

CRUISING WORLD

How To Trim the Main

Knowing how to trim your sails properly will take your cruising to the next level to the next level of performance and comfort.

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The good news is that proper sail trim is not difficult. Let's face it: we're pulling on three corners of a triangle with a couple of control lines. It is not like tuning a Stradivarius violin. All you need is to understand is how each control line works and an understanding of what you're trying to accomplish. In this series we will explore the importance of trim, and how to trim the three main sails: mainsail, headsail, and spinnaker. Let's start with the mainsail.

Why is main trim important?

Two reasons. First, we have to change the sails to reflect the boat's angle to the wind. Second, no matter what your sails are made of, they stretch and move. To simply maintain the design shape, you're going to have to pull on the fabric to counteract stretch. Any change in apparent wind velocity will require a trim change.

A boat only requires "X" amount of power. More than that and it becomes overpowered. Upwind and reaching, this means excessive heel and weather helm (having to fight the helm to keep the boat from rounding up into the wind). The flip side to being overpowered is being underpowered. In light to moderate wind we often struggle for enough horsepower. The bottom line is we need to understand how each control line can be adjusted to add and reduce power.

The hardest thing to make a sailboat do is sail upwind. This is particularly true of most cruising boats, where design choices limit upwind performance. As we look at sail controls, we need to understand how they affect our quest for the best upwind VMG (velocity made good).

VMG is the percentage of our speed that is actually advancing up straight upwind. Try to sail too close and angle (the natural tendency when that's where you want to go) and there will not be enough water flowing past the keel for it to work. The boat will just go sideways. This is often referred to as "pinching." The converse is "footing." Sail at too wide an angle and the boat will go fast, but not make much progress upwind. The trick is finding a balance between speed and pointing for the conditions, e.g. in light air and waves, we can't point as high; in smooth water and medium breeze, we can sail much closer angles.

As we look at how each sail control works, we need to consider the impact on:

- Keeping the boat on its feet and in control
- Maximizing power in light-to-moderate and off-wind conditions
- Optimizing upwind VMG

Hoist

Hoist your sail with minimum halyard tension then sheet the sail appropriately for the point of sail. With the sail now loaded, tension the halyard just enough to remove any horizontal wrinkles emanating from the luff (wrinkles will be at right angles to the luff).

In light apparent wind velocity, you can leave just a hint of wrinkles. As velocity increases, wrinkles will reappear and additional halyard tension will be needed. Avoid over tensioning. A vertical wrinkle or "gutter" parallel to the luff is a sign of too much halyard tension.

Halyard and Cunningham (Luff Tension)

Ease the sheet and boom vang when adding halyard tension – there's no point in fighting a fully loaded sail. If you're trimming a racing mainsail, don't raise the head of the sail over the black band at the top of the mast (that delineates maximum legal hoist). If more luff tension is needed, use the Cunningham to pull down and remove horizontal wrinkles.

The halyard and Cunningham do the same thing: provide luff tension. They just work from opposite directions. If your mast is capable of bending, more bend will require more luff tension. Add the halyard or Cunningham when adding mastbend, which will ease tension when straightening the mast.

Depth (Power)

The deeper (more curvature) in the sail shape, the more power it creates. In light to moderate apparent wind velocities, when the boat is not heeling too much, extra depth is desirable. When overpowered, heeling too much, and particularly when trying to sail upwind, a flatter sail shape is better. A mainsail will become fuller if the leech and the luff move

closer together; flatter if they move farther apart.

Outhaul

The outhaul controls depth in the lower third of the mainsail. Easing it adds depth and power. Pulling on it flattens and de-powers.

If the boat is heeling too far (enough to develop weather helm), add outhaul. Upwind, the mainsail should generally be flatter than when sailing off the wind, so it's better to use more outhaul. Easing the outhaul will round up the lower leech and help pointing in smooth water.

The outhaul is usually only eased all the way off (approximately 100 mm from maximum tension) when sailing off the wind. In light to moderate conditions, when you need power and helm, ease the outhaul until the sail is 50-75 mm from maximum tension and the foot shelf is partially relaxed. Increase tension gradually as the breeze builds.

Mastbend

Mastbend is created by the compression induced by the backstay on a masthead boat, or by a combination of backstay and running backstays on a fractionally rigged boat. When backstay or running backstays are tightened, the force is back, but mostly down. This forces the top of the mast down toward the deck, which compresses the mast, much like pushing on a straw standing on a table. The middle of the mast pushes forward, pulling the luff away from the leech and flattening the sail.

Mastbend controls the depth in the upper two-thirds of the sail. The same rules apply as with the outhaul: a flatter mainsail shape (more mastbend) will create less heel, reduce weather helm, and allow for more control.

Flatter mainsail shapes work best when trying to sail upwind. In light to moderate conditions, particularly off the wind, a fuller shape (straighter mast) is appropriate. Many racing or performance oriented boats have check stays or running backstays connected lower on the mast (usually 45-60 percent of the luff length). These keep the mast from bending too far when the backstay is applied. They also allow the trimmer to add more backstay tension (to tighten the headstay), without over-bending the mast.

A mainsail will develop over-bend wrinkles, radiating from the clew up towards the luff, if the mast is bent too far for the available luff curve.

Mainsheet

Sheet tension affects every characteristic of the sail. More than any other control, sheet tension will change substantially as wind velocity and sea state change.

On a reach, the golden rule applies: when in doubt, let it out. Ease until the sail begins to luff (bubble or backwind along its leading edge) then trim just enough to stop luffing. The mainsail will need to be eased further than you think. Don't be afraid to let the sail out until it's against the shrouds and spreaders (just make sure the boom vang is on tight

enough).

For perfect trim on a reach, ease in every puff. Conversely, the sail will need to be trimmed in lulls. If the boat is overpowered in a puff, the sheet can be eased, allowing the sail to luff and spill excess power. Off the wind, the mainsheet simply moves the sail in and out of the boat, changing the sail's angle to the wind. Upwind, as the sail nears the centerline of the boat, the mainsheet begins to pull down, affecting the twist.

Twist is a measure of how open the top of the sail is relative to the bottom of the sail. Tightening the mainsheet tightens the leech (reducing twist), rounding up the back of the sail and forcing the boat into the wind and making it point. Easing opens the leech, accelerates the flow of air across the sail, and encourages the boat to bear off and accelerate.

In more wind, the mainsheet can be trimmed tighter without slowing down. This will improve pointing. In less breeze, be careful not to over-trim or the boat will not accelerate.

Keep in mind another fundamental rule of sail trim: speed first then try to point. Start with the mainsheet relatively eased and gradually trim harder once the boat is up to speed. Start with enough mainsheet tension that the top batten is parallel to the boom. The top telltale will be on the verge of stalling (disappearing behind the leech of the sail). In light air, you'll need a more open leech. Ease the sheet from the median setting so the top batten points 5-10 degrees to leeward.

The mainsheet is the primary pressure-relief valve when the boat heels too far. Ease and let the sail luff to let the boat get back on her feet. On monohulls, ease whenever the heel is greater than twenty-five degrees, or whenever there is too much weather helm on any type of boat.

Traveler

The traveler has two functions: to control the boom's angle to the wind and to steer the boat, controlling helm and heeling.

Boom angle is a function of mainsheet tension. Set the twist with the mainsheet then use the traveler to position the boom on the centerline for maximum power and pointing (provided the helm and heeling are under control). This means that in light air, when the mainsheet is well-eased to promote acceleration, the traveler will need to be up to weather to put the boom on the centerline.

It's the position of the boom relative to the centerline that counts, not the position of the traveler itself. As the breeze builds and mainsheet tension increases, the traveler will gradually be dropped to keep the boom on the centerline and to de-power the boat. It's a wonderful means of fine-tuning the balance of the boat as velocity increases.

When racing, play the traveler continuously to adjust helm in puffs and lulls. When cruising, find a happy medium that provides a good comfort level and keeps the boat from heeling too far.

Boom Vang

The boom vang pulls down on the mainsail clew and controls twist when the boom is eased out for off-wind sailing. The same rule for the mainsheet upwind applies to the boom vang: use enough tension to keep the top batten parallel to the boom.

Upwind in light to moderate conditions, don't use the vang, simply keep it snug. In heavy air upwind it can help the mainsheet pull down on the boom and maintain leech tension. Pull the vang on hard and you can ease the mainsheet rapidly in big puffs to keep the boat on its feet without giving away the whole leech.

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