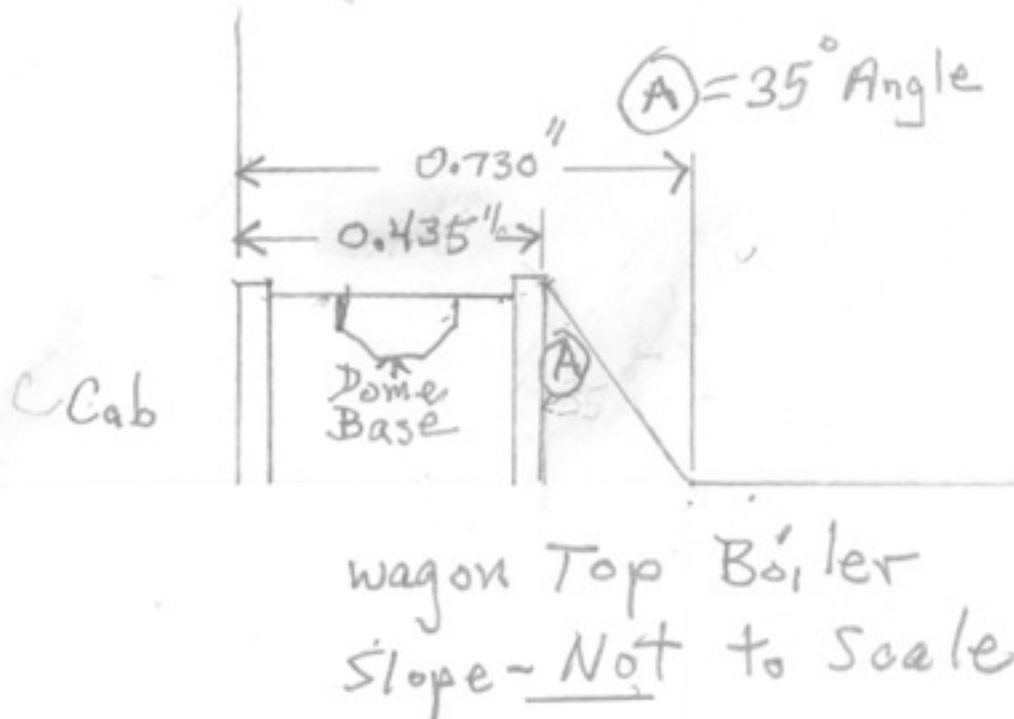


## Ankle Rails for the Mantua General

To backdate the Mantua General to its appearance during the Civil War, it is necessary to remove the running boards and install ankle rails (also called "outside frame").

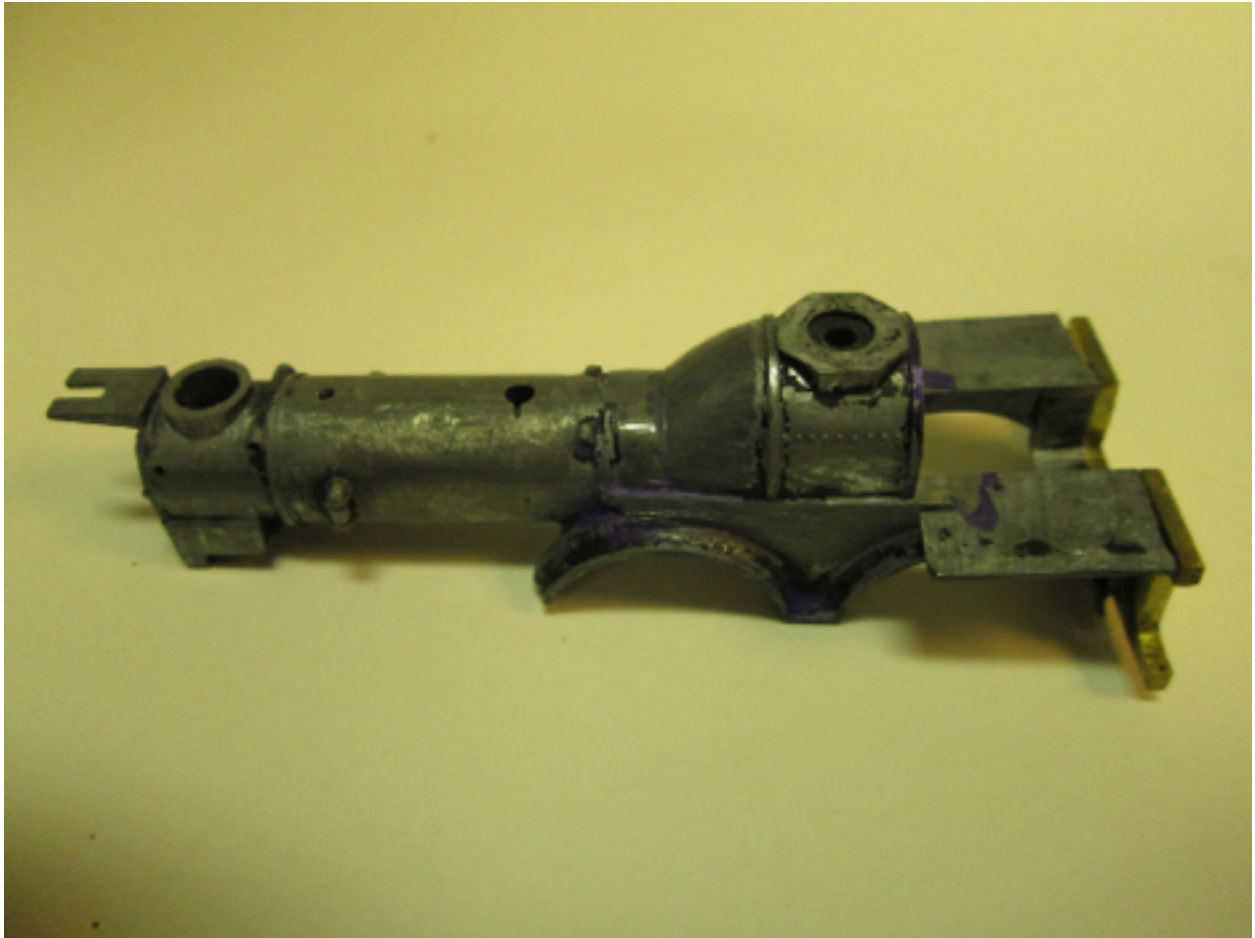
### Boiler Modifications

1. Refer to page 27 of my book "Mantua General Rebuild" for general guidance in modifying boilers.
2. Remove the running boards (except under the cab) and the sand dome base.
3. Use files to change the slope of the wagon top boiler to conform to the drawing below. Any file nicks can be filled with a 2-part epoxy called "JB Weld", available at hardware stores.



## Ankle Rails for the Mantua General

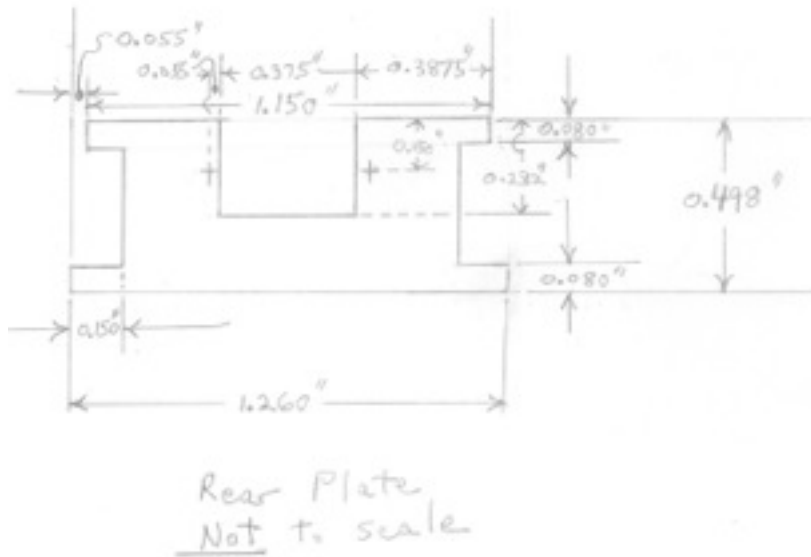
4. Your boiler should appear as in the photo below.



## Ankle Rails for the Mantua General

### Preparing the rear of the locomotive

1. File or mill 0.063" off of the rear of the frame. You will replace it with a piece of 0.063" brass cut to the dimensions shown in the drawing below.



2. Drill a 0.016" hole (#78 bit) in the bottom of each lower "horn" centered and 0.022" in from the edge.
3. Solder a piece of 0.015" brass wire into each hole. Trim the wire flush at the bottom and leave 0.080" extending at the top. These wires show up in red in the photo below.

## Ankle Rails for the Mantua General



4. Drill two 0.060" holes (#53 bit) in the brass plate, 0.150" from the top and 0.035" in from each inner edge, as shown in the drawing above.
5. Attach the brass plate to the rear of the boiler by clamping. (Sometimes, I super glue the piece to the rear of the boiler and let it dry overnight. After drilling into the boiler, I soak the boiler in a tightly closed jar of Acetone overnight. The acetone melts the glue joint.)
6. Use the Holes as pilot holes to drill into the back of the boiler deep enough to be able to accommodate a short 1-72 flat head screw.

## **Ankle Rails for the Mantua General**

7. Remove the brass piece and drill the holes 0.079" (#47 bit). Countersink the holes so that a 1-72 flat head screw sits flush with the surface of the piece.
8. Tap the boiler holes 1-72.
9. Screw the brass piece to the rear of the boiler with 1-72 flat head screws.
10. Solder the screw heads shut and file the brass piece smooth.

### **Creating the Ankle Rails**

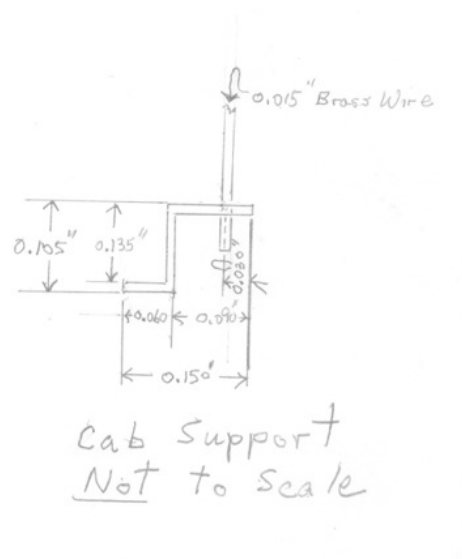
1. Use Special Shapes Co. part number 05003 A-2 1/16" brass angle for the ankle rails. You will need one length per locomotive.
2. Cut the length in half to make two rails.
3. Drill a 0.016" (#78 bit) hole in what will be the rear of each rail, 0.030" from the rear and centered.
4. Attach the pilot of your choice to the locomotive frame.
5. File each end of the pilot beam until it measures 1.220". Be sure to remove the same amount of material from each end of the beam.
6. Attach the boiler to the frame.
7. Temporarily attach each ankle rail by inserting it into the 0.015" wire at the rear of the boiler. Lay the ankle rails on the edges of the pilot beam.
8. Mark hole locations on the front of each pilot beam, centered on the pilot beam and 0.030" in from the outer edge of the ankle rail.
9. Remove the ankle rails and drill the front holes 0.0135" (#80 bit). Reinstall the ankle rails.
10. Use the front ankle rail holes as pilot holes to drill a 0.0135" (# 80 bit) hole in each end of the pilot beam.

## Ankle Rails for the Mantua General

11. Solder a piece of 0.012" brass wire into each pilot beam hole. Trim the wire flush at the bottom and leave 0.080" at the top.
12. Cut off the ankle rail even with the front of the pilot beam.

### Creating Ankle Rail Cab Supports

1. Use Detail Associates #2528 0.015" X 0.042" brass strip to create four (4) supports as shown in the drawing below.

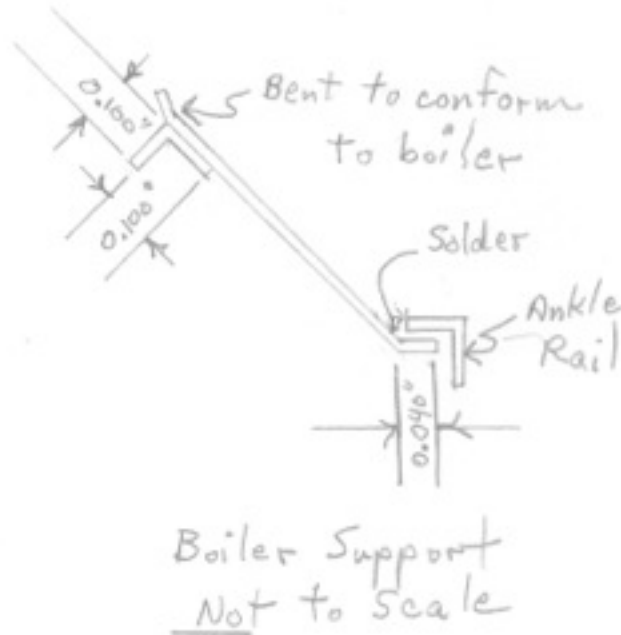


2. Drill a centered 0.016" (#78 bit) hole 0.030" from the end of the strip,
3. Make the 90-degree bends as shown in the drawing.
4. Solder a length of 0.015" brass wire into the hole. Cut the bottom flush. Leave about 1" extending at the top.

### Creating Ankle Rail Boiler Supports.

1. Use Detail Associates #2524 0.010" X 0.030" brass strip to create six (6) supports as shown in the drawing below.

## Ankle Rails for the Mantua General



2. Bend a piece of 0.015" brass wire to form an "L" with the short leg 0.100" long.
3. Solder the 0.100" leg to the back of the 0.010" X 0.030" brass Strip, centered and 0.100" from the end, as shown in the drawing above. Cut the wire leaving 0.080".
4. File the wire where it is soldered to the strip to reduce the 0.015" thickness to about 0.007".

### Final Assembly

1. Lay a straightedge along the top of the remainder of the running board and draw a pencil line from the front of the remaining running board to the back of the smoke box. Do this on both sides of the boiler.

## **Ankle Rails for the Mantua General**

2. Mark hole centers 0.884" and 1.210" from the front of the smokebox. Mark a third hole center 1.100" forward of the rear of the cab and 0.060" below the pencil line.
3. Drill 0.016" (# 78 bit) holes 0.100" deep (perpendicular to the boiler, not slanted) at the points marked. Be sure to use cutting oil when drilling.
4. Attach the ankle rail to its pins (pilot beam and rear plate) and secure it with "alligator" clips.
5. Insert each boiler support pin into the boiler hole, Bend it to conform to the boiler and to the top of the ankle rail (but about 0.015" below the top of the ankle rail). After it is bent to your satisfaction, cut the lower end of the support 0.040" from the lower bend so that it will fit under the ankle rail.
6. Trim the wire pin of each support to a length of 0.040".
7. Solder each support to the underside of the ankle rail so that it is perpendicular to the ankle rail.
8. Remove the ankle rail assemblies.
9. Scribe a line along the top of each running board 0.075" in from the edge.
10. Mark hole centers 0.350" and 0.620" from the rear of the running board.
11. Drill 0.016" (# 78 bit) holes at the points marked.
12. Attach the ankle rails to the boiler/frame using "alligator" clips at the ends.
13. Insert the cab supports into the running board holes and solder the supports to the underside of the ankle rails so they are perpendicular to the ankle rails.
14. Trim the support wires so that they just protrude through the top of the running boards.
15. The completed assembly appears in the photo below.



## Ankle Rails for the Mantua General

