Scratchbuilding a Gondola

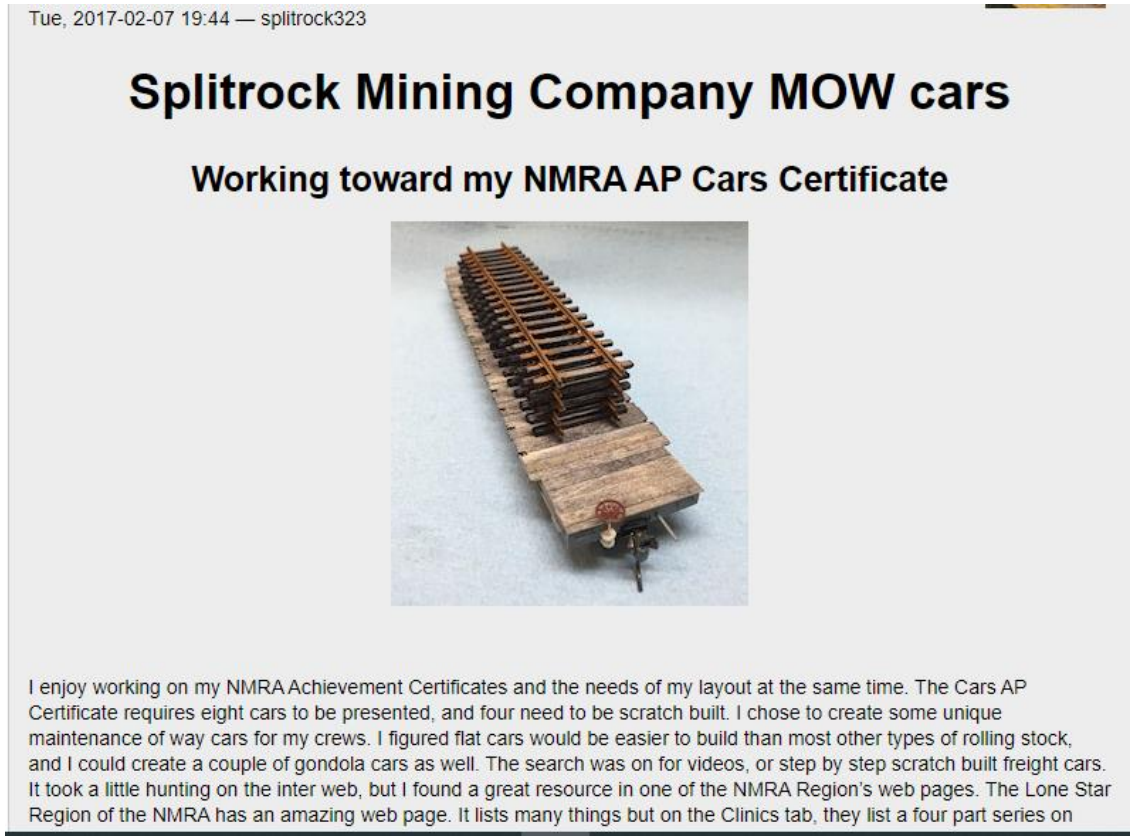
John McHugh

hikerjohn111@gmail.com

Focus of Presentation: I will illustrate and explain how I scratchbuilt a HO scale 42’ fishbelly gondola.

My breakthrough:

I found a 2017 online blog article in *Model Railroad Hobbyist Magazine* Blogs called – Scratch Build flatcars and gondolas. NMRA AP Cars Certificate by splitrock323 (Thomas Gasior) - https://model-railroad-hobbyist.com/node/29114 which details how to scratch build flatcars and gondolas.



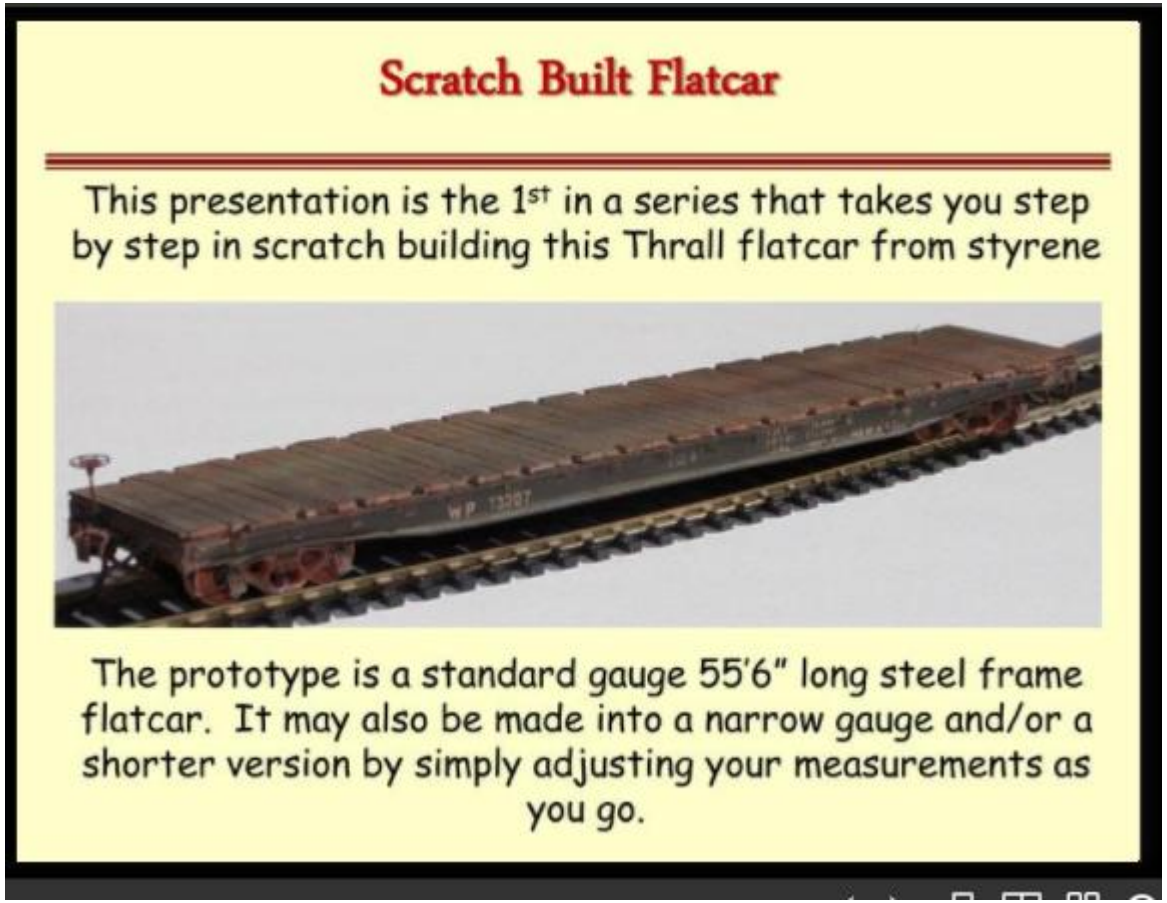
Tue, 2017-02-07 19:44 — splitrock323

Splitrock Mining Company MOW cars

Working toward my NMRA AP Cars Certificate

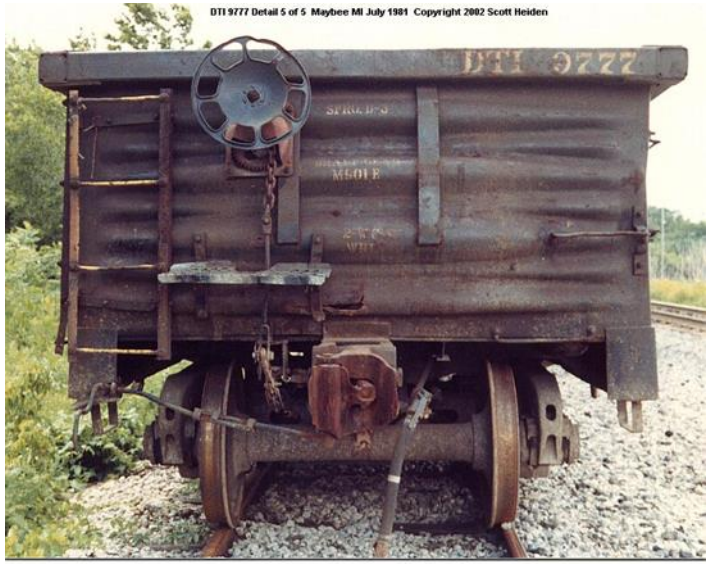
I enjoy working on my NMRA Achievement Certificates and the needs of my layout at the same time. The Cars AP Certificate requires eight cars to be presented, and four need to be scratch built. I chose to create some unique maintenance of way cars for my crews. I figured flat cars would be easier to build than most other types of rolling stock, and I could create a couple of gondola cars as well. The search was on for videos, or step by step scratch built freight cars. It took a little hunting on the inter web, but I found a great resource in one of the NMRA Region's web pages. The Lone Star Region of the NMRA has an amazing web page. It lists many things but on the Clinics tab, they list a four part series on

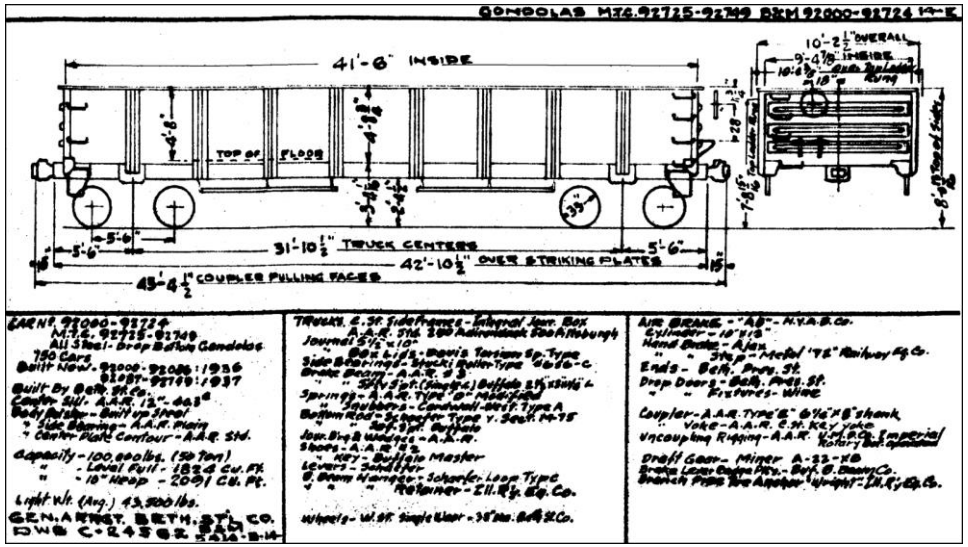
Splitrock323 received his inspiration from a series of clinics on the Lone Star Region website. (https://www.lonestarregion.com/node/5 - scroll down to the flatcar clinics)



I can do this!

First step: gathering information – prototypical photos and drawings

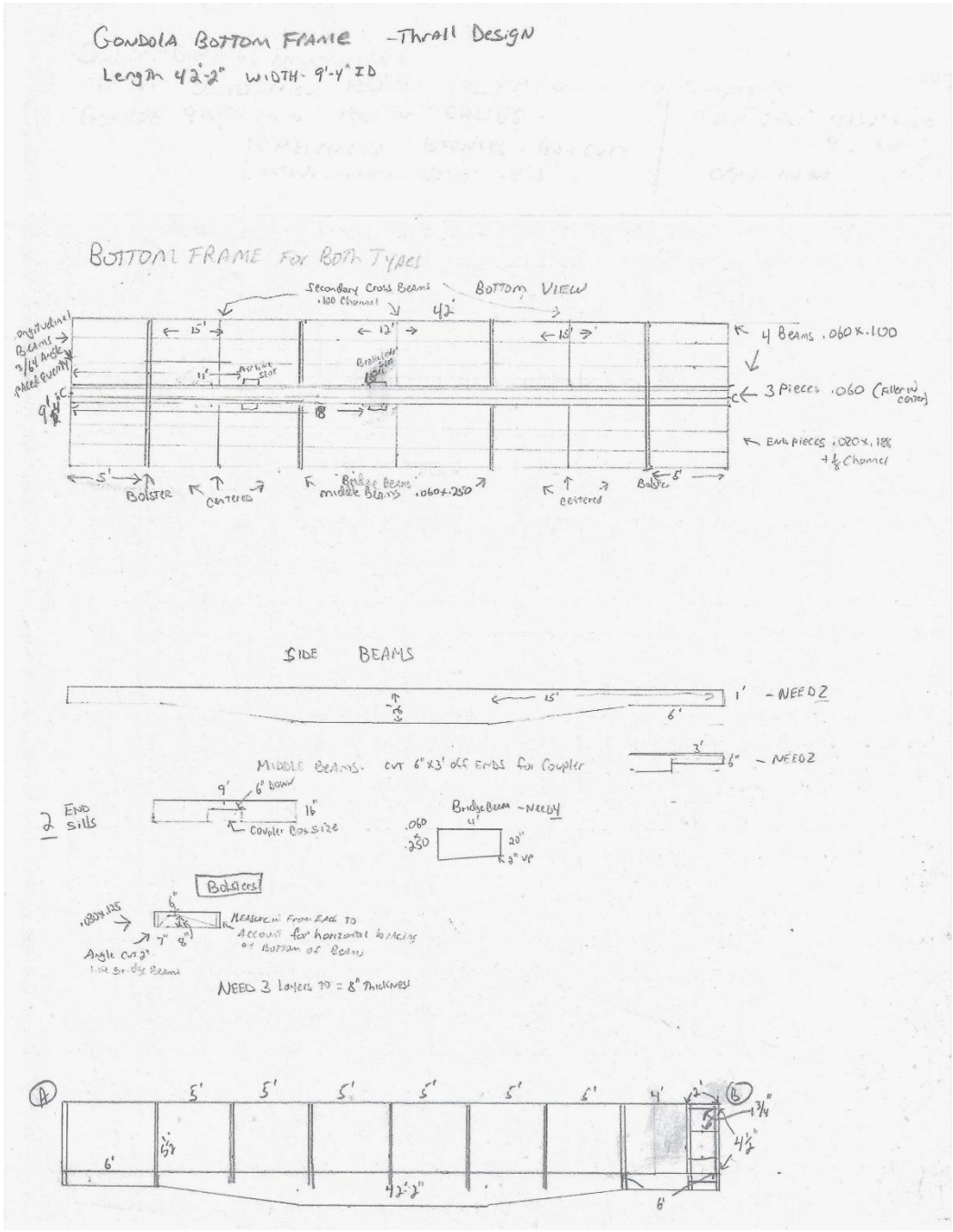




B&M car classification card

Make a scale drawing (This is in HO scale)

- Accurately draw in all parts giving dimensions in scale feet/inches
- Label the size/shape of all the styrene pieces you will need



Gather Parts - Parts List

Evergreen Scale Models .060X.250 E-159
.020X.100 E-125
.060X.060 E-153
.020X.125 E-126
.020X.188 E-128
1/8” channels E-264
.060X.250 E-159
.080 channel E-262
.100 channel E-263
.020 sheet E-9020
.030X.125 E-136
.010X.125 E-106
HO 2X12 E-8212
HO 12” channel E-265
HO 2X6 E-8206
1/4” channel E-250

Plastruct 3/64” angle P-90501
Detail Associates brass wire .019 #2506
Detail Associates brass wire .028 #2508
Tichy Train Group .015 PB wire #1102
Precision Metals .005 brass plate #250
Cal Scale AB Brake System #190-283
Details West Gondola End #6221-E
Detail Associates brake wheel set #6402
Tichy Train Group Brake Wheel & Staff #33003
Tichy Train Group Phosphor bronze wire .015 #1102
36 gauge magnet wire

Kadee #5 couplers (No. 5)
Kadee Air Hose and Angle Cock #438
Kadee trucks #500
Walthers Brass Screws 2-56X1/4” 94-1003
MicroMark Decal Paper – rivets #84958
-- clear paper #82859
A-Line 40 link chain ALP29216
Vallejo white 71.001, black 71.057
Dirt 71.133, tarnished black 29022x2
Model Master steel 4679
Poly Scale RR Tie Brown F414329
Pan Pastels Burnt Sienna Shade 704.3
Burnt Sienna 704.5
Raw Umber 780.5
Red Iron Oxide 380.1

Building the gondola:

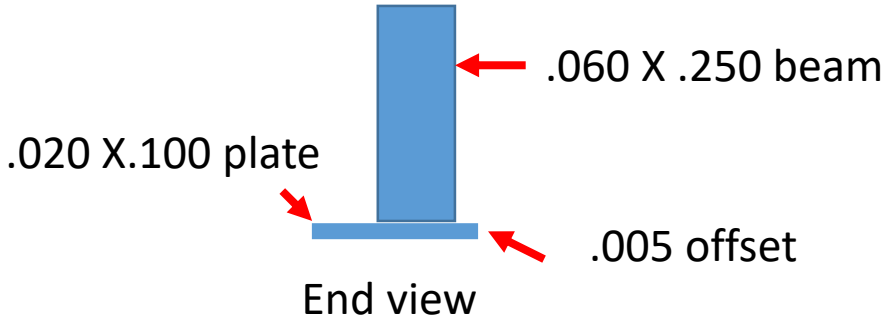
1) Build the 4 beams

Start making the four beams by shaping .060 X .250 styrene and adding .020 X .100 bottom plates (horizontal bracing)

Be sure to account for the thickness of each end sill when determining the length

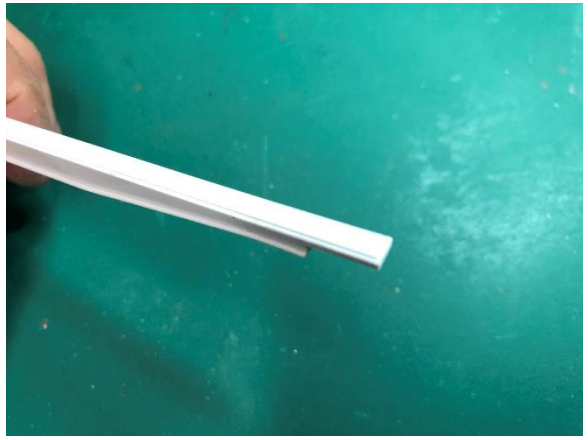
The two center beams need to be notched a scale 6” X 3’ to account for the coupler box

Note that the bottom plate is offset about .005 on one side



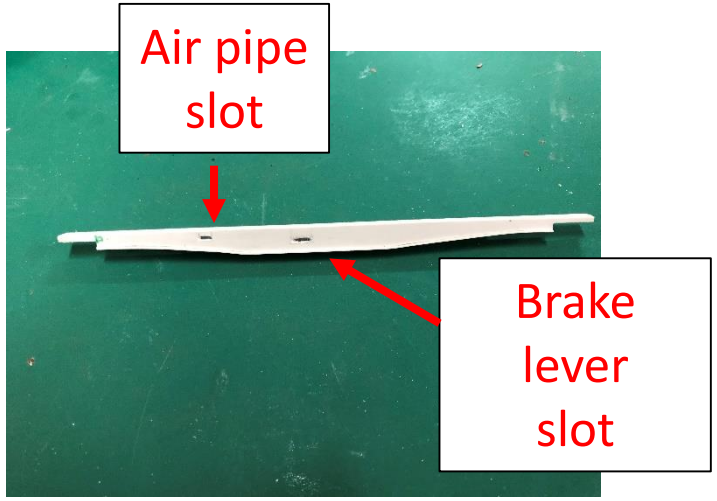
2) Form the center beam

Unite the two notched out center beams by gluing a piece of .060 X .060 styrene strip between the beams at the top



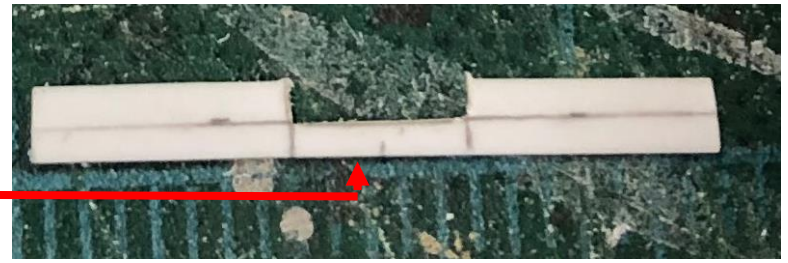
Glue a piece of styrene .020 X .125 along the top of the center beam keeping it centered – note that the center beam will be **.020 higher** than the side beams. Trim 3” off each end for the end sill.

Once completed and dry it is a good time to notch out the slots for the air piping and brake lever. Brake slot- 3” x 18”, air pipes 3” x 12” – air pipe slot 6” from top of beam, brake level slot down about 12” to align with piston rod later on. Air slot 11’ from end sill, brake slot 17’ from end sill



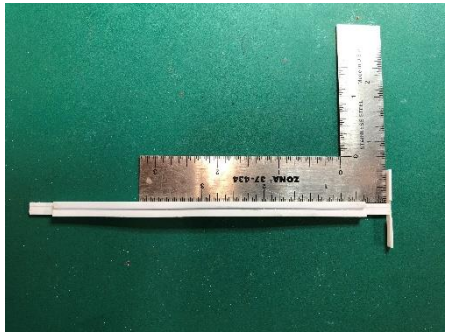
3) Make and glue the end sills

Cut inner sill -¼” channel 9’ long - may need to be trimmed to fit when installing. Notch out coupler pocket – start 6” down from top



Cut outside end sill from .020 X .188 styrene 10’ long X 15” high. Notch out for the coupler box. Will trim to fit.

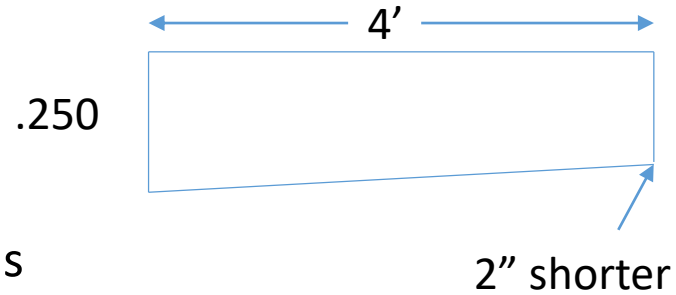
Glue center beam to end channel making sure pieces are square and centered – LET DRY! Also make sure the top of the end sill is even with the top of the center beam.



Once dry, assemble the other end beam and the two side beams – make sure square and level. Add outside end sills – The end channels go between the side beams and outside sill covers the side beams.

4) Completing the frame: bridge beams, cross beams and longitudinal braces

Make 4 bridge beams (for 40’ cars) from .060 X .250 styrene 4’ long. Trim along the bottom bridge beam at an angle down 2” to account for the higher center beam.



Attach to frame and trim so side beams don’t bow out or in.

Add bottom plate .020 X .100 to each bridge beam

Trim and notch four 3/64” angle so they fit evenly with the top of the beams. Slight filing of the beams is needed. Make sure the braces are spaced evenly.

Make secondary cross beams out of .100 channel. Trim and abut to the longitudinal braces

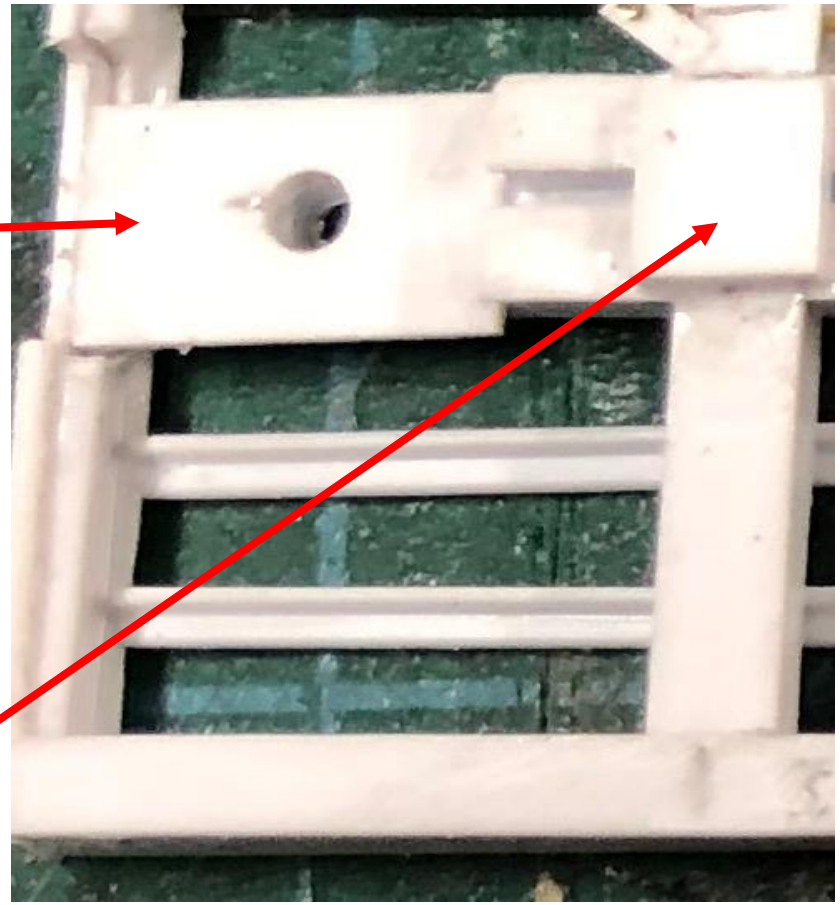
5) Make and place bolsters

Add the 4 bolsters fabricated from 3 pieces of .030 X .125 strips glued together and shaped.

Since they can't be seen I made them at a straight angle. Glued .010 X.125 cross strap to each bolster.

6) Completing the frame

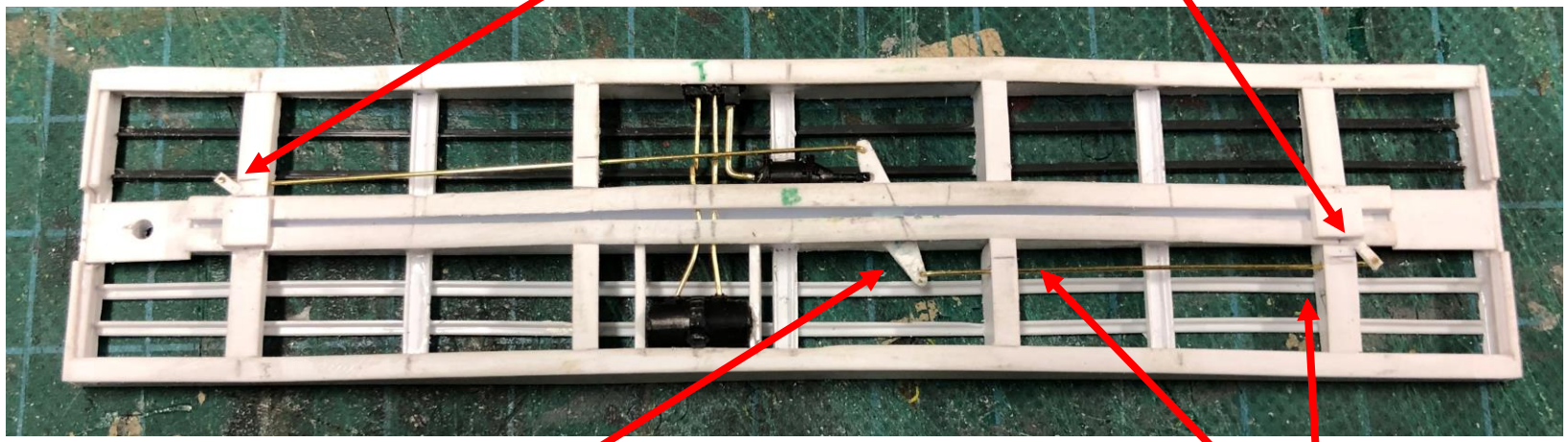
I added a .020 spacer the width of the coupler box to make a flat platform for the box. Then I drilled and tapped a hole to attach the coupler box.



Make the attach point block for the trucks from 2 pieces of .030 X .125
I will drill and tap this piece to fit a 5/32 round head screw

Completing the frame – continued
Adding the brake lever and pinch arms

Make the 2 pinch arms out of .020 X .040 styrene 12” long, cut a slight angle in one end and glue it to the bolster point block. Drill a hole near one end to accept the brake wire –I used .019 wire for the brake lines.

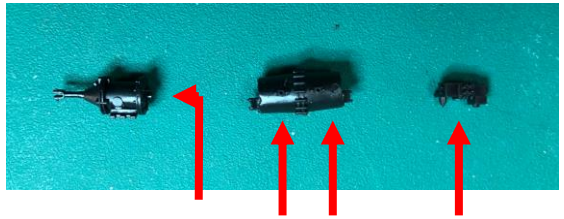


Make the brake lever from .020 X .125 styrene. Shape and drill holes in each end to accept the brake wire and glue in slot.

Drill holes for brake lines through the bridge beams and bolsters.

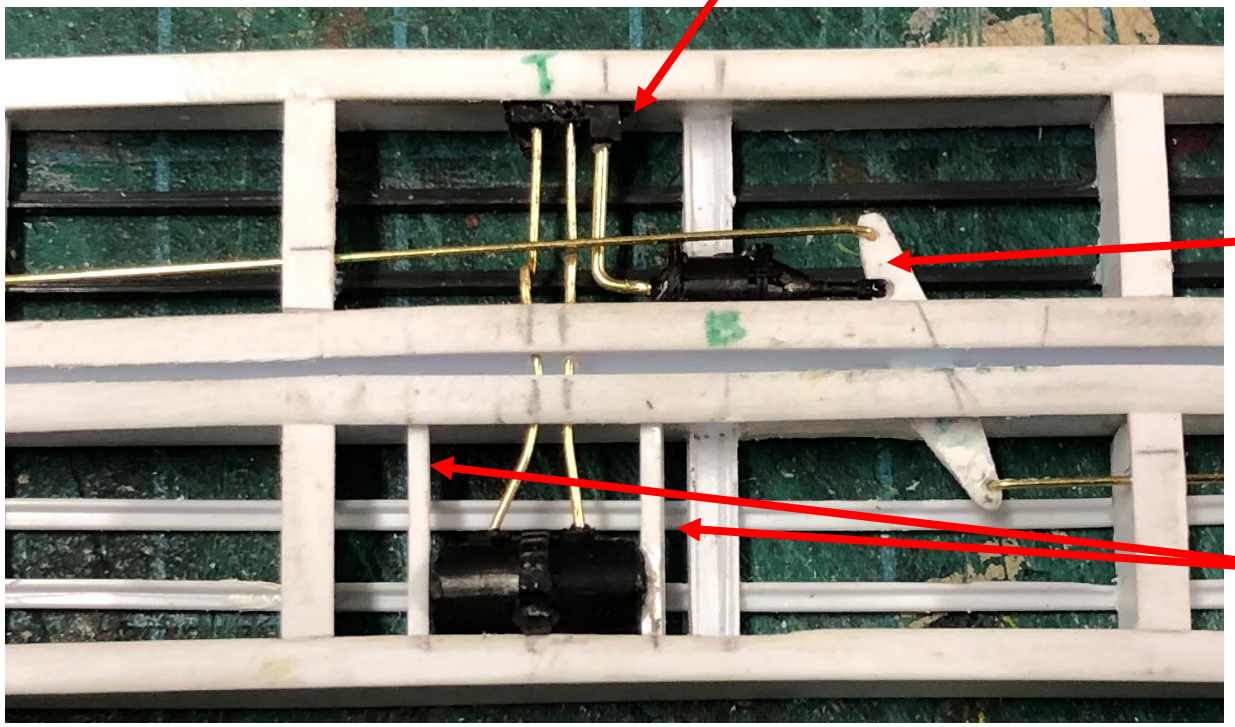
7) Adding the brake gear

Drill appropriate holes in brake gear to accept .019 or .028 brass rods as needed.



4 holes with one to the left side.

Glue valve to side beam resting on bottom brace.



Glue brake cylinder to middle beam with piston rod glued to brake lever. (I added the piping before gluing)

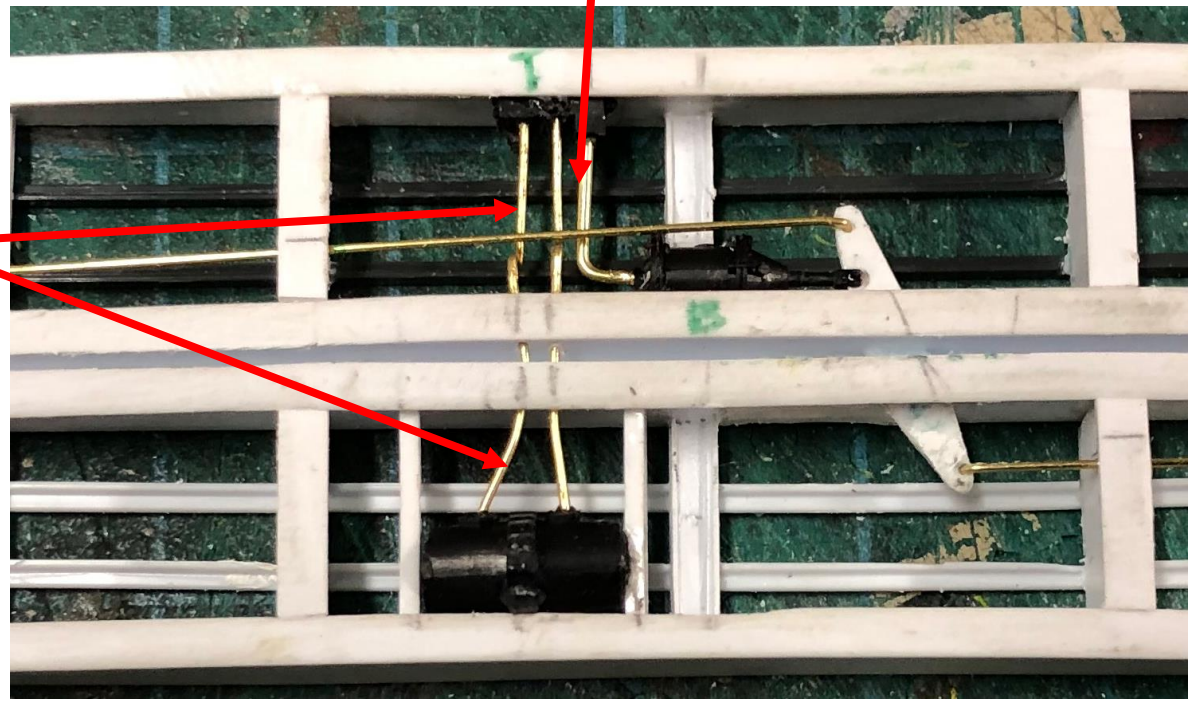
Make supports from channel styrene for the air reservoir tank and glue tank to supports and side beam.

MAKE SURE THE BRAKE GEAR HOLES ARE LINED UP BEFORE GLUING!

8) Adding the piping

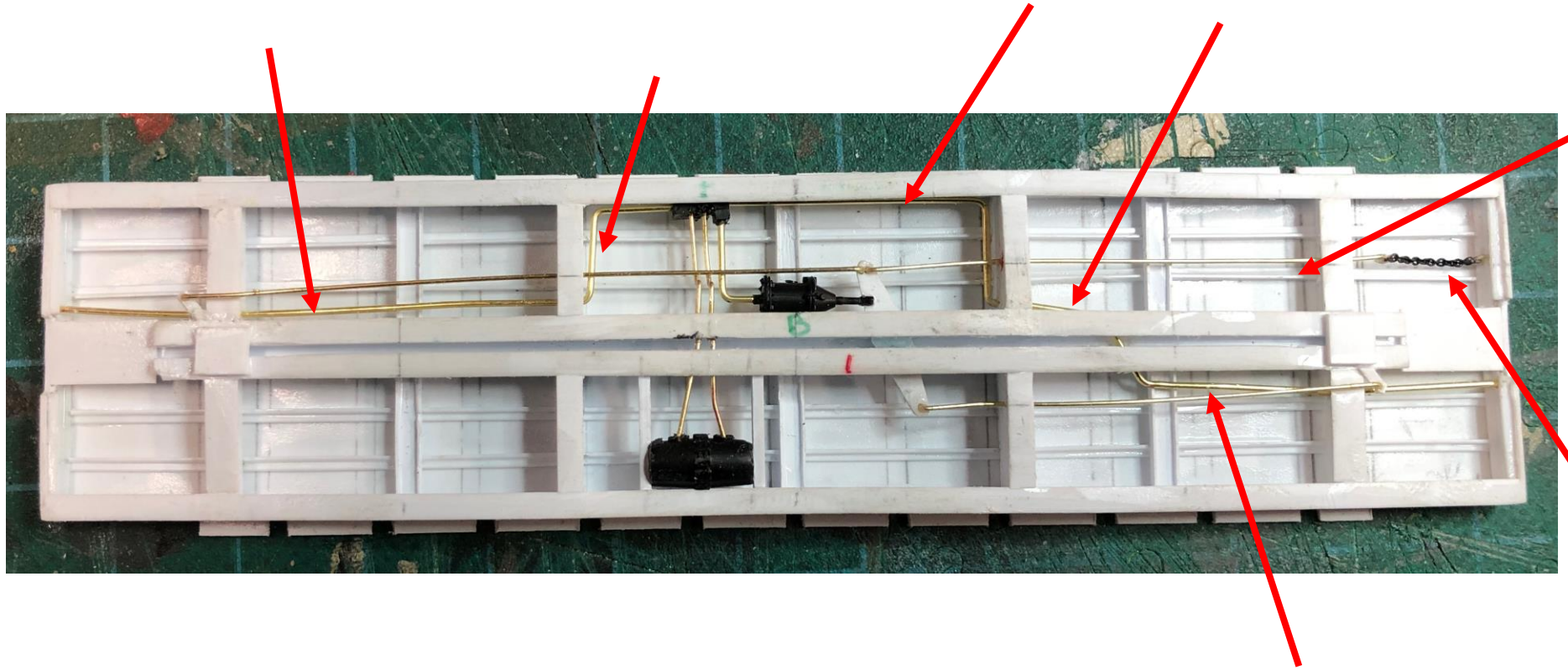
Cut and bend .028 brass rod cylinder to control valve – I did this before gluing the cylinder

Cut and bend .019 brass rod to form the reservoir to valve pipes. Note that I used 4 pieces for these lines to make it easier to install – they are not connected.



Adding the piping – continued…

Add the .028 brass rod air lines – again I cut them into smaller pieces to make it easier to install. Photo has subdeck attached to make it easier to see piping. Note that each arrow is a different piece of rod shaped to fit.



Add .019 rod to brake lever extending to the B end of car and bend the end to accept the chain.

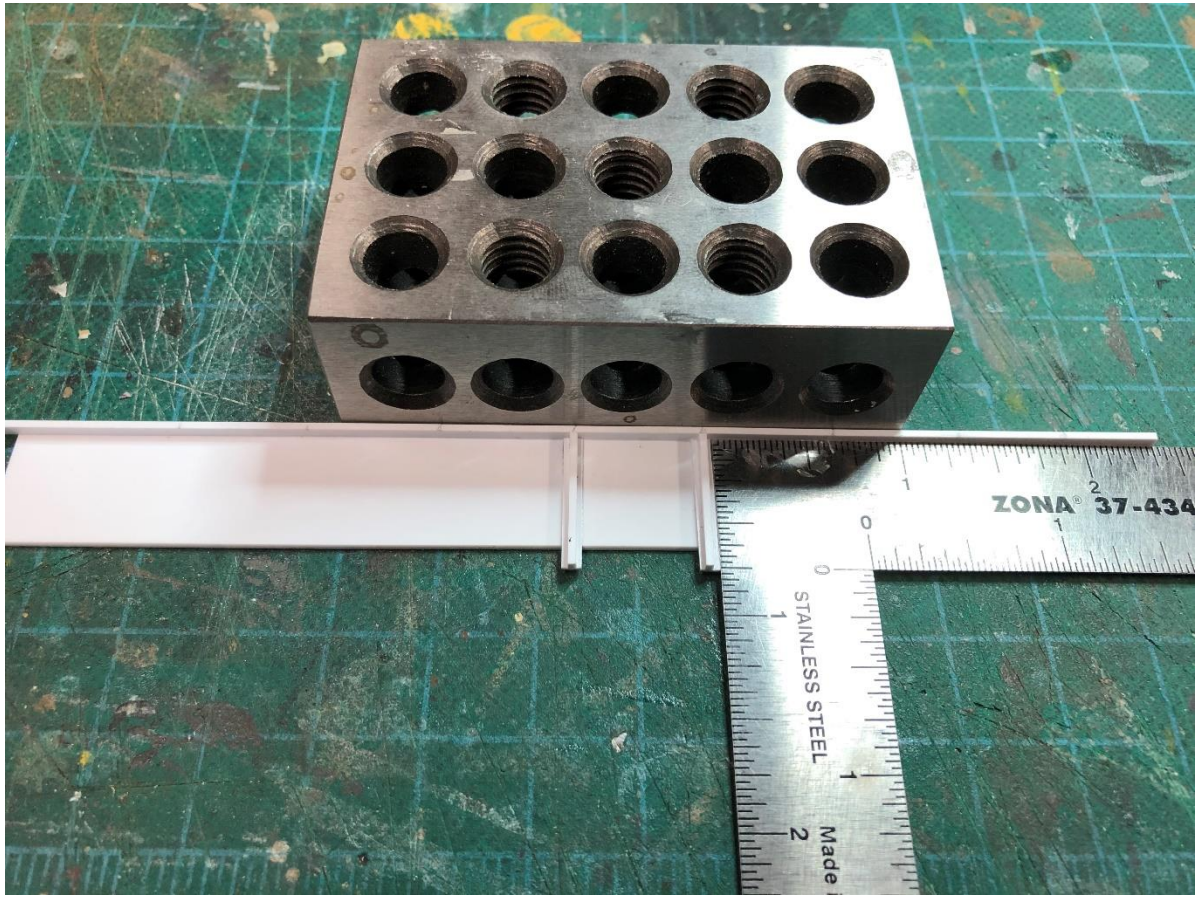
Add the chain using an eye bolt to secure it to the end sill.

9) Cut and apply the deck

Cut a piece of .020 styrene and glue to deck.

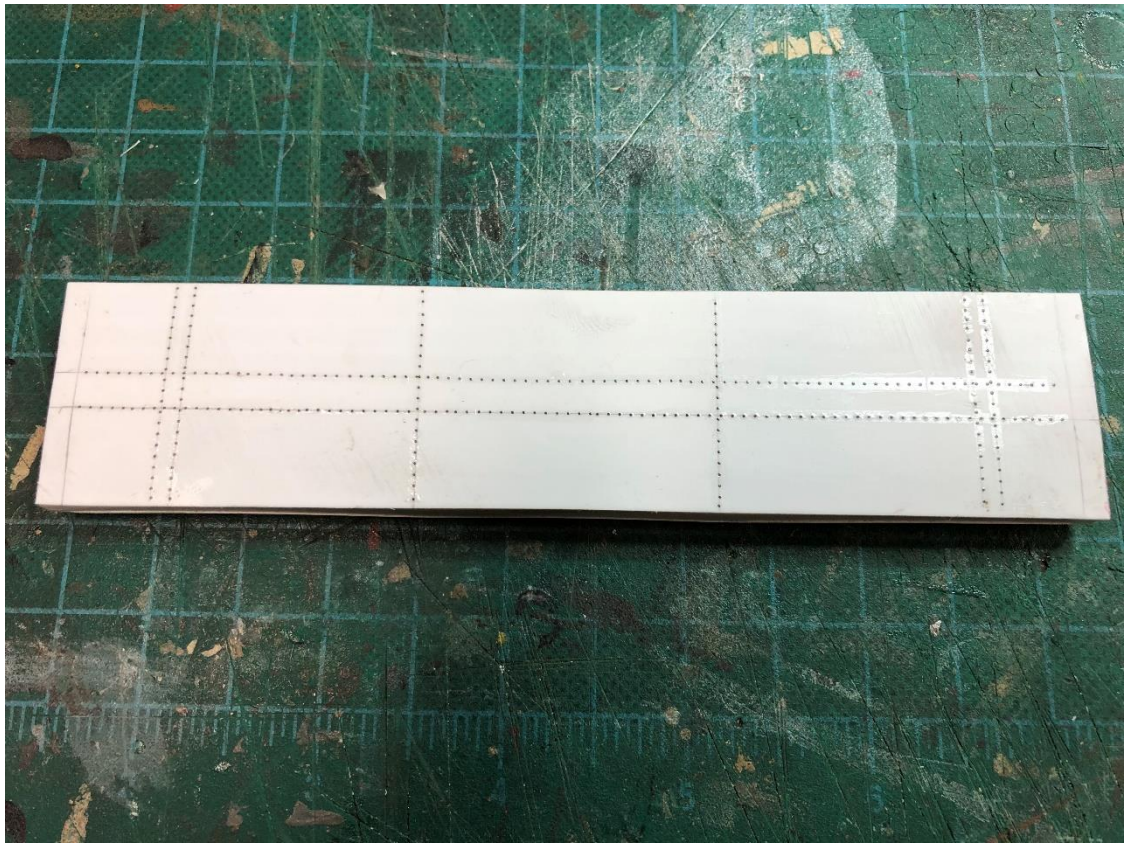
10) Making the side walls

The 2 side walls were cut from a piece of .040 styrene. The top rail is a piece of .040 X .080 styrene and the side bracing consists of two pieces: a .040 X .060 glued to a piece of .020 X .100 styrene making sure that when both pieces are glued together they are even with the top rail.
I marked the locations of the side bracing and used a square for alignment, starting with the center brace.



11) Adding rivets to the deck

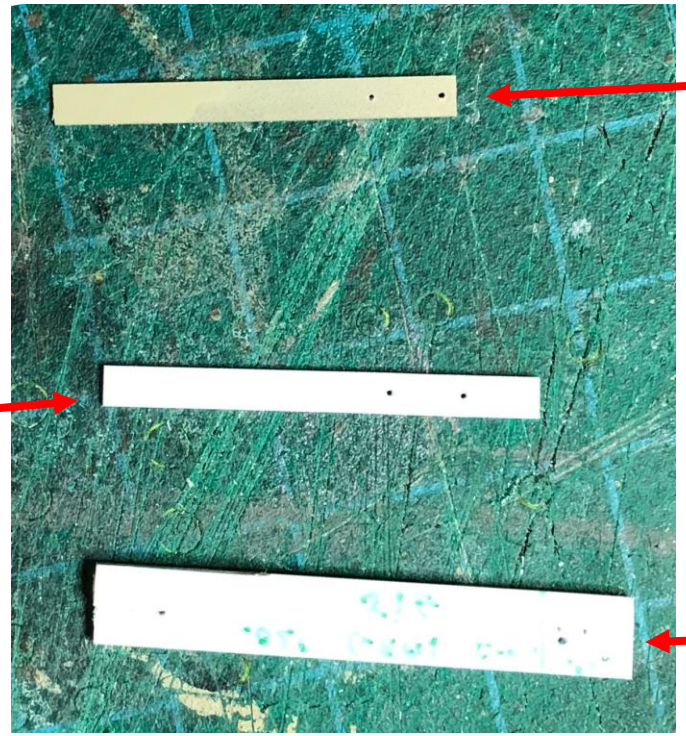
I added Microscale raised 3D rivets to the deck over the beams and bolsters.



12) Add grab irons

Scratchbuilding grab irons from .015 bronze phosphor wire.

First create jigs



Drill two holes in a strip of .020 styrene for proper grab iron spacing, 19” in this case.

Drill 2 holes in a strip if .030 X .125 styrene for drop down grab irons.

Drill a hole 19” or so from end of .060 X .250 styrene (or similar) to form grab irons.

Making grab irons

Straight grab irons

Insert wire in hole 19” from end

Bend wire then use flat faced pliers to make a good 90° bend

Bend other side of wire holding with piers

Drop grab irons

Stick grab iron in .030 thick jig

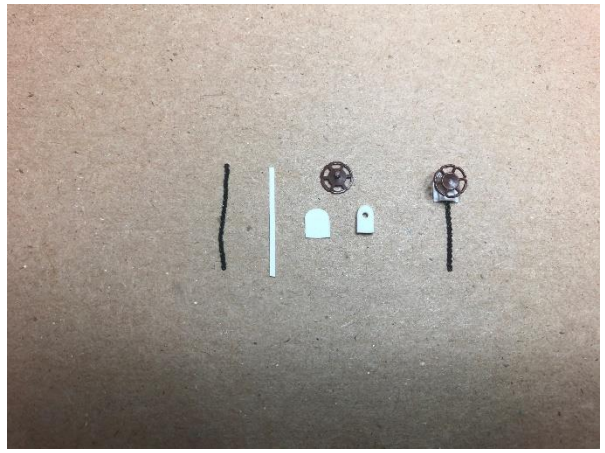
Hold with pliers and bend with finger

13) Adding the ends

After gluing on the sides and end walls I used a jig to properly align the handrails.

The ends continued

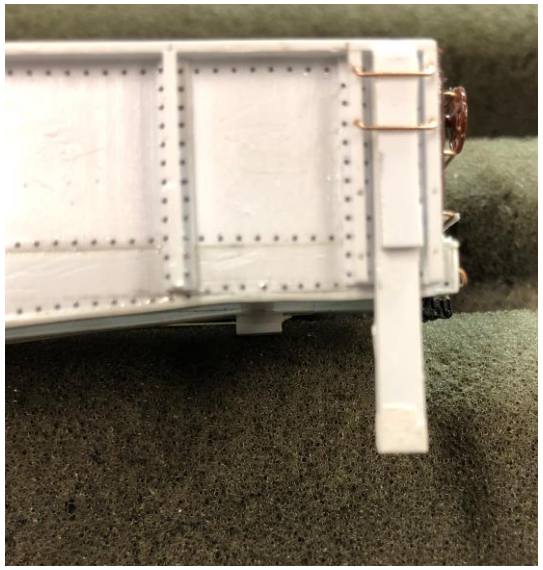
I fabricated most of the Ajax brake housing. I took a piece of 1/8” channel and drilled a hole for the Detail Associates brake wheel then cut it 7/32” long rounding the top. I cut and rounded a piece of .010 styrene 3/16” X 3/16” to use as a backing. I ended up filing the backing to match the 1/8” channel. A piece of .010 X .040 styrene was cut to go over the rounded top and filed smooth with the sides. I glued on the wheel and A-line chain.

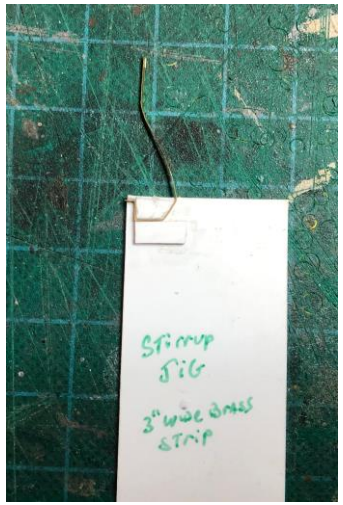


I used the B&M Builder’s Classification card to align the brake housing and platform. The platform was made from .020 X .010 styrene and I will add .020 X .020 bottom diagonal supports for the platform and the bell crank to the bottom of the chain.

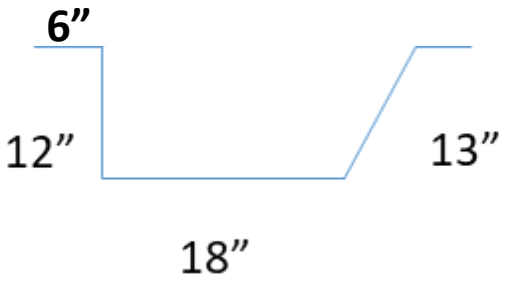
14) Completing the side walls

Drilled holes and inserted grab irons. I made a jig to assure proper alignment.



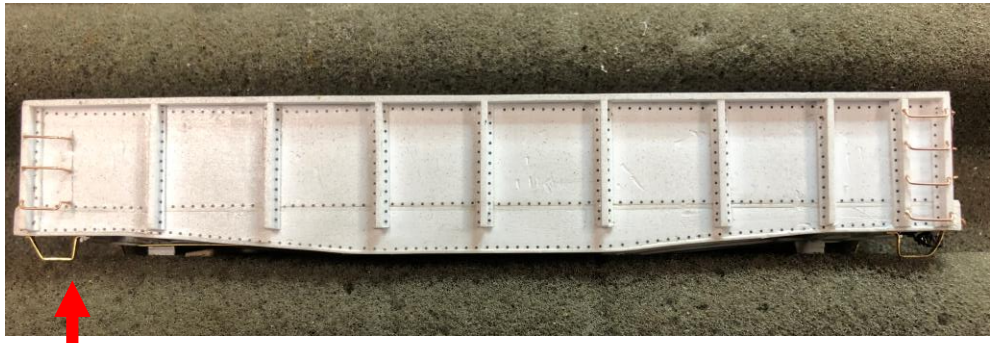


Cut .005 brass sheet 2.5” wide. Cut each strip about 55” long and use jig to shape.



Stirrup dimensions

Completed side showing rivet detail, grab irons and stirrups.

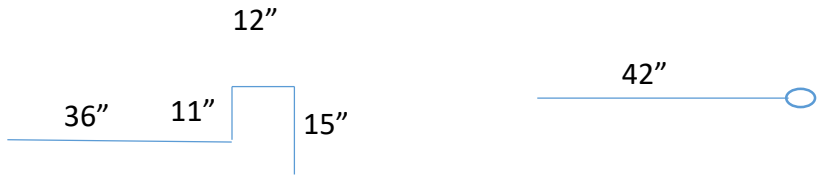


Note: Stirrup should be reversed

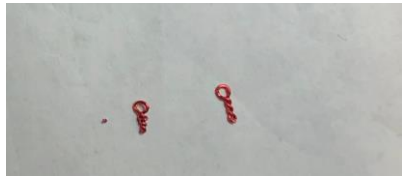
15) Making the coupler locking pin arms

A jig is helpful to make the bends

Make 2 pieces from .019 brass rod for each side.



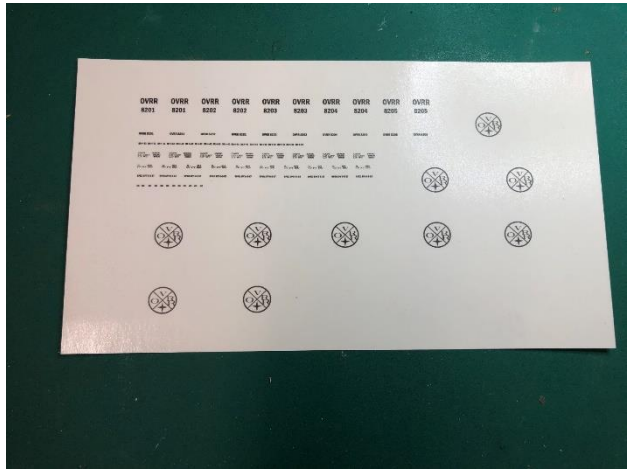
Make 2 eye bolts for each coupler arm from 36 gauge wire



Glue the two rods together so they equal 5’ in length. Tie two pieces of thin thread at the ends where they overlap

16) Paint and decal

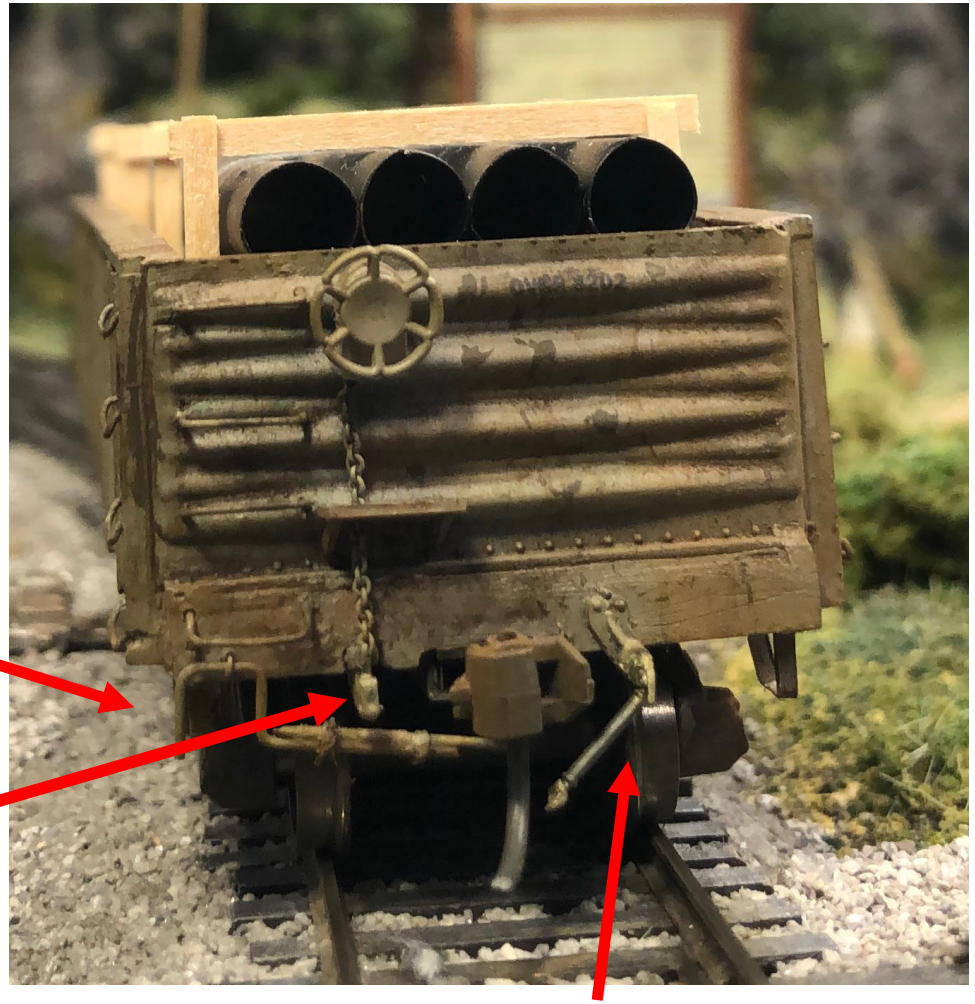
I sprayed light grey, let it dry and applied homemade decals
(Micro Mark clear decal paper)



17) Applying coupler locking pin arms and air hose

Drill a hole into the underside of the coupler box, attach an eyebolt to the loop end and glue the bolt to the box.
Slip the other eye bolt over the handle end to line up where to drill a hole. Drill and glue into place.

Bell crank attached to chain



Apply air hose and angle cock aligning with brass air pipe. Some modification will be needed applying the bracket.

18) Weathering and load

I weathered using diluted acrylic paints and Pan Pastel powders.

The pipe load was made with straws sprayed black, glued together and secured with grey thread. The wooden supports were made with 2x6” stripwood.

A Few Lessons Learned

1) Use “thin” type glue and watch glue lines and gaps – putty can be very helpful!

2) Use sharp blades and make many lighter passes when cutting styrene.

3) Redo/ disassemble errors!

4) Square, level and plumb.

5) Best if copying exactly from prototype photo(s).

6) Proper tools make life easier.

7) Small parts will fly off into space never to be found again.

8) Lastly, it will take A LOT longer than expected.

Give scratchbuilding a try!!