

# **Raymarine®**

## **Race Master User Guide**

  
***micronet***

## EMC Conformance

All Tacktick equipment is designed to the best industry standards for use in the recreational marine environment. The design and manufacture of Tacktick equipment conforms to the appropriate Electromagnetic Compatibility (EMC) standards. Correct installation is required to ensure that performance is not compromised.



### Important

Due to the wireless communication systems used in Micronet instruments they are only recommended for use on boats up to 18 metres (60 ft.) **Before installing to a boat of aluminium or steel construction, please contact your Tacktick dealer.**

Like any other electronic instruments your Micronet system is designed to serve only as an aid to navigation and it remains the skippers responsibility to maintain a permanent watch and be aware of developing situations.

Any attempt to take a Micronet product apart will invalidate the warranty. The battery may only be replaced by a person trained and approved for this purpose.

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# 1 Introduction

## 1.1 Key Features

Your Race Master provides a unique combination of features:

### **Viewable from both sides of the boat**

Two LCD displays mounted at an angle to permit viewing from either side of the boat.

### **Solar Power**

The Race Master is powered for life by the environment. Although feature packed and highly visible in all conditions, current demand is so low, and the supply so efficient, that the solar-powered display is self sufficient.

### **Integrated Heading Sensor**

The Race Master is a powerful racing compass; with functions for Race Timer, Wind Shift and Line Bias.

### **Bar Graph display**

Both screens of the Micronet Race Master incorporate a bar graph to permit analogue display of Wind Shift, Speed Trim or Depth.

### **Remote control capability**

By purchasing an optional Tactick Remote Display, you can control your Race Master from any location in the boat.



## 2. Basic Operation

### 2.1 Display Information



### 2.2 Switching the System On and Off

To switch your Race Master on or off, press for 2 seconds.



### 2.3 Information Display Panes

#### Top Pane



**Heading** is permanently displayed in the top pane.

#### Bottom Pane

There are three Functions; The button scrolls through the Functions. See sections 3 and 4 for operating details.



**Race Timer (TMR)**, a countdown timer and elapsed time clock..



**Wind Shift (WND)**, which displays wind shift information while sailing close hauled and the angle of the boat from the mean downwind direction while sailing downwind.



**Line Bias (LiNE)**, for detecting the favoured end of the starting line.


















## 2.4 Power Management and Battery Life

What makes your Race Master possible is Tacttick's revolutionary approach to power management. By reducing the amount of power being used by the electronics and maximizing the potential of the sun to provide power, the Race Master is capable of virtually perpetual operation.

Power status is indicated by two icons on the display:

Battery Level  and Charge Rate 

Used together these icons will show the condition of the power supply.

Bright Sunny Day 	 	Battery is charged and being topped up by the sun. (see Note)
	 	Battery is low and being charged by the sun.
Overcast Day 	 	Battery is charged and requires no further charging.
	 	Battery is low but maintaining it's level.
Night 	 	Battery is charged but is not charging.
	 	Battery is low with no charging.
LOW Power	 	It is recommended that the instrument be left in daylight for some time for the battery to recover. A fully discharged battery will recharge in approximately 12 hours of direct bright sunlight.

If using the Race Master at night, power usage can be reduced dramatically by switching the Backlighting to level 1.

**Note:** If the internal battery is fully charged then it does not matter how much the display is subjected to bright sunlight, no further charging is required and the Charge Rate Indicator will remain low.

If the display is to be stored for a long period before next use (e.g. over winter), ensure that the battery is fully charged before storage.

**Warning:** Artificial light WILL NOT recharge the battery. Placing your Race Master close to an artificial light will seriously damage the display. Only recharge in natural daylight.





## 2.5 Sleep Mode

If there is no change in heading registered on the system for a period of ten minutes your Race Master will switch off to conserve power.

## 2.6 Backlighting



At any stage of the display's operation, press and hold  for 2 seconds to access the lighting control.

Pressing  and  will scroll through the options OFF, 1, 2 and 3 whilst changing the backlighting.

Backlighting is automatically switched off in daylight as part of the display's power saving feature and will not operate in daylight.

## 2.7 Keylock

The Keylock feature protects from accidental key presses. Keylock can be enabled or disabled in setup (see page 15), it is disabled by default.

When keylock is enabled, pressing a key causes the unit to give the unlock key prompt. Press  followed by  to unlock the keys (the keys will function for one minute, after which the keys will automatically relock).

## 2.8 Audible Signals

At stages during its operation your Race Master will beep to indicate moments of importance.

**Power-up** The display will issue a single beep as it is switched on.

**Button Press** A single beep is issued each time a button is pressed. A second beep is issued when a button has been held down for two seconds.

**Timer** A single beep will be issued at each minute of the countdown.

With 1 minute left to go a beep will sound every 10 seconds.

With 10 seconds to go a beep will sound every second.

Countdown complete will be indicated by a single burst of three beeps.

## 2.9 Safety and Disposal

Your Race Master contains Manganese Lithium Dioxide batteries which should be disposed of correctly. Do not dispose of any instrument in domestic waste. Refer to regulations in force in your country.

If in doubt return the instrument to Tacktick Ltd. for correct disposal.

## 3 Racing Functions

### 3.1 Some definitions and terminology

**True Wind Direction (TWD)**, the current actual direction of the wind over the water, expressed as a compass heading. If the boat is head to wind, the TWD is the same as the heading of the boat.

**Mean Wind Direction (MWD)**, the average of the True Wind Direction over a sufficiently long period to even out any regular periodic changes in the wind direction.

**Tack Angle (TAK)**, the angle through which the boat turns when going from close hauled on one tack to close hauled on the other. Typically this is about 90 degrees.

**Line Bias**, the angle between the heading of the start line and a line at right angles to the wind.

### 3.2 Improving Race Performance with the Race Master

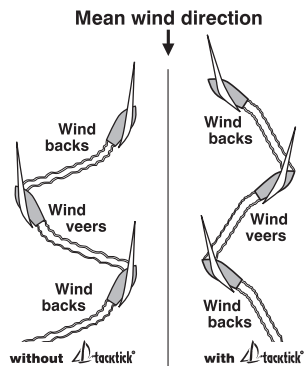
#### Racing and Wind Shifts

Like most things in sailing, the wind does not remain constant in either strength or direction.

The crew tend to react naturally to gusts but find wind shifts more difficult to detect. However the wind does tend to shift in regular patterns, oscillating from one side of the Mean Wind Direction (MWD) to the other. Every shift in the wind requires the boat to alter its heading in order to maintain a close hauled course. A shift that allows the boat to change its heading closer to the Mean Wind Direction (MWD) is called a “lift”; a shift that forces the boat to change course away from the Mean Wind Direction (MWD) is known as a “header”.

In an oscillating wind, a boat that regularly tacks when headed will spend more of its time sailing a lifted course and will sail a shorter distance to the windward mark than a boat that regularly sails a headed course. This gives the boat sailing in the lifts a considerable advantage.

In the diagram, the boat on the right sails a shorter course by tacking when headed and thereby sailing mostly in lifts.



The opposite is true sailing down wind. A boat that gybes to sail in the “headers” will sail a shorter course to the leeward mark than a boat that sails a “lifted” course.



## Optimise wind shifts

Your Race Master is the ultimate wind shift indicator, giving you precise, clear numerical and graphical readouts.

Before the race, you program the Mean Wind Direction (MWD) and the Tack Angle (TAK) into the Race Master (see section 3.3).

During the race, you get an instant visual display of:

Your heading as a large stable digital number (the upper display).

How far you are sailing above or below the mean close hauled heading (lifted or headed) as a precise digital number (the lower display).

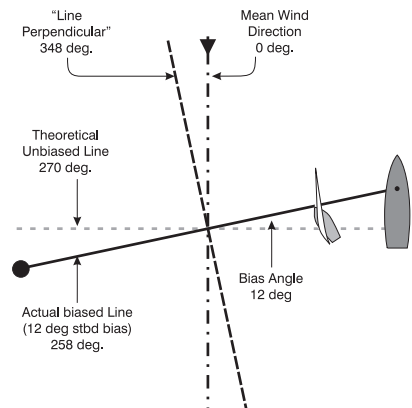
How far you are lifted or headed in bar graph format for instant visual impact (the vertical bar graph).

Race Master gives you this critical information when you are sailing both upwind AND downwind. You sail your boat for maximum speed to windward, using the Race Master to identify the headers and lifts to help you decide when to tack. Timing your tacks and gybes is absolutely critical to winning races and Race Master shows you the wind shifts more clearly than ever before.

## Racing and Start Line Bias

If the starting line is laid at exactly right angles to the wind, the distance sailed to the windward mark is the same wherever the boat starts on the start line.

If the start line is not laid at exactly ninety degrees to the wind, there is a favoured end to the line; a boat that starts at the favoured end starts upwind and therefore ahead of a boat starting at the other end of the line. The angle between the actual line heading and the theoretical line at right angles to the wind is called the Line Bias; the larger the bias angle, the greater the advantage to be gained from starting at the favoured end of the line.



The diagram (right) shows the relationship between these values.

## Optimise your start with the Race Master

Your Race Master has the ability to capture the Line Perpendicular (the heading at right angles to windward of the start line) and to display the Line Bias angle and the favoured end of the line.

### 3.3 Before the Race

Programme the Mean Wind Direction (MWD) and Tack Angle (TAK), capture the Line Bias (LiNE) and set the Race Timer (TMR).

#### To set the Mean Wind Direction (MWD) and Tack Angle (TAK) in "Single Button" mode

Go to the Wind Shift (WND) page.

Sail upwind for several minutes to determine your average close hauled heading on each tack.

Press and hold . Rotating lines will appear on the display.

Steer your average close hauled course on either tack.

When the display shows the pop-up "TAC NOW", tack the boat and sail your close hauled course on the other tack.

The rotating lines will reappear on the display, hold your close hauled course until the Tack Angle (TAK) pop-up appears.

The displayed value can be adjusted using  and .



#### To capture the Line Perpendicular and the Line Bias

Ensure that the Mean Wind Direction (MWD) has been captured (see the section above).

Go to the Line Bias (LiNE) page.

Sail directly along the start line, then press .

A pop-up is displayed showing the Line Bias angle and the favoured end of the start line based on the captured Mean Wind Direction (MWD).

When the pop-up closes, the bottom pane shows the Line Perpendicular (the bearing at right angles to windward of the start line).

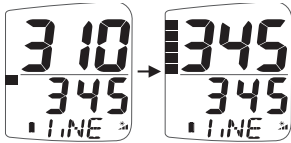


#### To check the direction of the Line Bias

If the wind changes prior to the start, provided you have captured the Line Perpendicular, as described above, you can check the Line Bias at any time as follows:

Go to the Line Bias (LiNE) page.




Steer the boat towards the eye of the wind until the Heading in the upper pane matches the Line Perpendicular in the lower pane.



If the wind is coming from the starboard side, the line is starboard biased. If the wind is coming from the port side, the line is port biased.

### To set the Start Timer

Go to the Race Timer (TMR) page.

Press  for 1 second, the last start countdown value is shown, flashing. If required adjust the countdown value using  and .

Press  to exit edit mode and prepare for countdown.

At the first “gun” press  to start the countdown.


The timer will sound a single beep at the end of each minute.

During the last minute, the timer will sound a beep every ten seconds.

During the final ten seconds, the timer will beep every second.

“START” will be indicated by a triple beep.

At the end of the countdown, the Wind Shift (WND) page is displayed.

The timer will count the elapsed time in the background, until stopped by scrolling to the Race Timer (TMR) page and pressing  for two seconds.

### To adjust the Timer

At any time during the countdown, press  to resynchronise the countdown to the nearest minute.



Press and hold for 1 second to enter timer setup



Select the desired countdown time



Press and hold for 1 second to store the countdown time



Ready to start countdown



Press to start



Countdown time in progress



Press to re-synchronise to nearest full minute (8:00)

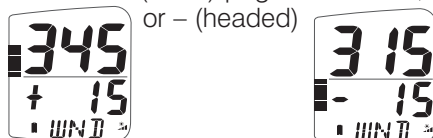
## 3.4 During the Race

### Sailing upwind

Tack when headed to keep the boat sailing on the lifted tack.

The bar graph indicates the Wind Shift in 2.5 degree steps from a central zero. Bar Graph above the centre line indicates a lift, Bar Graph below the centre line indicates a header.

When the Wind Shift (WND) page is selected, Wind Shift is shown as a + (lifted) or - (headed) value in the lower pane.







### Oscillating wind pattern



If the wind is swinging regularly either side of the Mean Wind Direction (MWD), you should tack on headers to keep sailing on the lifted tack, i.e. you should tack on “-” digital or bar graph indications.

### Permanent wind shifts

These can be recognised as a constant header on one tack, and a constant lift on the other tack. In this situation, you can adjust the Mean Wind Direction (MWD) as follows:

- 1 Sail close hauled on either tack.
- 2 If on starboard tack, press . If on port tack, press . The new Mean Wind Direction (MWD) is captured.
- 3 The Mean Wind Direction (MWD) pop-up is displayed.
- 4 If required, the value can be adjusted using  and .





### Sailing Downwind





Gybe to keep the bar graph low, to sail on the headed tack.

The bar graph displays Downwind Angle (the angle of the boat from the mean downwind direction) in 2.5 degree steps from 0 to 50 degrees, from zero at the bottom of the display. For example, at 45 degrees the bar graph is almost full length and the boat is sailing at 45 degrees from the mean downwind direction.

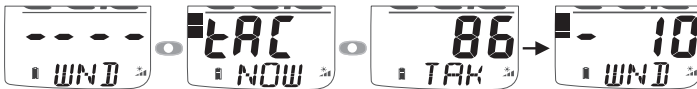
When the Wind Shift (WND) page is selected, Downwind Angle is shown on the numeric display and the direction is shown by  (Port) or  (Stbd), e.g. the example shows that the boat is sailing 20 degrees to starboard of the mean down wind direction.

## 4 Advanced Operation

### To set the Mean Wind Direction (MWD) and Tack Angle (TAK) by sailing closehauled





- 1 Go to the Wind Shift (WND) page.
- 2 Sail upwind for several minutes to determine your average close hauled heading on each tack.
- 3 Steer your average close hauled heading on either tack.
- 4 Press , the display will beep twice and "TAC NOW" will show for two seconds.
- 5 Tack and sail your average close hauled heading on the new tack.
- 6 Press , the display will beep three times and the Tack Angle (TAK) pop-up will be displayed.

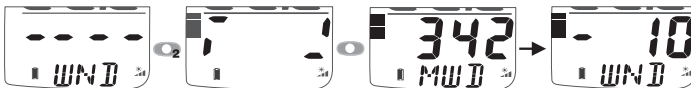
The Tack Angle (TAK) can be adjusted using  and .



### To set the Mean Wind Direction (MWD) to a known value




If you know the required Mean Wind Direction (MWD), you can set it at any time as follows (you do not need to be sailing):

- 1 Go to the Wind Shift (WND) page.
- 2 Press and hold  for 2 seconds, rotating lines are shown.
- 3 Press , the Mean Wind Direction (MWD) pop-up is displayed.
- 4 Set the desired heading using  and .



### To set the Tack Angle (TAK) to a known value



If you know the required Tack Angle (TAK), you can set it at any time as follows (you do not need to be sailing):

- 1 Follow the procedure above to display the Mean Wind Direction (MWD) pop-up.
- 2 Press , the Tack Angle (TAK) pop-up is displayed.
- 3 Set the required value using  and .

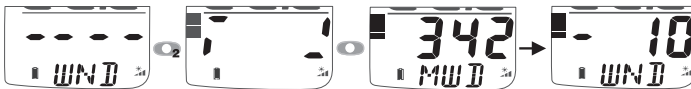


**To correct the Mean Wind Direction (MWD) by going head to wind.**

*For Wind Shift to work correctly, you must ensure that the tack angle is captured using one of the methods described above.*

- 1 Go to the Wind Shift (WND) page.
- 2 Take the boat head to wind.
- 3 Press and hold  for 2 seconds, rotating lines are shown
- 4 Press and hold  again for 1 second, the Mean Wind Direction (MWD) popup is displayed.

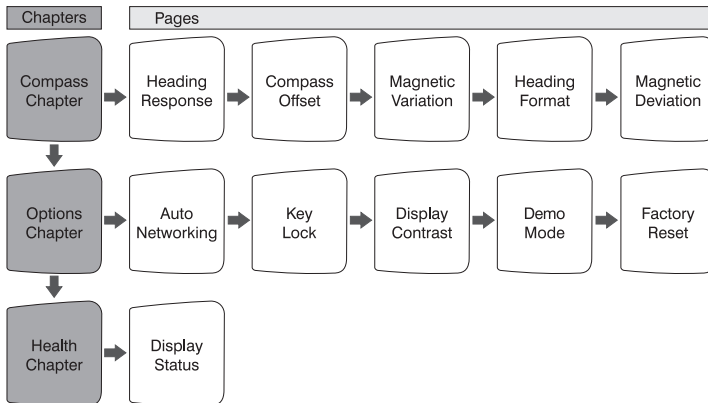
If necessary, adjust the captured value using  and .



## 5 Setup and Calibration

### 5.1 Setup and Calibration Organisation

Setup is organised into Chapters, each comprising a number of Pages. Setup pages use both the top and bottom panes of the display. The diagram shows the layout of the available chapters and pages. For a full description of each setup page refer to section 5.4.



### 5.2 Setup and Calibration Operation


#### To enter Setup:



**Warning:** It is not possible to enter setup mode while the Race Timer (TMR) or Wind Shift (WND) page is visible. Scroll to the Line Bias (Line) page in order to enter setup.

From the Line Bias (LiNE) page, press and hold , the first chapter title page is displayed.

#### To change the active chapter:

Press  repeatedly until the desired chapter title page is displayed. At the end of the chapter cycle, the display returns to the first chapter title page.

If you are currently on a chapter parameter page, you must return to the chapter title page before you can move to a new chapter.

#### To access the setup pages:

Use  to scroll through the pages.  returns to the previous page.

## 5.3 Editing Setup Data

Parameter values may be one of three types:

**A user editable numeric value** (for example, the magnetic variation may have the value 03 degrees).

To edit a numeric parameter value:

Press . The value data will begin to flash.

Use  and  to adjust the value.

Press  again to set the new value.

**A list of options** (for example, the heading response parameter may have the values SLO , mED or FAST).

To select a parameter option from a list:


Press . The parameter option will begin to flash.

Use  and  to select the option required.

Press  again to set the new option.

**A toggle between two alternative options** (for example the keylock parameter can be either ON or OFF).

To toggle between alternate parameter settings

Press . The setting will toggle between the options.

## 5.4 Setup Parameter Descriptions

In the descriptions below, system default values are shown in **bold** text

### Compass Chapter

#### Heading Response



Sets the update period of the compass display.

**Auto (automatic)**, SLO (slow), mED (medium), FAST (fast).

#### Compass Offset



Aligns the displayed heading with the actual magnetic heading of the boat (see page 17 for the calibration process).

The live heading is shown on the lower line of the bottom pane, with the applied offset on the upper line shown as +/- degrees (0 to +/- 180).



### Magnetic Variation



Allows manual entry of local magnetic variation. A value between W90 degrees and E90 degrees.

### Heading Format



The system can be configured to show heading information in either **MAG (Magnetic)** or TRU (True) format. Magnetic Variation must be set to enable True display format (see section above). A True Heading is indicated by the TRUE icon in the upper pane; the absence of this icon indicates a Magnetic heading.

### Magnetic Deviation



However carefully the Compass Transducer is positioned, there is always the possibility of errors being introduced by the vessel and equipment. To remove errors it is necessary to “Swing” the compass by turning the boat slowly until the system can optimize the readings. Once the correction has been completed the deviation correction value will be displayed (See page 17 for the calibration process).

On entry, the top pane shows the maximum deviation applied (dashes if the compass has not been swung).

## Options Chapter

### Auto Networking



Adds display units or transducers to the Micronet network. For information on the Auto Networking function, refer to the Race Master Sytem user guide.

### Key Lock



Press  to toggle between keylock **OFF** and On

### Display Contrast



Adjusts the viewing angle of the LCD display to improve visibility under varied mounting possibilities.

Available values are: 1 - 7 **default 4**.

### Demonstration Mode





Allows the display to show information for demonstration purposes only.

The Race Master will return to **default OFF** on power down.

### Factory Reset



Returns all the calibration setting to the factory default values.

Pressing  starts a three second countdown, at the end of which all values are returned to their defaults. The countdown can be stopped and reset cancelled by pressing  again.

## Health Chapter

### Status of the Race Master display



The number of Micronet devices in the system is shown in the top pane.

The software version is shown in the bottom pane. Battery level and charge rate for the current display are shown using the appropriate icons.

## 6 Calibration

Once the Race Master has been installed on the vessel and Auto Networking has been completed it is necessary to calibrate the compass. It is not safe to use the Race Master for navigational purposes until calibration has been carried out correctly.

To compensate for deviation caused by magnetic objects on the boat, it is necessary to carry out a deviation correction turn.

The compass reading may be set to the correct heading.

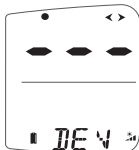
### To begin the calibration process

From the Line Bias (LiNE) page, press and hold  for 2 seconds to enter Setup.

Press  repeatedly to scroll to the **Heading** chapter.

### To complete a deviation correction turn

Press  to scroll to the **DEV** parameter.



Press  to enter Compass Calibration Mode.

Turn the vessel slowly keeping the speed below 4 knots and taking approximately 2 minutes to complete 360 degrees. Keep turning the vessel until the display changes to show a value (usually about 1.25 turns).

**Note:** If the rate of turn of the vessel is too fast the display will show "FAST TRN". It is not necessary to abandon the turn at this stage but do lessen the rate of turn by reducing speed or widening the turning circle.

Press  to exit Compass Calibration Mode.

### Then, to align the heading



Using a hand bearing compass or an external fixed compass, steer the vessel on a known heading.

Warning: Only use an external fixed compass as a known heading if you are certain it has been checked and compensated.

Press  repeatedly to scroll to the Compass Offset page.



Press  to enter Edit Mode.

Press  or  to change the displayed heading (in small text) to the known correct value.



The display shows the offset entered.

Press  to exit Edit Mode.

Press and hold  to exit Setup and return to normal operation.

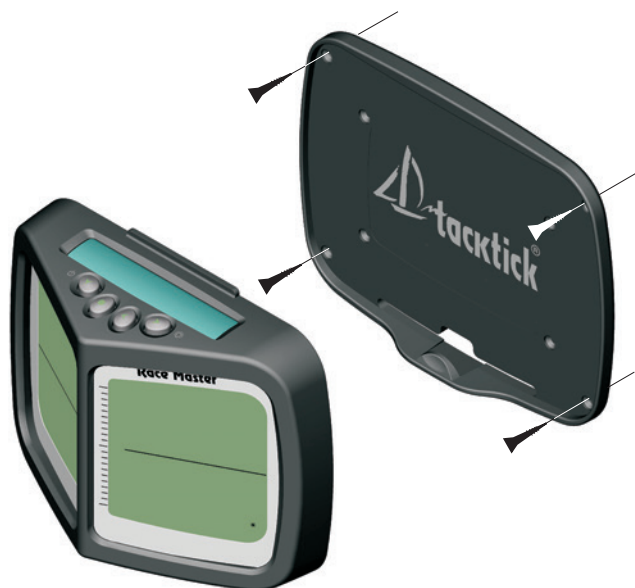
## 7 Installation



**Warning:** The Race Master must be mounted within 20 degrees of the vertical to permit correct functioning of the integrated compass sensor. Ideally, the display should be mounted at or below eye height; if this is not possible it may be necessary to adjust the display contrast to optimise visibility (see page 16).

Select a mounting location that is as far as possible from magnetic objects that might interfere with the compass sensor.

Attach the Cradle to a suitable bracket or bulkhead using the bolts or screws supplied. Take care to ensure the plane of the cradle is at right angles to the centreline of the vessel, minor mis-alignment may be corrected by following the Calibration process (see page 17).



## **8 Maintenance and Fault Finding**

### **8.1 Care and Maintenance**

All Micronet products are totally sealed against water and are not serviceable. Any attempt to take a Micronet product apart will invalidate the warranty. The battery may only be replaced by a person trained and approved for this purpose.

To clean, use only a damp, soft cloth. No detergents, solvents or abrasives should be used. To avoid damaging a Micronet display unit we recommend storing in the supplied soft pack when not in use.

If the displays are to be stored for a long period before next use (e.g. over winter) ensure that the batteries are fully charged before storage.

### **8.2 Fault Finding**

#### **The Race Master turns itself off**

a) The vessel is ashore or moored on a constant heading. The Race Master will switch off if there is no change of heading for ten minutes in order to save battery power. Switch the unit back on and ensure movement every ten minutes.

b) The battery level on the Race Master is low. Check the battery icon on the display; if this flashes, the battery must be re-charged. Leave the unit in bright sunlight for 12 hours minimum to recharge the battery.

#### **The backlighting turns itself off or will not turn on**

a) The unit is in daylight. The Race Master automatically turns off the backlight when daylight is detected, to save battery power.

b) The battery power is insufficient to operate backlighting. Check the battery status and recharge the battery if required by placing the unit in bright sunlight.

#### **The heading displayed does not agree with the expected heading**

Ensure that the Race Master is mounted correctly, it must be mounted within 20 degrees of the vertical.

There may be magnetic objects within 70cm (2 ft) of the Race Master. Remove magnetic objects or carry out the compass calibration procedure (see section 17).

#### **The Bar Graph does not correctly indicate headers/lifts**

The Race Master has not been setup correctly. Ensure that Mean Wind Direction (MWD) and Tack Angle (TA) have been setup (see section 3.3 and section 4).

#### **The Race Master rattles and/or splashes when shaken**

This is normal. The fluxgate compass is gimballed in a fluid filled container to ensure it is not affected by the boats movement in the water.

## Specifications

- Height of digits:** 27mm (upper pane), 18mm (lower pane)
- Backlighting:** 3 levels with daylight shutoff  
System-wide or local control
- Power:** Solar Powered  
300 hrs autonomy by day, 7 nights at brightest backlighting,  
20 nights at economy backlighting without charge
- Units of display:** Boat Speed (knots, kilometres per hour, statute miles per hour)  
Distance (nautical miles, statute miles, kilometres)  
Depth (metres, feet, fathoms)  
Wind Speed (knots, metres per second, Beaufort)
- Weight:** 435g (1lb)
- Operating Temp:** -10<sup>o</sup> to +60<sup>o</sup>C (14<sup>o</sup> to 140<sup>o</sup>F)
- Frequency:** 868 MHz or 916 MHz