12.9 Radar adjustments: non-HD digital radomes

You can use the gain presets and other functions to improve the quality of the radar picture.

The following settings apply to non-HD digital radomes and are available from the Radar menu:

Menu Item	Description	Options
Rain	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.
Adjust Gain	Enables you to adjust the sensitivity of the radar reception. In some situations, adjusting the sensitivity may improve the clarity of the radar picture. The following settings are available: • **Gain** • **FTC** — 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. You can adjust the intensity of the FTC function between 0 and 100%: – A higher setting shows only the leading edge of large (rain clutter) echoes, while the effect on smaller (ship) echoes is only slight. – A lower setting reduces background noise and fill-in returns from land and other large targets. • **Sea** — Enable you to quickly select pre-configured settings to achieve the best picture in different situations. Each of the gain presets has a gain function, which is set to automatic mode by default. Raymarine strongly recommends the use of these presets to achieve optimum results. However, you can adjust this gain manually if required. • **Auto Sea Mode**	**Gain** • Auto — the preset operates in automatic mode. This is the default. • Man — allows you to manually adjust the intensity of the gain, from 0 to 100%. **FTC** • On — enables the FTC function and allows you to adjust the setting between 0 and 100%. • Off — disables the FTC function. This is the default. **Sea** • Auto— the preset operates in automatic mode. This is the default. • Man— allows you to manually adjust the intensity of the sea gain, from 0 to 100%. **Auto Sea Mode** • **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.

Adjusting radar anti rain clutter

From the radar application:

1. Select **Menu**.
2. Select **Rain** so that On is highlighted
   Selecting Rain will switch between rain On and Off.
3. Using the **Rotary Control**, adjust the control to the appropriate setting (between 0 and 100%).

Adjusting the radar FTC function

From the radar application:

1. Select **Menu**.
2. Select **Adjust Gain <Mode>**, where <Mode> shall be the Auto Gain mode already selected.
3. Select **FTC** so that On is highlighted
   Selecting FTC will switch between On and Off.
4. Use the **Rotary Control** to adjust the setting to the required value.

Adjusting radar anti sea clutter

From the radar application, with the required **Auto Gain Mode** selected:

1. Select **Menu**.
2. Select **Adjust Gain <Mode>**, where <Mode> shall be the Auto Gain mode already selected.
3. Select **Sea** to select the Man option.
4. Using the **Rotary Control** , adjust the Sea gain control to the appropriate setting (between 0 and 100%).

Selecting radar auto sea mode

These presets require a digital radar scanner.

From the radar application:

1. Select **Menu**.
2. Select **Adjust Gain <Mode>**, where <Mode> shall be the Auto Gain mode already selected.
3. Select **Auto Sea Mode**.
4. Select Harbor, Costal or Offshore as appropriate.

The option is ticked and the display changes to reflect the new mode.

12.10 Radar presentation menu options

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** • **Vessel Offset**	**Orientation** • Head Up • North Up • Course Up **Motion Mode** • True • Relative **Vessel Offset** • 0 • 1/3 • 2/3
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. • **Expansion** • **Expansion Level** — only available on non-HD digital radomes. • **Wakes** • **Wakes Period**	**Interference Rejection** • On • Off **IR Level** — only available on non-HD digital radomes. • Normal • High **Expansion** • On • Off **Expansion Level** — only available on non-HD digital radomes. • Low • High **Wakes** • On • Off **Wakes Time Period** • 10 Secs • 30 Secs • 1 Min • 5 Min • 10 Min
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

Function	Description	Options
Data Overlay Set-up	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). • **Data Cell 1** • **Select Data Category** • **Data Cell 2** • **Select Data Category**	**Data Cell 1 & 2** • On • Off **Select Data Category** • List of available data by category
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

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 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.

Enabling radar wakes

From the radar application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Enhance Echoes**.
4. Select **Wakes**.
5. Select **Wakes time period**.
6. Select the required time period.

12.11 Using radar to measure distances, ranges, and bearings

When you are using the radar application, you can measure distances, ranges and bearings in a variety of ways.

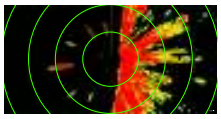
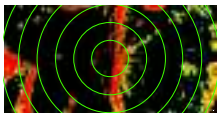
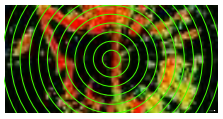
These options are detailed in the table below:

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.

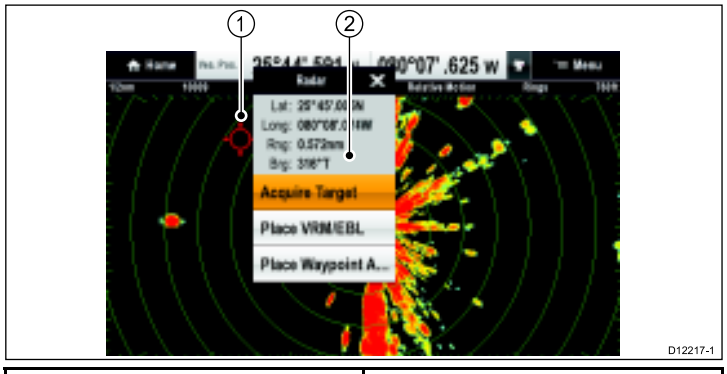
Examples:

		
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

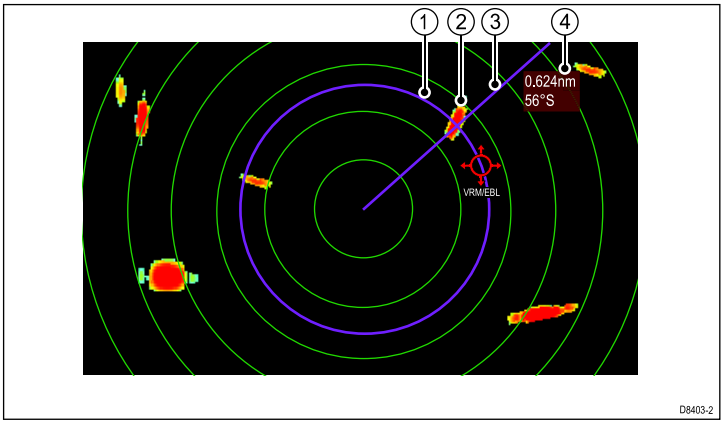
Variable Range Markers (VRM)

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.

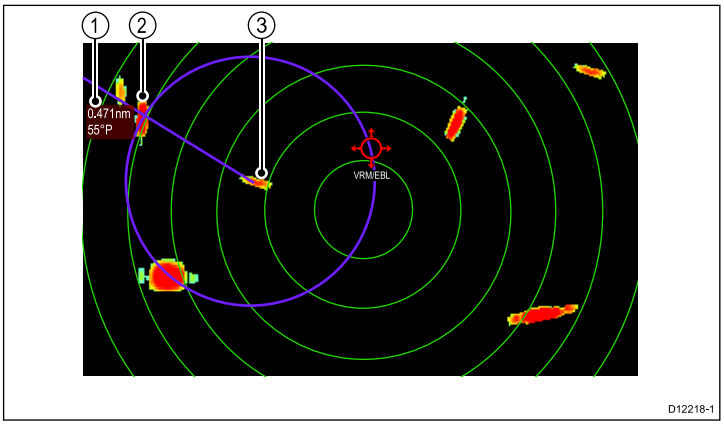
The VRM/EBL are combined to measure both the range and the bearing of the specified target.



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 VRM/EBL context menu can be accessed by:

- Highlighting the VRM/EBL using the **Joystick** and pressing the **Ok** button, or
- Selecting and holding on the VRM/EBL on screen — Hybridtouch multifunction displays only.

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**

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

Creating a VRM/EBL on the radar display using touch

This only applies to HybridTouch displays.

From the radar application:

1. Select and hold on the required target.
   The radar context menu is displayed.
2. Select **Place VRM/EBL**.
3. Select the required bearing and range.
4. Press the **Ok** button to save the settings.

Note: The first VRM/EBL will be placed at a location of 1/3 of the current range and 030° relative to your vessel's head. If this setting is adjusted, the display will retain the adjustments and use them when the VRM/EBL is next enabled.

Creating a VRM/EBL on the radar display

From the radar application:

1. Select a target on screen.
2. Press the **Ok** button.
   The radar context menu is displayed.
3. Select **Place VRM/EBL**.
4. Using the joystick adjust the VRM/EBL to the required bearing and range.
5. Press the **Ok** button to save the settings.

Note: The first VRM/EBL will be placed at a location of 1/3 of the current range and 030° relative to your vessel's head. If this setting is adjusted, the display will retain the adjustments and use them when the VRM/EBL is next enabled.

Creating a floating VRM/EBL on the radar display using touch

This only applies to HybridTouch displays.

From the radar application with a VRM/EBL already created:

1. Press and hold on the VRM/EBL.
   The radar context menu is displayed.
2. Select **Float Centre**.
3. Press the **Ok** button.
4. Select the desired location for the center position.
5. Press the **Ok** button to confirm the new position.

Note: When creating the first VRM/EBL, it will be placed at a location of 1/3 of the current range and 030° relative to your vessel's head. If this setting is adjusted, the display will retain the adjustments and use them when the VRM/EBL is next enabled.

Creating a floating VRM/EBL on the radar display

From the radar application with a VRM/EBL already created:

1. Position the cursor over the VRM/EBL.
2. Press the **Ok** button.
   The radar context menu is displayed.
3. Use the **Rotary Control** to select **Float Centre**.
4. Press the **Ok** button.
5. Using the joystick, move the center position of the circle to the desired position.
6. Press the **Ok** button to confirm the new position.

Note: When creating the first VRM/EBL, it will be placed at a location of 1/3 of the current range and 030° relative to your vessel's head. If this setting is adjusted, the display will retain the adjustments and use them when the VRM/EBL is next enabled.

Unfloating a VRM/EBL on the radar display using touch

This only applies to HybridTouch displays.

From the radar application:

1. Position the cursor over the VRM/EBL.
   The Radar context menu is displayed.
2. Select **Centre**.

Unfloating a VRM/EBL on the radar display

From the radar application:

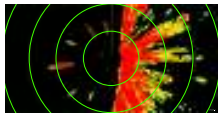
1. Position the cursor over the VRM/EBL.
2. Press the **Ok** button.
   The Radar context menu is displayed.
3. Select **Centre**.

Using the radar range rings

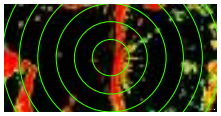
Radar range rings enable you to measure the distance between two points on the radar display.

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.

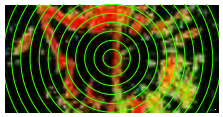
Examples:



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:

1. Select **MENU**.
2. Select **Presentation**.
3. Select **Range Rings**.

   Selecting Range rings will switch the range rings On and Off.

12.12 Using radar to track targets and avoid collisions

The **Guard Zone** , **VRM/EBL** and **MARPA** functions will help you track targets and avoid collisions.

With a radar connected to your multifunction display, you can:

- Assess how far away a target is and its bearing (VRM/EBL).
- Set an alarm to trigger when a target is within a specified zone (Guard Zone).
- Display detailed information on tracked targets (MARPA).
- Display the range and bearing of a target.

Setting up a radar guard zone

From the radar application:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **Guard Zone Set-up**.
4. Select **Zone**.

   Selecting Zone will switch the zone On and Off.
5. Select **Adjust Zone**.
6. Select **Zone shape** to switch between Sector or Circle.
7. Select **Adjust Outer**.
   i. Using the **Rotary Control** adjust the outer radius of the guard zone to the required distance.
   ii. Press the **Ok** button, or select the next option.
8. Select **Adjust Inner**.
   i. Using the **Rotary Control** adjust the inner radius of the guard zone to the required distance.
   ii. Press the **Ok** button, or select the next option.
9. Select **Adjust Width**.
   i. Using the **Rotary Control** adjust the angular width of the guard zone to the required setting.
   ii. Press the **Ok** button, or select the next option.
10. Select **Adjust Bearing**.
    i. Using the **Rotary Control** adjust the bearing about the heading marker of a sector zone to the required setting.
    ii. Press the **Ok** button.

Note: Guard zone width and bearing can only be adjusted when the **Zone Shape** is set to Sector.

Guard zone context menu

The guard zone function includes a context menu which provides additional menu items.

The guard zone context menu can be accessed by:

- Selecting the guard zone area on screen and pressing the **Ok** button, or
- Selecting and holding on the guard zone on screen — Hybridtouch multifunction displays only.

The context menu provides the following menu items:

- **Adjust Zone**
- **Zone Off**

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

Adjusting guard zone using touch

You can open the Guard zone menu from the guard zone context menu.

	This only applies to HybridTouch displays.

1. Select the guard zone.
   The guard zone context menu is displayed.
2. Select **Adjust Zone**.
   The Adjust guard zone menu is displayed.
3. Select **Zone shape** to switch between Sector or Circle.
4. Select **Adjust Outer**.
   i. Select the location on screen you wish the outer guard zone to be placed.
5. Select **Adjust Inner**.
   i. Select the location on screen you wish the inner guard zone to be placed.
6. Select **Adjust Width**.
   i. Select the location on screen you wish the guard zone width to be set to.
7. Select **Adjust Bearing**.
   i. Select the location on screen you wish the guard zone bearing to be set to.

Note: Guard zone width and bearing can only be adjusted when the **Zone Shape** is set to Sector.

Adjusting guard zone sensitivity

You can adjust the threshold at which the alarm is triggered by a target entering the guard zone.

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **Guard Zone Set-up**.
4. Select **Sensitivity**.
5. Using the **Rotary Control** adjust the threshold to the required percentage.
6. Press **Ok** to save the changes.

The guard zone sensitivity setting can also be accessed from the **Alarms** menu: **homescreen > Set-up > Alarms > Guard Zone > Sensitivity**.

MARPA overview

MARPA is used for target tracking and risk analysis in the radar application.

With an accurate heading sensor connected to your multifunction display, you can use the Mini Automatic Radar Plotting Aid (MARPA) functions for target tracking and risk analysis. MARPA improves collision avoidance by calculating information for tracked targets, and provides continuous, accurate, and rapid situation evaluation. The number of targets that you can track at any one time is dependent on the model of radar scanner that you are using.

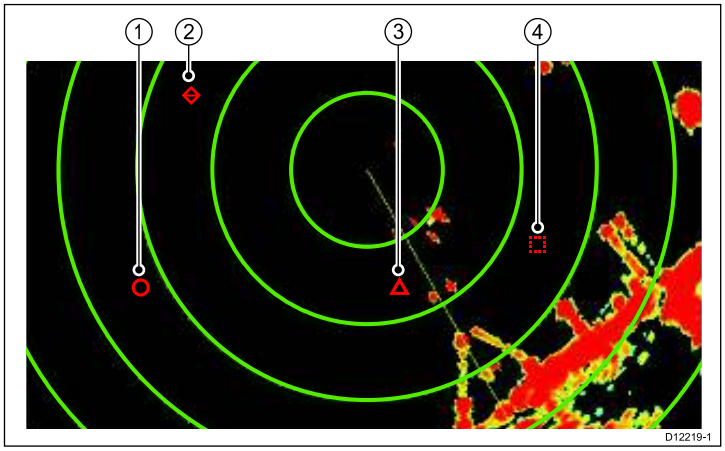
MARPA tracks acquired targets, and calculates the target's speed and course.

Each target tracked 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 shown on your screen. Each target is continually assessed and an audible alarm is sounded if a target becomes dangerous, or is lost.

For effective MARPA operation, your multifunction display must have accurate heading and speed data for your vessel. The better the quality of the heading and speed data, the better MARPA will perform. For the best heading data, a Raymarine SMART heading sensor or a gyro-stabilized autopilot is required.

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	Description
1	Safe target
2	Lost target
3	Dangerous target
4	Target being acquired

Safety notices

MARPA can improve collision avoidance when used wisely. It is your responsibility to exercise common prudence and 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 might be impossible to maintain. Better quality heading data might improve performance in these circumstances.

How a MARPA risk is assessed

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 an on-screen warning appears. The on-screen symbol will change to the target lost symbol. Acknowledging the warning will silence the alarm and remove the on-screen warning and the target lost symbol.

Effective range for MARPA targets

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, an on-screen warning indicates that the target is off-screen.

MARPA context menu

The MARPA function includes a context menu which provides positional data and menu items.

The MARPA context menu can be accessed by:

- Highlighting a MARPA target using the **Joystick** and pressing the **Ok** button, or
- Selecting and holding on a MARPA target on screen — Hybridtouch multifunction displays only.

The context menu provides the following target information:

- CPA
- TCPA
- COG
- SOG

The context menu also provide the following menu items:

- **Cancel target**
- **CPA Graphic**
- **MARPA Data**

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

Configuring MARPA options

From the radar application:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **MARPA Options**.

Note: If AIS data is available the menu will be **MARPA & AIS Options**.

4. Select **Vector Length**.
5. Select an appropriate time period.
   The distance that your vessel travels in the time period you specify here determines the length of the vector lines.
6. Select **MARPA Target History**.
7. Select an appropriate time period.
   The target's previous position will be plotted on the radar display as a target icon with lighter shading than the actual target.

Note: MARPA and AIS functions share **Safe Zone** and **Vector Length** settings.

Configuring safe zone set up for MARPA

From the Radar application:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **Safe Zone Set-up**.
4. Select **Safe Zone Radius**.
   i. Select a distance for the Safe Zone.
   This is the distance from your vessel that the safe zone will be set up.
5. Select **Time to Safe Zone**.
   i. Select a time period.
   A target is considered dangerous if it will enter your safe zone within this time period.
6. Select **Safe Zone Ring**.
   Selecting safe zone ring will switch between showing and hiding the safe zone ring in the radar application.

Using MARPA

Acquiring a MARPA target to track

From the radar application:

1. Select the target to be acquired.
   The radar context menu is displayed.
2. Select **Acquire Target**.

The "target being acquired" symbol is displayed. If the target is present for several scans, the radar locks-on to the target, and the symbol changes to "safe target" status.

Cancelling a MARPA target using the MARPA context menu

From the radar application:

1. Select the relevant target.
   The MARPA context menu is displayed.
2. Select **Cancel Target** or **Cancel All Targets**.

Cancelling a MARPA target using the menu

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **View MARPA Lists**.

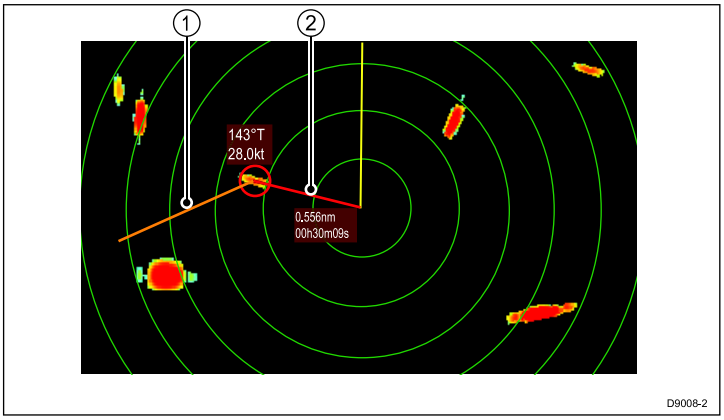
Note: If AIS data is available the menu will be **View MARPA & AIS Lists**.

4. Select View **MARPA List**.
5. Select the relevant MARPA target from the list.
6. Select **Cancel Target** or **Cancel All Targets**.

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 MARPA target data

1. Select the target.

2. Press the **Ok** button

   The MARPA context menu is displayed which provides the following data:

   - Closest Point of Approach (CPA).
   - Time to Closest Point of Approach (TCPA).
   - COG (if available).
   - SOG (if available).

3. To display CPA graphics select **CPA Graphic** from the context menu:
   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.
4. To display course and bearing information alongside to the target select **MARPA Data** so that Show is highlighted.
   i. Selecting MARPA Data will switch between Show and Hide.

Displaying MARPA target data using touch

This only applies to HybridTouch displays.

1. Select and hold the target.

   The MARPA context menu is displayed which provides the following data:

   - Closest Point of Approach (CPA).
   - Time to Closest Point of Approach (TCPA).
   - COG (if available).
   - SOG (if available).

2. To display CPA graphics select **CPA Graphic** from the context menu
   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 **MARPA Data** so that Show is highlighted.
   i. Selecting MARPA Data will switch between Show and Hide.

Viewing full MARPA target information

From the radar application:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **View MARPA Lists**.
4. Select **View MARPA List**.
5. Select the relevant target.
6. Select **View Full Target Data**.

12.13 Scanner set-up menu options

The Scanner Set-up menu enables you to configure the performance and behavior of your radar scanner.

Function	Description	Options
Timed Transmit Set-up	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	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	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	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)
Scanner Speed	SuperHD open array radars with software version 3.23 or above or HD digital radomes support multiple scan speeds: • 24 RPM • 48 RPM	**Scanner Speed** • 24 RPM • Auto — his option automatically switches between the 24 RPM and 48 RPM scan speeds as appropriate.
Advanced Set-up	This menu item contains a sub-menu that enables you to adjust the following options: • **Bearing Alignment** • **Display Timing** • **Main Bang Suppression** • **Tune Preset** • **STC Preset**— Non-HD Digital radomes only • **Reset Advanced**	**Bearing Alignment** • -180º — 179.5º **Display Timing** • 0.415 n m — selected range **Main Bang Suppression** • On • Off **Tune Preset** • 0 — 255 **STC Preset** • 0 — 100% **Reset Advanced** • Yes • No

Adjusting the radar tune control

From the radar application:

1. Select **Menu**.
2. Select **Scanner Set-up**.
3. Select **Tune Adjust**.
4. Select **Tune Adjust**.
   Selecting Tune Adjust will switch the function between Auto and Man.
5. In Manual mode use the **Rotary Control** to adjust the level, to obtain the maximum signal strength (indicated by the eight-step horizontal bar).

12.14 Resetting the radar

To reset radar settings to defaults follow the steps below:

From in the radar application:

1. Select **Menu**.
2. Select **Scanner Set-up**.
3. Select **Advanced Set-up**.
4. Select **Reset Advanced**.
   A confirmation pop up message is displayed.
5. Select **Yes** to confirm reset.

Chapter 13: Using AIS

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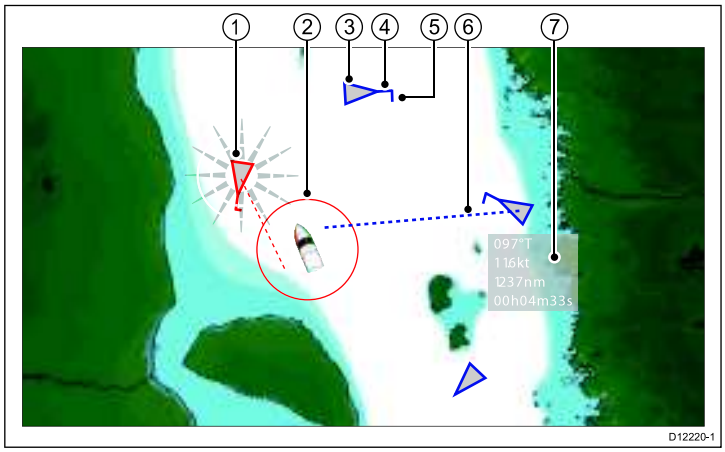
13.1 AIS overview

The AIS feature enables you to receive information broadcast by other vessels, and to add these vessels as targets in the chart and radar applications.

With an optional AIS unit connected to your system you can:

- Display targets for any other AIS-equipped vessels.
- Display voyage information being broadcast by these targets, such as their position, course, speed and rate-of-turn.
- Display basic or detailed information for each target vessel, including safety-critical target data.
- Set up a safe zone around your vessel.
- View AIS alarm and safety-related messages.
- Add AIS-equipped friends and regular contacts to a “Buddy List”

AIS information is displayed in the form of an overlay in the chart and radar applications. Additional data is displayed in a dialog box, for example:



Item	Description
1	Dangerous target (flashes).
2	Safe zone (defined by distance and / or time).
3	AIS target vessel.
4	Heading.
5	Direction of turn.
6	COG/SOG vector.
7	Safety critical data.

AIS-equipped vessels in the surrounding area are displayed in the chart or radar application as triangular targets. Up to 100 targets are displayed. As the vessel’s status changes, the symbol for the target changes accordingly.

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. You can either display all targets or just dangerous targets.

How AIS Works

AIS uses digital radio signals to broadcast ‘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 avoidance data. The AIS features complement the radar application, as AIS can operate in radar blind spots and can detect smaller vessels equipped with AIS.

Note: It may not be mandatory for vessels to be fitted with operational AIS equipment. Therefore, you should not assume that your multifunction display will show ALL vessels in your area. Due prudence and judgement should be exercised. AIS should be used to complement radar, NOT substitute it.

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.

13.2 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 SeaTalkng, 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.

13.3 AIS context menu

The AIS function includes a context menu which provides AIS target information and menu items.

The AIS context menu can be accessed by:

- Highlighting an AIS target using the **Joystick** and pressing the **Ok** button, or
- Selecting and holding on an AIS target on screen — Hybridtouch multifunction displays only.

The context menu provides the following AIS target data:

- MMSI
- CPA
- TCPA
- COG
- SOG

The context menu also provide the following menu items:

- **AIS Vector** — Switch target vectors On and Off.
- **AIS Data** — Switch on screen target data On and Off.
- **View Full AIS Target Information**
- **Add Buddy** — Add target to the buddy directory.

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

13.4 Enabling AIS

Enabling AIS in the chart application

To enable AIS overlay in the chart application the chart view must be set to 2D **Menu > Presentation > Chart View**.

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **AIS Overlay** so that On is highlighted.
   Selecting AIS Overlay will switch AIS between On and Off.

Enabling AIS in the radar application

From the radar application:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **AIS Targets** so that On is highlighted.
   Selecting AIS Targets will switch AIS between On and Off.

13.5 Displaying AIS vectors

You must have the correct data available before AIS vectors can be displayed.

A target is defined as active when it has the following data displayed graphically:

- A COG/SOG vector indicating the predicted distance that a target will travel within a given period of time.
- A heading and direction of turn indicator.

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 same target vector and safe zone settings apply to both radar MARPA and AIS targets.

13.6 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.
	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.

13.7 AIS silent mode

AIS silent mode enables you to disable AIS transmissions

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 accompanies your AIS unit.

Enabling and disabling AIS silent mode in the chart application

From the chart application:

1. Select **Menu**.
2. Select **AIS Options**.
3. Select **AIS Unit Set-up**.
4. Select **AIS Silent Mode**.

   Selecting AIS Silent Mode will switch between silent mode On and Off.

Enabling and disabling AIS Silent Mode in the radar application

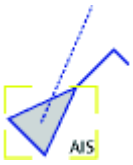
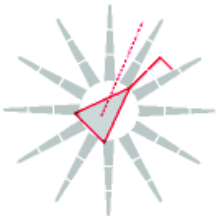
From the Radar application:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **AIS Unit Set-up**.
4. Select **AIS Silent Mode**.

   Selecting AIS Silent Mode will switch silent mode On and Off.

13.8 AIS target symbols

Your multifunction display shows a range of symbols to represent the different types of AIS target.

Target type	Description	Symbol
Transmitting target	Target is moving or at anchor (Target is not activated, dangerous or lost).	
Activated target	Target activated — that is, AIS vector displayed. Vector line (optional) shows predicted distance travelled within a given time.	
Selected target	Target selected with cursor. Can view detailed data.	
Dangerous target	Targets within specified distance (CPA) or time (TCPA). Dangerous target alarm sounds if enabled. Target red and flashing.	
Uncertain target	Calculated CPA / TCPA value uncertain.	
Lost target	When the signal of a dangerous target not received for 20 seconds. Target in latest predicted position. Alarms sounds if enabled. Target flashes.	
Buddy target	Target has previously been added to the Buddy List.	
Aid To Navigation (AToN) target (Real)	AToN target is ON position.	
Aid To Navigation (AToN) target (Real)	AToN target is OFF position.	
Aid To Navigation (AToN) target (Virtual)	AToN target is ON position.	
Aid To Navigation (AToN) target (Virtual)	AToN target is OFF position.	
Land base station target	Land base station target is ONLINE.	

13.9 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 Full AIS Data**.

AIS Data

The table below shows the AIS target information which if available will be displayed on the multifunction display:

- 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 dependant upon what information is being transmitted from the target vessel and the type of AIS unit connected to your system.

13.10 Viewing all AIS targets

From the chart application go to **Menu > AIS Options**

From the radar application go to **Menu > Track Targets > View AIS Lists**

1. Select **AIS List**.

   A list of all available AIS targets is displayed. The list will provide the following data:

   - MMSI
   - Range
   - Bearing
   - Buddy
   - Type

   This list can be filtered to show only buddies or all targets.
2. To view full AIS target information Select an AIS target from the list and then select **View Full Target Data**.

   The AIS target info dialog is displayed showing all available data on the target.

13.11 Using AIS to avoid collisions

You can use the AIS safe zone and safety message functions to help you avoid collisions with other vessels and objects.

Safe Zones

A safe zone is a ring centred on your vessel within which a target is considered dangerous. It is displayed in the radar or chart applications as a red ring.

This AIS safe zone uses the same criteria as MARPA and will deem a target dangerous if it comes within a specified distance of your vessel (closest point of approach or CPA) within a specified time (time to closest point of approach or TCPA). The CPA and TCPA are calculated using COG/SOG and position from the AIS target.

When your system recognizes a dangerous AIS target:

- The target symbol changes to red and flashes.
- The dangerous alarm dialog is displayed (this can be disabled if required).
- The dangerous alarm sounds (this can be disabled if required).

Note: When the AIS unit is connected and functioning, the system will check for dangerous targets within the safe zone and if enabled issue an alarm whenever necessary. Dangerous target alarm operates irrespective of the status of the AIS target display, or the safe zone ring.

Safety Messages

When the status of the AIS Safety Messages function is set to 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**).

Note: You will NOT receive any safety messages in Simulator mode (**homescreen > Set-up > System Settings > Simulator**).

Enabling Safe Zones

To show the Safe Zone ring follow the instructions below:

From the chart application go to **Menu > AIS Options > Safe Zone Set-up**

From the radar application go to **Menu > Track Targets > Safe Zone Set-up**

1. Select **Safe Zone Ring** so that **Show** is highlighted.

   Selecting Safe Zone Ring will switch the zone ring from hidden to visible.
2. Select **Safe Zone Radius**.
   i. Select the required radius for the safe zone.
3. Select **Time to Safe Zone**.
   i. Select the required time period.
4. Select **AIS Alarm** so that On is highlighted.

   Selecting AIS Alarm will switch the dangerous target alarm between On and Off.

Enabling and disabling AIS safety messages in the chart application

From in the chart application:

1. Select **Menu**.
2. Select **AIS Options**.
3. Select **AIS Unit Set-up**.
4. Select **AIS Safety Messages**.

   Selecting AIS Safety Messages will switch between safety messages On and Off.

Enabling and disabling AIS safety messages in the radar application

From in the radar application:

1. Select **Menu**.

2. Select **Track Targets**.
3. Select **AIS Unit Set-up**.
4. Select **AIS Safety Messages**.

   Selecting AIS Safety Messages will switch between safety messages On and Off.

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.

13.12 AIS options

The AIS options are accessible in the chart application by selecting **Menu > AIS Options > MARPA & AIS Options** or the radar application by selecting **Menu > Track Targets > MARPA & AIS Options**.

Parameter	Description	Options
Vector Length	The length of the vector lines displayed depends on the distance that an AIS 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
Display AIS	This option determines whether all or only dangerous / lost targets are displayed in the radar or chart application.	• All • Dangerous
Buddy Tracking	This option allows you to turn the Buddy Tracking function On and Off.	• On • Off
Add New Buddy Vessel	This option allows you to add a buddy to the directory by manually entering the vessel MMSI number.	
AIS Unit Set-up	Provides the following options: • **AIS Silent Mode** — Switches silent mode On or Off. AIS silent mode enables you to disable AIS transmissions. • **Safety Messages** — Allows you to enable or disable the display of AIS safety messages. • **View AIS Unit Log** — Displays a list of AIS alarms, and includes details on when the alarm was raised and a description of the fault.	**AIS Silent Mode** • Off (default) • On **Safety Messages** • On (default) • Off **View AIS Unit Log** • Display Alarms list.

13.13 AIS alarms

The AIS functions generate a number of alarms to alert you to dangerous or lost targets.

In addition to the dangerous target alarm, the system generates an alarm when a dangerous target becomes a lost target i.e. its signal has not been received for 20 seconds.

Your AIS receiver generates local alarms which are displayed and sounded on your multifunction display whenever an alarm condition exists on the unit.

Local AIS alarms

When the connected AIS unit generates an alarm, your multifunction display shows a local alarm message and indicates the alarm status in the status bar.

Active AIS alarms list

The active alarm list shows the status of each local alarm. This list can be accessed from the chart application by going to **Menu > AIS Options > AIS Unit Set-up > View AIS Unit Log**, or from the radar applications by going to **Menu > Track Targets > AIS Unit Set-up > View AIS Unit Log**.

Acknowledging AIS alarms

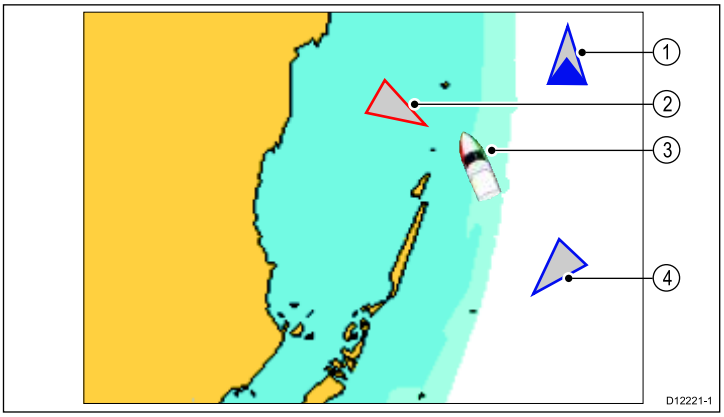
In the chart or radar application:

1. Select **Ok** on the alarm dialog box.

Note: An AIS alarm remains active until it is acknowledged on your multifunction display.

13.14 Buddy tracking

The Buddy Tracking feature enables you to add AIS-equipped friends and regular contacts to a “Buddy List” on your multifunction display. As soon as a vessel on your Buddy List sails into the range of your AIS unit, the vessel icon changes to indicate this.



Item	Description
1	Buddy icon
2	Dangerous target icon
3	Own vessel icon
4	Normal AIS icon

How it works

When the AIS Layer is enabled in the chart or radar application, AIS targets are shown on your display. You can add any AIS target to a “Buddy List”, each entry consisting of an MMSI number, and an optional name. Subsequently, whenever Buddy Tracking is enabled on your multifunction display, and a “Buddy” vessel with an MMSI number sails into the range of your AIS receiver, an AIS Buddy icon is displayed. Up to 100 vessels may be added to the Buddy List.

Pre-requisites

The following items are required for the Buddy Tracking feature:

- For the purposes of using the Buddy Tracking feature, it is assumed that your display is already connected to a suitable AIS unit.
- Only transmitting AIS-equipped vessels will be detected.

Enabling and disabling buddy tracking in the chart application

From the chart application, with the AIS Targets layer enabled:

1. Select **Menu**.
2. Select **AIS Options**.
3. Select **MARPA & AIS Options**.
4. Select **Buddy Tracking** .

   Selecting Buddy Tracking will switch between buddy tracking On and Off.

Enabling and disabling buddy tracking in the radar application

From the radar application, with the AIS Targets layer enabled:

1. Select **Menu**.
2. Select **Track Targets**.
3. Select **MARPA & AIS Options**.
4. Select **Buddy Tracking** .

   Selecting Buddy Tracking will switch between buddy tracking On and Off.

Adding a vessel to your buddy list

In the chart or radar application:

1. Select the AIS target.

   The AIS target 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 directory.

Adding a vessel to your buddy list from AIS target list

1. If you are in the chart application, goto **Menu > AIS Options**.
2. If you are in the radar application, goto **Menu > Track Targets > View MARPA & AIS Lists**.
3. Select **View AIS List**.

   The AIS Target List is displayed.
4. Select an AIS target.
5. 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 directory.

Editing a buddy's details

From the chart or radar application:

1. Select the AIS buddy target.

   The AIS buddy context menu is displayed.
2. Select **View Buddy Data**.
3. Select the buddy you wish to edit.

   The Buddy options dialog is displayed.
4. To change the MMSI number select **Edit Buddy MMSI** or.

   The MMSI number must be 9 digits.
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.

Deleting 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 directory.

The buddy directory can also be accessed via the chart application (**Menu > AIS Options > View Buddy Directory**), or the radar application (**Menu > Track Targets > MARPA & AIS Lists > View Buddy Directory**).

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 14: Using the fishfinder

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14.1 Fishfinder introduction

Warning: Sonar operation

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

Fishfinder overview

The fishfinder application provides a detailed view of the fish and seabed under your vessel, enabling you to accurately distinguish between different sizes of fish, bottom structure, and underwater obstacles. The standard fishfinder image is a historical, scrolling bottom graph with range and sonar frequency automatically selected by the system.

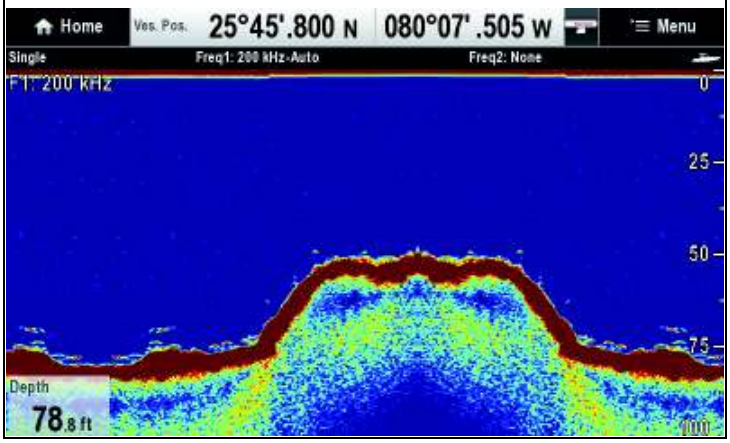
The various functions and features of the fishfinder application include:

- Preset modes for easy optimal operation.
- Display modes (Zoom, A-Scope or Bottom Lock).
- Adjustable range and zoom.
- Finding bottom feeding fish with the **bottom lock** display mode.
- Clutter and gain options to simplify the image.
- Pausing and adjusting the speed of the scrolling image.
- Using waypoints to mark a position.
- Determining depths and distances of targets.
- Fishfinder alarms (fish, depth or water temperature).

Fishfinder screen

The fishfinder displays a scrolling image of the seabed, updating from the right as your vessel makes progress.

Example fishfinder screen



The fishfinder window includes the following aspects:

- The bottom together with any bottom structure such as reefs and shipwrecks etc.
- Target images indicating fish.
- A status bar noting the frequency and gain settings.
- The bottom depth.

Status icon

The fishfinder status icon is located on the Status icon bar:

- **Icon animated** - fishfinder is operating.
- **Icon static** - the fishfinder transducer is connected but not transmitting.
- **Icon greyed-out** - no fishfinder transducer is connected.

How the fishfinder works

The fishfinder application uses a Digital Sounder Module (DSM) and a suitable sonar transducer. The DSM interprets signals from the transducer and builds up a detailed underwater view.

The transducer is located on the bottom of the boat, it sends pulses of sound waves into the water and measures the time it takes for the sound wave 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.

Colors are used on the display 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.

Fishfinder context menu

The fishfinder application includes a context menu which provides fishfinder information and menu items.

The fishfinder context menu can be accessed by:

- Selecting a location using the **Joystick** and pressing the **Ok** button, or
- Selecting and holding on an area on screen — Hybridtouch multifunction displays only.

The context menu provides the data for the position of the cursor:

- Range
- Depth

The context menu also provide the following menu items:

- **Place Waypoint**
- **Place Marker**

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

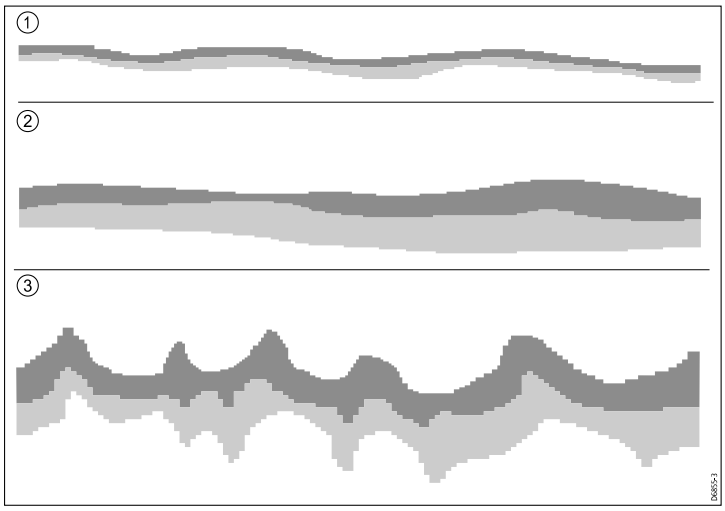
14.2 The sonar image

Interpreting the seabed using sonar

It is important to understand how to correctly interpret the seabed structure represented in the fishfinder display.

The seabed usually produces a strong echo.

The following images show how different seabed conditions are represented in the sonar display:



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 seabed, bouncing off the vessel, then reflecting off the seabed again. This can happen if the water is shallow, the seabed is hard, or the gain is set to high.

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.

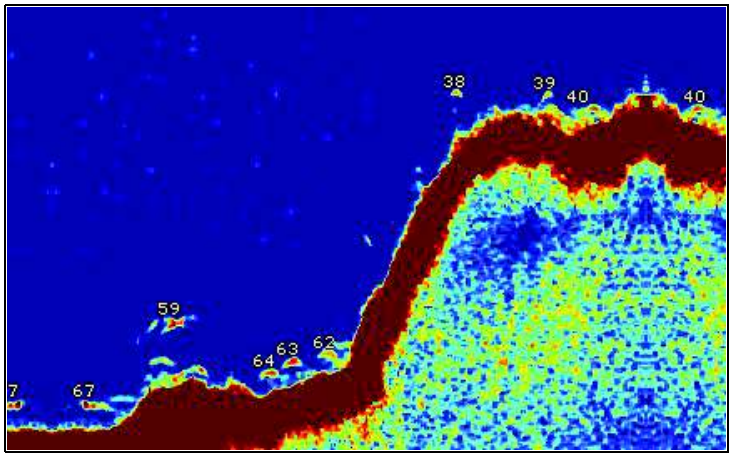
Vessel speed

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.

The depth of individual targets can be displayed by switching on the **Target Depth ID** in the fishfinder menu **Menu > Presentation**. The number of target depths displayed is influenced by the fish alarm sensitivity level.



Water depth

As sea depth increases signal strength decreases, resulting in a lighter on-screen image of the bottom.

Size of the target

The larger the target, the larger the return on the fishfinder display. 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.

Transducer frequency

The same target will appear differently when the transducer frequency is changed. The lower the frequency the broader the mark.

Clutter / Background noise

The fishfinder picture may be impaired by echoes received from floating or submerged debris, air bubbles or even the vessel's movement. This is known as 'background noise' or 'clutter' and is controlled by the gain modes. The system will automatically control the gain settings according to the depth and water conditions. You can however adjust the gain settings manually if you prefer.

14.3 Fishfinder presets

The fishfinder provides you with four preset configurations available from the fishfinder menu. These enable you to quickly select appropriate settings tailored for various situations.

Each preset has been configured to provide the best operating parameters for the fishfinder. However, it is possible to manually adjust the presets if necessary. The four default presets are:

- **Single** — this preset provides quick access to a single-frequency configuration, suitable for general fishing conditions.
- **Dual** — this preset provides a dual frequency configuration. You can either display two different frequencies at the same time in one window, or display one frequency at full-screen on your master display and the other frequency at full-screen on an additional networked display.
- **Shallow** — this preset optimizes the fishfinder display for shallow waters.
- **Deep** — this preset optimizes the fishfinder display for deep waters.

Display modes

When using presets, you can either select the relevant preset and start using the default configuration immediately, or you can adjust and configure frequencies:

- Zoom
- Bottom Lock
- A-Scope

Any changes you make to a preset are retained when you switch off the power to your multifunction display.

Selecting a fishfinder preset

From the fishfinder application:

1. Select **Menu**.
2. Select **Select Preset**.
3. Select the required preset.

The fishfinder display will change to the new mode. This is indicated in the top left-hand corner of the status bar.

14.4 Dual / Single frequency fishfinder

Dual frequency operation allows the sonar to operate and display 2 frequencies simultaneously. If the preset mode that you are using has two frequencies configured, you can view either one or both of those frequencies in separate windows.

Selecting dual frequency view

From the fishfinder application:

1. Select **Menu**.
2. Select **Select Preset**.
3. Select **Dual**.
4. Select **View**.
5. Select the required setting:
   - Frequency 1
   - Frequency 2
   - Both

14.5 Fishfinder preset configuration

Sonar frequency

The frequency of the sonar determines the width of the sonar beam, the depth to which the signals will penetrate and the resolution of the image. Each of the preset operating modes has its own frequency settings.

The frequencies supported depend upon the DSM and transducer in use on your system.

- **Auto**. When operating in automatic frequency the system will set and adjust the frequency automatically to suit your transducer and operating conditions.
- **Lower frequencies** (e.g. 50 kHz) produce a wide sonar beam and penetrate the water well. A lower frequency provides 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) produce narrow beam and produce a high resolution image. They are most useful in shallower water (up to 1000 ft) and at higher speeds.

Setting the fishfinder frequency

With the **Adjust Preset** menu options you can:

- Configure one or two frequencies for each of the four presets.
- Select a display mode.
- Edit preset names.
- Reset presets to factory defaults.

1. From the fishfinder application select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Configure Frequencies**.
4. Select **Select Frequency 1** or **Select Frequency 2** as required.
5. Select the required frequency: Auto, low frequency or high frequency
6. You can also manually adjust the frequency by selecting the relevant **Tune Frequency** option.

   The Tune Frequency menu is displayed
7. Select the **Tune Frequency** so that Man is highlighted

   Selecting Tune Frequency will switch between Auto and Manual.
8. Use the **Rotary Control** to adjust the frequency to the required setting.

Changing fishfinder preset names

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Edit Name**.
4. Select the required characters.
5. Select **Save** to save the new preset name.

14.6 Fishfinder display modes

Selecting a fishfinder display mode

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Display Mode**.
4. With dual frequency preset, select **Adjust** to select which frequency display you wish to change.

   Selecting Adjust in Dual frequency preset will switch between Frequency 1 and Frequency 2.
5. Select **Select Mode**.
6. Select the required display mode:
   - None
   - Zoom
   - Bottom Lock
   - A-Scope

Fishfinder zoom mode

The zoom display mode magnifies a region of the fishfinder screen to display more detail.

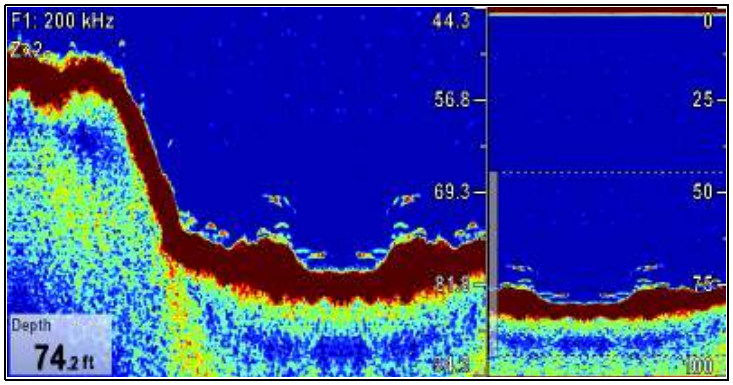
This zoom option enables you to:

- Replace the standard fishfinder image with the zoomed image, or display the zoomed image alongside the standard fishfinder 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 fishfinder image (ZOOM SPLIT). The zoomed section is indicated on the standard fishfinder screen by a zoom box.



Selecting zoom split screen

From the fishfinder application, with Zoom preset selected:

1. Select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Display Mode**.
4. Select **Zoom** so that Split is highlighted.

   Selecting Zoom will switch between Split and Full.

Adjusting the fishfinder zoom factor

When the zoom function is active (Zoom Full or Zoom Split), you can either select a predefined zoom factor or adjust it manually.

From the fishfinder application, with Zoom preset selected:

1. Select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Display Mode**.
4. Select **Zoom Factor**.

5. Select a preset Zoom Factor (**x2**, **x3**, **x4**) or select **Manual**

   Once selection is made you will be returned to the Display Mode menu.
6. If Manual is chosen select **Manual Zoom Factor**

   The manual zoom factor menu is displayed.
7. Select **Manual Zoom Factor** so that the zoom setting is highlighted.
8. Using the **Rotary Control** change the zoom factor to the required setting.
9. Press the **Ok** button, or select the **Manual Zoom Factor** menu again to confirm the setting.

Adjusting the position of the fishfinder zoomed area

When the zoom function is selected, the system automatically selects the zoom position so that the bottom details are always in the lower half of the display. If required you can reposition the portion of the image to be zoomed so that an alternative area is displayed.

From the fishfinder application, with Zoom preset selected:

1. Select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Display Mode**.
4. Select **Zoom Position**.

   The manual zoom position menu is displayed.
5. Select **Zoom Position** .

   Selecting the zoom position menu will switch the zoom position between Auto and Manual.
6. If Manual is chosen use the **Rotary Control** to reposition the zoomed area as required.

Fishfinder 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 fishfinder display shows a historical record of fishfinder 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.

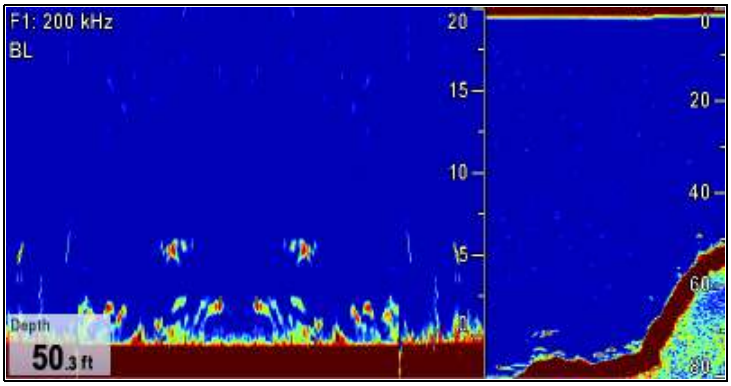
There are three A-Scope modes:

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.

Bottom Lock

The Bottom Lock function applies a filter to flatten the image of the seabed and make any objects on or just above it easier to discern. This feature is particularly useful for finding fish that feed close to the bottom.

Bottom Lock is selected for individual fishfinder windows and can replace or appear alongside the standard fishfinder image. Adjusting the range of the bottom lock image allows you to view more bottom details. You can also reposition the image on screen to anywhere between the bottom of the window (0%) and the middle of the window (50%) by using the Bottom Shift control.



Bottom Lock is selected for individual fishfinder windows and can either replace (ON) or appear alongside (SPLIT) the standard fishfinder image.

Adjusting the bottom lock range/position

From the fishfinder application, with bottom lock display mode selected:

1. Select **Menu**.
2. Select **Adjust Preset <mode>**, where <mode> is the preset already selected.
3. Select **Display Mode**.
4. Select **Bottom Lock** to switch between Full screen and Split screen
5. Select **B-Lock Range**.

   Selecting Bottom Lock Range will open the B-Lock Range menu
6. Select the **B-Lock Range** menu.
7. Use the **Rotary Control** to adjust the range to the required setting.
8. Press the **Ok** button, or select the **B-Lock Range** menu again to confirm the setting.

14.7 Fishfinder range

The Range and Range Shift functions enable you to change the range of depth displayed by the fishfinder.

Range

The Range function enables you to define the range of depth that you see in the fishfinder display.

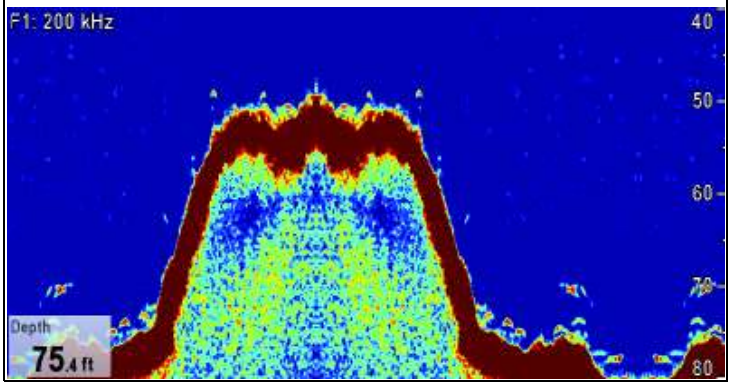
By default, the fishfinder display shows the shallowest required range, enabling you to clearly see what is near the surface of the water under your vessel. This is useful for finding smaller fish that feed nearer the surface. An example of this kind of depth range is 0 to 200 feet. In this case, the range is 200 feet, so 200 feet of water will be displayed on-screen at any one time.

There may be circumstances in which you want to see a less detailed image showing a greater amount of depth beneath your vessel. This is useful for locating bigger fish and other objects located closer to the seabed such as wrecks. An example of this kind of depth range is 0 to 1000 feet or greater. In this case, the range is 1000 feet, and you will be able to see 1000 feet of water beneath your vessel, without needing to scroll the display up or down.

Range Shift

The Range Shift function enables you to define which area of the overall depth you want to be able to see on-screen. For example, if your range is 5000 feet and the display is showing the surface (0 feet) at the very top of the display, and 5000 feet at the bottom of the display, you can use the Range Shift function to focus on a different 5000 feet range. For example, 2000 feet at the very top of the screen, and 7000 feet at the very bottom of the screen.

Example screen with range and range shift used to view the seabed at a depth range of 40–80 ft



Changing the fishfinder depth range

From the fishfinder application

You can choose from either:

- **automatic** adjustment whereby the display automatically shows the shallowest required range.
- **manual** adjustment of the depth range, up to the maximum depth displayed on the scrolling bottom and A-Scope images.

Changes to the range affect all fishfinder windows.

1. Select **Menu**.
2. Select **Range**.
3. Select **Range Mode**.
4. Select **Mode** to switch between Auto and Man.
5. With manual mode selected you can now use the **Range Control** to adjust the depth range shown in the fishfinder application.

Note: When Range is in Auto mode using the **Range Control** will display a confirmation pop up message before switching to Manual range mode.

Using fishfinder range shift

The default setting adjusts the display to keep the seabed in the lower half of the display window. Alternatively you can shift the image within the current range. Changes to the range shift are reflected in all fishfinder windows.

From the fishfinder application, with the **Range Mode** set to Manual:

1. Select **Menu**.
2. Select **Range**.
3. Select **Range Shift**.
   The range shift menu is displayed.
4. Select the **Range Shift** menu.
5. Use the **Rotary Control** to adjust the Range Shift to the required setting.
6. Press the **Ok** button, or select the **Range Shift** menu again to confirm the setting.

14.8 Fishfinder sensitivity adjustments

The **Adjust Sensitivity** menu gives you access to features and functions which enhance what is displayed on screen.

Sensitivity options include:

- **Gain Mode**
- **Auto Adjust**
- **Color Gain**
- **TVG**
- **Color Threshold**
- **Power Mode**

Sonar gain

The gain settings alter the way the DSM processes background noise (also called clutter). 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 adjusts the return threshold (echo strength) above which the fishfinder will show an object on the screen.

There are two gain modes:

- Auto
- Manual

Auto

In Auto mode, the DSM sonar automatically adjusts the gain setting to suit current conditions. Any adjustments made apply to all fishfinder windows using that particular frequency.

There are three Auto modes, each suited to different scenarios:

- **Low (Cruising)** is ideal for viewing fishfinder images with a minimum of background noise as you are cruising to your fishing spot. Only the strongest echoes are displayed.
- **Medium (Trolling)** is a slightly higher gain setting that displays more detail. This is the default mode.
- **High (Fishing)** provides the most detail, but also displays the most background noise and surface clutter.

Manual

If necessary you can set the gain controls manually, between a value of 1 to 100 (default value is 75). 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, they are applied to both the active window and any other fishfinder windows with the same frequency.

Selecting automatic fishfinder gain

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Sensitivity**.
3. Select **Gain Mode**.
4. Select the **Gain Mode** menu so that Auto is highlighted.
   Selecting Gain Mode will switch between Auto and Manual gain modes
5. Go **Back** to the **Sensitivity** menu.
6. Select **Auto Adjust**.
7. Select the required Auto Gain mode.

Adjusting the fishfinder gain manually

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Sensitivity**.
3. Select **Gain Mode**.
4. Select the **Gain Mode** menu so that Man is highlighted.
5. Use the **Rotary Control** to adjust the gain to the required setting.

The new values remain set even when you switch off the display, they are applied to both the active window and any other fishfinder windows displaying the same frequency.

Fishfinder color gain

You can adjust the color gain to change the signal strength threshold for the strongest color in your fishfinder display.

Color gain 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 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.

There are two color gain modes:

- **Auto**. In Auto mode the color gain setting is automatically adjusted to suit current conditions. Any adjustments made apply to all fishfinder windows.
- **Manual**. You can set the color gain manually, between a value of 1 to 100.

Adjusting the fishfinder color gain

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Sensitivity**.
3. Select **Color Gain**.
4. Select the **Color Gain** menu so that Man is highlighted.
   Selecting the Color Gain menu will switch between Auto and Manual color gain.
5. Use the **Rotary Control** to adjust the Color Gain to the required setting.

The new values remain set even when you switch off the display and are applied to all fishfinder windows.

Fishfinder TVG (Time Varied Gain)

The Time Varied Gain (TVG) function reduces the amount of clutter in the fishfinder display by varying the gain throughout the column of water. This function is useful for reducing the appearance of 'noise'.

- Increasing the TVG value increases the maximum depth to which TVG is applied. A high value decreases the gain in shallow water so that only the strongest echoes are displayed.
- Decreasing the TVG value reduces the maximum depth. A low TVG value has little effect on gain in shallow water.

TVG adjustment can be made automatically or manually.

Adjusting the fishfinder time varied gain

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Sensitivity**.
3. Select **TVG**.
4. Select the **TVG** menu so that Man is highlighted.
   Selecting the TVG menu will switch between TVG Auto and Manual modes.
5. Use the **Rotary Control** to adjust the TVG to the required setting.

Note: TVG has no effect in fishfinder simulator mode.

Fishfinder color threshold

The color threshold setting determines the range of colors used on screen. The effect of this is to set a color threshold below which targets are not shown. For example a low setting would result in only the strongest (orange and red) targets being displayed.

Adjusting the fishfinder color threshold

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Sensitivity**.
3. Select **Color Threshold**.
4. Select the **Color Threshold** menu so that the setting is highlighted.
5. Use the **Rotary Control** to adjust the color threshold to the required setting.

6. Press the **Ok** button, or select the **Color Threshold** menu again to confirm the setting.

Fishfinder power

The power setting controls the power level of the transducer.

Power options:

- **Auto**. This is the default setting. When it is selected the DSM automatically determines the required power setting based on the current depth, speed, and (bottom) signal strength. .
- **Manual**. If you wish to manually adjust the power to suit current conditions, you can adjust the power level between 0% and 100%, in 10% increments. Lower power levels are normally used in depth ranges less than 8 ft. (2.4 m) and higher power levels are typically selected for depths greater than 12 ft. (3.7 m).

Adjusting the fishfinder power

From the fishfinder application:

1. Select **Menu**.
2. Select **Adjust Sensitivity**.
3. Select **Power Mode**.
4. Select the **Power Mode** menu so that Man is highlighted.

   Selecting the Power Mode menu will switch the power mode between Auto and Manual.
5. Use the **Rotary Control** to adjust the power mode to the required setting.

The new values remain set even when you switch off the display and are applied to all fishfinder windows.

14.9 Fishfinder presentation options

The **Presentation** menu gives you access to features and functions which provide additional on-screen functionality.

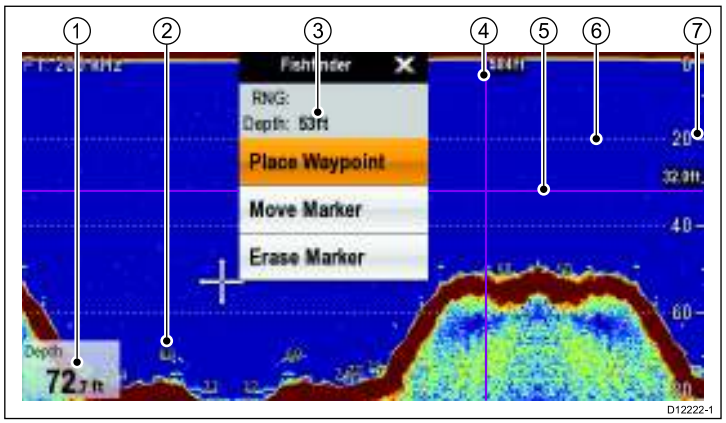
Presentation options include:

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
Depth Lines	Controls whether horizontal lines indicating depth are displayed.	• On • Off
White Lines	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
Bottom Fill	When set to On, this option displays a solid color fill for the seabed.	• On • Off
Color Palette	Various color palettes are available to suit different conditions and your personal preference.	• Classic Blue • Classic Black • Classic White • Sunburst • Greyscale • Inverse Greyscale • Copper • Night Vision
Ping Rate	Hyper Ping is a fishfinder setting for use when travelling at high speed in shallow waters. When set to Hyper the display will provide an accurate, undistorted image of the bottom at speeds of up to 40 kt.	• Normal • Hyper
Scroll Speed	Specify the fishfinder scroll speed.	• 10% — 100%
Data Overlay Set-up	Allows you to set up and display/hide up to 2 data cells in the bottom left corner of the screen: • Data Cell 1 • Select Data Category • Data Cell 2 • Select Data Category	**Data Cell 1** • On • Off **Select Data Category** Allows selection of a data type by category. **Data Cell 2** • On • Off **Select Data Category** Allows selection of a data type by category.

14.10 Depth and distance with the fishfinder

You can use VRM markers and depth lines to help you determine depths and distances in the fishfinder display.

The fishfinder display provides a number of features to help you determine depths and distances. These features are illustrated and described in more detail below:



Screen item	Description
1	**Depth reading** — current depth of seabed.
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 returns.
3	**Cursor Depth** — this is the depth of the cursor position.
4	**Vertical VRM marker** — indicates the distance behind your vessel.
5	**Horizontal VRM marker** — indicates the depth of the target.
6	**Depth lines** — horizontal dashed lines drawn at regular intervals to indicate the depth from the surface.
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 marked with the appropriate measurement.

From the fishfinder 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 desired location on screen.
4. Press the **Ok** button or select and hold the desired location to open the fishfinder context menu.
5. Select **Place marker**.
6. Press **Ok** or select and hold on the position of the marker to open the fishfinder context menu.
7. Select **Move marker**.
8. Position the marker at the desired location.
9. Press the **Ok** button to position the marker at the required position.

Note: The VRMs used in the fishfinder application are unrelated to the VRMs used in the radar application.

Fishfinder marker context menu

The fishfinder marker function includes a context menu which provides marker information and menu items.

The fishfinder marker context menu can be accessed by:

- Highlighting the marker lines using the **Joystick** and pressing the **Ok** button, or
- Selecting and holding on the marker lines on screen — Hybridtouch multifunction displays only.

The context menu provides the data for the position of the marker:

- Range
- Depth

The context menu also provide the following menu items:

- **Place Waypoint**
- **Move Marker**
- **Erase Marker**

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

14.11 Fishfinder scrolling

The fishfinder image scrolls from right to left. You can pause the scrolling or adjust the scroll speed, to ease placing of waypoints or VRMs on-screen.

Scroll speed

You can adjust the speed at which the fishfinder 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 fishfinder image. When the image is paused scrolling stops but the depth indication continues to be updated. Scroll pause/resume affects the currently selected fishfinder frequency.

If you are in dual frequency mode, you can pause one frequency while the other continues to scroll. This allows you to inspect a paused image while the other frequency continues to scroll and detect fish.

Note: Scrolling will resume if the frequency changes. For example an automatic change of frequency resulting from a change in depth.

Adjusting the fishfinder scrolling speed

From the fishfinder application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Scroll Speed**.
4. Use the **Rotary Control** to adjust the scroll speed to the required setting.
5. Press the **Ok** button, or select the **Scroll Speed** menu again to confirm the setting.

Pausing the fishfinder scrolling image

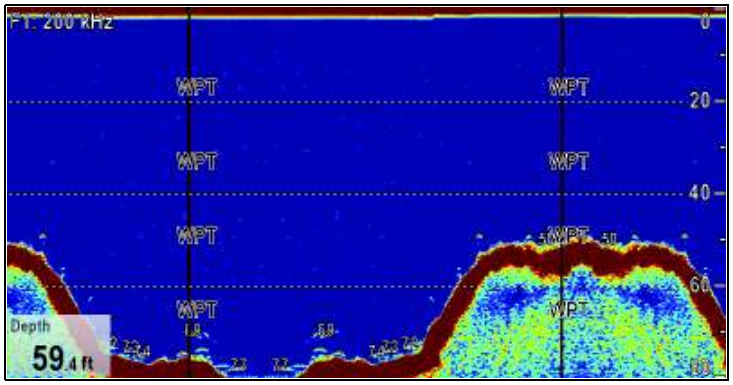
From the fishfinder application:

1. Select **Menu**.
2. Select **Scroll** so that Pause is highlighted.
   Selecting Scroll will switch between Scroll Pause/Resume.

14.12 Fishfinder waypoints

Placing a waypoint on the fishfinder display 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 labelled WPT is displayed on screen. You can edit waypoints and navigate to them in the fishfinder window.



Placing a Waypoint in the fishfinder application using touch

This only applies to HybridTouch displays.

From the fishfinder application:

1. Select and hold the required location.
   The fishfinder context menu is displayed.
2. Select **Place Waypoint**.

Placing a waypoint in the fishfinder application

From the fishfinder application:

1. Press the **WPT** button.
   The waypoint menu is displayed.
2. Whilst the waypoint menu is open:
   - Press the **WPT** button 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.

14.13 Fishfinder alarms

The display can be configured to provide a number of fishfinder alarms.

The following fishfinder alarms can be set when a DSM is detected, or when the simulator is on:

- **Fish** — alarm sounds when a target meets the specified sensitivity level and, is within the depth limits (if enabled). The greater the fish alarm sensitivity, the greater the number of target image depths displayed.
- **Fishfinder Deep** — alarm sounds when the DSM detects that the depth is greater than the deep limit.
- **Fishfinder Shallow** — alarm sounds when the DSM detects that the depth is less than the shallow limit.

Setting up fish alarms

The fish alarms are configured from the alarms menu.

From the homescreen:

1. Select **Set-up**.
2. Select **Fish**.
   The Fish alarms menu is displayed.
3. Select **Fish** so that On is highlighted.
4. Select **Fish Sensitivity**.
5. Use the **Rotary Control** to adjust the fish sensitivity to the required setting.
   The greater the fish alarm sensitivity, the greater the number of target image depths displayed.
6. Select **Fish Depth Limits** so that **On** is highlighted.
   The shallow and deep fish limit settings will be activated in the menu.
7. Select **Shallow Fish Limit**.
8. Use the **Rotary Control** to adjust the shallow fish limit to the required setting.
9. Select **Deep Fish Limit**.
10. Use the **Rotary Control** to adjust the deep fish limit to the required setting.

Setting up fishfinder deep alarm

From the homescreen:

1. Select **Set-up**.
2. Select **Alarms**.
3. Select **Fishfinder Deep**.
4. Select Deep so that On is highlighted.
   Selecting Deep will switch between On and Off.
5. Select **Deep Limit**.
6. Use the **Rotary Control** to adjust the setting to the required value.
7. Press the **Ok** button to confirm value.

Note: The Deep Limit cannot be set to less than the Shallow Limit.

Setting up fishfinder shallow alarm

From the homescreen:

1. Select **Set-up**.
2. Select **Alarms**.
3. Select **Fishfinder Shallow**.
4. Select Shallow so that On is highlighted.
   Selecting Shallow will switch between On and Off.
5. Select **Shallow Limit**.
6. Use the **Rotary Control** to adjust the setting to the required value.
7. Press the **Ok** button to confirm value.

Note: The Shallow Limit cannot be set to greater than the Deep Limit.

14.14 Sounder set–up menu options

This section describes the settings you can change using the sounder set up menu: (**Menu > Set-up > Sounder Set-up**). The set up menu contains settings that are likely to be changed infrequently.

Menu Item	Description	Options
Internal Sounder	Switch the built in sounder on and off, for use when you have more than one multifunction display with internal sounder. **Note:** Disabled on non-sounder variants. **Note:** Disabled if external sounder detected.	• On • Off
Ping Rate Limit	Provides a speed limiter; it is useful to adjust the ping rate to suit local conditions. For example, the ping rate may be too fast when there is a hard bottom in shallow water. This setting reverts to 26 pings per second when the DSM unit is powered off. **Note:** Ping rate limit is disabled if Ping rate is set to hyper in the presentation menu.	• 5 — 30 pings per second
Ping Enable	The sonar ping is normally enabled. It 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 DSM unit is powered off.	• On • Off
Interference rejection	Removes spikes caused by other fishfinder-equipped vessels. **Note:** Interference rejection will be disabled in Hyper Ping mode	• Auto • Low • Medium • High
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 will be disabled in Hyper Ping mode	• Off • Low • High
Sonar reset	Restore all settings on the DSM to factory default. When performing a DSM Reset, it is normal to briefly loose connection with the DSM.	• Yes • No
Trip Counter Reset	Resets the Trip Counter of the DSM.	• Yes • No

14.15 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.

Menu Item	Description	Options
Select Transducer	Select the appropriate transducer type from those displayed. Some transducer may be detected by the system automatically.	• P58/P65/P66 • P79 • P319/B117SS555 • B66V/B66VL • B744V/B744Vl/SS544V • B45 • B60/SS60 • P48 • 83\200 Khz (Minn Kota)
Select 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.	• None • Default • B120/P120 ST600 • ST69 • B120/P120 ST800 • CS4500
Depth Offset (waterline)	Offset represents the depth of the transducer (relative to the waterline).	• –9.9 to +9.9 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

Fishfinder Transducer Calibration

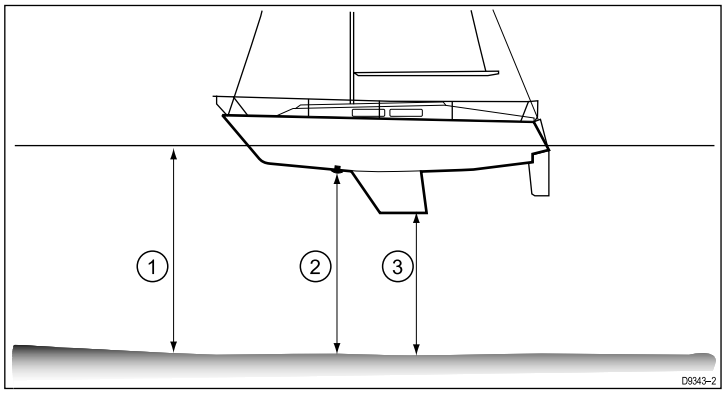
Your fishfinder transducer must be calibrated correctly to achieve accurate depth readings.

The multifunction display receives the image from a DSM 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 DSM 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 DSM and relate to the transducer, they are applied system-wide.

Depth Offset

Depths are measured from the transducer to the sea bed, but you can apply an offset value to the depth data, so that the displayed depth reading represents the depth to the sea bed from either the keel or the waterline.

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 the keel on your vessel, as appropriate. Then set the appropriate depth offset value.



1	Waterline offset
2	Transducer / Zero offset
3	Keel offset

If an offset is not applied, displayed depth readings represent the distance from the transducer to the sea bed.

Setting the depth offset

From the fishfinder application:

1. Select **Menu**.
2. Select **Set-up**.
3. Select **Transducer Set-up**.
4. Select **Depth Offset**.
5. Use the **Rotary Control** to adjust the offset to the required value.

14.16 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 Fishfinder 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 15: Using the data application

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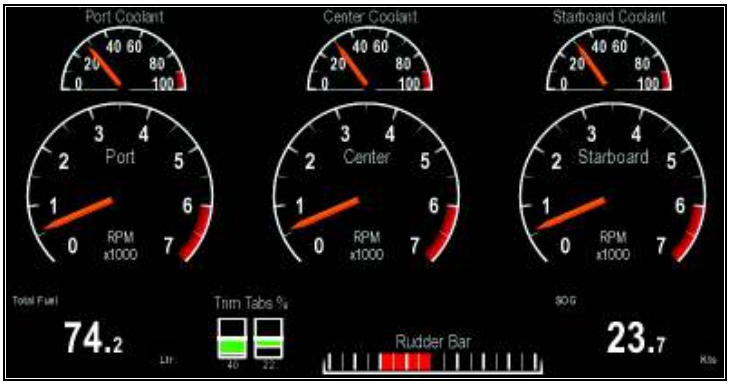
- 15.1 Data application overview on page 174
- 15.2 Pre-configured datapages on page 174
- 15.3 Customizing the data application on page 175

15.1 Data application overview

The data application displays system and instrument data on your multifunction display.

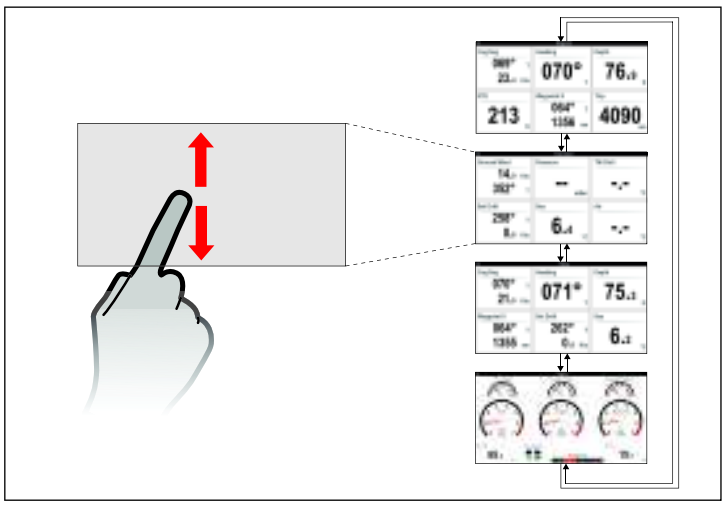
The data application enables you to view numeric data generated by the system. It also shows data from instruments connected to your multifunction display using the NMEA or SeaTalk^{ng} protocols.



Selecting datapages using touch

You can scroll through pre-configured and custom datapages using the touch screen.

This only applies to HybridTouch displays.



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

From the data application:

1. Use the **Rotary Control** to scroll between datapages.
   Turn the rotary control **clockwise** to view the next datapage, or **anti-clockwise** to view the previous datapage.
2. You can also use the **Joystick** to scroll between datapages
   Move the Joystick **Down** to view the next datapage, or **Up** to view the previous datapage.

15.2 Pre-configured datapages

By default, a pre-configured range of data is displayed in a number of datapages. Each datapage consists of a number of 'cells', each containing a different item of data.

Note: The datapages available, by default are dependant upon the type of vessel selected during the initial set up wizard and the number of engines selected in the data application menu.

Datapage	Default Data Items
Navigation panel	• COG SOG • Heading • Depth • Rolling road • Waypoint Info • Trip (e7 / e7D / e95 / e97 / c95 / c97 only.)
Environmental panel	• GWS & GWD • Pressure • True Wind Chill • Set & Drift • Sea Temperature • Air Temperature • AWA & AWS (e125 / e127 / c125 / c127 only.) • Humidity (e125 / e127 / c125 / c127 only.)
Fishing panel	• COG SOG • Heading • Depth • Live well (e125 / e127 / c125 / c127 only.) • Waypoint Info • Set & Drift • Sea Temperature • Local time (e125 / e127 / c125 / c127 only.)
Sailing panel	• COG SOG • Compass (e125 / e127 / c125 / c127 only.) • Heading (e7 / e7D / e95 / e97 / c95 / c97 only.) • Depth • Speed through water (e125 / e127 / c125 / c127 only.) • AWS & AWA • VMG Wind • VMG wpt • TWS & TWA (e125 / e127 / c125 / c127 only.)
Engine 1	• Oil Pressure 1 • RPM 1 • Coolant Temperature 1 • Total Fuel • Rudder • SOG

Datapage	Default Data Items
Engine 2	• Oil Pressure 1 • Coolant Temperature 1 • Coolant Temperature 2 • Oil Pressure 2 • RPM 1 • Trim Tabs • RPM 2 • Total Fuel • Rudder • SOG
Engine 3	• Coolant Temperature 1 • Coolant Temperature 2 • Coolant Temperature 3 • RPM 1 • RPM 2 • RPM 3 • Total Fuel • Rudder • SOG

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.

15.3 Customizing the data application

You can customize the data application to show the system and instrument data that you require.

In addition to displaying the default, pre-configured datapages in the data application, you can also:

- Change the order datapages appear.
- Customize datapages content to your specific requirements.
- Rename the datapages.
- Add new custom datapages.
- Delete existing datapages.
- Set the number of engines your vessel has (1 — 3).
- Set the maximum engine RPM range.
- Change page color theme and dial color.
- Reset all pages to default.

Changing datapage order using touch

You can change the order that datapages appear.

This only applies to HybridTouch displays.

From the data application:

1. Scroll to the datapage you want to move.
2. Select **Menu**.
3. Select **Edit Page**.
   The edit page menu is displayed.
4. 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 up or down in the data application.

Changing datapage order

You can change the order that datapages appear.

From the data application:

1. Using the **Rotary Control** or **Joystick** scroll to the datapage you want to move.
2. Select **Menu**.
3. Select **Edit Page**.
   The edit page menu is displayed.
4. To move a datapage up:
   i. Select **Move Page Up**.
   ii. Press the **Ok** button to confirm.
5. To move a datapage down:
   i. Select **Move Page Down**.
   ii. Press the **Ok** button to confirm.

Each time move page up or move page down is selected and confirmed the datapage will be moved 1 space up or down in the data application.

Customizing datapage content

From the data application:

1. Select **Menu**.
2. Select **Edit Page**.
3. Select the cell you want to change.
4. Select **Select Data Category**.
5. Select a data category.
   Selecting a data category will display a list of data items for that category.
6. Select the data item you want to display.
   Once selected a tick will be placed next to the data item in the menu and the cell on screen will display the new data item
7. Repeat steps 3 to 6 for all the data items you want to change.

List of data items

Data items can be displayed in datapage cells.

The following table shows the data items available by category.

Data Category	Data Item	Digital	Dial	Graphical
Boat	Fresh Water	✓	✓	✗
	Grey Water	✓	✓	✗
	Black Water	✓	✓	✗
	Live Well	✓	✓	✗
	Trim Tabs	✗	✗	✓
Depth	Depth	✓	✗	✗
Distance	Log & Trip	✓	✗	✗
	Log	✓	✗	✗
	Trip	✓	✗	✗
	Ground Log, Trip	✓	✗	✗
	Ground Log	✓	✗	✗
	Ground Trip 1	✓	✗	✗
	Ground Trip 2	✓	✗	✗
	Ground Trip 3	✓	✗	✗
	Ground Trip 4	✓	✗	✗
Engine	RPM	✓	✓	✗
	Boost Pressure	✓	✓	✗
	Alternator	✓	✓	✗
	Oil Pressure	✓	✓	✗
	Coolant Temperature	✓	✓	✗
	Coolant Pressure	✓	✓	✗
	Engine Load	✓	✓	✗
	Engine Hours	✓	✗	✗
	Engine Tilt	✓	✗	✗
Fuel	Fuel Level 1	✓	✓	✗
	Fuel Level 2	✓	✓	✗
	Fuel Level 3	✓	✓	✗
	Total Fuel	✓	✗	✗

Data Category	Data Item	Digital	Dial	Graphical
Environ-ment	Pressure	✓	✗	✗
	Air Temperature	✓	✗	✗
	Set & Drift	✓	✗	✗
	App Wind Chill	✓	✗	✗
	True Wind Chill	✓	✗	✗
	Humidity (digital)	✓	✗	✗
	Dew Point	✓	✗	✗
	Sea Temperature	✓	✗	✗
GPS	Vessel Position	✓	✗	✗
	COG SOG	✓	✗	✗
	COG	✓	✗	✗
	SOG	✓	✗	✗
Heading	Heading	✓	✗	✗
	Locked Heading	✓	✗	✗
Navigation	Cursor position (databar and data overlay only.)	✓	✗	✗
	Cursor info (databar and data overlay only.)	✓	✗	✗
	Cross Track Error	✓	✗	✗
	Rolling Road	✗	✗	✓
	Compass	✗	✓	✗
	Target Position	✓	✗	✗
	Bearing to Waypoint	✓	✗	✗
	Distance to Waypoint	✓	✗	✗
	WPT TTG	✓	✗	✗
	Waypoint Info	✓	✗	✗
Pilot	Rudder	✓	✗	✗
Speed	Speed	✓	✗	✗
	VMG to Waypoint	✓	✗	✗

Data Category	Data Item	Digital	Dial	Graphical
Time	Local Time	✓	✗	✗
	Local Date	✓	✗	✗
Wind	TWS & TWA	✓	✗	✗
	AWS & AWA	✓	✗	✗
	GWS & GWD	✓	✗	✗
	VMG to Windward	✓	✗	✗
None				

Note: The engine data category shown above will contain one set of data items per engine.

Renaming a datapage

From the data application:

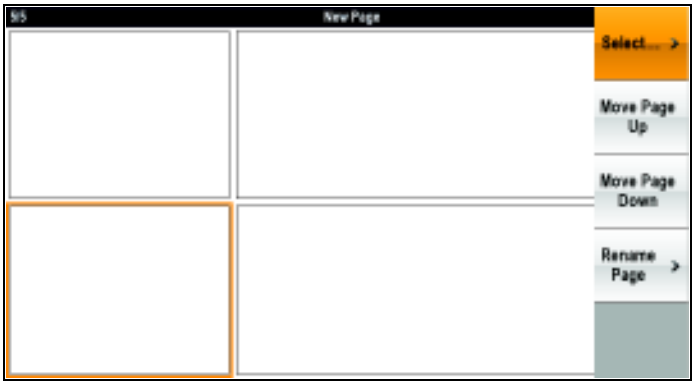
1. Select **Menu**.
2. Select **Edit Page**.
3. Select **Rename Page**.
   The on screen keyboard is displayed.
4. Enter the new name for the datapage.
5. Select **SAVE**.

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 data application:

1. Select **Menu**.
2. Select **Create New Page**.
   A list of available page layouts is displayed.
3. Select the required page layout.
   The new page is displayed on screen.



4. Select the blank cell on the new page layout that you want to add a data item to.
5. Select **Select Data Category**.
6. Select a data category.
   Selecting a data category will display a list of data items for that category.
7. Select the data item you want to display.
   Once selected a tick will be placed next to the data item in the menu and the cell on screen will display the selected data item.
8. Repeat steps 3 to 6 for all the data items you want to change.
9. Select **Rename Page**.
   The on screen keyboard is displayed.
10. Enter the new name for the datapage.
11. Select **SAVE**.

Deleting a datapage

You can delete custom or pre-configured datapages from the data application. The minimum number of datapages allowed is 1.

From the data application:

1. Scroll to the datapage you want to delete.
2. Select **Menu**.
3. Select **Delete Page**.
   The confirm delete pop up message is displayed.
4. Select **Yes** to delete the datapage, or **No** to cancel the action.

Note: You cannot create a new engine page with the same layout as the pre-configured engine datapages.

Setting number of engines

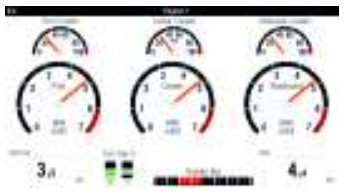
You can set the number of engines your vessel has between 1 and 3.

From the data application:

1. Select **Menu**.
2. Select **Num. Of Engines**.
3. Select either **1**, **2** or **3**.
   Once selected, a tick will be placed next to the item in the menu and the engine datapage will be reset to display the correct number of engines.

Engine datapages

Depending on the number of engines you choose you will see one of the following datapages:

1 Engine	
2 Engines	
3 Engines	

Note: The default number of engines is determined by the vessel type selected during the initial start up wizard, if a sail boat is chosen then default is 1 engine for motor boats default is 2 engines.

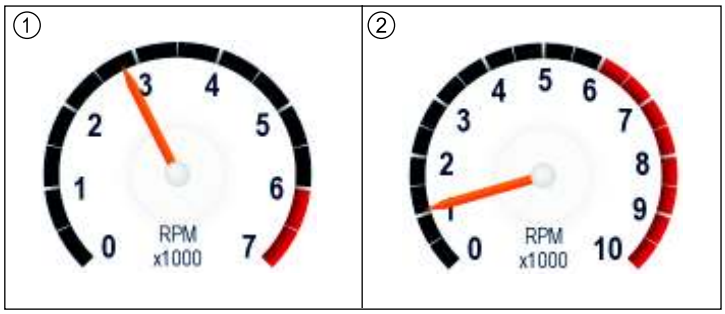
Setting maximum engine RPM

You can set the maximum RPM range to display on the RPM data item.

From the data application:

1. Select **Menu**.
2. Select **Max RPM Range**.
   A list of available RPM settings is displayed.
3. Select the required RPM range.
   A tick will be placed next to the selected RPM range in the menu and the RPM range on the engine datapage will be changed to your new setting.

Example



1	Auto*
2	10,000 RPM

Note: *The maximum RPM when in auto mode is set by the engine.

Changing color theme and dial colors

You can change both the color theme and the dial color.

From the data application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Color Theme**.
   Selecting color theme will switch color between Light and Dark.
4. Select **Dial Color**.
   Selecting dial color will switch the color between Light and Dark.

Datapage and dial colors

Datapage color theme and dial colors can be switched between light and dark.

Color Theme	Dial Color	Example
Light	Light	
Light	Dark	
Dark	Dark	
Dark	Light	

Resetting all datapages

You can reset the datapages in the data application to the factory defaults.

1. Select **Menu**.
2. Select **Reset All Pages**.
   The confirm reset pop up message is displayed.
3. Select **Yes** to reset or **No** to cancel the action.

Note: Resetting all pages will restore your pre-configured pages to default settings and remove any custom pages that have been created. Number of engines and maximum RPM settings will not be changed during the reset.

Chapter 16: Using the weather application (North America only)

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- 16.1 Weather application overview on page 180
- 16.2 Weather application set up on page 180
- 16.3 Weather application display overview on page 181
- 16.4 Weather map navigation on page 184
- 16.5 Weather context menu on page 184
- 16.6 Weather information on page 185
- 16.7 Weather reports on page 185
- 16.8 Animated weather graphics on page 186
- 16.9 Weather application menu options on page 187
- 16.10 Glossary of weather terms on page 188

16.1 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.

Note: For types of warnings, watches, and advisories, refer to the NOAA website at www.nws.noaa.gov

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.

If you do not have the subscription agreement, you may view a copy on the internet at www.sirius.com/marineweather

16.2 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 (www.siriusxm.com) to subscribe for Sirius Marine Weather (www.siriusxm.com/marineweather). 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.

Accessing the weather application

To access the weather application on your multifunction display follow the step below:

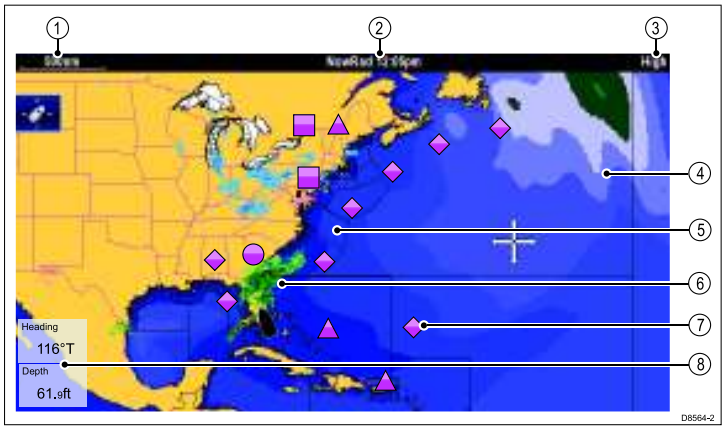
From the homescreen:

1. Select the **Weather** icon: 

16.3 Weather application display overview

The weather application displays a range of graphics to indicate weather conditions and forecast information.

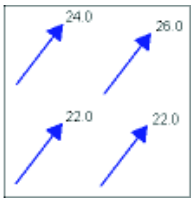
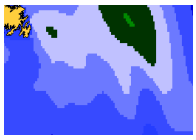
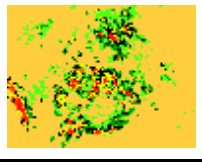
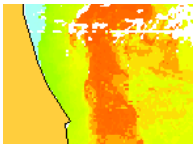
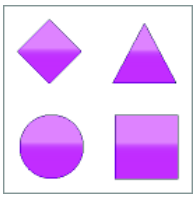
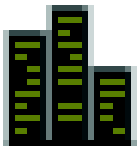
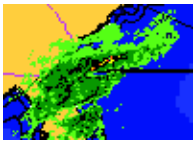
The following diagram illustrates the main features of the weather application display:



Item	Description
1	Range
2	Animation and time / date
3	Signal strength
4	Wave heights
5	Marine zones
6	NOWRad
7	Surface observation stations
8	Data overlay cells

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.

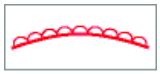
Historical (grey)	Current (red)	Forecast (orange)	Description
			Hurricane (Category 1–5)
			Tropical storm
			Tropical disturbance, tropical depression

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)
	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

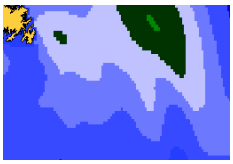
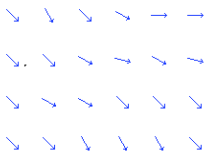
The weather application uses a range of symbols to represent different wind speeds.

Symbol	Speed	Symbol	Speed	Symbol	Speed
	3–7 kts		8–12 kts		13–17 kts
	18–22 kts		23–27 kts		28–32 kts

Symbol	Speed	Symbol	Speed	Symbol	Speed
	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)

Color code	Precipitation type	Reflectivity Intensity
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.

16.4 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

1. Select the Find Ship icon:  located on the left hand side of the screen.

Note: You can also access the Find Ship function from the menu: **Menu > Find Ship**.

16.5 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 weather context menu can be accessed by:

- Selecting a location using the **Joystick** and pressing the **Ok** button, or
- Selecting and holding on an area on screen — Hybridtouch multifunction displays only.

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.

The context menu options can be accessed:

- using the **Rotary Control** and **Ok** button, or
- selecting the menu item on screen — Hybridtouch multifunction displays only.

16.6 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.

16.7 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:

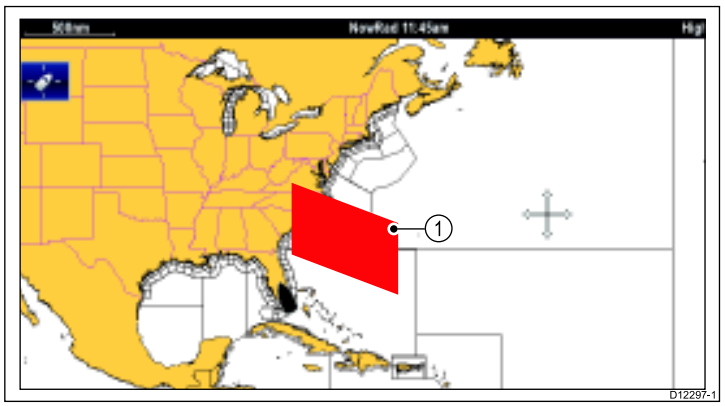
1. Select **Menu**.
2. Select **View Report**.
3. Select **Report At**.
   Selecting report at will switch between reports from Ship location or Cursor location.

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.

16.8 Animated weather graphics

You can view animated weather graphics to provide an indication of changing weather patterns.

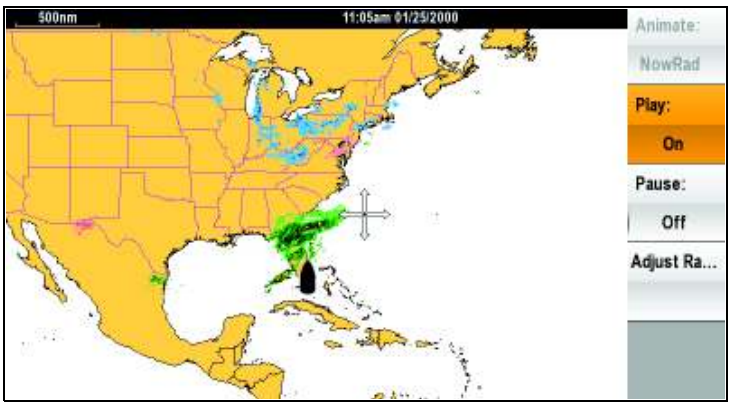
The animated weather option enables you to view an animation from the current time for:

- 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.

16.9 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** • Canadian Radar • Cities • Lightning • Marine Zones • NOWRad • 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.
Data Overlay Set-up	Allows you to set up and display/hide up to 2 data cells in the bottom left corner of the screen: • Data Cell 1 • Select Data Category • Data Cell 2 • Select Data Category	**Data Cell 1** • On • Off **Select Data Category** Allows selection of a data type by category. **Data Cell 2** • On • Off **Select Data Category** Allows selection of a data type by category.
Sirius User ID	This option will display your registered Sirius User ID.	

16.10 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 7495 mph (6482 kt or 119153 km/hr). Storm surge generally 45 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 96110 mph (8395 kt or 154177 km/hr). Storm surge generally 68 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 24 hours before arrival of the hurricane centre Small craft in unprotected anchorages break moorings. • **Category 3** — Winds 111130 mph (96113 kt or 178209 km/hr). Storm surge generally 912 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 35 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 131155 mph (114135 kt or 210249 km/hr). Storm surge generally 1318 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 35 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 35 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 510 miles (816 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.
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.

Term	Definition
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 17: Using video

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- 17.1 Video application overview on page 192

17.1 Video application overview

You can view a video or camera source on your multifunction display.

The video application enables you to connect a video source directly to your multifunction display, and view the video on the screen.

You can also adjust the brightness, contrast, and color of the video image and aspect ratio. PAL / NTSC is selected automatically.

The following image shows an example of a camera feed displayed in the video application:

Note: For information on connecting the video source and compatible video formats, refer to the Installation instructions.

Adjusting the video image

With a video source displayed in the video application:

1. Select **Menu**.
2. Select **Contrast**, **Brightness**, or **Color**, as appropriate.
   A level indicator is displayed.
3. Use the rotary control to adjust the setting to the required level.

Selecting the aspect ratio

If supported by your connected video input device you may manually switch the aspect ratio between 4:3 and 16:9 follow the steps below:

From the Video application with a video feed displayed:

1. Select **Menu**.
2. Select **Aspect ratio** so that 4:3 or 16:9 is selected as required.

Selecting a video input feed

For displays with more then 1 video input you can select which feed to view in the video application.

Note: Only applicable to e95 / e97 / e125 / e127 variants.

From the Video application with a video feed being displayed:

1. Select **Menu**.
2. Select **Feedname1** or **Feedname2** to select the required video feed to be displayed.

Chapter 18: Wireless video streaming

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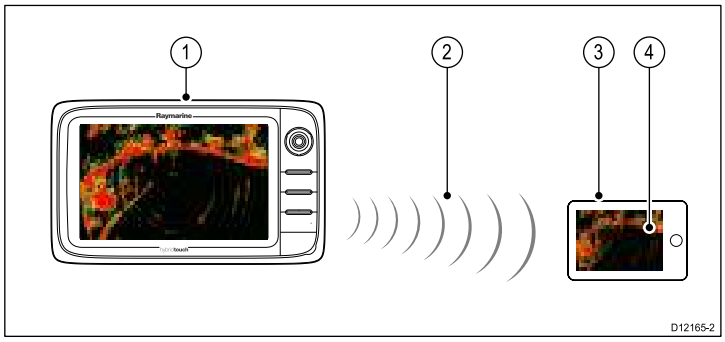
- 18.2 Enabling WiFi on page 194
- 18.3 Enabling display streaming on page 195
- 18.4 Setting up WiFi security on page 195
- 18.5 Selecting a WiFi channel on page 196

18.1 Video streaming connection

You can use an Apple iPhone or iPad as a wireless repeat display.

This feature enables you to stream what you see on your multifunction display to an Apple iPhone 4 (or later) or iPad, using a WiFi connection.



1. Multifunction display.
2. Wi-Fi connection.
3. Apple iPhone 4 (or later) or iPad.
4. “Raymarine Viewer” video streaming app.

To use this feature you must first:

- Download and install the “Raymarine Viewer” video streaming app, available from the Apple App Store.
- Enable Wi-Fi in the System Settings on the multifunction display.
- Enable Wi-Fi on your iPhone or iPad.
- Select the Raymarine Wi-Fi connection from the list of available Wi-Fi networks on your iPhone or iPad.
- Enable Device Streaming in the System Settings on the multifunction display.

18.2 Enabling WiFi

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **WiFi > ON**.

18.3 Enabling display streaming

Display streaming must be enabled before you can stream video from the multifunction display to an iPad or iPhone.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **Display Streaming > ON**.
5. To stream your display launch the Raymarine viewer application on your ipad or iphone and follow the on-screen instructions.

18.4 Setting up WiFi security

You can encrypt the WiFi connection on the multifunction display to prevent unauthorized devices from accessing the connection. The default encryption is WPA2.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **WiFi > ON**.
5. Select **WiFi Name** and specify the SSID. This should be a memorable word and must be unique to each multifunction display in your system.

   By default the SSID is the serial number of the multifunction display.
6. Select **WiFi Security** and specify the type of encryption you want to use — None, WPA only, WPA 2 only (default), or WPA/WPA 2.

Note:

- Raymarine strongly recommends the use of the **WPA2** security setting.
- Selecting **None** for your WiFi Security will leave your WiFi open and allow anyone with a WiFI enabled device access to your system.

7. It is recommended that the default **WiFi Passphrase** is NOT changed.

Note: Once WiFi security is set up on the multifunction display you must specify the same SSID and password credentials on your iPhone or iPad before wireless video streaming can be used.

Changing the default passphrase

It is recommended that the default passphrase is not changed, however if you do need to change the passphrase follow the steps below:

From the Connections menu: **Set-up > System Settings > Connecitons**

1. Select **WiFi Passphrase**.

   The on-screen keyboard will be displayed, showing the current passphrase.
2. Use **DEL** to delete the current passphrase.
3. Enter a new passphrase.

Note: Ensure the passphrase you choose is 'strong' by using a combination of upper/lower case letters, numbers and special characters. The passphrase can be between 8 and 63 characters in length with longer passphrases being more secure.

4. Select **SAVE** to save the new passphrase.

18.5 Selecting a WiFi channel

By default the multifunction display automatically selects an available WiFi channel. If you're experiencing difficulties with wireless video streaming it may be necessary to manually specify a WiFi channel for both the multifunction display and the device you want to stream video to.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **WiFi > ON**.
5. Select **WiFi Channel**.
6. Select one of the listed channels.

Chapter 19: Media player application

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- 19.1 Media player connection on page 198
- 19.2 Enabling Bluetooth on page 198
- 19.3 Pairing a Bluetooth media player on page 199
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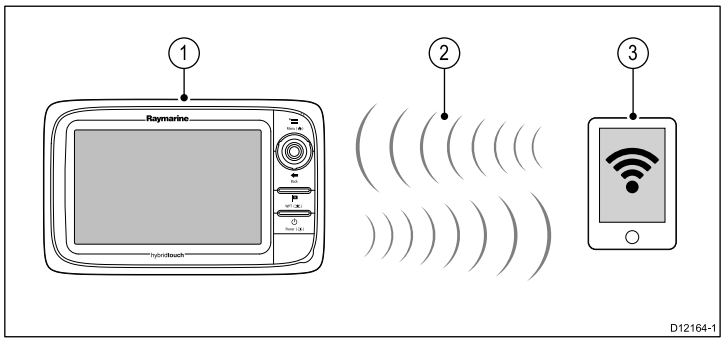
- 19.5 Media player controls on page 200
- 19.6 Media player controls using a remote control on page 200
- 19.7 Unpairing a Bluetooth device on page 201

19.1 Media player connection

You can use your multifunction display to wirelessly control a Bluetooth-compatible media player (such as a smartphone).

The media player must be compatible with the Bluetooth AVRCP protocol (version 2.1 or higher).



1. Multifunction display.
2. Bluetooth connection.
3. Bluetooth-compatible media player.

To use this feature you must first:

- Enable Bluetooth in the System Settings on the multifunction display.
- Enable Bluetooth on the media player device.
- Pair the media player device with the multifunction display.
- Enable Audio Control in the System Settings on the multifunction display.

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.

19.2 Enabling Bluetooth

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **Bluetooth > On**.

19.3 Pairing a Bluetooth media player

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **New Bluetooth Connection**.

   A message is displayed prompting you to put your media player device into discovery mode.
5. 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.
6. On the multifunction display, select **OK** in the message dialog.

   The multifunction display will search for active Bluetooth devices.
7. Select **Stop** when your device appears in the list.
8. Select the media player device in the list.

   A pairing request message is displayed on the external media device.
9. 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.
10. 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.
11. If the pairing was successful the multifunction display will confirm the pairing.

    The external media device is now paired with the multifunction display.

19.4 Enabling audio control

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **Connection Manager**.
5. Select the media player device in the list.
6. Select **Audio Control > ON**.

19.5 Media player controls

The on-screen media player controls enable you to control the audio playing on your external media player.

	This only applies to HybridTouch displays.

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.

19.6 Media player controls using a remote control

You can control audio wirelessly using a Raymarine remote control unit.

1. Press **UP** arrow for next track.
2. Press **DOWN** arrow for previous track.
3. Press **SHORTCUT** button to play/pause audio.

19.7 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.

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **Connection Manager**.
5. Select the media player device in the list.
6. Select **Unpair / Forget this device**.

Chapter 20: Using the thermal camera application

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- 20.1 Thermal camera application overview on page 204
- 20.2 Camera control on page 205
- 20.3 Image adjustments on page 206
- 20.4 Camera setup on page 207

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:**
  - 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.
  - Aspect ratio.
  - 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.

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.
	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.
	Image paused.
	Single active controller on network.
	Multiple active controllers on network.
	PC / laptop detected on network.

20.2 Camera control

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.

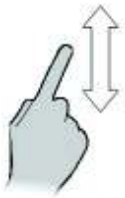
Note: You can also use any of the camera controls in the thermal camera application to "wake" the camera from standby mode.

Panning, tilting, and zooming the thermal image

There are 2 ways of controlling the thermal camera using the thermal camera application:

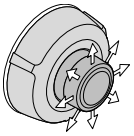
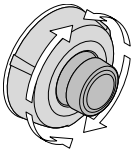
- Using the touchscreen and the UniControl's rotary control (HybridTouch displays only).
- Using the UniControl's joystick and rotary controls.

To pan and tilt the thermal camera using touch actions:

	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).

Note: You cannot zoom the image using the touchscreen. You must use the multifunction display's rotary control, or the thermal camera's optional Joystick Control Unit (JCU).

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.

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

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 JCU (Joystick Control Unit) or thermal camera application 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.

20.3 Image adjustments

Thermal and visible-light operation

“Dual payload” thermal cameras are equipped with 2 camera lenses — a thermal imaging (infrared) camera lens and a visible-light camera lens.

	**Thermal camera lens** — provides night-time imagery, based on temperature differences between objects. Thermal imaging produces a clear image even in total darkness.
	**Visible-light camera lens** — 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.

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.

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.
4. Use the rotary control to adjust as required.

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 is available to help you distinguish objects on-screen in different conditions.

The **Color Palette** option 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 red, which may improve your night vision. This default mode can be changed if required using the camera’s **Video Set-up** menu.

Note: If you have the Disable Color Thermal Video option selected in the camera’s **Video Set-up** menu, only 2 color modes are available — greyscale and red.

Changing the thermal camera color mode

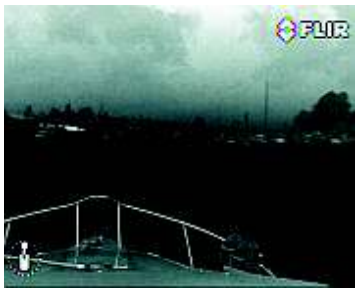
With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Image Options**.
3. Use the **Color Palette** 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**.

20.4 Camera setup

Accessing the thermal camera set-up menu

With the thermal camera application displayed:

1. Select **Menu**.
2. Select **Camera Set-up**.
3. Select **Camera Menu**.

   The camera's menu is displayed and can be controlled using the joystick and the OK button.

Chapter 21: DSC VHF radio integration

Chapter contents

- 21.1 Using a DSC VHF radio with your display on page 210
- 21.2 Enabling DSC VHF radio integration on page 210

21.1 Using a DSC VHF radio with your display

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-equipped vessel, 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) 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:

21.2 Enabling DSC VHF radio integration

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **DSC Alerts > ON.**

Note: DSC VHF distress messages are only displayed for radios connected via NMEA 0183. DSC VHF distress messages are NOT displayed for SeaTalk radios connected to the display via the SeaTalk to SeaTalkng converter.

Chapter 22: Using a remote control

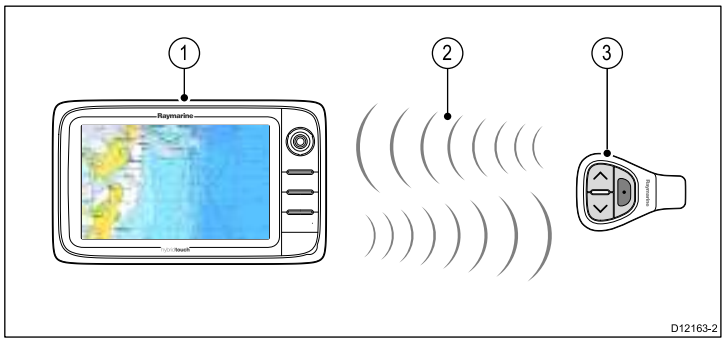
Chapter contents

- 22.1 Remote control connection on page 212
- 22.2 Pairing the remote and configuring the UP and DOWN buttons on page 212
- 22.3 Operating principles on page 213
- 22.4 Customizing the SHORTCUT button on page 213
- 22.5 Remote control functions on page 214
- 22.6 Reconnecting the RCU on page 215

22.1 Remote control connection

You can control the multifunction display wirelessly using a Raymarine remote control unit.

The remote control uses a Bluetooth wireless connection.



1. Multifunction display.
2. Bluetooth connection.
3. Raymarine Bluetooth remote control (for example, RCU-3).

To use the remote control you must first:

- Enable Bluetooth in the System Settings on the multifunction display.
- Pair the remote control unit with the multifunction display.

22.2 Pairing the remote and configuring the UP and DOWN buttons

The remote control unit must be “paired” with the multifunction display that you want to control. On your multifunction display, with the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Connections**.
4. Select **Bluetooth > On**.
5. Select **New Bluetooth Connection**.

   A pop-up message will be displayed to confirm that the device you are connecting to is discoverable.
6. Select **Ok** to confirm.
7. On your **remote control unit**, hold down the UP and DOWN buttons together for 10 seconds.
8. Select OK to clear the on-screen message.

   A list of discovered devices is displayed.
9. Select the remote control unit in the list of devices.
10. When prompted, press the arrow button on your remote that you wish to be configured as the UP button. The other arrow button will automatically be configured as the DOWN button.

    If the pairing was successful a “Pairing Success” message will be displayed. If a “Pairing Failure” or “Pairing Timeout” message is displayed, repeat steps 1 to 9.

22.3 Operating principles

Remote control operating principles.

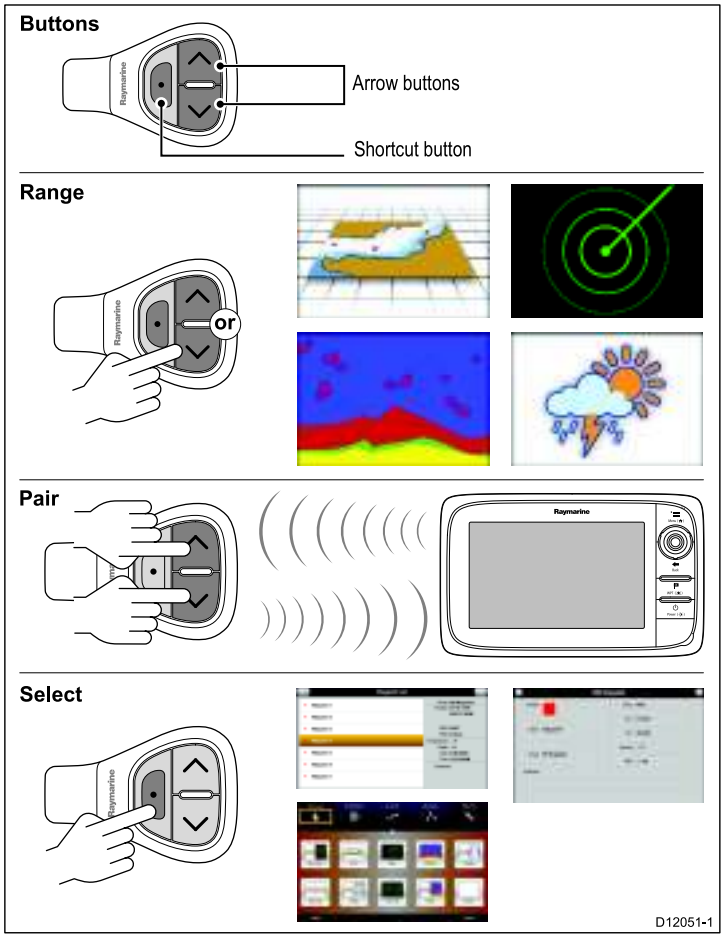
- Only 1 multifunction display may be operated by a remote control unit at any one time. You cannot pair a multifunction display to more than 1 remote control at the same time.
- The 3 buttons on the remote control unit have different functions depending on the CONTEXT in which you are using it. For example, in the chart application the buttons control different functions than they do in the homescreen.
- All functions are accessed using a combination of the 3 buttons. For some functions you must press a button MOMENTARILY. You can also HOLD a button for continuous response (for example, continuous ranging in the chart application).
- The main methods of operation involve the use of the **UP** and **DOWN** “arrow” buttons to highlight different on-screen options. The **SHORTCUT** button is used to select (execute) them.
- During the pairing process you must define which of the arrow buttons you want to be the “UP” button.
- The **SHORTCUT** button is customizable and can be configured to operate one of a number of functions, using the System Settings menu on your multifunction display.

22.4 Customizing the SHORTCUT button

On your multifunction display, with the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **External Devices**.
4. Select **Remote Control**.
5. Select **Customize shortcut key**.
6. Select the function that you want to assign to the **SHORTCUT** key.

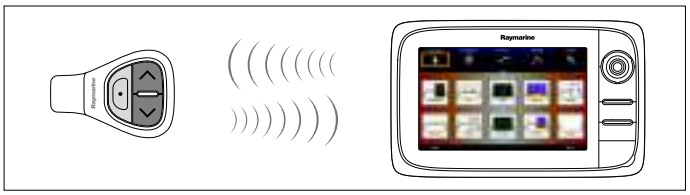
22.5 Remote control functions



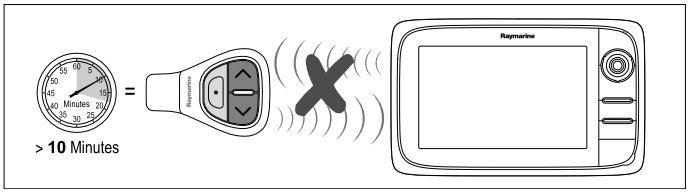
	Button	Application where function available:				
Default functions:		**Chart**	**Radar**	**Fishfinder**	**Weather**	**Homescreen**
Range / zoom.	• Press UP or DOWN arrow for momentary response. • **Hold** UP or DOWN arrow for continuous response.	✓	✓	✓	✓	✗
Open homescreen.	Shortcut: **Hold**	✓	✓	✓	✓	✗
Select application in homescreen (in left-to-right, top-to-bottom order).	• Press UP or DOWN arrow for momentary response. • **Hold** UP or DOWN arrow for continuous response.	✗	✗	✗	✗	✓
Toggle menu items and options in dialogs and prompts (in left-to-right, top-to-bottom order).	• Press UP or DOWN arrow for momentary response. • **Hold** UP or DOWN arrow for continuous response.	✓	✓	✓	✓	✓
Place waypoint at vessel position.	Shortcut	✓	✓	✓	✓	✗
Media player control (requires a Bluetooth media player paired to the multifunction display).	• Press UP / DOWN arrow for next / previous track. • Press SHORTCUT button for play / pause.	✓	✓	✓	✓	✓
Customizable functions:						
Open homescreen.	SHORTCUT	✓	✓	✓	✓	✗
Switch active application (only available when multiple applications are displayed).	SHORTCUT	✓	✓	✓	✓	✗

22.6 Reconnecting the RCU

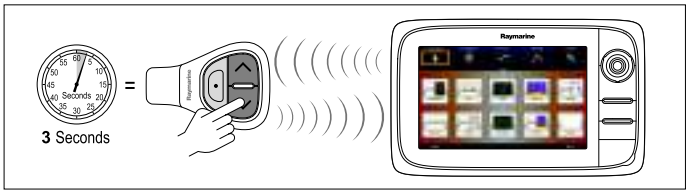
1. When you pair the RCU-3 with a multifunction display a wireless connection is established.



2. When you power off the multifunction display it loses its connection with the RCU-3 after 10 minutes.



3. To restore the connection between the 2 units, press and hold any button on the RCU-3 for at least 3 seconds.



Note: You will also need to reconnect the RCU-3 as described above if you disable and then re-enable the Bluetooth connection on the multifunction display at any time.

Chapter 23: Customizing your display

Chapter contents

- 23.1 Language selection on page 218
- 23.2 Boat details on page 219
- 23.3 Units set-up on page 220
- 23.4 Time and Date set-up on page 221
- 23.5 Display preferences on page 222
- 23.6 Data cell and databar customization on page 223
- 23.7 System set-up menus on page 226

23.1 Language selection

The system can operate in the following languages:

English (US)	English (UK)	Chinese
Danish	Dutch	Finnish
French	German	Greek
Italian	Japanese	Korean
Norwegian	Portuguese (Brazilian)	Russian
Spanish	Swedish	Turkish
Polish	Croatian	

With the homescreen displayed:

1. Select **Customize**.
2. Select **Language**.
3. Select from the languages available.

23.2 Boat details

You can customize various aspects of the display's functions 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
Minimum Safe Depth	Allows you to specify the hull clearance required by your vessel. Hull clearance information is used by the tide graphs in the chart application to display the times at which the tide will go above or below a safe depth for your vessel's hull. If the tidal water depth is too low for your hull you risk damaging or grounding your vessel. **Note:** Raymarine recommends adding some contingency from the actual hull clearance to the value selected.	• 1.0 to 33.0 (if Depth Units preferences set to Feet) • 0.5 to 10.0 (if Depth Units preferences set to Meters) • 0.1 to 5.0 (if Depth Units preferences set to Fathoms)

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.

Setting the vessel minimum safe depth

You can change the appearance of the vessel in the chart application.

With the homescreen displayed:

1. Select **Customize**.
2. Select **Boat Details**.
3. Select **Minimum Safe Depth**.
4. Use the rotary to adjust the setting as appropriate. The units for the depth measurement are based on those specified in the **Homescreen > Customize > Units Set-up > Depth Units** menu.

23.3 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 • 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 • Litres

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).

23.4 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)

23.5 Display preferences

You can specify your preference for general display behavior.

Menu item	Description	Options
Key Beep	An audible sound can be made each time a button is pressed or the touchscreen is used.	• ON (default) • OFF
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 (default)
Shared Brightness	You can set up shared brightness groups (or "zones") to adjust the brightness on multiple units simultaneously.	**Share Brightness** • ON (default) • OFF **Brightness Group** • Helm 1 (default) • Helm 2 • Cockpit • Flybridge • Mast • Group 1 • Group 2 • Group 3 • Group 4 • Group 5

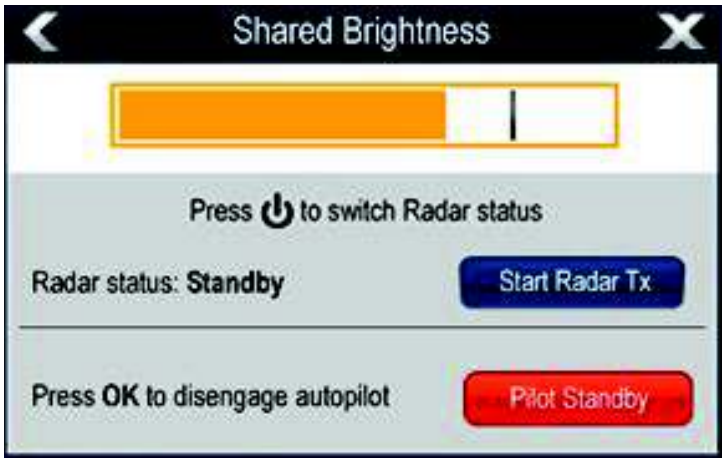
Shared brightness

You can set up shared brightness groups (or "zones") to adjust the brightness on multiple units simultaneously.

The following units are compatible with shared brightness groups:

- e7 / e7D / e95 / e97 / e125 / e127 / c95 / c97 / c125 / c127 multifunction displays
- i70 instruments
- p70 / p70R pilot controllers
- ST70
- ST70+

Once compatible units are added to a shared brightness group, any brightness adjustment made to any of the units in the group is also reflected in all other units in that group. An on-screen single brightness control is available for controlling any units in the brightness group:



Multiple brightness groups can be configured. This can reflect the physical location of the units on your vessel if required. 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. In this example, any brightness adjustments made to a unit at the helm would be automatically reflected in the other units at the helm.

The shared brightness function requires the following:

- All units must be compatible with the shared brightness function (see list of compatible units above).
- Before a unit can respond to a shared brightness adjustment it must be assigned to the relevant **Brightness Group**.
- A single unit can only belong to one brightness group at any one time.
- The **Share brightness** setting must be set to ON for all units in the brightness group.
- When setting up a brightness group an initial **Sync brightness** operation must be performed, with all the displays in that group powered on, to synchronize the display brightness of all units in the group.

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**.

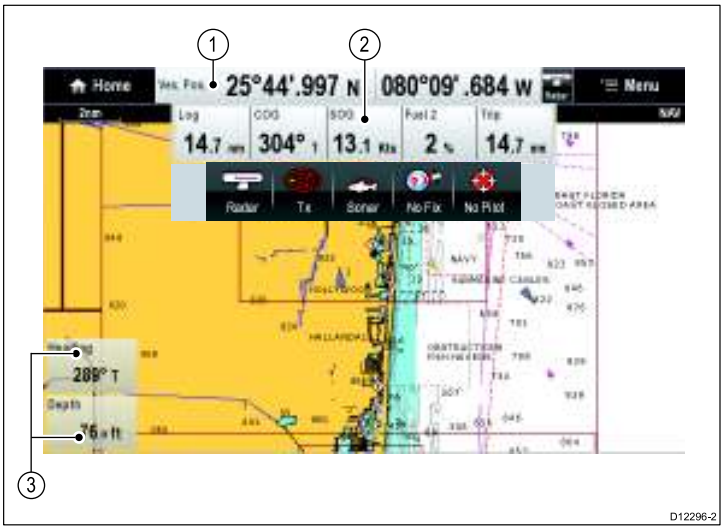
    A message is displayed confirming that the brightness levels of all displays in the group are now synchronized.

23.6 Data cell and databar customization

You can customize the data displayed in on-screen cells with a wide range of data.

Customizable data is displayed in the databar, extended databar (HybridTouch displays only) or data cells areas of the screen: The databar and extended databar are available in all applications the data cells are available in all applications:

The 3 areas of the screen where customizable data is displayed are illustrated and described below:



1. **Databar** — permanently displayed at the top of the screen in the chart, radar, fishfinder, and weather applications. The databar contains data cells that can be customized to display data from a wide range of categories.
2. **Expanded Databar** — (HybridTouch displays only) displayed when you touch the databar. Additional data cells can be displayed, from a wide range of data categories. The expanded databar is displayed until the screen is touched again. You can display the status icons below the expanded databar. This provides status information for external equipment:
3. **Data overlay cells** — up to 2 data cells can be displayed. Each cell can display one item of data from the available data categories. Data is displayed on-screen permanently.

Customizing data overlay cells

In the chart, radar, fishfinder, or weather application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Data Overlay Set-up**.
4. To customize Data Cell 1, select **Data Cell 1 > ON**.
5. To customize Data Cell 2, select **Data Cell 2 > ON**.
6. Choose the **Select Data Cell 1** or **Select Data Cell 2** menu item, as appropriate.
7. Select the category that reflects the type of data you want to display in the cell. For example, Depth data.
8. Select the data item.

   The data you selected is displayed on-screen in the appropriate data overlay cell.

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

	This only applies to HybridTouch displays.

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.

Data categories

Depending on connected devices the categories of data available to display in the data overlay, databar, and expanded databar.

Data category	Description	Options
Boat	Types of data generated by your vessel. For example, tank levels.	• Fresh Water (%) • Grey Water (%) • Black Water (%) • Live Well (%)
Depth	Depth data.	• Depth
Distance	Types of data related to distance travelled by your vessel. For example, trip distance.	• Log & trip • Log • Trip • Ground log, 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. **Note:** The options displayed are dependant on the number of engines set in the data application.	• RPM (Port) • RPM (Center) • RPM (Starboard) • Boost Pressure (Port) • Boost Pressure (Center) • Boost Pressure (Starboard) • Alternator (Port) • Alternator (Center) • Alternator (Starboard) • Oil Pressure (Port) • Oil Pressure (Center) • Oil Pressure (Starboard) • Coolant Temperature (Port) • Coolant Temperature (Center) • Coolant Temperature (Starboard) • Coolant Pressure (Port) • Coolant Pressure (Center) • Coolant Pressure (Starboard) • Engine Load (Port) • Engine Load (Center) • Engine Load (Starboard) • Engine Hours (Port) • Engine Hours (Center) • Engine Hours (Starboard) • Engine Tilt (Port) • Engine Tilt (Center) • Engine Tilt (Starboard)
Fuel	Types of data related to the fuel system. For example, fuel levels. **Note:** The options displayed are dependant on the number of engines set in the data application.	• Fuel Level 1 • Fuel Level 2 • Fuel Level 3 • Total Fuel

Data category	Description	Options
Environment	Environmental-related data. For example, air temperature.	• Pressure • Air Temperature • Set & Drift • Apparent Wind Chill • True Wind Chill • Humidity • Dew Point • Sea Temperature
GPS	GPS-related data. For example, vessel position.	• Vessel Position • COG SOG • COG • SOG
Heading	Heading-related data. For example, locked heading.	• Heading • Locked Heading
Navigation	Types of data related to navigation. For example, bearing to waypoint.	• Cursor Position • Cross Track Error • Target Position • Bearing to Waypoint • Distance to Waypoint • Waypoint TTG (Time To Go) • Waypoint Information
Pilot	Pilot-related data. For example, rudder.	• Rudder
Speed	Speed-related data. For example, VMG (Velocity Made Good) to Waypoint.	• Speed • VMG (Velocity Made Good) to Waypoint
Time	Time-related data. For example, local time.	• Local Time • Local Date
Wind	Wind-related data. For example, VMG (Velocity Made Good) to Windward.	• TWS (True Wind Speed) & TWA (True Wind Angle) • AWS (Apparent Wind Speed) & AWA (Apparent Wind Angle) • GWS (Ground Wind Speed) & GWD (Ground Wind Direction) • VMG (Velocity Made Good) to Windward

23.7 System set-up menus

The system set-up menus enable you to configure your display and connected external devices.

The following menus are available:

Menu item	Description	Notes
Alarms	Enables you to configure all the different types of alarms produced by the display and connected equipment.	
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.
Ground 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.	

Alarms menu

Menu item	Description	Options
MOB Data Type	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.	• Dead Reckoning • Position (default)
Alarm Clock	When set to On, an alarm is triggered at the time you specify for the Alarm Clock Time setting.	**Alarm Clock** • Off (default) • On **Alarm Clock Time** • 00:00 (default) • 00.01 to 24:00 hrs
Anchor Drift	When set to On, the Anchor Drift alarm is triggered when your vessel drifts from your anchor position by more than the distance you specify for the Anchor Drift Range setting.	**Anchor Drift** • Off (default) • On **Anchor Drift Range** • 0.01 — 9.99 nm (or equivalent units)
Countdown Timer	When set to On, counts down the time period you specify for the Timer Period setting, and triggers an alarm when zero is reached.	**Countdown Timer** • Off (default) • On **Timer Period** • 00h00m (default) • 00h01m to 99h59m
AIS Targets	When set to On, the alarm for Dangerous Targets is enabled. This option is only available when an AIS unit is detected. Refer to the AIS section for details.	**Dangerous Targets** • On (default) • Off
Fishfinder Deep	If this option is set to On, an alarm is triggered when the depth exceeds the value that you specify. This option is only available when a Digital Sounder Module (DSM) is detected. **Note:** The Fishfinder Deep alarm limit cannot be set to a value less than the Shallow Limit.	**Fishfinder Deep** • Off (default) • On **Deep Limit** • 2 ft (or equivalent units) to the maximum of the transducer range
Fishfinder Shallow	If this option is set to On, an alarm is triggered when the depth drops below the value that you specify. This option is only available when a Digital Sounder Module (DSM) is detected. **Note:** The Fishfinder Shallow alarm limit cannot be set to a value greater than the Deep Limit.	**Fishfinder Shallow** • Off (default) • On **Shallow Limit** • 2 ft (or equivalent units) to the maximum of the transducer range
Fish	If the Fish alarm and fish depth limits alarm are set to On, a warning sounds is triggered if any target meets the sensitivity level and is within the Shallow Fish Limit and Deep Fish Limit that you specify. The following items are available in the sub-menu: • **Fish** — Switches fish alarm On and Off. • **Fish 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 Depth Limits** — Switches depth limits On and Off. • **Shallow Fish Limit** — Specifies the lower value for the Fish Alarm Depth Limit. • **Deep Fish Limit** — Specifies the upper value for the Fish Alarm Depth Limit.	**Fish** • Off (default) • On **Fish Sensitivity** • 1 to 10 **Fish Depth Limits** • On • Off (default) **Shallow Fish Limit** • 2 ft (or equivalent units) to the maximum of the transducer range **Deep Fish Limit**

Menu item	Description	Options
		• 2 ft (or equivalent units) to the maximum of the transducer range
Guard Zone	The Guard Zone feature in the radar application triggers an alarm when a target is within a specified zone. You can adjust the sensitivity of the alarm. Ensure that the sensitivity is not set too low, or targets may be missed and the alarm will not be triggered.	**Guard Zone Sensitivity** • 1% to 100%
Off Track	When set to On, 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.	**Off Track Alarm** • Off (default) • On **Off Track XTE** • 0.01 to 9.99 nm (or equivalent units)
Sea Temperature	When set to On, triggers an alarm when the sea temperature is equal to or lower than the limit you specify for the Lower Temp Limit or equal to or greater than the limit you specify for the Upper Temp Limit setting.	**Sea Temperature** • Off (default) • On **Lower Temp Limit** • 60 degrees fahrenheit (or equivalent units) • –09.9 to +99.7 degrees fahrenheit (or equivalent units) **Upper Temp Limit** • 75 degrees fahrenheit (or equivalent units) • –09.7 to 99.9 degrees fahrenheit (or equivalent units)
Waypoint Arrival	When you arrive at a waypoint, an alarm is triggered. This setting allows you to specify the distance from the target waypoint at which the alarm is triggered. The units used for this setting are based on the units you specify for distance in the Units Set-up menu.	0.01 to 9.99 nm (or equivalent units)

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.

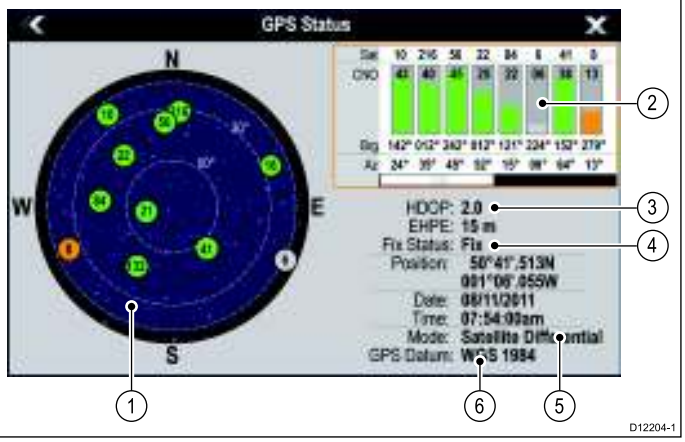
System settings menu

GPS setup

The GPS setup options enable you to configure a connected GPS receiver.

The Global Positioning System (GPS) is used to position your vessel on the chart. You can set up your GPS receiver and check its status from the GPS Status option in the **System Settings** menu. For each tracked satellite, the screen provides the following information:

- Satellite number.
- Signal strength bar.
- Status.
- Azimuth angle.
- Elevation angle.
- A sky-view to show the position of tracked satellites.



Item	Description
1	**Sky view** — a visual representation of the position of tracked satellites.
2	**Satellite status** — displays the signal strength and status of each satellite identified in the sky view diagram on the left of the screen. The colored bars have the following meanings: • Grey = searching for satellite. • Green = satellite in use. • Orange = tracking satellite.
3	**Horizontal Dilution of Position (HDOP)** — a measure of GPS accuracy, calculated from a number of factors including satellite geometry, system errors in the data transmission and system errors in the GPS receiver. A higher figure signifies a greater positional error. A typical GPS receiver has an accuracy of between 5 and 15 m. As an example, assuming a GPS 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 GPS 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.
4	**Fix status** — indicates the actual mode the GPS receiver is reporting (No Fix, Fix, D Fix or SD Fix).
5	**Mode** — the mode currently selected by the GPS receiver.
6	**Datum** — The GPS receiver's 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 accuracy of the GPS receiver depends on the parameters detailed above, especially the azimuth and elevation angles which are used in triangulation to calculate your position.

Multiple data sources (MDS) overview

Installations that include multiple instances of data sources can cause data conflicts. An example is an installation featuring more than one source of GPS data.

MDS enables you to manage conflicts involving the following types of data:

- GPS Position.
- Heading.
- Depth.
- Speed.
- Wind.

Typically this exercise is completed as part of the initial installation, or when new equipment is added.

If this exercise is NOT completed the system will automatically attempt to resolve data conflicts. However, this may result in the system choosing a source of data that you do not want to use.

If MDS is available the system can list the available data sources and allow you to select your preferred data source. For MDS to be available all products in the system that use the data sources listed above must be MDS-compliant. The system can list any products that are NOT compliant. It may be necessary to upgrade the software for these non-compliant products to make them compliant. Visit the Raymarine website (www.raymarine.com) to obtain the latest software for your products. If MDS-compliant software is not available and you do NOT want the system to automatically attempt to resolve data conflicts, any non-compliant product(s) can be removed or replaced to ensure the entire system is MDS-compliant.

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	Notes
Fishfinder Set-up	Enables you to select an external transducer and configure the options for the unit, such as depth offset. Also enables you to configure the options for an internal or external DSM Digital Sounder Module.	For an explanation of these options refer to the Transducer set-up menu options described in the Fishfinder section of this document.
Radar Set-up	Enables you to make radar scanner adjustments, such as tune adjust and time transmit.	For an explanation of these options refer to the Scanner set-up menu options described in the Radar section of this document.
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.
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.	

Connections menu

This menu enables you to connect wireless Bluetooth and WiFi devices to the display.

Menu item	Description	Options
Bluetooth	Enable or disable Bluetooth on the display.	• On • Off (default)
WiFi	Enable or disable WiFi on the display.	• On • Off (default)

Menu item	Description	Options
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.	
WiFi Name	Enables you to specify an SSID (WiFi Name) for connecting WiFi 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.	
WiFi Security	You can encrypt the WiFi connection on the multifunction display to prevent unauthorized devices from accessing the connection. This menu item enables you to select the type of WPA (WiFi Protected Access) encryption you want to use. WPA2 provides stronger security than WPA.	• None • WPA Only • WPA 2 Only. (default) • WPA / WPA2.
WiFi Passphrase	Enables you to specify a password for the WiFi 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.	
WiFi Channel	By default the multifunction display automatically selects an available WiFi channel. If you're experiencing difficulties with wireless video streaming it may be necessary to manually specify a WiFi channel for both the multifunction display and the device you want to stream video to.	• 1 (default) • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11
Display streaming	Display streaming must be enabled before you can stream video from the multifunction display to an iPad or iPhone.	• On • Off (default)

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.	• APB • BWC • BWR • DBT • DPT • GGA • GLL

Menu item	Description	Options
		• GSA • GSV • MTW • MWV • RMA • RMB • RMC • RSD • RTE • TTM • VHW • VLW • VTG • WPL • ZDA
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**.	

Menu item	Description	Options
	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 reset and diagnostics.

Menu item	Description	Options
Touchscreen Alignment	(HybridTouch displays only) 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.	
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.	
Compatibility	Compatibility mode should be used when connecting the display to a system including an E90W, E120W, E140W or a G-Series display. Not all functions will be available refer to the Network constraints sections.	• On • Off
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 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.	• Yes • No
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.	• Select Device • Save Logs • Erase Logs

Chapter 24: Maintaining your display

Chapter contents

- 24.1 Service and maintenance on page 236
- 24.2 Routine equipment checks on page 236
- 24.3 Cleaning on page 237
- 24.4 Cleaning the display case on page 237
- 24.5 Cleaning the display screen on page 238

24.1 Service and maintenance

This product contains no user serviceable components. Please refer all maintenance and repair to authorized Raymarine dealers. Unauthorized repair may affect your warranty.

24.2 Routine equipment checks

Raymarine strongly recommends that you complete a number of routine checks to ensure the correct and reliable operation of your equipment.

Complete the following checks on a regular basis:

- Examine all cables for signs of damage or wear and tear.
- Check that all cables are securely connected.

24.3 Cleaning

Best cleaning practices.

When cleaning this product:

- Do NOT wipe the display screen with a dry cloth, as this could scratch the screen coating.
- Do NOT use abrasive, or acid or ammonia based products.
- Do NOT use a jet wash.

24.4 Cleaning the display case

The display unit is a sealed unit and does not require regular cleaning. If it is necessary to clean the unit, follow this basic procedure:

1. Switch off the power to the display.
2. Wipe the display with a clean, soft cloth (a microfibre cloth is ideal).
3. If necessary, use isopropyl alcohol (IPA) or a mild detergent to remove grease marks.

Note: Do NOT use IPA or any other solvent or detergent on the screen itself.

Note: In certain conditions, condensation may appear inside the display screen. This will not harm the unit, and can be cleared by powering on the display for a short time.

24.5 Cleaning the display screen

A coating is applied to the display screen. This makes it water repellent, and prevents glare. To avoid damaging this coating, follow this procedure:

1. Switch off the power to the display.
2. Rinse the screen with fresh water to remove all dirt particles and salt deposits.
3. Allow the screen to dry naturally.
4. If any smears remain, very gently wipe the screen with a clean microfibre cleaning cloth (available from an opticians).

Chapter 25: Troubleshooting

Chapter contents

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25.1 Troubleshooting

The troubleshooting information provides possible causes and corrective action required for common problems associated with marine electronics installations.

All Raymarine products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programs. However, if you experience problems with the operation of 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 unit, please contact Raymarine Technical Support for further advice.

25.2 Power up troubleshooting

Problems at power up and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
The system (or part of it) does not start up.	Power supply problem.	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.

25.3 Radar troubleshooting

Problems with the radar and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No Data or No scanner message	Radar scanner power supply	Check that the scanner power supply cable is sound and that all connections are tight and free from corrosion.
		Check relevant fuses and breakers.
		Check power source is of the correct voltage and sufficient current (using voltage booster if appropriate).
	SeaTalk^{hs} / RayNet network problem	Check that the Scanner is correctly connected to a Raymarine network switch or SeaTalk^{hs} crossover coupler (as applicable).
		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.
	Switch at scanner pedestal in OFF position	Ensure scanner pedestal switch is in ON position.
Radar will not initialize (Voltage control module (VCM) stuck in “sleep mode”	Intermittent or poor power connection	Check power connection at VCM. (Voltage at input = 12 / 24 V, Voltage at output = 40 V)
The bearing of a target on the radar screen is incorrect.	The radar bearing alignment requires correcting.	Check and adjust radar bearing alignment.

25.4 GPS troubleshooting

Problems with the GPS and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
“No Fix” GPS 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.
	GPS connection fault.	Ensure that external GPS connections and cabling are correct and fault free.
	External GPS antenna in poor position. For example: • Below decks. • Close proximity to transmitting equipment such as VHF radio.	Ensure GPS antenna has a clear view of the sky.
	GPS installation problem.	Refer to the installation instructions.

Note: A GPS Status screen is available within the Setup menu of Raymarine multifunction displays. This provides satellite signal strength and other relevant information.

25.5 Sonar troubleshooting

Problems with the sonar and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No data source for the sounder.	Unit power supply fault.	Check the unit power supply and cables.
	Other unit fault.	Refer to the instructions supplied with the unit.
	SeaTalk^{hs} / RayNet network problem.	Check that the unit is correctly connected to a Raymarine network SeaTalk^{hs} switch or crossover coupler (as applicable).
		Check the status of the Raymarine network switch (if applicable).
		Check that SeaTalk^{hs}/ RayNet cables are free from damage.
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Problematic depth readings or sonar image.	Gain or Frequency settings may be inappropriate for present conditions.	Check the sounder presets, gain and frequency settings.
	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.
	Unit cable fault.	Ensure that the power, transducer and all other cables to the unit are properly connected and free from damage.
	Transducer fault	Check that the transducer is mounted correctly and is clean.
		Check the transducer is within 10° of vertical.
		If you have a transom-mount transducer, check that the transducer hasn't kicked up due to hitting an object.
	Other unit fault.	Refer to the instructions supplied with the unit.
	Vessel stationary	Fish arches are not displayed if the vessel is stationary, fish will appear on the display as straight lines.
	High vessel speed	Turbulence around the transducer may be confusing the unit.
	Scroll speed set to zero	Adjust scroll speed
Incorrect speed reading	Paddle wheel fault	Check that the paddle wheel is clean.
	No speed offset set	Add speed offset.
	Incorrect calibration	Re-calibrate equipment

25.6 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.
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.

25.7 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 ST70 instrument or engine interface) is not operating.	Check the source of the missing data (e.g. ST70 instrument 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

25.8 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.

25.9 Wi-Fi 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.	iPhone does not have a wireless connection established with the multifunction display.	Ensure that Wi-Fi is enabled on the multifunction display (**Homescreen: > Set-Up > System Settings > Connections > Wi-Fi > On**).
		Ensure that the “Wi-Fi” option is enabled on the iPhone (available from the phone’s Settings menu).
		Ensure that the Raymarine connection is selected as the W-iFi network. If a passcode has been specified for the multifunction display’s Wi-Fi connection ensure that the same passcode is entered into the iPhone when prompted.
No video streaming to iPhone.	iPhone does not have “Raymarine Viewer” iPhone app installed and running.	Download the “Raymarine Viewer” iPhone app from the Apple App Store.
		Start the “Raymarine Viewer” app on the iPhone.
	“Display Streaming” is NOT enabled on the multifunction display.	Enable “Display Streaming” (**Homescreen: > Set-Up > System Settings > Connections > Display Streaming > On**).
No waypoint / routes synchronization with Navionic Marine app.	iPhone does not have “Navionics Marine” iPhone app installed and running.	Download the “Navionics Marine” iPhone app from the Apple App Store.
		Start the “Navionics Marine” app on the iPhone.
	Chart application is not running on the multifunction display.	Start the chart application on the multifunction display.
Weak or intermittent Wi-Fi 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.

25.10 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.	iPhone does not have a Bluetooth connection established with the multifunction display.	Ensure that Bluetooth is enabled on the multifunction display (**Homescreen: > Set-Up > System Settings > Connections > Bluetooth > On**).
		Ensure that the “Bluetooth” option is enabled on the iPhone (available from the phone’s Settings / General menu).
		Ensure that the Bluetooth device is paired with the multifunction display that you want to use it with. To do this: **Homescreen: > Set-Up > System Settings > Connections > New Bluetooth Connection**.
No media player control.	Media player device is not compatible with the Bluetooth AVRCP protocol (version 2.1 or higher).	Check the Bluetooth AVRCP compatibility with the device manufacturer. If the device is not Bluetooth AVRCP 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” (**Homescreen: > Set-Up > System Settings > Connections > Connections Manager > Audio Control > On**).
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.

25.11 Touchscreen troubleshooting

Problems with the touchscreen and their possible causes and solutions are described here.

	This only applies to HybridTouch displays.

Problem	Possible causes	Possible solutions
Touchscreen does not operate as expected	Touch lock is enabled	Use the Trackpad 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.

25.12 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).	Go to www.raymarine.com and 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 26: Technical support

Chapter contents

- 26.1 Raymarine customer support on page 254
- 26.2 Third-party support on page 254

26.1 Raymarine customer support

Raymarine provides a comprehensive customer support service. You can contact customer support through the Raymarine website, telephone and email. If you are unable to resolve a problem, please use any of these facilities to obtain additional help.

Web support

Please visit the customer support area of our website at:

www.raymarine.com

This contains Frequently Asked Questions, servicing information, e-mail access to the Raymarine Technical Support Department and details of worldwide Raymarine agents.

Telephone and email support

In the USA:

- **Tel:** +1 603 881 5200 extension 2444
- **Email:** Raymarine@custhelp.com

In the UK, Europe, the Middle East, or Far East:

- **Tel:** +44 (0)13 2924 6777
- **Email:** ukproduct.support@raymarine.com

Product information

If you need to request service, please have the following information to hand:

- Product name.
- Product identity.
- Serial number.
- Software application version.

You can obtain this product information using the menus within your product.

Viewing product information

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Diagnostics**.
4. Select **Select Device**.
5. Select the relevant product from the list.
6. Select **Show All Data**.

26.2 Third-party support

Contact and support details for third-party suppliers can be found on the appropriate websites.

Navionics

www.navionics.com

Sirius

www.sirius.com

Chapter 27: Technical specification

Chapter contents

- 27.1 Technical specification on page 256

27.1 Technical specification

e7 / e7D Physical specifications

Dimensions	• Width: 233 mm (9.17 in.) • Height (NOT including bracket): 145 mm (5.71 in.) • Height (including bracket): 180 mm (7.09 in.) • Depth (NOT including cables): 64 mm (2.52 in.) • Depth (including cables): 160 mm (6.29 in.)
Weight (bare unit)	**e7** • 1.465 kg (3.23 lb.) **e7D** • 1.550 kg (3.42 lb.)
Weight (boxed unit)	**e7** • 2.385 kg (5.26 lb.) **e7D** • 2.423 kg (5.34 lb.)

e95 / e97 / c95 / c97 Physical specifications

Dimensions	• Width: 290 mm (11.42 in.) • Height (NOT including bracket): 173 mm (6.81 in.) • Height (including bracket): 212 mm (8.35 in.) • Depth (NOT including cables): 64 mm (2.52 in.) • Depth (including cables): 160 mm (6.29 in.)
Weight (bare unit)	**e95 / c95** • 2.165 kg (4.77 lb.) **e97 / c97** • 2.265 kg (4.99 lb.)
Weight (boxed unit)	**e95 / c95** • 3.540 kg (7.8 lb.) **e97 / c97** • 3.635 kg (8 lb.)

e125 / e127 / c125 / c127 Physical specifications

Dimensions	• Width: 354 mm (13.94 in.) • Height (NOT including bracket): 222 mm (8.74 in.) • Height (including bracket): 256 mm (10.08 in.) • Depth (NOT including cables): 69 mm (2.72 in.) • Depth (including cables): 160 mm (6.29 in.)
Weight (bare unit)	**e125 / c125** • 3.320 kg (7.32 lb.) **e127 / c127** • 3.450 kg (7.6 lb.)
Weight (boxed unit)	**e125 / c125** • 4.955 kg (10.9 lb.) **e127 / c127** • 5.070 kg (11.18 lb.)

e7 / e7D Power specification

Nominal supply voltage	13.8 V dc
Operating voltage range	10.2 to 15.6 V dc
Fuse / Breakers	In-line fuse (fitted within power cable) • 7 A. (Standard 20 mm glass fuse)
Power consumption (at full brightness)	13.2 W
LEN (Refer to Seatalkng reference manual for further information).	1

e95 / e97 / e125 / e127 / c95 / c97 / c125 / c127 power specification

Nominal supply voltage	12/24 V dc
Operating voltage range	10.8V dc to 31.2V dc
Fuse / Breakers	In-line fuse (fitted within power cable) • 10 A. (Standard 20 mm glass fuse)
Power consumption (at full brightness)	• e95 / e97 / c95 / c97 = 16W Max. • e125 / e127 / c125 / c127 =36W Max.
LEN (Refer to Seatalkng reference manual for further information).	1

Environmental specification

Environmental specifications below apply to all display variants

Operating temperature	-25 ºC to +55 ºC (-13 ºF to 131 ºF)
Storage temperature	-30 ºC to +70 ºC (-22 ºF to 158 ºF)
Relative humidity	Maximum 75%
Waterproof rating	IPX6

e7 / e7D Display specification

Size	7 in.
Type	TFT backlit LED
Color depth	18–bit

Resolution	800 x 480 pixels (WVGA)
Viewing angle	• Left / Right: 70 degrees • Top / Bottom: 70 / 50 degrees

e95 / e97 / c95 / c97 Display specification

Size	9 in.
Type	TFT backlit LED
Color depth	8–bit
Resolution	800 x 480 pixels (WVGA)
Viewing angle	• Left / Right: 80 degrees • Top / Bottom: 80 / 60 degrees

e125 / e127 / c125 / c127 Display specification

Size	12 in.
Type	TFT backlit LED
Color depth	8–bit
Resolution	1280 x 800 pixels (WXGA)
Viewing angle	• Left / Right: 80 degrees • Top / Bottom: 80 / 60 degrees

Data connections

Wired connections

NMEA 0183	2x NMEA 0183 ports: • NMEA port 1: Input and output, 4800 / 9600 / 38400 baud • NMEA port 2: Input only, 4800 / 9600 / 38400 baud
Network (SeaTalk^{hs})	• e7 / e7D = 1 x SeaTalk^{hs} port. 100 Mbits/s. RayNet type connection. • e95 / e97 / c95 / c97 / e125 / e127 / c125 / c127 = 2 x SeaTalk^{hs} port. 100 Mbits/s. RayNet type connection.
SeaTalk^{ng}	1 x SeaTalk^{ng} connection

Wireless connections

WiFi	802.11 b / g
Bluetooth	AVRCP 2.1+ EDR power class 1.5

Internal GPS specification

Channels	48
Hot start	< 1 second
Cold start	36 seconds in optimal conditions
Receiver IC Sensitivity	159 dBm Tracking
Satellite Based Aiding System (SBAS)	WAAS + EGNOS
Special features	Active Jamming Reduction
Operating frequency	1575.42MHz
Signal Acquisition	Automatic
Almanac Update	Automatic
Geodetic Datum	WGS-84, alternatives available through Raymarine displays.
Update Rate	1 second
Antenna	Ceramic chip
Accuracy	• Without SBAS: <= 15 metres 95% of the time • With WAAS / EGNOS: <= 5 metres 95% of the time

Internal sonar specification (e7D / e97 / e127/ c97 / c127 displays only)

Operating frequencies	50 / 83 / 200 KHz
Transmit power	Up to 600 W RMS, depending on transducer
Depth range	Up to 3000 ft, depending on transducer

Video specification

Signal type	Composite
Format	PAL or NTSC
Connector type	BNC (female)

Electronic chart specification

Embedded electronic charts	Navionics worldwide base map.
Compatible chart cards	• Navionics Ready to Navigate • Navionics Silver • Navionics Gold • Navionics Gold+ • Navionics Platinum • Navionics Platinum+ • Navionics Fish'N Chip • Navionics Hotmaps Refer to the Raymarine website (www.raymarine.com) for the latest list of supported chart cards.

Conformance specification

Conformance certification applies to all display variants

Conformance	• NMEA 2000 certification • WiFi Alliance certification • Bluetooth certification • Europe: 1995/5/EC • Australia and New Zealand: C-Tick, Compliance Level 2 • FCC 47CFR part 15 • Industry Canada RSS210

Chapter 28: Spares and accessories

Chapter contents

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- 28.8 e125 / e127 / c125 / c127 Service spares on page 263

28.1 Transducer accessories

Item	Part number	Notes
P48 sonar transducer	A102140	Transom mount.
P58 sonar transducer	A102138	Transom mount.
1 m (3.28 ft) Minn Kota transducer adaptor cable	A62363	Only for direct connection to sonar variant multifunction display.
0.5 m (1.64 ft) transducer adaptor cable	E66066	For connecting any 600 watt DSM-compatible sonar transducer directly to a sonar variant multifunction display.

28.2 Cables

RayNet network cables

Cable	Part number
1 m (3.28 ft) RayNet to SeaTalk^{hs} (RJ45) cable	A62360
2 m (6.56 ft) RayNet to RayNet cable	A62361
5 m (16.4 ft) RayNet to RayNet cable	A80005
10 m (32.8 ft) RayNet to RayNet cable	A62362
20 m (65.6 ft) RayNet to RayNet cable	A80006
RayNet cable puller 5 pack	R70014

SeaTalk^{hs} network cables

Cable	Part number
1.5 m (4.9 ft) SeaTalk^{hs} network cable	E55049
5 m (16.4 ft) SeaTalk^{hs} network cable	E55050
10 m (32.8 ft) SeaTalk^{hs} network cable	E55051
20 m (65.6 ft) SeaTalk^{hs} network cable	E55052

SeaTalk^{hs} patch cables

Cable	Part number
1.5 m (4.9 ft) SeaTalk^{hs} patch cable	E06054
5 m (16.4 ft) SeaTalk^{hs} patch cable	E06055
10 m (32.8 ft) SeaTalk^{hs} patch cable	E06056
15 m (49.2 ft) SeaTalk^{hs} patch cable	A62136
20 m (65.6 ft) SeaTalk^{hs} patch cable	E06057

Video cables

The following video cable is required for the video in / out connector on the e95 / e97 / e125 / e127 variant multifunction displays.

Part number	Description	Notes
R70003	e-series accessory video cable	

Power cables

Cable	Part number	Notes
1.0 m (3.3 ft) Power and data cable	R62379	Supplied with e7 / e7D displays..
1.0 m (3.3 ft) Right angled power and data cable	R70029	Supplied with c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127

28.3 e7 e7D spares

Item	Part number	Notes
Trunnion (bracket) mount kit	A62358	
Documentation pack	R62378	
Flush mount panel set	R62376	
Front bezel	R62377	
Suncover	R62365	

28.4 e7 / e7D Service spares

Service spares are only available to service dealers.

Item	Part number	Notes
Front housing assembly	R62371	
GPS PCB assembly	R62373	
LCD / touchscreen assembly	R62372	
PCBA with sonar assembly	R62367	
Flexi kit	R62370	
Screw kit	R62369	
Dust cap kit	R62366	
Seal pack assembly (Internal)	R62375	
WiFi PCB assembly	R62374	
MicroSD card reader assembly	R62364	

28.5 e95 / e97 / c95 / c97 spares

Item	Part number	Notes
c/e series trunnion kit	R70001	
c/e series front bezel	R7004	
c/e series suncover	R70005	
c/e/ series rear bezel	R70027	
c.e series gasket	R70079	
Mounting adaptor kit — C90W/E90W	R70008	
Mounting adaptor kit — C80/E80	R70010	
Mounting screw kit	R62369	
Document pack	R70061	

28.6 e95 / e97 / c95 / c97 Service spares

Service spares are only available to service dealers.

Item	Part number	Notes
Dust cap kit	R62366	
Flexi pack c/e 9”	R70081	
Internal seal pack c/e 9”	R70083	
Front housing assembly c95/c97	R70085	
Front housing assembly e95/c97	R70087	
MicroSD card reader c/e 9”&12”	R70089	
c/e 9” keyboard	R70090	
Wi-Fi PCB Assembly c/e 9”	R70092	
GPS/PCB Assembly	R62373	
PCB assembly non-sonar c95	R70096	
PCB assembly non-sonar e95	R70098	
PCB assembly sonar c97	R70100	
PCB assembly sonar e97	R70102	
CPU board non-sonar c95	R70104	
CPU board non-sonar e95	R70106	
CPU board sonar c97	R70108	
CPU board sonar e97	R70110	
LCD assembly non-touch c9	R70018	
LCD assembly touchscreen e9	R70020	

28.7 e125 / e127 / c125 / c127 spares

Item	Part number	Notes
c/e series trunnion kit	R70002	
c/e series front bezel	R7006	
c/e series suncover	R70007	
c/e/ series rear bezel	R70028	
c.e series gasket	R70080	
Mounting adaptor kit — C120W/E120W	R70009	
Mounting adaptor kit — C120/E120	R70011	
Mounting screw kit	R62369	
Document pack	R70061	

28.8 e125 / e127 / c125 / c127 Service spares

Service spares are only available to service dealers.

Item	Part number	Notes
Dust cap kit	R62366	
Flexi pack c/e 12”	R70082	
Internal seal pack c/e 12”	R70084	
Front housing assembly c125/c127	R70086	
Front housing assembly e125/c127	R70088	
MicroSD card reader c/e 9”&12”	R70089	
c/e 12” keyboard	R70091	
Wi-Fi PCB Assembly c/e 12”	R70093	
GPC/PCB assembly c12	R70094	
PCB assembly non-sonar c125	R70097	
PCB assembly non-sonar e125	R70099	
PCB assembly sonar c127	R70101	
PCB assembly sonar e127	R70103	
CPU board non-sonar c125	R70105	
CPU board non-sonar e125	R70107	
CPU board sonar c127	R70109	
CPU board sonar e127	R70111	
LCD assembly non-touch c12	R70019	

Item	Part number	Notes
LCD assembly touchscreen e12	R70021	

Appendix A NMEA 0183 sentences

The display supports the following NMEA 0183 sentences. These are applicable to NMEA 0183 and SeaTalk protocols.

Transmit

APB	Autopilot b
BWC	Bearing and distance to waypoint
BWR	Bearing and distance to waypoint rhumb line
DBT	Depth below transducer
DPT	Depth
MTW	Water temperature
RMB	Recommended minimum navigation information
RSD	Radar system data
TTM	Tracked target message
VHW	Water speed and heading
VLW	Distance travelled through the water
GGA	Global positioning system fix data
GLL	Geographic position latitude longitude
GSA	GPS DOP and active satellites
GSV	GPS satellites in view
RMA	Recommended minimum specific loran c data
RMC	Recommended minimum specific GPS transit data
VTG	Course over ground and ground speed
ZDA	Time and date
MWV	Wind speed and angle
RTE	Routes sentence
WPL	Waypoint location sentence

Receive

AAM	Waypoint arrival alarm sentence
DBT	Depth below transducer sentence
DPT	Depth sentence
DTM	Datum reference sentence
APB	Autopilot b sentence
BWC	Bearing and distance to waypoint sentence
BWR	Bearing and distance to waypoint rhumb line sentence
DSC	Digital selective calling information sentence
DSE	Distress sentence expansion
GGA	Global positioning system fix data sentence
	Geographic position loran c sentence GLC
GLL	Geographic position latitude longitude sentence
GSA	GPS DOP and active satellites sentence
GSV	GPS satellites in view sentence
HDG	Heading deviation and variation sentence
HDT	Heading true sentence
HDM	Heading magnetic sentence
MSK	MSK receiver interface sentence
MSS	MSK receive r signal status sentence
MTW	Water temperature sentence
WMV	Wind speed and angle sentence
RMA	Recommended minimum specific loran c data sentence
RMB	Recommended minimum navigation information sentence
RMC	Recommended minimum specific GPS transit data sentence
VHW	Water speed and heading sentence
VLW	Distance travelled through the water sentence
VTG	Course over ground and ground speed sentence
XTE	Cross track error measured sentence
ZDA	Time and date sentence
MDA	Meteorological composite sentence
GBS	GPS satellite fault detection data sentence
RTE	Routes sentence
WPL	Waypoint location sentence

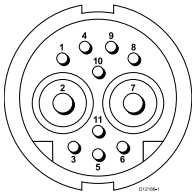
Appendix B NMEA 2000 sentences

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	Bridge
59392	ISO Acknowledgment	•	•	•
59904	ISO Request		•	
60928	ISO Address Claim	•	•	•
126208	NMEA - Acknowledge group function	•	•	•
126464	PGN List	•	•	•
126992	System time	•	•	•
126996	Product information	•	•	•
127237	Heading/Track Control		•	
127245	Rudder	•	•	•
127250	Vessel heading	•	•	•
127488	Engine parameters rapid update		•	
127489	Dynamic engine parameters		•	
127493	Dynamic transmission		•	
127498	Static engine parameters		•	
127505	Fluid level		•	
128259	Speed	•	•	•
128267	Water depth	•	•	•
128275	Distance log	•	•	•
129025	Position rapid update	•	•	•
129026	COG SOG rapid update	•	•	•
129029	GNSS position data	•	•	•
129033	Time and date	•	•	•
129038	AIS Class A Position Report		•	
129039	AIS Class B Position Report		•	
129040	AIS Class B Extended Position Report		•	
129044	Datum	•	•	•
129283	Cross track error	•	•	•
129284	Navigation data	•	•	•
129291	Set and drift rapid update	•	•	•
129301	Time to or from mark		•	
129539	NMEA 2000 GNSS DOPs message		•	
129540	GNSS Sats in view	•	•	•
129545	NMEA 2000 GNSS RAIM output message		•	
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			•
129801	AIS Addressed Safety Related Message			•
129802	AIS Safety Related Broadcast Message			•
130306	Wind data	•	•	•
130310	Environmental parameters	•	•	•
130311	Environmental parameters message		•	
130576	Small craft status		•	
130577	Direction data	•	•	•
130578	Vessel speed components		•	

Appendix C Connectors and pinouts

Power, data, and video connector

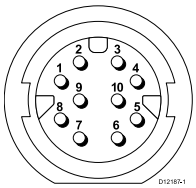


Item	Remarks
Identification	PWR / NMEA / Video
Connector type	11 pin twist-lock
Current source to network	No current sourced for external devices
Current sink from network	• PSU: Main Power input. • NMEA: No power required for interface. • Video: No power required for interface.

Power, data and video cable cores and colors

Signal	Pin	AWG	Color
BATT+	2	16	Red
BATT-	7	16	Black
SCREEN	10	26	Black
NMEA1 TX+	8	26	Yellow
NMEA1 TX-	9	26	Brown
NMEA1 RX+	1	26	White
NMEA1 RX-	4	26	Green
NMEA2 RX+	3	26	Orange / White
NMEA2 RX-	11	26	Orange / Green
VIDEO IN	6	RG179 coaxial	
VIDEO RTN	5	Screen	

Network connector

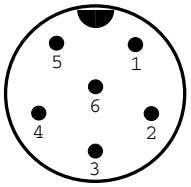


Item	Remarks
Identification	Network
Connector type	RJ45 (with suitable waterproofing)
Current source to network	No current sourced for external devices
Current sink from network	No power required for interface

Pin	Signal
1	Rx+
2	Rx-
3	Not connected
4	Not connected
5	Tx+
6	Tx-
7	Not connected
8	Not connected
9	Screen
10	Not connected

Note: Use only Raymarine RayNet cables when connecting SeaTalk^{hs} devices.

SeaTalk^{ng} connector

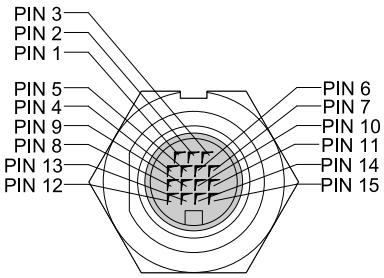


Item	Remarks
Identification	ST2/NMEA2000
Connector type	STNG
Current source to network	No current sourced for external devices
Current sink from network	<160mA (Interface drive only)

Pin	Signal
1	+12V
2	0V
3	Screen
4	CanH
5	CanL
6	SeaTalk (not connected)

Note: Use only Raymarine cables when connecting to SeaTalk^{ng}

Video in/out connector



PIN	Signal
‘1	H-SYNC
2	V-SYNC
3	V–SYNC 0V
4	DDC CLK
5	DDC DATA
6	BLUE RTN
7	BLUE
8	Not used
9	H–SYNC 0V
10	GREEN RTN
11	GREEN
12	VIDEO IN2
13	VIDEO IN2 RTN
14	RED RTN
15	RED

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