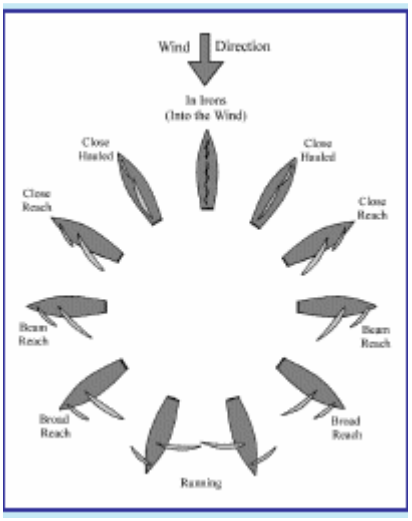
Downwind Sail Trim

(J Little, Oct 2009)

John Middaugh has done a great job in writing the first two sailing tips. Thus, I was somewhat reluctant to write one, but here goes..

I find sail trim racing downwind to be the most difficult for me. I've tried to cover some of the more important topics, but the description is definitely not comprehensive. Downwind would be defined as the wind being 135 to 180 degrees with respect to the bow of the boat. This is usually the course sailed when traveling from the upwind mark at the dam to the downwind island mark. However, nothing is ever the same racing on Watauga Lake!



If you watch the fleet during the downwind run, you will see there are a wide variety of ways to accomplish this goal. One might be tempted after rounding the upwind mark to just ease the mainsail out to the spreaders, ignore the luffing headsail, turn on the autopilot, and pop open a beer. However, there is still plenty of work to be done.

Some let out their mainsail perpendicular to the wind, set their sails "wing to wing" (main one side of boat, headsail on the other extended with a whisker pole or spinnaker pole). Their idea is to expose as much sail to the wind as possible since the boat is essentially being more pushed than lifted by the wind.

A whisker pole is better than a spinnaker pole since the former should be the length of the foot of the headsail and the latter is the J dimension (distance between mast and bow) of the boat. This can work really well especially if the wind is reasonably strong (>10 knots). Even in this approach, it is probably still not best to run directly downwind. Instead alternate between a broad reach (less wind) and a dead run (more wind) jibing as needed to make the most direct line to the mark.

Another approach is to increase your sail area by employing a spinnaker or a drifter. I have both an asymmetrical spinnaker (similar to big head sail, tacked directly to bow of boat, first picture below) and a symmetrical spinnaker (sail tacked to pole which is attached to mast, second picture below). These sails can greatly increase ones speed from 2 to 10 knots, but can be quite a challenge as the wind speed increases from 15-20 knots! For my Catalina 270, I find that the symmetrical is usually more useful for the prevailing winds at Watauga, but it is somewhat more difficult to sail and rig than the asymmetrical. I won't discuss spinnakers more at this time since that can be a relatively complex topic.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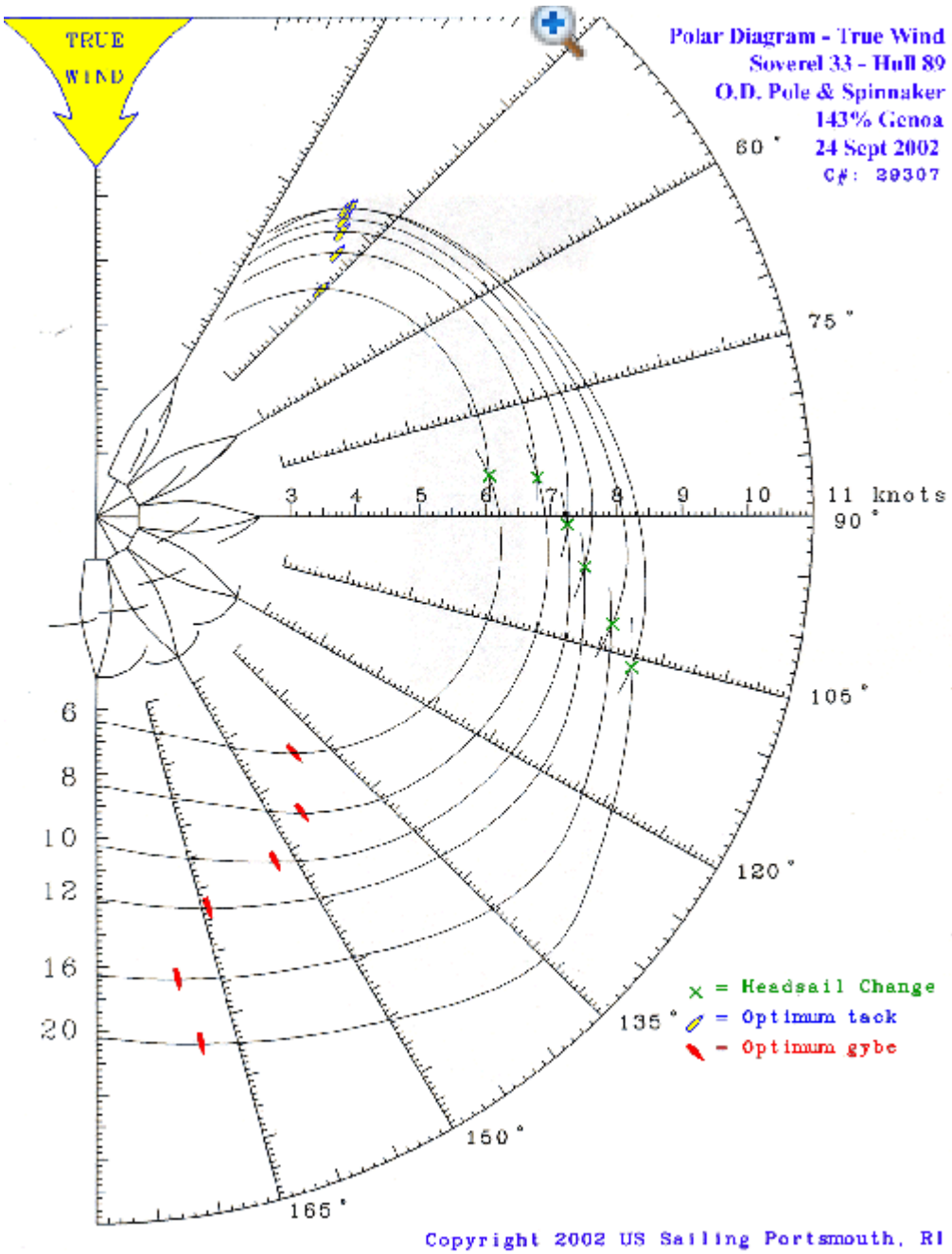
Another approach is to actively jibe the boat much like you would tack the boat upwind. Thus, winding down the lake going from between a beam reach to a dead run depending on the wind speed at any point in time. This takes advantage of the fact that one can actually get to the downwind mark quicker by not always sailing directly to the mark. This is true since all that matters is the velocity made good (VMG) to the mark not the direction sailed. You can measure VMG using a handheld GPS by setting the approximate position of the downwind mark and then maximizing this value as you adjust your sail trim and direction as you practice sailing from the upwind to a downwind mark.

In this approach you are constantly adjusting your course heading up towards the wind as the wind decreases in speed and heading down directly towards the mark as the wind increases. Of course, changing your course requires constant attention to sail trim and leaves very little time for sipping that beer. Also, be sure to look behind you as you sail to anticipate wind shifts and increases in wind speed. You will need to jibe many times in this approach since you don't want to get too far away from the center of the race course.

A polar diagram (shown below) shows the relationship of boat speed (horizontal axis), wind speed (vertical axis), boat direction, and wind direction. Even if no polar is available for your boat, the one below can give one an idea of the point of sail employed to maximize VMG as a function of wind speed and direction.



If this graph makes your head hurt or a polar diagram is not available for your boat, here is a rule of thumb approach. At around a wind speeds up to 10 knots true wind angle of about 140 degrees will give optimum VMG. For each additional knot of true wind speed, you can sail about 5 degrees lower.

This would also indicate that when gusting, one would head up when the wind slows, and fall off as the wind increases.

In general when running downwind, the tension in many sail controls will have to be relaxed. If you had reefed to the upwind mark, it might also be good to pop the reef to expose more sail area as you run down wind. Release some of the luff tension in your mainsail, especially if you note a vertical crease in the luff of the mainsail. Release the tension until this vertical crease disappears and you can even have the hint of a few small horizontal wrinkles down the luff.

Also release some of the tension of the headsail halyard to give a few small vertical wrinkles in the luff of the headsail and you can move the genoa car forward some to minimize the twist of the top of the headsail to leeward. You should also adjust the boom vang to bring the top batten (decrease twist) parallel to the boom. The boom vang can also be released if the wind at some point overpowers the boat, much like one would play the traveler when going upwind.

When jibing, it is very important to control the main, especially in strong winds! If the boom jibes in an uncontrolled manner, one could actually knock out the sidestays that support the mast or break the boom vang. Thus, as one turns down wind, be sure the traveler is locked on both sides (car normally centered) and take up slack in the mainsheet to center the main. As you head back upwind on the other side of the jibe, be sure to play out the sheet to release the pressure on the mainsail such that you can control the steerage of the boat. Always remember that the sails really control the direction of the boat and the wheel or tiller is just a fine adjustment. You will also need to jibe the headsail, but the mainsail is the most critical to control on a jibe.

As you approach the leeward mark and prepare to head back upwind, you need to readjust all the sail trim to that employed in the first upwind leg after the start. Also, the apparent wind is much lower while running and the boat and crew can be overwhelmed as they turn into the wind. If you shook a reef running downwind, you might need to reef the boat again before heading back upwind.

In very high winds, one could also consider rigging a preventer that keeps the boom from accidentally jibing. However, the preventer is no panacea for poor steering, it just gives one a very small time to adjust steerage and sail trim to a wind shift. *If you are carrying too much sail and you are afraid jibing might cause injury to your boat or crew, one can always tack through the wind to get from one broad reach to the other.* Tacking is a much safer maneuver than jibing!

After all this discussion, I've about decided maybe I should just pop a beer and use the autopilot, much less stress..