BASIC DINGHY TUNING

A Guide for Tuning the Albacore and Laser

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SETTING UP THE ALBACORE

1. Mast and boom

a) Generally

The mast and boom are key to controlling sail shape and, by extension, power. On modern dinghies, the mast will be tapered along its length and is very flexible, particularly high up, so that it may be bent in various ways to control sail shape. In contrast, the boom will be so inflexible that it cannot be bent.

Older boats tend to have untapered masts and bendy booms, indeed often the mast and boom will be made of the same guage material and be of the same diameter. This severely limits the ability to control sail shape. Rather, the mast and boom will bend under load in ways that are actually counter to good sail control.

b) Making sure the mast is straight

Odd as it may seem given these initial comments about the ability of modern masts to bend, the very first check to make when setting up an Albacore is to confirm the mast is actually not bent.

This needs to be done before the mast is installed on the boat and checked in two different dimensions. First, with the tip of the mast sitting on the ground, raise the base to eye-level and sight down the bolt rope track. The track should be visibly straight along its entire length. If the mast is bent side-to-side, that will be immediately apparent. Second, still with the tip of the mast on the ground, rotate the mast 90 degrees and look along the lip of the bolt rope track. Again, the mast should be visibly straight along its entire length. Minor bends can often be cured by wedging the mast, at the bend, between two trees and gently applying pressure to straighten it.

c) Checking shroud length

After confirming that the mast is straight – and again before stepping the mast – check that the shrouds are the same length by pulling them both taught along their length and then bringing them together in the middle of the mast at their bottoms. The bottom of the swages should line up. If they don't, the shrouds are obviously different lengths. Generally, if there is a difference in length, it won't be a large one. Mark where the shorter shroud comes to on the longer one as this needs to be known when the mast is stepped to ensure the mast is straight side-to-side. (The length of the forestay doesn't matter).

d) Setting the spreaders

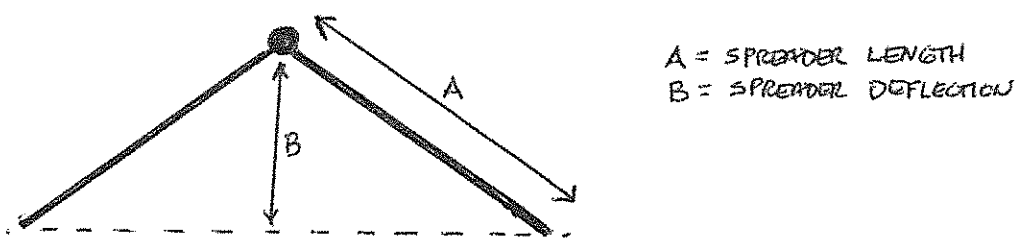
Before the mast is stepped, the spreaders should be also inspected. Spreaders are potentially adjustable for length and for deflection (that is, the angle they form to the mast). They can be fully fixed, fully adjustable or sometimes partially adjustable.

Fixed spreaders are just that – they are neither adjustable for length nor for deflection. With these types of spreaders, the only recourse if the settings are not appropriate is to replace them.

Fully adjustable spreaders should first be checked for length. For the average crew, the spreaders should be 42.5 cms long (16 ¾ inches). (Lighter crews may want to shorten the length of the spreaders by about 10 cms (2 ½ inches)). Some spreaders will have adjustments that allow you to change their length. If the spreaders do not have such an adjustment and are overly long, they may be shortened by cutting them at the base.

Once the spreaders are set to the proper length, place the mast on the ground with the spreaders pointing upwards and spread them apart as far as the will go. Lay a yardstick or something similar across between the two spreaders and then measure the distance from the bottom of the yardstick to the bolt rope track at the point on the mast where the spreaders are mounted. That distance should be 19 cms (7.5 inches). If necessary, adjust the deflection of the spreaders to achieve this result.

Semi adjustable spreaders will be adjustable for deflection only.



e) Checking the mast step

Finally before the mast is stepped, inspect the mast step plate in the bottom of the boat. As a good maintenance practice, check that the screws holding the plate into the boat are not loose (but do not overtighten them).

The mast step plate should have two bolts running across its width. The heel of the mast will sit between those two bolts when the mast is stepped. The forward-most bolt should pass through the set of holes at the very front of mast step. If it is not located there, relocate it and then relocate the rear bolt forward as well. (Count the number of placement holes that separate the front and rear bolts before removing them and leave the same number when you reinstall them).

f) Adjusting mast rake

After checking the position of the mast step, the mast may be stepped. (The mast is stepped without the shrouds attached. When sitting in the mast step, the mast will rest safely against the mast gate at the deck).

Once the mast is stepped, the mast rake must be set. The rake of the mast is the offset of the tip of the mast from a perfectly vertical position. It can be measured in various ways, but the most common is by measuring the distance from the tip of the mast to the transom of the boat. To do this, follow these steps:

- Attach the shrouds where they naturally seem to align on the shroud adjusters inside the boat.

- Raise the jib and tension the halyard properly (discussed further below).

- Take a piece of thin, spare line and measure off a distance of 22'10". Mark the line at that spot.

- Attach the end of the line from which you measured to the main halyard (that is, the mark should now be 22'10" from the point the line is attached to the halyard). Note how much line you used up to secure it to the main halyard and the length of the shackle on the main halyard.

- Raise the end of the line as high up on the mast as it will go and secure the halyard.

- Lead the line that is attached to the halyard to the stern of the boat and draw it tight to the top of the transom. (Note: if the transom is scalloped or curved, place a yardstick across the two corners of the transom and draw the line tight to the bottom of the yardstick).

- If the rake is properly set, the mark on the line, plus the amount used to tie it to the halyard and the length of the shackle, will touch the top of the transom. If it passes by the transom, then the mast is raked to far aft; if it doesn't reach the transom it is too far forward.

- Adjust the rake if necessary and try again. To adjust the rake, release the tension on the jib halyard and move the shrouds either up (to rake forward) or down (to rake aft) in the shroud adjusters in the boat.

- Repeat this process until the rake is set correctly. Note: this is not an exact science; an inch or two one way or the other will not matter.

Once the rake has been set, mark the points where the shrouds attach on the boat so that you do not have go through the process of re-setting the rake every time you put the mast up. As a double measure, always put the clevis pins back in the holes they came out of when you take the mast down.

g) Postscript on rake

Rake is one of two adjustments that directly affect how the boat sails when it is on the water.

Sometimes, when the boat is sailing upwind, it will seem to always have a tendency to turn into the wind. This is called "weather helm" and it is caused by the mast being raked too far aft, the centerboard being lowered too far down or the crew weight being too far forward. If raising the centerboard slightly and moving crew weight aft does not cure the problem, the rake will need to be adjusted. Note: do not confuse weather helm as a result of excessive rake with the natural tendency of a dinghy to round up into the wind when it is heeled over. The latter kind of helm can be reduced by sailing the boat flat.

Sometimes (though rarely), the opposite happens and when the boat is sailing upwind, it will seem to always have a tendency to turn away from the wind. This is called "lee helm" and it is caused by the mast being raked too far forward, the centerboard being up too far or the crew weight being too far aft. If lowering the centerboard slightly and moving crew weight forward does not cure the problem, the rake will need to be adjusted.

Some weather helm is always good to have as a safety feature. Lee helm is never desirable.

2. Mainsail controls

a) Rig tension

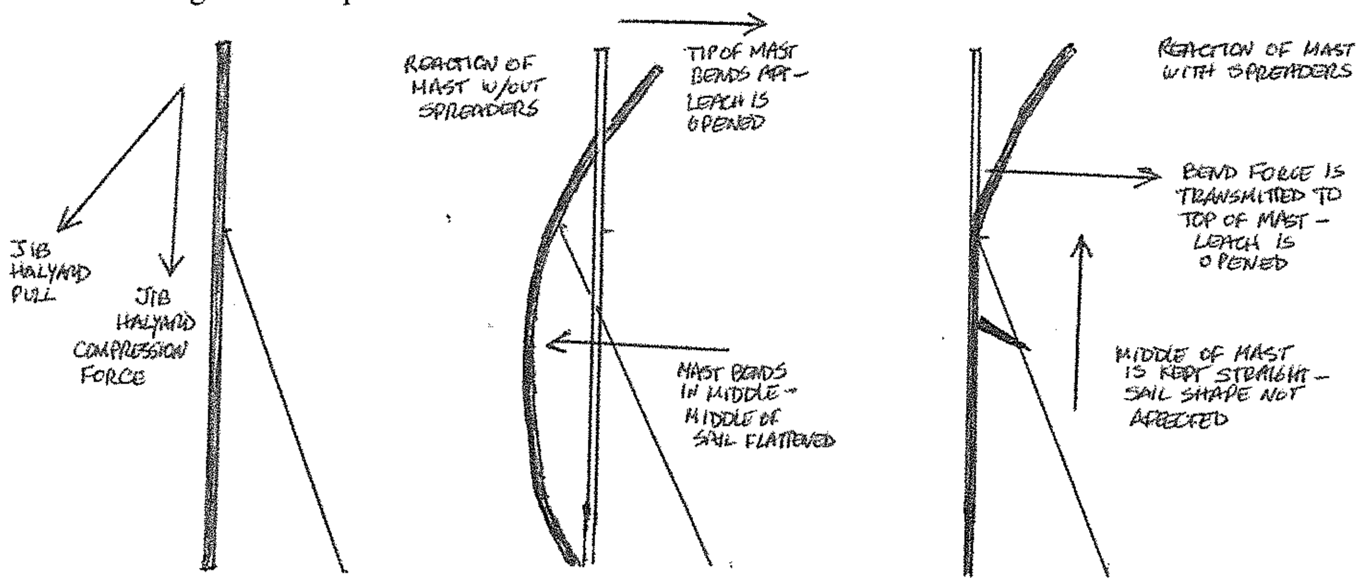
Rig tension on the Albacore is controlled by the tension of the jib halyard. It affects the performance of the boat in three ways.

First, jib halyard tension affects mast rake. As the halyard is tightened, it pulls the tip of the mast forward, decreasing rake. (That is why the rake must always be measured with the jib raised and the halyard at its normal tension).

Second, rig tension affects side-to-side bend of the mast. A loose rig will allow the top of the mast to bend off to leeward. This can often be seen when sailing upwind when the leeward shroud goes slack while the windward shroud is very tight – the distance between the hounds and the deck has decreased on the leeward side and so the leeward shroud slackens. This happens because the mast has bent to leeward as a result of pressure exerted on it by the mainsail.

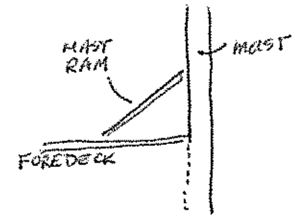
If the mast is allowed to bend to leeward, the result is to allow the mainsail to spill wind as the upper part of the leach is suddenly under less tension and, it too, blows off to leeward. This effect is called "opening the leach". And while depowering the mainsail through opening the leach is key tool in depowering the mainsail, generally it is not accomplished through the use of a loose rig except in heavy winds (see further discussion below).

Third, rig tension affects the draft or fullness of the mainsail. Imagine what happens as the jib halyard is tensioned. The forestay pulls the mast forward and the shrouds become tighter. They in turn start to compress the mast. In a mast without spreaders, that compression creates a curving of the mast along its length – think of standing a small twig on end and pressing down on the top of it with your finger. Since the shrouds are attached to the boat aft of the mast, the forces will curve mast forwards. That bowing results in increasing the distance between the deepest part of the curve and the leach of the sail, stretching it and, as a consequence, flattening it. Flattening the sail depowers it.



Masts equipped with spreaders allow more control over where precisely the bending of the mast takes place along its length. The swept back orientation of the spreaders and their location in the upper third of the mast combine to move the point of maximum mast bend upwards. This means that mast bend due to rig tension tends to affect the upper part of the sail, rather than the lower area. Again, this becomes a mechanism for "opening the leach" and depowering the mainsail.

Mast bend induced by rig tension can also be controlled through the use of mast rams or prebenders. These are controls mounted at deck level, forward of the mast but attached to it. They are used to reduce lower mast bend by holding the lower mast firmly in place. A mast ram is a solid rod on a screw that rotates in or out. Prebenders consist of a line wrapped around the mast at the deck which pulls the mast. Both controls are adjustable.



The proper amount of rig tension depends directly on how heavy the crew is and the wind and wave conditions being sailed in. Generally, a lighter crew sailing in heavier winds will want a looser rig, even to the point of permitting some slack in the leeward shroud. This will allow the tip of the mast to feather to leeward in puffs. Heavier crews, because they can man-handle the boat better, can get away with higher rig tensions. Commercial gauges are available that will actually measure shroud tension. Light crews will want a rig tension of between 200 and 250 lbs depending on conditions while heavier crews will want somewhere between 300 and 350 lbs of tension.

b) Main halyard and gooseneck position

Someone once remarked that he figured could place mid-fleet in any club-level race in any type of boat just by making sure his boat was properly rigged. Though overly cynical, this remark underlies the reality that many people tend to be pretty haphazard in how they rig their boats. Nowhere is this more evident than in looking at how people rig their mainsails.

It is of critical importance to obtaining proper sail shape that the mainsail be raised as high as it will go on the mast. In some set-ups, one cannot do otherwise as the main halyard as a wire loop that must fit over a single hook at the base of the mast and this ensures the sail is fully raised. But most set-ups either use a razorback fitting which offer a number of alternative hooks on which to secure the loop or use all rope halyards which are secured to a cleat, which means the person rigging gets to decide when to stop hauling up the sail. Many stop well before they should.

To ensure the mainsail can be fully raised, do five simple things:

- never try to raise the mainsail except with the boat head to wind;
- make sure the mainsheet, boom vang and Cunningham are all not cleated and fully slacked;
- have a crew member hoist the end of the boom over his or her head in the final effort to remove tension on the leach;
- leave the boom off the gooseneck until the halyard is secured;
- mark the halyard line in some way as an indicator for when the mainsail is fully raised.

Note: if the main halyard consists of a wire loop that must go over some type of a hook, always ensure that the rope tail that is attached to the wire loop is pulled up and away from the end of the loop once it is on the hook. In other words, avoid a situation where the rope is between the loop and the hook so that the rope is bearing all the stress. Otherwise the rope tail will quickly wear through. Let the wire loop alone take the load.

Once the main sail is fully raised, then attach the boom to the gooseneck. On some boats, the gooseneck is fixed on the mast and not adjustable. On others, it slides vertically along the mast on a track. With an adjustable gooseneck, moving the gooseneck up or down affects how loose or tight the luff of the mainsail is, and so its fullness.

The lighter the wind, the more full the sail should be (except in very light conditions when the sail should be flatter). Fullness is also controlled by the class rules. There is a black band on the mast near the gooseneck and the fitting cannot be above that mark.

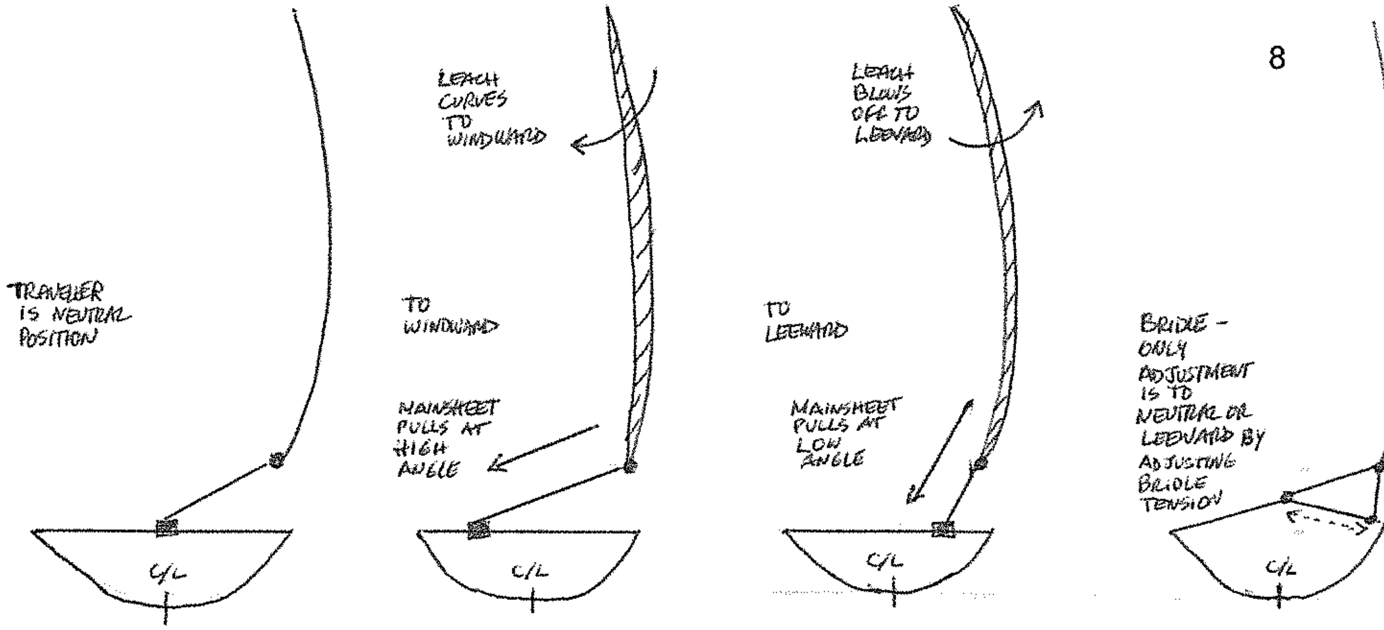
c) Mainsheet and traveller or bridle

The mainsheet performs the most obvious control of the mainsheet. As any novice sailor knows, letting out the mainsheet spills wind from the sail and depowers the boat. Pulling in the mainsheet has the opposite effect.

This explanation is, of course, perfectly correct. Gross mainsheet adjustment alters the angle of attack of the mainsail to the wind and either produces a less efficient or more efficient result as needed.

But the mainsheet also performs an equally important role in terms of controlling sail shape. The pulling in /easing out description of mainsheet function goes to the ability of the mainsheet to position the end of the boom relative to the centerline of the boat. This has a direct effect on the twist that is put into the leach and is most easily observed when looking from the stern of the boat. As the mainsheet positions the end of the boom closer to the centerline, it adds twist to the leach and adds power. As the end of the boom moves further away from the centerline, twist decreases and so does the power of the sail, to the point where the boom is well outboard and the leach is not twisted at all.

Older boats were equipped with travellers, consisting of a metal track running across the boat with an adjustable car running on it. A mainsheet block was then mounted on the car. As the car was moved towards the centerline, and in light air even to windward of the centerline, the angle at which the mainsheet was pulling on the boom increased and this augmented the leach twist (and power) sheeting in was already providing. Modern boats use Laser-style bridles instead of travellers (which some older sailors find odd, since travellers originally replaced bridles…). Bridles will not permit the mainsheet to pull the end of the boom to windward of the centerline but otherwise operate in similar manner to add twist to the leach.



The other effect the mainsheet can have on mainsail shape is to flatten the lower mid portion of the sail. As the mainsheet is pulled in, it starts to exert a downward force on the middle section of the boom. If the boom is not stiff enough to resist this force, it will bend. As the boom bends, it will stretch the sail downward, reducing draft. This is not desirable and is one of the reason modern booms are quite stiff.

Generally, in light air, the leach should have good twist – though it is important in very light air to avoid oversheeting. The boom should never be brought further in than over the leeward corner of the transom (even when using a traveller – the car may be brought to windward of the centerline, but the sheet is then eased to reposition the end of the boom over the transom corner).

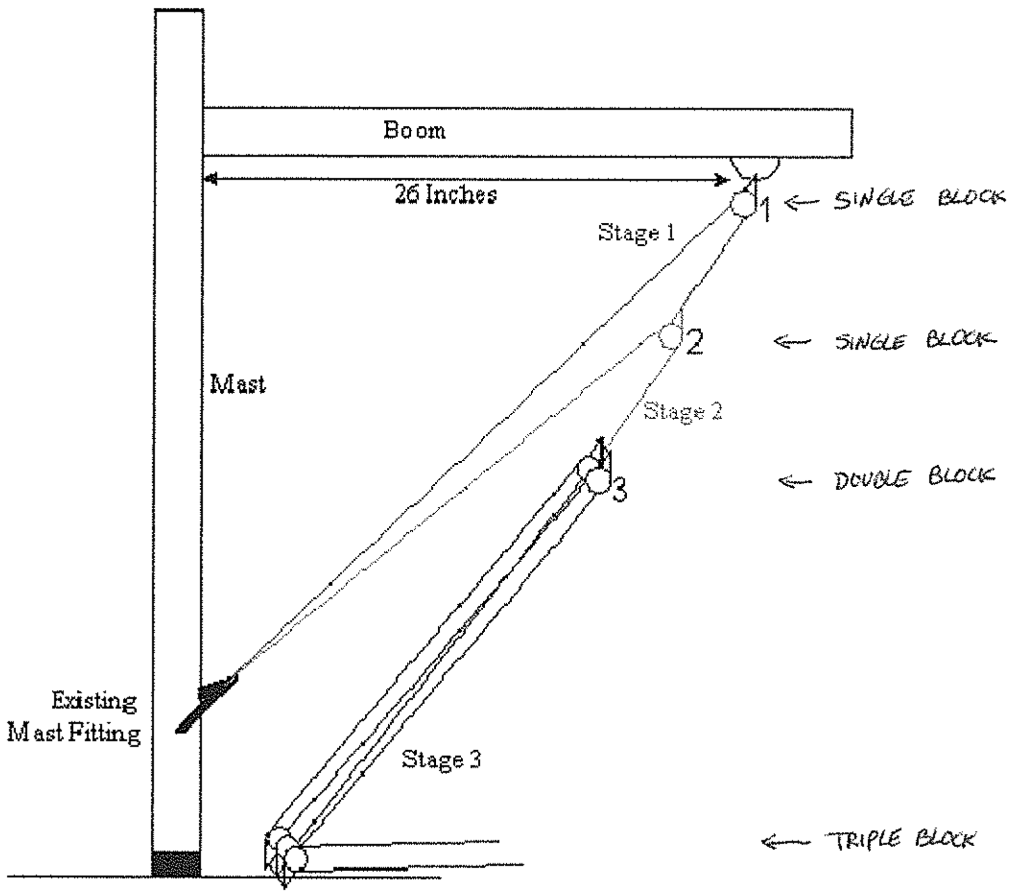
As the wind increases, it is important to keep the boat flat. If heel cannot be controlled by hiking, the first response in a boat with a traveller is to move the car to leeward of the centerline while keeping the end of the boom over the transom. If that is not effective, or if the boat does not have a traveller, it is then time to let the mainsail out (luff the sail).

d) Boom vang

Boom vangs have evolved radically over the last fifty years. Initially, boom vangs consisted of little more than a single line running from the base of the mast to the boom. Their purpose was merely to prevent the end of the boom from jackknifing into the air when the mainsheet was not under load (as for example on runs).

Basic multiple purchases of 3:1 (as seen today on standard Laser rigs) arrived in the late 60's-early 70's, still with the objective of controlling boom movement. However, by the late '70s, more powerful vangs started to become common place – first using levers to increase purchase but more lately using a series of cascading pulleys. As an example of the change, a modern racing Laser uses a boom vang of 15:1 – five times more powerful than the stock equipment.

A 16:1 system for the Albacore would look like this:



Combined with modern extremely stiff booms, the increase in purchase brought a fundamental change in role for the boom vang. Today, on high performance dinghies, the boom vang is as key as the mainsheet to controlling the shape, and thus the power, of the mainsail.

The physics of a modern boom vang is not hard to understand. As the boom vang is tightened, the boom resists bending and most of the increased force is transmitted horizontally to the inboard end of the boom at the gooseneck and against the mast. Modern masts, in contrast to modern boom, are extremely flexible. But for a normally high rig tension that is holding the spar stiffly in place, the mast offers little resistance to the forward horizontal pressure and it wants to bend.

The tight rigging and spreaders operate to place the bending force above the hounds into the upper reaches of the mast. The tip of the mast therefore bends aft. As it bends aft, it reduces the distance between it and the aft end of the boom. This has the effect of slackening the tension on the leach and depowering the mainsail.

So: initially in light winds, where no de-powering is required, the vang should only be used for its traditional function – to keep the end of the boom from rising (because, of course, if the end of the boom rises, it will reduce the distance between it and the tip of the mast and free the leach). As the wind starts to rise, vang tension should be increased, first to maintain good leach shape and, as the wind rises further, thereafter to start to free the leach and depower the mainsail.

A good indicator of sufficient boom vang tension is to install a telltale in the area around the top batten. If the telltale is flowing freely, you have proper leach tension. If it is curling behind the sail, and you can still hold the boat flat, add more vang tension. Note that a backwinding telltale may also indicate that the main is oversheeted or, if equipped, that the traveller car needs to be more to leeward.

Another good indicator is the amount of backwinding in the mainsail. If the leach is too free, it will start backwinding up near the head. A properly adjusted vang will promote the luff of the mainsail to begin luffing down its entire length simultaneously.

Note: on older boats without stiff booms, powerful vangs offer no advantage, as the boom simply bends in response to increased tension. On older boats, use the traveller/bridle and mainsheet to control the leach.

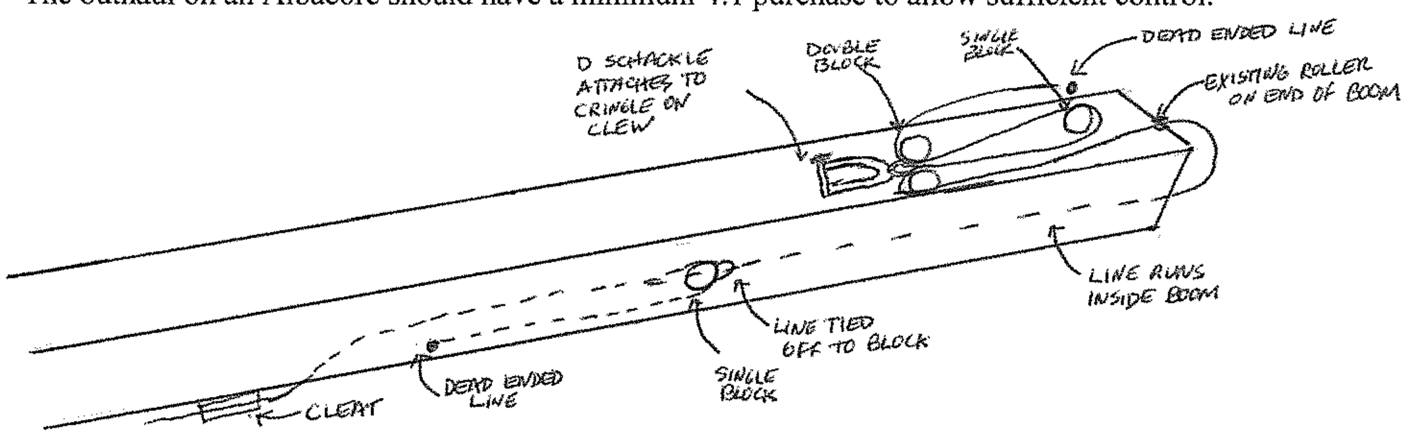
e) Outhaul

The outhaul controls how much draft there is in the lower part of the sail – the tighter the outhaul, the less draft there is and the more depowered the sail is.

How tight to set the outhaul depends on three criteria: how old the sails are (newer sails will need less outhaul tension because they are less baggy than older ones), how hard the wind is blowing (except in very light conditions, outhaul tension should be looser as windspeed drops) and how heavy the crew is (heavier crews can carry fuller sails than lighter crews). In no case should the outhaul be so loose that vertical wrinkles appear along the foot or the foot seems to create a shelf along the boom.

The outhaul should be eased about 1 ½" on offwind legs to create a very full sail.

The outhaul on an Albacore should have a minimum 4:1 purchase to allow sufficient control.

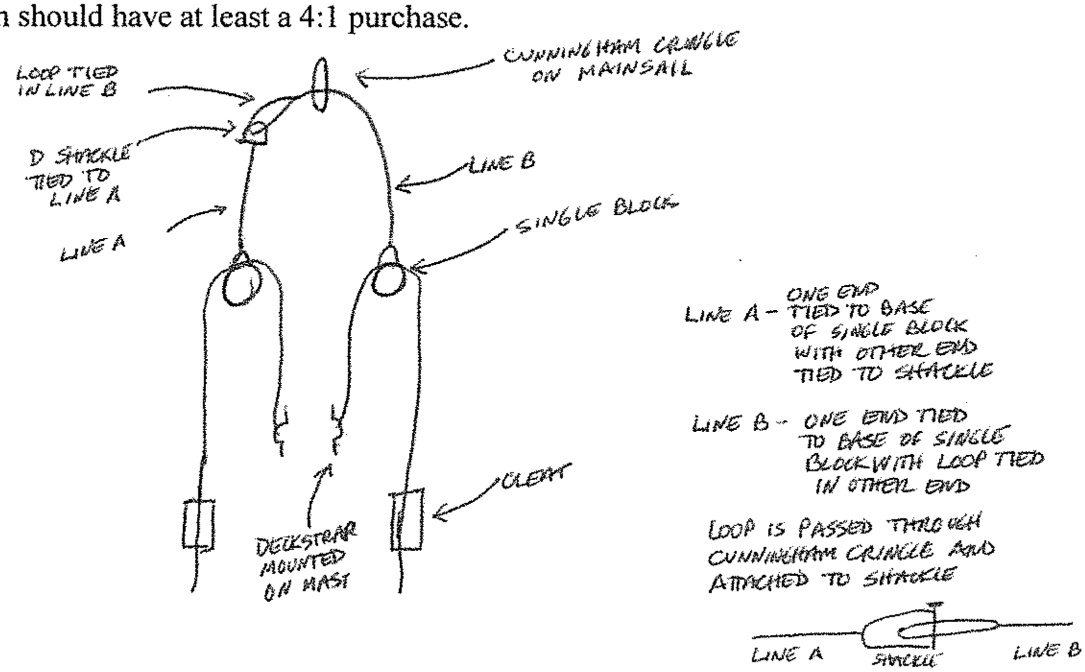


f) Cunningham

The Cunningham also controls the draft of the mainsail. As the sail fills, the point of maximum draft has a tendency to move aft and up. This is not ideal for sail control. By tightening the Cunningham, the draft is moved back down and forward.

Cunningham tension is, again, directly related to windspeed – except in very light conditions, the lighter the wind, the less Cunningham tension is needed, so that the sail remains as full as possible. Start with just enough tension to remove the horizontal wrinkles running out from the luff and increase tension from there.

The Cunningham should have at least a 4:1 purchase.



3. Jib controls

a) Jib halyard

As has been described, the jib halyard performs several functions: it controls mast rake and it controls rig tension, which in turn controls mainsail power. But it also still the jib halyard and beyond raising and lowering the sail, it controls luff tension of the jib and, as a result, fullness and power of that sail. The tighter the jib halyard (the more rig tension it is being used to create), the flatter the jib is.

Contrary to what many think, some sag in the jib luff is desirable in most conditions. In light conditions, for example, the jib luff should be slack enough that, midway up the luff, the luff sags backs towards the mast about 3" off the line formed by the forestay when it is pulled taught.

On dead runs, the jib halyard can also be eased to add fullness to the jib.

Too much sag will hurt pointing. Oddly, so too will too little. In most conditions, about 2" of luff sag off a line from the forestay is about right, but this advice must be tempered by the impact on rig tension and resulting power of the mainsail.

b) Jib fairleads

Novice sailors are generally very focussed on the mainsail and never pay the jib much attention. Serious racers see the jib as playing a critical role in creating boatspeed, not only in and of itself, but as being key to developing full available power in the mainsail.

To understand the role of the jib in mainsail power, a brief overview of the theory on how sails work is necessary.

Ask someone on the street how a sailboat moves and the answer is usually straightforward: the wind blows against the sail and pushes the sailboat along. As logical as this response may be, it is, not surprisingly, simplistic and actually, for all points of sail but a dead run, wrong. Think about it: if the wind pushes a sailboat along, how can a boat sail upwind when it sailing "against the wind"? In fact, sailboats sail for much the same reasons that airplanes fly. It's not about push; it's all about lift.

Think of a breeze blowing down a lake. If you could see it, you would see the air flowing in straight parallel lines. (You can see this when you look at a flag blowing in a strong wind – the flag blows straight out). When something gets in the way of that breeze – like, say stand of trees on an island – those straight parallel lines of air that are closes to the obstacle will bend around it and then, once past it, resume their straight parallel path. That disruption is highest closest to the obstacle and the amount of disruption decreases as the distance from it increases, to a point where, far away, the airflow isn't being disturbed at all by the obstacle. Out there, it simply carries on in a straight, parallel manner.

Key here is the fact that these streams of air resist compression. That is, close to the imaginary island, because the island is big and hard, the airflow will bend and compress. But as the distance from the island decreases and the force of compression is less caused by the rocks and trees of the island and more by the airflow itself trying to compress other parts of the airflow, those other parts of the airflow are not as easily bent. They want to stay on their straight, parallel course.

The airflow in-between gets pinched. Now that same volume of air must get through a narrower channel between the island and the outer reaches of the airflow that is unaffected by the disruption of the island and is not prepared to alter its straight parallel flow.

What must happen next? Think about a garden hose. With the tap fully open, water comes out of the garden hose at a certain rate. You can see how fast it is flowing by how far the spray goes out into your yard. Think about what would happen if you partially cover the hose outlet with your thumb. Suddenly the water goes much further out into your yard; the water is flowing much faster. Why is this? Because the volume of the water has not changed, but the diameter of the hose has been reduced (your thumb is partially covering the end of the hose), the rate at which the water has to leave the hose outlet has to increase, in order to move the same volume of water within the same amount of time.

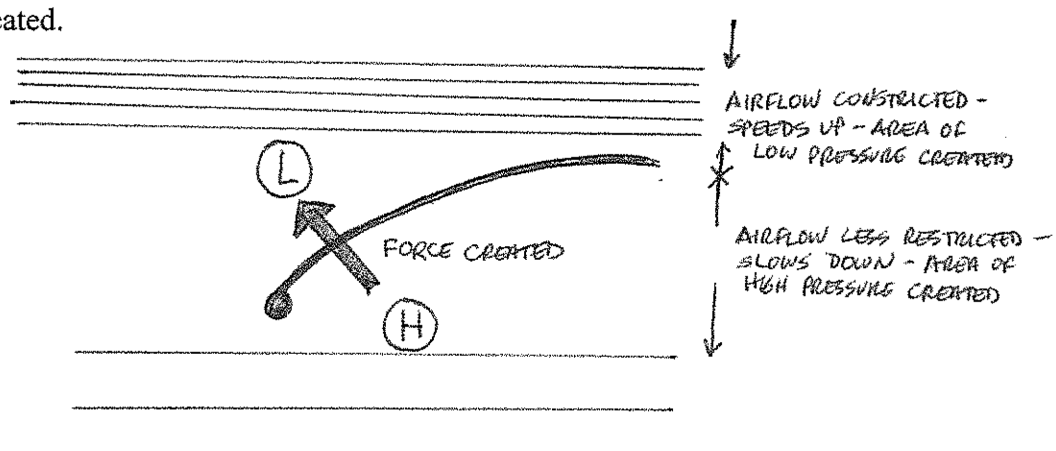
Returning to the island: When the airflow is constricted by the island and the rest of the airflow far away from the island exactly the same thing happens. The airflow that is affected by the disturbance the island creates speeds up. Nature must move the same volume of air through the constriction as it moves where there is no restriction. To do this, the speed of the air must increase.

Now think about a sail. Viewed from the top of the mast, the sail looks like a curved feather. On the leeward side of the sail, it bulges out downwind. On the windward side, it scallops away downwind.

On the leeward side, a sail interferes with airflow exactly the way the island does, or the way your thumb over the garden hose interferes with the flow of water. It creates a disturbance which compresses the airflow and, as a result, speeds the airflow up.

On the windward side, exactly the opposite happens: when the windward side of the sail bends away from the airflow, it creates more room for the airflow to pass through and this has the opposite effect to what is happening on the leeward side – the airflow slows down.

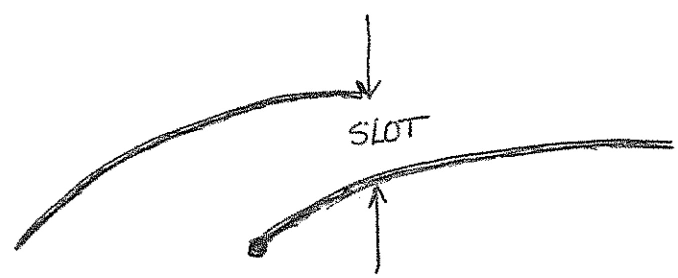
Here another theory of physics comes into play and, since there is no way to explain it easily with analogies, you just have to accept it on faith. (And since it is the theory which explains why airplanes fly, it's probably right). That theory is: where a flow is disturbed as a result of compression -- with the result that the speed of the flow through the constriction increases – a local area of low pressure is created in the constriction. Likewise, the opposite is true. Where a flow is disturbed such that the speed of the flow is reduced, a local area of high pressure is created.



With a sail, this area of low pressure is created on the leeward side of the sail and the area of high pressure is created on the windward side of the sail. And as you know from watching the weather reports on television, when there is an area of high pressure in one spot and low pressure in another, nature tries to even things out by sending some of the "extra" air from the area of high pressure to the area of low pressure – this is principally why there is wind after all. So with these differences in pressure on either side of the sail, a force is created as nature tries to restore equal pressure on both sides of the sail. That force is what makes a sail move the sailboat.

With weather systems, the larger the pressure difference between an area of high pressure and an area of low pressure, the stronger the wind is – the harder nature tries to equalize the difference. So too with the physics operating on a sail – the greater the pressure difference between the windward and leeward sides of the sail, the more force is exerted on the windward side of the sail as nature tries harder to equalize that difference. The more force that is generated, the more power that is available to drive the boat.

How can the pressure difference between the two sides of the mainsail be increased? By increasing the relative speed of the airflow on the leeward side of the mainsail. How can the relative speed of the airflow be increased? By further constricting the airflow from its natural, parallel path. How can the airflow be constricted on an Albacore? Well, how about sticking a sail in front of, and to leeward of, the mainsail and using the shape of that sail to constrict the airflow headed toward the mainsail?



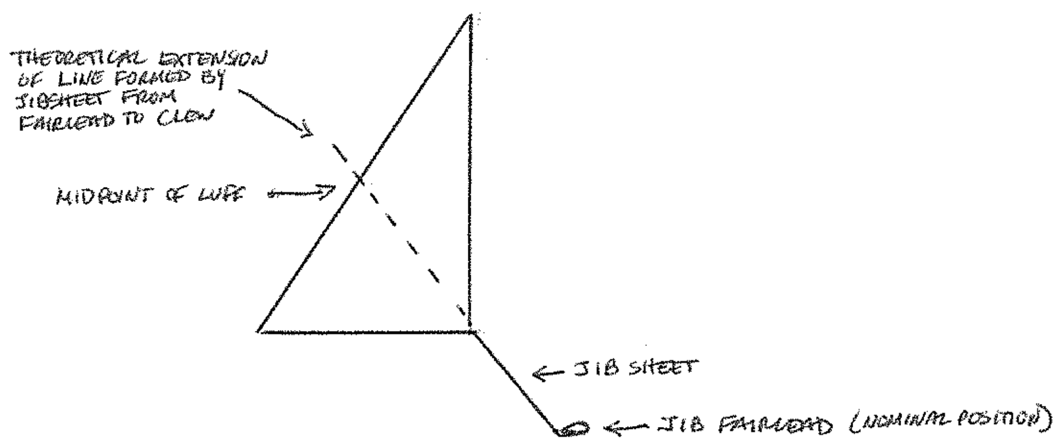
This is how the jib is used to generate more power for the mainsail: by using it to accelerate the airflow on the leeward side of the mainsail. The space, and overlap, between the leach of the jib and the luff of the main is called "the slot". Managing the slot is accomplished principally through the placement of the jib fairleads and jib sheet tension.

Jib fairleads can be fixed or can be potentially adjustable up to six ways: inboard or outboard relative to the centerline of the boat, fore or aft relative to the transom/bow, and up or down relative to the deck.

All of these various available adjustments have as their objective tensioning or easing pressure on the foot of the sail. Tensioning the foot (pulling it aft more than pulling it down) tends to ease tension on the leach and flattens the sail. This has the result of widening the slot and depowering the main. Easing the tension on the foot (pulling it down more than aft) tends to put more tension on the leach and add fullness to the sail. This has the effect of narrowing the slot and powering up the main (to the point where the narrowed slot actually chokes the airflow off and causes it to deflect into the mainsail, causing backwinding).

Modern Albacores come equipped with the moveable fairleads running fore and aft on fixed tracks – so they offer only fore and aft adjustment. But the tracks themselves can always be re-located. The front of the track should be located about 10 cm (about 4 inches) aft of a line extending perpendicular to the centerline and outboard from the centerboard pin. The tracks themselves should run about 15" inches outboard of and parallel to the centerline of the boat. The tracks should be about a foot long and the center of the track should be about eight feet from the transom.

The placement of the fairlead on the track depends on the natural shape of the jib and wind conditions. As a rule of thumb, a good neutral starting point for the fairleads should be such that when the jib sheet is tensioned, an extension of the line it forms between the fairlead and the clew of the jib would intersect the luff of the jib about halfway up the sail.



From that point, it is a matter of seeing what works best. Generally, the fairleads will be move aft of the neutral position when going upwind and forward of the neutral position when going offwind. Adjustment when sailing close hauled should be focussed on reducing backwinding of the main when both sails are properly trimmed for heel. That said, some backwinding of the main should remain about 36" above the boom and about a foot aft of the mast.

c) Telltales

Telltales on the jib are extremely helpful in getting maximum performance from the sail. Placed about midway along the luff and 2-3" aft of the jib halyard, telltales will reveal if the jib is properly trimmed. The objective is to have telltales on both sides of the sail flowing parallel to the deck. If the windward telltale is flowing upward, it means the jib needs to be tightened or the boat needs to bear off. If the leeward telltale is flowing improperly, it means the jib needs to be loosened or the boat can luff up.

Telltales on the jib leach will reveal how the airflow is leaving the sail. If the telltale is blowing to leeward, tension on the leach needs to be eased by moving the fairlead forward.

d) Other controls: Cunningham and barber haulers

An Albacore jib may be equipped with a Cunningham to control the draft of the sail (keep it down and forward).

Jibs are often equipped with barber haulers. A barber hauler consists of a small pulley that runs freely along the jib sheet. A thin line tied to the bottom bracket of the pulley and is then led inboard, down through the side deck and across the boat. On reaches, by pulling on the barber hauler line, the jib sheet will be pulled inboard from a point further forward than the fairlead. This has the effect of adding twist to the leach. Barber haulers should be rigged to run about 6-9" forward of the shrouds.

e) Jib stick

A jib stick is just a small diameter aluminum pole. When sailing by the lee on runs (that is, when sailing with the jib on the windward side of the boat), it may be attached to the clew of the jib and then to an eye mounted on the front of the mast.

The effect of the jib stick is to push the clew straight out from the boat, turning the sail into an almost flat surface that faces perpendicular to the wind. This presents more sail area for the wind to push against.

4. Crew weight placement

Crew placement in the Albacore is critical to its performance and can be positioned in two ways – inboard/outboard and fore/aft.

Inboard/outboard weight placement is known to everyone. When the boat heels over, the crew uses its combined weight to offset that effect: in other words, the crew hikes. Keeping the boat flat (except in very light air) is key to performance success in the Albacore. The first response to boat heel should always be weight transfer outboard and, where that is insufficient, reducing the power of the sailplan.

In light air, this rule needs to be modified. Here, the need is to keep the sails full and to reduce the wetted surface of the hull (and so reduce resistance). In these conditions, the boat should be heeled somewhat to leeward.

Fore/aft weight placement is equally important but often overlooked. Fore/aft weight placement changes the hull shape that the boat presents in the water. Think about the underwater hull design of the Albacore. It has a knife-sharp bow that flairs to a broad table top stern area. Now think about that shape moving through the water. At low speeds or in heavy waves, which is more preferable to emphasize? Clearly it offers less resistance – and is therefore faster – in these types of conditions to slice through the water with the bow, rather than drag along by the stern.

Likewise, in higher wind conditions, it is important to promote planning. Is it easier for the boat to ride up on its bow wave (that's what planing is) with the crew weight pressing down on the bow or back towards the stern?

It is also important to be cognizant of how the crew is placed one relative to the other. The crew should always be placed right close together, regardless of where they are placed in the boat, in order that their weight works together and does not either cancel each other's efforts or cause the boat to hobbyhorse.

The following chart will help determine where crew weight should be placed fore and aft depending on various conditions.

	Light wind 10 knots or less	Medium wind 10-15 knots	Heavy wind 15 knots or more
Close hauled	Crew to leeward, on c/b trunk or next to shroud; skipper right next to crew. In very light air, don't change sides when tacking.	Forward – crew up against shroud but move back slightly to ensure side by side with skipper. Skipper right at thwart.	Forward – crew up against shroud but move back slightly to ensure side by side with skipper. Skipper just behind thwart.
Reaching	Same.	Both midships but prepared to move aft of thwart if boat starts to plane	Both aft of the thwart. Skipper back as far as end of tiller; crew close against skipper. Lean aft.
Runs	Same – crew to hold boom to leeward if need be	Start further forward than for reaches but be prepared to move aft if planning	Same

Remember: weight together!

5. Underwater surfaces

a) Hull preparation

A smooth hull surface maximises boat speed by reducing underwater resistance. It is important therefore to ensure that dings and scratches are properly filled and faired.

One issue that often arises is whether to wax or wetsand the hull. While waxing is more common, there is considerable debate as to its merits, the argument being that a waxed hull going through the water will carry air bubbles along its surface and that air/water resistance is greater than water/water resistance.

To achieve water/water resistance, many for wetsanding the hull with at least 600 grade paper, instead of waxing, arguing that the resulting roughness along the hull results in the hull picking up and essentially carrying a thin layer of water which then forms the interface with the surrounding water flow.

Those who believe in waxing a hull respond by saying that wetsanding cause a hull to become waterlogged. The logic is that wetsanding opens up the finish of the hull gelcoat, allowing water to permeate, and waterlog, the fibreglass fibres underneath.

Note: if you choose to wax, never wax the deck or cocpit of a boat as it will become dangerously slippery when wet.

b) Centreboard

The centreboard plays an important role in boat tuning. Generally, the Albacore is built with a fixed attachment point, so no fore/aft adjustment of the centerboard is possible. What is possible, as everyone knows, is vertical adjustment (up and down).

To begin with, however, it is important to know where "absolute down" is. That is, when the board is fully down, it should be precisely perpendicular to the bottom of the hull. This position may or may not correspond to lowering the board as far as it will go in the centreboard trunk. On many boats, lowering the board as far as it will go actually rotates the board past vertical to a position where it is angled forward (that is, towards the bow).

To avoid this situation, turn the boat over on its side on the beach. Lower the centerboard and, from the bottom side of the boat, position it in the proper fully down position using a t-square. Now go around to the cocpit side and draw a line with a permanent marker along each side of the centerboard using the top of the centreboard trunk as a straight edge. When you are sailing, lowering the centerboard to that mark will position it in the fully down position.

While the boat is on its side, ensure that the boat has a rubber or nylon seal running the length of the bottom of the centerboard trunk opening. If there is no seal, either have one made at the local chandlery (the chandlery will need to know the length required) or one can be made using a bicycle inner tube sliced in half. The new seal should be cemented in place using rubber cement and, for best longevity, held in place with two metal strips (one on each side of the trunk opening). Modern Albacores come with an indentation for the mounting of these seals.

If the boat has a seal but it is torn or worn, replace it. The centerboard slot seal keeps water from being carried inside the centerboard trunk while the boat is moving and ejecting out into the cocpit.

The centreboard should be inspected as well for cracks and dings and these should be repaired and faired.

On the water, the centerboard performs two functions. The first, and most obvious one, is that it resists the action of the wind trying to tip the boat over. This suggests that, when going upwind, the centerboard should be fully down and when on a run, the board should be fully up since it is not needed.

Such an analysis is somewhat simplistic. With regard to sailing upwind, while it is true that the centerboard counteracts heeling, it should not be forgotten that the centerboard actually causes heeling to begin with. Try sailing upwind with the centerboard fully up. The boat doesn't heel at all – it just goes sideways. Put the centerboard down and the boat can go straight, but it will also start to heel.

It is important to remember this if sailing in heavy winds. As has been said before, the Albacore is designed to be sailed flat. Counteracting heeling starts with hiking. When that fails, the next step is to depower the sails. But a third remedy also exists, however counterintuitive it might appear – raise the centerboard by up to one-third. The result will be to cause some leeway (sideslip) but it will significantly reduce heeling and in survival conditions may well make the difference between control and capsize.

Certainly, when sailing off the wind, the centerboard may be raised. The closer the course is to dead downwind, the less the centerboard is needed to either counteract heeling or to maintain course. However, even on a dead run, some centerboard (about a third) should be left down in order to help maintain helm control.

Note: when gibing in heavy winds, it is always advisable to raise the centreboard. This is extremely concerning for novices but actually makes the gybe much safer to carry out for the simple reason that, as the boom comes across the boat and fills on the new tack, that initial force will, if the centerboard is down, have a tendency to roll the boat to windward in a broach and cause a capsize. If the centerboard is up, on the other hand, when the sail fills on the new tack, the initial force will simply blow the boat sideways without any heel.

(Though completely off topic: the threat of broaching can also be reduced in three other ways: (1) always gybe when the boat is going its fastest – this is when the pressure on the sail is actually at its lowest; (2) always pull the mainsail completely in before starting the gybe and, as the boom crosses the boat, let it run free – this minimises the roll caused by the sail crossing the boat; and (3) always gybe from a true run to a true run -- do not try to gybe from a broad reach to a broad reach as this will also promote a broach – and as a corollary to this, a good tip is to always straighten the tiller just as the boom crosses the boat.)

To repeat: the centreboard performs two functions. The second function, often overlooked, is that it plays a key role in controlling helm. The lower the centerboard is, the more the boat will want to round up into the wind as a result of weather helm. This is particularly true if the boat is heeled over. Raising the centerboard slightly (and moving the crew weight slightly aft) will help counteract situational weather helm and may solve endemic weather helm if changing the mast rake and crew weight placement does not.

c) Rudder

The rudder should be fully down at all times unless the boat is equipped with an old style "beavertail" rudder. In which case, in light air going downwind, the rudder may be brought up to reduce wetted surface.

BASIC LASER TUNING

	LIGHT WIND (10 KNOTS OR LESS)	MEDIUM WIND (10 – 15 KNOTS)	HEAVY WIND (15 KNOTS OR MORE)
Traveller	4-6" off deck at highest point – when mainsheet is fully sheeted in, traveller blocks should not be further inboard than corner of stern.	4-6" off deck at highest point – when mainsheet is fully sheeted in, traveller blocks should not be further inboard than corner of stern. Ease traveller off as you get overpowered going upwind.	6-8" off deck at highest point – mainsheet – when mainsheet is fully sheeted in, traveller blocks should be outboard of corner of stern.
Mainsheet	Going upwind: 1"-10" between the traveller blocks when mainsheet is fully sheeted in. The gap should decrease as the wind increases. Do not oversheet in light air. Going offwind, sail out until it luffs then in slightly.	Going upwind: Traveller blocks should be touching each other when mainsheet is fully sheeted in. But ease the mainsheet as required if you cannot keep the boat flat by hiking. Going offwind, sail out until it luffs then in slightly.	Going upwind: key is to keep the boat flat with the mainsheet once you can no longer keep it flat by hiking. Blocks may well be 18" apart. On runs, if deathrolling, sheet in when boat rolls to leeward and out when boat rolls to windward (to counteract)
Boom Vang	Set the traveller and then pull the mainsheet in until the traveller blocks are about 1" apart. Then take the slack out of the boom vang line.	The vang should be set tight enough that the boom does not rise if there is no tension on the mainsheet. As you start to get overpowered going upwind, increase vang tension. Going offwind, ease vang until mast is straight.	Vang should be overly tight; the boom should be visibly bent due to tension on vang. Warning: when going offwind with a tight vang, the boom hitting the water will cause the boat to pivot and may cause capsize.
Outhaul	Loose enough that there is one hand span between the boom and the foot of the mainsail at the point of maximum draft of the sail.	Clew should be about 3" from the bullseye at the end of the boom. Tighten outhaul as you start to get overpowered but if the boat is experiencing lots of weather helm, ease it slightly. Do not loosen outhaul when going offwind.	There should be 3-4" between the boom and the foot of the mainsail at the point of maximum draft when the sail is under load. Reduce if getting overpowered.
Cunningham	Just snug.	Tight enough to smooth out any wrinkles in the mainsail between the tack and clew. Increase tension as you start to get overpowered.	Very tight – to the point where the grommet is at or below the boom. Ease tension on runs.
Crew Weight	Minimize movement in boat	Keep the boat flat	Survival
Close hauled	Slightly forward of main block; heel boat slightly to leeward	Slightly aft of main block	Center yourself on the hiking strap
Reaching	Slightly aft of main block	Angle body rearward; move weight back in boat as planning starts	As far aft as possible, with body angled out and away from boat
Running	As far forward as possible, feet still in cocpit; heel boat to windward and hold boom out to leeward	Straddle centreboard trunk; move aft as boat starts to plane	As far aft as possible, with body angled out and away from boat. In "deathrolls", stay in position, steer into the roll not against it