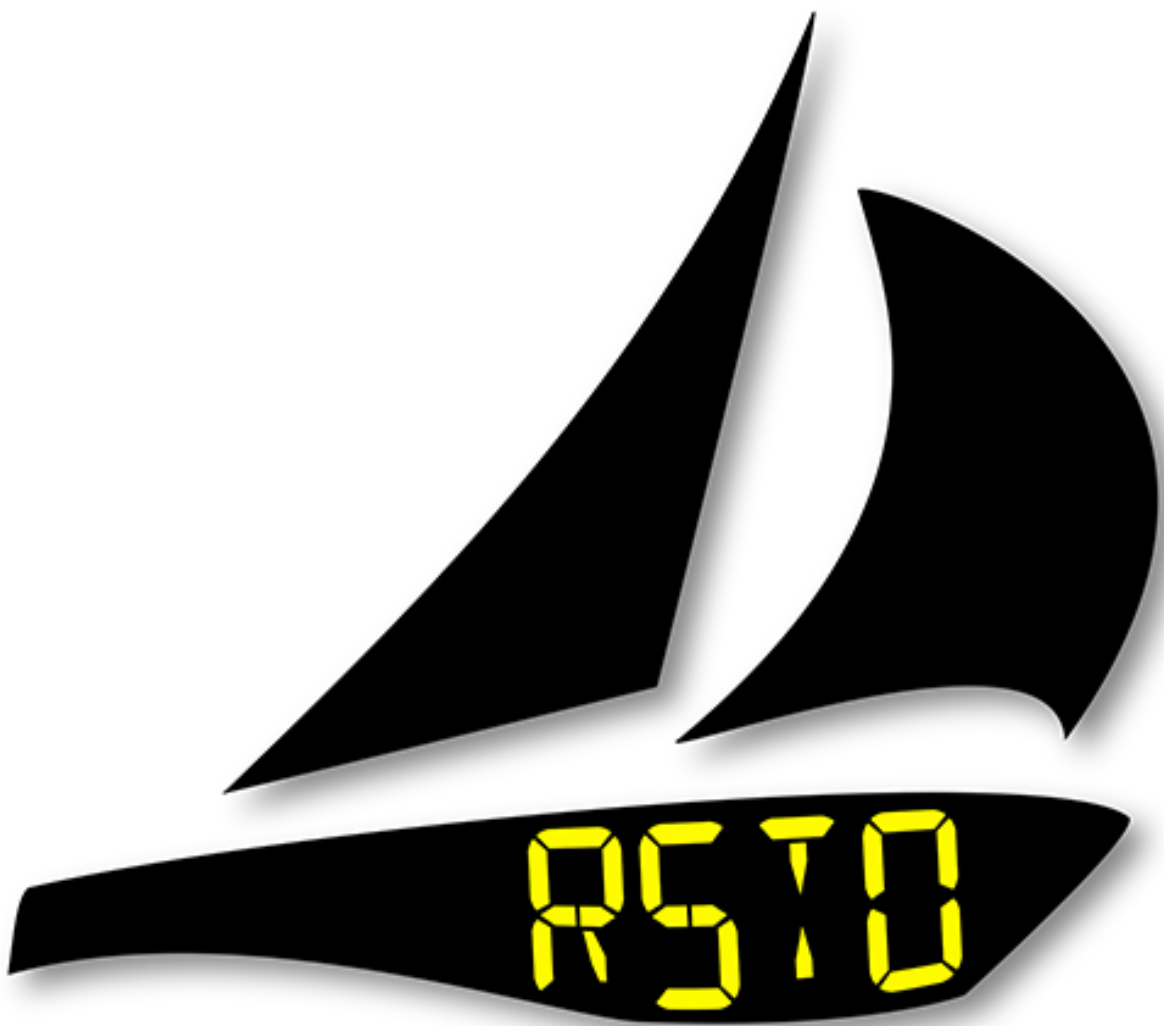


Race Sailing Tack Optimizer

Users Manual



Race Sailing Tack Optimizer (RSTO) is a dahlhof product

©2015 Flemming Dahlhof Jensen • +45 40 14 57 02 • fj (a) dahlhof.com • Cvr: 32 19 85 46

About RSTO

Winning sailboat races requires good sailing skills, starting on time and getting to the Mark as quickly as possible. Sailing skills are up to you. RSTO helps you with the other two factors by providing a Countdown function and a Tack function. The Countdown function displays the time left to the Start signal in minutes and seconds.

The Tack function has 2 modes – Course mode (which displays track and speed) and Tack Mode (which displays your variance from optimum tack angle). RSTO is primarily a wind shift indicator and provides guidance on which Tack to sail and your upwind or downwind speed (Velocity Made Good, or VMG, relative to wind direction).

The operation and use of RSTO is simple which makes it ideal for open boats and shorthanded crew such as dinghies and small keel boats.



The high visibility display can be easily seen even in bright sunlight from a wide angle and the simple controls enable rapid setting and adjustment. Because the direction and speed are set using GPS coordinates then the orientation and position of the device is not important. The position and orientation of the device can be adjusted during racing.

RSTO will help you win races, yet it won't distract you with complicated adjustments.

The Rules for all sailboat classes and events are not the same. Some classes permit the use of electronic aids while others do not. You should check with your class Association and your event organizer before using RSTO in a regatta.

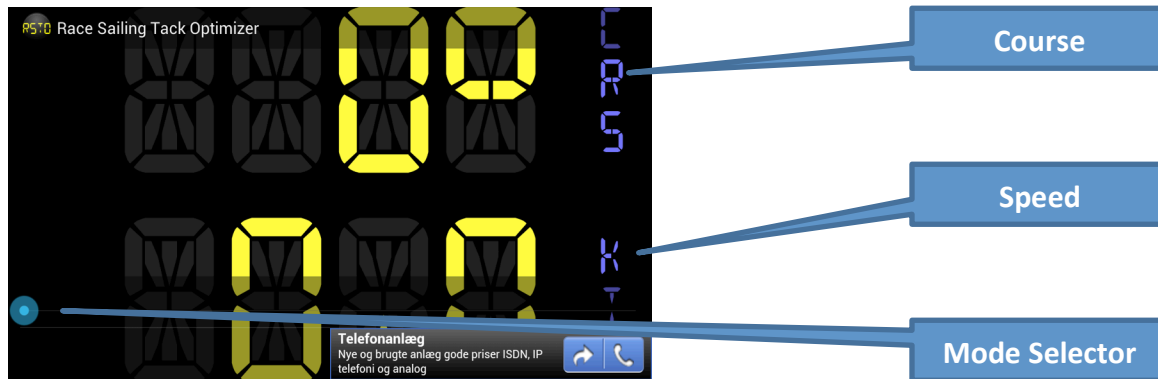
RSTO Functions

1. Tack Function

RSTO has been developed to help you determine the best heading and tack when sailing upwind and the best heading when sailing downwind. RSTO has two basic navigational modes.

1.1 Course Mode

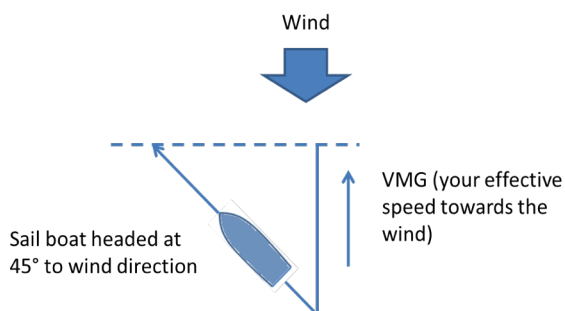
When initially started the application is in course mode. The top number (**CRS**) displays your course over ground and the bottom number (**KTS**) displays your speed over the ground (SOG).



To use Course Mode simply start the application. The application will display **WAIT** until it has established a reliable GPS satellite connection. The course and speed are calculated from positions determined from GPS coordinates, so your device must be moving in order for the app to be able to determine the difference between positions.

1.2 Tack Mode

To enter Tack mode tap the screen. A blue dot will appear on the left side of the screen. Dragging this dot to the right causes the application to enter tack mode. In this mode the top number displays the heading to your intended destination and the bottom number displays your velocity made good (VMG) towards your destination. The heading is set by dragging the blue dot to the left or right. The heading changes in increments of 5°. VMG is your speed in the desired heading. At a tack angle of 45° to the



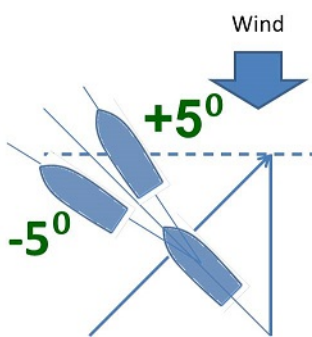
wind your speed towards the wind is approximately 70% of your actual SOG. This is because you are not heading directly towards your desired direction.

Going fast is not enough if it is in the wrong direction so you need to find the best combination of heading and speed which will take you in the intended direction as fast as possible.

As you sail closer to the wind your sails will start to luff and the boat will go slower, so the best direction depends on the boat, the heading and the SOG.

To use Tack Mode start the application, tap the screen in order to display the blue dot, then drag the dot to your intended direction. If the next mark on the race course is directly upwind then the intended direction is the wind direction. If the mark is not directly upwind then it can be determined as a compass direction and that value would be used.

With the direction set as you sail in the intended direction your speed in that direction will be shown as VMG. The higher the VMG the faster you will go towards your mark.



The Tack angle will be shown at the top of the screen in degrees. If you are on a Starboard tack the number will be green, if you are on a port tack the numbers will turn red.

The application assumes that you can sail at 45 degrees to the wind, so when you are sailing at that angle the Tack angle will read 0 degrees. If you turn away from the wind then the Tack angle will start to increase and will be prefixed by a “-” sign. If you turn up into the wind past the 45 degree angle then the Tack angle will be prefixed by a “+” sign.

1.3 Wind Shifts.

- Headers. When the wind shifts to a header then, providing you continue to sail as close to the wind as possible, the Tack angle displayed will start to increase. Your decision on when to tack will depend on your boat, distance to the mark, etc. but a good indication is that if the wind shifts +5 degrees for a period of 30 seconds then you should tack.

- Lifts. When the wind shifts to a lift, providing you continue to sail as close to the wind as possible, then the Tack Angle will increase prefixed by a negative sign. Your decision to stay on this tack or to tack the boat over will depend on how close you are to the Race Mark.

1.4 Using RSTO.

During upwind legs simply keep the Tack angle positive (+). If it becomes negative and stays negative for a period of time then you are in a steady header and should tack. You should not tack on temporary or very small shifts as these may just be temporary gusts.

2. Clock Mode

To put RSTO into clock mode start the application and swipe the screen to the right. This will show the local time. The RSTO clock is set using GPS time so the device must have access to a GPS satellite signal.

2.1 Countdown Mode

Starting the countdown. To start countdown simply tap the screen. The timer will start at the pre-set number of countdown minutes. Duration can be any value in whole minutes from 9 minutes to 1 minute. The standard sequence (ISAF Rule 26, 2013-2016 Edition) is 5 minutes. Dinghy classes often use a 3 minute start sequence.



Setting the start sequence duration. Tap the *menu key* on your device. A menu will appear at the bottom right of the screen. Tap **Settings** and then select the number of minutes for your start sequence.

Synchronizing the countdown timer. If the timer is not started at the right time it can be synchronized at the next signal during the countdown by tapping the device screen. This will synchronize the timer to the nearest minute. For example if the race committee makes a signal during a 3 minute start sequence at 2 minutes and the timer is showing 1.55 seconds tapping the screen will cause the timer to round up to 2 minute. If the timer is showing 2:05 then tapping the screen will cause the timer to round down.

Audible Warnings. During countdown the RSTO timer will speak the time on each minute. Until it reaches 1 minute to start. During the last minute RSTO will speak the time at 45 seconds, 30 seconds, 15 seconds and then count down from 10 seconds to Start. When Start is reached RSTO will switch automatically to **Tack Mode**.

3. Settings

The RSTO **Settings** page is accessed by tapping the **Menu Key** on your device. There are four settings:

Race Timer Minutes. Tap this item and then select the duration in minutes of the start sequence for your sailboat class. Dinghies typically use a 3 minute start while larger boats use a 5 minute start sequence, but this will be shown in the Sailing Instructions (SI's) for your event.

GPS Upsampling. This can be set on or off. Setting it on causes RSTO to calculate intermediate updates giving a more rapid display.

Font Scaling. Font size can be set from 100% in order to change the size of the readout and to optimize the display to the screen.

HW Acceleration. Can be set to on or off.

To Exit the **Settings** Menu touch the **Back Key** on your device.

4. Is it legal

Different sailboat events and classes have different rules for the types of electronic equipment that can be used during racing. Some one-design dinghy classes prohibit the use of devices that compute correlations between time and distance and or calculate lifts and headers. You should check with your class Association and your event organizer before using RSTO in a regatta.

Terminology

This is an explanation of the terms as they are used in this manual not a definition of sailing terms and is provided only to help you understand how RSTO works.

Intended Direction. This is the direction in which you wish to sail. In a typical sailing race there will be upwind and downwind legs. During the upwind leg you will be tacking at approximately 45° angles to your intended direction.

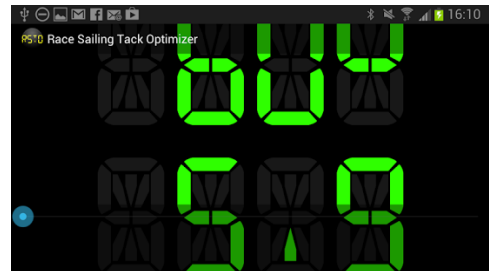
Velocity Made Good (VMG). This is your speed in the Intended Direction. During an upwind tack, at 45° to the wind, your speed in the intended direction (**VMG**) is slower than your actual speed (SOG) because it is partly in a different direction.

Speed over the Ground (SOG). This is your speed relative to a fixed point on the ground. Note that this is not your speed through the water (STW), as there may be currents. If you are heading directly in to a 1 knot current at a speed of 5 knots STW then your SOG will only be 4 knots.

Course. The direction in which the boat sail over ground (COG). This is what RSTO shows because it is using the GPS as input.

Heading. The direction in which the boats bow is pointing. This is the angle shown on the boats compass. The direction in which the boat moves may be different if there is sideways drift due to current or sideways motion (leeway) of the boat due to the force of the wind.

Starboard Tack. Sailing upwind with the wind coming from the Starboard side of the boat. When sailing downwind this has a different meaning, you are on a starboard tack when your sail is on the Port side. RSTO cannot determine the position of your sail so for this application it is assumed that the wind is coming from the Starboard side. If you are sailing by the lee you need to take this in to account.



Port Tack. Sailing upwind with the wind coming from the Port side of the boat. When sailing downwind this has a different meaning, you are on a port tack when your sail is on the Starboard side. RSTO cannot determine the position of your sail so for this application it is assumed that the wind is coming from the Port side. If you are sailing by the lee you need to take this in to account.

