Simplified Sail Tuning and Trim

Introduction: Being a great fan of the KISS principle, we have reduced our upwind sail tuning to a nice, simple three-step process on W3854:

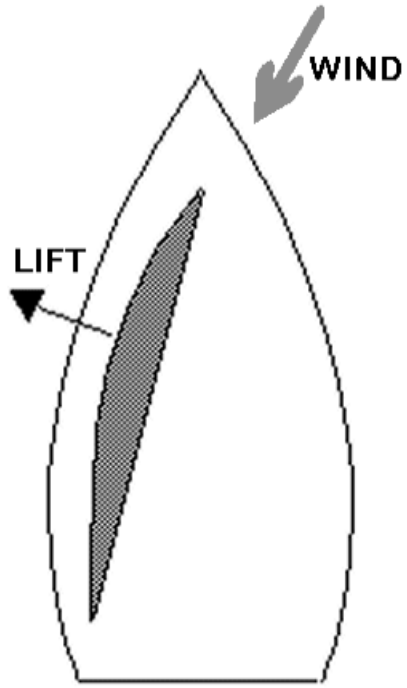
1. set the "groove" with jib halyard tension
2. sheet the jib in until all three telltales luff at the same time

3(a) First gear: sheet main in until leech tell-tale is about to get sucked behind the luff

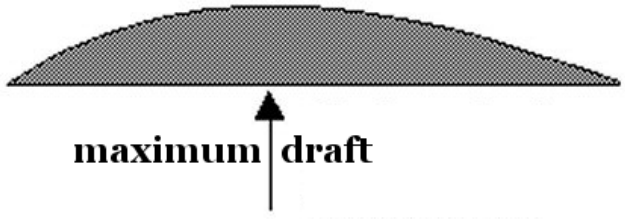
3(b) Second gear: once up to speed, oversheet the main a bit to help pointing

Keeping things in perspective. Rigging exists only to be the servant of your sails. So, when you see/hear tuning numbers, always keep in mind that these are meant as a means to an end rather than a goal in themselves. On a racing sailboat, our real and only goal when it comes to tuning is to keep the sails up and properly set to take best advantage of the available wind.

Sails - general principles. Your sailmaker builds a smooth curve into each sail. The depth of this curve will vary somewhat from class to class and from sailmaker to sailmaker. On our boat, we no longer worry about trying to influence this except insofar as we use vang/kicker tension to bend the mast and thus pull fullness from the main whenever we become over-powered.



Like the wings of a very slow airplane, sails are curved fore and aft, so that the air flowing over them generates some lift toward the outside of the curve of the sails *(left)*.



The designed fore/aft position of maximum draft depth in sails is usually from 40 to 50% aft from the luff *(above)*. Rig settings and/or wind friction affect the actual max. draft location, but for now you can ignore this except as specifically addressed later in this guide.

In essence, all you need to do is try not to mess up the intended shape more than unavoidable. How do you get and maintain the optimum shape in your sails? Mostly you will do this by adjusting - in very simple ways - their leading and trailing edges, i.e. the luff and the leech. Details to follow in a moment.

Getting underway: Before we sheet in and start sailing, we must ensure that our sails are properly hoisted. This may seem obvious but when I look at other boats sailing on any given day, some review seems called for.

First, we need to ensure that each sail is hoisted fully, to the extent that there is no excessive slack in the luff of either sail. But we must be equally careful never to stretch the luff as we hoist, either, as this will put too much fullness into the leading edge of your sail. This is especially damaging in light air.

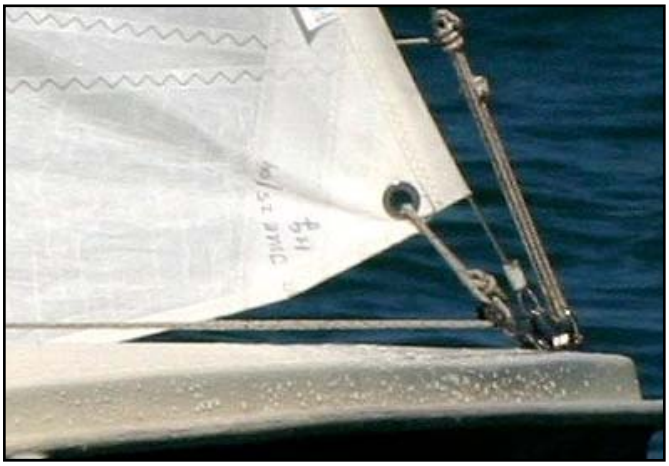
Hoisting the jib. Because no good can come of hoisting the main early, we always hoist our jib first. It is then easy enough to roll it around its luff wire and the forestay to keep it from flogging. A multi-purchase device (magic box or cascade system) for the jib halyard is a must to get adequate halyard/rig tension.

Running down a luff sleeve is a luff wire that takes over forestay duties once the halyard is under tension. The jib head is lashed to an eye

at the top end of this wire. The tack of the jib used to be lashed to the lower end of the luff wire, but over time, the sail cloth shrinks and is then being stretched when the luff wire is put under suitable tension. This leads to stretch bulges *(above)* along the luff which are usually detrimental to performance.

To avoid this potential problem, we now leave the tack of the jib loose, i.e. not lashed on to the lower wire eye. There is thus a very definite distinction between jib halyard tension and cloth tension in the leading edge of the sail. And most of the time, the luff cloth tension is virtually nil.

To keep the cloth from riding up excessively, we run a thin line through a grommet in the tack of the sail *(below)* as a jib cunningham. That line starts dead-ended at deck level, then comes up through the grommet, down to a mini-block, and aft to a cleat on the deck beside the mast. But do not forget to keep some speed wrinkles *(below)* as Mike Mac so aptly calls them.



Raising the main: Hoist the main to the limit band at the mast top, and then pop the boom back onto the gooseneck. If you now see stretch bulges in the luff of the main along the mast *(below)*, raise the gooseneck if possible. If

the main luff is simply too short, you'll just have to back off the main halyard as necessary. Of course, you want to start the day with speed wrinkles in the main as well *(below)*. If these have been smoothed out, your luff is too tight (even though it may look prettier unwrinkled!)

Well, that just about gets us set to go - except for a few small bits of review that will explain the logic behind the various adjustments that we are about to make as we sheet in.

Your sailmaker assumes that:

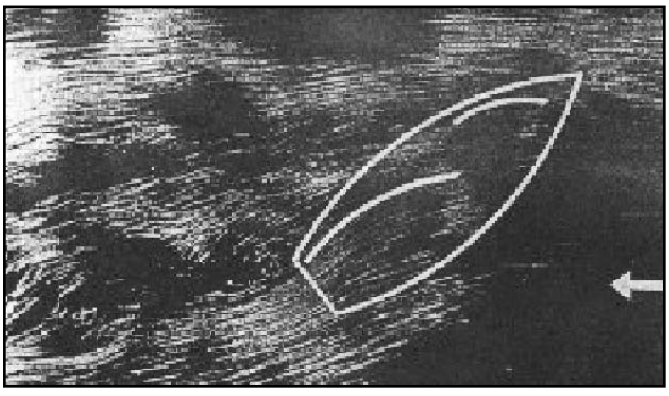
1. Your mast **does not** lean excessively to one side or the other (i.e. the sidestays are of equal length) but that it **is** raked (leaning slightly aft) such that, with the main and jib properly hoisted, but without any mainsheet tension, your boom hangs more or less level, i.e. parallel to the waterline *(below)*.

2. On a Wayfarer, your jib luff will sag 5 to 8 cm. at mid-luff in any amount of breeze *(photos above right: front view, then side view)*. This is because the luff wire is supported at only two points: the tack and the hounds where the halyard enters the mast. Your luff is cut to anticipate and match this sag.

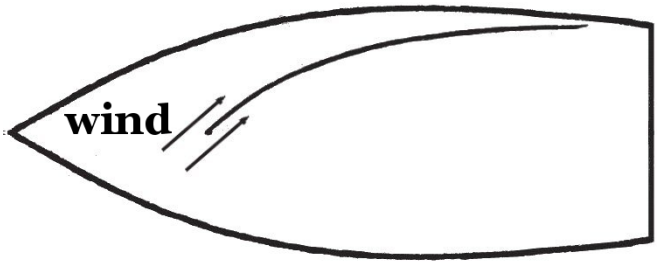
3. Similarly, the assumption is made that, as the wind gets up, the mast on a Wayfarer will unavoidably bend 5-10 cm. - even more if you let it *(below)*. Your main luff has thus been cut

with extra cloth in the leading edge to allow for the expected mast bend. Your job is to keep the mast from bending more than that. If there is more bend than your sail is cut for, large creases *(above)* start to run from the area of excess bend towards the clew. In light airs pre-bending the mast is said to help, but I have yet to see it make an appreciable difference.

Other sail shape and function basics:
The image below has been borrowed from Eric Twiname's wonderful 1973 book *Start to Win*.



They sprinkled aluminum dust onto water flowing through a test tank from right to left to simulate wind direction *(see arrow below left)*. Foils were then inserted to test how the air particles that make up the wind - represented by the aluminum dust on the water - flow over a sail. You will note that the sail's leading edge must meet the wind head on, i.e. the leading edge of your sail needs to be exactly parallel to the wind, so that the wind is able to flow easily along both sides of your sail *(below)*.

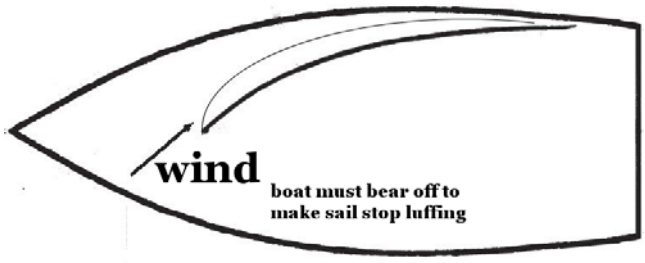


If you point too high for your sail-set, your sail starts to luff because the wind is blowing in at an angle from the leeward side of your sail. Worse, if you point too low, the sail does nothing obvious like luff but does lose vast amounts of its lift since the wind is blowing in at an angle from the windward side of your sail and thus cannot generate lift/power by flowing properly over both sides of the sail. This is known as stalling out, something that causes planes to lose lift and crash.

The groove. The more rounded (amount of fore/aft curve) your sail's entry, the more forgiving your sail will be of less than perfect angling to the wind (be it due to inexperienced helmsmanship, bouncing around in waves or whatever). The amount of this entry curve is proportional to the amount of jib luff sag you choose to sail with: more sag = a rounder, more forgiving entry, and vice versa.

Jib luff sag is controlled by the amount of halyard tension. The more you tension the halyard, the flatter the entry becomes. So, if you ease the jib halyard, your jib luff entry becomes fuller (more rounded), and your steering "groove" becomes correspondingly wider - more forgiving of imperfections in the angle of your sails to the wind.

It follows that an expert helmsman sailing in a very steady wind on flat water can get away with a much flatter jib luff entry, i.e. a sail with a narrower groove, than a beginner struggling in big waves or very shifty winds.



So why not sail with a wide groove all the time? Remember that you must steer your boat such that the wind meets the jib luff entry head on. So the trade-off is that a more rounded entry *(see effect exaggerated by thin line above)*, forces you to point lower to keep the sail from luffing. Thus, it pays to sail with the flattest entry you can get away with. But again, when in doubt, let it out. If I do not feel right going upwind, the first cure we always try is expanding the groove by easing the halyard which makes our entry fuller.

Tuning the "engine"

Next, we'll talk about the simple, inexpensive "instrumentation" that will definitively tell you if your entry is too flat.

Setting the upwind groove

Let us assume a nice breeze of 5 to 8 knots. To get the optimum groove for existing conditions we deliberately crank up jib halyard tension more than we expect current wind strength to support, i.e. until we reach a point where we are sure we'll have less jib luff sag than our sailmaker anticipated since the halyard tension is too great. This in turn will make our entry curve too flat, and the steering groove too narrow for the conditions.

Now comes the acid test: We sheet in and sail closehauled. I'm assuming here, that everyone knows how to steer to the telltales. Most good racers point up until the windward side jib telltales angle upwards 30 to 60°. This has two benefits:

1. It lets us point a bit higher (pinch).
2. It keeps us away from the dreaded stall.

If the jib luff cloth actually begins to luff, we are definitely too high, but if the leeward telltales start lifting or worse, going in circles, then we are stalling out, i.e. sailing too low.

Identifying a jib entry that is too flat

A sure sign that the entry is too flat due to an overly tensioned jib halyard, is that the telltales are jumpy: from one second to the next they switch from indicating luff to showing stall, sometimes both at once.

If this unacceptable state of affairs exists, we start easing our jib halyard in small amounts to make the entry rounder until the telltales settle down. At that point, we have theoretically got our jib halyard tension - and its attendant entry curve/steering groove - to its optimal setting for the conditions.

And we have set the correct rig tension at the same time, since the jib halyard/luff wire combination is deriving its tension by pulling against the resistance of the shrouds - remembering that on Ws, the forestay is loose enough that the jib halyard takes over mast support duties almost as soon as the jib goes up.

If the wind increases, we will naturally add more halyard/rig tension to counteract the increased luff sag caused by the extra wind pressure, and vice versa. Always though, we watch for our telltales to tell us when the entry is too flat - the ultimate performance disaster! If the telltales start to get twitchy, we ease off some halyard right away.

Alas, there is no direct way to tell if the entry is fuller than it needs to be. To be sure that you have it as flat as you can get away with, you need to overtighten and then ease off as much as is necessary. Eventually, you'll reach a point where you pretty much develop a feel for an amount of halyard tension that is "in the ball-park" for existing conditions - a useful skill in mid-race where overtensioning and then easing off as needed, are not an attractive option. There, your best guess is really the only way to go. If the telltales get antsy, you'll know have too much halyard tension and will need to ease a bit.

Sometimes, even though the telltales do seem to be working well, our boat still feels a tad slow. In that case, we are in doubt and so we let it - the jib halyard - out. Almost invariably that helps - perhaps only psychologically, or maybe because the boat is just that little bit easier to steer properly in its expanded groove.

One quick example to show the importance of a comfortable groove: We once sailed a Worlds qualifier on Lake Ontario in a nasty cross chop of large leftover swells from an overnight south-east gale and the new waves from a southerly wind of about 10 knots. By the time we had eased the halyard enough to give us some semblance of well behaved telltales, the middle of the jib luff was hanging a good nine inches to leeward of our slackless forestay - talk about luff sag! We pointed lower than all the others who were sailing with tighter halyards but we absolutely axed them on better boat speed. And better speed makes your centreboard more effective so that we didn't even end up losing much distance to leeward.

What about the mainsail entry? I hear you ask. Well, luckily for us non-high-performance dinghy sailors, only easily adjustable mast bend would force us to distract ourselves by trying to fit the mast to the main's basic, built-in entry shape. So we can happily ignore that as being immaterial for the moment, since we have no easy way to adjust this on a Wayfarer. In the early 90's, I actually did figure out a way to pre-bend my Wayfarer mast relatively easily for really light airs, but doing so seemed to not help our performance, so that I now ignore pre-bend with no noticeable ill effects - the KISS (Keep It Simple, Stupid!) principle in beautiful action. Note: We will talk about the main cunningham soon.

So, having set the jib entry to our satisfaction and left the main entry unfiddled, we can now turn our attention to the sheets and how to set our sails at the desired angle to the wind.

Sheeting the sails: We do not want only part of our sail set such that its leading edge is angled to meet the wind correctly, as is sadly the case with 1979's mainsail above on the right. Instead, we (usually) want the whole leading edge to be at the same, optimum angle to the wind all the way up and down the sail, i.e. the entry parallel to the wind so that the air particles can flow along both sides without impediment, the way 2469 has it on the left above. Fortunately, when the boat is close-hauled, such an ideal angle of the whole length of the entry is easily achieved with the sheets (and, when overpowered, with the vang/kicker) - as you are about to see.

Sheeting the jib: The *and now for something completely different* department. To the best of my knowledge, the following is to be found nowhere else in educational sailing materials. Most experts worry about the ideal fore and aft position of your jib sheet fairlead,

usually where an imaginary line drawn from the mid-point of your jib luff through the clew grommet meets the boat. Thanks to Mike McNamara - who only partly agrees - I have realized that such lead location is not crucial and that fiddling with it uses brain effort that is better spent on almost anything else.

Here's what happened: While Mike, several times Wayfarer World champion, was coaching us in Toronto in 1990, he had us tip a rigged W on its side. He then asked one of us to sheet the jib in. “Now,” said Mike, “watch what happens to the leech at spreader height when I sheet in one more inch.” Amazingly enough, the upper leech moved inwards 5 to 6 inches. Mike's point of course was that small jib sheet tension adjustments have a major effect on the closehauled sail.

But if that is true, I wondered, will it matter where on the track I have my lead? If the upper part of the closehauled sail comes in far faster than the lower - six inches of upper leech for every inch at deck level, will there not come a point where the upper and the lower parts of the sail are in balance at the same optimum angle to the wind regardless of where the lead is positioned on its track?

If, for example, the upper jib is twisted off to leeward too much, I can sheet in more. As I do, the upper part of the jib comes in faster than the lower part, and eventually the excess twist will be removed, and the whole entry will meet the wind at the same angle. And this will happen no matter where the lead is. Sheeting in from further forward just means I'll need less tension to reach the balance point because I'm pulling down more directly on the leech and the upper part of the jib. By the same token, moving the lead further aft just means the jib foot will be in pretty tight by the time the upper jib catches up. For what it’s worth, moving the lead forward means you’ll be sailing with the foot of your jib progressively fuller (more curved), and vice versa if you move the lead aft.

Having not moved our jib lead from its position just forward of the thwart on the inside

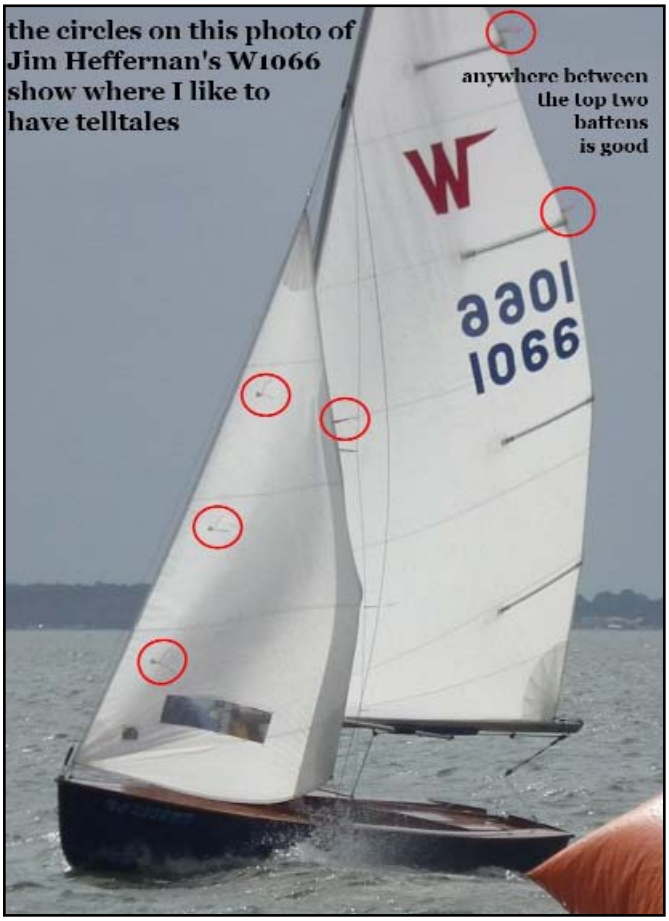
board of our front bench in years - regardless of wind conditions - I finally got rid of most the track *(above)* a couple of years back. As mentioned a moment ago, what we do instead of moving the lead is to sheet in/out until the upper jib luff telltales show luffing at the same time as the lower ones.

If the top ones show luff while the bottom ones are showing perfect trim, the top needs to come in. So the crew sheets in a tiny bit and the top comes in more than the bottom. The helm keeps steering to the bottom telltales, while the crew checks and keeps adjusting the sheet until the upper and lower telltales are in balance.

If the top telltales show stall while the bottom ones are showing perfect sail trim, then the sheet needs to be eased slightly. Again, the helm keeps steering to the lower telltales while the crew works to get the telltales into balance.

We then adjust only if there is a significant change in wind velocity. Or, if we don’t like our speed. In that case, we are definitely in doubt and thus let it out - a smidgen! - *it* being both the jib and the main sheet in this instance.

Before Mike McNamara told us about this upper and lower telltale balance, we were trimming to a telltale attached to the jib leech near spreader height *(see photo of good telltale set-up next page)*. In fact, we still prefer to use the jib leech telltale because this gives us a nice, definitive read from just the one telltale as



opposed to our having to compare two readings. The very simple principle here is to sheet in until the leech telltale starts to get sucked forward behind the jib leech, then ease out half a smidgen until it streams aft.

Both methods do the job equally well. But the leech telltale is great for telling you exactly when you must not - under pain of death due to slowness - sheet in any further. Again it is always better to sheet too loose than too tight. But it is of course best of all to sheet in as much as the leech telltale will let you get away with, i.e. to not waste any drive from your upper jib by letting it, in effect, luff a bit.

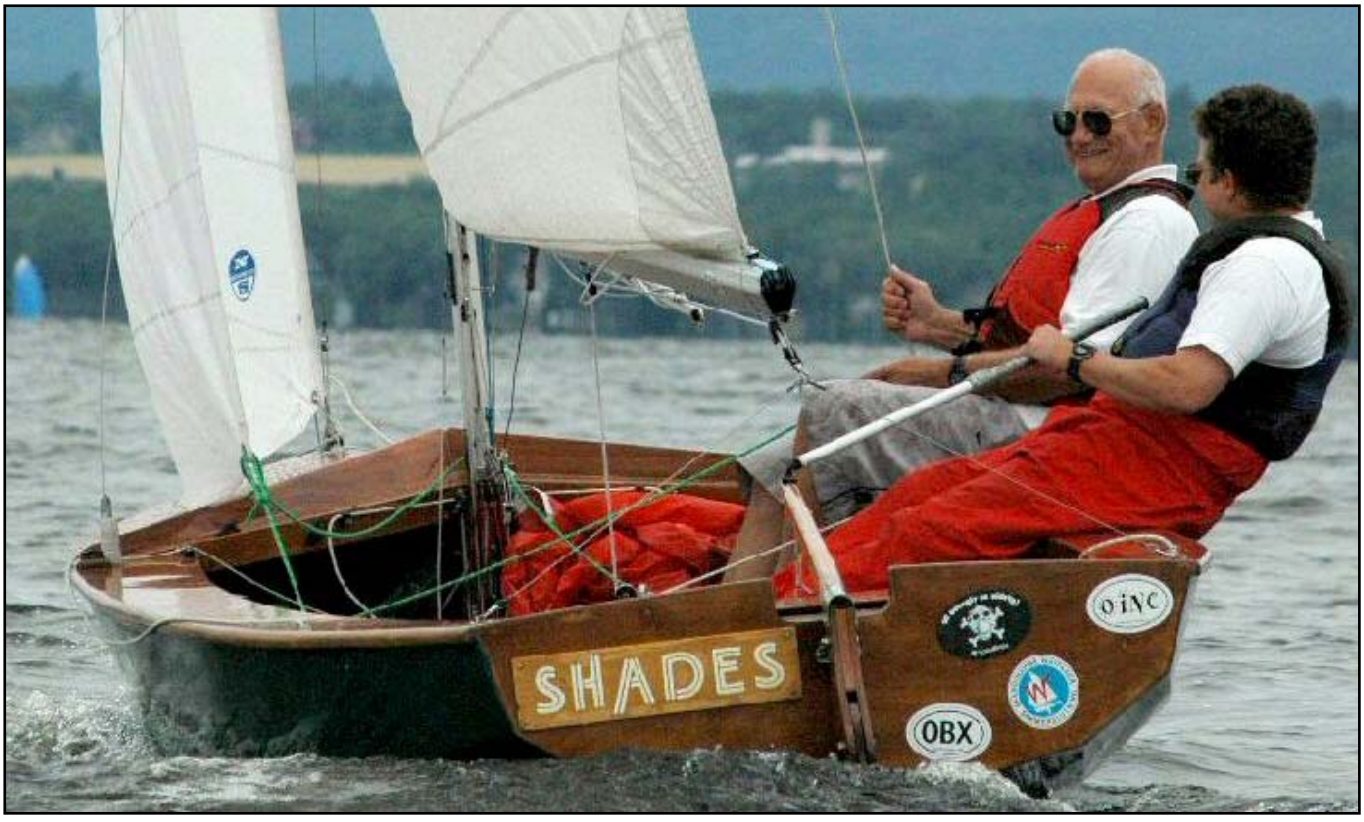
Afterthought: On a Wayfarer, it seems to me to make very little difference how far inboard you have your leads. In fact, we had ours on the deck for years in the 70s and still did not hurt much for pointing against those who had already moved their leads inboard to the benches. We did in the end move them since common sense says that this must let us point just a tiny little bit higher.

Sheeting the main: It is a little known fact that **a boat points on its mainsail leech.** I don't know exactly why, but Mike Mac confirms it, and that's good enough for me. This concept is counter-intuitive, but I find it to be most definitely true. The tighter the main leech tension you can get away with, the better distance you'll make to windward. I find that when we sheet the main in a bit harder once we are up to speed, we make better distance to windward relative to boats who do not make this adjustment. Note however, that I said "leech tension you can get away with". Overdoing this will impede air flow and definitely damage your performance.

Another basic point - probably related to angle of the leech to the centre line of the boat - is that you never want to move your traveller - if any - off to leeward even a few inches. That kind of stuff kills pointing and should be reserved for survival conditions of huge waves and howling winds, where pointing becomes a relatively low priority.

In Wayfarers, most people avoid the centred-traveller problem altogether by replacing the traveller with a bridle *(above)*. Remembering that being able to get adequate leech tension is crucial to optimal pointing, we must ensure that the bridle is not too long, i.e. we don't want to reach the *block-to-block* position while useful leech tension can still be added. In so many words, err on the side of having your bridle too short. The new Hartley Mk IVs come with a lovely adjustable bridle but for me this is a needless complexity.

We have our bridle length set so that we reach the block-to-block position just as we start to get overpowered and have to start using the kicking strap/vang. In the photo above, note that we are getting close to being block to block by the time we are both sitting on the windward deck, while in the middle picture, we are sitting out a bit and have sheeted in as much as this bridle will permit - block to block. Below Marc is steering and I am crewing, and we are again sheeted block to block and have just added a little bit of kicking strap/vang. But we'll talk more of this later.



Bridle bonuses. Apart from automatically ensuring that we are always sheeting the boom to the centreline of the boat which is best for pointing, the bridle does two useful things:

1. It lets us sheet to the centreline in lighter winds without the excessive downpull that would hook the leech too far to windward if we tried to get the boom in to a similar position working from the traveller.

2. It gives us a very easy read on how far in/out we have the mainsail, i.e. do we have one inch, two inches, three inches between blocks *(above right)* which is far easier to judge than the difference between say 30, 31 or 32 inches between the block on a traveller and the block on the boom *(above left)*.

So, is the main sheeted in just right? Our instrumentation here is one leech telltale between the top two battens *(installation directions provided later in this chapter)*. Perhaps the easiest way to illustrate how we use this telltale is to go through our routine as we sheet back in while coming out of a tack.

On the premise that it is always less damaging to undersheet than to oversheet, especially when we've already slowed down due to the tack, we always undersheet both jib and main as we complete our tack. Such undersheeting is also a desirable buffer against capsizing when you're tacking in a blow. With luck and good crew/helm teamwork, helm and crew then both fine-tune the sail trim simultaneously, which gives us a nice little nudge forward when we need it the most.

The crew trims the jib as previously outlined under *sheeting the jib*. After a tack, we use easy visual references as short-cuts to start with, like size of gap between jib foot and V-shaped splash boards on the last tack *(see three bridle pics on last page)*. The helm, meanwhile, sheets in until the leech telltale shows signs of wanting to hide to leeward of the leech. Of course, on a normal day, with reasonably consistent winds, I will have observed how big a gap should be left between the boom-end blocks to put us into this trim (first gear), and I can immediately sheet that far in without having to look up at the leech. This is really useful in high-stress racing situations.

Let me give you the gears: When the boat has slowed down for any reason such as tacking, motor boat or other waves, disturbed air, too much pinching, etc., it first and foremost needs to get moving again. And sailing with the main leech telltale nicely streaming aft (but on the edge of getting sucked behind the leech) is the sailing equivalent of driving in low gear. When do we shift to a higher gear? When the

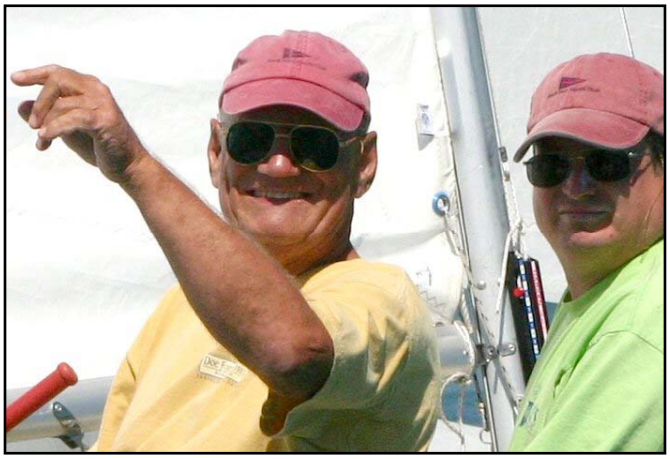
boat has regained good speed for the given wind strength. And how do we gear up? We crank the main in another few inches - how many depends on wave conditions, amount of wind, and so on. It's something that has to be learned by trial and error on any given day. With luck, you'll be near another beating boat against whom you can speed test, so that you can see if cranking the main in a bit more is helping. If it's helping the other guy, go back to first gear, get your speed up, and try cranking the main in a bit less the next time. And so on.

I always do a lot of main uncleating, adjusting and then recleating when sailing upwind. Unless the beat is in exceptionally steady winds, few waves and there is a lack of opponents near by, I adjust the mainsheet dozens of times on a one-mile beat. Like many sailing things, the more time you spend in the boat, the better your feel will become. Note that during all this, my crew has been dreaming of Jamaica and beer and left the jib unchanged from its previous perfect trim. The jib, ours anyway, has no gears. It's always in first. Its leech ticker must always stream aft!

The main leech telltale refuses to fly? If the telltale is out of order due to insufficient wind or because it has gotten stuck from rain or other causes, a very valid rule of thumb is to sheet in until the top batten is parallel to the centre line of the boat *(above)*.

Trivia: We usually do very little with our outhaul, upwind or off the wind. Most times, we

set it for the day and never touch it again, unless we really have nothing else to do, like on long reaches where we can ease the outhaul to power up the foot of the main a bit. More curve = more power. But mostly, outhaul adjusting uses time that can be better spent watching wind on water, waves, and fellow competitors, or plotting strategy. For very light or heavy winds, we tighten the outhaul to or near the max. In the mid-ranges, we ease it a bit for a fuller lower quarter of the mainsail.



Bringing wayward draft back home
Especially when you're closehauled, the wind blowing across your sails creates a surprising amount of friction which will blow some of the cloth aft from its designed max. depth location - especially on old sails that have gotten soft, but even on brand new sails with stiff cloth.

I once raised a new suit of sails on a calm day, and took "draft" pictures of the main. I was appalled to find that the main's maximum draft was only about 25% aft. Distressed, I phoned my sailmaker, who chuckled and said: "We'll go sailing next time there's a breeze, and you'll see that the wind going across the sail will drag the draft aft right to where it needs to be." I found this hard to believe. But sure enough, in about 8 knots of breeze next day, there was the maximum draft, blown from quarter- to half-way aft as we sailed close-hauled. What a relief!

Pursuing this line of thought further, however, begs the question: "What if the wind starts blowing more than the 8 knots that moved the draft from 25 to 50% aft? Won't the draft move even further aft?" The answer is yes, and this is where the cunningham rides to the rescue. The principle involved is that if you stretch one edge of the sail, this stretching pulls more cloth towards that edge. Thus, tensioning the luff moves sailcloth towards the luff, i.e. the draft further forward.

The upshot of all this is that when the breeze gets up enough to push the draft too far aft in the main, we start pulling on some main cunningham *(grommet above)* which pulls the draft back forward to the place half-way aft where it is supposed to be on the main. When we use our 1994 mainsail with years of hard use behind it, we crank on more cunningham since its cloth is tired and blows aft more easily than that of a newer sail.

If we use any jib cunningham at all , we use it extremely sparingly - even in a good blow. *(see speed wrinkles above)*

Vang/Kicker: Upwind, we never use our vang until we can no longer hold the boat flat without its assistance. But once we are over-powered, we do use it liberally and our easily adjusted vang (42:1) is worth its weight in gold, especially in gusty conditions where it frequently needs to be eased in a lull, and then cranked back on just before the next gust hits. Controls that go to both sides of the boat where either crew or helm can adjust them are also well worth the investment of your time and money. Our lever vang dates back to 1976, but now a cascade is the system of choice - see *The Wayfarer Book*.

When you are overpowered upwind, the vang does two extremely important things: It flattens your main by bending the mast *(above)*, and secondly, but no less importantly, it maintains absolutely essential tension on your main leech, letting you keep pointing even when you have to rag the main in order to spill wind to keep the boat reasonably flat.

In the pictures above, notice the leech tension we're getting *(right)*, even from our blown-out old main, which in turn is bending the mast - all due to our applying lots of vang. On the left, only the upper mainsail is falling off, a sure sign of too little vang, and because Richard and Michele are having to spill some wind, they're getting too little leech tension. This hurts in two ways: pointing will be poor, and the mast is not being bent to flatten and depower the mainsail.

I have found this out the hard way, by getting axed in a race, when I experimented with ragging the unvanged main, having brilliantly figured out that this would luff the top of the main first and would ease a lot of the heeling forces much sooner. Obviously that had to be faster! Alas, it took less than a single beat and our having plummeted from a great, race-leading start to 9th place, to discover that the reality did not match my theory.

It was another ten years before Mike Mac provided me with the reason: *a boat points on the leech tension of its main*. This is in fact the main reason why we need to have adjustable spreaders. These can be set to help the mast to resist being bent, which in turn lets you have more tension in the main leech which must be pulled down by the vang that much harder before the mast is willing to bend. And presto: you have better pointing even when the sail is eased.

What you should know about telltales. Telltales are going to annoy you each time you sail, if you don't make a little effort to get the right kind and to install them the best way.

Materials: I have found that sticking telltales onto the sail with tape *(previous page)* is the easiest but not the best way to install them because their loose ends tend to get stuck on the tape at inopportune moments. Also, telltales made from spinnaker cloth or better yet, your favourite Elvis tape, may be the lightest and most wind-sensitive, but they too, are not - in my experience - the best choice. When they get wet from rain or spray, they stick to the sail cloth *forever*! No, the ideal solution is virgin wool "sewn" into your sail. The virgin wool - of a nice, dark colour so that you can better see the leeward telltale through the sail cloth - is water resistant due to its oil content and will fly again very soon after a soaking.

Installation: To start with, I get a sailmaker's needle with an eye that will - grudgingly - accept wool's thickness. When I couldn't find my wife's needle threader, I put a loop of thread through the needle's eye, inserted the end of the wool through the thread loop, and then used the thread to pull the wool through the needle's eye. This was enough of a pain that I made sure that I cut off a length of wool - one or two metres - which was certain to avoid my having to do more threading any time soon and to be more than enough to provide three 20-cm. telltales and two at 15 cm. for the leeches of the main and jib.

Jib luff telltales: We thread the three 20-cm lengths of wool through the jib luff at about quarter, half, and three-quarters height, leaving 10 cm. to show on each side of the sail. It is more important to keep these telltales away from seams that can snag them, than to have them exactly at quarter height, etc. But do ensure you have all three "sets" of telltales the same distance in from the jib's leading edge in order to avoid getting confusing readings. That distance should be just far enough aft of the luff sleeve stitching to keep telltale ends from being able to snag.

Having marked the desired location for our three luff telltales on the jib luff's cloth, we now use the needle to thread the first telltale through the cloth such that a 10-cm. loose end remains on one side of the sail. Next, we cut the wool such that there will also be 10 cm. on the other side of the cloth. All that now remains to be done is to tie into the wool an overhand knot *(above)* close to each side of the cloth to keep our telltale centred with ~10 cm. on each side of the sail. Note: Until I used the blunt end of the needle as a fulcrum inside the loop of the overhand knot, I had trouble working the knot really close to the cloth.

Leech telltales: On our main, we use just one telltale, on the leech between the top two battens. The jib leech telltale also goes at about 3/4 height, far enough from the spreader to avoid entanglements as much as is reasonably possible. The leech telltale attachment procedure is as follows:

1. put a figure 8 or overhand knot in the long loose end of the wool.
2. Slide the needle inside the fold of cloth at the trailing edge of the leech between two of the stitch holes, letting the needle come out through the folded cloth at the very aft end of the leech.
3. Pull through until the stopper knot is wedged safely inside the fold where it will not catch the rest of the telltale.
4. Cut telltale to its desired length (10-15 cm.)

Off the wind: Off the wind, things are a fair bit less complex. As far as your sails are concerned, "tuning" is mostly a matter of letting your sails out to the edge of a luff (to once more avoid the dreaded stall) and of using enough vang to keep the boom level to the water line. Before I touch on spinnakers, here are three pictures that tell most of the story:

Pretty as these curves look, none of the above sails are using the wind to best advantage. Using enough vang to get the booms level would leave these mains at a far more uniform angle to the wind. Since neither main is luffing, one must assume that large parts of them are oversheeted and thus stalled. The jibs have the same problem. Really keen crews have been known to by-pass the jib lead and hold the sheet further forward where they can add more downpull on the leech and remove this performance-draining twist.

And in heavy airs, an unvanged main increases capsize risk during a gybe. Aong other things, the boat has to be turned much further before the wind can finally get around behind the upper main and violently slam the main over.

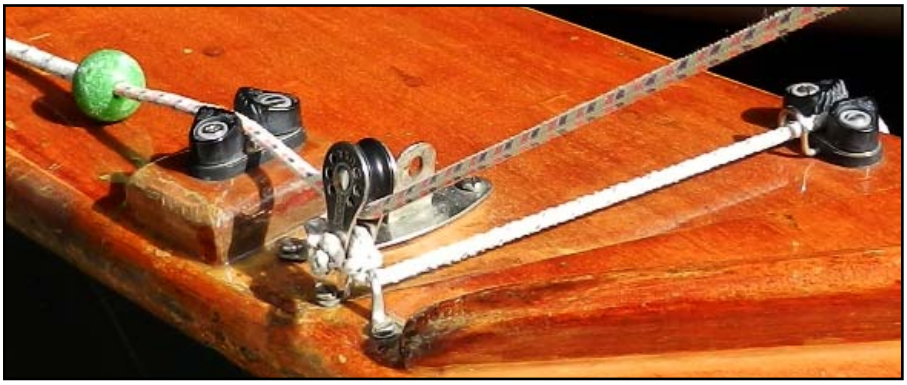
(above) Note how Uncle Al - to keep the boom end from lifting - has tightened his vang just before reaching the windward mark after not needing it while going upwind. In another pre-rounding preparation, Marc has just let off both cunninghams completely (see wrinkles in both luffs) because cunningham tension is undesirable on reaches and runs as can be seen on the left where the main is nicely vanged to keep the boom level but the jib luff has a stretch bulge that shows why you don't want the cunningham tensioned while you are sailing off the wind.

Spinnaker odds and ends

The complexities of the spinnaker, its gear and its routines are very nicely covered in the *Wayfarer Book* and on the web in the WIT. But to complete my simplified sails summary, I will provide some bits of spinnaker wisdom that help me a lot and that may be new to you.

Gear

After decades of use, I still love my spinnaker system, most especially the following:



My ability to cleat the guy right at the shrouds is a thing of beauty, though slightly upgraded from its 70s and 80s Mark 1 version when in 1989, the Brits brought the "balls system" to the Worlds. The green ball above has slid along the spi sheet core to the spot where the outer covering has been needle-whipped to the core. If I now uncleat the guy, the ball and sheet stop at the block and leave the pole (at normal height) and the guy just off the forestay. (details on WIT)

To keep our spinnaker halyard from getting in the way when the spinny is not in use, I have on both sides of the boat, the system shown on the right. This keeps the halyard under tension once the crew has cleated the halyard as shown, after which the helm tightens the halyard and cleats it aft.

Stowing the pole uphaul/downhaul.

Little do these lovable friends we made at our 2011 N.A. Rally in Hermit Island, Maine *(facing page)* realize they are helping me illustrate the pole stowage improvement shared with us by Mike Mac - a little aft-facing hook into which we can snap the pole uphaul/downhaul and thus keep the stowed pole from sticking out forward of the mast and getting in the way when we tack.

Hoist and Douse

In this day and age of the ever more ubiquitous dead runs to be sailed, I am finding it well worth planning for a executing a windward hoist if the spinnaker leg is going to be a run. For me, this avoids having to drag the spi up through the mess of shroud, spreader and mainsail. And if my crew is willing and able, (s)he can get the chute flying and hand it off to me before adding the the pole to the ensemble?

Haste Makes Waste

How true this is when we douse the chute! There are two things that we need to make time for in our douse - no matter how hectic the situation may have become:

1. The helm must ensure that the spi halyard is not tangled. A great way to do this is to grab the loose rope at the cleat and then let it run through your fingers as you raise your arm straight up over your head. I do this while standing and keep my arm up there while loosely gripping the halyard until the crew has finished pulling the spi down.

2. Always dousing to windward, the crew must above all keep the spi and its sheets from going under the boat. A good crew soon learns to pull down diagonally and rapidly such that the foot comes around the bow as the spi comes down - no fancy fiddling or stowing, just speed!

Flying the “little dear”

When a new crew asks how far aft the pole should be, I suggest pulling the pole as far aft as possible while still keeping the spinnaker looking like the ones on the left below, not stretched to leeward of the pole like 864 which has the pole too far aft (or the spinnaker sheeted in way too far).

More spi nuggets: Remember that on a run, a spi can also collapse because it is in too far and being blanketed by the main. In that case, pole aft and sheet eased!

On a run/broad reach, in **light airs**:

1. I have my crew hold the spi "short" *(above left)* bypassing a bunch of friction and sheet weight - barberhauler partially on to keep sheet from getting stuck behind boom?
2. heel to windward to let gravity bring spi out from behind the main - helm holds boom out
3. lower pole if the wind is so light it can't lift the spi cloth *(below right)*
4. take jib down to help spi to fly?