

Training guide

raceQs sailboat racing tactics app.

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Who should read this?

The raceQs watch app is an app that runs on a Garmin Vivoactive HR smartwatch which turns the data provided by the GPS receiver in the watch into "actionable intel" which can improve your yacht racing performance.

This document is for you if you're a sailor¹, new to the raceQs watch app and want to get a quick but comprehensive understanding of its facilities.

We have used this approach extensively during development to exercise as many of the app features as we can in a short space of time.

Completion of both exercises will expose you to most of the features of the app and is the best way to get you using the app when you are next on the water.

Both exercises are designed to be completed on land, in your neighborhood with the minimum of preparation.

In the first exercise, you walk two laps around a virtual windward/leeward race course and takes about 20 minutes

The second exercise is best carried out on a playing field where you set up a start line and practice using the Perfect Start features of the app.

Overview of training exercise 1

The concept is that you walk the watch app around a short course that mimics a yacht race and you get to interact with the app in a realistic manner.

During this walk, you get to

- Use the touch screen.
- Use the watch buttons.
- See most of the screens in the context of a real race.
- Use the race start timer.
- See the automatic creation of Windward and Leeward marks.
- See some of the navigation features.
- See a number of raceQs alerts.

Most of all you get a quick but comprehensive introduction to most of the features of the raceQs watch app.

The route consists of four sides of a square of around 200 metres per side. The track could be around your local block or on a playing field as long as there are not too many trees or nearby tall buildings to interfere with the GPS signal.

¹ You are familiar with sailboat racing terms such as "point of sailing", "upwind", "downwind", "reach", "tack", "jibe", "mark rounding", "start gun", "windward", "leeward", "start line" etc.

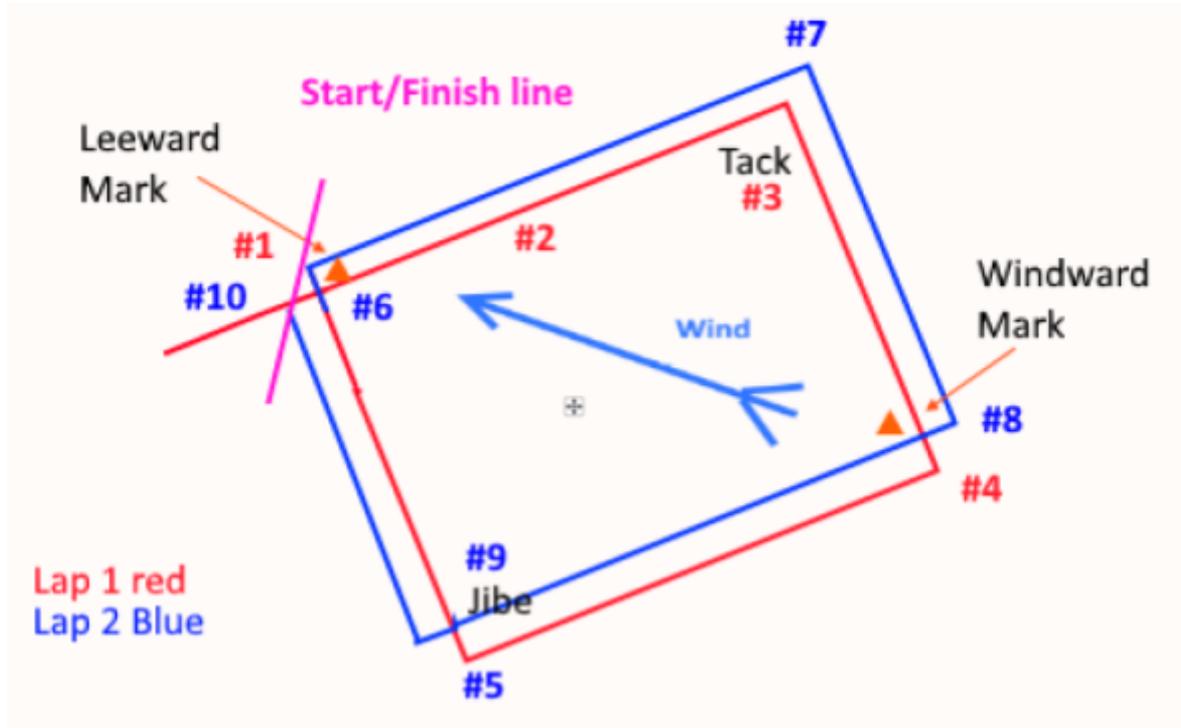
The track segments need to be pretty straight, to mimic the boat moving in straight lines upwind and downwind and need to be a reasonable length for the app to detect sections of a stable course of at least 15-30 seconds.

The corners need to be fairly square to mimic tacks, jibes and mark roundings.

The scenario is by walking around the course you simulate, or mimic a short race of two laps around a rectangular course.

Here's an overview of the exercise:





Key to the points in the diagram

1. Start the race timer using the countdown timer.
 - See the automatic creation of the Leeward Mark at the RCB.
2. Sail an upwind leg on starboard tack.
 - See the automatic detection of the Wind (TWD) on first Groove.
 - See wind shifts
 - See wind shift alerts
 - See the basic dashboard speed (SOG), heading (COG) and VMG
3. Tack onto port.
 - See the Tack analysis alert
4. Mimic a windward mark rounding to starboard. and execute a bear-away set onto a reaching port reach.
 - See the app automatically create a Windward Mark (WM)
 - See the Navigation screen directing you back to the RCB.
 - Monitor your downwind VMG
5. Jibe onto a starboard reaching leg.
6. Round the bottom mark to starboard and sail an upwind leg on starboard tack .
 - See the app automatically replaces the Leeward Mark (LM).
 - See the Navigation screen directing you to the WM.
 - Layline in 30 secs
 - On the Layline
7. Tack onto port (repeat of 3.) Now that you have a WM, you can see the following Cues:
 - Mark in 90 seconds

8. Mimic a windward mark rounding to starboard
 - which replaces the Windward Mark (WM).
 - Automatically navigate to the LM created in 4
9. Jibe onto a port reach..
 - See the "Mark in 90 seconds" alert.
10. Finish at the Start Line, near the LM.

Detailed instructions for Exercise 1.

Here are the detailed instructions.

Set up your watch

If you haven't done so already, follow the Garmin instructions to set up your watch.

1. Install the "Garmin Connect Mobile" app (GCM) on your phone. Search for Garmin Connect in your App Store (iPhone) or Play Store (Android) and install it on your phone.
2. Connect your Garmin Vivoactive HR watch to the phone .
3. Visit garminconnect.com/vivoactivehr to become familiar with the watch faces and watch apps that are available for your watch.

Install raceQs app on your watch

If you haven't done so already, install and configure the raceQs watch app on your watch.

1. Use GCM to locate and install raceQs on your watch.
2. Set Data Recording" to "Every Second".
 - a. Menu->Settings->System->Data Recording.²
3. Enable GLONASS.
 - a. Enter->Run->Menu->Run Settings->GPS->GLONASS³

Create an account in raceQs

If you haven't done so already, create an account in raceQs.com

4. Open an internet browser (Safari, Chrome, Edge, Internet Explorer, Firefox...) on your PC/laptop/tablet or phone.

²The default Data Recording option is "Smart" which only records your position every few seconds, when it detects certain movement characteristics. raceQs requires a position report every second.

³ Using GLONASS as well as GPS provides the best possible data quality.

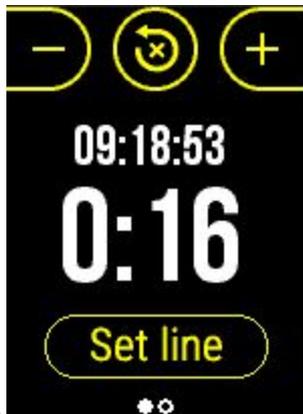
SIGN UP

5. Navigate to raceQs.com and follow the account in raceQs. prompt to create an

Log your raceQs watch app into your raceQs account

If you haven't done so already, log your raceQs watch app into your raceQs account⁴. This is a bit messy, so please follow the instructions carefully.

1. If you are using an iPhone⁵, start Garmin Connect Mobile (GCM) on your iPhone
2. Start raceQs on the watch. We fully describe these screens later in this guide, but for now please just follow these instructions to get yourself up and running.



3. Swipe to the Dashboard screen.



4. Tap the Navigate Icon.

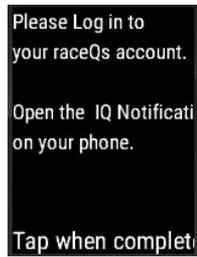


The message " Please log into your raceQs account on your phone" will be

⁴ This exercise uses the navigation features which requires the watch app to communicate with your raceQs account

⁵ This step is not required if you're using an Android phone. On iPhone the notification only appears if GCM is running, On android the notification appears on the Notifications bar at the top of the screen.

displayed:



Please Log in to
your raceQs account.

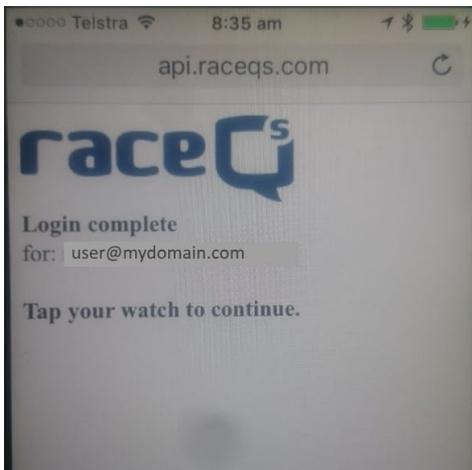
Open the IQ Notificati
on your phone.

Tap when complet

5. Leave this displayed on your watch until you complete step 6 below.
6. On your phone, log in to your raceQs account as follows:
 - a. Follow the Notification on your phone:
"Connect IQ
raceQs wants to open <http://raceqs.com/mobile-login1/?.....>"
 - b. This will open your browser at the raceQs LOGIN page



- c. Log in to raceQs with the credentials you set up above
- d. On successful entry of credentials, the browser will report
"Login complete for {your user name} Tap your watch to continue":



7. On your watch tap the screen displaying the " Please log into your.." .message. It will close and return you to the Dashboard screen.

- a. Tap the Navigate Icon once again and the "MARKS LIST" screen will open.



This will initially⁶ show an empty page, but its appearance confirms you have successfully logged the raceQs watch app into your raceQs account.

- b. Now that you have logged in to your raceQs account, you can now close the raceQs app.

Plan your route.

Choose a route that meets the requirements of length, geometry and sky visibility as described earlier.

Start the exercise

Step #0. Read the instructions first!

Before you start, please familiarize yourself with the entire instructions before commencing. Each new screen that is described is accompanied with a box containing explanation of the features of the screen which will also serve as a useful reference guide.

Step #1. Start the race

1. Go to the start point of the route with your watch. Your phone is not required for the exercise, so you can **leave your phone at home**.
2. Start the raceQs app on your watch. The first screen you will see is the Race Starting screen.

⁶ Later, it will show your Windward/Leeward marks and any marks you download from raceQs 3D replay.



Waiting for GPS

Indicates the watch's GPS has not yet acquired a position. The app relies on having a strong GPS signal to provide time and location data. Until then neither the touch screen nor buttons will operate the app.



These three icons are touch screen buttons that enable you to change the countdown timer.



enable you to decrease or increase the number of minutes to the start.



will bypass the timer and start racing straight away.



indicates the timer is set to start counting down from 5 minutes. The time to the gun is displayed here once you start the timer.



A touch screen button to open the Perfect Start screen.

A **long press** on Set Line will allow you to clear the Wind, W/L Marks and and the Start line. This is useful for when you're re-doing this exercise.



Screen navigation guide. Shows you're on the first (Starting) of two sets of screens. A horizontal swipe will take you to the Dashboard screens described below.

- Wait for the **Waiting for GPS** message to be replaced with the local time (9:18:20 am).



09:18:20

shows the time that is provided by the GPS adjusted by the watch to your local time zone.

- Tap the  icon on the Start screen four (4) times to reduce the start time from 5:00 to 1:00 (this just saves time at the start).



- Press the Enter button to start the clock counting down.
- As the time approaches 0:00, start walking briskly (around 2 kts) along leg 1.
- At 0:00 the display will change to the Dashboard screen, showing your speed

(SOG) and heading (COG) with the Race State icon  illuminated to show you're racing.



COG 001 °m COG is Course over Ground and is reported in degrees Magnetic. The GPS reports heading in degrees True and the app applies your local Magnetic Variation to report your course in the same frame of reference as your magnetic compass.

SOG 1.1 kt SOG is Speed over Ground and is reported in knots. The speed is smoothed over about 5 seconds to provide a good presentation of your speed.

VMG 1.0 kt VMG is Velocity Made Good and is the speed you are achieving directly upwind or downwind.

In practice, you will usually sailing faster than the values achieved in this exercise. This is a 15 second loop from an actual race.



8. The Navigate icon, and Wind icon should both be disabled,  indicating that you are not yet navigating and you have not yet set the wind (TWD).

If the wind icon is "illuminated" like this,  it means that you have already set the wind so the automatic wind detection feature at the start will not be activated.

At the gun, the app assumes that you sailed a perfect start and that on the gun, you were close hauled, on starboard tack and next to the Race Committee Boat (RCB). It creates a mark, named "LM: RCB {hh:mm:ss}" at that position.

If you tap the Navigate Icon  you will see the mark that was created:

MARKS LIST
LM: RCB 09:19:08

The name **LM: RCB 09:19:08** tells you it's a Leeward Mark (LM) created at the Race Committee Boat (RCB) at 9:19:08 am local time
Later in the exercise you will see how this list gets used for navigation.

Step #2. "Sail" your first upwind segment.



Shortly after the start - within around 30 seconds, if you are walking in a straight line, the app will detect a period of stable sailing and, since the countdown timer expired, it will do two very useful things. it will deduce two significant facts about your race:

1. the True Wind Angle (TWA)

It will assume that you are on starboard tack and will set the TWD at 45° to your current stable course. You will see the wind icon illuminate indicating the wind has been set.



You will see the wind icon illuminate indicating the wind has been set.

If you tap the wind icon, it will report the value it has deduced for the TWD:

A screenshot of the 'SET WIND' screen. It features a blue compass rose with white dots around the perimeter. The cardinal directions are labeled: N (North), NE (Northeast), E (East), SE (Southeast), S (South), SW (Southwest), W (West), and NW (Northwest). In the center of the compass, the number '098' is displayed in yellow. The background is black.	<p><i>When you're on the water, but not during this exercise, you use this screen to alter the TWD by tapping anywhere on the screen to indicate the direction of the wind.</i></p> <p><i>The app uses the watch's internal magnetic compass to rotate the display so that the North point of the display always points North.</i></p> <p><i>Before you use this facility, follow the Garmin on-screen instructions to calibrate the compass:</i></p> <p><i>Menu->Settings->Sensors-> Compass->Calibrate to alter the wind.</i></p>
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Swipe down to the Wind screen and see how the app reports lifts and headers from your stable course.



This screen uses the raceQs concept of a "Groove" which is a period of stable course heading.

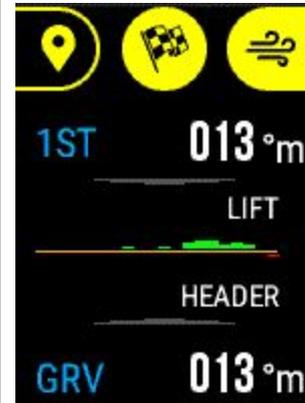
1ST 053 °m is the heading of the first Groove after a tack.

GRV 057 °m is the heading of your current Groove.

 shows the lifts and headers of your current groove.

On each Groove when you are sailing upwind, the app recalculates the TWD based on the Groove course and your tacking angle.

This is a 60 second looped video of a live race showing small lifts and headers.



You may also see some wind Cues advising of lifts or headers.



The wind shift Cues alert you to lifts or headers of 5° or more. They are only generated on upwind legs.

Cues remain on the screen for five seconds or until you clear them off either with a simple screen tap or a swipe in any direction.

Concentrate on sailing a steady course at a steady pace.

Step #3. Tack onto port.



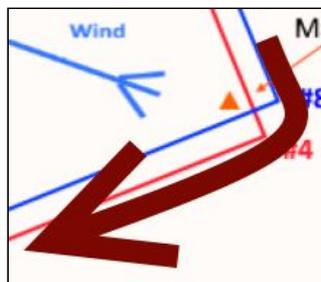
When you reach the first corner, execute a right-hand tack onto port tack. Once you have established a steady course on the new tack, it will report a tack analysis:



The Tack Analysis is a powerful training tool for monitoring your performance through a tack. It uses the same algorithms as the tack analysis provided in the raceQs 3D replay.

Continue on this port tack until you reach the windward mark at the next corner.

Step #4. Mimic a windward mark rounding, to starboard.



At the next corner, then turn right onto a reach (with a bear-away set). Once you have settled on the new course, it will report that it has created a windward mark.



The app automatically generates Windward and Leeward marks when it detects you have transitioned from an upwind to a downwind leg and vice versa. It positions the mark halfway between the last Groove before the transition and the first groove after.

WM: 09:23 It names the mark "WM: {hh:mm}" where {hh:mm} is the time it was created. This mark was created at your position at 9:23 am local time.

As you have rounded the Windward Mark, the app will now alert you to the fact that it has commenced to navigate you to the Leeward Mark that it created at the start. :



Without any input from you, on detecting that you have rounded a windward mark, the app will automatically start to navigate to the LM. In a future release of the app it will automatically generate and navigate to the first Windward Mark after the start, so "Stay Tuned."

Now, when you swipe up/down to the Navigation screen you will see the . This screen provides you with guidance to the next mark and is invaluable if you were in strong current, poor visibility or the mark is too distant to observe.(Steer 48° degrees Right)



DTM 177 m Your Distance to the Mark (DTM) is reported in Nautical miles until the mark is within 500 metres, then in metres.

TTM 3m04s Your Time to the Mark (TTM) is reported in minutes and seconds and is based on your current average VMG to the mark. Note that it alternately displays Distance To Mark (DTM) and Time To the Mark (TTM) every three seconds.



The pointer indicates the direction to the mark based on your current COG.

48_R

The Turn Angle indicates the angle and direction (48° right) you need to turn to track directly to the mark.

BTM 283 °m

The Bearing to Mark (BTM) is permanently displayed.

This is a 60 second looped video of a live race showing the navigation screen during a tack.



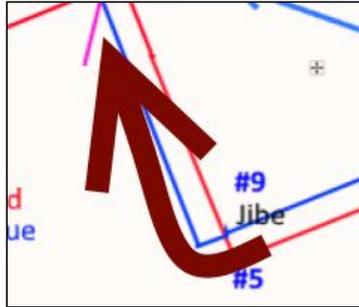
On this leg you use the Dashboard Screen to monitor your downwind performance by comparing your speed with your VMG.

The VMG is relative to the wind, so on the water, especially during training sessions, you could experiment with different sailing angles to determine the TWA for your best VMG.



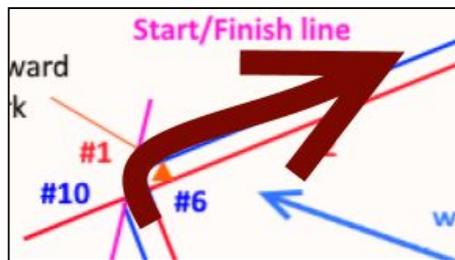
Continue on this starboard reach until you reach the next corner.

Step #5. Jibe onto a starboard reaching leg.



At the next corner, jibe onto a starboard reaching leg and continue to monitor your VMG to get the best time to the bottom mark.
Continue on this starboard reach reach until the next corner.

Step #6 Mimic a leeward mark rounding to starboard.



At the next corner round the bottom mark to starboard.
Once you have settled on the new course, it will report that it has replaced the Leeward Mark



LM: 09:26 This Leeward mark was created based on your position at time 9:26 am local time and replaces the previous Leeward Mark **LM: RCB 09:19:08** that was created at the start.

We are now at the start of Lap 2 and it will automatically start navigating you to the Windward Mark:



WM 09:23 was created on your first rounding of the windward mark.



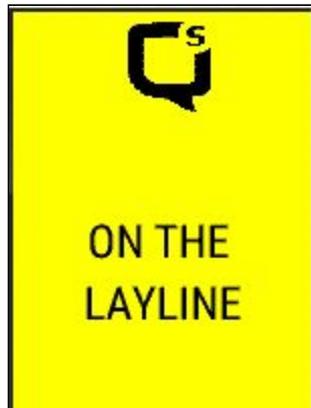
Your marks are displayed in this touch screen. You tap on a mark name to choose to have the app provide navigation advice to that mark.

Marks that you have created in raceQs 3D replay and downloaded the watch app will appear in this list.

W/L marks will be deleted from the app after 8 hours, leaving a clean slate for tomorrow's race.

This screen provides you with guidance to the next mark and is invaluable if you were in strong current, poor visibility or the mark is too distant to observe. (Steer 61° degrees Right)

Now that you are navigating to the WM, as you approach the next corner you will see the following Cues to alert you to the approach of the port layline:



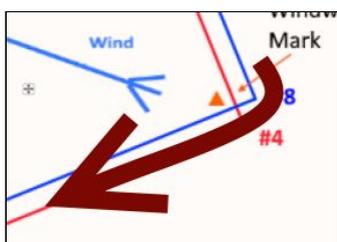
Step #7 Tack onto port



At the corner, turn right to tack onto port tack. As you approach the next corner, the Cue will alert you to your approach to the top mark:



Step #8 Mimic a windward mark rounding to starboard



At the next corner, turn right onto a port reach.

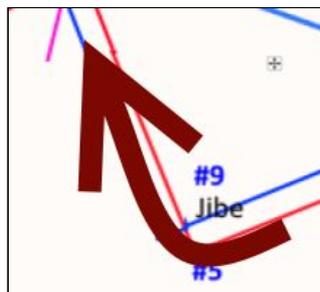
Once you have settled on the new course, it will report that it has **replaced** the Windward Mark.



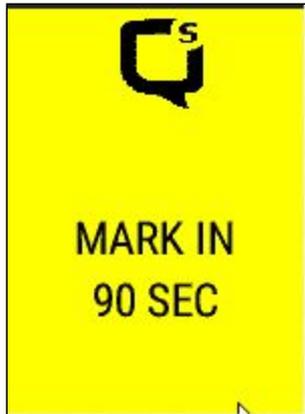
You can now start navigating to the bottom mark that was created at the end of Lap 1. But, since you have created a Leeward mark, the app will automatically commence navigating to the Leeward Mark after rounding a Windward Mark..



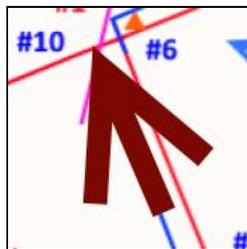
Step #9 Jibe onto port



At the next corner, jibe onto a port reach and start heading for the finish line. As you approach the final corner, it will alert you to your approach to the bottom mark:



Step #10 Finish



At the final corner you cross the finish line and can stop racing by pressing the race State button. It will prompt you with the advice that you have been racing for 15 minutes, and do you wish to stop racing? Tap the Yes option.

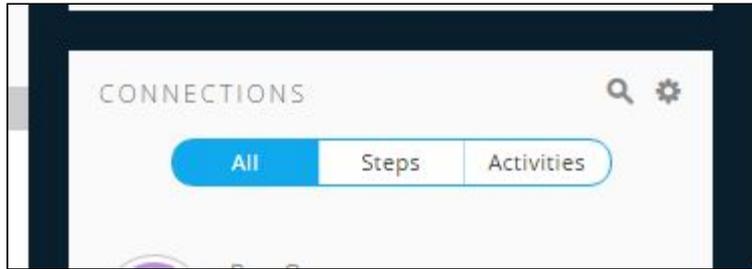
You have now finished the exercise, so press the back button to bring up the "Really Quit" prompt and tap "Confirm" to close the app and return you to the Garmin interface.

Replay your track in raceQs 3D replay

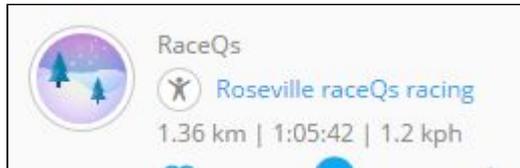
While you have been "sailing the race", your track has been recorded on the watch by the activity tracking feature of the Garmin watch. This "Activity" can be "synchronized" to Garmin's "IQ Connect" web site from where you can download the track and upload it to raceQs. Here are the steps.

1. Reconnect your watch to your phone.
Since you left your phone at home for the exercise, you now need to return home and pick up your phone.
2. Open GCM on your phone and wait for the Activity (on your watch) to "Synchronize" with the phone. GCM will display when this is complete.
3. Open the browser on your PC/Mac/laptop/ and navigate to [Garmin Connect](#)
4. Log in to your Garmin account using your username/password.

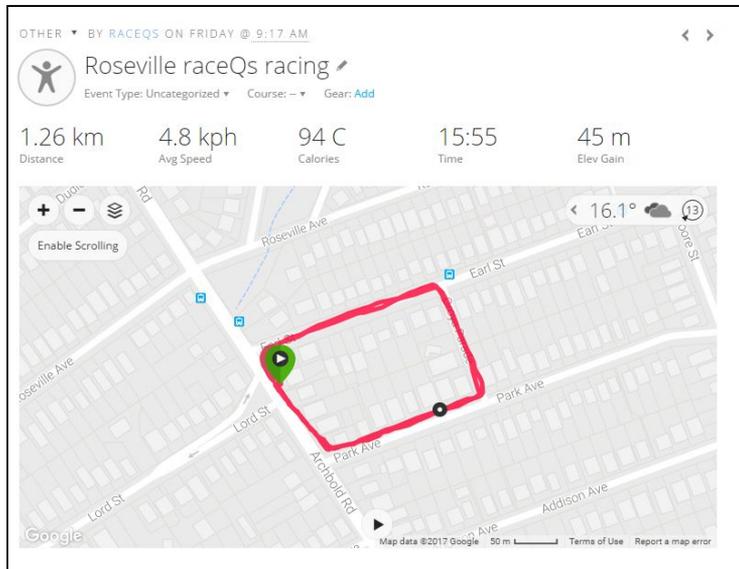
5. In Garmin Connect, look in the connections link⁷



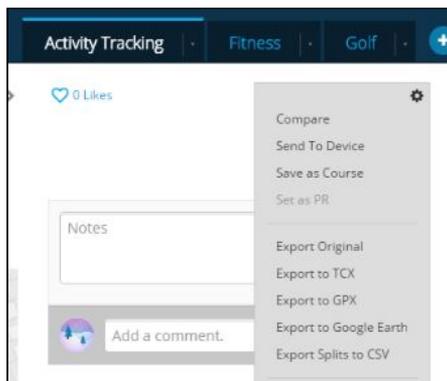
for the report of your training walk. It will be named "RaceQs {your location} racing" like



6. Click on the Activity to open the map



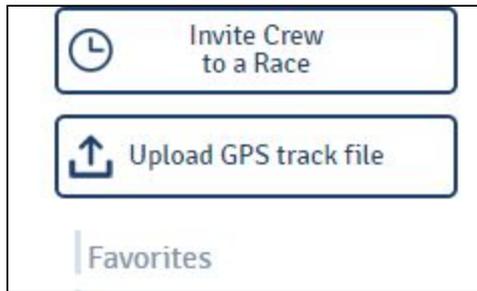
7. Click the icon in the top right corner to open a drop-down menu



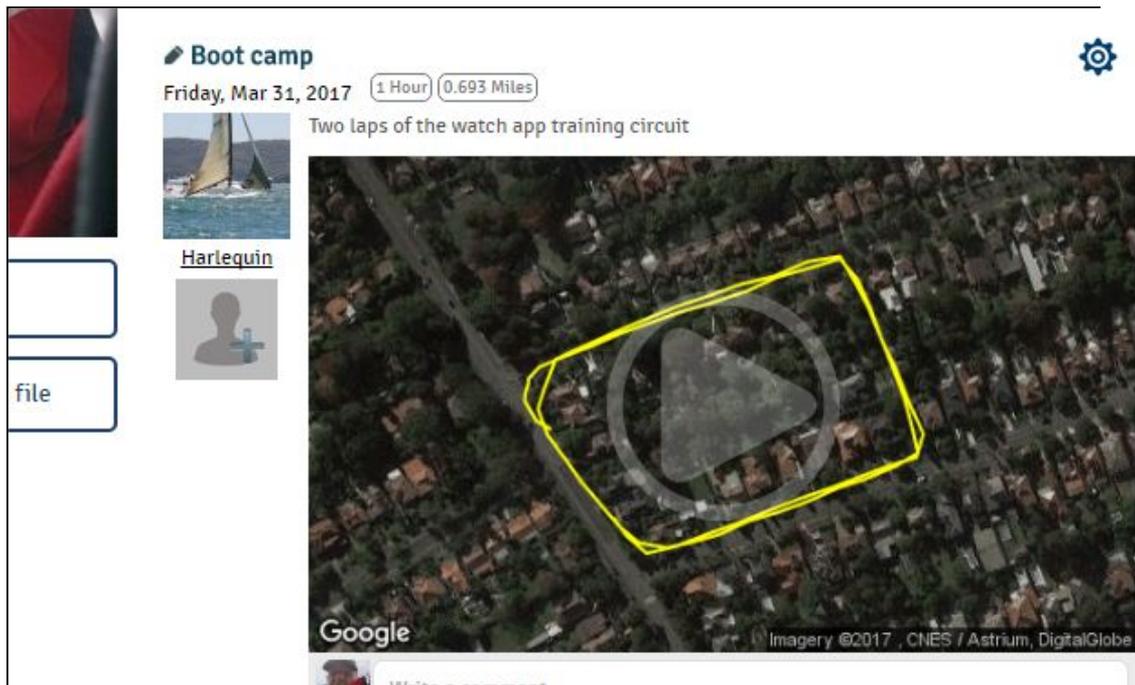
8. Click on "Export to GPX" and wait for the download to complete. Note the name and location of the downloaded file - by default it will be in your "Downloads" folder.

⁷ This guide to Garmin Connect is based on a Windows PC in April 2017. Your experience on a different platform or at a later date may be different. We are planning to streamline the process to have your track automatically uploaded to raceQs 3D replay.

9. Navigate to [raceQs 3D replay](#) and log in to your raceQs account.
10. In raceQs, from your "My Journal" page, click on the upload GPS track file link:



11. Follow the prompts to upload the .gpx file that you downloaded in step 8 above. Your track will now appear in your journal page:



12. Use the facilities of raceQs 3D replay to explore your track.

Exercise 2

Overview of training exercise 2 the "Perfect Start"

The concept of this exercise is that you walk a course that mimics setting the start line and then starting and you get to interact with the app in a realistic manner.

We assume that you have completed Exercise 1 (or at least have read through the instructions!) and so have

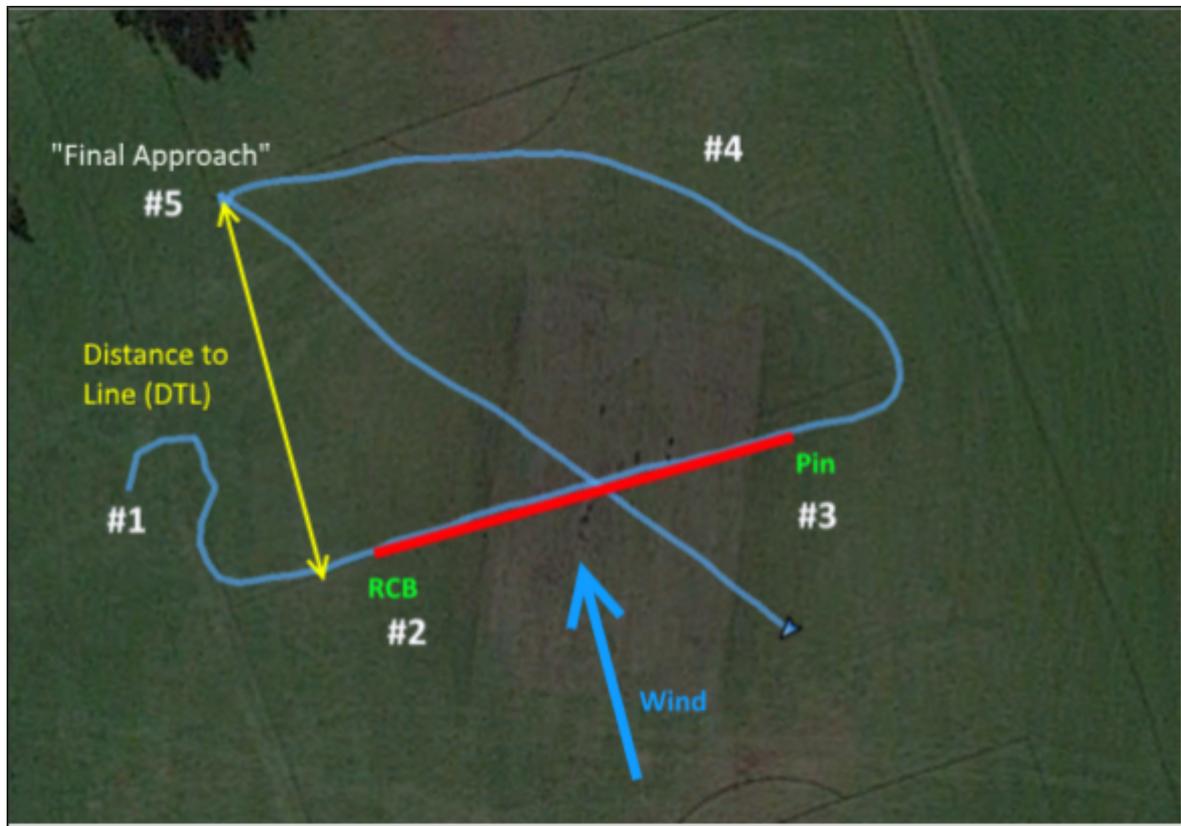
- installed raceQs on your watch and
- understand the how to navigate the app with the buttons and the touch-screen taps and swipes.

During this walk, you get to experience the "Perfect Start" feature of the watch and specifically

- Interact with the Perfect Start Screen
- set the "Bow offset"
- "ping" the ends of the start line
- Use the "go bars" to time your approach
- See the auto-wind detection from the line setting
- The auto-creation of the initial Leeward mark

The exercise is best carried out on a marked-up playing field, although a large car-park or other open space will do the trick. Once again, the area should be clear of overhanging trees or overlooked by tall buildings which will interfere with the quality of the GPS signal.

The scenario is by walking around the course you mimic sailing along the start line and manoeuvring to the the approach and then the final work to the line:



Plan your route.

Choose a route that meets the requirements of length, geometry and sky visibility as described earlier. A playing field with marked lines makes it easier to plan.

Imagine the position of the line, the Race Committee Boat (RCB) and the Pin. In my case, I used the marked centre line of the playing field as the position of start line and a position

either side of the centre as the position of the RCB and Pin. This gave a start line length of about 30 metres.

Point #5 on the diagram, "final approach" is where you start your run to the line. It should be around 30 metres from the line and at around 45° to the centre of the line. Find that point and line up some features in the distance that will help you to walk the straight line across the start line.

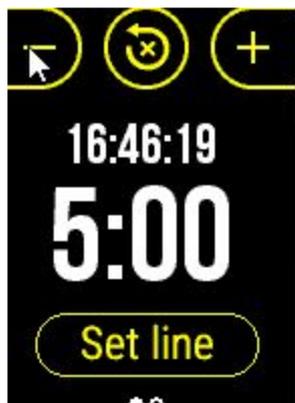
Start the exercise

Step #0. Read the instructions first!

Before you start, please familiarize yourself with the entire instructions before commencing. Each new screen that is described is accompanied with a box containing explanation of the features of the screen which will also serve as a useful reference guide.

Step #1.

1. Go to the start point of the route with your watch. Your phone is not required for the exercise, so you can **leave your phone at home**.
2. Start the raceQs app on your watch. The first screen you will see is the Race Starting screen.



This screen was explained in Exercise 1 but don't forget that the

Set line

*A **long press** on Set Line will allow you to clear the Wind, W/L Marks and the Start line. This is useful for when you're re-doing this exercise.*

- 3.
4. Tap the **Set line** screen button (or swipe down) to open the Perfect Start screen:



Bow offset Bow offset defines the distance between the bow of the boat and your position on the boat.. It enables the app to calculate the position of the bow based on the location of the GPS in the watch. It defaults to 8 metres (I sail a 12 metre yacht!)

- + screen buttons reduce or increase the Bow offset by 1 metre per tap.

No line yet. Line length and bearing display: not yet set.

PIN RCB are screen buttons to ping the ends described later.

Set wind screen button to open the Set Wind screen (Described in Ex. 1)

5. Since in this exercise you aren't on a sailboat, we'll assume that you are on the bow, so tap the button eight times to bring the bow offset down to zero (0) metres

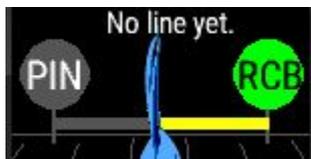


Step #2 Sail down the line to "ping" the RCB.

From your start point walk to a point on the extension of the "start line" a few metres before the position of the RCB and then follow along the line to the RCB. As you pass the position



of the RCB, tap the RCB screen button. The watch will make a short confirming buzz and the RCB button and its half or the line will illuminate.



Step #3 Continue down the line to "ping" the Pin.

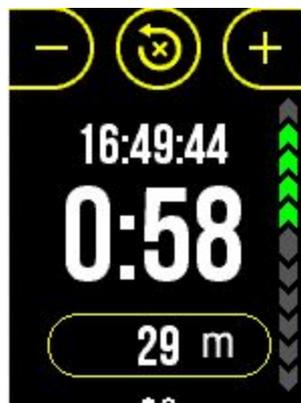
As you reach the position of the Pin, tap the Pin screen button. The watch will make a short confirming buzz and the PIN button and the remainder of the line will illuminate. The line length and bearing will be displayed



053°M/34m The line is 34 metres in length and the bearing from the RCB to the Pin is 053° Magnetic.

Step #4 Prepare for your final run to the line.

1. Go to the "final approach" point from where you will sail close hauled, starboard tack to the line. You need to plan this position.
From here, walking at normal pace, you should take around 20 seconds to cross the line.
2. Swipe back to the Start Screen and tap the button four times to bring the counter down to 1:00
3. Press the Select button to start the countdown. The screen will go into "pre-start" mode, providing actionable intel to assist your approach to the line.



go-bar The "go-bars" tell you to by how much to speed up, or slow down to cross the line on the gun (see below).

- + decrease or increase the timer by 1 minute during the countdown.

Reset Reset button allows you to stop the timer and reset it to 5:00

The Select button resets the timer to the nearest whole minute - enables you to synchronize with the RCB's clock if you started a few seconds late or early.

29 m The perpendicular distance from your bow to the line.

The "go-bars"

Each bar represents $\frac{1}{2}$ Knot, so  indicates "increase by 1 knot"



"slow down $\frac{1}{2}$ kt"



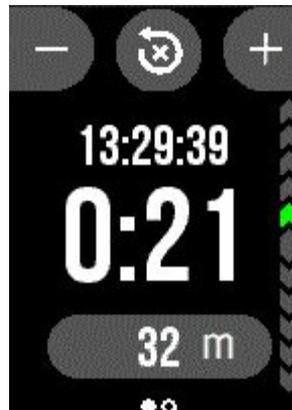
"maintain this speed and you will cross the line on the gun."

Step #5 Sail the final run to the line.

As the time approaches 00:20, walk briskly towards the line at around 45° to the middle of the line.

Adjust your walking pace to keep the go-bars in the yellow zone and reach the line on the gun.

Here's a video of the last 20 seconds of a real race.



You will probably have to repeat the exercise a few times before you get it just right, but the exercise will give you idea of how the go-bars operate.