

e7 / e7D

Multifunction display

Installation instructions

ENGLISH

Document number: 87136-2

Date: 10-2011

Raymarine®

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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: 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

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 in compliance 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: Planning the installation

Chapter contents

- 2.1 Handbook information on page 14
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2.1 Handbook information

This handbook contains important information regarding the e7 / e7D multifunction display.

The handbook is for use with the following models:

- e7 Multifunction display.
- e7D Multifunction display.

e7 / e7D handbooks

The following handbooks are applicable to the e7 / e7D multifunction display:

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

e7 / e7D handbooks

Description	Part number
Installation instructions	87136
User reference	81332
Quick reference	86143

Additional handbooks

Description	Part number
SeaTalk ^{ng} reference manual	81300

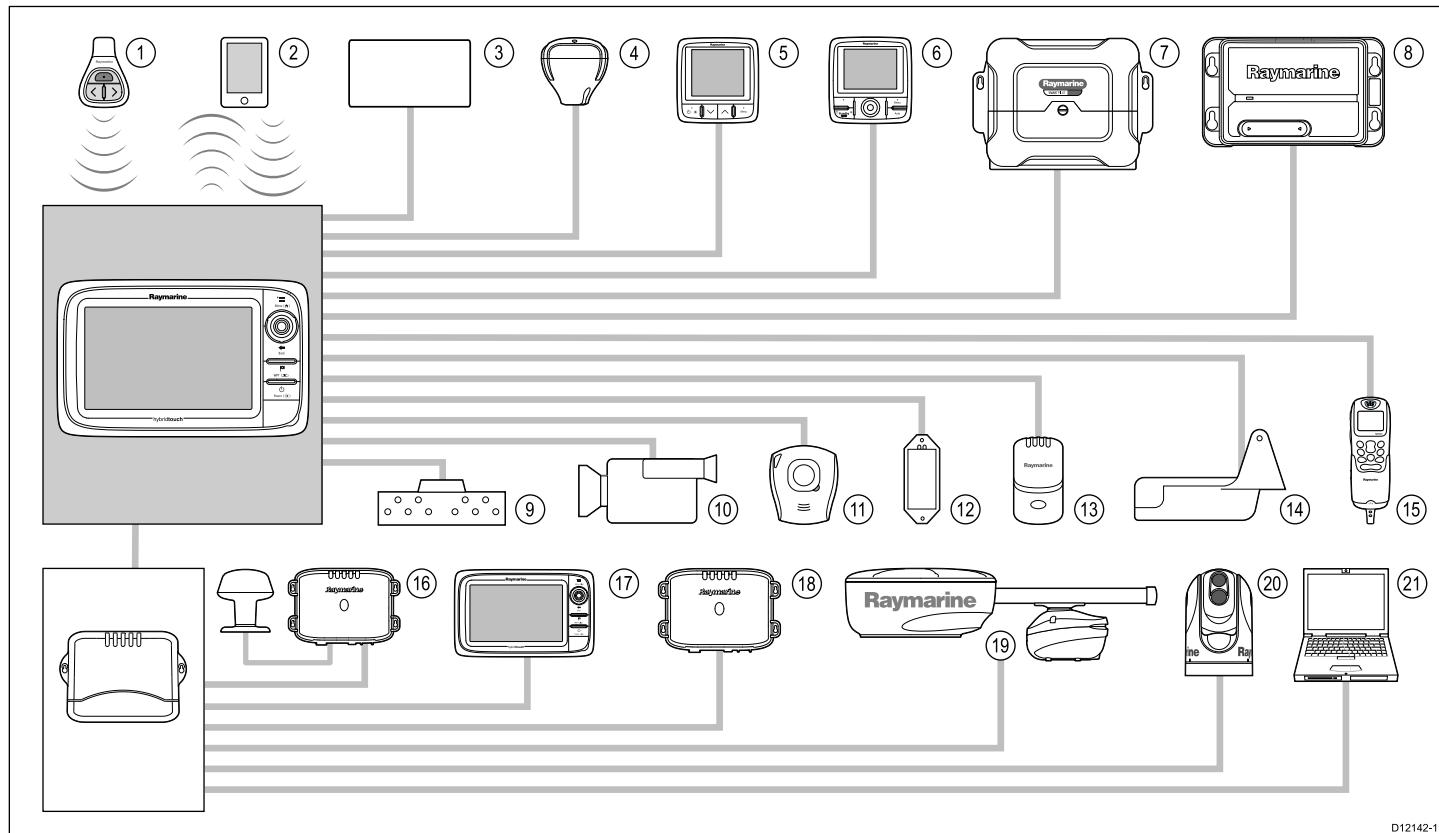
2.2 Installation checklist

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 test the system.

2.3 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 e7 / e7D multifunction display.	Raymarine RCU-3	Bluetooth
2	Smartphone	1 per e7 / e7D multifunction display.	<p>For chartplotter sync with Navionics Marine app:</p> <ul style="list-style-type: none"> • Apple iPhone or iPad. • Android-compatible smartphone. <p>For smartphone media player control:</p> <ul style="list-style-type: none"> • Any Bluetooth-enabled smartphone supporting Bluetooth AVRCP version 2.1 or higher. <p>For wireless video streaming:</p> <ul style="list-style-type: none"> • Apple iPhone 4 (or later) or iPad (requires the “Raymarine Viewer” video streaming app, available from the Apple App Store). 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<p>Any combination of the following:</p> <ul style="list-style-type: none"> • Raystar125 GPS. • Raystar125+ GPS (via optional SeaTalk to SeaTalk^{ng} converter). • RS130 GPS. 	SeaTalk, SeaTalk ^{ng} , or NMEA 0183.

Item	Device Type	Maximum quantity	Suitable Devices	Connections
5	Instruments — Raymarine	As determined by SeaTalk ^{ng} bus bandwidth and power loading.	<p>SeaTalk (via optional SeaTalk to SeaTalk^{ng} converter):</p> <ul style="list-style-type: none"> • ST40 Wind, Speed, Depth, Rudder, or Compass. • ST60 Wind, Speed, Depth, Rudder, or Compass. <p>SeaTalk^{ng}:</p> <ul style="list-style-type: none"> • ST70. • ST70+. • ST70+ keypads. • ST45. • i70. 	SeaTalk, SeaTalk ^{ng} .
5	Instruments — third-party	<ul style="list-style-type: none"> • Connections to e7 / e7D NMEA output: 4. • Connections to e7 / e7D NMEA inputs: 2 	NMEA 0183–compatible instruments.	NMEA 0183

Item	Device Type	Maximum quantity	Suitable Devices	Connections
6	Pilot control heads — Raymarine	As determined by SeaTalk or SeaTalk ^{ng} bus bandwidth and power loading, as appropriate.	<p>SeaTalk (via optional SeaTalk to SeaTalk^{ng} converter):</p> <ul style="list-style-type: none"> • ST6002. • ST7002. • ST8002. <p>SeaTalk^{ng}:</p> <ul style="list-style-type: none"> • ST70. • ST70+. • p70. • p70R. 	SeaTalk, SeaTalk ^{ng} .
6	Pilot control heads — third-party	1	NMEA 0183-compatible instruments.	NMEA 0183
7	Course computer — Raymarine	1	<p>SeaTalk (via optional SeaTalk to SeaTalk^{ng} converter):</p> <ul style="list-style-type: none"> • ST1000. • ST2000. • S1000. • S1. • S2. • S3. <p>SeaTalk^{ng}:</p> <ul style="list-style-type: none"> • All SPX course computers. 	SeaTalk, SeaTalk ^{ng} , or NMEA 0183.

Item	Device Type	Maximum quantity	Suitable Devices	Connections
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	<ul style="list-style-type: none"> • AIS 250. • AIS 500. • AIS 350. • AIS 650. 	SeaTalk ^{ng} , 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).
10	Video / camera	1 per e7 / e7D multifunction display.	Composite PAL or NTSC video source.	BNC connector.
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: <ul style="list-style-type: none"> • Wind. • Speed. • Depth. 	SeaTalk ^{ng} (via optional transducer pods).
13	Transducers and sensors — Airmar	1	<ul style="list-style-type: none"> • DT800 Smart Sensor. • DST800 Smart Sensor. • PB200 weather station. 	SeaTalk ^{ng} (via optional transducer pods).

Item	Device Type	Maximum quantity	Suitable Devices	Connections
14	Sonar transducer	1	<p>Direct connection to display (“D” e7 variants only):</p> <ul style="list-style-type: none"> • Raymarine P48. • Raymarine P58. <p>; OR:</p> <ul style="list-style-type: none"> • Any 600 watt DSM-compatible transducer (via optional E66066 adaptor cable). <p>; OR:</p> <ul style="list-style-type: none"> • Any Minn Kota transducer (via optional A62363 adaptor cable). <p>Connection via external DSM30 or DSM300 unit:</p> <ul style="list-style-type: none"> • Any DSM-compatible transducer. 	Raymarine transducer connection, OR Minn Kota transducer connection.
15	VHF radio — Raymarine	1	All Raymarine DSC VHF radios.	NMEA 0183 only (No SeaTalk support).
16	Sirius Weather receiver — Raymarine	1	<p>SeaTalk^{hs}:</p> <ul style="list-style-type: none"> • SR100. • SR6. <p>SeaTalk^{ng}:</p> <ul style="list-style-type: none"> • SR50. 	SeaTalk ^{hs} , SeaTalk ^{ng} .

Item	Device Type	Maximum quantity	Suitable Devices	Connections
17	Additional multifunction display(s) — Raymarine	5	<p>SeaTalk^{hs} (recommended):</p> <ul style="list-style-type: none"> e7 / e7D multifunction display. E90W, E120W, E140W multifunction display (must be running software version 2.49 or later). G-Series (must be running software version 4.49 or later). <p>Note: You can connect Raymarine multifunction displays using NMEA 0183 or SeaTalk^{ng} but not all functions are supported.</p> <p>Note: Visit www.raymarine.com to download the latest software version for your display.</p>	SeaTalk ^{hs} .
17	Additional multifunction display(s) — third-party	<ul style="list-style-type: none"> Connections to e7 / e7D NMEA output: 4. Connections to e7 / e7D NMEA inputs: 2 	NMEA 0183-compatible chartplotters and multifunction displays.	NMEA 0183
18	Fishfinder (Digital Sounder Module) — Raymarine	1	<ul style="list-style-type: none"> DSM 30. DSM 300. 	SeaTalk ^{hs} .
19	Radar — Raymarine	1	All Raymarine Digital Radome and Digital Open Array radar scanners. <p>Note: Please ensure your radar scanner is using the latest software version.</p>	SeaTalk ^{hs} .

Item	Device Type	Maximum quantity	Suitable Devices	Connections
20	Thermal camera — Raymarine	1	All Raymarine thermal cameras.	SeaTalk ^{hs} (for control), BNC connector (for video).
21	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		<p>External MicroSD, or MicroSDHC chart cards:</p> <ul style="list-style-type: none"> • Navionics Ready to Navigate. • Navionics Silver • Navionics Gold • Navionics Gold+ • Navionics Platinum • Navionics Platinum+ • Navionics Fish'N Chip • Navionics Hotmaps <p>Refer to the Raymarine website (www.raymarine.com) for the latest list of supported chart cards.</p>	Card slot.

2.4 System Limits

The following limits apply to the number of system components that can be connected in an e7 / e7D system.

Component	Maximum
Maximum number of SeaTalk ^{hs} devices	25
Maximum number of SeaTalk ^{ng} devices	50
e7 / e7D multifunction displays	6

2.5 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.

2.6 Networking constraints

The following constraints apply when networking an e7 / e7D multifunction display with other devices.

General

- e7 / e7D displays must be connected together using SeaTalk^{hs}.
- e7 / e7D displays can be connected via NMEA 0183 or SeaTalk^{ng}, but not all functions are supported.

Master / slave operation

- Any system featuring more than one e7 / e7D display must have one of the displays designated as the data master.
- Any system featuring e7 / e7D display(s) and an E90W, E120W, or E140W display connected using SeaTalk^{hs} must have one of the displays designated as the data master.
- e7 / e7D displays are always designated as slaves when a G-Series unit is connected to the system using SeaTalk^{hs}.

Homescreen sharing

- For networks featuring ONLY e7 / e7D displays:
 - Networked e7 / e7D displays share homescreens.
- For networks featuring e7 / e7D and non-e7 / e7D Raymarine displays:
 - e7 / e7D displays will share homescreens.
 - e7 / e7D displays will NOT share homescreens with E90W, E120W, or E140W displays.
 - e7 / e7D displays will NOT share homescreens with G-Series units.

Cartography sharing

- Chart card cartography is shared between e7 / e7D displays.

- Only chart card cartography that is purchased separately to the e7 / e7D display can be shared with E90W, E120W, or E140W, or G-Series units. Chart cards that are included with the e7 / e7D multifunction display at the time of purchase are NOT shared between e7 / e7D displays and E90W, E120W, E140W, or G-Series units.

- Embedded cartography can NOT be shared between e7 / e7D 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

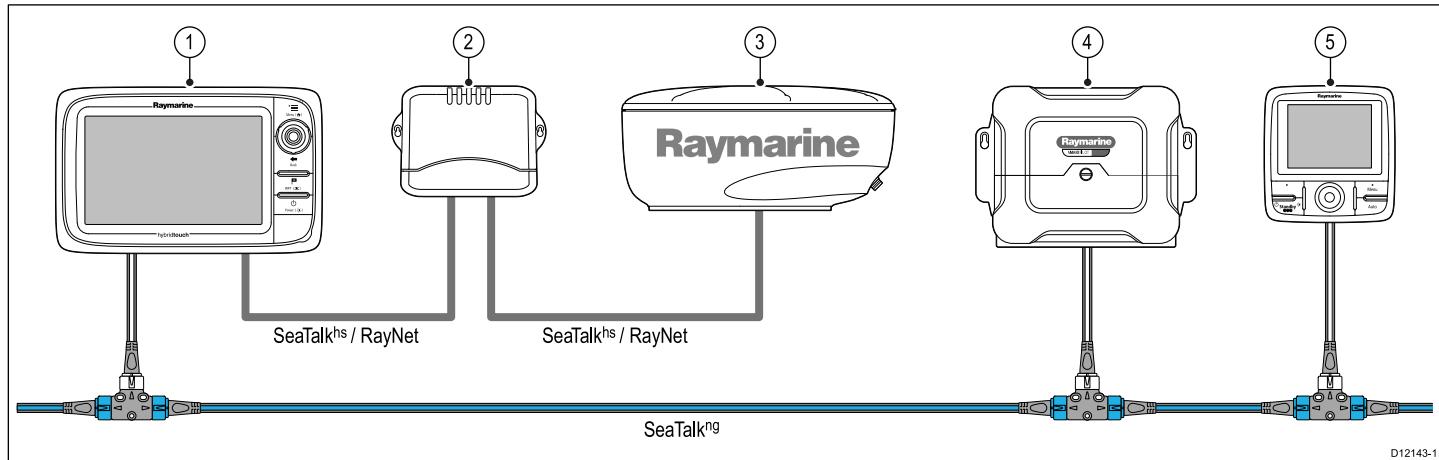
- e7 / e7D systems support the use of one radar scanner at a time.
- The data supplied by a connected radar scanner is repeated to any networked displays.

Sonar operation

- You can connect an external Digital Sounder Module (DSM) unit to e7 / e7D displays via SeaTalk^{hs} / RayNet.
- “D” model variants of the e7 displays include a built-in Digital Sounder Module and the display can be directly connected to a compatible sonar transducer.
- If an e7D display detects a connected and powered external DSM unit the internal DSM is automatically disabled.
- 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.

2.7 Typical systems

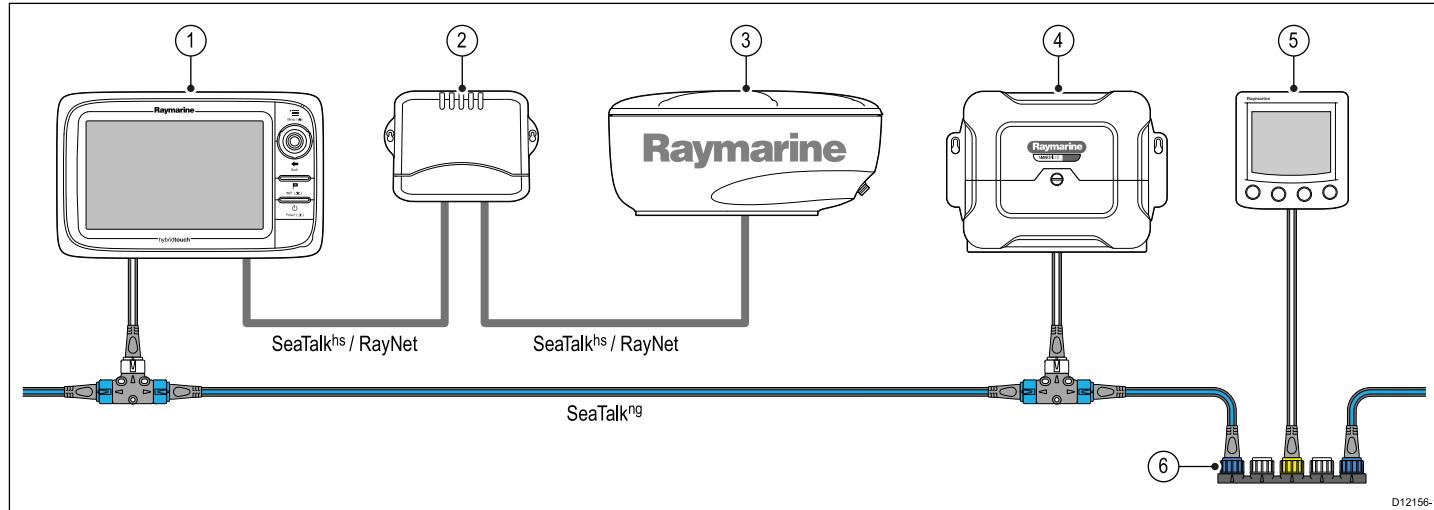
Example: Basic system



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**.

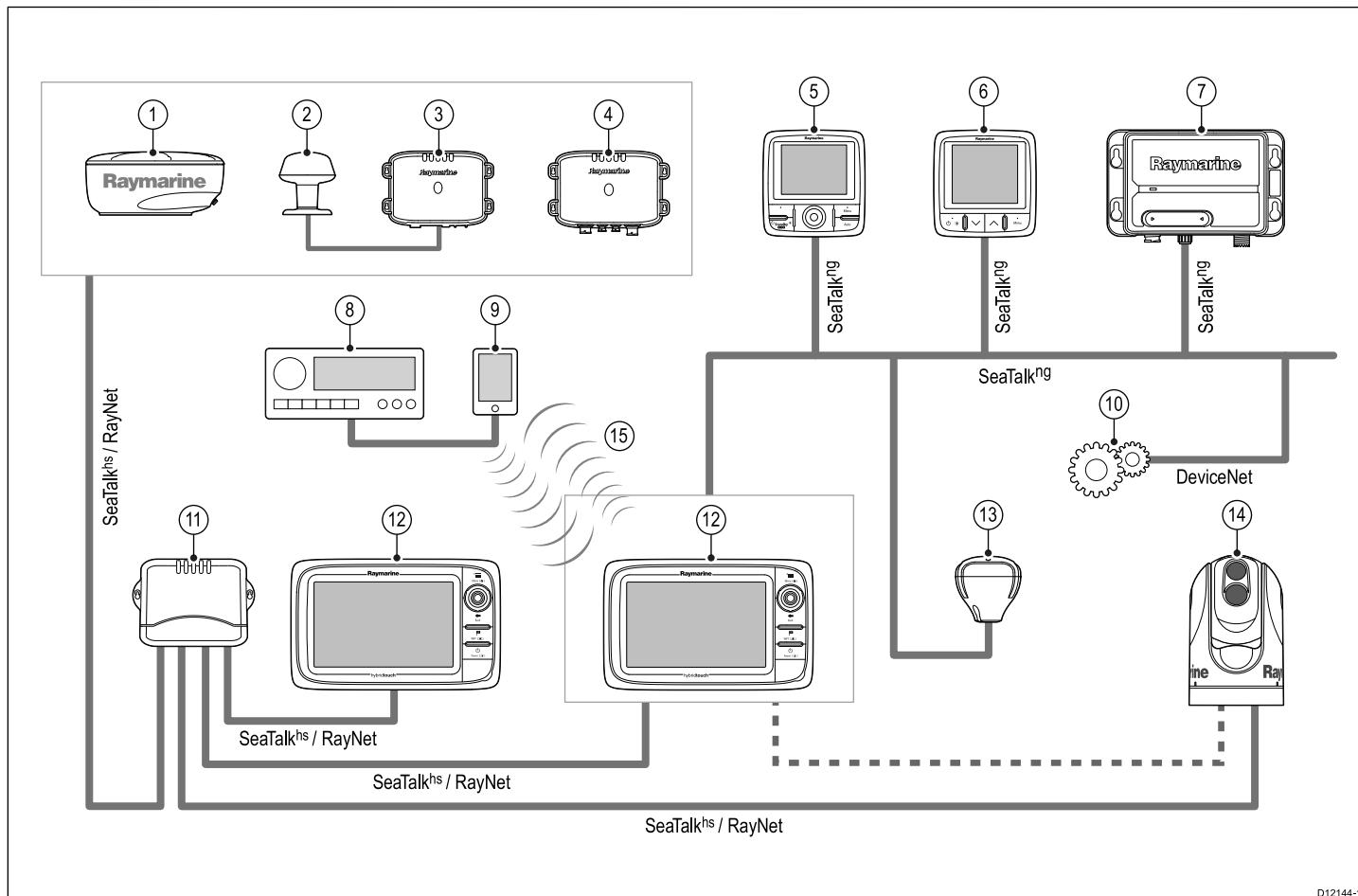
Example: Basic system with SeaTalk equipment



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



D12144-1

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.

2.8 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:

- SeaTalk^{hs}
- SeaTalk^{ng}
- 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.

SeaTalk^{hs}

SeaTalk^{hs} 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 SeaTalk^{hs} network includes:

- Shared cartography (between compatible displays).
- Digital radar data.
- Sonar data.

SeaTalk^{ng}

SeaTalk^{ng} (Next Generation) is an enhanced protocol for connection of compatible marine instruments and equipment. It replaces the older SeaTalk and SeaTalk² protocols.

SeaTalk^{ng} 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.

SeaTalk^{ng} is a proprietary extension to NMEA 2000 and the proven CAN bus technology. Compatible NMEA 2000 and SeaTalk / SeaTalk² 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.

2.9 Data master

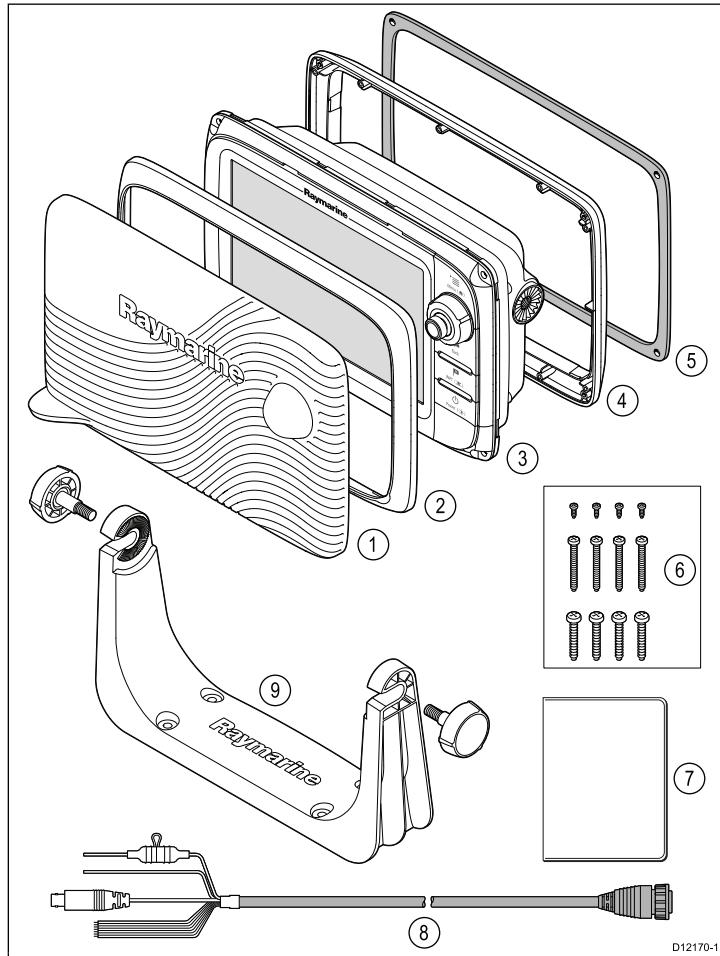
Any system containing more than one networked multifunction display must have a designated data master.

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.

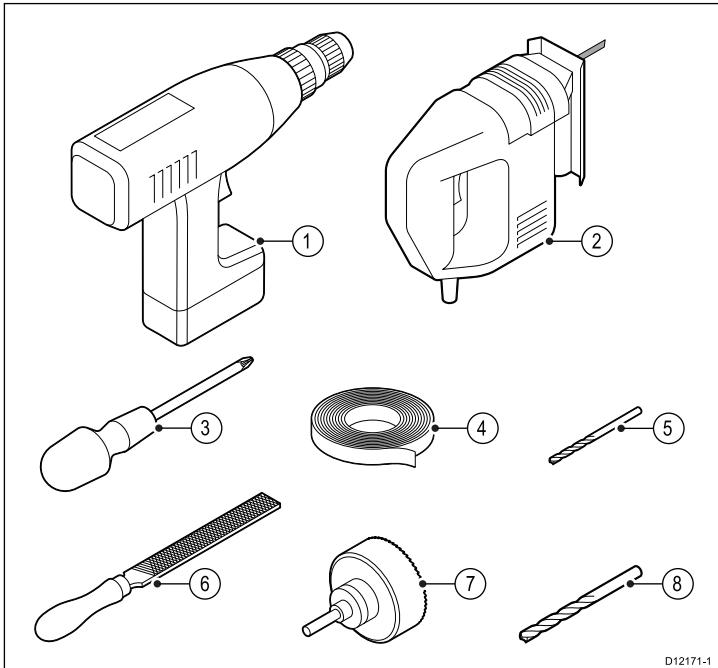
2.10 Parts supplied



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.
 - Installation instructions.
 - Quick reference.
 - Mounting template.
8. 1.5 m (4.9 ft) power and data cable.
9. Trunnion bracket.

2.11 Tools required for installation

8. Drill bit for flush mounting.



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.

Chapter 3: Cables and connections

Chapter contents

- 3.1 General cabling guidance on page 34
- 3.2 Connections overview on page 35
- 3.3 Power connection on page 35
- 3.4 Network connections on page 39
- 3.5 GPS connection on page 49
- 3.6 AIS connection on page 50
- 3.7 Fastheading connection on page 51
- 3.8 SeaTalk^{ng} connections on page 51
- 3.9 SeaTalk connection on page 55
- 3.10 NMEA 0183 connection on page 56
- 3.11 NMEA 2000 connection on page 59
- 3.12 Video connection on page 60
- 3.13 Bluetooth connections on page 61
- 3.14 WiFi connections on page 62

3.1 General cabling guidance

Cable types and length

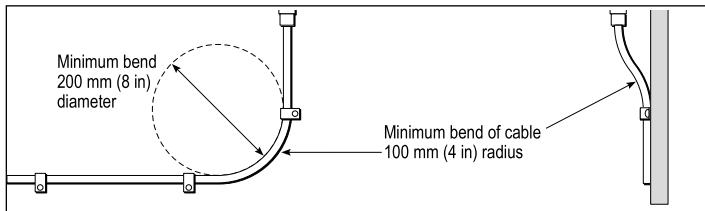
It is important to use cables of the appropriate type and length

- 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.



- 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

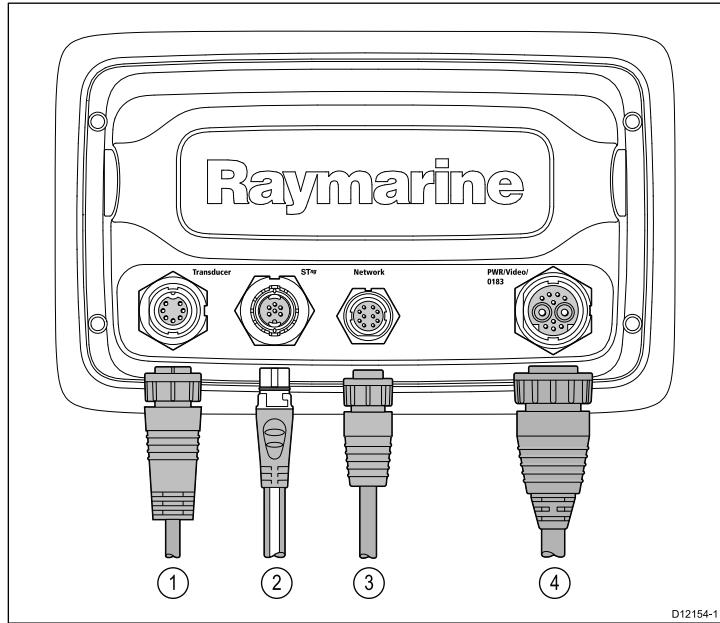
Appropriate circuit isolation is required for installations using both AC and DC current:

- 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

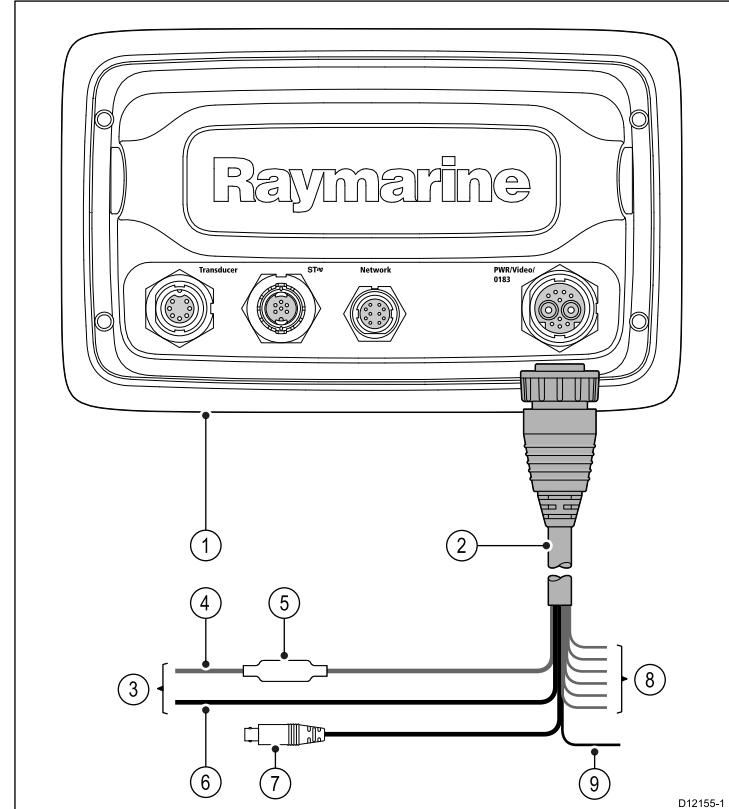
Ensure that all data cables are properly shielded that the cable shielding is intact (e.g. hasn't been scraped off by being squeezed through a tight area).

3.2 Connections overview



1. Sonar transducer ("D" models only).
2. SeaTalk^{ng}.
3. Network (for SeaTalk^{hs} connections via RayNet cables).
4. Power, data, and composite video input.

3.3 Power connection



1. Multifunction display.
2. Power and data cable.
3. Connection to 12 V power supply.

4. Red cable (positive).
5. 7 A fuse.
6. Black cable (negative).
7. Video input cable.
8. NMEA 0183 data cables.
9. NMEA 0183 screen (thin black wire; must be connected to 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

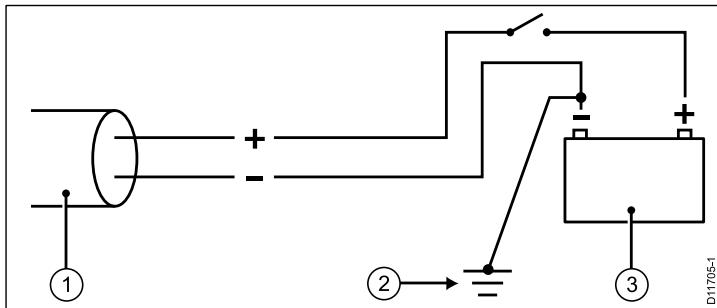
Before applying power to this product, ensure it has been correctly grounded, in accordance with the instructions in this guide.

Grounding

The following requirements apply when grounding Raymarine equipment which does not have a dedicated drain wire or shield:

Common ground point

The negative wire must be connected to a bonded common ground point, i. e. with the ground point connected to battery negative, and situated as close as possible to the battery negative terminal.



1. Power cable to display
2. Bonded common ground connection
3. Battery

Implementation

If several items require grounding, they may first be connected to a single local point (e.g. within a switch panel), with this point connected via a single, appropriately-rated conductor, to the boat's common ground.

The preferred minimum requirement for the path to ground (bonded or non-bonded) is via a flat tinned copper braid, with a 30 A rating (1/4 inch) or greater. If this is not possible, an equivalent stranded wire conductor may be used, rated as follows:

- for runs of <1 m (3 ft), use 6 mm² (#10 AWG) (6 mm) or greater.
- for runs of >1 m (3 ft), use 8 mm² (#8 AWG) or greater.

In any grounding system, always keep the length of connecting braid or wires as short as possible.

Important: Do NOT connect this product to a positively-grounded power system.

References

- ISO 10133/13297

- BMEA code of practice
- NMEA 0400

Power cable

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

Power cable supplied

Cable	Part number	Notes
1.0 m (3.3 ft) Power and data cable	R62379	Supplied with unit.

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
5–10 m (16.4–32.8 ft)	12 V	14
10–15 m (32.8–49.2 ft)	12 V	12
15–20 m (49.2–65.5 ft)	12 V	12

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

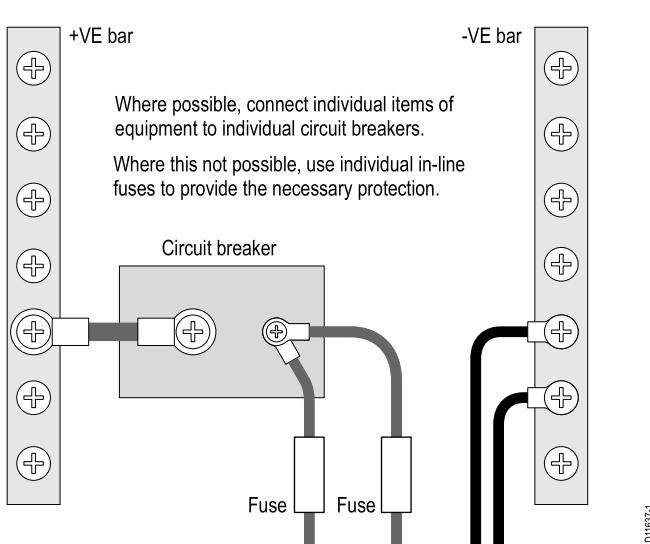
The power cable includes an in-line fuse. It is recommended that you fit an additional thermal breaker or fuse at the distribution panel.

Display	Fuse rating	Thermal breaker rating
• e7 / e7D	7 A in-line fuse fitted within power cable.	5 A (if only connecting one device)

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.



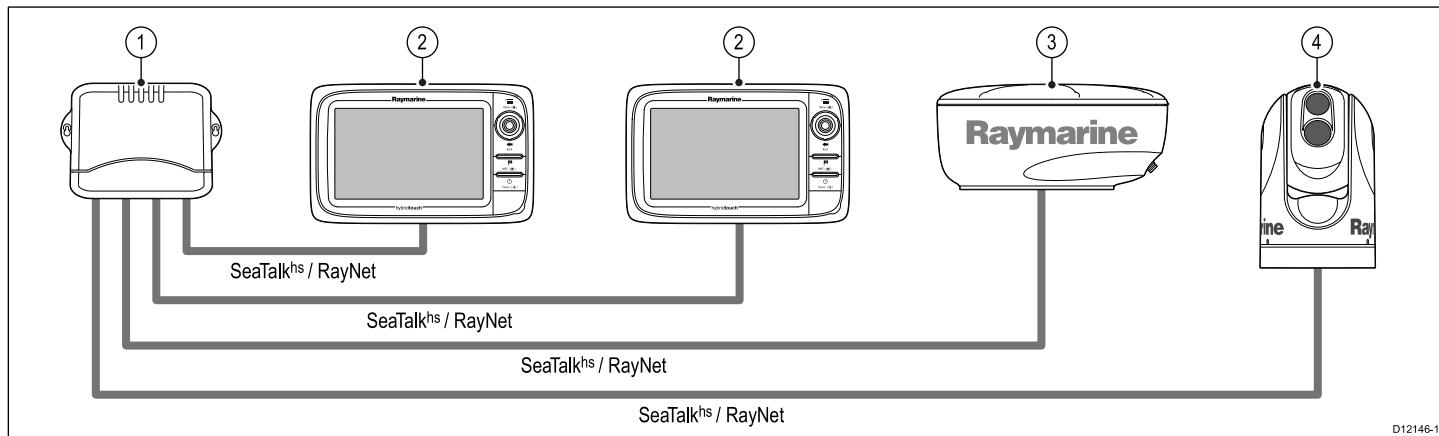
3.4 Network connections

You can connect a number of digital devices to your multifunction display using the Network connector at the rear of the unit. A typical network of digital devices may include:

- Up to 6 e7 / e7D multifunction displays.
- SeaTalk^{hs} digital devices such as a Digital Sounder Module (DSM) or radar scanner.
- Thermal camera.

Note: A network containing more than a single connection requires a Raymarine network switch. This is a hub used for connecting multiple devices.

Typical SeaTalk^{hs} network



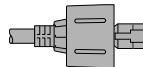
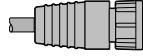
1. Raymarine network switch.
2. Multifunction display.
3. Digital radar scanner.
4. Thermal camera.

Network hardware

Item	Part number	Notes
SeaTalk ^{hs} network switch	E55058	8-way hub for network connection of multiple SeaTalk ^{hs} devices.
SeaTalk ^{hs} crossover coupler	E55060	Enables direct connection of SeaTalk ^{hs} devices to smaller systems where a switch is not required.

Network cable connector types

There are 2 types of network cable connector — SeaTalk^{hs} and RayNet.

	SeaTalk^{hs} connector — used for connecting SeaTalk ^{hs} devices to a Raymarine network switch via SeaTalk ^{hs} cables.
	RayNet connector — used for connecting Raymarine network switches and SeaTalk ^{hs} 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 SeaTalk^{hs} 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 SeaTalk ^{hs} (RJ45) cable	A62360
2 m (6.56 ft) RayNet to RayNet cable	A62361
10 m (32.8 ft) RayNet to RayNet cable	A62362

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

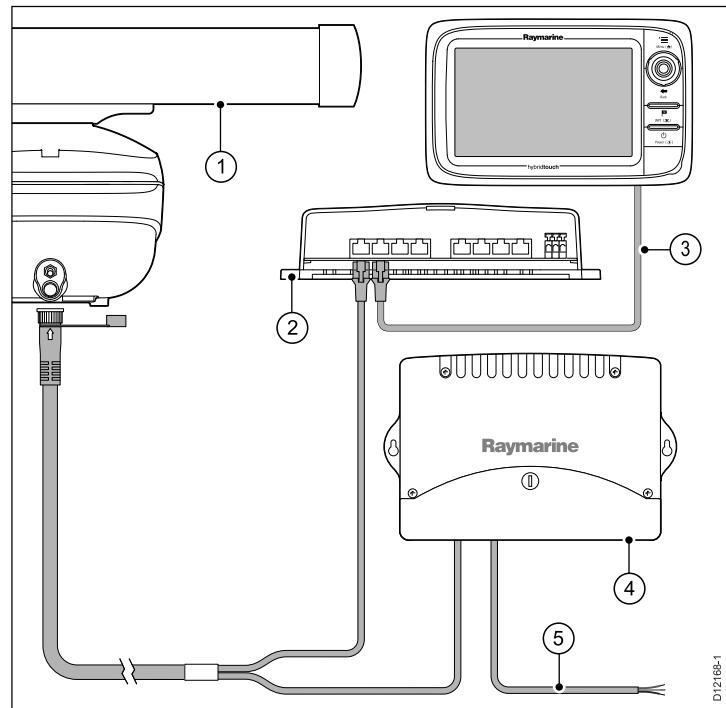
Cable	Part number
15 m (49.2 ft) SeaTalk ^{hs} patch cable	A62136
20 m (65.6 ft) SeaTalk ^{hs} patch cable	E06057

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.

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.

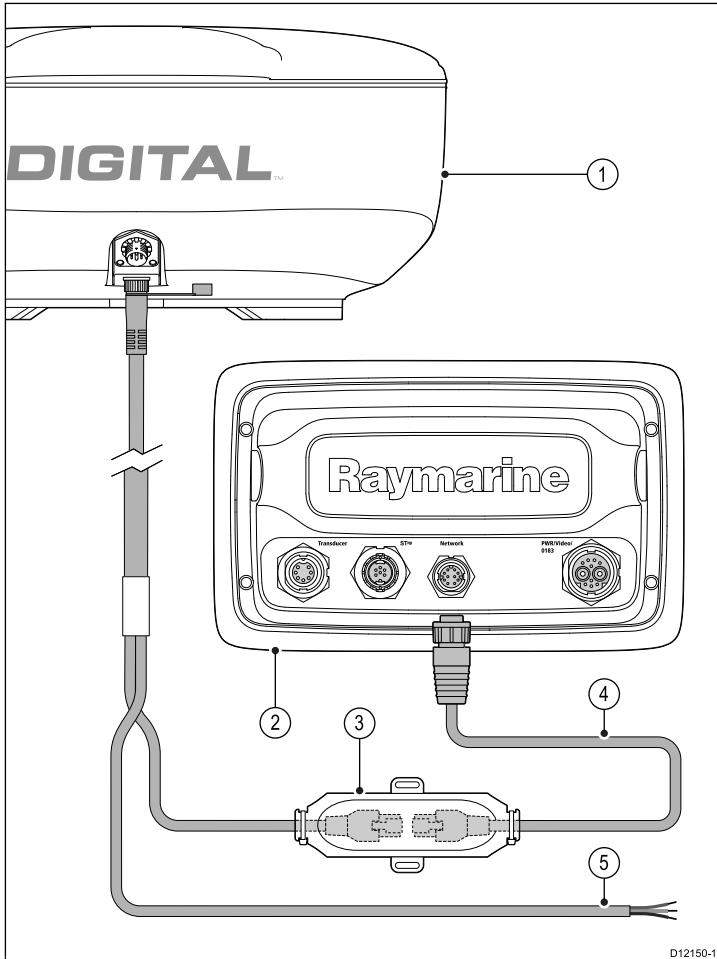
Radar connected using Raymarine network switch



D1268-1

1. Digital radar scanner.
2. Raymarine network switch.
3. RayNet cable.
4. VCM (Voltage Converter Module) — **required for Open Arrays.**
5. Power connection.

Radar connected directly to the display

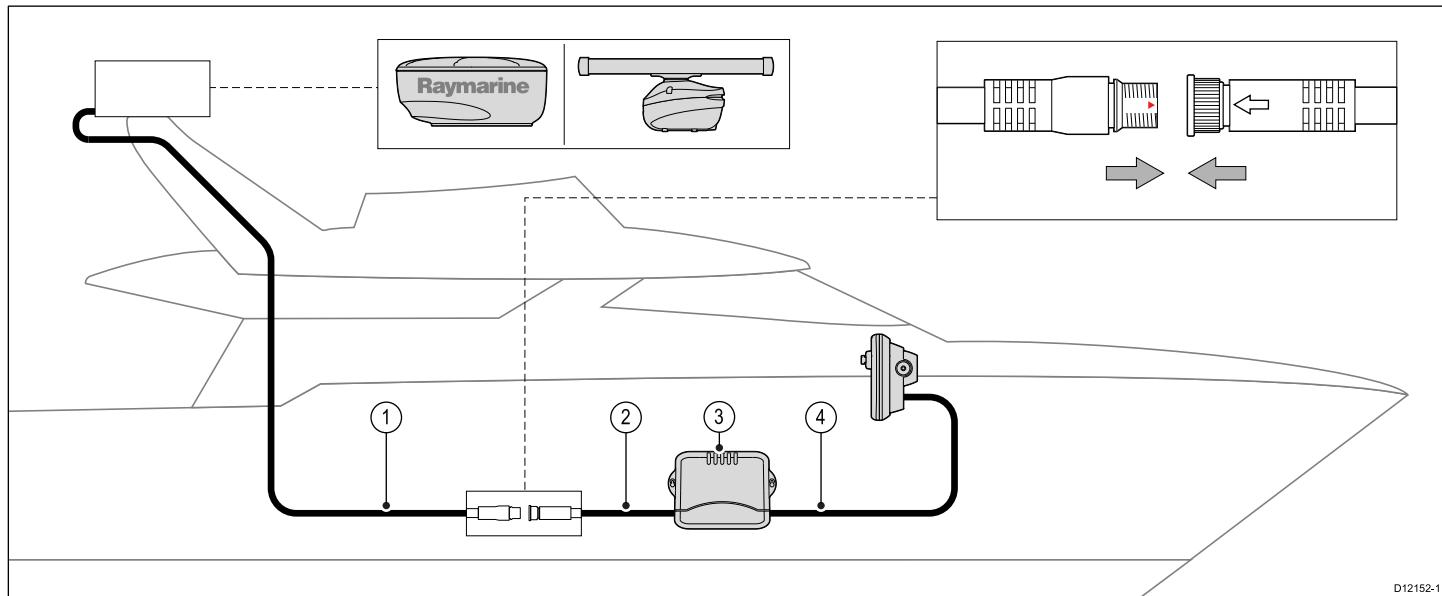


1. Digital radar scanner.
2. Multifunction display.
3. SeaTalk^{hs} crossover coupler.
4. RayNet cable.
5. Connection to power supply — **Open Array scanners require a VCM (Voltage Converter Module).**

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.

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).

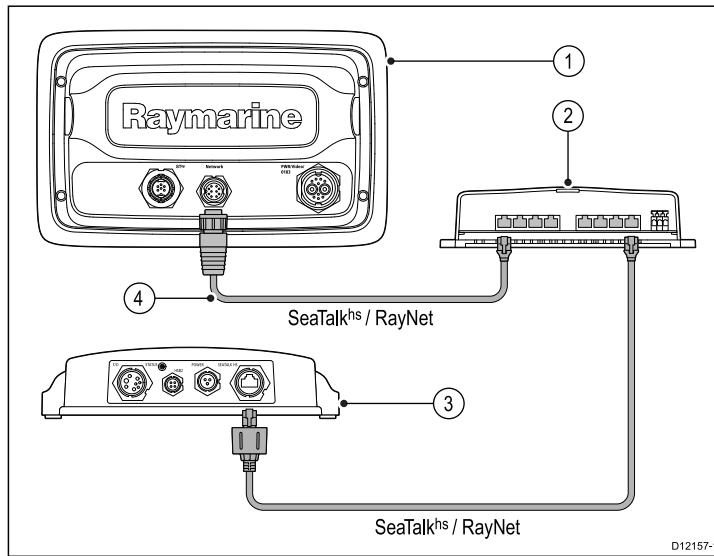
Sonar connection

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 "D" variant multifunction display models feature a built-in Digital Sounder Module (DSM), enabling you to connect the display directly to a compatible sonar transducer. Non-"D" variant models require a connection to an external Raymarine DSM unit. Internal and external DSM units require a connection to a compatible sonar transducer.
- **Sonar transducer connection** — provides sonar signals to the Digital Sounder Module (DSM).

Sonar DSM connection



1. Multifunction display (Non-“D” variant).
2. Raymarine network switch.
3. DSM unit (for example, DSM300).
4. RayNet cable.

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

- DSM300
- DSM30

Note: You can also connect the “D” variant displays to an external DSM. 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 SeaTalk^{hs} devices) the DSM may be connected directly to the display without using a Raymarine network switch.

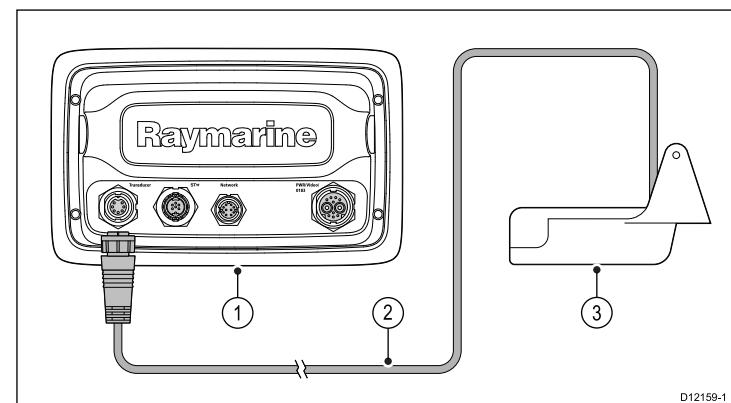
Note: You must ensure that the cable ends connected into the display and DSM have a locking / weather-tight mechanism.

Compatible sonar transducers

The multifunction display is compatible with the following sonar transducers:

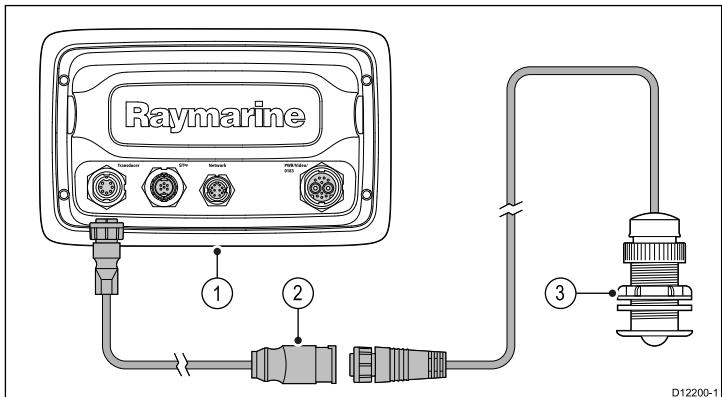
- Raymarine P48.
- Raymarine P58.
- Minn Kota transducers (“D” variant Raymarine displays only), via optional A62363 adaptor cable.
- Any 600 watt DSM-compatible transducer, via optional E66066 adaptor cable.

Sonar transducer connection — “D” variant models



1. Multifunction display ("D" variant).
2. Sonar transducer cable.
3. Sonar transducer.

600 watt DSM-compatible sonar transducer connection via optional adaptor — "D" variant models

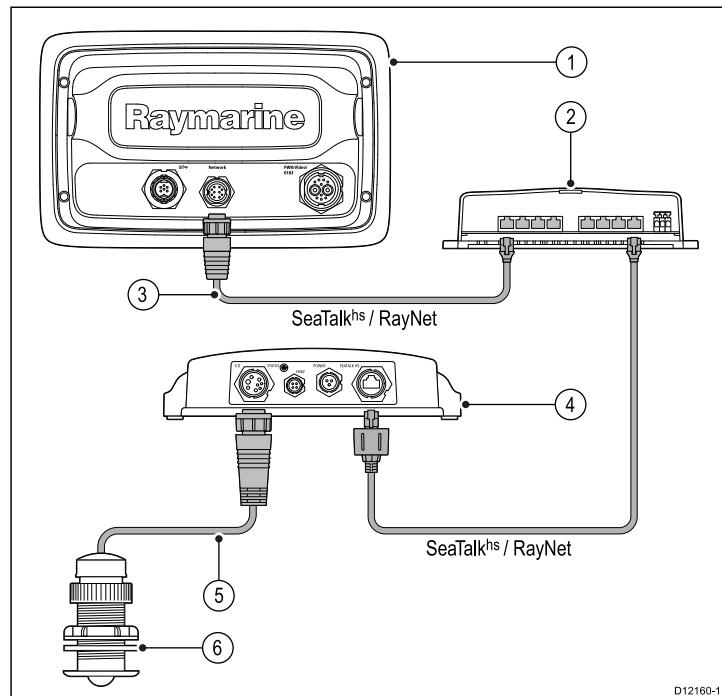


1. Multifunction display ("D" variant).
2. E66066 adaptor cable.
3. Sonar transducer.

Transducer adaptor cable

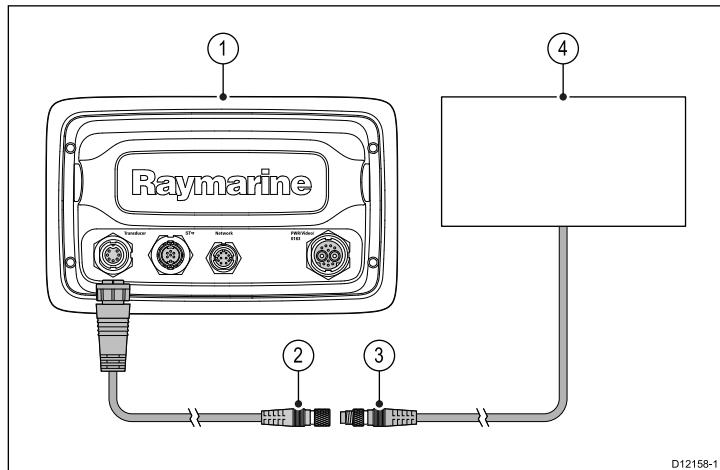
Cable	Part number
0.5 m (1.64 ft) transducer adaptor cable	E66066

Sonar transducer connection — Non—"D" variant models



1. Multifunction display.
2. Raymarine network switch (only required if connecting more than one device using SeaTalk^{hs} / RayNet).
3. RayNet cable.
4. DSM unit (for example, DSM300).
5. Sonar transducer cable.
6. Sonar transducer.

Minn Kota sonar transducer connection via optional adaptor cable ("D" variant models only)



1. Multifunction display.
2. Minn Kota transducer adaptor cable.
3. Minn Kota transducer cable.
4. Minn Kota transducer.

Minn Kota transducer adaptor cable

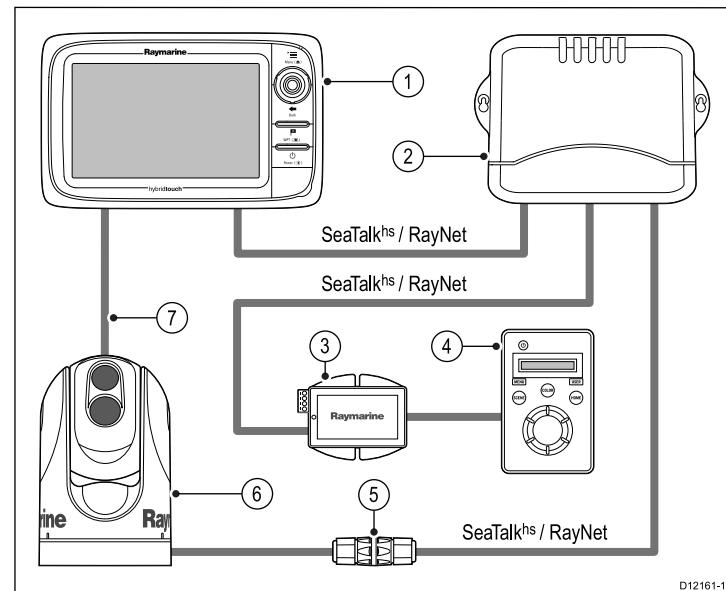
Connects a Minn Kota sonar transducer to a compatible Raymarine multifunction display.

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.



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.

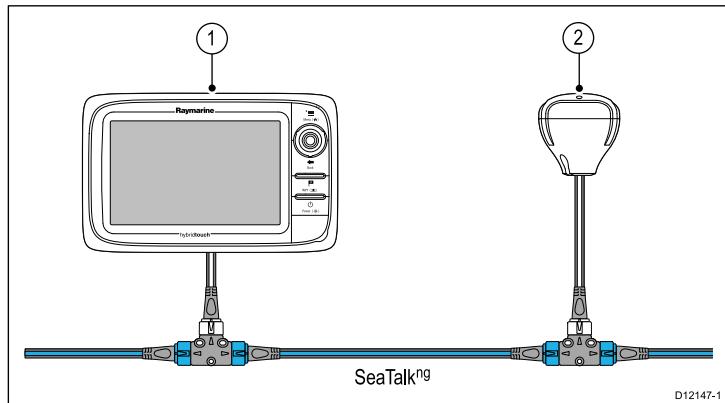
Video cables

Contact your dealer for suitable cables and adaptors.

3.5 GPS connection

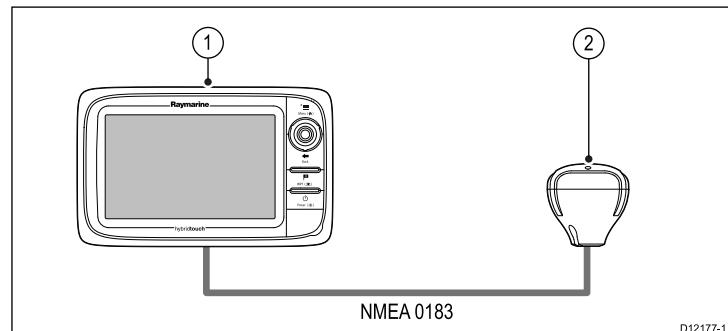
The multifunction display includes an internal GPS receiver. It can also be connected to an external GPS receiver, using SeaTalk^{ng} or NMEA 0183.

GPS connection — SeaTalk^{ng}



1. Multifunction display.
2. SeaTalk^{ng} GPS receiver (for example, RS130).

GPS connection — NMEA 0183

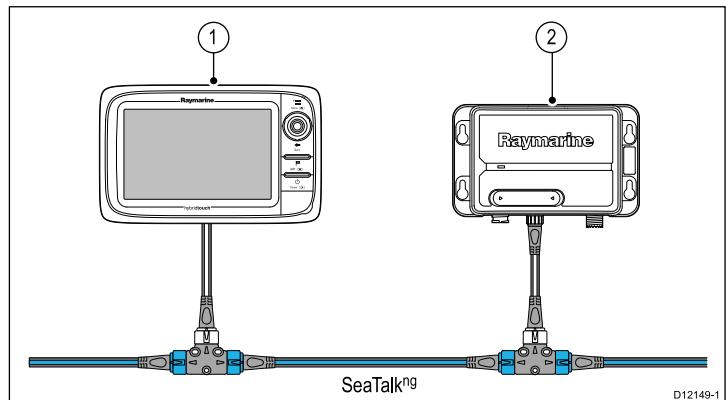


1. Multifunction display.
2. NMEA 0183 GPS receiver (for example, RS125).

3.6 AIS connection

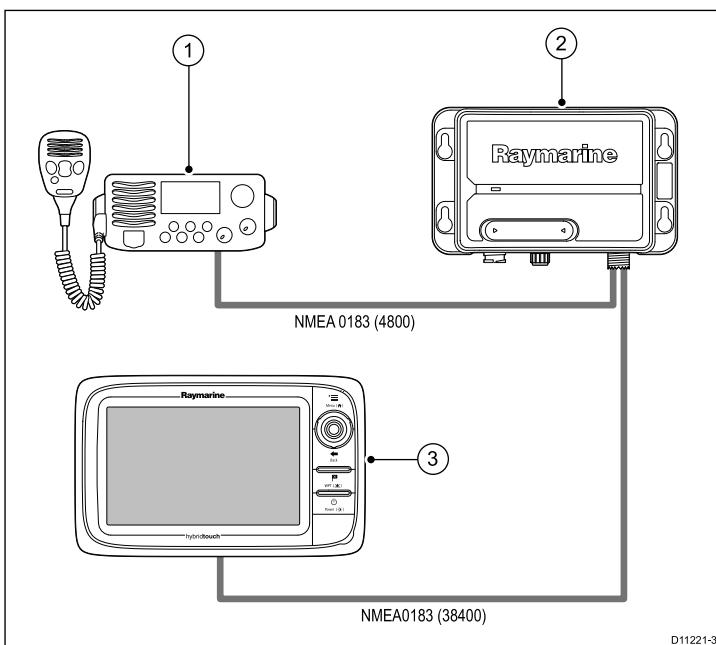
A compatible AIS can be connected using SeaTalk^{ng} or NMEA 0183.

Connection using SeaTalk^{ng}



1. Multifunction display.
2. SeaTalk^{ng} AIS receiver / transceiver.

Connection using NMEA 0183



1. VHF radio.
2. AIS unit.
3. Multifunction display.

3.7 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.

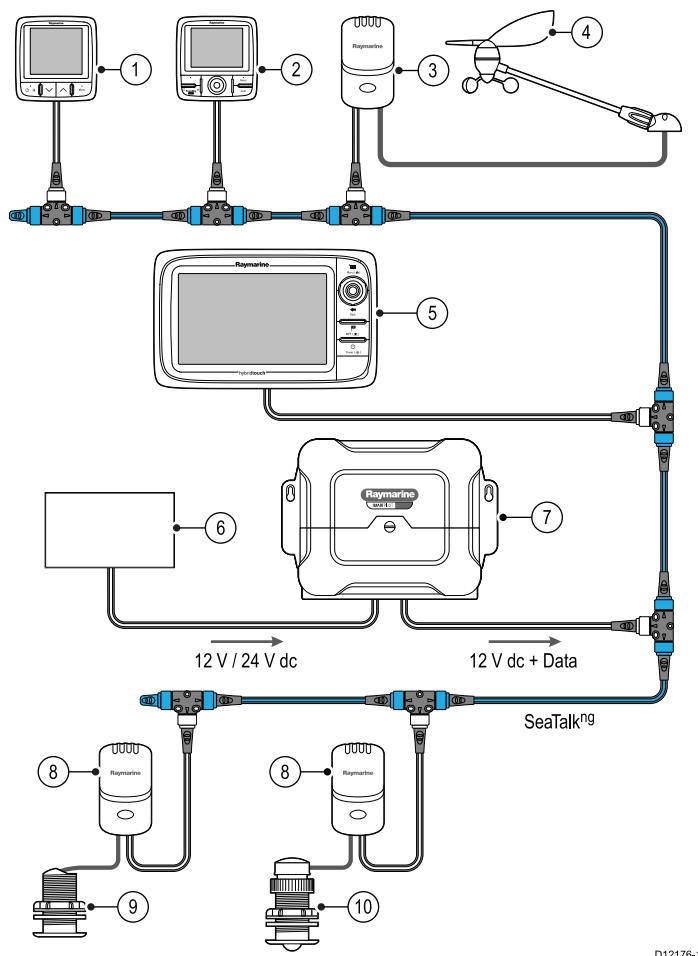
3.8 SeaTalk^{ng} connections

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.

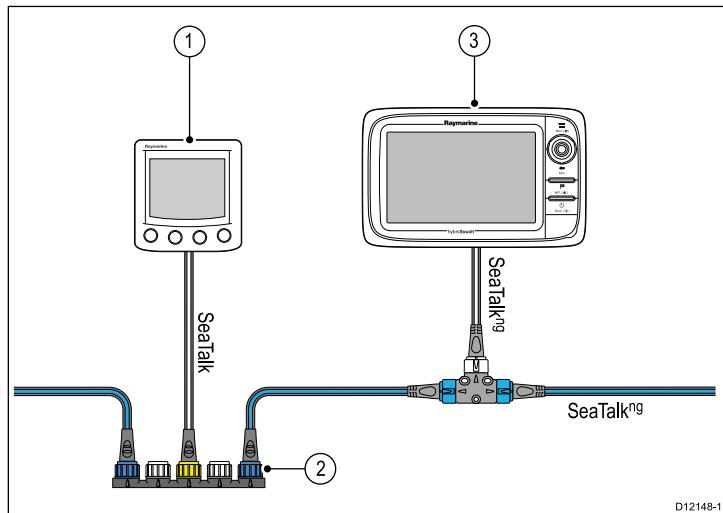
Description	Part No	Notes
Backbone Kit	A25062	Includes: <ul style="list-style-type: none"> • 2 x 5 m (16.4 ft) Backbone cable • 1 x 20 m (65.6 ft) Backbone cable • 4 x T-piece • 2 x Backbone terminator • 1 x Power cable
SeaTalk ^{ng} 0.4 m (1.3 ft) spur	A06038	
SeaTalk ^{ng} 1 m (3.3 ft) spur	A06039	
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	

Description	Part No	Notes
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	
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	

Description	Part No	Notes
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.

3.9 SeaTalk connection

You can connect SeaTalk devices to your multifunction display using the optional SeaTalk to SeaTalk^{ng} converter.



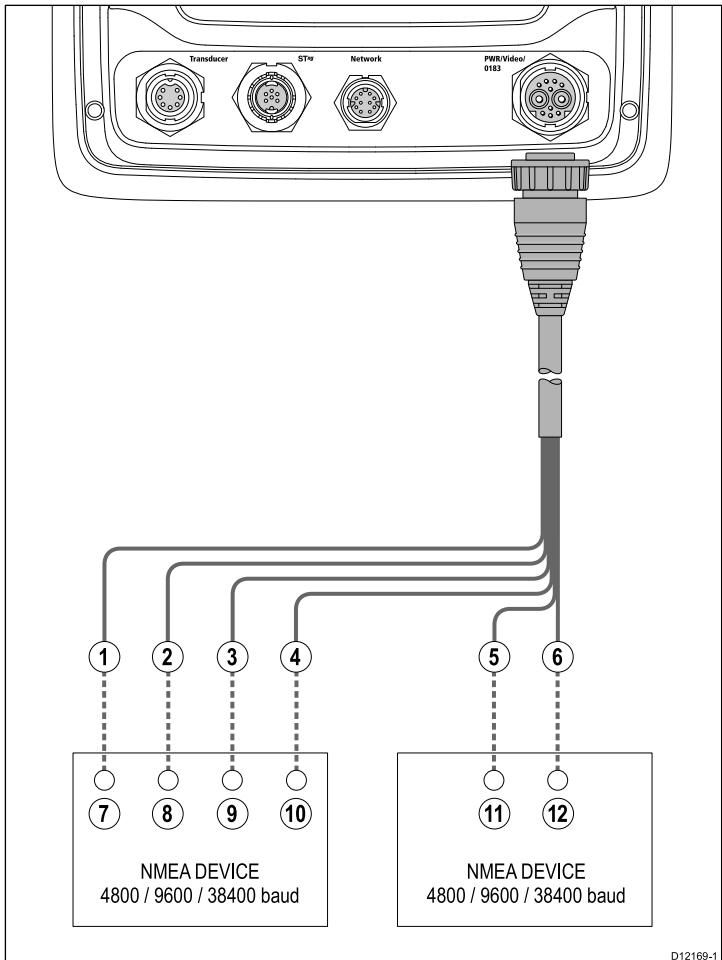
1. SeaTalk device.
2. SeaTalk to SeaTalk^{ng} converter.
3. Multifunction display.

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	

3.10 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
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: <ul style="list-style-type: none">• 2 x twisted pair with overall shield.• 50 to 75 pF/m capacitance core to core.

3.11 NMEA 2000 connection

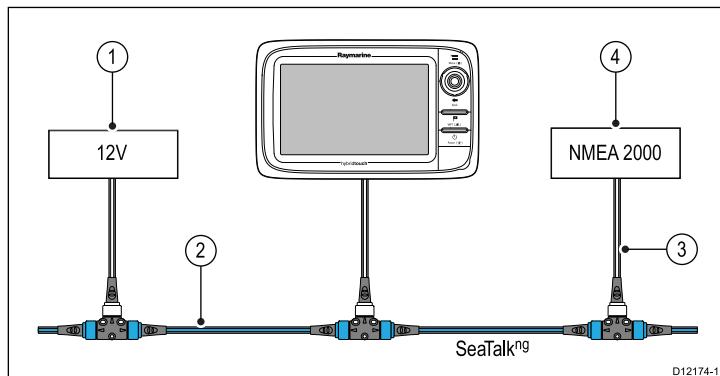
The display can receive data from NMEA 2000 devices (e.g. data from compatible engines). The NMEA 2000 connection is made using SeaTalk^{ng} and appropriate adaptor cables.

You can EITHER:

- Use your SeaTalk^{ng} backbone and connect each NMEA 2000 device on a spur, OR
- connect the display on a spur into an existing NMEA 2000 backbone.

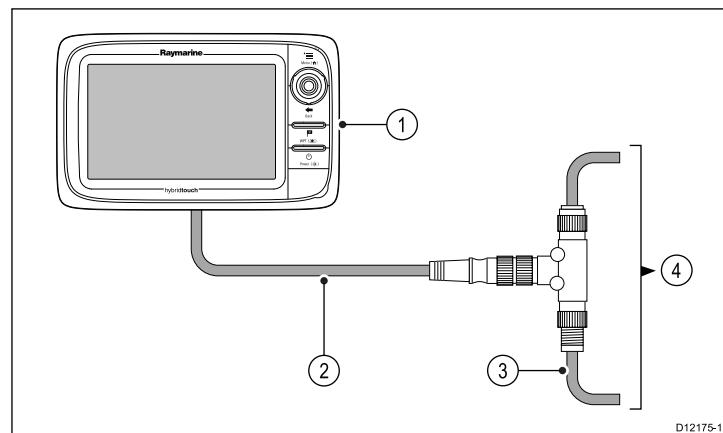
Important: You cannot have 2 backbones connected together.

Connecting NMEA 2000 equipment to the SeaTalk^{ng} backbone



1. 12 V supply into backbone.
2. SeaTalk^{ng} backbone.
3. SeaTalk^{ng} to DeviceNet adaptor cable.
4. NMEA 2000 equipment.

Connecting the display to an existing NMEA 2000 (DeviceNet) backbone



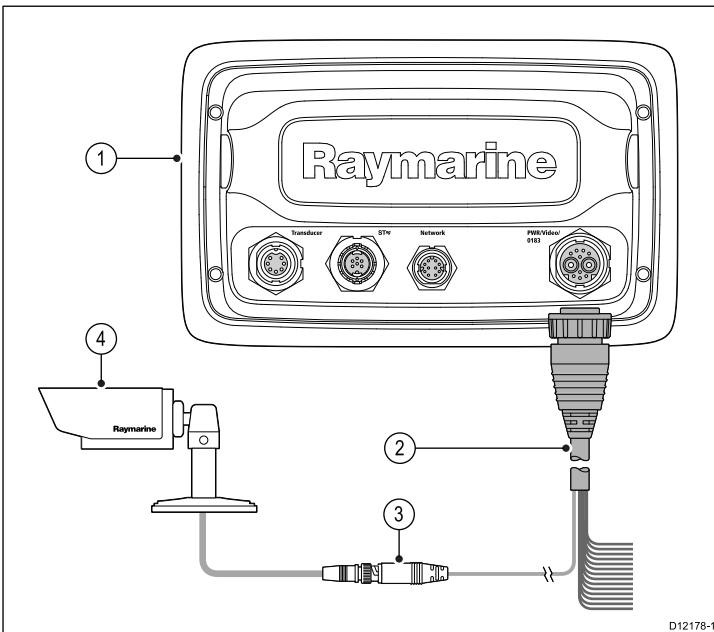
1. Multifunction display.
2. SeaTalk^{ng} to DeviceNet adaptor cable.
3. DeviceNet^{ng} backbone.
4. NMEA 2000 equipment.

3.12 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.
- Smartphone (typically requires a docking station featuring a video output).
- Portable digital video player.



1. Multifunction display.
2. Power and data cable.
3. Video connector.
4. Video source — for example, video camera.

Video specification

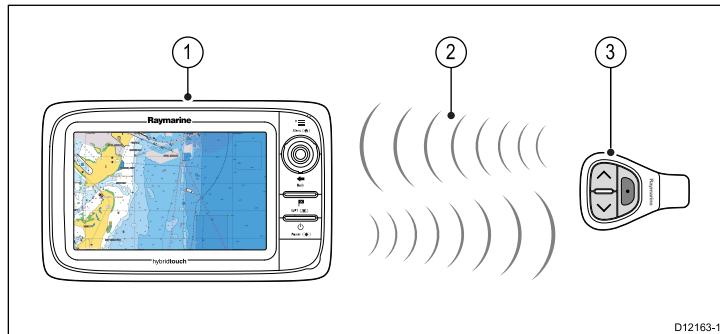
Signal type	Composite
Format	PAL or NTSC
Connector type	BNC (female)

3.13 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.



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 **Wireless Connections**.

4. Select **Bluetooth > ON**.

5. Select **New Bluetooth Connection**.

6. On your **remote control unit**, hold down the UP and DOWN buttons together for 10 seconds.

7. Select OK to clear the on-screen message.
A list of discovered devices is displayed.

8. Select the remote control unit in the list of devices.

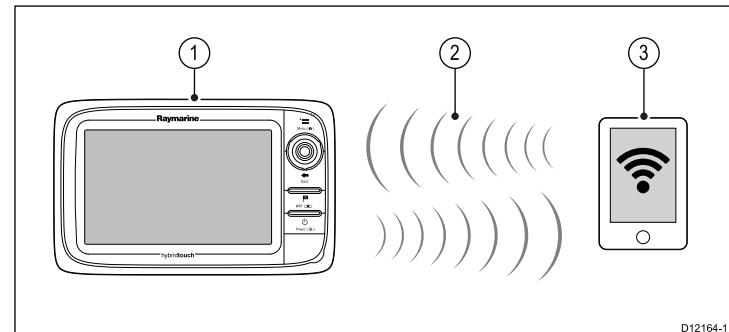
9. When prompted, press the arrow button on your remote that you wish to be configured as the UP button. The other arrow button will automatically be configured as the DOWN button.

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).



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.

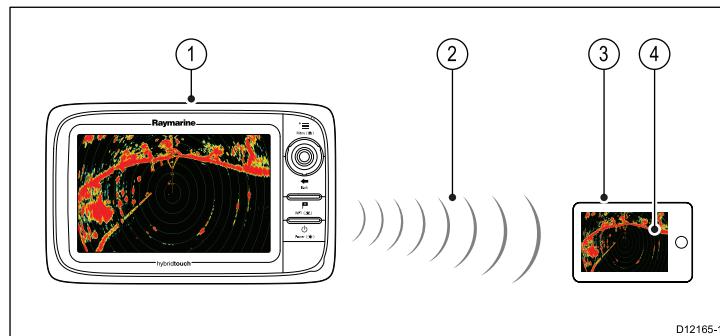
Note: If your media player does not include built-in speakers it may be necessary to connect the media player's audio output to an external audio system or a pair of headphones. For more information refer to the instructions that accompany the media player device.

3.14 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. WiFi connection.
3. Apple iPhone 4 (or later) or iPad.
4. “Raymarine Viewer” video streaming app.

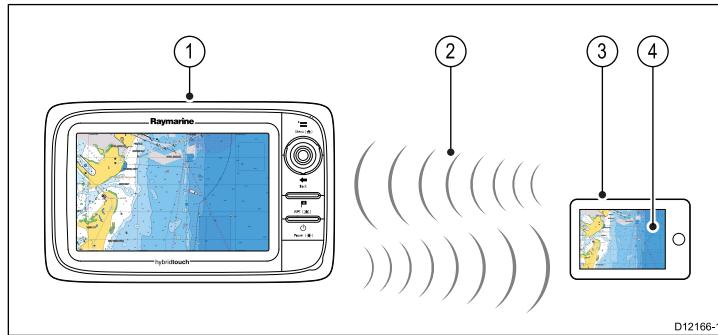
To use this feature you must first:

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

Chapter 4: Location and mounting

Chapter contents

- [4.1 Selecting a location on page 66](#)
- [4.2 Removing the rear bezel on page 68](#)
- [4.3 Flush mounting on page 69](#)
- [4.4 Attaching the rear bezel on page 70](#)
- [4.5 Bracket \(trunnion\) mounting on page 70](#)
- [4.6 Front bezel on page 72](#)

4.1 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.

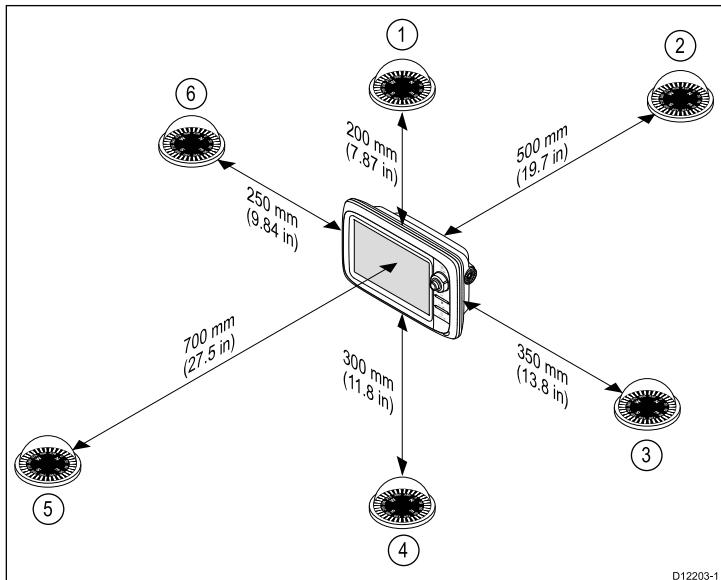
- **Power supply**

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.

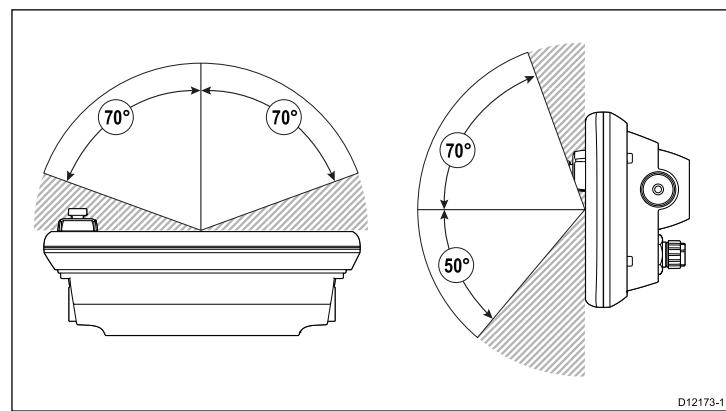
When choosing a suitable location for the multifunction display you should aim to maintain the maximum possible distance between the display and any compasses. Typically this distance should be at least 1 m (3 ft) in all directions. However for some smaller vessels it may not be possible to locate the 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.



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.

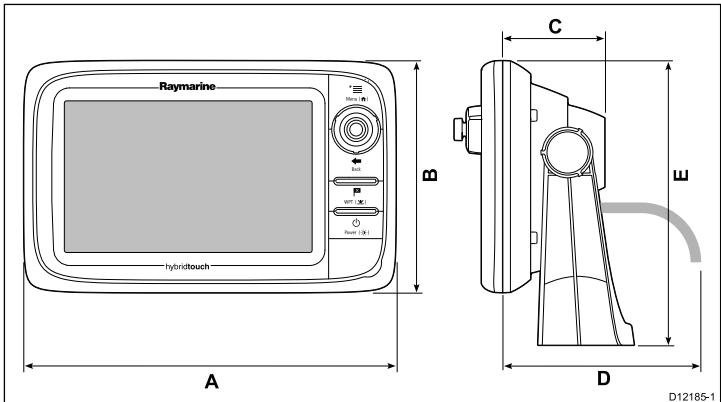
Viewing angle



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

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.)

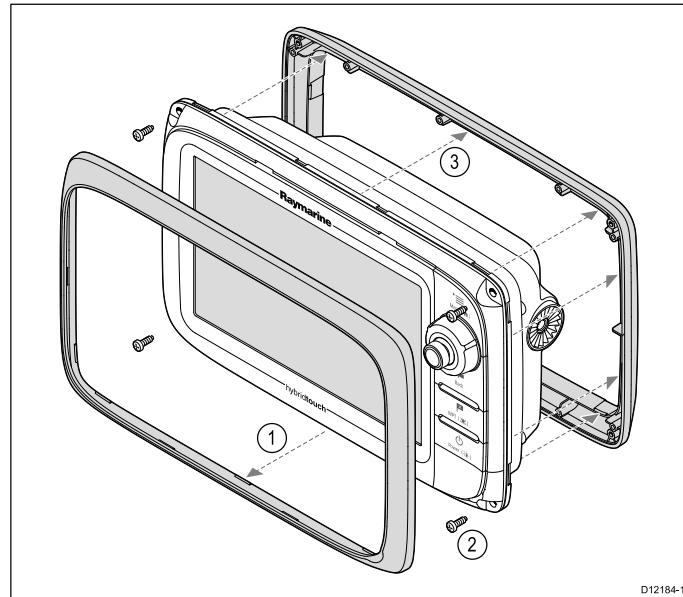
Product dimensions



4.2 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.



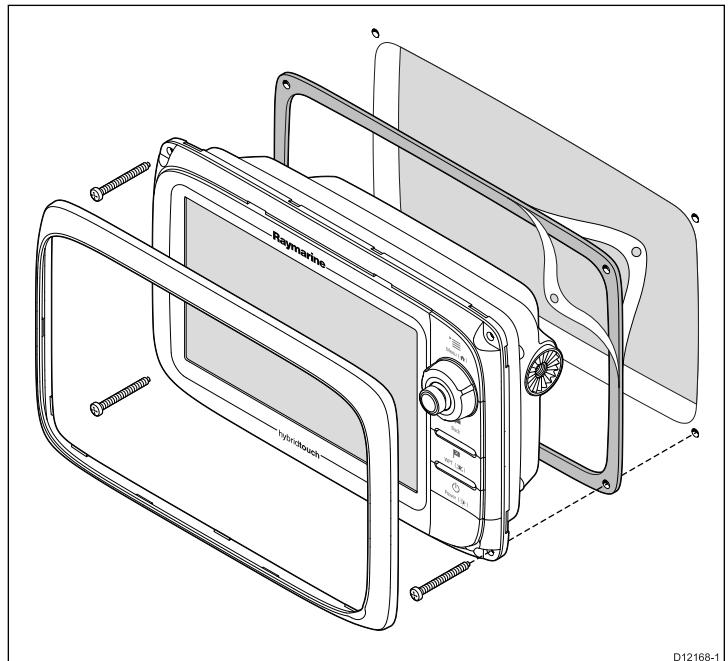
2. Remove the screws that secure the bezel to the display.
3. Carefully remove the bezel from the rear of the display, pulling the bezel gently along the:
 - i. Outer edges - work from the sides upwards and then along the top edge, ensuring that the clips are fully released from the display.
 - ii. Inner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

4.3 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.



D12168-1

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.

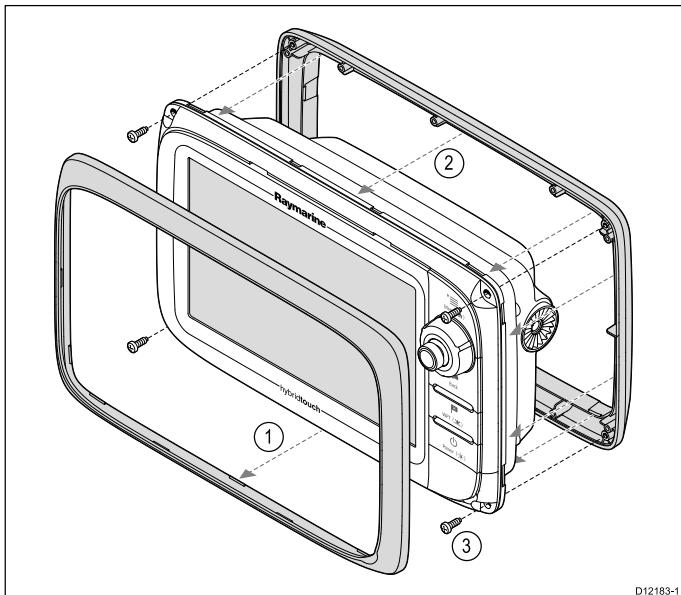
Note: The appropriate torque to use when drilling depends on the thickness of the mounting surface and the type of material.

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.

4.4 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.



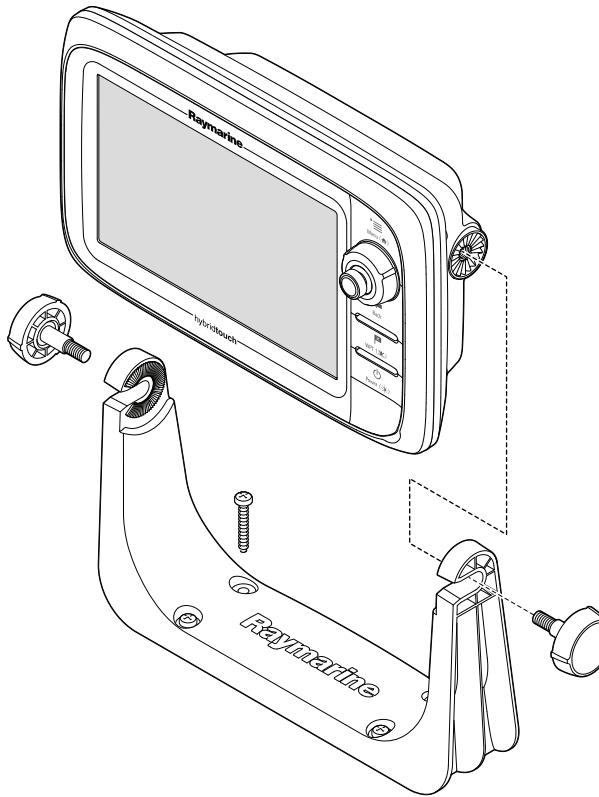
3. Use the supplied screws to secure the bezel to the display.

4.5 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.



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

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.

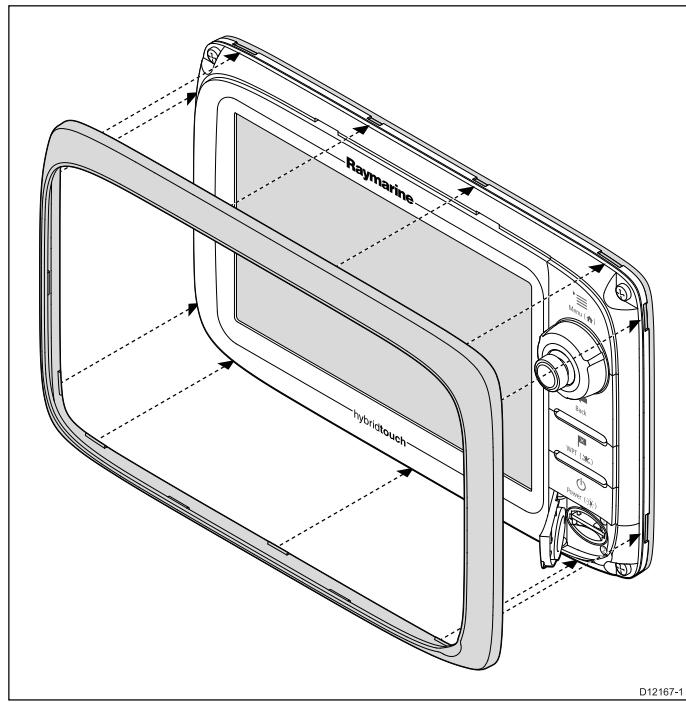
4.6 Front bezel

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,

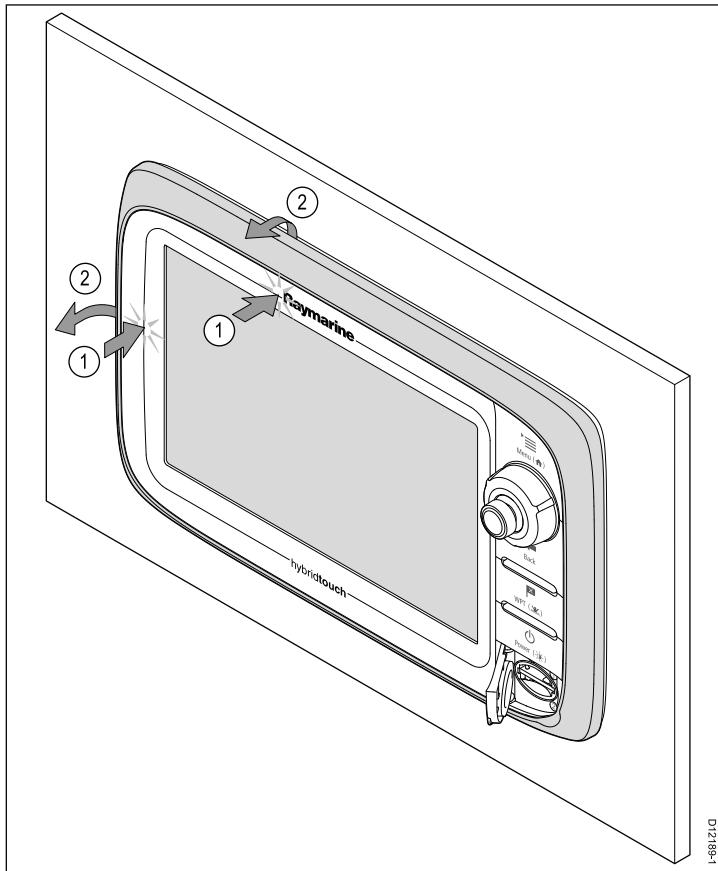
ensuring that the clips along the bottom edge of the bezel latch into position.



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.



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 5: System checks

Chapter contents

- 5.1 Initial power on test on page 76
- 5.2 Designating the data master on page 78
- 5.3 GPS check on page 78
- 5.4 Radar check on page 81
- 5.5 Sonar check on page 83
- 5.6 Thermal camera setup and checks on page 84
- 5.7 Enabling autopilot functions on page 86
- 5.8 Enabling AIS functions on page 86
- 5.9 Language selection on page 87

5.1 Initial power on test

Touchscreen overview

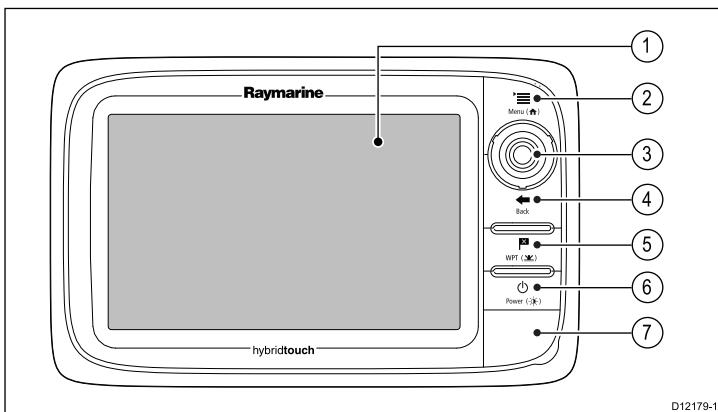
The touchscreen provides a quick way of performing many common functions.

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.

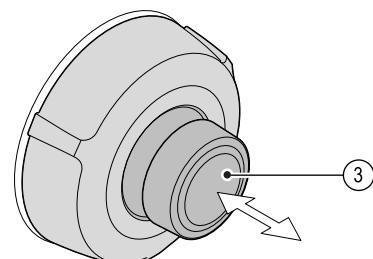
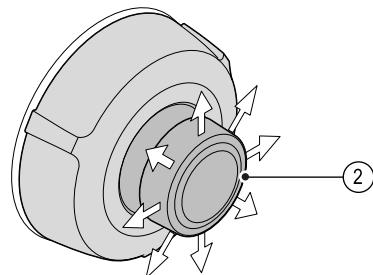
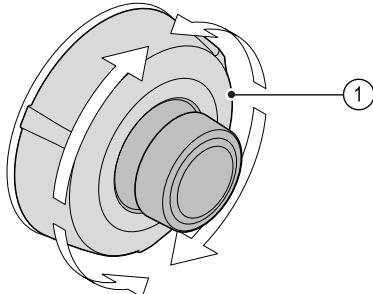
Note: Raymarine strongly recommends that you familiarize yourself with touch operations while your vessel is anchored or moored. You may find it helpful to use the simulator mode (accessible from **Homescreen > Set-up > System Settings**) in these situations.

Controls



D12179-1

1. **Touchscreen** — you can touch the screen to operate many common functions, including all menu operations.
2. **Menu** — accesses menus. Press again to close menus.
3. **UniControl** — provides a joystick 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. **WPTS / 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.



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 select menu items, and pan left and right in the chart and fishfinder applications.
3. **OK button** — push the end of the joystick to confirm a selection or entry.

Powering the display on

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

5.2 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.

5.3 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

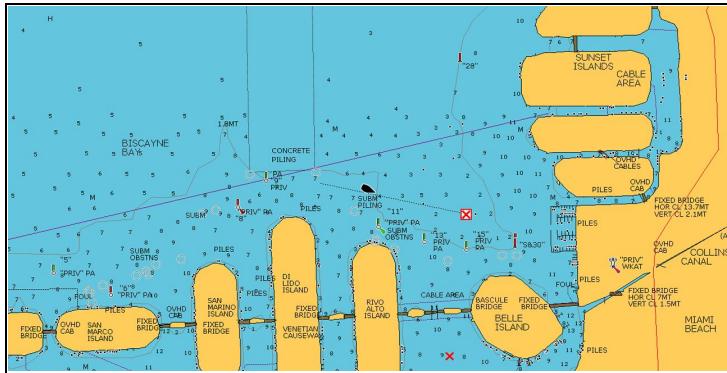
With the homescreen displayed:

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.

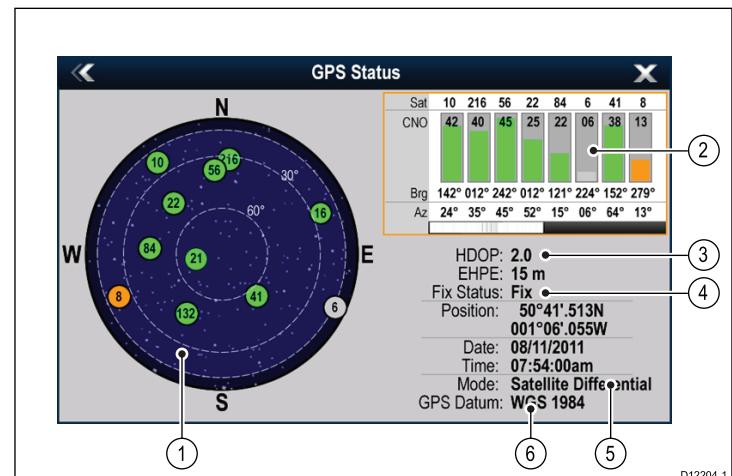
Note: A GPS Status screen is available within the Setup menu of Raymarine multifunction displays. This provides satellite signal strength and other relevant information.

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: <ul style="list-style-type: none"> • 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.

5.4 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.

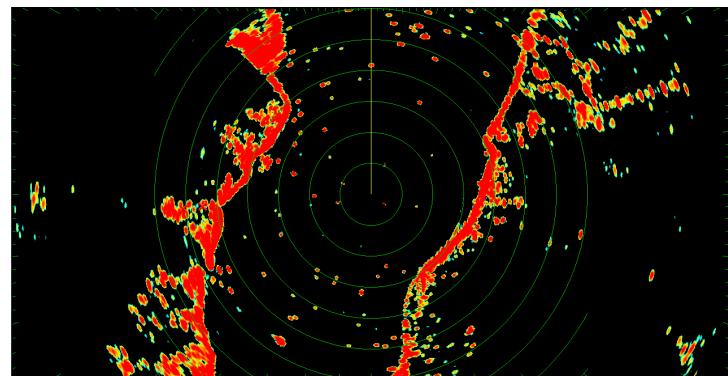
The Radar scanner will now initialize in standby mode. This process will take approximately 70 seconds.

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:

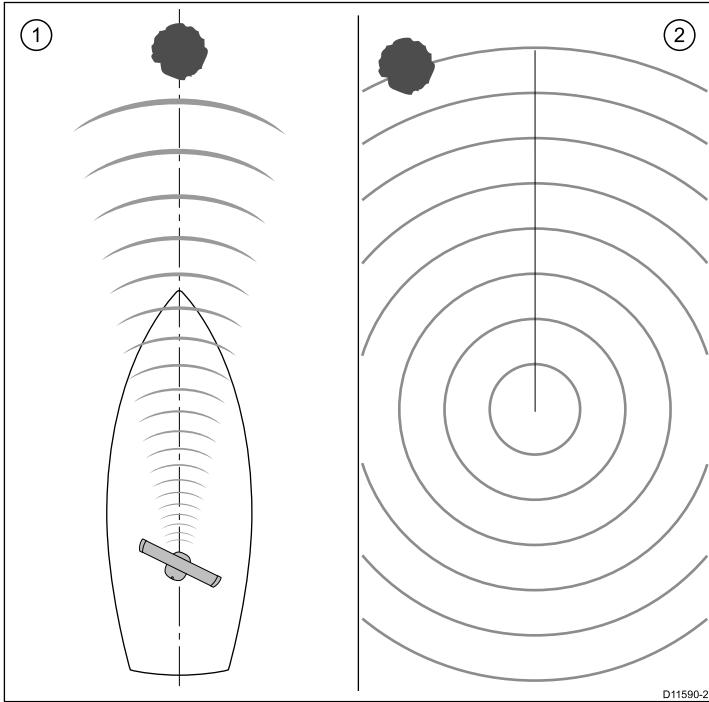
- Radar sweep with echo responses are shown on screen.
- Radar status icon rotating in top right hand corner.

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



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.

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.

5.5 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 Module (DSM) that you want to use.

Digital Sounder Module (DSM) selection

- “D” variant models are fitted with an internal sonar DSM.
- All models allow you to connect a compatible external DSM unit.
- If an external DSM unit is connected to a “D” variant model and a power supply the internal DSM is disabled.
- To use the internal DSM on “D” variant models that are also connected to an external DSM, disconnect the network cable from the external DSM unit and use the **Sounder Set-Up** menu in the fishfinder application to enable the internal DSM.

Transducer selection

- “D” variant models allow the direct connection of EITHER a Raymarine OR a Minn Kota sonar transducer.
- All models allow the connection of a Raymarine sonar transducer via a compatible external DSM unit.
- For all models 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

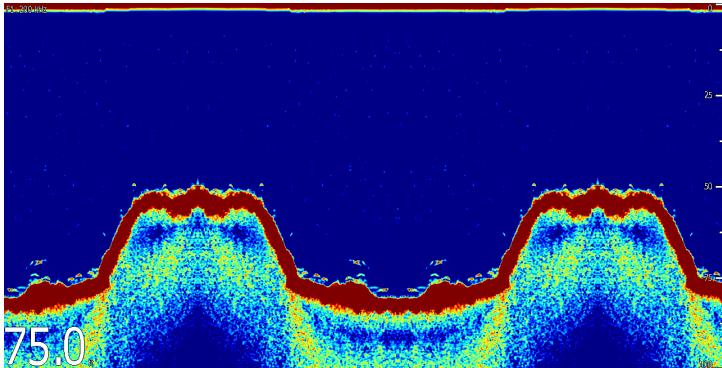
With the fishfinder application displayed:

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.

5.6 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:

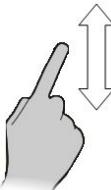
1. Select **Menu**.
2. Select **Adjust Contrast**.
3. Select the Contrast, Brightness, or Color option as appropriate.
4. Use the rotary control to adjust as required.

Panning, tilting, and zooming the thermal image

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

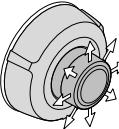
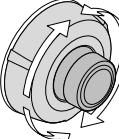
- Using the touchscreen and the UniControl's rotary control.
- Using the UniControl's joystick and rotary controls.

To pan and tilt the thermal camera using touch actions:

	<p>Move your finger up and down the screen to tilt the camera up or down.</p>
	<p>Move your finger left and right on the screen to rotate the camera left or right (panning).</p>

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.

	<p>UniControl joystick — is used for rotating the camera left or right (panning), or tilting the camera up or down.</p>
	<p>UniControl rotary — is used to zoom in and out.</p>

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.

5.7 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.

5.8 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.

5.9 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.

Chapter 6: Troubleshooting

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- 6.12 Miscellaneous troubleshooting on page 104

6.1 Troubleshooting

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

All Raymarine products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programs. However, if you experience problems with the operation of your product this section will help you to diagnose and correct problems in order to restore normal operation.

If after referring to this section you are still having problems with your unit, please contact Raymarine Technical Support for further advice.

6.2 Power up troubleshooting

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

Problem	Possible causes	Possible solutions
The system (or part of it) does not start up.	Power supply problem.	Check relevant fuses and breakers.
		Check that the power supply cable is sound and that all connections are tight and free from corrosion.
		Check that the power source is of the correct voltage and sufficient current.

6.3 Radar troubleshooting

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

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

6.4 GPS troubleshooting

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

Problem	Possible causes	Possible solutions
"No Fix" GPS status icon is displayed.	Geographic location or prevailing conditions preventing satellite fix.	Check periodically to see if a fix is obtained in better conditions or another geographic location.
	GPS connection fault.	Ensure that external GPS connections and cabling are correct and fault free.
	External GPS antenna in poor position. For example: <ul style="list-style-type: none">• Below decks.• Close proximity to transmitting equipment such as VHF radio.	Ensure GPS antenna has a clear view of the sky.
	GPS installation problem.	Refer to the installation instructions.

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

6.5 Sonar troubleshooting

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

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

Problem	Possible causes	Possible solutions
	Scroll speed set to zero	Adjust scroll speed
Incorrect speed reading	Paddle wheel fault	Check that the paddle wheel is clean.
	No speed offset set	Add speed offset.
	Incorrect calibration	Re-calibrate equipment

6.6 Thermal camera troubleshooting

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

Problem	Possible causes	Possible solutions
Video not displayed.	Camera is in Standby mode.	The camera will not display video if it is in Standby mode. Use the camera controls (either the thermal camera application or JCU) to “wake” the camera from standby.
	Problem with the thermal camera video connections.	<ul style="list-style-type: none">Check thermal camera video cables are sound and properly connected.Ensure that the video is connected into video input 1 at the multifunction display or GVM.Ensure that the correct video input is selected at the display.
	Problem with power supply to the camera or JCU (if used as the primary controller)	<ul style="list-style-type: none">Check the power connections to the camera and JCU / PoE injector (if used).Ensure that the power switch / breaker is on.Check the fuse / breaker state.
Cannot control thermal camera from Raymarine display or keyboard.	Thermal camera application is not running.	Ensure the thermal camera application is running on the multifunction display (as oppose to the video application which does not have camera controls).

Problem	Possible causes	Possible solutions
Erratic or unresponsive controls.	SeaTalk ^{hs} problem.	Check that the controller and thermal camera are correctly connected to the SeaTalk ^{hs} network. (Note: This may be a direct connection or via a SeaTalk ^{hs} switch.)
		Check the status of the SeaTalk ^{hs} switch.
		Check that SeaTalk ^{hs} cables are free from damage.
	Control conflict, e.g. caused by multiple users at different stations.	Ensure that no other controllers are in use at the same time.
	Problem with the controller.	Check power / SeaTalk ^{hs} cabling to the controller and PoE injector (PoE only used with optional Joystick Control Unit).
		Check other controllers if available. If other controllers are operating this will eliminate the possibility of a more fundamental camera fault.
Cannot switch between thermal and visible (VIS / IR) video image .	Camera is not a dual payload model.	Only "dual payload" (dual lens) thermal cameras support VIS / IR switching.
	VIS / IR cable not connected.	Ensure that the VIS / IR cable is connected from the camera to the Raymarine system. (The IR-only cable does not support switching).
Noisy image.	Poor quality or faulty video cable.	Ensure that the video cable is no longer than necessary. The longer the cable is (or the smaller the wire gauge / thickness), the more severe the losses become. Use only high quality shielded cable suitable for a marine environment.
	Cable is picking up electromagnetic interference (EMI) from another device.	<ul style="list-style-type: none"> • Ensure you are using a high quality shielded cable. • Ensure proper cable separation, for example do not run data and power cables in close proximity with each other.

Problem	Possible causes	Possible solutions
Image too dark or too light.	Display brightness is set too low.	Use the brightness controls at the display to adjust accordingly.
	The contrast or brightness settings in the thermal camera application are set too low.	Use the appropriate softkeys in the thermal camera application to adjust the contrast and brightness of the image.
	The Scene Mode is not appropriate for the current conditions.	A particular environment may benefit from a different Scene Mode setting. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate. Use the SCENE button.
Image freezes momentarily.	FFC (Flat Field Correction).	The image will pause momentarily on a periodic basis during the Flat Field Correction (FFC) cycle. Just prior to the FFC, a small green square will appear in the upper left corner of the screen.
Image is inverted (upside down).	Camera "Ball down" setting is incorrect.	Ensure that the Ball down setting within the thermal camera system setup menu is set correctly.

6.7 System data troubleshooting

Aspects of the installation can cause problems with the data shared between connected equipment. Such problems, their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Instrument, engine or other system data is unavailable at all displays.	Data is not being received at the display.	<p>Check the data bus (e.g. SeaTalk^{ng}) wiring and connections.</p> <p>Check the overall integrity of the data bus (e.g. SeaTalk^{ng}) wiring.</p> <p>If available refer to the reference guide for the data bus. (e.g. SeaTalk^{ng} reference manual)</p>
	Data source (e.g ST70 instrument or engine interface) is not operating.	<p>Check the source of the missing data (e.g. ST70 instrument or engine interface).</p> <p>Check the power to the SeaTalk bus.</p> <p>Refer to the manufacturer's handbook for the equipment in question.</p>
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support.
Instrument or other system data is missing from some but not all displays.	SeaTalk ^{hs} network problem	<p>Check that all required equipment is connected to the SeaTalk^{hs} switch.</p> <p>Check the status of the SeaTalk^{hs} Switch.</p> <p>Check that SeaTalk^{hs} cables are free from damage.</p>
	Software mismatch between equipment may prevent communication.	Contact Raymarine technical support

6.8 Video troubleshooting

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

Problem	Possible causes	Possible solutions
No signal message on screen (video image not displayed)	Cable or connection fault	Check that the connections are sound and free from corrosion.

6.9 WiFi troubleshooting

Aspects of the installation can cause problems with the data shared between wireless devices. Such problems, their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No wireless connection.	iPhone does not have a wireless connection established with the multifunction display.	<p>Ensure that WiFi is enabled on the multifunction display (Homescreen: > Set-Up > System Settings > Wireless Connections > WiFi > ON).</p> <p>Ensure that the “WiFi” option is enabled on the iPhone (available from the phone’s Settings menu).</p> <p>Ensure that the Raymarine connection is selected as the WiFi network. If a passcode has been specified for the multifunction display’s WiFi connection ensure that the same passcode is entered into the iPhone when prompted.</p>
No video streaming to iPhone.	iPhone does not have “Raymarine Viewer” iPhone app installed and running. “Display Streaming” is NOT enabled on the multifunction display.	<p>Download the “Raymarine Viewer” iPhone app from the Apple App Store.</p> <p>Start the “Raymarine Viewer” app on the iPhone.</p> <p>Enable “Display Streaming” (Homescreen: > Set-Up > System Settings > Wireless Connections > Display Streaming > ON).</p>
No waypoint / routes synchronization with Navionic Marine app.	iPhone does not have “Navionics Marine” iPhone app installed and running. Chart application is not running on the multifunction display.	<p>Download the “Navionics Marine” iPhone app from the Apple App Store.</p> <p>Start the “Navionics Marine” app on the iPhone.</p> <p>Start the chart application on the multifunction display.</p>
Weak or intermittent WiFi signal.	Interference from other wireless devices in the vicinity.	Multiple wireless devices running simultaneously (such as laptops, phones, and other wireless devices) can sometimes cause wireless signal conflicts. Temporarily disable each wireless device in turn until you have identified the device causing the interference.

6.10 Bluetooth troubleshooting

Aspects of the installation can cause problems with the data shared between wireless devices. Such problems, their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
No wireless connection.	iPhone does not have a Bluetooth connection established with the multifunction display.	Ensure that Bluetooth is enabled on the multifunction display (Homescreen: > Set-Up > System Settings > Wireless Connections > Bluetooth > ON).
		Ensure that the “Bluetooth” option is enabled on the iPhone (available from the phone’s Settings / General menu).
		Ensure that the Bluetooth device is paired with the multifunction display that you want to use it with. To do this: Homescreen: > Set-Up > System Settings > Wireless Connections > New Bluetooth Connection .
No media player control.	Media player device is not compatible with the Bluetooth AVRCP protocol (version 2.1 or higher).	Check the Bluetooth AVRCP compatibility with the device manufacturer. If the device is not Bluetooth AVRCP compatible then it is not suitable for wireless use with the multifunction display.
	“Audio Control” is NOT enabled on the multifunction display.	Enable “Audio Control” (Homescreen: > Set-Up > System Settings > Wireless Connections > Connections Manager > Audio Control > ON).
Weak or intermittent Bluetooth signal.	Interference from other wireless devices in the vicinity.	Multiple wireless devices running simultaneously (such as laptops, phones, and other wireless devices) can sometimes cause wireless signal conflicts. Temporarily disable each wireless device in turn until you have identified the device causing the interference.

6.11 Touchscreen troubleshooting

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

Problem	Possible causes	Possible solutions
Touchscreen does not operate as expected	Touch lock is enabled	Use the Trackpad to turn off the touch lock on the home screen.
	Screen is not being operated with bare fingers, for example gloves are being worn	Bare fingers must make contact with the screen for correct operation. Alternatively you may use conductive gloves.
	Touchscreen requires calibration	Use the setup menus to calibrate the touchscreen.
	Saltwater deposits on the screen	Carefully clean and dry the screen in accordance with the instructions provided.

6.12 Miscellaneous troubleshooting

Miscellaneous problems and their possible causes and solutions are described here.

Problem	Possible causes	Possible solutions
Display behaves erratically: <ul style="list-style-type: none">• Frequent unexpected resets.• System crashes or other erratic behavior.	Intermittent problem with power to the display.	Check relevant fuses and breakers. Check that the power supply cable is sound and that all connections are tight and free from corrosion. Check that the power source is of the correct voltage and sufficient current.
	Software mismatch on system (upgrade required).	Go to www.raymarine.com and click on support for the latest software downloads.
	Corrupt data / other unknown issue.	Perform a factory reset. Important: This will result in the loss of any settings and data (such as waypoints) stored on the product. Save any important data to a memory card before resetting.

Chapter 7: Technical support

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- [7.1 Raymarine customer support on page 106](#)
- [7.2 Third-party support on page 107](#)

7.1 Raymarine customer support

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

Web support

Please visit the customer support area of our website at:

www.raymarine.com

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

Telephone and email support

In the USA:

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

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

- Tel: +44 (0)23 9271 4713
- Email: ukproduct.support@raymarine.com

Product information

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

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

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

Viewing product information

With the homescreen displayed:

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

7.2 Third-party support

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

Navionics

www.navionics.com

Sirius

www.sirius.com

Chapter 8: Technical specification

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- [8.1 Technical specification on page 110](#)

8.1 Technical specification

Physical specification

Dimensions	<ul style="list-style-type: none">Width: 233 mm (9.17 in.)Height (NOT including bracket): 145 mm (5.71 in.)Height (including bracket): 180 mm (7.09 in.)Depth (NOT including cables): 64 mm (2.52 in.)Depth (including cables): 150 mm (5.90 in.)
Weight (bare unit)	e7 <ul style="list-style-type: none">1.465 kg (3.23 lb.) e7D <ul style="list-style-type: none">1.550 kg (3.42 lb.)
Weight (boxed unit)	e7 <ul style="list-style-type: none">2.385 kg (5.26 lb.) e7D <ul style="list-style-type: none">2.423 kg (5.34 lb.)

Power specification

Nominal supply voltage	13.8 V dc
Operating voltage range	10.2 to 15.6 V dc

Fuse / Breakers	In-line fuse (fitted within power cable) <ul style="list-style-type: none">7 A. (Standard 20 mm glass fuse)
Power consumption (at full brightness)	13.2 W
LEN (Refer to Seatalk nd reference manual for further information).	1

Environmental specification

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

Display specification

Size	7 in.
Type	TFT backlit LED
Color depth	18-bit
Resolution	800 x 480 pixels (WVGA)
Viewing angle	<ul style="list-style-type: none">Left / Right: 70 degreesTop / Bottom: 70 / 50 degrees

Data connections

Wired connections

NMEA 0183	2x NMEA 0183 ports: <ul style="list-style-type: none">NMEA port 1: Input and output, 4800 / 9600 / 38400 baudNMEA port 2: Input only, 4800 / 9600 / 38400 baud
Network (SeaTalk ^{hs})	1 x SeaTalk ^{hs} port. 100 Mbits/s. RayNet type connection
SeaTalk ^{ng}	1 x SeaTalk ^{ng} connection

Wireless connections

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

Internal GPS specification

Channels	48
Hot start	< 1 second
Cold start	35 seconds to 2.5 minutes
Sensitivity	163 dBm Tracking
Satellite Based Aiding System (SBAS)	WAAS + EGNOS
Special features	Active Jamming Reduction
Operating frequency	1575.42MHz
Signal Acquisition	Automatic

Almanac Update	Automatic
Geodetic Datum	WGS-84, alternatives available through Raymarine displays.
Update Rate	1 second
Antenna	Patch
Accuracy	<ul style="list-style-type: none">Without Signal Acquisition: <= 15 metres 95% of the timeWith WAAS / EGNOS: <= 5 metres 95% of the time

Internal DSM sounder specification (“D” variant models only)

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

Video specification

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

Electronic chart specification

Embedded electronic charts	Navionics worldwide base map.
Compatible chart cards	<ul style="list-style-type: none">• Navionics Ready to Navigate• Navionics Silver• Navionics Gold• Navionics Gold+• Navionics Platinum• Navionics Platinum+• Navionics Fish'N Chip• Navionics Hotmaps <p>Refer to the Raymarine website (www.raymarine.com) for the latest list of supported chart cards.</p>

Conformance specification

Conformance	<ul style="list-style-type: none">• NMEA 2000 certification• WiFi Alliance certification• Bluetooth certification• Europe: 1995/5/EC• Australia and New Zealand: C-Tick, Compliance Level 2
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Chapter 9: Options and accessories

Chapter contents

- [9.1 Spares and accessories on page 114](#)

9.1 Spares and accessories

Optional accessories

Item	Part number	Notes
1 m (3.28 ft) RayNet to SeaTalk ^{hs} (RJ45) cable	A62360	
2 m (6.56 ft) RayNet to RayNet cable	A62361	
10 m (32.8 ft) RayNet to RayNet cable	A62362	
P48 sonar transducer	A102140	Transom mount.
P58 sonar transducer	A102138	Transom mount.
1 m (3.28 ft) Minn Kota transducer adaptor cable	A62363	Only for direct connection to "D" variant multifunction displays.
0.5 m (1.64 ft) transducer adaptor cable	E66066	For connecting any 600 watt DSM-compatible sonar transducer directly to a "D" variant multifunction display.

Spare parts

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

Item	Part number	Notes
1 m (3.28 ft) power and data cable	R62379	
Suncover	R62365	

Service spares

Service spares are only available to service dealers.

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

Appendix A NMEA 0183 sentences

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

Transmit

APB	Autopilot b
BWC	Bearing and distance to waypoint
BWR	Bearing and distance to waypoint rhumb line
DBT	Depth below transducer
DPT	Depth
MTW	Water temperature
RMB	Recommended minimum navigation information
RSD	Radar system data
TTM	Tracked target message
VHW	Water speed and heading
VLW	Distance travelled through the water
GGA	Global positioning system fix data
GLL	Geographic position latitude longitude
GSA	GPS DOP and active satellites
GSV	GPS satellites in view
RMA	Recommended minimum specific loran c data

RMC	Recommended minimum specific GPS transit data
VTG	Course over ground and ground speed
ZDA	Time and date
MWV	Wind speed and angle
RTE	Routes sentence
WPL	Waypoint location sentence

Receive

AAM	Waypoint arrival alarm sentence
DBT	Depth below transducer sentence
DPT	Depth sentence
DTM	Datum reference sentence
APB	Autopilot b sentence
BWC	Bearing and distance to waypoint sentence
BWR	Bearing and distance to waypoint rhumb line sentence
DSC	Digital selective calling information sentence
DSE	Distress sentence expansion
GGA	Global positioning system fix data sentence
	Geographic position loran c sentence GLC

GLL	Geographic position latitude longitude sentence
GSA	GPS DOP and active satellites sentence
GSV	GPS satellites in view sentence
HDG	Heading deviation and variation sentence
HDT	Heading true sentence
HDM	Heading magnetic sentence
MSK	MSK receiver interface sentence
MSS	MSK receive r signal status sentence
MTW	Water temperature sentence
WMV	Wind speed and angle sentence
RMA	Recommended minimum specific loran c data sentence
RMB	Recommended minimum navigation information sentence
RMC	Recommended minimum specific GPS transit data sentence
VHW	Water speed and heading sentence
VLW	Distance travelled through the water sentence
VTG	Course over ground and ground speed sentence
XTE	Cross track error measured sentence

ZDA	Time and date sentence
MDA	Meteorological composite sentence
GBS	GPS satellite fault detection data sentence
RTE	Routes sentence
WPL	Waypoint location sentence

Appendix B NMEA 2000 sentences

The display supports the following NMEA 2000 sentences. These are applicable to NMEA 2000, SeaTalk^{ng} and SeaTalk 2 protocols.

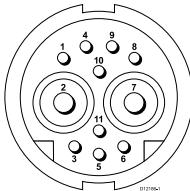
Message number	Message description	Transmit	Receive	Bridge
59392	ISO Acknowledgment	•	•	•
59904	ISO Request		•	
60928	ISO Address Claim	•	•	•
126208	NMEA - Acknowledge group function	•	•	•
126464	PGN List	•	•	•
126992	System time	•	•	•
126996	Product information	•	•	•
127237	Heading/Track Control		•	
127245	Rudder	•	•	•
127250	Vessel heading	•	•	•
127488	Engine parameters rapid update		•	
127489	Dynamic engine parameters		•	
127493	Dynamic transmission		•	
127498	Static engine parameters		•	
127505	Fluid level		•	
128259	Speed	•	•	•
128267	Water depth	•	•	•
128275	Distance log	•	•	•
129025	Position rapid update	•	•	•

Message number	Message description	Transmit	Receive	Bridge
129026	COG SOG rapid update	•	•	•
129029	GNSS position data	•	•	•
129033	Time and date	•	•	•
129038	AIS Class A Position Report		•	
129039	AIS Class B Position Report		•	
129040	AIS Class B Extended Position Report		•	
129044	Datum	•	•	•
129283	Cross track error	•	•	•
129284	Navigation data	•	•	•
129291	Set and drift rapid update	•	•	•
129301	Time to or from mark		•	
129539	NMEA 2000 GNSS DOPs message		•	
129540	GNSS Sats in view	•	•	•
129545	NMEA 2000 GNSS RAIM output message		•	
129550	GNSS differential correction receiver interface		•	
129551	GNSS differential correction receiver signal		•	
129793	AIS UTC and Date Report			•
129794	AIS Class A Static and Voyage Related Data			•
129801	AIS Addressed Safety Related Message			•
129802	AIS Safety Related Broadcast Message			•
130306	Wind data	•	•	•

Message number	Message description	Transmit	Receive	Bridge
130310	Environmental parameters	•	•	•
130311	Environmental parameters message		•	
130576	Small craft status		•	
130577	Direction data	•	•	•
130578	Vessel speed components		•	

Appendix C Connectors and pinouts

Power, data, and video connector



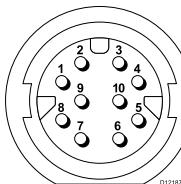
Item	Remarks
Identification	PWR / NMEA / Video
Connector type	11 pin twist-lock
Current source to network	No current sourced for external devices
Current sink from network	<ul style="list-style-type: none"> PSU: Main Power input. NMEA: No power required for interface. Video: No power required for interface.

Power, data and video cable cores and colors

Signal	Pin	AWG	Color
BATT+	2	16	Red
BATT-	7	16	Black
SCREEN	10	26	Black
NMEA1 TX+	8	26	Yellow
NMEA1 TX-	9	26	Brown

Signal	Pin	AWG	Color
NMEA1 RX+	1	26	White
NMEA1 RX-	4	26	Green
NMEA2 RX+	3	26	Orange / White
NMEA2 RX-	11	26	Orange / Green
VIDEO IN	6	RG179 coaxial	
VIDEO RTN	5	Screen	

Network connector



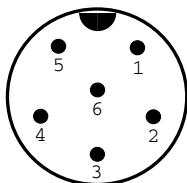
Item	Remarks
Identification	Network
Connector type	RJ45 (with suitable waterproofing)
Current source to network	No current sourced for external devices
Current sink from network	No power required for interface
Pin	Signal
1	Rx+
2	Rx-
3	Not connected

Pin	Signal
4	Not connected
5	Tx+
6	Tx-
7	Not connected
8	Not connected
9	Screen
10	Not connected

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

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

SeaTalk^{ng} connector



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

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