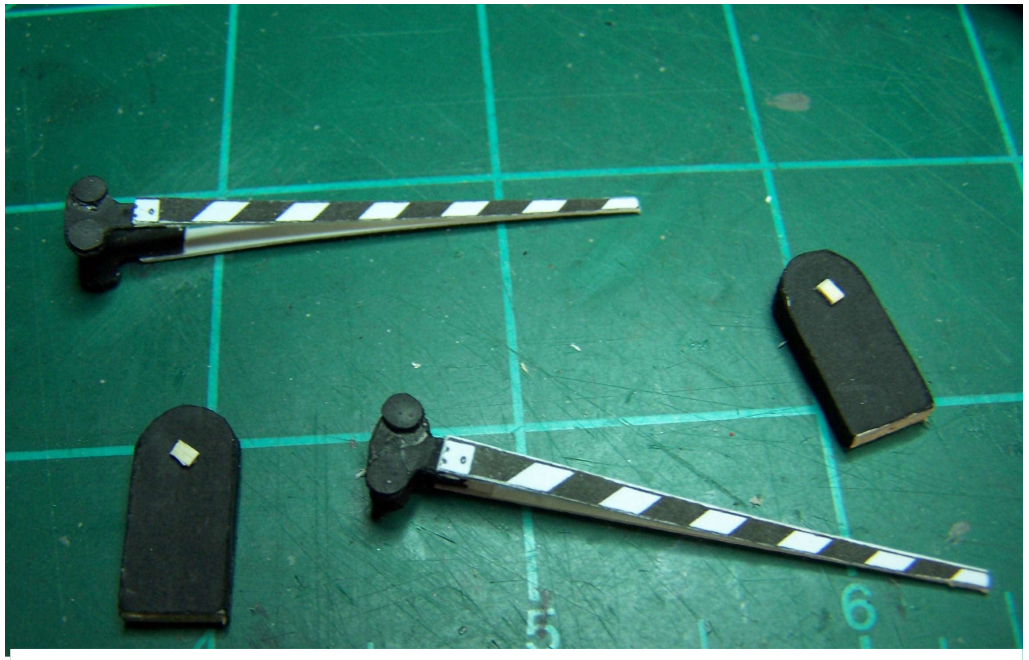


Turning down plastic sprue using drill and files.

Cutting disks from sprue. It was difficult to get a uniform slice.



Paper base image glued to basswood prior to cutting. Counterweight with disks attached ready to paint.



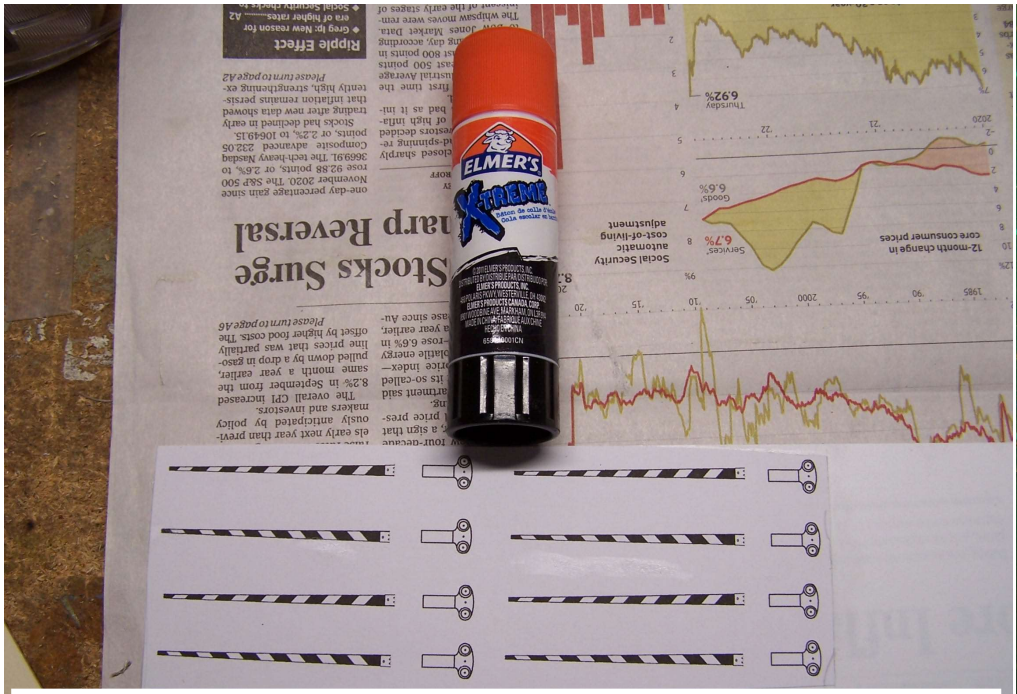
Note scrap of cardboard on base prior to gluing arm to base. This spaces arm away from base.

- Index card worked well, better than shirt cardboard.
- Glue stick easier than spray adhesive
- Cutting disks from sprue did not work well. A heavy duty 1/8” punch (for HO scale) to make disks from .010” styrene would work better.

Build Example 3

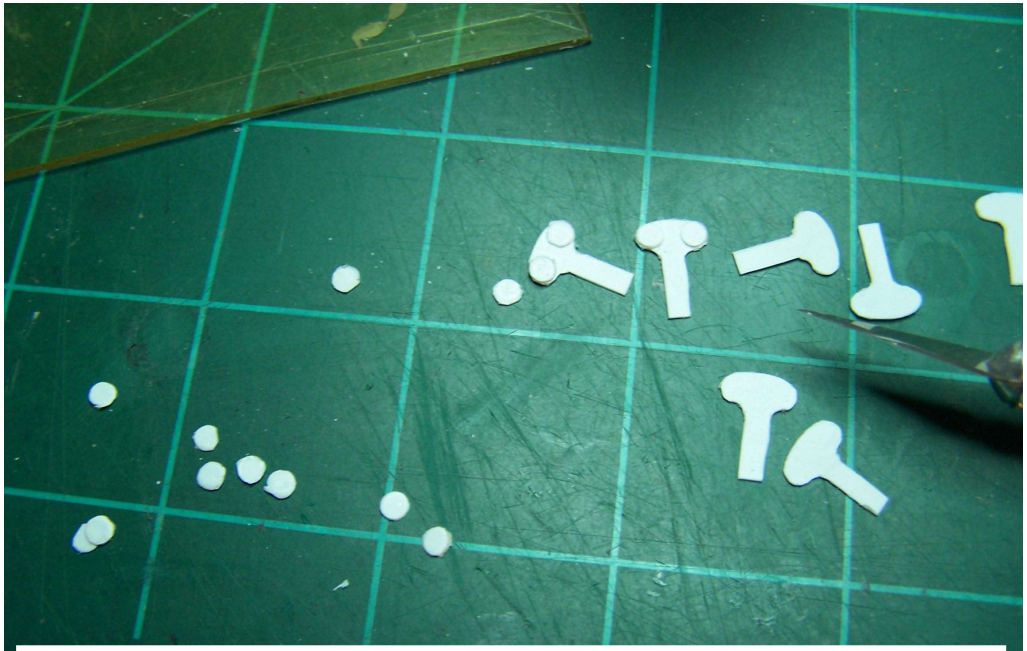
- Material:
  - *.010” & .020 styrene sheet*
  - *.100 styrene sheet*
  - *1/8” styrene I-beam*
  - *Stranded wire*
  - *.020” styrene rod*
  - *.015 wire*
  - *Printer paper*
  - *Glue stick*
  - *Isopropyl alcohol (IPA)*

- Print arms and counterweights on paper
- Glue to styrene with glue stick and cut out. (Yes, the glue stick actually held!)
- Remove paper from counterweights with IPA
- Make counterweight disks from .010 styrene using hole punch. Glue to arm counterweights.
- To make pin that holds weight disk: Pull a strand from stranded wire, insert in #80 hole drilled in counterweights. Glue with thin CA.

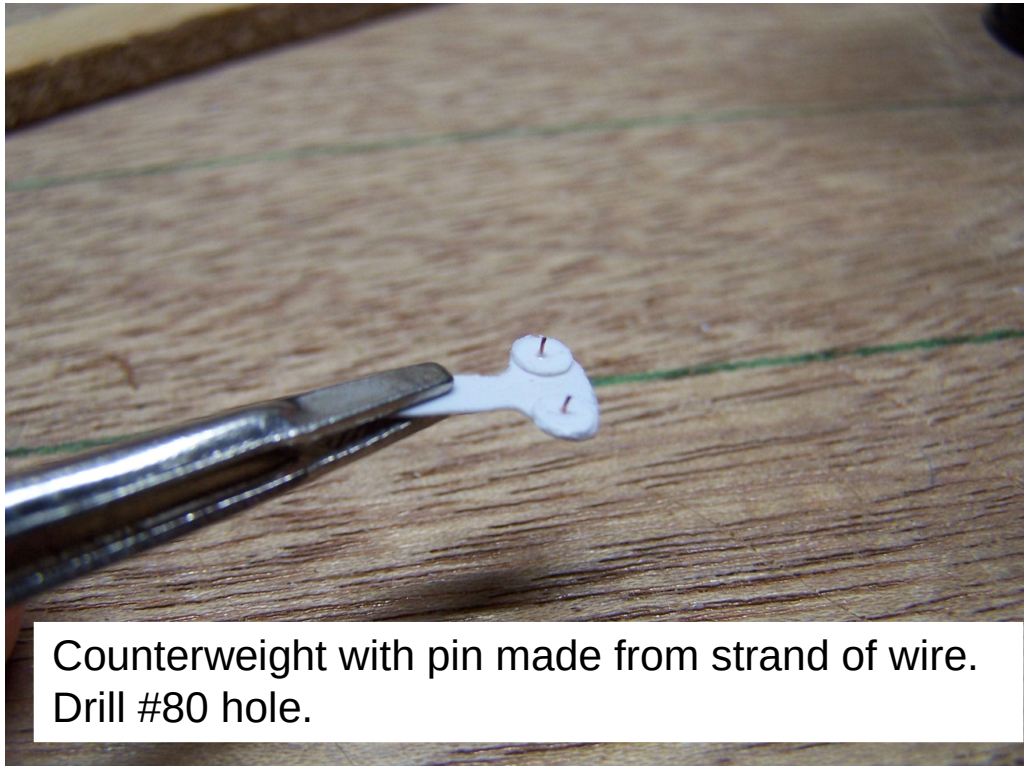


Glue stick used to fix paper to styrene.

Cut out and sand counterweight to match paper pattern. Remove paper with IPA.



Counterweights and weight disks ready for assembly.



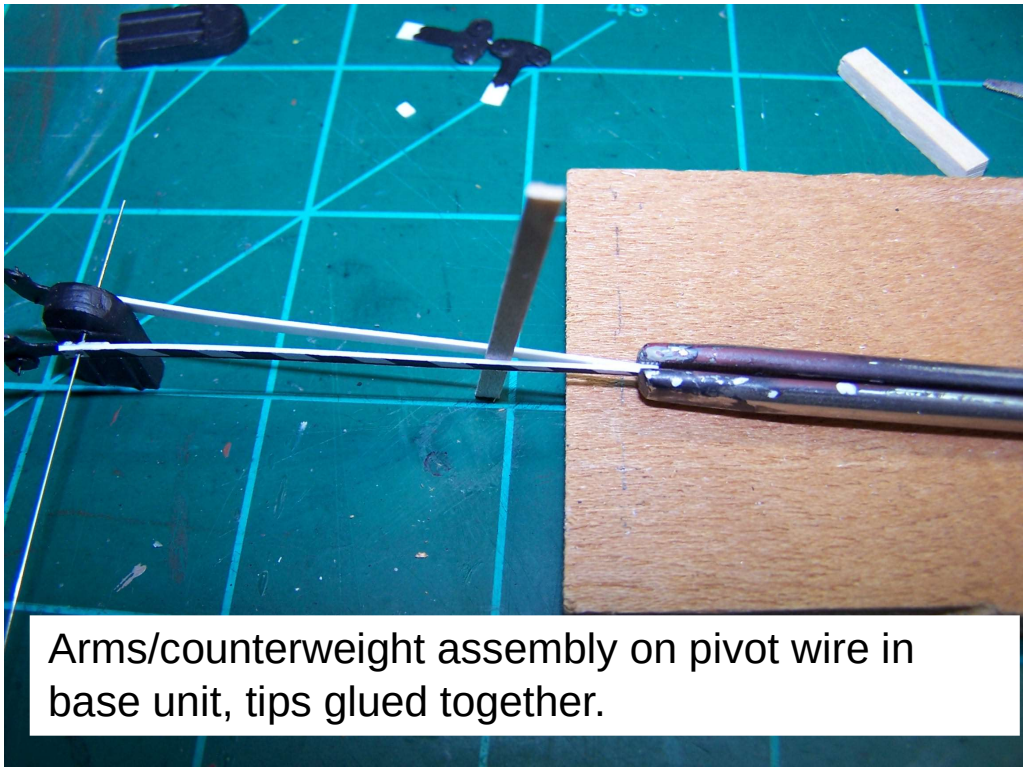
Counterweight with pin made from strand of wire. Drill #80 hole.

Build Example 3– continued

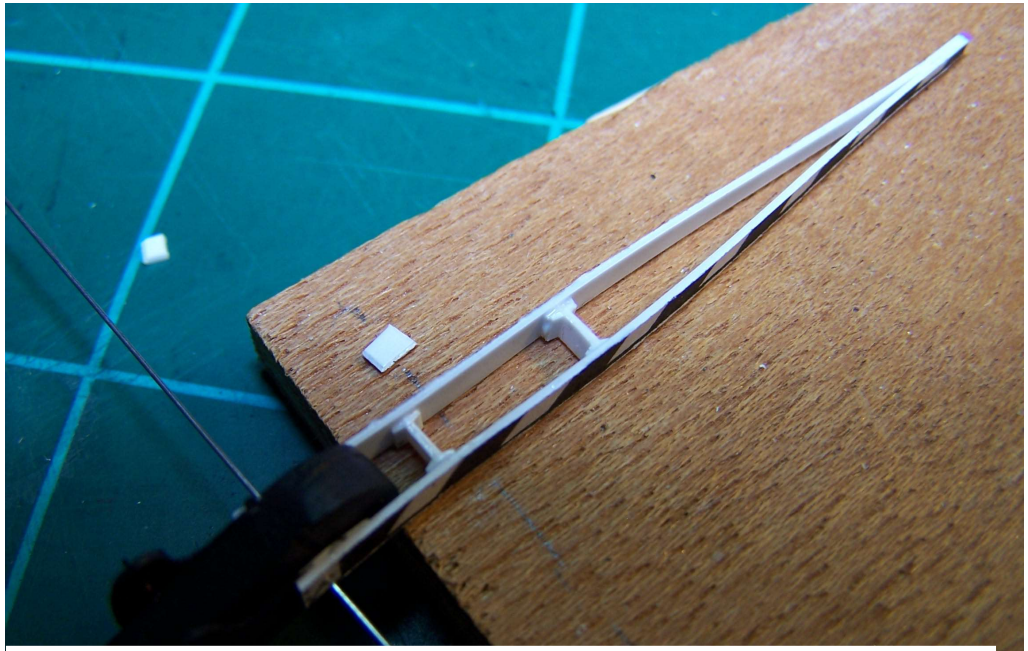
- For bases, glue paper to .100 styrene, cut and sand to size. Remove paper with IPA. Add .020” styrene to make thicker, to 10.5 HO scale inches.
- Mark pattern for weld seams on base unit. Make groove with triangular file, glue .020 styrene rod in grooves
- Paint counterweight and base units.
- Glue arms to counterweight assemblies.
- Drill #78 hole in pivot point of arms and base unit
- Use .015” wire to hold arms on base units. Glue tips of arms together with liquid cement. (It’s easier to put the arms on the pivot wire first, then glue the tips together.)
- Use 1/8” I-beam padded with .020 styrene as spacer between arms. Glue with liquid cement
- Cement arm to .015” pivot wire <u>on one side</u> with tiny drop of thin CA. “Spring action” of other arm will keep arm in place.
  - If CA gets into base unit as well as between arm and pin, the arm will not move.

Base units cut from styrene, paper pattern removed. Piece on left is marked for cutting grooves. Piece on right has .020” rod cemented into grooves to simulate seams.

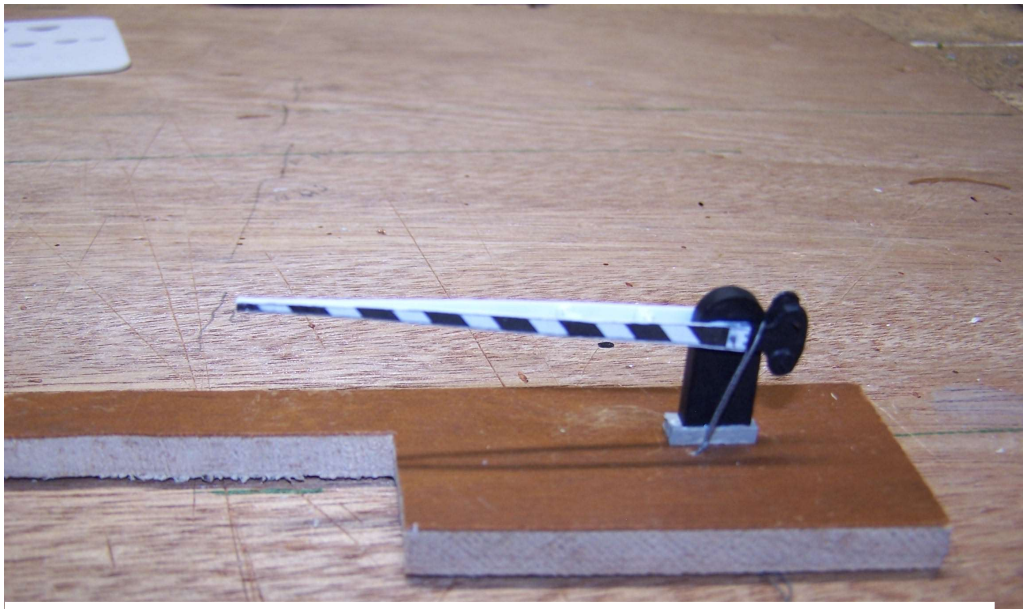
Arms +counterweight being assembled.



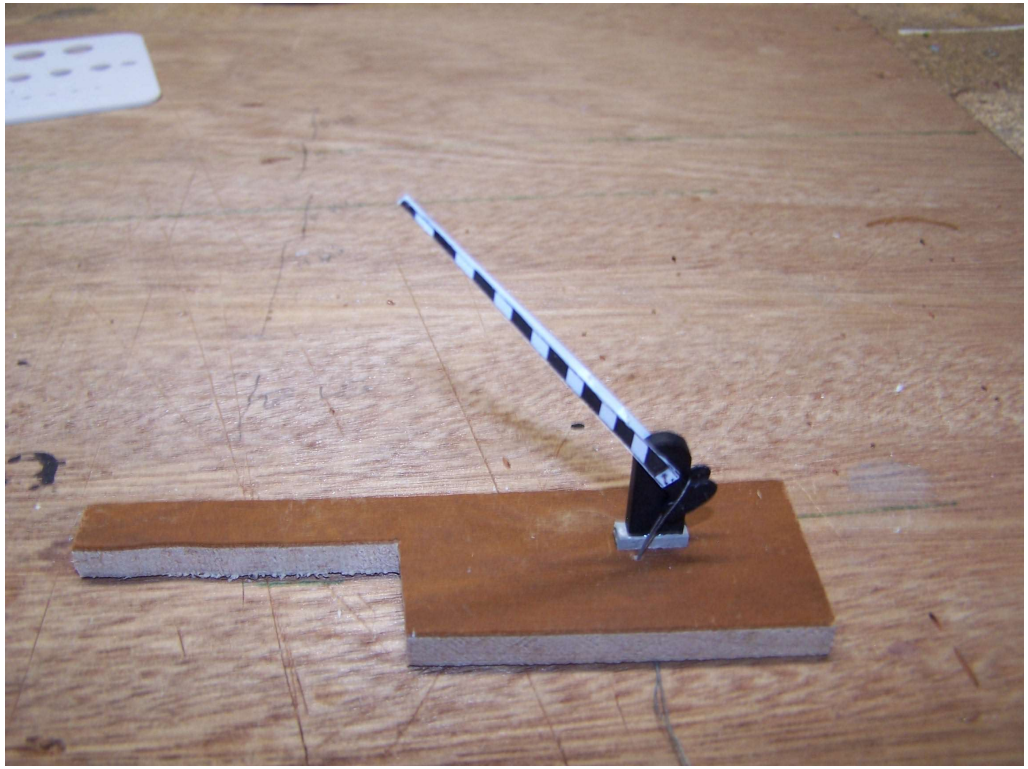
Arms/counterweight assembly on pivot wire in base unit, tips glued together.

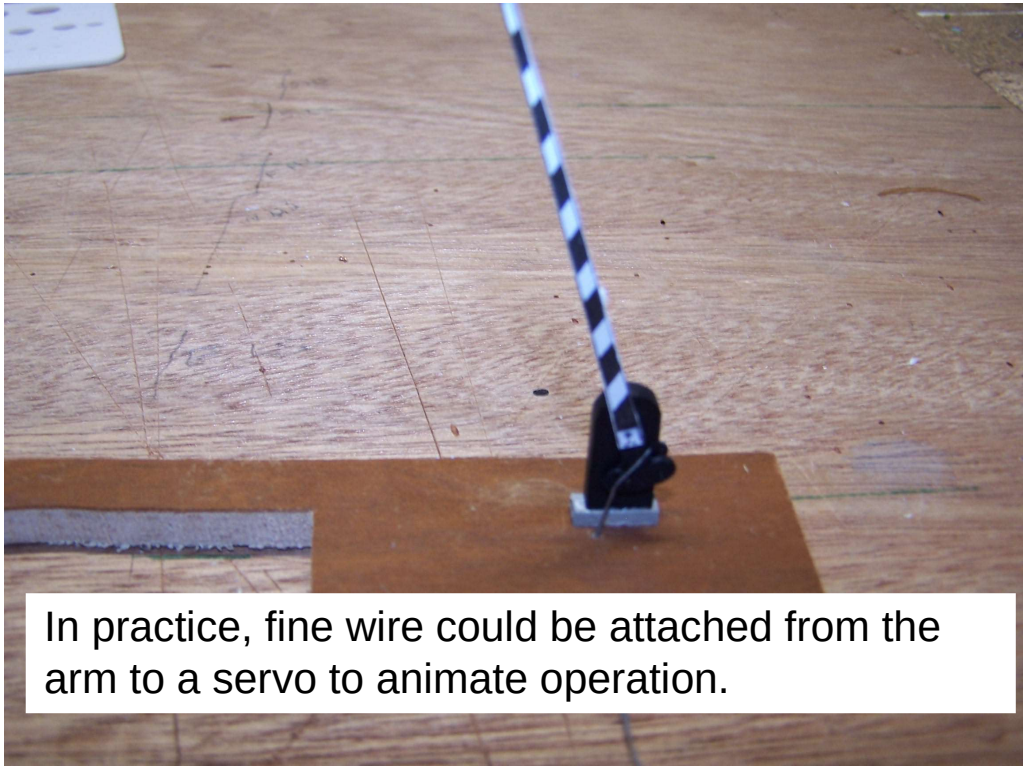


Spacers made from I-beam plus .020 spacer inserted between arms.



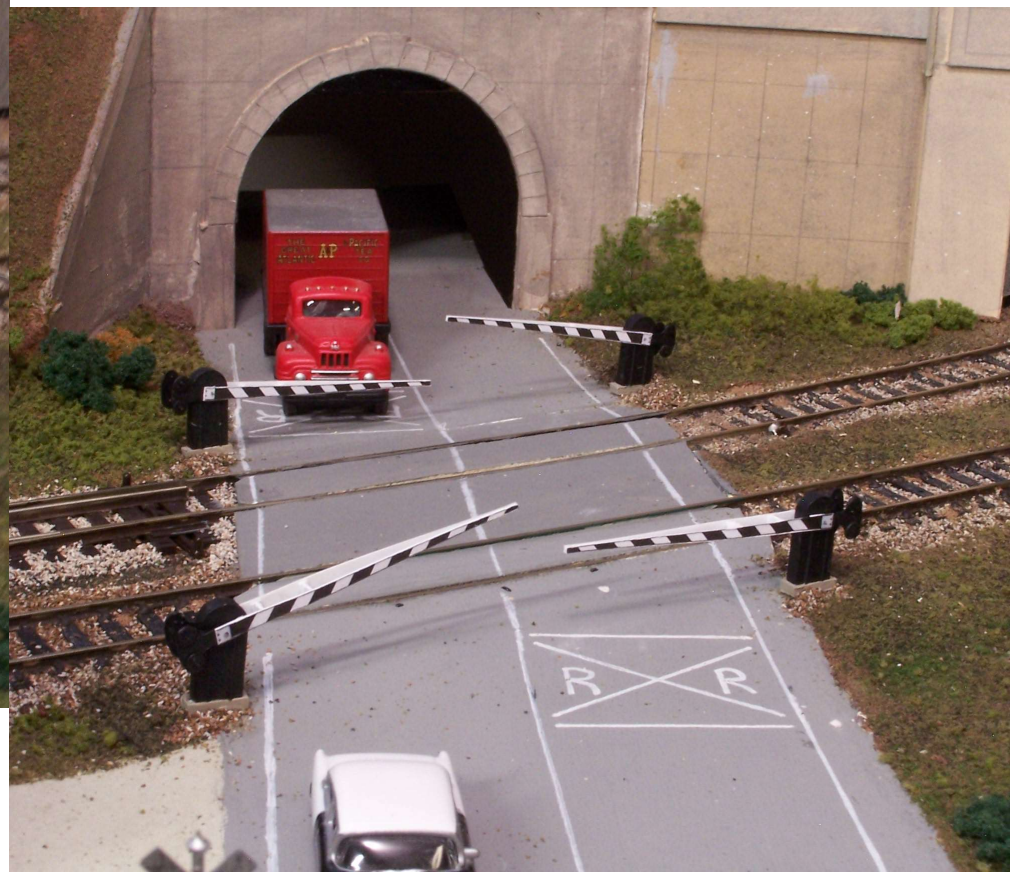
An animation example. A loop of thread was placed around counterweight. Pulling the thread raised the gate.





In practice, fine wire could be attached from the arm to a servo to animate operation.

Gates on the layout



The End