

Improving your Flying Scot

(David Ames)

Hello, my name is **David Ames** and I have been an avid Flying Scot sailor for about the past 6 years. I love the versatility of the Flying Scot and I use my FS for racing, teaching learn to sail, advanced racing techniques, and for fun I use the Flying Scot to go to the sand bar on days off with my family and our two dogs. Part of belonging to the Flying Scot community is sharing my knowledge with other Flying Scot sailors to enable them to better understand the Flying Scot and to help others get the most enjoyment out of their boat.

The Flying Scot is a one design boat which means that all the boats are the same and only minor modifications are allowed under the rules. In my following blog series, I will go over everything that we have done to our boat to make it sail faster as well as reduce common breakdowns and simplify control systems making the boat easier to sail. Even though it is important to have a fast boat, do not make the mistake of spending more than 10% of your sailing energy on the boat and leave yourself enough time to perfect your racing skill sets on the water.

So, we all would like a faster Flying Scot but what does that mean?

Standing Rigging – Your boat's standing rigging is an extremely important aspect of making the Flying Scot fast because the rake, stay tensions, and sail setup adjustments are all based on the symmetry of the rig. If the tip of the mast is not dead center, then the sails will be slightly different on each tack, and it will be difficult to find reproducible settings on each tack. The way I check the mast for centering is that I will measure a point on the rail from the stern of boat up near the chain plate and make a mark. Then I will replicate the measurement on the other rail in the exact same place and double check each side. To measure the mast's position, I will take a long tape measure and raise it to the top of the mast attaching it to the main halyard and then measure the length to the marks on each rail of the boat. If the measurement is not exact, look to replace one or both side stays compensating for the difference. Another cheaper way to correct the difference is to modify the holes on the side stay connector plates.

Rake – The mast rake should be somewhere in the range of 28' 5" - 28' 6". There are 2 ways to check if the mast is positioned at the correct angle. #1 connect the main halyard with a long tape measure and raise the halyard until it is snug at the top of the mast. Measure the length from the top of the mast to the back of the center of the deck and it should be in the range of 28' 5" - 28' 6". #2 Take the jib halyard and lower the shackle so that it is barely touching the deck right in front of the mast. Swing the jib halyard forward to the forestay and mark the fore stay right at the bottom of the shackle. Measure the distance from the fore stay mark to the hole on the bow plate. The distance should be 16" ¼" to correspond with a rake of 28' 5" - 28' 6".

Maintenance – Standing rigging maintenance should be done every time that you have the mast down or about once every 6 months at a minimum.

Blocks - At the top of the mast there is a main halyard block that should be inspected for wear and lubricated during each maintenance. The jib Halyard block, the topping lift block, the spinnaker halyard block.

Halyards – All the halyards should be checked for any burring; The spinnaker halyard should be checked for wearing and make sure that the stopper knot is set in the correct position.

Stay end fittings and connectors – Check the end fittings of the shrouds for cracking, burring, or excess corrosion. I use my boat in a high salt environment, so I normally change out my shrouds about every 3-4 years. Every time that my mast is down, I end up inspecting all stay fittings and I use Boeshield spray to keep the water off of the fittings and then I retape the shrouds to protect the sails from the clevis pins and to prevent the ring dings from backing out.

Stay thickness – The fore stay should be $\frac{1}{4}$ inch. If you are still using the $\frac{3}{32}$ inch halyard change it because the $\frac{1}{4}$ inch headstay relates to all the sail manufactures tuning guides.

Stay length – the side stays should be **Could you help me on this dimension.**

Chain plates – The side stay chain plates run through the deck and are attached to the boat behind the flotation foam under the seats. The chain plates are very durable but if you start to see corrosion at the deck then check the screws that anchor the chainplate for corrosion as well.

Stay Tension – For Snug Rig jibs the forestay tension should be around 90 lbs. for light winds and should be tensioned up to 130 lbs. in heavy winds. I check the tension every day that I go sailing. If the rig is not holding tension, then it is a good indicator that there may be a problem with the turnbuckle at the forward toggle or that an end fitting is damaged.

Forestay Extender & Turnbuckle – The forestay extender and turnbuckle run from the toggle up through the bow plate and is attached to the forestay. I set the turnbuckle to get the forestay to the low end of my tension range and I have two holes in the chainplate to change tension from light wind to heavy wind. Since the forestay extender is mainly hidden it can become neglected and will eventually fail leading to the mast falling causing damage to the boat and rig. The best way to prevent a forestay failure is to remember to inspect it for wear every time that the mast is down and tape the ring dings, so they do not pull out of the shackles. Older turnbuckles should be wired so they cannot unwind themselves.

Toggle – The Toggle is located under the bow plate and is attached to the forestay chainplate. Check the screws that hold the chainplate for corrosion and change them out before the screw heads sheer off.

Control Systems

Vang – I use a 12:1 vang which is the standard for a racing Flying Scot. I have a 6:1 purchase between the tabernacle and the boom and a 2:1 puller line that is run back to the cassette. The reason why I like to use this system configuration is that it cleans up any purchase that may interfere with the spinnaker halyard. Additionally, by having just a 2:1 from the puller makes the system responsive when I ease off the vang. When I ease the vang, I am usually in a situation where I am sailing into a lull and want the leach of the main to open back up to prevent stalling the sail. Most boats that I have looked at have the 6:1 as the control line which gives you excellent purchase for adding vang but creates resistance when you ease off the vang.

Cunningham – I use Cunningham as a draft compensation control when I depower the main in 15-20 Kts. All other conditions I do not use any Cunningham.

Outhaul – The outhaul should be adjusted based on the sailing conditions and by how much power that you want in the main Sail. A loose outhaul will make the main sail fuller and will generate more power, a tight outhaul will flatten the sail and depower the main. The proper amount power to carry in the main sail depends on combined crew weight, wind, and wave conditions. All skipper/crew combined weights are looking to power up in light winds, the key to decide when to depower and begin to flatten the main depends on when you can no longer hike the boat to about 7%. Heavier sailing teams will be able to carry a loose outhaul longer than lighter teams. In light winds there should be no wrinkles in the foot of the main. I tension the outhaul until there are no vertical wrinkles in the foot of the sail when I am in powering up conditions (0-12 kts). Once I get into depowering conditions, I start to create a horizontal wrinkle in the foot of the main. If the conditions are choppy, I will leave a little more power in the main to re-accelerate after hitting a wave.

Winches/Halyards – The winches and halyards need to be in good working order because the halyards are critical in properly setting up the sail shapes for the wind conditions. On race day, I fully unwind the wire halyard from the winch and then tightly rewind the halyard so that there is no bunching in the wire. The best way to judge halyard tension when setting up the sails is to sail down wind and tighten the halyards until there are no wrinkles in the luff of the sails. Ease off the jib halyard until you can barely see some crows' feet form near the jib hanks and cleat the halyard off. The main is setup in the same way, sail downwind and raise the main halyard until there are no wrinkles, then ease off the halyard until there are horizontal wrinkles halfway up the luff of the main sail. When sailing upwind there should be some horizontal wrinkles in both the main and jib luffs.

Mainsheet – The Flying Scot main sheet can be rigged at 3:1 or 2:1 to accommodate the strength of the skipper. The 3:1 system makes it easier for the skipper to trim but the downside of the 3:1 system is that it makes weather and leeward difficult because you must pull in or ease out so much extra sheet. A couple of keys to having a good mainsheet system is you are now allowed to put a second ratchet block on the boom to give the skipper more leverage which means that a 3:1 configuration is no longer necessary. Second, I see that most Flying Scot booms have chafe marks where the boom hits the shroud after a jibe. The best way to prevent damage to the boom is to put a stopper knot in the mainsheet so that the boom stays ½ of an inch off the shroud during a jibe. I use a 2:1 sheet system because of the sheeting at the marks.

Centerboard – I mark where my centerboard is 100% down by looking at the gap between the leading edge of centerboard and the front of the centerboard trunk. If the centerboard is not down 100% your Flying Scot will lose both pointing ability and boat speed. If your centerboard is down too far, then there will be additional drag created at the junction between the bottom of the boat and the leading edge of the centerboard trunk which is slow. The procedure for figuring out the perfect position is first I let the centerboard roll back so that there is a 1-inch gap between the leading edge of centerboard and the front of the centerboard trunk. Next, I will slowly roll the centerboard forward until there is zero gap between the leading edge of centerboard and the front of the centerboard trunk. Then I take a sharpie and mark right where the roller should be so that the crew can tell by not having to look down into the centerboard trunk. The final setting that I make is to put a stopper knot in the centerboard retractor line to prevent the centerboard from being dropped too far down.

Rudder – There is some debate about the ideal angle of the rudder. Stock, the Flying Scot rudder is set at about a 7% rake angle, but many Flying Scot sailors reduce the rudder rake down to about 2% to reduce the amount of weather helm when sailing upwind. Both The mast rake and the rudder angle have a big impact on the amount of helm in the Flying Scot, so it is important to understand the interaction between the two. If your mast rake is too far forward (more than 28' 7") then there will be little to no helm and a rudder raked at 2% will start to produce leeward helm making the boat difficult to point upwind. On the other extreme, if your mast rake is too far back (less than 28' 4") and your rudder has a 7% angle then there will be an excessive amount of weather helm slowing down your boat speed because the rudder produces more drag with increased helm. I have my mast rake at 28' 5 1/2" and my rudder is 3% from vertical. When I am sailing the boat upwind with the proper heel, I can let go of the tiller and the boat will sail perfectly straight and I strive to have little to no helm. When I let the boat heel a little bit, I get a small amount of weather helm.

The Gasket- The gasket seems like a small part of the boat, but it could potentially become a major reason why your boat is slow. The gasket gets pinched open from not having the centerboard up 100% when the boat is brought out of the water onto the trailer. Once the gasket is pinched open, it allows water to come into the centerboard trunk increasing drag on the bottom of the boat and at the junction with the centerboard. Once the gasket has been damaged it must be replaced, so be extra care full to make sure that the centerboard is all the way up and that the gasket is sitting centered on the trailer roller. The gasket should be inspected every time you go sailing.

Boat Bottom – The condition of the bottom of the Flying Scot should be inspected about twice a year for excessive scratching and fairness. Most of the scratches come from the rollers on the trailer so extra caution is needed when you unload and load the trailer. We installed some extra padding and a bow protector to prevent the hull from hitting the metal on the trailer. If the bottom has excessive scratches, then the boat will have to be rolled over patched and sanded which is a major project.

Boat Weight – All owners should weigh their boats with just the hull only. Weighing the hull only will allow you to gage how close your boat is to the class minimum weight (675 lbs). I weigh my boat about once a year and keep track of my measurements to see if the hull is gaining weight. If the hull is gaining weight, then it is probably absorbing water into the core or the tabernacle. If your boat is gaining weight, then I would closely inspect the core to try and identify the intrusion points or damage to the fiberglass encasing the boat core. Catching damage to the core and fixing it early will extend the life of the boat significantly. Try keeping anything like the anchor or other objects that could damage the core in a plastic container.

Jib Cars and Blocks – Most boats that I have looked at have the springs installed on the jib car blocks which moves the jib trim point outboard. Moving the jib trim point outboard reduces pointing ability in all conditions. A second problem with having the jib trim point outboard is that to compensate the crew must add 3-4 inches of weather sheeting. The jib Blocks should be attached to the jib cars so that they sit 2 inches inboard of the tracts which is the maximum limit under the rules. I removed my springs from my jib cars because they were preventing the blocks from moving inboard in light wind. Also, I hardly ever use any weather sheeting, when I use weather sheeting it is at most 1 inch.

Jib Sheets – On my boat I use three different jib sheets. I have a 1-1 light wind jib sheet that I use form 0-10 kts. I use a 1-1 sheet in light wind to improve boat handling and reduce the weight of the system

which closes the leach. In 10-15 Kts I use a heavier 1-1 jib sheet to improve boat handling. In 15-20+ Kts I use the traditional 2-1 jib sheet allowing the crew to deal with heavier sheet tensions.

Markings for trim/tension – I am a big proponent of using measuring stickers to allow the crew to understand the exact positioning of a control line or sheet tension. The jib sheets should have a mark and a measuring sticker on the back side of the bench.

At the end of the day, a fast boat is all about paying attention to the details. I am always looking at other sailors Flying Scot to see if they have done something different with the rigging or systems the boat. Everything that we do to our Flying Scot is a reflection of our knowledge of sailing and our understanding of the physics of the Flying Scot design.