Laser 4000 Tuning Guide

1 Overview

The following settings are given as a guide to basic, Static rig set-up. Merely reproducing these settings on your boat is not a guarantee of speed throughout the wind range. Far more important however, is how a team responds to the dynamics of the constantly changing wind and wave conditions. Always rationalise rig settings, sail, set and trim and body movements to the three base elements of power, balance and feel from the rudder

N.B. Before beginning to find settings check that spreader angles are square with the boat. Do this by standing about 30 meters from the boat and sight through the shrouds at deck level, then sight up the shrouds to the spreaders It the spreaders are square only one shroud should be seen, if not then the spreaders must be realigned

1.1 Measurements Overview

There are a number of measurements in this document, detailed below is the key to how to take these measurements, rather than repeating this throughout the document.

Mast Rake	From top of mast to underside of boat at transom
Rig Tension	Measured just above reinforcement at bottom jib batten
Pre-Bend	Measured at spreader bracket with the main halyard from the tip to gooseneck

1.2 Loos Gauge Comparison Chart

All the measurements listed in this guide are based on what is known as the “old loos guage” – however most people are know using a new “loos guage” and so the chart below provides a comparison of the various settings.

Old	kg	New
26	**100**	**19**
28	**109**	**20**
30	**118**	**21**
32	**136**	**23**
34	**154**	**24/5**
36	**177**	**27**
38	**204**	**29**

2 Wind 0-4 knots

2.1 Overview

Very little power in the wind. Therefore maintaining the flow across the sails is the priority. If the sails are too deep and/or sheeted too hard the breeze will simply stop and stall the flow. Start with flat sails and allow them to twist, this ensures flow. Very gently close the leech of the mainsail by sheeting on. If either the rudder pulls away and or the boat heels to leeward you are harnessing power that is available from the wind. If however, the rudder goes neutral and the boat feels "dead" in the water, you must ease the sails and allow the flow to attach itself to the sail again.

To achieve these flat sails a reasonable amount of rig tension is needed to encourage the mast to bend, this will take up luff curve from the mainsail and in turn, reduce depth. The high tension will make the jib a little difficult to read but this is better than having a mainsail, which is too deep.

2.2 Tuning Guide

Item	Key
Boat trim	Weight well forward particularly after manoeuvres, water should leave the transom clean
Mast rake	7360 mm
Lowers	No tension (this allows the mast to bend and reduce depth in the mainsail)
Rig tension:	35—36 on a Loos tension gauge
Jib tracks:	The back of the tracks in the very lightest wind, move towards the middle once there is some pressure.
Pre-bend	A minimum of 60 mm - If you are feeling very keen then in the very lightest of wind you would put the deflection to the class maximum, this will increase pre-bend

3 Wind 5-8 knots

3.1 Overview

Plenty of power in the breeze but still within righting moment. Therefore, every attempt should be made to get the maximum amount of power from the breeze by anticipating any gusts or lulls then make the necessary movement and keep the boat balanced. A straighter mast is required to give the mainsail depth. It is also enormously important not to use vang until over powered. The exact reasons for this varies from class to class.

In a Laser 4000 it is mainly due to the fact that, in a lull, the leech needs to be open to prevent the sail from stalling, if the vang is on this impossible. Off, and the mainsheet can be eased 1 inch and the leech will open 3 or 4 inches and the breeze will stay attached to the sail.

There should be a constant attempt to evaluate if there is more power available from the breeze than presently harnessed. This is achieved by gently squeezing the mainsheet. If this results in a pull on the rudder and/or the boat heeling to leeward then more power is being harnessed and will result in more height and speed. If however the rudder goes neutral then the wind is stalling, ease a small amount of mainsheet to reattach the breeze to the sail and continue the cycle. (If the rig is set

correctly and the breeze is within the above limits then the maximum amount of mainsheet worked should be only 1-2 inches).

Boat trim and movement: helm and crew must be very dynamic otherwise ultimate speed will not be achieved. Anticipate gusts and lulls, this will result in a speed advantage over boats that simply react. Remember there is no team in the world that can achieve total anticipation and therefore constant, perfect movement is impossible but teams who have this as a high priority will be extremely fast through the water.

3.2 Tuning Guide

Item	Key
Mast rake	7350/7360 mm
Lowers	5 on Loos gauge
Rig tension:	Rig tension: 36/37 on Loos gauge
Jib tracks:	3 or 4 holes showing at the front depending on conditions.
Pre-bend	50/60 mm

4 Wind 8-10 knots

4.1 Overview

This is the condition when the biggest speed differences appear in any fleet. The major factor here is not de-powering before reaching absolute maximum leverage i.e. helm hiking hard, crew fully extended with back straight and pointed toes. When in this situation the crew should call "maxed" or something to that effect.

The helm now knows that any increase in wind strength will result in the boat heeling to leeward unless he/she eases the mainsail to reduce heeling moment. As the gust leaves the rig and the helm pulls the mainsail back to the middle to power up he/she should call "blocked" or something to this effect allowing the crew to realise that any further lull will mean the boat will heel to windward unless they reduce their leverage.

Continuous communication is the key, still working at anticipating and not reacting to changes in power and balance.

4.2 Tuning Guide

Settings as above

5 Wind 11-18 Knots

5.1 Overview

More power than righting moment. Therefore looking at staying at maximum leverage whilst finding the most efficient way to de-power for the conditions. Very

simply flatter sails with a hard leech when the water is flat. In this situation the boat is not being slowed down by any waves and the changes in power are likely to be small and can be dealt with by simply easing the mainsail to maintain balance. In choppy water or in any conditions where the boat is being slowed, fuller sails with more twist are required. This provides the punch to get the boat through the chop.

Never depower to the extent that in the biggest lulls you become 'blocked' as this will compromise speed beyond any other mistake especially out of the start line. The settings below can be achieved by easing the rig tension the correct amount and keeping everything else in the same place as for 5 knots +

5.2 Tuning Guide

Item	Key
Mast rake	7320/7330 mm
Lowers	just off Loos gauge
Rig tension:	34/35 on Loos gauge
Jib tracks:	3 or 4 holes showing at the front depending on conditions.
Pre-bend	50/60 mm

6 Wind 18knots +

6.1 Overview

Very overpowered, looking to keep the mainsail still working and not flogging. Try pulling up some centreboard if loosing the mainsail. Lots of cunningham and enough vang to keep the mainsail leech under control. Remember that if you are fighting the boat it is set incorrectly. Think about the amount of power, the balance and try to feel the boat through the rudder.

Biggest mistakes made are allowing the mast to over bend, which causes luff curve starvation and unbalances the whole boat. Every attempt should be made to keep both sails working, this provides the balance that will allow the boat to be controlled and kept at top speed.

6.2 Tuning Guide

Item	Key
Mast rake	7290
Lowers	just off Loos gauge
Rig tension:	35/36 on Loos gauge
Jib tracks:	4/5 holes showing at the front.
Pre-bend	50/60 mm

7 Conclusion

Finally, please try not to get too tied up in your settings, the real secret to obtaining ultimate speed is through understanding that wind and wave conditions are dynamic and that what we do to respond to this is what defines fast and slow. Good luck!

Originally written by Paul Brotherton, reformatted for the updated website March 2004.

Laser 4000 Speed Settings

Breeze (Knots)	Rake (mm)	**Shrouds**	Tension	**Jib Halyard**	Lowers	**Lowers**	**Jib Track**	Prebend (mm)
< 5	7360	***7.1***	35/36		0			Min 60 mm
5-10	7350/7360		36/37		5 (tension)			
11-18	7320/7330		34/35		Just off gauge			50 / 60
18 +	7290	***8***	35/36		Just off gauge			50 / 60

Rake is measured from top of mast to underside of boat at transom
Prebend is measured at spreaders from halyard from mast head to gooseneck.
Tension is setting on Loos Gauge above reinforcement at bottom batten / Jib Track is number of holes in front of car