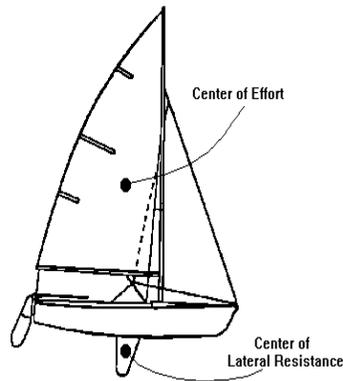


Pre Sailing Boat Set Up

Setting up your boat to suit wind and water conditions is key making the boat easy to sail and to provide good boat speed. The following are steps you should take when setting up your boat. Most classes associations and sail manufacturers will have class specific tuning guides which give the settings recommended by top of the fleet sailors.

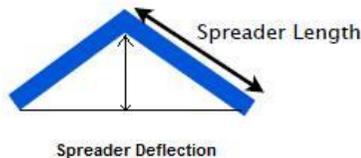
Mast Foot Position.



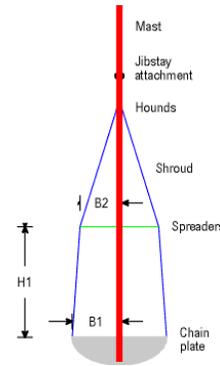
Measure the distance from the back of the mast foot to the transom. This is to ensure the centre force provided by the sails is in line with the centre of lateral resistance.

Spreader Set Up

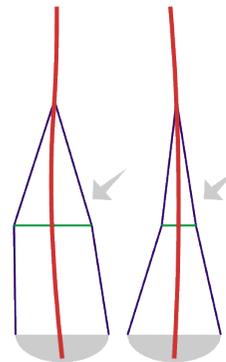
Use a straight edge and a ruler to check the spreader deflection. The greater the deflection the more the mast will bend when put under load.



Spreader Height – equal on both sides.



Measure from the spreader to the deck fitting (H1) on each side to make sure they are the same. Also check the spreaders are perpendicular to the mast.



Spreader Length

Check spreader length. Short spreaders allow the mast to bend to leeward – good for light crews in strong winds. Long spreaders will force the mast to bend to windward. Good for heavy crews needing maximum power.

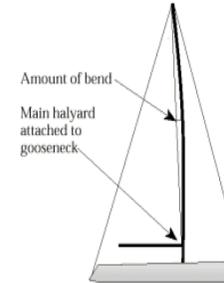
Rig Tension

Use a tension gauge to check rig tension. This should be done at the same height on each shroud.

Mast Pre-Bend and Mast Rake

Pre-Bend: With the rig tension on measure pre-bend and mast rake.

MEASURING MAST BEND



Pull the main halyard tight to the gooseneck. Measure the distance from the rope to the back edge of the mast.

Mast Rake: Attach a long tape to the main halyard and

measure from the top of the mast to the top of the middle of the top of the transom. This distance should be changed depending on the wind strength. In general the mast should be raked back (making the distance shorter) in stronger winds. Note to optimist sailors this is reversed.

Useful Links

Mirror tuning guide
http://www.ukmirrorsailing.com/index.php?option=com_weblinks&view=category&id=66&Itemid=171

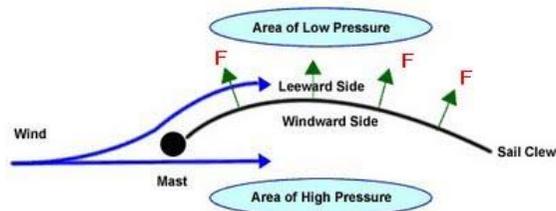
Optimist Tuning Guide
www.tuningguides.northsails.com/tuningguides/TuningGuides/TuningGuidesOptimist/.../Default.aspx

Laser Rig Explained
http://www.roostersailing.com/articles/Unstayed_rig.htm

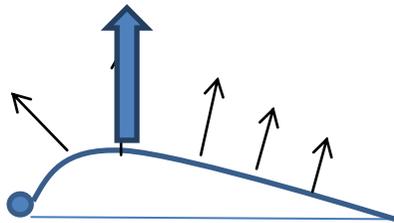
GP 14 Tuning Guide
www.pinbax.com/docs/GP14%20Tuning%20Guide%202011.pdf

Basic Principles of Sails

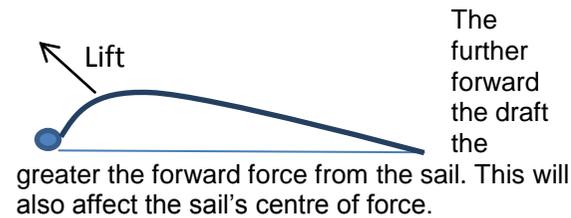
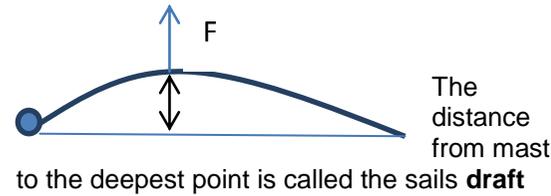
Unless sailing directly with the wind, sails work like an aeroplane wing, forcing the air on the downwind side to travel further than the air on the upwind side, creating force. This force is called **Lift**.



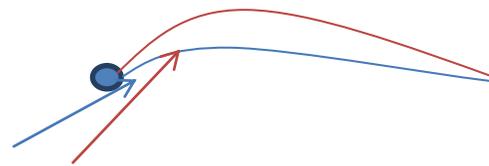
The forces across the sail combine to create a centre of force.



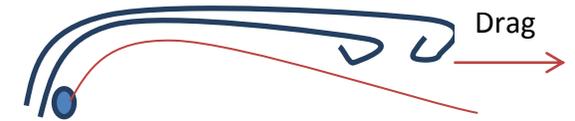
The maximum distance from straight line from mast to the back of the sail is called the sails **Depth**. The greater the depth the greater the force created (F).



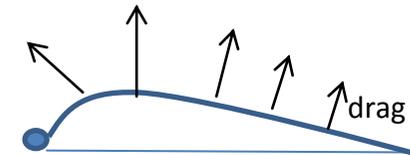
However to work well the air needs to be able to get into the sail, flow across the sail and away smoothly. If it can't do this it won't work efficiently.



The greater the sails depth and the further forward the draft the greater the angle the wind has to be at to get into the sail. This means the boat won't be able to point as close to the wind



The greater the depth and draft the greater the chance that the air will detach from the sail. This reduces the lift and creates drag.

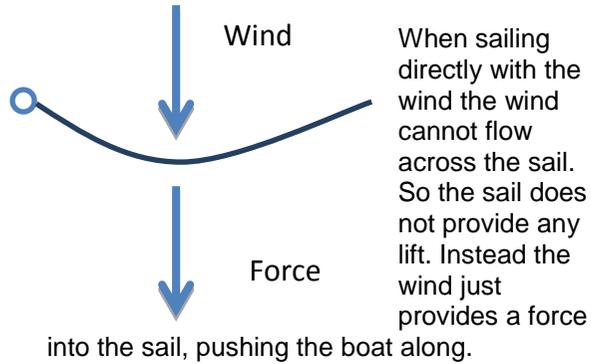


If the force at the back of the sail points backwards it creates a backwards force or drag. The chance of this happening is increased if the depth of the sail is increased or if the back of the sail is too tight.

If the back of the sail is too tight the air flowing into the sail can't escape and this also increases drag.

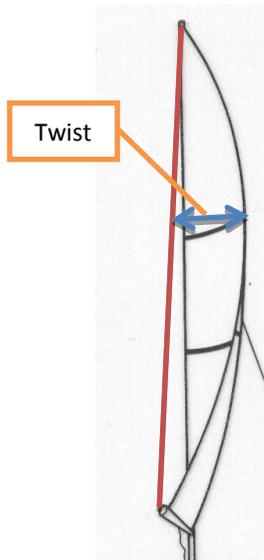
So sail set up is a compromise between maximising power and reducing drag. Full sail = more power but more drag. Flat sail = less power but less drag.

Directly down wind



Other Features of Sails

Twist

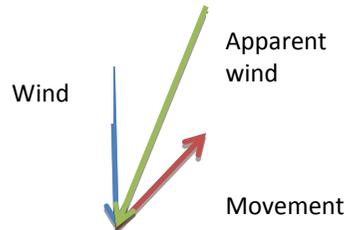


The front of the sail (luff) and the bottom of the sail (foot) are held in place by the mast and boom. The wind pushes the sail pushing the back of the sail (leech) out to leeward. This makes the sail "Twist". The amount of twist is measured by how far the leech is away from a line between mast and boom end.

Why is Twist Important

Apparent wind:

Wind is moving air. True wind is the direction the wind is blowing if you are standing still. If you move you create your own air current. The combined effect of the true wind and your own air current is called Apparent wind.



Wind near to water is slowed by friction. The further up you go the less this happens and the wind is stronger. This means that the apparent wind comes more from the true wind direction. Some twist in the sail allows the sail to be set at the correct angle to the wind as the apparent wind changes up the sail.

Effects of Twist

As well as matching the apparent wind, sail twist allows you to control the power in the top of the sail. Increasing twist allows the air to flow out of the leech and reduces power. Reducing twist will increase power. However, if the leech is pulled in too much the air can't flow away from the sail. This causes drag.

On the water Settings

Sail Controls

Kicking Strap

- Controls the amount the boom lifts
- Forces the boom into the mast bending the mast
- Controls twist.

Outhaul

- Pulls the sail out along the boom
- Controls the depth of the sail

Jib Fairleads

- The loop or pulley the jib sheets go through pulls the Jib along the bottom (foot) of the sail and down along the back edge (leech)
- This affects the fullness of the sail and the twist.

Cunningham

- Pulls down on the front of the sail
- Helps bend the mast
- Flattens the sail at the point of entry
- Pulls the draft further forward

Sail Setting while sailing

Up wind

Light winds search for more power while letting the air flow across the sail easily.

- Outhaul tight
- Minimal kicking strap
- No Cunningham
- Rig upright
- Fairleads back
- Centreboard / daggerboard right down

Medium winds use all power

- Outhaul looser
- Some kicking strap
- No Cunningham
- Rig upright / raked slightly
- Fairleads back
- Daggerboard right down

Heavy winds lose power to keep the boat sailing flat

- Outhaul tight
- Pull on more kicking strap
- Pull on Cunningham
- Rake rig backwards.
- Centreboard / dagger board raised a bit

WHY?

Light winds encourage the wind to flow over the sail without stalling. Pulling on the outhaul and using minimal kicking strap will flatten the sail and allow the sail to twist to allow the air to exit the sail. An upright rig will help the boat point as near to the wind as possible.

Medium winds the wind is strong enough to create twist so use kicking strap to make sure the back of the sail points straight backwards

which reduces drag and maximise power. Less outhaul means more power.

Heavy winds A tight outhaul will flatten the sail to lose power. Lots of kicker will bend the mast. This and pulling on the Cunningham will open the back of the sail to let the wind out, reducing power at the top of the sail. It will also help keep the centre of effort forward. Raking the rig will allow the back of the jib to open and will lower the centre of effort. Raising the centre board will reduce the tipping force to help keep the boat flat.

Down Wind

Light / medium winds

- Outhaul tight
- Little or no kicker
- No Cunningham
- Centreboard / dagger board up half way

Heavy winds

- Outhaul tight
- More kicker to help control twist (not as much as upwind)
- No Cunningham
- Centreboard down a bit

WHY?

Downwind the boat is being pushed by the wind. Tight outhaul maximises sail area. Little kicking strap helps the sail twist forward so it faces the wind more. Centreboard up reduces drag. As the wind increases you need more control. Adding kicking strap will reduce twist and help control. More centre board will help stop the boat rolling.

Reaching

Light / Medium winds

- Outhaul loose
- Minimal / Medium kicker

- No Cunningham
- Centreboard / Dagger board up half way.

Strong wind

- More Cunningham
- Raise centreboard / dagger board.

WHY?

Reaching is all about power. Loose outhaul increases the lift generated by the sail. Use kicker to control the twist in the sail and so the power in the top half of the sail. Half centreboard will reduce drag while making sure the boat does not slip sideways. In Stronger winds more Cunningham will help open the back of the sail and reduce power. Raising the centreboard /dagger board will reduce the tripping force and help keep the boat flat.