

The following information and photographs are what I did to build the kit. Your methods and needs may differ from this which is fine. There is no right or wrong way if you are used to scratch building. The idea is to make a final model that fits your railroad.

I do recommend having trucks and couplers on hand so they can be used to determine your final dimensions. Most kits include grab & step irons, truss rod wire & turn buckles and other various items for each particular car. You can add additional items as you desire. Most detail parts are available from Grandt Line, Tichy and others. Make sure you have all the parts shown in the photo; any missing parts will be sent free of cost.

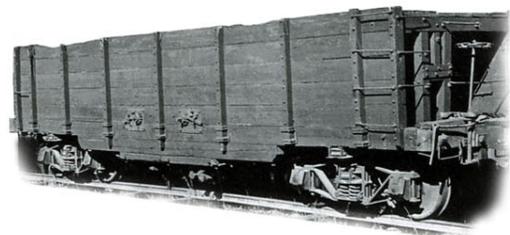
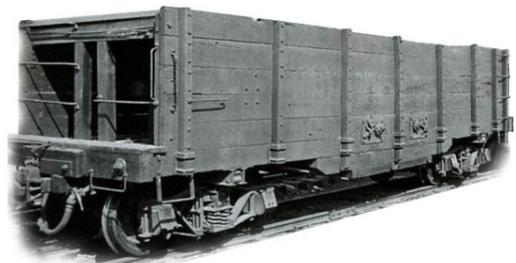
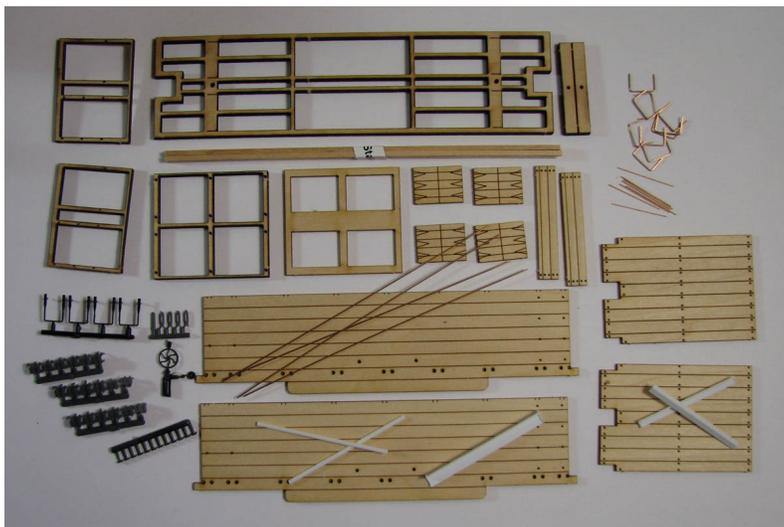
You can also modify the wood parts to get a shorter or narrower car, or you may want to make a full width bolster or you might want to add a name board or an end beam. The point is, make it your own. Now for my tips.

You can print these instructions by selecting them (highlight with your mouse) and copy and past into MS Word or similar program and print from there.

Or download the PDF here: [Hopper Assembly PDF](#)

## Hopper Car Assembly

These photos are from my assembly of the 24' long x 7' wide hopper. This car is based on an East Tennessee & Western North Carolina RR prototype. These instructions are also used for the assembly of the 28'6" Tweetsie Hopper. This kit uses laser cut sides and floors. I use Pink Flamingo glue from Northeastern for all my wood to wood joints and Rhino CA (super glue) for dissimilar items like wire and plastic. You may have your own favorites.



### FRAME

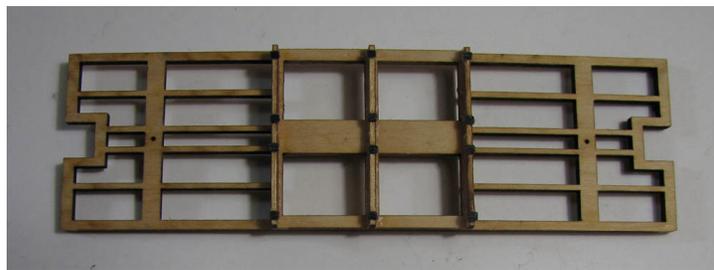
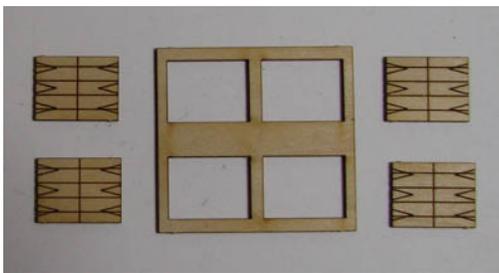
New kits come with the filler piece left in the coupler pocket. See the end of this section for more info. The first step is to work with the frame. Check the frame and make sure to locate the trussrod laser cut slots in the TOP surface above the bolster. These will accept the ends of your truss rods. Use a razor saw or knife to make these slightly wider and deeper to just accept the rods (included in the kit).

You need to decide how the ends of your truss rods will terminate. The rods in the kit are long enough to reach the bolsters, but you can add longer ones or use fishing line

or beading wire. You could then drill holes through the end of the frame and into the bolsters as the prototype is made and disregard the slots. You will install the truss rods later in the assembly.

Next is to glue the Door Frame and Needle Beam Frame to the BOTTOM of the frame (the surface opposite the slots). The Door Frame should be centered and glued in place and not extend beyond the sides of the main frame. The Needle Beam frame should then be glued to that. Make sure the beams are square to the sides. Check the holes in the needle beams to make sure they will accept the truss plates or slightly enlarge the holes if required.

Now glue the 4 doors to the bottom of the door frame. You could also glue the doors facing the inside if you want the boards to be visible from above.



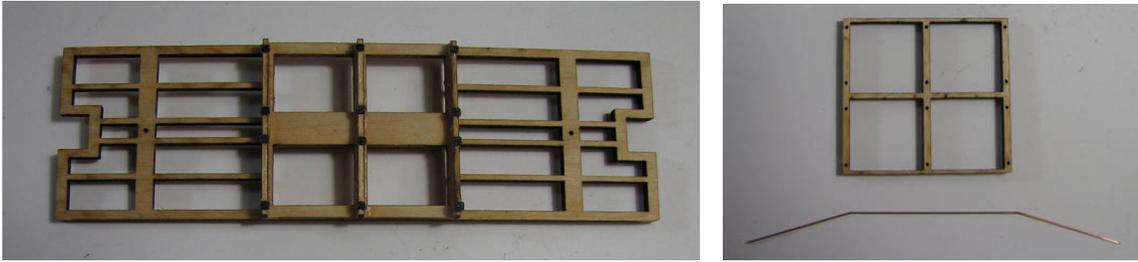
The next step is the Bolsters included in the kit. The full bolsters need to be tapered as shown. I use my Xacto to carve the taper, holding the bolster on end on the cutting mat. Then a little sanding afterwards, making sure NOT to have a "chisel edge" end.



Glue bolster to the frame bottom over the frame bolster location. Drill the bolster with the appropriate hole size for your truck screws using the hole in the frame top as a guide.

**Very carefully** trim the truss plates from their sprue and cleanup any flashing. When cutting the plate rod from the sprue, if they fly off, the plates will detach from the rod, which is not desirable. You could apply a dab of CA at the joint of the rod to the plate before cutting, to prevent separation. Insert them into the holes in the needle beam leaving them partially inserted. Then using a paper clip or toothpick, apply CA "super glue" to the shafts and push them down tight to the beam. Do this one at a time and make sure they are aligned with the beam so the trussrods will be guided through

them properly, turning them as required before the glue sets.



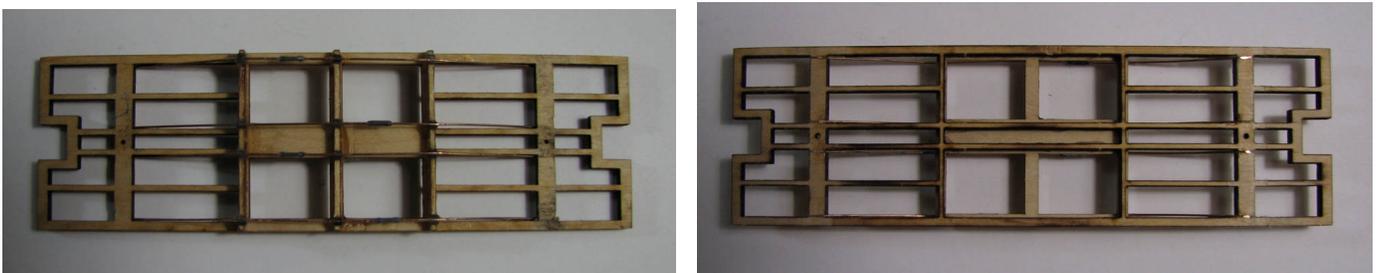
Now take the four, 4 5/8" (or 5 1/4") long pieces of wire in the kit for the truss rods. You need to bend each of these to fit the truss plates and over the top of the frame bolsters. You can make a bending template or simply use flat face pliers. If you are building multiple cars a template is definitely recommended. Lay one wire into the truss plates and with a black marker, mark the edge of each queenpost on the wire. Then holding the wire with the pliers, bend it slightly with your fingers. Both ends must be bent as shown. Do NOT over bend the wire! Make sure your bends are aligned with each other and not rotated or the wire will not lie properly in the truss plates and bolster slots.

NOTE: If you prefer, you can use .025" fishing/beading line for your model however, it is not included in the kit.

Next, lay the wire in the truss plates and over the bolsters aligned with the slots. You can mark them and then bend, but I was able to put a couple pieces of tape to hold the wire in place and then with my small flat pliers, reach in next to the bolster to hold the wire and bend it with my fingers. Again, do NOT over bend. After bending, lay the wire in the slot and make sure it looks correct from the side view. You can make slight adjustments with your fingers. Over bending will result in the wire having a "bowed" shape which is not desirable.

Slip the turnbuckles over the wires and place them in the open bays. I alternated mine but I'm not sure if this was prototypical or not.

NOTE: With the demise of Grandt Line I had to substitute Tichy turnbuckles in some of the kits. These have a smaller hole in them and will need to be carefully reamed out with a #76 or #75 drill.



Put the rods back over the truss plates and into the bolster slots, one at a time and hold them tight (again, I used tape). From the top of the frame, push the rod into the

slot, hold it there (I used a small clamp on the extended end) and apply CA (super glue). Glue both ends and each rod one at a time. After dry, turn the frame over, bottom up. Position the turnbuckles and apply CA to each truss plate and wire and also to the turnbuckles. You can turn the turnbuckles slightly to get a side profile of them when looking at the finished model.

After the glue dries, trim the trussrod ends with your cutting pliers.

**Now you need to determine your coupler height.** Temporarily install your trucks on the frame. Then set the car on a track and use another car to determine the coupler height. Mark that on the end of the frame at the coupler pocket. From this you will be able to see if you need to remove the filler piece from the coupler pocket or maybe trim it down to use as a shim or leave it in place. If you are using the full filler or a shim, it will be glued to the underside of the end floorboards later on. You may also need to notch the end beams to fit around the coupler box in the final steps.

## **SIDES & STAKES**

You can choose to cut your boards apart (so they look like boards on the inside) or leave the sides whole and mark the interior boards with a fine line marker or pencil. Or you can scribe the inside of the sides to make visible boards. If left intact, a nice touch is to use a razor saw and cut the boards at the very ends. This gives the appearance of separate boards from the end view.

On the sides, I counter sunk the back side of the stake pocket holes, using a larger size drill by hand. If you chose to cut your siding boards apart, you can do this on the one board with the larger stake holes, but make sure it is on the back side. The purpose of this is to allow you to form over the back of each stake pocket pin with a hot iron, into the countersink. This eliminates the glue hassle. Then, on each side, install the stake pockets in the large holes **with the "U" bolt pins at the top** and melt over the pins on the back side using your soldering iron or similar tool. Do not over heat the plastic but make sure they are flush with the back when completed. It may help to shorten the pins slightly so that there is less material to have to melt into the hole.

If the boards are cut apart, make up a frame jig or tape them to hold them in proper order while you glue the stakes in position.



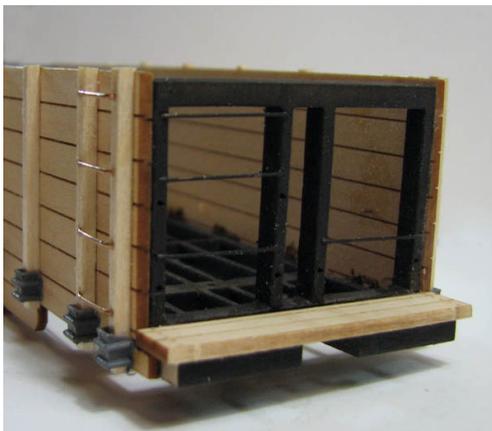
Cut the stakes to length from the bundle of stripwood supplied. Note the two different lengths required, 12 at 1 3/8" and 6 at 1 1/2" and cut the appropriate lengths from their respective package. On the Tweetsie the stakes are 1 1/4" and 1 1/2".



Next, glue the stakes into the pockets and onto the sides. Again, if your boards were cut apart, keep them in the proper order as you reassemble the sides. Keep the stakes perpendicular to the sides as you glue them.

Now drill out the grabiron holes through each stake, from the inside of the sides using the laser holes as a guide, with a #76 (.020") drill. Install the pre-bent grabirons in the sides and apply CA to the inside at the wall. After dry, the inside of the wire can be trimmed back a bit (not flush) except for the very top inside wire, that will be visible after the floor is installed, which should be flush.

Paint or stain the INSIDE of the sides now. You won't be able to get to the lower corners after the floors are installed.



## **ENDS**

The top edge of the ends should be cut at an angle to match the underside of the floors. Use a sharp knife or file to do this. Then, take the pieces of .015 or .020 wire included and bend grabirons to fit the end braces as shown. On newer kits the top right and right side use the pre-bent straight grabirons. Some kits may have these already cut to 7/8" long or else you may have to cut longer ones from wire provided. Use the holes in the end frame to determine the bend length. Use flat jaw pliers to get

a nice, neat 90° bend. Install the wires into the holes and apply CA glue to the inside. **Note:** Make sure you orient your ends correctly with the climbing rungs on the left and the heavier beam at the top.

I spray painted my frame and ends black before the next assembly. You might decide to do something different.

## **ASSEMBLY**

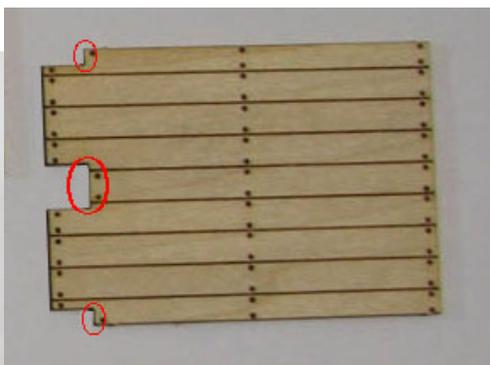
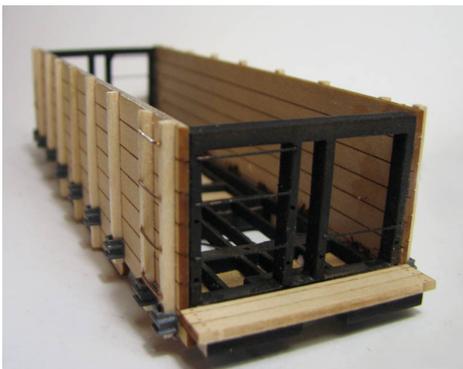
Next is to assemble the ends and sides to the frame. Glue one side to the frame, making sure it is spaced equal distance from each end and the side's end tabs are flush with the frame bottom. Hold or clamp in place until a strong tack is achieved. Now glue each end frame onto the frame top and to the side assuring that it aligns perfectly with side and is square to the frame. Again, hold until the ends will stay in place. Now glue the other side to the frame and ends.

After dry, glue the end footboards to the frame at each end. **Note:** New kits include 1/32" thick (1½") end boards which may look more prototypical, than the 1/16" thick. The next step is an option that I like to include. These cars are light weight so I try and add enough to meet the NMRA HO specifications. I have a lot of sheet lead left over from home improvement jobs and roofing work but it is also available at lumber yards. You may have other favorite weights. I cut a piece of the lead to fit inside the hopper sides and under the floors. If you cut it long enough, it can rest on the frame near the center and also hit the top of the end frame at an angle so as not to hide the frame after the lead is in place.

NOTE: Make sure you paint or stain the underside of your floors (or the lead) now.....you won't be able to get to them after assembly.

Now, slide it in and glue in place.

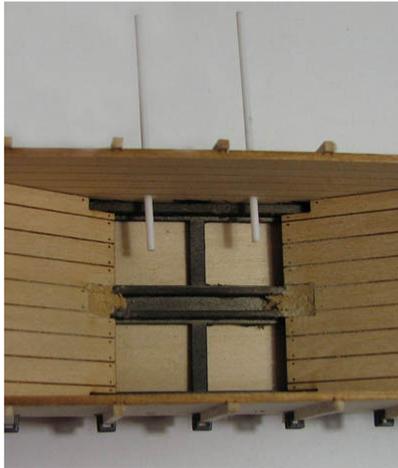
The next step is to glue the sloped floors into place. Prior to doing this, You **MUST** file or sand the notches at the bottom edge at about a 50°-60° **back angle** to allow the front edge of the floor base to hit the frame center and side beams. Otherwise you will have a gap at those joints.



You may also want to cut the top ends of the boards at the end grain to show the separate boards. Then, with a file, adjust the angle on the top edge of the end frame where the floor

will touch it (about 35°). Then apply glue to this angle and to the frame at the door brace where the floor will touch. Slide the floor into place and let dry. The top end of the floor should only be slightly higher than the

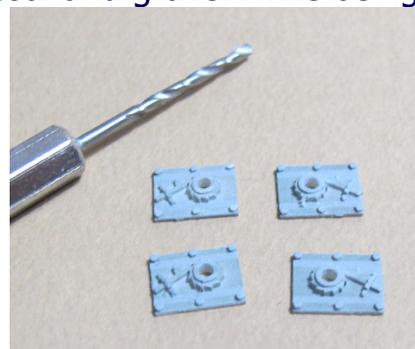
edge of the sides. Repeat for the other floor.



Included in the kit is a 3/16" plastic angle. This is to cover the center beam to keep coal and ash from getting into the frame. You will have to cut, sand and file the angles and length for this. I measured the shortest length along the frame, between the floor ends and marked this measurement on the bottom of the angle (see photos above) spaced equal distance from each end. I then marked an angle (about 35°) and clipped it using my sprue cutters. I used my sanding stick to fine tune the cut and angle by trial and error. Keep sanding and fitting until it looks good. Be careful not to over sand it or make it short.

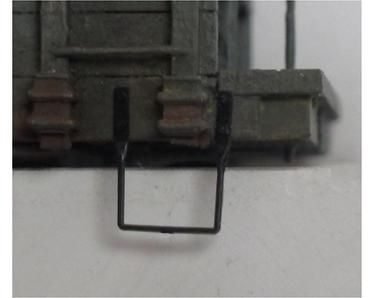
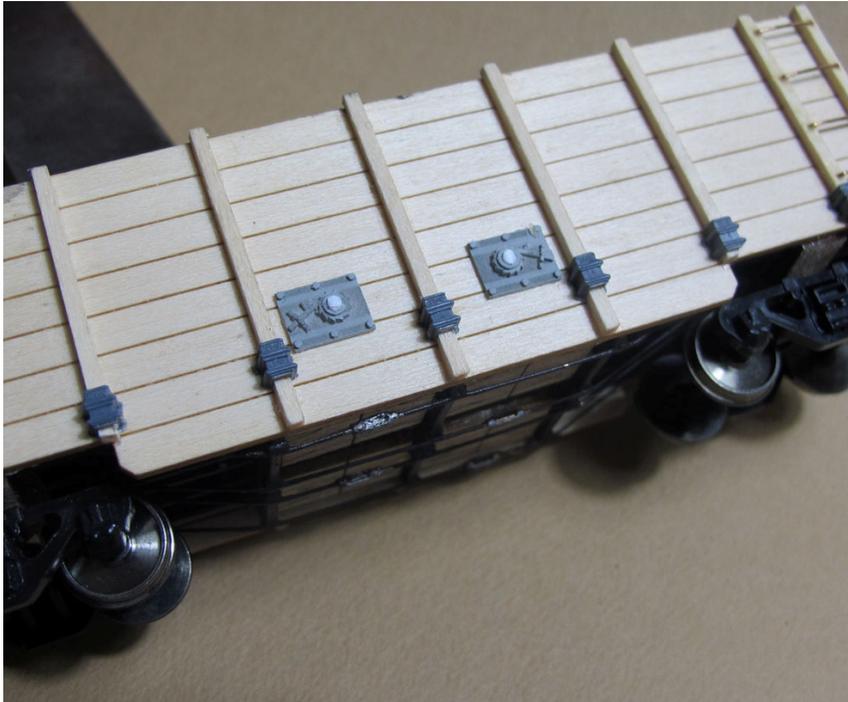
Now, place the angle over the centerbeam and insert the two 1/16" round operating rods through the sides and over the angle. Mark each side of the rods on the angle top and then remove the rods and angle. File small round notches in the top of the angle as shown to give clearance for the operating rods. Glue the angle to the centerbeam with CA. When gluing to wood using CA, it is best to apply an initial coat of CA to the wood so it can soak in and fill the wood pores first.

Slide the operating rods back in and through the opposite side. The small chain in the kit is for the door operation. I measured the distance from the rod to the door and doubled that measurement, cutting the chain that length. I then draped it over the rod and glued the loose ends to the doors. Although not exactly prototypical, it will look fine after the angle is installed over it. Now you can glue the smaller .100 angle over each of the rods to prevent damage from coal and gravel while being loaded.



Now, take the four ratchet & pawl plates and drill out the hole to slide over the rods.

I used a #53 first and then reamed the hole with a #51. Extreme care should be taken to not split or crack these plates when drilling. Now, slide them over the shafts that protrude through the sides. Take care to use the correct ones as there are left and right assemblies and glue them in place. See photo below.



Next is to install the stirrups steps. Locate and drill with a #75 or #76 drill (.020" - .022"). Keep the holes the correct distance apart to avoid angled irons. Now apply a drop of CA to the holes and press the stirrups into place. You can apply a drop more CA to the outside after assembly.

## **DETAILS**

Screw your trucks to the frame. Based on your earlier determination, install your couplers and any shim if needed. You can also now add end beams and truss rod nuts.

Next, drill a #70 (.028") hole for the brake shaft in the end floorboards. With CA, glue the brake wheel to the end of the shaft. When dry, slide the ratchet-pawl over the shaft bottom and insert the shaft into the floorboard hole. Glue in place.

## **FINISHING**

I chose to paint my car exterior after assembly. I had used an AI stain on the wood beforehand and I used a dark gray for the finish. I brushed it on because I wanted a crude finish but an airbrush would probably work better.



After that dried, I used powders to get the coal dust , rust and mud effects. Add decals and lettering for your RR, place it on the layout, load it up with coal and start making deliveries to your cities and towns.

I hope you have found this kit enjoyable to build. If you send me a photo, I'll add it to the gallery here. And as always, any suggestions are appreciated. I try to keep costs down to make these kits affordable to you and doing these assembly instructions here is just one part of that. If you note an error or have an improvement, let me know.