EVOLUTION

Race Course, Marks and Waypoints

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1. Introduction

This manual contains all the information necessary to create and manage race courses, including the starting line. Whether for a simple windward-leeward course or a complicated fixed-marks course, it provides a step-by-step guide for entering them into the system and managing them as files.

How to Use This Manual

Carefully reading this manual will give you a comprehensive understanding of the system's available functionality for race course management. It will also help you become familiar with different sections and easily find explanations for various topics you must reference.

The manual's table of contents allows users who are already familiar with the system and wish to make a specific query to access specific topics.

If you do not find the answer to your problem in this manual, we invite you to contact us directly by e-mail at info@evolution-tactic.com.

Suggestions

We welcome all suggestions and contributions that improve this manual and the EVOLUTION system.

If you wish to report any errors or omissions in the system documentation, please do so directly by e-mail at info@evolution-tactic.com.

Conventions

This section introduces various conventions and practices that will be used in subsequent chapters of this manual.

Types of Data Used in the System

EVOLUTION handles data types such as geographical position, direction, bearings, distance, date and time, depths, etc.

These types of data can be displayed or entered in EVOLUTION. This section presents specific details related to the system's main data types.

Positions (Latitude and Longitude)

The position (latitude and longitude) of a geographical point is used in navigation to specify the location of a race course, marks, and waypoints in addition to the yacht's position.

Reference System: For cartography and other functions using geographic coordinates, EVOLUTION uses positions referenced to the WGS84 datum, now the primary datum for GPS and georeferenced databases such as charts and waypoints.

Resolution: Even though EVOLUTION internally performs calculations with very high precision, the maximum resolution at which the earth's coordinates are entered or presented is one-thousandth of an arcminute, or 0º 00.0001'. On the earth's surface, this represents no more than 18 cm.

Presentation Format: EVOLUTION represents latitudes and longitudes in degrees and minutes with decimals and signs (hemisphere). For example, latitude 04° 01.2596' S and longitude 058° 41.2345' W.

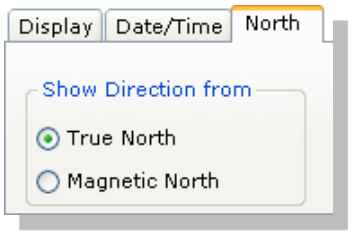
Input Format: Latitudes and longitudes should be entered as dddmm.mmm, where 'd' represents degrees and 'm' represents minutes. Leading zeros can be ignored for degrees but not for minutes unless spaces are used to separate them from degrees in the format d m.mmmm. Including the hemisphere indicator (W for West, E for East, S for South, N for North) is also essential**.** The following examples show how EVOLUTION interprets latitudes and longitudes entered with different formats:

Latitudes	
Entered	Interpreted
401.259S	04º 01.2590' S
4001.259S	40º 01.2590' S
4 1,259 S	04º 01.2590' S
40 1,259 S	40º 01.2590' S

Longitudes	
Entered	Interpreted
549E	005º 49.0000' E
5409E	054º 09.0000' E
5 49 E	005º 49.0000' E
54 9 E	054º 09.0000' E

Directions

In EVOLUTION, directions specify headings, bearings, wind directions, etc.



Reference System: The directions are usually referenced to true north or magnetic north, with a few exceptions where the value is for an angle relative to the bow of the boats. EVOLUTION internally works with and stores these directions relative to the true north. However, you can choose whether the system presents all directions referenced to either true or magnetic north. In the Global Options form, on the "North" page accessed through the "Evolution→Global Options" menu, you can customize how to display all directions.

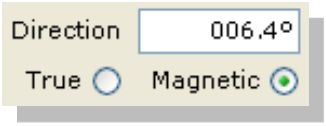
When converting a direction from "magnetic" to "true", EVOLUTION applies the declination obtained from the WMM for a specific location. If the direction is used on the boat (heading, wind direction, etc.), the declination used is that of the boat's position. For other objects, the system uses the declination related to the object's location.

The World Magnetic Model (WMM) is a precise geomagnetic model that provides the magnetic declination value for any position.

Resolution: Although EVOLUTION performs internal calculations with high accuracy, it rounds directions to whole degrees (234º) or, when relevant, to degrees with a decimal (234.8º).

Presentation Format: EVOLUTION presents directions in degrees with three digits, adding leading zeros if necessary. It eventually uses a decimal of a degree when the function requires a higher resolution. Usually, the system includes the degree symbol and a 'T' if the direction is referenced to true north (024° T) or an 'M' if it is referenced to magnetic north (024° M).

Input Format: When entering a direction, type the number of degrees without the north reference. For functions needing a north reference, EVOLUTION provides the option to select True or Magnetic.



Distances

Many data items in EVOLUTION represent distances on the earth's surface. Some common examples include the distance of a race course leg, the distance from the boat to a mark, or a layline.

Reference System: In EVOLUTION, all distances follow the shortest path. They are between two points on a great circle. A distance is traveled from a starting point to another point along an orthodromic line.

Resolution: EVOLUTION is very precise in distance calculations. But its highest presentation or input resolution is 18 cm.

Presentation: Distances vary widely. They range from 10800 nautical miles to a few centimeters. The system shows distances in nautical miles as standard practice. They are presented with varying decimal places followed by "nm." In a few cases, distances less than 0.25 nm are converted to meters displayed, followed by "mt."

Entry Formats: In some functions, EVOLUTION needs you to enter a distance. For example, when moving a mark on a race course. You can input a quantity in nautical miles or use 'k' or 'km' for kilometers, 'm' or 'mt' for meters, 'y' or 'yr' for yards, and 'f' or 'ft' for feet. Optionally, you can use 'n' or 'nm' for nautical miles.

2. Race Course, Marks and Waypoints

One of the critical elements of EVOLUTION is the Tactic Mark. It is the immediate destination. When combined with the yacht's position, it is used in the calculations to find the best sailing mode.

During a typical race, the position of the tactic mark is closely related to the race course to be followed. Building the race course is key when using EVOLUTION. It is perhaps the most essential task.

This chapter presents the concepts and procedures that will allow you to:

- Create and update race courses and the marks that make it up.
- Adjust the output line with the Start page functions.
- Position the tactic mark during the race.
- Manage the Waypoints database, which allows you to create marks based on objects with a predetermined position.

This chapter will explore methods and valuable tips for creating race courses. They should be easy to understand and use while racing.

Race Course

A Race Course is the path to complete a race. They are a set of consecutive Marks, including the starting line.

For EVOLUTION, a race course meets the following goals:

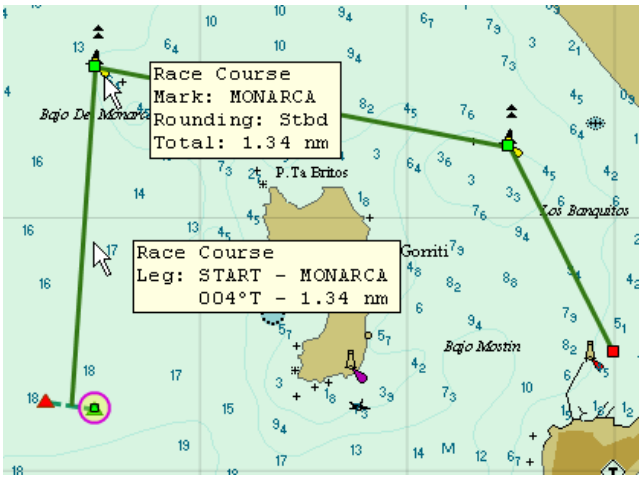
- Define the trajectory to be followed. This lets you identify areas requiring special attention, such as those for safety or tactical reasons.
- It allows you to put the Tactic Mark on any race course mark, making the navigator's job easier.
- Define the exact position of the starting line to be used by Start functions.
- Get tactic navigation information for future legs by considering the wind and currents and the boat's sailing performance.

EVOLUTION offers you the flexibility to create and store unlimited race courses. These courses are stored in files under the Yacht's Directory. Only one race course may be used at any time; we call this race course an Active Race Course.

Marks joined by segments or legs present the active race course on the nautical chart.

The system displays the relevant information for these objects when placing the cursor near a leg or mark.

In EVOLUTION, the legs of a course are paths between two consecutive marks. They are great-circle segments as the system uses orthodromic navigation. The system displays the departure heading from one mark to another.



Marks

A race course is a sequence of marks, where each mark is defined by:

- A Name – Up to eight letters (uppercase) or numbers with no spaces in between. Each mark must have a unique name, which cannot be repeated in the same race course.
- A Rounding Type indicates how to go around the mark. It has an associated symbol shown on the chart. The following list shows the different types available:

■	Port	A mark is to be rounded by leaving it on the port side.
■	Stbd	A mark is to be rounded by leaving it on the starboard side.
■	Mark	A generic mark with undefined rounding, for example, a "gate".
○	Temporary	These marks are not part of the original race course but must be respected for safety or tactical reasons.

▲	Start Port	The mark that defines the port end of the starting line; there can only be one per race course, and another mark, other than a Start Stbd mark, cannot precede it.
▲	Start Stbd	The mark that defines the starboard end of the starting line; there can only be one per race course, and another mark, other than a Start Port mark, cannot precede it.

- A Geographic Position (Position) – Latitude and longitude where the mark is positioned.
- Comments should be brief and aid the navigator. For example, they could identify the mark as the "Orange Tetrahedron," specify the RC communication channel as "VHF 71," or state the starting time as "Division A start at 11:00."

The following procedures describe how to create, change, delete, and manage race courses. They also describe how to manage the marks on them.

Create a New Race Course

To create race courses in EVOLUTION, two methods are available: the first is to directly use the mouse to draw it on the chart, and the second is to use a specific form for editing race courses.

When using the mouse, you can quickly and easily create marks with their position information. The system will automatically set the mark's name and type (refer to "New Quick Race Course").

Alternatively, you can use the Edit Course form to enter all data for each mark with detailed information (refer to "New Race Course using the Edit Form").

New Quick Race Course - New Quick!

To create a new race course quickly, select the menu option "Race→Race Course→New Quick!" The system will request confirmation to create and activate a new course by replacing the current active race course. If you proceed, EVOLUTION will automatically do the following:

a. Create a new race course named "Quick" without any marks, with a description including the date and time of creation.
b. Activate the "Quick" race course, replacing the current one.
c. Display the nautical chart (Chart) if it's on a different page.
d. Enter the "Modify the Race Course on the Chart" mode.

You can create, modify, or delete marks using only the mouse, following the techniques described in the "Modify the Race Course on the Chart" section.

When you create a new race course, the system deletes other race courses named "Quick." If you want to save a "Quick" race course, you can give it a different name using the instructions in the "Save the Race Course by Giving It a Name" section.

New Race Course Using the Edit Form

Using the "Race→Race Course→ New" menu option, the system displays the Course Edit form.

This form enables you to create a race course and incorporate marks with all their specific characteristics. The Modify the Race Course Using the Edit Form thoroughly explains the various ways to use this form. After completing the race course, you can input a brief description and save it by giving it a unique name.

When you close the form, the system asks if you want to activate the new race course by replacing the one used at that time. If you accept this option, the newly created race course will become active and be shown on the chart. The previous race course will remain stored in the Yacht Directory and may be used again.

Modify the Race Course on the Charts

While on the chart, you can use the mouse to create new marks, modify the positions of existing marks, or remove them from the race course. To use these functions, you must enter a particular mode of work called Modify the Race Course on the Chart.

Enter the Modify the Race Course on the Chart Mode

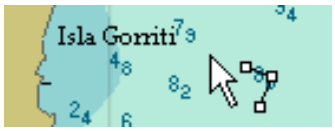
Using this button on the toolbar on the chart page, the system is in this mode, enabling the corresponding functions described below.

The mouse cursor transforms into an arrow on the chart, as shown on the right.

Please note that the system automatically enters this mode when you create a new race course using the "Race→Race Course→New Quick" menu option.

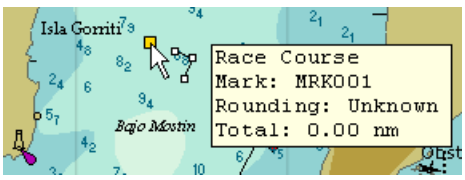
The button appears pressed as long as the system is in this mode. All the chart movement functions (centering, zoom-in, and zoom-out) remain available.

Create a New Mark

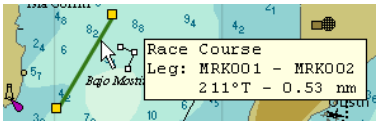


Position the cursor in the desired place and make a Long Click (more than 1 second) with the left mouse button.

Immediately, the system creates a new mark. If the race course does not have marks, this will be the first; otherwise, the new mark will be the last in the sequence, extending the race course with a new leg. This mark is given the default name MRKxxx and the generic type "Mark".

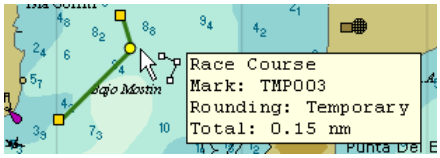


Create an Intermediate Mark on a Leg



Place the cursor on the leg near where you want to insert the new mark. The system should display the leg information, indicating that the leg has been selected and the operation can continue.

Click to create the new mark at the cursor position or drag to create and, at the same time, reposition the new mark in a single operation.



The system creates a new mark that, in the sequence of the race course, is placed between the marks that form both ends of the original leg. The new mark is given the default name TMPxxx and the type Temporary.

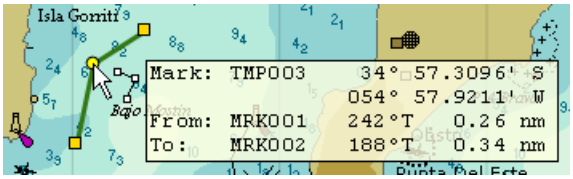
Temporary marks are generally not part of the official course described by the race instructions and are only created if obstacles need to be avoided. As we will see later, the name and type of the mark can be changed using the Race Course Edit Form.

Modifying the Position of a Mark

Place the cursor over the mark to be moved. The system should display the mark information indicating that the mark is selected and the operation can continue.

Do a ***drag,*** dragging the mark to its new position.

During the mark translation operation, the system displays helpful information for positioning the mark, including the latitude and longitude of the cursor position, distances, and directions from the previous mark to the next mark.



Remove a Mark

Place the cursor over the mark to be removed. The system should display the mark information indicating that the mark is selected and the operation can continue.

Double-click on the mark.

The mark is immediately removed. There is no undo function to revert this action. You will need to recreate the mark to recover it.

Exit Chart Race Course Modification Mode

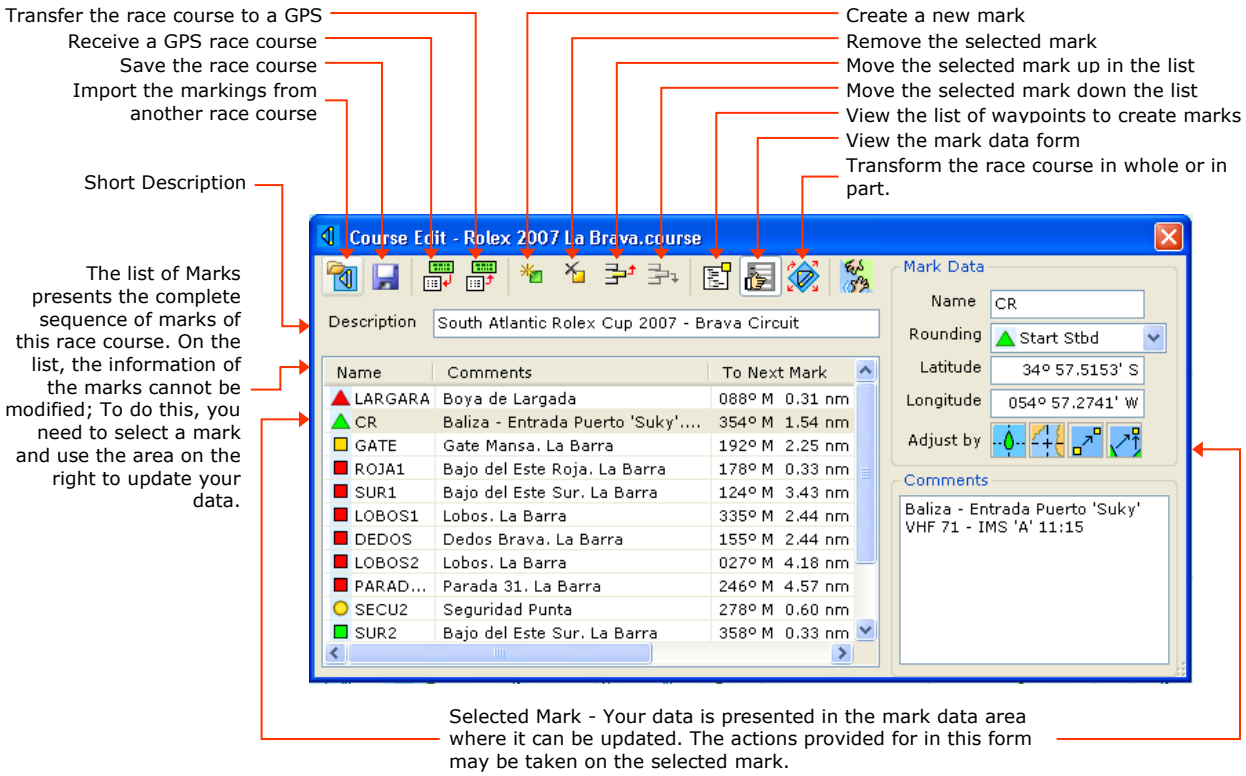
You can use this button again to exit the Modify the Race Course on the Chart mode. The system will ask if you accept the changes made.

You also force the exit of this mode in the following circumstances: when entering the Positioning the Tactic Mark Manually on the Chart, entering (BRL) Measurement mode, or opening the Race Course Edit Form.

Modify the Race Course Using the Edit Form

Whether creating a new race course or modifying the currently used (Active) race course, the Race Course Edit Form allows you to enter all the data for each mark in detail and perform operations on the entire race course.

The following figure shows the general structure of the Form. As we will see below, several sub-forms (data areas) and options allow you to execute specific functions.



It is important to remember that when you edit a race course using this form, the system does not reflect the changes on the menu. It only shows the updates when you close this form.

Open the Race Course Edit Form

The first way this form opens is by creating a New Race Course Using the Edit Form, a procedure described earlier in this section. The system presents the name of the race course in the title of the form or New if it is a new race course.

The second way to use this form is when you want to modify the course in use (Active), either by using the "Race→Race Course→Edit Active" menu option or by using this button.

It is important to remember that a race course can be modified if it is active. To change a stored race course, activate it using the Select a Race Course feature described below.

Use the Mark List

In the edit form, the list on the left presents the marks in the race course sequence. For each mark, in the different columns, we find the name preceded by the symbol associated with the type of mark, the comments, the heading and distance to the next mark, and the latitude and longitude.

Name	Comments	To Next Mark	Latitude	Longitude
LARGARA	Boya de Largada	088° M 0.31 nm	34° 57.5818' S	054° 57.6427' W
CR	Baliza - Entrada Puerto 'Suky'....	354° M 1.54 nm	34° 57.5153' S	054° 57.2741' W
GATE	Gate Mansa. La Barra	192° M 2.25 nm	34° 56.0401' S	054° 57.8035' W

Enlarging the size of the form or using the horizontal scroll bar allows you to access all columns.

On the list of marks, it is possible to perform the following actions:

- Change the position of a column by dragging and dropping its title.
- Change the width of the column by dragging the right edge of your title.
- Position the center of the chart in a mark by double-clicking on it.
- Switch between magnetic and true north direction to reach the next mark in the "To Next Mark" column by clicking on this title.
- Select a mark by clicking on it. This action is necessary to carry out many of the procedures described below.

Create a New Mark

Select the mark below which the new mark will be inserted. This step is unnecessary if the race course does not yet contain marks.

Using this button, the system creates a new mark with the default name MRKxxx and the generic type "Mark."

The new mark is selected, and its data can be updated in the data area to the right of the form.

The default name of a mark is MRK, followed by three numerical digits that the system assigns consecutively as it creates new marks. This numbering is unrelated to the sequence of the marks on the race course. It's a good practice to replace this name with one that identifies the mark as clearly as possible.

The mark is created without a position. The user must assign a position to it using one of the procedures described in Enter a Mark Position or Adjusting the Position of a Mark. Before a course can be recorded, all its marks must be assigned a position.

If the mark to be inserted is to be placed first in the race course sequence, it can be created after the first mark in the list and then moved upwards using the procedure Moving a Mark in the List.

Creating a New Mark from a Waypoint

Creating marks from a database of waypoints is a practical way to build a fixed-mark race course. See this manual's "Waypoints" section for more information on waypoints.

Using this button, the list of waypoints appears on the right side of the form.

From this hierarchical list, select the waypoint to use as a basis for creating the mark.

Select the mark, after which the new one will be inserted. This step is unnecessary if the race course does not yet contain marks.

Using this button, you can create a new mark with a default name, MRKxxx, and a generic type, "Mark." It includes the position of the waypoint that gave rise to it and, as a comment, the name of the waypoint and the folder to which it belongs.

In this example, the result of creating the first mark of the race course is as follows.

Name	Comments	Latitude	Longitude
MRK014	Baliza - Entrada Puerto 'Suky'....	34° 57.5510' S	054° 57.1210' W

The list of waypoints remains visible, allowing you to select waypoints and create the other marks by repeating this procedure.

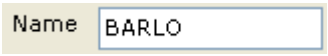
Using this other button, you can re-display the Mark Data area and change the name and type of the newly created marks.

It's important to remember that marks and waypoints are not related. The procedure described above uses a waypoint as a basis to create a mark. The Waypoints section describes how to create and manage a list of waypoints.

Update a Mark Name

In the Mark List, select the mark to modify.

Enter the new name in the Name field in the Mark Data area.



View Section Marks to review the guidelines that apply to a mark name.

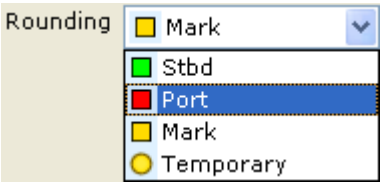
If the new name does not comply with these rules, the symbol will appear next to the field; when you hover over it, the system will present a message describing the problem.

The system automatically converts the name to uppercase if the name contains lowercase letters.

Specifying the Mark Type

In the Mark List, select the mark to modify.

Choose the mark type from the Rounding selection list in the mark data area.

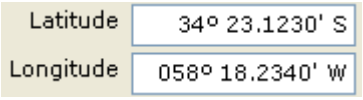


The system presents only the options valid for this mark. View Section Marks to review the guidelines that apply to this data.

Enter a Mark Position

In the Mark List, select the mark to update.

Enter the Latitude and Longitude in the Mark Data area.

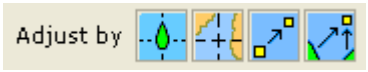


View Section Positions in the Introduction chapter to review the guidelines for entering this data.

If the latitude or longitude entered does not follow a valid format, the symbol will appear next to the field; hovering over it will prompt the system to present a message describing the problem.

Adjusting the Position of a Mark

The system allows you to enter or adjust a mark's position through any of the four procedures activated using the buttons located in the mark's data area.



Below, we will look at these procedures in detail.

1. Locating the Mark on the Yacht's Position

In the Mark List, select the mark to update.

Using this button, the mark immediately assumes the yacht's current position.

If the system does not have this information, it presents a warning message. The position is that of the GPS antenna. For the marks that define the starting line, it is more accurate to use the position of the yacht's bow. See the procedures described below in the Starting Line.

2. Placing the Mark in a Position on the Chart

Select the mark whose position you want to adjust from the Mark List.

Using this button enables the possibility of capturing a position on the chart.

The mouse cursor appears as a hand on the chart, as shown on the left. The mark takes that position by placing the cursor over the desired point with a Long Click.

You can access all chart movement functions in this mode, including centering, zooming in, and zooming out. However, selecting any other option, such as a menu or button, will cancel the current operation.

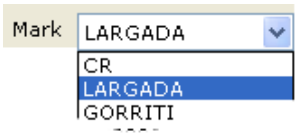
3. Positioning a Mark Relative to Another Mark

This procedure allows a mark to be positioned at a certain distance and direction from another reference mark. The reference mark can be the same mark to be adjusted; in this case, we will move it to its new position.

In the Mark List, select the mark whose position will be adjusted.

Use this button, and the system will display the form "Position Relative to a Mark" controls at the bottom right area.

Choose the reference mark from the Mark selection list. If the mark to be adjusted has a position, the system proposes it as a reference; if it does not yet have a position, the system suggests the previous mark. The list shows only the reference marks with positions.



Indicate whether the direction to be entered refers to true north or magnetic.

Enter the distance and direction of the new position from the reference mark.

To complete the operation, click the Adjust Position button. The system immediately calculates and assigns the new position to the selected mark.

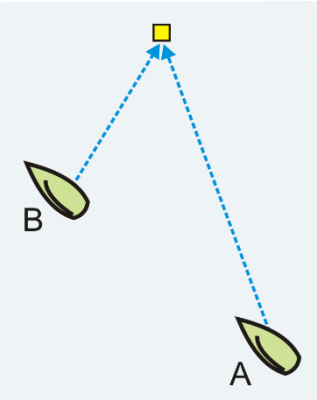
Finally, use this button again to display the Comments area at the bottom right of the form.

When calculating the new position, the system uses an orthodromic path with the specified direction of origin and distance. To review the rules for this data entry, see the sections Direction and Distances in the Introduction chapter.

If the distance and direction entered do not follow a valid format, a symbol appears next to the field. Hovering over it, the system displays a message describing the problem.

This method is handy on windward-leeward courses, where the race committee announces the direction and distance of the windward mark based on its location.

4. Placing the Mark in a Position by Successive Bearings



This procedure allows you to find and adjust the position of a mark using two or more successive bearings. Each bearing is the direction from the yacht's position towards the mark and can be taken using a hand compass or by pointing the yacht towards the mark. For the system to calculate the position of the mark, it is necessary to take at least two marks.

As several minutes may pass between one bearing and another, and we will continue to use other system functions, EVOLUTION preserves the bearing associated with the different marks even when we close the Course Edit form.

As a starting point, we enable the data area that allows this operation to be carried out.

Select the mark whose position you want to adjust in the Mark List.

Use this button to have the system display the Position by Bearings area at the bottom right of the form.

At this area's top, the system reports the number of available bearings to the selected mark; initially, none will be available.

The next step is to take one or more marks using the following procedure.

Indicate whether the mark to be entered refers to true north or magnetic; This will usually be a magnetic mark.

Use the button on the left (moving boat) when taking the mark, either with a hand compass or by pointing the bow towards the mark.

The system indicates that the ship's position was taken by showing a fixed ship on the left button and enabling the right button to complete the operation.

Initially, the direction is the yacht's heading, but this value can be changed to the reading of the hand compass.

Finally, use this button to create the corresponding bearing. The message at the top now indicates that a new bearing is available. To cancel the operation, use the button on the left showing the fixed boat.

At this point, selecting another mark in the Mark List and repeating this procedure is possible, thus taking bearings for several marks from the same area.

To review the rules when entering a bearing, see the Directions in the chapter Introduction. The symbol appears next to the field if the entered bearings do not follow a valid format. When you hover over it, the system presents a message describing the problem.

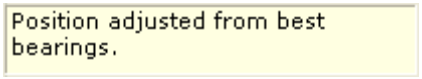
After two or more bearings have been applied to a mark, the following procedure can be used to adjust its position.

When you use this button, the system calculates and assigns a new position for the selected mark.

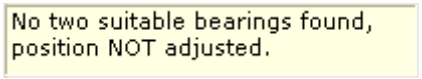
If more than two bearings are available, the system uses those that cut at a greater angle. Like all calculations in EVOLUTION, the new position is obtained by considering the marks as maximum circles (spherical trigonometry).

To minimize the possibility of error, EVOLUTION only considers valid pairs of bearings intersecting at an angle greater than 15º and taken less than ten nautical miles from the resulting position.

If the operation is successful, the system presents the following message indicating that the mark has a new position.



If no pair of bearings meets these conditions, the system does NOT adjust the position of the mark and displays the following message.



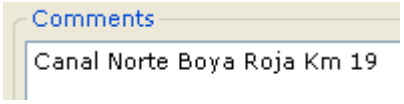
If a mark's bearings must be discarded, the following procedure can be used to remove them.

Use this button to remove ALL marks associated with the selected mark.

To prevent using bearings associated with a mark that may be obsolete, EVOLUTION automatically purges any bearings that have not been taken within the last 24 hours.

Adding Comments to a Mark

A mark's notes allow you to specify its full name or characteristics that can be useful for visually identifying it. These notes should be added in the Comments area.



In the Mark List, select the mark to which comments are added or modified.

Use this button if the mark's information area, located at the bottom right of the race course edit form, is not visible.

In the text field, enter short notes.

Remove a Mark

Select the mark to remove from the race course in the Mark List.

Use this button to remove the mark. The system immediately removes the mark from the course. The next mark on the list is selected.

Remember that there is no function to revert this action. Use it with caution.

Moving a Mark in the List

If you need to change the sequence of the marks in a race course, the following procedure allows you to move a mark up or down in the List.

In the Mark List, select the mark to move.

Use this button to move the mark one position down (forward) in the course sequence.

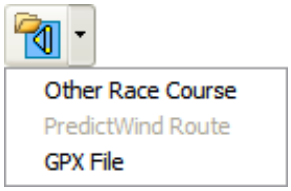
Use this button to move the mark one position up (backward) in the course sequence.

EVOLUTION enables or disables these buttons to follow the rules that apply to different mark types, specifically those that define the starting line. For more information on these rules, see the section Marks.

Copy Marks

In certain situations, copying the marks of an existing route is practical. This may be from a race course stored in EVOLUTION, an optimal forecast route produced by the "Predictwind Offshore" application, or race courses stored in GPX-formatted files.

EVOLUTION includes mark-loading functions for all three of these cases. The following button and options menu allow different possibilities for copying marks from other sources.



1. Copying the Marks of Another Race Course

When creating a new race course, it is sometimes helpful to copy the marks of another race course already stored in the system. Practical uses for this feature can include:

- Build a new course based on another one already run in the directory of this or another yacht.
- Build a new course based on a collection of courses predefined by the local race organizers, generally fixed-mark race courses.
- Copy the marks of a wind-aligned course (windward-leeward, Olympic triangle, etc.) and then use the Transform Race Course function to complete its construction.

The file containing the marks to be copied may have been recorded under the yacht in use (Active) or the directory of another yacht configured in the system.

When using this button or the "Other Race Course" list option, the system presents a form that allows you to select the directory (name) of a yacht and, within the directory, the course from which you want to copy the marks.

Open After selecting a yacht (or directory) and choosing the course from which the marks will be copied, use this button to complete the operation. This procedure copies the marks, replacing all existing marks on the course.

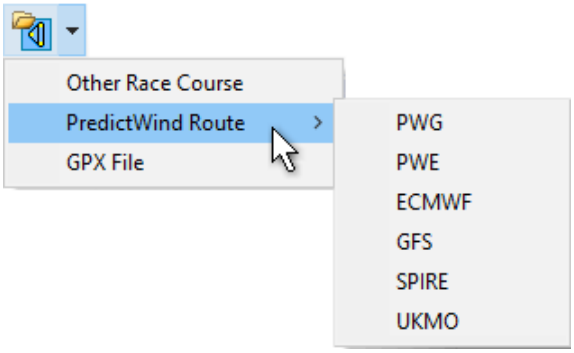
2. Copy Marks from PredictWind© Optimal Routing

PredictWind Offshore program obtains optimized race courses according to the boat's polar curves and several weather forecasts (GFS, ECMWF, SPIRE, UKMO, and PredictWind PWG and PWE).

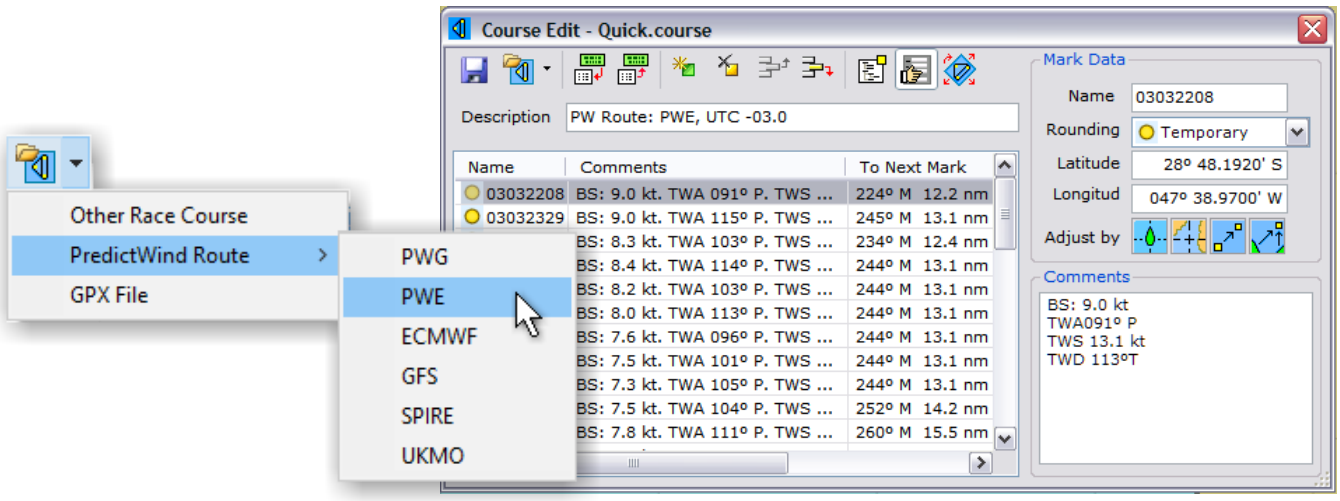
Once the six race courses have been created, EVOLUTION allows you to copy their route points as marks. The "PredictWind Route" option in the menu will be enabled, and you can select from which will EVOLUTION obtain the marks for the race course.

Select the forecast code associated with the desired race course; its points automatically become the new course marks.

All previous marks existing on the edited course will be replaced, and the description will indicate the origin of the marks, along with the time zone with which the estimated time for the boat is presented at each point.



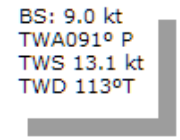
The result after selecting the PWE option will be as follows.



The optimal route assumes the yacht will be at each point at a specific time. Each mark of the course comes from a point on a race course that only has meaning in time. In this sense, the name taken by the marks has the following format: MMDDHHMM, where MM is the number of the month, DD the day, HH the hour, and MM the minutes.

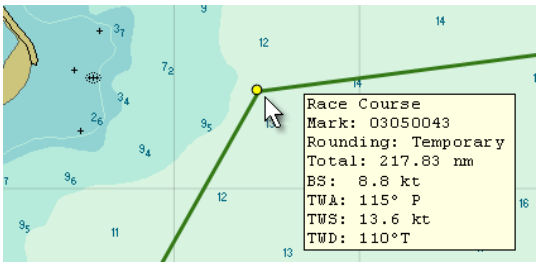
In the example, the name of the first mark, 03032208, means that the routing system expects the yacht to be at that point on March 3 at 10:08 p.m. The times correspond to the time zone indicated in the race course description; in this case, UTC-03.

Similarly, PredictWind indicates the sailing conditions the yacht should encounter at that point at the appointed time. EVOLUTION imports this data and includes it as each mark's comments. As always, this legend will be presented as an InfoTag by pointing the mark with the cursor over the chart.



In addition to the usual data, the additional data displayed by the system are:

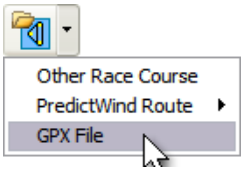
- BS: Speed through the water.
- TWA: True Wind Angle (P for port, S for starboard).
- TWS: True wind speed.
- TWD: True wind direction, referenced to true north.

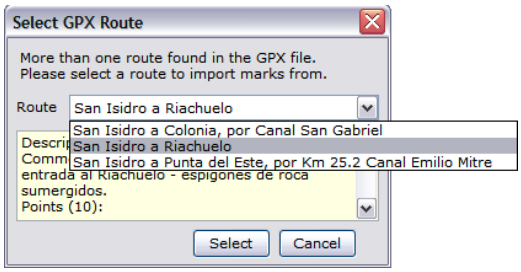


3. Copying Marks from GPX Files

The GPX file format, created by TopoGrafix, exchanges routes, waypoints, and tracks for various GPSs, chart-plotters, and programs. EVOLUTION can take the points of a race course contained in a .gpx file and convert them into marks of a race course.

Select the "GPX File" option. The system will then present the typical Windows form for selecting a file, limited to the .gpx extension. Browse and select the file that contains the path from which the points will be obtained to create the marks.





If the file includes multiple routes, the system will present the following form, from which you can select a route by name. For each option, the system will display the route's description, comments, and the list of its points, if any.

If the .gpx file contains only one route, the system will load its points as marks, replacing existing ones, if any. The marks will take the name "MRKnnn," and the name or description of the waypoint will become part of the comments. If the .gpx file contains no routes, the system will warn you about this situation.

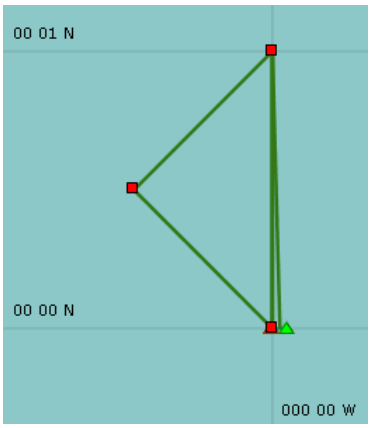
Name	Comments	To Next Mark
MRK000	San Isidro	122º M 0.79 nm
MRK001	Ex Canal Costanero: UNEN K...	145º M 1.46 nm
MRK002	Ex Canal Costanero: UNEN Nr...	124º M 6.46 nm
MRK003	Canal Emilio Mitre: Km 25.2	092º M 1.22 nm
MRK004	Boya UNEN "B"	063º M 2.15 nm
MRK005	Boya UNEN "A"	103º M 17.3 nm
MRK006	Canal Paso del Farallon: Km 6...	094º M 8.68 nm
MRK007	Pta Negra	050º M 2.42 nm
MRK008	Recalada Riachuelo	024º M 463 mt
MRK009	Riachuelo, Colonia,, UY	

Transform the Race Course

EVOLUTION includes a sophisticated tool that allows you to move, rotate, and resize a race course. This feature can be applied to all marks or marks from a certain point onward. This feature has two practical applications:

- Build a new race course based on a matrix race course. These are generally wind-aligned courses (windward-leeward, Olympic triangle, etc.) that must be moved to the competition area, rotated according to the direction of the wind, and adjusted to the length the race committee foresaw.
- Race course changes during the race. The marks are affected by a change. Also, in this case, these are wind-aligned courses, where the race committee has decided to change the alignment of the legs starting at a given mark.

We must choose a mark that works as a "pivot" to control the transformation. When assuming a new position, the pivot drags the other marks, and in rotation, it functions as a turning center.

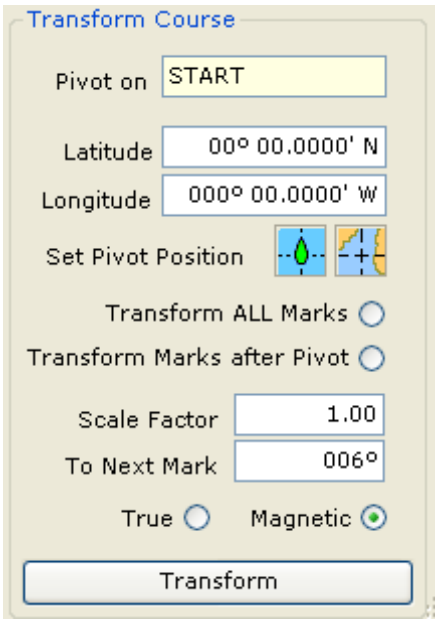


In this example, we copy the marks of a previously created "matrix" course located at 0º N—0º W, one nautical mile long on its leeward leg aligned to the true north, whose marks must be left on the port side.

Name	Comments	To Next Mark
RC	Start	270º T 100 mt
START	Start Buoy	000º T 1.00 nm
W1	Windward 1	225º T 0.71 nm

When using this button, the system displays the Transform Course area on the right side of the form.

Select the "Pivot" mark used as a reference point for the transformation; in this case, the pivot mark will be the START buoy.



In the latitude and longitude fields, indicate the new position for the "Pivot" mark. Alternatively, you can take these values from the boat's position or the chart.

Indicate whether the transformation will affect all marks on the race course or whether only the marks from the pivot will be adjusted. In this example, Transform ALL the marks will be used.

Indicate whether the new direction of the leg that starts at the pivot will be true north or magnetic north referenced.

Indicate the factor of expansion or contraction of the transformation.

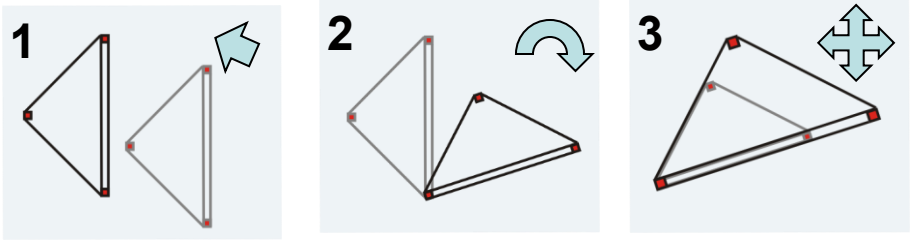
Indicate the new direction for the leg that starts at the pivot.

Finally, use the Transform button to complete the operation.

For more information on specifying the new pivot mark position, see the sections Enter a Mark Position, Locating the Mark on the Yacht's Position, and Placing the Mark in a Position on the Chart; they are the same procedures.

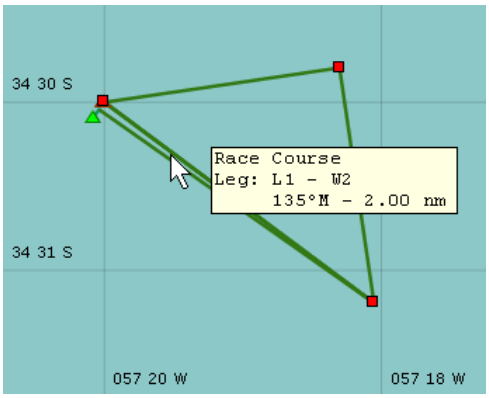
To review the rules that apply when entering a direction, check Direction in the chapter Introduction. If the entered direction does not follow a valid format, the symbol appears next to the field. When you hover over it, the system presents a message descriptive of the problem.

Conceptually, the system executes the following sequence of actions: 1) translation, 2) rotation, and 3) change of scale of all or part of the race course.



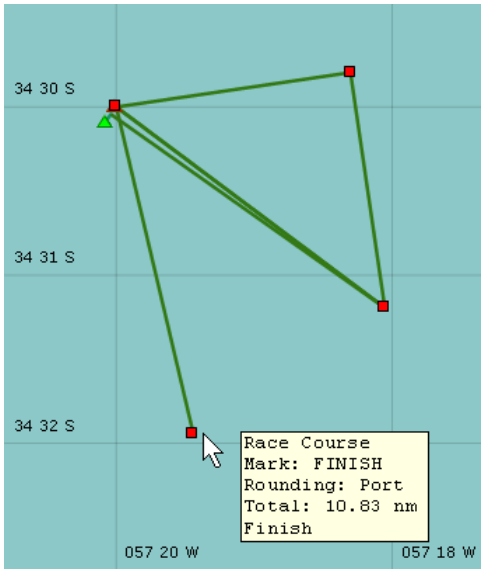
Example 1

In the first case of application, we will move ALL the marks of the race course so that the START buoy is at 34º 0.0' S—57º 20.0' W, the START-W1 leg has a direction of 135º M, and the length is 2 nm.



The race course size change is specified as a multiplier of the original size. As the initial length of the leeward-windward leg is 1 nm, we have used a scale factor of 2.00 to obtain the 2 nm. This figure shows the result of the transformation.

Example 2



For the second application case, let's suppose that, during the race, following the previous example's race course and reaching the last leeward mark (L2), we notice that the race committee has changed the direction of the previous leg, L2-FINISH, to 175º M.

Using the function of transforming the race course, we choose the L2 mark as the pivot, do not modify its position, and indicate that we will only transform the marks from the pivot onward. We do not change the scale factor proposed by the system (1.00), but we do enter a new direction for the leg (175º).

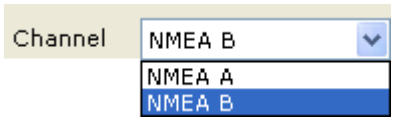
After transforming and saving the race course, we obtained the course presented in the figure on the left.

Receiving Chart Plotter Race Course Marks

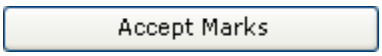
Among the possibilities for creating the marks for a race course, EVOLUTION allows you to download the active race course on a GPS-Plotter using the following procedure.

This function interprets the WPL (waypoint) and RTE (race course) statements of the NMEA 0183 protocol sent by a GPS-Plotter connected to the system through one of the data channels.

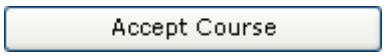
Use this button to display the Race Course Download area on the right side of the form. The system displays a selection list, a large message area, and, at the bottom, an initially disabled button.



Select the NMEA 0183 data channel from the Channel selection list with the GPS-Plotter connected. The system then tries to interpret the data sentences received.



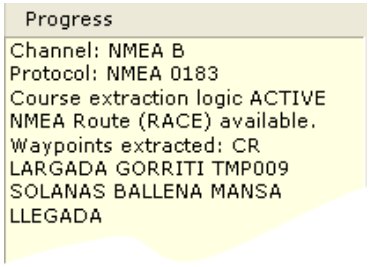
Once the system has detected marks, enables this button that allows you to incorporate the received marks in alphabetical order.



When the system detects a complete race course, it enables this other button that allows the operation to be completed, incorporating the marks received according to the sequence of the race course.

Most GPS plotters transfer a route by interleaving RTE/WPL sentences and position sentences; therefore, the system may take several seconds to detect a complete route download.

While the system receives information from the GPS, it shows the progress, indicating the name of the detected marks and the name of the race course.

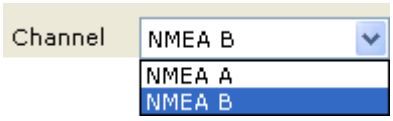


The system assigns the marks the pre-established names MRKxxx and generic Mark type and incorporates the names of the waypoints in the marks comment. The route's name is entered in the race course description.

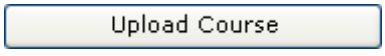
Send a Race Course to a GPS Race Course

As a backup alternative for navigation, it may be helpful to transfer the race course to a GPS-Plotter; EVOLUTION allows this transfer using the following procedure.

Use this button to display the Course Upload on the right side of the form. The system displays a selection list, a large message area, and an initially disabled button at the bottom.



From the Channel selection list, select the NMEA 0183 data channel to which the GPS plotter is connected. This device must be configured to receive and interpret NMEA 0183 WPL and RTE statements.



Use this button to complete the operation.

Each mark gives rise to a waypoint with the name of the mark. For its part, the race course is called "RACE".

For example, the transfer of this race course produces the following set of NMEA 0183 RTE and WPL statements to be sent to the GPS-Plotter.

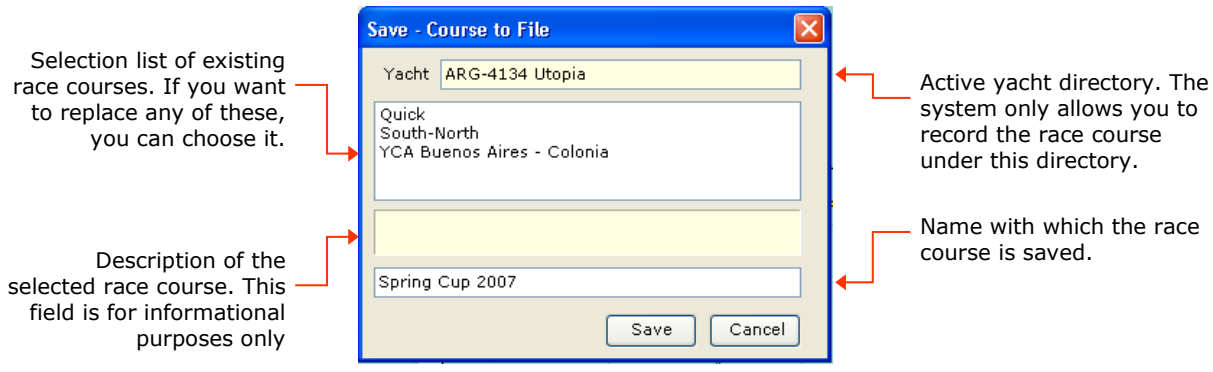
Name	Latitude	Longitude	To Next Mark
CR	34° 57.5340' S	054° 57.1140' W	324° T 0.36 nm
LARGADA	34° 57.2470' S	054° 57.3720' W	218° T 1.55 nm
GORRITI	34° 58.4710' S	054° 58.5280' W	313° T 4.87 nm
TMP009	34° 55.1466' S	055° 02.8770' W	321° T 1.46 nm
SOLANAS	34° 54.0106' S	055° 03.9992' W	156° T 1.63 nm
BALLENA	34° 55.5000' S	055° 03.1996' W	096° T 4.32 nm
MANSA	34° 55.9543' S	054° 57.9611' W	154° T 1.57 nm
LLEGADA	34° 57.3660' S	054° 57.1282' W	

```
$GPRTE,2,1,c,RACE,CR,START,GORRITI,TMP009,SOLANAS,WHALE*44
$GPRTE,2,2,c,RACE,TAME,FINISH*34
$GPWPL,3457.5340,S,05457.1140,W,CR*55
$GPWPL,3457.2470,S,05457.3720,W,START*19
$GPWPL,3458.4710,S,05458.5280,W,GORRITI*13
$GPWPL,3455.1466,S,05502.8770,W,TMP009*3C
$GPWPL,3454.0106,S,05503.9992,W,SOLANAS*00
$GPWPL,3455.5000,S,05503.1996,W,BALLENA*0B
$GPWPL,3455.9543,S,05457.9611,W,MANSA*14
$GPWPL,3457.3660,S,05457.1282,W,ARRIVAL*0E
```

Save the Race Course by Giving It a Name

EVOLUTION allows you to store a new or existing race course under a new name by saving it to the yacht's directory using the following procedure.

When using this button, the system presents the following form that allows you to save the race course by giving it a name.

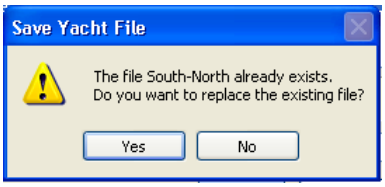


In the field at the bottom, we specify the name of the race course.

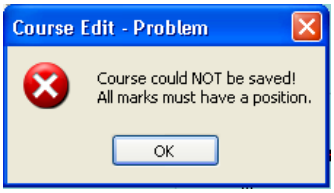
- If it is a new race course, the field will be blank and must be completed.
- If the race course has already been recorded, the system will propose the original name, which can be replaced.
- If you want to save the race course by replacing an existing one, just select it from the list.

Save — Use this button to complete the operation. The system records the race course under the yacht's directory with the specified name.

The file name must follow the guidelines specified in the Valid File Names. If the name entered does not follow these rules, the symbol appears next to the field; when you hover over it, the system displays a message describing the problem.



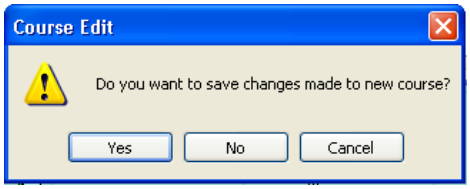
If the name of an existing file has been specified, EVOLUTION displays the following warning message and asks for confirmation that it is actually to be replaced. If you answer "No", the system allows you to re-enter a new name; otherwise, the system completes the operation.



Before recording the race course, EVOLUTION checks that all the marks have a position. If not, the system displays the following error message and cancels the recording, returning to the form where we can fix the problem.

Close the Race Course Edit Form

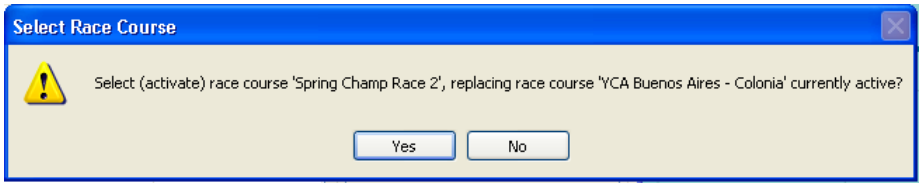
When you use this button to close the form and have created or modified the race course, the system asks if you want to save the changes.



At this point, it is possible to answer: Cancel to cancel and return to the editor and continue working on the race course; No, to close the form WITHOUT saving the changes; or Yes, in which case, depending on whether it is:

- A new race course, the system executes practically the same procedure described in the previous point: Save the Race Course by Giving It a Name before closing the form.
- A race course already saved; the system directly saves it under its current name to close the form.

If a race course is saved under a name other than the race course in use, the system will ask if you want to select it (Activate) or, on the contrary, if you prefer to continue with the currently active one.



It is important to remember that while editing a race course using the form, the system does NOT reflect the changes on the menu. The system only shows the updates when you close the form if you accept the changes and, eventually, activate the new race course.

Select a Race Course

To select and start using a saved race course, you use the Race→Race Course→ Select menu option; at this point, the system displays the following form, from which you can choose the desired course.

In the list, select the race course you want to activate.

Open After selecting the race course to be activated, use this button to complete the operation.

The system loads (activates) the selected race course, while the race course that was in use remains stored and can be chosen again in the future.

Delete a Race Course

EVOLUTION does not contemplate any specific function to delete a race course; for this, you use the functions provided by the Microsoft Windows operating system.

In the Yacht Directories you will find helpful information to access the race courses of each yacht.

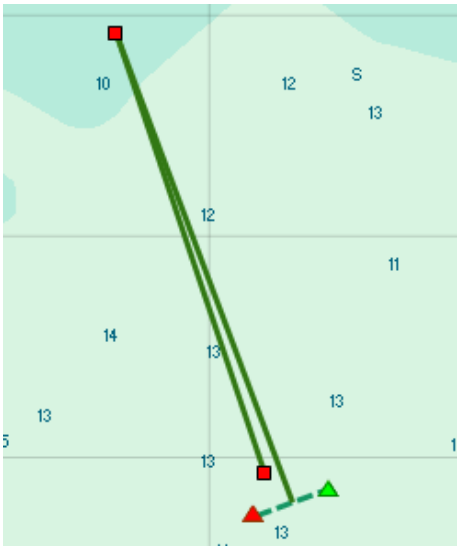
There is no particular restriction on deleting a race course file, as EVOLUTION saves the active race course in the Data Log, including all modifications made. In other words, replaying a race or sailing does not require the course file that was in use at the time to exist.

When operating in the yacht directory, it is important not to delete or alter the other configuration and calibration files, especially “yacht.setup” and the file containing the polars curves in use.

The Starting Line

Although the start is the subject of another manual, since the line is an integral part of the race course, this section presents the related concepts and procedures.

A race course has a starting line if its first two marks are of the type Start Port and Start Stbd, represented by the symbols ▲ and ▲ respectively.



On the Chart page, the starting line is shown as a dotted line between these mark symbols. If a third mark exists, it shows the first leg from the midpoint of the starting line.

The figure on the left represents a simple windward-leeward course with the two starting line marks and the windward and leeward marks. On the race Course Edit form, the Mark List looks like this.

Name	Comments	To Next Mark
BOYA	Boya de la linea de partida.	069º T 327 mt
CR	Comité de regata.	330º T 1.13 nm
BARLO	Boya de Barlovento.	156º T 1.04 nm
SOTA	Boya de sotavento.	

For the line to exist, both marks have to be present.

The order of these marks is not relevant; however, the "To Next Mark" column shows the direction and distance to the next mark (BARLO) from the second mark on the line (CR). If you want to use this data from the other end of the line (BOYA), reverse the order of the line marks using the procedure Moving a Mark in the List. Please see the EVOLUTION Start manual for all the valuable information you can obtain from the starting line.

Except for these special features, the starting line marks behave like the other course marks.

Set the Starting Line

On the one hand, the procedures described in Enter a Mark Position and Adjusting the Position of a Mark can be used for starting line marks.

In practice, the method that could be used is to approach the boat to the mark and assign it the GPS position using the Locating the Mark at the Yacht's Position procedure. However, this technique involves executing several steps with the Course Edit form in the hectic moments before the start.

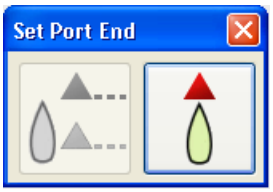
EVOLUTION offers a more precise and practical procedure for locating the line marks.

Setting the Ends of the Line with the Bow (Ping)

Taking the position of the ends of the line with the boat's bow is a simple procedure that requires a coordinated maneuver between the helmsman and the bow crewperson. You should approach the mark slowly until the bow practically touches the mark or is over the line. Then:

For Port End (Port):

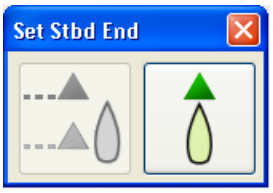
Use this button on the toolbar on the Start page, and the system will display the following form.



Use the button on the right when the bow crew member indicates that the bow has reached the point that we want to enter as the line's port end.

For starboard end (Stbd):

Use this button on the toolbar on the Start page, and the system will display the following form.



Use the button on the right when the bow crew member indicates that the bow has reached the point that we want to enter as the line's starboard end.

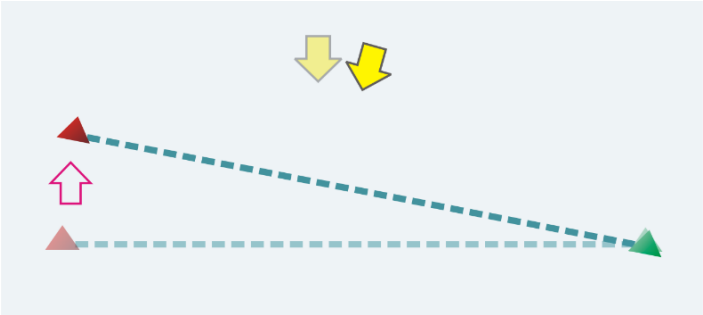
In both cases, when this operation is completed, the system automatically performs the following sequence of actions:

- If the race course does not have these marks, the system automatically creates them.
- It assigns the bow position taken at each mark. The bow position is referenced to the GPS based on the location of its antenna on the boat (see the Calibrations manual) and heading at that time.
- Finally, the system saves the new version of the race course.

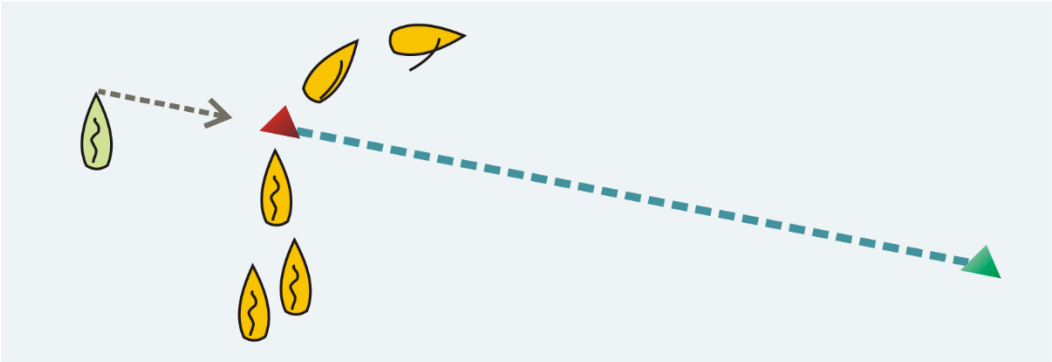
Realigning Line Ends with a Bearing

On starts aligned to the wind, the line may not be anchored correctly, and the race committee may decide to change the position of one of the ends to correct the problem. To complicate matters, the committee usually gives the preparatory call (5-minute TOP) immediately.

In this case, it will be necessary to re-establish the new position of this mark as soon as possible, with enough time to plan a new start strategy. However, many boats must also approach the mark to set their new position. In this scenario, executing the above procedure, which requires approaching the mark at low speed, can be quite difficult.

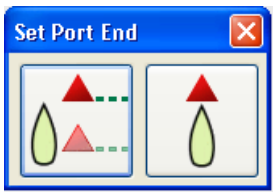


For cases where the committee has moved one end of the line but maintained its original length, EVOLUTION allows the mark to be relocated by taking the bearing when aligning both ends of the line and the bow.



The procedure for the port end is as follows:

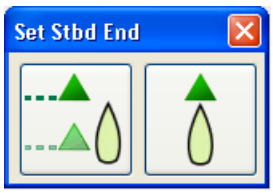
With the original line already set, use this button on the toolbar on the Start page, and the system will display the following form.



Use the now-enabled left button when the bow crew member indicates that he sees both marks aligned.

The procedure for the starboard end is as follows:

With the original line already set, use this button on the toolbar on the Start page, and the system will display the following form.



Use the now-enabled left button when the bow crew member indicates that he sees both marks aligned.

In this operation, the system adjusts the corresponding mark to align the bow, mark, and another line end.

Although it is possible to execute this procedure over the line between both ends, it will always be more accurate to do it on the external side of the mark to be adjusted.

Please remember that for the Start page to present an established line, both ends must exist and be within 2000 meters of each other and less than 1.5 nautical miles from the yacht's position.

The Starting Line when Loading a Stored Race Course

It's important to note that when these functions are used to mark the starting line, EVOLUTION will preserve the position of the line's ends. If a stored race course is selected and loaded, the system will combine the preserved line with it. This means that the starting line will not need to be set again.

Please keep in mind the following rules for using this feature: **1) Both ends of the line must be defined, 2) The system will DISCARD the saved line if you use the tools to create a new race course, edit the active race course on the chart, or use the race course edit form, and 3) If you close EVOLUTION the preserved line is deleted.**

Possible Errors and their Solutions

As we try to establish the starting line's location as accurately as possible, we must consider some potential errors and how to mitigate them.

The position of a given point taken from a standard GPS can vary erratically, from moment to moment, in an area between 3 and 10 meters in radius.

- Use a modern high-sensitivity GPS that can simultaneously receive more satellites, significantly reducing this variation.
- If a differential signal service (terrestrial or satellite) exists in the racing area, ensure the GPS can use it.

Most GPS delivers the position in 2-second intervals. Taking a position at speed, for example, at 6 knots, can represent an error of up to 5 meters.

- Use a GPS that calculates and provides the position as often as possible; once per second is acceptable, and five times per second is optimal.
- Make the final approach to the mark at the lowest possible speed.

The buoy and the boat of the race committee might be using anchor rode. Taking the position of these marks when they have not yet been established according to the wind and current can mean up to tens of meters of error.

- If possible, wait until the buoy and the committee boat have stabilized to the prevailing conditions.

The race committee can adjust either end of the line and is not obliged to report these changes, which can also result in tens of meters of error. This event can be as evident as a dinghy dragging the mark buoy or as subtle as the committee boat adjusting several of its anchor rode.

- Keep an eye on what the committee is doing.
- Designate a crew member to identify these changes.
- Be ready to retake the position of the mark that has been displaced.

A Note of Caution

All these possible sources of error can lead us to locate the starting line displaced a few meters from its actual position. Performing a 100% start with instruments can be challenging.

Consider that, within the last few meters of the final approach to the line, the most reliable source of information might be the bow crew person.

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Tactic Mark

The Tactic Mark represents the geographical position of the yacht's immediate destination; it generally corresponds to a mark of the race course.

EVOLUTION calculates all the performance and tactic targets based on the boat's path to the tactic mark while considering the prevailing winds and currents and using the polar curves.

There is only one tactic mark in force, and although it can be repositioned at will in any geographical point, it cannot be eliminated.

Although the tactic mark is not directly related to the race course marks, it can be placed on any course mark quickly and practically.

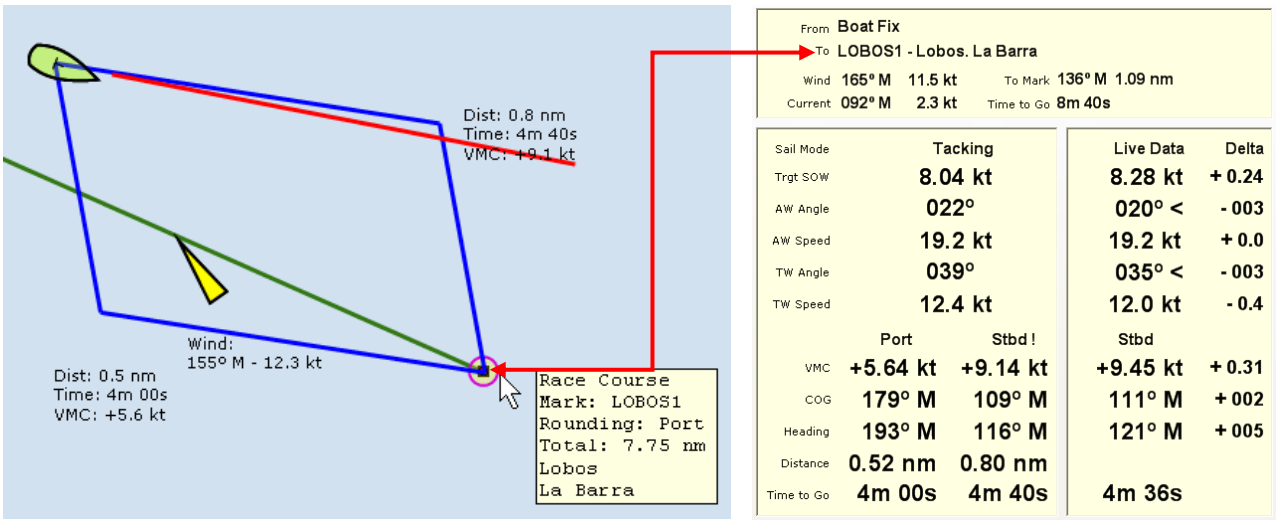
It is important to note that the position of the tactic mark affects several of the calculations that EVOLUTION performs. It is of utmost importance to keep the position of the tactic mark up to date with the desired destination.

EVOLUTION offers a set of procedures to control the position of the tactic mark, but it does not automatically update the position. It is the navigator's responsibility to set the position of the tactic mark.

Under a particular configuration, the tactic mark can be automatically synchronized with a GPS's "Go To Waypoint"; in that case, these procedures will not be available.

The information obtained based on the tactic mark is displayed on the Chart and Tactic pages. On the chart, the tactic mark is always represented by a symbol. 

On the chart, EVOLUTION presents information on how to navigate to the tactic mark in graphic form. At the same time, the tactic calculator, in its normal mode of use, also assumes this purpose for determining the ideal navigation targets.



Manage the Tactic Mark

The following procedures describe how to control the position of the tactic mark using two methods: the first involves setting its position in an arbitrary place outside the race course, and the second consists of using the course marks as reference points.

Positioning the Tactic Mark Manually on the Chart

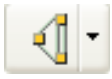
Using this button on the chart toolbar, the system allows you to position the tactic mark in any geographical location using the mouse.

The mouse cursor now appears on the chart, as shown on the left. When this cursor is over the desired point with a ***Long Click***, the tactic mark takes that position.

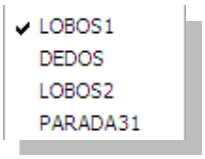
The button is pressed while performing this operation, but when it is completed, it returns to its original state. However, canceling the operation and exiting this mode using this button again is possible. All the movement functions on the chart (centering, zooming in, and zooming out) remain available in this mode.

Positioning the Tactic Mark over a Race Course Mark

Although the tactic mark is not tied to race course marks and can be freely placed in any position, it can be placed on any mark of the race course.



Choose the mark by name from the menu using the arrow to the right of the Course Edit button on the menu toolbar, or use the "Race →Set Tactic Mark" menu option.



Moving the Tactic Mark to the Next Race Course Mark

When passing the tactic mark set on a race course mark, the most natural thing to do is to change its position to the next mark on the race course.

Using this button on the toolbar, the tactic mark will instantly move to the next mark on the race course.

If the tactic mark is set outside the race course, this operation sets it on the first mark of the race course.

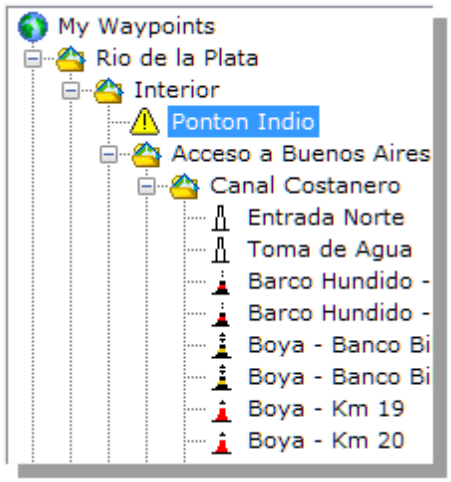
Moving the Tactic Mark to the Previous Course Mark

If the tactic mark needs to be set on the previous mark of the race course, simply use this button.

Waypoints

Waypoints represent significant points, or points of interest, with a known geographical position.

Waypoints should not be confused with the marks of a race course. Although it is possible to create marks from the position of a waypoint, that is where any relationship between the two ends.

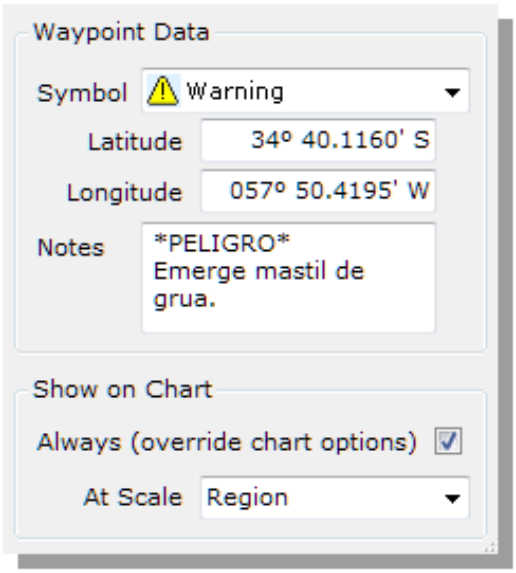


EVOLUTION allows you to manage a list of user-defined waypoints. Each waypoint in this list is represented by a name, its position, and a symbol indicating the object type.

Waypoints are grouped into folders. In addition to waypoints, these can contain other subfolders with their own waypoints, creating a structure that allows waypoints to be organized, for example, by zones.

Data of a Waypoint

Each waypoint has a name, which appears in the list; a type of object depicted as a symbol; a geographical position; and, optionally, descriptive notes.



Also, each waypoint can be assigned a specific zoom level at which it appears on the chart. These levels can be categorized as "Nearby" for close-up views, "Local" for coastal navigation, "Region" for a broad view of the chart, and "World" for visibility at any zoom scale. By default, newly created waypoints are assigned a "Local" display level to prevent symbol congestion on the chart.

A waypoint can be marked as "Always" to ensure it always appears on the chart, even if the general option to show waypoints is inactive. This is useful for highlighting a hazard that should always be noticed, especially if it has yet to be included in the current version of the chart.

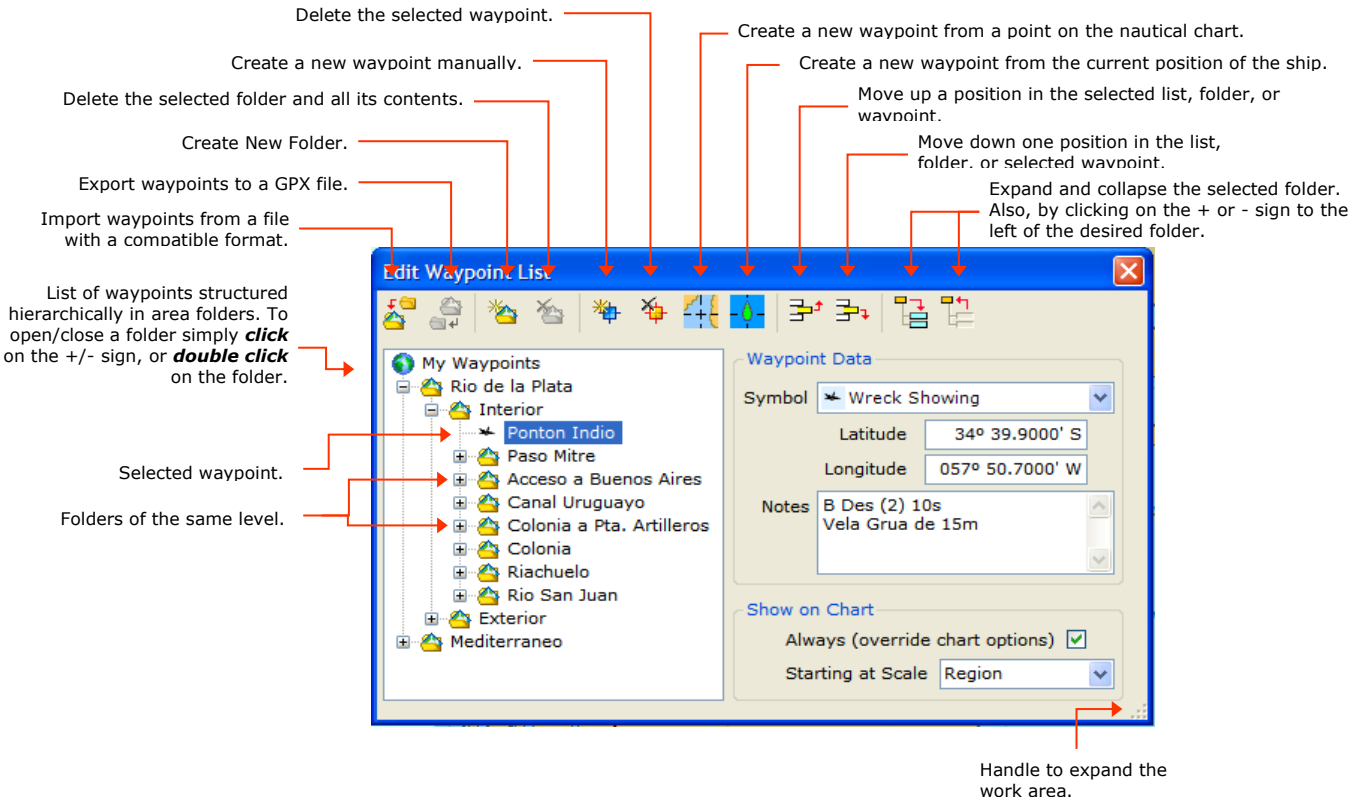
These options are in the “Show on Chart” area of the form containing the waypoint’s information.

Waypoints that do not have the "Always" mark are not featured on the chart unless the option to view waypoints under "Chart Options" is active. See the manual "EVOLUTION - The Nautical Chart" in the "Display Options" section.

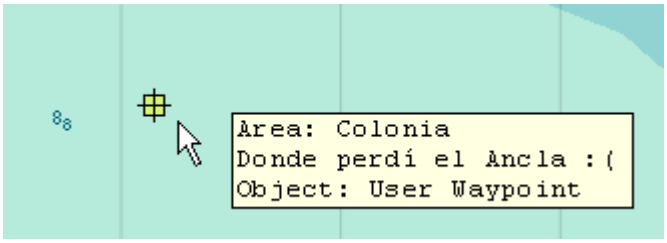
Manage the Waypoint List

To add, modify, or delete waypoints and folders from this list, you use the form you get when you use the "Tools→Waypoints…" menu option. This form works similarly to Windows Explorer. The following image presents the various elements of the waypoint list edit form.

In this example, the waypoint "Pontón Indio" is selected; the system shows on the right its data and the parameters used to present it on the chart.



When this form is open, all waypoints are presented on the chart even if the "Waypoints" objects group is not active for display, and the scale is not detailed enough.

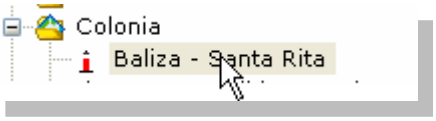


EVOLUTION shows the waypoints on the chart with the symbol associated with them. When you hover with the cursor near a waypoint, the system presents its name preceded by the name of the folder that contains it. Any modifications made to the waypoint data on the form are immediately reflected on the chart.

The following procedures describe managing the list and using this form to add, modify, or delete folders and waypoints.

Centering the Chart on a Waypoint

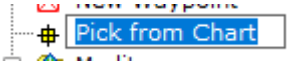
A ***Double Click*** on a waypoint in the list causes the center of the chart to assume the waypoint's position.



Creating a Waypoint in a Chart Position

After choosing the place in the list where we want to add the new waypoint, this button allows us to enter the mode to get a position on the chart.

The mouse cursor appears as a hand on the chart, as shown on the left. The system creates a new waypoint with the default name "Pick from Chart" by positioning the cursor over the desired point with a Long Click.

You can immediately change the name by editing it on the list. 

The symbol initially assigned can also be changed using the form at the right.

In this mode, all the movement functions on the chart (centering, zooming in, and zooming-out) remain available. However, the system cancels this operation if you use any other option (menu, button, etc.).

Create a Waypoint at the Current Boat's Position

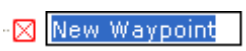
After choosing the place in the list where we want to add the new waypoint, this button creates a waypoint assuming the boat's position. The new waypoint takes the local date and time of the fix as part of its name.

This default name can be changed immediately by editing it directly on the list.

The assigned symbol can be changed to one from the predefined list.

Create a Waypoint by Entering its Position

After selecting the place in the list where we want to add the new waypoint, the system creates it with a starting position at 0º N – 0º W using this button. The new waypoint assumes the name "New Waypoint".



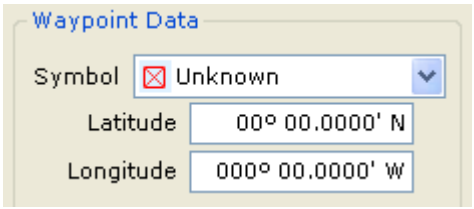
You can replace this default name by editing it directly on the list.

The assigned symbol ☒ can be changed to one of the symbols in the predefined list, and the position can be manually entered in the Latitude and Longitude boxes on the form.

Changing Waypoint Data

To modify the name of a previously selected waypoint, ***click*** on the name and edit it.

In the Waypoint Data area, you can change the symbol and position of the selected waypoint.



The formats in which a latitude or longitude can be specified are described in the Positions in the Introduction chapter. Once the two values are entered, the system immediately updates the position on the chart. The symbol will appear next to the field if the latitude or longitude entered does not follow a valid format. When you hover over it, the system presents a message descriptive of the problem.

In the "Notes" field, you can enter comments up to 150 characters long. The '|' character is not allowed.

Moving a Waypoint in the Waypoint List


Use these buttons to move the selected waypoint up or down one line within the same Folder.

You can move a waypoint from one folder to another by dragging it from its original folder to the destination folder.

If you need to move a waypoint to a folder that is not visible, drag the waypoint near the lower or upper edges. The list scrolls to show the folders that were initially hidden.

Delete a Waypoint

Select a waypoint from the list and use this button to delete it. Use this function cautiously, as there is no way to revert it.

The system does not ask for confirmation, but when you close the form, it asks if you want to save the changes.

Create a Waypoint Folder

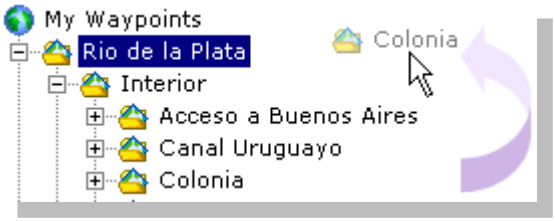
After selecting where to insert the new folder, this button creates a folder named "New Area".

This name can be replaced immediately by editing it directly above the list.

Moving a Waypoint Folder

With this pair of buttons, the selected folder is moved one line up or down within the folder that contains it.

You can move a subfolder from one folder to another by dragging it from its original folder to the destination folder.



If you need to move a subfolder to another folder that is not visible, drag the subfolder near the lower or upper edges. The list scrolls to show the folders that were initially hidden.

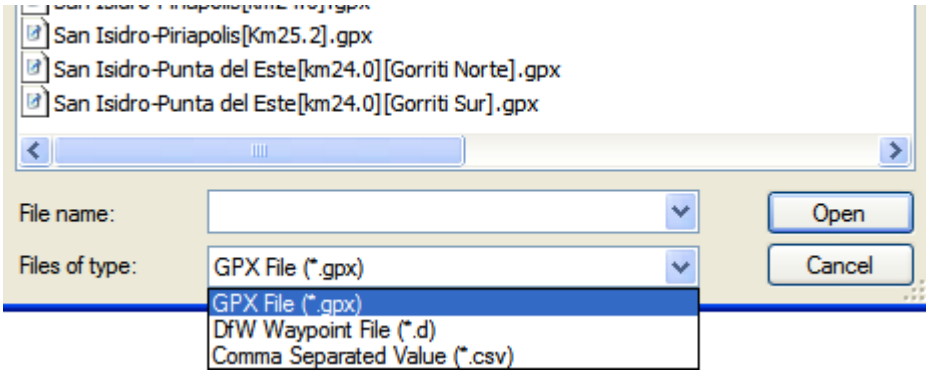
Deleting a Waypoint Folder

This button deletes the selected folder. The system asks for confirmation before deleting it and indicates the number of items (waypoints and folders) it contains.

Importing Waypoints from an External File

This button allows you to import a set of waypoints from a file with a predefined format created by another system or manually by the user. Using the button, open a file using the standard Microsoft Windows form.

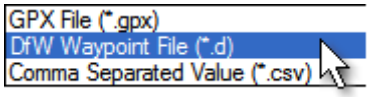
At the bottom, in the "File of type" selection list, the file type from which the waypoints will be extracted is chosen.



Currently, the options are GPX File for files with this standard format, DfW Waypoint File for files produced through the Deckman system, and Comma Separated Value Waypoint File for manually generated files whose format is described in the section Importing Waypoints from a CSV File.

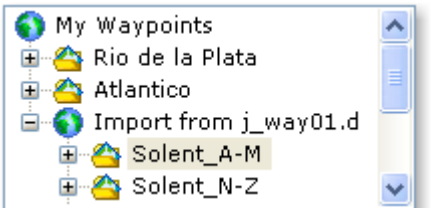
1. Import Waypoints from Deckman for Windows

From the "File types" list, select the file type you want to import. In this example, it is Dfw Waypoint File (*.d).



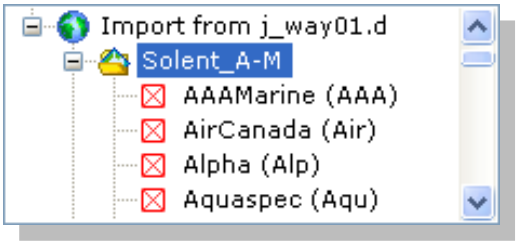
Finally, select the file, in this case, j_way01.d, and complete the operation by clicking the Open button.

When you open this file, EVOLUTION instantly imports the waypoints by creating a new folder called "Imported from *filename*". In our example, "Imported from j_way01.d".



Within the new folder, there may be one or two additional levels of folders with sub-areas. New folders and the waypoints they contain can now be edited. At first, the imported folder is preceded by the symbol, but after saving the Waypoint List, this area folder is preceded by the traditional symbol.

When importing waypoints from this file type, EVOLUTION assigns them the object type "Unknown", symbol , which is presented in both the Waypoint List and the Chart.

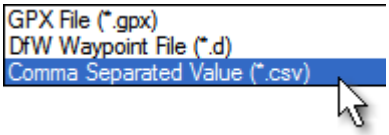


The waypoint names are the names and acronyms in the Deckman file, as shown on the right. The folders will correspond to the area names also present in Deckman.

2. Importing Waypoints from a CSV File

This format is relatively standard for storing data in table form. Waypoints can be created by following the detailed rules below, using Microsoft© Excel, and then saving them with the .cvs file type option.

Select "Coma Separated Value (*.csv)" from the File Type list. Search and open the file using the Open button.



The CSV-formatted waypoint file must respect these rules:

a. The file name extension must be CSV, for example, "MyWaypoints.csv"

b. Each row in the file represents a waypoint.

c. Each line must contain four fields: Latitude, Longitude, Object Type, Name, and optionally two additional fields: Sub-Area and Area, all separated by commas.

- Latitude and Longitude in one of the valid formats described in Formats for Entering a Position
- The Object Type that defines the symbol that represents the waypoint; the options are detailed at the end of this section.
- The Name of the waypoint.
- Sub-Area and Area are optional and indicate the folder name and sub-folder in which the waypoint is stored.

d. If any of the fields contain a comma, it must be enclosed in quotation marks (").

e. The file may contain blank lines that will be ignored.

For example, a waypoint file called Ejemplo.csv that contains the following four lines:

```
34° 56.2596' S, 54° 59.8068' W, SafeWatersBuoy, Buoy A, Punta del Este, Uruguay
34° 57.0162' S, 55° 01.4904' W, SpecialBuoy, Buoy B, Punta del Este, Uruguay
34° 56.3124' S, 55° 01.6302' W, WreckDanger, La Negrita, Piriapolis, Uruguay
34° 56.2206' S, 55° 01.6578' W, Warning, Canaleta Entrada Norte, Medanos, "Buenos Aires, Argentina"
```

… when imported, it incorporates the following items into the list of EVOLUTION waypoints:

The first two lines define the waypoints Buoy A and Buoy B in the Uruguay area, Punta del Este sub-area, with symbols of the IALA buoy of Aguas Seguras and IALA Especial buoy, respectively.

The third line defines the waypoint "La Negrita" with a shipwreck symbol in the Uruguay area but Piriápolis sub-area.

The last line defines the Canaleta Entrada Norte waypoint, with a warning symbol in the Médanos sub-area under the Buenos Aires, Argentina area. It is important to note that since the name of the latter area contains a comma, the field is enclosed in quotation marks in the file.

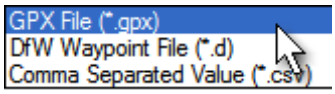
The symbols and their respective codes that can be used in a waypoint file are as follows:

UserUnknown	RedBuoyA	RedBeaconA
UserCross	RedBuoyB	RedBeaconB
UserCrosshair	GreenBuoyA	GreenBeaconA
UserGreenPin	GreenBuoyB	GreenBeaconB
UserHand	PreferredGreenBuoyA	PreferredGreenBeaconA
UserYachtFix	PreferredGreenBuoyB	PreferredGreenBeaconB
CoastGuardStation	PreferredRedBuoyA	PreferredRedBeaconA
RadioStation	PreferredRedBuoyB	PreferredRedBeaconB
Anchorage	SafeWatersBuoy	SafeWatersBeacon
Warning	DangerBuoy	DangerBeacon
RockDanger	NorthBuoy	NorthBeacon
WreckDanger	EastBuoy	EastBeacon
WreckShowing	SouthBuoy	SouthBeacon
Tower	WestBuoy	WestBeacon
PilotBoat	SpecialBuoy	SpecialBeacon
	NewDangerBuoy	NewDangerBeacon

3. Importing Waypoints from a GPX File

GPX format files allow you to store waypoints from other programs or devices such as GPSs or chart-plotters. EVOLUTION uses these types of files to upload waypoints.

Select "GPX File (*.gpx)" from the File Type list. Then, use the Open button to select and open the waypoints file.

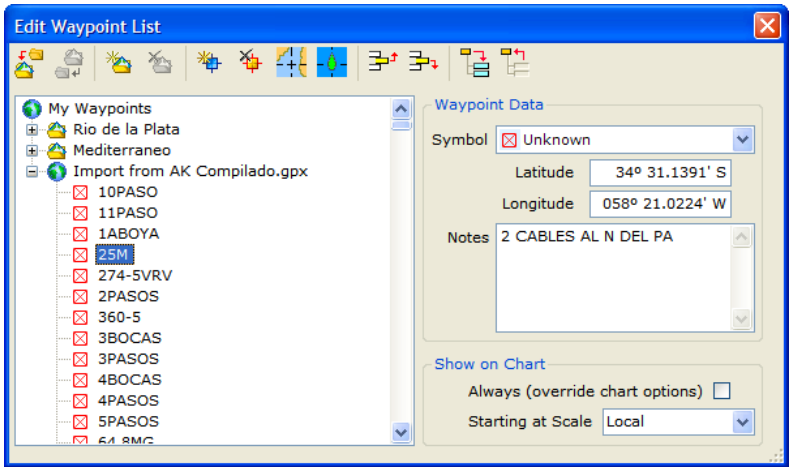


For example, selecting the "AK Compiled.gpx" file, which contains a large number of waypoints produced on a Garmin GPS, the result will be as follows:

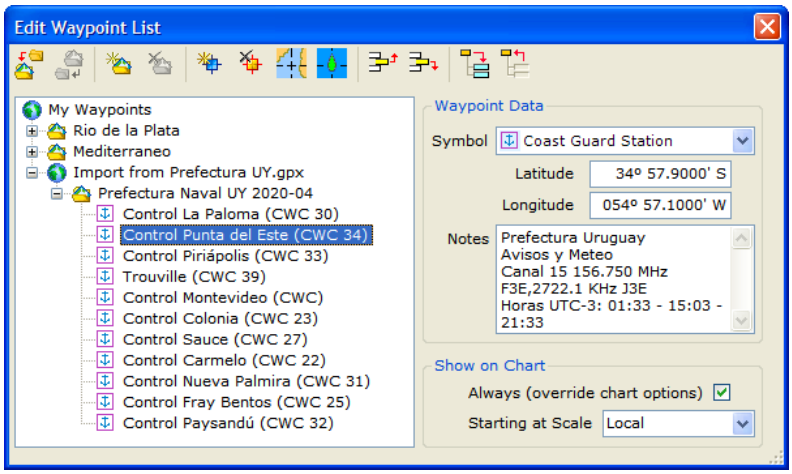
The system read each waypoint, including its position, name, and description.

However, the system could not obtain the object type (Symbol) and gave it the default type "Unknown" ☒.

It also did not find data that indicates the zoom scale level at which to present the waypoint on the chart. By default, "Local" was assigned.



If EVOLUTION created the .qpx file, as the next point, Exporting Waypoints to a GPX File, explains, the information from each waypoint is saved and retrieved with all its information. For example, importing the file "Prefectura Naval UY.gpx" created in the example below, the result is:



It is simple to note that EVOLUTION: a) allows names and notes of greater length and b) preserves the object type (Symbol).

If waypoints were part of a subfolder structure, it would be wholly and correctly rebuilt.

Exporting and importing waypoints using EVOLUTION's features is a great way to save or exchange this data.

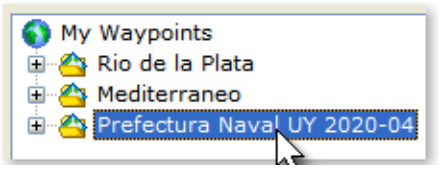
As in the previous cases (DfW and CSV), at first, the imported folder is preceded by the symbol , but after saving the Waypoint List, this area folder is preceded by the usual folder symbol , and it is always possible to reorganize folders, subfolders, and waypoints at will.

4. Exporting Waypoints to a GPX File

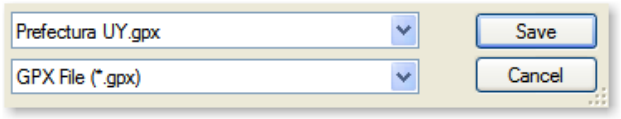
EVOLUTION can export its waypoints GPX format files of all or part of the list structure. This is a convenient way to exchange or store waypoint data. It is the best practice to interchange waypoints from one EVOLUTION installation to another.

Complementing the "Importing Waypoints from a GPX File", it is possible to export any folder with all its contents to a file in this format.

Select from the list the folder whose contents you want to transfer to the .gpx file. We will use the folder "Prefectura Naval UY 2020-04" in this case. The Export button below will not be available if the selected item is a waypoint. You can only export folders.



To export, click on the "Export" button. The system will prompt the Windows form to save the file. The file type will be limited to .gpx; if you enter a name without the file type, the system will automatically add it. Click on the "Save" button to complete the export.



The file can be used to export waypoints to other systems or devices. However, on some computers, the number of characters available for the name and description is limited. Therefore, it is recommended that you consult the respective manuals.

As a technical curiosity, it follows part of the content of the .gpx file created in the example.

```
<?xml version="1.0" encoding="utf-8"?>
<gpx xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  version="1.1"
  creator="support@evolution-tactic.com" xmlns="http://www.topografix.com/GPX/1/1">
  <wpt
    lat="-34.6558333333333"
    lon="-54.1427833333333">
    <name>Control La Paloma (CWC 30)</name>
    <desc>Prefectura Uruguay{eol}Avisos y Meteo{eol}Canal 15 156.750 MHz F3E, 2722.1 KHz
    J3E{eol}UTC-3 hours: 03:03 - 15:33 - 23:03</desc>
    <sym>CoastGuardStation</sym>
    <extensions>
      <evolution:wpt_show
        always="False"
        scale="Local" xmlns:evolution="www.evolution-tactic.com/schemas/gpx" />
      <evolution:wpt_path xmlns:evolution="www.evolution-tactic.com/schemas/gpx">My
       Waypoints|Prefectura Naval UY 2020-04</evolution:wpt_path>
    </extensions>
  </WPT>
  . . . . .
```

```
  . . . . .
  <wpt
    lat="-32.3016666666667"
    lon="-58.08555">
    <name>Control Paysandú (CWC 32)</name>
    <desc>Prefectura Uruguay{eol}Avisos y Meteo{eol}Canal 15 156.750 MHz F3E{eol}UTC-3 hours: 03:00
     - 09:00 - 15:00 - 21:00</desc>
    <sym>CoastGuardStation</sym>
    <extensions>
      <evolution:wpt_show
        always="False"
        scale="Local" xmlns:evolution="www.evolution-tactic.com/schemas/gpx" />
      <evolution:wpt_path xmlns:evolution="www.evolution-tactic.com/schemas/gpx">My
       Waypoints|Prefectura Naval UY 2020-04</evolution:wpt_path>
    </extensions>
  </WPT>
</gpx>
```

If you have any technical questions about using this function with other systems and devices, please get in touch with support@evolution-tactic.com.

Application Examples

Creating a race course is one of the most critical and delicate tasks when using EVOLUTION as a tactic tool.

By way of example, this section presents three cases of application of the procedures described in this chapter. We will see what techniques and tips we can use to build:

- A windward-leeward race course.
- A Simple Fixed Marks Race Course.
- A Race Course of Fixed Marks with Variations.

In each case, we will start from the information typically available before each competition, the Race Instructions.

General Recommendations

As a starting point, the following tips can be helpful no matter what type of race course you are going to develop:

Read the racing instructions carefully. This document is usually brief and, in some cases, ambiguous.

- Carefully analyze the race course description, especially in fixed-mark race courses, to identify ambiguities or missing information.
- If you have doubts, DO NOT assume, consult, and ask for all the necessary clarifications from the organizing authority.
- Work as a team with another crew member; Do it independently and compare the results.
- Remember to read the update bulletins, which can be published up to a few hours before the competition; in some cases, they affect the race course.

Enter as much information as possible to avoid confusion during the race.

- Enter each mark's name, type (how to go around), and description.
- Include clarifying comments in the start mark (CR), such as the start time and flag of the class and the VHF channel on which the race committee operates.

Allow sufficient time to ensure the quality and accuracy of the information.

- Do not leave the preparation of the race course, or the courses of the regatta, to the last minute.
- Head out onto the race course with plenty of time to take the position of the marks and ping the starting line.

Windward-Leeward Race Course

In windward-leeward races, the race instructions provide an approximate course location, the starting sequence for the competing classes or divisions, and most importantly, the number of legs and the location of the starting and finish lines on the course.

In practice, things can get confusing. There is usually an offset buoy after the windward mark. The leeward mark may have its own buoy, or in other cases, it will be the pin end of the starting line or perhaps a gate pair.

After all this information is clear, it is time to enter the race course into the system and decide which marks to include.

Remember that the main use of the race course is to help locate the tactic destination (Tactic Mark) on one of its marks. Sometimes, with a mark for Leeward, another for Windward, and the starting line, we will have everything we need.

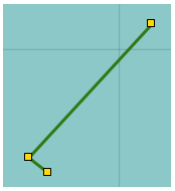
In Practice

Creating the course in the race area with an approximate location and orientation is advisable. Then, in navigation, we will take the exact positions of each mark.

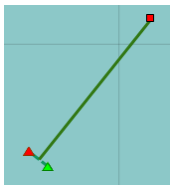
The ways to create this simple race course are:

1. **Based on the Matrix Race Course**
   a. Create a new race course using the Edit Form.
   b. Copy the marks of the matrix race course.
   c. Transform the course by placing it in the race area.

2. **With Quick and Edit Form**
   a. Create a new quick race course, as shown in the figure on the right.
   b. Use the Edit Form to fill in the data for each mark and record the race course with a new description and under a new name.



CR	Comite de Ragata. VHF 71	308º T 0.27 nm
SOTA	Boya de Linea y Sotavento	043º T 2.03 nm
BARLO	Boya de Barlovento	



After you close the form, the race course will look like this. If the leeward mark does not match the buoy on the line, we add a leeward mark, as the example shows at the beginning of the section The Starting Line in this chapter.

Remember that, when taking the position of the ends of the starting line, if the race course does not include the corresponding marks, the system creates them for you. You can have only the windward mark. Then, when taking the starting line position, the system will automatically complete the race course.

Simple Fixed Marks Race Course

Although fixed-mark race courses can sometimes be complex, they can be built in advance. For example, consider this race in Punta del Este in the Republic of Uruguay. The race instructions provided the following information regarding the race course:

Location of the Marks

Mansa Beach Gate:	Inflatable buoys near Playa Mansa (Lat. 34º 56.04' S Long. 54º 57.8' W). Boats must pass between the gate buoys and go around any of them.
Buoys of the Bajo del Este:	Red No. 1 (Lat. 34º 58.3 S Long. 54º 57.7' W). Cardinal Sur (Lat. 34º 58.6' S Long. 54º 57.7 W). If deemed necessary, the CR may replace these marks with inflatable buoys and announce them on the Official Notice Board.
Isla de Lobos Channel Buoy:	anchored near the Island of Lobos (Lat. 35º 00 S Long. 54º 54' W).
Dedos de la Brava Buoy:	Inflatable buoy anchored approximately in Lat. 34º 58' S Long. 54º 55.7' W.
Buoy Stop 31 of the Brava:	Inflatable buoy anchored approximately in Lat. 34º 56' S Long. 54º 52.5' W.
Starting Line:	Between the lamppost of the breakwater of the port of Punta del Este and an inflatable buoy anchored 300 meters away.
Finish Line:	Between the beacon of the breakwater in the port of Punta del Este and an inflatable buoy anchored 150 meters away.

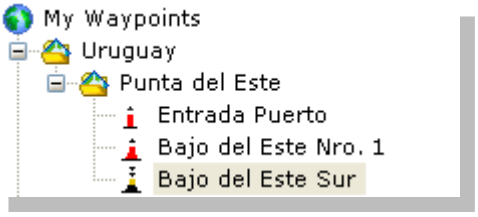
Race Course

Departure - Playa Mansa gate - Buoys from Bajo del Este on the port side - buoy Canal Isla de Lobos on port - buoy Dedos de la Brava on port - buoy Canal Isla de Lobos on port - buoy Stop 31 of the Brava on port side - buoys from Bajo del Este on starboard side - Arrival.

In Practice

Despite the number of marks involved, this is a relatively simple course, well described in the race instructions, and an excellent example to apply the different procedures in this chapter.

This race course is unique in that it includes three navigation aids (the buoys of Bajo del Este and the beacon at the entrance to the port) that are used more than once; one possibility is to add these objects to the Waypoints database with their exact position to facilitate the creation of marks.



1. **Incorporate new waypoints**
   a. Use the Waypoints functions to incorporate Uruguay and Punta del Este in the area folders.
   b. Create the waypoints, and if possible, take the positions by navigating to the exact point.

2. Build the Race Course

a. Create a new course with the Course Edit form.

b. Using the beacon's waypoint at the port entrance, create the first mark; and rename it to "CR" and type to Start Stbd.

c. Create the second mark, "LARGADA", and type Start Port. Adjust its position in relation to another mark 300 meters east (270º True) of the CR mark.

d. Create the mark "GATE" with a generic Mark at position 34º 56.04' S - 54º 57.8' W. In Comments, enter "Gate Mansa. La Barra".

e. Using the waypoints of the Buoys of the Bajo del Este, create the following two marks. Then, going back to the data area change their names to "ROJA1" and "SUR1" and type to Port.

f. Create the "LOBOS1" Port Mark at 35º 00 S - 54º 54' W and add the comment "Lobos".

g. Create the "FINGERS" Port Mark at 34º 58' S - 54º 55.7' W and enter the comment "Dedos Brava".

h. Create the "LOBOS2" Mark of type Port by adjusting its position to 0 meters from LOBOS1 and attach the comment "Lobos."

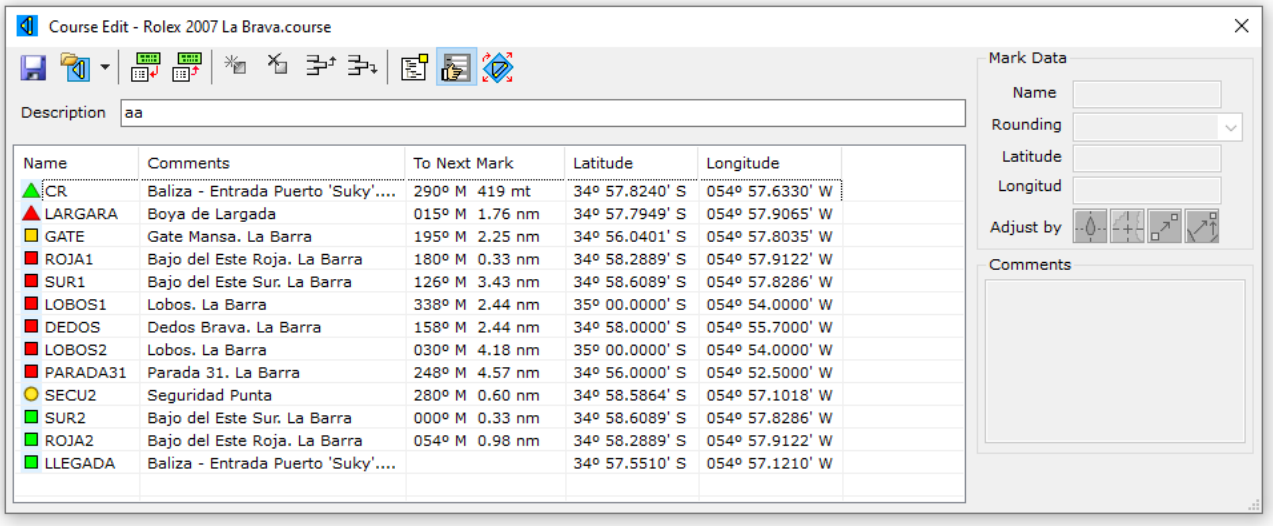
i. Create the "PARADA31" Port type mark at 34º 56' S - 54º 52.5' W and enter the comment "Parada 31. La Barra".

j. Using the waypoints of the Eastern Lower Buoys again, create the following two marks. Then, going back to the data area, change their names to "SUR2" and "ROJA2" and mark type to Stbd.

k. Using the waypoint of the port entrance beacon, create the last mark; return to the data area to change the name to "LLEGADA" (finish line) and the type to Start Stbd.

l. Close the form by saving the race course, naming it "Rolex 2007 La Brava".

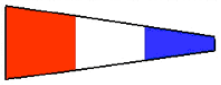
It is important to note that if the same object is used repeatedly on the race course, there must be a mark for each time it is gone around, as is the case of the marks SUR1 and SUR2, ROJA1 and ROJA2, and LOBOS1 and LOBOS2.



Name	Comments	To Next Mark	Latitude	Longitude
CR	Baliza - Entrada Puerto 'Suky'....	290º M 419 mt	34º 57.8240' S	054º 57.6330' W
LARGARA	Boya de Largada	015º M 1.76 nm	34º 57.7949' S	054º 57.9065' W
GATE	Gate Mansa. La Barra	195º M 2.25 nm	34º 56.0401' S	054º 57.8035' W
ROJA1	Bajo del Este Roja. La Barra	180º M 0.33 nm	34º 58.2889' S	054º 57.9122' W
SUR1	Bajo del Este Sur. La Barra	126º M 3.43 nm	34º 58.6089' S	054º 57.8286' W
LOBOS1	Lobos. La Barra	338º M 2.44 nm	35º 00.0000' S	054º 54.0000' W
DEDOS	Dedos Brava. La Barra	158º M 2.44 nm	34º 58.0000' S	054º 55.7000' W
LOBOS2	Lobos. La Barra	030º M 4.18 nm	35º 00.0000' S	054º 54.0000' W
PARADA31	Parada 31. La Barra	248º M 4.57 nm	34º 56.0000' S	054º 52.5000' W
SECU2	Seguridad Punta	280º M 0.60 nm	34º 58.5864' S	054º 57.1018' W
SUR2	Bajo del Este Sur. La Barra	000º M 0.33 nm	34º 58.6089' S	054º 57.8286' W
ROJA2	Bajo del Este Roja. La Barra	054º M 0.98 nm	34º 58.2889' S	054º 57.9122' W
LLEGADA	Baliza - Entrada Puerto 'Suky'....		34º 57.5510' S	054º 57.1210' W

Race Course with Fixed Marks with Variations.

This other example of a fixed mark coastal course presents a real challenge even for the most experienced sailors; it was taken from the regatta instructions of the Alicante Cup of the 2007 MedCup; it is Course Number 3 (COASTAL COURSES. NUMBER 3) presented as follows:


Pennant 3

Start – Optional Windward mark (Starboard or Port) – NW Mark of Tabarca Island Natural Reserve (Port) – SW Mark of Tabarca Island Natural Reserve (Port) – Chartinal mark of Bajo de la Llosa (Mandatory Waypoint Gate, Port) – Butano Mark (Starboard) – Variable Mark (Starboard) – Butano Mark (Starboard) – Finishing line.

Windward mark: Before or with the warning signal, the race committee will hoist a green or red flag to describe the side, and this mark will have to be rounded (green to starboard, red to port). Also, before or with the warning signal, the race committee will show the distance and bearing from the race committee to this mark on a board. The absence of a green or red flag on the will mean no Optional Windward Mark, and boats shall proceed to the next mark.

NW Mark of Tabarca Island Natural Reserve: yellow metallic government mark approximately 38º10.650N and 000º29.700W.

SW Mark of Tabarca Island Natural Reserve: yellow metallic government mark approximately 38º09.500N and 000º30.200W.

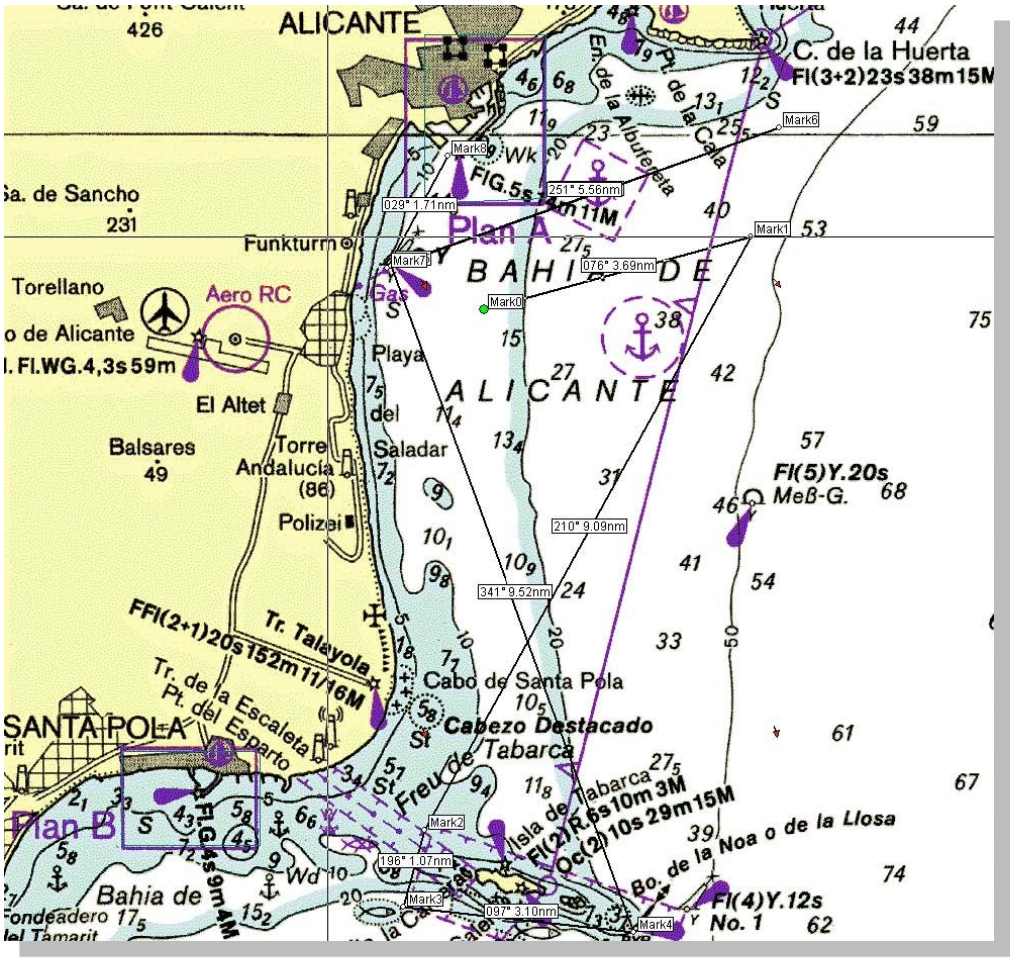
Cardinal Mark of Bajo de la Llosa (Mandatory Waypoint Gate, SI.6.2 and 6.6.2): the mandatory waypoint gate will be defined by a committee vessel (to be left to starboard), and the cardinal mark of Bajo de la Llosa), black and yellow metallic government mark approximately located at 38º09.400N and 000º26.300W (to be left to port).

Butane Mark: yellow metallic government mark approximately located at 38º18.200N and 000º.30.400W.

Variable Mark: when the first yacht is about to round the cardinal mark of Bajo de la Llosa, the race committee will show a board with the range and bearing between the "Butano" mark and the Variable mark. This information will be broadcast later on VHF channel 69. The Variable mark will be a yellow inflatable tetrahedron buoy

Finishing Line: the line between the mast with a blue flag on the Race Committee boat and a yellow inflatable tetrahedron buoy. The approximate location of the committee boat will be 38º19.800N and 000º29.300E.

MARK	ROUNDED	DESCRIPTION	LOCATION
Optional Windward Mark	Stbd or Port (Flag)	Yellow Inflatable Tetrahedron	Range & Bearing from RC
Tabarca Island NW	Port	Yellow Metallic	38º 10.65 N - 000º 29.70 W
Tabarca Island SW	Port	Yellow Metallic	38º 09.50 N - 000º30.20 W
Bajo de la Llosa	Port	Yellow and Black Metallic	38º 09.40 N - 000º26.30 W
Butane Mark	Starboard	Yellow Metallic	38º18.20 N - 000º.30.40 W
Variable Mark	Starboard	Yellow Inflatable Tetrahedron	Range & Bearing from Butane



In Practice

The race course has two challenges. The first challenge is the "optional" WINDWARD mark, given at the start time. The second challenge is the VARIABLE mark, the position of which is only informed when passing the GATE in the area of Tabarca Island.

The marks will initially have undefined positions when setting up the race course. During the race, you must adjust their positions using distance and direction (Range and Bearing).

The entry process for this race course is similar to the previous examples. The only new thing is using the comment field of each mark with information that helps execute the different variants correctly.

Name	Comments
PIN	
RC	VHF 69
WINDWARD	YellowTetra. Rounding: flag at start RED = Port, GREEN = Stbd and NONE = No Mark
TABARNW	NW Tabarca
TABARSW	SW Tabarca
GATE	Mandatory Gate. Between IALA Cardinal East and Inflatable Mark YellowTetra. RC boat present
BUTANO1	Butano - IALA Special
VARIABLE	Variable Mark - YellowTetra. BR from BUTANO shown at GATE and broadcast on VHF 69
BUTANO2	Butano - IALA Spacial. Pass 2
FINISH	Finish Line