NORTH SAILS

One-Design

Starling Tuning Guide

Prepared by, Andrew Wills of North Sails New Zealand, World Champion Coach and Sailor.

One of the most important items, in terms of speed, for any sailing vessel, are the shape and properties of the appendages (foils and sails), since it moves due to a combination of aerodynamic and hydrodynamic forces onto these appendages. Therefore, good care must be taken on, sails, dagger board and rudder blade in the Starling class.

The Starling sail is a true one design sail and there is no difference in, design, material, and construction, similar to a laser. It is up to the sailor to get the best out his, sail, rig, foils, and kinetics in order to win. This guide has been put together to help you get the best out of your North Sails Starling Sail.

The object of the **Starling** class is for all sails and masts to be identical.

In 1998 Glendowie Boating Club allowed some minor changes to enable the sails to be more consistent. The main change has been to use a more stable cloth. The fabric we now use is made by Dimension / Polyant and is called 160 B MT.

You may have noticed that the old cloth lasted for years as a sail, but only for a few months as a fast racing sail. It was soft so the shape changed as the wind increased and the sail stretched. The new sails will hold their 'racing shape' longer. Because the cloth is firmer, you will be able to see the cloth age. However the shape will remain fast.

We pride ourselves on our ability to reproduce sails identically, so please feel free to contact us if you feel your sail isn't the same as other sails. This is important as it allows us to improve our methods, and ensures all sails out on the water are the same. If for any reason your sail is outside the tolerances, then we will replace it.

The **luff** of the sail is 4040mm long.
If you are fitting a fixed height gooseneck, then allow 4025mm from the top of the boom to the top of the sail.

The **foot** is 2115mm long.
Allow for the outhaul to pull the sail out to a maximum 2125mm from the aft face of the mast.

The **leech** is 4370mm.

For the latest news from North Sails New Zealand including current price and product information, don't forget to check out our website at :

www.nz.northsails.com

Sail Care

Always roll your sail and keep it in its bag when not in use. Ideally remove the battens after use. If you don't want to do this, then release the battens from the pocket elastic and roll the sail parallel to the pockets. If you are rolling onto a tube, tie the clew first and roll the sail a couple of turns before attaching the tack. This will allow you to roll the sail parallel to the batten pockets on the tube. Wash the salt from the sail every 3-6 weeks depending on how often it gets wet. Be careful to not flog the sail and leave in the UV too long when drying before storing the sail.

Setting up

The tack should be set about 25mm from the mast, choose the hole which makes the tack area of the sail setup smooth.

There are no rules requiring black bands. To take maximum advantage of this, make sure your sail is as high as possible up the mast. Check that your mast is the maximum length allowed under the rules (4480 from base to tip.) If you have a fixed gooseneck, then you will want the sail to be at the top in heavy airs. Because the sail is set as high as possible up the rig, it may b necessary to loosen the luff in light winds or flat water, an adjustable tack is recommended.

Make sure that the boom is long enough so you can get maximum tension on the outhaul when the wind increases. Check that the sail doesn't extend beyond the end of the track on the boom or it will damage the sail.

Battens

Your sail comes with a standard set of battens specially designed for the Starling.

Smaller skippers will find a benefit from changing to a heavier #2 batten as the wind increases.

The basic shape of the sail features a very straight (or flat) exit, so there shouldn't be any need to change the lower battens from one condition to the next.

Remember….. the stiff end of the batten is the back. Bendy end forward!!!

Outhaul

We suggest 4:1 purchase inside the boom, so you can make easily adjust outhaul tension whilst sailing upwind. Make sure you have a system of marks so you can repeat your fast settings from upwind to downwind- or when the breeze changes. You can use a shock cord system inside or outside the boom to help the system release.

Don't ease the foot too much. If you are getting vertical wrinkles off the boom, then you have eased your outhaul too far. The Starling sail is quite full and resembles a pear shape when looking at the leach profile, this strengthens the case for running firm outhaul whenever possible.

The Starling sail has the ability to be set up full, but then to flatten really well as the wind increases. Experiment with various settings so you know what is fast for your weight in each condition.

Rake

Following is a formula for working out the correct mast rake for your hull. Because there is a variation in the hulls, there is no correct rake to suit all boats. There is a correct rake for your individual boat and you should have a record of this and of the rakes you try. Another way to find a starting rake is to level your hull alongside a top boat. Then sight the masts and set your mast up to the same angle. Measure this from a mark permanently etched on your mast to a mark on the stern. This is your rake.
The following system will give you a good all round rake. You should feel free to use this as a starting point and experiment slightly forward and aft of this point.

1) Measure up 2.8m from the deck and mark the back of the mast - this is the new rake measuring point. If you measure from this point to the transom and deck intersection you should get a measurement which is approximately 3.445m.
2) To get the correct stay tension measure up the mast parallel to the ground until the forward face of the mast and the forestay are 400mm apart. Bounce the forestay inwards towards the mast with one finger and the forestay should deviate 80mm. Make sure you are bouncing the forestay and not pressing too hard.
3) For a more accurate but complex method measure up 100mm from the deck on the back face of the mast track (project the track down if necessary). Measure from this point to the stern and mark the stern point. The distance is '**deck**' in the formula.
4) Calculate the correct rake for your hull.

Use metres in the formula.

Formula = $\sqrt{7.84 + deck^2 - .4101 \times deck}$

Sail Shape

It is a good idea to glance up at your sail occasionally especially when you are going fast- (or really slow) to see what your rig looks like and therefore be able to eventually memorise these shapes and settings.
Look carefully at the top batten. Try and guage how open the top batten is and use this as a reference to compare with previous settings. This tells you how much mainsheet and vang you should be using.

Rig Tension

Tight v's loose. I prefer a firm rig, especially as you get bigger or the conditions are choppy. A rough guide to rig tension was to measure parallel to the deck till the forestay and the mast have 400mm separation, then with one finger bounce the stay inwards quickly and you should get about 80mm deflection.

There are pro's and con's for the 2 extremes. If you have a loose rig, it will give you more optimal fore and aft rake upwind and downwind, whereas a tight rig can't move. However a loose rig also means it falls away sideways which isn't desirable. I think that this is why the 2 styles ultimately perform equally. Of course what the top skipper is using will always appear fastest!!- but look carefully at what else he/she is doing.

I also believe that the airflow can be disturbed easily on a loose rig as it shakes in choppy waves.

If you have a rotating rig, you may need to have it a little looser to help it rotate more easily. Try a 1-2mm thick teflon washer under the mast.

Masts

All masts must be from the same F4 section from Fosters. There is a 150mm range between the maximum and minimum heights for the stays. We suggest having the forestay close to min (2800) and the sidestays close to max (2950) to help promote fore and aft bend rather than sideways. If you are under 50Kg's it may be worth considering setting all of your stays at the minimum height to help the mast bend as much as possible in-turn, flattening the sail.

If you have a rotating mast, then we recommend an inner forestay at 900mm to help stopping the mast bend when gybing. This should be set very loose so that when the boom is right out there is still about 20mm slack in the stay.

Due to the nature of the mast construction, there will be variations in the stiffness of the masts. Beware of this as it can be the reason for consistently poor performance in certain conditions. Avoid masts which are too stiff.

If you are over 60kg you will start needing a stiffener in you mast. If you are careful you can wait until you are over 65kg- however you run the risk of breaking rigs downwind.

Vang

Your vang is there to control mast bend down low and to extend the width of your traveller. If the breeze is light and you don't have to depower the main in gusts, but rather just hike it flat in gusts, then you don't need any vang. In these conditions you should have it just eased, so that it isn't taking any load. However, you don't really want it too loose or else it will take too long to pull on should the breeze increase till where you are overpowered when full hike.

In even lighter breezes you are quite often sheeting quite loosely, so make sure there is no tension on the vang.

As soon as you find yourself easing the main in the gusts, you should have vang on. This should mean that as you ease the main in the gust, the boom moves outwards only- not upwards.

Remember vang bends the mast and flattens the sail a lot, so if you are hunting for power, make sure you don't have too much vang on.

Be sure your rig and fittings are strong enough, so that you aren't afraid to use a lot of vang when the wind increases.

Reaching is similar in trim to upwind. In the light you will have to be careful not to close the leech too much, however as the breeze increases, you will need to slowly increase the amount of vang to keep the leech under control and keep powered up. Again too much vang will bend the mast too much and lose power, I found the boat reached well with relatively loose vang.

Downwind you will need less tension than you have had upwind or on the reach. Ease vang as you go around the mark.

If you can imagine looking up from the boom, the 'twist' or amount the leech opens, should be nearly the same on all points of sail, in all conditions.

For this reason it is a good idea to get used to looking up at how open the top batten is and try to adjust the vang to keep it looking the same as the wind changes.

Cunningham

Cunningham does two things. It moves the shape forward in the sail, and then as you use more, it bends the the mast and opens the leech in the head.

Cunningham is the last control you should be using to depower. You will already have a good amount of vang and full outhaul before you use the cunningham. The more you get overpowered, the harder you pull on the cunningham.

Centreboard

Your centreboard is another very important control. The rake and positioning of the centreboard changes the balance of the boat and makes it easier or harder to sail.
Basically the further forward and further down the board is; the more power you will have. You may even try raking it forward a little in the light. As the breeze increases you will begin getting overpowered and the helm will start getting a little heavier. A heavy helm is slow, as you are holding the rudder against the water flow and creating drag just like a big brake. Therefore as it starts getting heavier, it is time to start moving the board. Firstly do this by raking the board. Leave the top at the front of the case, and let the bottom move as far aft as possible. You will probably find it faster if you begin doing this a little earlier in choppy conditions.
If you are still overpowered, you can now start lifting the board. Don't be afraid to sail around with up to 150mm of board up if it is windy.
This will allow the boat to sail flatter, especially through the gusts, and to move faster through the water. Be aware to begin putting it down again if it lightens, or else you will find yourself not pointing.

Rudder

The rudder is very important. You sail the boat by feel. The position and rake of the rudder will effect this feel. As a rough rule the rudder should be set up so the leading edge is square to the water. However it is even better to fine tune it from here by trying it a little back or forward from this position. Changing the tip postion by 10mm increments is about right. Once you are happy, then fix it in place with some sort of system which won't allow it to move around.
The rudder 'feel' should be light but not dead in all conditions.
Make sure there is no slop in the rudder system. There is potential for wear especially in the gudgeons. If this is the case then replace them with a good positive system.

Calibration

Even the best skippers need calibration marks. These enable you to keep the best speed from week to week, and to keep learning how small changes effect your performances.
Highest priority is the Outhaul, the cunningham and the vang. I would also recommend some marks on the mainsheet. Marks on ropes can be done with markers, or better still, by sewing contrasting thread into the lines.

LIGHT WIND

FLAT WATER

The airflow undergoes a change in velocity when passing by both sides of the sail foil. In light wind conditions we must ensure that the shape of the sail does not slow down the airflow by being too full, which would increase the aerodynamic drag (i.e. decrease the lift to drag ratio). On the other hand, we also need enough power to push the boat forward overcoming air and water resistance, which means that some sail fullness is needed. Hence, a compromise must be reached. It is always better, for flat Water, to have the sail slightly too flat rather than slightly too full.

WAVES

This is the most difficult condition in terms of both helming and sail trimming. Basically, the desired sail shape depends on the skipper experience, since critical shapes can be achieved with excellent performance, but the skipper must have very good knowledge of all wave sailing requirements or otherwise speed would reduce below standard. Hence, simple shapes are recommended for medium level sailors. Summarizing, for these conditions, leech should be slack and maximum camber far forward in order to increase power and therefore acceleration after the wave, rather than pointing angle.

HEAVY AIR

FLAT WATER

In this conditions every boat goes reasonably fast, it is the kind of weather in which sail trimming is simple for standard speed, but getting extra speed becomes quite complicated. The sail must be as powerful as possible regarding to the weight of the sailor, but usually due to nice wind and little wave resistance it might be interesting to point a bit higher than usual. We must look for a shape that allows us both higher speed and pointing angle.

WAVES

Acceleration is the word for these conditions. The boat sails fast but she keeps on slowing down at every wave. Therefore, it is necessary that the dinghy gets the maximum speed back as soon as possible after the wave, not only for the speed itself, but also for the pointing angle that changes with speed due to the change of apparent wind when the boat slows down and speeds up again. The way to get acceleration is to have a loose beech with tendency to open when pressure on the sail increases and to close when pressure releases, it is also important to have a quite full luff.

BREEZE

We rarely have flat water when strong wind blows, but, generally speaking, we find two types of wave conditions: big round waves in open seas or powerful, short and curly waves in closed bays. Trimming the sail for one or other condition is not very different, obviously the sail must show a flat shape, but if the sailor is heavy enough, when waves are strong and short, the sail must be slightly more powerful.

Good luck, and please feel free to make comments and contributions to this guide…….
TRIMMING CONTROLS

Good sailing and enjoy your new North Sail.

Andrew Wills & Derek Scott

50 years of FAST
NORTH SAILS
1957 2007

North Sails New Zealand Ltd.
Ph: +64 9 359 5999
Willzy Mob: +64 21 535735
Desy Mob: +64 21 2222144
Fax: +64 9 359 5995
Skype: willzynzl
willzy@nz.northsails.com
derek@nz.northsails.com
www.northsails.co.nz