Sail Trim

for Performance, Safety & Comfort

Moving Beyond Basic Trim

Slightly revised for 2004

by Jeff Rogers & Steve Runals

Intermediate Sail Trim

Here are 10 sail trim "rules." They have a racing focus but apply equally well to cruising. Books and articles on sail trim could fill a good size library so don't feel you have to "master" them all at once. Each boat requires a little different application of these fundamentals to maximize its safety, comfort and performance under different sailing conditions. These rules were written based on my experience with masthead-rigged sloops. A few things may be a bit different on fractional rigged boats, but most things will probably not be much different. Read each rule and then experiment with it on the water, gradually working your way up to the point where applying them becomes second nature – then you're ready for more!

Rule #1, Taught to all beginning sailors everywhere:
"When in doubt, let it out." (Refers to all sail controls)
This is a simplistic rule that is sometimes wrong. (But more often than not, is correct.) Do not omit the word "doubt". If the boat is slow, and you don't know what's wrong, let it out. If you know what's wrong, correct the problem and ignore the rule.

Rule #2: General rules for sail controls:
More wind, pull in/down hard; less wind, ease out. (Refers to all sail controls)
This doesn't explain why we do it, so you don't gain much understanding of the process with this rule, but it's generally true. The explanation is not difficult, but multi-faceted. Don't forget rule #1.

Corollary to Rule #2, on telltales:
Always try to have all three sets of genoa telltales flying, on both sides of the genoa luff. Let the mainsail out until it luffs, then bring it in until the mainsail leech telltales just start to break, then let it out an inch.

Rule #3 Headsail fairlead position going upwind
This one is relatively simple but true, and easy to visualize. Use a center position for normal wind. Position the car back a few inches in high wind. This tightens the foot of the sail and opens the leech. Since the wind primarily enters the luff of the sail and exits the leech, this de-powers the sail when there is too much wind and provides less drag and less weather helm. Position the car forward a few inches in light wind. This tightens the leech and opens the foot. Since the wind primarily enters the luff of the sail and exits the leech, this captures more of the force of the wind, providing more power (and more drag) to the sail. You need more power when the boat is not at full speed, and/or when you are sailing through a chop.

Rule #4 Mainsail sheet tension and mainsail leech tell-tales: (This is part of, or at least related to, #2 above)

The main sail provides balance and control; properly trimmed it complements the headsail, balances the helm and provides the best mix of pointing and speed.

a) **In the "Go-fast" mode**, have all tell-tales flying/streaming all the time.
b) **In "Point" mode**, sheet the main in harder so the leech closes and the top tell-tale flickers 50 percent of the time or so. This means that the very top of the main is just on the verge of stalling. (And the rest is pulling very hard.)
c) **Never go to weather without streaming at least all the lower tell-tales streaming.** But even when the main is flogging, the leech tell-tales will stream, so bring the sheet in until the top one stalls, then let it out until it streams or flicks, whichever you want. Unlike the headsail, the main doesn't have luff tell-tales on both sides that you trim by. On the main, the leech tell-tales are the best indicators of trim.
d) **On a run, or a deep reach,** it will be very difficult to get any of them to stream at all. Let the main out as far as possible and see if any of them stream. (Remember "When in doubt")

Corollary to rule #4 going upwind:

If you have the mainsheet tension correct on one tack, it will also be correct on the other tack, unless some factor makes the desired trim setting significantly different on the other tack, such as wave patterns, tactical concerns or other boats, wind change, etc. Therefore, once you have the mainsheet tension correct, when you tack, all you need to do is adjust the mainsheet traveler car position. And if you make note of how far the car is off the centerline before you tack, simply pull it across to the corresponding position on the opposite side and you're done.

Rule #5 Mainsail traveler car position:

Generally, lower the traveler to leeward to control heel as the wind builds.

a) When going to weather:

Start with the traveler car in the center of the boat and adjust the mainsheet tension first. Then pull the car up so the butt of the boom is right on the centerline. When making the first trim adjustments on a new course, always adjust the sheet first, then the traveler.

When the boat is overpowered (too much heel) and the helmsman has difficulty steering and/or too much weather helm, let the traveler car down to leeward just far enough so the boat and helmsman are happy. In very windy/gusty conditions, keep your hand on the windward traveler car control line, and let it out as necessary to control heel. Too much heel is **not** fast, places tremendous stress on the rig and creates very pronounced weather helm. Too much weather helm and the boat will turn to windward out of control. In such cases, the helmsman can't prevent the turn, even with the helm hard over. Even if he can still steer the boat, the rudder being turned sideways in the water creates a huge drag, slowing the boat dramatically. Get in tune with the boat and helmsman. You may be able to see that this is part of, or at least related to, Rule #2.

On the rare true "drifter" days, sometimes the end of the boom can actually be brought an inch above centerline, if the sheet is eased so there is substantial twist in the main. The sail stays generally in the same place, but is shaped much fuller. The fact that the clew of the main is above centerline is compensated for by the open leech. Air will still flow across the main if the sheet is let out. Once again, you may be able to see that this is part of, or at least related to, Rule #2.

b) When coming off a beat to a close-reaching course

Try just easing the traveler car without easing the sheet. Then play the sheet. This is not really an exception to #5a above, because you aren't beating, and #5a is only for beating. If you do this, it requires that the main be already properly trimmed when you start.

c) Otherwise, on a close reach:

Lower the traveler and then adjust mainsheet trim.

d) On a beam or broad reach or a run, (All 3 conditions):

The traveler no longer can hold the boom down at all, since the boom is so far out to the side. The vang is now used to hold the boom down, and the mainsheet is played to adjust airflow so the tell-tales fly. (The vang is usually just snugged up without much tension when trimmed properly for going upwind. This means that when the boom is let way out, the vang keeps it down at the same level it was at when beating, which is usually pretty good for running downwind)

Rule #6 "Winging" the headsail:

When reaching, if the windex is pointing anywhere between the two trim tabs or "knockers," (or if it is within about an inch outside of the knocker) you should "wing" the headsail by gybing it to the windward side of the boat. It will normally only fill and stay filled if the clew is poled out using a whisker pole, or if the boat is sailing directly downwind or by the lee. It is by far more efficient to pole the headsail out, extending the pole to max allowable length. (the "J" distance) The pole should be between the forward lower and upper (cap) shrouds. Only if you are flirting at the edge of the wind angle, with the windex an inch outside the windward knocker, should you set the pole forward of all shrouds on the windward side. When it is poled out to windward, most of the time it is fastest to sail so the windex is pointed generally toward the windward knocker. In light air, the helmsman steers to keep the windex out near or just outside the knocker. In heavy air, steer so the windex stays between the knockers, but closer to the windward one. In a howling gale, sail nearly dead downwind and hold on to your hat.

Rule # 7 Headsail tell-tales trim going to weather:

The sheets are the primary sail control to adjust trim. Ease sheets to build speed and trim in to point higher when speed is good.

a) When going to weather - general setting:

If we're going to weather (close hauled), the headsail trimmer trims the sail in until it is close to the spreader. (More on that below) The helmsman then sails as straight a course as possible, eyeballing the luff tell-tales and steering as follows:

If the boat is pointing too high, the near side tell-tales (windward) will lift, flutter, or spin. The trimmer can't do anything about this, because the sail is already against the spreader. The helmsman needs to sail lower. (More away from the wind) If the boat is pointed off the wind too far, the far side (leeward) tell-tales will droop or spin. The trimmer **shouldn't** do anything about this, because the boat isn't pointed in the right direction. The helmsman needs to steer up toward the wind.

b) When going to weather - point mode:
The windward tell-tales will lift *up* at a 45 degree angle and will either stay that way or will cycle between standing nearly straight up and streaming straight back, depending on the waves. You are trading a bit of boat speed to get a slightly better angle on the wind. You can't do this in light air and a chop, because the boat will stop.

c) When going to weather in very light air - drifter mode:
The helmsman may steer so that the leeward tell-tales just begin to droop. (not stream straight back) He's "pressing" to get the most power out of the sails, even if the boat doesn't point very well.

d) Speed Building Mode/Power Through Waves Mode:
Set up as in c) above for a short time to build speed or power through chop.

e) When going to weather in a blow:
The boat has more power than it needs; the helmsman may sail with the windward luff tell-tales lifting all the time as if he is pinching up too high. The leeward tell-tales will stream straight back. The boat sails fast, because it has all the power it wants, and also sails high, because it's pointed high. (this is good) You can only do this when the boat is going very fast and there is more power available than you need. Sailing with the windward tell-tales streaming all the time doesn't add significant boat speed, because you're already at or near hull speed, but reduces VMG because the boat is sailing farther off the wind. (not good)

f) Fundamental rule when beating to weather:
The sail trimmer brings the sail in close to the spreader tip (again, more details and exceptions in the corollary below) and leaves it alone. The helmsman sails the boat to the tell-tales.

Corollary to Rule #7, Trim of headsail off the spreader when going to weather (close hauled):

The best settings vary slightly from boat to boat because of rig, keel, hull shape, etc.; however...

a) Don’t pull the headsail through the spreader. The headsail is expensive and carefully shaped. Stretching it on the point of the spreader doesn't help its shape. Neither does poking a hole in it. Especially when it's windy or gusty, if you have the headsail up near the spreader tip, tend it constantly, trimming it in and out as required. It will stretch out when a gust hits, so if you trim it in, you'll have to ease it when the gust passes or the wind lightens even a knot or so. If the wind is gusting every 10 seconds, it may be best to trim it so it breathes in and out, just almost touching when it lightens, and breathing out away from the spreader when it blows. If the cycles are

longer, say 1 min or so, it may pay big dividends to constantly tend the headsail trim in and out as the wind strength changes.

b) Moderate air:

On most boats, the closer the sail is to the spreader, the higher she points. If the sail is trimmed in one degree closer, the boat will sail one degree higher. On a 1-mile windward leg, it can mean 5-8 boat lengths to weather, which is maybe 30 seconds of sailing time. But you need to check this on your own boat. Some boats like the genoa pulled right up to the spreader; others don't.

c) Light air "drifting" conditions:

However, in very light ("drifter") weather, an inch or two between the sail and the spreader keeps the air flow moving in the slot between the main and headsail, where having it tight up against the spreader might choke the flow and begin to stall both sails. In very light air, having the sail just off the spreader also forces the helmsman to sail just a few degrees off the wind, which helps to keep the boat moving if there are any waves or chop.

d) Heavy air:

In heavy air, a large overlapping headsail can overpower the boat, so if it's really blowing and you have a large headsail up and the car is already all the way back, easing the sheet so it's an inch or two off the spreader can lighten the load without really affecting boat speed much. Talk to the helmsman. It's also probably past time to reef.

Rule #8 Trimming the Headsail on a reach or run:

a) Fundamental rule for reaches:

Trimming on a reach or a run is totally different than on a beat. On a beat, the headsail is sheeted in and the helmsman steers to the tell-tales. On a reach or run, the helmsman picks a course and steers it, and the headsail trimmer trims to the tell-tales.

b) Trimming to the tell-tales:

If the headsail is too far out, the near side (windward) tell-tales will flutter, spin, or droop. The trimmer needs to trim the sail in. If the far side (leeward) tell-tales droop, the sail is trimmed in too tight, the sail is stalled, and needs to be eased. If the headsail is WAY too far in, say it's sheeted for beating but the boat is actually reaching, both the inner and outer tell-tales will droop down or hang lifeless. In general, trim toward the tell-tale that is not streaming. Think about it. In general, your job is to trim the sail so both the windward and leeward tell-tales are streaming back flat. On a reach, there is no value in being in "point" mode. If the helmsman wants to steer higher (or lower) there is no reason he can't do so by simply turning the boat. The trimmer needs to trim the sails to the course the helmsman is on at that moment. On a broad reach or a run, you may not be able to get the windward tell-tales streaming because the sail shape is too full for the wind conditions. But ALWAYS get the leeward tell-tales to stream straight back, then work on the windward ones. If, as you trim the sail in, the leeward tell-tales start to droop before the windward ones stream back, let it back out to get the leeward tell-tales flying straight back. (Remember rule #1?) Under these conditions, you might also think of asking whether or not we should be poling the headsail on the lee side.

c) Genoa car position:
When you crack off to a reach, the turning block or fairlead for the headsail needs to move forward and outboard to provide the best trim. If you have more than one set of genoa car tracks, switch to the outboard tracks and let the car run forward. The broader the reach, the more this needs to be done. Bringing the car forward closes the leech and keeps too much of the wind from spilling out when the sheet is eased for the reach. This is what most people do instead of poling to leeward. *If for some reason you can't set the pole to leeward, and the course is a close reach, then pull the car forward.* Watch the tell-tales when you do this, and don't forget to pull the cars back before you start the next weather leg.

Corollary to Rule #8 Whisker poling to leeward on a reach
If you are reaching, and you can't wing the genoa, think really hard about poling the genoa out to leeward. Why use the pole to leeward, when the wind obviously will fill the sails by itself? The answer is "because you can control the shape of the genoa better if the clew runs to the end of the pole." Imagine beating to windward with both main and genoa pulled in hard. Now turn the boat onto a beam reach without adjusting the sails at all. Both sails stall hard, and the boat slows way down. To get the boat moving on a beam reach, you need to let both sails way out. If you just let the sheets out, without making any other corrections, what happens? The mainsail stays pretty much the same shape, because the clew is tied to the boom. The distance between the mainsail's tack and clew doesn't change; the sail is just rotated outboard. However, the genoa's clew is not attached to a boom, so when you turn the boat onto a beam reach and let the genoa sheet out, the clew goes out, up, and way forward. This changes the shape of the genoa dramatically, from being an airfoil shape to a deep "cup" shape with a ton of twist that's not particularly fast. You won't be able to get the windward tell-tales flying because the draft is way too deep. Look at where the genoa clew is now, and imagine what it would do to the genoa if the clew could be pulled back, outboard, and down. The genoa would begin to look like an airfoil again, and the boat would go much faster. Attach the whisker pole to the sheet just aft of the clew, with the shaft of the pole between the aft lower shrouds and the cap shroud. Push the pole out and back and down and see what a change you can make in the shape of the genoa. Clip the other end of the pole to the mast. (It's mandatory under PHRF rules) To do this, you'll need to compress (shorten) the pole. You may need additional ring fittings on either side of the mast to do this, but it's worth it. Adjust the sheet and pole length until you have a nice airfoil shape and the telltales are flying straight back on both sides of the sail. This is very fast. *The goal here is to simply move the clew of the sail outward from the rail of the boat, without letting it go forward excessively.* This removes the pronounced "cup" in the lower leech and foot of the genoa, making it much more aerodynamic, resulting in more lift and lower drag**.** Setting the pole to leeward makes the boat faster under almost all conditions, but there are some conditions when you just can't do it, and there are some legs where you just don't have time to do it.

Rule #9 Other controls:
There are several other sail trim adjustments that have not been specifically addressed but generally follow Rule #2. The ***Outhaul*** adjusts the tension of the bottom 1/3 of the main – greatest percentage of the sail area. The ***Cunningham*** adjusts the main sail luff tension without having to adjust the halyard. Some boats will also have ***adjustable backstays***. Adjusting the backstay flattens the main and opens up the leach, requiring the outhaul and Cunningham to be tightened to be really effective. If you can adjust the backstay going up wind in mid to heavy winds, it will help keep the boat balanced by flattening the main - reducing draft. When you tighten the backstay – tighten the Cunningham till the wrinkles are gone from the luff. Once you come off the wind to a broad reach or run, ease the backstay, cunningham and outhaul (Rule #2). On a reach, all controls should be adjusted proportionally, and in concert with the apparent wind direction and velocity. More apparent wind, more airflow over the sails from front to back, more tension in all these controls. Less wind, less airflow, or airflow from rear to front instead of from front to rear, and these controls should all be eased more. Going downwind, the backstay should be eased completely, as should the main cunningham and outhaul. Remember all these controls are at least indirectly related to sheet tension in the genoa and main. Think about it: When the genoa and mainsheets are pulled in hard, all these other controls are likely to be pulled in hard; and when the main and genoa sheets are loose and sloppy, all these other controls will be likewise.

Rule #10 Situational Awareness:
Most of these rules require you to know which way the boat is going relative to the wind direction and how fast its blowing. Look up and out; the windex will show you the apparent wind, which is the only wind that the sails care about, while the surface of the wind, upwind boats and boat heel will give you a good indication of wind speed. Remember the old saying: "*When you first start to think about reefing, it's probably already too late."* Proper sail selection combines experience with wind strength, sea state and the trend in those conditions. In addition to knowing which way the wind is flowing over the boat, any good crewman will know whether the next leg is upwind, a close reach, or a run, and whether or not a tack or gybe will be required at the mark. If you don't know or can't tell, ask. Then you can plan ahead.

Now get out there on the water and practice, practice, practice. See you on the water !