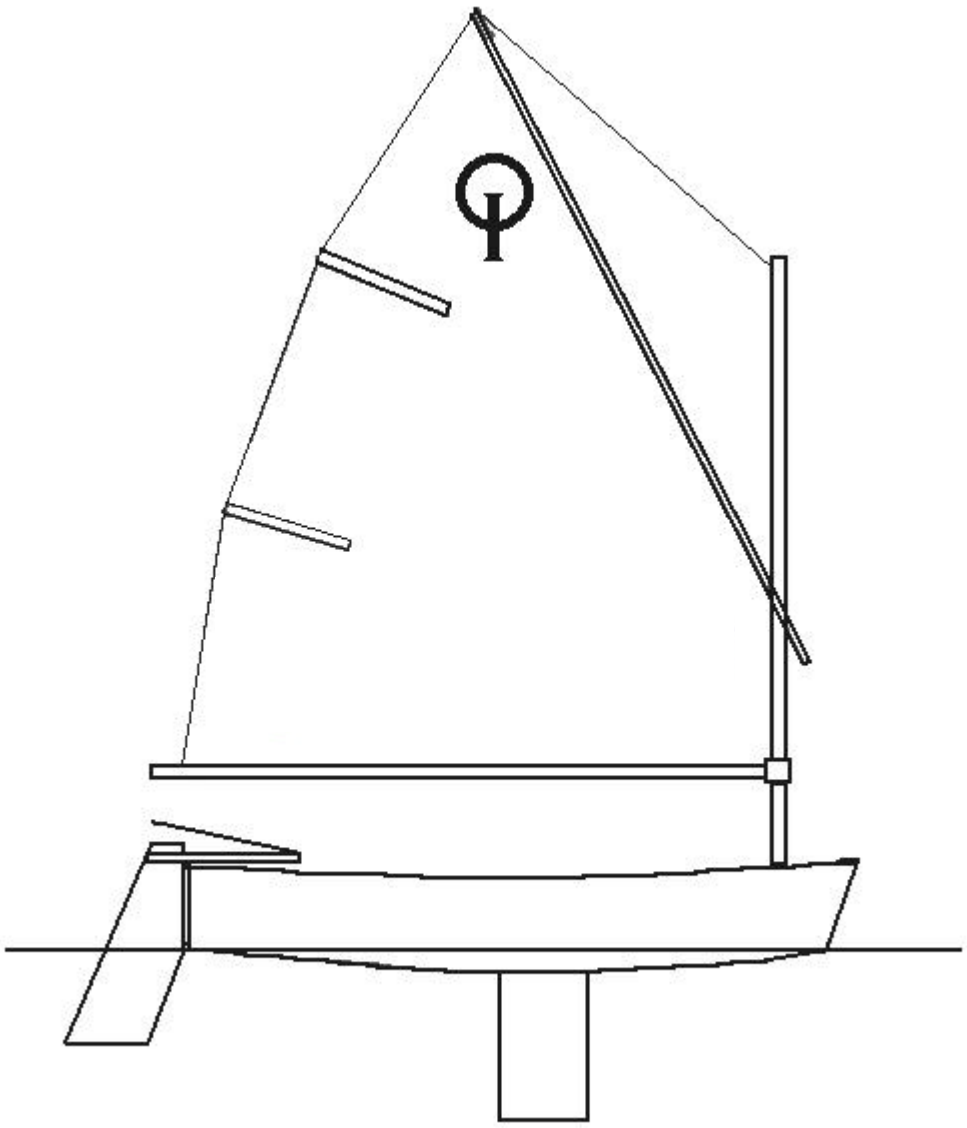
OPTIMIST TRIMMING NOTES



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OPTIMIST TRIMMING NOTES

The most important items, in terms of speed, for any sailing vessel, are the shape and properties of the appendages, 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.

Dagger board and rudder blade are simple when thinking about an Optimist dinghy, since their construction material and shape are very restricted by the Class Rules, they must be stiff and the edges well shaped. But it is much more complicated when talking about SAILS.

Sail material is also well restricted by the Class Rules, but an important allowance in the sail shape lets the designer improve the product in terms of speed, pointing angle, power, weight of the sailor and so on. Moreover, the Optimist sailor can trim the sail in order to change the factors above depending on the weather conditions.

1. DESIRED SHAPE

Generally, when sailing upwind, leech tension and luff camber are the main items to consider, combining speed with tacking angle. It is well known that it is not possible to have all the needed properties of a sail at the same time, so it is important that we know when to look for a particular characteristic depending on die sea and wind conditions. A lot could be' written about the leech, the luff and their relationship with mast bending and sail fullness, but this pretends to be an easy to read issue and the lack of trimming controls of Optimist Dinghies would make it even more complicated. Let's take a look, firstly, at the desired shape of the sail depending on the wind and sea conditions:

1.1. LIGHT WIND

1.1.1. 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 air flow 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 fiat Water, to have the sail slightly too fiat rather than slightly too full.

1.1.2. 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. Summarising, 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.

1.2.1. 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.

1.2.2. 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.

1.3. BREEZE

We rarely have fiat 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 fiat shape, but if the sailor is heavy enough, when waves are strong and short, the sail must be slightly more powerful.

2. TRIMMING CONTROLS

2.1. PEAK SPAR. It is common to think that the sail must show no creases and with the peak tension we can get rid of some of the most important ones. This is not completely wrong, but the main function of the peak is to change the leech tension and in some cases it is not so bad to have a small crease on the sail in order to open the leech and allow a faster air flow. Moreover, the peak tension always relates with the kicking strap.

2.2. KICKING STRAP (KICKER, VANG). As with the peak, the kicker also controls the leech tension, the problem could be the luff tension if the brake (or boom-stop) is not well set.

2.3. BOOM-STOP OR BRAKE. During many years the Optimist boom was free to move up and down along the mast. This was a problem since it was impossible to give beech tension without pulling the luff down. It was even worse when reaching or running, as the main sheet does not work downward

anymore, and the aft end of the boom moves up with the gust, and so, the forward end moves down, and, therefore, releases beech tension and increases luff tension far too much. This can now be avoided with the boom-brake that stops the boom from moving its forward end down. But it is also important when sailing upwind in order to control the luff tension. If we need power on the sail, we want to move the maximum camber forward. The way to move the camber of the sail forward is giving tension to the luff, so the brake must be loose and the kicker will pull the boom down, and viceversa, if we want some pointing angle, the brake will pull the boom up so tension on the luff will be released.

2.4. OUTHAUL. This item is to change the amount of camber of the sail keeping the design proportions.

2.5. MAST RAKE. The purpose of changing the mast rake is to change the position or the Centre of Effort of the sail. Moving the mast aft, the Centre of Effort moves aft and down; moving the mast forward, the Centre of Effort will move forward and up. The Centre of Effort is important in relation with the Centre of Lateral Resistance of the hull and the appendages under the water. So we are talking about the horizontal distance between the Centre of Effort and the Centre of Lateral Resistance, that can also be changed by moving the position of the centreboard and/or the design of the rudder.

2.6. MAIN SHEET. The lower pulley of the sheet is fixed on the midline of the boat, this means that the leech tension does not vary much with the sheet tension, the trimming angle of the sail is the most affected item due to the sheet trimming. This makes peak and vang even more important in terms of acceleration and speed of the boat.

2.7. GASKETS OR SAIL TIES. The mast ties are always more important than the boom ones. Their mission is to keep the sail tied to the mast at a certain distance, and this distance is very important in order to adjust the sail properly. Remember that due to the Class Rules this distance shall not exceed 1cm.

3. HOW TO USE THE TRIMMING CONTROLS IN ORDER T0 GET THE DESIRED SAIL SHAPE

We must assume that it is not possible to have acceleration and maximum speed at the same time, as well as it is extremely difficult to have power and good pointing angle together.

3.1. ACCELERATION AND POWER. We need some preference for these characteristics on the sail when we find that the boat keeps on slowing down with a frequency due to externa1 factors. The way to achieve this is to move the maximum camber forward by releasing the boom-brake and letting the vang pull the boom down, but special care must be taken on the vang tension since we do not want the leech to close too much. Actually it is more important that the leech is free to open on the gust and every time the boat hits a wave. Releasing

the peak helps to get this effect. It is also interesting to play with the distance of the luff from the mast.

3.2. SPEED AND POINTITNG ANGLE. Your sail is designed to induce optimum power together with a good pointing angle, and this is based on many parameters. But we may increase this amount of power or the pointing angle (but not both at the same time) by trimming the sail in a specific way. We shall do so when the sailing conditions allow us to point higher with no need of so much power, or on the other hand, the boat requires more power and we may not want to point so high.

We can obtain a nice sail shape with almost no creases, which will give the boat a nice velocity, when the sea conditions allow us to keep speed constant. In order to achieve this sail shape, the boom-stop must be fairly tight, so the luff is straight but not tense, the peak will be high enough so the sail show no creases and the kicker will pull the aft end or the boom down, keeping the leech quite closed. If the sailor is very light and he/she cannot keep the boat upright, the peak will be slightly loosen down in order to open the leech and allow a better air flow, getting rid of the overpower.

The sail ties are very important in order to achieve the right luff camber. The luff has a curved shape, so when it is attached to a straight mast this curve will be straighten, creating a sag up the luff this gives extra power, but the ability to point decreases *(see figure 1)*. Fastening the sail to the mast in different ways can modify this.

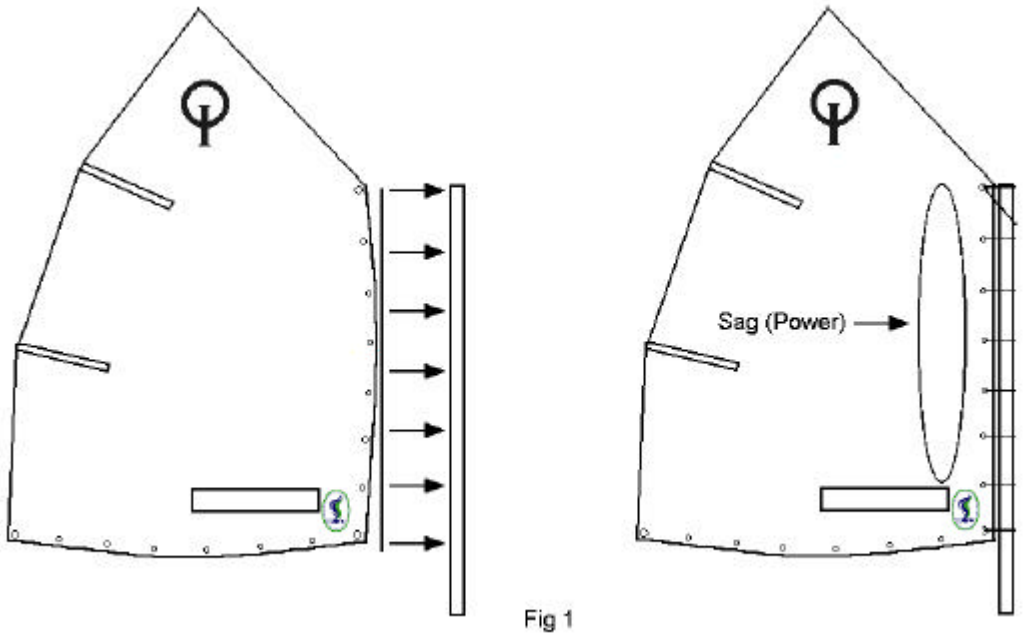

Fig 1

Unless special conditions occur, it is recommended that the sail is fastened to the mast with ah sail ties at the same distance from mast to luff, so we obtain maximum power, speed and pointing angle as designed by Toni Tió Velas (this is the way the last two World Championships were won). *(See Figure 2)*.

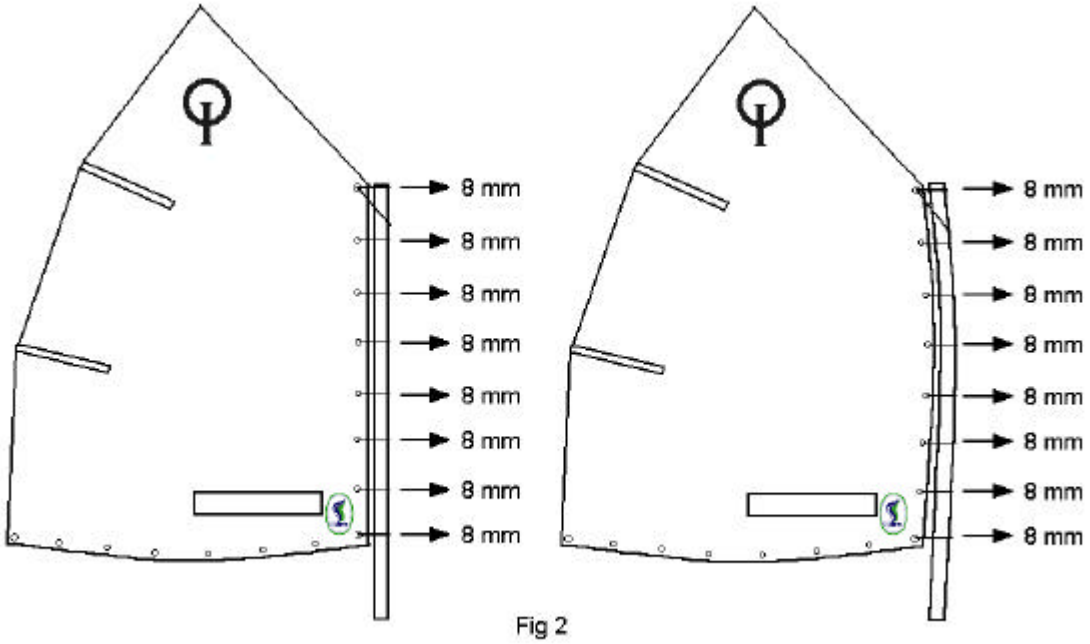

Fig 2

But, as said earlier on, alternative trimming will let us achieve a different boat performance.

It is not easy to explain the theory behind this just with words on a piece of paper, so in order to make it easier to understand we will imagine two typical cases in which it is desirable to improve performance:

Case 1: Very light wind and calm water, the mast does not bend at ah, so the luff is very saggy, but there are no waves and we therefore we could point higher. In this case, loosen the top and the bottom sail ties up to 8mm (1cm maximum), keep the two middle sail ties as tight as possible (but still allowing the sail to change sides freely when tacking l mm distance) making sure that the change in distance from top to middle and from middle to bottom is gradual. *(See Figure 3)*.

Case 2: It is very windy and the mast bends a lot, it might happen that when your mast bends it shows a curve bigger than the luff. In this case, if the sail is fastened to the mast as in Fig 2 we will see that ugly creases appear along our sail *(See Fig 4)*.

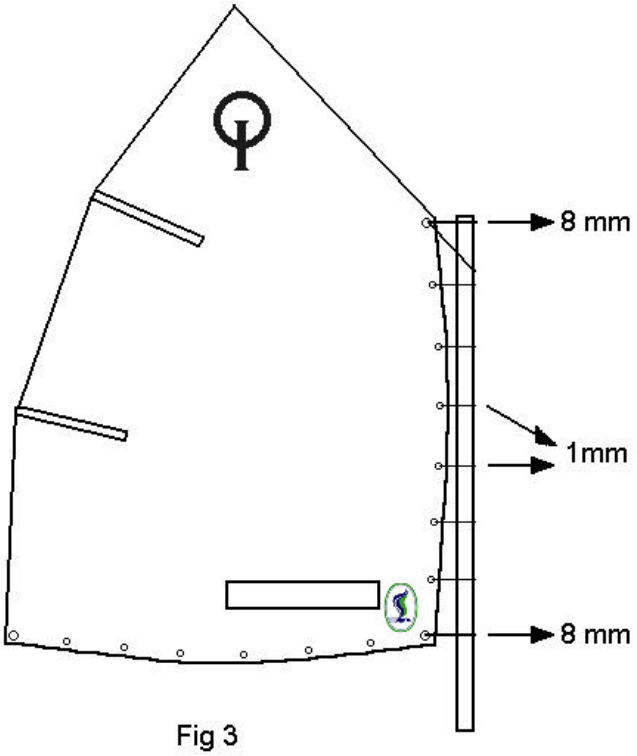

Fig 3

To avoid this we must loosen the middle sail ties and tighten the top and bottom ties. Do not forget to make the change in distance gradual *(See Fig 5)*.

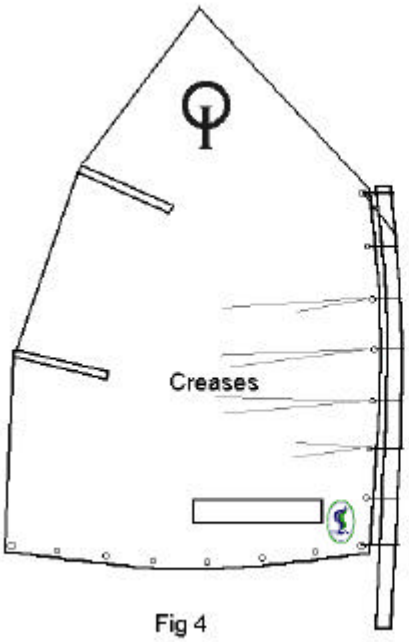

Fig 4

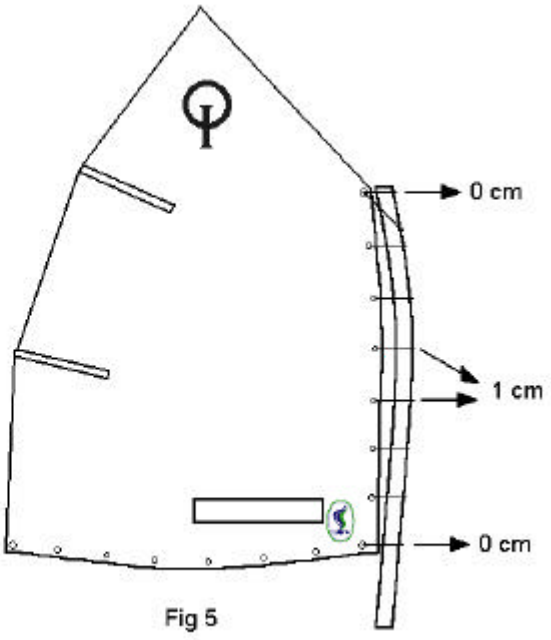

Fig 5

Before we finish and just as a reminder, the crease from the clew to the bottom batten that shows on many sails is not important in terms of sail shape. The lack of trimming controls on Optimist sails forces this crease on the sail. It could be possible to get rid of it, but we would ruin the ideal shape for best performance, so it is advisable to forget about it.

These are the main parameters that the Optimist sailor must know, and that Toni Tió Velas uses when designing your sail.

GOOD LUCK AND BEST WINDS!