

Using a Tack Ratio to Improve Your Racing Starts

By Ed Bottrell, SMSC Vice Commodore

Here's a relatively simple technique to help get you to the starting line at the gun. Some navigator-tacticians have a computer or special purpose watch that calculates and uses the Tack Ratio but you can still do the same thing with just a watch and some easy calculations. Here is the procedure for calculating the Tack Ratio:

1. Well before your start time (say 10+ minutes), and knowing your desired upwind heading, sail to the general area of the start line where you wish to be at for the start. You can get to this point from any direction but turn downwind on a heading about **+5 degrees towards the wind from the reciprocal of your desired upwind heading** AND start a timer (record as **Time #1**) as you leave the start line. *For example: true wind direction is 180, start line is perpendicular, desired upwind headings are 221 and 139. Downwind heading for practice run is $041+5 = 046$ or $319-5 = 314$ for the practice run.*
2. After sailing downwind for awhile (say 1-3 minutes), **turn**, record **Time #2**, and sail upwind on the reciprocal course, which should be off the wind by the same amount as used in #1. *Continuing with the example, turn upwind to $046+180 = 226$ or $314+180 = 134$.*
3. As you near the start line, head up to your desired upwind heading and record **Time #3** as you get to or **cross the start line**.
4. **Calculate the ratio** of the downwind leg to the total elapsed time for the loop. *For example: Time #1 = 1740h 30s, Time #2 = 1742h 50s, Time #3 = 1745h 00s, Downwind leg = 2m 20s or 140s, Elapsed time = 4m 30s or 270s, Tack Ratio = $140/270$ or 0.519.*

With your tack ratio in hand you can now predict when to turn back towards the start line to get there just in time. Just return to the area of the start line and turn downwind on the same heading as before AND note the time (Time A) remaining before your start. Calculate the turn time by using the Tack Ratio. For example if you turned down wind with 4m 10s remaining before your start then you will need to turn upwind on the reciprocal course in 130 seconds ($250 \text{ s} \times .519$) or when there are 2m to go before the start.

There are a few people who can do these calculations in their head while helming the boat at the start but I strongly recommend that a separate person (navigator) be assigned the task of the calculations. The technique assumes that the wind speed, direction and tidal currents have not changed significantly from the time you calculate the Tack Ratio to when you use it – usually a matter of minutes. The technique also works with any type of repeatable loop.