

## MINNEAPOLIS, SAINT PAUL AND SAULT STE. MARIE/WISCONSIN CENTRAL “SAWTOOTH” SS BOXCAR

### HO-2001 SERIES

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Revision 1, effective 6-12-23



**Thank you for choosing Zenith Model Works!** We recommend having at least some experience in building model railroad kits before you begin. Refer to sheet 2 for a history of the car, its specifications and lettering schemes.

#### IMPORTANT INFORMATION:

Our models are 3D printed in resin. This material is similar to styrene plastic, but it is slightly harder and more brittle. The resin we use responds to ACC, but it will not work with most solvent cements. Unlike traditional resin kits, most of the major components are printed together and very little major assembly is required. Unfortunately, one drawback to resin 3D printing is that sprues used to support the model during the print job are inevitable. At the time of this writing, there is no way to print models without sprues; however, most sprues are easily removed with a fresh X-Acto blade. There may be subtle lumps or deformities in the material where sprues were located; these can be easily sanded or smoothed with contour putty. The resin cures under exposure to UV light. If the model is too soft to work with, place it in a sunny environment for a few days and it will harden. It will become more brittle over time, so use caution. When you receive your model, there may be areas where the resin hasn't fully dried. This residue can usually be wiped away without any significant changes to the quality of the model. 3D printing is a rapidly changing technology and we hope to update our kits as things improve. Thank you for your patience, and as always, thank you for choosing Zenith Model Works. Should anything be missing or broken, please email us at [info@3dptrain.com](mailto:info@3dptrain.com) and we will ship replacements at earliest convenience.

#### RECOMMENDED TOOLS:

Read the instructions thoroughly before beginning construction. Keep a pencil and/or highlighter handy to underscore key details or check off steps. The following tools are necessary to build this kit:

1. Metric ruler or similar measuring device
2. A hobby knife of your choice (a typical X-Acto® knife with a #11 blade works very well)
3. Needle-Nose Pliers
4. Wire Clipper
5. A pin vice
6. #78 drill bit
7. 2/56 drill bit
8. Flathead or Phillips screwdriver depending on your choice of bolster screw
9. Tweezers

10. ACC
11. Epoxy
12. Weight material of your choice

It will help to have some familiarity with standard freight car features. You can add as much or as little detail as you like; feel free to omit certain steps or make modifications where you feel necessary. Wheels and couplers are included at this time.

### **Preparation:**

1. If your kit feels soft, allow it to cure in a sunny window for around 24 hours before beginning. This may make assembly easier and the model will take paint better if properly cured.
2. Start by removing sprue marks and cleaning any uncured resin off the model. A small amount of rubbing alcohol and a paper towel usually works very well.
3. Drill out the bolsters to accept a screw of your choice. This location is marked by a small hole included in the print. We recommend a self-tapping 2-56 machine screw. Make sure the hole is fully drilled through before attempting to start the screw or the bolster might split.

### **Body Details:**

4. Start by drilling out the holes for the grab irons with a #78 drill bit and a pin vice. Holes are marked in the print. These cars had four ladders, one on the right hand side of each side of the car and one on the left hand side of each end. In addition, they were built with one grab iron on each left hand side of the car, and one grab iron on the right hand side of each end. Beginning in 1932 these cars received an additional grab iron on the left hand side of the car body. The end sills also had grab irons - one on each side of the coupler. All grabs were 18 inches long. Insert the grab irons supplied into the holes so they extend about four inches out from the side of the car. Secure them in place with ACC from inside the car body.
5. The roof-corner running boards, which translated from the roofwalk to the ladders on the sides of the car, had an L-shaped grab iron on each corner. Drill out the holes with a #78 drill bit. Cut and bend a piece of the .015 gauge wire supplied to match the diagram. Use an eye bolt to support the corner of the grab iron (see diagram). Secure with ACC.

### **Assembly:**

6. Add weights of your choice to the floor piece. Per NMRA standards, a car weight should be one ounce, plus  $\frac{1}{2}$  an ounce of weight for every 1 inch of the car body. Per these standards, a 40 foot car should weigh roughly 3.75 ounces. Secure them in place with epoxy and allow them to fully dry before proceeding. This can take up to 24 hours depending on the epoxy used, so be sure to take this into consideration.
7. Run a trail of ACC around the edge of the underbody and carefully insert it into the body. Make sure the "B" end of the underbody is positioned towards the "B" end of the body (see diagram).

### **Underbody and Brake Details:**

8. It's best adding these additional details after the assembly. Add the train line. On all cars, it runs from one end sill to the other, passing through the center sill towards the A end of the car. Holes are included in the cross members to make this easier. You may want to cut and bend two pieces of wire and install one on each side of the center sill separately. See the diagram below. Secure in place with ACC.
9. The brake cylinder and linkage come included in the print. They may be Westinghouse K or AB brakes depending on the nature of your order.

- a. **K Brakes:** use .015 wire to connect the brake levers to the bolsters as shown on the diagram. Bend one end slightly so it fits into the hole in the brake lever, secure with ACC, and trim the other end with a nipper until the correct size is reached. For added detail, use a severed turnbuckle to act as a clevis at the end of each lever. A small piece of chain (not included to save cost) can be used to connect the brake cylinder lever to the link that runs to the hand brake. The connection from the brake cylinder to the train line is replicated in the print, but it is fragile. If it has broken off, which is fairly likely, you can bend a piece of wire into an L shape to replicate this feature.
- b. **AB Brakes:** use .015 wire to connect the brake levers to the bolsters as shown on the diagram. Bend one end slightly so it fits into the hole in the brake lever, secure with ACC, and trim the other end with a nipper until the correct size is reached. For added detail, use a severed turnbuckle to act as a clevis at the end of each lever. A small piece of chain (not included to save cost) can be used to connect the brake cylinder lever to the link that runs to the hand brake. The air reservoir had two pipes that ran through the center sill to the triple valve (see diagram). Cut small pieces of .015 gauge wire to length and secure on either side of the center sill. Drilling through the center sill would be almost impossible without damaging detail. A pipe additionally ran from the triple valve to the air cylinder. Take another length of wire and fit one end into the small hole in the brake cylinder. Secure in place with ACC, and then trim until the other end can terminate at the rear end of the triple valve. Pay close attention to the diagrams shown.

## Finer Details:

### Cut Levers:

10. brackets for the eye bolts are included in the print. Carefully drill them out, taking great care not to split them.
11. Bend the .015 wire according to the diagrams below to fasten cut levers for both the A and B ends. **B End:** This cut lever had a bend in it to accommodate the brake staff. Carefully replicate this feature by bending the wire with a needle-nose pliers. Bend the ends afterwards.
12. Thread the eye bolts onto the cut lever, maneuver it into position so that the eye bolts fit into the brackets on the end sill, and secure them in place with ACC. Ensure that the ACC doesn't get on the cut lever and prevent it from moving. Repeat this process on the other side of the car.

### Brake Staff:

13. The brake staff rose about 12 inches above the roof walk. Drill out the bracket on the B end if necessary using a #78 drill bit, and Insert a piece of .015 gauge wire into the bracket. Secure the base of the brake staff onto the end sill bracket using ACC.
14. Drill out the brake wheel supplied in the kit with a #78 drill bit and carefully attach it to the top of the brake staff. Secure with ACC.

### Retainer Valve:

15. The retainer valve is located immediately to the left of the brake staff bracket. Take a piece of .0125 gauge wire and secure one end with ACC to the underside of the retainer valve. Carefully bend this wire until it runs down to the end sill. Carefully trim until it fits snugly in place and secure with ACC.

### Air Brake Hoses:

16. Brackets for the air hoses are included on the right hand side of the coupler pocket under each end sill. Glue the hoses supplied into the holes in the brackets. The brackets can be drilled out if necessary, but use caution.

#### **Stirrups and Couplers:**

17. These cars had one double-step stirrup below the ladder on each right-hand side and one single-step stirrup on each left hand side. Carefully remove the stirrups from their sprues with a fresh razor blade. Drill out the holes marked on the body and secure them in place with ACC.
18. This kit comes with Kadee couplers. Insert a coupler into the pocket. We recommend you glue the coupler box cover into the peg with ACC. Be careful not to get any on the coupler. Drilling through the coupler box cover usually results in splitting, so we don't recommend it.

#### **Painting and Final Adjustments:**

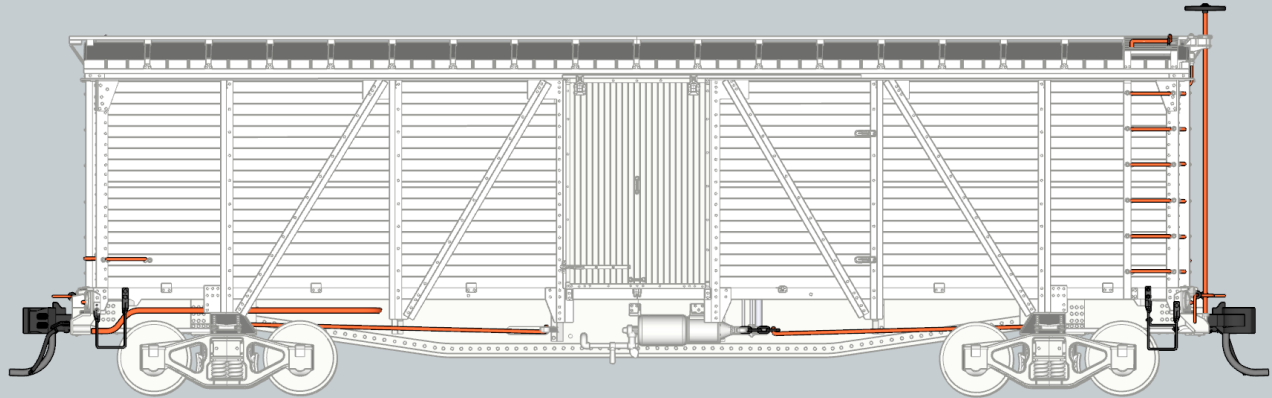
19. Prepare the completed model for painting by washing with detergent to remove any skin oils. Allow the car to fully dry before applying paint.
20. These cars were known to be a soft pinkish-red in color photos of the 1950s. This color had probably been in use for a long time. Considerable variation existed in freight car colors as years of service, sunlight exposure and dirt accumulation affected the appearance of many paints. There was also room for variation in paint mixing, which was usually done to a certain formula, and this wasn't always followed consistently.
21. Air hoses in the early 1900s were typically a light color when new, probably a shade of cream. Gradually they would have been weathered to black in service. For early cars, the hoses included in the kit can be brush painted accordingly.
22. Decals adhere best to a glossy surface. Gloss Coat the car if necessary, then apply our water slide decals with Micro-sol, Solvaset or a similar decal solution. Allow the setting solution to cure (at least 12 hours) before applying a flat finish. Apply the decals according to our lettering diagrams below.
23. Our trucks accept most standard HO scale wheelsets. It is advisable to install the wheels soon after you receive your kit, because the resin will continue to harden over time and may eventually break if strained too much. When fully assembled, test the coupler height. If the couplers are too high, file some material off the bolsters. If they are too low, you can use a washer to raise the height.
24. Congratulations! Your car is complete. For questions or comments, feel free to contact us at [info@3dptrain.com](mailto:info@3dptrain.com). We appreciate your support.

#### **ACKNOWLEDGEMENTS:**

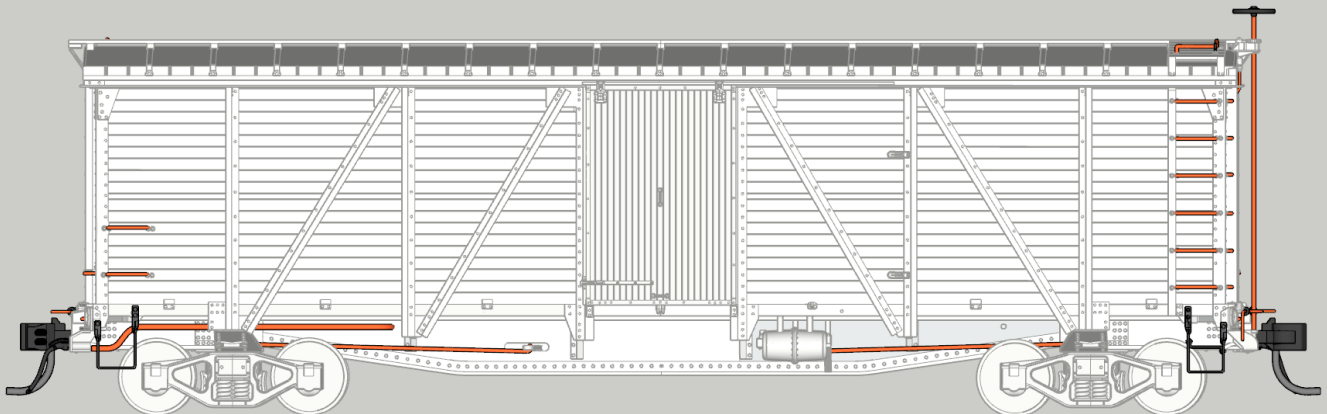
Zenith Model Works extends a gracious thank-you to Ken Soroos, who provided decal artwork; to Stephan Wintner, Frank Hicks, and Raymond Breyer, who provided reference photos; Zachary Start, who compiled roster data and fleet statistics; and finally to David and Kristin Kmecik at 3DPTrain for assisting in prototype development and hosting production. Without the kindness and generosity of these individuals this project would not have been possible.

HIGHLIGHTED AND ENLARGED TO IMPROVE VISIBILITY.

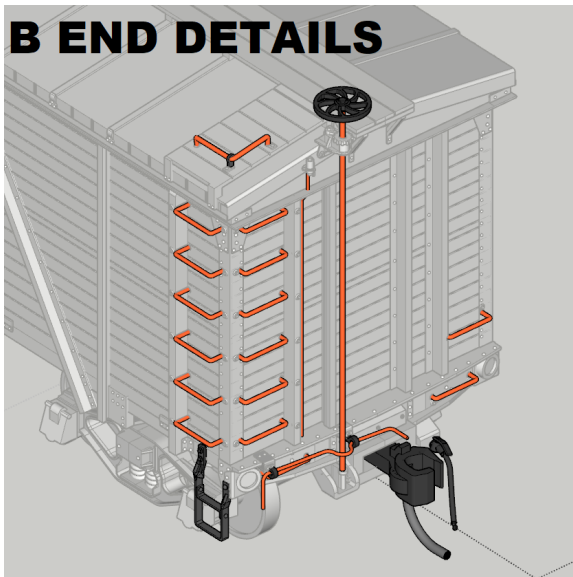
### BASIC SIDE VIEW SHOWING GRAB IRON AND STIRRUP CONFIGURATION



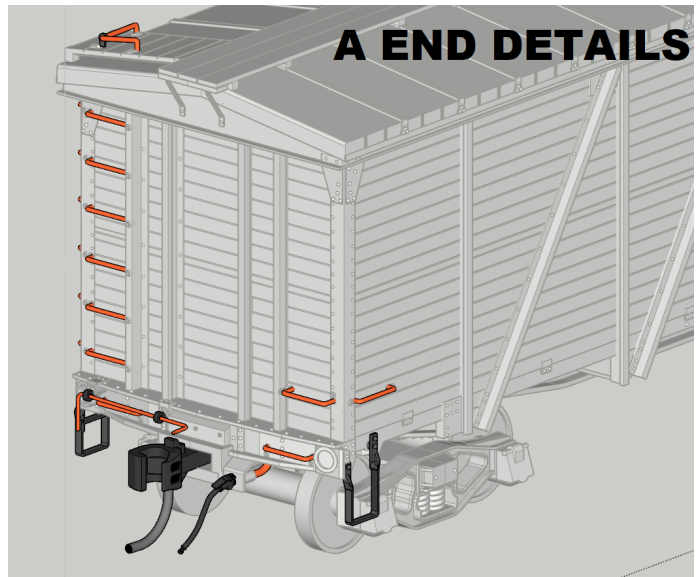
### MODERNIZED CAR, SIDE VIEW, WITH AB BRAKES AND ADDITIONAL LEFT-HAND GRAB IRON



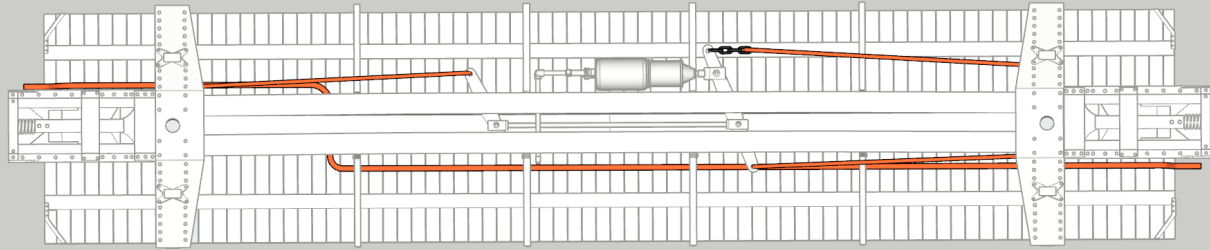
### B END DETAILS



### A END DETAILS



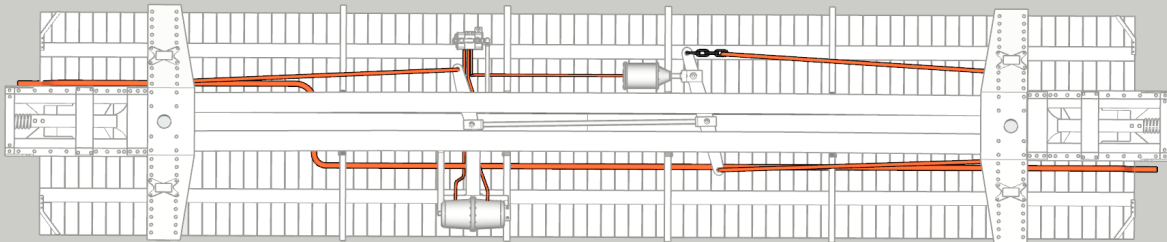
## ORIGINAL UNDERBODY WITH K BRAKES



**A END**

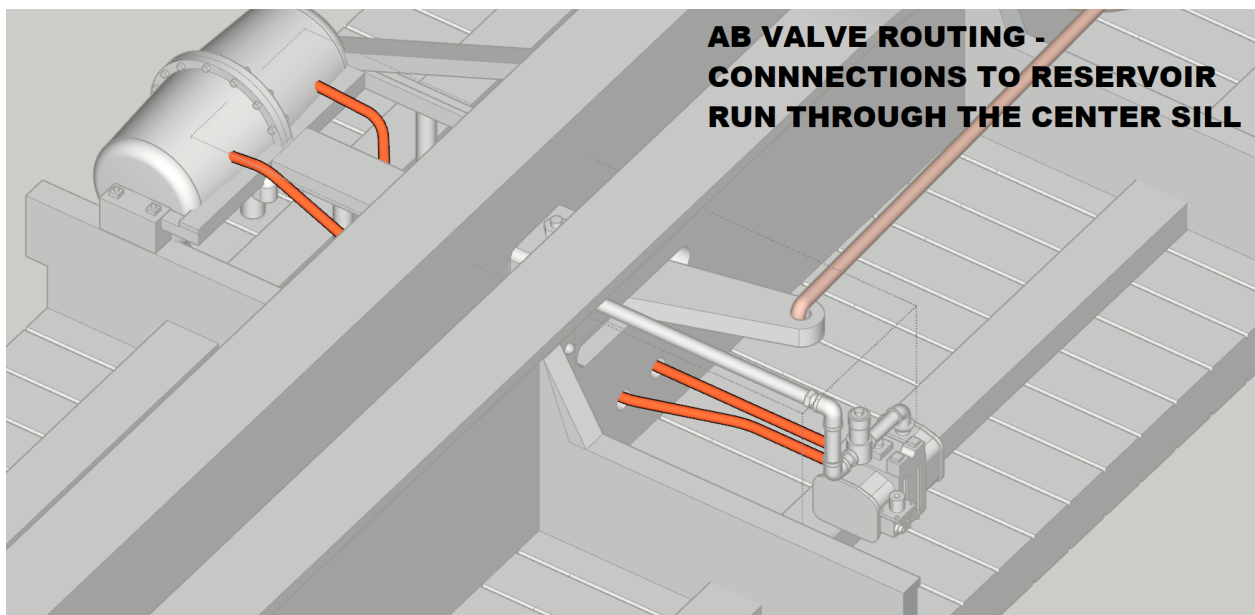
**B END**

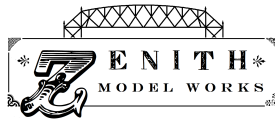
## MODERN UNDERBODY WITH AB BRAKES



**A END**

**B END**





## SOO LINE “SAWTOOTH” SINGLE SHEATH BOXCAR

### HO-2001 SERIES



#### General History:

The famous “Fowler” boxcar of 1909, first installed on the Canadian Pacific railway, was one of the first successful single-sheathed boxcars in North America. The neighboring Minneapolis, Saint Paul and Sault Ste. Marie (“Soo Line”) railway was quick to follow this trend. A new car was developed using the basic Fowler design features. The length was to be 40 feet, and the side braces extended below the side sills to connect to the cross braces in what became nicknamed the “sawtooth” configuration. The first Sawtooth boxcars were built in 1913 by American Car and Foundry. Soo Line subsidiary Wisconsin Central received several batches as well, beginning in 1914. Eventually, between 1913 and 1930, 5,400 Sawtooth boxcars were built, eventually making up almost 1% of the United States boxcar fleet.

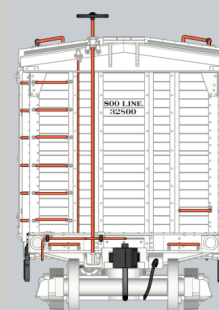
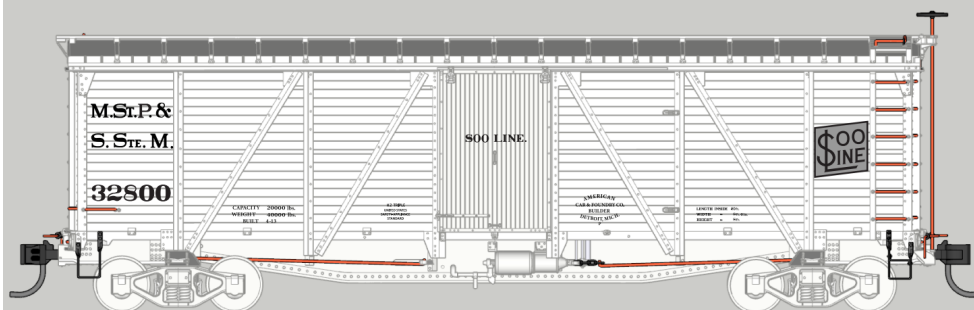
Some features were modified over the years. The 1913-1915 cars rode on T-section Bettendorf trucks. Cars built beginning in 1920 rode on Andrews trucks. For the 1926 delivery, the door opening was changed to 6 feet in width, and these cars were given 7/7 Murphy steel ends and radial roofs. The 1928-1930 built cars featured early 4/4 Dreadnaught ends while retaining the new roof design and door opening width. Beginning with the 1929 Pullman order, remaining cars were delivered with Dalman trucks.

The original lettering style featured the initials of the Minneapolis, Saint Paul and Sault Ste. Marie Railway on the left hand side of the car body. The road number was located below in a large roman typeface. A Soo Line “Dollar Sign” herald adorned the right hand side of the car body. The 1914-built cars were delivered to the Soo subsidiary Wisconsin Central, but the only major change in the lettering on these cars was a small “W.C.” in the top left corner. Small Lessor/Lessee agreements would have been posted here as well, but we did not have enough information to accurately recreate this feature.

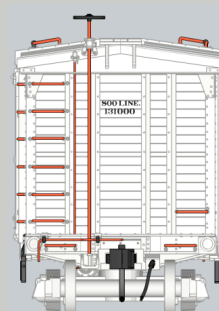
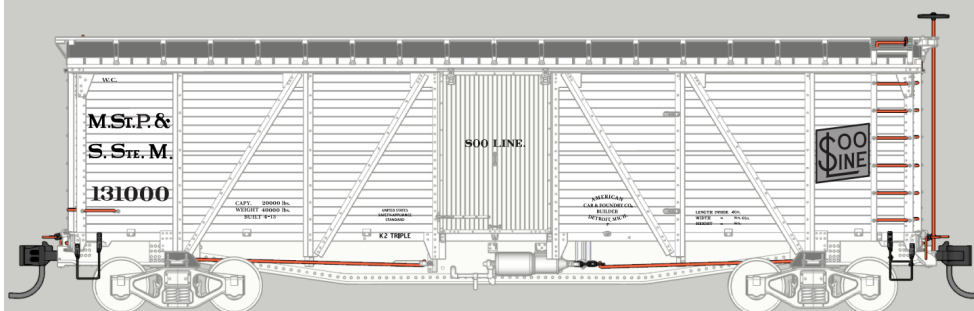
Small modifications to this lettering style occurred during the World War 1 era, but the first major change to the layout occurred in 1920. Stripes were added above and below the road number, and capacity and weight data blocks were restructured. The lettering was again updated around 1930 as industry standards became more widespread. In 1932, an additional grab iron was added to the left hand side of the car body in accordance with updates to safety appliance laws. This final scheme would last through the remainder of these cars’ lives. Some cars were upgraded with AB brakes during the 1930s and 1940s. K Brakes were banned in national interchange in 1953.

Soo Line freight car paint was a soft pinkish-red. There is plenty of room for variation because sunlight, shop practice, and dirt accumulation all impacted the appearance of the paint. The Soo Line herald was originally black with white borders; at some point during the twenties it was modified and the black was removed, leaving only a white stencil. Currently, this kit covers the first three orders of Sawtooths. It is plausible many of these original cars were retired after a ban on Westinghouse K brake systems in national interchange went into effect in 1953. Some cars ran as late as the 1960s; many cars were repurposed for work train service and lasted until the 1980s and 1990s. We may update this kit to feature the later deliveries in the future.

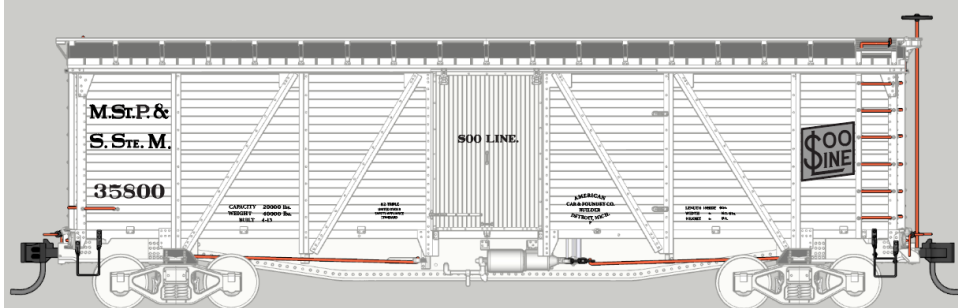




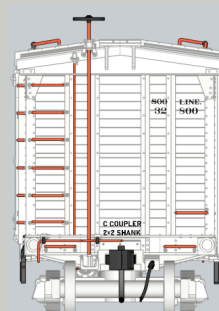
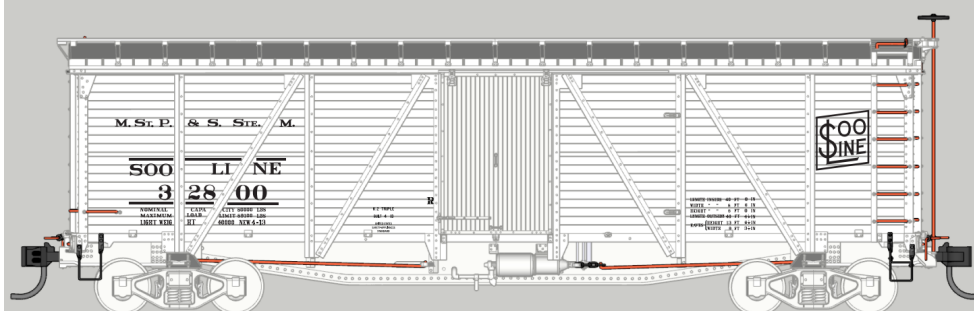
**ORIGINAL LETTERING, 1913**



**WISCONSIN CENTRAL LETTERING, 1914**

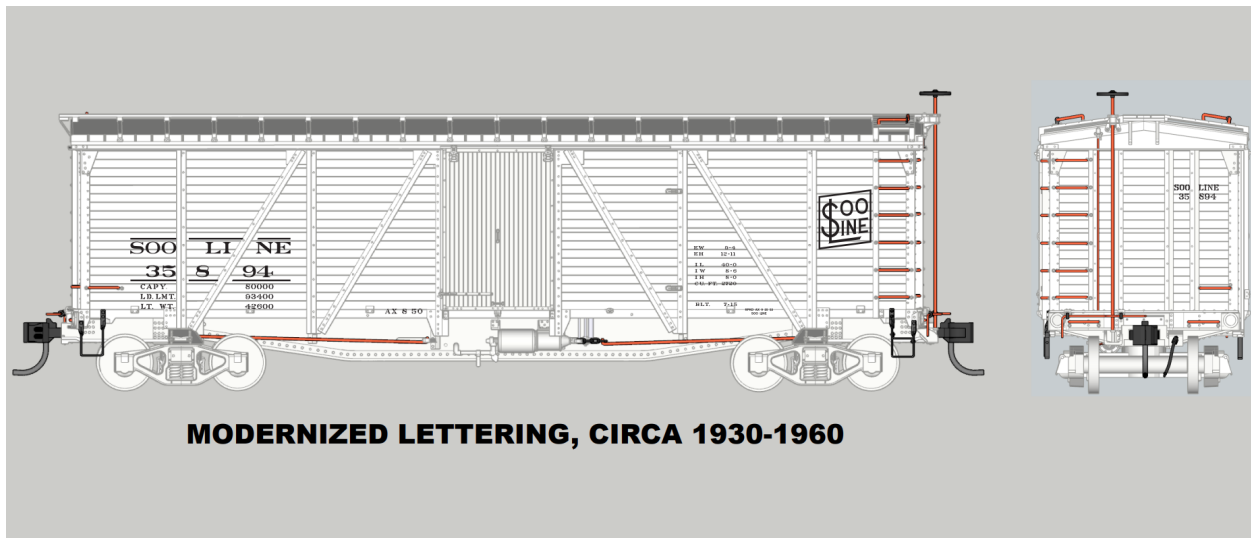


**ORIGINAL LETTERING, 1915**



**REVISED LETTERING, CIRCA 1920-1930**





#### Original Soo Line Family “Sawtooth” Boxcar Orders

Railroad:	Number Series:	Builder:	Year Built:	Total Number:
Soo Line	32800-35789 Even	American Car and Foundry Co. Lot 6908	1913	1500
Wisconsin Central	131000-132098 Even	American Car and Foundry Co. Lot 7268	1914	550
Soo Line	35800-36596 Even	American Car and Foundry Co. Lot 7653	1915	400

**Additional cars were built up until 1930 that were based on this design with substantial modifications. At this time, we are only offering the 1913-1915 built cars. We may do later versions in the future.**

Data compiled with assistance from Zachary Start, Stephan Wintner, Dennis Storzek and Kenneth Soroos.