

"Trim To Win"

New Zealander Geoff Smale shows how to set up and trim radio yacht rigs.

The most common complaint I get from back markers is "my boat just won't go".

These days this usually means that the sails are not set up correctly, for example too much twist. Headsail out too far, not sufficient rig tension to keep the headsail luff reasonably straight, maybe the mast does not match the luff curve of the mainsail.

Rig Tension.

We start with Rig tension - you are sailing with your "B" rig, in a good stiff breeze near the upper limit - can you detect by eye any deflection of the jib luff, if you can that probably means more than 5mm of sag in the forestay, that is too much, no self respecting boat will sail to windward like that, just think what that sag is doing to the foil shape..

Rig tension = luff sag = if you can see it from the bank it is too slack, hence the stronger the wind the more the rig tension, it is better to have too much than not enough.

Having got the rig tension as the boat or rig will reasonably stand, now look at the mast bend, which really means, looking how the mainsail sets on it. The mainsail luff curves and the mast bend must be in harmony.

Sail Tension.

The first step is to adjust the mainsail luff tension so that the sail is only just taking some load up to the luff, next set the foot curve so that it has a curvature of about 1:10 for the "A" rig. Or try 1:12 for the "B".

Next apply kicker or topper to only allow a moderate amount of twist in the sail. Hopefully the sail should have a nice even cross sectional shape from head to foot, with fullness around 42% from the luff edge.

If the shape is too close to the mast in any particular area, allow the mast to bend forward at that height, if it seems too flat forward or there is a wrinkle tending to form from the clew up to the mast, say at the spreaders, (if you have any), then straighten the mast where the wrinkle meets the mast.

Avoid over tensioning the luff up to the sail, to get rid of these wrinkles, bad news for the sail, if you don't over do it.

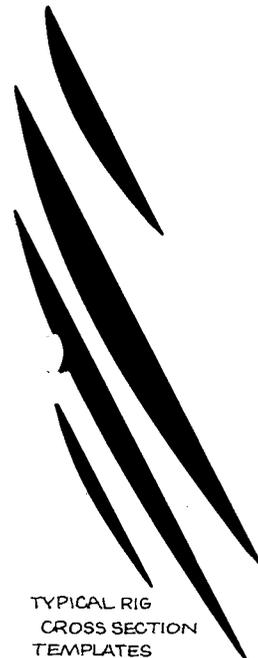
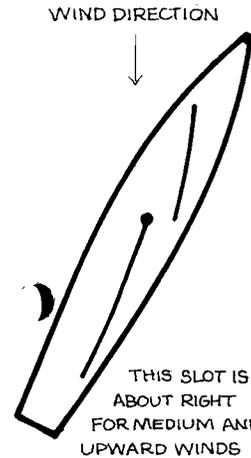
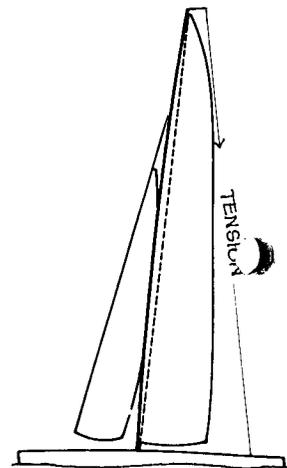
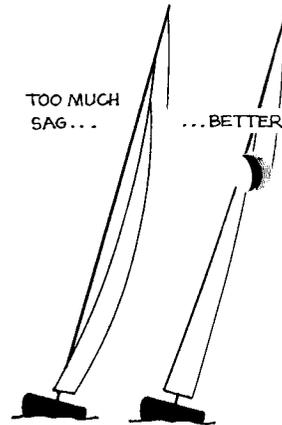
If the sail will just not set smoothly no matter what then you had better come to the next sail making lessons or help support our advertisers, they make good sails.

When it comes to the headsail your only controls are luff tension. (Once more don't over do it) and foot shape - usually it is either a good foil shape, or it is a re-shape job.

Sail and Observe.

Now lets assume that we have two good sails set on a rig that's strong enough to hold them accurately in position on the boat. Probably the most direct way to learn how to set the sails for greatest efficiency is to sail the boat close to you and observe the sails very intently, firstly, while sailing on the wind. How much twist? This is controlled by the kicker, on a conventional rig, or the topping lift, on most swing rigs.

Sail the boat to windward in a firm breeze and point closer and closer to the wind, till one or both sails begin to luff - where does it luff first - head or



middle - which sail - if its the head you've got too much twist, tighten the leach. If the wind lightens off be sure to free the leach till it flutters - then tighten very slightly again for the best performance - too tight a leach in light weather is just as bad as having it too slack in heavy weather.

After you have spent half a day getting this far you've probably realised that to get the best results the sails have got to be working for their total height as evenly as possible - so that when the jib luffs it does so for most of its height all at the same time, and of course the same should apply to the main.

This brings us to the next step.

Windward Trim.

How close to the centre line for the Main and Jib for sailing to windward. Start with the main as close to the middle as possible, but so that the sheet almost has some slack, when the boom is right on the centre line, so that the winch is not fighting to pull in more than is available when hard in. Next set the jib so that the boom is approx. 10° out from the centre line when the main is right in. The real test of the jib setting is now to sail the boat windward in a good "A" rig breeze, and watch to see if the top of the main and the jib start to lift at about the same time - they should - if in doubt have the head sail lift slightly before the main - few things make a boat go slower than having the "slot" too closed.

If you wish to win races these days you should record the shapes you had last time the boat sailed well. As a starting point I am including some suggested cross sections for your various rigs. Transfer them on to some heavy cardboard or similar then cut them out and use as a reference guide for setting up your rigs before racing. It would be interesting to use them to check the winning boats sails. Watch out for shape deterioration under load what's allowing it to happen? Work out how to fix it. As the wind speed increases, it is desirable for the entry to get a little fuller and the leach to straighten slightly in strong winds for the head sail, while the main should get slightly flatter over all.

A sail lifts or luffs when the pressure on the leeward side of the luff area is greater than that on the windward side with the result that part of the luff area comes up to windward and loses much of its drive. The luff area is that part of the sail from the luff edge (mast or leading edge of the jib) back to the line of maximum draught. A similar appearance to the main being back winded by the headsail.

A sail flutters when the leach loses drive. This may be caused by too flat a leach, or even reverse shape in the leach, or by very poor sail setting e.g. too much twist, or sailing far too close to the wind.

How to judge 10° - I used to mark the deck with the aid of plastic protector. Still not a bad idea - probably best to mark the deck with a felt pen when the boat goes particularly well so that the headsail boom can be set at the same angle next time, gradually you'll get the best average for your boat and sails.

Balance.

Your boat still won't go!! Don't despair we all get days like that. From my observations, a lot of good club boats are not performing as well as I'd expect, the problem may well be balance. On a good B or C Rig day with lots of puffs coming across the water, will your boat sail to windward and only gently point higher in the very strongest puffs? Now sail off with the sheets slightly eased on a beam reach where you can sail backwards and

forwards on the same track without altering the sheets - does the boat want to go round up viciously now in the puffs? If the boat takes more than just the slightest rudder to control, then you've got too much weather helm. If the boat tends to bear away in light patches you've got too much lee helm, an even greater sin.

How to fix it? What controls the balance? The major variables are the centre of effort of the sails and the centre of lateral resistance of the hull and fin. If we wish to reduce weather helm, it's usually easier to move the sails forward than the fin aft. Ideally move the mast forward 12-14mm, but if you cannot do that, then try some these ideas.

Can you move the jib's lower attachment point closer to the bow.

You may have a lot of mast rake, the boat will still go well with the mast vertical - this will help to reduce weather helm.

Can you put on a mainsail with a shorter foot and compensate for the area lost with a bigger headsail.

Don't forget to have it re-measured, on second thoughts, move the mast, you've probably noticed that in light A rig weather the boat is more competitive, weather helm increases with heel, largely due to the centre of effort up the sails moving out to leeward as the boat leans over.

That is why it is much harder to bear off around the windward mark than around the leeward one.

While you are making modifications don't forget previous discussions. Minor adjustments can be achieved by mainsail adjustments - flattening the sail and allowing more twist than normal to reduce leach load, but be careful not to loose too much power.

Why Use Battens.

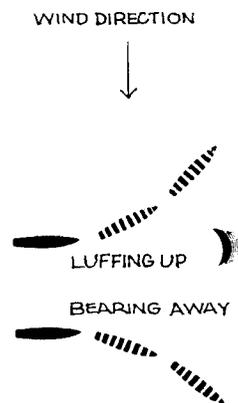
What do we have battens for and where to put them.

The reason for battens in a mainsail, for example, is to fair the leach of the sail (i.e. smooth out the stress wrinkles by applying tension across at right angles to the leach for the length of the batten.) By stopping the leach from collapsing inwards towards the mast, the cross sectional shape of the sail, built in by the seam shape is maintained and the round on the leach is held "out" against its natural tendency to straighten between the head and the clew under load. If the leach cannot move towards the mast then it cannot move from its designed shape, unless the loads are too great for the cloth of course, hence, the heavy Kevlar down the leach of big boat mainsails.

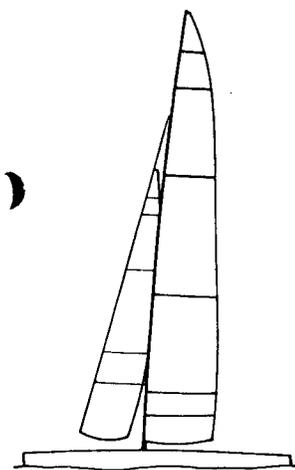
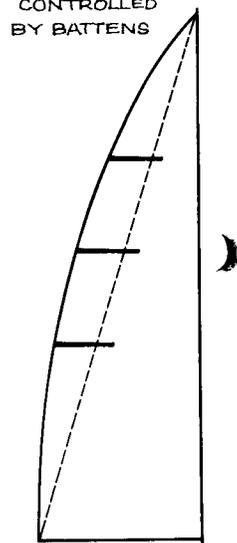
Hollow cut headsail leaches do not require battens because the leach tension in this case is acting in the opposite direction (i.e. pulling the leach edge back away from the luff wire.)

We know from previous discussions, that the cross section of the sail should get progressively flatter towards the leach. The batten must be soft enough to allow this, yet stiff enough to stand the compression load. This is why the inner end is always softer than the outer, so that it does not cause a local bump at its inner end, on the leeward side of the sail. Bumps cause breakaway of the air flow on the leeward side of the sail, causing turbulence and loss of power.

Most class rules decide where to put the battens and how long they should be. In the absence of a rule it is usually best to make the batten length 2.5 times the amount of the roach it has to control. Position them down the leach in proportion to the leach round. The Marblehead rules were evidently prepared before this was realised, the top and bottom battens should be closer to the head and clew. I have often seen the 900mm hound



EXTREME ROACH CONTROLLED BY BATTENS



MULTI-PANEL SAILS



BALANCED JIB AND MAIN TWIST

falling away to leeward near both head and clew. Battens will never make a bad sail good, all they do is make it less obvious.

There is no substitute for a correctly shaped sail. There is some suggestion that the Marblehead rules are to be altered to allow battens to be uncontrolled (i.e. as many and as long as you like.) Quite a good idea in my view, after all, if you put in too many you are only making the sail heavier and less able to tack easily in very light winds - a few strategically placed leach battens are all that are needed. We have plenty already but they would be better to be allowed to be closer to the head and clew to control those 900mm hound areas.

Shape Seams.

Incidentally, for the best results you should have a shape seam about midway along those 900mm hounds. It will do two very important things for your sail shape.

1. Help introduce the shape more quickly at the head and foot.
2. Reduce fall of those unsupported rounds on the leach.
3. By referring back to our "Centrefold" curves we have a good average cross section shape various rigs A - B and C, but especially for the "A" Rig there is a little more to learn.

Lets start with middle range "A" Rig conditions where we are trying to achieve the sections shown in the centrefold.

1. Lie the rigged boat on a mat on its side.
2. Tension the luff so that there are no wrinkles showing at right angles to the mast, but at the same time luff is not under noticeable tension.
3. Adjust the kicker so that there is about 30-35mm of sag in the leach below a straight line between the head and the clew.
4. Adjust the outhaul so that about 100mm above the boom the sail conforms to the centrefold cross section shape.
5. Now inspect the whole sail, does it conform to the suggested cross section shape. If the sail is too full it is most likely that the shape is also accentuated immediately behind the mast. "It is too full in the entry". The mast curve does not match the sail luff curve.

If the sail is too flat then the reverse process is necessary.

Answer.

Induce more mast bend by slackening check stays and or lower fractionally, if that does not do it apply more rig tension, as a last resort bend spreaders back a little more.

If you are using a simple swing rig apply more back stay tension. Having done this on the swing rig you will then have to reposition the clew in order to return to 30-35mm sag.

The main difference between drifting and medium "A" Rig setting is in "Twist".

In drifting conditions the breeze at the mast head is likely to be much faster than at boom height so to avoid stalling the lee side of the sail up high we should have lots of twist. The problem is that over about four knots at our heights the effect has almost disappeared

It is a fair bet that if you have good equipment, the sail sections are OK and you are getting "done" in the very light weather, you either need more "Twist" or a larger pennant to tell you the wind direction. You may be getting "lost" in the very light airs!

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Illustrated by Brian E. Wiles