

S9

This is a commentary on the hanging of the ninth plank on the starboard side S9, which is the first of the outer double planks on the starboard side.

Day 1:

- From the work done on IS2, I have recorded the width of the old S9 at each frame. Referencing this data, I marked the top edge of S9 at each frame on the outside face of IS2. Then using a fairing batten I extrapolated the mark to the hood ends. This data represents a rough estimate of the shape of the top edge of S9. This estimate will be used to rough-cut the plank. It also provides a reference for measuring bevel angles and making scrubbing templates. The top edge will be defined more carefully after the plank has been fitted.
- With some modification I was able to reuse the spiling batten used to make IS2. First I removed the butt blocks to separate the batten into sections (except for one spliced pair that I left in place – an error that I'll discuss later). I had to add a new section to account for the increased length over IS2, and trim the ends of some of the existing sections to have the splices not fall on a frame. I also modified the two hood end templates to fit. I then painted the sections white.
- I created a new bevel board and recorded the bevels at all the frames and at the hood ends. I've been trying to measure the bevels using my small bevel gage, but the results are not good, especially when the frame has some curvature. I should go back to measuring the bevels using scrubbing templates.
- Using scrubbing templates from previous planks, I found a set of 7 that closely matched the curvature of the frames. In practice, I only used one template for frames 5 through 15. The remaining frames were flat enough not to need scrubbing.

Day 2:

- Spiled for top and bottom edges of S9
- Removed the spiling batten, selected an offcut of Wana from plank P9, and reverse spiled for the S9 section from the hood end forward to frame 23. Draw a rough cut line ½" outside the spiling points and cut out the plank. This offcut was just barely wide enough near the middle. And now I see the consequences of getting the last bit out of my stock – the plank has a significant chunk of sap wood. Ideally I should probably make a new plank, but the rate this project is going I can't afford it. The sap wood is the greenish part in the pic below.



Day 3:

- Laid-out aft section on a piece of Wana that was wide enough not to need an extension. The second section runs from the hood end aft to frame 21, providing a 3 frame overlap at the ends of the two sections.

Day 4:

- Using a circular saw, I cut the aft section to the rough-cut lines.
- Thickness planed both sections to finish dimensions (.660" to .680" target was .657"). Tuning the thickness planer has made a big improvement. No scalloping; stock feeds without help; not as sensitive to stock vibration. Takes about 2mm per pass.
- Reverse spiled forward section and adjusted plank width from frames 4 – 15 for obtuse bevel angles.
- Cut plank to within 3/16" from the line. Planed bottom edge square to the face to just remove line. Left top edge as is for now.
- Laid out the bevel angles for the bottom edge. The bottom edge aft of frame 15 is basically square. Angles forward of frame 15 are obtuse. So I drew a bevel limit line of the face of the plank and planed the bevels to the line.
- Beveled the hood end. Again, obtuse angles. I had to adjust the shape of the hood end slightly – it's a bit convex, whereas the template was straight. I probably should have been more careful in checking the fit of the template, but the fix was not difficult.
- Set up for scrubbing the inside face, but when I checked the plank against the templates, the fit was already pretty good. I think the area occupied by the plank is basically flat. Significant curvature begins just above S9. This was an error! I must have been checking with the wrong template. The proper template was T7, which requires significant scrubbing from frames 5 through 15. My scrubbing planes tend to dig into the wood in spots, which I couldn't easily remove with sanding. Fortunately, this won't be visible and the gouges will be filled with sealant.

- Made the first trial fit. Frame 13 is about the mid point. The fit forward of frame 13 is just about perfect. But the plank then starts to diverge until the end when it again makes contact with the plank below. I believe the problem is the shape of the curve at the end of the plank – frames 22 & 23. When I was reverse spiling, the fairing batten didn't fit well to the data points at these frame locations. Correction ... I now believe that the problem was edge set in the spiling batten. In trying to save a bit of time, I violated one of my own principles – namely, use sections with a maximum length of 8' when construction the spiling batten on the boat. Two of the previous sections fit well for the S9 so I didn't remove the splice but used the pair as one. This may have introduced some edge set. Even if the problem wasn't caused by the double section, it's easy to introduce edge set when laying the batten onto the stock – the batten is just too long. In the future, I will try to pin the end away from the hood end, and then try to lay the hood end down without edge set.

I should also note that the magnitude of the error is about 1/8", which isn't much considering the length of the plank. Also, given that the problem was probably due to edge set, I should have removed material from both ends, instead of predominantly at the butt end. Since most of the correction was at the butt end, the top edge now falls below the data points. I will have to make an adjustment when scarfing the two plank sections. Also in estimating the width of S10, I'll need to measure the distance from the top to S9 to the bottom of S11, rather than just measure the width of S10.

In any case, the forward section now fits the bottom curve. I lost count of the number of trials required to achieve a good fit – maybe 7-10!

Day 5:

- Reverse spiled aft section. No significant obtuse bevels (except at hood end), so no adjustment to plank width was necessary.
- Cut out plank to within 3/16" of the line.
- Planed bottom edge to just remove the line. Edge is square to the face of the plank.
- First trial fit was again a bit disappointing. In this case the plank fit well until about 5 frames from the hood end, where the plank started to diverge. Maximum gap at the hood end was about 1/8". Again I suspect edge set in the spiling batten. In this case, however, I made the more logical move of balancing the error at both the hood end and butt end. So the error at each end was about 1/16". This was much more manageable.

Day 6:

- After about 3 iterations, the fit was acceptable. During fitting, I adjusted each bevel to more closely match that recorded on the bevel board. Most of the bevels were slightly obtuse, so not making a correction would tend to create a slightly open edge to the outside. Not sure that it matters much, but it's good (cosmetically) if any opening in the seam is to the inside.
- I then positioned the aft plank section on the boat and made a reference mark near frame 22. The mark is made on both the outer plank and on the inner plank top

and bottom. I then remove the aft plank and position the forward plank. I then made a reference mark on the plank matching the marks (top and bottom) on the inner plank. These reference marks allow me to properly align the two sections in preparation for scarfing.

Day 7:

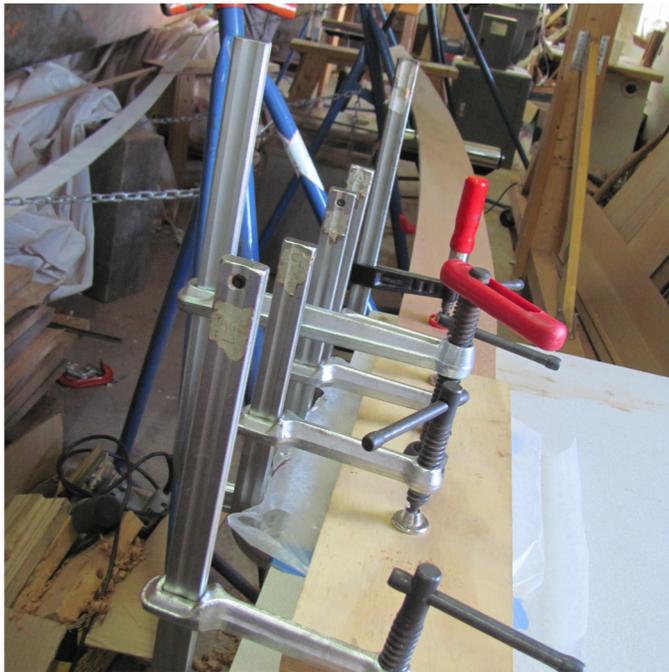
- I removed the forward plank section and placed both sections on the bench to test the alignment. I wasn't happy with the marks that I made (top marks didn't quite line up when bottom edges were congruent) so I put the sections back on the boat (one at a time) and made new marks at frame 21.
- The alignment with the new marks was much better. For almost 3 frames, the bottom edges matched exactly.
- As expected, the top edges differed significantly. In particular, the top edge of the butt end of the forward section was at least 1/8" below the line on the aft section. The error decreases as you move forward, until just before frame 21 the edges match. So I decided to place my scarf joint between frames 21 and 22. After glue up, I'll use my fairing batten to define a new top edge, as close to the original as possible.
- I decided to glue up the scarf joint on the bench rather than on the boat. The plank has substantial bend in this area, so it might be difficult to get a tight joint on the boat. The trick to gluing up on the bench is getting the two sections into alignment.

With a 3+ frame overlap, it's easy to align the sections (one on top of the other) so that the bottom edges match for (almost) the full length of the overlap. The problem is that when you cut the planks for the scarfs, you lose all that overlap. When that happens, achieving proper alignment is difficult. Consequently, before cutting the sections to length, I aligned the sections on the bench (one on top of the other) and made reference marks on the bench, several feet from the scarf. With these additional reference marks, I could easily align the two sections even after cutting to length.

- After cutting the sections to length for a 6" scarf joint, I glued up the joint with resorcinol.



Scarf joint being glued up on the bench.



Close up shows blue tape used for reference marks. The tape in the foreground marks the center of the scarf. The saw horse in the distance provides another reference. The other reference mark is at the near end of the bench (not visible in the pics above).



Day 8:

- After cleaning up the glue squeeze out, I found that the joint was near perfect. The top edge, of course, needed work.
- Using a fairing batten, I redefined the top edge so that the transition from one section to the other was as smooth as possible. The new curve, which differs from the original by 2 ft on either side of the scarf, is somewhat flatter than the original, but otherwise is fair.
- It's now time for a trial fit. The plank now is over 30' long and quite noodly, so I needed help moving it from bench to boat. Once along side the boat, I used ropes to lift the ends and then clamped the middle of the plank to the boat. With the help of my reference marks, I could accurately position the plank fore/aft. I then loosely clamped the ends, and then clamped the plank at every other frame working from the center outward. I wedged the plank down in a few spots and then checked the fit. The fit was pretty good and after wedging down a few spots, the largest gap was less than .022", including the hood ends.

Day 9:

- After a week out of town, I moved the plank back to the bench (again with help) to cut the top edge to the new line. I had to plane the edge with the plank laying on the bench, which made the task more difficult (harder to push the plane and harder to keep the edge square). The plank was just too long to set it up on edge. I also cut the caulking bevels at the hood ends. I decide to cut the bevel for the full thickness of the plank. In that way, the caulking will bottom against the inner plank, which should be better for stopping leaks.
- Time for a final trial fit before adding the sealant. I had to trim a bit more of the forward hood end, but otherwise everything looked good. So I traced the top edge of the plank onto the inner plank, to mark the limit of the primer. I also labeled all the wedges so I could install them at the right locations during final install.

- Removed the plank, sanded the two mating faces (by hand; 80 grit), vacuumed, tacked, and applied primer to the faces.
- After about 1 hr., the primer was tack free, so it was time for sealant. Using a pneumatic caulking gun (40 psi), I applied the caulk and spread the caulk with a 2mm notched trowel.
- Using ropes at either end, I lifted the plank into position and applied the clamps, working from the center towards either end.
- With clamps and wedges in place I started to install the fasteners. This process is quite time consuming, so after about 20 fasteners, I called it quits for the day.

Day 10:

- Finished installing the fasteners (about 100 total).

Day 11:

- Made and installed bungs.



Hood end aft.



Hood end forward.



Scarf joint.

Notes

- When installing the fasteners, I purposely reduced the depth of counter bore to between $1/16''$ and $1/8''$. The screws still went much deeper before taking up. Is the fastener bottoming out in the pilot hole or is the Wana crushing enough to stop the fastener? After checking the depth of my pilot holes, I conclude that the fastener is not bottoming out. It seems that, in most cases, the Wana crushes about

1/8" before taking up. So for most of the 100+ fasteners, the head of the screw is about .20-.25" below the surface. A few go as deep as .3" – one to .36, which is much too deep. In the future, I will stop before exceeding .25". For the existing fasteners, the head is only about 3/16" below the surface.

- Regardless of the depth of the fastener, the bungs only go as deep as the counter bore.
- Removing only 2 planks (the plank you're replacing plus the one above it), leaves very little clearance for access to the interior of the boat. In particular, it's hard to locate the frame/floor bolts so as to avoid hitting them with the plank screws. Rather than remove another plank, I'll try recording the location of the bolts prior to installing the next inner plank.
- Due to the fitting problems that I had, the top edge of the replacement plank S9 is lower than the original. So rather use the width of the original S10, I measured the distance from the top of the new S9 to the old S11.
- To avoid edge set, I must remember to keep the sections of the spiling batten to 8' or less. Also, when reverse spiling, I need to secure the batten to the stock at one end (not the hood end) and adjust the hood end to minimize edge set.
- Try using scrubbing templates for measuring bevels, especially now that the frames will have more curvature.
- I inadvertently started scrubbing the wrong (outside) face of the plank. This will be corrected (I hope) during final hull fairing.
- Gluing up on the bench is preferable to doing it on the boat. Alignment is critical, however, so the sections must be aligned while there is a 3-frame overlap. Then reference marks must be made at some distance from the scarf, before cutting to length.