

# Shay Main Frame Fabrication

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This page shows some of the processes used to make the main frame parts.

**Template:** I prefer to use templates whenever multiple hole patterns are required. The photo shows one template.



**Queen Post:** The queen posts can be turned from a 3/8" diameter rod followed by milling one end and soldering a plate on the other end. I chose to turn the end pieces from 3/8" rod, drill a 1/4" hole through the ends, slide the ends on a 1/4" rod and solder everything together. The out-of-focus photo on the left shows the pieces. The middle photo shows soldering the upper ends. The upper end was milled after everything was soldered together. The right photo shows the finished queen posts. The plate on the bottom was later drilled and used as a template for drilling holes in the frame to mount the queen posts. The 1/4" rod extends below the bottom plate and used as a locating pin when mounting the post to the frame.



**Truss Bracket:** The truss bracket has a piece that sticks up from a plate to secure the end of a truss rod. These pieces are made from 3/8" square stock. The photo at right shows three of these pieces held together by a 3/16" expansion pin. This made it possible to mill both ends to three pieces at once.



Some completed brackets are shown on the right. The pieces shown above are attached to the base plates with a cap screw and then silver soldered. The cap screw head is used as a locating pin when the brackets are mounted to the frame.



**Truss Plates:** There are four plates used to interconnect pieces of the truss rods. The first step was to cut the plates from bar stock. The pieces were clamped together and the 3/16" holes for the truss rods drilled though all four at the same time. Expansions pins were then used to hold the four pieces together. The next step was to mill the edges to the correct dimensions as shown on the left. The right photo shows milling the sides to the correct slope. The brass pieces are used to prop up the end to get the correct angle. This technique was easily reproduced to mill the other three similar surfaces.



The last step was to use a rounding end mill as shown on the left. The finished plates are shown on the right below. This is one of the few times that I've been able to exactly match Kenneth's drawings.



**Engine-Tender Coupling:** The coupling between the engine and tender is fabricated from angle and flat stock. The

drawings call for 5/16" thick angle. The first step was to rough cut the angle as shown on the left'. I used 3/8" thick since 5/16" angle wasn't available. The next step was to thin the angle using a fly cutter as shown in the middle photo. The resulting 5/16" thick angle is shown on the right.



The next step was to attach the flat pieces to the angle. I milled a slot in the angle to position one flat piece and milled a slot in the bottom flat piece to position it to the bottom of the angle. Rough cuts were made to the pieces and then all the parts were screwed and silver soldered together. The photo on the left shows the soldered pieces. The middle photo shows milling the angle on the flat pieces. The next step was to use the side of the end mill to round the meeting of the back and the side edges. The result of this is shown on the right.



The next step was the use a rounding end mill to finish the point of the coupling. The left photo below shows using a cardboard wedge to position the coupling in the milling vise. The same wedge was used in some of the earlier operations. The last step was to drill the hole for the pin. The finished coupling is shown below on the right. The coupling is very close to Kenneth's drawings and looks quite nice.



**Front Sill Bracket:** The angle bracket between the frame and the front sill channel was fabricated from 1/8" thick angle. The angle was milled to about 3/32" thickness. A 3/16" square reinforcement bar was silver soldered to the angle. To simplifying positioning the bar, a slot was milled in the edges of the angle. The bar was merely positioned in the slots and soldered as shown on the right. The end of the bars was then milled flush to the back sides of the angle after it was soldered in position.



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