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Large Transformer Loads for Depressed Center Flatcars**

By Gene Jameson



Over the years I have seen many large transformer loads on both normal and depressed center flatcars. Most of the ones that I have seen in the past 10 years have been on depressed center flatcars. The depressed center flatcar allows a taller load to be transported without requiring a “High / Wide” load movement. Heavier / larger transformers would be carried on a depressed center, four truck flatcar.

Regardless of the era you are modeling, you can build a model that is a real “eye catcher” and will lend itself to prototype operations. One thing nice about the larger transformer loads is that you can make a “proto typical” length train that is used in a special movement i.e., a “High / Wide” load movement just by making the transformer just a bit taller than the height limit of the era you are modeling. By definition, a “High / Wide” load that has one or more of the following characteristics: over 11 feet wide, over 20’ 2” above the rail head, requires more than four axles, weights more than 265,000 pound. Below are the standard height and width limits for classic and modern eras.

	Height	Width
Classic (1920 – 1982)	17” 0”	10’ 8”
Modern (Post 1983)	20’ 2”	10’ 8”

One thing nice about this project, I have never seen two transformers that were identical. If you look at the transformers that are installed in larger “sub stations” you will see many different looking large transformers. You can take what you like from one transformer and something you liked from another transformer and put them together. I would bet that some place that there is a transformer that looks like the one that you modeled.

The transformer really looks like it would be hard to build, but in fact it was not all that bad. It did take me several evenings to complete it, but I was working with out drawing or any measurements. In the back of this handout is the drawing for this transformer. The biggest thing that you have to worry about is getting the box square.

For this project, I elected to use a Walthers four truck depressed center flatcar. I will describe the modifications I did to the model. The same modifications would be performed on a smaller single truck depressed center flatcar. Before you start building the model, please read the entire handout. This gives you an overview of the assembly process and things to watch out for.

### **Material needed for this project:**

Evergreen .030 sheet styrene # 9030  
 Evergreen .080 X .125 rectangle styrene rod # 166  
 Evergreen .060 X .060 square styrene rod # 153  
 .015 piano wire  
 .046 brass rod  
 .020 brass rod  
 Model Master Camouflage Gray #1933  
 Model Master Gunship Gray (Spray) #1923  
 Model Master Gunship Gray (brush on) #1723  
 Model Master Insignia Red (brush on) #FS31136  
 Model Master Flat Clear finish (brush on) #2015  
 Paint to match the color of the car that you are building  
 Testors Dull Coat #1260  
 Testors Brown (spray) #1240  
 Testors Rust (brush on) #1185  
 Testors Flat Black #  
 RustAL  
 Weathering chalks  
 Tenax-7R  
 Sand paper, 400 grit (wet / dry)  
 Squadron Green filler putty  
 Super glue  
 Detail Associates Sand Hatch Covers #SD3001

Walthers Four Truck Depressed center flatcar (your favorite road name)  
Kadee #5 couplers (optional)  
Proto 2000 36 inch flat back metal wheel sets (optional)  
Walthers Goo

### **Tools needed for this project:**

#56 drill bit  
#74 drill bit  
#76 drill bit  
#77 drill bit  
#80 drill bit  
Pin vice  
Small adjustable machinist square  
Kadee coupler gauge  
Scale ruler (metal)  
Small file set  
Round nose pliers  
Northwest Short Lines Chopper  
Reboxx Exxact Socket Tool  
X-Acto knife with sharp #11 blades  
Touch-N-Flow glue applicator  
Tweezers  
Miter box and razor saw  
Leather punch  
Dial Caliper (micrometer)

### **Getting started:**

Remove the trucks from the car. Remove the wheel sets from the trucks and paint the trucks with the Testors #1240 Brown paint and set aside to dry. Paint the outside wheel web with the Testors #1185 Rust paint. Be careful not to get the paint on the wheel tread or the axle point. Keep the paint off of the lip of the wheel; this will leave a shiny rim that makes the wheel look like it has been through the retarders in the hump yard many times. After the brown paint on the truck has dried, spray the truck with Dull Coat and set aside to dry. Use the Exxact Socket tool to ensure that the truck has the correct shaped “point” for the axle of the wheel sets. This also gets any paint overspray out of the area where the axle rides. I have found that by using this tool I have improved the rolling qualities of my rolling stock. Check the wheel sets with the NMRA gauge to make sure the wheels match the gauge. When the trucks are dry, install the wheel sets. Paint the couplers with Testors #1185. Be careful no to get paint on the pivot of the coupler.

## Modifications to the depressed center flatcar:

Drill four #77 holes in the deck as shown in figure 1 on the next page. These are the holes for the lower tie down rods. Using the #74 drill bit, make sure that the holes in the deck tie down are open and the proper size for the tie down rods (see figure 2 on page 5).

Adding the brake piping is a nice touch on this car as there is a main reservoir, auxiliary reservoir, triple valve, and the train line brake pipe on each end of the car. I have not been



Figure 1

able to get a real close up look at the brake piping on a depressed center flatcar to verify the pipe routing that I used. **Caution:** Be very careful not to break off the ladder's on the end platforms while you are drilling holes, installing grab irons, and forming the brake piping. Using the #77 bit, drill the holes for the brake piping on the main reservoir, auxiliary reservoir, triple valve, and the train line brake pipe (see figure 3 on page 5 and figure 4 on page 6). Using the #80 drill bit, drill the holes for the grab irons on the end platforms. Use the directions included with the flatcar for locations of the grab irons.

Attach the grab irons to the end platforms with super glue. Using figure 3 and 4 as a guide, bend .015 piano wire for the brake piping. Attach the brake piping with super glue. After the super glue has set up, paint the grab irons and the brake piping to match the color of the car. Set the end platforms aside to dry.

After the paint on the grab irons and brake piping has dried, give the car a heavy coat of RustAL and set aside to dry. Apply a second coat of RustAL if needed. After the car is dry use the weathering chalks to get the weathered look that you want. When you are

satisfied with the weathering, use Testors Dull Coat #1260 to seal the chalks and give the car a nice dull finish.

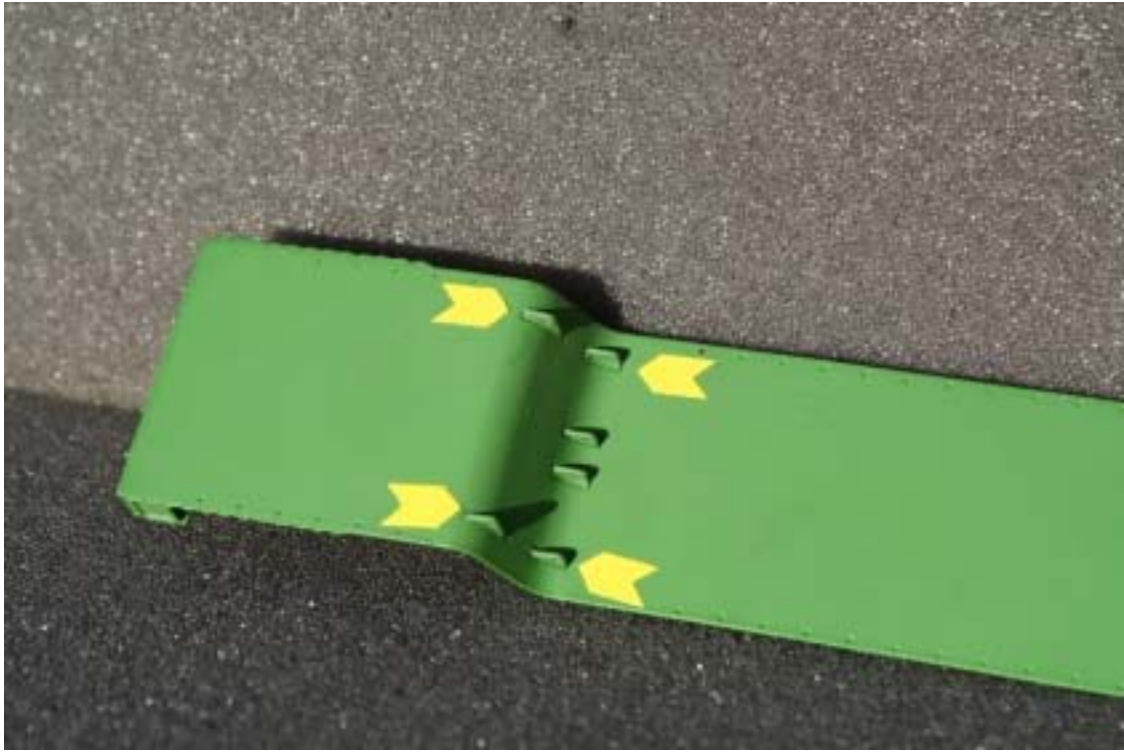


Figure 2

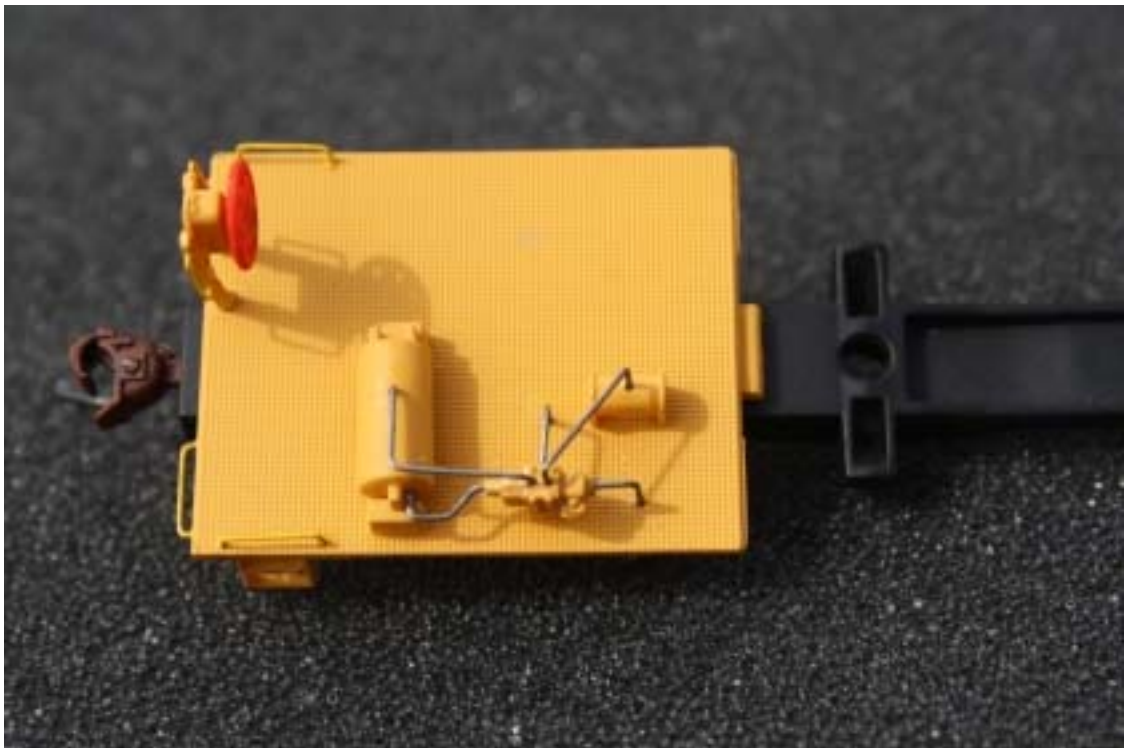


Figure 3



Figure 4

### **Building the Transformer:**

When you cut the top, bottom, ends, and sides of the transformer remember that the pieces have to be **square**. The top must match the bottom in size, the same goes for the sides and ends. This is where you want to take your time to get things right. Once the “box” is built, the rest of the project goes rather quickly.

All of the measurements from this point on are given in HO scale feet and inches unless otherwise stated. If you make the basic box a little different in size, the other measurements shown in the handout will be different. Cut two pieces of sheet styrene 17' X 9' for the top and bottom plates. Make sure that the top and bottom plates are exactly same size. Cut two pieces of sheet styrene 16' X 17' 6" for the side plates. Cut two pieces of sheet styrene 16' X 9' for the end plates. Cut one piece of sheet styrene 15' X 7' 6" to use as a brace under the bottom plate.

Cut eight pieces of scrap sheet styrene about a half inch by half inch to use as internal braces. These braces must have square corners. Use the Tenax-7R to assemble the “box.” Scribe a line in the top and bottom of the side plate .030 of an inch from the edge. Then glue the braces to the side plates, about a 1/4 inch from the each end of where the side plates will attach. Make sure that the square corner is where the top and the bottom plates will attach. Using a piece of scrap .030 styrene, make sure that the braces are positioned to allow for a flush fit of the top and bottom plates (see figure 5 on page 7).

Glue the side plate to the top plate. Make sure that the ends of the side plate overhang the top plate by 3 inches on each end. Make sure that the side plate is flush along the entire length of the top plate. After the glue has set on the top plate / side plate joint, attach the

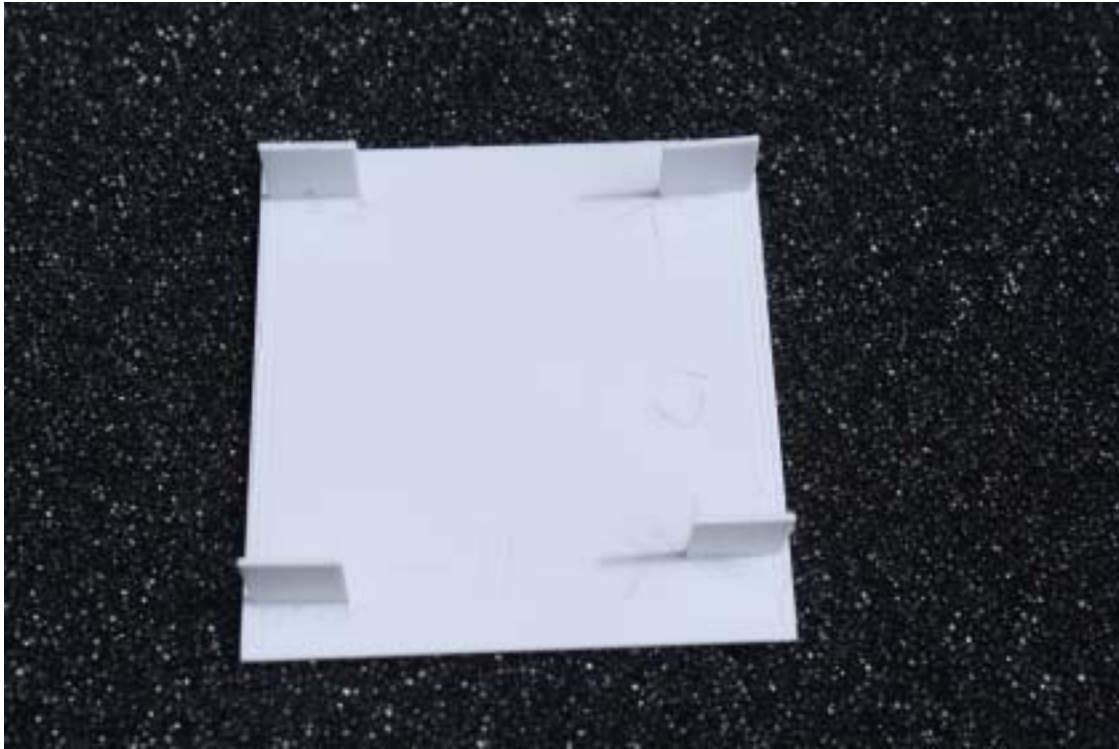


Figure 5

end of the “box.” Make sure that the end plate is flush with the top and side plates. Glue the second side plate to the top plate. Make sure that the side plate is flush with the top and end plates. Glue the second end plate to the assembly. Make sure that the end plate is flush with both side plates and the top plate.

File the corners to get them flush. After you have the corners flush, wet sand the “box” making sure that you remove any glue marks. Set the “box” aside to dry. Fill every joint with Squadron Green putty, and set aside to dry. Again, wet sand the “box” to get a smooth finish. Inspect the “box” for smooth, seamless joints on all sides. If needed repeat with Squadron Green putty and wet sanding.

Measure and mark the bottom plate 12 inches in from the edge on all sides. Attach the 15' X 7' 6" piece of sheet styrene to the bottom plate inside of the marks that you just made.

Cut two pieces of sheet styrene 1' X 15' 3" and two 1' X 7' 6". Make sure that the heights of these four pieces are exactly the same. Glue these to the bottom plate, butting up to the second plate that was added to the bottom plate. Assemble them the same way as the “box” was built.

Drill a #56 hole in the center of the bottom plate, and one on the lower part of the end where the control panel will be located. Using a small triangular file; cut a small triangular “notch” in the bottom edge of the transformer base, centered on each side and end. The two holes and the small triangles allow the “box” to breath with changes in atmospheric pressure after it is installed on the flatcar.

To make the control panel box, cut a piece of sheet styrene 6' X 4', cut two pieces 2' 3" X 3' 9", and cut two pieces 2' 3" X 5' 9". Glue one of the 2' 3" X 5' 9" pieces of styrene to the 6' side of the 6' X 4" piece of styrene, making sure the 2' 3" X 5' 9" piece is centered on the 6' X 4" piece of styrene, 2 inches from the edge. Make sure this joint is square. Glue one the of the 2' 3" X 3' 9" pieces to the 4' side of the 6' X 4" piece of styrene. Make sure this joint is square and one end is butted to the 2' 3" X 3' 9" piece of styrene in the last step and 2 inches from the edge. Glue the other two pieces to complete the control panel. Be careful not to sand or file the overhang of the front cover of the panel. This overhang gives the appearance of a cover that goes over the sides of the control panel (see figure 6). Fill all the seams with Squadron Green putty and set aside to dry. Wet sand the sides of the control panel box to get all of the joints smooth, wet sand the back of the control panel box to get the sides at the same height. When you are happy with the control panel box, measure the end of the transformer box (the end with the vent hole) to determine the center line of the end and mark where the “control panel” box will be located. Glue the “control panel” box in place, flush with the bottom of the end plate; using the Touch N Flow applicator (see figure 7, next page).



Figure 6





Figure 7

Using the .080 X .125 rectangle styrene rod; cut eight pieces 18' long, cut six pieces 11' long, cut two pieces 4' long, and two 3' 3' long. Measure up one foot from the bottom of the "box" and mark the both corners of the sides and ends of the "box." Start at the control panel and glue the 4' long rectangle rod in place. Make sure that it is square to the "box." This piece should overhang the side of the "box" by a bit more than a foot. Using the Touch N Flow applicator, glue one of the 18' long rectangle rod to the side of the "box." Make sure that it is square to the "box", flush with the piece that you just glued in place, and overhangs the end of the "box" by just over a foot. Glue one of the 11' long rectangle rod to the end of the "box." Make sure it is square to the "box", flush with the piece that you just glued in place, and overhangs just over a foot. Glue one of the 18' long rectangle rod to the second side of the "box." Make sure it is square to the "box", flush with the piece you just glued in place, and overhangs just over a foot. Test fit one of the 3' 3" long rectangle rods between the control panel and the rectangle rod on the side of the "box" you just glued in place. Once it has a nice fit, glue it in place. Make sure it is square to the "box." After all of the rectangle rods on this level are installed, file off the overhanging square rod. Make sure that the corners are square.

Measure up 3' 2" from the top of the rectangle rod you just installed to the top of the "control panel." Mark each corner on both sides and ends. Install the rectangle rod on this level the same way as the steps above.

Measure up 3' 8" from the rectangle rod you just installed. Mark each corner on both sides and ends. Glue one of the 18' long rectangle rods to the end of the "box." Make sure that it is square with the side of the "box" and one end is flush with the side of the "box." The other end of this rectangle rod will overhang the side of the "box" by just

over a foot. Glue one of the 11' long rectangle rods to the side of the "box." Make sure that it is square to the "box" and overhangs the end of the "box" by just over a foot. Glue one of the 18' long rectangle rods to the end of the "box." Make sure it is square to the "box" and overhangs just over a foot. Glue one of the 11' long rectangle rods to the second side of the "box." Make sure it is square to the "box" and overhangs just over a foot. After all of the rectangle rods on this level are installed, file off the overhanging square rod. Make sure that the corners are square.

Measure down one foot from the top of the "box" and mark the corners on both sides and ends of the "box." Install the rectangle rod on this level the same way as the step above.

Cut two pieces of rectangle rod 3' 9" long and four pieces 3' 7" long. You will have to "sand to fit" on all of these pieces. The 3' 9" long rectangle rods go between the second and third ribs. The 3' 7" rectangle rod goes between the top and second ribs. Sand the length of these to fit the place where they attach. A good fit here is a must. See the line drawing at the end of the handout for locations of these rectangle rods.

Inspect the assembled transformer making sure there are no gaps in the rectangle rod that was attached to the "box." If there are gaps, fill them with Squadron Green putty and file smooth. Once you are satisfied with the assembled transformer, attach some wet and dry 400 grit sand paper to a sanding block and sand the assembly smooth. Be careful when working around the control panel.

Refer to the line drawings at the end of the handout for the placement of the pipes and conduit. Use the .046 brass rod to form the larger conduit, and the .020 brass rod for the smaller conduit. Use the round nose pliers to bend both sizes of the brass rods. You can just about do anything with the conduit that you want. As I said earlier, there is a prototype out there somewhere for what you do with the transformer. I will explain how I did the conduit on this model.

Cut two pieces on .060 X .060 square styrene rod 1 foot long. Drill two #56 holes in the top of the "control panel." These holes should be centered, one foot apart, and as close to the rib on the transformer as you can get. Drill a third # 56 hole one foot to the left of the two drilled in the above step, make sure that this hole is as close to the rib on the transformer as the other two #56 holes. Drill one #76 hole on the right side of the "control panel," one foot out from the rib on the transformer. Use the line drawing as a template for the two large conduits above the "control panel," bend two pieces of .046 brass rod to match the drawing. Drill the side of the .060 X .060 square styrene rod that you cut in the above step with the #56 drill bit. Do not drill all the way through the square styrene rod. You want to make a place for the brass rod to sit.

Glue the .060 X .060 square styrene rod just below the top rib on the transformer and directly above the center hole on the top of the "control panel." Glue the second .060 X .060 square rod one foot to the left of the square rod you just installed. Insert the bottom of the .046 brass rod in the center hole on top of the "control panel", rotate it and insert the top in the left .060 X .060 square rod. Use a small amount of super glue to attach the

rod to the .060 X .060 square rod, and to the top of the “control panel.” Repeat this set for the conduit for the right hole.

Cut a piece of .046 brass rod, and use the line drawing as a template to bend the left side large conduit on the opposite end from the “control panel.” Drill a #56 hole in the end of the “box” on the opposite end from the “control panel” similar to the location of the left conduit as shown in the line drawing. Test fit the conduit, mark, and drill a #56 hole so it matches the line drawing. Repeat these steps to form the conduit on the right.

Drill a #56 hole in the center of the “box” (both horizontal and vertical) above the two conduits you just installed. Bend a piece of .046 brass rod 90 degrees to form the “vent” for the transformer. Cut the brass rod just below the top rib of the transformer. File the portion of the brass rod that hangs below the top rib smooth.

Cut some scrap .030 styrene sheet one foot wide. This will be used for the “lift rings” and tie down points. Cut one foot wide strip of .030 styrene into 12 one foot squares pieces, cut four pieces 1’ 3” long, and four pieces 8” inches long. Drill a #56 hole, centered in four of the one foot squares; these will be the lift rings. Round the top of the lift rings to match the contour of the #56 hole. Cut two nine by nine inch pieces of .030 scrape styrene. Cut the nine inch squares on a 45 degree angle for bracing under the lift rings. Drill a #56 hole centered in the 1’ 3” long styrene pieces. Referring to the line drawing at the end of the handout, install the lift rings and tie downs.

On the end of the transformer with the vent, glue the “sand hatch” that is used as the “oil fill” for the transformer. The “oil fill” should be centered on the end of the transformer, 6 inches from the edge. On the same end of the transformer, below the bottom rib; center the second “sand hatch” as the “drain” for the oil in the transformer.

Using the leather punch, with the 1/8 die selected; punch out 6 disks. These disks are used as covers for the electrical connections to the power grid. Refer to the line drawing at the end of the handout for placement of the covers and glue in place.

Wash the model in warm, soapy water and let dry overnight. Using Model Master Camouflage Gray #1933, paint the transformer gray and set aside to dry. Once the gray paint is dry, paint the oil filler and oil drain covers Model Master Insignia Red #FS31136. After all paint is dry, dull coat the transformer model.

### **Mounting the transformer to the flatcar**

Using scrap .030 styrene, build up the bottom of the transformer until it is almost flush with the transformer base support. Make sure that you don’t cover the vent hole drilled earlier.

Set the transformer on the flatcar deck, centering it side to side and between the deck tie down holes shown in figure 1. Once you know where the center is, remove the transformer and apply Walthers Goo to the transformer base support and place back on the deck, centered as before. Let the model sit over night for the Goo to fully set up.

Cut eight pieces of .015 piano wire, about 24 feet long. 6 inches from the end of these wires, bend one end 90 degrees. Cut four pieces of .015 piano wire three feet long. 6 inches from the end of these, bend one end 90 degrees. Cut a strip of .030 styrene 6 inches wide. Cut 24 6 inch squares from the strip. Drill a #78 hole centered in the 6 inch squares. Paint the piano wire and both sides of the 6 inch squares Model Master Gunship Gray #1923 and set aside to dry.

Test fit the short piano wire to the lower tie down holes. Cut to fit, remember to leave enough room for the 6 inch square plates (see figure 8). Once you have these like you want them, use super glue to attach the 6 inch square plates to both the top and bottom of the lower tie down rods.

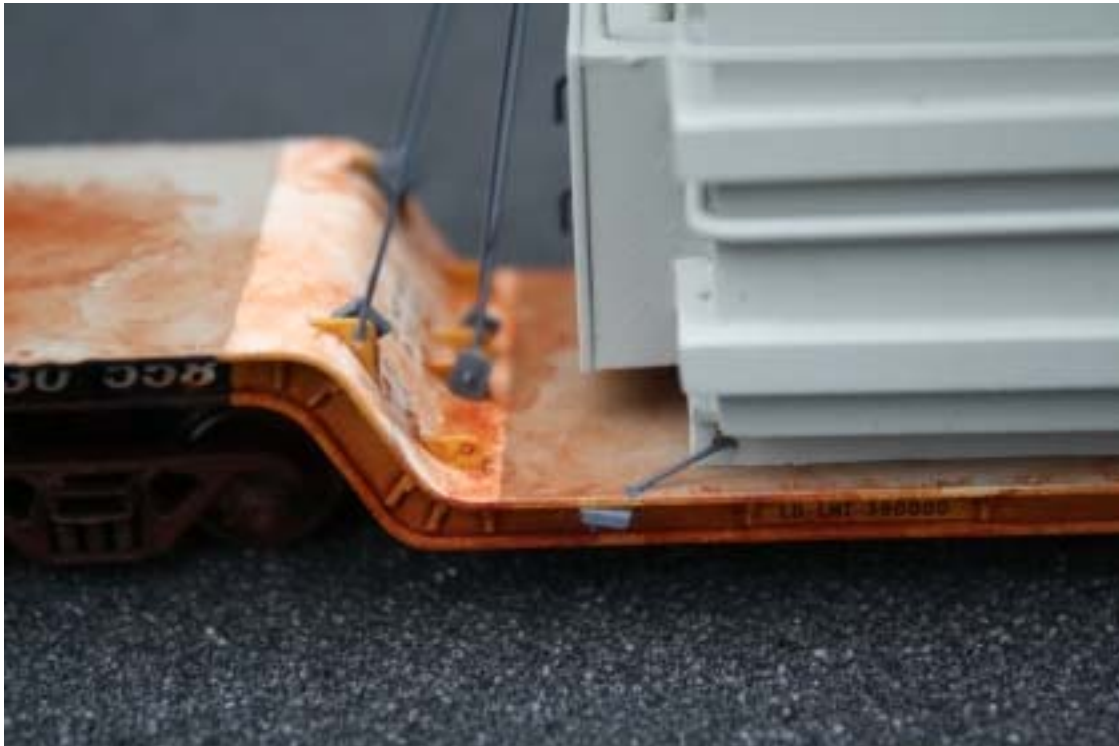


Figure 8

Using a #76 bit, drill two holes in each “lift ring” pad, angling them towards the tie downs on the flat car (see figure 9 and 10 on page 13). Test fit the tie down rods to the “lift ring” pads, and cut to length. Remember to leave enough room for the 6 inch square plates.

After you have all of the tie downs installed, carefully touch up any scratches on the tie downs. Cover any “shiny” areas with brush on Dull Coat. Install the trucks and the car is ready for service on your railroad.

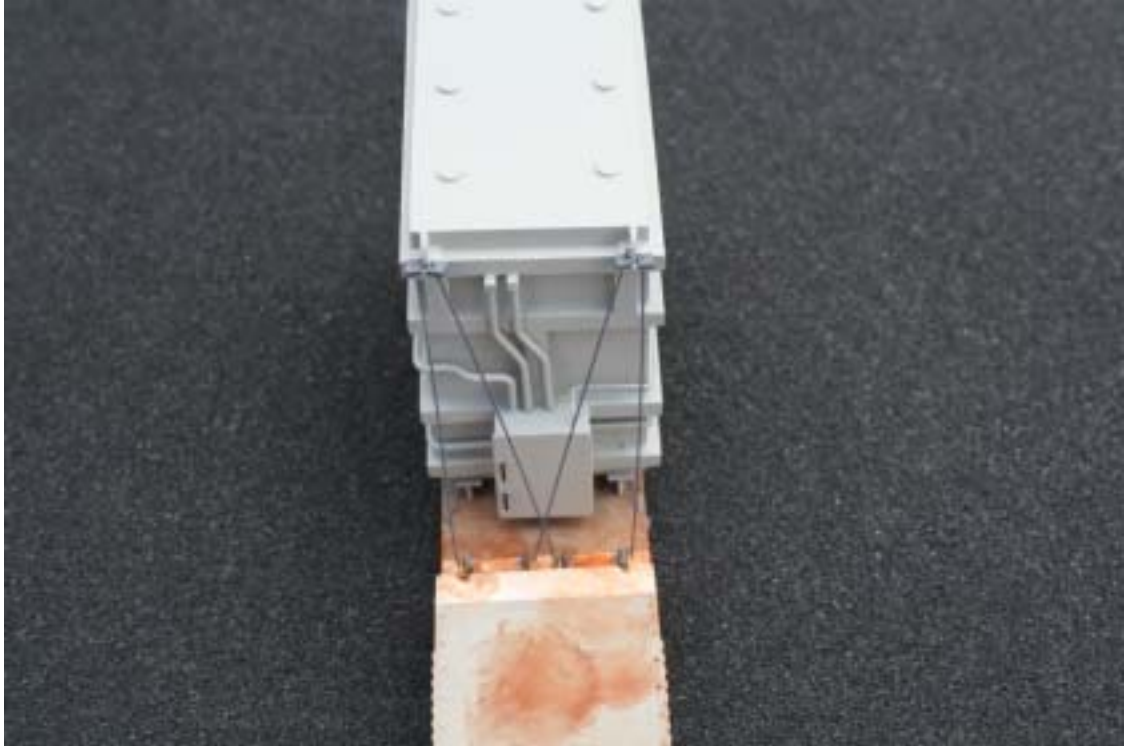


Figure 9

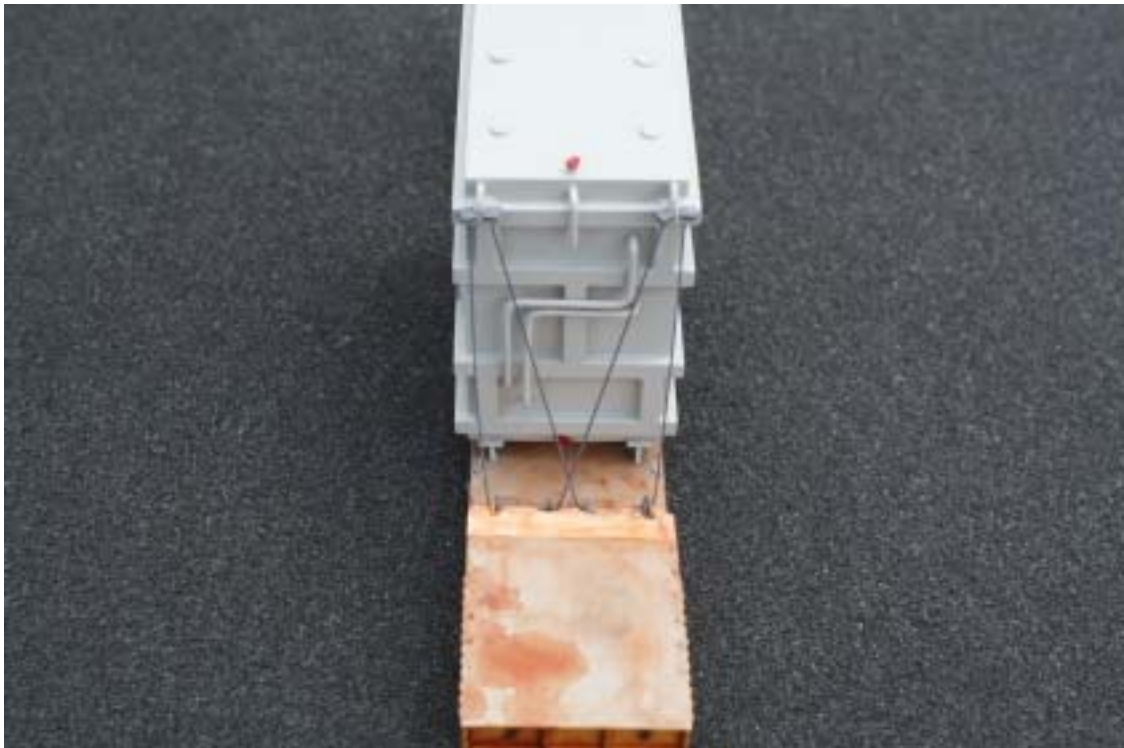


Figure 10

Figures 11 and 12 on the next page show the finished model.



Figure 11



Figure 12

If you have any questions about doing this model, feel free to e-mail me at [b-n-ferrco@cfl.rr.com](mailto:b-n-ferrco@cfl.rr.com) or visit our web site at [www.b-n-ferrco.com](http://www.b-n-ferrco.com)