e7 / e7D / e95 / e97 / e125 / e127 / c95 / c97 / c125 / c127
Multifunction displays

Installation and operation handbook

Raymarine®

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Software updates

Check the website www.raymarine.com for the latest software releases for your product.

Product handbooks

The latest versions of all English and translated handbooks are available to download in PDF format from the website www.raymarine.com. Please check the website to ensure you have the latest handbooks.

Contents

Chapter 1: Important information

⚠️ Warning: Product installation and operation

This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your vessel and/or poor product performance.

⚠️ Warning: Potential ignition source

This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

⚠️ Warning: High voltages

This product contains high voltages. Do NOT remove any covers or otherwise attempt to access internal components, unless specifically instructed in this document.

⚠️ Warning: Product grounding

Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions in this guide.

⚠️ Warning: Switch off power supply

Ensure the vessel's power supply is switched OFF before starting to install this product. Do NOT connect or disconnect equipment with the power switched on, unless instructed in this document.

⚠️ Warning: FCC Warning (Part 15.21)

Changes or modifications to this equipment not expressly approved in writing by Raymarine Incorporated could violate compliance with FCC rules and void the user's authority to operate the equipment.

⚠️ Warning: Radar scanner safety

Before rotating the radar scanner, ensure all personnel are clear.

⚠️ Warning: Radar transmission safety

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

⚠️ Warning: Sonar operation

*   NEVER operate the 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.

⚠️ Warning: Touchscreen display

When exposed to prolonged periods of direct sunlight, the touchscreen display can get very hot. In such conditions, avoid using the touchscreen display and use the unit's physical keys and buttons instead.

Caution: Transducer cable

Do NOT cut, shorten, splice the transducer cable or remove the connector. If the cable is cut, it cannot be repaired. Cutting the cable will also void the warranty.

Caution: Power supply protection

When installing this product ensure the power source is adequately protected by means of a suitably-rated fuse or automatic circuit breaker.

Caution: Care of chart and memory cards

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

*   Ensure that chart and memory cards are fitted the correct way around. DO NOT try to force a card into position.
*   DO NOT save data (waypoints, routes, and so on) to a chart card, as the charts may be overwritten.
*   DO NOT use a metallic instrument such as a screwdriver or pliers to insert or remove a chart or memory card.
*   Safe removal. Always power the unit off before inserting or removing a chart or memory card.

Caution: Ensure chart card door is securely closed

To prevent water ingress and consequent damage to the display, ensure that the chart card door is firmly closed. This can be confirmed by an audible click.

Caution: Sun covers

*   To protect your product against the damaging effects of ultraviolet (UV) light, always fit the sun covers when the product is not in use.
*   Remove the sun covers when travelling at high speed, whether in water or when the vessel is being towed.

Caution: Cleaning

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.

TFT Displays

The colors of the display may seem to vary when viewed against a colored background or in colored light. This is a perfectly normal effect that can be seen with all color Thin Film Transistor (TFT) displays.

In common with all TFT units, the screen may exhibit a few (less than 7) wrongly illuminated pixels. These may appear as black pixels in a light area of the screen or as colored pixels in black areas.

Water ingress

Water ingress disclaimer

Although the waterproof rating capacity of this product meets the IPX6 standard, water intrusion and subsequent equipment failure may occur if the product is subjected to commercial high-pressure washing. Raymarine will not warrant products subjected to high-pressure washing.

Disclaimers

This product (including the electronic charts) is intended to be used only as an aid to navigation. It is designed to facilitate use of official government charts, not replace them. Only official government charts and notices to mariners contain all the current information needed for safe navigation, and the captain is responsible for their prudent use. It is the user's responsibility to use official government charts, notices to mariners, caution and proper navigational skill when operating this or any other Raymarine product. This product supports electronic charts provided by third party data suppliers which may be embedded or stored on memory card. Use of such charts is subject to the supplier's End-User Licence Agreement included in the documentation for this product or supplied with the memory card (as applicable).

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

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

Chart cards and memory cards

Memory cards are used for archiving data and chart cards provide additional or upgraded charts.

Compatible cards

The following types of memory or chart card are compatible with your Raymarine product:

- micro Secure Digital Standard-Capacity (microSDSC)

- micro Secure Digital High-Capacity (microSDHC)

Note: The maximum card capacity supported is 32 GB.

Chart cards

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

Use branded chart cards and memory cards

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

EMC installation guidelines

Raymarine equipment and accessories conform to the appropriate Electromagnetic Compatibility (EMC) regulations, to minimize electromagnetic interference between equipment and minimize the effect such interference could have on the performance of your system

Correct installation is required to ensure that EMC performance is not compromised.

For **optimum** EMC performance we recommend that wherever possible:

- Raymarine equipment and cables connected to it are:

  – At least 1 m (3 ft) from any equipment transmitting or cables carrying radio signals e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 7 ft (2 m).

  – More than 2 m (7 ft) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.

- The product is supplied from a separate battery from that used for engine start. This is important to prevent erratic behavior

and data loss which can occur if the engine start does not have a separate battery.

- Raymarine specified cables are used.

- Cables are not cut or extended, unless doing so is detailed in the installation manual.

Note: Where constraints on the installation prevent any of the above recommendations, always ensure the maximum possible separation between different items of electrical equipment, to provide the best conditions for EMC performance throughout the installation

RF exposure

This transmitter with its antenna is designed to comply with FCC / IC RF exposure limits for general population / uncontrolled exposure. The WiFi / Bluetooth antenna is mounted behind the front facia on the left hand side of the screen. It is recommended to maintain a safe distance of at least 1 cm from the left hand side of the screen.

FCC

Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Interference Statement (Part 15.105 (b))

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

1. Reorient or relocate the receiving antenna.

2. Increase the separation between the equipment and receiver.

3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

4. Consult the dealer or an experienced radio / TV technician for help.

Industry Canada

This device complies with Industry Canada License-exempt RSS standard(s).

Operation is subject to the following two conditions:

1. This device may not cause interference; and

2. This device must accept any interference, including interference that may cause undesired operation of the device.

This Class B digital apparatus complies with Canadian ICES-003.

Industry Canada (Français)

Cet appareil est conforme aux normes d'exemption de licence RSS d'Industry Canada.

Son fonctionnement est soumis aux deux conditions suivantes:

1. cet appareil ne doit pas causer d'interférence, et

2. cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Third party software license agreements

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

- GNU — LPGL/PGL
- JPEG libraries
- OPENSSL
- FreeType

The license agreements for the above can be found on the documentation CD which accompanies this product.

Suppression ferrites

Raymarine cables may be fitted with suppression ferrites. These are important for correct EMC performance. If a ferrite has to be removed for any purpose (e.g. installation or maintenance), it must be replaced in the original position before the product is used.

Use only ferrites of the correct type, supplied by Raymarine authorized dealers.

Connections to other equipment

Requirement for ferrites on non-Raymarine cables

If your Raymarine equipment is to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite MUST always be attached to the cable near the Raymarine unit.

Declaration of conformity

Raymarine Ltd. declares that this product is compliant with the essential requirements of EMC directive 2004/108/EC.

The original Declaration of Conformity certificate may be viewed on the relevant product page at www.raymarine.com.

Product disposal

Dispose of this product in accordance with the WEEE Directive.

The Waste Electrical and Electronic Equipment (WEEE) Directive requires the recycling of waste electrical and electronic equipment. Whilst the WEEE Directive does not apply to some Raymarine products, we support its policy and ask you to be aware of how to dispose of this product.

Warranty registration

To register your Raymarine product ownership, please visit www.raymarine.com and register online.

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

IMO and SOLAS

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

Technical accuracy

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

Chapter 2: Handbook information

Chapter contents

2.1 Handbook information

This handbook contains important information regarding your multifunction display.

The handbook is for use with the following models:

- e7, e95, e125, c95, c125 Multifunction displays.
- e7D e97, e127, c97, c127 Multifunction displays.

About this handbook

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

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

Handbooks

The following handbooks are applicable to your multifunction display:

All documents are available to download as PDFs from www.raymarine.com

Handbooks
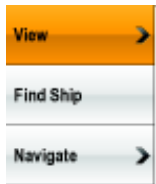
Description	Part number
Mounting and getting started guide	88001
Installation and operation handbook	81337
e7 / e7D Mounting template	87137
e95 / e97 / c95 / c97 Mounting template	87144
e125 / e127 / c125 / c127D Mounting template	87145

Additional handbooks

Description	Part number
SeaTalkng reference manual	81300

2.2 Handbook conventions

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

Type	Example	Convention
Icons		The term "select" is used in procedures involving icons to refer to the action of selecting an on-screen icon, either using touch or by using the UniControl.
Menus		The term "select" is used in procedures involving menus to refer to the action of selecting a menu item, either using touch or by using the UniControl.
Scroll		The term "scroll" is used in procedures involving menus and dialogs to refer to the action of scrolling a list or menu, either by touch (touching and dragging your finger up or downwards) or using the UniControl.

2.3 Handbook illustrations

The illustrations and screenshots used in this handbook may differ slightly from your display model.

Chapter 3: Planning the installation

Chapter contents

3.1 System integration

Your multifunction display is compatible with a wide range of marine electronics devices.
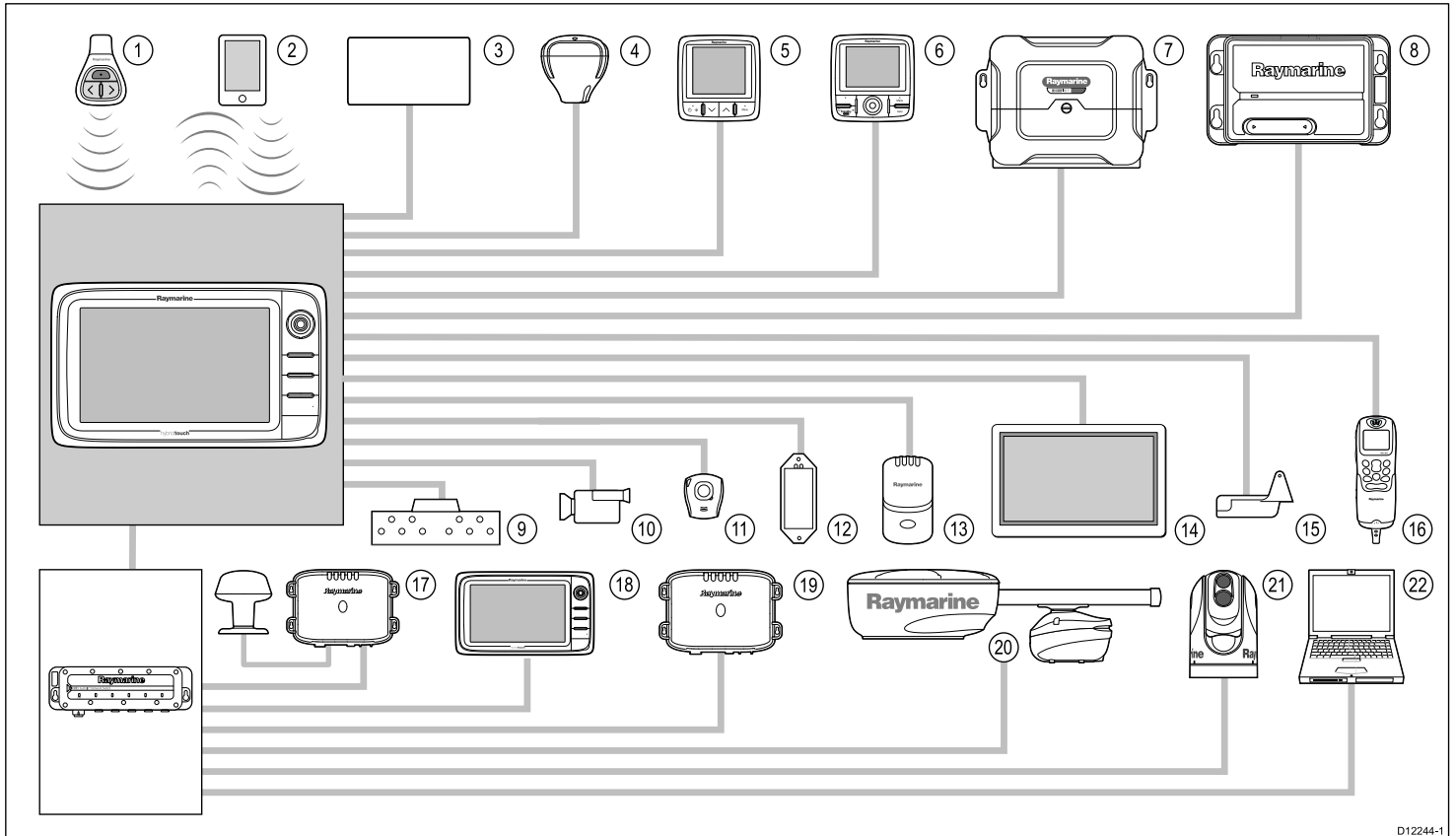
The display uses a number of protocols to transfer data between the various devices in your system. The following table details which devices may be connected to your display, and the type of connections (in terms of protocols and physical interfaces):

Item	Device Type	Maximum quantity	Suitable Devices	Connections
1	Remote control	1 per multifunction display.	Raymarine RCU-3	Bluetooth
2	Smartphone	1 per multifunction display.	For chartplotter sync with Navionics Marine app: • Apple iPhone or iPad. • Android-compatible smartphone. For smartphone media player control: • Any Bluetooth-enabled smartphone supporting Bluetooth AVRCP version 2.1 or higher. For wireless video streaming: • Apple iPhone 4 (or later) or iPad (requires the "Raymarine Viewer" video streaming app, available from the Apple App Store).	• Chartplotter sync with Navionics Marine app: WiFi. • Video streaming: WiFi. • Media player control: Bluetooth AVRCP 2.1 or later.
3	Vessel tank sensors — third-party	• Up to 3 x fuel. • 1 x fresh water. • 1 x waste water. • 1 x sewage. • 1 x bait / fish.	Third-party NMEA 2000 interfaces.	NMEA 2000 (via optional DeviceNet adaptor cables).
4	GPS (external) — Raymarine	1	Any combination of the following: • Raystar125 GPS. • Raystar125+ GPS (via optional SeaTalk to SeaTalk^{ng} converter).	SeaTalk, SeaTalk^{ng}, or NMEA 0183.

Item	Device Type	Maximum quantity	Suitable Devices	Connections
5	Instruments — Raymarine	As determined by SeaTalkng bus bandwidth and power loading.	SeaTalk (via optional SeaTalk to SeaTalkng converter): • ST40 Wind, Speed, Depth, Rudder, or Compass. • ST60 Wind, Speed, Depth, Rudder, or Compass. SeaTalkng: • ST70. • ST70+. • ST70+ keypads. • ST45. • i70.	SeaTalk, SeaTalkng.
5	Instruments — third-party	• Connections to multifunction display NMEA outputs: 4. • Connections to multifunction display NMEA inputs: 2	NMEA 0183–compatible instruments.	NMEA 0183
6	Pilot control heads — Raymarine	As determined by SeaTalk or SeaTalkng bus bandwidth and power loading, as appropriate.	SeaTalk (via optional SeaTalk to SeaTalkng converter):: • ST6002. • ST7002. • ST8002. SeaTalkng: • ST70. • ST70+. • p70. • p70R.	SeaTalk, SeaTalkng.
6	Pilot control heads — third-party	1	NMEA 0183–compatible instruments.	NMEA 0183
7	Course computer — Raymarine	1	SeaTalk (via optional SeaTalk to SeaTalkng converter): • ST1000. • ST2000. • S1000. • S1. • S2. • S3. SeaTalkng: • All SPX course computers.	SeaTalk, SeaTalkng, or NMEA 0183.
7	Course computer — third-party	1	NMEA 0183 or NMEA 2000 compatible course computer.	NMEA 0183 or NMEA 2000 (via optional DeviceNet adaptor cables).
8	AIS — Raymarine	1	• AIS 250. • AIS 500. • AIS 350. • AIS 650.	SeaTalkng, or NMEA 0183.
8	AIS — third-party	1	Third-party NMEA 0183–compatible AIS Class A or Class B receiver / transceiver.	NMEA 0183
9	Vessel trim tabs — third-party	1 pair	Third-party NMEA 2000 interfaces.	NMEA 2000 (via optional DeviceNet adaptor cables).

Item	Device Type	Maximum quantity	Suitable Devices	Connections
10	Video / camera	• e7 / e7D / c95 / c97 / c125 / c127 = 1 • e95 / e97 / e125 / e127 = 2	Composite PAL or NTSC video source.	BNC connectors.
11	Lifetag (Man overboard alert)	1 basestation	All Raymarine Lifetag basestations.	SeaTalk (via optional SeaTalk to SeaTalk^{ng} converter)
12	Engine interface — third-party	1	Third-party NMEA 2000 interfaces.	NMEA 2000 (via optional DeviceNet adaptor cables).
13	Transducers and sensors — Raymarine	1	Analog transducers: • Wind. • Speed. • Depth.	SeaTalk^{ng} (via optional transducer pods).
13	Transducers and sensors — Airmar	1	• DT800 Smart Sensor. • DST800 Smart Sensor. • PB200 weather station.	SeaTalk^{ng} (via optional transducer pods).
14	Video out	e95 / e97 / e125 / e127 = 1	External display.	Component
15	Sonar transducer	1	Direct connection to display (Sonar variant displays only): • Raymarine P48. • Raymarine P58. ; OR: • Any 600 watt DSM-compatible transducer (via optional E66066 adaptor cable). ; OR: • Any Minn Kota transducer (via optional A62363 adaptor cable). Connection via external Raymarine Digital Sounder Module (DSM): • Any DSM-compatible transducer.	Raymarine transducer connection, OR Minn Kota transducer connection.
16	VHF radio — Raymarine	1	All Raymarine DSC VHF radios.	NMEA 0183 only (No SeaTalk support).
17	Sirius Weather receiver — Raymarine	1	SeaTalk^{hs}: • SR100. • SR6. SeaTalk^{ng}: • SR50.	SeaTalk^{hs}, SeaTalk^{ng}.
17	Additional multifunction display(s) — Raymarine	5	SeaTalk^{hs} (recommended): • e7 / e7D / e95 / e97 / e125 / e127 / c95 / c97 / c125 / c127 multifunction display. **Note:** You can connect Raymarine multifunction displays using NMEA 0183 or SeaTalk^{ng} but not all functions are supported. **Note:** Visit www.raymarine.com to download the latest software version for your display.	SeaTalk^{hs}.
18	Additional multifunction display(s) — third-party	• Connections to multifunction display NMEA outputs: 4. • Connections to multifunction display NMEA inputs: 2	NMEA 0183–compatible chartplotters and multifunction displays.	NMEA 0183
19	Fishfinder (Digital Sounder Module) — Raymarine	1	• DSM 30. • DSM 300.	SeaTalk^{hs}.

Item	Device Type	Maximum quantity	Suitable Devices	Connections
20	Radar — Raymarine	1	All Raymarine Digital Radome and Digital Open Array radar scanners. **Note:** Please ensure your radar scanner is using the latest software version.	SeaTalk^{hs}.
21	Thermal camera — Raymarine	1	All Raymarine thermal cameras.	SeaTalk^{hs} (for control), BNC connector (for video).
22	PC / laptop	1	Windows-compatible PC or laptop running Raymarine Voyager planning software.	SeaTalk^{hs}
	Cartography — included		Embedded (internal) Navionics cartography.	Internal storage.
	Cartography — optional		External MicroSD, or MicroSDHC 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.	Card slot.

3.2 Installation checklist

Installation includes the following activities:

	Installation Task
1	Plan your system
2	Obtain all required equipment and tools
3	Site all equipment
4	Route all cables.
5	Drill cable and mounting holes.
6	Make all connections into equipment.
7	Secure all equipment in place.
8	Power on and test the system.

3.3 System Limits

The following limits apply to the number of system components that can be connected in an e7 / e7D / e95 /. e97 / e125 / e127 / c95 / c97 / c125 / c127 system.

Component	Maximum
Maximum number of SeaTalk^{hs} devices	25
Maximum number of SeaTalk^{ng} devices	50
e7 / e7D / e95 / e97 / e125 / e127 / c95 / c97 / c125 / c127 multifunction displays	6

3.4 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.

3.5 Identifying your display variant

To discover which model display you have follow the steps below:

From the homescreen:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Diagnostics**.
4. Select **Select Device**.
5. Search the Network column for the **'This Device'** entry.
6. The Device column for this record will list the model of your display.

3.6 Networking constraints

The following constraints apply when networking your multifunction display with other devices.

General

- Multifunction displays must be connected together using SeaTalk^{hs}.

- Multifunction displays can also be connected via NMEA 0183 or SeaTalk^{ng}, but not all functions are supported.

Master / slave operation

- Any system featuring more than one multifunction e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 display must have one of the displays designated as the data master.

Homescreen sharing

- For networks featuring ONLY e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 displays:

  – Networked e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 displays share homescreens.

Cartography sharing

- Chart card cartography is shared between e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 displays.

- The cartography contained on chart cards is always used in preference to embedded cartography when a chart card is inserted into a card slot.

Radar operation

- e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 systems support the use of one radar scanner at a time.

- The data supplied by a connected radar scanner is repeated to any networked displays.

Sonar operation

- You can connect an external Digital Sounder Module (DSM) unit to e7 / e7D / c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 displays via SeaTalk^{hs} / RayNet.

- e7D / e97 / e127 / c97 / c127 models include a built-in Digital Sounder Module and the display can be directly connected to a compatible sonar transducer.

- If connecting an external DSM unit to a e7D / e97 / e127 / c97 / c127 then the internal sounder should be switched off. From the fishfinder application goto **Menu > Set-up > Sounder Set-up > Internal Sounder > Off**.

- You can only use one sonar transducer at any one time.

- The data supplied by an internal or external DSM is repeated to any networked displays.

3.7 Typical systems

Example: Basic system
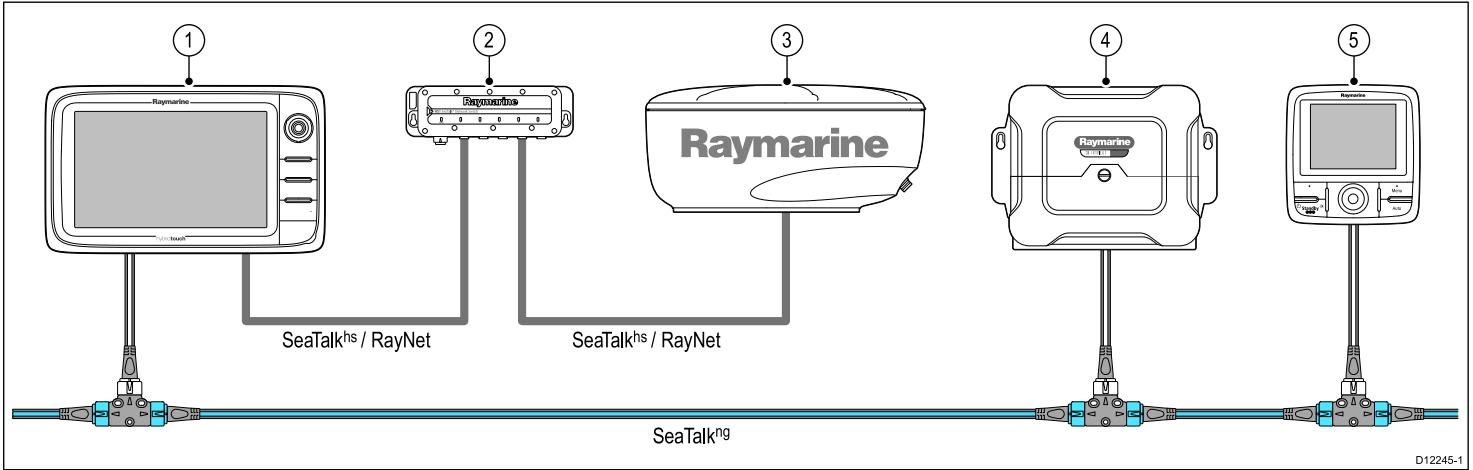
1. Multifunction display.
2. Raymarine network switch.
3. Digital radome scanner.
4. SPX course computer.
5. Pilot controller.

Note: A network switch is only required if more than one device is connected using SeaTalk^{hs} / RayNet.

Example: Basic system with SeaTalk equipment
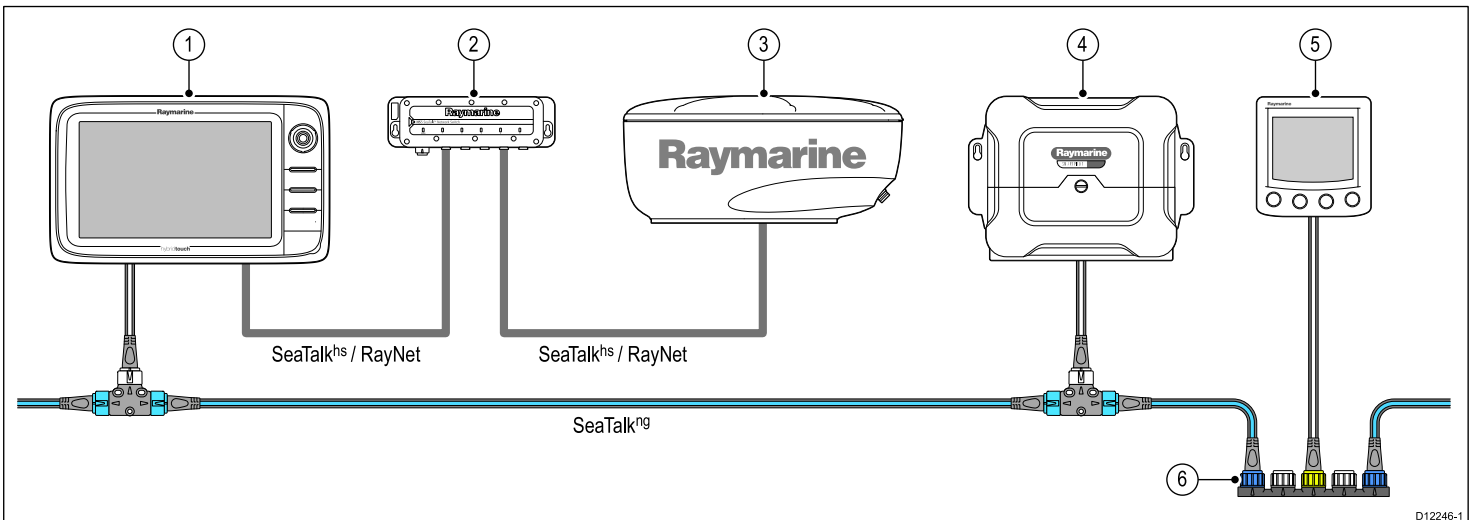
1. Multifunction display.
2. Raymarine network switch.
3. Digital radome scanner.
4. SPX course computer.
5. SeaTalk pilot controller.
6. SeaTalk to SeaTalk^{ng} converter.

Note: A network switch is only required if more than one device is connected using SeaTalk^{hs} / RayNet.

Example: Expanded system
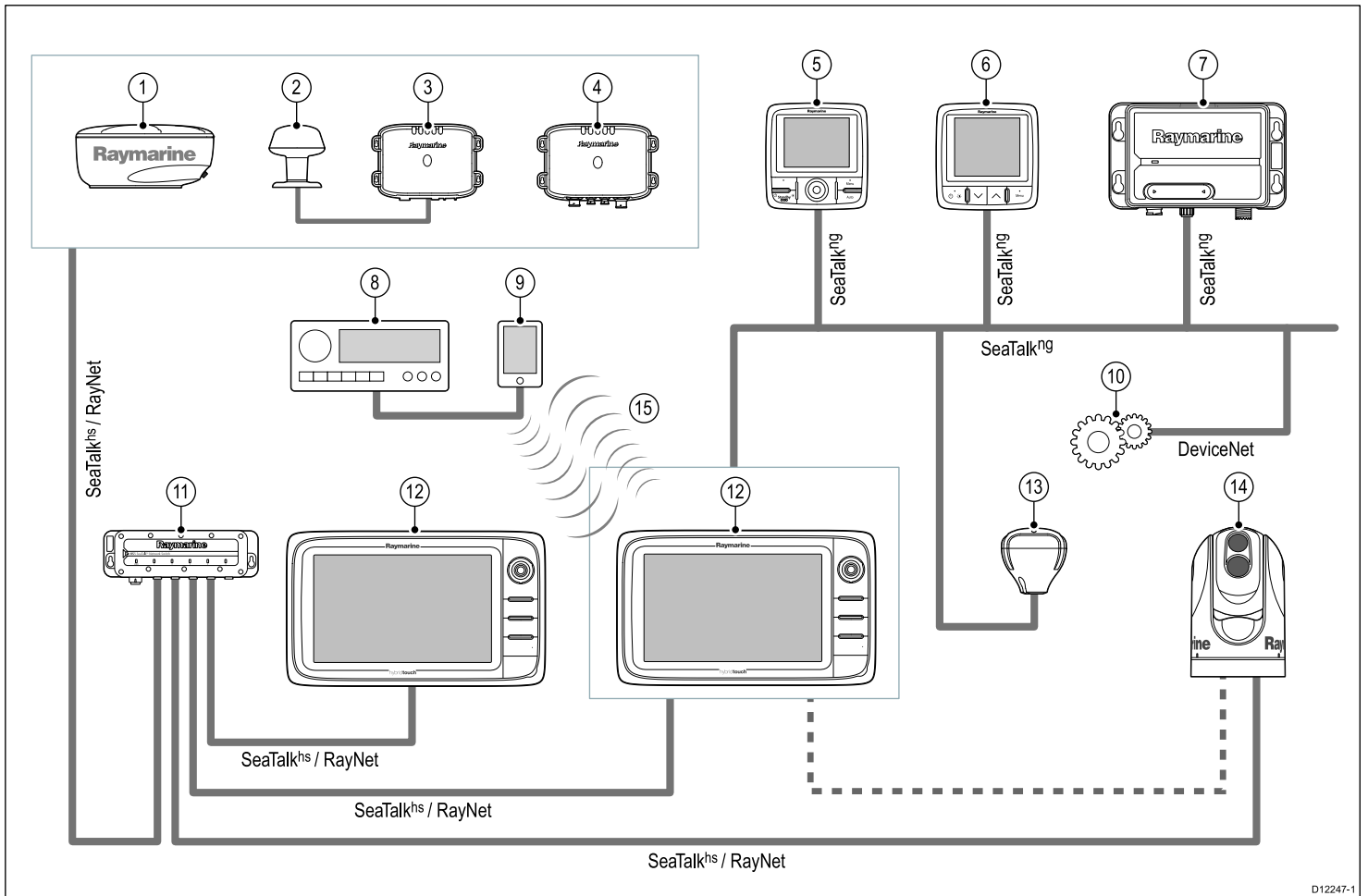
1. Digital radome scanner.

2. Weather sensor.

3. Sirius weather receiver.

4. Digital Sounder Module (DSM).

5. Pilot controller.

6. Instrument.

7. AIS receiver / transceiver.

8. Audio system.

9. Smartphone.

10. DeviceNet spur (for NMEA 2000 devices).

11. Raymarine network switch.

12. Multifunction display.

13. GPS receiver.

14. Thermal camera.

15. Wireless connection.

3.8 System protocols

Your Multifunction Display can connect to various instruments and displays to share information and so improve the functionality of the system. These connections may be made using a number of different protocols. Fast and accurate data collection and transfer is achieved by using a combination of the following data protocols:

• SeaTalkhs

• SeaTalkng

• NMEA 2000

• SeaTalk

• NMEA 0183

Note: You may find that your system does not use all of the connection types or instrumentation described in this section.

SeaTalkhs

SeaTalkhs is an ethernet based marine network. This high speed protocol allows compatible equipment to communicate rapidly and share large amounts of data.

Information shared using the SeaTalkhs network includes:

• Shared cartography (between compatible displays).

• Digital radar data.

• Sonar data.

Seatalkng

SeaTalkng (Next Generation) is an enhanced protocol for connection of compatible marine instruments and equipment. It replaces the older SeaTalk and SeaTalk^2 protocols.

SeaTalkng utilizes a single backbone to which compatible instruments connect using a spur. Data and power are carried within the backbone. Devices that have a low draw can be powered from the network, although high current equipment will need to have a separate power connection.

SeaTalkng is a proprietary extension to NMEA 2000 and the proven CAN bus technology. Compatible NMEA 2000 and SeaTalk / SeaTalk^2 devices can also be connected using the appropriate interfaces or adaptor cables as required.

NMEA 2000

NMEA 2000 offers significant improvements over NMEA 0183, most notably in speed and connectivity. Up to 50 units can simultaneously transmit and receive on a single physical bus at any one time, with each node being physically addressable. The standard was specifically intended to allow for a whole network of marine electronics from any manufacturer to communicate on a common bus via standardized message types and formats.

SeaTalk

SeaTalk is a protocol which enables compatible instruments to connect to each other and share data.

The SeaTalk cable system is used to connect compatible instruments and equipment. The cable carries power and data and enables connection without the need for a central processor.

Additional instruments and functions can be added to a SeaTalk system, simply by plugging them into the network. SeaTalk equipment can also communicate with other non-SeaTalk equipment via the NMEA 0183 standard, provided a suitable interface is used.

NMEA 0183

The NMEA 0183 Data Interface Standard was developed by the National Marine Electronics Association of America. It is an international standard to enable equipment from many different manufacturers to be connected together and share information.

The NMEA 0183 standard carries similar information to SeaTalk. However it has the important difference that one cable will only carry information in one direction. For this reason NMEA 0183 is generally used to connect a data receiver and a transmitter together,

e.g. a compass sensor transmitting heading to a radar display. This information is passed in 'sentences', each of which has a three letter sentence identifier. It is therefore important when checking compatibility between items that the same sentence identifiers are used some examples of which are:

• VTG - carries Course and Speed Over Ground data.

• GLL - carries latitude and longitude.

• DBT - carries water depth.

• MWV - carries relative wind angle and wind speed data.

NMEA baud rates

The NMEA 0183 standard operates at a number of different speeds, depending upon the particular requirement or equipment capabilities. Typical examples are:

• 4800 baud rate. Used for general purpose communications, including FastHeading data.

• 9600 baud rate. Used for Navtex.

• 38400 baud rate. Used for AIS and other high speed applications.

3.9 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. For example the displays may require heading information from the autopilot and GPS systems, usually received through a SeaTalk^{ng} or NMEA connection. The data master is the display to which the SeaTalk, NMEA and any other data connections are made, it then bridges the data to the SeaTalk^{hs} network and any compatible repeat displays. Information shared by the data master includes:

• Cartography

• Routes and waypoints

• Radar

• Sonar

• Data received from the autopilot, instruments, the engine and other external sources.

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

3.10 Parts supplied

The parts shown below are supplied with the e7 / e7D multifunction display.
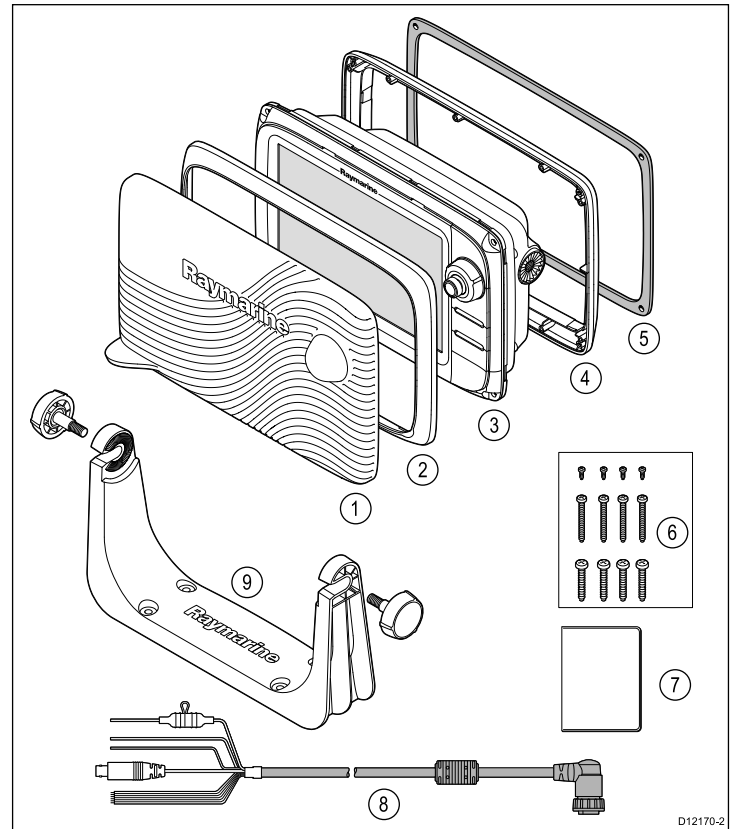
1. Sun cover.

2. Front bezel.

3. Multifunction display.

4. Rear bezel (required for trunnion bracket mounting).

5. Gasket (required for flush mounting).

6. Screw pack, includes:

    • 4 x rear bezel fixing screws.

    • 4 x unit mounting screws (for flush mounting).

    • 4 x unit mounting screws (for trunnion bracket mounting).

7. Documentation pack, includes:

    • Multilingual CD.

    • Mounting and getting started multilingual guide

    • Mounting template.

    • Warranty policy

8. 1.5 m (4.9 ft) power and data cable.

9. Trunnion bracket.

3.11 Parts supplied

The parts shown below are supplied with the c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 multifunction display.

D12248-1
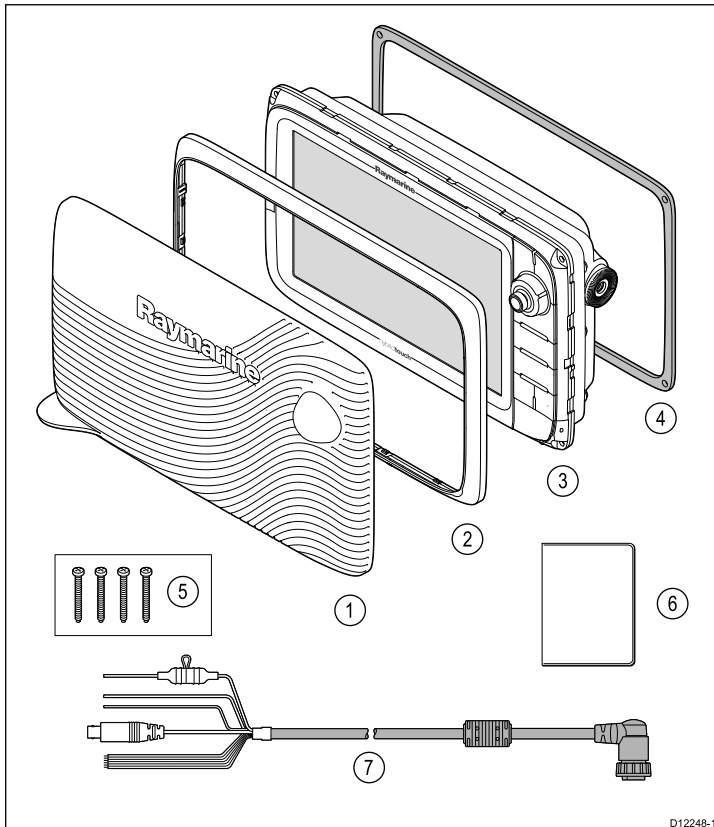
1. Sun cover.

2. Front bezel.

3. Multifunction display.

4. Gasket (required for flush mounting).

5. Screw pack, includes 4 x unit mounting screws (for flush mounting).

6. Documentation pack, includes:

   • Multilingual CD.

   • Mounting and getting started multilingual guide

   • Mounting template.

   • Warranty policy

7. 1.5 m (4.9 ft) power and data cable.

3.12 Tools required for installation

D12171-1
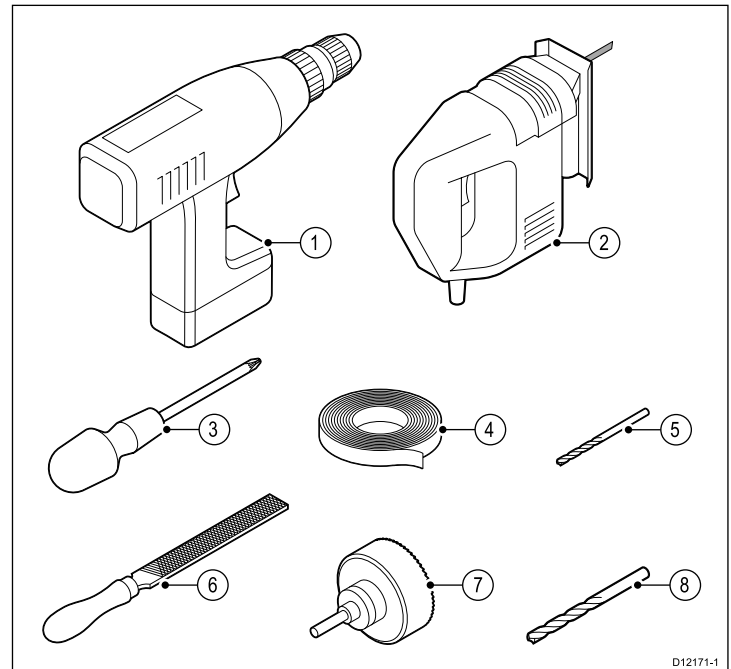
1. Power drill.

2. Jigsaw.

3. Pozidrive screwdriver.

4. Adhesive tape.

5. Drill bit for trunnion bracket mounting.

6. File.

7. 25 mm hole saw for flush mounting.

8. Drill bit for flush mounting.

Chapter 4: Cables and connections

Chapter contents

4.1 General cabling guidance

Cable types and length

It is important to use cables of the appropriate type and length

• Unless otherwise stated use only standard cables of the correct type, supplied by Raymarine.

• Ensure that any non-Raymarine cables are of the correct quality and gauge. For example, longer power cable runs may require larger wire gauges to minimize voltage drop along the run.

Routing cables

Cables must be routed correctly, to maximize performance and prolong cable life.

• Do NOT bend cables excessively. Wherever possible, ensure a minimum bend radius of 100 mm.

Minimum bend 200 mm (8 in) diameter

Minimum bend of cable 100 mm (4 in) radius
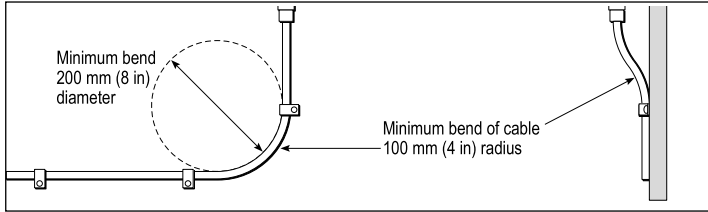
• Protect all cables from physical damage and exposure to heat. Use trunking or conduit where possible. Do NOT run cables through bilges or doorways, or close to moving or hot objects.

• Secure cables in place using tie-wraps or lacing twine. Coil any extra cable and tie it out of the way.

• Where a cable passes through an exposed bulkhead or deckhead, use a suitable watertight feed-through.

• Do NOT run cables near to engines or fluorescent lights.

Always route data cables as far away as possible from:

• other equipment and cables,

• high current carrying ac and dc power lines,

• antennae.

Strain relief

Ensure adequate strain relief is provided. Protect connectors from strain and ensure they will not pull out under extreme sea conditions.

Circuit isolation

Appropriate circuit isolation is required for installations using both AC and DC current:

• Always use isolating transformers or a separate power-inverter to run PC's, processors, displays and other sensitive electronic instruments or devices.

• Always use an isolating transformer with Weather FAX audio cables.

• Always use an isolated power supply when using a 3rd party audio amplifier.

• Always use an RS232/NMEA converter with optical isolation on the signal lines.

• Always make sure that PC's or other sensitive electronic devices have a dedicated power circuit.

Cable shielding

Ensure that all data cables are properly shielded that the cable shielding is intact (e.g. hasn't been scraped off by being squeezed through a tight area).

4.2 Connections overview

The connections for all multifunction display variants are listed below.

D12249-2
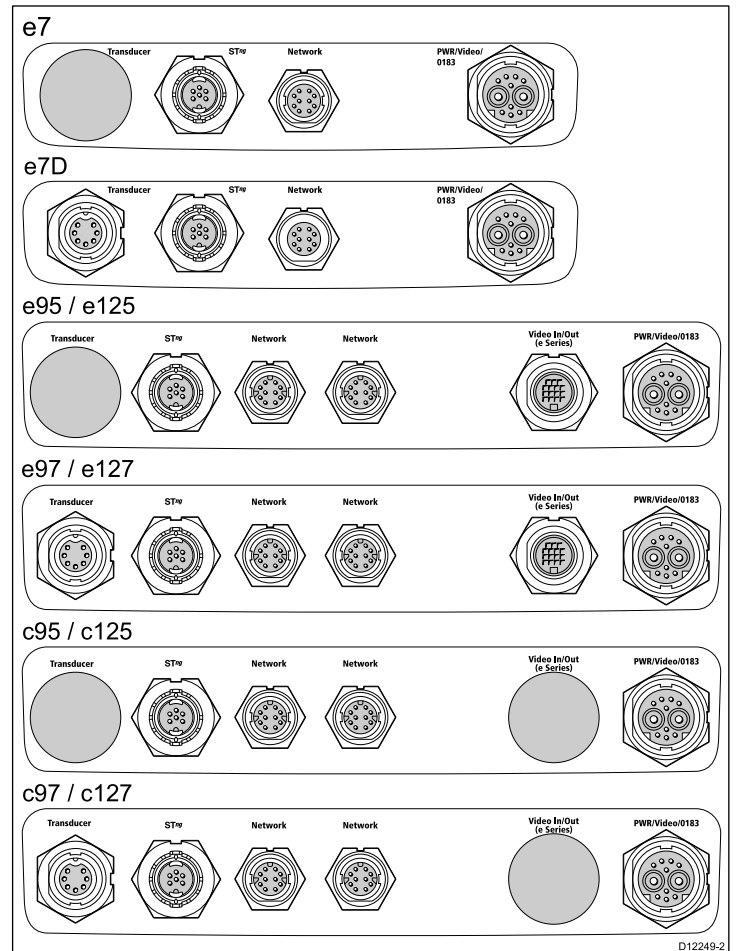
	Trans-ducer	SeaTalkng	SeaTalkhs /RayNet Net-work 1	SeaTalkhs /RayNet Net-work 2	Video in/out	Power / Video / NMEA 0183
e7	✘	✔	✔	✘	✘	✔
e7D	✔	✔	✔	✘	✘	✔
e95	✘	✔	✔	✔	✔	✔
e97	✔	✔	✔	✔	✔	✔
e125	✘	✔	✔	✔	✔	✔
e127	✔	✔	✔	✔	✔	✔
c95	✘	✔	✔	✔	✘	✔
c97	✔	✔	✔	✔	✘	✔
c125	✘	✔	✔	✔	✘	✔
c127	✔	✔	✔	✔	✘	✔

4.3 Power connection
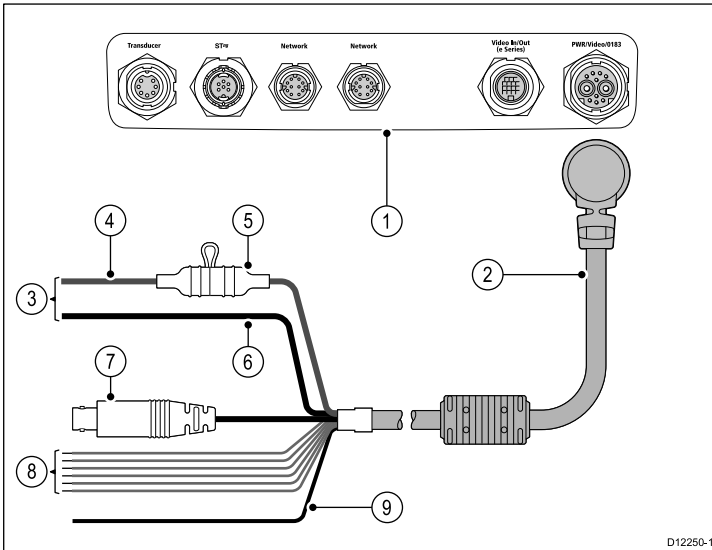
1. Multifunction display connections.

2. Power and data cable.

3. Connection to 12/24 V power supply (e7/e7D is 12V only).

4. Red cable (positive).

5. Fuse.

6. Black cable (negative).

7. Video input cable.

8. NMEA 0183 data cables.

9. Shield (drain) wire (thin black wire; must be connected to RF ground point).

Power distribution

Raymarine recommends that all power connections are made via a distribution panel.

• All equipment must be powered from a breaker or switch, with appropriate circuit protection.

• All equipment should be wired to individual breakers if possible.

> ⚠ **Warning: Product grounding**
>
> Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions in this guide.

Grounding — Dedicated drain wire

The power cable supplied with this product includes a dedicated shield (drain) wire for connection to a vessel's RF ground point.

It is important that an effective RF ground is connected to the system. A single ground point should be used for all equipment. The unit can be grounded by connecting the shield (drain) wire of the power cable to the vessel's RF ground point. On vessels without an RF ground system the shield (drain) wire should be connected directly to the negative battery terminal.

The dc power system should be either:

• Negative grounded, with the negative battery terminal connected to the vessel's ground.

• Floating, with neither battery terminal connected to the vessel's ground

> ⚡ **Warning: Positive ground systems**
>
> Do not connect this unit to a system which has positive grounding.

Power cable

The display is supplied with a combined power and data multi cable, this can be extended if required.

Power cables available

Cable	Part number	Notes
1.0 m (3.3 ft) Power and data cable	R62379	
1.0 m (3.3 ft) Right angled power and data cable	R70029	

Cable extension

The following restrictions apply to any extension to the power cable:

• Cable must be of a suitable gauge for the circuit load.

• Each unit should have its own dedicated power cable wired back to the distribution panel.

Total length (max)	Supply voltage	Cable gauge (AWG)
0–5 m (0–16.4 ft)	12 V	18
	24 V	20
5–10 m (16.4–32.8 ft)	12 V	14
	24 V	18
10–15 m (32.8–49.2 ft)	12 V	12
	24 V	16
15–20 m (49.2–65.5 ft)	12 V	12
	24 V	14

Note: These distances are for a 2 wire power cable run from the battery to the display (approximately the distance from the battery to the display). To calculate the round trip length, double the figure stated here.

Breakers, fuses and circuit protection

The power cable includes an in-line fuse. It is recommended that you fit an additional thermal breaker or fuse at the distribution panel.

Display	Fuse rating	Thermal breaker rating
• e7 / e7D	7 A in-line fuse fitted within power cable.	5 A (if only connecting one device)
• c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127	10 A in-line fuse fitted within power cable.	7 A (if only connecting one device)

Note: The suitable fuse rating for the thermal breaker is dependent on the number of devices you are connecting. If in doubt consult an authorised Raymarine dealer.

Sharing a breaker

Where more than 1 piece of equipment shares a breaker you must provide protection for the individual circuits. E.g. by connecting an in-line fuse for each power circuit.

Where possible, connect individual items of equipment to individual circuit breakers.

Where this not possible, use individual in-line fuses to provide the necessary protection.

+VE bar

-VE bar

Circuit breaker

Fuse   Fuse

D11637-1
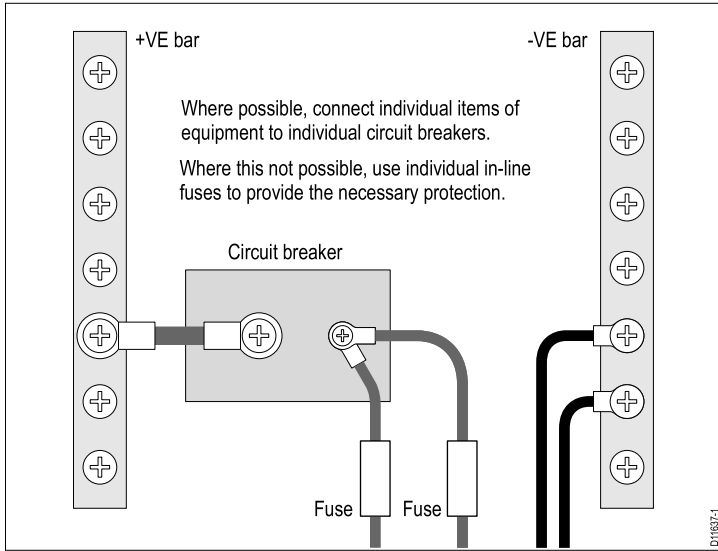
4.4 Network connections

You can connect a number of digital devices to your multifunction display using the Network connector(s) at the rear of the unit.

A typical network of digital devices may include:

- Up to 6 Raymarine multifunction displays.
- SeaTalkhs or RayNet digital devices such as a Digital Sounder Module (DSM) or radar scanner.
- Thermal camera.

Note: The display includes either 1 (e7 / e7D only) or 2 network connectors, networks requiring additional connections will require a Raymarine network switch. This is a hub used for connecting multiple devices.

Typical SeaTalkhs network

D12251-1
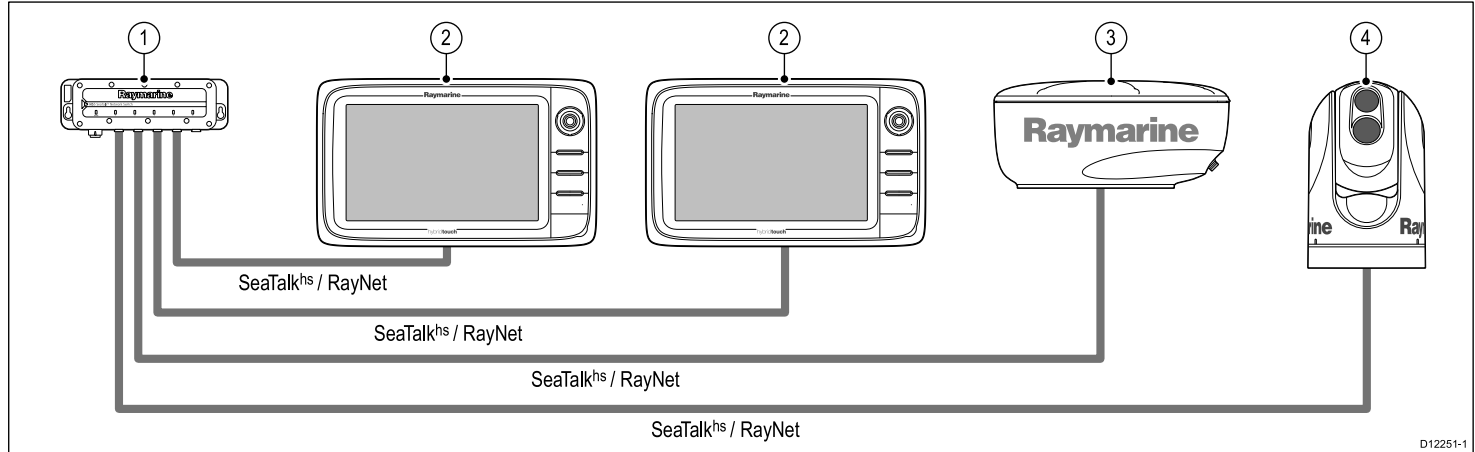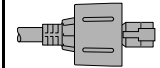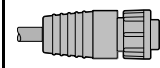
1. Raymarine network switch.
2. Multifunction display.
3. Digital radar scanner.
4. Thermal camera.

Network hardware

Item	Part number	Notes
HS5 SeaTalkhs network switch	A80007	5–port switch for network connection of multiple SeaTalkhs devices featuring RayNet connectors. Equipment with SeaTalkhs connectors can also be connected via suitable adaptor cables.
SeaTalkhs network switch	E55058	8–port switch for network connection of multiple SeaTalkhs devices.
SeaTalkhs crossover coupler	E55060	Enables direct connection of SeaTalkhs devices to smaller systems where a switch is not required. Also enables the connection of SeaTalkhs devices to an HS5 SeaTalkhs network switch (in conjunction with a RayNet to RJ45 cable).

Network cable connector types

There are 2 types of network cable connector — SeaTalkhs and RayNet.

	SeaTalkhs connector — used for connecting SeaTalkhs devices to a Raymarine network switch via SeaTalkhs cables.
	RayNet connector — used for connecting Raymarine network switches and SeaTalkhs devices to the multifunction display via RayNet cables. Also required for connecting a crossover coupler if only one device is being connected to the display's Network connector.

Network cable types

There are 2 types of SeaTalkhs network cable — "patch" and "network".

- **Patch** — for connecting the following devices to a Raymarine network switch:
  - Thermal camera via PoE injector.
  - Additional Raymarine network switch.
  - PC or laptop using Voyager planning software.
- **Network** — for connecting the following devices to a Raymarine network switch:
  - Digital Sounder Module (DSM) sonar.
  - SR100 Sirius weather receiver.
  - Additional compatible Raymarine multifunction displays.

RayNet network cables

Cable	Part number
1 m (3.28 ft) RayNet to SeaTalkhs (RJ45) cable	A62360
2 m (6.56 ft) RayNet to RayNet cable	A62361
5 m (16.4 ft) RayNet to RayNet cable	A80005

Cable	Part number
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

Radar connection

The multifunction display is compatible with Raymarine digital Radomes and digital Open Array radar scanners. The scanner is connected using a SeaTalk^{hs} cable.

Note: c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 displays have 2 RayNet / SeaTalk^{hs} connections to allow 2 devices to be connected directly to the display.

The digital radar is usually connected via a Raymarine network switch. On smaller systems (with only one display and no other digital devices) the radar may be connected directly using a SeaTalk^{hs} crossover coupler.

Radar connected using Raymarine network switch
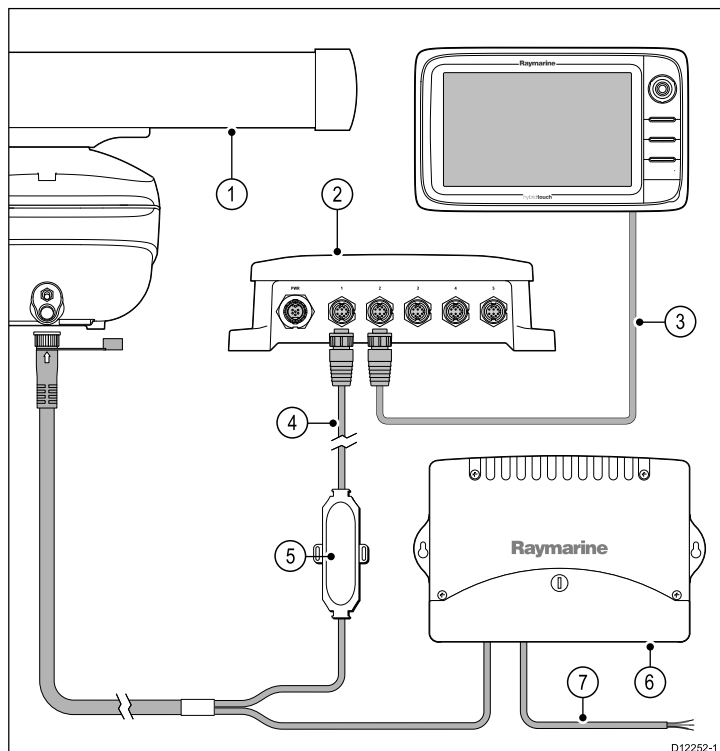
1. Digital radar scanner.
2. Raymarine network switch.
3. RayNet cable.

4. RayNet to SeaTalk^{hs} network cable.
5. SeaTalk^{hs} crossover coupler
6. VCM (Voltage Converter Module) — **required for Open Arrays**.
7. Power connection.

Radar connected using crossover coupler
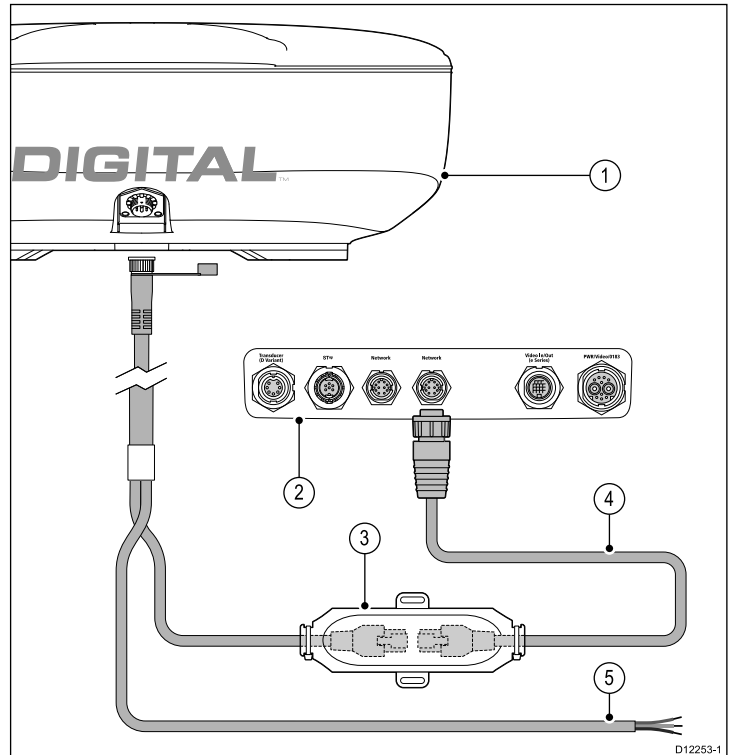
1. Digital radar scanner
2. Multifunction display rear connector panel.
3. SeaTalk^{hs} crossover coupler.
4. RayNet to SeaTalk^{hs} network cable.
5. Connection to power supply — **Open array scanners require a VCM (Voltage Converter Module).**

Note: The connector on the free end of the radar cable does NOT have a locking mechanism.

Digital radar cable extension

For longer cable runs a radar power and data digital cable extension is required.
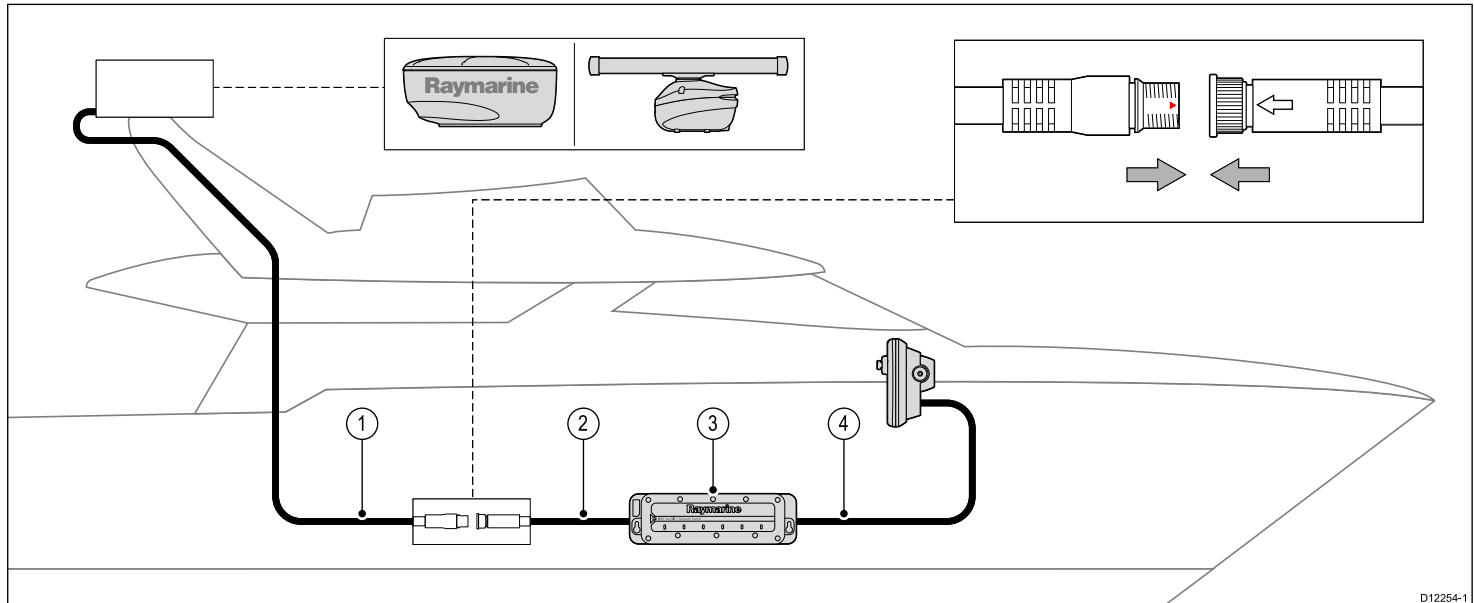
1. Radar extension cable.
2. Radar power and data digital cable.
3. Raymarine network switch (or crossover coupler if connecting radar directly to display).
4. RayNet cable (or RayNet to SeaTalk^hs cable if connecting via crossover coupler).

Note: The extension cable connects to the radar scanner.

Note: The power connection is NOT shown in the diagram. If using an Open Array scanner a VCM (Voltage Converter Module) must be connected between the scanner and the power supply.

Digital radar cables

You will need a dedicated radar power and data digital cable and SeaTalk^hs network cables to connect your scanner to your system.

Connection	Required cable
Digital radar scanner to power supply and Raymarine network switch.	Power and data digital cable. For longer cable runs, extensions are available in a variety of lengths.
Raymarine network switch to multifunction display.	SeaTalk^hs network cables, available in a variety of cable lengths.

Radar power and data digital cables

These cables contain the wires for a scanner's power and data connections.

Cable	Part number
5 m (16.4 ft) Power and data digital cable	A55076D
10 m (32.8 ft) Power and data digital cable	A55077D
15 m (49.2 ft) Power and data digital cable	A55078D
25 m (82.0 ft) Power and data digital cable	A55079D

Note: The maximum length for the radar power and data digital cable (including any extensions) is 25 m (82 ft).

Radar power and data digital extension cables

These cables extend the power and data digital cables for a scanner's power and data connections.

Cable	Part number
2.5 m (8.2 ft) Power and data digital cable	A92141D
5 m (16.4 ft) Power and data digital cable	A55080D
10 m (32.8 ft) Power and data digital cable	A55081D

Note: The maximum length for the radar power and data digital cable (including any extensions) is 25 m (82 ft).

Sonar connection

A sonar connection is required for fishfinder applications.

There are 2 types of connection required for fishfinder applications:

- **Digital Sounder Module (DSM) connection** — converts the sonar signals provided by the sonar transducer into data suitable for a marine electronics system. The sonar variant multifunction displays feature a built-in Digital Sounder, enabling you to connect the display directly to a compatible sonar transducer. Non-sonar variants require a connection to an external Raymarine DSM unit. Internal and external Digital sounders require a connection to a compatible sonar transducer.

- **Sonar transducer connection** — provides sonar signals to the Digital Sounder Module (DSM).

Sonar DSM connection
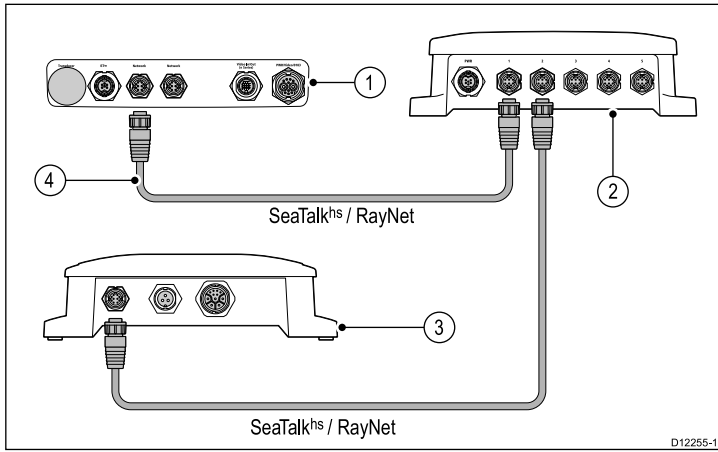
D12255-1

1. Rear connector panel of multifunction display (Non-sonar variant).

2. Raymarine network switch.

3. Raymarine (external) DSM unit

4. RayNet cable.

The multifunction display can be used with the following DSM units:

- DSM300

- DSM30

Note: You can also connect a sonar variant multifunction display to an external DSM unit. This is useful in circumstances where you need a higher powered DSM for example. You can only use one sonar transducer at any one time.

Sonar connected directly to the display

On smaller systems (with only one display and no other SeaTalkhs / RayNet devices) the DSM may be connected directly to the display without using a Raymarine network switch.

Note: You must ensure that the cable ends connected into the display and DSM have a locking / weather-tight mechanism.

Compatible sonar transducers

The multifunction display is compatible with the following sonar transducers:

- Raymarine P48.

- Raymarine P58.

- Minn Kota transducers Sonar variant Raymarine displays only), via optional A62363 adaptor cable.

- Any 600 watt DSM-compatible transducer, via optional E66066 adaptor cable.

Sonar transducer connection — Sonar variant multifunction displays

D12256-1
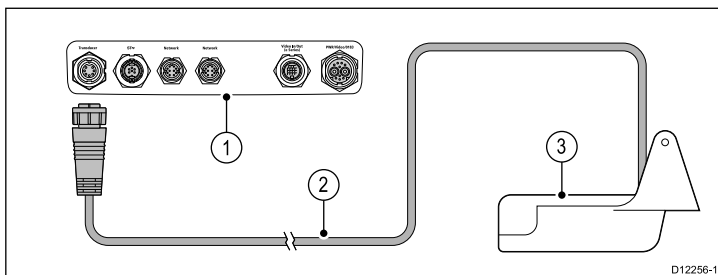
1. Rear connector panel of multifunction display (Sonar variant).

2. Sonar transducer cable.

3. Sonar transducer.

600 watt DSM-compatible sonar transducer connection via optional adaptor — Sonar variant multifunction displays

D12257-1
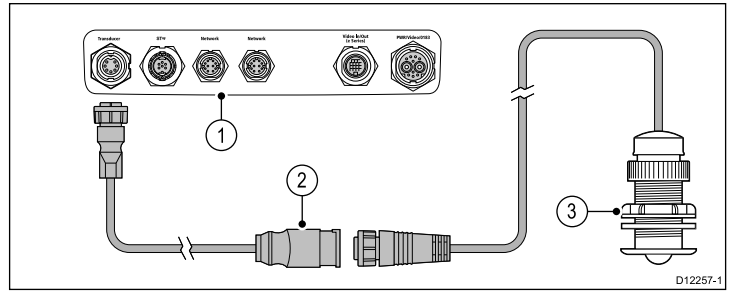
1. Rear connector panel of multifunction display (Sonar variant).

2. E66066 adaptor cable.

3. Sonar transducer.

Transducer adaptor cable

Cable	Part number
0.5 m (1.64 ft) transducer adaptor cable	E66066

Sonar transducer connection — Non-Sonar variant multifunction displays
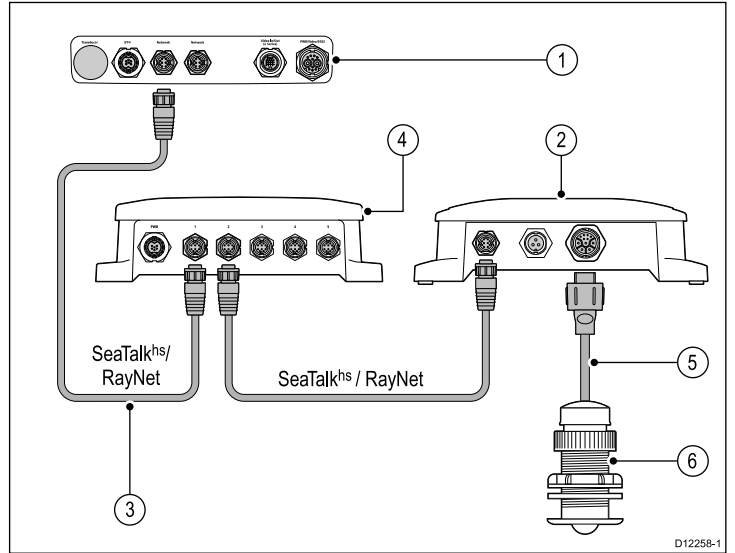
D12258-1

1. Rear connector panel of multifunction display (Non-sonar variant).

2. Raymarine network switch (only required if connecting more than one device using SeaTalkhs / RayNet).

3. RayNet cable.

4. Raymarine DSM unit

5. Sonar transducer cable.

6. Sonar transducer.

Minn Kota sonar transducer connection via optional adaptor cable (Sonar variant multifunction displays only)

D12259-1
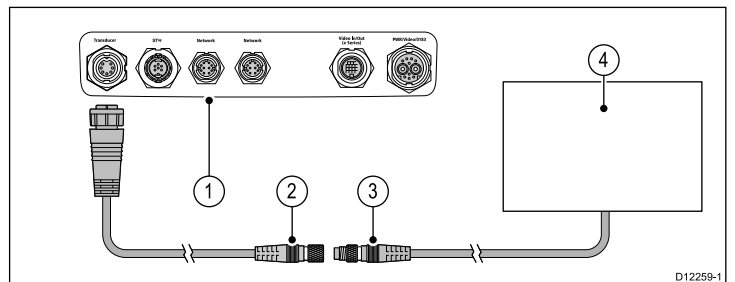
1. Rear connector panel of multifunction display (Sonar variant).

2. Minn Kota transducer adaptor cable.

3. Minn Kota transducer cable.

4. Minn Kota transducer.

Sonar variant multifunction displays

The table below details which multifunction display variants feature a built-in sonar DSM and can be connected directly to compatible sonar transducers.

Sonar variants	Non-sonar variants
e7D	e7
e97	e95
e127	e125
c97	c95
c127	c125

Minn Kota transducer adaptor cable

Connects a Minn Kota sonar transducer to a compatible Raymarine multifunction display.

Cable	Part number
1 m (3.28 ft) Minn Kota transducer adaptor cable	A62363

Thermal camera connection

You can connect a thermal camera to your multifunction display.

The camera is connected via a Raymarine network switch. If you want to use the optional Joystick Control Unit (JCU) with the camera this must also be connected to the network switch. A composite video connection is required between the camera and the multifunction display.

D12260-1
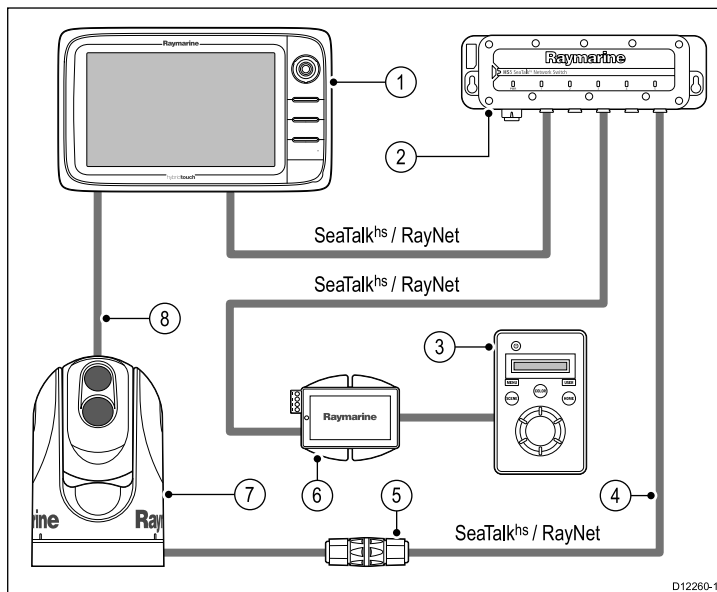
1. Multifunction display.

2. Raymarine network switch.

3. PoE (Power over Ethernet) injector (only required if using the optional JCU).

4. Joystick Control Unit (JCU), optional.

5. Cable coupler.

6. Thermal camera.

7. Video connection.

Important notes

• You can control the thermal camera using your multifunctional display. The Joystick Control Unit (JCU) is optional, but can be used in conjunction with the multifunctional display to control the thermal camera if required.

• "Dual payload" thermal cameras include 2 independent lenses; 1 for thermal (infrared) and visible light, 1 for thermal (infrared) only. If you only have 1 display you should only connect the video cable labelled "VIS / IR" (visible light / infrared) to the display. If you have 2 or more displays you should connect 1 cable to each display.

• You can only view the thermal camera image on the multifunction display to which the camera is physically connected. If you want to view the thermal camera image on more than 1 display you must obtain a suitable third-party video distribution unit.

• For further information regarding the camera's installation (including connections and mounting), refer to the installation instructions that accompany the camera.

Thermal camera cables

Cabling requirements for thermal cameras.

Camera to network switch

A network patch cable is required to connect the camera to the network switch. The connection is made between the camera cable tail and the network switch via the coupler (supplied with the camera). Network patch cables are available in a variety of lengths.

Joystick Control Unit (JCU)

An Ethernet (with power) cable is used to connect the JCU. The JCU is supplied with a 7.62 m (25 ft) Ethernet cable for this connection. If you require a different length contact your dealer for suitable cables.

Power over Ethernet (PoE) injector to network switch

A network patch cable is required for connecting the PoE injector to the network switch. Network patch cables are available in a variety of lengths.

Video cables

Contact your dealer for suitable cables and adaptors.

4.5 GPS connection

The multifunction display includes an internal GPS receiver. It can also be connected to an external GPS receiver, using SeaTalkng or NMEA 0183.

GPS connection — SeaTalkng
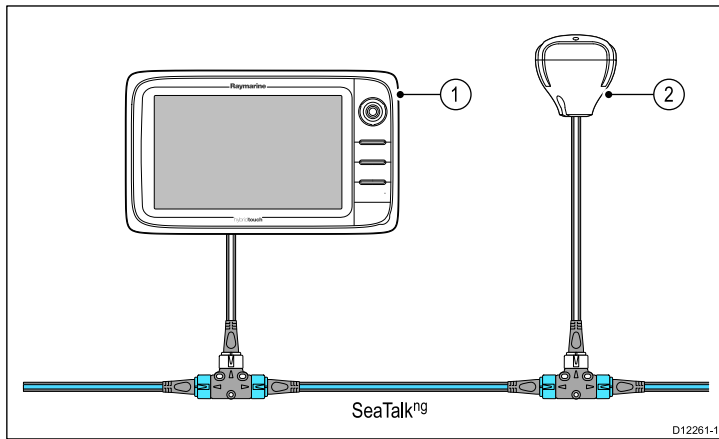
1. Multifunction display.
2. SeaTalkng GPS receiver.

GPS connection — NMEA 0183
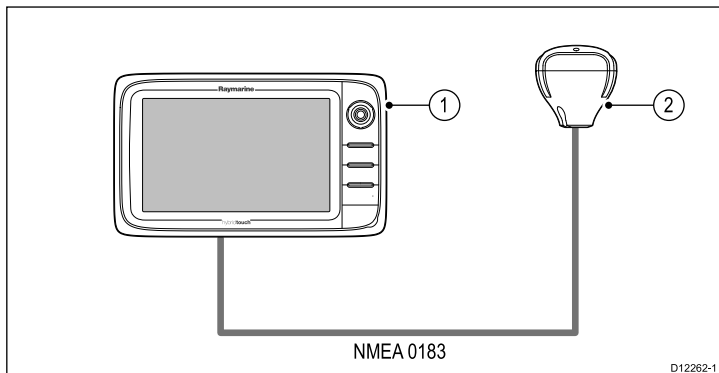
1. Multifunction display.
2. NMEA 0183 GPS receiver.

4.6 AIS connection

A compatible AIS can be connected using SeaTalkng or NMEA 0183.

Connection using SeaTalkng
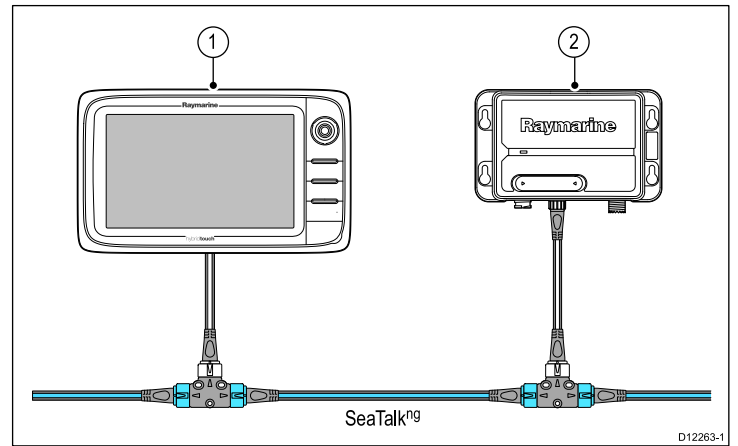
1. Multifunction display.
2. SeaTalkng AIS receiver / transceiver.

Connection using NMEA 0183
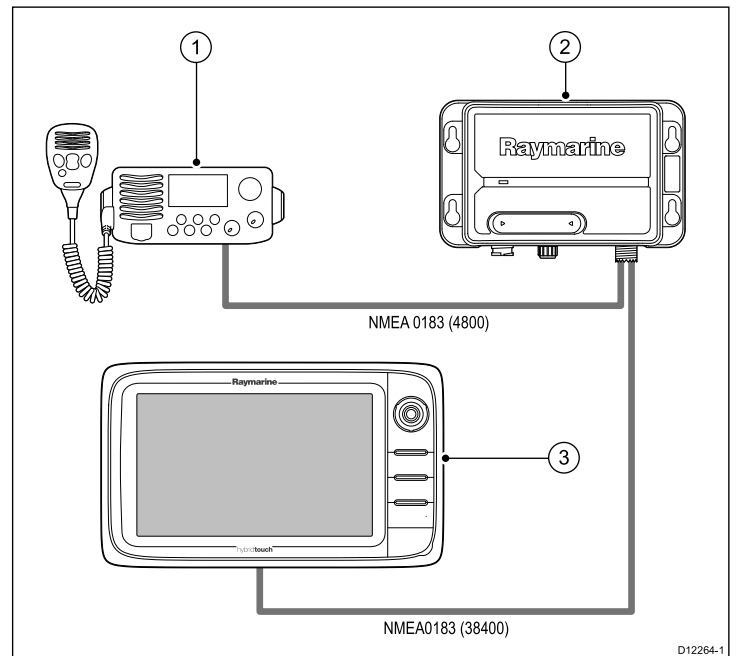
1. VHF radio.
2. AIS unit.
3. Multifunction display.

4.7 Fastheading connection

If you wish to use MARPA (radar target acquisition) functions on your multifunction display you need either:

- An autopilot connected to the multifunction display via SeaTalk^{ng} or NMEA 0183. The compass is connected to the course computer and calibrated via the pilot control head; or:

- A Raymarine or third-party fastheading sensor connected to the multifunction display via NMEA 0183.

Note: Please contact your dealer or Raymarine technical support for more information.

4.8 SeaTalk^{ng} connections

The display can connect to a SeaTalk^{ng} system.

The display can use SeaTalk^{ng} to communicate with:

- SeaTalk^{ng} instruments (for example, i70).

- SeaTalk^{ng} autopilots (for example, p70 with SmartPilot SPX course computer).

- SeaTalk equipment via the optional SeaTalk to SeaTalk^{ng} converter.

- NMEA 2000 equipment via optional DeviceNet adaptor cables.

Typical SeaTalk^{ng} system
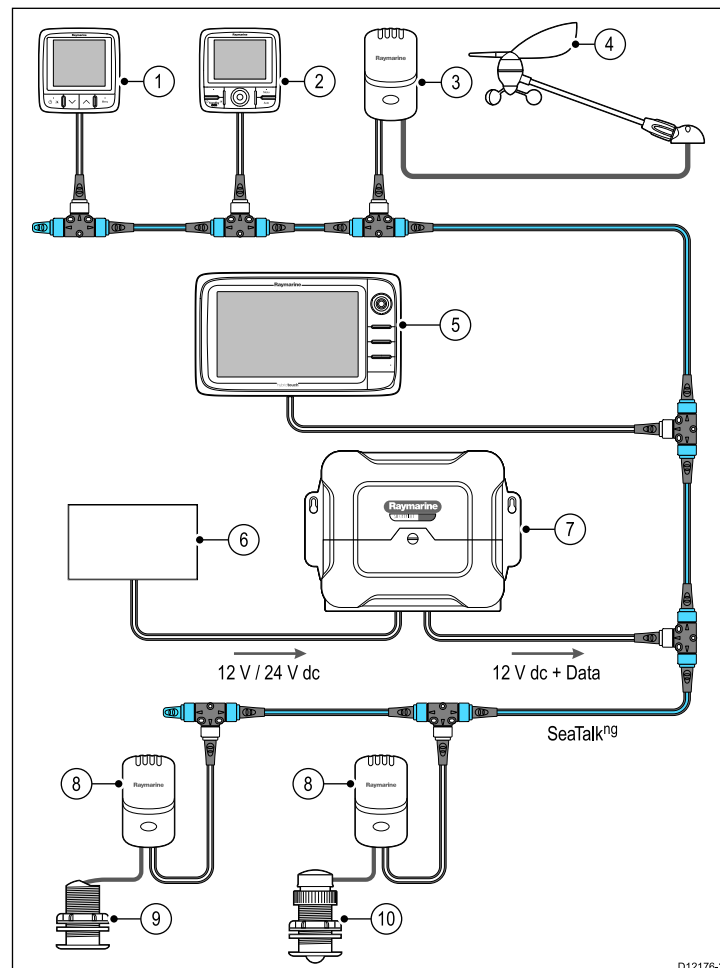
1. SeaTalk^{ng} instrument — for example, i70.
2. SeaTalk^{ng} pilot control head — for example, p70.
3. Transducer pod.
4. Wind transducer.
5. SeaTalk^{ng} multifunction display.
6. Power supply.
7. SeaTalk^{ng} course computer — for example, SPX-30.
8. Transducer pod.
9. Depth transducer.
10. Speed transducer.

SeaTalk^{ng} power requirements

The SeaTalk^{ng} bus requires a 12 V power supply.

Power may be provided from:

- Raymarine equipment with a regulated 12 V power supply (for example, a SmartPilot SPX course computer); or:

- Other suitable 12 V power supply.

Note: SeaTalk^{ng} does NOT supply power to multifunction displays and other equipment with a dedicated power supply input.

SeaTalk^{ng} cabling components

SeaTalk^{ng} cabling components and their purposes.

Connection / Cable	Notes
Backbone cable (various lengths)	The main cable carrying data. Spurs from the backbone are used to connect SeaTalk^{ng} devices.
T-piece connector	Used to make junctions in the backbone to which devices can then be connected.
Terminator	Required at either end of the backbone.
Inline terminator	Used to connect a spur cable directly to the end of a backbone; useful for longer cable runs.
Spur cable	Used to connect devices to the backbone. Devices may be daisy chained or connected directly to the T-pieces.
SeaTalk^{ng} 5–way connector	Used to branch, split, or make additional connections in SeaTalk or SeaTalk^{ng} networks.
Blanking plug	Inserted into unused spur connector positions in a 5-way connector or T-piece.

SeaTalk^{ng} cables and accessories

SeaTalk^{ng} cables and accessories for use with compatible products.

Description	Part No	Notes
Backbone Kit	A25062	Includes: • 2 x 5 m (16.4 ft) Backbone cable • 1 x 20 m (65.6 ft) Backbone cable • 4 x T-piece • 2 x Backbone terminator • 1 x Power cable
SeaTalk^{ng} 0.4 m (1.3 ft) spur	A06038	
SeaTalk^{ng} 1 m (3.3 ft) spur	A06039	
SeaTalk^{ng} 3 m (9.8 ft) spur	A06040	
SeaTalk^{ng} 5 m (16.4 ft) spur	A06041	
SeaTalk^{ng} 0.4 m (1.3 ft) backbone	A06033	
SeaTalk^{ng} 1 m (3.3 ft) backbone	A06034	
SeaTalk^{ng} 3 m (9.8 ft) backbone	A06035	
SeaTalk^{ng} 5 m (16.4 ft) backbone	A06036	
SeaTalk^{ng} 9 m (29.5 ft) backbone	A06068	
SeaTalk^{ng} 20 m (65.6 ft) backbone	A06037	
SeaTalk^{ng} to bare ends 1 m (3.3 ft) spur	A06043	

Description	Part No	Notes
SeaTalk^{ng} to bare ends 3 m (9.8 ft) spur	A06044	
SeaTalk^{ng} Power cable	A06049	
SeaTalk^{ng} Terminator	A06031	
SeaTalk^{ng} T-piece	A06028	Provides 1 x spur connection
SeaTalk^{ng} 5–way connector	A06064	Provides 3 x spur connections
SeaTalk to SeaTalk^{ng} converter	E22158	Allows the connection of SeaTalk devices to a SeaTalk^{ng} system.
SeaTalk^{ng} Inline terminator	A80001	Provides direct connection of a spur cable to the end of a backbone cable. No T-piece required.
SeaTalk^{ng} Blanking plug	A06032	
SeaTalk (3 pin) to SeaTalk^{ng} adaptor cable 0.4 m (1.3 ft)	A06047	
SeaTalk2 (5 pin) to SeaTalk^{ng} adaptor cable 0.4 m (1.3 ft)	A06048	
DeviceNet adaptor cable (Female)	A06045	Allows the connection of NMEA 2000 devices to a SeaTalk^{ng} system.
DeviceNet adaptor cable (Male)	A06046	Allows the connection of NMEA 2000 devices to a SeaTalk^{ng} system.
DeviceNet adaptor cable (Female) to bare ends.	E05026	Allows the connection of NMEA 2000 devices to a SeaTalk^{ng} system.
DeviceNet adaptor cable (Male) to bare ends.	E52027	Allows the connection of NMEA 2000 devices to a SeaTalk^{ng} system.

4.9 SeaTalk connection

You can connect SeaTalk devices to your multifunction display using the optional SeaTalk to SeaTalk^{ng} converter.
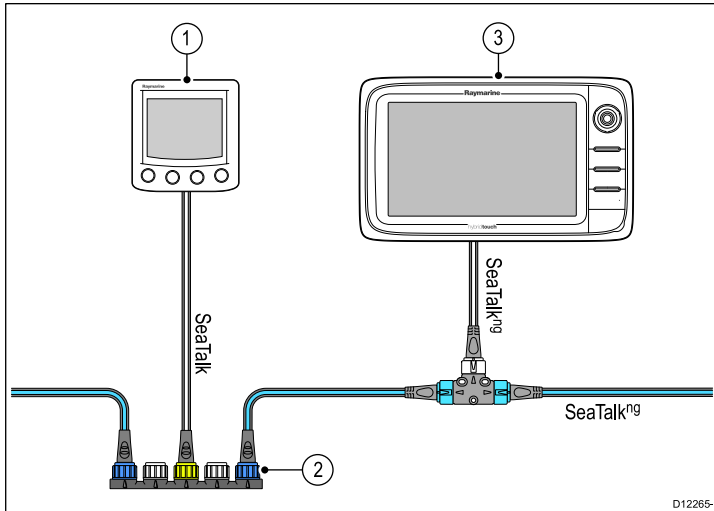
1. SeaTalk device.
2. SeaTalk to SeaTalk^{ng} converter.
3. Multifunction display.

SeaTalk accessories

SeaTalk cables and accessories for use with compatible products.

Description	Part No	Notes
NMEA / SeaTalk converter	E85001	
3 m (9.8 ft) SeaTalk extension cable	D285	
5 m (16.4 ft) SeaTalk extension cable	D286	
9 m (29.5 ft) SeaTalk extension cable	D287	
12 m (39.4 ft) SeaTalk extension cable	E25051	
20 m (65.6 ft) SeaTalk extension cable	D288	

4.10 NMEA 0183 connection
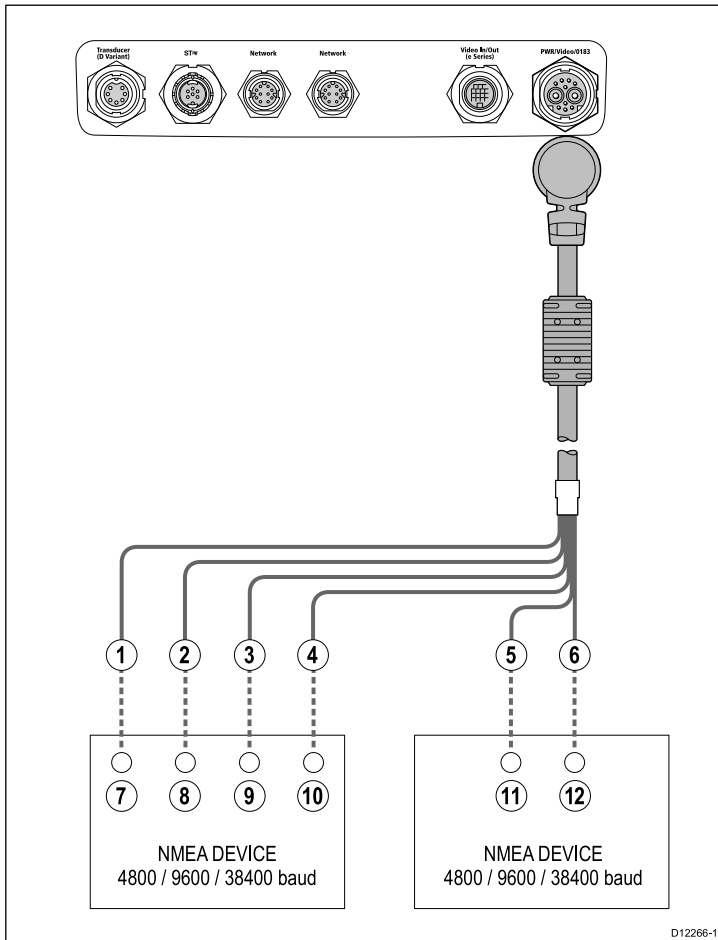
NMEA 0183 devices are connected using the supplied power and data cable.

The display has 2 NMEA 0183 ports:

• **Port 1**: Input and output, 4800, 9600 or 38400 baud rate.

• **Port 2**: Input only, 4800, 9600 or 38400 baud rate.

> **Note:** The baud rate you want to use for each port input must be specified in the System Settings menu (**Homescreen: > Set-up > System Settings > NMEA Set-up > NMEA Input Port**).

> **Note:** For Port 1, both the input and output communicate at the same baud rate. For example, if you have one NMEA 0183 device connected to the display's Port 1 INPUT, and another NMEA 0183 device connected to the display's Port 1 OUTPUT, both NMEA devices must be using the same baud rate.

You can connect up to 4 NMEA 0183 devices to the display's NMEA 0183 OUTPUT (Port 1). You can connect a total of 2 NMEA 0183 devices to the display's NMEA 0183 INPUT (Port 2).

Item	Device	Cable color	Port	Input / output	Positive (+) / negative (-)
1	Multifunction display	White	1	Input	Positive
2		Green	1	Input	Negative
3		Yellow	1	Output	Positive
4		Brown	1	Output	Negative
5		Orange / white	2	Input	Positive
6		Orange / green	2	Input	Negative

Item	Device	Cable color	Port	Input / output	Positive (+) / negative (-)
7	NMEA device	Refer to instructions provided with NMEA device.	Refer to instructions provided with NMEA device.	Output	Positive
8		Refer to instructions provided with NMEA device.	Refer to instructions provided with NMEA device.	Output	Negative
9		Refer to instructions provided with NMEA device.	Refer to instructions provided with NMEA device.	Input	Positive
10		Refer to instructions provided with NMEA device.	Refer to instructions provided with NMEA device.	Input	Negative
11	NMEA device	Refer to instructions provided with NMEA device.	Refer to instructions provided with NMEA device.	Output	Positive
12		Refer to instructions provided with NMEA device.	Refer to instructions provided with NMEA device.	Output	Negative

NMEA 0183 cable

You can extend the NMEA 0183 wires within the supplied power and data cable.

Data cable extension

The following restrictions apply to any extension to the NMEA 0183 data wires.

Total length (max)	Cable
Up to 5 m	High quality data cable: • 2 x twisted pair with overall shield. • 50 to 75 pF/m capacitance core to core.

4.11 NMEA 2000 connection

The display can receive data from NMEA 2000 devices (e.g. data from compatible engines). The NMEA 2000 connection is made using SeaTalkng and appropriate adaptor cables.

You can EITHER:

- Use your SeaTalkng backbone and connect each NMEA 2000 device on a spur, OR

- connect the display on a spur into an existing NMEA 2000 backbone.

> **Important:** You cannot have 2 backbones connected together.

Connecting NMEA 2000 equipment to the SeaTalkng backbone
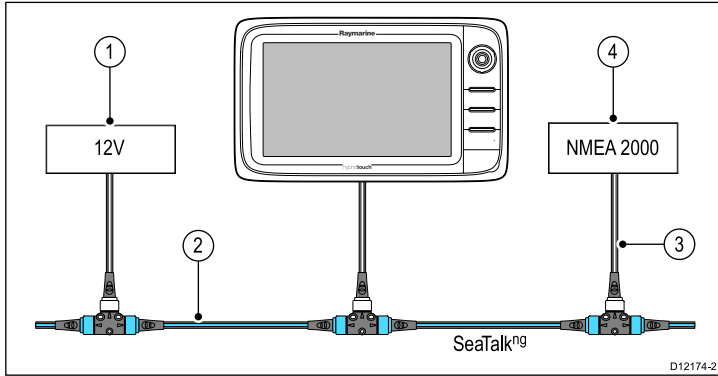
1. 12 V supply into backbone.
2. SeaTalkng backbone.
3. SeaTalkng to DeviceNet adaptor cable.
4. NMEA 2000 equipment.

Connecting the display to an existing NMEA 2000 (DeviceNet) backbone
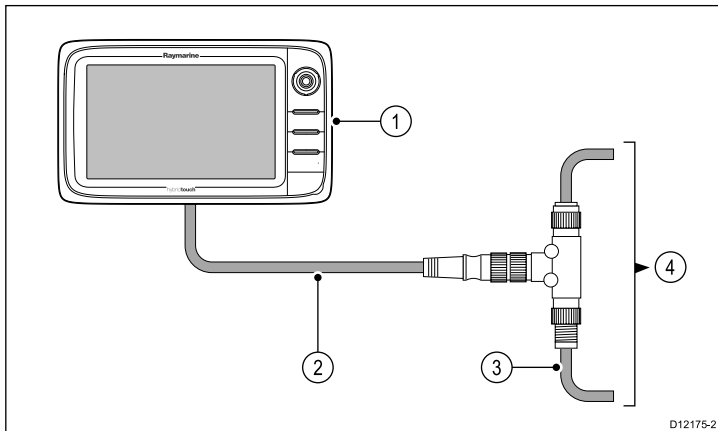
1. Multifunction display.
2. SeaTalkng to DeviceNet adaptor cable.
3. DeviceNetng backbone.
4. NMEA 2000 equipment.

4.12 Video connection

A video device can be connected to the multifunction display using the video connector on the power and data cable.

Examples of video sources that you can connect to the display include:

- Video camera.
- Thermal camera.
- DVD player.
- Portable digital video player.
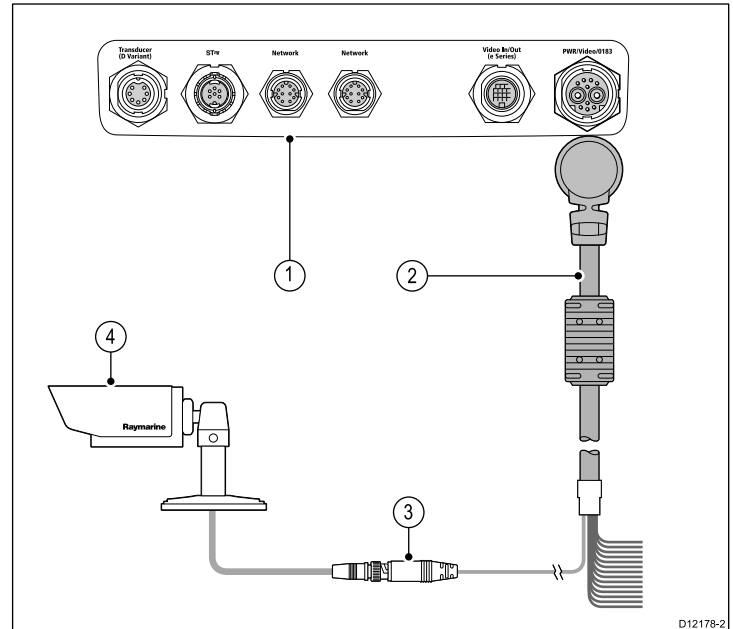
1. Multifunction display.
2. Power and data cable.
3. BNC video connector (input 1).
4. Video source — for example, video camera.

4.13 Video in-out connection

A video device can be connected to e95 / e97 / e125 / e127 variant multifunction display using the video in/out connector.

Video In

Examples of video input sources that you can connect to the display include:

- Video camera.
- Thermal camera.
- DVD player.
- Portable digital video player.
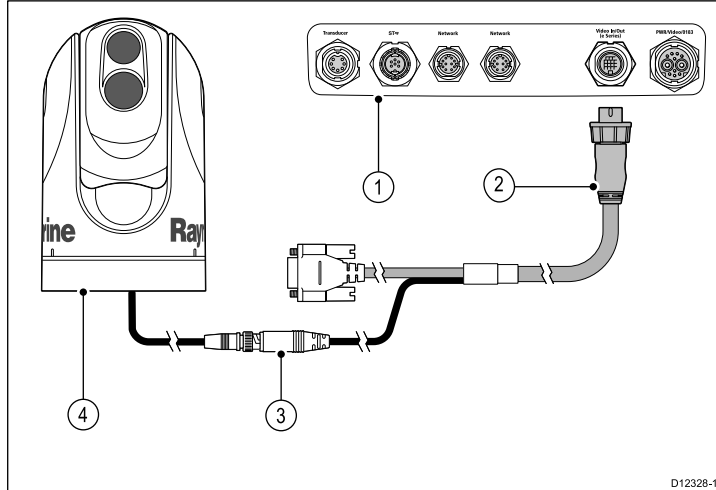
1. Rear connector panel of multifunction display.
2. Video accessory cable.
3. BNC video connector (input 2).
4. Thermal camera.

Video out

Examples of video output devices that you can connect to the display include:

- HDTV with VGA input.
- VGA monitor.
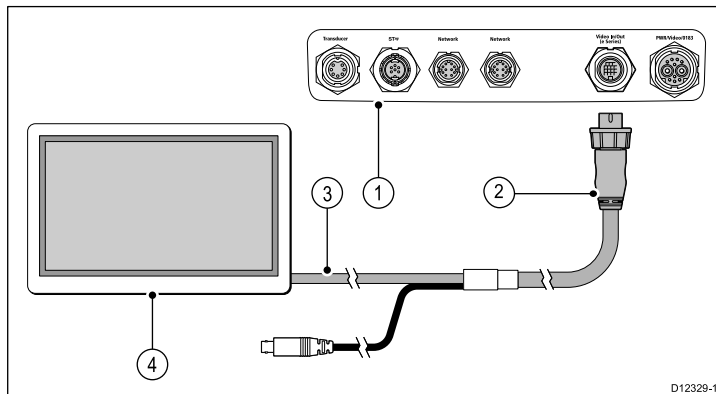
1. Rear connector panel of multifunction display.
2. Video accessory cable.
3. VGA cable to external display.
4. External display.

Video specification

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

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	

4.14 Bluetooth connections

Remote control connection

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

The remote control uses a Bluetooth wireless connection.

D12163-2
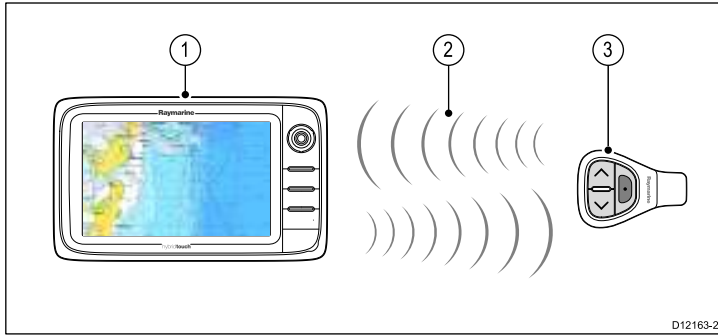
1. Multifunction display.

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.

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.

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).

D12164-1
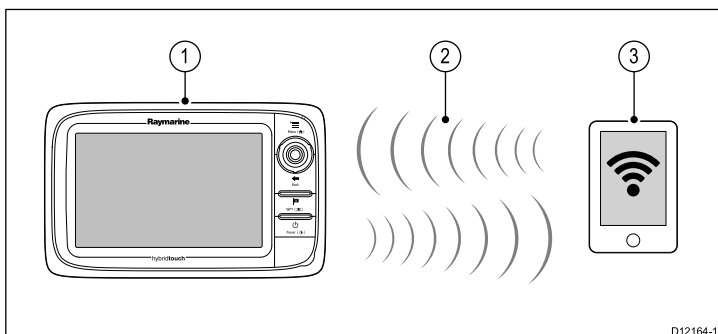
1. Multifunction display.

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.

4.15 WiFi connections

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.
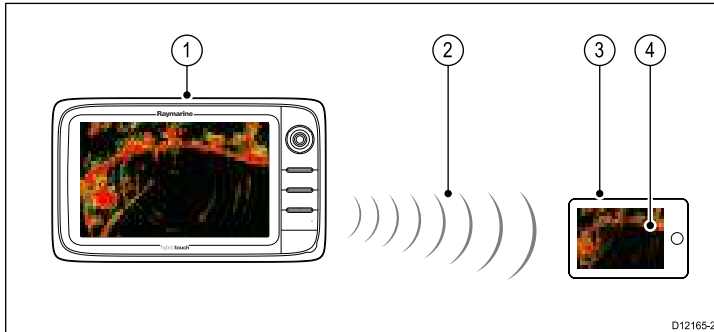
1. Multifunction display.

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.

Navionics chartplotter sync connection

You can wirelessly synchronize waypoints and routes between the multifunction display and an iPhone or iPad.

1. Multifunction display.

2. Wi-Fi connection.

3. Apple iPhone or iPad.

4. Navionics Marine app.

To use this feature you must first:

• Download and install the Navionics Marine 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.

Chapter 5: Location and mounting

Chapter contents

5.1 Selecting a location

⚠️ **Warning: Potential ignition source**

This product is NOT approved for use in hazardous/flammable atmospheres. Do NOT install in a hazardous/flammable atmosphere (such as in an engine room or near fuel tanks).

General location requirements

When selecting a location for your display it is important to consider a number of factors.

Key factors which can affect product performance are:

- **Ventilation**

  To ensure adequate airflow:

  – Ensure that equipment is mounted in a compartment of suitable size.

  – Ensure that ventilation holes are not obstructed. Allow adequate separation of equipment.

  Any specific requirements for each system component are provided later in this chapter.

- **Mounting surface**

  Ensure equipment is adequately supported on a secure surface. Do not mount units or cut holes in places which may damage the structure of the vessel.

- **Cable entry**

  Ensure the unit is mounted in a location which allows proper routing and connection of cables:

  – Minimum bend radius of 100 mm (3.94 in) unless otherwise stated.

  – Use cable supports to prevent stress on connectors.

- **Water ingress**

  The display is suitable for mounting both above and below decks. It is waterproof to IPX6 standard. Although the unit is waterproof, it is good practice to locate it in a protected area away from prolonged and direct exposure to rain and salt spray.

- **Electrical interference**

  Select a location that is far enough away from devices that may cause interference, such as motors, generators and radio transmitters / receivers.

- **Power supply**

  Select a location that is as close as possible to the vessel's DC power source. This will help to keep cable runs to a minimum.

Compass safe distance

To prevent potential interference with the vessel's magnetic compasses, ensure an adequate distance is maintained from the display.

When choosing a suitable location for the multifunction display you should aim to maintain the maximum possible distance between the display and any compasses. Typically this distance should be at least 1 m (3 ft) in all directions. However for some smaller vessels it may not be possible to locate the display this far away from a compass. In this situation, the following figures provide the minimum safe distance that should be maintained between the display and any compasses.
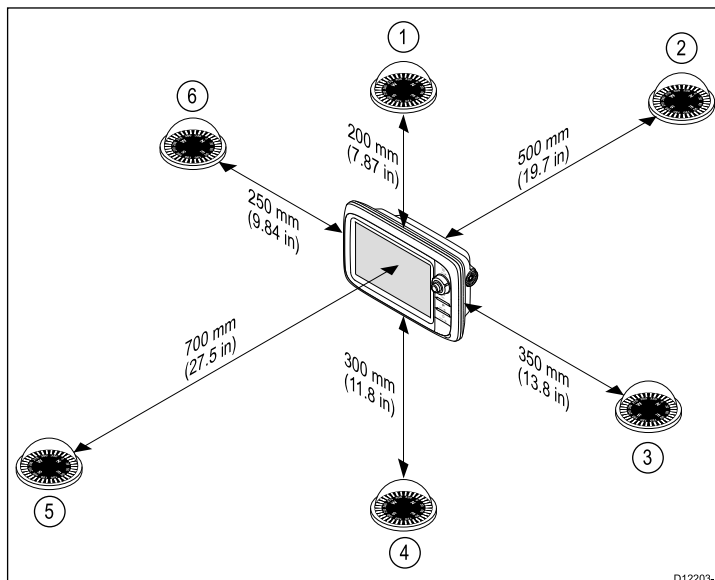
Item	Compass position in relation to display	Minimum safe distance from display
1	Top	200 mm (7.87 in.)
2	Rear	500 mm (19.7 in.)
3	Right-hand side	350 mm (13.8 in.)
4	Underside	300 mm (11.8 in.)
5	Front	700 mm (27.5 in.)
6	Left-hand side	250 mm (9.84 in.)

Viewing angle considerations

As display contrast, color and night mode performance are all affected by the viewing angle, Raymarine recommends you temporarily power up the display when planning the installation, to enable you to best judge which location gives the optimum viewing angle.

Viewing angle
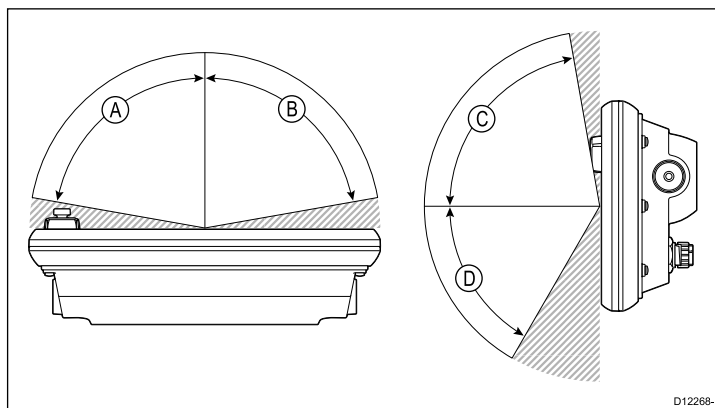
	e7 / e7D	e95 / e97 / c95 / c97	e125 / e127 / c125 / c127
A	70º	80º	80º
B	70º	80º	80º
C	70º	80º	80º
D	50º	60º	60º

Note: The angles stated are for a contrast ratio of equal to or greater than 10.

Product dimensions
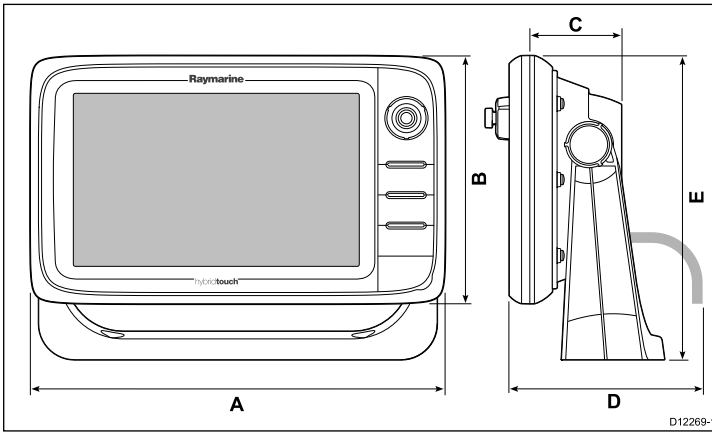
Item	e7 / e7D	e95 / e97 / c95 / c97	e125 / e127 / c125 / c127
A	233 mm (9.17 in.)	290 mm (11.42 in.)	354 mm (13.94 in.)
B	144 mm (5.67 in.)	173 mm (6.81 in.)	222 mm (8.74 in.)
C	64 mm (2.52 in.)	64 mm (2.52 in.)	69 mm (2.72 in.)
D	160 mm (6.29 in.)	160 mm (6.29 in.)	160 mm (6.29 in.)
E	180 mm (7.09 in.)	212 mm (8.35 in.)	256 mm (10.08 in.)

5.2 Removing the rear bezel

You must remove the rear bezel before flush-mounting the display.

1. Remove the front bezel. Refer to the separate instructions provided for that procedure.

* ✏ = e7 / e7D

✐ = c95 / c97 c125 / c127 / e95 / e97 / e125 / e127
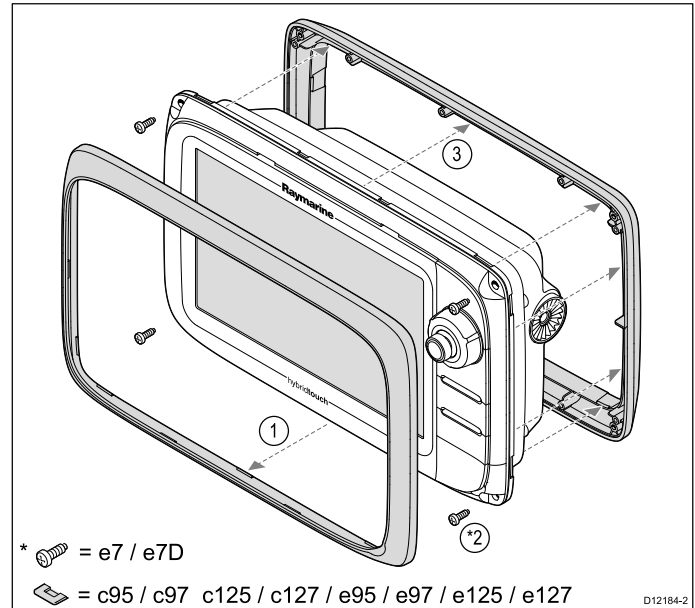
2. Remove the screws that secure the bezel to the display.

3. Carefully remove the bezel from the rear of the display, pulling the bezel gently along the:
   i. Outer edges - work from the sides upwards and then along the top edge, ensuring that the clips are fully released from the display.
   ii. Inner edges - ensure that the bezel is completely removed from the display.

5.3 Flush mounting

You can mount the display in a flush or panel mounting arrangement.

Before mounting the unit, ensure that you have:

• Selected a suitable location.

• Identified the cable connections and route that the cables will take.

• Detached the front bezel.

D12271-1
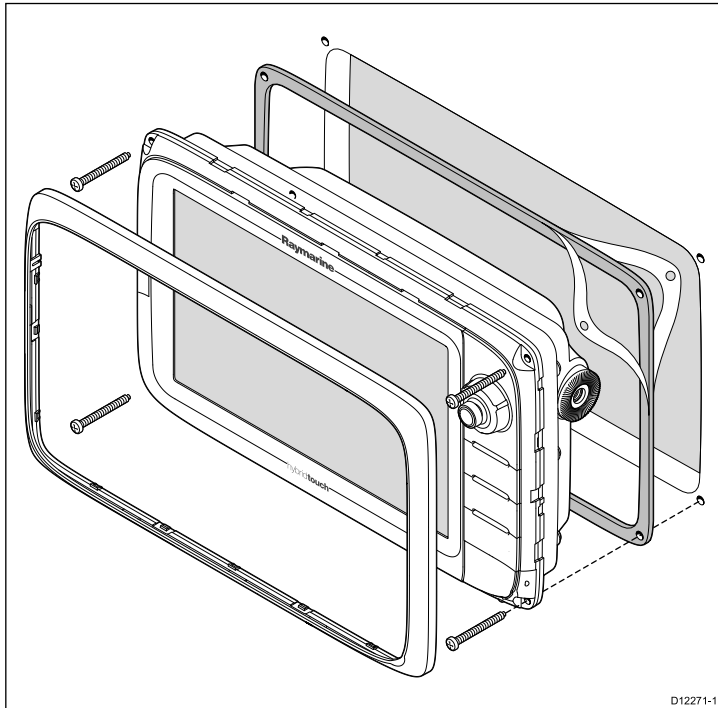
1. Check the selected location for the unit. A clear, flat area with suitable clearance behind the panel is required.

2. Fix the appropriate cutting template supplied with the product, to the selected location, using masking or self-adhesive tape.

3. Using a suitable hole saw (the size is indicated on the template), make a hole in each corner of the cut-out area.

4. Using a suitable saw, cut along the inside edge of the cut-out line.

5. Ensure that the unit fits into the removed area and then file around the rough edge until smooth.

6. Drill 4 holes as indicated on the template to accept the securing screws.

7. Place the gasket onto the display unit and press firmly onto the flange.

8. Connect the power, data and other cables to the unit.

9. Slide the unit into place and secure using the provided screws.

Note: The appropriate torque to use when drilling depends on the thickness of the mounting surface and the type of material.

Note: The supplied gasket provides a seal between the unit and a suitably flat and stiff mounting surface or binnacle. The gasket should be used in all installations. It may also be necessary to use a marine-grade sealant if the mounting surface or binnacle is not entirely flat and stiff or has a rough surface finish.

5.4 Attaching the rear bezel

The rear bezel must be fitted before mounting the unit on the supplied trunnion bracket.

1. Remove the front bezel. Refer to the separate instructions provided for that procedure.

2. Place the bezel over the rear of the display, ensuring that it is correctly aligned with the display. Apply firm but even pressure to the bezel along the:

   i. Outer edges - work from the sides upwards and then along the top edge, to ensure that it clips securely into position.

   ii. Inner edges - ensure that the bezel sits flat against the unit.

* ⌷ = e7 / e7D

◇ = c95 / c97 c125 / c127 / e95 / e97 / e125 / e127

D12183-2
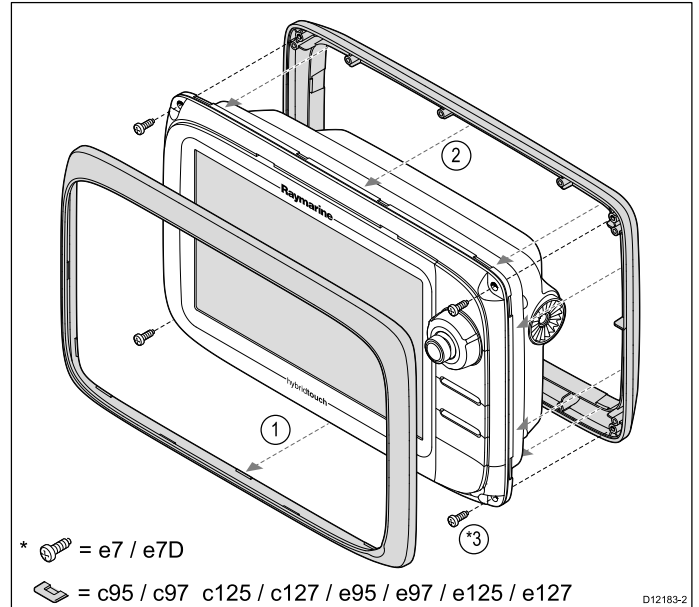
3. Use the supplied screws to secure the bezel to the display.

5.5 Bracket (trunnion) mounting

The display can be mounted on the supplied bracket.

Before mounting the unit ensure that you have:

- Selected a suitable location.
- Identified the cable connections and route that the cables will take.
- Attach the front bezel.

D12273-1
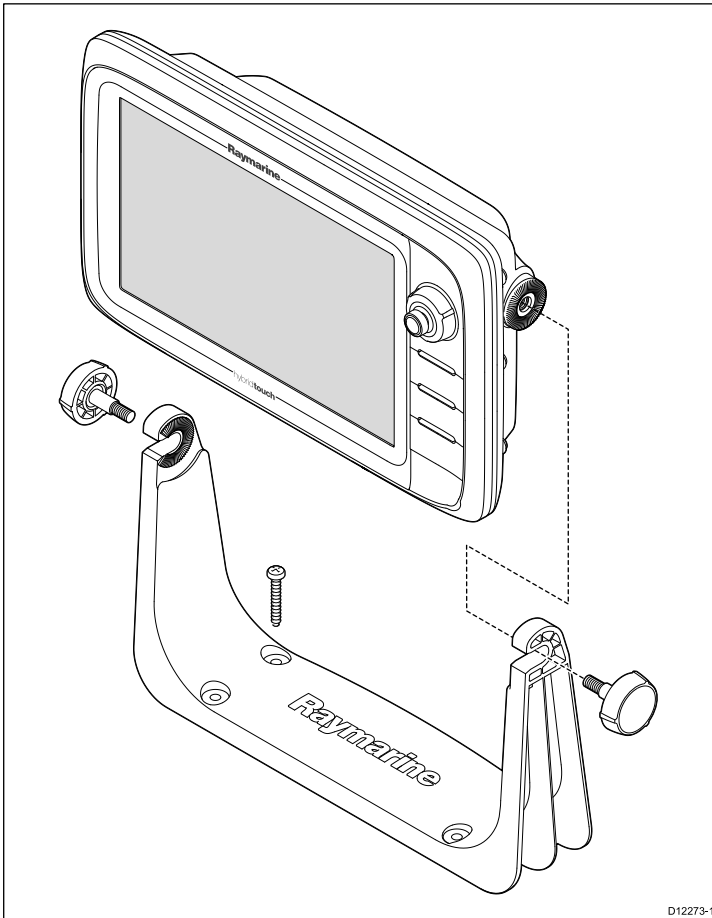
1. Mark the location of the mounting bracket screw holes on the chosen mounting surface.
2. Drill holes for the screws using a suitable drill, ensuring there is nothing behind the surface that may be damaged.
3. Use the supplied screws to attach the mounting bracket securely.
4. Attach the display unit to the mounting bracket.

Note: The appropriate torque to use when drilling depends on the thickness of the mounting surface and the type of material.

5.6 Front bezel

Attaching the front bezel

The following procedure assumes that the unit has already been mounted in position.

1. Carefully lift one edge of the screen protection film, so that it is accessible for removing when unit installation is complete.
2. Ensure the memory card slot door is in the open position.
3. Orientate the bottom-right side of the bezel under the lip of the chart card door and place the bezel over the front of the display, ensuring that the clips along the bottom edge of the bezel latch into position.

D12274-1
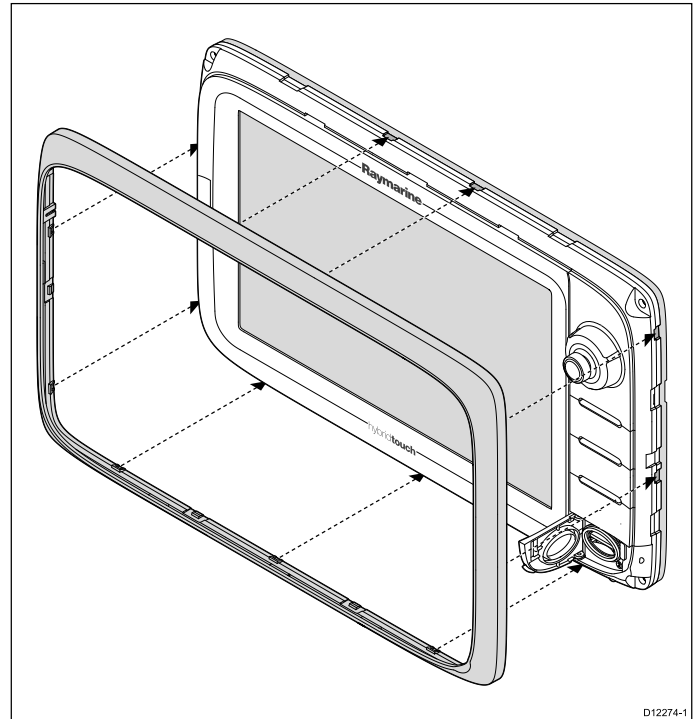
4. Ensure the bezel is correctly aligned with the display, as shown.
5. Apply firm but even pressure to the bezel along the:
   i. Outer edges - work from the sides upwards and then along the top edge, to ensure that it clips securely into position.
   ii. Inner edges - particularly along the chart card door edge, to ensure that the bezel sits flat.
6. Check that all control buttons are free to operate.

Removing the front bezel

Before proceeding ensure the memory card slot door is open.

D12275-1
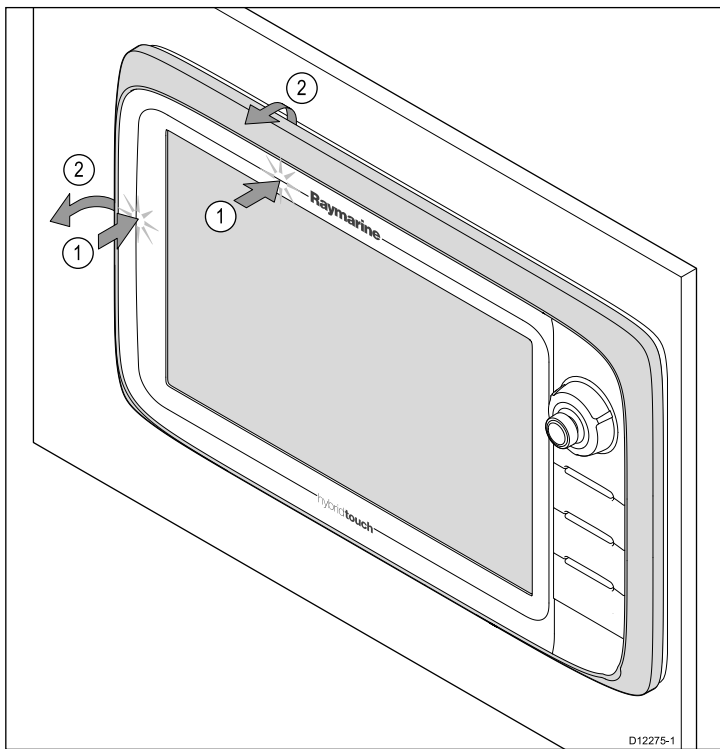
> **Important:** Use care when removing the bezel. Do not use any tools to lever the bezel; doing so may cause damage.

1. Place both your thumbs on the upper left edge of the display, at the positions indicated in the diagram above.
2. Place your fingers underneath the bezel, at the positions indicated in the diagram above.
3. In a single firm motion, apply pressure to the outer edge of the display with your thumbs and pull the bezel towards you using your fingers.

The bezel should now come away from the display easily.

Chapter 6: Getting started

Chapter contents

6.1 Display power

Powering the display on

1. Press and hold the **POWER** button until the Raymarine logo appears.
2. Press **OK** to acknowledge the disclaimer message.

Powering the display off

1. Press and hold the **POWER** button until the countdown reaches zero.

Note: If the **POWER** button is released before the countdown reaches zero, the power off is cancelled.

6.2 e7 / e7D Controls
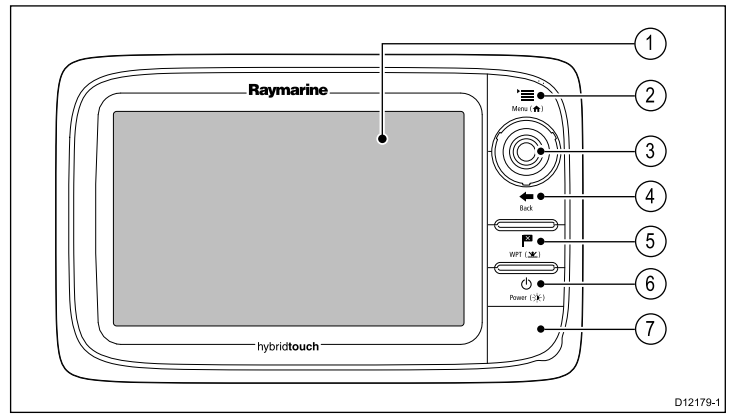
1. **Touchscreen** — you can touch the screen to operate many common functions, including all menu operations (HybridTouch multifunction displays only).

2. **Menu** — accesses menus. Press again to close menus.

3. **UniControl** — provides a joystick and rotary control and an OK button for using menus and applications.

4. **Back** — press to return to a previous menu or dialog level.

5. **WPT / MOB** — press and release to access the waypoint options. Press again to place a waypoint. Press and hold to place a Man Overboard (MOB) marker at your current position.

6. **Power** — press once to switch the unit ON. Once powered on, press the Power button again to adjust the brightness, access the power controls for external devices, and access the autopilot controls. Press and hold to switch the unit OFF.

7. **Chart card slots** — open the card door to insert or remove MicroSD cards. There are 2 card slots (labelled 1 and 2), used for electronic charts and archiving waypoint, route and track data.

6.3 c95 / c97 / c125 / c127 / e95 / e97 / e125 / e127 Controls
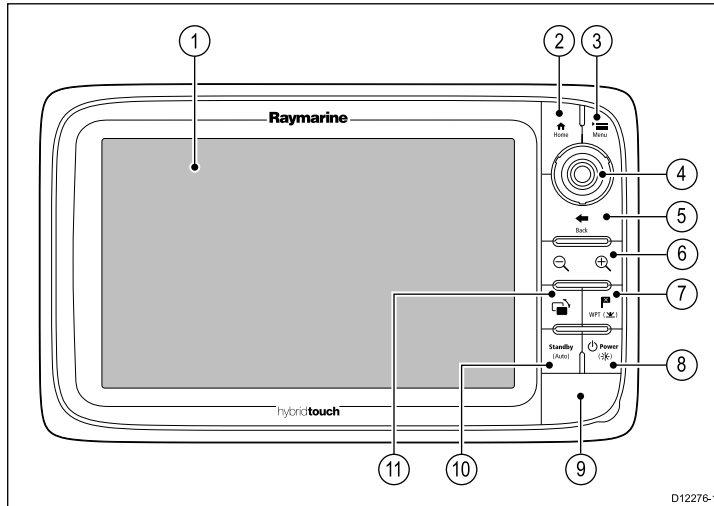
D12276-1

1. **Touchscreen** — you can touch the screen to operate many common functions, including all menu operations (HybridTouch multifunction displays only).

2. **Home** — Press to return to the homescreen.

3. **Menu** — accesses menus. Press again to close menus.

4. **UniControl** — provides a joystick and rotary control and an OK button for using menus and applications.

5. **Back** — press to return to a previous menu or dialog level.

6. **Range In/Out** — Press minus (-) to range out and plus (+) to range in

7. **WPT / MOB** — press and release to access the waypoint options. Press again to place a waypoint. Press and hold to place a Man Overboard (MOB) marker at your current position.

8. **Power** — press once to switch the unit ON. Once powered on, press the Power button again to adjust the brightness, access the power controls for external devices, and access the autopilot controls. Press and hold to switch the unit OFF.

9. **Chart card slots** — open the card door to insert or remove MicroSD cards. There are 2 card slots (labelled 1 and 2), used for electronic charts and archiving waypoint, route and track data.

10. **Standby (Auto)** — Press to disengage integrated autopilot, press and hold to activate Auto mode on integrated autopilot.

11. **Switch Active Pane** — Press to switch active datapane..

UniControl

D12180-1
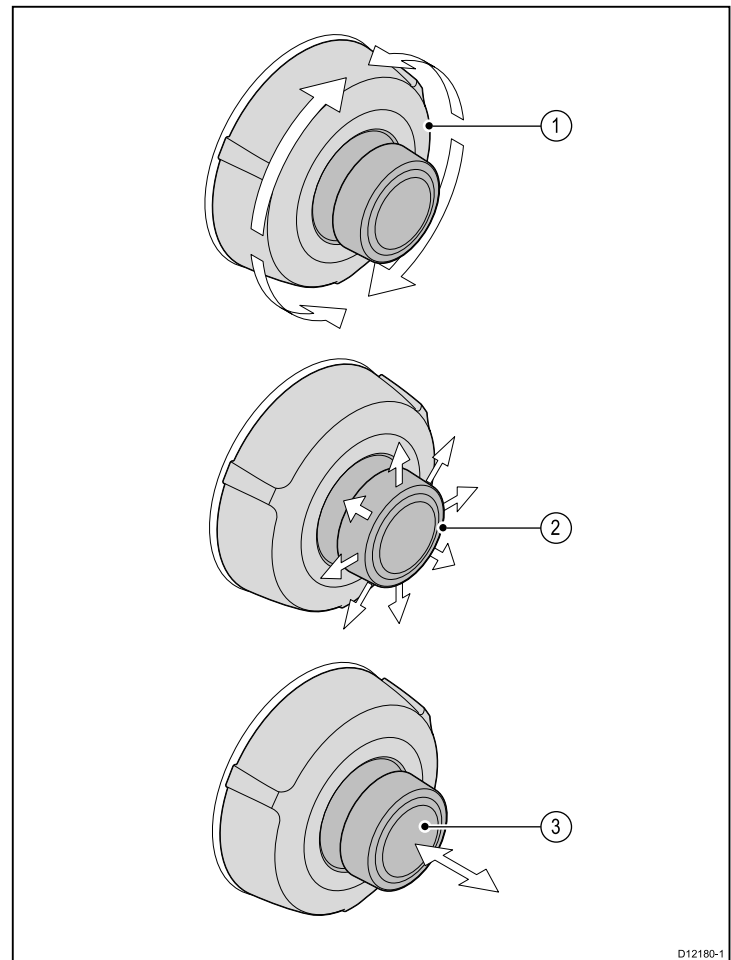
1. **Rotary** — use this to select menu items, move the on-screen cursor, and adjust the range in the chart and radar applications.

2. **Joystick** — use this to move the cursor position in applications, pan up, down, left and right in the chart, weather and fishfinder applications or to cycle through datapages in the data application.

3. **OK** button — push the end of the joystick to confirm a selection or entry.

Touch icons

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

🖐	This only applies to HybridTouch displays.

⟨	**Back** — go back one level (same effect as **BACK** button).
✕	**Close** — close all open menus (same effect as holding the **MENU** button for 3 seconds).

Using the cursor

The cursor is used to move around the screen.

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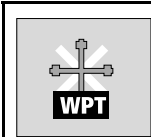
The cursor is context-sensitive. When it is placed over an object such as a waypoint or chart feature, it changes color and a label or information associated with the object is displayed.

List of cursor labels

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

6.4 Multifunction display variants

The table below details which multifunction display variants feature HybridTouch.

HybridTouch models	Non-Touch models
e7 / e7D	c95 / c97
e95 / e97	c125 / c127
e125 / e127	

6.5 Hybridtouch overview

Your multifunction display features Hybridtouch, which enables you to operate the unit using the touchscreen and the physical keys.

	This only applies to HybridTouch displays.

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

6.6 Touchscreen overview

The touchscreen provides a quick way of performing many common functions.

	This only applies to HybridTouch displays.

Some of the functions you can operate with the touchscreen include:

- Accessing applications.
- Adding and editing applications pages.
- Placing and editing waypoints.
- Building routes.
- Panning the chart display.
- Placing and moving the cursor.

Note: Raymarine strongly recommends that you familiarize yourself with touch operations while your vessel is anchored or moored. You may find it helpful to use the simulator mode (accessible from **Homescreen > Set-up > System Settings**) in these situations.

6.7 Homescreen overview

The homescreen provides a central point of access to your display's range of applications.

- The homescreen also provides quick access to your data (waypoints, routes, and tracks).

- To access the homescreen, hold the **MENU** button for 3 seconds. Alternatively, select the on-screen **Home** icon.

- The homescreen consists of a number of application "pages", each represented by an icon. Applications can be started by selecting the relevant page icon.

- Use the joystick or swipe the screen with your finger to scroll the homescreen and access additional application pages.
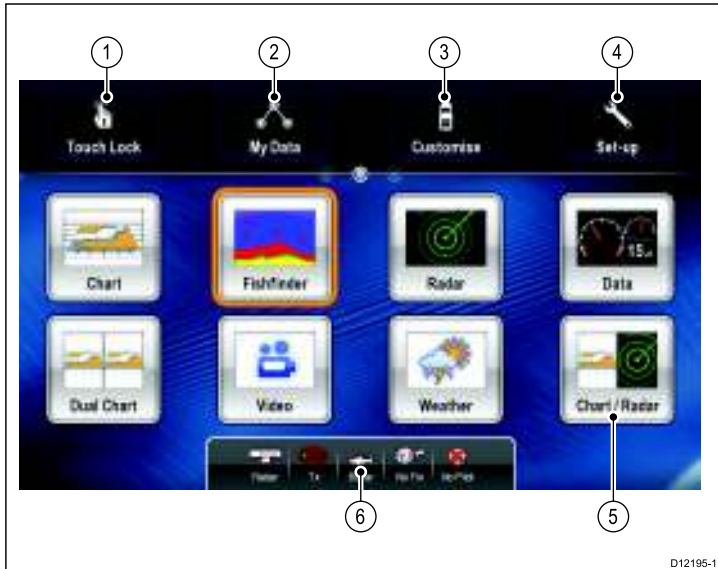
D12195-1

Screen item	Description
1	**Touch Lock** — select this icon to lock the touchscreen, preventing accidental use. To unlock, use the UniControl to deselect the Touch Lock icon (HybrifTouch displays only).
2	**My Data** — this icon enables you to centrally manage your lists of routes, tracks, and waypoints.
3	**Customize** — select this icon to configure application pages and select the display's language, units, date/time, boat details and display preferences.
4	**Set-up** — select this icon to access the system set-up menus.
5	**Page** — each icon represents an application page. A page can display up to 2 applications simultaneously.
6	**Status bar** — the status icons confirm the status of externally-connected equipment, including GPS, AIS, radar, and autopilot units.

6.8 System checks

GPS check

GPS selection

You can use an internal or external GPS receiver.

- The multifunction display features an internal GPS receiver.

- You can also connect an external GPS receiver using SeaTalk^{ng} or NMEA 0183.

- Use the System Settings menu to enable or disable the internal GPS receiver.

Enabling or disabling the internal GPS

With the homescreen displayed:

1. Select **Set-Up**.
2. Select **System Settings**.
3. Select **Internal GPS**.
4. Select the On or Off option as appropriate.

Checking GPS operation

You can check that the GPS is functioning correctly using the chart application.

1. Select the Chart page.

2. Check the screen.

   With the chart displayed, you should see:

   Your boat position (indicates a GPS fix). Your current position is represented by a boat symbol or solid circle. Your position is also displayed in the data bar under VES POS.

   A solid circle on the chart indicates that neither heading nor Course Over Ground (COG) data is available.

Note: Raymarine recommends that you check the displayed vessel position in the chart application against your actual proximity to a known charted object. GPS receivers typically have an accuracy of between 5 and 15 m.

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

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.

Radar check

⚠️ **Warning: Radar scanner safety**

Before rotating the radar scanner, ensure all personnel are clear.

⚠️ **Warning: Radar transmission safety**

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

Checking the radar

1. Select the Radar application.
   The Radar scanner will now initialize in standby mode. This process will take approximately 70 seconds.
2. Press the **MENU** button.
3. Select **Power** .
4. Select the On option.

5. Select **Radar**.
6. Select the Transmit option.
   The radar scanner should now be transmitting and receiving.
7. Check that the radar screen is operating correctly.

Typical HD digital radar screen
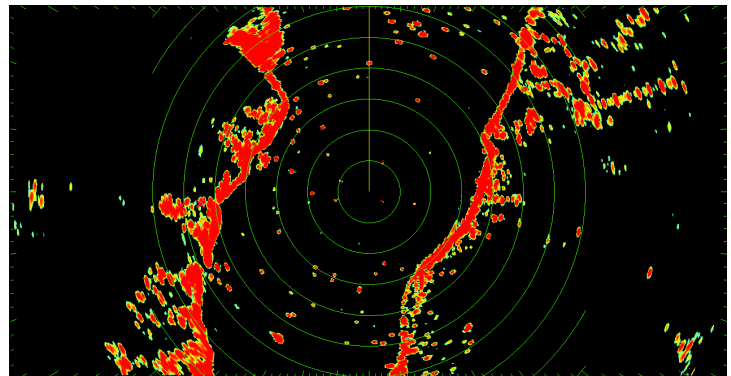
Note: The example above is representative of the enhanced output provided by a HD digital radar scanner.

Points to check:

• Radar sweep with echo responses are shown on screen.

• Radar status icon rotating in top right hand corner.

Check and adjust bearing alignment

Bearing alignment

The radar bearing alignment ensures that radar objects appear at the correct bearing relative to your boat's bow. You should check the bearing alignment for any new installation.

Example misaligned radar
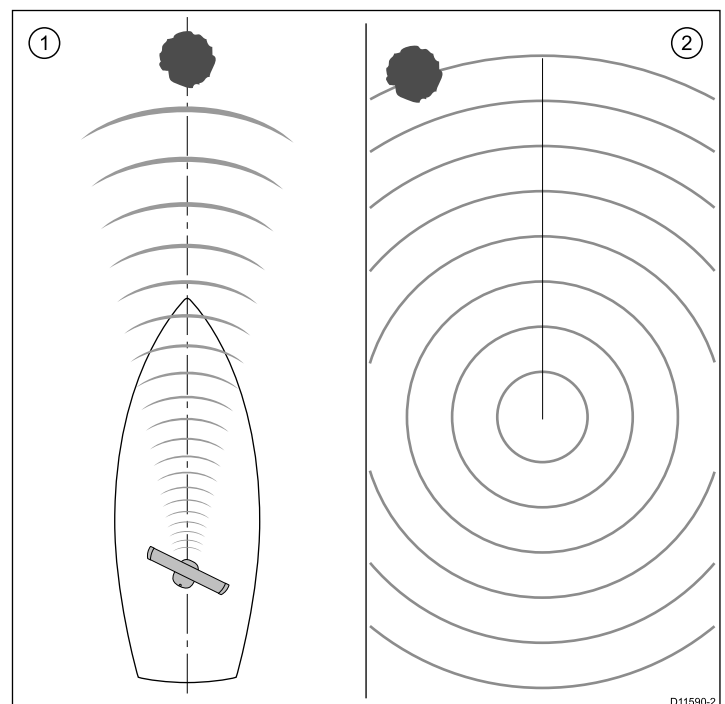
Item	Description
1	Target object (such as a buoy) dead ahead.
2	Target displayed on the radar display is not aligned with the Ship's Heading Marker (SHM). Bearing alignment is required.

Checking the bearing alignment

1. With your vessel under way: Align the bow with a stationary object identified on the radar display An object between 1 & 2 NM distant is ideal.
2. Note the position of the object on the radar display. If the target is not under the ships heading marker (SHM), there is an

alignment error and you will need to carry out bearing alignment adjustment.

Adjusting the bearing alignment

Once you have checked the bearing alignment you can proceed and make any required adjustments.

With the radar application displayed:

1. Press the **MENU** button.
2. Select **Set-Up** .
3. Select **Advanced**.
4. Select **Bearing Alignment**.
5. Use the rotary control to place the selected target under the Ship's Heading Marker.
6. Press **OK** when complete.

Sonar check

> ⚠️ **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.

Sonar transducer and DSM selection

You must designate the sonar transducer and Digital Sounder that you want to use.

Digital Sounder selection

- Sonar variant displays are fitted with an internal sonar.
- All variants allow you to connect a compatible DSM unit.
- If an external DSM unit is connected to a sonar variant display and a power supply the internal sounder should be switched off.
- To use a displays internal sonar on a system containing an external DSM unit, disconnect the network cable from the external DSM unit and use the **Sounder Set-Up** menu in the fishfinder application to enable the internal sonar.

Transducer selection

- Sonar variant displays allow the direct connection of EITHER a Raymarine OR a Minn Kota sonar transducer.
- All variants allow the connection of a Raymarine sonar transducer via a compatible external DSM unit.
- For all variants use the **Transducer Set-Up** menu in the fishfinder application to specify the sonar transducer you want to use.

Selecting the sonar DSM

Applicable only to multifunction displays with an internal DSM.

With the fishfinder application displayed:

1. Press the **Menu** button.
2. Select **Set-Up**.
3. Select **Sounder Set-Up**.
4. Select **Internal Sounder**.
5. Select the On option.

Note: The Internal Sounder menu item is disabled if an external DSM unit is connected to the multifunction display and a power supply. Disconnect the network cable from the external DSM unit to enable the display's internal DSM option.

Selecting the sonar transducer

With the fishfinder application displayed:

1. Press the **Menu** button.
2. Select **Set-Up**.
3. Select **Transducer Set-Up**.
4. Select the **Select Transducer** menu item.
5. Select the transducer you want to use.

Checking the sonar

Sonar checks are made using the fishfinder application.

1. Select the fishfinder page.
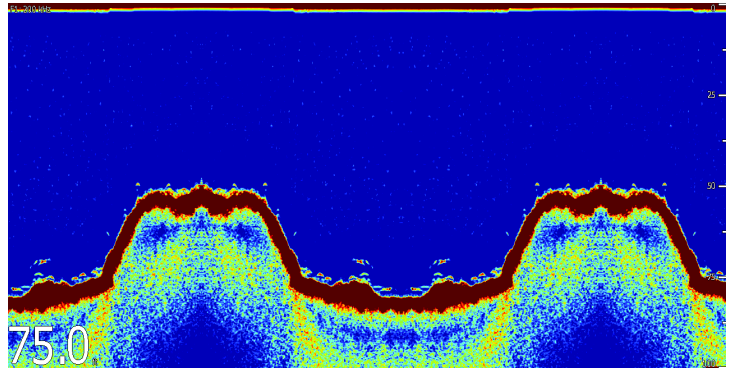
2. Check the fishfinder display.

   With the fishfinder active you should see:

   - Depth reading (indicates the transducer is working). The depth is shown in large white numbers at the bottom left of the screen.

Thermal camera setup and checks

To ensure correct operation of the thermal camera you should setup and check the camera's main functions.

Before proceeding ensure that the camera is connected correctly, according to the instructions provided. If your system includes the optional Joystick Control Unit (JCU) and PoE (Power over Ethernet) injector, ensure these units are also connected correctly.

Set up the camera

You will need to:

- Adjust the image (aspect ratio, contrast, brightness, and so on).

Check the camera

You will need to:

- Check the camera movement (pan, tilt, zoom).
- Check the camera "home" position is 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.

Panning, tilting, and zooming the thermal image

There are 2 ways of controlling the thermal camera using the thermal camera application:
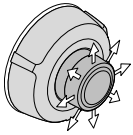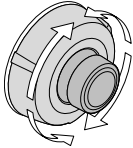
- Using the touchscreen and the UniControl's rotary control (HybridTouch displays only).
- Using the UniControl's joystick and rotary controls.

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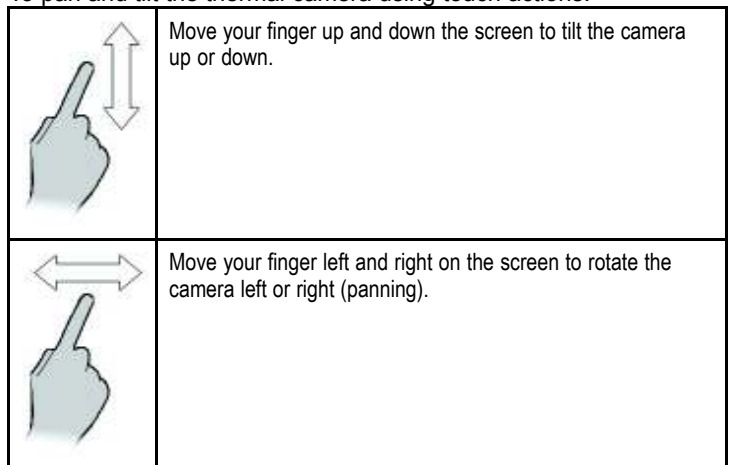
Note: You cannot zoom the image using the touchscreen. You must use the multifunction display's rotary control, or the thermal camera's optional Joystick Control Unit (JCU).

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.

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.

6.9 Enabling autopilot functions

With the homescreen displayed:

1. Select **Set-up**.
2. Select **System Settings**.
3. Select **Autopilot Control**.
4. Select the On or Off option as appropriate.
5. Use the **Back** button to return to the **System Settings** menu.
6. Select **Pilot Controls**.

   If this menu option is disabled, no autopilot has been found. Check the physical connections, then repeat steps 1 to 6.
7. The Pilot Control dialog is displayed, indicating that pilot control is enabled and an autopilot is detected.

6.10 Enabling AIS functions

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

With the homescreen displayed:

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

6.11 Language selection

The system can operate in the following languages:

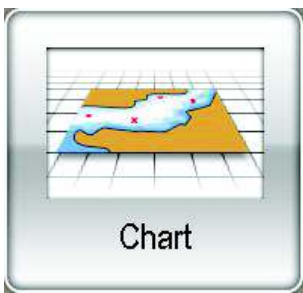|		
English (US)	English (UK)	Chinese
Danish	Dutch	Finnish
French	German	Greek
Italian	Japanese	Korean
Norwegian	Portuguese (Brazilian)	Russian
Spanish	Swedish	Turkish
Polish	Croatian	

With the homescreen displayed:

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

6.12 Pages

Pages are used to display applications.

Pages are displayed and accessed on the homescreen. Each page can display up to 2 applications.

Any page on the homescreen can be customized, enabling you to group your applications into different pages, each designed for a specific purpose. For example, you could have a page that includes the chart and fishfinder applications, suitable for fishing, and another page that includes the chart and data applications, which would be suitable for general sailing.

	You can add any application(s) to any empty page.
Chart	Page featuring a single application.
Custom	Page featuring multiple applications.

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

Changing an existing page on the homescreen

With the homescreen displayed:

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

Changing an empty page

With the homescreen displayed:

1. Select **Customize**.
2. Select **Homescreen**.
3. Select **Edit Page**.
4. Select an empty page icon (labelled "Customize").
   The Customize menu options are displayed.

5. Select the appropriate page layout (for example, "Splitscreen").
6. Select the application(s) you want to display on the page, either by selecting the relevant menu item or dragging it over to the displayed page.
7. Select **Finish**.
   The Rename Page dialog is displayed.
8. Use the on-screen keyboard to name the page, then select **Save**.

Moving a page on the homescreen

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Swap Page**.
4. Select the page icon that you want to move.
5. Select the page icon that you want to swap positions with.
   The page icon is moved to the new position.

Renaming a page on the homescreen

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Rename Page**.
4. Select the page that you want to rename.
   The on-screen keyboard is displayed.
5. Using the on-screen keyboard, enter the new name for the page.
6. Select SAVE.

Deleting a page from the homescreen

With the homescreen displayed:
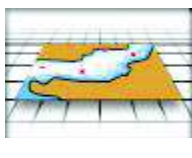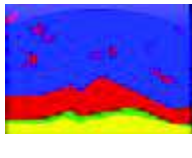
1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Delete Page**.
4. Select the page that you want to delete.
   The page is deleted.

Resetting the homescreen to default settings

With the homescreen displayed:

1. Select the **Customize** icon.
2. Select **Homescreen**.
3. Select **Reset**.
   A warning message is displayed asking for confirmation.
4. Select **Yes** to reset the homescreen to the default range of pages, or **No** to cancel the operation.

6.13 Applications

	Chart application — provides a 2D or 3D graphical view of your charts to help you navigate. Waypoint, route, and track functions enable you to navigate to a specific location, build and navigate routes, or record where you've been. Chart cards provide higher levels of detail and 3D views.
	Fishfinder application — with a transducer and a sonar variant multifunction display or compatible Digital Sounder Module (DSM), you can use the fishfinder application to help you accurately distinguish between different sizes of fish, bottom structure, and underwater obstacles. You can also view sea depth and temperature data and mark points of interest such as fishing spots or wrecks.
	Radar application — with a suitable radar scanner, you can use the radar application to track targets and measure distances and bearings. A number of automatic gain presets and color modes are provided to help you get the best performance from your radar scanner.
	Data application — view system and instrument data on your multifunction display, for a range of compatible instruments. Use the joystick or touchscreen to scroll through the available data pages.
	Weather application — (North America only). With a suitable weather receiver connected to your system, the weather application overlays historical, live, and forecasted weather graphics on a world map.
	Thermal camera application — view and control a compatible thermal camera using your multifunction display.
	Video application — view a video or camera source on your multifunction display.

6.14 Screen overview

D12196-1

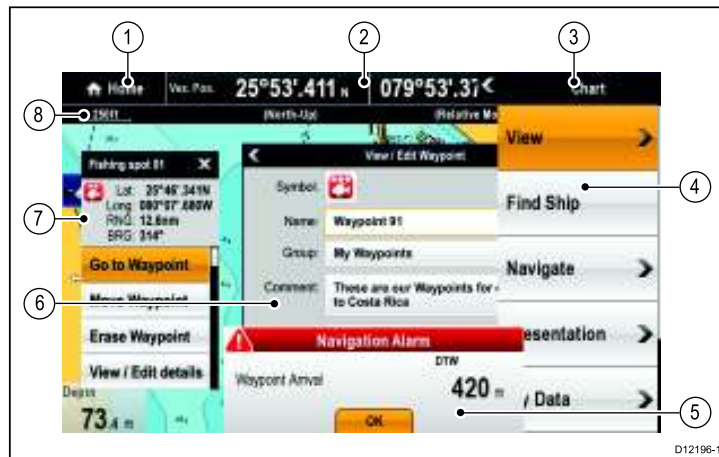| Screen item	Description
1	**Home** — select this icon to access the homescreen.
2	**Databar** — provides information about your vessel and its environment. The position and type of information in the databar can be customized from the **Homescreen > Customize > Databar Set-up** menu, if required.
3	**Menu** — select this icon to access the menu. The menu options are specific to the application that you are currently using. Use the touchscreen (HybridTouch displays only) or use the Rotary control to select menu items and scroll long menus.
4	**Pop-up menu** — menu options are displayed when you select the Menu icon.
5	**Pop-up messages** — alert you to a situation (such as an alarm), or unavailable function. Pop-up messages may require a response from you — for example, select **OK** to silence alarms.
6	**Dialogs** — enable data to be selected, edited or entered. Use in many common functions — for example, editing a waypoint..
7	**Context menu** — provides information and options specific to each application.
8	**Status bar** — provides information specific to each application. This information cannot be edited or moved.

Using pop-up menus

Pop-up menus enable you configure settings and preferences.

Menus are used in the:

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

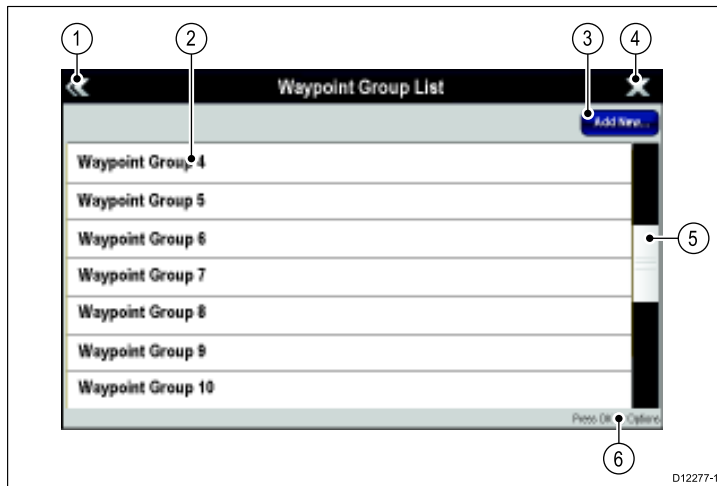The following diagram shows the main features of a pop-up menu:

D12281-1

Screen item	Description
1	**Back** — On all models you can press the **Back** button to go back to a previous menu, or on HybridTouch displays you can select the icon on screen.
2	**On / off switch** — Some menu items feature an on / off option to enable or disable the function. Use the touchscreen or the **OK** button to select the option.
3	**Scroll bar** — indicates that further menu items are available by scrolling the menu. To scroll through the available menu items, press and hold your finger on the menu to drag it up or down (HybridTouch displays only), or use the **Rotary control**.

Using menu dialogs

Menu dialogs are full-screen menus that enable you to manage data items such as waypoints and routes.

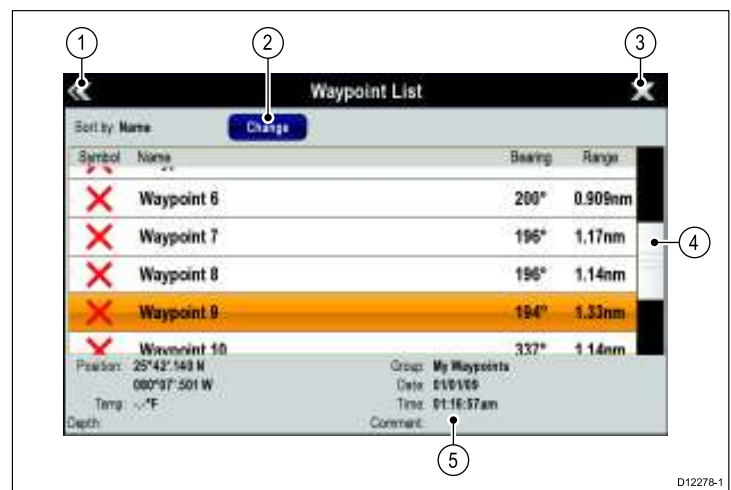The following diagram shows the main features of a standard menu:

D12277-1

Screen item	Description
1	**Back** — On all models you can press the **Back** button to go back to a previous menu, or on HybridTouch displays you can select the icon on screen.
2	**Menu item** — momentarily touching a menu item highlights and automatically selects the item (HybridTouch displays only). You can also use the **Rotary control** to highlight an item, and the **Ok** button to select it. To scroll a menu, touch a menu item and hold your finger down on the item while dragging your finger up or down (HybridTouch displays only). You can also the **Rotary control** to scroll the list.
3	**Function icon** — Some menu dialogs include an icon which can be selected to access additional functions. For example, in the Waypoint Group List menu dialog, the **Add New** icon can be used to add a new Waypoint group.
4	**Close** — On HybridTouch displays you can select this icon to close the menu(s).
5	**Scroll bar** — indicates that further menu items are available by scrolling the menu. To scroll through the available menu items, press and hold your finger on the menu to drag it up or down (HybridTouch displays only), or use the **Rotary control**.
6	**Options** — Highlight a menu item and then click OK to access more options for that item. For example, in the Waypoint Group list you can click OK on a highlighted menu item to view the waypoints in the group, edit the group name, or erase the group.

Using list dialogs

List dialogs are full-screen menus that display the details for specific types of data, such as Waypoints.

The following diagram shows the main features of a list dialog:

D12278-1

Screen item	Description
1	**Back** — On all models you can press the **Back** button to go back to a previous menu or only HybridTouch displays you can select the icon on screen.
2	**Sort icon** — Some list dialogs include an icon which can be selected to sort the items in the list. For example, in the Waypoint List you can sort the list by name, range, group, symbol, and so on.
3	**Close** — On HybridTouch displays you can select this icon to close the menu(s).
4	**Scroll bar** — indicates that further menu items are available by scrolling the menu. To scroll through the available menu items, press and hold your finger on the menu to drag it up or down (HybridTouch displays only), or use the **Rotary control**.
5	**Details** — the details for a particular list item are displayed at the bottom of the dialog.

Using edit dialogs

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

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

D12280-1

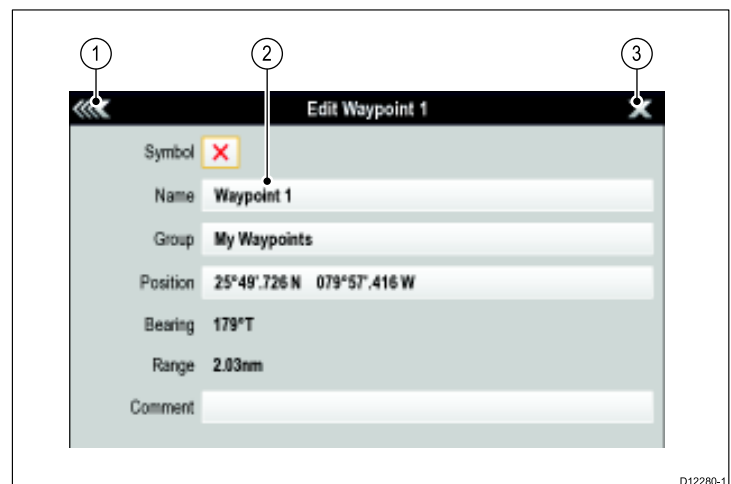| Screen item	Description
1	**Back** — On all models you can press the **Back** button to go back to a previous menu or, on HybridTouch displays you can select the icon on screen.
2	**Field** — Selecting a text field automatically displays the on-screen keyboard, which can be used to edit the details.
3	**Close** — On HybridTouch displays you can select this icon to close the menu(s).

Using control dialogs

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

The following diagram shows the main features of a typical control dialog:
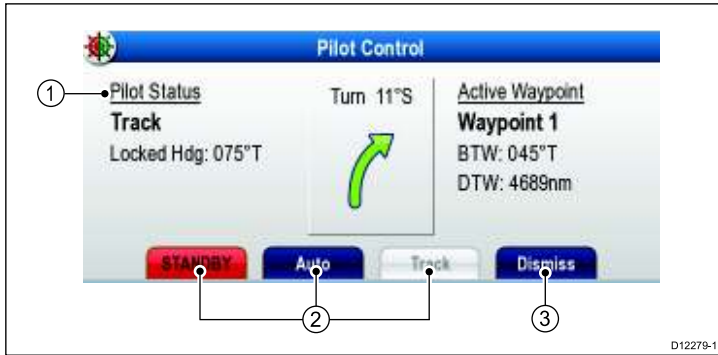
D12279-1

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

6.15 Editing information in dialogs

With the dialog displayed:

1. Select the field you want to edit.

   The on-screen keyboard is displayed:

2. Use the on-screen keyboard to make the changes.
3. Use the on-screen keyboard's **SAVE** key to keep any changes.

Entering special or accented characters

With the on-screen keyboard displayed:

1. Select the on-screen keyboard's **àèò** key.
2. Select the character you want to accent.

   The available accented characters are displayed above the text entry field.
3. For characters that have multiple available accents, use the character key to toggle between them.
4. Select the **àèò** key to enter the character.

6.16 Editing Numerical values in dialogs

To edit numerical values in a dialog you can either use the **Rotary Control** to increase or decrease the value or the on-screen numeric keypad.

With the dialog displayed:

1. Select the numeric data field you want to edit so that the value is highlighted.
2. To access the on-screen numeric keypad:

   • Using **touch** select and hold on the current value for 5 seconds (HybridTouch displays only). Or

   • Using the **UniControl** press and hold the **Ok** button for 5 seconds

   The on-screen numeric keypad is displayed.

3. Enter the new value using the numeric keypad.
4. Select **SAVE** to save the new value.

6.17 Basic touchscreen operations

Placing and moving the cursor using touch

	This only applies to HybridTouch displays.

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

Selecting the active window using touch

	This only applies to HybridTouch displays.

With a page featuring multiple applications displayed:

1. Tap anywhere inside the application you want to make active.
   A border appears around the application, indicating that it is active.

Touchscreen lock

You can lock the touchscreen to prevent accidental use.

	This only applies to HybridTouch displays.

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

The touchscreen is locked from the home screen. An icon in the home screen indicates the lock status:

	Touchscreen is unlocked.
	Touchscreen is locked. All functions remain available using the buttons and softkeys.

You must use the UniControl to unlock the touchscreen.

Locking the touchscreen

	This only applies to HybridTouch displays.

With the homescreen displayed:

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

Unlocking the touchscreen

	This only applies to HybridTouch displays.

With the homescreen displayed:

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

6.18 Databar status symbols

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

The symbols show the status for the following:

- Radar scanner.
- AIS receiver / transceiver.
- Sonar (DSM).
- GPS receiver.
- Autopilot.

Radar scanner status symbols

The radar scanner power mode status is indicated in the databar.

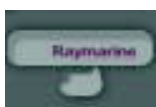| Symbol	Radar power mode	Description
	Transmit (TX)	Rotating icon, signifying that the scanner is on and transmitting. When SCANNER is set to ON, select this mode to activate the scanner. This is the usual mode of operation.
	Standby (STBY)	Static icon, indicating that the scanner is on but not transmitting, and the antenna is not rotating. The scanner does not transmit and the radar data is removed from the screen. This is a power-save mode used when the radar is not needed for short time periods. When you return to transmit mode, the magnetron does not need to warm up again. This is the default mode.
	Off	Scanner powered off when radar not required, but display is in use for other applications, such as the chart. When selected, the system counts down. During this time you cannot re-power the scanner.
	Timed Transmit	Scanner switches between on/transmitting, and standby mode. Scanner goes into power save mode when constant use of radar is not required.

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.

Symbol	Description
	AIS unit is connected and switched on, but has active alarms.
	AIS unit is connected and switched on, but the dangerous and lost alarm is disabled.

Sonar status symbols

The sonar (DSM) status is indicated in the databar.

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

GPS status symbols

The GPS receiver status is indicated in the databar.

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

Autopilot status symbols

The autopilot status is indicated in the databar.

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

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

6.19 Initial set up procedures

Once your display has been installed and commissioned (see Installation instructions), Raymarine recommends that you perform an initial set up procedure.

Start-up wizard

When you power-up the display for the first time a Start-up Wizard is displayed. The wizard guides you through the following initial settings:

- Language selection.
- Boat type selection.
- Units configuration.

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

Additional settings

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

- Set minimum safe depth.
- Set your date and time preferences.
- Adjust the display brightness (and set up a shared brightness scheme if appropriate).
- Align the touchscreen (HybridTouch displays only).
- Designate the data master.
- Select the GPS data source.
- Familiarize yourself with the Simulator Mode.

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.

Setting time and date preferences

With the homescreen displayed:

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

Adjusting the display brightness

1. Press the **POWER** button once.
   The Backlight Level control is displayed.
2. Using the rotary control, adjust the brightness level as appropriate.

3. To switch the color palette, from the homescreen select **Customize > Display Preferences > Color Palette**.

Touchscreen alignment

If the touchscreen is misaligned to your touch, you can realign it to improve the accuracy.

| | This only applies to HybridTouch displays. |

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.

Aligning the touchscreen

| | This only applies to HybridTouch displays. |

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **Touchscreen Alignment**.
4. Place your finger over the on-screen object momentarily, then remove it.
5. Repeat the action a further 3 times.
6. If the operation was successful, an "Alignment Completed" message is displayed.

   Touch the on-screen object and move it around the screen to test the alignment. Press Back to return to the Maintenance menu.
7. If the operation was unsuccessful at any point during the alignment exercise, an "Incorrect touch detected" message is displayed, and the alignment exercise is restarted.

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. For example the displays may require heading information from the autopilot and GPS systems, usually received through a SeaTalkng or NMEA connection. The data master is the display to which the SeaTalk, NMEA and any other data connections are made, it then bridges the data to the SeaTalkhs network and any compatible repeat displays. Information shared by the data master includes:

- Cartography
- Routes and waypoints
- Radar
- Sonar
- Data received from the autopilot, instruments, the engine and other external sources.

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

Designating the data master

For systems with 2 or more displays the following task must be performed on the multifunction display that you want to designate as the data master.

With the homescreen displayed:

1. Select **Set-up** .
2. Select **Maintenance**.
3. Select **Data Master**.
4. Select the display that you want to designate as the data master.
5. Press the **OK** button.

GPS selection

You can use an internal or external GPS receiver.

- The multifunction display features an internal GPS receiver.

- You can also connect an external GPS receiver using SeaTalkng or NMEA 0183.
- Use the System Settings menu to enable or disable the internal GPS receiver.

Enabling or disabling the internal GPS

With the homescreen displayed:

1. Select **Set-Up**.
2. Select **System Settings**.
3. Select **Internal GPS**.
4. Select the On or Off option as appropriate.

Simulator mode

The Simulator mode enables you to practice operating your display without data from a GPS antenna, radar scanner, AIS unit, or fishfinder.

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

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

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

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

Enabling simulator mode

With the homescreen displayed:

1. Select **Set-Up** .
2. Select **System Settings**.
3. Select **Simulator**.

Chapter 7: Managing display data

Chapter contents

7.1 Memory cards overview

You can use memory cards to archive data such as waypoints, routes, and tracks.

Memory cards can be used to archive your data when the system capacity is reached. You can then delete old data from your system, creating capacity for new data. The archived data can be retrieved at any time. You can also use memory cards to backup your data.

Note: Raymarine recommends that you backup your data to a memory card on a regular basis.

7.2 Inserting a memory card or chart card

1. Open the chart card door, located on the front right of the display.
2. Insert the card, as shown in the diagram below. For slot 1, the card contacts should be facing DOWN. For slot 2, the card contacts should be facing UP. Do NOT force the card. If the card does not fit easily into the slot, check the orientation.
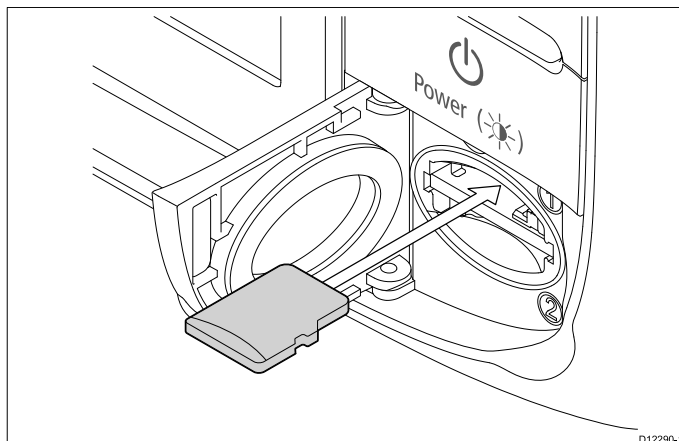
3. Gently press the card all the way in to the card slot, as shown in the diagram below. The card is secure when an audible click is heard.
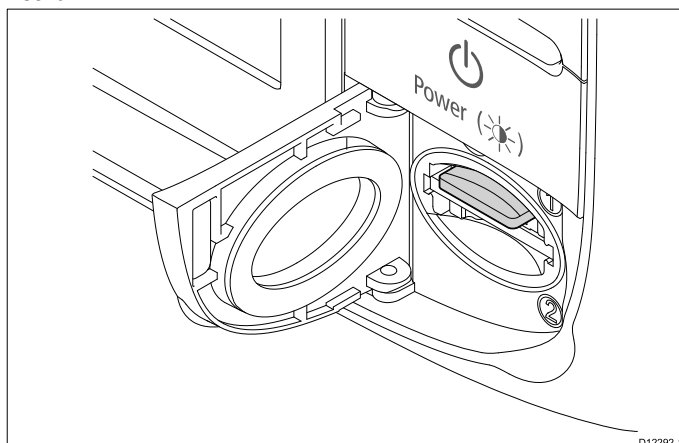
4. To prevent the ingress of water and consequent damage, close the chart card door.

7.3 Removing a memory card or chart card

From the homescreen:

1. Select **My Data**.
2. Select **Eject Card**.

   A message is displayed prompting you to select the memory device you want to eject.

3. Select **SD1** for a memory card in the top card slot, or **SD2** for a memory card in the bottom card slot.
4. Open the chart card door, located on the front right of the display.
5. Push the edge of the card towards the unit, until an audible click is heard.

   The card is released from the card slot mechanism, as shown in the following diagram:
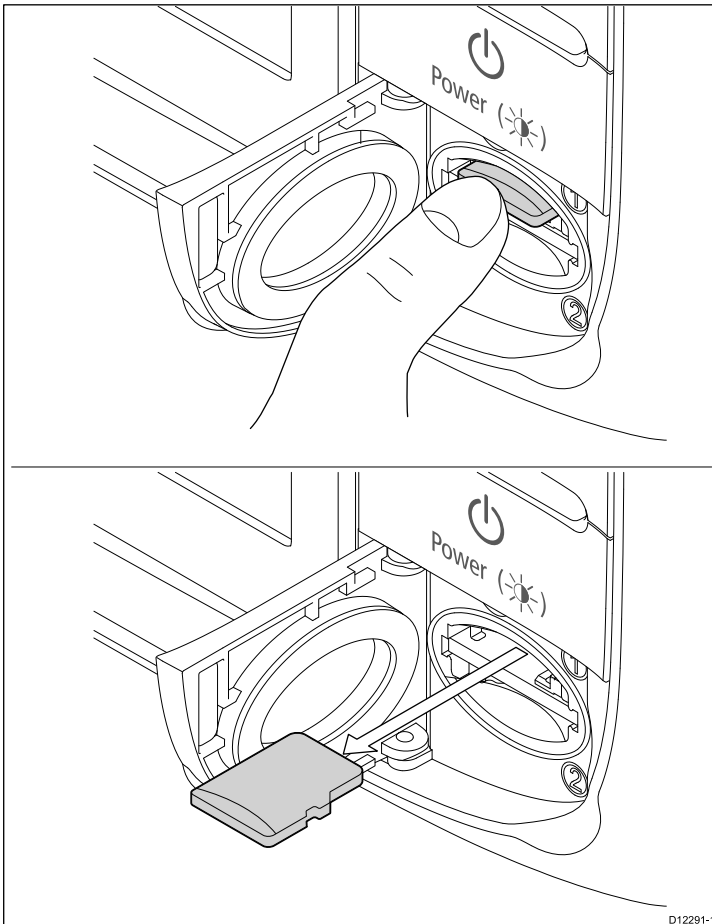
6. Use your fingers to pull the card clear of the card slot, using the edge of the card.
7. To prevent the ingress of water and consequent damage, close the chart card door.

Note: You can also power off the multifunction display and follow steps 4 to 7 above.

7.4 Saving user data and user settings

You can save user data (waypoints, routes, and tracks) or user settings to a memory card for later retrieval.

Type of data	Description	Notes
User data (waypoints)	Saves all waypoints to a single archive file.	Only 1 waypoints archive file can be saved per memory card.
User data (routes)	Saves all routes to a single archive file.	Only 1 routes archive file can be saved per memory card.
User data (tracks)	Saves all tracks to a single archive file.	Only 1 tracks archive file can be saved per memory card.
User settings	Saves the settings you've made in the set-up menus to a single archive file.	Only 1 user settings archive file can be saved per memory card.

Note: Raymarine recommends that you save your user data and user settings to a memory card on a regular basis.

Note: Raymarine strongly recommends that you save settings to a separate memory card, and NOT to a chart card containing cartography.

Saving waypoints, routes, and tracks to a memory card

With the homescreen displayed:

1. Ensure you have a memory card (NOT a chart card) in one of the card slots.
2. Select **My Data**.
3. Select **Save Data to Card**.

   A message is displayed prompting you to select the memory device you want to save the data to.

4. Select **SD1** for a memory card in the top card slot, or **SD2** for a memory card in the bottom card slot.
5. Select **Save Waypoints to Card**, **Save Routes to Card**, or **Save Tracks to Card**, as appropriate.

Retrieving waypoints, routes, or tracks from a memory card

With the homescreen displayed:

1. Ensure you have a memory card containing the user data in one of the card slots.
2. Select **My Data**.
3. Select **Retrieve from Card**.

   A message is displayed prompting you to select the memory device from which you want to retrieve the data.

4. Select **SD1** for a memory card in the top card slot, or **SD2** for a memory card in the bottom card slot.
5. Select **Retrieve Waypoints**, **Retrieve Routes**, or **Retrieve Tracks**, as appropriate.

Erasing waypoints, routes, and tracks from a memory card

With the homescreen displayed:

1. Ensure you have the memory card containing the data in one of the card slots.
2. Select **My Data**.
3. Select **Erase from Card**.

   A message is displayed prompting you to select the memory device from which you want to erase the data.

4. Select **SD1** for a memory card in the top card slot, or **SD2** for a memory card in the bottom card slot.
5. Select **Erase Waypoints from Card**, **Erase Routes from Card**, or **Erase Tracks from Card**, as appropriate.

Erasing waypoints, routes, and tracks from the system

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

With the homescreen displayed:

1. Select **My Data**.
2. Select **Erase from System**.
3. Select **Erase Waypoints from System**, **Erase Routes from System**, or **Erase Tracks from System**, as appropriate.
4. Select the specific data items you want to erase, or select **Erase All**.

   A message is displayed prompting you for confirmation.
5. Select **Yes** to proceed with the deletion, or **No** to cancel the operation.

Saving user settings to a memory card

With the homescreen displayed:

1. Ensure you have a memory card (NOT a chart card) in one of the card slots.
2. Select **My Data**.
3. Select **Backup and Restore Settings**.
4. Select **Backup Settings**.

   A message is displayed prompting you to select the memory device you want to save the data to.
5. Select **SD1** for a memory card in the top card slot, or **SD2** for a memory card in the bottom card slot.

Retrieving user settings from a memory card

With the homescreen displayed:

1. Ensure you have the memory card containing the user data in one of the card slots.
2. Select **My Data**.
3. Select **Backup and Restore Settings**.
4. Select **Restore Settings**.

   A message is displayed prompting you to select the memory device you want to retrieve the data from.
5. Select **SD1** for a memory card in the top card slot, or **SD2** for a memory card in the bottom card slot.

Save and retrieve items

The table below details the data items and settings which will be saved and retrieved on your multifunction display.

Homescreen and system settings

Application	Setting	Affected
Homescreen	Default page configuration	✓
System settings	Boat details	✗
	Position mode	✓
	Text size	✓
	Shared brightness	✓
	Brightness group	✓
	Screenshot destination	✗
	TD set-up	✓
	Simulator	✓
	Bearing mode	✓
	MOB Data type	✓
	Variation source	✓
	Manual variation	✓
	Language	✓
	Ground trip reset	✗
	Setting reset	✗
	Settings and data reset	✗
	Date format	✓
	Time format	✓
	Local time offset	✓
	Distance units	✓
	Distance subunits	✓
	Speed units	✓
	Depth units	✓
	Temperature units	✓
	Pressure units	✓
	Volume units	✓
System settings — integration	Autopilot control	✓
	DSC message	✓
	Data master	✗
	Bridge NMEA heading	✓
Multiple data sources	GPS position source	✓
	Heading source	✓
	Depth source	✓
	Speed source	✓
	Wind source	✓
Databar set-up	Databar content	✓
	Status bar	✓

Application	Setting	Affected
System diagnostics	External interfaces	✘
	Internal interfaces	✘
	Software services	✘
GPS status	GPS screen	✔
Compass status	Compass screen	✘

Alarms

Application	Setting	Affected
Alarms	Anchor alarm	✔
	Timer	✔
	Alarm clock	✔
	Temperature alarm	✔
	Arrival alarm	✔
	Offtrack alarm	✔
	Guard zone sensitivity	✔
	Fish alarm	✔
	Fish alarm depth limit	✔
	Shallow depth alarm	✔
	Deep depth alarm	✔
	AIS dangerous target alarm	✔
	AIS alarm list	✘

Chart application

Application	Setting	Affected
Chart	Chart detail	✘
	Display my data	✘
	Display vectors	✘
	Heading vector	✘
	COG vector	✘
	Tide arrow	✘
	Vector length	✘
	Vector width	✘
	Aerial overlay	✘
	Radar overlay	✘

Application	Setting	Affected
	AIS overlay	✘
	NOWRad overlay	✘

Application	Setting	Affected
Cartography	Range rings	✘
	2D Chart Use	✘
	Chart Sync	✘
	Chart orientation	✘
	Motion mode	✘
	Vessel offset	✘
	3D centre of view	✘
	3D exaggeration	✘
	3D transducer cone	✘
	3D depth scale	✘
	Data overlay cell 1 on / off	✔
	Data overlay cell 1 content	✔
	Data overlay cell 2 on / off	✔
	Data overlay cell 2 content	✔
	Chart object menu	✔
	Chart display	✔
	Chart grid	✔
	2D shading	✔
	Community layer	✔
	Chart text	✔
	Chart boundaries	✔
	Spot soundings	✔
	Safety contour	✔
	Depth contour	✔
	Deep water color	✔
	Hide rocks	✔
	Nav marks	✔
	Nav marks symbols	✔

Application	Setting	Affected
	Light sectors	✔
	Routing systems	✔
	Caution areas	✔
	Marine features	✔
	Land features	✔
	Business services	✔
	Panoramic photos	✔
	Roads	✔
	Additional wrecks	✔
	Aerial photo overlay	✔
	colored seabed areas	✔
	Vessel icon	✔
	Vessel size	✔

Radar application

Application	Setting	Affected
Radar	Select scanner	✔
	Scanner set-up	✘
	Range rings	✔
	Timed transmit	✘
	Transmit period	✘
	Standby period	✘
	Bearing alignment	✘
	Advanced set-up	✘

AIS Layer

Application	Setting	Affected
AIS Layer	Displayed target types	✔
	AIS safety messages	✔
	Buddy tracking	✔
	View buddy list	✘
	Silent mode	✔
	AIS alarms list	✘

Data application

Application	Setting	Affected
Data	Datapages and content	✔
	Datapage order	✔
	Color theme	✔
	Dial color	✔
	Number of engines	✔
	Maximum tachometer range	✔
	Trim tabs	✘
	Calibrate trim tabs	✘

Fishfinder application

Application	Setting	Affected
Fishfinder	Configure preset frequencies	✔
	Transducer settings	✘
	Sounder IR level	✘
	Sounder 2nd echo IR	✘
	Sounder ping rate limit	✘
	Sounder ping rate enable	✘

Weather application

Application	Setting	Affected
Weather	Sirius ESN	✔
	Wind symbol	✘
	Watchbox alerts	✘

7.5 Resetting your system

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

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

• Settings reset.

• Settings and data reset.

Settings reset

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

Settings and data reset

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

Resetting system settings

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **System Settings Reset**.

   A message is displayed prompting you to confirm the action.
4. Select **Yes** to proceed with the settings reset, or **No** to cancel.

Resetting system settings and data

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

With the homescreen displayed:

1. Select **Set-up**.
2. Select **Maintenance**.
3. Select **System Settings and Data Reset**.

   A message is displayed prompting you to confirm the action.
4. Select **Yes** to proceed with the settings and data reset, or **No** to cancel.

Chapter 8: Using waypoints, routes and tracks

Chapter contents

8.1 Waypoints

A waypoint is a position marked on the screen to indicate a site or a place to navigate to.

As well as acting as position markers, waypoints are also the building blocks used to create routes.

Common waypoint functions are accessed using the waypoints menu. This can be shown at any time by pressing the **WPT** button.

Waypoint display examples

Waypoints in the chart application

In the chart application both active and inactive waypoints are shown. The active waypoint (i.e. the one you are heading towards) has the box and symbol colors reversed.
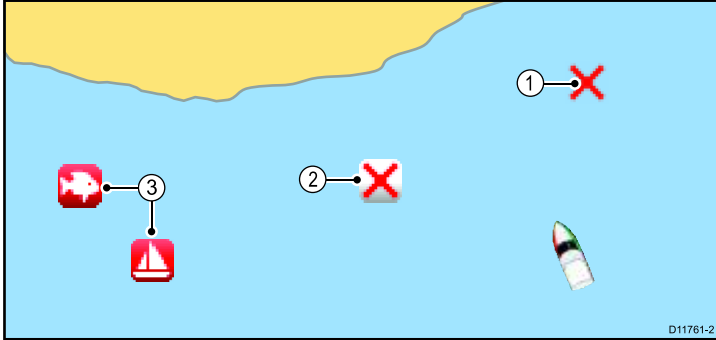
Item	Description
1	Inactive waypoint
2	Active waypoint
3	Alternative waypoint symbols

By default, all waypoints are indicated on screen by a waypoint symbol (**x**). You can assign different symbols if required, or choose which waypoints are shown.

Waypoints in the radar application

In the radar application both active and inactive waypoints are shown. The active waypoint (i.e. the one you are heading towards) has the box and symbol colors reversed.
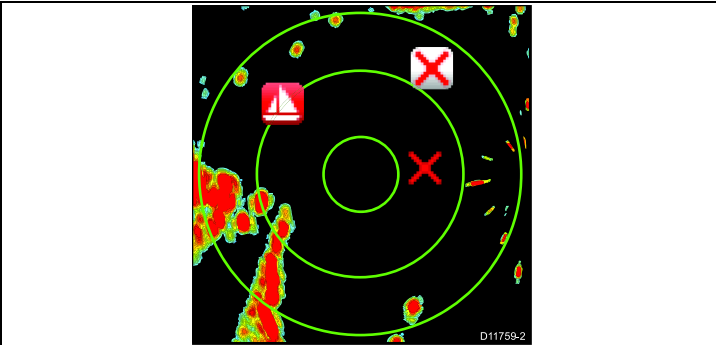
By default, all waypoints are indicated on screen by a waypoint symbol (**x**). You can assign different symbols if required, or choose which waypoints are shown.

Waypoints in the fishfinder application

Waypoints in the fishfinder application are represented by a vertical line labelled WPT.
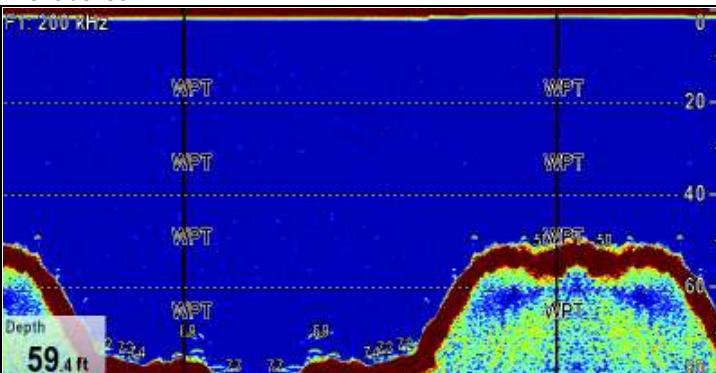
Showing and hiding waypoint groups / symbols

From the chart or radar application:

1. Press the **WPT** button.
2. Select **Display Waypoints**.
3. Select **Change** to switch between Groups and Symbols.

   A list of Symbols or Groups is displayed.
4. Select the Group or Symbol you wish to show/hide from the list.

   Selecting on the Symbol/Group will switch between Show and Hide.
5. Repeat Step 4 for each waypoint group or symbol you want to show or hide.

The list of waypoints and symbols can also be accessed from the Chart and Radar applications menu:

* Chart application: **Menu > My Data > Display My Data > Select WPTs To Display**.

* Radar application: **Menu > Presentation > Select WPTs To Display**.

Waypoint context menu

Placing the cursor over a waypoint in the chart or radar applications displays a context menu showing the waypoint's positional data and menu items.

The waypoint context menu can be accessed by:

* Highlighting the waypoint using the **Joystick** and pressing the **Ok** button, or

* Selecting a waypoint using touch — Hybridtouch multifunction displays only.

The context menu provides the following positional data for the waypoint in relation to your vessel:

* Latitude

* Longitude

* Range

* Bearing

For inactive waypoints the following menu items are available:

* **Goto Waypoint**

* **Edit Waypoint**

* **Erase Waypoint**

* **Move Waypoint**

* **Measure**

* **Build Route**

For active waypoints the following menu items are available:

* **Stop Goto**

* **Restart XTE**

* **Measure**

* **Build Route**

*

Waypoint features

There are a range of features for placing, navigating and managing waypoints.

Waypoint features are accessed from:

- **the waypoint context menu** — by positioning the cursor over an existing waypoint on the screen.

- **any application** — by pressing the **WPT** button. This displays the **Waypoints** menu.

- **the chart application** — by going to the following menu: **Menu > My Data**.

- **the homescreen** — by going to the following menu: **My Data**.

Note: Pressing the **WPT** button from the homescreen will open the waypoint list.

Waypoint placement

Placing a waypoint using touch

	This only applies to HybridTouch displays.

From the chart, radar or fishfinder application:

1. Select and hold the required location on screen.

   The context menu is displayed.

2. Select **Place Waypoint**.

Placing a waypoint at the cursor position

From the chart, radar or fishfinder application:

1. Using the **joystick** move the cursor to the area of the screen where you want the waypoint to be placed.

2. Press the **WPT** button.

   The waypoint menu is displayed.

3. Select **Place Waypoint at Cursor**.

   The waypoint is placed at the location and a confirmation pop up message is displayed.

4. Select **Ok** to confirm waypoint placement, or **Edit** to edit the waypoint details.

Placing a waypoint at your vessel's position

In addition to positional information, a waypoint placed at the vessel position will capture temperature and sounded depth information (if you have the appropriate sensors connected to your system).

From the chart, radar or fishfinder application:

1. Press the **WPT** button.

   The waypoint menu is displayed.

2. Press the **WPT** button again.

   A confirmation pop up message is displayed.

3. Select **Ok** to place the waypoint, or Edit to edit the waypoint details.

Note: Alternatively with the waypoint menu displayed you can select **Place Waypoint At Vessel**.

Placing a waypoint at a known position

You can place a waypoint at a specified location using latitude and longitude coordinates:

1. Press the **WPT** button.

2. Select **Place Waypoint At Lat/Lon**.

3. Select the position field.

4. Enter the Latitude/Longitude position.

5. Select **SAVE**.

6. You can also add a name for the waypoint and add to a group by selecting the **Name** and **Group** fields.

Navigation

Navigating to the cursor position on the chart using touch

	This only applies to HybridTouch displays.

From the chart application:

1. Select and hold on the required location on screen.

   The chart context menu is displayed.

2. Select **Goto Cursor**.

Navigating to the cursor position on the chart
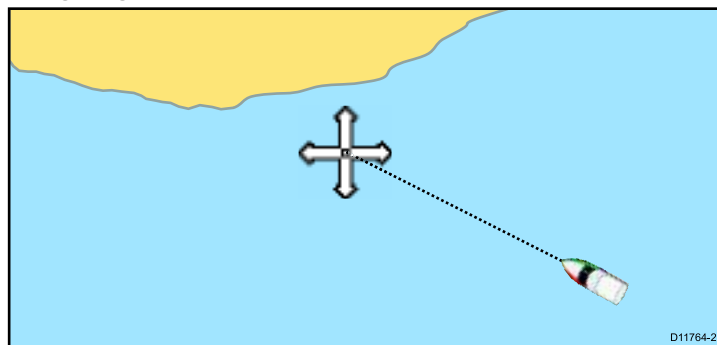
From the chart application:

1. Position the cursor at the desired destination on the chart.

2. Select **Menu**.

3. Select **Navigate**.

4. Select **Goto Cursor**.

Navigating to a waypoint on the screen
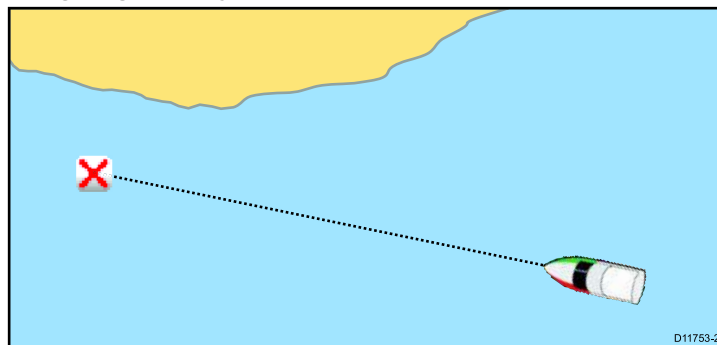
From the chart or radar application:

1. Select the waypoint.

   The waypoint context menu is displayed.

2. Select the **Goto Waypoint**.

Note: With an active waypoint selected you can select **Stop Goto** option from the waypoint context menu at any time to cancel the action.

Navigating to a waypoint in the waypoints list

From any application:

1. Press the **WPT** button.

   The waypoint menu is displayed.

2. Select **View Waypoint List**.

   The waypoints list is displayed.

3. Select the required waypoint.

   The waypoint options dialog is displayed.

4. Select **Goto Waypoint**.

Note: Pressing the **WPT** button from the homescreen will display the waypoints list.

Cancelling navigation to a waypoint

From the chart or radar application:

1. Select the active waypoint.

   The waypoint context menu is displayed.
2. Select **Stop Goto**.
3. Alternatively, in the chart application, go to: **Menu > Navigate > Stop Goto**.

> **Note:** Once navigation is no longer active, the waypoint symbol returns to its normal state, and the dashed line between your vessel and the waypoint is removed.

Arriving at a waypoint

As your vessel approaches a waypoint, the waypoint arrival alarm provides a warning.

1. Select **Ok** on the waypoint arrival alarm pop up message.

Once the alarm is acknowledged, the next waypoint is selected, and the display updates to indicate the next leg of the route.

> **Note:** You can set the approach distance (radius) at which the waypoint arrival alarm will sound using the **Alarms** menu from the homescreen: **Set-up > Alarms > Waypoint Arrival**.

Cross Track Error (XTE)

Cross Track Error (XTE) is the amount of deviation from your intended route or waypoint, expressed as a distance.

In the event that you steer off-track, you can go straight to your target by resetting XTE.

Resetting Cross Track Error (XTE)

While following a route in the chart application:

1. Select the route.
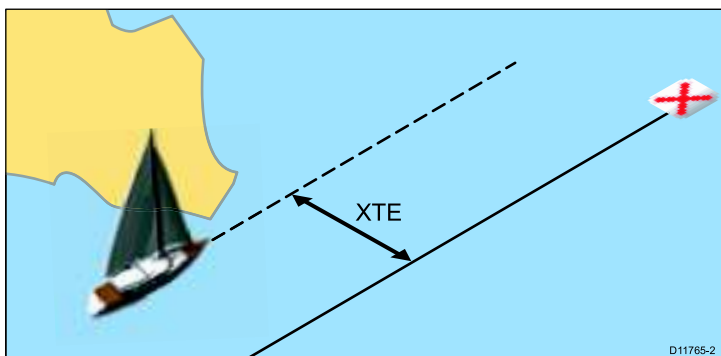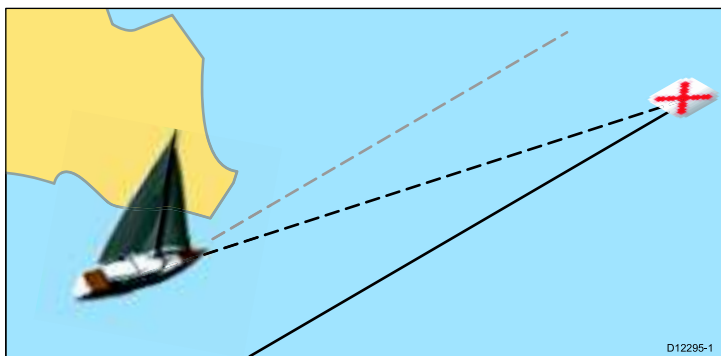
   The route context menu is displayed.
2. Select **Restart XTE**.

Resetting XTE results in a new course from the current vessel position to the current target waypoint. This does not affect your saved route.

You can also reset the XTE from the Navigate Menu: **Menu > Navigate > Restart XTE**.

Waypoint information

When you create a waypoint, the system assigns information regarding the location marked. You can view and edit the details of any waypoint that has been created and stored.

The following information is assigned or captured for each waypoint:

- Name
- Position (as Lat/Lon and range/bearing from vessel.)
- Temperature (requires appropriate sensor, only for waypoints captured at the vessel position.)

- Depth (requires appropriate sensor, only for waypoints captured at the vessel position.)
- Date and time
- Comment (you can add your own text comments to a waypoint.)
- Symbol (a default symbol is assigned, or you can select an alternative.)

There are 2 features which allow you to view or edit waypoint information:

- Place the cursor over a waypoint on the 2D chart or Radar screen to view selected information.
- Use the waypoint list for comprehensive information to view and edit as required.
- You can allocate waypoints to a waypoint group to make waypoint management easier.

Displaying the waypoint list

1. Press the **WPT** button.
2. Select **View Waypoint List**.

   The waypoint list is displayed.

> **Note:** You can also access the waypoint list from the homescreen and chart application by going to the **My Data** menu and selecting **Waypoint List**.

Waypoint editing

Editing waypoint details

With the Waypoint List displayed:

1. Select the waypoint you want to edit.

   The waypoint options dialog is displayed.
2. Select **Edit Waypoint**.
3. Select the field you want to edit: Name, Group, Position or Comment.
4. Use the on-screen keyboard to make the changes, then select the on-screen keyboard's **SAVE** button.

Editing a waypoint on the chart or radar screen

From the chart or radar application:

1. Select the waypoint.

   The waypoint context menu is displayed.
2. Select **Edit Waypoint**.

   The edit waypoint dialog is displayed.
3. Select the field you want to edit.
4. Use the on-screen keyboard to make the changes, and then select the on-screen keyboard's **SAVE** key.

Waypoint symbols

There are a range of symbols to represent different waypoint types.

Symbol	Type	Symbol	Type
	Airport		Anchor
	Billfish		Bottom mark
	Bridge		Buoy
	Cans		Car
	Caution		Circle
	Concrete		Cross
	Diamond		Diamond quarter
	Diver down		Diver down (alternative)
	Dolphin		Dot
	Fad		Fish

Symbol	Type	Symbol	Type
	Fish (1–star)		Fish (2–star)
	Fish (3–star)		Fish trap
	Hill peak		Ledge
	Lobster		Marker
	Martini		Nuns
	Oil rig		Oyster
	Post		Preferred marks
	Private reef		Public reef
	Reef		Reef ball
	Restriction		Rocks
	Sail boat		Route end
	Route start		School of fish
	Seaweed		Shark
	Skull		Small fish
	Sport fisher		Square
	Swimmer		Tank
	Top mark		Tower
	Trawler		Tree
	Triangle		Wreck

Changing a waypoint symbol

With the Waypoint List displayed:

1. Select the waypoint.

   The edit waypoint dialog is displayed.
2. Select the Symbol field.
3. Select the required symbol in the list.

Moving waypoints

Moving a waypoint on the chart or radar screen

From the chart or radar application:

1. Position the cursor on the relevant waypoint.

   The waypoint context menu is displayed.
2. Select **Move Waypoint**.
3. Select the new position for the waypoint.
4. Press the **Ok** button to confirm the new location.

Moving a waypoint within a route

From the chart application:

1. Position the cursor over the waypoint you want to move.

   The waypoint context menu is displayed.
2. Select **Move Waypoint**.
3. Move the cursor so that it stretches the leg of the route to the desired position on the chart.
4. Press the **Ok** button to confirm the new location.

Moving a waypoint by entering new coordinates

With the Waypoint List displayed:

1. Select the waypoint.

   The edit waypoint options dialog is displayed.
2. Select **Edit Waypoint**.

3. Select the Position field.
4. Use the on-screen keyboard to make the changes, and then select the on-screen keyboard's **SAVE** key.

Erasing waypoints

Erasing a waypoint on screen

From the chart or radar application:

1. Select the relevant waypoint.

   The waypoint context menu is displayed.
2. Select **Erase Waypoint**.

   The erase waypoint pop up message is displayed.
3. Select **Yes** to confirm, or **No** to cancel.

Note: If you erase a waypoint which is part of a route the erase waypoint in route pop up message is displayed to warn you that the waypoint will be removed from the route.

Erasing a waypoint using the waypoint list

With the Waypoint List displayed:

1. Select the waypoint you want to erase.

   The waypoint options dialog is displayed.
2. Select **Erase Waypoint**.

   The erase waypoint pop up message is displayed.
3. Select **Yes** to confirm, or **No** to cancel.

Note: If you erase a waypoint which is part of a route the erase waypoint in route pop up message is displayed to warn you that the waypoint will be removed from the route.

Erasing all waypoints

From the homescreen:

1. Select **My Data**.
2. Select **Erase Data From System**.
3. Select **Erase Waypoints From System**.

   The erase waypoints from system dialog is displayed.
4. Select **Erase All**.

   The confirm delete pop up message is displayed.
5. Select **Yes** to confirm, or **No** to cancel.

Waypoint groups

In order to make your waypoints easier to manage, you can organize them into groups of your choice. When fishing, for example, you may only wish to see the waypoints that indicate good fishing sites.

Provided that you have not changed the default group, all waypoints are automatically placed in the default "My Waypoints" group when they are created.

Note: A waypoint can only belong to one group.

Displaying the waypoint group list

From any application:

1. Press the **WPT** button.
2. Select **Waypoint And Group Options**.
3. Select **View Group List**.

The waypoint group list is displayed.
You can now:

• Make a new waypoint group.

• Rename waypoint groups.

• Erase waypoint groups.

Note: You cannot rename or erase the default **My Waypoints** group.

Making a new waypoint group

With the Waypoint Group List displayed:

1. Select **Add New**.

   The on-screen keyboard is displayed.

2. Select the name field.

3. Use the on-screen keyboard to enter the required name for your new waypoint group.

4. select **SAVE** .

Moving waypoints between groups

1. From any application press the **WPT** button.

2. Select **View Waypoint List**.

3. Select the Waypoint you wish to change the group of.

   The waypoint options dialog is displayed.

4. Select **Edit Waypoint**.

5. Select the **Group** field.

   A list of available waypoint groups is displayed.

6. Select the group you wish to move the waypoint to.

The waypoint is moved to the new group.

> **Note:** The Waypoints list can also be accessed from the homescreen by pressing the **WPT** button.

Renaming a waypoint group

With the Waypoint Group List displayed:

1. Select the group you want to rename.

2. Select **Edit Group Name**.

   The on-screen keyboard is displayed.

3. Using the on-screen keyboard, edit the group name.

4. Select **SAVE**.

Changing the default waypoint group or symbol

From the Waypoint And Group Options menu:

- accessed via the homescreen: **My Data > Waypoint And Group Options**, or

- accessed via the chart application: **Menu > My Data > Waypoint And Group Options**, or

- accessed from any application: **WPT button > Waypoint And Group Options**

1. Select **Select Default Group**.

   A list of groups is displayed.

2. Select the group you want all new waypoints to be placed in by default.

3. Select **Default Symbol**.

4. Select the symbol you want all new waypoints to be assigned.

Erasing a waypoint group

When you erase a waypoint group, the group name is erased from the system and the waypoints that were in that group are moved to the My Waypoints group. You can erase any waypoint group except the following:

- the 'My Waypoints' group,

- a group containing an active waypoint,

- a group that contains waypoints that are part of a stored route.

With the Waypoint Group List displayed:

1. Select the waypoint group that you want to erase.

2. Select **Erase Group (But Keep Waypoints)**.

3. Select **Yes** to confirm the action, or **No** to cancel.

Erasing a waypoint group and its waypoints

To erase a waypoint group and all of the waypoints in that group follow the steps below:

From the homescreen:

1. Select **My Data**.

2. Select **Erase from System**.

3. Select **Erase Wpts from System**.

   The waypoints group list is displayed.

4. Select The waypoint group that you want to erase.

   A confirmation pop-up message is displayed.

5. Select **Yes** to confirm the deletion.

   The waypoint group and all waypoints in that group have now been erased from the system.

8.2 Routes

A route is a series of waypoints typically used to assist with passage planning and navigation.

A route is displayed on screen as a series of waypoints linked by a line.
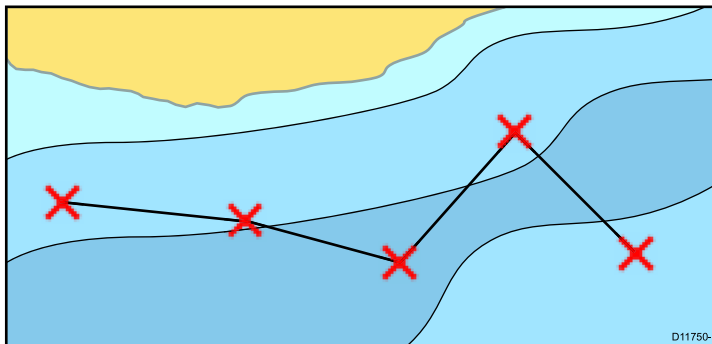
Route features

There are a range of route features for building, navigating and managing routes.

The route features allow you to:

- Build and save a route for use when required (stored in the route list).

- Navigate (follow) routes.

- Manage and edit routes stored on the system.

- Build a route from an existing track.

Route features are accessed from the chart application:

- by selecting an existing route.

- by using the **Build Route** option in the chart context menu.

- by using the chart application menu: **Menu > Navigate > Follow Route**.

> **Note:** The Route List can also be accessed from the homescreen by selecting **My Data** and then **Route List**.

Route building

A route can consist of a combination of:

- New waypoints which you place on the screen as required and/or

- existing waypoints selected from a list displayed on screen.

> **Note:** A route can also be created from a track.

As each waypoint is added, it is assigned an index number corresponding to its position in the route and drawn on the chart using the currently specified symbol. The following should be noted:

- When a route is being built it is not active and does not affect any current navigation.

- You cannot save a new route if any of the waypoints within it are currently active.

Building a route using touch

 This only applies to HybridTouch displays.
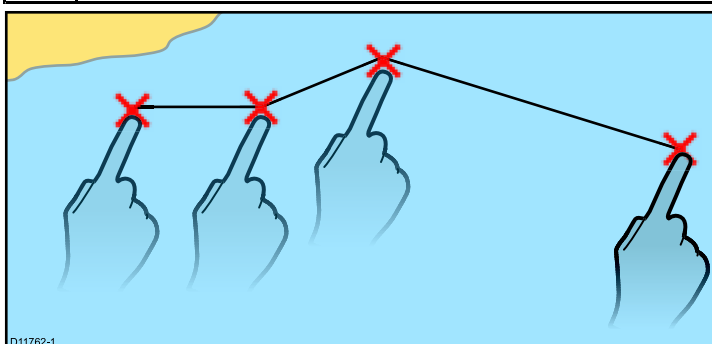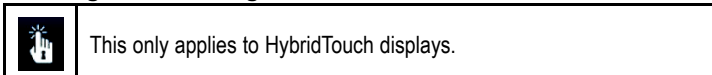
From the chart application:

1. Select and hold a location on screen.
   The chart context menu is displayed.
2. Select **Build Route**.
   The build route menu is displayed.
3. Select a location on screen to be the starting position.
4. Select relevant locations to place subsequent waypoints in order.
   The route is saved and displayed as each waypoint is placed.
5. When complete select **Finish Build**.
   The finish route build pop up message is displayed.
6. Select **Follow** to immediately follow the route. or
7. Select **Edit** to change the route name or change the route color. or
8. Select **Exit** to save the route and return to the chart application.
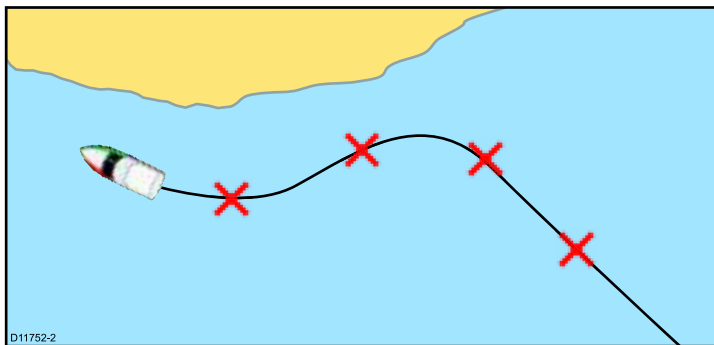
Note: If you place a waypoint at the wrong position, select **Undo Waypoint** from the Route Menu.

Building a route on the chart

From the chart application:
1. Select **Menu**.
2. Select **Navigate**.
3. Select **Build Route**.
   The build route menu is displayed.
4. Select **Place Route**.
5. Using the **Joystick** select a location on screen.
6. Press the **Ok** button to place the first waypoint in the route.
7. Use the **Joystick** and **Ok** button to place subsequent waypoints.
   The route is saved and displayed as each waypoint is placed.
8. When your route is complete select **Finish Build**.
   The finish route build pop up message is displayed.
9. Select **Follow** to immediately follow the route. or
10. Select **Edit** to change the route name or change the route color. or
11. Select **Exit** to save the route and return to the chart application.

Note: If you place a waypoint at the wrong position, select **Undo Waypoint**.

Building a route using the waypoint list

From the chart application:
1. Select **Menu**.
2. Select **Navigate**.
3. Select **Build Route**.
   The build route menu is displayed.
4. Select **Use WPT List**.
   The waypoint list is displayed.
5. Select the required waypoint.
   You will be taken back to the build route menu.
6. Add subsequent waypoints to the route.
   The route is saved and displayed as each waypoint is placed.
7. When your route is complete select **Finish Build**.
   The finish route build pop up message is displayed.
8. Select **Follow** to immediately follow the route. or
9. Select **Edit** to change the route name or change the route color. or
10. Select **Exit** to save the route and return to the chart application.

Note: If you select the wrong waypoint, select **Undo Waypoint** from the route menu.

Adjusting chart range while building a route

From the Build Route menu:
1. Select **Adjust Range**.
2. Use the **Range Control** to range in and out of the chart.

Build a route from a track

You can create a route from a recorded track.

When a track is converted the system creates the closest route through the recorded track, using the minimum number of waypoints. Each waypoint created will be saved with the depth and temperature data (if applicable) for that position.

Note: If a track break occurs, only the last segment is converted to a route.

Building a route from a track

From the Track List:

- accessed from the homescreen: **My Data > Track List**
- accessed from the chart application: **Menu > My Data > Track List**

1. Select the Track you want to convert to a route.
   The track options dialog is displayed.
2. Select **Create Route From Track**.
   On completion, the maximum deviation of the route from the recorded track is displayed in a dialog and the new route is added to the route list. It can now be displayed, edited and erased etc. in the same way as other routes in the system.
3. Select **Ok** to confirm.
4. Select **Edit** to change the name and line color of the created route.

Building a route from a track displayed on the chart

From the chart application:
1. Select the required track.
   The track context menu is displayed.
2. Select **Create Route From Track**.
   On completion, the maximum deviation of the route from the recorded track is displayed in a pop up message and the new route is added to the route list. It can now be displayed, edited and erased etc. in the same way as other routes in the system.
3. Select **Ok** to confirm.
4. Select **Edit** to change the name and line color of the created route.

Route context menu

Placing the cursor over a route in the chart application displays a context menu showing the leg of the route highlighted by the cursor and menu items.
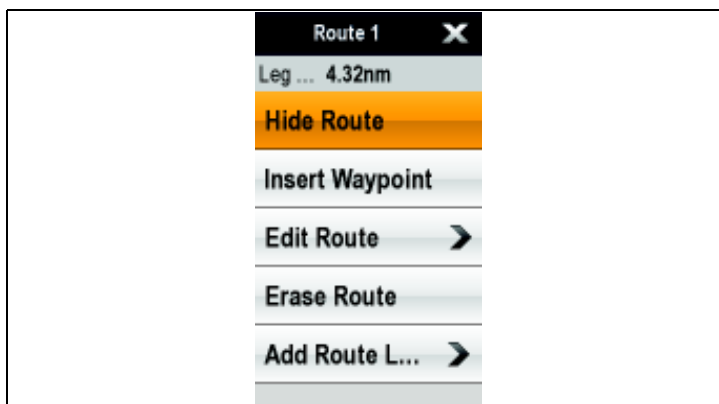
The waypoint context menu can be accessed by:

- Highlighting a route using the **Joystick** and pressing the **Ok** button, or
- Selecting a route using touch — Hybridtouch multifunction displays only.

The context menu provides the following menu items:

- **Follow Route**
- **Follow Route In Reverse**

- **Hide Route**
- **Insert Waypoint**
- **Edit Route**
- **Erase Route**
- **Add Route Leg**

When following a route the context menu options change to:

- **Stop Follow**
- **Restart XTE**
- **Advance Waypoint**
- **Insert Waypoint**
- **Edit Route**
- **Erase Route** — Disabled
- **Add Route Leg**

Navigating a route

You can follow any route stored on the display. When following a route you visit each waypoint in order. You may also use the follow route options in conjunction with a compatible autopilot to automatically navigate along your chosen route.
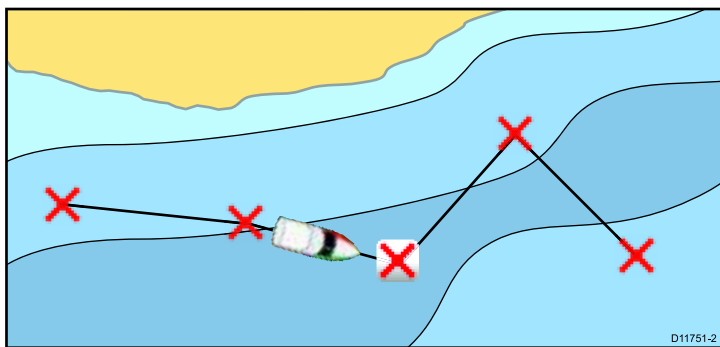
There are a number of ways to select the follow route option:

- Using a stored route within the route list.
- From a selected waypoint or any leg within a route.

You can also follow any route in reverse order.

Following a stored route

From the chart application:

1. Select **Menu**.
2. Select **Navigate**.
3. Select **Follow Route**.
   The Route list is displayed.
4. Select the route you want to follow.
5. Select **Follow Route**.

Cancelling navigation of a route

From the chart application:

1. Select the Route.
   The route context menu is displayed.
2. Select **Stop Follow**.

Arriving at a waypoint

As your vessel approaches a waypoint, the waypoint arrival alarm provides a warning.

1. Select **Ok** on the waypoint arrival alarm pop up message.

Once the alarm is acknowledged, the next waypoint is selected, and the display updates to indicate the next leg of the route.

> **Note:** You can set the approach distance (radius) at which the waypoint arrival alarm will sound using the **Alarms** menu from the homescreen: **Set-up > Alarms > Waypoint Arrival**.

Advancing to the next waypoint in a route

You can skip the current active waypoint and advance to the next waypoint in a route at any time.

While following a route in the chart application:

1. Select the route.
   The route context menu is displayed.

2. Select **Advance Waypoint**.

> **Note:** If the current destination is the last waypoint, the chart advances on to the first waypoint in the route.

Cross Track Error (XTE)

Cross Track Error (XTE) is the amount of deviation from your intended route or waypoint, expressed as a distance.

In the event that you steer off-track, you can go straight to your target by resetting XTE.

Resetting Cross Track Error (XTE)

While following a route in the chart application:

1. Select the route.
   The route context menu is displayed.
2. Select **Restart XTE**.

Resetting XTE results in a new course from the current vessel position to the current target waypoint. This does not affect your saved route.
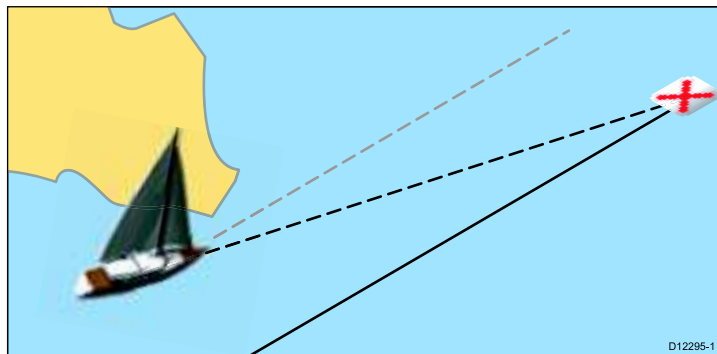
You can also reset the XTE from the Navigate Menu: **Menu > Navigate > Restart XTE**.

Following a route in reverse order

From the chart application:

1. Select the route.
   The route context menu is displayed.
2. Select **Follow Route In Reverse**.

You can also select **Follow Route In Reverse** by selecting a route from the route list: **Menu > Navigate > Follow Route**.

Review or edit a route

There are a variety of attributes associated with routes. These can be reviewed and edited.
You can:

- Show or hide a route on the chart screen.
- Review details of the route
- Change the name or color of a route.
- Add, move and remove waypoints from a route.
- Change the route lines width.

> **Note:** An active route can be edited, with the exception of the active waypoint. If a waypoint being edited becomes active, then the system shall cancel the edit; the waypoint shall remain in its original position.

Showing or hiding a route

From the chart application:

1. Select **Menu**.
2. Select **My Data**.
3. Select **Display My Data**.
4. Select **Select Routes To Display**.
   The display routes dialog is displayed.
5. Select the route to switch between Show and Hide.

Selecting a route to review or edit

1. Do one of the following to select the required route:
   - With the chart application active, select a route on screen to display the route context menu.
   - With the chart application active, select: **Menu > My Data > Route List** and select the required route from the list.
   - From the homescreen, select: **My Data > Route List** and select the required route from the list.

Adding a waypoint to a route on the chart screen

From the chart application:
1. Select the appropriate leg of the route.
   The route context menu is displayed.
2. Select **Insert Waypoint**.
3. Move the cursor so that it stretches the leg of the route to the desired position on the chart.
4. Press the **Ok** button.

Removing a waypoint from a route

From the chart application:
1. Select the waypoint you want to erase.
   The waypoint context menu is displayed.
2. Select **Erase Waypoint**.
   The erase waypoint pop up message is displayed.
3. Select **Yes** to confirm or **No** to cancel the action.

Moving a waypoint within a route

From the chart application:
1. Position the cursor over the waypoint you want to move.
   The waypoint context menu is displayed.
2. Select **Move Waypoint**.
3. Move the cursor so that it stretches the leg of the route to the desired position on the chart.
4. Press the **Ok** button to confirm the new location.

Erasing routes

Erasing a displayed route

From the chart application:
1. Select the route.
   The Route context menu is displayed.
2. Select **Erase Route**.
   The erase route pop up message is displayed.
3. Select **Yes** to confirm, or **No** to cancel the action.

Erasing a route using the route list

From the chart application menu or the homescreen:
1. Select **My Data**.
2. Select **Route List**.
   The route list is displayed.
3. Select the route you want to erase.
4. Select **Erase route**.
   The erase route pop up message is displayed.
5. Select **Yes** to confirm, or **No** to cancel the action.

> **Note:** You can delete any route, except for the one that you are currently following. When you erase a route, only those waypoints associated with that route are deleted.

Erasing all routes

From the homescreen:

1. Select **My Data**.
2. Select **Erase Data From System**.
3. Select **Erase Routes From System**.
   The erase routes from system dialog is displayed.
4. Select **Erase All**.
   The confirm delete pop up message is displayed.
5. Select **Yes** to confirm, or **No** to cancel the action.

8.3 Tracks

A track is an on-screen trail that shows the passage you have taken. This trail is made up of a series of track points which are created automatically. You can save the track to create a permanent record of where you have been
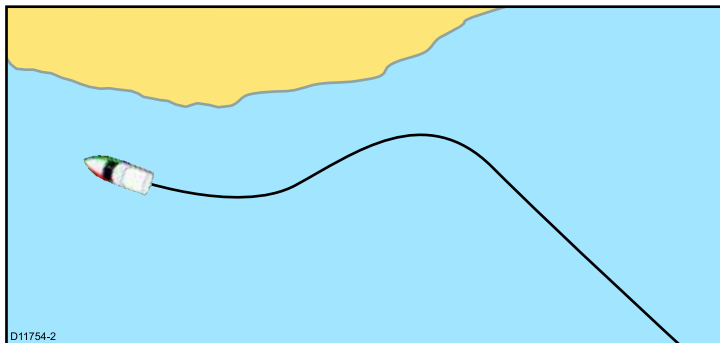
With tracks you can:

- Review where you have been.
- Create a route from a track.

Creating a track

From the chart application:

1. Select **Menu**.
2. Select **Navigate**.
3. Select **Create Track**.

   The create track pop up message is displayed.
4. Select **Ok**.

   As you navigate your vessel, your journey is automatically recorded as a track.

Note: If the power fails whilst a track is being recorded or the position fix is lost, a break will occur in the track. Only the last segment of a track can be converted into a route.

Note: If the maximum number of tracking points is reached, you will be warned. The track will continue to be recorded with the earlier tracking points being overwritten.

5. To complete your track select **Stop Track** from the **Navigate** menu: **Menu > Navigate > Stop Track**.

   The track stopped pop up message is displayed.
6. Select **Save**, **Erase** or **Cancel**.

   - **Save** — Will save the track and open the Edit track Properties dialog where you can name the track and choose a color for the track line.
   - **Erase** — Will erase the track.
   - **Cancel** — Will cancel the Stop Track action.

Track interval

The track interval specifies the time period or distance between the points in a track.

You can adjust the interval between points which can help ensure best use of the available storage.

The settings are available from the **My Data** menu:

- **Record Track By** — specifies the interval type (Auto / Time / Distance).
- **Track Interval** — specifies the interval value (e.g. 15 minutes).

For example when creating a track for a long journey, an interval set to Auto could result in rapid use of all of the storage available for track points. In this case selecting a higher value for the Track Interval would provide capacity for a longer track.

Setting the track interval

From the chart application:

1. Select **Menu**.
2. Select **My Data**.
3. Select **Track Set-up**.
4. Select **Record Track By** and set to the appropriate value:

- Auto— The track interval is automatically set (Auto will minimize track points whilst maintaining correlation between the track and the actual path followed).
- Time— The track points are placed at regular intervals of time.
- Distance— The track points are placed at regular intervals of distance.

5. Select the **Track Interval** and set to the appropriate value:

- Units of time from the list displayed (available if "record track by" is set to time).
- Units of distance from the list displayed (available if "record track by" is set to distance).
- Not available — no Track Interval is available if the "record track by" is set to auto).

Track context menu

Placing the cursor over a track in the chart application displays a context menu showing the track length, number of points and menu items.
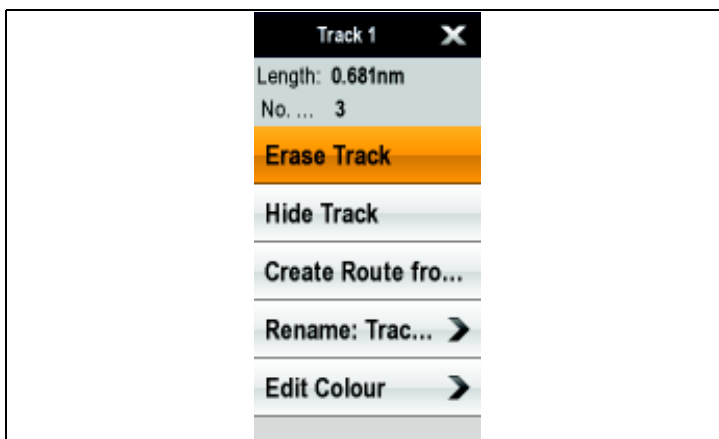
The track context menu can be accessed by:

- Highlighting a track using the **Joystick** and pressing the **Ok** button, or
- Selecting a track using touch — Hybridtouch multifunction displays only.

The context menu provides the following menu items:

- **Erase Track**
- **Hide Track**
- **Create Route From Track**
- **Rename Track**
- **Edit Color**

When creating a track the context menu options change to:

- **Stop Track**
- **Erase Route** — Disabled
- **Create Route From Track**
- **Rename Track**
- **Edit Color**

Reviewing and editing a track

You can review and edit aspects of the tracks stored.

You can:

- Erase a track.
- Create a route from a track.
- Show or hide a track on the chart (only available from the chart application).
- Change the name of a track.
- Change the color of a track.

Selecting a track to review or edit

1. Do one of the following to select the required track:

- From the chart application, select a track on screen to display the track context menu.
- From the chart application, go to the following menu: **Menu > My Data > Track List**, and select the required track.
- From the homescreen, select: **My Data > Track List** and select the required track.

You can then proceed and review or edit the required track using the options available.

Erasing tracks

Erasing a track

From the chart application:

1. Select **Menu**.
2. Select **My Data**.
3. Select **Track List**.
   The track list is displayed.
4. Select the track you want to erase.
5. Select **Erase Track**.
   The erase track pop up message is displayed.
6. Select **Yes** to confirm, or **No** to cancel the action.

> **Note:** You can also erase tracks from the homescreen: **My Data > Track List**.

Erasing all tracks

From the homescreen:

1. Select **My Data**.
2. Select **Erase Data From System**.
3. Select **Erase Tracks From System**.
   The erase tracks from system dialog is displayed.
4. Select **Erase All**.
   The confirm delete pop up message is displayed.
5. Select **Yes** to confirm, or **No** to cancel the action.

8.4 Waypoints, routes and tracks storage capacity

The display can store the following quantities of waypoints, routes and tracks

Waypoints	• 3000 Waypoints
	• 100 waypoint groups
Routes	• 150 routes, each consisting of up to 50 waypoints.
Tracks	• 15 tracks, each consisting of up to 10000 track points.

Chapter 9: Using the chart

Chapter contents

9.1 Chart application overview

The chart application provides an electronic chart with passage planning and navigation features. It combines 2D and 3D viewpoints and provides a variety of cartographic information regarding your surroundings and charted objects.

Typical uses for the chart application include :

* Monitor your vessel location and heading.
* Interpret your surroundings.
* Measure distance and bearing.
* Navigate using waypoints.
* Plan, and Navigate using routes.
* Monitor fixed and moving objects using radar overlay.
* Monitor vessels in your vicinity using AIS data.
* Keep track and record your course.
* View information for charted objects.
* Overlay NOWRad weather information.
* Overlay aerial photos and other chart enhancements

> **Note:** To obtain full 3D detail, you must have chart cards containing 3D cartography for the appropriate geographic area.

You can also use your multifunction display to customize your chart application to your own particular requirements and circumstances. You can:

* Alter the way the chart is drawn in relation to your vessel and the direction you are travelling in (chart orientation and motion mode).
* Manage and edit chart data you have entered.
* Control the level of detail displayed on-screen.

Chart datum

The chart datum setting affects the accuracy of the vessel position information displayed in the chart application.

In order for your GPS receiver and multifunction display to correlate accurately with your paper charts, they must be using the same datum.

The default datum for your multifunction display is WGS1984. If this is not the datum used by your paper charts, you can change the datum used by your multifunction display, using the system preferences page. The system preferences page can be accessed from the homescreen: **Set-up > System Settings > System Preferences > System Datum**.

When you change the datum for your multifunction display, the chart grid will subsequently move according to the new datum, and the latitude/longitude of the cartographic features will also change accordingly. Your multifunction display will attempt to set up any GPS receiver to the new datum, as follows:

* If your multifunction display has a built in GPS receiver it will automatically correlate each time you change the datum.
* If you have a Raymarine GPS receiver using SeaTalk or SeaTalk^ng, it will automatically correlate each time you change the datum on the multifunction display.
* If you have a Raymarine GPS receiver using NMEA0183, or a third-party GPS receiver, you must correlate it separately.

It may be possible to use your multifunction display to correlate an NMEA0183 GPS receiver. From the homescreen go to **Set-up > System settings > GPS Set-up > View Satellite Status**. If the datum version is displayed, it may be possible to change it. From the homescreen go to **Set-up > System settings > Data Sources > GPS Datum**.

> **Note:** Raymarine recommends that you check the displayed vessel position in the chart application against your actual proximity to a known charted object. A typical GPS has an accuracy of between 5 and 15 m.

Chart cards overview

Chart cards provide additional cartographic information.

Obtain detailed cartographic information for the area that you navigate using Navionics® chart cards. To check the current availability of Navionics chart card types, please visit www.navionics.com or www.navionics.it. The amount of cartographic detail shown varies for different areas and for different scales. The chart scale in use is indicated by a number and a horizontal line in the status bar — the number represents the distance the horizontal line represents in nautical miles horizontally across the chart.

You can remove and insert chart cards while a chart is displayed provided that you follow the correct procedure. The chart information is retained on-screen until the chart application redraws the screen; for example, when you pan outside the current area, or use the **Range control** to change the chart scale.

> ### Caution: Care of chart and memory cards
>
> To avoid irreparable damage to and / or loss of data from chart and memory cards:
>
> * Ensure that chart and memory cards are fitted the correct way around. DO NOT try to force a card into position.
> * DO NOT save data (waypoints, routes, and so on) to a chart card, as the charts may be overwritten.
> * DO NOT use a metallic instrument such as a screwdriver or pliers to insert or remove a chart or memory card.
> * Safe removal. Always power the unit off before inserting or removing a chart or memory card.

Chart compatibility

Your multifunction display is supplied with a base map and depending on unit a Navionics chart card. You may also purchase Navionics chart cards to get enhanced chart details and additional chart features.

Your multifunction display is compatible with the following Navionics chart cards:

* Ready to Navigate
* Silver
* Gold
* Gold+
* Platinum
* Platinum+
* Fish'N Chip
* Hotmaps

> **Note:** Refer to the Raymarine website (www.raymarine.com) for the latest list of supported chart cards.

Navionics chartplotter sync connection

You can wirelessly synchronize waypoints and routes between the multifunction display and an iPhone or iPad.

1. Multifunction display.

2. Wi-Fi connection.

3. Apple iPhone or iPad.

4. Navionics Marine app.

To use this feature you must first:

• Download and install the Navionics Marine 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.

9.2 Vessel position and orientation

Vessel position on the chart display

Your current position is represented on screen by the vessel symbol.

The symbol used for your vessel will vary depending on the vessel type selected during initial set up of your multifunction display.

Motor Vessels	
Sail Vessels	
Small Vessel	
The vessel symbol will change to a black dot when your vessel is stationary and no heading data is available.	

Note: If positional data has been selected for display, your position will be displayed in the databar under Ves Pos.

Chart orientation

The orientation of a chart refers to the relationship between the chart and the direction that you are travelling in.

It is used in conjunction with motion mode to control how your vessel and chart relate to one another and how they are displayed on screen.

The mode you choose applies to the active chart instance, and is restored at power up.

The following options are available:

North–Up
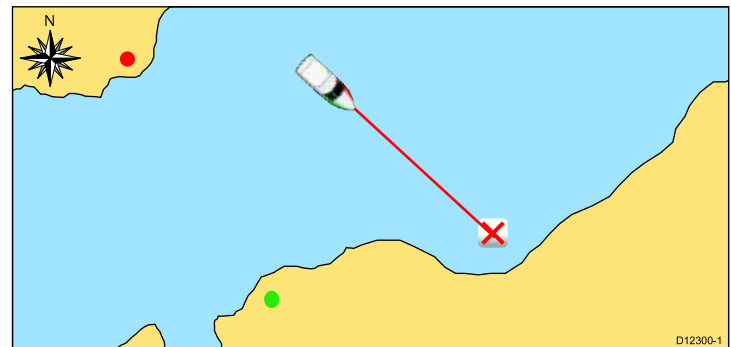
In North Up mode, the chart orientation is fixed with true north upwards. As your heading changes the vessel symbol moves accordingly. This is the default mode for the chart application.

Head-Up
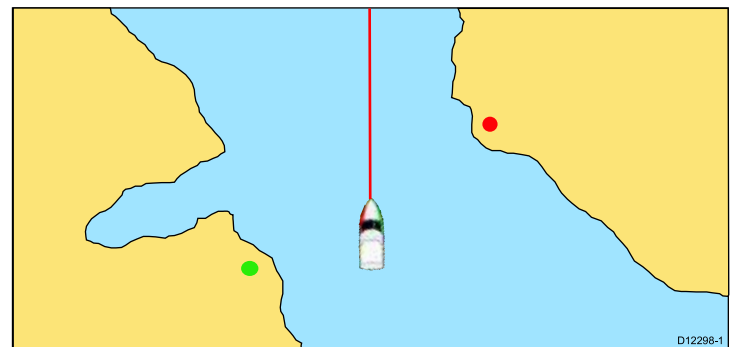
Head Up mode displays the chart with your vessel's current heading upwards. As the heading changes the vessel symbol remains fixed and the chart picture rotates accordingly.

Note: To prevent continuous backwards and forwards rotations as the vessel yaws from side-to-side, the chart will not update unless the heading changes by at least 10 degrees from the last displayed orientation.

Note: It is not possible to select Head Up when the motion mode is set to True.
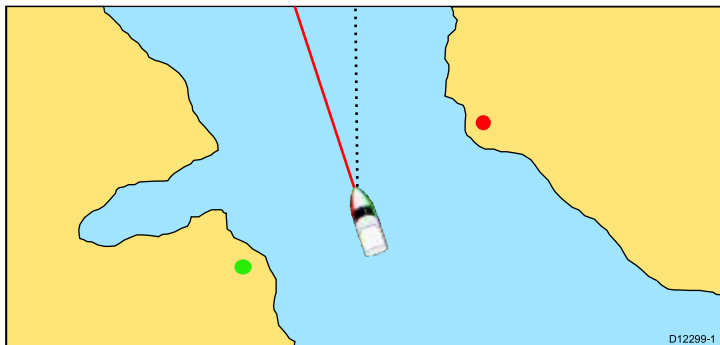
Course-Up

In Course Up mode, the chart picture is stabilized and shown with your current course upwards. As your vessel's heading changes, the ship symbol moves accordingly. If you select a new course, the picture will reset to display the new course upwards. The reference used for Course Up depends upon the information available at a given time. The system always prioritizes this information in the following order:

1. Bearing from origin to destination, i.e. intended course.

2. Locked heading from an Autopilot.

3. Bearing to waypoint.

4. Instantaneous heading.

If heading data becomes unavailable whilst in this mode, a warning pop up message is displayed and the chart uses 0° heading in relative motion.

Setting the chart orientation

From the chart application:

1. Select **Menu**.

2. Select **Presentation**.

3. Select **Chart Orientation**.

4. Select Head Up, North Up, or Course Up option, as appropriate.

   Once selected a tick will be placed next to the chosen orientation and the screen will update to reflect the new orientation.

Chart motion mode

The motion mode controls the relationship between the chart and your vessel.

Whilst motion mode is active, as your vessel moves, the chart is redrawn to keep the vessel on-screen. The 3 motion modes are:

• Relative Motion.

• True Motion.

• Auto Range.

Note: In the 3D chart view, only Relative Motion mode is available.

The current motion mode applies to the active instance of the chart application.

When you pan the chart the motion mode is no longer active. This is indicated in the status bar by brackets around the motion mode — for example, (Relative Motion). This enables you to view another area of the chart whilst navigating. To reset the motion mode and return your vessel to the screen, select the **Find Ship** icon or select **Find Ship** from the menu. Manually changing the range or panning the chart in auto range also suspends motion mode. The default setting is relative motion with zero offset. The mode that you select is restored at power up.

Relative Motion with optional vessel offset

Offset	Example
Zero Offset	
1/3 Offset	
2/3 Offset	

When the motion mode is set to Relative Motion, the position of your vessel is fixed on the screen and the chart picture moves relative to your vessel. You can use the **Menu > Presentation > Vessel Offset** menu item to determine whether the vessel is fixed in the centre of the window (0 offset) or offset by 1/3 or 2/3. If you change the offset to 1/3 or 2/3, the view ahead of your vessel will be increased.

In the example shown above, the motion mode has been set to Relative Motion, with a vessel offset of 1/3. The vessel is fixed in the offset position and the chart moves accordingly:

True Motion
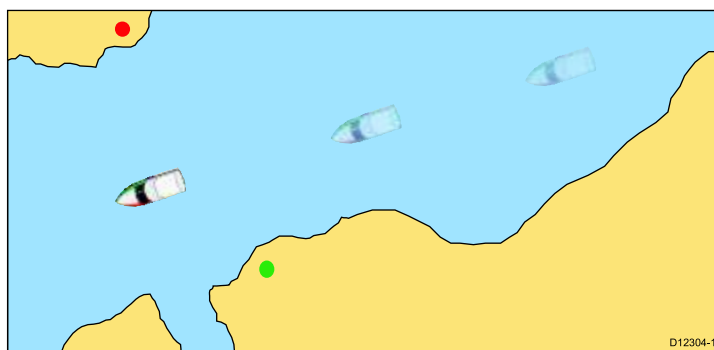
When the motion mode is set to True Motion, the chart is fixed and the vessel moves in true perspective to fixed landmasses on the screen. As the vessel's position approaches the edge of the screen, the chart picture is automatically reset to reveal the area ahead of the vessel.

Note: It is not possible to select True Motion when the orientation is set to Head Up.

Auto Range
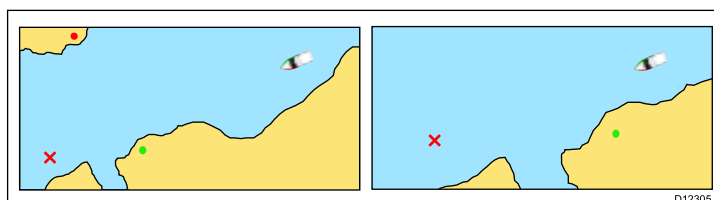
Auto Range selects and maintains the largest possible scale of chart that will display both the vessel and the target waypoint. Auto range is not available if radar-chart synchronization is on.

Setting the motion mode

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Motion Mode**.
4. Select True Motion, Relative Motion, or Auto Range option as appropriate.

Once selected a tick will be placed next to the chosen motion mode and the screen will update to reflect the new mode.

Changing the vessel offset value

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Vessel Offset** .
4. Select 0, 1/3, or 2/3 option as appropriate.

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**.

9.3 Chart views

Switching between 2D/3D chart view

You can switch between 2D and 3D views.

From the chart application:

1. Select **Menu**.
2. Select **Presentation** .
3. Select **Chart View** to switch between 2D or 3D.

2D chart view

The 2D chart view can display a range of information to help you navigate.
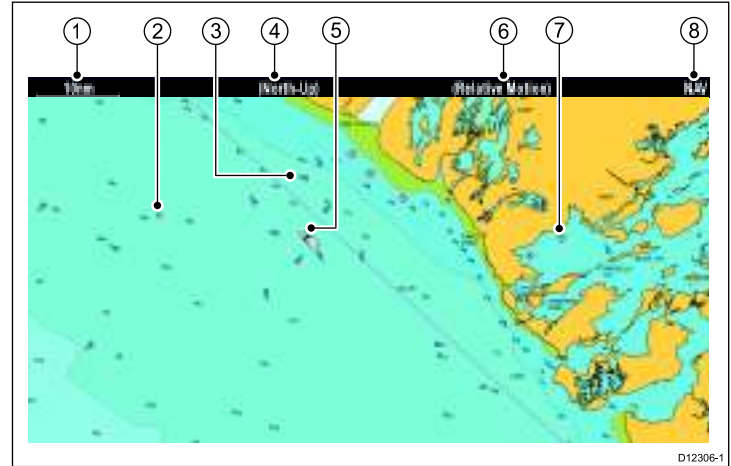
D12306-1

Item	Description
1	**Range** — horizontal chart scale indicator (shown in selected system units).
2	**Waypoint**(optional)
3	**AIS target** — a vessel broadcasting AIS information (optional).
4	**Orientation** — states the orientation mode that the chart is using (North-up, Head-up, or Course-up).
5	**Vessel symbol**— shows your current position.
6	**Motion mode** — states the current motion mode (Relative, True, or Auto Range).
7	**Cartographic objects** — use the Cartography menu: **Menu > Set-up > Cartography** to choose which objects to display.
8	**Chart type** — indicates the type of chart in use — Fish or Navigation.

3D chart view

The 3D view can display and range of information to help you navigate.
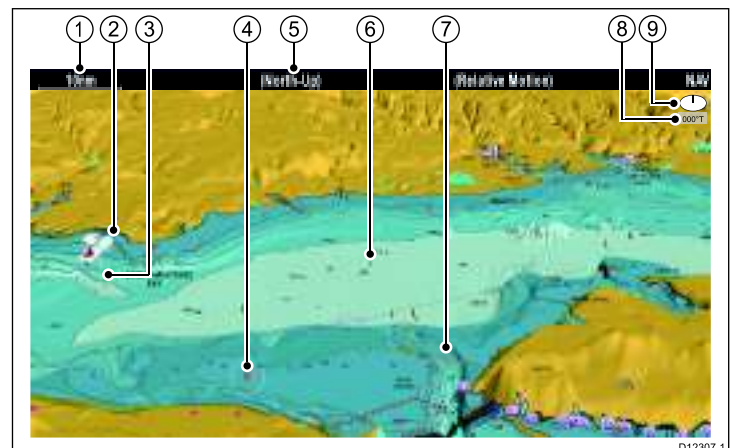
D12307-1

Item	Description
1	**Range** — horizontal chart scale indicator (shown in selected system units).
2	**Vessel symbol** — your vessel's current position.
3	**Depth Scale** — approximate depth beneath your vessel (optional).
4	**Waypoint** — (Active)
5	**Orientation** — states the orientation mode that the chart is using.
6	**Center-of-view** — the white cross indicates the center of chart view at the water level (optional).
7	**Cartographic objects** — use the Cartography Set-up menu to choose which objects to display.
8	**Rotation** — shows in degrees true, how far the on-screen view has been rotated from your vessel's heading and the tilt angle of your vessel.
9	**North arrow** – 3D indication of True North in relation to the chart view. The north arrow also tilts to indicate pitch angle.

Manipulating the 3D chart view

From the chart application:

1. **Chart pitch**
   i. With the chart is in 3D mode, go to the 3D View menu: **Menu > Adjust 3D View**.
   ii. Select **Pitch**.
   iii. Use the **Rotary Control** to change the pitch angle of the chart display.
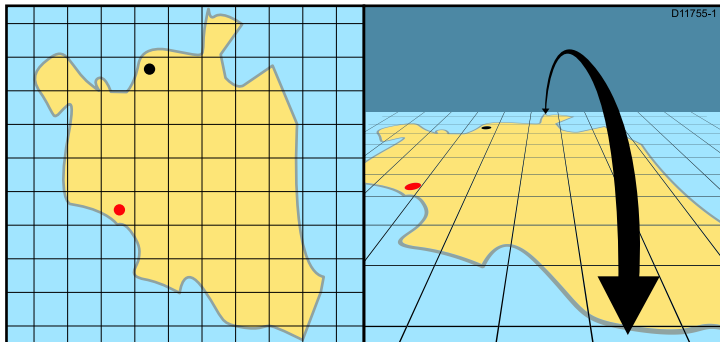
2. **Rotate**
   i. With the chart is in 3D mode, go to the 3D View menu: **Menu > Adjust 3D View**.
   ii. Select **Rotate**.
   iii. Use the **Range Control** to change the rotation of the chart display.
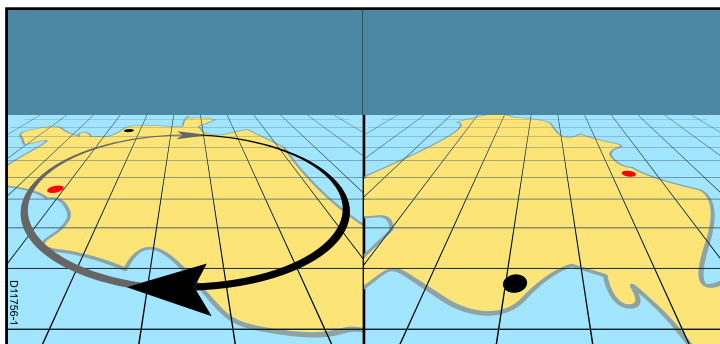
3. **Adjust Range**
   i. With the chart is in 3D mode, go to the 3D View menu: **Menu > Adjust 3D View**.
   ii. Select **Adjust Range**.
   iii. Use the **Rotary Control** to zoom in and out of the chart,
4. **Pan**— Use the Joystick at any time to pan the chart.

Panning the chart using touch

This only applies to HybridTouch displays.

In the chart application:

1. Swipe your finger across the display in the direction you want to pan the chart.

9.4 Chart context menu

Placing the cursor over an area in the chart application displays a context menu showing the cursors positional data and menu items.

The chart context menu can be accessed by the following actions:

- Select an area on the chart using the **Joystick** and press the **Ok** button.
- Select a chart object using the **Joystick** and press the **Ok** button.
- Select and hold on an area on the chart using touch — Hybridtouch multifunction displays only.
- Select a chart object using touch — Hybridtouch multifunction displays only.
- Select and hold on a chart object using touch — Hybridtouch multifunction displays only.

The method of selecting a chart object using touch depends on the **Context Menu** setting in the chart **Set-up** menu, which can be set to Touch or Hold.

The context menu provides the following positional data for the cursor position in relation to your vessel:

- Latitude
- Longitude
- Range
- Bearing

The following menu items are available:

- **Goto Cursor** / **Stop Goto** / **Stop Follow**
- **Place Waypoint**
- **Chart Objects**
- **Find Nearest**
- **Measure**
- **Build Route**

The following options are available when a current or tide station is selected:

- **Current Station** / **Tide Station**
- **Animate**

Selecting context menu settings

You can choose how chart object context menu is a accessed using touch.

	This only applies to HybridTouch displays.
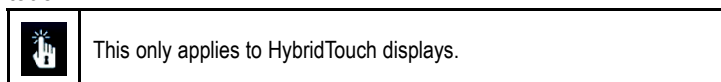
From the chart application:

1. Select **Menu**.
2. Select **Set-up**.
3. Select **Context Menu** to switch between Touch or Hold.

   - Hold — requires you to touch and hold on a chart object to access the context menu.
   - Touch — requires you to touch a chart object to access the context menu.

9.5 My Data options

The chart provides features to help you manage your data and help plan your navigation to a chosen location.

The options are found in the **My Data** menu: **Menu > My Data**.

- **Waypoint List** — View and edit waypoints stored on the system.
- **Route List** — View and edit routes stored on the system.
- **Track List** — View and edit tracks stored on the system. Start or stop a track.
- **Display My Data** — Allows you to choose which waypoints, routes, or tracks to show or hide in the chart application.
- **Create Track / Stop Track** — Allows you to create a new track or stop a track which is in progress.
- **Tracks Set-up** — Allows you to specify the time period or distance between track points.
- **WPT & Group Options** — View and edit waypoint groups and select default waypoint group and symbol.

Refer to the Using waypoints, routes and tracks section for further details.

9.6 Navigation options

The chart application provides features to help navigate to a chosen location.

The navigation options are found in the Navigate menu: **Menu > Navigate**.

- **Goto Cursor** — Will set the cursor position as the active destination.
- **Goto Waypoint** — Provides options to navigate to a waypoint stored on the system
- **Follow Route** — Provides options to navigate to a route stored on the system
- **Create Track** — Will initiate a track on screen to plot your course as you progress.
- **Build Route** — Provides options to build a route.

Refer to the Using waypoints, routes and tracks section for further details.

9.7 Measuring distances and bearings

You can use the databar and context menu information you can use the measure function to measure distances in the chart application.

You can determine the distance and bearing:

- from your vessel to the position of the cursor;
- between two points on the chart.

Measuring from vessel position to cursor

From the chart application:

1. Select the location on screen that you want to measure the distance or bearing from your vessel.

    The chart context menu will be displayed.

2. Select **Measure**.

    The following will happen:

    - The measure menu will be displayed.
    - A line will be drawn from the cursor position to the center of the screen.
    - The cursor location will be moved at the center of the screen.
    - The bearing and distance will be displayed next to the new cursor location.

3. From the measure menu select **Measure From** so that Ship is selected.

    The ruler line is re-drawn from the cursor position to your vessel.

4. You can now adjust the ruler position by moving the cursor to the desired location.

5. If you want the ruler displayed after you have closed the measure menu, select **Display Ruler** so that On is highlighted.

    Selecting display ruler will switch the ruler On and Off.

6. If you want to adjust the range of the chart application whilst in the measurement menu select **Adjust Range** and use the **Range Control** to zoom in or out.

Measuring from point to point

From the chart application:

1. Select the location on screen that you want to measure the distance or bearing from your vessel.

    The chart context menu will be displayed.

2. Select **Measure**.

    The following will happen:

    - The measure menu will be displayed.
    - A line will be drawn from the cursor position to the center of the screen.
    - The cursor location will be moved at the center of the screen.
    - The bearing and distance will be displayed next to the new cursor location.

3. Select **Measure From** so that Cursor is selected.

    Selecting measure from will switch between Ship and Cursor.

4. You can now adjust the end point by moving the cursor to the desired location.

5. You can also **Swap Direction** of the ruler so that the bearing becomes the bearing from end point to start point.

6. If you want the ruler displayed after you have closed the measure menu, select **Display Ruler** so that On is highlighted.

    Selecting display ruler will switch the ruler On and Off.

7. If you want to adjust the range of the chart application whilst in the measurement menu select **Adjust Range** and use the **Range Control** to zoom in or out.

9.8 Chart vectors

Chart vectors display indicators for heading, COG, wind direction and tide direction.

A range of vector graphics can be displayed in the chart application when in 2D chart view. The following vectors can be independently enabled or disabled:

Item	Descriptions
1	**Wind arrow** — wind direction is displayed as a yellow line with solid arrow heads pointing towards your vessel, indicating the wind direction. The width of the arrow indicates the wind strength.
2	**Tide arrow** — tide is displayed as a blue line with solid arrow head pointing away from your vessel, in the direction of the tidal set. The width of the arrow indicates the tide strength.
3	**COG (Course Over Ground) vector** — a green line indicates the vessel's actual course. A double arrow head is used if the vector length is set to a value other than infinite.
4	**HDG (heading) vector** — a red line shows the vessel's heading. An arrow head is used if the vector length is set to a value other than infinite.

Note: If Speed Over Ground (SOG) or heading data is not available, vectors cannot be displayed.

Vector length

The length of the HDG and COG vector lines is determined by the distance your vessel will travel in the time you specify at your current speed.

Enabling and disabling chart vectors

In 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **Vectors**.
5. Select the relevant menu item to switch **Heading Vector**, **COG Vector**, **Tide Arrow**, or **Wind Arrow** On or Off as appropriate.

Setting vector length and width

You can specify the length and width of the heading and cog vectors

In 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **Vectors**.
5. Select **Vector Length**.

    A list of times is displayed .

6. Select a time setting or select Infinite.
7. Select **Vector Width**.

    A list of widths is displayed.

8. Select either Thin, Normal or Wide.

9.9 Current information

Animated current information

The electronic charts may allow animation of the current information current stations.
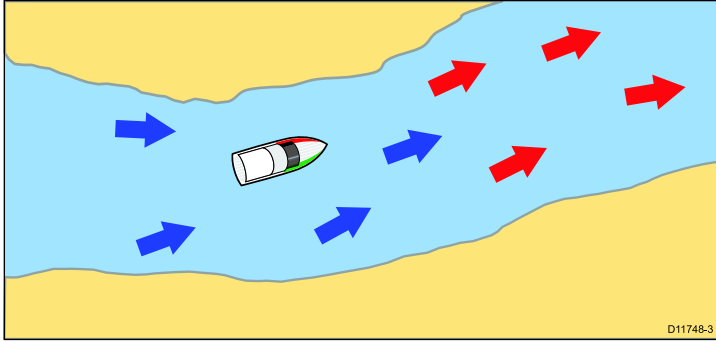
Animated current information is available in the chart application wherever a diamond-shaped symbol with a "C" is displayed:

◇	This symbol identifies the location of a current station and the availability of current information for the location.

When you select a current station symbol the chart context menu is displayed, which provides the **Animate** option.

When you select **Animate** the animate menu is displayed and the diamond-shaped current symbols are replaced with dynamic current arrows which indicate the direction and strength of the currents:

(arrow with 3)	Current animation.
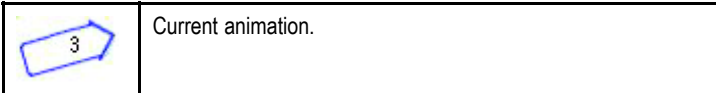
- Arrows indicate the direction of current flows.
- The length of the arrow indicates the flow rate.
- The color of the arrow indicates the flow speed:
  - **Red**: increasing current flow speed.
  - **Blue**: decreasing current flow speed.

The animation can be viewed continuously or incrementally at a time interval that you specify. You can also set the date for the animation, and start or restart the animation at any point within a 24-hour period. If the system does not have a valid date and time the date used will be midday for the system default date.

Note: Not all electronic charts support the animated currents feature.

Viewing animated current information

From the chart application:

1. Select diamond-shaped current icon.

   The chart context menu is displayed.

2. Select **Animate**.

   The animate menu is displayed and the current icons are replaced with dynamic current arrows

Controlling animations

From the chart application, with the animate menu displayed:

1. To start or stop the animation, select **Animate:** to switch between Play and Pause.
2. To view the animation in steps, select **Step Back** or **Step Forward**.
3. To set the animation step interval, pause any playing animations, and then select **Set Time Interval**.
4. To set the animation date, select **Set Date** and then using the on screen keyboard enter the required date.
5. To set the animation date to the current date select **Today**.
6. To set the animation date to 24 hours previous to the current date select **Previous Date**.
7. To set the animation date to 24 hours ahead of the current date select **Next Day**.

Displaying details of currents

From the chart application:

1. Select diamond-shaped current icon.

   The chart context menu is displayed.

2. Select **Current Station**.

   The current graph for the selected current station is displayed.

Current graphs

Current graphs provide a graphical view of current activity.
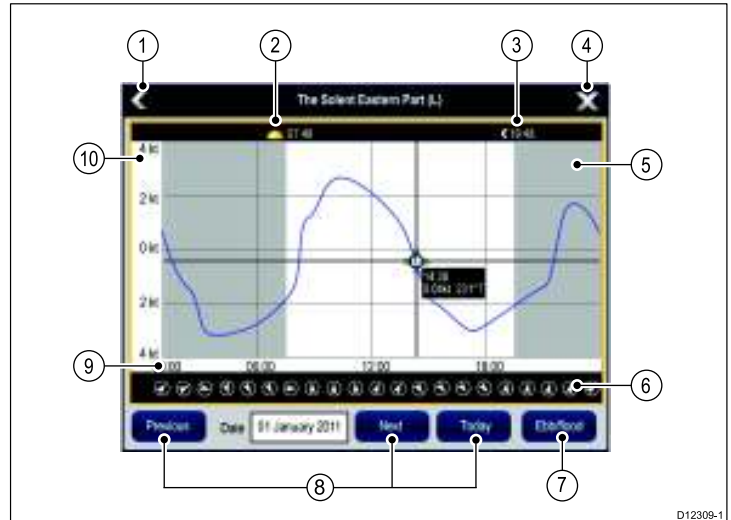
1. **Back** — Return to the previous menu or view.
2. **Sunrise indicator** — Indicates when the sun rises.
3. **Sunset indicator** — Indicates when the sun sets.
4. **Exit** — Closes the dialog.
5. **Nightfall indicator** — The greyed-out section of the graph indicates when nightfall occurs.
6. **Current direction** — Indicates the direction of current (relative to north).
7. **Ebb/Flood** — Displays a list showing ebb, slack and flood tides.
8. **Date navigation** — Use the icons to move to the next or previous day.
9. **Time** — The horizontal axis of the graph indicates time, in accordance with the time format specified in the **Units Set-up** options.
10. **Current speed** — The vertical axis of the graph indicates speed, in accordance with the speed preferences specified in the **Units Set-up** options

Note: The data provided in the current graphs is for information purposes only and should NOT be relied upon as a substitute for prudent navigation. Only official government charts and notices to mariners contain all the current information needed for safe navigation. Always maintain a permanent watch.

9.10 Tide information

Animated tide information

The electronic charts may allow animation of the tide information tide stations.

Animated current information is available in the chart application wherever a diamond-shaped symbol with a "T" is displayed:
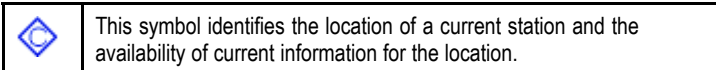
| ◇T | This symbol identifies tide stations and the availability of tide information for the location. |
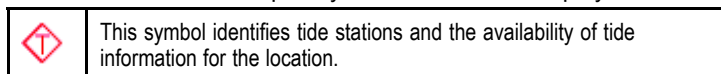
When you select a tide station symbol the chart context menu is displayed, which provides the **Animate** option.

When you select **Animate** the animate menu is displayed and the diamond–shaped symbols are replaced with dynamic tide bar which indicates the predicted tide height for the actual time and date:

| [1↑] | Tide animation. |
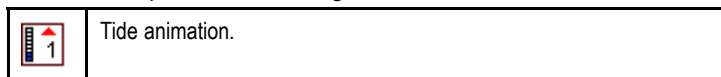
- Tide height is indicated by a gauge. The gauge is comprised of 8 levels, which are set according to the absolute minimum / maximum values of that particular day.

- The color of the arrow on the tide gauges indicates changes in the tide height:

  - **Red**: increasing tide height.

  - **Blue**: decreasing tide height.

The animation can be viewed continuously or incrementally at a time interval that you specify. You can also set the date for the animation, and start or restart the animation at any point within a 24-hour period. If the system does not have a valid date and time the date used will be midday for the system default date.

Note: Not all electronic charts support the animated tides feature.

Viewing animated tide information

From the chart application:

1. Select diamond-shaped tide icon.

   The chart context menu is displayed.

2. Select **Animate**.

   The animate menu is displayed and the tide icon is replaced with a dynamic tide bar indicator.

Controlling animations

From the chart application, with the animate menu displayed:

1. To start or stop the animation, select **Animate:** to switch between Play and Pause.

2. To view the animation in steps, select **Step Back** or **Step Forward**.

3. To set the animation step interval, pause any playing animations, and then select **Set Time Interval**.

4. To set the animation date, select **Set Date** and then using the on screen keyboard enter the required date.

5. To set the animation date to the current date select **Today**.

6. To set the animation date to 24 hours previous to the current date select **Previous Date**.

7. To set the animation date to 24 hours ahead of the current date select **Next Day**.

Displaying details of tides

From the chart application:

1. Select diamond-shaped tide icon.

   The chart context menu is displayed.

2. Select **Tide Station**.

   The tide graph for the selected tide station is displayed.

Tide graphs

Tide graphs provide a graphical view of tidal activity.
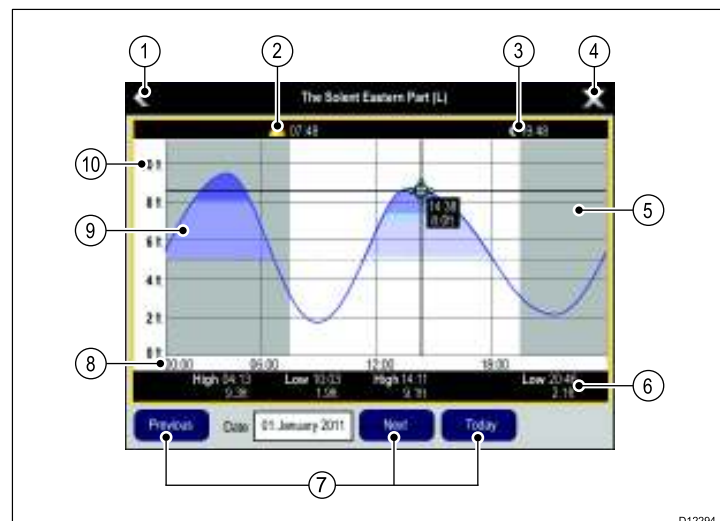
1. **Back** — return to the previous menu or view.

2. **Sunrise indicator** — indicates when the sun rises.

3. **Sunset indicator** — indicates when the sun sets.

4. **Exit** — closes the dialog.

5. **Nightfall indicator** — the greyed-out section of the graph indicates when nightfall occurs.

6. **Low / High Tide** — Indicates the time at which low or high tide occurs.

7. **Date navigation** — Use the icons to move to the next or previous day.

8. **Time** — The horizontal axis of the graph indicates time, in accordance with the time format specified in the System Settings.

9. **Minimum safe depth** — The blue shaded area of the graph indicates the point during the tide cycle when it is safe to navigate your vessel, based on the water depth at that time and the settings you specified for your vessel in the **Minimum Safe Depth** settings in the Customize menu. For example, the diagram above is based on a minimum safe depth setting of 5 ft.

10. **Depth** — The vertical axis of the graph indicates tidal water depth. The units for the depth measurement are based on those specified in the **Homescreen > Customize > Units Set-up > Depth Units** menu.

Note: The data provided in the tide graphs is for information purposes only and should NOT be relied upon as a substitute for prudent navigation. Only official government charts and notices to mariners contain all the current information needed for safe navigation. Always maintain a permanent watch.

9.11 Chart object information

You can display additional information on the chart for cartographic objects, ports, and marinas.

You can also search for the nearest instance of a particular chart object and search for ports by name.

Depending on the chart card you are using, you can view some or all of the following additional information:

- Details of each cartographic object that is marked on the chart, including source data for structures, lines, open sea areas, and so on.

- Details of ports, port features, and business services.

- Pilot book information (similar to what you would see in a marine almanac). Pilot book information is available at certain ports.

- Panoramic photos of ports and marinas. The availability of photos is indicated by a camera symbol on the chart display.

This information can be accessed using the **Chart Objects** or **Find Nearest** options from the chart context menu:

- Select a chart object on screen and choose **Chart Objects** from the chart context menu to view information about the selected object.

- Select **Find Nearest** from the chart context menu to search for objects close by.

Note: The amount of object information available depends upon the electronic charts that you are using for your system. For full details of the features available for your chart cards contact your chart card supplier.

Displaying chart object information

From the chart application:

1. Select an object.

   The chart context menu is displayed.

2. Select **Chart Objects** to view detailed information about the selected object

   The Object Info dialog is displayed.

3. Selecting the position in the object info dialog will close the information dialog and position the cursor over the object.

4. Selecting available options will display detailed information about that item.

Searching for the nearest chart object or service

From the chart application:

1. Select a location on screen.

   The chart context menu is displayed.

2. Select **Find Nearest**.

   A list of chart object types is displayed.

3. Select the chart object or service in the list.

   A list is displayed of the available instances of that particular object or service.

4. Select the item that you want to find.

   The cursor will be repositioned over the selected object or a list of instance will be displayed.

Searching for a port by name

From the chart application:

1. Select a location on screen.

   The chart context menu is displayed.

2. Select **Find Nearest**.

   A list of chart object types is displayed.

3. Select **Port (search by name)** from the list.

   The on–screen keyboard is displayed.

4. Use the on-screen keyboard to enter the desired port name.

5. Select **SEARCH**.

   The search results are displayed.

6. Select an entry in the list to display more information.

Displaying pilot book information

From the chart application, when a port symbol is displayed for a port which has a pilot book:

1. Select the port symbol.

   The chart context menu will be displayed.

2. Select **Pilot Book**.

3. Select the relevant chapter.

Displaying panoramic photos

From the chart application, when a camera symbol is displayed, indicating the availability of a photo:

1. Select the camera symbol.

   The chart context menu is displayed.

2. Select **Photo**.

   The photo is displayed on screen.

Note: Not all cartography types are capable of displaying panoramic photos.

9.12 Chart presentation

The chart has a number of presentation options which affect the level of detail, types of objects and aspects of its operation.

The presentation options available are:

- **Chart detail** — Set the level of object detail shown on the chart.

- **Layers** — Set content layers which can be overlaid.

- **Chart View** — Toggle 2D and 3D perspective view.

- **2D Chart Use** — Select fishing charts (if supported by your chosen chart supplier) or standard navigation.

- **Chart Orientation** — Set the orientation of the chart application.

- **Motion Mode** — Set the motion mode for the chart application (only available in 2D view).

- **Vessel Offset** — Set the vessel offset from the centre of the screen (only available in 2D view).

- **Chart Sync** — Synchronize the radar and chart scales.

- **Data Overlay Set-up** — Enable data cells in the chart application.

Accessing chart presentation options

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.

Chart detail
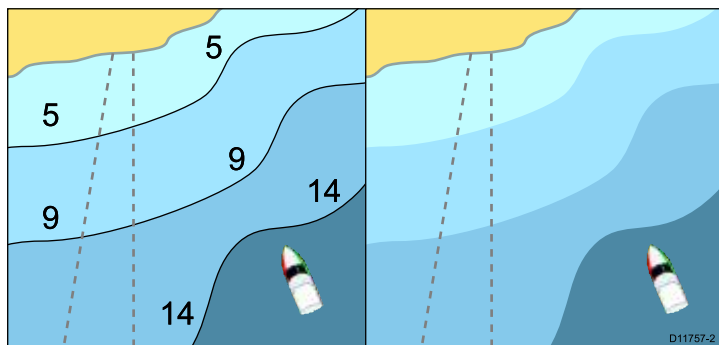
The chart detail setting determines the amount of cartographic detail shown in the chart application.

Selecting the Low option for the **Chart Detail** hides the following cartographic objects:

- Text.

- Chart boundaries.

- Spot soundings.

- Depth contours.

- Light sectors.

- Caution and routing Data.

- Land and marine features.

- Business services (if available for your chart card).

Selecting the High option shows these objects.

Changing the level of chart detail

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Chart Detail** to switch between the High or Low option, as appropriate.

Chart layers

The chart has a number of content layers providing different kinds of display and information.

You can overlay the following data onto a 2D chart window to give greater depth of information. The overlays available are:

- **Aerial** — Provides an aerial / satellite photography overlay.

- **AIS** — View and track AIS targets (2D view only) .

- **Radar** — Overlay radar onto the chart (2D view only).

- **NOWRad** — Provides the NOWRad weather radar overlay, without the need to open a separate weather application window (2D view only).

- **My Data** — Allows you to select which waypoints, routes and tracks to display.

- **Vectors**— View heading and COG vectors or tide and wind arrows (2D view only).

- **Range Rings**— View radar range rings (2D view only).

- **3D Display Options** — Provides 3D options: Centre of View, Exaggeration, Transducer Cone and Depth Scale(3D view only).

Note: The layers require electronic charts with the appropriate feature support and may also require additional hardware and service subscriptions.

Aerial photo overlay

Your electronic charts may include aerial photography.

Aerial photos cover the navigable waters up to 3 miles inside the coastline. The resolution is dependent on the region covered by the chart card.

Enabling aerial photo overlay

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **Aerial** so that On is highlighted.
   The opacity bar is displayed showing the current opacity percentage.
5. Use the **Rotary Control** to adjust the opacity to the required percentage.

Specifying the aerial overlay area

From the chart application.

1. Select **Menu**.
2. Select **Set-up**.
3. Select **Cartography**.
4. Select **Aerial Overlay**.
   A list of overlay options is displayed.
5. Select either On Land, On Land and Shallows, or On Land and Sea.
   A tick is displayed next to the option and if aerial overlay is switched on the screen is redrawn showing the new overlay selection.

Radar overlay

You can combine the chart with the radar and MARPA functions to provide target tracking or to help you distinguish between fixed objects and other marine traffic.

You can enhance the use of your chart by combining it with the following radar features:

- MARPA.
- Radar overlay (for distinguishing between fixed and moving objects).

Using the radar to view MARPA targets on the chart

The Mini Automatic Radar Plotting Aid (MARPA) function is used for target tracking and risk analysis. When the radar overlay is on, all MARPA targets are displayed in the chart window and associated MARPA functions can be accessed via the chart.

Using radar overlay to distinguish between fixed and moving objects

You can overlay radar image data over your chart image allowing better distinction between fixed objects and other marine traffic. For best results, switch on Radar-Chart synchronization to ensure radar range and chart scale are synchronized.

Enabling radar overlay

With the radar turned on and transmitting, with the chart application in 2D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **Radar** so that On is highlighted.
   The opacity bar is displayed showing the current opacity percentage.
5. Use the **Rotary Control** to adjust the opacity to the required percentage.

Accessing radar controls on the chart

From the chart application:

1. Select **Menu**.
2. Select **Radar Options**.

> **Note:** Any changes made to the radar options from the chart application will be applied to the radar application.

Chart scale and radar range synchronization

You can synchronize the radar range in all radar windows with the chart scale.

When synchronization is switched on:

- The radar range in all radar windows changes to match the chart scale.
- 'Sync' is indicated in the top left-hand corner of the chart window.
- If you change the radar range, in any radar window, all synchronized chart views change scale to match.
- If you change the scale of a synchronized chart window, all radar windows change range to match.

Synchronizing the chart and radar range

In the 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Chart Sync**.
4. Select **Radar**.

> **Note:** Radar range synchronization is not available when the chart motion mode is set to AUTORANGE.

NOWRad weather overlay

With a suitable weather receiver connected to your multifunction display, you can overlay NOWRad weather information on the chart display.

The NOWRad weather overlay provides NOWRad weather information and reports in the chart application. You can adjust the intensity of the overlay to achieve optimal visibility of both chart and weather information.
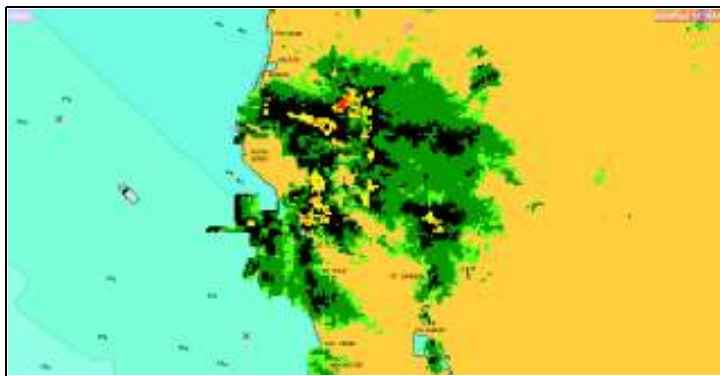
> **Note:** The NOWRad weather overlay can only be used in North America and its coastal waters.

Enabling NOWRad weather overlay on the chart

In the 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **NOWRad** so that On is highlighted.
   Selecting NOWRad will switch the weather overlay On and Off.

Viewing weather reports from the chart application

In the 2D chart view:

1. Select **Menu**.
2. Select **Weather Reports**.
3. Select **Report At** to switch between weather reports from Ship or Cursor location.
4. Select either Tropical Statements, Marine Warnings, Marine Zone Forecasts, or Watchbox Warnings.

Range rings
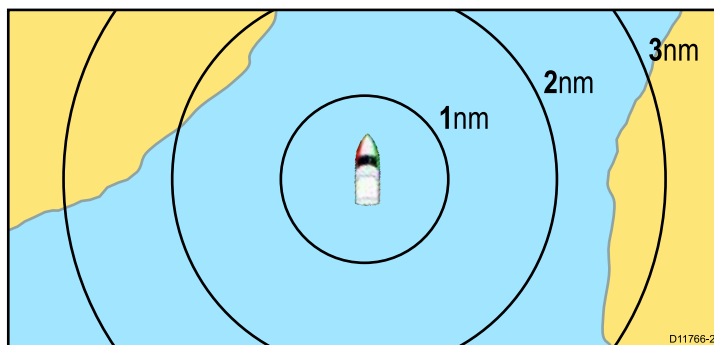
Range rings give you an incremental representation of distance from your vessel to help you judge distances at a glance. The rings are always centred on your vessel, and the scale varies to suit your current zoom setting. Each ring is labelled with the distance from your vessel.

Enabling range rings

In the 2D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **Range Rings** so that On is highlighted.
   Selecting range rings will switch range rings between On and Off.

3D Display Options

The following options are available with the chart application in 3D view:

- **Centre Of View** — Switches a cross hair on and off at the centre of the screen at sea level.
- **Exaggeration** — Adjusting the exaggeration has the effect of vertically stretching objects on the chart, making it easier to see their shape and position.
- **Transducer Cone** — Switches on and off a transducer cone indicating the coverage of a fishfinder transducer.
- **Depth Scale** — Switches on and off a depth scale at your vessel position.

Enabling centre of view

To enable the centre of view cross hair at sea level follow the steps below:

In 3D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **3D Display Options**.
5. Select **Centre of View** so that On is highlighted.

   Selecting centre of view will switch the cross hair on and off.

Adjusting the 3D chart exaggeration

In the 3D chart view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **3D Display Options**.
5. Select **Exaggeration**.
6. Use the **Rotary Control** to adjust the exaggeration to the required setting between 1.0 and 20.0.

Enabling transducer cone

To enable the transducer cone to indicate the coverage of your fishfinder transducer follow the steps below:

In 3D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **3D Display Options**.
5. Select **Transducer Cone** so that On is highlighted.

   Selecting Transducer cone will switch the function on and off.

Enabling depth scale

To enable a depth indicator at your vessels location follow the steps below:

In 3D view:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Layers**.
4. Select **3D Display Options**.
5. Select **Depth Scale** so that On is highlighted.

   Selecting depth scale will switch depth indicator on and off.

2D Chart Use

In addition to normal navigation charts Fish mode provides bathymetric contour data on the chart for use during fishing.

Before you can display bathymetric data in the chart application you must have chart cards with the relevant level of detail.

When you change the **2D Chart Use** to the Fish option, bathymetric data is shown on the chart (providing that the chart card contains bathymetric data for that particular location). Certain chart detail is also removed to ensure the bathymetric data can be seen clearly on the chart display.

If the chart card does NOT contain bathymetric data the chart reverts to the default NAV (navigation) data.

> **Note:** Fish mode is not suitable for navigation.

Selecting fish mode

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **2D Chart Use** so that Fish is highlighted.

   Selecting 2D chart use will switch the chart between Fish and Navigation modes.

Multiple chart synchronization

You can synchronize the heading, range, and position information across multiple chart views and networked displays.

When chart synchronization is enabled:

- It is indicated by "CHRT Sync" in the chart application title bar.
- Any changes made to the heading, range or position in any chart instance will be reflected in all other chart instances.

> **Note:** When the 2D and 3D chart views are synchronized, the Motion Mode is always Relative Motion.

Synchronizing multiple chart instances

From the chart application:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Chart Sync**.
4. Select Chart from the list.

   A tick is placed next to the selected option.
5. Repeat the steps above for each chart instance and if required on each networked multifunction display you want to sync the chart view.

> **Note:** You cannot sync to another chart if radar sync is turned on.

9.13 Chart set-up

Selecting the chart set-up menu

From the chart application:

1. Select **Menu**.
2. Select **Set-up**.
   The Chart Set-up menu is displayed.

Chart set-up menu options

The following table describes the various options in the Chart Set-up Menu for your multifunction display.

Menu item	Description	Options
Context Menu	(HybridTouch displays only) Determines how the context menu is accessed using touch	• Touch — touching a chart object opens the context menu. • Hold — Touch and holding on a chart object opens the context menu.
Cartography	Provides access to the Cartography menu options.	
Vessel Size	Determines the size of vessel icon displayed in the chart application.	• Small (default) • Large
Easy View	Easy view increases text size and reduces the number of cartography items displayed to make the chart application more readable.	• On • Off

Selecting the cartography set-up menu

From the chart application:

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

   The cartography menu options are displayed.

Cartography set-up menu options

The following table describes the various options in the Cartography Set-up Menu for your multifunction display.

Menu item	Description	Options
Chart Display	Determines the level of detail shown on the chart.	• Simple • Detailed (default) • Extra Detailed
Chart Grid	Determines whether grid lines representing longitude and latitude are displayed on the chart: • **Off** — grid lines are NOT displayed. • **On** — grid lines are displayed.	• Off • On (default)
2D Shading	If supported by your chart card, determines whether terrain shading is displayed in 2D view.	• On • Off
Community Layer	Determines whether community layer is enabled or disabled. With the community layer turned on, in addition to the standard cartography you will be able to see User Generated Content (UGC). The community layer contains: • Modified chart objects — identified by a blue box containing 3 dots. • Added chart objects — identified by a green box containing a plus symbol. • Deleted chart objects — identified by a red box containing a cross symbol. UGC data can be downloaded from the Navionics web store and stored on your Navionics chart card.	• On • Off
Chart Text	Determines whether chart text is displayed (place names and so on). • **Off** — chart text is NOT displayed. • **On** — chart text is displayed.	• Off • On (default)
Chart Boundaries	Determines whether a line indicating the chart boundary is displayed. • **Off** — chart boundary is NOT displayed. • **On** — chart boundary is displayed.	• Off • On (default)
Spot Soundings	Determines whether a number indicating depth is displayed. • **Off** — depth is NOT displayed. • **On** — depth is displayed.	• Off • On (default)
Safety Contour	The chart will use this depth as the deep water boundary. Water areas of depth greater than this will be colored using the appropriate **Deep Water Color**.	• Off • 7 ft • 10 ft • 16 ft • 20 ft • 33 ft • 66 ft (default)
Depth Contour	The depth contour is shown on the chart display as a line indicating the depth at a particular position.	• Off • 16 ft • 20 ft • 33 ft • 66 ft • All (default)
Deep Water Color	Determines the color used to shade areas of deep water. (The depth used to determine areas of deep water is specified by the **Safety Contour** setting)	• White (default) • Blue
Hide Rocks	Determines whether rocks are displayed in the chart application.	• Off (default) • On
Nav. Marks	Determines whether navigation marks are displayed on the chart: • **Off** — navigation marks are NOT displayed. • **On** — navigation marks are displayed.	• Off • On (default)

Menu item	Description	Options
Nav. Marks Symbols	Determines which set of navigation mark symbols is used — International, or US. These symbols correspond to paper charts.	• International (default) • US
Light Sectors	Determines whether the sector of light cast by a fixed beacon is displayed or not. • **Off** — sector of light is NOT displayed. • **On** — sector of light is displayed.	• Off • On (default)
Routing Systems	Determines whether routing data is displayed or not. • **Off** — routing data is NOT displayed. • **On** — routing data is displayed.	• Off • On (default)
Caution Areas	Determines whether caution data is displayed or not. • **Off** — caution data is NOT displayed. • **On** — caution data is displayed.	• OFF • ON (default)
Marine Features	When this menu item is set to On, the following water-based cartographic features are displayed: • Cables. • Nature of seabed points. • Tide stations. • Current stations. • Port information.	• Off • On (default)
Land Features	When this menu item is set to On, land-based cartographic features are displayed.	• Off • On (default)
Business Services	When this menu item is set to On, symbols indicating the location of a business will be shown.	• Off • On (default)
Panoramic Photos	Determines whether panoramic photos are available for landmarks such as ports and marinas.	• Off • On (default)
Roads	Determines whether major coastal roads are displayed on the chart: • **Off** — coastal roads are NOT displayed. • **On** — coastal roads are displayed.	• Off • On (default)
Additional Wrecks	Determines whether extended information for new wrecks is displayed.	• Off • On (default)
Aerial Overlay	Determines the areas of the chart covered by the aerial photo overlay feature.	• On Land (default) • On Land and Shallow • On Land and Sea
Colored Seabed Areas	Provides greater definition of the seabed. This applies only to limited areas where the extra detail is available.	• Off (default) • On

Chapter 10: Using autopilot control

Chapter contents
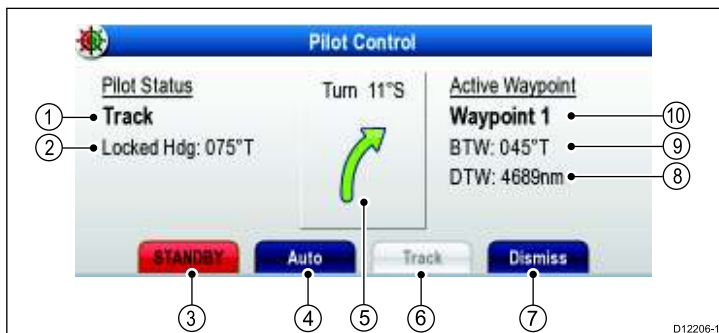
10.1 Autopilot control

You can use your multifunction display to control your autopilot.

Note: For information on connecting your multifunction display to a Raymarine autopilot system, refer to the documentation that accompanied your autopilot.

With the Autopilot Control function enabled, you can use your multifunction display to:

- Engage the autopilot and instruct it to follow a route, or a waypoint.

- Disengage the autopilot.

- Silence the waypoint arrival alarm.

Pilot Control dialog

Item	Description
1	Pilot Mode.
2	Current Locked Heading.
3	**STANDBY** — Disengages the autopilot and return to manual vessel control.
4	**Auto**—Engages the autopilot.
5	Turn angle — The turn angle is only available for SPX autopilots connected using SeaTalk^{ng}. This indicates the direction and severity of turns to be made under autopilot.
6	**Track** — Engages the autopilot in Track mode and automatically steers your vessel along a route plotted on your chartplotter.
7	**Dismiss** — Dismisses the Pilot Control dialog.
8	Distance to next waypoint.
9	Bearing to next waypoint.
10	Next waypoint name.

Note: The **Pilot Control** dialog will close if no action is taken for 10 seconds.

The Pilot Control dialog is displayed in the following situations:

- When you select **Menu > Navigate > Goto Waypoint** , **Goto Cursor** or **Follow Route** option in the chart application.

- When you select **Goto Waypoint** or **Goto Cursor** using the chart context menu.

- When you place the cursor over an active route or waypoint on the chart and select **Stop Goto**, **Stop Follow** or **Advance Waypoint** from the context menu.

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

- When you arrive at a target waypoint.

Note:

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

Enabling the autopilot control function

From the homescreen:

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

Disengaging the autopilot in an emergency

With the autopilot engaged:
1. Press and release the **POWER** button.
2. Select **PILOT STANDBY**.

The autopilot is disengaged, and put into standby mode.

Disengaging the autopilot

In the chart application with the autopilot engaged:
1. Select **Menu > Navigate > Stop Goto** or **Stop Follow**.
   The Pilot Control dialog is displayed.
2. Select **STANDBY**.
   The autopilot is disengaged, and put in standby mode.

Engaging the autopilot

In the chart application:
1. Select **Menu > Navigate > Goto Cursor**, **Goto Waypoint**, or **Follow Route** as appropriate.
   The Pilot Control dialog is displayed.
2. Select **Engage Pilot — Track**.
3. Select the appropriate option to engage the autopilot.

Engaging the autopilot using the context menu

In the chart application:
1. Position the cursor over a waypoint, or a waypoint in a route.
   The chart object context menu is displayed.
2. Select **Goto Waypoint**.
3. Select **Engage Pilot — Track**.

Dedicated Pilot Button

The following displays include a dedicated **Pilot** button which can be used to engage and disengage an installed Raymarine autopilot system:

- e95 / e97

- e125 / e127

- c95 / c97

- c125 / c127

In Standby mode press and hold the **Pilot** button to engage the autopilot system, With the autopilot engaged press the **Pilot** button to disengage the autopilot.

Manually displaying the pilot control dialog box

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

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

10.2 Autopilot status symbols

The autopilot status is indicated in the databar.

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

10.3 Autopilot alarms

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

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

Silencing autopilot alarms

1. Select **Dismiss**.

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

2. Select **Auto**.

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

3. Select **Track**.

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

Silencing autopilot alarms and disengaging autopilot

1. Select **STANDBY**.

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

Chapter 11: Using alarms and MOB functions

Chapter contents

11.1 Using Man Overboard (MOB) functions

Man overboard

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

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

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

When MOB is **activated**:

- An audible MOB alarm is sounded.

- An MOB alarm dialog box is displayed.

- The system sends MOB alarms to other Raymarine equipment.

- The active chart application is changed to a low-detail 2D view, with an initial range of 15 m (50 ft). Motion mode is set to Auto Range.

- The active radar application range is changed to 230 m (760 ft).

- All Goto and Follow functions are disabled in all applications. Navigation to any active waypoint is stopped and any existing navigation function is cancelled.

- If position or heading and speed information is available a MOB waypoint is placed at the current vessel position in any application that is capable of showing waypoints and vessel position.

- MOB data is displayed in the databar, replacing the existing data.

- MOB data is displayed on the homescreen, replacing the status icons.

- As the vessel moves away from the MOB position a dotted line is displayed, joining the MOB position with the vessel's position.

When the MOB alarm is **cancelled**:

- MOB data is removed from the relevant applications.

- The chart application motion mode is reset.

- The chart is centered on the vessel and pitch / rotation set to default.

- GOTO and route functions are restored.

- The databar mode is reset.

- A MOB normal mode signal is sent to any instrument on SeaTalk.

Activating the man overboard (MOB) alarm

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

Cancelling the man overboard (MOB) alarm

1. Select **OK** on the MOB alarm dialog.
   The MOB alarm remains active.
2. To cancel the alarm, press and hold the **WPTS / MOB** button for 4 seconds.

11.2 Alarms

Alarms alert you to a situation or hazard requiring your attention.

You can set up alarms to alert you to certain conditions, such as collision warnings and temperature limits.

Alarms are raised by system functions, and also external equipment connected to your multifunction display.

When an alarm sounds a message dialog is displayed on your multifunction display and any networked displays. The dialog states the reason for the alarm.

You can configure the behavior of certain alarms by selecting the Edit option on the message dialog or by using the **Alarms** menu, accessible from the homescreen via the **Set-Up** icon.

Silencing/Cancelling alarms

To silence/cancel an active alarm:

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

Note: Once silenced some alarms may remain active.

Accessing the alarms menu

From the homescreen:

1. Select **Set-up**.
2. Select **Alarms**.

   The Alarms menu is displayed.
3. Select the appropriate alarm category.

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)

Chapter 12: Using radar

Chapter contents

12.1 Radar overview

Radar is used to provide information that can help you to track targets and measure distances and bearings.

Radio Detection And Ranging (RADAR) is used at sea to detect the presence of objects (known as 'targets') at a distance, and if they are moving, detect their speed.

Radar works by transmitting radio pulses, then detecting reflections of these pulses (echoes) from objects in the area and displaying the reflections as targets on your display.

Until you are familiar with interpreting the radar display, every opportunity should be taken to compare the radar screen patterns with visual targets, such as other boats, buoys and coastal structures. You should practise harbor and coastal navigation during daylight hours and in clear weather conditions.

HD and SuperHD digital radar

Your multifunction display can be used with digital radar scanners.

HD and SuperHD Digital radar scanners provide a range of advantages, making it easier to discern objects around your vessel.

HD and SuperHD Digital radar scanners provide:

- Improved target detection.
- Full-color image.
- Dual Range operation.
- SuperHD option. This effectively increases the transmitter power by a factor of at least 2, and reduces the beamwidth by a similar amount.

Note: You must connect a SuperHD radar scanner in order to use the SuperHD option.

Multiple radar scanners

The multifunction display only supports the use of 1 radar on the network.

When the radar application is opened, if multiple radar scanners are detected then a warning message shall be displayed. Additional scanners will need to be removed from the network before the radar application will function.

Radar Features

Depending on the type of Raymarine radar you have different features will be available to you, the table below shows which features and settings are supported by radar type:

Feature	Non-HD Digital Radome	HD Digital Radome	HD Open Array	SuperHD Open Array
Color Gain	✘	Auto / Manual (0-100%)	Auto / Manual (0-100%)	Auto / Manual (0-100%)
FTC	Off/On (0-100%)	✘	✘	✘
Sea	Harbour / Coastal / Offshore / Manual (0-100%)	Auto / Manual (0-100%)	Auto / Manual (0-100%)	Auto / Manual (0-100%)
Auto Mode: Buoy	✘	✔	✔	✔
Auto Mode: Harbor	✘	✔	✔	✔
Auto Mode: Offshore	✘	✔	✔	✔
Auto Mode: Coastal	✘	✔	✔	✔
Auto Mode: Bird	✘	✔	✘	✔

Feature	Non-HD Digital Radome	HD Digital Radome	HD Open Array	SuperHD Open Array
Power Boost	✘	✘	✘	✔
Antenna Boost	✘	✘	✘	✔
Interference Rejection	Off / Normal / High	Off / On	Off / On	Off / On
Target Expansion	Off / Low / High	Off / On	Off / On	Off / On
MARPA Targets	10	25	25	25
Dual Range	✘	✔	✔	✔
Dual Range Restrictions	N/A	✘	✘	✘
Scanner Speed	24 RPM	24 RPM / Auto	24 RPM / Auto	24 RPM / Auto
Parking Offset	✘	✘	0-360 degrees	0-360 degrees
Antenna Size	✘	✘	4ft / 6ft	4ft / 6ft
Display Timing	0-153.6m	0-767m (range dependant)	0-767m (range dependant)	0-767m (range dependant)
STC Preset	0-100%	✘	✘	✘
Gain Preset	0-100	✘	✘	✘
Tune Correction	✘	✔	✔	✔

Note: Features not listed are supported by all types of Raymarine Digital, HD and SuperHD radars.

12.2 Digital radar scan speed

SuperHD open array radars with software version 3.23 or above or HD digital radomes support multiple scan speeds.

Radar scan speed is set up using the Radar Set-up menu. When the system detects a scanner that is capable of operating at both 24 RPM and 48 RPM, 2 options are provided for scanner speed:

- 24 RPM
- Auto

If you have a digital radar scanner that only operates at 24 RPM, the scanner speed option is disabled. If the scanner speed option is enabled, you must select the Auto option if you want to use the higher scan speeds. This option automatically switches between the 24 RPM and 48 RPM scan speeds as appropriate.

Selecting radar scanner speed

The speed option requires a 48 RPM compatible Raymarine HD digital radome or Raymarine SuperHD digital open array radar scanner.
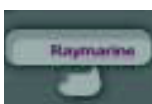
Select your radar scanner speed from within the radar application.

1. Select **Menu**.
2. Select **Scanner Set-up**.
3. Select **Scanner Speed**
4. Select the required scanner speed:
   - Auto
   - 24 RPM

   The Auto option automatically selects the appropriate speed for your radar range. 48 RPM is used at radar ranges of up to 3 nm. It provides an increased refresh rate, which is useful at high speed or in areas where you have large numbers of radar targets. At radar ranges of greater than 3 nm the display switches the radar speed to 24 RPM.

12.3 Radar scanner status symbols

The radar scanner power mode status is indicated in the databar.

Symbol	Radar power mode	Description
	Transmit (TX)	Rotating icon, signifying that the scanner is on and transmitting. When SCANNER is set to ON, select this mode to activate the scanner. This is the usual mode of operation.
	Standby (STBY)	Static icon, indicating that the scanner is on but not transmitting, and the antenna is not rotating. The scanner does not transmit and the radar data is removed from the screen. This is a power-save mode used when the radar is not needed for short time periods. When you return to transmit mode, the magnetron does not need to warm up again. This is the default mode.
	Off	Scanner powered off when radar not required, but display is in use for other applications, such as the chart. When selected, the system counts down. During this time you cannot re-power the scanner.
	Timed Transmit	Scanner switches between on/transmitting, and standby mode. Scanner goes into power save mode when constant use of radar is not required.

Powering the radar scanner on and off

In the radar application:

1. Select **Menu**.
2. Select **Power** to switch the Radar's power On and Off.

   The radar will always power up in Standby mode.
3. Select **Radar** to switch the radar between Transmit and Standby modes.

Using the power button and touch to switch operating modes

	This only applies to HybridTouch displays.

The radar operating modes can also be set using the multifunction displays power button menu.

1. Press and release the **Power** button
2. Select **Start Radar TX** to start the radar transmitting.
3. Select **Stop Radar TX** to put the radar into standby.

Using the power button to switch operating modes

The radar operating modes can also be set using the multifunction displays power button menu.

1. Press and release the **Power** button
2. Press the **Power** button again so that Start Radar TX is highlighted.

   With the Display Brightness dialog open pressing the **Power** button will switch between Transmit and Standby.

12.4 Radar range and image quality

Maximum radar range

The usable range of the radar is limited by factors such as the height of the scanner, and height of the target.

Maximum radar range is essentially line-of-sight, so is limited by the height of the scanner and the height of the target as illustrated below:

$$R_{max} = 2.23 \left(\sqrt{h} + \sqrt{H} \right)$$
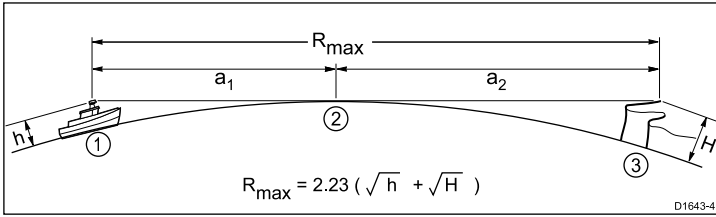
Item	Description
1	Radar equipped vessel.
2	Curvature of the earth.
3	Target (Cliff).
a_1	Radar horizon of antenna.
a_2	Radar horizon of target.
R_{max}	Maximum radar range in nautical miles. $R_{max} = a_1 + a_2$
h	Radar antenna height in metres.
H	Target height in metres.

The table below shows typical maximum radar ranges for various radar antenna heights and target heights. Remember that although the radar horizon is greater than the optical horizon, the radar can only detect targets if a large enough target is above the radar horizon.

Antenna height (meters)	Target height (meters)	Maximum range (Nautical miles)
3	3	7.7
3	10	10.9
5	3	8.8
5	10	12

Radar image quality

A number of factors can affect the quality of a radar image, including echoes, sea clutter, and other interference.

Not all radar echoes are produced by valid targets. Spurious or missing echoes may be caused by:

• Side lobes.

• Indirect echoes.

• Multiple echoes.

• Blind sectors.

• Sea, rain, or snow clutter.

• Interference.

Through observation, practice, and experience, you can generally detect these conditions very quickly and use the radar controls to minimize them.

Side Lobes

Side lobe patterns are produced by small amounts of energy from the transmitted pulses that are radiated outside the narrow main beam. The effects of side lobes are most noticeable with targets at short ranges (normally below 3 nm), and in particular with larger objects. Side lobe echoes form either arcs on the radar screen similar to range rings, or a series of echoes forming a broken arc.
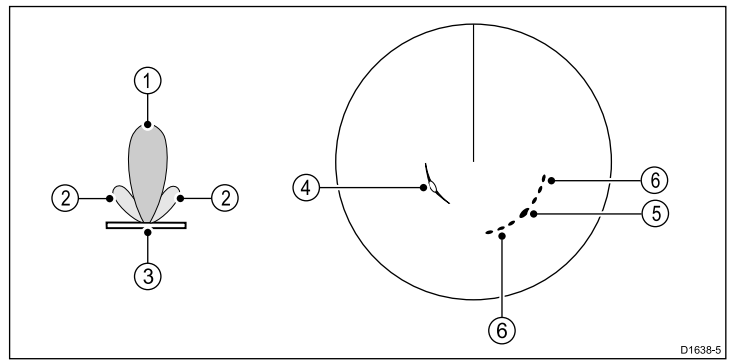
Item	Description
1	Main lobe
2	Side lobes
3	Antenna
4	Arc
5	True echo
6	Side echoes

Indirect Echoes

There are several types of indirect echoes or ghost images. These sometimes have the appearance of true echoes, but in general they are intermittent and poorly defined.
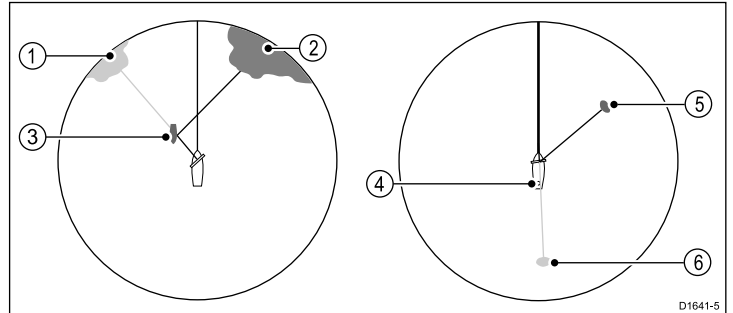
Item	Description
1	False echo
2	True echo
3	Passing ship
4	Mast or funnel
5	True echo
6	False echo

Multiple Echoes

Multiple echoes are not very common but can occur if there is a large target with a wide vertical surface at a comparatively short range. The transmitted signal will be reflected back and forth between the target and your own ship, resulting in multiple echoes, displayed beyond the range of the true target echo, but on the same bearing.
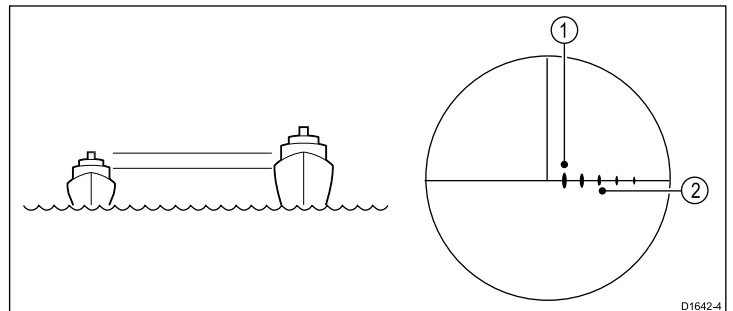
Item	Description
1	True echo
2	Multiple echoes

Blind Sectors

Obstructions such as funnels and masts near the radar antenna may obstruct the radar beam and cause radar shadows or 'blind sectors'. If the obstruction is relatively narrow, there will be a reduction of the beam intensity, though not necessarily a complete cut-off. However, for wider obstructions there may be a total loss of signal in the shadow area. There may also be multiple echoes which extend behind the obstruction. Blind sector effects can normally be minimized by careful selection of the scanner site prior to installation.

Sea Clutter

Radar returns from waves around the vessel can clutter the centre of the radar picture, making it difficult to detect real targets. Such 'sea clutter' usually appears as multiple echoes on the display at short range scales, and the echoes are not repetitive or consistent in position. With high winds and extreme conditions, echoes from sea clutter may cause dense background clutter in the shape of an almost solid disc.

Rain or Snow Clutter

The radar can see echoes from rain or snow. Returns from storm areas and rain squalls consist of countless small echoes that continuously change size, intensity and position. These returns sometimes appear as large hazy areas, depending on the intensity of the rainfall or snow in the storm cell.
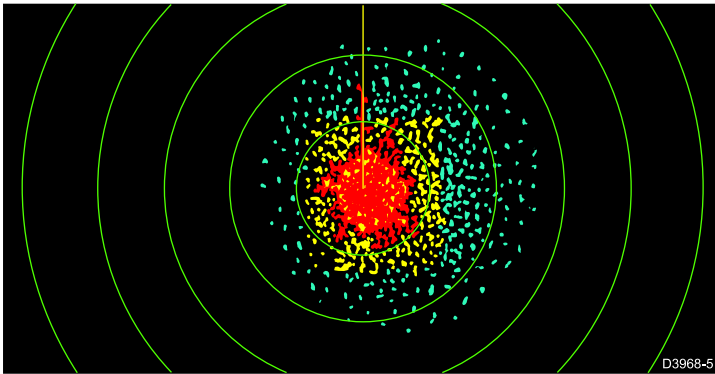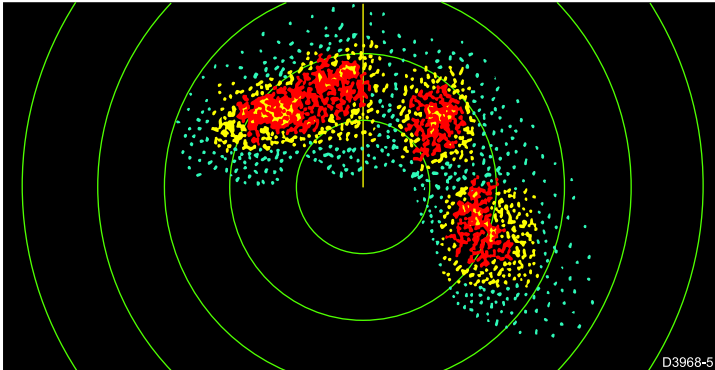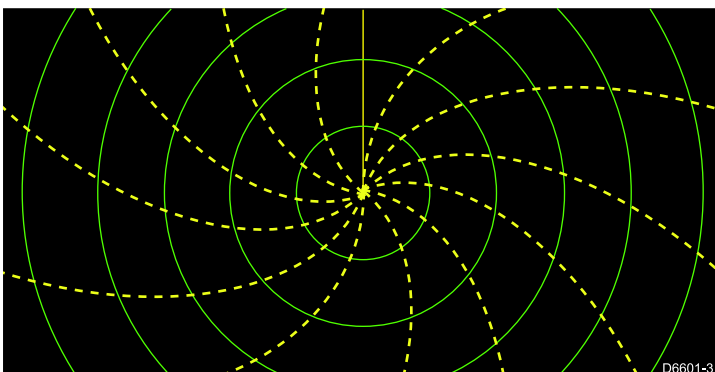
Interference

When two or more radar-equipped vessels are operating within range of each other mutual radar interference can occur. This usually appears as a spiral of small dots from the display centre This type of interference is most noticeable at long ranges.

12.5 Radar display overview

With your radar scanner connected and the radar in transmit mode, the radar picture provides a map-like representation of the area in which the radar is operating.
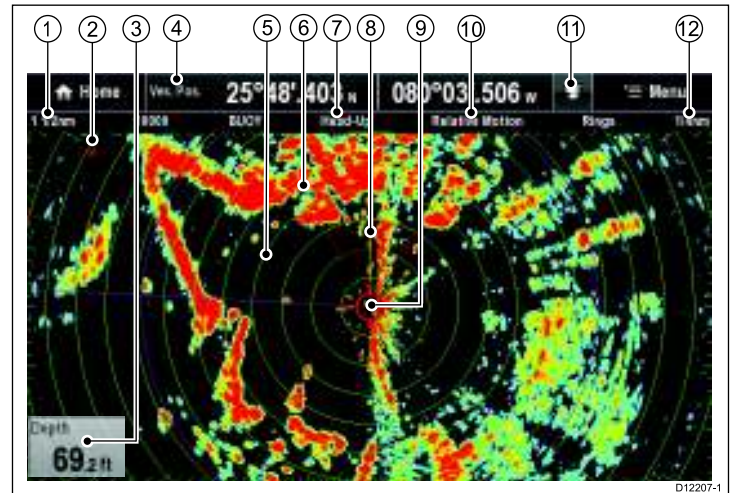
Item	Description
1	Range
2	Waypoint
3	Data cell
4	Databar
5	Range ring
6	Target
7	Orientation
8	Ship's Heading Marker (SHM)
9	Ship's position
10	Motion mode
11	Radar scanner status
12	Range ring spacing

Additional functionality of the radar application includes:

- Color palettes.
- Adding AIS overlay.
- MARPA targets.

Typically, your vessel's position is at the center of the display, and its dead ahead bearing is indicated by a vertical heading line, known as the Ship's Heading Marker (SHM).

Note: If the cursor is placed over the SHM, the SHM will temporarily be removed to help placing markers or acquiring targets etc.

On-screen targets may be large, small, bright or faint, depending on the size of the object, its orientation and surface. If using a non-HD digital radome scanner, strongest target returns are displayed in yellow with weaker returns in 2 shades of blue. If using an HD or SuperHD digital radar scanner, stronger target returns show as different colors from a range of 256 colors, providing better clarity. Be aware that the size of a target on screen is dependent on many factors and may not necessarily be proportional to its physical size. Nearby objects may appear to be the same size as distant larger objects.

Note: Colors stated above refer to the default color palette.

With experience, the approximate size of different objects can be determined by the relative size and brightness of the echoes.

You should bear in mind that the size of each on-screen target is affected by:

- The physical size of the reflecting object.
- The material from which the object is made. Metallic surfaces reflect signals better than non-metallic surfaces.

- Vertical objects such as cliffs reflect signals better than sloping objects such as sandbanks.

- High coastlines and mountainous coastal regions can be observed at longer radar ranges. Therefore, the first sight of land may be a mountain several miles inland from the coastline. Although the coastline may be much nearer, it may not appear on the radar until the vessel is closer to shore.

- Some targets, such as buoys and small vessels difficult to discern, because they do not present a consistent reflecting surface as they bob and toss about in the waves. Consequently these echoes tend to fade and brighten, and at times disappear momentarily.

- Buoys and small vessels resemble each other, but vessels can often be distinguished by their motion.

Note: A GPS receiver and a fast heading sensor are required for MARPA operation, and to enable radar/chart overlay.

Radar context menu

The radar application includes a context menu which provides positional data and menu items.

The radar 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

The context menu also provide the following menu items:

- **Acquire Target**

- **Place VRM/EBL**

- **Place Waypoint At Cursor**

The menu items can be accessed:

- using the **Rotary Control** and **Ok** button, or

- selecting the menu item on screen — Hybridtouch multifunction displays only.

12.6 Dual range radar operation

The Dual Range radar function enables you to view 2 ranges at the same time in separate windows. The function is available with SuperHD and HD digital radar scanners.

Using your multifunction display and an HD digital radar scanner, you can view either a short or a long range image in separate radar windows.

The default setting is Long, which provides a standard scanner range.
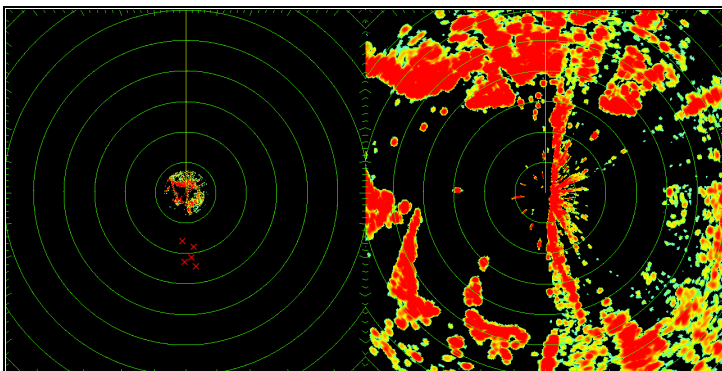
Limitations

- Dual Range operation is not available if MARPA targets are active.

- You cannot acquire MARPA targets if Dual Range is enabled.

- Radar/chart sync and radar/chart overlay are temporarily disabled when Dual Range is enabled.

Dual range radar compatibility

The range covered by the short Dual Range option depends on the radar scanner you are using, and the software version it is using.

Scanner	Dual range mode	*Range covered by software versions 1.xx to 2.xx	Range covered by software versions 3.xx onwards
4 Kw HD Digital Open Array	Long (1)	1/8 nm to 72 nm	1/8 nm to 72 nm
	Short (2)	1/8 nm to 3 nm	1/8 nm to 72 nm
4 Kw SuperHD Digital Open Array	Long (1)	1/8 nm to 72 nm	1/8 nm to 72 nm
	Short (2)	1/8 nm to 3 nm	1/8 nm to 72 nm
12 Kw HD Digital Open Array	Long (1)	n/a	1/8 nm to 72 nm
	Short (2)	n/a	1/8 nm to 72 nm
12 Kw SuperHD Digital Open Array	Long (1)	1/8 nm to 72 nm	1/8 nm to 72 nm
	Short (2)	1/8 nm to 3 nm	1/8 nm to 72 nm
HD Digital Radome	Long (1)	1/8 nm to 48 nm	1/8 nm to 48 nm
	Short (2)	1/8 nm to 48 nm	1/8 nm to 48 nm

Limitations of software version 1.xx and 2.xx

- The value for the short range setting must be less than or equal to the long range setting.

- With **Dual Range** On and a short range window active Expansion control shall be disabled in the **Enhance Echoes** menu.

Using Dual Range with SuperHD scanners

Dual range radar operation with SuperHD scanners.

When using the short Dual Range option, a SuperHD scanner operates in HD mode only. When using the long Dual Range option, a SuperHD radar operates in SuperHD mode.

Scanner	Dual Range mode	Operating mode
4 Kw SuperHD Digital Open Array	Long	SuperHD
	Short	HD
12 Kw SuperHD Digital Open Array	Long	SuperHD
	Short	HD

Enabling Dual Range radar operation

In the radar application.

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Dual Range** so that On is highlighted.

   Selecting Dual Range will switch between dual range On and Off.

Selecting range operation

With Dual Range set to on and the radar application screen displayed:

1. Select **Menu**.
2. Select **Presentation**.
3. Select **Dual Range Channel** to switch between 1 or 2, as appropriate.

12.7 Radar mode and orientation

Radar orientation modes

The radar can operate in a number of orientation modes to suit different types of navigation.

The orientation of the radar refers to the relationship between the radar and the direction that you are travelling in. There are three orientation modes to choose from:

- Head-Up
- North-Up
- Course-Up

These orientation modes are used in conjunction with motion mode to control how your boat and radar relate to one another and how they are displayed on screen. Any changes that you make to the orientation of the radar are retained when you switch off your multifunction display.

Head-Up

This is the default mode for the radar application.

D12208-1
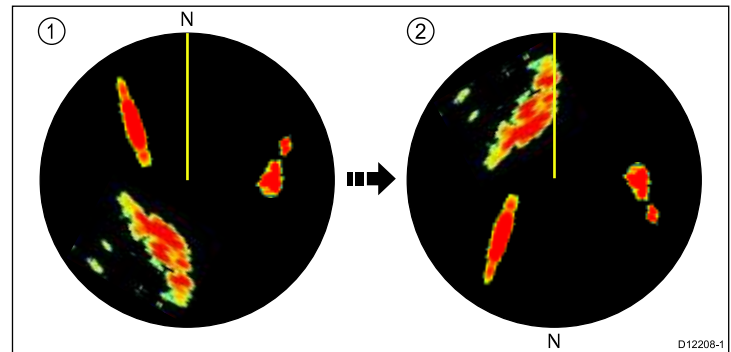
Item	Description
1	Ship's Heading Marker (SHM) (indicating the vessel's current heading is upwards).
2	As the vessel's heading changes: • SHM is fixed upwards • Radar picture rotates accordingly

North-Up

D12209-1
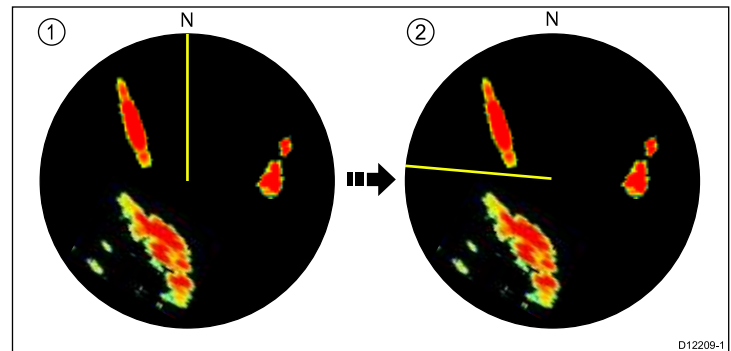
Item	Description
1	True north at top.
2	As your vessel's heading changes: • Radar picture is fixed (north up) • SHM rotates accordingly

Note: If heading data becomes unavailable whilst in this mode, a warning message will be shown, the status bar indicates North-Up in brackets and the radar uses 0° heading in relative motion. When heading data becomes available once more, North-Up mode is reinstated.

Note: It is not possible to select Head Up mode when the motion mode is set to True.

Course-Up

D12210-1
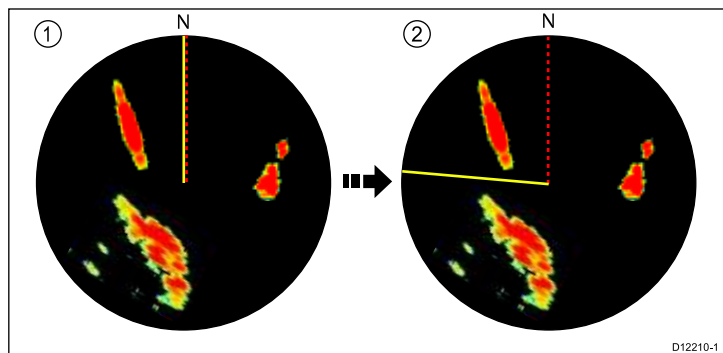
Item	Description
1	Current course upwards.
2	As your vessel's heading changes: • Radar picture is fixed • SHM rotates accordingly

If you select a new course, the picture will reset to display the new course upwards.

The reference used for Course-Up depends upon the information available at a given time. The system always prioritizes this information in the following order:

1. Bearing from origin to destination, that is, intended course.

2. Locked heading from an Autopilot.

3. Bearing to waypoint.

4. Instantaneous heading (when course-up is selected).

Note: If heading data becomes unavailable whilst in this mode, a warning message will be shown, the status bar indicates the Course Up in brackets and the radar uses 0° heading in relative motion. When heading data becomes available once more, Course-Up mode is reinstated.

Selecting the radar orientation mode

From the radar application:
1. Select **Menu**.
2. Select **Presentation**.
3. Select **Orientation & Motion Mode**.
4. Select **Orientation**.
5. Select the required orientation.

Radar motion modes overview

The motion mode controls the relationship between the radar and your vessel. There are two modes:

• Relative motion.

• True motion.

The selected motion mode is displayed in the status bar. The default setting is Relative Motion with zero offset.

Relative Motion (RM) with optional Vessel Offset

When the motion mode is set to Relative, the position of your vessel is fixed on the screen and all the targets move relative to the vessel. You can specify whether the vessel is fixed in the center of the window (0 offset) or offset by 1/3 or 2/3 to increase the view ahead, as shown below:

Examples:

0 offset	1/3 offset	2/3 offset
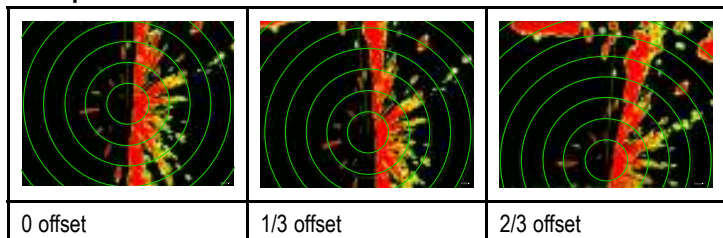
The default motion mode is "Relative", with zero offset.

True Motion (TM)

When the motion mode is set to True, fixed radar targets maintain a constant position and moving vessels (including your vessel) travel in true perspective to each other and to fixed landmasses on the screen. As the vessel's position approaches the edge of the screen, the radar picture is automatically reset to reveal the area ahead.

Note: If heading and position data become unavailable when True motion is selected, a warning message will be shown, the mode will revert to relative motion and be noted in the status bar in brackets, for example, (TM).

Note: It is not possible to select True Motion when the orientation is set to Head Up.

Selecting the radar motion mode

From the radar application:
1. Select **Menu**.
2. Select **Presentation**.
3. Select **Orientation & Motion Mode**.
4. Select **Motion Mode**.

    Selecting Motion Mode will switch between True and Relative.

Changing the radar vessel offset

Radar offset is only available in Relative motion mode.

From the radar application:
1. Select **Menu**.
2. Select **Presentation**.
3. Select **Orientation & Motion Mode**.
4. Select **Vessel Offset**.
5. Select the required offset value.

12.8 Radar adjustments: HD and SuperHD digital scanners

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

The following settings are available from the Radar menu and apply to HD radomes, HD and SuperHD digital open array scanners:

Menu Item	Description	Options
Auto Gain Mode	The digital radar gain presets enable you to quickly select pre-configured settings to achieve the best picture in different situations. Raymarine strongly recommends the use of these presets to achieve optimum results.	• **Buoy** — a special mode that enhances the detection of small objects like mooring buoys. It is useful at ranges up to 0.75 nm. • **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. • **Bird Mode** — a special mode that helps you to identify flocks of birds, useful when identifying suitable fishing locations, for example. **Note:** Bird Mode requires a SuperHD open array with software version 3.23 or above or an HD digital radome.
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	Each of the gain presets can be manually adjusted using gain, color gain and sea clutter functions.	• **Gain** — enables you to use a preset in automatic mode, or to adjust its gain manually between 0 and 100%. • **Color Gain**— adjusts the intensity (color) of displayed targets, but does not affect the number of targets displayed. Increasing the color gain causes more targets to be displayed in the same color, which may help you to determine whether an object is an actual target, or just background noise. Reducing the color gain may provide better target detail and detection. • **Sea** — radar echoes from waves around your vessel can clutter the center of the radar picture, making it difficult to detect real targets. Adjusting the sea gain reduces this clutter for up to 5 nautical miles (depending on wave and sea conditions) from your vessel. • **SuperHD Controls** — for SuperHD scanners only: – Antenna Boost: scales the effective antenna size. At zero, the effective antenna size matches its actual size. At 95%, the effective antenna size is doubled. Increasing the effective antenna size separates targets that appear merged at lower settings. – Power Boost: adjusts effective transmit power. At zero, the radar operates at its standard power (4 kW or 12 kW). At 90, the effective power is increased by a factor of at least two. Increasing the power makes targets more distinct from noise. For maximum benefit, reduce power boost to prevent saturation of strong targets.

Selecting radar gain presets

These presets require a HD digital or SuperHD radar scanner. Bird mode requires a SuperHD digital open array scanner with software version 3.23 or above or an HD digital radome.

From the radar application:

1. Select **Menu**.
2. Select **Auto Gain Mode**.
3. Select Buoy, Harbor, Costal, Offshore, or Bird as appropriate.

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

Adjusting radar preset gain

Raymarine strongly recommends the use of the preset gain modes to achieve optimum results. However if required manual adjustments can be made.

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 **Gain** to select the Man option.
4. Using the **Rotary Control** , adjust the gain control to the appropriate setting (between 0 and 100%).

Adjusting radar color gain

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 **Color Gain** to select the Man option.
4. Using the **Rotary Control** , adjust the color gain control to the appropriate setting (between 0 and 100%).

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%).

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 SuperHD radar antenna boost

From the radar application:

1. Select **Menu**.
2. Select **Adjust Gain <Mode>**, where <Mode> shall be the Auto Gain mode already selected.
3. Select **Super HD Controls**.
4. Select **Antenna Boost** so that Man is highlighted.

   Selecting Antenna Boost will switch between Auto and Manual.
5. Use the **Rotary Control** to adjust the boost to the required setting.

Adjusting SuperHD radar power boost

From the radar application:

1. Select **Menu**.
2. Select **Adjust Gain <Mode>**, where <Mode> shall be the Auto Gain mode already selected.
3. Select **Super HD Controls**.
4. Select **Power Boost** so that Man is highlighted.

   Selecting Power Boost will switch between Auto and Manual.
5. Use the **Rotary Control** to adjust the boost to the required setting.

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.