

Note:

The information presented here should work for all DF65 boats but exact settings and measurements must be treated as generic. Unfortunately, boats and rigs can be different. Therefore, your boat may need slightly modified measurements to get it balanced and make it fast. It is suggested that the measurements presented here are used as a starting point for further refinement by the sailor.

To aid understanding of the terminology used, please refer to Image 23 which shows the Head, Tack, Clew and position of luff ties 1, 2 and 3.

Materials required

It is recommended to use a mix of 80lbs, 50lbs and 20lbs braid in place of the manufacturer's supplied line e.g.:



Image 1

Thinner braid can be used if preferred and will likely be strong enough when new. However, service life of thin line may be short due to chafing and sharp edges, hence the recommendation to go slightly heavier than may be ultimately necessary for the service.

Always apply supa glue (or similar) to each knot, especially when the knot is not a braid specific knot, e.g. on a bowline or reef knot, otherwise the knot will fail under load. Research the Palomar knot and Uni knot, use them where you can. They are braid specific and mostly secure under load even without supa glue.

One of the biggest variables in the rig setup is due to how the mast is constructed from its component parts by the owner. To help make my setup more applicable to your boat consider constructing your mast in the same way as I do, which is.....:

Glue in most parts, i.e. mast joiner tube and the bottom mast extension piece, but not the mast head and crane.

Before bonding the two-piece mast tubes together check to determine if the tubes are straight, normally they are slightly bent so do not worry if yours are. A good way to check and mark the direction of the bend is to roll the tubes on a flat horizontal surface holding the one end of the tube down as it is slowly rolled. The bend will become apparent when the end of the tube not held down

lifts up off the surface as it is rolled. Mark the top of the tube when the bend is in the upward direction.

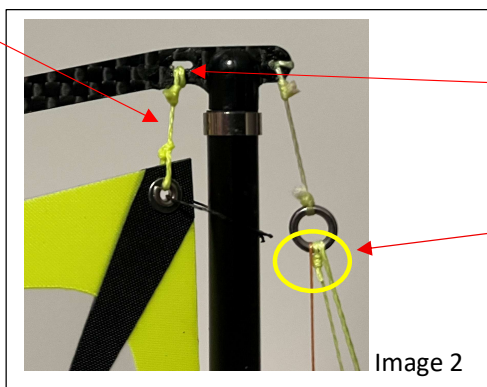
Glue the two mast tubes (and the mast joiner insert) together using 5-minute araldite. As the glue goes off hold the two sections straight in both x and y axis so that the mast is straight and with the marks indicating the direction of the bend aligned in the upward orientation. This is more easily achieved by using a straight piece of right-angle section (RAS) of metal. Place and hold the mast into the corner of the RAS until the glue is set, being careful not to let the mast stick to the RAS. Do not put the metal end reinforcing rings on until after the mast tubes are glued and set. Leaving the rings off makes it easier to achieve a very straight mast.

Glue the carbon fibre crane into the plastic mast head insert so it forms one piece. This can then be pushed into the top of the mast tubes and left unglued. The crane is vulnerable to breakage and if glued in, a broken mast crane will result in the whole mast being scrapped. So leave the mast head unglued to enable broken cranes to be replaced. When inserting the crane, make sure the crane aligns with the back of the mast, i.e. the marks indicating the upward orientation of the tube bend, this assures that any bend in the mast tubes is held in the fore/aft alignment with the boat when sailing.

Rigging the sails onto the spars:

1. Rigging up the mainsail:

Start by securing the mainsail to the masthead crane with 80 lbs braid. Use knots that you are familiar with but make sure there is only one line (no loop) between the sail and the crane, to allow the sail to swivel freely. Tie the sail at the back of the slot in the crane.

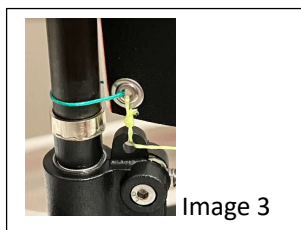


Tie close to the back slot, here.

Also refer to image 8

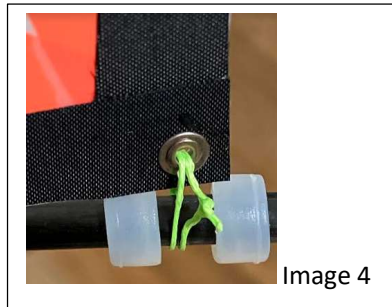
If setting up a new rig, these lines would not be rigged yet

The height of the sail is important. Set the sail as low as possible on the mast, allowing just enough space at the tack attachment point to allow the sail luff to be tensioned without running out of cunningham adjustment. Like the yellow line in image 3:



Tie the cunningham bowsie as shown in the DF rigging manual using 50lbs braid.

Attach the clew of the sail to the boom with a double loop of 50lbs braid and a reef knot. Before application of supa glue, the length of the loop can be easily adjusted simply by pulling on the loop (Place a needle or similar object between the knotted loop, just the one strand with the knot in it, and the boom, and pull on it gentle to make the knot slip a little. Be careful not to crush the sail.) to make it longer, or pulling on the ends of the line (to make the knot slip a little) to make it shorter. Set the length of the loop so that the bottom of the sail does not contact the rubber stoppers, as shown in Image 4:



Once the length is set, apply supa glue to permanently set the knot and prevent it slipping, then cut the ends suitably short. For added security, consider tying overhand stopper knots in each end of the braid hard up against the reef knot prior to gluing it.

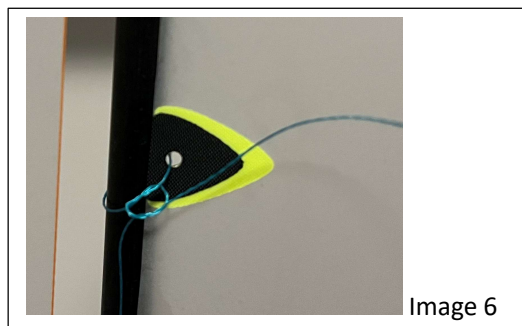
Next step is to make the luff ties.

Firstly, tie the luff tie at the tack of the sail so that the cunningham eye in the tack of the sail is held directly above the cunningham eye in the gooseneck fitting. This is the reference point for the sail in relation to the rig.

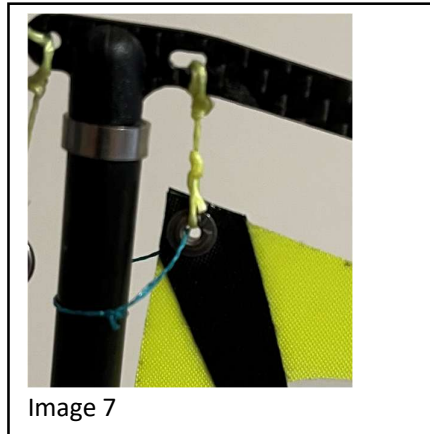


The tack tie can be set permanently with supa glue and the ends cut off.

Then for luff ties 1, 2 and 3 use a loop of 20lbs braid to make the luff tie, but this time leave the knot loose, unglued and ends uncut, as shown in image 6:

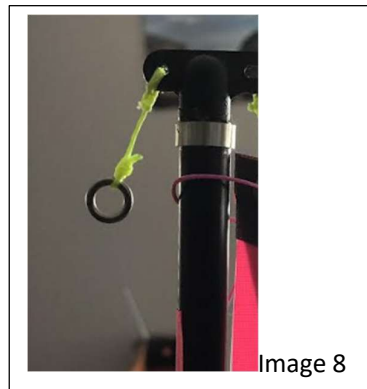


The head of the sail should have the luff tie set very loose, too loose to have any effect on the sail. It is not required for performance but is required to satisfy Class Rules. Tie it very loose so that there is no risk of the luff tie taking any tension, as shown in Image 7.



2. Rigging up the jib:

Make sure there is a metal ring tied to the hole in the mast head meant for the jib attachment:



Similar to the mainsail attachment, the ring needs to be attached to the mast by one strand of 80lbs braid so that it can swivel easily. The distance between the ring and the hole in the crane should be close to 15 mm. To stop the lines moving, chafing, and ultimately breaking, apply supa glue to the braid running through the holes in the masthead fitting so that the braid is glued to the mast crane.

Tie 300 mm of 80lbs braid to the jib luff wire using a Uni knot, (Image 9).

Tie 300 mm of 50lbs braid to the jib head ring using a Uni knot, (Image 10).

Tie 250 mm of 50lbs braid to the jib tack eyelet, using a non-slipping loop knot of some kind. I use a bowline with supa glue, which has proven to be reliable enough. Make sure the loop is short, only as long as it needs to be to move freely and not squeeze the sail into the tack eyelet. (Image 11).



Image 9



Image 10

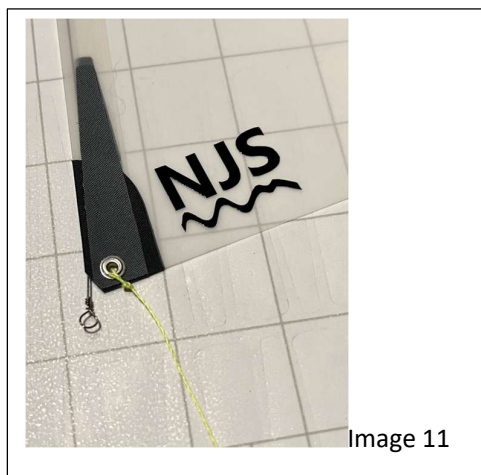


Image 11

Connect the 80lbs braid at the top of the jib luff wire to the metal ring using a bowsie. Do not tie the stopper knot or cut the line to length yet. I use the micro metal type bowsie for this (as pictured), but the Joysway plastic ones are fine if that is what you have and they are a lot easier to adjust. To set the height of the jib without cutting the line or tying the stopper knot I wrap the uncut end around the mast crane multiple times to stop it slipping. This allows the length to be set accurately later in the rigging process.

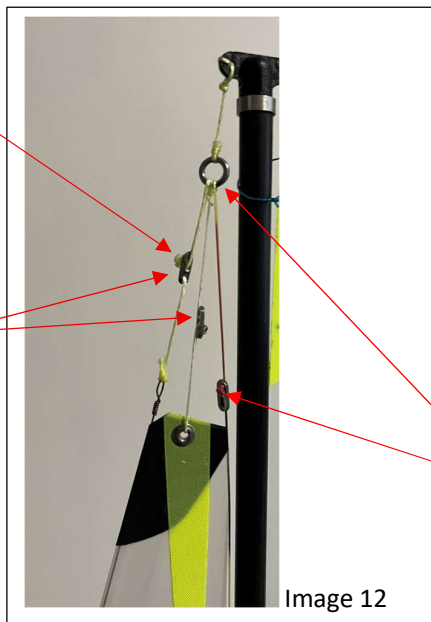
Slide the jib boom counterweight through the bottom eye in the jib luff wire and into its normal position in the jib boom.

Connect the 50lbs braid tied to the ring (image 10) using another bowsie through the head eyelet of the jib, again not tying the knot or cutting the end off.

Thread the jib boom uphaul as normal, through the ring and behind the other two lines. So, the 80lbs braid is frontmost, the 50lbs in the middle and the jib uphaul sits rearmost through the ring.

This image shows the stopper knots tied and ends cut, but yours should not be at this point in time.

Make sure the two bowsies are in the middle of their adjustment when the rig is set with correct mast rake and tension on. This allows for maximum adjustment either way

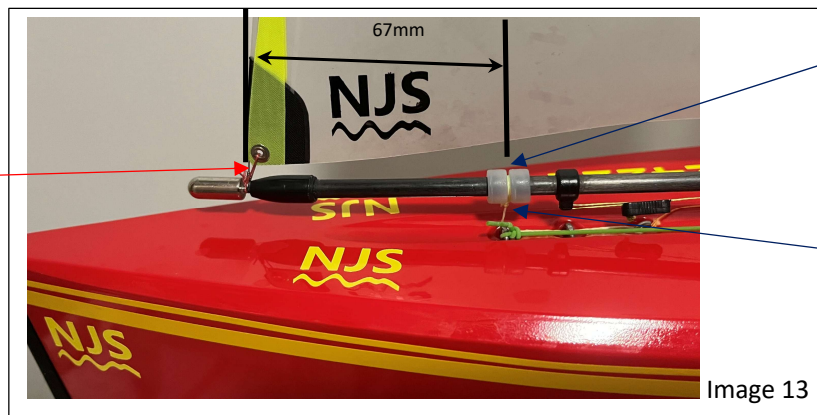


The boom uphaul (lift line) is run through the ring at the top, with the bowsie also at the top

Now tie the jib clew to the jib boom in exactly the same way as the main clew is tied to the main boom, see image 4.

Note, it is assumed that the jib boom tie down length is set as short as it can be, somewhere between 48 and 50 mm is OK, but no more. The jib boom must be kept nice and low to the deck as per image 13. Ideally the jib should be held low, close to the jib boom so keep the tack tie short.

Do your best to keep the jib as low as possible

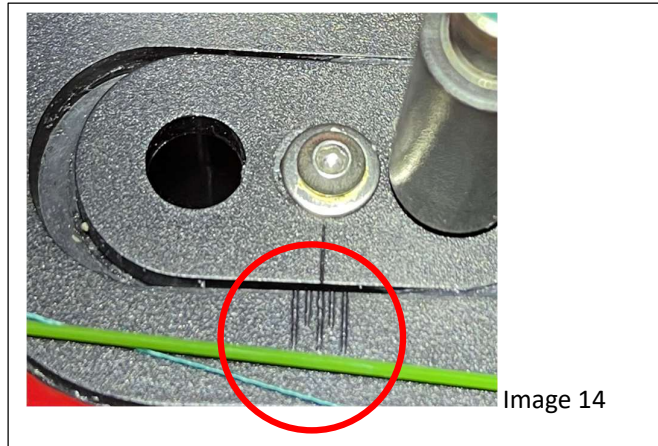


Boom pivot approx. 67mm from front of boom fitting

Keep this line short to keep the boom low.

Now it is time to set the lengths of the two lines that hold the jib up. Set the length of each line so that the bowsie is halfway between the two ends of the braid (refer to image 12) when the mast rake measurement is at 950mm. This is measured from the deck to the backstay attachment point in the jib crane. Take the measurement while there is some reasonable tension applied, similar to what you would use when sailing. The point of measurement on the back deck for purposes of mast rake determination, is the point on the horizontal deck just to one side of the backstay hook, as far back in the boat as possible, at the transom.

Check that the mast foot slide is set in your normal racing position, which I find is somewhere near the middle of its adjustment for the DF65 (see image 14), (the DF95 is different). Setting further back will produce a stiffer mast and higher forestay tension for a specific amount of mast bend. Conversely, setting the slider forward produces a setup with looser forestay tension for the same mast bend.



Mast stiffness can vary a lot between different masts so the optimum mast foot slider position will likely be different for each boat, as such you may need to try a few different positions to find what works best for your boat. Start in the middle and work out in either direction from there. If this search for the optimum position is problematic then don't stress, just set the mast adjuster in the middle, it will be close to ideal. For the initial luff tie setup, if you are rigging a new mast and have not yet worked out where the optimum slider position is, then set the slider to the middle for the first time of rigging new sails onto a new mast. If you are rigging a used mast and know where the best slider position is, then of course, use that slider position.

Now we need to get the mainsail luff ties set with the backstay tension applied, remembering that the knots in the ties that need to be set are still loose and adjustable.

Set the backstay tension and mast rake to the setting you use when racing. Then tension up the backstay a little more to bend the mast just a little more. Do not overdo this, applying too much tension can overstress the boat, but you do want to bend the mast just a little more than you do when setting your boat up in the static condition. For reference see the photo below. The black dots on the backstay adjuster are aligned for my race settings, but in the photo the adjuster is pulled on more and the dots misaligned by about 1cm in order to conduct this setup of the luff ties.

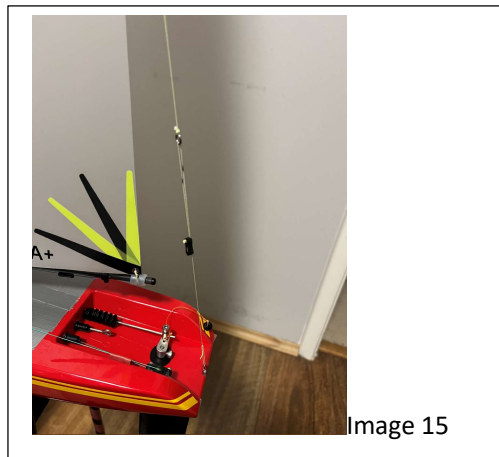


Image 15

Now tension up the cunningham to apply a bit of luff tension. There must be no slack in the mainsail luff.

Start with luff tie 2, snug up the knot in the luff tie so that the tie is still just loose when you hold and gentle pull the mainsail backward from the leach. Only pull back hard enough on the leach to remove any slack and find the point at which the sail sits behind the mast when under the slightest bit of load. See photo below:

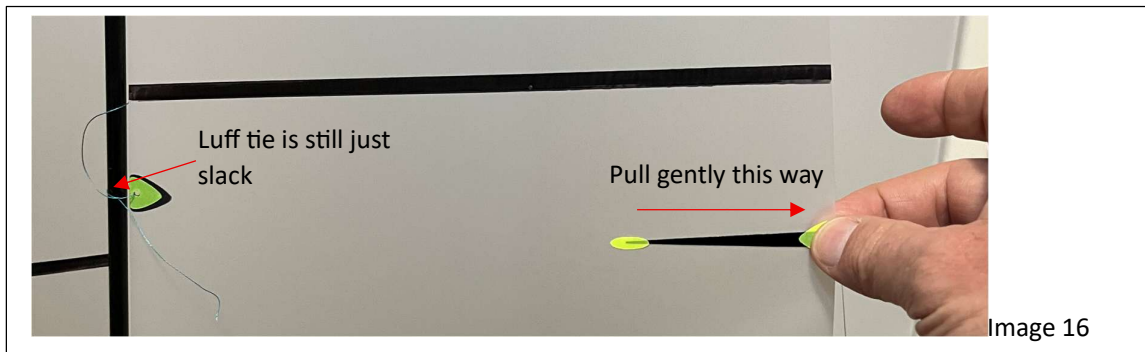


Image 16

The correct luff tie length can be checked by hooking into the luff tie and pulling it back while also pulling gently back on the mainsail leach. The tie should pull back to about the centre of the hole in the luff tie patch before the tie becomes tight, see below:

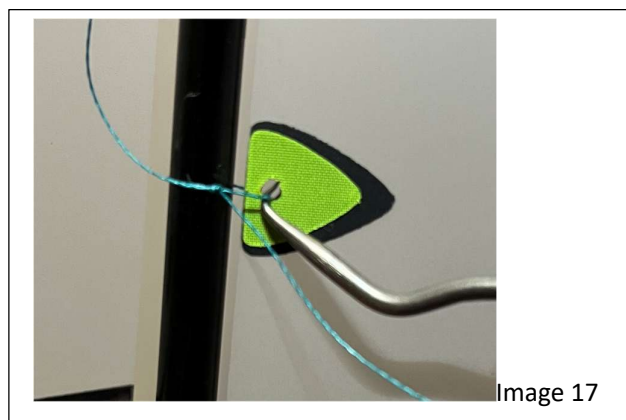
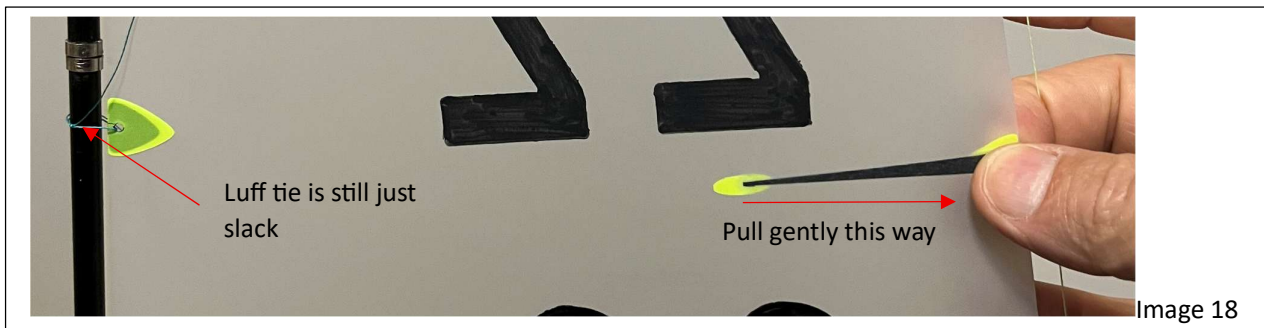
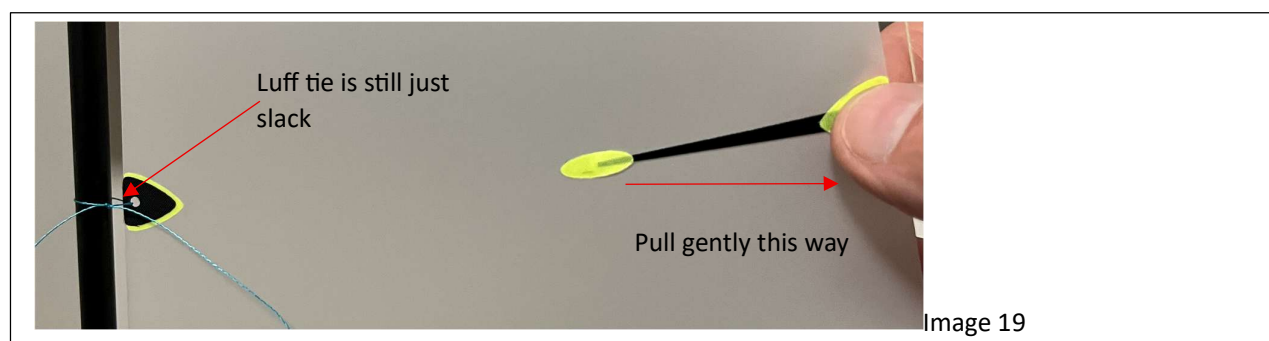


Image 17

When this is done repeat the procedure for luff tie 2.

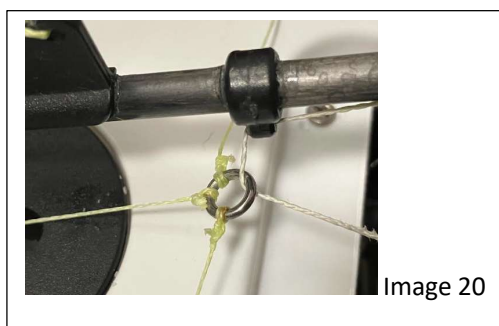


Then luff tie 3.



Now set a generous amount of depth in the mainsail foot by sliding the clew adjustment rubber rings in toward the mast. Exact depth is not important at this stage but it should be ample at around 35 mm measured at the mainsheet attachment point.

Set the mainsheet adjustment (winch) to your typical upwind setting. The image below shows about 5 mm of mainsheet between the boom and the metal eye in the bridle.



Make sure the bridle adjustment is not tight (holding the metal ring close to the deck). The bridle should always be set as high as practical, so the metal eye of the bridle hits the mainsheet slider on the boom just before the main comes to centerline (as the mainsheet is pulled in). A good guide for bridle adjustment is that when the rig is off the boat, pull the bridle eye forward along the deck and it should sit in the centre of the boat and over the very back of the recess for the keel fin slot, as shown in image 21:



Image 21

The length of the bridle fore/aft restraint line needs to be set so that the back edge of the metal ring is held just at the front of the mainsheet lead on the boom, see image 22 below. Bridle setup is important, as your boat will be slow if it is set too low, too far back or too far forward.

Set the length of this line to hold the bridle ring immediately under the mainsheet lead on the boom

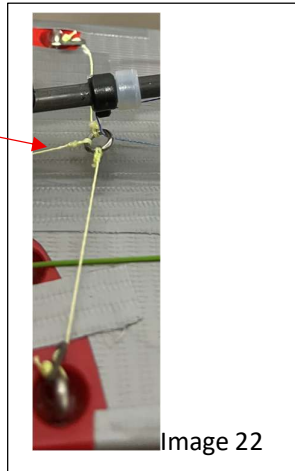


Image 22

Now pick up the boat by the keel and hold it horizontally, refer to image 23. Tension the backstay until the curve in the mast is matching (as closely as you can make out) the curve in the mainsail luff. This should be close to the rig tension you like to sail with. I recommend a reasonably tight jib luff when racing.

If the rig seems really loose and the mast very bendy, then slide the mast step slider back a bit and try again. Conversely, if the rig seems very tight, to get the required mast bend to match the mainsail luff set the slider further forward to soften the rig. (It's much easier to move the mast step slider with the back stay loose, then retightened afterwards.)

The sail should sit in line behind the mast.

Head

Luff tie 3

Luff tie 2

Luff tie 1

Tack

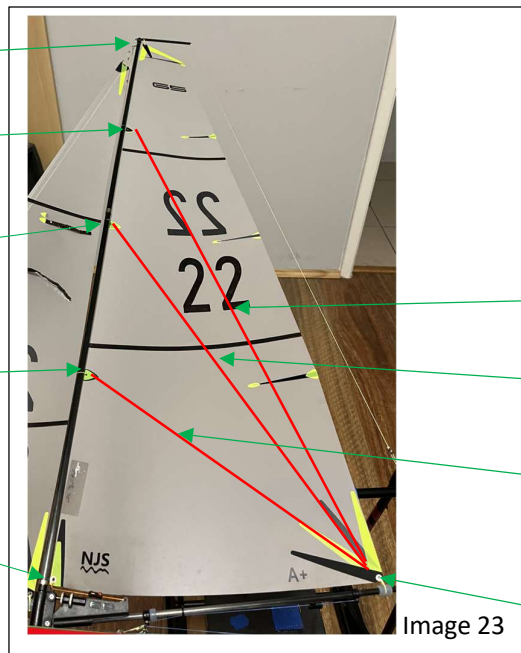


Image 23

Clew

If a crease appears along these red lines when the pressure comes on the sail when sailing, then the mast bend is too much or the luff ties are too short. A correction needs to be made.

If the wrinkle is here loosen Tie 3

If the wrinkle is here loosen tie 2

If the wrinkle is here loosen tie 1

Now test the tie lengths as follows. Set the vang so the main has only a small amount of (but some) twist. The main leach must not be under tension from the vang at this point. Hold the keel and fairly vigorously but carefully (so as not to hit anything in the vicinity) wave the boat and sails through the air. Watch the shape in the main and make sure no wrinkles (inversion in the curve of the main) occurs between the clew and the luff of the main. That is, along the red lines in image 23. If it does occur then firstly double check to make sure there is not too much rig tension on the backstay. If there is, loosen it a bit and check again. If there is not then loosen the luff tie that the wrinkle leads to and try again. It should be possible to reach a point where no wrinkles (commonly called overbend creases, or starvation creases) occur in the main when there is pressure on it from the air.

Note: if when sailing you observe creases running from the clew to any luff tie, then your mast is too bent. Do something to straighten it e.g. loosen the backstay, vang or both, consider moving the mast step slider back a little bit, or change the luff tie, they can shrink over time.

When happy with the luff tie lengths, glue the knot to make it permanent and cut the ends short. Mark black dots on your backstay adjuster so that backstay setting can be repeated consistently. It is sensible to apply calibration marks to everything you can so that settings can be reproduced, refer to image 24.



Image 24

Now the rig is ready for fine setup:

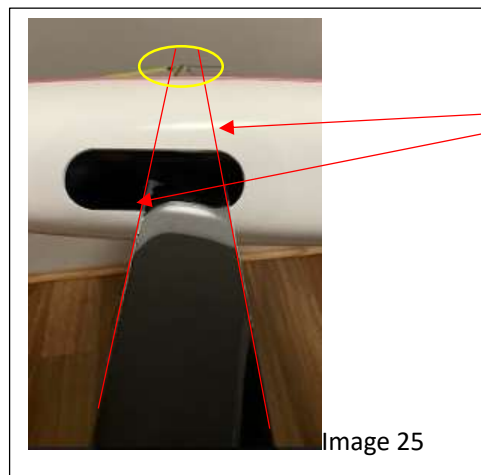
3. Setting the main controls:

When adjusting the sail controls for racing, it can be done in many different ways. This is my way which I hope is helpful.

Set the depth of the mainsail and the depth in the jib foot to 30mm measured at about 1/3rd from the front of the sail. Less depth is set if it is a windier day, down to 15 mm minimum when it is on the limit for the A+ rig.

Then set the backstay tension to the calibration marks.

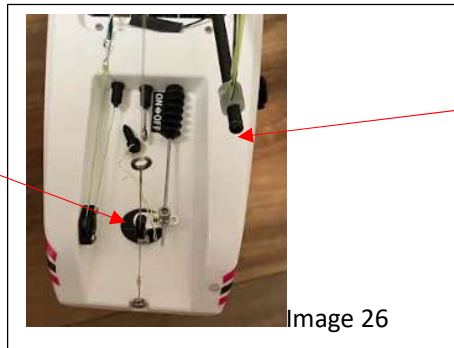
Check the mast rake with rig tension on. It should measure 950 mm from the back corner of the deck next to the backstay hook, up to the backstay attachment hole in the masthead crane. Sight from the bottom of the keel, along the keel and up to the masthead. The masthead should sit somewhere near the middle of the keel (image 25).



Look along the red lines (which are aligned with the front and back edges of the keel) to make sure the masthead falls in between the two, best to be somewhere near the front as in the yellow circle.

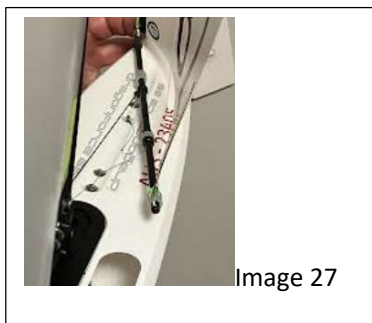
Set the winch position to fully in, making sure the mainsheet or jib sheet do not pull taut while doing so. With the winch set to fully in, set the mainsheet to have 5 mm of line between the bridle eye and boom slider, refer to image 15. This should set the main boom end in a position approximately above the middle of the raised back deck on either side of the boat, as image 26. Check the position is equal on both sides (either tack).

Align the backstay with the middle of the boat to align and standardize your viewpoint



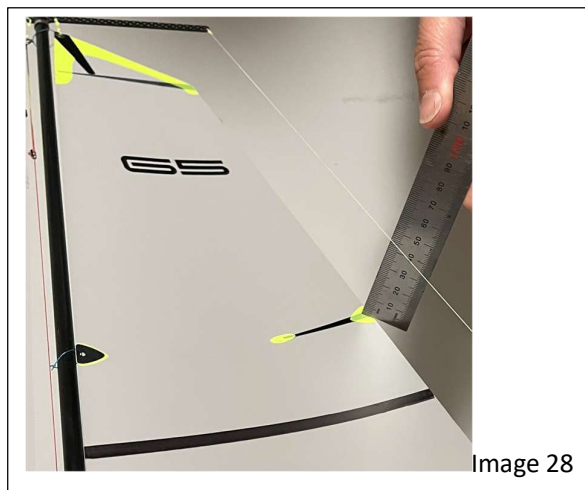
When your viewpoint is aligned, check the boom position with the main pulled in fully. It should be close to here as a first try (base) position.

Set the jib boom position to just inside the shearline (gunwale edge), as image 27.



Please note, wider boom angles are necessary in big waves.

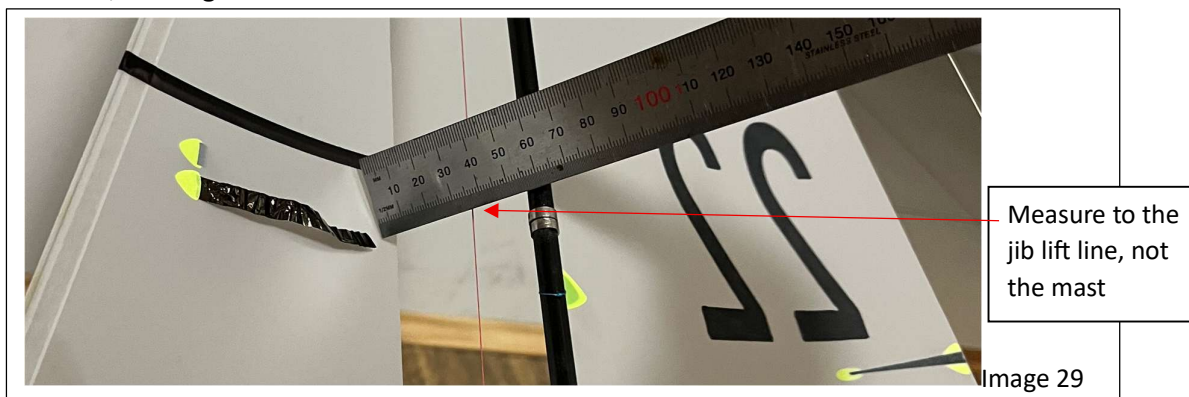
Then set the mainsail vang, typically the mainsail twist will be approx. 45 mm when measured between the backstay and the second batten down from the head. The measurement is taken with the boat set on its side but without distorting the sail shape, as in Image 28.



A useful method of setting the vang to help get it very nearly correct, very quickly with rig tension on is to back off the front vang locking wheel so the vang is unlocked. Then make sure the vang is set completely off, no mainsail leach tension at all, then wind on the vang using the back adjuster wheel until the leach of the main is just taut, all the twist is removed and the back edge of the sail has just become tight between the outboard end of the boom and the mast head. The main leach should not be so tight as the sail inverts and the leach falls away, but you should just feel the adjuster wheel tighten up as the leach becomes fully tight. This is a reference point so be careful to get it right, it is the point where

the leach just becomes tight, zero twist. Then, with that reference found, wind the vang off using the back adjuster wheel turn it at least a $\frac{1}{2}$ turn in the “vang off” direction, or as much as a $\frac{3}{4}$ turn but no more. Then lock the vang in position with the front locking wheel. This should set the vang to within $\frac{1}{4}$ of a turn of its optimum setting when racing. The optimum setting will need to be determined by going for a sail but this initial setting needs to be close to optimum and this is the best way I have found to achieve that.

Then set the jib boom uphaul to provide ample twist in the jib leach. Measure from the boom uphaul line to the jib leach at the mid height (approx.) of the jib. This should be close to 35 mm, as image 29



The mainsail cunningham should be snug, no slack but not tight.

Jib luff tension should be snug, not tight and definitely no wrinkles in the front of the jib. If the jib luff is too tight there will be a nasty looking wobble in the leach towards the head. Don't let that happen, it is slow.

Note, the lighter the wind, the slacker the jib luff needs to be.

Now wave the boat and sails through the air as before and check there are no overbend creases generated. If there are, loosen the backstay until they disappear and note the distance the calibration marks are apart for future reference.

When looking from astern at the boat as it is waved through the air, it should be possible to see depth in the mainsail from top to bottom. There should be twist easily visible in the mainsail leach and jib leach. The twist in the jib should allow the jib leach to sit a consistent distance away from the belly in the main. This keeps the slot open and parallel to the mainsail.

Then go back over the settings again. They do interact, so one setting can change when a different sail control is adjusted (e.g. vang and backstay) so keep cycling through the settings until they are all to your liking.

Then go for a sail. The boat should sail upwind in steady conditions without any input from the sailor. If it tends to point up into the wind by itself (without being forced to do so by a gust) and ultimately luffs to a stop, then loosen the vang and consider tightening the jib leach, and letting off the jib uphaul a small amount.

If it tends to turn away from the wind by itself, or does not respond well to a gust (it should gently head up into the wind as it accelerates, it should not round up abruptly and stop) then do the opposite.

When judging the boat's setup while sailing upwind be careful to do it in as steady a wind as you can find. A boat will always tend to round up when hit by a strong gust, so do not consider that as bad tuning, instead ease the sails as the stronger gusts hit to allow the boat to accelerate and sail straight on instead of rounding up.

When sailing downwind it must be possible to set the booms out to 90 degrees to the centerline. If this is not possible then consider making adjustments to the proportion control on your radio set, or end stops to increase the winch range of movement. If it is still not possible to get to 90 degrees then consider moving the main and jib sheet slider forward on the respective booms.

A Rig and the smaller B and C rigs

There are some differences when rigging up and tuning your smaller rigs, most notably, they are fractional rigs not masthead. That is, the jib attachment is only part way up the mast, not at the masthead which is the case for the A+ rig. This allows the mast to bend very much more easily and creates more forestay tension for a particular back stay tension. So be happy not to have to pull the backstay on as taut as it needs to be set when using the A+ rig. Other than that, the rigging and tuning principals are the same as set out for the A+ rig. I do not alter the mast foot slider between rigs, but if you find the A rig too bendy, or too stiff, you may have to. Remembering that the rigs are all so different, each boat will have its own optimum setup.

Sailing technique, some tips:

1. We typically sail in very shifty conditions, so the priority is to sail fast upwind rather than to point high. So do not be afraid to ease the sails when sailing upwind. This accelerates the boat which does many good things, too many to go into depth about here. But for certain, never try to sail high in a big lift, ease sheet and sail fast when lifted.
2. Overuse of the rudder, steering too much is very slow. Both upwind and down, only steer if you have to. The boat will go faster and faster and faster if the sails are set correctly and the rudder is left set on the centre line. Move the rudder and the boat will slow.
3. If you want to turn the boat never do it without making a complementary sail adjustment. Infact, because the winches are a little slow it helps to make the sail adjustment first, then move the rudder. This is never more the case than when the boat needs to do a big bear away e.g. at the top mark and spacer, or to dip another boat's stern. If there is time, always ease the main first, then steer down.

Good luck! If you have questions then please come have a chat. Happy Sailing.

By: Nick Jerwood.