

# RadaScan Operator's Guide

**GUIDANCE**  
**MARINE**  
Expert Positioning Technology



featuring RadaScan  
Dashboard

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# Document History

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94-0393-4-B	New radome and Series 3 responders	19/11/2015
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# Introduction

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This section provides an introduction and overview of the RadaScan system. It contains the following pages:

- [Welcome](#) (Page 6)
- [System Overview](#) (Page 7)

# Welcome

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Welcome to the RadaScan (Dashboard) Operator's Guide. It explains how to use the RadaScan system once it has been fully installed. For instructions on how to install the system onto a vessel, please see the RadaScan (Dashboard) Installer's Guide (Doc No 94-0394-4).

The **System Overview** on page 7 describes the different components of the system and how they work together.

The **Getting Started** section on page 8 explains how to get the system up and running and how to shut it down again. It also details what you will see on the Dashboard screen when the system is running, and how to interpret the information.

The **Readiness for Tracking** section on page 20 deals with the state of the RadaScan system prior to commencing a tracking operation.

The **Single and Multi-Target Tracking** section on page 25 explains the concepts involved in single and multi-target tracking. Please ensure that you understand the material in this section before attempting to use the RadaScan system for multi-target tracking.

Further useful information is included in the **Support Information** section on page 41, and in the **Appendices** on page 47.

# System Overview

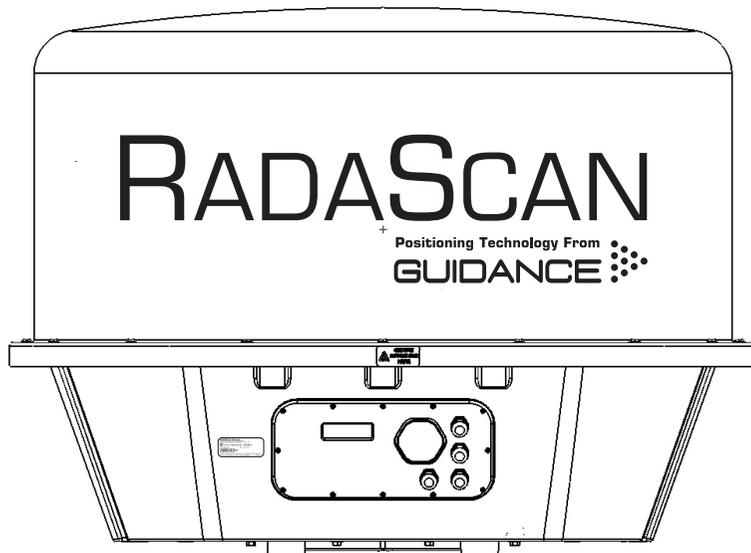
The RadaScan position reference system combines the accuracy of a laser-based system with the all-weather capabilities of radar. It provides precise positional data to DP (dynamic positioning) vessel control systems, which can be used to enable automated approach and station keeping relative to a structure or other vessel.

The RadaScan System consists of three main parts:

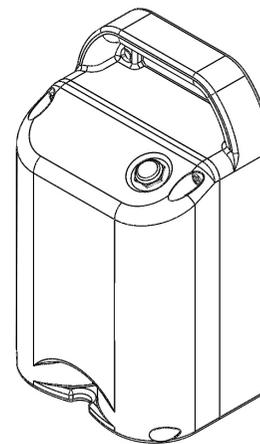
- RadaScan Sensor
- RadaScan Dashboard
- RadaScan Responder (Target)

## RadaScan Sensor

The RadaScan Sensor is a rotating radar scanner mounted on the DP-equipped vessel. It emits a microwave beam and detects the reflections returned by any RadaScan Responders that are within range. It is connected to the vessel's DP system and to the RadaScan Dashboard.



RadaScan Sensor



Responder



RadaScan Dashboard Software

## RadaScan Dashboard Software

The RadaScan Dashboard software runs on a marine-specification processor, usually mounted on the bridge near to the controls of the vessel's DP system. It gives the DP operator control of the RadaScan Sensor and the data stream being fed to the DP system.

## RadaScan Responder

One or more responders are mounted on the target platform or vessel. Each responder returns a modulated radar reflection that carries its unique ID number back to the RadaScan Sensor.

The precise range and bearing of each responder is measured by the sensor. This is used to calculate the exact position of the RadaScan vessel relative to the target structure or vessel. The positional data is fed directly into the vessel's DP system.

# Getting Started

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This section covers the basics of using the RadaScan system.  
It contains the following pages:

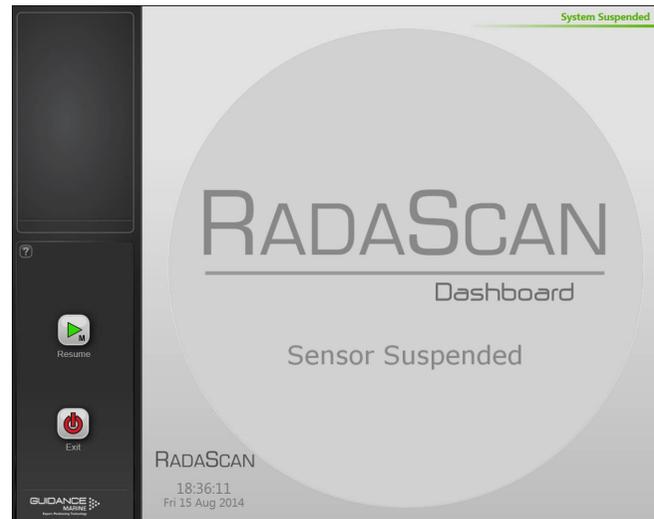
- **Start Up and Shut Down** (Page 9)
- **Screen Layout** (Page 10)
- **Tracking Information Quality** (Page 16)

# Start Up and Shut Down

## Start Up

### To Start the RadaScan Dashboard

1. Ensure that the RadaScan sensor is powered on.
2. Double-click on the RadaScan Dashboard icon. (Or run the RadaScan Dashboard application from **Start > All Programs > Guidance Navigation Ltd > RadaScan > RadaScan Dashboard**.
3. The Dashboard display screen will appear. If the sensor is currently suspended, the main part of the screen will be greyed out. Click on the Resume button in the side bar in order for the sensor to begin scanning and for the results to be displayed on the screen. If the sensor was already scanning, any targets in view will be displayed straight away.



Dashboard screen with sensor suspended



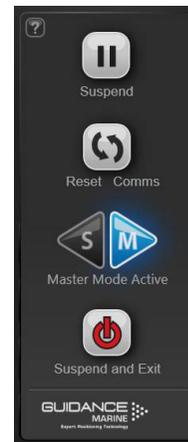
Dashboard screen with sensor scanning

## Shut Down

### To Suspend, Exit or Reset Communications

Click on the Guidance button in the lower left corner of the screen. The set of buttons revealed will depend on whether the Dashboard is running as a Master or Slave. Each button is explained below.

- **Suspend**—Places the sensor into a ‘sleep mode’ and the rotor ceases spinning. The Dashboard remains active and connected to the sensor ready for operations. This mode is suitable for use when travelling between locations.
- **Suspend and Exit**—Places the sensor into the same ‘sleep mode’ as the suspend command (discussed above) and also closes the RadaScan Dashboard program.
- **Disconnect**—Ceases communications between the Dashboard computer and the sensor.
- **Reset Comms**—Re-initialises communications between the Dashboard and sensor.
- **Exit**—Closes down a slave Dashboard without affecting the sensor.



Master Dashboard



Slave Dashboard

See *Multi - Dashboard RadaScan Systems* (See page 38) for information on Master/Slave functionality.

# Screen Layout

The RadaScan Dashboard screen is split into three distinct sections, these are:

- 1. **Main Screen and Bird's Eye View (BEV)** (see page 11)
- 2. **Side Bar** (see page 13)
- 3. **Menu Pane** (see page 15)



# Screen Layout (Continued)

## Main Screen and Bird's Eye View (BEV)

The centre of the circular BEV represents the RadaScan sensor and it shows the relative positions of the RadaScan vessel and any detected reflections.

### RadaScan Vessel

The length and breadth of the vessel and the offsets and orientation of the RadaScan sensor within it can be entered on the Vessel Parameters pane (see Installer's Guide) so that the vessel image is correctly scaled and positioned on the BEV.

### Blanking Zone

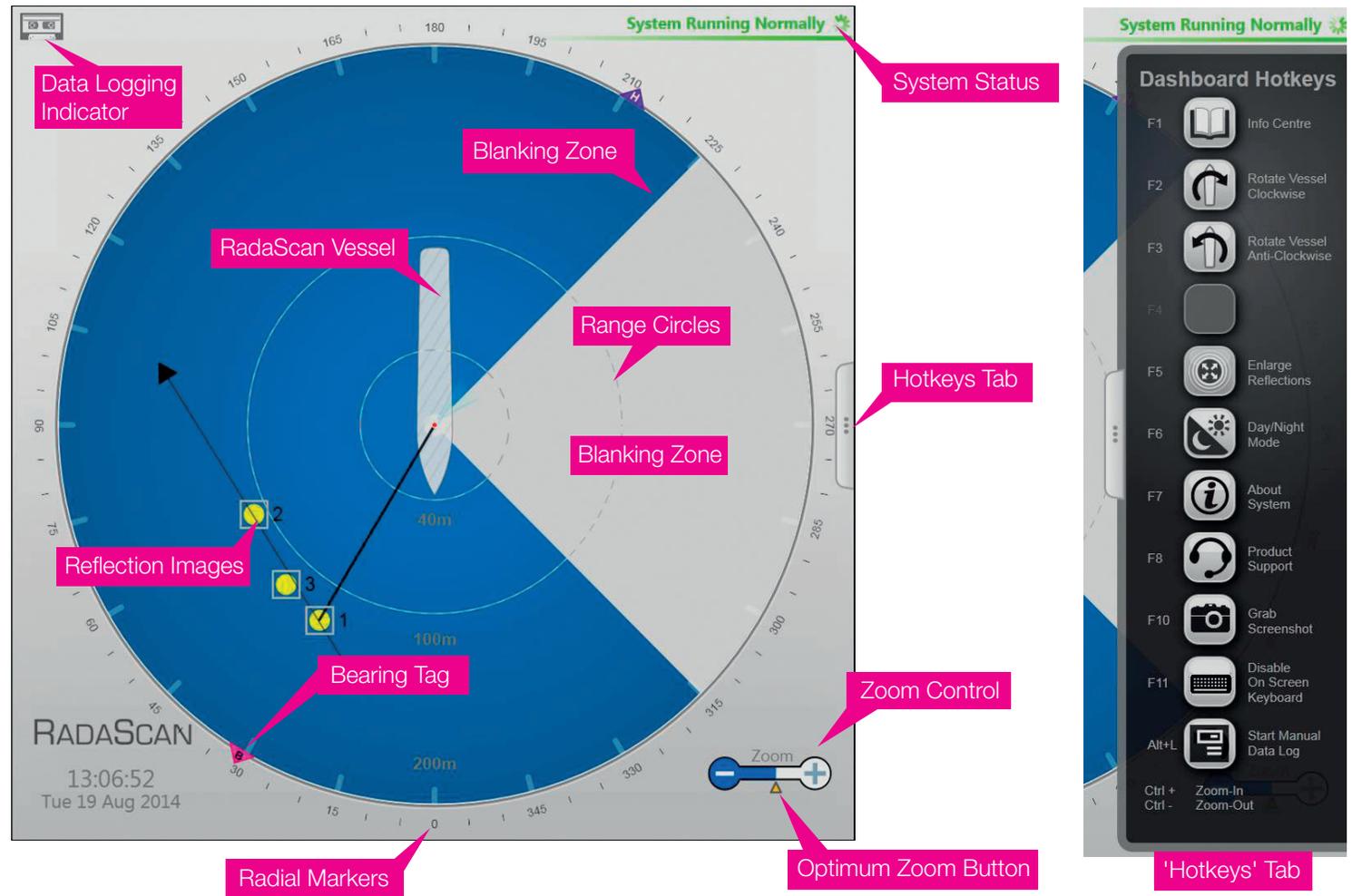
The Blanking Zone is a sector within each revolution of the sensor, from which any received signals are ignored. It is typically set to correspond to the area in which the beam would strike portions of the vessel structure. The blanking zone can be adjusted to suit different situations (see [Blanking Zones](#) on page 21).

### Range Circles

The Range Circles act as a visual guide to show the distance between the RadaScan vessel and the detected reflections. Distances are shown in metres from the RadaScan sensor. Use the Zoom Control to change the scale of the display. (See page 12).

### Radial Markers

These form an angular scale in degrees, clockwise around the circumference of the BEV. Zero is defined by the bow of the vessel, or by a line between the primary and secondary targets, or by a manual alignment of vessel heading, depending upon the selected tracking mode, DP format and display coordinates.



# Screen Layout (Continued)

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## Reflection Images

Reflections received by the sensor are displayed as yellow circles. For tracking you must select the reflection(s) that correspond to the physical target(s) to be used. During multi-target tracking, grey boxes are drawn around the selected reflections to indicate a strong association with the target (i.e. the system is receiving good data and is confident of the target position). A red box appears around a selected reflection during tracking if the system has lost sight of the target, or there is insufficient data being received to use it for tracking.

## Bearing and Heading Tags

These are displayed on the Radial Marker when the system is in tracking mode, to indicate the bearing of the primary (or only) target and the vessel's heading. The visibility of these two elements depends on the DP format selected and which coordinate system is being used to display the positional information (see [Positional Display Modes](#) on page 28).

## Data Logging Indicator

This symbol is displayed when data is being logged to disk. During a tracking operation the symbol is steady and when manual logging is in progress it flashes.

## Zoom Control

Click on the left-hand side of the control (marked '-') to zoom out of the display and on the right-hand side ('+') to zoom in. Click on the yellow triangular Optimum Zoom button to ensure appropriate scaling of the BEV for the longest range reflection.

## System Status

This consists of two fields:

### Primary

The primary part of the status display is in the upper-right corner of the Main Pane. It indicates the current status of the system (running, suspended or error).

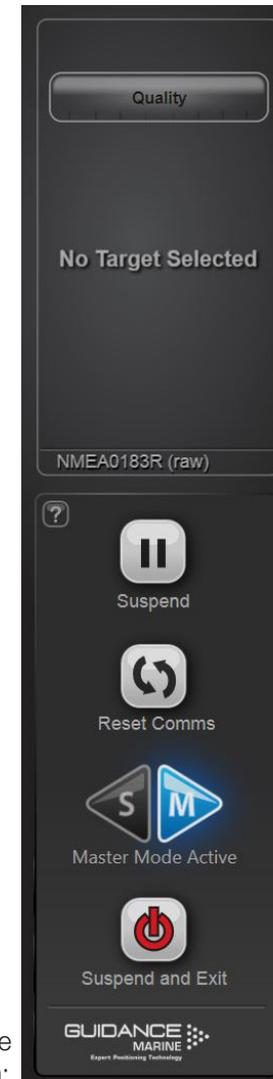
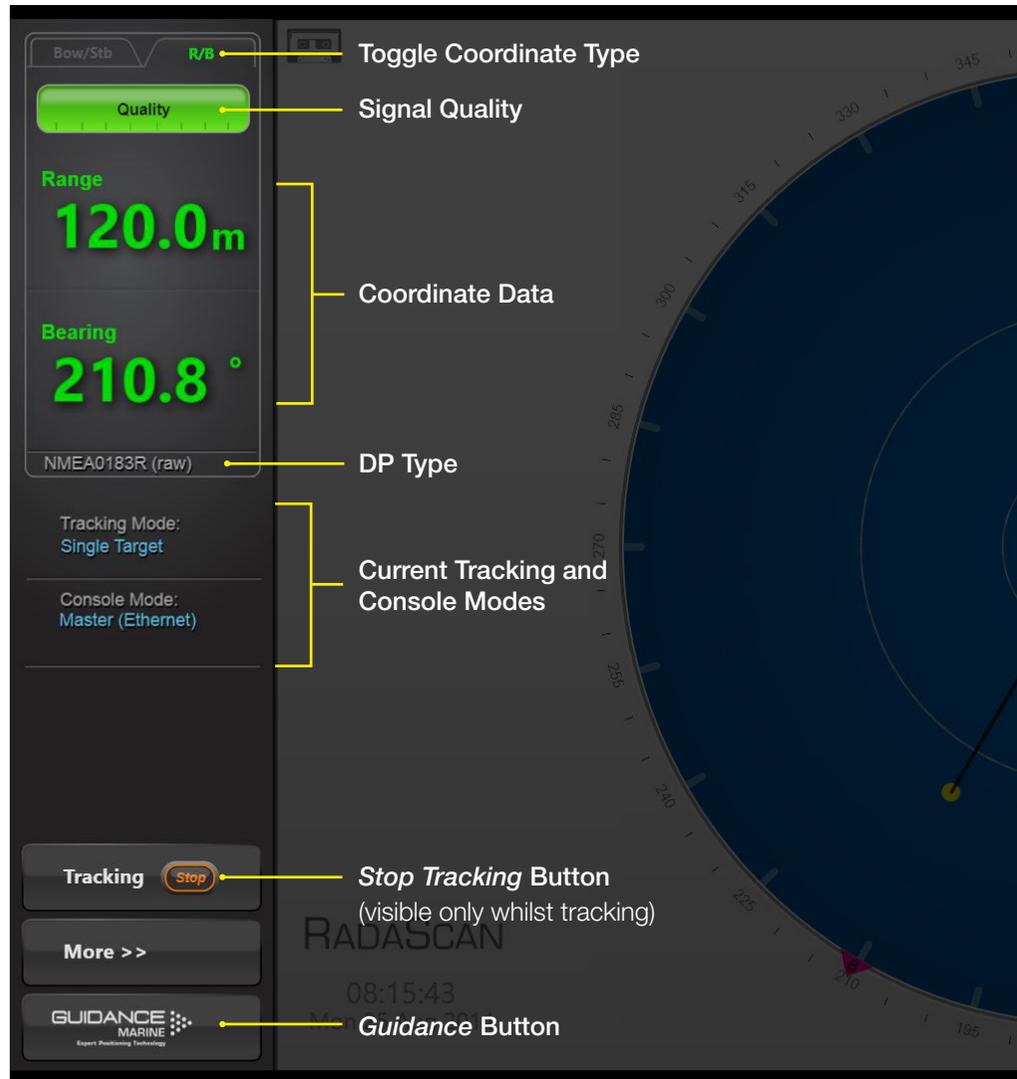
### Secondary

The secondary status display is located in the lower right corner of the Main Pane (beneath the zoom function) and is normally hidden. It displays a flashing message for a number of seconds in order to confirm an action taken by the user, e.g. starting manual data logging or activating a server access code. It can also display a persistent, static message if there is a communications problem.

# Screen Layout (Continued)

## Side Bar

The Side Bar, the black pane to the left of the BEV, contains control and display components in addition to the coordinates pane.

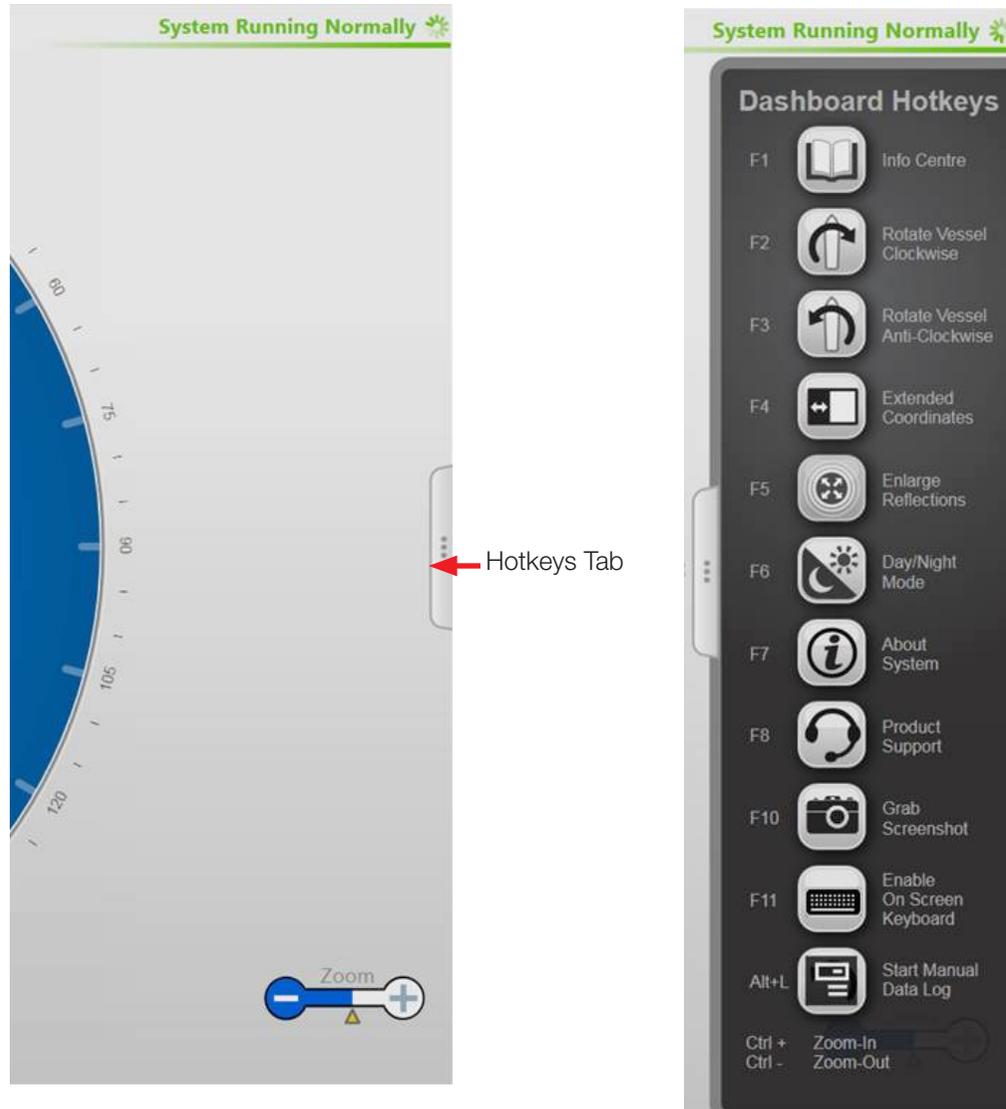


After pressing the Guidance button:

# Screen Layout (Continued)

## Hotkey Buttons

Selecting the Hotkeys tab on the right-hand side of the Bird's Eye View (BEV) activates the 'Dashboard Hotkeys' menu.



The following keys - and the corresponding buttons on the **Dashboard Hotkeys** menu - act as shortcuts to application functions.

- F1** Help Menu
- F2** Rotates the vessel clockwise
- F3** Rotates the vessel counter-clockwise
- F4** Toggles between the default coordinate display and the extended coordinate display
- F5** Toggles between enlarged and standard-sized reflections
- F6** Toggles between the day view and night view
- F7** Toggles between the **About System** pane and the full BEV display
- F8** Toggles between the **Product Support** pane and the full BEV mode
- F10** Takes a snapshot of the screen and stores the image in the file **desktop.bmp**, at the configured location for data logging (defined by the **LogPath** parameter in the **config.ini** file, in the RadaScan Dashboard installation folder).
- F11** Enables or Disables the On Screen Keyboard function.
- Alt+L** Starts or Stops manual data logging
- Ctrl +** Zoom-In
- Ctrl -** Zoom-Out
- Esc** When in operation confirmation mode, cancels the current operation request; in all other modes, brings back the full BEV screen
- Return** When in operation confirmation mode, confirm the current operation request

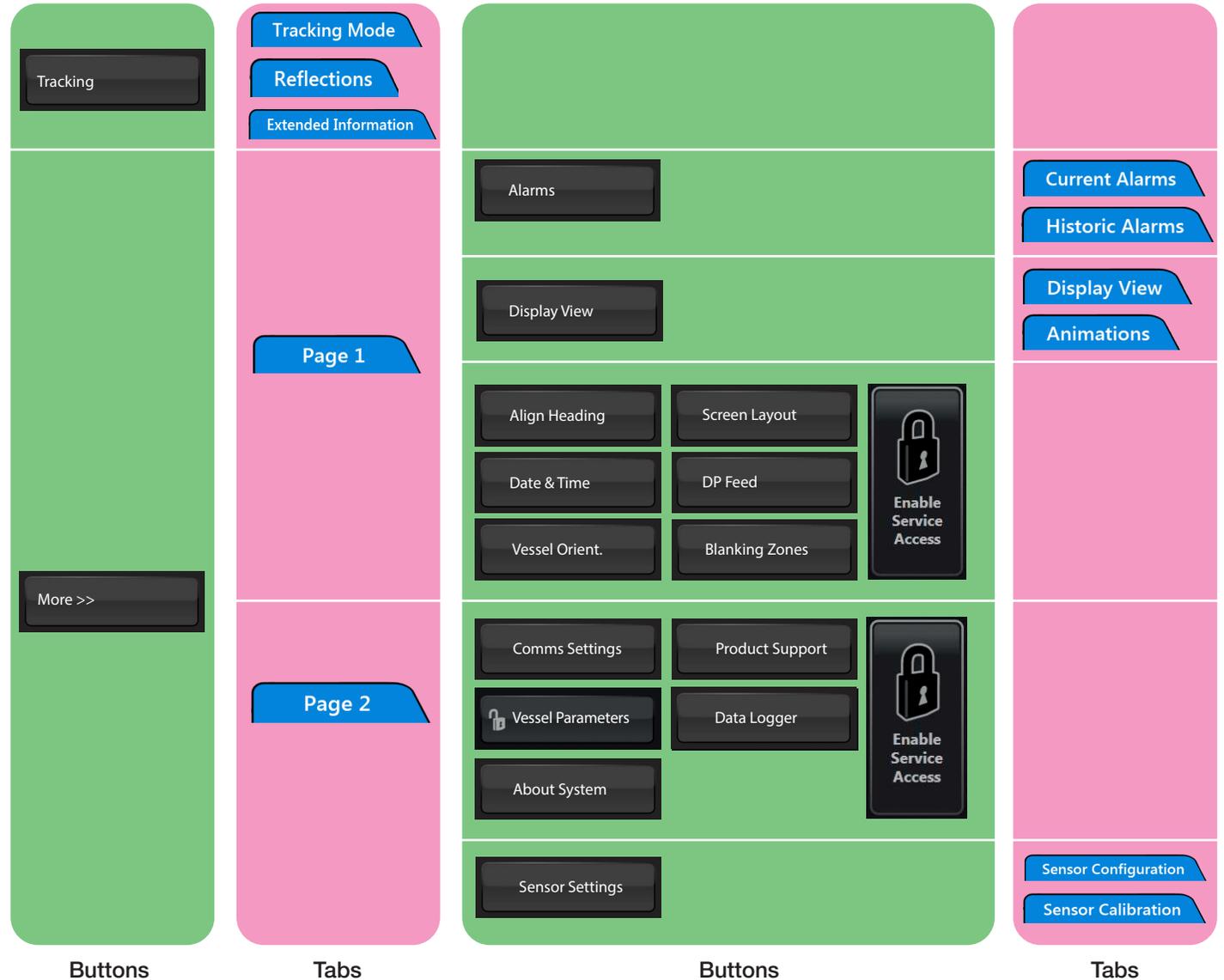
# Screen Layout (Continued)

## Menu Pane

The Menu Pane, located across the bottom of the RadaScan Dashboard Screen, is not always visible. It appears when the Tracking or More >> buttons at the foot of the Side Bar are pressed. This causes the Bird's Eye View (BEV) to contract towards the top of the screen. Clicking the same button for a second time causes the Menu Pane to disappear and the BEV to be restored to full size.

The Menu Pane is used to display a wide variety of information and controls, often accessed by further tabs and buttons that become available once the Menu Pane is in place. The following chart shows the structure of the Menu Pane:

 only available in Service Access mode



# Tracking Information Quality

The RadaScan Sensor rotates anti-clockwise. On each rotation, the sensor emits a radar beam and calculates the position of responder(s) from which it has received a sufficiently strong return signal.

Before tracking has been selected, the Data Quality and Coordinates area in the upper left corner of the screen are grey. After tracking is started, the coordinates are initially displayed in red or amber and the quality bar is partially filled with the same colour.



After a few seconds, as the scanner gathers more information, the colour changes from amber to green and more - or all - of the Quality bar is filled. This indicates that the vessel's position can now be calculated consistently and that the system can reliably track the targets.

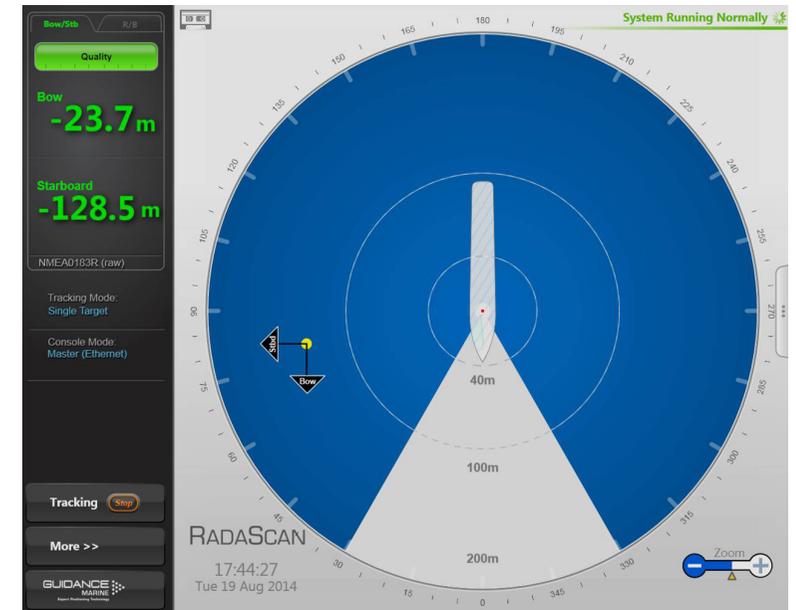
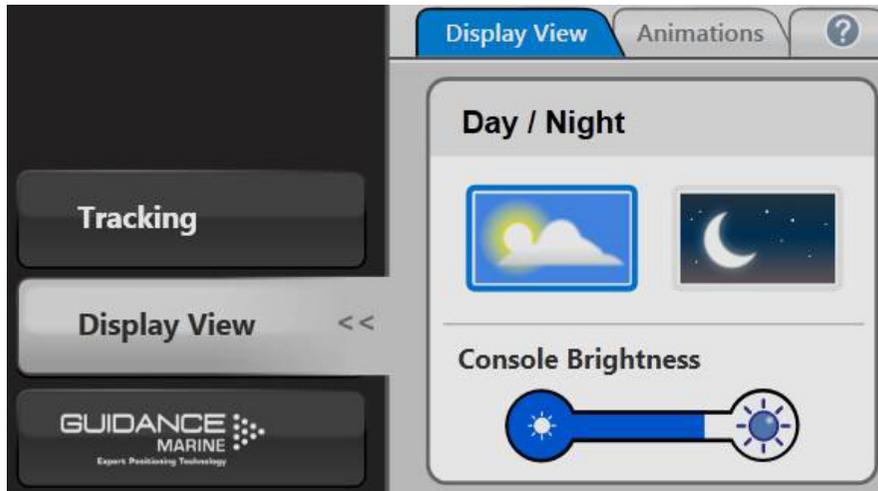
If the responder becomes obscured, e.g. by another vessel, the quality bar diminishes and the colour changes to amber or red. Eventually, the message "Target(s) Lost" may be seen, until the line of sight to the responder is restored.

# Display Views

To provide ample visibility during daytime operation and to limit glare during night shifts, the RadaScan Dashboard offers two display modes: Day View and Night View. In either mode the brightness can be further adjusted by the Console Brightness control.

To change the day/night view and adjust brightness:

1. Click on **More >> Display View** or use the keyboard shortcut **F6** or the **Day/Night Mode** button in the Dashboard Hotkeys panel.
2. Click on the **Day View** or **Night View** symbol.
3. Click on the left side of the **Console Brightness** control to dim the screen and on the right to make it brighter.



Day View



Night View

# Display Views (Continued)

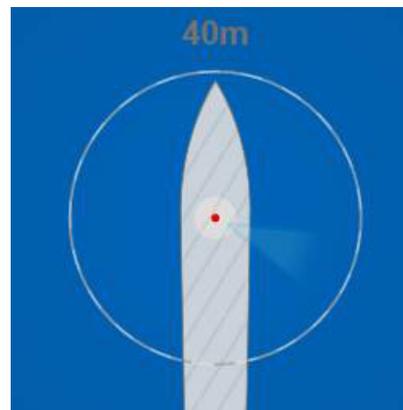
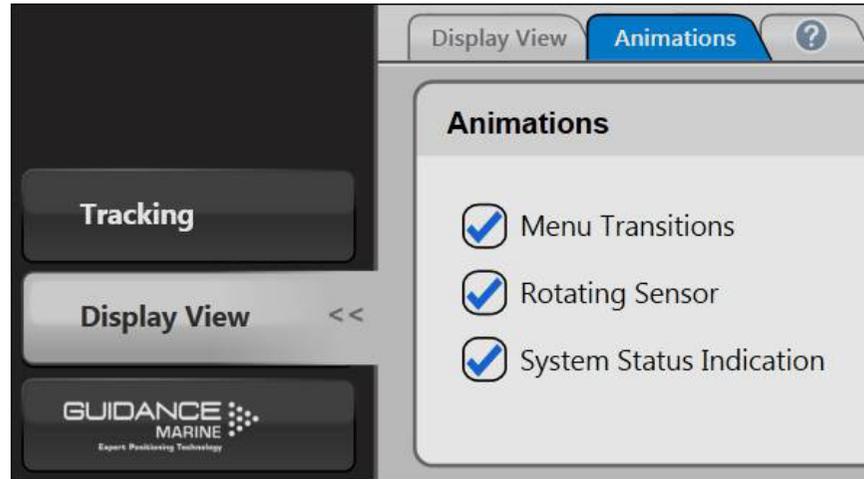
## Animation

The following animated features of the RadaScan Dashboard can be turned on or off as you prefer.

- **Menu Transitions**—these smooth the opening and closing of menu panes and the consequent re-sizing of the BEV.
- **Rotating Sensor**—this circular motion around the centre of the BEV indicates that the sensor is turning, but is not meant to represent the actual rotation speed nor the current direction of the antenna.
- **System Status Indication**—the wheel-like symbol in the upper right corner of the screen which appears to rotate when the system is running normally.

To change the animation settings:

1. Click on **More >> Display View**.
2. Click on the **Animations** tab.
3. Click on the tick boxes to select or deselect each animation feature as required.



Rotating Sensor



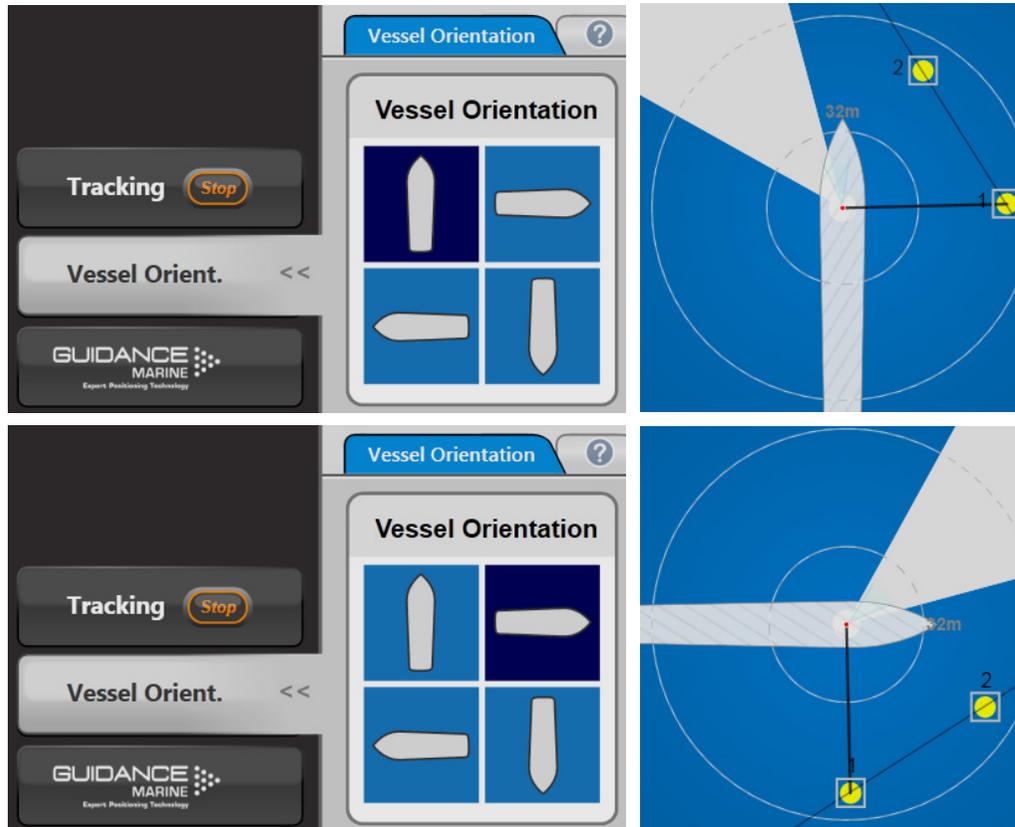
System Status Indication

# Vessel Orientation

The RadaScan Dashboard supports four different layouts of the Bird's Eye View so that the operator can choose the one which best represents his surroundings.

For instance, if the Dashboard screen is facing aft and the operator is therefore facing forward when using it, he would want the bow of the vessel in the BEV to point upwards, so that a target on the starboard side of the vessel is shown on the right-hand side of the BEV.

There are two ways of setting the Vessel Orientation; one just for the current Dashboard session and the other which will apply to all Dashboards in the system and will persist after a Dashboard has been closed and re-opened.



## To set Vessel Orientation for the Current Session:

1. Click on **More >> Vessel Orient**.
2. Click on the vessel outline that points in the required direction.

Alternatively, rotate the vessel clockwise by clicking **F2** or the **Rotate Vessel Clockwise** hotkey. Rotate anti-clockwise by clicking **F3** or the **Rotate Vessel Anti-Clockwise** hotkey.

## To set Default Vessel Orientation:

1. Enter Service Access Mode (see [Entering Service Access Mode](#) on page 44).
2. Navigate to **More >> Page 2 >> Vessel Parameters**.
3. Select required Display Bow Orientation. This will cause the Apply and Cancel buttons to appear at the foot of the Side Bar.
4. Click on the **Apply** (tick) button to confirm.



# Readiness for Tracking

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This section deals with preparing the system and interpreting the information that it displays, prior to target tracking.

It contains the following pages:

- **Blanking Zones** (Page 21)
- **Working with Reflections** (Page 22)

# Blanking Zones

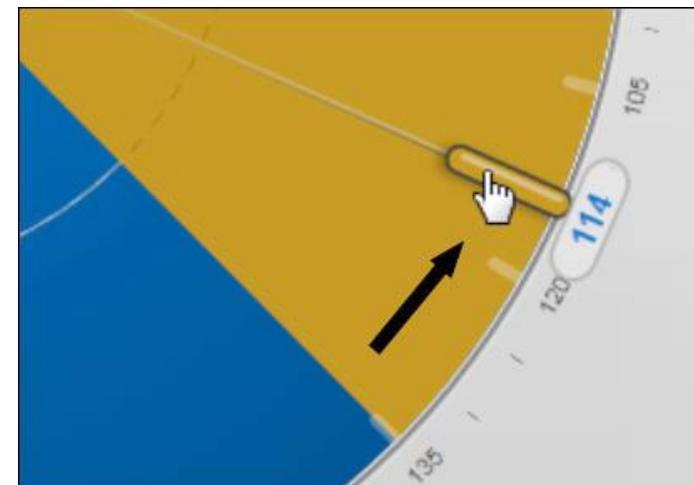
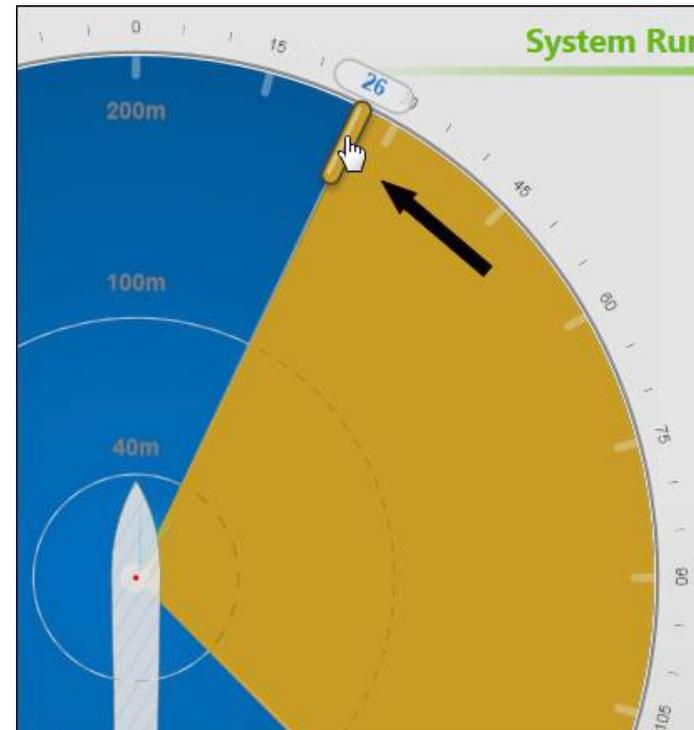
A Blanking Zone can be used to mask the segment of the scan rotation that is obscured by the vessel's superstructure. The start and end of the zone can be set to any positions around the circle to the nearest degree.

Generally, once the blanking zone has been set, it will not need to be changed. However, there may be occasions when it is necessary to adjust the blanking zone, for example if the responder is on the opposite side of the vessel to normal.

**! The option to change the blanking zone is not available whilst target tracking.**

## To Define a Blanking Zone

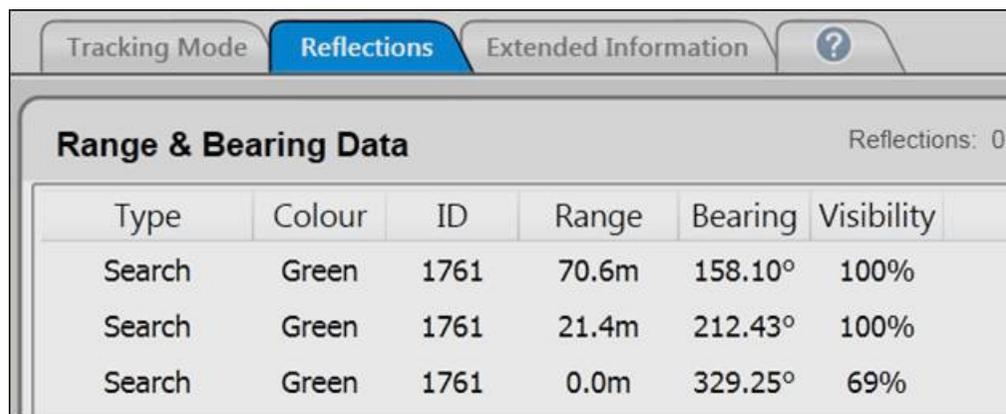
1. Ensure that the Dashboard is in **Master Mode** (See page 39).
2. Enter **Service Access Mode** (See page 44).
3. Click on **More >> Blanking Zones**.
4. Click on **Show Handles**.
5. Click one of the blanking zone handles on the BEV and, holding down the left mouse button, drag to the desired position. Alternatively - on a touchscreen - touch and drag. As the handle is moved, its current position (in degrees clockwise from the vessel bow) is displayed in blue numerals outside the perimeter of the circle.
6. If required, drag the second zone handle in the same way.
7. The Apply-Cancel buttons will have popped up after step 5. Click on the **Apply** button to set the blanking zone, or on **Cancel** to restore the blanking zone to its previous state.



# Working with Reflections

## Detecting Responders

The RadaScan Sensor automatically detects any RadaScan Responders when they come into range. When a responder is first detected, but its position is not yet confirmed, up to three candidate tracks appear on the Reflections pane and on the Extended Information pane, each with a type of **Search**:



The screenshot shows the 'Reflections' tab in the software interface. The 'Range & Bearing Data' table lists three candidate tracks, all with a 'Type' of 'Search' and 'Colour' of 'Green'. The 'ID' for all is '1761'. The 'Range' values are 70.6m, 21.4m, and 0.0m. The 'Bearing' values are 158.10°, 212.43°, and 329.25°. The 'Visibility' values are 100%, 100%, and 69%. The 'Reflections: 0' indicator is visible in the top right corner of the pane.

Type	Colour	ID	Range	Bearing	Visibility
Search	Green	1761	70.6m	158.10°	100%
Search	Green	1761	21.4m	212.43°	100%
Search	Green	1761	0.0m	329.25°	69%

The reflection is not represented on the BEV at this stage.

If the candidate tracks appear repeatedly over a period in excess of 10 seconds, it may be necessary to move the vessel closer to the responder.

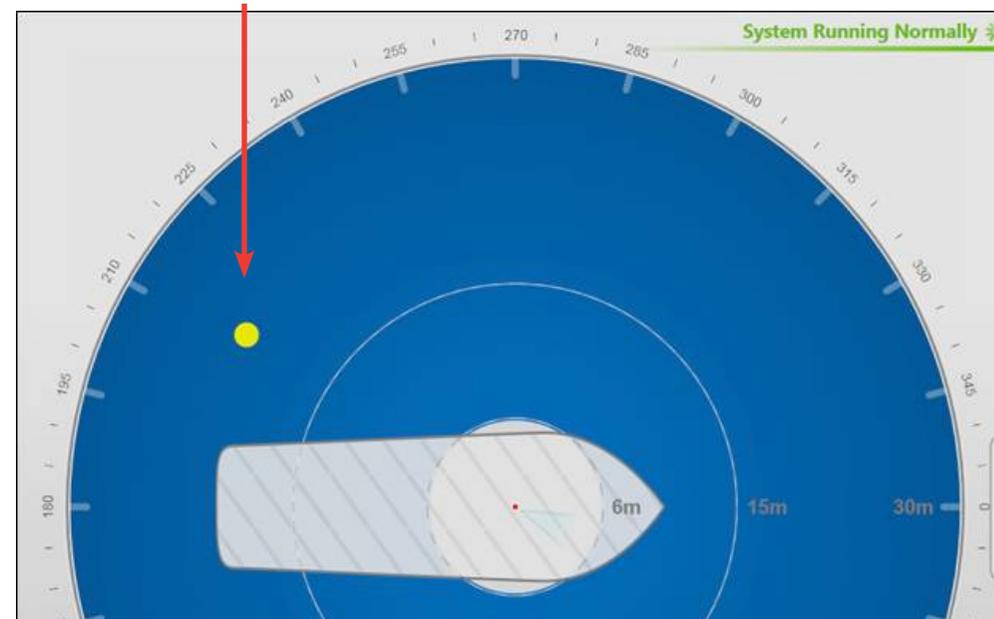
In some cases the responder may need to be re-orientated towards the sensor to give a better signal.

When a responder's position is confirmed, it appears as a yellow circle on the sensor display.

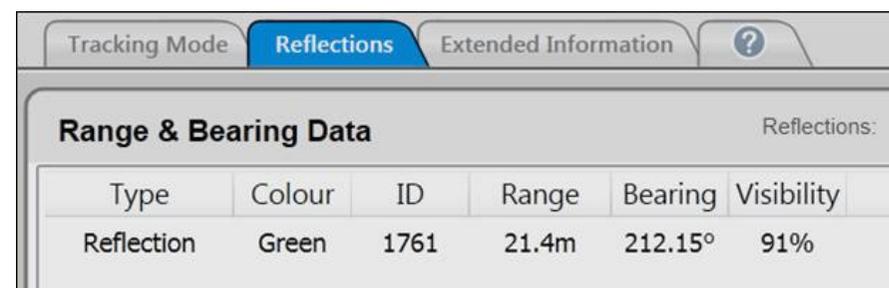
**If a reflection is shown in the reflections tab but is not visible on the sensor display, use the Zoom buttons to adjust the display accordingly.**

(See [Zoom Control](#) on page 12).

### Confirmed responder position.



A confirmed responder is listed as a Reflection on the Reflections pane:



The screenshot shows the 'Reflections' tab in the software interface. The 'Range & Bearing Data' table lists one confirmed responder with a 'Type' of 'Reflection' and 'Colour' of 'Green'. The 'ID' is '1761', the 'Range' is '21.4m', the 'Bearing' is '212.15°', and the 'Visibility' is '91%'. The 'Reflections: 1' indicator is visible in the top right corner of the pane.

Type	Colour	ID	Range	Bearing	Visibility
Reflection	Green	1761	21.4m	212.15°	91%

# Working with Reflections (Continued)

## Reflections Pane

The Reflections pane is obtained by clicking on the **Tracking** button and then on the **Reflections** tab. It displays the following information:

**Type** - Unconfirmed responders are listed as **'Search'**, confirmed responders as **'Reflection'** and rejected responders as **'Reject'**. (see [Detecting Responders](#) on page 22).

**Colour** – Series 2 and Series 3 responders are colour-coded (Red, Yellow, Green or Blue). Responders of different colours use different modulation frequencies which makes it easier for the Radascan system to distinguish between them. If you use more than one responder at once, then for best results make sure that they are of different colours.

**ID** - The unique identification number of the responder.

**Range** - The distance to the responder in metres.

**Bearing** - The bearing of the responder in degrees, clockwise from the bow of the vessel.

**Visibility** - The brightness of the responder in the radar frequency spectrum, as viewed from the sensor.

**Reflections** - The total number of confirmed responder reflections.

**Rev#** - The number of revolutions made by the scanner since it was last switched on or resumed from suspension.

**Internal** - The temperature of the processor board inside the sensor. Typically, this will be 15° higher than the outside temperature.

The screenshot shows the software interface with the 'Reflections' tab selected. The interface includes a sidebar with 'Tracking' and 'More >>' buttons, and a main display area. The main display area is divided into three sections: 'Range & Bearing Data', 'Rotor Status', and a status bar. The 'Range & Bearing Data' section contains a table with two rows of reflection data. The 'Rotor Status' section shows 'Rev #' as 397 and 'Internal' as 35.0°C. The status bar at the top right of the main display area shows 'Reflections: 2 | Rejects: 0'.

Type	Colour	ID	Range	Bearing	Visibility
Reflection	Yellow	2204	115.6m	223.27°	80%
Reflection	Green	3306	107.3m	243.95°	90%

Rotor Status

Rev #	397
Internal	35.0°C

Reflections: 2 | Rejects: 0

# Working with Reflections (Continued)

## Extended Information Pane

The Extended Information pane is obtained by clicking on the **Tracking** button and then on the **Extended Information** tab. In addition to the data on the Reflections pane (except for Visibility), it contains the following fields:

**RCS** – Radar Cross Section: a measure of how detectable the responder is by the sensor (similar to Visibility but more formal).

**SNR** – Signal to Noise Ratio: the strength of the signal being returned by the responder. The higher the number, the stronger is the signal; 20-36 dB is optimal.

**Rejection** – One or more characters representing the reason(s) why a responder is being rejected (for diagnostic purposes and subject to redefinition).

**ID Hits** – The number of times that the sensor extracts the ID number of the responder in a single revolution; another measure of the robustness of the returned signal, where 255 is the maximum hit count.

**Cycles** - How long the system has been tracking the responder, expressed in number of revolutions of the scanner.

## Reset

The system can be reset by suspending and resuming the Dashboard (see [Start Up and Shut Down](#) on page 9).

The screenshot displays the 'Extended Information' tab of the software interface. The main content area is titled 'Extended Reflection Data' and shows a table with the following data:

Type	Colour	ID	Range	Bearing	RCS	SNR	Rejection	ID Hits	Cycles
Reflection	Red	1159	26.3m	187.60°	-6.6dB	29.3dB		255	1395
Reflection	Green	1761	21.5m	212.16°	-10.4dB	29.9dB		255	1433

Reflections: 2 | Rejects: 0

The interface also features a sidebar on the left with a 'Tracking' button and a 'More >>' button. The 'GUIDANCE MARINE' logo is visible at the bottom left of the sidebar.

# Single and Multi-Target Tracking

---

This section describes the two types of target tracking and how to set them up. It is for general guidance only and does not provide an exhaustive explanation of target tracking using the RadaScan system, nor does it form the basis of a contract. Implementation of the material covered in this section will vary according to the type of DP system used in conjunction with the RadaScan system. The use of, or reliance on, anything in this section is therefore entirely at the user's own risk and should only be undertaken after assessment of its accuracy, completeness and suitability for the proposed use.

This section contains the following pages:

- ***Introduction to Single and Multi-Target Tracking*** (Page 26)
- ***Positional Display Modes*** (Page 28)
- ***Selecting Targets for Multi-Target Groups*** (Page 30)
- ***Rotational Offsets*** (Page 33)

# Introduction to Single and Multi-Target Tracking

## Single and Multi-Target Modes

The RadaScan system can operate in two modes—'Single-Target Mode' and 'Multi-Target Mode':

### Single-Target Mode

In Single-Target Mode, only one target is tracked. Single-Target Mode is quick and easy to use, but has the following limitations:

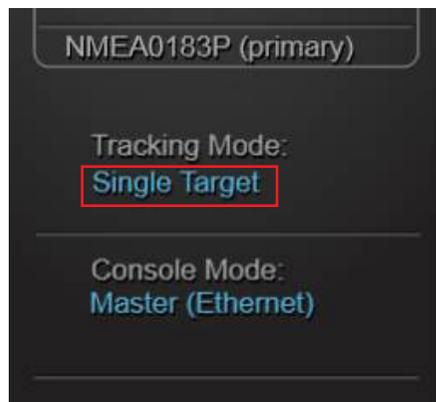
- Tracking stability is affected if the target is temporarily lost, as there is no redundancy.
- Relative vessel heading cannot be reported.

### Multi-Target Mode

In Multi-Target Mode, two targets are tracked. Multi-Target Mode has the following advantages compared to Single-Target Mode:

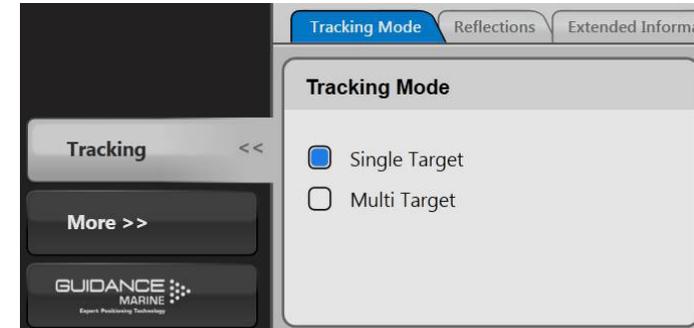
- Improved tracking stability.
- Redundancy allows tracking to continue even if a target is temporarily lost.
- The vessel's heading in relation to the Multi-Target Group can be reported.

The current tracking mode is displayed on the Side Bar:



## To Change Tracking Mode

1. Click on the **Tracking** button.
2. Select one of the options.



## To Start Tracking

### In Single-Target Mode

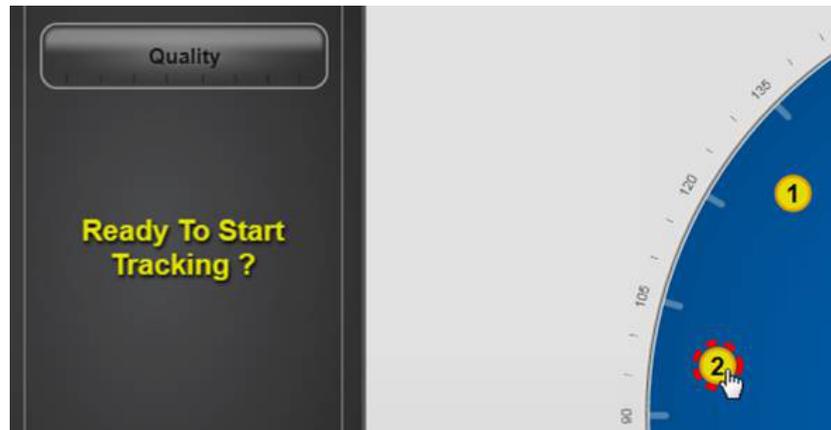
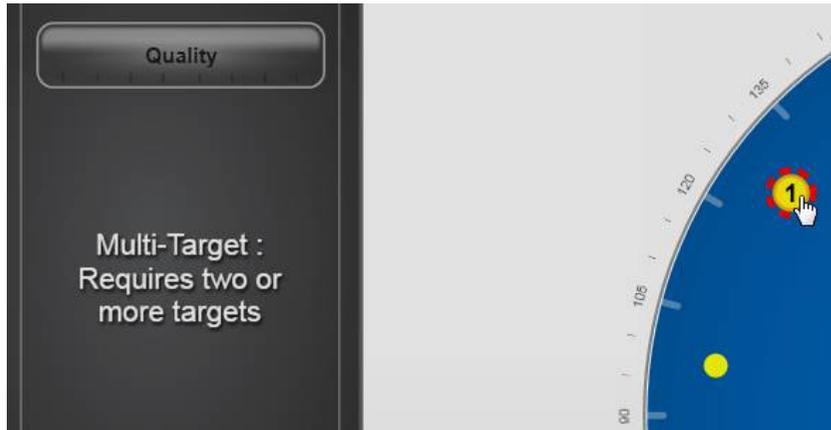
1. Click on the required target reflection on the Bird's Eye View. It changes to the selected state (with the number "1" superimposed) and the message "Ready To Start Tracking?" appears in the Coordinate Data area of the Side Panel.
2. Click on the **Apply** button to confirm and begin tracking.



# Introduction to Single and Multi-Target Tracking (Continued)

## In Multi-Target Mode

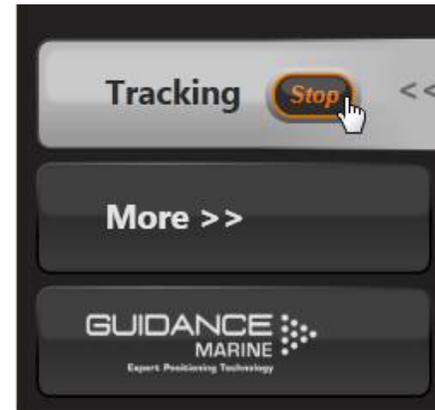
1. Select two target reflections (see [Selecting Targets for Multi-Target Groups](#) on page 30). An ordinal number will be superimposed on each as they are clicked. N.B. Once a target has been selected, it can be deselected by clicking on it a second time.
2. Click on the Apply button to confirm and begin tracking.



## To Stop Tracking

Whilst tracking is in progress, a Stop button is embedded in the Tracking button on the Side Bar.

1. Click on the **Stop** button.
2. Click on the **Apply** button to confirm.



# Positional Display Modes

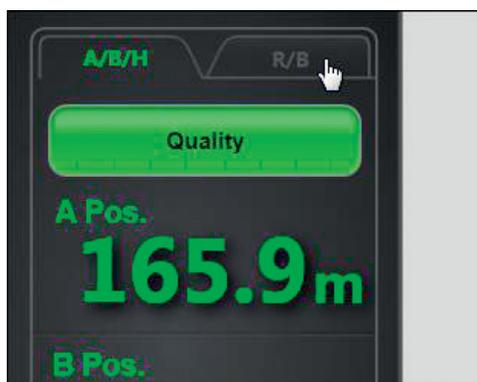
The relative positions of the RadaScan vessel and single or multiple targets can be expressed either as Range and Bearing values, or as 'x' and 'y' positions on a rectangular coordinate frame.

Rectangular coordinates are only available if the DP feed format is set to either NMEA0183P or NMEA0183R.

Range and Bearing data can also be displayed when using these formats, if required.

DP Mode	Tracking Type	Coordinate Axes
NMEA0183P (Primary)	Single-Target	Bow and Starboard Axes
	Multi-Target	
NMEA0183R (Raw)	Single-Target	Bow and Starboard Axes
	Multi-Target	A and B Axes
All other DP modes display Range and Bearing data only.		

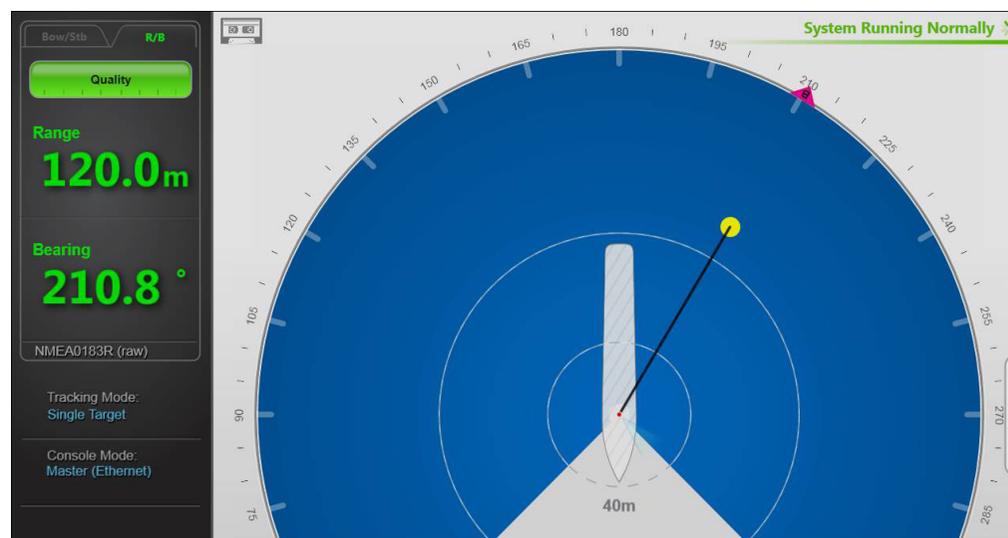
When using a DP message format for which more than one display mode is supported, select the required mode by clicking the appropriate tab above the Data Quality area:



## Range & Bearing

Range and Bearing mode displays the distance and the bearing of the primary (or only) target from the sensor. The radial markers around the outside of the BEV are zeroed in line with the vessel bow and a magenta tag marks the bearing which is the angle of the target clockwise from the bow.

In the case of multi-target tracking, there is also a heading axis. This always passes through the primary target and by default it points through the secondary target, although it can be realigned if required (see [Aligning a Multi-Target Group to a Given Vessel Heading](#) on page 37). A purple tag represents the heading, which is the angle of the vessel bow clockwise from the heading axis.



Bearing and Heading tags

# Positional Display Modes (Continued)

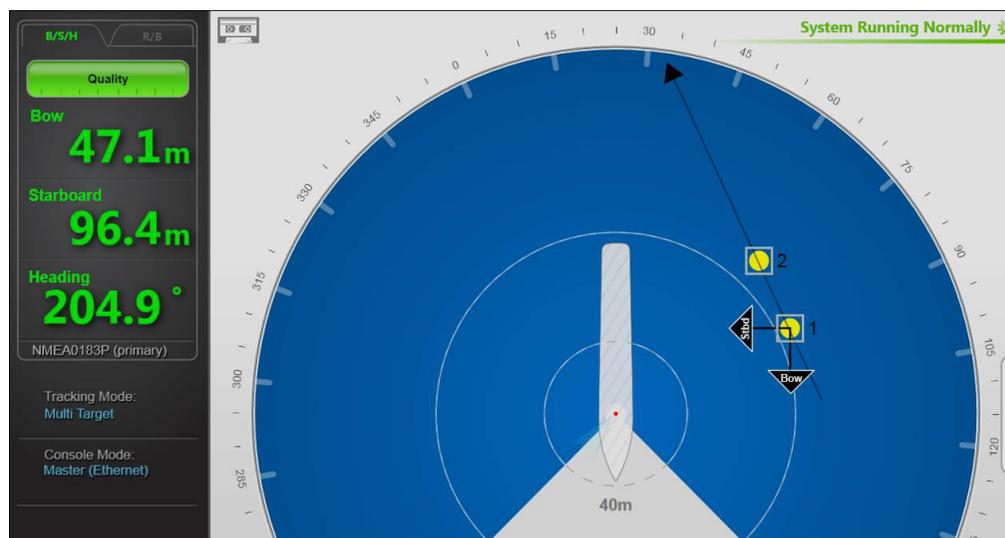
## Bow and Starboard Axes

This mode is available for single-target tracking, and for multi-target tracking where the DP feed messages are sent in **NMEA0183P** (primary) format.

In this mode, the position of the sensor vessel is expressed in metres from the target along Bow (B) and Starboard (S) axes which have their origin at the primary (or only) target. The B and S coordinate axes are always parallel with the vessel's own axes.

For multi-target tracking, the vessel's relative heading is based upon a third axis passing through the primary target. By default, the heading axis is drawn between targets 1 and 2 but can be realigned if required (see [Aligning a Multi-Target Group to a Given Vessel Heading](#) on page 37).

The radial markers around the outside of the BEV are zeroed in the same direction as the heading axis. The purple heading tag is aligned with the vessel bow, at the point on the scale that shows the angle of the bow clockwise from the heading axis



Bow and Starboard Axes

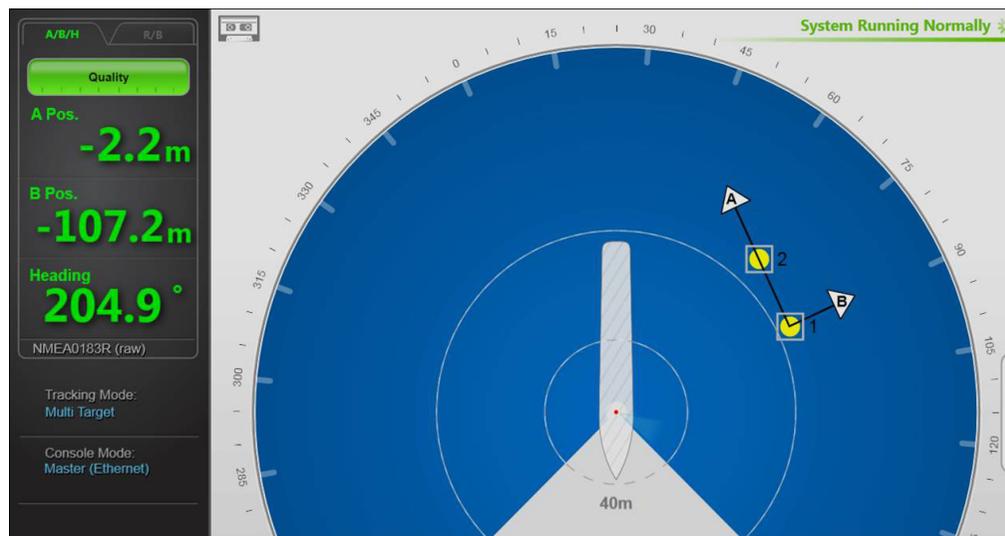
## A and B Axes (A Pos and B Pos)

This mode is only available for multi-target tracking where the DP feed messages are sent in **NMEA0183R** (raw) format.

In this mode, the position of the sensor vessel is expressed in metres from the target along A and B axes which have their origin at the primary target.

The axes are initially aligned with the multi-target group, with the A axis passing through the secondary target. The vessel's relative heading is measured clockwise from the A axis. If required, the axes can be manually realigned to correspond with the DP system or another sensor's coordinate axes (see [Aligning a Multi-Target Group to a Given Vessel Heading](#) on page 37).

The radial markers around the outside of the BEV are zeroed in the same direction as the A axis, which acts as the heading axis. The purple heading tag is aligned with the vessel bow, at the point on the scale that shows the angle of the bow clockwise from the A axis.



A and B Axes

# Selecting Targets for Multi-Target Groups

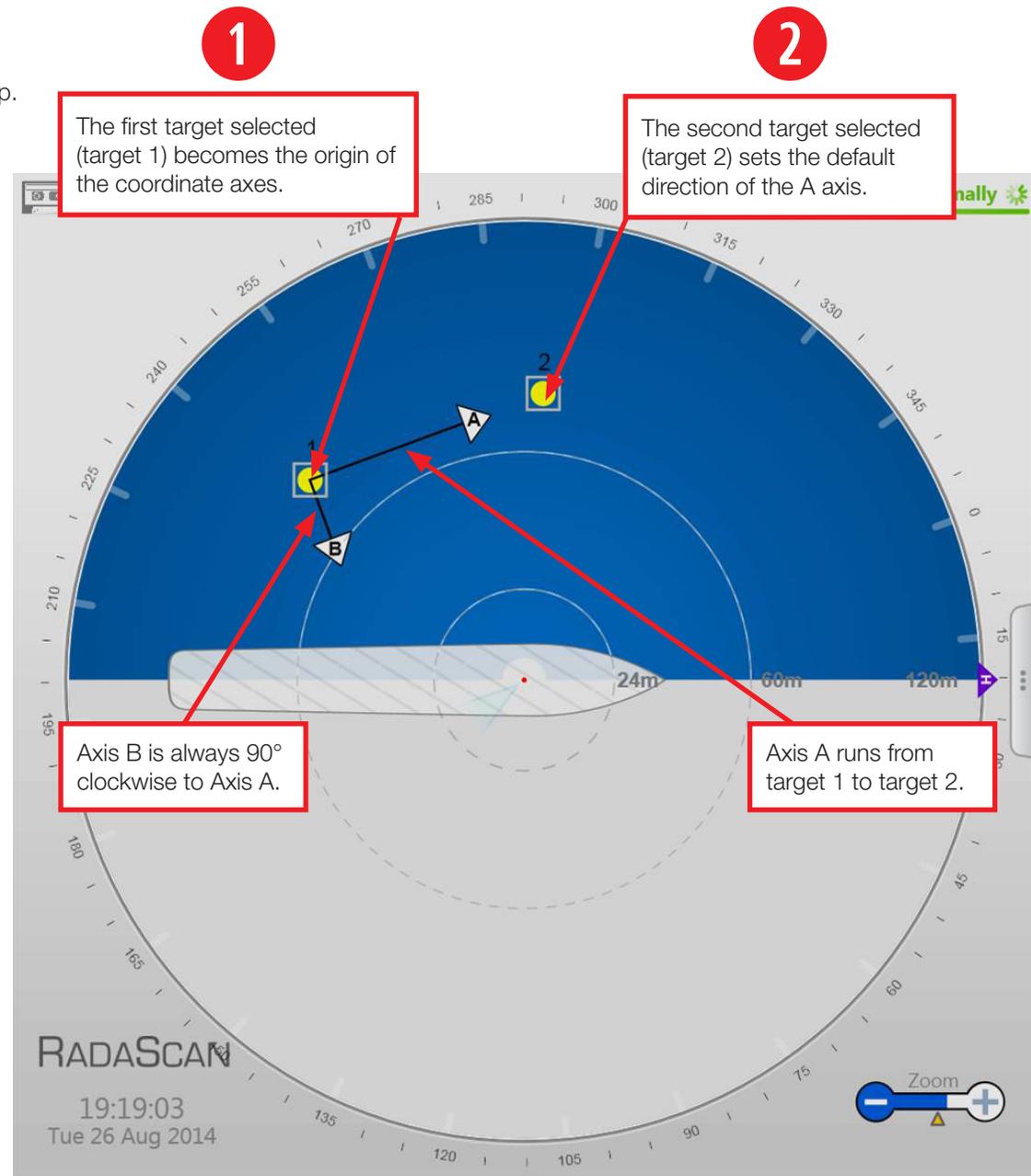
## Target Selection Order

When you select a reflection as a target, make sure that it corresponds to the actual responder that you wish to track. You can select 2 reflections to form a multi-target group.

The first reflection that you select (target 1) becomes the primary target, which forms the origin of the A and B coordinate axes.

The second reflection that you select (target 2) sets the default orientation of the A and B coordinate axes.

**! Do not select targets that are on the edge of a blanking zone.**

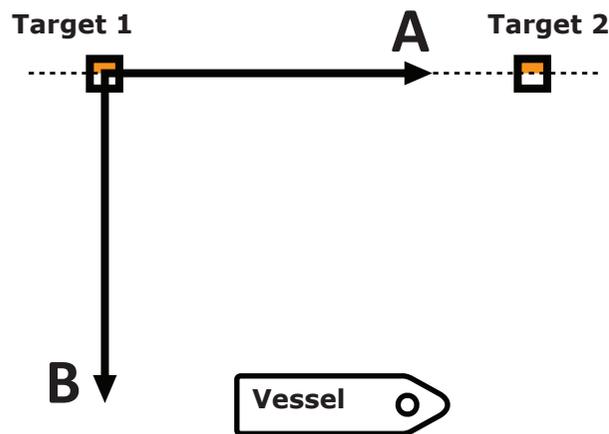


# Selecting Targets for Multi-Target Groups (Continued)

## Target Selection Order and Coordinate Axes Direction

The A and B coordinate axes point in different directions according to the order in which targets 1 and 2 are selected.

By default, axis A runs from target 1 to target 2, and axis B is always drawn 90° clockwise from axis A.



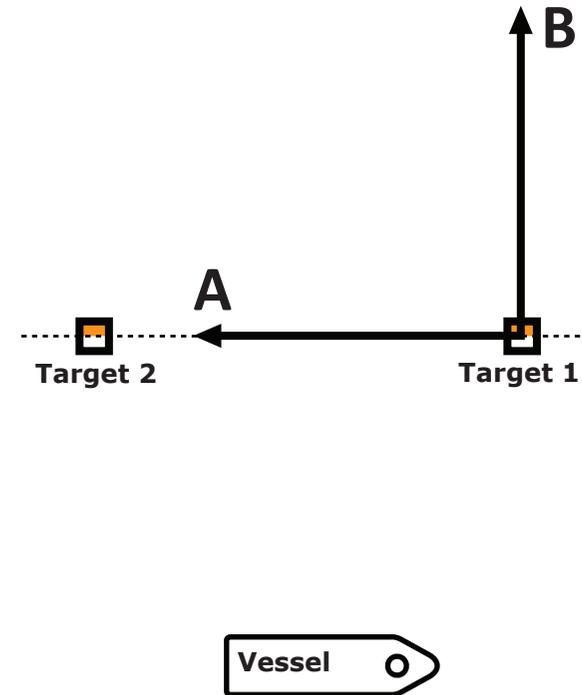
### Target 1 on Left

- Axis A runs from left to right.
- Axis B points towards the RadaScan vessel.

The left-most reflection is selected as target 1 and the right-most reflection as target 2.

Axis A runs from left to right on the display.

Axis B is drawn 90° clockwise from axis A, and points towards the RadaScan vessel on the display.



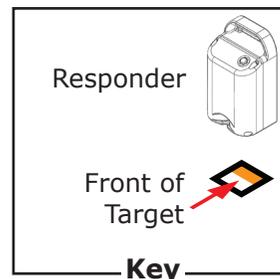
### Target 1 on Right

- Axis A runs from right to left.
- Axis B points away from the RadaScan vessel.

The right-most reflection is selected as target 1 and the left-most reflection as target 2.

Axis A runs from right to left on the display.

Axis B is drawn 90° clockwise from axis A, and points away from the RadaScan vessel on the display.



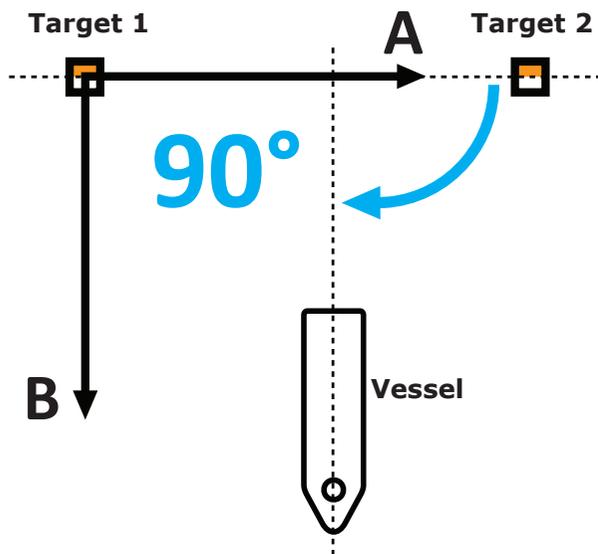
# Selecting Targets for Multi-Target Groups (Continued)

## Vessel Heading

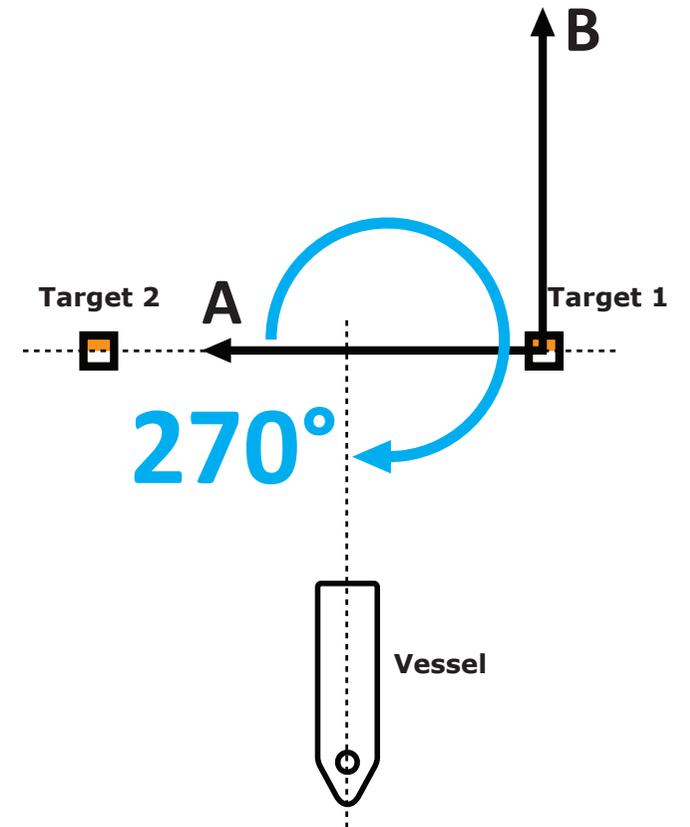
Vessel Heading is measured clockwise from the origin of the A axis to the RadaScan vessel's centre-line. The vessel's relative heading value depends on the orientation of the coordinate axes. Changing the orientation of the A axis also changes the vessel's relative heading.

In the examples below, the vessel's heading relative to the targets remains constant. However, the system measures different heading values according to the different orientation of the A and B coordinate axes.

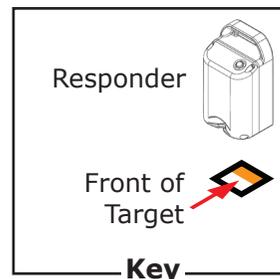
(The reported 'A Pos' and 'B Pos' values will also change, as the coordinate axes from which they are measured have moved.)



Target 1 on Left  
Vessel heading 90°.



Target 1 on Right  
Vessel heading 270°.



# Rotational Offsets

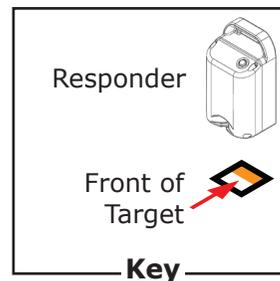
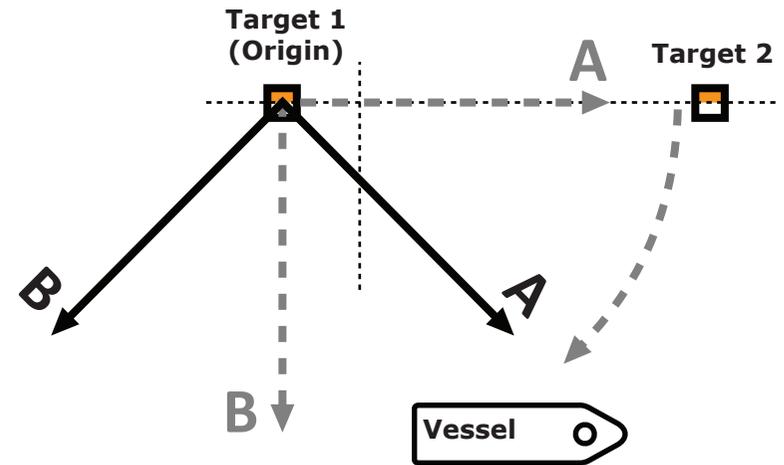
Some DP systems and applications may require the A and B coordinate axes to be rotated to match a different heading. For example, to line-up with the DP System's own co-ordinate axes, the axes of another sensor, the vessel's gyrocompass, or any other heading value.

When the axis orientation is adjusted manually, both the A and B axes are rotated about their origin in the centre of target 1.

Vessel heading is measured in a clockwise direction from the A axis, so changing the orientation of the coordinate axes also changes the vessel's relative heading value.

The orientation of the A and B coordinate axes can be adjusted by aligning the multi-target group to a given vessel heading.

(See [Aligning a Multi-Target Group to a Given Vessel Heading](#) on page 37).



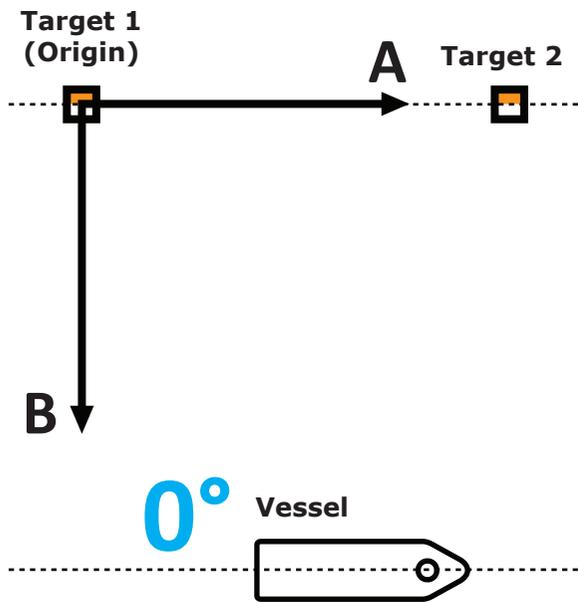
# Rotational Offsets (Continued)

## Axis Orientation and Vessel Heading Examples

In the following examples, the RadaScan vessel's relative heading to the multi-target group remains constant, and the coordinate axes are rotated clockwise about their origin (target 1).

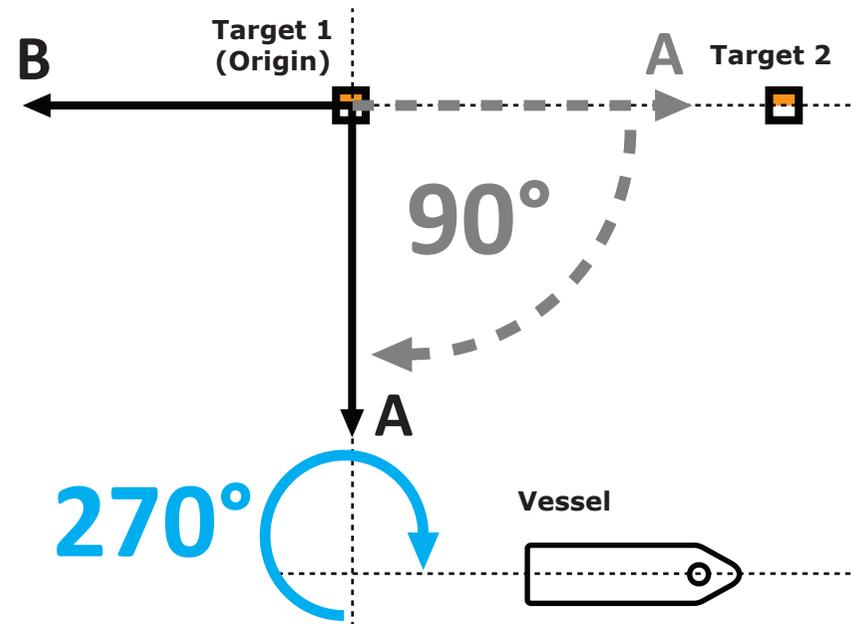
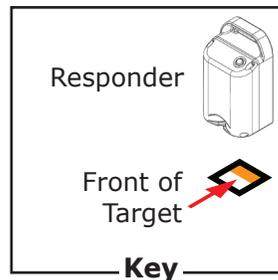
The orientation of the targets with respect to the A axis is measured clockwise from the origin of the A axis to the perpendicular of a line passing through targets 1 and 2.

Vessel Heading is measured clockwise from the A axis to the vessel's centre-line.



### Default position (Target 1 on Left)

- Rotational Offset = 0° (default)
- Vessel Heading = 0° (parallel with A axis).

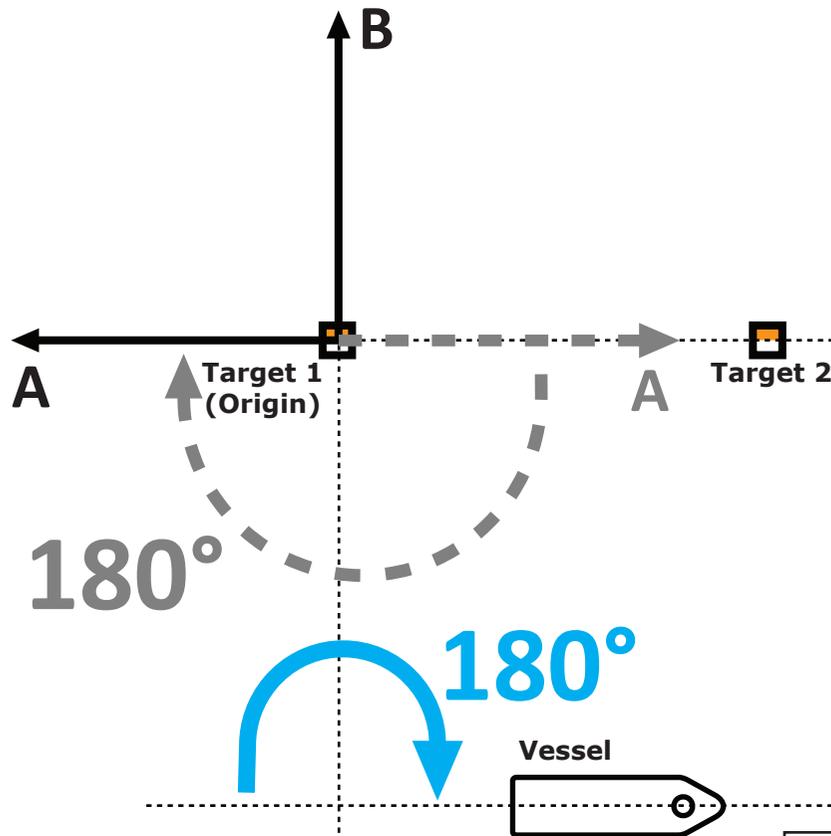


### Coordinate axes rotated 90° clockwise from default position.

- Rotational Offset = 90°
- Vessel Heading = 270°

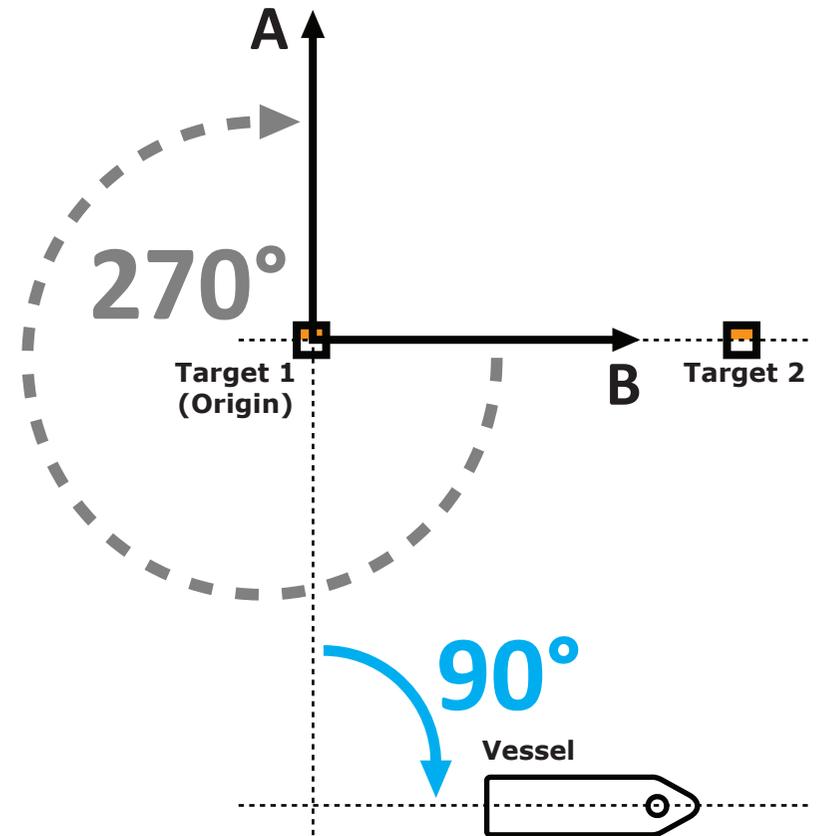
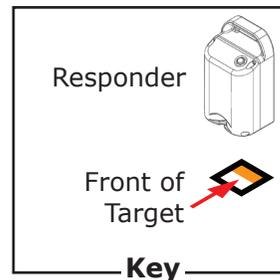
# Rotational Offsets (Continued)

## Axis Orientation and Vessel Heading Examples (Continued)



Coordinate axes rotated 180° clockwise from default position.

- Rotational Offset = 180°
- Vessel Heading = 180° (parallel to A axis)



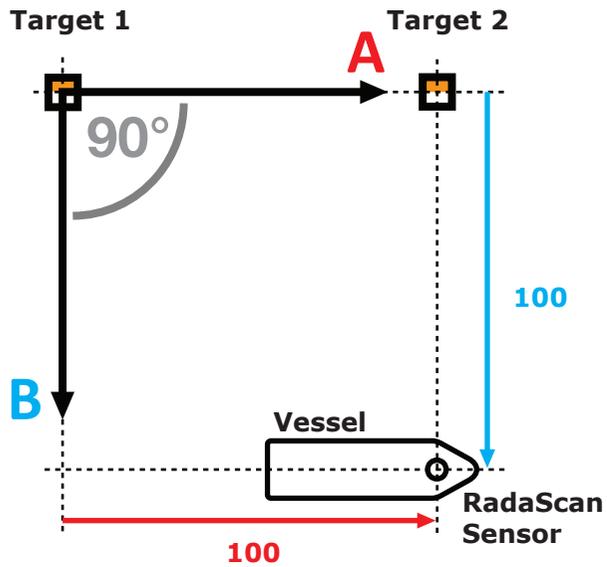
Coordinate axes rotated 270° clockwise from default position.

- Rotational Offset = 270°
- Vessel Heading = 90°

# Rotational Offsets (Continued)

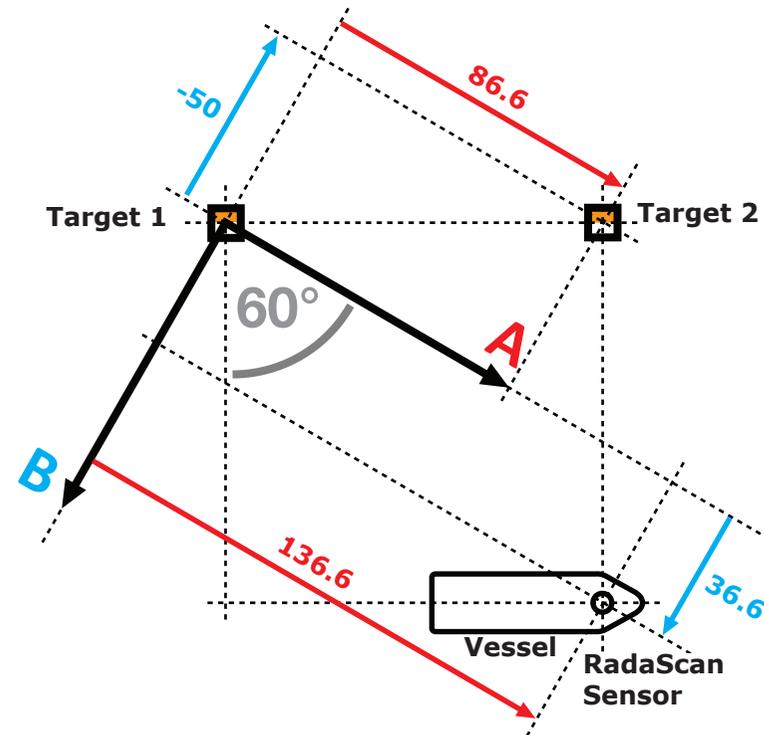
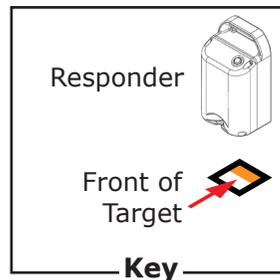
## Axis Orientation and A Pos and B Pos Coordinates

Changes to the orientation of the A and B axes affect the A Pos and B Pos coordinates of the targets and the RadaScan Sensor. In the following examples, the vessel's relative position to the multi-target group remains constant, but the reported 'A Pos' and 'B Pos' values change as the coordinate axes are rotated:



T <sup>a</sup> rget/Sens <sup>o</sup> r	A P <sup>o</sup> s	B P <sup>o</sup> s
Target 1	0	0
Target 2	100	0
RadaScan Sensor	100	100

Target Orientation with respect to Axis A = 90°  
(default 0° offset)



T <sup>a</sup> rget/Sens <sup>o</sup> r	A P <sup>o</sup> s	B P <sup>o</sup> s
Target 1	0	0
Target 2	86.6	-50
RadaScan Sensor	136.6	36.6

Target Orientation with respect to Axis A = 60°  
(manual 30° offset)

# Rotational Offsets (Continued)

## Aligning a Multi-Target Group to a Given Vessel Heading

When you manually align a multi-target group to a given heading, the A and B axes orientation and position coordinates are recalculated so that they correspond with the new vessel heading value.

The heading and position coordinate data sent to the DP system will change instantly when you confirm the new alignment.

You may need to deselect the RadaScan sensor at the DP Console BEFORE commencing this operation.

### To Align a Multi-Target Group to a Given Heading:

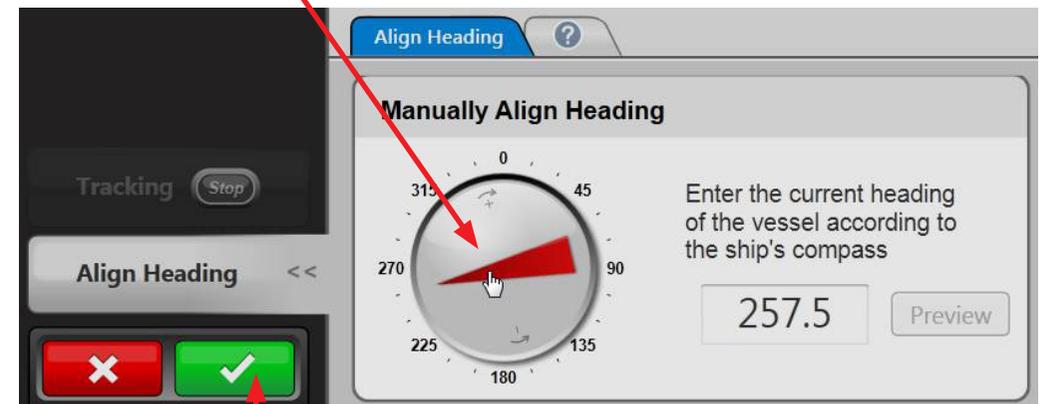
Whilst tracking against a multi-target group:

1. Click on **More >> Align Heading**.
2. Either
  - Click and drag the red compass needle to the required heading
  - Or  
Enter the required heading value in the numerical entry box and click the **Preview** button
  - Or  
Click on the small '+' and '-' arrows for increments/decrements of 0.5°

These actions cause the radial markers around the outside of the BEV to rotate so that the Heading tab indicates the new value, but the A/B/Heading axes are not redrawn until the change takes effect in step 3.

3. Click on the **Apply** button to confirm.

Drag the **compass needle** to the required heading.



Click on the **Apply** button.

# Multi - Dashboard RadaScan Systems

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This section contains the following pages:

- [RadaScan Dashboard - Master Mode](#) (See page 39)
- [RadaScan Dashboard - Slave Mode](#) (See page 40)

# RadaScan Dashboard - Master Mode

---

The RadaScan Dashboard software supports one master dashboard and multiple slave dashboards running simultaneously on the same system.

All control and configuration functions are available in a master dashboard (Service Access is required for some of these). Any changes made to the tracking or sensor-related settings at the master dashboard will be visible on the screens of the slave dashboards. On the other hand, display options such as dashboard Brightness or Zoom level can be set differently on each individual Dashboard, whether it is a master or a slave.

When the master dashboard is used to suspend the RadaScan sensor a message will appear on the screens of the slave dashboards indicating that the system is suspended.

In this state, clicking the RESUME button on any slave Dashboard will automatically make that Dashboard the master dashboard. Clicking EXIT will close the Dashboard application on that individual dashboard only.

If no master Dashboards are open in a RadaScan system, the next one to be opened will default to master mode. Subsequently, new Dashboards will default to slave mode.

## To switch a Dashboard from slave mode to master mode:

1. Click the **Guidance** button.
2. Click the unlit **M** button on the Side Bar.

If there is already a master Dashboard on the system this will automatically switch to slave mode when the current Dashboard is switched to master mode.



# RadaScan Dashboard - Slave Mode

---

The RadaScan Dashboard software supports one master Dashboard and multiple slave Dashboards running simultaneously on the same system.

When the Dashboard is running in slave mode the controls relating to the Dashboard itself will be active, but those relating to the RadaScan sensor will be disabled. Service Access is not available in slave mode.

Slave Dashboards display the same reflections and positional data as the master, but cannot initiate or stop tracking operations.

## To switch a Dashboard from slave mode to master mode:

1. Click the **Guidance** button.
2. Click the unlit **M** button on the Side Bar.



If there is already a master Dashboard on the system this will automatically switch to slave mode when another Dashboard is switched to master mode

## To switch a Dashboard from master mode to slave mode:

1. Click the **Guidance** button.
2. Click the unlit **S** button on the Side Bar.



# Support Information

---

This section contains the following pages:

- [Serial Numbers and Software Versions](#) (Page 42)
- [DP Feed](#) (Page 43)
- [Entering Service Access Mode](#) (Page 44)
- [Data Logging](#) (Page 45)

# Serial Numbers and Software Versions

Serial Numbers and Software Version Numbers are used to identify the hardware configuration and product revision of each RadaScan sensor. They will be requested by Guidance Marine in the event of an application service or support call to the company.

## Product Labels

Part Numbers and Serial Numbers can be found on the product label fixed on the side of the sensor, near the connection panel.

## Software Version Information

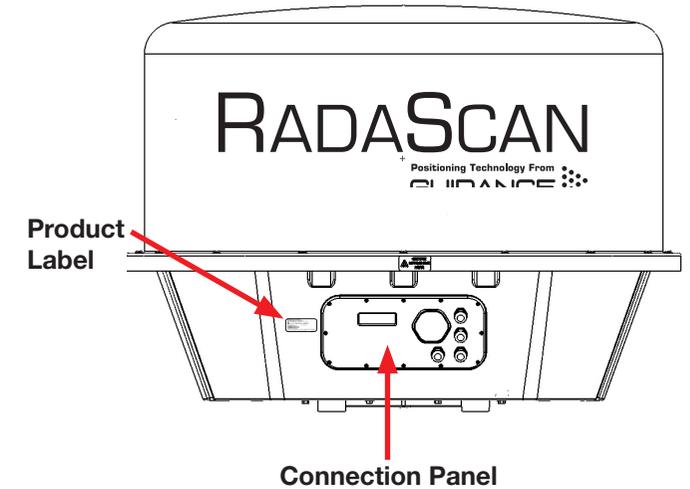
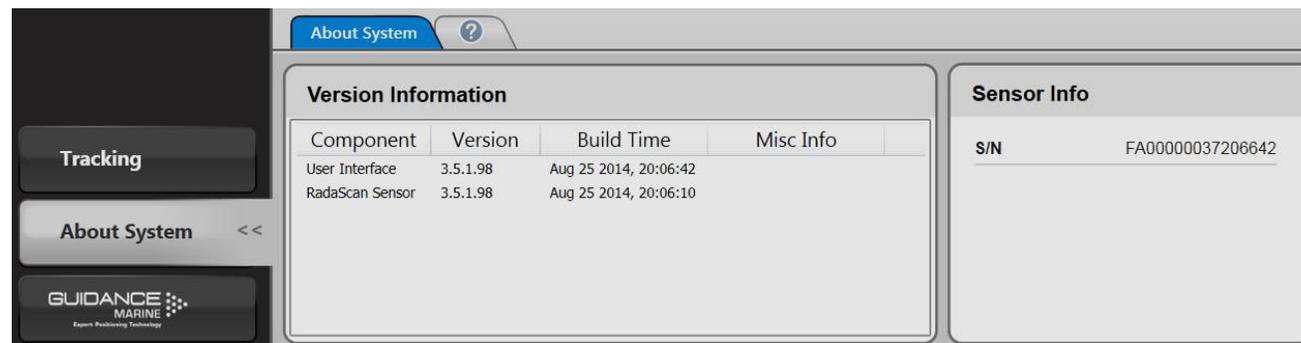
The About System pane provides version information about the Dashboard and the software within the RadaScan sensor. It also contains the serial number of the processor board within the sensor.

The processor board serial number is different from the serial number for the whole sensor shown on the product label. These should not be confused.

## To Display the About System Pane

1. Click on the **More >>** button.
2. Click on the **Page 2** tab.
3. Click on the **About System** button.

Alternatively, click **F7** or the **About System** button via the Hotkey tab.



**RadaScan Sensor  
Part Number**

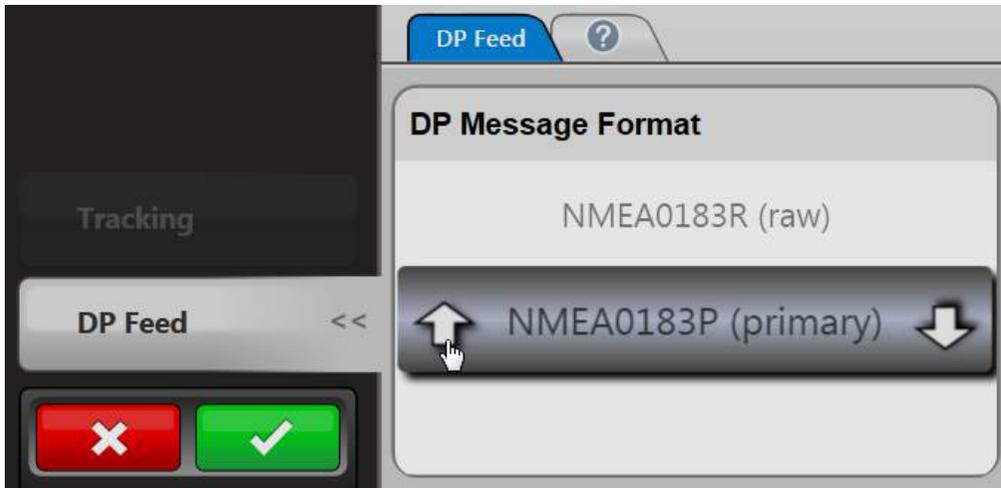
**RadaScan Sensor  
Serial Number**

# DP Feed

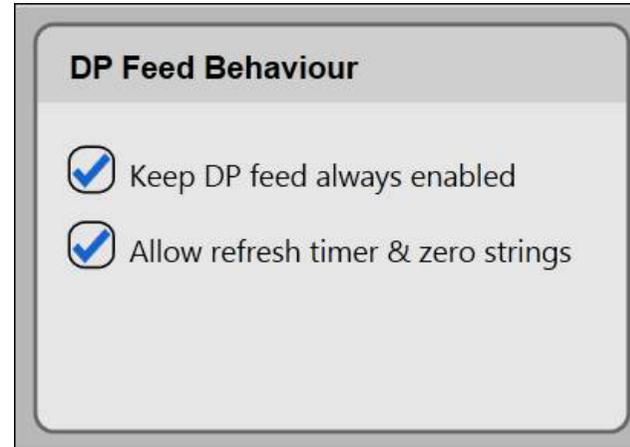
The DP Feed is the data that the RadaScan sensor sends to the vessel's Dynamic Positioning system. Several different data message formats are supported; it is important that the RadaScan and DP systems are both configured to use matching formats.

## Setting DP Message Format

1. Click on **More >> DP Feed**
2. Click on the up or down arrow in order to select the required message format.
3. Click on the **Apply** button to confirm the change.



When the Dashboard is operating in normal access mode with a standard sensor, the DP Message Format can only be changed to one of the two formats shown in the illustration on the left. In Service Access mode, several other formats may be selected and the DP Feed pane also contains controls that determine how the DP output behaves in certain situations.



See document [94-0394-4 RadaScan \(Dashboard\) Installer's Guide](#) for a description of the available DP message formats and the different modes of behaviour.

# Entering Service Access Mode

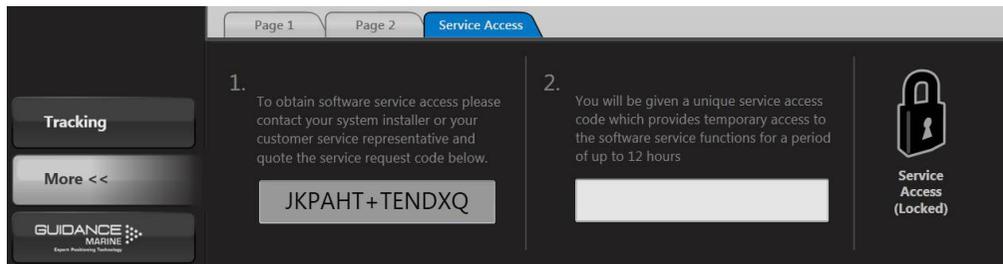
Certain settings within the RadaScan Dashboard can seriously affect system operation if they are incorrectly altered. For this reason they cannot be modified unless you enter Service Access mode.

Service Access mode can be entered either by using a temporary service access code, or by using an engineer USB key.

## To Obtain and Use a Temporary Service Access Code

1. Click on the **More >>** button.
2. Click on the **Enable Service Access** button.

This displays the Service Access pane, which contains a **Service Request Code**.



3. Obtain a **Service Access Code** as follows. Visit the Customer Support page of the Guidance Marine website, follow the link to the Access Code Request form, fill in the Service Request Code and other information and click on the **Send Request** button. Alternatively, email the Service Request Code to Guidance Marine (customerservices@guidance.eu.com) or to an authorised customer service representative.

4. The Service Access Code will be displayed on the screen and/or emailed to you. This code is non-transferable and will operate only with the current Dashboard system for a limited period.

5. Enter the Service Access Code into the blank field on the Service Access pane and click on the **Service Access (Locked)** button.

The system will enter Service Access mode, which will be available for the next 12 hours. After 20 minutes it will automatically revert to normal access mode.

6. In order to turn on Service Access mode for another 20 minute period before the 12 hour code expires, click on the **Enable Service Access** button.

7. If you finish using Service Access before the end of a 20 minute period, click on the **Relinquish Service Access** button, followed by **1) Relinquish Temporarily** or **2) Relinquish Irrevocably**.

When Temporary Service Access is enabled, the Relinquish Service Access button on the Menu Pane shows an open padlock symbol with a red-coloured keyhole. Any button that can only be used in Service Access mode, is now enabled and contains a small open padlock symbol.

## Using an Engineer USB Key

To enter Service Access mode, either start the RadaScan Dashboard with the engineer USB key already plugged into an available USB port on the Dashboard computer, or connect the USB key and click on the **More >> Enable Service Access** button.

When USB Service Access is enabled, the More>> Menu Pane contains an inactive USB Service Access button showing an open padlock symbol with a grey keyhole.

The only way to relinquish USB Service Access is to close down the RadaScan Dashboard. Ensure you restart the Dashboard without the USB key in order to return to normal access mode.



# Data Logging

During tracking, the system automatically generates a set of operation logs that can be analysed by a service engineer to diagnose any system faults. Logging can also be started manually, when the system is not tracking (see below).

When logging is in progress, the following symbol is displayed in the top left-hand corner of the main pane. In the case of manual logging, the symbol flashes.



By default, logs are written to the **C:\Logs\RadaScan** directory. Sub-folders within this directory are named according to the time period that they cover.

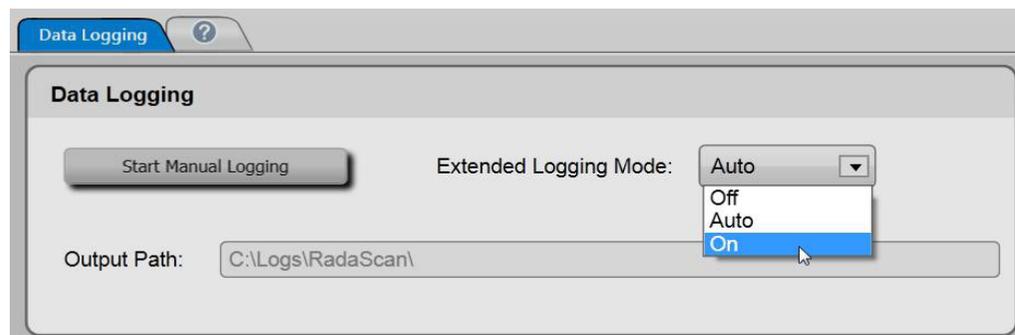
Logs can be copied manually and e-mailed to Guidance Marine (**customerservices@guidance.eu.com**) or your DP supplier in the event of a problem.

## Extended Logging Mode

You can configure the amount of information that is recorded in the logs. Extended data can be excluded (to save disk space) by setting Extended Logging Mode to 'Off' or included by setting it to 'On'. By default, Extended Logging Mode is 'Auto', which means that the system automatically retains the extended data if it is likely to be of interest (e.g. the vessel is moving towards or away from the responders) but otherwise does not retain it (during periods when the vessel is stationary and the data is not changing significantly).

### To set Extended Logging Mode

1. Stop any tracking or manual logging that is in progress.
2. Enter Service Access Mode (see [Entering Service Access Mode](#) on page 44).
3. Navigate to **More >> Page 2 >> Data Logger**.
4. Select the required mode.



## Starting and Stopping Manual Logging

### To start manual logging:

Either

1. Navigate to **More >> Page 2 >> Data Logger**
2. Click on the **Start Manual Logging** button.

Or

Press **Alt+L**.

Or

1. Click the **Hotkeys tab**.
2. Click the **Start Manual Data Log** button

### To stop manual logging:

Either

1. Navigate to **More >> Page 2 >> Data Logger**.
2. Click on the **Stop Manual Logging** button.

Or

Press **Alt+L**.

Or

1. Click the **Hotkeys tab**.
2. Click the **Stop Manual Data Log** button

Or

Click on the flashing cassette symbol.

# Data Logging (continued)

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## Taking Screenshots

The Screenshot option records every detail of the current screen and stores it as a bitmap image. Screenshots can be analysed by a service engineer or e-mailed to Guidance Marine in the same way as log files.

The screenshot is stored in the file **desktop.bmp**, in the same directory as the log files. If a desktop.bmp file already exists, it is overwritten.

### To take a screen shot:

Either

1. Click on the **Hotkeys tab**.
2. Click on **Grab Screenshot**.

Or

Press the **F10** key.



The Grab Screenshot and Start Manual Data Log buttons

# Appendices

---

This section contains the following appendices:

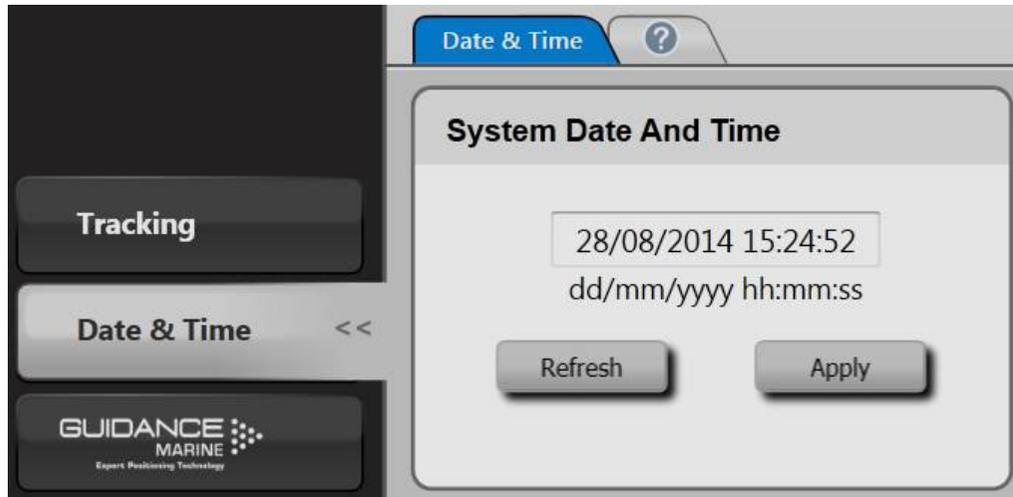
- ***Setting the Date and Time*** (Page 48)
- ***Using the On-Screen Keyboard*** (Page 49)
- ***Working with Alarms*** (Page 50)
- ***International Standards Compliance*** (Page 52)
- ***System Specifications*** (Page 53)
- ***Low Temperature Start Up*** (Page 54)
- ***Index*** (Page 55)

# Setting the Date and Time

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To set the System Date and Time

1. Click on **More >> Date & Time** in order to open the Date & Time pane:



The system's current date and time is displayed as a static value; the **Refresh** button can be used to update this.

2. Amend the contents of the date and time box and click **Apply**.
3. Click on the **Apply** (tick) button to confirm (the new setting will not take effect until you do this).

# Using the On-Screen Keyboard

The RadaScan Dashboard provides an On-Screen Keyboard (OSK), which allows text to be input using only a trackball pointer or touch screen.

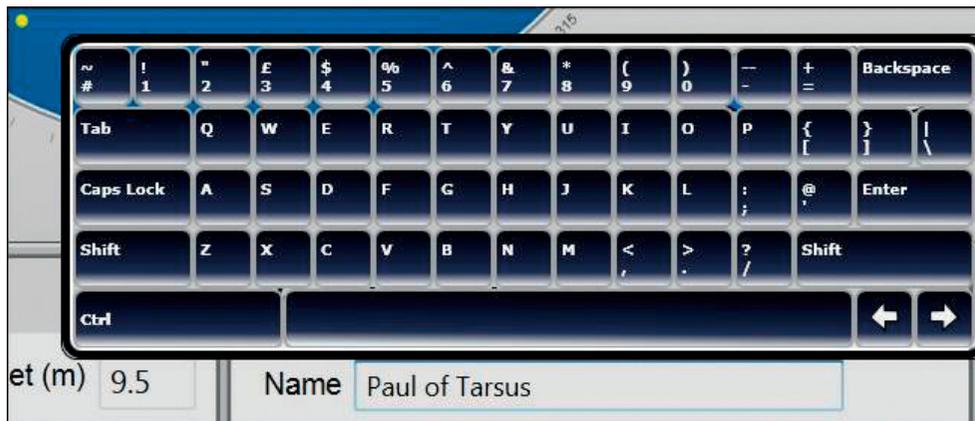
## To enable the on-screen keyboard

If, during installation, you indicated that the Dashboard would be used with a touch screen, the OSK will already be enabled.

Otherwise, the OSK can be enabled and disabled by clicking **F11** or by clicking the **Hotkeys** tab and **Enable On Screen Keyboard/Disable On Screen Keyboard**.

## To use the on-screen keyboard

Simply click on any text entry field and the OSK will pop-up ready for use:



Click on the necessary keys on the on-screen keyboard using your mouse or by tapping the touch screen.

In the case of a numerical field, the OSK is restricted to the appropriate keys:

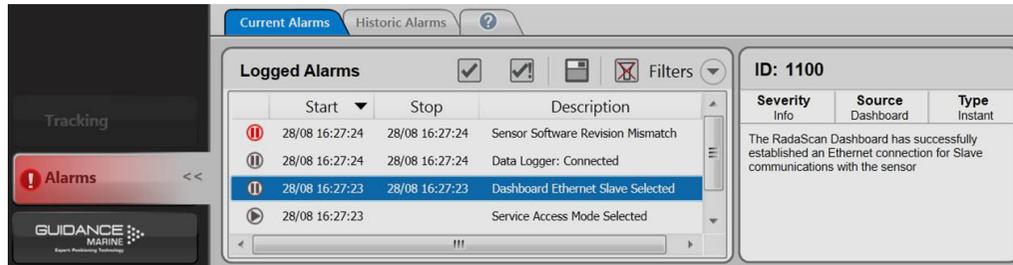


When you have finished using the OSK, click on a different part of the screen and the OSK will disappear.

# Working with Alarms

During operation, the RadaScan system produces an audit trail of event messages. These range in increasing order of severity from: Information, Warning, and Error to Fatal. As these alarms are raised, the Dashboard lists them within the Alarms pane.

Click on any alarm to display details about it in the right-hand section of the Alarm pane:



The severity and current state of an alarm are reflected in its colour and shape:

- Information—grey symbols
- Warning—orange symbols
- Error—red symbols
- Fatal—red symbols

The arrowhead symbol indicates that an alarm condition is persisting; an alarm in this state will show a Start time but not a Stop time.

The square symbol means that the alarm condition no longer exists, therefore the alarm will show both Start and Stop times.

The pause symbol indicates an instantaneous alarm. In this case, the Start and Stop times are identical.

When an Error or Fatal alarm is raised, the Alarms pane is opened automatically and its Side Bar button is shaded red as in the example above. If the pane is closed and re-opened, the Side Bar button returns to its normal light grey shading.

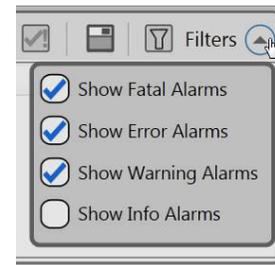
**When a Fatal alarm occurs, communications with the sensor are disabled.**

**In order to return to normal operation, ensure that the fault condition has been cleared, close the Dashboard and re-open. If communications are not re-established, power the sensor off, wait for 20 seconds then power back on.**

## Filtering Alarms

A filter is available to suppress the display of particular alarm types. By default, the filter is activated and causes information messages to be hidden.

Click on the Alarm Filter button to toggle between activated and de-activated . Click on the Filter Selection button to choose which types of alarm are to be filtered out:



A tick means that alarms of the corresponding severity are always viewable in the alarms list. No tick means that alarms of that severity are hidden when the filter is activated.

# Working with Alarms (Continued)

---

## Using the Current and Historic Alarms Tabs

There are two tabs on the Alarms pane, each containing a list of alarms:

- The **Current Alarms** tab displays new alarms (raised since the Dashboard was last opened).
- The **Historic Alarms** tab displays alarms that have been cleared from the Current Alarms tab.

Current alarms are automatically transferred when the Dashboard is closed or when the maximum number of Current Alarms has been reached.

Items on the Current Alarms tab cannot be deleted, they may only be moved to the Historic Alarms tab. Only items on the Historic Alarms tab can be permanently deleted.

### To accept alarms on the Current Alarms Tab

1. Click on **More >> Alarms** and ensure that the **Current Alarms** tab is in focus.
2. Select the alarms that you wish to move into the Historic list:
  - To accept one alarm**—Click on the alarm and click on the ✓ button.
  - To accept all alarms**—Click on the ✓! button.
3. If accepting all alarms, click **Apply** to move these alarms onto the Historic Alarms tab.

**! This will not apply to alarms that have been hidden by the filter mechanism.**

### To clear alarms on the Historic Alarms tab

1. Click on **More >> Alarms** and ensure that the Historic Alarms tab is in focus.
2. Select the alarms to delete:
  - To delete one alarm** – click on the alarm entry and then on the ✕ button.
  - To delete all alarms** – click on the X! button.
3. If deleting all alarms, click **Apply** to confirm.

**! This will not apply to alarms that have been hidden by the filter mechanism.**

### To export an alarms list to a text file

1. Click on the **Export Historic and Current Alarms** button 
2. If required, amend the default path and filename of the alarms file to be written to disk.
3. Click **Apply** to confirm.

# International Standards Compliance

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## RadaScan Transceiver

### European Union

The equipment is permitted to be used in all EU member states without the need for a specific administrative licence.

The RadaScan X-band Transceiver meets the requirements of Directive 2004/108/EC.

The equipment complies with EN 60945:2002.

# C E0191

### Norway

Note that in Norwegian waters a maritime radio licence is required for the use of the RadaScan Dynamic Positioning Sensor.

Please contact Telenor Maritime Radio to obtain a licence:

Telenor Maritime Radio  
Radio Licensing Department  
N-1331 FORNEBU  
NORWAY

Tel: +47 22 77 43 50

Fax: +47 22 42 70 72

Web: [www.maritimradio.no](http://www.maritimradio.no)

### USA

Use of the RadaScan system in the United States of America is authorised by the Federal Communications Commission. FCC ID: **VYMRADASCAN**.



## RadaScan Responders

### EU ATEX Directive 94/9/EC, Annex II, 1.06

RadaScan responders are certified as intrinsically safe and can be used with flammable gases and vapours belonging to gas group IIB. Series 2 responders can be used in zones 1 and 2 and Series 3 responders can be used in zones 0, 1 and 2.



# System Specifications

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Guidance Marine reserves the right to alter or amend this published specification without notice.

## Sensor

Emitter Type:	FMCW (9.2 – 9.3GHz maritime radio-location band).
Operating Range:	10 to 1000 metres.
Range Repeatability:	0.25m (1 $\sigma$ ) up to 600m; 0.5m (1 $\sigma$ ) up to 1000m.
Angular Repeatability:	0.15° (1 $\sigma$ ) up to 600m; 0.2° (1 $\sigma$ ) up to 1000m.
Rotation:	Uni-directional, 1Hz.
Beam Shape:	Divergent.
Close-range Elevation Angle:	+35° at 25m.
Temperature Control:	Thermostatic heating circuit.

## Vessel Interface

Power Requirement:	90-264V AC 45-65Hz. 80W operation, 120W at power-up.
I/O:	Sensor to Dashboard – Ethernet 100Base-T. Sensor to DP – RS422, 9600 baud.
Data Formats:	Compatible with common DP systems using standard or customised message types: NMEA0183R, NMEA0183P, MDL Standard, MDL Multi-Target, Kongsberg Standard, MT Custom, Rolls-Royce Custom.

## Control & Data Display

Operating System:	Windows 7 Embedded.
Software:	Dedicated real-time interactive.
Hardware Options:	Type 2 Marine Processor + 15" TFT monitor. Hatteland Type Approved integrated PC/TFT screen.

## Environmental

Operating Temperature:	-50 to +55°C.
Water and Dust Protection:	IP66 certified.
EMC:	CE and FCC certified.

## Mechanical

Enclosure:	Fibreglass Radome.
Dimensions:	1214mm (Ø), 885mm (h).
Weight:	approx 100kg.
Mounting:	Securing bolt holes in base.

## Responder

Type:	Active
Environmental Use:	CSA responder ATEX certified.
Azimuth Response:	170°.
Elevation Response:	+/-35°.
Power:	Battery or mains.
Battery Life:	12 months fixed cell, 3 weeks rechargeable cell.
Dimensions:	170 x 305 x 128mm (W x H x D).
Weight:	3.8kg (Rechargeable), 3.2kg (Mains/Primary).

# Low Temperature Start Up

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The RadaScan Sensor will operate at temperatures ranging from -50 to +55°C.

When starting at very low temperatures the sensor may require up to 40 minutes to warm up sufficiently to acquire targets.

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