

LightHouse™ OPERATION INSTRUCTIONS

English (en-US)
Date: 06-2017
Document number: 81360-5
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Software changes

The tables in this section describe the main changes that have been made since the last release of the product software.

- **Applicable software version: LightHouse II** — Release 19.
- **Applicable products: a65 / a65 WiFi / a67 / a67 WiFi / a68 / a68 WiFi / a75 / a75 WiFi / a77 / a77 WiFi / a78 / a78 WiFi / a95 / a97 / a98 / a125 / a127 / a128 / e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 / e165 / eS75 / eS77 / eS78 / eS97 / eS98 / eS127 / eS128 / gS95 / gS125 / gS165 / gS195**.

New features

Description	Applicable application	Applicable chapter(s) or section(s)
Added support for M100/M200 cameras	Thermal camera	N/A
Added support for long-hold touch with Digital Switching System switches	Switch panel	N/A
Improved Navionics Dock-to-Dock and SonarChart Live behaviour	Chart	N/A

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Chapter 1: Important information

Warning: Ensure safe navigation

This product is intended only as an aid to navigation and must never be used in preference to sound navigational judgment. Only official government charts and notices to mariners contain all the current information needed for safe navigation, and the captain is responsible for their prudent use. It is the user's responsibility to use official government charts, notices to mariners, caution and proper navigational skill when operating this or any other Raymarine product.

Warning: Minimum Safe Depth, Beam and Height

Depending on cartography vendor, the minimum safe settings are used during automatic route generation, they are used to restrict created routes from entering water that is not suitable for the vessel.

Data is taken from compatible cartography. Minimum safe settings are user defined calculations. As both of these factors are outside of Raymarine's control; Raymarine will not be held liable for any damage, physical or otherwise, resulting from the use of the automatic route generation feature or the **Minimum Safe Depth**, **Minimum Safe Beam** or **Minimum Safe Height** settings.

Warning: Automatic route generation

Routes created using automatic route generation use data taken from compatible electronic cartography and user defined settings.

- Do not rely on automatic route generation alone to guarantee that the route is safe to navigate. You MUST review the suggested route carefully and where necessary edit the route before following it.
- Automatic route generation will NOT be used when moving waypoints within routes, extra care should be taken to ensure that the route leg and any moved waypoints are safe to navigate.

Warning: Traffic separation

Automatic route generation features do not adhere to the Traffic Separation Schemes identified in Rule 10 of the *International Regulations for Preventing Collisions at Sea 1972* as amended.

Raymarine® therefore recommends that you do NOT use Automatic route generation to create any part of a route which will cross traffic lanes or pass near to traffic separation lines. In these situations Automatic route generation MUST be switched Off and the route or route leg MUST be built manually, ensuring compliance to the rules laid out in the above regulations.

Warning: Radar transmission safety

The radar scanner transmits electromagnetic energy. Ensure all personnel are clear of the scanner when the radar is transmitting.

Warning: Sonar operation

- NEVER operate the sonar with the vessel out of the water.
- NEVER touch the transducer face when the sonar is powered on.
- SWITCH OFF the sonar if divers are likely to be within 7.6m (25ft) of the transducer.

Touchscreen location requirements

Touchscreens offer an alternative to using physical buttons to control your display. Full product functionality can be achieved using the Touchscreen.

Note:

Touchscreen performance can be affected by the installation environment, specifically Touchscreen displays installed above decks, where it will be open to the elements may exhibit the following:

- Hot Touchscreen temperature — If the display is mounted where it will be exposed to prolonged periods of direct sunlight, the touchscreen may get very hot.
- Erroneous Touchscreen performance — Exposure to prolonged rain and / or water wash over may cause the display to respond to 'false touches', caused by the rain/water hitting the screen.

If, due to the required installation location, exposure to these elements is anticipated then it is recommended that you consider:

- locking the Touchscreen and using the physical buttons instead — HybridTouch displays
- attaching a third-party 'display hood accessory' to reduce direct sunlight exposure and the volume of water that the display is exposed to.
- installing a remote keypad such as the RMK-9 and operating the display remotely — Touch-only displays
- upgrading to a HybridTouch display and using the physical buttons instead — Touch-only displays

Caution: Care of chart and memory cards

To avoid irreparable damage to and / or loss of data from chart and memory cards:

- Ensure that chart and memory cards are fitted the correct way around. DO NOT try to force a card into position.
- DO NOT use a metallic instrument such as a screwdriver or pliers to insert or remove a chart or memory card.

Caution: Ensure card reader cover or door is securely closed

To prevent water ingress and consequent damage to the product, ensure that the card reader door or cover is firmly closed.

Caution: Sun covers

- If your product is supplied with a sun cover, to protect against the damaging effects of ultraviolet (UV) light, always fit the sun cover when the product is not in use.
- Sun covers must be removed when travelling at high speed, whether in water or when the vessel is being towed.

Caution: Product cleaning

When cleaning products:

- Lightly rinse or flush with clean, cool fresh water.
- If your product has a display screen, do NOT wipe the screen with a dry cloth, as this could scratch the screen coating.
- Do NOT use: abrasive, acidic, ammonia, solvent of chemical based cleaning products.
- Do NOT use a jet wash.

Disclaimers

Raymarine does not warrant that this product is error-free or that it is compatible with products manufactured by any person or entity other than Raymarine.

This product uses digital chart data, and electronic information from Global Navigation Satellite Systems (GNSS) which may contain errors. Raymarine does not warrant the accuracy of such information and you are advised that errors in such information may cause the product to malfunction. Raymarine is not responsible for damages or injuries caused by your use or inability to use the product, by the interaction of the product with products manufactured by others, or by errors in chart data or information utilized by the product and supplied by third parties.

This product supports electronic charts provided by third party suppliers which may be embedded or stored on memory card. Use of such charts is subject to the supplier's End-User Licence Agreement.

Memory cards and chart cards

MicroSD memory cards can be used to back up / archive data (e.g. Waypoint, and Tracks). Once data is backed up to a memory card old data can be deleted from the system, creating capacity for new data. The archived data can be retrieved at any time. Chart cards provide additional or upgraded cartography.

It is recommended that your data is backed up to a memory card on a regular basis. Do NOT save data to a memory card containing cartography.

Compatible cards

The following types of MicroSD cards are compatible with your display:

- Micro Secure Digital Standard-Capacity (MicroSDSC)
- Micro Secure Digital High-Capacity (MicroSDHC)

Note:

- The maximum supported memory card capacity is 32 GB.
- MicroSD cards must be formatted to use either the FAT or FAT 32 file system format to enable use with your MFD.

Speed class rating

For best performance it is recommended that you use Class 10 or UHS (Ultra High Speed) class memory cards.

Chart cards

Your product is pre-loaded with electronic charts (worldwide base map). If you wish to use different chart data, you can insert compatible chart cards into the unit's memory card reader.

Use branded chart cards and memory cards

When archiving data or creating an electronic chart card, Raymarine recommends the use of quality branded memory cards. Some brands of memory card may not work in your unit. Please contact customer support for a list of recommended cards.

Third party software license agreements

This product is subject to certain third party software license agreements as listed below:

- GNU — LGPL/GPL
- JPEG libraries
- OpenSSL
- FreeType

Product disposal

Dispose of this product in accordance with the WEEE Directive.



The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment.

It is important that you register your product to receive full warranty benefits. Your unit package includes a bar code label indicating the serial number of the unit. You will need this serial number when registering your product online. You should retain the label for future reference.

IMO and SOLAS

The equipment described within this document is intended for use on leisure marine boats and workboats NOT covered by International Maritime Organization (IMO and Safety of Life at Sea (SOLAS Carriage Regulations.

Technical accuracy

To the best of our knowledge, the information in this document was correct at the time it was produced. However, Raymarine cannot accept liability for any inaccuracies or omissions it may contain. In addition, our policy of continuous product improvement may change specifications without n otice. As a result, Raymarine cannot accept liability for any differences between the product and this document.

Chapter 2: Document and product information

Chapter contents

- 2.1 Handbook information on page 24
- 2.2 Handbook conventions on page 25
- 2.3 Document illustrations on page 27
- 2.4 HybridTouch overview on page 27

2.1 Handbook information

This handbook contains important information regarding your multifunction display.

The handbook is applicable to **LightHouse™** powered multifunction displays.

About this handbook

This handbook describes how to operate your multifunction display in conjunction with compatible electronic cartography and peripheral equipment.

It assumes that all peripheral equipment to be operated with it is compatible and has been correctly installed. This handbook is intended for users of varying marine abilities, but assumes a general level of knowledge of display use, nautical terminology and practices.

Software revision

Raymarine regularly updates product software to add new features and improve existing functionality.



This handbook covers multifunction display software version — **LightHouse II** Release 19. Please refer to the *Software Releases* section for details on software releases.

Product documentation

The following documentation is applicable to your product:

Documentation

Description	Part number
a Series / c Series / e Series installation instructions	87247
eS Series installation instructions	87250
gS Series installation instructions	87248
LightHouse™ multifunction display operation instructions (This document)	81360
LightHouse™ New Features	82331

Additional documentation

Description	Part number
RMK-9 Installation and operations instructions	81351
RCU-3 Installation and operations instructions	87139

User manuals Print Shop

Raymarine provides a Print Shop service, enabling you to purchase a high-quality, professionally-printed manual for your Raymarine product.

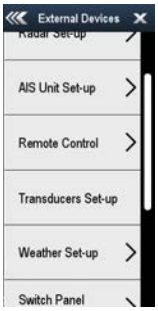
Printed manuals are ideal for keeping onboard your vessel, as a useful source of reference whenever you need assistance with your Raymarine product.

Note:

- Accepted methods of payment for printed manuals are credit cards and PayPal.
- Printed manuals can be shipped worldwide.
- Further manuals will be added to the Print Shop over the coming months for both new and legacy products.
- Raymarine user manuals are also available to download free-of-charge from the Raymarine website, in the popular PDF format. These PDF files can be viewed on a PC / laptop, tablet, smartphone, or on the latest generation of Raymarine multifunction displays.

2.2 Handbook conventions

The following conventions are used throughout this handbook when referring to:

Type	Example	Convention
Icons		The term "**select**" is used in procedures involving icons to refer to the action of selecting an on-screen icon, either using touch or physical buttons: • **Touch** — Press your finger on the icon to select. • **Physical buttons** — Use the **Joystick** to highlight the icon and press the **OK** button.
Menus		The term "**select**" is used in procedures involving menus to refer to the action of selecting a menu item, either using touch or physical buttons: • **Touch** — Press your finger on the icon to select. • **Physical buttons** — Use the **Joystick** to highlight the icon and press the **OK** button.
		The term "**scroll**" is used in procedures involving menus and dialogs to refer to the action of scrolling a list or menu, either by touch or physical buttons: • **Touch** — Press your finger on the menu and slide up or down to scroll. • **Physical buttons** — Turn the Rotary control clockwise or anti—clockwise to scroll. .
Applications		The term "**select**" is used in procedures involving applications to refer to the action of selecting a location, object or target on-screen using touch or physical buttons: • **Touch** — Press and hold your finger on a location to select, or • **Touch** — Press and release your finger on an object or target. • **Physical buttons** — Use the **Joystick** to highlight the location, object or target and press the **OK** button.
Numeric adjust controls		The term "**adjust**" is used in procedures involving numerical adjust controls to refer to the action of changing the numeric value using touch or physical buttons: • **Touch** — Press your finger on the up or down arrow to increase or decrease the numeric value. • **Physical buttons** — Use the **Rotary control** to increase or decrease the numeric value. With the Numeric adjust control displayed you can also select on the **keypad** icon or press and hold the **OK** button to open a numeric keypad to enter a new value for the setting.
Slider bar controls		The term "**adjust**" is used in procedures involving slider bar controls to refer to the action of changing the associated numeric value using touch or physical buttons: • **Touch** — Press your finger on the up or down arrow to increase or decrease the numeric value. • **Physical buttons** — Use the **Rotary control** to increase or decrease the numeric value.

Waypoint (MOB) button / icon

Depending on the multifunction display variant there will be either a Waypoint (MOB) button or an onscreen icon.

WPT button		• c Series • e Series • eS Series • RMK-9 keypad
WPT icons		• a Series • gS Series

Throughout this manual the term: Select **WPT**, refers to pressing the physical **WPT** button or pressing the on-screen **WPT** icon.

Touch and non-touch operations

This handbook applies to both touch and non-touch operations.

This handbook uses icons to identify whether a particular task is specifically a touch or a non-touch operation. Where a task does not have a touch or non-touch icon then the task can be performed using either.

	Touch (Touchscreen operation) — Touch operations apply to multifunction displays which have a touchscreen.
	Non-touch (physical button operation) — Non-touch operations apply to multifunction displays with physical buttons or multifunction displays that have a remote keypad connected and paired to it.

2.3 Document illustrations

Products may differ slightly from those shown in the illustrations in this document, depending on product variant and date of manufacture.

The illustration shown below is used throughout this document to represent **LightHouse™** powered **MFDs** and unless otherwise stated applies to all multifunction display variants.



D12596-2

2.4 HybridTouch overview

If your multifunction display features HybridTouch, this enables you to operate the unit using the touchscreen and the physical buttons.

A HybridTouch display has physical buttons which can be used in addition to the touchscreen. Touchscreen only multifunction displays (which do not have physical buttons) can be connected to a remote keypad which allows HybridTouch functionality.

All functions can be accessed using the touchscreen. However, there may be situations (such as rough sea conditions) when it is not appropriate to use the touchscreen. In these situations, Raymarine strongly recommends that you activate the touch lock and use the physical buttons to operate your multifunction display.

Chapter 3: Getting started

Chapter contents

- 3.1 Switching the unit on and off on page 30
- 3.2 Controls on page 31
- 3.3 Basic touchscreen operations on page 35
- 3.4 Multi-Touch gestures on page 36
- 3.5 Touch icons on page 36
- 3.6 Homescreen overview — Touch only displays on page 37
- 3.7 Homescreen overview — HybridTouch and non-Touch displays on page 37
- 3.8 Pages on page 40
- 3.9 Applications on page 41
- 3.10 Screen overview on page 42
- 3.11 Splitscreen controls on page 45
- 3.12 Initial set up procedures on page 46
- 3.13 GNSS Status on page 50
- 3.14 Enabling autopilot control on page 52
- 3.15 Engine identification on page 53
- 3.16 Enabling AIS functions on page 55
- 3.17 Shared preferences on page 55
- 3.18 Memory cards and chart cards on page 56
- 3.19 Simulator mode on page 56
- 3.20 System software updates on page 57
- 3.21 Pairing the keypad on page 59
- 3.22 Learning resources on page 59

3.1 Switching the unit on and off

Powering the display on

1. Press the **POWER** button on the display.
2. Select **Accept** to acknowledge the disclaimer message.

Powering the unit off

MFDs still consume a small amount of power from the battery when powered off, if this is a concern unplug the connector from the back of the unit.

1. Press and hold the **Power** button for approximately 6 seconds.

   A 3 second count-down timer is displayed.

   To cancel the power off process, release the power button before the display powers off.

Note:

- The network connections on **gS Series** and **eS Series** MFDs remain active when the MFD has been powered off, potentially drawing more power from the battery.

PowerSave mode

In PowerSave mode all functions of the multifunction display remain active, but the unit is placed into a low power state. The LED lights around the Rotary controller will blink once every 1.5 seconds to indicate that the unit is in PowerSave mode. PowerSave mode is cancelled by pressing a physical button or when an alarm event occurs.

Note: To ensure user safety the PowerSave feature will not be available if:

- any connected Radars are switched on
- the multifunction display is providing autopilot control in a system without a dedicated pilot head and the autopilot is engaged.

Attention Leaving an **MFD** in PowerSave mode will continue to consume some power from your vessel's batteries. The unit could drain your batteries if left in PowerSave mode for prolonged periods of time. When switching off the power to your vessel, ensure that the unit is powered off using the power button. For more information on the amount of power consumed by the unit in PowerSave mode, refer to the Technical specification section of your product's installation instructions.

Enabling PowerSave mode

To enable PowerSave mode follow the steps below.

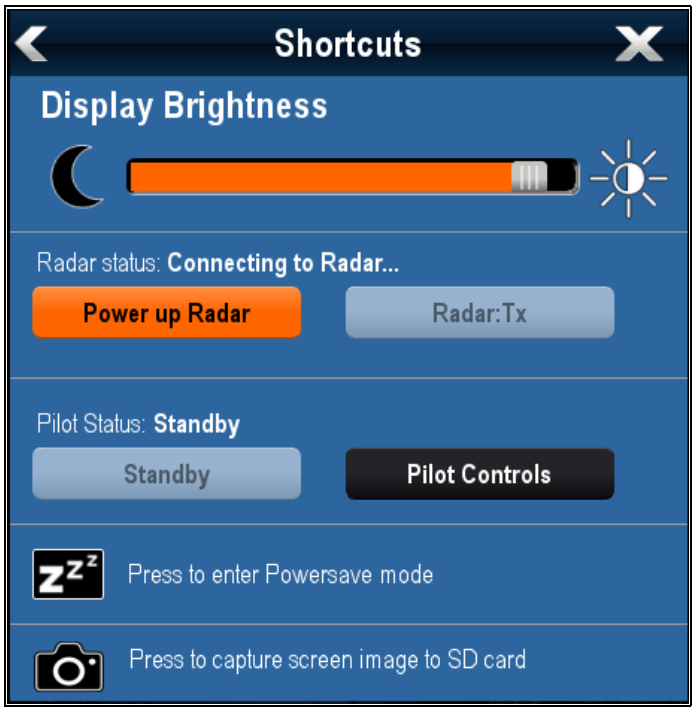
1. Ensure any radars connected to the system are switched off.
2. Press the **POWER** button.

   The shortcuts menu is displayed.
3. Select **PowerSave Mode**.

   The multifunction displays is now in PowerSave mode.
4. You can wake the unit from PowerSave mode at anytime by pressing a physical button on the multifunction display.

Note: PowerSave mode is automatically cancelled if an alarm event occurs.

Adjusting the display brightness



1. Press the **POWER** button once.

   The Shortcuts menu is displayed.
2. Adjust the brightness to the required level using the on-screen brightness slider bar control, or
3. Touch the Sun icon to increase the brightness level or the Moon icon to decrease the brightness level.

Note: The brightness level can also be increased by pressing the **Power** button multiple times.

Adjusting the display brightness

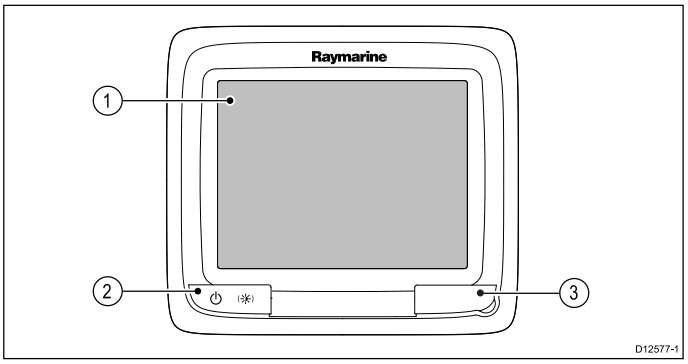
1. Press the **POWER** button once.

   The Shortcuts menu is displayed.
2. Adjust the brightness to the required level using the **Rotary control**.

Note: The brightness level can also be increased by pressing the **Power** button multiple times.

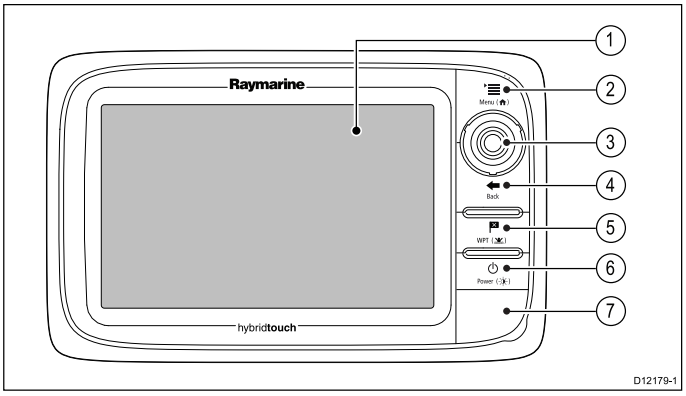
3.2 Controls

a Series Controls



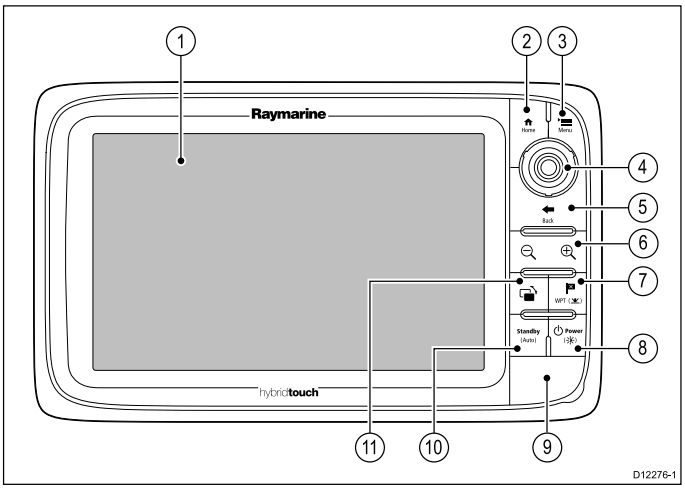
	Description	Functions
1	**Touch-screen**	Touch the screen to operate functions, including all menu operations.
2	**Power**	• Press once to switch the unit ON. • Once powered on, press the Power button again to open the shortcuts page where you can adjust the brightness, perform a screen capture, access PowerSave mode or access the power controls of external devices. • Press and hold to switch the unit OFF. • If an integrated pilot is engaged, press and hold to put the autopilot into STANDBY mode.
3	**Card reader slot**	MicroSD card reader • a6x and a7x = 1 x MicroSD card slot • a9x and a12x = 2 x MicroSD card slots

e7 / e7D Controls



	Description	Functions
1	**Touch-screen**	you can touch the screen to operate many common functions, including all menu operations.
2	**Menu**	Accesses menus. Press again to close menus.
3	**UniControl**	Provides a joystick, rotary control and an OK push button for using menus and applications.
4	**Back**	Press to return to a previous menu or dialog level.
5	**WPT / MOB**	• Press and release to access the waypoint options. Press again to place a waypoint. • Press and hold to place a Man Overboard (MOB) marker at your current position.
6	**Power**	• Press once to switch the unit ON. • Once powered on, press the Power button again to adjust the brightness, perform a screen capture, access Powersave mode or access the power controls for external devices. • Press and hold to switch the unit OFF. • If an integrated pilot is engaged, press and hold put the autopilot into STANDBY mode.
7	**Card reader slot**	Open the card door to insert or remove a MicroSD card. There are 2 card slots (labelled 1 and 2), used for electronic charts and archiving waypoint, route, track and settings data.

c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 / e165 Controls

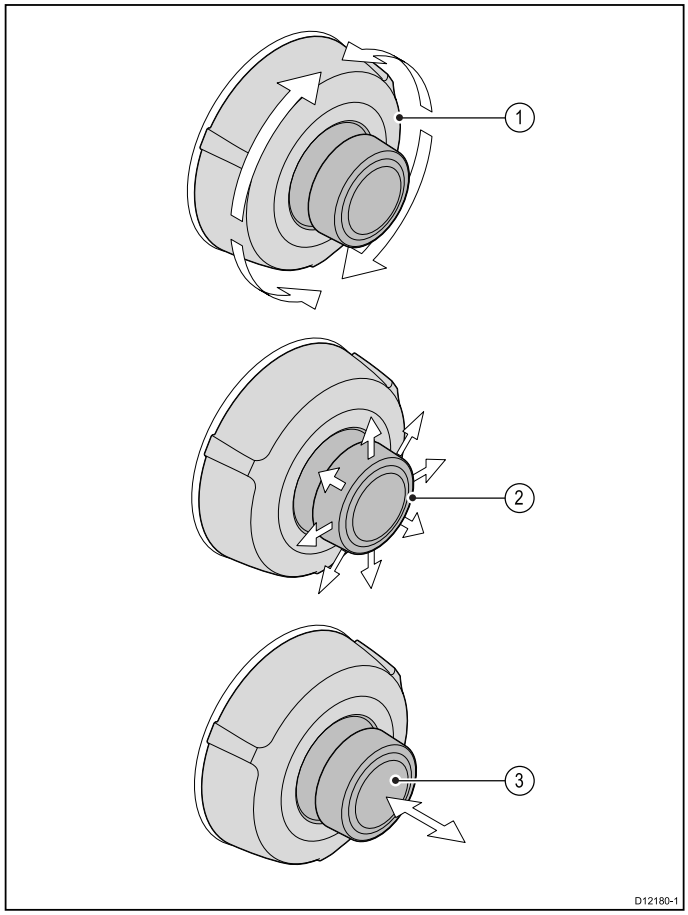


	Description	Functions
1	**Touch-screen**	you can touch the screen to operate many common functions, including all menu operations.
2	**Home**	Press to return to the homescreen.
3	**Menu**	Accesses menus. Press again to close menus.
4	**UniControl**	Provides a joystick, rotary control and an OK push button for using menus and applications.
5	**Back**	Press to return to a previous menu or dialog level.
6	**Range In/Out**	Press minus (-) to range out and plus (+) to range in

	Description	Functions
7	**WPT / MOB**	• Press and release to access the waypoint options. Press again to place a waypoint. • Press and hold to place a Man Overboard (MOB) marker at your current position.
8	**Power**	• Press once to switch the unit ON. • Once powered on, press the Power button again to adjust the brightness, perform a screen capture, access Powersave mode or access the power controls for external devices. • Press and hold to switch the unit OFF.
9	**Card reader slot**	Open the card door to insert or remove a MicroSD card. There are 2 card slots (labelled 1 and 2), used for electronic charts and archiving waypoint, route, track and settings data.
10	**Pilot**	• Press to disengage integrated autopilot. • Press and hold to activate Auto mode on integrated autopilot.
11	**Switch Active Pane**	• Press to switch the active pane in splitscreen pages. • Press and hold to expand the selected pane to fullscreen.

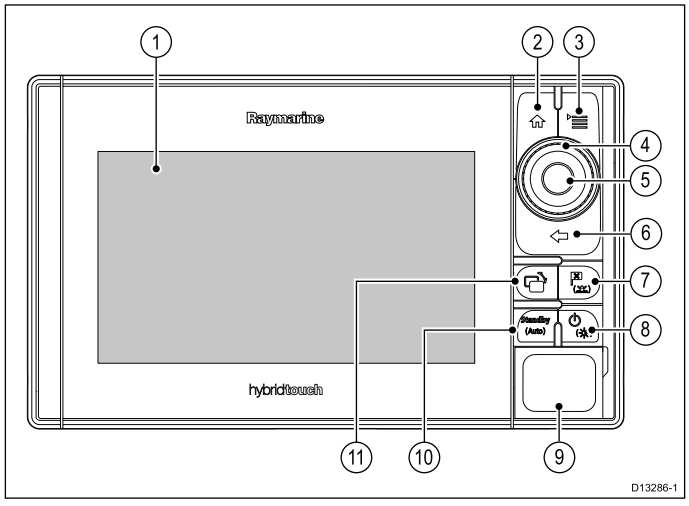
UniControl

Non-touch, HybridTouch and the remote keypad include a UniControl which consists of Rotary, Joystick and a push button control.



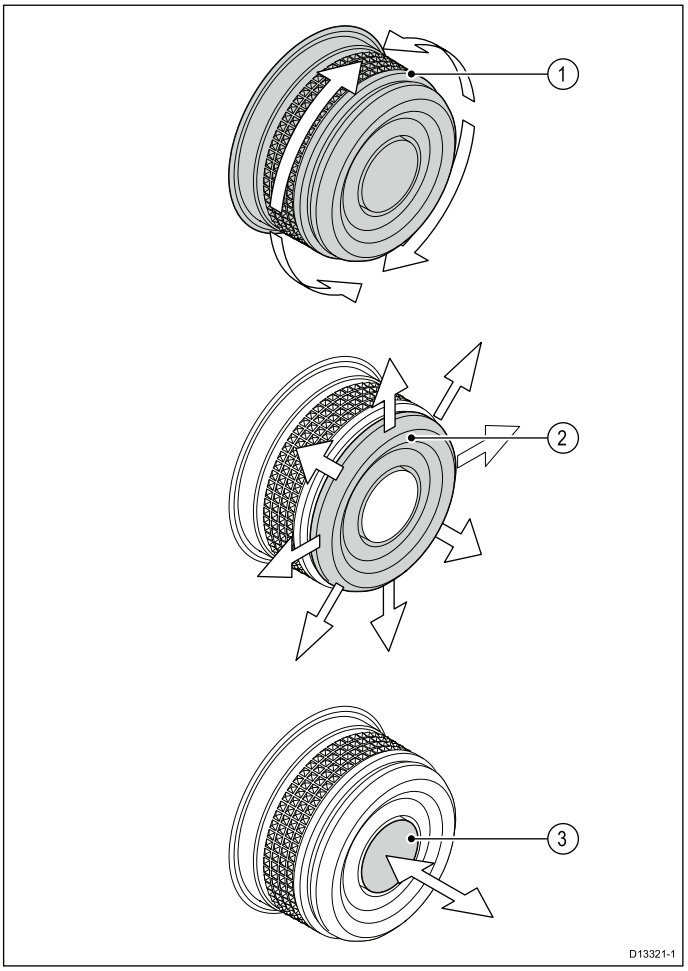
1. **Rotary** — use this to select menu items, move the on-screen cursor, and adjust the range in the Chart and Radar applications.
2. **Direction controls** / **Joystick** — use this to move the cursor position in applications, pan up, down, left and right in the Chart, Weather and Sonar applications or to cycle through datapages in the Data application.
3. **OK** button — push the end of the joystick to confirm a selection or entry.

eS Series Controls



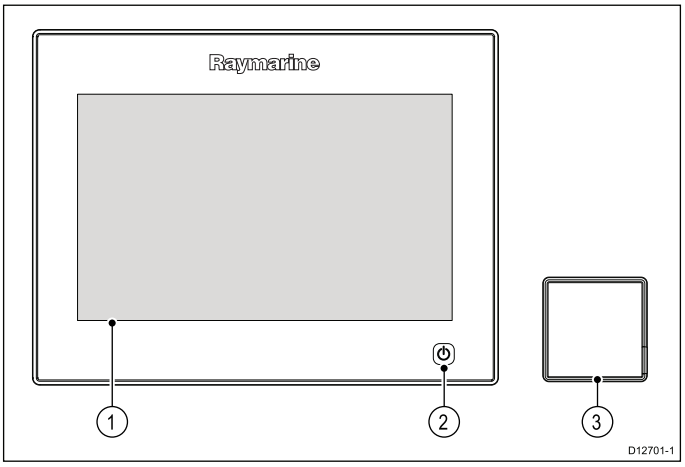
	Description	Functions
1	**Touch-screen**	you can touch the screen to operate many common functions, including all menu operations.
2	**Home**	Press to return to the Homescreen.
3	**Menu**	Accesses menus. Press again to close menus.
4	**UniControl**	Provides rotary and joystick control.
5	**Ok**	Ok push button
6	**Back**	Press to return to a previous menu or dialog level.
7	**WPT / MOB**	• Press and release to access the waypoint options. Press again to place a waypoint. • Press and hold to place a Man Overboard (MOB) marker at your current position.
8	**Power**	• Press once to switch the unit ON. • Once powered on, press the Power button again to adjust the brightness, perform a screen capture, access Powersave mode or access the power controls for external devices. • Press and hold to switch the unit OFF.
9	**Card reader slot**	Open the card door to insert or remove a MicroSD card. There are 2 card slots (labelled 1 and 2), used for electronic charts and archiving waypoint, route, track and settings data.
10	**Pilot**	• Press to disengage integrated autopilot. • Press and hold to activate Auto mode on integrated autopilot.
11	**Switch Active Pane**	• Press to switch the active pane in splitscreen pages. • Press and hold to expand the selected pane to fullscreen.

eS Series UniController



1. **Rotary** — use to select menu items, move the onscreen cursor, and adjust the range in the Chart and Radar applications.
2. **Directional control** — use to move the cursor position in applications, pan up, down, left and right in the Chart, Weather and Sonar applications or to cycle through datapages in the Data application.
3. **OK** push button — push in to confirm a selection or entry.

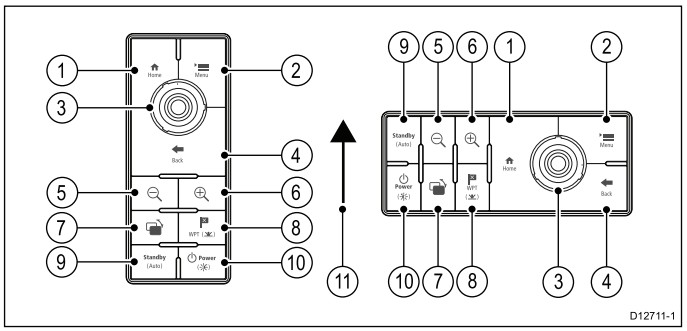
gS Series Controls



	Description	Functions
1	**Touchscreen**	Touch the screen to operate functions, including all menu operations.
2	**Power**	• Press once to switch the unit on. • When powered on, press the **Power** button again open the Shortcuts page. • When powered on, press and hold to put the display into Standby mode. • If an integrated pilot is engaged, press and hold to put the autopilot into STANDBY mode.
3	**Card reader**	Open the card door to insert or remove a MicroSD card. There are 2 card slots (labelled 1 and 2), used for electronic charts and archiving waypoint, route, track and settings data.

Keypad controls

Connecting the keypad allows you to control your multifunction display remotely.



1. **Home** — press to return to the Homescreen.
2. **Menu** — accesses menus. Press again to close menus.
3. **UniController** — provides a rotary control and a joystick that includes an OK push button for using menus and applications.
4. **Back** — press to return to a previous menu or dialog level.
5. **-** (Minus/Negative symbol) — press to range out.
6. **+** (Plus/Positive symbol) — press to range in.
7. **Active** — press to switch the active pane, or to switch the active multifunction display (in multiple display systems).
8. **Waypoint / MOB** — press and release to access the waypoint options. Press again to place a waypoint. Press and hold to place a Man Overboard (MOB) marker at your current position.
9. **Standby (Auto)** — press to disengage integrated autopilot, press and hold to activate Auto mode on integrated autopilot.
10. **Power** — see table below:

Configuration	Display State	Momentary press	Press and hold
1 Multifunction display	Off / Standby	* Power on	—
	On	Open Shortcuts page	Power off / put into Standby
Multiple multifunction displays	All displays Off or in Standby	* Power on all displays	—
	All displays On	Open Shortcuts page on active display	Power down all displays
	1 Display On and 1 display Off or in Standby	Open Shortcuts page on active display	Power down active display

Note: * Only applicable to eS and gS Series displays. a Series, c Series and e Series displays cannot be powered on using the keypad.

Note: In a multiple display configuration, where displays are in different states, displays that are turned off can only be turned on using the **Power** button on the display.

11. Direction of Joystick Up.

3.3 Basic touchscreen operations

Placing and moving the cursor using touch

To place or move the cursor around the screen on a touchscreen multifunction display follow the steps below.

1. Touch the screen at any position on the screen to place the cursor there.

Touchscreen lock

On a multifunction display with HybridTouch you can lock the touchscreen to prevent accidental use.

For example, locking the touchscreen is particularly useful in rough water or weather conditions.

The touchscreen can be locked and unlocked from the homescreen. The touchscreen can only be unlocked using physical buttons.

Locking the touchscreen – HybridTouch displays

On HybridTouch multifunction displays the Homescreen contains a dedicated Touch Lock icon.

With the homescreen displayed:

1. Select the **Touch Lock** icon.
   It changes color to indicate that the touchscreen is disabled. All functions are still available using the physical buttons.

	Touchscreen is locked. All functions remain available using physical buttons.

Locking the touchscreen - touch only displays

When a touch only display is paired with an optional remote keypad the touchscreen can be locked.

From the Homescreen:

1. Select the **Set-up** icon.
2. Select **Touch-Lock** so that On is highlighted.

The touchscreen is now locked.

Unlocking the touchscreen – HybridTouch displays

You can unlock the touchscreen by following the steps below.

With the Homescreen displayed:

1. Use the UniControl to highlight the **Touch Lock** icon.
2. Press the **OK** button.
   The Touchscreen is enabled.

	Touchscreen is unlocked.

Unlocking the touchscreen - touch only displays

To unlock the touchscreen of a touch only display when paired with a remote keypad follow the steps below.

From the Homescreen:

1. Select the **Set-up** icon.
2. Select **Touch-Lock** so that Off is highlighted.

The touchscreen is now unlocked.

3.4 Multi-Touch gestures

Raymarine a Series and gS Series multifunction displays support multi-touch.

Multi-touch means that the display is capable of recognizing multiple simultaneous touch inputs. This means that you can use 2 or more fingers on the screen at the same time to perform multi-touch gestures.

Pinch to Zoom

The pinch to zoom gestures can be performed on multifunction displays that support multi-touch.

Pinch to zoom consists of 2 actions:

- Move 2 fingers apart to zoom in.
- Move 2 fingers together to zoom out.



Pinch to Zoom can be used in the following applications:

- Chart application.
- Weather application.

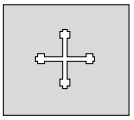
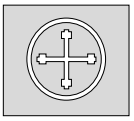
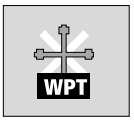
3.5 Touch icons

Touchscreen multifunction displays can use the **BACK** and **CLOSE** icons to move between the different levels of menus available in each application.

	**Back** — go back one level (same effect as pressing the **BACK** button).
	**Close** — close all open menus (same effect as pressing the **MENU** button).

Using the cursor

The cursor is used to move around the screen.

	The cursor appears on the screen as a white cross.
	If the cursor has not been moved for a short period of time, it changes to a circle with a cross in it, to make it easier to locate on the screen.
	The cursor is context-sensitive. When it is placed over an object such as a waypoint or chart feature, it changes color and a label or information associated with the object is displayed.

List of cursor labels

Label	Feature	Application
A/B	Ruler line	Chart
AIS	AIS target	Chart
COG	Course Over Ground vector	Chart
CTR	Center of radar	Radar
FLT	Floating EBL/VRM	Radar
GRD	Guard zone	Radar
HDG	Heading vector	Chart
MARPA	MARPA target	Radar
MOB	Man Over Board marker	Chart, Radar
POS	Vessel's position	Chart
RTE	Route leg	Chart
SHM	Ship's Heading Marker	Radar
TIDE	Tide indicator	Chart
TRACK	Track line	Chart
VRM/EBL	VRM and EBL, 1 or 2	Radar
WIND	Wind indicator	Chart
WPT	Waypoint	Chart, Radar

3.6 Homescreen overview — Touch only displays

The Homescreen provides a central point of access for your display's applications, data and settings.

- The Homescreen provides quick access to your data (waypoints, routes, tracks, images and videos) and backup settings.
- The Homescreen consists of a number of Homescreen pages. Swipe the screen left or right with your finger to scroll through the available Homescreen pages.
- Each Homescreen page consists of a number of icons. Applications are started by selecting the relevant icon.



Screen item	Description
1	**Waypoint** — select the icon to access the waypoint list. Select and hold on the icon to place a Man Overboard (MOB) marker at your vessel's current position.
2	**My Data** — this icon enables you to centrally manage your data including route, track, and waypoint lists. You can also access saved pictures and videos and backup settings.
3	**Customize** — select this icon to configure application pages and display preferences.
4	**Set-up** — select this icon to access the system set-up menus.
5	**Icon** — each icon represents an application page. A page can display multiple applications simultaneously.
6	**Status bar** — the status icons confirm the status of externally-connected equipment, including GPS, AIS, radar, sonar and autopilot units.

3.7 Homescreen overview — HybridTouch and non-Touch displays

The Homescreen provides a central point of access for your display's applications, data and settings.

- The Homescreen provides quick access to your data (waypoints, routes, tracks, images and videos) and backup settings.
- The Homescreen consists of a number of Homescreen pages. Swipe the screen left or right with your finger to scroll through the available Homescreen pages.
- Each Homescreen page consists of a number of icons. Applications are started by selecting the relevant icon.



Scr-een item	Description
1	**Touch Lock** — (HybridTouch displays only) select this icon to lock the touchscreen, preventing accidental use. To unlock, use the UniControl to deselect the Touch Lock icon.
2	**My Data** — this icon enables you to centrally manage your data including route, track, and waypoint lists. You can also access saved pictures and videos and backup settings.
3	**Customize** — select this icon to configure application pages and display preferences.
4	**Set-up** — select this icon to access the system set-up menus.
5	**Icon** — each icon represents an application page. A page can display multiple applications simultaneously.
6	**Status bar** — the status icons confirm the status of externally-connected equipment, including GPS, AIS, radar, sonar and autopilot units.

Accessing the homescreen

The homescreen can be accessed from any application.

To access the homescreen follow the steps below:

1. Select the homescreen icon on-screen.

Accessing the homescreen

The homescreen can be accessed from any application.

To access the homescreen follow the steps below:

1. Press the **Home** button.

Note: The e7 and e7D have a combined Menu and Home button, to access the homescreen press and hold the **Menu / Home** button for 3 seconds.

Databar status symbols

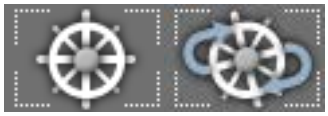
The status symbols on the databar confirm whether the appropriate connections to your system have been made.

The symbols show the status for the following:

- Radar scanner.
- AIS receiver / transceiver.
- Sonar module.
- GPS receiver.
- Autopilot.

Autopilot status symbols

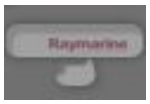
The autopilot status is indicated in the databar.

Symbol	Description
	Autopilot is in Standby mode.
	Autopilot is in Track mode.
	Autopilot is in Auto mode.
	No autopilot detected.
	Autopilot alarm active.
	Dodge mode is active.
	Fish mode is active.

Symbol	Description
	Autopilot calibration.
	Power steering active.
	Wind Vane mode is active.

Radar scanner status symbols

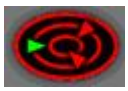
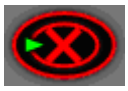
The Radar scanner power mode status is indicated in the databar located at the top of the screen.

Symbol	Radar power mode	Description
	Transmit (TX)	**Rotating icon** The Radar is powered on and transmitting. This is the usual mode of operation.
	Standby (STBY)	**Static icon** The Radar is powered on but not transmitting. On Open Array Radars the antenna is not rotating. The Radar does not transmit and Radar data is not shown onscreen. This is a power-save mode used when the Radar is not needed for short time periods. This is the default mode.
	Sleep	**Static icon** Radar scanners connected over Wi-Fi go into a sleep mode when powered down, this is so that the Wi-Fi connection is still available to re-connect to the Radar.
	Off	**Grayed out icon** Wired Radar powered off or no Radar is connected.
	Timed Transmit	**Radar switches between rotating and static icon** Radar switches between on/transmitting, and standby/sleep in Timed Transmit mode.

AIS status symbols

AIS status is indicated by a symbol in the databar.

Symbol	Description
	AIS unit is switched on and operating.
	AIS currently unavailable.

Symbol	Description
	AIS unit is switched off, or not connected.
	AIS unit is in Silent Mode.
	AIS unit is in Silent Mode, with active alarms.
	AIS unit is connected and switched on, but has active alarms.
	AIS unit is connected and switched on, but the dangerous and lost alarm is disabled.

Sonar status symbols

The sonar status is indicated in the databar.

Symbol	Description
	Symbol animated: the sonar module is connected and transmitting.
	Symbol static: the sonar module is connected but not transmitting.
	Symbol greyed-out: the sonar module is not connected, or is not detected.

GPS status symbols

The GPS receiver status is indicated in the databar.

Symbol	Description
	A GPS receiver is connected and has obtained a fix.
	A GPS receiver is not connected, or cannot obtain a fix.

Locking the Homescreen, Databar and Data application configuration

The Homescreen, Databar and Data application can be locked to prevent accidental changes to their layout and configuration.

It is recommended that you Back-up your settings and data before you lock the Homescreen, refer to:4.1 **Saving user data and user settings** for instructions.



1. From the Homescreen, select **Customize**.
2. Select **Homescreen**.
3. Select **Lock Homescreen**.
   The onscreen keyboard is displayed.
4. Enter the password that you want to use.

Important: Ensure that you retain your Homescreen password. If you lose your password a **Power on Reset** is required to unlock the Homescreen.

5. Select **Lock**.
   The **Homescreen**, **Databar** and **Data application** layout and configuration are now locked and cannot be changed. The **Settings and Data Reset** options are also not available when the Homescreen is locked.

To unlock the Homescreen select: **Homescreen > Customize > Homescreen > Unlock Homescreen.** and enter your Homescreen password.

3.8 Pages

Pages are made up of 1 to 4 panes that are used to display applications on your multifunction display (MFD).

Pages are accessed using the icons on the Homescreen.

- You can create up to 2 application panes per page using an MFD that has a screen size of 7 inches or less.
- You can create up to 4 application panes per page using an MFD that has a screen size of greater than 7 inches.
- MFDs with a screen size of 7 inches or less can view pages with more than 2 application panes but only if they are sharing the Homescreen of an MFD which is capable of creating those pages.

Pages can be customized, enabling you to group your applications into different pages, each designed for a specific use.

	Icon for a page featuring a single application.
	Icon for a page featuring multiple applications.

You can also define the layout for each page, which determines how the applications are arranged on the screen.

Setting the Power-up page

You can setup your multifunction display to show a page instead of the Homescreen at power up.

Form the Homescreen:

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Starting page**.
   A list of options is displayed
   - Homescreen — Homescreen is displayed after power-up.
   - Last page — The page last viewed is displayed after power-up
   - Choose page — The page you select will be displayed after power-up
4. If selecting Choose page the Homescreen is displayed.



5. Select the icon for the page you want displayed when the display is turned on.

The starting page setting applies to each individual display and is not automatically shared on networked displays.

Changing an existing page on the homescreen

With the homescreen displayed:

1. Select **Customize**.
2. Select **Homescreen**.
3. Select **Edit Page**.
4. Select the page icon that you want to change.
   The Customize menu options are displayed.
5. Select the appropriate page layout (for example, “Splitscreen”).
6. Select the application(s) you want to display on the page, either by selecting the relevant menu item or dragging it over to the displayed page.
7. Select **Finish**.
   The Rename Page dialog is displayed.
8. Use the on-screen keyboard to name the page, then select **Save**.

Changing an empty page

With the homescreen displayed:

1. Select **Customize**.
2. Select **Homescreen**.
3. Select **Edit Page**.
4. Select an empty page icon (labelled “Customize”).
   The Customize menu options are displayed.
5. Select the appropriate page layout (for example, “Splitscreen”).
6. Select the application(s) you want to display on the page, either by selecting the relevant menu item or dragging it over to the displayed page.
7. Select **Finish**.
   The Rename Page dialog is displayed.
8. Use the on-screen keyboard to name the page, then select **Save**.

Moving a page on the homescreen

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.

3. Select **Swap Page**.
4. Select the page icon that you want to move.
5. Select the page icon that you want to swap positions with.

   The page icon is moved to the new position.

Renaming a page on the homescreen

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Rename Page**.
4. Select the page that you want to rename.

   The on-screen keyboard is displayed.
5. Using the on-screen keyboard, enter the new name for the page.
6. Select SAVE.

Deleting a page from the homescreen

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Delete Page**.
4. Select the page that you want to delete.

   The page is deleted.

Resetting the homescreen to default settings

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Reset**.

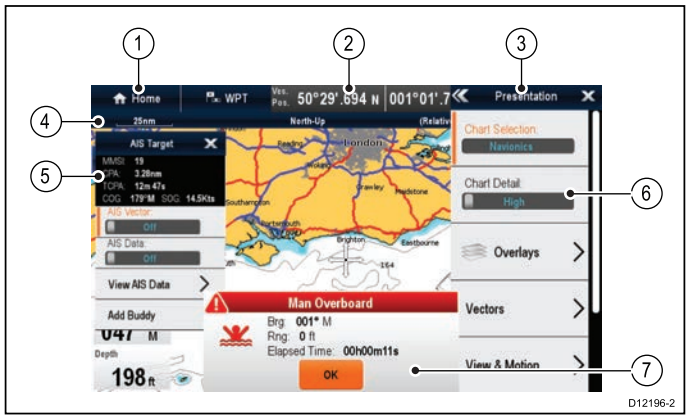
   A warning message is displayed asking for confirmation.
4. Select **Yes** to reset the homescreen to the default range of pages, or **No** to cancel the operation.

3.9 Applications

	**Chart application** — provides a 2D or 3D graphical view of your charts to help you navigate. Waypoint, route, and track functions enable you to navigate to a specific location, build and navigate routes, or record where you've been. Chart cards provide higher levels of detail and 3D views.
	**Sonar (Fishfinder) application** — with a transducer and a sonar variant MFD or compatible Sonar module, you can use the Sonar application to help you accurately distinguish between different targets, bottom structure, and underwater obstacles. You can also view water depth and temperature data and mark points of interest.
	**Radar application** — with a suitable radar scanner, you can use the radar application to track targets and measure distances and bearings. A number of automatic gain presets and color modes are provided to help you get the best performance from your radar scanner.
	**Data application** — view system and instrument data on your MFD, for a range of compatible instruments. Use the joystick or touchscreen to scroll through the available data pages.
	**Weather application** — (North America only). With a suitable weather receiver connected to your system, the weather application overlays historical, live, and forecasted weather graphics on a world map.
	**Thermal cam application** — view and control a thermal camera using a compatible MFD. **Note:** The thermal camera application is not available on a6x and a7x variant MFDs.
	**Camera application** — view a video or camera source on your MFD.
	**Doc Viewer** — view pdf documents stored on a MicroSD card.
	**FUSION Link application** — link to and control a compatible Fusion entertainment system from your MFD.

	**Sirius Audio application** — control Sirius radio from your MFD. Only available in USA.
	**User Manual** — Opens the English version of the product user manual stored on the display. To open translated user manuals stored on memory card use the Doc Viewer.
	**GRIB Viewer** — The GRIB Viewer produces animated visualizations of the data contained in compatible GRIB files. GRIB files may be downloaded directly from within the GRIB Viewer application or can be manually downloaded.
	**Audio application** — Control compatible NMEA 2000 compliant entertainments systems from your MFD.
	**Switch panel application** — Control compatible digital switching systems from your MFD.

3.10 Screen overview



Screen item	Description
1	**Home** • **Displays with a touchscreen** — Select the onscreen **Home** icon to access the Homescreen. • **Non-touchscreen and HybridTouch displays** — Use the physical **Home** button to access the Homescreen.
2	**Databar** — provides information about your vessel and its environment. The type of information in the databar can be customized from the **Homescreen > Customize > Databar Set-up** menu, if required.
3	**Menu** — menu options are specific to the application that you are currently using.
4	**Status bar** — provides information specific to each application. This information cannot be edited or moved.
5	**Context menu** — provides information and options specific to each application.
6	**Menu options** — menu options are displayed when the Menu is selected.
7	**Pop-up messages** — alert you to a situation (such as an alarm), or unavailable function. Pop-up messages may require a response from you — for example, select **OK** to silence alarms.

Menus

Menus enable you configure settings and preferences.

Menus are used in the:

- **Homescreen** — to configure your multifunction display and externally-connected equipment.
- **Applications** — to configure the settings for that particular application.

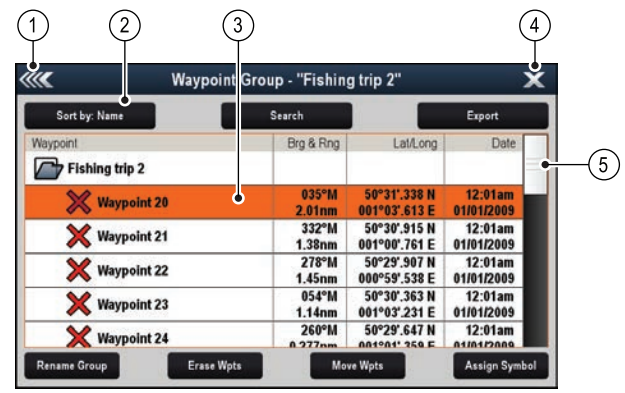


Screen item	Description
1	**Back** — On displays with a touchscreen you can press the onscreen **<<** (back) icon to go back to a previous menu. On non-touchscreen displays or HybridTouch displays use the **Back** button.
2	**Close** — On displays with a touchscreen you can press the onscreen **X** (close) icon to go back to a previous menu. On non-touchscreen displays or HybridTouch displays use the **Back** button to back out of the menu structure.
3	**Selected menu option** — the menu option currently selected will be highlighted.
4	**Scroll bar** — indicates that further menu items are available by scrolling the menu. On displays with a touchscreen to scroll through the available menu items, press and hold your finger on the menu and drag it up or down. On non-touchscreen displays or HybridTouch displays use the **Rotary control**.
5	**On / Off switch** — On displays with a touchscreen you can select onscreen menu items to switch features On or Off to enable or disable the function. On non-touchscreen displays or HybridTouch displays use the **OK** button to switch the function On or Off.

Screen item	Description
1	**Back** • Displays with a touchscreen — Select the onscreen **Back** icon to go back to the previous menu. • Non–touchscreen or HybridTouch displays — Use the **Back** button to go back to the previous menu.
2	**Function icons** — Some dialogs include icons which can be selected to access additional functions. For example, in the Waypoint List dialog, the **Sort by** icon can be used to change how the waypoints list is sorted.
3	**Menu / List item** • Displays with a touchscreen — Momentarily touching an item automatically selects the item and displays the item options menu. • Non–touchscreen or HybridTouch displays — Use the **Rotary control** to highlight an item, and the **OK** button to select it and display the item options menu.
4	**Close** • Displays with a touchscreen — Select the onscreen **Close** icon to close the dialog. • Non–touchscreen or HybridTouch displays — Use the **Back** button to close the dialog.
5	**Scroll bar** • Displays with a touchscreen — To scroll through the available items, press and hold your finger on the scroll bar and drag it up or down. • Non–touchscreen or HybridTouch displays — To scroll through the available menu items, use the **Rotary control**.

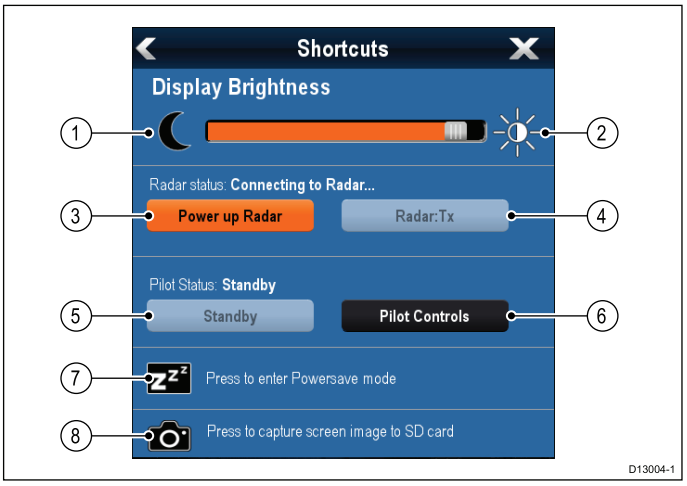
Dialogs

Dialogs are fullscreen menus that enable you to manage data items such as waypoints and routes.



Shortcuts page

A number of useful functions can be accessed from the Shortcuts page.



1	Decrease display brightness
2	Increase display brightness
3	Power up / Power down Radar
4	Radar standby / Radar transmit
5	Autopilot standby (during active navigation)
6	Display pilot control dialog
7	PowerSave mode
8	Screenshot / Screen capture

Edit dialogs

Edit dialogs enable you to edit the details of data items stored on your multifunction display, such as waypoints, routes, and tracks.



Selecting a text field displays the onscreen keyboard, which can be used to edit the details.

Editing information in dialogs

With the dialog displayed:

1. Select the field you want to edit.
   The onscreen keyboard is displayed:



2. Use the onscreen keyboard to make the changes.
3. Select **SAVE** to save the changes.

Entering special or accented characters

With the onscreen keyboard displayed:

1. Select the onscreen keyboard's **àèò** key.
2. Select the character you want to accent.
   The available accented characters are displayed above the text entry field.
3. For characters that have multiple available accents, use the character key to toggle between them.
4. Select the **àèò** key to enter the character.

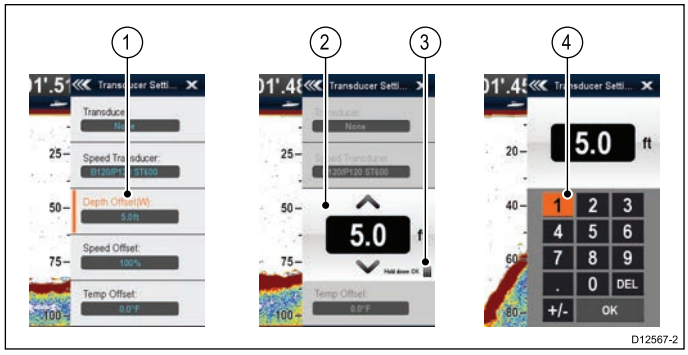
Numeric menu items

Numeric menu items display numeric data and enables you to either select a predefined value or to increase and decrease the value as required.



Editing numerical settings

To edit numerical values you can use either the onscreen numeric adjust control, onscreen numeric keypad or the **Rotary Control** on a non-touch or HybridTouch display to increase or decrease numeric values.

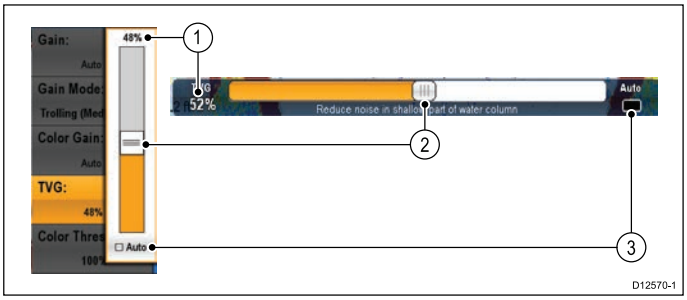


1. Select the numeric data field you want to edit.
   The numeric adjust control is displayed.
2. Adjust the setting to the required value using:
   i. The **Rotary control** — Non-touchscreen or HybridTouch displays, or
   ii. The onscreen **Up** and **Down** arrows — Touchscreen displays.
3. To access the on-screen numeric keypad:
   - Touch operation — Select the onscreen keypad icon from the numeric adjust control.
   - Non-Touch operation — Press and hold the **OK** button.

   The onscreen numeric keypad is displayed.
4. Enter the required value.
5. Select **OK** to exit the numeric keypad and return to the menu.

Using slider bar controls

Slider bar controls provide a graphical representation of numeric data and enables you to quickly change setting values.

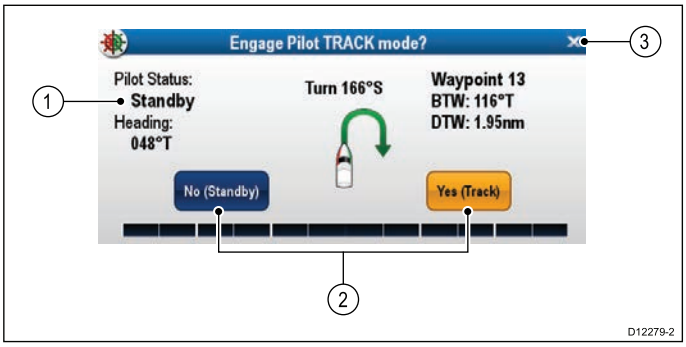


Item	Description	Non—Touch operation	Touch operation
1	Current value	N/A	N/A
2	Slider control	Use the **Rotary control** to adjust value	Slide the slider **Up** or **Down** to adjust value.
3	Auto	Press **OK** button to switch between Auto and manual adjustment.	Select to switch between Auto and manual adjustment.

Using control dialogs

Control dialogs enable you to control externally connected equipment, such as an autopilot unit.

The following diagram shows the main features of a typical control dialog:



Screen item	Description
1	**Status** — provides status information for the connected equipment. For example, the Pilot Control dialog displays the locked heading and current navigation mode for a connected autopilot unit.
2	**Control icons** — provide direct control of the connected equipment. For example, the Pilot Control dialog **Standby** and **Track** icons enable you to instruct a connected autopilot unit to perform specific functions.
3	**Close** — Closes the control dialog.

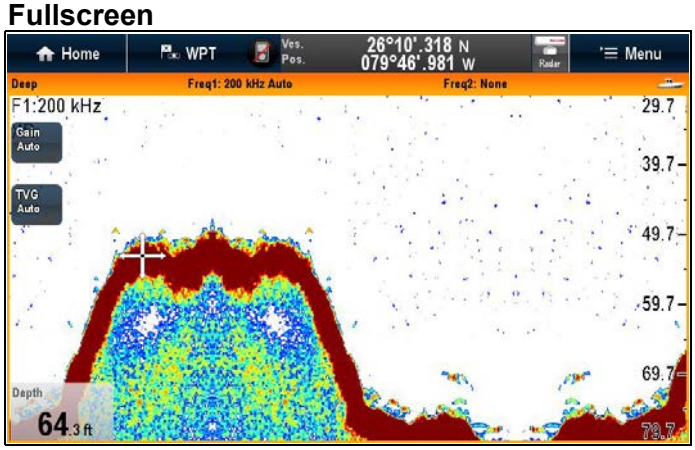
3.11 Splitscreen controls

When viewing a page with more than 1 application displayed you can switch applications from the splitscreen view to fullscreen view.

Example 1 — Splitscreen page



Example 2 — Sonar application expanded to Fullscreen

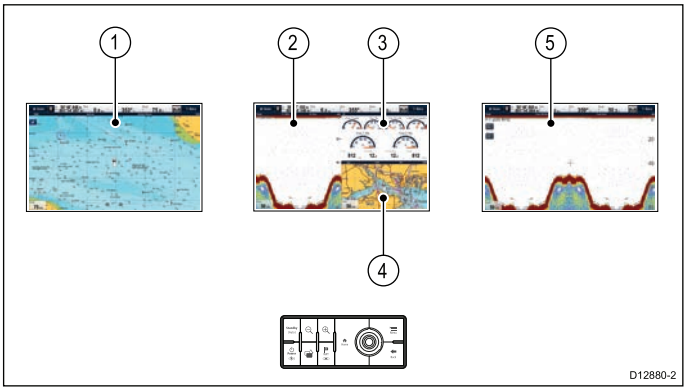


Switching the active pane or display using the keypad

The Switch Active button is used to switch the active pane on a multi application page and / or to switch the active display.

With multiple displays connected and / or multiple application page(s) displayed:

Cycle sequence



1. Press the **Switch Active** button to enter switch mode.
2. Use the **Rotary control** to cycle through the available panes and / or displays.

   The keypad will cycle through displays in the order in which they were paired. On multi application pages the Range buttons can be used

to switch the active application between full and splitscreen.

3. Press the **Back** button or the **Switch Active** button to exit switch mode.

Expanding and retracting a splitscreen application

The following steps apply to MFDs that have a **Switch Active Pane** button or have an MFD keypad connected.

With a page featuring multiple applications displayed:

1. Select the application you want to expand.
2. Press and hold the  **Switch Active Pane** button.
   The active pane is expanded to fullscreen.
3. To revert back to the splitscreen view press and hold the  **Switch Active Pane** button again.

Expanding and retracting a splitscreen application using menu options

The following steps apply to MFDs that do not have a **Switch Active Pane** button.

With a page featuring multiple applications displayed:

1. Select **Menu**.
2. Select **Fullscreen View** to expand the active application in fullscreen, or
3. Select **Splitscreen View** to revert to the splitscreen page view.

3.12 Initial set up procedures

Once your display has been installed and commissioned, Raymarine recommends that you complete the Startup wizard and perform some additional procedures.

Startup wizard

When you power-up the display for the first time or after a system reset a Startup Wizard is displayed. The wizard guides you through the following basic configuration settings:

1. Language
2. Boat type
3. Configure Units (Units of measure)
4. Boat Details (Parameters)

Note: These settings can also be set at any time using the menus accessible from **Homescreen > Customize**.

Additional settings

In addition to the settings covered by the Wizard, it is also recommended that the following initial set up tasks are completed:

- Designate the data master
- Set your date and time preferences
- Select data sources
- Familiarize yourself with the product using Simulator Mode



Warning: Minimum Safe Depth, Beam and Height

Depending on cartography vendor, the minimum safe settings are used during automatic route generation, they are used to restrict created routes from entering water that is not suitable for the vessel.

Data is taken from compatible cartography. Minimum safe settings are user defined calculations. As both of these factors are outside of Raymarine's control; Raymarine will not be held liable for any damage, physical or otherwise, resulting from the use of the automatic route generation feature or the **Minimum Safe Depth**, **Minimum Safe Beam** or **Minimum Safe Height** settings.

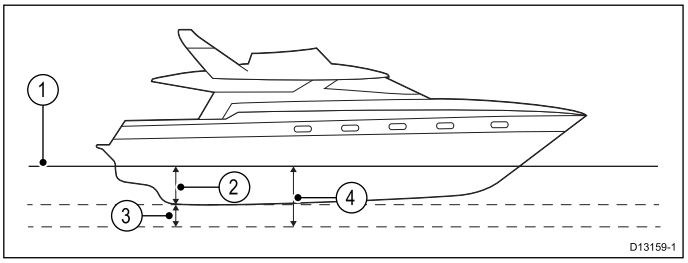
Minimum safe vessel depth

As part of the **Initial startup wizard** the **Minimum Safe Depth** value can be set.

Minimum Safe Depth can be established by adding together:

- Maximum Vessel Draft (i.e. the distance from the waterline to the lowest point of a vessel's keel.)
- Safety Margin (an adequate clearance below the keel to allow for draft variation and changes in water or bottom conditions.)

i.e.: **Minimum Safe Depth** = Maximum Vessel Draft + Safety Margin.



1. Waterline
2. Maximum Vessel Draft
3. Safety Margin
4. **Minimum Safe Depth**

Important: The information below is provided for guidance only and is not exhaustive. Some influencing factors can be unique to certain vessels and / or areas of water and may not be listed below. You should ensure you account for ALL factors that apply to your current situation when making calculations.

Some of the factors that can influence how much a vessel draws are shown below:

- **Vessel displacement (weight)** — A vessel's draft will increase when it is fully laden when compared with its unladen displacement.
- **Water type** — A vessel's draft will increase by approximately 2% to 3% in fresh water compared to seawater.

Some of the factors that should be taken into account when calculating a Safety Margin are:

- **Vessel maneuvering characteristics** — A vessel's draft increases due to squat, trim, roll, pitch and heave.
- **Chart accuracy** — The electronic chart depth may not be accurate or the true depth may have changed since the last survey.
- **Weather conditions** — High air pressure, and prevailing wind strength and direction can affect wave height.

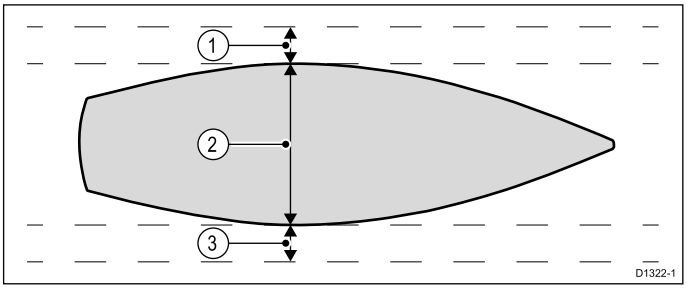
Minimum safe beam

As part of the **Initial startup wizard** the **Minimum Safe Beam** value can be set.

Minimum Safe Beam can be established by adding together:

- Maximum Vessel Width (Beam)
- Safety Margin (an adequate clearance to either side of the vessel.)

i.e.: **Minimum Safe Beam** = Port Safety Margin + Beam + Starboard Safety Margin.



1. Port safety margin
2. Maximum Vessel Width (Beam)
3. Starboard safety margin

Important: The information below is provided for guidance only and is not exhaustive. Some influencing factors can be unique to certain vessels and / or areas of water and may not be listed below. You should ensure you account for ALL factors that apply to your current situation when making calculations.

Some of the factors that should be taken into account when calculating a Safety Margin are:

- **Vessel maneuvering characteristics** — A vessel's required clearance will increase due to roll.
- **Chart accuracy** — The electronic chart data may not be accurate or may have changed since last surveyed.

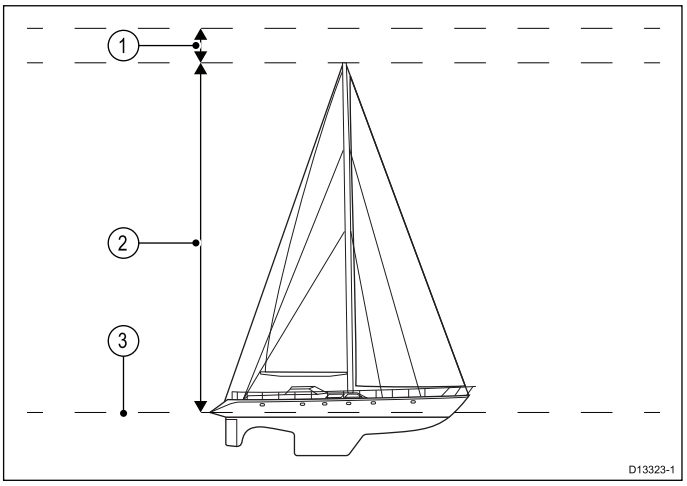
Minimum safe height

As part of the **Initial startup wizard** the **Minimum Safe Height** value can be set.

Minimum Safe Height can be established by adding together:

- Maximum vessel height from waterline
- Safety Margin (an adequate clearance above the vessel to account for tide and weather effects.)

i.e.: **Minimum Safe Height** = Maximum Vessel Height + Safety Margin.



1. Safety Margin
2. Maximum height from waterline
3. Waterline

Important: The information below is provided for guidance only and is not exhaustive. Some influencing factors can be unique to certain vessels and / or areas of water and may not be listed below. You should ensure you account for ALL factors that apply to your current situation when making calculations.

Some of the factors that can influence vessel height are shown below:

- **Vessel displacement (weight)** — A vessel's height (from the waterline) will decrease when it is fully laden when compared with its unladen displacement.
- **Water type** — A vessel's height will decrease by approximately 2% to 3% in fresh water compared to seawater.

Some of the factors that should be taken into account when calculating a Safety Margin are:

- **Vessel maneuvering characteristics** — A vessel's height changes due to squat, trim, roll, pitch and heave.
- **Chart accuracy** — The electronic chart data may not be accurate or may have changed since the last survey.
- **Weather conditions** — Low air pressure, and prevailing wind strength and direction can affect water level.

Setting the vessel Minimum Safe Depth, Beam and Height

From the Homescreen:

1. Select **Customize**.
2. Select **Boat Details**.
3. Select **Min. Safe Depth**, **Min. Safe Beam** or **Min. Safe Height**.
4. Enter your calculated minimum safe settings.

Setting time and date preferences

With the homescreen displayed:

1. Select **Customize**.
2. Select **Time and Date Set-up**.
3. Use the **Date Format**, **Time Format**, and **Local Time: UTC** menu items to set your time and date preferences.

Data master

Systems containing more than one MFD must have a designated Data master MFD. The Data master is the primary MFD in the network, this should be the MFD that has the connection to the **SeaTalkng®** / **NMEA 2000** CAN bus network and any other devices and sources of data in your system. The Data master bridges the data over the **SeaTalkhs** network to any compatible networked 'repeater' MFDs.

Information shared by the Data master includes:

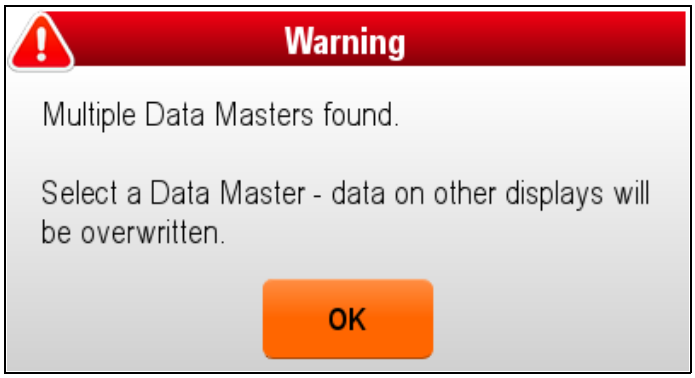
- Cartography
- Routes and waypoints
- Radar
- Sonar
- Data received from the autopilot, GNSS receiver, instruments, transducers, the engine and any other compatible external sources.

Note: Your system may be wired for redundancy with data connections made to repeat displays. However these connections will only become active in the event of a fault and/or reassignment of the data master.

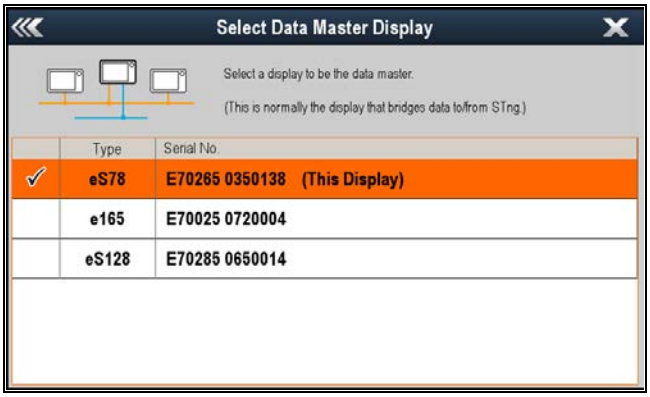
Note: In an autopilot system which does not contain a dedicated pilot control head the Data master also acts as the autopilot controller.

Resolving multiple Data masters

An alarm is triggered if the system detects more than one Data master. A single Data master display must be selected before you can use your networked MFDs.



1. Select **OK**.
   The Data master list is displayed.



2. Select an MFD from the list that you want to designate as the Data master. This should be the MFD that is connected to the **SeaTalkng®** / **NMEA 2000** network.

Important: Devices and data from the **SeaTalkng®** / **NMEA 2000** network will NOT be available to networked MFDs, if the designated Data master is not connected to the **SeaTalkng®** / **NMEA 2000** network.

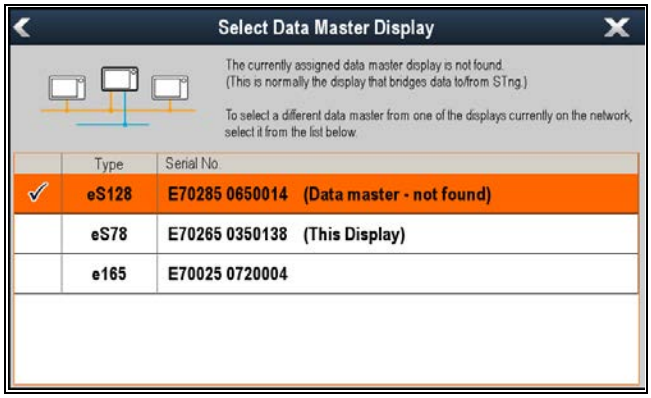
Resolving Data master lost

If the current Data master cannot be found by the system then an alarm is triggered. The Data master may become temporarily unavailable under certain circumstances, such as if the MFD is rebooting after a software update of power cycle.



1. If you have not made any changes to your system then WAIT for the Data master to become available. When the Data master is available the alarm will cancel and you can use you MFDs as normal.
2. If the Data master does not become available check the power connection and status of the Data master MFD and resolve any issues
3. If problems with the Data master MFD cannot be resolved then select **Options** from the Data master lost warning.

   The Data master selection list is displayed.



4. Select an MFD from the list that you want to designate as the new Data master.

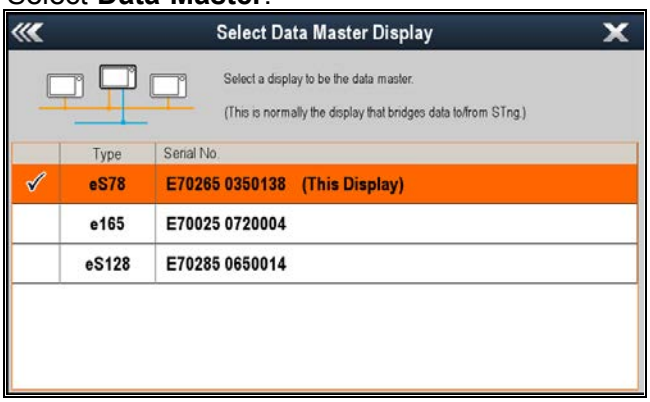
Important: If this is not the MFD that is connected to the **SeaTalkng®** / **NMEA 2000** network then devices and data from this network will not be available to networked MFDs.

Changing the Data master

On multiple MFD networks, at power up the system will search for the Data master MFD. If more than one Data master is found or no Data master is found then you will be prompted to select a Data master before you can use you MFDs.

You can change your Data master MFD at any time:

1. From the Homescreen select the **Set-up** icon.
2. Select **Maintenance**.
3. Select **Data Master**.



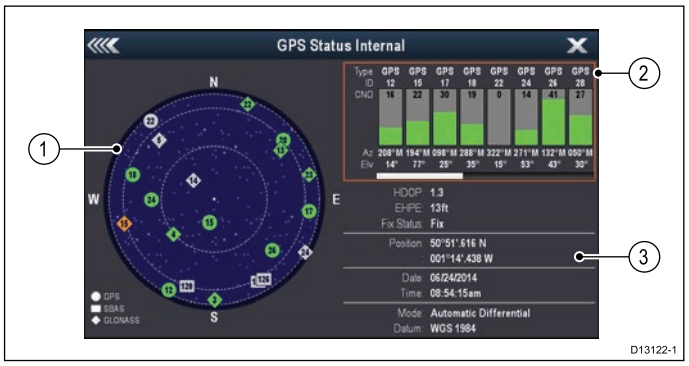
4. Select an MFD from the list that you want to designate as the Data master. This should be the MFD that is connected to the **SeaTalkng®** / **NMEA 2000** network.

Important: Device and data from the **SeaTalkng®** / **NMEA 2000** network will NOT be available to networked MFDs, if the designated Data master is not connected to the **SeaTalkng®** / **NMEA 2000** network.

3.13 GNSS Status

The **GPS status** page enables you to view the status of the available satellites that are compatible with your receiver.

The satellite constellations are used to position your vessel in the Chart and Weather applications. You can set up your receiver and check its status from the GPS Set-up menu: **Homescreen > Set-up > System Settings > GPS Set-up**. For each satellite, the screen provides the following information:



1. Sky view
2. Satellite status
3. Position and fix information

Sky view

Sky view is a visual representation that shows the position of navigation satellites and their type. Satellite types are:

- **Circle** — A circle identifies a satellite from the GPS constellation.
- * **Diamond** — A diamond identifies a satellite from the GLONASS constellation.
- **Square** — A square identifies an (SBAS) differential satellite.

Note: * GLONASS satellites are only available when connected to a compatible GNSS receiver. Refer to the *Technical specification* for your product to identify your receiver type.

Satellite status area

The Satellite status area displays the following information about each satellite:

- **Type** — Identifies which constellation the satellite belongs to.
- **ID** — Displays the satellites identification number.
- **CNO** (Carrier-to-noise ratio) — Displays the signal strength of each satellite shown in the Sky view:
  - Grey = searching for satellite
  - Green = satellite in use
  - Orange = tracking satellite
- **Azimuth and Elevation** — Provides the angle of elevation and azimuth between the location of the receiver and the satellite.

Position and fix information

The following positional and fix information is provided:

- **Horizontal Dilution of Precision (HDOP)** — HDOP is a measure of satellite navigation accuracy, calculated from a number of factors including satellite geometry, system errors in the data transmission and system errors in the receiver. A higher figure signifies a greater positional error. A typical receiver has an accuracy of between 5 and 15 m. As an example, assuming a receiver error of 5 m, an HDOP of 2 would represent an error of approximately 15 m. Please remember that even a very low HDOP figure is NO guarantee that your receiver is providing an accurate position. If in doubt, check the displayed vessel position in the Chart application against your actual proximity to a known charted object.
- **Estimated Horizontal Position Error (EHPE)** — EHPE is a measure of the estimated error of a position fix in the horizontal plane. The value displayed indicates that your position is within a circle radius of the stated size 50% of the time.
- **Fix status** — indicates the actual mode the receiver is reporting:
  - **Fix** — Satellite fix has been acquired.
  - **No Fix** — No satellite fix can be acquired.
  - **D Fix** — A differential beacon fix has been acquired.
  - **SD Fix** — A differential satellite fix has been acquired.
- **Position** — Displays the latitude and longitude position of your receiver.
- **Date / Time** — Displays the current date and time generated by the position fix in UTC format .
- **Mode** — Identifies wether the receiver is working in differential mode or non-differential mode.
- **Datum** — The receiver's datum setting affects the accuracy of the vessel position information displayed in the Chart application. In order for your receiver and MFD to correlate accurately with your paper charts, they must be using the same datum.

Global Navigation Satellite Systems (GNSS)

A GNSS is a system of satellites that provides autonomous geo-spatial positioning that allows electronic devices with compatible receivers to determine their location (longitude, latitude and altitude).

Operational GNSS

- **GPS** — (NAVSTAR) Global Positioning SystemUS owned constellation of satellites that became fully operational in 1995.
- **GLONASS** acronym for "***GLO****balnaya* ***NA****vigatsionnaya* ***S****putnikovaya* ***S****istema*" or “Global Navigation Satellite Systems” — Russian owned constellation of satellites that offered global coverage in 2010.

Planned GNSS

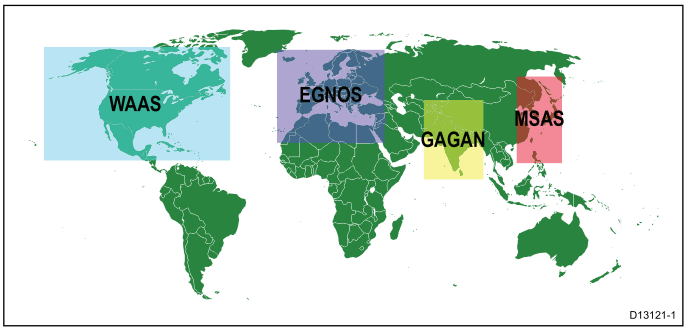
- **Galileo** — European satellite constellation in initial deployment phase due to become operational in 2020.

- **COMPASS / Beidou-2** — Chinese Regional Navigation Satellite System (Beidou) is currently being expanded for global coverage (COMPASS or Beidou-2) by 2020.

Satellite based augmentation systems (SBAS)

Satellite based augmentation systems (SBAS) are systems that are used to compliment existing GNSS by providing differential corrections that improve a GNSS's attributes such as accuracy, availability and reliability.

The image below shows SBAS regional coverage.



- **WAAS** — Wide Area Augmentation System (Operated by the Federal Aviation Authority (FAA) in the USA.)
- **EGNOS** — European Geostationary Navigation Overlay Service (Operated by the European Space Agency.)
- **GAGAN** — GPS Aided Geo Augmented Navigation (Operated by India.)
- **MSAS** — Multi-functional Satellite Augmentation System (Operated by Japan's Ministry of Land, Infrastructure and Transport and Japan Civil Aviation Bureau (JCAB)
- **QZSS** — Quasi-Zenith Satellite System (Proposed by Japan)

Raymarine GPS / GNSS receiver compatibility

Raymarine GPS receivers and GNSS (GPS/GLONASS) receivers are compatible with the following GNSS and SBAS.

Status / Type	Name	Compatible receivers
Operational GNSS	GPS	All internal and external Raymarine GPS receivers and GNSS receivers
Operational GNSS	GLONASS	eS Series and a9x, a12x internal GNSS receiver
Planned GNSS	COMPASS / Beidou–2	* eS Series and a9x, a12x internal GNSS receiver
Planned GNSS	Galileo	* eS Series and a9x, a12x internal GNSS receiver
Operational SBAS	WAAS	All internal and external Raymarine GPS receivers and GNSS receivers
Operational SBAS	EGNOS	All internal and external Raymarine GPS receivers and GNSS receivers
Operational SBAS	MSAS	All internal and external Raymarine GPS receivers and GNSS receivers
Operational SBAS	GAGAN	All internal and external Raymarine GPS receivers and GNSS receivers
Planned SBAS	QZSS	* eS Series and a9x, a12x internal GNSS receiver

Note: * Not currently operational but will be supported via software update in the future.

GPS selection

You can use an internal (if available) or external GPS receiver or GNSS receiver.

- Your multifunction display may feature an internal GPS or GNSS receiver.
- You can also connect an external receiver using SeaTalk^{ng} or NMEA 0183.
- Where appropriate use the System Settings menu to enable or disable the internal receiver.

Enabling or disabling the internal receiver

If your multifunction display features an internal GPS receiver or GNSS receiver then this can be enabled and disabled by following the steps below.

With the Homescreen displayed:

1. Select **Set-Up**.
2. Select **System Settings**.
3. To enable the internal receiver, select **Internal GPS** so that On is highlighted.
4. To disable the internal receiver, select **Internal GPS** so that Off is highlighted.

Enabling and disabling differential satellites

You can choose wether or not your receiver uses differential data provided by SBAS constellations.

From the GPS Set-up menu: **Homescreen > Set-up > System Settings > GPS Set-up**:

1. Select **Differential GPS**.
   Selecting Differential GPS will switch differential satellite (SBAS) reception On (default) and Off.

Choosing differential satellites

You can select which constellations of SBAS your receiver will use.

From the GPS Set-up menu: **Homescreen > Set-up > System Settings > GPS Set-up**:

1. Select **Differential System**
   The following differential systems are available:
   - WAAS
   - EGNOS
   - MSAS
   - GAGAN
   - All Others
2. Select the relevant differential system from the menu to switch reception for that system On (default) and Off.

COG/SOG Filter

The COG/SOG filter averages the velocity vectors to compensate for the oscillating motion of the vessel, giving a clearer indication of the vessel's course and speed.

The filter does not affect the calculation of your receiver's reported position. The velocity vectors calculated from the signal provide an instantaneous measure of speed and direction of the receiver. The COG and SOG can therefor seem erratic under certain conditions. For example, when a vessel is moving slowly through rough seas, the receiver moves from side to side as well as in the direction of travel.

Slow moving vessels, or vessels sailing in rough seas will benefit from a high setting, whereas a power boat that can quickly change speed and direction will benefit from a low setting.

Selecting COG/SOG filter

You can change the level of filter applied to COG/SOG.

From the GPS Set-up menu: **Homescreen > Set-up > System Settings > GPS Set-up**:

1. Select **COG/SOG Filter**.
   A list of available filter levels is displayed:
   - Low
   - Medium (default)
   - High
2. Select the require filter level from the list.

Restarting the GNSS (GPS/GLONASS) receiver

To restart the GNSS (GPS/GLONASS) receiver follow the steps below:

From the GPS Set-up menu: **Homescreen > Set-up > System Settings > GPS Set-up**:

1. Select **Restart GPS**.
   The receiver will be restarted.

3.14 Enabling autopilot control

Enabling the autopilot control function — SeaTalk and SPX SeaTalk^{ng} autopilots

To enable control of your SeaTalk or SPX SeaTalk^{ng} autopilot using your multifunction display follow the steps below.

From the Homescreen:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Autopilot Control** so that On is highlighted.
   Selecting Autopilot Control will switch the control between On and Off.

On a system containing multiple displays the pilot control is enabled on all displays at the same time.

Enabling the autopilot control function — Evolution autopilots

To enable control of your Evolution autopilot using your multifunction display follow the steps below.

From the Homescreen.

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **External Devices**.
4. Select **Pilot Set-up**.
5. Select **Pilot control** so that On is highlighted.
   Selecting Pilot control will switch the Autopilot control function on and off.

3.15 Engine identification

Engine data can be displayed on your MFD using the Data application, which provides some preset Engine pages for displaying some of the most common types of engine data.

Important: Before you can display Engine data on your MFD, you must:

- Ensure that your MFD is running LightHouse software version 8 or later.
- **Refer to the important “Engine setup with an ECI interface” and “Using the engine identification wizard” information.**
- Make the data connections, according to the instructions provided in the **87202 ECI Installation instructions**.
- Ensure all data buses are powered up (including engine data CAN buses, gateways, and also the SeaTalk^{ng} bus).
- Start the engine. It is important that only one engine is running at a time, to ensure that the system can isolate the correct engine data message.
- Run the **Engine identification wizard** to ensure that your engines are displayed in the correct order in the Data application.



Engine setup with an ECI interface

Before you can display engine data on your MFD, you may need to use the "Engine Identification wizard" on the MFD to setup the engines.

Important: When setting up on a multiple engine system, engines should always be turned on in sequence from port to starboard.

The following table details the different types of engine supported by the ECI interface unit, and the setup requirements for each:

Engine CAN bus protocol	Number of engines	Engine CAN bus configuration	Number of ECI units	Setup via wizard on MFD required
NMEA 2000	1	Single CAN bus	1	✗
NMEA 2000	2+	Single shared CAN bus	1	✗
NMEA 2000	2+	Separate CAN bus for each engine	1 for each CAN bus	✓
J1939	1	Single CAN bus	1	✗
J1939	2+	Single shared CAN bus	1	✗
J1939	2+	Separate CAN bus for each engine	1 for each CAN bus	✓

Engine interfacing without an ECI unit

For engines with a NMEA 2000 CAN bus it may be possible to connect to a Raymarine MFD via a SeaTalk^{ng} system without the use of a Raymarine ECI unit.

Refer to your engine dealer and also your local Raymarine dealer for advice on any engine instancing requirements and suitable connection cables.

Using the engine identification wizard

If your engine data appears in the wrong order on the engine data pages you can correct this by running the engine identification wizard.

From the Homescreen:

1. Select **Set-up > System Settings > External Devices > Engines Set-up**.
2. If required change the number of engines your vessel has by selecting **Num. of Engines:** and entering the correct number of engines.

   You can select up to 5 engines.

3. Select **Identify engines**.

Important: It is important that only one engine is running at a time, to ensure that the system can isolate the correct engine data message.

4. Follow the onscreen prompts to complete the engine identification wizard.

   The engines that will be included in the identification wizard are determined by the Number of engines set during step 2 above.

   i. Switch Off ALL vessel engines and select **Next**.

   The wizard will run through all engines (max of 5 as defined in step 2 above) from port to starboard in sequence.

   ii. Turn On the **port engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the port engine.

   iii. Turn On the **center port engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the center port engine.

   iv. Turn On the **center engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the center engine.

   v. Turn On the **center starboard engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the center starboard engine.

   vi. Turn On the **starboard engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the starboard engine.

5. Select **OK** on the Identify Engines confirmation dialog.

The engines will now appear in the correct location on the engine data page.

3.16 Enabling AIS functions

Before proceeding ensure your AIS unit is connected to NMEA Port 1.

With the homescreen displayed:

1. Select **Set-Up**.
2. Select **System Settings**.
3. Select **NMEA Set-Up**.
4. Select **NMEA Input Port 1**.
5. Select the AIS 38400 option.
6. Select **Back** to return to the **System Settings** menu.
7. Select **External Devices**.
8. Select **AIS Unit Set-up**.
   The AIS Unit Set-up menu is displayed.
9. Adjust the AIS options as appropriate.

3.17 Shared preferences

The Shared preferences scheme allows all compatible networked **MFD**s and instrument displays to share user preference settings. When a user preference is changed on 1 display device all compatible networked display devices are automatically updated to use the changed preference.

Shared preferences are applicable to the following devices:

- **MFD**s networked using **SeaTalk^{hs}**
- **MFD**s networked using **SeaTalk^{ng}**
- **SeaTalk^{ng}** instruments displays networked using **SeaTalk^{ng}**
- **SeaTalk** instruments displays networked via a **SeaTalk** to **SeaTalk^{ng}** converter.

List of shared preferences

The table below shows the settings that are shared as part of the Shared preference scheme.

Units • Speed units • Distance units • Depth units • Wind units • Temperature units • Flow Rate units • Volume Units • Pressure units	**Boat Details** • Boat Type • Number of engines • Number of fuel tanks • Number of batteries
Time and Date • Date Format • Time Format • Local Time (UTC) offset	**System Preferences** • Bearing mode • Variation (manual) • Language
Data application • Max RPM range • RPM red zone • RPM red zone value	

3.18 Memory cards and chart cards

MicroSD memory cards can be used to back up / archive data (e.g. Waypoint, and Tracks). Once data is backed up to a memory card old data can be deleted from the system, creating capacity for new data. The archived data can be retrieved at any time. Chart cards provide additional or upgraded cartography.

It is recommended that your data is backed up to a memory card on a regular basis. Do NOT save data to a memory card containing cartography.

Compatible cards

The following types of MicroSD cards are compatible with your display:

- Micro Secure Digital Standard-Capacity (MicroSDSC)
- Micro Secure Digital High-Capacity (MicroSDHC)

Note:

- The maximum supported memory card capacity is 32 GB.
- MicroSD cards must be formatted to use either the FAT or FAT 32 file system format to enable use with your MFD.

Speed class rating

For best performance it is recommended that you use Class 10 or UHS (Ultra High Speed) class memory cards.

Chart cards

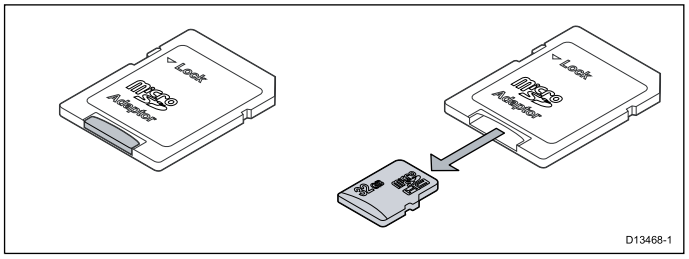
Your product is pre-loaded with electronic charts (worldwide base map). If you wish to use different chart data, you can insert compatible chart cards into the unit's memory card reader.

Use branded chart cards and memory cards

When archiving data or creating an electronic chart card, Raymarine recommends the use of quality branded memory cards. Some brands of memory card may not work in your unit. Please contact customer support for a list of recommended cards.

Removing MicroSD card from its adaptor

MicroSD memory and cartography chart cards are usually supplied inserted into an SD card adaptor. The card will need to be removed from the adaptor before inserting into your display.



3.19 Simulator mode

The Simulator mode enables you to practice operating your display without data from a GNSS receiver, Radar scanner, AIS unit, or Sonar module.

The simulator mode is switched on / off in the **System Setup Menu**.

Note: Raymarine recommends that you do NOT use the simulator mode whilst navigating.

Note: The simulator will NOT display any real data, including any safety messages (such as those received from AIS units).

Note: Any system settings made whilst in Simulator mode are NOT transmitted to other equipment.

Enabling and disabling simulator mode

You can enable and disable simulator mode by following the steps below.

With the homescreen displayed:

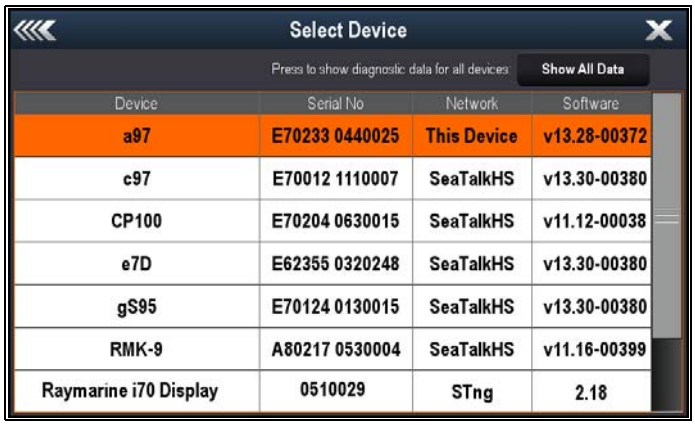
1. Select **Set-Up** .
2. Select **System Settings**.
3. Select **Simulator:**.
4. Select On to turn simulator mode on, or
5. Select Off to turn simulator mode off.

Note: The Demo movie option is for retail demonstration purposes only.

3.20 System software updates

Raymarine regularly issues software updates for its products that can provide new and enhanced features and improved performance and usability. You should ensure that you have the latest software for your products by regularly checking the **Raymarine®** website for new software. **Raymarine®** MFDs can be used to check and update the software of compatible **Raymarine®** products.

You can identify product software versions using the Diagnostics page on your **MFD**: **Homescreen > Set-up > Maintenance > Diagnostics > Select Device**.



The system update process can be used to update all compatible products connected over **SeaTalk^{hs}** and **SeaTalk^{ng}®**.

Caution: Installing software updates

The software update process is carried out at your own risk. Before initiating the update process ensure you have backed up any important files.

Ensure that the unit has a reliable power supply and that the update process is not interrupted.

Damage caused by incomplete updates are not covered by Raymarine warranty.

By downloading the software update package, you agree to these terms.

Using your MFD to Check for software updates online

When your MFD is connected to an Access point which has an internet connection, the MFD can check online for available software updates for your Raymarine products.

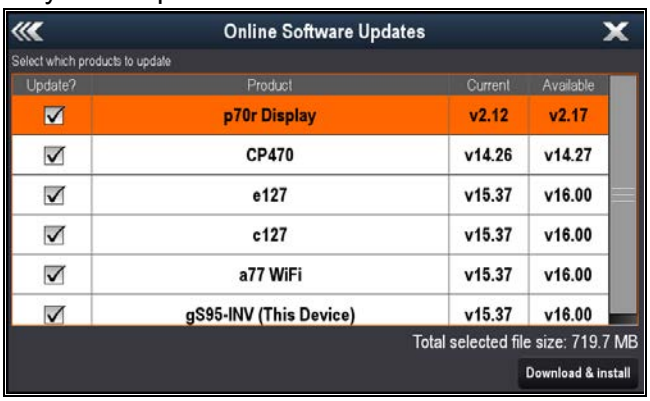
Note: To check for software updates for connected SeaTalk^{ng}® products, you must use the Data Master MFD.

See 21.2 **Connecting to a Wi-Fi access point / mobile hotspot** for more information about connecting your MFD to the internet.

Note: When connected to a Quantum Radar using a Wi-Fi connection **a**, **c**, **e** and **gS Series** MFDs cannot connect to a Wi-Fi Access point at the same time. The Radar must be placed into Standby before trying to establish a connection to the Access point.

From the Maintenance menu: (**Homescreen > Set-up > Maintenance >**

1. Select **Check Online for Updates**.
   The MFD will now attempt to establish an internet connection. Please follow any onscreen instructions.
2. Once a connection is established the MFD will check for new software updates available for your Raymarine products.



3. Select the software updates that you want to download.

Important:

- Software files are downloaded to internal storage or to MicroSD card depending on the free space available.
- Downloaded software files are deleted once the software update process is complete.

4. Select **Download and Install**.
   The software will now be downloaded to your MFD and then installed on the selected products.



Downloading software updates to MicroSD card

Software updates can be downloaded from the Raymarine website.

To perform a software update you will need:

- A PC or Apple Mac with an internet connection and a card reader.

- A FAT 32 formatted MicroSD card with SD card adaptor.

Note: Do not use a cartography chart card for software updates or user data / settings backups.

1. Go to the Software update section of the **Raymarine®** website.
2. Compare the latest available software against the software version of your **Raymarine®** products.
3. If the software on the website is newer than the software on your products download the relevant software package.
4. Insert the MicroSD card into your PC or Mac card reader.

   Depending on your computers card reader type an SD card adaptor may be required.

5. Unzip the downloaded software package 'zip' file to the MicroSD card.
6. If used, remove the MicroSD card from the SD card adaptor.

Performing software updates

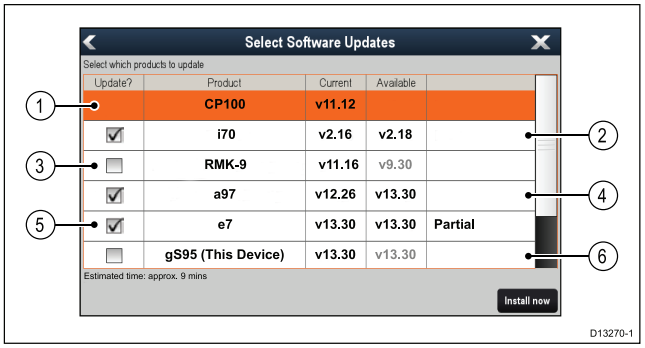
Attention Do NOT perform software updates whilst your boat is underway.

1. Backup your user data and settings.
2. Insert the MicroSD card containing software update files into the card reader of your **Data Master** MFD.

   If the inserted card contains updated software for a device on your system, after a few seconds a pop-up message is displayed. If you need to re-install or downgrade software then select the **Check Card for Updates** option from the **Maintenance** menu: **Homescreen > Set-up > Maintenance**.
3. Select **Yes**.

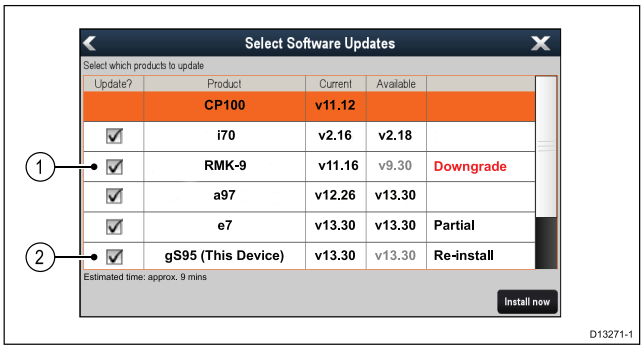
   A second pop-up is displayed.
4. Select **OK**.

   The Software updates page is displayed.



1	No software update available on memory card
2	Software update available on memory card
3	Software on memory card is older than the software installed on the product
4	Software update available on memory card
5	Partial software update available on memory card
6	Software version on memory card is the same as the software installed on the product

   If a software update is available on the memory card the **Update?** box is automatically ticked.
5. On touchscreen displays you can select and hold on the available software version to see further details about the software that will be installed.
6. Select the products that you want to update.



1	Software downgrade will be performed
2	The same software version will be re-installed

7. Select **Install Now**.

   The installation process will begin.



   During the update process, details of each product's progress is displayed. The **MFD** serving the software updates will be the last device to be updated.
8. Select **OK** on the Software Updates pop-up message.
9. Remove the MicroSD card from the card reader.

Note: If you switch on a display when it has a memory card already inserted which contains software update files saved to the root directory, a standalone software update will be started for that display only.

3.21 Pairing the keypad

Each keypad can be paired with multiple MFDs and multiple keypads can be connected to the same system.

With the keypad connected to the MFD:

1. Select **External Keypad** from the External Devices menu: **homescreen > Set-up > System Settings > External Devices > External Keypad**.
2. Select **Pair Keypad**.
3. Press any button on the external keypad.
4. From the pop-up message select the orientation of the keypad.

   Either landscape or portrait orientations are available.

The keypad is now paired.

Unpairing the keypad

The keypad can be unpaired from an individual display.

1. Select **External Keypad** from the External Devices menu: **homescreen > Set-up > System Settings > External Devices > External Keypad**.
2. Select **Clear Pairings**.
3. Select **Yes** to unpair the keypad with the display.

3.22 Learning resources

Raymarine has produced a range of learning resources to help you get the most out of your products.

Training courses

Raymarine regularly runs a range of in-depth training courses to help you make the most of your products.

FAQs and Knowledge Base

Raymarine has produced an extensive set of FAQs and a Knowledge Base to help you find more information and troubleshoot any issues.

Technical support forum

You can use the Technical support forum to ask a technical question about a Raymarine product or to find out how other customers are using their Raymarine equipment.

Chapter 4: Managing display data

Chapter contents

- 4.1 Saving user data and user settings on page 62
- 4.2 Save and restore items on page 64
- 4.3 Screenshots on page 66
- 4.4 Resetting your system on page 66

4.1 Saving user data and user settings

User data, settings and media files can be saved to a memory card.

Waypoints, routes and tracks are saved in the .gpx file format. The gpx file format is a device-independent data format, making it easy to exchange data between your display and other GPS devices / software that support the gpx file format.

Data	File format	Data type
Waypoints	.gpx	User data
Routes	.gpx	User data
Tracks	.gpx	User data
Image files	.png	Media file
Video files	.mp4	Media file
User settings	.tgz	User Settings
Weather data	.grb	User data

Note: It is recommended that you save your user data and user settings on a regular basis.

Note: Do NOT save user data or settings to a chart card containing cartography.

Legacy archive.fsh support

With the introduction of LightHouse II Release 9, Raymarine added support for the GPS Exchange (GPX) file format for archiving and transfer of Waypoint, Route and Track data. The GPX file format is a device-independent format universally used, simplifying data exchange between Raymarine and other manufacturer's products. With the introduction of LightHouse II Release 14, support for Raymarine's legacy data archiving format archive.fsh has been removed.

The process for converting an archive.fsh file to the new GPX file format is as follows:

1. Using an MFD with LightHouse II Release 8 or lower, export user data to MicroSD card (archive.fsh format).
2. Update the MFD to LightHouse II Release 13.
3. Import the archive.fsh file from MicroSD card.
4. Export user data to MicroSD card (GPX format).
5. Update the MFD to LightHouse II Release 14 or greater.
6. Import user data (GPX format) from the MicroSD card.

Alternatively Raymarine's Voyage Planner software can also be used to convert archive.fsh file to GPX format.

Saving all user data to a memory card

You can save all user data to one archive file.

With the Homescreen displayed:

1. Ensure you have a memory card (NOT a chart card) inserted into a card slot.
2. Select **My Data**.
3. Select **Import/Export**.
4. Select **Save Data**.
5. Select **Save All**.

   The onscreen keyboard is displayed.
6. Using the keyboard, enter the filename you want to save the file as.
7. Select **SAVE**.

   The select external storage dialog is displayed.
8. Select **SD1** (single or top card reader slot) or **SD2** (bottom card reader slot).

   A confirmation dialog is displayed.
9. Select **OK**.

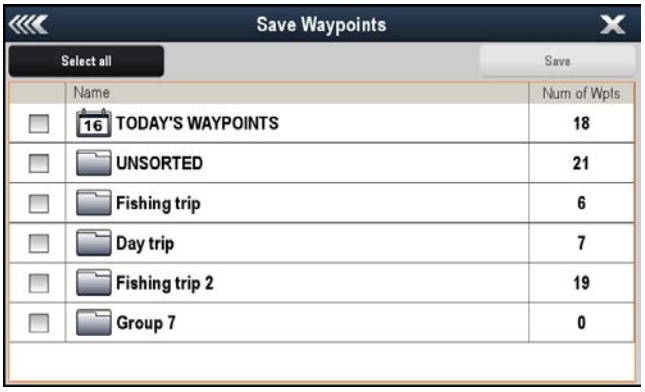
Saving Waypoints, Routes and Tracks

With the Homescreen displayed:

1. Ensure you have a memory card (NOT a chart card) inserted into a card slot.
2. From the **Homescreen** select **My Data > Import/Export > Save Data**.
3. Select either **Save Waypoints**, **Save Routes**, **Save Tracks** or **Save All**.

   The appropriate list is displayed.

Example — Waypoint list



4. Select the group or groups you want to save, or select **Select All**.
5. Select **Save**.

   The onscreen keyboard is displayed.
6. Using the onscreen keyboard enter the filename you want to save the file as.
7. Select **SAVE**.
8. Select **SD1** (single or top card reader slot) or **SD2** (bottom card reader slot).

   When complete a confirmation dialog is displayed.
9. Select **OK**.

Importing Waypoints, Routes, or Tracks

With the Homescreen displayed:

1. Ensure you have the memory card containing the gpx file(s) inserted into a card reader slot.
2. From the **Homescreen** select **My Data > Import/Export > Retrieve Data**.

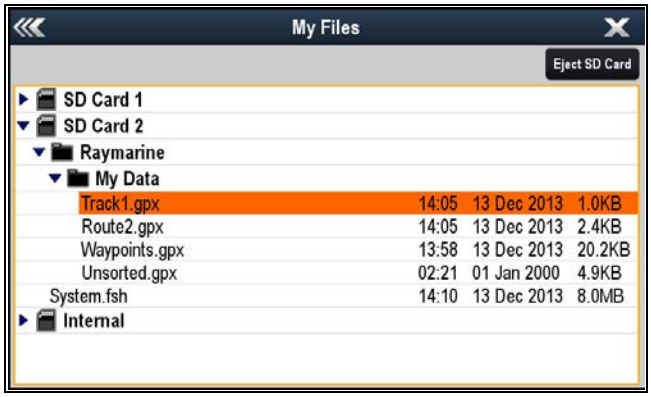
   The file browser is opened.

3. Browse to and select the file you want to import.
   A confirmation dialog is displayed.
4. Select **OK**.

Erasing user data files from a memory card

With the Homescreen displayed:

1. Ensure you have the memory card containing the data in one of the card slots.
2. Select **My Data**.
3. Select **Import/Export**.
4. Select **Erase from Card**.
   The file browser is opened.



5. Browse to and select the file you want to erase.
   A confirmation dialog is displayed.
6. Select **Yes**.

Erasing waypoints, routes, and tracks from the system

Note: The following procedure permanently erases selected or ALL waypoints, routes, or tracks stored on the display. BEFORE proceeding, ensure that you backup any data that you want to keep on to a memory card.

With the Homescreen displayed:

1. Select **My Data**.
2. Select **Import/Export**.
3. Select **Erase from System**.
4. Select **Erase Waypoints from System**, **Erase Routes from System**, or **Erase Tracks from System**, as appropriate.
5. Select the specific data items you want to erase, or select **Erase All**.
   A message is displayed prompting you for confirmation.
6. Select **Yes** to proceed with the deletion, or **No** to cancel the operation.

Backing up user settings

From your Data Master MFD:

1. Ensure you have a memory card (NOT a chart card) inserted into a card slot.
2. From the **Homescreen** select **My Data > Import/Export > Back-up Settings**.
3. Select **SD1** (single or top card reader slot) or **SD2** (bottom card reader slot).
   A confirmation dialog is displayed.
4. Select **OK**.

Restoring user settings

From your Data Master MFD:

1. Ensure you have a memory card (NOT a chart card) inserted into a card slot.
2. From the **Homescreen** select **My Data > Import/Export > Restore Settings**.
3. Select **SD1** (single or top card reader slot) or **SD2** (bottom card reader slot).
   A confirmation dialog is displayed.
4. Select **OK**.

4.2 Save and restore items

The table below details the data items and settings which will be saved to and restored from a memory card on your multifunction display.

Homescreen and settings

Menu	Setting
Homescreen	Default page configuration
Set-up > System settings	Autopilot control
	DSC alerts
Set-up > System settings > GPS Set-up	GPS screen
Set-up > System settings > External Devices > AIS Unit Set-up	Silent mode
	AIS safety messages
Set-up > System settings > External Devices > Remote control	Shortcut key
Set-up > System settings > External Devices > Weather Set-up	Source
Set-up > System settings > External Devices > Engines Set-up	Number of engines
Set-up > System settings > System preferences	Bearing mode
	Variation source
	Manual variation
	System Datum
Set-up > System settings	Simulator
Customize	Language
Customize > Boat Details	Boat Type
	Number of Engines
	Number of Fuel Tanks
	Number of Batteries
Customize > Units Set-up	Distance units
	Speed Units
	Depth Units
	Temperature Units
	Pressure Units
	Volume Units
	Economy Units
	Wind Speed Units
Customize > Time and Date Set-up	Date format
	Time format
	Local time offset

Menu	Setting
Customize > Databar Set-up	Databar content (cell 1 to 6)
	Compass in titlebar
	Status Icon Bar
	Databar Autohide
Customize > Display Preferences	Starting Page
	Key Beep
	Color Theme
	Cursor Autohide
	Range Controls
	Chart Ctxt Menu
	Pilot Control Bar
	Screenshot File

Alarm Manager

Menu	Setting
Safety Alarms	Waypoint arrival
	Offtrack alarm
	Anchor alarm
	Low fuel remaining
	MOB Data type
	Dangerous Radar targets
	Dangerous AIS targets
General Alarms	Alarm clock
	Countdown timer
	Water temperature
General Alarms > Fish alarm	Enable
	Fish alarm depth limits
	Fish alarm shallow limit
	Fish alarm deep limit

Chart application

Menu	Setting
Presentation	Chart Display
Presentation > Overlays	Aerial overlay
	Chart grid
	2D shading
	Community edits
	Chart text
	Chart boundaries
	Boat size
	Databox 1
	Databox 1 content

Menu	Setting
	Databox 2
	Databox 2 content
Presentation > Vectors	Vector length
	Vector width
Presentation > Objects	Show rocks
	Nav marks
	Nav marks symbols
	Light sectors
	Routing systems
	Caution areas
	Marine features
	Land features
	Business services
	Panoramic photos
	Roads
	Additional wrecks
	Colored seabed areas
	Vessel icon
Presentation > Depth & Contours	Show soundings
	Show contours
	Shallow contour
	Safety contour
	Depth contour
	Deep water color

Radar application

Menu	Setting
Presentation	Range rings
Presentation > Databoxes	Databox 1
	Databox 1 content
	Databox 2
	Databox 2 content

Sonar application

Menu	Setting
Channel	Channels
Presentation > Databoxes Set-up	Databox 1
	Databox 1 content
	Databox 2
	Databox 2 content

Data application

Menu	Setting
	Datapages and content
Presentation	Color theme
	Dial color
	Number of engines
	Maximum RPM range

Weather application

Menu	Setting
Databoxes Set-up	Databox 1
	Databox 1 content
	Databox 2
	Databox 2 content

4.3 Screenshots

You can take a screenshot of what is currently displayed on the screen.

Screenshots are saved in .png (Portable Network Graphic) format to a MicroSD Card. The saved images can be viewed from any device capable of viewing .png images.

Taking a screenshot

You can take a screenshot by following the steps below.

1. Insert a MicroSD card with suitable free space into the card reader.
2. Press the **Power** button.
   The Shortcuts page is displayed:
3. Select the **Camera** icon.
   A confirmation message is displayed.
4. Select **OK**.
   The screenshot is now saved to the MicroSD card.

Tip If your display has a **Back** button you can also take a screenshot by pressing and holding the **Back** button until the confirmation message appears.

Selecting the SD card slot for screenshots

If your multifunction display has 2 card reader slots, you must select which card slot to save the screenshot to.

From the homescreen.

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Screenshot File:**.
4. Select either **MicroSD 1** or **MicroSD 2**.

Viewing an image on the MFD

You can use your MFD to view images such as screenshots.

1. Ensure you have the memory card, containing the image you want to view, inserted into a card reader slot.
2. From the Homescreen, select **My Data**.
3. Select **My Files**.
   The file browser is displayed.
4. Use the file browser to locate the file.
5. Select the file you want to view.
   The file will now open.
6. Select **Back** or **Close** to close the image.

4.4 Resetting your system

Your system may be reset to its factory default settings if required.

There are 2 types of reset operation, both of which affect the current display you are using, AND any networked displays.

- Settings reset.
- Settings and data reset.

Settings reset

This option resets your setup menus, page sets, and databar settings to factory default. It will NOT affect your waypoints, routes, or tracks data.

Settings and data reset

In addition to the settings reset detailed above, performing a settings and data reset will also remove ALL waypoints, routes, and tracks data.

Resetting system settings

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **System Settings Reset**.
   A message is displayed prompting you to confirm the action.
4. Select **Yes** to proceed with the settings reset, or **No** to cancel.

Resetting system settings and data

Note: Performing a settings and data reset erases ALL waypoints, routes, and track data from your system. BEFORE proceeding with a settings and data reset, ensure that you backup any data that you want to keep on to a memory card.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **System Settings and Data Reset**.
   A message is displayed prompting you to confirm the action.
4. Select **Yes** to proceed with the settings and data reset, or **No** to cancel.

Chapter 5: Customizing your display

Chapter contents

- 5.1 Language selection on page 68
- 5.2 Boat details on page 69
- 5.3 Units set-up on page 70
- 5.4 Time and Date set-up on page 71
- 5.5 Display preferences on page 72
- 5.6 Databar and databox overview on page 74
- 5.7 Set-up menu options on page 76

5.1 Language selection

The system can operate in the following languages:

English (US)	English (UK)	Arabic
Bulgarian	Chinese — Simplified	Chinese — Traditional
Croatian	Czech	Danish
Dutch	Finnish	French
German	Greek	Hebrew
Hungarian	Icelandic	Indonesian
Italian	Japanese	Korean
Latvian	Lithuanian	Malay
Norwegian	Polish	Portuguese (Brazilian)
Russian	Slovenian	Spanish
Swedish	Thai	Turkish

With the Homescreen displayed:

1. Select **Customize**.
2. Select **Language**.
3. Select your language from the list of languages.

Language is part of the Shared Preferences scheme. Once a new language is selected the User interface language will change on all MFDs networked using **SeaTalk^{hs}** or **SeaTalk^{ng}** and, if the language is supported any instrument displays networked using **SeaTalk^{ng}** .

5.2 Boat details

You can customize various settings to make them specific to your vessel.

Menu item	Description	Options
Boat Type	You can change the appearance of the vessel in the chart application. Select the option that most closely resembles the type and size of your vessel. **Note:** When boat type is selected during the initial set up of the multifunction display the boat type shall determine the datapage configuration in the data application.	• Power Cruiser 1 (default) • Power Cruiser 2 • Power Cruiser 3 • Inboard Speed Boat • Outboard Speed Boat • Workboat • RIB • Sail Cruiser • Race Sail • Catamaran • Sport Fishing • Pro Fishing
Import Polar Table	Allows you to import a Polar table is .csv format. This option is available when a sailing vessel has been selected in the Boat type option.	Displays file browser
Delete Polar Table	An imported Polar table can be deleted from the system.	Confirm deletion
Min. Safe Depth	The Minimum Safe Depth setting is required when building routes using the **Autorouting** or **Easy Routing** feature.	Depth measurement
Min. Safe Beam	The Minimum Safe Beam setting is required when building routes using the **Easy Routing** feature.	Beam measurement
Min. Safe Height	The Minimum Safe Height setting is required when building routes using the **Easy Routing** feature.	Height measurement
Num. of Engines	Allows you to specify the number of engines your vessel has. This setting determines the number of engines shown in the engine data application.	• 1 to 5
Num. of Fuel Tanks	Allows you to specify the number of fuel tanks your vessel has. This setting determines the number of fuel tanks available in the Data application.	• 1 to 5
Num. of Batteries	Allows you to specify the number of batteries your vessel has. This setting determines the number of batteries available in the Data application.	• 1 to 16
Total Fuel Capacity	Allows you to specify the total fuel capacity of your vessel, this is required in order to enable the fuel manager function.	Total fuel capacity measurement

Customizing the vessel icon

With the homescreen displayed:

1. Select **Customize**.
2. Select **Boat Details**.
3. Select **Boat Type**.
4. Select the icon that most closely resembles your vessel type and size.

5.3 Units set-up

You can specify your preference for the units of measurement that will be used in all applications.

Menu item	Description	Options
Distance Units	The units of measure that will be used in all applications for the display of all values related to distance.	• Nautical Miles • NM & m (major units = Nautical Miles, minor units = meters) • Statute Miles • Kilometers
Speed Units	The units of measure that will be used in all applications for the display of all values related to speed.	• Knots • MPH (Miles Per Hour) • KPH (Kilometers Per Hour)
Depth Units	The units of measure that will be used in all applications for the display of all values related to depth.	• Feet • Meters • Fathoms
Temperature Units	The units of measure that will be used in all applications for the display of all values related to temperature.	• Fahrenheit • Celsius
Pressure Units	The units of measure that will be used in all applications for the display of all values related to pressure.	• Bar • PSI • Kilopascals
Volume Units	The units of measure that will be used in all applications for the display of all values related to volume.	• US Gallons • Imperial Gallons • Liters
Economy Units	The units of measure that will be used in all applications for the display of all values related to fuel usage.	• Distance per Volume • Volume per Distance • Liters per 100 km
Wind Speed Units	The units of measure that will be used in all applications for the display of all values related to wind speed.	• Knots • Metres per second

Specifying preferred units of measurement

1. Select **Customize**.
2. Select **Units Set-up**.
3. Select the type of measurement you want to change (for example, Distance Units).
4. Select the preferred type of unit (for example, Statute Miles).

5.4 Time and Date set-up

You can specify your preference for the way that time and date will appear in all applications.

Menu item	Description	Options
Date Format	Allows you to specify the preferred format for the display of date information in all applications.	• MM:DD:YY (Month, Day, Year) • DD:MM:YY (Day, Month, Year)
Time Format	Allows you to specify the preferred format for the display of time information in all applications.	• 12hr • 24hr
Local Time: UTC	Allows you to specify the local time zone that will be used, in terms of an offset from UTC (Universal Coordinated Time), in 0.5 hour increments.	• –13 to +13 hours (in 0.5 hour increments)

5.5 Display preferences

You can specify your preference for general display behavior.

Menu item	Description	Options
Starting page	Allows you to select what page the display opens at start up.	• Homescreen • Last page — After power up the last used page is displayed. • Choose page — After power up the page selected is displayed.
Key Beep	An audible sound can be made each time a button is pressed or the touchscreen is used.	• ON • OFF
Color Theme	Allows you to change the user interface color theme.	• Dark • Light
Cursor Autohide	If set to On, the cursor will be automatically hidden after a period of no movement. If set to Off, the cursor will persist on the screen until moved.	• ON • OFF
Range Controls	On HybridTouch displays you can specify whether the Chart, Radar and Weather application display the onscreen range in and range out icons. **Note:** • Onscreen range controls are not available on non-touchscreen displays. • Onscreen range controls cannot be hidden on touch only displays.	• Show • Hide
Chart Touch Call-outs	(Touchscreen displays only) Determines whether Call-outs are displayed in the Chart application.	• On • Off
Pilot Control Bar	Allows you to enable and disable the pilot bar on each display individually, when connected to an SPX or SeaTalk autopilot. **Note:** For evolution autopilots the Pilot Bar option is in the Pilot Set-up page.	• Shown • Hidden
Shared Brightness	You can set up shared brightness groups (or "zones") to adjust the brightness on multiple units simultaneously.	**Share Brightness** • ON • OFF **Brightness Group** • Helm 1 • Helm 2 • Cockpit • Flybridge • Mast • Group 1 to Group 5
Screenshot File	Enables you to specify the default memory card slot for screen capture images. **Note:** This option is only available on displays with multiple card reader slots.	• MicroSD 1 • MicroSD 2

Onscreen range controls

You can enable and disable onscreen range controls on HybridTouch displays by following the steps below.

From the Homescreen:

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Range Controls**.

   Selecting Range Controls will switch between showing and hiding the onscreen range controls.

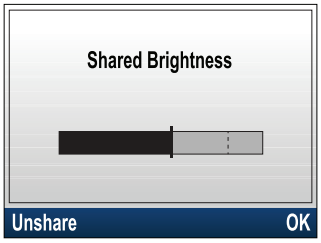
Shared Brightness

You can set up Shared Brightness groups which enables simultaneous brightness adjustment the all units that are part of the same group.

The following products are compatible with Shared Brightness:

- **LightHouse™** powered MFDs
- **SeaTalkng®** Instrument displays and Pilot controllers
- **Ray50** / **Ray52** / **Ray60** / **Ray70** VHF DSC Radios

Any adjustments to the Shared Brightness level will be reflected on all units assigned to the same group.

LightHouse™ MFD	Instrument display / Pilot Controller
	
Ray50 / **Ray52** / **Ray60** / **Ray70** VHF DSC Radio	
	

Multiple brightness groups can be configured. These groups could be used to reflect the physical location of units on your vessel. For example, the units at your helm can be set to one group, and the units on the flybridge can be set to a different group.

Shared Brightness requires:

- all units to be compatible with the Shared Brightness function (see list of compatible units above).
- the **Share brightness** setting set to On for all units in the brightness group.
- units to be assigned to Network Groups.
- all the displays in that group to be synchronized.

Setting up shared brightness

With the homescreen displayed:

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Shared Brightness**.
4. Select the On option for the **Shared brightness** menu item.
5. Select **Brightness Group**.
6. Select an appropriate brightness group.
7. Repeat the process for the other displays you want in the brightness group. If the display is not a multifunction display, refer to the documentation that accompanies the unit for instructions on setting-up shared brightness.
8. Once all required displays have been added to the same brightness group, select **Sync Brightness** on the multifunction display.

   A shared brightness message is displayed.
9. Ensure all displays in the brightness group are powered on.
10. Select **Sync**.

    When completed a message is displayed confirming that shared brightness has been configured.

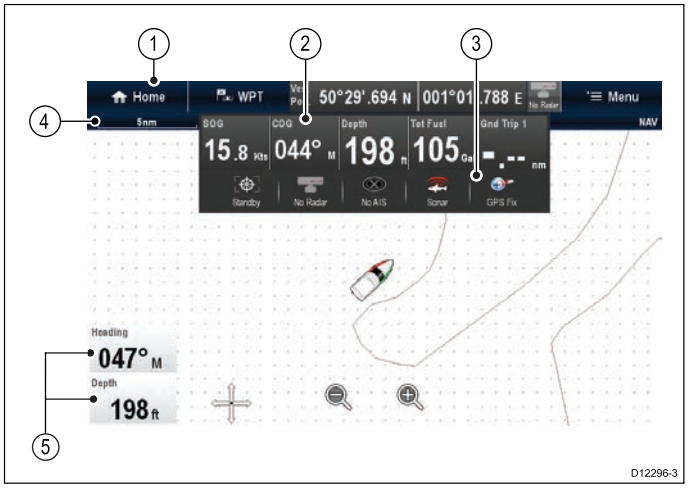
Once shared brightness has been successfully configured, changing the brightness of any display in that brightness group will automatically change the brightness of all displays in that group.

5.6 Databar and databox overview

You can customize the data displayed in the databar and onscreen databoxes.

Customizable data is displayed in the databar, extended databar (HybridTouch displays only) or databoxes. The databar, extended databar and databoxes are available in all applications.

These areas of the screen are illustrated and described below:

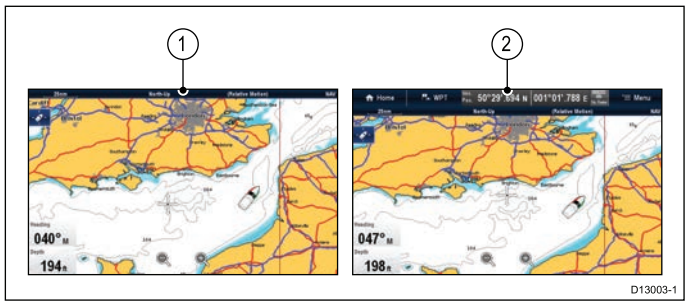


1. **Databar** — displayed at the top of the screen in all applications. The databar contains cells that can be customized to display data from a wide range of categories. The databar can also be hidden to provide
2. **Expanded Databar** — (Touchscreen displays only) displayed when you touch the databar. The extended databar can be displayed. The expanded databar is displayed until the screen is touched again.
3. **Status icons** — You can display the status icons below the expanded databar. This provides status information for externally connected equipment:
4. **Status Bar** — Permanently displayed in all applications. The status bar contains information on the currently selected settings of the application displayed onscreen.
5. **Databoxes** — up to 2 databoxes can be displayed. Each box can display one item of data from the available data categories. Data is permanently displayed onscreen.

The databar can be set to auto-hide so that only the Status bar is visible onscreen.

Auto-hide the databar

On multifunction displays that have a touchscreen, the databar that is displayed at the top of all applications pages can be set to auto-hide. This provides a larger screen area for the application pages.



From the Homescreen:

1. Select **Customize**.
2. Select **Databar Set-up**.
3. Select **Auto-Hide** so that On is selected.

When viewing application pages the databar will now auto-hide after 10 seconds. You can view the databar again by touching the databar with your finger.

Customizing databoxes in the chart application

To switch databoxes on and off and to select data to display follow the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlay**.
3. Select **Databoxes**.
4. Select **Databox 1 > On**.
5. Select **Databox 2 > On**.
6. Choose the **Select Data** option for the relevant databox.
7. Select the category that reflects the type of data you want to display in the databox. For example, Depth data.
8. Select the data item.

   The data you selected is displayed onscreen in the appropriate databox.

Customizing Databoxes

In the Radar, Sonar, or Weather application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Databoxes**.
4. Select **Databox 1 > ON**.
5. Select **Databox 2 > ON**.
6. Choose the **Select Databox 1** or **Select Databox 2** menu item, as appropriate.
7. Select the category that reflects the type of data you want to display in the databox. For example, Depth data.
8. Select the data item.

   The data you selected is displayed onscreen in the appropriate databox.

Customizing the databar

From the homescreen:

1. Select **Customize**.
2. Select **Databar Set-up**.
3. Select **Edit Databar**.
4. In the databar, select the cell that you want to change.

   The Select Data Category menu will be displayed.
5. Select the category that reflects the type of data you want to display in the cell. For example, Depth data.
6. Select the data item.

   The data you selected is displayed on-screen in the appropriate cell.
7. Select **Home** or **Back** when completed.

Displaying status icons in the databar

Touchscreen multifunction displays enable you to display status icons in the databar.

From the homescreen:

1. Select **Customize**.
2. Select **Databar Set-up**.
3. Select **Status Icon Bar** so that On is highlighted.

   The status icons are now displayed below the expanded databar.

5.7 Set-up menu options

The Set-up menu enables you to configure your MFD and connected devices.

The following menus are available:

Menu item	Description	Notes
Touch-Lock	Enables you to lock the touchscreen of a touch only display when the display is paired with a remote keypad. **Note:** This option is not available on touch-only displays which do not have a remote keypad connected. **Note:** This option is not available on displays which have physical buttons.	• ON • OFF (default)
Alarms	Display the Alarm Manager. Refer to Chapter 8 **Alarm management**	
Fuel Manager	Displays the Fuel manager page	
Pilot Controls	Displays the Pilot Control dialog.	Only available when a Raymarine autopilot is detected on the system and **Autopilot Control** is set to On.
Pilot Response	Enables selection of the pilot response level when connected to an Evolution autopilot. **Note:** Pilot Response is not available on SPX and SeaTalk autopilots.	• Leisure • Cruise • Performance
Audio Controls	Displays the audio controls pop-up. **Note:** Not available on non-touch displays.	Only available when connected to an audio device via bluetooth.
Wireless Connections	Provides access to the Wi-Fi and Bluetooth menus.	
Trip Resets	Resets the chosen ground trip distance counter to zero.	
System Settings	Enables you to configure the settings for external devices connected to the display.	
Maintenance	Provides diagnostic information. Also enables you to designate the data master and reset the display to factory settings.	

Ground trip resets menu

This menu enables you to resets the chosen ground trip distance counter to zero.

Menu item	Description
Ground Trip 1 Reset	Resets the ground trip 1 distance counter to zero.
Ground Trip 2 Reset	Resets the ground trip 2 distance counter to zero.
Ground Trip 3 Reset	Resets the ground trip 3 distance counter to zero.
Ground Trip 4 Reset	Resets the ground trip 4 distance counter to zero.

System settings menu

Menu item	Description	Options
Autopilot Control	Enables and disables autopilot controls from your multifunction display.	• On • Off
DSC Alerts	Enables and disables DSC radio alerts on your multifunction display.	• On • Off
GPS Set-up	Provides GPS setting options.	• View Satellite Status • Differential GPS • COG/SOG Filter • Restart GPS
Internal GPS	Switches the multifunction displays internal GPS On or Off. **Note:** Not applicable to MFDs that do not include an internal GPS/GNSS Receiver.	• On • Off
Data Sources	Enables selection of preferred sources of data for connected equipment. **Note:** The Data Sources menu is only available on displays set as Data Master.	• GPS • GPS Datum • Time and Date • Heading • Depth • Speed • Wind
External Devices	Enables set-up of compatible externally connected devices.	Refer to the *External devices menu* section of the manual.
NMEA Set-up	Enables you to configure settings for NMEA devices.	Refer to the *NMEA set-up menu* section of the manual.
System Preferences	Enables you to configure system settings	Refer to the *System preferences menu* section of the manual.
Simulator	Switches simulator mode On or Off.	• Off • On • On (Demo movie)

Multiple data sources (MDS)

For MDS to be available all products in the system that use the data sources, must be MDS-compliant. The system will report any products that are NOT MDS-compliant. It may be possible to upgrade the software for these products, to make them compliant.

If MDS-compliant software is not available for the product and you do NOT want to use the systems preferred data source, you must remove any non-compliant products from the system. You should then be able to select your preferred data source.

Note: Once you have completed setting up your preferred data sources, you may be able to add non-compliant products back into the system.

Data sources menu

This menu enables you to select the external sensors and devices that will provide data to the display.

Auto / manual selection

Each dialog enables you to view and select your preferred data source. selection of data source can be manual or set to automatic:

- **Auto** — the display will automatically select a device and attempt to resolve any data conflicts that may occur where there is more than one source of data for that particular data source (for example, multiple GPS receivers).
- **Manual** — once the display has performed a search for connected devices you can manually select the preferred device from the list.

Note: Selecting the **Auto** option may result in the system choosing a source of data that you do not want to use.

Device selection

Menu item	Description
GPS	Enables you to search for any externally-connected GPS devices, and select the one you want to use.
GPS Datum	In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum. This option enables you to choose the data source for this datum.
Time and Date	Enables you to select the device you want to use for the time and date information used by the display.
Heading	Enables you to select the device you want to use for heading data.
Depth	Enables you to select the device you want to use for depth data.
Speed	Enables you to select the device you want to use for speed data.
Wind	Enables you to select the device you want to use for wind data.

External devices menu

This menu enables you to configure the external devices connected to the display.

Menu item	Description	Options
Pilot Set-up	When connected to an Evolution autopilot this option allows you to enable and disable pilot control and the pilot bar. You can also access certain pilot settings and modes.	
AIS Unit Set-up	Enables you to configure additional functions for AIS units, such as Silent Mode. This menu item is only available when an AIS unit is detected or when Simulator mode is On.	For an explanation of these options refer to the *AIS menu options* described in the AIS section of this document.
Quantum Radar	Enables pairing with a Quantum Radar scanner over Wi-Fi	• Pair with Quantum Radar
Remote Control	Enables you to customize certain controls for Raymarine Bluetooth remote control units (for example, RCU-3).	For an explanation of these options refer to the *Remote Control* section of this document.
Transducers Set-up	Displays a list of connected transducers which you can select and calibrate.	
Weather Set-up	Enables you to select your Raymarine weather receiver:	• SR6 • SR50 • SR100 • SR150 (default)
Switch Panel Set-up	Enables you to install and uninstall Switch Panel configuration files.	
External Keypad	Enables you to pair and unpair remote keypads.	
Engines Set-up	Enables you to run the engine identification wizard.	For an explanation of these options refer to *Engine identification wizard* section of this document.

Wireless Connections menu

This menu provides access to the MFD's Bluetooth and Wi-Fi functions.

Bluetooth

Menu item	Description	Options
Bluetooth	Enable or disable Bluetooth on the display.	• On • Off (default)
Connection Manager	Provides a list of Bluetooth devices in range. When you highlight a connection in the list and press OK, the following options are available: • **Unpair / Forget this device** — Disconnect the device and remove it from the connection list. If you unpair a device in this way you must re-pair the device if you want to connection it again to the multifunction display. • **Audio Control** — If this option is set to On, you can control the audio for a compatible wireless media player, from the multifunction display.	• Unpair / Forget this device • Audio control On / Off.
New Bluetooth Connection	Selecting this menu item initiates the Bluetooth pairing process. This is necessary for connecting a wireless remote control unit or media player device to the multifunction display.	

Wi-Fi

Menu item	Description	Options
Wi-Fi	Enable or disable Wi-Fi on the display.	• On • Off (default)
Wi-Fi Networks	Provides a list of all Wi-Fi Access points currently within range.	• Connect • Forget
Wi-Fi Sharing	**Wi-Fi Name** Enables you to specify an SSID (Wi-Fi Name) for connecting Wi-Fi devices using an encrypted connection. If you want to prevent unauthorized devices from connecting to your display you must specify the same SSID for both the multifunction display and the wireless device you want to connect to the display. **Wi-Fi Passphrase** Enables you to specify a password for the Wi-Fi connection. If you want to prevent unauthorized devices from connecting to your display you must specify the same password for both the multifunction display and the wireless device you want to connect to the display. **Wi-Fi Channel** By default the multifunction display automatically selects an available Wi-Fi channel. If you're experiencing difficulties with wireless video streaming it may be necessary to manually specify a Wi-Fi channel for both the multifunction display and the device you want to stream video to. **Wi-Fi Security** You can encrypt the Wi-Fi connection on the multifunction display to prevent unauthorized devices from accessing the connection. This menu item enables you to select the type of WPA (Wi-Fi Protected Access) encryption you want to use. WPA2 provides stronger security than WPA. **Mobile Apps**	**Wi-Fi Channel** • 1 to 11 (2 GHz) **Wi-Fi Security** • None • WPA Only • WPA 2 Only. (default) • WPA / WPA2. **Mobile Apps** • Off (default) • Viewing only • Remote Control

Menu item	Description	Options
	Enables you to select the type of mobile app in use: • Viewing only — RayView • Remote Control — RayRemote or RayControl	

NMEA Set-up menu

This menu enables you to configure settings for NMEA devices.

Menu item	Description	Options
Bridge NMEA Heading	If set to ON, NMEA heading data will be bridged onto the SeaTalk data bus, and will be sent to all NMEA-connected devices. If set to OFF, NMEA heading data will NOT be bridged onto the SeaTalk bus. An example of a use for this setting is when using MARPA with an external fast heading sensor, in which case you should set this option to OFF to ensure that all NMEA-connected units receive heading data from the external heading sensor.	• On • Off (default)
NMEA Output Settings	Allows you to enable or disable the individual NMEA “sentences” that are sent by the multifunction display to any devices connected the NMEA output port.	• List of available sentences.
NMEA Input Port 1	Enables you to specify the appropriate port speed for the equipment connected to NMEA Input port 1. Use the AIS 38400 option for AIS receivers.	• NMEA 4800 • AIS 38400
NMEA Input Port 2	Enables you to specify the appropriate port speed for the equipment connected to NMEA Input port 2. Use the AIS 38400 option for AIS receivers.	• NMEA 4800 • AIS 38400

System preferences menu

Menu item	Description	Options
Bearing mode	Determines how all bearing and heading data is displayed in. This does not affect how the chart or radar displays are drawn.	• True (default) • Magnetic
Variation Source	This setting compensates for the naturally occurring offset of the earth's magnetic field. When set to Auto, the system automatically compensates, and displays the compensation value in brackets. To enter your own compensation value, use the Manual option, then specify the value using the Manual Variation setting (see below). This value is also transmitted to any other connected Raymarine instruments.	• Auto (compensation value displayed) (default) • Manual
Manual Variation	When the Variation Source menu item is set to Manual (see above), you use the Manual Variation setting to specify the compensation value that you want to use.	• Range: 0 to 30 degrees, East or West •
System Datum	In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum. The default datum for your multifunction display is WGS1984. If this is not the datum used by your paper charts, you can change the datum used by your multifunction display. When you change the datum for your multifunction display, the chart grid will subsequently move according to the new datum, and the latitude / longitude of the cartographic features will also change accordingly. Your multifunction display will attempt to set up any GPS receiver to the new datum, as follows: • The internal GPS receiver will automatically correlate each time you change the datum. • If you have a Raymarine GPS receiver using SeaTalk or SeaTalk^{ng}, it will automatically correlate each time you change the datum on the multifunction display. • If you have a Raymarine GPS receiver using NMEA 0183, or a third-party GPS receiver, you must correlate it separately. It may be possible to use your multifunction display to correlate an NMEA 0183 GPS receiver. From the homescreen go to **Set-up > System settings > GPS Set-up > View Satellite Status**. If the datum version is displayed, it may be possible to change it. From the homescreen go to **Set-up > System settings > Data Sources > GPS Datum**. **Note:** Raymarine recommends that you check the displayed vessel position in the chart application against your actual proximity to a known charted object. A typical GPS has an accuracy of between 5 and 15 m.	

Maintenance menu

This menu provides access to systems settings and diagnostics.

Menu item	Description	Options
Diagnostics	Diagnostics provides detailed information on the multifunction display and connected devices. The range of information available includes product serial number, software version, and network status. When you select the Diagnostics menu item the multifunction display scans for any connected equipment and enables you to select the product you want to view. You can also save the diagnostics information to a memory card. This is particularly useful for sending detailed information to **Raymarine®** Customer Support in the event of a technical issue. The Interfaces option allows you to view statistics and buffer information for **NMEA 0183** ports 1 and 2 and **NMEA 2000** / **SeaTalkng®**. The Sirius option is only displayed when connected to relevant hardware and allows you to view received messages, memory and errors.	• Select Device • Sirius • Save Logs • Erase Logs • Interfaces • AIS Alarms Log
Data Master	Any system containing more than one networked multifunction display must have a designated data master. The data master is the display which serves as a primary source of data for all displays, it also handles all external sources of information.	• MFD selection
Check Card for Updates	Scans inserted memory cards for software files for connected products. This option can be used at anytime to manually start the System Software Update process.	
Check Online for Updates	When the MFD is connected to an access point that has an internet connection the MFD can check the Raymarine website for software updates for connected devices.	
System Settings Reset	This option resets your menu options, datapages, and databar settings to factory default. It will NOT affect your waypoints, routes, or tracks data.	• Yes • No
System Settings & Data Reset	In addition to the settings reset detailed above, performing a settings and data reset will also remove ALL waypoints, routes, and tracks data.	• Yes • No
Touchscreen Alignment	If the touchscreen is misaligned to your touch, you can realign it to improve the accuracy. Realignment involves a simple exercise to align an on-screen object with your touch. For best results, perform this exercise when your vessel is anchored or moored. **Note:** The Touchscreen alignment is not required on gS Series and non-Touchscreen **MFD**s.	

Diagnostics menu

If you encounter problems with your multifunction display or peripheral devices you can use the Diagnostics menu to view information about your device and connected equipment.

Menu	Description	Options
Select Device	Enables you to view a list of all devices connected to the SeaTalk^{hs} network. You can also select an item in the list to view further details for that device.	• Device • Serial No. • Network • Software
Sirius	If connected to a Sirius weather receiver this option enables you to view Sirius weather statistics.	
Save Logs	Allows you to save error logs to a MicroSD card for troubleshooting purposes.	
Erase Logs	Selecting this option will erase any crash logs on the device.	
Interfaces	Enables viewing of statistics and viewing and recording of buffers on NMEA inputs and the SeaTalk^{ng} bus. On multifunction displays with multiple MicroSD card slots you can also choose which MicroSD card slot the buffer will be recorded to.	• NMEA 1 • NMEA 2 • SeaTalk^{ng} • Record File
AIS Alarms Log	View a list of generated AIS alarms.	

Chapter 6: Document viewer application

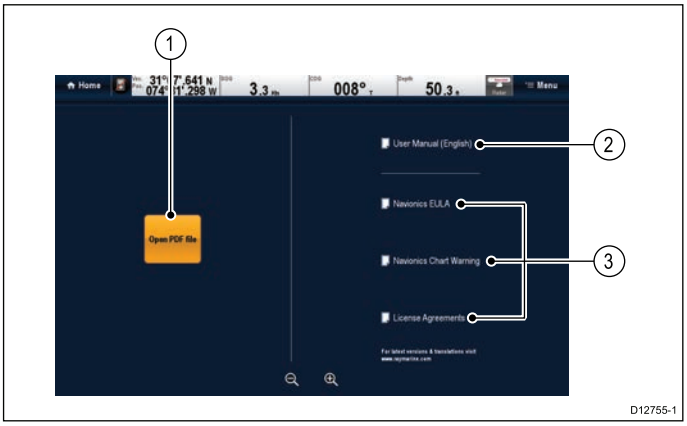
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- 6.1 Document viewer overview on page 88

6.1 Document viewer overview

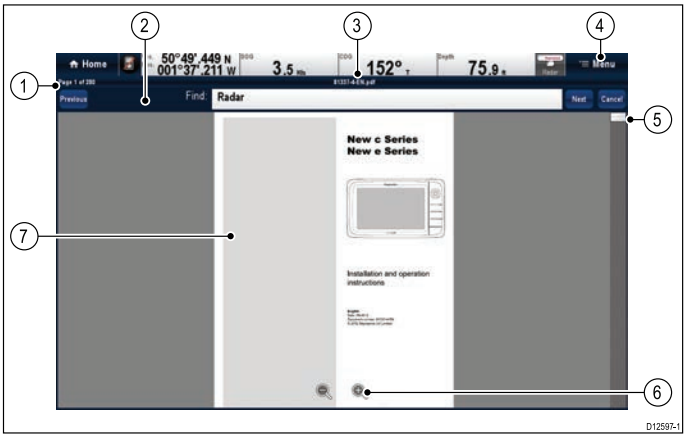
You can view PDF documents on your multifunction display.

The document viewer is available from the homescreen and is used to view and search PDF documents (such as product handbooks).



1	Opens the MicroSD card file browser.
2	Opens the user manual stored on the multifunction display.
3	Opens the relevant license agreement information.

Note: The document viewer does not support password protected documents or documents containing security certificates. An error message will be displayed if you try to open such documents.



1	Current page number (page x of y).
2	Find (search) tool bar (only displayed when searching a document). **Note:** The Previous, Next and Cancel buttons are only shown on touch-only products. For non-touch and Hybridtouch products the physical buttons are used.
3	Filename of the current PDF.
4	Document viewer menu.
5	Scroll bar.
6	On-screen zoom controls (Touchscreen displays only).
7	PDF document content.

The following options are available from the document viewer menu:

- **Open File** — Allows you to browse a MicroSD card or the MFD's internal storage for a PDF document to open.
- **Go to page:** — Allows you to jump to a specific page number.
- **Find** — Allows you to search the document for specific words.
- **Fit to Height** — Scales the open document to fit the height of the application window.
- **Fit to Width** — Scales the open document to fit the width of the application window.
- **Close File** — Closes the open document.

Opening the user manual

The product user manual is stored on the internal memory.

From the homescreen:

1. Select **Doc Viewer**.
2. Select **User Manual**.

   The product user manual is opened.

Note: The User manual can also be opened by selecting the **User Manual** icon from the Homescreen.

Opening a PDF document

You can open PDF documents stored on internal or external storage by following the steps below.

Note: When saving PDF documents to MicroSD cards, ensure you do not overwrite important data.

1. Ensure you have the memory card, containing the pdf you want to view, inserted into a card reader slot.
2. Select **Open File** from the Document Viewer menu.

   The file browser is displayed.
3. Browse to location of the document you want to view.
4. Select the document you want to view.

   The document will now open.
5. If the 'Cannot Open File' error message is displayed, select **OK** to confirm and then try opening the document again. Check that the pdf is not corrupted. Also ensure that the pdf does not include password protection or a security certificate. PDF security features are not supported by the Document Viewer application.

Note: Large filesize pdfs may take a while to open.

Closing an open document

Each Doc viewer instance is separate, the last document opened will automatically open next time you select that instance of the Doc viewer unless it its closed using the Close File menu option.

With a document open

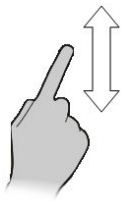
1. Select **Menu**.

2. Select **Close file**.
   The document is close and the main Doc viewer page is displayed.

Browsing an open document

On touchscreen displays you can browse pdf documents as detailed below.

With a pdf document open:

	• Move your finger up to scroll down the document. • Move your finger down to scroll up the document.
	When the document width is greater than the width of the application window, move your finger left or right to pan the width of the document.

Note: You can also use the scroll bars to navigate through the document.

Browsing an open document

On HybridTouch and non-touch displays you can browse pdf documents by following the steps below.

With a pdf document open:

1. Move the Joystick **Up** or **Down** to move up and down through the document.
2. Move the Joystick **Left** or **Right** to pan left and right.

Changing the zoom factor

On touchscreen displays you can change the zoom factor of the open document by following the steps below.

With a pdf document open:

1. Select the on-screen **Zoom in** icon to zoom in, or
2. Select the on-screen **Zoom out** icon to zoom out.

Changing the zoom factor

On HybridTouch and non-touch displays (excluding the e7 and e7D) you can change the zoom factor of the open document by following the steps below.

With a pdf document open:

1. Use the **Range out** button to zoom out, or
2. Use the **Range in** button to zoom in.

Note: New a Series and e7 / e7D multifunction displays do not have Range in and Range out button.

Note: On a New c Series display only the **Rotary control** can be used to change the zoom factor.

Selecting a page

You can skip to the page you want to view by entering the page number.

With a pdf document open:

1. Select **Menu**.
2. Select **Go to page:**.
   The numeric keypad is displayed.
3. Enter the page number of the page you want to view.
4. Select **OK** to view the page.

Using document hyperlinks

On touchscreen displays you can use internal document hyperlinks.

With a pdf document opened on a page containing a hyperlink:

1. Momentarily touch your finger on the hyperlink.
   You will be taken to the hyperlinked page.

Note: Document hyperlinks cannot be activated on a New c Series display.

Searching for text

To use the find function to search for text on touch only display follow the steps below.

With a pdf document open:

1. Select **Menu**.
2. Select **Find**.
   The on-screen keyboard is displayed.
3. Enter the keyword you want to find.
4. Select **SAVE**.
   The document viewer will enter find mode and:
   - You may see a ‘Searching’ icon while all occurrences are found.
   - The find tool bar is displayed.
   - The first occurrence of the keyword is highlighted.
5. Select **Next** to find the next occurrence of the keyword, or
6. Select **Previous** to go back to the last occurrence of the keyword.
7. You can select **Cancel** at any time to close the find tool bar and return to the normal viewing.

Searching for text

On HybridTouch and non-touch displays you can use the find function to search for text in an open pdf document by following the steps below.

With a pdf document open:

1. Press the **Menu** button.
2. Select **Find**.
   The on-screen keyboard is displayed.
3. Enter the keyword you want to find.

4. Select **SAVE**.
   The document viewer will enter find mode and:
   - You may see a ‘Searching’ icon while all occurrences are found.
   - The find tool bar is displayed.
   - The first occurrence of the keyword is highlighted.
5. Move the **Joystick Down** to go to the next occurrence of the keyword, or
6. Move the **Joystick Up** to go to the previous occurrence of the keyword.
7. You can press the **Back** button at any time to close the find tool bar and return to the normal viewing.

Keyword not found

The document viewer will let you know if the keyword you have searched for does not appear in the document.

If the keyword is not found then the find tool bar will display an exclamation mark and a pop-up message is displayed on-screen.



Selecting **New Search** will take you back to the on-screen keyboard so that you can try a different keyword. Selecting **Cancel** will close the find tool bar and resume normal operation.

Chapter 7: Autopilot control

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7.1 Autopilot Control overview and features

Raymarine® autopilots can be controlled directly from a compatible LightHouse powered **MFD**, with or without a dedicated Pilot control head.

Note: For information on connecting a **Raymarine®** autopilot to a compatible **MFD**, refer to the documentation that accompanied your autopilot.

The **MFD** can be used to:

Control a connected Autopilot.	• 7.2 **Enabling autopilot control**
Engage the autopilot in Track mode (Goto a specified position or follow a route) or Auto mode (Remain on the current heading).	• 7.6 **Engaging the autopilot**
Adjust the current locked heading when in **Auto** mode.	• 7.7 **Adjusting the current locked heading**
Disengage the autopilot.	• 7.8 **Disengaging the autopilot**
Provide close integration with the Chart application for seamless navigation.	• 14.6 **Navigate menu options**
Select different performance modes, when connected to an **Evolution** autopilot.	• 7.5 **Pilot Set-up**
Adjust the **Pilot Settings**, when connected to an **Evolution** autopilot.	• 7.10 **Pilot settings**
Manage autopilot alarms.	• 7.13 **Autopilot alarms**

Note: In a system that does not include a dedicated Pilot control head the Data Master **MFD** cannot be switched Off or put into **PowerSave** mode whilst the autopilot is engaged.

7.2 Enabling autopilot control

Enabling the autopilot control function — SeaTalk and SPX SeaTalkng autopilots

To enable control of your SeaTalk or SPX SeaTalkng autopilot using your multifunction display follow the steps below.

From the Homescreen:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Autopilot Control** so that On is highlighted.

   Selecting Autopilot Control will switch the control between On and Off.

On a system containing multiple displays the pilot control is enabled on all displays at the same time.

Enabling the autopilot control function — Evolution autopilots

To enable control of your Evolution autopilot using your multifunction display follow the steps below.

From the Homescreen.

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **External Devices**.
4. Select **Pilot Set-up**.
5. Select **Pilot control** so that On is highlighted.

   Selecting Pilot control will switch the Autopilot control function on and off.

7.3 Pilot Control dialog

The **Pilot Control** dialog can be used to control autopilot functions.

Pilot Control dialog (standby)

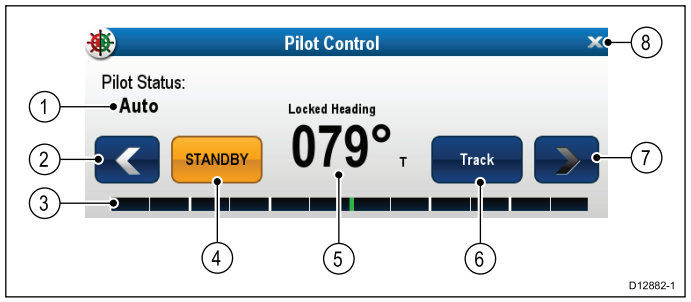
The example below shows the **Pilot Control** dialog options when the dialog is opened from a menu or using a dedicated physical **Pilot** button.



Selecting **Auto** will engage the autopilot and maintain the current heading.

Pilot Control dialog (Auto)

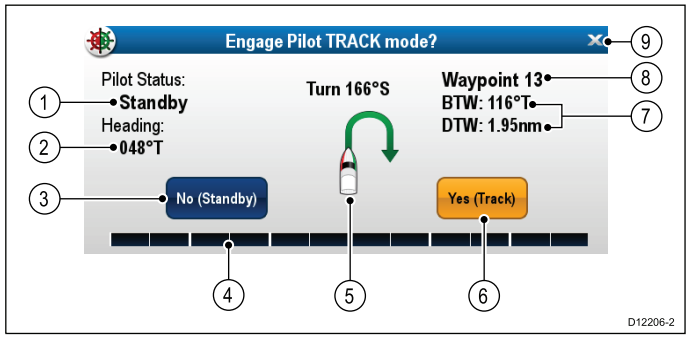
The example below shows the **Pilot Control** dialog options when **Auto** (locked heading) has been engaged.



	Description
1	Pilot Status — Current pilot mode.
2	**Left Arrow** — Decrease locked heading angle.
3	Rudder bar — Indicates the position of the rudder.
4	**STANDBY** — Disengages the autopilot and returns to manual vessel control.
5	Current locked heading.
6	**Track** — Engages the autopilot in Track mode and automatically steers your vessel to a target waypoint or along a route plotted on your chartplotter.
7	**Right Arrow** — Increase locked heading angle.
8	**Close** — Closes the Pilot Control dialog.

Pilot Control dialog (Starting navigation)

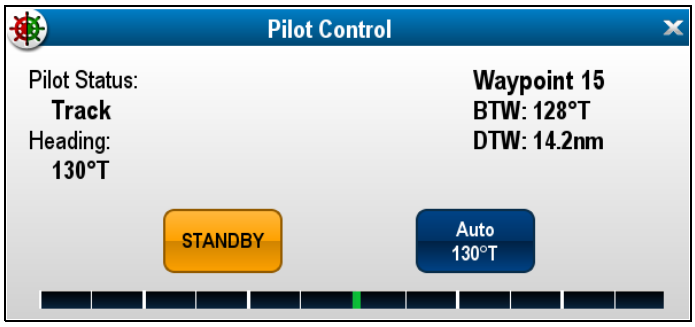
The example below shows the **Pilot Control** dialog options when **Goto Cursor**, **Goto Waypoint** or **Follow Route** has been selected.



	Description
1	Pilot Status — Current pilot mode.
2	Current Heading.
3	**No (Standby)** — Disengages the autopilot and returns to manual vessel control.
4	Rudder bar — Indicates the position of the rudder.
5	Turn angle — The turn angle is only available for **SeaTalk**^{ng} autopilots. This indicates the direction and severity of turn.
6	**Yes (Track)** — Engages the autopilot in **Track** mode and automatically steers your vessel to a target waypoint or along a route plotted on your **MFD**.
7	Distance to next waypoint (DTW) and Bearing to next waypoint (BTW).
8	Next Waypoint name.
9	**Close** — Closes the **Pilot Control** dialog.

Pilot Control dialog (Track)

The example below shows the **Pilot Control** dialog options when in track mode.



Manually displaying the pilot control dialog box

You can also open the Pilot Control dialog at any time from the homescreen or chart application.

1. From the homescreen:
   i. Select **Set-up**.
   ii. Select **Pilot Controls**.
2. From the chart application:
   i. Select **Menu**.
   ii. Select **Navigate**.
   iii. Select **Pilots Controls**.

Displaying the Pilot Control dialog

The Pilot Control dialog is displayed under the following conditions:

1. When the physical **Pilot** button is pressed.
2. When **Pilot Controls** selected from the shortcuts page.
3. When you select **Menu > Navigate > Goto Waypoint** , **Goto Cursor** or **Follow Route** option in the Chart application.
4. When you select **Goto Waypoint** or **Goto Cursor** using the Chart context menu.
5. When you place the cursor over an active route or waypoint in the Chart application and select

Stop Goto, **Stop Follow** or **Advance Waypoint** from the context menu.

6. When you are following a route or going to a waypoint or cursor position, and select **Menu > Navigate > Stop Goto**, **Stop Follow**, or **Advance Waypoint**.
7. When you arrive at a target waypoint.

Note: When arriving at a waypoint, the dialog title bar turns red to indicate waypoint arrival.

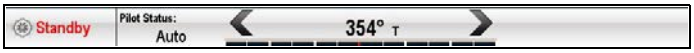
7.4 Pilot Bar

The Pilot Bar provides autopilot status information. For touchscreen displays you can disengage the autopilot using the Pilot Bar.

Pilot Bar — Track mode



Pilot Bar — Auto mode



The Pilot Bar is displayed when autopilot control is enabled, the Pilot Bar is switched on and the autopilot is engaged.

When the autopilot is disengaged the Pilot Bar is hidden.

On a system containing multiple displays the Pilot Bar can be disabled or enabled on each display.

Enabling the Pilot Bar

When connected to a SeaTalk or SeaTalk^{ng} SPX autopilot the Pilot Bar can be enabled by following the steps below.

From the Homescreen, with autopilots controls enabled:

1. Select **Customize**.
2. Select **Display Preferences**.
3. Select **Pilot Control Bar** so that Shown is highlighted.

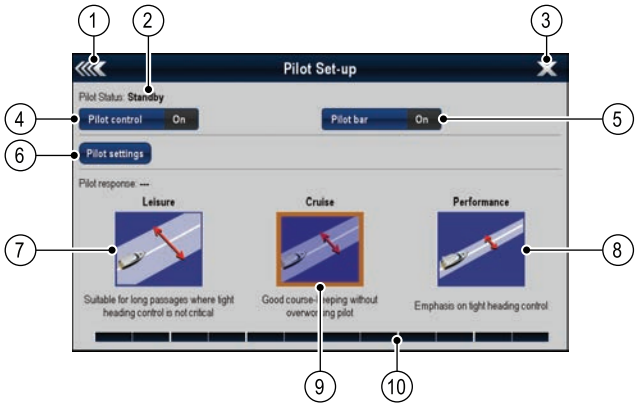
   Selecting Pilot Control Bar will switch the Pilot Bar between Shown and Hidden.
4. Engage the autopilot.

The Pilot Bar is now displayed at the bottom of the screen in all applications whilst the autopilot is engaged.

Note: When connected to an Evolution autopilot the Pilot Bar is enabled from the Pilot Set-up page.

7.5 Pilot Set-up

When connected to an Evolution autopilot the Pilot Set-up page is available.



1	**Back** — Go back to the previous menu.
2	Pilot Status — Current pilot mode.
3	**Close** — Closes the pilot set-up page and displays the homescreen.
4	**Pilot control** — Switches autopilot control via the multifunction display on and off.
5	**Pilot bar** — Switches the Pilot bar on and off.
6	**Pilot settings** — Displays available pilot settings that can be configured from the multifunction display. **Note:** The **Pilot settings** menu is only available on the data master multifunction display.
7	**Leisure** — Places the autopilot in Leisure mode. Leisure mode is suitable for long passages where tight heading control is not critical.
8	**Performance** — Places the autopilot in Performance mode. Performance mode provides good course keeping without overworking the autopilot.
9	**Cruise** — Places the autopilot in Cruise mode. Cruise mode provides tight heading control.
10	Rudder bar — Indicates the position of the rudder.

Accessing the Pilot Set-up page.

When connected to an Evolution autopilot you can access the Pilot Set-up page by following the steps below.

From the Homescreen:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **External Devices**.
4. Select **Pilot Set-up**.

7.6 Engaging the autopilot

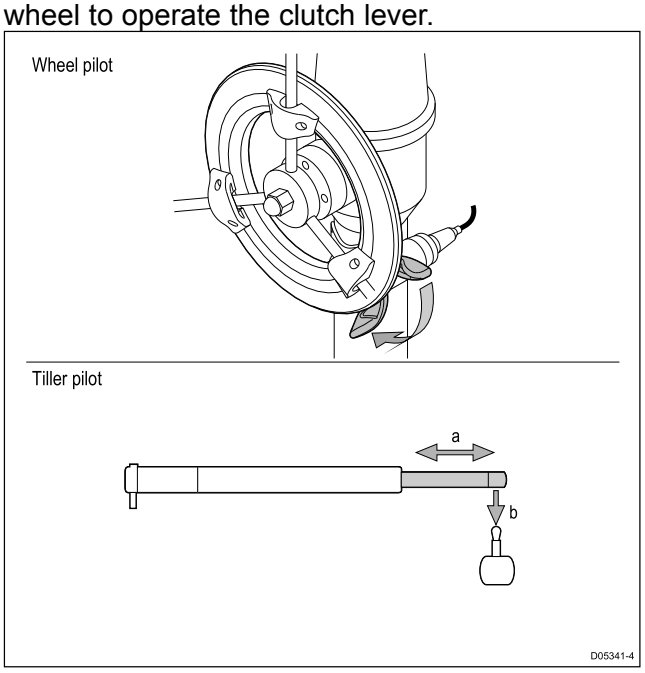
> **Caution: Maintain a permanent watch**
>
> Automatic course control makes it easier to steer your vessel, but it is NOT a substitute for good seamanship. ALWAYS maintain a permanent watch by the helm.

Automatically steering along a heading

With Pilot Control enabled on your MFD:

1. Steady your vessel on the required heading.
2. For Wheel and Tiller drive systems follow the instructions below to engage the mechanical drive.
   - **Wheel Pilot:** Engage the wheel drive clutch by rotating the clutch lever clockwise (so the lever fully engages onto the locating pip).
   - **Tiller Pilot:** Place the pushrod end over the tiller pin. If necessary, extend or retract the pushrod by selecting **Auto** from the Pilot Control Dialog and using the **Left Arrow** and **Right Arrow** to adjust the rod's position.

   Attention Always reach around (not through) the wheel to operate the clutch lever.



3. Select **Auto**, if not already selected.

   The autopilot will now automatically steer along the chosen locked heading.

7.7 Adjusting the current locked heading

When the autopilot is in **Auto** mode the current locked heading can be adjusted from the **Pilot Control** dialog and from the **Pilot Bar**.

With the **Pilot Bar** or **Pilot Control** dialog displayed:

1. Use the **Left Arrow** icon to decrease the current locked heading, or
2. Use the **Right Arrow** icon to increase the current locked heading.

7.8 Disengaging the autopilot

Caution: Disengaging the autopilot

On integrated multifunction displays that do not have a dedicated pilot button, in an emergency the autopilot can be disengaged by pressing and holding the Power button.

Disengaging the autopilot (Standby mode)

The autopilot can be disengaged by following the steps below.

With Pilot Control enabled on your MFD:

1. Select **Standby**.
2. For Wheel and Tiller drive systems see below instructions for disengaging the mechanical drive to return to manual steering
   - **Wheel Pilot:** Disengage the wheel drive clutch by rotating the clutch lever anti-clockwise (so the lever disengages fully from the locating pip.**Attention** Always reach around (not through) the wheel to operate the clutch lever.
   - **Tiller Pilot:** Remove the drive unit from the tiller pin. If necessary, extend or retract the pushrod by selecting **Auto** from the Pilot Control Dialog and using the **Left Arrow** and **Right Arrow** to adjust the rod's position.

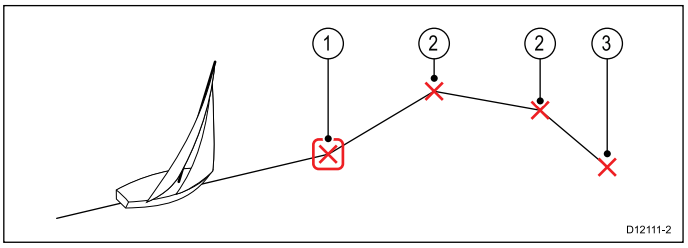
On wheel drive systems, always make sure that the clutch is fully disengaged before you leave the vessel.

7.9 Track mode

You can use track mode to automatically steer your vessel.

In Track mode, the autopilot automatically steers your vessel to a target waypoint or along a route plotted on your multifunction display. It makes any course changes necessary to keep your vessel on course, automatically compensating for tidal streams and leeway.

Track mode is available only if you have connected the autopilot to a suitable multifunction display with autopilot control enabled.



Item	Description
1	Current goto / waypoint
2	Subsequent waypoints in a route
3	Final waypoint in route

7.10 Pilot settings

The Pilot settings option is available on a data master multifunction display when it is integrated with an Evolution autopilot.

The Pilot settings enable the setup and commissioning of an Evolution autopilot using a multifunction display.

The Pilot settings include the following options:

- Vessel Settings
- Drive Settings
- Sail Boat Settings
- Commissioning

Initial setup and commissioning

Vessel settings

The vessel settings are designed to provide optimum steering performance for typical vessels.

It is important to complete the vessel hull type selection as part of the initial set-up, as it forms a key part of the autopilot calibration process. You can also access the options at any time by selecting **Pilot Settings > Vessel settings** from the Pilot Set-up page.

Vessel setting include the following options:

- Vessel Hull Type
- Drive Type
- Compass Offset
- Calibration Lock

Vessel hull type selection

The vessel hull type options are designed to provide optimum steering performance for typical vessels.

It is important to complete the vessel hull type selection as part of the initial set-up, as it forms a key part of the commissioning process. You can also access the options at any time with the pilot in Standby from the Pilot Set-up page by selecting: **Pilot Settings > Vessel Settings > Vessel Hull Type**.

As a general guide, select the option that most closely matches your vessel type and steering characteristics. The options are:

- **Sail**.
- **Sail (slow turn)**.
- **Sail Catamaran**.
- **Power**
- **Power (slow turn)**.
- **Power (fast turn)**.

It is important to be aware that steering forces (and therefore rate-of-turn) vary significantly depending on the combination of vessel type, steering system, and drive type. Therefore, the available vessel hull type options are provided for guidance only. You may wish to experiment with the different vessel hull

type options, as it might be possible to improve the steering performance of your vessel by selecting a different vessel type.

When choosing a suitable vessel type, the emphasis should be on safe and dependable steering response.

Important: If you change the vessel type **after** completing the Dockside wizard, all commissioning settings will be reset to default settings, and you will need to complete the Dockside wizard again.

Selecting a vessel hull type

The Vessel hull type can be accessed from the Pilot Set-up page.

1. Select **Pilot Settings**.
2. Select **Vessel Settings**.
3. Select **Vessel Hull Type**.
4. Select the option that most closely matches your vessel type.
   The new selection is applied.

Selecting a drive type

Drive type selection is available from the dockside wizard, and also from the Vessel settings menu: **Pilot Set-up > Pilot Settings > Vessel Type > Drive type**.

With the **Drive Type** menu displayed:

1. Select your drive type from the list.

Note: The drive types available are dependant on the ACU type. If your drive type is not listed contact your Raymarine dealer for advice.

2. Select **OK** to save your setting and display the next set-up page.

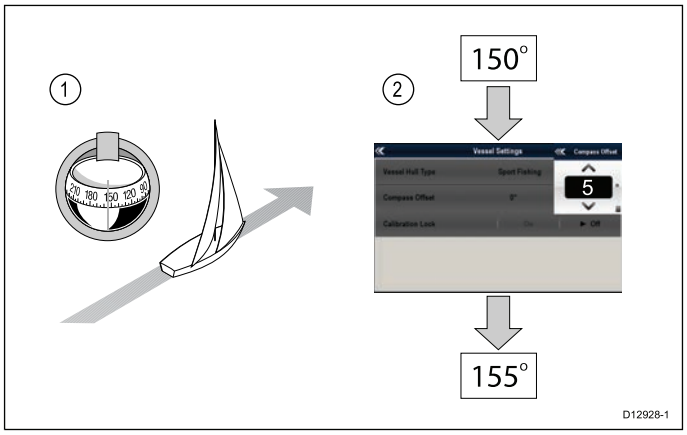
Note: You can cancel the Dockside wizard at any time by selecting **STANDBY**.

Aligning heading

The autopilot heading can be aligned to the ship's compass using the Compass offset setting.

Note: To perform this procedure you will need a networked device such as an instrument, pilot control head or multifunction display to have the current autopilot heading shown onscreen.

Many factors can cause a difference between heading and course over ground (COG), you must align the heading so it matches the vessel's steering compass (or a known transit bearing).



1. Set your vessel on a known heading and check the steering compass.
2. Check the autopilot heading on your multifunction display.
3. From the Pilot Set-up page select **Pilot Settings**.
4. Select **Vessel Settings**.
5. Select **Compass Offset**.
6. Adjust the Compass Offset so that the autopilot heading will match the steering compass heading.

   e.g. If the steering compass heading was 155° and autopilot heading was 150° applying a compass offset of 5° would mean that the steering compass and autopilot heading are aligned.

The compass offset will be changed automatically if required when the align compass to GPS procedure is carried out.

Drive settings

The drive settings are designed to provide optimum drive performance.

It is important to check and where necessary adjust the drive settings to suit your drive setup.

Drive settings include the following settings:

- *Rudder Damping.
- Auto Turn.
- Power Steer.
- Reverse rudder ref.
- Rudder Offset.
- Rudder Limit.
- Hard Over Time.

Note: *The rudder damping setting should not be adjusted without first seeking advice from Raymarine technical support.

Setting the auto turn angle

You can specify the angle at which the vessel will turn when performing an Auto Turn using a connected Pilot control Head.

From the Pilot Set-up page:

1. Select **Pilot Settings**.
2. Select **Drive Settings**.
3. Select **Auto Turn**.
4. Adjust the auto turn setting to the required value.
5. Select **Back** or **Ok** to confirm the setting.

Power Steer

If you have a joystick or a p70R pilot control head connected to your autopilot you can select its mode of operation. For detailed information refer to the documentation that accompanied your joystick or your p70R.

The modes of operation are as follows:

- **Off** — Joystick control is turned off.
- **Proportional** — Proportional mode applies rudder in proportion to joystick movement — the further

the joystick is held over, the greater the applied rudder.

- **Bang-Bang** — Bang-bang modes applies continuous rudder in the direction of the joystick movement, to improve control, the speed of rudder movement changes with the angle of the joystick. For maximum speed, push the joystick hard over. If you return the joystick to the center position, the rudder will remain in its current position.

Reversing the rudder reference phase

On vessels fitted with a rudder reference transducer, if the rudder bar moves in the wrong direction you can correct this by reversing the phase of the rudder reference.

Note: This procedure is not required on vessels without a rudder reference transducer.

From the Pilot Set-up page:

1. Select **Pilot Settings**.
2. Select **Drive Settings**.
3. Select **Reverse Rudder Ref**.

   Selecting Reverse Rudder ref will switch between On and Off.

Setting the rudder offset

On vessels fitted with a rudder reference transducer, you can set an offset to the rudder's center position if required.

Note: This procedure is not required on vessels without a rudder reference transducer.

Note: To perform this procedure it is desirable to have a networked device such as an instrument, pilot control head or multifunction display that can display the current rudder position onscreen whilst making this adjustment.

1. Use the steering wheel to center the rudder.
2. From the Pilot Set-up page select **Pilot Settings**.
3. Select **Drive Settings**.
4. Select **Rudder Offset**.
5. Adjust the Rudder Offset value until the rudder bar shows the rudder in the central position.

   The rudder adjustment is limited to ± 9° if the adjustment required to center the rudder bar position is beyond these limits then the alignment of the rudder reference sensor will need to be physically adjusted.

Setting the rudder limits

On vessels fitted with a rudder reference transducer the rudder limits must be set. The rudder limit is used to set the rudder control. The rudder limits should be set to just inside the mechanical end stops to prevent unnecessary load on the steering system.

Note: This procedure is not required on vessels without a rudder reference transducer.

Note: To perform this procedure it is desirable to have a networked device such as an instrument, pilot control head or multifunction display that can display the current rudder position onscreen whilst making this adjustment.

The limits should be set to approximately 5° less than the maximum rudder angle.

1. Turn the steering wheel all the way to port and note the angle on the rudder bar.
2. Turn the steering wheel all the way to starboard and note the angle on the rudder bar.
3. From the Pilot Set-up page select **Pilot Settings**.
4. Select **Drive Settings**.
5. Select **Rudder Limit**.
6. Adjust the rudder limit to be 5° less than the lowest angle noted in steps 1 and 2 above.
7. Select **Back** or **OK** to confirm the settings.

Setting the hard over time

Once the hard over time has been established it can be set following the steps below.

From the Pilot Set-up page:

1. Select **Pilot Settings**.
2. Select **Drive Settings**.
3. Select **Hard Over Time**.
4. Enter your hard over time in seconds.

Sail boat Settings

When the vessel type has been set to a sail boat the Sail Boat settings menu will be available.

Sail boar settings consist of the following options:

- **Wind Trim Response** — Wind trim response controls how quickly the autopilot system responds to changes in the wind direction. A higher wind trim setting will result in a system that is more responsive to wind changes.
- **Gybe Inhibit** — With gybe inhibit turned on, to prevent accidental gybes, the autopilot will prevent the vessel from performing a turn away from the wind. With gybe inhibit turned off, you can perform an AutoTack into or away from the wind. Gybe inhibit does not effect Auto Turn.
- **Wind Trim** — This option determines whether the vessel steers to Apparent or True wind in when in Wind Vane mode.

Aligning compass to GPS

You can align the autopilot compass to your COG heading.

Aligning the compass must be performed whilst heading into the tide or in slack water.

From the Pilot Set-up page:

1. Select **Pilot Settings**.
2. Select **Commissioning**.
3. Select **Align Compass to GPS**.
4. Steer your vessel on a steady course and then select **Start**.
5. Ensure sufficient vessel speed, if you are going too slow a 'Go Faster' message is displayed.

6. If the alignment is successful select **OK** to complete the procedure.

If required this procedure will automatically correct the compass offset value accessible from the Vessel Settings menu.

Note: If the alignment fails it means that the pilot sensor is more than a 10° deviation between your COG heading and the pilot sensor, in this situation the pilot sensor position must be checked.

7.11 Commissioning

You can commission an Evolution autopilot using the Pilot settings menu on your multifunction display. All set-up and commissioning procedures must be carried out before using the autopilot.

Commissioning the autopilot system consists of the following procedures:

- Vessel Hull Type selection.
- Drive Type selection.
- Rudder check
- Motor check

Commissioning pre-requisites

Before commissioning your system for the first time, check that the following processes have been carried out correctly:

- Autopilot system installation completed in accordance with the Installation instructions.
- SeaTalk^{ng} network installed in accordance with the SeaTalk^{ng} Reference Manual.
- Where fitted, the GPS receiver has been installed and connected in accordance with the associated Installation instructions.

Check also that the commissioning engineer is familiar with the installation and components of the autopilot system including:

- Vessel type.
- Vessel steering system information.
- What the autopilot will be used for.
- System layout: components and connections (you should have a schematic of the vessel's autopilot system).

Vessel hull type selection

The vessel hull type options are designed to provide optimum steering performance for typical vessels.

It is important to complete the vessel hull type selection as part of the initial set-up, as it forms a key part of the commissioning process. You can also access the options at any time with the pilot in Standby from the Pilot Set-up page by selecting: **Pilot Settings > Vessel Settings > Vessel Hull Type**.

As a general guide, select the option that most closely matches your vessel type and steering characteristics. The options are:

- **Sail**.
- **Sail (slow turn)**.
- **Sail Catamaran**.
- **Power**
- **Power (slow turn)**.
- **Power (fast turn)**.

It is important to be aware that steering forces (and therefore rate-of-turn) vary significantly depending on the combination of vessel type, steering system,

and drive type. Therefore, the available vessel hull type options are provided for guidance only. You may wish to experiment with the different vessel hull type options, as it might be possible to improve the steering performance of your vessel by selecting a different vessel type.

When choosing a suitable vessel type, the emphasis should be on safe and dependable steering response.

Important: If you change the vessel type **after** completing the Dockside wizard, all commissioning settings will be reset to default settings, and you will need to complete the Dockside wizard again.

Selecting a vessel hull type

The Vessel hull type can be accessed from the Pilot Set-up page.

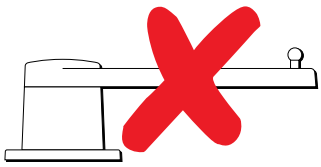
1. Select **Pilot Settings**.
2. Select **Vessel Settings**.
3. Select **Vessel Hull Type**.
4. Select the option that most closely matches your vessel type.

   The new selection is applied.

Performing the Dockside wizard

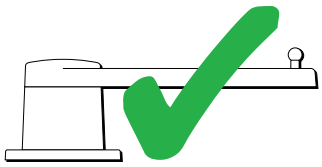
The dockside wizard must be completed before the Evolution autopilot system can be used for the first time. The Dockside wizard guides you through the steps required for commissioning.

The Dockside wizard contains different steps depending on whether you have a rudder reference transducer fitted to your vessel:



The following Dockside wizard procedures only apply to vessels **without** a rudder reference transducer:

- Drive Type selection.
- Rudder Limit setting.
- Hard-over time setting (Raymarine recommends that this information is specified once the dockside wizard and Rudder Drive check is complete, using the Hard Over Time menu option).
- Rudder Drive check.



The following Dockside wizard procedures only apply to vessels **with** a rudder reference transducer:

- Drive Type selection.
- Align Rudder (rudder alignment).
- Rudder Limit setting.
- Rudder Drive check.

To access the wizard, ensure the pilot is in **standby** mode and then from the Pilot Set-up page:

1. Select **Pilot Settings**.
2. Select **Commissioning**.
3. Select **Dockside Wizard**.

Selecting a drive type

Drive type selection is available from the dockside wizard, and also from the Vessel settings menu: **Pilot Set-up > Pilot Settings > Vessel Type > Drive type**.

With the **Drive Type** menu displayed:

1. Select your drive type from the list.

Note: The drive types available are dependant on the ACU type. If your drive type is not listed contact your Raymarine dealer for advice.

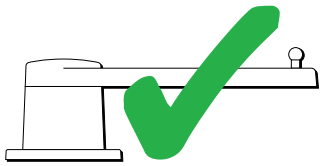
2. Select **OK** to save your setting and display the next set-up page.

Note: You can cancel the Dockside wizard at any time by selecting **STANDBY**.

Checking the rudder alignment

This procedure establishes port and starboard rudder limits for systems using a rudder reference transducer.

The rudder check forms part of the dockside wizard.



The following procedure only applies to vessels with a rudder reference transducer.

1. Center the rudder and select **OK**.
2. When prompted, turn the rudder hard to port and select **OK**.
3. When prompted, turn the rudder hard to starboard and select **OK**.
4. When prompted, turn the rudder back to centre and select **OK**.

Note: You can cancel Dockside wizard at any time by selecting **STANDBY**.

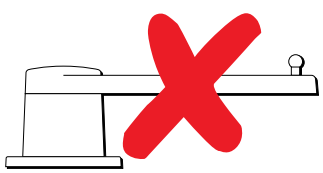
Rudder limit setting

As part of the Dockside wizard, the system will set-up the rudder limits.

- **For vessels with a rudder reference transducer** — This procedure establishes the rudder limit. The rudder limit will be displayed with a message confirming that the rudder limit has been updated. This value can be changed if required.
- **For vessels without a rudder reference transducer** — A default of 30 degrees is displayed, and can be changed as required.

Hard over time

The hard over time setting can be specified as part of the Dockside wizard.



The following information only applies to vessels without a rudder reference transducer.

- **If you already know the hard-over time** for your vessel's steering system: enter this time during the Dockside wizard procedure.
- **If you do NOT know the hard-over time** for your vessel's steering system: skip this step during the Dockside wizard by selecting **SAVE**, complete the Dockside wizard procedure. Once the wizard is complete, calculate and adjust the hard-over time.

Checking the rudder drive

As part of the Dockside wizard, the system will check the drive connection. Once it has completed the check successfully, a message will appear asking if it is safe for the system to take the helm.

During this procedure the autopilot will move the rudder. Ensure it is safe to proceed before selecting **OK**.

When in the Dockside wizard, with the Motor Check page displayed:

1. Center and let go of the rudder.
2. Disengage any rudder drive clutch.
3. Select **CONTINUE**.
4. Check it is safe to proceed before selecting **OK**.

   For vessels **with** a rudder reference transducer, the autopilot will now automatically move the rudder to port and then starboard.
5. For vessels **without** a rudder reference transducer, you will be asked to confirm the rudder turned to port by selecting **YES** or **NO**.
6. Select **OK** if it is safe to engage the rudder in the opposite direction.
7. You will be asked to confirm the rudder turned to starboard by selecting **YES** or **NO**.
8. Dockside wizard is now complete, select **CONTINUE**.

Note: If you confirmed a "NO" response for the rudder movement to both port and starboard, the wizard will exit. It is possible that the steering system did not move the rudder in any direction, and it will be necessary to check the steering system before completing the Dockside wizard procedure again.

Note: If the rudder moves in the opposite direction than expected you may need to reverse the phase of the rudder reference unit. This can be achieved by accessing: **Pilot Set-up > Pilot Settings > Drive Settings > Reverse Rudder Ref**.

You can cancel Dockside wizard at any time by pressing **STANDBY**.

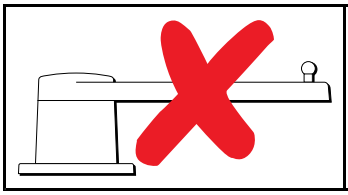
Warning: Rudder check

If no rudder reference has been fitted you MUST ensure that adequate provision is made to prevent the steering mechanism from impacting the end stops.

Adjusting the hard-over time

On vessels **without** a rudder reference transducer, it is important to set the hard-over time limits correctly, to ensure accurate autopilot operation. Hard-over time is the time it takes the vessel's steering system to drive the rudder from full port to full starboard.

Before attempting the following procedure, ensure that you've observed and understood the Rudder check warning provided in this document.



The following information only applies to vessels without a rudder reference transducer.

1. With the autopilot in 'Standby' mode, **manually turn the helm full to port**.
2. Place the autopilot in 'Auto' mode.
3. Using a stopwatch, **start the timer**, and then immediately:
4. Turn 180 degrees from your current heading.
5. Once the rudder has reached the rudder limit that was specified as part of the Dockside wizard, **stop the timer**.
6. To calculate your hard-over time, take the measured time and double it.
7. Now access the **Hard Over Time** menu to specify this hard-over time.

Setting the hard over time

Once the hard over time has been established it can be set following the steps below.

From the Pilot Set-up page:

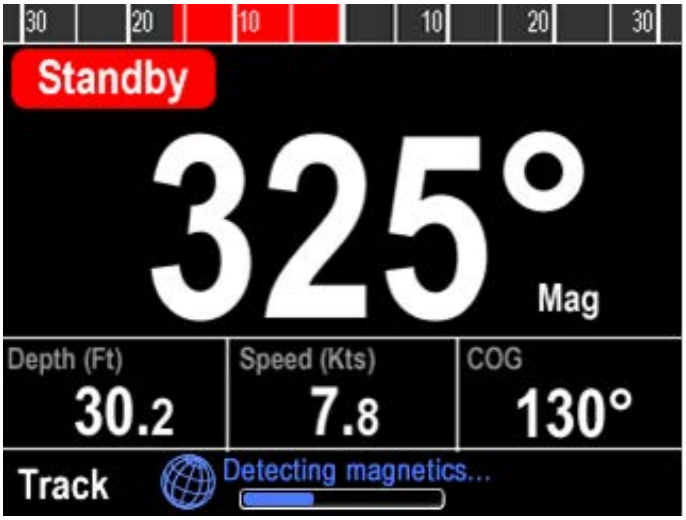
1. Select **Pilot Settings**.
2. Select **Drive Settings**.
3. Select **Hard Over Time**.
4. Enter your hard over time in seconds.

Compass linearization — Evolution autopilots

The EV unit's internal compass needs to compensate for local and the Earth's magnetic fields. This is achieved using an automatic process known as linearization.

Initial linearization

When the EV unit is first installed and powered-up (or after a factory reset or compass restart) linearization is required. A progress bar is displayed to indicate linearization is required.

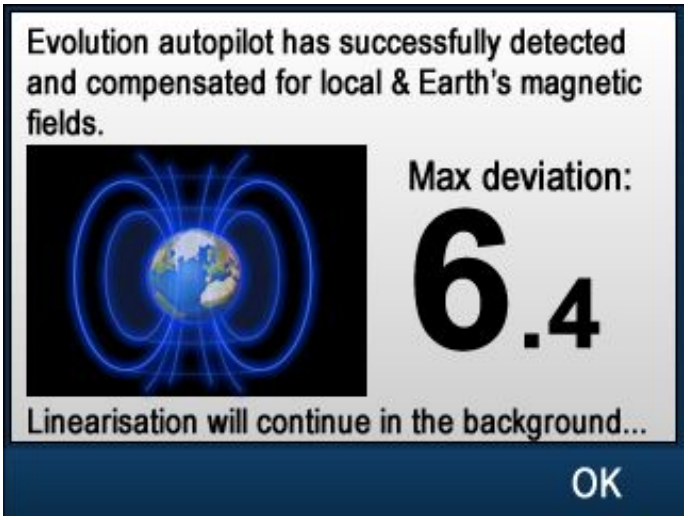


The linearization process will start automatically after your vessel has turned approximately 100° at a speed of between 3 –15 knots. Linearization requires no user input, however at least a 270° turn is required before linearization can complete. The progress bar will fill to indicate progress, the progress bar will turn Red if the process is paused or otherwise interrupted. Time it takes to complete the linearization will vary according to the characteristics of the vessel, the installation environment of the EV unit, and the levels of magnetic interference at the time of conducting the process. Sources of significant magnetic interference may increase the time required to complete the linearization process. Examples of such sources include:

- Marine pontoons
- Metal-hulled vessels
- Underwater cables

You can speed-up the linearization process by completing a full 360° turn (at a speed of 3 – 15 knots). You can also restart the linearization process at any time by selecting the **Restart Compass** menu item.

Once the initial linearization is completed the Deviation page is displayed and the current maximum compass deviation is shown.



Compass deviation

If the reported deviation is 45° or higher, it is highly recommended that the EV unit is moved and re-installed in a location which is subject to less magnetic interference. After the linearization process has successfully completed you can check the current deviation value at anytime from the diagnostics pages.

Note: If "- -" is displayed as the Deviation value, it means that linearization has not been successfully completed yet.

Check the compass heading data

As part of the autopilot system commissioning process, it is recommended that you check the compass heading value displayed, against a good known heading source on various headings.

Note: Once the linearization process has completed, it is possible that the heading value may have a slight offset of 2 to 3 degrees. This is common where installation space is limited, and the EV unit cannot be properly aligned to the vessel's longitudinal axis. In this case, it is possible to manually adjust the Compass Offset value.

Note: Do NOT rely on the reported heading until compass linearization and alignment is complete.

System monitoring and adaptation

To ensure optimum performance, after the initial linearization process is complete the EV continues to monitor and adapt the compass linearization to suit current conditions.

If the conditions for linearization are less than ideal, the automatic linearization process temporarily pauses until conditions improve again. The following conditions can cause the linearization process to temporarily pause:

- Boat speed < 3 knots.
- Boat speed > 15 knots.
- Rate-of-turn is too slow.
- Significant magnetic interference is present

Compass lock

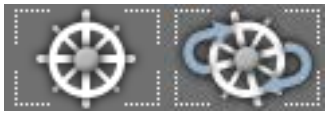
Once you are satisfied with the compass accuracy, you can lock the setting to prevent the autopilot system from completing a further automatic linearization in the future.

This feature is particularly useful for vessels in environments that are exposed to strong magnetic disturbances on a regular basis (such as offshore wind farms or very busy rivers, for example). In these situations it may be desirable to use the Compass lock feature to disable the continuous linearization process, as the magnetic interference may build a heading error over time.

Note: The compass lock may be released at any time, to allow the compass continuous linearization to restart. This is particularly useful if planning a long voyage. The earth's magnetic field will change significantly from one geographical location to another, and the compass can continuously compensate for the changes, ensuring you maintain accurate heading data throughout the voyage.

7.12 Autopilot status symbols

The autopilot status is indicated in the databar.

Symbol	Description
	Autopilot is in Standby mode.
	Autopilot is in Track mode.
	Autopilot is in Auto mode.
	No autopilot detected.
	Autopilot alarm active.
	Dodge mode is active.
	Fish mode is active.
	Autopilot calibration.
	Power steering active.
	Wind Vane mode is active.

7.13 Autopilot alarms

The autopilot function provides alarms to alert you to situations that require action.

Your multifunction display shows autopilot alarms, regardless of whether there is active navigation on the system. If autopilot control is enabled, and an alarm is raised by the autopilot, the multifunction display provides an audible alarm sound (providing that the alarm has not already been silenced). The **Pilot Control** dialog is displayed, indicating a new alarm. Additionally, the autopilot status icon is displayed in red, and remains red until the alarm is cleared.

Silencing autopilot alarms

1. Select **Dismiss**.

   The alarm is silenced and the autopilot remains engaged in auto mode, continuing on the current locked heading.
2. Select **Auto**.

   The alarm is silenced and the autopilot remains engaged in auto mode, continuing on the current locked heading.
3. Select **Track**.

   The alarm is silenced and the autopilot 'tracks' to the next waypoint.

Silencing autopilot alarms and disengaging autopilot

1. Select **STANDBY**.

The alarm is silenced, and the autopilot is disengaged and put in standby mode.

Chapter 8: Alarm management

Chapter contents

- 8.1 Alarms overview on page 106
- 8.2 Alarm Manager overview on page 106
- 8.3 Alarm options on page 109

8.1 Alarms overview

Alarms alert you to a situation or hazard requiring your attention, such as shallow depth or a change in water temperature.

Alarms are triggered by system functions, and external devices connected to the Multifunction display (MFD).

Audible and visual warnings are displayed on all networked MFD screens when an alarm is triggered. The alarm message provides details of the reason for the alarm.

Alarm messages are color coded to signify their severity as follows:

- **Red Alerts** — immediate attention required due to potential or immediate danger to life or vessel. Red Alerts continue to sound until acknowledged or the conditions that triggered the alarm are no longer present. Red Alerts are accompanied by an urgent audible tone.
- **Orange Warnings** — used to warn a user about a change in situation that they need to be aware of. Orange Warnings are accompanied by a normal audible tone.
- **Blue Cautions** — used to inform a user of any other information. Blue Alerts are also used for user acknowledgments and disclaimers. Blue Alerts are not accompanied by an audible tone.

Acknowledging an active alarm

When an alarm event occurs it can be acknowledged by selecting OK, this will dismiss the alarm message and stop the alarm tone.

During an active alarm event (i.e. an alarm message is displayed):

1. Select **OK**.

   The message is dismissed and the alarm tone is stopped.

   Tip If an alarm message includes an **Edit** button then the alarm's settings can be accessed directly from the alarm message.

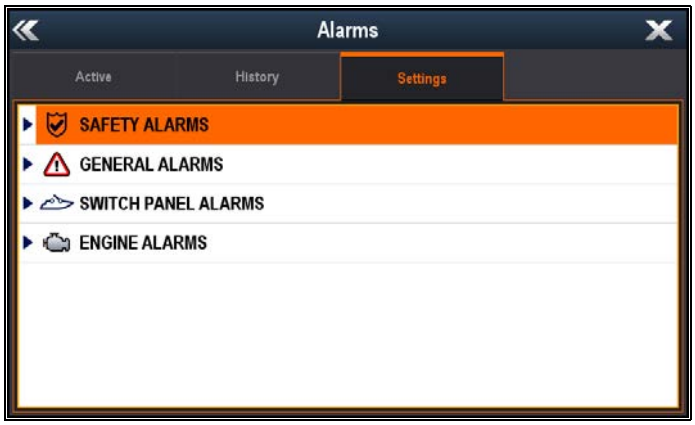
Most alarms will remain active until the conditions that triggered the alarm are no longer present e.g. a Shallow Depth alarm will automatically dismiss when the depth becomes deeper. Whilst active the alarm will be triggered at a set time interval.

8.2 Alarm Manager overview

The Alarm Manager is used to configure the behavior of alarms and to manage alarm activity.

The Alarm Manager can be used to:

- Enable and disable alarms
- Adjust alarm thresholds
- View alarm history
- View list of currently active alarms



In the **Settings** tab alarms are displayed in the following categories:

- Safety Alarms
- General Alarms
- * Switch Panel Alarms
- ** Engine Alarms

Note:

- * The **Switch Panel Alarms** category is only displayed when you have a correctly configured Raymarine Digital Switching system installed on your vessel.
- ** Engine alarms will only be triggered when the relevant engine data is available on the network and transmitting appropriate NMEA messages.

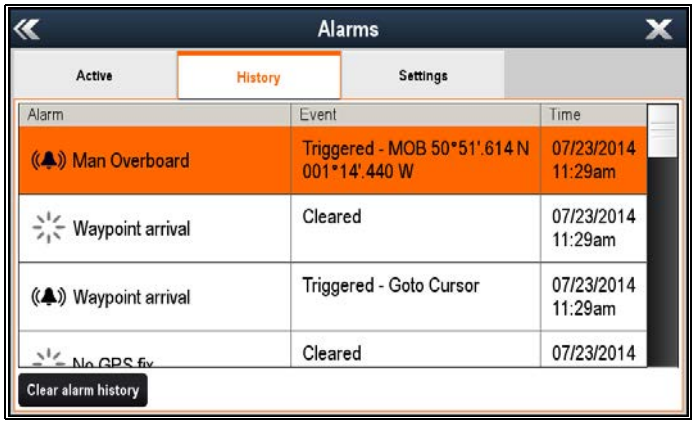
Alarm Settings



From the **Settings** tab you can enable and disable alarms and change alarm thresholds.

Alarms with Black text are currently enabled, alarms with Gray text are currently disabled. The currently highlighted alarm's text will also be Black.

Alarm History



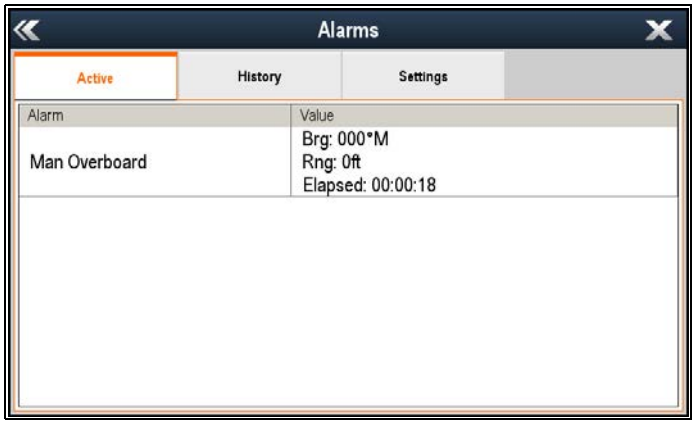
The Alarm History tab provides details of alarms and the date and time that they were triggered and cleared / acknowledged. The Alarm history can display up to 1,000 alarm events and displays them sorted by time.

When the Alarm history has reached its capacity of 1,000 entries, the oldest events in the list will be automatically deleted when subsequent new alarm events occur.

Alarm events will only be removed from the list if:

- **Clear alarm history** is selected.
- a **Systems and Data Reset** is performed.
- it is automatically deleted due to the list reaching its capacity of 1,000 events.

Active Alarms



The Active Alarm tab lists all currently active alarms. Alarms are removed from the list when:

- the conditions that triggered the alarm are no longer present.
- the alarm has been disabled.

Accessing the Alarm Manager

From the Homescreen:

1. Select **Set-up**.
2. Select **Alarms**.
   The Alarm Manager is displayed.

Enabling and disabling an alarm

You can enable and disable alarms using the Alarm Manager.

From the Alarm Manager **Homescreen > Set-up > Alarms**:

1. Select the **Settings** tab.
2. Select the alarm category for the alarm you want to enable / disable.

   Alarms are displayed in the Alarm Manager in the following categories:

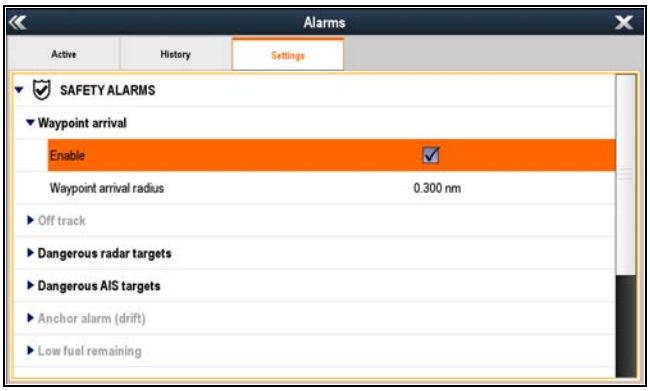
   - ***Safety Alarms***
   - ***General Alarms***
   - **** Switch Panel Alarms***
   - ***Engine Alarms***

Note: * The **Switch Panel Alarms** category is only displayed when you have a correctly configured Raymarine Digital Switching system installed on your vessel.

3. Select on the relevant alarm.

   Alarms with Black text are currently enabled and alarms with Gray text are currently disabled.

   The alarm will be expanded to show the alarm settings.



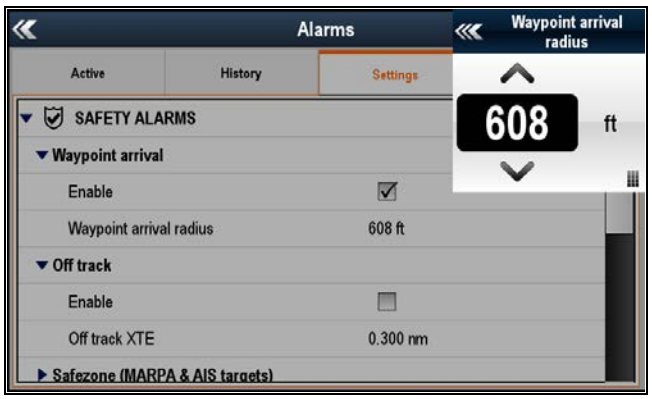
   If the **Enable** box is ticked then the alarm is currently enabled.
4. To disable the alarm, select the **Enable** tick box so that the tick is removed.
5. To enable the alarm, select the **Enable** tick box so that a tick is displayed.

Changing alarm thresholds

Alarm thresholds are the attributes associated with each alarm which dictates when the alarm event is triggered.

With the Alarm Manager displayed:

1. Select the **Settings** tab.
2. Select the alarm category for the alarm you want to change the thresholds of.
3. Select on the relevant alarm.
   The alarm will be expanded to show the alarm settings.
4. Select the relevant threshold.
   The numeric adjustment control is displayed.



5. With the numeric adjust control displayed, select the on-screen **Up** and **Down** arrows to adjust the alarm threshold value, or
6. To use the numeric keypad:
   i. Select on the actual value or the keypad icon.
   The numeric keypad is displayed.



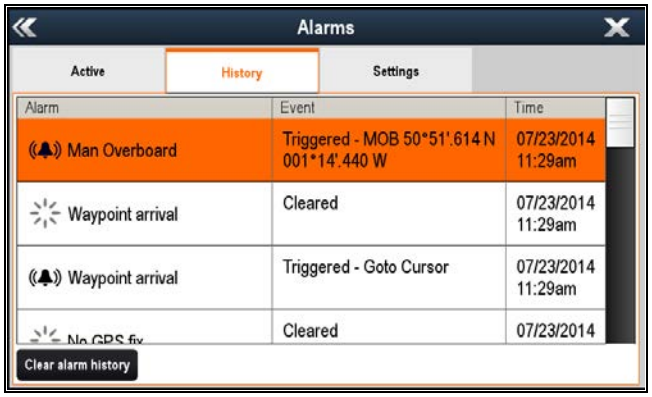
   ii. Use the on-screen keypad to enter the desired value for the alarm threshold.
   iii. Select **OK** to save the new value for the alarm threshold.
   iv. You can also change the unit of measure for the alarm threshold you are currently changing by selecting on the relevant unit of measure from the numeric keypad.

Clearing the alarm history

You can view the history of alarm events from the Alarm Manager.

From the Homescreen:

1. Select **Set-up**.
2. Select **Alarms**.
   The Alarm Manager is displayed.
3. Select **History**.
   The alarm history is displayed.



4. Select **Clear alarm history**.
   A confirmation message is displayed.
5. Select **Yes**.
   The alarm history is deleted.

The alarm history is also cleared if a **Systems and Data Reset** is performed.

8.3 Alarm options

Safety Alarms

Menu item	Description	Options
Waypoint arrival	If enabled, when you arrive at a waypoint, an alarm is triggered. This setting allows you to specify the radius of the waypoint arrival circle. The waypoint arrival circle is an imaginary circle around the destination waypoint. When your vessel crosses this circle the Waypoint Arrival alarm is triggered. **Note:** The waypoint arrival alarm is always enabled if your system includes a Raymarine autopilot.	**Enable**: • Enabled (Ticked) (default) • Disabled (Un-ticked) **Waypoint arrival radius** Default values: • 19 m — applies to km and nm & m units of measure. • 61 ft — applies to Nautical Miles and Statue Miles units of measure. Radius / distance range: • 19 to 18,520 m • 61 to 60,761 ft • 0.01 to 10 nm • 0.012 to 11.508 sm • 0.019 to 18.52 km
Off track	When enabled, during active navigation an alarm is triggered when your vessel steers off-track more than the value you specify for the **Off Track XTE** setting.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Off Track XTE** Default values: • 556 m — applies to km units of measure. • 0.300 nm — applies to nm and nm & m units of measure. • 0.345 sm — applies to sm units of measure. Radius / distance range: • 19 to 18,520 m • 61 to 60,761 ft • 0.01 to 10 nm • 0.012 to 11.508 sm • 0.019 to 18.52 km
Dangerous radar targets	Alarms are triggered when targets become dangerous. MARPA targets are deemed dangerous when they are within the specified: • Distance / Radius — Closest Point of Approach (CPA), or • Time — Time to Closest Point of Approach (TCPA) MARPA target alarms cannot be disabled.	**Safe Distance** • 0.1 nm / 0.1 sm / 0.2 km • 0.2 nm / 0.2 sm / 0.5 km • 0.5 nm / 0.5 sm / 1 km (default) • 1 nm / 1 sm / 2 km • 2 nm / 2 sm / 5 km **Time to Safe Distance** • 3 min (default) • 6 min • 12 min • 24 min

Menu item	Description	Options
Dangerous AIS targets	AIS target alarms can be enabled and disabled. With the AIS target alarm disabled AIS targets will not trigger an alarm when they become dangerous.	• Enabled (Ticked) • Disabled (Un-ticked) (default)
Anchor alarm (drift)	When enabled, the Anchor Drift alarm is triggered when your vessel drifts from your anchor position by more than the distance specified in the **Drift range** setting.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Drift range** Default values: • 185 m / 608 ft Distance range: • 19 to 3,047 m • 61 to 9,999 ft • 0.01 to 1.646 nm • 0.012 to 1.894 sm • 0.019 to 3.048 km
Low fuel remaining	If the Fuel Manager is not currently enabled then selecting the Low fuel remaining (LFR) alarm will result in a message being displayed asking if you want to enable the Fuel Manager. The LFR alarm can be enabled and the threshold can be set without the Fuel Manager being enabled, however the alarm will not be triggered until the Fuel Manager is enabled. **Note:** You cannot set LFR to be more than the current TFC value.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Fuel level** Default value: • If Total Fuel Capacity (TFC) has been set in the Fuel Manager then the default shall be 20% of the TFC value. Volume range: • 0 to 99,999 ltr / 0 to TFC • 0 to 99,999 Gal / 0 to TFC
DSC	With the DSC alarm enabled, DSC distress calls will be displayed on the screen of all networked MFDs.	**DSC Alerts**: • Enabled (Ticked) (default) • Disabled (Un-ticked)
AIS	With the AIS alarm enabled, AIS safety messages will be displayed on the screen of all networked MFDs.	**AIS safety messages**: • Enabled (Ticked) (default) • Disabled (Un-ticked)
MOB	Determines whether Position or Dead Reckoning (DR) data is displayed. Assuming that your vessel and the MOB are subject to the same tide and wind effects, the Dead Reckoning setting normally gives a more accurate course.	**MOB data type** • Dead Reckoning • Position (default)

General Alarms

Menu item	Description	Options
Alarm Clock	When enabled, an alarm is triggered at the time you specify in the **Alarm Clock Time** setting.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Alarm Clock Time**

Menu item	Description	Options
		• 00.00 to 23:59 hrs (hh:mm)
Countdown Timer	When enabled, counts down the time period specified in the **Timer Period** setting, and triggers an alarm when zero is reached.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Time Period** • 00:00:01 to 99:59:59 (hh:mm:ss)
Fishing — shallow water arrival	When enabled, an alarm is triggered when the depth reaches the value specified in the **Shallow Limit** alarm setting. This option is only available when current depth data is available. **Note:** The **Shallow Limit** cannot be set to a depth greater than the depth specified for the **Deep Limit setting.**.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Shallow Limit** Default values: • 1.5 m / 5.0 ft / 0.89 fa (default) Range: • 0.6 m to Max depth limit of connected sonar module • 2 ft to Max depth limit of connected sonar module • 0.3 fa to Max depth limit of connected sonar module
Fishing — deep water arrival	When enabled, an alarm is triggered when the depth reaches the value specified in the **Deep Limit** alarm setting. This option is only available when current depth data is available. **Note:** The **Deep Limit** cannot be set to a depth less than the depth specified for the **Shallow Limit setting.**.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Deep Limit** Default values: • 1.5 m / 5.0 ft / 0.89 fa (default) Range: • Shallow Limit to 914 m • Shallow Limit to 3,000 ft • Shallow Limit to 500 fa
Water temperature	When enabled, an alarm is triggered when: • the water temperature is equal to or less than the temperature specified in the **Lower Temp Limit** setting, or • the water temperature is equal to or greater than the temperature specified in the **Upper Tempo Limit** setting.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Upper Temp Limit** Defaults: • 23.9°C / 75°F (default) Range: • Lower Temp Limit to 37.7°C • Lower Temp Limit to 99.9°F **Lower Temp Limit** Defaults: • 15.6°C / 60°F (default) Range: • –23.3°C to Upper Temp Limit

Menu item	Description	Options
		• –9.98°F to Upper Temp Limit
Fish	If the Fish alarm is enabled, an alarm tone is triggered if a target is detected that meets the **Fish alarm sensitivity**. The following options are available under Fish Alarm. • **Enable** — Enables and disables Fish Alarms. • **Fish alarm sensitivity** — If the Fish alarm is set to On, an alarm is triggered when the fish return strength reaches the sensitivity that you specify. • **Fish alarm depth limits** — Enables and disables the shallow and deep fish alarm limits. • **Fish alarm shallow limit** — Specifies the lower value for the Fish alarm depth limits. • **Fish alarm deep limit** — Specifies the upper value for the Fish alarm depth limits.	**Enable**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Fish alarm sensitivity** • Default: 5 • Range: 1 to 10 **Fish alarm depth limits**: • Enabled (Ticked) • Disabled (Un-ticked) (default) **Fish alarm shallow limit** Default values: • 0.6 m / 2 ft / 0.3 fa (default) Range: • 0.6 m to Fish alarm deep limit • 2 ft to Fish alarm deep limit • 0.3 fa to Fish alarm deep limit **Fish alarm deep limit** Default values: • 305 m / 1,000 ft / 167 fa Range: • Fish alarm shallow limit to 914 m • Fish alarm shallow limit to 3,000 ft • Fish alarm shallow limit to 500 fa

Switch Panel Alarms

Menu item	Description	Options
Switch Panel Alarms	The Switch Panel Alarms section is only displayed when connected to a correctly configured Raymarine Digital Switching system.	• Enabled (Ticked) (default) • Disabled (Un-ticked)

Engine Alarms

Menu item	Description	Options
Show alarms for engine errors	When enabled, warning alarms from connected, compatible engine management systems will be displayed on the MFD.	• Enabled (Ticked) (default) • Disabled (Un-ticked)
Check engine	The engine alarms listed below can be enabled or disabled using the Alarm Manager • **Over temperature** • **Low oil pressure** • **Low oil level** • **Low fuel pressure** • **Low system voltage** • **Low coolant level** • **Water flow** • **Water in fuel**	• Enabled (Ticked) (default) • Disabled (Un-ticked)

Menu item	Description	Options
	• **Not charging** • **High boost pressure** • **Rev limit exceeded** • **EGR system** • **Throttle position sensor** • **Emergency stop** • **Warning level 1** • **Warning level 2** • **Power reduction** • **Maintenance needed** • **Communications error** • **Sub or secondary throttle** • **Neutral start protect** • **Engine shutting down** • **Unknown error 1** (manufacturer specific error message) • **Unknown error 2** (manufacturer specific error message) • **Unknown error 3** (manufacturer specific error message) • **Unknown error 4** (manufacturer specific error message) • **Unknown error 5** (manufacturer specific error message) • **Unknown error 6** (manufacturer specific error message) • **Unknown error 7** (manufacturer specific error message) • **Unknown error 8** (manufacturer specific error message) • **Check Transmission** • **Transmission over temperature** • **Transmission low oil pressure** • **Transmission low oil level**	

Chapter 9: Man Overboard (MOB)

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- 9.1 Man overboard on page 116

9.1 Man overboard

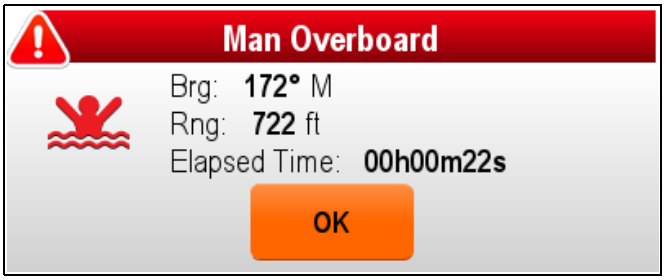
If you lose a person or object overboard, you can use the Man Overboard (MOB) function to mark the position that the vessel was at when the MOB function was activated.

The MOB function is available at all times, regardless of which application is running. MOB can be set to Dead Reckoning or Position mode. Dead Reckoning mode will take into consideration the effects of wind and tides. This usually provides a more accurate course. Position mode does not take these factors into account.

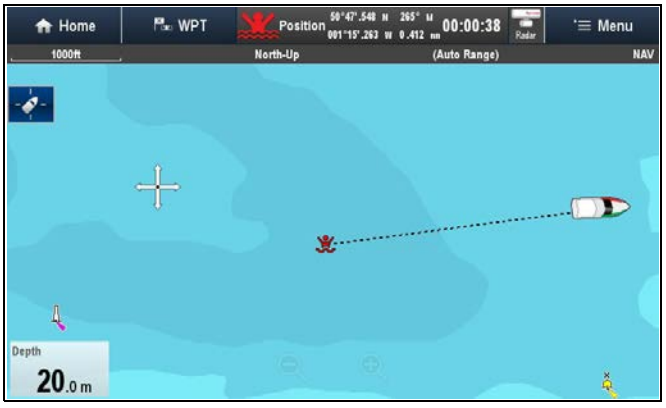
To obtain a MOB position, your multifunction display must have a GPS position fix. If you're using dead reckoning, heading and speed data must also be available.

When MOB is **activated**:

- An audible MOB alarm is sounded every 30 seconds until the MOB is cancelled.
- An MOB alarm dialog is displayed until it is acknowledged.



- The system sends MOB alarms to other Raymarine equipment.
- The active Chart application is changed to a low-detail 2D view, with an initial range of 15 m (50 ft). Motion mode is set to Auto Range. As the vessel moves away from the MOB position a dotted line is displayed, joining the MOB position with the vessel's position.



- The active radar application range is changed to 230 m (760 ft).
- All Goto and Follow functions are disabled in all applications. Navigation to any active waypoint is stopped and any existing navigation function is cancelled.
- If position or heading and speed information is available a MOB waypoint is placed at the current vessel position in any application that is capable of showing waypoints and vessel position.
- MOB data is displayed in the databar, replacing the existing data.
- MOB data is displayed on the homescreen, replacing the status icons.



When the MOB alarm is **cancelled**:

- MOB data is removed from the relevant applications.
- The chart application motion mode is reset.
- The chart is centered on the vessel and pitch / rotation set to default.
- GOTO and route functions are restored.
- The databar mode is reset.
- A MOB normal mode signal is sent to any instrument on SeaTalk.

Waypoint (MOB) button / icon

Depending on the multifunction display variant there will be either a Waypoint (MOB) button or an onscreen icon.

WPT button		• c Series • e Series • eS Series • RMK-9 keypad
WPT icons		• a Series • gS Series

Throughout this manual the term: Select **WPT**, refers to pressing the physical **WPT** button or pressing the on-screen **WPT** icon.

Activating the man overboard (MOB) alarm

On multifunction displays with physical buttons or when using a remote keypad you can use the WPT (MOB) button to activate the MOB alarm

1. Press and hold the **WPT / MOB** button for 3 seconds.

Activating the man overboard (MOB) alarm — Touch only displays

On a Touch only display you can use the onscreen WPT (MOB) icon to activate the MOB alarm

1. Press and hold the onscreen **WPT / MOB** icon for 3 seconds.

Cancelling the man overboard (MOB) alarm — Touch only display

On a Touch only display you can cancel the MOB alarm and resume normal operation follow the steps below:

1. Press and hold the onscreen **WPT / MOB** icon for 4 seconds.

   The MOB alarm is cancelled and normal operation is resumed.

Cancelling the man overboard (MOB) alarm

On a multifunction display with physical buttons or when using a remote keypad you can cancel the MOB alarm and resume normal operation follow the steps below:

1. Press and hold the **WPT / MOB** button for 4 seconds.

   The MOB alarm is cancelled and normal operation is resumed.

Chapter 10: DSC VHF radio integration

Chapter contents

- 10.1 DSC VHF radio integration on page 120
- 10.2 Enabling DSC VHF radio integration on page 120

10.1 DSC VHF radio integration

You can connect your DSC VHF radio to your multifunction display and show distress message information and GPS position data for other vessels.

Connecting a DSC VHF radio to your multifunction display provides the following additional functionality:

- Distress Messages — when your DSC VHF radio receives a DSC message or alarm from another DSC VHF radio, the vessel identification (MMSI), GPS position, and time of distress message is displayed on your multifunction display. With the distress message displayed you can use the buttons provided to: clear the message, place a waypoint on the chart at the GPS position of the distressed vessel, or immediately start navigating (Goto Vessel) to the GPS position of the distressed vessel.
- Position Data — the “Position Request” button on your DSC VHF radio enables you to send and receive GPS position data to and from other vessels equipped with a DSC VHF radio.

For information on installing and operating your DSC VHF radio, refer to the handbook that accompanies the radio.

The following image shows an example of a distress message displayed on a multifunction display:



10.2 Enabling DSC VHF radio integration

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select the **DSC Alerts** option so that On is displayed.

Chapter 11: Fuel manager

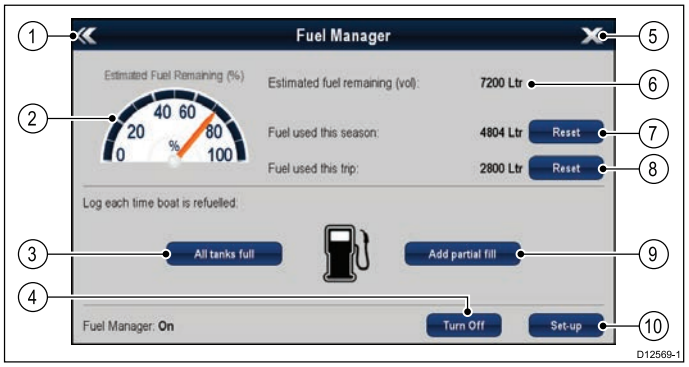
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- 11.1 Fuel manager overview on page 122

11.1 Fuel manager overview

The fuel manager provides an estimate of fuel remaining, and the distance and time which can be travelled before the tanks are empty. In order to calculate these values, you must configure the total capacity of fuel available to the engines and log each time you add fuel. The fuel manager also allows you to set a low fuel warning alarm which is sounded when the vessel's estimated fuel falls below a specified value.

The fuel manager page provides current calculation estimates and controls to enable use of the fuel manager feature.



Item	Option	Description
1	**Back**	Back to System Set-up menu — Touchscreen displays (For non-touchscreen displays use the **Back** button).
2	Estimated fuel remaining (%)	Graphical representation of percentage of fuel remaining in the fuel tank(s).
3	**All tanks full**	Resets fuel remaining to full tank capacity.
4	**Turn On/Off**	Turn fuel manager On or Off.
5	**Close**	Back to Homescreen — Touchscreen displays (For non-touchscreen displays use the **Back** button).
6	Estimated fuel remaining (vol)	Volume of fuel remaining in the fuel tank(s).
7	**Reset** (Fuel used this season.)	Reset the fuel used this season to zero.
8	**Reset** (Fuel used this trip.)	Reset the fuel used this trip to zero.
9	**Add partial fill**	Specify fill amount by volume
10	**Set-up**	Specify settings for fuel manager.

In order to use the fuel manager you must:

- Connect a compatible engine interface to each engine you wish to monitor (to provide fuel flow rate data to the network).
- Enter the total fuel capacity of the vessel's fuel tanks.
- Turn on the fuel manager feature.
- Fill the fuel tanks to full.
- Select 'All tanks full'.
- Log each subsequent fuel fill whether partial or full.

Note:

Fuel manager estimates the amount of fuel onboard, based on the user logging each time you fill up, the total fuel capacity, and how much fuel is burned by the engine(s). Any incorrect entry could dramatically affect the estimated fuel usage and capacity which could result in a shortage of fuel. This system is not a substitute for other types of fuel calculations.

Total fuel onboard is an estimate and will be inaccurate if fuel fills are not entered, or fuel is used by other sources (e.g. generators etc.). Estimated distance and time to empty will be based on the fuel remaining calculation and values do not include weather/tide effects.

You should not rely on the fuel manager calculations for accurate voyage planning or in emergency and safety critical situations.

Enabling the fuel manager

To turn the fuel manager on and off follow the steps below.

From the homescreen.

1. Select **Set-up**.
2. Select **Fuel Manager**.
3. Select **Turn On**.
   The fuel manager disclaimer is displayed.
4. Select **ACCEPT** to accept the disclaimer and start using the fuel manager.
   The Initialize fuel manager pop-up is displayed.
5. Select **OK**.

The fuel manager will start the next time the **All tanks full** icon is pressed.

Disabling the fuel manager

From the fuel manager page:

1. Select **Turn Off**.
   The deactivate fuel manager pop-up message is displayed.
2. Select **Yes** to turn off the fuel manager.

Setting up fuel manager

To set up the required settings for the fuel manager follow the steps below.

With the Fuel Manager page displayed:

1. Select **Set-up**.
2. Select **Total Fuel Capacity**.
   The numeric keypad is displayed.
3. Enter your vessel's total fuel capacity.
4. Select **OK**.

5. Select **Economy Units**.
   A list of available options is displayed:
   - Distance per Volume
   - Volume per Distance
   - Litres per 100km
6. Select the required economy units.
7. Select **Fuel Calculations** to select the desired method of calculation.
   The following options are available:
   - Fuel Used (PGN127497)
   - Fuel Flow Rate

Note: If the Fuel Used (PGN127497) is not available on your network you will need to use the Fuel Flow Rate option. When Fuel Flow Rate is selected then your multifunction display must remain powered on whilst the engines are running to enable the fuel calculation to be made.

8. Select **Back** to go back to the **Fuel Manager** page.

Fuel logging

You must ensure **all** fuel fills are recorded using the fuel manager.

From the fuel manager page:

1. When filling the tanks until full select **All tanks full**.
   The estimated fuel remaining is reset to the value of your fuel tanks capacity.
2. When only partially filling the tank make a note of the volume of fuel added to the tank and then select **Add partial fill**.
3. Enter the value noted earlier this will be added to your current fuel remaining figure.

Note: It is recommended that you perform an 'All tanks full' fill up as regularly as possible as partial fills will cause a higher cumulative inaccuracy in the provided calculations.

Setting the low fuel alarm

Using the fuel manager also allows you to set a low fuel alarm which, if activated, is sounded when your vessel's remaining fuel falls to a specified value.

With the fuel manager turned on and set up correctly:

1. From the homescreen select **Set-Up**.
2. Select **Alarms**.
3. Select **Fuel manager**.
   The low fuel alarm settings are displayed.
4. Select **Low Fuel** so that On is highlighted.
   Selecting **Low Fuel** will turn the low fuel alarm On or Off.
5. Select **Fuel Level**.
   The fuel level numeric adjust control is displayed.
6. Adjust the fuel level to the required value.

The low fuel alarm will now be sounded when the fuel remaining in the tank falls to the value specified.

Note: By default the low fuel alarm is switched off.

Resetting fuel used readings

You can reset the value of the fuel used this season or fuel used this trip by following the steps below.

From the fuel manager page:

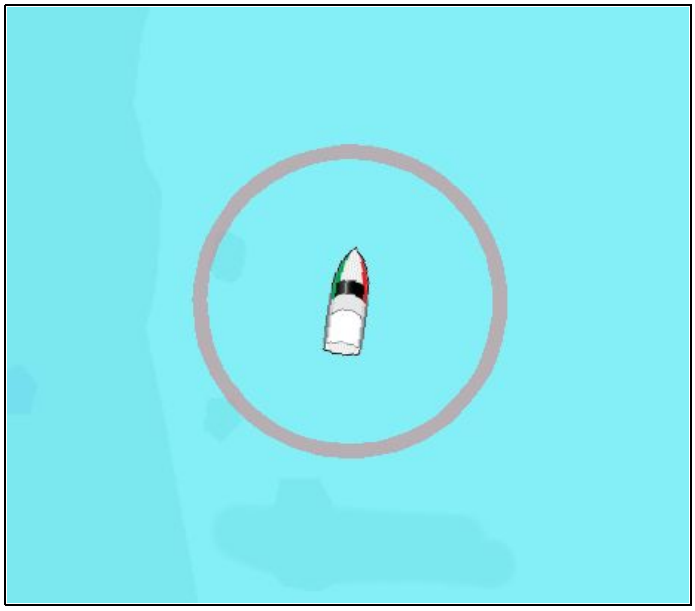
1. Select **Reset** against fuel used this season, or
2. Select **Reset** against fuel used this trip.

The value is set to zero after **Reset** has been selected.

Note: Performing a Season reset automatically resets the trip value.

Fuel range rings

The fuel range ring gives an estimated range that can be reached with the estimated fuel remaining on-board.



The fuel range ring can be displayed graphically in the chart application and indicates an estimated range that can be reached with the:

- Current rate of fuel consumption.
- Estimated fuel remaining on-board.
- Course remaining in a straight line.
- Current speed maintained.

Note:

The fuel range ring is an estimated range that can be reached at the current rate of fuel consumption, of the fuel onboard and based on a number of external factors which could either extend or shorten the projected range.

This estimate is based on data received from external fuel management devices, or via the Fuel Manager. It does not take into account prevailing conditions such as tide, current, sea state, wind etc.

You should not rely on the fuel range ring feature for accurate voyage planning or in emergency and safety critical situations.

Enabling the fuel range ring

From the chart application, in 2D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Overlays**.
4. Select **Fuel Range Ring** so that On is selected.
   The fuel range ring pop-up message is displayed.
5. Select **OK** to turn on the fuel range rings.

Chapter 12: AIS (Automatic Identification System)

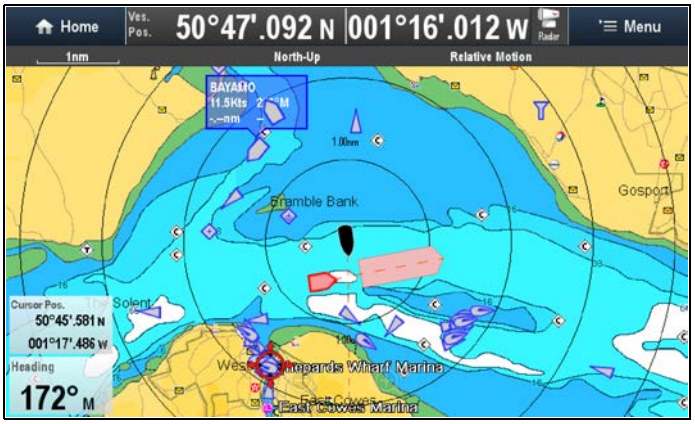
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- 12.1 AIS overview on page 126
- 12.2 AIS prerequisites on page 127
- 12.3 Enabling AIS on page 128
- 12.4 AIS context menu on page 128
- 12.5 AIS vectors on page 129
- 12.6 Vector options on page 130
- 12.7 Tracked target list on page 130
- 12.8 Dangerous targets on page 131
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- 12.11 Displaying safety-critical AIS information on page 137
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- 12.13 AIS silent mode on page 138
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12.1 AIS overview

AIS uses digital radio signals to transmit ‘real-time’ information between vessels and shore-based stations via dedicated VHF radio frequencies. This information is used to identify and track vessels in the surrounding area and to provide fast, automatic and accurate collision awareness data. Vessels and aids equipped with AIS transmitters that are within range can be displayed as targets in the Chart and Radar applications.

Important: It is not mandatory for vessels to be fitted with AIS equipment. Therefore, you should not assume that your MFD will display ALL vessels in your area. Due prudence and judgement should be exercised. AIS should be used to complement Radar, NOT substitute it.



With an AIS unit connected to your system you can:

- Display targets for any other transmitting AIS-equipped vessels within range. Up to 100 targets can be displayed simultaneously. You can either display all targets or just dangerous targets.
- Display position data being broadcast by these targets, such as their position, course, speed and rate-of-turn.
- Display vectors for AIS targets. Vectors can be displayed for each target. These vectors indicate the vessels direction of travel and the distance it will travel over a specified period of time (COG / SOG vector). Targets displayed with their vectors are referred to as ‘active targets’ and are scaled according to the size of the vessel. The larger the vessel, the larger the target.
- Display basic or detailed information for each target vessel, including safety-critical target data.
- Set up a Dangerous target alarm to alert you if an AIS target is getting too close.
- View Target interception graphics for targets to help improve collision awareness.
- Add AIS-equipped friends and regular contacts to a “Buddy List”

AIS Simulator Mode

Raymarine recommends that you use the simulator function to familiarize yourself with the AIS features. When the simulator function is enabled (**Homescreen > Set-up > System Settings > Simulator**). It displays 20 AIS targets within a 25 nm range. These targets are displayed using the appropriate AIS target's status symbol, and move around the screen as if they were real targets.

Note: Incoming safety messages are NOT displayed while the simulator is enabled.

AIS target types

Your MFD displays a range of symbols to represent the different types and status of AIS targets.

AIS target types

	Unknown vessel type		Yacht
	Commercial vessel		High speed
	Land based station		* Blueforce
	SAR (Search and Rescue Aircraft)		AToN (Aid To Navigation)
	Virtual AToN		SART (Search and Rescue Transpon-ders)

Note: * Military and law enforcement target (Approved STEDS-EAIS-AIS hardware required).

AIS target status

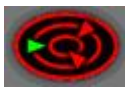
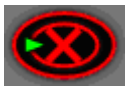
	Lost target (No border, crossed through)		Dangerous target (Flashes red)
	Buddy target (Triangle fill)		Uncertain target (Dashed line)
	Dangerous and uncertain target (Dashed line, flashes red)		AToN target off position (Red border)

When a target status changes, the symbol is updated accordingly.

AIS status symbols

AIS status is indicated by a symbol in the databar.

Symbol	Description
	AIS unit is switched on and operating.
	AIS currently unavailable.

Symbol	Description
	AIS unit is switched off, or not connected.
	AIS unit is in Silent Mode.
	AIS unit is in Silent Mode, with active alarms.
	AIS unit is connected and switched on, but has active alarms.
	AIS unit is connected and switched on, but the dangerous and lost alarm is disabled.

12.2 AIS prerequisites

You must have suitable AIS hardware connected to your multifunction display to make use of the AIS functionality.

In order to run AIS, you will need:

- A receive-only AIS unit or a full AIS transceiver (a unit that sends and receives).
- A VHF antenna.
- A GPS - to provide position data.
- The AIS layer enabled in the chart or radar application, as appropriate.

Note: A receiver will allow you to receive data about other vessels in your area but will not allow other vessels to 'see' you. A full transceiver transmits and receives AIS data, and therefore allows you to receive data about other vessels. It also enables other AIS-equipped vessels to see and receive information about your vessel. This could include position, course, speed and rate of turn data.

When the AIS unit is connected to your multifunction display, the status of the unit is indicated by an AIS icon in the status bar.

You can connect an AIS unit to your multifunction display using NMEA0183 or SeaTalk^{ng}, depending on the AIS unit. If connecting using NMEA0183, you will now need to specify the 38,400 baud setting (**homescreen > Set-up > System Settings > NMEA Set-up**) for the NMEA input port that communicates with the AIS transceiver or receiver.

12.3 Enabling AIS

Enabling AIS in the Chart application

To enable the AIS overlay in the Chart application follow the steps below.

To enable the AIS overlay your system must include an AIS receiver or transceiver. The AIS overlay is not available in 3D view.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **AIS:** so that On is selected.

   Selecting AIS: switches the AIS between On and Off.

For AIS information refer to Chapter 12 **AIS (Automatic Identification System)**.

Enabling AIS in the Radar application

From the Radar application menu:

1. Select **AIS**.
2. Select **Display AIS:**.
3. Select the relevant option from the list:
   i. **All** — All AIS target within range will be displayed.
   ii. **Dangerous** — Only AIS targets that are within your specified **Safe distance** are displayed.
   iii. **Off** — AIS targets are not displayed.

12.4 AIS context menu

When an AIS target is selected, the Chart application context menu includes AIS target information and menu options.

The context menu provides the following AIS target data:

- Buddy Name / Vessel Name / MMSI
- CPA
- TCPA
- COG
- SOG

The context menu also provides the following menu options:

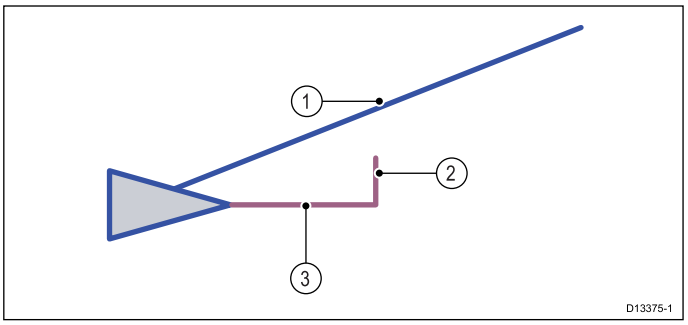
- **AIS Vector** — Switch target vectors On or Off.
- **AIS Data** — Switch on-screen target data On or Off.
- **Show Interceptions** — Switch individual Target interception On or Off.
- **View AIS Data**
- **Add Buddy** — Add target to the buddy directory.
- **Acquire Target** (only available if Radar overlay is switched on.)
- **Slew IR camera** (only available when a pan / tilt thermal camera is connected and operating.)

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

12.5 AIS vectors

Vectors can be displayed for AIS targets.

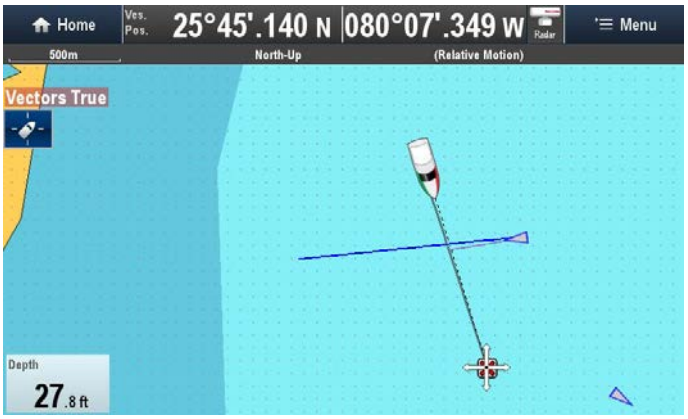


1. **COG vector** — The length of the COG vector predicts the distance the target will travel within a specified time period. The COG vector can be set to ‘Relative’ (Orange) or ‘True’ (Blue) motion.
2. **Rate of turn** — Class A targets, if available can display a Rate of Turn (ROT) indicator.
3. **Heading** — The Heading line is a fixed length.

Vector motion mode

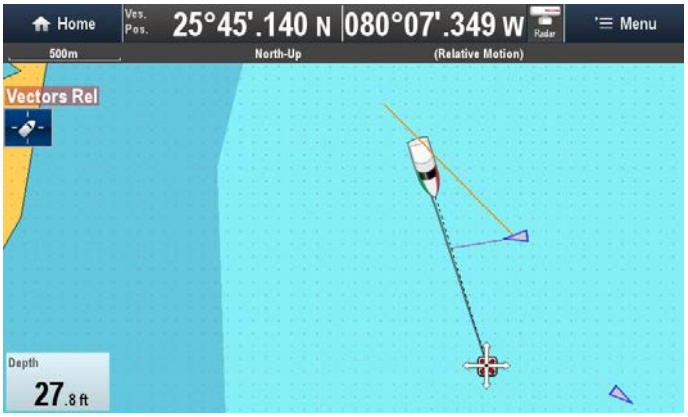
The COG vector can be set to Relative or True motion mode independently of the Chart or Radar application’s motion mode.

True motion



In True motion the COG vector displays the actual target’s predicted course / position.

Relative motion



In Relative motion the COG vector is displayed in relation to your own vessel’s position.

Note: By default the motion mode for target vectors are synchronized with the motion mode of the application they are displayed in. When the application’s motion mode is changed the motion mode for the target vectors are also changed.

Enabling and disabling AIS vectors

From the Chart or Radar application:

1. Select an AIS target.
   The AIS target context menu is displayed.
2. Select **AIS Vector**.
   Selecting AIS Vector will switch between On and Off.

Note: The vector settings apply to both MARPA and AIS targets.

12.6 Vector options

The Vector options can be accessed from the Collision Avoidance menu.

The location of the Vector options is dependent on the application and the overlays you have enabled:

- Radar application: **Menu > Collision Avoidance**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > Collision Avoidance**
- Chart application with only the Radar overlay enabled: **Menu > Radar > Collision Avoidance**
- Chart application with only the AIS overlay enabled: **Menu > AIS > Collision Avoidance**

Parameter	Description	Options
Vector Length	The length of the vector lines displayed depends on the distance that an AIS / MARPA target travels in the time period that you specify for this setting.	• 0.5 min • 1 min • 3 min • 6 min • 12 min • 30 min • 60 min
Target History	MARPA Targets' previous position will be plotted using a light gray target icon for the time specified.	• Off (default) • 0.5 min • 1 min • 3 min • 6 min

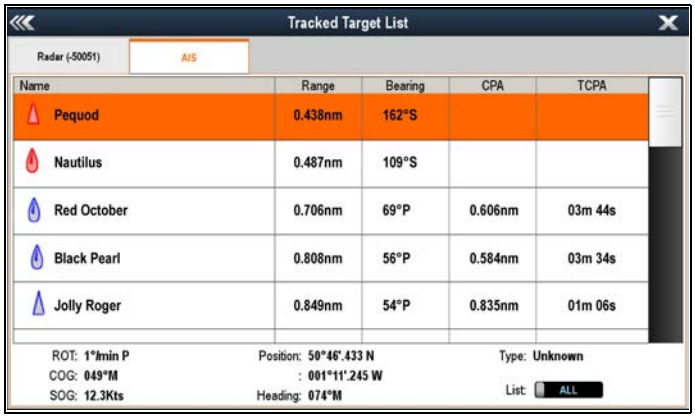
12.7 Tracked target list

All targets currently being tracked are shown in the Tracked target list. MARPA and AIS targets are shown in separate tabs.

The location of the Tracked target list is dependent on the application and Overlays you have enabled:

- Radar application: **Menu > Tracked Targets**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > Tracked Targets**
- Chart application with only the Radar overlay enabled: **Menu > Radar > Tracked Targets**
- Chart application with only the AIS overlay enabled: **Menu > AIS > Tracked Targets**

AIS targets

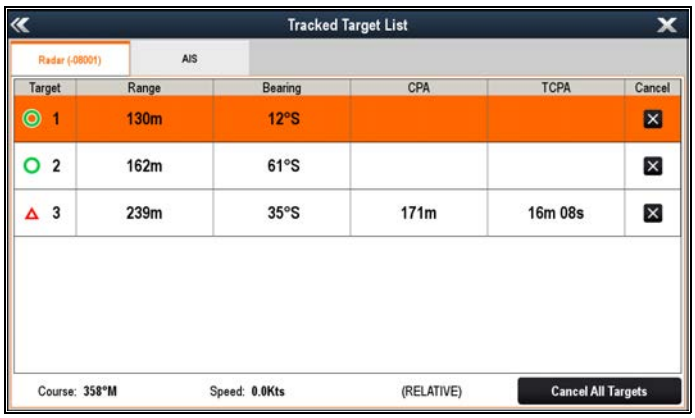


By selecting an AIS target from the list you can:

- View full AIS Data
- Add the target as a Buddy (AIS targets only)
- Show the target in the Chart application
- Edit existing Buddy details:
  - Remove Buddy
  - Edit Buddy MMSI
  - Edit Buddy Name

The **List:** options can be used to filter the AIS target list to only display Buddies.

MARPA targets



By selecting MARPA target from the list you can:

- Cancel the target

- Show the target in the Chart application

Selecting **Cancel All Targets** will remove “stop tracking all MARPA targets” in the list. You can also cancel individual targets by selecting the ‘**X**’ in the Cancel column.

12.8 Dangerous targets

Targets are considered dangerous if the target will get closer than the specified **Safe Distance** within the specified **Time to Safe Distance**.

The location of the Dangerous Targets page is dependent on the application and Overlays you have enabled:

- Radar application: **Menu > Collision Avoidance > Dangerous Targets**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > Collision Avoidance > Dangerous Targets**
- Chart application with only the Radar overlay enabled: **Menu > Radar > Collision Avoidance > Dangerous Targets**
- Chart application with only the AIS overlay enabled: **Menu > AIS > Collision Avoidance > Dangerous Targets**



E.g.: With **Time to Safe Distance** set to 6 minutes and the **Safe Distance** set to 0.5Nm, AIS targets will turn red and start to flash if they will reach the Safe Distance within the next 6 minutes.

Alarms

An alarm can also be set up to trigger whenever a target becomes dangerous.

- The Dangerous target alarm for Radar targets is permanently On and cannot be disabled.
- The Dangerous target alarm for AIS targets can be switched On or Off.

An alarm is also triggered if a Dangerous target becomes Lost (i.e. no signal has been received for 20 seconds).

The Dangerous AIS target alarm can also be enabled from the Alarm Manager: (**Homescreen > Set-up > Alarms > Safety Alarms > Dangerous AIS targets**).

Displaying only Dangerous AIS targets

You can choose whether your MFD will display all AIS targets within range or you can display only Dangerous AIS targets.

The location of the menu is dependent on the application and Overlays you have enabled:

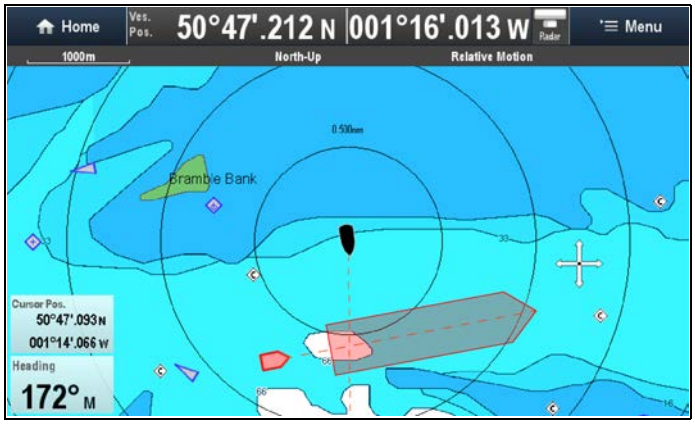
- Radar application: **Menu > AIS**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > AIS Options > Display AIS:**

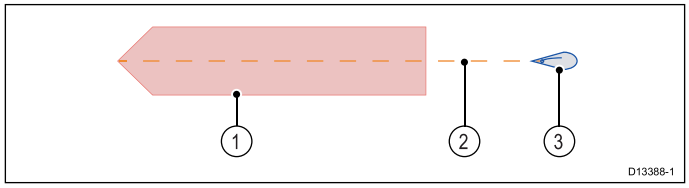
- Chart application with only the Radar overlay enabled: **Menu > Radar > AIS Options > Display AIS:**
- Chart application with only the AIS overlay enabled: **Menu > AIS > AIS Options > Display AIS:**

1. Select **Display AIS:** so that Dangerous is selected.
   Only Dangerous AIS targets will be displayed.
2. Select **Display AIS:** so that All is selected.
   All AIS targets in range will be displayed.

12.9 Collision Avoidance

The Chart application provides features to help improve collision awareness. The Target interception feature tracks AIS targets in relation to your own vessel's Course Over Ground (COG) and Speed Over Ground (SOG). Target interception zones indicate areas where there is an increased risk of collision. Zones are based on your current speed and AIS data received from targets and can help you determine whether you should change course and / or speed to avoid danger. The Target interception graphics automatically refresh when new position data for the target or your own vessel is received by the system.





1. Target interception zone (Predicted area of danger based on target's last reported position.)
2. Target COG line
3. AIS Target (Last received position)

Important: You must still maintain a permanent watch for:

- vessels that are not equipped with AIS or AIS equipped vessels that are not currently transmitting their position, as these targets will not be displayed in the Chart application.
- AIS equipped vessels reporting an inaccurate GPS position or your own vessels GPS accuracy, as this will cause your vessel's position and / or AIS target positions to be displayed inaccurately in the Chart application.

There are 3 potential scenarios:

- Own vessel moving faster than target
- Target moving faster than own vessel
- Both targets moving at similar speed

Warning: Collision Avoidance and the IRPCS

The Collision Avoidance feature is a graphical aid provided to help increase user awareness of the potential for collision. It is important to have a good understanding of the *International Regulations for Preventing Collisions at Sea* (IRPCS), so that all actions taken are in accordance with the IRPCS.

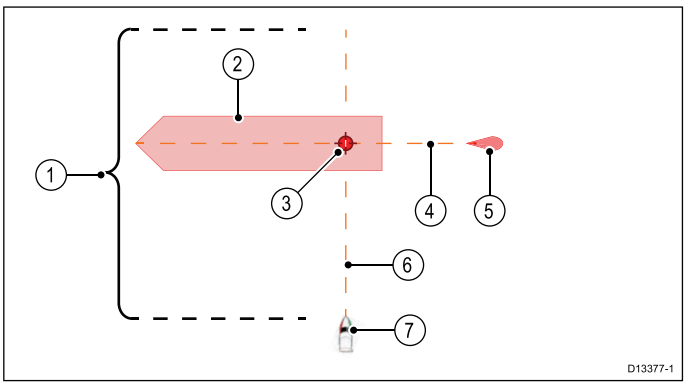
In the event of conflict the IRPCS regulations must take precedence.

Target interception pre-requisites

Target interception graphics are displayed in the Chart application when:

- the AIS overlay is enabled
- your own vessel's SOG is greater than 2.0 Kts.
- target vessel's SOG is greater than 2.0 Kts. (Under 2.0 Kts the target's interception zone is displayed as a circle around the target.)
- Target Interceptions are turned On and the target's Course Over Ground (COG) will cross your own COG within the specified **Intercept distance**, or
- An individual intercept has been initiated using the context menu. Target interception graphics will be displayed regardless of whether your paths will cross.

Target interception graphics



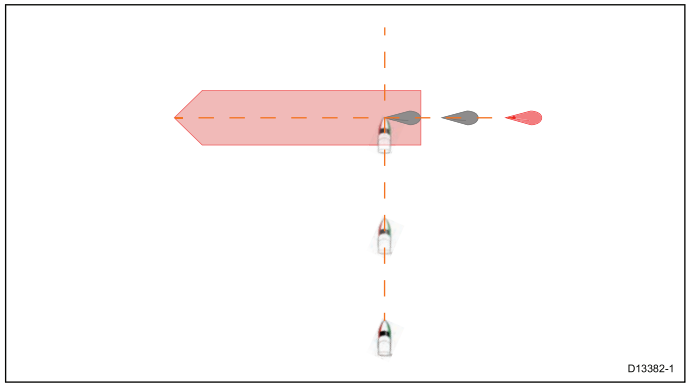
1. **Intercept distance** — When Target interceptions is turned on, target interception graphics are displayed for targets whose COG could cross your own within the **Intercept distance** specified on the Target interceptions page.
2. **Interception zone** — The Interception zone provides a suggested clearance area around the target's projected location. This enables you to plot your course safely around any potential collision areas.
3. **Intercept point** — The Intercept point is only displayed when an individual target interception has been initiated from the context menu.

Note: When trying to rendez-vous with a target this is the point to aim for.

4. **Target's COG line** — Target's COG.
5. **Target** — This is the last reported position of the target.
6. **Own vessel's COG line**
7. **Own vessel**

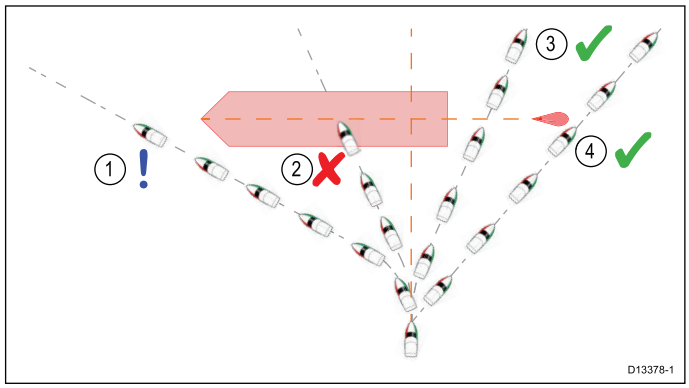
Example scenario 1 — Own vessel moving faster than the target vessel

Note: These scenarios are examples provided for guidance only.



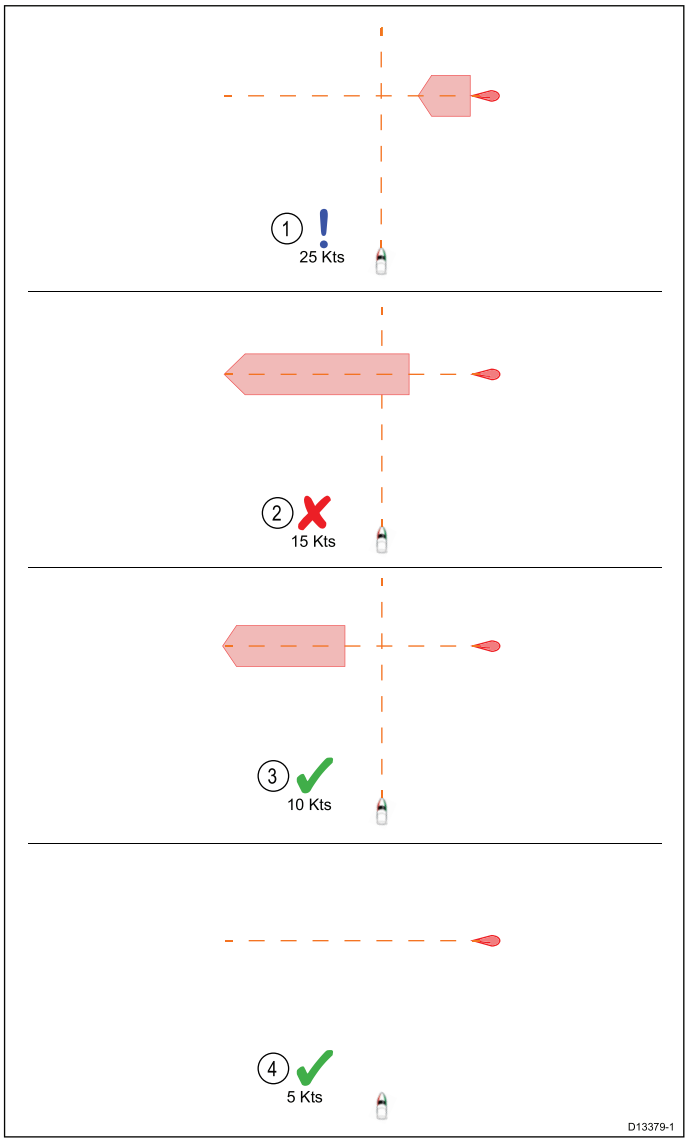
In the example above the vessel's COG will cross with the target's COG within the Interception zone, which could cause a collision. You should alter course and / or speed to avoid the potential collision.

Scenario 1 Course change examples



1. Course alteration to pass ahead of the Interception zone — **Proceed with caution**, there is always an inherent risk when passing in front of other vessels.
2. Course alteration to pass ahead of the target vessel — This manoeuvre is not recommended as your vessel will still cross through the target's Interception zone.
3. Course alteration to pass astern of the target vessel and its Interception zone — This manoeuvre alters your vessel's course so that it does not come into contact with the target's Interception zone and passes astern of the target.
4. Course alteration to pass clear astern of the target vessel and its Interception zone. This is the preferred manoeuvre as it correctly alters your vessel's course so that it is clear of the target's Interception zone and passes safely astern of the target. This manoeuvre also clearly shows the target vessel of your change of course.

Scenario 1 Speed change examples



1. **Speeding up**(1) — Increasing vessel speed to pass ahead of the target vessel. **Proceed with caution**, there is always an inherent risk when passing in front of other vessels.
2. **No speed change** — Not changing speed or course is not an option as it can result in a collision.
3. **Slowing down** — Slowing down a sufficient amount will allow the target vessel to pass safely ahead of your vessel.
4. **Slowing down**(2) — Slowing down a sufficient amount will allow the target vessel to pass safely ahead of your vessel.

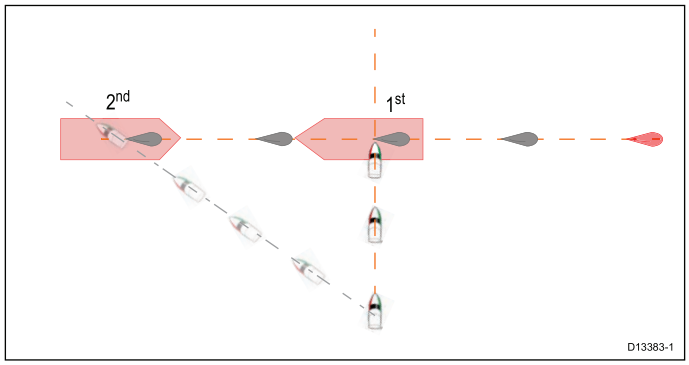
Note:

- (1) In this example the paths will still cross within the **Intercept distance**, so the graphics are still displayed.
- (2) In this example the paths will no longer cross within the **Intercept distance**, so the graphics are not displayed.

Example scenario 2 — Target vessel moving faster than your vessel

Note: These scenarios are examples provided for guidance only.

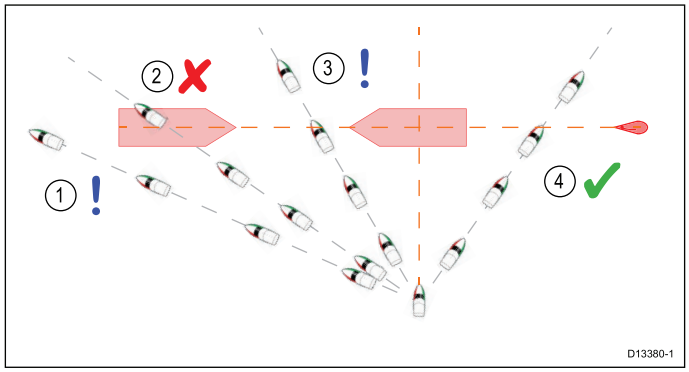
In certain situations, when the target vessel is travelling faster than your vessel, there may be more than one opportunity for your paths to cross within the **Intercept distance**. If this is the case then a second Interception zone is displayed.



1. 1st — The first Interception zone (displayed closest to the target vessel) represents a bow-to-bow collision.
2. 2nd — The second Interception zone (displayed farthest from the target vessel) represents the target vessel running you down from behind.

When altering course and speed, both Interception zones must be avoided.

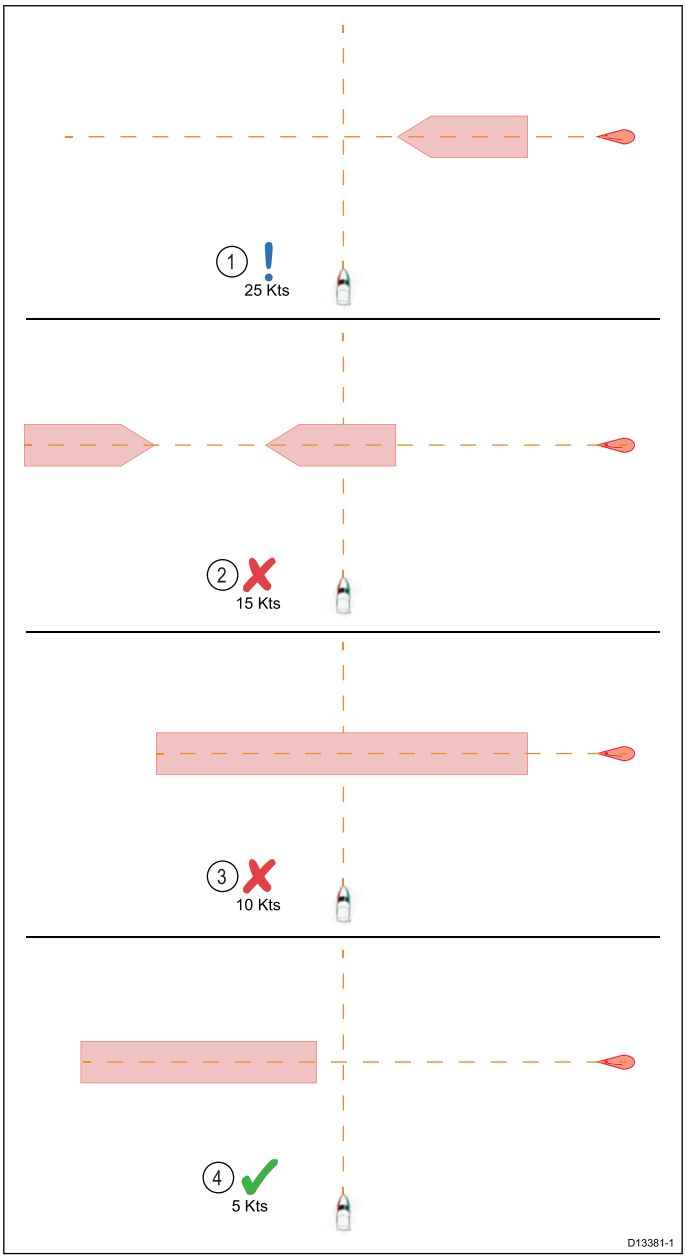
Scenario 2 Course change examples



1. Course alteration to pass ahead of the Interception zone. As the target vessel is moving faster than your vessel you will pass astern of the target.
2. Course alteration to pass ahead of the first Interception zone. Although this course alteration is sufficient to avoid a potential bow-to-bow collision, it has created a second Interception zone where the target may now run you down from behind.
3. Course alteration to pass between the 2 Interception zones. Although this may seem like the quickest option, **proceed with caution**, as the gap between the 2 Interception zones can close quickly, especially when your vessel slows down.
4. Course alteration to clear astern of the target vessel and its Interception zone. This would be the preferred manoeuvre as it correctly alters your vessel's course so that it is clear of the

target's Interception zone, and passes safely astern of the target. This manoeuvre also clearly indicates to the target vessel your change of course.

Scenario 2 Speed change examples



1. **Speeding up** — Increasing vessel speed to pass ahead of the target vessel. **Proceed with caution**, there is always an inherent risk when passing in front of other vessels.
2. **No change** — Not changing speed or course is not recommended as it may result in a collision.
3. **Slowing down** — Slowing down slightly may result in the 2 Interception zones closing up or merging into a single zone.
4. **Slowing down** — Slowing down a sufficient amount will allow the target vessel to pass safely ahead of your vessel, avoiding the Interception zone(s).

Example scenario 3— Both vessels travelling at the same speed

Note: These scenarios are examples provided for guidance only.

Course change

When both vessels are travelling at the same speed, course alterations should be made in accordance with the guidance provided in examples 1 and 2.

Speed change

When both vessels are travelling at the same speed, altering your speed will change the collision scenario to one of the scenarios detailed in examples 1 and 2.

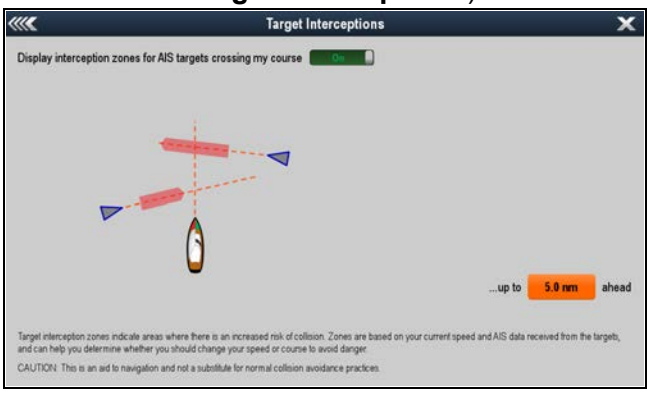
Enabling Target interception

Target interception graphics are disabled by default; they can be enabled from the Target interceptions page, which is accessible from the Chart application's menu.

1. Ensure the AIS Overlay is enabled.

   *The AIS Overlay can be enabled from the Overlays menu (**Menu > Presentation > Overlays**).*

2. Open the Target Interception page: (**Menu > Radar & AIS > Collision Avoidance > Target Interceptions**, or **Menu > AIS > Collision Avoidance > Target Interceptions**).



3. Select the slider control so that On is displayed.
4. Select the distance ahead box and select the required **Intercept distance**.
5. Select **Back** or **Close** to return to the previous menu or Chart application screen.

Target interception graphics will now be displayed for all AIS targets that will cross your current course within the specified **Intercept distance**, based on your current speed and the target's course and speed derived from their AIS data.

Showing Target interception for individual targets

Target interception graphics can be displayed for individual targets that you want to track or rendez-vous with.

1. Ensure that the AIS Overlay is enabled.

   *The AIS Overlay can be enabled from the Overlays menu (**Menu > Presentation > Overlays**).*

2. Select an AIS target.
3. From the context menu select **Show Interceptions** so that On is selected.

Target interception graphics will now be displayed for the selected target, regardless of whether it will cross your path or not. (If your paths will not cross then only the COG line will be displayed).

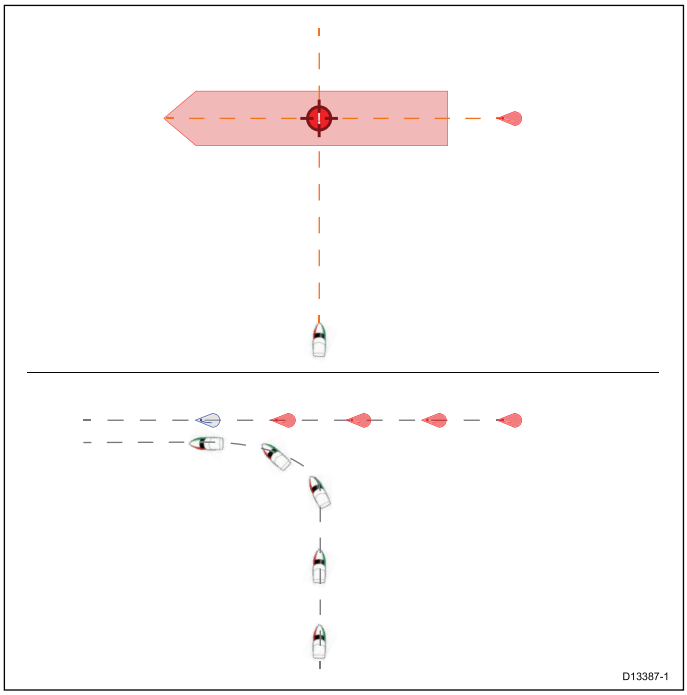
12.10 Rendez-Vous (Target interception)

The Intercept point is displayed when performing an individual Interception. It can be used to help rendez-vous with friends or for Pilot boats and the Coastguard to intercept vessels that are to be boarded. The Intercept point is displayed within the Interception zone.

When performing an individual interception you are placing your vessel on a collision course with the target vessel. It WILL be necessary to change to a parallel course to prevent a collision.

Pre-requisites:

- You must be familiar with the IRPCS.
- You must be familiar with the AIS feature.
- You must have a thorough understanding of the Target interception feature.



1. Initial Target interception graphics.
2. Actual vessel movements to perform the rendez-vous.

Performing an individual Target interception

Pre-requisites:

- The AIS Overlay must be enabled

1. Select the AIS target you want to Intercept.
2. From the context menu select **Show Interceptions** so that On is selected.

   Target interception graphics will now be displayed for the selected target.

   If no Intercept point is displayed then your vessel is not travelling fast enough to catch the target vessel. You will need to accelerate, or alternatively call the target vessel and request them to slow down.

3. Begin navigation to the Intercept point.

   Remember When the target moves the Intercept point will move accordingly. It will be necessary to change course so that your COG lines intersect at the Intercept point.
4. Adjust course and speed as necessary to intercept the target.
5. Ensure you alter your course to a parallel course before reaching the Intercept point.

12.11 Displaying safety-critical AIS information

From the chart or radar application:

1. Select the AIS target.

   The AIS target context menu is displayed.
2. Select **AIS Data** so that On is highlighted.

   Selecting AIS Data will switch between AIS data On and Off.

The Safety critical AIS data will now be displayed next to the target in the application.

12.12 Displaying detailed AIS target information

From the chart or radar application:

1. Select an AIS target.
   The AIS target context menu is displayed.
2. Select **View AIS Data**.

AIS Data

The following AIS data can be displayed on the MFD, if available:

Type	Status	Destination
Last Seen	ETA	MMSI
Call Sign	IMO No.	Length
Beam	Draught	Heading
ROT	Position	COG
SOG	CPA	TCPA

Note: Available data is dependent on what information is being transmitted from the target and the type of AIS unit connected to your system.

12.13 AIS silent mode

AIS silent mode enables you to disable the transmitting functions of your AIS equipment. This is useful when you do not want to transmit your vessel's AIS data to other AIS receivers, but still wish to receive data from other vessels.

Note: Not all AIS equipment supports silent mode. For more information, refer to the documentation that accompanied your AIS unit.

Silent mode can be switched On and Off from the AIS menu. The location of the AIS menu is dependent on the application and Overlays you have enabled:

- Radar application: **Menu > AIS** .
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > AIS Options > Silent mode:**
- Chart application with only the Radar overlay enabled: **Menu > Radar > AIS Options > Silent mode:**
- Chart application with only the AIS overlay enabled: **Menu > AIS > AIS Options > Silent mode:**

12.14 AIS Safety messages

With **AIS Safety Messages** switched On, any incoming safety messages from surrounding vessels, shore stations and mobile stations are displayed in a dialog box.

If known, the message will include the sending vessel's position in latitude / longitude. You will have the option to:

- Remove the message (**OK**).
- Place a waypoint on your chart / radar to mark the sending vessel's position (**Place Waypoint**).
- Goto the sending vessel's position (**Goto Waypoint**).

AIS Safety messages can be switched on and off form the AIS Unit Set-up menu: (**Homescreen > Set-up > System settings > External Devices > AIS Unit Set-up > AIS Safety Messages.**

Note: You will NOT receive any safety messages in Simulator mode.

12.15 Buddy tracking

Buddy Tracking enables you to add AIS-equipped friends and regular contacts to a "Buddy List" on your MFD. When a vessel on your Buddy List is in range of your AIS unit, a Buddy icon is displayed instead of the normal icons.

Pre-requisites:

- Chart application — The AIS overlay must be enabled
- Radar application — AIS targets must be enabled

	Unknown vessel type Buddy icon		Yacht Buddy icon
	High speed vessel Buddy icon		Commercial vessel Buddy icon

Accessing the Buddy list

From the Chart or Radar application:

1. Select the AIS buddy target.
   The AIS context menu is displayed.
2. Select **My Buddies**.
   The Buddy list is displayed.

The buddy list can also be accessed from:

- the Radar application: (**Menu > AIS > My Buddies**
- the Chart application with only the AIS overlay enabled: **Menu > AIS > My Buddies**.
- the Chart application with only the Radar overlay enabled: **Menu > Radar > My Buddies**.
- the Chart application with the Radar and AIS overlays enabled: **Menu > Radar & AIS > My Buddies**.

Adding a vessel to your buddy list

In the Chart or Radar application:

1. Select the AIS target.
   The AIS context menu is displayed.
2. Select **Add Buddy**.
   i. Select **Yes** to enter a name for the buddy vessel
   ii. Select **No** to save the vessel to your buddy list without entering a name for the buddy vessel.

The vessel will now be added to your buddy list.

You can also add AIS targets to your Buddy list by selecting them in the **Tracked Targets list** and selecting **Add Buddy**.

Editing a buddy's details

From the Chart or Radar application:

1. Select the AIS buddy target.
   The AIS context menu is displayed.
2. Select **My Buddies**.
   The Buddy list is displayed.
3. Select the buddy you wish to edit.
4. To change the MMSI number select **Edit Buddy MMSI** or.

5. Select **Edit Buddy Name** to change the buddy name.

   This could be the name of the vessel, or the name of the friend who owns the vessel, for example
6. Enter the new details and select **SAVE**.

   You will be returned to the buddy list.

Removing a buddy

From the Chart or Radar application:

1. Select the AIS buddy target.

   The AIS buddy context menu is displayed.
2. Select **Remove Buddy**.
3. Select **Yes** to confirm.

   The buddy has now been removed from the list.

Displaying additional buddy information

From the chart or radar application:

1. Select the AIS buddy target.

   The AIS buddy context menu is displayed.
2. Select **Buddy Data** so that On is highlighted.

   Selecting Buddy Data will switch data between On and Off.

The Buddy MMSI and Name will now be displayed next to the buddy icon.

Chapter 13: Waypoints, Routes and Tracks

Chapter contents

- 13.1 Waypoints on page 142
- 13.2 Routes on page 150
- 13.3 Tracks on page 160
- 13.4 Import and Export on page 162
- 13.5 Waypoints, routes and tracks storage capacity on page 162

13.1 Waypoints

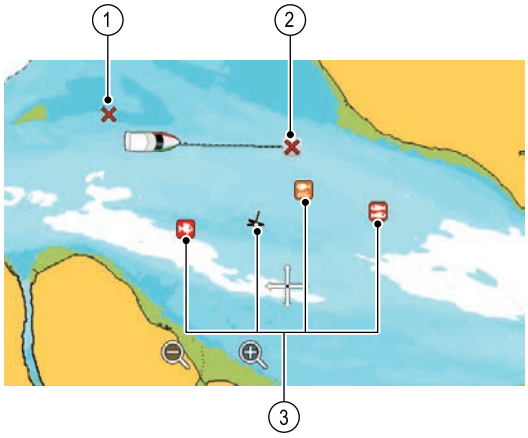
Waypoints are used to mark specific locations or points of interest. Waypoints can be used in the Chart, Radar and Sonar apps. Your MFD can store up to 3,000 waypoints which can be sorted into up to 100 waypoint groups.

In the Chart app you can navigate to a waypoint by selecting **Goto** from the Waypoint context menu.

Waypoint display examples

Waypoints in the chart application

In the chart application both active and inactive waypoints are shown. An active waypoint is the one that you are navigating to.

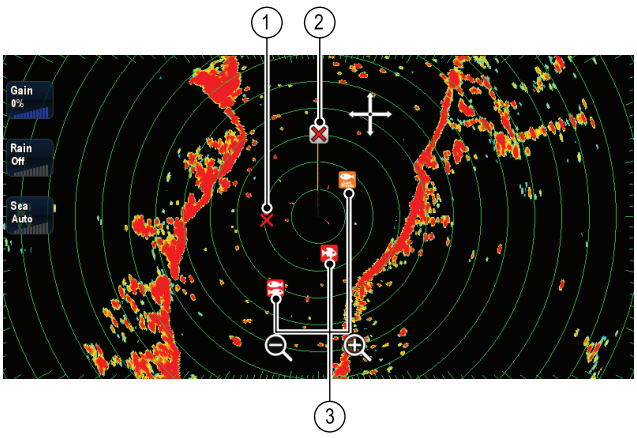


Item	Description
1	Inactive waypoint
2	Active waypoint
3	Alternative waypoint symbols

The default waypoint symbol is a red ‘X’. Alternative symbols can be used if required.

Waypoints in the radar application

In the radar application both active and inactive waypoints are shown. An active waypoint is the one that you are navigating to.

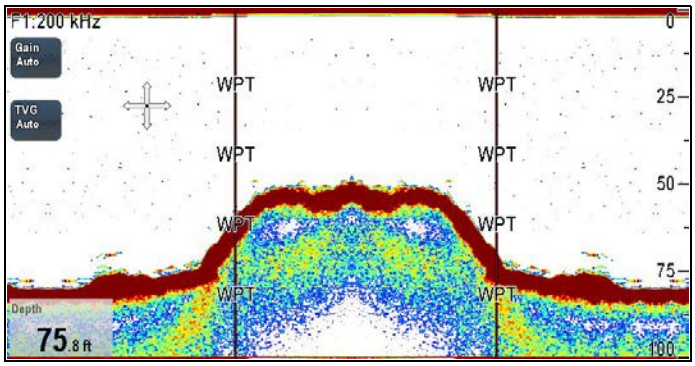


1. Inactive waypoint
2. Active waypoint
3. Alternate waypoint symbols

The default waypoint symbol is a red ‘X’. Alternative symbols can be used if required.

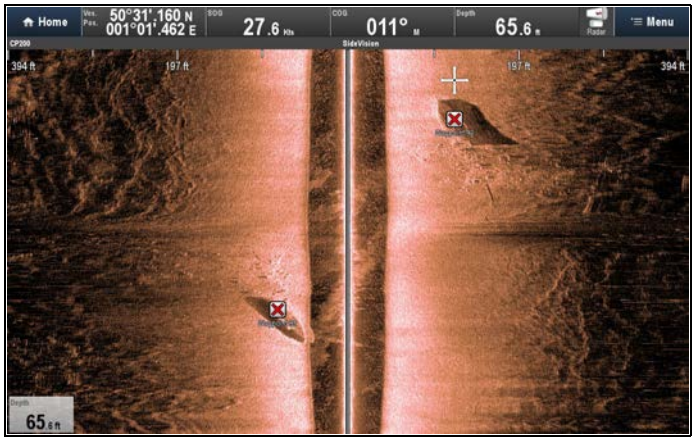
Waypoints in the Sonar application

Waypoints in the Sonar application are represented by a vertical line labelled WPT.



Waypoints and SideVision

When viewing **SideVision™** channels waypoints are represented by waypoint symbols and can be placed from the context menu.



Waypoint (MOB) button / icon

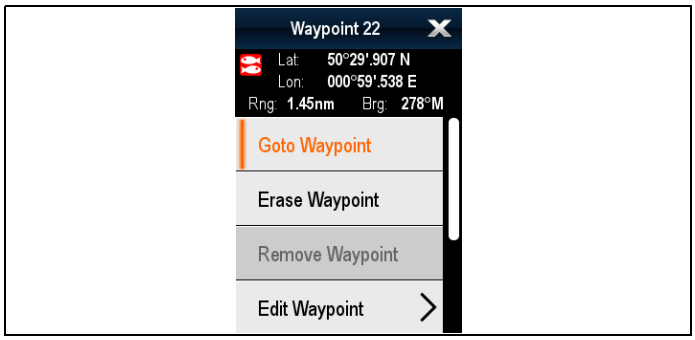
Depending on the multifunction display variant there will be either a Waypoint (MOB) button or an onscreen icon.

WPT button		• c Series • e Series • eS Series • RMK-9 keypad
WPT icons		• a Series • gS Series

Throughout this manual the term: Select **WPT**, refers to pressing the physical **WPT** button or pressing the on-screen **WPT** icon.

Waypoint context menu

Placing the cursor over a waypoint in the Radar application or selecting and holding on a Waypoint in the Chart application displays the Waypoint context menu.



The context menu provides Latitude and Longitude, and Range and Bearing from your vessel.

The Waypoint context menu also includes various context sensitive menu options.

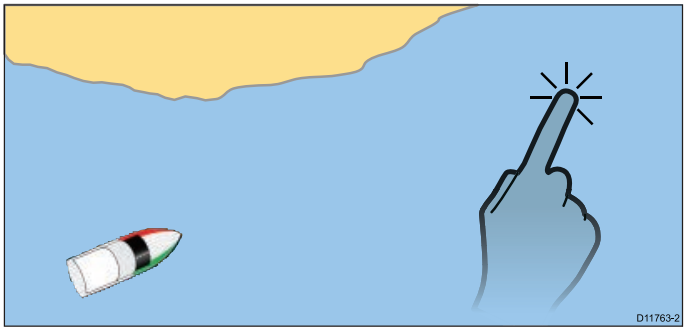
Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

Waypoint placement

Placing a waypoint

You can place a waypoint on a multifunction display with a touchscreen by following the steps below.



From the Chart, Radar or Sonar application:

1. Select and hold the required location on screen.
   The context menu is displayed.
2. Select **Place Waypoint**.
   The Waypoint Saved dialog is displayed.



3. Select the **Symbol field** to change the symbol that will be used to display the waypoint in the Chart or Radar application.
4. Select the **Name field** to change the name of the waypoint.
5. Select the **Group field** to change the group that the waypoint is assigned to.
6. Select **OK** to confirm the waypoint details.

Note: If there is no user interaction with the Waypoint saved dialog for approximately 5 seconds then the waypoint is saved with the default settings and the dialog is closed automatically.

Placing a waypoint

From the Chart, Radar or Sonar application:

1. Position the cursor at the required position.
2. Press the **WPT** button.
   The context menu is displayed.
3. Select **Place Waypoint**.
   The Waypoint Saved dialog is displayed.



4. Select the **Symbol field** to change the symbol that will be used to display the waypoint in the Chart or Radar application.
5. Select the **Name field** to change the name of the waypoint.
6. Select the **Group field** to change the group that the waypoint is assigned to.
7. Select **OK** to confirm the waypoint details.

Note: If there is no user interaction with the Waypoint saved dialog for approximately 5 seconds then the waypoint is saved with the default settings and the dialog is closed automatically.

Placing a waypoint at your vessel's position

In addition to positional information, a waypoint placed at the vessel position will capture temperature and sounded depth information (if you have the appropriate sensors connected to your system).

From the Chart, Radar or Sonar application:

1. Select **WPT**.
   The waypoint menu is displayed.
2. Select **WPT** again or select **Place Waypoint At Vessel** from the menu.
   The Waypoint Saved dialog is displayed.



3. Select the **Symbol field** to change the symbol that will be used to display the waypoint in the Chart or Radar application.
4. Select the **Name field** to change the name of the waypoint.
5. Select the **Group field** to change the group that the waypoint is assigned to.
6. Select **OK** to confirm the waypoint details.

Note: If there is no user interaction with the Waypoint saved dialog for approximately 5 seconds then the waypoint is saved with the default settings and the dialog is closed automatically.

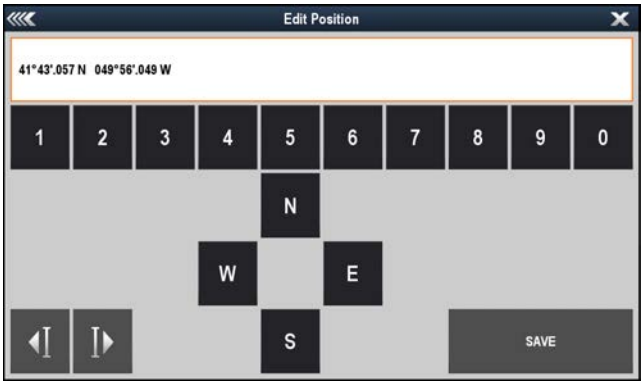
Placing a waypoint at a known position (lat/lon)

You can place a waypoint at a specified location using latitude and longitude coordinates:

1. Select **WPT**.
2. Select **Place Waypoint At Lat/Lon**.
   The waypoint details dialog is displayed.



3. Select the **Position** field.



4. Enter the Latitude/Longitude position.

   *For HybridTouch displays you can use the **Rotary control** and **Ok** button to quickly enter the required coordinates.*

5. Select **SAVE**.
6. You can also edit the waypoint symbol, name and group by selecting the relevant fields.
7. Select **Close** or **Back** to close the dialog.

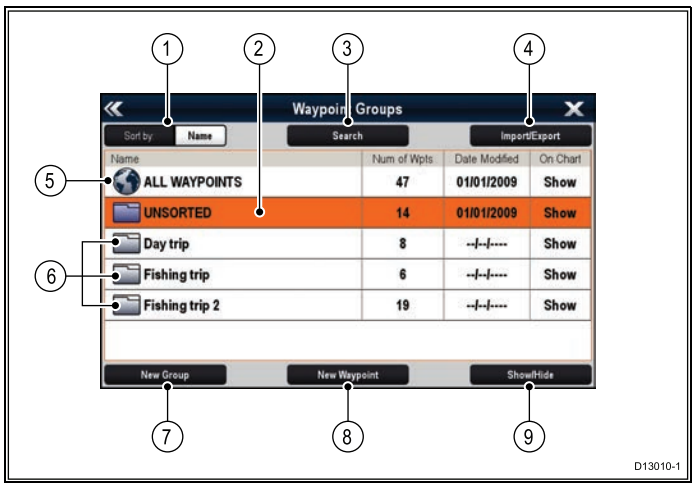
Waypoints list

Waypoints are organized into groups. By default all waypoints are placed in the “UNSORTED” group.

The Waypoints list is accessed from the menu: **Menu > My data > Waypoints**.

New waypoint groups can be created and each waypoint can be assigned to a waypoint group. For example; you could create a waypoint group called “Fishing” and place all of your waypoints where you caught fish into that group.

Waypoint groups can be managed from the Waypoint groups list.

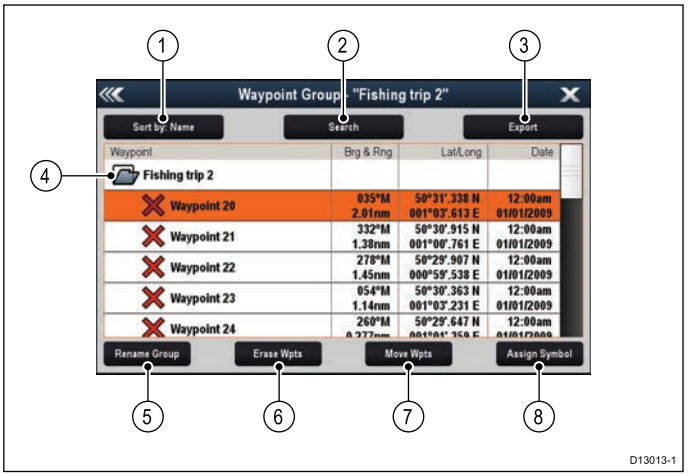


1. **Sort By:** — Waypoint groups can be sorted by name or by date by selecting the **Sort By:** field.
2. **Unsorted** — By default new waypoints are added to the **UNSORTED** waypoint group. Selecting the group will display a list of all waypoints that have not been assigned to a specific group.
3. **Search** — You can search for waypoints using keywords by selecting **Search**.
4. **Import/Export** — Waypoints can be exported to or imported from a microSD card by selecting

Import/Export. Refer to 4.1 **Saving user data and user settings** for details.

5. **All waypoints** — Selecting **ALL WAYPOINTS** displays a list of all waypoints saved on your system.
6. **Waypoint Groups** — All waypoint groups are displayed in the list.
7. **New Group** — A new waypoint group can be added by selecting **New Group**.
8. **New Waypoint** — New waypoints can be added manually by selecting **New Waypoint**.
9. **Show/Hide** — You can choose which waypoint groups are displayed and which groups are hidden by selecting the relevant group from the list and then selecting **Show/Hide**.

Selecting a waypoints group from the list displays a list of all waypoints in that group. Additional functions are available to help manage your waypoints.



1. **Sort By:** — Sort waypoints by Name, Range, Symbol or Date.
2. **Search** — Search for waypoints using keywords.
3. **Export** — Exports the waypoint group currently displayed to a memory card.
4. **Waypoint group** — This is the currently selected waypoint group.
5. **Rename Group** — Rename the current group.
6. **Erase Wpts** — Erase all waypoints in the group.
7. **Move Wpts** — Move all waypoints in the group.
8. **Assign Symbol** — Assign a new symbol to all waypoints in the group.

Displaying the waypoint group list

From any application:

1. Select **WPT**.
2. Select **Waypoints**.
   The waypoint group list is displayed.

Making a new waypoint group

With the Waypoint Group List displayed:

1. Select **New Group**.
   The on-screen keyboard is displayed.
2. Use the on-screen keyboard to enter the required name for the new group.
3. select **SAVE** .

Renaming a waypoint group

With the Waypoint group list displayed:

1. Select the group you want to rename.
   Group details are displayed.
2. Select **Rename Group**.
   The on-screen keyboard is displayed.
3. Using the on-screen keyboard change the group name as required.
4. Select **SAVE**.

Assigning a new symbol to a waypoint group

You can assign a new waypoint symbol to all the waypoints in a group.

From the Waypoint group list:

1. Select the group that you want to assign a new waypoint symbol to.
   A group details list is displayed showing all waypoints in the selected group.
2. Select **Assign Symbol**.
   A list of all available symbols is displayed.
3. Select the symbol that you want to use for the waypoints in the selected group.
   A confirmation dialog is displayed.
4. Select **Yes** to apply the new symbols to the waypoints, or select No to **cancel**.

Moving a waypoint to a different group

With the Waypoints group list displayed:

1. Select **ALL WAYPOINTS**.
   A list of all waypoints currently on your system is displayed.
2. Select the waypoint you want to move.
   The waypoint details page is displayed.
3. Select the **Group** field
   A list of all groups is displayed.
4. Select the **Group** that you want to move the waypoint to, or
5. Select **Create New Group** to move the waypoint to a new group.

The waypoint is moved to the selected group.

Moving all waypoints in a group to a different group

You can move all waypoints in a group to a different group.

With the Waypoints group list displayed:

1. Select the Group that contains the waypoints you want to move.
2. Select **Move Wpts**.
   A list of all groups is displayed.
3. Select the group from the list that you want to move the waypoints too.
   A confirmation dialog is displayed.
4. Select **Yes** to move the waypoints or **No** to cancel.

The waypoints have now been moved to the new group.

Erasing all waypoints in a group

You can erase all waypoints in a selected group.

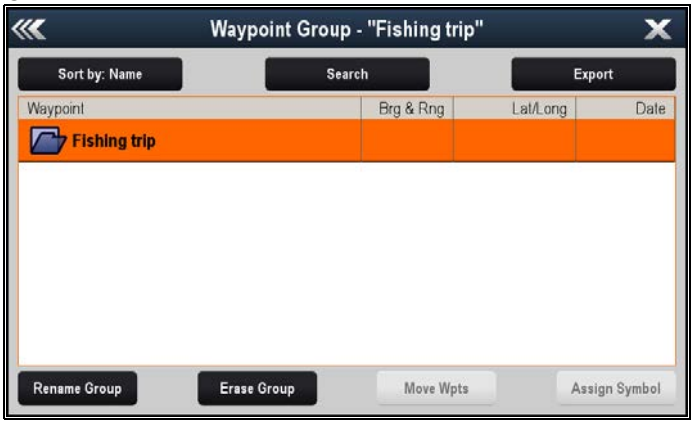
With the waypoint groups list displayed:

1. Select the group that contain the waypoints you want to erase.
   A list is displayed showing all waypoints in the selected group.
2. Select **Erase Wpts**.
   A confirmation dialog is displayed.
3. Select **Yes** to erase all waypoints in the group, or **No** to cancel.

All of the waypoints in the selected group are erased from the system and the group will now be empty.

Erasing a waypoint group

Before you can erase a waypoint group you must move or erase all the waypoints assigned to that group.



From the Waypoint list:

1. Select the waypoint group that you want to erase.
2. Select **Erase Group**.

Waypoint information

When you create a waypoint, the system assigns information regarding the location marked. You can view and edit the details of any waypoint that has been created and stored.



The following information is assigned or captured for each waypoint:

- **Symbol** (a default symbol is assigned, or you can select an alternative.)
- **Name** (a default name is assigned, or you can select an alternative.)
- **Group** (new waypoints are assigned to the 'UNSORTED' group, or you can select an alternative group.)
- **Position** (Latitude and Longitude of the waypoint.)
- **Bearing** and **Range** (Bearing and range from vessel.)
- **Temperature** (requires appropriate sensor, only for waypoints captured at the vessel position.)
- **Depth** (requires appropriate sensor, only for waypoints captured at the vessel position.)
- **Date** and **time**
- **Comment** (you can add your own text comments to a waypoint.)

From the waypoint information page you can also perform the following actions:

- **Goto** (Start active navigation to the waypoint.)
- **Show on Chart** (Show the waypoint location in the chart application.)
- **Delete** (Delete the waypoint from the waypoints list.)

Displaying the waypoint list

From any application:

1. Select **WPT**.
2. Select **Waypoint List**.
   The waypoint list is displayed.

> **Note:** The waypoint list can also be accessed directly from the Homescreen by selecting **WPT**. or by going to the **My Data** menu and selecting **Waypoint List**.

Editing waypoint details

With the Waypoint List displayed:

1. Select the waypoint you want to edit.
   The waypoint information page is displayed.
2. Select the field you want to edit.
3. Use the on-screen keyboard to make the changes, then select the on-screen keyboard's **SAVE** button.

Editing a waypoint using the context menu

With the application page displayed:

1. Select the waypoint symbol on-screen.
   The waypoint context menu is displayed.
2. Select **Edit Waypoint**.
   The edit waypoint dialog is displayed.
3. Select the field you want to edit.
4. Use the on-screen keyboard to make the changes, and then select the on-screen keyboard's **SAVE** key.

Moving waypoints

Moving a waypoint using the context menu

With the application page displayed:

1. Select the waypoint symbol on-screen.
   The waypoint context menu is displayed.
2. Select **Move Waypoint**.
3. Select the new position for the waypoint.

Moving a waypoint by entering new coordinates

With the Waypoint List displayed:

1. Select **All Waypoints**.
2. Select the relevant waypoint.
   The waypoint information page is displayed.
3. Select the Position field.
4. Use the on-screen keyboard to make the changes, and then select the on-screen keyboard's **SAVE** key.

Erasing waypoints

Erasing a waypoint using the context menu

With the application page displayed:

1. Select the waypoint symbol on-screen.
   The waypoint context menu is displayed.
2. Select **Erase Waypoint**.
   The erase waypoint pop up message is displayed.
3. Select **Yes** to confirm, or **No** to cancel.

Erasing a waypoint using the waypoint list

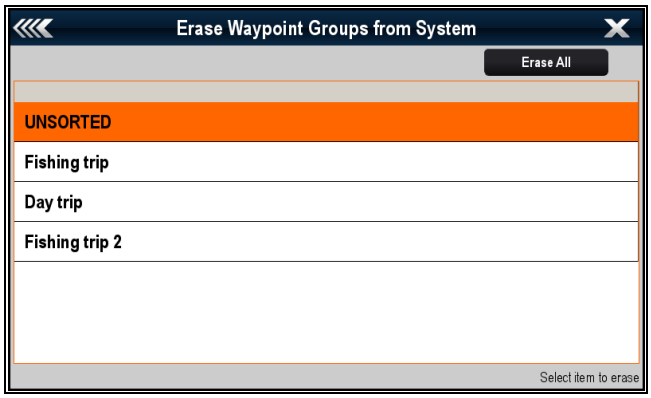
With the Waypoint List displayed:

1. Select **All Waypoints**.
2. Select the waypoint you want to erase.
   The waypoint information page is displayed.
3. Select **Erase**.
   The erase waypoint pop up message is displayed.
4. Select **Yes** to confirm, or **No** to cancel.

Erasing all waypoints

From the homescreen:

1. Select **My Data**.
2. Select **Import/Export**.
3. Select **Erase From System**.
4. Select **Erase Waypoints From System**.
   A list of all waypoint groups is displayed.



5. Select **Erase All**.
   The confirm delete pop up message is displayed.
6. Select **Yes** to confirm, or **No** to cancel.

Waypoint search

The waypoint search feature allows you to search for waypoints on your system.

The search feature is available by selecting **Search** from the Waypoints list.

Waypoints can be searched for by:

- Name or keyword
- Symbol
- Area



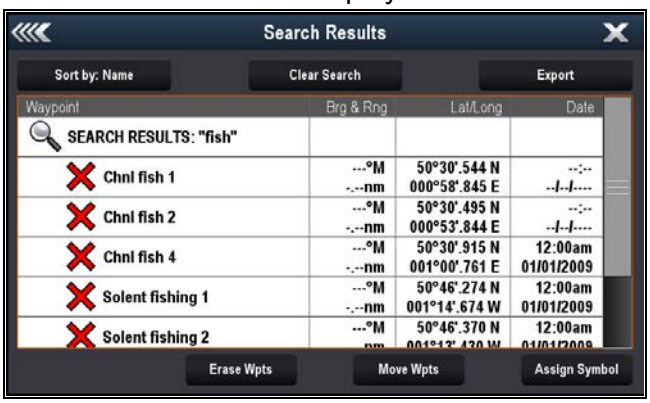
From the search results you can erase all the waypoints in the search list, move them to an existing or new waypoint group or assign all of the waypoints the same waypoint symbol.

Searching for waypoints by name or keyword

Waypoints can be searched for by name or keyword.

From the Waypoints list:

1. Select **Search**.
   The search page is displayed.
2. Use the on-screen keyboard to enter the waypoint name or keyword.
3. Select **Search**.
   The search results are displayed.



4. Select **Erase Wpts** to erase the list of waypoints from your system, or
5. Select **Move Wpts** to move the waypoints to a new or existing group, or
6. Select **Assign Symbol** to assign a new symbol to all the waypoints in the search results list.

You can also select a waypoint from the list to view its details, or if accessed from the Chart application set a goto or display the waypoint in the Chart application.

Searching for waypoints by symbol

Waypoints can be searched for by waypoint symbol.

From the Waypoints list:

1. Select **Search**.
   The search page is displayed.
2. Select **Symbol**.
   The waypoints symbol list is displayed.
3. Select the symbol that is assigned to the waypoint(s) you want to search for.
   A list of all waypoints using the selected symbol is displayed.



4. Select **Erase Wpts** to erase the list of waypoints from your system, or
5. Select **Move Wpts** to move the waypoints to a new or existing group, or
6. Select **Assign Symbol** to assign a new symbol to all the waypoints in the search results list.

You can also select a waypoint from the list to view its details, or if accessed from the Chart application set a goto or display the waypoint in the Chart application.

Searching for waypoints by area

Waypoints can be searched for by selecting an area in the Chart application.

From the Chart application:

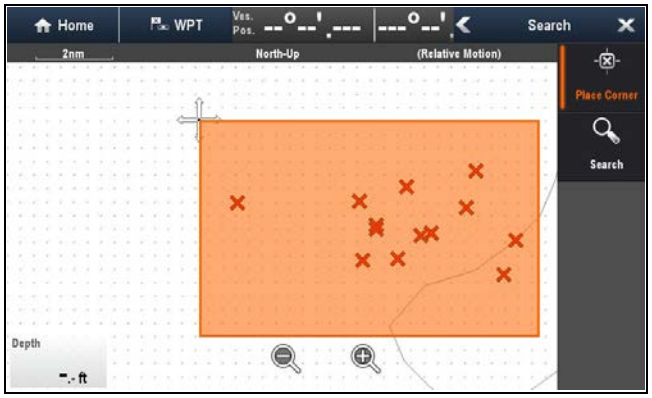
1. Select **Menu**.
2. Select **My Data**.
3. Select **Waypoints**.

   The waypoints list is displayed.
4. Select **Search**.

   The search page is displayed.
5. Select **Area**.

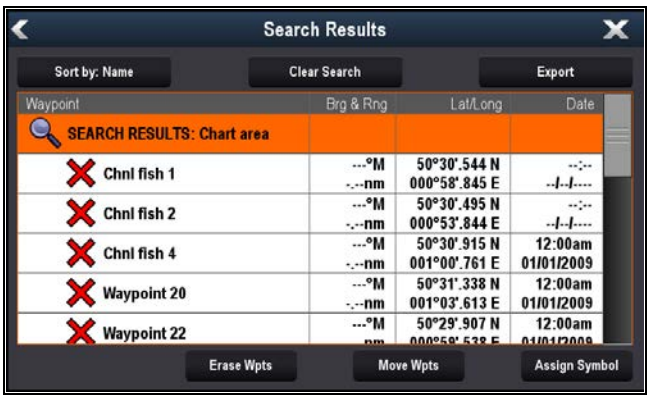
   The Chart application is displayed with the area search menu open.
6. Select the location for the first corner point of the search area.
7. Select the location for the opposite corner of the search area.

   A box is drawn on the screen which covers the selected area.



   If the box is drawn in the wrong place you can draw a new area by selecting 2 new corner points.
8. Select **Search** from the menu.

   A list of all waypoints in the selected area is displayed.



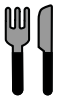
9. Select **Erase Wpts** to erase the list of waypoints from your system, or
10. Select **Move Wpts** to move the waypoints to a new or existing group, or
11. Select **Assign Symbol** to assign a new symbol to all the waypoints in the search results list.

You can also select a waypoint from the list to view its details, set a goto or display the waypoint in the Chart application.

Waypoint symbols

A Range of waypoint symbols are available that can be used to represent different waypoint types.

	Black Cross		Red Cross
	Black Circle		Red Circle
	Black Square		Red Square
	Black Triangle		Red Triangle
	Blue Cross		Green Cross
	Blue Circle		Green Circle
	Blue Square		Green Square
	Blue Triangle		Green Triangle
	Anchor		Wreck
	Buoy		Fuel

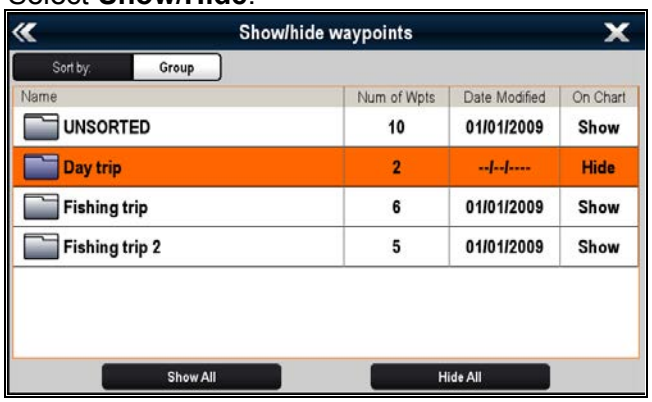
	Toilets		Restaurant
	Ramp		Caution
	Green racemark anti-clockwise		Green Racemark clockwise
	Yellow racemark anti-clockwise		Yellow Racemark clockwise
	Red racemark anti-clockwise		Red Racemark clockwise
	Marker		Restriction
	Bottom Mark		Top Mark
	Route Start		Route End
	Diver Down		Diver Down 2
	Oil Rig		Filled Circle
	FAD (Fish Attracting Device)		Concrete Rubble
	Seaweed		Oyster
	Green Can		Green Nun
	Red Can		Red Nun
	Yellow Can		Yellow Nun
	Fish Trap		Brushpile
	Preferred Marks		Post

	Ledge		Fish
	Fish 1 Star		Fish 2 Star
	Fish 3 Star		School Fish
	Lobster		Small Fish
	Rocks		Reef
	Private Reef		Public Reef
	Dolphin		Shark
	Billfish		Tank
	Reef Ball		Sailboat
	Sportsfisher		Trawler
	Swimmer		Martini
	Tree		Tower
	Hill or Peak		Bridge
	Airplane		Car
	Skull		Diamond T
	Diamond Quarter		Filled Triangle

Showing and hiding waypoint groups

From the Waypoint list:

1. Select **Show/Hide**.



2. Select the Group from the list that you want to show or hide.

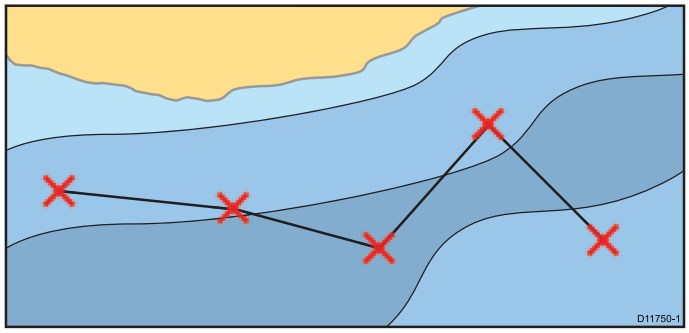
   *If **Show** is displayed in the list then the group will be displayed, if **Hide** is displayed in the list then the group is not displayed in the application.*

3. Repeat Step 4 for each waypoint group you want to show or hide.
4. Alternatively to show or hide all waypoints select **Show All** or **Hide All** to show or hide all waypoints.

13.2 Routes

A route is a series of waypoints typically used to assist with passage planning and navigation.

A route is displayed on screen as a series of waypoints linked by a line.



Route features

There are a range of route features for building, navigating and managing routes.

The route features allow you to:

- Build and save a route for use when required (stored in the route list).
- Navigate (follow) routes.
- Manage and edit routes stored on the system.
- Build a route from an existing track.

Route features are accessed from the chart application:

- by selecting an existing route.
- by using the **Build Route** option from the chart context menu.
- by using the Chart application menu: **Menu > Navigate > Follow Route** or **Build Route**.

Note: The Route List can also be accessed from the homescreen by selecting **My Data** and then **Routes**.

Route building

A route can consist of a combination of:

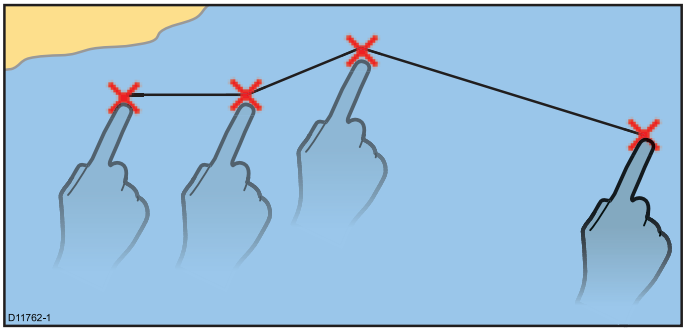
- New waypoints
- existing waypoints
- an existing track

As each waypoint is added, it is assigned an index number corresponding to its position in the route and drawn on the chart using the currently specified symbol. The following should be noted:

- When a route is being built it is not active and does not affect any current navigation.
- You cannot save a new route if any of the waypoints within it are currently active.

Building a route

You can build a route on a touchscreen multifunction display by following the steps below.



From the chart application:

1. Select and hold a location on screen.
   The chart context menu is displayed.
2. Select **Build Route**.
   The build route menu is displayed.
3. Select a location on screen to be the starting position.
4. Select relevant locations to place subsequent waypoints in order.
   The route is saved and displayed as each waypoint is placed.
5. When complete select **Finish Build**.
   The finish route build pop up message is displayed.
6. Select **Follow** to immediately follow the route. or
7. Select **Edit** to change the route name or change the route color. or
8. Select **Exit** to save the route and return to the chart application.

Note: If you place a waypoint at the wrong position, select **Undo Waypoint** from the Route Menu.

Building a route

From the chart application:

1. Select **Menu**.
2. Select **Navigate**.
3. Select **Build Route**.
   The build route menu is displayed.
4. Select **Place Wpt**.
5. Using the **Joystick** select a location on screen.
6. Press the **OK** button to place the first waypoint in the route.
7. Use the **Joystick** and the **OK** button to place subsequent waypoints.
   The route is saved and displayed as each waypoint is placed.
8. When your route is complete select **Finish Build**.
   The finish route build pop up message is displayed.
9. Select **Follow** to immediately follow the route. or
10. Select **Edit** to change the route name or change the route color. or
11. Select **Exit** to save the route and return to the chart application.

Note: If you place a waypoint at the wrong position, select **Undo Waypoint**.

Building a route using the waypoint list

From the chart application:

1. Select **Menu**.
2. Select **Navigate**.
3. Select **Build Route**.
   The build route menu is displayed.
4. Select **Use WPT List**.
   The waypoint list is displayed.
5. Select the required waypoint.
   You will be taken back to the build route menu.
6. Add subsequent waypoints to the route.
   The route is saved and displayed as each waypoint is placed.
7. When your route is complete select **Finish Build**.
   The finish route build pop up message is displayed.
8. Select **Follow** to immediately follow the route. or
9. Select **Edit** to change the route name or change the route color. or
10. Select **Exit** to save the route and return to the chart application.

Note: If you select the wrong waypoint, select **Undo Waypoint** from the route menu.

Building a route using racemark IDs

You can build a route quickly by entering a list of racemark IDs. Each Racemark ID must be unique and must have been entered into the comments field of the relevant waypoints.

Racemark IDs must:

- only use alpha numeric characters
- not include any spaces
- be separated from any other information in the field using a space.



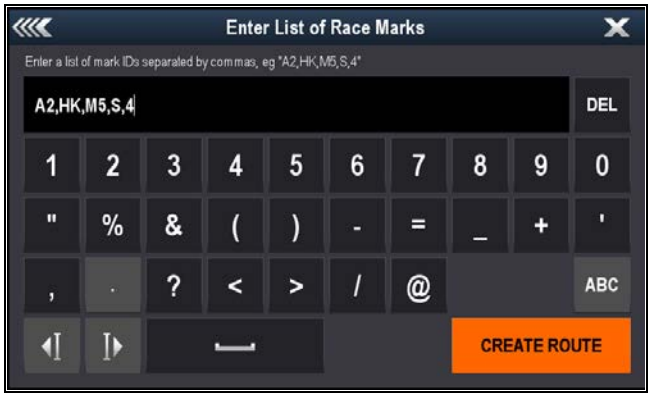
From the Chart application menu:

1. Select **My Data**.
2. Select **Routes**.
3. Select **Build using racemark IDs**.

   *An instructional pop-up is displayed, unless you have previously selected **Don't show again**.*

4. If the pop-up is displayed, select **Continue**.
   The onscreen keyboard is displayed.
5. Enter the relevant racemark IDs, in order, using a comma to separate each ID that you want to include in your route.

   *e.g. entering **A2,HK,M5,S,4** and selecting **CREATE ROUTE** will search for and create a route using the 5 waypoints with matching IDs.*

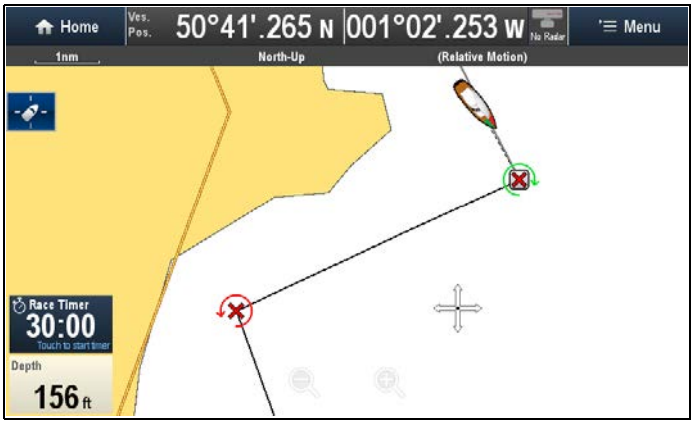


Once created you can select individual waypoints and apply rounding instructions.

Adding rounding instructions to waypoints within a route

Rounding instructions can be added to waypoints within a route to indicate the direction the vessel should take around the waypoint.

To use the Rounding feature the **Boat Type** setting must be set to a sailing vessel.



With the Route plan displayed:

1. Select the Waypoint that you want to add a rounding direction to.
2. Select **Rounding Direction**.
3. Select a rounding option:
   - None
   - Leave to Port
   - Leave to Starboard

Waypoint symbols with pre-defined rounding instructions

Some waypoint symbols have pre-defined rounding instructions that cannot be changed or removed.

	Green racemark anti-clockwise		Green Racemark clockwise
	Yellow racemark anti-clockwise		Yellow Racemark clockwise
	Red racemark anti-clockwise		Red Racemark clockwise

Adjusting chart range while building a route

From the Build Route menu:

1. Use the on-screen **Range In** and **Range Out** icons to range in and out of the chart.

Adjusting the chart range while building a route

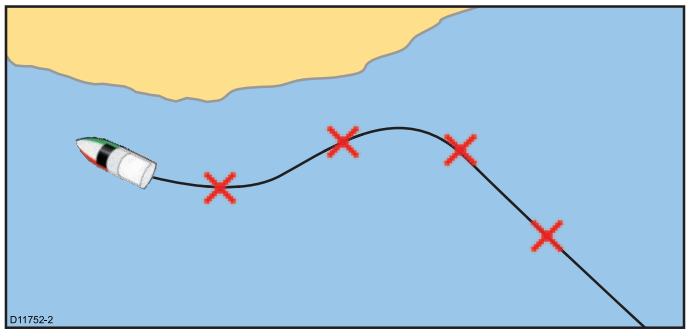
From the Build Route menu:

1. Use the **Range In** and **Range Out** buttons to range in and out of the chart.

Build a route from a track

You can create a route from a recorded track.

When a track is converted the system creates the closest route through the recorded track, using the minimum number of waypoints. Each waypoint created will be saved with the depth and temperature data (if applicable) for that position.



Note: If a track break occurs, only the last segment is converted to a route.

Building a route from a track

From the Track List:

- accessed from the homescreen: **My Data > Tracks**
- accessed from the chart application: **Menu > My Data > Tracks**

1. Select the Track you want to convert to a route.
   The track options dialog is displayed.
2. Select **Create Route From Track**.
   On completion, the maximum deviation of the route from the recorded track is displayed in a dialog and the new route is added to the route list.

It can now be displayed, edited and erased etc. in the same way as other routes in the system.

3. Select **OK** to confirm.
4. Select **Edit** to change the name and line color of the created route.

Building a route from a track displayed on the chart

From the chart application:

1. Select the required track.

   The track context menu is displayed.
2. Select **Create Route From Track**.

   On completion, the maximum deviation of the route from the recorded track is displayed in a pop up message and the new route is added to the route list. It can now be displayed, edited and erased etc. in the same way as other routes in the system.
3. Select **OK** to confirm.
4. Select **Edit** to change the name and line color of the created route.

Automatic route generation

Automatic route generation can be used to automatically create the shortest route between 2 waypoints. Automatic route generation can be used when creating new routes or when adding a route leg to an existing route.



The generated route is based on the data available on compatible cartography compared with user defined settings. Waypoints automatically generated will be restricted from entering areas that do not adhere to the user defined settings.

Important: The following restrictions apply:

- Automatic route generation can only be used when generating routes within the area covered by your compatible cartography.
- Automatic route generation can be used between waypoints less than 100 nm apart.
- Automatic route generation always uses the cartography's minimum depth reading when calculating routes. Please refer to the Differences between automatic route generation functions section for further details.
- Automatic route generation will fail if the generated route will exceed the maximum waypoint or route capacity of the MFD.
- Automatic route generation will also fail if insufficient cartographic data is available.

Caution: Easy Routing - Dredged areas

The C-MAP® Easy Routing feature will ignore some hazards in dredged areas. Easy Routing is intended for passage planning between harbors rather than within a harbor.

Warning: Traffic separation

Automatic route generation features do not adhere to the Traffic Separation Schemes identified in Rule 10 of the *International Regulations for Preventing Collisions at Sea 1972* as amended.

Raymarine® therefore recommends that you do NOT use Automatic route generation to create any part of a route which will cross traffic lanes or pass near to traffic separation lines. In these situations Automatic route generation MUST be switched Off and the route or route leg MUST be built manually, ensuring compliance to the rules laid out in the above regulations.

Automatic route generation - compatible cartography

Automatic route generation requires compatible **Navionics®** or **C-MAP®** cartography.

The **Navionics® Autorouting** feature is available on the following cartography:

- **Navionics Updates**
- **Navionics Platinum**
- **Navionics Platinum+**

The **Navionics® Dock-to-dock** feature is available on the following cartography:

- **Navionics+**
- **Navionics Platinum+**
- **Navionics Updates**
- **Navionics Hotmaps**

The **C-MAP ® Easy Routing** feature is available on the following cartography:

- **C-MAP 4D MAX+**

Note: There may be certain areas where sufficient details are not yet available even on the latest cartography.

Automatic route generation - user defined settings

User defined settings must be set before using automatic route generation. The settings used for route generation are dependent on cartography vendor.

User setting	Navionics® Autorouting and Dock-to-dock	C-MAP® Easy Routing
Minimum Safe Depth	✓	✓
Minimum Safe Beam	✗	✓
Minimum Safe Height	✗	✓

Refer to 3.12 **Initial set up procedures** for details on setting the required user defined settings.

Differences between automatic route generation functions

There are important differences between the way **Navionics®** and **C-MAP®** handle automatic route generation.

	Navionics® Autorouting and Dock-to-dock	C-MAP® Easy Routing
Tidal height — Depth clearance	**Autorouting** avoids shallow areas based on the user defined **Minimum Safe Depth** setting plus an additional Navionics safety margin. **Autorouting** assumes the lowest tide level, normally Lowest Astronomical Tide (LAT). The tide can be lower than LAT due to atmospheric effects such as high air pressure, wind direction, etc.	**Easy Routing** assumes that there will be some tide. The user must apply their own safety margin as appropriate to current conditions. Route legs that cross areas shallower than the user defined **Minimum Safe Depth** setting are marked with hazard waypoint symbols, it is critical that these legs are checked to ensure that there is sufficient tide to avoid the hazard.
Beam / Height constraints	**Autorouting** does not use the user defined **Minimum Safe Beam** or **Minimum Safe Height** settings to generate routes. Objects with beam / height constraints are marked with hazard waypoint symbols, it is critical that these legs are checked to ensure that there is sufficient clearance to avoid the hazard.	**Easy Routing** uses the user defined **Minimum Safe Beam** and **Minimum Safe Height** settings to determine if sufficient clearance is available. The user must apply their own safety margin as appropriate to current conditions. The Height datum must be checked, as it could be Mean High Water Springs (MHWS) or Highest Astronomical Tide (HAT). In both cases the tide can be higher than the datum due to atmospheric effects such as high air pressure, wind direction, etc.

Easy Routing Splitscreen Restrictions

The C-MAP® Easy Routing feature is available on all Raymarine LightHouse™ powered MFDs. However some MFD variants are restricted to displaying in a single page application only when using this feature.

Fullscreen / Splitscreen	Fullscreen only
eS Series All variants	a6x
gS Series All variants	a7x
c12x	a9x
e12x	c9x
e165	e7 / e7D
a12x	

Building a route using automatic route generation

Automatic route generation can be used to create an entire route or can be activated at any time when building a new route.

From the Chart application:

1. Select **Build Route** from the chart context menu or the **Navigate** menu.

   The Build Route menu is displayed.
2. Select **Autorouting**, **Dock-to-dock Autorouting** or **Easy Routing** so that On is selected.

   Automatic route generation can be switched On and Off at any time during route building.
3. Select the position on the Chart where you want the route or route leg to start.



4. Select the position on the Chart where you want the route or route leg to end.



   The system will try to automatically calculate the shortest safe route between the 2 points.



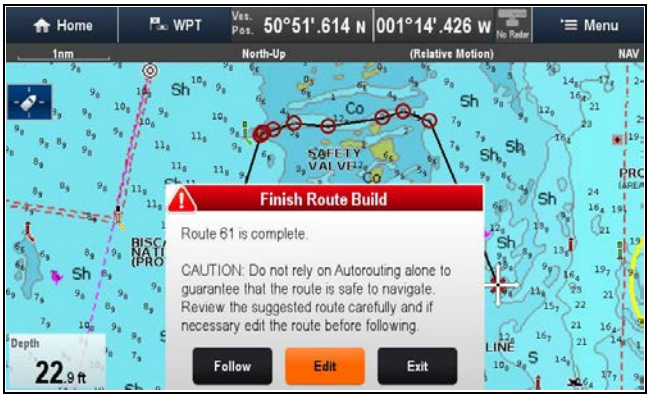
If the automatic route generation completes successfully the calculated route is displayed.



Waypoints within the route that were calculated using automatic route generation are assigned the Marker waypoint symbol.

5. Subsequent route legs can be added by selecting the next desired location on the Chart.
6. When your route is complete select **Finish Build**.

   The Finish Route Build warning is displayed.



7. Select **Exit** to complete the route and close the **Build Route** menu.
8. Select **Follow** to immediately start following the generated route.
9. Select **Edit** to display the Route in the Route List



You can further customize the route from the route list. Reviewing the route list is not an adequate method of checking a route, please refer to Reviewing an automatically generated route for details on how to check a route.

Once finished, routes generated automatically will behave the same as any other route.

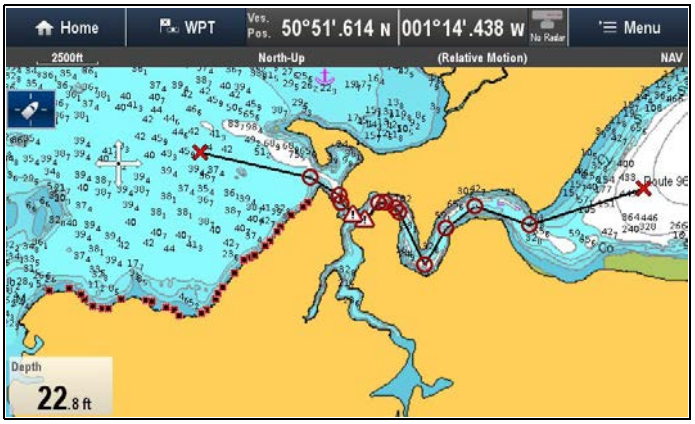
Warning: Automatic route generation

Routes created using automatic route generation use data taken from compatible electronic cartography and user defined settings.

- Do not rely on automatic route generation alone to guarantee that the route is safe to navigate. You MUST review the suggested route carefully and where necessary edit the route before following it.
- Automatic route generation will NOT be used when moving waypoints within routes, extra care should be taken to ensure that the route leg and any moved waypoints are safe to navigate.

Reviewing an automatically generated route

Before you start to follow any route you should review each waypoint and route leg to ensure it is appropriate to follow.



With the completed route displayed:

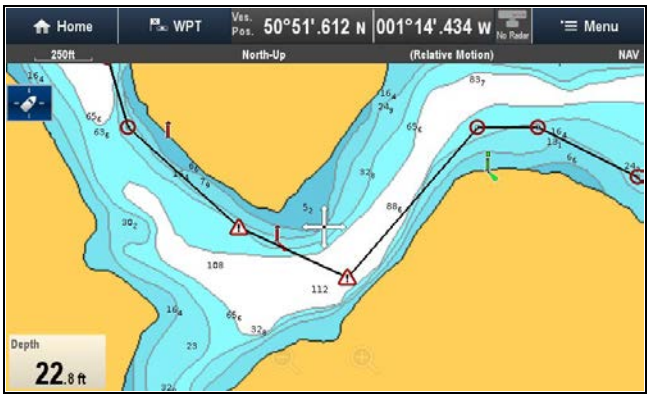
1. **Range in** on the route to identify areas of caution.



Areas of caution should be identified by the use of the **Caution** waypoint symbol before and after the cautionary area.

2. **Range in** further to review the area around and between the caution symbols.

In the example below the route passes close to a charted buoy.



3. Once the reason for the caution has been identified you can manipulate the route by moving the caution waypoints so that the caution area is avoided.

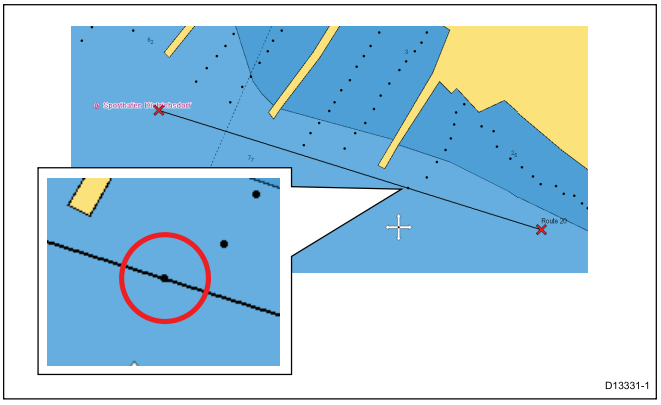


4. Scroll over the entire route to identify any other areas that might be of concern, that have not been highlighted with Caution symbols.

Important: Due to variations in detail and accuracy of cartography at different zoom levels, automatic route generation may not highlight all areas of concern within a route. It is therefor essential that the entire route is checked before following.

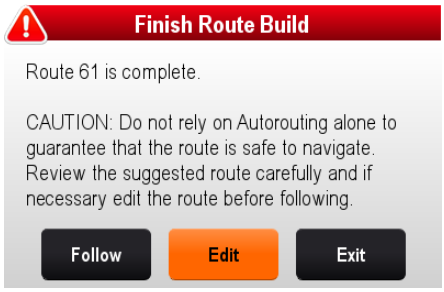
Example route leg

In the example below the automatic route generation has not identified the pile as a hazard.



Troubleshooting automatic route generation

The information below details the warnings that can be displayed when using automatic route generation, a description of what the warning means and actions to be taken to correct the issue.

Example warning message	Description	Resolution
	Route generation completed successfully	The Route maybe followed AFTER it has been reviewed to ensure that the generated route is safe for your vessel to follow.
	Route generation completed successfully, however the route passes close to areas where extra caution is advised (e.g. a charted buoy). The caution areas will be between waypoints that have been assigned caution symbol.	The route must be reviewed as follows: • Identify any waypoints using the caution symbol (these will be in sets of 2), check between the caution symbols to identify the reason for the caution. • If possible move the waypoint(s) to avoid the hazard. • Review all route legs and their waypoints to ensure appropriate before following the route.
	The start and or end point of the route does not meet the minimum safe values specified in the **Boat Details** settings. The start and end waypoints will be created and joined with a straight route leg, however there will be no automatically generated waypoints and the waypoint symbols will be changed to caution symbols.	Perform the following checks: • Check that the values specified in the **Boat Details** settings are correct. • Using the context menu check the **Chart Objects** menu at the exact location of the start and or end points to establish if the **Depth range** meets your **Minimum Safe Depth**. **Note:** – If no minimum value for depth is available at the desired location, a minimum depth of 0 feet is assumed. – Automatic route generation adds its own safety margin of 0.8 m or 20% of the specified Minimum Safe settings. which ever is greater. • Check for any other hazards that would prevent route generation.
	There is insufficient data available on the cartography to generate the route, The start and end waypoints will be created, however there will be no automatically generated waypoints and the waypoint symbols will be changed to caution symbols.	• Insert compatible cartography • Update existing cartography **Note:** There may be certain areas where sufficient details are not yet available even on the latest cartography.

Example warning message	Description	Resolution
	The start and end point of the desired route are further than 100 nm apart.	Create smaller route legs. e.g. instead of trying to create a route from point A to point B, create a route from point A to point B to point C to point D, this will enable a route longer than 100 nm to be created for each route leg.
	A safe route could not be generated The first waypoint will be placed but the end waypoint will not.	Check the chart area along the expected route to identify areas which cannot be navigated through due to obstacles or land mass.

Review or edit a route

There are a variety of attributes associated with routes. These can be reviewed and edited.

You can:

- Show or hide a route on the chart screen.
- Review details of the route
- Change the name or color of a route.
- Add, move and remove waypoints from a route.
- Change the route lines width.

Note: An active route can be edited, with the exception of the active waypoint. If a waypoint being edited becomes active, then the system shall cancel the edit; the waypoint shall remain in its original position.

Showing or hiding routes and tracks

From the chart application:

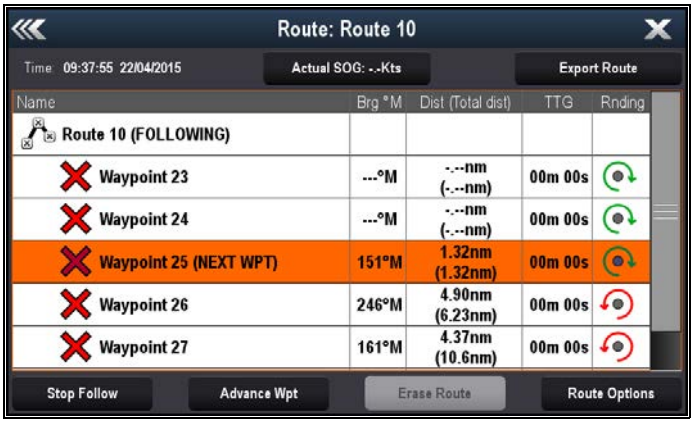
1. Select **Menu**.
2. Select **My Data**.
3. Select **Routes** or **Tracks**.
4. Select **Show/Hide**.
5. Select the route or track to switch between Show and Hide.

Selecting a route to review or edit

1. Do one of the following to select the required route:
   - From the chart application, select a route on screen to display the route context menu.
   - From the chart application, select: **Menu > My Data > Routes** and select the required route from the list.
   - From the Homescreen, select: **My Data > Routes** and select the required route from the list.

Displaying the Route Plan

When following a route the current Route Plan can be reviewed and edited.



From the Chart application menu:

1. Select **Navigate**.
2. Select **Route Plan**.

Note: You can also access the Route plan by selecting **Edit Route** from the Route context menu.

Adding a waypoint to a route on the chart screen

From the chart application:

1. Select the appropriate leg of the route.
   The route context menu is displayed.
2. Select **Insert Waypoint**.
3. Select the location for the new waypoint.
   The leg of the route is stretched to include the new waypoint.

Removing a waypoint from a route

From the chart application:

1. Select the waypoint you want to erase.
   The waypoint context menu is displayed.
2. Select **Remove Waypoint**.
   The Remove waypoint dialog is displayed.
3. Select **Yes** to confirm or **No** to cancel the action.

The waypoint will be removed from the route but will still be available.

Moving a waypoint within a route

From the chart application:

1. Position the cursor over the waypoint you want to move.
   The waypoint context menu is displayed.
2. Select **Move Waypoint**.

3. Select the new location for the waypoint.

Erasing routes

Erasing a displayed route

From the chart application:

1. Select the route.
   The Route context menu is displayed.
2. Select **Erase Route**.
   The erase route pop up message is displayed.
3. Select **Yes** to confirm, or **No** to cancel the action.

Erasing a route using the route list

From the Chart application menu or the Homescreen:

1. Select **My Data**.
2. Select **Routes**.
   The route list is displayed.
3. Select the route you want to erase.
4. Select **Erase route**.
   The erase route dialog is displayed.
5. Select **Yes** to confirm, or **No** to cancel the action.

Note: You can delete any route, except for the one that you are currently following. When you erase a route, only those waypoints associated with that route are deleted.

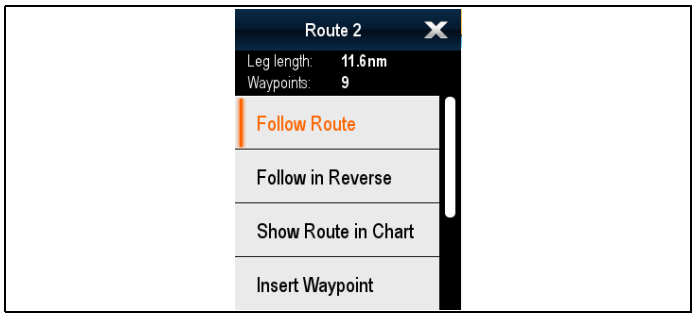
Erasing all routes

From the homescreen:

1. Select **My Data**.
2. Select **Import/Export**.
3. Select **Erase from System**.
4. Select **Erase Routes from System**.
   The erase routes from system dialog is displayed.
5. Select **Erase All**.
   The confirm delete dialog is displayed.
6. Select **Yes** to confirm, or **No** to cancel the action.

Route context menu

Placing the cursor over a route in the chart application displays a context menu showing the leg of the route highlighted by the cursor and menu items.



The context menu provides the following menu items:

- **Follow Route**
- **Follow Route In Reverse**
- **Hide Route**
- **Insert Waypoint**
- **Edit Route**
- **Erase Route**
- **Add Route Leg**
- **Acquire Target** (only available if Radar overlay is switched on.)

When following a route the context menu options change to:

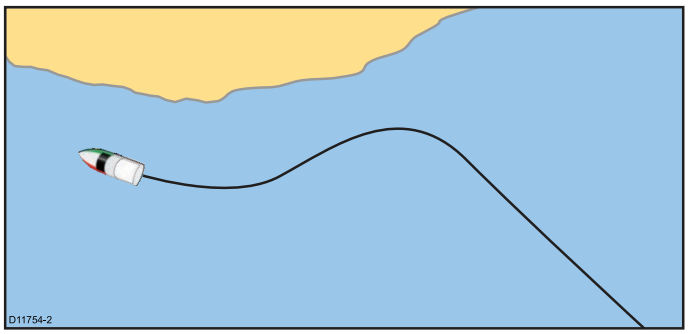
- **Stop Follow**
- **Restart XTE**
- **Advance Waypoint**
- **Insert Waypoint**
- **Edit Route**
- **Erase Route** — Disabled
- **Add Route Leg**
- **Acquire Target** (only available if Radar overlay is switched on.)

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

13.3 Tracks

Tracks can be used to make a permanent record of where you have been. Tracks are made up of track points that are created automatically at specified intervals. Tracks can be converted to routes so that they can be followed again at a later date.



Each track can contain up to 10,000 track points, when the track limit is reached the track is saved and a new track is started automatically. Up to 15 tracks can be saved and a 16th track may be active (currently recording), if the track limit is reached for the 16th track then the user will be prompted to delete a current track or stop recording, otherwise the earliest track points will be overwritten with the new track points.

Creating a track

From the chart application menu:

1. Select **Navigate**.
2. Select **Start Track**.
   The start track pop up message is displayed.
3. Select **OK**.
   As you navigate your vessel, your journey is automatically recorded.

Note: If the power fails whilst a track is being recorded or the position fix is lost, a break will occur in the track.

Note: If the maximum number of tracking points is reached, a new track will be started automatically, unless you have reached the track limit.

4. To complete your track select **Stop Track** from the **Navigate** menu: **Menu > Navigate > Stop Track** .
   The track stopped pop up message is displayed.
5. Select **Save**, **Erase** or **Cancel**.
   - **Save** — Will save the track and open the Edit track Properties dialog where you can name the track and choose a color for the track line.
   - **Erase** — Will erase the track.
   - **Cancel** — Will cancel the Stop Track action.

Track interval

The track interval specifies the time period or distance between the points in a track.

You can adjust the interval between track points and choose the interval type (i.e. distance or time), which can help ensure best use of the available storage.

The settings are available from the Tracks Set-up options.

- **Record Track By** — specifies the interval type (Auto / Time / Distance).
- **Track Interval** — specifies the interval value (e.g. 15 minutes).

For example when creating a track for a long journey, an interval set to Auto could result in rapid use of all of the storage available for track points. In this case selecting a higher value for the Track Interval would provide capacity for a longer track.

Setting the track interval

From the My Data menu in the Chart application or on the Homescreen:

1. Select **Tracks**.
2. Select **Track Set-up**.
3. Select **Record Tracks By:** and set to the appropriate value:
   - Auto— The track interval is automatically set (Auto will minimize track points whilst maintaining correlation between the track and the actual path followed).
   - Time— The track points are placed at regular intervals of time.
   - Distance— The track points are placed at regular intervals of distance.
4. Select the **Track Interval** and set to the appropriate value:
   - Units of time (available if “record track by” is set to time).
   - Units of distance (available if “record track by” is set to distance).
   - Not available — no Track Interval is available if the “record track by” is set to auto).

Reviewing and editing a track

You can review and edit aspects of the tracks stored.

You can:

- Erase a track.
- Create a route from a track.
- Show or hide a track on the chart (only available from the chart application).
- Change the name of a track.
- Change the color of a track.

Showing or hiding routes and tracks

From the chart application:

1. Select **Menu**.
2. Select **My Data**.
3. Select **Routes** or **Tracks**.
4. Select **Show/Hide**.
5. Select the route or track to switch between Show and Hide.

Selecting a track to review or edit

1. Do one of the following to select the required track:

- From the Chart application, select a track on screen to display the track context menu.
- From the Chart application, go to the following menu: **Menu > My Data > Tracks** , and select the required track.
- From the Homescreen, select: **My Data > Tracks** and select the required track.

You can then proceed and review or edit the required track using the options available.

Renaming a track

You can change the name of a saved track.

With the track list displayed.

1. Select the track you want to edit.
   The track options page is displayed.
2. Select **Edit Name**.
   The on-screen keyboard is displayed.
3. Use the on-screen keyboard to change the track name.
4. When finished Select **SAVE**.

You can also edit track details by selecting **Edit Track** from the track context menu.

Changing the color of a track

You can change the color of a saved track.

With the track list displayed.

1. Select the track you want to edit.
   The track options page is displayed.
2. Select **Edit Color**.
   A list of colors is displayed.
3. Select the color you want to use.

You can also edit track details by selecting **Edit Track** from the track context menu.

Erasing tracks

Erasing a track

From the My Data menu:

1. Select **Tracks**.
   The track list is displayed.
2. Select the track you want to erase.
3. Select **Erase Track**.
   The erase track pop up message is displayed.
4. Select **Yes** to confirm, or **No** to cancel the action.

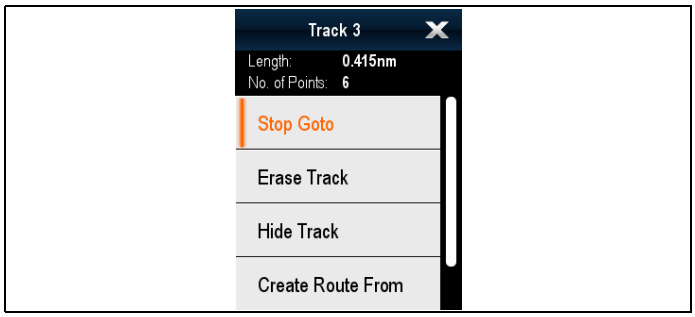
Erasing all tracks

From the Homescreen:

1. Select **My Data**.
2. Select **Import/Export**.
3. Select **Erase from System**.
4. Select **Erase Tracks from System**.
   The tracks list is displayed.
5. Select **Erase All**.
   The confirm delete dialog is displayed.
6. Select **Yes** to confirm, or **No** to cancel the action.

Track context menu

Selecting a track in the chart application displays a context menu showing the track length, number of points and menu items.



The context menu provides the following menu items:

- **Stop Goto** (only available during active navigation.)
- **Erase Track**
- **Hide Track**
- **Create Route From**
- **Rename**
- **Edit Color**
- **Acquire Target** (only available if Radar overlay is switched on.)

When creating a track the context menu options change to:

- **Stop Goto** (only available during active navigation.)
- **Stop Track**
- **Erase Route** — Disabled
- **Create Route From**
- **Rename**
- **Edit Color**
- **Acquire Target** (only available if Radar overlay is switched on.)

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

13.4 Import and Export

Waypoints, Routes and Tracks can be imported and exported using a memory card.

For details on importing and exporting waypoints, routes and tracks refer to: 4.1 **Saving user data and user settings**.

13.5 Waypoints, routes and tracks storage capacity

Way-points	• 3,000 waypoints (split between up to 100 waypoint groups)
Routes	• 150 routes (each route can contain up to 200 waypoints)
Tracks	• 15 tracks (each track can contain up to 10,000 points)

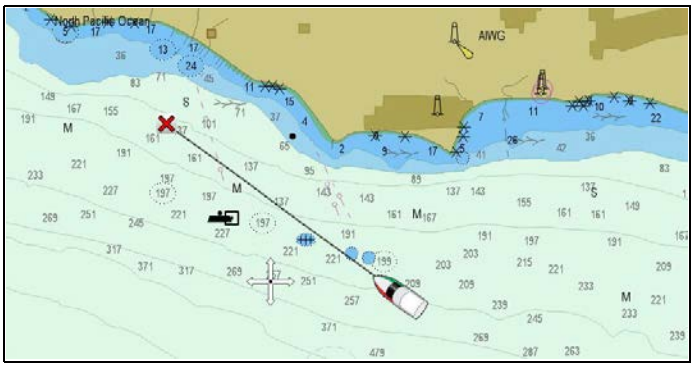
Chapter 14: Chart application

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14.1 Chart application overview and features

The chart application provides route planning and navigation features. The Chart application is pre-loaded with world base maps. Compatible electronic charts can be used to expand the information and detail regarding your surroundings and charted objects. Depending on cartography type the chart application can be set to 2D or 3D view.



Typical Chart application includes the following features to help you navigate your vessel safely and effectively:

Features

Satellite-based navigation.	• **GNSS Status**
Route planning with waypoints, routes and tracks.	• 13.1 **Waypoints** • 13.2 **Routes** • 13.3 **Tracks** • 4.1 **Saving user data and user settings**
Navigating using waypoints, routes and tracks.	• **Navigation**
Choice of electronic 2D and 3D cartography. **Note:** To obtain full 3D detail, you must have chart cards containing 3D cartography for the appropriate geographic area.	• 14.2 **Electronic charts overview** • **Selecting 2D and 3D chart views**
Enabling graphical overlays.	• 14.16 **Overlays**
Waypoints, routes and tracks backup and transfer	• 4.1 **Saving user data and user settings**
Display chart vectors	• 14.17 **Chart vectors**
Display animated current and tide information	• **Animated current information** • **Animated tide information**
Viewing information for charted objects and deciding which objects should be shown or hidden.	• 14.20 **Cartography objects** • 14.21 **Object information**
Control the level of detailed information displayed in the Chart application	• 14.15 **Chart display** • **Chart detail**
Measuring distances and bearings.	• 14.25 **Measuring distances and bearings**
Alter the Chart application's orientation to better suit your needs.	• 14.11 **Chart Orientation**
Change (offset) the vessel position in the Chart application.	• 14.12 **Chart motion mode**

Chart application synchronization

Plan your journey at home, then transfer the routes to your MFD.	Refer to the **Voyage Planner** manual for more information (81339).

Race sail features

The Chart application includes features to aid in race sailing activities, these features are available when the **Boat Type** setting is set to one of the available sailing vessels.

Feature	Details	Chapter / Section
Laylines	show the most efficient way for a sailing vessel to reach its destination, given present wind conditions	• 14.18 **Laylines**
Race Startline	create a startline	• 14.9 **Race Startline and Race Timer**
Race Timer	use a countdown race timer	• 14.9 **Race Startline and Race Timer**
Racemark ID route building	Build a route quickly using racemark IDs	• **Building a route using racemark IDs**
Rounding direction	Apply a rounding direction to waypoints within a route	• **Adding rounding instructions to waypoints within a route**

Chart datum

The chart datum setting affects the accuracy of the vessel position information displayed in the chart application.

In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum.

The default datum for your multifunction display is WGS1984. If this is not the datum used by your paper charts, you can change the datum used by your multifunction display, using the system

preferences page. The system preferences page can be accessed from the homescreen: **Set-up > System Settings > System Preferences > System Datum**.

When you change the datum for your multifunction display, the chart grid will subsequently move according to the new datum, and the latitude/longitude of the cartographic features will also change accordingly. Your multifunction display will attempt to set up any GPS receiver to the new datum, as follows:

- If your multifunction display has a built in GPS receiver it will automatically correlate each time you change the datum.
- If you have a Raymarine GPS receiver using SeaTalk or SeaTalkng, it will automatically correlate each time you change the datum on the multifunction display.
- If you have a Raymarine GPS receiver using NMEA0183, or a third-party GPS receiver, you must correlate it separately.

It may be possible to use your multifunction display to correlate an NMEA0183 GPS receiver. From the homescreen go to **Set-up > System settings > GPS Set-up > View Satellite Status**. If the datum version is displayed, it may be possible to change it. From the homescreen go to **Set-up > System settings > Data Sources > GPS Datum**.

Note: Raymarine recommends that you check the displayed vessel position in the chart application against your actual proximity to a known charted object. A typical GPS has an accuracy of between 5 and 15 m.

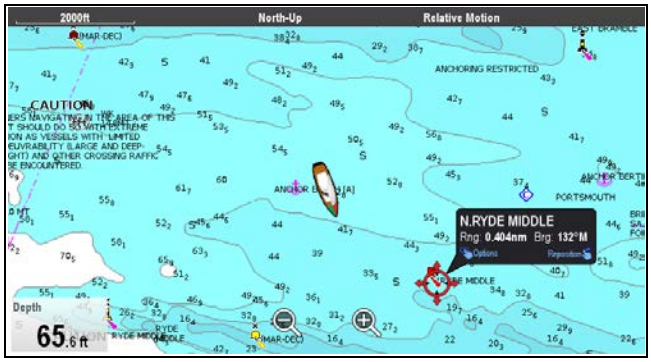
Using Chart Call-outs

On touchscreen **MFD**s, touching an area onscreen displays a “Call-out” which provides information about the selected location or object.

Call-outs are enabled by default and can be disabled from the Homescreen: **Homescreen > Customize > Display Preferences > Chart Touch Call-outs**.

1. Touching an area or object opens the Call-out.

   The Call-out will close automatically after 10 seconds. Alternatively, it can be closed by touching a different location, by panning or zooming the chart area, or by pressing the **Back** button.



2. Touch the Call-out to open the Context menu.
3. If you did not select the correct location, you can reposition the Call-out by swiping your finger over another area or object.

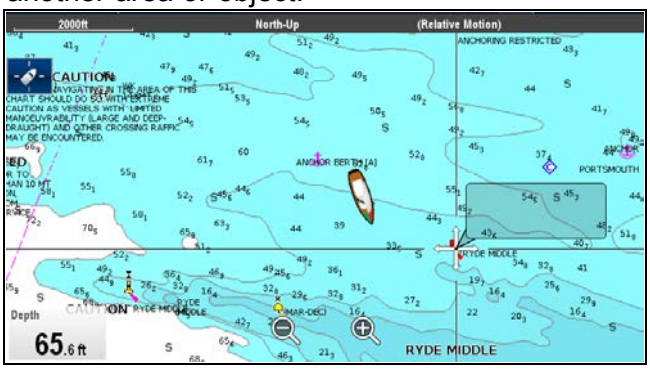
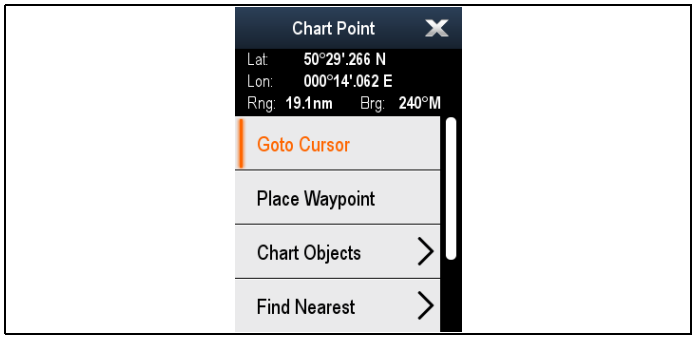


Chart context menu

The context menu provides positional data for the cursor position in relation to your vessel and access to menu options.



The following menu options are available:

- **Goto Cursor**
- **Stop Goto** / **Stop Follow**
- **Place Waypoint**
- **Photo**
- **Tide Station** (only available if a tide station is selected.)
- **Current Station** (only available if a current station is selected.)
- **Pilot Book** (only available at certain ports.)
- **Animate** (only available if a tide or current station is selected.)
- **Chart Objects**
- **Find Nearest**
- **Measure**
- **Build Route**
- **Acquire Target** (only available if Radar overlay is switched on.)
- **Slew thermal camera** (only available when thermal camera is connected and operating.)

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

14.2 Electronic charts overview

Your multifunction display includes basic world base maps. Electronic charts provide additional cartographic information.

The level of cartographic detail available varies for different chart vendors, chart types, geographic locations and chart scales. The chart scale in use is indicated by the scale indicator, the value displayed is the distance that the line represents across the screen.

You can remove and insert chart cards at any time. The chart screen is automatically redrawn when the system detects that a compatible chart card has been inserted or removed.

Using a dual view page it is possible to display different cartography types simultaneously.

Caution: Care of chart and memory cards

To avoid irreparable damage to and / or loss of data from chart and memory cards:

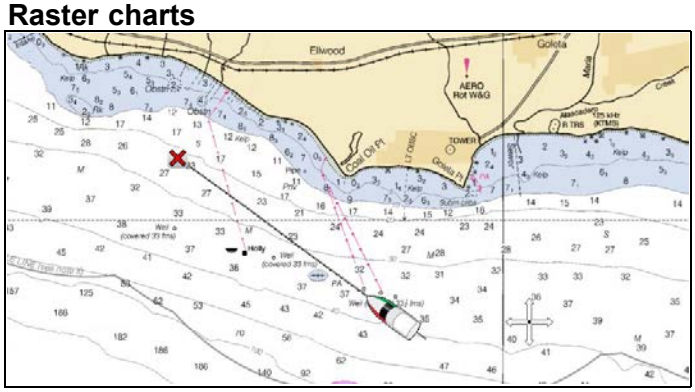
- Ensure that chart and memory cards are fitted the correct way around. DO NOT try to force a card into position.
- DO NOT use a metallic instrument such as a screwdriver or pliers to insert or remove a chart or memory card.

LightHouse charts

The LightHouse chart engine enables Raymarine to offer new raster and vector charts from around the world.

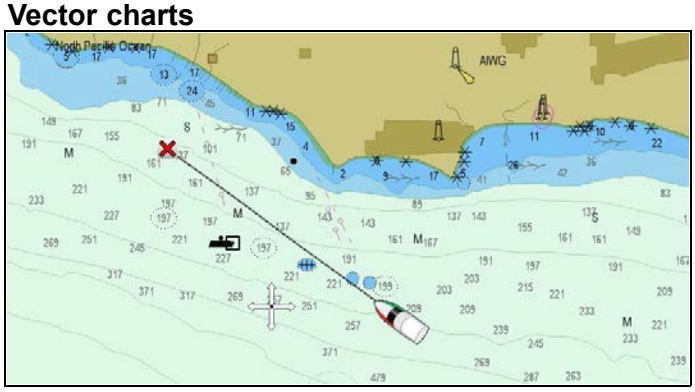
Follow the link above and Go to the Getting Started page for full instructions on downloading LightHouse Charts to MicroSD card using the LightHouse Download Manager.

Raster charts



Raster charts are an exact copy / scan of an existing paper chart. All information is embedded directly in the chart. Ranging in and out of raster charts will make everything appear larger or smaller on the screen, including text. When changing the Chart application's orientation everything on the chart will rotate, including the text. As raster charts are a scanned image the file size is normally bigger when compared to the vector equivalent.

Vector charts



Vector charts are computer generated, consisting of a series of points and lines that make up the chart. Chart objects and overlays on vector charts can be switched on and off and chart objects can be selected to provide further information. Ranging in and out of vector charts will make geographical features appear larger or smaller on the screen, however text and chart objects will remain the same size regardless of range. When changing the Chart application's orientation geographical features will rotate but text and chart objects will remain in the correct orientation for the display. As vector charts are generated rather than a scanned image the file size is normally smaller when compared to the raster equivalent.

Navionics charts

Your multifunction display is compatible with Navionics cartography.

The following Navionics cartography types are available for your multifunction display:

- Ready to Navigate

- Silver
- Gold
- Gold+
- Platinum
- Platinum+
- Fish'N Chip
- Hotmaps

Navionics Free Trial chart cards are also supported by your multifunction display.

C-MAP charts

Your display is supplied with world base maps and depending on purchasing options a C-MAP® chart card. You may also purchase extra C-MAP® chart cards to get enhanced chart details and additional chart features.

Your display is compatible with the following C-MAP® chart cards:

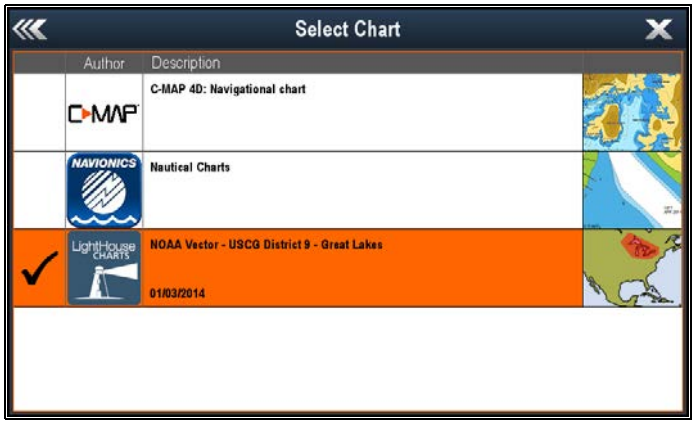
- C-MAP Essentials
- C-MAP 4D MAX
- C-MAP 4D MAX+

Refer to the Raymarine website for the latest list of supported chart cards.

14.3 Chart selection

When a Chart application instance is opened for the first time, any chart cards inserted into the card reader will be detected and the cartography stored on the card will be displayed.

Where multiple chart types are present, the order of precedence will be: LightHouse Charts first, then Navionics, and then C-Map. You can switch between cartography types at any time using the Chart selection page. The selected cartography applies to the active instance of the Chart application and will persist over a power cycle.



Selecting a cartography type

You can select the cartography type you want to display in the Chart application.

Ensure you have inserted the chart card that contains the cartography type you want to display.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Chart Selection**.
   A list of available cartography is displayed.
3. Select the cartography type you want to display
   The Chart window is re-drawn to show the select cartography type.

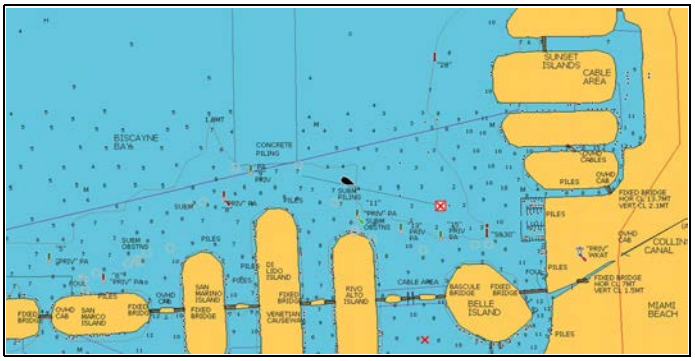
14.4 GPS Check

Checking GPS operation

You can check that the GPS is functioning correctly using the chart application.

From the Homescreen:

1. Select the Chart application.



2. Check the screen.

   You should see:

   ***Your boat position (this indicates a GPS fix)**. Your current position is represented by a boat symbol or solid circle. Your position is also displayed in the data bar under VES POS.*

   A solid circle on the chart indicates that neither heading nor Course Over Ground (COG) data is available.

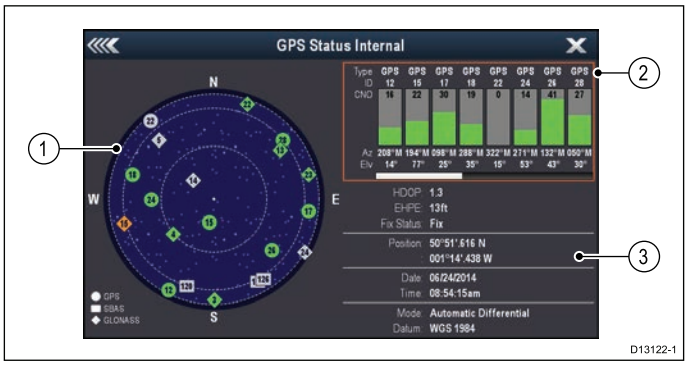
Note: Raymarine recommends that you check the displayed vessel position in the Chart application against your actual proximity to a known charted object. GPS / GNSS receivers typically have an accuracy of between 5 and 15 m.

Note: A GPS Status page is available from the GPS Set-up menu: (**Homescreen > Set-up > System Settings > GPS Set-up > View Satellites Status**). This provides HDOP and EHPE data which can provide an indication of how accurate your vessel's GPS position is.

GNSS Status

The **GPS status** page enables you to view the status of the available satellites that are compatible with your receiver.

The satellite constellations are used to position your vessel in the Chart and Weather applications. You can set up your receiver and check its status from the GPS Set-up menu: **Homescreen > Set-up > System Settings > GPS Set-up**. For each satellite, the screen provides the following information:



1. Sky view
2. Satellite status
3. Position and fix information

Sky view

Sky view is a visual representation that shows the position of navigation satellites and their type. Satellite types are:

- **Circle** — A circle identifies a satellite from the GPS constellation.
- * **Diamond** — A diamond identifies a satellite from the GLONASS constellation.
- **Square** — A square identifies an (SBAS) differential satellite.

Note: * GLONASS satellites are only available when connected to a compatible GNSS receiver. Refer to the *Technical specification* for your product to identify your receiver type.

Satellite status area

The Satellite status area displays the following information about each satellite:

- **Type** — Identifies which constellation the satellite belongs to.
- **ID** — Displays the satellites identification number.
- **CNO** (Carrier-to-noise ratio) — Displays the signal strength of each satellite shown in the Sky view:
  - Grey = searching for satellite
  - Green = satellite in use
  - Orange = tracking satellite
- **Azimuth and Elevation** — Provides the angle of elevation and azimuth between the location of the receiver and the satellite.

Position and fix information

The following positional and fix information is provided:

- **Horizontal Dilution of Precision (HDOP)** — HDOP is a measure of satellite navigation accuracy, calculated from a number of factors including satellite geometry, system errors in the data transmission and system errors in the receiver. A higher figure signifies a greater positional error. A typical receiver has an accuracy of between 5 and 15 m. As an example, assuming a receiver error of 5 m, an HDOP of 2 would represent an error of approximately 15 m. Please remember that even a very low HDOP figure is NO guarantee that your receiver is providing an accurate position. If in doubt, check the displayed

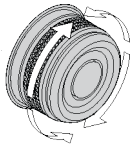
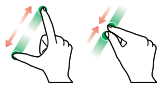
vessel position in the Chart application against your actual proximity to a known charted object.

- **Estimated Horizontal Position Error (EHPE)** — EHPE is a measure of the estimated error of a position fix in the horizontal plane. The value displayed indicates that your position is within a circle radius of the stated size 50% of the time.
- **Fix status** — indicates the actual mode the receiver is reporting:
  - **Fix** — Satellite fix has been acquired.
  - **No Fix** — No satellite fix can be acquired.
  - **D Fix** — A differential beacon fix has been acquired.
  - **SD Fix** — A differential satellite fix has been acquired.
- **Position** — Displays the latitude and longitude position of your receiver.
- **Date / Time** — Displays the current date and time generated by the position fix in UTC format .
- **Mode** — Identifies wether the receiver is working in differential mode or non-differential mode.
- **Datum** — The receiver's datum setting affects the accuracy of the vessel position information displayed in the Chart application. In order for your receiver and MFD to correlate accurately with your paper charts, they must be using the same datum.

14.5 Chart ranging and panning

Ranging in and out

The table below shows the Range controls available for each display variant.

	**Rotary Control**	• eS Series
	**Rotary Control**	• c Series • e Series • RMK-9 keypad
	**Range in** and **Range out** buttons	• c Series • e Series (excluding e7 and e7D • RMK-9 keypad
	**Range in** and **Range out** onscreen icons	• a Series • e Series • gS Series • eS Series
	Multi-Touch gesture — Pinch to Zoom	• a Series • gS Series • eS Series

Panning the chart

You can pan the chart area on a touchscreen multifunction display by following the steps below.

In the chart application:

1. Swipe your finger across the screen from right to left to pan right.
2. Swipe your finger across the screen from left to right to pan left.
3. Swipe your finger across the screen from top to bottom to pan up.
4. Swipe your finger across the screen from bottom to top to pan down.

Panning the chart

You can pan the chart area on a non-touchscreen multifunction display by following the steps below.

From the chart application:

1. Move the **Joystick** in the direction you want to pan.

14.6 Navigate menu options

The chart application provides features to help navigate to a chosen location.

The navigation options are found in the Navigate menu: **Menu > Navigate**

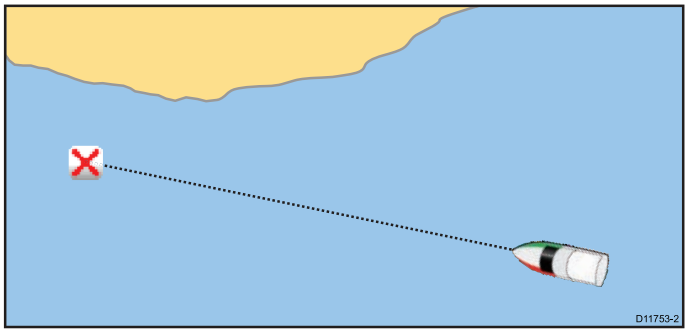
- **Pilot Controls** — Accesses the Pilot Control Dialog, when Autopilot Control is enabled.
- **Goto Cursor** — Will set the cursor position as the active destination.
- **Goto Waypoint** — Provides options to navigate to a waypoint stored on the system
- **Stop Goto** — Stops the Goto Cursor or Goto Waypoint.
- **Stop Follow** — Stops following the current route.
- **Restart XTE** — Restarts the Cross Track Error.
- **Advance Waypoint** — When following a route, skips to the next waypoint in the route.
- **Follow Route** — Provides options to navigate to a route stored on the system
- **Start Track / Stop Track** — Will initiate a track on screen to plot your course as you progress or stop a track that is currently being created.
- **Build Route** — Provides options to build a route.
- **Race Startline** — Provides options to create a virtual startline.
- **Race Timer** — Provides a count down timer / stopwatch.

Refer to Chapter 13 Waypoints, Routes and Tracks for details on creating waypoints, routes and tracks.

Navigation

Navigating to a waypoint

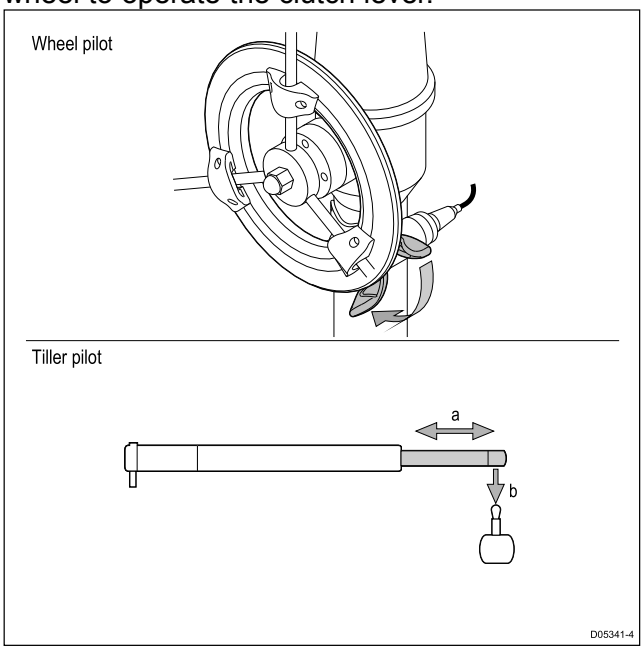
With Pilot Control enabled on your MFD, you can automatically navigate your vessel to a waypoint by following the steps below.



From the Chart or Radar application:

1. For Wheel and Tiller drive systems follow the instructions below to engage the mechanical drive.
   - **Wheel Pilot:** Engage the wheel drive clutch by rotating the clutch lever clockwise (so the lever fully engages onto the locating pip).
   - **Tiller Pilot:** Place the pushrod end over the tiller pin. If necessary, extend or retract the pushrod by selecting **Auto** from the Pilot Control Dialog and using the **Left Arrow** and **Right Arrow** to adjust the rod's position.

Attention Always reach around (not through) the wheel to operate the clutch lever.



2. Select the waypoint.
   The waypoint context menu is displayed.
3. Select the **Goto Waypoint**.
   The Pilot Control Dialog is displayed.
4. Select **Yes (Track)**.

Note:

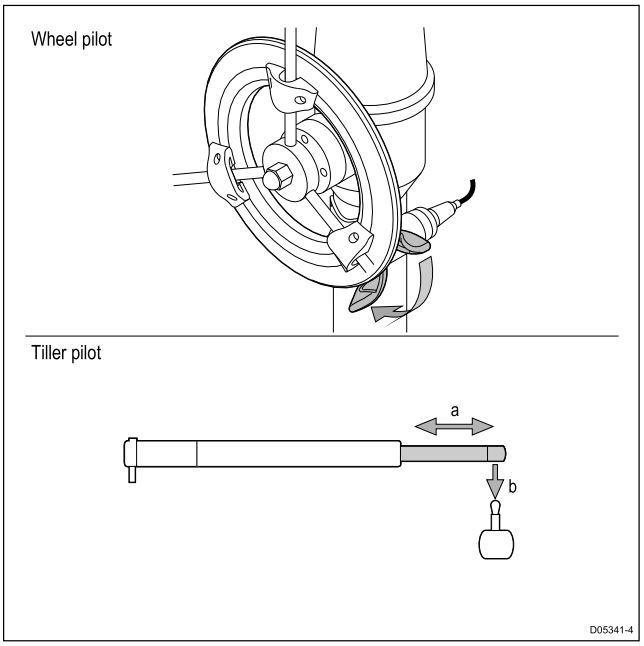
- In Track mode you can select **Stop Goto** option from the waypoint context menu at any time to return to Auto (locked heading) or
- you can select **Standby** to return to manual vessel control.

Navigating to a waypoint using the waypoints list

From the Chart application:

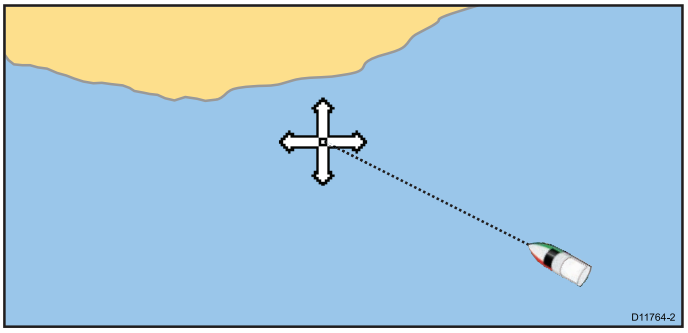
1. Select **WPT**.
   The waypoint menu is displayed.
2. Select **Waypoints**.
   The waypoints group list is displayed.
3. Browse the waypoints list for the relevant waypoint.
4. Select the waypoint.
   The waypoint options dialog is displayed.
5. For Wheel and Tiller drive systems follow the instructions below to engage the mechanical drive.
   - **Wheel Pilot:** Engage the wheel drive clutch by rotating the clutch lever clockwise (so the lever fully engages onto the locating pip).
   - **Tiller Pilot:** Place the pushrod end over the tiller pin. If necessary, extend or retract the pushrod by selecting **Auto** from the Pilot Control Dialog and using the **Left Arrow** and **Right Arrow** to adjust the rod's position.

Attention Always reach around (not through) the wheel to operate the clutch lever.



6. Select the **Goto** .
   The Pilot Control Dialog is displayed.
7. Select **Yes (Track)**.

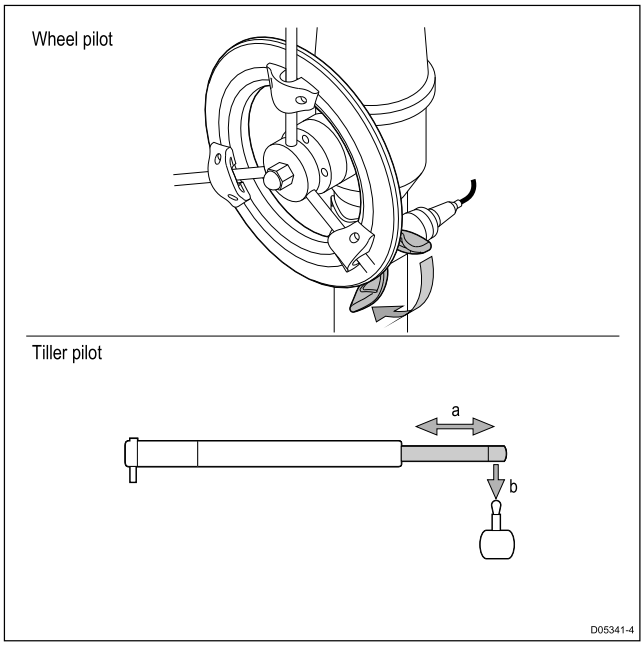
Navigating to a location on the chart



From the chart application:

1. For Wheel and Tiller drive systems follow the instructions below to engage the mechanical drive.
   - **Wheel Pilot:** Engage the wheel drive clutch by rotating the clutch lever clockwise (so the lever fully engages onto the locating pip).
   - **Tiller Pilot:** Place the pushrod end over the tiller pin. If necessary, extend or retract the pushrod by selecting **Auto** from the Pilot Control Dialog and using the **Left Arrow** and **Right Arrow** to adjust the rod's position.

   Attention Always reach around (not through) the wheel to operate the clutch lever.



2. Select the required location onscreen.
   The chart context menu is displayed.
3. Select **Goto Cursor**.
   The Pilot Control Dialog is displayed.
4. Select **Yes (Track)**.

Note:

- In Track mode you can select **Stop Goto** option from the waypoint context menu at any time to return to Auto (locked heading) or
- you can select **Standby** to return to manual vessel control.

Cancelling navigation to a waypoint

Active navigation can be cancelled by following the steps below.

With Pilot Control enabled on your MFD:

1. Select **Standby**.
2. For Wheel and Tiller drive systems see below instructions for disengaging the mechanical drive to return to manual steering
   - **Wheel Pilot:** Disengage the wheel drive clutch by rotating the clutch lever anti-clockwise (so the lever disengages fully from the locating pip.**Attention** Always reach around (not through) the wheel to operate the clutch lever.
   - **Tiller Pilot:** Remove the drive unit from the tiller pin. If necessary, extend or retract the pushrod by selecting **Auto** from the Pilot Control Dialog and using the **Left Arrow** and **Right Arrow** to adjust the rod's position.
3. Select any position anywhere on-screen.
   The waypoint context menu is displayed.
4. Select **Stop Goto**.
5. Alternatively, in the chart application, go to: **Menu > Navigate > Stop Goto**.

Note: Once navigation is no longer active, the waypoint symbol returns to its normal state, and the dashed line between your vessel and the waypoint is removed.

Arriving at a waypoint

As your vessel approaches a waypoint, the waypoint arrival alarm is triggered.



With the Waypoint arrival warning displayed:

1. Select **OK**.

Once the alarm is acknowledged:

- the Dialog is closed and the audible alarm is silenced.
- if navigating a route then the next waypoint is selected.

Note: You can set the radius (distance) of the waypoint arrival circle which is used to trigger the waypoint arrival alarm.

Changing destination during active navigation

Having initiated a **Goto**, you can change your desired destination by initiating a new **Goto**.

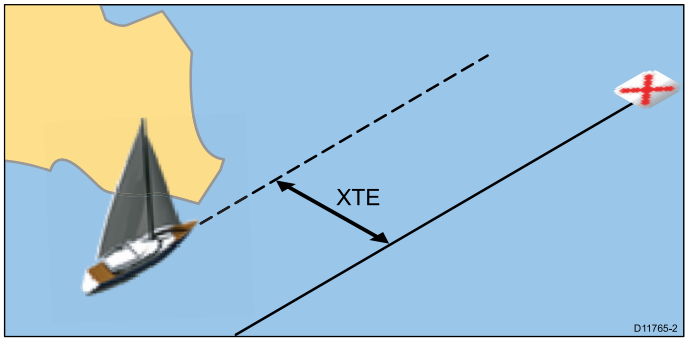
Note: To use this feature when connected to a non-Evolution autopilot, Pilot integration must be Off.

During active navigation (excluding following a route):

1. Select the new destination.
2. Open the context menu.
3. Select **Goto Cursor** or **Goto Waypoint**

Cross Track Error (XTE)

Cross Track Error (XTE) is the amount of deviation from your intended route or waypoint, expressed as a distance.



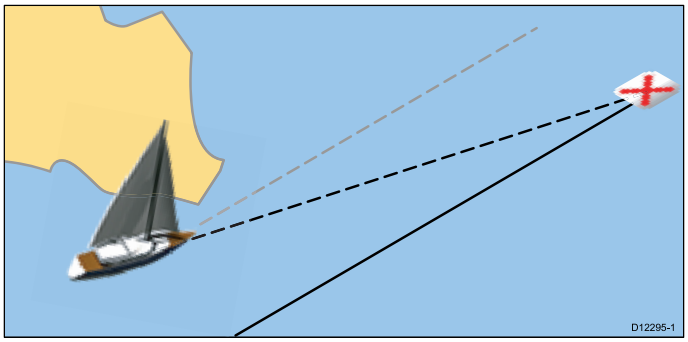
In the event that you steer off-track, you can go straight to your target by resetting XTE.

Resetting Cross Track Error (XTE)

While following a route in the chart application:

1. Select the route.
   The route context menu is displayed.
2. Select **Restart XTE**.

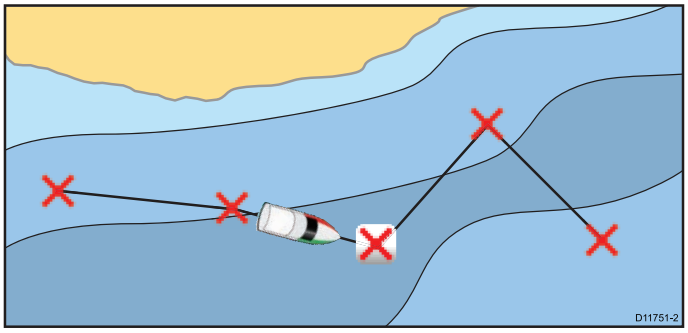
Resetting XTE results in a new course from the current vessel position to the current target waypoint. This does not affect your saved route.



You can also reset the XTE from the Navigate Menu: **Menu > Navigate > Restart XTE**.

Navigating a route

You can follow any route stored on the display. When following a route you visit each waypoint in order. You may also use the follow route options in conjunction with a compatible autopilot to automatically navigate along your chosen route.



There are a number of ways to select the follow route option:

- Using a stored route within the route list.
- From a selected waypoint or any leg within a route.

You can also follow any route in reverse order.

Following a stored route

With your mechanical drive engaged.

From the Chart application:

1. Select **Menu**.
2. Select **Navigate**.
3. Select **Follow Route**.
   The Route list is displayed.
4. Select the route you want to follow.
5. Select **Follow Route**, or
6. Select **Follow Route in Reverse** to follow the route in reverse order.

Cancelling navigation of a route

From the Chart application:

1. If required, disengage your mechanical drive
2. Select the Route onscreen.
   The route context menu is displayed.
3. Select **Stop Follow**.

Advancing to the next waypoint in a route

You can skip the current active waypoint and advance to the next waypoint in a route at any time.

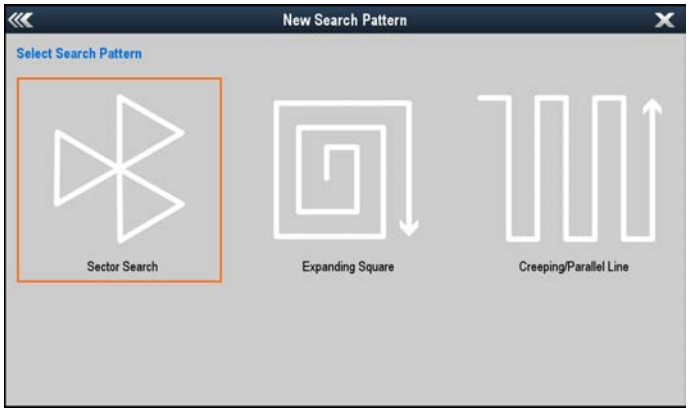
While following a route in the chart application:

1. Select the route.
   The route context menu is displayed.
2. Select **Advance Waypoint**.

Note: If the current destination is the last waypoint, the chart advances on to the first waypoint in the route.

14.7 SAR (Search and Rescue) Patterns

Attempting a search in the water is challenging, due to the vastness of the ocean, how difficult it is to spot something in the water and because of the effects of tide; the object you are searching for will not normally be in its last known location. Search patterns can be created by your MFD.



The Search Patterns available are:

- Sector Search
- Expanding Square
- Creeping/Parallel Line

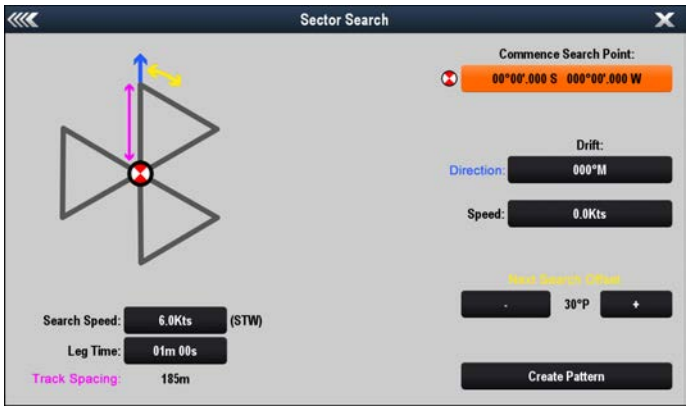
Once a search pattern is created it is saved as a Route and can be managed and navigated in the same manner as any other saved Route.

Note: Before attempting to follow a search pattern ensure that you have set the Waypoint Arrival Radius to the minimum value, otherwise the route navigated will not follow the search pattern.

Creating a Sector Search pattern

The Sector Search pattern is made up of 3 equal sized triangle sectors. Each of the triangle sectors is made up of 3 legs of equal time (The Track Spacing will change depending on whether you are with or against the drift).

Note: As the Search patterns take in to account drift, the resulting Route may not resemble the patterns shown.



To create a Sector Search pattern follow the steps below:

1. Select **Search Patterns** from the Navigate menu: (**Menu > Navigate > Search Patterns**).
2. Select **Sector Search**.

3. Select the **Commence Search Point** box.
4. Enter the latitude and longitude for the starting point of the search pattern.

   By default and after a power cycle the coordinates shall be set to zeros. If you have already created a search pattern then the last used Commence Search Point (CSP) position is displayed.

5. Enter the reported/observed drift **Direction** and **Speed** in the relevant boxes.
6. Select the **Search Speed** box and enter your search speed.

   Search Speed is the Speed Through the Water (STW).

7. Select the **Leg Time** box and enter the amount of time that each leg should take.

   The Track Spacing is automatically calculated from the specified Search Speed and Leg Time.

8. Select **New Search Offset** the '**-**' or '**+**' buttons to offset the bearing to the first waypoint.

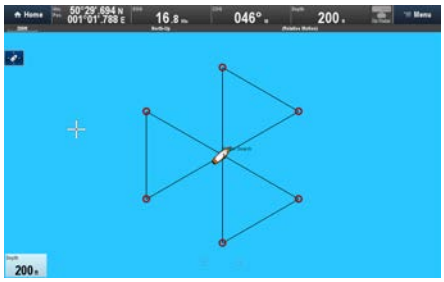
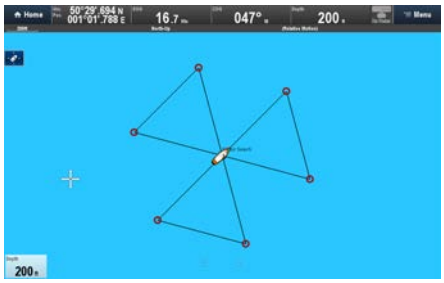
   The first waypoint after the CSP waypoint will always be towards the specified drift direction, this can be adjusted by applying an Offset.

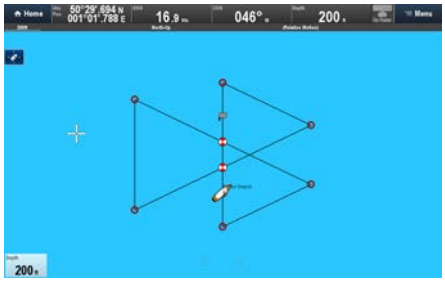
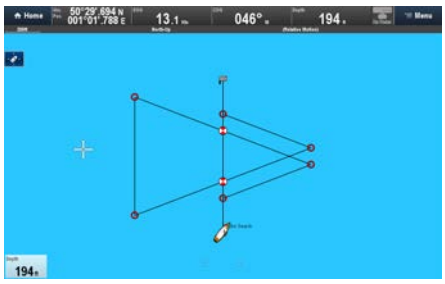
9. Double check your settings.
10. Select **Create Pattern**.

    The Pattern will now be created as a Route ready for you to follow.

Drift effects on Sector Search patterns

As the search patterns account for drift the resulting Route may not resemble the pattern shown above.

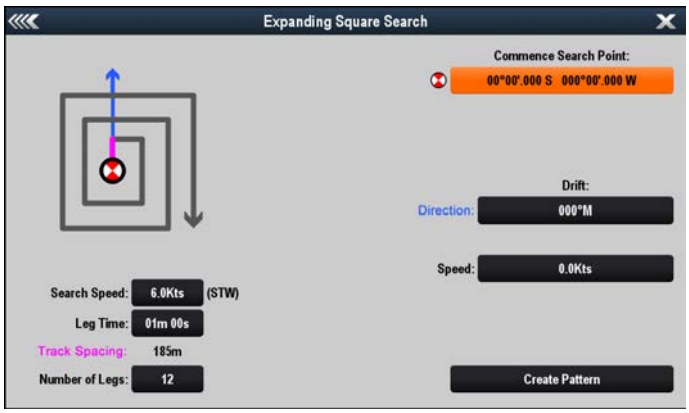
Example	Drift
	Direction: 0° Speed: 0 Kts
	Direction: 45° Speed: 0 Kts

Example	Drift
	Direction: 0° Speed: 0.5 Kts
	Direction: 0° Speed: 1 Kts

Creating an Expanding Square search pattern

The Expanding Square search pattern is outwards spiralling square pattern.

Note: As the Search patterns take in to account drift, the resulting Route may not resemble the patterns shown.



To create an Expanding Square search pattern follow the steps below:

1. Select **Search Patterns** from the Navigate menu: (**Menu > Navigate > Search Patterns**).
2. Select **Expanding Square**.
3. Select the **Commence Search Point** box.
4. Enter the latitude and longitude for the center starting point for the search pattern.

   By default and after a power cycle the coordinates shall be set to zeros. If you have already created a search pattern then the last used Commence Search Point (CSP) position is displayed.

5. Enter the reported tidal drift **Direction** and **Speed** in the relevant boxes.
6. Select the **Search Speed** box and enter your search speed.

   Search Speed is the Speed Through the Water (STW).

7. Select the **Leg Time** box and enter the amount of time that it should take to complete the first leg.

   The Track Spacing is calculated automatically using the specified Search Speed and Leg Time. Subsequent leg times are calculated automatically.

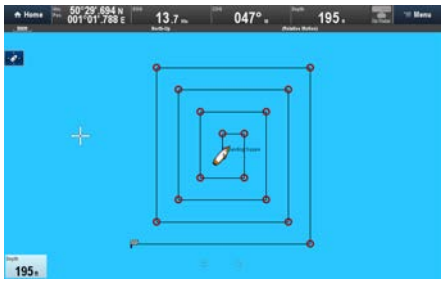
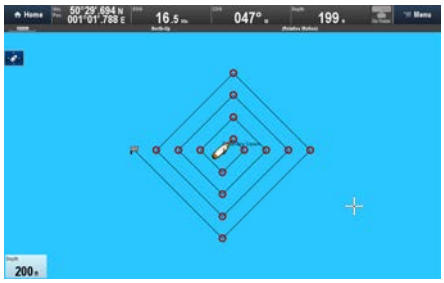
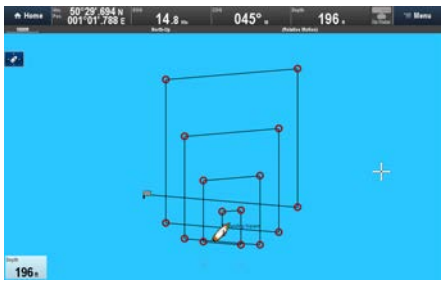
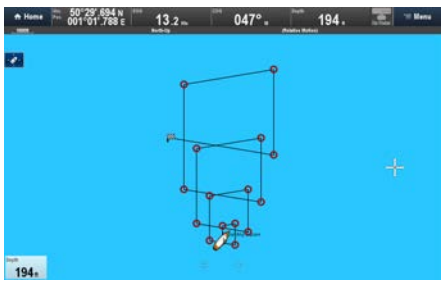
8. Select the **Number of Legs** box and enter the total number of legs for the pattern.
9. Double check your settings.
10. Select **Create Pattern**.

    The Pattern will now be created as a Route ready for you to follow.

Note: The first waypoint after the CSP waypoint will always be towards the specified drift direction.

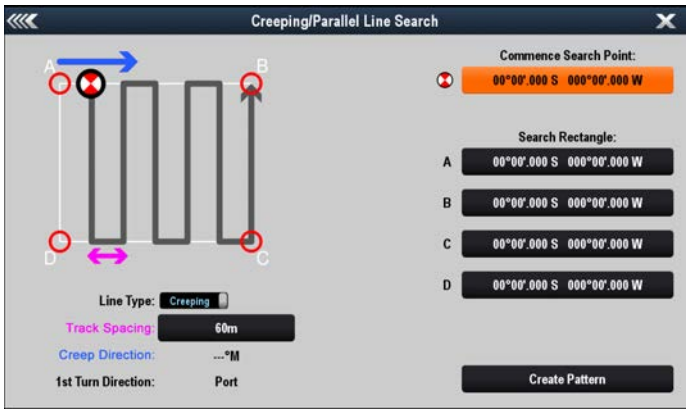
Drift effects on Expanding Square search patterns

As the search patterns account for tidal drift the resulting Route may not resemble the pattern shown above.

Example	Drift
	Direction: 0° Speed: 0 Kts
	Direction: 45° Speed: 0 Kts
	Direction: 0° Speed: 0.5 Kts
	Direction: 0° Speed: 1 Kts

Creating a Creeping / Parallel Line pattern

The Creeping / Parallel Line search pattern covers a rectangular area, the area is searched either by starting at one end of the search area (Creeping) which provides greater coverage of one end but will take time to cover the whole area, or by searching the area lengthways (Parallel) which provides reasonable coverage of the area quickly. The Creeping Line search should be used when there is a logical end of the search area to start your search from.



To create a Creeping / Parallel Line search pattern follow the steps below:

1. Select **Search Patterns** from the Navigate menu: (**Menu > Navigate > Search Patterns**).
2. Select **Creeping / Parallel Line Search**.
3. Select the **Commence Search Point** box.
4. Enter the latitude and longitude for the starting point of the search pattern.

   By default and after a power cycle the coordinates shall be set to zeros. If you have already created a search pattern then the last used Commence Search Point (CSP) position is displayed.

   The position of the CSP in relation to the coordinates for 'A' shall determine whether a Creeping Line or Parallel Line search pattern is created.

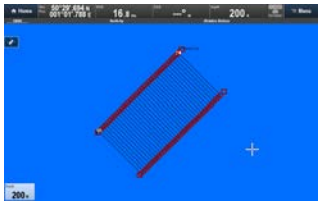
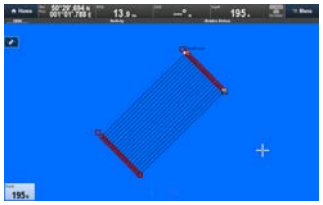
5. Enter the coordinates for the 4 corners of the search pattern labelled A, B, C and D.

   If the coordinates are suitable to create the search pattern then the Creep Direction is shown.

6. Select the **Track Spacing** box and enter the distance between each line.
7. Select the relevant **Line Type**.
8. Double check your settings.
9. Select **Create Pattern**.

   The Pattern will now be created as a Route ready for you to follow.

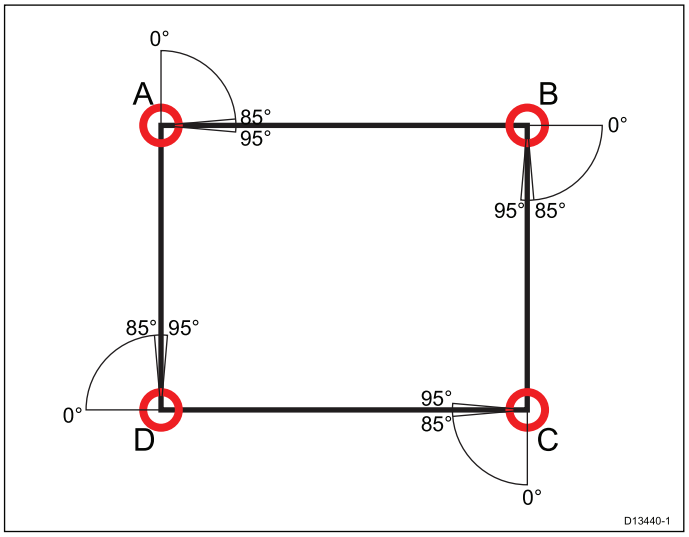
The table below shows both Creeping Line and Parallel Line search patterns which have been created using the same corner point coordinates.

Creeping Line	Parallel Line
	

Creeping / Parallel Line search pattern requirements

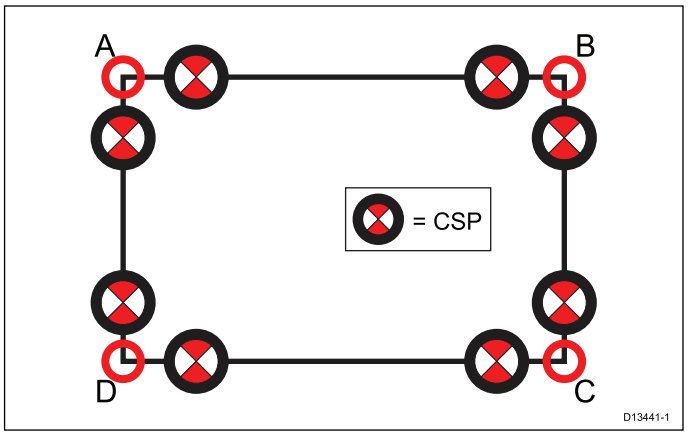
The use of the search patterns feature will usually be in conjunction with a coordinated Search and Rescue mission, whereby the Coastguard will issue the relevant details to enable creation of the search pattern. The guidance below will enable you to create your own Creeping or Parallel Line search pattern.

Corner points



- The corner points must be positioned to create a rectangular shape.
- Each corner must be between 85° to 95° (i.e. right angle ± 5°) of the adjacent corner point.
- Corner points cannot be located above 85° N latitude or below 85° S latitude (the area covered by the Chart application).

CSP



- The CSP must be on one of the sides of the search pattern.
- For a Creeping Line search pattern the CSP must be located along one of the longer sides.
- For a Parallel Line search pattern the CSP must be located along one of the shorter sides.
- The CSP must be on a bearing of between 85° to 95° (i.e. right angle ± 5°) from the previous side.
- The CSP should be half a track width from the corner point.

14.8 Collision Avoidance

The Radar and Chart applications include features to help increase your awareness for the potential for collisions.

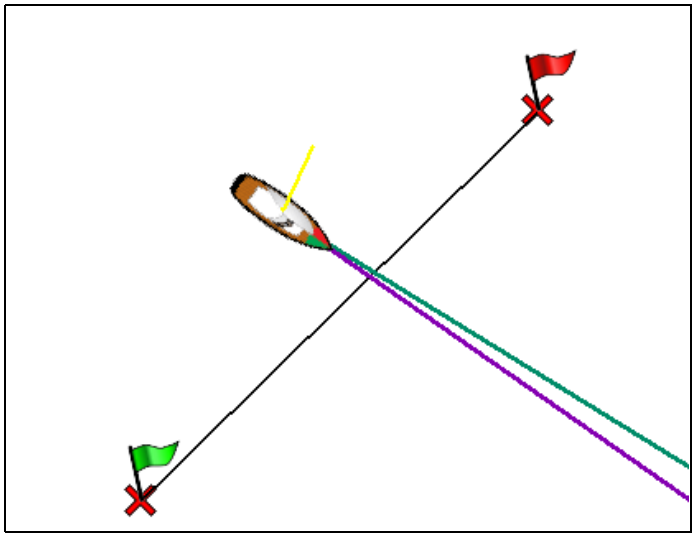
Collision Avoidance features include:

AIS	Vessels and aids equipped with AIS transmitters, that are within range can be displayed as targets. Refer to Chapter 12 **AIS (Automatic Identification System)** for details.	Chart and Radar applications
MARPA	MARPA (Mini Automatic Radar Plotting Aid) improves collision awareness by tracking acquired targets and calculating their speed and course to enable risk analysis. Refer to 16.9 **MARPA overview** for details.	Chart and Radar applications
Target Interception	The Target interception feature tracks AIS targets in relation to your own vessel's Course Over Ground (COG) and Speed Over Ground (SOG). The purpose of this feature is to help you determine if you need to change your speed and / or course to avoid danger. Refer to 12.9 **Collision Avoidance** for details.	Chart application
Guard Zone Alarm	The Guard Zone Alarm will warn you if Radar returns are detected within the specified Guard Zone limits. Refer to 16.12 **Setting up a Guard Zone Alarm** for details.	Radar application
Dangerous targets	AIS and acquired MARPA targets are considered dangerous if the target will get closer to your vessel than the specified Safe Distance within the specified Time to Safe Distance. Refer to 12.8 **Dangerous targets** for details.	Chart and Radar applications
VRM/EBL	The VRM/EBL feature can be used to assess how far away a Radar target is and its bearing. Refer to 16.15 **Distances, range, and bearing** for details.	Radar application
Trails	Trails (also known as wakes) show a history of the targets position over a specified time period. Refer to 16.13 **Trails** for details.	Radar application

14.9 Race Startline and Race Timer

Creating a Race Startline

A Race Startline can be created by placing port and starboard end points in the Chart application.



The end points can be created by:

- using existing waypoints
- entering the latitude and longitude for each end point
- pinging your vessels current location

From the Chart application menu:

1. Select **Navigate**.
2. Select **Racing**.
3. Select **Race Startline**.
4. Select **Define Port End**.
   - Select **Ping at Vessel Position** to create the end point at your vessels current location, or
   - Select **Select Waypoint** to choose a waypoint from the Waypoints list, or
   - Select **Enter Lat/Long** to enter the coordinates for the end point.
5. Select **Back** to return to the Race Startline menu.
6. Select **Define Starboard End**
   - Select **Ping at Vessel Position** to create the end point at your vessels current location, or
   - Select **Select Waypoint** to choose a waypoint from the Waypoints list, or
   - Select **Enter Lat/Long** to enter the coordinates for the end point.
7. Select **Back** to return to the Race Startline menu.
8. Ensure the **Startline:** option is set to **Show**.
9. If required you can swap the port and starboard end points by selecting **Swap Direction**.
10. The Race Startline can be removed at any time by selecting **Clear**.

Note: Local conditions, including the effects of tide and wind on committee vessels and startline should be taken into consideration when using the Race Startline feature.

Using the Race Timer

A count down Race Timer is available in the Chart application. Once the Race Timer reaches zero it will change color and start to count up, after 10 seconds the Race Timer will automatically be hidden from the screen but continue to count up.

From the Chart application's Navigate menu:

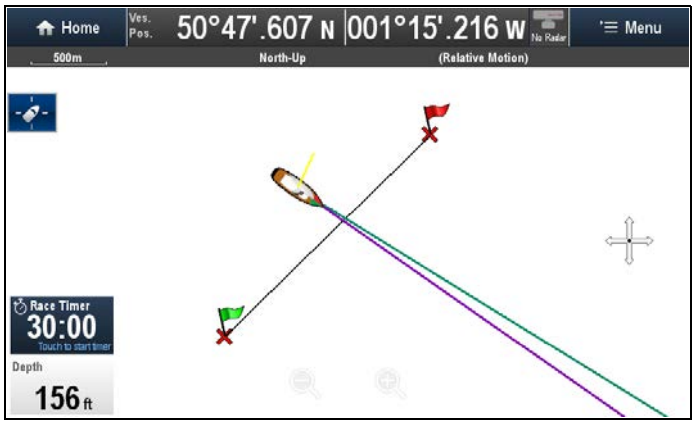
1. Select **Racing**.
2. Select **Race Timer**.
3. Select **Show Race Timer in Chart**.
4. Select **Countdown From:**.
5. Set the timer to the required value.

   The Race Timer can be set from 1 minute to 30 minutes.

6. Select **Back** to return to the Race Timer menu.
7. Select **Start** to start the Race Timer countdown.
   - You can synchronize the Race Timer count down by selecting **Skip to Next Minute**.
   - You can stop and reset the Race Timer by selecting **Stop & Reset**.
8. With the Race Timer count down stopped, you can hide the timer by selecting **Hide Race Timer**
9. With the Race Timer hidden you can display it again by selecting **Show Race Timer in Chart** from the menu.

Using the Race Timer — Touchscreen controls

The Race Timer can be controlled by interacting with the onscreen Race Timer.



From the Chart application, with the Race Timer displayed:

1. Touch the **Race Timer** to start the countdown.
2. With the timer running you can select the **Race Timer** to synchronize.
3. Touch and hold the **Race Timer** to stop and reset the countdown.

14.10 Vessel position on the chart display

Your current position is represented on-screen by the vessel symbol.

The vessel symbols are only displayed when heading or COG data is available.

The vessel symbol varies depending on selected settings and the availability of heading data.

	Motor Vessel	The motor vessel symbol is used when the vessel type selected during the initial set up wizard is a motor vessel.
	Sail Vessel	The sail vessel symbol is used when the vessel type selected during the initial set up wizard is a sail vessel.
	Small Vessel	The small vessel symbol is used when the **Boat Size** setting is set to Small.
	Black dot	A black dot is displayed when heading and COG data is not available.

Vessel position data can also be shown in the databar.

Locating your vessel

The vessel icon can be repositioned to the center of the screen by following the steps below.

1. Select the Find Ship icon:  located on the left hand side of the screen.

Locating your vessel

The vessel icon can be repositioned to the center of the screen by following the steps below.

1. Select **Menu**.
2. Select **Find Ship**.

14.11 Chart Orientation

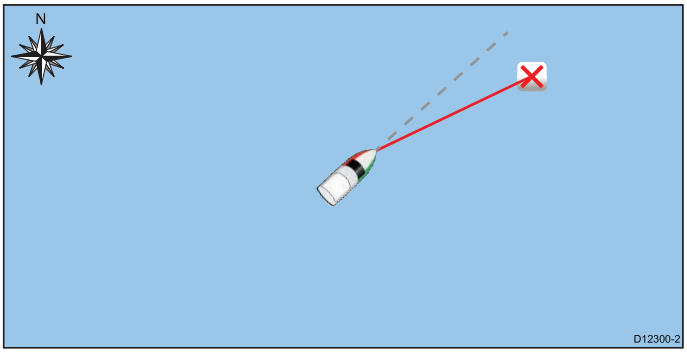
The orientation of a chart refers to the relationship between the chart and the direction that you are travelling in.

Chart Orientation is used in conjunction with Motion Mode to control how your vessel and chart relate to one another and how they are displayed on-screen.

The mode you choose applies to the active Chart instance, and is restored at power up.

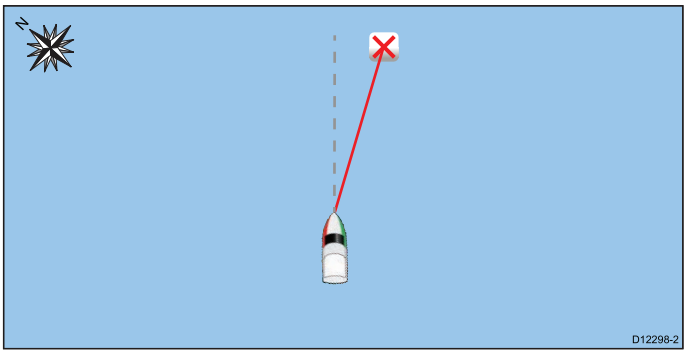
The following options are available:

North Up



In **North Up** mode, the **Chart Orientation** is fixed with true north pointing up this is the (usual orientation of nautical charts). As your heading changes the vessel symbol rotates accordingly. This is the default orientation for the Chart application.

Head Up

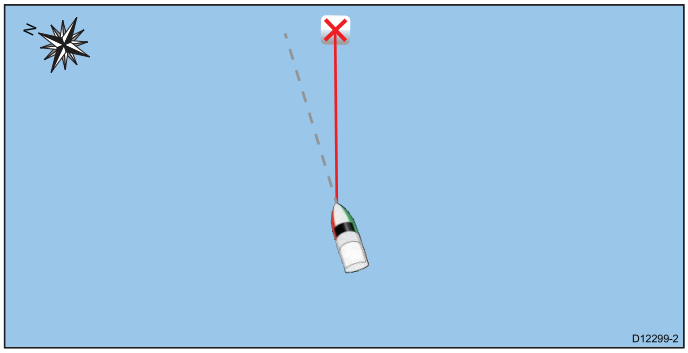


In **Head Up** mode, the Chart application displays the vessel's current Heading directly up. As the vessel Heading changes the vessel symbol remains fixed and the chart picture rotates accordingly. If Heading is not available then stable COG is used instead. If Heading or stable COG data is no longer present then the Orientation mode is suspended and the Chart application will display 0 degrees directly up if there is no active navigation or Course Up if there is active navigation.

Note: To prevent continuous backwards and forwards rotations as the vessel yaws from side-to-side, the chart will not update unless the heading changes by at least 10 degrees from the last displayed orientation.

Note: It is not possible to select **Head-Up** when the Motion Mode is set to True.

Course Up



In **Course Up** mode, during active navigation, the Chart application displays the vessel's current destination waypoint directly up. When the destination waypoint changes the chart picture rotates accordingly. The reference used for Course Up depends upon the information available at a given time. The system always prioritizes this information in the following order:

1. Bearing Origin to waypoint
2. Locked heading from an Autopilot
3. BTW (Bearing To Waypoint)
4. Heading snapshot
5. Stable COG
6. North Up

If Heading or stable COG data is no longer present then the Orientation mode is suspended and the Chart application will display 0 degrees directly up if there is no active navigation or Course Up if there is active navigation.

Setting the chart orientation

From the Chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **Chart Orientation**.
4. Select Head Up, North Up (default), or Course Up option as appropriate.

   Once selected the screen will update to reflect the new orientation.

14.12 Chart motion mode

The motion mode controls the relationship between the chart and your vessel.

Whilst motion mode is active, as your vessel moves, the chart is redrawn to keep the vessel on-screen. The 3 motion modes are:

- **Relative Motion (default)**
- **True Motion**
- **Auto Range**.

Note: In the 3D chart view, only Relative Motion mode is available.

The current motion mode applies to the active instance of the chart application.

When you pan the chart the motion mode is no longer active. This is indicated in the status bar by brackets around the motion mode — for example, (Relative Motion). This enables you to view another area of the chart whilst navigating. To reset the motion mode and return your vessel to the screen, select the **Find Ship** icon or select **Find Ship** from the menu. Manually changing the range or panning the chart in auto range also suspends motion mode. The default setting is relative motion with the boat icon positioned in the center of the screen. The mode that you select is restored at power up.

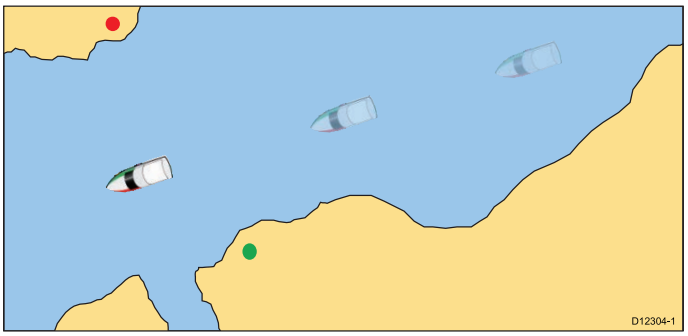
Boat positions (Relative Motion only)

Position	Example
Center	
Partial Offset	
Full Offset	

When the motion mode is set to Relative Motion, the position of your vessel is fixed on-screen and the chart picture moves relative to your vessel. You can use the **Menu > Presentation > View & Motion > Boat Position:** menu options to determine whether the vessel is fixed in the center of the window or

offset. If you change the position to Partial Offset or Full Offset, the view ahead of your vessel will be increased.

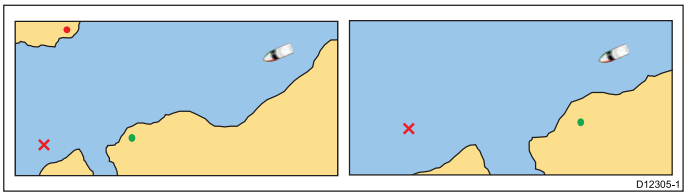
True Motion



When the motion mode is set to True Motion, the chart is fixed and the vessel moves in true perspective to fixed landmasses on-screen. As the vessel's position approaches the edge of the screen, the chart picture is automatically reset to reveal the area ahead of the vessel.

Note: It is not possible to select True Motion when the orientation is set to Head Up.

Auto Range



Auto Range selects and maintains the largest possible scale of chart that will display both the vessel and the target waypoint. Auto range is not available if radar-chart synchronization is on.

Setting the motion mode

To change the motion mode follow the steps below.

From the chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **Motion Mode:**.
4. Select True Motion, Relative Motion, or Auto Range option as appropriate.

Once selected the screen will update to reflect the new mode.

Changing the position of the boat icon

From the chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **Boat Position**.
4. Select **Center**, **Partial Offset**, or **Full Offset** as appropriate.

14.13 Multiple chart synchronization

You can synchronize the heading, range, and position information across multiple chart views and networked displays.

When chart synchronization is enabled:

- It is indicated by "CHRT Sync" in the chart application title bar.
- Any changes made to the heading, range or position in any chart instance will be reflected in all other chart instances.

Note: When the 2D and 3D chart views are synchronized, the Motion Mode is always Relative Motion.

Synchronizing multiple chart instances

From the Chart application's View & Motion menu: (**Menu > Presentation > View & Motion**)

1. Select **Chart Sync**.
2. Select Chart from the list.
   A tick is placed next to the selected option.
3. Repeat the steps above for each chart instance and if required on each networked MFD you want to sync the chart view.

Note: You cannot sync to another Chart if Radar sync is turned on.

14.14 Chart views

If supported by your cartography type, the Chart application can be set to either 2D or 3D view.

Selecting 2D and 3D chart views

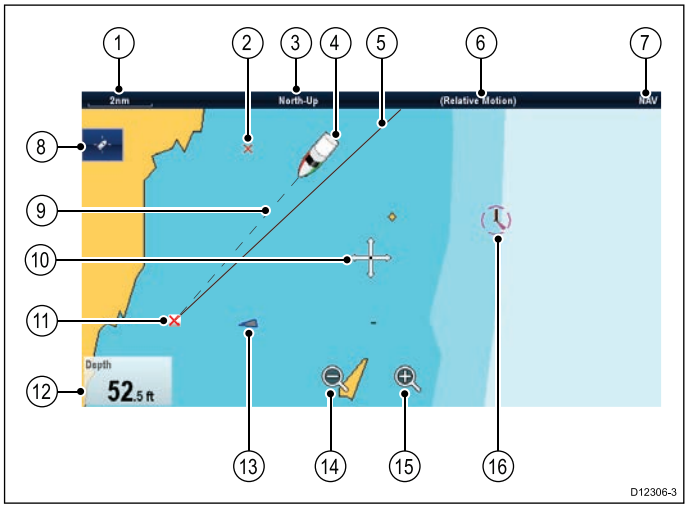
You can switch between 2D and 3D views in the chart application if supported by your cartography.

From the chart application menu:

1. Select **Presentation** .
2. Select **View & Motion**.
3. Select **Chart View** to select 2D or 3D.

2D chart view

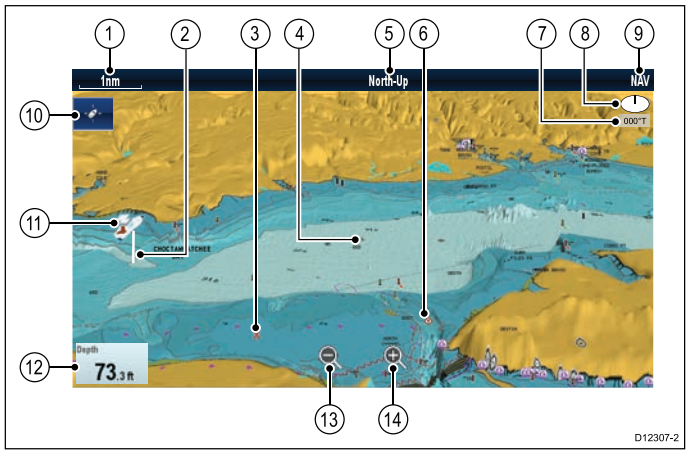
The 2D chart view can display a range of information to help you navigate.



Item	Description
1	**Range** — horizontal chart scale indicator (shown in selected system units).
2	**Waypoint** — inactive.
3	**Orientation** — states the orientation mode that the chart is using (North-up, Head-up, or Course-up).
4	**Vessel symbol**— shows your current position.
5	**Navigation origin line** — during navigation, shows a solid line from the starting point to the target waypoint. The starting point can be the vessel's original location, the point of XTE reset or the point the current leg of a route was initiated.
6	**Motion mode** — states the current motion mode (Relative, True, or Auto Range).
7	**Chart type** — indicates the type of chart in use — Fish or Navigation.
8	**Find ship icon** — used to find and center your vessel on the chart.
9	**Vessel position line** — during navigation, shows a dotted line from the vessel's current position to the target waypoint.
10	**Cursor** — used to select chart objects and move around the chart area.
11	**Target waypoint** — current target waypoint.
12	**Databoxes** — used to display data such as depth on the chart screen.
13	**AIS target** — a vessel broadcasting AIS information (optional).
14	**Range out** — select icon to range out (Touchscreen displays only).
15	**Range in** — select icon to range in (Touchscreen displays only).
16	**Cartographic objects** — level of cartographic objects is determined by the cartography type.

3D chart view

The 3D view can display a range of information to help you navigate.



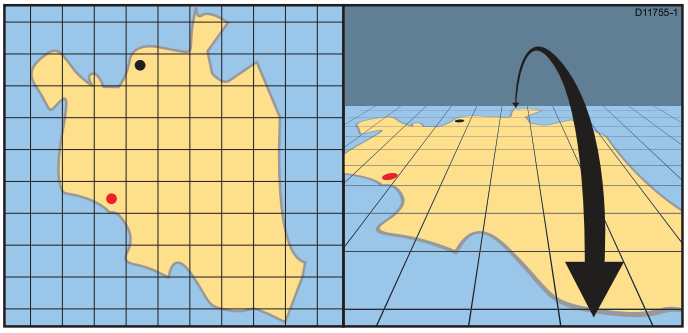
Item	Description
1	**Range** — horizontal chart scale indicator (shown in selected system units).
2	**Depth Scale** — approximate depth beneath your vessel (optional).
3	**Waypoint** — optional.
4	**Center-of-view** — the white cross indicates the center of chart view at the water level (optional).
5	**Orientation** — states the orientation mode that the chart is using.
6	**Cartographic objects** — use the Cartography Set-up menu to choose which objects to display.
7	**Rotation** — shows in degrees true, how far the on-screen view has been rotated from your vessel's heading and the tilt angle of your vessel.
8	**North arrow** – 3D indication of True North in relation to the chart view. The north arrow also tilts to indicate pitch angle.
9	**Chart type** — indicates the type of chart in use — Fish or Navigation.
10	**Find ship icon** — used to find and center your vessel on the chart.

Item	Description
11	**Vessel symbol** — your vessel's current position.
12	**Data overlay** — used to display data such as depth on the chart screen.
13	**Range out** — use icon to range out (Touchscreen displays only).
14	**Range in** — use icon to range in (Touchscreen displays only).

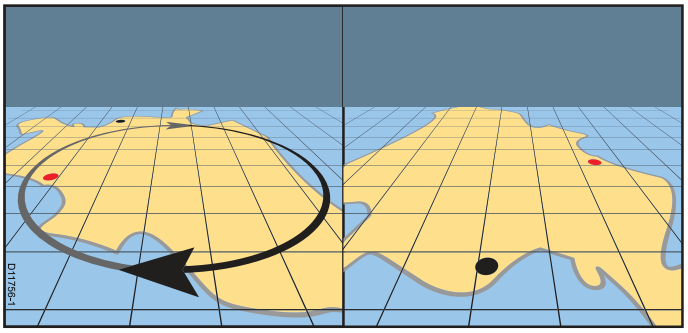
Manipulating the 3D chart view

From the chart application:

1. With the chart in 3D mode, go to the Adjust Viewing Angle menu: **Menu > Adjust Viewing Angle**.
2. Select **Adjust:** so that Pitch and rotate is highlighted.
3. To adjust the pitch:
   i. Non-touchscreen or HybridTouch displays — Move the **Joystick Up** or **Down** to adjust the pitch
   ii. HybridTouch or Touch only displays — Swipe your finger up or down across the screen to adjust the pitch.



4. To adjust the rotation:
   i. Non-touchscreen or HybridTouch displays — Move the **Joystick Left** or **Right** to adjust the rotation
   ii. HybridTouch or Touch only displays — Swipe your finger left or right across the screen to adjust the rotation.



3D Display Options

The following options are available with the Chart application in 3D view:

- **Center Of View** — Switches a cross hair on and off at the center of the screen at sea level.
- **Exaggeration** — Adjusting the exaggeration has the effect of vertically stretching objects on the chart, making it easier to see their shape and position.
- **Transducer Cone** — Switches on and off a cone symbol which indicates the coverage of your sonar transducer.
- **Depth Scale** — Switches on and off a depth scale at your vessel position.

Enabling center of view

In 3D view, to enable the center of view cross hair at sea level follow the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **3D Display Options**.
4. Select **Center of View** so that On is highlighted.
   Selecting centre of view will switch the cross hair on and off.

Adjusting the 3D exaggeration

In the 3D chart view.

From the Chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **3D Display Options**.
4. Select **Exaggeration:**.
   The Exaggeration numeric adjust control is displayed.
5. Adjust the numeric adjust control to the required setting, between 1.0 and 20.0
6. Select **OK** or **Back** to confirm the setting and close the numeric adjust control.

Enabling transducer cone

In 3D view, to enable the transducer cone which indicates the coverage of your Sonar transducer follow the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **3D Display Options**.
4. Select **Transducer Cone** so that On is highlighted.
   Selecting Transducer cone will switch the function on and off.

Enabling depth scale

In 3D view, to enable a depth indicator at your vessel's location follow the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **View & Motion**.
3. Select **3D Display Options**.
4. Select **Depth Scale:** so that On is highlighted.
   Selecting depth scale will switch depth indicator on and off.

Enabling and disabling Easy View

Easy View is available when using **Navionics®** cartography. Easy View magnifies useful icons and text to make the screen easier to read.

From the **View & Motion** menu: **Menu > Presentation > View & Motion**.

1. Select **Easy View** so that On is selected.
2. Easy View can be disabled by selecting Off.

Increasing Text and symbol size

The size that symbols and text appear when using **C-MAP®** cartography can be adjusted to make the screen easier to read.

From the **View & Motion** menu: **Menu > Presentation > View & Motion**.

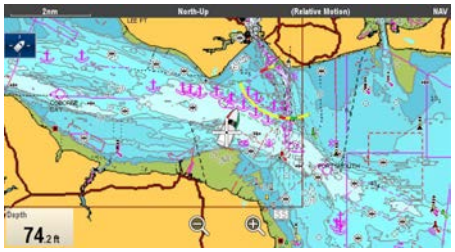
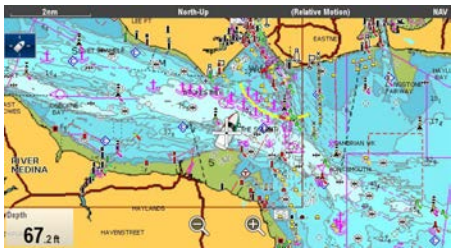
1. Select **Text/Symbol Size** so that Large is selected.
2. The text and symbol size can be changed back to normal by selecting Normal.

14.15 Chart display

The Chart Display menu option determines the level of detail that is displayed on-screen.

The Chart display menu option is only available when using vector based cartography.

The Chart display options are shown below.

Simple	
Detailed	
Extra Detailed	

The level of detail shown on-screen is also affected by the cartography **Chart detail** settings. Refer to **Chart detail** for information.

Changing the chart display detail

From the Chart application menu:

1. Select **Presentation**.
2. Select **Chart Detail**.
   The following options are available:
   - Simple
   - Detailed
   - Extra Detailed
3. Select the required option.

14.16 Overlays

Various overlays are available to aid navigation and increase situational awareness.

Note: The table below identifies the overlays supported by each cartography vendor. However, the overlay may not be supported by all levels of cartography supplied by that vendor. Please check with your cartography vendor for supported features.

Overlay	Description	LightHouse	Navionics®	C-MAP®
AIS	Switch AIS targets on or off. This feature requires additional hardware and is not available in 3D view.	✓	✓	✓
Radar	Switches the Radar overlay on or off. This option requires additional hardware and is not available in 3D view.	✓	✓	✓
Aerial	Provides an aerial / satellite image overlay with transparency setting.	✗	✓	✓
Aerial Overlay:	When **Aerial** is switched on, this feature determines the coverage of the aerial overlay.	✗	✓	✗
Relief Shading	Overlays shading to indicate the depth and altitude of terrain	✗	✗	✓
NOWRad	Provides the NOWRad weather overlay. This option requires additional hardware and a service subscription. This overlay is not available in 3D view.	✓	✓	✓
Databoxes	Choose whether databoxes are displayed onscreen and select which data is displayed.	✓	✓	✓
ActiveCaptain VAD	Enables ActiveCaptain community sourced content on compatible C-Map cartography.	✗	✗	✓
Chart Grid	Determines whether lines of longitude and latitude are displayed. This overlay is not available in 3D view.	✓	✓	✓
2D Shading	Determines whether terrain shading is displayed in 2D view.	✗	✓	✗
Community Edits	Determines whether the community layer is enabled or disabled.	✗	✓	✗
Chart Text	Determines whether chart text is displayed (place names and so on).	✓	✓	✓
Chart Boundaries	Determines whether a line indicating the chart boundary is displayed.	✓	✓	✓
Range Rings	View range rings in the Chart application. This overlay is not available in 3D view.	✓	✓	✓
Fuel Range Ring	View the fuel range ring. This overlay is not available in 3D view.	✓	✓	✓
Boat Size	Determines the size of the boat icon.	✓	✓	✓
Waypoint Name	Determines whether the Waypoint names are displayed next to waypoints.	✓	✓	✓
Route Width	Determines the width of route lines. This overlay is not available in 3D view.	✓	✓	✓
Track Width	Determines the width of track lines. This overlay is not available in 3D view.	✓	✓	✓

Enabling AIS in the Chart application

To enable the AIS overlay in the Chart application follow the steps below.

To enable the AIS overlay your system must include an AIS receiver or transceiver. The AIS overlay is not available in 3D view.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.

3. Select **AIS:** so that On is selected.
   Selecting AIS: switches the AIS between On and Off.

For AIS information refer to Chapter 12 **AIS (Automatic Identification System)**.

Radar overlay

You can overlay Radar and MARPA functions in the Chart application to provide target tracking or to help you distinguish between fixed objects and other marine traffic.

You can enhance the use of the Chart application by combining it with the following Radar features:

- **MARPA** — The Mini Automatic Radar Plotting Aid (MARPA) function is used for target tracking and risk analysis. MARPA targets are only available in the Chart application when Heading data is available. When MARPA targets are being tracked they are displayed in the Chart application regardless of whether Radar overlay is switched On. Associated MARPA functions can be accessed using the menu.
- **Radar overlay** — You can overlay the Radar image over your Chart image allowing better distinction between fixed objects and other marine traffic. For best results, switch on Radar-Chart synchronization to ensure radar range and chart scale are synchronized.



Radar overlay using Heading

Radar overlay requires the use of Heading data from a connected:

- Evolution autopilot sensor (such as the EV-1 or EV-2, or
- Fluxgate compass

With Heading data available both Radar overlay and MARPA targets can be displayed in the Chart application.

The system will always use Heading for the overlay when it is available.

When the Radar overlay is using Heading then ‘OVL’ is displayed in the top left corner of the Chart application.

Radar overlay using stable COG

Radar overlay can be set to use COG when Heading data is not available or is lost. In order to use COG for the overlay it must be stable i.e. there must be sufficient SOG.

When using COG for the overlay MARPA targets are not available.

If Heading data becomes available then the overlay will automatically switch back to using Heading instead.

When the Radar overlay is using COG then ‘OVL-COG’ is displayed in the top left corner of the Chart application.

Note: When the overlay is using COG, misalignment of the Radar and Chart images can occur due to tide and current effects.

Enabling Radar overlay

With a connected Radar turned On and Transmitting, from the Overlays menu: (**Menu > Presentation > Overlays**)

1. Select **Radar** so that On is selected.
   The **Radar Overlay Settings** menu option will appear in the Overlays menu.
2. Select **Radar Overlay Settings**.
3. Select **Overlay**.
4. Adjust the Overlay‘s Opacity to the required level.

Note: Radar overlay is not available in 3D view.

Using COG for the Radar overlay

COG can be used for the Radar overlay when Heading data is not available or is lost.

From the Chart application’s Overlays menu: (**Menu > Presentation > Overlays**)

1. Select **Radar w/o Hdg:** so that On is highlighted.
   The Radar overlay is now set to automatically switch to use COG data if Heading data is not available or is lost. If Heading data subsequently becomes available again the system will automatically change back to using Heading data. An alert message will be displayed when switching to COG.

Note: When the overlay is using COG, misalignment of the Radar and Chart images can occur due to tide and current effects.

Accessing Radar controls from the Chart application

From the Chart application:

1. Select **Menu**.
2. Select **Radar** or **Radar & AIS**.

Note: Any changes made to the Radar options from the Chart application will be applied to the Radar application.

Chart scale and radar range synchronization

You can synchronize the radar range in all radar windows with the chart scale.

When synchronization is switched on:

- The radar range in all radar windows changes to match the chart scale.
- ‘Sync’ is indicated in the top left-hand corner of the chart window.

- If you change the radar range, in any radar window, all synchronized chart views change scale to match.
- If you change the scale of a synchronized chart window, all radar windows change range to match.

Synchronizing the chart and radar range

In the 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **View & Motion**
4. Select **Chart Sync**.
5. Select **Radar**.

Note: Radar range synchronization is not available when the chart motion mode is set to Auto Range.

Aerial photo overlay

Your electronic charts may include aerial photography.



Aerial photos cover the navigable waters up to 3 miles inside the coastline. The resolution is dependent on the region covered by the chart card.

Enabling aerial photo overlay

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Overlays**.
4. Select **Aerial**.

   The aerial opacity slider bar control is displayed showing the current opacity percentage.
5. Adjust the slider bar to the required opacity, or
6. Select **Off** to turn the aerial overlay off.

Specifying the aerial overlay area

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Aerial Overlay:**.

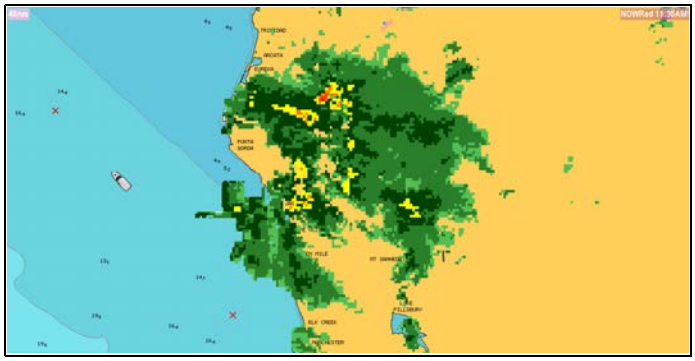
   A list of overlay options is displayed.
4. Select either On Land, On Land and Shallows, or On Land and Sea.

   The chart display is redrawn showing the new overlay selection.

NOWRad weather overlay

With a suitable weather receiver connected to your multifunction display, you can overlay NOWRad weather information on the chart display.

The NOWRad weather overlay provides NOWRad weather information and reports in the chart application. You can adjust the intensity of the overlay to achieve optimal visibility of both chart and weather information.



Note: The NOWRad weather overlay can only be used in North America and its coastal waters.

Enabling NOWRad weather overlay on the chart

In the 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Overlays**.
4. Select **NOWRad**.

   The NOWRad opacity slider bar control is displayed showing the current opacity percentage.
5. Adjust the slider bar to the required opacity, or
6. Select **Off** to turn the NOWRad overlay off.

Viewing weather reports from the chart application

In the 2D chart view:

1. Select **Menu**.
2. Select **Weather Reports**.
3. Select **Report At** to switch between weather reports from Ship or Cursor location.
4. Select either Tropical Statements, Marine Warnings, Marine Zone Forecasts, or Watchbox Warnings.

Databoxes

Databoxes can be displayed in the application window.

The databoxes can be switched on and off and the data that is displayed can be customized.



Customizing databoxes in the chart application

To switch databoxes on and off and to select data to display follow the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlay**.
3. Select **Databoxes**.
4. Select **Databox 1 > On**.
5. Select **Databox 2 > On**.
6. Choose the **Select Data** option for the relevant databox.
7. Select the category that reflects the type of data you want to display in the databox. For example, Depth data.
8. Select the data item.

   The data you selected is displayed onscreen in the appropriate databox.

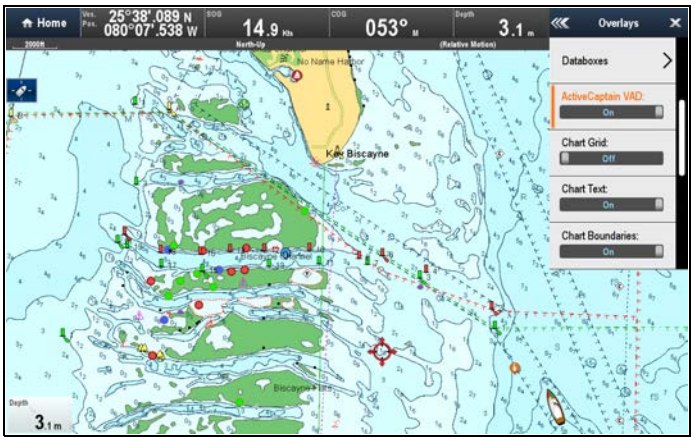
Active Captain

The **ActiveCaptain** setting allows you to view **ActiveCaptain**™community sourced content available on compatible C-Map cartography.

The following C-Map cartography is compatible with ActiveCaptain:

- C-Map 4D MAX
- C-Map 4D MAX+

The chart cards may come pre-programmed with ActiveCaptain content or existing chart cards can be updated on the C-MAP web store.



Icon	Type of content	Icon	Type of content
	Airport		Inlet
	Anchorage		Local Knowledge
	Boat ramp		Lock
	Bridge		Marina
	Dam		Marine Store
	Ferry		Shop
	Hazard		Towing

Enabling ActiveCaptain

To enable ActiveCaptain content on your compatible C-Map cartography follow the steps below.

From the Overlays menu (**Menu > Presentation > Overlays**):

1. Select **ActiveCaptain VAD:** so that On is displayed.

   The ActiveCaptain icons will now be displayed in the Chart application.

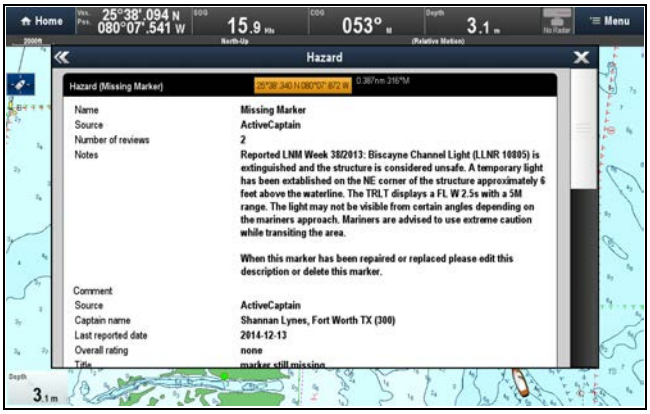
Viewing ActiveCaptain content

With **ActiveCaptain** enabled you can view details about community sourced content.

From the Chart application:

1. Select an **ActiveCaptain** icon and open the context menu.
2. Select **Chart Objects**.
3. Select the relevant object from the Chart Objects list.

   Details about the object are displayed:



   The Source will be ActiveCaptain.
4. Selecting the object's lat/long field will close the details page and centre the object on the Chart screen.

Chart grid

You can overlay a grid onto the Chart application

The Chart grid represents the lines of latitude and longitude.



By default the Chart grid is switched off.

Switching the chart grid on and off

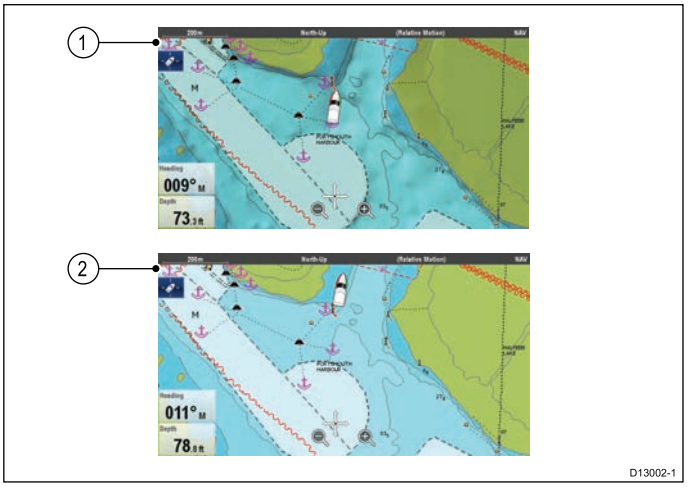
The Chart grid can be switched on and off by following the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Chart Grid:** so that On is selected to turn the grid on, or
4. Select **Chart Grid:** so that Off is selected to turn the grid off.

2D shading

If supported by your cartography type, you can switch shading of land and sea contours on and off.



1. 2D shading On.
2. 2D shading Off

By default 2D shading is switched on.

Switching 2D shading on and off

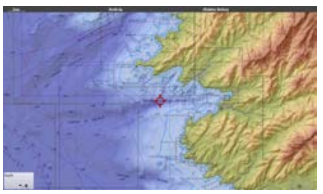
2D shading can be switched on and off by following the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **2D Shading:** so that On is selected to turn the shading on, or
4. Select **2D Shading:** so that Off is selected to turn the shading off.

Relief shading

Relief shading is available when using **C-MAP®** cartography and provides an overlay that indicates the depth and altitude of terrain.



Relief shading On



Relief Shading Off

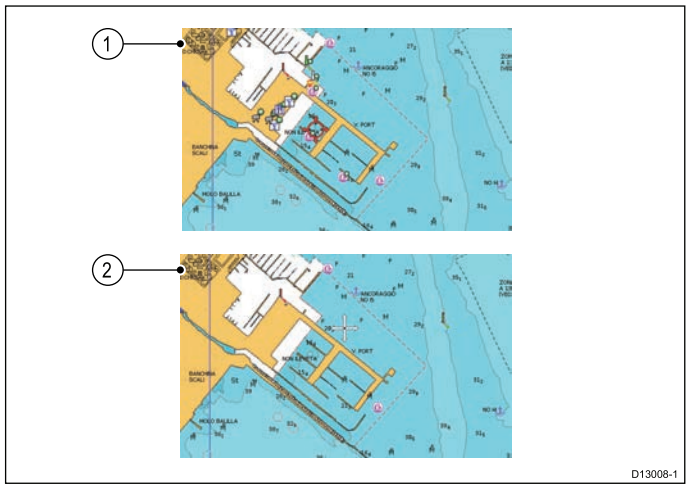
Switching relief shading on and off

From the **Overlays** menu: **Menu > Presentation > Overlays**.

1. Select **Relief Shading:** so that On is selected to turn the shading on, or
2. Select **Relief Shading:** so that Off is selected to turn the shading off.

Community layer

If supported by your cartography type, you can display User Generated Content (UGC) on the Chart application.



1. Community feature On.
2. Community feature Off.

Switching the community edits on and off

If supported by your cartography type, the User Generated Content (UGC) overlay can be switched on and off by following the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Community Edits:** so that On is selected to display UGC, or
4. Select **Community Edits:** so that Off is selected to turn off UGC.

Chart text

If supported by your cartography type, chart text such as place names and caution text etc. can be switched on and off.



1. Chart text On.
2. Chart text Off.

The default setting for Chart text is On.

Switching chart text on and off

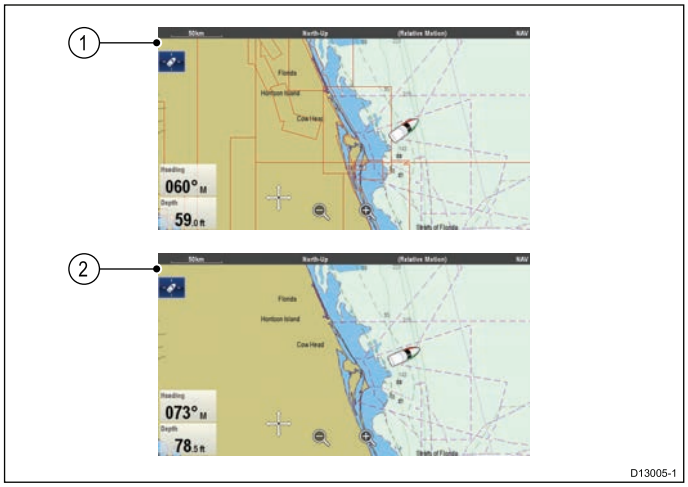
The Chart text can be switched on and off by following the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Chart Text:** so that On is selected to turn chart text on, or
4. Select **Chart Text:** so that Off is selected to turn chart text off.

Chart boundaries

Chart boundary lines can be shown on-screen, these lines indicate the boundary of the cartography currently in use.



1. Chart boundaries On.
2. Chart boundaries Off.

By default Chart boundary lines are switched On.

Switching chart boundary lines on and off

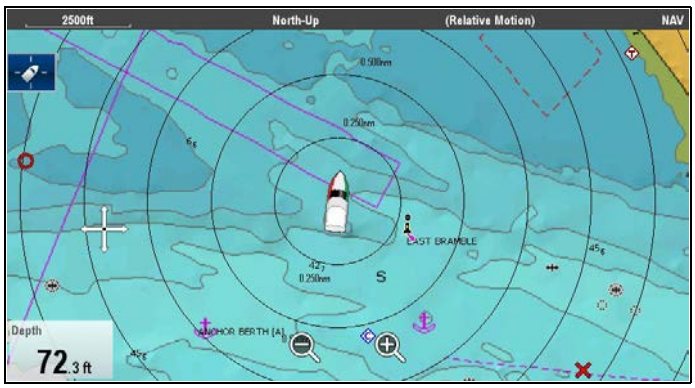
Chart boundary lines can be switched on and off by following the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Chart Boundaries:** so that On is selected to display boundary lines, or
4. Select **Chart Boundaries:** so that Off is selected to turn the boundary lines off.

Range rings

Range rings provide an on-screen incremental representation of distance from your vessel to help you judge distances at a glance.



The rings are always centred on your vessel, and the scale varies to suit your current chart range. Each ring is labelled with the distance from your vessel.

By default range rings are switched off. Range rings are not displayed in 3D view.

Switching range rings on and off

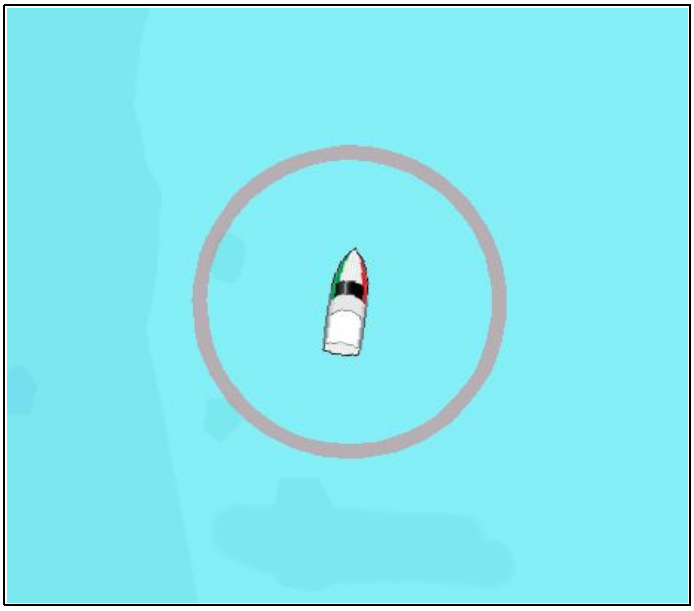
The range rings can be switched on and off by following the steps below.

With the Chart application in 2D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Overlays**.
4. Select **Range Rings:** so that On is selected to display Range Rings, or
5. Select **Range Rings:** so that Off is selected to turn the Range Rings off.

Fuel range rings

The fuel range ring gives an estimated range that can be reached with the estimated fuel remaining on-board.



The fuel range ring can be displayed graphically in the chart application and indicates an estimated range that can be reached with the:

- Current rate of fuel consumption.
- Estimated fuel remaining on-board.
- Course remaining in a straight line.
- Current speed maintained.

Note:

The fuel range ring is an estimated range that can be reached at the current rate of fuel consumption, of the fuel onboard and based on a number of external factors which could either extend or shorten the projected range.

This estimate is based on data received from external fuel management devices, or via the Fuel Manager. It does not take into account prevailing conditions such as tide, current, sea state, wind etc.

You should not rely on the fuel range ring feature for accurate voyage planning or in emergency and safety critical situations.

Enabling the fuel range ring

From the chart application, in 2D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Overlays**.
4. Select **Fuel Range Ring** so that On is selected.
   The fuel range ring pop-up message is displayed.
5. Select **OK** to turn on the fuel range rings.

Disabling the Fuel Range Ring

From the chart application, in 2D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Overlays**.
4. Select **Fuel Range Ring** so that Off is selected.

Changing the size of the vessel symbol

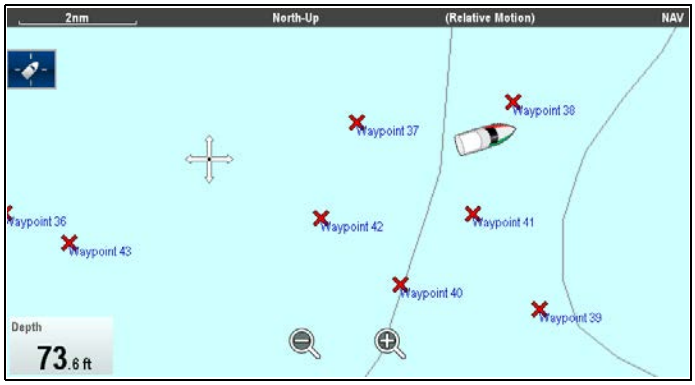
The vessel symbol size can be changed following the steps below.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Boat Size:** so that Large is selected to show the large vessel symbols, or
4. Select **Boat Size:** so that Small is selected to show the small vessel symbol.

Displaying waypoint names

Waypoint names can be shown next to their respective waypoint symbols.

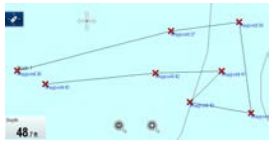
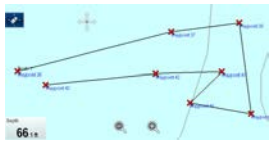
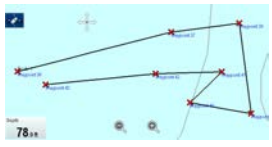


From the Chart application menu.

1. Select **Presentation**.
2. Select **Overlays**.
3. Select **Waypoint Name:** so that Show is selected to display the waypoint names, or
4. Select **Waypoint Name:** so that Hide is selected to hide the waypoint names.

Route and Track widths

The width of route and track lines can be changed.

Set-ting	Route	Track
Thin		
Nor-mal		
Thick		

Changing route or track line widths

The width of the line that make up routes and tracks can be changed by following the steps below.

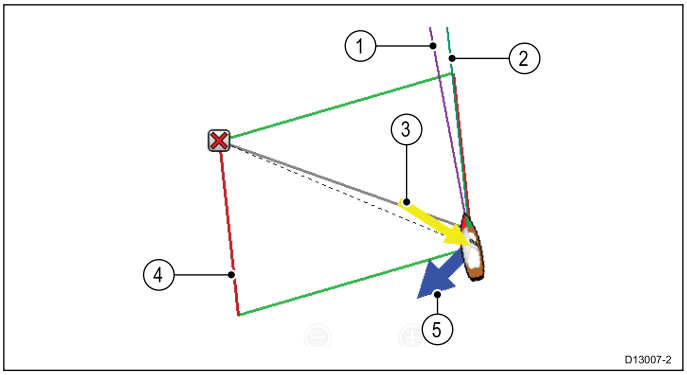
From the Chart application menu.

1. Select **Presentation**.
2. Select **Overlays**.

3. Select either **Route Width** or **Track Width** as required.
4. Select the width you require from the list.

14.17 Chart vectors

Chart vectors can be displayed in 2D view.



Item	Descriptions
1	**Heading vector** — a purple line shows the vessel's current heading.
2	**COG vector** — a dark green line indicates the vessel's actual Course Over Ground.
3	**Wind arrow** — wind direction is displayed as a yellow line with solid arrow heads pointing towards your vessel, indicating the wind direction. The width of the arrow indicates the wind strength.
4	**Laylines** — show the most efficient way for a sailing vessel to reach its destination, given present wind conditions.
5	**Tide arrow** — tide is displayed as a blue line with solid arrow head pointing away from your vessel, in the direction of the tidal set. The width of the arrow indicates the tide strength.

Note:

- If Speed Over Ground (SOG) or heading data is not available, vectors cannot be displayed.
- Laylines are only shown when the **Boat Type** setting is set to a sailing vessel.

Vector length

The length of the Heading and COG vector lines can be set to the distance your vessel will travel in the time you specify at your current speed or they can be set to infinite.

Enabling and disabling chart vectors

You can enable and disable the available chart vectors by following the steps below.

In 2D chart view:

From the Chart application menu:

1. Select **Presentation**.
2. Select **Vectors**.
3. Select the relevant menu item to switch **Heading Vector**, **COG Vector**, **Tide Arrow**, or **Wind Arrow** On or Off as appropriate.

Setting vector length and width

You can specify the length and width of the heading and COG vectors by following the steps below.

In 2D chart view.

From the Chart application menu:

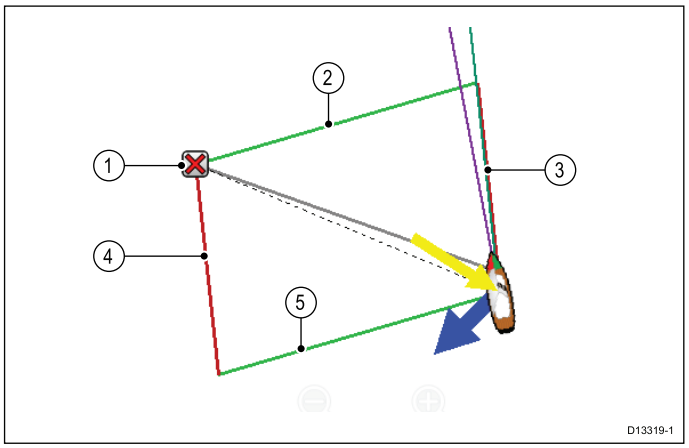
1. Select **Presentation**.
2. Select **Vectors**.
3. Select **Vector Length**.
   A list of times is displayed .
4. Select a time setting or select Infinite.
5. Select **Vector Width**.
   A list of widths is displayed.
6. Select either Thin, Normal or Wide.

14.18 Laylines

Laylines are used in sailing to show how far the vessel must sail on the current tack in order to make the target waypoint after tacking, given present wind conditions. Laylines are based on the True Wind Direction (TWD) and fixed or polar upwind and downwind sailing angles. Sailing along laylines maximizes your Velocity Made Good (VMG) to windward.

Laylines are displayed under the following conditions:

- The **Boat Type** setting is set to one of the available sailing vessels
- The vessel is under active navigation towards a waypoint
- The layline path to the destination point is less than 150 nm
- The angle between port and starboard laylines is less than 170°



1. Destination
2. Starboard destination layline
3. Port vessel layline
4. Port destination layline
5. Starboard vessel layline

Laylines appear differently depending on destination point and vessel position in relation to the wind. When the destination point is upwind the layline parallelogram is displayed as shown above. Once your vessel has passed the destination point (and you are ready to tack) only 2 sides of the parallelogram will be shown. If the destination point is downwind then only the vessel laylines are displayed in the same color, this indicates the best angle to sail.

Laylines types

There are 3 types of laylines:

- **Mirrored TWA** (True Wind Angle) — the vectors use current TWA data to create laylines to an upwind destination point, these are mirrored on the opposite side of the wind. This option shows the current course on the opposite tack.
- **Fixed Angles** — the vectors are created based on specified Upwind and Downwind angles. These angles are set by default to 45° and 165° respectively and can be configured in the menu.
- **Polars** — the vectors use an imported polar table for your vessel to create the laylines.

Laylines - Leeway calculations

The Laylines features uses calculations based on the selected boat type to work out leeway.

Boat Type	< 5 knots	5 to 18 knots	> 18 knots
Race Sail	3°	up to 5°	5°
Sail Cruiser	3°	5° to 10°	5°
Catamaran	3°	10° to 20°	5°

If your hull behaves differently than expected try changing the **Boat Type** setting.

Enabling and disabling laylines

With the **Boat Type** setting set to either, **Sail Cruiser**, **Race Sail** or **Catamaran** Laylines can be enabled and disabled.

From the Chart application menu:

1. Select **Presentation**.
2. Select **Vectors**.
3. Select **Laylines** so that On is highlighted to enable laylines, or
4. Select **Laylines** so that Off is highlighted to disable laylines.

Changing layline type

From the Chart application's Vectors menu:

1. Select **Laylines Set-up**.
2. Select **Laylines Type**.
3. Select the type of Laylines you want to use.

*The **Polars** option is only enabled when a Polar table has been imported.*

Adjusting laylines for tidal flow

An option is available to automatically adjust the laylines to take into account tidal flow.

From the **Laylines Set-up** menu:

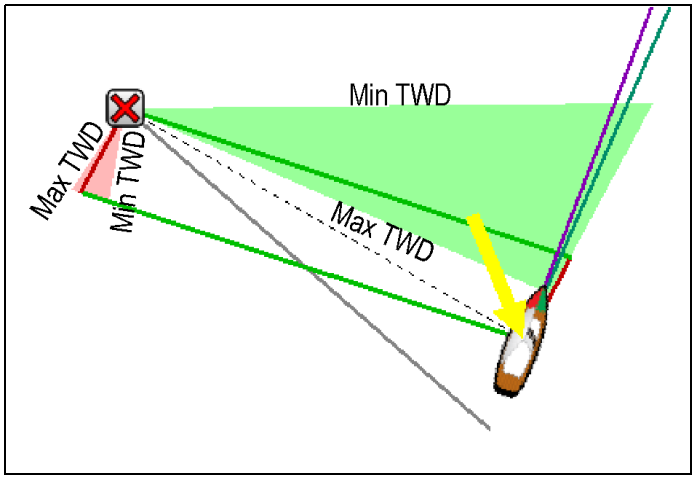
1. Select **Adjust for Tides** so that On is highlighted.

Displaying historical layline data

As True Wind Direction (TWD) is constantly changing, the position of the Laylines change over time. These changes are shown as lighter colored shaded triangles which represent the minimum and maximum TWD over the a specified time period.

Tip In the Diagram below:

- With TWD holding at its Maximum value the vessel can Tack to starboard and will lay the waypoint as it enters the shaded area. However if TWD shifts back towards its Minimum value the vessel will fall short of the layline and may have to perform extra Tacks to reach the waypoint.
- With TWD holding at its Minimum value the vessel can Tack to starboard and will only lay the waypoint when it reaches the end of the shaded area. However if TWD shifts back towards its Maximum value the vessel will overlay and may travel farther to reach the waypoint.
- Depending on the situation , the normal course of action would be to Tack when the vessel is halfway through the shaded area. However this may not be the shortest or quickest method.



To display historical layline data:

1. Select **Laylines Set-up** from the **Laylines** menu.
2. Select **Min & Max Laylines:**.
3. Select the time period that you want the historical data to cover.

Historical Laylines can be reset at any time by selecting **Reset Min & Max Laylines** from the **Laylines Set-up** menu.

14.19 Polar tables

Polar coordinate tables for your vessel can be imported in .csv format. The layout of the .csv file must adhere to the layout detailed below.

Spreadsheet programs such as Microsoft Excel can be used to .csv files.

The following table layout constraints apply:

Column 1

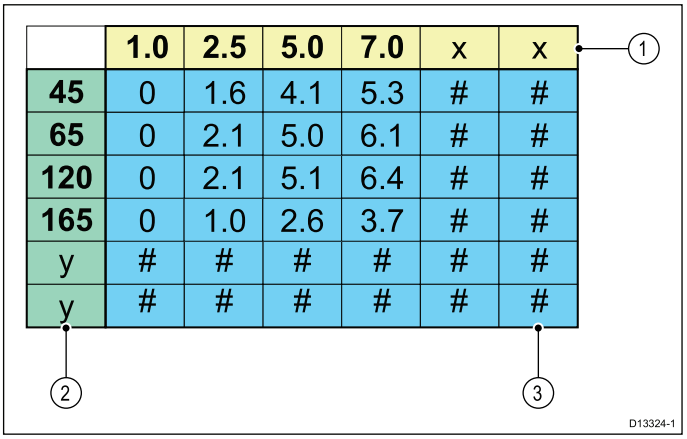
- The first cell is ignored
- Column 1 must contain the relevant TWA angles
- A minimum of 3 TWA angles are required

Rows

- The first cell is ignored
- Row 1 must contain the relevant TWS values in knots
- A minimum of 3 TWS values are required

Example table layout

	1.0	2.5	5.0	7.0	x	x
45	0	1.6	4.1	5.3	#	#
65	0	2.1	5.0	6.1	#	#
120	0	2.1	5.1	6.4	#	#
165	0	1.0	2.6	3.7	#	#
y	#	#	#	#	#	#
y	#	#	#	#	#	#



1. Increasing TWS values in knots
2. Increasing TWA values in degrees
3. Target vessel speed values in knots

Importing a polar table

Once the polar table has been created and saved as a .csv file it can be imported into the **MFD** using a MicroSD card.

With the MicroSD card containing the .csv file inserted into your **MFDs** card reader:

From the Chart application's Laylines set-up menu: **Menu > Presentation > Vectors > Laylines Set-up**.

1. Select **Import Polar Table**.
2. Browse to the location of the .csv file on your MicroSD card and select it.

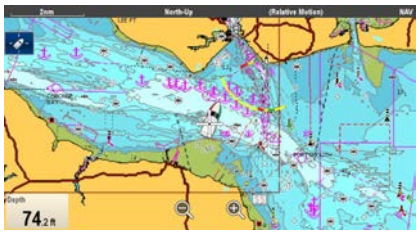
The polar table has now been imported and the **Polars** option will be available from the **Laylines Type** menu.

Note: The Polar table can be deleted from the system at any time by selecting **Delete Polar table** from the **Laylines Set-up** menu.

14.20 Cartography objects

Chart detail

The chart detail setting is available when using **Navionics®** or **LightHouse** Vector charts and determines the level of detail shown in the Chart application.

Low	
High	

Selecting the Low option for the **Chart Detail** disables the following objects and overlays:

- 2D Shading
- Community Edits
- Chart Text
- Chart Boundaries
- Light Sectors
- Routing Systems
- Caution Areas
- Marine Features
- Land Features
- Panoramic Photo
- Roads
- Additional Wrecks
- Color Seabed Areas
- Depth Contours

Changing the level of chart detail

From the chart application menu:

1. Select **Presentation**.
2. Select **Objects**.
3. Select **Chart Detail** to switch between High or Low, as appropriate.

Cartography objects

If supported by your cartography type, cartographic objects can be individually switched on or off.

The Objects menu is accessed from: **Menu > Presentation > Objects**.

Note: The Objects menu is only available when the cartography in use supports these features.

Note: The table below identifies the objects supported by each cartography vendor. However, the object may not be supported by all levels of cartography supplied by that vendor. Please check with your cartography vendor for supported features.

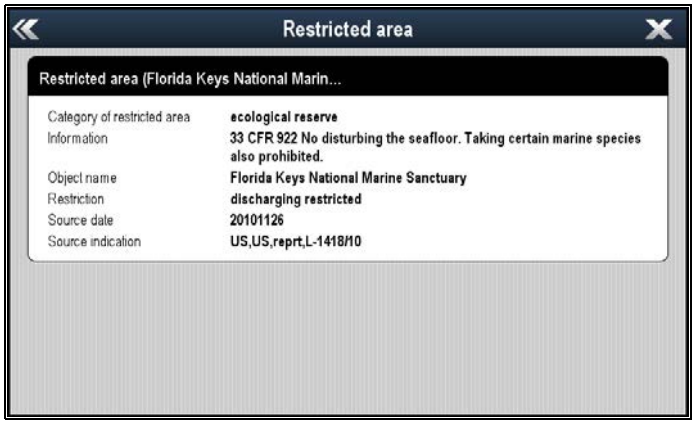
Object	Description	LightHouse	Navionics®	C-MAP®
* **Sports Fishing**	Determines whether C-MAP's Sports Fishing Value Added Data (VAD) is displayed.	✗	✗	✓
* **Protected Areas**	Determines whether C-MAP's Marine Protected Areas Value Added Data (VAD) is displayed.	✗	✗	✓
* **Fishing AOI**	Determines whether C-MAP's Fishing Areas Of Interest (AOI) Value Added Data (VAD) is displayed.	✗	✗	✓
Show Rocks	Determines the depth at which rocks are displayed.	✗	✓	✓
Nav. Marks	Determines whether navigation marks are displayed.	✓	✓	✓
Nav. Mark Symbols	Determines which set of navigation mark symbols is used — International, or US. (These symbols correspond to paper charts).	✓	✓	✓
Light Sectors	Determines whether the sector of light cast by a fixed beacon is displayed.	✓	✓	✓
Routing Systems	Determines whether routing data is displayed.	✓	✓	✓
Caution Areas	Determines whether caution data is displayed.	✓	✓	✓
Marine Features	Determines whether the water-based cartographic features such as cables, tide and current stations and port information etc. is displayed.	✓	✓	✓
Land Features	Determines whether land-based cartographic features such as buildings, towers, masts and coast guard stations etc. are displayed.	✓	✓	✓
Business Services	Determines whether symbols indicating the location of a business will be shown.	✗	✓	✓
Panoramic Photos	Determines whether panoramic photos are available for landmarks such as ports and marinas.	✗	✓	✓
Roads	Determines whether major coastal roads are displayed on the chart.	✓	✓	✓
Additional Wrecks	Determines whether extended information for new wrecks is displayed.	✗	✓	✗
Colored Seabed Areas	Provides greater definition of the seabed. This applies only to limited areas where the extra detail is available.	✗	✓	✗

Note: * VAD objects:

- are available at an additional cost from **C-MAP®**.
- may not be available in all areas.

14.21 Object information

If supported by your cartography type, you can view detailed information about specific cartographic objects.



Depending on the cartography type you are using, you can view some or all of the following additional information:

- Details of each cartographic object that is marked on the chart, including source data for structures, lines, open sea areas etc.
- Details of ports, port features, and business services.
- Pilot book information (similar to what you would see in a marine almanac). Pilot book information is available at certain ports.
- Panoramic photos of ports and marinas. The availability of photos is indicated by a camera symbol on the chart display.

You can also search for the nearest instance of a particular chart object using the **Find Nearest** option. The following object can be searched for:

Object	LightHouse	Navionics®	C-MAP®
Port (Search by name	✗	✓	✓
Waypoints	✓	✓	✓
Ports	✗	✓	✓
Tide Station	✗	✓	✓
Current Station	✗	✓	✓
Obstruc-tions	✓	✓	✓
Wrecks	✓	✓	✓
Port Services	✓	✓	✓
Business Services	✗	✓	✗
Point of Interest	✗	✗	✓
Outdoor Recre-ational Ar-eas (ORA)	✗	✗	✓
ORA Services	✗	✗	✓
Small Craft Facility	✓	✗	✗
Harbor Facility	✓	✗	✗

This information can be accessed using the **Chart Objects** or **Find Nearest** options from the chart context menu:

- Select a chart object on screen and choose **Chart Objects** from the chart context menu to view information about the selected object.
- Select **Find Nearest** from the chart context menu to search for objects close by.

Displaying chart object information

From the chart application:

1. Select an object.
   The chart context menu is displayed.
2. Select **Chart Objects**.
   The Chart Object Dialog is displayed.
3. Selecting available options will display detailed information about that item.
4. Selecting the position in the dialog will close the information dialog and position the cursor over the object.

Searching for the nearest chart object or service

From the chart application:

1. Select a location on screen.
   The chart context menu is displayed.
2. Select **Find Nearest**.
   A list of chart object types is displayed.
3. Select the chart object or service in the list.
   A list is displayed of the available instances of that particular object or service.
4. Select the item that you want to find.
   The cursor will be repositioned over the selected object or a list of instance will be displayed.

Searching for a port by name

From the chart application:

1. Select a location on screen.
   The chart context menu is displayed.
2. Select **Find Nearest**.
   A list of chart object types is displayed.
3. Select **Port (search by name)** from the list.
   The on–screen keyboard is displayed.

4. Use the on-screen keyboard to enter the desired port name.
5. Select **SAVE**.
   The search results are displayed.
6. Select the position against an entry in the list to reposition the cursor over that position.

Displaying pilot book information

From the chart application, when a port symbol is displayed for a port which has a pilot book:

1. Select the port symbol.
   The chart context menu will be displayed.
2. Select **Pilot Book**.
3. Select the relevant chapter.

Displaying panoramic photos

From the chart application, when a camera symbol is displayed, indicating the availability of a photo:

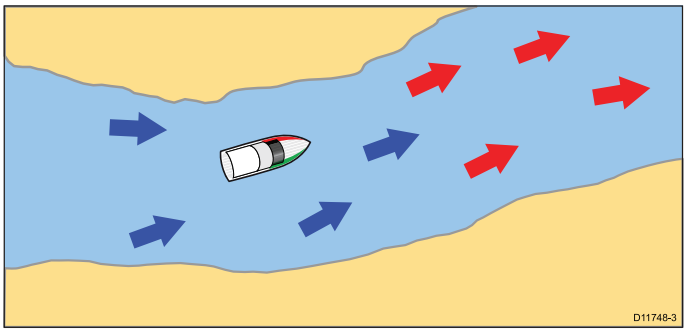
1. Select the camera symbol.
   The chart context menu is displayed.
2. Select **Photo**.
   The photo is displayed on screen.

Note: Not all cartography types are capable of displaying panoramic photos.

Current information

Animated current information

Depending on the cartography in use the current information may be animated.



Animated current information is available in the chart application wherever a diamond-shaped symbol with a "C" is displayed:

	This symbol identifies the location of a current station and the availability of current information for the location.

When you select a current station symbol the chart context menu is displayed, which provides the **Animate** option.

The animation can be viewed continuously or incrementally at a time interval that you specify. You can also set the date for the animation, and start or restart the animation at any point within a 24-hour period. If the system does not have a valid date and time the date used will be midday for the system default date.

Navionics animated currents

	Example current animation.

Arrows are used to indicate the direction of current flow. The length of the arrow indicates the flow rate and the color of the arrow indicates flow speed:

- **Red**: increasing current flow speed.
- **Blue**: decreasing current flow speed.

Note: Not all electronic charts support the animated currents feature.

C-MAP animated currents

Arrows are used to indicate the direction of current flow. The size and color indicates the current strength:

	Yellow	0 to 0.1 Knots
	Yellow	0.2 to 1.0 Knots
	Orange	1.1 to 2.0 Knots
	Orange	2.1 to 3.0 Knots
	Red	3.1 to 9.9 Knots

Note: Not all electronic charts support the animated currents feature.

Viewing animated current information

From the chart application:

1. Select diamond-shaped current icon.
   The chart context menu is displayed.
2. Select **Animate**.
   The animate menu is displayed and the current icons are replaced with dynamic current arrows

Controlling animations

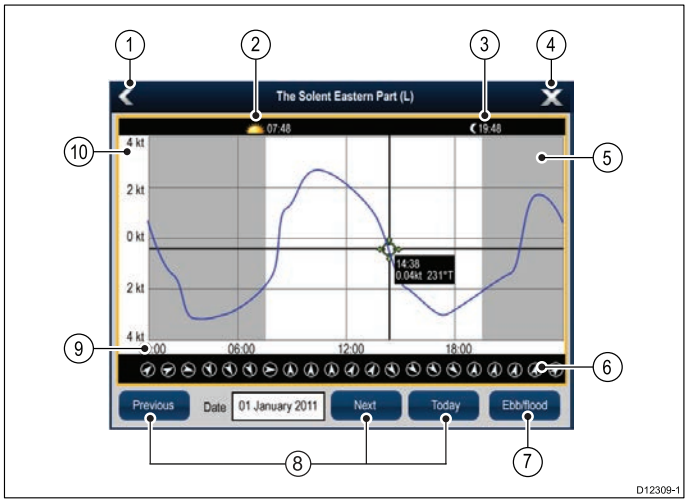
From the chart application, with the animate menu displayed:

1. To start or stop the animation, select **Animate:** to switch between Play and Pause.
2. To view the animation in steps, select **Step Back** or **Step Forward**.
3. To set the animation step interval, pause any playing animations, and then select **Set Time Interval**.

4. To set the animation date, select **Set Date** and then using the on screen keyboard enter the required date.
5. To set the animation date to the current date select **Today**.
6. To set the animation date to 24 hours previous to the current date select **Previous Day**.
7. To set the animation date to 24 hours ahead of the current date select **Next Day**.

Current graphs

Current graphs provide a graphical view of current activity.



1. **Back** — Return to the previous menu or view.
2. **Sunrise indicator** — Indicates when the sun rises.
3. **Sunset indicator** — Indicates when the sun sets.
4. **Exit** — Closes the dialog.
5. **Nightfall indicator** — The greyed-out section of the graph indicates when nightfall occurs.
6. **Current direction** — Indicates the direction of current (relative to north).
7. **Ebb/Flood** — Displays a list showing ebb, slack and flood tides.
8. **Date navigation** — Use the icons to move to the next or previous day.
9. **Time** — The horizontal axis of the graph indicates time, in accordance with the time format specified in the **Units Set-up** options.
10. **Current speed** — The vertical axis of the graph indicates speed, in accordance with the speed preferences specified in the **Units Set-up** options

Note: The data provided in the current graphs is for information purposes only and should NOT be relied upon as a substitute for prudent navigation. Only official government charts and notices to mariners contain all the current information needed for safe navigation. Always maintain a permanent watch.

Displaying details of currents

From the chart application:

1. Select the diamond-shaped current icon.
   The chart context menu is displayed.
2. Select **Current Station**.
   The graph for the selected station is displayed.

Tide information

Animated tide information

The electronic charts may allow animation of the tide information tide stations.

Animated tide information is available in the chart application wherever a diamond-shaped symbol with a "T" is displayed:

	This symbol identifies tide stations and the availability of tide information for the location.

When you select a tide station symbol the chart context menu is displayed, which provides the **Animate** option.

When you select **Animate** the animate menu is displayed and the diamond–shaped symbols are replaced with dynamic tide bar which indicates the predicted tide height for the actual time and date:

	Tide animation.

- Tide height is indicated by a gauge. The gauge is comprised of 8 levels, which are set according to the absolute minimum / maximum values of that particular day.
- The color of the arrow on the tide gauges indicates changes in the tide height:
  - **Red**: increasing tide height.
  - **Blue**: decreasing tide height.

The animation can be viewed continuously or incrementally at a time interval that you specify. You can also set the date for the animation, and start or restart the animation at any point within a 24-hour period. If the system does not have a valid date and time the date used will be midday for the system default date.

Note: Not all electronic charts support the animated tides feature. Check with you cartography vendor to ensure the features are available on your chosen cartography type level or type.

Viewing animated tide information

From the chart application:

1. Select diamond-shaped tide icon.
   The chart context menu is displayed.
2. Select **Animate**.
   The animate menu is displayed and the tide icon is replaced with a dynamic tide bar indicator.

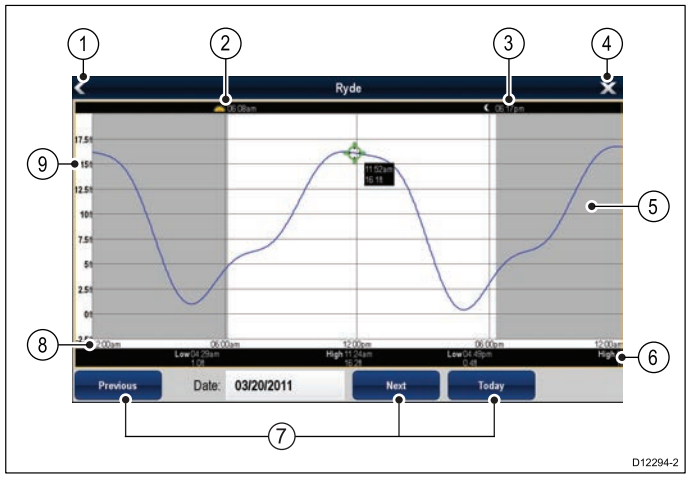
Controlling animations

From the chart application, with the animate menu displayed:

1. To start or stop the animation, select **Animate:** to switch between Play and Pause.
2. To view the animation in steps, select **Step Back** or **Step Forward**.
3. To set the animation step interval, pause any playing animations, and then select **Set Time Interval**.
4. To set the animation date, select **Set Date** and then using the on screen keyboard enter the required date.
5. To set the animation date to the current date select **Today**.
6. To set the animation date to 24 hours previous to the current date select **Previous Day**.
7. To set the animation date to 24 hours ahead of the current date select **Next Day**.

Tide graphs

Tide graphs provide a graphical view of tidal activity.



1. **Back** — return to the previous menu or view.
2. **Sunrise indicator** — indicates when the sun rises.
3. **Sunset indicator** — indicates when the sun sets.
4. **Exit** — closes the dialog.
5. **Nightfall indicator** — the greyed-out section of the graph indicates when nightfall occurs.
6. **Low / High Tide** — Indicates the time at which low or high tide occurs.
7. **Date navigation** — Use the icons to move to the next or previous day.
8. **Time** — The horizontal axis of the graph indicates time, in accordance with the time format specified in the System Settings.
9. **Depth** — The vertical axis of the graph indicates tidal water depth. The units for the depth measurement are based on those specified in the **Homescreen > Customize > Units Set-up > Depth Units** menu.

Note: The data provided in the tide graphs is for information purposes only and should NOT be relied upon as a substitute for prudent navigation. Only official government charts and notices to mariners contain all the current information needed for safe navigation. Always maintain a permanent watch.

Displaying details of tides

From the chart application:

1. Select the diamond-shaped tide icon.
   The chart context menu is displayed.
2. Select **Tide Station**.
   The graph for the selected station is displayed.

14.22 Depth & Contour options

If supported by your cartography type, the following depth and contour settings are available.

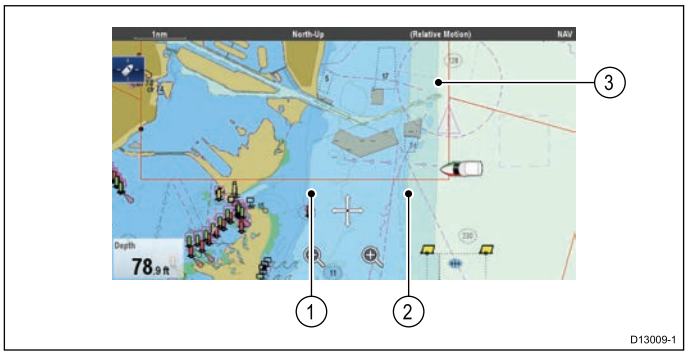
Note: The table below identifies the Depth & Contour options supported by each cartography vendor, however the option may not be supported by all levels of cartography supplied by that vendor. Please check with your cartography vendor for supported features.

Menu item	Description	LightHouse	Navionics®	C-MAP®
High Res Bathy	Determines whether C-MAP's High Resolution Bathymetry Value Added Data (VAD) is displayed. **Note:** • VAD is available at an additional cost from C-MAP. • VAD may not be available in all areas.	✗	✗	✓
Show Soundings	Determines the depth at which depth soundings are displayed.	✓	✓	✓
Show Contours	Determines whether contours are displayed.	✗	✓	✓
Shallow Water	Determines the depth at which the Shallow contour is displayed. The Shallow contour cannot be set to a value greater than the Safety or Deep contours.	✓	✗	✗
Safe Water From	Determines the depth at which the Safety contour is displayed. The Safety contour cannot be set to a value less than the Shallow contour or higher than the Deep contour.	✓	✗	✗
Deep Water From	Determines the depth at which the Deep contour is displayed. The Deep contour cannot be set to a value less than the Shallow or Safety contours.	✓	✓	✓
Deep Water Color	Determines whether Deep Water is colored Blue or White.	✗	✓	✓
Sonar Logs	Allows logging of depth and position data to your Navionics chart card. This data will be sent to Navionics to improve the contour detail of Sonar Charts on your multifunction display.	✗	✓	✗

Depth soundings and contours

If supported by your cartography type, depth soundings and contours can be used in the Chart application to provide awareness of water depth.

When using vector based cartography you can adjust the depth at which the contours and soundings appear on-screen.



1. **Shallow Water**
2. **Safe Water From**
3. **Deep Water From**

The Depth & Contours menu can be accessed from: **Menu > Presentation > Depth & Contours**.

14.23 Navionics Advanced Menu options

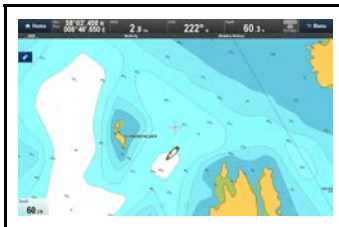
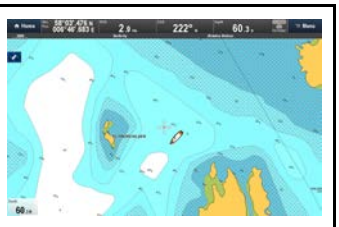
Identifying Shallow Water - Navionics

With appropriate Navionics **SonarChart™** cartography inserted you can easily identify shallow water by adjusting the Shallow Water setting.

From the Chart application:

1. Select **Advanced Options** from the **Presentation** menu (**Menu > Presentation > Advanced Options**).
2. Select **Shallow Water**.
3. Adjust the depth to the required value between 0 to 32.8 feet (0 to 10 metres).

   The areas less shallow than the value selected will contain red hatch pattern.

	
Shallow Water Off	Shallow Water On

4. Select **Back** to close the Shallow Water adjustment.

Creating personal bathymetry charts using SonarChart™ Live

With appropriate Navionics **SonarChart™** cartography inserted you can easily create high resolution bathymetry maps, which are displayed in real time on your MFD, using your connected depth transducer.



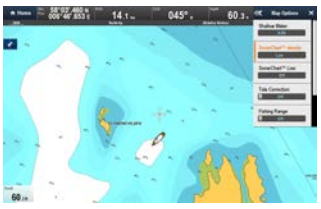
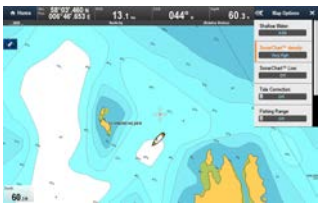
1. Ensure **Sonar Logs** is switched On: **Menu > Presentation > Depths & Contours > Sonar Logs**
2. Switch the **Tide Correction** setting On, this offsets your depth measurements using tide height data taken from nearby tide stations.
3. Select **SonarChart Live**.
4. Untick the **Off** check box.
5. Adjust the opacity of the SonarChart Live overlay to your desired level.
6. Select **Back** to close the opacity adjustment.

Selecting a density for SonarCharts

With the appropriate Navionics **SonarChart™** cartography, the density of the displayed contours can be changed.

From the **Advanced Options** menu: (**Menu > Presentation > Advanced Options**):

1. Select **SonarChart Density**.
2. Select the desired density option:

	
Example of **Low** density setting.	Example of **Very High** density setting.

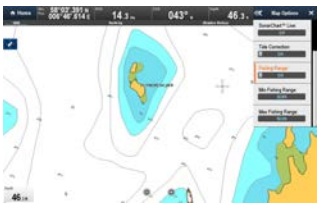
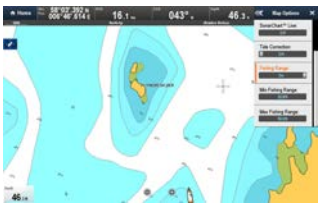
Setting up a fishing range

With appropriate Navionics **SonarChart™** cartography inserted, you can set up a Fishing Range. When set up, the depth range between the minimum and maximum will be colored white, and the depths outside of this range will be blue.

Note: If the **Deep Water From** setting has been set to a shallower depth than the **Min Fishing Range**, and the **Deep Water Color** setting is set to Blue, then the area within the **Fishing Range** will appear Light Blue rather than White.

From the **Advanced Options** menu: (**Menu > Presentation > Advanced Options**):

1. Select **Fishing Range:** so that On is displayed.
2. Select **Min. Fishing Range:** and adjust the minimum fishing depth to the desired value.
3. Select **Max. Fishing Range:** and adjust the maximum fishing depth to the desired value.

	
Fishing Range Off	Fishing Range On

14.24 My Data options

The My Data menu provides access to your user data.

The options are found in the **My Data** menu: **Menu > My Data**.

- **Waypoints** — View the waypoints group list.
- **Routes** — View the Routes list.
- **Tracks** — View the Tracks list.

Refer to Chapter 13 Waypoints, Routes and Tracks for further details.

14.25 Measuring distances and bearings

You can use the databar and context menu information you can use the measure function to measure distances in the chart application.

You can determine the distance and bearing:

- from your vessel to the position of the cursor;
- between two points on the chart.

Measuring from vessel position to cursor

From the chart application:

1. Select the location on screen that you want to measure the distance or bearing from your vessel.
   The chart context menu will be displayed.
2. Select **Measure**.
   The following will happen:
   - The measure menu will be displayed.
   - A line will be drawn from the cursor position to the center of the screen.
   - The cursor location will be moved at the center of the screen.
   - The bearing and distance will be displayed next to the new cursor location.
3. From the measure menu select **From** so that Ship is selected.
   The ruler line is re-drawn from the cursor position to your vessel.
4. You can now adjust the ruler position by moving the cursor to the desired location.
5. If you want the ruler displayed after you have closed the measure menu, select **Ruler:** so that On is highlighted.
   Selecting ruler will switch the ruler On and Off.
6. Select Back or OK to close the measure menu leaving the current measurement on-screen.

Measuring from point to point

From the chart application:

1. Select the location on screen that you want to measure the distance or bearing from your vessel.
   The chart context menu will be displayed.
2. Select **Measure**.
   The following will happen:
   - The measure menu will be displayed.
   - A line will be drawn from the cursor position to the center of the screen.
   - The cursor location will be moved at the center of the screen.
   - The bearing and distance will be displayed next to the new cursor location.
3. Select **From** so that Cursor is selected.
   Selecting measure from will switch between Ship and Cursor.

4. You can now adjust the end point by moving the cursor to the desired location.
5. You can also **Swap Direction** of the ruler so that the bearing becomes the bearing from end point to start point.
6. If you want the ruler displayed after you have closed the measure menu, select **Ruler** so that On is highlighted.

   Selecting display ruler will switch the ruler On and Off.
7. Select **Back** or **OK** to exit the measure menu leaving the current measurement on-screen.

Repositioning the ruler

You can reposition a ruler by following the steps below.

1. Select the current ruler.

   The ruler context menu is displayed.
2. Select **Measure**.

You can now reposition the ruler as required.

Chapter 15: Sonar (Fishfinder) application

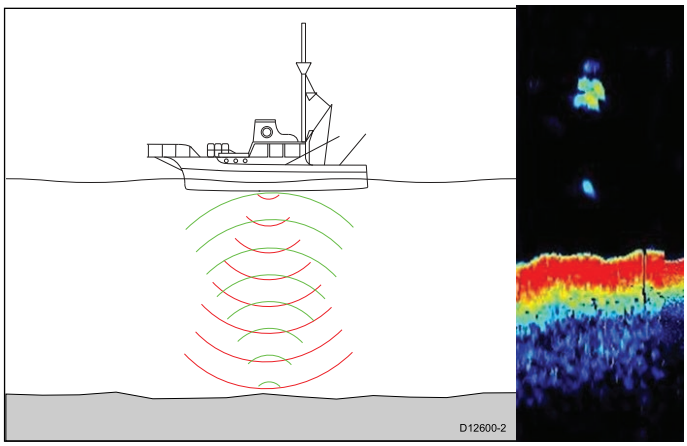
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- 15.3 Sonar overview and features on page 211
- 15.4 Sonar transducer and sonar module selection on page 213
- 15.5 Checking the sonar on page 214
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15.1 Sonar technologies

Traditional sonar technology

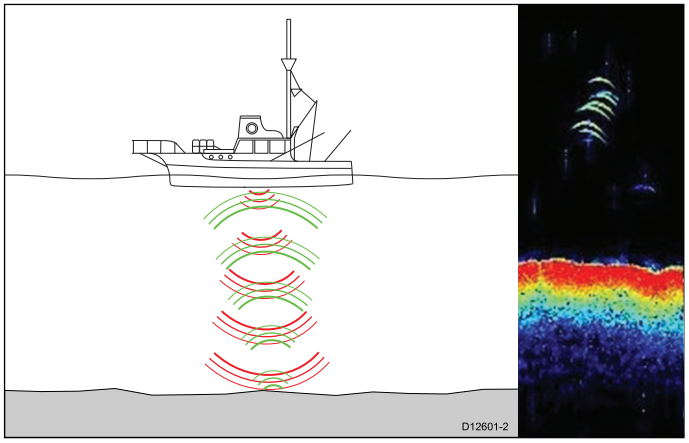
Traditional sonar uses a single carrier frequency or carrier wave for the sonar ping. The sonar works by measuring the time it takes the ping echo to return to the transducer to determine target depth.



CHIRP technology

CHIRP sonars use a swept frequency 'CHIRP' signal which can distinguish between multiple close targets, this enables the sonar to display multiple targets instead of large combined targets that you would see when using traditional non-CHIRP sonar.

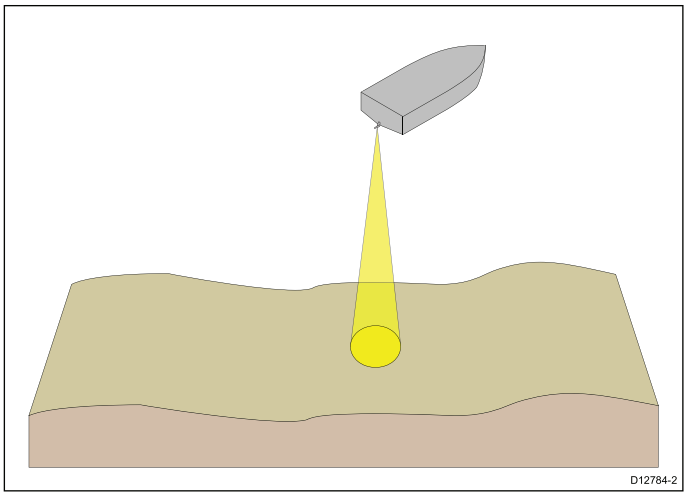
Benefits of CHIRP include improvements to target resolution, bottom detection even through bait balls and thermoclines and detection sensitivity.



CHIRP Sonar overview

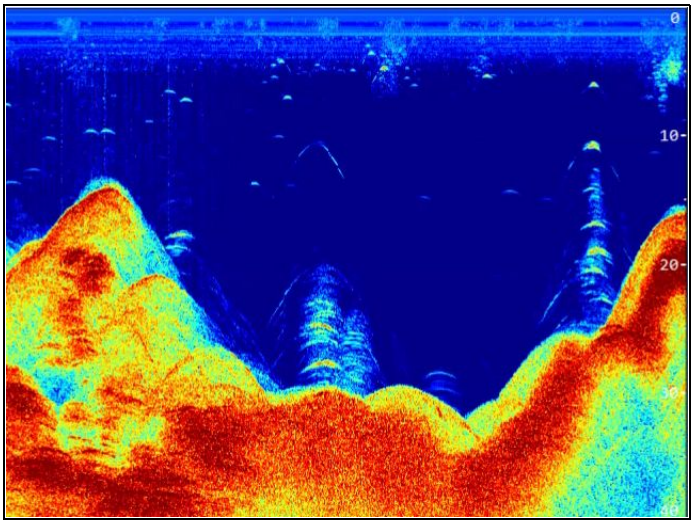
CHIRP sonar produces a conical shaped beam, the coverage of the conical beam is the water column directly beneath the vessel

Conical beam



Sonar is effective at a range of speeds. In deeper waters the CHIRP bandwidth is automatically optimized to improve bottom lock and the detection of moving objects (e.g. fish) in the wider water column.

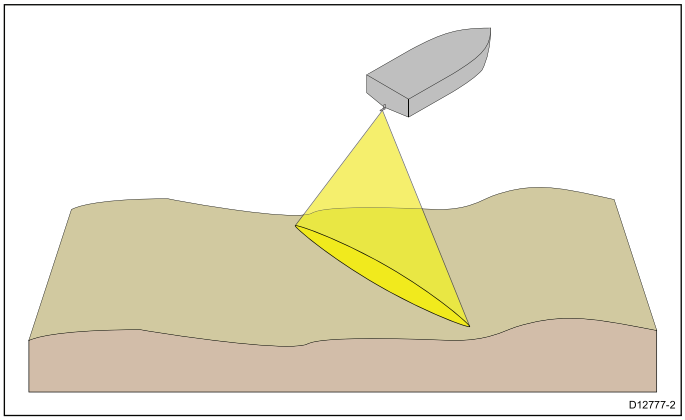
CHIRP sonar screen example



CHIRP DownVision™ overview

DownVision™ produces a wide–angle side-to-side beam and a thin fore-to-aft beam. The coverage of the **DownVision™** beam is a water column directly beneath and to the sides of the vessel.

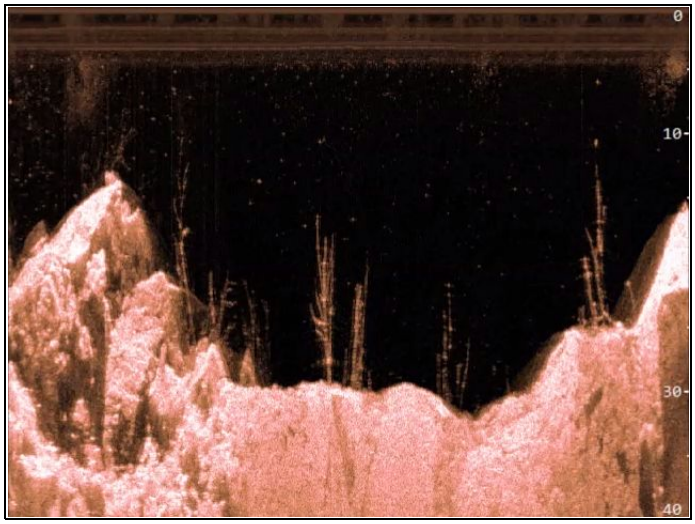
DownVision™ beam



DownVision™ is effective at lower vessel speeds. In deeper waters the CHIRP bandwidth is automatically optimized to improve bottom lock and the detection of moving objects (e.g. fish) in the wider water column.

The wide, thin beam produces clear target returns. The use of CHIRP processing and a higher operating frequency provide a more detailed image, making it easier to identify bottom structures around which fish may reside.

CHIRP DownVision™ screen example

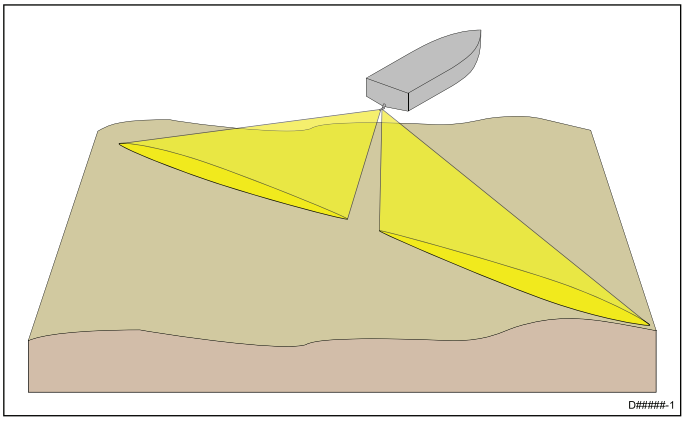


CHIRP SideVision™ overview

SideVision™ interprets signals from a pair of side-looking transducers and builds up a detailed underwater view as your vessel moves forward. The transducers send pulses of sound waves into the water on each side of your vessel, and record the sound waves that reflect off the bottom, and off objects on the bottom or suspended in the water column. The received echoes are affected by the bottom material (for example mud, gravel or rock), and by any other objects in their path (for example cables on the sea floor, bridge piers, wrecks, shoals or fish).

SideVision™ produces two wide–angle side-to-side beams, each with a thin fore-to-aft beam. The coverage of the **SideVision™** beams is a swath on each side of the vessel.

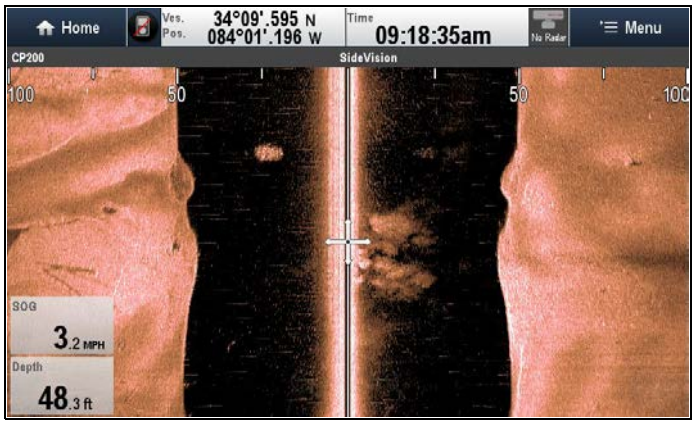
SideVision beams



SideVision™ is effective at lower vessel speeds. The wide, thin beams produce clear target returns. As your vessel moves forward, subsequent returns build up to provide an image of the sea floor on each side of your vessel.

The use of CHIRP processing and a high operating frequency provide a detailed image, making it easier to identify bottom structures around which fish may reside. The narrow angle the beams make with the bottom at longer ranges can reveal the shadows of structures that protrude from the bottom.

CHIRP SideVision™ screen example

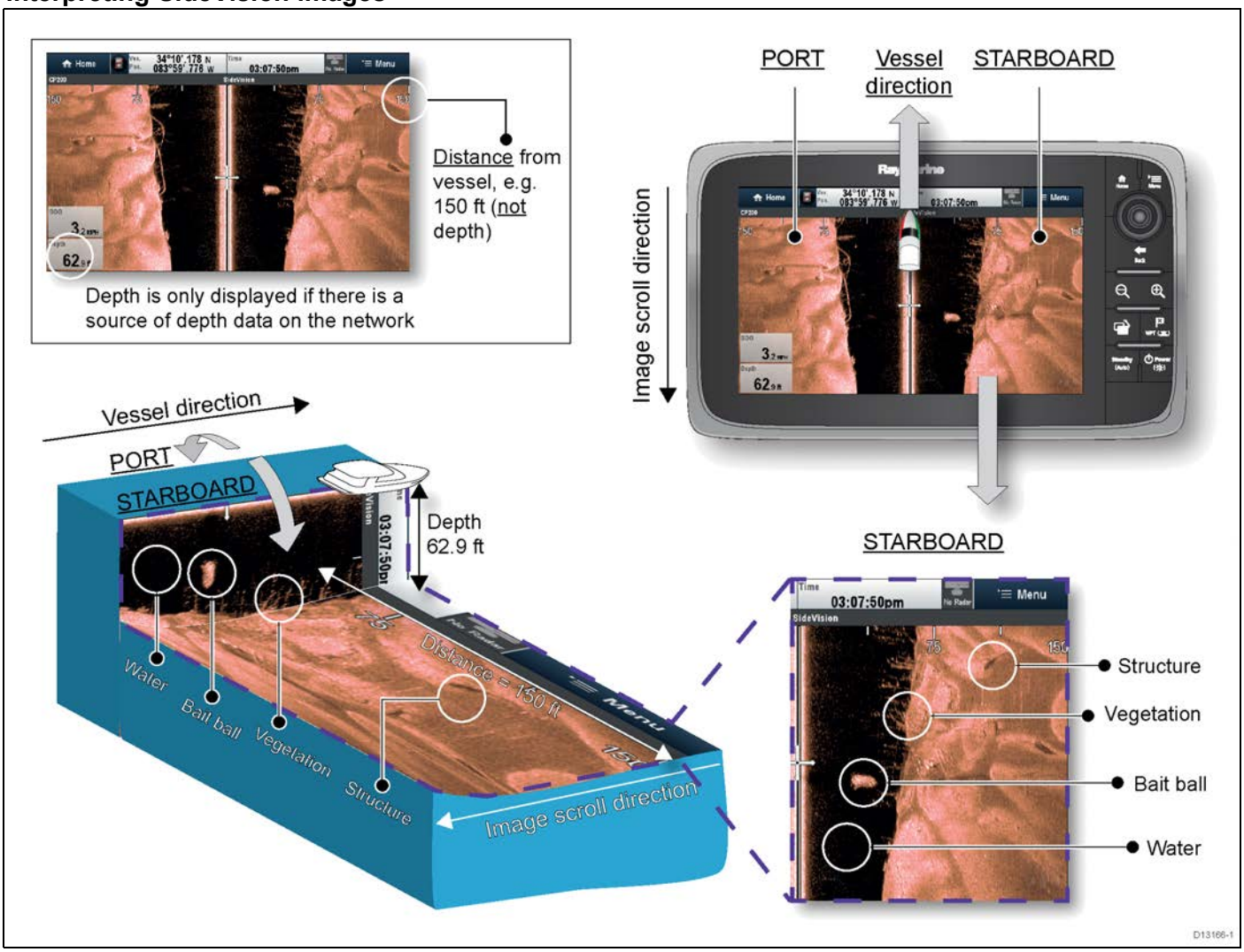


Note: The “Depth” figure shown in the illustration above assumes that you have a device in your system that provides depth data. Please be aware that not all transducers and / or sonar modules support depth sensing. For more information, refer to the latest specifications and documentation available for your particular products on the Raymarine website.

Interpreting SideVision™ images

The following illustration shows how **SideVision™** images on your multifunction display are related to the water column and sea floor to the sides of your vessel.

Interpreting SideVision images



SideVision™ images are constructed line-by-line, similar to the way a television picture is composed of many horizontal lines. Each successive ping from the **SideVision™** transducer adds a new line of image data to the top of your display. Each new line shows sonar returns from both the port and starboard sides of your vessel.

As new lines are added with each successive ping, older data gradually scrolls down the display, building up a detailed image of the water column and sea floor to the sides of your vessel. If your vessel maintains the same bearing and speed for a period of time, you can interpret the image as a plan of the sea floor along your vessel's course.

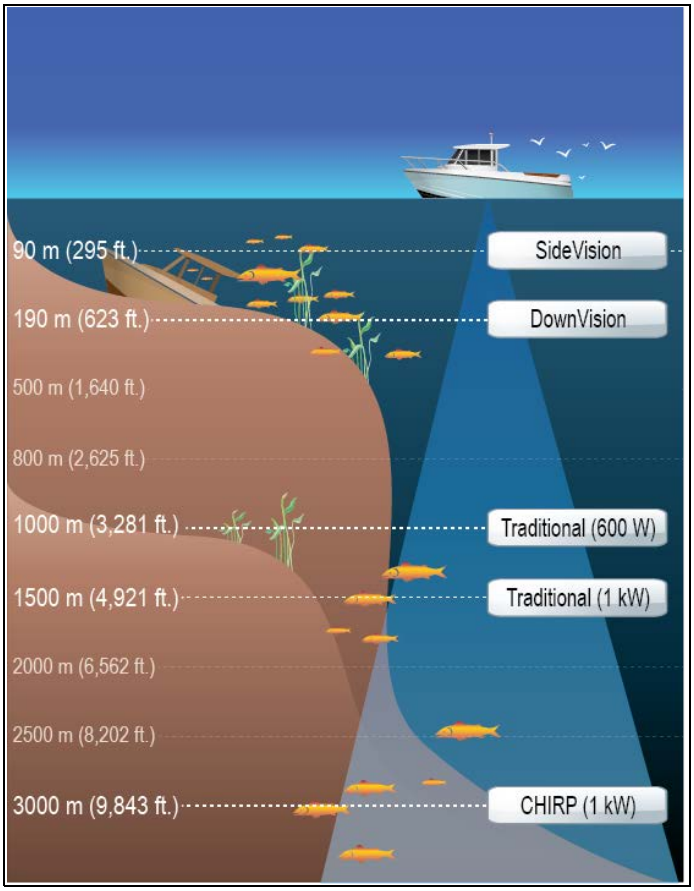
The illustration also identifies examples of features that may be visible in **SideVision™** images:

- **Water:** close to your vessel, the **SideVision™** sonar beams may not interact with any solid objects in the water column until they hit the sea floor. The water column close to your vessel is displayed as a dark band in the image. The abrupt change to a lighter section in the image indicates where the sea floor is first detected with each ping.
- **Bait ball:** objects in the water column close to your vessel may be detected before the **SideVision™** beams hit the sea floor. In this example, a bait ball is shown within the water column, at a distance of approximately 30 feet from the vessel.
- **Vegetation:** objects in contact with the sea floor that are close to your vessel may be clearly visible in the image at the point where the **SideVision™** beams hit the sea floor. In this example, the shapes in the image indicate vegetation attached to the sea floor.
- **Structure:** the lighter regions of the **SideVision™** image represent the sea floor. It may be possible to detect differences in the bottom material (for example, where an area of mud meets an area of gravel) as well as solid structures such as pipelines and piers. Larger solid structures, and sea floor relief, may reveal an area of shadow directed away from your vessel.

Note: Unlike **DownVision™**, **SideVision™** does not provide direct depth readings. The scale shown across the top of the image indicates the **distance** of features from your vessel.

15.2 Raymarine sonar modules

The depth shown below for **DownVision™** and the range for **SideVision™** sonar modules are typical achievable depths / ranges, depending on the connected transducer in optimum water conditions. The depths shown for Traditional and **CHIRP** sonar modules are the maximum depths achievable depending on connected transducer in optimum water conditions.



Sonar module	Technology / Description
CP100	**DownVision™** external
CP200	**SideVision™** external
CP300 / CP370	Traditional (1 kW) external
CP450C / CP470	CHIRP external
CP570	CHIRP external
a68 / a78 / a98 / a128 / eS78 / eS98 / eS128	**DownVision™** internal
a67 / a77 / a97 / a127 / c97 / c127 / e7D / e97 / e127 / eS77 / eS97 / eS127	Traditional (600 W) internal
DSM30 / DSM300	Legacy external
Dragonfly	**DownVision™** internal

Note: SideVision™ cannot be used as a source of depth data.

15.3 Sonar overview and features

The Sonar application uses a sonar module and a suitable sonar transducer. The sonar module interprets signals from the transducer and builds up a detailed underwater view. Various sonar technologies are available, all of which work on the same basic principles.

The sonar transducer sends pulses of sound waves into the water and measures the time it takes for the sound waves to travel to the bottom and back. The returning echoes are affected by bottom structure and by any other objects in their path, for example reefs, wrecks, shoals or fish. The Sonar module interprets these signals and builds up a detailed underwater view which is displayed in the Sonar application.

The Sonar application uses colors and shading to indicate the strength of the returns. You can use this information to determine the bottom structure, the size of fish and other objects in the water, such as debris or air bubbles

Note:

- Some transducers include additional sensors to measure water temperature and/or speed.
- Not all Sonar modules can be used for a source of depth information.

Sonar technology

Traditional sonar technology	• **Traditional sonar technology**
CHIRP technology	• **CHIRP technology**
DownVision™ technology	• **CHIRP DownVision™ overview**
SideVision™ technology	• **CHIRP SideVision™ overview**

Sonar features

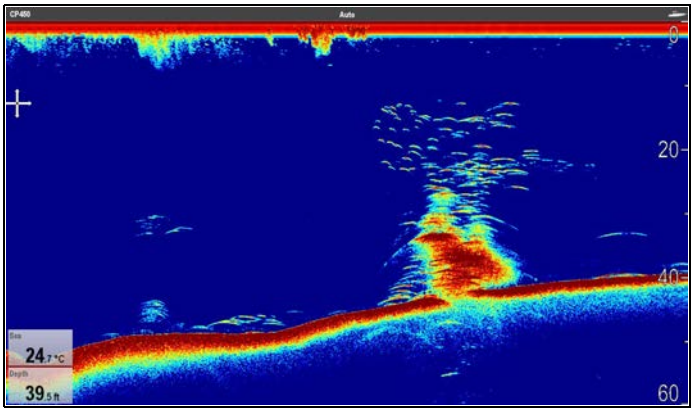
Supports multiple, active sonar modules.	• 15.7 **Multiple sonar module support**
Create custom channels.	• 15.9 **Custom channels**
Sonar application panes.	• **Sonar application panes**
Pausing and adjusting the speed of the scrolling image.	• 15.14 **Sonar scrolling**
Using waypoints to mark fishing spots or target locations.	• 15.19 **Waypoints in the Sonar application**
Determining target depths and distances.	• 15.18 **Depth and distance**
Setting Sonar alarms (fish, depth or water temperature).	• 15.21 **Fish alarms**
Sonar display modes (Zoom, A-Scope or Bottom Lock). **Note:** The display modes available are dependent on the sonar channel / module being displayed.	• 15.15 **Sonar display modes**

Depth range controls (manual or automatic) **Note:** Not applicable to **SideVision™** sonar modules.	• 15.12 **Depth Range**
Distance range controls **Note:** Only applicable to **SideVision™** sonar modules.	• 15.13 **SideVision™ Range**
Sensitivity Settings to help optimize and simplify the displayed image.	• 15.20 **Sensitivity settings**

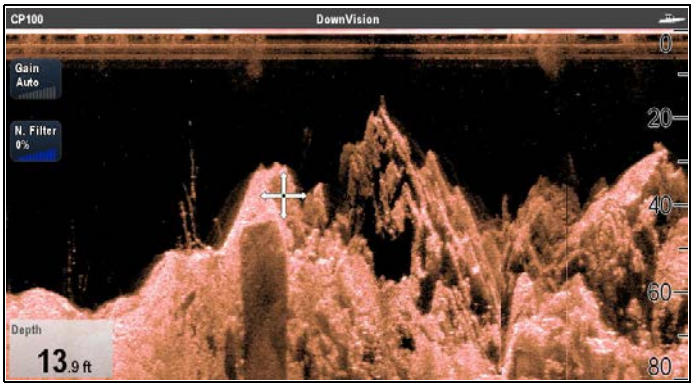
Sonar screen

The Sonar application displays a scrolling image across the screen of the water under your vessel. Each Sonar application pane can be independently configured to show a different sonar module / frequency.

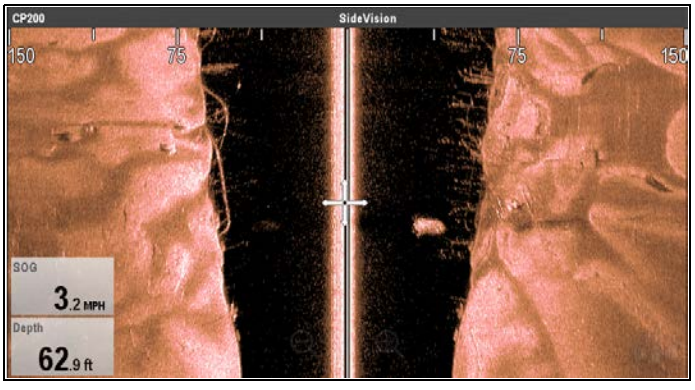
Example CHIRP screen



Example DownVision™ screen



Example SideVision™ screen



The Sonar window includes the following features:

- The bottom together with any bottom structure such as reefs and shipwrecks etc.
- Target images indicating fish.
- A status bar indicating the current sonar module and channel in use.
- Bottom depth.
- * On-Screen controls.

Note: * On-screen controls are only available on multifunction displays with a touchscreen and are dependent on the sonar module and channel that is being displayed.

Sonar application panes

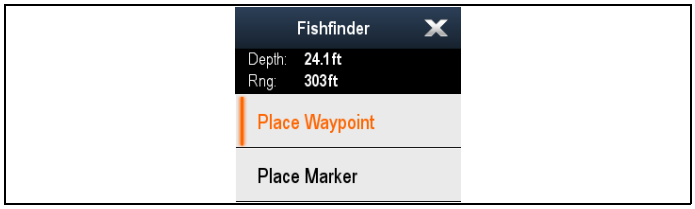
All panes showing an instance of the Sonar application is independent and any changes made to the Channel selection or Display mode are automatically saved against that pane of the application.

Multiple pages can be set up on the Homescreen which can be used to display different combinations of Channel and Display mode.



Sonar context menu

The Sonar application context menu displays data and shortcuts to menu items.



The context menu provides the data for the position of the cursor:

- Depth
- Range

The context menu also provide the following menu items:

- **Place Waypoint**
- * **Place Marker**
- * **Move Marker** (only available when a marker has been placed.)
- * **Erase Marker** (only available when a marker has been placed.)

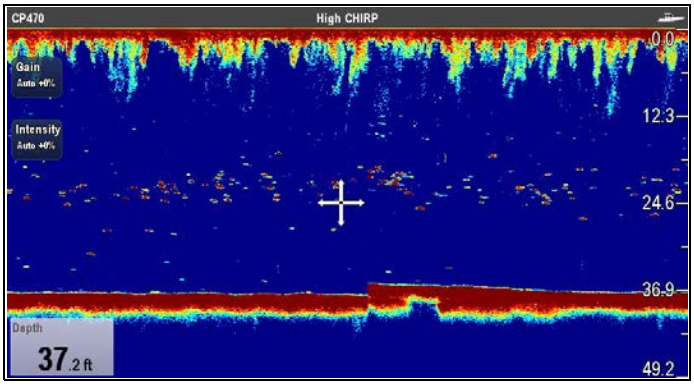
Note: * Not available on **SideVision™**.

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

Onscreen controls

Onscreen controls are available on Touchscreen **MFDs** that provide easy access to frequently used sensitivity controls.



The controls available are dependent on the type of sonar module being displayed.

CPx70 series sonar modules	• Gain • Intensity
traditional / CHIRP / Legacy (non CPx70 sonar modules)	• Gain • TVG
CHIRP DownVision™ / Sonar	• Gain • Noise Filter

Note: SideVision™ does not use onscreen controls.

Onscreen controls can be switched on and off from the Presentation menu: **Menu > Presentation > Gain Controls**.

15.4 Sonar transducer and sonar module selection

You must select the sonar transducer and sonar module that you want to use in the displayed Sonar application pane.

Sonar module selection

- Sonar and DownVision™ variant displays are fitted with an internal sonar module.
- All variants allow you to connect a compatible external sonar module or use an internal sonar module from a networked display.
- The sonar channel you want to use must be selected from the Sonar application menu.

Transducer selection

- Sonar variant displays allow direct connection of a Raymarine OR a Minn Kota sonar transducer.
- DownVision™ variant displays allow direct connection of Raymarine DownVision™ transducers.
- All variants allow the connection of a Raymarine sonar transducer via a compatible external sonar module.
- For all variants use the **Transducer Set-Up** menu in the Sonar application to specify the transducer you want to use.

Selecting the sonar channel

To select the channel you want to display follow the steps below.

From the Sonar application:

1. Select **Menu**.
2. Select **Channel**.
   The Channel selection page is displayed.
3. Select the tab for the sonar module you want to use.
   A list of available channels for the selected sonar module is displayed.
4. Select a channel from the list.

The Channel selection page will close and the Sonar application will now show the selected channel.

Selecting the sonar transducer

With the Sonar application displayed:

1. Select **Menu**.
2. Select **Set-Up**.
3. Select **Transducer Set-Up**.
4. Select **Transducer**.
   A list of transducers is displayed.
5. Select the transducer you want to use.

Selecting the speed transducer

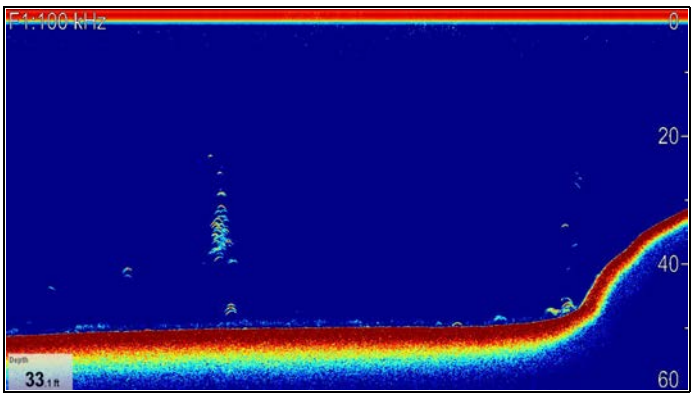
With the Sonar application displayed:

1. Select **Menu**.
2. Select **Set-Up**.
3. Select **Transducer Set-Up**.

4. Select **Speed Transducer**.
   A list of transducers is displayed.
5. Select your speed transducer from the list.

15.5 Checking the sonar

1. Select a Sonar application page from the Homescreen.



2. Check the Sonar display.

   With the Sonar active you should see:

   - *Depth reading (indicates the transducer is working). The depth is shown in a databox in the bottom left of the screen.*

   If the databox is not present it can be turned on from the Presentation menu: ***Menu > Presentation > Databoxes Set-up****.*

15.6 Sonar transducer Calibration

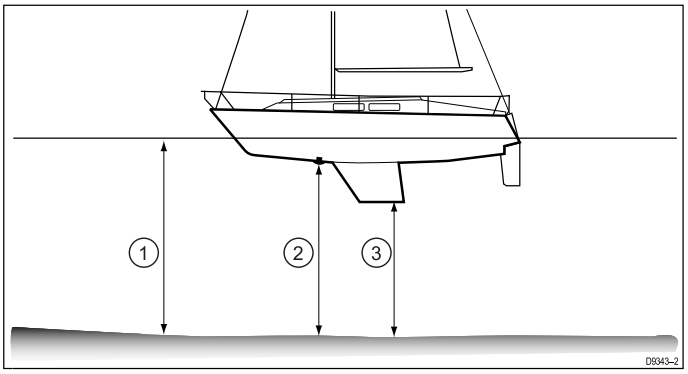
Your sonar transducer must be calibrated correctly to achieve accurate depth readings.

The multifunction display receives the image from a sonar module which processes sonar signals from a transducer mounted in the water. If the transducer is equipped with a speed paddle wheel and temperature-sensing thermistor, the sonar module calculates speed and temperature. To ensure accurate readings, it may be necessary to calibrate the transducer(s) by applying offsets to depth, speed and temperature. As these settings are held in the sonar module and relate to the transducer, they are applied system-wide.

Depth Offset

Depths are measured from the transducer to the bottom, you can apply an offset value to the depth data, so that the displayed depth reading represents the depth to the bottom from either the keel (negative offset) or the waterline (positive offset).

Before attempting to set a waterline or keel offset, find out the vertical separation between the transducer and either the waterline or the bottom of your vessel's keel, as appropriate. Then set the appropriate depth offset value.



1	Waterline offset	Values greater than zero (Positive values) represent a waterline offset
2	Transducer	Zero offset represents the depth from the transducer's location
3	Keel offset	Values less than zero (Negative values) represent a keel offset

Setting the depth offset

From the Sonar application:

1. Select **Menu**.
2. Select **Set-up**.
3. Select **Transducer Set-up**.
4. Select **Depth Offset**.
5. Adjust the offset to the required value.

   Remember Negative values represent a keel offset and positive values represent a waterline offset.

Setting the speed offset

From the Sonar application:

1. Select **Menu**.
2. Select **Set-up**.
3. Select **Transducer Set-up**.
4. Select **Speed Offset**.

   The speed offset numeric adjust control is displayed.
5. Adjust the offset to the required value.

Setting the Temperature offset

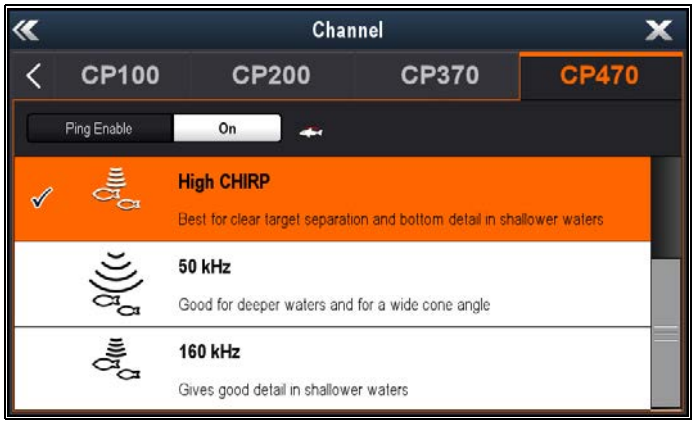
1. Select **Menu**.
2. Select **Set-up**.
3. Select **Transducer Set-up**.
4. Select **Temperature Offset**.

   The temperature offset numeric adjust control is displayed.
5. Adjust the offset to the required value.

15.7 Multiple sonar module support

Your multifunction display supports multiple active sonar modules on the same network.

You can select which sonar channel you want to be displayed. Multiple sonar channels can be displayed at the same time using custom splitscreen pages. Alternatively multiple custom pages could be set up to suit individual requirements.



Legacy, traditional and CHIRP sonar modules

Channel	Description	CHIRP external	Traditional external	Traditional internal
Auto	Automatically selects the best frequency for bottom tracking	✓	✓	✓
50 kHz / 83 kHz	Good for deeper waters and for a wide sonar beam	✓	✓	✓
100 kHz	Good detail at most depths, with moderately wide sonar beam	✓	✗	✗
160 kHz	Gives good detail in shallow waters	✓	✗	✗
200 kHz	Gives the best detail in shallow waters	✗	✓	✓
Low **CHIRP**	Good target separation in deep water	✓	✗	✗
Medium **CHIRP**	Good all round performance, with great target separation	✓	✗	✗
High **CHIRP**	Best for clear target separation in shallow waters and bottom detail	✓	✗	✗
DownVision™	Gives photo like images of bottom structure	✗	✗	✗
SideVision™	Gives a clear view of fish and structure either side of your vessel.	✗	✗	✗
Sonar	Targets bait and predator fish with wide sonar beam	✗	✗	✗

DownVision™ and SideVision™sonar modules

Channel	Description	DownVision™ sonar	SideVision™ sonar
DownVision™	Gives photo like images of bottom structure	✓	✗
SideVision™	Gives a clear view of fish and structure either side of your vessel.	✗	✓
Sonar	Targets bait and predator fish with wide sonar beam	✓	✗

Note:

1. The channels available are dependent on the sonar module and its connected transducer.
2. **DownVision™** sonar modules include both a **DownVision™** channel and a traditional sonar channel.
3. **SideVision™** sonar modules include 1 **SideVision™** channel, the view icons can be used to switch between left and right views.

Important software requirements for multiple sonar systems

If your system includes more than one source of sonar data you must ensure that any CP300 or CP450C sonar modules are running software version **v4.04** or later.

This applies to systems which include:

- Any number of MFD(s) with an internal sonar module plus a CP300 and / or CP450C sonar module; or
- No MFD(s) with an internal sonar module, but more than one CP300 or CP450C sonar module.

This does NOT apply to any systems that do NOT include a CP300 or CP450C sonar module.

Selecting the sonar channel

To select the channel you want to display follow the steps below.

From the Sonar application:

1. Select **Menu**.
2. Select **Channel**.

   The Channel selection page is displayed.
3. Select the tab for the sonar module you want to use.

   A list of available channels for the selected sonar module is displayed.
4. Select a channel from the list.

The Channel selection page will close and the Sonar application will now show the selected channel.

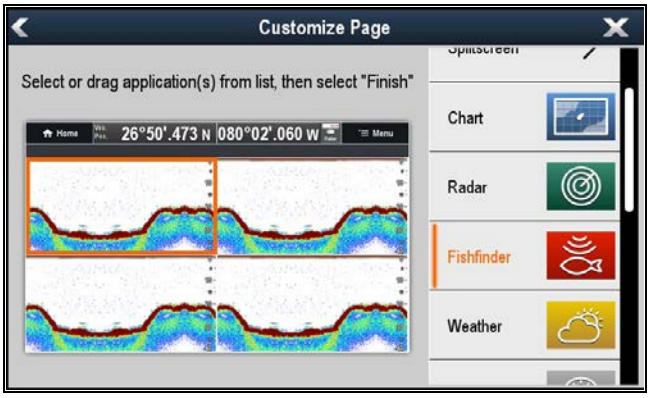
Displaying multiple sonar channels

Up to 4 sonar channels can be viewed at the same time by creating a custom splitscreen page that includes multiple Sonar application instances.

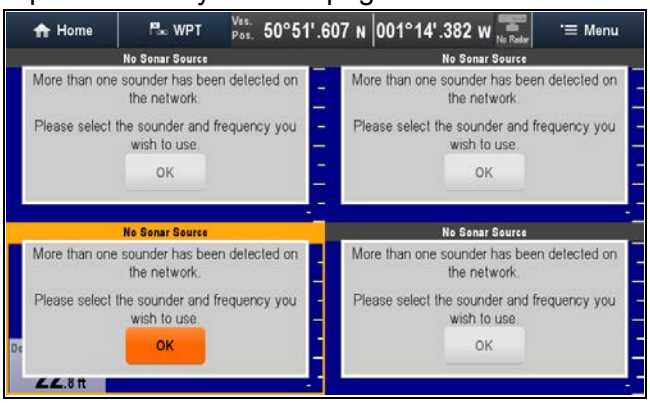
Important: Your ping rate may be reduced if you display different channels from the same sonar module at the same time.

1. Create a new splitscreen page using multiple instances of the Sonar application.

   Refer to the Changing an existing page on the homescreen section to find out how to create a page.

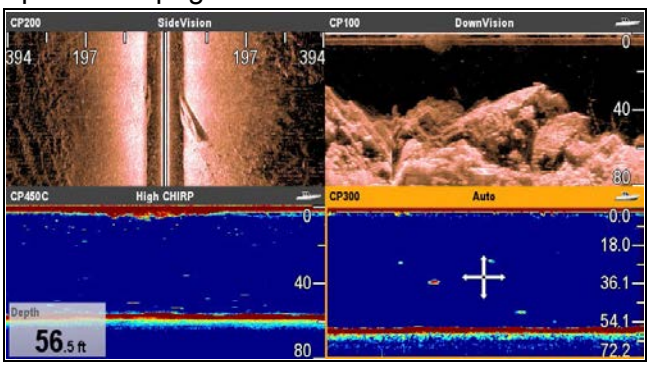


2. Open the newly created page.



3. Select the **OK** button in one of the sonar panes.
4. Select to channel that you want to view in the selected pane.

   Refer to the Selecting the sonar channel section for details on selecting a sonar channel.
5. Repeat steps 3 and 4 for each pane on the splitscreen page.



Depth data source

Where multiple sources of depth data exist on a system and the depth Data Source is set to Auto the system will automatically select the optimum source for depth data.

The system will set the data source for depth according to the priority table below:

1st	**CP470 / CP570**	**SeaTalkhs**
2nd	**CP370**	**SeaTalkhs**
3rd	**CP450C / CP300**	**SeaTalkhs**
4th	**DSM300 / DSM30**	**SeaTalkhs**

5th	Traditional sonar variant multifunction displays	Internal
6th	**CHIRP DownVision™** variant multifunction display	Internal
7th	**CP100**	**SeaTalkhs**
8th	Instrument / multifunction display	**SeaTalkng®**
9th	Instrument	**SeaTalk**
10th	Instrument / multifunction display	**NMEA 0183**

If multiple sonar modules of the same priority are present on a **SeaTalkhs** network then the unit with the highest serial number will be selected as the preferred data source. For **SeaTalkng®** and **NMEA 0183** networks the unit with the highest CAN address is selected.

If the preferred depth data source becomes unavailable then the system will automatically select the next highest priority data source.

Refer to the Data Source menu section for details on selecting preferred data sources.

Important: A depth offset must be set for all installed transducers to ensure consistent and accurate data is shown. Refer to the Depth Offset section for details.

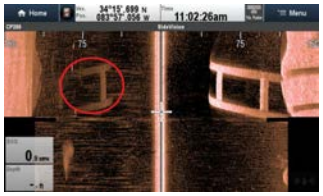
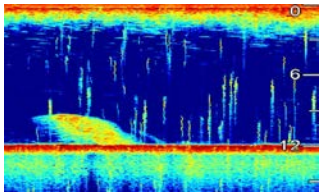
Note: SideVision™ cannot be used as a source for depth data.

15.8 Sonar crosstalk interference

There are 2 types of potential sonar crosstalk interference in a Raymarine sonar system:

1. **SideVision** sonar crosstalk interference
2. Multiple sonar crosstalk interference

The types of crosstalk interference that you may experience in your system depend on the combination and type of sonar equipment installed, and the way in which the equipment has been installed.

SideVision sonar crosstalk interference	**Multiple sonar crosstalk interference**
	
Due to the high sensitivity of **SideVision** transducers, you may experience some minor crosstalk interference between the left and right receiving channels in areas of strong target returns. Examples of strong target returns include solid objects such as underwater bridge structure. This interference shows up in the Sonar application as subtle reflections from the right sonar image displayed in the left sonar image, or vice versa.	When using multiple sonar modules and transducers operating in overlapping frequency ranges, you may experience some crosstalk interference between the ranges. This interference is displayed in the Sonar application as vertical “rain drops” throughout the water column. These vertical “rain drops” indicate that 2 sonar modules are operating in close frequency proximity to one another.

SideVision sonar crosstalk interference

Crosstalk interference is expected behavior in a high sensitivity device such as a **SideVision** transducer, and is not indicative of a fault with your transducer or sonar module.

Reducing multiple sonar crosstalk interference

Crosstalk interference in systems with multiple sonar modules and transducers is the result of a number of factors, including installation, operation, and environment.

- **Choose an equipment combination that minimizes overlapping frequencies.** Wherever possible, choose to use sonar modules and transducers that operate in different frequency ranges (“Channels”), for example CP100 and CP300 sonar modules and CPT-100 and B744V transducers. This will help to ensure that each component is operating in a distinct relative frequency range – for example, a “high” frequency range for the CP100 and a “low” frequency range for the CP300.

- **Only use the sonar channels that you really need.** Although it is possible to run multiple sonar modules simultaneously in a Raymarine system, it may not always be necessary to do so. If you are in a scenario that requires only one sonar module to be active at a time, disable any other sonar modules by changing the Sonar application pane to a single one which only displays the output from one sonar module. Alternatively, disable the ping for any unused sonar modules by selecting **MENU > Channel > Ping > OFF** in the Sonar application.
- **Identify the sonar module and transducer that is causing the interference.** To do this, disable the ping or remove the power for one of the sonar modules in your system. If the interference in the Sonar application disappears immediately, you now know which device is causing the interference. If the interference doesn't disappear, repeat the exercise again with the other sonar module(s) in your system, one at a time. Once you know which device is causing the interference, proceed with the following methods to reduce the interference from the relevant device.
- **Adjust the Interference Rejection Filter.** The default setting for all Raymarine MFDs is "Auto". Changing this setting to "High" might help to reduce interference (**MENU > Setup > Sounder Setup > Interference Rejection**). Note that the Interference Rejection Filter setting is not available for all sonar modules.
- **Decrease the power output of the interfering transducer.** Adjusting the "Power Mode" in the Sensitivity Settings in the Sonar application can help to minimize the presence of crosstalk interference (**MENU > Sensitivity Settings > Power Mode**). Note that the Power Mode setting is not available for all transducers.
- **Ensure that you have a common RF ground point for all electrical equipment on your vessel.** On vessels without an RF ground system, ensure all product drain wires (where available) are connected directly to the negative battery terminal. Ineffective RF grounding can cause electrical interference which may in turn result in sonar crosstalk interference.
- **Increase the physical distance between your sonar modules.** Electrical interference may be occurring between a cable on one sonar module, and a cable on a different sonar module. Ensure that your sonar modules are physically located as far away from each other as possible.
- **Increase the physical distance between your sonar transducers.** Electrical and / or acoustic interference may be occurring between the different transducers in your system. Ensure that your transducers are physically located as far away from each other as possible.

Note: Given the effort and potential difficulties involved in relocating sonar equipment, it should only be considered as a last resort when you judge the interference to be a significant problem which cannot be resolved using the methods described above.

Note: Due to physical size and other constraints that vary from vessel to vessel, it may not be possible to completely eliminate crosstalk interference from your system. However, this will not impede your ability to benefit from the full capabilities of your sonar system. Being able to easily identify the way in which interference is displayed in the Sonar application can sometimes be the best and easiest route to dealing with it.

15.9 Custom channels

When connected to an **External Traditional** sonar module such as the CP300 or an **External CHIRP** sonar module such as the CP450C, custom channels can be created from the sonar module's default channels; excluding Auto channels. This enables some settings to be customized and saved as a separate channel. These channels can then be assigned to individual Sonar application panes. Up to 10 custom channels can be created for each compatible sonar module.

When changed the following settings are saved to the channel that is currently displayed:

- Sensitivity settings
- Range settings
- Frequency tuning — Only 2 frequency settings can be saved per transducer / sonar module combination.

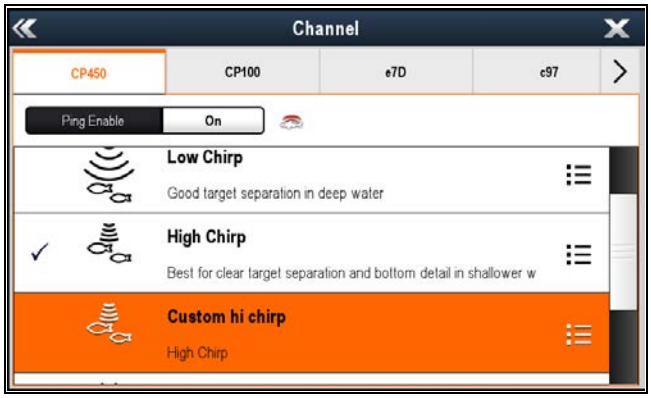
Note: Performing a Sonar Reset will erase all custom channels for the current sonar module.

Creating a custom channel

To create a custom channel follow the steps below.

From the Sonar application menu:

1. Select **Channel**.
   The Channel selection page is displayed.
2. Select the tab for the sonar module you want to create a custom channel for.
3. Select the **Channel options** icon located next to the channel that you want to use, or
4. using non–touch controls, select the channel and then press and hold the **OK** button until the options screen is displayed.
5. Select **Copy Channel**.
   The on-screen keyboard is displayed.
6. Enter the name you want to assign to your new channel.
7. Select **SAVE**.
   The new channel is now available in the channel list for the relevant sonar module.



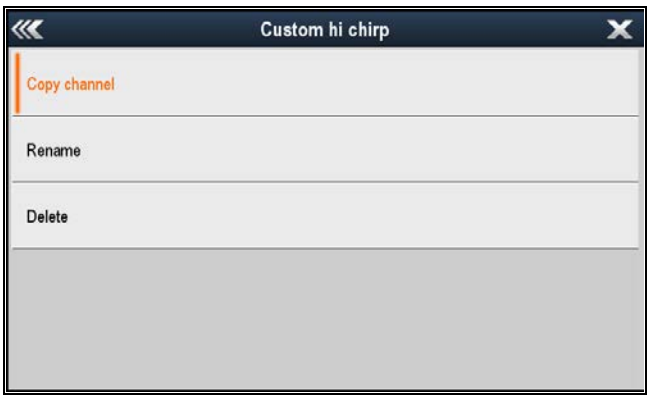
8. Select the new channel to display it in the Sonar application pane.
   Changes made to the Sensitivity, Range or Frequency tuning settings are automatically saved to the channel displayed.

You can now assign the new channel to a Sonar application pane.

Renaming custom channels

With the Channel selection page displayed:

1. Select the tab for the sonar module that contains the channel you want to rename.
2. Select the **Channel options** icon next to the custom channel.
   The custom channel options page is displayed



3. Select **Rename**.
   The on-screen keyboard is displayed.
4. Enter the new name for the channel.
5. Select **SAVE**.

Deleting custom channels

With the Channel selection page displayed:

1. Select the tab for the sonar module that contains the channel you want to delete.
2. Select the **Channel options** icon next to the custom channel.
3. Select **Delete**.
   A confirmation dialog is displayed.
4. Select **Yes**.

The custom channel has now been removed from your system.

15.10 Dual channel ping modes

The **CP570** sonar module features 2 **CHIRP** sonar channels that can transmit and receive independently of each other. Ping modes are available that balance the ping rate Vs interference between the 2 channels.

Ping modes:

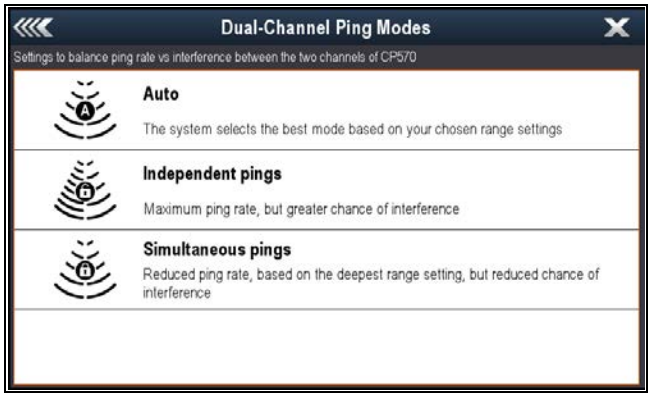
- **Auto** — The system selects the best mode based on your chosen range settings.
- **Independent pings** — Maximum ping rate, but greater chance of interference.
- **Simultaneous pings** — Reduced ping rate, based on the deepest range setting, but reduced chance of interference.

Note: Ping modes will only be available when the sonar module is connected to a 2 channel transducer.

Selecting a ping mode

From the Sonar application menu:

1. Select **Set-up**.
2. Select **Sounder Set-up**.
3. Select **Dual-Channel Ping Modes**.
   The ping mode selection page is displayed.



4. Select the required ping mode.

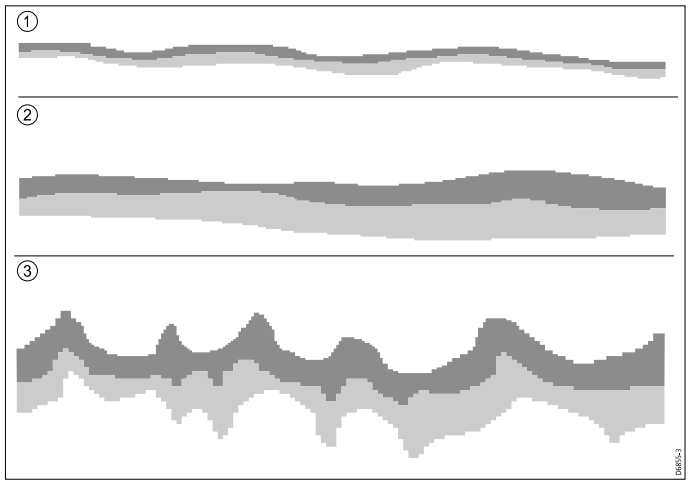
15.11 The sonar image

Interpreting the bottom using sonar

It is important to understand how to correctly interpret the bottom structure represented on-screen.

The bottom usually produces a strong echo.

The following images show how different bottom conditions are represented on-screen:



Item	Description
1	A hard bottom (sand) produces a thin line.
2	A soft bottom (mud or seaweed cover) produces a wide line.
3	A rocky or uneven bottom or a wreck produces an irregular image with peaks and troughs.

The dark layers indicate a good echo; the lighter areas indicate weaker echoes. This could mean that the upper layer is soft and therefore allowing sound waves to pass to the more solid layer below.

It is also possible that the sound waves are making two complete trips – hitting the bottom, bouncing off the vessel, then reflecting off the bottom again. This can happen if the water is shallow or the bottom is hard.

Factors influencing the sonar display

The quality and accuracy of the display can be influenced by a number of factors including vessel speed, depth, object size, background noise and transducer frequency.

Vessel speed

The shape of the target changes along with your speed. Slower speeds return flatter, more horizontal marks. Higher speeds cause the target to thicken and arch slightly, until at fast speeds the mark resembles a double vertical line.

Target depth

The closer the target to the surface, the larger the mark on screen.

Water depth

As water depth increases signal strength decreases, resulting in a lighter onscreen image of the bottom.

Size of the target

The larger the target, the larger the return on-screen. The size of a fish target is also dependent upon the size of the fish's swim bladder rather than its overall size. The swim bladder varies in size between different breeds of fish.

Clutter / Background noise

The Sonar picture may be impaired by echoes received from floating or submerged debris, air bubbles or even the vessel's movement. This is known as 'Noise' or 'Clutter' and is controlled by the Sensitivity Settings. The system can automatically control some settings according to depth and water conditions. You can also adjust the settings manually if required.

Transducer frequency

The same target will appear differently when using different transducer frequencies. The lower the frequency the broader the mark.

Recovering lost bottom

If the seabed floor (bottom) is lost then follow the steps below to recover the bottom depth.

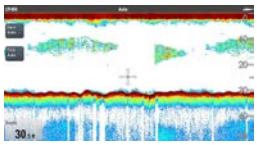
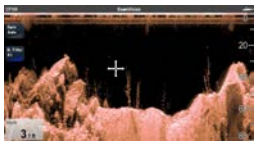
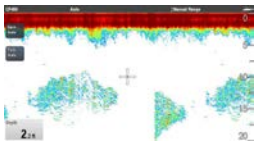
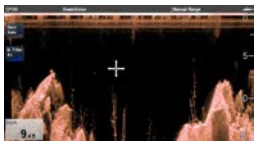
From the Sonar application:

1. Ensure your vessel is in clear undisturbed water.
2. If range is set to Manual, adjust the range to the known, charted depth of your location. or
3. If range is set to Auto then switch the range to manual and adjust the range to the known, charted depth of your location.
4. Once bottom has been regained you can switch range mode back to Auto.

15.12 Depth Range

The Depth Range function enables you to define the range of depth that you see in the Sonar application. In Auto Range, the Sonar application automatically adjusts the range to ensure the water column and bottom are always displayed. In Manual Range, you can adjust the range displayed on-screen to suit your needs.

The table below shows examples of the Range function used with different sonar types.

	Traditional and CHIRP channels	DownVision™ channel
Auto Range		
Manual Range		

Switching between Auto and Manual range

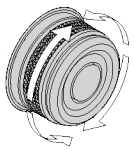
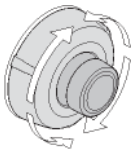
From the application menu:

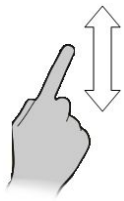
1. Select **Range**.
2. Select **Range:** to switch between Auto and Man.
3. With manual mode selected you can now adjust the depth range shown onscreen.

Range in and out

The method of ranging in and out of the Sonar application is dependent upon the multifunction display variant being used.

The table below shows the Range controls available for each display variant.

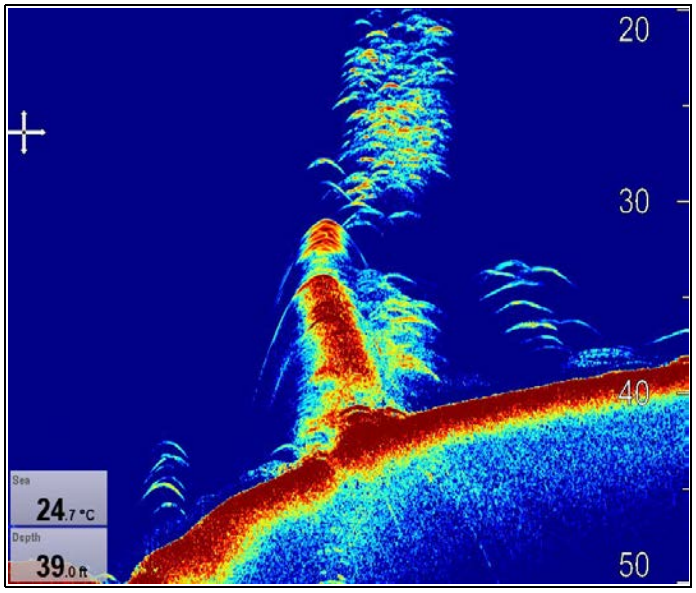
	Controls	Multifunction displays
	**Rotary Control**	• eS Series
	**Rotary Control**	• c Series • e Series • RMK-9 keypad

	Controls	Multifunction displays
	**Range in** and **Range out** buttons	• c Series • e Series (excluding e7 and e7D • RMK-9 keypad
	Slide the screen **Up** or **Down**	• a Series • e Series • gS Series • eS Series

Range shift

The Range Shift function enables a specific area of the water column to be displayed on-screen.

In the below example the top 20 feet of the water column is not displayed



Using range shift

The default setting adjusts the display to keep the bottom in the lower half of the screen. Alternatively you can shift the image within the current range.

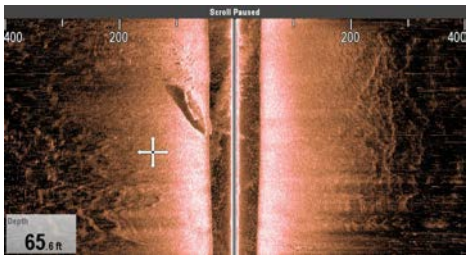
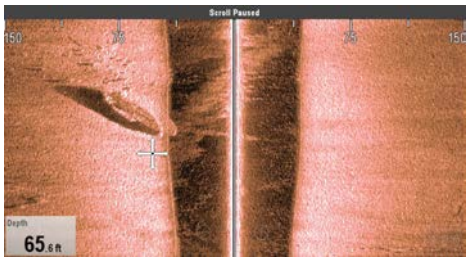
From the application menu, with **Range** set to Manual:

1. Select **Range**.
2. Select **Range Shift**.
   The range shift dialog is displayed.
3. Adjust the setting to the required value.
   You will see the range changing on the screen as you adjust the setting.
4. Select **Back** or press the **OK** button to confirm the setting and close the range shift dialog.

15.13 SideVision™ Range

The **SideVision™** Range function enables you to define the distance to the left and right of the vessel that is displayed on-screen. The range displayed on-screen can be adjusted to suit your needs.

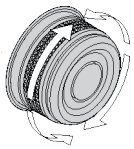
The table below shows examples of the **SideVision™** Range function.

	SideVision™ channel
Ranged Out	
Ranged In	

SideVision™ Range in and out

The method of ranging in and out of a Sonar application displaying **SideVision™** is shown below.

The table below shows the Range controls available for each display variant.

	Controls	Multifunction displays
	**Rotary Control**	• eS Series
	**Rotary Control**	• c Series • e Series • RMK-9 keypad
	**Range in** and **Range out** buttons	• c Series • e Series (excluding e7 and e7D • RMK-9 keypad
	**Range in** and **Range out** on-screen icons	• a Series • e Series • gS Series • eS Series

15.14 Sonar scrolling

The sonar image scrolls from right to left. You can pause the scrolling or adjust the scroll speed, to ease placing of waypoints or VRMs onscreen.

Scroll speed

You can adjust the speed at which the sonar image scrolls. A faster speed provides more detail which may be useful when you are looking for fish. If you select a slower speed the information remains on the display for longer.

Scroll pause

You can pause the display to see a 'snapshot' of the sonar image. When the image is paused scrolling stops but the depth indication continues to be updated.

Adjusting the scroll speed

The default scroll speed is 100%, the scroll speed can be adjusted following the steps below.

From the Sonar application menu:

1. Select **Presentation**.
2. Select **Scroll Speed**.
   The Scroll speed numeric adjust control is displayed.
3. Adjust the scroll speed to the required setting.

   Adjustment increments are as follows:

   - *10% increments for values between 10% and 100%*
   - *100% increments for values between 100% and 500%*

4. Select **Back** or **OK** to confirm and close the numeric adjust control.

Pausing the screen

The Sonar application can be paused.

From the Sonar application:

1. Select **Menu**.
2. Select **Scrolling** so that Pause is highlighted.
   Selecting Scrolling again will resume the scrolling.

15.15 Sonar display modes

Selecting a display mode for the Sonar application

When using a Legacy, Traditional, **CHIRP** or **DownVision™** you can select which display mode you want to use.

From the Sonar application:

1. Select **Menu**.
2. Select **Display Mode**.
3. Select **Select Mode:**.
4. Select the required display mode:
   - None
   - Zoom
   - * A-Scope
   - * Bottom Lock

Important: * Not available on the **DownVision™** channel of a **DownVision™** sonar module.

Note: Display modes are not applicable to SideVision™.

Sonar zoom mode

The zoom display mode magnifies a region of the sonar screen to display more detail.

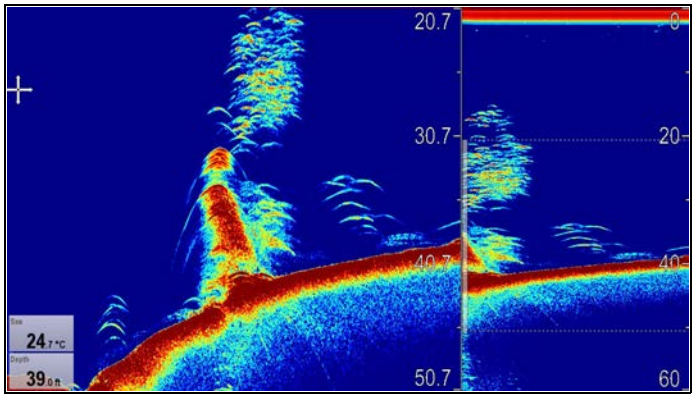
This zoom option enables you to:

- Replace the standard sonar image with the zoomed image, or display the zoomed image alongside the standard sonar image.
- Set the zoom factor to a predefined level, or adjust it manually.
- Reposition the zoomed portion of the image to a different point in the display.

When the range increases, the area shown in the zoom window also increases.

Zoom split

With the zoom display mode you can split the screen and display the zoomed image alongside the standard sonar image (ZOOM SPLIT). The zoomed section is indicated on the standard sonar screen by a zoom box.



Selecting split screen in zoom mode

From the Sonar application, with the zoom display mode selected:

1. Select **Menu**.
2. Select **Display Mode**.
3. Select **Zoom** so that Split is highlighted.
   Selecting Zoom will switch between Split and Full.

Adjusting the sonar zoom factor

When the display mode is set to Zoom, you can select a zoom factor or adjust it manually.

From the Sonar application, with the display mode set to Zoom.

1. Select **Menu**.
2. Select **Display Mode**.
3. Select **Zoom Factor**.
4. Select a preset Zoom Factor (**x2**, **x3**, **x4**) or select **Manual**
   Once selection is made you will be returned to the Display Mode menu.
5. If Manual is chosen select **Manual Zoom**
   The manual zoom factor numeric adjust dialog is displayed.
6. Adjust the setting to the required value.
7. Select **Back** or use the **OK** button to confirm the setting.

Adjusting the position of the sonar zoomed area

When the Zoom display mode is selected, the system automatically selects a zoom position so that the bottom details are always shown in the lower half of the screen. If required, you can reposition the portion of the image to be zoomed so that an alternative area is displayed.

From the Sonar application, with Zoom display mode selected:

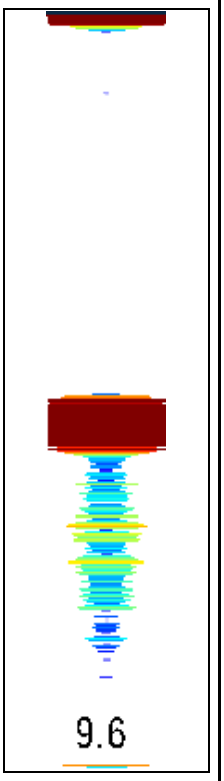
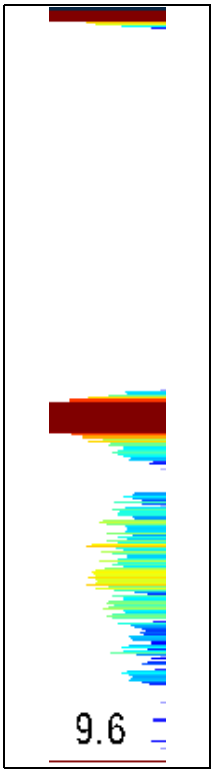
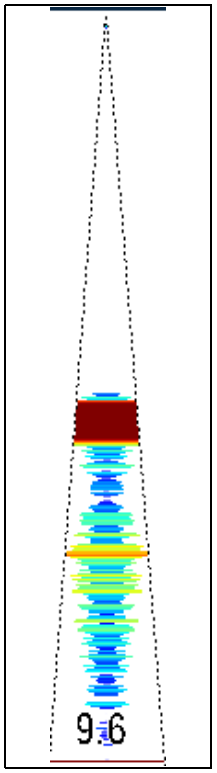
1. Select **Menu**.
2. Select **Display Mode**.
3. Select **Zoom Position** so that Man is selected.
   Selecting the zoom position will switch between Man and Auto.
4. Select **Man Zoom Pos:**.
   The Zoom position numeric adjust control is displayed.
5. Adjust the setting to the required value.
6. Select **Back** or **OK** to close the menu.

Sonar A-Scope mode

The A-Scope mode enables you to view a live (rather than historical) image of the seabed and fish directly below your vessel.

The standard sonar display shows a historical record of sonar echoes. If required, you can display a live image of the bottom structure and the fish directly below the transducer by using the A-Scope feature. The width of the bottom covered by the A-Scope is indicated at the bottom of the window. A-Scope provides a more precise and easier to interpret indication of the target strength.

There are three A-Scope modes:

Mode 1	Mode 2	Mode 3
		
The A-scope image is centred in the window.	The left-hand side of the Mode 1 image is expanded to give a more detailed view.	The A-scope image angles outward as signal width increases with depth.

The numbers displayed at the bottom when in A-Scope mode indicate the approximate diameter (in selected depth units) of the conical beam's coverage of the bottom.

Selecting A-Scope mode

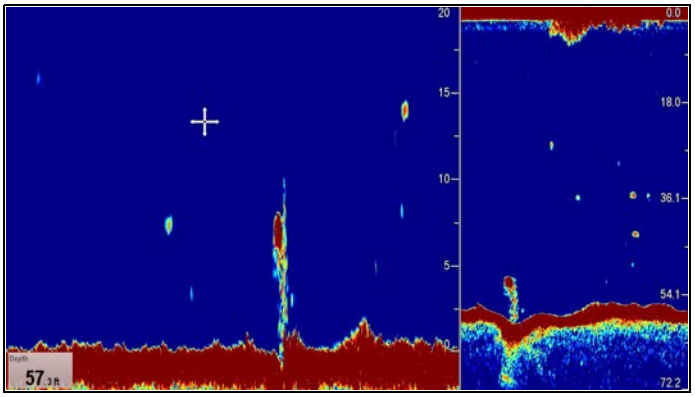
From the Sonar application, with the A-Scope display mode selected:

1. Select **Menu**.
2. Select **Display Mode**.
3. Select **Select Mode:**.
4. Select **A-Scope**.
5. Select **A-Scope:** to display the list of A-Scope modes.
6. Select the required mode.

Bottom Lock

The Bottom Lock display mode applies a filter which flattens the image of the bottom and makes any objects on or just above it easier to see. This feature is particularly useful for finding fish that feed close to the bottom.

Adjusting the range of the bottom lock image allows you to view more bottom details. You can also reposition the image on the screen to anywhere between the bottom of the window (0%) and the middle of the window (50%) using the Bottom Shift control.



Adjusting the bottom lock range/position

From the Sonar application, with bottom lock display mode selected:

1. Select **Menu**.
2. Select **Display Mode**.
3. Select **Bottom Lock** to switch between Full screen and Split screen
4. Select **B-Lock Range**.

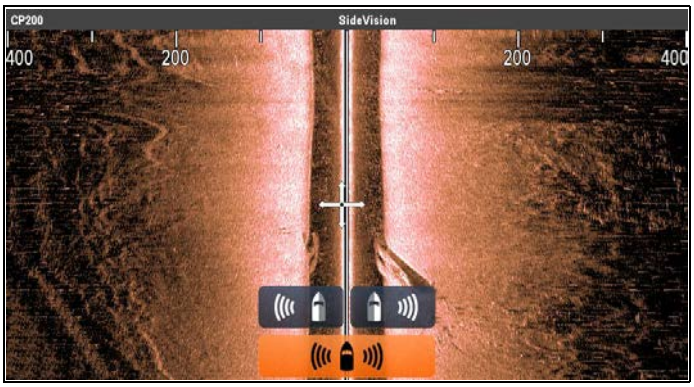
   Selecting Bottom Lock Range will display the B-Lock Range numeric adjust dialog.
5. Adjust the setting to the required value.
6. Select **Back** or use the **OK** button to confirm the setting.
7. Select **B-Lock Shift** to reposition the image onscreen.

   Selecting Bottom Lock Shift will display the B-Lock Shift numeric adjust dialog.
8. Adjust the setting to the required value.
9. Select **Back** or use the **OK** button to confirm the setting.

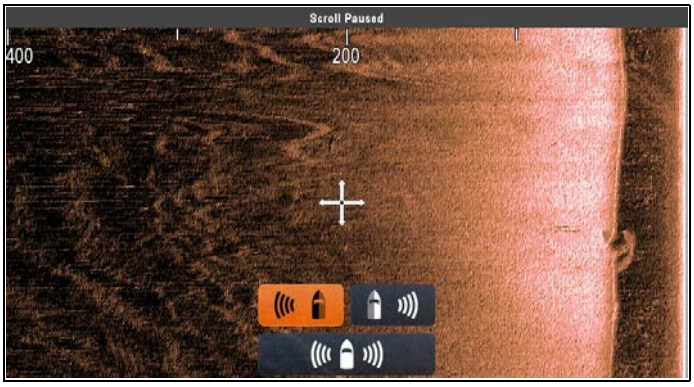
15.16 SideVision™ Views

When connected to a **SideVision™** sonar module the default view displays both **Left** (port) and **Right** (starboard) views at the same time, the View icons and View menu can be used to switch between left and right views or both.

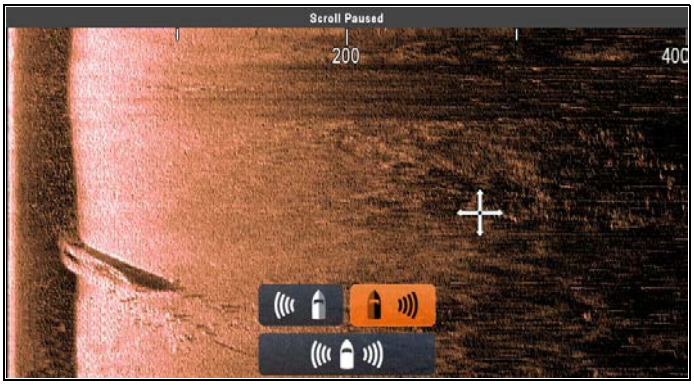
View: Both



View: Left



View: Right



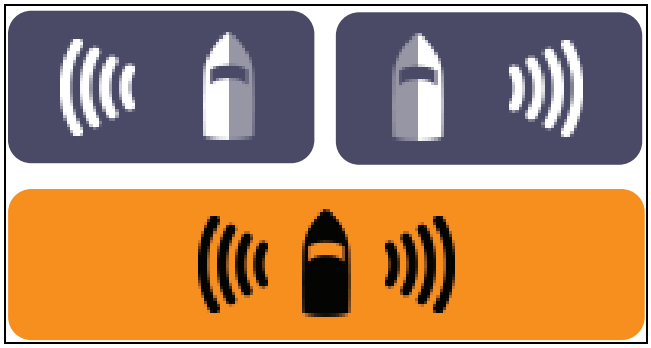
Selecting a SideVision™ view

When viewing a **SideVision™** channel on an MFD with a touchscreen, you can select which channel you want to display in the Sonar application using the View icons.

From the Default **SideVision™** view:

1. Select the on-screen view icon, located in the bottom right corner of the screen

   The View icons are displayed in the bottom center area of the screen.



2. Select the **Left view icon** to display only the left channel.
3. Select the **Right view icon** to display only the right channel, or
4. Select the **Both view icon** to display both channel simultaneously.

Selecting a SideVision™ view using the menu.

When viewing a **SideVision™** channel on an MFD without a touchscreen or on a HybridTouch MFD, you can use the menu to select which channel you want to display in the Sonar application.

From the Default **SideVision™** view:

1. Select **Menu**.
2. Select **View**.
   The View options are displayed.
3. Select **Left** to display only the left channel.
4. Select **Right** to display only the right channel, or
5. Select **Both** to display both channel simultaneously.

15.17 Presentation menu options

The **Presentation** menu provides access to features which provide additional on-screen detail.

The table below shows the available Presentation options.

Menu Item	Description	Options
* **Target Depth ID**	Controls whether the depth of identified targets are displayed. The level of targets displayed is directly linked to the level of Fish Alarm sensitivity.	• On • Off (default)
** **Depth Lines**	Controls whether horizontal lines indicating depth are displayed.	• On • Off (default)
*** **Range Lines**	Controls whether vertical lines indicating range are displayed.	• On • Off (default)
***White Line**	When set to On, this option displays a white line along the contour of the seabed. This helps to distinguish objects close to the bottom.	• On • Off (default)
***Bottom Fill**	When set to On, this option displays a solid color fill for the seabed.	• On • Off (default)
Color Palette	Various color palettes are available to suit different conditions and your personal preferences.	**Traditional / CHIRP sonar channels** • Classic Blue (default) • Classic Black • Classic White • Sunburst • Greyscale • Inverse Greyscale • Copper • Night Vision **DownVision™ / SideVision™ channels** • Copper (default) • Inv. Copper • Slate Grey

Menu Item	Description	Options
		• Inv. Slate Grey
Scroll Speed	Specify the sonar scroll speed.	• 100% (default) • 10% to 500%
** **Gain controls**	Controls whether or not the on-screen sensitivity settings are displayed.	• Show (default) • Hide
Databoxes Set-up	Allows you to set up and display/hide up to 2 databoxes in the bottom left corner of the screen: • Databox 1 • Select Data • Databox 2 • Select Data	**Databox 1** • On • Off **Select Data** Allows selection of a data type by category. **Databox 2** • On • Off **Select Data** Allows selection of a data type by category.

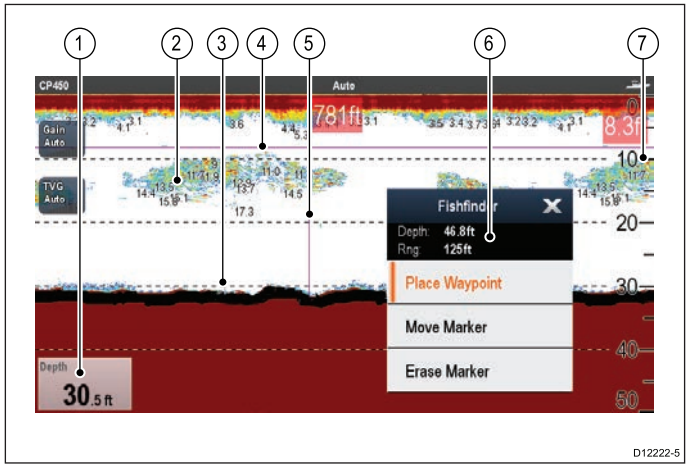
Note:

- * Not available on **DownVision™** or **SideVision™** channels.
- ** Not available on **SideVision™'**
- *** Only available on **SideVision™'**

15.18 Depth and distance

Legacy, Traditional **CHIRP** and **DownVision™** sonar modules use there respective transducers to obtain depth readings. **SideVision™** can only display depth readings when a separate source for depth is available on the network.

The Sonar application provides a number of features to help you determine depth and distance.



	Description
1	**Depth reading** — current depth of bottom.
2	**Depth Target ID** — depths are displayed against recognized targets. The sensitivity of these IDs is directly linked to the Fish Alarm sensitivity; the greater the fish alarm sensitivity, the greater the number of labelled targets.
3	**Depth lines** — horizontal dashed lines drawn at regular intervals to indicate the depth from the surface.
4	**Horizontal VRM marker** — indicates the depth of the target.
5	**Vertical VRM marker** — indicates the distance behind your vessel.
6	**Cursor Depth** — this is the depth of the cursor position. **Cursor Range** — this is the range from your vessel to the cursor position.
7	**Depth markers** — these numbers indicate depth.

Measuring depth and distance with VRM

You can use a Variable Range Marker (VRM) to determine an object's depth and distance behind your vessel. These markers consist of a horizontal (depth) line and a vertical (distance) line, each of which are labelled with the appropriate measurement.

From the Sonar application:

1. Select **Menu**
2. Select **Scroll** so that Pause is highlighted (This may make it easier to position the marker).

   Selecting Scroll will switch the scroll between Pause and Resume.
3. Select the location you want to place the marker.
4. Open the **Sonar context menu**.
5. Select **Place Marker**.

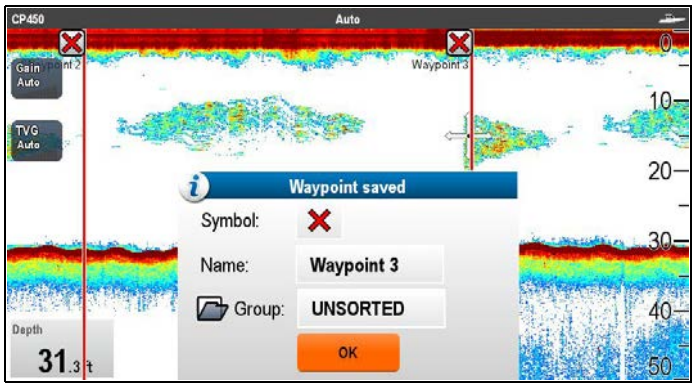
*Once placed you can move the marker by selecting **Move Marker** from the Sonar context menu.*

Note: The VRM is only available in Bottom Lock mode when viewing the display mode in **Split** screen.

15.19 Waypoints in the Sonar application

Placing a waypoint in the Sonar application enables you to mark a position so that you can return to it later.

When a waypoint is placed its details are added to the waypoint list and a vertical line showing the waypoint symbol is displayed on-screen. The waypoints can then be navigated from the Chart application.



Placing a Waypoint in the Sonar application

From the Sonar application:

1. Select and hold the required location.
   The Sonar context menu is displayed.
2. Select **Place Waypoint**.

Placing a waypoint using the WPT button or icon

From the Sonar application:

1. Select **WPT**.
   The waypoint menu is displayed.
2. Whilst the waypoint menu is open:
   - Select **WPT** again to place a waypoint at your vessels position, or
   - Select the appropriate option: Place Waypoint At Vessel, Place Waypoint At Cursor or Place Waypoint At Lat/lon.

Placing a Waypoint using the context menu

You can place a waypoint in the Sonar application using the context menu.

From the Sonar context menu:

1. Select **Place Waypoint**.
   The Waypoint is placed at the cursors location. and the new waypoint dialog is displayed.
2. Select **OK** to accept the default waypoint details, or
3. Select a field to edit the new waypoint's details.

15.20 Sensitivity settings

The **Sensitivity settings** menu provides access to features that enhance what is displayed onscreen. In most situations default values should be adequate.

Legacy, traditional and CHIRP sonar modules

	CPx70 external	**CHIRP** external	Traditional external	Traditional internal	Legacy external
Manual / Auto Gain	✓	✓	✓	✓	✓
Auto Gain Modes	✗	✗	✗	✓	✓
Auto Gain Offset	✓	✗	✗	✗	✗
Manual / Auto Intensity	✓	✗	✗	✗	✗
Auto Intensity Offset	✓	✗	✗	✗	✗
Color Gain	✗	✓	✓	✓	✓
TVG	✗	✓	✓	✓	✓
Auto TVG Modes	✗	✓	✓	✗	✗
Depth Sensitivity	✓	✗	✗	✗	✗
Color Threshold	✓	✓	✓	✓	✓
Power Mode	✓	✓	✓	✓	✓

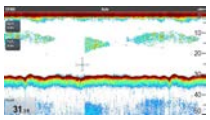
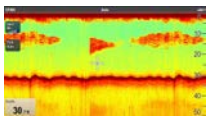
DownVision™ and SideVision™sonar modules

	DownVision™	**SideVision™**
Gain	✓	✓
Contrast	✓	✓
Noise Filter	✓	✗
Color Threshold	✓	✗

Gain

The gain settings alter the way the sonar module processes background noise. Adjusting the gain settings can improve the sonar image, however for optimum performance in most conditions, we recommend that you use the auto settings.

The gain control determines the strength above which echoes are displayed onscreen.

		
20% Manual Gain	Auto Gain	80% Manual Gain

Auto

In Auto mode the sonar module automatically adjusts the gain setting to suit current conditions.

Auto Gain modes

When connected to a Legacy sonar module or a Traditional internal sonar module 3 Auto Gain modes are available:

- Cruising (Low)
- Trolling (Med)
- Fishing (Fast)

Auto Gain Offset

When connected to a **CPx70** series sonar module Auto Gain can be offset by +/–50%. This allows small modification to be made to the gain, while still utilizing Raymarine's proprietary noise filter and target identification algorithms.

Manual

If necessary you can set the gain controls manually, between a value of 0% to 100%. This value should be set high enough to see fish and bottom detail but without too much background noise. Generally a high gain is used in deep and/or clear water; a low gain in shallow and/or murky water.

The new values remain set even when you switch off the display.

Onscreen gain control

Selecting the onscreen control enables you to adjust the setting as required.

When connected to a **CPx70** series sonar module the Auto gain can be offset by +/-50%	
When connected to non **CPx70** series external **CHIRP**, external Traditional or **DownVision™** sonar modules gain modes are not required.	

When connected to a Legacy or a internal Traditional sonar module the automatic gain has 3 modes.	
When in manual mode the slider bar control is shown regardless of connected sonar module type.	

Note: SideVision™ channels do not use onscreen Gain controls The Gain setting can be found in the **Sensitivity Settings** menu.

Enabling and disabling on-screen gain controls

You can enable and disable the on-screen gain controls by following the steps below.

On a touchscreen multifunction display, with the relevant application displayed.

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Gain Controls**.

   Selecting Gain Controls will switch between showing and hiding the on-screen controls.

Note: When the on-screen Gain controls are set to Hidden then the Gain settings can be accessed directly from the application menu: **Menu > Gain**.

Adjusting gain manually using on-screen controls

1. Select the on-screen **Gain** control located on the left hand side of the Sonar application.
2. Select the **Auto** box to switch between Auto and Manual gain.
3. With **Auto** deselected, select and hold the **Slider** and move **Left** to decrease value or **Right** to increase value.

Setting the auto gain mode using the on-screen controls

1. Select the on-screen **Gain** control located on the left hand side of the Sonar application.
2. Select the **Auto** box so that a tick is displayed in the box.
3. Select the required **Auto Gain Mode**.

Adjusting sonar Gain using the menu

The sonar Gain setting can be accessed from the Sonar application menu.

From the Sonar application:

1. Select **Menu**.
2. Select **Sensitivity Settings**.
3. Select **Gain**.

   The Gain adjust dialog is displayed
4. Adjust the gain control to the required setting, or
5. Select **Auto**.

   A tick is displayed in the **Auto** box to signify automatic gain is enabled.

Setting auto gain mode using the menu

When using a Legacy sonar module or a Traditional internal sonar module 3 Auto Gain modes are available. The Auto Gain mode can be set by following the steps below.

From the Sonar application menu:

1. Select **Sensitivity Settings**.
2. Select **Auto Gain Mode**.
3. Select the required auto gain mode.

Setting an auto gain offset

When connected to a **CPx70** series sonar module the Auto gain can be offset by +/–50%.

From the **Sensitivity Settings** menu:

1. Select **Gain**.
2. Ensure **Auto** is selected.
3. Adjust the slider control to the required value.

The scrolling image will now track the automatic setting by the offset value specified.

Intensity

When connected to a **CPx70** series sonar module the Intensity control is available. Sonar modules use different colors to determine the strength of an echo. You can adjust the color intensity manually between 0% and 100% or set it to automatic. When Intensity is set to automatic the setting can be offset by +/- 50%.

The Intensity control sets the lower limit for the strongest echo color. All echoes with a signal strength above this value are displayed in the strongest color. Those with a weaker value are divided equally between the remaining colors.

- Setting a low value produces a wide band for the weakest color, but a small signal band for the other colors.
- Setting a high value gives a wide band for the strongest color, but a small signal band for the other colors.

Onscreen Intensity control

The onscreen Intensity control is available when connected to a **CPx70** series sonar module.

Selecting the onscreen control enables you to adjust the setting as required.

The Auto Intensity can be offset by +/-50%	
When in manual mode the slider bar control	

Adjusting the Intensity

To adjust the Intensity control on a **CPx70** series sonar module follow the steps below.

From the Sonar application:

1. Select **Menu**.
2. Select **Sensitivity settings**.

3. Select **Intensity**.
   The slider bar control is displayed.
4. Adjust the control to the required value.
5. Select **Back** to confirm setting and close slider bar, or
6. Select **Auto** to enable automatic Intensity control.

Setting auto Intensity offset

When connected to a **CPx70** series sonar module the Auto Intensity can be offset by +/–50%.

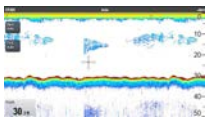
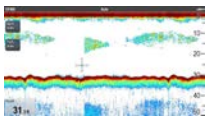
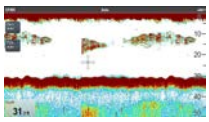
From the **Sensitivity Settings** menu:

1. Select **Intensity**.
2. Ensure **Auto** is selected.
3. Adjust the slider control to the required value.

The scrolling image will now track the automatic setting by the offset value specified.

Color Gain

Non—**CPx70** series, Traditional, **CHIRP** and Legacy sonar modules use different colors to determine the strength of an echo. You can adjust the color intensity manually between 0% and 100% or set it to automatic.

		
20% Manual	Auto	80% Manual

The color gain control sets the lower limit for the strongest echo color. All echoes with a signal strength above this value are displayed in the strongest color. Those with a weaker value are divided equally between the remaining colors.

- Setting a low value produces a wide band for the weakest color, but a small signal band for the other colors.
- Setting a high value gives a wide band for the strongest color, but a small signal band for the other colors.

Adjusting the color gain

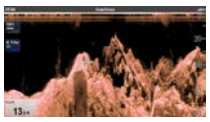
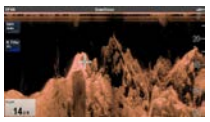
To adjust the Color gain on Traditional, **CHIRP** and Legacy sonar modules follow the steps below.

From the Sonar application:

1. Select **Menu**.
2. Select **Sensitivity settings**.
3. Select **Color Gain**.
   The slider bar control is displayed.
4. Adjust the control to the required value.
5. Select **Back** to confirm setting and close slider bar, or
6. Select **Auto** to enable automatic Color gain control.

Contrast

DownVision™ and **SideVision™** use monochrome shading to determine the strength of echoes. You can adjust the contrast manually between 0% and 100% or set it to automatic.

		
20% Manual Contrast	Auto Contrast	80% Manual Contrast

Contrast sets the lower limit for the strongest echo shade. All echoes with a signal strength above this value are displayed in the lightest shade. Those with a weaker value are divided equally between the remaining shades.

- Setting a low value produces a wide band for the darkest shade, but a small signal band for the other shades.
- Setting a high value gives a wide band for the lightest shade, but a small signal band for the other shades.

Adjusting the contrast

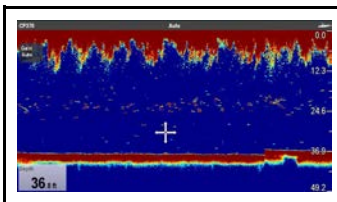
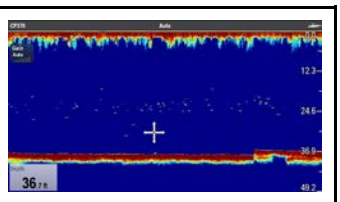
To adjust the contrast setting follow the steps below.

From the Sonar application:

1. Select **Menu**.
2. Select **Sensitivity settings**.
3. Select **Contrast**.
   The Contrast slider bar control is displayed.
4. Adjust the control to the required value.
5. Select **Back** to confirm setting and close slider bar, or
6. Select **Auto** to enable automatic contrast.

Surface filter

The **Surface filter** setting is available when connected to a **CPx70** series sonar module. The control reduces the amount of noise / clutter displayed near the surface by varying the gain throughout the water column.

	
0%	100%

The Surface filter can be set to automatic or can be adjusted manually. In manual:

- a low value decreases the depth to which the filter is applied and produces stronger targets / more clutter near the surface.
- a high value increases the depth to which the filter is applied and produces weaker targets / less clutter near the surface.

Adjusting the Surface filter

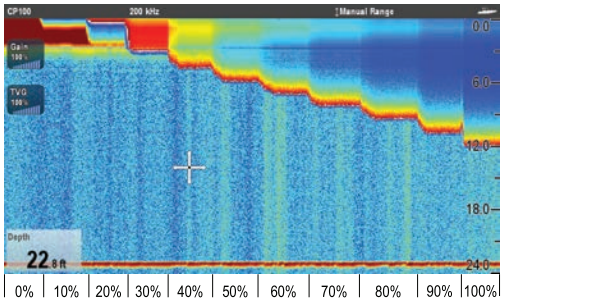
Adjusting the **Surface filter** settings can improve the sonar image.

From the **Sensitivity Settings** menu:

1. Select **Surface Filter**.
2. Adjust the slider control to the required value, or
3. Select **Auto** to allow the system to automatically adjust the **Surface Filter** for current conditions.

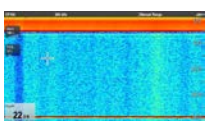
Time Varied Gain (TVG)

The Time Varied Gain (TVG) setting controls the amount of attenuation applied throughout the water column, which provides a balance of shallow water returns (where echoes are strong) against deep water returns (where echoes are weak) so that targets of the same size produce echoes of the similar size regardless of target depth. The TVG setting can be manually set from 0% to 100% or set to automatic.

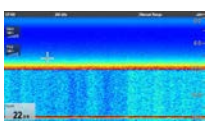


- A higher TVG setting will produce weaker targets / less clutter on-screen.
- A lower TVG setting will produce stronger targets / more clutter on-screen.

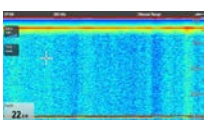
Note: TVG values between 0% and 30% represent top out mode control, values between 31% and 100% represent TVG control.



31% TVG



100% TVG



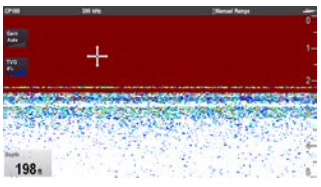
Auto TVG

Note: TVG has no effect in simulator mode however top out mode (0% to 30%) does.

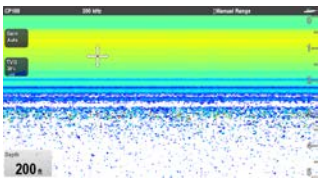
Top out mode

Top out mode is a digital filter that is combined with the TVG control. The top out mode filter reduces noise and clutter from the top portion of the sonar beam.

Top out mode is active when TVG values are between 0% and 30%. TVG values between 31% and 100% represent actual TVG control.



0% TVG



30% TVG

Setting TVG to Automatic

The TVG setting can be set to automatic by following the steps below.

From the Sonar application:

1. Select **Menu**.
2. Select **Sensitivity Settings**.
3. Select **TVG**.
   The TVG slider bar control is displayed.
4. Select **Auto** so that a tick is placed in the auto box.

Auto TVG mode

When TVG is set to automatic 3 auto TVG modes are available, depending on sonar module in use.

The auto TVG modes available are as follows:

- Low
- Medium
- High

Auto TVG modes are only available on Legacy sonar modules and Traditional internal sonar modules.

Selecting an auto TVG mode

Follow the steps below to select an Auto TVG mode.

From the Sonar application, with TVG set to Auto:

1. Select **Menu**.
2. Select **Sensitivity Settings**.
3. Select **Auto TVG**.
4. Select the required setting: Low, Medium or High.

Manually adjusting TVG

From the Sonar application menu:

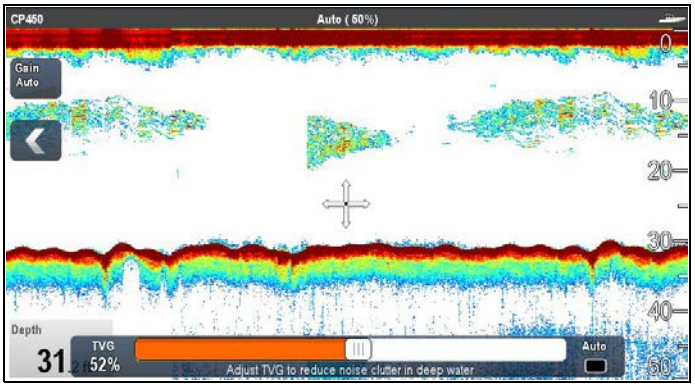
1. Select **Sensitivity Settings**.
2. Select **TVG**.
   The TVG slider bar control is displayed.
3. Adjust the slider bar control to the required setting.

   Values between 31% and 100% represent TVG control.

4. Select **Back** or **OK** to close slider bar control.

On-screen TVG controls

Touch only and HybridTouch multifunction displays have on-screen TVG controls.



Selecting the on-screen TVG control will display the TVG settings.

When connected to an external CHIRP sonar modules (excluding DownVision™) and external Traditional sonar modules (excluding legacy) the automatic TVG has 3 modes.



When in manual mode the slider bar control is shown.



Enabling and disabling on-screen gain controls

You can enable and disable the on-screen gain controls by following the steps below.

On a touchscreen multifunction display, with the relevant application displayed.

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Gain Controls**.

   Selecting Gain Controls will switch between showing and hiding the on-screen controls.

Note: When the on-screen Gain controls are set to Hidden then the Gain settings can be accessed directly from the application menu: **Menu > Gain**.

Adjusting TVG manually using on-screen controls

Touch only and HybridTouch multifunction displays have on-screen TVG controls.

1. Select the on-screen **TVG** control located on the left hand side of the Sonar application.
2. Select the **Auto** box to switch between Auto and Manual TVG.
3. Adjust the setting to the required value.

Setting auto TVG using the on-screen controls

Touch only and HybridTouch multifunction displays have on-screen TVG controls.

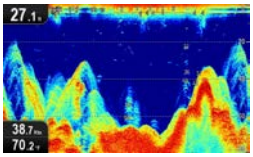
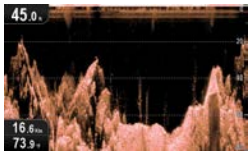
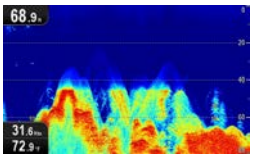
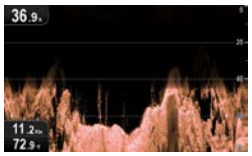
1. Select the on-screen **TVG** control located on the left hand side of the Sonar application.
2. Select the **Auto** box to select Auto TVG mode.
3. When connected to external CHIRP sonar modules (excluding DownVision™) and external traditional sonar modules (excluding legacy) you can select an auto TVG mode,

Noise Filter

The Noise Filter reduces the amount of clutter displayed onscreen by varying the gain throughout the column of water. Adjusting the setting can improve target identification, however for optimum performance in most conditions, it is recommended that you use the auto setting.

The Noise Filter can be set to automatic or adjusted manually:

- **Automatic** — In Auto mode the Noise Filter is set to 20%.
- **Manual** — You can adjust the Noise Filter manually, between a value of 0% to 100%.
  - A low value decreases the depth at which the filter is applied.
  - A high value increases the depth at which the filter is applied.

	Sonar	DownVision
0%		
100%		

The new values will persist over a power cycle.

Adjusting the Noise Filter

Follow the steps below to adjust the Noise Filter.

From the Sonar application:

1. Select **Menu**.
2. Select **Sensitivity Settings**.
3. Select **Noise Filter**.

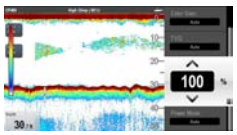
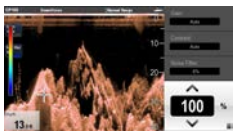
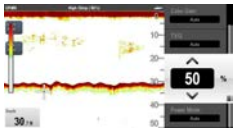
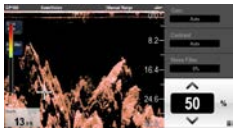
   The Noise filter slider bar control is displayed.
4. Adjust the Noise Filter to the required value, or
5. Select the **Auto** check box to switch to Auto mode.

Note: The Noise filter can also be adjusted by selecting the on-screen **N. Filter** control.

Color threshold

Color threshold determines the signal strength below which targets are not shown. Traditional and CHIRP sonar use different colors to determine signal strengths whilst DownVision™ uses monochrome shading.

The Color Threshold setting is a global setting. When the color threshold value is changed all Sonar application panes on all networked multifunction displays will share the same color threshold value.

Color threshold	Traditional / CHIRP channels	DownVision™ channel
100% (default)		
50%		

A low setting would result in only the strongest colors or lightest shades being displayed.

Adjusting the color threshold

The color threshold's default value is 100%, you can adjust this setting so that less colors / shades are displayed.

From the Sonar application menu:

1. Select **Sensitivity Settings**.
2. Select **Color Threshold**.
3. Adjust the color threshold to the required value.
4. Select **OK** to confirm setting and close the numeric adjust control.

Power mode

Power mode controls the power level of the transducer. Power mode can be set to automatic or adjusted manually between 0% and 100%. Power mode is only available on CHIRP, Traditional and Legacy sonar modules.

- **Auto** — This is the default setting. When auto is selected the sonar module automatically determines the optimum setting based on the current depth, speed, and (bottom) signal strength.
- **Manual** — You can adjust the power level between in 1% increments. Lower power levels are normally used in depth ranges less than 2.4 m (8 ft.) and higher power levels are typically selected for depths greater than 3.7 m (12 ft.).

Adjusting the transducer power level

From the Sonar application menu:

1. Select **Sensitivity settings**.
2. Select **Power Mode**.
   The power mode slider bar control is displayed.
3. Adjust the slider bar to the required setting, or
4. Select **Auto** to set automatic power mode.

15.21 Fish alarms

The following Fishing alarms can be set when a depth data source is available.

- **Fish** — alarm sounds when a target meets the specified sensitivity level and, is within the depth limits (if enabled).
- **Fishing Deep** — alarm sounds when the detected depth is greater than the deep limit.
- **Fishing Shallow** — alarm sounds when the detected depth is less than the shallow limit.

Setting up fish alarms

From the Alarms menu **homescreen > Set-up > Alarms**:

1. Select **Fish**.
   The Fish alarms menu is displayed.
2. Select **Fish** so that On is highlighted.
3. Select **Fish Sensitivity**.
   The fish sensitivity numeric adjust control is displayed.
4. Adjust the fish sensitivity to the require value.
   The greater the fish alarm sensitivity, the greater the number of target image depths displayed.
5. Select **Fish Depth Limits** so that **On** is highlighted.
   The shallow and deep fish limit settings will be activated in the menu.
6. Select **Shallow Fish Limit**.
   The shallow fish limit numeric adjust control is displayed.
7. Adjust the value to the require setting.
8. Select **OK** to confirm the new value and close the numeric adjust control.
9. Select **Deep Fish Limit**.
   The deep fish limit numeric adjust control is displayed.
10. Adjust the value to the require setting.
11. Select **OK** to confirm the new value and close the numeric adjust control.

Setting up Fishing — deep alarm

From the Alarms menu **homescreen > Set-up > Alarms > General Alarms**:

1. Select **Fishing — Deep water arrival**.
2. Select Enable so that a tick is placed in the check box.
3. Select **Deep Limit**.
4. Adjust the setting to the required value.
5. Select **Back** or **OK** to confirm the new value and close the numeric adjust control.

Note: The Deep Limit cannot be set to less than the Shallow Limit.

Setting up Fishing — shallow alarm

From the Alarms menu **homescreen > Set-up > Alarms > General alarms**:

1. Select **Fishing — Shallow water arrival**.

2. Select Enable so that a tick is placed in the check box.
3. Select **Shallow Limit**.

   The shallow limit numeric adjust control is displayed.
4. Adjust the setting to the required value.
5. Select **Back** or **OK** to confirm the new value and close the numeric adjust control.

Note: The Shallow Limit cannot be set to greater than the Deep Limit.

15.22 Frequency tuning

The frequency is dependent on the sonar module and transducer in use. When using a non-CHIRP sonar module or a CHIRP sonar module that is operating in non-CHIRP mode then the transducer's frequency can be manually fine-tuned.

The advantages of being able to tune the frequency include:

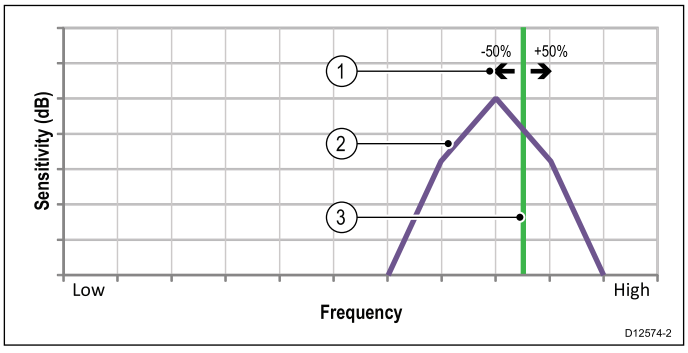
- Optimization for particular species of fish and water conditions.
- Avoiding interference from other sonar operating nearby (at the same frequency).
- Use of wide or narrow beam on a particular transducer.

Traditional and Legacy frequency tuning

The following frequency types are available on Legacy and Traditional sonar modules:

- **Auto** — When operating in automatic no fine-tuning is needed as the system will set the frequency automatically to suit your transducer's operating conditions.
- **Lower frequencies** — (e.g. 50kHz) — Produces a wide sonar beam and penetrate the water well. Lower frequencies provide a lower resolution image that may not be as good at detecting small fish. Use lower frequencies if you require a large coverage beneath your vessel or if you are in deep water.
- **Higher frequencies** — (e.g. 200 kHz) — Produces a narrow beam and produce a high resolution image. They are most useful in shallower water (up to 1000 ft) and at higher speeds.

The graph below depicts fine-tuning of a Traditional or Legacy sonar frequency (from –50% to +50%).



1. Tuning range
2. Transducer characteristics
3. Operating frequency

CHIRP frequency tuning

The list below provides details of the frequency types available when using a CHIRP sonar module.

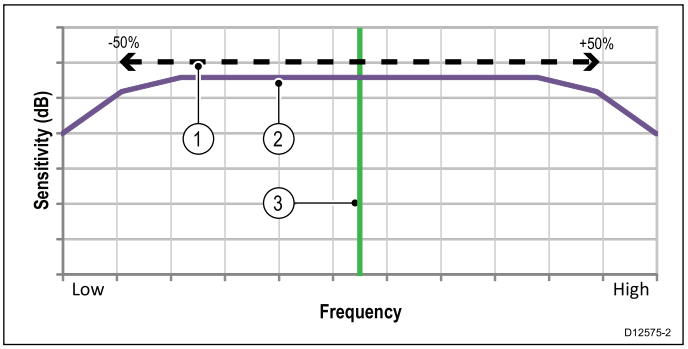
- **Auto** — When operating in automatic no fine-tuning is needed as the system will set the frequency automatically to suit your transducer's operating conditions.
- **Low frequency** — non-CHIRP mode (e.g. 50kHz) — Produces a wide sonar beam and penetrate the water well. Lower frequencies provide a lower

resolution image that may not be as good at detecting small fish. Use lower frequencies if you require a large coverage beneath your vessel or if you are in deep water.

- **Medium frequency** — non-CHIRP mode (e.g. 90 kHz) — Produces good detail at most depths, with moderately wide sonar beam.
- **High frequency** — non-CHIRP mode (e.g. 160 kHz) — Produces a narrow beam and produce a high resolution image. They are most useful in shallower water (up to 1000 ft) and at higher speeds.
- **Low Chirp** — CHIRP mode (e.g. 42 to 65 kHz) — No fine-tuning is not needed as the CHIRP sonar module will sweep the transducer's available frequency range in each ping.
- **Med Chirp** — CHIRP mode (e.g. 85 to 135 kHz) — No fine-tuning is not needed as the CHIRP sonar module will sweep the transducer's available frequency range in each ping.
- **High Chirp** — CHIRP mode (e.g. 130 to 210 kHz) — No fine-tuning is not needed as the CHIRP sonar module will sweep the transducer's available frequency range in each ping.

With the CHIRP sonar module set to a non-CHIRP mode the frequency can be fine tuned to adjust the frequency at which the transducer is transmitting.

The graph below depicts fine-tuning of a CHIRP broadband sonar frequency (from —50% to +50%).



1. Tuning range
2. Transducer characteristics
3. Operating (center) frequency

Fine-tuning the frequency

When connected to a Traditional or Legacy sonar module or when operating a CHIRP sonar module in non-CHIRP mode the transmit frequency can be fine-tuned.

From the Sonar application:

1. Ensure that the channel frequency that you want to fine-tune is displayed in the active sonar pane.
2. Select **Menu**.
3. Select **Set-up**.
4. Select **Sounder Set-up**.
5. Select **Tune Frequency**.
   The frequency adjust control is displayed.
6. Adjust the frequency until optimum results are achieved.

15.23 Sounder set-up menu options

This section details the options available in the Sounder set-up menu: (**Menu > Set-up > Sounder Set-up**).

Menu Item	Description	Options
* **Ping Rate**	Hyper Ping is a setting only available on Traditional internal and Legacy sonar modules, for use in shallow waters (depth range set to 6 meters (20 feet) or less. In depths of over 6 meters (20 feet) the ping rate will revert to normal until depth conditions are met. When set to Hyper the display will provide an accurate, un-distorted image of the bottom at speeds of up to 40 kts.	• Normal (default) • Hyper
* **Ping Rate Limit**	Provides a speed limiter; it is useful to adjust the ping rate limit to suit local conditions. For example, the ping rate may be too fast when there is a hard bottom in shallow water. **Note:** Ping Rate Limit is disabled if Ping Rate is set to Hyper.	• **DownVision™** sonar: 5 to 80 pings per second. • Legacy and Traditional Internal sonars: 5 to 50 pings per second. • CHIRP and traditional external sonars: 5 to 30 pings per second.
Ping Enable	The sonar ping can be disabled. This is useful when other equipment is being tested, or if someone is diving beneath the boat. This setting reverts to Enabled when the sonar module is powered off.	• On • Off
* **Tune Frequency**	Enables non-CHIRP channel frequencies to be manually tuned.	• –50% to +50%
* **Interference Rejection**	Removes spikes caused by other Sonar-equipped vessels. **Note:** Interference Rejection is disabled if Ping Rate is set to Hyper.	• Auto • Low • Medium • High • Off
* **2nd Echo IR**	Adjusts the ping rate in small increments, according to the 2nd echo level. This results in better sensitivity of the image. **Note:** 2nd Echo IR is disabled if Ping Rate is set to Hyper.	• Off • Low • High
Sonar Reset	Restore all settings on the sonar module to factory default. When performing a sonar Reset, it is normal to briefly lose connection with the sonar module. Transducer selection is not affected by the Sonar Reset operation.	• Yes • No
Trip Reset	Resets the Trip Counter of the sonar module	• Yes • No

Note: * Not applicable to **SideVision™**.

15.24 Transducer set-up menu options

The **Transducer Set-up** menu should be used when setting up your multifunction display for the first time or when installing a depth transducer.

Note: The settings listed below will only be available if the connected transducer supports the data type.

Menu Item	Description	Options
Transducer	Select the appropriate transducer type from those displayed. Some transducers may be detected by the system automatically.	Options available are dependent on the sonar module connected.
Speed Transducer	Select the appropriate speed transducer from those available. This option is only available if you are not using a combined Depth/Speed or Depth/Speed/Temperature transducer.	Options available are dependent on the sonar module connected.
Depth Offset	Offset represents the depth of the transducer relative to: • Waterline = 0.0 ft and above. • Keel = 0.1 ft and below.	• –9.8 to +9.8 feet — or equivalent units
Speed Offset	Offset applied to the speed log.	• 0 to 100%
Temperature Offset	Offset applied to the temperature transducer value.	• –9.9 to +9.9°F — or equivalent units

15.25 Resetting the sonar

The reset function restores the unit to its factory default values.

Note: Performing a factory reset will clear speed and temperature calibration settings and the depth offset.

1. Using a compatible Raymarine multifunction display go to the Sonar application page.
2. Select **Menu** from the side menu.
3. Select **Set-up**.
4. Select **Sounder Set-up**.
5. Select **Sonar reset**.
6. Select **Yes** to confirm.

The unit will now be reset to factory default settings.

Chapter 16: Radar application

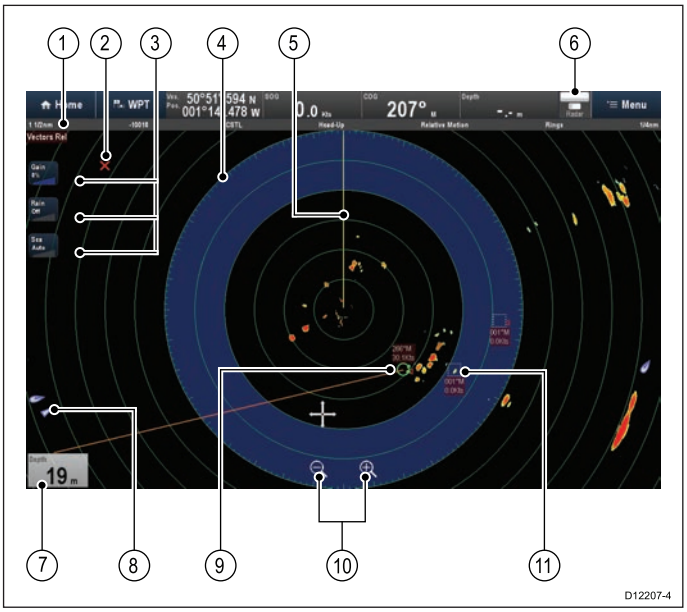
Chapter contents

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- 16.3 Switching the unit on and off on page 246
- 16.4 Multiple Radar support on page 247
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- 16.7 Radar range and image quality on page 249
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- 16.16 Radar mode and orientation on page 260
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16.1 Radar application overview

Radio Detection And Ranging (Radar) equipment is used to detect the presence, distance and speed of objects (known as 'targets'). Radar works by transmitting radio pulses, then detecting reflections of these pulses (echoes) from objects within range and displaying the reflections as targets in the Radar application.

Important: Until you are familiar with interpreting the Radar display; every opportunity should be taken to compare the Radar screen patterns with visual targets such as other vessels, buoys and coastal structures. You should practice harbor and coastal navigation during daylight hours and in clear weather conditions.



	Description
1	Radar status bar displaying: • Range • Radar scanner serial number • Gain mode • Orientation • Motion mode • Range ring spacing
2	Waypoint
3	Onscreen controls (Touchscreen multifunction displays only.)
4	16.12 Guard Zone
5	Ship's Heading Marker (SHM) (Your vessel's dead ahead bearing is indicated by the SHM. If the cursor is placed over the SHM, it will temporarily be removed to help placing markers or acquiring targets etc.)
6	Radar status (Displayed in the databar)
7	Databox overlay
8	Automatic Identification System (AIS) target
9	Acquired 16.9 Mini Automatic Radar Plotting Aid (MARPA) target
10	Range controls (Touchscreen multifunction displays only.)
11	MARPA target being acquired

Note:

- A GPS receiver and a fast heading sensor are required for MARPA operation.
- A GPS receiver is required for Radar overlay in the Chart application.

Radar scanner status symbols

The Radar scanner power mode status is indicated in the databar located at the top of the screen.

Symbol	Radar power mode	Description
	Transmit (TX)	**Rotating icon** The Radar is powered on and transmitting. This is the usual mode of operation.
	Standby (STBY)	**Static icon** The Radar is powered on but not transmitting. On Open Array Radars the antenna is not rotating. The Radar does not transmit and Radar data is not shown onscreen. This is a power-save mode used when the Radar is not needed for short time periods. This is the default mode.
	Sleep	**Static icon** Radar scanners connected over Wi-Fi go into a sleep mode when powered down, this is so that the Wi-Fi connection is still available to re-connect to the Radar.
	Off	**Grayed out icon** Wired Radar powered off or no Radar is connected.
	Timed Transmit	**Radar switches between rotating and static icon** Radar switches between on/transmitting, and standby/sleep in Timed Transmit mode.

Radar Feature Comparison

The information below shows which settings and features available for each type of Radar scanner:

Radar scanner types:

- Quantum™
- SuperHD™ Open Array
- HD Open Array
- HD Radome

- Non-HD Digital Radome

Sensitivity controls

Feature	Radar type
16.20 Gain	• All
16.20 Color Gain	• Quantum™ • SuperHD™ Open Array • HD Open Array • HD Radome
16.20 Rain	• All
16.20 Sea Clutter	• All
16.20 FTC (Fast Time Constant)	• Non-HD Digital Radome
16.20 Power Boost	• SuperHD™ Open Array
16.20 Antenna Boost	• SuperHD™ Open Array

Gain Modes

Feature	Radar type
16.19 Buoy	• SuperHD™ Open Array • HD Open Array • HD Radome
16.19 Harbor	• All
16.19 Costal	• All
16.19 Offshore	• All
16.19 Bird	• SuperHD™ Open Array • HD Open Array • HD Radome
16.19 Weather	• Quantum™

Settings and Features

Feature	Radar type
16.21 Dual Range	• SuperHD™ Open Array • HD Open Array • HD Radome
Interference Rejection	• All
Interference Rejection Level	• Quantum™ • Non-HD Digital Radome
Target Expansion	• All
Expansion Level	• Non-HD Digital Radome
16.12 Guard Zone	• All
16.12 Guard Zone Sensitivity	• All

Feature	Radar type
16.9 Radar Targets	• Quantum™ = 10 • SuperHD™ Open Array = 25 • HD Open Array = 25 • HD Radome = 25 • Non-HD Digital Radome = 10
16.22 Tuning	• SuperHD™ Open Array • HD Open Array • HD Radome
16.22 Radar Speed	• Quantum™ = 24 RPM • SuperHD™ Open Array = 24 RPM / Auto (48 RPM) • HD Open Array = 24 RPM / Auto (48 RPM) • HD Radome = 24 RPM / Auto (48 RPM) • Non-HD Digital Radome = 24 RPM
16.22 Sea Clutter Curve	• All
16.22 Parking Offset (Open Arrays only)	• SuperHD™ Open Array • HD Open Array
16.22 Antenna Size Selection (Open Arrays only)	• SuperHD™ Open Array = 4ft / 6ft • HD Open Array = 4ft / 6ft
16.22 Timed Transmit	• All
Bearing Alignment	• All
MBS (Main Bang Suppression)	• All
Tuning Preset	• SuperHD™ Open Array • HD Open Array • HD Radome • Non-HD Digital Radome
STC (Sensitivity Time Control) Preset	• Non-HD Digital Radome
Transmit Frequency (Adjustment)	• Quantum™
VRM/EBL (Variable Range Markers / Electronic Bearing Lines)	• All

Feature	Radar type
Display Timing	• SuperHD™ Open Array = 0–767m (range dependent) • HD Open Array = 0–767m (range dependent) • HD Radome = 0–767m (range dependent) • Non-HD Digital Radome = 0–153.6m
Max Range	• Quantum™ = 24nm • SuperHD™ Open Array = 72nm • HD Open Array = 72nm • HD Radome = 48nm • Non-HD Digital Radome = 48nm
16.17 Colors	• Quantum™ = 256 • SuperHD™ Open Array = 256 • HD Open Array = 256 • HD Radome = 256 • Non-HD Digital Radome = 8

16.2 Pairing with a Quantum Radar using Wi-Fi

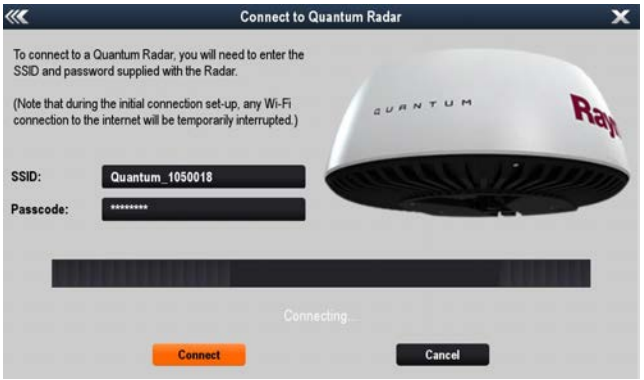
If your Radar scanner supports a Wi-Fi connection, you can connect to a **LightHouse™** MFD which also supports Wi-Fi. During pairing, the Wi-Fi credentials of all MFDs with Wi-Fi switched on are sent to the Quantum Radar. At subsequent power cycles the Quantum Radar will automatically connect to the MFD with the strongest signal.

Note:

1. During initial set up you will have 10 minutes in which to connect the Radar to your MFD. After this time, if no connection is made, the Radar will automatically go to Sleep. If this occurs, power cycle the Radar to bring it out of Sleep mode and establish a connection.
2. Networked MFDs that only have their Wi-Fi enabled after the initial pairing period, will send Wi-Fi credentials to the Radar when their Wi-Fi is switched on.

1. Apply power to your MFD(s).
2. Power on and then enable the Wi-Fi connection to the MFDs which have the strongest signal, as identified during the pre-installation site survey. Usually these will be the MFDs closest to and / or with the clearest line of sight to the Radar).
3. Apply power to your Radar scanner.
4. Select **Quantum Radar** from the External Devices menu on the MFD: (**Homescreen > Set-up > System Settings > External Devices > Quantum Radar**).
5. Select **Pair with Quantum Radar**.
6. If prompted, select **OK** to enable your MFD's Wi-Fi connection.
7. Enter the Radar's SSID (e.g. `Quantum_1234567`) in the **SSID** field and the passcode (e.g. `901589f5`) in the **Passcode** field.

   Refer to the Retain your Wi-Fi Passcode section for details on locating your SSID and Passcode.



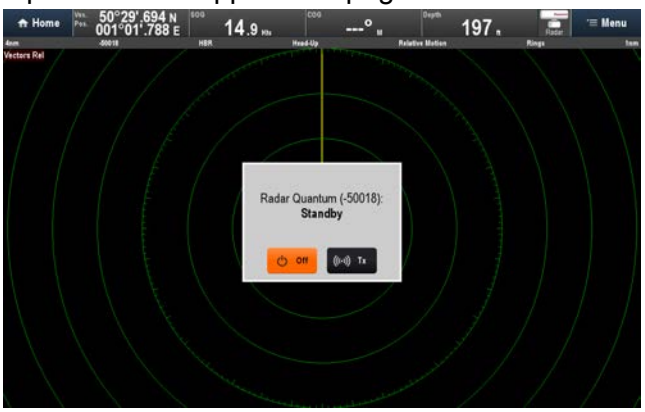
Important:

- Ensure that the SSID and Passcode are entered exactly as shown on the serial number label that was supplied with the Radar.
- The SSID is always made up of the word "**Quantum**", followed by an underscore "**_**", followed by the product's 7 digit **serial number**, (e.g. **Quantum_1234567**).

8. Select **Connect**.

   The initial connection can take up to 2 minutes to complete.

9. Select **OK** from the Successful Connection pop-up.
10. Open a Radar application page.



11. Check that the reported Radar on the power / transmit pop-up is the Radar that you have just paired with.
12. If the correct Radar is reported, select **Tx** (Transmit).
13. If the reported Radar is not the Radar scanner you just paired with, select the correct Radar from the menu: **Menu > Select Radar:** and then select **Tx** from the pop-up.

The Radar image can be displayed on all networked MFDs.

Retain your Wi-Fi passcode

To connect to the Radar using Wi-Fi (wireless), you will need to know the unit's **SSID**, and **Passcode**.

Both the SSID and Passcode are provided on the serial number label on the underside of the unit, and on spare serial number labels supplied in the box. You may wish to make a separate note of this information and keep in a secure location. You should also keep the Radar scanner packaging in a safe place for future reference.

Wi-Fi connection recovery

You should use the SSID and Passcode supplied with your Radar to pair the Radar with your MFD. In the event that the original SSID and Passcode cannot be located follow the steps below to try and re-connect to your Radar.

1. The Radar will store the Wi-Fi credentials (SSID and passphrase) of the last 10 devices it has been paired with, this means that you can use the Wi-Fi credentials from a MFD that

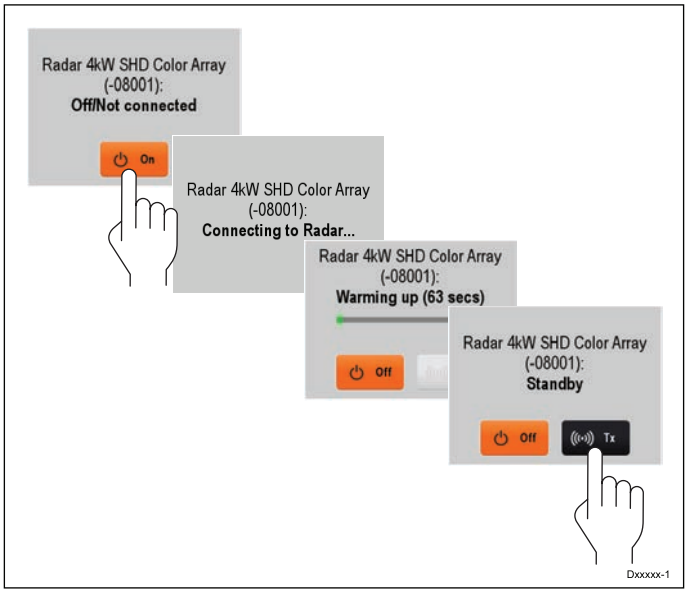
has previously been paired with the Quantum Radar. Enter the MFD's Wi-Fi Name and Wi-Fi Passphrase on the Quantum Radar pairing page and try to connect. The MFD's Wi-Fi Name (SSID) and Passphrase is located in the Wi-Fi menu: (**Homescreen > Set-up > System Set-up > Wireless Connections > Wi-Fi > Wi-Fi Sharing**)

2. If the above method does not work then contact Technical Support who will be able to assist you further.

16.3 Switching the unit on and off

Powering on the Radar scanner

From the Radar application, with the Radar powered off:



1. Select **On** from the onscreen message box.
   The Radar will power up in Standby mode.
2. Once the Radar has powered up, select **Tx** to start the Radar transmitting.

Radar returns will now be displayed onscreen.

Putting the Radar into Standby

The Radar can be placed into Standby mode, which allows the Radar to remain powered up but not transmitting.

With the Radar transmitting, from the Radar application menu:

1. Select **Radar:** to switch between Standby and transmitting modes.

The Radar can also be put into Standby mode by selecting **Standby** from the Shortcuts page.

Powering down the Radar scanner

The Radar can be powered down from the Shortcuts page.

With the Radar powered up:

1. Press the **Power** button.
   The shortcuts page is displayed:



Note: If you have 2 Radar scanners connected; options for each Radar scanner will be shown.

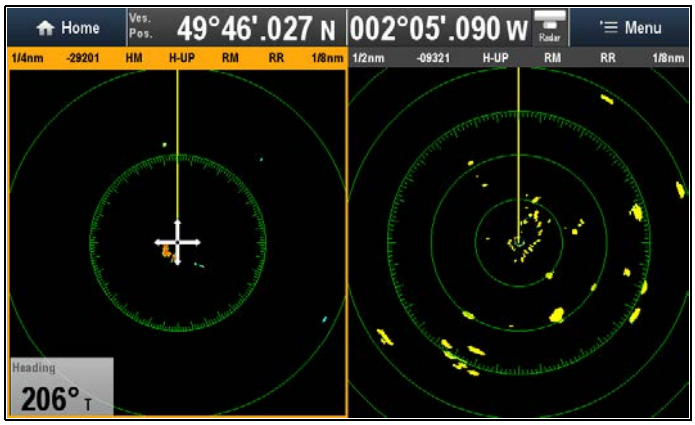
2. Select **Power down radar** for the active Radar scanner.

   Radars connected over Wi-Fi will be placed into Sleep mode. Sleep mode ensures the Radar's Wi-Fi connection remains available so the MFD can power the Radar back on.

16.4 Multiple Radar support

The MFD supports the use of up to 2 Radar scanners at the same time. However, only 1 of the Radars in a system can be a Quantum Radar scanner.

For each Radar application you can select which Radar scanner is displayed. 2 Radar scanners can be displayed simultaneously by creating a dual splitscreen Radar page on the Homescreen.



Selecting a Radar scanner

On systems with 2 Radar scanners, you can select which Radar scanner is displayed in each Radar application.

From the Radar application:

1. Select **Menu**.
2. Select **Select Radar** option.
3. Select the Radar scanner that you want to display in the current Radar application.

   The Radar selection will be remembered by the application and will be displayed automatically the next time that application page is displayed.

16.5 Radar check

Warning: Radar scanner safety

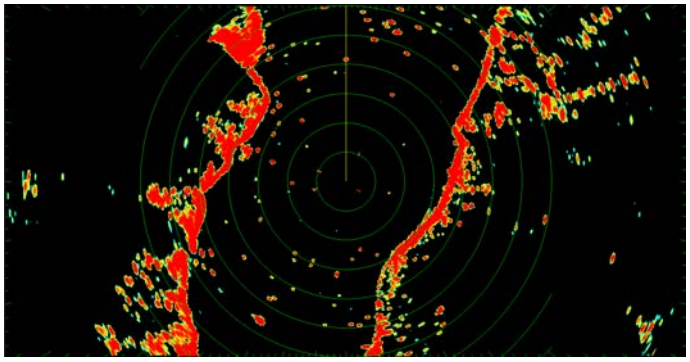
Before rotating the Radar scanner, ensure all personnel are clear.

Checking the Radar

From the Radar application, With the Radar scanner powered up and transmitting:

1. Check that the Radar screen is operating correctly.

Typical HD Radar screen



Points to check:

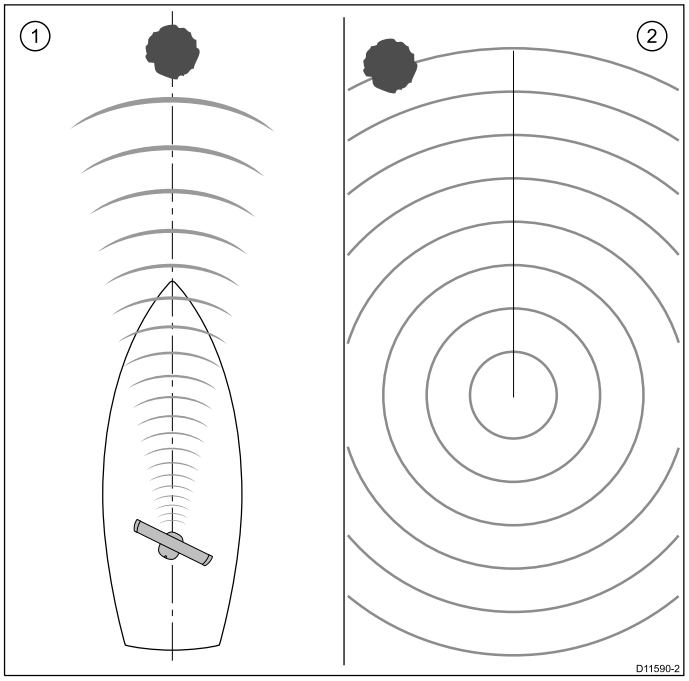
- *Radar sweep with echo responses are shown onscreen.*
- *Radar status icon rotating in top right hand corner of the status bar.*

Check and adjust bearing alignment

Bearing alignment

The Radar bearing alignment ensures that Radar objects appear at the correct bearing relative to your boat's bow. You should check the bearing alignment for any new installation.

Example misaligned Radar



Item	Description
1	Target object (such as a buoy) dead ahead.
2	Target displayed on the Radar display is not aligned with the Ship's Heading Marker (SHM). Bearing alignment is required.

Checking the bearing alignment

1. With your vessel under way: Align the bow with a stationary object identified on the Radar display An object between 1 & 2 NM distant is ideal.
2. Note the position of the object on the Radar display. If the target is not under the ships heading marker (SHM), there is an alignment error and you will need to carry out bearing alignment adjustment.

Adjusting the bearing alignment

Once you have checked the bearing alignment you can proceed and make any required adjustments.

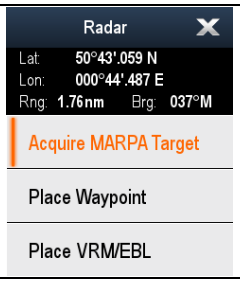
With the Radar application displayed:

1. Select **Menu**.
2. Select **Radar Set-up** .
3. Select **Advanced**.
4. Select **Bearing Alignment**.

   Selecting Bearing Alignment displays the numeric adjust control.
5. Adjust the setting so that the selected target is under the Ship's Heading Marker.
6. Select **Back** or **OK** when complete.

16.6 Radar context menu

The Radar application includes a context menu which provides positional data and menu items.



The context menu provides the following positional data of the cursor's location in relation to your vessel:

- Latitude
- Longitude
- Range
- Bearing

The context menu also provide the following menu items:

- **Acquire Target**
- **Place Waypoint**
- **Place VRM/EBL**

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

16.7 Radar range and image quality

Radar image quality

A number of factors can affect the quality of a Radar image, including echoes, sea clutter, and other interference.

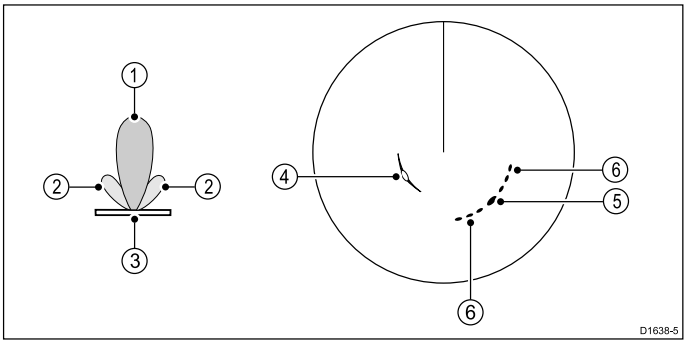
Not all Radar echoes are produced by valid targets. Spurious or missing echoes may be caused by:

- Side lobes.
- Indirect echoes.
- Multiple echoes.
- Blind sectors.
- Sea, rain, or snow clutter.
- Interference.

Through observation, practice, and experience, you can generally detect these conditions very quickly and use the Radar controls to minimize them.

Side Lobes

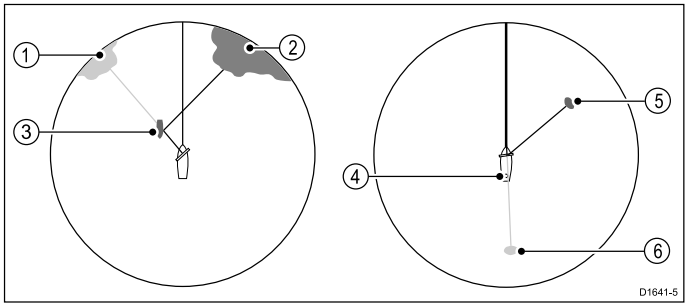
Side lobe patterns are produced by small amounts of energy from the transmitted pulses that are radiated outside the narrow main beam. The effects of side lobes are most noticeable with targets at short ranges (normally below 3 nm), and in particular with larger objects. Side lobe echoes form either arcs on the Radar screen similar to range rings, or a series of echoes forming a broken arc.



Item	Description
1	Main lobe
2	Side lobes
3	Antenna
4	Arc
5	True echo
6	Side echoes

Indirect Echoes

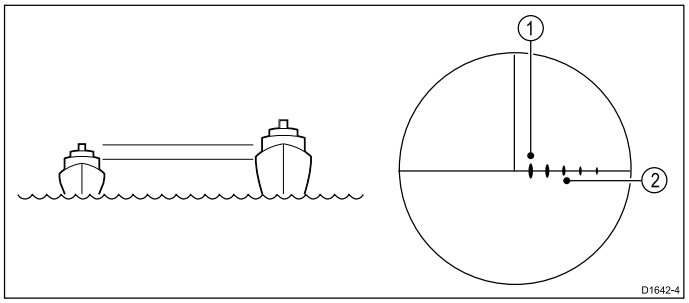
There are several types of indirect echoes or ghost images. These sometimes have the appearance of true echoes, but in general they are intermittent and poorly defined.



Item	Description
1	False echo
2	True echo
3	Passing ship
4	Mast or funnel
5	True echo
6	False echo

Multiple Echoes

Multiple echoes are not very common but can occur if there is a large target with a wide vertical surface at a comparatively short range. The transmitted signal will be reflected back and forth between the target and your own ship, resulting in multiple echoes, displayed beyond the range of the true target echo, but on the same bearing.



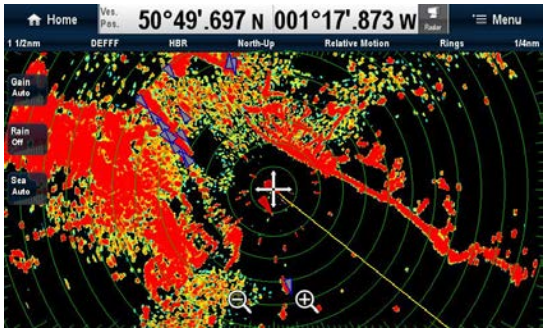
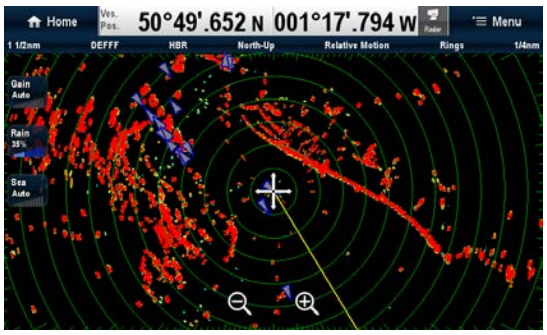
Item	Description
1	True echo
2	Multiple echoes

Blind Sectors

Obstructions such as funnels and masts near the Radar antenna may obstruct the Radar beam and cause Radar shadows or ‘blind sectors’. If the obstruction is relatively narrow, there will be a reduction of the beam intensity, though not necessarily a complete cut-off. However, for wider obstructions there may be a total loss of signal in the shadow area. There may also be multiple echoes which extend behind the obstruction. Blind sector effects can normally be minimized by careful selection of the scanner site prior to installation.

Rain or Snow Clutter

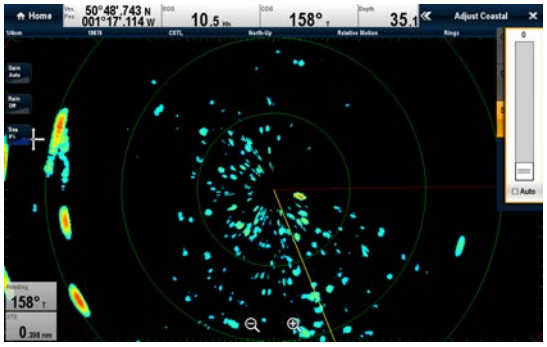
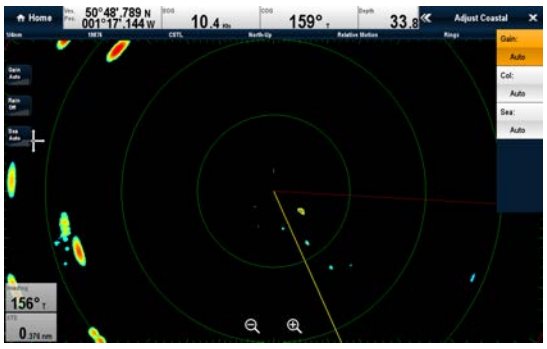
The Radar can see echoes from precipitation. Returns from storm areas and rain squalls consist of countless small echoes that continuously change size, intensity and position. These returns sometimes appear as large hazy areas, depending on the intensity of the rainfall or snow in the storm cell. The images in the table below show how the Rain control can clear up this clutter:

Rain clutter off	
Rain clutter on	

Note: Quantum uses pulse compression which filters out precipitation. However, you can identify/display precipitation using Quantum’s **Weather** mode.

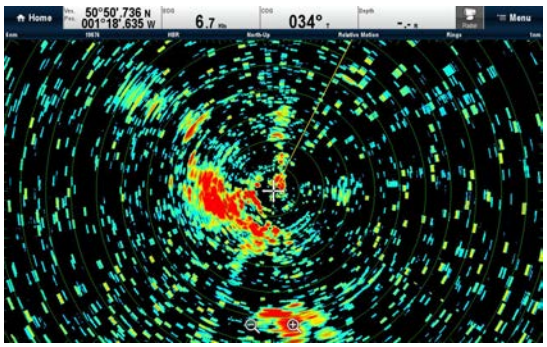
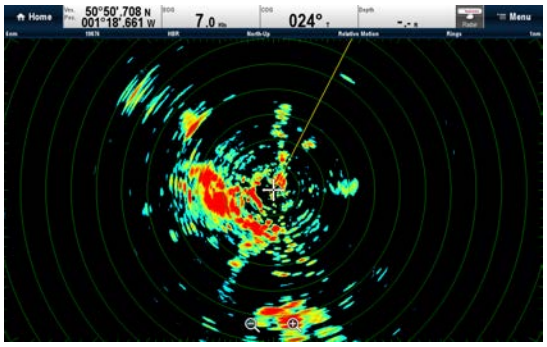
Sea Clutter

Radar returns from waves around the vessel can clutter the centre of the Radar picture, making it difficult to detect real targets. Such ‘sea clutter’ usually appears as multiple echoes on the display at short range scales, and the echoes are not repetitive or consistent in position. With high winds and extreme conditions, echoes from sea clutter may cause dense background clutter in the shape of an almost solid disc. Sea clutter can be suppressed using the sea clutter settings. The images in the table below show how the sea clutter settings can clear up some of this clutter:

Sea clutter off	
Sea clutter in auto	

Interference

When two or more Radar-equipped vessels are operating within range of each other mutual Radar interference can occur. This usually appears as a spiral of small dots from the display centre This type of interference is most noticeable at long ranges. This interference can be suppressed using the interference rejection settings. The images in the table below show how the Interference rejection settings can clear up some of this interference:

Interference rejection off	
Interference rejection on	

Interpreting objects

The size of a target on screen is dependent on many factors and may not be proportional to its physical size. Nearby objects may appear to be the same size as distant larger objects. With experience, the approximate size of different objects can be determined by the relative size and color / brightness of the echoes.

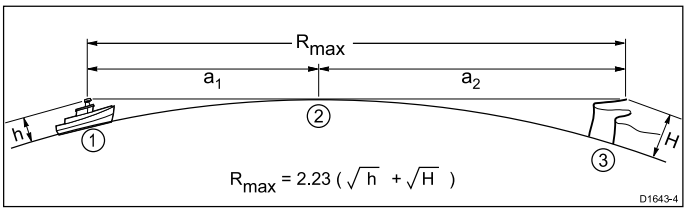
The size of onscreen targets are affected by:

- The physical size of the reflecting object
- The material from which the object is made (Metallic surfaces reflect signals better than non-metallic surfaces.)
- Vertical objects such as cliffs reflect signals better than sloping objects such as sandbanks
- High coastlines and mountainous coastal regions can be observed at longer Radar ranges. Therefore, the first sight of land may be a mountain several miles inland from the coastline. Although the coastline may be much nearer, it may not appear on the Radar until the vessel is closer to shore.
- Some targets, such as buoys and small vessels difficult to discern, because they do not present a consistent reflecting surface as they bob and toss about in the waves. Consequently these echoes tend to fade and brighten, and at times disappear momentarily.
- Buoys and small vessels resemble each other, but vessels can often be distinguished by their motion.

Maximum Radar range

The usable range of the Radar is limited by factors such as the height of the scanner, and height of the target.

Maximum Radar range is essentially line-of-sight, so is limited by the height of the scanner and the height of the target as illustrated below:



Item	Description
1	Radar equipped vessel.
2	Curvature of the earth.
3	Target (Cliff).
a_1	Radar horizon of antenna.
a_2	Radar horizon of target.
R_{max}	Maximum Radar range in nautical miles. $R_{max} = a_1 + a_2$
h	Radar antenna height in metres.
H	Target height in metres.

The table below shows typical maximum Radar ranges for various Radar antenna heights and target heights. Remember that although the Radar horizon is greater than the optical horizon, the Radar can only detect targets if a large enough target is above the Radar horizon.

Antenna height (meters)	Target height (meters)	Maximum range (Nautical miles)
3	3	7.7
3	10	10.9
5	3	8.8
5	10	12

16.8 Collision Avoidance

The Radar and Chart applications include features to help increase your awareness for the potential for collisions.

Collision Avoidance features include:

AIS	Vessels and aids equipped with AIS transmitters, that are within range can be displayed as targets. Refer to Chapter 12 **AIS (Automatic Identification System)** for details.	Chart and Radar applications
MARPA	MARPA (Mini Automatic Radar Plotting Aid) improves collision awareness by tracking acquired targets and calculating their speed and course to enable risk analysis. Refer to 16.9 **MARPA overview** for details.	Chart and Radar applications
Target Interception	The Target interception feature tracks AIS targets in relation to your own vessel's Course Over Ground (COG) and Speed Over Ground (SOG). The purpose of this feature is to help you determine if you need to change your speed and / or course to avoid danger. Refer to 12.9 **Collision Avoidance** for details.	Chart application
Guard Zone Alarm	The Guard Zone Alarm will warn you if Radar returns are detected within the specified Guard Zone limits. Refer to 16.12 **Setting up a Guard Zone Alarm** for details.	Radar application
Dangerous targets	AIS and acquired MARPA targets are considered dangerous if the target will get closer to your vessel than the specified Safe Distance within the specified Time to Safe Distance. Refer to 12.8 **Dangerous targets** for details.	Chart and Radar applications

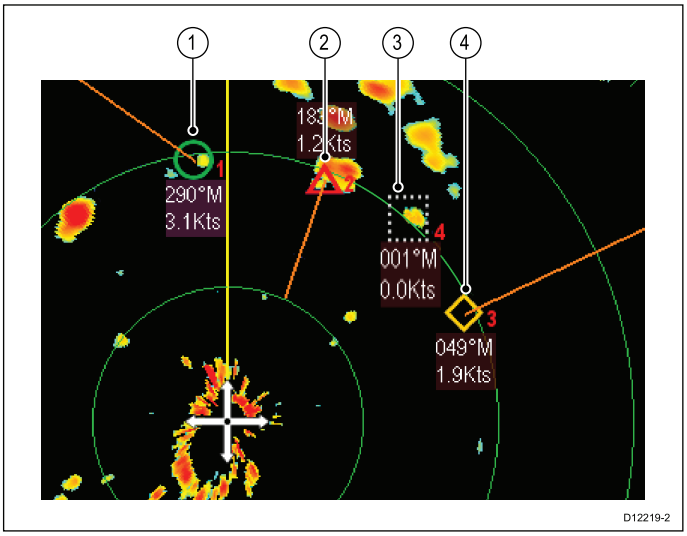
VRM/EBL	The VRM/EBL feature can be used to assess how far away a Radar target is and its bearing. Refer to 16.15 **Distances, range, and bearing** for details.	Radar application
Trails	Trails (also known as wakes) show a history of the targets position over a specified time period. Refer to 16.13 **Trails** for details.	Radar application

16.9 MARPA overview

MARPA (Mini Automatic Radar Plotting Aid) improves collision awareness by tracking acquired targets and calculating their speed and course to enable risk analysis.

Pre-requisites:

- For effective MARPA operation, your MFD must have accurate heading and speed data for your vessel.
- In True Motion mode, Speed Over Ground (SOG) and Course Over Ground (COG) information is required to show true target course and speed.
- In Relative Motion mode, heading and speed information is required.



Item	Target symbol	Description
1		Acquired target
2		Dangerous target
3		Target begin acquiring
4		Lost target

Each target can be displayed with a graphic indicating the Closest Point of Approach (CPA), and Time to Closest Point of Approach (TCPA). The calculated target data can also be displayed. Each target is continually assessed and an audible alarm is sounded if a target becomes dangerous, or is lost.

The number of targets that you can track at any one time is dependent on the type of Radar that you are using:

- Quantum™ = 10
- SuperHD™ Open Array = 25
- HD Open Array = 25
- HD Radome = 25
- Non-HD Digital Radome = 10

Safety notices

Note: It is your responsibility to exercise common prudence and sound navigational judgement.

There are conditions where acquiring a target may become difficult. These same conditions may be a factor in successfully tracking a target. Some of the conditions are:

- The target echo is weak.
- The target is very close to land, buoys or other large targets.
- The target or your own vessel is making rapid manoeuvres.
- Choppy sea state conditions exist and the target is buried in excessive sea clutter or in deep swells.
- Choppy sea state conditions exist yielding poor stability; own vessel's heading data is very unstable.
- Inadequate heading data.

Symptoms of such conditions include:

- target acquisition is difficult and the MARPA vectors are unstable;
- the symbol wanders away from the target, locks-on to another target, or changes to a lost symbol target.

In these circumstances, target acquisition and tracking may need to be re-initiated and in some cases it may not be possible to maintain acquired targets. Better quality heading data might improve performance in these circumstances.

MARPA risk assessment

Each target is monitored to ascertain whether it will be within a certain distance from your vessel within a certain time. If so, the target is designated as dangerous, and an audible warning is sounded and a warning displayed. The target symbol changes to the dangerous target symbol and flashes to indicate that it is a dangerous target. Acknowledging the alarm will remove the warning.

If a target is lost, either because the MARPA software has lost contact with it, or because it has moved out of range, an audible alarm is sounded and a warning is displayed. The symbol will change to the lost target symbol. Acknowledging the warning will silence the alarm and remove the warning and the lost target symbol.

MARPA targets range

MARPA target acquisition is only available at Radar range scales of up to 12 nm, although tracking continues at all ranges.

If you change to a smaller range scale, targets may be beyond the range of your Radar scanner and will be lost. In such cases, a warning indicates that the target is off-screen.

MARPA context menu

When a MARPA target is selected the context menu which provides the following positional data and menu items.

Positional data

- CPA
- TCPA
- COG
- SOG

Menu items:

- **Cancel target**
- **CPA Graphic**
- **Target Data**
- **Slew thermal camera** (Only available when thermal camera is connected and operating.)

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

Acquiring a MARPA target

From the Radar application:

1. Select the target to be acquired.
   The context menu is displayed.
2. Select **Acquire Target**.

The "acquiring target" symbol is displayed. If the target is present for several scans, the Radar locks-on to the target, and the symbol changes to the "acquired target" symbol.

Cancelling an individual MARPA target

From the Radar application:

1. Select the relevant acquired MARPA target.
   The MARPA context menu is displayed.
2. Select **Cancel Target**

Cancelling all MARPA targets

You can cancel all tracked MARPA targets using the Tracked targets list

The location of the Tracked target list is dependent on the application and Overlays you have enabled:

- Radar application: **Menu > Tracked Targets**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > Tracked Targets**
- Chart application with only the Radar overlay enabled: **Menu > Radar > Tracked Targets**
- Chart application with only the AIS overlay enabled: **Menu > AIS > Tracked Targets**

1. Select the **Radar** tab.
2. Select **Cancel All Targets**.

16.10 Vector options

The Vector options can be accessed from the Collision Avoidance menu.

The location of the Vector options is dependent on the application and the overlays you have enabled:

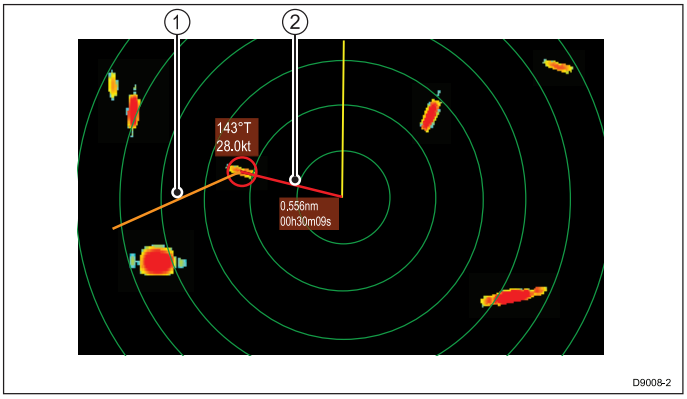
- Radar application: **Menu > Collision Avoidance**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > Collision Avoidance**
- Chart application with only the Radar overlay enabled: **Menu > Radar > Collision Avoidance**
- Chart application with only the AIS overlay enabled: **Menu > AIS > Collision Avoidance**

Parameter	Description	Options
Vector Length	The length of the vector lines displayed depends on the distance that an AIS / MARPA target travels in the time period that you specify for this setting.	• 0.5 min • 1 min • 3 min • 6 min • 12 min • 30 min • 60 min
Target History	MARPA Targets' previous position will be plotted using a light gray target icon for the time specified.	• Off (default) • 0.5 min • 1 min • 3 min • 6 min

16.11 Vessel vectors (CPA graphics) overview

CPA graphics show vectors for your vessel and a selected target.

A vector is a line on-screen showing the predicted courses of your vessel and the selected target if you both remain on your present course. These vectors vary in length due to vessel speed and vector length set in the MARPA Set-up menu.



Item	Description
1	Target vector
2	CPA graphic

True motion

With the display set in true motion mode, the vectors of your vessel and the target are shown extended to their intersection point. The CPA is shown as a line that is placed on your vessel's vector at the point of the CPA. The length and direction of the line indicates the distance and bearing of the target at CPA. The text indicates CPA and TCPA. The text next to the target symbol indicates its true course and speed.

Relative motion

With the display set in relative motion mode, no vector extension of your vessel is shown. The CPA line emerges from your own vessel, with the target vector extension being shown as relative, not true. The text next to the target indicates its course and speed.

Displaying CPA graphics for MARPA targets

1. Select the target.
   The MARPA context menu is displayed.
2. Select **CPA Graphic**.
   i. Select **Auto** to display the CPA graphic when the target is selected.
   ii. Select **On** to display the CPA graphic while the target is being tracked.
   iii. Select **Off** to hide the CPA graphic.
3. To display course and bearing information alongside to the target select **Target Data** so that Show is highlighted.

16.12 Setting up a Guard Zone Alarm

A Guard Zone can be setup in the Radar application to alert you if any Radar returns are detected within a specified zone. The Radar Guard Zone is specific to the Radar scanner in use.

2 types of Guard Zone are available:

- **Sector** — A Sector of a specified size and position
- **Circle/Ring** — A Circle/Ring centred around your vessel, with a specified outer and inner perimeter.

From the Radar application menu:

1. Select **Collision Avoidance**.
   The Guard Zone Alarm page is displayed.



2. Enable the Guard Zone using the toggle switch at the top of the page.
3. Select either the Sector or Circle/Ring graphic to determine the shape of the Guard Zone.
   The current Guard Zone setting will be displayed on the page.
4. Select **Adjust Zone**.
5. Adjust the Guard Zone settings to change the size and position of the Guard Zone as required.

   Guard zone width and bearing can only be adjusted when the Guard Zone shape is set to Sector.

6. Adjust the **Sensitivity** settings to the required value.

   The Sensitivity setting determines the size at which objects will be identified as targets, a lower setting will identify less targets.

7. Select **Back** or **Close** to close the Guard Zone Adjustment menu.

Guard Zone context menu

When the Guard Zone is selected the context menu provides the following menu options.

- **Acquire Target.**
- **Adjust Zone**
- **Hide Guard Zone** / **Show Guard Zone**

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

16.13 Trails

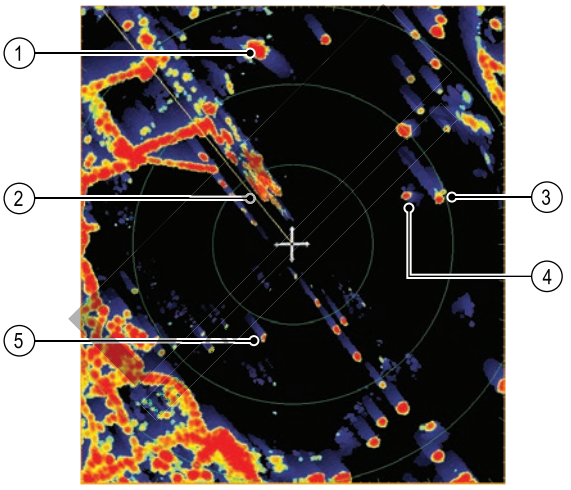
Radar Trails (also known as wakes) enable you to see target history. Trails will appear differently depending on whether your Radar is set to True motion or Relative motion mode.

Relative motion mode

In relative motion mode trails appear on targets that are moving relative to the sea (Sea stabilized) this includes targets that are fixed to the ground, such as piles.

Trails will not appear if a target is moving at the same speed and in the same direction as your vessel.

Relative motion mode example



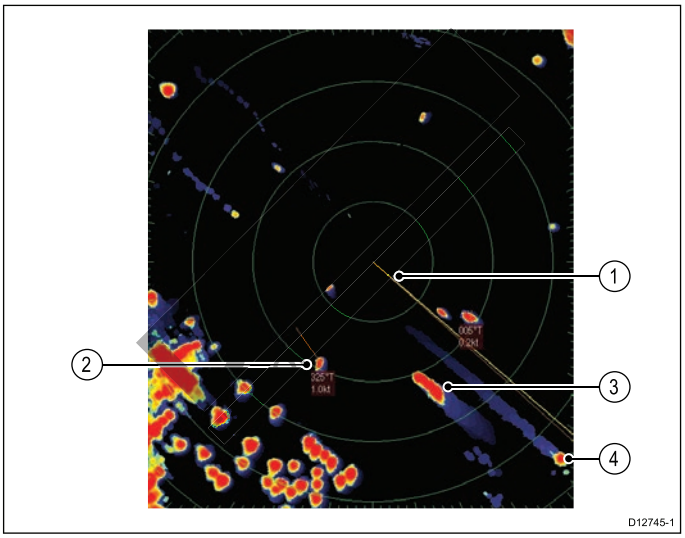
1	Target moving faster and in the same direction as vessel (Trails appear towards your vessel's heading)
2	Ships heading marker
3	Target moving in opposite direction to vessel (Trails appear opposite to your vessel's heading)
4	Target moving at approximately the same speed and direction as vessel (Minimal to no trails)
5	Fixed target (Trial in opposite direction to your vessel's heading)

True motion mode

In true motion mode Radar trails appear on targets that are moving relative to the ground.

trails will not appear on targets that are fixed to the ground.

True motion mode example



1	Ships heading marker
2	Target travelling at between 0 kt to 1 kt (Minimal to no trail)
3	Target moving in opposite direction to vessel (Trails appear in opposite direction to your vessel's heading)
4	Target moving in same direction as vessel (Trials appear towards your vessel's heading)

Note: You may see a Trail 'ring' around fixed targets due to small error factors such as rotation time delays. This is normal operation.

Enabling Trails

From the Radar application's Collision Avoidance menu: (**Menu > Collision Avoidance**)

1. Select **Trails** so that On is highlighted.

   Selecting Trails will switch the function between On and Off.
2. Select **Trails period**.

   A list of time periods is displayed:

   - 10 sec
   - 30 sec
   - 1 min
   - 5 min
   - 10 min
3. Select the required time period.

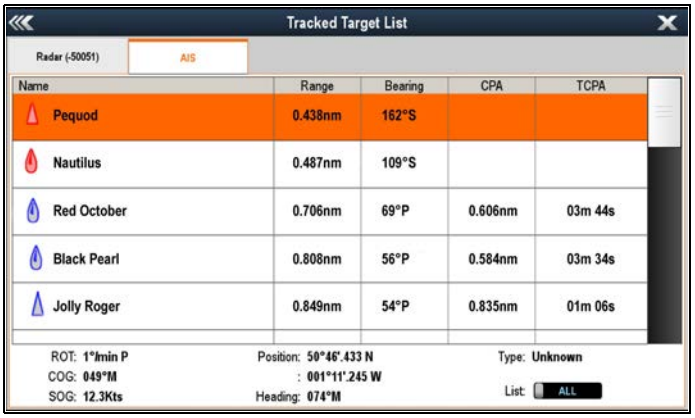
16.14 Tracked target list

All targets currently being tracked are shown in the Tracked target list. MARPA and AIS targets are shown in separate tabs.

The location of the Tracked target list is dependent on the application and Overlays you have enabled:

- Radar application: **Menu > Tracked Targets**.
- Chart application with Radar and AIS overlays enabled: **Menu > Radar & AIS > Tracked Targets**
- Chart application with only the Radar overlay enabled: **Menu > Radar > Tracked Targets**
- Chart application with only the AIS overlay enabled: **Menu > AIS > Tracked Targets**

AIS targets

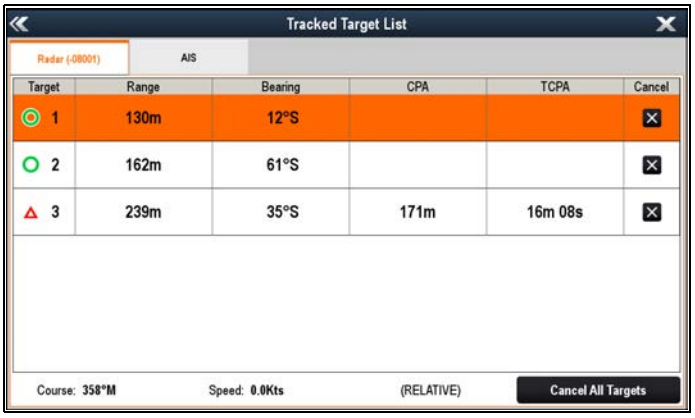


By selecting an AIS target from the list you can:

- View full AIS Data
- Add the target as a Buddy (AIS targets only)
- Show the target in the Chart application
- Edit existing Buddy details:
  - Remove Buddy
  - Edit Buddy MMSI
  - Edit Buddy Name

The **List:** options can be used to filter the AIS target list to only display Buddies.

MARPA targets



By selecting MARPA target from the list you can:

- Cancel the target
- Show the target in the Chart application

Selecting **Cancel All Targets** will remove “stop tracking all MARPA targets” in the list. You can also cancel individual targets by selecting the ‘**X**’ in the Cancel column.

16.15 Distances, range, and bearing

When you are using the Radar application, you can measure distances, ranges and bearings in a variety of ways.

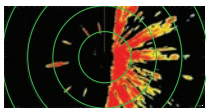
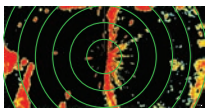
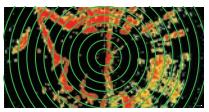
These options are detailed in the table below:

Functions	Distances Between Points	Range From Your Vessel	Bearings
Range Rings	Yes (approximate distance)	Yes (approximate range)	No
Cursor	No	Yes	Yes
Variable Range Markers / Electronic Bearing Lines (VRM/EBL)	No	Yes	Yes
Floating VRM/EBL	Yes	No	Yes

Measuring using the range rings

Use the range rings to gauge the approximate distances between points. Range rings are concentric circles displayed on the screen and centred from your vessel at pre-set distances. The number and spacing of the rings changes as you range in and out.

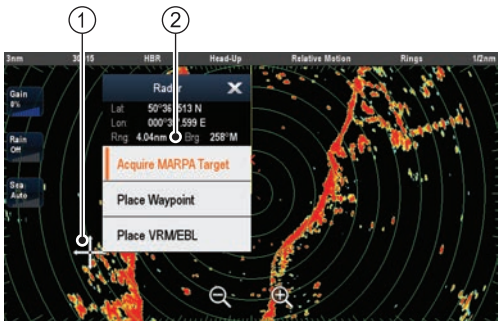
Examples:

		
Range — 1/4 nm Range Rings — 760ft apart	Range — 3/4 nm Range Rings — 1/4 nm apart	Range — 1 1/2 nm Range Rings — 1/4 nm apart

Measuring using the cursor

To measure the bearing and range from your vessel to a specified target, move the cursor to the appropriate position on the screen and press **Ok**, the Radar context menu will be displayed which shall provide:

- Latitude
- Longitude
- Range
- Bearing



Item	Description
1.	Cursor
2.	Bearing and range from your vessel to the cursor position

You can also display the cursor position in the databar, from the homescreen select: **Customize > Databar Set-up > Edit Databar**, now select the data box where you want the cursor position to be displayed. Select **Navigation > Cursor Position**.

Measuring using VRM/EBL

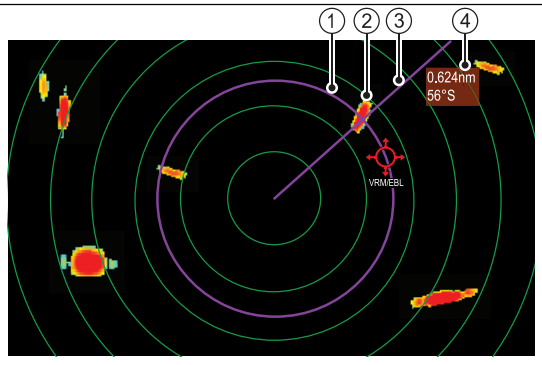
Variable Range Markers (VRM)

A Variable Range Marker (VRM) is a circle centred on your vessel's position and fixed with respect to the heading mode. When this circle is adjusted to align with a target, its range from your vessel is measured and displayed on the Radar context menu when you select the VRM with the cursor.

Electronic Bearing Lines (EBL)

An Electronic Bearing Line (EBL) is a line drawn from your vessel to the edge of the window. When this line is rotated to align with a target, its bearing relative to your vessel's heading is measured and displayed on the Radar context menu when you select the VRM with the cursor.

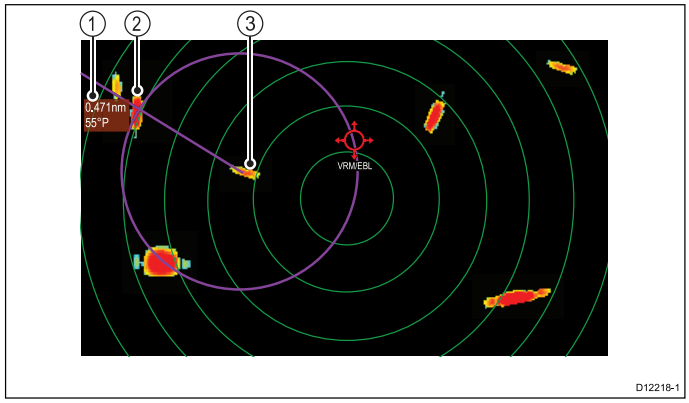
The VRM/EBL are combined to measure both the range and the bearing of the specified target.



Item	Description
1	VRM
2	Target
3	EBL
4	Range and bearing

Measuring using floating VRM/EBL

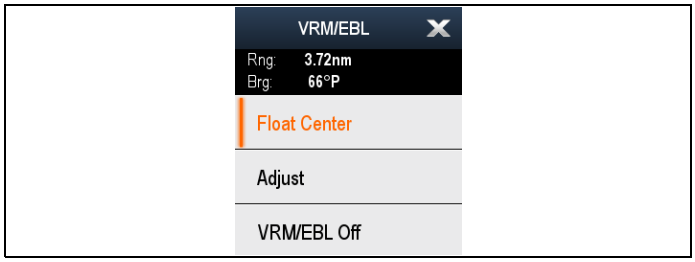
You can use the VRM/EBL float function to measure the range and bearing between any two points on the Radar screen. This function allows you to move the VRM/EBL centre away from your vessel's position and onto a target. You can then change the radius of the VRM to determine the distance between two points and change the angle of the EBL, relative to its new origin, to obtain the bearing.



Item	Description
1	Range and bearing
2	Target 1
3	Target 2

VRM/EBL context menu

The VRM/EBL function includes a context menu which provides positional data and menu items.



The context menu provides positional data of the VRM/EBL in relation to your vessel:

- Range
- Bearing

The context menu also provide the following menu items:

- **Float Centre**
- **Adjust**
- **VRM/EBL Off**

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

Creating a VRM/EBL

To create a VRM/EBL.

From the Radar application's context menu:

1. Select **Place VRM/EBL**.
2. Select the required location or target.
   The VRM/EBL is now set.

Create a floating VRM/EBL

By default the VRM/EBL is centered around you vessel, you can move the center to a different location using a Floating VRM/EBL.

From the Radar application with a VRM/EBL already created:

1. Select the VRM/EBL
   The VRM/EBL context menu is displayed.
2. Select **Float Center**.
3. Select the desired location for the center position.
   The VRM/EBL is centered at the new location.

Centering the VRM/EBL

To re-center a VRM/EBL follow the steps below:

From the Radar application:

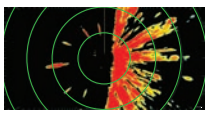
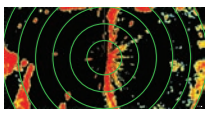
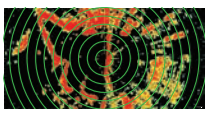
1. Position the cursor over the VRM/EBL.
   The VRM/EBL context menu is displayed.
2. Select **Center**.

Using the Radar range rings

Radar range rings enable you to measure the distance between two points on the Radar display.

Use the range rings to gauge the approximate distances between points. Range rings are concentric circles displayed on the screen and centred from your vessel at pre-set distances. The number and spacing of the rings changes as you range in and out.

Examples:

		
Range — 1/4 nm Range Rings — 760ft apart	Range — 3/4 nm Range Rings — 1/4 nm apart	Range — 1 1/2 nm Range Rings — 1/4 nm apart

Enabling and disabling Radar range rings

From the Radar application's Presentation menu: (**Menu > Presentation**)

1. Select **Range Rings**.
   Selecting Range rings will switch the range rings On and Off.

16.16 Radar mode and orientation

Radar orientation modes

The Radar can operate in a number of orientation modes to suit different types of navigation.

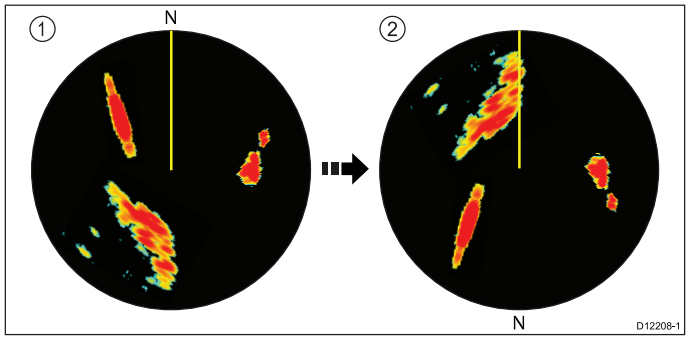
The orientation of the Radar refers to the relationship between the Radar and the direction that you are travelling in. There are three orientation modes to choose from:

- Head-Up
- North-Up
- Course-Up

These orientation modes are used in conjunction with motion mode to control how your boat and Radar relate to one another and how they are displayed on screen. Any changes that you make to the orientation of the Radar are retained when you switch off your multifunction display.

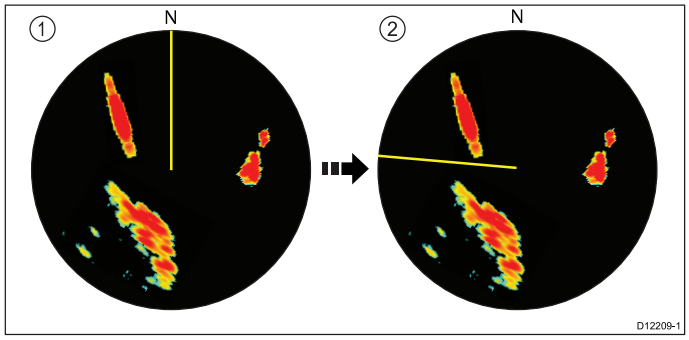
Head-Up

This is the default mode for the Radar application.



Item	Description
1	Ship's Heading Marker (SHM) (indicating the vessel's current heading is upwards).
2	As the vessel's heading changes: • SHM is fixed upwards • Radar picture rotates accordingly

North-Up

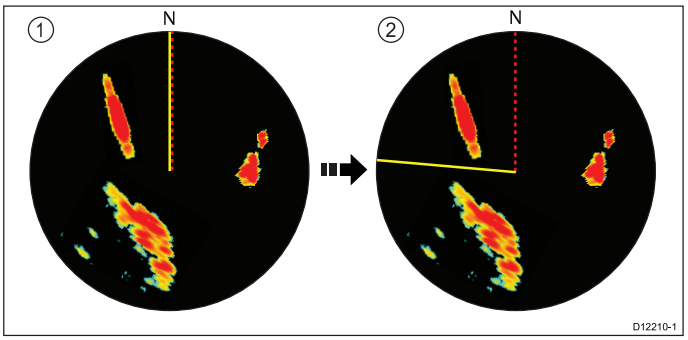


Item	Description
1	True north at top.
2	As your vessel's heading changes: • Radar picture is fixed (north up) • SHM rotates accordingly

Note: If heading data becomes unavailable whilst in this mode, a warning message will be shown, the status bar indicates North-Up in brackets and the Radar uses 0° heading in relative motion. When heading data becomes available once more, North-Up mode is reinstated.

Note: It is not possible to select Head Up mode when the motion mode is set to True.

Course-Up



Item	Description
1	Current course upwards.
2	As your vessel's heading changes: • Radar picture is fixed • SHM rotates accordingly

If you select a new course, the picture will reset to display the new course upwards.

The reference used for Course-Up depends upon the information available at a given time. The system always prioritizes this information in the following order:

1. Bearing from origin to destination, that is, intended course.
2. Locked heading from an Autopilot.
3. Bearing to waypoint.
4. Instantaneous heading (when course-up is selected).

Note: If heading data becomes unavailable whilst in this mode, a warning message will be shown, the status bar indicates the Course Up in brackets and the Radar uses 0° heading in relative motion. When heading data becomes available once more, Course-Up mode is reinstated.

Selecting the Radar orientation mode

From the Radar application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Orientation & Motion Mode**.
4. Select **Orientation**.
5. Select the required orientation.

Radar motion modes overview

The motion mode controls the relationship between the Radar and your vessel. There are two modes:

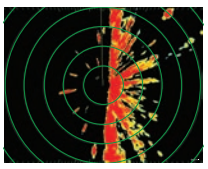
- Relative motion.
- True motion.

The selected motion mode is displayed in the status bar. The default setting is Relative Motion with no offset.

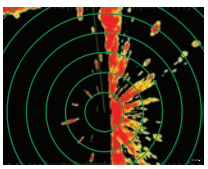
Relative Motion (RM) with optional Vessel Offset

When the motion mode is set to Relative, the position of your vessel is fixed on the screen and all the targets move relative to the vessel. You can specify whether the vessel is fixed in the center of the window, partially offset or fully offset to increase the view ahead, as shown below:

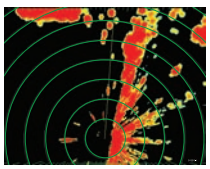
Examples:



Center offset



Partial offset



Full offset

The default motion mode is “Relative”, with center offset.

True Motion (TM)

When the motion mode is set to True, fixed Radar targets maintain a constant position and moving vessels (including your vessel) travel in true perspective to each other and to fixed landmasses on the screen. As the vessel’s position approaches the edge of the screen, the Radar picture is automatically reset to reveal the area ahead.

Note: If heading and position data become unavailable when True motion is selected, a warning message will be shown, the mode will revert to relative motion and be noted in the status bar in brackets, for example, (TM).

Note: It is not possible to select True Motion when the orientation is set to Head Up.

Selecting the Radar motion mode

From the Radar application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Orientation & Motion Mode**.
4. Select **Motion Mode**.

   Selecting Motion Mode will switch between True and Relative.

Changing the Radar vessel offset

Radar offset is only available in Relative motion mode.

From the Radar application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Orientation & Motion Mode**.
4. Select **Boat Offset**.
5. Select the required offset value.

16.17 Radar Presentation menu

Function	Description	Options
Dual Range	This menu item allows you to turn Dual range mode On and Off.	• On • Off
Dual Range Channel	This menu item allows you to choose long or short channel for dual range.	• 1 • 2
Orientation & Motion Mode	This menu item contains a sub-menu which enables you to adjust the orientation and motion mode: • **Orientation** • **Motion Mode** • **Boat Offset**	**Orientation** • Head Up • North Up • Course Up **Motion Mode** • True • Relative **Boat Offset** • Center (default) • Partial Offset • Full Offset
Select Waypoints to Display	This menu item takes you to the **Display Waypoints** dialog where you can choose which waypoint icons to Show/Hide in the Radar application.	**Display Waypoint** • Show • Hide
Waypoint Name	This menu item allows you to show or hide waypoint names in the Radar application.	• Show • Hide
Enhance Echoes	This menu item contains a sub-menu which enable you to adjust the follow options: • **Interference Rejection** • **IR Level** — only available on non-HD digital radomes and **Quantum**. • **Expansion** • **Expansion Level** — only available on non-HD digital radomes.	**Interference Rejection** • On • Off **IR Level** • Normal • High **Expansion** • On • Off **Expansion Level** • Low • High
Color Palette	This menu item allows you to select a Color Palette for the Radar application.	• Bold • Professional 1 • Professional 2 • Classic • Night Vision
Range Rings	This menu item allows you to turn the range rings On and Off.	• On • Off
Guard Zone	This menu item determines whether the Guard Zone is displayed in the Radar application.	• Show • Hide

Function	Description	Options
Gain Controls	This item allows you to show or hide the onscreen gain controls on multifunction displays with a touchscreen.	• Show • Hide
Databoxes	This menu item contains a sub-menu which enables you to turn on and select information to display in data cells located on the bottom left of the Radar application (Data cells will be displayed in all Radar windows). • **Databox 1** • **Select Data** • **Databox 2** • **Select Data**	**Databox 1 & 2** • On • Off **Select Data** • List of available data by category

Enhance echoes functions

Enabling Radar interference rejection

From the Radar application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Enhance Echoes**.
4. Select **Interference Rejection** so that On is highlighted.

   Selecting Interference Rejection will switch the function between On and Off.
5. For non-HD digital radomes and **Quantum** Radar scanners you can also select an interference rejection level:
   i. Select **IR Level**.

      Selecting IR Level will switch between Normal and High.

Enabling Radar expansion

From the Radar application:

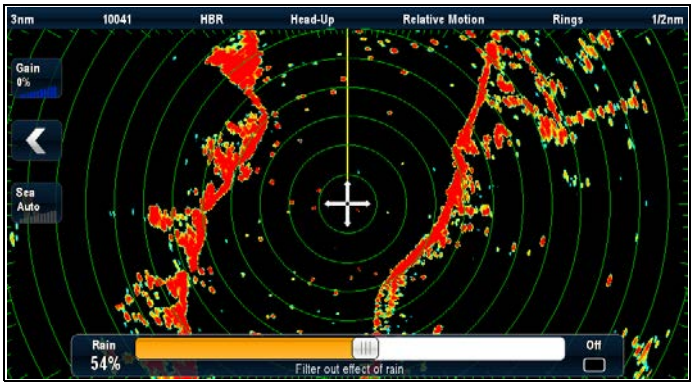
1. Select **Menu**.
2. Select **Presentation**.
3. Select **Enhance Echoes**.
4. Select **Expansion** so that On is highlighted.

   Selecting expansion will switch the function between On and Off.
5. For non-HD digital radomes you can also select an interference rejection level
   i. Select **Expansion Level**.

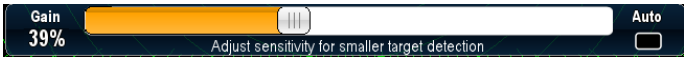
      Selecting Expansion Level will switch between Low and High.

16.18 Radar tuning: On-screen gain controls

Touchscreen multifunction displays provide on-screen access to controls for Gain, Rain and Sea clutter.



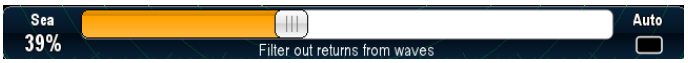
Gain control



Rain control



Sea control



Note: non-touchscreen controls are accessed by the menu options: **Menu > Rain** and **Menu > Adjust Gain**.

Enabling and disabling on-screen gain controls

You can enable and disable the on-screen gain controls by following the steps below.

On a touchscreen multifunction display, with the relevant application displayed.

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Gain Controls**.

   Selecting Gain Controls will switch between showing and hiding the on-screen controls.

Note: When the on-screen Gain controls are set to Hidden then the Gain settings can be accessed directly from the application menu: **Menu > Gain**.

Using the on-screen gain controls

To adjust settings using the on-screen controls follow the steps below.

On a touchscreen multifunction display, with the Radar application displayed:

1. Select either the **Gain**, **Rain** or **Sea** on-screen icon.

   The on-screen slider bar control is displayed.
2. Select the **Auto** box (Gain and Sea) or **Off** box (Rain) so that a tick is **placed** in the box to switch to automatic control or switch the control off, or
3. Select the **Auto** box (Gain and Sea) or **Off** box (Rain) so that a tick is **removed** placed in the box to switch to manual control.
4. Adjust the slider bar to the required setting.
5. The slider bar will auto dismiss, or you can select the on-screen icon again to close the slider bar.

16.19 Radar modes

Radar modes enable you to quickly select pre-configured settings to achieve the best picture for certain situations.

The Radar Mode can be selected from the Radar application's main menu.

Note: For Non-HD Digital Radomes refer to **Auto Sea Mode** settings.

Gain Modes	Description	Radar Type
Buoy	Mode that enhances the detection of small objects like mooring buoys. It is useful at ranges up to 0.75 nm.	• SuperHD™ Open Array • HD Open Array • HD Radome
Harbor	Default mode that takes account of land clutter so that smaller targets, like navigation buoys are not lost.	• All
Costal	Mode that accounts for slightly higher levels of sea clutter that might be encountered out of the harbor and adjusts the Radar display accordingly.	• All
Offshore	Automatically adjust for high levels of Sea Clutter.	• All
Bird (1)	Mode that helps identify flocks of birds, useful when identifying suitable fishing locations.	• SuperHD™ Open Array • HD Open Array • HD Radome
Weather	Mode that helps optimize the display to identify precipitation.	• Quantum™

Note: (1) Requires a HD Radome, HD Open Array or a SuperHD Open Array with software version 3.23 or above.

16.20 Sensitivity settings menu

You can use the Radar modes and other sensitivity settings to help improve the quality of the Radar picture.

The following settings are available from the **<Mode> Sensitivity Settings** menu: (**Menu > <Mode> Sensitivity Settings**)

Note: <Mode> represents the current active Mode, e.g. Harbor or Coastal etc.

The options available are dependent on the Radar scanner in use.

Menu Item	Radar scanner	Description	Options
Gain	• All	Gain enables you to use a preset in automatic mode, or to adjust its gain manually.	• Auto • Manual (0% to 100%)
Color Gain	• HD Radome • HD Open Array • SuperHD Open Array • Quantum	Color Gain adjusts the intensity (color) of displayed targets, but does not affect the number of targets displayed. Increasing the Color Gain causes more targets to be displayed in the same color, which may help you to determine whether an object is an actual target, or just background noise. Reducing the Color Gain may provide better target detail and detection.	• Auto • Manual (0% to 100%)
Sea	• All	Radar echoes from waves around your vessel can clutter the center of the Radar picture, making it difficult to detect real targets. Adjusting the Sea gain reduces this clutter for up to 5 nautical miles (depending on wave and sea conditions) from your vessel.	• Auto • Manual (0% to 100%)
Auto Sea Mode	• (Non HD) Digital Radome	Auto Sea Mode enables you to quickly select pre-configured settings to achieve the best picture for different situations. Raymarine recommends the use of these modes to achieve optimum results.	• **Harbor** — this is the default mode. This setting takes account of land clutter so that smaller targets, like navigation buoys, are not lost. • **Coastal** — accounts for the slightly higher levels of sea clutter you might encounter out of harbor and adjusts the Radar display accordingly. • **Offshore** — automatically adjusts for high levels of sea clutter.
Power	• SuperHD Open Array	The Power setting adjusts effective transmit power. At zero, the Radar operates at its standard power (4 kW or 12 kW). At 90, the effective power is increased by a factor of at least two. Increasing the power makes targets more distinct from noise. For maximum benefit, reduce Power to prevent saturation of strong targets.	• Auto • Manual (0% to 100%)
Antenna	• SuperHD Open Array	The Antenna setting scales the effective antenna size. At zero, the effective antenna size matches its actual size. At 95%, the effective antenna size is doubled. Increasing the effective antenna size separates targets that appear merged at lower settings.	• Auto • Manual (0% to 100%)

Menu Item	Radar scanner	Description	Options
FTC	• (Non HD) Digital Radome	The FTC (Fast Time Constant) settings enables you to remove areas of clutter at a distance from your vessel. It also helps you to distinguish between two very close echoes on the same bearing, which may otherwise merge and appear as one echo.	• Auto • Manual (0% to 100%)
Rain	• All	The Radar scanner detects echoes from rain or snow. These echoes appear on screen as countless small echoes continuously changing size, intensity and position. Turning the rain clutter function On suppresses the bulk effect of rain returns from around your vessel, making it easier to recognize other objects. You can adjust the intensity of this setting between 0 and 100%.	• **On** — enables the Rain function and allows you to adjust the setting between 0 and 100%. • **Off** — disables the Rain function. This is the default.

16.21 Dual range Radar operation

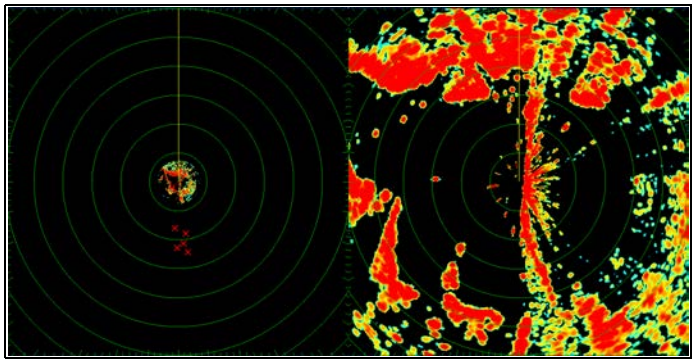
The Dual Range Radar function enables you to view 2 ranges at the same time in separate windows.

Dual Range is available on the following Radar scanners:

- SuperHD™ Open Array
- HD Open Array
- HD Radome

Using your MFD and a compatible Radar scanner, you can view either a short or a long range image in separate Radar windows.

The default setting is Long, which provides a standard scanner range.



Limitations

- Dual Range operation is not available if MARPA targets are active.
- You cannot acquire MARPA targets if Dual Range is enabled.
- Radar/Chart sync and Radar/Chart overlay are temporarily disabled when Dual Range is enabled.

Dual range Radar compatibility

The range covered by the short Dual Range option depends on the Radar scanner you are using, and the software version it is using.

Scanner	Dual range mode	*Range covered by software versions 1.xx to 2.xx	Range covered by software versions 3.xx onwards
4 Kw HD Open Array	Long (1)	1/8 nm to 72 nm	1/8 nm to 72 nm
	Short (2)	1/8 nm to 3 nm	1/8 nm to 72 nm
4 Kw SuperHD Open Array	Long (1)	1/8 nm to 72 nm	1/8 nm to 72 nm
	Short (2)	1/8 nm to 3 nm	1/8 nm to 72 nm
12 Kw HD Open Array	Long (1)	n/a	1/8 nm to 72 nm
	Short (2)	n/a	1/8 nm to 72 nm
12 Kw SuperHD Open Array	Long (1)	1/8 nm to 72 nm	1/8 nm to 72 nm
	Short (2)	1/8 nm to 3 nm	1/8 nm to 72 nm
HD Radome	Long (1)	1/8 nm to 48 nm	1/8 nm to 48 nm
	Short (2)	1/8 nm to 48 nm	1/8 nm to 48 nm

Limitations of software version 1.xx and 2.xx

- The value for the short range setting must be less than or equal to the long range setting.
- With **Dual Range** On and a short range window active Expansion control shall be disabled in the **Enhance Echoes** menu.

Using Dual Range with SuperHD scanners

Dual range Radar operation with SuperHD scanners.

When using the short Dual Range option, a SuperHD scanner operates in HD mode only. When using the long Dual Range option, a SuperHD Radar operates in SuperHD mode.

Scanner	Dual Range mode	Operating mode
4 Kw SuperHD Open Array	Long	SuperHD
	Short	HD
12 Kw SuperHD Open Array	Long	SuperHD
	Short	HD

Enabling Dual Range Radar operation

In the Radar application.

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Dual Range** so that On is highlighted.
   Selecting Dual Range will switch between dual range On and Off.

Selecting range operation

With Dual Range set to on and the Radar application screen displayed:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Dual Range Channel** to switch between 1 or 2, as appropriate.

16.22 Radar Set-up menu

The Radar Set-up menu enables you to configure the performance and behavior of your Radar scanner.

Menu Item	Radar Scanner	Description	Options
Timed Transmit Set-up	• All	This menu item contains a sub-menu that enables you to adjust the timed transmit options: • **Timed Transmit** • **Transmit Period** • **Standby Period**	**Timed Transmit** • On • Off **Transmit Period** • 10 Scans • 20 Scans • 30 Scans **Standby Period** • 3 minutes • 5 minutes • 10 minutes • 15 minutes
Tune Adjust	• HD Radome • HD Open Array • SuperHD Open Array	This menu item allows you to fine tune the Radar scanner's receiver for maximum returns on the display. Raymarine recommends that this function is set to Auto. If you set this function to Manual and adjust the setting shortly after powering up the Radar scanner, you should adjust it again approximately 10 minutes after powering up the scanner, as the required setting will change after the magnetron has warmed up.	**Man** • Auto • Man 0% — 100%
EBL Reference	• All	The measurement point used for reference when measuring distances using Electronic Bearing Lines (EBLs) and range rings in the chart application. The options are Relative to ships heading or referenced to the compass is degrees Magnetic — True as selected in Bearing Mode.	• Relative • Mag-True
Sea Clutter Curve	• All	This menu item allows you to adjust the Sea Clutter — Radar echoes from waves can make it difficult to detect real targets. These echoes are known as “sea clutter”. Several factors can affect the level of clutter you see, including the weather and sea conditions, and the mounting height of the Radar. The sea clutter curve setting adjusts the Radar's sensitivity to sea clutter. The steepest setting for the curve is 1, and the most shallow setting is 8.	• Adjust Curve (1 to 8)
Radar Speed	• HD Radome • SuperHD Open Array	SuperHD open array Radars with software version 3.23 or above or HD radomes support multiple scan speeds: • 24 RPM • Auto (24 / 48 RPM) The Auto option automatically selects the appropriate speed for your Radar range. 48RPM is used at Radar ranges of up to 3nm. It provides an increased refresh rate, which is useful at high speed or in areas where you have large numbers of Radar targets. At Radar ranges of greater than 3nm the display switches the Radar speed to 24RPM.	**Scanner Speed** • 24 RPM • Auto —

Menu Item	Radar Scanner	Description	Options
Parking Offset	• HD Open Array • SuperHD Open Array	This option allows you to select the 'parked' position of your Open Array antenna. This option can only be adjusted when the Open Array is in Standby. Parking Offset is not required for non-HD Digital, HD and Quantum Radomes.	• 0° to 359°
Radar Size	• HD Open Array • SuperHD Open Array	This option allows you to select the size of your Open Array Radar.	• 4 ft • 6 ft
Pair with Quantum Radar	• Quantum	Enables initial pairing between Quantum Radar and MFD.	• SSID • Passcode
Advanced	• All	Sub-menu containing advanced set-up parameters.	• **Bearing Alignment** • **Display Timing** • **MBS** • **Tune Preset** • **STC Preset** • **Transmit Freq** • **Reset Advanced**

Advanced menu

Important: Under normal circumstances you will not need to adjust these settings, as they are set automatically. If these parameters are set incorrectly the performance of the Radar will be adversely affected.

Menu Item	Radar Scanner	Description	Options
Bearing Alignment	• All	The Radar bearing alignment ensures that Radar objects appear at the correct bearing relative to your boat's bow. You should check the bearing alignment for any new installation.	• -180º — 179.5º
Display Timing	• HD Radome • HD Open Array • SuperHD Open Array • non-HD Digital Radome	The length of cable used to connect the Radar to your MFD may have an effect on display timing. This will affect the short range accuracy of the Radar. A symptom if incorrect timing is that bridges or piers will appear to be bent or bowed.	• 0.415 n m — selected range
MBS	• All	Main Bang Suppression (MBS), when set to Off, suppresses the display video for the duration of the transmission pulse. Under certain circumstances, it may be easier to adjust Display Timing with MBS turned Off. **Note:** MBS is reset to On automatically when you finish adjusting the display timing.	• On (default) • Off
Tune Preset	• HD Radome • HD Open Array • SuperHD Open Array • non-HD Digital Radome	Radar tuning is controlled either automatically or manually using the **Tune Adjust** control. However, this only controls a restricted range of tuning values. If the actual peak falls outside this range, you will need to adjust the **Tune Preset** to move the controlled range over the tuning peak.	• 0 — 255
STC Preset	• non-HD Digital Radome	The Sensitivity Time Control (STC) can be adjusted to equalize target levels across the display. The default setting should provide an even display, but if you find that targets are brighter or dimmer nearer the center than at the edge of the display, you can adjust this control until the required display is achieved.	• 0 — 100%
Transmit Freq	• Quantum	If you are experiencing interference on the Radar picture you can use the Transmit Frequency setting to change the transmission frequency range of the Radar.	• Low • Normal (default) • High
Reset Advanced	• All	Resets the Advanced parameters to factory defaults.	• Yes • No

16.23 Resetting the Radar

To reset Radar settings to defaults follow the steps below:

From in the Radar application:

1. Select **Menu**.
2. Select **Radar Set-up**.
3. Select **Advanced**.
4. Select **Reset Advanced**.
   A confirmation pop up message is displayed.
5. Select **Yes** to confirm reset.

Chapter 17: Data application

Chapter contents

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- 17.2 Customizing the Data application on page 277
- 17.3 List of data items on page 279
- 17.4 Engine identification on page 282
- 17.5 Setting boat details from the Data application on page 284
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- 17.8 Units set-up on page 286

17.1 Data application overview

The Data application enables you to view data generated by the multifunction display or data that is available on your system.

Data can be obtained from devices connected using SeaTalk^{hs}, SeaTalk^{ng} or NMEA protocols.



Pre-configured datapages

The default datapage configuration is dependant upon the boat type selected during the initial set-up wizard.

Each datapage consists of a number of 'cells', that display the information.

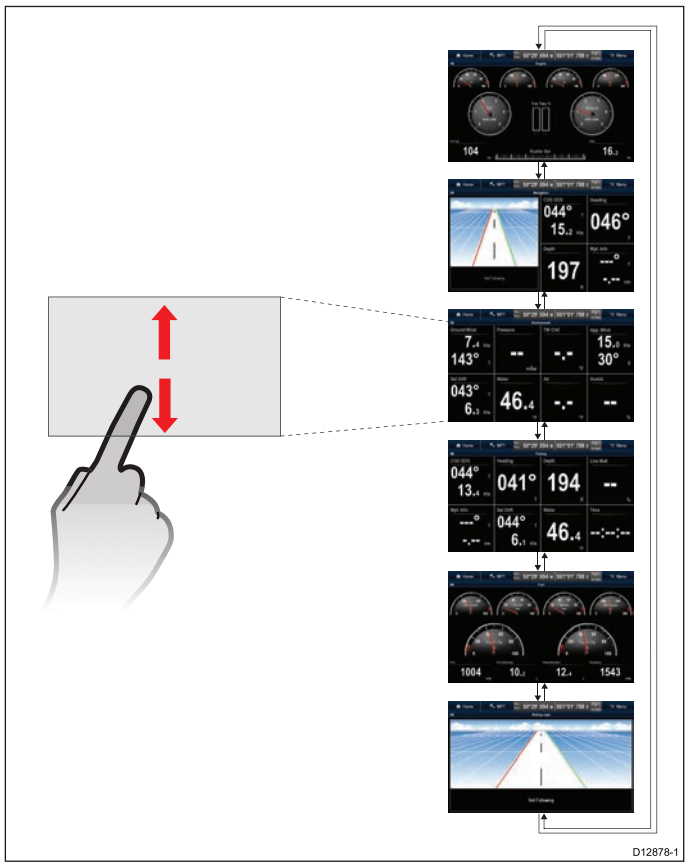
Default datapage configuration is shown below:

Motor vessel		Sailing vessel	
Page number	**Page**	**Page number**	**Page**
1/6	Engine	1/5	Engine
2/6	Navigation	2/5	Navigation
3/6	Environment	3/5	Sailing
4/6	Fishing	4/5	Environment
5/6	Fuel	5/5	Rolling road
6/6	Rolling road		

Note: Datapage selection is a local setting, and therefore only affects the individual display that you are currently using. It does not affect any networked displays.

Selecting datapages using touch

You can scroll through all available pages using the touchscreen.



From the Data application:

1. Touch the screen.
2. Slide your finger up and let go of the screen to go to the next datapage.
3. Slide your finger down and let go of the screen to go to the previous datapage.

Selecting datapages

To select datapages using a non-touch multifunction display follow the steps below.

From the data application:

1. Move the **Joystick Down** to goto the next page, or
2. Move the **Joystick Up** to goto the previous page.

Data application features

The following features are available in the Data application.

Change the order datapages appear	• **Changing the order of datapages**
Customize datapage content	• **Customizing datapage content using touch** • **Customizing datapage content**
Add new custom datapages	• **Adding a new datapage**
Rename the datapages	• **Renaming a datapage**
Delete datapages	• **Deleting a datapage**

Set boat details such as number of engines, fuel tanks, and batteries	• 17.5 **Setting boat details from the Data application**
Set the maximum RPM and Red zone range	• 17.6 **Setting engine RPM range and red zone**
Change the units of measurement	• **Changing units of measure from the Data application**
Adjust wind data response times	• **Setting wind damping from the Data application**
Reset minimum and maximum data readings	• **Resetting minimum and maximum readings**
Reset all datapages to defaults	• **Resetting all datapages**

Note: Relevant data must be available to your multifunction display.

17.2 Customizing the Data application

Changing the order of datapages

From the **Customize** menu: **Menu > Customize**.

1. Select **Edit Page**.
2. Select **Move Page Up** or **Move Page Down**.

   Each time **Move Page Up** or **Move Page Down** is selected the datapage will be moved 1 space in that direction.

Customizing datapage content using touch

On touchscreen multifunction displays you can customize a data item by pressing and holding on the item onscreen.

From the Data application:

1. Display the datapage that contains the data item you want to change.
2. Touch and hold your finger on the data item.

   After approximately 3 seconds the data item is highlighted and the **Select Data Category** menu is displayed.
3. Navigate the menu to locate the data item you want to use.
4. Select the data item.

   The selected data item is now displayed in place of the original data item.

Customizing datapage content

The content of datapages can be customized using the menu.

From the **Customize** menu: **Menu > Customize**.

1. Select **Edit Page**.
2. Select the cell you want to change.
3. Select **Select Data Category**.
4. Browse to the required data category.
5. Select the data item you want to display.
6. Repeat steps 2 to 5 for all the data items you want to change.

Adding a new datapage

You can add your own customized datapages to the data application. The total number of datapages including pre-configured pages is 10.

From the **Customize** menu: **Menu > Customize**.

1. Select **Create New Page**.

   A list of available page layouts is displayed.
2. Select the required page layout.

   The new page is displayed.



3. Select a blank cell on the new page.
4. Select **Select Data Category**.
5. Browse to the required data category.
6. Select the data item you want to display.
7. Repeat steps 3 to 6 for all data cells.
8. Select **Rename Page**.
9. Enter the new name for the datapage.
10. Select **SAVE**.

Renaming a datapage

From the **Customize** menu: **Menu > Customize**.

1. Select **Edit Page**.
2. Select **Rename Page**.
   The onscreen keyboard is displayed.
3. Enter the new name for the datapage.
4. Select **SAVE**.

Deleting a datapage

You can delete custom or pre-configured datapages. There must always be at least 1 datapage.

With the datapage you want to delete displayed:

From the **Customize** menu: **Menu > Customize**.

1. Select **Delete Page**.
   A confirmation pop-up is displayed.
2. Select **Yes** to delete the datapage, or **No** to keep the datapage.

Note: The pre-configured engine page layout is unique and cannot be recreated in a custom datapage.

Setting up an instrument page (Example)

You can use the Data application to set-up instrument data pages. The instructions below are provide as an example of how you would set up an Instrument data page for a DST800 transducer.

Ensure the relevant transducers are connected and available on your system.

Tip Check that the relevant devices (e.g. smart transducer, iTC-5 or Instrument display appears in the list of Devices shown under the Diagnostics menu.

With the Data application displayed:

1. Select **Create new page** from the Customize menu: (**Menu > Customize**).
2. Select the required Layout (e.g. 3 Cells).
   A new blank page is displayed with the first cell highlighted.



3. Select the **Select Data Category** option from the menu.
4. Select **Depth**.
5. Select the **Depth** data item.
6. Select the next empty cell on the page.
7. Select **Speed**.
8. Select **Speed**.
9. Select the speed graphic you want to use.
10. Select the next empty cell on the page.
11. Select **Back** to view the list of Data types.
12. Select **Environment**.
13. Select **Water Temp**.
14. Select the Water Temperature graphic you want to use.
15. Use the **Back** button to return to the Edit Page menu.
16. Select **Rename Page**.
    The onscreen keyboard is displayed.
17. Enter the name for your new data page and select **SAVE**.
18. Exit the Menu.



17.3 List of data items

Categories of data available to display in the data application, databoxes, databar, and expanded databar are shown below. Dial graphics are not available in databoxes or databars.

The following table shows the data items available by category.

Note:

* Only available in the Data application.

** Not available in the Data application.

*** The Battery, Engine, Fuel and Tanks menus will display 1 set of data items per configured device (e.g. if the system has been configured with 3 engines then 3 sets of engine data items will be displayed).

Data Category	Description	Data Items
Battery ***	Battery status	• Battery Amps • Battery Temperature • Battery Voltage • Battery Charge
Boat	Types of data generated by your vessel. For example, tank levels.	• Rate of Turn • Heel Angle • Trim Tabs *
Depth	Depth data.	• Depth • Maximum Depth • Minimum Depth
Distance	Types of data related to distance travelled by your vessel. For example, trip distance.	• Log & Trip • Log • Trip • Ground Log and Trip • Ground Log • Ground Trip 1 • Ground Trip 2 • Ground Trip 3 • Ground Trip 4
Engine ***	Types of data generated by engines. For example, oil pressure.	• RPM • RPM & SOG • Coolant Temperature • Coolant Pressure • Oil Temperature • Oil Pressure • Oil Pressure & Coolant Temperature • Transmission Oil Temperature • Transmission Oil Pressure • Transmission Gear • Boost Pressure • Fuel Pressure • Fuel Flow Rate • Fuel Flow (Inst) • Fuel Flow (Avg) • Engine Hours • Engine Trim • Alternator • Engine Load
Fuel ***	Types of data related to the fuel system. For example, fuel levels.	• Fuel Level (%) • Total Fuel (%) • Total Fuel (vol) • Fuel Flow Total • Economy • Estimated Fuel Remaining • Distance to Empty • Time to Empty • Fuel Used (Trip) • Fuel Used (Season)

Data Category	Description	Data Items
Environment	Environmental-related data. For example, air temperature.	• Pressure • Air Temperature • Minimum Air Temperature • Maximum Air Temperature • Drift • Set • Set & Drift • Apparent Wind Chill • True Wind Chill • Humidity • Dew Point • Sunset / Sunrise • Water Temperature • Minimum Water Temperature • Maximum Water Temperature
GPS	GPS-related data. For example, vessel position.	• Vessel Position • COG & SOG • COG • SOG • Maximum SOG • Average SOG
Heading	Heading-related data. For example, locked heading.	• Heading • Heading and Speed * • Locked Heading • Locked Heading Error • LH Error and LH * • Tack Heading • Steer to Layline • Compass *

Data Category	Description	Data Items
Navigation	Types of data related to navigation. For example, bearing to waypoint.	• Cursor Position ** • Cursor info ** • Cross Track Error • Rolling Road * • Waypoint Info • Active Waypoint Name • Target Position • Bearing to Waypoint • BTW & DTW * • Course Made Good • CMG & DMG • CMG & VMG • Distance to Waypoint • Distance Made Good • Waypoint ETA • Waypoint TTG • Route ETA • Route TTG
Pilot	Pilot-related data. For example, rudder.	• Rudder Angle
Speed	Speed-related data. For example, VMG (Velocity Made Good) to Waypoint.	• Speed • Maximum Speed • Average Speed • Speed and SOG • VMG to Windward • VMG to Waypoint
Tanks ***	Data related to water tanks	• Fresh Water (%) • Grey Water (%) • Black Water (%) • Live Well (%)
Time	Time-related data. For example, local time.	• Local Time • Local Date

Data Category	Description	Data Items
Wind	Wind-related data. For example, VMG (Velocity Made Good) to Windward.	• AWA • Maximum AWA • Minimum AWA • AWS • Maximum AWS • Minimum AWS • TWA • Maximum TWA • Minimum TWA • TWS • Maximum TWS • Minimum TWS • TWD • Cardinal Wind • Ground Wind • Beaufort • AWA and TWA • AWA & AWS • AWA (CH) and AWS • AWA and VMG • TWA & TWS • TWA (CH) and TWS • TWA and VMG • GWD and Beaufort • GWD & GWS
None		

17.4 Engine identification

Engine data can be displayed on your MFD using the Data application, which provides some preset Engine pages for displaying some of the most common types of engine data.

Important: Before you can display Engine data on your MFD, you must:

- Ensure that your MFD is running LightHouse software version 8 or later.
- **Refer to the important “Engine setup with an ECI interface” and “Using the engine identification wizard” information.**
- Make the data connections, according to the instructions provided in the **87202 ECI Installation instructions**.
- Ensure all data buses are powered up (including engine data CAN buses, gateways, and also the SeaTalkng bus).
- Start the engine. It is important that only one engine is running at a time, to ensure that the system can isolate the correct engine data message.
- Run the **Engine identification wizard** to ensure that your engines are displayed in the correct order in the Data application.



Engine setup with an ECI interface

Before you can display engine data on your MFD, you may need to use the "Engine Identification wizard" on the MFD to setup the engines.

Important: When setting up on a multiple engine system, engines should always be turned on in sequence from port to starboard.

The following table details the different types of engine supported by the ECI interface unit, and the setup requirements for each:

Engine CAN bus protocol	Number of engines	Engine CAN bus configuration	Number of ECI units	Setup via wizard on MFD required
NMEA 2000	1	Single CAN bus	1	✗
NMEA 2000	2+	Single shared CAN bus	1	✗
NMEA 2000	2+	Separate CAN bus for each engine	1 for each CAN bus	✓
J1939	1	Single CAN bus	1	✗
J1939	2+	Single shared CAN bus	1	✗
J1939	2+	Separate CAN bus for each engine	1 for each CAN bus	✓

Engine interfacing without an ECI unit

For engines with a NMEA 2000 CAN bus it may be possible to connect to a Raymarine MFD via a SeaTalk^{ng} system without the use of a Raymarine ECI unit.

Refer to your engine dealer and also your local Raymarine dealer for advice on any engine instancing requirements and suitable connection cables.

Using the engine identification wizard

If your engine data appears in the wrong order on the engine data pages you can correct this by running the engine identification wizard.

From the Homescreen:

1. Select **Set-up > System Settings > External Devices > Engines Set-up**.
2. If required change the number of engines your vessel has by selecting **Num. of Engines:** and entering the correct number of engines.

   You can select up to 5 engines.

3. Select **Identify engines**.

Important: It is important that only one engine is running at a time, to ensure that the system can isolate the correct engine data message.

4. Follow the onscreen prompts to complete the engine identification wizard.

   The engines that will be included in the identification wizard are determined by the Number of engines set during step 2 above.

   i. Switch Off ALL vessel engines and select **Next**.

   The wizard will run through all engines (max of 5 as defined in step 2 above) from port to starboard in sequence.

   ii. Turn On the **port engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the port engine.

   iii. Turn On the **center port engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the center port engine.

   iv. Turn On the **center engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the center engine.

   v. Turn On the **center starboard engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the center starboard engine.

   vi. Turn On the **starboard engine** and select **OK**.

   The wizard will now listen for data and assign the engine instance as the starboard engine.

5. Select **OK** on the Identify Engines confirmation dialog.

The engines will now appear in the correct location on the engine data page.

17.5 Setting boat details from the Data application

From the **Data Set-up** menu: **Menu > Data Set-up**.

1. Select **Boat Details**.
2. Select **Num. of Engines**, **Num. Fuel Tanks**, or **Num. of Batteries**.
3. Select the required value.

   If the number of engines is changed then the Engine datapage is reset to display the new number of engines.

17.6 Setting engine RPM range and red zone

The Data application display RPM dials that can display RPM data sent from connected engine(s). The maximum RPM range and the RPM red zone can be automatically set by the engines or can be configured manually.

From the **Data Set-up** menu: **Menu > Data Set-up**.

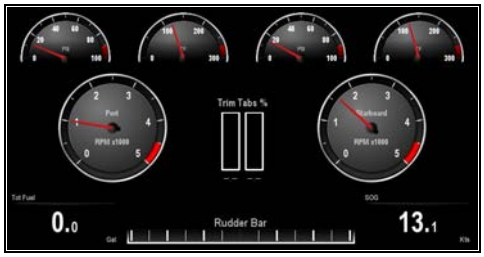
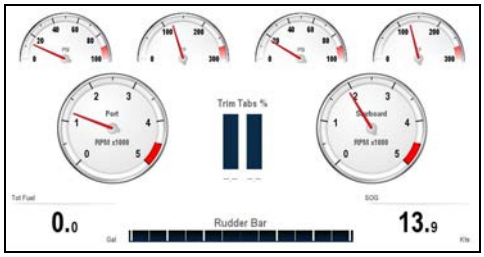
1. Select **Max RPM Range**.

   A list of available RPM settings is displayed.
2. Select the required RPM range, or select **Auto** to allow the engine to set the maximum range.
3. Select the first **RPM Red Zone:** option to switch the red zone range between Auto and Manual.

   With **Auto** selected the engine will set the red zone range, with Manual selected the second **RPM Red Zone:** option becomes available
4. With the first **RPM Red Zone:** set to Manual selected the second **RPM Red Zone:** option and adjust to the required value.

17.7 Color theme

The color theme in the Data application can be switched between light and dark.

Dark theme (default)	
Light theme	

Changing the color theme

You can change the color theme by following the steps below.

From the Data application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Color Theme**.

   Selecting color theme will switch color between Light and Dark.

17.8 Units set-up

You can specify your preference for the units of measurement that will be used in all applications.

Menu item	Description	Options
Distance Units	The units of measure that will be used in all applications for the display of all values related to distance.	• Nautical Miles • NM & m (major units = Nautical Miles, minor units = meters) • Statute Miles • Kilometers
Speed Units	The units of measure that will be used in all applications for the display of all values related to speed.	• Knots • MPH (Miles Per Hour) • KPH (Kilometers Per Hour)
Depth Units	The units of measure that will be used in all applications for the display of all values related to depth.	• Feet • Meters • Fathoms
Temperature Units	The units of measure that will be used in all applications for the display of all values related to temperature.	• Fahrenheit • Celsius
Pressure Units	The units of measure that will be used in all applications for the display of all values related to pressure.	• Bar • PSI • Kilopascals
Volume Units	The units of measure that will be used in all applications for the display of all values related to volume.	• US Gallons • Imperial Gallons • Liters
Economy Units	The units of measure that will be used in all applications for the display of all values related to fuel usage.	• Distance per Volume • Volume per Distance • Liters per 100 km
Wind Speed Units	The units of measure that will be used in all applications for the display of all values related to wind speed.	• Knots • Metres per second

Changing units of measure from the Data application

From the **Data Set-up** menu: **Menu > Data Set-up**.

1. Select **Units Set-up**.
2. Select the type of measurement you want to change.
3. Select the new unit of measure.

Resetting minimum and maximum readings

Minimum and maximum readings sorted on the display can be reset from the Data application.

From the Data application, with the data you want to reset displayed onscreen:

1. Select **Menu**.
2. Select **Data Resets**.
3. Select the data item you want to reset.
   The reading is reset.

Note: Resets will only be available for data items that are currently displayed onscreen.

Resetting all datapages

You can reset the Data application's datapages to factory defaults.

From the **Customize** menu: **Menu > Customize**.

1. Select **Reset All Pages**.
   A confirmation pop-up is displayed.
2. Select **Yes** to reset or **No** to cancel the action.

Note: The reset will also delete any custom pages that have been created. Custom settings will not be affected

Setting wind damping from the Data application

Damping settings determine the rate at which changes to wind angle and wind speed data are updated on the display.

From the **Data Set-up** menu: **Menu > Data Set-up**.

1. Select **Wind Angle Damping:**
2. Select **Wind Speed Damping:**

The default level is 12. The levels available are 1 to 15, 1 being the slowest update rate and 15 the quickest.

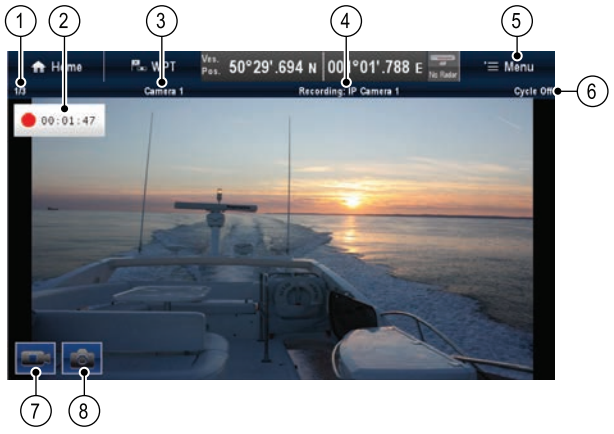
Chapter 18: Camera application

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- 18.2 Changing the camera feed on page 291
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- 18.5 Camera cycling on page 293
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18.1 Camera application overview and features

Analog and IP camera and video feeds can be viewed using the Camera application. Analog feeds must be connected directly to the display, IP feeds must be available on the **SeaTalk**^{hs} network. IP camera feeds can be recorded and photos can be taken.



1	Camera feed number – indicates the current feed and number of available feeds
2	Recording status – indicates that the camera application is recording and the current elapsed record time
3	Camera name – indicates the name of the camera that is currently displayed
4	Recording – indicates if the camera application is recording and which feed is being recorded
5	Menu – opens the Camera application's main menu
6	Cycle – indicates if the feed cycling is turned On or Off
7	Record video – temporary onscreen icon to start / stop recording (Touchscreen displays only)
8	Take photo – temporary onscreen icon to take a photo (Touchscreen displays only)

Important:

- Multifunction displays must be powered up before power is applied to networked IP cameras; this is to enable your multifunction display to assign the camera(s) a valid IP address.
- If IP a camera(s) is not detected, try power cycling the camera(s) whilst leaving the multifunction display turned on.

Camera application features

Changing camera or video feeds.	• 18.2 **Changing the camera feed**
Cycling through available feeds.	• 18.5 **Camera cycling**
Displaying multiple feeds using Quad View.	• 18.4 **Displaying multiple camera feeds using Quad View**
Recording IP camera feeds	• 18.10 **Record and playback**
Playing back recorded footage.	• 18.10 **Record and playback**
Taking photos of an IP camera feed	• **Taking a photo**
Viewing images.	• 18.12 **Viewing photos**

Note: For information on connecting a camera / video source and compatible video formats, refer to the *Cable sand connections* section of the installation instructions for your product.

18.2 Changing the camera feed

Changing the camera / video feed

On touchscreen displays, if more than 1 feed is available you can change which feed is displayed by swiping the screen.



From the Camera application.

1. Touch and swipe your finger up to move to the next video feed.
2. Touch and swipe your finger down to display the previous video feed.

Changing the camera / video feed

On HybridTouch and non-touch displays, if more than 1 feed is available you can change which feed is displayed on the screen using the Directional controls.

From the Camera application

1. Move the **Directional control Down** to display the next video feed.
2. Move the **Directional control UP** to display the previous video feed.

Changing the camera / video feed using the menu

When more than 1 feed is available, you can change which feed is displayed onscreen using the menu.

From the Camera application:

1. Select **Menu**.
2. Select **Camera View**.
3. Select **Camera:**.
4. Select the feed you want to display.

18.3 Switching video stream

When connected to a compatible camera, such as the **AX8** thermal camera, which broadcasts more than 1 video stream simultaneously, you can choose which stream to display.

From the Camera application with the desired camera's feed displayed:

1. Select Menu.
2. Select Image Mode:

   A list of available streams is displayed e.g.:

   - Thermal MSX
   - Thermal
   - Visible
3. Select the stream that you want displayed on your MFD.

18.4 Displaying multiple camera feeds using Quad View

When an IP camera is available on the network, the Camera application can be set to Quad View. In Quad View up to 4 camera feeds can be viewed simultaneously.

Quad View can consist of up to 4 x IP feeds or 1 x analog feed and up to 3 x IP feeds.



To enable Quad View, from the Camera application:

1. Select **Menu**.
2. Select **Camera View**.
3. Select **Layout:** so that Quad View is displayed.
4. Arrange the feeds by selecting a feed in each of the **Top-Left**, **Top-Right**, **Bottom-L** and **Bottom-R** menu options as required.

   Analog feeds can only be displayed in the top left corner.

5. The top left corner can also be set to cycle through all available analog and IP feeds using the cycling options available in the **Top-Left** menu.

   *See 18.5 **Camera cycling** for details of cycling feeds.*

Recording, taking photos, naming feeds and adjusting the video image are not supported in Quad View; however it is possible to switch to Quad View whilst recording in Single View.

Note: Except for **gS Series** displays, Quad View is not available on **MFD**s with a 9 inch or below screen size when the Camera application is being viewed as part of a splitscreen page.

Note: Displaying multiple IP feeds on multiple **MFD**s simultaneously may cause some feeds to not be displayed.

Using onscreen controls

On touchscreen displays, onscreen controls are available to quickly switch between Quad View and Single View.

In Quad View:

1. Select the feed.

   The Expand icon is displayed.

2. Select the Expand icon to view the feed in fullscreen.
3. Select the fullscreen feed.

   The Quad View icon is displayed.

4. Select the Quad View icon to switch the Camera application back to Quad View.

18.5 Camera cycling

When multiple feeds are available the Camera application can be set up to automatically cycle through the available feeds at a specified time interval.

Note: Camera cycling is not available when the Camera application is viewed as part of a splitscreen page.

With camera cycling turned on the Camera application will cycle through the display's available video input(s) and any available networked IP camera feeds. The feeds will be cycled in the order they appear in the Camera selection menu: **Menu > Camera View > Camera:**. Direct video input feeds will appear first followed by any networked IP camera feeds. When the final feed in the list has been displayed the Camera application will loop back to the first feed in the list.

Camera cycling will cycle through the multifunction display's available video input(s) even if no feed is connected to the input(s). When no feed is present on a video input the 'No video source available' message is displayed. You can choose whether or not the video input(s) appear during camera cycling.

The time interval that each feed is displayed, before switching to the next feed can be adjusted.

Enabling camera cycling

Camera cycling can be enabled independently in both Single View and Quad View.

From the camera application:

1. Select **Menu**.
2. Select **Camera View**.
3. Select **Camera Cycling**.
4. Select **Camera Cycling:** so that On is highlighted.

   Selecting Camera Cycling will switch cycling On and Off.

When the menu is closed the camera application will cycle through all available feeds at the defined time interval.

Setting the time interval for camera cycling

The time interval that each video feed is displayed for can be adjusted. The time interval specified will apply to Camera cycling in Single View and Quad View.

From the Camera application, with Camera cycling turned on:

1. Select **Menu**.
2. Select **Camera View**.
3. Select **Camera Cycling**.
4. Select **Cycle Interval:**.

   The cycle interval adjustment control is displayed.
5. Adjust the setting to the required time interval.

During camera cycling each feed is displayed for the specified time before changing to the next feed.

Showing or hiding video input feeds during camera cycling

By default your multifunction display's video input(s) are shown during cycling, even if no feed is connected. You can choose to Include or Exclude video input(s) from Camera cycling. The Input(s) included or excluded will apply to both Single View and Quad View.

From the Camera application:

1. Select **Menu**.
2. Select **Camera View**.
3. Select **Camera Cycling**.
4. Select the **Include <Camera Name>:** option for the video input you want to Show or Hide.

   Selecting **Include <Camera Name>:** option will switch between showing or hiding the video input during camera cycling.

Note: In the steps above **<Camera Name>** represents the default feed name provided by the connected device or the custom name which can be assigned to the feed.

Turning off camera cycling

You can turn off Camera cycling using the methods detailed below.

From the camera application, with camera cycling turned on:

1. Select **Menu > Camera View > Camera Cycling > Camera Cycling:** so that Off is highlighted, or
2. Change the camera / video feed manually.

18.6 Naming camera / video feeds

To help distinguish between camera feeds each feed can be named.

From the Camera application:

1. Select the feed you want to name so that it is displayed on the screen.
2. Select **Menu**.
3. Select **Adjust**.
4. Select **Edit Name**.

   The onscreen keyboard is displayed.
5. Enter the name you want the feed to be called.
6. Select **SAVE** to save the new name for the feed.

The name of the feed is displayed in the camera application's status bar.

18.7 Adjusting the video image

If supported by your connected camera / video input device or networked IP camera, you can adjust the image settings.

With a video feed displayed in the Camera application:

1. Select **Menu**.
2. Select **Adjust**.
3. Select **Contrast**, **Brightness**, or **Color**, as appropriate.

   The numeric adjust control is displayed.
4. Adjust the level to the required setting.

18.8 Selecting the aspect ratio

If supported by your connected camera / video input device or networked IP camera, you can manually change the aspect ratio between 4:3 and 16:9.

From the camera application with a feed displayed:

1. Select **Menu**.
2. Select **Adjust**.
3. Select **Aspect ratio** so that 4:3 or 16:9 is selected as required.

18.9 Selecting a location to store recordings

In order to record, playback or capture a still image of IP camera feeds you must select the location you want to save to.

If saving to a memory card ensure that a memory card with sufficient space is inserted into the relevant card reader slot.

Note: Do not save files to cartography chart memory cards.

From the Camera application:

1. Select **Menu**.
2. Select **Set-up**.
3. Select **Save Files to:**.
4. Select the location from the list:
   - SD1
   - SD2
   - Internal (default)

   SD1 and SD2 will only be selectable if a memory card is inserted into the relevant slot.

Note: If your multifunction display only has 1 card reader slot then only SD1 and Internal is displayed.

18.10 Record and playback

The Camera application can be used to record live IP camera feeds from a connected IP camera. The recording can then be played back at any time.

The camera application records IP camera feeds in .mp4 format which can be saved to a memory card or to the display's internal storage.

The Camera application titlebar displays the name of the feed being recorded and a recording timer is displayed onscreen that shows the elapsed time.

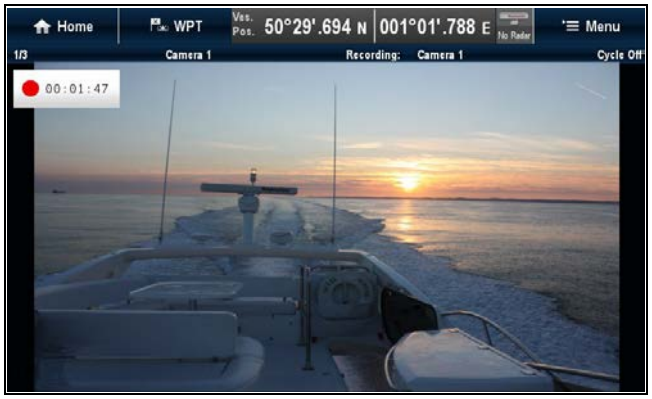
Recording an IP camera feed

To record the feed from an IP camera follow the steps below.

From the Camera application:

1. Select **Menu**.
2. Select **Videos**.
3. Select **Record**.

   The recording will start.



Whilst the camera application is recording you can use your multifunction display as normal e.g. view a different camera feed, go back to the Homescreen, or open a different application. The selected feed will continue to record until stopped or until the memory of the selected location is full.

Note: On a touchscreen display you can also start a recording using the onscreen icons. Refer to Onscreen icons.

Approximate record times

The approximate record times are dependant on IP camera resolution and settings, lighting conditions and available storage space.

The **CAM200IP**, set to factory default settings, can record at an approximate rate of 22.5 MB per minute; allowing up to 44 minutes of record time per 1 GB of available storage space.

Note: Recordings and images can be saved to the **MFD**s internal storage, refer to the Internal storage section for approximate available storage.

Internal storage

Multifunction displays (**MFD**s) include internal storage that can be used to store recorded video and photos taken using the Camera application. The table below shows the approximate available internal storage space for **LightHouse™** powered **MFD**s.

MFD variant	Approximate available internal storage	Approximate record time (CAM200IP)
a Series	2 GB	88.8 minutes
c Series	2 GB	88.8 minutes
e Series (excluding **e165**)	2 GB	88.8 minutes
e165	6 GB	266.6 minutes
gS Series	14 GB	622.2 minutes
eS Series	6 GB	266.6 minutes

Note:

- The available internal storage stated above is based on **MFD** manufactured after May 2014. Available storage on displays manufactured prior to this date may vary.
- Available internal storage space is subject to change without prior notice.
- The approximate record times stated above were taken using a **CAM200IP** set to its default resolution of 720p. Increasing image resolution and other factors such as lighting conditions may affect the resulting filesize and therefor reduce the available record time.

Stop recording

Recording can be stopped at any time.

From the Camera application:

1. Select **Menu**.
2. Select **Videos**.
3. Select **Stop**.

   The File is saved and the Video Saved confirmation dialog is displayed.
4. Select **OK** to confirm, **Play** to playback the recorded file or **Delete** to delete the file.

   The confirmation dialog will automatically close after 5 seconds.

Playing back a video file

You can playback video clips using the Camera application.

From the Camera application:

1. Select **Menu**.
2. Select **Videos**.
3. Select **View**.

   The My Files browser is opened.
4. Locate the Video file you want to view.

   *Video files stored on internal storage are saved in **Internal > User Data > Video files**.*

*Video files stored on memory card are saved in **SD Card # > Raymarine > Video files**.*

5. Select the Video file.
   The file options dialog is displayed.
6. Select **Play Video**.
   The Video file is played.

You can also playback video clips from the My Data menu from the Homescreen: **Homescreen > My Data > My Files**.

Moving and copying video files

You can copy and move files between your display's internal storage and memory cards using the steps below.

Ensure you have a memory card inserted in the card reader.

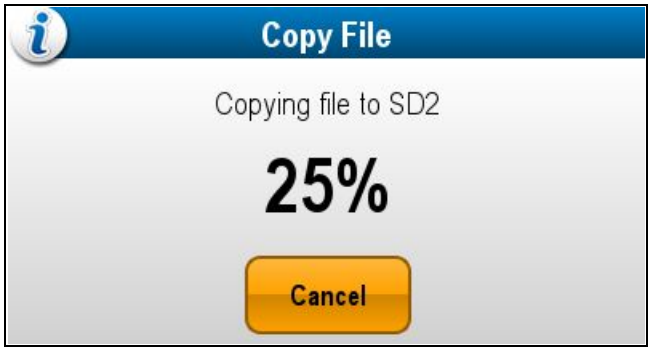
From the Camera application:

1. Select **Menu**.
2. Select **Videos**.
3. Select **View**.
   The My Files browser is opened.
4. Locate the relevant video file.

   *Video files stored on internal storage are saved in **Internal > User Data > Video files**.*

   *Video files stored on memory card are saved in **SD Card # > Raymarine > Video files**.*

5. Select the video file.
   The file options dialog is displayed.
6. Select **Move** or **Copy**.
7. Confirm the location you want to move or copy the file to.
   A progress indicator is displayed e.g.:



   When the operation is complete a confirmation pop-up message is displayed.
8. Select **OK**.

18.11 Taking photos

When a camera feed from an IP camera is displayed you can capture a still image.

Photos can be taken using the following methods:

Capture 	Capture — Immediate image capture.
Timer 	Timer — You can select the image to be taken in 5, 10 or 30 seconds after selection.
Remote 	Remote — You can use a wireless remote control (e.g. the RCU–3) to take the photo.

Taking a photo

To take a photo of what is currently displayed in the Camera application follow the steps below.

If saving to a memory card ensure that a memory card with sufficient space is inserted into the relevant card reader slot.

From the Camera application, with an IP camera feed displayed:

1. Select **Menu**.
2. Select **Photos**.
3. Select **Capture**.
   The photo is saved and a confirmation dialog is displayed showing a preview of the picture taken.



4. Select **OK** to confirm.
5. Select **View** to view the picture fullscreen.
6. Select **Delete** to delete the picture.

Note: On a touchscreen display you can also take a photo using the onscreen icons. Refer to Onscreen icons.

Taking a photo using the timer

To take a photo after a defined interval follow the steps below.

If saving to a memory card ensure that a memory card with sufficient space is inserted into the relevant card reader slot.

From the Camera application:

1. Select **Menu**.
2. Select **Photos**.
3. Select **Timer**.
4. Select **Time Delay**.
   A list of time intervals is displayed:
   - 5 s
   - 10 s
   - 30 s
5. Select a time interval from the list.
6. Select **Start Timer**.
   The photo will be taken after the time delay specified has elapsed. A confirmation dialog is then displayed showing a preview of the photo taken.
7. Select **OK** to confirm.
8. Select **View** to view the photo fullscreen.
9. Select **Delete** to delete the photo.

Taking a photo using a remote control

To take a photo using a Raymarine wireless remote control as the trigger follow the steps below.

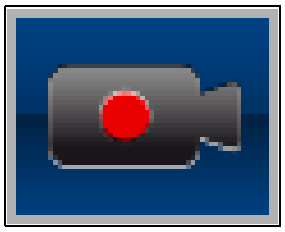
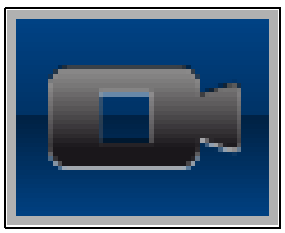
If saving to a memory card ensure that a memory card with sufficient space is inserted into the relevant card reader slot.

1. Ensure that your wireless Raymarine remote control is paired to the multifunction display and working.
2. From the Camera application, select **Menu**.
3. Select **Photos**.
4. Select **Remote**.
   The Remote dialog is displayed.
5. Press any button on the connected remote control to take a photo.
   The photo is saved and a confirmation dialog is displayed showing a preview of the photo.
6. Select **OK** to confirm.
7. Select **View** to view the photo fullscreen.
8. Select **Delete** to delete the photo.

Onscreen icons

On Touchscreen multifunction displays you can touch anywhere on the screen to display the onscreen icons

The onscreen icons can be used to start / stop recording or to take a picture.

	Record icon
	Stop Recording icon
	Take Photo icon

The onscreen icons will close after 5 seconds.

Using the onscreen icons

1. Select the **Record icon** to start recording.
2. Select the **Stop recording icon** to stop the recording.
3. Select the **Take Photo icon** to capture a still image.

18.12 Viewing photos

You can view the photos you have taken by following the steps below.

From the Camera application:

1. Select **Menu**.
2. Select **Photos**.
3. Select **View**.
   The My Files browser is opened.
4. Locate the photo you want to view.

   *Photos stored on internal storage are saved in **Internal > User Data > Image files**.*

   *Photos stored on memory card are saved in **SD Card # > Raymarine > Image files**.*

5. Select the file.
   The file options dialog is displayed.
6. Select **View Image**.
   The photo is displayed onscreen.

You can also view images from the My Data menu from the Homescreen: **Homescreen > My Data > My Files**.

Moving and copying photos

You can copy and move files between your display's internal storage and inserted memory cards.

From the Camera application:

1. Ensure you have a memory card (NOT a chart card) inserted into a card slot.
2. Select **Menu > Photos > View**.
   The My Files browser is opened.
3. Browse to the relevant photo.

   - *Photos stored on internal storage are saved in **Internal > User Data > Image files**.*
   - *Photos stored on memory card are saved in **SD Card # > Raymarine > Image files**.*

4. Select the file.
   The file options dialog is displayed.
5. Select **Move** or **Copy**.
6. Confirm the location you want to move or copy the file to.
   When the operation is complete a confirmation message is displayed.
7. Select **OK**.

18.13 Switching on a camera's LED / Light

When connected to a compatible camera, such as the **AX8** thermal camera, which includes an LED light, you can switch the LED on and off using the Camera application menu.

From the Camera application with the desired camera's feed displayed:

1. Select **Menu**.
2. Select **Adjust**.
3. Select **Light:** so that On is selected.

Chapter 19: Thermal camera application — Pan and tilt cameras

Chapter contents

- 19.1 Thermal camera application overview on page 302
- 19.2 Thermal camera image on page 302
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- 19.7 Pan and tilt camera — new camera interface on page 310
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- 19.9 Pan and tilt camera — old camera interface on page 314

19.1 Thermal camera application overview

The thermal camera application enables you to control a connected thermal camera and display its image on your multifunction display.

Note: The features and options available in the thermal camera application may vary, and are dependent on the thermal camera model.

Thermal imaging (also known as infrared) cameras enable you to see clearly in low-light and no-light conditions. For example, a thermal camera can help you navigate at night or identify obstacles in areas of low visibility or even total darkness.

The thermal application enables you to:

- **Control the camera:**
  - Pan.
  - Tilt.
  - Zoom (range).
  - Return camera to “home” (default) position.
  - Set the camera “home” position.
  - Pause the camera image.
  - Toggle between visible light and thermal camera lenses.
  - Toggle surveillance mode.
- **Adjust the camera image:**
  - Color palette.
  - Scene presets.
  - Brightness.
  - Contrast.
  - Color.
  - Video polarity (reverse video color).

Displaying the thermal camera application

With the home screen displayed:

1. Select a page icon that includes the thermal camera application.

   The thermal camera application is displayed.

Note: If the home screen does NOT include a page icon that features the thermal camera application you will need to create a new page icon featuring the thermal camera application.

19.2 Thermal camera image

The thermal camera provides a video image which is shown on your display.



The video feed provides:

- Thermal image.
- Status icons / system information.

You should take time to familiarize yourself with the thermal image. This will help you to make the most of your system:

- Consider every object you view in terms of how it will look “thermally” as opposed to how it looks to your eye. For example look for changes caused by the heating effect of the sun. These are particularly evident right after sunset.
- Experiment with white-hot and black-hot (reverse video) modes.
- Experiment by looking for hot objects (such as people) compared to the colder surroundings.
- Experiment with the camera for daytime viewing. The camera can provide improved daytime viewing in environments where traditional video camera performance suffers, such as in shadows or backlit scenes.

Thermal camera status icons

The thermal camera image includes icons to show the current status of the camera.

Icon	Description
	Camera direction indicator.
	Camera home position.
	Camera paused.
	Scene preset mode for night conditions.
	Scene preset mode for daytime conditions.

Icon	Description
	Scene preset mode for night docking.
	Scene preset mode for identifying people or objects in the water.
	Rear-view mode — image is flipped horizontally.
	Zoom setting: 2x zoom.
	Zoom setting: 4x zoom.
	Single active controller on network.
	Multiple active controllers on network.
	PC / laptop detected on network.
	Point mode enabled.
	Point mode disabled.
	Stabilization Off.
	Stabilization On.

FFC (Flat Field Correction)

Periodically the camera will perform a Flat Field Correction (FFC). This will fine tune the thermal image to suit the current ambient temperature.

The FFC operation is indicated by a momentary pause and a green rectangle displayed in the upper left of the thermal video image.

19.3 Thermal camera setup and checks

To ensure correct operation of the thermal camera you should setup and check the camera's main functions.

Before proceeding ensure that the camera is connected correctly, according to the instructions provided. If your system includes the optional Joystick Control Unit (JCU) and PoE (Power over Ethernet) injector, ensure these units are also connected correctly.

Set up the camera

You will need to:

- Adjust the image (contrast, brightness, and so on).
- Check camera movement (pan, tilt and home functions) (if applicable).

Adjusting the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Adjust Contrast**.
3. Select the Contrast, Brightness, or Color option as appropriate.

   The relevant numeric adjust control is displayed.
4. Adjust the value as required.
5. Select **Back** or **OK** to confirm the new value.

19.4 Controls overview

The thermal camera application is available on compatible Raymarine multifunction displays and systems. It includes controls for the thermal camera.

Rotary control	Zoom image in / out.
Joystick	• Pan and tilt camera **Note:** On touchscreen displays you can also use the touchscreen to pan and tilt the camera. • Navigate menus
OK	Confirm menu selection
CANCEL / Back	Cancel selection
RANGE IN / OUT	Zoom image in / out.

19.5 Camera control

Power up and standby

When the breaker connecting power to the camera is switched on, the camera will run a boot up sequence lasting for about 1 minute, after which the camera will be in **Standby** mode.

In order for the camera to operate, you must bring the camera out of standby mode using the camera controls.

Thermal camera standby

Standby mode can be used to temporarily suspend the thermal camera's functions when the camera is not needed for a prolonged period.

When in standby mode the camera:

- Does NOT provide a live video image.
- Moves the camera into its “stowed” (parked) position (lens facing down into the camera base) to protect the camera optics.
- Engages its pan / tilt motors to hold the camera in place in rough seas.

Note: The “stowed” (parked) position can be configured using the camera's setup menu.

Enabling and disabling thermal camera standby

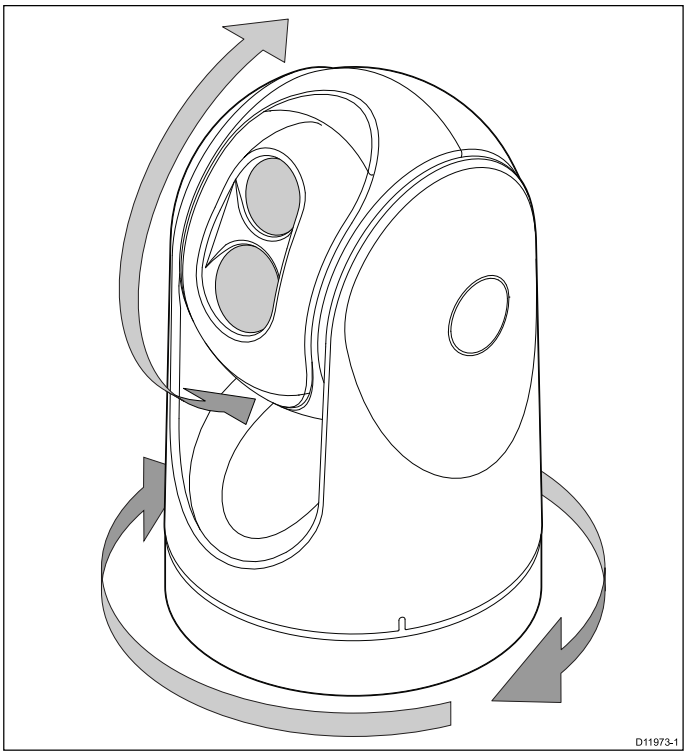
With the thermal camera application displayed:

1. Select **Menu**.
2. Use the **Standby** menu item to switch the camera in and out of standby mode.

Note: You can also use any of the camera controls in the thermal camera application to “wake” the camera from standby mode.

Pan, tilt and zoom

The camera controls allow for pan and tilt (elevation) of the camera, as well as zoom (magnification) of the thermal image.

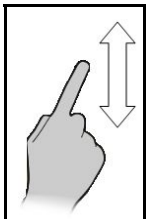
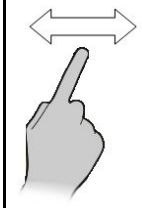


- Pan continuously through 360º.
- Tilt (elevate) to ±90º relative to the horizon.
- Zoom (magnify) the thermal camera image.

Note: Stabilized variants of the T-Series thermal cameras include a continuous zoom function, non-stabilized variants can switch between x2 and x4 magnification.

Panning and tilting, and the thermal image

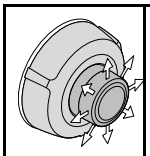
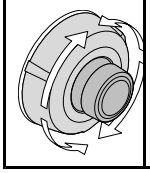
On a touchscreen multifunction display you can pan and tilt the thermal camera image using the touchscreen.

	Move your finger up and down the screen to tilt the camera up or down.
	Move your finger left and right on the screen to rotate the camera left or right (panning).

Panning, Tilting and zooming the thermal image

On a multifunction display with physical buttons or when using a remote keypad you can pan, tilt and zoom the thermal camera image using the UniControl.

In some circumstances it may be better to use just the UniControl's rotary and joystick controls to manipulate the thermal camera view. For example, this method is ideal for finer control over the camera and is particularly useful in rough sea conditions.

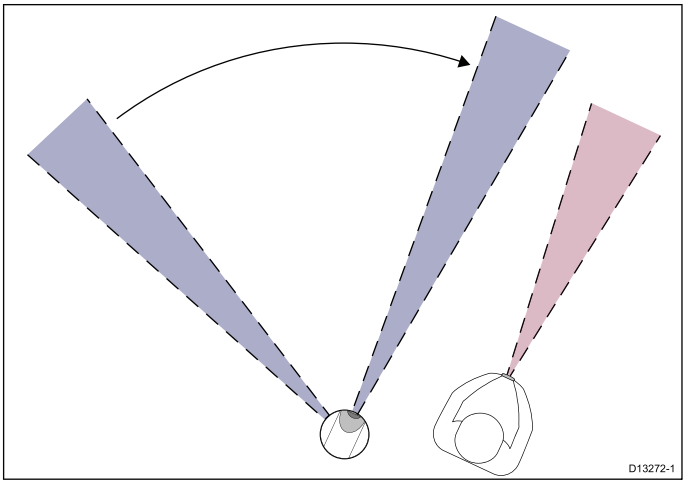
	UniControl joystick — is used for rotating the camera left or right (panning), or tilting the camera up or down.
	UniControl rotary — is used to zoom in and out.

Aligning to mobile device

When using the **RayControl** or **RayRemote** mobile applications your connected mobile device may be used to position the thermal camera's field of view.

Prerequisites:

- A compatible **Raymarine®** / **FLIR®** pan and tilt thermal camera is required
- Your mobile device must have a built-in compass (magnetometer).
- Your mobile device must be connected to the Wi-Fi connection of the **MFD** that is connected to the thermal camera.
- Your mobile device must have the latest version of the **RayRemote** or **RayControl** app installed.



1. Open the **RayRemote** or **RayControl** app.
2. Ensure the Thermal camera application is running on the MFD.
3. With the thermal camera application displayed on your mobile device select **Motion sync**.

The thermal camera will now automatically pan and tilt to the same heading as your mobile device.

Thermal camera home position

The home position is a preset position for the camera.

The home position usually defines a useful reference point — for example, straight ahead and level with the horizon. You can set the home position as required and to return the camera to the home position at any time.

	The home icon appears on-screen momentarily when the camera returns to the home position. The icon flashes when a new home position is set.

Resetting the thermal camera to the home position

When connected to a pan, tilt thermal camera the home position of the camera can be set.

In the thermal camera application:

1. Select **Menu**.
2. Select **Camera Home**.
   The camera returns to its currently defined home position, and the “Home” icon appears on-screen momentarily.

Setting the thermal camera home position

With the thermal camera application displayed:

1. Use the joystick or touchscreen to move the camera to the desired position.
2. Select **Menu**.
3. Select **Camera Set-up**.
4. Select **Set Home Position**.
   The “Home” icon flashes on-screen to indicate that a new home position has been set.

Pausing the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Pause Image**.

Thermal camera surveillance mode

In surveillance mode the camera pans left and right continuously.

The camera continues to pan until surveillance mode is disabled, or the camera controls are used to move the camera. When this occurs the camera does not automatically resume surveillance mode and the mode must be enabled again if required.

Enabling and disabling thermal camera surveillance mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Surveillance** menu item to select the On or Off option, as appropriate.

Surveillance mode settings

The scan width and scan speed can be adjusted.

Scan Width

The scan width determines the distance that the camera pans left and right when in surveillance mode.

Scan Speed

The scan speed determines the speed at which the camera pans left and right when in surveillance mode.

Setting scan width

The surveillance mode scan width can be adjusted by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Surveillance Settings**.
4. Select **Scan Width**.
   The scan width options will be displayed:
   - **Narrow** — The camera will scan approximately 20º left and right of the center (40º total).
   - **Medium** — The camera will scan approximately 40º left and right of the center (80º total).
   - **Wide** — The camera will scan approximately 80º left and right of the center (160º total).
5. Select the required option.

Setting scan speed

The surveillance mode scan speed can be adjusted by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Surveillance Settings**.
4. Select **Scan Speed**.
   The scan speed options will be displayed:
   - **Slow**
   - **Medium**
   - **Fast**
5. Select the required option.

Thermal camera stabilization

The Raymarine T470SC and T473SC thermal cameras include a mechanical stabilization feature.

The mechanical stabilization feature improves image stability by compensating for vessel motion and keeping the camera aimed at the point of interest. Mechanical stabilization has two aspects: horizontal (azimuth) and vertical (elevation). By default, mechanical stabilization is set to on, which provides the best on-the-water performance particularly when the vessel is underway and traveling on rough water or in swell conditions. You can disable or enable stabilization whenever you want. When you enable full stabilization (horizontal and vertical), the Stabilization On (no wave) icon flashes. It does not display continually, since this is the normal mode of operation. If you disable stabilization, the Stabilization Off (wave) icon remains on the screen to make you aware that the motion of the vessel can affect the camera performance. This is not a normal mode of operation. Stabilization is automatically turned off when the camera is stowed, but the system restores your setting when the camera is powered on. You can turn off the horizontal (pan) stabilization while retaining the tilt stabilization by enabling point mode.

Enabling / Disabling stabilization

Stabilization is enabled by default. You can enable or disable stabilization at any time by following the steps below.

From the thermal camera application

1. Select **Menu**.
2. Select **Camera Set-up**.

3. Select **Stabilization Mode**.
   Selecting Stabilization mode switches stabilization On and Off.

Thermal camera point mode

Point mode is only applicable to thermal cameras which have mechanical stabilization.

Enabling point mode only has significance when stabilization is enabled. Enabling point mode turns off the horizontal (pan) stabilization while retaining the vertical (tilt) stabilization. This can be helpful when you want to use the thermal camera as an aide to navigation and keep the camera pointing in the same position relative to the vessel as it turns. For example, you may have stabilization enabled and have set the camera to point straight ahead relative to the front of the vessel. If the vessel is turned at a sharp angle under these conditions, the camera sensor will not follow the direction of the vessel. Enabling point mode keeps the camera in sync with the vessel direction while maintaining a stable elevation position. When point mode is enabled, a lock icon displays. The camera's azimuth position is now locked to the base. When you disable point mode, the unlock icon displays momentarily. The camera always starts up with point mode disabled.

Enabling / Disabling point mode

Point mode is disabled by default. With Stabilization enabled you can also enable point mode at any time by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Point Mode**.
   Selecting point mode switches point mode On and Off.

19.6 Image adjustments

Adjusting the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Adjust Contrast**.
3. Select the Contrast, Brightness, or Color option as appropriate.
   The relevant numeric adjust control is displayed.
4. Adjust the value as required.
5. Select **Back** or **OK** to confirm the new value.

Thermal camera scene presets

Scene presets enable you to quickly select the best image setting for the current environmental conditions.

During normal operation the thermal camera automatically adjusts itself to provide a high-contrast image optimized for most conditions. The Scene presets provide 4 additional settings that may provide better imagery in certain conditions. The 4 modes are:

	**Night Running** — scene preset mode for night conditions.
	**Day Running** — scene preset mode for daytime conditions.
	**Night Docking** — scene preset mode for night docking.
	**Search** — scene preset mode for identifying people or objects in the water.

Although the preset names indicate their intended use, varying environmental conditions might make another setting more preferable. For example, the night running scene preset might also be useful while in a harbor. You may find it beneficial to experiment with the different scene presets to discover the best preset to use for different conditions.

Changing the thermal camera scene preset

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Scene** menu item to switch between the available scene presets, as appropriate.

Thermal camera color modes

A range of color modes are available to help you distinguish objects on-screen in different conditions.

Changing the color mode switches the thermal camera image between a greyscale mode and 1 or more color modes. There are 5 color modes available.

The factory default color mode is white, which may improve your night vision. This default mode can be changed if required using the camera's on-screen **Video Setup** menu.

Note: If you have the Disable Color Thermal Video option selected in the camera's on-screen **Video Setup** menu, only 2 color modes are available — greyscale and red.

Changing the thermal camera color mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Color** menu item to switch between the available color palettes, as appropriate.

Thermal camera reverse video

You can reverse the polarity of the video image to change the appearance of objects on-screen.

The reverse video option (video polarity) switches the thermal image from white-hot (or red-hot if the color mode setting is active) to black-hot. The difference between white-hot and black-hot is shown below:

	White-hot thermal image.
	Black-hot thermal image.

You may find it useful to experiment with this option to find the best setting to suit your needs.

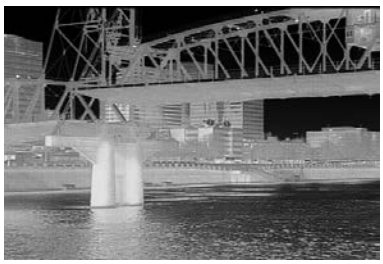
Enabling thermal camera reverse video

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Select **Reverse Video**.

Thermal and visible-light operation

“Dual payload” thermal cameras are equipped with 2 cameras — a thermal imaging (infrared) camera and a visible-light camera.

	**Thermal camera** — provides night-time imagery, based on temperature differences between objects. Thermal imaging produces a clear image even in total darkness.
	**Visible-light camera** — provides black and white (or greyscale) imagery during the day and in low-light conditions. Helps to improve navigational abilities in low-light conditions; for example during twilight hours when operating along intercoastal waterways and near harbor entrances. **Note:** The T470SC and T473SC have a color camera and continuous zoom lens.

Switching between thermal and visible-light camera lenses

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Image Type** menu item to switch between IR and Visible Light views, as appropriate.

Thermal camera rear view mode

The rear view mode flips the video image horizontally, providing a “mirror image”.

This is useful for example in instances where the camera is rear-facing and you are viewing the image on a forward-facing monitor.

Enabling thermal camera rear view mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Select **Rear View**.

Slew to Cue

Slew to cue is a feature which maintains a selected position or object in the thermal cameras field of view. Slew to Cue options are available in the chart and radar applications as target context menu items.

Note: Heading data must be available on the system for Slew to Cue to work correctly.

For details on how to select a target to 'slew to' refer to the radar and chart sections of your manual.

The thermal camera can also automatically slew to:

- MOB target
- Dangerous AIS target
- Dangerous MARPA target

Options to enable or disable the automatic slew options are available in the thermal camera application

Setting the camera's height above sea level

To ensure that the thermal camera's alignment can be set correctly the height of the camera above sea level must be set.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Slew Settings**.
   The Slew settings page is displayed.
4. Select **Camera height above sea level**.
   The Camera height above sea level pop up is displayed.
5. Adjust the value to the required setting.

Aligning the thermal camera horizontally

If you find that slew to cue objects are consistently too far left or right on the screen then you can make fine adjustments to the cameras alignment by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Align camera**.
   The Align camera to boat pop up is displayed.
4. Adjust the value to the required setting.
   This value will adjust the camera's offset position to port or starboard.

Aligning the thermal cameras elevation

If you find that slew to cue objects are consistently too low or high on the screen then you can make fine adjustments to the cameras alignment by following the steps below.

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Elev Align:**.
   The Align camera to boat pop up is displayed.
4. Adjust the value to the required setting.
   This value will adjust the camera's offset position to port or starboard.

Enabling / disabling automatic slew to cue

From the thermal camera application:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Slew Settings**.
   The Slew settings page is displayed which includes the following auto slew options:
   - Auto Slew to MOB
   - Auto Slew to Dangerous AIS target
   - Auto Slew to Dangerous MARPA target
4. Select the relevant option.
   Selecting an option from the list will switch the auto slew option for that item On or Off.

19.7 Pan and tilt camera — new camera interface

The thermal camera application menu options for a pan and tilt thermal camera with the new camera interface are shown below.

Activate Camera	Brings the thermal camera out of standby mode. (only available when camera is in standby.)
Pause Image	• On • Off (default)
Camera Home	Select to return the camera to its home position.
Image Options	Select to display the **Image Options** sub-menu. • Color – Red / RedHot / RedHot Inverse – Greyscale / WhiteHot / BlackHot – Glowbow – Rainbow – Fusion / Fusion Inverse – FireIce / FireIce Inverse • Scene – Night Running / Night – Night Docking / Docking – Day Running / Day – Man Overboard – High Contrast • Thermal / Visible • Reverse video • Rear View • Surveillance
Adjust Contrast	Select to display the **Adjust Contrast** sub-menu. • Contrast • Brightness • Color
Standby	Select to place the camera in to standby mode. (only available when camera is activated.)
Camera Set-up	Select to display the **Camera Set-up** menu. • Set Home Position • Slew Settings • Align Camera • Elev Align: • Surveillance Settings • Default Color • Icon Level • Stabilization Mode • Point Mode • Ball Down Mode • High Power Standby • High Power Torque

	• JCU Icon • PC Icon • Restore Factory Defaults • Calibrate Platform

Camera Set-up menu

Set Home Position	Sets the camera's current position as the **Camera Home** position.	
Slew Settings	Provides automatic slew options and camera alignment settings.	• Auto Slew to MOB • Auto Slew to dangerous AIS target • Auto Slew to dangerous MARPA target • Camera height above sea level
Align Camera	Enables changes to camera's horizontal alignment.	
Elev Align	Enables changes to camera's elevation (vertical) alignment.	
Surveillance Settings	Enables you to set the speed and width the camera will scan when in surveillance mode.	• Scan Speed – Slow – Medium – Fast • Scan Width – Narrow – Medium – Wide
Default Color	Enables selection of default color palette.	• Red • Greyscale • Glowbow • Rainbow • Fusion
Icon Level	Enables selection of level of icons displayed on-screen.	• None • Minimal • All
Stabilization Mode	Enables and disables stabilization mode. **Note:** Only available on stabilized variants of the T-Series cameras.	• On (default) • Off
Point Mode	Enables and disables point mode.	• On • Off (default)
Ball Down Mode	This options should be enables when the camera is mounted upside down in the 'ball down' configuration.	• On • Off (default)
High Power Standby	This option controls the amount of power used to hold the camera in position while it is in standby mode. With the setting enabled the camera will consume more power, but will help ensure that the camera is held in place in rough seas.	• On (default) • Off

High Power Torque	This option controls the amount of power used to hold the camera steady when in use. With the setting enabled the camera will consume more power, but will help ensure that the camera is held in place in rough seas. The High Power Torque mode may be useful for power boats that operate at higher speeds and experience high impact environments, and can accept higher power consumption.	• On (default) • Off
JCU Icon	Shows or hides the on-screen JCU connected icon.	• On (default) • Off
PC Icon	Shows or hides the on-screen PC connected icon.	• On (default) • Off
Restore Factory Defaults	Enables you to restore the camera's settings to factory default values.	
Calibrate platform	The calibrate platform option re-initializes the pan and tilt mechanism in the thermal camera.	

Note: The thermal camera menu options available are dependant on the software version of your multifunction display and thermal camera. If options are different than listed above please refer to the manual that accompanied your thermal camera and / or the installation and operations handbook which accompanied your multifunction display.

19.8 High power and high torque modes

Camera State	Camera setting	Dual payload	Single payload
Standby	• High Power Mode ON • High Torque Mode ON	22W	17.4W
Standby	• High Power Mode OFF • High Torque Mode ON	8W	7.4W
Standby	• High Power Mode ON • High Torque Mode OFF	13W	13W
Awake	• High Power Mode OFF • High Torque Mode OFF	8W	7.4W
Awake	• High Power Mode ON or OFF • High Torque Mode ON	30W	19.4W
Awake	• High Power Mode ON or OFF • High Torque Mode OFF	20W	16.5W

19.9 Pan and tilt camera — old camera interface

The thermal camera application menu options for a pan and tilt thermal camera with the old camera interface are shown below.

Activate Camera	Brings the thermal camera out of standby mode. (only available when camera is in standby.)
Pause Image	• On • Off (default)
Camera Home	Select to return the camera to its home position.
Image Options	Select to display the **Image Options** sub-menu. • Color – Red – Greyscale – Glowbow – Rainbow – Fusion • Scene – Night Running – Night Docking – Day Running – Man Overboard • Thermal / Visible • Reverse video • Rear View • Surveillance
Adjust Contrast	Select to display the **Adjust Contrast** sub-menu. • Contrast • Brightness • Color
Standby	Select to place the camera in to standby mode. (only available when camera is activated.)
Camera Set-up	Select to display the **Camera Set-up** menu. • Set Home Position • Camera menu — (Onscreen display (OSD) menu) • Align Camera

Camera Set-up menu

Set Home Position	Sets the camera's current position as the **Camera Home** position.
Camera menu	Provides access to the camera's onscreen display (OSD) menu options.
Align Camera	Enables changes to camera's horizontal alignment.

Note: The thermal camera menu options available are dependant on the software version of your multifunction display and thermal camera. If options are different than listed above please refer to the manual that accompanied your thermal camera and / or the installation and operations handbook which accompanied your multifunction display.

Note: It may be possible to update your camera to the new camera interface. Please contact your Raymarine dealer for details.

OSD menu options

Setup menus

The setup menus provide a range of tools and settings to configure the thermal camera.

The menus can be accessed from any controller on the system. The menus are overlaid onto the video image.

Note: The on-screen menus only appear on the thermal camera image. They are not available when viewing the visible light image (on dual payload models).

Menus available

Enable Point Mode / **Disable Point Mode**	Selecting Enable Point mode will turn point mode on, selecting disable point mode will turn point mode off. Only applies to models with mechanical stabilization.
Video Setup	This menu is used to set the video configuration options.
Set Symbology	Settings associated with the status icons.
User Programmable Button	Configure the **USER** button on the JCU.
System Setup	Settings to optimize operation for this particular system / installation.
About / Help	Helpful information and restore to factory defaults setting.
Exit	Cancels on-screen menu.

Video setup menu

Menu item / Description	**Settings / Operation**
Set Thermal Color Default	This saves the current color setting as the default value.
Set Reverse Video or **Set Video Polarity**	This toggles the infrared image between white-hot (or red-hot if viewing a color image) and black-hot.
Enable / Disable Color Thermal Video	Enable or disable the thermal color palettes: • Enabled – Greyscale, Red, Sepia, Rainbow and Fusion palettes are available. • Disabled – Only Greyscale and Red palettes are available.
Display Test Pattern	Use the display test pattern when setting up the color / contrast settings for your particular display or monitor. You can switch through the 4 test patterns available.
Exit	

Set symbology menu

Menu item / Description	**Settings / Operation**
Enable / Disable PC Icon	• Enabled – The PC icon is displayed whenever a PC is detected on the network. • Disabled – The PC icon is not displayed.
Enable / Disable JCU Icon	• Enabled – The JCU icon is displayed whenever a JCU is detected on the network. • Disabled – The JCU icon is not displayed.
Display All Icons	Selecting this menu item enables all available icons.
Display Minimal Icons	Selecting this menu item reduces the icon activity: • Position, Zoom, Rearview, Pause, Stabilization disabled and Point Mode enabled icons are unaffected. • Home and Scene icons are displayed only momentarily. • Other icons are not shown.
Hide All Icons	Selecting this option hides all icons except for: • Position indicator • Rearview mode enabled • Stabilization disabled • Point mode enabled
Exit	Returns to the main menu.

Surveillance mode menu

Menu item / Description	Settings / Operation
Scan Width	This setting determines the distance that the camera pans left and right when in surveillance mode. Select from: • Narrow — The camera will scan approximately 20º left and right of the center (40º total). • Medium — The camera will scan approximately 40º left and right of the center (80º total). Or, • Wide The camera will scan approximately 80º left and right of the center (160º total).
Scan Speed	This option determines the speed at which the camera pans left and right when in surveillance mode. Select between: • Slow • Medium • Fast
Exit	

System Setup menu

Menu item / Description	Settings / Operation
Enable / Disable Ball-Down Installation	This menu option should be enabled when the camera is mounted upside down in the “ball-down” configuration.
Enable / Disable Twist-to-Pan mode	This menu option changes the JCU controls pan and zoom functions as follows: **Enabled** — Pan the camera by rotating the **Puck** clockwise or counterclockwise, zoom in and out by pushing the puck in and pulling it out. (This is default operation of the JCU). **Disabled** — Pan the camera by moving the **Puck** left or right, zoom in and out by rotating the **Puck** clockwise and counterclockwise.
Enable / Disable High Power Standby	This option controls the amount of power used to hold the camera in position while it is in Standby mode. The enabled setting will consume more power, but will help ensure that the camera is held in place in rough seas. **Note:** If the camera moves when in standby (due to shock or vibration), then the Position indicator or Home setting may need realigning (reset the camera to realign).
Enable / Disable High Motor Torque	This option controls the amount of power used to hold the camera steady when in use. The enabled setting will consume more power, but help ensure that the camera is held in place in rough seas. The High Motor Torque mode may be useful for power boats that operate at higher speeds and experience high impact environments, and can accept higher power consumption. **Note:** If the camera moves due to shock or vibration, then the Position indicator or Home setting may need realigning (reset the camera to realign).
Enable / Disable Rearview Mode	When this option is enabled the camera image is reversed and you will see a mirror image on the display.
Enable / Disable Stabilization	When this option is enabled horizontal and vertical stabilization is turned on. Only applies to T470SC and T473SC.
Set Stow Position	This option sets the current position as the Stow position. The camera moves to the stow position whenever it is turned off or put into Standby mode.
Name Camera	Use this option to name the camera.
Surveillance mode	This options enables you to set the scan width and speed when in surveillance mode.
Exit	Exit to main menu.

High power / High torque power use

Camera State	Camera setting	Dual payload	Single payload
Standby	• High Power Mode ON • High Torque Mode ON	22W	17.4W
Standby	• High Power Mode OFF • High Torque Mode ON	8W	7.4W
Standby	• High Power Mode ON • High Torque Mode OFF	13W	13W
Awake	• High Power Mode OFF • High Torque Mode OFF	8W	7.4W

Camera State	Camera setting	Dual payload	Single payload
Awake	• High Power Mode ON or OFF • High Torque Mode ON	30W	19.4W
Awake	• High Power Mode ON or OFF • High Torque Mode OFF	20W	16.5W

User Programmable Button menu

Use this menu to set up the **USER** button on the JCU.

Menu item / Description	USER button operation
Search settings	The **USER** button will set the camera scene to Search mode.
Switch Thermal / VIS Video (Dual payload models only)	The **USER** button will switch between Thermal and Low Light camera images.
Hide / Show All Icons	The **USER** button will toggle between Show and Hide icon settings.
Reverse Video	The **USER** button will toggle between the White-hot and Black-hot (reverse) thermal image.
Rearview Mode	The **USER** button will toggle Rearview mode on and off.
Surveillance Mode	The **USER** button will toggle Surveillance mode on and off.
Point Mode	The **USER** button will toggle Point Mode on and off.
Exit	Returns to the main menu.

Chapter 20: Thermal camera application — fixed mount cameras

Chapter contents

- 20.1 Thermal camera application overview on page 320
- 20.2 Thermal camera image on page 320
- 20.3 Thermal camera setup and checks on page 321
- 20.4 Controls overview on page 322
- 20.5 Camera control on page 322
- 20.6 Image adjustments on page 323
- 20.7 Fixed mount camera menu on page 324

20.1 Thermal camera application overview

The thermal camera application enables you to control a connected thermal camera and display its image on your multifunction display.

Thermal imaging (also known as infrared) cameras enable you to see clearly in low-light and no-light conditions. For example, a thermal camera can help you navigate at night or identify obstacles in areas of low visibility or even total darkness.

The thermal application enables you to:

- **Control the camera:**
  - Zoom (range).
  - Pause the camera image.
- **Adjust the camera image:**
  - Color palette.
  - Scene presets.
  - Brightness.
  - Contrast.
  - Color.
  - Video polarity (reverse video color).

Displaying the thermal camera application

With the home screen displayed:

1. Select a page icon that includes the thermal camera application.

   The thermal camera application is displayed.

Note: If the home screen does NOT include a page icon that features the thermal camera application you will need to create a new page icon featuring the thermal camera application.

20.2 Thermal camera image

The thermal camera provides a video image which is shown on your display.



The video feed provides:

- Thermal image.
- Status icons / system information.

You should take time to familiarize yourself with the thermal image. This will help you to make the most of your system:

- Consider every object you view in terms of how it will look “thermally” as opposed to how it looks to your eye. For example look for changes caused by the heating effect of the sun. These are particularly evident right after sunset.
- Experiment with white-hot and black-hot (reverse video) modes.
- Experiment by looking for hot objects (such as people) compared to the colder surroundings.
- Experiment with the camera for daytime viewing. The camera can provide improved daytime viewing in environments where traditional video camera performance suffers, such as in shadows or backlit scenes.

Thermal camera status icons

The thermal camera image includes icons to show the current status of the camera.

Icon	Description
	Camera paused.
	Scene preset mode for night conditions.
	Scene preset mode for daytime conditions.
	Scene preset mode for night docking.
	Scene preset mode for identifying people or objects in the water.

Icon	Description
	Rear-view mode — image is flipped horizontally.
	Zoom setting: 2x zoom.
	Zoom setting: 4x zoom.
	Single active controller on network.
	Multiple active controllers on network.
	PC / laptop detected on network.

FFC (Flat Field Correction)

Periodically the camera will perform a Flat Field Correction (FFC). This will fine tune the thermal image to suit the current ambient temperature.

The FFC operation is indicated by a momentary pause and a green rectangle displayed in the upper left of the thermal video image.

20.3 Thermal camera setup and checks

To ensure correct operation of the thermal camera you should setup and check the camera's main functions.

Before proceeding ensure that the camera is connected correctly, according to the instructions provided. If your system includes the optional Joystick Control Unit (JCU) and PoE (Power over Ethernet) injector, ensure these units are also connected correctly.

Set up the camera

You will need to:

- Adjust the image (contrast, brightness, and so on).
- Check camera movement (pan, tilt and home functions) (if applicable).

Adjusting the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Adjust Contrast**.
3. Select the Contrast, Brightness, or Color option as appropriate.

   The relevant numeric adjust control is displayed.
4. Adjust the value as required.
5. Select **Back** or **OK** to confirm the new value.

20.4 Controls overview

The thermal camera application is available on compatible Raymarine multifunction displays and systems. It includes controls for the thermal camera.

Rotary control	Zoom image in / out.
OK	Confirm menu selection.
Joystick	Navigate menus.
CANCEL / Back	Cancel selection.
RANGE IN / OUT	Zoom image in / out.

20.5 Camera control

Power up and standby

When the breaker connecting power to the camera is switched on, the camera will run a boot up sequence lasting for about 1 minute, after which the camera will be in **Standby** mode.

In order for the camera to operate, you must bring the camera out of standby mode using the camera controls.

Thermal camera standby

Standby mode can be used to temporarily suspend the thermal camera's functions when the camera is not needed for a prolonged period.

When in standby mode the camera does not provide a live video image.

Enabling and disabling thermal camera standby

With the thermal camera application displayed:

1. Select **Menu**.
2. Use the **Standby** menu item to switch the camera in and out of standby mode.

Note: You can also use any of the camera controls in the thermal camera application to “wake” the camera from standby mode.

Pausing the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Pause Image**.

20.6 Image adjustments

Adjusting the thermal camera image

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Adjust Contrast**.
3. Select the Contrast, Brightness, or Color option as appropriate.
   The relevant numeric adjust control is displayed.
4. Adjust the value as required.
5. Select **Back** or **OK** to confirm the new value.

Thermal camera scene presets

Scene presets enable you to quickly select the best image setting for the current environmental conditions.

During normal operation the thermal camera automatically adjusts itself to provide a high-contrast image optimized for most conditions. The Scene presets provide 4 additional settings that may provide better imagery in certain conditions. The 4 modes are:

	**Night Running** — scene preset mode for night conditions.
	**Day Running** — scene preset mode for daytime conditions.
	**Night Docking** — scene preset mode for night docking.
	**Search** — scene preset mode for identifying people or objects in the water.

Although the preset names indicate their intended use, varying environmental conditions might make another setting more preferable. For example, the night running scene preset might also be useful while in a harbor. You may find it beneficial to experiment with the different scene presets to discover the best preset to use for different conditions.

Changing the thermal camera scene preset

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Scene** menu item to switch between the available scene presets, as appropriate.

Thermal camera color modes

A range of color modes are available to help you distinguish objects on-screen in different conditions.

Changing the color mode switches the thermal camera image between a greyscale mode and 1 or more color modes. There are 5 color modes available.

The factory default color mode is white, which may improve your night vision. This default mode can be changed if required using the camera's on-screen **Video Setup** menu.

Note: If you have the Disable Color Thermal Video option selected in the camera's on-screen **Video Setup** menu, only 2 color modes are available — greyscale and red.

Changing the thermal camera color mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Color** menu item to switch between the available color palettes, as appropriate.

Thermal camera reverse video

You can reverse the polarity of the video image to change the appearance of objects on-screen.

The reverse video option (video polarity) switches the thermal image from white-hot (or red-hot if the color mode setting is active) to black-hot. The difference between white-hot and black-hot is shown below:

	White-hot thermal image.
	Black-hot thermal image.

You may find it useful to experiment with this option to find the best setting to suit your needs.

Enabling thermal camera reverse video

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Select **Reverse Video**.

Thermal camera rear view mode

The rear view mode flips the video image horizontally, providing a “mirror image”.

This is useful for example in instances where the camera is rear-facing and you are viewing the image on a forward-facing monitor.

Enabling thermal camera rear view mode

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Select **Rear View**.

20.7 Fixed mount camera menu

The thermal camera application menu options for a fixed mount thermal camera are shown below.

Activate Camera	Brings the thermal camera out of standby mode. (only available when camera is in standby.)
Pause Image	• On • Off (default)
Image Options	Select to display the **Image Options** sub-menu. • Color – Red – Greyscale – Glowbow – Rainbow – Fusion • Scene – Night Running – Night Docking – Day Running – Man Overboard • Reverse video • Rear View
Adjust Contrast	Select to display the **Adjust Contrast** sub-menu. • Contrast • Brightness • Color
Standby	Select to place the camera in to standby mode. (only available when camera is activated.)
Camera Set-up	Select to display the **Camera Set-up** menu. • Default Color • Icon Level • Ball Down Mode • High Power Standby • JCU Icon • PC Icon • Restore Factory Defaults

Camera Set-up menu

Default Color	Enables selection of default color palette.	• Red • Greyscale • Glowbow • Rainbow • Fusion
Icon Level	Enables selection of level of icons displayed on-screen.	• None • Minimal • All

Ball Down Mode	This options should be enables when the camera is mounted upside down in the 'ball down' configuration.	• On • Off (default)
High Power Standby	This option controls the amount of power used to hold the camera in position while it is in standby mode. With the setting enabled the camera will consume more power, but will help ensure that the camera is held in place in rough seas.	• On (default) • Off
JCU Icon	Shows or hides the on-screen JCU connected icon.	• On (default) • Off
PC Icon	Shows or hides the on-screen PC connected icon.	• On (default) • Off
Restore Factory Defaults	Enables you to restore the camera's settings to factory default values.	

Note: The thermal camera menu options available are dependant on the software version of your multifunction display and thermal camera. If options are different than listed above please refer to the manual that accompanied your thermal camera and / or the installation and operations handbook which accompanied your multifunction display.

Chapter 21: Wi-Fi and Mobile applications

Chapter contents

- 21.1 MFD Wi-Fi on page 328
- 21.2 Connecting to a Wi-Fi access point / mobile hotspot on page 328
- 21.3 Connecting your smart device via Wi-Fi on page 330
- 21.4 Raymarine mobile apps on page 331
- 21.5 Wi-Fi Sharing Settings on page 332

21.1 MFD Wi-Fi

MFDs that include built in Wi-Fi can connect to Wi-Fi access points / mobile hotspots and can also act as a Wi-Fi Access point for other devices.



Personal computers / Smart devices can be connected to the MFD to enable:

- use of compatible Mobile applications on your smart device,
- the smart device to log the MFD in to networks that require user authentication,
- access to the built-in web interface (from your smart device) of compatible products such as the AX8 Thermal camera.

The MFD can be connected to a Wi-Fi Access point / mobile hotspot to enable available MFD internet services such as checking online for product software updates.

The MFD can be connected to a Wi-Fi Access point / mobile hotspot at the same time as acting as an Access point for other devices. If the MFD has an internet connection then this connection can be shared with other devices connected using Wi-Fi and with MFDs on the same **SeaTalk^{hs}** network.

Only 1 MFD on the same **SeaTalk^{hs}** network can be connected to an access point at a time, all networked MFDs will share this connection.

When the MFD's Wi-Fi is enabled it will automatically connect to previously accessed Access points / mobile hotspots within range.

Note: When connected to a Quantum Radar using a Wi-Fi connection **a**, **c**, **e** and **gS Series** MFDs cannot connect to a Wi-Fi Access point at the same time. The Radar must be placed into Standby before trying to establish a connection to the Access point.

Enabling Wi-Fi

From the Wi-Fi menu: (**Homescreen > Set-up > Wireless Connections > Wi-Fi**)

1. Select **Wi-Fi** so that On is selected.

Warning: Network data charges

When connecting and downloading data from a mobile hotspot data roaming charges may apply. Check with your network service provider for details of your data allowance.

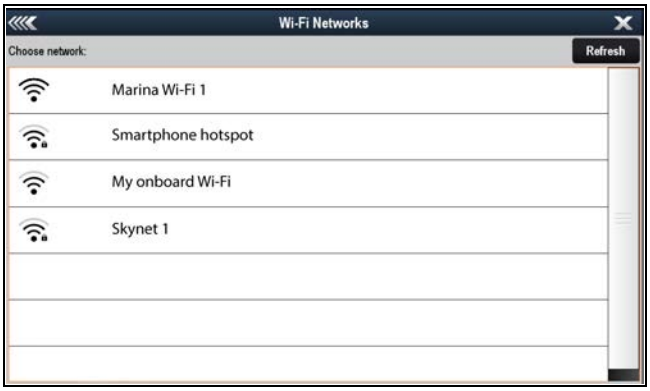
21.2 Connecting to a Wi-Fi access point / mobile hotspot

Raymarine Wi-Fi enabled MFDs can be connected to the internet via a Wi-Fi access point or mobile hotspot.

From the Wi-Fi menu: (**Homescreen > Set-up > Wireless Connections > Wi-Fi**)

1. Select **Wi-Fi Networks**

   The MFD will now search for and display a list of all Wi-Fi networks in range. The list will be sorted by decreasing signal strength.



2. Select the network that you want to connect to.

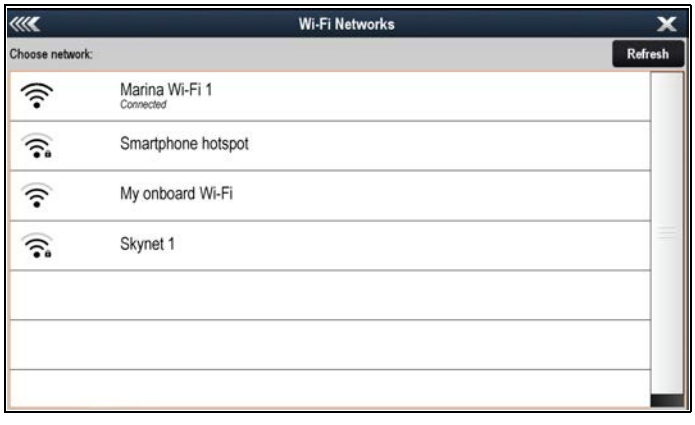
   The Network details are displayed.



3. Select **Connect**.

The MFD will now attempt to connect to the selected network.

When connecting to a secured network (identified by the lock symbol) the onscreen keyboard will be displayed to enable you to enter the network's passphrase.

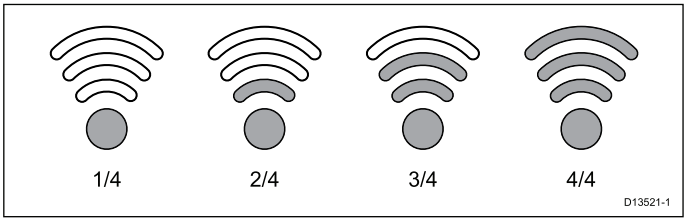


Once connected the network credentials will be saved by the system and be available to networked MFDs.

Wi-Fi signal strength

Wi-Fi signal strength is measured in decibel-milliwatts (dBm). The signal strength of the network you are currently connected to is usually represented graphically by a Wi-Fi symbol.

The signal strength range represented by each filled bar is determined independently by each device manufacturer. However, in general the performance will be similar.



- **1/4** — Unable to maintain a connection, usually accompanied by very poor connection speed (**LightHouse™** MFD: –150dBm or worse).
- **2/4** — Intermittent disconnects and reconnects, usually accompanied by a slow connection speed (**LightHouse™** MFD: –80dBm to –149dBm).
- **3/4** — Reliable connection with good connection speed (**LightHouse™** MFD: –70dBm to –79dBm).
- **4/4** — Reliable connection, excellent connection speed (**LightHouse™** MFD: –55dBm or better).

Logging in to an access point / mobile hotspot

Depending on the type of network you are connecting to you may need to login using a connected smart device to gain internet access.

1. Connect your MFD to the Wi-Fi access point / hotspot.
2. Connect your smart device to the MFD's Wi-Fi connection.
3. Open the web browser on your smart device.

   You should be redirected to a landing page.
4. Enter the username and password for the network.

Removing a Wi-Fi Access point / mobile hotspot

Once your MFD has connected to a network the details will be saved and the MFD will try to re-connect to that network whenever it is in range, if the MFD has no active connection.

From the Wi-Fi Networks list: (**Homescreen > Set-up > Wireless Connections > Wi-Fi > Wi-Fi Networks**)

1. Select the network that you want to remove.

   Networks not currently active or in range will not be displayed.

2. Select **Forget** from the Network's details page.

   The MFD will no longer connect to this network, to re-connect to this network refer to the 21.2 Connecting to a Wi-Fi access point / hotspot section.

Switching the connected MFD

In systems with multiple MFDs, you can switch which MFD has the active connection to the Wi-Fi Access point / mobile hotspot. This may be useful when connecting to Wi-Fi at a Marina, an MFD located on the Flybridge may receive a stronger signal than an MFD installed below decks. If the MFD you are using is not the MFD with an active connection then the Wi-Fi Networks page will identify which MFD is connected to the network.

From the MFD you want to connect:

1. Select the network from the Wi-Fi Networks list: (**Homescreen > Set-up > Wireless Connections > Wi-Fi > Wi-Fi Networks**)

   The connection will be switched to the second MFD.

Changing the Wi-Fi Channel

You cannot change Wi-Fi channel whilst your MFD is connected to an access point. Any devices connected to your MFD will temporarily lose connection whilst the MFD changes its channel.

1. Disconnect your MFD from the Wi-Fi network it is currently connected to (e.g. marina Wi-Fi access point).
   i. Select **Wi-Fi Networks** from the Wi-Fi menu : (**Homescreen > Set-up > Wireless connection > Wi-Fi**).
   ii. Select the currently connected network.
   iii. Select **Forget**.

   To reconnect to a forgotten network you will need to know the network's SSID and Passphrase.
   iv. Select **Back** to go back to the Wi-Fi menu.
2. Select **Wi-Fi Sharing**.
3. Select **Wi-Fi Channel**.
4. Select the Wi-Fi Channel that you want your MFD to use.

   The best Wi-Fi Channel can be established by using a free Wi-Fi Analyzer app from the relevant app store, that can show network traffic per channel. You should change your Wi-Fi channel to a channel that has the least amount of traffic (other networks).

21.3 Connecting your smart device via Wi-Fi



1. Open the Wi-Fi settings on your smart device and select your product's Wi-Fi Name / SSID from the list of available networks.
2. Enter your product's Wi-Fi Passphrase.
3. Your device will now connect to the unit and obtain an IP address.
4. The network status will change to **Connected**.

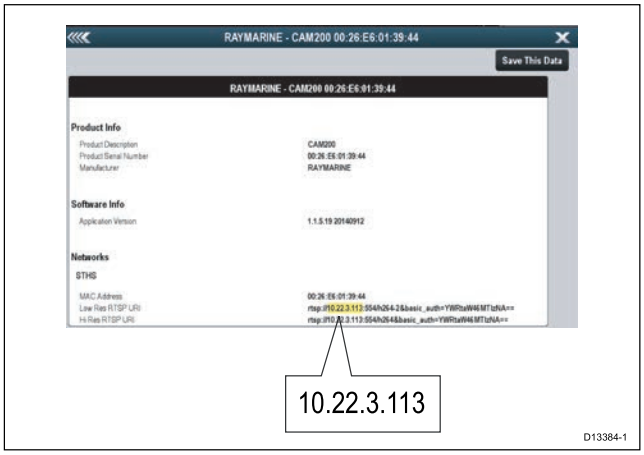
Accessing a product's web interface

With a PC or laptop connected to your MFD via Wi-Fi, you can access the built-in web interface of certain products (e.g. AX8). Depending on the device and web browser application used, it may also be possible to access the web interface using a connected smart device.

With your PC or laptop connected to your MFD:

1. Obtain the product's IP address.

   *For Raymarine products the IP address is displayed on the diagnostics page, accessed by selecting the relevant device from the MFD's Diagnostics menu: (**Homescreen > Set-up > Maintenance > Diagnostics > Select Device**).*



2. Open the web browser on your smart device and enter the IP address in the address bar and select **Enter** / **Go**.
3. Login to the web interface.

   The username and password can be found in the documentation that accompanied the product.

Tip If the web interface is not displayed or is displayed incorrectly, try using a different web browser.

21.4 Raymarine mobile apps

Raymarine mobile apps enable viewing and control of your multifunction display via a compatible mobile device, using a Wi-Fi connection.

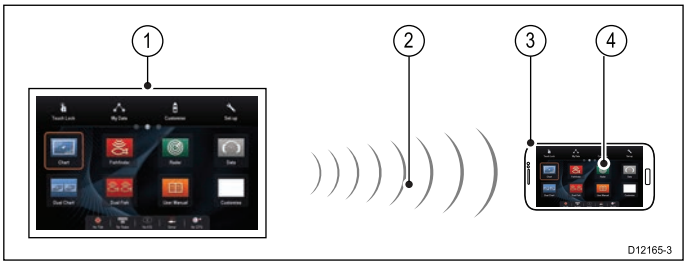
Raymarine currently offers the following mobile apps:

- **RayView**
- **RayRemote**
- **RayControl**

Note: Your multifunction display must have software version V3.15 or later in order to use mobile apps.

RayView

This app enables you to stream what you see on your multifunction display to a compatible smartphone or tablet device, using a Wi-Fi connection.

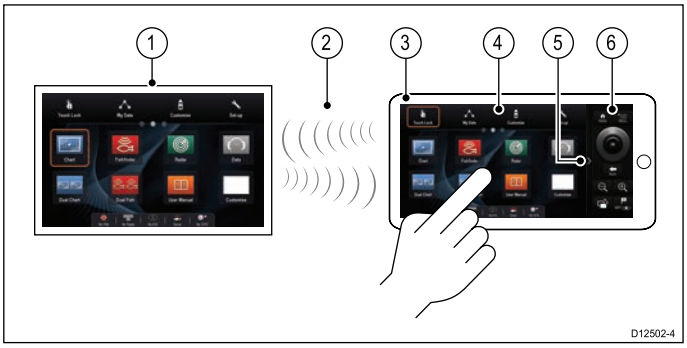


1. Multifunction display.
2. Wi-Fi connection (1 way – streaming only).
3. Compatible device.
4. “RayView” video streaming app.

RayControl

— This app enables you to stream and remotely control your multifunction display from a compatible tablet device, using a Wi-Fi connection.

Note: For safety reasons pilot controls and power button options are not available remotely.

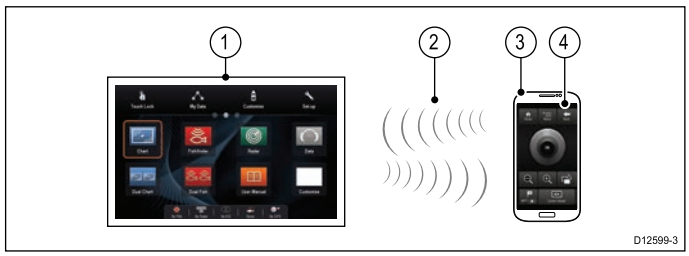


1. Multifunction display.
2. Wi-Fi connection (2 way – streaming and remote control).
3. Compatible tablet.
4. “RayControl” streaming and remote control app.
5. “RayControl” controls access (Touch the arrow to access controls).
6. “RayControl” remote controls

RayRemote

This app enables you to stream or control your multifunction display remotely from a compatible smartphone, using a Wi-Fi connection.

Note: RayRemote is able to switch between displaying the remote controls or the video stream.



1. Multifunction display.
2. Wi-Fi connection (2 way – streaming or remote control).
3. Compatible smartphone.
4. RayRemote app

To use Raymarine mobile apps you must first:

- Download and install the required app from the relevant app store.
- Enable Wi-Fi in the System Settings on the multifunction display.
- Enable Wi-Fi on your compatible device.
- Select the Raymarine Wi-Fi connection from the list of available Wi-Fi networks on your compatible device.
- Enable the relevant type of connection (i.e. Viewing or Remote Control) in the System Settings on the multifunction display.

Mobile app compatibility

The Raymarine mobile apps are compatible with the following devices.

Device	Operating system
iPhone 4 or later	iOS
iPad 2 or later	iOS
Android smartphone	Android V2.2.2 or greater with 1GHz or greater processor
Android tablet	Android V2.2.2 or greater with 1GHz or greater processor
Kindle Fire	Android \ amazon

Enabling mobile apps

Raymarine mobile apps must be enabled before you can stream video or remote control your MFD via a smart device.

From the Wi-Fi Sharing menu: (**Homescreen > Set-up > Wireless Connections > Wi-Fi > Wi-Fi Sharing**)

1. Select **Mobile apps:**.

2. Select **Viewing only** to enable video streaming only, or
3. Select **Remote Control** to enable remote control and video streaming.
4. Launch the relevant Raymarine mobile app on your smart device and follow any onscreen instructions.

21.5 Wi-Fi Sharing Settings

Wi-Fi settings can be accessed from the Wi-Fi Sharing menu (**Homescreen > Set-up > Wireless Connections > Wi-Fi > Wi-Fi Sharing**.

Wi-Fi Name	The default Wi-Fi Name (SSID) is made up of the MFD product and serial numbers (e.g. RM E70265 0350138) this can be customized to a more memorable name if desired but should be unique to the MFD.	Onscreen keyboard displayed for user input.
Wi-Fi Passphrase	The default Wi-Fi Passphrase is a unique string generated by the MFD, this can also be customized if desired. **Note:** Ensure the passphrase you choose is 'strong' by using a combination of upper and lower case letters, numbers and special characters. The passphrase can be between 8 and 63 characters in length with longer passphrases being more secure.	Onscreen keyboard displayed for user input.
Wi-Fi Channel:	If you experience interference (Wi-Fi connection keeps dropping) then the Wi-Fi Channel can be changed to a channel with less activity. **Note:** • The Wi-Fi channel option will be grayed out when connected to an Access point / mobile hotspot. • The MFD will connect to Channels 12 and 13, however these channels are not selectable. **Tip** Free Wi-Fi Analyzer apps are available for smart devices to help you choose a less congested channel.	• Channels 1 to 11 (2 GHz)

Wi-Fi Security:	The default encryption is **WPA2 Only**. This is the recommended security type, however you can change the security type if desired. **Important:** Selecting **None** from the options will leave your system open to unauthorized connections / access.	• None • WPA Only • WPA2 Only • WPA / WPA2
Mobile apps:	The Mobile apps setting allows you to choose whether mobile apps can view and / or control your MFD or mobile app connections can be switched Off.	• Off • Viewing only • Remote Control

Chapter 22: Audio application

Chapter contents

- 22.1 Compatible entertainment systems on page 336
- 22.2 Audio application overview on page 336
- 22.3 Powering on the entertainment system on page 338
- 22.4 Selecting an audio source on page 339
- 22.5 Browsing media files on page 340
- 22.6 Audio Control Bar on page 340
- 22.7 Audio application menu on page 341

22.1 Compatible entertainment systems

The table below shows compatible NMEA 2000 entertainment systems, that have been approved for use with the Audio app.

Device	Manufacturer
RMX-5 / RMX-8	Rockford Fosgate

22.2 Audio application overview

The Audio application can be used to control compatible **NMEA 2000** entertainment systems, connected to the **SeaTalk^{ng}®** / **NMEA 2000** CAN Bus.

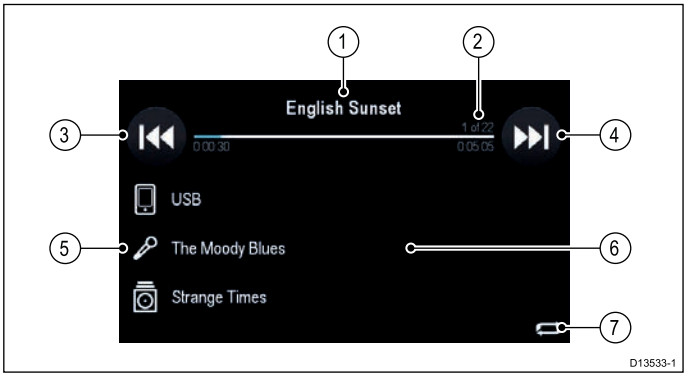


1. **Standby and Mute all buttons**
   - Use the **Standby** button to switch your entertainment system off.
   - Use the **Mute All** button to Mute ALL audio zones at the same time.
2. **Audio Source** — Use the **Audio Source** button to switch between audio sources that are available to your entertainment system.
3. **Current audio zone** — Indicates the currently selected audio zone and the Audio Source assigned to that zone.
4. **Track/Station information and controls** — Displays details and controls for the current track or station.
5. **Available audio zones** — Indicates other available audio zones and the Audio Source assigned to that zone.
6. **Decrease Volume** — You can also use the **Rotary control** on MFDs that have physical buttons to adjust the volume level.
7. **Play/Pause/Stop** button with **Volume Level Indicator** — The ring around the**Play/Pause/Stop** button indicates the volume level for the current zone.
8. **Increase Volume** — You can also use the **Rotary control** on MFDs that have physical buttons to adjust the volume level.

Note: When switching between audio sources or tracks using the file browser, ensure that the Audio application has finished searching for devices / tracks before you selecting a new one.

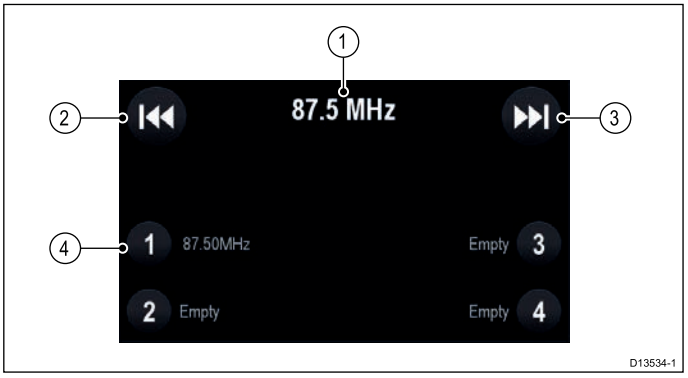
Audio Track Controls

When playing an audio track from a connected USB or Bluetooth device, the following details and controls are available.



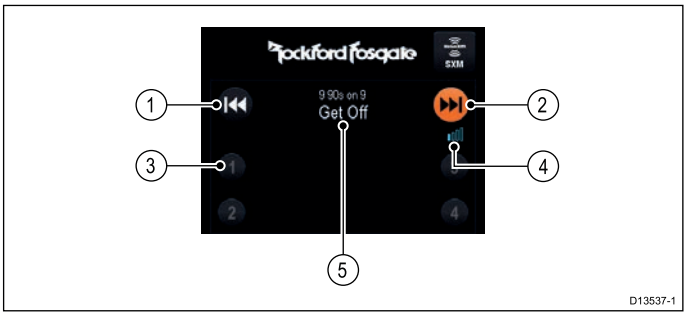
1. **Track Title**
2. **Track Progress Bar** — The Progress Bar indicates current track progress, track time, track time left, track number and number of tracks.
3. **Skip backwards**
   - Single press will skip backwards to the beginning of the current track.
   - Double press will skip backwards to the beginning of the previous track.
4. **Skip Forwards** — Skips forwards to the beginning of the next audio track.
5. **Details**
   - Audio Source
   - Artist
   - Album name
6. **File browser** — Selecting a blank area within the control box will open the file browser for the device.
7. **Repeat/Shuffle indicator**Indicates whether Shuffle or Repeat is active.

Radio Station Controls



1. **Station**
2. **Seek backwards**
   - Quick press — Searches backwards through the available radio stations.
   - Long press — Switches to manual tune mode.
3. **Seek Forwards**
   - Quick press — Searches forwards through the available radio stations.
   - Long press — Switches to manual tune mode.
4. **Preset buttons** — The 4 available preset buttons will mirror the first 4 presets of your entertainment system:
   - Press and hold until you hear a three beeps to save the current station to that preset button.
   - Pressing a **Preset** button that has already been set will change the channel to that station.

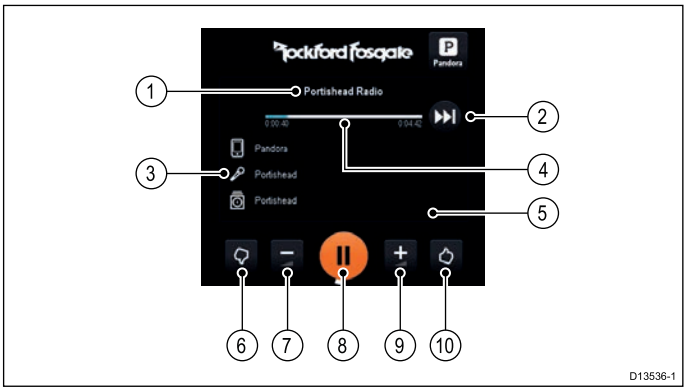
SiriusXM Controls



1. **Channel Down** — Searches backwards through the available radio stations.
2. **Channel Up** — Searches forwards through the available radio stations.
3. **Preset buttons** — The 4 available preset buttons will mirror the first 4 presets of your entertainment system:
   - Press and hold until you hear a three beeps to save the current station to that preset button.
   - Pressing a **Preset** button that has already been set will change the channel to that station.
4. **SiriusXM Receiver Signal Strength** — Indicates the strength of you receiver's signal reception.
5. **Station** — Selecting a station name or blank area within the control box will open the channel selection browser.

Pandora Controls

When using Pandora internet radio, available in the USA, Australia and New Zealand, the following controls are available.



1. **Track title**
2. **Next Track** — Number of skips available depend on your Pandora subscription.
3. **Details**
   - Audio Source

- Artist
- Album name

4. **Track Progress Bar** — The Progress Bar indicates current track progress, track time and track time left.
5. **Channel selection** — Selecting a blank area within the control box will open the channel selection browser.
6. **Thumbs Down**
   - Selecting Thumbs Down will ‘Dislike’ the current track, add an Orange box around the Thumbs Down, skip to the next track and prevent the ‘Disliked’ track from playing on the current station again.
7. **Decrease Volume**
8. **Play/Pause/Stop** button with **Volume Level Indicator** — The ring around the**Play/Pause/Stop** button indicates the volume level for the current zone.
9. **Increase Volume**
10. **Thumbs Up**
    - Selecting Thumbs Up will ‘Like’ the current track, add an Orange box around the Thumbs Up and will add similar artists and songs on the current station.
    - When playing a song that you have already ‘Liked’ an Orange box is displayed around the Thumbs Up, selecting the Thumbs Up again will cancel the ‘Like’ for that track.

22.3 Powering on the entertainment system

The Audio application can be used to power on your entertainment system.



1. Select an **Audio** application page from the Homescreen.
2. Select the onscreen **Power** button.

   Your entertainment system will power up and the Audio application controls will be displayed.

Alternatively with the **Audio Control Bar** enabled, you can power up your entertainment system from any application page.



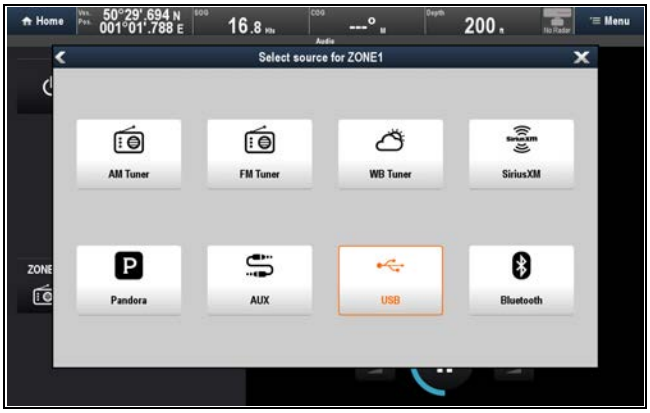
22.4 Selecting an audio source

An audio source can be assigned to each zone individually. The audio sources that are available depend on the entertainment system you are using. For information on connecting the different audio sources to your Entertainment system please refer to the documentation that accompanied your entertainment system.

From the Audio application:

1. Select the **Zone** that you want to assign the audio source to.
2. Select the **Audio Source** button.

   The Audio Sources page is displayed:



3. Select the relevant button for the desired audio source.

   The selected audio source will start to play on the selected zone:



4. Repeat the above steps for each Zone/Audio Source.

   Restrictions apply to some audio sources.

Audio source zone restrictions

Depending on your Entertainment system, you may be restricted from assigning a source to a zone.

Some sources will not be available in all geographic locations. For more information, refer to the documentation that accompanies your audio equipment.

Note: When changing the audio source for a zone, other zones may also change their source, if the change violates the restrictions listed below:

Zone 1 set to:	Subsequent zones can be set to:
AM Radio	AM Radio / SiriusXM / Pandora / Aux / USB / Bluetooth
FM Radio	FM Radio / SiriusXM / Pandora / Aux / USB / Bluetooth
Weather	Weather / SiriusXM / Pandora / Aux / USB / Bluetooth
SiriusXM	AM Radio / FM Radio / Weather / SiriusXM / Pandora / Aux / USB / Bluetooth
Pandora	AM Radio / FM Radio / Weather / SiriusXM / Pandora / Aux
Aux	AM Radio / FM Radio / Weather / SiriusXM / Pandora / Aux / USB / Bluetooth
USB	AM Radio / FM Radio / Weather / SiriusXM / Aux / USB
Bluetooth	AM Radio / FM Radio / Weather / SiriusXM / Aux / Bluetooth

22.5 Browsing media files

You can browse media files stored on a USB device, that is connected to your entertainment system.

From the Audio application's menu:

1. Select **Tracks**.
   The file browser is displayed.



2. Alternatively, using a Touchscreen MFD, you can select a blank area in the details and controls area to open the file browser.



3. Browse to the file you want to play.
4. Wait for the page to completely load before selecting a file.
5. Select the file you want to play.

The track will commence playback.

22.6 Audio Control Bar

On Touchscreen MFDs an Audio Control Bar is available. When enabled the control bar is displayed at the bottom of all other application pages.

The Audio Control Bar is enabled from the Audio application's menu: **Menu > Audio Control Bar > Show**.



With the Audio Control Bar displayed you can:

- Switch between zones
- Seek/search forwards and backwards
- Mute/Unmute the zone
- Increase and decrease volume.

Note:

If the **Pilot Bar** has been set to On then the **Audio Control Bar** will be replaced by the **Pilot Bar** during active navigation.

22.7 Audio application menu

In addition to using the onscreen controls the Audio application menu can be used to access audio and radio controls.

Menu	Description	Options
Mute All	Mutes all zones.	N/A
Select Source	Displays the Audio Source selection page.	• AM Tuner • FM Tuner • WB Tuner • SiriusXM • Pandora • AUX • USB • BT (Bluetooth)
Tracks	When using a USB device this option will open an audio browser window to enable track selection.	
Power:	Allows you to power the entertainment system on and off.	• On • Off
Shuffle:	When the audio source is USB or Bluetooth you can set the current playlist to shuffle.	• On • Off
Repeat:	When the audio source is USB or Bluetooth you can set the application to repeat the current track or folder that is being played.	• Off • Track • All
Adjust Frequency	Displayed when a Radio audio source is currently selected. Allows you to switch the Radio controls between automatically searching for channels or manual frequency adjustment.	• Seek Channel • Manual Tune
Audio Control Bar	Allows you to show or hide the Audio Control Bar that can be used to control your entertainment system whilst viewing a different application page. **Note:** The Audio Control Bar is only available on Touchscreen MFDs.	• Show • Hide
Set-up	Allows you to change the crossover frequencies.	• Crossover LPF • Crossover HPF

Chapter 23: Media player application

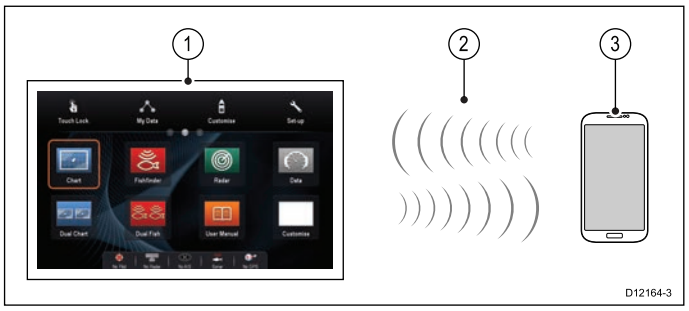
Chapter contents

- 23.1 Media player connection on page 344
- 23.2 Enabling Bluetooth on page 344
- 23.3 Pairing a Bluetooth media player on page 345
- 23.4 Enabling audio control on page 345
- 23.5  Media player controls on page 346
- 23.6  Media player controls using a remote control on page 346
- 23.7 Unpairing a Bluetooth device on page 347

23.1 Media player connection

You can use your **MFD** to control a Bluetooth media player (such as a smartphone).

The media player must be compatible with the Bluetooth 2.1+ EDR power class 1.5 (supported profile: AVRCP 1.0) or higher.



1. **MFD**
2. Bluetooth connection
3. Bluetooth media player

To use this feature you must first:

- Enable Bluetooth in the **System Settings** on the **MFD**.
- Enable Bluetooth on the media player device.
- Pair the media player device with the **MFD**.
- Enable **Audio Control** in the System Settings on the **MFD**.
- Connect an **RCU-3** remote and assign the shortcut key to Start/Stop audio playback (Only required on MFD that do not have a touchscreen).

Note: If your media player does not include built-in speakers it may be necessary to connect the media player's audio output to an external audio system or a pair of headphones. For more information refer to the instructions that accompany the media player device.

23.2 Enabling Bluetooth

From the Bluetooth menu: (**Homescreen > Set-up > Wireless Connections > Bluetooth**)

1. Select **Bluetooth:** so that On is selected.

23.3 Pairing a Bluetooth media player

From the Bluetooth menu: (**Homescreen > Set-up > Wireless Connections > Bluetooth**)

1. Select **New Bluetooth Connection**.

   A message is displayed prompting you to put your media player device into discovery mode.
2. Ensure Bluetooth is enabled on your external media player device and ensure it is ready to be paired. For more information, consult the instructions that accompany the device.
3. On the multifunction display, select **OK** in the message dialog.

   The multifunction display will search for active Bluetooth devices.
4. Select **Stop Discovery** when your device appears in the list.
5. Select the media player device in the list.

   A pairing request message is displayed on the external media device.
6. On the external media device, select Pair (or equivalent) to accept the pairing request message.

   The multifunction display shows a message asking you to confirm the Pairing code.
7. If the pairing code displayed on the multifunction display matches the code displayed on the external media device, select **OK** on the multifunction display. If the code does NOT match, repeat steps 4 to 8.
8. If the pairing was successful the multifunction display will confirm the pairing.

   The external media device is now paired with the multifunction display.

23.4 Enabling audio control

From the Bluetooth menu: (**Homescreen > Set-up > Wireless Connections > Bluetooth**)

1. Select **Connection Manager**.

   A list of all paired Bluetooth devices is displayed.
2. Select the media player device in the list.
3. Select **Audio Control > On**.

23.5 Media player controls

Touchscreen multifunction displays enable you to use the on-screen media player controls to control the audio playing on your external media player.



1. Touch this icon to display the audio controls.
2. Previous track.
3. Play track.
4. Pause track.
5. Next track.

Selecting **Back** will hide the audio controls.

23.6 Media player controls using a remote control

You can control audio wirelessly using a Raymarine RCU-3 remote control unit.

The Shortcut key on the RCU-3 must be set to Start/Stop audio playback, refer to the *Using a Remote control* section for further details.

1. Press **UP** arrow for next track.
2. Press **DOWN** arrow for previous track.
3. Press **SHORTCUT** button to play/pause audio.

Note: On New c Series multifunction displays, whilst the audio controls appear on the screen you cannot interact with them. To control audio you must use a connected RCU-3.

23.7 Unpairing a Bluetooth device

If you are experiencing problems when attempting to use a Bluetooth device with the multifunction display it may be necessary to unpair the device (and any other paired Bluetooth devices) and then retry the pairing procedure.

From the Bluetooth menu: (**Homescreen > Set-up > Wireless Connections > Bluetooth**)

1. Select **Connection Manager**.
   A list of all paired Bluetooth devices is displayed.
2. Select the media player device in the list.
3. Select **Unpair / Forget this device**.

Chapter 24: Sirius audio application (North America only)

Chapter contents

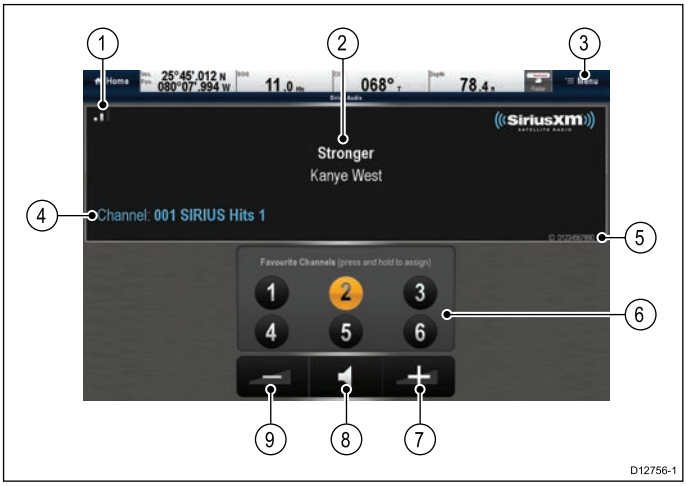
- 24.1 Sirius audio overview on page 350

24.1 Sirius audio overview

A connected, compatible Raymarine Sirius marine weather / satellite radio receiver can be controlled using the Sirius audio application.

Note: A Sirius subscription is required to enable use of a Sirius marine weather / satellite radio receiver.

To enable volume controls the Raymarine Sirius marine weather / satellite radio receiver also needs to be connected to a vessel entertainment system. Volume control is achieved using a combination of the multifunction display controls and the vessel entertainment system controls.



1	Signal strength (Between 0 and 3 bars).
2	Track name and Artist name.
3	Menu — The menu is used to browse available satellite radio channels.
4	Station details.
5	Sirius receiver ID.
6	Favorite channels.
7	Volume up.
8	Mute / Unmute.
9	Volume down.

The Sirius audio application can be used to:

- Browse available radio channels.
- Switch radio channel.
- Assign channels as favorites.
- Change the volume level.
- Mute the volume.

Note: Sirius satellite radio is only available in North America.

Accessing the Sirius audio application

1. Select the **Sirius Audio** page icon from the homescreen.

Changing the channel

You can view a list of available satellite radio channels and select the station you want to listen to.

From the Sirius Audio application:

1. Select **Menu**.
2. Select **Select channel**.
   The Channel browser is displayed.



3. Select the relevant channel from the list.

Adding favorites

You can programme up to 6 favorite channels in the Sirius audio application. To save the current channel as a favorite follow the steps below.

1. Switch to the channel you want to save as a favorite.
2. When the channel is displayed onscreen select and hold on a favorite channel number (1 to 6) for 2 seconds.

The radio channel is now assigned as a favorite.

Using the volume controls

The Sirius audio application can be used to control the volume of your Sirius audio receiver.

With the Sirius audio application displayed:

1. Select the **Volume up** or **Volume down** icon to change the volume level, or
2. Select the **Mute icon** to mute and un-mute the audio.

Chapter 25: Fusion link application

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- 25.1 Fusion link application overview on page 352
- 25.2 Media sources on page 353
- 25.3 Browsing music on page 353
- 25.4 Selecting shuffle and repeat functions on page 354
- 25.5 Adjusting volume levels for each zone on page 354
- 25.6 Selecting the system to control on page 356
- 25.7 Powering off an NMEA 2000 Fusion unit on page 356
- 25.8 Powering on an NMEA 2000 Fusion unit on page 357
- 25.9 Settings menu options on page 357

25.1 Fusion link application overview

The multifunction display can control compatible Fusion entertainment systems.

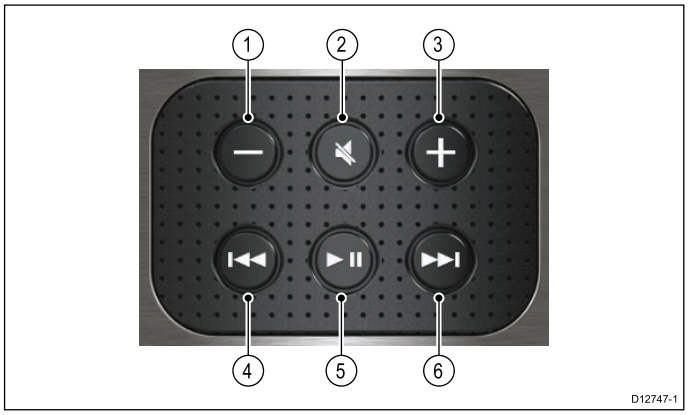
Example



1	Fusion menu options / track lists
2	Shuffle and Repeat icons
3	Track / media specific details and controls
4	Volume control
5	Zone selector
6	Media source
7	Media controls (See below)

Note: Album artwork is only available when using an iPod.

Media controls



1	Volume Down.
2	Mute / Unmute.
3	Volume Up.
4	• Single press — Skips back to the beginning of the current track, subsequent presses will skip backwards through the available tracks. • Press and hold — Scans the current track backwards in 10 seconds intervals.
5	Play / Pause current track.
6	• Single press — Skips forward to the next track, subsequent presses will skip forwards through the available tracks. • Press and hold — Scans the current track forwards in 10 seconds intervals.

Fusion link application features:

- Power the Fusion unit on and off (**NMEA 2000** only)
- Browse available media sources
- Adjust volume control
- Adjust tone controls (Bass, Middle, and Treble)
- Skip backwards and forwards through tracks
- Scan backwards and forwards through the current track
- Play / Pause the current track
- Select the zone to be controlled. (For information on setting up zones refer to the manual that accompanied your Fusion entertainment system)
- Set Shuffle and Repeat functions
- Select a region for the Radio tuner
- * Initiate software update on your Fusion unit

Note: * The Fusion software update files must be saved on a USB stick which is connected to the Fusion unit. Please refer to the instructions supplied with your Fusion unit.

Compatible Fusion units

The table below details the Fusion entertainment systems that are compatible with **LightHouse™** powered **MFD**s.

Fusion unit	NMEA 2000 connection	SeaTalk^{hs} connection
650 Series	✓	✗
700 Series	✓	✓
750 Series	✓	✓
RA205 Series	✓	✗
BB100	✓	✗
BB300	✓	✗

Accessing the Fusion link application

If more than one Fusion entertainment system is connected to your system then you can choose which system the Fusion link application will control.

1. Select the **FUSION link** page icon from the Homescreen.
   A list of connected Fusion entertainment systems is displayed.
2. Select the system you want to control.

25.2 Media sources

The media sources available depend on the type of Fusion unit and its connected peripheral devices.

Media sources:

- AM/FM Radio
- Aux 1 / Aux 2
- MTP (Media Transfer Protocol)
- ARC (Audio Return Channel — HDMI)
- USB
- Bluetooth
- iPod 1 / iPod 2
- Android Audio
- DVD
- VHF Radio
- Satellite Radio
- DAB+

Selecting a media source



From the Fusion link application:

1. Select the **Source** button.
   A list of media sources is displayed.
2. Select the relevant media source.

25.3 Browsing music

You can browse electronic music files held on devices connected to the Fusion unit.



From the Fusion link application:

1. Select the **Menu** icon.
   The Menu is displayed. The top half of the menu screen contains the File Browser.
2. Browse the available folders for your music.
3. Select the track that you want to listen to.
   The track will begin to play.

25.4 Selecting shuffle and repeat functions

You can set the Fusion link application to repeat the selected folder or to shuffle the play order.

From the Fusion link application:

1. Select the **Menu** icon.
2. Select **Repeat** to switch the repeat folder function on or off.
3. Select **Shuffle** to switch the shuffle function on or off.

25.5 Adjusting volume levels for each zone

The volume level for each zone can be adjusted individually or you can adjust all zones at the same time.

From the Fusion link application:

1. Select **Vol:**.

   The zone volume control is displayed.



2. Select the relevant zone.
3. Adjust the volume level to the required setting.
4. Select the **Back** icon to go back to the main screen.

Note: Adjusting the All Zones level will adjust all of the zones at the same time.

Selecting the zone to control

You can select which zone the application controls.

From the Fusion link application:

1. Select **Zone:**.

   The zone selection bar is displayed.



2. Select the zone you want to control.

The volume controls on the main screen will now control the volume level of the selected zone.

Zone settings menu

Zone settings can be accessed from the Setting menu (**Menu > Settings > Zone > Zone #**):

Menu	Description	Options
Enable	Enables you to switch off Zones that you do not want to use.	• On • Off
Balance	Enables adjustment of Left/Right balance for the selected zone.	Slider control
Volume Limit	Enables you to specify the maximum volume limit for the selected zone.	Volume control
Sub level	Enables you to specify the maximum subwoofer output volume.	Volume control
Sub filter	Enables you to select the desired cut-off frequency.	• 55Hz • 85Hz • 120Hz • 160Hz
Name	Enables you to customize the name assigned to each zone	Onscreen keyboard

Adjusting Tone controls (Bass, Middle, and Treble)



From the Fusion link application:

1. Select the **Menu** icon.
2. Select **Settings**.
3. Select **Tone Controls**.
4. Adjust the controls to the required levels.
5. Select **Back** to go back to the Settings menu.
6. Select **Back** from the Settings menu to go back to the Main menu.
7. Select **Close** to return to the Main screen.

25.6 Selecting the system to control

Where more than one Fusion entertainment system is connected you can select which system the Fusion link application will control.

From the Fusion link application:

1. Select the **Menu** icon.
2. Select **Settings**.
3. Select **Select Fusion system**.
   A list of available systems is displayed.
4. Select the system you want to control.

The Fusion link application will now control the selected system.

25.7 Powering off an NMEA 2000 Fusion unit

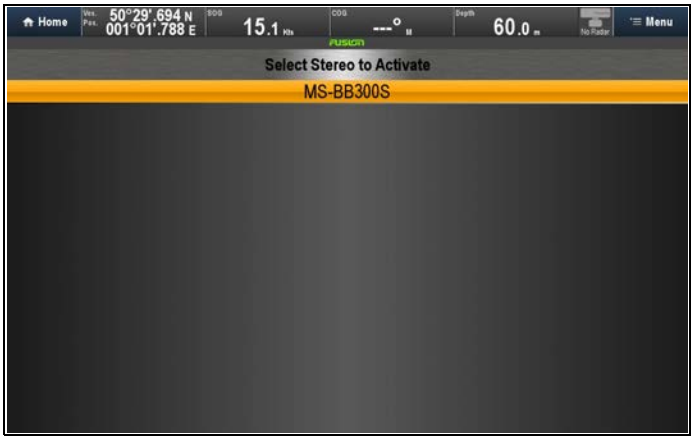
From the Fusion link application:

1. Select the **Menu** icon.
2. Select **Settings**.
3. Select **Power off**.
   The Fusion unit will power off.

The Fusion link application will display the unit selection page.

25.8 Powering on an NMEA 2000 Fusion unit

Opening the Fusion Link application with your entertainment system(s) switched Off will display the Device selection page.



With the unit selection page displayed.

1. Select the unit that you want to power up.

25.9 Settings menu options

The options available in the Settings menu are dependent on the connected media source.

Menu option	Description	Options
Tone Controls	Enables adjustment of the tone controls.	• Bass • Middle • Treble
Zone	Enables you to select the zone that you want the application to control.	List of available zones.
Searching	When connected to a iPod/iPhone or MTP device which has more than 100 artists, songs or albums you can use this setting to search by letter or number instead of displaying the full item list. Select the option that is closest to the number of items you have on your device or select Off to display the full item list.	• Off • 100 • 200 • 400 • 800
Tuner region	Enables selection of Tuner Region.	• USA • Europe • Japan • Australasia
Tel/Mute	When your entertainment system is connected to a hands-free telephone, the Tel/Mute option will mute the audio or switch to Aux/ARC so you can hear the call, when your phone rings.	• Aux • ARC • Mute
Artwork	Enables album artwork to be displayed next to track details, when connected to an iPod/iPhone.	• On • Off
Set Device Name	Enables you to assign a custom device name to your entertainment system.	Displays the onscreen keyboard.

Menu option	Description	Options
Select Fusion system	Enables you to select the Fusion entertainment system you want to control.	Displays a list of compatible, currently connected Fusion entertainments systems.
Update	Initiate software update of Fusion unit.	N/A
Power Off	Powers off the Fusion unit and displays the unit selection page. Only available when connected over **NMEA 2000**.	N/A

Chapter 26: GRIB Viewer

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- 26.2 GRIB Viewer compatibility on page 361
- 26.3 Logging in on page 361
- 26.4 Data Type Icons on page 362
- 26.5 Selecting a storage location for GRIB files on page 363
- 26.6 Downloading and playing (temporary) GRIB Files using touchscreen controls on page 363
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- 26.9 Playing saved animations on page 365
- 26.10 Viewing data and graphs for a specific location on page 366
- 26.11 Hiding map text on page 366
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- 26.13 Moving and Copying files on page 367

26.1 GRIB (Gridded Information in Binary) Viewer overview

GRIB files contain historical / forecast meteorological data in binary format. The GRIB Viewer produces animated visualizations of the data contained in compatible GRIB files. GRIB files may be downloaded directly from within the GRIB Viewer application or can be manually downloaded.

The GRIB Viewer can display visualizations for the following data types:

- Wind
- Precipitation
- Pressure
- Temperature
- Wave
- Sea surface temperature (not animated)
- Tidal stream (North-Western Europe only)
- Nexrad (US only)

Note: In-App downloads require a valid **Theyr** subscription from the **LightHouse**™ Chart Store and an internet connection to your MFD.



1. **GRIB Data type icons**
   - When logged in to the Chart Store, selecting an icon will download temporary GRIB files and play an animation of the selected data type. The icon for the data type being played is ticked and the icons for all data types contained within the downloaded file will also appear colored. If the GRIB Viewer is not logged in to the Chart Store, only the icons for data types available in the currently selected GRIB file will be displayed.
   - The data will remain available until a different data type icon has been selected or the GRIB Viewer is closed and another app is opened from the Homescreen

2. **Vessel position** — The Black circle indicates the current location of your vessel. The vessel position is only shown if position data is available to your MFD.
3. **Progress bar** — The progress bar shows the position of the current animation and identifies the date and time stamp.
4. **Animation controls** — The animation controls enable the animation to be paused, played or skipped forwards and backwards.

Note:

- The GRIB Viewer and associated GRIB files are MFD specific and can only be viewed on an MFD that is logged in to the Chart Store or contains the downloaded GRIB files. To use the GRIB Viewer on more than 1 MFD, each MFD must be logged in and have the GRIB files downloaded to it.
- Only 1 instance of the GRIB Viewer may be displayed in an application page.

26.2 GRIB Viewer compatibility

The GRIB viewer can be used to play compatible third party GRIB files which adhere to the following data/formats:

- GRIB-1 format
- WE:NS and WE:SN latitude-longitude grids
- Wind 10 metres above surface
- Temperature 2 metres above surface
- Surface temperature (Sea surface temperature)
- Pressure reduced to Main Sea Level
- Total accumulated precipitation
- Precipitation rate
- Tidal stream (Speed/direction of current)
- Combined Wind Waves and Swell, Wind Waves and Swell wave data

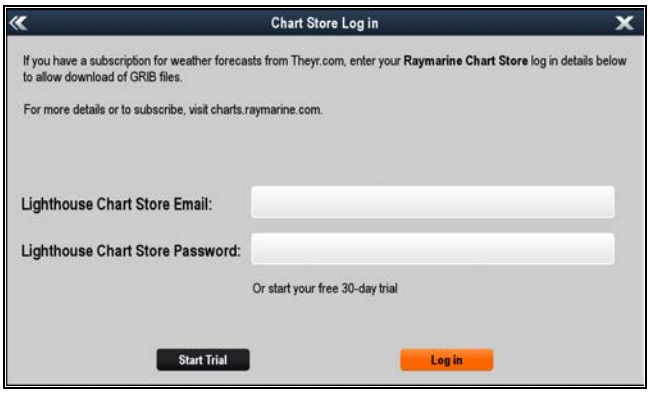
26.3 Logging in

The GRIB Viewer can be logged in to the **LightHouse™** Chart Store which will enable In-App GRIB file downloads.

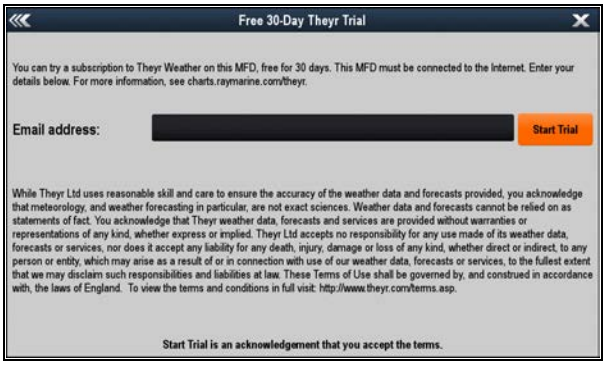
Your MFD requires an internet connection to enable log in, refer to Chapter 21 **Wi-Fi and Mobile applications** for details on connecting your MFD to the internet.

1. Select the **GRIB Viewer** icon from the Homescreen.

   *when the **GRIB Viewer** is opened, if you do not have an internet connection, then you will be requested to connect to the internet. Once the connection is established the log in page is displayed.*



2. From the **Log in** page you can either: **Log in** or **Start Trial**.
   i. To **Log in**, enter your **LightHouse™** Chart Store log in details and select **Log in**, or
   ii. Select **Start Trial** and enter your E-Mail address to commence a free 30 day trial.



Once you have logged in the Data Type Icons are displayed:



3. You can Log out at any time by selecting: **Menu > Log out**

   Once logged out only the icons for data types that have been downloaded will be displayed.

26.4 Data Type Icons

When logged in to the Chart Store all of the Data Type Icons are displayed. Selecting an Icon will automatically download a temporary GRIB file and play the animation for that data type. When manually downloaded to MicroSD card, only the Icons for the available data types are displayed.

Icon	Data Type
	**Wind**
	**Precipitation**
	**Pressure**
	Combined **Wind/Precipitation/Pressure**
	**Temperature**
	Combined **Wind/Wave**
	**Wave**
	**Sea Surface temperature** The Sea Surface Temperature data is not animated.
	**Tidal Stream** (North-Western Europe only)
	**Nexrad** (US Only)

26.5 Selecting a storage location for GRIB files

You can specify the storage location for GRIB files.

1. From the **Menu**.
2. Select **Forecast Files:** and then select a storage location:
   - Internal
   - MicroSD 1
   - MicroSD 2 (If available)

The GRIB files will be downloaded and stored is a folder named ‘Theyr-Weather’ in the selected location.

26.6 Downloading and playing (temporary) GRIB Files using touchscreen controls

Note: In-App downloads require a valid **Theyr** subscription from the **LightHouse™** Chart store and an internet connection to your MFD.

1. Select the required **Data Type Icon**.

   The relevant GRIB File is downloaded from the Chart Store and will begin playback automatically.



   The Data Type Icon will appear colored to indicate that data is available and a tick is placed in the bottom right corner of the icon to indicate the animation is being displayed. The animation covers the area currently displayed onscreen.

Note: The **Sea Surface Temperature** data is not animated.

2. With the animation playing you can use the Animation Controls, located in the bottom right of the screen to:
   - Pause/Play
   - Skip forwards
   - Skip backwards
3. You can also select a position on the **Progress Bar** to playback from a specified date/time stamp.
4. Selecting the Icon again will hide the animation.

   The Icon will be unticked and file playback is paused.

The Downloaded data will remain available until a different Data Type Icon has been selected, a different application is opened or the MFD is power cycled.

26.7 Downloading and playing (temporary) GRIB Files using non-touch controls

When using a non-touch MFD or a HybridTouch™ MFD that has its Touchscreen locked, follow the steps below.

Note: In-App downloads require a valid **Theyr** subscription from the **LightHouse™** Chart store and an internet connection to your MFD.

1. Select **Menu > Weather Layers**.
2. Select the required **Data Type Icon** using the **Rotary control** and pressing the **OK** button.

   The relevant GRIB File is downloaded from the Chart Store and will begin playback automatically.



   The Data Type Icon will appear colored to indicate that data is available and a tick is placed in the bottom right corner of the icon to indicate the animation is being displayed. The animation covers the area currently displayed onscreen.

Note: The **Sea Surface Temperature** data is not animated.

3. With the animation playing you can use the Animation Controls, by selecting **Menu > Animate Weather**.
4. Use the **Rotary control** and **OK** button to:
   - Pause/Play
   - Skip forwards
   - Skip backwards
5. To hide the animation:
   i. Select: **Menu > Weather Layers**.
   ii. Highlight the ticked Data Type Icon using the **Rotary control**
   iii. Press the **OK** button to deselect the current animation.
   iv. Press the **Back** button to close the Weather Layers control.

   The Icon will be unticked and file playback is paused.

The Downloaded data will remain available until a different Data Type Icon has been selected, a different application is opened or the MFD is power cycled.

26.8 Saving GRIB Files from the Chart Store

Selecting the onscreen Data Type Icons downloads the data temporarily, you can also download GRIB files to your available storage.

It may be useful to download the files if:

- You need to use them in the future, at a time when you may not have an internet connection available to your MFD.
- You want to view the files to another MFD but do not want to use your mobile data allowance to download the same files twice.

Note: In-App downloads require a valid **Theyr** subscription from the **LightHouse™** Chart Store and an internet connection to your MFD.

With the GRIB Viewer logged in to the Chart Store:

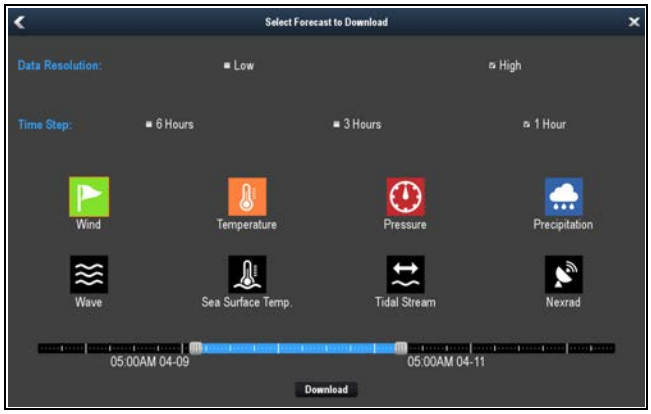
1. Select **Forecast Files:** from the Menu and then select a storage location for the downloaded files:
   - Internal
   - MicroSD 1
   - MicroSD 2 (If available)
2. Select **Download Forecast** from the Menu.

   The Download Forecast page is displayed.



3. Select either **Low** or **High** the required resolution Selecting High will enable the 1 Hour Time Step setting.
4. Select the desired **Time Step** setting.
5. Select the relevant Icons for the data types you want to download.
6. Adjust the Start and End points for the data using the Time Frame bar at the bottom of the page.

   The time frame available is dependent on the Time Step selected (i.e. a 1 Hour Time Step will contain more data than a 6 Hour Time Step meaning that a 6 Hour Time Step can cover a larger overall Time Frame than a 1 Hour Time Step).



Sea Surface Temperature, Tidal Stream and Nexrad data must be downloaded individually, Wind, Temperature, Pressure, Precipitation and Wave data can be downloaded individually or combined together.

7. Select **Download**.

   The GRIB files will be downloaded and stored is a folder named 'Theyr-Weather' in the selected location. The animation will automatically commence playback when the download is complete. The files will be available until manually deleted.

26.9 Playing saved animations

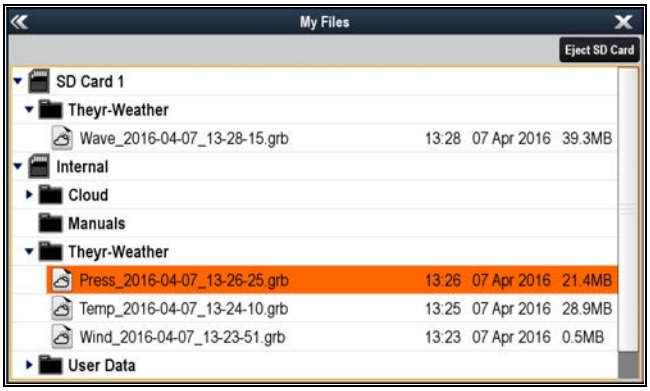
GRIB files that have been downloaded to the internal memory or to a MicroSD card can be played without an internet connection or Chart Store log in.

With the GRIB files saved to internal memory or MicroSD card:

Note: In addition to the GRIB files downloaded from the Chart Store, other compatible third party GRIB files may also be viewed.

1. Select **My Files** from the Menu.

   The File browser is displayed.



2. Navigate to the location of the GRIB Files

   *For internal storage the file are saved in the **Theyr-Weather** folder.*

3. Select the file you want to view.

   The animation will be played.

26.10 Viewing data and graphs for a specific location

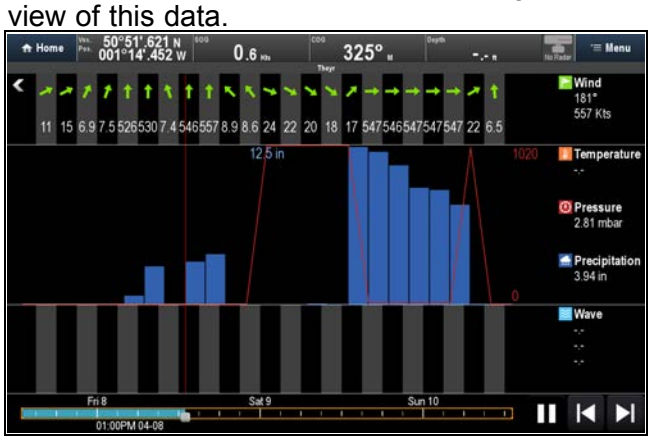
With GRIB files downloaded to your MFD you can select a location onscreen and view data and graphs for that location.

1. Select an area onscreen.

   The context menu and Side Data bar are displayed.



2. Select **View Graphs** to view animated graphical view of this data.



3. Use the **Progress Bar** and **Animation Controls** to interact with the graph.
4. Select the **Back Arrow** located in the top left corner to close the Graph.

26.11 Hiding map text

Whilst animations are playing, the place name labels that appear on the GRIB Viewer's map can be switched off.

From the GRIB Viewer's menu:

1. Select **Display Labels:** so that On is selected to show place names, or
2. Select **Display Labels:** so that Off is selected to hide place names.

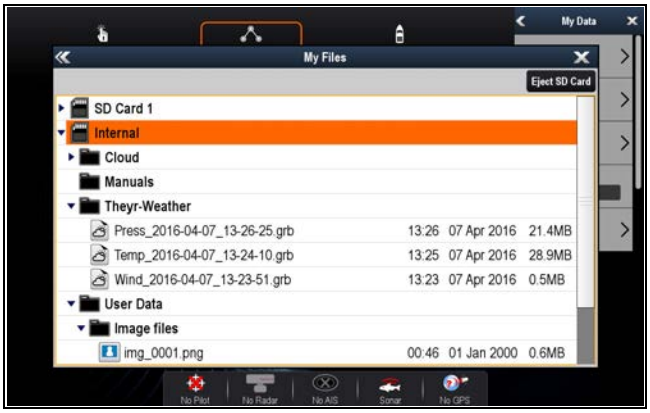
26.12 Deleting files

User files can be deleted from the system following the steps below.

From the Homescreen:

1. Select **My Data**.
2. Select **My Files**.

   The File browser is opened.



3. Browse to the file you want to delete.
4. Select the file.
5. Select **Delete**.
6. Select **Yes** to confirm.

The file is deleted.

26.13 Moving and Copying files

You can move or copy GRIB files between storage locations.

From the Homescreen:

1. Select **My Data**.
2. Select **My Files**.
3. Browse to and select the file you want to Move or Copy.
4. Select **Move** or **Copy** as required.

   Depending on the location of the selected file you can move or copy the file as follows:

Original file location	Available storage locations
Internal	SD1 / SD2
SD1	SD2 / Internal
SD2	SD1 / Internal

5. Select the location you want to move or copy the file to.

   The file will be copied or moved to the selected location and stored in a folder named ‘Theyr-Weather’.

Chapter 27: Weather application (North America only)

Chapter contents

- 27.1 Weather application overview on page 370
- 27.2 Weather application set up on page 370
- 27.3 Weather application display overview on page 371
- 27.4 Weather map navigation on page 374
- 27.5 Weather context menu on page 375
- 27.6 Weather information on page 375
- 27.7 Weather reports on page 376
- 27.8 Animated weather graphics on page 377
- 27.9 Weather application menu options on page 378
- 27.10 Glossary of weather terms on page 380

27.1 Weather application overview

The weather application overlays historical, live, and forecasted weather graphics on a world map.

The weather application can only be used in North America and its coastal waters.

The weather application graphics and their associated weather data enable you to determine the actual conditions in the vicinity of your vessel, or at a particular location.

Weather forecasts and warnings, detailing both current and predicted conditions, are regularly updated in the weather application.

Disclaimer — advisory only

The weather information is subject to service interruptions and may contain errors or inaccuracies and consequently should not be relied upon exclusively. You are urged to check alternate weather information sources prior to making safety related decisions. You acknowledge and agree that you shall be solely responsible for use of the information and all decisions taken with respect thereto. By using this service, you release and waive any claims against Sirius Satellite Radio Inc., WSI, Navcast Incorporated, and Raymarine with regard to this service.

27.2 Weather application set up

A number of steps must be completed before you can use the weather application for the first time.

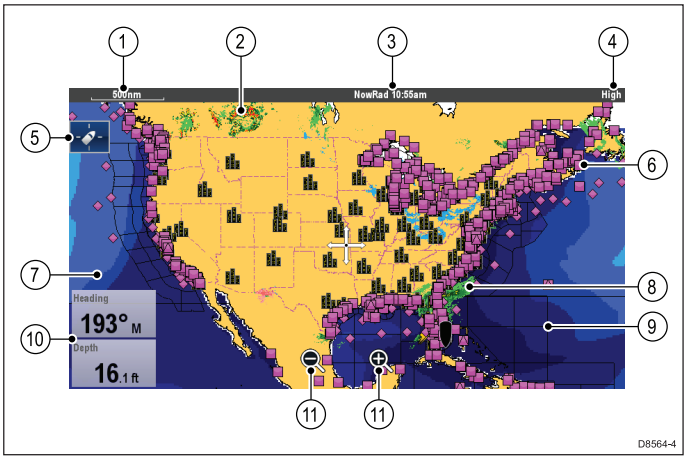
- Your multifunction display must be connected to a Raymarine Sirius weather receiver.
- Identify your Raymarine Sirius weather receiver's electronic serial number (ESN). This information can be obtained from the homescreen **Set-up** menu by selecting the device from the select devices page: **Set-up > Maintenance > Diagnostics > Select Device >**
- Using your ESN contact SiriusXM to subscribe for Sirius Marine Weather. When viewing the multifunction display's weather application, the ESN may be accessed from the following menu: **Menu > Sirius ESN**.

- You must be navigating within US coastal waters.
- Your multifunction display must obtain a GPS fix on your vessels location.
- You must specify the weather graphics that you want to display in the weather application.

27.3 Weather application display overview

The weather application displays a range of graphics to indicate weather conditions and forecast information.

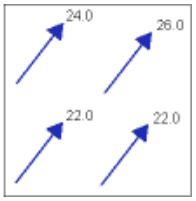
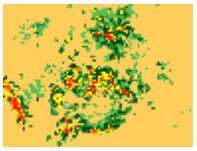
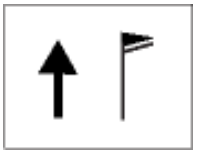
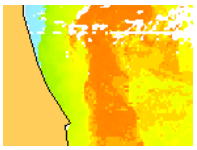
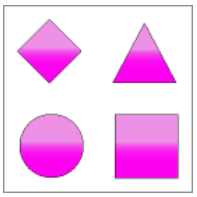
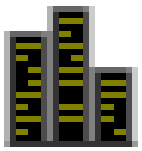
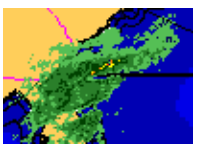
The following diagram illustrates the main features of the weather application display:



Item	Description
1	Range
2	Canadian radar
3	Animation and time / date
4	Signal strength
5	Find ship icon
6	Surface observation stations
7	Wave heights
8	NOWRad
9	Marine zones
10	Data overlay cells
11	On-screen Range in and out icons (Touchscreen displays only)

Weather symbols

The weather application uses a range of graphics and symbols to represent different weather conditions and forecasts.

Symbol	Description
	Storm cast (dark blue) arrows indicating direction and speed of a storm.
	Wave height • Highest waves (red) • Intermediate waves (greens) • Lowest waves (blues)
	Canadian radar (dark greens, yellow, orange and red)
	Lightning — a lightning symbol is shown at each cloud-to-ground strike: • Light (recorded in last 10–15 minutes.) • Medium (recorded in last 5–10 minutes.) • Dark (recorded in last 0–5 minutes.) More recent strikes are overlaid over older symbols.
	Wind — Wind symbols show the current wind direction and strength and can be displayed as either an arrow or a wind barb. Wind arrows indicate speed — the larger the arrow, the greater (stronger) the wind speed. Wind barbs give a more precise indication of wind speed as shown in the wind speed symbols section.
	Sea surface temperature (green, yellow and orange) • Blue — coldest • green • yellow • orange and red — warmest
	Surface observation stations (pink) — Current or historical weather data can be viewed at surface observation stations. Not all data is available for all stations.
	Cities — The city symbols enables you to access details of city weather forecasts. Up to 3 forecasts are displayed for each city.
	NOWRad • Rain (green, yellow and red.) • Snow (blues) • Mixture (pinks)

Storm tracking symbols

The weather application uses a range of symbols to represent different types of storm tracks. The storm tracking function enables you to monitor significant storms in the area.

Examples of significant storms include tropical disturbances, depressions, storms and cyclones, hurricanes, typhoons, and super typhoons.

The weather map displays the track that the storm has taken, its current and forecasted position, the wind radii (current position only), direction, and speed of travel.

Storm tracks are highlighted on the weather map in the form of symbols, as shown below.

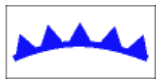
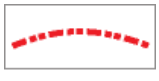
Historical (grey)	Current (red)	Forecast (orange)	Description
			Hurricane (Category 1–5)
			Tropical storm
			Tropical disturbance, tropical depression

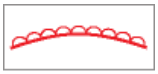
When a symbol is selected, additional storm information can be accessed by the context menu:

- Storm's name and type.
- Date and time.
- Position, direction and speed.
- Pressure and maximum wind speed and gusts.

Surface pressure symbols

The weather application uses a range of symbols to represent different surface pressure conditions.

Symbol	Description
	High / low pressure (blue and red)
	Warm front (red)
	Cold front (blue)
	Occluded front (purple)
	Stationary front (red-blue)
	Trough (brown)
	Squall line (red)

Symbol	Description
	Dry line (red)
	Isobars (grey)

Surface observation station symbols

The weather application uses a range of symbols to represent different types of surface observation station.

Symbol	Description
	Buoy station
	C-MAN (Coastal-marine automated network)
	WSI (Weather services international)
	NWS (National weather service)

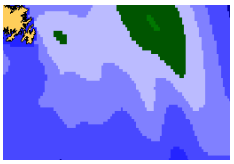
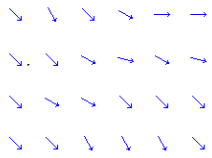
Wind speed symbols

The weather application uses a range of symbols to represent different wind speeds.

Symbol	Speed	Symbol	Speed	Symbol	Speed
	3–7 kts		8–12 kts		13–17 kts
	18–22 kts		23–27 kts		28–32 kts
	33–37 kts		38–42 kts		43–47 kts
	48–52 kts		53–57 kts		58–62 kts
	63–67 kts		68–72 kts		73–77 kts
	78–82 kts		83–87 kts		88–92 kts
	93–97 kts		98–102 kts		etc.

Wave information symbols

The weather application uses a range of graphics and symbols to represent different types of wave information.

Symbol	Description
	Wave height — Waves are shown in 16 shades of color from: • Reds — Highest waves • Greens — Intermediate waves • Blues — Lowest waves
	Wave period — wave periods are shown using shades of blue, the darker the shade the shorter gap between successive waves. The wave period detail can be accessed by the context menu **View Data** option.
	Wave direction — direction of waves is indicated by blue arrows.

NOWRad precipitation color codes

NOWRad displays the type and level of precipitation:

Color code	Precipitation type	Reflectivity Intensity
Light green	Rain	(15 to 19 dBz)
Medium green	Rain	(20 to 29 dBz)
Dark Green	Rain	(30 to 39 dBz)
Yellow	Rain	(40 to 44 dBz)
Orange	Rain	(45 to 49 dBz)
Light red	Rain	(50 to 54 dBz)
Dark red	Rain	(55+ dBz)
Light blue	Snow	(5 to 19 dBz)
Dark blue	Snow	(20+ dBz)
Light pink	Mixed	(5 to 19 dBz)
Dark pink	Mixed	(20+ dBz)

Canadian radar precipitation color codes

Canadian radar shows the intensity of precipitation for Canada. Unlike NOWRad, Canadian radar does not show the precipitation type.

Color code	Intensity in mm per hour
Transparent (nothing shown at very low precipitation)	0.00 to 0.20 mm/hr
Light green	0.21 to 1.00 mm/hr
Medium green	1.01 to 4.00 mm/hr
Dark green	4.01 to 12.00 mm/hr
Yellow	12.01 to 24.00 mm/hr
Orange	24.01 to 50.00 mm/hr
Light red	50.01 to 100 mm/hr
Dark red	100.01+ mm/hr

Reflectivity intensity to rainfall correlation

You can use the table below to correlate reflectivity intensity in dBz to estimated rainfall in millimeters per hour or inches per hour.

Reflectivity Intensity	Rainfall (mm/hr)	Rainfall (in/hr)
5	0.0749	0.0029
10	0.1538	0.0059
15	0.3158	0.0123
20	0.6484	0.0253
25	1.332	0.0519
30	2.734	0.1066
35	5.615	0.219
40	11.53	0.4497
45	23.68	0.9235
50	48.62	1.8963
55	99.85	3.8949
60	205.05	7.9975
65	401.07	15.6424
70	864.68	33.723
75	1775.65	69.252
80	3646.33	142.21
85	7487.83	292.03
90	15376.51	599.69
95	31575.91	1231.46
100	64841.98	2528.84
105	133154.6	5193.03
110	273436.4	10664.02

Selecting weather graphics

From the weather application:

1. Select **Menu**.
2. Select **Display Graphics**.
   The display graphics list is displayed.
3. Select each graphic you want to Show or Hide.
4. Selecting a graphic will switch between Show or Hide.

Note: The Wind Vector graphic options are Arrow or Barb.

27.4 Weather map navigation

You can move around the weather map and place waypoints.

When you open the weather application, a world map is displayed. If the system has a position fix for your vessel, the map will be centred on your location. As in the chart application, use the cursor to move around the map and view different locations, and the **Range Control** to zoom in and out. Use the **WPT** button to place waypoints.

Note: Waypoints are not displayed in the weather application, to view waypoints you will need to have an active chart application or radar application displayed.

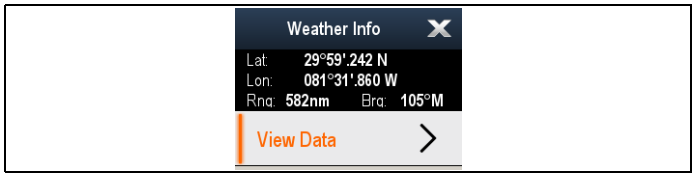
Locating your vessel

The vessel icon can be repositioned to the center of the screen by following the steps below.

1. Select the Find Ship icon:  located on the left hand side of the screen.

27.5 Weather context menu

The weather application includes a context menu which provides positional data and the option to view weather reports from the cursor location.



The context menu provides the following positional data for the cursor location in relation to your vessel:

- Latitude
- Longitude
- Range
- Bearing

Depending on the item or location selected on screen the context menu provides the following options:

- **View Report** — Only available when a city is selected.
- **View Data**— Not available when a city is selected.
- **View Full Report** — Only available when an observation station is selected.

Accessing the context menu

1. Non-touchscreen and HybridTouch displays:
   i. Move the cursor over the area or object and pressing the **OK** button.
2. HybridTouch and Touch only displays:
   i. Select and hold on an area or object, or
   ii. With the Chart Call-out displayed select the Call-out box.

27.6 Weather information

You can view weather information for:

- a specific location
- a surface observation station (when displayed)
- Cities (when displayed)

Viewing weather data at a specific location

You can view weather details at a particular location on the world map regardless of the display graphics being shown in your weather application.

From the weather application:

1. Select the location you wish to view weather details for.
   The context menu is displayed.
2. Select **View Data**.
   A weather information page is displayed.

Weather information page

When selecting **View Data** from the weather context menu the following information is displayed:

- Zone description
- Zone ID
- Precipitation intensity
- Precipitation type
- Sea surface temperature
- Wind speed
- Wind form
- Wave height
- Wave period
- Wave direction

Viewing weather station reports

You can view surface observation station reports by following the steps below:

From the weather application, with surface observation stations displayed:

1. Select a surface observation station.
   The weather context menu is displayed.
2. Select **View Full Report**.
   The station report is displayed.

Station report

Surface observation station reports contain the following information (when available)

- Station ID, name, type, bearing, time and date
- Air temperature
- Visibility
- Sea pressure
- Wind speed and form
- Sea temperature
- Wave information

Viewing city weather forecasts

You can view weather forecasts for a particular city by following the steps below:

From the weather application, with cities displayed:

1. Select a city.
   The weather context menu is displayed.
2. Select **View Report**.
   The City forecast is displayed. Up to 3 forecasts are shown.

27.7 Weather reports

You can view a number of different weather reports to give you a comprehensive view of the weather.

Your multifunction display shows weather reports for:

- Tropical statements.
- Marine warnings.
- Marine zone forecasts.
- Watchbox warnings.

Tropical statements

Tropical statements provide information on tropical weather conditions. This information may not be available in all areas.

Marine warnings

You can display a report for the current marine warnings in the US coastal or near shore areas, or for the zone around your cursor or vessel.

Marine zone forecasts

These forecasts cover:

- US coastal weather forecasts, offshore forecasts and high seas forecasts, or
- Great lakes forecasts and near shore forecasts, or
- Canadian coastal weather forecasts.

Watchbox warnings

When a tornado or thunderstorm warning is received within the specified alert range of your vessel, the system generates a watchbox alert. This alert provides information on the type of warning and validity period. The full watchbox report text is also displayed.

Displaying weather reports

From the weather application:

1. Select **Menu**.
2. Select **View Report**.
3. Select either **Tropical Statements**, **Marine Warnings**, **Marine Zone Forecasts**, or **Watchbox Warnings**.

The relevant report, warning, or statement is displayed.

Changing the position of forecasts on the weather map

From the weather application:

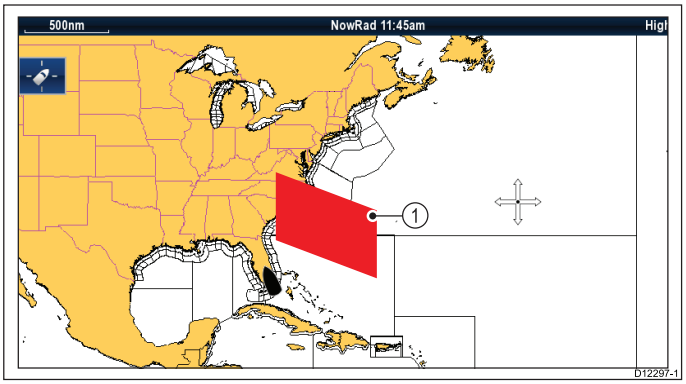
1. Select **Menu**.
2. Select **View Report**.
3. Select **Report At**.
   Selecting report at will switch between reports from Ship location or Cursor location.

Note: You cannot change the position of Tropical Statements or Watchbox Warnings.

Watchbox alert box

The watchbox alert box is a red polygon which shows the location where severe weather is occurring.

The watchbox alert box shall be displayed if the weather application is displayed, watchbox alerts are On and the watchbox alert area is within the specified range from your vessel, or set to All.



Item	Description
1	Watchbox alert box

Viewing watchbox alerts

You can view a watchbox alert at any time by following the steps below:

From the weather application with a watchbox alert box displayed.

1. Select the watchbox alert box.
   The context menu is displayed.
2. Select **View Data**.
   The watchbox alert message is displayed.

Setting watchbox alert range

You can specify the range from your vessel that you wish to receive watchbox alerts from.

From the weather application:

1. Select **Menu**.
2. Select **Watchbox Alerts**.
3. Select the required range, All, or Off if you do not want to receive watchbox alerts.
   - Selecting a range will display watchbox warnings occurring within the specified range.
   - Selecting All will display all watchbox warning regardless of range from your vessel.
   - Selecting Off will stop watchbox alerts.

Note: When the watchbox alert setting is set to Off watchbox reports will still be received but you will not be alerted.

27.8 Animated weather graphics

You can view animated weather graphics to provide an indication of changing weather patterns.

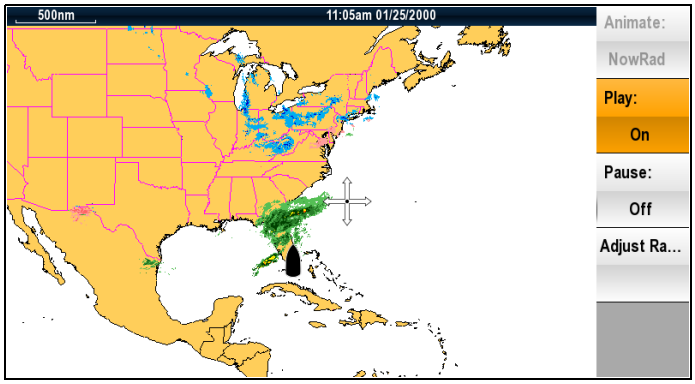
The animated weather option enables you to view an animation from the current time for:

- NOWRad — weather radar
- Wind
- Waves
- Pressure — surface pressure

Running a weather animation

From the weather application:

1. Select **Menu**.
2. Select **Animate Weather**.
3. Select **Animate**.
   A list of animation is displayed.
4. Select the type of animation from the list.
5. Select **Play** so the On is displayed.
   Selecting play will switch between on and off.



Note: You cannot display information (by moving the cursor over a symbol) when animation is running. The Range and Rotary controls do however remain operable provided the PAUSE option has not been selected. Ranging / panning will cause the animation to restart.

Note: The animation will be switched to Off if the animation menu is closed.

27.9 Weather application menu options

The following options are available from the weather application menu:

Menu item	Description	Options
Find Ship	Selecting **Find Ship** will reset the display to show your vessel in the center of the screen.	
Display Graphics	The **Display Graphics** menu allows to choose what graphics to Show or Hide in the weather application.	**Display Graphics** • Cities • Lightning • Marine Zones • NOWRad • Cloud Tops • Sea Surface Temperature • Storm Cast • Storm Tracks • Surface Pressure • Surface Observation Stations • Wind • Wind Vector — Arrow or Barb • Watchbox • Wave Height • Wave Period • Wave Direction
Animate Weather	The **Animate Weather** menu contains the following sub-menus: • Animate • Play • Pause • Adjust Range	**Animate:** • NOWRad • Wind • Wave • Pressure **Play:** • On • Off **Pause:** • On • Off **Adjust Range** Adjust Range allows you to use the **Range Control** to zoom in and out.
View Report	The **View Report** menu allows you to view the different types of weather reports received. You can also select the location of the report.	**Report At** • Ship • Cursor **View Report** • Tropical Statements • Marine Warnings • Marine Zone Forecasts • Watchbox Warnings
Watchbox Alert	The **Watchbox Alerts** menu allows you to turn alerts Off, or select a range.	**Alert Range** • Off • 50 nm • 150 nm • 300 nm • 500 nm • All **Note:** Unit of measurement is dependant upon unit set-up choices.

Menu item	Description	Options
Databoxes Set-up	Allows you to set up and show / hide up to 2 databoxes in the bottom left corner of the screen.	**Databox 1** • On • Off **Select Data** Allows selection of a data type by category. **Databox 2** • On • Off **Select Data** Allows selection of a data type by category.
Sirius User ID	This option will display your registered Sirius User ID.	

27.10 Glossary of weather terms

Term	Definition
Cold front	The boundary between two different air masses where cold air pushes warm air out of the way and brings colder weather.
Cyclone	A large area of low atmospheric pressure, characterized by inward spiralling winds. A “low” also called a “depression”. Also the name used for a hurricane in the Indian Ocean and Western Pacific.
Depression	An area of low pressure. Also called a cyclone.
Dry line	A region where there is a strong gradient in dew point temperatures. It is often found in a region where strong thunderstorms develop.
Forecast	Something that tells us what the weather is probably going to be like.
Front	The boundary between two masses of air with different temperatures (i.e. a mass of cold air and a mass of warm air).
High	Also known as an 'anticyclone' an area of high atmospheric pressure with a system of winds rotating outwards. This usually means dry weather. It is the opposite of a 'low'.
High Pressure	A mass of air that presses down strongly on the surface of the Earth because it is being cooled and is therefore more dense.
Hurricane	A violent, spiralling storm that forms over the Atlantic Ocean, with winds over 120 kph. Such storms usually have a lifespan of several days. Also known as a typhoon or tropical cyclone. There are 5 levels of hurricane: • **Category 1**— Winds 74–95 mph (64–82 kt or 119–153 km/hr). Storm surge generally 4–5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage. • **Category 2** — Winds 96–110 mph (83–95 kt or 154–177 km/hr). Storm surge generally 6–8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable dam age to mobile homes, poorly constructed signs, and piers. Coastal and low lying escape routes flood 2–4 hours before arrival of the hurricane centre Small craft in unprotected anchorages break moorings. • **Category 3** — Winds 111–130 mph (96–113 kt or 178–209 km/hr). Storm surge generally 9–12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtain wall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low lying escape routes are cut by rising water 3–5 hours before arrival of the centre of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low lying residences with several blocks of the shoreline may be required. • **Category 4** — Winds 131–155 mph (114–135 kt or 210–249 km/hr). Storm surge generally 13–18 ft above normal. More extensive curtain wall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low lying escape routes may be cut by rising water 3–5 hours before arrival of the centre of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km). • **Category 5** — Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low lying escape routes are cut by rising water 3–5 hours before arrival of the centre of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5–10 miles (8–16 km) of the shoreline may be required.
Isobar	A line on a weather map linking areas with equal air pressure.
Lightning	Discharge of static electricity in the atmosphere, usually between the ground and a storm cloud.
Low	Also called a 'depression' this region of low pressure can mean wet weather.
Low Pressure	A mass of air that presses down only weakly on the surface of the Earth’s surface as it is warmed and it therefore less dense.
Millibar	A unit used to measure atmospheric pressure.

Term	Definition
Occluded Front	An area where warm air is pushed upwards as a cold front overtakes a warm front and pushes underneath it.
Precipitation	Moisture that is released from the atmosphere as rain, drizzle, hail, sleet or snow, as well as dew and fog.
Pressure Centre	A region of high or low pressure.
Squall line	A non-frontal band, or line, of thunderstorms.
Super typhoon	A typhoon that reaches maximum sustained 1 minute surface winds of at least 65 m/s (130 kt, 150 mph). This is the equivalent of a strong category 4 or 5 hurricane in the Atlantic basin or a category 5 severe tropical cyclone in the Australian basin.
Tornado	A funnel shaped whirlwind which extends to the ground from storm clouds.
Tropical cyclone	A low pressure system that generally forms in the tropics. The cyclone is accompanied by thunderstorms and, in the Northern Hemisphere, a counterclockwise circulation of winds near the earth's surface.
Tropical depression	An organized system of clouds and thunderstorms with a defined surface circulation and maximum sustained winds of 38 mph (33 kt) or less.
Tropical storm	An organized system of strong thunderstorms with a defined surface circulation and maximum sustained winds of 3973 mph (34 63 kt).
Tropics	An area on the Earth's surface that lies between 30º north and 30º south of the equator.
Trough	An elongated area of relatively low atmospheric pressure, usually extending from the centre of a low pressure region.
Typhoon	The name for a tropical storm originating in the Pacific Ocean, usually the China Sea. They are basically the same as the hurricanes of the Atlantic Ocean and the cyclones of the Bay of Bengal.
Wave cyclone	A storm or low pressure centre that moves along a front.
Wave period	The period is the time gap between successive waves and the longer the period the faster the waves travel.

Chapter 28: Troubleshooting

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28.1 Troubleshooting

The troubleshooting information provides possible causes and corrective action required for common problems associated with installation and operation of your product.

Before packing and shipping, all Raymarine products are subjected to comprehensive testing and quality assurance programs. If you do experience problems with your product this section will help you to diagnose and correct problems in order to restore normal operation.

If after referring to this section you are still having problems with your product, please refer to the Technical support section of this manual for useful links and Raymarine Product Support contact details.

28.2 Power up troubleshooting

Problems at power up and their possible causes and solutions are described here.

Product does not turn on or keeps turning off

Possible causes	Possible solutions
Blown fuse / tripped breaker	1. Check condition of relevant fuses and breakers and connections, replace if necessary (Refer to the *Technical Specification* section of your product's installation instructions for fuse ratings.) 2. If fuse keeps blowing check for cable damage, broken connector pins or incorrect wiring.
Poor / damaged / insecure power supply cable / connections	1. Check that the power cable connector is fully inserted into the unit and locked in position. 2. Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary. 3. With the unit turned on, try flexing the power cable near to the display connector to see if this causes the unit to re-boot/loose power, replace if necessary. 4. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion, replace if necessary. 5. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc, replace if necessary.
Incorrect power connection	The power supply may be wired incorrectly, ensure the installation instructions have been followed.
Power source insufficient	With the product under load, using a multi-meter, check the power supply voltage as close to the unit as possible to establish actual voltage when the current is flowing. (Refer to the *Technical Specification* section of your product's installation instructions for power supply requirements.)

Product will not boot up (re-boot loop)

Possible causes	Possible solutions
Power supply and connection	See possible solutions from 'Products does not turn on or keeps turning off' above.
Software corruption	1. In the unlikely event that the products software has become corrupted please try re-flashing the latest software from the Raymarine website. 2. On display products, as a last resort, you can try to perform a 'Power on Reset', however this will delete all settings/presets and user data (such as waypoints and tracks) and revert the unit back to factory defaults.

Performing a Power on Reset

Performing a 'Power on Reset' will delete all settings/presets and user data (such as waypoints and tracks) and revert the unit back to factory defaults.

1. Power the unit off.
2. Power the unit back on.
3. When the **LightHouse** logo appears Press and hold the **Power** button.

   The Raymarine Initialization screen is displayed.
4. **Touch only displays:**
   i. Press the **Power** button again to select '1 – Reset to factory defaults'.

      A 7 second countdown will begin. When the countdown reaches zero the unit will be reset to factory default settings.
   ii. You can stop the reset process by pressing the **Power** button again before the countdown timer reaches zero.

      This will select the second option: '2– Exit and start the application' and begin a new countdown timer.
5. **Non-Touch and HybridTouch displays:**
   i. Press the **WPT/MOB** button.

      The unit will be reset to factory default settings.

28.3 Radar troubleshooting

Problems with the Radar and their possible causes and solutions are described here.

No connection can be made to the scanner

Possible Causes	Possible Solution
Radar powered down	• If the scanner unit has shut down, awaken it by using the **Power Up Radar** option on the Shortcuts page, accessible on your MFD by momentarily pressing the power button. • Quantum Radar will shut down within 30 minutes if neither a wired (RayNet) connection, nor a wireless (Wi-Fi) connection can be made to a multifunction-display unit (MFD).
Radar not transmitting	Select Tx for the relevant Radar scanner from the Shortcuts page.
Missing or incorrect Wi-Fi credentials	If using a WiFi (wireless) connection to the Radar, check that you have entered the correct WiFi pass key for the SSID that matches your scanner. Both the SSID and WiFi pass key are provided on the scanner packaging, and are also shown on the serial number label on the underside of the unit.
Damaged or disconnected Power cable / RayNet cable	1. Check that the cable connectors are fully inserted and locked in position. 2. Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary. 3. With the unit turned on, try flexing the cable near to the display connector to see if this causes the unit to re-boot/loose power, replace if necessary. 4. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion, replace if necessary. 5. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc (this can cause the unit to reset/turn off), replace if necessary. 6. Check condition of relevant breakers and fuses, replace if necessary. . If breaker keeps tripping or fuses keep blowing, contact a Raymarine authorized dealer for assistance.
Open Array power switch in OFF position	Ensure Open Array power switch is in ON position.
Software mismatch between equipment may prevent communication.	Ensure all Raymarine products contain the latest available software, check the Raymarine website for software compatibility.

Displayed bearing is different to the true bearing.

Possible Causes	Possible Solution
Bearing alignment adjustment required	Carry out the Bearing Alignment procedure described in the latest version of the **LightHouse™** Operations manual (81360).

Radar will not initialize (Voltage control module (VCM) stuck in "sleep mode"

Possible Causes	Possible Solution
Intermittent or poor power connection	Check power connection at VCM. (Voltage at input = 12 / 24 V, Voltage at output = 40 V)

28.4 GNSS troubleshooting

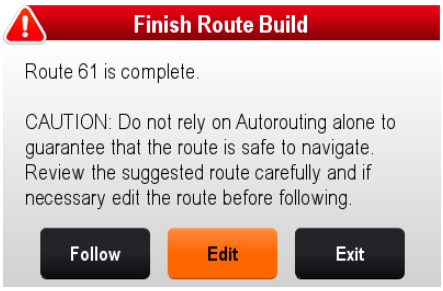
Problems with the GNSS and their possible causes and solutions are described here.

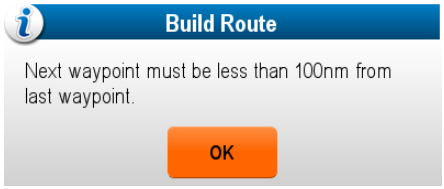
Problem	Possible causes	Possible solutions
"No Fix" GNSS status icon is displayed.	Geographic location or prevailing conditions preventing satellite fix.	Check periodically to see if a fix is obtained in better conditions or another geographic location.
	GNSS connection fault.	Ensure that external GNSS connections and cabling are correct and fault free.
	External GNSS receiver in poor location. For example: • Below decks. • Close proximity to transmitting equipment such as VHF radio.	Ensure GNSS receiver has a clear view of the sky.
	GNSS installation problem.	Refer to the installation instructions.

Note: A GNSS Status screen is accessible from the display. This provides satellite signal strength and other relevant information.

28.5 Troubleshooting automatic route generation

The information below details the warnings that can be displayed when using automatic route generation, a description of what the warning means and actions to be taken to correct the issue.

Example warning message	Description	Resolution
	Route generation completed successfully	The Route maybe followed AFTER it has been reviewed to ensure that the generated route is safe for your vessel to follow.
	Route generation completed successfully, however the route passes close to areas where extra caution is advised (e.g. a charted buoy). The caution areas will be between waypoints that have been assigned caution symbol.	The route must be reviewed as follows: • Identify any waypoints using the caution symbol (these will be in sets of 2), check between the caution symbols to identify the reason for the caution. • If possible move the waypoint(s) to avoid the hazard. • Review all route legs and their waypoints to ensure appropriate before following the route.
	The start and or end point of the route does not meet the minimum safe values specified in the **Boat Details** settings. The start and end waypoints will be created and joined with a straight route leg, however there will be no automatically generated waypoints and the waypoint symbols will be changed to caution symbols.	Perform the following checks: • Check that the values specified in the **Boat Details** settings are correct. • Using the context menu check the **Chart Objects** menu at the exact location of the start and or end points to establish if the **Depth range** meets your **Minimum Safe Depth**. **Note:** – If no minimum value for depth is available at the desired location, a minimum depth of 0 feet is assumed. – Automatic route generation adds its own safety margin of 0.8 m or 20% of the specified Minimum Safe settings. which ever is greater. • Check for any other hazards that would prevent route generation.
	There is insufficient data available on the cartography to generate the route, The start and end waypoints will be created, however there will be no automatically generated waypoints and the waypoint symbols will be changed to caution symbols.	• Insert compatible cartography • Update existing cartography **Note:** There may be certain areas where sufficient details are not yet available even on the latest cartography.

Example warning message	Description	Resolution
	The start and end point of the desired route are further than 100 nm apart.	Create smaller route legs. e.g. instead of trying to create a route from point A to point B, create a route from point A to point B to point C to point D, this will enable a route longer than 100 nm to be created for each route leg.
	A safe route could not be generated The first waypoint will be placed but the end waypoint will not.	Check the chart area along the expected route to identify areas which cannot be navigated through due to obstacles or land mass.

28.6 Sonar troubleshooting

Problems with the sonar and their possible causes and solutions are described here.

Scrolling image is not being displayed

Possible causes	Possible solutions
Sonar disabled	Select **Ping Enable** from the Sonar app's Sounder menu.
Incorrect transducer selected	Check that the correct transducer is selected in the Sonar app's Transducer menu.
Damaged cables	1. Check that the transducer cable connector is fully inserted and locked in position. 2. Check the power supply cable and connectors for signs of damage or corrosion, replace if necessary. 3. With the unit turned on, try flexing the cable near to the display connector to see if this causes the unit to re-boot/loose power, replace if necessary. 4. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion, replace if necessary. 5. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc (this can cause the Sonar applications to stop scrolling or the unit to reset/turn off), replace if necessary.
Damaged or fouled transducer	Check the condition of the transducer ensuring it is not damaged and is free from debris/fouling, clean or replace as necessary.
Wrong transducer fitted	Ensure the transducer is compatible with your system.
External sonar module: SeaTalkhs™ / RayNet network problem.	• Check that the unit is correctly connected to the multifunction display or Raymarine network switch. If a crossover coupler or other coupler cable / adapter is used, check all connections ensuring connections are secure, clean and free from corrosion, replace if necessary.
External sonar module: Software mismatch between equipment may prevent communication.	Ensure all Raymarine products contain the latest available software, check the Raymarine website for software compatibility.

No depth reading / lost bottom lock

Possible causes	Possible solutions
Transducer location	Check that the transducer has been installed in accordance with the instructions provided with the transducer.
Transducer angle	If the transducer angle is too great the beam can miss the bottom, adjust transducer angle and recheck.
Transducer kicked-up	If the transducer has a kick-up mechanism, check that it has not kicked up due to hitting an object.
Power source insufficient	With the product under load, using a multi-meter, check the power supply voltage as close to the unit as possible to establish actual voltage when the current is flowing. (Check your product's Technical specification for power supply requirements.)
Damaged or fouled transducer	Check the condition of the transducer ensuring it is not damaged and is free from debris / fouling.

Possible causes	Possible solutions
Damaged cables	1. Check the unit's connector for broken or bent pins. 2. Check that the cable connector is fully inserted into the unit and that the locking collar is in the locked position. 3. Check the cable and connectors for signs of damage or corrosion, replace if necessary. 4. With the unit turned on, try flexing the power cable near to the display connector to see if this causes the unit to re-boot/loose power, replace if necessary. 5. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion, replace if necessary. 6. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc (this can cause the Sonar applications to stop scrolling or the unit to reset/turn off), replace if necessary.
Vessel speed too high	Slow vessel speed and recheck.
Bottom too shallow or too deep	The bottom depth may be outside of the transducers depth range, move vessel to shallower or deeper waters as relevant and recheck.

Poor / problematic image

Possible causes	Possible solutions
Vessel stationary	Fish arches are not displayed if the vessel is stationary; fish will appear on the display as straight lines.
Scrolling paused or speed set too low	Unpause or increase sonar scrolling speed.
Sensitivity settings may be inappropriate for present conditions.	Check and adjust sensitivity settings or perform a Sonar reset.
Damaged cables	1. Check the unit's connector for broken or bent pins. 2. Check that the cable connector is fully inserted into the unit and that the locking collar is in the locked position. 3. Check the cable and connectors for signs of damage or corrosion, replace if necessary. 4. With the unit turned on, try flexing the power cable near to the display connector to see if this causes the unit to re-boot/loose power, replace if necessary. 5. Check the vessel's battery voltage, the condition of the battery terminals and power supply cables, ensuring connections are secure, clean and free from corrosion, replace if necessary. 6. With the product under load, using a multi-meter, check for high voltage drop across all connectors/fuses etc (this can cause the Sonar applications to stop scrolling or the unit to reset/turn off), replace if necessary.
Transducer location	• Check that the transducer has been installed in accordance with the instructions provided with the transducer. • If a transom mount transducer is mounted too high on the transom it may be lifting out of the water, check that the transducer face is fully submerged when planing and turning.
Transducer kicked-up	If the transducer has a kick-up mechanism, check that it has not kicked up due to hitting an object.
Damaged or fouled transducer	Check the condition of the transducer ensuring it is not damaged and is free from debris / fouling.
Damaged transducer cable	Check that the transducer cable and connection is free from damage and that the connections are secure and free from corrosion.
Turbulence around the transducer at higher speeds may affect transducer performance	Slow vessel speed and recheck.

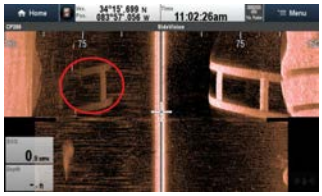
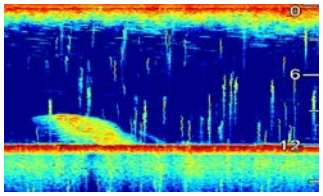
Possible causes	Possible solutions
Interference from another transducer	1. Turn off the transducer causing the interference. 2. Reposition the transducers so they are further apart.
Unit power supply fault	Check the voltage from the power supply, if this is too low it can affect the transmitting power of the unit.

28.7 Sonar crosstalk interference

There are 2 types of potential sonar crosstalk interference in a Raymarine sonar system:

1. **SideVision** sonar crosstalk interference
2. Multiple sonar crosstalk interference

The types of crosstalk interference that you may experience in your system depend on the combination and type of sonar equipment installed, and the way in which the equipment has been installed.

SideVision sonar crosstalk interference	Multiple sonar crosstalk interference
	
Due to the high sensitivity of **SideVision** transducers, you may experience some minor crosstalk interference between the left and right receiving channels in areas of strong target returns. Examples of strong target returns include solid objects such as underwater bridge structure. This interference shows up in the Sonar application as subtle reflections from the right sonar image displayed in the left sonar image, or vice versa.	When using multiple sonar modules and transducers operating in overlapping frequency ranges, you may experience some crosstalk interference between the ranges. This interference is displayed in the Sonar application as vertical "rain drops" throughout the water column. These vertical "rain drops" indicate that 2 sonar modules are operating in close frequency proximity to one another.

SideVision sonar crosstalk interference

Crosstalk interference is expected behavior in a high sensitivity device such as a **SideVision** transducer, and is not indicative of a fault with your transducer or sonar module.

Reducing multiple sonar crosstalk interference

Crosstalk interference in systems with multiple sonar modules and transducers is the result of a number of factors, including installation, operation, and environment.

- **Choose an equipment combination that minimizes overlapping frequencies.** Wherever possible, choose to use sonar modules and transducers that operate in different frequency ranges ("Channels"), for example CP100 and CP300 sonar modules and CPT-100 and B744V transducers. This will help to ensure that each component is operating in a distinct relative frequency range – for example, a "high" frequency range for the CP100 and a "low" frequency range for the CP300.
- **Only use the sonar channels that you really need.** Although it is possible to run multiple sonar modules simultaneously in a Raymarine system, it may not always be necessary to do so. If you are in a scenario that requires only one sonar module to be active at a time, disable any other sonar modules by changing the Sonar application pane to a single one which only displays the output from one sonar module. Alternatively, disable the ping for any unused sonar modules by selecting **MENU > Channel > Ping > OFF** in the Sonar application.
- **Identify the sonar module and transducer that is causing the interference.** To do this, disable the ping or remove the power for one of the sonar modules in your system. If the interference in the Sonar application disappears immediately, you now know which device is causing the interference. If the interference doesn't disappear, repeat the exercise again with the other sonar module(s) in your system, one at a time. Once you know which device is causing the interference, proceed with the following methods to reduce the interference from the relevant device.
- **Adjust the Interference Rejection Filter.** The default setting for all Raymarine MFDs is "Auto". Changing this setting to "High" might help to reduce interference (**MENU > Setup > Sounder Setup > Interference Rejection**). Note that the Interference Rejection Filter setting is not available for all sonar modules.
- **Decrease the power output of the interfering transducer.** Adjusting the "Power Mode" in the Sensitivity Settings in the Sonar application can help to minimize the presence of crosstalk interference (**MENU > Sensitivity Settings > Power Mode**). Note that the Power Mode setting is not available for all transducers.
- **Ensure that you have a common RF ground point for all electrical equipment on your vessel.** On vessels without an RF ground system, ensure all product drain wires (where available) are connected directly to the negative battery terminal. Ineffective RF grounding can cause electrical interference which may in turn result in sonar crosstalk interference.
- **Increase the physical distance between your sonar modules.** Electrical interference may be occurring between a cable on one sonar module, and a cable on a different sonar module. Ensure that your sonar modules are physically located as far away from each other as possible.
- **Increase the physical distance between your sonar transducers.** Electrical and / or acoustic interference may be occurring between the different transducers in your system. Ensure that your transducers are physically located as far away from each other as possible.

Note: Given the effort and potential difficulties involved in relocating sonar equipment, it should only be considered as a last resort when you judge the interference to be a significant problem which cannot be resolved using the methods described above.

Note: Due to physical size and other constraints that vary from vessel to vessel, it may not be possible to completely eliminate crosstalk interference from your system. However, this will not impede your ability to benefit from the full capabilities of your sonar system. Being able to easily identify the way in which interference is displayed in the Sonar application can sometimes be the best and easiest route to dealing with it.

28.8 Thermal camera troubleshooting

Problems with the thermal camera and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Video not displayed.	Camera is in Standby mode.	The camera will not display video if it is in Standby mode. Use the camera controls (either the thermal camera application or JCU) to “wake” the camera from standby.
	Problem with the thermal camera video connections.	• Check thermal camera video cables are sound and properly connected. • Ensure that the video is connected into video input 1 at the multifunction display or GVM. • Ensure that the correct video input is selected at the display.
	Problem with power supply to the camera or JCU (if used as the primary controller)	• Check the power connections to the camera and JCU / PoE injector (if used). • Ensure that the power switch / breaker is on. • Check the fuse / breaker state.
Cannot control thermal camera from Raymarine display or keyboard.	Thermal camera application is not running.	Ensure the thermal camera application is running on the multifunction display (as oppose to the video application which does not have camera controls).
Erratic or unresponsive controls.	Network problem.	Check that the controller and thermal camera are correctly connected to the network. (Note: This may be a direct connection or via a Raymarine network switch.)
		Check the status of the Raymarine network switch.
		Check that SeaTalk^{hs} / RayNet cables are free from damage.
	Control conflict, e.g. caused by multiple users at different stations.	Ensure that no other controllers are in use at the same time.
	Problem with the controller.	Check power / network cabling to the controller and PoE injector (PoE only used with optional Joystick Control Unit).
		Check other controllers if available. If other controllers are operating this will eliminate the possibility of a more fundamental camera fault.
Cannot switch between thermal and visible (VIS / IR) video image .	Camera is not a dual payload model.	Only “dual payload” (dual lens) thermal cameras support VIS / IR switching.
	VIS / IR cable not connected.	Ensure that the VIS / IR cable is connected from the camera to the Raymarine system. (The IR-only cable does not support switching).
Noisy image.	Poor quality or faulty video cable.	Ensure that the video cable is no longer than necessary. The longer the cable is (or the smaller the wire gauge / thickness), the more severe the losses become. Use only high quality shielded cable suitable for a marine environment.
	Cable is picking up electromagnetic interference (EMI) from another device.	• Ensure you are using a high quality shielded cable. • Ensure proper cable separation, for example do not run data and power cables in close proximity with each other.

Problem	Possible causes	Possible solutions
Image too dark or too light.	Display brightness is set too low.	Use the brightness controls at the display to adjust accordingly.
	The contrast or brightness settings in the thermal camera application are set too low.	Use the appropriate menu in the thermal camera application to adjust the contrast and brightness of the image.
	The Scene Mode is not appropriate for the current conditions.	A particular environment may benefit from a different Scene Mode setting. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate. Use the **SCENE** button.
Image freezes momentarily.	FFC (Flat Field Correction).	The image will pause momentarily on a periodic basis during the Flat Field Correction (FFC) cycle. Just prior to the FFC, a small green square will appear in the upper left corner of the screen.
Image is inverted (upside down).	Camera “Ball down” setting is incorrect.	Ensure that the Ball down setting within the thermal camera system setup menu is set correctly.

28.9 System data troubleshooting

Aspects of the installation can cause problems with the data shared between connected equipment. Such problems, their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Instrument, engine or other system data is unavailable at all displays.	Data is not being received at the display.	Check the data bus (e.g. **SeaTalk^{ng}**) wiring and connections.
		Check the overall integrity of the data bus (e.g. **SeaTalk^{ng}**) wiring.
		If available refer to the reference guide for the data bus (e.g. **SeaTalk^{ng}** reference manual).
	Data source (e.g. instrument display or engine interface) is not operating.	Check the source of the missing data (e.g. instrument display or engine interface).
		Check the power to the **SeaTalk** bus.
		Refer to the manufacturer's handbook for the equipment in question.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Instrument or other system data is missing from some but not all displays.	Network problem.	Check that all required equipment is connected to the network.
		Check the status of the Raymarine network Switch.
		Check that **SeaTalk^{hs}** / **RayNet** cables are free from damage.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Position data is not displayed on VHF radio	VHF radio **NMEA 0183** input not isolated / incorrect polarity	• Check that the radio has an Isolated **NMEA 0183** input. • Check polarity of **NMEA 0183** wires.

28.10 Video troubleshooting

Problems with the video inputs and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No signal message on screen (video image not displayed)	Cable or connection fault	Check that the connections are sound and free from corrosion.

28.11 Wi-Fi troubleshooting

Before troubleshooting problems with your Wi-Fi connection, ensure that you have followed the Wi-Fi location requirements guidance provided in the relevant installation instructions and performed a power cycle/reboot of the devices you are experiencing problems with.

Cannot find network

Possible cause	Possible solutions
Wi-Fi not currently enabled on devices.	Ensure Wi-Fi is enabled on both Wi-Fi devices and rescan available networks.
Some devices may automatically turn off Wi-Fi when not in use to save power.	Power cycle / reboot devices and rescan available networks.
Device not broadcasting.	1. Try to enable broadcasting of the device's network using the Wi-Fi settings on the device you are trying to connect to. 2. You may still be able to connect to the device, when it is not broadcasting, by manually entering the device's Wi-Fi Name / SSID and passphrase in the connection settings of the device you are trying to connect.
Devices out of range or signal being blocked.	Move devices closer together or, if possible remove the obstructions and then rescan available network.

Cannot connect to network

Possible cause	Possible solutions
Some devices may automatically turn off Wi-Fi when not in use to save power.	Power cycle/reboot devices and retry the connection.
Trying to connect to the wrong Wi-Fi network	Ensure you are trying to connect to the correct Wi-Fi network, the Wi-Fi network's name can be found in the Wi-Fi settings on the broadcasting device (the device that you are trying to connect to).
Incorrect network credentials	Ensure you are using the correct passphrase, the Wi-Fi network's passphrase can be found in the Wi-Fi settings on the broadcasting device (the device that you are trying to connect to).
Bulkheads, decks and other heavy structure can degrade and even block the Wi-Fi signal. Depending on the thickness and material used it may not always be possible to pass a Wi-Fi signal through certain structures	1. Try repositioning the devices so the structure is removed from the direct line of sight between the devices, or 2. If possible use a wired connection instead.
Interference being caused by other Wi-Fi enabled or older Bluetooth enabled devices (Bluetooth and Wi-Fi both operate in the 2.4 GHz frequency range, some older bluetooth devices may interfere with Wi-Fi signals.)	1. Change the Wi-Fi Channel of the device you are trying to connect to and retry the connection. You can use free Wi-Fi analyzer apps on your smart device to help you choose a better channel (channel with least traffic). 2. Temporarily disable each wireless device in turn until you have identified the device causing the interference.
Interference caused by other devices that use the 2.4GHz frequency See list below of some common devices that use the 2.4GHz frequency: • Microwave ovens • Fluorescent lighting • Cordless phones / baby monitors • Motion sensors	Temporarily switch off each device in turn until you have identified the device causing the interference, then remove or reposition the offending device(s).
Interference caused by electrical and electronic devices and associated cabling could generate an electromagnetic field which may interfere with the Wi-Fi signal.	Temporarily switch off each item in turn until you have identified the device causing the interference, then remove or reposition the offending device(s).

Connection extremely slow and or keeps dropping out

Possible cause	Possible solutions
Wi-Fi performance degrades over distance so products farther away will receive less network bandwidth. Products installed close to their maximum Wi-Fi range will experience slow connection speeds, signal drop outs or not being able to connect at all.	• Move devices closer together. • For fixed installations such as a Quantum Radar, enable the Wi-Fi connection on an MFD installed closer to the device.
Interference being caused by other Wi-Fi enabled or older Bluetooth enabled devices (Bluetooth and Wi-Fi both operate in the 2.4 GHz frequency range, some older bluetooth devices may interfere with Wi-Fi signals.)	1. Change the Wi-Fi Channel of the device you are trying to connect to and retry the connection. You can use free Wi-Fi analyzer apps on your smart device to help you choose a better channel (channel with least traffic). 2. Temporarily switch off each device in turn until you have identified the device causing the interference, then remove or reposition the offending device(s).
Interference from devices on other vessels. When in close proximity to other vessels, for example, when moored up in a marina, many other Wi-Fi signals may be present.	1. Change the Wi-Fi Channel of the device you are trying to connect to and retry the connection. You can use free Wi-Fi analyzer apps on your smart device to help you choose a better channel (channel with least traffic). 2. If possible, move your vessel to a location with less Wi-Fi traffic.

Network connection established but no data

Possible cause	Possible solutions
Connected to the wrong network.	Ensure that your devices is connected to the correct network.
Device software incompatibility	Ensure both devices are running the latest available software.
It may be possible that the device has become defective	1. Try updating software to a later version, or 2. try reinstalling the software. 3. Obtain new replacement device.

Mobile application running slowly or not at all

Possible cause	Possible solutions
Raymarine app not installed	Install mobile app from relevant app store.
Raymarine app version not compatible with MFD software	Ensure mobile app and MFD software are latest available versions.
Mobile apps not enabled on MFD	Enable “Viewing only” or “Remote Control” as required in the Mobile Apps setting on your MFD.

28.12 Bluetooth troubleshooting

Aspects of the installation can cause problems with the data shared between wireless devices. Such problems, their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No wireless connection.	Smart Device does not have a Bluetooth connection established with the multifunction display.	Ensure that Bluetooth is enabled on the MFD.
		Ensure that the “Bluetooth” option is enabled on the Smart Device (available from the phone's Settings / General menu).
		Ensure that the Bluetooth device is paired with the MFD that you want to use it with.
No media player control.	Media player device is not compatible with the Bluetooth 2.1+ EDR power class 1.5 (supported profile: AVRCP 1.0) or higher.	Check the Bluetooth compatibility with the device manufacturer. If the device is not Bluetooth 2.1+ EDR power class 1.5 (supported profile: AVRCP 1.0) compatible then it is not suitable for wireless use with the multifunction display.
	“Audio Control” is NOT enabled on the multifunction display.	Enable “Audio Control”.
Weak or intermittent Bluetooth signal.	Interference from other wireless devices in the vicinity.	Multiple wireless devices running simultaneously (such as laptops, phones, and other wireless devices) can sometimes cause wireless signal conflicts. Temporarily disable each wireless device in turn until you have identified the device causing the interference.

28.13 Touchscreen troubleshooting

Problems with the touchscreen and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Touchscreen does not operate as expected.	Touch lock is enabled.	Use the Joystick to turn off the touch lock on the home screen.
	Screen is not being operated with bare fingers, for example gloves are being worn.	Bare fingers must make contact with the screen for correct operation. Alternatively you may use conductive gloves.
	Touchscreen requires calibration.	Use the setup menus to calibrate the touchscreen.
	Saltwater deposits on the screen.	Carefully clean and dry the screen in accordance with the instructions provided.

28.14 Touchscreen alignment

If the touchscreen is misaligned to your touch, you can realign it to improve the accuracy.

Realignment involves a simple exercise to align an on-screen object with your touch. For best results, perform this exercise when your vessel is anchored or moored.

Note: This only applies to touchscreen multifunction displays.

Aligning the touchscreen

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Touchscreen Alignment**.
4. Place your finger over the on-screen object momentarily, then remove it.
5. Repeat the action a further 3 times.
6. If the operation was successful, an “Alignment Completed” message is displayed.
7. Select **Exit** to return to the Maintenance menu.
8. If the operation was unsuccessful at any point during the alignment exercise, an “Incorrect touch detected" message is displayed, the alignment exercise is repeated.
9. After 2 failed alignment exercises you may be asked to perform a precision alignment exercise.

28.15 Miscellaneous troubleshooting

Miscellaneous problems and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Display behaves erratically: • Frequent unexpected resets. • System crashes or other erratic behavior.	Intermittent problem with power to the display.	Check relevant fuses and breakers.
		Check that the power supply cable is sound and that all connections are tight and free from corrosion.
		Check that the power source is of the correct voltage and sufficient current.
	Software mismatch on system (upgrade required).	Click on support for the latest software downloads.
	Corrupt data / other unknown issue.	Perform a factory reset. **Important:** This will result in the loss of any settings and data (such as waypoints) stored on the product. Save any important data to a memory card before resetting.

Chapter 29: Technical support

Chapter contents

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- 29.2 Learning resources on page 407
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29.1 Raymarine product support and servicing

Raymarine provides a comprehensive product support service, as well as warranty, service, and repairs. You can access these services through the Raymarine website, telephone, and e-mail.

Product information

If you need to request service or support, please have the following information to hand:

- Product name.
- Product identity.
- Serial number.
- Software application version.
- System diagrams.

You can obtain this product information using the menus within your product.

Servicing and warranty

Raymarine offers dedicated service departments for warranty, service, and repairs.

Viewing product information

With your MFD Homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Diagnostics**.
4. Select **Select Device**.
5. Select the relevant product from the list.

The Diagnostics page is displayed.

29.2 Learning resources

Raymarine has produced a range of learning resources to help you get the most out of your products.

Training courses

Raymarine regularly runs a range of in-depth training courses to help you make the most of your products. Visit the Training section of the Raymarine website for more information:

FAQs and Knowledge Base

Raymarine has produced an extensive set of FAQs and a Knowledge Base to help you find more information and troubleshoot any issues.

Technical support forum

You can use the Technical support forum to ask a technical question about a Raymarine product or to find out how other customers are using their Raymarine equipment. The resource is regularly updated with contributions from Raymarine customers and staff:

Appendix A Switch panel application

Vessel control and monitoring systems

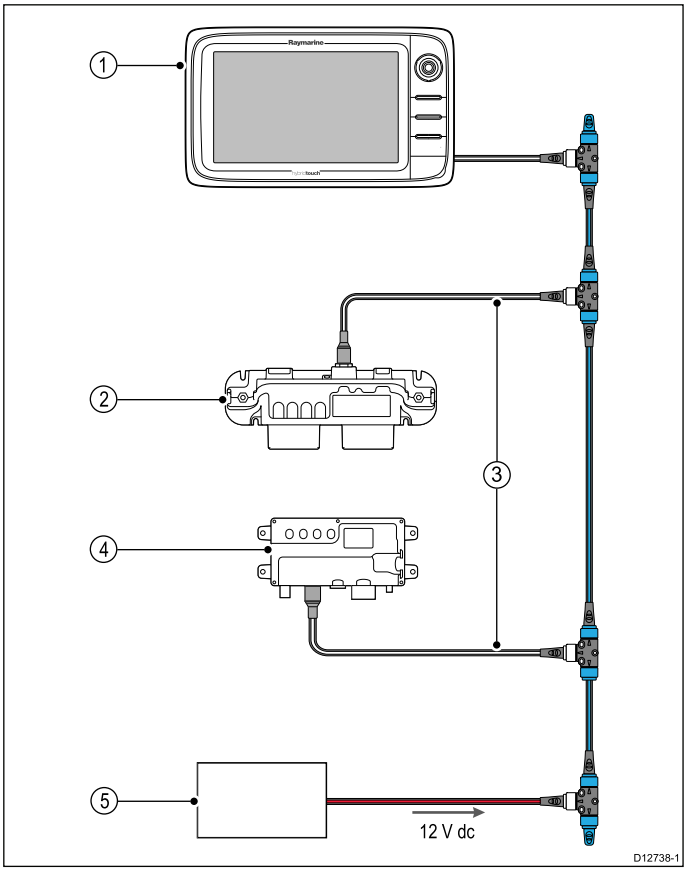
When integrated with a vessel control and monitoring system your multifunction display can provide monitoring and controls for your power circuits, breakers, switches and equipment.

The Switch Panel application can be used to:

- Show the status of power circuits, breakers, switches and other equipment.
- Apply power to each circuit individually.
- Reset tripped breakers.
- Control power to individual equipment.
- Alert users to a tripped circuit.

Vessel control and monitoring system connection

The multifunction display can connect to and control an EmpirBus NXT vessel control and monitoring system.



1	Raymarine multifunction display.
2	EmpirBus NXT DCM (dc module).
3	SeaTalkng to DeviceNet adaptor cable.
4	EmpirBus NXT MCU (Master control unit).
5	12 V dc supply into backbone.

Note: Ensure your vessel control and monitoring system has been installed in accordance with the instructions provided with the system.

Switch panel configuration

The switch panel application must be configured.

A Configuration file can be obtained from the system supplier.

Loading a configuration file

The switch panel application will only be available when a valid configuration file has been loaded.

1. Obtain the configuration file from the system supplier.
2. Save the configuration file to the root directory of your memory card.
3. Insert the memory card into the card reader on your multifunction display.
4. From the homescreen select **Set-up**.
5. Select **System Settings**.
6. Select **External Devices**.
7. Select **Switch Panel Set-up**.
8. Select **Install Config File**.
9. If prompted select the memory card slot that contains your configuration file.

   The file browser is opened.
10. Select the configuration file.
11. Select **OK**.

You can now add the Switch panel application from the Customize menu on the homescreen.

Note: If your multifunction display only has 1 card slot then step 9 is skipped.

Switch panel overview

The switch panel application is used to monitor and control compatible vessel control and monitoring systems. The pages and page layouts and vessel schematics are configured at installation and are unique for each vessel. The images below are examples.

Example 1 — Switch panel mode page



If configured a Mode page provides controls to switch between pre-configured modes.

In the example above selecting a mode icon will place the system into the selected mode.

You can cycle through available pages to monitor or control switches and configured groups of switches.

Example 2 — Vessel controls page



1	Toggle switch.
2	Rotary (multi-state) switch.
3	Position control switch.
4	Momentary switch.
5	Data item (dial gauge).
6	Data item (tank level).

Using the switches on a Touchscreen

	This only applies to HybridTouch displays.

From the switch panel application:

1. **Toggle switch** — Select the switch to switch on or off.
2. **Rotary control** — Selecting the rotary control will cycle through its available states.
3. **Position Control** — Select and hold on a direction to move.
4. **Momentary switch** — Select the switch to activate.
5. **Dimmer switch** — Select and then drag the control to adjust the value.

Using the switches

From the switch panel application:

1. Use the **Joystick** to highlight the relevant switch.
2. **Toggle switch** — Press **OK** to switch on or off.
3. **Rotary control** — Pressing **OK** will cycle through its available states.
4. **Position Control** — Press **OK** and use the **Joystick** to move direction.
5. **Momentary switch** — Press **OK** to activate.
6. **Dimmer switch** — Press **OK** on the switch and use the **Rotary Control** to adjust the value, then select **back** to exit adjust mode.

Resetting a tripped circuit

When a circuit is tripped a pop-up message will be displayed on-screen providing details of the tripped circuit and options, the circuit will also be identified as tripped in the switch panel pages.

1. With a tripped circuit pop-up message displayed select **Reset**. to reset the tripped circuit, or
2. Select the switch on a switch panel page to reset the tripped switch.

Note: Performing multiple resets risks causing damage to your system so if a trip persists check the main circuits.

Appendix B NMEA 0183 sentences

The display supports the following NMEA 0183 sentences. These are applicable to NMEA 0183 and SeaTalk protocols.

Sentence	Description	Transmit	Receive
AAM	Waypoint arrival alarm sentence		●
APB	Autopilot sentence 'B'	●	●
BWC	Bearing and distance to waypoint	●	●
BWR	Bearing and distance to waypoint — Rhumb	●	●
DBT	Depth below transducer	●	●
DPT	Depth	●	●
DSC	Digital selective calling information sentence		●
DSE	Distress sentence expansion		●
DTM	Datum reference sentence		●
GBS	GPS satellite fault detection data sentence		●
GGA	GPS System fix data	●	●
GLC	Geographic position loran C sentence		●
GLL	Geographic position latitude longitude	●	●
GSA	GPS DOP and active satellites	●	●
GSV	GPS satellites in view	●	●
HDG	Heading deviation and variation sentence		●
HDT	Heading true sentence		●
HDM	Heading magnetic sentence		●
MDA	Meteorological composite sentence		●
MSK	MSK receiver interface sentence		●
MSS	MSK receiver signal status sentence		●
MTW	Water temperature	●	●
MWV	Wind speed and angle	●	●
RMB	Recommended minimum navigation information	●	●
RMC	Recommended minimum specific GNSS data	●	●
RSD	Radar system data	●	●
TTM	Tracked target message	●	●
VDM	AIS VHF data link message		●
VDO	AIS VHF data link own vessel report		●
VHW	Water speed and heading	●	●
VLW	Distance travelled through the water	●	●
VTG	Course over ground and ground speed	●	●
XTE	Cross track error measured sentence		●
ZDA	Time and date	●	●

Appendix C NMEA data bridging

NMEA data bridging allows data that exists on the display's NMEA 2000 bus to be repeated to NMEA 0183 devices, and vice versa.

An example of NMEA data bridging is in a system that includes a third-party GPS receiver connected to the NMEA 0183 Input of a Raymarine display. The GPS data messages transmitted by the GPS receiver are repeated to any appropriate devices connected to the display's NMEA 2000 bus. Bridging only occurs when the data is being transmitted by an NMEA 0183 device that is not already being transmitted by a NMEA 2000 device, and vice versa.

For a list of data messages (PGN sentences) that are bridged between NMEA 2000 and NMEA 0183, refer to the list of supported NMEA 2000 sentences provided in this document.

Appendix D NMEA 2000 sentences

The display supports the following NMEA 2000 sentences. These are applicable to NMEA 2000, SeaTalkng and SeaTalk 2 protocols.

Message number	Message description	Transmit	Receive	Bridged to NMEA 0183
59392	ISO Acknowledgment	●	●	
59904	ISO Request	●	●	
60928	ISO Address Claim	●	●	
126208	NMEA - Request group function	●	●	
126464	PGN List – Receive / Transmit PGN's Group function	●	●	
126983	Alert		●	
126984	Alert Response	●		
126985	Alert Text		●	
126986	Alert Configuration		●	
126992	System time	●	●	
126993	Heartbeat	●	●	
126996	Product information	●	●	
126998	Configuration information		●	
127237	Heading / Track Control		●	
127245	Rudder		●	
127250	Vessel heading	●	●	●
127251	Rate of Turn	●	●	
127257	Attitude	●	●	
127258	Magnetic Variation	●		
127488	Engine parameters, rapid update		●	
127489	Engine parameters, dynamic		●	
127493	Transmission parameters, dynamic		●	
127496	Trip parameters, Vessel		●	
127497	Trip parameters, Engine		●	
127498	Engine parameters, static		●	
127503	AC Input status		●	
127504	AC Output status		●	
127505	Fluid level		●	
127506	DC Detailed status		●	
127507	Charger status		●	
127508	Battery status		●	
127509	Inverter status		●	
128259	Speed (water referenced)	●	●	●
128267	Water depth	●	●	●
128275	Distance log	●	●	●
129025	Position, rapid update	●	●	●
129026	COG and SOG, rapid update	●	●	●
129029	GNSS position data	●	●	●

Message number	Message description	Transmit	Receive	Bridged to NMEA 0183
129033	Time and date	●	●	●
129038	AIS Class A position report		●	
129039	AIS Class B position report		●	
129040	AIS Class B extended position report		●	
129041	AIS Aids to Navigation (AToN) report		●	
129044	Datum	●	●	●
129283	Cross track error	●	●	●
129284	Navigation data	●	●	●
129285	Navigation — Route WP Information	●		
129291	Set and drift, rapid update	●	●	●
129301	Time to or from mark		●	
129539	GNSS DOPs		●	
129540	GNSS Sats in view	●	●	
129542	GNSS pseudorange noise statistics	●	●	
129545	GNSS RAIM output		●	
129550	GNSS differential correction receiver interface		●	
129551	GNSS differential correction receiver signal		●	
129793	AIS UTC and date report		●	
129794	AIS Class A static and voyage related data		●	
129798	AIS SAR aircraft position report		●	
129801	AIS Addressed safety related message		●	
129802	AIS Safety related broadcast message		●	
129808	DSC call information		●	
129809	AIS class B “CS” static data report, part A		●	
129810	AIS class B “CS” static data report, part B		●	
130306	Wind data	●	●	●
130310	Environmental parameters	●	●	●
130311	Environmental parameters		●	●
130312	Temperature		●	
130313	Humidity		●	
130314	Actual pressure		●	
130569	Entertainment – Current file status		●	
130570	Entertainment – Library data file		●	
130571	Entertainment – Library data group		●	
130572	Entertainment – Library data search		●	
130573	Entertainment – Supported source data		●	
130574	Entertainment – Supported zone data		●	
130576	Small craft status		●	
130577	Direction data	●	●	●
130578	Vessel speed components		●	

PGN 127489 - Support engine alarms

The following engine alarms are supported.

Engine Error
Check Engine
Over Temperature
Low Oil Pressure
Low Oil Level
Low Fuel Pressure
Low System Voltage
Low Coolant Level
Water Flow
Water in Fuel
Charge Indicator
High Boost Pressure
Rev Limit Exceeded
EGR System
Throttle Position Sensor
Engine Emergency Stop Mode
Warning Level 1
Warning Level 2
Power Reduction
Maintenance Needed
Engine Comm Error
Sub or Secondary Throttle
Neutral Start Protect
Engine Shutting Down
unknown error

Digital Switching NMEA 2000 sentences

The PGNs listed below are only displayed in the MFD's Switch Panel (Digital Switching) application and in most cases requires the connection of compatible third-party Digital Switching equipment. If you are interested in a Digital Switching solution please contact your local Raymarine dealer.

Message number	Message description	Transmit	Receive	Bridged to NMEA 0183
127503	AC Input status		●	
127504	AC Output status		●	
127507	Charger Status		●	
127509	Inverter status		●	

Appendix E Software releases

Raymarine regularly updates its multifunction display software to introduce improvements, additional hardware support and user interface features. The table below details some of the important enhancements and which software revision they were introduced with.

Software version	Applicable product manual	Multifunction displays compatibility	Changes
LightHouse II — V19.03	81360–5	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / eS75 / eS77 / eS78 / eS97 / eS98 / eS127 / eS128 / gS95 / gS125 / gS165 / gS195	• Added support for M100/M200 cameras • Added support for long-hold touch with Digital Switching System switches • Improved Navionics Dock-to-Dock and SonarChart Live behavior
LightHouse II — V17.xx	81360–4	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / eS75 / eS77 / eS78 / eS97 / eS98 / eS127 / eS128 / gS95 / gS125 / gS165 / gS195	• New NMEA 2000 Audio app • New GRIB (Gridded Information in Binary) file Viewer • Added ability to place waypoints when viewing SideVision™ channels. • New feature to lock the Homescreen icons, Databar and Data application configuration. • Changed Default chart selection • Navionics advanced chart features support: – Shallow Water – SonarChart™ Density – SonarChart™ Live – Tide Correction – Fishing Range • Added C-MAP Active captain support • Navionics Dock-to-dock support • Added further NMEA 2000 PGN support. • Improved Fusion Link app features • Sonar improvements for bait school lock up and bottom tracking • Added ability to create splitscreen Switch Panel application pages
LightHouse II — V16.47	81360–3	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / eS75 / eS77 / eS78 / eS97 / eS98 / eS127 / eS128 / gS95 / gS125 / gS165 / gS195	• New Search Pattern feature • Added support for Quantum Radar • Improved Data master selection process • Improved track creation behavior • Added support for using the Rotary to input waypoint lat/lon • Added support in Sonar application to select single element B75/B175 transducers • Added support in Sonar application for CP470/CP570 speed/temp transducers

Software version	Applicable product manual	Multifunction displays compatibility	Changes
			• Race features collected under new ‘Racing’ Menu in Chart application. • Vector set-up options moved to Collision Awareness menu
LightHouse II — V15.61	81360–2	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / eS75 / eS78 / eS98 / eS128 / gS95 / gS125 / gS165 / gS195	• New Collision Avoidance and target interception feature • Added ability to change AIS target’s motion mode independently of the Chart / Radar application’s motion mode • New combined Tracked targets list for AIS and MARPA • Added new Dangerous targets set-up page • Added new Guard zone set-up page • Removed Safe zone ring from Chart and Radar applications • New AIS target vessel type symbols • MFD Access point / mobile hotspot support • Checking online for software updates • Added support for Indonesian and Thai User Interface languages • Added AX8 specific options to Camera application • Usability improvements: – AIS Safety message option moved to external devices and alarms manager – AIS Alarms log moved to Maintenance menu – Wi-Fi and Bluetooth options split into separate sub-menus. – AIS menu options moved to top level menu. – Radar power on/off option removed from Menu. – Adjust Preset menu renamed Sensitivity settings. – Rain option moved to New Sensitivity menu. – Radar ‘Wakes’ have been renamed ‘Trails’. – ‘Target options’ menu renamed ‘Vector Set-up’ – ‘Preset Modes’ menu renamed ‘Modes’. – Radar overlay and Transparency split into separate controls. – Chart Sync option moved to Motion menu.

Software version	Applicable product manual	Multifunction displays compatibility	Changes
LightHouse II — V14.36	81360–1	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / eS75 / eS78 / eS98 / eS128 / gS95 / gS125 / gS165 / gS195	• Added Race Sailing features: – Laylines – Building routes using Racemark IDs – Added ability to assign rounding instructions to waypoints – Added rounding instructions to pre-defined waypoint symbols – Race Startline – Race Timer – Ability to import Polar tables • Added support for **C-Map Easy Routing** • Added new **Minimum Safe Beam** and **Minimum Safe Height** system settings to enable implementation of Easy Routing. • Added support for Malay (Bahasa) User Interface language. • Expanded Fusion support: – Add support for connection of compatible Fusion entertainment systems over **NMEA 2000**. – Added ability to power Fusion units on and off from within the Fusion link application. – Added support for Bluetooth devices connected to the Fusion unit. – Added Tuner Region selection for AM/FM radios • When connected to a **CPx70** series sonar module the Color Gain sensitivity setting has been renamed Intensity and has also been added as an onscreen control. • Support has been added for the Dual-channel **CP570** sonar module • The Depth Sensitivity setting has been renamed Surface filter
LightHouse II — V13.37	81337–13 81344–7	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165 / gS195	• Added new system wide software update process • Added support for C-MAP cartography. • Added new Chart Touch Call-outs to Chart application • Added feature to allow you to change your desired destination during active navigation. • Improved Depth contour naming in the Chart application. • Added support for CPx70 series **ClearPulse™** sonar modules, including new controls for – Auto gain offset – Auto color gain offset – Depth sensitivity

Software version	Applicable product manual	Multifunction displays compatibility	Changes
			• Added Wind Angle and Wind Speed damping settings to the Data application. • Added feature to RayControl and RayRemote apps that allow a thermal camera to align to the mobile device's heading. • Added support for Traditional Chinese and Hungarian user interface languages. • Added support for Vessel name to be displayed in AIS target context menu. • Sirius XM NOAA Marine Zone Update for 1 December 2014 • Improved Data application menu structure (added Customize and Data-Setup menus).
LightHouse II — V12.26	81337–12 81344–6	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165 / gS195	• Added support for up to 2 radar scanners on the same network. • Added support for displaying up to 4 camera feeds using Quad View. • Added support in the Radar application for extreme latitudes up to 82 degrees north. • Added 'Battery Charge' data item and changed 'RPM & Speed' data item to 'RPM & SOG' in the Data application. • Increased support for number of batteries to 16.
LightHouse II — V11.26	81337–11 81344–5	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165 / gS195	• Added support for the **CP200 SideVision™** sonar module. • New Alarm Manager with new NMEA 2000 alarm support (providing alarm history, a list of active alarms and ability to change alarm settings all from the alarm manager). • Added **Autorouting** feature to assist when route building with compatible **Navionics®** cartography. • Display preferences now shared with display products over **SeaTalk^{ng}**. • Added ability to display Radar overlay using stable COG when Heading is not available. • When acknowledged, the Limitations of Use screen now dismisses globally on all networked MFDs. • Added support for Hebrew User Interface language. • Added ability to switch off the Waypoint arrival alarm. • Added **Minimum Safe Depth** setting under **Boat Details** and included in the Start-up wizard.

Software version	Applicable product manual	Multifunction displays compatibility	Changes
LightHouse II — V10.41	81337–10 81344–4	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / a95 / a97 / a98 / a125 / a127 / a128 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165 / gS195	• Support for the GPS/GLONASS function for the built-in module and the external GA150 GPS/GLONASS antenna accessory for the new a Series a9x & a12x display products. • Increase of the internal GPS refresh to 5 Hz for the existing a, c & e Series Multifunction display products. • Add Multifunction display network compatibility with v3.xx software of CP300 & CP450C sounder modules • Support for the HD-SDI Video Input & 4:3 aspect ratio on the new **gS Series** gS195 display product.
LightHouse II — V10.34	81337–10 81344–3	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165	**New Sonar application** • Support for multiple active sonar modules on the network • Ability to display multiple sonar channels simultaneously using splitscreen pages • Ability to create custom sonar channel profiles • New sonar module specific Sonar simulator • Corrected (reversed) TVG control on CP450C to match all sonar modules • Switch panel alarms can now be enabled/disabled globally across the network • Added horizontal splitscreen template for 5.7 and 7 inch MFDs • Added support for Navionics Sonar Log depth recording • Added support for Navionics Plotter Sync mobile chart updates • Updated SiriusXM NOAA Marine Zone Boundaries updates for April 1st 2014 • AIS dangerous target alarm defaults to Off in Simulator mode and cannot be enabled. • Added additional language support for Czech and Slovenian
LightHouse II — V9.45	81337–9 81344–2	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165	• LightHouse II Graphics refresh • Added hide databar option • Added support for LightHouse charts • Waypoint management improvements • Chart and Radar application menu improvements • Added support for multiple sonars • Added estimated time of arrival for Routes • Added NM & m to distance units • Added digital widget to Switch panel app • Added support for DSC over NMEA 2000

Software version	Applicable product manual	Multifunction displays compatibility	Changes
			• Added support for Navionics Gold chip encryption • Updated Japanese limitations of use statement • Added support for multi-touch gesture on a Series displays
V8.52	81337–9 81344–2	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi a68 / a68 Wi-Fi / a75 / a75 Wi-Fi / a77 / a77 Wi-Fi / a78 / a78 Wi-Fi / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165	• Added support for ECI-100 (Engine Identification Wizard)
V7.43	81337–7 81344–1	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165 / gS95 / gS125 / gS165	• Added support for gS Series. • Added User manual shortcut to Homescreen. • Added IP camera record, playback and image capture to Camera application. • Added support for Evolution autopilots • Added Pilot bar. • Added support for T200 Series fixed mount thermal cameras. • Added support for CP100 and CP300 sonar modules. • Added additional data types to data application. • Improved dial graphics in Data application. • Improved menu layouts in Chart and Radar applications. • Added support for RMK-9 remote keypad. • Added feature to allow simultaneous software update of networked displays and keypads. • Improved engine support for fuel manager. • Add feature to allow choice of startup page. • Moved Cartography menu to Homescreen Setup menu. • Removed compatibility mode (for E-Wide and G Series compatibility). • Added Pilot Standby function to power button for displays that do not have a pilot button.
V6.27	81337–6	a65 / a65 Wi-Fi / a67 / a67 Wi-Fi / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165	• Addition of Sirius audio application. • Addition of Fusion link application. • Addition of Switch panel application. • New homescreen application icons • Changed Chart navigation to include vessel position to target WPT and original position to target WPT lines. • Added Icelandic and Bulgarian language support.

Software version	Applicable product manual	Multifunction displays compatibility	Changes
V5.27	81337–5	a65 / a67 / c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127 / e165	• Addition of Fuel Manager including: Estimated fuel remaining, distance to empty and time to empty calculations, fuel used and fuel economy data, fuel range rings in the Chart application and low fuel alarm). • Addition of Document (pdf) Viewer application. • Addition of Slew to Cue (Auto slew thermal camera to AIS, MARPA or MOB targets). • Support for multiple thermal camera JCUs. • Thermal cameras OSD menu options now available directly from Thermal Camera application's menu. • Video application now called Camera application. • Support for networked IP cameras in the Camera application. • Ability to automatically cycle through available video / camera feeds in the Camera application. • Support for up to 5 engines in the Data application. • Improved engine data selection in the Data application. • Support for detailed engine warning alarms. • Addition of on-screen range controls to the Weather application • Ability to view images saved to MicroSD card from the homescreen My Data menu. • Addition of Demo Video mode for retail. • Ability to record live bus messages (NMEA 0183 and SeaTalk^{ng} to MicroSD card.
V4.32	81337–4	c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127	• Addition of on-screen range controls to the Chart & Radar applications. • Addition of on-screen Gain, Rain & Sea controls to Radar application. • Addition of on-screen Gain & TVG controls to Sonar application. • Addition of slider bar control adjustment. • Addition of new numeric adjustment controls. • Improved Power Key shortcuts to Brightness and Capture Screen image options
V3.15	81337–3	c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127	• Added support for Raymarine CP450C CHIRP Sonar Module. • Added support for AIS feature support for STEDS EAIS integration & display of SAR aircraft & SART devices. • Added limited support for Sirius Marine Weather Module. • Added Standby / PowerSave Mode. • Added support for RayRemote and RayControl Applications.

Software version	Applicable product manual	Multifunction displays compatibility	Changes
			• Enhanced home screen customize option permitting 9 and 12 inch MFDs to view up to 4 applications on a single page. • Default Fuel data page added. • Added Arabic language support. • Inclusion of Remote Upgrade Utility to permit the upload of software to peripheral Raymarine products using SeaTalk^{ng} / SeaTalk^{hs}. • Display of Aids To Navigation (AToNs) AIS targets when data received on either SeaTalkng or NMEA 0183. • Added 1kW transducer support added to MFDs featuring internal ClearPulse Digital Sounder circuitry (i.e. c97/c127/e7D/e97/e127 MFDs) transducer output limited to 600W. • Corrected the ability to select Tide and/or Current Station using the Find Nearest feature. • Added NMEA 0183 & SeaTalkng data monitors to the diagnostics features. • Increased touch area for Alarm pop-ups and Back buttons.
V2.10	81337–1	c95 / c97 / c125 / c127 / e7 / e7D / e95 / e97 / e125 / e127	• Cartography redraw performance has been improved when sharing cartography via the SeaTalkhs/RayNet network. • Added support to display fuel flow rate. • Addition of NMEA 0183 and SeaTalk^{ng} data buffer diagnostics. • Improvements to databar customization. • Ability to manually change the aspect ratio of the Video application.
V1.11	81332–1	e7 / e7D	• Initial software release.

Appendix F Multifunction display compatibility

The table below identifies the MFD software version required to support the listed **Raymarine®** hardware.

CP450C	V3.15 — **LightHouse™**
Raymarine mobile applications	V3.15
1kW transducer support for sonar variant displays	V3.15
Multiple thermal camera JCU's	V5.27
Sirius weather receiver	V6.27
Fusion entertainment	V6.27
Digital Switching	V6.27
Evolution autopilots	V7.43
T200 fixed mount thermal cameras	V7.43
CP100	V7.43
CP300	V7.43
RMK-9 remote keypad	V7.43
ECI-100	V8.52
LightHouse™ Charts	V9.45 — **LightHouse™ II**
Multiple sonar support (1 active)	V9.45
CP100 software V10.06 support	V10.41
CP300 software V4.04 support	V10.41
CP450C software V4.04 support	V10.41
Multiple active sonar modules	V10.41
CP200 SideVision™	V11.26
CAM200IP	V12.26
Dual Radar scanner support	V12.26
CPx70 ClearPulse™ sonar modules	V13.37
eS Series MFDs	V14.36
FLIR AX8 Thermal Camera	V15.61
Quantum™ Radar	V16.47
eS97 / **eS127**	V16.47
Rockford Fosgate PMX-5 entertainment system	V17.xx
GRIB File support (via GRIB Viewer)	V17.xx
M100/M200 thermal cameras	V19.xx

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