

Sail Interaction to Windward, and the Jib Trim ..

excerpt from Bob Sterne's "How to Sail Fast"

I am quite sure that all of you are aware that when you alter the setting of either the main or jib sheet, that because of the interaction of the two sails you are affecting both sails at the same time. I don't believe, however, that most of you realize how these interactions really work, and I feel that if you understand the basics, then you will be better able to tune your boats.

First of all, you must forget the idea that the jib increases the efficiency of the main. The air flowing over the lee side of the main would actually be moving faster without the influence of the jib. In fact, the jib decreases the power available from the main, and the narrower the slot, the greater this effect. The exact opposite, however, applies to the jib. The airflow is faster over the lee side of the jib than it would be were the main not present. The main, therefore, increases the power of the jib. In addition, because of their close proximity, the jib is sailing in a continual "lift" caused by the main, while the main is constantly being "headed" by the jib. This sounds terrible, but in reality all it means is that the main is sheeted tighter than it would be if there were no jib, while the jib is sheeted more freely. The result, of course, is that the jib provides more drive, and less heeling force, while the main provides less drive, and more heeling force, per square inch of area. The net result is that while sailing to windward, the jib is much more efficient than the main. Before you run out and build a jib 'unarig', let me remind you that were it not for the main, the jib wouldn't look nearly so good. The performance lost by the main is (nearly) regained by the jib. In addition, the increased airspeed over the jib, plus its "lift" helps prevent luffing, while the reduced pressure change over the main caused by the slot, plus the "header" helps prevent stalling. Therefore, the two sails interacting can have more camber, and hence more power, and can point higher, than one larger sail.

It is very important that you begin to think of the two sails acting as one large airfoil, one that has a tremendous range of adjustment. Keep in mind, however, the important part that the jib has in driving the boat. At all times, you must keep the jib from stalling or luffing. Use jib telltales, and WATCH 'EM CLOSELY. There are times, however, that you may intentionally stall or luff the main, which I will cover later. For the present, let us try to distinguish what to expect when you make an adjustment to either the main or jib sheet. In all cases, I am assuming that you are starting from the proper sail trim. In each case, I will mention both the effect on the sail you are adjusting, and on the other sail.

Easing the Mainsheet. When you ease the mainsheet, you are re-arranging the forces acting on the main in the forward direction. You will therefore reduce the heel, and increase the drive. This is especially useful in a puff in heavy conditions, when your rig is a bit too tall, and you want to keep the boat on its feet. It will also reduce the weather helm considerably, and also the leeway, because of the reduced heel. The "lift" being provided to the jib will decrease, and both it and the main may luff. This will require that you bear off to keep the boat driving. In other words, you can't point as high with the -main eased out, but the boat will heel less.

Hardening the Mainsheet

This is virtually the opposite case. When you tighten the mainsheet, you will increase the heel, and decrease the forward drive.

The weather helm, and the leeway will increase. The amount of “lift” felt by the jib is increased, and both the jib and main may stall. This will require that the boat be pointed higher, and this in turn further reduces the drive available. Oversheeting the main, is therefore to be avoided, with the exception of situations requiring that you really must pinch. Be forewarned, however, that you cannot keep this up for more than a few boat lengths, before speed suffers, and leeway increases to the point that you will lose more than you gain. In light airs, don’t pinch at all.

Easing the Jib sheet. This will increase the jib’s drive, while reducing its heeling force, much as easing the mainsheet did for the main. In addition, it will increase the suction on the lee side of the main (its “power”), therefore increasing both its drive and heeling force. The change in heeling forces nearly cancel, and the result is a net increase in forward drive from both sails. The catch is that the main is “headed” less, leading to an increased tendency to stall. There will also be an increase in weather helm, due to the Centre of Effort moving aft. Generally, this is exactly what you want in light airs, providing you can accomplish it without stalling the main. You may have to bear off to avoid luffing the jib.

Hardening the Jib sheet

Again the opposite situation, where the jib’s drive will be decreased, while its heeling force will be increased. The suction on the lee side of the main will be reduced, thereby reducing both its drive and heeling forces. The main will be “headed” more, and may be backwinded, forming a “bubble” just behind the mast. This reduces heeling and drive even further, and also moves the C. of E, ahead, and reduces weather helm considerably. This depowers the rig without affecting its pointing ability.’ .. In fact, you may be able to pinch quite well, providing you have sufficient wind to keep up your speed. By now you may have the idea that changing the relationship between the main and the jib could be a useful way to tune the boat for different conditions. This, of course, is exactly the idea behind a Jib Trim. It should not be used, however, as a substitute for poor tuning techniques. The boat should be trimmed for the average conditions at the time, so that the Jib Trim is just that, and is not used instead of changing rigs, or rig position, when this is the proper course of action. A properly adjusted Jib Trim will enable you to ease the jib in light airs, or to harden it up in a puff. It should never be adjusted so that it is always being kept at one end of its travel. This ties in with its biggest asset, which is finding the proper relationship between main and jib during a tuning session. When this is found, then the necessary adjustments should be made so that the Jib Trim can be returned to its middle position again. When you are using a Jib Trim, bear in mind that any change to the jib sheeting angle will probably require a slight course correction to keep the jib from luffing or stalling. In addition to jib luff telltales, you should have some about half way back on the main. When the sails are trimmed properly, all telltales should flow smoothly. By coordinating the Jib Trim with the Sail Winch, you can do things like ease the mainsheet, by first hardening the Jib Trim, and then letting out both sails until the jib returns to normal. In heavy puffs, you may well sail with the main luffing, and the windward telltales collapsed. By reversing the procedure, you can pull in the mainsheet until it is on the verge of a stall to pinch effectively, although not for long. The jib trim is probably the easiest auxiliary control to learn how to use, and combined with telltales on the sails, can become almost foolproof.