

J30 Outhaul Overhaul

Background:

When the previous owner of Smiles (Hull #115, Sail # 30001) allowed my spouse and I to take over ownership, she was in excellent condition and she has served us well these past 4.5 years. In the past 12 months, however, the outhaul has been a sore spot – trimming on has become more difficult but more critically, easing the outhaul has become next to impossible.

Back in May 2019 I initiated a thread on the J30 class association website ([“What’s Inside the Boom”](#)). Thanks to those who responded to my post, but the comments did not fully fit the situation. Things on Smiles came to a head in December of 2020 when we wanted to reef the main, but the outhaul would not ease sufficiently to connect to the reef clew (no reef lines on Smiles).

Perhaps thinking that Smiles might not be the only J30 experiencing a similar situation, I’ve decided to document the process hoping it will better enable others to resolve the problem.

Objectives:

As I committed to the outhaul overhaul, I had several objectives:

1. Enhance the trimming/easing mechanism – especially assuring a smooth release/ease.
2. Eliminating the wire rope “tail”
3. Replacing any rivets with removeable fasteners

Phases:

Not being overly anal (yeah, right!) I attacked the process in the following phases:

1. Removal (from the boat and outhaul from the boom) & Inspection (what did I have)
2. Redesign (of the purchase system) & Hardware Purchase
3. Prep for Installation
4. Build & Test the New System
5. Re-install Outhaul and Boom
6. Go Sailing

Removal & Inspection

I concluded early on that this process would be better handled off the boat. Boom removal is straightforward and “Kanga”, our Subaru Outback was happy to handle the outhaul hauling – protest flag on the back of the boom as a warning flag, of course.



Figure 1: Note the rivets on the gooseneck end. Green line is the outhaul leading to a Harken single with cam cleat.

After establishing a “workshop” on our covered back patio so we could keep cars in the garage, all fasteners were removed from both the gooseneck (mast end) and aft end of the boom.

Tip: I used a Workmate to clamp the boom in either vertical or horizontal position. This proved to be very important during the reinstallation phase.



Figure 2: Gooseneck secured with a combination of fasteners, leading to decision to eliminate rivets and standardize fasteners.



Over time Smiles’ assortment of fasteners had come to include rivets, pan-head and hex bolts and the decision was made that we would move to a standard fastener on the reinstallation.

Rivets were drilled out using appropriately sized bits for the rivet (there were multiple sizes). This was likely the most frustrating part of the first phase – varying size rivets/bits, broken bits, etc. – just reinforced a “never use rivets again” mentality. As the gooseneck and end fitting were pulled it became clear that part of the success of reassembly was going to be getting to a standard size fitting. More on that in Phase 3 – Prep for Installation.

At last, the ends were off. What’s inside the boom? This is what things look like from the mast/gooseneck end – a triple block (standing) held in place by a 3/8” bolt thru the boom.



Figure 3: Triple block (standing) attached to 3/8" bolt appx 4" in from boom "front". And drilling debris.



Figure 4: Line coming to camera is the outhaul working end, leads out thru gooseneck and back to cam cleat on boom.

After the bolt holding the standing end was removed, I could just reach the standing block. Messenger lines were attached at both ends of the outhaul and the entire outhaul was pulled out THRU THE AFT END OF THE BOOM (at this time the wire rope tail was still in place and its swagged eye splice, running around the aft turning block, could not be removed without cutting the wire rope – I was not ready to do this yet.).

And vola! It became immediately clear why the outhaul was not releasing smoothly (or at all) – the race of the 6:1 tackle was twisted, at least one-half turn, maybe two.

Here is what I found inside. The video link that follows will give you a visual of the current system laid out on the patio. Click the image to get a video with commentary.



Figure 5: Video of standard J30 outhaul removed from boom.

- Standing block = Harken 30mm triple
- Running block – Harken 30mm triple with becket
- Line = Unidentified type, Somewhere between 5/16-3/8" in diameter. Approximately 19 feet.
- Wire rope = 1/4"? Approximately 11'4" long

For a more static view of the original system, check out my drawing below.

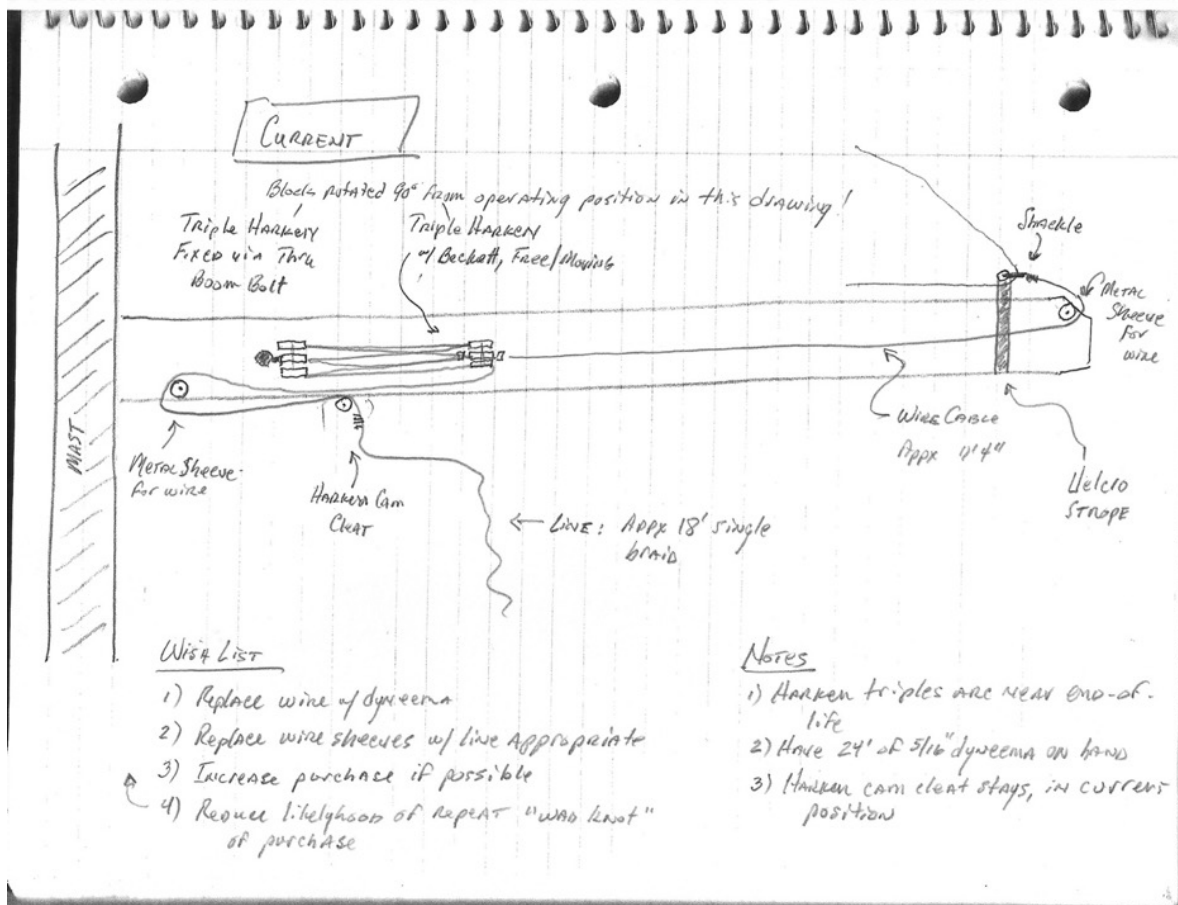


Figure 6: Sketch of Original Outhaul

Phase 2 – Redesign and Hardware Purchase

As noted in the objectives section above, I was looking for a low friction system which trimmed easily and released smoothly when heading downwind (and would ease sufficiently on the rare occasions when reefing was deemed appropriate).

To achieve this objective, I made the decision to move to a 12:1 system from the original 6:1. To do so we went with a 6:1 (similar to the original) connected to a 2:1. Components were:

- Harken 29mm triple Carbo swivel block
- Harken 29mm triple with becket Carbo swivel block
- Harken 29mm single (for the 2:1) Carbo swivel block
- Robline Copa 7mm (covered dyneema) for the 6:1 race
- West Marine 5/16" dyneema for the 2:1 and final pendant

The swivels were “locked” on all of the Harken blocks, a nice option in my opinion. The rigger I was working with recommended a low friction ring rather than the Harken single. I purchased one, did all the splices needed, assembled the outhaul but WAS NOT HAPPY with the ease smoothness. So back to West for the single block. Success.

Following is my final design sketch (before assembly):

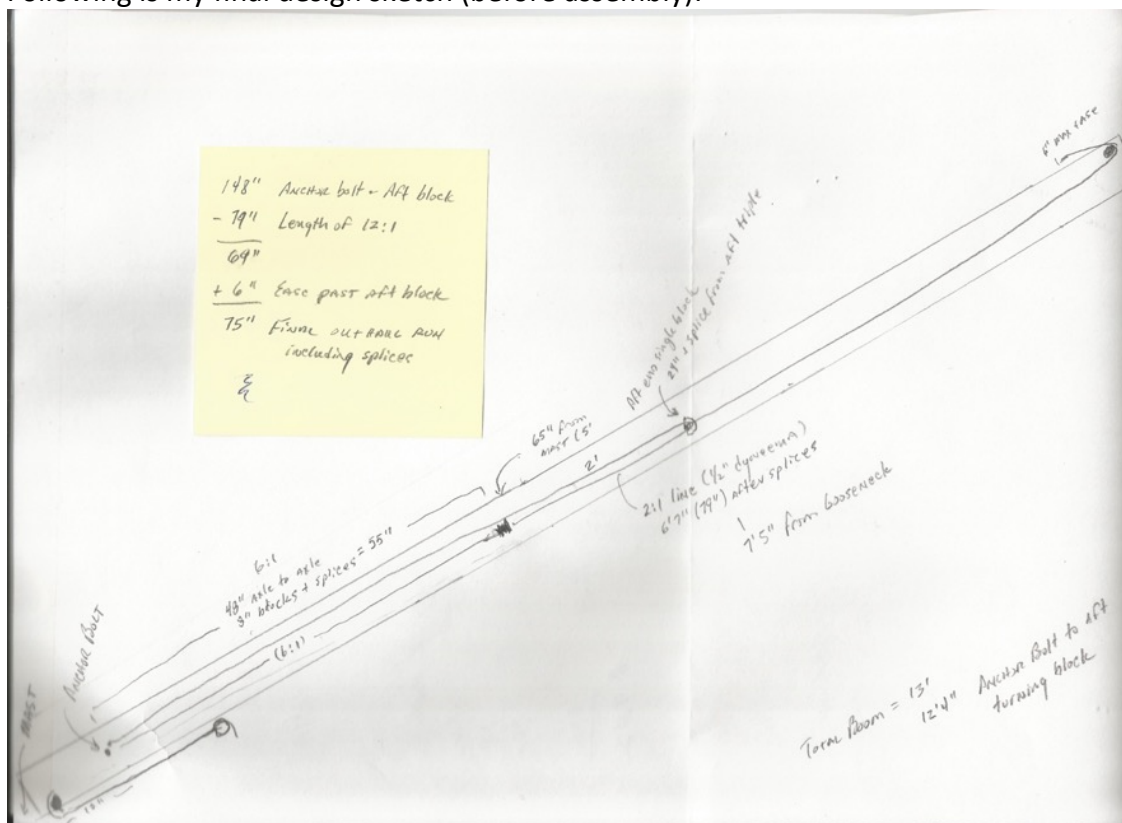


Figure 7: Sketch of 12:1 Final Design, All Measurements Specific to Smiles

As noted above, all the measurements for line is specific to my situation and was the most nerve-racking part of the design and assembly. As I put together the lengths needed, I used the following considerations:

- With a 12:1, to move the clew end of the outhaul one inch, the working end needed to move one foot.
- I allowed 9 inches at the clew end from full ease to full trim, clew to white band. This was a WAG, never having measured that movement.
- I set the length of the “fall” (distance between blocks) at 4’ at max clew ease, allowing the fall to contract by about 1/3 to get to full ease, pulling in 9’ or outhaul.
- Set the distance from the top of the running triple block to the single block at 24” and added the distance from there to the attachment thru bolt at the forward end of the boom (which also holds the standing triple block). The 24” was again was a swag. The block never comes close to the running triple regardless of how things are trimmed so it might not matter what its distance from the running block would be.
- Calculated the “tail” – from the single to the clew (including the 9” ease).
- Calculated how much ease would be needed (in addition to the 9” to get the outhaul forward to the reef clew.
- Calculated the amount of line needed in the race + the run to the gooseneck and back to the Harken single with cam cleat and then added line needed to get the max ease to the reefing clew.

AND THEN, I made a wild estimate of how much line in each part I would need for necessary splices.

One of the pure joys of this project was learning that Brummel splicing single braid dyneema (regardless of how many ends you can work with) is SIMPLE!

Great intros to splicing dyneema here: [Both ends available](#). [Single end available](#).

So off to the internet I went to purchase the hardware and line. Thanks to Rod Favela of [Vela Sailing Supply](#) for the design and sourcing support. Even in the middle of training others, his own rigging projects and helping to build the VX-1 Fleet he was a steady hand in the process and willing to validate or challenge my ideas.

Phase 3 – Prepping for Installation

This phase focused on getting the gooseneck, end fitting and boom ready to accept a standard size fastener. I was pretty uncertain on this for several of reasons. First, over time many sizes had been used. Second, normal wear and tear on the boom has “stretched” some rivet/bolt

holes. And finally, I knew I was going to have to tap the existing holes to the common size and had never used a tap before.

Well, guess what? Ace is the “Helpful Hardware Place” and in my area has the best selection of stainless pieces and parts. AND, if you bring your gooseneck in with you then you just might find one of the Ace associates is ex-Navy and sailed in his youth.

“Yep, we are going to need to go with a 5/16” x 24 tap. Here’s your drill, here’s your tap, you’ll need a tap handle. Do you have 3-n-1 oil or something like that? Great, now let’s go see what fasteners we have.”



Figure 8: Drill, tap, handle for 5/16x24 taps.

Tapping Tips for the Novice:

- Secure the work – I used a vice
- Go SLOOOOW. That’s the only way!
- Back the tap out and clean it frequently
- Use lots of oil to help cut and clean the threads
- Wear gloves, that tap handle hurts after awhile

Ultimately cutting the threads in the gooseneck and aft end fitting was not too difficult. I had a total of 9 taps to cut and it took me a bit over 90 minutes. Standardizing the holes in the boom was a bit more difficult – the material is harder and since it is thinner, getting the cut going is a bit more trouble. But patience won.

Because of the prior wear on the boom holes, we had to go to 5/16” fasteners and at my Ace they stop carrying pan-head bolts at ¼” so we had to go with hex-head bolts.

Other than cutting the necessary holes, the only other pre-assembly prep I did was a full cleaning of the interior and exterior of the boom and replacement of the “pads” where the boom hits the shrouds (bicycle inter-tube and black duck tape). I looked at repainting the boom but by the time I looked at what it takes to work with Awlgrip I knew I had insufficient time – boom had to be back on for the first race of our Frostbite series.

Phase 4 – Build and Test the New System

Simple you say? Well, I had never reeved a 6:1 purchase in a manner that looked correct and did not have crossing falls. So off to the internet. I thought, “sure, Harken will have something”. They did, some confusing illustrations. Search on!

The best thing I found was a training video which seems to be a merchant mariner being tested in some country outside the US. Since I was starting with an eye splice on the running triple (with becket) this was perfect.



Figure 9: Video of proper reeving for 6:1 purchase

Working from the 6:1, adding the 2:1 was straight forward, two eye splices running thru the Harken single. Adding the final tail was also no problem – two eye splices, one on the Harken single (do this first!) and one for the end connected to the clew.

I also did a “dry-fit” of the system by taping it to the outside of the boom. I set the fall at 4’, then laid out all the other pieces. A bit messy and low tech but it gave me the confidence that my measurements were at least close. The video below talks thru the dry fit. The “pink thing” referred to is only a chaffing guard fashioned out of a piece of silicon straw.



Figure 10: Video of external dry fit of system. Before stripping the dyneema in the 6:1 fall.

Well I had already decided the 2:1 and the outhaul “tail” were going to be dyneema. Rob Favela convinced me to use 7mm Robline Copa for the 6:1 and strip the cover off the line in the 6:1 fall. I was concerned about 7mm from a crew handling standpoint. Rod had the perfect solution: “Tell them its European 8mm and hand them another beer!”. Game on!!

I did have some trouble estimating where to stop the stripping. Also the “bury” of the cover needs a simple lashing to secure the cover so it does not “creep”. This creates a hard point that does not like to bend around small blocks like I was using. After working the lashing aggressively in my hands, I finally got the run that I was looking for as it went past the first block.

Test your system OUTSIDE the boom first!

Remember my objective “Enhance the trimming/easing mechanism”?

Don’t be a dummy like me and put it in (twice) only to find out its not working the way you want. This is where I found I was not getting the ease I wanted using the low friction ring and discovered the issue with the lashing on the stripped cover.

Instead, anchor one end of your system to a post or other unmovable object and run the working end to something the purchase can lift (I used the old triple anchored to a rafter to a propane tank). Up, down. Up, down. Up, down.

Phase 5 – Re-install Outhaul and Boom

Remember those messenger lines from Phase 1. They have been just lying there getting in the ways since Phase 1. They become your best friend. *Make sure you have one on each end of the purchase when you reinstall so if you need to remove you can do so.*

I installed the aft end fitting, and I did the install from the forward end so I could watch each part go in without twisting. By running the forward messenger line thru the turning block in the end fitting and bringing it back to the forward end of the boom I was able to control the process effectively.

Hint: Do the insertion with the boom oriented vertically, in normal use alignment. This clarifies how the “tail” of the outhaul should run AND that the clew end should go ABOVE the thru bolt that holds the mainsheet!

As each part was eased in, I checked it for alignment and twisting, especially paying attention to how the running block went in. There is not a lot of space for a 29mm block, the 2:1 line and the running end of the 6:1 plus that 3/8” bolt threading the needle. So, it was a bit “fiddly” getting each piece where I wanted it so that all parts ran true. The good news is that I was able to reach inside the boom to manage the final connection to the thru bolt.

Hint: The running end of the outhaul needs to be lead ON TOP OF the bolt to which the 6:1 and 2:1 are anchored to lead fairly to the gooseneck turning block.

TEST EVERYTHING AGAIN! Trim. Ease. Trim. Ease. Ease to reef length. Trim back to full on. You get the picture.

All that was left was to put the gooseneck back in place, put in the hex bolts (red Loctite please) and put everything back up on the Outback and take her to the lake

Phase 6 – Go Sailing!

This is the real test, right?

We rolled out of the marina and hoisted the main. The outhaul was “off”. I asked for outhaul and all I heard from the front of the boat was: “This thing is like butter, man.”

My job is done here!



Figure 11: Smiles - bullet in Race 1 of 2021 Frostbite Series